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COMPUTERVISION CORP BEDFORD MA
FT. BELVOIR TEXT PLACEMENT SYSTEM.(U)
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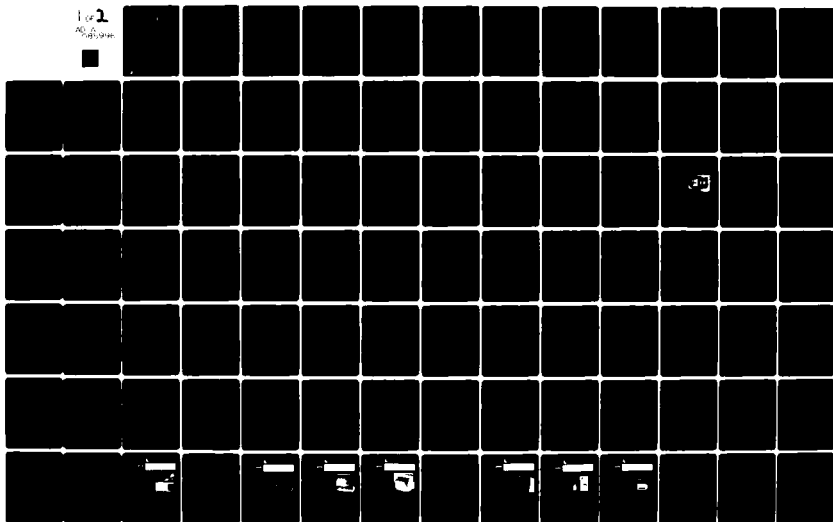
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FINAL TECHNICAL REPORT

Ft. Belvoir Text Placement System

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JUN 25 1980
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November 2, 1979

Final Technical Report for the Ft. Belvoir Text Placement System

Approved for Public Release; Distribution Unlimited

U.S. ARMY ENGINEER TOPOGRAPHIC LABORATORIES
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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The objective of the project was to develop a system using off-the-shelf hardware which automates the placement of typeset text on a map. The Final Technical Report documents the results, problems encountered and their solution, conclusions and recommendations, and references used. The Appendices include: Ft. Belvoir Test Plan; Operator's		

Manual; Computervision's Graphics System Description; and
photographs and specifications of the hardware.

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FINAL TECHNICAL REPORT

FT. BELVOIR TEXT PLACEMENT SYSTEM
COMPUTERVISION
AUGUST 23, 1979

November 2, 1979

PREFACE

This Report, written under contract number DAAG53-76-C-0172 with USAETL and with the supervision of ETL's Contracting Officer's Technical Representative (John Garlow), documents results, problems encountered, their solution, conclusions, recommendations, and references used in the development of a Type Placement Composition System.

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FINAL TECHNICAL REPORT

A. Objective

The objective of the project was to develop a system using off-the-shelf hardware which automates the placement of typeset text on a map.

A.1 The text placement system is an integrated system of graphic hardware, graphics operating system software, and special software developed for cartographic text placement.

A.2 Input to the system is a file specifying text characters, type style, type size and justification of text.

A.3 The interactive process permits an operator to individually place and align text at proper position and angle.

A.4 The operator has complete editing freedom in changing the text, text position, type font, type size, justification, angle and intercharacter spacing during the interactive phase.

A.5 Output from the system is a magnetic tape data file containing XY position and angle information in degrees in addition to text name, font, size, and intercharacter spacing. The system was revised to be flexible and easy to use in a production environment.

B. Results

Acceptance testing performed by USAETL personnel has verified that all of the desired objectives have been met and that all of the special problems enumerated have been solved.

See attached software test plan 11/13/78 Appendix 1.

C. Problems Encountered and Their Solutions

C.1 Special software was added in the later phases of the project in order to permit the entry of diacritics without requiring excessive numbers of key strokes. The final solution permits the entry of diacritics with two keys: one key to indicate that a diacritic follows and one key to represent the diacritic. (Refer to Operator's Manual CS-3-185: Appendix 2)

C.2 Special software was introduced to permit expanding or compressing text to fit between selected beginning and ending points of a text string for special problem areas.

C.3 Special procedures were designed to permit restarting a placement job in the middle of a run without a time consuming recovery process.

C.4 The problem of multi-line names on map features required the addition of software to display not only the current line being placed but also the four lines to follow. (See Operator's Manual - Text Placement System CS-3-185: Appendix 2)

D. Conclusions and Recommendations

All software was developed according to the contract specifications. Extensive testing prior to shipment has shown that all features were operating satisfactorily. Experience in actual production may suggest further additions to the package. The software has been designed and structured to permit further improvements. Additional refinements to the suggested operating procedures may be discovered. The text placement system was developed to operate within the structure of a general purpose system for computer aided mapping. Investigations into how these features may help in the solution of other DMA mapping tasks need to be made.

E. References Used

CADDS 3	Database Reference Manual	001-00007
CADDS 3	O/S Operator's Manual	001-00002
CADDS 3	Graphics Operator's Manual	001-00201
CADDS 3	O/S Programmer's Manual	001-00003

APPENDIX I

11/13/78

FORT BELVOIR TEXT PLACEMENT SYSTEM - TEST PLAN

OPERATING SYSTEM FEATURES

Boot up
LCEDIT to prepare a new input file
LCEDIT to modify an existing input file
PRNT to print a file on the decwriter
SAVFIL to put a file onto mag tape
RSTFIL to read a file from mag tape
Read Cards
LCEDIT to prepare font definition tables
LOGIN/LOGOUT
Enter CADDS graphics

STANDARD PROCEDURE FEATURES

Start placement with a new input file
 align map
 read input file
 start on first entry
Position entries
 single-digitize mode
 double-digitize-mode
 carding double-digitize mode
Modify parameters before placement
 change font
 change point size
 change justification
 change text
Change position after initial placement
Change parameters after placement
 change font/size/text/carding
 see the resulting rectangle
Proceed to next text entry
Generate output file

SPECIAL SITUATIONS

Save/restart unfinished work with no replotting
 save CADDS graphics
 reenter CADDS with saved graphics
 start with last positioned entry
Save/restart unfinished work with replotting
 generate unfinished output file
 reenter CADDS with unfinished output file
 replot all rectangles already placed
 start with last positioned entry
Random access alteration of preplaced entries
 identify the entry total
 make desired changes

CONTRACT MODS DETAILS

Easier diacritics
 verify rectangle size with short form diacritic
 verify rectangle size with long form diacritic
Carding
 verify rectangle size
 verify carding field appears in output
More consecutive names
 verify that consecutive names shown are correct
 (optional: alter PFK definition to control number of lines)

APPENDIX II

CS-3-185

OPERATOR'S MANUAL
TEXT PLACEMENT SYSTEM
U. S. ARMY ETL

November 2, 1979

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 - D. How to Initiate Graphics
 - E. Excerpts From Companion Manuals

Operator's Manual/Text Placement System

There are two companion manual's to this special Operator's Manual.

CADDS 3 Graphic Operators Manual
Publication Number 001-00201

for description of: CADDSCLR
INIT PEN
CHG PROP
ECHO PLOT ON
SEL PLOT
RST KEYS

CADDS 3 O/S Operator's Manual
Publication Number 001-00002

for description of: ATTACH
DETACH
SAVFIL
RSTFIL
login procedures
boot up procedures
EDITLC AND EDIT

I. INTRODUCTION

The ETL text placement system works in two operating modes.

- A. TEXT oriented mode: This is CV's O/S mode. It allows editing work on an inexpensive alpha-numeric CRT or other alpha-numeric device such as a dec-writer. In this mode, one does:
1. create original input files on the CRT.
 2. read in offline produced CARDS or TAPE.
 3. correct the text, font, size, or justification properties given to any entry in the input file.
 4. add or delete entries.
 5. review or edit the output of the GRAPHICS mode.
 6. move files between on-line disk storage or off-line mag tapes.
- B. GRAPHICS oriented mode: This is CV's CADDS mode. It allows text placement and can draw text outline rectangles. All work is done on an IA-4 or other CV graphics I/O devices.

In this mode one does:

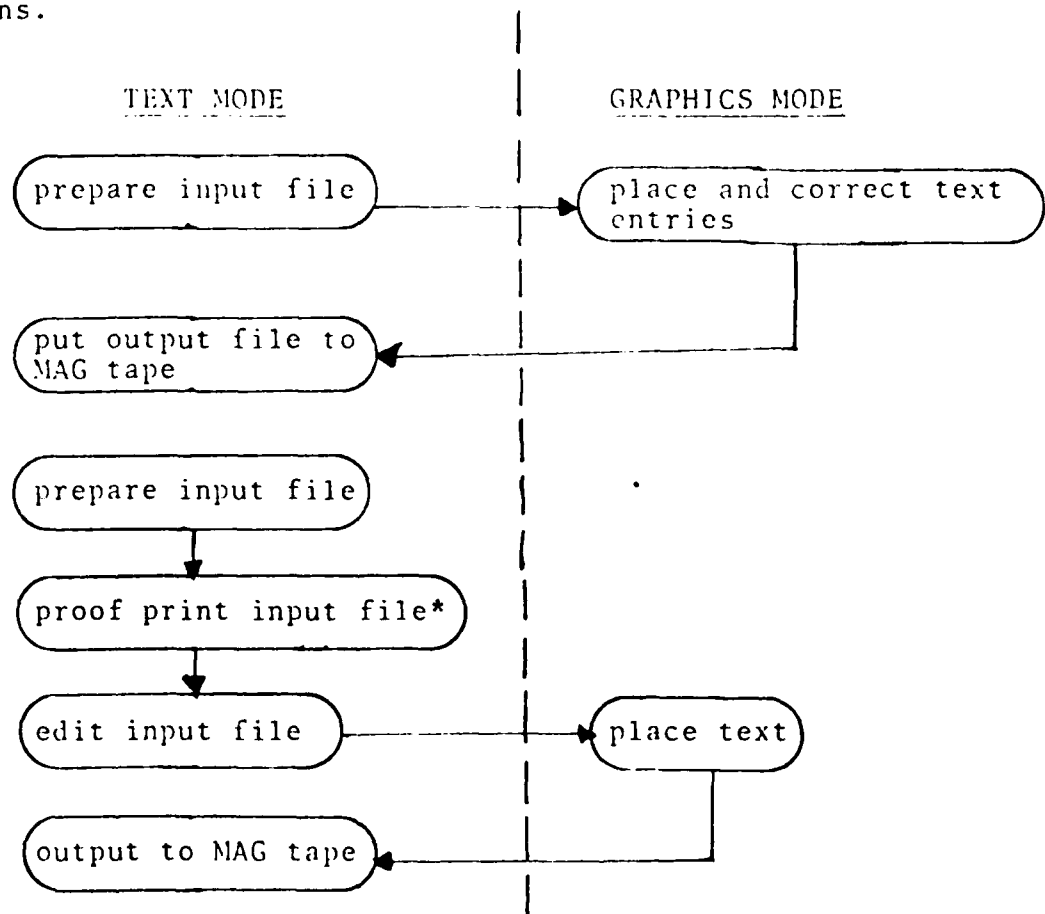
1. text placement by digitizing
2. sees text outline rectangles
3. changes text placement, text messages, font, size or justification.

A user on a single task can shift from one mode to the other at will, providing he has the necessary graphics device attached to his task.

11. OPERATION IN A MULTI-TASK ENVIRONMENT

There may be several tasks which have only an alpha-numeric I/O device. The operators of each of these tasks can be performing any of the text mode operations mentioned above. The only restriction is that two tasks cannot simultaneously operate on the same file. However, when one task finishes with a file any other task can access and modify it.

At least one, and perhaps several, tasks will have a graphics as well as an alpha-numeric device. The operator of this task can perform any of the text mode functions and, in addition, can enter the graphics mode and perform graphics operations.



*The input file at this point may be a previously created and filed output file. In which case only changed entries will have to be placed.

III. TEXT MODE OPERATIONS

A. Preparation of Input File

BOOT UP/LOG IN

EDITLC file name, N ↵

I ↵

F3 S13 T"Message"

F3 S10 T"This is an exam
ple of a continuation line" ↵

F, or S may be absent. In which case the last specified values will be assumed, likewise for J and C.

The QUOTES are necessary to delimit the start and end of text messages, but can be eliminated if the text is at the end of the line (a space between T and text is still needed, though).

When file is finished, type ↵ F ↵

The EDITLC will also allow corrections or additions be made to existing files.

The files may be input from cards, mag tape or from the CADDS alpha-numeric CRTS.

B. Offline Storage on Mag Tape or for Input to PDP-11

SPATTACH MT, TAP 0 ↵

SPATTACH MT, TAP 1 ↵

0 SAVFIL ↵ SAVFIL SINCE DATE OR CR

↵

#Catalog-name/name-list/options

TRNG.RED.&BCD/ATPS/NLEV

↵

↵

DETACH MT ↵

C. Preparation of Font definition tables is done in this mode.

IV. GRAPHICS MODE OPERATIONS

One first boots up and logs in to the CADDs system using CADDsCLR. From this mode one requests CADDs graphics mode.

SEE CADDsCLR.

Entering graphics requires one step of converting the TEXT mode "input" file into an active graphics "PART". Likewise, exiting from graphics requires converting the the graphics "PART" into a text mode "output" file.

Before one uses a file, other tasks could have been creating it, and after one outputs it other tasks can verify it or send it to mag tape.

Text placement and associated editing in the graphics mode can be done in two ways.

- a. Sequentially: One starts at the first entry and cycles thru each entry one at a time until "entities finised."
- b. Random Access: If text has already been placed one can digitize the rectangle of an entry to be changed and then reposition or otherwise change the properties of that entry.

All commands issued to the graphics system after the start up step go via menu buttons. (PFK's on the IA-4).

Typing is only necessary when text messages, font, size, carding or justification properties are to be changed.

PLOTTER SETUP COMMANDS		INIT PEN	CHG PORT WIN	SEL PLOT	ECHO PLOT ON		↘	
SEQ TEXT PLACE	STANDARD OPERATING PROCEDURE	IN	SCN STG	RUN ETL LIST 5: POS: P		OUT	↘	
	ADD/CHG ANY PROP	RUN ETL LIST5:	CHG PROP	ETL			↘	
	PLACE TXT L/C/R, S/C	CHG PROP	1	2	3	4	5	↘
RANDOM ACCESS EDITING		SEE ALL	SCN STG		6	7	8	↘
TO SHUT DOWN		FILE OK	EXIT DG		9	0	:	↘

V.

THE SEQUENTIAL TEXT PLACEMENT OPERATION

(In the following, words all capitalized will be given by the system, words underlined will be given by the operator and all else are instructions or clarifications).

A. Standard Procedure

1. Boot up/log in/initiate graphics.
(See appendix D for plotter setup commands)
2. RUN ETL IN FILE = type file name, then carriage return.
3. SCN STG ↵ This command will start the placement process.
4. RUN ETL LIST 5: ENT D ↵

This command will show the "Properties" associated with the current entry (and the following 4 entries).

5. RUN ETL POS: ENT D DIG Dibitize one (or twice)

This command will allow placement of the text currently "active". A digitize indicates the origin of the text entry (i.e. the lower left hand corner of left justified text, etc.). A second digitize will determine an angle for the text. Horizontal text requires only one digitize.

6. ↵ A carriage return finalizes the text placement. The system will then calculate and draw a rectangle.
7. P and carriage return

This command will proceed to the next entry. The operator should repeat steps 4 through 7 until the message "ENTITIES FINISHED" appears.

8. RUN ETL OUT FILE = Type output file, then carriage return. Use different out file from input file.
9. EXIT ↵ DG to terminate graphics.

B. To Change or Add any Property

The graphics mode operator can change any of the properties associated with an entry F(font) S(point size) J (justification) or T(text message).

