User's Guide for TRANZ: A Data Transformation and Analysis Program

K. J. Fischer

December 1985

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**Pacific Northwest Laboratory
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Pacific Northwest Laboratory
Richland, Washington 99352

FORWARD

This report is one in a series of documents describing particular elements of the End-Use Load and Conservation Assessment Program (ELCAP), which is being conducted by Pacific Northwest Laboratory (PNL) for the Bonneville Power Administration (BPA). The project's objective is to efficiently and accurately compile hourly end-use energy consumption levels and characteristic data for buildings and residences in the Pacific Northwest. These data will be used to characterize the energy requirements and to refine the accuracy of estimates of conservation potential in residential housing stock throughout the Pacific Northwest.

The project entails the auditing and metering of 700 residences and 250 buildings throughout the BPA service area during 1984 and 1985. The data will be configured into a data base management system to facilitate detailed analysis of building energy-use cause and effect. This report provides an insight into procedures used to ensure the quality of the data collected.

This report was prepared by Kenneth J. Fischer, a senior mechanical engineering student from Oregon State University, who participated in the summer intern program at PNL during 1984.

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SUMMARY

This report is a user's guide for TRANZ, a program developed by Pacific Northwest Laboratory (PNL) for an IBM PC® with a basic compiler, Version 2.0. The purpose of TRANZ is to convert, organize, and evaluate electrical end-use load data obtained from the Field Data Acquisition Systems (FDAS). These FDAS will be installed in commercial buildings and residences as part of the End-Use Load and Conservation Assessment Program (ELCAP) that is being managed by PNL for the Bonneville Power Administration (BPA). TRANZ has been developed with highly interactive menu-driven routines and requires little computer experience for proper operation. It is executable on a single or double disk drive IBM PC®. The program can be used for spot checking data, troubleshooting installation problems, and preparing tabular and graphical summaries. Sample files and program output, and a program source code listing are provided as appendices.

The program itself contains six primary routines: The first routine converts the raw character byte data dumped from the FDAS into a formatted ASCII engineering unit file. The second routine checks the data to make sure that each value is within a reasonable range. The third routine sorts a file so that the records start at the earliest time and end at the latest time. The fourth routine appends two files for the same building or residence, removing any overlap in the files. The fifth routine summarizes the data in both a tabular and graphical form. The sixth routine generates a hard copy table of day numbers and their corresponding dates.

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1.0 INTRODUCTION

Pacific Northwest Laboratory (PNL) is managing the End-Use Load and Conservation Assessment Program (ELCAP) for the Bonneville Power Administration (BPA). To ensure the quality of the end-use data collected under the ELCAP effort, it is necessary to have techniques that can be used to support the data verification process. The verification process is required after the Field Data Acquisition System (FDAS) has been installed in commercial buildings and residences. This process determines whether or not the data being acquired is accurate and representative of actual conditions. One method that can be used in the verification process is to list and plot acquired data for various time intervals. It is desirable to have this process of either listing or plotting the data done independently of PNL's normal data acquisition and analysis tasks. To meet this objective, a Basic computer program, TRANZ, has been developed by PNL to operate on an IBM PC®. This document provides a user's guide for TRANZ.

The program was created under Disk Operating System (DOS) Version 2.0 and is menu driven to facilitate its use. The program consists of a main module and six primary routines. These routines deal with various aspects of data processing, summarization, and presentation. The latter can be either in the listing or plotting mode. A flow diagram of the program is illustrated in Figure 1.

Sample input files and program output, and a program source code listing are provided in Appendices A and B, respectively, to document correct operation of the program. The program is structured in such a manner that it can be easily converted to other PC types.

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FIGURE 1. TRANZ Program Flow Diagram

2.0 PROGRAM CHARACTERISTICS

2.1 RUNTIME REQUIREMENTS

Before running TRANZ, check the program disk directory to make sure both TRANZ.EXE and BASRUN.EXE are included. The BASRUN.EXE file is required for the proper initialization of the compiled program. If both files are there, start the program by entering 'TRANZ' after a system prompt. To initialize the computer and start DOS, the user must have a system disk with the proper 'AUTOEXEC.BAT' file containing commands that are automatically executed when the system is initialized (an important process for the printer interface). If the user is unfamiliar with DOS, check the DOS manual and the printer manual for the proper 'AUTOEXEC.BAT' file. To initialize the system, place the disk in drive 'A:' while simultaneously pressing 'Ctrl', 'Alt', and 'Del'. If the computer is turned off, simply place the disk in drive 'A:' and turn the power on.

2.2 PROGRAM STRUCTURE

The first prompt given by the program is as follows:

```
ENTER DISK ORIVE FOR BUILDING DATA FILES (A:, B:, etc.)  
DISK MUST CONTAIN '.DAT' AND '.PAR' FILES?
```

After entering the drive specification ('A:' or 'B:'), which tells where the file disk will be located, the program's main menu is displayed. Table 1 gives the six main routines for TRANZ.

To choose a routine, press the corresponding key (see Table 1). The first four routines ('A' through 'D') prepare the file so that it can be summarized using the fifth routine ('E'). Not every routine, however, must be used in all cases. All routines, except the summary routine, perform the desired function once for one building and one file, and they automatically return the user to the main menu. The summary routine has its own menu (see Section 7). Once the user enters the summary routine, summary work must be done for the same

TABLE 1. Example of Main Menu

<u>Key</u>	<u>Choice</u>
A	Convert raw data to an engineering (ASCII) file
B	Check engineering data for reasonableness
C	Sort an engineering file chronologically
D	Append two sorted engineering files
E	Summarize an engineering file and present results
F	Create table of day, numbers, and corresponding dates
Q	QUIT****

PRESS DESIRED KEY

building. There is no limit, however, to the number of files used for that building while in the routine. To initialize a new building, simply exit to the main menu and reenter the summary routine.

2.3 DISK DRIVE SPECIFICATION

The first prompt the user will see after executing TRANZ will ask for the disk drive where the files are to be located. The user has three choices:

1. For a Single Drive System: Enter 'A:'. Remove the program disk and replace with a disk containing the files. If the program disk is removed, the computer will ask for a system disk if a runtime error occurs or if the user terminates the program. This should cause little problem.
2. For a Double Drive System: Have the program disk in drive 'A:' and the files in drive 'B:', since the computer will look for a system disk in drive 'A:' when the program terminates. The file disk may be

changed during execution as long as the red 'busy' light for the drive is not lit. The new disk must have all the files necessary for the given operation.

3. For a Hard Disk: The program TRANZ.EXE (with BASRUN.EXE) and/or the building and data files may also be stored on a hard disk, usually specified as 'D:'.

2.4 BUILDING AND FILE NAMES

As already noted, each routine prompts for a building name. This name is used with the '.DAT' and '.PAR' extensions to locate these two files (i.e., generally 'building.DAT' and 'building.PAR'). These two files contain information about channel status, description, calibration factors, units, and maximum values; thus they are crucial to proper program operation. These two files are created by another BASIC program for the IBM PC®. This program, called PROGRAM2.BAS (and the compiled version, DIAL.EXE), was also developed by PNL for ELCAP. Example '.DAT' and '.PAR' files are shown in Tables A.1 and A.2 of Appendix A.

Several problems may occur with incorrect building name inputs. Note that the default record length is nine. If the screen shows 'RECORD LENGTH 9' after prompting for a building name, an incorrect or missing building name was probably entered. Reinitialize the program and start again.

Spelling is important. If a misspelled building name is entered, a blank '.DAT' file and '.PAR' file will be created under that name. If file names are misspelled, a disk error will result in most cases, and execution will be stopped. A typical error message is 'File not found at address XXXX:YYYY', where XXXX and YYYY are four digit hexadecimal numbers.

The usual form for raw data file names is 'building.ddd', where 'building' is the building name and 'ddd' is the date of collection (e.g., for July 2, ddd = '702'). A convenient way to label ASCII engineering files is 'buildENGR.ddd', where 'build' is the first four letters of the building

name. Numbers can be used instead of names; e.g., use only the numbers when naming engineering files (7777ENGR.ddd).

If the file name to be created is the same as a file that already exists on the file disk, two things can happen. If that file is already open (i.e., being used), the following runtime error will occur: 'File already open at address XXXX:YYYY'. Program execution will be terminated. If the file is not open, the engineering file being created will be appended (in the same form as if it were given a new name) to the end of the existing file, whatever it may be. This cannot be done as a means of appending without using the append routine because time overlap is not removed, and index numbers are not changed. If the engineering file is appended to a compressed data file, both the compressed data and the engineering data are rendered useless and cannot be accessed. With the sort routine, the user has the option to name the sorted file the same name as the unsorted file, but the unsorted file will be deleted. One should not, however, use the name of any other existing file.

2.5 INKEYS AND USER INPUTS

The pauses in the program suspend operation until the user enters a character from the keyboard. The message 'PRESS ANY KEY TO CONTINUE' is displayed on the screen. Nearly any key will work (except 'shift', 'control', etc.), but do not use the F1 through F10 function keys (left of the main keyboard) because they enter more than one character into the keyboard buffer. Thus, pauses after that point may be skipped because the keyboard buffer already contains a character, and the program does not look for another character from the keyboard. For this reason, do not type into the keyboard buffer during program execution.

2.6 EXAMINING FILES

If questionable program results occur during program execution, look at the current files using the DOS 'TYPE' command after a DOS-system prompt. To obtain a DOS-system prompt the user must first terminate operation of the program. The format for the command is as follows: 'TYPE device:filename.extension'. The 'device' is the drive letter where the file

can be found. Punctuation is important. After the command is entered, the file will be printed on the screen. To temporarily stop the type command, press the 'Num Lock' key while holding the 'control' key down (i.e., control-Num Lock). To continue, press any other key. To terminate the type command, simply use 'control-Break'.

To get a hard copy of the file while using the DOS 'TYPE' command, press control-PrtSc (i.e., Print Screen) before entering the command and after the command is complete. With this method, the user can also produce a hard copy of small sections of the data by entering the control-PrtSc to start printing at a given point and again to stop. For any printer to function properly, the computer must be initialized correctly according to the printer specifications, and the printer must be 'on line'. (If correct initialization is not known, check the printer manual.) When printing, the computer must be correctly initialized. If a hard copy of the whole file is desired, use the DOS 'COPY' command. In this case, the file is not shown on the screen. The format for this command is as follows: 'COPY device:filename.extension LPT1:'. The command sends the file directly to the line printer.

3.0 ROUTINE TO CONVERT RAW DATA TO ASCII ENGINEERING UNITS

When raw data are obtained from the data loggers, they are stored in a file as a succession of one-byte characters. By typing the file on the screen, the user will see what looks like random characters and will probably hear several beeps from the computer. (These beeps are due to control characters in the file.) TRANZ can take the nearly incomprehensible, compressed data and properly convert it to a formatted ASCII engineering unit file only when the correct '.DAT' and '.PAR' files are used. If the wrong files are used, or if one is not current, the data conversion will not work correctly, and the resulting file will be of little use. An incorrect '.PAR' file yields an incorrect record length, and numbers will be read into the wrong category. An incorrect '.DAT' file will give improper calibration of the data. This problem can be difficult to detect because the file will look organized, and yet much or all of the data may be incorrect.

The program allows for data with any integration period to be converted, primarily to accommodate both initial 5-min integration and standard hourly integration. The integration period is determined from the '.PAR' file; again the wrong file could result in incorrect data. If the integration period is wrong, then all data will be scaled incorrectly, though relative magnitudes will be unchanged.

The routine begins by prompting the user for the building name to find the correct '.DAT' and '.PAR' files. The actual prompt is

BUILDING?

After the name is entered, the program returns the record length and prompts for the compressed file name with

COMPRESSED FORMAT FILE NAME?

Once this file name is entered, the number of channels is returned by TRANZ and the ASCII engineering file name is asked for with the prompt

ASCII OUTPUT DATA FILE NAME?

The program then proceeds to convert the compressed file to engineering units and returns to the main menu.

Once the converted file is created, either examine the file from outside the program or use the check routine to ensure that the data are reasonable. The check routine will help spot the 'out of range' values, overflow errors, and problems with the '.DAT' file. If an extreme number of errors are noted on several channels, exit the program and examine the actual file.

4.0 ROUTINE TO CHECK DATA REASONABLENESS

The primary function of this routine is to check the data for values that are 'out of range'. An 'out of range' value is one that is less than zero or greater than the maximum value taken from the '.DAT' file. If the temperature data are in degrees Celsius, an error may occur because of negative data, since below freezing temperatures are common. Because the good data range is flexible, two other errors are noted by the check routine: printing overflows and possible bad '.DAT' file values.

Often during the conversion process, data that were originally erroneous in the logger will convert to numbers that will not fit in the 5-digit field designated for them. In this case, an overflow marker (i.e., the % sign) is printed with the oversized number. Unfortunately, the whole data field becomes offset. Thus, it is necessary to check for and to keep track of overflows as the file is being read in order to keep the data from becoming jumbled.

In addition, some of the converted data may look incorrect because of an incomplete or incorrect '.DAT' file, even though, at least in the raw data file, the data are correct. This is because the maximum value for each channel is obtained using the maximum count value (usually 255) and two calibration factors in the '.DAT' file. The maximum value is calculated from the equation

$$ZMAX(Q) = VAL(CL1\$) * VAL(MV\$) + VAL(CL2\$) \quad (1)$$

where $ZMAX(Q)$ = maximum value for channel Q

$VAL(CL1\$)$ = calibration constant number one

$VAL(MV\$)$ = maximum number of counts (from '.DAT' file)

$VAL(CL2\$)$ = calibration constant number two.

If any of these values is incorrect, the range by which values are checked will be incorrect. For this reason, maximum values that are obviously incorrect (i.e., ≤ 0) are noted.

This routine also begins by prompting for the building name with

BUILDING?

Then, after returning the record length, the program will continue by prompting for the name of the file to be checked with

NAME OF ENGINEERING FILE TO BE CHECKED?

Once the file name has been entered, the program will prompt for the reasonable range for the temperature data with

MINIMUM VALUE FOR TEMPERATURE DATA?

MAXIMUM VALUE FOR TEMPERATURE DATA?

If the maximum value is greater than the minimum value, if the values are equal, or if no range is entered, the default values are set to -50° for the minimum and 60° for the maximum (Celsius temperature range). This prompt allows a switch to kelvin if desired. After this information has been entered, TRANZ asks whether or not a hard copy of the check results is desired with

DO YOU WANT A HARD COPY OF THE RESULTS (Y or N)?

The program then proceeds to check the given data.

The output begins by giving the time period that the data encompasses. Then the error summary output is presented as follows: The kind of error being summarized is printed first. Then 'out of range' values, overflow errors, and '.DAT' file warnings are summarized, respectively. For each channel with an 'out of range' value or an overflow, the channel description and the number of errors for that channel are displayed with the total number of 'out of range' values or overflows. For channels with a maximum value (from the '.DAT' file) ≤ 0 , the channel description is noted, and the total number of warnings is stated. If a channel description of '** NO LABEL **' is given, the program probably tried to read nonexistent values at the end of each record, and the message should be of no consequence. If other warnings occur, examine the '.DAT' file or check the parameters with PROGRAM2.BAS or DIAL.EXE. A hard copy of the error summary is optional (an example error summary is shown in Table A.7).

5.0 ROUTINE TO SORT A FILE CHRONOLOGICALLY

Data dumped from the logger are sequential, but the real time order of the records may not be perfectly chronological because of the logger memory configuration. Once data enters memory, it does not move; but when memory is full, the earliest data in memory are replaced with new data. Therefore, even though the data are in order, the earliest time may not be at the beginning of memory block. In most cases, the earliest time is somewhere in the middle of the file. From that point to the end of the file will be chronological, and from the beginning of the file to that point will be chronological. This routine separates the two sections and rewrites them in order.

First the program searches for the earliest time by reading through the file. When determined, the record number for the earliest time is noted. Then, beginning at that record, the file is rewritten in a new file until the end of the file is reached. Subsequently, the beginning portion of the file is rewritten in the same new file after the earlier data. As the new file is created, the records are renumbered. If any power outages are detected (i.e., a day number <100), then those records are noted and are given new 'day numbers' and 'seconds since midnight' data in the sorted file. If all the data are for a power outage, that data are sorted; however, the days and times are not changed because there is no reference from which the values can be obtained.

