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**Hanford Meteorological
Station Computer Codes
Volume 5 - The TOWER
Computer Code**

J. W. Buck
G. L. Andrews

October 1987

**Prepared for the U.S. Department of Energy
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HANFORD METEOROLOGICAL STATION
COMPUTER CODES

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Richland, Washington 99352

PREFACE

This volume is the fifth in a series of volumes that describe computer programs routinely used at the Hanford Meteorological Station (HMS) (e.g., data entry programs). Each volume, which documents one computer code, consists of a program overview, user's guide, description of input, a detailed program description and flowchart, and a listing of the source code.

The first seven volumes present the data entry programs used at the HMS for archiving and checking various types of data. All of these programs use a data entry form to facilitate data input, and each code calls the same series of subroutines that control and display the data entry form at the user's terminal. The subroutines were generated from the program FORMEDIT, which was developed by John Wiberg of the Computer Science staff in the Engineering Physics Department at Pacific Northwest Laboratory. An informal user's guide to the FORMEDIT program that describes how to create, modify, and eliminate data entry forms is available from the HMS system manager.

SUMMARY

The Hanford Meteorological Station (HMS), operated by Pacific Northwest Laboratory, archives wind, dry bulb temperature, and soil temperature data gathered each hour from the 410-ft meteorological tower. These data include measurements of wind speed and wind direction for seven heights, eight dry bulb temperatures, and three soil temperatures. The TOWER computer code is used to archive those measurements and apply quality assurance checks to the data. The code accesses an input file, which contains the previous archive's date and hour, and an output file, which contains tower weather observations for the current month. A data entry form consisting of 25 fields is included in the program. The fields must be filled in by the user. The information entered is appended to the monthly file, which provides an archive for the tower data gathered hourly. This volume describes the implementation and operation of the TOWER computer code at the HMS.

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INTRODUCTION

The Hanford Meteorological Station (HMS) was established in 1944 on the Hanford Site to collect and archive meteorological data and to provide weather forecasts and related services for Hanford project activities. The HMS is located in the northwest quadrant of the Hanford Site and is operated by the Pacific Northwest Laboratory (PNL).

The 410-ft Hanford meteorological tower was erected in 1944 along with the HMS for measuring wind and temperature. The tower is equipped with seven levels of instruments for measuring wind speed and wind direction, eight levels of dry bulb temperature sensors for measuring temperature, and three levels of sensors for measuring soil temperature. The wind speed and wind direction instruments are at the 7-, 30-, 50-, 100-, 200-, 300-, and 400-ft level; the dry bulb temperature sensors at the 3-, 30-, 50-, 100-, 200-, 250-, 300-, and 400-ft level; and the soil temperature sensors at 1/2, 15 and 36 inches below the ground. Some of the tower data are archived each hour. The variables archived are all the dry bulb and soil temperatures; the wind speed for the 7-, 50-, 100-, 200-, 300-, and 400-ft level; wind direction for the 50-, 200-, and 400-ft level; and the maximum wind speed at the 50-ft level plus the associated wind direction and time. Those data are hereafter referred to as the tower data. Forecasters use the TOWER computer code to archive and apply quality assurance checks to the tower data. The archive is maintained in monthly disk files on the HMS computer system (DEC VAX 11/750).

The following sections in the volume describe the implementation and operation of the TOWER computer code. Appendix A contains a description and flowchart of the TOWER computer code and Appendix B contains a source listing of the TOWER computer code.

THE TOWER COMPUTER CODE

The TOWER computer code provides a method for archiving data obtained from the 410-ft meteorological tower. The code has replaced manual entry of data via computer cards and a keypunch. The TOWER code was written, compiled, and linked on the DEC VAX 11/750 at the HMS and is executed once an hour.

PROGRAM OVERVIEW

The TOWER computer code accesses one input file and one output file. The input file contains the previous archive's date and hour, and the output file consists of hourly tower data for the current month. The convention used in naming the monthly forecast files is TOWERxxx.DAT where the xxx is the three-character abbreviation of the current month (e.g., AUG for August). (Refer to Appendix A for more information about input/output operations.)

The program begins by displaying a data entry form on the terminal screen (Fig. 1). The length of each field is indicated by the number of X's next to the field name. The program fills in the date and hour fields by accessing an input file to obtain the previous archive's date and hour. You are then prompted to enter data for the remaining fields in the form. You can exit the data entry form after filling in all the input fields. The screen clears, and a prompt to make any needed corrections appears on the screen. Once all the input values are correct, you can exit the program and the TOWER data are appended to the current monthly tower data file.

USER'S GUIDE FOR THE TOWER COMPUTER CODE

This section describes how to invoke the TOWER computer code on the HMS DEC VAX 11/750 computer and how to respond to the various prompts associated with the code. We assume that you know how to access the FCST account on the HMS computer, and that you have some basic knowledge of the VAX operating system. The terminal must be in the DEC VT100 terminal mode before executing the TOWER computer code. To determine the terminal status, simply type SHOW TERMINAL and depress the RETURN key. A list of terminal characteristics appears

HMS TOWER DATA INPUT FORM							
DATE: xxxxxx				HOUR: xx			
- 1/2 INCH: xxxx		- 15 INCH: xxxx		- 36 INCH: xxxx			
3FT TEMP: xxxx		30FT TEMP: xxxx		50FT TEMP: xxxx		100FT TEMP: xxxx	
200FT TEMP: xxxx		250FT TEMP: xxxx		300FT TEMP: xxxx		400FT TEMP: xxxx	
S7: xx	D5: xx	S5: xx	S1: xx	D2: xx	S2: xx	S3: xx	D4: xx S4: xx
PK GST DIR: xx		PK GST SPD: xx		PK GST TIME: xx			

FIGURE 1. Example of the Data Entry Form Used by the TOWER Computer Code

on the screen. Check to make sure the terminal type is set to VT100. If it is not, type SET TERMINAL/VT100 and depress the RETURN key. Currently, the HMS is equipped with several Tektronix 4107 terminals that can emulate the VT100 terminal.

