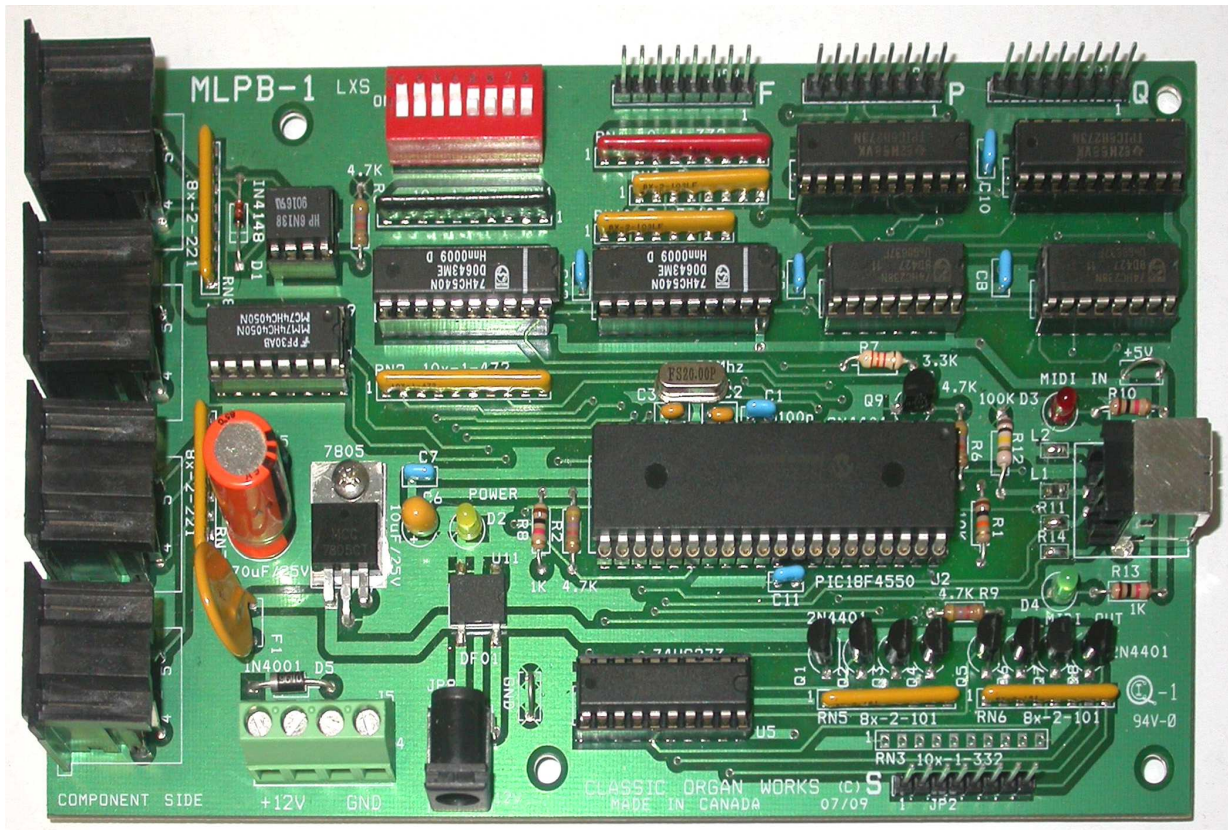# MIDI LIGHTED PUSH-BUTTON CONTROL BOARD
MLPB-1

INSTALLATION

Description

    The MLPB-1 MIDI Lighted Push-button Control board is a stand-alone unit that can control up to 128 push-buttons with LEDs as well as a separate MIDI device. The LEDs would normally be integral with the push-buttons but could be wired separately. The MLPB-1 generates a MIDI signal from the push-button switches to control an organ system, such as Hauptwerk, via a computer connected to the USB receptacle, although it could be used to control almost anything via MIDI note-on (Patch) messages. Each push-button switch has a momentary-on action and a message is sent on one MIDI channel only when pushed.

    The MLPB-1 also uses an input from the USB source to drive the push-button LEDs from whatever the switches are controlling, thus giving fool-proof indication that something happened.

    There are two ways that the MLPB-1 can be used. One uses the various headers to connect to lighted push-buttons as above. The other is via the MIDI connectors from a device such as a pedalboard scanner (Classic type MKSC-4A). Thus, the board can control a pedalboard and stop push-buttons at the same time. The MIDI connections obviate the use of a separate MIDI hub interface.

    A typical push-button board mounts up to eight push-button switches in one group with a common Enable line. Each switch has a series diode and is connected via the common line to an associated LED. Every switch/LED pair is connected in parallel with the corresponding pair in the next group of eight and the LEDs are separate from the switches. Sixteen such groups of eight are possible for 128 push-buttons.

