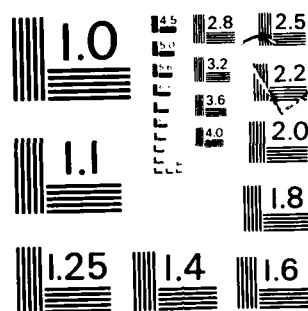


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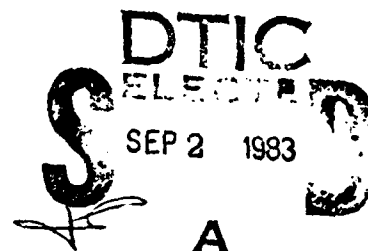
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MEMORANDUM REPORT ARBRL-MR-03298

PROCEDURES FOR THE TRANSFER OF DATA FILES
BETWEEN THE BRL CYBER COMPUTER SYSTEM
AND THE IBD HEWLETT-PACKARD
MINICOMPUTER NETWORK

Caledonia L. Henry

August 1983



US ARMY ARMAMENT RESEARCH AND DEVELOPMENT COMMAND
BALLISTIC RESEARCH LABORATORY
ABERDEEN PROVING GROUND, MARYLAND

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I. INTRODUCTION

Frequently, files stored on one computer must be transferred to another computer. This need has become more prevalent in the last few years with the advent of satellite minicomputer networks within the Ballistic Research Laboratory (BRL).

In particular, the Interior Ballistics Division (IBD) of the BRL has established a minicomputer network with a HEWLETT-PACKARD (HP) 1000-F minicomputer at the hub. Experimental data recorded on analog tape are converted to digital form and stored on digital tape and/or disk for further processing. This conversion is accomplished using an HP analog-to-digital converter. These data may be transferred from the HP1000 to one of the several HP9845 microcomputers within the IBD for intermediate or final analysis.

•If analysis is desired on a larger machine, the data may be transferred to the BRL's Control Data Corp (CDC) computer mainframe system. This system is composed of a CDC CYBER 173 (MFA), a CDC CYBER 825 (MFB) and a CDC CYBER 7600 (MFZ). MFA is the common link to MFB and MFZ, and, therefore, is the transfer point for the CDC system. •

After the data analysis is finished on the CDC system, output data files are sent to the minicomputer or microcomputer site for such things as interactive computer graphics processing or additional analysis using existing software. So, the transfer from MFA to the HP9845 is also required.

The method herein discussed has proven to be a convenient means of transferring files (primarily data files) between an HP9845 and MFA.

II. PREPARATION OF DATA FILES CREATED ON HP9845

The great majority of the data files now created on an HP9845 is stored in binary format. In order to be transferred to MFA, the data must be converted into ASCII character strings. There are currently two Enhanced BASIC programs written for an HP9845 for the purpose of converting these data files into 80-character (column) card images for transfer to MFA. These 80-character card images are called records.

The first conversion program (CNVTB1:C) creates a data file which conforms to a proposed uniform format for experimental data.¹ Both data file formats are designed to be used in FORTRAN digital computer programs that have been written for the conversion into engineering units of and for the further analysis of experimental and simulation data. A listing of this program is found in Appendix A.

The second of these programs (CNVTB4:C) creates a file format which emulates the data files created using the FORTRAN programs ADTAPE3² and

¹Franz R. Lynn, "A Uniform Format For Experimental Data," BRL Memorandum Report ARBRL-MR-03151, December 1981 (AD 109964).

²E.M. Wineholt, C.L. Henry, K.L. Zimmerman, "A Procedure For the Semiautomatic Reduction of Experimental Data," BRL Memorandum Report ARBRL-MR-03259, April 1983 (AD A127321).

ADTAPE4. Program ADTAPE3 creates a data file accepted by FORTRAN program ADTAPE4 which converts data into engineering units. If the data are already in engineering units, they may be used in other data analysis programs which use output from program ADTAPE4. In most cases, the data transferred from an HP9845 are already in engineering units. Appendix B contains the listing of program CNVTB4.

A. Data File Format Created Using BASIC Program CNVTB1

An example of a data file which conforms to a uniform format for experimental data is found in Figure 1. This data format is accepted by a modified version (BALDPRESS) of the FORTRAN program BROAD,³ which converts data to engineering units and integrates and/or plots. This data input sequence is also accepted by other data analysis programs.

The program control and channel information data are found in records one through five. Table 1 provides a description of the variables contained on these records. There is a zero placed in column 80 of records one through five so that all records will have exactly 80 columns.

The format for the data is included in record 2. This format must specify exactly 80 columns of data per card image. If the last record of the data does not contain 80 columns, then the balance of the record will be filled with zeroes so that each record will be 80 columns long.

Figure 1 shows records 1 through 10 and the last five data records. Following the program control and channel information are the first five data records. These are separated from the last five data records by three blank lines.

B. Data File Format 2 Created Using BASIC Program CNVTB4

Program CNVTB4 is designed to convert one channel or multiple channels of data to be stored on one file. The hardcopy output from this program lists each channel individually and also the summary of the entire file. The individual channels are written to an array and the entire file is stored at one time. This eliminates the necessity of using extra disk space for intermediate storage.

Figure 2 gives an example of a file created to be input for program ADTAPE4 and other data analysis programs. There are three lines of file information preceding the data lines. The variables written in records 1 through 3 are described in Tables 2 and 3. There is a one placed in column 80 of the first three records to force each record to equal 80 columns. The data records are written in eight ten-column fields of fixed point data. If the number of data points is not exactly divisible by eight, the balance of the last data record is filled with zeroes in order to make it 80 columns long.

³C.L. Henry, R.L. Marts, E.M. Wineholt, "An Improved Procedure For The Reduction of Interior Ballistic Data Recorded on Analog Tape," BRL-MR-2374, April 1974 (AD 919923L).

237MM ACCURACY PROGRAM				10DEC82	1430	31	1	8 (8F10.1)	0
LERF	1	0	2048	.0005	0.	0.	0	0	0
UP-DOWN FRONT	DISPLACEMENT	IN	MUZZLE SCHMIDT						
0.	0.	0.	1.	0.	0.	0.	0	0.	0
1.	0.								0
125.0	124.0	124.0	125.0	125.0	125.0	125.0	125.0	125.0	125.0
124.0	125.0	125.0	125.0	125.0	124.0	124.0	125.0	126.0	126.0
125.0	124.0	125.0	125.0	125.0	125.0	125.0	125.0	125.0	125.0
125.0	124.0	124.0	125.0	125.0	124.0	124.0	126.0	125.0	125.0
125.0	125.0	125.0	126.0	125.0	125.0	125.0	125.0	125.0	125.0
.	.	.							
115.0	115.0	114.0	114.0	114.0	114.0	114.0	114.0	113.0	
113.0	112.0	113.0	113.0	113.0	114.0	112.0	112.0	112.0	
113.0	113.0	113.0	113.0	113.0	114.0	114.0	114.0	114.0	
115.0	115.0	115.0	115.0	115.0	114.0	114.0	116.0	115.0	
115.0	115.0	115.0	117.0	117.0	118.0	125.0	125.0	125.0	

Figure 1. An Example of a Uniform Format for Experimental Data

**TABLE 1. DEFINITION OF VARIABLES ON DATA INFORMATION LINES FOR THE UNIFORM
FORMAT FOR EXPERIMENTAL DATA**

Record Number	Variable Name	Column Numbers	Format	Description
1	IFV	1-5	15	File format version number, currently 2, but may be changed if the format should be changed.
	TITL	6-35	A30	Title of the firing project.
	DATE	36-45	A10	Date of the firing.
	TIME	46-55	A10	Time of the firing.
	IROUND	56-60	15	Identification number on the analog tape.
	IADC	61-65	15	The number of recording devices used in this firing.
2	IA	1-10	A10	The name of the recording device used for this particular phenomenon.
	NCH	11-15	15	The number of channels in this group.
	ITZ	16-20	15	Number of calibration data points.
	NBD	21-30	I10	Number of phenomenon data points.
	DELT	31-45	E15*	Time between consecutive data points.
	OFFTIM	46-60	E15*	Offset time from time zero of the data channel, usually the time of the first data point of this channel.
	NUMBER	61-65	15	Number of data points per card image.
	IRDFMT	66-75	A10	Format for reading calibration and phenomenon data points.
3	NTS	1-20	A20	Description of the phenomenon contained in the current channel.
	YAT	21-40	A20	Phenomenon and units of the channel.
	GT	41-60	A20	Gage type used to record this channel.
	ICB	61-65	15	Calibration code: 1, if there are calibrations for this channel, or 0, if there are no calibrations for this channel.

*The E type format can be overridden by a decimal point in the data field.

**TABLE 1. DEFINITION OF VARIABLES ON DATA INFORMATION LINES FOR THE UNIFORM
FORMAT FOR EXPERIMENTAL DATA (continued)**

Record Number	Variable Name	Column Numbers	Format	Description
3	SBL	66-70	15	Value, in analog-to-digital counts, to bring the data to the zero baseline.
4	SS	1-15	E15*	Value, in electrical units or in physical units, of the top step of the calibration steps.
	SA,SB,SC	16-60	3E15*	Quadratic calibration coefficients used to convert the raw data into electrical units.
	A	61-75	E15*	The first of three quadratic transformation coefficients used to convert the electrical units into physical units.
5	B,C	1-30	2E15*	The second and third quadratic coefficients for the conversion of electrical units to physical units.

* The E type format can be overridden by a decimal point in the data field.

```

3IU-DF      1 3 7UP-DOWN FRONT ID 31
2048
0.          .00050
125.0       124.0       125.0       125.0       125.0       125.0       125.0
124.0       125.0       125.0       125.0       124.0       125.0       125.0
125.0       124.0       125.0       125.0       125.0       125.0       125.0
125.0       124.0       124.0       125.0       124.0       126.0       125.0
125.0       125.0       125.0       125.0       125.0       125.0       125.0
124.0       125.0       126.0       126.0       125.0       124.0       125.0
124.0       124.0       125.0       125.0       124.0       125.0       125.0
.           .
.           .
.           .
115.0       115.0       114.0       114.0       114.0       114.0       113.0
113.0       112.0       113.0       113.0       112.0       112.0       112.0
113.0       113.0       113.0       113.0       114.0       114.0       114.0
115.0       115.0       115.0       115.0       115.0       116.0       115.0
115.0       115.0       115.0       117.0       118.0       125.0       125.0
FILE 3IU-DF:C12

```

Figure 2. An Example of an Input Format Accepted by ADTAPE4 and Other Data Analysis Programs

**TABLE 2. DEFINITION OF VARIABLES ON DATA INFORMATION LINES OF DATA FILE
FORMAT 2**

Record Number	Variable Name	Column Numbers	Format	Description
1	NTS*	1-48	24A2	File description including file name, round number, channel number, total number of channels and message. These variables will be described in Table 3.
2	NPT	1-10	I10	Total number of data points in this channel.
3	TIME	1-15	F15.8	Time at fiducial mark.
	DT	16-30	F15.8	Time between data points.

*Table 3 describes the variable NTS. NTS is made up of 24 two-column words. Words six and seven of NTS have been left blank.

TABLE 3. EXPLANATION OF CONTENTS OF VARIABLE NTS

Variable Name	Index of NTS	Format	Column Numbers	Description
NAMEF	1-5	5A2	1-10	The name of the data file, which usually contains the round number from the original analog tape.
IRD	8	12	15-16	The round number* of this round in relation to other rounds in this file.
ICNT	9	12	17-18	The channel number in relation to the total number of channels in this round.
NCH	10	12	19-20	The total number of channels of this round in this file.
MSSG	11-24	14A2	21-48	An optional 28 columns that may be used for additional description of the channel. It is taken from the storage information of files stored on an HP9845.

*Program ADTAPE3 counts the rounds that are sequentially stored on a file. This round number generally has nothing to do with the round number on the original analog tape. In most cases, this number will not be greater than one for the files converted on an HP9845.

The first ten rows of Figure 2 are the data information records (one through three) and the first seven data lines. These are followed by three blank lines and the last five data records. The last line of Figure 2 is printed as hardcopy output, but is not stored on the disk. This line gives the name of the file that was converted.

Figure 3 is a summary of all of the channels converted to be put in a single file and lists the first five lines of each channel converted separated by three blank lines. The final line of the hardcopy output is not stored on disk. This line prints the name of the disk file on which all of this data are stored.