Basically, there are six steps to executing the TOWER computer code, filling in the data entry form, and terminating the program. These steps are listed below and each step will be discussed in detail in the following paragraphs:

- log in to the HMS computer (need the FCST password)
- type RUN TOWER, then depress the RETURN key
- fill in the data entry form
- exit the form
- answer "yes" or "no" to "need corrections" prompt
- terminate program.

To log in, depress the RETURN key a couple of times. The computer responds with the prompt USERNAME:. Enter FCST and depress the RETURN key. The computer responds with the prompt PASSWORD:. You must know the password to the FCST

account before logging in to the HMS computer. Enter the correct password. If you fail to answer either of these prompts correctly the computer repeats the appropriate prompt. You are given three chances to enter the correct response. By logging in to the FCST account, you are placed in the [FCST] directory and can immediately invoke the TOWER computer code.

The TOWER code is invoked by typing RUN TOWER and depressing the RETURN key. The screen clears and the data entry form appears on your terminal. You can now begin data entry. If problems occur when executing the code refer to the "Trouble-Shooting" section of this volume for help.

The data entry form appears on the screen as shown in Figure 1 with the cursor in field three (-1/2 INCH). The date and hour fields (first and second fields, respectively) are filled in by the program. A prompt for the field indicated by the cursor appears on the screen at the bottom of the data entry form. Included with each prompt is a default value and a valid range or list of matching values from which the input must be selected. To enter data into a field, simply type in the requested data and depress the RETURN key. Integers are used for all input. The default value may be entered by depressing the ENTER key or the SELECT DEFAULT key, which is found on some Tektronix terminals. This action enters the default value. The input value appears in the field (assuming a valid value or default value was entered) while the cursor moves from left to right into the next field. After data are entered in the rightmost field, the cursor moves down one line to the leftmost field. When a value is entered in all the fields, you should check the fields for mistakes. If corrections are needed use the up, down, right, and left arrow keys ($\uparrow, \downarrow, \rightarrow, \leftarrow$) located at the top of the keyboard to move within the form. Once you are satisfied that the entered values are correct, depress the EXIT key to exit the form. You may exit the data entry form from any field.

The TOWER program provides two phases of quality assurance to the input data. The first phase is applied as you enter the input data for each field. An error message appears at the bottom of the form if the input value is not within the valid range or valid list of matching numbers, and you are then given the opportunity to enter another value for that field. The second phase occurs when you exit the form and the "need corrections" prompt appears below

the information entered in the form. You can check the input values for validity and make necessary corrections.

After exiting the form, the program displays the information entered into the data entry form on the terminal in the format in which it is appended to the monthly file (e.g., TOWERxxx.DAT). A prompt appears just below the information asking if you would care to make any corrections. If no corrections are needed, enter an N or n and the program appends the data to the monthly file. If corrections are needed, enter a Y or y and the program returns to the data entry form mode. At this time, the entered values will appear in their respective fields. Incorrect value(s) can be corrected by using the arrow keys to move the cursor to the appropriate field. When all corrections have been made, you can exit the form by depressing the EXIT key. You can exit the data entry form from any field; it is not necessary to move to the last field.

The TOWER program is terminated by answering n or N to the "need corrections" prompt. The entered data are appended to the monthly file and the program terminates with a FORTRAN STOP message written to your terminal. The monthly data files for the hourly tower data are located in the [FCST.DAT] directory. Each file contains all of the hourly tower data for any single month.

DESCRIPTION OF INPUT

The data entry form consists of 25 fields; integer values must be provided for 23 of these fields. The program provides the value for the first and second fields, which are the date and hour fields. When you move the cursor to one of the other 23 input fields, the code provides a prompt related to the required input. The prompt consists of a brief description of the field, the valid range or list of matching numbers from which the input value must be selected, and a default value (refer to the "User's Guide" section for information on how to input the default value). Table 1 describes each of the input fields. All temperatures are recorded in tenths

TABLE 1. Reference Guide to Input Fields

<u>Input Field</u>	<u>Description</u>	<u>Range or List</u>	
DATE	YYMMDD	860101-990101	/999999
HOUR	hour of day	1 - 24	/ 99
-1/2 INCH	1/2-in. soil temp. (a)	- 50 - 1500	/ 9999
-15 INCH	15-in soil temp. (a)	0 - 1000	/ 0
-36 INCH	36-in soil temp. (a)	0 - 900	/ 0
3 FT TEMP	3-ft dry bulb temp. (a)	- 370 - 1250	/ 9999
30 FT TEMP	30-ft dry bulb temp. (a)	- 370 - 1250	/ 9999
50 FT TEMP	50-ft dry bulb temp. (a)	- 370 - 1250	/ 9999
100 FT TEMP	100-ft dry bulb temp. (a)	- 370 - 1250	/ 9999
200 FT TEMP	200-ft dry bulb temp. (a)	- 370 - 1250	/ 9999
250 FT TEMP	250-ft dry bulb temp. (a)	- 370 - 1250	/ 9999
300 FT TEMP	300-ft dry bulb temp. (a)	- 370 - 1250	/ 9999
400 FT TEMP	400-ft dry bulb temp. (a)	- 370 - 1250	/ 9999
S7	7-ft wind speed (mph)	0 - 92	/ 99
D5	50-ft wind direction (in 10°)	0 - 37	/ 99
S5	50-ft wind speed (mph)	0 - 92	/ 99
S1	100-ft wind speed (mph)	0 - 92	/ 99
D2	200-ft wind direction (in 10°)	0 - 37	/ 99
S2	200-ft wind speed (mph)	0 - 92	/ 99
S3	300-ft wind speed (mph)	0 - 92	/ 99
D4	400-ft wind direction (mph)	0 - 37	/ 99
S4	400-ft wind speed (mph)	0 - 92	/ 99
PK GST DIR	direction of maximum wind speed at 50 ft (in 10°)	0 - 36	/ 0
PK GST SPD	maximum wind speed (mph) at 50 ft	0 - 92	/ 0
PK GST TIME	minutes in hour (code) at 50 ft	0 - 9	/ 0

(a) Measured in tenths of degrees Fahrenheit

of °F and are instantaneous values that are recorded one half-hour after each hour, except for the 15- and 36-inch soil temperature values, which are recorded every 6 hours. The wind speed and direction are hourly averages that the forecaster determines.