The sequential switch addressing uses 16 wires that route the group active-low enable lines to the push-button groups. Thus, up to 128 Note-On messages can be sent on one MIDI channel. The same Enable lines also act as the low signal to turn on whichever LEDs in that group are then receiving an active-high drive from the controller.

The 128 LEDs associated with the switches are driven by the MLPB-1 using data returned from the controlled system by a MIDI signal on the same channel as the switches. The LEDs use the same MIDI control codes as the switches but are maintained on by the controlled equipment. While they are normally controlled individually by note-on/note-off messages, they can also be turned off collectively.

MOUNTING

Four mounting holes are provided for #4 screws. Short spacers should be used to space the board up from the mounting surface. The board should be mounted reasonably close to the first push-button group board (at the left side of the organ console) but this is not essential. It is not necessary to provide ventilation as the board consumes little power.

CONNECTIONS

Power

No power is necessary other than the console switched power supply. This may be from a 7.5V to 12V adaptor (of either polarity) or via the terminal block (polarity as indicated). The board includes a resettable fuse.

Push-button Data

Wire the 8-pin Switch Data outputs from the MLPB-1 board connector 'F' to the appropriate switches (via diodes) on all push-button groups. These will join together 1, 9, 17, 25… etc., 2, 10, 18, 26… etc., in each group. Suitable connectors are the 'Through' variety of MAS-CONs that will accept stranded wire without the need for stripping off the insulation. See Wiring schematic MLPB-1-W1.Sch.

Push-button LED Drive

Like-wise, wire the corresponding LEDs to Connector 'S'. No diodes are necessary because the LEDs act as diodes.

Push-button Groups

Connect each group common (1-8, 9-16, etc.) to the appropriate pin on Connector 'P' (and 'Q' if more than eight groups).

MIDI

Connect the MIDI OUT to the MIDI IN of the device being controlled (e.g., an MKSC-4A) using a standard 5-pin DIN MIDI cable. There are two independent MIDI OUT connectors. The second one can be used to pass the MIDI data from the push-button switches to some other piece of equipment.

Similarly connect the MIDI OUT of the device being controlled to the MIDI IN of the MLPB-1. The MIDI THROUGH connector has a buffered duplicate of this signal if it needs to be passed on to other equipment.

USB

This provides the connection to a computer or other USB-controlled hardware that can be Linux, MacIntosh or Windows-based. The connector is a standard USB type-'B' receptacle.

Two LEDs near to the USB connector normally pulse on to show message activity. The green one indicates the outgoing path while the red one monitors the incoming data.

SET-UP

There is no set-up procedure other than setting for the MIDI channel, and a particular version of Hauptwerk. On the eight-position DIP-Switch, switches 1-4 select the MIDI Channel as follows:

Channel (Binary)	Channel Number	Switch-4	Switch-3	Switch-2	Switch-1	Remarks
0	1	Off	Off	Off	Off	Default
1	2	Off	Off	Off	**On**	
2	3	Off	Off	**On**	Off	
3	4	Off	Off	**On**	**On**	
4	5	Off	**On**	Off	Off	
5	6	Off	**On**	Off	**On**	
6	7	Off	**On**	**On**	Off	
7	8	Off	**On**	**On**	**On**	
8	9	**On**	Off	Off	Off	
9	10	**On**	Off	Off	**On**	
10	11	**On**	Off	**On**	Off	
11	12	**On**	Off	**On**	**On**	
12	13	**On**	**On**	Off	Off	
13	14	**On**	**On**	Off	**On**	
14	15	**On**	**On**	**On**	Off	
15	16	**On**	**On**	**On**	**On**	

Note that the required number is greater by one than the actual MIDI channel binary code (as indicated by the switches). Switch-1 is nearest to the MIDI connectors.

Switch-5 and 6 are used to adjust the brightness of the LEDs. With both off, the brightness will be about 10% of maximum. Setting Sw5 on increases the brightness to 20% of max. Sw6 (alone) = 50%, and both Sw5&6 on sets the brightness to maximum. The remaining two switches do nothing at this time and are reserved for future use.

A yellow 'Power' LED indicates that the board has power. The red and green LEDs near the USB connector flash when MIDI messages are sent (MIDI-Out) or received (MIDI-In).

MIDI Messages:

Output:
Any Switch-On gives (Bn 51 xx), where 'xx' is the tab number from 0 to 127 and 'n' is the Channel (0 to 15). Switch-Off message is Bn 50 xx. Hauptwerk must be configured to respond to these messages, and send out corresponding messages when stops or pistons are activated by Hauptwerk (touchscreen or other hardware i.e. pistons or toe studs).

Input:
LED-On is (Bn 51 xx), where 'xx' is the LED number from 0 to 127 and 'n' is the Channel (0 to 15).
LED-Off is (Bn 50 xx). All LEDs Off uses (Bn 79 00). FF will reboot the processor on the MLPB and turn off all LEDs.
You can observe these messages on a computer by using MIDI Medic, a free software program for Windows, downloadable from the Classic Organ Works website.