EG3200 Genie III Computer System

USER'S *MANUAL* & UTILITIES

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EG3200

GENIE III

USER'S MANUAL

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SECTION ONE
INTRODUCTION

1 INTRODUCTION

The Genie III is a professional computer from EACA. Housed in a single console with a detachable keyboard, it has a number of unique features, which make the machine most attractive to the programmer and user alike.

The computer is supplied complete development of NEWDOS/80 specifically written for the machine. The Genie III has been designed to run software from the Genie I and Genie II computers to maintin a family compatibility.

One of the unique features of the Genie III is that it may be used with CP/M 2.2, the industry standard operating system for micro-computers. This unique dual compatibility is achieved by using a variable format screen.

This manual gives information which is specific to Genie III, other reference manuals are included with the system to give information about the operating system and software.

It is not possible in a users manual to give a detailed introduction to computing, as many excellent books are available to do this; basic information has only been given where it specifically relates to Genie III.

The Genie III is an advanced and flexible machine which is sure to be further enhanced by additional units. We feel sure you will be happy with the Genie III for many years.

SECTION TWO

GETTING STARTED WITH THE GENIE III

2.1 CONNECTING UP THE GENIE III

Carefully unpack the Genie III. There are two main units, the main console and a separate keyboard unit; place these units on the working table.

DO NOT DISCARD THE SYSTEM PACKAGING YOU WILL NEED IT TO SAFELY TRANSPORT YOUR SYSTEM

Firstly check that the mains voltage marked on the unit corresponds with the supply available. Ensure that the correct type of mains plug is fitted to the computer, but do NOT plug this into the power outlet yet.

Next connect the 20 way cable which exits from the lower right of the main console into the keyboard unit so that the stripe* on the cable is closest to the F1 key on the keyboard unit, be sure the connector locking pins are correctly seated.

* blue

Finally plug the unit into the power outlet, and locate the keys provided for the power switch.

NOW READ SECTION 2.2 BEFORE SWITCHING ON THE UNIT

2.2 THE DISK OPERATING SYSTEM (D.O.S)

Were the Genie III simply switched on now it would be unable to perform any useful tasks. A system is required to provide an interface between operator and machine, an operating system. The operating system acts as a manager of the computer, dealing with the interaction between the different components making up the system: disk drives, the keyboard, the memory, programming languages and application programs.

A disk operating system (DOS) in its minimal form, provides a software interface between the disk drives and an applictation program. In the Genie III the DOS provides more than this. The machine has a variable internal and screen format, so the DOS is also used to provide the machine with full details of its operating conditions.

Two DOS diskettes are provided with two kinds of machine format information.

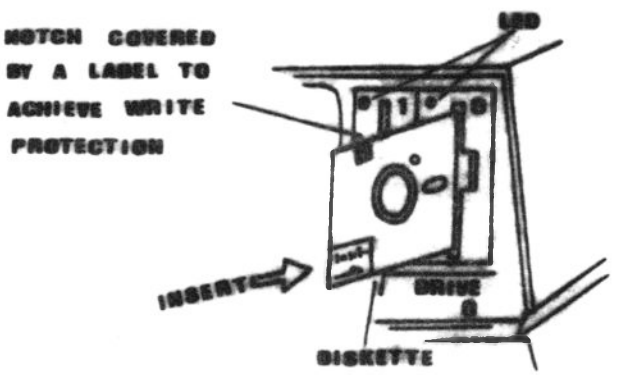
a) NEWDOS/80 64 mode provides a 64 character line length, with 16 lines (the same display format as Genie I/II).

b) NEWDOS/80 80 mode gives an 80 character by 24 line display format

2.3 POWER UP

To switch on the system insert one of the DOS diskettes provided into drive 0 as shown in figure 2.1. Ensure the diskette is inserted with the write protect notch uppermost, and that the notch is covered by a write protect tab. Close and lock the drive door.

Fig 2.1 Insert a Diskette into the Disk Drive.



Insert the power key and turn it clockwise to switch on the system power, the red light on drive 0 will light for a few seconds and the message:-

'NEWDOS/80 VERSION 2.0 GENIE III'

will appear on the screen. If this does not occur, check the following:-

a) The system is correctly connected to the power outlet; if it is not the power light on the keyboard will not illuminate.

b) The DOS disk is correctly inserted into drive 0, if it is not then the system will power up but the screen will remain blank.

If both these things are correct and the system still does not power up correctly, try with the second DOS diskette. If this is unsuccessful refer to your dealer for advice.

When your system is powered up correctly, take backup copies of both system diskettes.

BEFORE DOING ANYTHING ELSE BACKUP BOTH SYSTEM DISKS

2.4 BACK UP SYSTEM DISKETTES

Since Genie III is a totally disk based system it is very important to keep copies of your system disks. A damaged or erased system disk will be most inconvenient at least, and may cause more serious problems.

To back up your system disks follow the procedure given below, make at least two copies of each diskette, and keep one set away from the machine. The copies should be made onto double track double density diskettes.

a) Switch on the system as described in section 2.3.

b) Insert a blank disk in drive 1 which does not have the write protect tab attached, and lock the drive door.

c) Type 'COPY 0 1' (take care to include the spaces), and press NEWLINE, drive 0 will run, and a series of questions will appear. Answer these as follows.

d) Question 'FORMAT DISKETTE?'
Answer 'Y'

e) Question 'ARE SYSTEM AND SOURCE THE SAME DISKETTE?'
Answer 'Y'

f) Question 'PRESS ENTER WHEN DESTINATION DISKETTE MOUNTED ON DRIVE 1'
Answer simply press NEWLINE (ENTER and NEWLINE are equivalent keys on the Genie keyboard).

The copying will now begin, the screen should be as shown in figure 2.2.

Fig. 2.2

```
NEWDOS/80 READY
COPY 0 1
STARTING DISKETTE COPY
FORMAT DISKETTE?  (Y OR N) Y
ARE SYSTEM AND SOURCE THE SAME DISKETTE?  (Y OR N) Y
PRESS "ENTER" WHEN DESTINATION  DISKETTE MOUNTED ON DRIVE 1

FORMATTING
COPYING
DONE

NEWDOS/80 READY
```

When copying is finished the system will reply with

```
DONE
NEWDOS/80 READY
```

NEWDOS/80 READY is a standard prompt given when the system is ready to accept commands.

Now insert the other DOS disk, press both RESET keys simultaneously and copy the other system disk in the same way.

More explicit details of this procedure can be found in the NEWDOS/80 manual, together with details of error messages which may appear.

2.5 RUNNING STANDARD SOFTWARE

2.5.1 Disk BASIC

The DOS diskette supplied contains a copy of an extended disk BASIC, which is compatible with that in Genie I/II. The Genie III BASIC manual is provided containing full details of this language.

2.5.2 Running Genie I/II compatible disk software

The Genie III can be configured to run disk software from the Genie I/II computers; this must be done by powering up using the NEWDOS/80 64 DOS diskette in drive 0, inserting the program diskette in drive 1. It is not possible to simply insert a Genie I/II disk and power up the Genie III since the information required to configure the machine will not be present on the program disk.

To run programs which require the use of both drives fitted to the Genie III, first copy the program onto a backup NEWDOS diskette, (see appendix) and then run the program from the new disk created, which has both NEWDOS and the program recorded on it. The NEWDOS/80 manual gives full details of how to do this.

It is worthwhile looking at the FORMAT command in the NEWDOS/80 manual at this stage, as blank but formatted disks are required for data storage with many systems.

Ensure that all software purchased is on the correct type of diskette (double track double density), your dealer will be able to advise about the suitability of a particular software.

2.5.3 CP/M

The Genie III is able to run CP/M 2.2 (Control Program for Microcomputers), the closest to a standard operating system available today. The CP/M disk is optional and will be supplied by your dealer fully documented.

2.6 COPY PROGRAM FILES IN DISK

We shall find it interesting to build up a library of programs stored in disk. Recall that both the source diskette and the destination diskette should be 5 1/4 inch, double track and double density type (otherwise, see section 2.6.2 and Appendix on PDRIVE command). The diskette in Drive 0 should contain NEWDOS/80 version 2 system for GENIE III.

In order to illustrate the COPY function, we shall see now additional program files can be copied from a source program diskette to the back-up diskette obtained as in section 2.4.

Proceed as follows while the computer stays at the DOS level:

(1) Insert the backup diskette into drive 0 and lock the drive door.

(2) Insert the source program diskette into drive 1 and lock the drive door.
This diskette should be write-protected for safety.

(3) Type

COPY USERFILE/BAS:1 :0 [NEWLINE]

The filename here is an example only.
The file 'USERFILE/BAS' will be copied from disk in drive 1 to disk in drive 0.

Then, a blinking asterisk appears at the top right corner of the screen during copying operation.

Once the copying operation finishes, the message below will be displayed.

```
DONE


NEWDOS/80 READY
```

NOTE: In case, the destination diskette is memory full, a message 'DISKETTE SPACE FULL' will be displayed. Then, you cannot copy any more files into that diskette. Should you want to give up some copied files, use the KILL command.

Make sure you have several backup system diskettes before you proceed to kill any files.

Type

```
KILL XXX/BAS:1          NEWLINE
```

Then, the file XXX/BAS on the diskette mounted on drive 1 is killed. You can copy other files as memory space on the diskette is available.

You are recommended to check the files copied by the DIR command.

Type

```
DIR Ø                   NEWLINE
```

REMARK: There are many other versions of COPY, FORMAT and KILL commands. You are strongly suggested to study DOS manual for details.

2.6.1 Copy a Program File Using External Disk Drives.

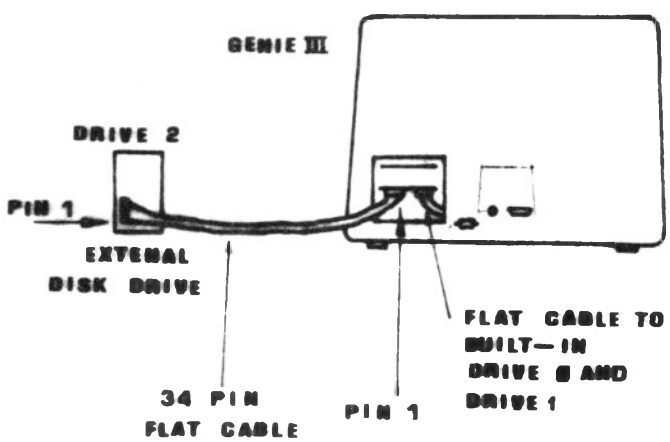
On the Interface II Board, there are two 34-pin card edges; one is for built-in disk drives, and the other for external drives. Should you like to copy program files from or to external drives, note that the storage formats of the built-in drives and external drives may be different.

Typical Procedure:

The following procedure shows how to copy a program file from an external drive that is single density, single track and single-sided. Recall that the built-in drives are double density, double track and single-sided.

(1) Connect the external drive to the interface II Board of the GENIE III System.
See Fig. 2.3.

Fig. 2.3 Connecting the External Drives.



hide P. 5-26

(2) set the external drive number 2 according to the instruction manual of your external drive.

(3) Take off the write-protect tab on the NEWDOS/80 system diskette. Insert the system diskette into drive 0 and the source diskette into drive 2. The source diskette can be write-protected.

(4) As the computer stays at DOS level, type

```
PDRIVE,0,2,TI=A,TD=A,TC=40,SPT=10,A
```

Then, the display will show a list of 10 PDRIVE specifications, and those for drive 2 are updated as below.
Also see Appendix for drive specifications in more detail.

(5) Insert a NEWDOS/80 V.2 formatted diskette into drive 1. This diskette should be double track and double density corresponding to the drive specifications of drive 1. Note that this destination diskette cannot be write-protected.

(6) Start copying operation by typing

COPY filename:2 :1

A blinking asterisk will appear at the top right corner of the screen.
As the copying operation finishes,
'NEWDOS/80 READY' will be displayed.
Remark: In a certain case, you would like to copy a program file from drive 1 containing the source diskette to the external drive (drive 2) containing the destination diskette. Remember the destination diskette cannot be write-protected. Instead of the above COPY command, type

COPY filename:1 :2

2.6.2 Using Formatted Disks other than Double Density / Double Track.

The DOS facilitates us to read/write disks with different types of recording formats mounted in double density/double track disk drives.

