

**THE GRAPPLER™
INTERFACE**

OPERATORS MANUAL



Orange Micro

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INTRODUCTION

TM

The Grappler Interface is a Centronics compatible parallel interface for the Apple II/II+ Computer. In addition to advanced text features, it offers high resolution dot graphics (HIRES) dump routines located in firmware. These are easily invoked using simple control commands.

There is no standardization among printer manufacturers for dot graphics. Therefore a specific version of the Grappler interface was developed for each type of printer. If you connect a printer to an incorrect version of the Grappler, the text features should still function properly. However, the graphics commands will have unpredictable results.

INSTALLATION INSTRUCTIONS

To install the Grappler simply plug it into any slot inside the Apple (except Ø), as follows:

1. Turn off the power to the Apple. This is important to prevent damage to the computer and the Grappler.
2. Connect the Grappler cable to the set of pins on the Grappler interface card. Make sure that all the pins on the card go into the cable's matching holes. Also, the cable should point away from the card (it will only fit one way).
3. Remove the cover from the Apple. This is done by pulling up on the cover at the rear edge (the edge farthest from the keyboard) just until the two corner fasteners pop apart. Don't lift the edge any further, but instead slide the cover backward until it comes free.
4. Inside the Apple along the rear edge of the circuit board, there is a series of eight long, narrow sockets called "slots". The leftmost slot (looking at the computer from the keyboard end) is slot #9~. The adjacent slot is slot #1 and this is where most Apple programs expect the Grappler to be.

5. Be sure the power is off. Insert the Grappler card into slot #1 (or any other slot except zero) with a gentle rocking motion until fully seated.
6. Pass the cable through one of the vertical openings in the back of the Apple case.
7. Replace the Apple's cover. Slide the front edge of the cover into place, and then press down on the rear corners until they pop into place.
8. Connect the Grappler cable to the printer.

TEXT FEATURES

Before sending a character to the printer, the Grappler will check the SELECT and PAPER EMPTY Status lines. If the printer is not "online", or is out of paper, a warning will be printed on the screen and the Apple will beep. If this occurs check the following:

1. The cable is firmly and properly attached to the printer.
2. The cable is firmly seated on the Grappler interface card.
3. The printer is on.
4. The printer is on-line.
5. There is paper in the printer. Note: The Grappler will not check for paper on Epson printers.
6. The printer is set up for parallel operation. (Check Appendix B of this manual for proper dip switch settings.)

Once the error condition has been corrected you may continue by pressing the return key.

The Grappler interface has many text features, including adjustable margins, line length, page length, etc. All commands affecting these features are listed on the following pages with a description of their function. Each one is preceded by a control character which is CTRL-I from BASIC or CTRL-Y from Pascal or CP/M, unless specifically changed by the user's program.

To type a control character, hold down the control key (marked "CTRL" on the Apple) and then press the appropriate letter. Then release the letter key, and then the control key. Control characters do not appear on the screen as they are typed. You may also use the CHR\$ function found in Applesoft Basic (consult your Apple manual and Appendix A).

TEXT COMMANDS

Spaces have only been used to make the commands easier to read: do not type the spaces when issuing the command.

- PR#n Turns on the Grappler interface card. n is equal to the slot number of the Grappler. All subsequent characters appearing on the Apple video screen will also be printed on the printer. This command must be used before any of the following commands will be accepted by the Grappler.
- PR#0 Turns off the Grappler.
- CTRL-I A Append line feeds onto carriage returns. Basic will not send a linefeed after a carriage return. This means the printhead will return to the left margin but will not advance the paper. The Grappler will automatically issue a linefeed command and advance the paper after every carriage return. If your printer is performing double line spacing, check Appendix B of this manual.
- CTRL-I K Don't append linefeeds onto carriage returns.
- CTRL-I H Allows the high order (8th) bit to be output to the printer. On many printers this has no effect. On some it allows printing of block graphics (Epson MX/80). However, when block graphics are being printed, the standard character set is not accessible.