The following list describes each input field, the associated range or list of matching values from which the input must be selected, and the default value.

- 1) DATE - The date format is YYMMDD: where YY is the last two digits of the current year (e.g., 87 for 1987), MM is the numerical equivalent of the month (e.g., 04 represents April), and DD is the day of the month. An example of a date is 870421 which is April 21, 1987. The range of the date is 860101 (i.e., January 1, 1986) through 990101 (i.e., January 1, 1999). The default value for the date is 999999 (refer to the User's Guide Section for details on entering default values). This value indicates that the date is missing for the daily weather summary.
- 2) HOUR - The input value for this field is the hour of the day. The range is 1 through 24 with a default of 99. For example, 15 represents the hour 1500 on a 24-hour clock, or 3:00 p.m., using the normal convention. The default value indicates the hour was missing for that observation.
- 3) - 1/2 INCH - The input value for this field is the soil temperature one-half inch below the ground in tenths of degrees Fahrenheit (°F). For example, 599 indicates a temperature of 59.9°F. The range is -50 to 1500 with a default value of 9999. The default value indicates a missing 1/2-inch soil temperature for that observation.
- 4) - 15 INCH - The input value for this field is the soil temperature 15 inches below the ground in tenths of °F. For example, 599 indicates a temperature of 59.9°F. The range is 0 to 1000 with a default value of 0. The default value indicates a missing 15-in. soil temperature for that observation.

- 5) - 36 INCH - The input value for this field is the soil temperature 36 inches below the ground in tenths of °F. For example, 599 indicates a temperature of 59.9°F. The range is 0 to 900 with a default value of 0. The default value indicates a missing 36-in. soil temperature for that observation.
- 6) 3FT TEMP - The input value for this field is the 3-ft dry bulb temperature in tenths of °F. For example, 599 indicates a temperature of 59.9°F. The range is -370 through 1250 with a default value of 9999. The default value indicates a missing 3-ft dry bulb temperature for that observation.
- 7) 30FT TEMP - The input value for this field is the 30-ft dry bulb temperature in tenths of °F. The range and default values are the same as those for field 6).
- 8) 50FT TEMP - The input value for this field is the 50-ft dry bulb temperature in tenths of °F. The range and default values are the same as those for field 6).
- 9) 100FT TEMP - The input value for this field is the 100-ft dry bulb temperature in tenths of °F. The range and default values are the same as those for field 6).
- 10) 200FT TEMP - The input value for this field is the 200-ft dry bulb temperature in tenths of °F. The range and default values are the same as those for field 6).
- 11) 250FT TEMP - The input value for this field is the 250-ft dry bulb temperature in tenths of °F. The range and default values are the same as those for field 6).
- 12) 300FT TEMP - The input value for this field is the 300-ft dry bulb temperature in tenths of °F. The range and default values are the same as those for field 6).
- 13) 400FT TEMP - The input value for this field is the 400-ft dry bulb temperature in tenths of °F. The range and default values are the same as those for field 6).

- 14) S7 - The input value for this field is the 7-ft average wind speed in mph. The range is 0 through 92 with a default value of 99. The default value indicates a missing 7-ft average wind speed.
- 15) D5 - The input value for this field is the 50-ft average wind direction in tens of degrees. For example, 25 represents a wind direction 250° from the north. The range is 0 through 37 with a default value of 99. The value 37 indicates variable wind conditions, while the value 0 indicates calm conditions. The default value indicates a missing 50-ft average wind direction.
- 16) S5 - The input value for this field is the 50-ft average wind speed in mph. The range and default values are the same as those for field 14).
- 17) S1 - The input value for this field is the 100-ft average wind speed in mph. The range and default values are the same as those for field 14).
- 18) D2 - The input value for this field is the 200-ft average wind direction in tens of degrees. The range and default values are the same as those for field 15).
- 19) S2 - The input value for this field is the 200-ft average wind speed in mph. The range and default values are the same as those for field 14).
- 20) S3 - The input value for this field is the 300-ft average wind speed in mph. The range and default values are the same as those for field 14).
- 21) D4 - The input value for this field is the 400-ft average wind direction in tens of degrees. The range and default values are the same as those for field 15).
- 22) S4 - The input value for this field is the 400-ft average wind speed in mph. The range and default values are the same as those for field 14).

- 23) PK GST DIR - The input value for this field is the wind direction for maximum wind speed at 50 ft, if that speed is greater than or equal to 15 mph. It is recorded in tens of degrees. For example, 25 represents a wind direction of 250° from the north. The range is 1 through 36 with a default value of 0. The default value indicates no wind gust equal to or greater than 15 mph was observed if direction and speed are also 0.
- 24) PK GST SPD - The input value for this field is the 50-ft maximum wind speed in mph, if the maximum wind speed is equal to or greater than 15 mph. The range is 0 through 92 with a default value of 0. The default value indicates no wind gust equal to or greater than 15 mph was observed.
- 25) PK GST TIME - The input value for this field is the time of the 50-ft maximum wind speed, if the maximum wind speed was equal to or greater than 15 mph. It is recorded as one of the codes indicated in Table 2. The range is 0 through 9 with a default value of 0. The default value indicates there were no wind gusts equal to or greater than 15 mph.

