

# USERS MANUAL

FOR  
VIDEOINTERFACE  
TO HP-IL



 **micronix**



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## Introduction

The MICRONIX video-interface makes it possible to display data from your calculator through the Hewlett-Packard Interface Loop.

The display medium is a monitor displaying 24 x 80 characters (24 lines with 80 characters in each line). This is the most commonly used size for today's computers. Connecting a HP calculator with HP-IL interface to the MICRONIX video-interface enables you to use your calculator as a personal computer.

The video-interface is constructed by DATEC of Denmark in close co-operation with users all over the country. We have put emphasis to demands from our customers that software made for the HP video-interface had to be applicable to the MICRONIX video-interface.

In the following paragraphs it will be demonstrated that the MICRONIX video-interface is fully compatible with the HP video-interface, and that the MICRONIX video-interface contains more features.

MICRONIX video-interface is an open construction allowing a renewal of control programs found in the ROM of the video-interface.

We have chosen this concept, in order to give the users the possibility to upgrade the video-interface if new HP-IL devices should be available.

Every improvement to the video-interface will be announced through our dealers.

The character ROM which is delivered from the start is a standard HP 71/75 ROM. It holds the complete character set of the HP 71/75 - including the 32 special characters, accessible via CTRL or the CHR \$ .

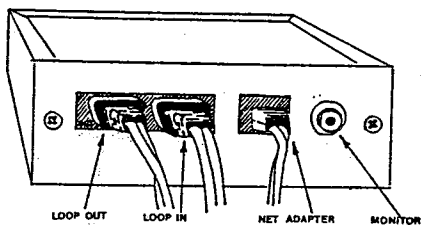
MICRONIX video-interface is delivered with the following accessories:

One Processor Box	One 5V DC adapter
One Monitor cable	One HP-IL cable
One Manual	

MICRONIX Video-Interface is produced by Micro Technic A-S, Odense, Denmark under license from DATEC, Århus, and is marketed by Micronix International ApS, Odense Denmark.

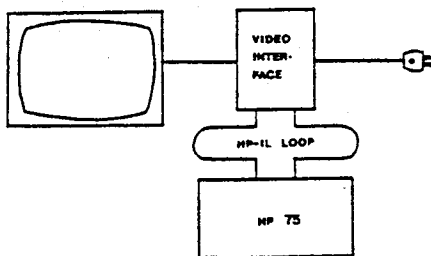
### Installation:

MICRONIX video-interface is ready for use when connected properly to the 5V DC-adapter and the monitor. The cable connections cannot be mixed up, thus securing correct installation.



### HP-IL connection:

Hewlett-Packards Interface Loop may be build up from several devices connected serially into a loop. It is emphasized that a loop must be formed. Each device will exhibit an HP-IL inlet and an HP-IL outlet. The controller must be switched off when connecting the MICRONIX video-interface.

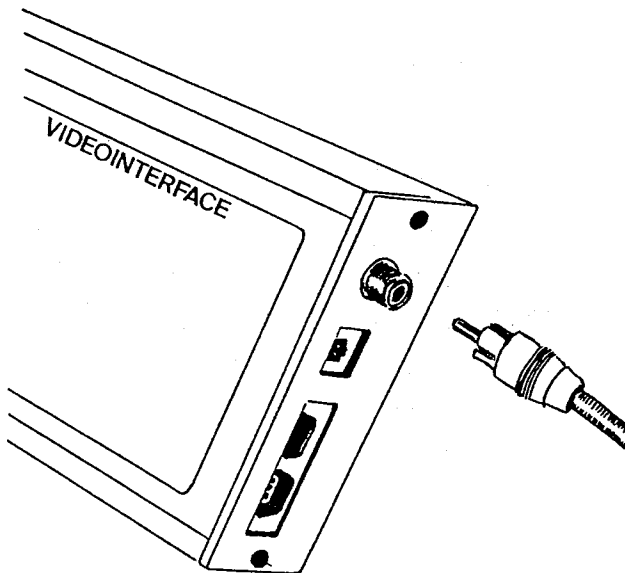


It is advised that the MICRONIX video-interface is inserted as the no. 1 unit in the loop. It is not necessary, but it helps if you always know that device no. 1 is the video-interface.

### Connecting the Monitor:

Connect the MICRONIX video-interface to the monitor by means of the monitor cable enclosed.

The monitor inlet must have a 75 ohms impedance and provide a phono plug. If the latter demand is not fulfilled, the enclosed monitor cable must be provided with another jack, corresponding to the plug found on the monitor. Please ask your dealer or any radio- and televisionshop to solve this problem.