The proper place in the sequence to make a change is before step 5 or between steps 6 and 7. Before step 5, the operator may see a misspelling or an incorrect parameter value. After step 6, he may see that the rectangle overlaps another and may want to change the position, angle or size.

1. RUN ETL LIST 5: ENT D ↓

2. CHG PROP

Type the desired changes in this particular string using the same format as the input file.

3. : ENT D ↓ This finalizes the change

4. RUN ETL LIST 5: ENT D ↓

This will list the new values (optional)

C. To Change Text Position

Return to steps 5 and 6 in part A above.
That is, merely redo:

1. RUN ETL POS: ENT D DIG digitize once (or twice)

2. ↓

D. To place text either Right or Center justified:

1. CHG PROP type J2 (or J3)

To select justification mode, J2 for right justified, J3 for center. (J1 is left justified and default)

2. : ENT D ↓ This finalizes the change to J

3. RUN ETL POS: ENT D DIG digitize once (or twice).

Digitize position

4. ↓ carriage return to finalize placement.

E. To place text spread (or compressed) to fill a space

1. CHG PROP type J4 (or J5)

To select carding spread mode. J4 is horizontal and J5 takes the angle of the two digitizes

2. : ENT D ↓ This finalizes the change

3. RUN ETL POS: ENT D DIG digitize twice

Digitize twice to indicate position (two digitizes are required for spreading or compressing)

4. ↓ A carriage return finalizes the text placement.
The system will then calculate and draw the rectangle.

VI. RANDOM ACCESS EDITING

It may be necessary to edit individual text strings after the sequential text placement operation. If corrections are discovered before exiting from the original part, steps 1-3 below can be skipped. Otherwise:

1. Activate a new part
2. RUN ETL IN FILE = type old output file then carriage return
3. RUN ETL SEE ALL ↵ This will recalculate all the rectangles and redraw them.
4. SCN STG: ENT Digitize the rectangle to be changed.
5. ↵
6. RUN ETL LIST 5: ENT D ↵
7. CHG PROP type changes : ENT D ↵
8. RUN ETL POS: ENT D digitize once (or twice)
Digitize a new position.
9. ↵ carriage return to finalize the placement.
10. The above steps 4-9 may be repeated for as many changes as needed. Also, you may not need to do 6, 7, or 8, but rather only one or two depending on the change.
11. RUN ETL OUT FILE = type file name
12. EXIT ↵ D G

VII. TO SHUT-DOWN AND RESTART

A. Shut Down

1. FILE ↵ at end of day
FILENAME: XXX ↵ (some appropriate name)
TYPE OK TO FILE REGEN: OK ↵
2. EXIT ↵ D G to terminate graphics
3. Shut down the system

B.. START UP

1. Boot up/log in/initiate graphics

In the normal manner, but use the same file name XXX filed at shut down. Also initialize the plotter origin to the same origin used before.

2. SCN STG: ENT Digitize last rectangle plotted ↵
3. RUN ETL LIST 5: ENT D ↵ To check that it was in fact the last one worked on.
4. P ↵ To get next text string
5. RUN ETL LIST 5: ENT D ↵ To check on new text string
6. RUN ETL POS: ENT D Digitize position
7. ↵
8. Continue as before

C. Alternate Shut Down (Do not use)

1. RUN ETL OUT FILE = type file name ↵
2. EXIT ↵ D G
3. Shut down the system

D. Restart after alternate Shut Down.

1. Boot up/log in/initiate graphics in normal manner
2. RUN ETL IN FILE = type file name ↵
3. RUN ETL SEE ALL ↵
4. Continue with step VII.B.2. above.

VIII. PREPARATION OF FONT DEFINITION TABLES

The portion of the graphics system which creates the text outline rectangles needs to know the relative widths of all characters it will see.

The widths for all characters of a particular font NNN must be specified in an ASCII text file named DATA.ETL.FONTNNN (NNN ranges from 001 to 999)

Example: font two is in DATA.ETL.FONT002

This file will have 127 lines, one for each of the possible characters 7 bits of ASCII (excluding 0) allows.

Example line 1: 0.00 01 (HEX) unused
 line 2: 0.60 02 (HEX) ?
 .
 .
 line 48: 0.60 30 (HEX)=zero
 line 49: 0.60 31 (HEX)-one

1. No lines may be skipped. For an illegal character value use value 0.00.
2. Comments go after column 15 and are for user convenience only.
3. Width values are in "Relative units". A width of one relative unit would mean that at point size S, the width of the character is 1 times S. We expect but don't require that all relative unit sizes will be less than or equal to one.
4. If a font table has not been provided for a font requested by text entry, an error message will be printed and the table for font one will be used.
5. Use the same EDITLC program to produce font tables that is used to edit or produce input files.

IX. INPUT/OUTPUT FORMATS

CV uses input/output in a format verifiable and editable with existing File Management commands. The data are in an ACSII file editable with the CV/OS's EDITLC command.

A. Free Field Tagged Format

The basic format for an entry is a series of tagged properties:

tag value tag value ... tag value

on input there will be no x, y or angle tags or values and on final output these properties will be added.

Valid Properties are:

<u>tag</u>	<u>value</u>
F	text font (INTEGER)
S	point size (INTEGER POINTS)
J	iustification (1-5) on input only, but usually omitted
C	carding (INTEGER POINTS) usually not input

X	x-location (REAL)
Y	y-location (REAL)
A	angle of orientation (INTEGER DEGREES)
T	text (ASCII)

Example / Input:

F2 S8 T"THIS IS THE MESSAGE"

S7 T"THIS IS THE NEXT"

- NOTES:
- ° The tags on input can be in any order.
 - ° The double quotes used with text can be omitted if the text is the last property on the line.
 - ° If J is omitted left justification is assumed.

B. Continuation Capability

Special long line or multi-line input: A physical line cannot exceed 72 characters. For more than 72 characters a line to be continued will end with a "/"

for example:

F2 S8 T"THIS IS THE MES/
SAGE"

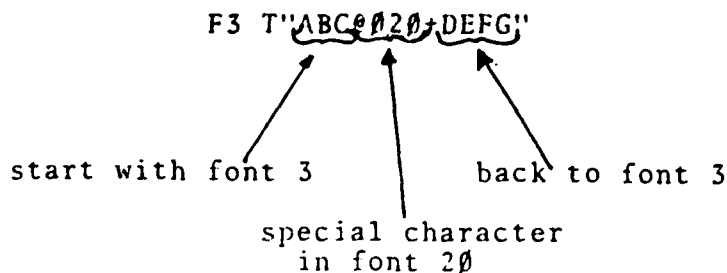
C. Font Shifts Within an Entry

A change of font is signalled by:

@nnn or @@nnn

where nnn is the number of the font to apply to the following character:

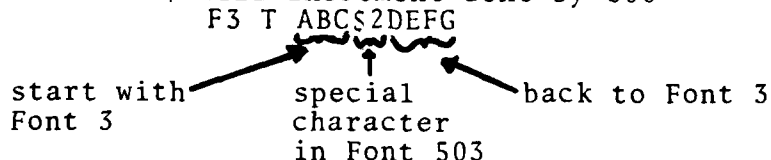
- @nnn will change font for one character only, then revert back to the previous font.
- @@nnn will change font for all subsequent characters of the current entry.



D. Accents Within an Entry

Accents are stored in fonts 500-999 and this can be represented in long form by @nnn and a character. However, a short form for accents of \$ character will be used most often.

\$ will increment font by 500



Input Format - Rules of Use

1. F, S, J, C, and T may appear in any order on input.
2. T must appear.
3. If F S J or C is not specified, the system uses the previous value of that parameter.
4. Size is in typographical points from 4 to 72.
5. Special characters are delineated by the "@" symbol or by \$.
6. X,Y problem may be specified as input.
7. A line must be less than or equal to 72 columns. For longer entries use the continuation format described above.
8. The X and Y coordinate values are of decimal form.
9. The angular value in integer format in degrees.

Output Format - Rules of Use

1. The file produced for output can be used as an input file.
2. J does not appear on output.
3. Output is in fixed field format with all defaulted parameters filled in.

EXAMPLE:

/S2.... / F013 S10 X38.012.104 Y25.104 A000 C012 T "Message"

In terms of columns numbered from 1 to 72 starting at the left.

/S2/	starts at 1 and ends at 8
F013	starts at 10 and ends at 13
S10	starts at 15 and ends at 17
X38.012	starts at 19 and ends at 25
Y25.104	starts at 27 and ends at 33
A000	starts at 35 and ends at 38
C012	starts at 40 and ends at 43
T"Message"	starts at 45 and ends at -

If the line ends with a slash the message is continued on the following line.

APPENDIX A

Magnetic Tape Format

The CV/OS output on mag tape is in the following format:

9 TK tape P 8 BIT CHAR

record 1 Tape header

record 2 File header

record 3 File line data variable length 1000 HEX

.
.
.

Each line is of the form:

4 BYTE header, data

Ø	# of leading blanks	previous character count	character count
---	------------------------	-----------------------------	--------------------

SAVFIL File Format:Record 1: (8 words): Header record

- 0) Checksum of words 1-7
- 1) 0
- 2-3) Encoded date and time
- 4-5) SAVFIL SINCE date and time (or 0,0)
- 6) 0
- 7) 0

Record 2: (variable length): Identification record

- 0) Checksum of words 1-N
- 1) '8000'x + saved file number: '8001'x
- 2-3) Sector count for file
- 4-5) Creation date and time of file
- 6) 0-Not new name; /0 New-name
- 7) User attribute 1 for file
- 8) User attribute 2 for file
- 9) CHKSUM word
- 10) File type
- 11) Number of bytes in file name
- 12-N) Characters for file name with catalogs separated by
" " 's and terminated by a "!"

Record 3: (variable length '1000'x): File data record

- 1-N) File data

(The data for a single file may span several records)

Record N1: Identification recordRecord N1+1: File data record

.

.

.

EOF

EOF

APPENDIX B

Crash Recovery Procedure

In case the system crashes or hangs for any reason, whether it is from a power outage or whatever, there are several procedures to follow in order to recover your work.

First you must reboot and login to the system in the normal manner. Then you must type:

FMCLEAR↓

Then type:

CADDSCLR↓

You must login under same task # as you were hung up in.

OK

The system should respond with:

"TYPE OK TO RECOVER PART"

Type:

OK↓

The system should then respond:

"PART RECOVERED"

Type:

REGEN REGEN↓

You may then proceed from where you were before. However, should the system respond:

"PART NOT RECOVERABLE"

you must reactivate the last version of the part on disk. It would be best to place a new sheet of paper and hitting the button RUN ETL SEE ALL to get a new plot of the rectangle. Then type SCAN STG: and digitize the last rectangle plotted. You may then proceed as before.

APPENDIX C

Card Input Process

In order to input card information to the system,
turn on the card reader and place the cards in it.

Depress Motor Button

Depress Start Button

From system level do:

```
n>   Attach CR,   DCMN  ↓  
n>   CARDEV CR ↓  
n>   Transfer  ↓
```

Copy (filename) = CR: ↓

The Cards will then start reading in. When they are
finished type:

↓

This file has been stored on disk and can be reactivated and
edited at will. See Appendix on EDITLC.

```
n>   EDITLC (same filename) ↓  
#T ↓
```

Check to see that all the data was sent to disk

#F ↓ Make sure you file.

APPENDIX D

How to Initiate Graphics

- 1) CADDSCCLR ↓
OK ↓
↓ R&D ↓ type appropriate part name (These are not file names.)
- 2) RST KEY ↓
KEYFILE.ETL ↓
- 3) HIT IA-4 reset button.
- 4) Tape down map document
Determine the map's origin (zero, zero) point.
Mark this point for future reference.
Move IA-4 reticle to this point.
Hit white button to set counters to zero, zero.
- 5) a) Move pen #1 to any convenient point on the margin of your paper.
b) Init Pen ↓
c) Move IA-4 reticle to the cross drawn
d) digitize
e) repeat c and d for Pens 2, 3 and 4
- 6) CHG PORT WIN:
digitize lower left corner and upper right corner of your paper
↓ carriage return finished the process.
- 7) SEL PLT ACC1 SPD 10 PEN 1 STP 2 ↓
- 8) ECHO PLOT ON ↓

APPENDIX E

EXCERPTS FROM COMPANION MANUALS

The following pages reproduce a few selected sections of the graphics and O/S operator's manuals.

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Task Control

LOGIN PROCEDURE

To log in a task under CADD3 3 O/S, the user types Control L or Control Rn on a terminal. This terminal will be assigned as the command I/O device for the task unit name of SD.

Only if this task is the first task to be logged in since the system start-up will the following message result:

BOOTUP LOGIN

TYPE DATE AND TIME : MM-DD-YY (, HH:MM)

The user must type the date and time in the format indicated. For example:

4-31-75, 13:15

The system will then respond with:

TYPE COST/MIN

The user must respond with the cost per minute of user time. For example, for a rate of \$.01/minute, type .01.

NOTE

The above information must only be input once, each time the system is rebooted.

TASK LOGIN

The following information is automatically initiated:

TYPE NAME

The user must respond with a user name of up to 20 characters. Carriage return at this point will cause the LOGIN procedure to abort.

NAME

TYPE OK IF OK

At this point the user should verify that the name is valid. If it is not, institute a carriage return. Now the system will reprompt with:

TYPE NAME

If the name is satisfactory, the system will respond with:

TYPE NUMBER

The user must respond with a user number of up to 13 characters consisting only of letters and numbers. Carriage return at this point will cause the name request to be repeated.

NUMBER

TYPE OK IF OK

Once the user inputs and approves the user number, the message:

****TASKn INITIATED****

n>

is output and the task LOGIN is completed. The task is now ready for command input. The system assigns the task unit name SD to the device on which LOGIN has taken place and assigns this as the task's COMMDEV.

During the course of logging in, should the message:

LOG FULL

appear, the user should call the Key Operator. The accounting log is full and must be reinitialized.

CADDS 3 System Accounting ACCESSING

The system manager will be required to perform certain operations for accounting log maintenance. To access these operations, the operator logs in under the name:

****LOGOPER****

Once he has approved this name, the message:

TYPE COMMAND

is displayed. The operator then types any one of the commands listed below, or a carriage return. Carriage return terminates the operator session. Upon completion of one operator's commands, another is requested. The operator may perform these commands at any time during the operation of CADDS 3 O/S.

CAUTION

Performing CLEARLOG or INITLOG while other tasks are logged in causes the accounting information for these tasks to be lost.

COMMANDS

INITLOG

The accounting log is initialized and all current entries are cleared. This should be done when the system is booted up.

DUMPLOG

Generates a formatted dump of the accounting log containing the following information for each log entry:

NAME:	User name
NUMBER:	User number
DATE:	Date of login
TIME:	Time of login
DURA:	Time used in hours and minutes
TASK:	Task number
COST:	Charge for time used (at current charge rate)

Section Three

SYSTEM BOOTUP PROCEDURES

(Tape, Disc)

CGP BOOTUP

APL Switches

The Computervision Graphics Processor (CGP) is equipped with Automatic Program Load (APL) from either of two device codes. The usual devices used by these two APLs are the system primary disc and the system primary tape. The device the boot comes from is controlled by a large black toggle switch in the middle of the control panel labeled APL1 at the top and APL2 at the bottom. In a standard system, RESET, APL1 will cause a boot from the system primary disc and RESET, APL2 will cause a boot from the system primary tape.