TABLE 2. Codes for Minutes Past the Hour of Maximum Wind Speed

<u>Codes</u>	<u>Minutes in Hour</u>
0	0 - 5
1	6 - 11
2	12 - 17
3	18 - 23
4	24 - 29
5	30 - 35
6	36 - 41
7	42 - 47
8	48 - 53
9	54 - 59

TROUBLE-SHOOTING THE TOWER COMPUTER CODE

This section provides information that may help resolve problems that occur when operating the TOWER computer code. We assume that you are familiar with the VAX EDT editor and the VAX operating system commands. Basically, there are three types of failure or problem areas: terminal (i.e., CRT), system, and/or program. The following sections discuss problems or failures that may occur when using the TOWER computer code and the suggested recovery procedures. If a series of recovery actions are suggested, you should try them in sequence until the problem or failure is resolved. Remember that the date and shift number are incremented each time you execute the TOWER program. Therefore, you may need to edit the [FCST.PREVIOUS_DATE] TOWER_DATE.DAT file to reflect the desired date and shift number after you have tried the recovery procedures.

TERMINAL PROBLEMS/FAILURES

Problem: Terminal does not respond.

Recovery: Determine if terminal is on. On Tektronix terminals the on/off switch is located in the front and to the right.

Determine if the dimmer switch is turned all the way down. On Tektronix terminals the dimmer switch is located in the front and to the right. Turn the switch clockwise to increase the light intensity on the screen.

If the above actions fail to get a response from the terminal, ask the instrument specialist (the HMS Room 125) to check the terminal.

SYSTEM PROBLEMS/FAILURES

Problem: System does not respond to operating system commands or carriage returns.

Recovery: Check with the Emergency Meteorological System (EMS) computer manager (Eric Stephan, 376-1107, or Ora Gifford, 373-3216) to

see if the HMS computer system is down for maintenance or repair.

If the EMS computer manager indicates the HMS computer system is operating, turn the terminal off, wait approximately 15 to 20 seconds, and turn the terminal back on. Depress the RETURN key several times to get attention of the computer system.

If the above actions fail ask an instrument specialist to examine the computer and notify the EMS computer manager.

PROGRAM PROBLEMS/FAILURES

Problem: Terminal not correctly displaying data entry form.

Recovery: Depress the CTRL key and the Y key simultaneously to get to the dollar sign prompt. Type SET TERMINAL/VT100 and depress RETURN. Try running the program again.

Depress the SETUP key at the top of the keyboard. The terminal should respond with an asterisk. Type CODE ANSI and depress RETURN, then depress the SETUP key. Try running the program again.

Problem: Terminal displaying garbled data.

Recovery: Depress the SETUP key at the top of the keyboard. The terminal should respond with an asterisk. Type CODE ANSI, depress RETURN, then depress the SETUP key.

Problem: Program TOWER.EXE cannot be found or program has been "trashed" in some way.

Recovery: Copy backup version to the FCST directory. Type
COPY [FCST.DATA_ENTRY]TOWER.EXE [FCST]TOWER.EXE. Try program again.

Problem: Input file ([FCST.PREVIOUS_DATE]TOWER_DATE.DAT) or output file ([FCST.DAT]TOWERxxx.DAT where xxx is the three-character abbreviation of the current month) cannot be found.

Recovery: Check the [FCST.PREVIOUS_DAT] directory for the input file or the [FCST.DAT] directory for the output file.

If file(s) is intact, try copying the backup version of TOWER.EXE to the [FCST] directory (see above for directions). Try running the code again.

APPENDIX A

PROGRAM DESCRIPTION AND FLOWCHART

APPENDIX A

PROGRAM DESCRIPTION AND FLOWCHART

This discussion describes, in detail, the operations and logical flow of the TOWER computer code. A flowchart indicating the general operations and logical sequence of the TOWER code is shown at the end of this appendix. The flowchart is divided into three sections by two dashed lines. The top and bottom sections are transparent to the user and do not require your input. The middle section involves the data entry form that requires your input. The following three paragraphs describe the operations within each section. For a more in-depth review of the operations and logical sequence of the program, refer to the source listing in Appendix B.

The program begins by opening the file TOWER_DATE.DAT, which contains one record with the previous archive's date and hour. The program then reads the data. The TOWER_DATE.DAT file resides in the [FCST.PREVIOUS_DATE] sub-directory. The month from that date is then used to open the file TOWERxxx.DAT (where xxx is the three-character abbreviation for the current month), which contains the hourly tower data for the current month. The TOWERxxx.DAT file resides in the [FCST.DAT] sub-directory. The date and hour are incremented and returned to the TOWER_DATE.DAT file. If the incremented date crosses over into the next month, a new TOWERxxx.DAT file is opened (where xxx will then reflect the new month). At this point the code calls several subroutines that control and display a data entry form at your terminal.

The TOWER code uses a data entry form to facilitate data entry. The form consists of several input fields (see Fig. 1 in the main text), each of which represents a tower variable. Each field is displayed in reverse video to highlight the field length. The fields are initially blank. Prompts at the bottom of the form for an input value describe the data required for the current field. The prompt consists of a brief description of the field, the valid range or list of values from which the input must be selected, and a default value. A valid entry must be made in the current field before the cursor moves to the next field. If the numeric value is valid, the number is

displayed in the appropriate field and the cursor moves to the next field when the ENTER key is depressed. If the input value is not valid, an error message occurs at the bottom of the form and the cursor remains in that field. When this occurs, the prompt reappears.

After entering all the input data, the data entry process is terminated by depressing the EXIT key on the Tektronix 4107 terminal. The screen is then cleared, and the input data are displayed at the terminal in the data format used in the TOWERxxx.DAT file. You are then asked if any corrections are needed before the record is appended to the current monthly file. If no corrections are needed, the hourly TOWER data are appended to the TOWERxxx.DAT file and a message is displayed on the screen indicating that the hourly tower data have been appended to the current monthly file. The program terminates when the message FORTRAN STOP appears on the terminal. If corrections are needed, the code returns to the data entry form and the input values entered by you are displayed. You can move to the appropriate input field(s) (refer to the "User's Guide" section for information on how to move the cursor within the form) and change the value(s). Once all the value(s) are corrected, the data record is again displayed on the screen and you are given another opportunity to correct any mistakes.