### Operation:

The MICRONIX video-interface is ready for use as soon as it is connected to the HP-IL Loop. It then accepts HP-IL messages and responds to print commands issued by your calculator. Data bytes sent to it will be displayed and recognized. Escape sequences (described on page 7) will act according to their purpose and will, however, not be displayed. Appendices A, B and C explain how calculators HP 75, HP 41 and HP 71 may be operated as controllers.

## TECHNICAL DESCRIPTION

### Internal Design

Character set:

MICRONIX video-interface features 123 displayable characters and 4 non-displayable control characters, each shown below.

0	1	2	3	4	5	6	7	64	65	66	67	68	69	70	71
△	"	×	+	α	β	Γ	Δ	Ⓔ	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ	Ⓕ	Ⓖ
8	9	10	11	12	13	14	15	72	73	74	75	76	77	78	79
BS	σ	LF	λ	μ	CR	τ	ξ	H	I	J	K	L	M	N	O
16	17	18	19	20	21	22	23	80	81	82	83	84	85	86	87
θ	η	ς	ε	π	Α	Β	Ω	P	Q	R	S	T	U	V	W
24	25	26	27	28	29	30	31	88	89	90	91	92	93	94	95
δ	ο	υ	ESC	Σ	#	£	⊗	X	Y	Z	[	\	]	↑	
32	33	34	35	36	37	38	39	96	97	98	99	100	101	102	103
	!	"	#	\$	%	&	'	`	a	b	c	d	e	f	g
40	41	42	43	44	45	46	47	104	105	106	107	108	109	110	111
(	)	*	+	,	-	.	/	h	i	j	k	l	m	n	o
48	49	50	51	52	53	54	55	112	113	114	115	116	117	118	119
0	1	2	3	4	5	6	7	p	q	r	s	t	u	v	w
56	57	58	59	60	61	62	63	120	121	122	123	124	125	126	127
8	9	:	;	<	=	>	?	x	y	z	{		}	~	␣

Table showing the Micronix character set

The 123 displayable characters may be presented either as normal video, i.e. light characters on a dark background, or as inverse video, dark characters on a light background. If the latter is chosen 128 must be added to the character code number applied, or one applies the ESC# function, as will be explained later.

Control characters sent to the video-interface are accepted as commands. They will, however, not be displayed.

The control characters 8, 10, 13 and 27 are commands.

If e.g. control character 10 is received, the cursor moves one line downwards (line feed). Accordingly control character 27 has an escape function, which causes the characters typed after ESCAPE to work as special commands (page 7). The Control character 8, BS (Back space), moves the cursor left until it reaches column zero, row zero.

Control character 13, CR (Carriage return) moves the cursor to column zero.

### Display memory

The Display memory contains 2,048 bytes, thus easily holding the 1,920 bytes needed for the generation of 24 lines by 80 characters. The screen shows only 24 lines at a time, but more lines may be scrolled into the screen-window.

### Controlling the video-interface

The video-interface may be controlled in one of two ways:

1. By means of control characters and the ESCAPE sequences.
2. By means of frames generated by the HP-IL instructionset.

The former is a transfer of data bytes to the video-interface initiated by preprogrammed functions of the controller. The latter employs the HP-IL instructionset which is a set of preprogrammed functions in the controller. Commands and instructions for the control will be found in the following pages.

### Start up:

The video-interface is automatically turned on when the DC adapter is plugged into it. It is in an inactive mode and its default address is set to 31 (auto address unconfigured).

The display is cleared and the cursor is positioned on column zero, row zero.

### Escape characters:

The MICRONIX video-interface responds to 16 escape characters. An escape sequence always starts with Escape (character no. 27) - and is followed by one or more characters defining the instruction. The escape functions are your means to control the display.

They may for instance be:

- clear the display
- position the cursor
- make inverse video

and so on.

The following table shows the escape functions to which the MICRONIX video-interface may respond.

### Escape sequence Instructions

Escape sequence	Character codes	Instruction	Description
ESC A	27 65	Cursor Up	Moves the cursor upwards one line. Cursor will not move past top line.
ESC B	27 66	Cursor Down	Moves cursor downwards one line.
ESC C	27 67	Cursor Right	Moves cursor one position to the right; if activated at column 79, cursor moves to column 0 of the next line.

