SLOTEXPANDER
4&4
(c) PABLOTRONIC
(p) Sunrise for MSX

Tis expander was born because of an absolutely necessity for a new one.

Even if we can find several different expanders in the MSX-world, it was important to develop this one.

A few reasons for it:

Current models no longer available
Current model had no powerconnector
Current model had to less slots
Current models board was to large

That's what we wanted to have:

=>   Producable as many as we like
=>   Powersource either MSX or external powersupply
       (best installed in a PC-box)
=>   At least 8 slots. 4 subslots, 4 I/O slots
=>   Board should fit in a 19" housing
=>   Enabling or disabling for every single subslot
=>   If possible, all current and all new modules are working.

Because of all those facts, we developped a new product.

Because the function of a slotexpander is defined by Microsoft and ASCII in the MSX standard, there are nearly no liberties for a designer. That's why You can see some similarities wit other expanders. As a matter of fact, we checked all the known expandersif we can adapt then to our wishes. But it was not possible to do so.

Guide to operate

To write an operationguide for a piece of hardware like this seems to beexaggerated.But there are a few points to clarify

1 Attachement to the computer

Even if in MSX standard are two pins to protect the computer and the cartridge against disconnecting under power,they are ins most computers not connected. This means, it is absolutely required to power off the computer and the expander bevore they are connected or disconnected. That applies to all circumstances. So, keep extremely care to switch off computer and expander if You want to connect either parts together.

2. Connecting cartridges

It is possible to connect the cartidges the wrong way if the expander is not installed in a specialy designed housing. So keep care to install the cartridges so, that the borders of cartridges and expanderboard are even.

3 Switch on

The parts used in expander doesn't like it to receive datas before they are connected to a powersource. It may be gangerous for some parts if the expander is not powered on during the computer still works. So, our recommendation is: Everytime switch on the two hardwares together. You can do it either with a switchable multiple plug or by connecting the computer to the auxiliary powerplug installed in a PC-box powersupply.

4 Use

About the use and the working with this expander there is not much to write. Generaly, all cartridges working in a primary slot of MSX should be able to work also in a secondary slot of the expander.

But, keep care there are two different slots available on the expander. The four subslots are real childs from the sourceslot and the other four are only I/O slots. Normaly every cartridge containing a startable program has to be connected to a subslot. In the appendix You can find a list with all the cartridges we know and the prefered slot-position.

With four switches each subslot can be enabled or disabled. This may be usefull if You install a SCSI and a IDE harddiskinterface and You want to decide wich one has to be enabled and so, from wich one the MSX will boot. You can also decide wich of the four connected games has to start.

5. Connectors

In adition to the 8 slotconnectors You can find 4 possibilities to connect or to solder something.

Slotconnectors

Those are gouped to four. near the electronicpart of expander the four subslots are allocated. In the remaining four I/O slots You can connect Your cartridges without any order. Not so to the subslots. It may happen, some Cartridges don't work in every subslot in the sam good way. So You have to connect them in a order You have to find out. See also the appendix for help.

Powerconnector

This connector corresponds with the 12-pins powerconnector on a PC-systemboard. So You are able to dirctely connect the expander to a PC-powersupply.Please find the pinnumbering and how to connect in the appendix.

Powerjumper

Near the powerconnector You can find three jumperpositions. We did not solder jumpers or connectors to this position. With this jumpers jou can decide if You want so supply the expanders power from the MSX. If so, You have to solder jumpers to this positions.
In addition You have tho keep extremely care not to connect an external powersupply while the expander is supplied by MSX.

CAUTION: Neither the expander nor the MSX is able to sense if both powersupplys are connected. In case of error, the expander as well as the MSX may be damaged seriously.
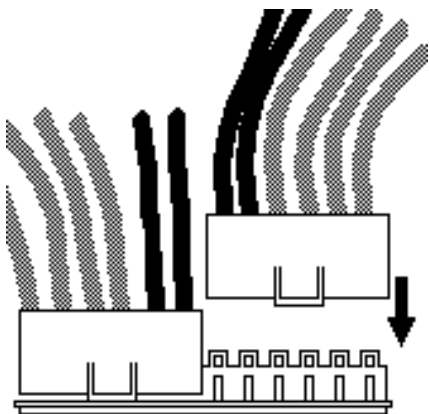
Slotswitch

This is a 8-pin DIL connector to wich You can connect jumpers as well as switches. The switches are wired via flat or ribboncables. The board is in this way designed not to be damaged if the switchconnector is connected upside down.