APPENDIX B

TOWER SOURCE CODE LISTING

15:33:49DUA0: [FCST.DATA_ENTRY]TOWER.FOR;16

```

0001 C *****
0002 C
0003 C
0004 C      PROGRAM: TOWER.FOR
0005 C
0006 C      PROGRAMMER: GREGG ANDREWS AND ORA GIFFORD
0007 C
0008 C      FUNCTION: THIS PROGRAM WAS DEVELOPED TO FACILITATE THE
0009 C                ARCHIVING OF THE HMS TOWER DATA.
0010 C                THE PROGRAM ACCESSES A SCRATCH FILE
0011 C                (TOWER_DATE.DAT) TO DETERMINE DATE AND HOUR OF
0012 C                LAST DATA ENTRY. PROGRAM THEN INCREMENTS THE DATE
0013 C                AND HOUR THROUGH SOFTWARE. AFTER THE DATE AND HOUR
0014 C                OF THE NEXT ENTRY IS DETERMINED IT MAKES CALLS TO
0015 C                SUBROUTINES THAT CONTROL THE INPUT FORM. AT THIS
0016 C                POINT THE FORECASTER ENTERS THE DATA. GROSS ERROR
0017 C                CHECKS ARE MADE AND DEFAULT VALUES ARE AVAILABLE
0018 C                IF NEEDED. ONCE THE DATA IS ENTERED THE FORECASTER
0019 C                HITS THE EXIT KEY ON THE TEX 4107. THE DATA WILL
0020 C                APPEAR AS IT WILL BE WRITTEN TO THE OUTPUT FILE
0021 C                (MONTHLY) AND ASKS IF THE DATA IS CORRECT;
0022 C                IF NOT THE PROGRAM GOES BACK TO THE FORM MODE AND THE
0023 C                FORECASTER IS GIVEN THE OPPORTUNITY TO MAKE THE
0024 C                DESIRED CORRECTIONS.
0025 C
0026 C      CREATED: 1.0 2/86 GL ANDREWS AND ORA GIFFORD
0027 C
0028 C *****
0029
0030
0031      INCLUDE 'ERDS$INCLUDE:FORMFLAGS.INC'
0032
0033      DIMENSION MONTH_NAME(12)
0034
0035      Byte      Form_Interface_Record( 100)
0036      Integer*4  Iflags( 25)      ! Form flags
0037
0038 C
0039 C      Type      Name      Field Type      Field Prompt String
0040 C
0041      Integer*4  I_VAR001      ! 1 Integer      Date (860101 - 990101)/ Default
0042      Integer*4  I_VAR002      ! 2 Integer      Hour (1 - 24)/ Default =
0043      Integer*4  I_VAR003      ! 3 Integer      Enter -1/2 inch temp (-50 - +150)
0044      Integer*4  I_VAR004      ! 4 Integer      Enter -15 inch temp (0 - +1000)/
0045      Integer*4  I_VAR005      ! 5 Integer      Enter -36 inch temp (0 - +900)/
0046      Integer*4  I_VAR006      ! 6 Integer      Enter 3 ft temp (-300 - +1200)/
0047      Integer*4  I_VAR007      ! 7 Integer      Enter 30 ft temp (-300 - +1200)/
0048      Integer*4  I_VAR008      ! 8 Integer      Enter 50 ft temp (-300 - +1200)/
0049      Integer*4  I_VAR009      ! 9 Integer      Enter 100 ft temp (-300 - +1200)/
0050      Integer*4  I_VAR010      ! 10 Integer     Enter 200 ft temp (-300 - +1200)/
0051      Integer*4  I_VAR011      ! 11 Integer     Enter 250 ft temp (-300 - +1200)/
0052      Integer*4  I_VAR012      ! 12 Integer     Enter 300 ft temp (-300 - +1200)/
0053      Integer*4  I_VAR013      ! 13 Integer     Enter 400 ft temp (-300 - +1200)

```

```

0088      Integer*4      I_VAR014      ! 14 Integer      Enter 7 ft wind spd (0 - 70)/ De
0089      Integer*4      I_VAR015      ! 15 Integer      Enter 50 ft wind dir (0 - 37)/ D
0090      Integer*4      I_VAR016      ! 16 Integer      Enter 50 ft wind spd (0 - 70)/ D
0091      Integer*4      I_VAR017      ! 17 Integer      Enter 100 ft wind spd (0 - 70)/
0092      Integer*4      I_VAR018      ! 18 Integer      Enter 200 ft wind dir (0 - 37)/
0093      Integer*4      I_VAR019      ! 19 Integer      Enter 200 ft wind spd (0 - 70)/
0094      Integer*4      I_VAR020      ! 20 Integer      Enter 300 ft wind spd (0 - 70)/ D
0095      Integer*4      I_VAR021      ! 21 Integer      Enter 400 ft wind dir (0 - 37)/
0096      Integer*4      I_VAR022      ! 22 Integer      Enter 400 ft wind spd (0 - 70)/
0097      Integer*4      I_VAR023      ! 23 Integer      Enter peak gust wind dir (0 - 36
0098      Integer*4      I_VAR024      ! 24 Integer      Enter peak gust wind spd (0 - 90
0099      Integer*4      I_VAR025      ! 25 Integer      Enter peak gust time (0 - 9)/ De
0100
0101      INTEGER*4      YEAR, MONTH, DAY, HOUR, DAYS_IN_MONTH(12),
0102      DAYS_IN_MONTH_LY(12)
0103
0104      CHARACTER*1      SELECT
0105      CHARACTER*3      MONTH_NAME
0106
0107      Equivalence (Form_Interface_Record, I_VAR001)
0108
0109      Common /Form_Record/ I_VAR001, I_VAR002, I_VAR003, I_VAR004,
0110      I_VAR005, I_VAR006, I_VAR007, I_VAR008,
0111      I_VAR009, I_VAR010, I_VAR011, I_VAR012,
0112      I_VAR013, I_VAR014, I_VAR015, I_VAR016,
0113      I_VAR017, I_VAR018, I_VAR019, I_VAR020,
0114      I_VAR021, I_VAR022, I_VAR023, I_VAR024,
0115      I_VAR025
0116
0117      DATA DAYS_IN_MONTH/31, 28, 31, 30, 31, 30, 31, 31, 30, 31,
0118      30, 31/
0119
0120      DATA DAYS_IN_MONTH_LY/31, 29, 31, 30, 31, 30, 31, 31, 30,
0121      31, 30, 31/
0122
0123      DATA MONTH_NAME/'JAN', 'FEB', 'MAR', 'APR', 'MAY', 'JUN',
0124      'JUL', 'AUG', 'SEP', 'OCT', 'NOV', 'DEC'/
0125
0126      MONTH_FLAG = 0
0127      OPEN(UNIT=11, FILE='[FCST.PREVIOUS_DATE]TOWER_DATE.DAT',
0128      STATUS='OLD', IOSTAT=IER)
0129      IF(IER .NE. 0) THEN
0130      WRITE(*,10) IER
0131      STOP
0132      ENDIF
0133      10 FORMAT(/5X,'Error Opening [FCST.PREVIOUS_DATE]TOWER_DATE',
0134      '.DAT Code - ',I4)
0135
0136
0137      C..... READ PREVIOUS DATE AND HOUR FROM TOWER DATE FILE AND OPEN
0138      C..... MONTHLY TOWER DATA FILES
0139
0140
0141      READ(11,'(4I2)') YEAR, MONTH, DAY, HOUR

