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NFDRSPC:

The National Fire-Danger Rating System on a Personal Computer

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ABSTRACT

This user's guide is an introductory manual for using the 1988 version (Burgan 1988) of the National Fire-Danger Rating System on an IBM PC or compatible computer. NFDRSPC is a window-oriented, interactive computer program that processes observed and forecast weather with fuels data to produce NFDRS indices. Other program features include user-designed display formats, on-line context-sensitive help, archiving in the standard Fort Collins format or in a user-designed format, and utilities to maintain a catalog of station attributes.

Keywords: Fire-danger rating, computerized systems, PC software.

Section 1. Introduction

The 1972 fire-danger rating system was installed on a mainframe computer in 1972. The primary purpose of the program was to compute fire-danger indices, but various other functions such as a message system were added to provide communications among fire control organizations and to archive observed fire weather data. The system was designated as "Administrative and Forest Fire Information Retrieval and Management System" (AFFIRMS) and has been widely used by fire management organizations nationwide.

AFFIRMS has migrated across a number of mainframes since its original installation. It was revised in 1978 to accommodate the 1978 Revision of the National Fire Danger Rating System (Burgan and others 1977; Deeming and others 1977), and was again revised in 1988 to accommodate the latest revisions (Burgan 1988).

Many AFFIRMS users have expressed concern about communication costs, and about what would now be considered a "user unfriendly" system. As a result of these concerns, the 1988 NFDRS (Burgan 1988) has been installed on a PC with a window/menu-oriented user interface.

Before fire-danger indices or other program functions can be accessed, the program must be installed on your PC and initialized. (Detailed instructions on installation and initialization are provided in sects. 4 and 5.)

It is assumed that any potential user should have a working knowledge of:

- The MS-DOS or PC-DOS operating system.
- The AFFIRMS user manual (Helfman and others 1980).
- The 1978/1988 National Fire Danger Rating System manual (Burgan 1988; Deeming and others 1977).

Appendix 1 discusses the files used in the NFDRSPC program, and appendix 3 shows the program flow. The archive files are stored as ASCII files and hence can be used as input to many spreadsheet, graphics, or data-base programs.

The program will perform the following tasks:

- Compute 1988 version of the National Fire-Danger Rating System indices with either observed or forecast data as input.
- Archive weather and compute indices in the Fort Collins formats designed by the user.
- Display the entered weather and resultant indices in the AFFIRMS format or a user-designed format.
- Provide for forecast trending in a fire weather zone or individual station.
- Provide for input of RAWs (Remote Automated Weather Station) and the associated manual station.

(See "Section 3. Program Concepts" for further details on program functions.)

If you have problems you think are related to the installation or execution of the NFDRSPC program on your equipment, collect the information for a Problem Report as indicated in appendix 6. Then contact the Southeastern Forest Experiment Station at 912-744-0252 from 8 a.m. to 4:30 p.m., or mail the Problem Report to:

Southeastern Forest Experiment Station
Rt. 1, Box 182A
Dry Branch, GA 31020

Section 2. System Needs

Minimum Equipment Requirements

- IBM PC or compatible computer.
- Two 5 1/4" 360k floppy disk drives.
- 512K memory.
- Monochrome monitor.
- PC- or MS-DOS version 3.0.

Optional Equipment

- 5 1/4" 1.2M floppy disk drives.
- 3 1/2" 720k and 1.44M microfloppy disk drive.
- Hard drives.
- Color monitors, such as the CGA, EGA, and VGA. The NFDRSPC program will use color if it is available, but it does not produce graphic output. Other programs are becoming available to graph NFDRSPC outputs.

Section 3. Program Concepts

3.1 Installation

Many computers with various hardware configurations are advertised as "IBM" or "DOS" compatible. The major hardware differences among these computers that are important in installing, initializing, and running the NFDRSPC program include memory size, hard/floppy disk locations and capacities, and, to a lesser extent, type of video display. As a result, the NFDRSPC program must be installed on your PC using the supplied SETUP program. (See sect. 2 on the minimum equipment requirements to determine if your PC will accommodate NFDRSPC, and sect. 4 for details on installation.)

3.2 Initialization

Installation is the first of two mandatory tasks that must be completed before running the NFDRSPC program. The second mandatory task is initialization. The main task in initialization is cataloging all the stations for which you expect to enter weather data. The initialization process uses certain procedures that can also be used later to change, delete, or add stations to the catalog. Access to the initialization process is through the NFDRSPC Main Menu. (See sect. 5 for detailed instructions on initialization.)

3.3 Using the Program

Although some tradeoffs were required, flexibility, ease of use, and ease of updating were major considerations in designing NFDRSPC. The program will compute NFDRS-88 indices using either observed or forecast weather information, and the computed indices can be displayed in a variety of user-selected formats. The program will archive observed and forecast weather information, and archiving of the calculated indices is an option. Other features of the program include station catalog maintenance routines and a set of specialized utilities that perform such tasks as changing the date and designing custom formats.

3.4 Choosing From Menus

When the program is executed, the user first sees the NFDRSPC banner, followed by the NFDRSPC Main Menu. Selections from this and all other menus are made by entering the number associated with the desired option. The menu selection bar moves to the option the user selects. The user may alternatively use the Up and Down Arrow keys to move the menu selection bar up or down one option at a time. Once the selection bar is on the user's choice, press the ENTER key, and the program will continue. The user may press the HELP key (defined to be the F1 key) to receive more information on the currently selected choice of the menu.

3.5 Data Entry on Windows

Data inputs (observations, forecasts, etc.) are made through a window that represents a form with blanks to fill in. Usually the program will place prompts on the screen for the information to be entered, return to the space after the first prompt, and wait for the user to enter a value. Enter your choice for each of the values as the program asks for them. If you are unsure exactly what the program is

asking for, press the HELP key, and the program will provide a short explanation of the current item. When your entry for the field is complete, press the ENTER key. The program will move to the next field, or it will process your entries if you have finished the last field.

3.6 Returning From a Menu or a Window

If you are in a data entry window, such as the Station Observation Entry window, when the last entry is made, the program will process your entries and return you to the menu where you selected the window. If you wish to abort the entry window and discard any information you have entered, press the ESCAPE key (ESC), and the program will return to the Main Menu. If you are at one of the other menus, choose the Return option go go back to the previous menu. The ESC key will also provide a return to the previous menu.

3.7 Special Keys

Throughout the program, when selecting an option from a menu or filling a data window, various special keys can be used to advantage. The keys and the action taken are shown below.

<u>Key</u>	<u>Action</u>
Left Arrow	Moves the cursor one space to the left in the current field without changing field contents.
Right Arrow	Moves the cursor one space to the right in the current field without changing the contents.
Back Space	Deletes the last character typed and moves the cursor one space to the left.
INSert	Toggles insert mode. In insert mode, characters are inserted at the cursor location. Any characters after the cursor are pushed to the right and can be pushed out of the field and lost.
DELeTe	Deletes the character under the cursor.
Up Arrow	Moves the cursor to the previous field, or moves the menu selection bar up.
Down Arrow	Moves the cursor to the next field, or moves the menu selection bar down.
ESC	Quit input and exit current window or menu. If you are in a data entry window, the system will ask whether you wish to exit the window.
F1	The Help key. Retrieves information about the current entry field or menu choice.
. (Period)	When entering a number involving a decimal point, as in latitude or precipitation amount, the decimal point toggles the cursor from the left side of the decimal to the right and back.

Throughout the NFDRSPC system, when the program is waiting for an entry or menu choice from you, you can press the HELP key (F1) and the system will give you a short explanation of the entry to be made or the current choice of the menu. To exit the Help screen, press the ESC key.

Section 4. Installation of NFDRSPC Program

We suggest you read through this entire procedure once before you attempt it. We have attempted to make it as painless as possible, but you can get ahead of yourself.

All of the screen displays shown in this documentation are enclosed in quotation marks (" ").

There are two types of installations for the NFDRSPC program.

Type 1 installs the program on one of the following:

- a single 5 1/4" 1.2M floppy disk, or
- a single 3 1/2" 720k microfloppy disk, or
- a single 3 1/2" 1.44M microfloppy disk, or
- a hard disk.

Type 2 installs the program on two disks. This is the required type on a computer that only has 360K floppy disk drives.

The difference is that in a Type 2 installation, there is not enough room on a single 360k floppy disk to hold all the NFDRSPC files, so they are split between the two disks.

4.1 Procedure for a Type 1 Installation

In this procedure, you will be asked to place diskettes in drives and enter your choices for drives. We will assume that the SETUP disk will be in the A: drive, and you will be installing the program on the C: drive. You can change these to suit your particular system configuration.

1. If you are installing the program on one of the floppy drives, there are two steps you need to complete before starting the Setup Program.
 - a. Format a diskette. (You can use diskettes formatted previously; just make sure they are blank.)
 - b. Copy the file "COMMAND.COM" from your boot or system diskette to the NFDRSPC SETUP Diskette.
2. Place the NFDRSPC SETUP Diskette in your A: drive and enter A: to make the A: drive your current working drive.
3. At the DOS prompt, type SETUP and press the ENTER key.
4. The Setup Program loads and then asks you for the following information:
 - a. "Do you want to perform a Type 1 installation or a Type 2 installation? (Enter a 1 or a 2.)"
You should enter a 1 and press the ENTER key.
 - b. "Enter the letter for the drive where I should put the program and files."
The program will display "C" for the destination drive. If "C" is your choice, press ENTER. If you wish to use a drive other than "C," enter the letter for the drive you want to use.

- c. "Enter the name of the directory where I should put the program and files:

\NFDRSPC"

The default directory name is "\NFDRSPC." If you wish to put the program in another directory, enter the name of the directory. You can use 2d or 3d level subdirectories, but are limited to 32 characters for the entire directory path. Remember to include the leading backslash character "\", and do not add a backslash at the end.

The program will then attempt to create the directory. If it already exists, the program will go on. If any other error occurs, the program will stop. If a problem occurs, please record the contents of the PC display and report the problem to the authors.

- d. You will be asked to make sure the SETUP Diskette is in the A: drive.

Note: If you want to stop at this point, press the ESC key. The program will return you to the DOS prompt. If you want to continue with the installation, just press the ENTER key.

The program will place the NFDRSPC program and its files on the destination disk. It will also update the NFDRSCFG.DAT file to store the information obtained here.

When the program finishes, remove the Setup Disk and store it in a safe place. The program is complete when the following message appears on the screen, "Installation of the NFDRSPC system is complete."

If you are doing a floppy disk installation, remove the floppy disk and label it "NFDRSPC Program Diskette."

CAUTION: The program will not function properly if you move the files from the directory where the SETUP Program put them. You can back them up, but the NFDRSPC program uses the NFDRSCFG data file to determine where the files should be when it needs them. If you wish to move the NFDRSPC program and files, create the new directory, and copy all the files in the old directory to the new directory. Then rerun the SETUP Program, and specify the new drive and/or directory when asked for them. The SETUP Program will then overwrite the program and unchanging data files, and update the NFDRSCFG.DAT data file to reflect the new location. Now, skip to section 5 and continue with the procedure for initialization of the program.

4.2 Procedure for a Type 2 Installation

In this procedure, you will be asked to place diskettes in drives and enter your choices for drives. We will assume that the SETUP Disk is in the A: drive, that you will be installing the program on the B: drive, and that, after the installation is completed, you will run the program with the Program disk in the A: drive and the Data disk in the B: drive. However, you can change these to suit your particular system configuration.