III. ACTUAL TRANSFER OF DATA

Detailed instructions for the transfer of files between an HP9845 and MFA are found in Appendix A of Reference 2 which is reproduced in Appendix F for the reader's convenience. Files may be transferred in either direction, i.e., from HP to MFA and from MFA to HP.

It takes approximately 10 wall-clock minutes to transfer 1813 lines of data from HP to MFA at a rate of 4800 baud (bits per second).

IV. READING THE FILES ON THE CDC MAINFRAMES

There are four short segments of job control language (JCL) and FORTRAN IV programs stored on MFA that have been written to read the ASCII files transferred from an HP9845. Two of the program files (CONHP and CVHPZ) contain the formats used to read the data files created by CNVTB1. The remaining two program files (CVHPZ3 and CVHPA) read the data files set up by CNVTB4.

The FORTRAN programs contained in files CONHP and CVHPA are combined with the JCL established to run on MFA. The JCLs designed for MFZ are stored with the FORTRAN programs in files CHVPZ and CVHPZ3. The MFZ is normally used for larger programs and faster execution time. The MFB shares files with MFA; therefore, files that are stored on MFA are accessible from MFB. MFB is used primarily for interactive graphics applications.

In order to use a data file created by program CNVTB4 in program ADTAPE4 and various other existing data analysis programs, the data must be read in using formatted input and re-stored on a file using unformatted output. This process is the function of the FORTRAN programs in files CVHPZ3 and CVHPA. The BALDPRESS version of the BROAD program accepts the data file written by CNVTB1 as it exists. There is no need for an intermediate program. For use in other programs, the formats in the FORTRAN programs in files CONHP and CVHPZ are recommended for reading the data.

All of the FORTRAN programs listed will plot each data channel separately. Therefore, you may desire to run files CONHP or CVHPZ in order to get a plot of the data as it currently exists. These programs will not change or re-save the data; they will simply verify the existence of the data in MFA by printout and plot.

Appendix C contains JCL for MFA, JCL for MFZ and the corresponding FORTRAN program designed to read data files created by program CNVTB1.

31U-DF	1 1 7UP-DOWN FRONT ID 31							1
2048								1
	0.	.00050						1
125.0	124.0	124.0	125.0	125.0	125.0	125.0	125.0	
124.0	125.0	125.0	125.0	125.0	124.0	125.0	126.0	
31U+DF	1 2 7UP+DOWN FRONT ID 31							1
2048								1
	0.	.00050						1
46.0	47.0	47.0	46.0	46.0	47.0	46.0	47.0	
46.0	47.0	47.0	47.0	47.0	47.0	47.0	46.0	
31L-RF	1 3 7LEFT-RIGHT FRONT ID 31							1
2048								1
	0.	.00050						1
127.0	127.0	127.0	126.0	127.0	127.0	127.0	127.0	
127.0	127.0	127.0	126.0	127.0	127.0	127.0	127.0	
31L+RF	1 4 7LEFT+RIGHT FRONT ID 31							1
2048								1
	0.	.00050						1
51.0	51.0	51.0	50.0	50.0	51.0	50.0	50.0	
51.0	50.0	50.0	50.0	50.0	51.0	50.0	50.0	
31U-DM	1 5 7UP-DOWN MUZZLE ID 31							1
2048								1
	0.	.00050						1
127.0	127.0	127.0	127.0	127.0	127.0	127.0	127.0	
128.0	128.0	127.0	127.0	127.0	127.0	127.0	127.0	
31U+DM	1 6 7UP+DOWN MUZZLE ID 31							1
2048								1
	0.	.00050						1
50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	
50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	
31L-RM	1 7 7LEFT-RIGHT MUZZLE ID 31							1
2048								1
	0.	.00050						1
125.0	125.0	125.0	125.0	125.0	125.0	125.0	124.0	
125.0	125.0	124.0	124.0	124.0	124.0	124.0	125.0	

FILE 37M31:C12 IS STORED

Figure 3. An Example of a Summary of Multiple Data Files Converted, Consolidated and Stored on One File

Appendix D lists JCL for MFA, JCL for MFZ and the associated FORTRAN program established to read data files converted using program CNVTB4.

The files CONHP, CVHPA, CVHPZ and CVHPZ3 are saved on MFA under UN=CAL. These files are in the public domain and may be read and changed. However, when changes are made, they must be saved under the name of the current user. They may not be re-saved under UN=CAL.

V. TRANSFER OF DATA FILES CREATED ON CDC MAINFRAMES TO HP9845

In addition, it is often desirable to transfer data files created on CDC mainframes to an HP9845 for additional analysis. Analysis on an HP9845 is often more desirable because of faster turnaround with smaller computations. It also frees the mainframes for larger number-crunching jobs.

In order for a file to be accessible to an HP9845, it must be stored on MFA. If a file is created on MFZ, it may be stored on MFA using the SAVEPF command. The SAVEPF command follows the same parameter list as the GETPF command illustrated in Appendices C and D.

An additional method of getting a file stored on MFA is to submit the job using the SUBMIT,fn,T command. This returns the output to MFA from MFZ and provides the option of editing, printing, saving or otherwise manipulating the data before transfer. The transfer will be faster if all unnecessary information is edited out before the file is cataloged and/or transferred.

As was previously stated, the mechanics of the actual transfer of data from the CDC to an HP9845 can be found in Appendix F.

VI. READING THE FILES ON AN HP9845

In order for the transferred data files to be used on an HP9845, they must be converted from ASCII to a numeric data type, either digital or binary. For greater efficiency in reading and for more compact storage of the data, it is more desirable to convert the data to a binary format. The program (SORTAL:C) is designed to accomplish this conversion.

The format for the data storage conforms to the format designed for use in the ANPACK⁴ routines. These routines are the basic analysis packages used on the HP9845s in the IBD of the BRL. This data format is also used in numerous other analysis and plotting routines developed for use on an HP9845.

The SORTAL program converts the ASCII data, whether it is one data file stored in rows or in several data files stored in columns. The general layout of a transferred data file conforms to a computer printout in which the data are printed out one phenomena at a time in rows or several phenomena at a time printed out in columns. The listing of the SORTAL routine along with the STOSOR routine, which is used to store files on disk, can be found in Appendix E.

⁴J.N. Walbert, "Interactive Data Acquisition, Analysis, and Presentation Software for Experimental Research Facilities in the Interior Ballistics Division at BRL," to be published.

VII. SUMMARY

BASIC programs CNVTB1 and CNVTB4 were designed to convert binary data stored on an HP9845 to ASCII. This conversion enables this data to be transferred to MFA. FORTRAN programs in files CONHP, CVHPA, CVHPZ and CVHPZ3 were written for the purpose of reading the transferred data and putting it in a format suitable for use by data analysis programs that reside on MFA or MFZ.

The program SORTAL was written to convert ASCII data to binary. This process enables an HP9845 to read and use data that have been transferred from MFA to an HP9845. This data can then be further analyzed and/or plotted on an HP9845 using existing software or software to be created.

APPENDIX A
LISTING OF PROGRAM CNVTB1

APPENDIX A

LISTING OF PROGRAM CNVTB1

```

10      OPTION BASE 1                                !FILE CNVTB1:C
20      ! CONVERTS DATA FROM BDAT TO ASCII FOR POTENTIAL TRANSFER TO CDC
30      SHORT Data(5000)
40      DIM Label$(64),Data1$(300)[80],Temp$(1)[80],Value$(80),Ss(10),Data$(2100)[80]
50      INTEGER Data1(0:5000)
60      Ident$=" 65"
70      Devname$="SIMULATION"
80      MASS STORAGE IS ":C12"
90      !
100     ! INPUT NUMBER OF FILES TO CONVERT AND CONSOLIDATE
110     !
120     PRINT PAGE
130     PRINT "HOW MANY FILES DO YOU WANT TO CONVERT AND CONSOLIDATE?"
140     INPUT Number
150     PRINT PAGE
160     I=1
170     Ss(1)=1
180     J1=1
190     !
200     ! SET UP SOME ASCII VALUES OF ZERO, ONE AND BLANK
210     !
220     One$=" 1"
230     Zero$=" 0"
240     Blank$=" "
250     Blank4$=" "
260     Point$="."
270     !
280     ! READ THE FILE TO BE CONVERTED
290     !
300     PRINT "ENTER FILE NAME"
310     INPUT Filename$
320     Filename$=Filename$&"":C12"
330     PRINT "WAS THE DATA STORED FROM THE ACQUISITION (INTEGER) ROUTINE (0) OR"
340     PRINT "FROM THE ANALYSIS (SHORT) ROUTINE (1)"
350     INPUT From
360     IF From=1 THEN Ana
370     !
380     ! READ DATA STORED USING ACQUISITION ROUTINE
390     !
400     FREAD Filename$,Data1(*)
410     MAT Data=Data1
420     Data(37)=1/Data(37)
430     GOTO Next
440     !
450     ! READ DATA STORED USING ANALYSIS ROUTINE
460     !
470     Ana:FREAD Filename$,Data(*)
480     !
490     ! PRINT FILE INFORMATION AND DETERMINE IF CORRECT FILE
500     !

```

```

510 Next:Nrec=ROW(Data)
520 PRINT PAGE
530 Nwords=Nrec-37
540 Format$="#.64A"
550 IF From=1 THEN ENTER Data(1) USING Format$;Label$
560 IF From=0 THEN ENTER Data(0) USING Format$;Label$
570 PRINT "STORAGE INFORMATION FOR FILE ";Filename$;LIN(1);Label$
580 PRINT "START=";Data(33);"STOP=";Data(34);"INC=";Data(35)
590 PRINT "DELTA TIME=";Data(37)
600 PRINT "NO. OF RECORDS = ";Data(36)
610 PRINT LIN(2)
620 PRINT "IS THIS THE CORRECT FILE? 'Y' or 'N'"
630 INPUT Right$
640 PRINT PAGE
650 IF Right$<>"Y" THEN 300
660 !
670 ! SET UP THE INFORMATION LINES WITH INFORMATION FROM THE FILE
680 !
690 FOR N=1 TO 50 STEP 10
700 Temp$(1)[N;10]=Label$[N;2]&Label$[N+2;2]&Label$[N+4;2]&Label$[N+6;2]&
Label$[N+8;2]
710 NEXT N
720 PRINTER IS 0
730 Data1$(1)[1;5]=" 2"
740 Data1$(1)[6;30]=Temp$(1)[1;10]&Temp$(1)[11;10]&Temp$(1)[21;10]
750 Data1$(1)[36;10]=Temp$(1)[31;10]
760 Data1$(1)[46;10]=Temp$(1)[41;10]
770 Data1$(1)[56;5]=Ident$
780 Data1$(1)[61;5]=One$
790 Data1$(1)[66;15]=Blank$&Blank$&Zero$
800 Data1$(2)[1;10]=Devname$
810 Data1$(2)[11;5]=One$
820 Data1$(2)[16;5]=Zero$
830 Data1$(2)[21;10]=VAL$(Data(34))
840 FIXED 9
850 Data1$(2)[31;15]=Blank$&VAL$(Data(37))
860 STANDARD
870 Data1$(2)[46;15]=Blank$&Blank$&Zero$&Point$
880 Data1$(2)[61;5]=" 8"
890 Data1$(2)[66;10]=" (8F10.1)"
900 Data1$(2)[76;5]=Zero$
910 A=2
920 Stat=1
930 Nn1=21
940 Nn2=30
950 GOTO Justify
960 Back:Nn1=31
970 Nn2=45
980 Stat=2
990 A=2
1000 GOTO Justify
1010 !
1020 ! CONVERT THE NUMERICAL DATA POINTS TO ASCII
1030 !

