Expansionport Switcher Add-On Board

Purpose:

The Expansionport Switcher is an add-on board to more or less common cartridge extender boards such as CMD EX3. It provides the ability to COMPLETELY disable an attached cartridge. This prevents power drainage from signal, data and address lines and allows for sharper signal levels. In case you have an Easyflash Cartridge, try to connect it (alone) to the CMD EX3 or similar and disable the +5V (both) only. Now start the C64 and be surprised.

The Expansionport Switcher add-on board has been designed about 20 years ago and has been in use since then (you might want to check out the "prototype" photo in the gallery at **http://www.telecomm.at/c64.html)**. A variant of it has also been published in the 64er magazine in the early 90s. Unfortunately some details have been changed so that the switcher has lost some features.

Notes:

Essentially the switcher is nothing else than a simple straight through connection of all pins switched by using a bank of HCT4066 chips. Note the different setup (HCT125) for the EXROM and GAME signal.

Another important fact concerns the use of the GND lines Z,A,22,1: Line 22 (male connector) has been used as a SELECT line. In OFF state it is connected to GND, in ON state it is connected to +5V via a pullup resistor. This setup is used by cartridge expanders like mine (which has been adopted by some people). By including a manual switch on the Expansionport Switcher, it can be used with other expanders such as the CMD EX3 as well. So it is essential, that pin 22 is NOT connected through and is kept isolated from the other GND pins Z,A,1. Only on the female side of the 44-pin connector pin 22 should be connected to pins Z,A,1 (GND).
All of this is shown on the schematics in the next pages. Please note, that we did not duplicate the entire bank of HCT4066 chips as this would heavily clutter the image. Please refer to the list at the end which better explains the association of lines and chips.

A standard C64 setup allows for 300mA of excessive power to be used for expansion port and I/O. Running more Expansionport Switcher units hooked to the common +5V driven by the C64 might result in problems. Either use a stronger power supply such as the one for the C128 (+1A for 5V, a solution recommended for CMD SuperCPU as well as REUs) or adapt your cartridge extender to use an external power supply. We followed the second approach and it has proven itself a successful solution for more than 20 years. It might also be useful to dedicate one +5V pin of the 44-pin connector (male, input side) to the Expansionport switcher and reserve the other for use with the cartridge plugged into the 44-pin female (output) connector. At the output connector pins 2 and 3 should be connected to supply +5V on both pins. By seperating the pins this way it is very easy to adapt a cartridge extender such as the CMD EX3 to supply external power to the Expansionport Switcher hardware while C64 power is reserved for the active cartridge. As CMD EX3 features seperate +5V dip switches for pin 2 and 3, you're in full control of the power supplied to the Expansionport Switcher add-on board and the connected cartridge.

Physical dimensions:

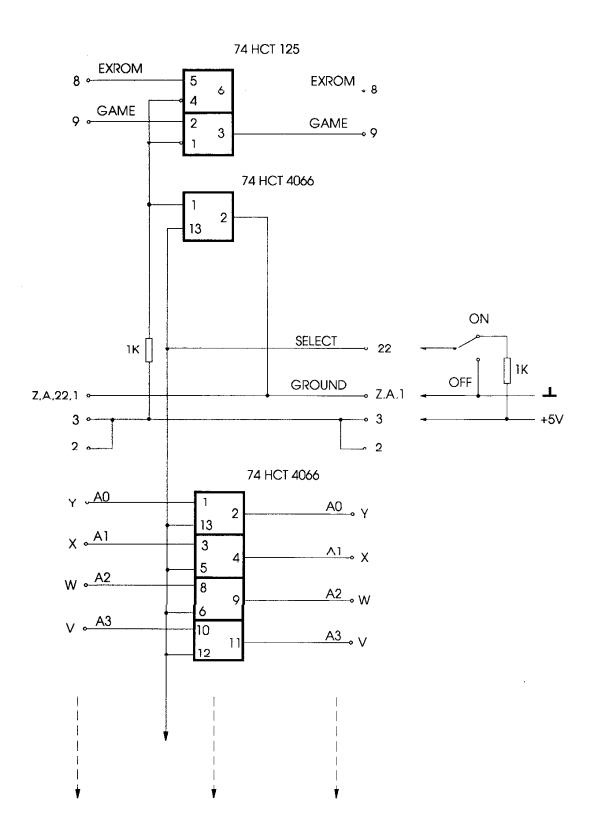The Expansionport Switcher Add-On Board should not exceed
- 2.5cm to the left (measured from the leftmost pin of the 44-pin connector)
- 5.0cm to the right (measured from the rightmost pin of the 44-pin connector)
- 7.0cm in height

Furthermore the male and female 44-pin connectors should be vertically aligned. Otherwise some expanders would be knocked out due to physical limitations.

"Call of Duty":

We decided to place the schematics in the internet, as some people showed high interest in a printed circuit board. It is also common, that more than one board is requested, e.g. for combining the 1541 Ultimate with IDE64. In case someone is interested in converting the schematics to a common format such as Eagle, please be welcome. In case of questions, please feel free to contact me under my email c.dombacher@telecomm.at.

MODULPORT   **MODULSTECKER**

74 HCT 125

EXROM   EXROM   8
8

GAME   GAME   9
9

74 HCT 4066

1K   SELECT   22   ON

GROUND   Z.A.1   OFF   1K

Z.A.22.1   ⊥

3   3   +5V

2   2

74 HCT 4066

Y   A0   A0   Y

X   A1   A1   X

W   A2   A2   W

V   A3   A3   V

ADAPTER C 64

Bezeichnung	Modulport Pin	Chip Type	Chip Nr	I/P Pin	O/P Pin	Select Pin	Modulstecker Pin
GROUND	Z						Z
A0	Y	HCT 4066	1	1	2	13	Y
A1	X		1	3	4	5	X
A2	W		1	8	9	6	W
A3	V		1	10	11	12	V
A4	U	HCT 4066	2	1	2	13	U
A5	T		2	3	4	5	T
A6	S		2	8	9	6	S
A7	R		2	10	11	12	R
A8	P	HCT 4066	3	1	2	13	P
A9	N		3	3	4	5	N
A10	M		3	8	9	6	M
A11	L		3	10	11	12	L
A12	K	HCT 4066	4	1	2	13	K
A13	J		4	3	4	5	J
A14	H		4	8	9	6	H
A15	F		4	10	11	12	F
Ø2	E	HCT 4066	5	1	2	13	E
NMI	D		5	3	4	5	D
RESET	C		5	8	9	6	C
ROMH	B		5	10	11	12	B
GROUND	A						A
GROUND	22						--
SELECT	--						22
D0	21	HCT 4066	6	1	2	13	21
D1	20		6	3	4	5	20
D2	19		6	8	9	6	19
D3	18		6	10	11	12	18
D4	17	HCT 4066	7	1	2	13	17
D5	16		7	3	4	5	16
D6	15		7	8	9	6	15
D7	14		7	10	11	12	14
DMA	13	HCT 4066	8	1	2	13	13
BA	12		8	3	4	5	12
ROML	11		8	8	9	6	11
I/O2	10		8	10	11	12	10
EXROM	9	HCT 125	11	5	6	4	9
GAME	8		11	2	3	1	8
		HCT 4066	9	1	2	13	
I/O1	7	HCT 4066	9	8	9	6	7
DOT CLOCK	6		9	10	11	12	6
R / W	5	HCT 4066	10	1	2	13	5
IRQ	4		10	3	4	5	4
+5V	3						3
+5V	2						2
GROUND	1						1