ESC D	27 68	Cursor Left	Moves cursor one position to the left; if activated at column 0, moves cursor to column 79 of previous line. Cursor does not move past column 0 row 0.
ESC E	27 69	Clear Device	Clears the display memory, moves the cursor to home (column 0, row 0) and displays cursor as a flashing block.
ESC H	27 72	Cursor Home	Moves the cursor to home (column 0, row 0) but does not erase the display.
ESC J	27 74	Clear Display from Cursor	Clears the display from the cursor onwards until reaching the bottom of the screen.
ESC K	27 75	Clear Line from cursor	Clears the line from the cursor position onwards to the beginning of next line.
ESC N	27 78	Insert Character	Inserts character from cursor position.
ESC O	27 79	Delete Character	Deletes character from cursor position.
ESC Q	27 81	Insert Cursor	Displays cursor as a flashing underline.
ESC R	27 82	Replace Cursor	Displays cursor as a flashing block.

ESC<	27 60	Cursor off	Cursor is not displayed, but is still being updated.
ESC>	27 62	Cursor on	Displays cursor.
ESC%XY	27 37 mn	Cursor to address m,n	Moves cursor to display address (m,n) where m and n are line numbers and position, respectively $0 \leq m \leq 79$ $0 \leq n \leq 23$
ESC#	27 35	Inverse video	Entering ESC# will initiate inverse video on display. Repeating the ESC# cancels the inverse video function.
ESC\$	27 36	HP 41 print	HP 41 users who would like to have a larger program presented on their display will use this routine. Entering the ESC\$ will move the cursor to row 0 allowing the operator to write upto 96 programlines into the display. Each line will contain upto 4 HP 41 programlines. If more than 96 programlines will be needed one may scroll contents of the display. Repeating the ESC\$ cancels the function.
ESC (8)	27 8	Backspace	Moves cursor one position to the left and erases the character. Cursor does not move past column 0 row 0.

### HP-IL Messages.

When the MICRONIX Video-interface receives an HP-IL message, it responds according to the following table. Except when specified otherwise, the command is automatically passed on to the next device in the loop.

### Responses to HP-IL messages

#### HP-IL MESSAGE

#### VIDEO INTERFACE RESPONSE

#### Command group

Interface clear	Removes talker or listener status.
Device clear	Display memory is cleared; the new cursor is seen at row 0, column 0.
Selected device clear	If listener, device cleared as with device clear.
Go to local	No response.
Local lockout	No response.
Remote enable	No response.
Not remote enable	No response.
Parallel Poll Enable 0-15	No response.
Parallel Poll Disable	No response.
Parallel Poll Unconfigure	No response.
Group Execute Trigger	No response.
Loop Power Down	No response.

Enable Async. requests	No response.
Auto Address Unconfigure	Address set to 31.
Listen Address 0-31	If address matches, device is removed from talker status and becomes a listener.
Unlisten	Device is removed from listener status.
Device dependent listener 0-31	No response.
Talk address 0-31	If address matches, device is removed from listener status and becomes a talker. If address does not match, device is removed from talker status.
Untalk	Device is removed from talker status.
Device Dependent talker 0-31.	No response.
Secondary address 0-30	No response.
<u>Ready Group</u>	
Take Control	No response.
Ready for Command	Passes message to next device in the loop after having responded to previous message.
Send Data	No response.
Send Status	No response.
Send device ID	No response.

Send accessory ID	If a talker, sends one byte with a value of 49. Indicates that the received message is not passed to the next device in the loop.
Not ready for data	If the device receives this message after having transmitted "accessory ID", it transmits an "End of transmission error" - message; otherwise, no response.
End of transmission-OK	No response.
End of transmission-error	No response.
Auto address 0-31	<p>If device has earlier auto address, no response.</p> <p>If message address is 31, no response.</p> <p>If message address is less than 31 and device does not have earlier auto address, device address is set to message address, increments message address by one, and passes revised message to next device.</p>
Auto extended primary 0-31	No response.
Auto extended second 0-31	No response.
Auto multiple primary 0-31	No response.
<u>Identify group</u>	
Identify (no serv. request)	No response.
Identify (service request)	No response.

### Data Group

Data byte (no serv. request) If the device is a listener, it accepts the data byte and passes on to next device.

Data byte (service request) See above.

End byte (no serv. request) See above.

End byte (service request) See above.

## APPENDIX A

### Using the HP 75 as a controller

Any owner of an HP 75 will find that the MICRONIX video-interface is a major improvement in terms of displaying program lines and data for whatever purpose.