Change the PDRIVE data as below:
Note: dn2 is the drive spec to be changed.

(1) Single Density / Single Track.
PDRIVE,Ø,dn2,TI=AL,TD=A,TC=40,SPT=1Ø,TSR=3,GPL=2,
DDSL=17,DDGA=2.

(2) Single Density/ Double Track.
PDRIVE,Ø,dn2,TI=A,TD=A,TC=8Ø,SPT=1Ø,TSR=3,GPL=2,
DDSL=17,DDGA=2

(3) Double Density / Single Track.
PDRIVE,Ø,dn2,TI=CKL,TD=E,TC=39,SPT=18,TSR=3,GPL=2,
DDSL=17,DDGA=2

(4) Double Density / Double Track.
PDRIVE,Ø,dn2,TI=CK,TD=E,TC=79,SPT=18,TSR=3,GPL=2,
DDSL=17,DDGA=2

Remark: refer to Appendix of this manual and the DOS Manual of GENIE III.

SECTION THREE

HARDWARE OVERVIEW

3.1 SYSTEM CONFIGURATION.

The Genie III is a unique soft-formatted microcomputer which is designed for office data processing and other professional uses. The unit is equipped with two mini-floppy disk drives, and the detachable keyboard allows the optimum distance between the user and the screen to be achieved for comfortable operation.

The computer consists of the following modules :-

a) Keyboard - full ASCII keyboard with numeric key pad, easily convertible for European characters.

b) Display - non-reflective green high resolution screen.

c) Power supply - switching power supply to minimise weight and heat generation. 80W output.

d) Mini-floppy disk drives - two double track double density drives mounted on a metal rack. Total storage capacity 733K formatted under NEWDOS and 814K formatted under CP/M.

e) CPU and interfaces - one CPU board contains all the system memory. Two interface cards have video, printer and RS232C interfaces on one, and real time clock, disk controller on the other.

3.2 MAIN CONSOLE

The computer is arranged into 3 sections internally, the monitor, the PSU and a card frame containing the disk drives and the three printed circuit boards. Two extra spaces are provided in the motherboard for additional boards to be inserted.

Access to the electronic boards is via a cover on the rear of the unit. Ensure that all power is switched off and the unit and peripherals unplugged before opening this cover.

A key operated power switch on the front panel controls the power to the complete unit, the use of a key provides protection against unauthorised use of the computer.

The keyboard is a separate unit with some internal electronics. A connector for a light pen and a sound unit are provided within the keyboard unit. The light pen feature is under development and will be available soon.

3.3 MEMORY

To achieve the uniquely flexible operation of the Genie III the system memory is arranged with a 64K section of RAM onto which the major system components are memory mapped as required for each application.

The memory in the Genie III is arranged into 5 banks which are all connected by a single set of address and data lines. Bank switching is controlled from a CPU port.

Bank 0) 64K RAM the main system memory

Bank 1) ROM/EPROM. Up to 12K of ROM or EPROM may be fitted to the Genie III for special applications; a 2K boot ROM to start up the system is fitted as standard.

Bank 2) Video memory 1. This bank provides a 1K video memory equivalent to that in the Genie I/II.

Bank 3) Video memory 2. This second bank of video memory provides another 1K of video RAM to use with the 80 column display, and may be fitted with an additional 32K bytes of memory to implement the high resolution graphics.

Bank 4) Keyboard and disk control. The keyboard and disk controller memory are separately provided.

It is possible to switch in any or all of these memory banks under software control, for example connecting in banks 1,2 and 4 will give a Genie I/II compatible system configuration.

3.4 DISPLAY

The display in the Genie III is memory mapped from memory banks 2 and 3, and fed to the display by a special controller chip, which allows many different screen formats to be generated under software control. The system is supplied with software to enable operation with 64 columns and 16 lines or 80 columns and 24 lines, (NEWDOS 64 and 80 respectively).

The CRT controller also handles the Genie III graphics; standard Genie I/II type pixel graphics are available on the basic system to a maximum resolution of 160 * 72 pixels, one of two optional boards may be fitted to the interface I board within the Genie III, offering fully programmable graphics characters, or high resolution graphics of 640 * 288 points (a total of 184320 individual points) in 80 * 24 mode or 512 * 192 in 64 * 16 mode.

3.5 INTERFACES

The Genie III is supplied with 4 interfaces to enable other peripherals to be connected.

a) Parallel printer interface. A Centronics compatible parallel interface to connect compatible printers.

b) RS232C serial interface. To connect serial printers, telephone modems, or other devices requiring uni- or bi-directional serial communication.

c) Disk interface. To enable the connection of external disk drives. Up to four drives may be fitted to the system in total, which may be single or double density, single or double sided, and either 8 or 5.25 inches, (for 8 inches disk drives, single density only).

3.6 ACCESSORIES

3.6.1 Programmable graphics characters

An extra interface may be fitted to the Genie III on the interface I board to give individually programmable graphics characters which may be used within programs as simply as alphanumeric characters to produce diagrams, charts and other pictorial aids. The adaptor is PGA EG3210. Further details are supplied with the unit.

3.6.2 High-resolution graphics interface

A high resolution graphics interface giving 184,320 individually addressable points may be fitted to the Genie III, on the interface I board. The extra interface gives a screen resolution of 640 horizontally and 288 vertically

This optional board and the programmable graphics interface board may not be both fitted to the Genie III simultaneously, further details are supplied with the interface, type number EG3211.

3.6.3 Light pen

Since the CRT controller used in the Genie III has a light pen control facility, a socket has been fitted to the keyboard unit for a light pen, which can react to signals from the screen, and detect their position. Further details will be provided with the light pen, which is under development.

3.6.4 CP/M

The Genie III is supplied with NEWDOS. The operating system CP/M is available as an option, type number EG3220 for the master diskette and EG3221 for the full CP/M 2.2 manual.

3.6.5 MP/M

An MP/M multiuser system is under development for the Genie III to enable the machine to form part of an integrated computer network. This system will include the provision of a 192K memory card, and multiple serial interfaces.

3.6.6 Hard disk drive

A 5 megabyte fixed disk drive is under development, and will fit externally to the GENIE III.

SECTION FOUR

SOFTWARE OVERVIEW

4/ DISK SYSTEM

The Genie III is a totally disk based system, whose internal operating format may be altered under software control. The machine format is loaded from the DOS diskette upon power up by an internal boot ROM.

4.1 NEWDOS/80

The Genie III operates basically with NEWDOS/80 version 2, specific modifications are made to this DOS to cope with the flexible structure of the computer. Because of these modifications a standard NEWDOS/80 will not operate without changes and any prewritten programs must be copied onto a NEWDOS backup disk before use.

When the computer is powered up with NEWDOS, the boot ROM loads the 12K Microsoft BASIC used in the Genie I/II computers into the system memory, since this BASIC is required to run NEWDOS properly. The computer may subsequently be used with disk BASIC, which incorporates significant extentions to the standard 12K.

Since the system is reliant on NEWDOS/80, the DOS Manual is an essential part of the system documentation. Thorough study of this manual will prove very beneficial, specifically the manual sections on LOAD, RUN, COPY, FORMAT, and DIRECTORY.

A separate BASIC Manual is provided with the Genie III, this includes details of several significant extentions to the standard disk BASIC, notably a specially written screen editor program.

Das Model I Newdos 80 V2 im Original
lauft als Betriebssystem natürlich nicht auf 64
jedoch Superzap Directedit

4.1.1 Modifications to NEWDOS/80 version 2

The modifications for the use of NEWDOS/80 with the Genie III are listed below. All other commands are as described in the manual for NEWDOS/80 version 2.

a) 'RESET' & 'R'

In the modified reset command the 'R' key should be depressed first and held down whilst pressing both the 'RESET' keys simultaneously. The routines of the Level II BASIC ROM on disk are loaded into the main memory every time this reset command is executed.

'RESET' & 'R' is used for :-

i) changing from one DOS to another

ii) changing the disk routines from one format to another, e.g. from 80 x 24 mode to 64 x 16 mode.

b) 'RESET' & 'B'

This reset command stops the execution of a BASIC program but retains the program in memory. The 'B' key should be depressed first and held down as the two 'RESET' keys are pressed simultaneously.

c) 'RESET'

Pressing both 'RESET' keys simultaneously without either 'R' or 'B' at the same time causes all programs in memory to be lost and the system to restart in NEWDOS.

N.B. : If all reset commands fail you are advised to switch off the machine and turn it on again after about ten seconds.

4.1.2 Additional utilities within NEWDOS

A small manual accompanying this manual describes the additional facilities provided with NEWDOS, which are :

a) Programmable function key routine. This allows a key to be programmed to simulate a series of keystrokes, thus allowing a sequence of commands to be entered with a single key.

b) Dump terminal utility. To allow the use of the RS232 interface.

c) Programmable graphics character generator. For use with the EG3210 interface which is an optional card.

d) Double-sided Disk Generator. This utility helps the user generate an double-sided system disk.

4.2 CP/M

The CP/M operating system is available as an option separately for use with the Genie III.

SECTION FIVE

TECHNICAL DETAILS

5.1 THE CPU BOARD

The CPU board in the Genie III contains three main items, the CPU itself, (a Z80A microprocessor), a main system clock, and the 64K system memory.

5.1.1 Z80A CPU

The Z80 microprocessor can operate with a clock speed of up to 4MHz, in the Genie III, 1.78 and 4.0 MHz clock speeds are used. The CPU is provided with 16 address lines, (A0 to A15), allowing 64k of memory to be addressed at one time. And 8 bidirectional data lines, (D0-D7), through which the CPU communicates.

5.1.2 Clock

The system clock signal is derived from a master 16MHz oscillator, the clock speed is 4.0MHz when the system runs under CP/M or MP/M and is normally 1.78MHz when the system runs NEWDOS to maintain compatibility with Genie I/II software which uses the lower clock speed.
(normally 4.0 MHz but at 1.78 MHz during op-code fetch cycle.)

A signal on the main system bus ØSEL controls the clock speed according to the following convention

ØSEL	CPU clock
low	1.78MHz
high	4.0MHz

5.1.3 Reset

To boot up the system it is necessary to pull low the NMI (non maskable interrupt) signal of the Z80A. When the system is first switched on a short delay is required to allow the PSU voltages to stabilise before the system software is loaded. This is achieved by a simple delay circuit.

At other times the system may be re-booted by pressing simultaneously both RESET keys on the keyboard unit.

Befehl		Zusätzliche Clock-Zeiten unter ZDOS zu 5.1 + 4.4
LD	A,(37EF)	15
LD	HL,(37EE)	25
LD	HL,(37EF)	10
LD	HL,(3800)	0
LD	HL,(3FFE)	55.4
LD	HL,(3FFF)	29.4
LD	A,(3FFF)	28.1

5.1.4 Memory

The CPU board contains the bank 0 (64K of RAM), and the bank 1 ROM/EPROM facility. There are three 24 pin sockets on the CPU board.

Each of these sockets can suit either 4K ROM, EPROM 2716 or 2732 by altering the jumpers. It allows a combination of ROM and EPROM's.

a) 2K EPROM This is used for the boot program and is fitted in the the Genie III as standard.

b) 6K EPROM Three 2716 (or compatible) EPROMS may be used with the Genie III, at memory locations 0000 to 17FF.

c) 12K ROM The three 4K ROMS (or compatible ROMS) as supplied in the Genie I/II may be fitted, at locations 0000 to 2FFF.

d) 12K EPROM the three 4K EPROMs may be used with the Genie III, at momory locationa 0000 to 2FFF.
A set of links need to be altered to accomodate the type of ROM used, link details are given in table 5.1

TABLE 5.1 ROM/EPROM link settings.