Device Switches

The devices assigned to APL1 and APL2 are controlled by two switch blocks each containing seven miniature rocker switches at the right side of the control panel. The left block controls APL1 and the right block controls APL2. The switches are numbered 1 through 7 from left to right. Switch number 1 controls whether the device is a DMA type device (ON = disc, mag tape) or a programmed I/O type device (OFF = paper tape). Switches 2 through 7 contain the device code of the desired device; typically this is:

33₈ = DIABLO
34₈ = 2314
36₈ = Storage Module
22₈ = Mag Tape

For a standard system with APL1 coming from disc and APL2 coming from tape, a possible switch block configuration is: left block (APL1) = 134₈ and right block (APL2) = 122₈.

• NOTE

It is also possible to boot a CGP in the manner described for a non-CGP processor without program load, but only after removing the front cover from the control panel.

For further information about the CGP, refer to the *CGP-100 User's Guide*.

BOOTING FROM A TAPE

Tape must have page 0 boot code record at front with boot code start address at 'FF'x in record.

To boot from a tape, mount tape, place at LOAD point and set ON-LINE. On machines with program load to boot from unit 0:

- 1) Put 100022₈ in switches
- 2) Press RESET
- 3) Press PROGRAM LOAD*

*Be sure switch 4 is up if Teletype is being used rather than Infoton.

The system has a simplified operator's console with address and data display and two switches (see Figure 1-3). Address and data are displayed by LED octal digits. The two switches are STOP/RESET to stop and reset the processor; and APL1/APL2 an Automatic Program Load switch.

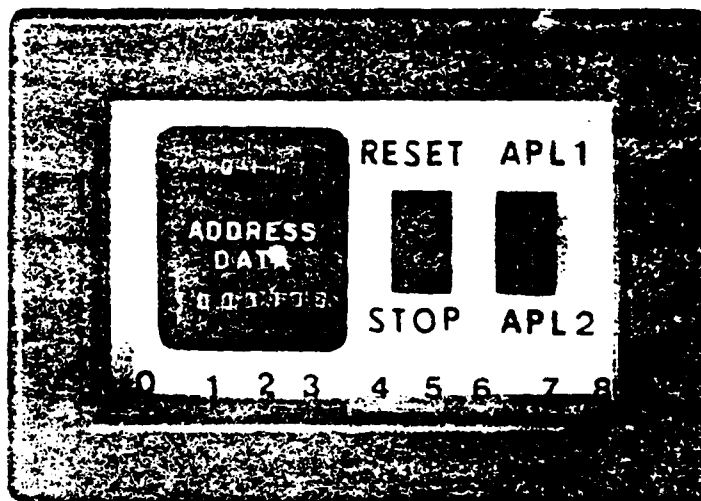


Figure 1-3. Operator's Control Panel

The Central Processor Unit (CPU) is micro-program controlled. Internal Read Only Memory (ROM) chips contain firmware (a microprogram) that is activated by program instructions. Microprogramming permits simultaneous execution of CPU functions giving much faster processing of program instructions than conventional CPU's. Simplified operator controls, and state of the art microprogrammed circuitry assures ease of operation, fast response for users, simple field up-grading and increased system reliability.

Associated with the CPU is a memory board capable of storing 32,768 17 bit words: 16 bits data, one parity bit. The memory capacity is expanded to 512K words with the Memory Mapping and Protection Unit (MMP) and additional memory boards. The Operating System (CADD3 O/S) that supervises all system resources, uses 8K of memory. Each user or task uses 24K of memory. Current CGP-100 configurations presently accommodate as many as eight interactive users.

Magnetic Tape Unit

The magnetic tape unit is used to write and store design information entered into the system (see Figure 1-4). The unit records onto magnetic tape. Once stored on tape, the information can always be read back into the system.

Command

EDIT

PURPOSE

Text file editor.

SYNTAX

EDIT catalog.file{,N}

The text to be processed is contained in "file" in catalog "catalog.&BCD", which must exist. The N option must be used if "file" does not exist.

The system returns with a prompt (#), indicating it is waiting for an EDIT command.

DESCRIPTION

EDIT commands are single or double character mnemonics followed where appropriate by the parameters shown.

All line numbers are in decimal. If the number exceeds the number of lines in the text, the number of the last line will be used. Any place where a line number range is to be entered, a single line number will be accepted.

For the sake of legibility, a space is shown after each command mnemonic in this documentation. When actually using the command, however, no spacing is necessary to separate the mnemonic from the parameter list.

Insertions, deletions, replacements, copying, moving and extracting do not take place immediately, but only when the file lines are renumbered. Renumbering occurs when one of the following commands is given: Type, File, Punch, Locate, Substitute or Auxilliary File.

There is a limit to the amount of editing which may be performed before a renumbering is done. When the message:

****EDIT BUFFER FULL****

is output, the limit has been reached and the user must perform one of the commands which causes renumbering (Type is usually used). This limit may be reached in the middle of execution of a command such as copy. A message indicating the point at which the command was terminated is also output so that the user may complete the command after a renumbering is done.

COMMANDS

I {line #}

Insert. 0 is assumed if line # is omitted.

Each line typed in, subsequent to the Insert command, is inserted after the specified line. The insertion is terminated by hitting RETURN at the beginning of a line.

When creating text for a new file, the first command should be:

I 0, or I (insert after line 0)

EDIT

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D line a { - line b }

Delete. Deletes the specified lines.

R line a { - line b }

Replace. Replaces the specified lines by the lines typed in subsequently. This command is exactly equivalent to:

D line a { - line b }
I line a

The replacement is terminated by hitting RETURN at the beginning of a line.

N numdig

Set Number of Digits. Sets the number of digits of the line number to be typed with each line when lines are typed. The value "numdig" must be ≥ 0 and ≤ 10 . The rightmost "numdig" digits of the line number is then typed with each line, followed by an exclamation point (!) and the contents of the line. If "numdig" is set to 0, no ! is typed. The default value for "numdig" is six.

T {line a { - line b } }

Type. Types the specified lines. All lines are typed if there is no specification.

TV {line a { - line b } }

Type with Version. Types file name, date, and time of the file, and then the specified lines as with T.

TH {line a { - line b } }

Type with Header. Types the specified lines as with T, but includes on each page of the output the file name (with the &BCD level), the date and time of the file, and a page number.

P {line a { - line b } }

Punch. Punches the specified lines for offline listing. All lines are punched if there is no line specification. Leader and trailer are punched. The paper tape device must have been declared using the command PPTDEV.

Q

Quit. Control leaves the text processor and returns to the system. The text processed since the last file command is not filed.

F

File. Updated text is filed in "file" in catalog "catalog.&BCD". Then control leaves the text processor and returns to the system.

FF {/options}

File and FORT. Updated text is filed as above and then FORTRAN compiled using the options specified or the default NOLIST option (see FORT).

FT {/options}

File and TPL. Updated text is filed as above and then TPL compiled using the options specified or the default NOLIST option (see TPL).

FL {/options}

File and LOAD. Updated text is filed as above and then LOAD'd using the options specified or the default options (see LOAD).

FX

File and Execute. Updated text is filed as above and then EXECUTE'd (see EXECUTE).

E line # {/character x { - character y }}

Edit. Edit a line. If both character position x and character position y are omitted, the whole line will be edited. Character positions x and y give the limits on the columns in the line to be edited. If character position y is omitted, the end of the line is assumed.

After the Edit command is keyed-in, the part of the line to be edited is typed out. Edit is now ready for a modification line.

EDIT

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The typed out line and the modification line are processed character by character in step. The modification line is created as follows:

Modification character	Action
Blank	Keep old character
Λ or I	Blank out old character
\	Delete old character
[	Insert following characters, including blanks, in front of old character. Insertion is terminated by hitting RETURN or].
	<i>NOTE:</i> Modifications may be made to the current line after terminating an insertion, but the positioning will be off by the number of characters typed.
Any other non-blank character	Replace old character by this character.
RETURN	End of modification line. Produces blank modification character for remainder of line, i.e. old characters will be kept.

After the modification line is created, it is typed out and becomes the basic line for the next modification.

The editing operation is terminated by hitting RETURN at the beginning of the line.

C line a { - line b }, line c

Copy. Insert a copy of lines "line a - line b" after line c.

M line a { - line b }, line c

Move. Same as Copy except that lines "line a - line b" are deleted after the copy is made.

X catalog.file, line a { - line b }, line c

Extract. A copy of lines "line a - line b" from text file "catalog.&BCD.file" is inserted after line c.

NOTE: EDIT forces all line numbers into the range 1 to maximum line number before performing the operation, except for line number in I and line c in C,M,X where the minimum is 0.

L {line a { - line b}} , XXX
S {line a { - line b}} , XXX, YYY

Locate (= L), *Substitute* (= S). Optional line a, line b define scope of search or substitution. Whole text file is the default.

XXX is a string to be matched. If it starts with a special character (not a letter or digit), then that same special character terminates the string. In this case, the search will find any occurrence of the string in a line, e.g.

L, /J/

will list every occurrence of the letter J in the text file.

If the match string starts with a letter or digit, it is terminated by a special character. In this case, the string will only be recognized during the search if it is preceded and followed by a special character (search assumes there is a special character preceding the first character of a line and following the last character), e.g.

L, J

will list all occurrences of variable J. It would not list a line such as

JJ = KK

YYY is a substitution string. Although it can be (but does not *need* to be) defined in the same manner as match string, the way it is defined has no effect on the search. Multiple occurrences of the match string in the same line will be found and substituted.

A catalog.file

Auxiliary File. Renumbers the current file and stores it under the file "catalog.&BCD.file" which must not be the file being edited. In this case EDIT does *not* terminate.

EXITING EDIT

The only ways to leave the text processor and return control to the system are to use any one of the file commands (F, FF, FL, FT, or FX) or the Quit command (Q).

ERROR MESSAGES

BAD CNT

Bad file count in header of text file.

FM ERROR

Fatal file manager error (non-recoverable).

8002

Wrong file type.

Command	EDITLC
PURPOSE	Text file editor for upper-lower case text files.
SYNTAX	EDITLC catalog.file {,N} where the text to be processed is contained in "file" in "catalog. &BCD", which must exist. The NEW option must be used if "file" does not exist.
COMMANDS	EDITLC commands are single character mnemonics followed where appropriate by the parameters for the command. All commands valid for the EDIT command are valid for EDITLC. In addition, the following commands are valid: U <i>Force Upper.</i> Force all text typed to upper case. B <i>Type Lower and Upper.</i> Type both lower and upper case.
• NOTES	The files processed by EDITLC are stored as type 5. EDITLC may be given a file of type 3 as input, but it also is stored as a type 5 file by EDITLC. Commands FF, FT, FL, and FX can not be used; the succeeding commands will not handle type 5 files.

COMMAND ATTACH

DESCRIPTION The Attach command allocates a specific device or type of device to the current task.

SYNTAX ATT xx xxxx ↓

where xx is the task unit name to be assigned to the device and xxxx is either the device type desired (e.g. IOSB, TAPE) or the specific device desired (e.g. IOS0, TAP1) from the following list:

TAPE	Mag tape unit
DMAB	DMA Console
IOSB	IOS Console
DCMN	High Speed (7600 cpm) card reader
CTR2	Line Printer
INFO	VT-50 Alpha Numeric Display
TTYS	Teletype
SCAN	Scanner
XYNT	Xynetics Plotter
FPTR	Fast paper tape reader
FPTP	Fast paper tape punch
SCMN	Standard card reader
INTD	Interdata Communications interface
TBIO	Basic task-based I/O unit

When using the CADDs graphic software, any name can be used as the task unit name with the exception of the Magtape unit which must use the name MT. The following are examples:

CR	Name assigned to CRT display (DMAB or IOSB)
PT	Name assigned to plotter
MT	Name assigned to mag tape unit (TAPE)
DG	Name assigned to digitizer (IOSB)
SN	Name assigned to Scanner (IOSB)
CP	Name assigned to Online Calcomp (NFO)
XP	Name assigned to Online Xynetics (XYNT)

ERROR MESSAGES

ILLEGAL DEVICE NAME

One or both of the device names specified in the command was incorrect.

NO UNITS OF TYPE nnnn ARE AVAILABLE

All units of the type specified, or the unit specified, are in use.

COMMAND	DETACH														
DESCRIPTION	The Detach command releases a device from the current task.														
SYNTAX	DET xx ↘ where xx is the task unit name of the device to be detached. When using the CADDs graphic software, any name can be used as the task unit name with the exception of the Magtape unit which must use the name MT. The following are examples: <table> <tr> <td>CR</td><td>Name assigned to CRT display (DMAB or IOSB)</td></tr> <tr> <td>PT</td><td>Name assigned to plotter</td></tr> <tr> <td>MT</td><td>Name assigned to mag tape unit (TAPE)</td></tr> <tr> <td>DG</td><td>Name assigned to digitizer (IOSB)</td></tr> <tr> <td>SN</td><td>Name assigned to Scanner (IOSB)</td></tr> <tr> <td>CP</td><td>Name assigned to Online Calcomp (INFO)</td></tr> <tr> <td>XP</td><td>Name assigned to Online Xynetics (XYNT)</td></tr> </table>	CR	Name assigned to CRT display (DMAB or IOSB)	PT	Name assigned to plotter	MT	Name assigned to mag tape unit (TAPE)	DG	Name assigned to digitizer (IOSB)	SN	Name assigned to Scanner (IOSB)	CP	Name assigned to Online Calcomp (INFO)	XP	Name assigned to Online Xynetics (XYNT)
CR	Name assigned to CRT display (DMAB or IOSB)														
PT	Name assigned to plotter														
MT	Name assigned to mag tape unit (TAPE)														
DG	Name assigned to digitizer (IOSB)														
SN	Name assigned to Scanner (IOSB)														
CP	Name assigned to Online Calcomp (INFO)														
XP	Name assigned to Online Xynetics (XYNT)														
MESSAGES	ILLEGAL DEVICE NAME Device name specified to be detached was incorrect. xx IS NOT ATTACHED Device specified to be detached has not been previously attached. NO DETACH xx IS COMDEV Attempt to detach COMDEV.														

Command	SAVFIL
PURPOSE	Save files in a standard SAVFIL file or an RDOS SAVFIL file on stacked tape.
SYNTAX	SAVFIL TAPENAME{,OPTIONS} where TAPENAME is the task name for the tape unit. OPTIONS is a list from among the following, separated by commas: RDOS Generate an RDOS SAVFIL rather than a standard SAVFIL. STARTAPE At completion of SAVFIL position tape at load point. STARTFIL At completion of SAVFIL position tape at start of SAVFIL. ENDFIL At completion of SAVFIL position tape at end of SAVFIL. Default. NOCHK Do not do check pass on SAVFIL. CHK Do check pass on SAVFIL. Default. OLDFORM Generate the tape in the old style SAVFIL format*.
DESCRIPTION	If the RDOS option is not present, SAVFIL outputs the message: TYPE SAVFIL SINCE DATE OR CR If the user wishes to include a SAVFIL SINCE DATE on the SAVFIL tape, he should type this date in the format: mo-dy-yr { :hr:min:sec } If he does not wish a SAVFIL SINCE DATE, he types carriage return. The SAVFIL SINCE DATE is used by RSTFIL (see the RSTFIL command) if it is present. A prompt (#) is then typed out to indicate SAVFIL is ready for a SAVFIL command.
COMMANDS	A SAVFIL command has the general form: Catalog-name/name-list/options

*IDREC(2) is set to zero, and minutes of day is translated to sequence number on file date and time.

SAVFIL

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where "catalog-name" is the name of the catalog which contains the files to be saved. If the catalog-name is omitted, SYSCATLG is assumed. If the catalog-name is of the form:

catalog-name, new-catalog-name

then when files are saved, the catalog-name portion of the name will be replaced by new-catalog-name. Note that no check is done during the check pass when NEWCAT is specified.

If the name-list is omitted, everything in the catalog will be saved. If a name-list is given and NLEV is selected, all files in subcatalogs of catalog-name whose terminating file names appear on the name-list will be saved.