The internal architecture of HP 75 makes it possible to work with text- and programlines up to 96 characters. On the other hand there are now printers available for the HP 75, capable of writing characters into an 80 characters linewidth. Linking the HP 75 and the MICRONIX video-interface together on the HP-IL loop, renders a really powerful portable computing system with features resembling those of much bigger systems.

The following paragraph will tell you how to use your MICRONIX video-interface in connection with an HP 75 calculator.

### Introduction to the HP-IL Loop

In the following paragraph it is assumed that the MICRONIX video-interface is the only device in the loop.

Connect the HP 75 and the MICRONIX video-interface as described in the installation procedure and switch on the latter.

The write:

```
> ASSIGNIO
```

The HP 75 replies with a:

```
1 device (s) on loop  
device#1 = ": "
```

```
Write      : TV  
and then   : (RTN)
```

Now the HP 75 is aware that a device is introduced into the loop. The next step is to inform the video-interface about its role in this loop.

Following command is issued:

```
>Display is ":TV"
```

The reply following this command will be seen in the upper left corner of the display:

```
">", followed by a flashing cursor.
```

Now you may define the linewidth stating the required number of characters per line:

```
>WIDTH 80
```

You will see that the displays of the HP 75 and the monitor write exactly the same.

Since you do not need delay on the display you write:

```
>DELAY 0
```

If you require an acoustical signal to call your attention each time you have written 80 characters you simply issue the command:

```
>MARGIN 80
```

You may now command:

```
>CATALL
```

Activate the "↓" key to give you access to the entire catalog of the HP 75.

You may address the video-interface in two ways each having its own speed due to the internal architecture of the HP 75. One is applying the PRINT statement, the other using the DISP statement.

To give you a greater understanding of the operational aspects of the HP 75 following sequence might be followed:

Write the program line:

```
10 DISP "This is an examble showing how the DISPLAY IS statement  
initiates a printout"
```

RUN the program line and notice that the first 32 characters are displayed very fast. The trailing characters, however, will appear with a markedly lower print-out speed.

To speed up the print-out sequence one may introduce the following:

```
>PRINTER IS ":TV"  
>PWIDTH 80
```

Thus the video interface acts as a printer as well as a display. Change the DISP statement in the previous programline into a PRINT statement and RUN it again.

Now no delays will be found in the printout sequence.

When applying long programs to the HP 75 the instructions LIST and PLIST are recommended.

#### HP 75 and the ESCAPE characters

In the "HP 75 USERS MANUAL", page 294, a short explanation on sending escape characters with an HP 75 may be found. In the following paragraphs, however, we will demonstrate the inverse video function.

This is a point, where the MICRONIX video-interface differs to a larger extent from the HP 82163 video-interface. The classical method to attain inverse video, as applied by HP, is to add 128 to the value of the character displayed following the program below:

```

10 DIM X$(80)
20 X$="Micronix videointerface prints inverse video"
30 FOR X=1 TO LEN (X$)
40 PRINT CHR$(128 + NUM(X$(X,X)));
50 NEXT X

```

RUN the program to see the inverse video on the display:

Micronix video-interface prints inverse video

You may notice that it takes quite some time to apply this procedure, especially if you are going to do an entire screen in this manner.

There is, however, an easier way to inverse video. The MICRONIX video-interface features a functions, the ESC# speeds up the printing. From one ESC# to the next, the text will appear in inverse video, according to the following program:

```

10 PRINT CHR$(27)&"#" ! INVERSE VIDEO ENABLED
20 PRINT "MICRONIX VIDEO-INTERFFACE PRINTS INVERSE VIDEO!";
30 PRINT CHR$(27)&"#!INVERSE VIDEO DISABLED.

```

The message is the same as before, but the execution of the shorter program is much faster. Note that ESC is sent by means of character 27 (CHR (27)).

#### Instant cursor positioning

The next function to be demonstrated is the instant cursor positioning. This function ESC%XY, allows the cursor to move anywhere on your display. Let us for instance write "HP 75" in the middle of the display surface, using the following programline.

```

10 DISP CHR$(27)&"%"&CHR$(38)&CHR$(12)&"HP 75"

```

You should now read HP 75 in the middle of the display.

The position is designated by (38) for the 38th. character of the line, and (12) for the 12th. line on the display.

NOTE: If the HP 75 is interrupted in the middle of an ESC%XY statement, it may cause the cursor to be placed incorrectly. A reset of the interface using the ESC E will solve the problem.

The MICRONIX video-interface is just as easy to use as the HP 75 when editing a text.

