

Now you don't have to spend a fortune to enjoy a complete woodworking shop.

The Shopsmith MARK V combines five major power tools into one unique, big-capacity unit.

Whether you're an experienced craftsman, a dedicated hobbyist, or a week-end "do-it-yourselfer," at one time or another, you've probably dreamed of owning a complete woodworking shop. A few hand-held power tools just aren't enough for most projects you'd like to try.

If you purchased the five separate tools woodworkers use most — table saw, vertical drill press, horizontal boring machine, disc sander and lathe — you could expect to pay at least a couple of thousand dollars. And even if you had the money, would you have enough space for them?

Save space, save money with the Shopsmith MARK V.

There's one answer that can solve both those problems — the Shopsmith MARK V. This remarkable piece of equipment is a single precision tool that combines all five of the major power tools in one unit that actually takes up less space than a bicycle... and that can be yours for about ONE-THIRD the price of the five separate units!

Outperforms individual tools

The MARK V's unique design not only gives you greater accuracy and more convenience — it allows you to do things you just can't do with other power tools.

This ingenious woodworking system combines a 10" table saw, a 16½" vertical drill press, a horizontal boring machine, a 34" lathe and a 12" disc sander — all powered by one rugged variable-speed motor.

After only about an hour's practice, you'll be able to change from one function to another in less than 60 seconds. And you'll be able to perform dozens of sophisticated woodworking operations, including edge sanding, spindle turning, and doweling. We call the MARK V "the tool to start with, the system you grow with," because with optional accessories, you can perform more

specialized operations, like mortising, routing, molding, and many others.

With the Shopsmith MARK V, the skill and accuracy are built right into the machine. It's so simple to operate that even if you're a beginner you'll soon be making your own furniture, cabinets, and gifts. In no time you'll be doing money-saving home repairs and impressive remodeling projects.

Mail the coupon today for your FREE Information Kit.

Find out more about this amazing 5-in-1 tool. Simply mail the coupon below and we'll send you a FREE Information Kit. Your Kit will include a booklet,

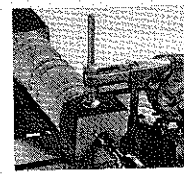
"What to Look For When You Buy Power Tools," PLUS all the details on the incredible MARK V. You'll also learn how you can actually use it in your home, for a full 30 days, without risking a penny!



1. It's a 10" table saw!



2. It's a 16½" vertical drill press!



3. It's a horizontal boring machine!



4. It's a 34" lathe!



5. It's a 12" disc sander!



Mail this coupon today!



Shopsmith Inc.

The Home Workshop Company
750 Center Drive
Vandalia, Ohio 45377

Dept. 354G

YES! Please send me my FREE Information Kit on the Shopsmith MARK V, including illustrated brochure and "What To Look For When You Buy Power Tools" booklet — PLUS all the details on how I can test-use the MARK V at home, without risk, for 30 days. I understand that this information is FREE and I am under no obligation.

Name _____
Address _____
City _____ State _____ Zip _____

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CIRCLE NO 62 ON FREE INFORMATION CARD