'2716' x 3		'2732' x 3		ROM x 3	
J1 -J2	Z27	J3 -J4	Z27	J2 -J3	Z27
J3 -J4		J5 -J6		J4 -J5	
J17-J18	Z29	J19-J20	Z29	J18-J19	Z29
J19-J20		J21-J22		J20-J21	
J23-J24	Z28	J25-J26	Z28	J24-J25	Z28
J25-J26		J27-J28		J26-J27	
J9 -J15	Decode	J7 -J8	Decode	J7 -J8	Decode
J13-J10		J9 -J10		J9 -J10	
		J11-J12		J11-J12	
		J13-J14		J13-J14	
		J15-J16		J15-J16	

Bevor auf eine Adresse zugegriffen wird, wird überprüft, ob die Adresse in einem Bank-Bereich liegt

d.h. bei

0 – 2 FFFh	Bank 1
3C 00h – 3FFFh	Bank 2
4000h – 47FFh	Bank 3
3800h – 38 FFh	Bank 4

Ist beim Bank-enabling Byte das der betreffenden Bank zugeordnete Bit gesetzt, dann wird auf Bank ⊙ zugegriffen, ist das der Bank zugeordnete Bit = ⊙ dann wird BK⊙DIS gegeben und auf die betreffende Bank zugegriffen.

wird also

```
DI
LD A, ⊙
OUT ØFAH, A
```

gegeben, dann wird, wenn eine Bank vorhanden ist, auf diese zugegriffen.

Wird aber

```
DI
LD A, 15
OUT ØFAH, A
```

gegeben, dann wird grundsätzlich kein BK⊙DIS gegeben und Bank ⊙ steht voll zur Verfügung und der Screen etc. sind verschwunden

CP/M unter RSX.COM

LD C,7	0E 07	LD A,71	3E 71
Call 5	CD 0500	OUT (FA),A	D3 FA
Push AF	F5	POP AF	F1

5.1.4.1 Bank select

The CPU board contains the circuitry to generate the bank enabling signals for the four switchable memory banks (banks 1-4). A timing signal BK0DIS disables bank 0 when the CPU is addressing other banks. Port FA is used for bank selection as shown in Table 5.2.

Port FA

TABLE 5.2 Memory bank enable switching

Port	Data Bit	Memory Banks		Content of Bank	
		Bank Enable signal			
ØFAH	DØ (1)	1	BK1	ROM/EPROM	0 - 2FFF
	D1 (2)	2	BK2	VIDEO 0	3C00 - 3FFF
	D2 (4)	3	BK3	VIDEO 1 & 2	4000 - 47FF
	D3 (8)	4	BK4	KEYBOARD/ DISK CONTROLLER	3800 - 3BFF 37E0 - 37EF

wenn Bit = 0 dann BK0DIS und es wird gebanked.

NOTE: Bank Ø contains 64 Kbyte RAM.

```
DI
LD A,1
OUT (ØFAH),A
```

blendet Banks 2, 3, 4 in Bank 0 ein. Werden die Adressen in Banks 2, 3, 4 angesprochen, dann sind es nicht mehr die Inhalte von Bank 0 unter den entsprechenden Adressen. Bei Bank 1 - Adressen wird nicht gemapped : n = 0000 0001

Bitwert Bank

(1) × 1 → 1
2 0 (2)
(4) × 1 → 3
8 0 (4)

```
F3          DI
3E 05       LD A,5
D3 FA       OUT (ØFAH),A
```

blendet die Banks 2 und 4 in Bank 0 ein. Bei Bank 1 und 3 - Adressen wird nicht gemapped n = 0000 0101

Bank 0 wird nur auf den Bank - Adressen die abbed, deren Bank - bits im n von DI, LD A,n OUT ØFAH,A gleich 0 sind.

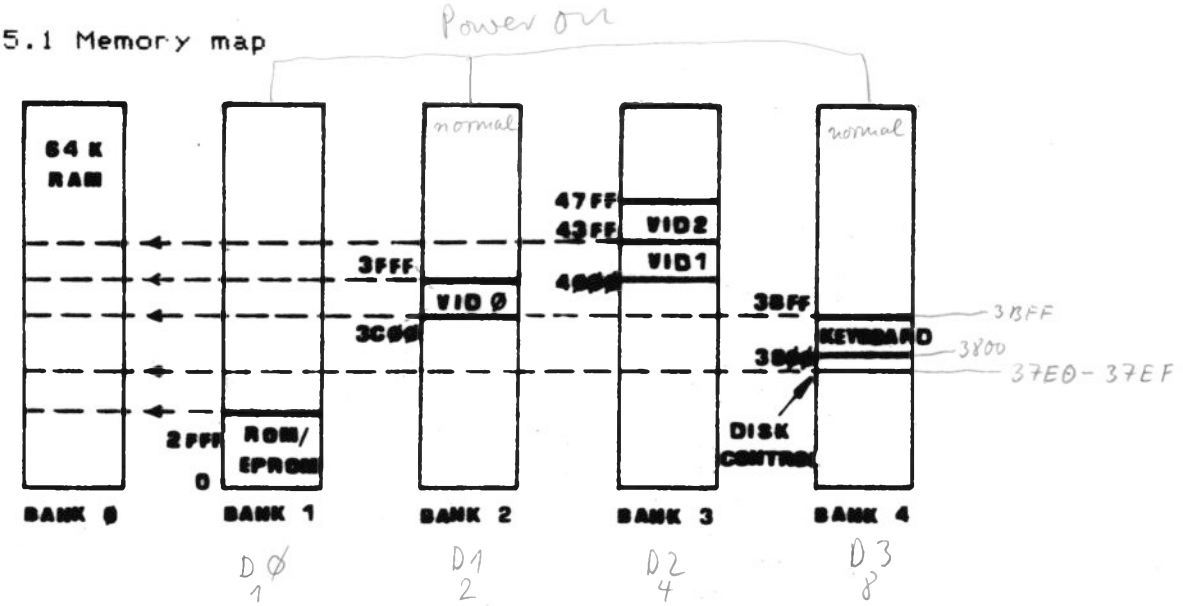
Regel: Bank - Bit = 0 dann BK0DIS und Bank - Zugriff

Wesentlich ist, da die I/O - Controller auf die Bank - Rams zugreifen und nicht auf das Bank 0 - Ram.
Tatsächlich steht nutzbar nur Bank 3 zur Verfügung zum Hin und Herschalten mit 2K - Ram.

5.1.4.2 Memory map

Memory banks 1-4 are not completely filled with memory, each bank has specific areas filled. These areas and their interrelationship with the 64K RAM in bank 0 are shown in figure 5.1.

FIGURE 5.1 Memory map



Power-on reset signal (Z80A pin 26) is used to enable banks 1, 2 and 4 such that during power-on the CPU is initialized by the system program in ROM (Bank 1).

Unterschied zwischen Mapping und Banking:

Normaler G-DOS-Start: VID Ø, Keyboard und Disk-Control sind eingemapped. D.h. $37E0_h$ bis $3FFF_h$ sind auf Bank Ø nicht mehr erreichbar. Werden diese Adressen auf den Adressbus gegeben, so werden sie automatisch auf die entsprechenden Banks umgemapped, was zum Beispiel die Ausführungszeit von LD A,($37FC_h$)* um ~945,5 nsec verlängert gegenüber LD A,(12344)**. Wird über OUT FA,n gebanked, so wird über BKODIS, Bank Ø ausgeblendet (kein Mapping mehr), was im allgemeinen zu Absturz mit Reboot führt. Wird z.B. nach 3F00: LD A,1 OUT FA,A JP 3F00 geladen und 3F00 angesprungen, kommt es nicht zum Absturz, das System läuft, wie es ablaufen sollte.

≈ dieser Befehl blendet in Bank Ø die Banks 2, 3, 4 aus also auch Vid Ø

* auf Bank 4

** auf Bank Ø, dh. kein Banking

5.2 INTERFACE I BOARD

The interface I board contains three main units, the video interface, parallel printer interface, and RS232 serial interface.

5.2.1 Video interface

At the heart on the video interface is a CRT controller chip (CRTC), type HD46505. This chip is fully programmable to achieve a variable number of displayed characters on the screen, a variable dot format for each character, variable horizontal and vertical sync signals, and display timing.

5.2.1.1 Display formats.

The video interface is designed to have two display formats, 80 characters by 24 lines and 64 by 16. The character size is 5*7 dots and the dot frequency 12MHz.

There are two display modes available thruogh port F5, as shown in Table 5.3, to print inverse video characters from BASIC the command :-

```
OUT 245,1
```

can be used with character codes 127 to 255. To reset to normal mode use the command :-

```
OUT 245,0
```

TABLE 5.3 Display mode settings

PORT	DATA BIT 0 SETTING	DISPLAY MODE
F5	set	Inverse video characters
F5	reset (power on setting)	Genie I compatible graphics or programmable graphics with an optional board.

The alphanumeric character is produced from 6 bits of the 8 bit video signal. The final two bits are used to switch between the graphics types as shown in Table 5.4.

TABLE 5.4 Graphics mode settings

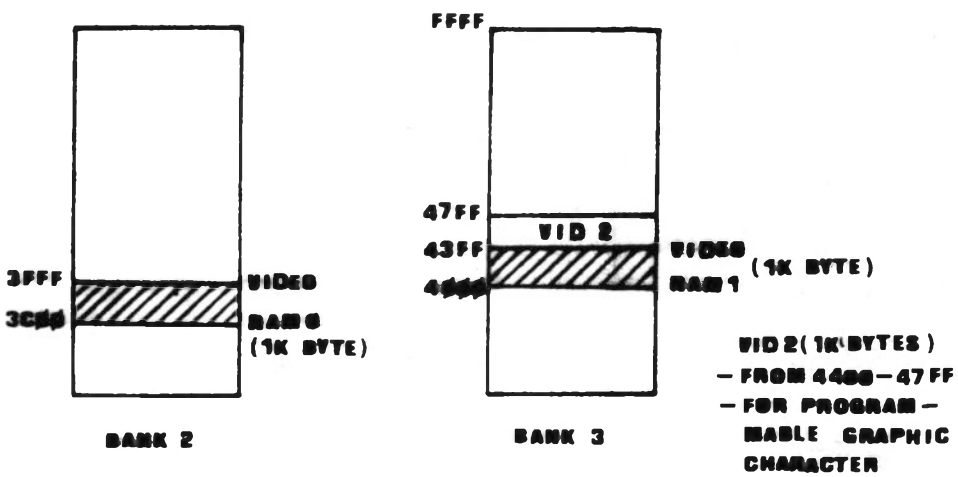
Display	Bit 7	Bit 6	
Characters	0		Bits 0-6 ASCII character codes
Genie 1 graphics	1	0	Bits 0-5 graphics codes
Programmable graphics	1	1	Bits 0-5 graphics codes

To display programmable graphics:
(1) For 80 mode:
use the command:
PRINT CHR$(X) where X= programmable graphics code (192 to 255).
(2) For 64 mode:
POKE Y,X where Y= screen address (15360 to 16383; or 3C00H to 3FFF).
X= programmable graphics code (192 to 255).

5.2.1.2 Video Memory Map

Two memory banks (2 and 3) provide the video memory as shown in Figure 5.2.

FIGURE 5.2 Video Memory Map.



$2^5 = 32$

5.2.1.3 CRTC Registers

The CRT controller has a 5 bit address register and 18 control registers through which the video interface can be programmed. The interface may be programmed for different display modes, formats, synchronisation signal, and cursor control methods.

Port

The address register contains the address of the control register to be accessed, the control register addresses and functions are shown in Table 5.5, the address register is at port F6, and the control register at port F7.

F6 Address register

F7 Control Reg

For further details of the operation of the video section see the Genie III technical manual.

TABLE 5.5 Control Registers of the CRTC.

Address Register (5 bits)	Control Register	Register Name
00H	R0	horizontal total
01H	R1	horizontal displayed
02H	R2	horizontal sync position
03H	R3	horizontal sync width
04H	R4	vertical total
05H	R5	vertical total adjust
06H	R6	vertical displayed
07H	R7	vertical sync position
08H	R8	interface mode
09H	R9	maximum raster address
0AH	R10	cursor start raster
0BH	R11	cursor end raster
0CH	R12	start address (H)
0DH	R13	start address (L)
0EH	R14	cursor (H)
0FH	R15	cursor (L)
10H	R16	Light Pen (H)
11H	R17	Light Pen (L)

5.2.1.4 Optional boards

Two optional boards may be fitted to the interface I board, they are:-

a) High resolution graphics
b) Programmable graphics characters

Only one of these boards may be fitted to the machine at one time.