"Name-list" is a list of the files within the catalog which are to be saved. If the name-list is omitted, all files in the next level down of the catalog will be saved. If a name-list is given and NLEV is selected, all files in subcatalogs of catalog-name whose terminating file names appear on the name-list will be saved.

OPTIONS

The "option" places further restrictions on which files are to be saved.

NLEV	In addition to the files listed in the named catalog, process the files in any catalogs which are subcatalogs of the named catalog, etc.
TYPE = n	Only save those files with the specified type; any number of TYPE options may be used.
SUBCAT	The name-list is to be interpreted as a subcatalog list, and NLEV is assumed.
{ SINCE } { BEFORE }	Save only those files for which the current version has been created since (before) the date and time given.

The SINCE (BEFORE) option is expressed as follows:

{ SINCE }	Date	Time
{ BEFORE }	{mo-dy-yr}	{hr:min:sec}

This must be the last option in the option list. Several options, separated by commas, may be used within one SAVFIL command.

If the RDOS option has been used, all SAVFIL commands are interpreted as if TYPE = 3 had been included (i.e., only BCD files are saved).

EXAMPLES

AU.&BCD/AU09,AU11

Saves the BCD for AU09 and AU11.

GTD

Saves all the object programs in GTD.

GP//NLEV

Saves both the object and the source for all GP codes.

//NLEV, TYPE=3, SINCE 10-12-77: 12:01:42

Saves all BCD on the disc which has been changed since 10-12-77, 12:01:42.

• NOTE

The names of the files are listed as they are written on tape. If the RDOS option has been used, the microfiche heading generated for each saved file is also listed. After all files specified in the current command have been saved, the prompt (#) is again typed out for further input. Typing a carriage return at the beginning of a line indicates that there are no more input SAVFIL commands.

Typing Q as a SAVFIL command causes SAVFIL to terminate.

If the RDOS or NOCHK option has been used, SAVFIL terminates after the carriage return without doing a check pass; otherwise, SAVFIL then outputs:

TYPE OK TO LIST SAVED FILES

Typing OK causes a list of all files on the tape together with the creation date and time, sector count, and reserved words. Whether or not the list is desired, the entire tape is read back in and checked against the disc. Typing ESCAPE and then Q during the check pass causes SAVFIL to terminate.

At the end of this pass, control automatically returns to the system.

MESSAGES

Various messages are output by SAVFIL if error conditions are encountered. If a bad SAVFIL command is given:

BAD REQUEST

is output. If a tape error is encountered, the following is output:

TAPE ERROR

If the SAVFIL tape written is found to be bad on checking, one or more of the following messages is output:

CHECK PASS ERROR

BAD FILE REC

DOESN'T CHECK

SAVFIL

FILE FORMAT

RECORD 1: Header Record (8 words)

- 0) Checksum of words 1-7
- 1) 0
- 2-3) Encoded date and time
- 4-5) SAVFIL SINCE date and time (or 0,0)
- 6) 0
- 7) 0

RECORD 2: Identification record (variable length)

- 0) Checksum of words 1-N
- 1) '8000'x + saved file number: '8001'x
- 2-3) Sector count for file
- 4-5) Creation date and time of file
- 6) =0-Not new name; ≠0-New name
- 7) User attribute 1 for file
- 8) User attribute 2 for file
- 9) CHKSUM word
- 10) File type
- 11) Number of bytes in file name
- 12-N) Characters for file name with catalogs separated by "."'s and terminated by an "!".

RECORD 3: File data record (variable length ≤ '1000'x)

- 1-N) File data

(The data for a single file may span several records.)

RECORD N1: Identification record

RECORD N1 + 1: File data record

⋮

RDOS FILE

RDOS SAVFIL files are in RDOS readable format and may be used to transfer BCD files to RDOS and/or to produce microfiche listings of these files.

The tape records are 257 words long. The first 255 words contain text, the last two words contain the file number which is zero. Note that CADD3 tapes use 4096 word blocks, so RDOS tapes will be longer.

To print a RDOS tape, do the following:

- 1) Boot an RDOS disc.
- 2) Enter date and time. RDOS prompts with an "R".
- 3) Type INIT MT0
Then PRINT MT0:0
- 4) To kill the printing, type Control A, then SPKILL \$LPT.
- 5) When you are done, type RELEASE MT0. To remove disc cartridge type RELEASE DP0.

The printing is spooled so that RDOS can be used at the same time for work that does not require the magnetic tape or the line printer. If you distrust spooling, it can be disabled by typing:

SPDIS \$LPT before PRINTing

For microfiche listings, a heading is placed on each page, i.e., after each form feed. The first line of the heading is 28 characters long. It appears in large letters at the top of each fiche and is also used to control fiche change.

Its format is:

Cnnnnmddyyffffffggggggggp

where:

nnnn	is the sequence number
mddyy	is the date when the tape was produced
ffffff	is the first level file name
gggggggg	is the second level file name
p	is the fiche number for this file name pair

A new fiche is produced each time the first or second file name changes or more than 207 pages are written. The second heading is for information purposes and contains the full file name, the date and sequence number of the file, and the page number in the file. Each heading starts with the letter "C" so that FORTRAN programs can be transferred to RDOS more easily. Each page is 60 lines long and is followed by a form feed character (OC).

The RDOS text editor can be used to selectively print data from an RDOS FMSAVFIL tape. For example:

R	
EDIT	
*GW\$LPT	Get for writing
*GRMT0:0	Get for reading
*Q&BCDbbbbAU09	Search for "&BCDbbbbAU09" with no output
*N&BCDbbbbAU17	Print until "&BCDbbbbAU17" is in buffer
*GCH	Close files and return to RDOS
R	

will print files AU09 up to, but not including AU16. Here ¢ = escape key and b = space, while \$ = \$. (For more information, see the *RDOS Editor Manual*.)

Command

RSTFIL

PURPOSE

Restore files to disc from a SAVFIL file on stacked tape.

SYNTAX

RSTFIL TAPENAME {,OPTIONS}

where TAPENAME is the user-assigned task name for the tape unit (see ATTACH).

OPTIONS

OPTIONS is a list from among the following, separated by commas:

- | | |
|----------|---|
| OLD | The file is an old-style SAVFIL file (made from non-FM catalog structure) |
| STARTAPE | At RSTFIL completion, position tape at load point (default) |
| STARTFIL | At RSTFIL completion, position tape at start of SAVFIL file |
| ENDFIL | At RSTFIL completion, position tape at end of SAVFIL file |
| NOTSTK | The tape is not a stacked tape (OLD is implied) and was not generated by CADDS 3/OS |

The header record is read and the following information typed out:

- 1) Time and date of SAVFIL tape.
- 2) "SAVFIL SINCE DATE" if one exists on the SAVFIL tape.

A prompt (#) is then output to indicate RSTFIL is ready for a RSTFIL command.

COMMANDS

DO {catalog}{, {newcat}}{/file₁,...,file_n {SUBCAT
NLEV

Searches for the specified files on tape and attempts to restore them. Interpretation of file specification is as follows, by case:

DO {catalog}{, {newcat}}/file₁,...,file_n

All files with name "catalog.file_i".

DO {catalog}{, {newcat}}

All files in catalog "catalog"; if catalog is not present, does all files.

DO {catalog}{, {newcat}}/file₁,...,file_n/SUBCAT

All files in catalogs with names "catalog.file_i".

DO {catalog}{, {newcat}}/file₁,...,file_n/NLEV

All files in catalog "catalog" with last name "file_i"; i.e., all files with names:

"catalog....file_i"

In all cases, if the "," field is present, the "catalog" portion of the name is replaced by the "newcat" field before the file is restored. If "catalog" is not present, "newcat" is just added as the first name level. If "newcat" is not present, "catalog" is removed from the name.

DOALL

This does a DO for every file on the SAVFIL. The files are taken in the order of the SAVFIL listing.

LIST

Lists the sector size, creation date and time, reserved system words, and names of all files in the SAVFIL file.

CHK

Same as LIST, and in addition, compares files on tape against files in FM catalog structure. Comments if file is not in structure, if FM file is a different version than tape file, or if FM file and tape file do not compare word for word (SAVFIL does a compare pass on the tape after it is generated. Therefore, this request is mainly to tell if any files have been changed since the SAVFIL tape was made.)

DOREC file number list

This does a DO for every file number in the file list.

The file number list is of the form:

$b_1 \{-b_2\}, b_3 \{-b_4\}, \dots$

where b_1 is either a single number or a range; for example:

DOREC 2, 40-47, 37, 20-29

NOTEXIST, DOEXT, ASKEXIST

These commands determine the action RSTFIL will take when a file is to be restored which already exists.

NOTEXIST specifies that such files are not to be restored. DOEXIST specifies that such files are to be restored. ASKEXIST specifies that RSTFIL should wait for a user response to the message:

EXISTS: TYPE OK TO RESTORE

when such a file is encountered.

The default upon entry to RSTFIL is ASKEXIST.

OLDDATE, NEWDATE

These commands determine what date and time will be assigned to files which will be restored.

OLDDATE specifies that the file date and time on the SAVFIL tape are to be retained. NEWDATE specifies that the file date and time is to be set to the current date and time.

The default upon entry to RSTFIL is NEWDATE.

USESINCE, NOSINCE

These commands determine whether or not the SAVFIL SINCE DATE on the SAVFIL is to be used to determine the overwriting of files which already exist in the FM catalog structure and appear on the SAVFIL.

NOSINCE specifies that the SAVFIL SINCE DATE is not to be used, and restoration of files which already exist is to be determined by the NOTEXIST, DOEXIST, ASKEXIST setting.

USESINCE, which may only be typed if a SAVFIL SINCE DATE exists on the SAVFIL tape, specifies that for files which already exist in the FM structure:

- 1) The NOTEXIST, DOEXIST, ASKEXIST setting is to be ignored.
- 2) If the date and time of the file on the disc is *before* the SAVFIL SINCE DATE, the file should be restored from the SAVFIL; if the date and time of the file on the disc is on or *after* the SAVFIL SINCE DATE, the file should not be restored from the SAVFIL.

The default upon entry to RSTFIL is NOSINCE.

TYPE=n, ALLTYPE

These commands determine whether or not files will be screened for type. If the user wishes only files of type n, he requests:

TYPE = n

before restoring. If the user desires both types n_1 and n_2 , he requests:

RSTFIL

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TYPE = n₁
TYPE = n₂

before restoring. As many types as desired may be used.

If the user wishes no type screening, he types:

ALLTYPE

and the type filter is turned off. The default is ALLTYPE.

SINCE, BEFORE, ALLDATE

These commands determine whether or not files will be screened for date. If the user wishes only files after a given date, he types:

SINCE mo-day-yr { :hr:min:sec }

If the user wishes only files before a given date, he types:

BEFORE mo-day-yr { :hr:min:sec }

If the user wishes no date screening, he types:

ALLDATE

and the date filter is turned off. The default is ALLDATE.

PRINTERR, ALLPRINT

These commands determine whether messages printed out indicating expected status are to be suppressed or not. PRINTERR requests that only messages indicating unusual conditions are printed. ALLPRINT requests that all messages are printed. The default is ALLPRINT.

START

Causes the SAVFIL tape to be positioned at the first file.

Hitting RETURN immediately following a prompt (#) returns control to the system.

• NOTE

Any time RSTFIL is reading the records on the tape, it performs validity checks on the records.

Any of the following messages indicates a bad SAVFIL tape:

BAD HDRREC (SAVFIL tape header record)
BAD IDREC (File header record)

Messages indicating bad files found will be typed even if the file is not the one requested.

When a catalog into which a file is to be restored does not exist, it is created.

• **NOTE**

When the OLD option is used, the following conversions are made:

Creation date and time: Old date with sequence number as seconds.

User attributes: 1) 0
2) 0

Reserved system words: 1) 0
2) Old type

CADDSCLR

PURPOSE To reinitialize a graphics task and reset system parameter defaults.

NOTE Must be issued prior to a CADDSC command on a new CADDSC 3 system.

DESCRIPTION When the command is issued, the system will respond with:

INITIALIZE CADDSC PARAMETERS?
TYPE OK TO CONTINUE

The user at this time responds by typing OK; any other response will result in an immediate exit of CADDSCLR.

The system will then respond with the allocated storage area lengths.

EXAMPLE

1> CADDSCLR↓

INITIALIZE CADDSC PARAMETERS?
TYPE OK TO CONTINUE
OK↓

0A00 REGEN SECTORS AVAILABLE
TYPE OK TO REALLOCATE

↓
2560 (0A00) SECTORS ALLOCATED FOR REGENS
PART NAME:

COMMAND	INITIALIZE PEN
DESCRIPTION	The Initialize Pen command informs the system of the offset from the plotting head reticle to the pen point of any of the two or four pens available with the LIS Plotter. This varies when any new pen is inserted. The system will first cause pen number one to draw a cross. The operator will then be expected to move the plotting head reticle over the cross and digitize the intersection. This will continue for the remaining pens. This command is necessary for accurate positioning of the LIS pens with respect to the plot paper origin.
SYNTAX	INIT PEN _i

COMMAND	CHANGE PROPERTY
DESCRIPTION	The Change Property command allows modifications to the values of the non-graphic properties associated with existing entities.
NOTE	The List Property command lists properties associated with a given entity. The property name must be on file to be accepted.
SYNTAX	CHG PROP Name1 (Value1...Name n Value n) : ENT D...D
MODIFIERS	
Property Names	The property names are kept on file. To determine what names are valid, the command LIST PROP ALL may be used. All properties and their corresponding values will be listed along with a brief description if one is available. The property name may be any combination of up to 10 letters. Any letters in excess of 10 are ignored. An allowable non-alphabetic character terminates the name. Allowable characters are: ● Alphabetic ● Numeric ● Minus, decimal, double quotes ("), colon, blank, carriage return, CNTRL-E A rubout is also allowable, but it is never recognized as a terminating character. All other characters are rejected. After the property name has been terminated, a value may be entered. The value may be integer, text, real or null, but most correspond with the value type listed for that name. Any other type is rejected. Text is entered by opening and closing with double quotes (""). The limit on the text string is 394 characters. Any character is allowed in a text string. A numeric value is terminated by an alphabetic character, a blank or a colon. The termination of a value by other than a colon allows for the start of a new property name.
ERROR MESSAGES	NO PROPERTY NAME ENTERED An attempt was made to enter something other than an alphabetic character string. The entry was interpreted as a value without a name. Entry is lost and system awaits a name input. PROPERTY JUST REQUESTED NOT ON FILE, ENTER NEW NAME The character string input as a property name was not found in the Name File. System awaits a name input.

VALUE TYPE n REQUIRED, RE-ENTER PROPERTY

The property name entered requires a value type of n and some other type was entered. The types are listed in the Name File. They are:

- 0 - No value,
- 1 - Integer value
- 2 - Real value
- 3 - Text value

System awaits a name input.

CHARACTER COUNT EXCEEDED, OPERATION TERMINATED

There is an upper limit on the number of properties that can be entered at one time. The limit depends on the type of properties. If all the properties have no value, the limit is 66. At the other extreme, if all the properties require text and the limit of 394 characters is used in all cases, the limit is 1.

PROPERTY NOT ENTERED. Name ALREADY EXISTS

NO PROPERTY OF TYPE Name

These messages would be encountered on an attempt to insert a pre-existing property to an entity or delete a non-existent one from it. If a list of properties is being processed, the message would print one for each occurrence per digitized entity. All other properties are processed as requested.

DB ERROR xx

Error from database routines. Control returned to system.*

THERE IS NO ROOM IN TDB, COMMAND ABORTED

There is no room at this time to store the property list. Control returned to the system.*

*An error of this type flags a system malfunction. The operator should contact Computervision's Customer Support department immediately.

