

# ***jw Electronics***

## **MTP-9 MIDI-to-Parallel Converter**

### **Installation and Operating Instructions**

#### ***Product Description***

The MTP-9 from jOmega Electronics is an electronic circuit module that can switch up to 128 logic-level outputs on or off under the control of signals received from a data source complying with the Musical Instrument Digital Interface (MIDI) standard. MIDI 'note on' and 'note off' messages are used to control the MTP-9's outputs in a relationship determined by an internally stored configuration map that can be re-programmed as required by the user.

In addition to directly switching outputs, the MTP-9 can be programmed to allocate up to 15 of its outputs as register outputs which latch on when triggered by the allocated note and are cleared on receipt of a register cancel (known as the 'declanche') note-on event. The MTP-9 also provides a tremulant function that repeatedly switches on and off any register outputs that are active and are required by the user to be modulated by the tremulant. The tremulant rate is adjustable over a wide range using a rotary control on the MTP-9 circuit board.

#### ***Installation***

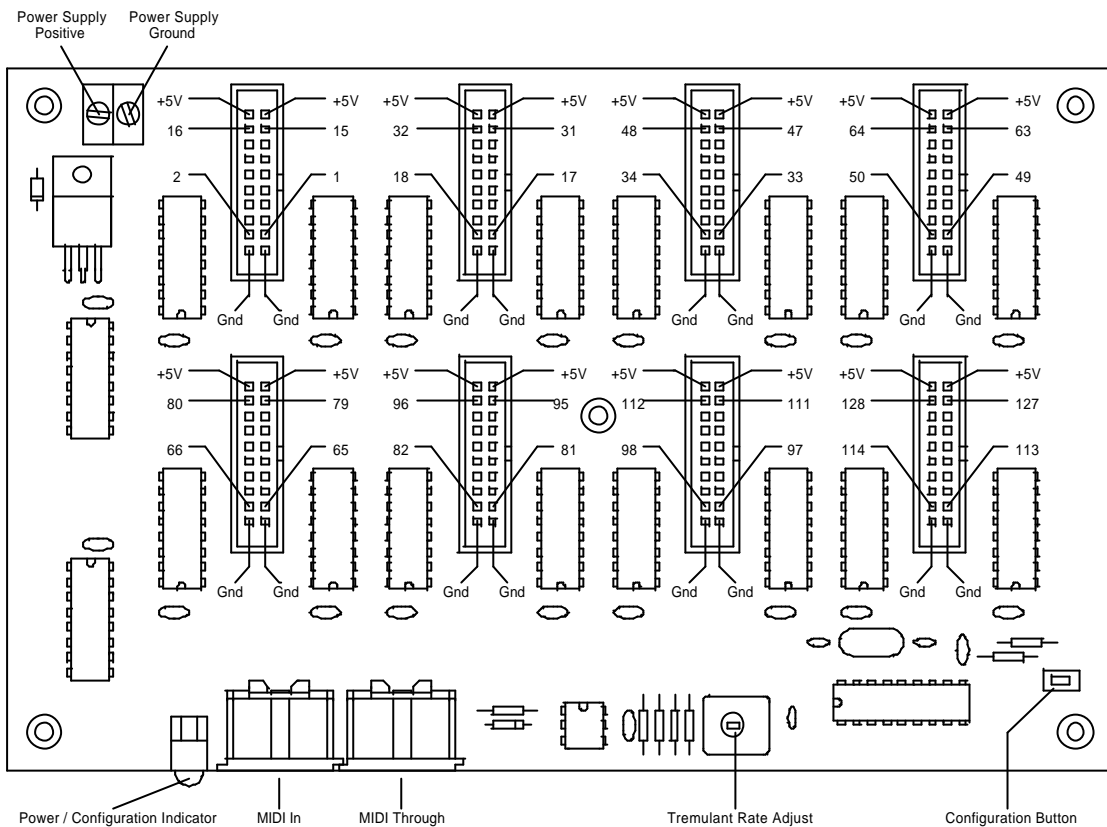
Carefully remove the MTP-9 circuit from its protective packaging, handling the board by its edges only. Five mounting holes of 3.2 mm diameter are provided on the circuit board to allow it to be fixed inside the instrument that it controls. Suitable methods of fixing include self-adhesive pillars and screws or bolts with insulating spacers. Whatever method is used, ensure that no metal can come into contact with any wiring tracks or components on the circuit board.