- CTRL-I X Don't output the high order bit to the printer. This puts the printer back in standard text mode.
- CTRL-InN Set line length to n characters from left side of page (not from left margin). After issuing this command, characters will only be printed on the printer, and not on the Apple video screen. A carriage return will automatically be generated after n characters have been printed. If the line length is set to zero, the Grappler will not issue a carriage return until it receives one from the Apple. Note: When listing basic programs, the printing will automatically be formatted for 40 columns unless this command is used (i.e. CTRL-I 80 N).
- CTRL-II Transmits characters to both the Apple screen and printer. When the line length is set with a CTRL-InN command the screen will be turned off and printed characters will go only to the printer. If you wish characters to appear on the screen while they are being printed, use this command.
- CTRL-InL Set left margin to nth column. All subsequent printing will have n spaces at the start of each line. For example, when using CTRL-I 10L, all printing will start in the 10th column.
- CTRL-InR Set right margin to nth column from left edge of page (not left margin). This command will prevent words from being split at the right margin. The Grappler will end the line at the first space that occurs after the right margin, but before the end of the line as set by the CTRL-InN command. A right margin of zero disables this feature.
- CTRL-InP Set page length to n. The printer will print six line-feeds after n number of lines have been printed. A page length of zero disables the page length feature. Continuous form paper typically has a total of 66 possible

lines per page (this may vary with the type of printer). Therefore if you specify a printed page length of 60 lines (CTRL-I 60P), your printer will print 60 lines and automatically skip over the perforation with 6 line feeds.

- CTRL-I B Turn on bell. This allows a CTRL-G to ring the printer bell. Many printers do not have a bell so check your printer manual to see if this feature is available.
- CTRL-I C Turn off bell.
- CTRL-I S Duplicate the present text screen on-the printer. The screen will be printed 20 spaces from the left edge of the paper. This command is accessible from BASIC only as it uses some of the monitor routines, Only the forty character screen is printed. Eighty character boards are not supported.
- CTRL-I CTRL-Y Change to new command character CTRL-Y. To do this, type in CTRL-I CTRL-Y. Any control character may be used here (instead of CTRL-Y) but you should avoid characters used by your printer or normal text control characters such as CTRL-M (carriage return).
- CTRL-Y CTRL-I changes back to command character CTRL-I.

The values and conditions listed below are the values which are automatically set any time the Grappler is "turned on" with a PR#n command or initialized from Pascal or CP/M:

Left Margin = 0	Right Margin	= 0
Line Length = 0	Page Length=	0
Video = On	Printer Bell	= Off
Eighth Bit = Off	Line feed after carriage return?	= Yes with Basic No with Pascal or CP/M

GRAPHICS FEATURES AND COMMANDS

The Grappler Interface can output the HIRES screen to the printer by using simple commands. All graphics commands consist of the command character (usually CTRL-I) followed by a "G", and any options described below. If no other options are used (i.e. CTRL-I G [carriage return]), HIRES page 1 will be printed horizontally with every white dot on the screen printed as a black dot on the paper. The different options are described as follows:

2 - Print HIRES page 2 instead of page 1.

D - Print the graphics screen double size. Some printers don't have enough character positions to print a double size image horizontally (e.g. MX-70, MX-80, IDS-445). If that is the case, you must also use the "R" option. Otherwise your printer will get confused and "crash", meaning it won't do anything. If that happens you will have to reset the APPLE by pressing the reset key, and then reset the printer by turning it off and then on again.

E - Prints and "emphasized" image (EPSON MX-80S, MX-80FT, and MX-100 only). When in this mode, the printer will print two closely spaced dots for every one it would normally print. This results in a denser image but printing time is twice as long.