REPORT The command LIST PROP generates the following message:

PROPERTIES ATTACHED TO THIS ENTITY ARE:

What will follow will be a list of all properties attached and their corresponding values. If no properties are attached, then the message:

NONE

will be output. This message will appear once for each digitize and will report the entities in the order they were digitized.

EXAMPLE

CHG PROP COLOR"BLUE" : ENT D

This time the value of the color property is changed to blue.

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COMMAND	ECHO PLOT
DESCRIPTION	The Echo Plot command allows the LIS plotter to draw entities as they are inserted on the LIS. The plotter draws all inserted entities upon a carriage return or semi-colon in the command line inserting those entities.
SYNTAX	ECH PLOT (MODIFIERS) ↓
MODIFIERS	
ALL	The entities inserted will be echoed even before the carriage return or semi-colon as on the display. In addition, all other identification marks as seen on the display will also be drawn. For safety reasons, the other mode should typically be used.
ON	Turns plotter echoing on.
OFF	Terminates plotter echoing.

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COMMAND	SELECT PLOT
DESCRIPTION	The Select Plot command selects plotter parameters.
SYNTAX	SEL PLT (MODIFIER) ↓
MODIFIERS	
ACCn	Selects low (n=1) or high (n=2) acceleration. Lower acceleration should be used for better quality. Default is 1.
ORG n, m	Selects a point on the current part that will correspond to the 0,0 reading on the plotter head. Default is 0,0.
PENn	Selects plotting pens one to four. Default is 1.
SCLn	Selects a scale factor with respect to database for plotting and digitizing on the LIS. Default is 1.
SPDn	Selects one of sixteen plotting speeds (1 through 16). Slower speeds yield better plot quality. Default is 10.
STPn	Selects LIS movement in one or two mil increments. One mil increments are slower but more accurate. Default is 2.
NOTE	The one or two mil step is a hardware option. Selecting plot step one without this option will cause the drawing to be plotted at four times its actual size.
WIN:	Selects a window on the database to plot. The default values for the opposite corners of the window are 0,0 and 28500, 17000.
EXAMPLES	SEL PLT ACC2 SEL PLT ORG : dig D SEL PLT SCL3.7 SEL PLT SPD2 SEL PLT STP1 SEL PLT WIN : dig (on Plotter only) DD

COMMAND	RESTORE KEY
DESCRIPTION	The Restore Key command restores a saved key file. All current definitions are lost.
NOTE	A saved key file is created with the SAVE KEY command.
SYNTAX	RST KEY ↵ KEYFILE.My.File The system requests the name under which the key definitions will be found. The system starts the line by typing the first part of the name, KEYFILE, which is the name of the base catalog under which all key files are stored. You supply the rest of the name (the unique part).
PUNCTUATION/ CONTROL CHARS	Any special character after the noun of the command line will initiate execution; usually it is a blank. During the entry of the unique file name, any characters not allowed in file names will not be accepted or echoed. Thus any disallowed characters that might be typed will just disappear. Allowable characters are: Alphabets: A-Z Numerics: 0-9 Special Characters: . () # \$ % & * + - @
ERROR MESSAGES	RSTKEY : FILE NOT FOUND The file name specified does not match any existing file. RSTKEY : INVALID FUNCTION KEY FILE The file specified was found, but did not contain function key definitions. RSTKEY : TOO MANY KEYS The file is too large to fit into the allocated space for function keys.
RESTRICTIONS	Because "." is an allowed character in file names, use may be made of the multi-level features of the file system.
EXAMPLE	Restore the function key definitions called STANDARD: RST KEY ↵ FILE NAME=KEYFILE. STANDARD ↵ ALL FUNCTION KEYS RESTORED. ↵
NOTE	See overview in Section Three for additional examples.

NOTE

Once the keyfiles are on disk, they may be backed up on magnetic tape or restored using the CADD3/OS commands SAVFIL and RSTFIL.

RESTRICTIONS

Because "." is an allowed character in file names, use may be made of the multi-level features of the file system. If operator Pat worked sometimes on Printed Circuits, sometimes on Electrical Schematics, then a reasonable way to arrange the keyfiles would be:

1. Keyfile.Pat.Pc
2. Keyfile.Pat.Es

This allows Pat to easily dump all of these to a mag tape by exiting from CADD3 and typing:

```
SAVFIL MT }  
# Keyfile.Pat//NLEV }  
# }
```

APPENDIX III

Tables, charts and diagrams describing
the Computervision Graphics System

Note: Computervision Product Specifications are upgraded and/or changed periodically without prior written notice. Any features or capabilities not specifically included in this specification may be provided from time to time. However, except by prior written agreement, Computervision does not *guarantee to provide any capabilities not specifically included in this specification.*

CGP-100 MODULES

The CGP-100 is delivered in a tabletop cabinet with a magnetic tape drive and a telewriter. It is comprised of modular units on 15"x15" printed circuit boards configured to the user's application.

The standard CGP-100 consists of:

- Central Processor Unit
- Operator's Console
- Maintenance Console
- MOS Memory
- IOS Controller(s)
- Peripheral Controllers (MTP, Disc)
- Backplane and Chassis
- Power Supply
- Magnetic Tape Drive
- Telewriter
- Disc Drive

Optional equipment includes:

- Hardware Floating Point Unit (FPU)
- Memory Management and Protection Unit (MMP)
- Computervision Peripherals

CENTRAL PROCESSOR UNIT (CPU)

The CPU is similiar to a conventional CPU:

- it supervises all peripheral I/O devices
- it does all fixed point arithmetic functions
- it handles data
- it sequences the program

The CPU is microinstruction controlled. Internal Read Only Memory (ROM) chips are encoded with a microprogram that is activated by program instructions. Each program instruction is broken down to one or several microprogram routines. Microprogram instruction execution time is called microcycle time and lasts 300 nanoseconds. Microprogramming permits simultaneous execution of CPU functions giving much faster processing of program instructions than conventional CPU's. This is a feature transparent to the user except for the increase in processing speed.

The CPU is connected to the memory by a memory bus and to the peripheral devices by I/O bus. It has an Internal Bus (IBUS) that distributes data to the logical units of the CPU and connects directly to the Memory bus and the I/O bus. The I/O bus is compatible with all Computervision systems' interfaces.

OPERATOR'S CONSOLE

The operator's console is the front-panel communication link between the user and the processor. Unlike the traditional computer console there are a minimum number of switches. Address and data are displayed by LED octal (0-7) digits.

Switches

The two switches on the operator's console are:

- STOP/RESET--three position momentary switch STOP or RESET the CPU
- APL1/APL2--three position momentary switch to initialize hardware Automatic Program Load

Displays

The displays are:

- ADDRESS--shows the contents of the Program Counter register in the CPU
- DATA--shows the next instruction to be executed by the CPU

MAINTENANCE CONSOLE

A full maintenance console is located behind the operator's console. The maintenance console has:

1. A power ON/OFF toggle switch.
2. A full data switch register for entering and verifying data in memory.
3. Function switches and indicators for controlling and monitoring basic processor operations.
4. Register select switches for entering and verifying data in any of the CPU's registers or running micro diagnostic routines.
5. APL device code select switches for setting the device codes of hardware Automatic Program Load devices.
6. All switches and indicators available on the operator's console.

The maintenance console can be used in a test mode. It provides access to internal ROM's encoded with microdiagnostics for testing various system hardware operations.

MOS MEMORY

The CGP-100 has a memory board capable of storing 32,768 17-bit words: 16 bits data, one parity bit. The memory capacity

is expandable to 512K words with the Memory Mapping and Protection (MMP) option and additional memory boards.

Metal Oxide Semiconductor Random Access Memory (MOS RAMs) circuitry saves space and decreases memory cycle time. A memory cycle is 600 nanoseconds; read access time is 400 nanoseconds; write access time is 400 nanoseconds. Timing, control, parity, and refresh logic is on board each 32K memory module, enabling asynchronous operation independent of CPU timing or control.

PERIPHERAL CONTROLLERS

Controllers used to interface the CPU with various peripherals are provided with the peripherals when shipped. All controller boards currently in use are compatible with the CGP-100.

BACKPLANE AND CHASSIS

The CGP-100 has a 24-slot card cage. Circuit boards are mounted vertically so air circulates across the cards. The area directly above the circuit boards, behind the control panel, is empty so that air heated by the circuit boards can be exhausted. Enough space has been provided so that if the exhaust fans fail, natural convection cooling will keep the system operating. The backplane has enough power and bus distribution to allow the CGP-100 to be field expandable to support additional interactive users. Its organization, like the card cage, is vertical.

POWER SUPPLY

A heavy duty power supply is installed in the CGP-100 cabinet under the operator's table. It requires no fan cooling and is separated from the processor logic circuitry. This is to prevent heat generated by the supply transformer and regulator modules from affecting the processor logic. The supply has its own sequencing and protection circuits. Adequate power is available to support more than eight interactive users, allowing future system expansion.

MAGNETIC TAPE DRIVE

The CGP-100 is supplied with a magnetic tape drive. The drive is 9 track, accommodates full-size 10½ inch reels, and processes 45 inches of tape per second. The rewind speed is 150 inches per second which means it takes about three minutes to rewind 2250 feet of tape.

TELEWRITER II

The CGP-100 is supplied with a Telewriter II which is hardwired to the CPU and is the principal means of communication with the CGP-100. It prints at 30 characters per second and inputs data as fast as the operator can type. The telewriter employs the ASCII code system and character set.

The keyboard looks much like a typewriter; except for special characters and control functions, it operates like a typewriter. The quiet non-impact printing of the telewriter is a thermal process: a small 5x7 dot matrix of 35 miniature heating elements mounted on a solid state printhead create characters on heat sensitive paper.

DISC DRIVE (STORAGE MODULE)

Any disc drive currently used by a Computervision system can be supported by the CGP-100. For operation, a disc is essential as a peripheral storage device. An 80 megabyte or a 300 megabyte storage module gives the best results.

OPTIONS

Memory Management and Protection Unit (MMP)

The Memory Management and Protection Unit (MMP) allows additional 32K Memory Modules, up to a maximum of 512K, to be added to the CGP-100. The MMP Unit:

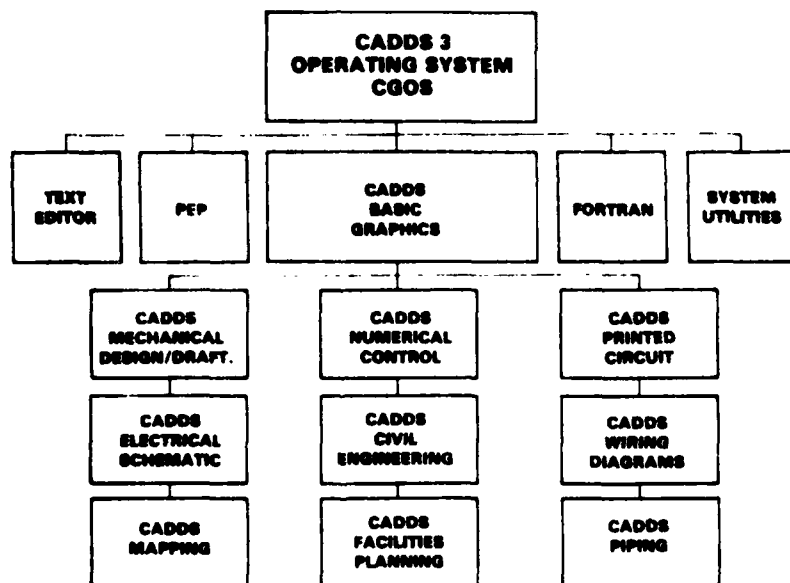
- maps the available memory in 2K pages
- write protects any 2K page
- access protects any 2K page
- prevents infinite indirect looping
- provides executive mapping.

Floating Point Unit (FPU)

To speed floating point calculations a multi accumulation hardware Floating Point Unit (FPU) is available in the CGP-100. The Floating Point Unit is controlled by the CPU and takes its data and instructions directly off the memory bus. After the CPU has issued a floating point instruction it can execute other instructions without waiting for the FPU to finish the floating point operation.

The floating point instruction repertoire includes instructions that perform all arithmetic operations including square root.

COMPUTERVISION'S CADD 3 GRAPHICS SYSTEM



Overview

Since the founding of our Company in 1969, Computervision has provided state-of-the-art CAD/CAM systems to its customers. Initially, we found that existing operating systems could not function in a graphics environment. They were number crunching-oriented rather than graphics-oriented systems. As a result of this analysis and subsequent development, Computervision's Computer Aided Design and Drafting Systems - CADDS 1 and CADDS 2 - and their respective application software programs evolved. As the requirements for even more powerful data structures grew, we met and surpassed the challenge with the development of the Computervision Graphics Operating System - CGOS-100 - for CADDS 3 applications.

The largest functional department within Computervision is the software development area. Over 120 programmers develop, refine, and test more than one work-year of software every two days. The software department generally works against yearly-defined product plans under the direction of application product line managers. Approximately two-thirds of this effort is internally funded. Product definition comes from recognized industry needs, customer feed-back, and funded specials. All software, regardless of application and purpose, is designed and implemented in such a way as to be used by all graphics users and applications. The result has been that all applications share features and gain capabilities with each other.

As with other graphics companies, Computervision has, through the years, acquired software and personnel from other sources. Unlike other companies, Computervision has taken great pains to build a proper software foundation.

Computervision maintains R&D investments averaging 10 percent, and it is the policy of the Company to continue its aggressive new product development effort. Since Computervision's sole endeavor is in the field of industry automation, these substantial investments (which are further augmented by customer-funded developments) assure customers that their systems can be periodically upgraded with the state-of-the-art technological products. In this regard, Computervision has established an important product policy regarding upward compatibility and product obsolescence. Each new product, hardware or software, is carefully scrutinized to assure that an effective way of upgrading systems is available.

Multi-Task

The CADDS 3 graphics system is a combination of specialized hardware and software that may be configured from a single to a ten-task system. Each task functions independently from other tasks and may, therefore, have its own peripherals to conduct any type of processing, including software modification and graphics display, without considering other tasks.

A True Multi-Application System

An important difference between CADDS 3 and other graphics systems is its ability to allow simultaneous usage of different application packages. All 2-D and 3-D applications (Mechanical Design, Numerical Control, Electrical Schematics, Printed Circuits, Mapping, and Piping) may run simultaneously with the result being a common data base. New features added to CADDS 3 will apply immediately to all applications.

When working with CADDS 3 graphics, the end product is usually a graphics data base, a collection of data describing a part. This data is then used to produce a drawing or other product such as a parts list or an NC machine tape. When a part is stored on magnetic tape or on the disc, it is actually the graphics data base information that is stored.

The structure and complexity of the data base is determined by the intended use of the graphics system and the types of graphical figures or entities that will be dealt with. The more complex the application and the greater the capabilities of the system, the more powerful a data base will be required.

Associativity

The CADDS 3 data base is highly associative and flexible. Unlike most graphic data bases, the CADDS 3 package has the ability to ascribe to any entity non-graphics properties. These might include color, weight, cost, density, thermal co-efficient, etc. This information may then be used for engineering analysis or report generation.

Accuracy

All 2-D and 3-D coordinate values are stored in floating point format with seven significant digits of precision in the range of 10^{-38} to 10^{-38} .

Job Accounting

CGOS can maintain an accounting log that can be listed at any time. Information included in the log is:

Name:	User Name
Number:	User Account Number
Date:	Date of log-in
Time:	Time of log-in
Duration:	Time used in hours and minutes
Task:	Task Number
Cost:	Charge for time used

Layering

Each entity can be placed on any one of the 256 layers available within a drawing. The contents of any combination of layers can be made visible or invisible, editable or non-editable. This provides the user with a means of storing many different classes of data (geometric, alphanumeric, dimensional, etc.) within one drawing file, and extracting any subset via the appropriate layer list. The user may output any layer or group of layers to his terminal or the plotter. This allows for the creation and editing of each type of information independently, and the plotting of several different drawing types by combining the appropriate layers.