```

```

0142
0143     OPEN(UNIT=12, FILE='[FCST.DAT]TOWER'//MONTH_NAME(MONTH)//
0144         '.DAT', STATUS='OLD',
0145         ACCESS='APPEND', CARRIAGECONTROL='LIST', IOSTAT=IER)
0146     IF(IER .NE. 0) THEN
0147         WRITE(*,20) MONTH_NAME(MONTH), IER
0148         STOP
0149     ENDIF
0150 20    FORMAT(/5X,'Error Opening [FCST.DAT]',A3,'TOWER.DAT Code - ',
0151            I4)
0152
0153
0154 C..... INCREMENT DATE AND HOUR WHERE NEEDED
0155
0156
0157 200   IF(HOUR.EQ.24 .AND. DAY.EQ.31 .AND. MONTH.EQ.12) THEN      ! check for end of year
0158
0159         YEAR = YEAR + 1
0160         MONTH = 1
0161         DAY = 1
0162         HOUR = 1
0163         MONTH_FLAG = 1
0164         OPEN(UNIT=13, FILE='[FCST.DAT]TOWER'//MONTH_NAME(MONTH)//
0165             '.DAT', STATUS='NEW',
0166             CARRIAGECONTROL='LIST', IOSTAT=IER)
0167         IF(IER .NE. 0) THEN
0168             WRITE(*,30) MONTH_NAME(MONTH), IER
0169             STOP
0170         ENDIF
0171 30    FORMAT(/5X,'Error Opening [FCST.DAT]',A3,'TOWER.DAT ',
0172            'Code - ',I4)
0173         TYPE *, ' '
0174         TYPE *, ' '
0175         TYPE *, ' Opened New Monthly Tower File for ',
0176             MONTH_NAME(MONTH)
0177
0178
0179     ELSE
0180
0181         IF(MOD(YEAR,4) .EQ. 0) THEN      ! check for leap year
0182
0183             IF(DAY.EQ.DAYS_IN_MONTH_LY(MONTH) .AND. HOUR.EQ.24) THEN
0184
0185                 MONTH = MONTH + 1
0186                 DAY = 1
0187                 HOUR = 1
0188                 MONTH_FLAG = 1
0189                 OPEN(UNIT=13, FILE='[FCST.DAT]TOWER'//
0190                     MONTH_NAME(MONTH)//'.DAT', STATUS='NEW',
0191                     CARRIAGECONTROL='LIST', IOSTAT=IER)
0192                 IF(IER .NE. 0) THEN
0193                     WRITE(*,30) MONTH_NAME(MONTH), IER
0194                     STOP
0195                 ENDIF

```

```

0196             TYPE *, ' '
0197             TYPE *, ' '
0198             TYPE *, ' Opened New Monthly Tower File for ',
0199             MONTH_NAME(MONTH)
0200
0201
0202         ELSE
0203
0204             IF (HOUR.EQ.24) THEN
0205                 DAY = DAY + 1
0206                 HOUR = 1
0207             ELSE
0208                 HOUR = HOUR + 1
0209             ENDIF
0210
0211         ENDIF
0212
0213     ELSE
0214
0215         IF (DAY.EQ.DAYS_IN_MONTH(MONTH) .AND. HOUR.EQ.24) THEN
0216
0217             MONTH = MONTH + 1
0218             DAY = 1
0219             HOUR = 1
0220             MONT_FLAG = 1
0221             OPEN(UNIT=13, FILE='FCST.DAT|TOWER'
0222                 //MONTH_NAME(MONTH)//'.DAT', STATUS='NEW',
0223                 CARRIAGECONTROL='LIST', IOSTAT=IER)
0224             IF (IER.NE. 0) THEN
0225                 WRITE(*,30) MONTH_NAME(MONTH), IER
0226                 STOP
0227             ENDIF
0228             TYPE *, ' '
0229             TYPE *, ' '
0230             TYPE *, ' Opened New Monthly Tower File for ',
0231             MONTH_NAME(MONTH)
0232
0233         ELSE
0234
0235             IF (HOUR.EQ.24) THEN
0236                 DAY = DAY + 1
0237                 HOUR = 1
0238             ELSE
0239                 HOUR = HOUR + 1
0240             ENDIF
0241
0242         ENDIF
0243
0244     ENDIF
0245
0246 ENDIF
0247
0248
0249 C..... WRITE NEW DATE AND HOUR TO PREVIOUS DATE FILE