#### ***Connection***

The MIDI input to the MTP-9 is via the standard 5-pin DIN connector at the end of the board, nearest the power / configuration indicator LED. Signals received at this connector are passed to the adjacent MIDI Through connector allowing other MIDI equipment to be used simultaneously if required.

The note outputs are in groups of 16, each group being on a 20-pin connector on a 0.1" (2.54 mm) pitch suitable for connection by a plug-in IDC (insulation displacement connector) header and ribbon cable. Each 20-pin connector also has two pins connected to the Ground reference and two pins connected to the on-board 5V power supply. The circuit board layout illustration below shows the allocation of output numbers to the pins of the 20-pin connectors.

Power is supplied to the MTP-9 via the two screw terminals. The circuit has on-board voltage regulation and can use a smoothed DC supply in the range 8 to 35 Volts, with 9 to 12V being the optimum region. The power input is diode-protected against reverse polarity, but the circuit will only function when the polarity is correct.



## Operation

The MTP-9 is designed to be fitted as a permanent installation in a piece of equipment. Once installed, simply connecting the power to the unit will start its operation. Under normal operation, the LED near the MIDI input will be illuminated continuously whilst the power is on.

Note outputs will be activated under control of the MIDI transmitter connected to the MTP-9, according to the internal configuration map and register / tremulant allocation. Positive logic is used, so an output that is active produces a 5V level and an output that is de-active is pulled to supply ground. An output not defined as a register or the tremulant will be activated by a 'note on' event and deactivated by a 'note off' event corresponding to the note and channel mapped to that output.

An output that is defined as a register or tremulant will be activated by a 'note on' event addressed to that output. Once activated, a register or tremulant output will latch (stay active) even if a corresponding 'note off' event is received. To deactivate a register or tremulant output, a 'note on' event corresponding to the declanche note must be received. On receipt of the declanche signal, any registers or tremulant which do not correspond to notes being held at that time will be deactivated. If the 'note on' event which triggers a register or tremulant is still active (e.g. no corresponding 'note off' event yet received), then the declanche has no effect on that output. This feature allows registers to be kept active as required even if others are to be cancelled. The timing of any 'note off' events relating to the declanche note have no effect on register latch operation. The declanche note may be allocated to one of the 128 outputs but will have the same effect on the registers and tremulant whether it is mapped to an output or not.

When the tremulant is active, any registers which are currently active and also defined as being tremulant-modulated will be turned on and off repeatedly. The tremulant may be allocated to one of the 128 outputs but will have the same effect of modulating active registers whether it is mapped to an output or not. If mapped to an output, the tremulant output will modulate if it has been defined as being tremulant-modulated. The tremulant will latch and is cancelled by the declanche in the same way as the 15 registers. The tremulant rate is set by the position of the rotary adjuster control and can be set as desired using a small screwdriver.

### ***Setting the Configuration Map***

For each of its 128 outputs, the MTP-9 keeps a record of the MIDI channel number and MIDI note number that have together been assigned to control that output. MTP-9s are factory programmed with a configuration map corresponding to a rising chromatic scale on channel 1, starting at note number 0 and with no registers or tremulant allocated. If a different map is required, the unit must be placed into its configuration mode by holding down the Configuration button whilst the board power is being switched on.

Once in configuration mode, the power / configuration indicator will flash rapidly and output number 1 will be switched on. Upon receipt of a MIDI 'note on' event, the MTP-9 will assign the note and channel numbers just received to output 1 in the configuration map, turn off output 1 and turn on output 2. The channel and note numbers of the next 'note on' event received will be assigned to output 2, etc. This process will continue until 128 'note on' events have been received.

The next 15 'note on' events received will define the register outputs. Any notes received in this phase that match both the channel and note number of an output defined in the previous 128 notes will cause that output to be allocated as a register output. If the velocity of the note received in the register definition phase is greater than or equal to the mid-level (64 on a scale of 1 to 127), then the register that it defines will be affected by the tremulant. If the velocity is less than 64, then the tremulant will not modulate that register output. If, during the reception of the 15 register notes, a note is received that does not match with an earlier defined output then that register note is disregarded since it cannot relate to an output.

