

PolyLetter



January/February 1983

NEWS FROM POLYMORPHIC

A delay in the new system, and new life for the old ones...

When last we met, Poly's new system was slated for a February release date. This has now slipped to March, and it wouldn't be a big surprise if it slips further. But that's not necessarily bad news: it's far better to finish the job than to ship a rushed-out product, especially one of the complexity Poly promises.

We have no new details on internals of the new system. PolyMorphic has decided to keep further information "close to the chest," for a number of reasons. But the information we reported in earlier issues remains true, to the best of our knowledge: in summary, "8086 with lots of memory!"

We do have some good news on upgrading: Ken Gudis reports that all 8813s shipped from now on will be upgraded to the new system, possibly at no charge, when the new system is released. The new system is expected to sell at about the same price as a new 8813, so buyers of new 8813s can trade in their 8813 cards for the new "system card." They would have to pay only the difference in selling cost between the new system and the 8813, which could be zero.

We reported earlier that Poly's new system will be shipped with the CP/M-86 operating system initially. It's been rumored that this would be the **only** operating system available. "Not true," says Ken Gudis. "I won't make any promises, but as of now, we do plan to offer a version of Exec on the new system. Customer demand will dictate how fast we work on developing this."

Upgrading an 8813

You will be able to add a new "system card" to your existing 8813, and take advantage of many features from the new

system. First, you will be able to run CP/M-86 on the new system card. Using the emulator mode Poly will provide, you will also be able to run CP/M-80 ("old" CP/M) programs with this new card. And your current Poly programs will still run, under Exec, using your existing CPU card. While running on the old CPU, the new system card will be used only for the 80 x 24 video display. This means both old and new CPUs will coexist in the same chassis. Upgrading your 8813 to take advantage of these features will require adding the new system card, at a cost of between \$1500 and \$2000. You would still use your current keyboard and monitor.

Poly press

Look for Poly press releases in several computing publications, including Personal Computing. The new HD/18 has been heavily publicized. Poly's new system should also get good coverage as the release date nears. We may also see some feature articles.

Remember the 8810?

The 8810 is being re-released, this time with two, half-height 5" floppy drives. This represents a big step for the 8810, for as we know, the usefulness of a one-drive Poly is limited. This new model of the 8810 will use disks compatible with the current DSDD 5" drives, with each disk holding 360K bytes. By sacrificing compatibility with current DSDD 5" disks, the drives could hold up to 1/2 megabyte each. (There are no plans to make this two-drive configuration available as an upgrade for existing 8810s.)

Another popular configuration is an 8810, coupled with the new HD/18 hard disk. The 8810 and HD/18 are each packaged in small cabinets, taking less desk space than an 8813. Cosmetically, this makes an 8810-HD combination more competitive with the IBM PC and other small systems on the market.

INDEX TO POLYLETTER/1982

This index is arranged as issue/page.
For example, the 8088 processor is
discussed in issue 82/2, page 3.

8088 processor	2/3
Applications software	1/2,5/2
BASIC C03, bugs	1/6
BASIC Editor	4/6
BASIC statements, new	3/5
BASIC, squeezing	4/8
BASIC, user-defined functions	1/8
Bugs in Exec/95	1/6
Cache.ZO	6/2
CASHFLOW.BS	1/3
CompuServe (timesharing net)	1/2
Confidence testing	2/7,3/4
CP/M	1/2,1/7, 4/1,4/3,5/3,6/4
CP/M program exchange	6/2,6/5
Custom software services	3/6
Dealers	1/2
DEF (BASIC functions)	1/8
Diablo printer	5/4
Dictionary program	5/3
Disk conversion service	3/5
Disk formats, Poly	4/8
Disk name	5/5
Disk-Of-The-Month	2/5
Driver.DD	1/3
DSDD drive problems	3/5
Editor, and special characters	4/4
Electrical spikes	4/9
Exec/95	1/3
Exec/95, bugs	1/6
Exec/96	6/1
Factory assistance	3/2,4/1
FORMAT	3/7
FORMAT (using from Exec)	4/9,5/4
FORMAT and mail lists	2/6
Front panel lockout	4/2
Hard Disk	1/1,3/1, 3/4
Hard Disk, HD/18	6/1
IBM personal computer	2/3
Insurance (computer)	5/4
Intel processors	5/1
Keyboard fix	1/7
KISS.RL	1/5
Linefeeds, eliminating	2/2
Load light	4/2
Macros	6/9
Mail lists	2/6
Mass storage	6/3
MEMTOP	3/4
Micronet (timesharing net)	1/2
Micropolis Users Group	1/3
MS-DOS	4/1
Okidata printer	4/5

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create a forum of ideas for
users of Poly equipment.
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WHO'S IN CHARGE AT POLY?

Sirous Parsaei is President of
PolyMorphic Systems. Mark Maclin is in
charge of hardware, and Lennie Araki is
responsible for software. When contacting
PolyMorphic, the first person you should
speak to is Ken Gudis. He will respond to
your question or arrange for someone else
to help you.

Poly's number is (805) 967-0468.

Operating system revisions	1/3,3/3
Overlays (using w/BASIC)	3/8
PACK in command files	2/2
Pascal	1/3
Plotter	2/3
Poly 88	1/1,4/7
PolyNet	1/1,3/2
Portability	6/7
Printer driver (using w/BASIC)	3/8
Printers	4/5
ROMs	1/3,2/2, 3/3
Relocating loader	6/6
Smith Corona printer	4/5
Source (timesharing net)	1/2,5/3
Static electricity	3/5
Squeezing BASIC programs	4/8
System Disk	5/6
User-defined functions (BASIC)	1/8
Volume Manager	1/3,3/4
WordMaster II	3/7
WPS (word processing system)	3/7

BUGS!

Ralph Kenyon has compiled a new list of bugs in the operating system. Copies of these bugs have been forwarded to PolyMorphic Systems, hopefully for correction in Exec/96.

Exec/95

If you use the wild card "*" in a RENAME command, it will look for deleted files matching the wild card pattern. If it finds them, it will undelete them, and then rename them as well.

```
$RENAME TEST.* JUNK.*
TEST.TX renamed to JUNK.TX
TEST.GO renamed to JUNK.GO
TEST.TX renamed to JUNK.TX
```

The third file had been deleted, but is now active again!

If you TYPE a file which has bad sectors, TYPE will not only report the error (for example, "Hard Error! Preamble bad"), but will also say "I can't find that file."

The PACK command only looks for a one-character disk specifier on the command line. For example, if you type "PACK 12", drive 1 would be packed.

The LIST command can be used with the wild card "#", but only if # has been defined with a drive number.

```
## SUB
$L #
Bad disk identifier!

## 4<SUB
$L #
Directory # has...
```

Edit/3.3 has a bug (or "undesired feature?") in its output mechanism. If the output directory is full, you must enter a new filename, in a subdirectory, on the same disk as the original output file. If there is no subdirectory available, you cannot leave the editor without pressing LOAD.

PACK should, but doesn't, kill command file mode if it encounters a fatal error while packing the disk. Your command file will keep on running even if PACK fails.

The "boot" command does not check to see that the disk you are booting to is a System disk.

The debugging utility, RDB, does not reset the SRA7 vector after you give the Quit command. If your system is prone to jumping into the Front Panel, you may find that this bug in RDB causes your system to jump back into RDB, or reboot.

BASIC C03

INPUT and READ from a file will skip over any null (00) bytes in the file.

Writing to a fixed-length file with blank (20 hex) records, in the INOUT mode, will write past the end of the file without indicating an error. It can destroy other files on the disk. To avoid this, always use POS before writing. POS checks for end-of-file condition.

The LEN function will accept only a string variable, not a string expression. LEN(A\$) works, but LEN(MID\$(A\$,1,3)) does not.

ROMs version 81 for SSSD disks

The main disk I/O routine for 5" SSSD disks has a bug. If asked to read several sectors, one of which is unreadable, Dio will read the others without reporting an error.

NEW DEALER IN DALLAS

PolyMorphic welcomes a new dealer: Dennis Cherry, 4010 Clover Lane, Dallas TX 75220, is setting up a business and will be carrying the PolyMorphic line.

VOLUME MANAGER - EXPLAINED
by John J. Warkentin

I will admit not having a hard disk or 8" drives on my system, but I have poked around the operating system a lot. I think I can explain the function of some of the programs PolyLetter asked about.

Vmgr.OV is referenced in the Exec overlay, and gets loaded at boot time. It in turn loads the file **Driver.DD**, which is the driver for the hard disk. Vmgr hooks into the disk I/O vector so that all disk references are first processed by Vmgr. Vmgr holds a table of physical-to-logical device assignments, so that disk drive numbers can be re-assigned dynamically.

CONFIGURE.GO is used to format (initialize) the hard disk, to make it look like a number of smaller disks. This gives the user a number of "virtual" disks, providing certain advantages. For example, BASIC can only have one output file open per drive. By making the HD look like several drives, we can let BASIC have several output files open at once.

CONNECT.GO is the program which provides the physical to logical assignment. The command would be something like

```
$CONNECT 11 4
```

which would make physical disk 11, one of the hard disk partitions, operate under the drive number <4>.

Without having the proper ROMs and other disk drives besides my three 5" SSSD, I cannot explore Volume Manager any further. Perhaps this will give readers some ideas, and someone with the appropriate hardware can report in PolyLetter on any further discoveries.

1982 INCOME TAX PROGRAM

Charles Thompson is revising his Tax Return Preparation System for the 1982 IRS season. Advance orders are now being accepted, at \$75 for individual use, and \$150 for people in the tax business. Last year, many buyers reported that this program more than paid for itself by increasing their refunds. Order directly from Charles A. Thompson, 2909 Rosedale Avenue, Dallas TX 75205.

POLY - ADS

Ads are published as a free service to PolyLetter subscribers.

FOR SALE: 8813 with 56K, two 5" drives, keyboard, monitor, printer port, CP/M hardware option installed. CP/M disk still sealed - never used. Includes system disks and confidence disks. \$1500 plus shipping. Duane Austin, 1864 Hackett Avenue, Mtn. View CA 94043, (415) 965-4092 after 5 PM Pacific time.

FOR SALE: Essentially complete Poly-88 system 16 in kit form. Some assembly completed. Sold as-is, with keyboard, or will sell individual boards. No monitor. Make offer! Eugene Gardner, 1703 South 7th Street, Lamar CO 81052.

FOR SALE: Like new, 8813 with two DSDD 5" drives, 32K, monitor, keyboard. With WordMaster, Confidence disks, MailList, Loan and Investment Analysis software. Standard serial port installed. Will sell with or without a printer. Price negotiable. John T. Bear, PO Box 19163, Cleveland OH 44119, (216) 291-5666.

NEW PRODUCTS FROM RALPH KENYON

Abstract Systems Etc., Ralph Kenyon's software firm, has released some new items.

Inhibit.GO prevents the system from jumping into the Front Panel unexpectedly. Unlike the FPL.GO program presented in PolyLetter (issue 82/4), Inhibit.GO can be removed when desired. \$25.

Move.GO combines COPY and DELETE in one operation. Like PolyMorphic's SCOPY, Move.GO can be run from the command line or it can prompt you for filenames. \$25.

LoadRel.GO will load a relocatable program just below MEMTOP and execute it. **MakeRel.GO** makes a relocatable program self-loading. Both programs are efficient and provide error-checking. MakeRel.GO: \$50. LoadRel.GO: \$30.

Vio.PS is a printer-driver for the WW Components 80 x 24 video card. \$50.

DisAsmb.BS version 3.0 runs faster than previous versions, due to reduced disk access. \$35. If you purchased versions 1.3 or 2.0, return your disk for a \$15 credit.

A "COOK'S TOUR" OF THE SHUGART SA-400 MINI-DISK DRIVE (PART 1)

by Frank Stearns
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Many of us have at least one Shugart SA-400 5" SSSD (single sided, single density) disk drive in our Polys. Let's go on a tour of the drive and see what it does and how it works; and at the same time, learn a few simple things that can be done to keep an SA-400 healthy.

THE DISK -- That square thing commonly called "a disk" is really not the disk. It is a protective jacket with quilted cleaning and lubricating surfaces bonded to its inside. The round, flexible, oxide-coated inner disk is the actual recording medium, and it revolves inside the stationary square jacket.

We all know better than to touch any of the exposed disk surfaces. As with precision audio recording tape, oxide is damaged by "foreign matter" such as dust and oil from our skin, or from physical nicks or creases. Anyone of these items can cause a "dropout", which is a momentary loss of sufficient oxide coating to accept or playback a signal. (Dropouts can also be caused by momentary losses of head-to-disk contact.) The internal cleaners are meant only for "normal" amounts of dust and cannot contend with oil or excessive dust. And, they can't do a thing about mechanical damage. Handle disks with care!

THE ANALOG SIGNAL -- We'll get to how the digital signal finds its way from the system to the disk drive in a moment. But first, the actual signal on disk. To begin with, each byte sent to the drive becomes a string of eight bits. The bits are recorded on the disk using FM (frequency modulation). That's right -- just like your FM radio, only things are simple here because instead of the rich complexities of sound, there are only ones and zeros. A zero is represented by the FM "carrier" signal of 62.5 KHz (also called "clock pulses"). When a "one" comes along, the recording frequency jumps to 125 KHz -- an extra pulse has been placed between two clock pulses. If another "one" appears immediately, the frequency stays at 125 KHz. Otherwise, it drops back to the 62.5 KHz carrier. Through careful manipulation on playback, data is "separated" from the carrier and sent out of the drive back into Poly.

"RANDOM ACCESS" -- Of course, recording/playback can be stopped or started at will throughout the disk, provided it is done in 256-byte blocks called "sectors". Thirty-five concentric recording tracks are pie-sliced into 10 sectors each. Any one of these sectors can be randomly accessed. The drive provides quick switching and magnetic markings at the front and end of each sector to make sure reading and writing stop and start at the right instant.

In addition, Poly uses the "hard sectoring" format which involves those little holes near the center of the disk. (Carefully rotate the disk from its center with your hand and watch the quarter-inch round cutout near the inside edge of the jacket. Periodically, little holes will appear.) Inside the drive a light shines on the cutout. A photo-diode on the other side picks up the flash when a hole lets the light through. This tells Poly where a sector begins and ends. Poly's disk control system keeps track of these flashes, and uses them to update head position information. More about disk formatting in the CONTROLLER section.

THE HEAD -- Your data is stored on the backside of the diskette! That's the surface the head presses against during read/write operations. The head itself is nothing out of the ordinary as magnetic recording heads go, though it does have a couple of interesting features. Unlike an audio recorder, there is no erase piece preceding the read/write head. Old data is erased by the writing action of new data. There are, however, two

(Continued on pages 6,7)

erase elements that sandwich the read/write element. During recording, these side pieces create protective guard bands that will not allow magnetic "splash" into either neighboring track. This is very important when media is written by one drive and read with another. The guard bands allow for minor alignment deviations, as it is easier to read a track slightly off-center if there is no immediately adjacent signal to confuse the issue. If the alignment is far off enough to cause writing or reading directly over an adjacent track, it is time for an alignment.

HEAD LOAD BUTTON -- For you audio buffs, data recording speed varies from roughly 16 IPS (inside track) to 36 IPS (outside track). 16 IPS is slow for 125 KHz. Firm head-to-disk contact is essential. Whenever the drive is accessed for read or write, a pressure pad (referred to by Shugart as the "load head button"), presses against the head from the other side of the disk. This can be a critical part of the system. In fact, a good portion of soft errors result from the head load button being worn or out of position. Depending on the media, button life will be six months to five years. (Author's note: While using 3M media, button life on my system deteriorated to a matter of months. Since switching to the new Verbatim, visible wear has stopped.)

The button is located just opposite the head. If you can gain visual access to the drive while it is operating, you'll notice an arm dropping against the disk when the red drive-activity LED comes on, and retraction of the arm when the LED goes out. At the end of this arm, facing the disk, is a small round item -- the load button. If the button is in good shape, the round area will look like a small bit of white felt. If bad, the felt may be quite dirty or nearly worn away. In this case, it should be replaced immediately. (More in Part 2, next issue.)

THE DRIVE MOTORS: Speed, stepper -- There are two motors on the drive. When switched on by the disk controller, a DC-servo motor with a belt and pulley keeps the disk turning at a constant 300 RPM. "DC-servo" means that as the motor spins, it sends a tachometer signal back to the motor-drive circuitry. The tach signal is monitored. If the speed begins to drift, the drive level sent to the motor is varied in the opposite direction of the drift, correcting the speed. (Speed drifts can be due to uneven media or instabilities within the motor-drive electronics.) A plus or minus 10% speed window is allowed, though it is best to have drive speed dead center. Your drives have a much better chance of using or providing data from or to other systems if they are "in the middle".

The second motor is a bi-directional stepper. Each time the stepper motor is pulsed, its shaft turns a small, measured distance in the desired direction. The distance "stepped" requires consistent precision through all 360 degrees of rotation (the motor has no stops and will continue stepping in the selected direction). The motor shaft is connected directly to the spiral-grooved head-position cam. Turning of the cam forces a guide pin ("cam follower") attached to the head carriage to move in a groove cut in the cam. In this way, the head is positioned over the desired track.

DISK CONTROLLER -- The drives are very stupid; somebody has to be the boss and signal the motors when to start, when to load heads, which tracks to address, what sectors to read and write, how to handle data flow, and so on. This is the job of Poly's disk controller, a separate circuit card inside the system but external to the drives. Perhaps the simplest controller task is transferring information between data bus and the desired drive. The controller's real chore is knowing where the head is. The well-worn mail-system analogy serves well: The sector of data is the mail, the CPU is the main post office, the disk-controller the postman, the SA-400 drive the postman's jeep (or feet!), and the sectors on disk the mail boxes.