```

```

0250
0251
0252      BACKSPACE (UNIT=11,IOSTAT=IER)
0253      IF(IER.NE.0) WRITE(*,40) IER
0254 40      FORMAT(/5X,' Error During Backspace Code - ',I4/
0255          5X,' Check [FCST.PREVIOUS_DATE]SFCOBS_DATE.DAT File')
0256      WRITE(11,'(4I2)') YEAR, MONTH, DAY, HOUR
0257
0258
0259      C..... FIX DATE AND HOUR TO THE VARIABLES I_VAR001 AND I_VAR002
0260
0261
0262      I_VAR001 = (YEAR*10000) + (MONTH*100) + DAY
0263      I_VAR002 = HOUR
0264
0265
0266      C..... PREVENT USER FROM ENTER DATA FOR DATE AND HOUR AND FORCE
0267      C..... CURSOR TO START AT FIRST VARIABLE
0268
0269
0270      IFLAGS(1) = FWS_NO_WRITE
0271      IFLAGS(2) = FWS_NO_WRITE
0272      IFLAGS(3) = FWS_FORCE_START
0273
0274      C..... CALL SUBROUTINES TO CREATE INPUT FORM
0275
0276
0277 100      CALL SUBPROCESS_OPEN_IO
0278      CALL SELECT_ANSI          ! put terminal in ANSI mode
0279      Call FM_Form_Open (15, 'HWSFORMS.FRM', IError)
0280      Call FM_Form_Input ('TOWER', Form_Interface_Record,
0281          IFlags, Ierror, User_Check, *990)
0282      Call FM_Form_Close (IError)
0283      CALL SUBPROCESS_CLOSE_IO
0284
0285
0286      C..... WRITE DATA TO SCREEN AS WILL BE WRITTEN TO FILE AND
0287      C..... PROMPT FOR CORRECTION
0288
0289
0290      TYPE *, ' '
0291      TYPE *, ' '
0292      TYPE *, ' '
0293      TYPE *, ' The Following Data Record Will be Appended to ',
0294          'Monthly Tower File : '
0295
0296      WRITE(*,50)
0297 50      FORMAT(/1X,'123456789 123456789 123456789 123456789 ',
0298          '123456789 123456789 123456789')
0299      WRITE(*,60) I_VAR001, I_VAR002, I_VAR003, I_VAR004,
0300          I_VAR005, I_VAR006, I_VAR007, I_VAR008,
0301          I_VAR009, I_VAR010, I_VAR011, I_VAR012,
0302          I_VAR013, I_VAR014, I_VAR015, I_VAR016,
0303          I_VAR017, I_VAR018, I_VAR019, I_VAR020,

```

```

0304      I_VAR021, I_VAR022, I_VAR023, I_VAR024,
0305      I_VAR025
0306 60  FORMAT(/,I0,I0,I2,IX,11I4,IX,11I2,I1,/)
0307
0308      SELECT = 'N'
0309
0310      TYPE *, ' Do You Need To Make Any Corrections ?'
0311      TYPE *, ' Enter N or Y'
0312      READ(*,'(A)') SELECT
0313
0314      IF(SELECT.EQ.'Y' .OR. SELECT.EQ.'y') GOTO 100
0315
0316
0317  C..... WRITE DATA TO MONTHLY FILE
0318
0319
0320      IF(MONTH_FLAG .EQ. 1) THEN
0321          LUN = 13
0322      ELSE
0323          LUN = 12
0324      ENDIF
0325
0326      WRITE(LUN, 70) I_VAR001, I_VAR002, I_VAR003, I_VAR004,
0327      I_VAR005, I_VAR006, I_VAR007, I_VAR008,
0328      I_VAR009, I_VAR010, I_VAR011, I_VAR012,
0329      I_VAR013, I_VAR014, I_VAR015, I_VAR016,
0330      I_VAR017, I_VAR018, I_VAR019, I_VAR020,
0331      I_VAR021, I_VAR022, I_VAR023, I_VAR024,
0332      I_VAR025
0333 70  FORMAT(I0,I2,IX,11I4,IX,11I2,I1)
0334
0335
0336      TYPE *, ' '
0337      TYPE *, ' '
0338      TYPE *, ' Data Appended to: [FCST.DAT]',
0339      MONTH_NAME(MONTH), 'TOWER.DAT File.'
0340      TYPE *, ' '
0341      TYPE *, ' '
0342      TYPE *, ' Do You Want to Enter Data for Another Hour ?'
0343      TYPE *, ' Enter Y or N'
0344      READ(*,'(A)') SELECT
0345      IF(SELECT.EQ.'Y' .OR. SELECT.EQ.'y') GOTO 200
0346
0347      GOTO 300
0348
0349 990  TYPE *, ' Error During Form Input - Call Gregg A.'
0350      TYPE *, ' Home 946-5482   Work 378-0138'
0351 300  CALL EXIT
0352  END

```

PROGRAM SECTIONS

Name Bytes Attributes

0 \$CODE	2591	PIC CON REL LCL	SHR	EXE	RD NOWRT LONG
1 \$PDATA	795	PIC CON REL LCL	SHR NOEXE		RD NOWRT LONG
2 \$LOCAL	564	PIC CON REL LCL	NOSHR NOEXE		RD WRT LONG
3 FORM_RECORD	100	PIC QVR REL GBL	SHR NOEXE		RD WRT LONG