COMPUTER BITS

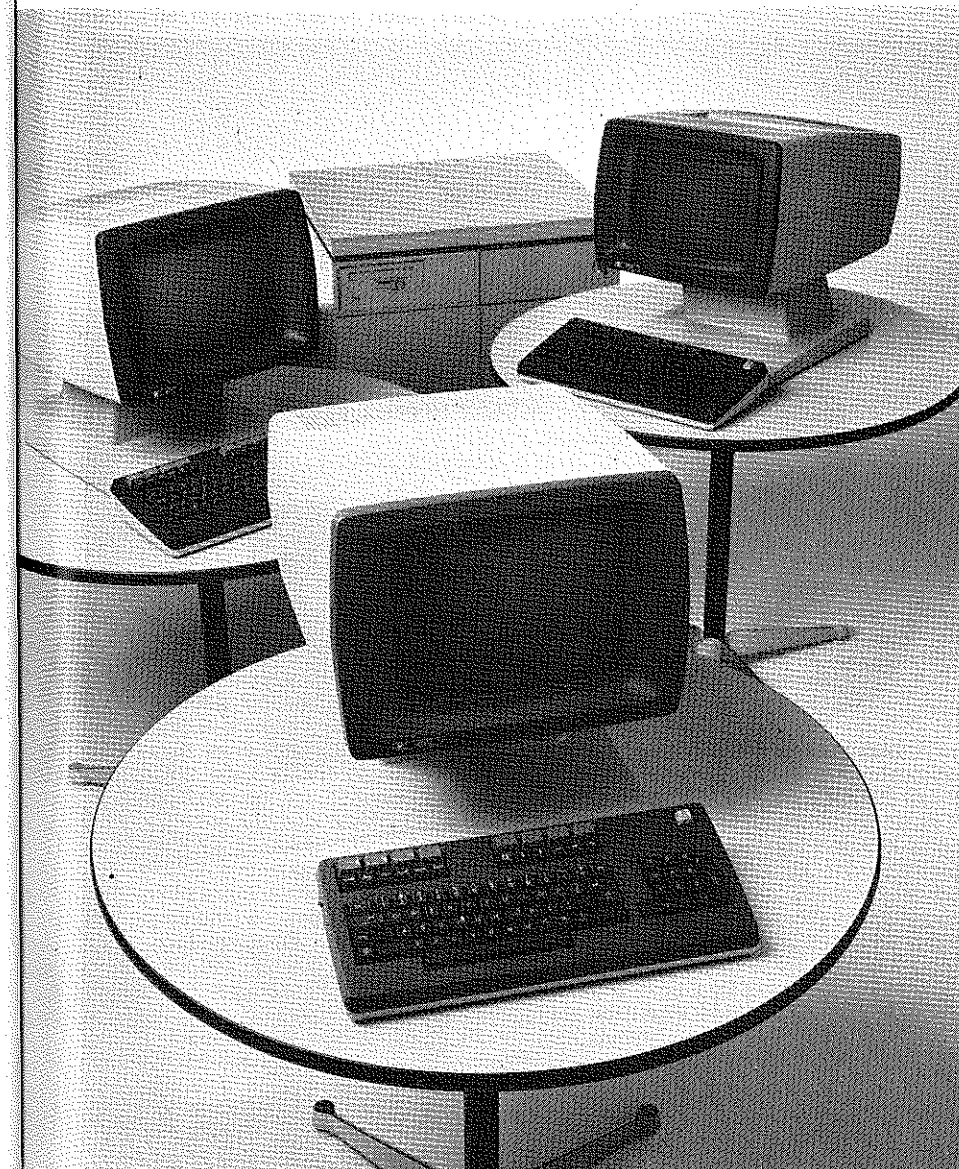
By Carl Warren

High-End Systems (for Low-End Buyers)

TWO prestigious companies, Xerox and Hewlett-Packard, have added their names in the very-small-business computer field. Both manufacturers have introduced powerful word- and data-processing microcomputer systems featuring the versatile industry-recognized standard operating system, CP/M. Both systems are in the low (less

than \$3,000) to medium (\$10,000) price range.

The principal significance of these developments is that the professional systems approach has entered the world of small systems. For example, the Xerox 820 sports a full-screen display (80 X 24) with reverse video and full-screen mapping, a detachable full-function



The Hewlett-Packard HP-125 microcomputer system supports two RS-232C serial ports and employs two Z-80A microprocessors.

SEPTEMBER 1981

NEW!!! THE ELECTRIC MOUTH*



ELF II VERSION

for \$100, Elf II, Apple, TRS-80 Level II*

From \$99.95 kit

Now — teach your computer to talk, dramatically increasing the interaction between you and your machine.

That's right: the ELECTRIC MOUTH actually lets your computer talk! Installed and on-line in just minutes, it's ready for spoken-language use in office, business, industrial and commercial applications, in games, special projects, R&D, education, security devices — there's no end to the ELECTRIC MOUTH's usefulness. Look at these features:

- * Supplied with 143 words/letters/phonemes/numbers, capable of producing hundreds of words and phrases.
- * Expandable on-board up to thousands of words and phrases (just add additional speech ROMs as they become available).
- * Four models, which plug directly into \$100, Apple, Elf II and TRS-80 Level II computers.
- * Get it to talk by using either Basic or machine language (very easy to use, complete instructions with examples included).
- * Uses National Semiconductor's "Digitaltalker" system.
- * Includes on-board audio amplifier and speaker, with provisions for external speakers and amplifier.
- * Adds a new dimension and excitement to programming: lets you modify existing programs and games to add spoken announcements of results, warnings, etc.
- * Installs in just minutes.