1. There are three steps you need to complete before starting the SETUP Program:
 - a. Format two diskettes. (You can use diskettes formatted previously; just make sure they are blank.)
 - b. Label one of the blank diskettes "NFDRSPC Program Disk" and the other one "NFDRSPC Data Disk."
 - c. Copy the file "COMMAND.COM" from your boot or system diskette to the NFDRSPC SETUP Diskette.
2. Place the NFDRSPC SETUP diskette in your A: drive and the blank floppy labeled "NFDRSPC Data Disk" in the B: drive.
3. Enter **A:** to make the A: drive your current working drive.
4. At the DOS prompt, type SETUP and press the ENTER key.
5. The SETUP program loads and then asks you for the following information:
 - a. "Do you want to perform a Type 1 installation or a Type 2 installation? (Enter a 1 or a 2.)"
You should enter a 2 and press the ENTER key.
 - b. "Enter the letter for the drive where I should put the program and files."
The program will display "B" for the destination drive. If "B" is your choice, press ENTER. If you wish to use a drive other than "B," enter the letter for the drive you want to use.
 - c. "Enter the letter for the drive where you will place the NFDRSPC Program Diskette when executing the program."
The program will display "A" for the program drive. If "A" is your choice, press ENTER. If you wish to use a drive other than "A," enter the letter for the drive where you will put the NFDRSPC Program diskette.
 - d. "Enter the letter for the drive where you will place the NFDRSPC Data Diskette when executing the program."
The program will display "B" for the data drive. If "B" is your choice, press ENTER. If you wish to use a drive other than "B," enter the letter for the drive where you will put the NFDRSPC Data Diskette.
 - e. You will be asked to make sure the SETUP Diskette is in the A: drive, and that a blank floppy is in the drive you choose in step b, above.
Note: If you want to stop at this point, press the ESC key. The program will return you to the DOS prompt. If you want to continue with the installation, just press the ENTER key.

The program will place the NFDRSPC files on the data disk.

- f. Remove the diskette in the B: drive.

At this point, remove the Data Diskette from the B: drive and insert the Program Diskette. When the switch is made, press the ENTER key. The SETUP Program will place the NFDRSPC program on the Program Diskette and update the file NFDRSCFG.DAT with the information obtained here.

When the program finishes, remove the Setup disk and store it in a safe place. The program is complete when the following message appears on the screen, "Installation of the NFDRSPC system is complete."

Below this message are reminders of where to place the program and data diskettes when executing NFDRSPC.

CAUTION: The program will not function properly if you do not put the diskettes where you said you would in steps c and d. You can back them up, but the NFDRSPC program uses the NFDRSCFG data file to determine where the files should be when it needs them. If you wish to move the NFDRSPC program and files, rerun the SETUP Program, and specify the new drives when asked for them. The SETUP Program will then overwrite the program and unchanging data files, and update the NFDRSCFG.DAT data file to reflect the new locations.

Now, continue with the procedure for initialization of the program in section 5.

Section 5. Initialization of NFDRSPC Program

Before the NFDRSPC program can be used to compute NFDRS indices, the system must have been successfully installed as described in section 4, and the program must be initialized as described below.

1. If your copy of the NFDRSPC system was installed on your hard disk, use the CD command and go to the directory where you installed the system (you may already be there). If your copy of the NFDRSPC system was installed on floppy diskettes, place the "NFDRSPC Program Diskette" in the drive you chose, and for Type 2 installations, the "NFDRSPC Data Diskette" in the other drive, and make the drive containing your Program disk your current drive.
2. Execute the NFDRSPC program by entering NFDRSPC at the DOS prompt. You will see the NFDRSPC banner, followed by a display of the NFDRSPC Main Menu.
3. The first step in initialization requires a decision on processing current and historical data. Historical data are defined as any data for days earlier than when you installed the program. If no historical data; i.e. only current data, are to be entered, go to step 4 below to catalog your station. If you are going to enter historical data, you need to set the date in the computer to the starting date for the historical data. To set the date, choose option 7 (Use System Utilities) from the Main Menu, by pressing 7, then pressing the ENTER key. The program will display the Utilities Menu. Select option 3 (Change the Date) by pressing 3, then the ENTER key. A window will be open for the entry of the earliest date of the historical data to be entered. When the entry is completed, press ENTER, and the program will return you to the Utilities Menu. Choose option 4, and press ENTER, to return to the Main Menu. Proceed with step 4 below.
4. The NFDRSPC Main Menu is displayed. A complete description of this menu is given in section 7.1. To initialize the program, choose option 6 (Use Catalog Operations) by pressing 6 and pressing the ENTER key.
5. The Catalog Operations Menu (sect. 7.2) is displayed. The next step is to add your stations to the NFDRSPC catalog. Do that now by selecting option 1 (Add a Station).

The program will open a window and ask whether the station is automated or manual. After your response, the Station Catalog Entry or Modification window (sect. 8.5) is displayed. The program will then return to the space after the first header and wait for you to make an entry.

Enter your choice for each of the values as the program asks for them. If you are unsure of exactly what the program is asking for, you can press the HELP key (F1), and the program will give you a short explanation of the current item. When your entries are completed, the program will save your information, allocate space for your station in the NFDRSPC files, and return you to the Catalog Operations Menu.

6. Choose Catalog option 8 (Return to Main Menu) or, choose option 1 to continue adding stations.

At this point, the program is ready for routine operation.

7. Optionally, you may choose to
 - Design a Custom Display Format.
 - Design a Custom Archive Format.

If no custom display or archive formats are chosen, the standard formats will be used. Custom display or archive formats may be designed now or at a later date; once a custom display or archive format is designed, it will be saved and available for future use.

If you want to design a format, choose NFDRSPC Main Menu option 7 (Use System Utilities). Then choose which format to design, display or archive.

8. The program will display the Custom Format Selection window. (See sect. 8.6 for complete details on designing custom formats.)
9. When you are finished designing your format, just press RETURN when the program asks you for an item number.

Your format will be saved, and is immediately available for use. If you decide to quit without changing the format, press the ESC key when asked for an item number. This causes the system to ignore any changes you made to the design. If you had no format designed, you will not have one after pressing ESC. If you had a format, any changes made this time will be ignored.

10. Choose Utility option 4 (RETURN) to return to the NFDRSPC Main Menu.

Section 6. Running the NFDRSPC System

Observation and forecast data must be entered in sequential time order. For example, the program will not allow the entry of Saturday's or Sunday's data after you have entered the data for the following Monday. You should first enter Saturday's data, then Sunday's, and then Monday's.

Historical data (last month, last year, etc.) can best be accommodated with the FIRDAT program (Main and others 1982). However, historical data can be properly entered and utilized by the NFDRSPC program, provided you do a few things first.

If you have already entered an observation for the station, you must delete the station and then add it again before you can enter the historical data. To delete a station:

- a. Choose Main Menu option 6 (Catalog).
- b. Choose Catalog option 2 (Delete a station).
- c. Enter the number of the station you wish to delete.

When you return to the Catalog Menu, the station has been deleted. To add the station, repeat steps 4, 5, and 6 of the procedure for Initialization of NFDRSPC Program (sect. 5). Then you can continue here.

From this point on, you can enter your station observations like you would in normal processing.

- A. Choose the type of data to be entered from the Main Menu. (See sect. 7.1 for complete details on the options possible from the Main Menu.)
- B. Enter the information the program requests. When the system returns you to the Main Menu, the indices have been calculated and stored.
- C. To see your indices, choose Main Menu option 5 (Display data). Then choose the format and data type to display using the Display Options Menu (sect. 7.2). Then choose how the program is to search for stations, using the Station Selection Menu (sect. 7.4), and, if necessary, enter the search criteria. The system will search for data. If any are found, it will display the data in the format you chose.

Before RAWs (Remote Automated Weather Station) data can be entered using Main Menu option 2, the observation must be entered for the RAWs station's associated manual station. You should also enter the observation data before entering forecast data for a station, Main Menu options 3 or 4 (Forecasts).

6.1 Archiving

The system can maintain two types of archive files. The first is the format defined by Furman and Brink (1975) and hereafter referred to as the "Fort Collins Archive Format" (FCAF). This format is discussed in appendix 4. The second is a custom format file, containing the items of interest to your organization. There is no fixed record format for the custom archive file, but appendix 5 has a description of how the archive file is assembled. The custom archive file is not created unless you design a custom archive format using the Utilities Menu option. The program can archive data in both files if you have designed a custom format, but it will in all cases archive using the FCAF.

The archive files are updated in one of two cases. Whenever you successfully enter an observation or a forecast, (i.e., no error), the program checks to see if the data you entered previously have been archived. If not, the program will archive the data. When you use the Quit option at the Main Menu, the program reads the file containing the observed and forecast entries, and saves any data you have entered that have not already been archived.

6.2 Backup - Hard Disk, Floppy Disk

You should backup your data at least once per week. Just copy the data files with the .DAT extension to another location, preferably to another diskette. It is suggested that you copy all the files to another diskette and put that diskette away in a safe place once you have added all the stations you will be using and designed the custom formats the way you like them.

6.3 Full Disk

At least once a week, check the space remaining on your data drive. If you get close to the capacity, you may fill up your disk while running the program. This should happen in only two cases--either you are adding a station or you are entering some weather data, and the archive filled up the disk. In either case, you will have to quit the program, ignoring errors on your way out, and make some room on your data drive. Probably the best way to make room is to copy the files NFDRSARC.DAT and NFDRSCTM.DAT to another drive, and delete them from your data drive.

If you were adding a station when you reenter the program, you should delete the station, then add it again, since the data files probably were not updated correctly. If entering some weather data, then you should just reenter that data. Any data you entered previously should not be affected.

Section 7. NFDRSPC Menus

The menus permit you to select the task you want to accomplish. When a menu is displayed, press the number of the choice you want, and the menu selection bar will move to that choice. Alternatively, you can use the Arrow keys to move the menu selection bar. When the bar is on the choice you want, press ENTER, and the program will perform the action you have requested. It may open an entry window or display another menu with additional options.

Below are examples of the menus in the NFDRSPC program. After each menu option is a discussion of the task that option performs. (For a graphical representation of the menu structure, see app. 3).

7.1 NFDRSPC Main Menu

1 Enter a Station Observation

This option allows you to enter a station observation (using the Station Observation Entry window (sect. 8.1), calculates the indices, and saves them for later display. When completed, you are returned to the Main Menu.

Missing Days

While calculating the indices, the program determines how many days have passed since the previous entry. To avoid requiring the date for every observation entered, the program assumes any data entered are for today's date, as stored by DOS in your PC. If more than 1 day has passed since your last entry, you are asked to confirm your intention to miss a day. If you choose to miss a day, the program will continue, making the necessary allowances for the missed day(s). Otherwise, the program will abort the entry and return to the Main Menu.

Depending on the number of days since the previous entry, you will be asked to enter new defaults for the items that cannot be taken from the previous entry. For a gap of more than 3 days, new values for 10-Hour and 100-Hour Moistures are requested. For a gap of 7 or more days, a starting value for the Drought Index also is requested. For gaps of more than 50 days, new values for Herbaceous, Woody, 1000-Hour, and X1000 Moistures are requested in addition to the other items.

If you have missed a day's observations, the missed day's data can be properly entered after setting the date to that of the missed day, using the Date option of the Utility Menu (sect. 7.5).27.

Saving the Data, and Archiving

The weather and calculated information is saved in the file NFDRSCOF.DAT, a random access file. This file contains the most current forecast and observed information and is replaced when new data are entered. Before updating the NFDRSCOF.DAT file with new data, those elements to be archived are saved on the NFDRSARC.DAT file, and, optionally, on the NFDRSCTM.DAT file.

2 Enter a RAWS Observation

This option allows you to enter a RAWS observation (using the RAWS Observation Entry window, section 8.2) and will retrieve the information entered by the Associated Manual Station, if one has been assigned. Then you are asked to confirm the manual data. If you do not confirm the manual data, or the manual data are unavailable, you are allowed to enter new values for the manual data. The program then calculates the indices and saves them for later display. When completed, the program returns you to the Main Menu.