The optional boards are fitted via two connector strips on the interface I board, the pin assignments for these strips is shown in Table 5.6.

Table 5.6 : Pin Assignment for the connector socket strips.

PIN	E1	PIN	E2
1	$\overline{WR}$	1	LD2
2	$\overline{IORQ}$	2	LD4
3	$\overline{MREQ}$	3	LD5
4	A2	4	LD3
5	A14	5	LD1
6	A12	6	LD0
7	A0	7	$\overline{PWAIT}$
8	A5	8	S/L
9	A9	9	PGC
10	A10	10	+12V
11	A15	11	VDG
12	A13	12	GND
13	A11	13	GND
14	A1	14	GND
15	A2	15	$\overline{PMG}$
16	A4	16	$\overline{RD}$
17	A6	17	$\overline{BK0DIS}$
18	A7	18	+5V
19	-5V	19	12.875MHZ
20	A8	20	$\overline{BK3}$

5.2.1.5 Light Pen

A light pen may be easily added to the system as the CRT controller has facilities for this. The CRT controller on the Interface I board accepts the light-pen-stroke signal, LPSTB from pin 41 of the Mother board. There will be a socket on the keyboard module for connecting to a light pen.

HR15 – GIII – Printer – UP

Zu sendendes Byte (z.B. IP=13) in IP

```
3000 II=INP(&HFD)
3010 IF (II AND 64) <> 0 THEN PRINT " KEIN PAPIER ": END
3020 IF (II AND 32) = 0 THEN PRINT " SELECT IST AUSGESCHALTET ":
END
3030 IF ( II AND 128) <> 0 THEN GOTO 3000
3040 OUT &HFD,IP
3050 RETURN
```

(z.B. ist in Bascom eine Printer-Routine, die fünf Steuerbytes dies verlangt)

PORT FD

5.2.2. Parallel printer interface

This interface is provided to allow a Centronics parallel standard printer to be connected to the Genie III. This is the most common type of printer interface and will allow many varieties of printer to be connected to the computer. A special cable is required to connect the printer, type number EG3016C.

The printer interface is ported onto the system at port number FD of the CPU.

The printer interface may respond to the following signals from the printer:-

a) BUSY low=not busy, i.e. the computer is able to send more data. High=busy , no more data. This signal is active high, i.e. when high the printer is busy.

b) OUT OF PAPER, High=printer out of paper, stop sending data, low=continue sending. If left unterminated this input will assume a high state and stop the printer. It should always be grounded if the printer used does not provide this signal. This signal is also active high.

c) UNIT SELECT, few printers use this signal, the signal is low when the printer is switched off line, the Genie III printer interface will automatically pull this signal high if unused. So no extra connections are required. This signal is active low.

The status bits are assigned as shown below, the same port is used to output data, and input the status bits using the strobe signal for timing.

TABLE 5.7 Printer Port Assignment

Bit	Status input	Data output
7 128	busy	7 (MSB)
6 64	out of paper	6
5 32	unit select	5
4 16	held high	4
3 8	n/c	3
2 4	n/c	2
1 2	n/c	1
0 1	n/c	0 (LSB)

5.2.3 RS232C serial interface

The RS232C interface gives a means of connecting the Genie III to other serial devices, such as serial printers or other computers.

The interface is termed "serial" since the individual data bits are tramsmitted and received one after the other is a serial stream. RS2332C is the most common serial interconnection standard, and this interface is bidirectional, so it can be used to talk and listen to other devices.

The interface system is implemented using a programmable UART (Universal Asynchronous Reieiver and Transmitter). This device has many different communication speeds, and formats, so it needs to be instructed which format to use by the computer program used.

Two functions are controllable, firstly the communication speed (baud rate), may be set between 50 and 38400. (The baud rate is the number of bits per second transmitted so 50 baud transmits 50 bits per second).

Secondly the data format needs to be defined, the type of parity, and the number of start and stop bits to each communicated word.

Baud rate selection is performed by writing the appropriate divisor to the divisor latches in the UART, located at ports E8, and E9 (LSB And MSB respectively). The required divisor can be calculated using the formula

DIVISOR=3,072,000/(BAUD RATE*16)

Details are given in Table 5.8.

TABLE 5.8 UART Band Rate.

Band Rate	Divisor used to Generate 16 x clock (decimal)
50	3840
75	2560
110	1745
134.5	1428
150	1280
300	640
600	320
1200	160
1800	107
2000	96
2400	80
3600	53
4800	40

cont'd Baud Rate

7200	27
9600	20
19200	10
38400	5

maximal läuft er mit
5 . 38400 = 192 000 Baud
aber etwas unruhig

mögliche Baudraten = $\frac{192000 \text{ Baud}}{N}$

Port EC = Modem Control des INS 8250

60	40	20	10	8	4	2	1
Ø	Ø	Ø	Ø	Ø	Ø	RTS	DTR
7	6	5	4	3 . .	2	1	0

nur schreiben

PORT EE = Modem Status des INS 8250

80	40	20	10	8	4	2	1
		DSR	CTS				
7	6	5	4	3	2	1	0

nur lesen

Two sets of control latches are addressed using the ports EA-F and E8-9. The latch set is switched using bit 7 of the line control register the DLAB (Divisor Latch Address Bit). EB

Transmitted and received data is located at port E8, details of the addressable ports are shown in Table 5.9.

TABLE 5.9 Port Address of the UART's accessible registers.

Divisor access = Bit 7 von EB
Latch, bit

DLAB	PORT	REGISTERS
0	E8	receiver buffer (read only) transmitter holding register (write only)
0	E9	interrupt enable *)
X	EA	interrupt identification (read only)
X	EB	line control Betriebsart vorgeben
X	EC	MODEM control Kommando vorgeben } nie lesen!
X	ED	Line status Betriebsartstatus
X	EE	MODEM status Kommandostatus
X	EF	None rücksetzen
1	E8	Divisor Latch (LSB)
1	E9	Divisor Latch (MSB)

NOTE: When defining the settings of the DLAB 0=low 1=high and X=Dont care i.e. low or high. Further details may be found in the INS8250 UART data sheets. S.5-21

System Disk DRV0 DRS1342 TRK 37

enthält CD 31D6 , JP 30 EB lädt nach 2200H

Sys24/Sys Start DRS 1340 LD DE, 300 S
JP 0046

G 30ABH Start Screen mode OR 80 Out EB
Break → REF (RST48)

LOAD SYS24/SYS G 30DA

*) SIO hängt aber nicht an der Interrupt-Line

5.3 INTERFACE II

The interface II board contains the floppy disk interface circuits, there are memory mapped at bank 4. Also provided on this board is the real time clock.

5.3.1 Floppy Disk Drive

The minifloppy disk interfaces are situated on the interface II board. Two disk controller chips are used, one for single density, FD 1771, and the second for double density, FD 1791.

The system can use up to four disk drives of either 5.25 or 8 inches, either single or double sided in single or double density. (8 inches disk drives, single density only)

A disk controller is an intelligent subsystem within the computer, running up to four disk drives via a common 34 way control bus. Only one of the two FDC (Floppy Disk Controller) chips can be in use at any instant so the system cannot be simultaneously in both single and double density modes.

Two sets of control signals are used to organise the FDC's. One set controls the controller paremeters (which FDC is used, which drive is active, which disk side is in use, the size of the drive used, and reads two timing signals from the controller.

The second set communicate directly with the controller itself, giving commands, reading, and writing data.

These two sets of control signals are taken directly from five memory locations, 37E0 and 37EC to 37EF. Locations 37EC, 37EE and 37E0 are used by both sets of signals. Firstly they set the drive specifications when the system is started up, and subsequently they communicate with the drive controller.

Tel 0231 52 81 84 (57400 64)

Die FDC-Clock läuft mit 1 MHz d.h. 30ms langsamster Stepping

5.3.1.1 Drive specifications

The drive specification signals are shown in Table 5.10.

TABLE 5.10 Disk Drive Specification signals.

F8 oder F9 ? Schaltet zwischen FD 1791 und FD 1771 um.

	37EC ("CR")	37EE	37E0
D0	Density		Drive 0
D1			Drive 1
D2			Drive 2
D3	1		Drive 3
D4	1		Side
D5	1	Waiten	(**)
D6	1	Size	INTRQ) these signals
D7	1	1	RTC) are read from the FDC

37E1 ?

37E0 ?

Side: D = INT(2TN+.5) :IF "Seite 2" Then D = D+16. ; D = Drive-Nr.-Maske

NOTE:
Signals shown as 1 at 37EC must be set high when setting density; similarly for 37EE and drive size.

5.3.1.2 Switch bit settings

TABLE 5.11

Density	1=double density	(FD1791 controller)
	0=single density	(FD1771 controller)
Drive select	1=drive selected (not more than one drive may be selected at one time)	
Size	1=8 inch disk drives 0=5.25 inch disk drives	
Side	0=side 0 of the disk drive 1=side 1	
INTRQ	Interrupt request to CPU	von irgendwoher
RTC	Real time clock output (25mS)	

(**) INTRQ löschen
LD A,08H
LD ("CR"),A
Warte 100µsec 1*)
LD A,00H
Warte 100µs 2*)
LD A,("CR")
Warte 100 µsec 3*)

1*) 6µs ; 30-50µsec
2*) ≈ 46 µsec
3*) etwas zeitschon für 1771 u 1779

Vermutung: LD HL,37ECH
LD (HL),0FEH LD (HL),0FFH
Single Density Double Density
INC HL
LD (HL),00H

21 EC 37
36 FE 36 FF
23
36 00

5.3.1.3 Drive communication signals

Direct communication between the CPU and FDC is made via the four registers, 37EC to 37EF according to the following scheme.

Address	Action	Information
37EC	read from FDC	FDC status
	write to FDC	FDC commands
37ED	read from FDC	track register
	write to FDC	track register
37EE	read from FDC	sector register
	write to FDC	sector register
37EF	read from FDC	data register
	write to FDC	data register

A fuller explanation of the operation of the FD1771 and FD1791 disk controller chips can be found in the Genie III Technical Manual or their data sheets.

5.3.2 Real Time Clock

A real time clock is provided on the interface II board, this clock is implemented using a CMOS chip, and is kept running permanently by a battery fitted to the board. The RTC provides a 25ms heartbeat for the system, and is addressed by two CPU ports as shown in table 5.12.

E0H
E1H

TABLE 5.12 Port Assignment for the RTC

	E0RD	E0WR	E1WR
D0	D0	D0	
D1	D1	D1	
D2	D2	D2	
D3	D3	D3	
D4		A0	
D5		A1	
D6		A2	RD
D7		A3	WR

A0, A1, A2 and A3 are register addresses of the clock chip. The chip can only be accessed when the RTC signal is HIGH.

NOTE: RTC is the interrupt signal from the real-time clock.

RTC = Bit 7 von (37E0) siehe 5-15

The clock chip has an internal 4 bit address bus, bits 4-7 of port E0 are used to set this address. Data bits 0-3 of the same port, are used as a bidirectional data bus. The read and write operation of the RTC is controlled from port E1, bit 6 is set when reading from the RTC, and bit 7 when writing from it. Data is available from the RTC as shown in table 5.13.

TABLE 5.13 Functions of the RTC

ADDRESS INPUTS				INTERNAL COUNTER	DATA I/O				DATA LIMITS	NOTES
A_0	A_1	A_2	A_3		D_0	D_1	D_2	D_3		
0	0	0	0	S 1	•	•	•	•	0 ~ 9	S_1 or S_{10} are reset to zero irrespective of input data $D_0 \sim D_3$ when write instruction is executed with address selection
1	0	0	0	S 10	•	•	•		0 ~ 5	
0	1	0	0	MI 1	•	•	•	•	0 ~ 9	
1	1	0	0	MI 10	•	•	•		0 ~ 5	
0	0	1	0	H 1	•	•	•	•	0 ~ 9	
1	0	1	0	H 10	•	•	†	†	0~1 / 0~2	D_2 = "1" for PM, D_3 = "1" for 24 hour format; D_2 = "0" for AM, D_3 = "0" for 12 hour format
0	1	1	0	W	•	•	•		0 ~ 6	
1	1	1	0	D 1	•	•	•	•	0 ~ 9	
0	0	0	1	D 10	•	•	†		0 ~ 3	D_2 = "1" for 29 days in month 2; D_2 = "0" for 28 days in month 2 (2)
1	0	0	1	MO 1	•	•	•	•	0 ~ 9	
0	1	0	1	MO 10	•				0 ~ 1	
1	1	0	1	Y 1	•	•	•	•	0 ~ 9	
0	0	1	1	Y 10	•	•	•	•	0 ~ 9	

(1) • data valid as "0" or "1"
blank does not exist (unrecognized during a write and held at "0" during a read)
† data bits used for AM/PM, 12/24 HOUR and leap year

(2) If D_2 previously set to "1" upon completion of month 2 day 29, D_2 will be internally reset to "0"

5.4 PSU and Motherboard

The Genie III has a switching power supply to minimise weight and heat generation. This supply should not be opened whilst the machine is connected to the power outlet, and is not suitable for supplying any ancillary equipment either than that designed specifically for the GENIE III.