You may have noticed that when Poly is first powered on, or whenever the load button is pressed, the drives "take longer" than they do the next time they are accessed. Poly "knows" if she has just gotten out of bed and pulses the stepper of any selected drive 35 times in and 35 times back out. In this way, no matter what track the head is at on power-up or load, it is reset to track zero, the origin track. From then on, Poly can determine the number of pulses needed to step to a given track, based on how far it is

(SA-400 - continued from page 6)

from the track-zero reference.

DISK FORMATS -- The SA-400, via the controller, allows an OEM such as PolyMorphic numerous ways to define sectors on the disk. The range (per track) is 16 sectors of 128 bytes each, all the way to 1 sector of 2048 bytes. The most dense track formats are 5 sectors of 512 bytes each, and the familiar 10 sectors of 256 bytes each. The 10/256 format has several advantages for the programmer, not the least of which is the fact that 255 decimal equals FF Hex. Assembly language programmers will recognize the significance of that! If you're not a programmer, let's just say that 256/10 is a minor detail that makes the daily life of an Assembler programmer easier. The trade off? Time. The fewer sectors one has to deal with, the less redundant overhead and "housekeeping" there will be for each sector, and data transfer is faster. But considering all aspects, the net speed increase from using larger sectors is marginal. And, to see a substantial speed improvement, 20% of the disk storage capacity would be lost.

(Next PolyLetter, look for Part 2 -- Care of the SA-400.)

EXEC/96

Exec/96 was released the week of January 10. It contains no major new features, but does include a number of bug fixes and "housekeeping" changes. Exec/96 will be shipped with an addendum to the Poly manuals, which explains all changes in the operating system since Exec/90. This documentation may be the best part of the Exec/96 release! Exec/96, with the addendum, is available from PolyMorphic for \$75.

CORRECTION...

Last PolyLetter, we inadvertantly misquoted Charles Thompson. We said that he believed assembly language was a figment of the imagination. Chuck's actual statement was that "(a) It doesn't work, and (b) What happens is that the Tooth Fairy is inside the machine manipulating the bits and bytes." We deeply regret the mistake and trust that Mr. Thompson will forgive us.

HEX INPUT/OUTPUT IN BASIC

Here are some functions which convert hex to decimal and vice-versa. FNH\$ accepts a decimal value and returns a hex value in a string. FND accepts a hex number in a string variable and converts it to a normal decimal value. FNH2\$ is like FNH\$, but is designed for byte values (0 to 255) which can be put into a 2-digit hex number.

```

110 REM convert X to 4-hexit string
120 DEF FNH$(X)
130 Z$=""
140 Z1=48+MOD(X,16)
   \Z$=CHR$(Z1+7*(Z1>57))+Z$
   \X=INT(X/16)
150 IF X>0 THEN 140
160 IF LEN(Z$)<4 THEN Z$="0"+Z$ \GOTO 160
170 RETURN Z$+"H" \FNEND

200 REM return decimal value of hex string
210 DEF FND(X$)
220 IF X$="" THEN RETURN 0
230 Z1=0 \FOR Z=1 TO LEN(X$)
   \Z2=ASC(X$,Z)-48
240 Z1=Z1*16+Z2-7*(Z2>9) \NEXT
   \RETURN Z1 \FNEND

310 REM convert X to 2-hexit string
320 DEF FNH2$(X)
330 Z$=""
340 Z1=48+MOD(X,16)
   \Z$=CHR$(Z1+7*(Z1>57))+Z$
   \X=INT(X/16)
350 IF X>0 THEN 340
360 IF Z1>57 THEN Z$="0"+Z$
370 RETURN Z$+"H" \FNEND

```

AND NOW, A WORD FROM THE EDITOR...

Last issue we inquired about publishing a list of our subscribers. The letters we received were all positive, so this PolyLetter concludes with a list of all our readers. We'll reprint the list from time to time, and we hope it encourages you to make contact with your fellow Poly users.

Next PolyLetter, look for Part 2 of Frank Stearns' trip through the SA-400 disk drive; a comparison of Poly and CP/M commands; a new list of Poly owners on the Source; and, hopefully, more of **your** questions and comments on your computing activities!

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Kelso, Bob Pringle, Thom		3116-C Lemon Street 1301 Rue Chartres	Metairie New Orleans	LA 70002 LA 70116	
Houghton, Richard W. Kenyon, Ralph Tripi, Bob	Abstract Systems, Etc.	48 Foster Street RFD Lower Prospot Hill 23 Endicott Dr.	Littleton, Chester Westboro,	MA 01460 MA 01011 MA 01581	4133547750 6173661853
Jackson, Herbert Jenkins, Kenneth A.	Syntech Enterprises	9219 Gary Lane 14501 Elmhan Court	Landover Silver Spring	MD 20785 MD 20906	3015985170

Balden, Dr. Maurice J.		176 Academy St.	Presque Isle, ME	04769	2077645393
Johnson, Bob	Wadena Pioneer Journal	P.O. Box 31	Wadena, MN	56482	
McCluer, Rufus	McCluer Investment Company	Box 4223 G.S.	Springfield, MO	65808	4178833709
Petty, Raymond		608 Sunnybrook Drive	Monroe, NC	28110	7042831223
Davis, Henry	Greater Omaha Packing Co.	5100 South 26th St.	Omaha, NE	68107	4027313480
Miller, Thomas E.	The Chardon Company	2400 Sahler St.	Omaha, NE	68111	4024515200
Teall, Robert A.	Bob's Industrial Electronics	1720 North Sherman	North Platte, NE	69101	3085328017
Hills, Jack G.	Los Alamos Nat'l Laboratory	11 Loma Vista Drive	Los Alamos, NM	87544	5056675897
Mulloy, Patrick		4371 Toledo Ave.	Las Vegas, NV	89121	4513102
Davis, Dr. David L.		172 Mount Vernon	Snyder, NY	14226	7168392023
Levy, Al	Jazz Record Co.	P.O. Box 71	Hicksville, NY	11801	
Fenichel, Henry	University of Cincinnati	Physics Department	Cincinnati, OH	45221	5134752373
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Gilbert, Horace E.		1142 Highcliff Court	Cincinnati, OH	45224	
Gross, Charles W.		445 Rising Hill Dr.	Fairborn, OH	45324	5138793450
Hope, Jack I.		10200 Anderson Way	Cincinnati, OH	45242	5139845411
Jones, Robert L.	ADirections, Inc.	3222 N. High Street	Columbus, OH	43202	6148463538
Klysz, Karen	Automated Business Technique	4050 Hearststone Court	Cincinnati, OH	45245	5137527186
Montillon, George		351 Fleming Rd.	Cincinnati, OH	45215	5137611565
Phelan, T. R.	Zeil-Blossom & Assoc., Inc.	23 East Seventh St.	Cincinnati, OH	45202	5134213363
Salinger, James	James Salinger & Associates	P.O. Box 37245	Cincinnati, OH	45222	5135313106
Schwartz, Robert	Schwartz & Schwartz	906 Main St. #405	Cincinnati, OH	45202	5132413447
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Carlson, William S.	Pittsburgh Testing Lab.	P.O. Box 1646	Pittsburgh, PA	15230	4129224000
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Rooney, Steve	Dome & Associates Inc.	4068 Mt Royal Blvd #215	Allison Park, PA	15101	4124868166
Schirripa, Douglas R.		101 Cherry Lane	Wynnewood, PA	19096	
Shimmel, Norman E.		R.D. #2	Butler, PA	16001	4122832723
Sloan, John A.	The Sloan Brothers Company	659-13th Street	Oakmont, PA	15139	4123624848
Synder, Daniel D.		561 5th Street	Butler, PA	16001	4122871625
Graves, Charles B.		1074 Evergreen Circle	Rock Hill, SC	29730	
Goodman, James	Goodman Sales Co.	473 Sharon Drive	Memphis, TN	38122	
Britton, R.W.	Corrosion-Protective Inc.	115 West Shore Drive	Richardson, TX	75080	2142353836
Cook, Jim	PolyGrip	P.O. Box 18121	Dallas, TX	75218	2143270631
Dial, David H.	D. H. Dial & Company	5550 LBJ Freeway, LB-1	Dallas, TX	75240	2144580987
Dimiceli, Sam	BSP Marketing, Inc.	P.O. Box 42075	Houston, TX	77042	7137807417
Gibbs, Rebecca A.	SBI Capital Corp.	PO Box 771668	Houston, TX	77215	7139751188
Handlogen, Clarence J.	The Handlogen Corporation	9235 Whitehurst	Dallas, TX	75243	2143492367
Head, Gene B.	Acme Wholesale Supply Inc.	PO Box 21189	Houston, TX	77226	7136352410
Hockert, Susan	Hockert Computime, Inc.	4835 LBJ Frwy. #250	Dallas, TX	75234	
Kinne, Dr. Harold C.		2514 Custer Parkway	Richardson, TX	75080	2142357145
Mach, Charles & Helen		709 Bowman	Irving, TX	75060	
Matney, Greg		14015 Britoak Lane	Houston, TX	77079	7134974512
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Norton, Arthur W.		7640 Four Winds Drive	Fort Worth, TX	76133	2928060
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Ryan, Jim	Ryan Associates	P.O. Box 1038	Richardson, TX	75080	2142318411
Sipes, J.E.		3011 Kilkenny	El Paso, TX	79925	9155912362
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Thompson, Charles A.		2909 Rosedale Ave.	Dallas, TX	75205	3688223
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PolyLetter



March/April 1983

NEWS FROM POLYMORPHIC

We'll start out this time by answering some questions. Several readers asked about the HD/18 hard disk, and whether the sale price was still in effect. Ken Gudis reports the price is still \$3995, which is a 10% discount off the regular HD/18 sticker. And the removable cartridge winchester is now available for the HD/18. The HD/18 holds 18 megabytes of data, and the removable cartridge holds another 5 megabytes. This cartridge disk is designed for backup of the main disk, but can also be used as on-line storage. If the 18 meg disk should fail, the 5 meg could be used as the system drive, and would operate at the same high speed. The sale price of the HD/18 with cartridge drive is \$5995.

Pascal!

That's all you need to say to some programmers, and they're happy as can be. Pascal and FORTRAN are the two most often requested languages on the 8813. And PolyMorphic is happy to report that Pascal will soon be available. Within 30 days, Pascal/MT should be ready for the 8813. Programmers will recognize that Pascal/MT is a product of Digital Research, creators of CP/M. Indeed, one advantage of the Pascal language is that (like CP/M) it is very **portable**. Poly's motivation for providing Pascal on the 8813 is to make it easier for you to move programs to the new system. Pascal/MT will also run on Poly's new system, under the CP/M-86 operating system.

The New System

By now it must be getting close. Poly won't yet give us a release date, but they admit that some dealers are ready to place orders. Here is a rundown on the features of the new system, as we know it so far:

- Intel 80186 16-bit processor
- **Concurrent** CP/M-86 operating system
- 256K RAM, expandable

- Z80 or 8080 co-processor, running CP/M-80
- High-res color graphics (16-color)
- 80 x 24 display

What is Concurrent CP/M-86? It's a new, multi-tasking version of CP/M-86. This allows you to run more than one program at a time. Printing or sorting could be done as a "background" task while you run some other program, say a word processor, in the "foreground." In addition, it's said that Concurrent CP/M-86 is more "friendly" than any other CP/M release so far. (But still not as friendly as Exec!)

Running Concurrent CP/M-86, the new system should be compatible with all applications software being sold for the IBM-PC and others. But what about the disk format problem? So far, systems built by Poly have been unable to read any other computer's disks, except (sometimes) North Star single-density. In order to be useful, we need a way to read some "standard" disk format on our Polys.

There are two answers to this problem. First, the new system will (eventually) have a new disk controller which will be able to read the 5" IBM-format diskettes used by the IBM-PC, Xerox, Morrow, Osborne, and other popular systems.

But for a while, the new system may be shipped with the current Poly disk controllers. And if you upgrade your 8813 by adding a new-system CPU card, you will still have to contend with your present disk drives and controllers. You will need a way to transfer data into this format. PolyMorphic plans to provide a disk format conversion service, to get data onto disks you can read. (There are a number of vendors offering this service now. See PolyLetter, May/June 1982, page 5, for an example.)

It is also rumored that PolyMorphic may provide a way to read IBM-format,

(Continued on page 2)

soft-sectored 8" diskettes, on current MS systems. This would allow us to read the most popular of all disk formats: the format in which nearly all CP/M software is available. If this idea intrigues you, write to PolyMorphic and encourage development on this project. If PolyMorphic can accomplish this, it would be the biggest compatibility breakthrough to date on 8813 CP/M systems. It would also help the compatibility issue on the new system.

How does it stack up?

When all is said and done, what will Poly's new system offer that other vendors won't? If we look at similar systems on the market today, most run CP/M-86, but not Concurrent CP/M-86. Some other systems will be able to upgrade to run Concurrent CP/M-86, but some won't. Poly's will have it built-in from the start. Other systems are being shipped with 64K or 128K standard memory. The IBM-PC has 64K standard. Poly's system will have 256K standard, and will be upgradable to one megabyte of RAM! Most systems have some graphics options, but Poly's will have high-resolution graphics standard.

In summary, it's safe to say that Poly's system will incorporate more features than most other systems in its price range. And the functionality will be achieved without much risk. Poly will be using technology that's been available for months, or in some cases years.

Other vendors will certainly follow suit with similar products. In fact, similar products may be announced by the time Poly's is ready. But the other feature, as far as we're concerned, is the upgrade path. We can move to a new Poly less painfully than to any other system. And it won't be necessary to scrap our 8813s in order to upgrade, if we take advantage of the upgrade plans Poly is offering. (See our last issue for more details on Poly's upgrade policy.)

FOR SALE: Like new, 8813 with two DSDD 5" drives, 32K, monitor, keyboard. With WordMaster, Confidence disks, MailList, Loan and Investment Analysis software. Never used. \$1750 or best offer. John T. Bear, PO Box 19163, Cleveland OH 44119, (216) 291-5666.

POLY USERS ON THE SOURCE

Just as soon as we published our last list of Poly-owning Source users, two old friends joined the crew. Next time you're "online," say hello to TCX634 and STJ970. Their real names are listed below, along with the rest of the Sourceketeers.

TCX634: Bob Harris, general sales manager of a TV station in Kansas City.

STJ970: Charles Thompson, attorney, programmer, writer, and frequent PolyLetter contributor from Dallas. Chuck's account number recently changed, it was TCX175.

CL1543: Bob Measle, Lexington, Kentucky.

CL1970: Frank McGuire, Washington DC.

TCB203: Frank Stearns, Vancouver, Washington.

TCC609: Joe Toman, Ogden, Illinois.

TCC870: Stuart Woods, Atlanta, Georgia.

TCD098: Bob Schwartz, Cincinnati, Ohio.

TCD125: PolyLetter, Atlanta, Georgia.

TCI127: Ralph Kenyon, Chester, Massachusetts.

TCG256: Russ Nobbs, Spokane, Washington.

TCN206: Jim Wyman, North Carolina.

TCZ587: Jon Wolfert, Dallas, Texas.

For information on joining the Source, call 800-336-3330. There is an initial signup fee, and an hourly rate for connect time. You can use your 8813 to connect to the Source through a telephone modem, and PolyLetter will be happy to help you with this easy project.

A modem will open your computing horizons to many other systems. There are bulletin boards, timesharing services (such as the Source and CompuServe), and many systems offering specialty services like stock reports and farm information. Once you get a modem, you'll never be without one again! Just ask any of the people on our list above.

CP/M CORNER

In this edition of the CP/M Corner, we will make some comparisons between the Poly and CP/M operating systems.

Under CP/M, disks are given letters instead of numbers. Your disk drives might be A:, B:, and C:. Note the colon after the letter; this is how CP/M names a disk. A Poly filename might be <2<FILE, but under CP/M, the name would have to be B:FILE.

The CP/M prompt uses the letter of the "current" disk drive. The "current" drive is like the Poly "System" disk: it is the drive where the OS will search for files, unless you specify some other drive number in the command. If drive A: is the current drive, CP/M will prompt you with

A>

when it wants the next command. Changing system disks is easy in CP/M; simply type the name of the new drive, with a colon. That drive becomes the system drive... even if no disk is in it!

A>B:

B>

But if B: doesn't contain a disk, this is not a fatal error. Since CP/M does not use overlays, it is much more tolerant of missing disks.

A CP/M filename consists of the primary name, which can be up to 8 characters, and the secondary name, or extension, or type, which can be up to 3 characters. The name of a CP/M BASIC program might be PROGRAM3.BAS, and an assembly language source file might be MYPROG.ASM.

Many CP/M commands respond to "wild card" characters. The Poly "*" wild card can stand for a complete primary name, or a complete secondary name, or in the COPY command, it means the destination name should be the same as the source name. Under CP/M, there are two wild cards: "?" and "*". The "?" matches any single character, and "*" matches a complete primary or secondary name. So, for example, "*.SRC" would match any file whose type is SRC. And "? .SRC" would match any SRC file whose primary name is exactly one character long. The "?" can be embedded in a filename, too: "A?B.SRC" might match A1B.SRC, AAB.SRC, etc.

In each OS (operating system), there are certain built-in commands. Then, there are other commands which are actually programs on disk. Since some commands are used very frequently, it makes sense to have them built-in to the OS. This saves time by reducing disk accesses, although it usually doesn't save any disk space or memory.

The Poly OS has a large number of built-in commands. CP/M has fewer, but it has the essential ones. Here are the built-in CP/M commands, along with the corresponding Poly commands.

