



Four Surrogate Mice



Trackballs and trackwheels are becoming common for manipulating text and data

Jeff Holtzman

Intrigued by graphic interfaces but hate mice? Then you might try one of the following four pointing devices to get the functionality of a mouse without the hassle. PC-Trac, FastTRAP, and Trackball Plus utilize optomechanical trackball technology; the fourth, Felix, employs a new optical data-tablet technology. I tested serial versions of these four devices on IBM and compatible equipment; PC-Trac and FastTRAP also come in bus versions, and a Macintosh version of Felix is available.

Generally speaking, mice have some advantages over trackballs, including smaller size and, often, better bundled software. Trackballs, however, are usually easier to control, so you may like them better than mice for more detailed operations. If you're used to a mouse, it may take a while for you to get used to a trackball. But after overcoming your ini-

tial resistance, chances are you'll enjoy using it.

MicroSpeed, the company that got its start in the DOS world with a clock-speed-enhancement accelerator, designed and manufactures both PC-Trac and FastTRAP (which stands for fast tri-axis pointer). These two devices are similar internally and externally—and they even use the same CMOS microcontroller. PC-Trac combines an optomechanical trackball with three buttons; to that configuration, FastTRAP adds an additional vertically oriented wheel, called a trackwheel, that also drives an optomechanical system. PC-Trac and FastTRAP sell for \$119 to \$169, depending on the version you choose.

The Fulcrum Trackball Plus, put out by Fulcrum Computer Products, is the Volkswagen of trackballs for personal computers. It combines low price (\$95) with many mouse and digitizing pad emulations, and less-than-perfect support for text modes. Budget-conscious buyers and those who require multiple emulations will find this a satisfactory, if uninspiring, product.

Cats hate mice, and Lightgate's electronic Felix is supposed to be a mouse killer. The documentation is full of near-religious fervor about Felix's merits. Hype aside, it turns out that Felix works acceptably for navigating text and graphics screens. Its software is a little rough, however: Depending on the application you're running, you must load various RAM-hungry drivers via a large batch file. And the documentation does little to help you figure out how to streamline the process of loading the drivers. But you will like the fact that Felix comes with a special Lotus 1-2-3 driver that makes it practical to use a pointing device with that program.

PC-Trac and FastTRAP

The serial version of PC-Trac is available for \$119, the bus version for \$139. Fast-

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Clockwise from top left: the MicroSpeed PC Trac, MicroSpeed FastTRAP, Fulcrum Trackball Plus, and Lightgate Felix.

REVIEW
FOUR SURROGATE MICE

Name	PC-Trac	FastTRAP	Trackball Plus	Felix
Type	Trackball	Tri-axis pointer	Trackball	Pointing device
Company	MicroSpeed, Inc. 5307 Randall Place Fremont, CA 94538 (415) 490-1403	MicroSpeed, Inc. 5307 Randall Place Fremont, CA 94538 (415) 490-1403	Fulcrum Computer Products 459 Allan Court Healdsburg, CA 95448 (707) 433-0202	Lightgate 6202 Christie Ave. Emeryville, CA 94608 (415) 596-2350
Features	Microsoft Mouse emulation in hardware, three buttons, ballistic-gain-control software, 200-dot-per-inch resolution; 10K bytes of memory used	Microsoft Mouse emulation in hardware, 2- and 3-axis operation, three buttons, ballistic-gain-control software, 200-dpi resolution; 10K bytes of memory used	10 mouse and digitizing tablet emulations, six buttons, power pack, 100-dpi resolution; 8K bytes of memory used	Two emulations, one button, 1-to-1 pointer-to-screen mapping, 1-2-3 and AutoCAD support, power pack, 320-dpi resolution; 40K bytes of memory used
Size	7½ × 4¼ × 2½ inches; 12 ounces; 6-foot cord	7½ × 4¼ × 2½ inches; 12 ounces; 6-foot cord	4½ × 5¾ × 1¾ inches; 4½ ounces; 4-foot cord	6 × 6 × 1 inches; 12 ounces; 7-foot cord
Hardware Needed	IBM PC, XT, AT, PS/2, or compatible with one floppy disk drive	IBM PC, XT, AT, PS/2, or compatible with one floppy disk drive	IBM PC, XT, AT, PS/2, or compatible with one floppy disk drive and a serial port	IBM PC, XT, AT, PS/2, or compatible with one floppy disk drive
Software Needed	MS-DOS 2.0 or higher	MS-DOS 2.0 or higher	MS-DOS 2.0 or higher	MS-DOS 3.1 or higher
Documentation	PC-Trac User's Guide; KeyMap User's Guide; "50 Things to Do with a Used Mouse"	FastTRAP User's Guide; KeyMap User's Guide; "50 Things to Do with a Used Mouse"	3-page installation instructions; 30-page technical manual	15-page installation guide; 17-page Lotus 1-2-3 guide
Price	Serial version: \$119 Bus version: \$139	Serial version: \$149 Bus version: \$169	\$95	IBM version: \$199 Macintosh version: \$149
	Inquiry 889.	Inquiry 890.	Inquiry 891.	Inquiry 892.
Note: The Macintosh version of Felix does not include Hot Spots. Versions for the Mac II and SE were due in July.				