The keys "↑", "→", "←", "↓", "DEL" and "CLR" respond in precisely the same way as it would with an HP 75 display.

Pressing the "I/R" key, produces a flashing underline cursor below the character to be inserted or deleted.

There is a slight discrepancy though, mainly notice while editing. One might expect the keys "↑" and "↓" to move the cursor up/down, respectively.

Instead the programline is printed again. This is caused by the HP 75, as the video-interface operates as a slave to the calculator.

One major advantage, mainly notice while programming, is the 24 lines by 80 characters format, which allows you to work with longer program-lines.

The CATAL function may be used to present the contents of HP 75 on the display. Using the CATAL, the next frame of data is called to the display by pressing the "↓" key. In the following you will find a means to avoid the mentioned procedure and in addition a few more interesting features, all presented in the program called PRINTCAT:

```
10 DIM C$(40)
20 PWIDTH 80
30 RINT CHR$(27)&"#";!INVERSE VIDEO
40 PRINT " NAME      TYPE   LEN   TIME      DATE  ";
50 PRINT " NAME      TYPE   LEN   TIME      DATE  "
60 PRINT CHR$(27)&"#";
70 C=-1
80 N=1
```

```

90 C$=CAT$(N)@ C=-C
100 IF C$="" THEN 150 !NO MORE
110 IF C=1 THEN PRINT C$
120 IF C=-1 THEN PRINT USING 130;C$
130 IMAGE X,39A
140 N=N+1@ GOTO 90
150 PRINT@ PRINT
160 PRINT NEM:@ PRINT" BYTES LEFT."

```

Designate a key assignment to C111, making it easy to execute

```
DEF KEY "1", 'RUN "PRINTCAT"
```

HP 75 owners using the VISICALC and/or the TEXTEDITING ROM will find that the MICRONIX video-interface with a 24 x 80 character screen is fully compatible.

## APPENDIX B

### Using the HP 41 as a controller

(Details of the HP 41 are explained in the HP 41 manual)

HP 41 is the smallest controller to be used with the HP-IL Loop. Installing the HP-IL module, HP 82160A, in the HP 41 will enable you to control the MICRONIX video-interface to send data bytes, escape sequences and to present inversed video.

Users already familiar with the HP 82163 video-interface may have noted already, that two more routines applies to the MICRONIX Video-interface, namely ESC# and ESC\$ .

These routines are implemented especially for the users of HP 41. The ESC# produces a faster and easier way to inversed video and the print program routine ESC\$ with the HP 41 allows the display to print up to 96 programlines simultaneously.

The connections between the calculator and the MICRONIX video-interface are described in the installation procedure in this book and detailed descriptions on the HP-IL Loop may be found in chapter 4 of the Owners manual of the HP-IL Interface Module.

Devices responding with an "Accessory ID" between 32 and 63 is automatically designated as a printer device if AUTOIO mode is chosen. Since the MICRONIX video-interface responds with an Accessory ID 49, you will have no concerns connecting the HP-IL Loop.

On the other hand, working in the MANIO mode demands that the operator knows the designated numbers of the specific devices in order to address them, as you need to SELECT a device before it can be given a listener status. For practical reasons it is advised that one connects the MICRONIX video-interface as the number 1 device.

In the following paragraphs it will be assumed that AUTOIO mode is selected.

## The functions of the HP-IL Module and the MICRONIX video-interface

FUNCTION	VIDEO-INTERFACE RESPONSE
ACA	Displays contents of the ALPHA register. The interface responds to specified control characters. No End of line indicator is sent.
ACCHR	Displays specified character of x-register. The interface responds to specified control characters. No End of Line indicator is sent.
ACSPEC	Displays character values, utilised by the (BLDSPEC) function.
ACX	Displays contents of X-register. No End of Line indicator is sent.
ADV	Sends an End of Line indicator.
BLDSPEC	Displays the special character build by BLDSPEC.
LIST	Displays specified program lines.
OUTA	Displays contents of ALPHA register. If flag 17 is set, no end of Line indicator is received. If the ALPHA register contains control codes or escape sequences the interface will respond accordingly.
PRA	Displays contents of ALPHA register. An End of Line indicator is sent.
PRBUF	An end of Line indicator is received.
PRFLAGS	Displays a listing of status flags and other information.
PRKEYS	Displays a listing of assigned keys.