```

```

1040 Convert:PRINT PAGE
1050 PRINT "CONVERTING DATA TO ASCII"
1060 J=6
1070 L=38
1080 Ii=INT((Nrec-37)/8)+2
1090 FOR K=1 TO 80 STEP 10
1100 Data$(J)[K;10]=VAL$(Data(L))
1110 A=J
1120 Stat=3
1130 Nn1=K
1140 Nn2=K+9
1150 GOTO Justify
1160 Data_trans:L=L+1
1170 IF L>Nrec THEN 1340
1180 NEXT K
1190 J=J+1
1200 GOTO 1090
1210 !
1220 ! IF THE FINAL DATA LINE DOES NOT HAVE EIGHT DATA POINTS,
1230 ! FILL THE REST OF THE DATA POINTS WITH ZEROES TO MAKE 80 COLUMNS
1240 !
1250 PRINT PAGE
1260 Nleft=Nwords MOD 8
1270 IF Nleft=0 THEN 1340
1280 FOR Kk=K+10 TO 80 STEP 10
1290 Data$(J)[Kk;10]=" 0.000"
1300 NEXT Kk
1310 !
1320 ! PRINT THE SUMMARY OF THE CONVERTED FILE
1330 !
1340 PRINT PAGE
1350 Mm=J
1360 PRINTER IS 0
1370 FOR Jj=1 TO 10
1380 PRINT Data$(Jj)
1390 NEXT Jj
1400 PRINT LIN(1)
1410 FOR Jj=Mm-4 TO Mm
1420 PRINT Data$(Jj)
1430 NEXT Jj
1440 PRINT "FILE ";Filename$
1450 PRINT LIN(1)
1460 PRINTER IS 16
1470 GOTO Trans
1480 !
1490 ! EACH OF THE DATA POINTS IS RIGHT-JUSTIFIED IN A TEN-COLUMN FIELD
1500 !
1510 Justify:Savenn=0
1520 Dec_pt=0
1530 FOR Nn=Nn1 TO Nn2
1540 IF Data$(A)[Nn;1]=" " THEN Savenn=Savenn+1
1550 IF Data$(A)[Nn;1]="." THEN Dec_pt=1
1560 NEXT Nn
1570 IF Savenn=0 THEN Savenn=1

```

```

1580 Nnspan=Nn2-Nn1+1
1590 Nchar=Nnspan-Savenn
1600 FOR L1=Nn2 TO Nn2-Nchar+1 STEP -1
1610 Data1$(A)[L1;1]=Data1$(A)[L1-Savenn;1]
1620 Data1$(A)[L1-Savenn;1]=" "
1630 NEXT L1
1640 IF Stat=1 THEN 1660
1650 IF Dec_pt=0 THEN 1680
1660 ON Stat GOTO Back,Default,Data_trans
1670 STOP
1680 FOR H=Nn2-Nchar+1 TO Nn2
1690 Data1$(A)[H-2;1]=Data1$(A)[H;1]
1700 NEXT H
1710 Data1$(A)[Nn2;1]="0"
1720 Data1$(A)[Nn2-1;1]="."
1730 GOTO 1660
1740 !
1750 ! SET UP DEFAULT FILE INFORMATION FROM INPUT FILE
1760 !
1770 Default:PRINTER IS 16
1780 Data1$(3)[1;20]=Data1$(1)[6;20]
1790 Data1$(3)[21;20]=Data1$(1)[26;20]
1800 Data1$(3)[41;20]=Blank$&Blank$&Blank$&Blank$
1810 Data1$(3)[61;5]=Zero$
1820 Data1$(3)[66;5]=Zero$
1830 Data1$(3)[71;10]=Blank$&Zero$
1840 Data1$(4)[1;15]=Blank$&Blank4$&Zero$&Point$
1850 Data1$(4)[16;15]=Blank$&Blank4$&Zero$&Point$
1860 Data1$(4)[31;15]=Blank$&Blank4$&One$&Point$
1870 Data1$(4)[46;15]=Blank$&Blank4$&Zero$&Point$
1880 Data1$(4)[61;15]=Blank$&Blank4$&Zero$&Point$
1890 Data1$(4)[76;5]=Zero$
1900 Data1$(5)[1;15]=Blank$&Blank4$&One$&Point$
1910 Data1$(5)[16;15]=Blank$&Blank4$&Zero$&Point$
1920 Data1$(5)[31;50]=Blank$&Blank$&Blank$&Blank$&Blank$&Blank$&Blank$
&Blank$&Blank$&Zero$
1930 !
1940 ! PRINT THE DEFAULT VALUES DERIVED FROM THE INPUT FILE
1950 !
1960 Info:PRINT PAGE
1970 PRINT "These are the default values from your file and as otherwise"
1980 PRINT "designated. If you want to change any of them, ENTER 'C'."
1990 PRINT
2000 PRINT "FILE VERSION = ";Data1$(1)[1;5];" PROJECT NAME = ";Data1$(1)[6;30]
2010 PRINT "DATE = ";Data1$(1)[36;10];" TIME = ";Data1$(1)[46;10];" IDENT NO. = ";
Data1$(1)[56;5]
2020 PRINT "NO. OF DEVICES = ";Data1$(1)[61;5];" DEVICE NAME = ";Data1$(2)[1;10]
2030 PRINT "NO. OF CHANNELS = ";Data1$(2)[11;5];" NO. OF CAL WORDS = ";
Data1$(2)[16;5]
2040 PRINT "NO. OF DATA WORDS = ";Data1$(2)[21;10];" DELTA TIME = ";
Data1$(2)[31;15]
2050 PRINT "OFFSET TIME = ";Data1$(2)[46;15];" WORDS PER CARD AS SET BY THIS
PROGRAM = ";Data1$(2)[61;5]
2060 PRINT "DATA FORMAT = ";Data1$(2)[66;10];" GAGE TYPE = ";Data1$(3)[41;20]

```

```

2070 PRINT "CHANNEL DESCRIPTION = ";Data1$(3)[1;20]
2080 PRINT "QUANTITY AND UNITS = ";Data1$(3)[21;20]
2090 PRINT "CAL CODE ( 1 IF THERE ARE CALS, 0 IF THERE ARE NO CALS )= ";
Data1$(3)[61;5]
2100 PRINT "BASELINE = ";Data1$(3)[66;5];" TOP STEP GAGE RESPONSE = ";
Data1$(4)[1;15]
2110 PRINT "QUADRATIC CALIBRATION COEFFICIENTS ";
Data1$(4)[16;15];Data1$(4)[31;15];Data1$(4)[46;15]
2120 PRINT "QUADRATIC TRANSFORMATION COEFFICIENTS ";
Data1$(4)[61;15];Data1$(5)[1;15];Data1$(5)[16;15]
2130 PRINT LIN(1)
2140 !
2150 ! HERE IS THE OPTION TO CHANGE ANY INFORMATION THAT HAS BEEN LISTED
2160 ! AND RIGHT-JUSTIFY ANY NEW INFORMATION
2170 !
2180 PRINT "DO YOU WANT TO CHANGE ANY ITEMS? ENTER 'C' TO CHANGE"
2190 BEEP
2200 INPUT Change$
2210 IF Change$<>"C" THEN Convert
2220 PRINT
2230 PRINT "IF YOU WANT TO CHANGE A VARIABLE, ENTER THE VALUE THAT YOU WANT;"
2240 PRINT "OTHERWISE, ENTER 'N'. IF YOU HAVE CHANGED THE LAST VALUE THAT YOU"
2250 PRINT "WANT TO CHANGE, ENTER 'E'"
2260 PRINT "FILE VERSION (I5)=";Data1$(1)[1;5]
2270 INPUT Value$
2280 IF Value$="E" THEN Convert
2290 IF Value$="N" THEN 2380
2300 Data1$(1)[1;5]=Value$
2310 FOR E=5 TO 1 STEP -1
2320 IF Data1$(1)[5;1]<>" " THEN 2380
2330 FOR F=4 TO 1 STEP -1
2340 Data1$(1)[F+1;1]=Data1$(1)[F;1]
2350 NEXT F
2360 Data1$(1)[5-E+1;1]=" "
2370 NEXT E
2380 PRINT "PROJECT NAME (A30)=";Data1$(1)[6;30]
2390 INPUT Value$
2400 IF Value$="E" THEN Convert
2410 IF Value$="N" THEN 2430
2420 Data1$(1)[6;30]=Value$
2430 PRINT "DATE (A10)=";Data1$(1)[36;10]
2440 INPUT Value$
2450 IF Value$="E" THEN Convert
2460 IF Value$="N" THEN 2480
2470 Data1$(1)[36;10]=Value$
2480 PRINT "TIME (A10)=";Data1$(1)[46;10]
2490 INPUT Value$
2500 IF Value$="E" THEN Convert
2510 IF Value$="N" THEN 2530
2520 Data1$(1)[46;10]=Value$
2530 PRINT "IDENT NO. (I5)=";Data1$(1)[56;5]
2540 INPUT Value$
2550 IF Value$="E" THEN Convert
2560 IF Value$="N" THEN 2650

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2570 Datal$(1)[56;5]=Value$
2580 FOR E=60 TO 56 STEP -1
2590 IF Datal$(1)[60;1]<>" " THEN 2650
2600 FOR F=59 TO 56 STEP -1
2610 Datal$(1)[F+1;1]=Datal$(1)[F;1]
2620 NEXT F
2630 Datal$(1)[60-E+56;1]=" "
2640 NEXT E
2650 PRINT "NO. OF DEVICES (I5)=";Datal$(1)[61;5]
2660 INPUT Value$
2670 IF Value$="E" THEN Convert
2680 IF Value$="N" THEN 2770
2690 Datal$(1)[61;5]=Value$
2700 FOR E=65 TO 61 STEP -1
2710 IF Datal$(1)[65;1]<>" " THEN 2770
2720 FOR F=64 TO 61 STEP -1
2730 Datal$(1)[F+1;1]=Datal$(1)[F;1]
2740 NEXT F
2750 Datal$(1)[65-E+61;1]=" "
2760 NEXT E
2770 PRINT "DEVICE NAME (A10)=";Datal$(2)[1;10]
2780 INPUT Value$
2790 IF Value$="E" THEN Convert
2800 IF Value$="N" THEN 2820
2810 Datal$(2)[1;10]=Value$
2820 PRINT "NO. OF CHANNELS (I5)=";Datal$(2)[11;5]
2830 INPUT Value$
2840 IF Value$="E" THEN Convert
2850 IF Value$="N" THEN 2940
2860 Datal$(2)[11;5]=Value$
2870 FOR E=15 TO 11 STEP -1
2880 IF Datal$(2)[15;1]<>" " THEN 2940
2890 FOR F=14 TO 11 STEP -1
2900 Datal$(2)[F+1;1]=Datal$(2)[F;1]
2910 NEXT F
2920 Datal$(2)[15-E+11;1]=" "
2930 NEXT E
2940 PRINT "NO. OF CAL WORDS (I5)=";Datal$(2)[16;5]
2950 INPUT Value$
2960 IF Value$="E" THEN Convert
2970 IF Value$="N" THEN 3060
2980 Datal$(2)[16;5]=Value$
2990 FOR E=20 TO 16 STEP -1
3000 IF Datal$(2)[20;1]<>" " THEN 3060
3010 FOR F=19 TO 16 STEP -1
3020 Datal$(2)[F+1;1]=Datal$(2)[F;1]
3030 NEXT F
3040 Datal$(2)[20-E+16;1]=" "
3050 NEXT E
3060 PRINT "NO. OF DATA WORDS (I10)=";Datal$(2)[21;10]
3070 INPUT Value$
3080 IF Value$="E" THEN Convert
3090 IF Value$="N" THEN 3180
3100 Datal$(2)[21;10]=Value$