TRAP costs \$149 for the serial version; the bus version is \$169. Both devices use the same case, which is about 2½ inches high at the highest point. The feel of the trackball in both PC-Trac and FastTRAP is smooth and solid. I wish, though, that the FastTRAP trackwheel had more resistance and its switches required less pressure; these alterations would give it a more consistent overall tactile sense.

Because of their overall similarity, I'll discuss the two devices as one, distinguishing between them only when necessary.

When you rotate the trackball, in either the text or graphics mode, the position of a special on-screen cursor varies accordingly. When the cursor moves to a menu title bar or icon, you press a button to make the functions represented by that

menu or icon available for use. Further trackball movement lets you traverse the list of menu items; pushing a button then executes the currently selected function.

Text-mode programs seldom include drivers for pointing devices, so many pointer vendors include programs that enable their devices to at least emulate cursor-key motion. MicroSpeed, for example, includes a utility called KEYMAP.COM that allows trackball motion to send the cursor up, down, left, and right. This utility also lets you program each of the device's three push buttons to deliver a single keystroke. Each button can also be used alone or in combination with the Shift, Alt, or Control keys, giving you a total of 12 programmable button combinations to provide functions such as traversing the menu system of your spread-

sheet. However, there aren't enough button combinations to map every function of your word processor or spreadsheet. KEYMAP.COM would be much more useful if you could program multiple keystrokes for each button-key combination.

An editor also lets you define as many as 32 named sets of programmed key substitutions, which are maintained in KEYMAP.COM. To define more than 32 templates, you can create and save programs under different names, such as KEYMAP1.COM, KEYMAP2.COM, and so forth. MicroSpeed supplies key sets for WordStar, Lotus 1-2-3, Turbo Pascal, and several others.

You can operate both PC-Trac and FastTRAP either in a Microsoft Mouse-

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emulation mode or in native mode. With native mode, you can utilize FastTRAP's tri-axis capabilities. Microsoft mode is the default, but you can alter a DIP-switch setting to force booting in native mode. In Microsoft mode, you can program the middle button to emulate simultaneous depression of the two outer buttons.

Both devices provide an emulated drag mode. Without this feature, you might find it hard to drag a trackball, pressing the button with one finger while you rotate the ball with others. For example, to choose a block of numbers for formatting in Excel, you position the cursor at one corner of the desired range, initiate drag mode by pressing the middle button, move the trackball to select the desired spreadsheet cells, and terminate drag mode by pressing the middle button again.

The trackball is handy for navigating even a standard text-mode spreadsheet, such as VP-Planner. You can move by row or column much faster with the trackball than even by holding a cursor key down. And with FastTRAP, you can use the trackwheel to page up, down, left, or right, very quickly.