Featureconnector

Here You can find each a connector wich supplies Your (to be developped) slotdisplay or something else with +5 Volt and Ground. The remaining two pins are to connect a power on LED without additional resistors. The required resistor is already installed on board. Please find in appenxix the related informations.
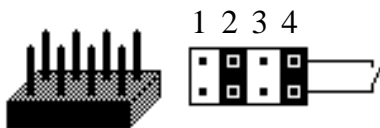
CONNECTORS & JUMPERS

Powerconnector

This is a 12 Pin male connector. Dual connectors from the PC-powersupply can fit in only one direction.
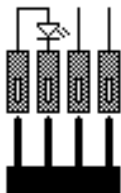Make sure to connect the two connectors with the two black wires at the center, as shown in the diagram.

Slotswitches

1 2 3 4

to this 8 pin DIL socket you can attach 4 on-off switches.(exemple position 4). It is also possible to put jumpers on as shown in position 2 in the diagram left.

LED 0 +5 Featureconnector

As You can see in the diagram left, You can attach a LED as a "power good" indicator to this connector. You do 'nt have to install an aditional resistor because it's already installed on the expanderboard. The remaining two pins supplies You with an free usable +5 Volt source. It is used to drive a (not yet developped) Slotmonitor or something else.
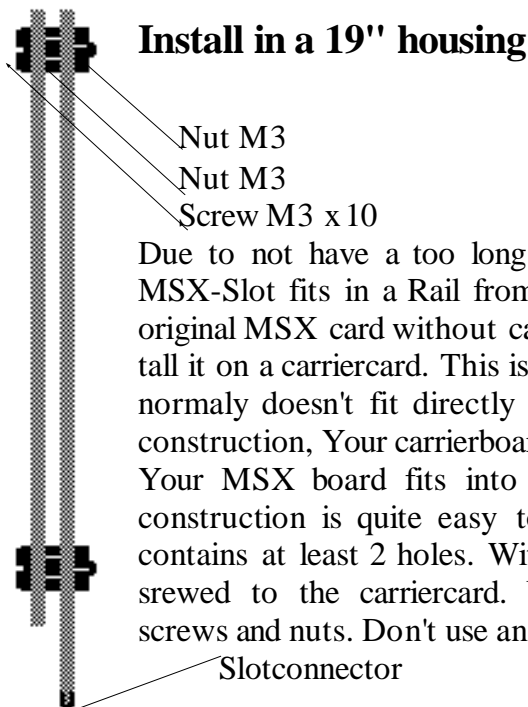
50 Pin Connectors

All 50 pin connectors(not only the slotconnectors) are following the standard MSX-Slot pinnumbering

Powerjumper

They are only!! used if power to the expander is supplied by the MSX powersupply

HARDWARE INSTALLATION

Install in a 19" housing

Nut M3
Nut M3
Screw M3 x 10

Due to not have a too long board, only every 2nd MSX-Slot fits in a Rail from a 19" box. To install a original MSX card without cartridge, You have to install it on a carriercard. This is because the MSX cards normaly doesn't fit directly into the rails. With this construction, Your carrierboard fits into the rails while Your MSX board fits into the Slotconnector. The construction is quite easy to do. Every MSX card contains at least 2 holes. With those two holes, it is srewed to the carriercard. Use only the descrbed screws and nuts. Don't use any shims.

Slotconnector

Carrier-Board
MSX-Board
Nuts

Keep care, the slotconnector is not centered. The smaller cutout has to be on the right, the larger on the left side.