Command Language

The system has a powerful, easy-to-use, English-like command language. No computer knowledge is required to operate the system. The only requirement is to become familiar with a set of shortened English language commands. The command words are reduced to three-letter mnemonics; for example, INS for "insert" and LIN for "line".

A command is composed of a verb, a noun, optional modifiers, and data (coordinate) information. A colon (:) always initiates entry into the data input mode called GETDATA.

VERB-NOUN PROCESSOR			MODIFIER PROCESSOR		GETDATA PROCESSOR				
Prompt	Verb	Noun	Modifiers	Colon	Mode and Prompt	Digitize	New Mode	Digitize	Punctuation
#	INS	LIN	PRL	:	ent	D	dig	DD	↓

GETDATA is a general purpose means of inputting data. The user may select the mode of input; i.e., numerical data or digitized graphic data. GETDATA prompts the user by indicating the type of input required by the command. The easy-to-use command language, coupled with the powerful entity and coordinate input capability of GETDATA, gives the CADDS 3 user a human factored, user-machine interface.

The VERify command, for any entity the operator has digitized, will describe the type of entity, its length, the coordinates of its end points, the layer on which it is present, and additional relevant information, if necessary. For example, VER PNT will verify specific X, Y, Z, point locations.

In every software release Computervision includes an on-line user's manual such that a graphics operator can query the system for assistance at any time. A question mark (?) entered after any command segment will list for the user the possible functions available for that command segment or string. An explanation symbol (!) will provide the user with information as to how to use the function and the options associated with it.

CGOS has an extensive set of error feedback messages that are displayed on the alphanumeric CRT or the telewriter. The operator, after reading the error message, is ready to correct the input and continue the task. The operator is instructed how to use these codes in defining corrective action. Corrective procedures are defined in conjunction with the errors. Computervision is careful not to impose too much tutoring or questioning because, once in full production, the user will know what to do and how to give commands. At this point too many system tutor responses would slow down throughput.

User Software Development

All application programs are written in FORTRAN. As an option, Computervision provides its users with source and object code to allow additional software development under CADDS 3. The customer is provided the same tools provided to Computervision's own staff. Any programmer who is familiar with FORTRAN can learn to implement and execute programs running under CADDS 3.

The user interface to the Computervision data structure is through a data base language implemented in the form of FORTRAN callable procedures. These procedures allow the data structure to be created, read, and modified independently of the actual physical storage mechanism of the stored data. The procedures are constructed on several levels. Data base primitives (open record, read data, change data, close record) are at the lowest level and various data base construct operations are built upon these primitives at higher levels. Through proper use of this interface mechanism, it is possible to make necessary changes in the structure or contents of the data base with minimum perturbation to an application code.

Macros

A macro is a combination of commands which are strung together and executed in the same manner as a single command. Macros may be any mix of graphic commands and data. These commands can include parameter changes as well as commands which will require user response such as coordinate positions, names, or digitizing.

Parametric Element Processor (PEP)

PEP is an operator-oriented programming language that serves as another class of macro with the addition of logical operators and mathematical calculations. Using PEP, the operator can implement special purpose functions without using FORTRAN.

PEP allows the user to create a parametric graphic file which may be called back to create a modification of that file by changing a parameter. In reality PEP is an interactive "family of parts" program which carries graphic entity associativity, variable parameters, logical operations, and mathematical capabilities.

PEP differs from stringed command macros in that graphical dimensions can be defined using tests such as greater than, equal to, less than, etc., and mathematical operations such as sine, cosine, and tangent, etc. Command macros typically allow user intervention interactively to change coordinate data and scales, but normally do not carry the associativity, mathematical and logical operations included in PEP.

Input Commands

Definition and construction of the following entities are part of the basic CADD 3 software.

- (1) Points
- (2) Lines
- (3) Line types
- (4) Arc (3 points, 2 points and center, 2 points and radius)
- (5) Circles, ellipses, hyperbolas and parabolas

- (6) Splines (3-D B-Splines)
- (7) Surfaces (3-D B-Surfaces, TABCYLS, ruled surfaces, surfaces of revolution)
- (8) Spheres*
- (9) Cones*
- (10) Cylinders*
 - *through use of TABCYL, ruled surfaces and surfaces of revolution entities
- (11) Boxes (3-D, i.e., PEP routine requiring input of dimensions)
- (12) Fillets
- (13) Components and parts
- (14) Text parts
- (15) "Automatic Dimensioning" (standard based on ANSI Y14.5 1973)

Display Operations and Component Manipulation

Insertion: All data displays on the CRT as it is inserted, thus giving immediate feedback to the user. This feedback allows command cancellation before entering the data base if the input is correct.

Identification and Editing: Data to be verified or edited (move, stretch, erase, etc.) will be identified with a box for user feedback purposes. Again, the command may be ejected if the input was incorrect. When the edit or verification is processed, an "X" shows in the box to show completion. The user may or may not refresh the screen at his or her discretion. Few systems allow feedback verification and interaction which CADDS 3 provides.

Viewing: The CADDS 3 system is optimized for display purposes. CADDS 3 breaks down and stores all the data in the least common denominator for display purposes. This eliminates most calculations every time a display request occurs. As a result, exceptional display speeds are offered.

In defining a view, various methods may be used. Some examples are as follows:

- (1) Window - a window may be used to determine a display area, group erasure, or group copy. The window definition may be a rectangle or any polygon. The user may center any window area during window definition by digitizing a desired center point.
- (2) Paging moves the display area in a 1:1 ratio left, right, up, or down. A page may also be processed by digitizing a point (area identification) and digitizing again for the new location.

- (3) Zooming rescales the display in regard to a specific scale factor by user input. A 2:1 or 1:2 factor is the default. A zoom may be up or down.
- (4) The commands called SAVE DISplay and REStore DISplay will save display windows and restore them automatically upon user request.

Most graphic systems have basic functions which allow windows, paging, and zooming. Differences do appear, however, when one looks at the CADDS 3 flexibility which allows polygon definition and single digitize moves.

In the instance where a group of geometric entities are defined with PEP or macros (execute files), there is one command which parametrically stretches or shrinks the whole group. Individual entities may be trimmed, moved (separately or by window) or stretched.

The stretch and shrink capability accommodates all entities in any configuration. In a stretch operation, associativity and connectivity will remain as well as linear dimensions that are automatically updated.

There are various ways that groups of connected geometric entities may in certain instances be stretched or shrunk. Two of these ways are:

- | | |
|----------------|--|
| MOVE WINDOW: | Allows everything captured in the window to be moved. |
| RECTification: | Sets points to which data will stretch or shrink, allowing "rubber sheet" distortions. |

The user has the option of retaining component identity and update, or essentially hiding the data in the drawing. If an original drawing is revised, the operator may keep the original as well as the revised drawing.

Drawing File Manager and Manipulation

File Manager: The CADDS 3 file manager allows the user to create files and corresponding catalogs of graphic and non-graphic information by assigning prefixes and suffixes to the file names. These file and catalog names may or may not be associated in various tree-like structures. Drawings are given specific names and functions which automatically place the drawing to the user-defined tree structure. Disc space is automatically allocated and packed in conjunction with the active task. The disc space available to a task is limited only by the total free space.

Drawings may be accessed or manipulated in the following manner:

- (1) To activate a drawing resident on disc, the operator has only to state the PART or DRAWING NAME. The system will also allow part protection parameters to be specified at this time.

To retrieve drawings from magnetic tape to disc, the operator uses a command called REStore PART. This part can be a file, files or catalogs (multiple files).

- (2) Parts (drawings, files and catalogs, etc.) may be deleted from disc by issuing the DELeTe PART NAME (or NAMES) command. The disc may also be compacted at this time.
- (3) The editing of drawings on disc is essentially accomplished by activating the file and using the usual functions and commands. To edit a drawing on magnetic tape, the operator must first bring the data to disc.
- (4) Any drawing or groups of drawings may be retrieved from disc or tape.
- (5) All drawing files may be password protected as read, write, or access protected.

Component Library

Any geometric CADDs 3 operation may be used to create and to edit a library component. A change to an existing library component will update and reflect in any drawing which uses it unless the component was optionally copied into the drawing file at insertion time. The operator may select the mode of insertion and update.

When library components are not copied into a drawing, they essentially reference back to the library each time the drawing is activated. When inserted in this way, a library component cannot be edited in the drawing. If the library component is copied into the drawing, it in turn can now be edited.

Text

Computervision offers block, Leroy and slanted Leroy fonts. The block font is a high-speed computer font which has been optimized for plot and display speeds. There are ten other fonts available which relate primarily to mapping applications. The user may, with minimal FORTRAN knowledge, create other text fonts easily.

Data Communications

Computervision has over 20 work years of experience in data communications. We installed our first communications interface between a Computervision Designer System and a remote CPU in 1972. Since that time, we have developed hardware and software interfaces which currently support asynchronous, synchronous, and bi-synchronous communications with most major CPU manufacturer's mainframes. A partial list is shown:

<u>Mainframe</u>	<u>Asynchronous</u>	<u>Synchronous</u>	<u>Bi-Sync</u>
IBM 360	*	*	*
IBM 370	*		*
Univac 1108		*	
Honeywell 6000		*	
CDC 6600		*	
XDS Sigma 7	*		
DEC PDP-15	*		
Siemens 4004	*		
Singer MS6000	*		

The above list represents over 30 different Computervision customer locations which are in operation today.

We recognized the need for such communications links early in our history and have committed over 15 work years of development in this area to date. A general approach has been adopted which uses a standard communications processor module for all customers and a specific terminal emulation module for each different CPU. For example, the bi-synchronous link to the IBM 370 emulates a 2780 terminal. Thus, no software changes are required at the customer's end.

CVNET

Computervision offers a software application package called CVNET. This is a synchronous communication package designed to transfer information between CV CADDS 3 systems at both local and remote sites with little or no operation intervention. CVNET offers the following capabilities:

- Data can be communicated via CVNET from a central system with large storage capacity, which functions as a library, to satellite systems (local or remote).
- When a user changes systems, data can be transferred via CVNET to another system, eliminating the necessity of transporting a mag tape.

- A user can communicate with CV-Bedford for such purposes as plotting or debugging.
- No user interaction is required for the above functions at the remote system (i.e., no operator is required once communications are established).
- User interaction is not required to send or receive disc files from a remote system once communication is established.
- A log file is maintained of all file transfers and operator messages.
- CVNET can be configured to limit file access from the remote system.
- An operator can send a message via CVNET to a remote system.
- All commands can be executed either by a direct user entry or by a CVNET execute file. The execute file allows all CVNET commands to be processed in a batch mode. Parameters may be inserted in the CVNET commands from the main command level.
- CVNET runs as a single task under the CADDS 3 Operating System, and allows one task on a system to transfer information to a task on a different system.

RJE Emulation

The capability to emulate IBM 2780 RJE terminals enables a user to communicate with a remote IBM 370 computer. Computervision's emulator can communicate at speeds of 4800 baud over a dial-up telephone line and 9600 baud and higher over a dedicated line. Line protocol is IBM binary synchronous, as described in IBM manual GA27-3004-2. The emulator operates in a point-to-point mode.

Unique features of the emulator are:

- (1) Emulator runs in conjunction with other functions in the CADDS 3 system (i.e. graphics). It does not require system to be shut down or rebooted.
- (2) Easy to use and extensible command language.
- (3) Runs in a compatible fashion with either the IBM HAsp or VM operating system.
- (4) Any terminal (task) can use the communication capabilities of the CADDS 3 system.

Synopsis of CADDS 3 Features

MULTI-TERMINAL - multiple interactive and batch users functioning simultaneously.

MULTI-APPLICATION - permits a user to use any applications' features without system reboot or reloading software. Different applications can co-exist on multi-terminal system with complete flexibility.

SIMULTANEOUS 2-D/3-D OPERATION - the system supports both 2-D and 3-D applications within a common application software and data base system.

NUMBER OF APPLICATION PACKAGES - provides mechanical design, mechanical drafting, numerical control, printed circuit, electrical schematics, wiring diagrams, mapping, and piping.

DATA STRUCTURE - An optimum combination of fixed format and variable format. The fixed format is used to describe basic graphic entities and associated data; the variable format permits user-specified data to be ascribed to basic entity and subsequently be retrieved for analytical or logical processing.

FILE MANAGER - allows multi-level cataloging of associated information into logical files or sets of files.

OPTIMIZED DISPLAY FILE - the system automatically maintains an optimized display file from which all display and entity identification is executed. This display file is automatically synchronized to the true data base and gives the system the advantages of an extensible data base coupled with fast display operations.

DATA MANAGEMENT SYSTEM - provides a comprehensive means of filing and retrieving drawings, provides status of drawings as well as costs, operators, rev. level and time spent on each drawing operation.

COMMAND DEFINITION - allows the operator to build his own "Macros" from the set of allowable graphic commands.

MENU - an unlimited number of menus can be created by the operator(s) and stored on disk. Each menu is capable of 220 command inputs or strings of commands (macros).

OPERATOR-ORIENTED PROGRAMMING LANGUAGE - the system provides a language (PEP) for the operator to implement special purpose functions without learning FORTRAN.

ON-LINE DOCUMENTATION - a summary of the User's Manual is stored on the system. An operator may query the system at any time to obtain lists of commands available and their structure.

ON-LINE FORTRAN - permits simultaneous software development in conjunction with graphics oriented tasks.

FORTRAN CODE - application software is written entirely in FORTRAN.

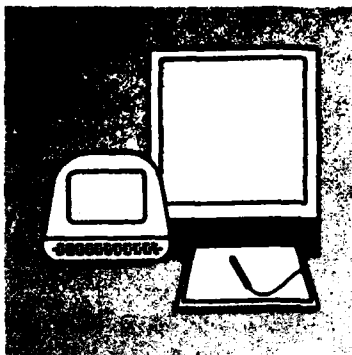
BACKGROUND TASKS - low priority background tasks function simultaneously with interactive users. This would include plotter output, communication to a large computer, etc.

ON-LINE INTERFACE TO LARGE COMPUTER - communications software for IBM 370, IBM 360, Univac, Burroughs, CDC and other large computers.

PERIPHERAL SUPPORT - full line of peripheral support software for card reader, line printer, etc.

APPENDIX IV

Photographs and specifications of hardware
units available with the system.



COMPUTERVISION

JULY 1979

CGP-100 Graphics Processor

...Computervision-designed CPU specifically for CAD/CAM Applications

General Description

The Computervision Graphics Processor—CGP™-100—designed and manufactured by CV—is the first CPU developed specifically for CAD/CAM applications. It provides speed, accuracy, reliability, on-site expansion and enhancement capabilities previously unattainable. The CGP-100 supports a large number of interactive tasks, thereby significantly reducing the cost per terminal.