The routine begins with the standard prompt for the building name:

BUILDING?

After returning the record length, the program then gives the following two prompts in succession:

NAME OF ENGINEERING FILE TO BE SORTED?

ENTER NAME FOR NEW SORTED FILE:

(SAME AS ABOVE FOR WRITE-OVER)?

Once the file names have been entered, TRANZ begins the sorting process. Messages noting what the program is doing are displayed along with the number of power outages. If the file is already sorted, the program gives the user

the option to resave the file with the corrected 'day numbers' and 'seconds since midnight' (for files with power outages) with the following prompt:

RESAVE WITH POWER OUTAGE DAYS/TIMES RESET (Y or N)?

The routine will resave the file even if no power outages were detected during the sorting procedure, if a 'Y' is entered.

If the sorted file is to be given the same name as the unsorted file, the sorted file is first saved under a temporary name. When complete, the unsorted file is deleted, and the sorted file is given its name. Thus, the disk must still have enough space to hold the temporary file before the sort begins.

6.0 ROUTINE FOR APPENDING FILES

This routine will join two files, creating a third file and eliminating any duplicate data. In this way, several files may be appended, two at a time. The program, however, can only handle up to 999 records per file. In this routine, TRANZ gives the following three prompts for file names before beginning the append:

NAME OF FIRST FILE?

NAME OF FILE TO APPEND?

NAME FOR NEWLY APPENDED OUTPUT FILE?

The routine first determines the earliest and latest time for each of the two files to be appended. To be done correctly, both files must already be sorted. The order in which the first two files are entered has no bearing on the appending process. Then the configuration of the two files is determined. If the files overlap (Figure 2a), then the program proceeds to append. If one file is included in the other (Figure 2b), the message

TIME PERIOD FOR file1 INCLUDES ALL OF file2

is given, and the program returns to the main menu. If the files include the same time period (Figure 2c), the message

FILES file1 AND file2 INCLUDE THE SAME TIME PERIOD

is displayed, and the program returns to the main menu. In these two cases the files are not appended. If the files do not overlap (Figure 2d), the message

FILES file1 AND file2 INCLUDE TOTALLY DIFFERENT TIME PERIODS

FILES MAY BE DISJOINT

is given, and the user has the option to continue the append or to abort.

During the actual append process, the file with the earliest time (e.g., file A) is simply rewritten under the append file name. Then the file with the latest time (e.g., file B) is rewritten at the end of the new appended file, beginning with the first record in file B after the last time in file A. The records from file B are renumbered to obtain unduplicated sequential indexes.

FIGURE 2. Configurations for Files to be Appended
 (a) Overlapping Files
 (b) One File Included Within Another File
 (c) Files Include Same Time Period
 (d) Files Do Not Overlap

7.0 ROUTINE TO SUMMARIZE DATA

This routine is divided into two major sections: tabular summaries and graphical summaries. Though the menu (Table 2) has three execution options (A, B, and C), both plotting routines use the same section of code, and a flag determines which of the plots is created. After choosing the summary routine, TRANZ prompts for the building name with

BUILDING?

When that is entered, the record length is returned and the program prompts with

DO YOU WANT A HARD COPY OF 'ON CHANNEL' DESCRIPTIONS (Y/N)?

When the question is answered, the program proceeds to display the 'ON CHANNEL' descriptions in groups of ten. As the program states, the user can return to the 'ON CHANNEL' descriptions at nearly any pause in the summary routine by entering a 'P'. TRANZ then displays the following summary menu:

TABLE 2. Example of Summary Menu

<u>Key</u>	<u>Choice</u>
A	Tabular Summaries (Max, Min, Avg, Std Dev, Total)
B	Scatter Plot of Usage Data
C	Point-to-Point Plot of Usage Data
P	Display 'On Channel' Descriptions
Q	QUIT **** (Return to Main Menu)
PRESS DESIRED KEY	

7.1 TABULAR SUMMARIES

When the tabular summary (choice 'A') is chosen, TRANZ first prompts for the file name with

NAME OF ENGINEERING FILE TO BE SUMMARIZED
(DO NOT ENTER 'P' FOR DESCRIPTIONS)?

All files to be summarized must be sorted, so the routine will work properly. If 'P' is entered at this point, it will be taken as the file name. Next, the program will ask

DO YOU WANT A HARD COPY OF THE TABLE (Y or N)?

This input determines whether or not the resulting summary table is sent to the printer. After this information is received, TRANZ prompts with

NUMBER OF CHANNELS TO BE SUMMARIZED AND TABULATED (1-ALL)?

By entering 'ALL', the program will automatically summarize every channel. The user may also choose a specific number of channels not to exceed the total number of 'ON CHANNELS'. If something besides 'ALL' or a number is entered, a zero is assumed for the number of channels to be summarized. Even though the program will search the file, no actual summary will be generated. If a number other than 'ALL' is entered, the program will prompt with

ENTER 'ON CHANNEL' NUMBERS AS GIVEN IN THE TABLE
(OR 'P' FOR DESCRIPTION DISPLAY)?

Choosing specific 'ON CHANNELS' may be desirable when making comparisons because the channels can be summarized in any order. If an 'ON CHANNEL' number is chosen that does not exist, the program assigns '** NO LABEL **' to that 'ON CHANNEL' description. If an incorrect 'ON CHANNEL' number is accidentally entered, the process can be reinitialized by entering 'P'.

The tabular summary yields five types of information for each 'ON CHANNEL':

1. minimum value for the channel
2. maximum value for the channel
3. average value for the channel
4. standard deviation for all channel values
5. total of all channel values.

As the program reads through each channel, it keeps a running tally of the sum of the channel values, the sum of the square of the channel values, and the

number of values. The program simultaneously keeps track of the minimum and maximum for the channel. The standard deviation is calculated using the following equation:

$$\text{SDEV} = \text{SQR}((X_i^2 - n * X_{\text{avg}}^2)/(n - 1)) \quad (2)$$

where SDEV = the standard deviation for the channel i

SQR = the square root function

X_i = an individual value for the channel i

n = the number of values for the channel i

X_{avg} = the average value for the channel i.

If the argument of the square root function is less than zero (negative), then the argument is set to zero. When an overflow is encountered, the maximum, minimum, and average will be 99999. An example of channel summary output can be found in Table A.9 of Appendix A.

7.2 GRAPHICAL SUMMARIES

When trying to understand trends in the data, the graphical summaries are the most useful tool. Files to be plotted must be previously sorted in order for the graphical routine to work correctly.

When entering the routine, the program asks if the user is using a graphics capable screen with the prompt

DO YOU HAVE A GRAPHICS CAPABLE SCREEN (Y/N)?

This option allows those users who have a plotter but no graphics screen to generate hard copy plots. If a graphics screen is not being used and a 'Y' is entered, the error message 'Device unavailable at XXXX:YYYY' will appear, and program execution will be terminated. The next prompt that appears in the program is

NAME OF SORTED FILE TO BE PLOTTED?

When the file name is received, TRANZ asks for the 'ON CHANNEL' that is to be plotted with

ON CHANNEL NUMBER FOR PLOT TO BE CREATED?

If the number is not known, the user can go to the 'ON CHANNEL' descriptions by entering 'P'. If an on 'ON CHANNEL' number is given that does not exist, the program tells the user that no data exists or that all quantities have values of zero. Next, TRANZ prompts for the time period that the plot will include according to the following format:

```
          ELCAP DAY 1 = JANUARY 1, 1981
    ELCAP DAY NUMBER AT WHICH PLOT WILL BEGIN ('ALL' FOR FILE)?
          TIME (IN SECONDS) FOR THE ABOVE DAY?
    ELCAP DAY NUMBER AT WHICH PLOT WILL END?
          TIME (IN SECONDS) FOR THE ABOVE DAY?
```

Entering 'ALL' after the first prompt will skip the other prompts and will automatically plot all the data in the file. If nothing is entered for a prompt, then a zero value is assigned. If any other word besides 'ALL' is entered for the first prompt, zero is assigned. Obviously, if the time period that the data encompasses is not known, start with the 'ALL' option. Once the entire file is plotted, the user can focus on smaller portions of the timeline.

Once the plot has been generated on the screen, it remains until the user enters a character from the keyboard. When the character is received, TRANZ prompts with

```
DO YOU WANT A HARD COPY OF THE PLOT (Y/N)?
```

If an 'N' is entered, the program branches around the hard copy plotting section and asks whether another plot from the same file is desired. If a 'Y' is entered, the program prompts with

```
DO YOU HAVE AN HP PLOTTER? (A = 7475A, B = 7470A, N = NONE)
```

The program was designed only for the HP 7470A and the HP 7475A plotters. It may, however, be possible to use the program with other plotters based on the HP-GL plotter language used in this program. Some experimentation will probably be required. If an 'N' is entered, the program jumps to the end of the routine and asks whether another plot from the same file is desired. If either 'A' or 'B' is entered, the program will continue with the prompts

LOAD PAPER FOR PLOT AND PREPARE PLOTTER
PRESS ANY KEY TO CONTINUE

This pause allows the user to get the paper loaded correctly and to make certain that the plotter is properly connected to the IBM PC®. This pause is especially useful for computers with only one communications port, where the printer may have to be disconnected in order to connect the plotter. When the program continues, it prompts for the communications port with

COMMUNICATIONS PORT NUMBER (COM1, COM2)?

If anything other than the two specified inputs (i.e., COM1, COM2) is entered, the error message 'Device unavailable at XXXX:YYYY' is displayed, and program execution is terminated. This option allows for computers that may have more than one communications port to choose from, eliminating the need to switch cables in the back of the machine.

If the plotter specified is the HP 7475A, then the program will prompt for the paper size with

PAPER SIZE FOR PLOT? (1 = 11 X 17, 2 = 8.5 X 11)?

Though '1' and '2' are specified as inputs, any whole number ≤1 will set the 11- x 17-in. paper size, and any other whole number will set the 8.5- x 11-in. paper size.

After the plot is finished, TRANZ displays the message

WANT ANOTHER ORIGINAL OF THE SAME PLOT (Y/N)?

If a 'Y' is entered, then the same plot will be generated again, beginning with the pause for loading the paper. The computer may show this prompt before the plotter is actually finished plotting, so the user should wait until the plot is complete before proceeding. If an 'N' is entered, then the program prompts with

PLOT ANOTHER CHANNEL FROM THE SAME FILE (Y or N)?

If a 'Y' is entered, the routine starts again at the prompt for the 'ON CHANNEL' to be plotted. The second plot that is generated will be the same

type as the first (i.e., scatter or point-to-point). If an 'N' is entered, then the program returns to the summary menu.

Using the user-defined limits, the program gathers the data. Then after determining the maximum and minimum values on both axes, the program sets the configuration and increments for the axes. The horizontal time axis will always round to the next lowest and the next highest day when setting the axis length, although only data for the chosen time period is plotted. The vertical axis always ranges from the minimum value (or zero, whichever is lower) to the maximum value. Negative data will be plotted correctly. If a power outage gap is found in the data file, a line will connect the bounding data points on a point-to-point plot. This fact may be helpful in explaining strange data characteristics. The label and units for the vertical axis are given above the plot (to the left of the plot on the hard copies). An example of a scatter plot and a point-to-point plot are shown in Figures A.1 and A.2, respectively, of Appendix A.

8.0 ROUTINE TO CREATE A TABLE OF DAY NUMBERS AND DATES

This routine will print a one-to-three column table of day numbers and their corresponding date. The day of the week is also included. When the routine is specified, the following prompts appear on the screen:

ELCAP DAY NUMBER TO START THE TABLE?

<JANUARY 1, 1981=1> <JANUARY 1, 1982=366> <JANUARY 1, 1983=731>
<JANUARY 1, 1984=1096> <JANUARY 1, 1985=1462> <JANUARY 1, 1986=1827>

ELCAP OAY NUMBER TO END THE TABLE?

The user defines the limits of the table using day numbers. Any time period since January 1, 1981, can be tabulated. Every day number for the period is printed for the user's ease in determining the corresponding date. Day numbers and dates are printed both on the screen and on the printer. An example of the output for this routine is given in Table A.10 in Appendix A.

APPENDIX A

SAMPLE FILES AND PROGRAM OUTPUT

APPENDIX A

SAMPLE FILES AND PROGRAM OUTPUT

Several files and printed program outputs have been included in this appendix to show the file types under TRANZ. The building name has been changed to 'BUILDING' to ensure anonymity.

The '.DAT' file (Table A.1) is made up of 112 records (corresponding to the maximum number of channels: 48 digital and 64 analog), each with a length of 54 characters. The field is divided into six sections: the title, calibration factor one (multiplier), calibration factor two (offset), units, accuracy (*), and maximum counts. The file is used for identification of channels and data conversion. This file [along with the '.PAR' file (see Table A.2)] is created using the program PROGRAM.BAS or DIAL.EXE. These programs were developed for the End-Use Load and Conservation Assessment Program (ELCAP) by Pacific Northwest Laboratory (PNL).

The '.PAR' file is composed of 239 records, each with a length of four characters. The various records contain information on such topics as channel status and integration period.

The first data file (Table A.3) is 'BUILENGR.831'. This file shows the form of the data just after it has been converted, although the file has been shortened for easy display. The 'ON CHANNELS' begin in column seven. Column one is the index, column two is the check sum, column three is the record length, and column six is the wind direction. Columns four and five are particularly important to this program. Column four is the day number, and column five is the number of seconds after midnight. These six columns should contain the same type of information in all files. One can determine the on-channel information by correlating the data with the sequential entries in the '.DAT' file. Note that the second half of this file is power outage data. Also note that the reference column contains overflow data.

The second file (Table A.4) is "BUILSORT.831". This file is the sorted version of the previous file. Note that none of the data has been changed, but

A.2

BREEDING.DAT					
0				0	
WIND	.75		m/S * 225	0	
0				0	
0				CO MONITOR	255
0				AEROSOL MONITOR	255
0				0	
0				0	
0				TOTAL ELECTRIC PH1	78.8 WATTS* 255
0				HOT TUB	46.8 WATTS* 255
0				RANGE	18.2 WATTS* 255
0				KITCHEN (REFIG)	9.44 WATTS* 255
0				MICROWAVE	9.47 WATTS* 255
0				LITE	7.86 WATTS* 255
0				LITE	7.92 WATTS* 255
0				DISHWASHER	7.85 WATTS* 255
0				TOTAL ELECTRIC PH2	77.7 WATTS* 255
0				FURNACE	25.9 WATTS* 255
0				HOT WATER	18.5 WATTS* 255
0				WASHER	9.48 WATTS* 255
0				KITCHEN	9.48 WATTS* 255
0				LITE	7.92 WATTS* 255
0				LITE	7.84 WATTS* 255
0				GARB DISPOSAL	7.90 WATTS* 255
0				0	
0				0	
0				0	
0				0	
0				0	
0				0	
0				0	
0				0	
0				0	
0				0	
0				0	
0				0	
0				0	
0				0	
0				0	
0				0	
0				0	
0				0	
0				0	
0				0	
0				0	
TEMP OUTSIDE	.39	-29.5	DEG C* 255	0	
TEMP CRAWL SPACE	.39	-29.5	DEG C* 255	0	
PYRANOMETER	4.9		W/M^2* 255	0	
REL HUMIDITY INSIDE	.402		% * 255	0	
WIND DIRECTION	1.4116		DEG 255	0	
TEMP BEDROOM #2	.39	-29.5	DEG C* 255	0	
0				0	
REFERENCE	1.		COUNTS 255		
0					
0					

TABLE A.2. Example of '.PAR' File Containing Information on Channel Status and Integration Periods