Missed days of RAWS Observations are processed as described above in "Entering a Station Observation."

The information is saved as described above in "Saving the Data and Archiving" in "Enter a Station Observation."

3 Enter a Point Forecast

This option allows you to enter a single station forecast (using the Station Forecast Entry window, sect. 8.3), calculates the indices, and saves them for later display. When the entry is completed, you are returned to the Main Menu.

Any forecast entered is assumed to be valid for tomorrow's date. Before calculating the forecast indices, the program determines how many days have passed since the previous observation was entered. If more than 3 days separate the forecast valid date and the date of the observation, the forecast is rejected, and indices are not calculated.

Saving Forecast Data

The weather and calculated data are saved in the file NFDRSCOF.DAT, a random access file. The new data replace any earlier data of the same type. Thus, if today's forecast needs to be changed, simply enter the new forecast as you would the original and the data will be archived upon exiting the program. If you change the date and enter a new forecast, the following occurs:

1. The forecast data in NFDRSCOF.DAT file are archived.
2. The newly entered forecast is saved in the NFDRSCOF.DAT file.
3. The new forecast (2 above) is archived upon exiting the program.

4 Enter a Forecast Trend

This option allows you to enter a trend forecast (using the Zone or Station Trend Forecast Entry window, sect. 8.4), calculates the indices for the trended station(s), and saves them for later display. When completed, the program returns you to the Main Menu.

Trend forecasts can be applied either to a zone or to a single station. When you enter a zone trend, the trends are automatically applied to all current observations for stations in that zone, just as if you used the Point Forecast option for each station.

If the current day's observation for a station has not been entered, the program will not make a forecast for that station. If there are no current observations for any station in a zone, you will receive a message, and no forecasts will be generated. You will then have to use the Point Forecast option for each station.

The forecast data are saved as described in "Saving Forecast Data" for option 3, Station Forecast, above.

5 Display NFDRS Data

Use this option to see the indices calculated in options 1-4. You must choose what data (Display Options Menu, sect. 7.2), what type of data (Observed or Forecast), and which stations you wish to display (Station Selection Menu, sect. 7.4).

When you are finished displaying data, or if you chose the Display option by mistake, choose the Return option or just press the ESC key.

6 Use Catalog Operations

This choice will bring up the Catalog Operations Menu (sect. 7.3). From this menu you can add a station, delete a station, display a station, or modify an existing station. When you are finished working with the catalog, or if you chose the Catalog option by mistake, choose the Return option or press the ESC key.

7 Use System Utilities

This choice will bring up the Utilities Menu (sect. 7.5), from which you can choose to design a custom display to archive format, or to change the effective date for entries.

8 Quit

Use this option to leave the program and return to the operating system (DOS). The program checks to see if any data need to be archived and archives any entered data that have not already been archived. Then you will be asked to confirm your request to leave the program. If you choose not to leave, you will be returned to the NFDRSPC Main Menu. Otherwise, you will be returned to the operating system (DOS).

7.2 Display Options Menu

With this menu, you choose what format the program is to use when displaying station weather and indices. After you enter your choice, the program shows you a two-line menu, where you choose to display either observed or forecast data. Then you are asked which stations you wish to display (Station Selection Menu, sect. 7.4). The data for the station(s) you select will be shown, and the program will wait for you to tell it to continue. When you do, it displays more data or returns to this menu.

After each format option is a sample of how that format will display the data. If no displayed format shown provides the information you need, you may design your own custom format, using the Design Custom Display option of the Utilities Menu (sect. 7.5).

If you want a printing of the displays, the simplest way is to use the PrtSc (Print Screen) key. Make sure the printer is turned on, loaded with paper, and on-line. Then hold down the Shift key and press the Print Screen key, which will provide a hard copy of the contents of your screen. If an error occurs, refer to your DOS manual or the Operating Guide for your printer. (If the line characters around the window do not print correctly, try putting the line "DEVICE=ANSI.SYS" in your CONFIG.SYS file. See your DOS manual for more information on the CONFIG.SYS file, the DEVICE command, and the ANSI.SYS driver.)

1 Display Station(s) Weather

This format displays the entered weather data for your station. The actual format will differ between observed data and forecast data. Below are the two formats, first for observed data, then for forecast data.

Figure 1--Sample observed weather display.

```
-----WEATHER-----12/10/88--OBS---13:07 LCL-----
STANAM HR DY W DBT DPT  RH YLMLDIR WS 10 TMX TMN HMX HMN PD PPAMT HF WF S MMSG
Athens 13 10 2  65  37  35 1 1 -99  0  3  68  33  78  28  0  .000  0  0  4
```

Figure 2--Sample forecast weather display.

```
-----WEATHER-----12/10/88--FCST--13:08 LCL-----
STATN  DY HR W DBT DPT  RH AL TL DIR WS 10 TMX TMN HMX HMN P1 P2
Athens 11 13 3  69  55  60  1  1 -99  0 14  70  45 100  50  0  0
```

2 Display Station(s) Indices

This format displays the fuel moistures and indices calculated for each model of the selected stations. The information for each model is displayed on a separate line. This format is the same for observed and forecast data.

Figure 3--Sample observed indices format display.

```
-----INDICES-----12/10/88--OBS---13:10 LCL-----
STANAM YMSGC DY WS WDY HRB 1H 10 HU TH KDI IC LR LO MR MO SC EC BI FL MC R
Athens 8P3P3 10 0 70 3 3 3 17 23 32 47 0 0 0 0 6 43 39 0 M -
```

3 Display in Abbreviated Format

This format displays some of the moistures and the indices for each model of the selected stations, with each model displayed on a separate line. The format is the same for observed and forecast information.

Figure 4--Sample observed abbreviated format display.

```
-----ABBREVIATED-----12/10/88--OBS---13:11 LCL-----
STANAM YMSGC DY HR TH IC LR LO MR MO SC EC BI FL MC R
Athens 8P3P3 10 13 23 47 0 0 0 0 6 43 39 0 M -
```

4 Display in Shortest Format

This format is the most compact and displays the precipitation and manning information for each model on a separate line. This format is the same for observed and forecast information.

Figure 5--Sample observed shortest format display.

```
-----SHORTEST-----12/10/88--OBS---13:12 LCL-----
STATN YMSGC DY PPAMT PD MC R
Athens 8P3P3 10 .000 0 M -
```

5 Display in Manager's Format

This format displays the information likely to be needed by a fire manager, again with each model on a separate line. The format is the same for observed and forecast data.

Figure 6--Sample observed manager's format display.

```
-----MANAGERS-----12/10/88--OBS---13:12 LCL-----
STANAM YMSGC DY DBT DPT RH WS PPAMT PD 1H 10 IC SC EC BI FL MC R
Athens 8P3P3 10 65 37 35 0 .000 0 3 3 47 6 43 39 0 M -
```

6 Display Station Data in Custom Format

This format displays the information you selected when you designed the custom format using the Utility Options Menu. Depending on which items you chose, formats for observed and forecast data may or may not differ. For example, if you choose to display the Morning Lightning Activity Level when you display observed data, you will see the entered value. But, when you display forecast data, you will always see a 0, as the ML entry is only in observed data.

Below is a sample of a custom display format. Your custom display will not look like this one. This display was produced using the information shown in the example Custom Format Selection (sect. 8.6).

Figure 7--Sample of observed data in custom format.

```
-----CUSTOM-----12/10/88--OBS---13:40 LCL-----  
STANAM RH  HR DD DBT 1H DIR YL PD UNIT KDI HRB R S HF WF IC LO MO  
Athens  35 13 10  65  3 -99  1  0 GaFC  32  3 - 4  0  0 47  0  0
```

7 Return to Main Menu

This option takes you back to the NFDRSPC Main Menu.

7.3 Catalog Operations Menu

This menu provides the option of adding a station to your catalog, deleting a station from the catalog, displaying the catalog of one or more stations, or modifying a station.

The catalog information is stored in the random-access file NFDRSCAT.DAT. When you add a station, the information entered is saved in this file. When you display stations, information is read from the catalog file, and displayed to you. If you modify a station, the program will replace the old information with your modified information.

When you are finished with catalog operations, or if you are at this menu by mistake, choose the Return option or press the ESC key. You will be returned to the Main Menu.

1 Add a New Station

Before any data can be entered or indices calculated for a station, you must add your station's information to the catalog file using this option. The information you enter will be saved and used later when an observation or forecast is entered. You are limited to 1025 stations in your catalog.

When this option is chosen, the program will ask you if you are adding a Manual Station or an Automated Station. Enter an **M** if your station is a manual station, or enter an **A** if your station is automated. Then the program will display the Station Catalog Entry or Modification window (sect. 8.5), and request your catalog information. When you complete the entry of your information, the program will save it in the catalog file, and space for the station is created in the current observation file, NFDRSCOF.DAT. The program then returns you to the Catalog Operations Menu.

2 Delete an Existing Station

When you choose this option, the program will delete the station whose number you enter. If you chose this option by mistake, press the ESC key, or enter a station number of 0. The program will return you to the Catalog Operations Menu.

This option removes your station from the catalog file AND from the current observation file, but it will not alter the contents of the archived files. Be very sure you wish to delete a station, as recovery of its catalog, weather, and calculated information is not possible.

3 Display One or More Catalog Entries

This option displays the catalog information for stations that are saved in your catalog file. When you choose this option, the program asks you which stations to display, using the Station Selection Menu (sect. 7.4). After each station is displayed, the program waits for you to press ENTER and then displays another station if any are left to display. When all the stations you requested have been displayed, you will be returned to the Catalog Operations Menu.

4 Modify Any Catalog Value

With this option, you are able to alter any value saved in your catalog except the station number. The station number must remain because it is used throughout the program as the key reference number for information about that station. If a station number is incorrect, delete the station and add the station back using the correct station number.

When you choose this option, the program asks for the number of the station you wish to modify. Once that number is entered, the program searches for that station in the catalog file, displays the catalog information, and requests your modifications, using the Station Catalog Entry or Modification window (sect. 8.5).

When your modifications are complete, the program saves the new catalog information in the file, and returns you to the Catalog Operations Menu.

Note: With this option you can make some changes that will cause the program to reset the fuel moistures and indices to starting values. (See the Station Catalog Entry or Modification window for more details.)

5 Change Woody Fuel Moisture

This option permits entry of a measured woody-fuel moisture content. The program asks for the number of the station for which you measured the woody moisture. The program searches for that station, displays the catalog information, and requests your woody moisture measurement, using the Station Catalog Entry and Modification window (sect. 8.5). When the entry is completed, the program saves your information and returns you to the Catalog Operations Menu.

6 Change Fuel-Stick Date

With this option, you enter the date that you installed the fuel sticks used to measure 10-Hour Fuel Moisture. When you choose this option, the program asks for the number of the station where the new sticks are to be

installed. The program searches for the station, displays all the catalog information, and requests the new fuel-stick date, using the Station Catalog Entry or Modification window (sect. 8.5). When completed, the program saves your information and returns you to the Catalog Operations Menu.

7 Return to Main Menu

Choosing this option returns you to the NFDRSPC Main Menu.

7.4 Station Selection Menu

When you reach this menu, you have selected the format with which to display your information--one of the data formats or the catalog format. If you have reached this menu incorrectly, simply press the ESC key, and you will be returned to the menu you were using previously.

At this menu, you will choose which of the stations defined in your catalog the program will display. Each option offers a different way to select stations. If you choose an incorrect option, when the program asks for your information, press the ESC key, and you will be returned to the beginning of this menu.

