
HP-71 Replaces TI-59 for Fire Calculations in the Field

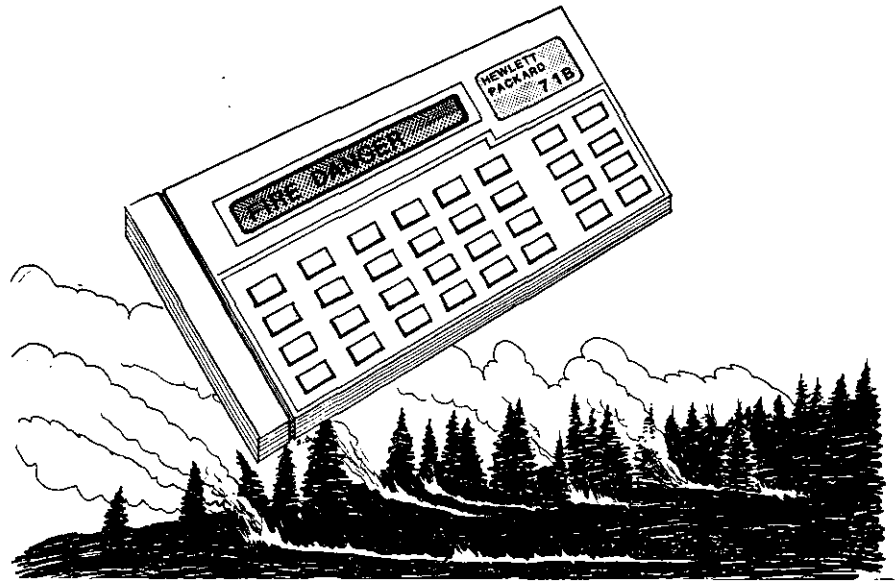
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If your Texas Instruments TI-59 is nearing its last gasp, you can replace it with a newer calculator and enjoy the use of improved fire danger and fire behavior programs. The Hewlett-Packard HP-71B handheld calculator has been selected to replace the TI-59 and is now available on a USDA Forest Service contract.

The HP-71B has several features that make it attractive as a field calculator:

- An alphanumeric display that eliminates the need for keyboard overlays.
- A liquid crystal display (LCD) that becomes easier to read in daylight, rather than more difficult.
- Use of complementary metal oxide semiconductor (CMOS) technology, which has a very low power requirement, thus permitting 2 to 3 months of normal use between battery changes.
- Field-replaceable AAA batteries, rather than rechargeable nickel-cadmium batteries.
- A continuous memory that retains the information stored in the calculator even when it is turned off.
- A computational speed about six times faster than the TI-59.
- A capability to be used with optional battery-operated printers, data cassettes, and disk drives.
- A powerful BASIC programming language that is available for many other applications.
- Output that can be routed to a battery-operated, field-portable Hewlett-Packard inkjet printer.



The HP-71B has several features that make it an effective field calculator.

The National Fire Danger Rating System (NFDRS) program and the fire behavior program have been put on separate Custom Read Only Memories (CROM's) for use in the HP-71B. Separate user's manuals have also been prepared for each program. The manual for calculating NFDRS indexes and components is "Fire Danger Computations with the Hewlett-Packard HP-71B Calculator." The fire behavior user's manual is "Fire Behavior Computations with the Hewlett-Packard HP-71B Calculator." Both manuals are soon to be published by the Intermountain Research Station (2, 4). Separate self-study guides have been prepared for the fire danger and fire behavior pro-

grams and are available through the agency coordinator.

NFDRS Program

The inputs required to perform 1978 NFDRS (3) computations are the same as for the TI-59 and other systems. Weather inputs may be recorded on the Weather Service's "10-Day Fire Danger and Fire Weather Record" form D-9b or on the form provided in the user's manual.

The major attributes of the NFDRS program are:

- Computes NFDRS indexes and components from weather inputs when the program's WEATHER module is selected.

- Automatically updates and stores the values of those inputs that must be carried forward from day to day. When the WEATHER module is used, these values do not need to be manually reentered each day.

