HARDWARE INSTALLATION HANDBOOK

With Support from

Wolfgang Betzl, TI-Club Berlin (2/1997)

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Translation by Bob Carmany
Actual versions at system-99 user-group

1 Table of Contents

2 FORWARD

We present the fifth **P-BOX-Card** of the System 99 User-group! Have fun!

2.1 History:

1990: BwG-Disk-Controller with RTC. Although we shipped the "w" it was not our own DSR but that of Atronic until 1999. Circulation over 80 units! That was available from 1993. Since 1999 they were with our own DSR from Harald! Rebuilt in 1999!

1994: EVPC 80-column card with VGA-DAC. Circulation 50 units, at this time still some remaining. Since 1999 with a new DSR and EEPROM! Rebuilding possible!

1995: HSGPL Super-GROM/GRAM card with a new GROM-0 with over 2MB FEPROM, that is in-system-programmable. Circulation 50 units, still available.

1996: SGCPU- The TI 99/4P with up to 1MB-AEMS-compatible RAM and more. Circulation 30 units, still available.

1997: ASCSI-"SCSI emergency program" for German users, see the closing remarks! Again available in 1999 but only a circulation of 20 units, but as ASCSI2 with P-DMA.

3 INTRODUCTION

This overview is strictly for instructions for the physical installation of the SCSI-Controller card in your 99/4A or Geneve computer system. It was NOT written for the function of the software or the use of the disk manager software. For information about the use of the accompanying software please see the SOFTWARE OPERATIONS MANUAL.
This product is based on the industry-standard SCSI-Controller-Chip 53C80, that is manufactured by various companies. It has full SCSI-Level-1 support .It permits the complete integration of the non-removable drives, floppy disks and other SCSI-devices in the 99/4A or Geneve System.
The SCSI-Interface is written to ANSI standards. For further information about the SCSI and the implementation of the controller-Chip 53C80 please see the ANSI documentation or the manufacturer's overview. These documents will only show you a glimpse of the installation of the Peripheral card.

4 INSTALLATION

The SCSI-Interface card is a Peripheral card of standard size, for use with the Texas Instruments 99/4A or Myarc Geneve computers. To use this card, you MUST the following system configurations:

TI 99/4a Console, Monitor, 32K Memory Expansion, Peripheral Expansion Box

OR

Myarc Geneve, Monitor, Peripheral Expansion Box

Before installation starts, be sure that you computer is running properly and the voltages are verified.

5 PROGRAMS ON THE INCLUDED DISKETTES

Along with the SCSI card are some accompanying help programs and one necessary program that this full-standing Peripheral uses. In most cases there is a document file on the disk and there is no overview in this handbook.

5.1 The Accompanying Disks Contain the Following:

MDOS 2.5s (or higher)	The Geneve MDOS with SCSI-Support
SCUZZY	A SCSI-non-removable disk sector editor with P-DMA
DM12M;O (Disk Manager")	A simple TI-based Disk-Manager (EA 3)
SCSICAT	A BASIC-Program for Disk-Catalog (SCSI or others)
README	The last Information about suppliers
DSRLDR	DSR-Loader for the FLASH-EEPROM etc.....

All of the individual overviews are on the disks, read and understand them. Most of the programs are intuitive and menu-controlled and those that are not have document files on the disk.

6 Adjusting the DIP-Switches

The SCSI card contains two sets of DIP-Switches for the management of the hardware. They are designated on the circuit board as SW1 and SW2. SW1 controls the CRU address of the card and SW2 sets SCSI-ID (Identification number) and the choice between the TI and the Geneve. These switches are already set for a CRU address of >1700 and the SCSI-ID 7 for function with the TI.

7 CONFIGURATION OF DIP-SWITCH SW1

SW1 controls the CRU (Communications Register Unit) base address. The following table shows the possible installation for the SCSI peripheral and contains as well as the other peripheral devices and the addresses where they are located. It is important that the SCSI card only use its own reserved address for it to work properly. If you do not have cards at the listed addresses, you can place the SCSI at any unused address if you wish. The default address for the SCSI card is >1700. That is where the program looks for the CRU-ID nowhere else. The DSRLDR from V 2.14 on will look for the CRU address of the card.