BUILDING.PAR				
0	0	12	0	0
0	0	12	0	0
0	0	12	0	0
0	0	0	0	0
0	0	0	0	0
14	0	0	0	0
16	0	0	0	0
64	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
245	0	0	0	0
12	0	0	0	0
255	0	0	0	
255	0	0	0	
0	0	0	0	
0	0	0	0	
0	0	0	0	
0	0	0	0	
64	0	0	0	
0	0	0	0	
0	0	0	0	
0	0	0	0	
0	0	0	0	
0	0	0	0	
245	12	0	0	
0	12	0	0	
127	12	0	0	
127	12	0	0	
0	4	0	0	
0	12	0	0	
0	0	0	0	
0	12	0	0	
0	0	0	0	
11	0	0	0	
0	0	0	0	
0	0	0	0	
0	4	0	0	
0	4	0	0	
0	0	0	0	
0	0	0	0	
0	4	0	0	
0	12	0	0	
0	12	0	0	
0	12	0	0	
0	12	0	0	
0	12	0	0	
0	12	0	0	
0	12	0	0	
0	4	0	0	
0	12	0	0	
0	12	0	0	
0	12	0	0	
0	12	0	0	

TABLE A.3. 'BUILENGR.831' (First Data File)

BUILENGR.831																														
1	1441	38	1330	33395	144	2	13	14	0	43	24	0917504	0	0	0	0	161	0	153	0	0	0	0	358	0	0	0	0	9	
2	1442	38	1330	34995	144	1	13	16	0	43	24	0917504	0	0	0	0	224	0	0	0	0	0	0	0	0	0	0	0	37	
3	1421	38	1336	48595	184	1	13	14	0	43	25	0917504	0	0	0	0	118	0	0	0	0	0	0	0	0	0	0	0	9	
4	1495	38	1338	44195	535	2	32	16	0	43	25	0917504	0	0	0	0	187	0	161	0	0	0	0	0	0	0	0	0	37	
5	1517	38	1338	47795	138	1	13	14	0	43	25	0917504	0	0	0	0	114	0	18	0	0	0	0	0	0	0	0	0	9	
6	1572	38	1338	51395	121	1	12	14	0	43	25	0917504	0	0	0	0	129	0	27	0	0	0	0	0	674	0	0	72	16	37
7	1696	38	1338	51995	144	0	12	14	33	44	25	0917504	0	0	0	0	97	0	224	0	0	0	0	0	1724	0	0	16	54	9
8	1649	38	1338	58595	167	1	14	14	173	44	25	0917504	0	0	0	0	129	0	0	0	0	0	0	0	0	0	0	0	0	37
9	1684	38	1338	62195	124	1	14	16	332	44	25	0917504	0	0	0	0	107	0	0	0	0	0	0	0	0	0	0	0	0	9
10	1279	31	1338	65795	128	2	17	14	435	44	25	0917504	0	0	0	0	187	97	134	9	0	0	0	0	379	0	0	0	0	37
11	1482	38	0	3408	223	1	21	16	494	44	25	0917504	0	0	0	0	129	0	0	17	723	0	0	0	314	0	0	1	0	27
12	1405	31	0	7200	217	2	18	16	117	44	25	0917504	0	0	0	0	187	0	0	589	0	0	0	0	1231	0	0	0	0	9
13	1094	38	0	18809	13	1	15	16	130	44	25	0917504	0	0	0	0	97	0	151	0	9	0	0	0	0	0	0	0	0	9
14	1214	38	0	14400	13	0	17	14	117	45	24	0917504	0	0	0	0	247	0	0	0	0	0	0	0	1873	0	0	34	45	27
15	1372	38	0	18808	229	0	14	16	50	45	24	0917504	0	0	0	0	118	0	34	34	0	0	0	0	358	0	0	9	0	9
16	1292	38	0	21600	171	1	15	14	22	44	25	0917504	0	0	0	0	118	0	197	0	0	0	0	0	0	0	0	0	0	27
17	1318	38	0	25209	150	2	13	14	17	45	25	0917504	0	0	0	0	129	0	0	0	0	0	0	0	0	0	0	10	0	9
18	1414	38	0	28806	151	1	12	14	6	45	25	0917504	0	0	0	0	187	0	241	0	0	0	0	0	548	0	0	171	0	27
19	1458	31	0	32408	214	1	11	14	0	45	25	0917504	0	0	0	0	97	0	9	0	0	0	0	0	337	0	0	17	0	27
20	1420	38	0	36000	129	0	10	16	0	45	25	0917504	0	0	0	0	148	0	178	144	0	0	0	0	0	0	0	117	0	9

TABLE A.4. 'BUILSORT.B31' (Second Data File)

[illegible]

the day numbers and the seconds since midnight for the power outage have been reset. This file was used for subroutines 'B' and 'D'.

The third file (Table A.5) is 'BUILDENGR.830'. This sorted engineering file contains data prior to the file 'BUILSORT.831' and was appended to that file. The appended file 'BUILAPND.831' (Table A.6) contains 35 records. Note that five repetitious records were not included a second time.

A reasonableness check summary for 'BUILSORT.831' is given in Table A.7. The reference has 20 'out of range' values and 20 overflows. A quick check of the '.DAT' file shows that neither the 'CO MONITOR' nor the 'AEROSOL MONITOR' has any calibration factors. Thus, their maximum values were computed to be zero, and they were included in the listed warnings. Also note the example of a '** NO LABEL **' warning. This warning is of no consequence, unless it comes in the middle of the list. If so, the '.PAR' and '.DAT' files should be checked for errors.

The summary routine was run with the appended file 'BUILAPND.831'. A list of 'ON CHANNEL' descriptions as the program would print them is given in Table A.8. These descriptions can be checked in the '.DAT' file. Option 'A' of the summary menu produced the tabular summary found in Table A.9. A manual check will verify the accuracy of the output. Option 'B' was used with the same file for the outside temperature data ('ON CHANNEL' #2), and the scatter plot found in Figure A.1 was generated. A point-to-point plot (Figure A.2) was produced for the refrigerator ('ON CHANNEL' #13) using option 'C' of the summary menu.

Table A.10 gives an example of the day number tables produced by the main routine 'F'.

TABLE A.5. 'BUILENGR.830' (Third Data File)

BUILENGR.830																									
1	1271	30	1337	65795	124	3	23	16	591	39	24	9917504	0	0	0	0	0	129	0	42	0	0	0	0	27
2	1342	30	1337	69395	150	3	24	17	600	40	24	9917504	0	0	0	0	0	97	11	0	9	0	0	0	9
3	1397	30	1337	71995	181	3	27	17	563	40	24	9917504	0	0	0	0	0	129	11	0	34	0	0	0	27
4	1401	30	1337	76595	167	1	29	18	551	40	25	9917504	0	0	0	0	21	110	0	194	0	0	0	0	9
5	1413	30	1337	80195	141	2	29	18	613	41	25	9917504	0	0	0	0	331	118	0	233	0	0	0	350	9
6	1527	30	1337	83795	210	1	29	18	329	41	26	9917504	0	0	0	0	166	247	9	10	0	0	0	356	27
7	1546	30	1338	895	222	3	28	18	184	40	26	9917504	0	0	0	0	193	0	0	0	0	0	0	0	9
8	1416	30	1338	4595	114	3	28	17	0	40	26	9917504	0	0	0	0	0	120	0	0	34	0	0	0	27
9	1351	30	1338	8195	174	1	16	16	4	42	26	9917504	0	0	0	0	21	140	0	0	189	0	0	1950	18
10	1307	30	1338	11795	130	1	16	16	4	63	26	9917504	0	0	0	0	352	150	11	152	342	0	0	0	109
11	1311	30	1338	15395	135	2	15	16	0	44	26	9917504	0	0	0	0	0	161	0	0	280	0	0	0	216
12	1354	30	1338	18995	144	2	15	16	0	43	26	9917504	0	0	0	0	0	187	0	170	153	0	0	0	210
13	1344	30	1338	23595	120	1	16	16	0	43	26	9917504	0	0	0	0	0	150	0	34	0	0	0	0	732
14	1369	30	1338	26195	112	1	11	16	0	43	26	9917504	0	0	0	0	0	187	0	170	0	0	0	0	0
15	1374	30	1338	29795	146	2	13	16	0	43	26	9917504	0	0	0	0	0	187	0	0	0	0	0	0	0
16	1441	30	1338	33395	144	2	13	16	0	43	26	9917504	0	0	0	0	0	161	0	151	0	0	0	0	350
17	1461	30	1338	36995	164	1	13	16	0	43	26	9917504	0	0	0	0	0	226	0	0	0	0	0	0	0
18	1421	30	1338	40595	184	1	13	16	0	43	25	9917504	0	0	0	0	0	119	0	0	0	0	0	0	0
19	1499	30	1338	44195	135	2	11	16	0	43	25	9917504	0	0	0	0	0	187	0	161	0	0	0	0	0
20	1517	30	1338	47795	130	1	12	16	0	43	25	9917504	0	0	0	0	0	110	0	10	0	0	0	0	0

TABLE A.6. 'BUILAPND.831' (Appended File)

B)TYPE BUILAPND.831																											
1	1271	30	1337	65795	124	9	23	16	591	39	24	9917504	0	0	0	0	0	129	0	65	0	0	0	0	0	0	27
2	1341	30	1337	69395	150	3	24	17	600	40	24	9917504	0	0	0	0	0	97	11	0	9	0	0	0	0	0	9
3	1397	30	1337	71995	181	2	27	17	563	00	24	9917504	0	0	0	0	0	129	11	0	54	0	0	0	0	0	9
4	1401	30	1337	74595	167	2	29	10	553	40	25	9917504	0	0	0	0	21	110	0	134	0	0	0	0	0	0	9
5	1403	30	1337	80195	141	1	29	10	613	41	25	9917504	0	0	0	0	331	110	0	233	0	0	0	0	350	0	9
6	1527	30	1337	83795	220	2	29	10	319	41	26	9917504	9	0	0	0	146	247	0	16	0	0	0	0	350	0	27
7	1546	30	1330	995	220	3	20	10	104	00	26	9917504	0	0	0	0	0	193	0	0	0	0	0	0	0	0	9
8	1416	30	1330	6595	114	3	20	17	0	40	26	9917504	0	0	0	0	0	150	0	0	54	0	0	0	0	0	9
9	1351	30	1330	8195	174	1	16	16	4	42	26	9917504	0	0	0	0	31	140	0	0	109	0	0	0	1930	0	36
10	1307	30	1330	11795	120	1	16	16	4	43	26	9917504	0	0	0	0	352	150	11	152	342	0	0	0	109	0	124
11	1311	30	1330	15395	135	2	15	16	0	40	26	9917504	0	0	0	0	0	161	0	0	200	0	0	0	0	0	214
12	1354	30	1330	18995	194	2	15	16	0	43	26	9917504	0	0	0	0	0	107	0	170	153	0	0	0	110	0	171
13	1344	30	1330	23595	120	1	14	16	0	43	26	9917504	0	0	0	0	0	150	0	54	0	0	0	0	737	0	0
14	1360	30	1330	26195	142	1	14	16	0	43	26	9917504	0	0	0	0	0	107	0	170	0	0	0	0	0	0	0
15	1374	30	1330	29795	146	2	13	16	0	43	26	9917504	0	0	0	0	0	107	0	0	0	0	0	0	0	0	0
16	1441	30	1330	33395	146	1	13	16	0	43	26	9917504	0	0	0	0	0	161	0	151	0	0	0	0	330	0	0
17	1462	30	1330	36995	144	1	13	16	0	43	26	9917504	0	0	0	0	0	226	0	0	0	0	0	0	0	0	0
18	1421	30	1330	40595	106	1	13	16	0	43	25	9917504	0	0	0	0	0	120	0	0	0	0	0	0	0	0	0
19	1499	30	1330	44195	135	2	12	16	0	43	25	9917504	0	0	0	0	0	107	0	161	0	0	0	0	0	0	0
20	1517	30	1330	47795	130	1	12	16	0	43	25	9917504	0	0	0	0	0	110	0	16	0	0	0	0	0	0	0
21	6572	30	1330	51395	121	1	12	16	0	43	25	9917504	1	0	0	0	0	9	129	0	27	0	0	0	674	0	72
22	1676	30	1331	54995	146	0	12	16	33	44	25	9917504	0	0	0	0	0	97	0	224	0	0	0	0	1726	0	10
23	1669	30	1330	58595	167	1	14	16	173	44	25	9917504	0	0	0	0	0	129	0	0	0	0	0	0	0	0	0
24	1686	30	1330	62195	124	2	14	16	312	44	25	9917504	0	0	0	0	0	107	0	0	0	0	0	0	0	0	0
25	1279	30	1330	65795	124	2	17	16	435	44	25	9917504	0	0	0	0	0	107	97	134	9	0	0	0	379	0	0
26	1412	30	1330	69395	273	1	21	16	494	44	25	9917504	0	0	0	0	0	129	0	0	27	733	0	0	314	0	0
27	1405	30	1330	72995	247	2	10	16	117	44	25	9917504	0	0	0	0	0	107	0	0	0	509	0	0	1221	0	0
28	1074	30	1330	76595	13	1	15	16	128	44	25	9917504	0	0	0	0	0	97	0	151	0	0	0	0	0	0	0
29	1224	30	1330	80195	13	0	17	16	117	45	26	9917504	0	0	0	0	0	247	0	0	0	0	0	0	1073	0	36
30	1372	30	1330	83795	229	0	14	16	50	45	26	9917504	0	0	0	0	0	110	0	36	36	0	0	0	330	0	0
31	1291	30	1339	995	131	1	15	16	22	44	25	9917504	0	0	0	0	0	110	0	197	0	0	0	0	0	0	0
32	1310	30	1339	4595	150	3	13	16	17	45	25	9917504	0	0	0	0	0	129	0	0	0	0	0	0	0	0	10
33	1414	30	1339	8195	151	1	12	16	4	45	25	9917504	0	0	0	0	0	107	0	241	0	0	0	0	560	0	171
34	1450	30	1339	11795	214	1	11	16	0	45	25	9917504	0	0	0	0	0	97	0	9	0	0	0	0	337	0	27
35	1420	30	1339	15395	129	0	10	16	0	45	25	9917504	0	0	0	0	0	140	0	170	144	0	0	0	0	0	117

TABLE A.7. Reasonableness Check Summary for 'BUILSORT.831'

DATA SPANS THE TIME PERIOD FROM: 8/30/1984 TO 8/31/1984

***** SUMMARY OF ERRORS *****

REFERENCE 20 ERRORS

TOTAL NUMBER OF OUT OF RANGE VALUES IS 20

***** SUMMARY OF OVERFLOWS *****

REFERENCE 20 OVERFLOWS

TOTAL NUMBER OF OVERFLOWS = 20

***** SUMMARY OF WARNINGS *****

MAXIMUM VALUE FOR CO MONITOR LESS THAN OR EQUAL TO ZERO

MAXIMUM VALUE FOR AEROSOL MONITOR LESS THAN OR EQUAL TO ZERO

MAXIMUM VALUE FOR ** NO LABEL ** LESS THAN OR EQUAL TO ZERO

TOTAL NUMBER OF WARNINGS IS 3

TABLE A.8. List of 'ON CHANNEL' Descriptions

DESCRIPTIONS FOR °ON CHANNELS' 1 TO 10

ON CHANNEL # 1	WIND
ON CHANNEL # 2	TEMP OUTSIDE
ON CHANNEL # 3	TEMP CRAWL SPACE
ON CHANNEL # 4	PYRANOMETER
ON CHANNEL # 5	REL HUMIDITY INSIDE
ON CHANNEL # 6	TEMP BEDROOM #2
ON CHANNEL # 7	REFERENCE
ON CHANNEL # 8	CO MONITOR
ON CHANNEL # 9	AEROSOL MONITOR
ON CHANNEL # 10	TOTAL ELECTRIC PH1

DESCRIPTIONS FOR °ON CHANNELS' 11 TO 20

ON CHANNEL # 11	HOT TUB
ON CHANNEL # 12	RANGE
ON CHANNEL # 13	KITCHEN (REFIG)
ON CHANNEL # 14	MICROWAVE
ON CHANNEL # 15	LITE
ON CHANNEL # 16	LITE
ON CHANNEL # 17	DISHWASHER
ON CHANNEL # 18	TOTAL ELECTRIC PH2
ON CHANNEL # 19	FURNACE
ON CHANNEL # 20	HOT WATER