1 All Stations

This option causes the display of data for all the stations defined in your station catalog.

2 Single Station

With this option, you enter the NFDRS station number of the station you wish to display.

3 State

For this option, you enter the one- or two-digit NFDRS code number for the State containing the stations you wish to display. Remember, NFDRS station numbers are formatted SSCNN, where the SS is the State code, CC is the county code, and NN is the number of the station in the county. For example, station 092701 is in State 09, county 27, station number 1.

4 County

For this option you enter the one- or two-digit NFDRS code number for the county where the stations of interest are located. Then, you enter the code for the State where the county is located. See the discussion "3 State" above, for the location of the county and State codes in the station number.

5 Zone

In this option, you enter the one- or two-digit Fire Weather Forecast Zone number for the stations of interest. You also are asked for the Forest Service Region Number associated with the stations. If you wish, enter 0

(zero) for the Region Number, and all the stations defined in your catalog with the last two digits of their FWX Zone number the same as your entry will be displayed. Otherwise, only those whose complete FWX Zone number matches your Zone and Region entry will be displayed.

6 Region

With this option, you enter a Forest Service Region Number. All stations defined in your catalog as being in this region will be displayed.

7 Unit

With this option, you enter the Unit Name of the stations you wish to display. You can also enter a Region Number. The program will display data for all stations in your catalog with the same unit name and region number, if you selected one.

8 List of Stations

With this option, you enter a list of up to 15 station numbers for the program to display. If you have fewer than 15 stations to display, enter a station number of 0 (zero) to stop the entry and start the display of the data.

7.5 Utilities Menu

At this menu, you have the option to design a Custom Display format, design a Custom Archive format, or set the operating date.

If you are finished using the utilities or if you reached this menu by mistake, choose the Return option or press the ESC key. You will be returned to the Main Menu.

1. Design Custom Display

Choose this option to design a format which will be used when you select option 6 from the Display Options Menu (sect. 7.2). When this option is chosen the computer displays the Custom Format Selection window (sect. 8.6).

When you complete your selection of items by selecting item 0, the program saves the items in the configuration file, NFDRSCFG.DAT, and returns you to this menu. The new format you have designed is available for use immediately. If you exited the Custom Format Selection window by pressing the ESC key, the items are not saved, and the old format, if any, is left unchanged.

2. Design Custom Archive

Choose this option to design a format for archiving data. When this option is chosen, the computer displays the Custom Format Selection window (sect. 8.6). Indicate that your selection of items is complete by selecting item 0. The program then saves the items in the configuration file,

NFDRSCFG.DAT, and returns you to this menu. The new format you have designed is used the next time the program archives any data. If you exited the Custom Format Selection window by pressing the ESC key, the items selected are not saved, and the old format, if any, is left unchanged.

3. Change the Date

This option allows you to change the date that the program associates with any data entry. When the program starts, it assumes the date in your PC is correct unless the date given by your PC is January 1, 1980. In this case, the program automatically requests that you set the date, just as if you had chosen this option.

You cannot use this option to enter a date later than the date in your PC, unless the date in your PC is 1/1/80. If your computer's date is incorrect, exit the program, and reset the date using DOS.

4. Return to Main Menu

Choosing this option returns you to the NFDRSPC Main Menu.

Section 8. NFDRSPC Entry or Modification Windows

Below are descriptions of the windows used to enter or modify data in the NFDRSPC program.

While you are entering data using these windows, you may move within the fields using the Left and Right Arrow keys, and between fields using the Up and Down Arrow keys. If you do not wish to complete the entries, or chose the window by mistake, press the ESC key, and the program will return to the last menu displayed. (Special keys and their functions are described fully in sect. 3.7.)

8.1 Station Observation Entry

Figure 8 is a sample of the Station Observation Entry window. The values are arranged in three columns, with the computer asking for all the values on each row before proceeding to the next row. On the left side of each column is the prompt for the data item to be entered, and on the right is the space for the entry itself.

If at any time during the entry of data on this window you decide that you do not wish to continue, you may press the ESC key. You will be asked to confirm your request to abort. Enter a Y to abort the entry, or an N to go back to the entry window.

In this sample, the numbers in parentheses () to the left of the prompts are used solely for reference to table 1, which follows the sample. This table shows maximum and minimum values for each field, the length of the entry space, and if the item is allowed to be missing. The numbers in parentheses do not appear on the actual entry window on your computer screen.

Some of the values have one or more zeros (0) in the entry space, some have the letter M, and some are blank. Those items with the zero (0) are required entries, and you must enter some value for them. Those items with the letter M are allowed to be missing. If you do not have the data item, you can just press the ENTER key, and the program will move to the next field. The blank entry spaces are for character entries like number 21, the season code.

Figure 8--Sample of station observation entry window.

(1)Station Number	0	(2)Obs Time	0.00	(3)State of Weather	0
(4)Temperature	0	(5)Humidity	0	(6)10-Hour Fuel Stick	M
(7)Wind Direction	M	(8)Wind Speed	0	(9)Human-Caused Risk	0
(10)Forecast HCR	0	(11)Max. Temperature	0	(12)Min. Temperature	0
(13)Max. Rel. Hum.	0	(14)Min. Rel. Hum.	0	(15)Precip. Duration	0
(16)Precip. Amount	0.00	(17)Morning LAL	0	(18)Yesterday's LAL	0
(19)Herb. Green. Factor	0	(20)Woody Green. Factor	0	(21)Season Code	
(22)Message		(23)Are these values OK ?	(Y/N)		

Table 1--Items for entry of station observation

Item number	Item name	Minimum value	Maximum value	Length	Missing OK?
1	Station number	010101	509999	6	No
2	Observation time	0.01	24.00	5	No
3	State of weather ^a	0	9	1	No
4	Dry-Bulb temperature	-98	136	3	No
5	Humidity entry ^b	-98	136	3	No
6	10-Hour fuel stick ^c	1	99	2	Yes
7	Wind direction ^d	Variable	Variable	3	Yes
8	Wind speed	0	99	2	No
9	Human caused risk	0	99	2	No
10	Human caused risk for forecast ^e	0	99	2	No
11	Maximum temperature	-98	136	3	No
12	Minimum temperature	-98	136	3	No
13	Maximum relative humidity	1	100	3	No
14	Minimum relative humidity	1	100	3	No
15	Precipitation duration ^f	-24	23	3	No
16	Precipitation amount	0	9.99	4	No
17	Morning lightning activity level ^g	1	6	1	No
18	Yesterday's lightning activity level ^g	1	6	1	No
19	Herbaceous greenness factor	0	20	2	No
20	Woody greenness factor	0	20	2	No
21	Season Code ^h	Variable	Variable	2	No
22	Message	None	None	4	Yes
23	Confirmation that entry of items is complete ⁱ	Variable	Variable	1	No

^aStates of the weather 5, 6, or 7 (drizzle, rain, and snow) cause all indices to be set to zero because generalized precipitation over the protection area is assumed. States of the weather 8 and 9 assume localized precipitation and will not zero out all indices.

^bHumidity may be entered as wet-bulb, relative humidity, or dewpoint temperature. The selection is made when the station is added to the catalog by choosing the proper value for the "Hum Type" entry. Once this selection is made, it stays in effect until this value is changed, using the "Modify Any Catalog Value" option of the Catalog Menu.

^cIf the Observed 10-Hour Timelag Fuel Moisture is entered as missing, then the 10-Hour T/L Moisture will be calculated using the Burgan (1988) method. Otherwise, the entered value will be corrected for the age of the fuel sticks, if the age is known.

^dWind direction may be entered in regular 8-point one-digit form, in 16-point two-digit form, in degrees-of-the-compass three-digit form, or in 16-point letter codes. Thus, all of the following would give the same wind direction :1, 02, 045, NE. (If 0 is entered for wind speed, then 0 or M must be entered for wind direction.) Wind direction is stored in degrees-of-the-compass format. If the wind direction is unknown, enter M.

^eHuman-caused risk to be used automatically in any subsequent forecast for this station.

^f"Fuels Wet" can be indicated by entering the precipitation duration as a negative number. For example, if the actual duration was 3 hours, you would enter -3 if the fuels were still wet. If snow or ice still covers the sticks, but no precipitation has fallen that day, enter -0. Any negative number sets all indices to zero.

^gMorning LAL is the code that best describes the lightning situation from midnight to basic observation time. Yesterday's LAL is the level for the entire previous day. The value of Yesterday's LAL cannot be lower than the Morning LAL from Yesterday's observation.

^hSeason of the year can be entered in one- or two-letter codes. Winter can be W or WI, spring must be SP, summer must be SU, and fall can be F or FA. These entries will be converted to their numeric equivalents, with winter being 1 and fall being 4.

ⁱEnter a Y if all the items are satisfactory, or an N if you see an error or something you want to change. If you enter an N, the program will allow reentry of all the items.

8.2 RAWS Observation Entry

Below is a sample of the RAWS Observation Entry window. The values are shown in two sections, with the RAWS information in the top, and the associated manual station data in the bottom.

The RAWS information is arranged in two columns, with the computer asking for all the values on each row before proceeding to the next row. The entry space is to the right of the prompts on the row.

The manual station information is entered in the bottom section. The prompts are on a row, with the entry spaces below. When you complete the entry of the RAWS information, the program searches for the associated station and retrieves the manual data entered for that station. This information is shown in the entry spaces in this section, and you are asked if the data are satisfactory. If you answer N, you are allowed to change any of the manual station items.

In the sample provided in figure 9, the numbers in parentheses () to the left of the prompts are used solely for reference to table 2, which follows the sample. This table shows maximum and minimum values for each field, the length of the entry space, and if the item is allowed to be missing. The numbers in parentheses do not appear on the actual entry window on your computer screen.

Some of the values have one or more zeros (0) in the entry space, some have the letter M, and some are blank. Those items with the 0 (zero) are required entries, and you must enter a numeric value for them. Those items with the letter M are allowed to be missing. If you do not have the data item, press the ENTER key, and the program will move to the next field. The blank entry spaces are for character entries, like number 12, the message.

If at any time during the entry of data on this window, you decide that you do not wish to continue, you may press the ESC key. You will be asked to confirm your request to abort. Enter a Y to abort the entry, or an N to go back to the entry window.

Figure 9--Sample of RAWS observation entry window.

(1)Station ID	0	(2)Obs. Time	0.00
(3)Wind Direction	M	(4)Windspeed	0
(5)Temperature	0	(6)Humidity	0
(7)Max Temp	0	(8)Minimum Temp	0
(9)Max RH	0	(10)Minimum RH	0
(11)Precip Amount	0.00	(12)Message	
(15)			
(14) 10-hour	(16) (17) (18) (19) (20) (21) (22) (23)		
SW F.M. HCR FHCR PD MLAL YLAL HGF WGF Sea			
0 M 0 0 0 0 0 0 0			
(13) Are these values OK? (Y/N) [press ESC key to abort entry]			

Table 2--Items for entry of RAWs observation

Item number	Item name	Minimum value	Maximum value	Length	Missing OK?
1	Station number	010101	509999	6	No
2	Observation time	0.01	24.00	5	No
3	Wind direction ^a	Variable	Variable	3	Yes
4	Windspeed	0	99	2	No
5	Dry-bulb temperature	-98	136	3	No
6	Humidity entry ^b	-98	136	3	No
7	Maximum temperature	-98	136	3	No
8	Minimum temperature	-98	136	3	No
9	Maximum RH	1	100	3	No
10	Minimum RH	1	100	3	No
11	Precipitation amount	0	9.99	4	No
12	Message	None	None	4	Yes
13	Are these values OK? ^c	Variable	Variable	1	No
14	State of weather ^d	0	9	1	No
15	10-hour fuel stick ^e	1	99	2	Yes
16	Human-caused risk	0	99	2	No
17	Human-caused risk for forecast ^f	0	99	2	No
18	Precipitation duration ^g	-24	23	3	No
19	Morning lightning activity level ^h	1	6	1	No
20	Yesterday's lightning activity level ^h	1	6	1	No
21	Herbaceous greenness factor	0	20	2	No
22	Woody greenness factor	0	20	2	No
23	Season code ⁱ	Variable	Variable	2	No

^aWind direction may be entered in regular 8-point one-digit form, in 16-point two-digit form, in degrees-of-the-compass three-digit form, or in 16-point letter codes. So, all of the following would give the same wind direction: 1, 02, 045, NE. (If 0 is entered for windspeed, then a 0 or M must be entered for wind direction). Wind direction is stored in degrees-of-the-compass format. If the wind direction is unknown, enter M.