```

```

3110 FOR E=30 TO 21 STEP -1
3120 IF Data1$(2)[30;1]<>" " THEN 3180
3130 FOR F=29 TO 21 STEP -1
3140 Data1$(2)[F+1;1]=Data1$(2)[F;1]
3150 NEXT F
3160 Data1$(3)[30-E+21;1]=" "
3170 NEXT E
3180 PRINT "DELTA TIME (E15)=";Data1$(2)[31;15]
3190 INPUT Value$
3200 IF Value$="E" THEN Convert
3210 IF Value$="N" THEN 3370
3220 Data1$(2)[31;15]=Value$
3230 Isign=0
3240 CALL Decimal(Data1$(2),31,15,Isign)
3250 IF (Data1$(2)[45;1]<>" ") AND (Isign=1) THEN 3370
3260 FOR E=45 TO 31 STEP -1
3270 IF Data1$(2)[44;1]<>" " THEN 3370
3280 Is=44
3290 IF Isign=1 THEN 3320
3300 Is=43
3310 IF (E=45) AND (Isign=0) THEN Data1$(2)[45;1]=Point$
3320 FOR F=Is TO 31 STEP -1
3330 Data1$(2)[F+1;1]=Data1$(2)[F;1]
3340 NEXT F
3350 Data1$(2)[45-E+31;1]=" "
3360 NEXT E
3370 PRINT "OFFSET TIME (E15)=";Data1$(2)[46;15]
3380 INPUT Value$
3390 IF Value$="E" THEN Convert
3400 IF Value$="N" THEN 3560
3410 Data1$(2)[46;15]=Value$
3420 Isign=0
3430 CALL Decimal(Data1$(2),46,15,Isign)
3440 IF (Data1$(2)[60;1]<>" ") AND (Isign=1) THEN 3560
3450 FOR E=60 TO 46 STEP -1
3460 IF Data1$(2)[59;1]<>" " THEN 3560
3470 Is=59
3480 IF Isign=1 THEN 3510
3490 Is=58
3500 IF (E=60) AND (Isign=0) THEN Data1$(2)[60;1]=Point$
3510 FOR F=Is TO 46 STEP -1
3520 Data1$(2)[F+1;1]=Data1$(2)[F;1]
3530 NEXT F
3540 Data1$(2)[60-E+46;1]=" "
3550 NEXT E
3560 PRINT "WORDS PER CARD IMAGE (set in program) (I5)=";Data1$(2)[61;5]
3570 INPUT Value$
3580 IF Value$="E" THEN Convert
3590 IF Value$="N" THEN 3680
3600 Data1$(2)[61;5]=Value$
3610 FOR E=65 TO 61 STEP -1
3620 IF Data1$(2)[65;1]<>" " THEN 3680
3630 FOR F=64 TO 61 STEP -1
3640 Data1$(2)[F+1;1]=Data1$(2)[F;1]

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```

3650 NEXT F
3660 Data1$(2)[65-E+61;1]=" "
3670 NEXT E
3680 PRINT "DATA FORMAT(set in program) (A10)=";Data1$(2)[66;10]
3690 INPUT Value$
3700 IF Value$="E" THEN Convert
3710 IF Value$="N" THEN 3730
3720 Data1$(2)[66;10]=Value$
3730 PRINT "CHANNEL DESCRIPTION (A20)=";Data1$(3)[1;20]
3740 INPUT Value$
3750 IF Value$="E" THEN Convert
3760 IF Value$="N" THEN 3780
3770 Data1$(3)[1;20]=Value$
3780 PRINT "QUANTITY AND UNITS (A20)=";Data1$(3)[21;20]
3790 PRINT "USE A BLANK INSTEAD OF A COMMA TO SEPARATE THE UNITS FROM THE
QUANTITY"
3800 PRINT "EXAMPLE: PRESSURE MPA"
3810 INPUT Value$
3820 IF Value$="E" THEN Convert
3830 IF Value$="N" THEN 3850
3840 Data1$(3)[21;20]=Value$
3850 PRINT "GAGE TYPE (A20)=";Data1$(3)[41;20]
3860 INPUT Value$
3870 IF Value$="E" THEN Convert
3880 IF Value$="N" THEN 3900
3890 Data1$(3)[41;20]=Value$
3900 PRINT "CAL CODE (1 if there are calcs, 0 if there are no calcs)(I5)=";
Data1$(3)[61;5]
3910 INPUT Value$
3920 IF Value$="E" THEN Convert
3930 IF Value$="N" THEN 4020
3940 Data1$(3)[61;5]=Value$
3950 FOR E=65 TO 61 STEP -1
3960 IF Data1$(3)[65;1]<>" " THEN 4020
3970 FOR F=64 TO 61 STEP -1
3980 Data1$(3)[F+1;1]=Data1$(3)[F;1]
3990 NEXT F
4000 Data1$(3)[65-E+61;1]=" "
4010 NEXT E
4020 PRINT "BASELINE (I5)=";Data1$(3)[66;5]
4030 INPUT Value$
4040 IF Value$="E" THEN Convert
4050 IF Value$="N" THEN 4140
4060 Data1$(3)[66;5]=Value$
4070 FOR E=70 TO 66 STEP -1
4080 IF Data1$(3)[70;1]<>" " THEN 4140
4090 FOR F=69 TO 66 STEP -1
4100 Data1$(3)[F+1;1]=Data1$(3)[F;1]
4110 NEXT F
4120 Data1$(3)[70-E+66;1]=" "
4130 NEXT E
4140 PRINT "TOP STEP GAGE RESPONSE (E15)=";Data1$(4)[1;15]
4150 INPUT Value$
4160 IF Value$="E" THEN Convert

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4170 IF Value$="N" THEN 4330
4180 Data1$(4)[1;15]=Value$
4190 Isign=0
4200 CALL Decimal(Data1$(4),1,15,Isign)
4210 IF (Data1$(4)[15;1]<>" ") AND (Isign=1) THEN 4330
4220 FOR E=15 TO 1 STEP -1
4230 IF Data1$(4)[14;1]<>" " THEN 4330
4240 Is=14
4250 IF Isign=1 THEN 4280
4260 Is=13
4270 IF (E=15) AND (Isign=0) THEN Data1$(4)[15;1]=Point$
4280 FOR F=Is TO 1 STEP -1
4290 Data1$(4)[F+1;1]=Data1$(4)[F;1]
4300 NEXT F
4310 Data1$(4)[15-E+1;1]=" "
4320 NEXT E
4330 PRINT "QUADRATIC CALIBRATION COEFFICIENTS (3E15)"
4340 PRINT "A";Data1$(4)[16;15]
4350 INPUT Value$
4360 IF Value$="E" THEN Convert
4370 IF Value$="N" THEN 4530
4380 Data1$(4)[16;15]=Value$
4390 Isign=0
4400 CALL Decimal(Data1$(4),16,15,Isign)
4410 IF (Data1$(4)[30;1]<>" ") AND (Isign=1) THEN 4530
4420 FOR E=30 TO 16 STEP -1
4430 IF Data1$(4)[29;1]<>" " THEN 4530
4440 Is=29
4450 IF Isign=1 THEN 4480
4460 Is=28
4470 IF (E=30) AND (Isign=0) THEN Data1$(4)[30;1]=Point$
4480 FOR F=Is TO 16 STEP -1
4490 Data1$(4)[F+1;1]=Data1$(4)[F;1]
4500 NEXT F
4510 Data1$(4)[30-E+16;1]=" "
4520 NEXT E
4530 PRINT "B";Data1$(4)[31;15]
4540 INPUT Value$
4550 IF Value$="E" THEN Convert
4560 IF Value$="N" THEN 4720
4570 Data1$(4)[31;15]=Value$
4580 Isign=0
4590 CALL Decimal(Data1$(4),31,15,Isign)
4600 IF (Data1$(4)[45;1]<>" ") AND (Isign=1) THEN 4720
4610 FOR E=45 TO 31 STEP -1
4620 IF Data1$(4)[44;1]<>" " THEN 4720
4630 Is=44
4640 IF Isign=1 THEN 4670
4650 Is=43
4660 IF (E=45) AND (Isign=0) THEN Data1$(4)[45;1]=Point$
4670 FOR F=Is TO 31 STEP -1
4680 Data1$(4)[F+1;1]=Data1$(4)[F;1]
4690 NEXT F
4700 Data1$(4)[45-E+31;1]=" "

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```

4710 NEXT E
4720 PRINT "C";Data1$(4)[46;15]
4730 INPUT Value$
4740 IF Value$="E" THEN Convert
4750 IF Value$="N" THEN 4910
4760 Data1$(4)[46;15]=Value$
4770 Isign=0
4780 CALL Decimal(Data1$(4),46,15,Isign)
4790 IF (Data1$(4)[60;1]<>" ") AND (Isign=1) THEN 4910
4800 FOR E=60 TO 46 STEP -1
4810 IF Data1$(4)[59;1]<>" " THEN 4910
4820 Is=59
4830 IF Isign=1 THEN 4860
4840 Is=58
4850 IF (E=60) AND (Isign=0) THEN Data1$(4)[60;1]=Point$
4860 FOR F=Is TO 46 STEP -1
4870 Data1$(4)[F+1;1]=Data1$(4)[F;1]
4880 NEXT F
4890 Data1$(4)[60-E+46;1]=" "
4900 NEXT E
4910 PRINT "QUADRATIC TRANSFORMATION COEFFICIENTS (3E15)"
4920 PRINT "A";Data1$(4)[61;15]
4930 INPUT Value$
4940 IF Value$="E" THEN Convert
4950 IF Value$="N" THEN 5110
4960 Data1$(4)[61;15]=Value$
4970 Isign=0
4980 CALL Decimal(Data1$(4),61,15,Isign)
4990 IF (Data1$(4)[75;1]<>" ") AND (Isign=1) THEN 5110
5000 FOR E=75 TO 61 STEP -1
5010 IF Data1$(4)[74;1]<>" " THEN 5110
5020 Is=74
5030 IF Isign=1 THEN 5060
5040 Is=73
5050 IF (E=75) AND (Isign=0) THEN Data1$(4)[75;1]=Point$
5060 FOR F=Is TO 61 STEP -1
5070 Data1$(4)[F+1;1]=Data1$(4)[F;1]
5080 NEXT F
5090 Data1$(4)[75-E+61;1]=" "
5100 NEXT E
5110 PRINT "B";Data1$(5)[1;15]
5120 INPUT Value$
5130 IF Value$="E" THEN Convert
5140 IF Value$="N" THEN 5300
5150 Data1$(5)[1;15]=Value$
5160 Isign=0
5170 CALL Decimal(Data1$(5),1,15,Isign)
5180 IF (Data1$(5)[14;1]<>" ") AND (Isign=1) THEN 5300
5190 FOR E=15 TO 1 STEP -1
5200 IF Data1$(5)[14;1]<>" " THEN 5300
5210 Is=14
5220 IF Isign=1 THEN 5250
5230 Is=13
5240 IF (E=15) AND (Isign=0) THEN Data1$(5)[15;1]=Point$

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```

5250 FOR F=Is TO 1 STEP -1
5260 Datal$(5)[F+1;1]=Datal$(5)[F;1]
5270 NEXT F
5280 Datal$(5)[15-E+1;1]=" "
5290 NEXT E
5300 PRINT "C";Datal$(5)[16;15]
5310 INPUT Value$
5320 IF Value$="E" THEN Convert
5330 IF Value$="N" THEN Convert
5340 Datal$(5)[16;15]=Value$
5350 Isign=0
5360 CALL Decimal(Datal$(5),16,15,Isign)
5370 IF (Datal$(5)[30;1]<>" ") AND (Isign=1) THEN 5380
5380 FOR E=30 TO 16 STEP -1
5390 IF Datal$(5)[29;1]<>" " THEN Convert
5400 Is=29
5410 IF Isign=1 THEN 5440
5420 Is=28
5430 IF (E=30) AND (Isign=0) THEN Datal$(5)[30;1]=Point$
5440 FOR F=Is TO 16 STEP -1
5450 Datal$(5)[F+1;1]=Datal$(5)[F;1]
5460 NEXT F
5470 Datal$(5)[30-E+16;1]=" "
5480 NEXT E
5490 GOTO Convert
5500 !
5510 ! CONSOLIDATION OF CONVERTED FILES INTO ONE FILE
5520 !
5530 Trans:FOR K=1 TO Mm
5540 Datas$(I)=Datal$(K)
5550 I=I+1
5560 NEXT K
5570 IF J1<>Number THEN Ss(J1+1)=I
5580 PRINT "FILE ";Filename$;" IS DONE"
5590 IF J1=Number THEN 5650
5600 J1=J1+1
5610 GOTO 300
5620 !
5630 ! INPUT THE NAME OF THE FILE TO STORE CONSOLIDATED DATA
5640 !
5650 PRINT "ENTER THE NAME OF FILE TO STORE"
5660 INPUT Filestore$
5670 Filestore$=Filestore$&"":C12"
5680 !
5690 ! DETERMINE OPTIMUM FILE SIZE
5700 !
5710 Mm=I-1
5720 REDIM Datas$(Mm)
5730 Size=INT((4*Mm+84*Mm)/256)+1
5740 PRINT "Size = ";Size
5750 !
5760 ! CREATE FILE AND STORE DATA
5770 !
5780 CREATE Filestore$,Size