If you use WordStar 4.0, the trackball cursor movement is somewhat jerky. You will have better luck with other editors, such as the one in Turbo Pascal that allows the cursor to roam freely about the screen.

You can use FastTRAP's trackwheel in several ways. You can traverse menus without moving the cursor from the current position, traverse the third (z) axis in a CAD program, or, in conjunction with a utility supplied by MicroSpeed, page up and down in a spreadsheet or word processor.

Even if you're not doing three-dimensional CAD work, the trackwheel can come in handy. In AutoCAD, for example, to get at the command menus, normally you must move the drawing cursor (cross hairs) from wherever you are to the far right edge of the screen, make your selections, and then move the cross hairs again to wherever you need the cursor. With FastTRAP, simply rotating the trackwheel activates the menu; you can traverse it by using more rotation, selecting items as usual with the left button. When you move the trackball again, you pick up where you left off with the cross hairs. You must load a separate driver, however, to use AutoCAD and Windows in this mode.

Software Drivers

You can install either device easily since they both emulate the Microsoft Mouse

Test Setup

I tested each device in this review on two machines: an AST Premium/286 (10 MHz, zero wait states) with 1.5 megabytes of Expanded Memory Specification (EMS) 3.2 memory, a 40-megabyte hard disk drive (ST-251), an Orchid Designer VGA card, and an NEC MultiSync monitor; and an IBM PC XT with 1.5 megabytes of EMS 4.0 memory, a 20-megabyte hard disk drive (ST-225), a Hercules monochrome graphics card, and a Micro-soft Mach 20 accelerator board.

On the AST, I used the following software to test each device: AutoCAD 9.0 (VGA mode), Windows 2.0 (in Orchid's proprietary 800- by 600-pixel, 16-color mode), and AutoSketch (EGA mode); under Windows, I tested several of the desktop accessories, as well as PageMaker 1.0a and Excel. On the IBM, I tested each device with VP-Planner, AutoSketch, and WordStar 4.0, all running under DESQview 2.01. I also tested compatibility with DESQview itself.

in hardware. If you have a Microsoft or compatible mouse, you just unplug the mouse and plug in FastTRAP or PC-Trac; the existing mouse driver will allow you to use it just as you would your mouse.

For best performance, you should take advantage of MicroSpeed's software drivers. You can load the drivers via CONFIG.SYS using MAP.SYS, or via AUTOEXEC.BAT using MAP.COM. With either driver, you can specify which serial port the device is connected to, among other parameters.

Driver versions 2.0 and higher allow ballistic gain control, a feature that provides dynamic speed and distance management. For example, when you rotate the trackball slowly, the pointer traverses only half the screen. But if you rotate the ball quickly over the same distance, the pointer traverses the whole screen.

FastTRAP's documentation consists of a well-written, well-organized 40-page manual that contains both an index and a table of contents. Beginners will find the information presented clearly and logically; advanced users will not find it insulting. Approximately half the book contains technical information on

how FastTRAP works, software protocols and functions, and even a wiring diagram for 9-pin and 25-pin serial ports. (Microsoft charges \$25 for this type of optional technical information.) A separate manual discusses how to use KEYMAP.COM.

Documentation for PC-Trac was not complete when I wrote this review. The review device came with the FastTRAP manual and semifinal PC-Trac-specific documentation. MultiSpeed says the finished version will be shipping by the time you read this review, and it will not include the FastTRAP manual.

A booklet of cartoons called "50 Things to Do with a Used Mouse" is sent free to PC-Trac and FastTRAP owners when they send in their warranty registration card.

Trackball Plus

Although Trackball Plus is about the same height as the MicroSpeed devices, it has only about half the footprint. The device has a grand total of six push buttons, only some of which are available in any given emulation mode. You change modes by pressing various combinations of buttons, or by using STB.COM from the DOS command line.

