

ORGAN HARDWARE BUILDING

ORGANBUILDER'S MANUAL

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SUMMARY :

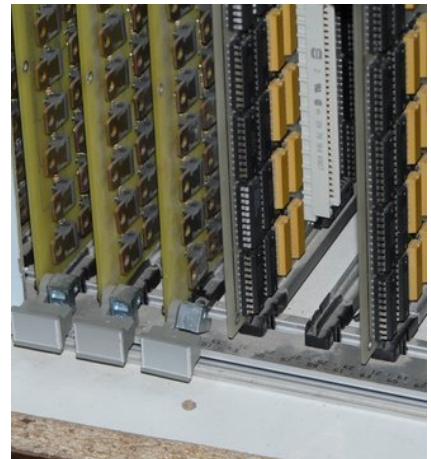
This brochure is dedicated to Organbuilders who want to use our hardware boards. It is the same process for a small or large organ. You need :

1. A 19' VME Rack
2. A bus backplane
3. An input board for knobs and pistons.
4. An opto-isolated interface
5. Output boards
6. A low cost PC for example Mini ITX Intel
7. Power supply 15V & 7,5V

1. 19' VME Rack :

The VME rack is a classic one, with double 64 Pins 41612 type connectors.

Put at the rear the backplane.



2. A bus backplane :

Normally, a standard 19' rack can receive up to 14 output boards : The 1x64 output boards, or the 4x64 output boards, which is largely sufficient for any sizes organs. Even with some unit style windchests. Of course, several 19' Rack can be used.

3. INPUTS BOARDS :

Our standard input board can receive up to 8 keyboards, largely sufficient for any pipe organ. Additional input board can be added, using the IN and OUT DB25 plugs.

MIDI output can also be used.

In this case, use the MIDI version of the input board.

All our input boards have 8 DB15 plugs, which must be connected to our keyboard interfaces.

Direct MIDI keyboards :

Such keyboards are currently available, even in the classic Pipe Organ style, with MIDI or MIDI/USB outputs.

In this case, use a MIDI to USB interface, and plug directly to the PC.

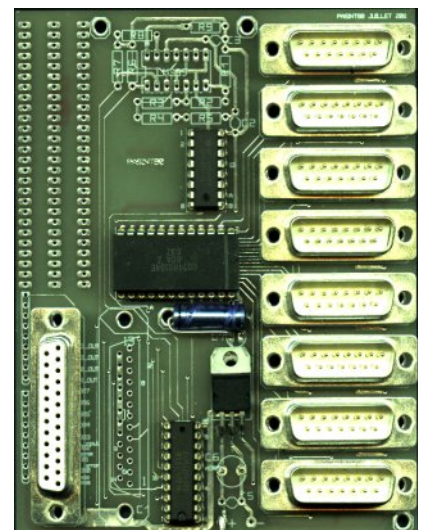
Our ORGAN CONTROLLER software supports also MIDI/USB inputs.

VERSION 1 :

- 8 keyboards in input.
- Output on parallel port

VERSION 2 :

- 8 keyboards in input



- MIDI outputs (may be connected to USB connectors via a cheap MIDI<->USB interface)

Several input boards can be used. And more keyboards can be added, which can share as you want some or all registers of the pipe you control.

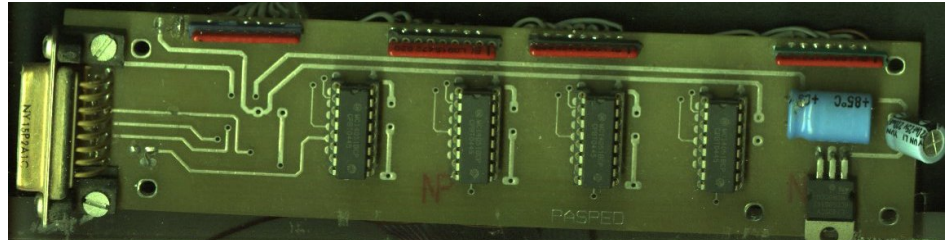
You can also use direct USB/MIDI keyboards.