Principle of Operation: The ELECTRIC MOUTH stores words in their digital equivalents in ROMs. When words, phrases, and phonemes are desired, they are simply called for by your program and then synthesized into speech. The ELECTRIC MOUTH system requires none of your valuable memory space except for a few addresses if used in memory mapped mode. In most cases, output ports (user selectable) are used.

one	eighteen	at	dollar	inches	number	as	c	u
two	nineteen	cancel	is	of	second	d	l	u
three	twenty	case	equal	it	off	set	e	v
four	thirty	cancel	error	kilo-	on	space	f	w
five	forty	400hertz tone	feet	left	out	speed	g	x
six	fifty	80hertz tone	flow	less	over	star	h	y
seven	sixty	20ms silence	fuel	lesser	parenthesis	start	i	z
eight	seventy	40ms silence	gallon	limit	percent	stop	j	
nine	eighty	80ms silence	go	low	please	than	k	
ten	ninety	160ms silence	gran	lower	plus	the	l	
eleven	hundred	320ms silence	greater	mark	point	time	m	
twelve	thousand	cancel	meter	round	try	a	n	
thirteen	million	check	have	nile	pulses	up	o	
fourteen	zero	comma	high	mill	rate	vult	p	
fifteen	again	control	higher	minus	to	weight	q	
sixteen	ampere	danger	hour	minute	ready	a	r	
seventeen	and	degree	in	near	right	h	s	

*"Elf II" and "The Electric Mouth" are reg. trademarks of Netronics R&D Ltd. "Apple" is a reg. trademark of Apple Computer Inc. "TRS-80 Level II" is a reg. trademark of Tandy Corp.

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Please send the items checked below:

\$100 "Electric Mouth" kit \$99.95

Elf II "Electric Mouth" kit \$99.95

Apple "Electric Mouth" kit \$119.95

TRS-80 Level II "Electric Mouth" kit \$119.95

Add \$20.00 for wired & tested units. All plus \$3.00 postage & insurance. Conn res. add sales tax.

Total Enclosed \$ _____

Personal Check Cashier's Check/Money Order

Visa Master Charge (Bank No. _____)

Acct. No. _____

Signature _____ Exp. Date _____

Print Name _____

Address _____

City _____

State _____ Zip _____

keyboard, a choice of 5.25-in. or 8-in. floppy disks, and a full range of CP/M-compatible software. Some very sophisticated communications features are provided, too. Specifically, the 820 supports the 872/873 Communication Server, which provides for Ethernet compatibility for future expansion of the machine. Because it is generally agreed that software is the primary ingredient in the success of any computer, Xerox is offering a version of Micropro's WordStar wordprocessing system, Sorcim's Supercalc electronic worksheet, and other CP/M-compatible packages.

The 820 is priced at \$2,995 for CRT, keyboard, 64K bytes of memory, and two 5.25-in single-density floppy disks. Adding the optional 40-cps daisywheel printer (Diablo Model 630) brings the price to \$5,895.

Although Xerox chose not to bundle any software into the basic package, it is offered at standard prices. For example, the word-processing package carries a \$500 price tag regardless of disk size, 8- or 5.25-in. CP/M is an extra \$200.

Hewlett-Packard's HP-125 CP/M system is \$6,960. This is a Z-80-based system with dual 5.25-in. disk drives, two RS-232C communication ports and an integrated 80-cps thermal printer. Unlike Xerox, Hewlett-Packard includes CP/M in the base price, but you should expect to pay extra for additional software. Among the software options offered by HP are: VisiCalc/125, \$200; Word/125, \$500 (a version of WordStar); Graphics/125, \$200 (a version of Personal Software's Visitrend/Visiplot package, designed for creating graphs and doing trend analysis); BASIC 80, \$325; Link/125, \$150; and a CP/M utility package, \$125.

HP, like Xerox, has allowed for communications applications and future growth. Hardware and software provisions have been made to permit the 125 to operate in the company's HP-3000 EDP network or other large mainframe systems.

The HP-125 employs dual Z-80A microprocessors and sports a full 64K bytes of RAM memory. One processor serves the computation requirements of the system, while the other handles the screen/terminal chores.

Xerox and HP have paid close attention to the human engineering needs of the intended user. The 820 and 125 use easy-to-understand menus to guide you in the use of the system(s). Moreover, specific functions such as screen scrolling are assigned individual keys.