^bHumidity may be entered as wet-bulb, relative humidity, or dewpoint temperature. The selection is made when the station is added to the catalog by choosing the proper value for the "Hum Type" entry. Once this selection is made, it stays in effect until this value is changed, using the "Modify Any Catalog Value" option of the Catalog Menu.

^cEnter a Y if all the items are satisfactory, or an N if you see an error or something you want to change. If you enter an N, the program will allow reentry of all the items in the current section.

^dStates of the weather 5, 6, or 7 (drizzle, rain, and snow) cause all indices to be set to zero because generalized precipitation over the protection area is assumed. States of the weather 8 and 9 assume localized precipitation and will not zero out all indices.

^eIf the Observed 10-Hour Timelag Fuel Moisture is entered as missing, then it will be calculated using Burgan's 1988 method. Otherwise, the entered value will be corrected for the age of the fuel sticks if the age is known.

^fHuman-caused risk to be used automatically in any subsequent forecast for this station.

^g"Fuels Wet" can be indicated by entering the precipitation duration as a negative number. For example, if the actual duration was 3 hours, you would enter -3 if the fuels were still wet. If snow or ice still covers the sticks, but no precipitation has fallen that day, enter -0. Any negative number sets all indices to zero. If the program detects inconsistency in the precipitation entries (amount in the RAWs section, and duration in the manual section), the program will ask you to reenter both of these.

^hMorning LAL is the code that best describes the lightning situation from midnight to basic observation time. Yesterday's LAL is the level for the entire previous day. The value of Yesterday's LAL cannot be lower than the Morning LAL from yesterday's observation.

ⁱSeason of the year can be entered in one- or two-letter codes. Winter can be W or WI, spring must be SP, summer must be SU, and fall can be F or FA. These entries will be converted to their numeric equivalents, with winter being 1 and fall being 4.

8.3 Station Forecast Entry

Figure 10 is a sample of the Station Forecast Entry window. The values are arranged in two columns, and the computer asks for all the values on each row before proceeding to the next row. The entry space is to the right of the prompt for each data item.

In figure 10, the numbers in parentheses () to the left of the prompts are used solely for reference in table 3 which follows the sample. This table shows maximum and minimum values for each field, the length of the entry space, and if the item is allowed to be missing. The numbers in parentheses do not appear on the actual entry window on your computer screen.

Some of the values have one or more zeros (0) in the entry space, and some have the letter M. Those items with the 0 (zero) are required entries, and you must enter some value for them. Those items with the letter M are allowed to be missing. If you do not have the data item, you can just press the ENTER key, and the program will move to the next field.

If at any time during the entry of data on this window you decide that you do not wish to continue, you may press the ESC key. You will be asked to confirm your request to abort. Enter a Y to abort the entry or an N to go back to the entry window.

Figure 10--Sample of station forecast entry window.

(1)Station Id	0	(2)Valid Time	0.00
(3)State Of Weather	0	(4)Temperature	0
(5)Humidity	0	(6)10-Hr F.M.	M
(7)Wind Direction	M	(8)Wind Speed	0
(9)Max Temp	0	(10)Min Temp	0
(11)Max RH	0	(12)Min RH	0
(13)Precip Dur 1	0	(14)Precip Dur 2	0
(15)Precip Amount	0.00	(16)Afternoon LAL	0
(17)Tomorrow LAL	0	(18)Are these values OK ? (Y/N)	

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Table 3--Items for entry of station forecast

Item number	Item name	Minimum value	Maximum value	Length	Missing OK?
1	Station number	010101	509999	6	No
2	Forecast valid time	0.01	24.00	5	No
3	State of Weather ^a	0	9	1	No
4	Dry-bulb temperature	-98	136	3	No
5	Relative humidity ^b	1	100	3	No
6	10-hour fuel stick ^c	1	99	2	Yes
7	Wind direction ^c	Variable	Variable	3	Yes
8	Wind speed	0	99	2	No
9	Maximum temperature	-98	136	3	No
10	Minimum temperature	-98	136	3	No
11	Maximum relative humidity	1	100	3	No
12	Minimum relative humidity	1	100	3	No
13	Precipitation duration period 1 ^d	0	16	2	No
14	Precipitation Duration period 2 ^d	-8	7	2	No
15	Precipitation amount	0	9.99	4	No
16	Afternoon lightning activity level ^e	1	6	1	No
17	Tomorrow's lightning activity level ^f	1	6	1	No
18	Confirmation that entry of items is complete ^f	Variable	Variable	1	No

^aStates of the weather 5, 6, or 7 (drizzle, rain, and snow) cause all indices to be set to zero because precipitation over the entire area is assumed. States of the weather 8 and 9 assume localized precipitation and will not zero out all indices.

^bIf the 10-Hour Timelag Fuel Moisture is entered as missing, and if the Forecast Valid Time is within 1 hour of 2 p.m., the forecasted 10-Hour T/L Fuel Moisture will be calculated using the Fosberg 1977 method. In all other cases of this entry as "M," the forecasted 10-Hour Moisture will be calculated with the Burgan 1988 method.

^cWind direction may be entered in regular 8-point one-digit form, in 16-point two-digit form, in degrees-of-the-compass three-digit form, or in 16-point letter codes. So, all of the following would give the same wind direction: 1, 02, 045, NE. (If 0 is entered for wind speed, then a 0 or M must be entered for wind direction). Wind direction is stored in degrees-of-the-compass format. If the wind direction is unknown, enter M.

^dPrecip. Duration Period 1 is for the first 16 hours, and Precip. Duration Period 2 is for the last 8 hours of the 24 hours between standard observation times. "Fuels Wet" can be indicated by entering the Precip. Duration Period 2 as a negative number. For example, if the actual duration was 3 hours, you would enter -3 if the fuels were still wet. If snow or ice still covers the sticks, but no precipitation has fallen that day, enter -0. Any negative number sets all indices to zero.

^eAfternoon LAL is the predicted lightning activity level from standard observation time to midnight. Tomorrow's LAL is the lightning activity level for tomorrow, midnight to midnight.

^fEnter a Y if all the items are satisfactory, or an N if you see an error, or something you want to change. If you enter an N, the program will allow reentry of all the items.

8.4 Zone or Station Trend Forecast Entry

Figure 11 is a sample of the Trend Forecast Entry window. The values are arranged in two columns, with the computer asking for all the values on each row before proceeding to the next row. The entry space is to the right of the prompt for each data item.

In this sample, the numbers in parentheses () to the left of the prompts are used solely for reference to table 4, which follows the sample. This table shows maximum and minimum values for each field, the length of the entry space, and if the item is allowed to be missing. The numbers in parentheses do not appear on the actual entry window on your computer screen.

When you first request the Trend Forecast, the program asks if you want a trend for a zone or a station. If you enter **Z** for a zone trend, then the prompt for item number 1 will be as shown. If, however, you enter an **S** for a station trend, then the prompt for item number 1 will be "Station Number."

Some of the values have one or more zeros (0) in the entry space, and some have the letter M. The zero (0) indicates that you must enter a numeric value. The letter M indicates that a value need not be entered. If you do not have the data item, press the ENTER key, and the program will move to the next field.

If at any time during the entry of data on this window you decide that you do not wish to continue, you may press the ESC key. You will be asked to confirm your request to abort. Enter a **Y** to abort the entry, or an **N** to go back to the entry window.

Figure 11--Sample of zone trend forecast entry window.

(1)Zone Number	0	(2)Region Number	0
(3)Valid Time	0.00	(4)State of Weather	0
(5)Temp Trend	M	(6)Humidity Trend	M
(7)10-Hr F.M. Trend	M	(8)Wind Speed Trend	M
(9)Max Temp Trend	M	(10)Min Temp Trend	M
(11)Max RH Trend	M	(12)Min RH Trend	M
(13)Precip Dur 1	0	(14)Precip Dur 2	0
(15)Precip Amount	0.00	(16)Afternoon LAL	0
(17)Tomorrow LAL	0	(18)Values OK ? (Y/N)	

Table 4--Items for entry of zone or station trend forecast

Item number	Item name	Minimum value	Maximum value	Length	Missing OK?
1	Zone number or Station number ^a	Variable	Variable	6	No
2	Forest Service region number	1	10	2	No
3	Forecast valid time ^b	1	24	2	No
4	State of weather ^b	0	9	1	No
5	Dry-bulb temperature	-40	40	3	Yes
6	Relative humidity trend	-90	90	3	Yes
7	10-hour fuel stick trend ^c	-65	65	3	Yes
8	Wind speed trend	-40	40	3	Yes
9	Maximum temperature trend ^d	-40	40	3	Yes
10	Minimum temperature trend ^d	-40	40	3	Yes
11	Maximum relative humidity trend ^d	-90	90	3	Yes
12	Minimum relative humidity trend ^d	-90	90	3	Yes
13	Precipitation duration period 1 ^e	0	16	2	No
14	Precipitation Duration period 2 ^e	-8	7	2	No
15	Precipitation amount	0	9.99	4	No
16	Afternoon lightning activity level ^f	1	6	1	No
17	Tomorrow's lightning activity level ^f	1	6	1	No
18	Confirmation that entry of items is complete ^g	Variable	Variable	1	No

^aThis item can either be a Zone Number or a Station Number, depending on which type of trend you selected. If you are interested in a Zone, then the Minimum Value is 1 and the Maximum Value is 10, with 7 not allowed. If you are interested in a Station, the Minimum Value is 10101, and the Maximum Value is 509999.

^bStates of the weather 5, 6, or 7 (drizzle, rain, and snow) cause all indices to be set to zero because precipitation over the entire area is assumed. States of the weather 8 and 9 assume localized precipitation and will not zero out all indices.

^cIf a trend is entered, the Observed 10-Hour Fuel Moisture will be limited to 25 (maximum) before the trend is applied. If the trend to 10-Hour Timelag Fuel Moisture is entered as missing, and if the Forecast Valid Time is within 1 hour of 2 p.m., then the forecast 10-Hour Fuel Moisture will be calculated with the Fosberg 1977 method. In all other cases of missing trend, the forecast 10-Hour T/L Moisture will be calculated with the Burgan 1988 method.

^dIf you wish to forecast the average 24-hour temperature and relative humidity, enter the same trend for both the forecast Maximum and Minimum values. This will have the same effect as trending the averages.

^ePrecip. Duration Period 1 is for the first 16 hours, and Precip. Duration Period 2 is for the last 8 hours of the 24 hours between standard observation times. "Fuels Wet" can be indicated by entering the Precip. Duration Period 2 as a negative number. For example, if the actual duration was 3 hours, you would enter -3 if the fuels were still wet. If snow or ice still covers the sticks, but no precipitation has fallen that day, enter -0. Any negative number sets all indices to zero.

^fAfternoon LAL is the predicted lightning activity level from standard observation time to midnight. Tomorrow's LAL is the lightning activity level for tomorrow, midnight to midnight.