	A2	A3	A4	A5	A6	A7	A8	frei	Processor-Address
CRU	1	2	3	4	5	6	7	8	Possible Hardware
*>600	ON	ON	ON	OFF	OFF	ON	ON		The Addresses from >600 to >F00 are only usable when you have an AT-Keyboard and a separately produced ROM-Upgrade installed. These addresses have no other uses.
*>700	ON	ON	ON	OFF	OFF	OFF	ON		
*>800	ON	ON	OFF	ON	ON	ON	ON		
*>900	ON	ON	OFF	ON	ON	OFF	ON		
*>A00	ON	ON	OFF	ON	OFF	ON	ON		
*>B00	ON	ON	OFF	ON	OFF	OFF	ON		
*>C00	ON	ON	OFF	OFF	ON	ON	ON		
*>D00	ON	ON	OFF	OFF	ON	OFF	ON		
*>E00	ON	ON	OFF	OFF	OFF	ON	ON		
*>F00	ON	ON	OFF	OFF	OFF	OFF	ON		SGCPU-Supplementary-DSR
>1000	ON	OFF	ON	ON	ON	ON	ON		HFDC, HRD's
>1100	ON	OFF	ON	ON	ON	OFF	ON		All Disk Controllers, HFDC
>1200	ON	OFF	ON	ON	OFF	ON	ON		Math. Co-Processor
>1300	ON	OFF	ON	ON	OFF	OFF	ON		RS232 Nr.1
>1400	ON	OFF	ON	OFF	ON	ON	ON		EVPC 80-Column Card
>1500	ON	OFF	ON	OFF	ON	OFF	ON		RS232 Nr.2
>1600	ON	OFF	ON	OFF	OFF	ON	ON		
>1700	ON	OFF	ON	OFF	OFF	OFF	ON		PGRAM(+) ASCSI
>1800	ON	OFF	OFF	ON	ON	ON	ON		TI-Thermal Printer
>1900	ON	OFF	OFF	ON	ON	OFF	ON		
>1A00	ON	OFF	OFF	ON	OFF	ON	ON		
>1B00	ON	OFF	OFF	ON	OFF	OFF	ON		HSGPL
>1C00	ON	OFF	OFF	OFF	ON	ON	ON		
>1D00	ON	OFF	OFF	OFF	ON	OFF	ON		IEEE8-Controller
>1E00	ON	OFF	OFF	OFF	OFF	ON	ON		
>1F00	ON	OFF	OFF	OFF	OFF	OFF	ON		P-Code Card

The SCSI card works with other controllers as well:

For example, if you have the fine Myarc HDFC Hard Drive Controller that is installed at the recommended address of >1100, you must locate the SCSI card at >1700 or some other unused address.

A second important configuration is the use of the SCSI card with a FDC / RAMDisk. In this case the FDC is located at FDC >1100, and the SCSI card at >1700 or another unused address.

Another configuration could be: a HFDC Hard Drive Controller together with a Disk Controller (TI, CorComp, Myarc, BWG, etc.). In this case, leave the Disk Controller at >1100, the Hard Disk Controller at >1000, and the SCSI card can be at >1700 or another unused address.

There are many possible configurations that are too many to list. If you are not sure of the CRU addresses for your system, you can call us.

8 CONFIGURATION OF DIP-SWITCH SW2

SW2 activates the Software-designed functions that are explained in the following table. The SCSI-ID occupies its own address that is normally 7.

1	2	3	4 = System	SCSI-ID
ON	ON	ON	ON = TI, OFF = GENEVE	0 (SCS1)
OFF	ON	ON		1 (SCS2)
ON	OFF	ON		2 (SCS3)
OFF	OFF	ON		3 (SCS4)
ON	ON	OFF		4 (SCS5)
OFF	ON	OFF		5 (SCS6)
ON	OFF	OFF		6 (SCS7)
OFF	OFF	OFF		7 (SCS8)

9 CABLING

Also included with the SCSI Controller card if you wish is an internal/external disk drive cable. This cable has 4 50-pin ends, two at one end and two at the other. The SCSI disk drives must be attached in a particular continuous chain. The cable is manufactured in such a way that that you can connect two internal or external devices to it. To connect a third drive or device, you will need an additional connector. If you plan to connect more than two devices to the SCSI card you must use additional cabling. For information or details about cabling please call or write to us.