Emulations include: mice from Microsoft and Mouse Systems; graphics tablets from Houston Instruments, Retrographics, Tektronix, Hitachi, and Summagraphics (ASCII and binary); and the USI Optomouse. Separate software drivers provide the proper program interface for the Microsoft and Mouse Systems emulations; for the others, the target application must have a built-in driver.

The Trackball Plus plugs into an RS-232 serial port; versions are available with both 9-pin and 25-pin connectors. A separate cable runs from the serial port connector to a wall-mount transformer that supplies the unit with power. After plugging in the hardware, you set the desired mode and then (if necessary) install the Microsoft or Mouse Systems driver. Both .COM and .SYS drivers are supplied for these two emulations. Fulcrum's drivers are unlike most mouse drivers that load at the DOS command line: You cannot remove them from memory without rebooting. When you try to install a different driver, you receive a Driver already installed message.

The trackball itself functions fairly well in graphics applications. It has a good feel, and on-screen motions are smooth. However, there is no way you

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Inside the Trackballs

Both PC-Trac and FastTRAP use 24-pin CMOS microcontrollers from National Semiconductor's COPS (Controller Oriented Processor System) family. They contain the program, data, and temporary storage, as well as system timing and I/O control. Inputs to PC-Trac include three push buttons and two slotted optical encoders; FastTRAP is similar but has a third encoder plus a trackwheel and a shaft-mounted encoder wheel. The devices have identical cases, but a panel covers the unused trackwheel slot in PC-Trac.

Four transistors on a printed circuit board interface the input devices to the microcontroller; except for the push buttons, all the electronics are mounted on one other small printed circuit board. The two boards are interconnected by a four-conductor flex circuit. All subassemblies—the PC boards, encoder shafts, switch caps, and cable—are press-fit into the base of the case. Everything is nicely arranged, and the overall impression is one of quality design and manufacture.

Because of the devices' low power re-

quirements (a few milliamperes), they do not need a separate power transformer; as with most mice, they draw the power they require directly from the control lines of the port to which they are connected.

The COPS microcontroller is not interrupt-driven; rather, it continuously scans the six input ports. When it detects a switch opening or closure, or a trackball or trackwheel motion, it formats a message that it sends to the host computer via the serial port. In mouse mode, it sends a standard 3-byte message that contains button status and an 8-bit relative x,y displacement. In native mode, it adds a fourth byte that allows the transmission of third-button status and z-axis information from the trackwheel.

At the programming level, interface with the mouse driver is accomplished via the standard interrupt 33 hexadecimal. MicroSpeed's driver recognizes the standard Microsoft function calls (0 to 19), and it adds 11 extended functions of its own (64 to 74).

A look at the inside of Trackball Plus

showed that it was built with less elegance and economy than the MicroSpeed devices. The PC board is hand-soldered, and traces of flux were evident all over the board. An Intel 8051 running at slightly over 7 MHz provides the unit's intelligence. A separate 2764 (8K-byte) EPROM contains the control program and data. Like the MicroSpeed devices, the 8051 works on a polled (not an interrupt-driven) basis.

Lightgate was notably tight-lipped about Felix's internal operation. However, by both inspecting the device and talking with technical-support personnel, I was able to gather some information. Two orthogonal plastic slides with precision-etched slots serve to interrupt the beams between a pair of orthogonal optical encoders. A proprietary microprocessor then processes that information, formats it, and sends it to the host computer. The microprocessor senses changes in the pointer's velocity and alters the outgoing message rate, thereby varying on-screen response.

Layout, materials, and construction in Felix are all first-rate.

can adjust sensitivity, nor can you use ballistic gain control.

In the Microsoft mode, I found the sensitivity satisfactory under Windows and AutoCAD, but unsatisfactory under AutoSketch. In addition, in the Summagraphics Bit Pad One mode under the version of AutoCAD (9.0) used for testing, I got no results from operating the alternate cursor button, which should allow you to move the cursor between two locations. According to the manufacturer, this version of AutoCAD precludes the efficient use of the alternate cursor button. Like the MicroSpeed devices, the Fulcrum Trackball Plus supports a drag-emulation mode.