The motherboard has a 60 way connection bus, all 5 slots in this bus are identical.

The bus signals are given in Table 5.14

TABLE 5.14 Bus Signals.

PIN	SIGNALS	PIN	SIGNALS
1	-12V	2	+12V
3	GND	4	GND
5	+5V	6	$\overline{NMI}$
7	$\overline{RESET}$	8	$\overline{BA}$
9	$\overline{SHLTA}$	10	RESET (SW)
11	$\overline{PINT}$	12	$\overline{WR}$
13	16 MHzCK	14	$\overline{RD}$
15	$\overline{\emptyset SEL}$	16	D3
17	$\overline{IORQ}$	18	D2
19	$\emptyset$ (CPU CLOCK)	20	D4
21	$\overline{M1}$	22	D1
23	$\overline{PWAIT}$	24	$\overline{MREQ}$
25	$\overline{PHOLD}$	26	$\overline{ADDBS}/\overline{DODBS}$, $\overline{C/CDBS}/\overline{STADBS}$
27	$\overline{BK\emptyset DIS}$	28	D5
29	$\overline{RFSH}$	30	D0
31	$\overline{KB}$	32	D6
33	$\overline{BK2}$	34	D7
35	$\overline{BK3}$	36	FA
37	$\overline{BK4}$	38	$\overline{BOUT}$
39	$\overline{BIN}$	40	A15
41	LPSTB	42	A13
43	A14	44	A11
45	A12	46	A1
47	A0	48	A3
49	A2	50	A4
51	A10	52	A6
53	A5	54	A7
55	A9	56	+5V
57	A8	58	NC
59	GND	60	-5V

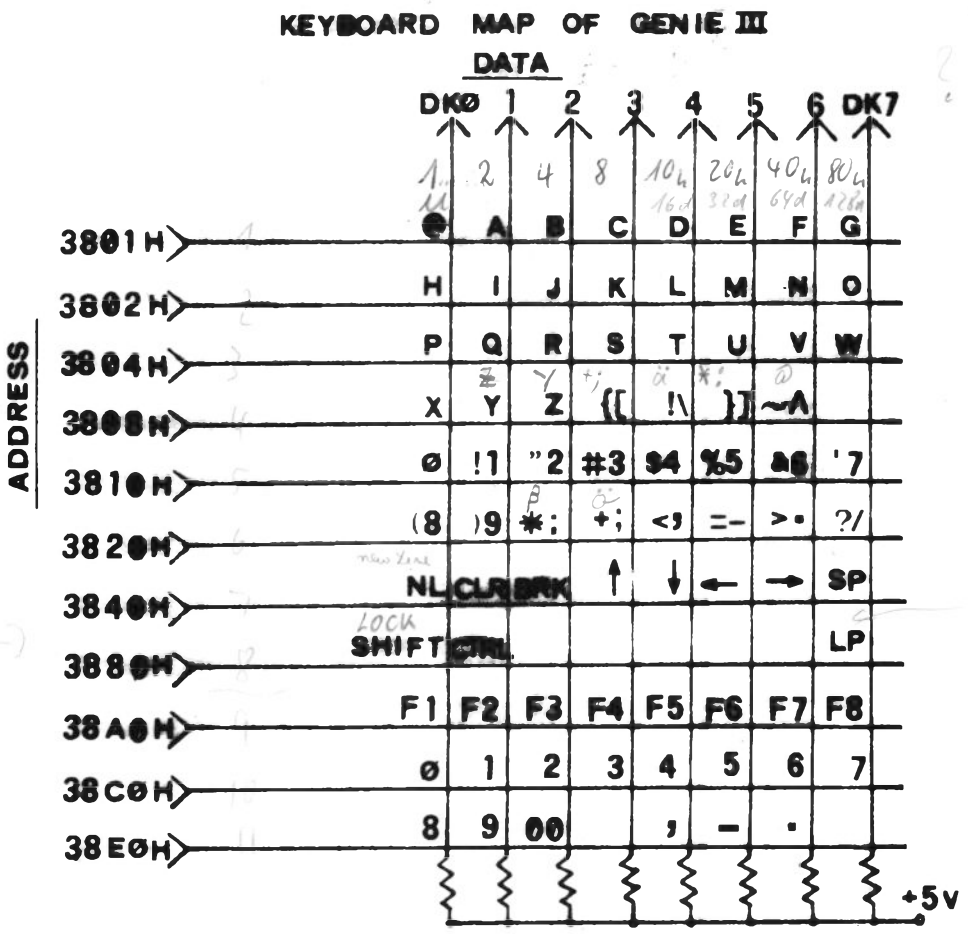
5.5 Monitor

The Genie III has a high performance green phosphor monitor, a brightness control for this is porvided in the rear of the case. For the best display the monitor should be adjusted so that the background is not quite bright.

5.6 Keyboard.

The Keyboard unit is separate from the main console, and is addressed as a matrix from memory bank 4. A map of the keyboard unit is given in figure 5. The keyboard is addressed between 3801 and 38E0, key contact is detected by continuously scanning these addressees and detecting a change in the status of the data lines.

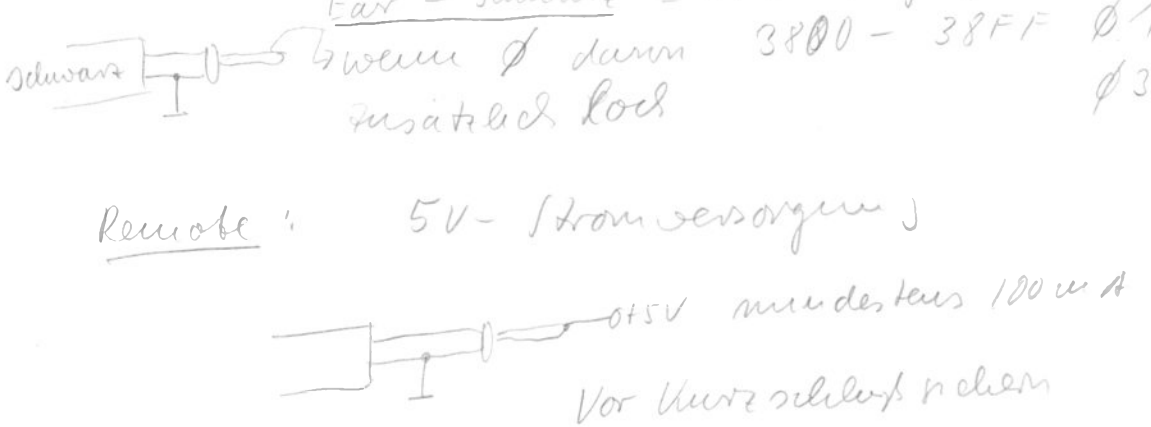
FIGURE 5.3 Keyboard map



A small speaker is built into the keyboard unit of the Genie III, this can be used within programs to provide prompts, and audible warnings.

The sounds are produced by accessing address 3860, the simple example shown below runs in BASIC under NEWDOS and produces a single tone. A pulse is produced in the sound unit each time address 3860 is accessed, the sound pitch can be changed by accessing this address at different rates, this will need to be done via machine code to achieve different sounds.

```
10 FOR N=1 TO 1000 : POKE &H3860,0 : NEXT N
```



5.7 CONNECTION DIAGRAMS

5.7.1 Connector layout

FIGURE 5.4

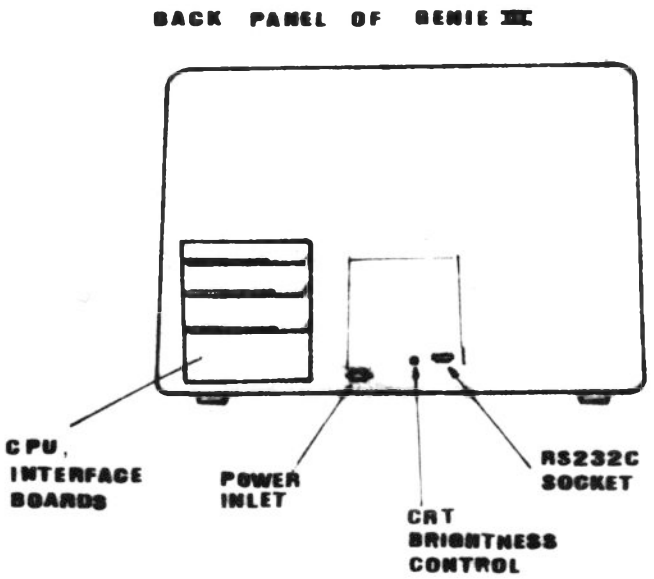
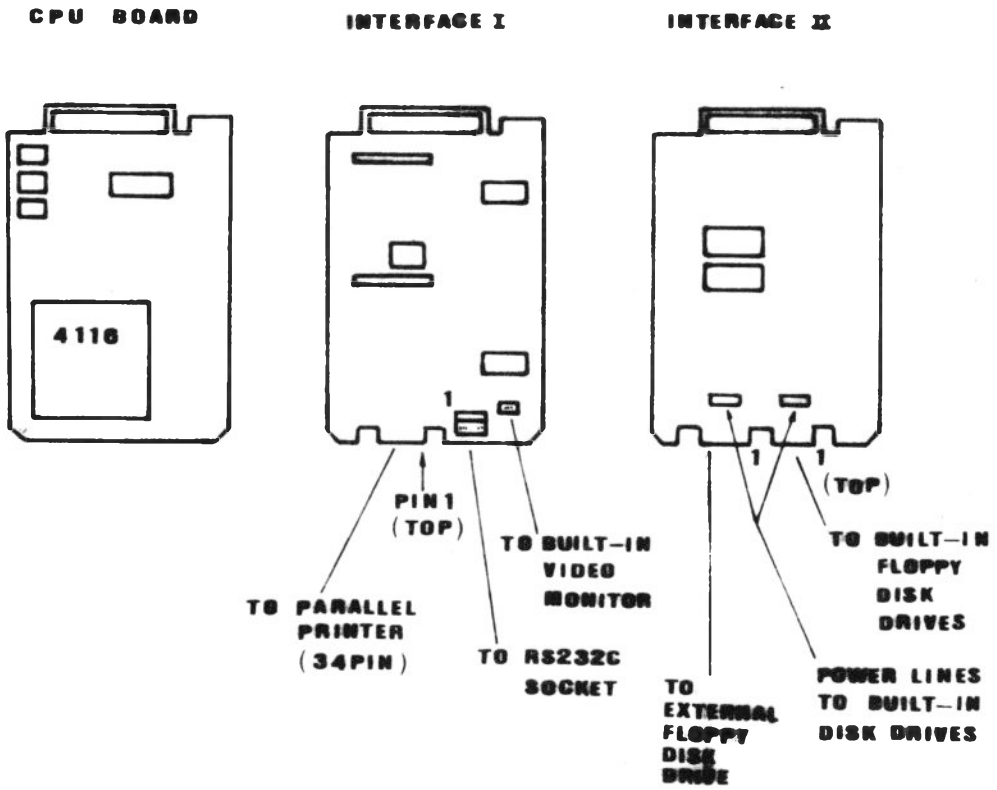


FIGURE 5.5



Port FD enter
RST 48

```
F056:  F5          PUSH AF
F057:  3A 45 FF    LD   A,(FF45)
F05A:  07          RLCA
F05B:  38 17       JR   C,F074
F05D:  F1          POP  AF
F05E:  F5          PUSH AF
F05F:  FE 08       CP   08
F061:  28 0E       JR   Z,F071
F063:  CD 00 ED    CALL ED00
F066:  DB FD       IN   FD
F068:  CB 7F       BIT  7,A
F06A:  20 F7       JR   NZ,F063
F06C:  F1          POP  AF
F06D:  D3 FD       OUT  FD
F06F:  00          NOP
F070:  F5          PUSH AF
F071:  F1          POP  AF
F072:  00          NOP
F073:  C9          RET
F074:  F1          POP  AF

COMMAND?



ED30:  00          NOP
ED31:  DB FD       IN   FD
ED33:  32 45 FF    LD   (FF45),A

COMMAND?
```

Port FD

5.7.2 Parallel printer (Quick Brüter von Basic OK)

The Genie III is supplied with a parallel printer interface conforming to Centronics parallel connection standards. The connector for this interface is on the Interface I card, and is a 34 way edge connector. The pin assignments are shown below, pin 1 on the connector cable is normally marked with a red stripe. The matching cable for this interface is cable type number EG3016C.

siehe vom 5-25

TABLE 5.15 Parallel Printer Pin Assignment.