SCSI disk drives require a termination/ resistor pack to function correctly. The drive may or may not have a termination pack built in. Please consult the handbook that came with your disk drive for instructions to activate or deactivate the termination pack.

To connect the disk drive to the SCSI card, plug one end of the cable into the SCSI card and the other end (the farthest connector into the farthest device) into the disk drive. When the disk drive(s) is/are connected, you must activate or deactivate the termination pack. When you have determined the farthest two devices, ONLY the termination pack of the farthest device should have the termination pack activated. All of the termination packs on the other disk drives on the other end from the SCSI card should normally be deactivated. For more information, see the handbook that came with your disk drives on how to activate the termination pack. Without proper termination, the SCSI system can be unstable. If you have a problem reading or writing, then check for proper termination. Too many termination packs will result in data failures and none will result in excessive noise.

We recommend the shortest possible cable length between the SCSI card and the device. If you have additional cable length remaining, you can put it in the disk drive housing.

10 RECOMMENDED DISK DRIVES

Every one of the standard SCSI non-removable disk drives, supporting 512 bytes per sector, is compatible with the SCSI host adapter. All of the drives that are compatible with IBM PC,

Apple Macintosh, as are most other disk drives will work. If you have a question about a specific disk drive, please call or write to us before you undertake installation. If the disk drive is not one that is supported, it can destroy your card and void your warranty and thus please be careful in the selection of your disk drives. Often used or reconditioned disk drives are purchased and they can damage ANY computer system. ALWAYS get a written guarantee that the disk drive has been tested and is guaranteed. So that proper installation will cause no damage to your computer.

11 ELECTRICAL SUPPLY

Each disk drive that you buy to use with your SCSI-Card, requires its own electrical supply to function. You may think about installing your SCSI non-removable disk drive in the Peripheral Box. BE VERY CAREFUL about electrical restrictions when installing EACH SCSI non-removable disk drive in the Peripheral Box. The information in the overview of the P-Box will tell you whether each disk drive, either non-removable disk drive or floppy exceeds the electrical installation limits of the P-Box.

IF YOU EXCEED THE ALLOWABLE ELECTRICAL LIMITS OF THE YOUR P-BOX, YOU CAN DESTROY IT AND ALL OF THE CONTENTS.

We are not responsible for any incidental damages caused by the installation of a SCSI non-removable disk drive in your P-Box.

11.1 A Guidelines for the Installation of Disk Drives in the P-Box:

- NEVER install a full height non-removable disk drive in the P-Box.
- 3.5” non-removable drives are usually economical enough with current that they can run in the P-Box.
- ALWAYS add up the electrical consumption of the disk drives that you wish to install in your P-Box AND BE SURE that it is less than what is possible for the P-Box.
- It is SAFEST to install NO disk drives in the P-Box.
- The disk drive lines of the Texas Instruments Peripheral Expansion Box are appropriate for about 1 Ampere.

It is possible to install your non-removable/floppy disk drives in an external housing. If you wish to use this method of installing your disk drives, make sure that the external housing is appropriate for the operation of non-removable disk drives and follow the cabling and wiring requirements and restrictions.

12 ACCESS TO SCSI DEVICES THROUGH ASSEMBLER

12.1 DSR Link-Subprogram

The following is a short list of the syntax of machine access for the DSR-LINK subprogram to SCSI devices through GPL and Assembler. Further information on how to use these subprograms, is given in the handbook for the TI Editor/Assembler.

The routines are general with >1X for the access to floppies and the routines with >2X for non-removable disk drives. Error messages are returned to the CPU address of >8350.