DIR, under CP/M, lists the directory of a disk, just as Poly's L or LIST does. There is no CP/M command for printing a hardcopy of the directory, such as the Poly DIR command. The CP/M DIR command can list partial directories, however. For example, to list only files whose secondary name is SRC, you might type

A>DIR *.SRC

ERA is the CP/M "erase" command, which deletes a file. You can erase more than one file at a time by using wild cards, such as

A>ERA *.ASM

The corresponding Poly command might be

\$DEL *.TX

Under CP/M, files are not arranged as consecutive sectors on a disk, the way Poly does it. This gives CP/M the ability to have more than one output file open on a drive. It also means you never have to PACK a CP/M disk. But, once you ERASE a file, it is very difficult to recover that file. When you create new files, they can write over the information in any erased files.

REN is the CP/M "rename" command. Under CP/M, you use the equals sign to separate the old and new names, much like a FORTRAN or BASIC "assignment" statement. To rename OLDFILE to NEWFILE, you would type

A>REN NEWFILE=OLDFILE

(Continued on page 4)

The corresponding Poly command would be

\$REN OLDFILE NEWFILE

SAVE works much like the Poly SAVE command. It stores a range of memory data into a disk file. Like the Poly SAVE command, it is usually used to capture binary data into a machine code program file.

TYPE is like the Poly TYPE command. It displays a file on the screen. CP/M's TYPE does not stop automatically every 15 lines, as Poly's does. But, in just about every case, you can suspend CP/M's output with Ctrl-S and restart it with Ctrl-Q. This works during TYPE as well as other commands.

USER is an interesting CP/M command. When you want to divide up your files into groups on a Poly, you would put them in subdirectories. This helps keep files organized, and also allows you to store more files than if you were limited to a single directory's size. CP/M has no subdirectories, but by assigning files to different USER numbers, you can keep them separate from each other. User numbers range from 0 to 15, and you change your current user number with a command like

A>USER 3

Now that you are user 3, any files you create are assigned the user number 3. The DIR command would only display these files. If you never use the USER command, you are effectively user 0.

The USER command provides some ability to keep files separate from each other. But all files, regardless of their user number, are stored in the same directory area of a disk. It is quite possible to fill up this directory, and if you do, your only choice is to erase files. The size of the directory of a given disk is fixed by the designers of the system. You must hope the designers gave you enough space.

Those are all the built-in commands CP/M has. Next issue, we'll look at the transient commands CP/M usually comes with.

EXEC/96 NOW AVAILABLE

We reported last issue that Exec/96 was available from PolyMorphic. It seems that report was a bit premature, but PolyMorphic assures us that Exec/96 is now available. It has been revamped, reorganized, and re-priced too. The system disks, including BASIC, Assembler, and WordMaster, as well as an expanded Addendum to the manuals, is priced at \$150. The complete set of manuals to go with this system is \$75.

Other prices for current software products: PLAN, Poly's analysis package, \$200. Mail List is \$200. The System Programmer's Guide is \$300. Each of these comes with disks and complete documentation.

All software should be available through your dealer, or through PolyMorphic Systems directly. Be sure to specify your disk size and format when ordering.

PolyLetter has received several letters from users who are running old versions of the operating system. They want to know if and when they should upgrade to a newer release. Our advice: if you are running pre-Exec/83 software now, you probably would benefit from ordering a new release.

Be aware that old programs may not run on a new release without modification. If you do your own programming, this won't be difficult. This type of modification is usually trivial. But if you bought your applications programs from a third party, you may have trouble running it on a new release of the operating system. In this case, be prepared to stick with the old Exec for your old software. But you will still enjoy using the newer release for any new development you do.

SOFTWARE AUTHORS TAKE NOTE!

Datapro is a division of McGraw-Hill publishing company. They publish a "Directory of Microcomputer Software" which contains information on many software products, including some for the PolyMorphic 8813. For information on listing your software products with Datapro, write to the Managing Editor, Directory of Microcomputer Software, Datapro, 1805 Underwood Boulevard, Delran NJ 08075, (609) 764-0100.



WHY AN HD/18?

One of Poly's biggest efforts right now is to increase sales of the HD/18. Unfortunately there are more inquiries than sales at the moment. And among PolyLetter subscribers, no one (to our knowledge) has yet purchased an HD/18.

Of course, many PolyLetter readers are individuals, or small businesses with no need for a hard disk. And yet, many of these same subscribers write that they are upgrading to other systems. Most often, the IBM-PC is mentioned. What are the reasons for upgrading to another system?

The biggest reason is the availability of software. The next biggest reason is performance: When the business grows, so must the computer. And performance usually boils down to storage capacity and speed. This is where a hard disk can make all the difference! You already know that a hard disk stores much more data than a floppy. The HD/18, in particular, stores about as much data as 200 floppies. But the other advantage is access speed. Since most programs perform a lot of disk I/O, this is where the improvement in performance really shows.

When Poly's new system is released, it will let you use some of your current hardware, and expand to more memory space and more standard software. So, if you were to add a hard disk now, it would still serve you on Poly's new system.

If you upgraded to an IBM or similar system, you would gain more memory space. Or would you? BASIC on the IBM-PC is limited to 64K bytes of program space, despite the fact that the IBM-PC can hold several hundred kilobytes of RAM. Then there's the problem of moving your programs, or at least moving your data, to a new system.

If it sounds like I'm sold on a Poly/HD combination, it's from experience. I've tried an IBM-PC, and many other systems too. But my system, where I'm typing right now, still consists of an 8813 with a hard disk. I recommend the combination to anyone. And for anyone interested in "trying before buying," I'll make this open offer: Visit PolyLetter's office in Atlanta and test drive our hard disk. You'll love the performance. To coin a phrase: "It is awesome!"

SOFTWARE FROM ABSTRACT SYSTEMS, ETC.

FileSort.GO reads disk directories and subdirectories, and makes a cross-reference list from file names to disk names. The output list is alphabetized by file name, in dictionary order (lower and upper case names combining properly). Up to 669 file names can be handled, depending on your Top of RAM. Price: \$25. Purchasers of **FileSort.BS** are entitled to a discount.

print.GO will print a file, in "background" mode. This allows you to use your computer normally while the file is printing. **print.GO** loads itself into high RAM, taking less space than the "spooler" programs which use large amounts of RAM. You can immediately use your system again, regardless of the size of the file you are printing. Printing may be aborted at any time. When finished, **print.GO** restores the original value of MEMTOP. Price: \$35.

Order any of these programs from Ralph Kenyon, Abstract Systems Etc., RFD Lower Prospect Hill, Chester MA 01011, (413) 354-7875. You can write to Ralph for a complete catalog of his software products.

FOR SALE: 8813 with 48K, 3 SSSD 5" drives, keyboard, monitor, LA36 Decwriter printer (dot matrix). Dave Dudley, (404) 325-5816, nights.

FOR SALE: 8813 with Olivetti printer, data entry program, payroll program, and financial statement program. Will take best offer. Greg Heinrich, (714) 731-7171.

FOR SALE: 8813, 3 drives, keyboard, \$1695. New (never been used) 88/DS 5" hard disk with new Exec and ROMs, with WordMaster, Varilist, customized mailing list, and Confidence disks, \$3995. TI810 RO printer with RS232 cable, new, \$1625. 8810, single 5" disk, \$1395. 88/MS dual 8" disks, \$2295. Diablo 1345A printer with acoustic cover, \$795. Soroc CRT, \$155. Hitachi video monitor, \$155. Procedural manuals and about 50 disks with various manuals. Will sell components separately, or as a package for a lower cost. Total separate component cost \$14,105 - package price, \$12,995 - savings \$1100. Marlene Zoratti, 1720 Fourteenth Street, Boulder CO 80302, (303) 443-3134.

DISK-OF-THE-MONTH

At last it has returned! Our thanks to Art Norton and Don Barrett, who contributed programs for this month's Disk. And please keep those programs coming in... we need them for future Disks.

DATA-ENTRY.BS is one of a set of programs written by Art Norton. He calls the system a "poor man's database manager." It's very well done, and comes with examples and extensive documentation. This would be a fine system for any record-keeping tasks you have been planning to put on your Poly.

BASES.GO was written by Don Barrett. It will accept an input in hex, decimal, ASCII, octal, or split-octal, and display the equivalent values in all other bases. It's much handier than using a table of hex numbers, and more complete too.

SMIFFALL.GO is a utility to check the surface of a disk for defects. You already know about the Exec command, "Sniff", which reads a disk and reports errors. **SMIFFALL** will read every sector, even ones you haven't used yet, and report errors.

SCAN.GO was written by PolyLetter in response to many requests. The original idea was brought up several years ago by Frank Stearns. **SCAN** will look for a character string on a disk. If it finds the string, it will tell you which file the string is located in. Then **SCAN** will display three sectors of the disk, including the sector containing the string.

The Disk still sells for \$15 in 5" SSSD format, or \$20 in 8" SSDD. Order directly from PolyLetter, 1437 Sugarwood Lane, Norcross GA 30093.

1982 INCOME TAX PROGRAM

The PolyCom Associates 1982 Tax Return program is complete, and ready for shipment. This newly revised program includes the long form 1040, and schedules A, B, C, G, and W. The package also includes extensive instructions and examples, in a 23-page manual. Output can be printed directly on IRS forms. Price: \$75 for individuals, \$150 if you prepare tax returns for a living. Order directly from Charles A. Thompson, 2909 Rosedale Avenue, Dallas TX 75205.

POLY - TALK

This column lists questions from you, the readers. If you can help, please write to the address listed, or to PolyLetter.

I would like to make contact with others in my line of work, Real Estate Loan Brokerage and Investment, and see what they have developed in the way of software. It is not possible to purchase canned programs for the Poly for my operation. Jim Trahan, OSO Investments, 130 West Palm Drive, Oxnard CA 93032, (805) 487-2774.

I am looking for a program I once saw on the Poly. It was called CALORIE or DIET or something similar. The program was in BASIC, and allowed you to input your activities and your desired weight-loss schedule, and it would tell you how long it would take to lose the pounds. The program was originally on cassette. Mark Hammarquist, PO Box 7018, Canyon Lake CA 92380.

BUGS!

Ralph Kenyon has found another bug in BASIC C03. The ASIN (arcsine) of -1 should be $-\pi/2$, or -1.5707963. Instead, it returns $+\pi/2$. But $\text{ASIN}(-.999999) = -1.5703491$ as it should.

From an unknown source: another C03 BASIC bug. Using ON ERROR GOTO line # with an undefined line number, will hang BASIC! Presumably, this happens because while executing the ON ERROR, BASIC detects the error of the undefined line number, then tries to execute the ON ERROR again, and so on. C01L BASIC didn't have this problem.

Does anyone know of a program that prints large letters, in varying sizes? Richard Wagner, 5416 Gaston Avenue, Dallas TX 75214, (214) 823-0292. (Sam Dimicelli is also looking for a program of this type.)

A "COOK'S TOUR" OF THE SHUGART SA-400 MINI-DISK DRIVE (PART 2)

by Frank Stearns
Frank Stearns Associates
14305 NE 13th St
Vancouver, WA 98664

LAST ISSUE -- Major points of operating theory and hardware were covered including the data-recording method, sectoring, load button, and motor speed.

INFORMAL MAINTENANCE

This section is for the person that knows something about general hardware design, and has the tools and patience to service his or her own hardware. If you're uncomfortable with the thought of "hardware maintenance in the garage or basement", don't read on. Have a qualified service organization handle your service needs. If you don't know of one nearby, contact PolyMorphic or Shugart for recommendations.

BE SURE SYSTEM POWER IS OFF BEFORE REMOVING OR INSTALLING DRIVES, OR BEFORE MAKING OR BREAKING ANY CONNECTIONS.

HELPFUL BOOKS -- If you are anxious to know more about the SA-400, there are a series of manuals from Shugart that will tell you everything you ever wanted to know about the drive. They are: The SA-400 OEM Manual and The SA-400 Service Manual, which includes a complete maintenance section. If you plead your case and catch Shugart Technical Support on a good day, you may be able to get these manuals from Shugart no charge.

REPLACING THE HEAD LOAD BUTTON -- This may be the most "major" repair ever done to your drive. Ask your dealer or write to Shugart's Technical Support Department for replacements (address below). If you ask nicely, they'll send you some free. (Make sure you talk to Technical Support, not Parts. The tech people are much more sympathetic.) If you've caught them on a bad day and they talk about a \$100 minimum order, then ask for the

nearest dealer or regional Shugart sales office. You may then have to pay the outrageous sum of \$2 to \$3 each.

Once the drive has been completely removed from Poly, you'll need to remove the logic board to get to the button. That's easy; just don't forget to remove the head cable connector from the PC board! And be careful -- those head wires are delicate. Removal of the old button takes a slight squeeze and downward pressure from a needle nose pliers. The new button will snap right in.

There may be a slight performance variation with the new button. Run the Confidence disks. If you are getting a high incidence of soft errors, rotate the button (clockwise or counterclockwise) 30 to 40 degrees and try again. Keep rotating until you have come full circle or are no longer registering soft errors. If you're very careful, the drive can remain physically outside of Poly and the drive's circuit board allowed to hang free during this adjustment. (If you do, be sure to run a ground wire from the frame of the drive to the Poly chassis. If you don't you will get some very odd behavior from the system. Note that it is not necessary to have all the drives connected to the ribbon cable or power supply.) If you're still getting quite a few soft errors and have checked to be sure there is no gross button seating error, suspect drive alignment. Time to find the local drive alignment shop. (Ultimately, you may have to call Shugart for a recommendation.) You can also try cleaning the head (see CLEANING).

SPEED ADJUSTMENT -- In order to keep your drives "dead center" in the speed window, an adjustment may become necessary as the drive ages. The servo circuit in the SA-400 is not the most age-stable. At the rear of the drive is a small, oblong PC board that piggy-backs on the outside of the drive frame. This is the motor drive circuit, and at its top is a multi-turn pot. This is the speed adjustment. Each drive should have a strobe disk pasted on the disk rotation pulley. With the drive turning a disk and the head loaded (front-panel LED lit), and a fluorescent lamp shining on the strobe disk, adjust the pot so that the 60 Hz strobe marks "stand still". Optionally, a frequency counter may be used (refer to the SA-400 maintenance manual). If you need a program to load the head and continually spin the disk, see the disk offer in the "HEAD ALIGNMENT" section below.

CLEANING, HEAD -- Clean the head only if there is visible oxide buildup. Use denatured alcohol (not rubbing), and a delicate touch with a cotton swab. Never let the arm with the button snap back against the head. Don't worry about demagnetizing, the drive does that automatically at the end of each sector-write.

CLEANING, GENERAL -- As time goes by, a lot of dust can build up in and around the drive. Remember, the 8813 fans are pulling a lot of air through those drives. Periodically, say once every three to six months, this dust build-up should be removed. You can use a combination of soft-haired artist brushes and a dark-room negative brush (a brush with squeeze-bulb that can generate short blasts of air). Avoid using your own lung power, there tends to be a lot of moisture in that air.

Recently, one of my drives had a buildup of an unknown gummy substance on the head-carriage guide rods. None of the other drives have ever shown this problem, so to this day it remains a mystery. What was not a mystery was that the head carriage could not move properly. With great care, I disassembled the rod and carriage assembly and cleaned the guide rods with denatured alcohol, which immediately dissolved the gum (and the problem). If you have a similar problem, removing and reinstalling the rods should change no alignments if you have been careful. You can do so even if the Shugart manuals are not available. But only attempt repairs like this if you've had some experience in performing "blind maintenance".

ALIGNMENT -- This one requires an alignment diskette, oscilloscope, and drive exerciser -- about \$3000 worth of hardware. If you're adventurous, you don't need any of it. What you do need is the SA-400 maintenance manual so that you can understand SA-400 alignment concepts; an alignment-reference disk such as the Poly-recorded confidence disk; and a program I have written called ALIGN.GO. (Send me a blank disk and eighty cents in

return postage, and ALIGN is yours no charge.) Alignments should only be necessary if you're consistently having trouble reading all the confidence disks, or if a drive is having trouble reading disks made by two or more outside Polys or another drive on your system. A radial alignment (see the manual) is very rare, and may never have to be done in the entire five-year life of the drive. Most alignments concern correct placement of the track-zero micro-switch and index timing.

LUBRICATION -- None! Don't! Even the most innocent amounts of lubricants can cause problems later. You may, however, have a problem that I found most annoying -- a squealing cam. This can be solved two ways: First (and this is the preferred method), take a medium hardness graphite pencil and gently run the point through the cam groove (method courtesy Mark Maclin at Poly). Second (and do this only if method #1 has failed repeatedly): If you are EXTREMELY careful, you can direct a split-second burst of spray lubricant into the groove near the cam-follower pin. WD-40 is acceptable, but be sure that it does NOT get on any other surface than the cam disk. The best application technique is to dampen a cotton swab with a lubricant such as WD-40 and pat the cam groove with it. The lubricant will be absorbed immediately, do NOT keep "pouring it on".

WARNING: Do NOT use oil -- period.

WARNING: too much lubricant of any kind may cause the cam follower to slide out of the groove during operation, or get on other surfaces that could contaminate the disk.

PREVENTIVE MAINTENANCE -- here's a quote from the SA-400 maintenance manual: "Preventive maintenance is not required on the SA-400 minifloppy under normal usage." They mean that, and it's true. Don't invite trouble.

GENERAL LOOSE TOLERANCE COMMENTS

The SA-400 is one of the most forgiving pieces of consumer computer equipment ever built. It requires almost no attention, will last a lot longer than its "five year" rated life. While the data transfer rate is horribly slow by today's standards, the SA-400 is still one of the most reliable data recorders ever built. One can get away with "bit murder" when it comes to alignment, recording level, and speed.