```

```

5790 ASSIGN #3 TO Filestore$
5800 PRINT #3;Data$(*)
5810 ASSIGN * TO #3
5820 PRINT "STORAGE COMPLETE"
5830 !
5840 !   PRINT SUMMARY OF ALL FILES CONSOLIDATED AND STORED
5850 !
5860 PRINTER IS 0
5870 FOR Mi=1 TO Number
5880 J=Ss(Mi)
5890 FOR M=J TO J+6
5900 PRINT Data$(M)
5910 NEXT M
5920 IF Mi<>Number THEN PRINT LIN(1)
5930 NEXT Mi
5940 PRINT "FILE ";Filestore$;" IS STORED"
5950 PRINT LIN(2)
5960 PRINTER IS 16
5970 !
5980 !   OPTION TO CONVERT AND/OR CONSOLIDATE ANOTHER SET OF FILES
5990 !
6000 INPUT "DO YOU WANT TO CONVERT AND CONSOLIDATE ANOTHER SET OF FILES? Y or
N",Anymore$
6010 IF Anymore$="Y" THEN 120
6020 PRINT "PROGRAM TERMINATED"
6030 STOP
6040 END
6050 !
6060 !   SUBROUTINE TO CHECK FOR DECIMAL POINT IN A NUMBER
6070 !
6080 SUB Decimal(Data$,Is,Nl,Isign)
6090 OPTION BASE 1
6100 FOR I=Is TO Nl+Is-1
6110 IF Data$(I;1)="." THEN Isign=1
6120 NEXT I
6130 SUBEND

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APPENDIX B
LISTING OF PROGRAM CNVTB4

APPENDIX B

LISTING OF PROGRAM CNVTB4

```

10      OPTION BASE 1                                !FILE CNVTB4:C
20      ! CONVERTS DATA FROM BDAT TO ASCII FOR POTENTIAL TRANSFER TO CDC
30      COM SHORT Data(5000)
40      COM Label$(64),Data1$(300)[80],Temp$(1)[80],Value$(80),Msg$(24),
      Datas$(2100)[80]
50      COM Nrec,Filename$,Nlines,I,Filename1$,Ss(10),Number
60      MASS STORAGE IS ":C12"
70      !
80      ! INPUT THE DESIRED PROGRAM OPTION
90      !
100     PRINT "DO YOU WANT TO CONSOLIDATE FILES THAT HAVE ALREADY BEEN
      CONVERTED"
110     PRINT "TO ALPHANUMERIC?  Y or N"
120     INPUT Consol$
130     IF Consol$<>"Y" THEN Conv
140     Consolop=1
150     GOTO Combin
160     Conv:Consolop=2
170     !
180     ! INPUT NUMBER OF FILES TO CONVERT AND CONSOLIDATE
190     !
200     PRINT PAGE
210     PRINT "HOW MANY FILES DO YOU WANT TO CONVERT AND CONSOLIDATE?"
220     INPUT Number
230     PRINT PAGE
240     I=1
250     Ss(1)=1
260     J1=1
270     !
280     ! SET UP SOME ASCII VALUES OF ZERO, ONE AND BLANK
290     !
300     One2$=" 1"
310     One6$="      1"
320     One$="      1"
330     Zero$="      0"
340     Blank$="      "
350     Blank5$="      "
360     !
370     ! READ THE FILE TO BE CONVERTED
380     !
390     REDIM Data1$(300),Datas$(2100)
400     CALL Readin(1,0)
410     !
420     ! PUT THE INFORMATION FROM VARIABLE LABEL$ INTO TEMP$
430     !
440     FOR N=1 TO 50 STEP 10
450     Temp$(1)[N;10]=Label$(N;2)&Label$(N+2;2)&Label$(N+4;2)&Label$(N+6;2)&
      Label$(N+8;2)
460     NEXT N
470     PRINTER IS 0

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480      !
490      !   SET UP THE INFORMATION LINES WITH INFORMATION FROM THE FILE
500      !
510      Data$(1)[1;10]=Filename1$
520      Data$(1)[11;4]=Blank$
530      Data$(1)[15;6]=One6$
540      Data$(1)[21;2]=One2$
550      Data$(1)[23;2]=One2$
560      Data$(1)[25;10]=Temp$(1)[1;10]
570      Data$(1)[35;10]=Temp$(1)[11;10]
580      Data$(1)[45;4]=Temp$(1)[21;4]
590      Data$(1)[49;6]=Blank5$&" "
600      Data$(1)[55;15]=Blank5$&Blank5$&Blank5$
610      Data$(1)[70;11]=Blank5$&One6$
620      Data$(2)[1;10]=VAL$(Data(34))
630      Data$(2)[11;20]=Blank5$&Blank5$&Blank5$&Blank5$
640      Data$(2)[31;20]=Blank5$&Blank5$&Blank5$&Blank5$
650      Data$(2)[51;20]=Blank5$&Blank5$&Blank5$&Blank5$
660      Data$(2)[71;10]=Blank5$&One$
670      Data$(3)[1;15]=Blank5$&Blank5$&Zero$&"."
680      FIXED 9
690      Data$(3)[16;15]=Blank$&VAL$(Data(37))
700      STANDARD
710      Data$(3)[31;20]=Blank5$&Blank5$&Blank5$&Blank5$
720      Data$(3)[51;20]=Blank5$&Blank5$&Blank5$&Blank5$
730      Data$(3)[71;10]=Blank5$&One$
740      A=2
750      Stat=1
760      Nn1=1
770      Nn2=10
780      GOTO Justify
790      Back:Nn1=16
800      Nn2=30
810      Stat=2
820      A=3
830      GOTO Justify
840      !
850      !   CONVERT THE NUMERICAL DATA POINTS TO ASCII
860      !
870      Convert:PRINT PAGE
880      PRINT "CONVERTING DATA TO ASCII"
890      J=4
900      L=38
910      II=INT((Nrec-37)/8)+2
920      FOR K=1 TO 80 STEP 10
930      Data$(J)[K;10]=VAL$(Data(L))
940      A=J
950      Stat=3
960      Nn1=K
970      Nn2=K+9
980      GOTO Justify
990      Data_trans:L=L+1
1000     IF L>Nrec THEN 1080
1010     NEXT K

```

```

1020 J=J+1
1030 GOTO 920
1040 !
1050 !   IF THE FINAL DATA LINE DOES NOT HAVE EIGHT DATA POINTS,
1060 !   FILL THE REST OF THE DATA POINTS WITH ZEROES TO MAKE 80 COLUMNS
1070 !
1080 PRINT PAGE
1090 Nleft=Nwords MOD 8
1100 IF Nleft=0 THEN 1140
1110 FOR Kk=K+10 TO 80 STEP 10
1120 Data1$(J)[Kk;10]="      0.000"
1130 NEXT Kk
1140 Mm=J
1150 Nlines=Mm
1160 REDIM Data(5000)
1170 !
1180 !   PRINT THE SUMMARY OF THE CONVERTED FILE
1190 !
1200 PRINTER IS 0
1210 FOR O=1 TO 10
1220 PRINT Data1$(O)
1230 NEXT O
1240 PRINT LIN(2)
1250 FOR O=Mm-4 TO Mm
1260 PRINT Data1$(O)
1270 NEXT O
1280 PRINT "FILE ";Filename$
1290 PRINT LIN(2)
1300 PRINTER IS 16
1310 GOTO Trans
1320 From:PRINT PAGE
1330 !
1340 !   EACH OF THE DATA POINTS IS RIGHT-JUSTIFIED IN A TEN-COLUMN FIELD
1350 !
1360 Justify:Savenn=0
1370 Dec_pt=0
1380 FOR Nn=Nn1 TO Nn2
1390 IF Data1$(A)[Nn;1]=" " THEN Savenn=Savenn+1
1400 IF Data1$(A)[Nn;1]="." THEN Dec_pt=1
1410 NEXT Nn
1420 IF Savenn=0 THEN Savenn=1
1430 Nnspan=Nn2-Nn1+1
1440 Nchar=Nnspan-Savenn
1450 FOR Ll=Nn2 TO Nn2-Nchar+1 STEP -1
1460 Data1$(A)[Ll;1]=Data1$(A)[Ll-Savenn;1]
1470 Data1$(A)[Ll-Savenn;1]=" "
1480 NEXT Ll
1490 IF Stat=1 THEN 1510
1500 IF Dec_pt=0 THEN 1530
1510 ON Stat GOTO Back,Info,Data_trans
1520 STOP
1530 FOR H=Nn2-Nchar+1 TO Nn2
1540 Data1$(A)[H-2;1]=Data1$(A)[H;1]
1550 NEXT H

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1560 Data1$(A)[Nn2;1]="0"
1570 Data1$(A)[Nn2-1;1]="."
1580 GOTO 1510
1590 !
1600 ! PRINT THE DEFAULT VALUES DERIVED FROM THE INPUT FILE
1610 !
1620 Info:PRINTER IS 16
1630 PRINT PAGE
1640 PRINT "These are the default values from your file and as otherwise"
1650 PRINT "designated. If you want to change any of them, ENTER 'C'."
1660 PRINT
1670 PRINT "FILE NAME = ";Data1$(1)[1;10];" FILE NUMBER = ";Data1$(1)[15;6]
1680 PRINT "CHANNEL NO. = ";Data1$(1)[21;2];" TOTAL NO. OF CHANNELS = ";
Data1$(1)[23;2]
1690 PRINT "MESSAGE = ";Data1$(1)[25;24]
1700 PRINT "NO. OF DATA PTS = ";Data1$(2)[1;10]
1710 PRINT "START TIME = ";Data1$(3)[1;15];" DELTA TIME = ";Data1$(3)[16;15]
1720 PRINT LIN(1)
1730 !
1740 ! HERE IS THE OPTION TO CHANGE ANY INFORMATION THAT HAS BEEN LISTED
1750 ! AND RIGHT-JUSTIFY ANY NEW INFORMATION
1760 !
1770 PRINT "DO YOU WANT TO CHANGE ANY ITEMS? ENTER 'C' TO CHANGE"
1780 BEEP
1790 INPUT Change$
1800 IF Change$<>"C" THEN Convert
1810 PRINT
1820 PRINT "IF YOU WANT TO CHANGE A VARIABLE, ENTER THE VALUE THAT YOU WANT;"
1830 PRINT "OTHERWISE, ENTER 'N'. IF YOU HAVE CHANGED THE LAST VALUE THAT
YOU"
1840 PRINT "WANT TO CHANGE, ENTER 'E'"
1850 PRINT "FILE NAME (5A2) =";Data1$(1)[1;10]
1860 INPUT Value$
1870 IF Value$="E" THEN Convert
1880 IF Value$="N" THEN 1970
1890 Data1$(1)[1;10]=Value$
1900 FOR E=10 TO 1 STEP -1
1910 IF Data1$(1)[10;1]<>" " THEN 1970
1920 FOR F=9 TO 1 STEP -1
1930 Data1$(1)[F+1;1]=Data1$(1)[F;1]
1940 NEXT F
1950 Data1$(1)[10-E+1;1]=" "
1960 NEXT E
1970 PRINT "FILE NUMBER (3A2)=";Data1$(1)[15;6]
1980 INPUT Value$
1990 IF Value$="E" THEN Convert
2000 IF Value$="N" THEN 2090
2010 Data1$(1)[15;6]=Value$
2020 FOR E=20 TO 15 STEP -1
2030 IF Data1$(1)[20;1]<>" " THEN 2090
2040 FOR F=19 TO 15 STEP -1
2050 Data1$(1)[F+1;1]=Data1$(1)[F;1]
2060 NEXT F
2070 Data1$(1)[20-E+15;1]=" "

```