PRP	Displays the specified HP 41 program
PRREG	Displays contents of storage registers.
PRREGX	Displays registers as directed by the X-register.
PR	Displays contents of statistical registers.
PRSTK	Displays the contents of the X-, Y-, Z- and I-registers.
PRX	Displays contents of the X-register followed by an End of Line indicator.

The End of Line indicator of the HP 41 is Carriage Return/Line Feed (CR/LF) represented by the characters 13 and 10 respectively.

If flag 17 is cleared when using the OUTA function, an End of Line indicator will follow the alpha string. If the flag is set, however, no End of Line indicator will appear.

## HP 41 ESCAPE FUNCTIONS

Only four HP 41 instructions are capable of sending ESCAPE characters:

ACCHR, OUTA, PRA and ACA

If quick access is required, it is suggested that an overlay with a key assignment to the upper ten keys is made.

Switch on the HP 41 and enter the instructions PRX to display the contents of the x-register.

Reset the video-interface by means of the ESC E:

27 ACCHR ; 27 is the escape character  
69 ACCHR ; 69 is ASCII E

write HP 41 on line 5 character no. 38 by doing the following:

27 ACCHR ; Escape character  
37 ACCHR ; 37 is the % character  
38 ACCHR ; Character no.  
5 ACCHR ; Line no.

ALPHA HP 41 ALPHA

XEQ PRA ; write the content of the alpha register to the display  
followed by CR/LF.

Since the HP 41 is not capable of sending characters 10 and 13 with the ACCHR, BLDSPEC must be used.

Let us e.g. write MICRONIX starting on line 13 character 53:

```
CLA
27 BLD SPEC ; Escape character
  ARCL X
  CLX
  ALPHA APPEND % ALPHA
53 BLD SPEC ; character no. 53
  ARCL X
  CLX
13 BLD SPEC ; line no. 13
  ARCL X
  ALPHA APPEND MICRONIX ALPHA
  XEQ OUTA
```

Now the word        MICRONIX        should be found on line 13, character no. 53

### Inverse video with HP 41

Inverse video may be generated in two ways by the HP 41, one is faster than the other. The slower one is to add 128 to the number of the required character, the faster one utilizes the ESC# command only feasible for the MICRONIX video-interface.

Following is an example, showing the former:

```
CLA
1 BLDSPEC ; set the most significant bit to 1 - the same as adding
      128 to the next number
72 BLDSPEC ; character H
  ARCL X ; inverse H in ALHPA-register
  CLX      clear x-register before new value
1 BLDSPEC ; adds 128 to next byte
80 BLDSPEC ; character P
  ARCL X ; inverse P in ALPHA register
  CLX
1 BLDSPEC ; adds 128 to next byte
52 BLDSPEC ; character 4
  ARCL X ; INVERSE 4 in ALPHA register
  CLX
1 BLDSPEC ; adds 128 to next byte
49 BLDSPEC ; character l
  ARCL X ; inverse l in ALPHA register
  OUTA ; the display shows HP 41 in inverse video
```

Now let us demonstrate the latter. The command.ESC# will initiate the inverse video function, which will prevail until next ESC# is given. It should be noted that the fast program is much shorter, thus facilitating the use of inverse video.

```
27 ACCHR ; ESCAPE
35 ACCHR ; enable inverse video
ALPHA HP 41 ALPHA
PRA ; write HP 41 in inverse video
27 ACCHR ; ESCAPE
35 ACCHR ; disables inverse video
```

## ESC\$ - The Special HP 41 Print Routine

The MICRONIX video-interface is capable of displaying 24 lines. As programs for the HP 41 in most cases are longer than that, the designer attempted to overcome the problem thus:

Dividing each display line into four program lines allows for a total of 96 HP 41 displayable program lines. This is done by means of the ESC\$ function which also applies when printing flags and registers.

Now let us see the program PRPLOT presented as single programlines:

```
XEQ ALPHA PRP ALPHA
ALPHA PRPLOT ALPHA
```

And now try the ESC\$ function

```
27 ACCHR ; Escape character
36 ACCHR ; Character $. Note that cursor executes a carriage return.
XEQ ALPHA PRP ALPHA
ALPHA PRPLOT ALPHA
```

Now the program will appear as 96 programlines a page. To cancel the ESC\$ following procedure must be followed:

```
27 ACCHR ; Escape character
36 ACCHR ; ESC$ is disabled, the cursor executes carriage return
27 ACCHR ; Escape character
69 ACCHR ; ESC E; reset video-interface
```

The ESC\$ may be applied with more statements than just PRP, namely the PRFLAGS, the PRKEYS and the PRREG. It may also be of value to the operator, doing fast tabulations while writing calculated values into rows and columns.