Total Space Allocated 4050

ENTRY POINTS

Address	Type	Name	References
0-00000000		TOWER\$MAIN	

VARIABLES

Address	Type	Name	Attributes	References
2-000000F4	I*4	DAY		101 141= 157 161= 183
186=		205(2)=	215 218= 236(2)= 256 262	
2-000000F8	I*4	HOURL		101 141= 157 162= 183
187=		204 206= 208(2)=	215 219= 235	
		237= 239(2)=	256 263	
2-00000100	I*4	IER		127=A 129 130 143=A 145
147		164=A 167 168 189=A	192 193	
		221=A 224 225 252=	253(2)	
2-00000108	I*4	IERROR		280A
2-00000104	I*4	IDERROR		279A 282A
3-00000000	I*4	I_VAR001	COMM EQUIV	75 107 109 262= 299
326				
3-00000004	I*4	I_VAR002	COMM EQUIV	76 109 263= 299 326
3-00000008	I*4	I_VAR003	COMM EQUIV	77 109 299 326
3-0000000C	I*4	I_VAR004	COMM EQUIV	78 109 299 326
3-00000010	I*4	I_VAR005	COMM EQUIV	79 109 299 326
3-00000014	I*4	I_VAR006	COMM EQUIV	80 109 299 326
3-00000018	I*4	I_VAR007	COMM EQUIV	81 109 299 326
3-0000001C	I*4	I_VAR008	COMM EQUIV	82 109 299 326
3-00000020	I*4	I_VAR009	COMM EQUIV	83 109 299 326
3-00000024	I*4	I_VAR010	COMM EQUIV	84 109 299 326
3-00000028	I*4	I_VAR011	COMM EQUIV	85 109 299 326
3-0000002C	I*4	I_VAR012	COMM EQUIV	86 109 299 326
3-00000030	I*4	I_VAR013	COMM EQUIV	87 109 299 326
3-00000034	I*4	I_VAR014	COMM EQUIV	88 109 299 326
3-00000038	I*4	I_VAR015	COMM EQUIV	89 109 299 326

3-0000003C	I*4	I_VAR016	COMM EQUIV	90	109	299	326	
3-00000040	I*4	I_VAR017	COMM EQUIV	91	109	299	326	
3-00000044	I*4	I_VAR018	COMM EQUIV	92	109	299	326	
3-00000048	I*4	I_VAR019	COMM EQUIV	93	109	299	326	
3-0000004C	I*4	I_VAR020	COMM EQUIV	94	109	299	326	
3-00000050	I*4	I_VAR021	COMM EQUIV	95	109	299	326	
3-00000054	I*4	I_VAR022	COMM EQUIV	96	109	299	326	
3-00000058	I*4	I_VAR023	COMM EQUIV	97	109	299	326	
3-0000005C	I*4	I_VAR024	COMM EQUIV	98	109	299	326	
3-00000060	I*4	I_VAR025	COMM EQUIV	99	109	299	326	
**	I*4	LUN		321=	323=	326		
2-000000F0	I*4	MONTH		101	141=	143	147	157
160=								
164	168	176	183	185(2)=	189			
193	198	215	217(2)=	221	225			
230	258	262	338					
2-000000FC	I*4	MONTH_FLAG		128=	163=	188=	320	
**	I*4	MONT_FLAG		220=				
2-000000E0	CHAR	SELECT		104	308=	312=	314(2)	344=
345(2)								
2-0000010C	R*4	USER_CHECK		280A				
2-000000EC	I*4	YEAR		101	141=	159(2)=	181	256
262								

ARRAYS

Address	Type	Name	Attributes	Bytes	Dimensions	References
2-00000064	I*4	DAYS_IN_MONTH		48	(12)	101 117D
215						
2-00000094	I*4	DAYS_IN_MONTH_LY		48	(12)	101 120D
183						
3-00000000	L*1	FORM_INTERFACE_RECORD	COMM EQUIV	100	(100)	70 107
280A						
2-00000000	I*4	IFLAGS		100	(25)	71 270=
271=						
272=		280A				
2-000000C4	CHAR	MONTH_NAME		36	(12)	69 105
123D						
143	147	164	168	175		
189	193	198	221	225		
230	338					

PARAMETER CONSTANTS

Type	Name	References
------	------	------------

I*4	FW\$ _FIELD_BOLD	55	59#		
I*4	FW\$ _FIELD_UNDERLINE	55	59#		
I*4	FW\$ _FORCE_START	55	59#	272	
I*4	FW\$ _NO_ECHO	55	59#		
I*4	FW\$ _NO_SEE	55	59#		
I*4	FW\$ _NO_WRITE	55	59#	270	271
I*4	FW\$ _SET_ERROR	55	59#		
I*4	FW\$ _SET_EXCEPTION	55	59#		
I*4	FW\$ _USER_CHECK	55	59#		

LABELS

Address	Label	References			
1-00000182	10'	130	133#		
1-000001C9	20'	147	150#		
1-000001FE	30'	160	171#	193	225
1-00000235	40'	253	254#		
1-00000291	50'	296	297#		
1-000002DF	60'	299	306#		
1-000002F9	70'	328	333#		
0-00000550	100	277#	314		
0-00000110	200	157#	345		
0-00000A10	300	347	351#		
0-000009E0	990	280A	349#		

FUNCTIONS AND SUBROUTINES REFERENCED

Type	Name	References				
	FW_FORM_CLOSE	282				
	FW_FORM_INPUT	280				
	FW_FORM_OPEN	279				
	FOR\$EXIT	351				
	FOR\$OPEN	127	143	184	189	221
	SELECT_ANSI	278				
	SUBPROCESS_CLOSE_ID	283				
	SUBPROCESS_OPEN_ID	277				

```

-----
|           KEY TO REFERENCE FLAGS           |
|  =  - Value Modified                       |
|  #  - Defining Reference                   |
|  A  - Actual Argument, possibly modified  |
|  D  - Data Initialization                  |
|  (n) - Number of occurrences on line      |

```

COMMAND QUALIFIERS

FOR/LIS/CROSS/CHECK=ALL TOWER

/CHECK=(BOUNDS,OVERFLOW,UNDERFLOW)

/DEBUG=(NOSYMBOLS,TRACEBACK)

/STANDARD=(NOSYNTAX,NOSOURCE_FORM)

/SHOW=(NOPREPROCESSOR,NOINCLUDE,MAP,NODICTIONARY,SINGLE)

/WARNINGS=(GENERAL,NODECLARATIONS,NOLTRIX)

/CONTINUATIONS=10 /CROSS_REFERENCE /NOD_LINES /NOEXTEND_SOURCE /F77

/NOG_FLOATING /I4 /NOMACHINE_CODE /OPTIMIZE

COMPILATION STATISTICS

Run Time: 10.84 seconds

Elapsed Time: 20.07 seconds

Page Faults: 614

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