```

2080 NEXT E
2090 PRINT "CHANNEL NO. (A2)=";Data1$(1)[21;2]
2100 INPUT Value$
2110 IF Value$="E" THEN Convert
2120 IF Value$="N" THEN 2170
2130 Data1$(1)[21;2]=Value$
2140 IF Data1$(1)[22;1]<>" " THEN 2170
2150 Data1$(1)[22;1]=Data1$(1)[21;1]
2160 Data1$(1)[21;1]=" "
2170 PRINT "TOTAL NO. OF CHANNELS (A2) = ";Data1$(1)[23;2]
2180 INPUT Value$
2190 IF Value$="E" THEN Convert
2200 IF Value$="N" THEN 2250
2210 Data1$(1)[23;2]=Value$
2220 IF Data1$(1)[24;1]<>" " THEN 2250
2230 Data1$(1)[24;1]=Data1$(1)[23;1]
2240 Data1$(1)[23;1]=" "
2250 PRINT "MESSAGE (12A2) =";Data1$(1)[25;24]
2260 INPUT Value$
2270 IF Value$="E" THEN Convert
2280 IF Value$="N" THEN 2300
2290 Data1$(1)[25;24]=Value$
2300 PRINT "NO. OF DATA PTS (I10)=";Data1$(2)[1;10]
2310 INPUT Value$
2320 IF Value$="E" THEN Convert
2330 IF Value$="N" THEN 2420
2340 Data1$(2)[1;10]=Value$
2350 FOR E=10 TO 1 STEP -1
2360 IF Data1$(2)[10;1]<>" " THEN 2420
2370 FOR F=9 TO 1 STEP -1
2380 Data1$(2)[F+1;1]=Data1$(2)[F;1]
2390 NEXT F
2400 Data1$(2)[10-E+1;1]=" "
2410 NEXT E
2420 PRINT "START TIME (E15.6)=";Data1$(3)[1;15]
2430 INPUT Value$
2440 IF Value$="E" THEN Convert
2450 IF Value$="N" THEN 2610
2460 Data1$(3)[1;15]=Value$
2470 Isign=0
2480 CALL Decimal(Data1$(3),1,15,Isign)
2490 IF (Data1$(3)[15;1]<>" ") AND (Isign=1) THEN 2610
2500 FOR E=15 TO 1 STEP -1
2510 IF Data1$(3)[14;1]<>" " THEN 2610
2520 Is=14
2530 IF Isign=1 THEN 2560
2540 Is=13
2550 IF (E=15) AND (Isign=0) THEN Data1$(3)[15;1]="."
2560 FOR F=Is TO 1 STEP -1
2570 Data1$(3)[F+1;1]=Data1$(3)[F;1]
2580 NEXT F
2590 Data1$(3)[15-E+1;1]=" "
2600 NEXT E
2610 PRINT "DELTA TIME (E15.6)=";Data1$(3)[16;15]

```

```

2620 INPUT Value$
2630 IF (Value$="E") OR (Value$="N") THEN Convert
2640 Datal$(3)[16;15]=Value$
2650 Isign=0
2660 CALL Decimal(Datal$(3),16,15,Isign)
2670 IF (Datal$(3)[30;1]<>" ") AND (Isign=1) THEN 2680
2680 FOR E=30 TO 16 STEP -1
2690 IF Datal$(3)[30;1]<>" " THEN Convert
2700 Is=29
2710 IF Isign=1 THEN 2740
2720 Is=28
2730 IF (E=30) AND (Isign=0) THEN Datal$(3)[30;1]="."
2740 FOR F=Is TO 16 STEP -1
2750 Datal$(3)[F+1;1]=Datal$(3)[F;1]
2760 NEXT F
2770 Datal$(3)[30-E+16;1]=" "
2780 NEXT E
2790 GOTO Convert
2800 !
2810 ! CONSOLIDATION OF CONVERTED FILES INTO ONE FILE
2820 !
2830 Combin:PRINT PAGE
2840 REDIM Datas$(2100),Datal$(300)
2850 INPUT "HOW MANY FILES DO YOU WANT TO CONSOLIDATE?",Number
2860 I=1
2870 Ss(1)=1
2880 !
2890 ! READ THE FILES TO BE CONSOLIDATED
2900 !
2910 FOR J=1 TO Number
2920 CALL Readin(2,J)
2930 !
2940 ! STORE THE CONVERTED FILE INTO ARRAY DATAS$
2950 !
2960 Trans:FOR K=1 TO Nlines
2970 Datas$(I)=Datal$(K)
2980 I=I+1
2990 NEXT K
3000 IF J1<>Number THEN Ss(J1+1)=I
3010 PRINT "FILE ";Filename$;" IS DONE"
3020 IF Consolop=1 THEN 3060
3030 IF J1=Number THEN 3100
3040 J1=J1+1
3050 GOTO 390
3060 NEXT J
3070 !
3080 ! STORE THE CONVERTED AND CONSOLIDATED FILE
3090 !
3100 PRINT "READY TO ENTER STORE"
3110 CALL Store(2,I-1)
3120 !
3130 ! OPTION TO CONSOLIDATE ANOTHER SET OF FILES OR END PROGRAM
3140 !
3150 IF Consolop=2 THEN 3200

```

```

3160 INPUT "DO YOU WANT TO CONSOLIDATE ANOTHER SET OF FILES? Y or N",Again$
3170 PRINT PAGE
3180 IF Again$="Y" THEN Combin
3190 GOTO 3260
3200 INPUT "DO YOU WANT TO CONVERT AND CONSOLIDATE ANOTHER SET OF FILES? Y or
N",Again$
3210 IF Again$="Y" THEN Conv
3220 INPUT "DO YOU WANT TO CONSOLIDATE A SET OF ALREADY CONVERTED FILES? Y or
N",Change$
3230 IF Change$="N" THEN 3260
3240 Consolop=1
3250 GOTO Combin
3260 PRINT "PROGRAM STOPPED"
3270 STOP
3280 END
3290 !
3300 ! SUBROUTINE TO READ DATA FROM ACQUISITION ROUTINE, ANALYSIS ROUTINE
3310 ! OR PREVIOUSLY STORED AS ASCII
3320 !
3330 SUB Readin(In,J)
3340 !
3350 OPTION BASE 1
3360 COM SHORT Data(5000)
3370 COM Label$(64),Data$(300)[80],Temp$(1)[80],Value$(80),Msg$(24),
Data$(2100)[80]
3380 COM Nrec,Filename$,Nlines,I,Filename1$,Ss(10),Number
3390 INTEGER Data1(0:5000)
3400 IF In=2 THEN Alpha
3410 !
3420 ! INPUT THE NAME OF THE FILE TO BE CONVERTED AND HOW IT WAS STORED
3430 !
3440 INPUT "ENTER NAME OF FILE TO CONVERT",Filename$
3450 Filename1$=Filename$
3460 Filename$=Filename$&"C12"
3470 PRINT "WAS THE DATA STORED FROM THE ACQUISITION ROUTINE (0) OR"
3480 PRINT "FROM THE ANALYSIS ROUTINE(1)"
3490 INPUT From
3500 IF From=1 THEN Ana
3510 !
3520 ! READ DATA STORED USING ACQUISITION ROUTINE
3530 !
3540 FREAD Filename$,Data1(*)
3550 MAT Data=Data1
3560 Data(37)=1/Data(37)
3570 GOTO Next
3580 !
3590 ! READ DATA STORED USING ANALYSIS ROUTINE
3600 !
3610 Ana:FREAD Filename$,Data(*)
3620 !
3630 ! PRINT FILE INFORMATION AND DETERMINE IF CORRECT FILE
3640 !
3650 Next:Nrec=ROW(Data)
3660 PRINT PAGE

```

```

3670 Nwords=Nrec-37
3680 Format$="#",64A"
3690 IF From=1 THEN ENTER Data(1) USING Format$;Label$
3700 IF From=0 THEN ENTER Data(0) USING Format$;Label$
3710 PRINT "STORAGE INFORMATION FOR FILE ";Filename$;LIN(1);Label$
3720 PRINT "START=";Data(33);"STOP=";Data(34);"INC=";Data(35)
3730 PRINT "DELTA TIME=";Data(37)
3740 PRINT "NO. OF RECORDS = ";Data(36)
3750 PRINT LIN(2)
3760 PRINT "IS THIS THE CORRECT FILE? Y' or N'"
3770 INPUT Right$
3780 PRINT PAGE
3790 IF Right$<>"Y" THEN 3440
3800 GOTO Quit
3810 !
3820 ! READ FILE THAT HAS ALREADY BEEN CONVERTED TO ASCII
3830 ! FOR PURPOSES OF CONSOLIDATION
3840 !
3850 Alpha:PRINT "WHAT IS THE NAME OF FILE NUMBER ";J
3860 INPUT Filename$
3870 Filename$=Filename$&"":C12"
3880 ASSIGN #1 TO Filename$
3890 READ #1;Data1$(1)
3900 READ #1;Data1$(2)
3910 Nwords=VAL(Data1$(2)[1;10])
3920 Nlines=Nwords/8+3
3930 ASSIGN * TO #1
3940 REDIM Data1$(Nlines)
3950 ASSIGN #1 TO Filename$
3960 READ #1;Data1$(*)
3970 ASSIGN * TO #1
3980 REDIM Data1$(300)
3990 Quit:SUBEND
4000 END
4010 !
4020 ! SUBROUTINE TO STORE FILE THAT HAS BEEN CONSOLIDATED
4030 !
4040 SUB Store(In,Mm)
4050 !
4060 OPTION BASE 1
4070 COM SHORT Data(5000)
4080 COM Label$(64),Data1$(300)[80],Temp$(1)[80],Value$(80),Msg$[24],
Data$(2100)[80]
4090 COM Nrec,Filename$,Nlines,I,Filename1$,Ss(10),Number
4100 REDIM Data$(Mm)
4110 !
4120 ! DETERMINE OPTIMUM FILE SIZE
4130 !
4140 Size=INT((4*Mm+34*Mm)/256)+1
4150 PRINT "Size = ";Size
4160 !
4170 ! INPUT THE NAME OF THE FILE TO STORE CONSOLIDATED FILE
4180 !
4190 PRINT "ENTER THE NAME OF THE FILE TO STORE (6 CHAR MAX.)"

```

```

4200 INPUT Filestore$
4210 Filestore$=Filestore$&"C12"
4220 !
4230 ! CREATE FILE AND STORE DATA
4240 !
4250 CREATE Filestore$,Size
4260 ASSIGN #3 TO Filestore$
4270 PRINT #3;Datas$(*)
4280 ASSIGN * TO #3
4290 PRINT "STORAGE COMPLETE"
4300 !
4310 ! PRINT SUMMARY OF ALL FILES CONSOLIDATED AND STORED
4320 !
4330 PRINTER IS 0
4340 FOR Mi=1 TO Number
4350 J=Ss(Mi)
4360 FOR M=J TO J+4
4370 PRINT Datas$(M)
4380 NEXT M
4390 IF Mi<>Number THEN PRINT LIN(2)
4400 NEXT Mi
4410 PRINT "FILE ";Filestore$;" IS STORED"
4420 PRINT LIN(2)
4430 PRINTER IS 16
4440 SUBEND
4450 END
4460 !
4470 ! SUBROUTINE TO CHECK FOR DECIMAL POINT IN A NUMBER
4480 !
4490 SUB Decimal(Data$,Is,Nl,Isign)
4500 OPTION BASE 1
4510 FOR I=Is TO Nl+Is-1
4520 IF Data$(I;1)="." THEN Isign=1
4530 NEXT I
4540 SUBEND
4550 END

```

APPENDIX C

**LISTING OF FORTRAN PROGRAM IN FILES CONHP AND CVHPZ ALONG WITH ASSOCIATED JOB
CONTROL LANGUAGES FOR MFA AND MFZ**

APPENDIX C

LISTING OF FORTRAN PROGRAM IN FILES CONHP AND CVHPZ ALONG WITH ASSOCIATED JOB CONTROL LANGUAGES FOR MFA AND MFZ

I. Job Control Language for MFA

```
Usrn.  
USER,username,password.  
CHARGE,account,project number.  
BEGIN,ATTACH,PLOTLIB.  
GET,TAPE1=filename.
```

where filename = name of file in which data are stored

```
FTN.  
LGO.  
BEGIN,PLOT,CALCOMP,TAPE13.
```

II. Job Control Language for MFZ

```
Usrn,STMFZ.  
ACCOUNT,account number.  
BEGIN,ATTACH,PLOTLIB.  
REQUEST,TAPE13,*PF.  
GETPF,TAPE1,pfn,UN=usn,UP=pwd,ST=MFA,CH=acctno,PN=projno.
```

where pfn = name of file from which the data are read
usn = username
pwd = user password
acctno = computer account number
projno = project number

```
FILE,TAPE1,CM=YES,MRL=81,RT=F.  
FTN,I=INPUT,R=3,SL.  
MAP,OFF.  
LGO.  
CATALOG,TAPE13,pfn,ID=userid.
```

where pfn = name of file in which plot is to be stored