12.1.1 Subprogram Sector Read/Write >10 and >20

>834A	Returned Sector Numbers		
>834C	Unit / Device number	Bit 0 to 3 Disk drive number	000 = SCS 1 ..... 111 = SCS 8
		Bit 4 to 5 Sector size	00 = 256 Bytes 01 = 512 Bytes 10 = 1024 Bytes 11 = 2048 Bytes
		Bit 6 Access for absolute Sector size	0 = logical Sector size absolute size from 512 Bytes 1 = Sector size as designated in Bits 4 and 5
		Bit 7 Storage type	0 = VDP-Ram 1 = CPU-Ram
>834D	Read/Write	0 = Write 1 = Read	
>834E	Buffer-Start address in CPU- or VDP-RAM. 16-Bit-Integer storage location. The buffer can entertain a sector size of 256, 512, 1024 or 2048 Bytes.		
>8350 and >8352	32-Bit address of the number of sectors to be read or to be written		

12.1.2 Media Formatting - Subprogram >21 Hard Disks, Opticals and Tapes

>834A	Returned SCSI Status	
>834B	Returned SCSI Notification Byte	
>834C	Unit- / Device Number	SCSI-Address
>834D	Sector size	0 = 128 Bytes 1 = 256 Bytes 2 = 512 Bytes 3 = 1024 Bytes

>834A	Returned SCSI Status	
>834B	Returned SCSI Notification Byte	
>834C	Unit- / Device Number	Bit 0-2 the SCSI address Bit 4-6 logical number of the device
>834D	Error Processing	Bit 0 – activates the error processing Bit 1 Reserved for an extra sector/extra track for error mapping. Bit 2 Used existing sector for error mapping. Bit 7 Used CPU-Error-Table for error mapping.
>834E	Buffer-Start Address in CPU-RAM for error mapping. 16-Bit integer storage location	
>8350 and >8352	Returned 32-Bit number for the logical 256-Byte sectors per disk.	
>8354 and >8356	32-Bit absolute sector size in multiples of 128 Bytes	

12.1.3 File Protection modification - Subprogram >22

>834C	Unit / Device Number	Bit 0-3 Disk drive number Bit 7 Location of the filename: 0 = VDP / 1 = CPU
>834D	Protection Code	>00 = not write protected, >FF = write protected
>834E	Pointer to the filenames	16-Bit pointer to the 10-Character buffer in CPU- or VDP-RAM

12.1.4 File/Sub List Renaming - Subprogram >23

>834C	Unit / Device Number	Bit 0-3 Disk drive number Bit 7 Location of the filename: 0 = VDP / 1 = CPU
>834E	Pointer to the new name	16-Bit pointer to the 10-Character buffer in CPU- or VDP-RAM

>8350	Pointer to the old name	16-Bit pointer to the 10-Character buffer in CPU- or VDP-RAM

12.1.5 Direct Access Reading of a File - Subprogram >24

>834C	Unit / Device Number	Bit 0-3 Disk drive number Bit 7 Location of the buffers and filename: 0 = VDP / 1 = CPU
>834D	Access Code	>00 = File transfer parameters, if not zero shows a list of the files that can be read - the start sector and additional information.
>834E	Pointer to the filenames	16-Bit Pointer to the 10-Character buffer in CPU- or VDP-RAM.
>8350	Additional Information	Offset for the Information at >83XX >83XX Buffer-Start-address >83XX+2 Number of the first sector >83XX+4 Status-Flags >83XX+5 Count of the data position per sector >83XX+6 EOF-Offset >83XX+7 Logical data length >83XX+8 Count of the allocation Level-3 data location >83XX+10 MSB of the first sector >83XX+11 MSB of the Level-3 Data location >83XX+12 Extended data length