PIN	SIGNAL	PIN	SIGNAL
1	DATA STROBE	2	GND
3	D0	4	GND
5	D1	6	GND
7	D2	8	GND
9	D3	10	GND
11	D4	12	GND
13	D5	14	GND
15	D6	16	GND
17	D7	18	GND
19	NC	20	GND
21	BUSY	22	GND
23	OUT OF PAPER	24	GND
25	UNIT SELECT	26	NC
27	NC	28	NC
29	NC	30	NC
31	NC	32	NC
33	NC	34	NC

VIEWED FROM REAR OF CABINET

an das Bord mit den beiden RS232 und CRT Kabeln

von hinten

von hinten gesehen: Flachbandkabel → nach unten rote 1-Leitung nach rechts

5.7.3 RS232C connector

The Genie II RS232 serial interface is connected via a 9 way wafer connector to a standard DB25S socket on the back panel of the computer, the pin assignments for this socket are shown below. The RS232C connector is fully buffered.

For detailed information on the method of using this interface see section 5.2.3 Page 5-12

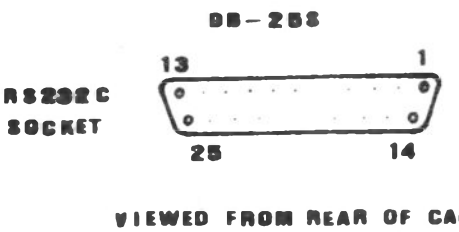
TABLE 5.16 Pin Assignment for RS-232C socket.

PIN	SIGNAL	DESCRIPTION
1	PGND	Protective Ground
2	TXD →	Transmit Data
3	RXD ←	Receive Data
4	RTS →	Request-to-send
5	CTS ←	Clear-to-send
6	DSR ←	Data set ready
7	SGND	Signal Ground
8	CD ←	Carrier Detect
20	DTR →	Data Terminal Ready

Seriale Gerätschaft

S 5-12

9 Pins



5.7.4 Disk drive connections

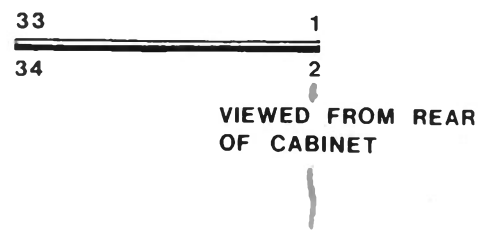
Two connectors for disk drives are provided in the Genie III, one for internal drives, and the second for external drives. The signals to both connectors are identical, though two additional power connectors are provided for use with internal drives. The connector pin assignments are shown below.

To connect external drives a cable type EG3018C is required.

The drive control system will support single or double density, single or double sided, and 40 or 80 track operation with no hardware changes. The DOS will of course need to be changed to suit the disk configuration.

TABLE 5.17 Pin Assignment for 34-pin Floppy Disk Drive Card Edges.

PIN	SIGNAL
odd pins	GND
2	NC
4	NC
6	SIDE SELECT
8	INDEX / SECTOR
10	DS 1 }
12	DS 2 } Drive select 1,2 and 3
14	DS 3 }
16	MOTOR ON (active low)
18	DIR SEL (step in/out)
20	STEP
22	WRITE DATA
24	WRITE GATE
26	TRACK 00
28	WRITE PROTECT
30	READ DATA
32	DS 4 (Drive select 4)
34	NC.



hch P2-11

SECTION SIX

DIAGNOSTIC ROUTINES

6/ DIAGNOSTIC ROUTINES.

There are some diagnostic routines stored in the EPROM (Erasable Programmable Read-only Memory) on the CPU Board. These routines consists of a tiny monitor, RAM memory testing, video circuit testing and testing on minifloppy disk drives. They are useful especially to the computer servicing people and to the users themselves as well. It helps you fix the problems and fault, and then have them repaired more quickly. You will find it enjoyable to troubleshoot the computer system yourself.

Nevertheless, these diagnostic routines are only troubleshooting aids. You are still urged to have the system repaired by the servicing people, and you can describe the faults according to the diagnostic routines.

TEST NUMBER	TEST FUNCTION
0	tiny Monitor (machine language)
1	Bank 0 RAM Test.
2	Video Test.
3	Single-density Single-sided Drive Test.
4	Single-density Double-sided Drive Test.
5	Double-density Single-sided Drive Test.
6	Double-density Double-sided Drive Test.

6.1 Enter and Exit from the Diagnostic Routines.

To enter these routines, depress the keys

RESET - n

where n is an integer from 0 to 6, and each number corresponds to one specific test.
Press the number key and the RESET keys simultaneously, and first release the RESET keys and then the number key.

NOTE: As one of the routines is just entered, the number n will appear at the top left corner of the screen.

Depress the BREAK Key to exit from any routines (except the Video Test) to the display mode of the Tiny Monitor.

You can exit to 'NEWDOS READY' just by pressing the two RESET keys only.

6.2 RESET - 0 : Tiny Monitor.

This routine allows us to examine, modify and execute memory contents of the BOOT ROM (but no modification), and most of the RAM memory. (We cannot examine and modify the RAM memory addresses which are occupied by the ROM).

There are three modes of operation : Display mode, exchange mode and run mode.

(1) Display mode

Type mmmmD

where mmmm is the starting memory location in hexadecimal to be examined.

A line of 16 bytes of consecution memory contents starting from location mmmm will be displayed. Press NEW LINE key (or any key other than the E key or G key) to display next 16 bytes of memory contents.

Example:

34FED FF FF 1E 2D 33 28 4A FE F0 2C 35 0E 01 D0 1E 2C

location content

(2) Exchange Mode

Type xxxxE

where xxxx is the starting memory location in hexadecimal to be modified.

The address of the memory location and its content will be echoed, and then you can type in the new data (two digits) in hexadecimal. The content of the next location will be displayed and the system waits for your new data entry.

This exchange mode can be terminated by pressing NEW LINE or BREAK key.

Example:

(3) RUN mode

To execute a program starting from a specific address, type

bbbbG

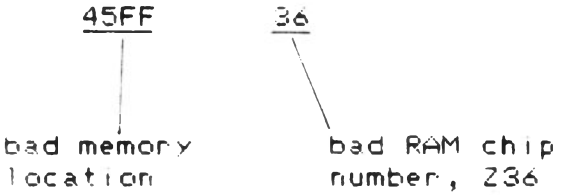
where bbbb is the starting address of execution.

6.3 RESET - 1 : RAM Test (Bank 0)

This routine tests the operation of the 64K byte RAM chips and their interfacing circuit which contains the address decode logic and data buffers. It checks that every bit of the memory can properly be written or read a one/zero without error.

Defect messages are as follows. When any error occurs, the test routine will stop and display the bad memory location and RAM chip number (from Z31 to Z62).

Example:



Press NEW LINE or any other keys to proceed to test other memory locations.

Note that if many RAM chips are reported bad (or dead), then the fault may be in the address decode logic rather than the memory chips.

6.4 RESET - 2 : Video Test.

This routine checks the video interface circuits, video RAM and the character generator.

As the system has just entered this test, you may come across two fault message if there are the faults.
They are

'BANK SWITCHING ERR' and 'BAD RAM'.

If neither of these faults are present, the test will proceed to display cycling patterns of all the available the characters and graphics. You can press the BREAK key to hold a pattern of the characters and graphics. Then individual characters / graphics may be examined and see if they are correct.

6.5 Minifloppy Disk Drive Tests.

These tests check the two built-in disk drives with various storage formats such as single/double side, and single/double density. Note that the two drives must be of the double track type.

The following message will appear on the screen.

SINGLE (or DOUBLE) SIDE

SINGLE (or DOUBLE) DENSITY

TEST COMPLETED if the drives under test are all right.

This test routine will give the error messages as below.

DISK ERR AT (track number) (drive number)

where drive number is 0 or 1.

The test will stop at the disk error, and you are required to press NEW LINE or any other keys to continue the test.

To enter these drive test routines as follows.

(1) RESET - 3 : single density, single side.
(2) RESET - 4 : single density, double side.
(3) RESET - 5 : double density, single side.
(4) RESET - 6 : double density, double side.

Normally, the two built-in floppy disk drives are of the double density, single side and double track types.

PRECAUTION: avoid depressing the RESET keys to reset the System when the disk drive is reading or writing (that is, the LED on the drive is ON.) Try to open the door of the disk drive, and the LED will turn OFF soon. Then, remove the disks and switch off the computer.

APPENDIX

A. More Information on Selecting Disk Drive Specifications:

Other versions of the PDRIVE command are briefly listed below. You can read the details from NEWDOS/80 version 2 Manual .

The command is

PDRIVE,Ø,dn2,TI=m,TD=n,TC=r,SPT=c,A

(1) Ø : system diskette in drive Ø.
(2) dn2 : the drive number of which the control information on the system diskette is to be updated.
(3) TI=m : type of disk drive interface -

	DRIVE		FORMATTED DISK	
m	density	track	density	track
A	single	single	single	single (TC=4Ø MAX)
A	single	double	single	double (TC=8Ø MAX)
AL	single	double	single	single
CK	double	double	double	double
CKL	double	double	double	single

(4) TD = n : type of drive specification.

DISK			
n	inch	density	side
A	5	single	single
C	5	single	double
E	5	double	single
G	5	double	double
B	8	single	single
D	8	single	double
F	8	double	single
H	8	double	double

(5) TC = r : number of tracks on the disk.

r	number of tracks	*TI=K
35	35	No
40	40	No
m	m	No
34	35	Yes
39	40	Yes
m-1	m	Yes

*NOTE: TI contians the K flag eg. CK, CKL.

(6) SPT = c : number of sectors/track.

TD	c (max)
A	10
B	17
C	20
D	34
E	18
F	26
G	36
H	52

(7) A : if and only if no errors were found during the checking of the specifications for all the drives, then these new specifications are loaded into the main memory as the present controlling data for those drives.

GENIE III

EG 3200

ADDITIONAL UTILITIES

I. Programmable Function Key Generator.

II. RS-232C Utility.

III. Programmable Graphic Character Generator.

IV. Double-side Disk Generator.

EACA COMPUTER.
1982.

I. PROGRAMMABLE FUNCTION KEY GENERATOR

(1) Introduction

This utility allows us to program or define eight function keys, F1 - F8. The predetermined key functions can be messages, remarks, commands and short programs. The utility helps us save time for typing programs and commmands into the computer. Also we can execute some predefined short programs just by hitting the corresponding function keys. It is useful to the beginners and those who have not yet been familiar with the Genie System.

The function key definitions are stored on the system disk, and they can be changed at any time. There is a maximum space of 255 characters available to store the 8 function key definitions.

2. To enter this Function Key Generator.

With the computer in the DOS level, type in

FKGEN64/CMD (NEWLINE) or FKGEN80/CMD (NEWLINE)

We shall see the following message and operation menu.

```
   FUNCTION KEY DEFINITION DISPLAY  FREE SPACE=> 222 CHAR
F1:LD=FUNCTION/TXT.┘
F2:WD=FUNCTION/TXT.Y.┘
F3:                  ↑
F4:                  end sign
F5:
F6:
F7:
F8:


PRESS KEY => "E" - TO ENTER EDIT MODE.     . = <CR>
             "T" - TO TERMINATE TO DOS.
```

The display will show us the definitions of the function keys from F1 to F8. At the top right corner of the screen, we shall see the amount of free space left for more function key definition. Note that each function key definition is terminated by an end sign.