Enter IBM. There are more introductions forthcoming, but from more traditional computer manufacturers. The long-awaited IBM entry is imminent, but it will not be based on the S-100 bus, nor will it be greeted with open arms as some "experts" have predicted. As evidenced by the 5110 and 5120, IBM (its position as undisputed leader in new high technology notwithstanding) is unable to offer the level of support required by the small-system user.

The IBM product is believed to be the system that has been under development at the General Systems Division in Boca Raton, FL. The unit reportedly is built around Intel's 8088 microprocessor and will use the operating system designed by Microsoft. This operating system is supposed to be like the CP/M system, and many believe that it may be CP/M 86, rather than the Unix-like Microsoft version. The system supposedly will support up to 256K bytes of RAM and employ dual-tandem double-density (96-tpi) floppy drives.

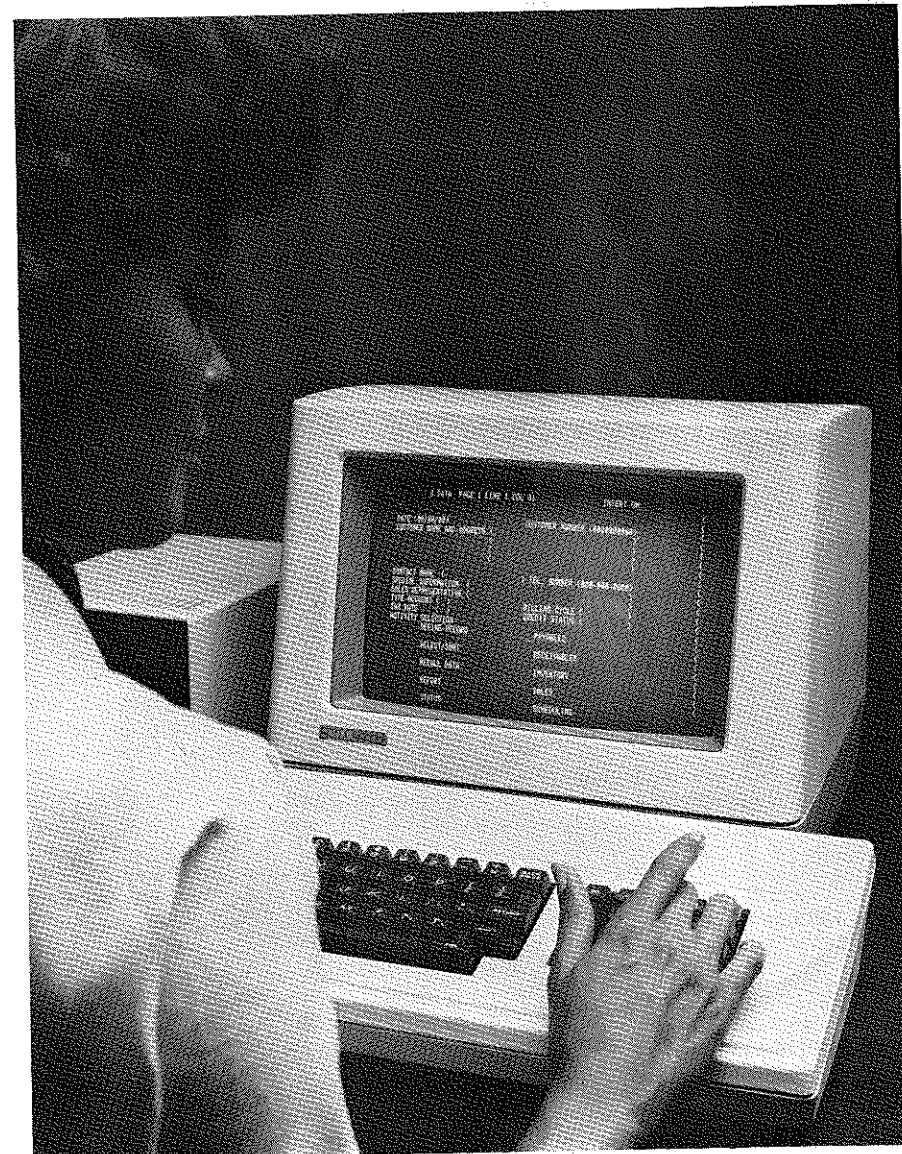
To support the lowest end of the personal computer spectrum, observers speculate that IBM will offer a stripped-down version for less than \$1,000 when the larger unit is introduced. Interestingly, both IBM systems are based on its 3101 terminal with add-ons.