DESCRIPTIONS FOR °ON CHANNELS' 21 TO 25

ON CHANNEL # 21	WASHER
ON CHANNEL # 22	KITCHEN
ON CHANNEL # 23	LITE
ON CHANNEL # 24	LITE
ON CHANNEL # 25	GARB DISPOSAL

TABLE A.9. Tabular Summary Produced by Option 'A' of the Summary Menu

ELCAP DAY NUMBER (DAY 1 = JANUARY 1, 1981)-- 1337 TO 1339

DATES INCLUDE: 8/29/1984 TO 8/31/1984

SUMMARIES FOR CHANNELS 1 TO 10 BUILDING

ON CHANNEL	UNITS	MINIMUM	MAXIMUM	AVERAGE	STAND DEV	TOT (W-H)
1 WIND	m/s	0	3	2	0.886	54.0E+00
2 TEMP OUTSIDE	DEG C	10	29	17	5.773	59.6E+01
3 TEMP CRAWL SPACE	DEG C	16	18	16	0.676	57.1E+01
4 PYRANOMETER	W/M^2	0	680	155	224.888	54.3E+02
5 REL HUMIDITY INSIDE	%	39	45	43	1.738	15.0E+02
6 TEMP BEDROOM #2	DEG C	24	26	25	0.631	88.6E+01
7 REFERENCE	COUNT	99999	99999	99999	0.000	35.0E+05
8 CO MONITOR		0	0	0	0.000	0.0E+00
9 AEROSOL MONITOR		0	0	0	0.000	0.0E+00
10 TOTAL ELECTRIC PH1	WATTS	0	0	0	0.000	0.0E+00

SUMMARIES FOR CHANNELS 11 TO 20 BUILDING

ON CHANNEL	UNITS	MINIMUM	MAXIMUM	AVERAGE	STAND DEV	TOT (W-H)
11 HOT TUB	WATTS	0	0	0	0.000	0.0E+00
12 RANGE	WATTS	0	352	25	83.860	89.1E+01
13 KITCHEN (REFIG)	WATTS	97	247	134	39.398	46.9E+02
14 MICROWAVE	WATTS	0	97	4	16.529	13.0E+01
15 LITE	WATTS	0	241	71	85.535	25.0E+02
16 LITE	WATTS	0	342	37	83.865	13.1E+02
17 DISHWASHER	WATTS	0	723	35	147.318	12.4E+02
18 TOTAL ELECTRIC PH2	WATTS	0	0	0	0.000	0.0E+00
19 FURNACE	WATTS	0	0	0	0.000	0.0E+00
20 HOT WATER	WATTS	0	1958	336	546.332	11.7E+03

SUMMARIES FOR CHANNELS 1 TO 5 BUILDING

ON CHANNEL	UNITS	MINIMUM	MAXIMUM	AVERAGE	STAND DEV	TOT (W-H)
21 WASHER	WATTS	0	0	0	0.000	0.0E+00
22 KITCHEN	WATTS	0	0	0	0.000	0.0E+00
23 LITE	WATTS	0	216	32	56.727	11.1E+02
24 LITE	WATTS	0	54	4	13.164	15.3E+01
25 GARB DISPOSAL	WATTS	9	27	18	9.128	62.1E+01

FROM 8/29/1984 TO 9/1/1984

FIGURE A.1. Scatter Plot Generated by Option 'B' for Outside Temperature Data

A.13

FIGURE A.2. Point-to-Point Plot Produced for the Refrigerator Using Option 'C'

TABLE A.10. Day Number Tables Produced by the Main Routine 'F'

1096--SUNDAY	JANUARY	1, 1984	1156--THURSDAY	MARCH	1, 1984
1097--MONDAY	JANUARY	2, 1984	1157--FRIDAY	MARCH	2, 1984
1098--TUESDAY	JANUARY	3, 1984	1158--SATURDAY	MARCH	3, 1984
1099--WEDNESDAY	JANUARY	4, 1984	1159--SUNDAY	MARCH	4, 1984
1100--THURSDAY	JANUARY	5, 1984	1160--MONDAY	MARCH	5, 1984
1101--FRIDAY	JANUARY	6, 1984	1161--TUESDAY	MARCH	6, 1984
1102--SATURDAY	JANUARY	7, 1984	1162--WEDNESDAY	MARCH	7, 1984
1103--SUNDAY	JANUARY	8, 1984	1163--THURSDAY	MARCH	8, 1984
1104--MONDAY	JANUARY	9, 1984	1164--FRIDAY	MARCH	9, 1984
1105--TUESDAY	JANUARY	10, 1984	1165--SATURDAY	MARCH	10, 1984
1106--WEDNESDAY	JANUARY	11, 1984	1166--SUNDAY	MARCH	11, 1984
1107--THURSDAY	JANUARY	12, 1984	1167--MONDAY	MARCH	12, 1984
1108--FRIDAY	JANUARY	13, 1984	1168--TUESDAY	MARCH	13, 1984
1109--SATURDAY	JANUARY	14, 1984	1169--WEDNESDAY	MARCH	14, 1984
1110--SUNDAY	JANUARY	15, 1984	1170--THURSDAY	MARCH	15, 1984
1111--MONDAY	JANUARY	16, 1984	1171--FRIDAY	MARCH	16, 1984
1112--TUESDAY	JANUARY	17, 1984	1172--SATURDAY	MARCH	17, 1984
1113--WEDNESDAY	JANUARY	18, 1984	1173--SUNDAY	MARCH	18, 1984
1114--THURSDAY	JANUARY	19, 1984	1174--MONDAY	MARCH	19, 1984
1115--FRIDAY	JANUARY	20, 1984	1175--TUESDAY	MARCH	20, 1984
1116--SATURDAY	JANUARY	21, 1984	1176--WEDNESDAY	MARCH	21, 1984
1117--SUNDAY	JANUARY	22, 1984	1177--THURSDAY	MARCH	22, 1984
1118--MONDAY	JANUARY	23, 1984	1178--FRIDAY	MARCH	23, 1984
1119--TUESDAY	JANUARY	24, 1984	1179--SATURDAY	MARCH	24, 1984
1120--WEDNESDAY	JANUARY	25, 1984	1180--SUNDAY	MARCH	25, 1984
1121--THURSDAY	JANUARY	26, 1984	1181--MONDAY	MARCH	26, 1984
1122--FRIDAY	JANUARY	27, 1984	1182--TUESDAY	MARCH	27, 1984
1123--SATURDAY	JANUARY	28, 1984	1183--WEDNESDAY	MARCH	28, 1984
1124--SUNDAY	JANUARY	29, 1984	1184--THURSDAY	MARCH	29, 1984
1125--MONDAY	JANUARY	30, 1984	1185--FRIDAY	MARCH	30, 1984
1126--TUESDAY	JANUARY	31, 1984			
1127--WEDNESDAY	FEBRUARY	1, 1984			
1128--THURSDAY	FEBRUARY	2, 1984			
1129--FRIDAY	FEBRUARY	3, 1984			
1130--SATURDAY	FEBRUARY	4, 1984			
1131--SUNDAY	FEBRUARY	5, 1984			
1132--MONDAY	FEBRUARY	6, 1984			
1133--TUESDAY	FEBRUARY	7, 1984			
1134--WEDNESDAY	FEBRUARY	8, 1984			
1135--THURSDAY	FEBRUARY	9, 1984			
1136--FRIDAY	FEBRUARY	10, 1984			
1137--SATURDAY	FEBRUARY	11, 1984			
1138--SUNDAY	FEBRUARY	12, 1984			
1139--MONDAY	FEBRUARY	13, 1984			
1140--TUESDAY	FEBRUARY	14, 1984			
1141--WEDNESDAY	FEBRUARY	15, 1984			
1142--THURSDAY	FEBRUARY	16, 1984			
1143--FRIDAY	FEBRUARY	17, 1984			
1144--SATURDAY	FEBRUARY	18, 1984			
1145--SUNDAY	FEBRUARY	19, 1984			
1146--MONDAY	FEBRUARY	20, 1984			
1147--TUESDAY	FEBRUARY	21, 1984			
1148--WEDNESDAY	FEBRUARY	22, 1984			
1149--THURSDAY	FEBRUARY	23, 1984			
1150--FRIDAY	FEBRUARY	24, 1984			
1151--SATURDAY	FEBRUARY	25, 1984			
1152--SUNDAY	FEBRUARY	26, 1984			
1153--MONDAY	FEBRUARY	27, 1984			
1154--TUESDAY	FEBRUARY	28, 1984			
1155--WEDNESDAY	FEBRUARY	29, 1984			