12.1.6 Direct Output to a File – Subprogram >25

>834C	Unit / Device Number	Bit 0-3 Disk drive number Bit 7 Location of the buffers and filename: 0 = VDP / 1 = CPU
>834D	Access Code	If zero copy the files using the level-3 parameters, if not equal to zero point to the sector count and write the file. The Start-Sector number is in additional information.
>834E	Pointer to the filenames	16-Bit pointer to the 10-Character buffer in CPU- or VDP-RAM.
>8350	Additional Information	Offset for the information at >83XX >83XX Buffer-Start-address >83XX+2 Number of the first sector >83XX+4 Status-Flags >83XX+5 Count of the data position per sector >83XX+6 EOF-Offset >83XX+7 Logical data length >83XX+8 Count of the allocation Level-3 data location >83XX+10 MSB of the first sector >83XX+11 MSB of the Level-3 Data location >83XX+12 Extended data length

12.1.7 Setting Actual Pathnames - Subprogram >27

>834C	Unit / Device Number	Bit 0-3 Disk drive number Bit 7 Location of the pathname: 0 = VDP / 1 = CPU
>834E	Pointer to the Pathname	16-Bit pointer to the 39-character buffer in CPU- or VDP-RAM, with the preceding string length

12.1.8 Sub Menu Creation - Subprogram >18 and >28

>834C	Unit / Device Number	Bit 0-3 Disk drive number Bit 7 Location of the buffers: 0 = VDP / 1 = CPU
>834E	Pointer to the Sub Menu	16-Bit pointer to the 10-character buffer in CPU- or VDP-RAM

12.1.9 Sub Menu Delete - Subprogram >19 and >29

>834C	Unit / Device Number	Bit 0-3 Disk drive number Bit 7 Location of the buffers: 0 = VDP / 1 = CPU
>834E	Pointer to the Sub Menu	16-Bit pointer to the 10-character buffer in CPU- or VDP-RAM

This program does not delete a sub list that is not empty!

12.1.10 SCSI Direct - Subprogram >1B

>834A	Returned SCSI Status Byte	
>834B	Returned SCSI Information Byte	
>834C	Unit-Nr. / Device number	Bit 0-2 SCSI-ID

		Bit 3 In/Output: 0 = Polling, 1 = P-DMA Bit 6 File buffer: 0 = VDP-Ram, 1 = CPU-Ram Bit 7 CDB buffer: 0 = VDP-Ram, 1 = CPU-Ram
>834D	Read/Write	0 = Write 1 = Read
>834E	CDB Buffer	
>8350	Length of the CDB Buffers	
>8352	Start Address of the Data Buffers	
>8354	Length of the Data Buffers	

12.1.11 Examination / Recognition of SCSI Devices - Subprogram >1C

>834A	Returned SCSI Status Byte	
>834B	Returned SCSI Information Byte	
>834C	Unit / Device number	Bit 0-3 Disk drive number Bit 7 Location of the buffers: 0 = VDP / 1 = CPU
>834E	Start Address of the Buffers	16-Bit-Start address of the buffers for 44-Byte data packets

12.2 Package Structure:

OFFSET	DESCRIPTION
0	8 Bytes of information identifies the answer of the command to the SCSI query
8	8 Bytes Manufacturer identification number
16	16 Bytes Product identifications number
32	4 Bytes Number of the product version /-revision
36	32-Bit-The sector count of the device
40	32-Bit-Sector size of the device

13 PARTS LIST

This list can be used in procuring parts for repair and/or to be used as spare parts.

Number	Designation	Vaule	Remarks
17	C3,C4,C6,C7,C8,C9,C10, C11,C12,C13,C15,C16,C19, C20,C22,C23,C24	0.1 Ceramic or MKT	
1	C1	0.1 MKT	
1	C2	0.22	
2	C5,C21	10uF/16V Tantallum	
2	C14,C18	10uF/16V ALU	
1	C17	22uF	
1	CON1	50-pin flat cable	
1	D1	LED Green	
1	D2	1N4001	o.ä.
1	F1	5x20mm, 500mA	
1	J1	BUS	Gold Plated
1	JU1	JP-UM	RAM Size
1	P1	DB25-F	f. APPLE
2	R1,R4	1K0	
1	R2	6K8	
1	R3	10K	
2	R5,R6	0R82	Bridged
3	R7,R8,R9	SIL-TERM	330/220R
1	R10	100R	
1	R11	4*4K7	
1	R12	8*10K	
3	R13,R14,R15	4K7	
1	SW1	SW DIP-8	
1	SW2	SW DIP-4	
1	U1	7805	For the SK09/37
1	U2	TL7702	
1	U3	AT29C512 Atmel	also 010-040
1	U4	62256, RAM 32K*8	to 628512
1	U5	L53C80-PC2	also PC4
3	U6,U7,U8	74HCT244	
1	U9	74LS245	
2	U10,U11	74LS125	
1	U12	74HC688	
1	U13	74HC251	
1	U14	MACH231-15JC/1	V2.02