Product Features

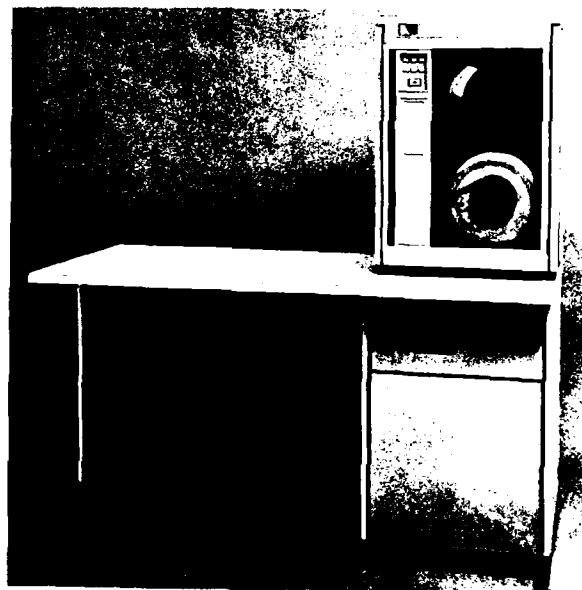
- Micro-programmed.
- Field-expandable to 512K words of 16-bit dual-ported memory.
- Vertically mounted board design.
- Large, isolated 750 watt power supply.
- Built-in micro-diagnostics.
- High accuracy integral hardware floating point processor.
- Large 24 slot chassis for future expansion.

User Benefits

- Flexible design allows for addition of future performance enhancements at minimum cost.
- Accommodates ten tasks by simple field addition of memory.
- Provides lower cost per terminal in multi-user environments.
- Assures data integrity, higher reliability, less downtime.
- Dramatically increases speed on tough compute-bound tasks common to graphics applications. Provides high precision with the hardware floating point option.
- Offers superior system integration and reliability for multi-application, multi-user interactive graphics environments.

Performance Specifications

The Processor's CPU uses a microprogrammed basic architecture with a microinstruction cycle time of 300 nanoseconds. The microcode implements such functions as automatic program load



and micro-diagnostics. The data channel function also operates via microcode whenever a new instruction is loaded.

The CGP-100's memory system communicates via a 16-bit bidirectional memory bus. A real time clock and an asynchronous serial line interface are resident on the CPU board. The CPU controls all memory and floating point operations.

Physical Specifications

Height	60 inches (152.4 cm)
Width	30 inches (76.2 cm)
Length	60 inches (152.4 cm)
Weight	250 pounds (113.6 kg)

Environmental Specifications

Ambient Temperature	60°F to 80°F (16°C to 27°C)
Relative Humidity	40% to 80% (non-condensing)

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Power Specifications

Voltage 115 VAC
Current 14 Amps (Maximum)
Frequency 50/60 Hz
Wattage 1.6 KVA (Maximum)

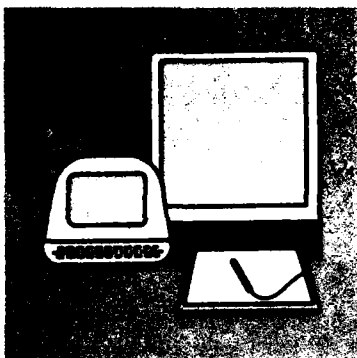
NOTE: There are four 115 VAC convenience outlets on main chassis which can be used for a total current draw of 30 Amps.

Additional Features

- Floating Point Processor (Model D-4011).
- Memory Expansion Module—expands CPU memory up to 512K 16-bit words plus parity, semi-conductor, and high-speed memory (Model D-4012).

Product Specification—PS-21-02

Model Number—D-4000, D-4004, D-4005, D-4010



COMPUTERVISION

JULY 1979

Floating Point Unit

...Provides for Single and Double Precision Arithmetic Functions, Exceptionally Fast and Accurate Floating Point Operations

General Description

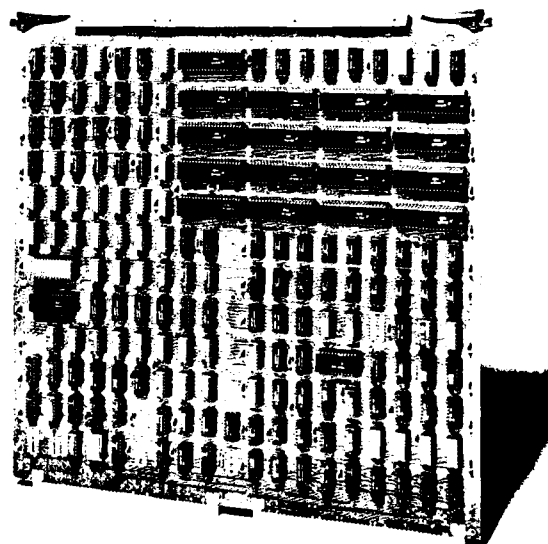
The Floating Point Unit (FPU) is a high-speed, multi-accumulator floating point processor. It was designed and implemented for maximum speed in graphics applications while maintaining the highest levels of computational accuracy. The FPU operates in parallel with the Computervision Graphics Processor, CGP™-100 and is controlled automatically by the microcoded instructions of the CGP-100's CPU.

Product Features

- Single (32-bit) and double (64-bit) precision floating point arithmetic instructions.
- Integer conversion instructions.
- 16 user "save and restore" areas.
- Single board design plugs directly into CGP-100 backplane.
- Parallel processing controlled by CGP-100 CPU microcode.
- Flexible addressing modes including array indexing.

Performance Specifications

Number of Accumulators	12		
Micro Instruction Cycle	250 nsec		
Execution Times:			
	Single/Double	Typical	Maximum
FADD/FSUB	S/D	6.5us	19.5us
FMUL	S	9.5us	10.0us
FDIV	S	9.25us	10.0us



Physical Specifications

- 15 inches x 15 inches multilayer board

Power Specifications

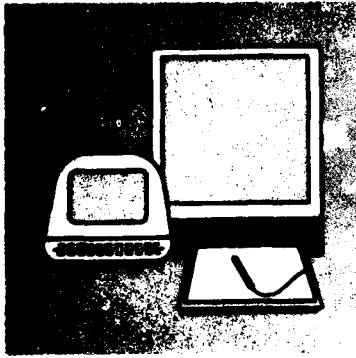
Voltage 5 VDC
Current 10 Amps (Maximum)

NOTE: DC Current Supplied by CGP-100 Power Supply

Product Specification—PS-21-02
Model Numbers—D-4003, D-4011

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COMPUTERVISION

JULY 1979

Multi-User Controller

...For Expanded Memory Addressability

General Description

The Multi-User Controller (MUC) allows the memory addressing of the Computervision Graphics Processor, CGP-100™ to be expanded from 32K words to 512K words, which is accomplished in 2K pages. Each page may be independently configured for "normal access," "read-only," or "no access."

Product Features

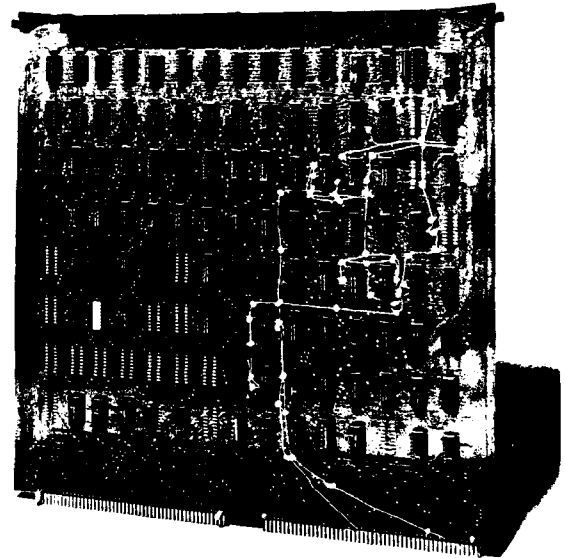
- Independent Direct Memory Access (DMA) allows multiple DMA devices to access all physical memory.
- Write Protection will inhibit any attempts by a user program to write in a 2K page declared to be write-protected.
- Access Protection will inhibit any attempts by the user program to access a 2K page declared to be access-protected.
- Infinite Indirection Loop detects an infinite indirection loop (defer) and inhibits its occurrence for more than eight levels.
- Executive Mapping allows system to utilize the user map when a reference is made to the most significant 2K logical page.

Performance Specifications

Memory Page Size 2K
Maximum Address-
able Memory 512K words

Physical Specifications

- Requires one CGP-100 backplane slot.
- 15 inch x 15 inch multilayer PC board



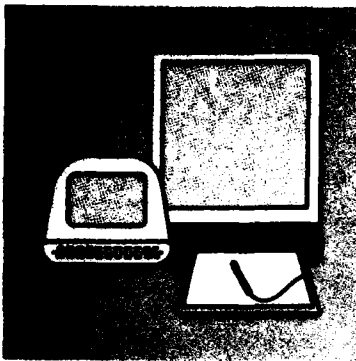
Power Specifications

Voltage 5 VDC
Current 2.5 Amps (Maximum)

Product Specification—PS-21-02
Model Number—D-4014

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COMPUTERVISION

JULY 1979

Ultra-Isolation Transformer/ Power Line Filter

...Protects CV Systems from Damage Due to Power Line Noise

General Description

The Topaz Ultra-Isolation Transformer—The power line filter with its Topaz Ultra-Isolation Transformer provides protection to sensitive equipment from power transients and spikes caused by power line noise. (Sources of power line noise include utility feeder switching, lightning and air conditioning.) To provide clean, noise-free output, the Ultra-Isolation Transformer is required for the 150 mega-word Disk Drive.

Product Features

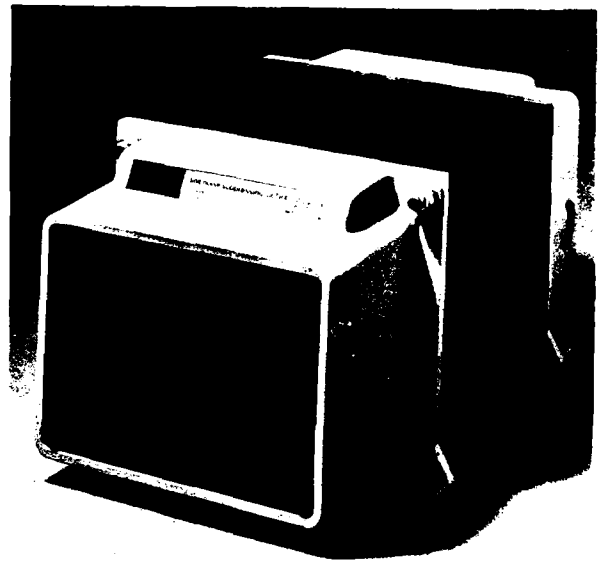
- Clean, noise-free power output.
- Unique triple box shielded design for maximized electrostatic shielding.
- Low coupling capacitance.
- High leakage resistance.
- Remains cool under high/low conditions.
- Eliminates both common mode and transverse noise.

Performance Specifications

Regulation (load)	3%
Effective Coupling	0.005 pF
Capacitance	—
Leakage	—
Resistance	1000 megohms

Physical Specifications

Height	6.3 inches (16 cm)
Width	8.4 inches (21 cm)
Depth	14.2 inches (36 cm)
Weight	90.5 pounds (41 kg)



Power Specifications

Voltage	120 VAC at 50/60 Hz
	208 VAC at 60 Hz
	240 VAC at 50 Hz
Current	50 Amps or 25 Amps
Frequency	50/60 Hz
Wattage	5 KVA (up to 9 KVA for short periods)

Product Specification—PS-14-28
Model Number—D-4002

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Card Reader

FUNCTION

This line of heavy duty card readers has been specifically designed to operate in remote terminal applications requiring fast and simple loading and unloading on the fly and where cards are especially vulnerable to damage through rough handling on adverse environment. The slant-top feature incorporates the principle of gravity to permit smooth card flow so that personnel can effortlessly load and unload cards while the card reader is operating.

The reader chassis is of heavy duty construction enabling it to withstand continuous operation while setting new standards for card reader dependability. The sophisticated vacuum picker mechanism has a high tolerance to mutilated, warped and edge-damaged cards and will reject stapled cards without damage to the cards.

The card handler features a straight-through card-track which permits almost limitless reusability of card decks. This also makes the reader inherently jam-resistant, since only one card is in the card track at any one time.

Each card reader comes complete with control and timing electronics to provide stable and reliable data readout. The crystal oscillator controlled timing guarantees the inherent accuracy and stability to provide a high tolerance to misregistered cards. A photo-transistor sensor array reads standard 12-row, 80-column punched cards in serial, column-by-column fashion.

PERFORMANCE SPECIFICATIONS

Card Rate – 300 cards/minute

Card Type – Standard 80-column EIA card

Hopper/Stacker – 1000 card capacity

Light Source – Infrared light emitting diodes

Read Station – Photo transistor, 12 bits parallel

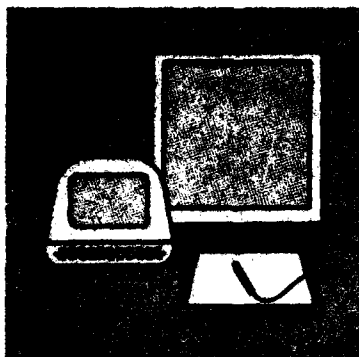
Electronics – 7400 Series TTL integrated circuit logic

Internal Clock – Crystal Oscillator

Power – 1000 VA Starting load, 450 VA Running load

ENVIRONMENTAL SPECIFICATIONS

	Domestic Model	Export Model
Voltage	115 to 125VAC, 60Hz	115 to 125 VAC, 50 Hz
Height	16¼ inches	41.3 cm
Width	23-1/16 inches	58.6 cm
Depth	18 inches	45.7 cm
Weight	75 lbs.	34 kg
Shipping Weight	1000 lbs.	45.4 kg.



JULY 1979

Storage Modules

...High-Speed, Large-Capacity Disc Storage Modules

General Description

Computervision offers two high-speed, random access disc storage modules which interface with the Computervision Graphics Processor, CGP-100™: a 40 million word and a 150 million word unit. In both, the electro-mechanical drive moves read/write head to addressed tracks. Data (in the form of magnetized bits) is read from or written on the disc surfaces by the heads, positioned by a closed loop proportional servo system. The carriage is driven by a servo actuator which provides position feedback from a servo surface on the disc pack.

The basic drive consists of a disc pack spindle with associated drive motor, actuator assembly, speed and position sensing devices, and logic circuitry for positioning, reading, writing and interfacing.

Product Features

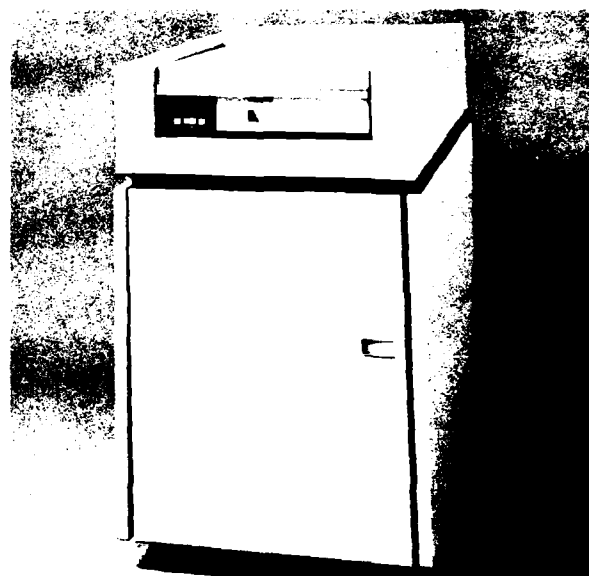
- The disc drives provide the system with a large, high-speed, on-line storage capability.
- Up to four disc drives (600M words) can be used with the CGP-100.
- Position feedback allows reliable disc pack interchangeability.

User Benefits

Very high rates of data transfer resulting in improved system performance.
Large on-line data storage permitting extensive parts libraries and drawing storage.