The next 'note on' event defines the note and channel used to control the tremulant function. If this matches both the channel and note number of an output defined in the first 128 notes, then the corresponding output will be allocated as the tremulant output. When an output is allocated, whether it is modulated or not depends on the velocity of the tremulant note received during configuration - a velocity of 64 or greater enables modulation whereas a velocity below 64 disables it. If the note and channel given do not match any of the first 128 notes, then no output will be allocated, but the tremulant function will still be controlled by that note.

The final 'note on' event defines the note and channel to use for the register declanche. If it matches both the channel and note number of an output defined in the first 128 notes, then it will operate in conjunction with that output. It is not necessary to allocate the declanche to an output as it will always be functional on whatever note and channel are defined for it.

After receiving the full 145 notes of the configuration sequence, the power / configuration indicator will be briefly extinguished whilst the circuit carries out internal functions to store the configuration data. The indicator will then be lit continuously signifying the end of the configuration process and return to the normal operating mode.

A time interval of at least 20 milliseconds must be allowed between 'note on' events, which corresponds to a maximum tempo of 3000 bpm when using crotchet-length notes.

## Electrical Specifications

Supply voltage: 8 to 35 V DC.

Supply current: 15 mA typical in addition to current drawn by output loads.

Power-up: Initial supply voltage rise rate must be greater than 0.05 V/ms for reliable starting.

Note outputs: 0 – 5 V logic, 5 mA source or sink maximum per output.

5V Outputs: 350 mA maximum for all outputs in total.

Tremulant: Modulation rate adjustable between 2 and 14 Hz.

## Important Note

Since the MTP-9 is intended to form part of an instrument system, these instructions are to be considered as being for guidance only. It is assumed that the installer has a level of competence appropriate to the system being constructed. j-Omega Electronics will take no responsibility for any accident or damage to personnel or property caused by the mis-use of any of its products. It is the responsibility of the installer to ensure that any system incorporating this unit conforms to the relevant laws concerning electromagnetic compatibility (EMC) and/or electrical safety.

## MIDI Implementation Chart

MIDI-to-Parallel Converter  
Model MTP-9

Date: 2th July 2010  
Version: 1

| Function...       |  | Transmitted           | Recognised                        | Remarks                            |
|-------------------|--|-----------------------|-----------------------------------|------------------------------------|
| Basic Channel     | Default Changed  | X<br>X                | 1-16<br>X                         | Set according to configuration map |
| Mode              | Default Messages Altered   | X<br>X<br>X           | Mode 3<br>X<br>X                  |                                    |
| Note Number:      | True voice   | X<br>X                | 0-127<br>*                        | Set according to configuration map |
| Velocity          | Note ON<br>Note OFF  | X<br>X                | O v=1-127<br>X                    |                                    |
| After Touch       | Keys<br>Ch's   | X<br>X                | X<br>X                            |                                    |
| Pitch Bender      |  | X                     | X                                 |                                    |
| Control Change    |  | X                     | X                                 |                                    |
| Prog Change:      | True #   | X<br>X                | X<br>X                            |                                    |
| System Exclusive  |  | X                     | X                                 |                                    |
| System Common:    | Song Pos<br>Song Sel<br>Tune   | X<br>X<br>X           | X<br>X<br>X                       |                                    |
| System Real Time: | Clock Commands   | X<br>X                | X<br>X                            |                                    |
| Aux Messages:     | Local ON/OFF<br>All Notes OFF<br>All Sounds OFF<br>Active Sense<br>Reset | X<br>X<br>X<br>X<br>X | X<br>O (120)<br>O (123)<br>O<br>O |                                    |
| Notes             |  |                       |                                   |                                    |

Mode 1: OMNI ON, POLY  
Mode 3: OMNI OFF, POLY

Mode 2: OMNI ON, MONO  
Mode 4: OMNI OFF, MONO

O : Yes  
X : No

Issue 1  
2 July, 2010.

For the latest product information and support, please visit: [www.j-omega.co.uk](http://www.j-omega.co.uk)