Whatever the fate of IBM's entries into this market, software incompatibilities will apparently not be a problem.

Sources close to the computer giant say that agreements are in the making for the use of MBASIC, SuperCalc, dBase II, and a variety of other popular software products, including those of Personal Software, but neither IBM nor the suppliers would comment.

From the miniworld, you can probably expect to see low-end (less than \$1,000) entrants from both Digital Equipment and Data General. Whether or not these machines will be CP/M compatible is anyone's guess; right now no one will say.

Computer Networks. Due to typographical errors three numbers shown in the June, 1981 column are in error. These are 503-641-5510, 503-641-9029 and 817-776-1325. Please do not call these numbers as they are private residences. We apologize for the error. Also, the listing of 915-584-5393 is no longer available. ♦



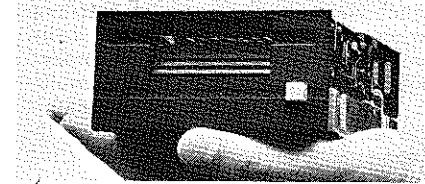
The Xerox 820 information system includes a Z-80 microprocessor, 64K bytes of RAM, detachable keyboard, and is CP/M compatible.

COMPUTER SOURCES

By Leslie Solomon
Senior Technical Editor

Hardware

3.5" Floppy Disk. The Sony 3.5-inch "Micro Floppydisk Drive" features 437.5K bytes double-density, single-side unformatted and 322.5K bytes formatted. The transfer rate is 500K bits/s,



latency is 50 ms, and access time track-to-track is 15 ms. The drive is 2"H x 4"W x 5.1"D and weighs 1.7 pounds. A special hard-cover diskette is used. Power dissipation is 7.5 watts continuous, 3.3 watts standby. \$400. Diskettes are \$5 each. Address: Sony Data Products Div., 15 Essex Rd., Paramus, NJ 07652 (Tel: 201-368-5000).

Computer Percussion. The Rhythm Box is a computer peripheral that synthesizes the sounds of seven different percussion instruments including bass drum, wood block, snare drum, short cymbals, long cymbals, hand clap, and tom-toms. It is programmed in Level II BASIC or assembly language using a single OUT instruction. It comes with two interface options; Model RBX-T (\$149) for the TRS-80 Model I Level II and the RBX-S (\$179) for other computers, and connects to any standard 9600-baud serial port with RS232 or 20-mA provisions. Address: Newtech Computer Systems, Inc., 230 Clinton St., Brooklyn, NY 11201 (Tel: 212-625-6220).

Single-Board Computer. The CPU-1 is an 8085-based system similar to the Intel 80/04. It operates at 3 MHz, and includes 256 bytes of RAM, 22 I/O lines, serial I/O port, programmable counter/timer, and two sockets for EPROM, expandable on board to 512 bytes of RAM, 44 I/O lines, and two clock timers. The EPROM can be 2708,

2716, 2758, or TMS 2716. It has power-on reset, manual reset and it supports the 8085 interrupt structure. The power supply is on board and only an external transformer is required. It also has a wire-wrap area. \$185. CPU-1A (512 bytes RAM, 44 I/O lines, two timers) is \$220. Address: Pragmatic Designs Inc., 950 Benicia Ave., Sunnyvale, CA 94086 (Tel: 408-736-8670).

6800 Trainer. "Trainer 1" is a two-board computer using a 6808 CPU with 1/4K RAM, provisions for 4K PROM and onboard I/O. It has an 8-digit display, hex keypad, Tbug 2K monitor, and hardware trace. Optional equipment includes KC cassette I/O, parallel I/O, serial (RS232/20 mA) port, crystal-controlled baud rate generator, and expansion cards. Starts at \$349. Address: Omnibyte Corp., 245 W. Roosevelt Rd (1-5), West Chicago, IL 60185 (Tel: 312-231-6880).