^gEnter a Y if all the items are satisfactory, or an N if you see an error or something you want to change. If you enter an N, the program will allow reentry of all the items.

8.5 Station Catalog Entry or Modification

Below is a sample of the Station Catalog Entry or Modification window. The values are arranged in two sections. The top section contains the general station information, and the bottom section contains the model-specific information. The program requests all of the station information (items 1-23) and checks it before requesting model-specific information (items 24-30).

For station information, the entry space is to the right of the prompts for each value. The program asks for all the values on each row before proceeding to the next row.

For model-specific information, the prompts are arranged along the top, with the corresponding entry spaces below. Each model is entered on a separate line, and the program checks each as it is entered.

Figure 12 shows a Station Catalog Entry or Modification window. In it, the numbers in parentheses () to the left of the prompts are solely for reference in table 5, which follows the sample. This table shows maximum and minimum values for each field, the length of the entry space, and if the item is allowed to be missing. The numbers in parentheses do not appear on the actual entry window on your computer screen.

If you are adding a station to the catalog, some of the values have one or more zero (0) in the entry space, and some are blank. Those items with the 0 (zero) are numeric entries, and you must enter a numeric value for them. The items with the blank entry space are for character entries, like the station name. If you are modifying an existing station, the current values for your station are displayed.

If at any time during the entry of data on this window, you decide that you do not wish to continue, you may press the ESC key. You will be asked to confirm your request to abort. Enter a Y to abort the entry, or an N to go back to the entry window.

Caution: If you modify any items of an existing station other than Station Name, Unit, Fire Weather Forecast Zone, Agency Code, Associated Station, Measured Woody Fuel Moisture, or Fuel Stick Date, the program will discard the carried items, (1,000- and X1,000-hour timelag fuels moistures, and herbaceous and woody fuel moistures) and restart calculation of moistures and indices as if you were starting a new station.

Figure 12--Sample of station catalog entry or modification window.

(1)Station name	(2)Station Id	0	(3)Region	0	(4)Unit	
(5)Latitude	0.000	(6)Longitude	0.000	(7)Elev	0	(8)FWX Zone 0
(9)Agency	0	(10)Time Zone	(11)Hum Type	0	(12)Manning Index	(13)# Classes 0
(14)Assoc. Station	0	(15)Climate Class	0	(16)LRSF	0.00	(17)Aspect
(18)Site	0	(19)Woody F.M.	0	(20)Stick Date	/ /	(21)Annual Precip. 0.0
(22)Fine Dead F.M. = 10-Hr ?(Y/N)		(23)Obs Time	0	(24)Number of Models	0	
(25) Model	Model	Slope	Grass	Manning	Manning	Woody
(26) System	(27) Class	(28) Type	(29) 90th	(30) 97th	(31) Type	
	0		0	0		

Table 5--Items for entry or modification of station catalog

Item number	Item name	Minimum value	Maximum value	Length	Missing OK?
1	Station name	Variable	Variable	6	No
2	Station ID	10101	509999	6	No
3	Region	1	10	2	No
4	Unit ^a	Variable	Variable	4	Yes
5	Latitude	0	70	7	No
6	Longitude	1	180	7	No
7	Elevation	0	99999	5	No
8	Fire weather forecast zone ^b	1	999	3	Yes
9	Agency code	1	9	1	No
10	Standard time zone code ^c	Variable	Variable	1	No
11	Humidity entry type ^d	1	6	1	No
12	Manning class index ^d	Variable	Variable	2	Yes
13	Number of manning classes ^e	3	9	1	Yes
14	Associated station for automated stations ^f	10101	50999	6	Yes
15	Climate class	1	4	1	No
16	Lightning risk scaling factor	.01	5	4	No
17	Station aspect ^g	Variable	Variable	3	No
18	Siting code for station location	1	3	1	No
19	Measured woody fuel moisture ^h	Variable	500	3	Yes
20	Date of exposure for 10-hour fuel sticks ⁱ	01/01/80	12/31/99	3	Yes
21	Average annual precipitation amount	5	500	3	No
22	Should 1-hour fuel moisture - 10-hour? ^j	Variable	Variable	1	No
23	Hour that observations are usually taken	1	24	2	No
24	Number of fuel models ^k	1	4	1	No
25	Fuel model code ^l	Variable	Variable	1	No
26	Code for the type of fuel model ^m	77 or	88	2	No
27	Station slope class	1	5	1	No
28	Code for the type of grass ⁿ	Variable	Variable	1	No
29	90th percentile for calculating manning class ^o	1	999	3	Yes
30	97th percentile for calculating manning class ^p	1	999	3	Yes
31	Code for type of woody fuel ^q	Variable	Variable	1	No

^aThe four-letter code of the administrative unit for this station. If the unit name is unknown or unassigned, you may leave this field blank.

^bThe Fire Weather Forecast zone, usually assigned and used by the National Weather Service. Customarily, the first digit is the Forest Service Region number. If this number is unknown, enter a 0 (zero).

^cPossible values for the standard Time Zone Code are:

Code	Time zone
E	Eastern
C	Central
M	Rocky Mountain
P	Pacific
Y	Yukon
H	Hawaiian
B	Bering

Note: Most of the Alaska stations should enter H for Hawaiian time.

^dThe index used by your organization for calculation of Manning Classes. Valid entries are:

Code	Meaning
IC	Ignition Component
SC	Spread Component
EC	Energy Release Component
MO	Man-Caused Occurrence Index
LO	Lightning-Caused Occurrence Index
BI	Burning Index
FL	Fire Load Index

If your agency does not wish to calculate Manning Classes, leave this field blank. Also, enter a 0 (zero) when asked for the number of Manning Classes.

^eThe number of Manning Classes used by your organization. If your organization does not wish to calculate Manning Classes, enter a 0 (zero) here, and you leave the entry for Manning Index blank as well.

^fFor Automated Stations, the number of the manual station from which this program can obtain manually observed items. If this station is manually operated, you will not be prompted for this item.

^gThe direction towards which the station slopes. The value is entered like wind direction, in one-digit 8-point form, two-digit 16-point form, three-digit degrees-of-the-compass form, or 16-point letter codes. If there is no slope at your station, enter the direction that the station faces, usually South or Southwest.

^hThe actual woody fuel-moisture content, as manually measured at the station. The minimum value for this entry depends on the climate class, with 50, 60, 70, and 80 being the minimums for climate classes 1, 2, 3, and 4, respectively. If you do not measure the woody moisture, enter a 0 (zero). The measurement, if entered, will be used to fine-tune the internal calculation of the woody moisture content for the next 30 days. If another measurement is not entered by the end of that period, you will receive a message warning you of stale woody data, for the following 5 days. After the 30-day period, the program will calculate the woody fuel-moisture content, without considering this entry.

Note: Modification of this item may be selected directly from the Catalog Options Menu.

ⁱIf you use fuel-moisture sticks to measure 10-Hour Fuel Moisture enter the first date you used them, in the format month/day/year. If you do not use the sticks, leave this entry blank.

Note: Modification of this item may be selected directly from the Catalog Options Menu.

^jDecide whether or not to always set the Fine Dead (1-Hour) Fuel Moisture to the same value as the 10-Hour Fuel Moisture. Enter a Y or an N.

^kEnter the number of fuel models you wish the program to maintain for this station. You will be prompted for this many model lines in the following entry section.

^lEnter the letter code for the NFDRS fuel model. Values range from A to Z, excepting M.

^mEnter the fuel model group you wish to use for this model, 78 for 1978 system fuel models, or 88 for 1988 system fuel models. Some of the fuel loads have been changed in the 1988 system. (For more information, see "Appendix 2: Fuel Model Differences.")

ⁿEnter the letter code for the type of grass for this station, P for perennial, or A for annual.

^oThe 90th and 97th percentiles of the Manning Index, used to calculate Manning Class. If you chose not to have the program calculate the Manning Classes, you will not be prompted for these items.

^pEnter the type of Woody Fuels in your station locations, D for deciduous, or E for evergreen.

8.6 Custom Format Selection

The Custom Format Selection window is used to design both Custom Display and Archive formats. The operation of the screen is essentially the same for both types but is different from the other entry windows in the program. Rather than many entry spaces there is only one. Most of the screen is taken up with the display of information about your choices.

Figure 13 shows a sample Custom Format Selection window. In this sample, it is assumed you are designing a Custom Display format, and the discussion will reflect this assumption. However, where the operations differ, the Custom Archive format will be discussed as well.

Figure 13--Sample of custom display format selection window.

1-STANAM	11 TMX	21 MR	31-S	41 YMSGC	]
2-UNIT	12 TMN	22 MESH	32 LR	42-R	]
3-HR	13 RMX	23 P1	33-IC	43-HRB	]
4-DD	14 RMN	24 P2	34-LO	44 WDY	]
5-DBT	15 PPAMT	25 AL	35-MO	45 X1000	]
6-RH	16-PD	26 TL	36 SC	46-KDI	]
7 W	17-YL	27-1H	37 EC	47 STAT'N	]
8 10	18 ML	28 HU	38 BI	48 DATE	]
9-DIR	19 PR	29 TH	39 FL	49-HF	]
10 WS	20 DPT	30 O	40 MC	50-WF	]
{1}Man Caused Occurrence Index					]
					]
Enter the item number to add or delete.{2} 0					]
press ENTER to end. press ESC key to quit.					]
{3}					]
STANAM RH	HR DD DBT 1H DIR YL PD UNIT KDI HRB R S HF WF IC	LO MO	]		
					Bottom Section

The entry screen can be divided into three sections for the purposes of discussion. The top section lists the items you can display or archive. There are five columns of numbers and keywords. Between some of the numbers and keywords there is a dash "-", which indicates that item has been selected for display or archiving.

The middle section displays messages (following the {1}), the prompt for your entry, and the entry space (following the {2}), along with an instruction on how to end the entry of data. To select an item, enter the number of that item, and press ENTER. The "-" will be placed on the screen, between the number and the keyword. To delete (or turn off) an item, enter the number again.

The bottom section provides a Sample Header line (under the {3}), or the Archive record length. This is where the program shows you what the Custom Display Header will look like, or tells you how long your Custom Archive record will be.

When an item is added to the Custom Display format, the keyword is placed at the end of the Sample Header. When an item is deleted, it is removed from the line, and any following items are moved to the left. You cannot add more items to the Custom Display format than will fit on one line of the screen.

When an item is added to the Custom Archive format, the length of the item is added to the Archive record length. When an item is deleted, the length of the item is subtracted from the Archive record length. Due to the method of building the Custom Archive file, there will always be an extra space in the record, and the length will reflect it.

To exit the Custom Format window and save the changes made to the Custom Format, enter a value of 0 (just press the ENTER key when 0 is in the entry space). If you want to discard any changes you have made, press the ESC key. You will be asked to confirm your intention, and if you choose not to exit, you will be returned to this window. When you do exit, you will be returned to the Utility Menu.

We suggest that any format you design include the following:

- Either item number 1 (station name) or item number 47 (station number)
 - Either item number 4 (day) or item number 48 (date)
- For a Custom Archive format, items 47 and 48 are suggested.

Following this sample is a table of the items with their keywords, a discussion of the item, and the number of spaces available for the entry.