APPENDIX B

PROGRAM LISTING FOR TRANPLUS.BAS (SOURCE CODE)

```

&TYPE TRANPLUS BAS
1000 REM ***** TRANSFORMER ENGINE *****
1001 REM
1002 REM ***** FILE TRANSFORMATION AND EVALUATION PROGRAM *****
1003 CLEAR
1004 CLS LOCATE 8,16 PRINT "ENTER DISK DRIVE FOR BUILDING DATA FILES (A, B, etc.)"
1005 LOCATE 10,10 INPUT "DISK MUST CONTAIN 'DAY' AND 'PAR' FILES", M
1006 DIM B$(100)
1007 DEFINT D=I,C,L,N D,T-Y,M
1008 DEFSTRG A,M-F S,C,I
1009 DIM UNT$(10)
1010 DIM STREC(10)
1011 DIM CHSREC(10)
1012 DIM FDAY(10)
1013 DIM FSEC(10)
1014 DIM ADAY(10)
1015 DIM ASEC(10)
1016 DIM ATIME(10)
1017 DIM YTIME(10)
1018 DIM SAGRECORD(100,V)
1019 DIM PARAMETER(10)
1020 DIM DATA(1,255),SCALE(11),SCALE(12),SAVE(12),ZMAS(110)
1021 DIM R(4)
1022 DIM M(12)
1023 DIM DATA(255)
1024 DIM TIT(10)
1025 DIM D(10)
1026 DIM CHANS(10)
1027 DIM RITS(10)
1028 DIM STATUS(10)
1029 DIM ZSCALE(10)
1030 DIM TEMPOR(5)
1031 DIM OVER(10)
1032 DIM ARRAY(100,5)
1033 DIM RECORD(1,255)
1034 CLS LOCATE 4,10 PRINT "***** MAIN MENU *****"
1035 PRINT
1036 PRINT "KEY CHOICE"
1037 PRINT "-----"
1038 PRINT "A Convert Raw Data to an Engineering (BSC1) File"
1039 PRINT
1040 PRINT "B Check Engineering Data for Reasonableness"
1041 PRINT
1042 PRINT "C Sort an Engineering File Chronologically"
1043 PRINT
1044 PRINT "D Append Two Sorted Engineering Files"
1045 PRINT
1046 PRINT "E Summarize an Engineering File and Present Results"
1047 PRINT
1048 PRINT "F Generate Table of Big Numbers with Dates"
1049 PRINT
1050 PRINT "G QUIT *****"
1051 PRINT
1052 PRINT
1053 PRINT "PRESS DESIRED KEY"
1054 A1 = INKEY$
1055 IF A1 = "" GOTO 1055

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10570 IF A$ = "A" OR A$ = "a" GOTO 11500
10580 IF A$ = "B" OR A$ = "b" GOTO 11600
10590 IF A$ = "C" OR A$ = "c" GOTO 11600
10600 IF A$ = "D" OR A$ = "d" GOTO 11600
10610 IF A$ = "E" OR A$ = "e" GOTO 11500
10620 IF A$ = "F" OR A$ = "f" GOTO 11500
10630 IF A$ = "G" OR A$ = "g" THEN END
10640 GOTO 10550
11000 REM
11020 REM **** SUBROUTINE TO SORT AN ENGINEERING FILE CHRONOLOGICALLY ****
11020 GOSUB 11410
11030 LOCATE 0,14 INPUT "NAME OF ENGINEERING FILE TO BE SORTED"; EFN
11040 EFILE$ = W$ + EFN
11050 OPEN EFILE$ FOR INPUT AS #1
11060 LOCATE 12,25 PRINT "ENTER NAME FOR NEW SORTED FILE "
11070 LOCATE 13,25 INPUT "(SAVE AS ABOVE FOR WRITE-OVER)", SRTD$
11080 CDATE$ = D$(PARAMETER(3)) + PARAMETER(4)
11090 SORTD$ = W$ + SRTD$
11100 CLS LOCATE 4,1 PRINT "PLEASE WAIT".
11110 REM
11120 REM **** SECTION TO READ FILE PARTS INTO AN ARRAY ****
11130 CC = 0
11140 FOR I = 1 TO 1000
11150 U = IOF(1) IF U < 0 GOTO 11340
11160 LINE INPUT #1, S$
11170 ARRAY(I,1) = VAL(MID$(S,1,3))
11180 FOR J = 2 TO 5
11190 ARRAY(I,J) = VAL(MID$(S,4+(J-2)*4,4))
11200 NEXT J
11210 CC = CC + 1
11220 IF CC > 24 THEN PRINT " ": CC = 0
11230 NEXT I
11240 CLOSE #1 RETURN = I - 1
11250 REM
11260 REM **** SECTION TO FIND THE FIRST ENTRY IN THE FILE ****
11270 PRINT "NOW SORTING FILE" PRINT PRINT PRINT
11280 MINDAY = 10000 MINSEC = 0 MINREC = 0 POW = 0 MINO = 0
11290 FOR J = 1 TO I-1
11300 IF ARRAY(J,1) > MINDAY THEN GOTO 11340
11310 IF MINO = 0 AND ARRAY(J,1) < 100 THEN GOSUB 11390
11320 IF ARRAY(J,1) < MINDAY THEN MINDAY = ARRAY(J,1) MINSEC = ARRAY(J,2) MINREC = J
11330 IF ARRAY(J,2) < MINSEC THEN MINSEC = ARRAY(J,2) MINREC = J
11340 NEXT J
11350 IF MINO = 0 THEN PRINT PRINT POW, " POWER OUTAGES WERE DETECTED DURING SORT" PRINT
11360 IF MINREC < 2 THEN PRINT PRINT "FILE ALREADY SORTED" ELSE GOTO 11420
11370 PRINT PRINT PRINT "SAVE WITH POWER OUTAGE DATES/TIMES RESET (Y or N)?"
11380 N$ = INKEY$
11390 IF N$ = "" GOTO 11380
11400 IF N$ = "Y" OR N$ = "y" GOTO 11420
11410 IF N$ = "N" OR N$ = "n" THEN GOTO 10350 ELSE GOTO 11380
11420 REM
11430 REM **** SECTION TO ARRANGE AND SAVE THE FILE IN CHRONOLOGICAL ORDER ****
11440 IF POW > 0 THEN GOSUB 11740
11450 IF EFILE$ = SORTD$ THEN SORTD$ = W$ + "TEMPFIL"
11460 OPEN EFILE$ FOR INPUT AS #1
11470 OPEN SORTD$ FOR APPEND AS #2
11480 PRINT PRINT PRINT "PLEASE WAIT "
11490 CC = 0
11500 FOR M = 1 TO MINREC-1
11510 CC = CC + 1

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11520 IF CC > 15 THEN PRINT " ", CC - 1
11530 LINE INPUT R1, R1
11540 NEXT M
11550 IN1 = 0
11560 PRINT "SAVING SORTED FILE"
11570 FOR Q = MINREC TO RECMIN
11580   U = COT(1) IF U < 0 GOTO 11700
11590   FOR VV = 1 TO POW
11600     IF Q > STREC(VV)-1 AND Q < ENOREC(VV)+1 THEN LINE INPUT R1, R1 GOTO 11620
11610   NEXT VV
11620   IN1 = IN1 + 1
11630   LINE INPUT R1, R1
11640   PRES = STR$(IN1)
11650   IF IN1 < 10 THEN IN1 = " " + MID$(PRES, 1)
11660   IF IN1 > 9 AND IN1 < 100 THEN IN1 = " " + MID$(PRES, 1)
11670   IF IN1 > 99 THEN IN1 = MID$(PRES, 1)
11680   MID$(IN1, 1, 3) = IN11
11690   PRINT R1, USING "0"; R1
11700 NEXT Q
11710 CLOSE R1
11720 OPEN RFILES FOR INPUT AS R1
11730 FOR P = 1 TO MINREC-1
11740   FOR SS = 1 TO POW
11750     IF P > STREC(SS)-1 AND P < ENOREC(SS)+1 THEN LINE INPUT R1, R1 GOTO 11820
11760   NEXT SS
11770   IN1 = IN1 + 1
11780   LINE INPUT R1, R1
11790   PRES = STR$(IN1)
11800   IF IN1 < 10 THEN IN1 = " " + MID$(PRES, 1)
11810   IF IN1 > 9 AND IN1 < 100 THEN IN1 = " " + MID$(PRES, 1)
11820   IF IN1 > 99 THEN IN1 = MID$(PRES, 1)
11830   MID$(IN1, 1, 3) = IN11
11840   PRINT R1, USING "0"; R1
11850 NEXT P
11860 CLOSE R1
11870 CLOSE R1
11880 IF STARTED = "V" THEN TEMPFILE = "TEMPFILE" THEN RELL FILE "NAME SORTED" AS RFILES
11890 GOTO 11930
11900 REM
11910 REM **** SUBROUTINE TO SET DELETE BOUNDARIES FOR POWER OUTAGES ****
11920 IF POW = 0 THEN SED = 1 STREC(SED) = J POW = 1 ENOREC(SED) = J RETURN 11940
11930 IF J > 1 ENOREC(SED) THEN SED = SED + 1 POW = POW + 1 STREC(SED) = J
11940 ENOREC(SED) = J
11950 RETURN 11910
11960 REM
11970 REM **** SUBROUTINE TO RESET THE DAY AND SECONDS FOR A POWER OUTAGE ****
11980 IF STREC(1)+1 AND ENOREC(1)=RECMIN THEN PRINT "PRINT DATA FOR POWER OUTAGE ONLY" PRINT "MIND = 1 POW = 0 GOTO 11990
11990 SOUP = 1 NUTS = POW STEP = 1
12000 IF ARRAT(STREC(POW), 4)*44400+ARRAT(STREC(POW), 5) < SHATZ AND SHOREC(POW) = RECMIN THEN SOUP = POW NUTS = 1 STEP = 1
12010 FOR R1 = SOUP TO NUTS STEP STEP
12020   IF STREC(R1)-1 < 1 THEN AAA = RECMIN ELSE AAA = STREC(R1)-1
12030   IF ENOREC(R1)+1 > RECMIN THEN BBB = 1 ELSE BBB = ENOREC(R1)+1
12040   IF ARRAT(AAA, 4)*44400+ARRAT(AAA, 5) > ARRAT(BBB, 4)*44400+ARRAT(BBB, 5) AND ARRAT(STREC(R1), 4)*44400+ARRAT(STREC(R1), 5) < SHATE THEN COSUR 11160 ELSE COSUR 11140
12050 NEXT R1
12060 FOR RR = 1 TO POW
12070   IF ARRAT(STREC(RR), 4)*44400+ARRAT(STREC(RR), 5) < ARRAT(MINREC, 4)*44400+ARRAT(MINREC, 5) THEN MINREC = STREC(RR)
12080 NEXT RR
12090 RETURN
12100 FOR WW = STREC(1)+1 TO ENOREC(1)
12110   IF WW-1 < 1 THEN CCC = RECMIN ELSE CCC = WW-1

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12120  ARRAY(WW,4) = ARRAY(CCC,4)  ARRAY(WW,5) = ARRAY(CCC,5) + CHATE1
12130  IF ARRAY(WW,5) > 84000 THEN ARRAY(WW,4) = ARRAY(WW,4) + 1  ARRAY(WW,5) = ARRAY(WW,5) - 84000
12140  NEXT WW
12150  RETURN
12160  FOR VV = ENDREC(50) TO STREC(10) STEP -1
12170    IF VV >= RECHUM THEN DDD = 1 ELSE DDD = VV+1
12180    ARRAY(VV,4) = ARRAY(DDD,4)  ARRAY(VV,5) = ARRAY(DDD,5) + CHATE1
12190    IF ARRAY(VV,5) > 8 THEN ARRAY(VV,4) = ARRAY(VV,4) + 1  ARRAY(VV,5) = 84000 + ARRAY(VV,5)
12200  NEXT VV
12210  RETURN
12220  REM
12230  REM **** SECTION TO PREP POWER OUTAGE FOR RESAVE ****
12240  AAAA = STR$(ARRAY(0,4))
12250  APASS = ARRAY(0,4)  COSUB 12400
12260  MID$(AAA,14,4) = AAAA
12270  AAAA = STR$(ARRAY(0,5))
12280  APASS = ARRAY(0,5)  COSUB 12400
12290  MID$(AAA,12,4) = AAAA
12300  INK = INK + 1
12310  GOTO 12440
12320  AAAA = STR$(ARRAY(1,4))
12330  APASS = ARRAY(1,4)  COSUB 12400
12340  MID$(AAA,16,4) = AAAA
12350  AAAA = STR$(ARRAY(1,5))
12360  APASS = ARRAY(1,5)  COSUB 12400
12370  MID$(AAA,18,4) = AAAA
12380  INK = INK + 1
12390  GOTO 12790
12400  IF APASS < 10 THEN AAAA = " " + MID$(AAAA,1,1)
12410  IF APASS < 100 AND APASS > 9 THEN AAAA = " " + MID$(AAAA,2,2)
12420  IF APASS < 1000 AND APASS > 99 THEN AAAA = " " + MID$(AAAA,3,3)
12430  IF APASS < 10000 AND APASS > 999 THEN AAAA = " " + MID$(AAAA,4,4)
12440  IF APASS < 100000 AND APASS > 9999 THEN AAAA = " " + MID$(AAAA,5,5)
12450  IF APASS >= 100000 THEN AAAA = "99999"
12460  RETURN
12500  REM
12510  REM *** SUBROUTINE TO CONVERT RAW DATA TO AN ENGINEERING (ASCII) FILE ***
12520  COSUB 12630
12530  LOCATE 11,1
12540  INPUT "COMPRESSED FORMAT FILE NAME", F04
12550  F4 = F4 + F04
12560  INTSTN=1
12570  PRINT "NUMBER OF CHANNELS IS ".INTEND
12580  INTREC=1
12590  INTREC=RECHUM
12600  INPUT "ASCII OUTPUT DATA FILE NAME", FFILE4
12610  FFILE4 = F4 + FFILE4
12620  CHATE1 = 256*PARAMETER(5) + PARAMETER(4)
12630  PRINT
12640  PRINT
12650  PRINT "      PLEASE WAIT"
12660  PRINT
12670  PRINT "      TAKE TIME OUT TO GO GET A CUP OF COFFEE OR WHATEVER YOU LIKE"
12680  PRINT
12690  OPEN F4 AS #3 LEN=1
12700  FIELD #3,1 AS PARA
12710  GET #3,S
12720  LENGTH=ASC(PARA)
12730  GET #3,1
12740  L1=ASC(PARA)

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12750 GET #1,2
12760 L2=ASC(PAR1)
12770 RNUM=(L1*256)+L2
12780 GOSUB 13140
12790 OPEN #FILE FOR APPEND AS #1
12800 FOR I=INTSEC TO INECCO
12810 IF I>RNUM THEN GOTO 11840
12820 GOSUB 13110
12830 GOSUB 13100
12840 GOSUB 13100
12850 GOSUB 13100
12860 NEXT I
12870 CLOSE #1 CLOSE #1
12880 GOTO 10250
12890 REM
12900 REM **** READS ONE LINE OF BYTES INTO AN ARRAY ****
12910 L=LENGTH*(3-1)+2
12920 FOR J=1 TO LENGTH
12930 K=K+1
12940 GET #5,K
12950 RECORDA(I,J)=ASC(PAR1)
12960 NEXT J
12970 RETURN
12980 REM
12990 REM **** PREPARES UNCALIBRATED ENGINEERING (ASCII) VALUES FOR ONE LINE ****
13000 ZATA(I,1)=RECORDA(I,1)*256+RECORDA(I,2) ZATA(I)=0
13010 ZATA(I,2)=RECORDA(I,3) ZATA(I)=1
13020 ZATA(I,3)=RECORDA(I,4)*256+RECORDA(I,5) ZATA(I)=0
13030 Z1=RECORDA(I,6) Z2=RECORDA(I,7) Z3=RECORDA(I,8)
13040 ZDATA(I,1)=Z1*65536+Z2*256+Z3
13050 ZDATA(I,2)=RECORDA(I,9) ZDATA(I)=1
13060 K=5 J=10
13070 FOR I=1 TO 102
13080 IF STATUS(I)≠0 THEN GOTO 13110
13090 K=K+1
13100 IF VAL(STR(I))≠0 THEN ZATA(I,K)=RECORDA(I,J)*256+RECORDA(I,J+1) ZATA(I)=0 J=J+1 ELSE ZATA(I,K)=RECORDA(I,J) ZDATA(I)=0 J=J+1
13110 NEXT I
13120 LENGTH=L
13130 RETURN
13140 REM
13150 REM **** SUBROUTINE TO GET VALUES FROM 'DAT' FILE ****
13160 GOSUB 13570
13170 K = 4
13180 FOR J=1 TO 102
13190 IF STATUS(J)≠0 THEN GOTO 13240
13200 GET #1,J
13210 ZCALZ(K)=VAL(STR(J))
13220 ZCALZ(K)=VAL(STR(J))
13230 ZMAG(K)=VAL(STR(J))
13240 IF AVE1="Y" THEN ZAVE(K) = CHAYE ELSE ZAVE(K)=1
13250 K=K+1
13260 NEXT J
13270 CLOSE #1
13280 OPEN #FILE AS #2 LEN=0 FIELD #2.4 AS #M1
13290 L=4
13300 FOR J=1 TO 102
13310 IF STATUS(J)≠0 THEN GOTO 13350
13320 GET #2,J*35
13330 ZSCALE(K)=2*VAL(PAR1)
13340 K=K+1

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13750 NEXT J
13760 CLOSE #1
13770 RETURN
13780 REM
13790 REM **** SETS THE ACTUAL ENGINEERING (ASCII) VALUES FOR ONE LINE ****
13800 X=1
13810 FOR J=1 TO 112
13820 IF STATUS(J)=0 THEN GOTO 13950