VERSION 3 :

64 Input boards can be also directly connected to the input board, on one of the 8 inputs.

VERSION 4 :

A second model of 64 input board is also available, directly connected to the following interface boards. Opto-isolated thanks to the parallel interface board. Active “on” level is detected by a low level (ground) 0V in input. All inputs are clamped to VCC : +5V.

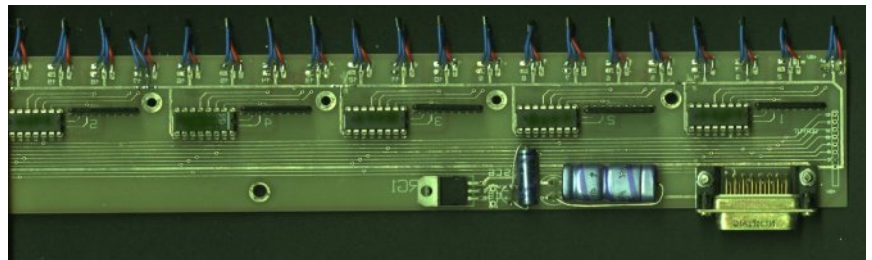


This board can be used as input for Pistons or classic Drawstops.

KEYBOARDS INTERFACE :

Input boards can be connected to electronic bars, which are composed of 2 sets of 32 inputs. Other connections are also possible using the version 4 interface, with classic contacts or opto-electronic sensors. Our keyboard interface board can receive one or two sensors, for detecting the “on” or “off” key position.

Velocity can be sent with the input board in MIDI version.



Of course, our keyboards interface can receive indifferently :
Digital Hall magnetic sensors

4. OPTO ISOLATED PARALLEL INTERFACE BOARD :

This board receives output information from the organ controller running on the PC, via a standard parallel port. ¹

It isolates the PC from the power output boards, thanks to an opto-electronic interface.

Outputs a demultiplexed parallel bus, allowing parallel 8 bit access to magnet valves.



¹ Don't think that parallel port is no longer available on PC's : Even brand new, cheap and small but powerfull MINI-ITX PC's are on the shelves. And classic desktops can also receive parallel port interface on their PCI bus.

5. OUTPUT POWER BOARDS :

Our 64 or 4x64 boards can be plugged to the PC, via the standard PC parallel port. Addresses are defined on the “options.wri” file. Power supply about 7,5V, via a 7805 regulator.

VERSION 1 :

- 64 power outputs.
Each of these outputs can drive up to 7 Amps
Discrete Darlingtons are soldered on the boards.
For heavy duty outputs, drawstops, and so on.

VERSION 2 :

- 4x64 power outputs with 4 x 64 pins connectors
- CI integrated Darlingtons can be put on the board, or soldered directly on the magnets.

These boards can be placed on a standard 19' Rack, with the opto-isolated interface board, connected to the PC. 15 boards can be easily placed on a rack, allowing direct control of 60 independent unit registers. Of course, several racks can be driven in parallel for unlimited stop number.

Of course, this board can also drive register windchest divisions, or several registers in parallel.



Outputs : Active : 0V. Magnets common to +15V.

6. PC to be used :

Any desktop PC can be used for controlling these boards. Add-on parallel boards can be added, with even dual parallel ports. Very cheap PC such as MINI ITX PC's can be used. Several screens and touch screens can also be used. All are supported by our “**ORGAN CONTROLLER SOFTWARE**”.

Boot duration process is less that 30s. Of course, one must load only a WINDOWS system without any add-in exe files.

It's the only constraint for the use of WINDOWS/PC based software. But really speaking, when we are switching “on” a classic organ, how much time do we spent for selecting our scores, waiting for the blower, switch the lights, and so on ?



8. POWER SUPPLIES :

Power supply for the RACK : 7,5V output. Can be done with a simple toric transformer (2*6V~), a diode bridge, and a condenser (1000µF is sufficient).