A separate program, SETCUR.COM, is supposed to allow the trackball to emulate cursor keys in text applications, but I found this emulation erratic when used under WordStar. It did work with XyWrite, however. The installation document states, "Use of this function with word-processing programs, where precise horizontal control is needed, may be unsatisfactory." It is. On the other hand, when I used just the supplied Microsoft emulation driver, I had no trouble navigating DESQview's menus with Trackball Plus.

Ergonomically, the buttons aren't up to today's standards. They are awkwardly located and definitely biased toward right-handed users. In fact, I can't see how a left-handed person would be able to use them at all. You also have to use too much pressure to activate them.

A 30-page technical manual and a 3-page installation guide are included. Neither is written or produced in the style of most of today's manuals, and nontechnical users may have trouble finding the necessary installation information. However, the company says the documentation and the packaging are being redone, and by the time you read this, the updated documentation and packaging should be available.

Felix

Protruding through the Felix low-profile hardware case is a single button mounted on a moving shaft. This button normally functions as the left mouse button; the right button is simulated by moving the shaft to the upper-left or upper-right corner and double-clicking. Right-handed and left-handed users will find it easy to use Felix since both corners are provided. When you double-click in the lower-right corner, Felix enters a "preci-

sion" mode in which cursor movement is restricted to just a portion of the screen. However, you have to press the button farther down compared to similar devices, and there is no tactile feedback to inform you when contact has been made. Thus, I found double-clicking under Windows to be slightly tiring.

Felix's software lets you change the button assignments and even move the buttons to the keyboard (i.e., using Felix just for positioning, and using keyboard keys to perform button functions). The software is supplied in both 5¼-inch (360K-byte) and 3½-inch (720K-byte) formats.

Felix's chief claim to fame is a 1-to-1 mapping with the screen (in nonprecision mode). When you move the pointer shaft to the upper-left corner of the 1.1- by 1.1-inch active portion of the device, the cursor will be in the upper-left corner of the screen. When you move the pointer to the lower-right corner, the cursor follows suit. In precision mode, a smaller portion of the screen is mapped to Felix, thereby allowing more accurate positioning in that portion of the screen.

Felix's secondary claim to fame is a feature called "Hot Spots." Hot Spots

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are locations at the perimeter of the pointing area that provide keyboard macro functions. By moving the pointer to a Hot Spot and clicking, you can insert a number of keystrokes into the currently running application.

There are 12 Hot Spots. You can activate each alone or in combination with the Control, Alt, or left or right Shift key, for a total of 60 Hot Spots. Felix comes with a number of predefined sets of Hot Spot macros, an editor for creating your own, and a print utility for displaying and printing them. The Lotus and AutoCAD Hot Spot macros are extremely useful for getting at often-used functions quickly.

You can utilize Lotus macros remarkably well, so it is practical, and even desirable, to use Felix with the spreadsheet. For example, moving the pointer into the upper-right corner sends a slash (/) keystroke, activating 1-2-3's familiar horizontal menu.

Other Hot Spots let you move to the beginning or end of the spreadsheet, scroll by row or column, or make large jumps to distant areas of the spreadsheet. Hot Spots that you activate in conjunction with the Alt key let you execute common Lotus functions (e.g., learn and recall modes, and paging up, down, left, and right). You can add 36 custom macros to the other Hot Spot layers.

According to the manufacturer, cursor positioning is erratic under DESQview and programs running under it, so I ran my test software directly from DOS. Lightgate is presently working on drivers for Microsoft Windows/386.

Except for the less-than-desirable tactile feedback for the push button, Felix's overall feel is quite nice. The pointer slides easily, and I had no trouble positioning it accurately on the 800- by 600-pixel enhanced VGA screen. Lightgate is correct when it says that the 1-to-1 pointer/cursor mapping can aid productivity.