Apple Parallel I/O. The APIO allows 8-bit parallel access to Apple II and Apple II Plus systems. The board provides 16 bidirectional data lines, and four handshaking lines for two 8-bit bidirectional interface ports. The direction of the data lines is under software control. On-board PROM operates a printer and makes the board independent of Apple slots. \$109 assembled, \$79 kit. Address: SSM Microcomputer Products Inc., 2190 Paragon Drive, San Jose, CA 95131 (Tel: 408-946-7400).

Tiny BASIC Module. The K-8073 uses the INS8073 CPU with Tiny BASIC, and includes an RS-232 I/O port, cassette port, 8K EPROM, with one slot, 1K RAM, with internal expansion to 8K, STD Bus, Asynchronous Rec/Trans remote controller for single-wire data control and retrieval of 8-bit words from 128 remote slave stations. It has PPI with 24 bi-directional I/O lines, and a real-time clock. Unit is on a 4.5" x 6.5" card and requires 5 volts. \$388. Address: Transwave Corp., RD 1, Box 489, Vanderbilt, PA 15486 (Tel: 412-628-6303).

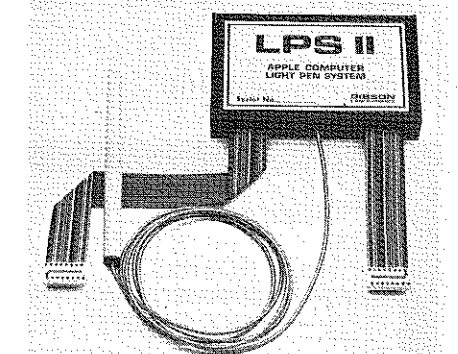
Color Printer Interface. The CPRINT module allows a Centronics-type parallel port for the TRS-80 Color Computer. Firmware allows all LLIST and PRINT #-2 outputs, a screen-print function can be initiated at any time, line width can be set, graphics in the LPVII can be accessed, page length can be set, and blank lines inserted between pages. The CPRINT module is a fully buffered 8-bit I/O port that can interface with any Model I/III which plug into the printer port. It is compatible with all versions of the Color Computer and requires no extra memory. \$49.95 Address: Micro-Labs, Inc., 902 Pinecrest, Richardson, TX 75080. (Tel: 214-235-0915).

CMOS Computer. The BASYS/1 is an all CMOS computer designed around

the CDP1802 CPU, with up to 2K of RAM and 8K of ROM. It has a flexible I/O circuit. Power requirements are 4 to 6 volts dc at 10 mA. Features include RS-232 or current-loop, parallel I/O, multiplexed I/O that can handle 10 digits and 80 keys, and a ROM monitor. A bus interface is provided. Price ranges from \$175 to \$300 depending on options. Address: Technical Micro Systems, Inc., 366 Cloverdale, Ann Arbor, MI 48105 (Tel: 313-994-0784).

Printers. The Sprinter-20 prints 20 characters wide, optionally sideways or upside down lines, at a normal print speed of 1.5 ips. Up to 5 different character sizes can be selected via ASCII control codes or 140 x n dot matrix in graphics mode. It measures 7.5" W x 5" D x 3" H (\$175). The Sprinter-40 prints 40 characters wide, at a selectable print speed of 2, 3, or 4 ips. Wraparound facility permits printing of lines greater than 40 characters. In graphics mode, it has 280 x n dot matrix. It measures 10.5" W x 7.5" D x 4" H (\$295). Interface is parallel, 7-bit ASCII plus Strobe, Busy and Acknowledge. Serial RS-232 to 9600 baud, 1 or 2 stop bits. Address: Alphacom, Inc., 2323 So. Bascom Ave., Campbell, CA 95008 (Tel: 408-249-2152).

Apple Light Pen. The LPS II light pen allows high-resolution (280 x 192) graphics on an Apple II. It is compatible with all languages, and usable in every



screen mode. It provides 60-Hz coordinate generation, and can be installed on the Apple motherboard so no slots are required. \$285. Address: Gibson Labs., Building 10, 406 Orange Blossom, Irvine, CA 92714 (Tel: 714-559-8727).

Ham TRS-80. The "Terminall" converts any TRS-80 into a flexible amateur radio terminal. It contains the necessary interface, audio demodulation, AFSK tone generator and transmitter keying hardware. Plug it into the receiver headphone jack and copy Morse code, with code speed displayed on status line, Baudot, or ASCII. ASCII capability provides upper- and lower-case, control codes, even/odd/no parity, 6/7/8 data bits, 75/110 baud. Software is on cas-