Power supply for the Magnets : 15V. can be built with a 2*12V transformer, a diode bridge 40A, and a condenser (40000 μ F is sufficient). Easily computed, knowing the supply current of all the magnets. $P = \text{sum}(\text{all magnets currents}) * 15V$.

Opto-electronic interface : must be supplied by a simple DC 7,5V or 5V supply. (if connected after the 7408 regulator).

NOTA : The 7,5V power supply can be replaced by the power 15V supply.

TO CONCLUDE :

That's all !

With this electronic board set, one can build organs any sizes.

You can use also “**ORGAN DESIGNER SOFTWARE**” for windchest design and automated machine tool drilling, and “**ORGAN CONTROLLER SOFTWARE**” for controlling the input and output boards.

All these sets can be driven remotely, via a telecommunication line, or a cheap, long distance dual plug USB to Ethernet interface. (see our website : <http://pascal.leray.free.fr>).

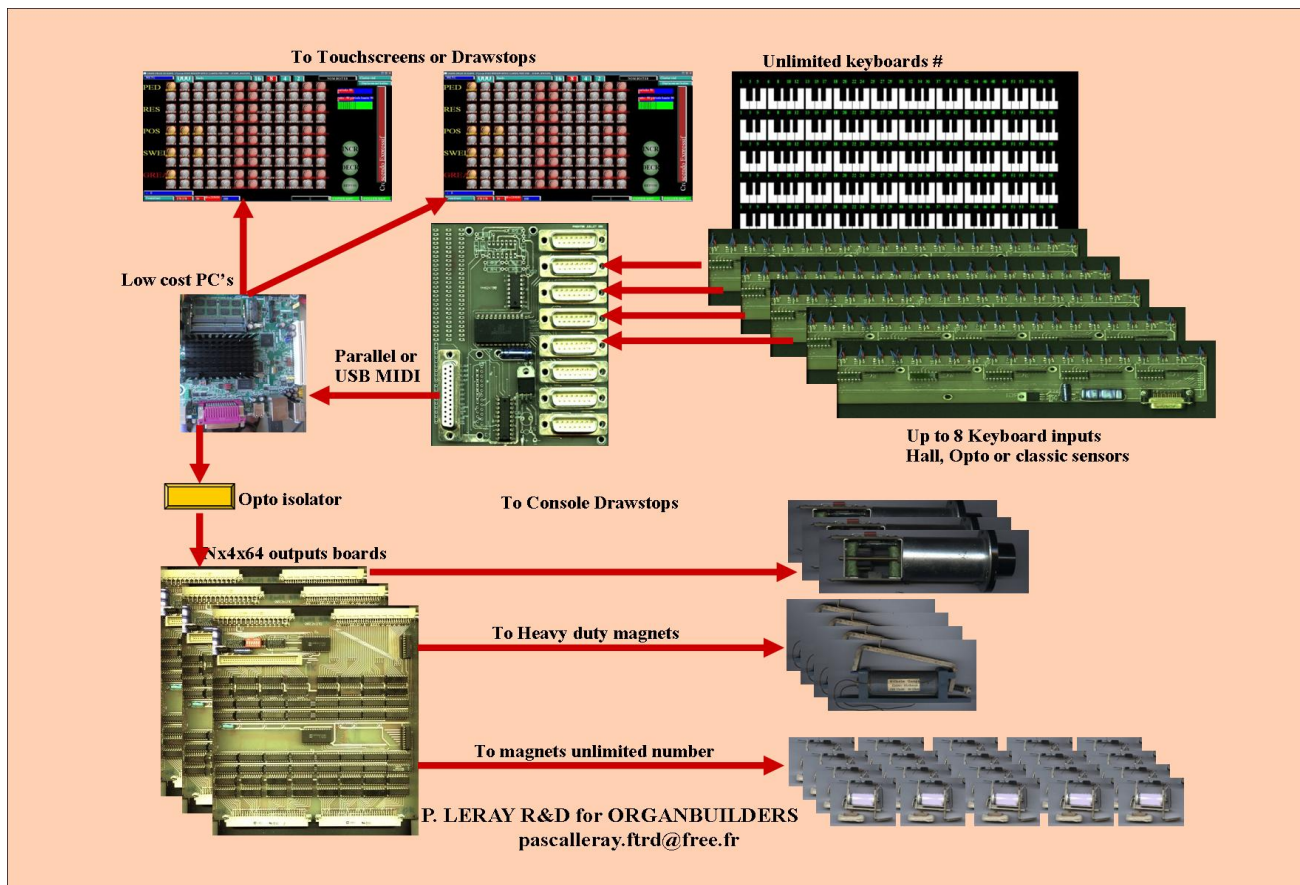
Our **ORGAN CONTROLLER SOFTWARE** can fit any requirements, and can be easily customized. Please ask : pascalleray.frd@free.fr