## Flags and the Video-Interface

Flags 12 and 13 will have no effect on the MICRONIX video-interface. If, however, one or both flags are set, a space will appear in the beginning of the written text.

The status of the flags 15 and 16 determines the output mode of a printing device. One may thus control what and how information is to be printed by selecting one of the following print modes:

<u>Flag 15</u>	<u>Flag 16</u>	<u>Print mode</u>
clear	clear	MAN (manual)
clear	set	NORM (normal)
set	clear	TRACE
set	set	TRACE med stack option

- In MAN (manual) mode, the printer is idle printing only when a print function is performed by yourself or executed by the program.
- In NORM (normal) mode, the display will present all numbers, ALPHA strings and functions received from the keyboard, as well as print statements.  
Programs running will be displayed only if using (PROMPT) and print statements.
- In TRACE mode, all numbers, ALPHA strings, names of functions, intermediate results, final results and all print statements will be displayed. Program listings will be presented in a condensed format.
- In TRACE mode with stack option, the display will do as in TRACE mode, but will, additionally, present the contents of the X, Y, Z and I-registers of the stack following each operation.

All four modes will present a display with a width up to 24 characters only.

## APPENDIX C

### Using the HP 71 as a controller

The newest controller for the HP-IL Loop is the HP 71. MICRONIX has introduced this new version of the video-interface on the market, in order to give HP 71 users full support.

The main difference between HP 75 and HP 71 is that HP 71 uses ESC(N) (insert character) and ESC(O) (delete character) as control characters to the video-interface.

These two escape sequences was not used on the HP 75.

The following passage will inform you how to use your MICRONIX video-interface connected to the HP 71.

### Getting contact with the HP-IL Loop

In the following paragraph it is assumed that your MICRONIX video-interface is the only device on the Loop.

Connect the video-interface as described in the installation procedure. Power up the video-interface and the HP 71.

Write:            ASSIGN IO ":TV"

This command addresses the first device on the loop as TV. If there are more devices on the loop you may write:

ASSIGN IO ":TV,:CA,:PR"

This command assumes that there are 3 devices on the loop. The first is the video-interface, the second is a cassette drive, and the third is a printer.

In order to define the maximum width for the display write:

WIDTH INF

Note that the HP 71 and the video-interface writes exactly the same.

Disable the display delay with the command:

```
DELAY 0
```

Now try the command:

```
CATALL
```

Activate the "↓" key. The key writes the content of the HP 71 catalog on the screen.

There are two ways to write the display. You can use DISP or PRINT commands. The following program will show you the difference in the speed, when you are using PRINT and DISP commands:

Write:

```
EDIT SPEED

10 FOR X=1 TO 10
20 DISP "MICRONIX VIDEOINTERFACE DEMONSTRATES THE DIFFE-
  RENCE BETWEEN DISP AND PRINT"
30 NEXT X
```

Now run the program and notice the speed. It takes a while, and if you look at the display on the HP 71 you will see why. The delay occurs because the HP 71 scrolls the text on it's own display, giving the DISP command a delay.

Now assign the display as a printer.

Do the following steps:

```
PRINTER IS ":TV"
PWIDTH INF
```

Edit the DISP command in line 20 to a PRINT command, and run the program.

Now there is no delay in the printout. Also try the LIST and PLIST commands on the same program.

### HP 71 and escape characters

On page 234 - 239 in the HP 71 owners's manual you will find a short explanation on how to send escape sequences with the HP 71. Consult these pages to get a more detailed information about the HP 71, and it's capabilities to send escape sequences.

One of the features you might want to use is the ability to inverse video.

There are two ways to inverse video with the MICRONIX video-interface. First try the normal HP-way of generating inverse video.

Write the following:

```
10 PWIDTH INF
20 DIM X$[80]
30 X$="MICRONIX videointerface prints inverse video"
40 FOR X=1 TO LEN(X$)
50 PRINT CHR (128+NUM(X$[X,X]));
60 NEXT X
```

Note that printing inverse video is slow this way. To improve the speed we have implemented a special command to the video-interface. (ESC#)

The ESC# command is actually a switch. The first time you send ESC# tells the MICRONIX video-interface to convert all the trailling characters to inverse video. Inverse video stops when you send ECS# again.

Write the following:

```
10 PRINT CHR$(27)&"#";!START INVERSE VIDEO
20 PRINT "MICRONIX videointerface prints inverse video";
30 PRINT CHR$(27)&"#";!STOP INVERSE VIDEO
```

The program does the same as before, but it is shorter and much faster.