```
BEGIN,PLOT,CALCOMP,TAPE13.
```

III. FORTRAN PROGRAM

```

PROGRAM CONVR( INPUT,OUTPUT,TAPE1,TAPE5=INPUT,TAPE6=OUTPUT)
DIMENSION D(5000),TITL(3),NTS(2),YAT(2),GT(2)
READ(1,1000) IFV,TITL,DATE,TIME, IROUND, IADC
READ(1,1020) IA,NCH, ITZ,NBD,DELT,OFFTIM,NUMBER, IRDFMT
NCHA=NCH
DO 200 I=1,NCHA
IF(K.GT.1) READ(1,1000) IFV,TITL,DATE,TIME, IROUND, IADC
IF(K.EQ.1) WRITE(6,1010) IFV,TITL,DATE,TIME, IROUND, IADC
IF(K.GT.1) WRITE(6,1110) IFV,TITL,DATE,TIME, IROUND, IADC
IF(K.GT.1) READ(1,1020) IA,NCH, ITZ,NBD,DELT,OFFTIM,NUMBER, IRDFMT
WRITE(6,1030) IA,NCH, ITZ,NBD,DELT,OFFTIM,NUMBER, IRDFMT
READ(1,1040) NTS,YAT,GT, ICB,SBL
WRITE(6,1050) NTS,YAT,GT, ICB,SBL
READ(1,1060) SS,SA,SB,SC,A
WRITE(6,1070) SS
WRITE(6,1080) SA,SB,SC
READ(1,1090) B,C
WRITE(6,1100) A,B,C
DO 100 J=1,NBD,NUMBER
JJ=J+NUMBER-1
IF(JJ.GT.NBD)JJ=NBD
READ(1,IRDFMT) (D(I),I=J,JJ)
IF(J.LT.25)WRITE(6,IRDFMT)(D(I),I=J,JJ)
100 CONTINUE
WRITE(6,1120)
CALL PLOT(D,NBD,NTS,DELT,K)
200 CONTINUE
STOP
1000 FORMAT( I5,5A10,2I5)
1010 FORMAT(' FILE VERSION =',I5,2X,'PROJECT NAME =',3A10/' DATE =',A10
*          ,2X,'TIME = ',A10,2X,' IDENT =',I5,2X,'NO. OF DEVICES =',I5)
1020 FORMAT(A10,2I5,I10,2F15.4,I5,A10)
1030 FORMAT(' DEVICE NAME = ',A10,2X,'NO. OF CHANNELS =',I5,2X,
*          'NO. OF CAL WORDS =',I5/' NO. OF DATA WORDS =',I10,2X,
*          'DELT =',F15.4/' OFFSET TIME =',F15.4,2X,'WORDS PER CARD =',
*          ,I5,2X,'DATA FORMAT =',A10)
1040 FORMAT(6A10,2I5)
1050 FORMAT(' CHANNEL DESCRIPTION =',2A10,2X,'QUANTITY AND UNITS =',
*          2A10/' GAGE TYPE =',2A10,2X,'CAL CODE =',I5,2X,'BASELINE =',
*          ,I5)
1060 FORMAT(5F15.4)
1070 FORMAT(' TOP STEP GAGE RESPONSE =',F15.4)
1080 FORMAT(' CALIBRATION COEFFICIENTS'/3(F15.4,2X))
1090 FORMAT(2F15.4)
1100 FORMAT(' CALIBRATION TRANSFORMATION COEFFICIENTS'/3(F15.4,2X))
1110 FORMAT(' FILE VERSION =',I5,2X,'PROJECT NAME =',3A10/' DATE =',A10
*          ,2X,'TIME = ',A10,2X,' IDENT =',I5,2X,'NO. OF DEVICES =',I5)
1120 FORMAT(//)
END

```

```

SUBROUTINE PLOT(D,NPT,NTS,DELT,K)
DIMENSION LABEL(4), ITITLE(3), D(5000), NTS(2), COUNT(5000)
IF(K.GT.1) GO TO 100
XB=1.75
YB=.4
XS=500.
DX=500.
XMI=.0
XAX=NPT/500+1
XMA=XS*XAX
YAX=4.
XPAGE=XAX+2.2
YPAGE=4.75
FACT=1.
IUNIT=13
LABEL(1)=10H CAL 390
LABEL(2)=10H 6126
LABEL(3)=10H37MM DATA
LABEL(4)=10HFROM HP45
MODE=1
CALL PLTBEG(XPAGE,YPAGE,FACT,IUNIT,LABEL)
YMI=0.
YMA=300.
DY=50.
YS=(YMA-YMI)/YAX
100 CALL PLTSCA(XB,YB,XMI,YMI,XS,YS)
CALL PLTWND(XMI,XMA,YMI,YMA)
CALL PLTAXS(DX,DY,XMI,XMA,YMI,YMA,4)
CALL LABELA(DX,DY,XMI,XMA,YMI,YMA,1.,1.)
TX=XMI
TY=YMA+.05*YS
CHT=.1
TIC=DX*DELT*1000.
TIM=DELT*FLOAT(NPT)*1000.
ENCODE(22,2000,ITITLE)(NTS(I),I=1,2)
2000 FORMAT(1H,2A10,1H>)
CALL PLTSYM(CHT,ITITLE,0.,TX,TY)
TX=XMI-XS*1.55
TY=YMA-YS*.3
ITITLE(1)=10HTIME, MS>
CALL PLTSYM(CHT,ITITLE,0.,TX,TY)
TY=YMA-YS*.45
ENCODE(18,3000,ITITLE)TIM
3000 FORMAT(8H /FRAME=,F9.3,1H>)
CALL PLTSYM(CHT,ITITLE,0.,TX,TY)
TY=YMA-YS*.6
ENCODE(16,4000,ITITLE)TIC
4000 FORMAT(8H /TIC=,F7.3,1H>)
CALL PLTSYM(CHT,ITITLE,0.,TX,TY)
DO 200 I=1,NPT
COUNT(I)=I
200 CONTINUE
CALL PLTDTS(MODE,0,COUNT(1),D(1),NPT,0)
CALL PLTPGE
RETURN
END

```

APPENDIX D

**LISTING OF FORTRAN PROGRAM IN FILES CVHPA AND CVHPZ3 ALONG WITH ASSOCIATED
JOB CONTROL LANGUAGES FOR MFA AND MFZ**

APPENDIX D

LISTING OF FORTRAN PROGRAM IN FILES CVHPA AND CVHPZ3 ALONG WITH ASSOCIATED JOB CONTROL LANGUAGES FOR MFA AND MFZ

I. Job Control Language for MFA

Usern.
USER,username, password.
CHARGE,account,project number.
BEGIN,ATTACH,PLOTLIB.
GET,TAPE1=filename.

where filename = name of file in which data are stored

FTN.
LGO.
SAVE,TAPE2=pfn.

where pfn = name of file in which to store reformatted data

BEGIN,PLOT,CALCOMP,TAPE13.

II. Job Control Language for MFZ

Usern,STMFZ.
ACCOUNT,account number.
BEGIN,ATTACH,PLOTLIB.
REQUEST,TAPE13,*PF.
GETPF,TAPE1,pfn,UN=usn,UP=pwd,ST=MFA,CH=acctno,PN=projno.

where pfn = name of file from which the data are read
usn = username
pwd = user password
acctno = computer account number
projno = project number

FILE,TAPE1,CM=YES,MRL=81,RT=F.
FTN,I=INPUT,R=3,SL.
MAP,OFF.
LGO.
CATALOG,TAPE2,pfn,ID=userid.

where pfn = name of file in which to store reformatted data

CATALOG,TAPE13,pfn,ID=userid.

where pfn = name of file in which plot is to be stored

BEGIN,PLOT,CALCOMP,TAPE13.

III. FORTRAN Program

```
PROGRAM CONVR( INPUT,OUTPUT,TAPE1,TAPE5=INPUT,TAPE6=OUTPUT,TAPE2,  
*TAPE13)  
DIMENSION D(5000),NTS(24)  
READ(1,1000) NTS  
DECODE(2,1080,NTS(12))NCHS  
DO 200 K=1,NCHS  
IF(K.GT.1) READ(1,1000)NTS  
IF(K.EQ.1) WRITE(6,1010) NTS  
IF(K.GT.1) WRITE(6,1100) NTS  
WRITE(2) NTS  
READ(1,1020) NPT  
WRITE(6,1030) NPT  
WRITE(2) NPT  
READ(1,1040) TZERO,DELT  
WRITE(6,1050) TZERO,DELT  
WRITE(2) TZERO,DELT  
DO 100 J=1,NPT,8  
JJ=J+7  
IF(J+7.GT.NPT)JJ=NPT  
READ(1,1060) (D(I),I=J,JJ)  
IF(J.LT.20) WRITE(6,1070) (D(I),I=J,JJ)  
100 CONTINUE  
WRITE(6,1090)  
WRITE(2) (D(I),I=1,NPT)  
CALL PLOT (D,NPT,NTS,DELT,K)  
200 CONTINUE  
STOP  
1010 FORMAT(1H1,'NTS = ',24A2)  
1000 FORMAT(24A2)  
1030 FORMAT(' NO. OF DATA POINTS = ',I10)  
1020 FORMAT(I10)  
1050 FORMAT(' TZERO = ',F15.8,' DELT = ',F15.8)  
1040 FORMAT(2F15.6)  
1060 FORMAT(8F10.0)  
1070 FORMAT(8F10.4)  
1080 FORMAT(I2)  
1090 FORMAT(//)  
1100 FORMAT(' NTS = ',24A2)  
END
```

```

SUBROUTINE PLOT(D,NPT,NTS,DELT,K)
DIMENSION LABEL(4),ITITLE(3),D(5000),NTS(24),COUNT(5000)
IF(K.GT.1) GO TO 100
XB=1.75
YB=.4
XS=500.
DX=500.
XMI=.0
XAX=NPT/500+1
XMA=XS*XAX
YAX=4.
XPAGE=XAX+2.2
YPAGE=4.75
FACT=1.
IUNIT=13
LABEL(1)=10H CAL 390
LABEL(2)=10H 6126
LABEL(3)=10H37MM DATA
LABEL(4)=10HFROM HP45
MODE=1
CALL PLTBEG(XPAGE,YPAGE,FACT,IUNIT,LABEL)
YMI=0.
YMA=300.
DY=50.
YS=(YMA-YMI)/YAX
100 CALL PLTSCA(XB,YB,XMI,YMI,XS,YS)
CALL PLTWND(XMI,XMA,YMI,YMA)
CALL PLTAXS(DX,DY,XMI,XMA,YMI,YMA,4)
CALL LABELA(DX,DY,XMI,XMA,YMI,YMA,1.,1.)
ENCODE(30,1000,ITITLE)(NTS(I),I=6,10)
1000 FORMAT(3H ID,5A2,8H PLOT,8X,1H>)
TX=XMI
TY=YMA+.05*YS
CHT=.1
CALL PLTSYM(CHT,ITITLE(1),0.,TX,TY)
TIC=DX*DELT*1000.
TIM=DELT*FLOAT(NPT)*1000.
TY=YMA+.20*YS
ENCODE(12,2000,ITITLE)(NTS(I),I=1,5)
2000 FORMAT(1H ,5A2,1H>)
CALL PLTSYM(CHT,ITITLE,0.,TX,TY)
TX=XMI-XS*1.55
TY=YMA-YS*.3
ITITLE(1)=10HTIME, MS>
CALL PLTSYM(CHT,ITITLE,0.,TX,TY)
TY=YMA-YS*.45
ENCODE(18,3000,ITITLE)TIM
3000 FORMAT(8H /FRAME=,F9.3,1H>)
CALL PLTSYM(CHT,ITITLE,0.,TX,TY)
TY=YMA-YS*.6
ENCODE(16,4000,ITITLE)TIC
4000 FORMAT(8H /TIC= ,F7.3,1H>)
CALL PLTSYM(CHT,ITITLE,0.,TX,TY)
DO 200 I=1,NPT

```

```
      COUNT(I)=I  
200  CONTINUE  
      CALL PLTDTS(MODE,0,COUNT(1),D(1),NPT,0)  
      CALL PLTPGE  
      RETURN  
      END
```

APPENDIX E
LISTING OF PROGRAM SORTAL

APPENDIX E

LISTING OF PROGRAM SORTAL