It can be adapted to touchscreens, but also for drawstops controls. Any existing or new, small or large pipe organ (any size) can be driven by our hardware and software modules.

ADVANTAGES :

Advantages # is huge:

- You become hardware independent, given the enormous PC offering worldwide.
- Memory extensions, disks, screens are very cost effective.
- Unlimited registration number.
- The PC world is very cost effective, due to the number of competitors.
- PC boards are using classical IC components, such as 74541, 74574, which are always available worldwide.
- These component never fail.
- Use a battery based inverter, and you'll become independent of any overvoltage.
- **SOFTWARE FLEXIBILITY : thanks to ORGAN CONTROLLER, many features are now available WITHOUT ADDITIONAL HARDWARE:**
 - Transposer
 - MIDI inputs and outputs
 - Displayed registration number.
 - Tremulant : variable frequency, for each register.
 - Pedal split
 - Multiple registration set per organist, defined as PC files.
 - Expressive sensitive keyboard keys.
 - Envelope curve.
 - Flexible drawstops display
 - Real drawstops and pistons can also be used.
 - Copy – Paste of registrations
 - Name for registrations.
 - Unlimited copulas.
 - All registers can be actuated from any keyboards
 - Independently of other keyboards : for example a trumpet can be actuated at the pedal,
 - Each keyboard can be defined with the stops you want. (can be defined by organbuilders or organists).
 - Mixturs can be defined by text files.
 - All stops can be actuated in 16', 8', 4' 2' feet and even tierce, quint, and so on.
 - Reed Mixturs can also be programmed, thanks to a simple text file. (see below).
- All these features are defined by our software, even on off or pistons stops.
- Our output boards can supply any continuous current, up to 10 Ohms charge. Whether darlington's are on board or on the magnets.



GENERAL CABLING SCHEMAS

9. HOW TO TEST or to INSTALL A COMPLETE HARDWARE SOFTWARE SYSTEM

Parts requested :

- A Mini-Itx PC type ATOM 525 with parallel port interface
- A disc
- Memory : 4GO
- A board 4x64 outputs
- An opto isolator.
- A USB keyboard (alone or multiple)

WIRING :

- Connect the PC to the USB/MIDI keyboards
- Connect the PC parallel port to the parallel interface
- Wire the magnets : For power magnets you have 2 solutions :
 - Whether use the 4x64 boards with 2803 Darlington or :
 - Use the 1x64 board with dirlingtons soldered on-board or :
 - Use a 4x64 board with resistors arrays and wire a BDX56 on all the magnets.²
- (Needs a + 15V, 0V, signal wire.)

² Upon request a more compact darlington board can be provided.

SOFTWARE :

Request us to configure a 2,5" PC Disc. Disc is returned with :

Installed Windows XP

Installed driver allowing the parallel port access.

Installed organ controller software following your requests.

Installed grand orgue virtual stops software, which may run in parallel.

For demo versions, the configured disc can be sent for free, for a dedicated configuration version.