I - Invert the image before printing. Normally, every white dot on the screen is printed as a black dot on the paper. This works fine for lines and graphs but if you are printing an actual picture of a person or object it will appear like a negative photograph. Using this command will print the black portions of the screen as black on the paper allowing the picture to appear normally.

L - Print the image at the left margin previously set using the left margin text command. Depending on the type of printer being used, this margin may be affected by the current print density (characters per inch) or may be automatically set to 7 dot positions per character. If this option is not used, the image will be printed in the center of an 8 1/2 inch page.

R - Rotate the picture 90 degrees in a clockwise direction. Some printers require this option when printing the image double-size. (See D above.)

An example of a graphics command would be CTRL-I GDIR2 followed with a carriage return. This will print the inverse of HIRES page 2, double size, rotated 90 degrees. Options may be listed in any order, as long as they are preceded by a CTRL-I G and followed by a carriage return. Care should be used when using the L" specifier. If too large of a left margin is used, the picture may wrap around or, depending on the printer, it could cause it to "crash" and then both the computer and printer would have to be reset (see "D" option above).

Note: When typing Grappler commands directly from the keyboard (not from a program), the Apple will give a syntax error. This is normal since Applesoft doesn't recognize this as a valid command. To avoid this, type a one line program. For example:

```
10 PR#1: PRINT CHR$(9);"G":PR
```

Then type RUN.

CHART RECORDER MODE

A chart recorder prints a continuous graph on a roll of paper. If you need to chart more information than can be done on a single HIRES screen, you can simulate a chart recorder by printing successive screens without any intervening spaces. The type of printer you are using will determine whether this can be done with normal or rotated images. In general, if your printer prints six graphics dots at a time (e.g. IDS Paper Tigers, Centronics 739, Anadex 9500-9501), you will be using successive normal (horizontal) screen dumps. If your printer prints seven dots at a time (e.g. Epsoms), you will be using successive rotated screen dumps.

PASCAL AND CP/M COMPATIBILITY

The Grappler is compatible with both PASCAL and CP/M. PASCAL 1.0 and CP/M will both recognize the card as a serial interface. Entry points have been provided to mimic a serial interface so that the card will function properly with these systems. PASCAL 1.1 will correctly interpret that it is a firm-ware printer interface and access it accordingly. In either case the card will function normally with a few minor exceptions as detailed on the following page.

Since both systems use a CTRL-I to represent a horizontal tab, the default command character has been changed to CTRL-Y. If you are listing a file that contains tabs, be certain the printer tabs (see your printer manual) have previously been set.

PASCAL does not use any of the monitor routines. For that reason do not try and turn on the screen with a CTRL-Y I command or do a text screen dump (CTRL-Y 5). Either one will "crash" the system and both the computer and printer will have to be reset.

Both PASCAL 1.0 and CP/M use one of the I/O Ram locations to pass the output character. Since the Grappler was already using all available locations for its variables, the right margin function had to be deleted to make it compatible. This feature is still available from BASIC or PASCAL 1.1.

FOR ADVANCED PROGRAMMERS:

MEMORY LOCATIONS USED BY THE GRAPPLER

The Grappler Interface uses those RAM locations set aside for its particular slot and the slot scratchpad area common to all slots. The ROM is turned on using the standard ROM expansion protocol and resides in locations \$C800 to \$CFFF. The entry points and the various RAM variables are listed below (N=Slot number):

Cold Entry	=	\$CN00
Warm Entry	=	\$CN02
Left Margin	=	\$478 + \$0N
Right Margin	=	\$678 + \$0N
Line Length	=	\$578 + \$0N
Page Length	=	\$5F8 + \$0N
Character Counter	=	\$4F8 + \$0N
Line Counter	=	\$6F8 + \$0N
Current Cmd. Char.	=	\$778 + \$0N
Text Flags	=	\$7F8 + \$0N

Text Flag Bit Representations: (Bit 7 - Output high order bit)
(Bit 6 - Video turned on)
(Bit 5 - LF after a CR)
(Bit 4 - Bell on)