But there are a few things to keep in mind. First, the drive does not like diskettes that do not match the current operating environment. If you get a cold disk out of the mailbox this winter, let it "thaw out" before using it. The drive does not appreciate sharp blows. Treat the Poly with care. Don't let a drive run without a frame ground. This will be taken of when the drive is mounted in the chassis and secured with screws, but be sure to add a ground if the drive is removed from Poly for service.

When all else fails:

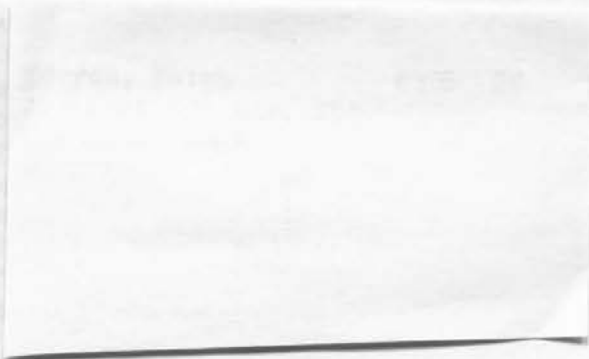
Shugart Associates
 Technical Support Department
 435 Oakmead Parkway
 Sunnyvale, CA 94086
 408/733-0100

A brief reader survey: what brand of diskettes have given you the best service? How many diskettes have you purchased (by manufacturer) in the past two years? Best price and source? Send your answers, comments, horror stories, or plaudits. I'll do a follow-up article based on your response.

(Editor's note: I'll be the first to respond to Frank's question. PolyLetter has used Scotch/3M and BASF disks with good results. The 3M ones seem to be a little noisier while they rotate in their sleeves, but this hasn't affected performance. -BB)

PolyLetter

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PolyLetter



May/June 1983

REPORTS ON EXEC/96

After a false start, a "factory recall," and some initial mixed reactions from the field, Exec/96 finally seems to be catching on.

As we reported earlier, the new release of the operating system is Exec/96, now available for \$150. This includes the latest versions of BASIC, Edit, Asmb, WordMaster II, and everything else Poly ships with new 8813s. The price was originally \$75, and some who ordered it COD got a rude shock when the postman asked for \$150.

At this price, Exec/96 does not come with complete manuals. Poly had said that an "addendum" would be sent with Exec/96, explaining all the latest changes, and detailing all of the operating system revisions since Exec/90. We eagerly awaited this document, but were disappointed when only six pages arrived. The pages are titled "Exec/96 Addendum," but many of the changes they mention were included in earlier releases. Also included was information on wiring the printer-card header for use with Printer/40. But, Exec/96 comes with Printer/43! Fortunately, the information still applies.

But looking on the bright side, a few exciting changes have been made to Exec/96. The Editor seems to have gotten most of the upgrading. It has a new "sideways scrolling" feature which lets you create lines longer than 64 characters. You can create large tables or charts, viewing a 64-character-wide piece at a time, and scroll sideways to see the rest of the line. This is similar to the way the Osborne I computer uses a 52-character screen to display 80-character CP/M program displays.

The Editor also has three new cursor modes, which "float" the cursor to the center of the screen and let the text move

(Continued on page 2)

NEWS FROM POLYMORPHIC

By the time you read this, Poly should have formally announced the new System 186. The announcement was to be made at a press conference at NCC, the National Computer Conference, in Anaheim, California the week of May 16.

The announcement was to be made jointly by PolyMorphic Systems and by Intel, inventors of the 8080 processor in the System 8813, and the 80186 processor in the System 186. As of this writing the true name of the new system had not been finalized, but it appears to be known (for now, at least) as the System 186.

PolyLetter will publish the text of the PolyMorphic/Intel announcement in our next issue. In the meantime, though, let's recap the features of the System 186, and fill in a few details.

The System 186 will be almost completely on one S-100 card. This card will contain the 80186 CPU, which is software-compatible with the IBM-PC and its many clones. It will contain 256K of user RAM, and is designed to upgrade to 1 megabyte of user RAM as the newer, high-density RAM chips become available. It will contain a high-resolution graphics screen with 128K of screen memory, for a 16-color display capable of 80 x 24 characters and color graphics.

The System 186 will be available, initially at least, with two disk formats. You will be able to have a disk controller that reads IBM-PC disks, or one that reads your current Poly disk formats. (Or, presumably, both.) Poly is looking into other disk formats, such as the 3.5" drives, but has made no commitment to these formats yet. The hard disks will also be available.

Shipments of the System 186 will begin in late summer, perhaps by July. As we've mentioned before, it will be possible to

(Continued on page 2)

(EXEC/96 - from page 1)

around the cursor. Some large mainframe text editors work this way. (The old cursor mode is still the default.)

The Editor's block and search functions have been greatly speeded up. There is also a new block-move function, sort of a copy-and-delete in one operation.

Setup.GO has a new feature which allows you to add a second printer-card to the system and drive one of two printers over the serial port. This has always been possible; Ralph Kenyon offers a version of Setup which supports this. But now you can append a "-0" to the baud rate in Setup to specify the alternate printer-card. To install a second printer-card, you will also need the Printer Two Upgrade Kit, available from PolyMorphic.

The Exec/96 Addendum also explains many features which have been around since Exec/90 or /93. These include the BASIC features FILE:x,DEL and the PEEK/POKE locations from 0 to 9; the BASIC function CALL (0,"string") which passes "string" as a command to Exec; and CALL(1) and CALL(2) which call Dio and Devlock. These are especially useful on the TwinSystem, since direct calls to the ROMs are not a good idea.

Russ Nobbs was one of the first PolyLetter subscribers to purchase Exec/96 and report his experiences. He was discouraged by the small amount of documentation, and was also hit with the \$150 price tag after being quoted \$75. After Russ discussed the matter with Poly, they agreed to give him a credit. Poly also has agreed to upgrade the Exec/96 documentation, and send Russ a copy. We hope other Exec/96 buyers will also receive a copy when it becomes available.

Russ also commented: "In all fairness to Poly I have to tell you that I like Exec/96, and find the sideways scroll in the Editor a great improvement. I produce catalog pages with tabbed columns. With the sideways scroll I can finally line them up before printing a sample copy. The speed of copies, block moves, and deletes is great! Instantaneous in most cases. So far I've found no new bugs in Edit 4.1 and I think the improvements make it almost worth the price."

(NEWS - from page 1)

buy a "system card" from the System 186, and upgrade your current 8813 to have these new features. The cost of this upgrade is now estimated at \$2500. This includes the system card, concurrent CP/M-86 operating system, documentation, and diagnostics. The upgrade kit should be available about a month after shipments begin. When upgrading, you may want to add the new disk controller and be able to read IBM-PC disks. But you could also stay with your current disk format for a while, to lower the cost.

Adding the 186 card will give you two modes of operation: you can use the card as a "smart video board," giving your 8813 the long-awaited 80 x 24 screen; or you can turn the 186 into the boss of your system and run concurrent CP/M-86, just like the System 186. These two modes should help you transport your software and data to the new CP/M-86 operating system easily.

Introducing the new System 186 hardware is, of course, only half the battle of building a new system. What about software? Poly is now meeting with several major software vendors to discuss the System 186 features, and ensure that a great deal of software will run on the System 186. Using CP/M-86 as the operating system will make this job much easier. It should be possible to run popular packages like Wordstar, Visicalc, and dBase II on the System 186.

It's not completely clear at this point, but Poly says the new system will support multiple users. The TwinSystem is a method whereby two users share the same CPU. But on the System 186, each user would have his own CPU and only the external devices (like disks) would be shared. This is accomplished by adding extra "system cards," one for each user. While this approach is not inexpensive, it is cheaper than buying several complete computers.

What about the future of the 8813 and 8810? The System 186 family of cards will eventually include a Z80 CPU card. This might replace the current CPU and improve performance. Poly says the 8080 CPU will eventually be phased out. But we should remember that PolyMorphic Systems is still shipping a lot of Poly-88 computers, which use the same cards as the 8813. This should help ensure a supply of parts for our 8813s for some time to come.

NEW PRODUCTS FROM BDMI

Business Data Management Inc., of Sandpoint Idaho, has released two new software packages: Accounts Receivable, and Vari-List (a list keeping system). For more information on these packages, contact Jerry White at BDMI, 212 North First Avenue, #206, Sandpoint ID 83864, (208) 263-8145.

The AR package allows customer accounts to be established for payment by invoice or statement. The cash receipt entry screen allows receipts to be applied to a specific invoice, or to a balance forward on a first-in, first-out basis. Statements can be printed immediately following delivery, and follow-up statements are generated each month for unpaid balances. Printed comments, remittance advice, finance charges, and aging information can all be included on the printed statement. The system handles credit limits for any or all customers.

Sales analyses can be generated by customer, customer type, salesman, and region. The system can also generate reports which include: customer master list (alphabetized), sales journal, cash receipts journal, accounts receivable aged trial balance, finance charges report, monthly sales summaries, commissions, and AR distribution to the general ledger report.

The AR system requires at least SSSD-MS disk capacity, a 132-column printer, and 56K RAM. Price: \$1000.

Vari-List is a list-keeping software system which can be easily used by inexperienced operators. The menu format with many sub-menu helps the user gain confidence in his ability to use all the capabilities of the system. Up to 12 fields may be defined, as well as the sizes of each field, for items such as dates, phone numbers, and names. Sub-files can be created with fields from one or more Vari-Lists. Vari-List files can be created from existing Poly mail-lists. The program supports up to 65536 records, limited only by disk space.

Some sample applications for Vari-List would be: mass mailings with follow-ups, client lists, prospect lists, simple inventory lists, appointment calendars,

The purpose of PolyLetter is to create a forum of ideas for users of Poly equipment. One year (six issues) subscription \$15 US and Canada, \$20 overseas. Back issues are available. Editor: Bob Bybee
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POLY SERVICE IN OHIO

Governmental System Incorporated has recently announced the creation of an Ohio-based service center for Poly equipment. They offer remedial and preventative maintenance, and maintenance contracts. Service is performed at the customer's location. GSI is also sponsor of the Ohio Poly Users Group. For more information, contact GSI at 665 East Dublin-Granville Road, Columbus OH 43299.

PolyMorphic is also discussing service arrangements with some nationwide service organizations. Perhaps local service for our Polys is forthcoming for all of us.

tickler files, and form letters which allow insertion of data from the Vari-List records.

Vari-List records never need to be sorted. This is one of many features which contribute to speed and effectiveness. Input checking is also performed to help verify the data.

Vari-List will run on any Poly 8813 or 8810 with 56K of RAM. It will work with any printers and disk formats supported by PolyMorphic Systems. Price: \$350.

CP/M CORNER

Last issue we discussed the CP/M built-in commands, and compared them to their Poly equivalents. Now, let's look at the transient commands CP/M usually comes with. Transient commands, so-called because they don't stay in memory like the operating system, are stored with a ".COM" extension. They are executable programs, like .GO files on the Poly.

STAT gives statistics on files and disks, and provides a few miscellaneous functions. It can list the free space available on a disk. It can list the sizes of disk files. It can set a file to "read-only" status, something Poly has no provision for doing. It can also set an entire disk to be temporarily "read-only".

STAT can set a file to be a DIR type or a SYS type file; this is similar to non-System and System files on a Poly. DIR files are listed by the DIR command, and SYS files are not. Don't confuse DIR type files with the DIR command!

STAT can perform some device assignments as well. If your system has several peripherals, such as different types of printers, STAT can connect one of these as the current printer device. There is no CP/M command analogous to the Poly "Printer" commands, and no way to "Setup" a printer according to your needs. The lines per page, margins, and other printer parameters, are not set up by CP/M. These things would have to be handled in your program, or "wired-in" to CP/M by the dealer who sold you the system. CP/M does have a "Printer LOG" command of sorts: pressing Ctrl-P will connect the printer to the screen, so that subsequent output goes to both. Ctrl-P again turns this feature off.

Finally, STAT can display the current user number, which was assigned by the USER command described above.

PIP is the CP/M "Peripheral Interchange Program." It can copy files on a disk, copy from one disk to another, and copy a file to a device (to print a file, for example). PIP has many options which allow you to alter the file as it is transferred. For example, you can add line numbers, insert or delete form-feeds, or convert

upper case characters to lower. So, PIP performs some of the functions of Poly's IMAGE, COPY, and PRINT commands, with some extra bells and whistles. If you are beginning to think that STAT and PIP are the catch-all commands of CP/M, I must agree! Most of the PIP and STAT functions are built-in commands in Poly.

ED is the CP/M editor. Designed for a teletype or similar terminal, it prints a line at a time, and requests commands to be performed on that line. There are commands to search, substitute, print, and all the usual text editing functions you would need. But after using the Poly editor, ED reminds you of the days when people carved text on stone tablets. Incidentally, the editor supplied with the IBM-PC uses the same philosophy as ED, and is just as evil.

DUMP displays the contents of a file, in hexadecimal and ASCII form. Its output is similar to SZAP, or the Poly DUMP command.

SUBMIT provides a CP/M facility similar to Poly's command files. The command

A>SUBMIT FILENAME

causes CP/M to read commands from FILENAME.SUB and execute them. But SUBMIT has an ability called "parameter substitution" which Poly does not have. For example, you could have a submit-file called PATTERN.SUB which contained the commands

```
TYPE $1
REN $2=$1
```

Then, giving the command

A>SUBMIT PATTERN FILEA FILEB

Would cause CP/M to execute these commands:

```
A>TYPE FILEA
A>REN FILEB=FILEA
```

The parameters, or command line arguments which follow the name of the pattern file, are plugged into the pattern to replace the symbols \$1, \$2, etc.

In addition to the commands above, CP/M systems usually come equipped with

utilities for the assembly language programmer and systems programmer. These include ASM, the assembler; DDT, the debugging utility for assembly programmers; MOVCPM, which relocates CP/M to run in a different amount of memory; and SYSGEN, which writes the "boot tracks" to a new disk. The first 2 or 3 tracks of a CP/M diskette are reserved for information that is used to boot the system.

Some Poly commands have no CP/M equivalent. Here is a partial list, along with explanations (or regrets):

ENABLE and **DISABLE** have no CP/M equivalent. The concept of System files is partly handled by the STAT command, which can assign the "SYS" status to make a file invisible.

INIT is not provided by CP/M. The function of initializing a new disk is necessary, though, and must be provided by the CP/M vendor in the form of a program, which might be named INIT or FORMAT.

IMAGE is not available. PIP can copy files, and SYSGEN can copy the boot tracks from a disk, but no command is available for copying the whole disk at once. Incidentally, all of Poly's disk I/O routines provide write-checking, or verification of the data written to disk. CP/M may, or may not provide this function, depending on the particular CP/M system. Since a verification after copying files is important, PIP has a [V] option which verifies each file after writing it.

DNAME is not available, since CP/M disks do not have names.

DLIST has no equivalent. After a CP/M file is erased, it is gone for good as far as the operating system is concerned. There are a few utilities available from software houses which will list the recently deleted files on a disk, but if a new file has been created since the last deletion, your deleted file may be gone.

START, **REENTER**, and **CONTINUE** are not provided. The only way to run a program is to type its name. An interrupted program cannot usually be continued. See the discussion of Ctrl-C and Ctrl-Y, below.

PACK and **ZPACK** are not needed, since CP/M disks never have to be packed.

NEW PRODUCTS FROM ABSTRACT SYSTEMS

Format.GO is a modified version of the Poly formatter. This version includes the new command {chr n}, which sends any character to the printer. Use it to activate special features of your printer that the formatter doesn't know how to use. \$25.00 in 5" SSSD format, \$26.50 in 8".

FileSort.GO version 3.0 is a utility which reads disk directories and subdirectories, and makes an alphabetical cross-reference list of all files. The list shows each file's location by disk name and pathname. Up to 4633 filenames can be handled, depending on memory and filename length. \$45 includes shipping. Purchasers of the original FileSort.BS are entitled to a 40% discount.

prism.GO is a program to manipulate the features of the IDS Prism printers. It will select character spacing, justification, graphics, colors, and correspondence/draft character set. \$20 for 5" SSSD, \$21.50 for 8".

Order from Ralph Kenyon, Abstract Systems Etc., RFD Lower Prospect Hill, Chester MA 01011, (413) 354-7875.

Sniff would be nice on any disk system. CP/M does not have this command.

PRINT can be done with the PIP command. There is no **PAGE** command in CP/M.

In the Poly, typing Ctrl-Y usually returns you to the operating system. Most programs can be continued after a Ctrl-Y. Under CP/M, the interrupt character is Ctrl-C. Typing this character sometimes returns you to the operating system, depending on the program. If a program is not producing any screen output, it may not be scanning the keyboard for Ctrl-C, and thus may not be interruptable. An interrupted CP/M program cannot usually be continued.

The information in this article was taken from my recent exposure to CP/M, which is admittedly limited. Anyone with more CP/M experience is invited to write in, and expand on the topic. (CP/M is a trademark of Digital Research.)

PolyServe

Mainstream products for the PolyMorphic Systems microcomputer

14305 NE 13th St. Vancouver, Washington 98664

PolyServe is a new brokerage house, founded to provide software and services to the PolyMorphic user community. To reach a broad marketplace of Poly users, PolyServe will be placing ads and press releases in national publications. Users who respond to the ads will receive a brochure from each PolyServe member. Members will provide brochures and pay a nominal fee to share the advertising expenses.

If you currently offer professional-quality software or services to the Poly user, you need to join **PolyServe!** For more information, send a description of your products to: PolyServe, 14305 NE 13th Street, Vancouver WA 98664, or call (206) 892-3970. PolyServe is not affiliated with PolyMorphic Systems.