Table 6--Custom item keyword descriptions

Item Number	Keyword	Explanation	Spaces or entry length
1	STANAM	Station name	6
2	UNIT	Unit name	4
3	HR	Hour of observation or forecast	2
4	DD	Day of observation or forecast	2
5	DBT	Dry-bulb temperature (^o F)	3
6	RH	Relative humidity (percent)	3
7	W	State of weather code	1
8	10	10-hour timelag fuel moisture	2
9	DIR	Wind direction (degrees)	3 ^a
10	WS	Wind speed (mi/h)	2
11	TMX	Maximum temperature (^o F)	3
12	TMN	Minimum temperature (^o F)	3
13	RMX	Maximum relative humidity (percent)	3
14	RMN	Minimum relative humidity (percent)	3
15	PPAMT	Precipitation amount (inches)	5 ^b
16	PD	Precipitation duration	2 ^b
17	YL	Yesterday's lightning activity level	1 ^c
18	ML	Morning lightning activity level	1 ^c
19	PR	Predicted man-caused risk	2 ^c
20	DPT	Dewpoint temperature (^o F)	3
21	MR	Man-caused risk (today's)	2
22	MESG	Message field	4
23	P1	Precipitation duration, first period	2 ^d
24	P2	Precipitation duration, second period	2 ^d
25	AL	Afternoon lightning activity level	2 ^d
26	TL	Tomorrow's lightning activity level	2 ^d
27	1H	1-hour timelag fuel moisture	2
28	HU	100-hour timelag fuel moisture	3
29	TH	1000-Hour timelag fuel moisture	3
30	O	Option level (computed)	1
31	S	Season code	2
32	LR	Lightning risk	2 ^e
33	IC	Ignition component	3 ^e
34	LO	Lightning occurrence index	3 ^e
35	MO	Man-caused occurrence index	3 ^e
36	SC	Spread component	3 ^e
37	EC	Energy release component	3 ^e
38	BI	Burning index	3 ^e
39	FL	Fire load index	3 ^e
40	MC	Manning class	2 ^e
41	YMSGC	Model type-fuel model-slope-grass-climate	5 ^e
42	R	Adjective rating	1 ^e
43	HRB	Herbaceous fuel moisture	3 ^e
44	WDY	Woody fuel moisture	3 ^e
45	X1000	Predictor for 1,000-hour moisture	5 ^e
46	KDI	Keetch-Byram drought index	3
47	STAT'N	Station number	6
48	DATE	Date of observation or forecast (YYMMDD, year, month, day)	6
49	HF	Herbaceous greenness factor	2
50	WF	Woody greenness factor	2

^aMissing entry displayed as -99.

^bFor observations, this is the precipitation duration as entered. For forecasts, this is sum of the precipitation durations for periods 1 and 2.

^cAvailable for observations only. Displayed as zero "0" for forecasts.

^dAvailable for forecasts only. Displayed as 0 (zero) for observations.

^eThere are four of these entries, one for each possible fuel model. For Display format, each model is displayed on a separate line. In Archiving, all four are always archived.

Section 9. Future Work

Planned Additions to the NFDRSPC Program

- Commands to set woody, herbaceous, 1,000-hour and X1,000 moistures.
- Command to add records to the Archive files.
- Ability to use the program in the Southern Hemisphere.

Additional Programs

- Program to process the Archive files that will print selected records, graph selected data for selected stations, sort the archive files, deleting duplicate records.
- PC version of the FIRDAT program.

These are some of the additions we have planned to the program. If you have a suggestion about a change or addition to the program, please use a copy of the USER Suggestion Form in appendix 6.

Literature Cited

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APPENDIX 1: DISCUSSION OF FILES

These are the files the Setup program put on your PC.

NFDRSPC.EXE	The actual program.
NFDRSCFG.DAT	The configuration file. Tells the program where to find the other data files.
NFDRSERR.DAT	The error messages.
NFDRSHLP.TXT	The help messages shown when you press F1.
NFDRSHLP.NDX	An index to the help messages, used to speed the search for the proper help.

The size of these files will not change, unless you get an update to the program. These files should not be altered, since alteration of these files would produce unpredictable results.

The other files you will find on your PC, after you have added a station to the catalog, are :

NFDRSCAT.DAT	The file containing the catalog information.
NFDRSDIR.DAT	A directory to all the operating files containing station information.
NFDRSCOF.DAT	The file holding the current observation data and the current forecast data for each station.
NFDRSARC.DAT	The Standard Archive file, containing fire weather information in the Fort Collins Archive Format.

These files will consume disk space in the following amounts:

NFDRSCAT.DAT	250 bytes / station
NFDRSDIR.DAT	12 bytes / station
NFDRSCOF.DAT	1100 bytes / station
NFDRSARC.DAT	81 bytes / observation or forecast / day

You will see the file below only if you tell the program to create it. This file and the NFDRSARC.DAT file listed above are the only files in the system that you should attempt to edit. The variability of this file precludes any attempt to guess the size.

NFDRSCTM.DAT	The Custom Format Archive file.
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APPENDIX 2: FUEL MODEL DIFFERENCES

The changes required by the 1988 update to the NFDRS program (Burgan 1988) required modification of all 20 NFDRS Fuel Models. A second set of fuel models was created. In some cases, fuel loads were changed to improve the seasonal response, but the major changes involved adding a minimum and maximum wind adjustment factor and a reservoir of dead fuel to improve the drought response. The user can choose which set of fuel models to use: the original 1978 NFDRS models or the 1988 revision of those models. Both the 1978 and 1988 models are listed below.

Table 1--1978 NFDRS fuel model descriptions

Fuel model parameters	Fuel models									
	A	B	C	D	E	F	G	H	I	J
Load (tons/acre)										
1-hour dead	0.2	3.5	0.4	2.0	1.5	2.5	2.5	1.5	12.0	7.0
10-hour dead	--	4.0	1.0	1.0	0.5	2.0	2.0	1.0	12.0	7.0
100-hour dead	--	0.5	--	--	0.25	1.5	5.0	2.0	10.0	6.0
1,000-hour dead	--	--	--	--	--	--	12.0	2.0	12.0	5.5
Woody	--	11.5	0.5	3.0	0.5	9.0	0.5	0.5	--	--
Herbaceous	0.3	--	0.8	0.75	0.5	--	0.5	0.5	--	--
Surface-area-to-volume ratio (1/ft)										
1-hour dead	3,000	700	2,000	1,250	2,000	700	2,000	2,000	1,500	1,500
10-hour dead	--	109	109	109	109	109	109	109	109	109
100-hour dead	--	30	30	--	30	30	30	30	30	30
1,000-hour dead	--	8	--	--	--	--	8	8	8	8
Woody	--	1,250	1,500	1,500	1,500	1,250	1,500	1,500	--	--
Herbaceous	3,000	--	2,500	1,500	2,000	--	2,000	2,000	--	--
Heat content (all fuels) (Btu/lb)	8,000	9,500	8,000	9,000	8,000	9,500	8,000	8,000	8,000	8,000
Moisture of extinction (%)										
Dead	15	15	20	30	25	15	25	20	25	25
Fuel Bed depth (ft)	0.8	4.5	0.75	2.0	0.4	4.5	1.0	0.3	2.0	1.3
Wind adjustment Factor	0.6	0.5	0.4	0.4	0.5	0.5	0.4	0.4	0.5	0.5
SCmax	301	58	32	68	25	24	30	8	65	44
	K	L	N	O	P	Q	R	S	T	U
Load (tons/acre)										
1-hour dead	2.5	0.25	1.5	2.0	1.0	2.0	0.5	0.5	1.0	1.5
10-hour dead	2.5	--	1.5	3.0	1.0	2.5	0.5	0.5	0.5	1.5
100-hour dead	2.0	--	--	3.0	0.5	2.0	0.5	0.5	--	1.0
1,000-hour dead	2.5	--	--	2.0	--	1.0	--	0.5	--	--
Woody	--	--	2.0	7.0	0.5	4.0	0.5	0.5	2.5	0.5
Herbaceous	--	0.5	--	--	0.5	0.5	0.5	0.5	0.5	0.5
Surface-area-to-volume ratio (1/ft)										
1-hour dead	1,500	2,000	1,600	1,500	1,750	1,500	1,500	1,500	2,500	1,750
10-hour dead	109	--	109	109	109	109	109	109	109	109
100-hour dead	30	--	--	30	30	30	30	30	--	30
1,000-hour dead	8	--	--	8	--	8	8	8	--	--
Woody	--	--	1,500	1,500	1,500	1,200	1,500	1,200	1,500	1,500
Herbaceous	--	2,000	--	1,500	2,000	1,500	2,000	1,500	2,000	2,000
Heat content (all fuels) (Btu/lb)	8,000	8,000	8,700	9,000	8,000	8,000	8,000	8,000	8,000	8,000
Moisture of Extinction (%)										
Dead	25	15	25	30	30	25	25	25	15	20
Fuel Bed Depth (ft)	0.6	1.0	3.0	4.0	0.4	3.0	0.25	0.4	1.25	0.5
Wind adjustment factor	0.5	0.6	0.6	0.5	0.4	0.4	0.4	0.6	0.6	4
SCmax	23	178	167	99	14	59	6	17	96	16