At this stage, there are two operations we can choose.

(a) 'E' - to enter edit mode to enter/modify the key definitions.
(b) 'T' - to terminate to DOS.

The current definitions of the function keys will be stored on the disk when the T key is pressed to exit to DOS. The old definitions on the disk will be overwritten and lost.

3. To Program/Edit the Function Key Definitions.

Enter the Edit mode by pressing the E key.
An editing menu will be displayed as shown below:

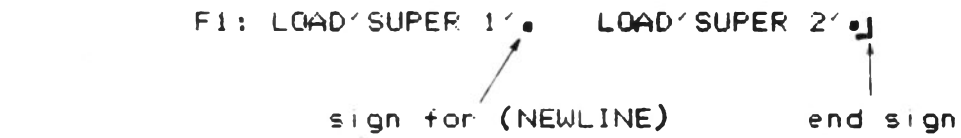
```
     DEFINING FUNCTION KEY                FREE SPACE=> 221 CHAR
CONTROL KEYS : (BREAK)        - EXIT TO DISPLAY MODE
               (CLEAR)        - CLEAR THE CURRENT DEFINITION
               (←,→)          - MOVE CURSOR
               (SHIFT →)      - INSERT A BLANK
               (SHIFT ←)      - DELETE A CHARACTER
               (UP ARROW)     - AUTO INSERT ON SWITCH
               (DOWN ARROW)   - AUTO INSERT OFF SWITCH
               (F1 - F8)      - SELECT/SWITCH FUNCTION KEY

F1:L D=FUNCTION/TXT.
```

CONTROL KEYS	DESCRIPTION
(F1 - F8)	Function key select.
(← , →)	Move cursor, left or right.
(CLEAR)	Clear the current key definition.
(SHIFT →)	Insert a blank at the cursor position.
(SHIFT ←)	Delete a character at the cursor position.
(Up Arrow)	Auto insert ON.
(Down Arrow)	Auto insert OFF.
(BREAK)	Exit to the definition display mode.

1) Funtion Key Select (F1 - F8).

Before we can edit the key definitions, we must select the function key to be edited. Suppose we want to modify the definition of key F1. We need only to press the key F1 and the current definition of F1 will be displayed. There is an end sign at the end of a Key definition.

Example:



Note that a message 'NO FUNCTION IS DEFINING' will appear if we try to modify a key definition without selecting a function key.

We can just press F4 , in case, the definition of F4 is to be edited following F1.

2) Clear a Key Definition.

We can erase a whole key definition by hitting the Key CLEAR , and the display will be, for instance,

3) Insert Characters.

Normally, we cannot extend a key definition beyond the end sign except using the keys SHIFT - → or ↑ (auto insert).

(a) SHIFT - →

A blank will be obtained at the right of the cursor when SHIFT - → are pressed simultaneously. Then, we may type in a new character at the blank.

(b) 'Auto Insert' ON/OFF

Turn on Auto Insert by hitting [↑] . Then we may enter new characters, and the end sign will shift to the right automatically.
Recall that a Key definition can be extended to the limit that the sum of the eight definitions is 255 characters maximum.
There is a bright spot in front of (UP ARROW) in the editing menu to indicate that Auto Insert is turned ON. Auto Insert can be turned OFF by pressing the Key [↓] (DOWN ARROW).

Example: The Key definition F2 will be edited. Assume that the computer has entered the definition editing mode.

(1) Press the Key F2. The current definition (F2) will be displayed.

```
F2: BASIC ▪ 10 INPUT "IT WILL REDUCE TYHING";A$ ▪J
    ↑                ↖                          ↑
  cursor          sign of (NEW LINE)          end sign
```

(2) Move the cursor by [←] and [→] .

```
F2: BASIC ▪ 10 INPUT "IT WILL REDUCE TYHING";A$ ▪J
                                        ↑
                                      cursor
```

(3) Delete the character H by pressing [SHIFT] - [←], insert a blank by [SHIFT] - [→] and then type in character p.

```
F2: BASIC. 10 INPUT "IT WILL REDUCE TYING ";A$.J

F2: BASIC. 10 INPUT "IT WILL REDUCE TYPING";A$.J
                                    ↑
                                  cursor
```

(4) Turn ON 'Auto Insert' by pressing [↑], move the cursor to the end of the definition, and then type in additonal characters.

```
F2: BASIC. 10 INPUT "IT WILL REDUCE TYPING";A$.J
                                          ↑
                                        cursor

F2: BASIC. 10 INPUT "IT WILL REDUCE TYPING ERROR
AND TIME";A$.J
```

(5) Turn OFF 'Auto Insert' by pressing [↓] key.

(6) If other key definitions, say F3, are also required to be edited, press F3 and do the editing work as in F1.

(7) As all key definitions have been edited, press the key BREAK to exit from the edit mode to the definition display mode.

(8) Press the T key to exit to the DOS level, and then the key definitions will be updated and stored in the disk. Should we not want to alter the old definitions in the disk, place a label over the write-protect notch on the disk.

4. To Apply the Predefined Function Keys.

There are two advantages in using the function keys. First, program typing becomes more efficient. Second, we can perform some sequence of commands automatically.

Example 1:

Assume F4 is defined as below.

```
F4: PRINT @ 10, "THE MATHEMATICAL MANIPULATION OF
STEP";N;"PRODUCES THE FOLLOWING RESULTS:"■
AN = INT (AN/2)*2■    AP =RND(INT(AP/2)*2 + 1)■
```

We may enter BASIC program through the keyboard in this way. The computer has already been in DISK BASIC.

```
AUTO
10 REM RESULT OF NUMERIC DATA PROCESSING
20 [F4]
```

Then, it will become

```
10 REM RESULT OF NUMERIC DATA PROCESSING
20 PRINT @10, "THE MATHEMATICAL MANIPULATION OF STEP"
;N;"PRODUCES THE FOLLOWING RESULTS:"
30 AN = INT(AN/2)*2
40 AP = RND (INT(AP/2)*2 +1)
50
:
:
```

EXAMPLE 2:

A set of disk files are to be copied into several diskettes. A function key can be defined as below.

```
F8 : COPY TDKC1/CMD:0 TDK2/CMD:1■
     COPY TDKC1/CMD:0 TDK2/CMD:2■
     COPY TDKC1/CMD:0 TDK2/CMD:3■
     COPY SUPER/BAS:0 :1■   COPY SUPER/BAS:0 :2■
     COPY ZFORM/CMD:0 :2■   COPY ZFORM/CMD:0 :3■┘
```

The computer is assumed to be in NEWDOS/80 version 2.

Just press the key F8 , and then the system will perform the disk copying operation automatically in the order specified by the key definition of F8. These function keys can be defined by senior staff, and the computer operator's work is much simplified especially wonderful to the green horn.

II. RS232C UTILITY

This utility allows us to define the communication data format and baud rate of the programmable RS232 interface within Genie III. It provides a simple communication between two microcomputers or terminals.

More precisely, it is a dumb terminal routine in which keyboard entries from terminal I (Genie III) via the RS232 interface to terminal II (or another Genie III system) and displayed, and incoming data will be displayed on the screen of terminal I. Both terminal I and II can be data receiver and sender.

This rountine can be used as the basis of a more advanced communication system.

(1) To Enter this RS232C Utility

With the computer at the DOS level, type in

RS/CMD (NEW LINE)

Then, an operation menu will appear as below.

```
          ***  RS232 UTILITY  ***

        <F> COMMUNICATION FORMAT
        <B> BAUD RATE SELECT
        <S> START TERMINAL COMMUNICATION
        <R> EXIT TO DOS
```

NOTE:

** PRESS "BREAK" TO EXIT **

DEFAULT FORMAT:

** 8 BIT WORD LENGTH, 1 STOP BIT, EVEN PARITY **

(2) To Select Communication Data Format

The selectable formats :

Word Length : 5, 6, 7 or 8 bits.
Stop Bit : 1, 1 1/2 or 2 bits.
Parity Bit : even, odd or nil.

As the computer is at the operation menu level, press the F key, and then the following messages will appear in sequence.

```
      ***  COMMUNICATION FORMAT SELECT  ***
WORD LENGTH SELECT (5,6,7,8) BITS ?8
STOP BIT 1.0, 1.5, 2.0 (A,B,C) ?A
PARITY EVEN, ODD, NO (E,O,N) ?E
```

Press (BREAK) to exit to the operation menu.

(3) To select the Baud Rate of Data Transfer

The software selectable baud rates range from 50 to 38400 bits per second with 17 choices.

As the computer stays at the operation menu, press the B key, and then a list of baud rates will be displayed. You are requested to enter the corresponding code of baud rate.

** BAUD RATE SELECT **

CODE	BAUD RATE	CODE	BAUD RATE
0	50	8	1800
1	75	9	2000
2	110	A	2400
3	134.5	B	3600
4	150	C	4800
5	300	D	7200
6	600	E	9600
7	1200	F	19200
		G	38400

INPUT BAUD RATE CODE ?? 7

↑ code entered

Press (BREAK) to exit to the operation menu.

(4) To Start Terminal Communication.

As the computer is at the level of operation menu, press the S key to start the data transfer between two terminals. The information entered through the keyboard of one of the two terminals will appear on both video display units of the terminals.

Extra routines are required to achieve practical RS232 communication.

Press (BREAK) to exit to the operation menu.

(6) To Exit from this Utility to DOS.

While the computer is at the operation menu level, press the R key to leave this RS232 utility and return to DOS.

III. User Programmable Graphic/Character Generator

(1) Introduction

This utility routine together with the optional card of programmable graphics adaptor reinforces the character generator chip by facilitating a programmable graphics / character generation. There may be more than one programmable character set. Different character sets can be stored in a disk with different filenames. A certain set of characters are selected by loading that file into the video memory (for programmable graphics / characters). The following sections will show how a graphics / character pattern is programmed. Note that each character set has 64 graphics characters.

(2) To Enter the Programmable Graphics / Character Mode.

When the computer stays in the DOS level, load and execute the utility routine from disk by typing CHRGEN64/CMD or CHRGEN80/CMD where CHRGEN64/CMD is for 64 x 16 mode, the CHRGEN80/CMD is for 80 x 24 mode. A menu of operations will be displayed on the screen as listed below.

```
MENU:
"C"  -  CREATE A NEW CHARACTER SET
"E"  -  ENTER EDIT MODE TO BUILD / MODIFY CHARACTER
"L"  -  LOAD A SET OF CHARACTER
"T"  -  TERMINATE TO DOS
```

Whatever operation of the menu is selected by pressing the corresponding key, a header will appear in front of that operation in the menu. For example, 'E' is depressed.

The display will be:

```
MENU :
"C"  -  CREATE A NEW CHARACTER SET
"E"  -  ENTER EDIT MODE TO BUILD / MODIFY CHARACTER
"L"  -  LOAD A SET OF CHARACTER
"T"  -  TERMINATE TO DOS

FILE NAME: _
           ↑
           |
         cursor
```

(3) To Create a New Graphic / Character File

Before we build a new character set, a blank file going to store the character set has to be created. This is done by hitting the C key (referring to the operation menu above), and typing in the filename of the new character set.

For example:

```
MENU:
"C"  -  CREATE A NEW CHARACTER SET
:
:
:
FILE NAME : JAPAN /CHR
                  |
                  entered by the user.
```

NOTE: We can skip this step for existing character sets.

(4) To Build / Modify a Graphics / Character Set

The operation menu allows us to build a new character set and to edit or modify an existing character set. To enter the Edit mode, press the E key and type in filename of the character set to be built or edited.
For character set files not yet created, a reminding message will appear as below for a few seconds.