POLY-ADS

Ads are published as a free service to PolyLetter subscribers.

FOR SALE: 8813 with 56K, two 5" drives, keyboard, monitor, printer port. With WordMaster II, Confidence, MailList, SPELL, FORTH, games. \$1500 plus shipping. Scott Whitney, 401 Lambert Road, Carpinteria CA 93013, (805) 969-2901.

FOR SALE: 10 megabyte Priam hard disk for Poly. \$2395. Poly video board, \$95. Charles Trayser, 1844 Washington Blvd., Fremont CA 94538, (415) 651-0100.

F.A.I.R. can give you big \$\$\$! Get a deduction from your tax return by donating used Poly equipment, 8813s, 8810s, keyboards, monitors, enclosures, modems, or any kind of Poly-compatible hardware or software. Equipment will be given to severely disabled non-vocal persons or used by F.A.I.R. in its operation of Intermediate Care Facilities for developmentally disabled children and young adults. Dr. W. Posnett Lynas, Financial Assistance for Independent Rehabilitation, PO Box 5603, Huntington Beach CA 92615, (714) 848-1122.

88/MS READS STANDARD CP/M DISKS!

As we reported last PolyLetter, Poly has developed a way to read 8" CP/M disks on the 88/MS. This relieves one of the most important compatibility problems between Poly and the rest of the microcomputer world!

The method does not require any hardware changes to the 88/MS. It is purely a software trick. It can only read, not write, standard IBM-format SSSD soft-sectored 8" disks. Ken Gudis says "We couldn't fool the drives enough to let us write on them in this format." But now, any Poly with CP/M and an MS will be able to use nearly any CP/M program on the market! The IBM-format 8" disk is the most common CP/M format, and is the only format shipped by the creators of CP/M, Digital Research.

The only remaining problem with any CP/M program would be if that program relied on an 80 x 24 screen. This problem is addressed by the new System 186 (see cover story). But several independent workers have added external terminals to their 8813s, via a serial port. One of these is Dan DeForest, 809 Villa Part Court, Fort Wayne IN 46808.

The price of the software to read CP/M disks on the 88/MS is expected to be between \$100-150. The package is now being beta-site tested by Ralph Kenyon, and should be available from PolyMorphic shortly. Contact Poly for details and exact pricing.

A VIEW FROM COMDEX

The National Computer Conference (NCC) is probably the biggest trade show for microcomputers. I had the opportunity to visit a similar (but smaller) show, COMDEX, which was held in Atlanta a few weeks ago. If I came away from COMDEX with one overriding thought, it is this: the world is full of IBM-PC lookalike computers. And probably the last thing the computer world needs right now is another one.

Poly's new System 186 will be IBM-PC compatible. But I can only hope that its features are head and shoulders above those of all the other IBM-PC hopefuls. Otherwise, Poly will remain what it has been for the past several years: unknown.

Bob Bybee

BUGNOTES

Ralph Kenyon and Abstract Systems continue to publish BugNotes concerning the Poly operating system. Here is his latest batch.

BASIC C03 SIN and COS functions do not return results accurate to the number of DIGITS specified. SIN(PI/2) should be exactly 1, but returns .99999986 instead. I suggest setting DIGITS 5 higher than needed for your application.

Edit 3.3 (6/10/81) has a bug in the read routine. When the number of characters in the file is an exact multiple of 256, Edit will warn you that there is more text in your file, and that you should use Ctrl-A to read some of it in. This causes no serious problems, but could lead you to wonder if there's something wrong when you're editing a small file.

Exec/95 Gfid.OV has a bug in the Enter function. If the file to be entered already exists, Gfid should return an 0600 error. Instead, it may return error 0505: "I can't write - the disk is full."

Exec/95 Gfid.OV has a bug in processing of the default path (#). # can be defined as # (itself) without causing an error. This can cause the system to lock up with Ctrl-Y blocked. If the system is ENabled, you can recover by pressing Ctrl-Z, then SPJ403G. Otherwise, you will have to re-boot.

Edit 3.3 (6/10/81) has a bug in the exit routine. ESC Ctrl-O RETURN closes the output file; but if the file has been closed and there is more data to be read in, and that data will not all fit in memory, Edit will blow up when you hit ESC Ctrl-E (the normal way to exit). To avoid this, use ESC CTRL-X when no output file is desired; don't use ESC Ctrl-O and no output filename.

FTP/04 through FTP/06 have a bug in the receive-file routine. If the file already exists, FTP reports an error 0258 and aborts the receive process. The correct error should be 0600: "That file already exists." Since 600 decimal is 0258 hex, it's probable that this was a typo in the FTP source file: someone typed 0600 instead of 0600H.

Sio.PS (for Printer/37 through /42) has a design problem in the input routine. If

MORE ON DISKETTES

Bob Tripi wrote to report his experience with different brands of diskettes: "I use DSDD 96 TPI drives at work, and have had bad luck with Scotch diskettes. They don't seem to initialize very well. They also use some kind of lubricant and it makes the disk sound funny when it rotates. But once you get them initialized, they do OK.

"I use Verbatim and Memorex with good results. Dysan media also seems to work well.

"From an engineering point of view, different media seems to work differently depending on the condition and alignment of the drive. I have the pleasure (?) of doing alignments on 8" drives at work, and Frank Stearns is right: the less you mess with diskette drives, the better."

Bob also ran into someone with some Poly items for sale, including a Priam 150 megabyte hard disk! This was advertised in the April BYTE magazine, so may be gone by now. But if you're interested, contact Jim Amick, 3009 Collin Court, Plano TX 75075, (214) 596-3788. Bob didn't say whether this drive was running on a Poly, so there may be some interface work involved. The asking price was \$5K.

HD FEEDBACK

From Bob Johnson, Wadena MN: "I just added an HD/18 to my system, and am also using Jerry White's software (Business Data Management, Sandpoint ID). I am very pleased with the results."

the input buffer is full, received characters are thrown away. Sio.PS has no provision for dropping DTR or RTS to stop the incoming data. Programs which read from the printer device at high baud rates may lose characters.

(Editor's note: We thank Ralph for pointing out these problems to PolyMorphic, and for sharing this information with us. But we should point out the Law of Cybernetic Entomology: "There's always one more bug." And to quote one of my co-workers in the Chromatics software department: "That's not a bug... that's merely something we wish to change.")

After we published our PolyLetter subscriber list recently, several people wrote to express their concern at the small number of Poly users. Many were a little upset that we didn't have a larger base of users. Certainly not all Poly owners subscribe to PolyLetter. So what is the real Poly census? Ralph Kenyon has taken a mathematical approach to the topic, and investigated...

HOW MANY POLYS ARE THERE?

by Ralph E. Kenyon Jr.
Abstract Systems, etc.
RFD Lower Prospect Hill
Chester, MA 01011

"How many Polys are there?" is a good question. Most people I speak with figure that the answer is the same as the answer to another question: "How many Polys have been made?" I agree that the answers to the two questions are related, but as a mathematician, I know that there are definitely two different answers.

To see that the answers are different, suppose we go through a "thought experiment." Let's take a bag of clay and make one marble for each Poly. If we make marbles from the clay and put them in a can, the number of marbles in the can will stand for the number of Polys there are. There is only one problem. What about the Polys that (shudder) get scrapped? If we make a hole in the bottom of the can, then a few marbles can fall out whenever there are marbles in the can. Of course, the more marbles there are in the can, the more will be falling out the hole. That means the number of Polys being scrapped is directly related to how many there are in the world (can).

If this seems clumsy with marbles, take a can with a hole in the bottom and try filling it up with water. You'll really get a feel for the dynamics of the situation. (Now be fair, make the hole big enough!)

Let's see, marbles go into the can when Poly makes Polys, and marbles go out of the can depending upon how many there are in the can. Let N stand for the number of marbles in the can (Polys in the world). Since N changes from time to time, we should mark it in some way, say: $N(t)$.

How fast do the marbles fall out? Well, if we say that there are $N(t)$ Polys,

then some fraction of that number will go away. If the average useful lifetime of a poly is a number of months, say " l ", then the percentage lost in one month is just $1/l$. So, if we have $N(t)$ Polys and we lose $1/l$ of them, the number lost is $N(t)$ times $1/l$ which is $N(t)/l$. Let's call that number lost $L(t)$. Now, since this is a loss, we will need to subtract it. The change in the number of Polys due to scrapping, $L(t)$, is $N(t)/l$.

$$L(t) = N(t)/l$$

For example, if $N(t)$ is 500 and l is 50 then we would lose $500/50$ or 10 Polys, and the new $N(t)$ would be less 10 Polys (490).

But wait! We have to add the number Poly made in order to get the whole picture.

How many Polys did Poly make each month? Here's where a little guesswork comes in handy. We 'know' how many were made in all (about 5000 8813's and 8810's) and we 'know' how many are being made each month (rumored at 2 or 3 systems a month now).

How many Polys did Poly produce each month in order to get a total of 5000 and 2.5 per month now? Now for that guesswork. Let's assume that we can divide the production into two factors, a growth factor $G(t)$ and an anti-growth factor $A(t)$. Now the growth factor seems to get bigger with time, but in a very proportional way, so I'll use t times a constant " a ". But the anti-growth factor gets cumulative with time and overrides the growth factor by a whole lot. Also using some characteristics of complexity, the anti-growth factor seems logically exponential. $EXP(-b*t)$ is our candidate. Production as it changes in time, $P(t)$, can be characterized as $G(t)*A(t)$ or $a*t*EXP(-b*t)$.

$$P(t) = a*t*EXP(-b*t)$$

We can now look again at the number of Polys, $N(t)$. What we know is how the number of Polys, $N(t)$, changed. Let's call that change $C[N(t)]$. The change in the number of Polys goes down depending upon the number there are and goes up depending upon how many Poly made, or:

$$C[N(t)] = -L(t) + P(t)$$

or (substituting)

$$C[N(t)] = -N(t)/l + a*t*EXP(-b*t)$$

This is a first order, non-homogeneous, linear, differential equation. I won't go thru the steps of solving it here, but the solution for $N(t)$ is:

$$N(t) = a*l*((1/(1 - b*l))*EXP(-t/l) + (t - 1/(1 - b*l))*EXP(-b*t))/(1 - b*l)$$

The constants a and b determine the shape of the production curve to yield a total of 5000 produced in 84 months (76 thru 82, or 7 years) and to result in a production of 2.5 per month at the 84th month.

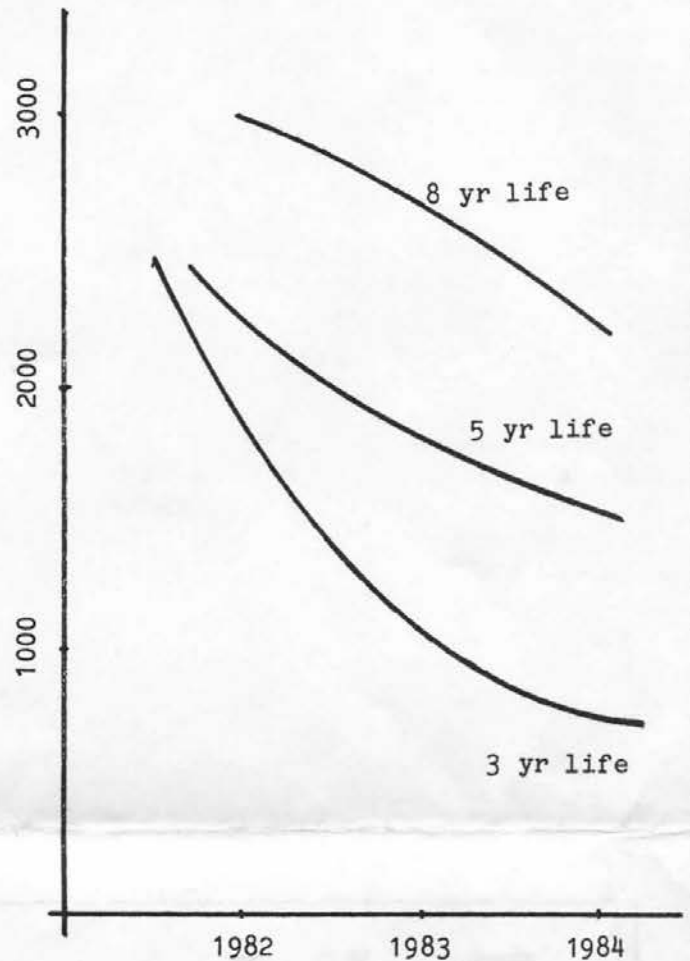
$$a = 35.92, b = .0844741$$

" l " is the useful life of the Poly. Some say 30 months, some say 60 months, some say 120 months. So, the answer(s) to the question, "How many Polys are there?", is (are)...

Well, here's a table of the number of Polys alive and well, depending upon how long you think they last. The columns represent estimates for last year, this year and next year.

Life (yrs)	Number of Polys alive and well		
	as of 1982 (72 m)	1983 (84 m)	1984 (96 m)
2	793	517	329
2.5	1099	775	535
3	1383	1030	755
3.5	1638	1272	973
4	1866	1495	1181
4.5	2068	1698	1377
5	2248	1883	1560
6	2552	2204	1884
8	2999	2691	2393
10	3309	3039	2769

So, you see, the number of Polys alive and well today is quite different from the total number produced. We might tinker with the shape of the production curve or the total number produced (adding the Poly-88 kits and OEM, sales of "orange toasters" might push the total number up to 8000), but the number "alive and well" today is not getting bigger. Even with these assumptions, these figures won't be off by "a whole order of magnitude". The IRS puts computer equipment in the 5 year class life, but the IRS tends to be conservative.



Polys In The Universe
(estimated)

POLY-TALK

This column presents questions from our readers. If you can help, please write to the address listed, or to PolyLetter.

Is there a Visicalc type program for the Poly, other than the one under CP/M? Chuck Gross, 445 Rising Hill Drive, Fairborn OH 45324.

PolyLetter

1437 Sugarwood Lane
Norcross, GA 30093
404/925-2480 (evenings only)



Ralph Bunche

USA
20c

PolyLetter

Issue 83/04



July/August 1983

WHAT'S NEW AT POLYMORPHIC?

From all reports, the HD/18 hard disk is going very well. Several PolyLetter readers have now purchased the HD/18, and the response is completely positive. The HD/18 is reliable and fast. What more could you ask of a disk drive?

Incidentally, there are two ways to talk about a disk's storage capacity: "formatted" and "unformatted." The HD/18 has about 18 megabytes of "unformatted" capacity, which translates to about 15 megabytes of "formatted" (useable) storage. This is not Poly's attempt to be misleading, since many vendors specify unformatted capacity in their literature.

Poly claims that well over a hundred HD/18 units have been shipped. Surprisingly, there have been no problems at all. "We were holding our breath, since most products have a few glitches during their introduction. But so far nothing has come back to haunt us," says Ken Gudis. (100 units sounds a little optimistic, but let's hope it's real. -BB)

Since Poly's efforts are currently geared toward the new system, some other projects have been put on the back burner. This includes the software to read standard soft-sectored CP/M disks on the 88/MS. "This is still an ongoing project," says Ken Gudis, "which we plan to finish when we have time."

By now, some of you may be getting a little tired of hearing that the new system is "coming soon!" It's still coming, but not as soon as we had originally thought. The new system was not announced with pomp and circumstance at NCC, as we had expected. Instead, Poly held a quiet meeting with several writers for large magazines and gave them a "preview" of what the new system will contain. No hard facts were disclosed, and no literature was handed out.

(Continued on page 2)

WHY DOES IT COST SO MUCH?

That's the question PolyLetter hears most often these days. It's becoming very obvious that Poly's prices are higher than other, comparable systems. What are the reasons for this?

My first guess was low sales volume. Since Poly's current products are mainly of interest to people who already own Polys, it seemed to me that this limited marketplace would drive prices up. It costs more, per piece, to build 100 of something than to build 10,000.

"Wrong," I was told by PolyMorphic. "The main reason for the high prices is that the technology is old. We are using components that have been available for seven to ten years. Instead of component prices continuing to go down, they are actually going up in some cases. Poly hasn't increased its system prices in over two years, so we are holding the line while our costs go up.

"The System 8813 is an expensive one to build. It was designed a long time ago, when it was necessary to use a lot of 'real estate' (board space) to build a system. Boards and connectors all add to the cost."

But what about hard disk prices? Anyone who reads Byte magazine sees dozens of ads for "hard disk subsystems - add one to your S100 machine!" In some cases the price is under \$2000; in all cases it's below Poly's HD/18 price of \$3995. Why this discrepancy?

"Don't just look at the hardware cost," Poly says, "look at the **system** cost. Our HD/18 price is actually lower than you would pay to add a hard disk to a system like an Altos or North Star. Companies that just sell disks have to have low prices, since they have nothing else to sell. We sell systems, and we sell a hard disk with full support for our operating system. There's more to it than just the drive."

(WHAT'S NEW - from page 1)

As a result of these meetings, we may see some brief mentions of the new Poly system in the August issues of some magazines. Specifically, look in Byte, Infoworld, Computer Business News, and Microsystems. You're not likely to find any big articles... if anything, it will probably be a few lines in the "rumors" columns of these magazines.

Why the delays now? Poly says there are several reasons. (1) Intel, makers of the 80186 processor chip for the new system, had some problems with that chip. The problems have only recently been resolved. (2) Rumor has it that IBM is also going to announce an 80186-based computer, aimed at small businesses. Poly wants to be sure they can be compatible with this new IBM (which probably will be similar, but not the same as, an IBM-PC). But, says Ken Gudis, "we're not building an IBM-PC lookalike. The reason for our interest in this IBM machine is that we want to be compatible this time... we tried it the other way, and it didn't work. This time we want to go along with the mainstream, only do it a little better than the next guy."