13830 ZATA(I,X)=(ZATA(I,X)*25SCALE(E)*ICAL(I))/ZAVE(E))*ICAL(I)
13840 X=X+1
13850 NEXT J
13860 RETURN
13870 REM
13880 REM **** WRITES ONE LINE INTO THE ENGINEERING (ASCII) FILE ****
13890 PRINT #1, USING "###",I.
13900 FOR J=112578 TO 112580
13910 PRINT #1, USING "#####",ZATA(I,J),
13920 NEXT J
13930 PRINT #1, " "
13940 RETURN
13950 REM
13960 REM **** SUBROUTINE TO OPEN 'BAT' FILE ****
13970 FILE= W$ + BUILDING1 + " BAT"
13980 OPEN FILE AS #1 LEN=54
13990 FIELD #1, 20 AS T1$, 12 AS C1$, 12 AS C2$, 5 AS W$, 5 AS AVE$, 4 AS MV$
14000 RETURN
14010 REM
14020 REM **** SECTION TO INPUT BUILDING AND SET CHANNEL STATUS ****
14030 GOSUB LOCATE 12,30 INPUT "BUILDING", BUILDING1
14040 PARFILE$ = W$ + BUILDING1 + " PAR"
14050 OPEN PARFILE$ AS #1 LEN=4
14060 FIELD #1, 4 AS PAR1
14070 FOR I = 1 TO 35
14080 SET #1
14090 PARAMETER(I)=VAL(PAR1)
14100 NEXT I
14110 CLOSE #1
14120 LENGTH=0
14130 FIRST = 1 LAST = 35 GOSUB 13700
14140 FOR I = 1 TO 112
14150 IF BIT(I)= "1" THEN STATUS(I)=1 ELSE STATUS(I)=0
14160 NEXT I
14170 X=0
14180 FOR I = 1 TO 112
14190 IF STATUS(I)=1 THEN X=X+1
14200 NEXT I
14210 IXTEND = X*5
14220 FIRST = 11 LAST = 34 GOSUB 13700
14230 FOR I=1 TO 112
14240 IF STATUS(I)=1 THEN LENGTH=LENGTH+1+VAL(BIT(I))
14250 NEXT I
14260 LOCATE 12,30 PRINT "RECORD LENGTH ", LENGTH
14270 RECDUM=FILE(15248/LENGTH)+1
14280 FILE = IXTEND*4 + 5
14290 RETURN
14300 FOR K=FIRST TO LAST
14310 D=PARAMETER(K)
14320 GOSUB 13700
14330 FOR L = 1 TO 8
14340 BIT(I+(K-FIRST)*4+L)=B$(P,L)

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13959 NEXT L
13960 NEXT K
13970 RETURN
13980 FOR N=K TO I STEP -1
13990   N=N-1
14000   IF D1>I*N1 THEN D=D-(I*N1)   N1(N)=I ELSE N1(N)=0
14010 NEXT K
14020 LET B1(I)=RIGHT$(STR$(D),15)
14030 RETURN
14040 REM
14050 REM **** SUBROUTINE TO APPEND TWO SORTED FILES ****
14060 CLS LOCATE 4,14 INPUT "NAME OF FIRST FILE", F1NFIL$
14070 F1NFIL$ = W$ + F1NFIL$
14080 LOCATE 5,14 INPUT "NAME OF FILE TO APPEND", APPFIL$
14090 APPFIL$ = W$ + APPFIL$
14100 LOCATE 12,14 INPUT "NAME FOR NEWLY APPENDED OUTPUT FILE", PUTFIL$
14110 PUTFIL$ = W$ + PUTFIL$
14120 REM
14130 REM **** SECTION TO DETERMINE BEGINNING AND ENDING TIMES IN FILES ****
14140 CLS LOCATE 4,1 PRINT "READING DATA FROM FILES .";
14150 OPEN F1NFIL$ FOR INPUT AS #1 OPEN APPFIL$ FOR INPUT AS #2
14160 LINE INPUT #1, F1NLIN$ LINE INPUT #2, APPLIN$
14170 FDAY(1) = VAL(MID$(F1NLIN$,14,6)) FSEC(1) = VAL(MID$(F1NLIN$,32,6))
14180 ADAY(1) = VAL(MID$(APPLIN$,14,6)) ASEC(1) = VAL(MID$(APPLIN$,32,6))
14190 CC = 0
14200 FOR VV = 1 TO 1000
14210   CC = CC + 1 IF CC > 35 THEN PRINT " ", CC = 0
14220   U = EOF(1) IF U < 0 GOTO 14710
14230   LINE INPUT #1, F1NLIN$
14240 NEXT VV
14250 FOR WV = 1 TO 1000
14260   CC = CC + 1 IF CC > 35 THEN PRINT " ", CC = 0
14270   U = EOF(2) IF U < 0 GOTO 14740
14280   LINE INPUT #2, APPLIN$
14290 NEXT WV
14300 PRINT "COMPLETE"
14310 BRUNT = VV BRUNA = WV
14320 FDAY(2) = VAL(MID$(F1NLIN$,14,6)) FSEC(2) = VAL(MID$(F1NLIN$,32,6))
14330 ADAY(2) = VAL(MID$(APPLIN$,14,6)) ASEC(2) = VAL(MID$(APPLIN$,32,6))
14340 CLOSE #1 CLOSE #2
14350 ATIME(1) = FDAY(1)*86400 + FSEC(1) ATIME(2) = ADAY(2)*86400 + ASEC(2)
14360 FTIME(1) = FDAY(1)*86400 + FSEC(1) FTIME(2) = ADAY(2)*86400 + ASEC(2)
14370 REM
14380 REM **** SECTION TO DETERMINE FILE RELATIONSHIPS AND TO BRANCH ****
14390 IF FTIME(1) < ATIME(1) AND FTIME(2) = ATIME(1) GOTO 15560
14400 IF FTIME(1) < ATIME(1) AND FTIME(2) > ATIME(1) GOTO 15480
14410 IF FTIME(1) < ATIME(2) AND FTIME(1) < ATIME(1) GOTO 15400
14420 IF FTIME(1) < ATIME(2) AND FTIME(2) > ATIME(1) GOTO 15400
14430 IF FTIME(1) < FTIME(1) AND ATIME(2) > FTIME(1) GOTO 15540
14440 IF ATIME(2) < FTIME(1) AND ATIME(2) > FTIME(1) GOTO 15540
14450 IF FTIME(1) < FTIME(1) AND ATIME(2) > FTIME(1) GOTO 15540
14460 IF FTIME(2) < ATIME(1) THEN ST1 = "1" GOTO 15540
14470 IF FTIME(2) < FTIME(1) THEN ST1 = "0" GOTO 15580
14480 IF ATIME(1) < FTIME(1) AND ATIME(1) < FTIME(2) AND ATIME(2) > FTIME(2) GOTO 15740
14490 REM
14500 REM **** SECTION TO DETERMINE WHERE FILES OVERLAP ****
14510 CUTFIL$ = F1NFIL$ BRUN = BRUNT STAPIL$ = APPFIL$ CLOSEC = BRUNA STATIME = ATIME(1)
14520 OPEN CUTFIL$ FOR INPUT AS #1
14530 FOR JJ = 1 TO 1000
14540   U = EOF(1) IF U < 0 GOTO 15540

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15010 LINE INPUT #1, FLN$
15020 CHRDAT = VAL(MID$(FLN$,14,3))
15030 CHRSEC = VAL(MID$(FLN$,17,4))
15040 CHRTIME = CHRHR*3600 + CHRSEC
15050 IF CHRTIME > STATIME GOTO 15090
15060 NEXT JJ
15070 REM
15080 REM **** SECTION TO CREATE THE OUTPUT FILE ****
15090 NEWREC = NROW - JJ + 1 + OLDREC
15100 CLS LOCATE 14,1 PRINT "CREATING NEW APPENDED FILE. ",
15110 OPEN STATFIL$ FOR INPUT AS #1
15120 OPEN PUTFIL$ FOR APPEND AS #2
15130 CC = 0
15140 FOR II = 1 TO OLDREC
15150 PRES = STR$(II)
15160 IF II < 10 THEN IN$ = " " + MID$(PRES,2)
15170 IF II > 9 AND II < 100 THEN IN$ = " " + MID$(PRES,2)
15180 IF II > 99 THEN IN$ = MID$(PRES,3)
15190 CC = CC + 1 IF CC > 13 THEN PRINT " "; CC = 0
15200 V = EDIT(1) IF V < 0 GOTO 15240
15210 LINE INPUT #1, SLIN$
15220 MID$(SLIN$,1,3) = IN$
15230 PRINT #2, USING "8", SLIN$
15240 NEXT II
15250 IF V < 0 THEN II = II + 1
15260 PRES = STR$(II)
15270 IF II < 10 THEN IN$ = " " + MID$(PRES,2)
15280 IF II > 9 AND II < 100 THEN IN$ = " " + MID$(PRES,2)
15290 IF II > 99 THEN IN$ = MID$(PRES,3)
15300 MID$(FLN$,1,3) = IN$
15310 PRINT #1, USING "4", FLN$
15320 FOR NN = 11 + 1 TO NEWREC
15330 CC = CC + 1 IF CC > 13 THEN PRINT " "; CC = 0
15340 V = EDIT(1) IF V < 0 GOTO 15420
15350 LINE INPUT #1, FLN$
15360 PRES = STR$(NN)
15370 IF NN < 10 THEN IN$ = " " + MID$(PRES,2)
15380 IF NN < 100 AND NN > 9 THEN IN$ = " " + MID$(PRES,2)
15390 IF NN > 99 THEN IN$ = MID$(PRES,3)
15400 MID$(FLN$,1,3) = IN$
15410 PRINT #1, USING "4", FLN$
15420 NEXT NN
15430 PRINT "DONE" SOUND 32767,27 SOUND 32767,1
15440 CLOSE #1 CLOSE #2 CLOSE #3
15450 GOTO 10350
15460 REM
15470 REM **** MESSAGES AND INITIALIZATIONS FOR VARIOUS FILE CONFIGURATIONS ****
15480 CLS LOCATE 4,1 PRINT "TIME PERIOD FOR *.FIRFIL$, " INCLUDES ALL OF *.APPFIL$
15490 LOCATE 10,1 PRINT "FILES NOT APPENDED"
15500 PRINT PRINT PRINT "PRESS ANY KEY TO CONTINUE"
15510 K$ = "XKEY"
15520 IF K$ = "" GOTO 15510
15530 GOTO 10350
15540 CLS LOCATE 4,1 PRINT "TIME PERIOD FOR *.FIRFIL$, " INCLUDES ALL OF *.FIRFIL$
15550 GOTO 15480
15560 CLS LOCATE 4,1 PRINT "FILES *.FIRFIL$, " AND *.APPFIL$, " INCLUDE THE SAME TIME PERIOD"
15570 GOTO 15480
15580 CLS LOCATE 4,1 PRINT "FILES *.FIRFIL$, " AND *.APPFIL$, " INCLUDE TOTALLY DIFFERENT TIME PERIODS"
15590 LOCATE 9,1 PRINT "FILES MAY BE DISJOINT"
15600 LOCATE 12,1 PRINT "CONTINUE TO APPEND (Y or N)?"

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15410 K1 = INKEY$
15410 IF K1 = "" GOTO 15410
15430 IF K1 = "P" AND STT1 = "P" OR K1 = "Q" AND STT1 = "P" GOTO 15730
15440 IF K1 = "E" OR K1 = "J" GOTO 15470
15450 IF K1 = "M" OR K1 = "N" GOTO 15350
15460 GOTO 15410
15470 CUFFIL = FIFIL : STAFIL = APFIL : OLDREC = NUH04
15480 OPEN CUFFIL FOR INPUT AS #1
15490 LINE INPUT #1, FLMS
15700 NUH02 = NUH04 + NUH06
15710 CLS LOCATE 10,1 PRINT "CREATING NEW APPENDED FILE . . ."
15720 GOTO 15110
15730 CUFFIL = APFIL : STAFIL = FIFIL : OLDREC = NUH01 GOTO 15460
15740 CUFFIL = APFIL : NUH01 = NUH04 : STAFIL = FIFIL : OLDREC = NUH01 : STATIM = PTIME(3)
15750 GOTO 15780
15900 REM
15910 REM **** SUBROUTINE TO CHECK FOR DATA REASONABLENESS ****
15920 CLS LOCATE 10,10 PRINT "RESETTING ARRAYS"
15930 GOSUB 13010
15940 GOSUB 13430
15950 FOR ORG = 1 TO 112
15960 ZAVE(ORG) = 0 : ZCAE(ORG) = 0
15970 NEXT ORG
15980 GOSUB 13570
15990 CLS LOCATE 8,14 INPUT "NAME OF ENGINEERING FILE TO BE CHECKED",BFS
16100 BFILE = B1 + BFS
16110 LOCATE 11,14 INPUT "MINIMUM VALUE FOR TEMPERATURE DATA", LLL
16120 LOCATE 12,14 INPUT "MAXIMUM VALUE FOR TEMPERATURE DATA", HHN
16130 IF LLL = 0 AND HHN = 0 THEN LLL = -50 : HHN = 60
16140 IF LLL > HHN THEN LLL = -50 : HHN = 60
16150 STT1 = ""
16160 CLS LOCATE 8,14 PRINT "DO YOU WANT A HARD COPY OF THE RESULTS (Y or N)?"
16170 K1 = INKEY$
16180 IF K1 = "" GOTO 16170
16190 IF K1 = "P" OR K1 = "Q" THEN STT1 = "P" GOTO 16320
16200 IF K1 = "M" OR K1 = "N" GOTO 16320
16310 GOTO 16170
16320 OPEN BFILE FOR INPUT AS #1
16330 LINE INPUT #1, CUFFIL
16340 CLOSE #1
16350 M = 1 : BEGIN = 34 : DATT = 4 : IC = 3 : WK = 0 : ECHS = 0 : VARN = 0 : OVE = 0 : EE = 0 : OCNE = 0 : EDAT = 10000 : EDAT = 0
16360 CLS LOCATE 10,15 PRINT "READING FROM 'DAT' FILE"
16370 GOSUB 17070
16380 CLS LOCATE 10,20 PRINT "CHECKING FILE"
16390 PRINT PRINT PRINT "PLEASE WAIT . ."
16390 FOR TTY = 1 TO 112:LOC(CHR(13+34+TTY)):
16390 PRINT " . ."
16390 OPEN BFILE FOR INPUT AS #1
16390 FOR II = 1 TO 1000
16390 LINE INPUT #1, EFLINS
16390 IF VAL(MID$(EFLINS,16,6)) > EDAT THEN EDAT = VAL(MID$(EFLINS,16,6))
16390 IF VAL(MID$(EFLINS,16,6)) < EDAT THEN EDAT = VAL(MID$(EFLINS,16,6))
16390 FOR JJ = 0 TO DATT
16390 STUDY = MID$(EFLINS,BEGIN+OVE*111+6+JJ,4)
16390 IF MID$(STUDY,2,1) = "N" THEN GOSUB 17360
16390 ARRAY(1:JJ+1) = VAL(STUDY)
16390 NEXT JJ
16390 U = EUP(1) IF U < 0 THEN BICHUM = 1 : CLOSE #1 GOTO 16440
16390 NEXT 1
16390 VU = 0

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16459 PRINT " ".
16460 FOR J = N TO N + DAT1
16470   VV = VV + 1
16480   IF ZMAT(J) <= 0 THEN GOSUB 17349
16490   IF MID$(V15(J),1,4) = "TEMP" THEN GOSUB 17429
16500   FOR M = 1 TO NCHRM
16510     IF ABBAT(M,VV) < 0 ON ARRAY(M,VV) : ZMAT(J) THEN GOSUB 17189
16520   NEXT M
16530 NEXT J
16540 N = N + 5 : BEGIN = BEGIN + 30
16550 IF LEN(CHNLS) = BEGIN < 30 THEN DAT1 = FID((LEN(CHNLS))-BEGIN)/41 - 1
16560 IF LEN(CHNLS) = BEGIN < 30 AND FID((LEN(CHNLS))-BEGIN)/41 < ((LEN(CHNLS))-BEGIN)/4 THEN DAT1 = FID((LEN(CHNLS))-BEGIN)/40
16570 IF DAT1 < 0 GOTO 16579
16580 NEXT TTT
16590 PRINT "DONE" : SOUND 32767, 9 : SOUND 32767, 1
16600 FLEAT = BDAT : GOSUB 17010 : CLS : LOCATE 4,21 : PRINT "DATA SPANS THE TIME PERIOD FROM " : LOCATE 4,10 : PRINT USING "00",MO : PRINT "/": PRINT USING "00",DAY : PRINT "/": PRINT USING "0000",YR:
16610 IF STTS = "Y" THEN LPRINT : LPRINT : LPRINT "DATA SPANS THE TIME PERIOD FROM " : LPRINT USING "00",MO : LPRINT "/": LPRINT USING "00",DAY : LPRINT "/": LPRINT USING "0000",YR:
16620 FLEAT = BDAT : GOSUB 17010 : PRINT " TO " : PRINT USING "00",MO : PRINT "/": PRINT USING "00",DAY : PRINT "/": PRINT USING "0000",YR
16630 IF STTS = "Y" THEN LPRINT " TO " : LPRINT USING "00",MO : LPRINT "/": LPRINT USING "00",DAY : LPRINT "/": LPRINT USING "0000",YR
16640 PRINT : PRINT : PRINT "PRESS ANY KEY TO CONTINUE"
16650 EI = INKEY$
16660 IF EI = "" GOTO 16650
16670 IF EC = 0 THEN PRINT : PRINT " NO OUT OF RANGE VALUES FOUND"
16680 IF EC = 0 AND STTS = "Y" THEN LPRINT : LPRINT " NO OUT OF RANGE VALUES FOUND" GOTO 16779
16690 CLS : LOCATE 4,15 : PRINT "***** SUMMARY OF ERRORS *****" : PRINT : PRINT
16700 IF STTS = "Y" THEN LPRINT : LPRINT : LPRINT " ***** SUMMARY OF ERRORS *****" : LPRINT : LPRINT
16710 FOR WW = 1 TO NH
16720   PRINT B15(WM), TAB(15), ZAVE(WW), TAB(15), "ERRORS" : PRINT