Running an Application

To run an application with Felix, you move to the application's subdirectory and load Felix drivers, followed by the application itself. For example, to load AutoCAD, you would move to its subdirectory and type `C>FELIX ACAD`. This Felix command actually invokes a fairly lengthy batch file—more than 100 lines in the version tested—that does conditional testing to determine which application you're loading, and then loads the appropriate drivers.

MOUSE.EXE is used for most applications, but FLXACAD.EXE loads drivers for

AutoCAD and AutoSketch, and FLX-123.EXE loads the Lotus (or 1-2-3) driver. Another program loads the Hot Spot macro file for the selected application. Then the application itself is run.

Processing a long batch file is inefficient; a shorter batch file for each application would be an improvement. To speed things up, you can move the appropriate lines for your application to a separate batch file. To avoid unnecessary waiting, Lightgate should have either supplied separate batch files to load each application or written a single software driver that supports all—or at least most—applications. The supplied drivers generally occupy about 40K bytes of memory, about 3 to 5 times as much as most mouse and trackball drivers use.

You install Felix by plugging the cable into your 25-pin serial port (or into the supplied 9-pin-to-25-pin adapter, which is then inserted into the port), plugging a small power transformer into an AC outlet, and then inserting the coaxial power plug into the rear of the 25-pin connector.

An installation program copies files to a subdirectory called `\FELIX` on the user's disk. The program also adds that directory to the path statement in your `AUTOEXEC.BAT` file. The old version is saved as `AUTOEXEC.OLD`.

According to the manufacturer, a new version (1.05) is due out by the time that this article is in print. Lightgate says the new version will feature support for relative mode, for programs such as Dr. HALO.

The quality of the documentation is not as good as the quality of the device itself. Here's an example of the gibberish that permeates the main manual: "Felix buttons use an innovative technology which is about to change your pointing life. Their operation is based on the kinesthetic space created by the little square which is Felix's travel area. The implementation is our ergonomically informed solution to the challenges and hazards of input device use."

Even the sections in which the company really is trying to present useful information are difficult because of the verbose, self-conscious writing style. To get the device working, I found the `READ.ME` file and the `FELIX.BAT` file to be more useful. All in all, the manual needs to be thoroughly reworked to make it easier to understand how to set up and use Felix.

A separate manual covers using the special 1-2-3 driver software. You will find it more informative and less filled with rhetoric than the main manual.

Trackball versus Mouse

If you need a pointing device, first you must choose between a mouse and some other device. The main disadvantage of a mouse is that you must have some clear space on your desk on which to operate it. All the devices discussed here overcome that problem. A trackball can also be advantageous for fine, detailed work, because it's easy to control the ball with your fingertips. Some mice, however—the new Microsoft Mouse in particular—are light enough to make fingertip control possible. Overall, I prefer a mouse because it's smaller and easier to handle.

If you decide against a mouse, Fulcrum's Trackball Plus is easy to set up and use, and it is the least expensive device of its type. A developer desiring information on the software protocols of the emulated devices might buy one for the documentation alone, because software protocol data regarding the various devices is all conveniently collected in this one manual. However, Trackball Plus suffers from its lack of support for text modes, its nonergonomic buttons, and its right-handed bias.

Despite its problems, Felix is an intriguing device. Its positioning system and Hot Spot macro system are top-notch. You will find the push button less than perfect, however, as is the collection of software drivers. With more compact and elegant drivers, rewritten documentation, and some form of tactile feedback on the button, Felix will be a product to contend with.

Currently, however, the MicroSpeed devices are my favorites. Both are well designed, engineered, and manufactured, and neither requires a bulky and inconvenient external power transformer. The documentation is excellent, the plug-in-and-go Microsoft emulation makes it easy to get started, and the ballistic-gain-control drivers provide a long-missing capability for MS-DOS machines.

FastTRAP costs \$30 more than PC-Trac. Viewed simply as a mouse replacement, it may not be worth the extra expense. But if you are working with AutoCAD or want a fast way of paging through your word processor or spreadsheet, it is worthwhile. Other developers are working on FastTRAP drivers that may also justify the extra expense. ■

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