Note that you send ESCAPE by sending character no. 27 CHR\$(27).

If you want to clear the display, simply use the command "clear" or use the ESC E command. (PRINT CHR\$(27)&"E";) This command puts the cursor home and clears the display.

The next example shows how to use ESC %XY, ESC N, and ESC<.

The ESC %XY command makes it possible to move the cursor anywhere on the display. ESCX N is the insert cursor command, the same command that executes when using the I/R function from the HP 71 keyboard. Finally ESC< is used to turn the cursor off.

Write this program:

```
PWIDTH INF
EDIT FANCY

10 DIM A$(80)
20 A$="***MICRONIX VIDEOINTERFACE ***"
30 CLEAR ! CLEAR DISPLAY
40 PRINT CHR$(27)&"<"; !CURSOR OFF
50 PRINT CHR$(27)&"N"; INSERT CURSOR
60 FOR T = LEN (A$) TO 1 STEP -1
70 PRINT CHR$(27)&"%"&CHR$(20)&CHR$(12); !GOTO COLUMN 20 ROW 12
80 PRINT A$[T,T]; !PRINT ELEMENT T IN A$
90 NEXT T
100 PRINT CHR$(27)&"H; CURSOR HOME
```

The next program uses the RND command in the HP 71, in order to display random stars. ESC %XY, then writes a star on the display.

Type in the program

PROGRAM STARS

```
10 CLEAR ! CLEAR DISPLAY
20 PRINT CHR$(27)&"%"&CHR$(20)&CHR$(23); !CURSOR TO COLUMN 20 ROW 23
30 PRINT "PRESS <<SPC>> TO STOP.";
40 IF KEYDOWN (" ") THEN GOTO 90
50 X=INT (78*RND) ! X=COLUMN
60 Y=INT (23*RND) ! Y = ROW
70 PRINT CHR$(27)&"%"&CHR$(X)&CHR$(Y)&"*";
80 GOTO 40 ! WAIT FOR SPACEBAR
90 PRINT CHR$(27)&"%"&CHR$(20)&CHR$(23);
100 PRINT "PROGRAM STOPPED...";
110 END
```

The MICRONIX video-interface is just as easy to use at the HP 71 display.

The keys "BACK", "-CHAR", "I/R", "-LINE", "←", "→", ">|" and "<|" responds in exactly the same way as on the HP 71's display, as you probably already have experienced.

If you use the "I/R" key, you will see an underline cursor, under the character you are about to insert or delete from.

### Repairs of failing or defective MICRONIX Video-interfaces

It is guaranteed that faults and defects in MICRONIX Video-interface will be repaired by MICRO TECHNIC A-S without charge under the conditions that the faults or defects have been reported in writing to MICRO TECHNIC A-S, within the first twelve months after delivery from the dealer and that the unit in question is sent at the customers expense to the dealer who sold it.

Repair of failing or defective units without charges to the customer will not take place if:

- the unit has been damaged by accident or through improper use.
- the unit has been modified or attempted repaired by any other than MICRO TECHNIC A-S (MICRONIX ApS)
- The installation guide found in this handbook has not been followed.

MICRO TECHNIC A-S (MICRONIX ApS) cannot be held responsible for any faults or defects not explicitly described above.

Consequences from installation or use will not be compensated by MICRO TECHNIC A-S (MICRONIX ApS)

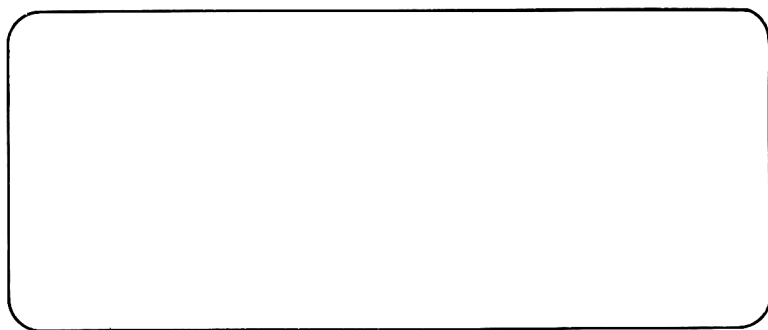
This image shows a single page of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page. There is no handwriting or other markings on the paper.

This image shows a single page of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There is no handwriting or other markings on the paper.

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# VIDEO INTERFACE



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