Example:

```
FILE NAME : CHINA/CHR
FILE NOT FOUND, YOU HAVE TO CREATE ONE.
```

For character set already created, an 8 x 12 dot matrix will appear together with a list of editing keys. These editing functions include:-

BLANK (SPACE BAR)	-	Erase or reset a dot at the current cursor position.
. (Full-stop)	-	Plot or set a dot at the current cursor position.
ARROWS (↑ , ↓ ,← ,→)	-	Move the cursor in the dot matrix in the direction of the arrow keys. (Up, Down, Left, Right)
B	-	Display the graphics character of the preceding code.
N	-	Display the graphics character of the next code.
X	-	Exit to the operation menu.

Each file of character set contains 64 graphics characters, to each of which a code number is designated starting from C0H (192 decimal) to FFH (255 decimal). These codes will be used to specify a particular graphics character to be displayed in an application program.

This is simple to program or edit a graphics character with a specific code number. See Fig. 1 below.

```
   76543210  PROGRAMMABLE CHARACTER GENERATOR
0  .+++++++
1  ++++++++  CODE NUMBER => 192 DEC
2  ++++++++                 OR C0 HEX
3  ++++++++
4  ++++++++   KEY       FUNCTION :
5  ++++++++   BLANK   - ERASE A DOT
6  ++++++++   .       - PLOT A DOT
7  ++++++++   ARROWS  - MOVE CUSOR (UP,DOWN,LEFT,RIGHT)
8  ++++++++   B       - LOAD BACK LAST CODE
9  ++++++++   N       - LOAD NEXT CODE
A  ++++++++   X       - EXIT TO MENU
B  ++++++++
              CHAR SHAPE ==>  .
```

Fig. 1 Programming a Graphics Character.

1) Set the code number of the graphics character to the desired number by the B key (backward) and the N key (advance).

2) Move the cursor by the arrow keys to the position of a dot to be edited.

3) Set or reset a dot in the dot matrix at the current cursor position by the '.' key (SET) and the space bar (RESET). Note that the character is also displayed with the actual size on the right hand side of the message 'CHAR SHAPE' as in Fig. 1.

4) As a graphics character has been edited, proceed with next character of the code number set by the B key and the N key. Recall that a character set can have a maximum of 64 graphics characters.

5) When all graphics characters have been programmed or edited, press the X key to exit to the menu level. The file of the character set will be transferred to and stored in a disk. If the disk is incidentally write-protected, then an error message will appear as below.

DISK ERROR : PRESS "M" TO MENU, "E" TO EDIT MODE

If the M key is depressed, the computer will get back to the operation menu, and the edited or programmed character set will be lost, that is, without changes to the old character set. In this case, you have to enter or edit the character set again.

If the E key is depressed, the computer will go back to the Edit Mode, and the edited or programmed character set will remain there. You can try to press the X key again as soon as the Disk Error has been cleared. In this case, the write protect tab on the disk has to be removed. Then, the character set file in the disk will be edited or updated.

As all files of character set have been built and edited, we may return to the DOS level by hitting the T key.

(5) Applying the Graphics Character Set in Video Display

Before we can use a certain graphics character set in video display, that character set must be loaded into the video memory (the part for programmable graphics) from disk. Hence, we have to enter the programmable graphics/character mode. With the computer at the DOS level, type in CHRGEN80/CMD or CHRGEN64/CMD. Once the operation menu level is entered, press the L Key, and type in the filename of the character set to be used. Press the T key to exit to the DOS level. Then, the character set is resident, which enables those graphics characters to be displayed.

There are two ways to display a graphics character of the resident character set in DISK BASIC. Refer to Table 1. (5.3-8)

1) CHR$(n) - n is the code number of a graphics character set.
Example:

```
10 PRINT CHR$(195) : REM GRAPHICS CHR OF CODE 195
READY
>RUN
*           (graphics character of code 195)
```

NOTE: This way is valid only for 80 x 24 mode.

2) POKE a,n - a is the address of video memory, and n is the code number of a graphics character of a resident character set.
NOTE: a=3000 - 3FFFH only.

Example:

```
10 POKE 16128, 195 : REM PRINT GRAPHICS CHR OF
CODE 195
READY
>RUN
*                (graphics character of code 195
                 at the position of the screen
                 corresponding to the video RAM
                 location 16128 (decimal) or
                 3F00H.
```

chr$(23) switched out for this one CHR$

		32	33 !	34 "	35 #	36 $	37 %	38 &	39 '
40 (	41)	42 *	43 +	44 ,	45 -	46 .	47 /	48 0	49 1
50 2	51 3	52 4	53 5	54 6	55 7	56 8	57 9	58 :	59 ;
60 <	61 =	62 >	63 ?	64 @	65 A	66 B	67 C	68 D	69 E
70 F	71 G	72 H	73 I	74 J	75 K	76 L	77 M	78 N	79 O
80 P	81 Q	82 R	83 S	84 T	85 U	86 V	87 W	88 X	89 Y
90 Z	91 [	92 \	93]	94 ^	95 _	96 `	97 a	98 b	99 c
100 d	101 e	102 f	103 g	104 h	105 i	106 j	107 k	108 l	109 m
110 n	111 o	112 p	113 q	114 r	115 s	116 t	117 u	118 v	119 w
120 x	121 y	122 z	123 {	124 |	125 }	126 ~	127		

Table 1. BASIC Function to use the Character set.

64 x 16 mode	80 x 24 mode
1. POKE a,n where a= address 3C00-3FFFH (video RAM) n=graphic code, C0-FFH (i.e. 192-255)	1. POKE a,n where a= address 3C00-3FFFH (video RAM) n=graphic code, C0-FFH
	2. CHR$(n) displays the graphic at the current cursor position, where n = graphic code, C0-FFH

Poke a,n:

0 □
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IV. DOUBLE-SIDE DISK GENERATOR

(1) Introduction

This double-sided disk generator allows the user to create a double-sided system diskette of NEWDOS/80 version 2. The procedure is very simple because this utility is self-contained by using the NEWDOS chaining function (that is, a sequence of commands and messages in a chain file will be treated as keyboard inputs.)

Before proceed, note the following requirements:

Hardware:

(1) Disk drive 0 must be double density, double track, and single- or double-sided type (typically, TEAC 50E or TEAC 50F).
(2) Disk drive 1 must be double density, double track, and DOUBLE-SIDED type.
(typically TEAC 50F or other double-sided floppy disk drive).

For the installation of disk drives, you are urged to hear the advice from your local dealer.

Software:

(1) The GENIE III system diskette must contains two files, namely, DIR/DBL and DBLSIDE/JCL. It can be checked by the DIR command.

This diskette should be double density and double track type, and for safety, be one of several back-up system diskettes.

Now, you may proceed as below.

1. Place the NEWDOS system diskette into drive 0, and place a blank diskette into drive 1. The blank diskette should be double density and double sided type. Both diskettes should not be write-protected.

2. Press the RESET keys of your GENIE III computer.

3. Type "DO DBLSIDE" NEWLINE.

4. Then, a sequence of messages and commands will appear as follows. Do the simple reply to the computer when asked.

```
NEWDOS/80 READY
DO DBLSIDE

     *****     DOUBLE SIDE DISK GENERATOR     *****
               INSERT A BLANK DISK INTO DRIVE 1

CHAINING PAUSE.  PRESS 'ENTER' WHEN READY TO CONTINUE
PDRIVE 0 1 TI=CK TD=G TC=79 SPT=36 TSR=3 GPL=8 DDSL=17 DDGA=2 A
0*   TI=CK,TD=E,TC=79,SPT=18,TSR=3,GPL=2,DDSL=17,DDGA=2
1*   TI=CK,TD=G,TC=79,SPT=36,TSR=3,GPL=8,DDSL=17,DDGA=2
2*   TI=CK,TD=E,TC=39,SPT=18,TSR=3,GPL=2,DDSL=17,DDGA=2
3*   TI=A,TD=A,TC=35,SPT=10,TSR=3,GPL=2,DDSL=17,DDGA=2
4    TI=CM,TD=E,TC=40,SPT=18,TSR=3,GPL=6,DDSL=17,DDGA=2
5    TI=A,TD=A,TC=35,SPT=10,TSR=3,GPL=2,DDSL=17,DDGA=2
6    TI=CK,TD=E,TC=39,SPT=18,TSR=3,GPL=2,DDSL=17,DDGA=2
7    TI=A,TD=C,TC=80,SPT=20,TSR=2,GPL=2,DDSL=17,DDGA=2
8    TI=C,TD=E,TC=40,SPT=18,TSR=3,GPL=2,DDSL=17,DDGA=2
9    TI=C,TD=G,TC=80,SPT=36,TSR=3,GPL=8,DDSL=17,DDGA=2
```

Gdos System TI = CHK, TD = G, SP = 80, SEC = 36, SKT = 3
EIB = 6, SBIV = 48, AEIV = 6

```
FORMAT 1
STARTING DISKETTE FORMAT
PRESS "ENTER" WHEN DESTINATION  DISKETTE MOUNTED ON DRIVE 1

FORMATTING
VERIFYING
INITIALIZING SYSTEM DATA
DONE

COPY DIR/DBL:0 DIR/SYS:1

COPY 0 1,,CBF,/SYS,NFMT,NDMW
STARTING DISKETTE COPY
COPYING
DONE

     A DOUBLE SIDE DISK HAS BEEN BUILT IN DRIVE # 1.
     COPY YOUR OWN USER FILE(S)
     TRANSFER YOUR FILE CAREFULLY.....


NEWDOS/80 READY
```

5. Now, you have got a double side system diskette in drive 1.

6. You can copy the user files in disk drive 0 onto the double-sided disk in drive 1.
Type

```
COPY,0,1,,CBF,USR,NFMT,NDMW          NEWLINE
```

At this stage, the whole procedure is completed. Do not forget to adjust the PDRIVE data on the two diskettes to match the drives when they are used in other situations. Refer to the GENIE III DOS Manual on PDRIVE command.

This double-side disk generator can be briefly described as follows:

1) Start the chaining function upon the command "DO DBLSIDE".

2) Change the PDRIVE data to suit the double-sided disk.

   PDRIVE,0,1,TI=CK,TD=G,TC=79,SPT=36,TSR=3,GPL=8,
   DDSL=17,DDGA=2

3) Format the blank double-sided disk.

4) Copy the directory from disk in drive 0 onto disk in drive 1.

5) Copy the system files from drive 0 to drive 1 (CBF means copy-by-file).

6) A double-sided system disk is created and can copy user files selectively.

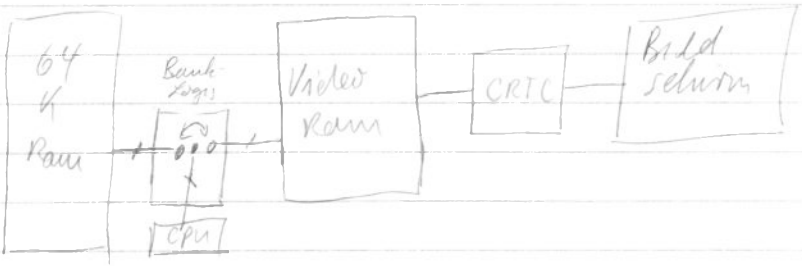
GDOS m = 0h
CP/M m = 7h
Tiny monitor m = Fh

F3 3E m n D3 FA

DI LD A,n OUT (0FAH), A

	BU1 (1)	BU2 (2)	BU3 (4)	BU4 (8)
m = 0,n : X = im Bank ⊙ eingeblendete banks				
	0-7FFF ROM/EPROM	3C00-3FFF Video 0	4000-47FF Video 1&2	37E0-37FF + 3B00-3BFF Keyboard/Disk Contr.
0 (15)	X	X	X	X
1 (14)		X	X	X
2 (13)	X		X	X
3 (12)			X	X
4 (11)	X	X		X
5 (10)		X		X (normal-Betrieb)
6 (9)	X			X
7 (8)				X
8 (7)	X	X	X	
9 (6)		X	X	
A (5)	X		X	
B (4)			X	
C (3)	X	X		
D (2)		X		
E (1)	X			
F (0)				

bei m n = 7 n werden CP/M-Banks eingeblendet
bei m n = F n wird statt des ROM-EPROM der Tiny-Monitor Rom eingeblendet
z.B. 3E, F4, D3, FA, C3, 94, AE springt RST 38 PIO an (Einsprung in Monitor)



7118 für RSM unter CP/M