CUSTOM DRIVERS

If you are writing your own drivers the following locations are used to access the card CY = NO where N = slot#)

Printer Status - \$C0S1,Y (READ)
Output Latch - \$C081,Y (WRITE)
Strobe Low - \$C082,Y (WRITE)
Strobe High - \$C084,Y (WRITE)

The following routine gives an example of how to output a character using these locations:

```
          PHA           ; SAVE OUTPUT CHARACTER ON STACK
          LDY 10        ; SET UP Y-REGISTER FOR SLOT #1
PAPER?   LDA $C081,Y   ; CHECK STATUS FOR PAPER
          AND 04        ; CHECK SIT 2
          BNE PAPER?   ; IF SET THEN NO PAPER, RECHECK
SLCT?    LDA $C081,Y   ; CHECK STATUS FOR PRINTER SELECT
          AND 02        ; CHECK BIT 1
          BEQ SLCT?    ; IF ZERO THEN NOT SELECTED
BUSY?    LDA $C0S1,Y   ; CHECK STATUS FOR PRINTER BUSY
          AND 08        ; CHECK BIT 3
          BNE BUSY?    ; IF SET THEN PRINTER IS BUSY
OUTPUT?  PLA           ; REGET OUTPUT CHARACTER
          STA $C081,Y   ; STORE TO OUTPUT LATCH
          STA $C082,Y   ; PULL STROBE LINE LOW
          STA $C084,Y   ; RESET STROBE LINE HIGH
          RTS          ; RETURN FROM SUBROUTINE
```

APPENDIX A

TM USING GRAPPLER COMMANDS WITHIN A PROGRAM

The following table illustrates how a few Grappler commands would be used within a program:

<u>INTEGER BASIC</u>	<u>DESCRIPTION</u>	TM
10 PRINT "CTRL-D";"PR#1"	10 PRINT CHR\$(4);"PR#1"	Turns on Grappler If you are <u>not</u> using DOS (disk operating SYSTEM) thEn enter the line as: 10 PR#1
20 PRINT "CTRL-I": "80N"	20 PRINT CHR\$(9);"80N"	Set line length to 80 columns and turn off Apple video
30 PRINT "TESTING"	30 PRINT "TESTING"	Prints "Testing" on the printer
40 POKE 36,50:PRINT"TESTING"	40 PORN 36,50:PRINT"TESTING"	Tabs to the 51st column and prints "Testing"
50 PRINT "CTRL-I"; "CTRL-A"	50 PRINT CHR\$(9);CNR\$(1)	Charges tha CTRL-I command character to CTRL-A
60 PRINT "CTRL-A" "10L"	60 PRINT CHR\$(1);"10L"	Sets left margin to 10, notice use of new command character,CTRL-A
70 PRINT THE GRAPPLER"	70 PRINT "THE GRAPPLER"	Prints "The Grappler". Notice printing starts at 10th column.
80 PRINT "CTRL-D" "PR#0"	80 PRINT CHR\$(4);'PR#0"	Turns off Grappler. If you are not using DOS enter the line as: 80 PR#0

NOTES:

Whenever you see CTRL-I enter the command, control I, as explained in the section "Text Features". For example, since control characters don't appear on the screen line 10 will look like this: 10 PRINT "";"PR#1"

When tabbing past 40 columns, you must set the line length greater than 40 (OTRI-InK) and then use the POKE 36,n command shown above.

The following programs allow you to test the graphics capability of the Grappler.