One final encouraging note on the new system: Ken Gudis says Poly now has one system running in their office, with one central hard disk serving many users at the same time. It sounds good.

The purpose of PolyLetter is to create a forum of ideas for users of Poly equipment.
One year (six issues) subscription \$15 US and Canada, \$20 overseas.
Back issues are available.
Editor: Bob Bybee
P o l y L e t t e r
1437 Sugarwood Lane
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PolyLetter is not affiliated with PolyMorphic Systems Inc.

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System _____
Printer _____
Uses _____
Future uses _____

POLYGLOT - NEW USERS GROUP

Ralph Kenyon has started a new Poly users group called PolyGlott. Its purpose is to create a library of public-domain software for the Poly, akin to the CPMUG (CP/M user's group) and North Star user's group libraries.

To make the offerings compatible with 8813s and 8810s alike, PolyGlott's programs will be available on system disks. Ralph plans to assemble a set of programs for each version of the operating system. To begin with, he already has a disk with Exec/4D, BASIC A01, and some games which run under that version.

PolyGlott means "many tongues". This refers to the multitude of languages and operating systems the Poly can speak. Taking a quick survey, we see Exec, CP/M, BASIC, assembly, FORTRAN, all of the languages available under CP/M, and of course, Ralph Kenyon's FORTH and Little-Ada.

For more information, write to Ralph Kenyon, RFD Lower Prospect Hill, Chester MA 01011, (413) 354-7875.

When chatting about the Poly micro, most often one hears the complaint "no software!". That's true, but only to the extent that there is not the wholesale proliferation of "anything and everything" with Poly as there is with, say, CP/M.

POLYSERVE is a newly formed consortium of commercial-level Poly programmers that are offering quality software to Poly owners everywhere. There are an estimated 4,000 to 8,000 systems out there somewhere, and many of them need software.

If YOU need software, give us a call. We can probably steer you to the right vendor. If you have developed commercial-grade software products (documented, fully debugged, etc...) and would like to join POLYSERVE, please send a brief description of your product (sales literature if you have it). We'll put you on the mailing list and explain how the organization functions.

PolyServe 206/892-3970
14305 NE 13th St
Vancouver, WA 98664
Frank Stearns, President

CP/M CORNER

Joe Toman (Naperville IL) has some useful Poly-CP/M hints for us this month. First is a patch that makes DDT work better with a 64-character screen: Run DDT.COM, and change location A17 from an 05 to an 08. Do this by entering SA17, RETURN, 08, RETURN, '.', RETURN, Ctrl-C. Then save the altered DDT by typing "SAVE 19 DDT.COM" and you are done. This will wipe out the old copy of DDT on your disk, so be sure not to use your original CP/M disk for this.

Joe has written a program he calls "FF" (form feed) which acts like Poly's "PAGE" command. You can enter it via DDT or use the assembler. It goes like this:

```
MVI    C,05H
MVI    E,0CH
JMP    05H
```

This puts a 5 into the C register to select the "list output" function (which directs a character to the printer). Then it puts a hex 0C, the form-feed character, into the E register. This is the character to be sent to the printer. Finally it jumps to CP/M's BIOS to perform the function.

Here are some more of Joe's comments on Poly CP/M:

"There is no way to create a full memory CP/M system. Poly did not see fit to provide MOVCPM nor SYSGEN.

Poly did not send me any of the CP/M manuals. In comparison to the usual high quality of Poly documentation, the information supplied was minimal.

One additional problem with Poly-CP/M is that the DELETE key repeats the deleted character instead of erasing it. Using Ctrl-H (the BACK SPACE key) will do a true delete. I tried to patch BIOS.S88 to fix this, but didn't have much luck.

CP/M likes to have a line feed after each RETURN. Therefore if you use the Poly Editor as I do, you must put in line feeds after each RETURN. The Poly macro to do this is:

```
ESC:^F Return ^[ Linefeed ESC
```

(Note: don't type any spaces in the command line.)

COLLEGE EDUCATION

A young man came home from college and his father asked him, "What did you learn?"

His son replied, "We learned some math, like algebra."

The father said, "Show me what you've learned. Say something in algebra."

The son shrugged and said, "Pi R square."

The father laughed. "Aw, you haven't learned anything. Pie are round. Cornbread are square!"

---contributed by Bob Schwartz, after reading last issue's article by Ralph Kenyon. (Don't feel bad, Bob; I never did understand differential equations either!)

CP/M also looks for an EOF at the end of a file, so each file should have at least 1 ^Z at the end.

When you have finished with PCOPY to copy a Poly file to CP/M you end up with a null file name on the CP/M disk. You must do a rename in the following way assuming the file you have copied is D.GO:

```
REN D.COM=RETURN
```

CP/M seems to require better memory than Poly, and I had problems with the memory I was using. I purchased a Digital Research Computers 64K S100 Static Ram kit for \$269 (it might be cheaper now) and modified it to work with Poly CP/M. This gives me 56K for Poly and 64K for Poly CP/M. However, I can't use the full 64K until I get MOVCPM. The board only draws 0.5 ampere and the system runs much cooler now. If any Poly user is interested I will construct, modify and test this kit for \$150. They will have to supply the kit."

From Russ Nobbs, Spokane, Washington: "Some CP/M users don't have complete documentation, and thus haven't figured out how to use all the Poly-CP/M features. For example: In order to read North Star format 5" disks, you have to refer to the 5" drives as H, I, and J. The letters A through G are for reading normal Poly-format disks."

POLY-ADS

Ads are printed as a free service to PolyLetter subscribers.

FOR SALE: Poly-88 5-slot chassis with CPU, video, keyboard, 16K Godbout memory, cassette interface, documentation and software: \$325. Industrial Microsystems 8K static board, \$40. Shugart SA-400 drive in 2-drive cabinet with power supply, \$125. Teletype model 33 with tape punch, shipped collect, \$100. Some items sold as-is, please write for a complete list and description. Steven Ensminger, PO Box 1810, Auburn AL 36831.

FOR SALE: 8813, 3 drives, keyboard, \$1495. 8810, with single drive, \$995. Diablo 1345A printer, \$495. Soroc CRT, \$90. Hitachi video monitor, \$90. Marlene Zoratti, 1720 Fourteenth Street, Boulder CO 80302, (303) 443-3134.

WANT TO BUY: Keyboard II (the one without the numeric keypad) in good condition. Ralph Kenyon, RFD Lower Prospect Hill, Chester MA 01011, (413) 354-7875.

WANT TO BUY: Poly CPU card, version F or later. G. R. Gamble, 5615 NW 63rd Place, Des Moines IA 50323, (515) 278-5332.

POLYLETTER HAS ANSWERING MACHINE

PolyLetter now has a telephone answering machine installed at our office, (404) 925-2480. You can now call PolyLetter during the day and leave messages or orders. We will respond to you by phone or mail as soon as possible. Usually your call can be returned the next business day.

If you want to talk to someone in person, the best time to call is still in the evenings, 7-10 PM Eastern time. PolyLetter's modem is not normally on-line, but can be hooked up to answer the phone if you let us know in advance.

RUMOR MILL

We had heard rumors that PolyMorphic was "dumping" single-sided 88/MS units, selling them off at very low prices. We checked with Poly, and found that a few in-house (used) units had been sold. Only about a half-dozen were available.

DISK OF THE MONTH

After traveling far and wide, the Disk has returned to bring you wisdom and many, many bits. This month we gaze into the crystal directory and find

DIS80.GO - a machine language disassembler for the Poly. It is written in machine language so it runs fast, 20 to 40 times faster than one written in BASIC. Source code is included so you don't have to go to the trouble of running DIS80 on DIS80. Output files are suitable for reassembly and include Poly "system" labels.

ERROR.GO and **BERR.GO** - ever get an error number and not remember what the error is? Never again will you have to pull out the manual. Just run ERROR and it will print any error message you specify. BERR does the same for BASIC error messages. Again, source files are included.

MKDIR.GO creates empty subdirectories. If you use subdirectories, you can make your system run faster by putting them at the very front of the disk. Poly does this with WordMaster disks. (Ever notice that WP.DX comes before Exec?)

This is an ideal disk for those of you who have "always wanted to learn machine language" but haven't yet gotten around to it. The source files for these programs are well commented so you can follow their operation and learn how the machine thinks. To order, send \$15 for 5" SSSD (\$20 for 8" DSDD) to PolyLetter, 1437 Sugarwood Lane, Norcross GA 30093.

TIME ACCOUNTANT 2.0: "Time is money!" Keep track of it with the TIME ACCOUNTANT master time accounting system. Ideal for professional people. \$159.50

CHECK 2.3: An accounting package for the layman. Handle your money like never before. \$149.50

SPELL 3.0: A fast, batch-speller for Poly. Catch those nasty spelling errors. \$129.50

Prices are for 5" SSSD. Add \$10 for all other formats. For a set of software data sheets, write or call:

Frank Stearns Associates
14305 NE 13th St
Vancouver, WA 98664
206/892-3970

PERFECT CALC

Last issue we asked if anyone knew of a "Visicalc" type program for the Poly. Bill Davis (Portland OR) found a program called Perfect Calc, from Perfect Software, 1400 Shattuck Avenue, Berkeley CA 94709, (415) 527-2626. Bill quotes the following specifications for Perfect Calc:

- Runs under CP/M-80 (This is the version of CP/M that a converted Poly can run)
- Allows a 16x64 character screen
- Requires 56K RAM, and at least 75K disk capacity
- Is available in 5" Northstar SSSD format for \$300

Here are some more of Bill's comments: "I have recently purchased a Kaypro II computer, for the express purpose of trying to download CP/M software into the Poly. The software that comes with this machine includes Perfect Calc and Perfect Writer [both by Perfect Software, address listed above]. Both have a systems installation package which allows for definition of screen parameters, like a 16x64 display.

"Now if we can only find some way to get a real 80x24 display to use under CP/M. It would be ideal if something could be rigged to shift back to the Poly screen size for Poly software, yet allow full 80x24 for CP/M. I propose that we Poly CP/M users fund the development of such a project. My version of Poly CP/M bears the number 195. If this means there are 195 owners of CP/M-Polys, and each could contribute \$100, then \$19,500 would be available for the project.

"If we assume that Poly's routine for reading 8" IBM-format disks on an MS is going to work, then an 80x24 screen is all we would need to give our Polys a new lease on life.

"Lastly, a brief compliment to PolyMorphic. After using Perfect Writer for a while, I am impressed with the excellent job that WordMaster does. It may not be as powerful as some word processors, but its ease of use never ceases to amaze me.

"As of this writing [June 10], I have not

UPGRADING AN 8810 TO TWO DRIVES

PolyMorphic is now shipping 8810s with two, half-height 5" drives. This is a great advancement for the 8810, since a one-drive Poly is not very useable in most applications (unless an 8813 is nearby to copy disks on).

PolyMorphic had previously indicated that they did not plan to offer this two-drive system as an upgrade to existing 8810s. But now the tune has changed, and Poly will offer this upgrade to anyone interested. Contact PolyMorphic for details, (805) 967-0468.

COMMUNICATIONS SOFTWARE

PolyLetter is dropping the price once again on our MODEM program. This program allows you to use your Poly to access other computer systems, using a modem and your telephone. This program has file transmit and receive capability, plus "data capture" to store incoming data on disk. **MODEM.GO** is now only \$35. Add \$15 for a modem cable, if you don't already own one.

We can customize this program to your needs - call PolyLetter to discuss your ideas.

Coming soon - two new communications products for the Poly: A smart terminal program that "learns," and a completely new concept in mail-list handling. Call PolyLetter for details. We will be looking for "beta test sites" for these products!

HOW TO REACH POLY

To ask questions, squelch rumors, buy hardware/software, or talk about your Polys: call Ken Gudis at (805) 967-0468, or write to

PolyMorphic Systems
5730 Thornwood Drive
Santa Barbara, CA 93117

received the 88/MS and IBM-disk-reading software from Poly. I will let you know as soon as it arrives, and will report on how it works."

Anyone interested in pursuing Bill's 80x24 screen display project, please write to Bill Davis, Church-Davis Architects, 600 West 10th Avenue, #444, Portland OR 97205.

HOW FORMAT.GO WORKS
 by Ralph E. Kenyon Jr.
 Abstract Systems, etc.
 RFD Lower Prospect Hill
 Chester MA 01011

We have probably all used FORMAT.GO either directly, or as part of WordMaster. How many of you have wondered "how does it do it?"

FORMAT.GO is an imbedded command, line oriented text formatter. By imbedded command, we mean that instructions to FORMAT are imbedded in the text to be formatted (within curly brackets -- { and }). By line oriented we mean that FORMAT sets up and prints one line of text at a time. There are page oriented formatters which do a whole page of text at a time, but FORMAT is not one of them.

Reading a line of text and then printing it sounds simple, right? Well, not quite. If we read only one character at a time, and put it in the line buffer, what happens when the buffer is full? Do we end up breaking a word? FORMAT solves this problem by having two line buffers. Characters are read into the input buffer one at a time. As soon a space, tab, carriage return, or format command is encountered, FORMAT checks to see if there is room in the output buffer. If there is enough room, the contents of the input buffer (usually a word) are transferred to the output buffer and reading continues. If there is NOT enough room, FORMAT empties (prints) the output buffer first, and then transfers the word from the input buffer to the output buffer. If the input buffer gets full before a space is encountered, then the entire contents of the buffer is transferred anyway.

Are you wondering about line length and buffer size? FORMAT computes the buffer size using the width, indent, temporary indent, double indent, and undent values each time it sets up a line. Actually, FORMAT has its buffer size twice as big as the number of characters on the line, because FORMAT keeps track of information about how the character is to be printed along with each character (bold, underline, subscript, superscript, CAPITALIZED, etc.). The actual print routine looks at the character and the instructions on how to print it. In the buffering portion, FORMAT merely sets up the buffer and interprets

commands to mark how each character is to be printed.

What about imbedded commands? While loading the buffer, the input routine looks at each character and checks for a left curly bracket - {. If one is found, then the output is switched from the input line buffer to the command buffer. Characters are read into the command buffer until a right bracket, comma or carriage return is found. At that point, the input routine stops, looks up, and executes the command. Some commands make changes right away, while others must wait until the next page.

Headers and footers are read into buffers, including commands to be expanded. When the top of a page is reached, the header buffer is used as an input source for characters to go into the input line buffer. Now, the footer poses a special problem for a line oriented formatter. FORMAT must find out how many lines the footer takes up. FORMAT does this by expanding the footer when the header is printed. The footer is expanded, just like during printing, except it is stored in an expanded footer buffer.

FORMAT finds out how many lines the footer used, and looks at that information before printing each line. If the page (with footer) will be full, FORMAT prints the footer and starts a new page before processing the next line. Because the footer is already expanded, changing the footer in the middle of a page just changes what's in the buffer. It won't get expanded until the next page is started. That's why you cannot change a footer in the middle of a page - it has already been expanded. Of course, there are two header and two footer buffers - one each for even and odd pages.

How does format remember margin information? FORMAT makes a copy of its data on margins and lines per page in a storage area which is not read by the regular printing and buffering routines. At the top of a page, the page margin information is copied from the storage area into the working area. Also, something similar works for the page width and indenting margins. Data is copied from the storage area to the working area between printing lines. Headers pose a bigger problem, because headers may contain commands which affect many things. For processing headers, FORMAT makes a copy of

most of its data area. After printing the header and expanding the footer, this data is copied back to the working area, thus restoring the data to its original condition.

Some parameters can only be changed before FORMAT actually prints anything. Printer type is one of those. The commands stan, diab or spin, can only be set at the beginning. These commands affect the print routines by changing what control characters are sent to the printer. Prnt.OV and Sio.PS are set up to take care of programming the tabs and setting the left edge in a Diablo. FORMAT also uses some of this logic. the lines-per-page and characters-per-line are programmable for Diablo and Spinwriter printers.

Now FORMAT.GO is not quite all that simple... there are still more options to be handled. The output routine can be switched off for the partial page routine. While reading header and footers, commands must be put into the buffer and not executed, while looking for {end} to signal the end of the header or footer.

FORMAT has provisions for specifying an environment file. If the first file to be formatted has a .IN extension, then FORMAT will skip looking up FORMAT.IN. Also, the print routine must accommodate different printers, and take care of the actual programming sequences for various character formats. It keeps track of alternate color selection, superscripts and subscripts, and margination, insuring the appropriate commands are sent to the printer only when a change occurs. (For example, the second character of a subscript must not cause the "down" command to be sent to the printer again.)

Since I am using a Prism printer, I wanted to be able to use its many programmable features. I have successfully modified FORMAT to add a new command {chr n} where n may be any number from 0 to 127 and is the ASCII value of the character to be sent to the printer. This modified version puts the character in the input line buffer as part of the word its next to, with an instruction to the print routine to send this character direct to the device driver at 3000H. (This is similar to the printer programming characters used for the Diablo and Spinwriter printers). When the print

DISKETTES... AND CP/M

Dick Jacobi wrote to us on the subject of diskettes: "I ordered, tried, and sent back four boxes of 5" SSSD disks by Wabash. They worked OK but the black plastic housing of the disk was warped - curved. This caused the disk to drag and sometimes would not read, causing unusable files. I have used BASF, CDC, Verbatim, and all of these work fine."

On the subject of CP/M displays for the Poly, Dick Jacobi writes: "A friend and I each bought a CRT-1 S100 board from MIKOS, Inc., El Granada CA, for \$259.95 assembled and tested. It acts as a video terminal and has a programmable character font, graphics, and any (reasonable) number of characters per line. I have it set for 80x24 and have struggled to modify my CP/M BIOS. Now I have a CP/M Poly with an 80x24 screen, sort of a "plain vanilla" CP/M system. But I'm still stuck with the non-standard Poly disk format. My friend has an 8" disk drive operating under Poly CP/M on his 8813.