16730   IF STTS = "Y" THEN LPRINT B15(WW), TAB(15), ZAVE(WW), TAB(15), "ERRORS" : LPRINT
16740 NEXT WW
16750 PRINT : PRINT : PRINT "TOTAL NUMBER OF OUT OF RANGE VALUES IS ",EC
16760 IF STTS = "Y" THEN LPRINT : LPRINT "TOTAL NUMBER OF OUT OF RANGE VALUES IS ",EC
16770 PRINT : PRINT : PRINT "PRESS ANY KEY TO CONTINUE"
16780 EI = INKEY$
16790 IF EI = "" GOTO 16790
16800 IF OV = 0 THEN PRINT : PRINT " NO OVERFLOWS DETECTED" : SOUND 32767, 9 : SOUND 32767, 1
16810 IF OV = 0 AND STTS = "Y" THEN LPRINT : LPRINT " NO OVERFLOWS DETECTED" GOTO 16900
16820 CLS : LOCATE 4,15 : PRINT "***** SUMMARY OF OVERFLOWS *****" : PRINT : PRINT
16830 IF STTS = "Y" THEN LPRINT : LPRINT : LPRINT " ***** SUMMARY OF OVERFLOWS *****" : LPRINT : LPRINT
16840 FOR VE = 1 TO ET
16850   PRINT B15(VE), TAB(45), SCAL(VE), TAB(15), "OVERFLOWS" : PRINT
16860   IF STTS = "Y" THEN LPRINT B15(VE), TAB(45), SCAL(VE), TAB(15), "OVERFLOWS" : LPRINT
16870 NEXT VE
16880 PRINT : PRINT : PRINT "TOTAL NUMBER OF OVERFLOWS =",OV
16890 IF STTS = "Y" THEN LPRINT : LPRINT "TOTAL NUMBER OF OVERFLOWS =",OV
16900 PRINT : PRINT : PRINT "PRESS ANY KEY TO CONTINUE"
16910 EI = INKEY$
16920 IF EI = "" GOTO 16910
16930 IF WARN = 0 THEN PRINT : PRINT : PRINT " NO WARNINGS FOUND"
16940 CLS : LOCATE 4,15 : PRINT "***** SUMMARY OF WARNINGS *****" : PRINT : PRINT
16950 IF STTS = "Y" THEN LPRINT : LPRINT : LPRINT " ***** SUMMARY OF WARNINGS *****" : LPRINT : LPRINT
16960 FOR VV = 1 TO VWH
16970   PRINT "MAXIMUM VALUE FOR ",D1(VV), TAB(15), "LESS THAN OR EQUAL TO ZERO" : PRINT
16980   IF STTS = "Y" THEN LPRINT "MAXIMUM VALUE FOR ",D1(VV), TAB(15), "LESS THAN OR EQUAL TO ZERO" : LPRINT
16990 NEXT VV
17000 PRINT : PRINT : PRINT "TOTAL NUMBER OF WARNINGS IS ",WARN
17010 IF STTS = "Y" THEN LPRINT : LPRINT : LPRINT "TOTAL NUMBER OF WARNINGS IS ",WARN
17020 PRINT : PRINT : PRINT "PRESS ANY KEY TO CONTINUE"
17030 EI = INKEY$
17040 IF EI = "" GOTO 17030

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17050 CLOSE #2
17060 GOTO 18250
17070 REM
17080 REM **** SUBROUTINE TO READ VALUES FOR "DAT" FILE ****
17090 Q = 0
17100 FOR I = 1 TO 112
17110 IF STATUS(I) = 0 THEN GOTO 17140
17120 Q = Q + 1
17130 GET #2, I
17140 T1(IQ) = TL(I) UNT1(IQ) = UT(I)
17150 ZHAI(IQ) = VAL(C1(I)) + VAL(MV(I)) + VAL(C2(I))
17160 NEXT I
17170 RETURN
17180 REM
17190 REM **** SUBROUTINE TO NOTE THE ERRORS FOUND ****
17200 EC = EC + 1
17210 IF NCHK(I) THEN NH = NH + 1 BIT(I,NH) = T1(I)
17220 ZAVECH(I) = ZAVECH(I) + 1
17230 RCHK = J
17240 IF ARRAT(I,W) ( 9999) GOTO 17270
17250 OVF = OVF + 1
17260 IF DCHK(I) THEN FF = FF + 1 S1(FF) = T1(I)
17270 ZCAL(FF) = ZCAL(FF) + 1
17280 DCHK = J
17290 RETURN
17300 REM
17310 REM **** SUBROUTINE TO TRAP PRINTING OVERFLOW ERRORS ****
17320 CHAS = MID$(CELLS,BEGIN+OVL(I),6+J+6,I)
17330 IF CHAS(I) = " THEN OVL(I) = OVL(I) + 1 GOTO 17380
17340 STUCH = " 99999"
17350 RETURN
17360 REM
17370 REM **** SUBROUTINE FOR SETTING WARNING PARAMETERS ****
17380 WARN = WARN + 1
17390 D1(WARN) = T1(I)
17400 IF T1(I) = "" THEN D1(WARN) = "" NO LABEL ""
17410 RETURN
17420 REM
17430 REM **** SUBROUTINE TO CHECK THE RANGE OF TEMPERATURES ****
17440 FOR R = 1 TO RECHIM
17450 IF ARRAT(R,W) ( LLL AND ARRAT(R,W) ) NH THEN GOSUB 17340
17460 NEXT R
17470 RETURN 16530
17480 REM
17490 REM **** SUBROUTINE TO SUMMARIZE DATA AND DISPLAY RESULTS ****
17500 GOSUB 17430
17510 GOSUB 17570
17520 GOSUB 17580
17530 CHATE' = ZSA*PARAMETER(I):PARAMETER(I)
17540 CLOSE #2
17550 GOSUB 17190
17560 CLS LOCATE 4,10 PRINT "***** SUMMARY MENU *****"
17570 PRINT
17580 PRINT " KEY CHOICE"
17590 PRINT " ---"
17600 PRINT " A Tables Summary (Min, Max, Avg, Std Dev, Total)"
17610 PRINT
17620 PRINT " B Scatter Plot of Usage Data "
17630 PRINT
17640 PRINT " C Point-to-Point Plot of Usage Data"

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17670 PRINT
17680 PRINT "      F      Display 'ON CHANNEL' Descriptions"
17690 PRINT
17700 PRINT "      Q      QUIT *** (Return to Main Menu)"
17710 PRINT PRINT
17720 PRINT "      PRESS DESIRED KEY"
17730 SPES = ""
17740 AS = INKEY$
17750 IF AS = "" GOTO 17740
17760 IF AS = "A" OR AS = "4" GOTO 18000
17770 IF AS = "B" OR AS = "5" GOTO 18020
17780 IF AS = "C" OR AS = "6" THEN SPES = "P" GOTO 18000
17790 IF AS = "2" OR AS = "8" THEN GOSUB 19100
17800 IF AS = "0" OR AS = "9" GOTO 18150
17810 GOTO 17500
18000 REM
18010 REM *** SUBROUTINE TO CREATE A TABULAR SUMMARY ***
18020 CLS LOCATE 4,1 PRINT "NAME OF ENGINEERING FILE TO BE SUMMARIZED (DO NOT ENTER 'P' FOR DESCRIPTIONS) : INPUT #15124
18030 EFILE$ = #1 + EFILE$
18040 STT$ = ""
18050 CLS LOCATE 4,14 PRINT "DO YOU WANT A HARD COPY OF THE TABLE (Y or N)?"
18060 K$ = INKEY$
18070 IF K$ = "" GOTO 18060
18080 IF K$ = "Y" OR K$ = "p" THEN STT$ = "Y" GOTO 18110
18090 IF K$ = "N" OR K$ = "n" GOTO 18110
18100 GOTO 18050
18110 CLS PRINT INPUT "NUMBER OF CHANNELS TO BE SUMMARIZED AND TABULATED (1-ALL):";CHANUM$
18120 IF CHANUM$ = "1" OR CHANUM$ = "p" THEN GOSUB 19170 GOTO 18116
18130 IF CHANUM$ = "ALL" OR CHANUM$ = "all" GOTO 18400
18140 CHANUM = VAL(CHANUM$)
18150 CLS PRINT PRINT "ENTER 'ON CHANNEL' NUMBERS AS GIVEN IN THE TABLE FOR 'P' FOR DESCRIPTION DISPLAY"
18160 FOR Y$ = 1 TO CHANUM
18170 INPUT CHAN$(Y)
18180 IF CHAN$(Y) = "P" OR CHAN$(Y) = "p" THEN GOSUB 19170 GOTO 18150
18190 DATA(1,Y) = VAL(CHAN$(Y))
18200 CHAN$(Y) = TRIM$(DATA(1,Y))
18210 IF CHAN$(Y) = "" THEN CHAN$(Y) = "NO LABEL ***"
18220 NEXT Y$
18230 FOR JJ = 1 TO CHANUM
18240 IF DATA(1,JJ) = 0 AND DATA(1,JJ) < 0 GOTO 18260
18250 DATA(1,JJ) = 0 DATA(JJ) = 0 ZSCALE(1) = 0 DATA(1,JJ) = 0
18260 NEXT JJ
18270 RECTN = 39 DATA = 0
18280 GOSUB 19010
18290 FOR DDD = 1 TO 113
18300 ZSCALE(DDD) = 0 ZSCALE(DDD) = 0
18310 NEXT DDD
18320 OPEN EFILE$ FOR INPUT AS #1
18330 LINE INPUT #1, CHAN$
18340 SCAT = VAL(CHAN$+CHR$(14,6))
18350 CLOSE #1
18360 REM
18370 REM *** MAIN LOOP FOR SUMMARIZING DATA ***
18380 CLS LOCATE 4,4 PRINT "PLEASE WAIT"
18390 LOCATE 9,4 PRINT "NOW SUMMARIZING CHANNELS "
18400 FOR YTI = 1 TO INSTR(LEN(CHAN$)-34)/4+1
18410 OPEN EFILE$ FOR INPUT AS #1
18420 PRINT " ",
18430 FOR SI = 1 TO 1000
18440 LINE INPUT #1, EFILE$

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10450     FOR JJ = 0 TO QATT
10460         STUDY = MID$(CFLIN$, BEGIN+OFFSET(JJ)+1,2,6)
10470         IF MID$(STUDY,1,1) = "N" THEN GOSUB 12300
10480         ANNOT(JJ,12,1) = VAL(STUDY)
10490     NEXT JJ
10500     U = 0.05(1) IF U < 0 THEN RECHNN = 11 ZDAY = VAL(MID$(CFLIN$,14,4)) CLOSE #1 GOTO 10530
10510     NEXT JJ
10520     PRINT " ";
10530     FOR CC = 1 TO 3
10540         FOR EE = 1 TO CHANNN
10550             IF (BEGIN-24)/8 + CC = ZDAY(1,EE) THEN GOSUB 19000
10560         NEXT EE
10570     NEXT CC
10580     BEGIN = BEGIN + 30
10590     IF LEN(CHNNL$)-BEGIN < 30 THEN QATT = FIX((LEN(CHNNL$)-BEGIN)/4)+1
10600     IF LEN(CHNNL$)-BEGIN < 30 AND FIX((LEN(CHNNL$)-BEGIN)/4) < (LEN(CHNNL$)-BEGIN)/4 THEN QATT = FIX((LEN(CHNNL$)-BEGIN)/4)
10610     IF QATT < 0 GOTO 10640
10620     PRINT " ";
10630     NEXT TTY
10640     PRINT "DONE"
10650     REM
10660     REM **** SUBROUTINE TO PRINT OUT THE SUMMARIES ****
10670     FLEAT = SDAY GOSUB 12010
10680     IF STT = "Y" THEN LPRINT LPRINT "ELCAP DAY NUMBER (DAY 1 = JANUARY 1, 1981) = ",SDAY," TO ",EDAY LPRINT
10690     IF STT = "Y" THEN LPRINT LPRINT "DAYS INCLUDE " LPRINT USING "00";MO LPRINT "/"; LPRINT USING "00";DAY LPRINT "/"; LPRINT USING "0000";YR LPRINT " TO "
10700     CLS LOCATE 4,32 PRINT BUILDINGS
10710     LOCATE 5,15 PRINT "ELCAP DAY NUMBER (DAY 1 = JANUARY 1, 1981) = ",SDAY," TO ",EDAY
10720     LOCATE 11,15 PRINT "DAYS INCLUDE " LPRINT USING "00";MO LPRINT "/"; LPRINT USING "00";DAY LPRINT "/"; LPRINT USING "0000";YR LPRINT " TO "
10730     FLEAT = EDAY GOSUB 12010
10740     IF STT = "Y" THEN LPRINT USING "00";MO LPRINT "/"; LPRINT USING "00";DAY LPRINT "/"; LPRINT USING "0000";YR
10750     PRINT USING "00";MO LPRINT "/"; LPRINT USING "00";DAY LPRINT "/"; LPRINT USING "0000";YR
10760     PRINT LPRINT PRINT "PRESS ANY KEY TO CONTINUE"
10770     K1 = INKEY$
10780     IF K1 = "" THEN GOTO 10770
10790     DC = 1 MO = 10
10800     IF CHANNN < 00 THEN DO = CHANNN
10810     CLS LOCATE 1,15 PRINT "SUMMARIES FOR CHANNELS",DC;"TO";DO," "BUILDINGS LPRINT
10820     IF STT = "Y" THEN LPRINT LPRINT "SUMMARIES FOR CHANNELS",DC;"TO";DO," "BUILDINGS LPRINT
10830     PRINT "ON CHANNEL",TAB(24);"UNITS",TAB(33);"MINIMUM",TAB(42);"MAXIMUM",TAB(51);"AVERAGE",TAB(60);"STAND DEV",TAB(71);"TOT (U-M)" PRINT
10840     IF STT = "Y" THEN LPRINT "ON CHANNEL",TAB(24);"UNITS",TAB(33);"MINIMUM",TAB(42);"MAXIMUM",TAB(51);"AVERAGE",TAB(60);"STAND DEV",TAB(71);"TOT (U-M)" LPRINT
10850     FOR TMT = DC TO DO
10860         PRINT ZDAY(1,TMT);TAB(5);CHANN(TMT);TAB(24);UNIT(ZDAY(1,TMT));TAB(33);
10870         PRINT USING "0000000", ZDAY(1,TMT); PRINT TAB(42); PRINT USING "0000000", ZMAX(TMT); PRINT TAB(51); PRINT USING "0000000", ZAVE(TMT); PRINT TAB(60); PRINT USING "0000 000", ZSCALE(TMT); PRINT TAB(
10880         PRINT USING "000 0000", ZSCALE(TMT) PRINT
10890     IF STT = "Y" THEN LPRINT ZDAY(1,TMT);TAB(5);CHANN(TMT);TAB(24);UNIT(ZDAY(1,TMT));TAB(33);
10900     IF STT = "Y" THEN LPRINT USING "0000000", ZDAY(1,TMT); LPRINT TAB(42); LPRINT USING "0000000", ZMAX(TMT); LPRINT TAB(51); LPRINT USING "0000000", ZAVE(TMT); LPRINT TAB(60); LPRINT USING "0000 000",
10910     ZSCALE(TMT); LPRINT TAB(70);
10920     IF STT = "Y" THEN LPRINT USING "000 0000", ZSCALE(TMT) LPRINT
10930     NEXT TMT
10940     PRINT "PRESS ANY KEY TO CONTINUE"
10950     K1 = INKEY$
10960     IF K1 = "" GOTO 10940
10970     IF CHANNN = 00 THEN GOSUB 10710 GOTO 10780
10980     DO = DO + 10 DC = DC + 10
10990     GOTO 10800
11000     REM
11010     REM **** SUBROUTINE TO FREE STRING SPACE ****
11020     FOR BB = 1 TO CHANNN
11030         CHANN(BB) = ""

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19030 NEXT B0
19040 RETURN
19050 REM
19060 REM **** SUBROUTINE TO CALCULATE STATS FOR A GIVEN CHANNEL ****
19070 ZDATA(1,EE) = 199999 : ZMAX(EE) = 0
19080 FOR N = 1 TO RECMN
19090   IF ARRATN(,GG) < ZDATA(,EE) THEN ZDATA(,EE) = ARRATN(,GG)
19100   IF ARRATN(,GG) > ZMAX(EE) THEN ZMAX(EE) = ARRATN(,GG)
19110   ZCAL(EE) = ZCAL(EE) + ARRATN(,GG)
19120   ZCAL2(EE) = ZCAL2(EE) + ARRATN(,GG) * ARRATN(,GG)
19130 NEXT N
19140 ZSCALE(EE) = (ZCAL2(EE)-ZCAL(EE)*ZCAL(EE)/RECMN)/(RECMN-1)
19150 IF ZSCALE(EE) < 0 THEN ZSCALE(EE) = 0 : GOTO 19170
19160 ZSCALE(EE) = SQRT(ZSCALE(EE))
19170 ZAKE(EE) = ZCAL(EE)/RECMN
19180 RETURN
19190 REM
19200 REM **** SUBROUTINE TO DISPLAY 'ON CHANNEL' DESCRIPTIONS ****
19210 STT$ = ""
19220 CLS : LOCATE 6,4 : PRINT "DO YOU WANT A HARD COPY OF 'ON CHANNEL' DESCRIPTIONS AND NUMBERS (Y/N)?"
19230 K$ = INKEY$
19240 IF K$ = "" GOTO 19230
19250 IF K$ = "Y" OR K$ = "y" THEN STT$ = "Y" : GOTO 19300
19260 IF K$ = "N" OR K$ = "n" GOTO 19380
19270 GOTO 19330
19280 DO = 1 : DO = 10