- The NFDRS fuel models are stored in the calculator, not on magnetic cards.

- Up to five supplemental "user defined" NFDRS fuel models may also be permanently stored in the calculator memory, although no method currently exists for building and testing such models.

Fire Behavior Program

The fire behavior program, which is patterned after the BURN subsystem of BEHAVE (1), implements much more fire behavior technology than was possible with the TI-59. Program capabilities are indicated by the following list of program modules and their functions:

- FUEL MODEL—permits inputting, loading, listing, saving and deleting models, and listing names of models stored in the calculator.

- DIRECT—calculates spread rate, heat per unit area, fireline intensity, flame length, reaction intensity, effective windspeed, and direction of maximum spread.

- SIZE—calculates area, perimeter, length-to-width ratio, forward

spread distance, backing spread distance, and maximum fire width.

- CONTAIN—calculates length of fireline at containment time, time to containment, and final fire size or line building rate required to stop the fire at a specified size.

- SPOT—calculates maximum spotting distance.

- SCORCH—calculates scorch height.

- IGNITE—calculates probability of spot fire ignition.

- MOISTURE—calculates 1-hour timelag fuel moisture, fuel level temperature and relative humidity, percentage of area shaded, and probability of ignition for a specific burn time or on an hourly basis.

- MAP—calculates fire dimensions or spotting distance for plotting on a map.

- SLOPE—calculates slope steepness, elevation change, and horizontal distance between two points.

- WIND—calculates midflame windspeed from 20-foot windspeed.

- RH—calculates relative humidity and dew point from dry bulb and wet bulb temperatures and elevation.

- TWO—calculates weighted rate of spread for the two-fuel model concept.

Up to 19 user-defined fire behavior fuel models may be stored in the calculator, in addition to the 13 standard models that are always available. Output may be produced as a list of one to three values for each output item or up to a 3-by-3 matrix of output values for a single output item. Program

modules can be linked as in the BEHAVE system, to easily pass outputs from one module to another for additional calculations. The program will accommodate either English or metric inputs and outputs.

Purchasing

The HP-71B calculator, fire danger CROM, and fire behavior CROM have been placed on contract for the following agencies: USDA Forest Service; USDI Bureau of Land Management, Bureau of Indian Affairs, National Park Service, Fish and Wildlife Service; and State Forestry agencies. Orders should be placed with:

Government Marketing Services, Inc.

701 E. Gude Drive
Rockville, MD 20850

Attn: Art Phillips

The original and one copy of the order must be sent to Government Marketing, and the order must state the contract number: 54-3187-5-35.

Contract prices are:

Calculator	\$349.12
Fire Danger CROM	37.80
Fire Behavior CROM	58.80

Those not authorized to purchase from this contract can order HP-71's and CROM's from Government Marketing at commercial prices.

The appropriate battery-operated printer is the HP "Think-jet" printer, model 2225B. The printer is not required for effective use of the calculator in the field because the user's

manuals include forms for recording inputs and outputs. The printer is almost a necessity, however, if the user plans to write other programs for the HP-71B. Ease of programming and filing capabilities suggest that many useful programs can be added to the HP-71B calculator. ■

Literature Cited

1. Andrews, Patricia A. BEHAVE Fire behavior prediction and fuel modeling system—BURN subsystem, Part 1. Gen. Tech. Rep. INT-194. Ogden, UT: U.S. Department of Agriculture, Forest Service Intermountain Research Station; 1986. 130 p.
2. Burgan, Robert E.; Susott, Ronald A. Fire danger computations with the Hewlett-Packard HP-71B calculator. Gen. Tech. Rep. INT-000. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station; 1986. [in press]
3. Deeming, John E.; Burgan, Robert E.; Cohen, Jack D. The national fire-danger rating system—1978. Gen. Tech. Rep. INT-39. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station; 1977. 63 p.
4. Susott, Ronald A.; Burgan, Robert E. Fire behavior computations with the Hewlett-Packard HP-71B calculator. Gen. Tech. Rep. INT-000. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station; 1986. [in press]