Dick's advice: "If you want CP/M, don't buy a Poly 8813. Buy a plain vanilla CP/M system. You'll save money, and be compatible with the rest of the world." This is similar to the advice PolyLetter offered a few issues ago. But for an alternative to the "either/or" solution, you might consider doing what a number of Poly owners have already done.

Now that portable CP/M systems are so inexpensive, several Poly owners have bought systems like the Osborne, Morrow, or Kaypro, and are using these in addition to their Polys. It's possible to transfer files between your Poly and these little CP/M boxes, so you can exchange disks with fellow CP/M users. We plan to have an article on this subject in a future issue.

routine gets this character, it sends it direct to the device driver, so as not to affect the line count and character counts. The extra character can be processed without messing up the line width, by dynamically increasing the size of the line buffers. When I want to send an ESC sequence to my printer, I put the sequence in the text file with the chr command. For example, ESC R 2 \$ sets the Prism to data quality format. I can use {chr 27,chr 82,chr 50,chr 36} to accomplish this.

HELPFUL HINTS IN LAYMEN'S LANGUAGE
 by Charles A. Thompson, Attorney
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Exec/96 and BASIC C04

I've been reviewing Exec/96 and BASIC C04, with a revision of my "Addendum to the Poly Manuals" in mind. However, except for the new Editor (Edit 4.1, 11/12/82), there's not enough new to justify a rewrite (perhaps I'll do an "Addendum Addendum").

The new version of **BACKUP.GO** is nice; it stops when you've completely filled the backup disk, and lets you insert another disk. The file being backed up is split into as many pieces as necessary. This allows large files (for example, from the HD/18) to be backed up on several smaller floppies. (There's even a message advising that the backup "will require more than 255 disks to save"!)

REBUILD.GO will put together what **BACKUP** tears asunder.

The **Editor** is the best part. The "move" (ESC CTRL-M) command is really as fast as advertised. Sideways scrolling is handy, and the screen-centered cursor is also quite useful after you become accustomed to it. You can copy blocks, remove marker arrows, and delete material almost instantly, regardless of the length of the file. One negative aspect: the revised Editor no longer will do the manual "global search and change" (invoked by entering ESC :) fully. It still works, but it has lost flexibility (can't skip a change -- can only CTRL-Y and restart; can't hit RETURN and have all the rest of the changes made). Poly's software chief, Lennie Araki, said he completely rewrote the ESC CTRL-G (auto global search and change) since it previously had some serious problems. The result is what creates the loss of flexibility in the ESC : capability. Since I used that all the time, I'm torn between using Edit 4.1 for the good features or staying with Edit 3.3.

I found one apparent bug in the Editor, which Lennie also explained. I use The Source quite a bit. Source puts a line feed after each carriage return. Edit 4.1 sees the combination carriage return and line feed in a strange manner, and it's very difficult to remove the line feed. This occurs in Edit 4.1 because it is designed to work with CP/M, and Lennie said CP/M sees a carriage return/line feed as a single character. He was aware of the

problem and is "working on it."

The only change in **BASIC C04** is that it looks for C04 in the directory instead of C03. Indeed, if you have programs in BASIC C04, just use SZAP (if you know how!) and change the directory start addresses in your SAVEF programs from C03 to C04 (if your programs are in a subdirectory, be sure to use ESC CTRL-C to re-checksum the subdirectory -- this is done automatically in the main disk directory). There are no changes whatsoever in **Berr.OV** and **Bfun.OV**, while in **Bslv.OV** one byte is changed (C03 to C04) and **Bdir.OV** five bytes are changed (C03 to C04 and the date).

Exec/96 documentation is still not complete, even with the recent increase in the size of it. There are more than a few of Poly's superb capabilities not even mentioned. If you buy Exec/96, you can use my 1981 Addendum to get a complete rundown on capabilities of the Poly which aren't in the most recent BASIC or User's manuals or in Poly's Exec/96 update. In fairness, the newer Poly documentation is very much improved. There's a good explanation of Volume Manager, the best so far.

(Incidentally, several of us in Dallas are running 5.25" double density and single density drives simultaneously on 8813's. It takes two controllers and a special **Driver.DD**. If you don't want to buy two-sided drives, you can use your existing Shugart SA-400s (in good shape) as single-sided double density drives. I have three SSDD and two SSSD drives on my 8813. Call me if you're interested at 214-437-2001).

The printer driver (**Printer/43**) has the added feature of allowing use of Port 0. If you have a second printer interface (one hooked to the "cassette" port on the CPU board), you can attach a second printer to it and use it merely by invoking its name. The setup routine for Printer/43 is the same as for Printer 36 thru 42, except that you can add "-0" to a baud rate and use Port 0.

Port 0 in older versions

Interestingly enough, all of Poly's printer drivers (including the one for the original "orange toaster" Poly 88, I'm told) have the capability of going to Port 0. If you don't get Exec/96 and want to hook up a second printer interface to Port 0, all you need is a bit of facility with

SZAP and knowing what to look for. It's easy. (1) Hook up a printer interface to the cassette port on the CPU, being sure that the interface is wired for Port 0. (2) Set up the usual parameters for your Port 0 printer using Setup.GO. If you want the same printer for both ports, set it up twice, using different names (such as Diablo-0 and Diablo-1). (3) Invoke SZAP, and move to Prnt.OV. (4) Go to the eighth sector of Prnt.OV and look for the names of the various printers. The names will start with Null and Screen, followed by those you've set up. Each printer name is followed by various codes, including one or more FF's. Immediately following these FF's, there is a number, such as 19, 1F, 1E, etc. The 1 represents the port, the second digit is the baud rate. (5) Substitute 09 for 19, or 0F for 1F, etc., and you've switched the printer from Port 1 to Port 0. You'll have to do this each time you add or change a printer. Wonder how come no one ever told us this before?

Using two printers from BASIC

If you set up two printers, you can use both (but only one at a time) from within a BASIC program by making a CALL to Prnt.OV when you want to switch from one to another. Here's how:

```
10 DIM A$(1:30)
20 FILE:2,LIST
30 A$=" Diablo"+CHR$(13)
REM invoke printer
40 Z=CALL("Prnt",2,0,0,MEM(A$))
50 PRINT:2,A$ \REM just to check!
REM Now, let's change it
60 A$=" Screen"+CHR$(13)
70 Z=CALL("Prnt",2,0,0,MEM(A$))
80 PRINT:2,A$ \REM another check!
```

(If you do this, you'll need to pay a lot of attention to where each printer is on the page, since each time you invoke a printer, it resets top of form at the present location.)

An Editor Hint

Have you ever been editing a file and botched part of it, making you wish you could get the "original" (deleted) file back into memory? For example, you might be editing "TEXTFILE". When you invoked the Editor, it deleted the old TEXTFILE and created a new one. In the past, I've just used "ESC CTRL-E" to save the botched up file, then renamed it "BOTCHED". Then I used ARISE.GO (or UNDELETE) to recover TEXTFILE. Then after "Edit TEXTFILE", I

used "ESC CTRL-I" plus CTRL-A to get "BOTCHED" added to memory, and then started reworking.

There is an easier way with later versions of Edit.GO. Use "ESC CTRL-X" to exit the Editor (REENTER will still be allowed!). Then UNDELETE (but not ARISE) TEXTFILE, rename it to something else, and then REENTER. Use the ESC CTRL-I plus CTRL-A routine to load the old file at the end of your edited, messed-up version. When you get the hang of it, it's much faster.

(What happens is that, when you ESC CTRL-X and UNDELETE the file you started with, the Editor won't let you REENTER because there would then be two files with the name TEXTFILE. But, after you rename the original TEXTFILE, it's OK.)

Hidden FORMAT.GO commands

Recently, I received a nice letter from G.R. Gamble in Des Moines, Iowa. He asked about the latest Addendum (it's still the May 1981 version) and then told me about a "hidden" capability of FORMAT.GO. He pointed out that, at least with a Diablo printer, you can use the command {lpi n} in the same fashion as {cpi n}, and it will change the printer line spacing to "n" lines per inch. Darned if he isn't right -- it works. Considering that I have a Diablo, and have been doing all sorts of contortions to vary linespacing on it, I'm both delighted to learn of the newly discovered capability and red-faced that I didn't find it myself.... Haven't had a chance to test it with a NEC spinwriter, but Lennie Araki says it should work with the NEC.

There's a new "undocumented" capability in FORMAT 5.6 which comes with Exec/96. It's {tabs n}, and it allows you to set tab stops for other than the usual every eight spaces. For example, use {tabs 20} to set tabs every 20 characters. Then use the TAB key in your text between columns of material. When formatted, the material will print out with columns starting every 20 characters. For people who do a lot of statistical work, or use a lot of columns, this promises to be a much-used feature.

ct

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PolyLetter



September/October 1983

NEWS FROM POLYMORPHIC

Poly's new system, based on the Intel 80186 16-bit processor, is almost ready for its first shipments. All the major delays seem to be solved now. The new system will come equipped with the 80186 CPU, 256K of user memory, 2 serial ports, and one parallel port. It can run from an external terminal (over a serial port) or can have a high-resolution color graphics display built-in.

The system's memory will be expandable to 1 megabyte, not by adding cards, but simply by replacing chips! The CPU card currently uses "64K" RAM chips, each holding over 64,000 bits. 32 of these chips make up the 256 kilobyte memory in the standard system. By unplugging these 32 chips and installing 32 new "256K" chips, the system's memory is expanded to 1 megabyte, which is the maximum address space of the 80186 processor. These new 256K chips are still very expensive, though, so it will probably be a while before the 1 megabyte upgrade is cost-effective. "Still," says Ken Gudis, "99.9 percent of all programs won't require more than 256K."

The graphics display card of the system has worked out so well that Poly is considering offering it as a separate color graphics terminal, or as an OEM card-level product. If it is offered as a terminal, the color graphics card would be an attractive unit to add to any system.

The first units to be shipped will be completely new systems, not upgrades for current 8813s. Poly says that they still have plans to offer an upgrade for current 8813 users. This will probably follow one or two months behind the first shipments. The lag will be due to the fact that additional software must be written, to help ease the transition from one system to another. For example, Poly must provide utilities for moving your data into the new disk formats.

(Continued on page 2)

FROM THE EDITOR'S SCREEN

We Poly owners have a lot in common. Most of us started out early in computing, before the recent rash of personal computers hit the marketplace. We were ambitious enough to buy our Polys when there were few programs, and fewer programmers, available to help us.

Most of us bought our computers to help in our businesses. A few of us (your editor included) bought them because we saw the small-computer rush coming, and wanted to get our hands in early.

Since there was little support for computers at that time, we had to fend for ourselves a lot. If we needed a program, we had to write it. If we needed a special piece of hardware connected to our system, we found a way to do it; often with the help of a friendly "hacker" who barely spoke English, but he could sure program!

At PolyLetter, we feel that your experiences would be valuable to other Poly users too. Many of us have fought common problems. Why not share your ideas with your fellow Poly People? We are always looking for articles written by our readers. And if you don't consider yourself a writer, fear not! Just send in your ideas or questions, in rough form, and we can develop the article from there.

Some ideas for articles might include: short programs or subroutines you've written to perform useful tasks; special devices you've managed to attach to your Poly; or some unique application that your computer is performing for you. Of course, we're happy to answer any questions you have, and sometimes these questions develop into interesting articles too.

Each of us probably has something unique about his Poly system. Don't take it for granted... let the rest of us in on some of your tricks! If we continue to share the wealth of information, PolyLetter can be useful for a long time to come.

(NEWS - from page 1)

Will Exec be supported on the new system? "No decision has been made there yet. We have done only a little preliminary work on that project." However, we are pleased to report that WordMaster has been moved to the new system, and will be available with the first units.

The first operating system on the new unit will definitely be Concurrent CP/M-86, by Digital Research. Future plans include some version of Unix, early next year. The system will come equipped with Digital Research's 8086 assembler, WordMaster, and some diagnostics. Other languages, and "bundled" software (such as financial programs) are under consideration. But according to Poly, "any program that runs under CP/M-86 on the IBM should run on our system." Poly has been having discussions with software vendors to ensure compatibility.

What software is available for CP/M-86? Admittedly, most of the initial software work in the IBM-PC-compatible marketplace was done under MS-DOS, the operating system shipped with the IBM. But more and more software is becoming available for CP/M-86, and most software vendors either support CP/M-86 now, or plan to support it soon.

What about our old enemy, the incompatible disk format? Poly says their system will be compatible with IBM's next generation of small computers, as well as the current IBM-PC and XT. Poly's new system uses 80-track, double sided, double density drives which store up to 720K per 5" diskette. Poly's system will also read and write the current 360K disks used by the PC and XT.

Poly's new system will initially be a single-user, multi-tasking system using Concurrent CP/M-86. This means several programs can run at the same time. For example, one program might be printing a file, one might be running some calculations on another file, and you might be using the editor while all this is going on. But a single-user system allows only one interactive program to run at a time. With just a little more programming work, the new Poly system will become a true multi-user system, with multiple terminals. This is definitely in Poly's plans for the near future.

The purpose of PolyLetter is to create a forum of ideas for users of Poly equipment. One year (six issues) subscription \$15 US and Canada, \$20 overseas. Back issues are available.

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USING FTP AS A TERMINAL

If you have a modem attached to your Poly, you can use it to access other computers. Some other systems you can tie into are the Source, CompuServe, and the many computer-bulletin-board (BBS) systems around the country.

Some of you may be using a custom program with your modem, to turn the Poly into an "intelligent terminal" with the ability to send and receive files. (See our ads in PolyLetter's last issue for one such program.) If your modem is attached to your main serial port, you also have the option of using Poly's program FTP.GO. FTP is designed to communicate between two Polys, for the purpose of transferring files. But it can also be used over a modem to a foreign (non-Poly) system.

There are a few drawbacks to this usage of FTP. First of all, FTP always operates in "half duplex." That means it displays, on your screen, every character you type. Since some other systems operate in "full duplex", they will also echo back each character you type, and the result is that anything you type will appear twice on the screen. Most dial-up systems have a "no-echo" or "half-duplex" command which can be used to eliminate this echo, once you are signed-on.

(Continued on page 6)

REPORT ON THE HD/18

John Neal, of Dallas, was one of the first purchasers of the Poly HD/18 hard disk with the removable 5-megabyte cartridge winchester disk. He has these comments:

"I have had problems obtaining the 5-megabyte cartridges for the removable winchester drive. The drive is made by Syquest, and uses a Syquest cartridge called the Q-Pack. This is not the same media that some other 5-meg cartridge drives use. The 5-meg cartridge by Dysan will not work in the Syquest drive.

"Operationally, the 5-meg drive is just as fast as the 18-meg fixed disk. Both are very quick and I've enjoyed using them. But there are a few quirks that I have uncovered.

"When changing cartridges in the Syquest, you have to press the 'unload' button and wait for the head to retract. A flashing light on the drive warns you not to remove the cartridge until the head is completely retracted. If you do pull the cartridge out early, it could be damaged.

"The whole unit will not operate unless a cartridge is installed in the Syquest drive. Since I don't have any spare cartridges at the moment, this forces me to put valuable data in the drive at all times. Poly says this may be changed in a future software release.

"There seems to be a problem with data being destroyed when the system is powered down. Poly recommends you use the CONNECT program to disconnect the Syquest drive before turning the power off. I have a command file called BYE which I run, and it does this for me.

"And finally, I found out the hard way that you must have the same version of the operating system on all volumes of your hard disk and cartridge disks. If you have different versions, and you use the 'boot' command to boot between drives, you can blow away a disk directory."

Editor's note: The problem of bombing the directory seems to be a feature of Exec, not of the HD/18, since I've had this problem with my homebrew hard disk also.

LOAD ADDRESS AND START ADDRESS

When listing a directory in ENabled mode, you see two columns labeled "La" and "Sa". Perhaps you know that those abbreviations stand for Load Address and Start Address. But what does the system actually use them for?

If a file is an executable, .GO file, it can be run by the system. You would execute that file by typing its name. Poly would read in the file (load it into memory), and execute it. The file is loaded into memory at the designated Load Address (La), which is usually 3200 hex in a single-user 8813. This magic 3200 number is the start of "user memory." Since the first instruction in the file is usually the first instruction to be executed, the Start Address is also usually 3200.

The system assumes you will follow these rules when you write your own .GO files. If you do, the system has some more commands that will be convenient for you to use. START simply jumps to address 3200, assuming there's a program in there to run. REENTER likewise jumps to address 3203, assuming there's a re-entry point to your program at that address. The GET command, however, makes no such assumptions. It will GET a file into memory at the file's listed Load Address, whatever that may be.

If a file is a text file, it is cannot be executed like a machine code program. Text files are stored with zero in both the La and Sa fields. This identifies them as special, and offers a certain amount of protection; for example, the editor will only edit a file whose La and Sa are both zero. Of course, a text file can be an executable BASIC program, but we'll discuss BASIC files in a minute.

If the Load Address of a file is zero,

(Continued on page 9)

The media for the Syquest drive is also known as the SQ-100. It is available through Hamilton/Avnet, a national distributor of electronic equipment. Their Atlanta number is (404) 447-7500, and the person to talk with is Perry Mason, their computer products specialist. Quantity one price of the Syquest media is \$70. They also sell the Syquest drive, quantity one priced at \$995 (without controller, power supply, chassis, or software).