To install MSX cards with cartridhehousing You only have to remove the rails from the 19" rack. Then all known MSX cartridges fits in the slots.

Fuse

Because the PC-powersupplies often are able to supply more than 10 Amperes on a 5 Volt line, we installed a fuse to the expander.
Since the max. powerconsumption of expander wit installed 8 cartridges following the MSX-specifications may not be more than 8x300 mA = 2400 mA and the expander itself uses a few Miliamperes a fuse of 2500 mA should be good. Even if the value of the fuse is not realy critical, it schoul not be higher than 3000 mA. If it is sure that the connected powersupply may not deliver more than 2500 mA You can work without a fuse. In this case, the tracks on the board are working as a kind of fuse. This results in burned out traks and so in a destroyed expander.

Warranty

Sunrise for MSX guarantees the errorfree function of these slotexpander during 12 month after purchasing. Sunrise for MSX decides in case of failure about repair or changing of the expander. Expanders with burned out tracks or any changements on the hardware are not covered by this warranty.

> **Prototypes of this expander were tested several hours, so we are sure, if used as designed, the expander works without any problems for itself or for attached units.**
> **So, Sunrise for MSX is not responsible for any defects caused through wrong connected cartridges or other misuse of the expander.**

CARTRIDGE - COMPATIBILITY

Name	Manufacturer	prefered slot
Moonsound	Sunrise Swiss	I/O
Graphix 9000	Sunrise Swiss	I/O
Music Module	Philips	I/O
IDE	H. Gilvat	Subslot 1 - 4
DOS 2	HSH	Subslot 1 - 4
Barcode-Reader	Philips	I/O
Eprommer		I/O oder Subslot 1 - 4

DETAILS SLOTEXPANDER PABLOTRONIC/SUNRISE SWISS

All 50 Pin Connectors

In	Sound In	49	50	-12 Volt	Out
Out	+5 Volt	47	48	+12 Volt	Out
Out	+5 Volt	45	46	SW1	
Out	0 Volt	43	44	SW2	
Out	0 Volt	41	42	Clock	Out
In/Out	Data 7	39	40	Data 6	In/Out
In/Out	Data 5	37	38	Data 4	In/Out
In/Out	Data 3	35	36	Data 2	In/Out
In/Out	Data 1	33	34	Data 0	In/Out
Out	Adresse 5	31	32	Adresse 4	Out
Out	Adresse 3	29	30	Adresse 2	Out
Out	Adresse 1	27	28	Adresse 0	Out
Out	Adresse 14	25	26	Adresse 13	Out
Out	Adresse 12	23	24	Adresse 8	Out
Out	Adresse 7	21	22	Adresse 6	Out
Out	Adresse 11	19	20	Adresse 10	Out
Out	Adresse 9	17	18	Adresse 15	Out
Out	/Reset	15	16	Reserve	
Out	/Write	13	14	/Read	Out
Out	/IO Request	11	12	/M-Request	Out
Out	/M1	9	10	/Busdir	IN
In	/Wait	7	8	/int	In
In	Reserve	5	6	/Refresh	Out
Out	/CS12	3	4	/Sltsl	Out
Out	/CS1	1	2	/CS2	Out

Powerconnector

1	+5 Volt
2	+5 Volt
3	+5 Volt
4	NC
5	0 Volt
6	0 Volt
7	0 Volt
8	0 Volt
9	-12 Volt
10	+12 Volt
11	NC
12	NC

Slot-Enable connector

Slot 4 In	1	2	Slot 4 Out
Slot 3 In	3	4	Slot 3 Out
Slot 2 In	5	6	Slot 2 Out
Slot1 In	7	8	Slot 1 Out

Featureconnector

1	+ LED
2	0 LED
3	+5 Volt
4	0 volt

All Jumpers

JMP01	On +5 Volt if Power will be supplied by MSX Powersupply
JMP02	Not in use
JMO03	On +12 Volt if Power will be supplied by MSX Powersupply
JMP04	On -12 Volt if Power will be supplied by MSX Powersupply
JKP05	On if installed without Subslots 2, 3, 4