For Applesoft basic users:

```
5 TEXT
10 HOME
20 PRINT 'ENTER THE SLOT YOUR GRAPPLER IS IN AND"
30 INPUT "HIT THE RETURN KEY: ":S
50 HGR
60 HCOLOR=3
70 POKE 49234,16
80 HPLLOT 0,0 TO 279,0 TO 279,190 TO 0,190 TO 0,0
90 FOR X=0 TO 279 STEP 9: HPLLOT X,0 TO X,190
100 NEXT
110 SOP Y=0 TO 190 STEP 5: HPLLOT 279,Y TO 0,Y
120 NEXT
130 FEINT CHR$(4):"PR#":S
140 PRINT CHR$(9):"G"
150 PRINT CHR$(4):PR#0"
160 TEXT:HOME
```

For Integer Basic Users:

Line 6 should be typed 6 D\$="CTRL-D" (The CTRL-D won't show on the screen)
Line 7 should be typed 7 I\$='CTRL-I"

```
5 B=1
6 D$=""
7 I$=""
10 CALL-936
20 PRINT "ENTER THE SLOT YOUR GRAPPLER IN IN"
30 PRINT "AND HIT THE RETURN KEY:"
40 INPUT S
50 POKE 8192,0: POKE 8193,0: POKE 66,1: POKE 67,32: POKE 60,0:
   POKE 61,32: POKE 62,255: POKE 63,63: CALL-466
55 POKE-16297,9: POKE-16390,9: POKE-16302,0: POKE-16204,0
60 FOR A=6192 TO 9207
70 POKE A,255: POKE C(A*1024) TO (A+7168) STEP 1024: POKE C,B, NEXT C
60 NEXT A
130 PRINT D$;"PR#";S
140 FEINT I$;"G"
150 PRINT D$;"PR#0"
160 TEXT:CALL-936
999 END
```

NOTES ON BOTH PROGRAMS:

If YOU are not using DOS (Disk Operating System), type line 130 as follows: 130 PR#S and line 150 as 150 PR#0.

To experiment with the different options, try changing line 149. You don't have to retype the whole program, just type a new line 149.

For example: 140 PRINT CHR\$(9):"GI" or 140 PRINT CHR\$(9):"GDR"
140 FEINT I\$;"GI" or 140 FEINT I\$;"GDR"

For Pascal Users:

```
PROGRAM DEMO,  
USES TURTLEGRAPHICS, APPLESTUFF,  
VAR ANGLE, DISTANCE: INTEGER;  
    PRINT, TEXT,  
  
BEGIN  
    ANGLE; 8-0;  
    INITTURTLE;  
    PNNCOLOR(NHITE);  
    FOR DISTANCE:= TO 99 DO  
        BEGIN  
            MOVE (2*DISTAMCE);  
            TURN ANGLE);  
        END,  
    REWRITE (PRINT, 'PRINTER;"),  
    NRITELN (PRINT, CHR(25), G'); (*USE CHR(25) [CTPL-Y] IN PASCAL*);  
END.
```

The following program will allow you to print a graph that has been previously saved to the disk. For e,[~]as-ple, after saving the greph created by one of the popular graphing programs for the Apple, run this program to print it on your printer.

Note: If your Grappler is not in slot #1 change line 5 so that S equals the clot number of your Grappler.

For Applesoft Basic Users:

```
5 S=1
10 HOME
20 D$=CHRS(4)
30 I$=CHRS(9)
40 PRINT "ENTER TNT NAI4E OF THE GRAPH:"
50 INPUT N$
60 HGR
70 PRINT D$;"BLOAD":N$;" ,A$2000"
50 VTAB 22
90 PRINT "ENTER OPTIONS (D,I,N,L,E,NORMAL"
100 INPUT A$
105 IF LEFT$(A$,1)="N" THEN A$=""
110 PHINT D$;PR#";S
120 PRINT I$;"G";A$
130 PRINT D$;"PR#0"
140 TEXT:HOME
```

For Integer Basic Users:

Line 30 should be typed with a CTRL-D between the quotes.
Line 40 should be typed with a 0151-I between the quotes.

```
5 S=1
10 CALL-936
20 DIM N$ (30):DIMA$(10)
30 D$=""
40 I$=""
50 PRINT "ENTER THE NAME OF THE GRAPH:"
60 INPUT N$
70 PRINT D$;'BLOAD";N$;" ,A$2000"
80 PRINT "ENTER OPTIONS (D,I,R,E,L,NORMAL).: "
90 INPUT A$
95 IF A$(1)="-N" THEN A$=""
100 PRINT D$:"PR#":S
110 PRINT I$;'G";A$
120 PRINT D$:"PR#0"
130 TEXT: CALL-936
999 END
```

APPENDIX B

DIP SWITCH SETTINGS FOR YOUR PRINTER

All printers must configure to a Centronics type psrallel interface.

ANADEX 9500 - 9301

All switches on S-3 must be off. Set switches on S-1 and S-2 appropriately.

CENTRONICS 739-1

All four switches must be off.

EPSON MX-70

Shorting plug must be hooked up to the red post for no auto-line feed.

EPSON NX-80; NX-SOFT with Graftrax-80

All switches on S-2 should be off. Dip switch S-1, switch 8 must be on and switch 3 must be off.

EPSON MX-100

S-2 switch 3 must be off

S-1 switch 6 must be off and switch 8 must be on.

I.D.S. 440G - 445G

S-4 switches 5, 6 and 7 Must be off

S-3 switches 6 must be on and switch 7 must be off

Strapping for 440G - 445G (locate beside I.D.S. cable connector)

9-6 - busy active when high

11-5 - strobe data on positive edge

14-1 - always remain installed

I.D.S. 460G - 560G

S-4 switch 5 must be off and switch on

S-3 switches 6 and 7 off

Strapping for 4600-5600 (locate beside I.D.S. cable connector)

Must be strapped as shipped.

8-7 installed for parallel

11-4 installed for busy rising high

12-3 installed for negative going strobe

*Note: All switches not mentioned can be set as user desires

TM
GRAPPLER PIN ASSIGNMENTS

<u>Function</u>	<u>Normal GRAPPLER</u>	<u>IDS GRAPPLER*</u>
--		
STE	1	5
	3	2
D1	5	25
D2	7	23
D3	9	21
D4	11	19
D5	13	17
D6	15	4
D7	17	--
--		
ACK	19	18
BUSY	21	12
--		
P.E.	23	22,26
SLCT	25	7
N/C	--	10,20
GND	all others	all others

*GRAPPLERS designed for use with IDS Paper Tiger printers may be identified by a white asterisk on the upper right hand corner of the board.

LIMITED WARRANTY

Every GRAPPLER INTERFACE is fully tested and quality checked before shipment and is warranted to be free from defects in materials and workmanship for a period of 90 days from date of purchase. During that time period. Orange Micro will, at no charge, repair or replace any defective unit returned to its Service Department in accordance with the instructions below.

Orange Micro disclaims any liability to users of the GRAPPLER INTERFACE for consequential damages of any kind arising from or connected with the use of the GRAPPLER INTERFACE.

This warranty is void in cases of misuse, abuse, abnormal conditions of operation or attempts to alter or modify the function of a part or assembly.

This limited warranty is in lieu of all other warranties express or implied, and no representative or other person is authorized to represent or assume for Orange Micro any warranty liability beyond that set forth herein.

This warranty gives you specific legal rights, and you may also have additional rights which vary from state to state.

In case of a problem with a GRAPPLER INTERFACE, please notify us of the model, aerial number, date of purchase, and particular details, Do not return the unit to Orange Micro until you have received authorization to do so.

When returning equipment, ship in the original carton or securely packed in a cardboard carton with at least two inches of cushioned packing material on all sides. Mark the package 'FRAGILE' and ship via ups, Parcel Post, or Air Freight, insured and prepaid. (Collect shipments will be refused and returned.) Enclose a clear description of the problems experienced, sample printouts if possible, proof of purchase date, return address, and preferred shipping method.