Table 2--1988 NFDRS fuel model descriptions

Fuel model parameters	Fuel models									
	A	B	C	D	E	F	G	H	I	J
Load (tons/acre)										
1-hour dead	0.2	3.5	0.4	2.0	1.0	2.5	2.5	1.5	12.0	7.0
10-hour dead	--	4.0	1.0	1.0	0.5	2.0	2.0	1.0	12.0	7.0
100-hour dead	--	0.5	--	--	0.25	1.5	5.0	2.0	10.0	6.0
1,000-hour dead	--	--	--	--	--	--	12.0	2.0	12.0	5.5
Woody	--	11.5	0.8	3.0	1.0	7.0	0.5	0.5	--	--
Herbaceous	0.3	--	0.8	1.0	0.5	1.0	0.5	0.5	--	--
Drought	0.2	3.5	1.8	1.5	1.5	2.5	5.0	2.0	12.0	7.0
Surface-area-to-volume ratio (1/ft)										
1-hour dead	3,000	700	2,000	1,250	2,000	700	2,000	2,000	1,500	1,500
10-hour dead	--	109	109	109	109	109	109	109	109	109
100-hour dead	--	30	30	--	30	30	30	30	30	30
1,000-hour dead	--	8	--	--	--	--	8	8	8	8
Woody	--	1,250	1,500	1,500	1,500	1,250	1,500	1,500	--	--
Herbaceous	3,000	--	2,500	1,500	2,000	1,500	2,000	2,000	--	--
Heat content (all fuels) (Btu/lb)	8,000	9,500	8,000	9,000	8,000	9,500	8,000	8,000	8,000	8,000
Moisture of extinction (%)										
Dead	15	15	20	40	25	15	25	20	25	25
Fuel bed depth (ft)	0.8	4.5	0.25	2.0	0.4	4.5	1.0	0.3	2.0	1.3
Minimum wind adjustment factor										
	0.6	0.5	0.3	0.4	0.3	0.5	0.3	0.3	0.5	0.5
Maximum wind adjustment factor										
	0.6	0.5	0.5	0.4	0.5	0.5	0.3	0.3	0.5	0.5
SCmax	301	58	32	68	25	24	30	8	65	44
	K	L	N	O	P	Q	R	S	T	U
Load (tons/acre)										
1-hour dead	2.5	0.25	1.5	2.0	1.0	2.5	0.5	0.5	1.0	1.5
10-hour dead	2.5	--	1.5	3.0	1.0	5.4	0.5	0.5	0.5	1.5
100-hour dead	2.0	--	--	3.0	0.5	2.9	0.5	0.5	--	1.0
1,000-hour dead	2.5	--	--	2.0	--	1.0	--	0.5	--	--
Woody	--	--	2.0	7.0	0.5	3.0	0.5	0.5	2.5	0.5
Herbaceous	--	0.5	--	--	0.5	1.0	0.5	0.5	0.5	0.5
Drought	2.5	0.25	2.0	3.5	1.0	3.5	0.5	1.5	1.0	2.0
Surface-area-to-volume ratio (1/ft)										
1-hour dead	1,500	2,000	1,600	1,500	1,750	3,500	1,500	1,500	2,500	1,750
10-hour dead	109	--	109	109	109	109	109	109	109	109
100-hour dead	30	--	--	30	30	30	30	30	--	30
1,000-hour dead	8	--	--	8	--	8	8	8	--	--
Woody	--	--	1,500	1,500	1,500	1,500	1,500	1,200	1,500	1,500
Herbaceous	--	2,000	--	1,500	2,000	1,500	2,000	1,500	2,000	2,000
Heat content (all fuels) (Btu/lb)	8,000	8,000	8,700	9,000	8,000	8,000	8,000	8,000	8,000	8,000
Moisture of extinction (%)										
Dead	25	15	40	30	30	18	25	25	15	20
Fuel bed depth (ft)	0.6	1.0	3.0	4.0	0.4	2.0	0.25	0.4	1.25	0.5
Minimum wind adjustment factor										
	0.5	0.5	0.5	0.5	0.3	0.2	0.3	0.6	0.6	0.3
Maximum wind adjustment factor										
	0.5	0.5	0.5	0.5	0.3	0.3	0.5	0.6	0.6	0.3
SCmax	23	178	167	99	14	59	6	17	96	16

```

Choose one of : <-----<-----<-----<-----^
1 Manual --> Manual Observation --->----->---(calculate and
   Obs      Entry & Checking                save indices) -^
   (sec. 8.1)                                ^
2 RAWs -> RAWs Observation --> (get Associated    --> Allow changes --^
   Obs      Entry & Checking    manual station    to manual data
   (sec. 8.2)                  data)              (sec. 8.2)         |
                                     ^
3 Station --> Station Forecast  -->----->-----^
   Fcst     Entry & checking
   (sec. 8.3)                                |
4 Trend --> Trend Forecast  --> (get manual      --> (trend obs -->--^
   Fcst     Entry & Checking    observation(s))    data )          |
   (sec. 8.4)                                |
5 Display --> Choose a format:---<-----<-----<-----<-----^
   (sec. 7.2)                                |
Data [1-Weather Format ]                               |
[2-Indices Format] --> Choose Data                    |
[3-Abbreviated Format] Type:                        |
[4-Shortest Format] [1-Observed Data]                 |
[5-Manager's Format] [2-Forecast Data]               |
[6-Custom Format]   |                                 |
| --> Choose which                                  |
| Stations (sec. 7.4)                              |
| [1-All Stations ] -----v                       |
| [2-Single Station ]                             |
| [3-State ]                                         |
| [4-County ]                                       |
| [5-Zone ]                                         |
| [6-Region ]                                      |
| [7-Unit ]                                         |
| [8-List of Stations]                            |
| --> Enter Station Selection:                      |
| Station Id, or } -->(Get --> Show -->^
| State code, or } Selected Data
| County Code, or } Data)
| Zone Id, or
| Region Number, or
| Unit, or
| List of Stations.)
[7-Return to Main Menu] ----->----->----->----->
(Continued on next page)

```

```

6 Catalog --> Choose a catalog operation: <-----<-----<-----<
Functions      (sec. 7.3)
[1-Add a Station    } -----> Enter Station -->-----v
[                    }                      Catalog Data   |
[2-Delete a Station } -----Select ----->-----V     ^
[                    }                      Station         |
[3-Display a Station }
[    |
[    --> Choose Which
[        Stations:
[        [1-All Stations    }-----v
[        [2-Single Station  }                      V     ^
[        [3-State           |                      |     ^
[        [4-County          |                      |     ^
[        [5-Zone            |                      |     ^
[        [6-Region          |                      |     ^
[        [7-Unit            |                      |     ^
[        [8-List of Stations}                      |     ^
[        |
[        --> Enter Station
[            Selection:
[        Station Id, or    } -->(Get    --> Show -----(Update
[        State code, or   } Selected   Data       files)--^
[        County Code, or  } Data)      |             |
[        Zone Id, or     |             |             |
[        Region Number, or|             |             |
[        Unit, or        |             |             |
[        List of Stations.)|             |             |
[
[4-Modify any Value    }
[5-Change Measured Woody } -> Select
[6-Change Fuel-Stick Date } Station
[                        |
[                        (Get selected
[                        Station Data)
[                        |
[                        Show Current --> Allow Changes -->-^
[                        Station Data   to selected data
[
[7-Return to Main Menu } ----->----->----->----->----->-----^

7- Utilities --> Choose a utility:----<-----<-----<-----<
      (sec. 7.5)
[1-Design Custom Display)
[2-Design Custom Archive) --> Select items for --- ( Update -->-^
[                        Display or Archive Configuration
[                        File )
[3-Change the Date      } --> Show Current
[                        Operating Date
[                        |
[                        --> Allow Changes --> (Save New -->--^
[                        to Date              Date )
[4-Return to Main Menu } ----->----->----->----->----->-----^

8-Quit --> (Read Observation files -->-- Confirm Quit ? --> Either exit
and Archive Observations                to DOS, or -->---^

```

APPENDIX 4: THE FORMAT OF STANDARD ARCHIVE FIRE WEATHER DATA
FORT COLLINS ARCHIVE FORMAT

<u>Field Descriptions</u>	<u>Begin Col. #</u>	<u>End Col. #</u>
Station Number	1	1
Date (yyymmdd)	7	12
State of Weather		13
Dry-Bulb Temperature ($^{\circ}$ F)	14	16
Relative Humidity (percent)	17	19
Herbaceous Greenness Factor	20	22
Digit '9' If Fuels Wet		23
Not Used		24
Man-Caused Risk	25	27
Wind Direction (8 points)		28
Windspeed (miles per hour)	29	31
Not Used		32
10-Hr-T/L Moisture (Only if measured)	33	35
Woody Greenness Factor	36	38
Maximum temperature ($^{\circ}$ F)	39	41
Minimum Temperature ($^{\circ}$ F)	42	44
Maximum Relative Humidity (percent)	45	47
Minimum Relative Humidity (percent)	48	50
Season Code		51
1 = Winter		
2 = Spring		
3 = Summer		
4 = Fall		
Precipitation Duration (Hours)	52	53
Precipitation Amount (inches-100)	54	57
Lightning Activity Level	58	60
Digit "2"		61
Model 1 ID		62
<u>Secondary Models:</u>		
Model 2 ID		63
Not Used	64	66
Model 3 ID.		67
Not Used	68	70
Model 4 ID	71	
Not Used	72	74
Not Used	75	78
Forecast Flag		79
0 or blank = OBS		
1 = FCST		
Region Number		80

Explanatory Notes for Format

1. Because all humidity entries are converted by NFDRSPC to relative humidity (even though the input may have been wet-bulb, dewpoint, or R.H.) only the relative humidity is available for archiving. The presence of the digit "2" in card column 61 indicates that the data in columns 17-19 are relative humidity and not wet-bulb (which is standard for the WS-D9b).

2. The program permits up to four fuel models to be associated with any given station. The model identifier (a letter from A through U) for the first model is placed in column 62. The other four models have their identification placed in columns 63, 67, and 71.
3. In the Max/Min temperature and humidity fields, a value of 100 in both Max and Min indicates that both values were missing. Subsequent processing should make this check.
4. The Forest Service Region Number (column 80) is included for convenience in sorting by the National Fire-Danger Rating Library.
5. The wind direction eight-point code in the card images has been derived from the stored degrees-of-the-compass value. Some stations may enter wind direction in systems other than 8 point which offer more resolutions, such as 16 point or degrees-of-the-compass. Such additional resolution is, of course, lost when this conversion to 8 point is made. Missing direction is recorded in the card images as "0."
6. The 10-Hour Timelag Fuel Moisture is only archived if actually entered (nonmissing) in an observation. In all cases where this item is computed from ambient conditions, it appears in the archived records as zero or blank.

APPENDIX 5: CUSTOM ARCHIVE CONSTRUCTION

Each record in the Custom Archive file will have one of three characters in the first position; either the pound sign "#," the letter "O," or the letter "F."

The records starting with the "#" are called list records, because they contain a list of the data items being archived, and the order in which they are placed on the record. The records starting with the letter "O" contain observation data, and the records starting with the "F" contain forecast data.

Normally, there will be only one list record in the Custom Archive file, located at the beginning. However, if you change your Custom Archive format, the program will place another in the file, before archiving any data in the new format. Therefore, anytime you see another list record in the file, expect the data on the following records to be in a different order or have different data altogether.

The list record is constructed with up to 50 two-digit numbers following the "#", with each number separated by a space, but no space after the "#". For example, the record

```
# 1 2 36 10 3 41
```

would mean that items 1, 2, 36, 10, 3, and 41 are being archived, and those items are located in the data records in that order.

The records beginning with the letters "O" and "F" contain observation and forecast data. The data items follow the "O" or "F" in the same order as that given on the most recent list record. There is a space between each data item, with items 32-45 being handled a little differently. The length of each item is given in table 6, following the Custom Format Selection window discussion in section 8.6.

For items 32-45, there are four possible values, one for each possible fuel model. The program will always archive all four values, even if they are zeros, and there will not be a space between the values. For example, in the case of BI, there are four items each of length 3, so the entire space occupied by the BI data would be 12 characters long, with a space before and after it.

So, if we use the example above as a list record, after 1 day, the Archive file would look something like this:

```
# 1 2 36 10 3 41
O ATHENS GAFC 23 16 43 0 11 13 8A1P37B2A38R1P2
F ATHENS GAFC 33 19 51 0 12 14 8A1P37B2A38R1P2
^ | ^ ^ ^ | | ^ | | ^ ^ | | ^ ^ | | ^ ^ | ]This part
  STATN UNIT SC1 SC3 WS HR YMSGCYMSGCYMSGCYMSGC ]wouldn't be
  NAME NAME SC2 SC4 1 2 3 4 ]in the file.
```

APPENDIX 6: NFDRS PROBLEM REPORT

NFDRS Version Number _____ Date _____

Type of installation performed	Type 1	Type 2
--------------------------------	--------	--------

Computer manufacturer _____

Model

CPU type	(XT or 8086/8088)	(AT or 80286)	(80386)
1. Name of the program			
2. Version of the program			
3. Date of the program			
4. Author of the program			
5. Title of the program			
6. Description of the program			
7. Comments			

Memory installed in system

Base memory (RAM) (0 to 640K) _____

extended memory

expanded memory _____

Disk Information

Floppy size _____" Capacity _____

Hard disk (if any) Capacity _____

Operating system _____ Version _____

Any TSR programs loaded? (Sidekick, Metro, etc.) _____

Running on a network?	Yes	No

If on a network, manufacturer _____

version

Problem Description

Describe the problem. Also describe how to reproduce it. (Have available a printout of the screen (shift- PRTSC key) if your problem resulted in a strange-looking display, or you received the message ABNORMAL END.)

USER SUGGESTION FORM

Name _____ Date _____

Address _____

City _____ State _____ Zip _____

Country _____

Suggestion(s):

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Donaldson, Bryan G.; Paul, James T. 1990. NFDRSPC: The National fire-danger rating system on a personal computer. Gen. Tech. Rep. SE-61. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southeastern Forest Experiment Station. 49 pp.

This user's guide is an introductory manual for using the 1988 version (Burgan 1988) of the National Fire-Danger Rating System on an IBM PC or compatible computer. NFDRSPC is a window-oriented, interactive computer program that processes observed and forecast weather with fuels data to produce NFDRS indices. Other program features include user-designed display formats, on-line context-sensitive help, archiving in the standard Fort Collins format or in a user-designed format, and utilities to maintain a catalog of station attributes.

Keywords: Fire-danger rating, computerized systems, PC software.

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