10. ANNEX 1 : Options.wri file (example)

Here is an example of how register addresses are simply defined for each register. The optional name gives the type of the stop : i.e. Flute, Reed. The character at the end of the line gives the keyboard shortcuts.

```
PORT_BASE 378
PORT_BASE_HALL 378
SCREENS 2
STOPS 24
BOURDON ;FF;BOARD1X64;FLUTE
FLUTE 4 ;F7;BOARD1X64;FLUTE
FLUTE 8 ;CF;BOARD1X64;FLUTE
MONTRE ;EF;BOARD1X64;PRINCIPAL
DULCIANE ;C7;BOARD1X64;FLUTE
NAZARD ;D7;BOARD1X64;FLUTE
SOUBASSE ;7F;BOARD1X64;FLUTE
PRESTANT ;27;BOARD1X64;PRINCIPAL
QUINTATON ;3F;BOARD1X64;FLUTE
DOUBLETTE ;2F;BOARD1X64;FLUTE
REGALE ;AF;BOARD1X64;REED
HAUTBOIS ;B7;BOARD1X64;REED
TROMPETTE ;E7;BOARD1X64;REED
VOX HUMANA ;DF;BOARD1X64;REED
FLUTE_HARM ;4F;BOARD4X64;FLUTE
BOURDON4 ;A7;BOARD4X64;FLUTE
GAMBE ;BF;BOARD4X64;FLUTE
CORNET ;00;BOARD4X64;FLUTE
PLEINJEU ;00;BOARD4X64;MIXTUR
FOURNITURE ;87;BOARD4X64;MIXTUR
CROMORNE ;0F;BOARD4X64;REED
VCELESTE ;07;BOARD4X64;FLUTE
TROMPETTE4 ;37;BOARD4X64;REED;T
TIERCE ;47;BOARD4X64;PRINCIPAL;t
```

ANNEX 1 : MIXTUR EXAMPLE :

VIRTUAL REGISTER EXAMPLE

fourniture dax 4 rank n°1 (keyboard GO)

" l= LARIGOT " " p= PRESTANT4 " M=MONTRE

```
1 32 M 37 M 44 M
2 33 M 38 M 45 M
3 34 M 39 M 46 M
4 35 M 40 M 47 M
5 36 M 41 M 48 M
6 37 M 42 M 49 M
7 38 M 43 M 50 M
8 39 M 44 M 51 M
9 40 M 45 M 52 M
10 41 M 46 M 53 M
11 42 M 47 M 54 M
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12 43 M 48 M 55 M
13 37 M 44 M 49 M
14 38 M 45 M 50 M
15 39 M 46 M 51 M
16 40 M 47 M 52 M
17 41 M 48 M 53 M
18 42 M 49 M 54 M
19 43 M 50 M 55 M
20 44 M 51 M 56 M
21 45 M 52 M 57 M
22 46 M 53 M 58 M
23 47 M 54 M 59 M
24 48 M 55 M 60 M
25 49 M 56 M 61 M
26 50 M 57 M 62 M
27 51 M 58 M 63 M
28 47 M 52 M 59 M
29 48 M 53 M 60 M
30 49 M 54 M 61 M
31 50 M 55 M 62 M
32 51 M 56 M 63 M
33 52 M 57 M 64 M
34 53 M 58 M 65 M
35 54 M 59 M 66 M
36 55 M 60 M 67 M
37 56 M 61 M 68 M
38 57 M 62 M 69 M
39 58 M 63 M 70 M
40 52 M 59 M 64 M
41 53 M 60 M 65 M
42 54 M 61 M 66 M
43 55 M 62 M 67 M
44 56 M 63 M 68 M
45 57 M 64 M 69 M
46 58 M 65 M 70 M
47 59 M 66 M 71 M
48 60 M 67 M 72 M
49 61 M 68 M 73 M
50 62 M 69 M 74 M
51 63 M 70 M 75 M
52 64 M 71 M 76 M
53 65 M 72 M 77 M
54 66 M 73 M 78 M
55 67 M 74 M 79 M
56 68 M 75 M 80 M
END