Performance Specifications

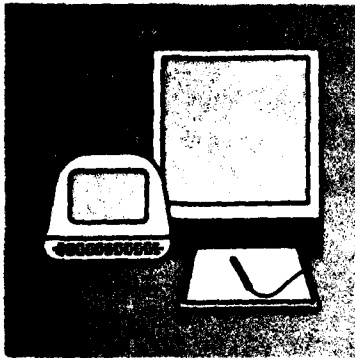
	40M Word Disc Drive	150M Word Disc Drive
Minimum positioning time	55 msec	55 msec
Track-to-track positioning time	6 msec	6 msec
Minimum average positioning time	30 msec	30 msec



Average rotational latency	8.33 msec	8.33 msec
Recording surfaces available	5	19
Number of cylinders/pack	823	823
Track-to-track spacing	0.0026 inch nominal	0.0026 inch nominal
Data transfer rate	1.2M bytes/second	1.2M bytes/second

Physical Specifications

	40M Word Disc Drive	150M Word Disc Drive
Height	36 inches (91.4 cm)	36 inches (91.4 cm)
Width	23 inches (58.4 cm)	23 inches (58.4 cm)
Depth	36 inches (91.4 cm)	36 inches (91.4 cm)
Weight	250 pounds (113 kg)	550 pounds (248 kg)



JULY 1979

Magnetic Tape Drive

...For Industry-Standard Data Storage and Transfer

General Description

The Magnetic Tape Drive supports industry-standard (IBM format) data storage and transfer. This is accomplished via Computervision Graphics Operating System (CGOs) commands.

Product Features

- Multiple tape drives per controller.
- Both 7- and 9-track can be daisy-chained on the same controller.

Performance Specifications

Speed	45 ips
Recording	800/1600 bpi.
Densities	switch-selectable
Recording Format	9-track
Reel Size	Up to 10.5 inch diameter
Tape Size	0.5 inch wide, up to 2400 feet
Rewind Speed	150 ips

Physical Specifications

Height	24 inches ± 0.5 inches (109.6 mm ± 12.7 mm)
Width	19 inches (48.26 cm)
Depth	19 inches (48.26 cm) maximum for mounting surface
Weight	Not to exceed 120 pounds (54.43 kg) on 45 ips

Environmental Specifications

Temperature	60°F to 80°F (16°C to 27°C)
Relative Humidity	40% to 80% (non-condensing)



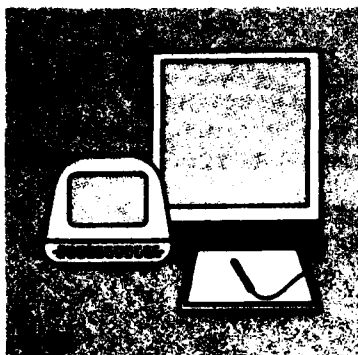
Power Specifications

Voltage	115 VAC
Current	3 Amps
Frequency	50/60 Hz
Wattage	.35 KVA

Additional Features

- 7-track 800 bpi, 45 ips (Model D-3123N).
- 9-track 800 bpi, 45 ips (Model D-3124).
- 9-track 1600 bpi, 45 ips (Model D-3126).

Product Specification—PS-14-27
Model Number—D-3124



COMPUTERVISION

JULY 1979

Interact IV Digitizer/Plotter

...Highly Versatile Interactive Design Terminal

General Description

Computervision's Interact IV LIS (Large Interactive Surface), a major component of the Designer™ IV system, is used for interactive digitizing, plotting and editing.

Product Features

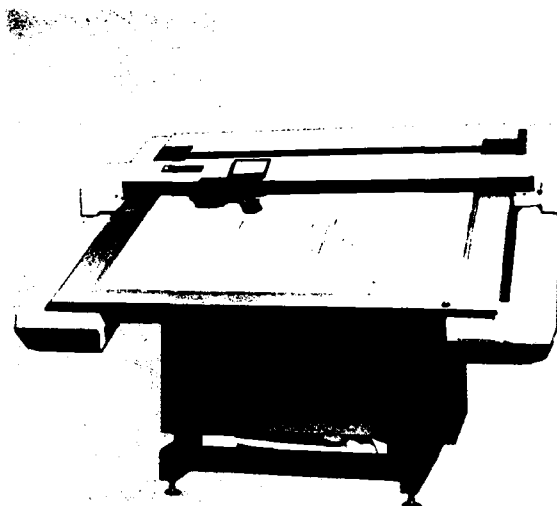
- Independently variable pressure from .05 to .045 pounds for each of up to four available pens.
- X, Y display counter for coordinate readout; LED indicator on the digitize head.
- X, Y lockout for horizontal or vertical digitizing.
- Sixteen-step, selectable plotting speed range.
- Power-assisted table tilt.
- Digitize button, pen-up button.
- Puck control of digitizing head position.
- Large 50" by 60" plotting/digitizing area.
- Plots in up to four colors.
- 60 Position program function menu.
- Backlit.

User Benefits

- Independent variable pen pressure allows selection of optimum pressure for the plotting tool in use.
- X, Y display counter provides a five-digit display of puck/pen position.
- X, Y lockout permits digitizing of only those points along a given horizontal or vertical line.
- Speed control is provided by a 16-step selectable speed range.
- Backlighting provides for ease of digitizing.

Performance Specifications

Resolution	0.002 inch (0.0508 mm)
Speed	28 inches/second maximum
Accuracy	±0.003 inch
Average Acceleration	0.7g for vectors over 2 inches



Physical Specifications

Height	78 inches (178 cm)
Width	96 inches (244 cm)
Depth	72 inches (0.83 cm)
Weight	1000 pounds (454 kg)
Plotting Surface	50 x 60 inches (127 cm x 152 cm)

Environmental Specifications

Temperature	60°F to 90°F (16°C to 31°C)
Relative Humidity	10% to 90% (non-condensing)

Power Specifications

Voltage	2 115 VAC lines
Current	15 Amps
Frequency	50/60 Hz
Wattage	2 1.75 KVA lines

NOTE: Two 115 VAC lines @ 15 Amps are required for electronics and backlighting/motor circuits.

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Additional Features

- Menu keyboard—60-button Program Function Keyboard (Model D-5113).
- Automatic T-square—X-Y digitize lockout (Model D-5114).
- Backlighting with adjustable intensity (Model D-5115).

- Electrostatic Hold-Down for multiple sheets of paper or files (Model D-5116).
- Projected Light Recticle (Model D-5117).
- Two additional plotting pens (Model D-5124).

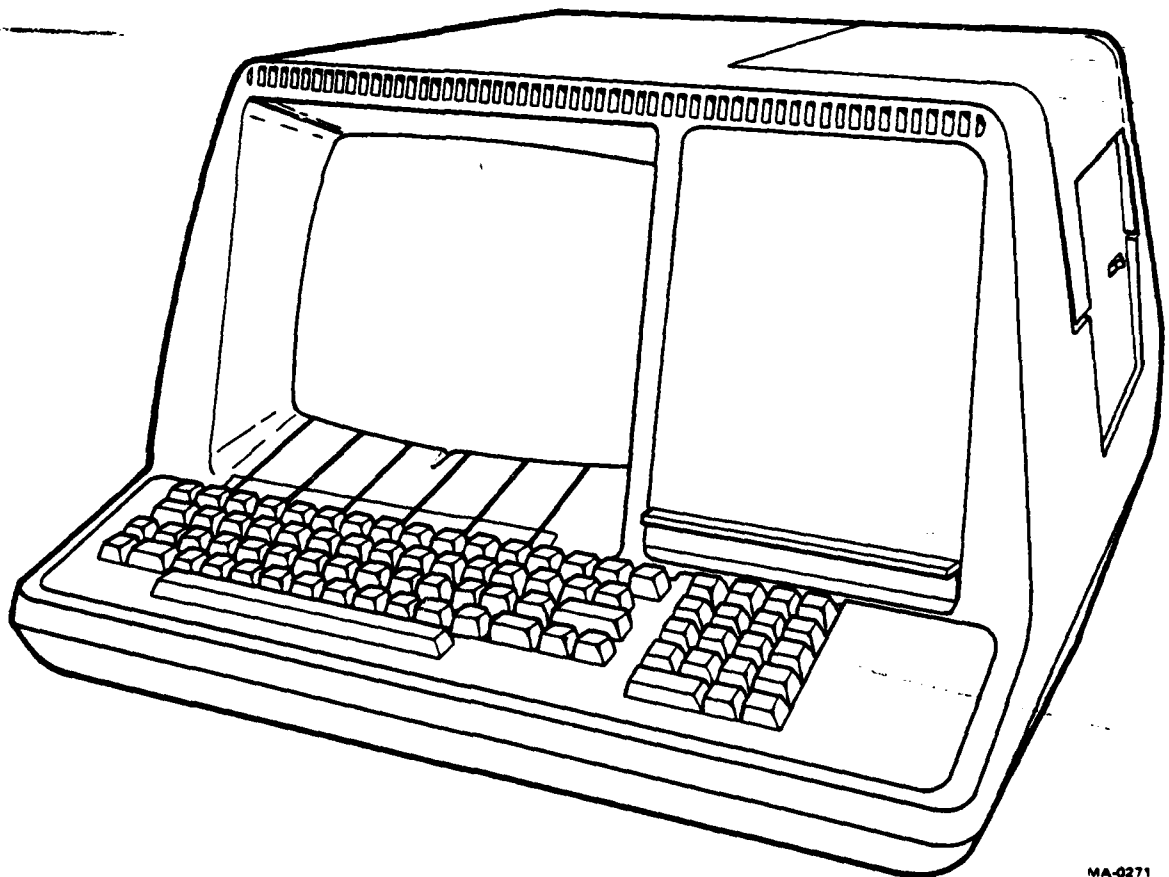
Product Specification—PS-17-09

Model Numbers—D-5105, D-5106, D-5107

CHAPTER 1 INTRODUCTION

1.1 GENERAL DESCRIPTION

The VT52 Video Display Terminal (Figure 1-1) is a 24-line, 80-character display terminal that serves as an input/output device to a host processor. It transmits and receives data at speeds up to 9600 baud. The main keyboard uses a standard typewriter layout that supplies upper- and lowercase alphabetic characters as well as numeric, symbol, and control characters to a host. A 7×7 dot matrix is used to form the displayable characters. All input, output, and display operations are controlled by a ROM resident microprogram.



MA-0271

Figure 1-1 VT52 Video Display Terminal

1.2 FEATURES

Design features of the VT52 include a 19-key auxiliary keyboard for applications requiring much numeric input, and a Hold-Screen mode for operator control of processor files. These and other features are described in the following paragraphs.

1.2.1 19-Key Auxiliary Keypad

This feature allows the operator to use the convenient 19-key numeric pad in applications requiring much numeric input. In one mode, numeric keys from the pad transmit the same code as numeric keys from the main keyboard. In the Alternate-Keypad mode, each key transmits a unique Escape Sequence that is used to invoke a user-defined function.

The three blank keys on the pad also transmit a unique Escape Sequence and can be defined by the customer for his own particular application.

Four cursor control keys transmit unique Escape Sequences that will move the cursor one position UP, DOWN, LEFT, or RIGHT, in the direction of the arrow, if the code produced by the key is echoed back to the terminal by the host.

1.2.2 Hold-Screen Mode

The Hold-Screen mode allows the operator to regulate the speed of the data received from the host and displayed on the screen. Normally, the host transmits data at a rate that is too fast for the operator to read; as the host adds new information to the bottom line, the information on the top line is scrolled off and lost forever to the operator. When in Hold-Screen mode, the terminal will not process information that would cause a line scroll until requested to do so by the operator. The operator can request a new line of characters by typing SCROLL or a new screenful of characters by typing SHIFT, SCROLL.

1.2.3 Direct Cursor Addressing

Direct cursor addressing allows the host to move the cursor to any position on the screen by transmitting an Escape Sequence to the terminal. Cursor positioning commands are defined in Chapter 3.

1.2.4 Identification Feature

This feature allows the host software to poll every terminal on the system, requesting each to identify itself. The VT52 will automatically respond with a 3-character Escape Sequence that identifies it as a VT52. This allows the VT52 to be mixed with other terminals in a system with the software responding correctly to each different type of terminal.

1.2.5 Terminal Interface

The VT52 is available with either the 20 mA current loop interface or, if ordered by the customer, a standard EIA interface.

1.2.6 Copier Option

An electrolytic copier is available to provide hard copy capability to the terminal. The copier can print a screenful of information or print the information one line at a time.

1.2.7 Printer Interface Option

The Printer Interface Option VTXX-KA is a field installable option available on all new VT52s and certain units already in the field. It provides a data path between the VT52 Video Terminal and a serial or parallel printer such as the LA36 or LA180.

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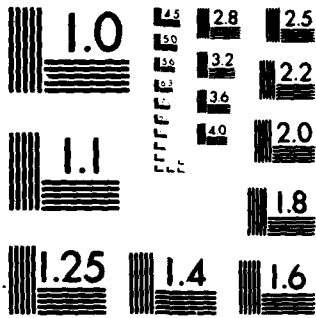
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1.3 VT52 SPECIFICATIONS

Dimensions	Height: 360 mm (14.1 in) Width: 530 mm (20.9 in) Depth: 690 mm (27.2 in) Minimum Table Depth: 450 mm (17.7 in)
Weight	20 kg (44 lbs)
Operating Environment	DEC STD 102 - Class B Environment 10° C to 40° C (50° F to 104° F)
Relative Humidity	10% to 90%
Maximum Wet Bulb	28° C (82° F)
Minimum Dew Point	2° C (36° F)
Line Voltage	U.S. model: 100-126 V (115 V nominal) European model: 191-238 V or 209-260 V (220/240 V nominal switch selectable)
Line Frequency	U.S. model: 60 ± 1 Hz European model: 60 ± 1 Hz or 50 ± 1 Hz
Power Consumption	110 Watts
Power Line Hash Filter	Low-leakage Balun type
Display	
Format	24 lines × 80 characters
Character	7 × 7 dot matrix
Character Size	2.4 mm × 3.4 mm (0.08 in × 0.16 in)
Active Display Size	218 mm × 114 mm (8.6 in × 4.5 in)
Character Set	96-character displayable ASCII subset (upper- and lowercase, numeric, and punctuation)
Keyboard	
Character Set	Complete 7-bit ASCII set (128 codes)
Key Layout	Typewriter - rather than keypunch - format; 63 keys
Auxiliary Keypad	19-keys: numerals, cursor-movement, three user-definable function keys
CAPS LOCK Key	Locks alphabetic keys to uppercase state, but does not affect non-alphabetic keys

Audible Signals

Key-Click	Keyclick sound simulates typewriter
Bell	Sounds (1) upon receipt of control characters BEL; (2) when keyboard input approaches right margin (output from host approaching right margin does not cause bell to ring)
Page Overflow	LF causes upward scroll.
Parity	Even or mark (no parity) switch-selectable; odd or space possible with rewiring. (Note that received data is not checked for parity error)
Type	Blinking underline
Control	Up or down one line, right or left one character, home, tab (fixed tab stops every eight spaces), direct cursor addressing (allows cursor to be moved to any character position on the screen)
Functions	Erase display from cursor position to end of line; erase to end of screen; scroll up
Hold-Screen Mode	Allows operator to halt transmission from host, preserving data on display. Operator can request new data, line- or screenful-at-a-time; enabled/disabled by Escape Sequences sent by system software.
Terminal Self-Identification	Terminal transmits on command a sequence unique to its model; software can identify features available on any terminal it is in contact with.
Communications	20 mA current loop or EIA interface; specify at time of order.
Code	USASCII extended through Escape Sequences
Baud Rates	Switch-selectable
Transmission Rates	Full duplex (switch selectable) 75, 110, 150, 300, 600, 1200, 2400, 4800, and 9600 baud Switch-selectable local copy
Synchronization	Automatically transmits control codes to host, requesting suspension and resumption of transmission, when unable to process data
Operator Controls	Power On/Off, Intensity Control, Baud Rate Switch, Terminal Mode Switch, Even/No Parity
Overload Protection	Thermal cutout (circuit breaker)