```

10  OPTION BASE 1          !   FILE SORTAL:C
20  ! CONVERTS DATA TRANSFERRED FROM MFA TO HP DISC IN CARD IMAGE
30  COM SHORT Array(1900),Ar(10),Delt,Ne
40  COM Label$(64),Prog$,Filestore$
50  COM INTEGER Ii,Maxfile,Index,Iit
60  COM SHORT A1(1800),A2(1800),A3(1800),A4(1800),A5(1800)
70  COM SHORT A6(1800),A7(1800)
80  DIM A$(402)[256],B$(256),C$(256),S$(1),Temp$(256)
90  !
100 !       SET ARRAYS TO ZERO
110 !
120  S$=" "
130  MAT A1=ZER
140  MAT A2=ZER
150  MAT A3=ZER
160  MAT A4=ZER
170  MAT A5=ZER
180  MAT A6=ZER
190  MAT A7=ZER
200  !
210  !       ENTER NUMBER OF DATA FILES, HOW FILES ARE STORED AND DELTA TIME
220  !
230  PRINT "ENTER THE NUMBER OF FILES IN WHICH DATA IS STORED"
240  INPUT Totalfile
250  I=2
260  Fileno=1
270  PRINT "IS DATA IN SEVERAL ARRAYS IN COLUMNS (C) OR IN ONE ARRAY"
280  PRINT "ARRANGED IN ROWS (R)"
290  INPUT Arrange$
300  PRINT PAGE
310  PRINT "ENTER THE NUMBER OF VARIABLES PER DATA LINE TO BE CONVERTED"
320  PRINT " MAX=7 IF IN COLUMNS OR MAX=8 IF IN ROWS"
330  INPUT Maxfile
340  PRINT "ARE ALL VARIABLES STORED ON 1 OR 2 LINES, ENTER NUMBER"
350  INPUT Lines
360  PRINT "ENTER THE TIME BETWEEN DATA POINTS (DELTA TIME)"
370  INPUT Delt
380  !
390  !       ENTER NAME OF FILE TO BE CONVERTED AND NUMBER OF DATA LINES
400  !
410  MASS STORAGE IS ":C12"
420  PRINT "ENTER NAME OF NEXT FILE"
430  BEEP
440  INPUT Filename$
450  Filename$=Filename$&":C12"
460  PRINT "ENTER NUMBER OF DATA LINES"
470  INPUT Imax
480  REDIM A$(Imax)
490  !
500  !   READ FILE

```

```

510  !
520  PRINT PAGE
530  ASSIGN #1 TO Filename$
540  READ #1;A$(*)
550  !
560  !   ENTER LINE AND COLUMN NUMBER TO START CONVERSION
570  !
580  PRINT "ENTER STARTING LINE NUMBER"
590  INPUT Ilineno
600  PRINT "ENTER STARTING COLUMN NUMBER"
610  INPUT Icolno
620  PRINT PAGE
630  PRINT "DATA CONVERSION IN PROGRESS"
640  !
650  !   CONVERTING DATA
660  !
670  FOR J=Ilineno TO Imax STEP Lines
680  B$=A$(J)
690  Is=0
700  M=1
710  It=Icolno
720  L1=LEN(A$(J))
730  L2=0
740  IF Lines=2 THEN L2=LEN(A$(J+1))
750  FOR L=1 TO Maxfile
760  K=0
770  IF (L=Maxfile) AND (Lines=2) THEN 860
780  IF It>L1 THEN 920
790  IF (B$(It;1)=S$) AND (Is>0) THEN 1020
800  IF (Is=0) AND (B$(It;1)=S$) THEN 840
810  IF Is=0 THEN Saveit=It
820  Is=Is+1
830  K=K+1
840  It=It+1
850  GOTO 780
860  Itemp=1
870  IF It<=87 THEN Temp$(Itemp;1)=B$(It;1)
880  Itemp=Itemp+1
890  IF It=L1 THEN 920
900  It=It+1
910  GOTO 870
920  It=8
930  IF J=Imax THEN 720
940  B$=A$(J+1)
950  IF It>L2 THEN 1000
960  IF B$(It;1)<>S$ THEN Temp$(Itemp;1)=B$(It;1)
970  Itemp=Itemp+1
980  It=It+1
990  GOTO 950
1000 Ar(L)=VAL(Temp$(1;Itemp+1))
1010 GOTO 1030
1020 Ar(L)=VAL(B$(Saveit;K))
1030 It=It+1
1040 Is=0

```

```

1050 NEXT L
1060 !
1070 !     STORE CONVERTED DATA INTO FILES TO BE STORED
1080 !
1090 IF Arrange$="R" THEN 1190
1100 IF Maxfile>=1 THEN A1(I)=Ar(1)
1110 IF Maxfile>=2 THEN A2(I)=Ar(2)
1120 IF Maxfile>=3 THEN A3(I)=Ar(3)
1130 IF Maxfile>=4 THEN A4(I)=Ar(4)
1140 IF Maxfile>=5 THEN A5(I)=Ar(5)
1150 IF Maxfile>=6 THEN A6(I)=Ar(6)
1160 IF Maxfile>=7 THEN A7(I)=Ar(7)
1170 I=I+1
1180 GOTO 1230
1190 FOR Ia=1 TO Maxfile
1200 A1(I)=Ar(Ia)
1210 I=I+1
1220 NEXT Ia
1230 NEXT J
1240 Ii=I-1
1250 PRINT PAGE
1260 IF Fileno<Totalfile THEN 1290
1270 IF Fileno=Totalfile THEN PRINT "CONVERSION COMPLETE"
1280 GOTO Store_data
1290 Fileno=Fileno+1
1300 GOTO 420
1310 Store_data: Index=1
1320 Ino=Ii+37
1330 Ne=1
1340 Iit=Ii+37
1350 Name:      !
1360 ON Index GOTO 1370,1390,1410,1430,1450,1470,1490
1370 MAT Array=A1
1380 GOTO 1530
1390 MAT Array=A2
1400 GOTO 1530
1410 MAT Array=A3
1420 GOTO 1530
1430 MAT Array=A4
1440 GOTO 1530
1450 MAT Array=A5
1460 GOTO 1530
1470 MAT Array=A6
1480 GOTO 1530
1490 MAT Array=A7
1500 !
1510 !     LOAD FILE STOSOR FOR DATA STORAGE
1520 !
1530 Prog$="SORTAL:C12"
1540 ASSIGN #3 TO "STOSOR:C"
1550 PRINT #3,7;"70     SHORT Data("&VAL$(Iit)&")"
1560 PRINT #3,8;"80     SHORT Data1("&VAL$(Iit)&")"
1570 ASSIGN #3 TO *
1580 GET "STOSOR:C12",10,Begin

```

```
1590 Back_again: PRINT "FILE ";Index;" STORED"  
1600 IF Index=Maxfile THEN 1640  
1610 IF Arrange$="R" THEN 1640  
1620 Index=Index+1  
1630 GOTO Name  
1640 PRINT "ALL ARRAYS IN THIS PROGRAM STORED"  
1650 STOP  
1660 END
```

```

10 Begin:  OPTION BASE 1  ! FILE STOSOR:C12
20  COM SHORT Array(1900),Ar(10),Delt,Ne
30  COM Label$(64),Prog$,Filestore$
40  COM INTEGER Ii,Maxfile,Index,Iit
50  COM SHORT A1(1800),A2(1800),A3(1800),A4(1800),A5(1800)
60  COM SHORT A6(1800),A7(1800)
70  SHORT Data(388)
80  SHORT Data1(388)
90  M=38
100  FOR K=1 TO Ii-1
110  Data(M)=Array(K)
120  M=M+1
130  NEXT K
140  Ij=Ii+37
150  PRINT "ENTER THE NAME OF THE FILE TO BE CREATED (6 CHAR. MAX.):"
160  INPUT Filename$
170  Filename$=Filename$&"C12"
180  Size=INT(Ij*4/256)+INT(Ij*4/65536)+3
190  FCREATE Filename$,Size
200  PRINT "ENTER THE LABEL INFORMATION (64 CHAR. MAX.):"
210  LINPUT Label$
220  Data(33)=1
230  Data(34)=Ii
240  Data(35)=1
250  Data(36)=Ii+37
260  Data(37)=Delt
270  Format$="#,64A"
280  PRINTER IS 0
290  PRINT LIN(1)
300  PRINT "STORAGE INFORMATION FOR FILE ";Filename$;LIN(1);Label$
310  PRINT "START=";Data(33);"STOP=";Data(34);"INC=";Data(35)
320  PRINT "DELTA TIME=";Data(37)
330  PRINT "NO. OF RECORDS = ";Data(36)
340  PRINT LIN(1)
350  PRINTER IS 16
360  MAT Data1=Data
370  OUTPUT Data1(1) USING Format$;Label$
380  FPRINT Filename$,Data1(*)
390  LOAD Prog$,Back_again
400  END

```

APPENDIX F

INPUT TO CYBER MFA VIA MODEM LINK ON HP9845

APPENDIX F

1. Preparation.

a. Turn on HP9845 and 7906 disc drive.

b. When disc drive is ready,

LOAD "ANPACK:D12",10

EXECUTE

c. When menu appears,

K3 (Data Communications)

d. Choose data link.

1 **CONT** for HP1000 or 2 **CONT** for CDC

e. Specify HP9845 file.

When "terminal ready" message appears, indicating the terminal emulator program is loaded, then

K13 (1) To get into edit mode

(2) It is not necessary to change any info on the first line. If you are going to the CDC and you do not want your password displayed on screen, you may want to change ECHO to ON by using **→** to space over and use STEP key to change to 'ON'.

STORE - To store data communication information line

(3) This line needs to be changed to the name of file and its size on the HP9845.

Change TEST:TI5 to filename:C12

Change SIZE=010 to # of records you want

STORE - To store file info line

(4) Will get a message that edit mode has been exited.

(5) If this is a new file, then it must be created. If it is not, skip this step.

SHIFT K12 To create file on HP9845

Answer "Y" to creation question. Message will appear on screen when creation is completed.

- f. **CONT** Sends prompt to CDC or HP1000. Wait for LOGIN messages.
2. From CDC to HP9845.
 - a. LOGIN to CDC
 - b. Repeat I.E.(1) through I.E.(4), changing first edit line back to ECHO OFF if you turned it ON.
 - c. /GET,A=Pfn. **CR** = **CONT**
 /ASSIGN,TT,B. **CR**
 /COPYSBF,A,B. No **CR** !
SHIFT **K15** to turn record on
CONT
 - d. When finished recording,
SHIFT **K15** to turn record off
 - e. Log off CDC
 /BYE
 - f. **SHIFT** **K4** to disconnect from CDC;
 now back under control of HP9845.
 3. From HP9845 to CDC
 - a. LOGIN to CDC
 - b. Repeat I.E.(1) through I.E.(4), changing first edit line back to ECHO OFF if you turned it ON.
 - c. Terminal definition defaults are set to emulate a Tektronix 4014 with a page width of 80 columns. If you need to set the terminal definition (TC parameter) to another terminal or the page width to a different size, then enter
 /TRMDEF,TC= ,PW= .
 See the NOS IAF Manual for parameter values. For most data transfers from the HP9845, the default parameters will be good and this step can be skipped.
 - d. Data transfer procedure:
 NEW,LFN1
 TEXT
 'Enter Text Mode' message returned by CDC

SHIFT **K14**

"N" to handshake message from the HP9845
Data being transferred will be displayed on screen.
When all data has been transferred,

CONTROL **T** then **CONT** = **CR**

This terminates the input in TEXT mode and gets you back to READY mode in IAF.

- e. Check the data transfer:

/REWIND,LFN1

/LIST,F=LFN1

- f. To save the file:

/SAVE,LFN1=PFN/PW=_____,M=_____,CT=_____.

- g. Disconnect procedure:

/BYE

SHIFT **K4**

4. From HP9845 to HP1000.

- a. Log in to HP1000.

- b. Repeat steps I.E.(1) to I.E.(4), changing file info line to correct file name and file size.

- c. :ST,1,NAMR - No **CR** = **CONT**

SHIFT **K14** Upload

"N" to handshake question

CONT

- d. When finished transferring to HP1000,

DO NOT **SHIFT** **K14** as this will cause great problems.

- e. Be careful not to hit

SHIFT **K15** as this will write all kinds of error messages over your file on the HP9845.

- f. Log off HP1000

:EX,SP

- g. **SHIFT** **K4** to disconnect.
5. From HP1000 to HP9845.
- a. Log in to HP1000.
- b. Repeat steps I.E.(1) to I.E.(4), changing file info line to correct file name and file size.
- c. ST, NAMR,1 No **CR** = **CONT**
- SHIFT** **K14** to turn record on
- CONT** to start recording
- d. When finished recording,
- SHIFT** **K14** to turn record off
- e. Log off HP1000
- :EX,SP
- f. **SHIFT** **K4** to disconnect

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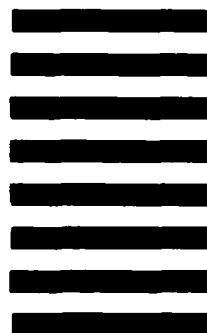


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