14 Upgrade Possibilities, Other

With jumper JU1 the actual RAM size can be changed. 1-2 = 628512, 512K*8 RAM; 2-3 = 62256, 32K*8 or 628128, 128K*8 RAM. At the present moment the software only needs 32K*8. Also used at this time for the DSR 64K*8 = AT29C512. One can also substitute an AT29C40 (512K*8) without using a jumper which is unnecessary since they are pin-compatible. If termination of the busses is not supplied by the controller, then the protection offered by F1 should be removed but normally it is so. The plug marked ”APPLE“ is for SCSI cables like those used by the APPLE computers. Advantage: Here you can use shielded cables; Disadvantage: they are more expensive than ribbon cables.

15 DSR-Loader

The loader for the DSR works the same as the better-known loader for the HSGPL card. It is a program file (E/A5) and can be started from the HRD menu.

ATTENTION: The loader must see the card at CRU >1700!

Upon presentation (hopefully) with the correct FEPROM type the files will be loaded. Normally it is DSKx.SCSI-DSR. It can also be accomplished from RAMDISK but not from an existing SCSI-Drive (logical?)! The loader proceeds from a 14-byte header and normally loads 8 files one after the other. After returning to the title screen, the DSR is complete. In contrast to the HSGPL loader, it is not “dsrldr“ but rather “dsrscsi“.

WARNING: The use of the wrong loader will load the DSR in the wrong card, for example in the HSGPL. Pay attention to the heading, Harald and I have worked to put a built-in barrier here.

16 Other Software

We have equipped our Memory Manager Version 3.30 with full SCSI support as well as the HSGPL control program V1.21, which is designated as V1.21e in English. The HSGPL program is available in a 40-column version as well!

17 Concluding Remarks

This product was made possible by the united efforts of many individuals:

17.1 Germany/ The Netherlands:

Michael Becker	Hardware-Design, PLD- Fabrication, Documentation
Jürgen Stelter	Printed circuit board design, construction unit procurement
Harald Glaab	All DSR-Loader, Plate procurement, etc.
Gerd Weismann	USA-connection
Berry Harmsen	ditto
Götz Feuerstein	Beta tester (who gives his best! And stumbles over all of the errors!) This formed the basis for this manual and was the first SCSI user in Germany. Thanks!

17.2 USA:

Don O'Neill	and WESTERN HORIZON which developed the ancestor of this card. Without the WHT ground work, this ASCSI card would not have been possible! Good developer and very cooperative!
Dave Nieters	Hats off for his DSR!
Bud Mills	Accepts orders from outside Germany, doesn't supply, but takes the money for us! [1]

Mannheim, January 1999

Michael

[1] *It is because of these gentlemen that we were able to rebuild the American card and eliminate all of the errors! Now we in Germany have gained entry to thee SCSI World as well! Had I known the Chief of WHT (Don) we could have saved a lot of trouble and gotten the information about the cards that he later sent to us from the USA. The new generation cards (with a PLD like ours!) cost ca. 170 dollars. It can not do a couple of things that the ASCSI can do. Our card will, after having paid the royalties, be ready with the DSR. After repairing all of the errors in the WHT cards that are very compatible with ours it will be put into a FLASH-DSR that it does not have. We are waiting for the new DSR from Dave and hopefully we can develop and use a PSEUDO-DMA for the card (after the American development!).*

It will be very helpful in the testing again of our FLASH-EPROM.