19290 IF DO < 0 THEN DO = 0
19300 CLS : LOCATE 1,35 : PRINT "DESCRIPTIONS FOR 'ON CHANNELS'";DO;"TO";DO : THEN
19310 IF STT$ = "Y" THEN LPRINT : PRINT : PRINT "DESCRIPTIONS FOR 'ON CHANNELS'";DO;"TO";DO : LPRINT
19320 FOR TW$ = DO TO DO
19330   PRINT "ON CHANNEL #";TW$;TAB(20);T$(TW$) : PRINT
19340   IF STT$ = "Y" THEN LPRINT "ON CHANNEL #";TW$;TAB(20);T$(TW$) : LPRINT
19350 NEXT TW$
19360 PRINT "PRESS ANY KEY TO CONTINUE"
19370 K$ = INKEY$
19380 IF K$ = "" GOTO 19370
19390 IF DO = 0 GOTO 19430
19400 DO = DO + 10 : DO = DO + 10
19410 GOTO 19330
19420 CLS : LOCATE 8,11 : PRINT "TO RETURN TO CHANNEL DESCRIPTIONS,"
19430 LOCATE 10,7 : PRINT "PRESS P AT NEARLY ANY PAUSE IN THE SUMMARY ROUTINE"
19440 PRINT : PRINT : PRINT "PRESS ANY KEY TO CONTINUE "
19450 K$ = INKEY$
19460 IF K$ = "" GOTO 19450
19470 CLS : RETURN
19480 FOR MN$ = 1 TO 0
19490   ZATA(1,MN$) = MN$
19500   CHAN(MN$) = DIS(MN$)
19510   IF CHAN(MN$) = "" THEN CHAN(MN$) = "NO LABEL"
19520 NEXT MN$
19530 CHANUM = 0
19540 GOTO 19330
20000 REM
20010 REM **** SUBROUTINE TO GENERATE A SCATTER OR POINT-TO-POINT PLOT ****
20020 CLS : LOCATE 4,16 : PRINT "DO YOU HAVE A GRAPHICS CAPABLE SCREEN (Y/N)?"
20030 K$ = INKEY$
20040 IF K$ = "" GOTO 20030
20050 IF K$ = "Y" OR K$ = "y" THEN ST$ = 1 : GOTO 20080
20060 IF K$ = "N" OR K$ = "n" THEN ST$ = 0 : GOTO 20080
20070 GOTO 20030

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10000 CLS LOCATE 4,16 INPUT "NAME OF SORTED ENGINEERING FILE TO BE PLOTTED";EFILE;
10010 EFILES = VS + EFILE;
10020 IZ = FREE;
10030 CLS LOCATE 4,16 INPUT "ON CHANNEL NUMBER FOR PLOT TO BE CREATED";CHAN;
10040 IF CHAN < "P" OR CHAN > "9" THEN GOSUB 19170 GOTO 10110
10050 CHAN = VAL(CHAN);
10060 CHAN2 = 0
10070 CHAN2 = 0
10080 CLS LOCATE 2,30 PRINT "ELCAP DAY 1 = JANUARY 1, 1961"
10090 LOCATE 4,1 INPUT "ELCAP DAY NUMBER AT WHICH PLOT WILL BEGIN ('ALL' FOR FILE)"; STPLOT;
10100 IF STPLOT < "ALL" OR STPLOT > "11" THEN CHAN2 = 1 GOTO 10130 ELSE STPLOT = VAL(STPLOT);
10110 LOCATE 7,4 INPUT "TIME (IN SECONDS) FOR THE ABOVE DAY";IZ; STPLOT = STPLOT*86400 + IZ;
10120 LOCATE 11,1 INPUT "ELCAP DAY NUMBER AT WHICH PLOT WILL END"; EMPLOT;
10130 LOCATE 14,4 INPUT "TIME (IN SECONDS) FOR THE ABOVE DAY";IZ; EMPLOT = EMPLOT*86400 + IZ;
10140 CLS LOCATE 4,5 PRINT "PLEASE WAIT"
10150 LOCATE 9,4 PRINT "GATHERING DATA FOR PLOT ";
10160 BEGIN = 34 DOAT = 0
10170 GOSUB 19180
10180 OPEN EFILES FOR INPUT AS #1
10190 PRINT " ", DE = 0
10200 FOR I1 = 1 TO 1000
10210 DE = DE + 1 IF DE > 10 THEN PRINT " ", DE = 0
10220 LINE INPUT #1, EFLIN;
10230 IF CHAN2 < 1 GOTO 10340
10240 IF VAL(MID$(EFLIN,16,4))*86400 + VAL(MID$(EFLIN,21,6)) < STPLOT GOTO 10400
10250 IF VAL(MID$(EFLIN,16,4))*86400 + VAL(MID$(EFLIN,21,6)) > EMPLOT THEN CLOSE #1 : RECHNN = I1 - 1 GOTO 10360
10260 IF CHAN = 0 THEN GOTO 10340
10270 IF CHAN = 0 AND VAL(MID$(EFLIN,21,6)) < 0 THEN DOAT = DOAT + 1 : IATA(I1) = I1
10280 IF CHAN = 0 THEN OLDAT = VAL(MID$(EFLIN,16,6)) : NTIME = OLDAT*86400 + VAL(MID$(EFLIN,21,6))
10290 CHAN = 1
10300 ARRAY(1,3) = VAL(MID$(EFLIN,16,6))
10310 ARRAY(1,4) = VAL(MID$(EFLIN,21,6))
10320 ARRAY(1,2) = ARRAY(1,3)*86400 + ARRAY(1,4)
10330 FOR J2 = 1 TO CHAN-1
10340 STUDJ = MID$(EFLIN,BEGIN+OVL(1,1)+J2,4)
10350 IF MID$(STUDJ,1,1) < "0" THEN GOSUB 19360
10360 NEXT J2
10370 ARRAY(1,1) = VAL(STUDJ)
10380 IF OLDAT < ARRAY(1,3) THEN DOAT = DOAT + 1 : OLDAT = ARRAY(1,3) : IATA(DOAT) = I1
10390 IF <= EFLIN THEN IF V < 0 THEN CLOSE #1 GOTO 10190
10400 NEXT I1
10410 RECHNN = I1
10420 PRINT "COMPLETE"
10430 IF ARRAY(GOGO,2) = ARRAY(RECHNN,1) THEN PRINT PRINT PRINT "NO DATA IN CHOSEN TIME PERIOD. PLOT ABANDONED" SOUND 440,9 : SOUND 32767,4.5 : SOUND 440,9 : SOUND 32767,4.5 : SOUND 32767,1 : GOTO 17510
10440 IF ARRAY(GOGO,2) = ARRAY(RECHNN,3) THEN PRINT PRINT PRINT "FILE NOT SORTED. PLOT ABANDONED" SOUND 440,9 : SOUND 32767,4.5 : SOUND 440,9 : SOUND 32767,4.5 : SOUND 32767,1 : GOTO 17510
10450 ZMIN = 0 : ZMAX = 0
10460 FOR IT = GOGO TO RECHNN
10470 IF ARRAY(IT,1) < ZMAX THEN ZMAX = ARRAY(IT,1)
10480 IF ARRAY(IT,1) < ZMIN THEN ZMIN = ARRAY(IT,1)
10490 NEXT IT
10500 IF ZMAX = 0 AND ZMIN = 0 THEN PRINT PRINT PRINT "ALL VALUES EQUAL TO ZERO" SOUND 440,9 : SOUND 32767,4.5 : SOUND 440,9 : SOUND 32767,4.5 : SOUND 32767,1 : GOTO 19190
10510 HTH = 150 * ABS(ZMIN)/(ABS(ZMIN)+ZMAX)
10520 SCALE = 150/(ABS(ZMIN)+ZMAX)
10530 IF FIX(ARRAY(GOGO,3)/86400) < ARRAY(GOGO,3)/86400 THEN STIME = FIX(ARRAY(GOGO,3)/86400)*86400
10540 IF FIX(ARRAY(RECHNN,3)/86400) < ARRAY(RECHNN,3)/86400 THEN NTIME = FIX(ARRAY(RECHNN,3)/86400)*86400
10550 IF STS < 1 GOTO 10730
10560 SCREEN 2
10570 CLS
10580 FOR C = 1 TO (NTIME-STIME)/86400+1
10590 AT = (86400*IC)/150+(NTIME-STIME)

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20600 IF AT > 250 GOTO 20720
20610 AT = (AT*50)/(450/415)
20620 BB1 = 199 - (MTN*60)/(200/325) BB1 = 199 - (MTN*57)/(200/325)
20630 LINE (AT,BB1)-(AT,BB2)
20640 NEXT G
20650 AXIS = 0
20660 IF MTN > 50 THEN AXIS = 50
20670 IF MTN > 100 THEN AXIS = 100
20680 IF MTN > 150 THEN AXIS = 150
20690 IF MTN > 200 THEN AXIS = 200
20700 IF MTN > 250 THEN AXIS = 250
20710 IF STS = 0 GOTO 20970
20980 MTN2 = 199 - (MTN*60)/(200/325)
20810 FOR N = 0 TO 5
20820 PLACE = 50*N*MTN*AXIS IF PLACE > 250 GOTO 20850
20830 PLACE = 199 - (PLACE*60)/(200/325)
20840 LINE (75*60/7,PLACE)-(1175*60/7,PLACE)
20850 NEXT N
20860 LINE (645*60/7,MTN2)-(777*60/7,MTN1)
20870 LINE (777*60/7,2340)-(777*60/7,143*60/7)
20880 FOR X = 0 GOTO TO RECHUM
20890 AX = 250*(ARRAY(N,3)-STIME)/(MTIME-STIME)
20900 AZ = (AX*50)/(400/415)
20910 AY = SCALE*ARRAY(N,1) + MTN
20920 AV = 199 - (AY*60)/(200/325)
20930 IF SPP6 = "Y" AND N > 0 GOTO THEN LINE -(AX,AY)
20940 PSET (AX,AY)
20950 NEXT N
20960 LOCATE 1,11 PRINT "KEY TO CONTINUE";TAB(34);Y1:(CHAN);TAB(55);MTN:(CHAN);TAB(67);BULB:LINE#
20970 FOR S = 1 TO 4
20980 SCALZIME = (50*N-1)*AXIS*(ABS(ZMIN)+ZMAX)/(250)
20990 NEXT K
21000 IF STS = 0 GOTO 21110
21010 PP = 0
21020 FOR LL = 1 TO 4
21030 IF PP = 2 ON SCALZ(11) 2200 GOTO 21070
21040 PP = 21*0*(ABS-MTN)/50-(11-1)*0
21050 IF PP < 1 THEN PP = 2
21060 NUM1 = MID$(STR$(SCALZ(11)),1,6)
21070 LOCATE PP,1
21080 PRINT USING "L", NUM1
21090 NEXT LL
21100 LOCATE 22,9 PRINT USING "0000", STIME/66400
21110 STP = 1
21120 IF DDAT > 5 THEN STP = 1
21130 IF DDAT > 10 THEN STP = 2
21140 IF DDAT > 15 THEN STP = 3
21150 IF DDAT > 20 THEN STP = 4
21160 IF DDAT > 25 THEN STP = 5
21170 IF DDAT > 30 THEN STP = 6
21180 IF DDAT > 35 THEN STP = 7
21190 IF STS = 0 GOTO 21170
21200 FOR P = 1 TO DDAT STEP STP
21210 BB = P + 60*(ARRAY(IATA,P)-21-STIME)/(MTIME-STIME)
21220 IF BB < 14 GOTO 21250
21230 IF BB > 72 GOTO 21250
21240 LOCATE 13,80
21250 PRINT USING "0000", ARRAY(IATA,P),3)
21250 NEXT P
21260 LOCATE 12,77 PRINT USING "0000", MTIME/66400
21270 CLEAR = STIME/66400: GOSUB 22010: M01 = M0: DAY1 = DAY: YR1 = YR

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21874 PRINT H1, "PU74-13, LRECAP Day Number Day 1 = January 1, 1961 (GMT)+CHR$(1) BOUND 11747,100 : SOUND 11747,1
21894 PRINT H1, "PU-44,8,DI0,1,10",T1$(CHAM1) " (" ,UNT1$(CHAM1)," ",CHR$(10)," "
21899 CLOSE H1
21900 C15 LOCATE 4,14 PRINT "WANT ANOTHER ORIGINAL OF THE SAME PLOT (Y/N)?"
21911 K5 = INKEY$
21924 IF K5 = "" GOTO 21910
21930 IF K5 = "Y" OR K5 = "y" GOTO 21990
21940 IF K5 = "N" OR K5 = "n" GOTO 21920
21950 GOTO 21910
21960 C15 LOCATE 4,14 PRINT "PLOT ANOTHER CHANNEL FROM THE SAME FILE (Y or N)?"
21971 K5 = INKEY$
21980 IF K5 = "Y" OR K5 = "y" GOTO 21910
21990 IF K5 = "N" OR K5 = "n" GOTO 21920
22000 GOTO 21920
22010 REM
22020 REM **** SUBROUTINE TO RESET THE OVERFLOW COUNTERS ****
22030 FOR OMC = 1 TO 99
22040 OMC(OMC)=0
22050 NEXT OMC
22060 RETURN
22070 REM
22080 REM **** SUBROUTINE TO CREATE TABLE OF DAY NUMBERS AND CORRESPONDING DATES ****
22090 C15 LOCATE 4,1 : PRINT "(JANUARY 1, 1961 = 1) (JANUARY 1, 1962 = 264) (JANUARY 1, 1963 = 731)"
22100 LOCATE 4,1 PRINT "(JANUARY 1, 1964 = 1094) (JANUARY 1, 1965 = 1458) (JANUARY 1, 1966 = 1821)"
22110 LOCATE 4,14 INPUT "ELCAP DAY NUMBER TO START THE TABLE";PDAYS
22120 LOCATE 10,14 INPUT "ELCAP DAY NUMBER TO END THE TABLE";PDAYS
22130 SKIP = 61
22140 SECT = FID((PDAYS-PDAYS)/60)+1
22150 C15 SECT = 0
22160 LPRINT CHR$(10)
22170 FOR PPP = PDAYS TO PDAYS
22180 SKIP = SKIP + 1 IF SKIP < 61 GOTO 22170
22190 C15 SECT = SECT + 1
22200 FLEAT = PPP COSUB 22000 COSUB 22000
22210 PRINT LPRINT
22220 PRINT USING "0000";FLEAT, PRINT "--",PDAYS,TAB(17);MONTH$," " : PRINT USING "00";DAY : PRINT " " : PRINT USING "0000";VR;
22230 LPRINT USING "0000";FLEAT, LPRINT "--",PDAYS,TAB(17);MONTH$," " : PRINT USING "00";DAY : LPRINT " " : LPRINT USING "0000";VR;
22240 IF SECT = 1 THEN FLEAT = PPP + 60
22250 IF SECT > 1 AND FLEAT < PDAYS THEN COSUB 22000 COSUB 22000 COSUB 22000
22260 IF SECT > 1 AND C15 SECT = 59 THEN SKIP = 0
22270 IF C15 SECT = 59 THEN C15 SECT = 0 SECT = SECT + 1 (PRINT CHR$(10))
22280 IF SECT <= 0 THEN PRINT LPRINT GOTO 22030
22290 NEXT PPP
22300 LPRINT PRINT
22310 GOTO 22030
22320 REM
22330 REM **** SUBROUTINE FOR SECOND COLUMN PRINT ****
22340 PRINT TAB(40), PRINT USING "0000";FLEAT, PRINT "--",PDAYS,TAB(16);MONTH$," " : PRINT USING "00";DAY, PRINT " " : PRINT USING "0000";VR;
22350 LPRINT TAB(40), LPRINT USING "0000";FLEAT, LPRINT "--",PDAYS,TAB(16);MONTH$," " : PRINT USING "00";DAY : LPRINT " " : LPRINT USING "0000";VR;
22360 RETURN
22370 REM
22380 REM **** SUBROUTINE TO SET YEAR, MONTH AND DAY ****
22390 Y(1)=365 Y(2)=365 Y(3)=365 Y(4)=365
22400 YR=1961 DAY=FLEAT
22410 WHILE DAY > 366
22420 DAY = DAY-L66
22430 YR = YR + 4
22440 WEND
22450 FOR M = 1 TO 4
22460 IF DAY > Y(M) THEN YR = YR + 1 DAY = DAY - Y(M)

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22700 NEXT N
22710 IF 'N' < 1 THEN LEAPDAY = 0 ELSE LEAPDAY = 1
22720 M(1)=31 M(2)=28+LEAPDAY M(3)=31 M(4)=30 M(5)=31 M(6)=30 M(7)=31 M(8)=31 M(9)=30 M(10)=31 M(11)=30 M(12)=31
22730 MO = 1
22740 FOR N = 1 TO 12
22750   IF DAY > MIN THEN DAY = DAY - MIN ELSE RETURN
22760   MO = MO + 1
22770 NEXT N
22780 RETURN
22790 REM
22800 REM **** SUBROUTINE TO SET THE DAY OF WEEK AND MONTH ****
22810 PDAYS = "WEDNESDAY" : ZEE = FLEAT/7-FIX(FLEAT/7)
22820 IF ZEE > 9.999999-0.1 THEN PDAYS = "THURSDAY"
22830 IF ZEE > 1.42144 THEN PDAYS = "FRIDAY"
22840 IF ZEE > 3.85735 THEN PDAYS = "SATURDAY"
22850 IF ZEE > 1.04541 THEN PDAYS = "SUNDAY"
22860 IF ZEE > 2.71419 THEN PDAYS = "MONDAY"
22870 IF ZEE > 2.14294 THEN PDAYS = "TUESDAY"
22880 MONTHS = "JANUARY"
22890 IF MO > 1 THEN MONTHS = "FEBRUARY"
22900 IF MO > 3 THEN MONTHS = "MARCH"
22910 IF MO > 4 THEN MONTHS = "APRIL"
22920 IF MO > 5 THEN MONTHS = "MAY"
22930 IF MO > 6 THEN MONTHS = "JUNE"
22940 IF MO > 7 THEN MONTHS = "JULY"
22950 IF MO > 8 THEN MONTHS = "AUGUST"
22960 IF MO > 9 THEN MONTHS = "SEPTEMBER"
22970 IF MO > 10 THEN MONTHS = "OCTOBER"
22980 IF MO > 11 THEN MONTHS = "NOVEMBER"
22990 IF MO > 12 THEN MONTHS = "DECEMBER"
23000 RETURN

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