CP/M CORNER

John J. Warkentin contributed a great deal of information for this issue's CP/M corner. You can send your comments on this article to PolyLetter or to John J. Warkentin, 7041 Walnut Avenue, Orangevale CA 95662. He is willing to help out fellow hobbyists, and will accept calls at (916) 988-8420 between Sunday and Thursday evenings, 7-10 PM Pacific time. John also does consultation on an hourly basis.

BACKSPACE / DELETE

I, too dislike the fact that CP/M treats the DELETE key differently than the BACKSPACE key. The reasoning behind this is, I believe, that the BACKSPACE key is used for video displays, and the DELETE character is used from printing terminals. If a printer backspaces and then prints another character, the result may be little more than a smudge-- not very desirable on a console-type device. Anyway, on to the fix. I chose to make the fix in the routine within BDOS that allows editing the input line, instead of in the BIOS. My reasoning for this is that there are programs (such as WordStar) that assign different functions to these keys, and I wanted to preserve that capability.

The easiest way to make the change is to boot up the Poly OS, with a bootable CP/M disk in drive 2. Use SZAP to make the change, by selecting drive 2, sector 0E. Move the cursor to the 11th line from the top, 6th byte from the left. You should be immediately to the right of 6 bytes that contain 7E 05 2B C3 xx A9 (xx will depend on CP/M size - AE for 48K, CE for 56K). Change those bytes to 00 00 00 C3 xx 0C, leaving xx the same. This will get rid of some instructions and jump to the backspace routine. Exit SZAP and boot the CP/M disk. Check the operation of the DELETE key and verify that it has the same effect as the BACKSPACE key. Make sure everything else works the same as it did before. As always, when working with SZAP, use a backed-up disk that you can afford to lose!

If you have the public-domain program DU running on your Poly-CP/M system, it can be used to make the same change. The area we are looking at is on track 0, sector 22. By the way, are you aware that the Poly BIOS makes the 5" disk look like it has 26 128-byte sectors per track? This is the same as a standard 8" CP/M disk.

PCOPY

I have never been able to successfully copy PCOPY to a CP/M disk from the distribution disk. Every time I have tried it, I got the message "unable to boot" which indicates a disk read error while reading the CCP and BDOS from the disk. Apparently something in the BIOS got clobbered. Instead of trying to solve the problem, I used some utilities I wrote, and copied PCOPY over to a CP/M disk. The version I have now works fine - I have tested it thoroughly in order to restore my confidence in it.

Adjusting your Poly CP/M for a different memory size is not easy. Even if you obtain a copy of MOVCPM and the source code for the BIOS, you cannot do it. The files PRINTER.COM and SIO.S88 need to be relocated also. In addition, the INIT program contains a program called BOOT which must be relocated.

The Poly CP/M boot process is as follows. Upon pressing the LOAD button, the system comes up in Poly mode. The program in ROM looks for a file called Exec. But the CP/M disk has a special version of Exec that loads a file called Boot.GO; this contains the CCP and BDOS programs, and a mini-BIOS. Boot.GO occupies the CP/M system tracks of the disk. The mini-BIOS then loads BIOS.S88 over itself and passes control to BIOS.S88. BIOS.S88 tries to load PRINTER.COM, and if it succeeds, jumps into PRINTER.COM to set up the default printer. This will also load SIO.S88 if the default printer requires it.

This is the end of the CP/M boot process (about time!). During this process, of course, the ROMs and video memory are being switched off and on, and the extra 8K memory board takes their place as needed in low memory. Here is a memory map of the Poly-CP/M environment:

Occupant	48k	56k
-----	-----	-----
Unused	DF00-DFFF	FF00-FFFF
Device driver	DD00-DEFF	FD00-FEFF
Printer driver	DC00-DCFF	FC00-FCFF
Space for 8" driver	D300-DBFF	F300-FBFF
BIOS	BA00-D2FF	DA00-F2FF
BDOS	AC00-B9FF	CC00-D9FF
CCP	A400-ABFF	C400-CBFF
TPA	100-A3FF	100-C3FF

80 BY 24 DISPLAYS

The concept of the printer driver code is the same as in the Poly OS. The general stuff is placed in a "wormhole" driver that is always loaded. The device-dependent code is placed in SIO.S88. You can substitute equivalent code for a strange device if you use the CUSTOM command when you set up your printer.

DOCUMENTATION

One of the things Digital Research (home of CP/M) is famous for is abysmal documentation. PolyMorphic cannot really be held accountable for CP/M's poor documentation. Poly should, however, include a set of Digital Research CP/M manuals with every CP/M system shipped. Poly's efforts to document the unique portions of their CP/M system amounts to two sheets of information. One discusses the files on the distribution disk and the control characters recognized by the video display, and the second discusses the addresses of the various types of drives (A:, B:, etc.). Although this may not seem like much, it certainly is adequate, given that you are not supposed to change your system around. (Obviously, some of us barge on regardless!)

I would certainly encourage the CP/M newcomer to obtain one of the books that attempts to explain CP/M.

VISICALC

With reference to "Visicalc"-type programs for the Poly: I have successfully implemented Supercalc version 1.06 on the Poly CP/M system. Supercalc's "Install" program has an undocumented option at choose-a-terminal time. Option "X" will allow you to configure Supercalc for a terminal which is not ordinarily supported by the Install program. You may specify the screen size so that it works on the Poly.

The only problem is that Supercalc files carry the screen size information internally. This means that if a file is generated on one size screen, it may not look right when displayed on another system with a different screen size.

In closing, a response to Bill Davis' thoughts on a changeable screen display. The concept is not too technically far-fetched, as there are available video boards whose display parameters are settable under software control. The problem is that the Poly ROMs must be modified so that they will initialize the screen properly. This procedure would vary with each manufacturer's video board. Also, any graphics capability provided by the board would probably be lost.

On my own system I added a separate RS232 port and connected a terminal to it. I then wrote a driver that patched itself into the BIOS. This worked quite well, but the terminal can be expensive.

May I suggest another alternative? John Bell Engineering (an advertiser in Byte magazine) manufactures a video display card. It emulates an ADM-3 and has a maximum baud rate of 9600. Its price is \$199.99, and its power requirements are small enough to be derived from inside the Poly chassis. Then, add an RS232 port to the Poly. RS232 S-100 cards are available for around \$100-200. Finally, write a patch program as I did, or modify the BIOS. Connect the new RS232 port to the John Bell card, connect a video monitor to the card, and you're done. Note that this does not require any modifications to your keyboard, or to the console input routines of the BIOS.

POLY-ADS

Ads are printed as a free service to PolyLetter subscribers.

FOR SALE: 9" Panasonic monitor, with cable. Cost \$140 new, sell for \$50. Mitchell S. Lippman, (404) 952-4341 day or night.

FOR SALE: Diablo printer. Bob Perry, PO Box 2649, Oxnard CA 93034.

WANTED: Poly 8" DSDD controller board in good condition. John Barrett, 1122 N. Black Acre Court, Casselberry FL 32708, (305) 699-1347 day or night.

WANTED: Poly 8810. IDM Controls, (504) 831-4637.

(FTP - from page 2)

Another problem is that FTP's file-transfer capability is limited. It will only send to, or receive from, another copy of FTP. This limits it to exchanging files between Polys, since no other systems run anything exactly like FTP. But this isn't a problem if you simply want to access a foreign system, without "downloading" files from it.

Chuck Thompson recently discovered that using FTP has another drawback. It simply won't communicate with some systems. We discussed the problem by sending a few letters over the "Source" timesharing system, and came up with a solution I'd like to share with you now.

In every data communication system, the designers make some decisions about how to transfer the data. These decisions are based, in part, on the type of data to be transferred. In the case of FTP, the designers wanted to be able to send/receive machine code files over the data link. This required sending all 8 bits of each character in a file. This is incompatible with some timesharing systems, which don't use 8 bits per character. They only use 7 bits, which is enough to represent the full ASCII upper/lower case character set.

If you run into one of these systems, you will see garbage on your screen whenever the system sends something to you. It will send stuff in response to you, because it is receiving you correctly. But FTP is not receiving properly from the foreign system.

The number of bits per character is programmed into the hardware by a subroutine in the ROMs, called SETUP. Its address is 02AD hex. A "call" to this address looks like CD AD 02. You will see these bytes if you use SZAP to examine the FTP file, in the places we will point out below.

SETUP gets called at three places in FTP, one for each of the three available baud rates. In FTP/06, this occurs in sector 7 of the 9-sector file. In each of these three cases, a string of data immediately follows the call to SETUP. So the complete string of data you're looking for is:

CD AD 02 13 AA 40 DE 00	for 110 baud,
(offset 61)	
CD AD 02 16 AA 40 DE 00	for 300 baud,
(offset 6C)	
CD AD 02 1F AA 40 DE 00	for 9600 baud.
(offset 77)	

The first three bytes are the call to SETUP. This is followed by 13, 16, or 1F, for 110, 300, or 9600 baud. This byte goes into the baud rate generator. Incidentally, changing this byte from 1x to 0x makes the serial port connect to "serial port 0", the second serial port which is optional equipment for the Poly.

The following bytes set up the parameters which will control the communications link. DE is the critical one. It sets up 8 bits, odd parity, 2 stop bits. For conversing with a "normal" system, change this byte to 7A. This is the value I use in all my serial I/O routines with good results.

The "offset" listed in the chart above is the location, in sector 7, of the first byte after CD AD 02. So the sequence 16 AA 40 DE 00 should start in sector 7, byte 61. At least, this is true in my copy of FTP/06.

Before making this change, you should copy FTP into some other file, like NEWFTP. Then use SZAP to make the change, carefully! The new file, NEWFTP, will probably not work for transferring files to another Poly, but should work reliably as a way to access dial-up systems.

Bob Tripi, of Massachusetts, writes: "I'm still hard at work collecting Poly parts. I've almost got enough for a third machine. Am still looking for a CPU.

"By the winter, I expect to have an 8088-based P.C. which I'd like to hook up to my 8813. I think I might have a line on a program to convert 8080 programs to 8086/8088. I'll let you know if I get anything of value converted from the Poly to run on the 8088."

MODEMS AND COMMUNICATIONS

Several PolyLetter readers have asked for more information about modems, and connecting modems to their Polys. In this first part of a two-part article, we'll explain what a modem is, what it does, and how you can connect one to your 8813 or 8810. (I promise to keep this article easy-to-read, and not get too technical!)

Before the advent of the microcomputer, people couldn't afford to have a system all to themselves. The only way to use a computer was to tie in to a timesharing computer service. This service was run by a company that operated a large "mainframe" computer, such as an IBM, Honeywell, or DEC system. These mainframes have tremendous power, and can easily serve dozens of users at the same time. By sharing the cost of the system over hundreds of users, it became possible for many businesses to afford computing for the first time.

The timesharing system you used might be across town, or across the country from you. To access this system, you needed a computer terminal and a modem. The modem performs the connection between the terminal and the telephone, allowing you to use standard phone lines to dial into a timesharing system. (Getting technical for just a minute: the modem converts digital signals to sounds, since sounds are all a telephone can carry. At the other end, another modem converts the sounds back to digital data for the other system.)

Of course, timesharing isn't like having your very own Poly sitting on your desk. You depend on the timesharing company to keep your data intact (not scramble it), and secure (not let your competitors see it). These are big problems, and when the microcomputer came along, many businesses jumped at the chance to keep the computing operation in-house.

Did modems die out when microcomputers came along? Certainly not. Despite their drawbacks, timesharing systems are still very handy. They use very powerful computers, can store millions (sometimes billions) of characters of data on their disk systems, and for very large computing projects, a timesharing system can still be the way to go.

Timesharing systems can also offer added-value services to their subscribers.

The Source carries UPI news on-line, and a few simple commands allow you to scan the files for stories you might never find in a newspaper. CompuServe contains excerpts from Popular Science and Popular Electronics magazines. Both services have electronic mail and shopping services available.

Owning a computer terminal, in the days of timesharing, locked you into timesharing forever. But owning a small computer (like a Poly) brings you the option of doing some of your own computing, or using a modem to talk to a "big" system. Virtually any microcomputer can be used, with a modem, to talk to another microcomputer or to a large mainframe system. This explains the explosion in modem sales over the past five years or so. Since 1979, prices of simple modems have gone from over \$200 to under \$100.

There are a lot of modems on the market today. Whole companies have been founded simply to produce modems for microcomputers. (D.C. Hayes, in Norcross Georgia, is one of them.) Their features vary widely, so let's look at some of these features and see what they can do for you.

Your Basic Modem

The simplest modems will be called "Bell 103 compatible." These operate at fairly slow speeds, up to 300 baud. There are modems in this category for under \$100, the J-CAT by Novation is one of them. With a simple modem, not having any bells and whistles, you can do just about anything you would ever want to do in the way of data communications. You can talk to virtually every system in the world using a Bell-103 modem at 300 baud. This is by far the most popular sort of modem today.

Oops - I promised I wouldn't get too technical in this article. So, what the heck is a "baud?" A "baud" is a measure of how fast data travels, and 300 baud is thirty characters per second. 110 baud is 10 characters per second (terribly slow), and 1200 baud is 120 characters per second (faster than you can usually read).

Faster! Faster!

So if I can get by with a 300 baud modem, why pay more for extra features? You probably don't need to. But some modems do offer nice features for extra

bucks. One such feature is 1200 baud operation. A modem that runs at 1200 baud will transfer data four times as quickly as one that runs at 300 baud. If you must pay long distance rates when calling your favorite timesharing system, a 1200 baud modem might save you money in the long run. But the timesharing companies are wise to this, and most of them charge you more if you call up at 1200 baud. And, the 1200-baud modem itself is more expensive... they start at around \$450.

A 1200 baud modem has other drawbacks. There are two different types, a Bell 202 and a Bell 212 style. The two are not compatible, and you must choose the right one for the timesharing system you want to call. But have no fear, for if you choose wrong, most 1200 baud modems will also operate at 300 baud using the Bell 103 standard. All things considered, a 1200 baud modem would not be my choice for general computing use.

Direct or Acoustic? (or twelve-string?)

Most modems being sold for microcomputers are of the direct-connect variety. This means they connect directly to the telephone line, just as your phone does, using a modular plug. (Some multi-line office phones make this method of connection difficult.) If a modem is not direct-connect, it will be acoustic-coupled. A few years ago, this was the only type available. An acoustic modem has a cradle in which you must place the handset of your telephone. This modem has a speaker and a microphone, and actually "talks" and "listens" to the phone to transmit its data. Of course, if your room occasionally suffers from loud noises, your modem won't be able to "hear" what the timesharing system is saying, and you will get garbled data. Acoustic modems are a good choice, though, if you can't predict what phone you will be using from day to day. (To my knowledge, all acoustic modems are 300 baud; 1200 baud modems are always direct-connect.)

Auto-Dialing

Another popular feature these days is auto-dialing. Before this feature was available, you had to use a telephone to dial the timesharing system, then attach the modem to the phone. An auto-dial modem provides a way for you to enter a number, and let the modem do the dialing for you.

Auto-dialing modems are always direct-connect modems, and most can dial using touchtones or standard pulse dialing. You will sometimes see the phrase "smart modem" or "intelligent modem;" this usually means the modem incorporates advanced features like auto-dialing.

Auto-Answer

If you need to leave your computer unattended, and access it from somewhere else, you need an auto-answer modem. With suitable software in your microcomputer, a person could dial in from an outside location and tie in to your computer, just as if it were a timesharing system! Of course, your micro doesn't timeshare, so if the user on the modem is running a program, you can't sit at the keyboard and run another one. Still, remote access is good for salesmen on the road, or a for workaholic (like me) who wants to call up the office system from a home terminal.

Software Support

A moment ago I brought up the subject of software. There isn't much hardware you can buy for any computer system that won't require some software, specifically written for that hardware. So you'll need a program written for the purpose of connecting your system to a modem. On CP/M systems there are a variety of "generic" modem programs available, written for just about any CP/M system, connected to just about any modem. Some examples are XMODEM and MODEM7, both (I believe) public-domain modem programs available under CP/M.

On the Poly, as usual, there are fewer alternatives. But you do have these choices: **FTP.GO** is distributed free with the Poly operating system, and can be used to tie your Poly to a modem. (See our article on FTP elsewhere in this issue.) PolyLetter sells a modem program which is more general-purpose, and is designed for timesharing systems (FTP is not).

Depending on which modem you purchase, you may have other software available. Ralph Kenyon has a modem program for use with the D.C. Hayes Micromodem 100 board. Unlike most modems, the Micromodem 100 does not connect to your system through a serial port. Instead, it plugs into the S-100 bus of your Poly. Ralph's address is RFD Lower Prospect Hill, Chester MA 01011, (413) 354-7875.

(LOAD ADDRESS - from page 3)

and you type in the file name as a command to Exec, the Poly will think this is a command file. This is a good assumption, since (a) all text files have La equal zero, and (b) since the system doesn't have any RAM at address zero, nothing could possibly have a valid Load Address of zero.

Overlays, or .OV files, are part of the operating system. A 2K block of memory is reserved for overlay use, starting at address 2000 hex. So, .OV files must have a Load Address of 2000. The executable part of the overlay always begins at 2004. But, the system assumes this, and so the Start Address of an overlay is ignored. Usually you will see it listed as 2000 or 2004, but it's never used by the system.

Subdirectories, .DX files, are marked with a special value of 101 for both the La and Sa. This only serves to make them different, and thereby help protect them. Actually, subdirectories (and directories) are loaded into address 2800 when the system reads them.

BASIC has several types of files, all stored with the extension ".BS". A BASIC file stored with the SAVE command is stored in ASCII form, and can be TYPed or EDITed. Such a file would have La and Sa equal zero. If a BASIC program is stored using SAVEF or SAVEP, the La is still zero, but the Sa is set to the version number of BASIC that saved the file. So, a BASIC program SAVEF'ed with version C04 would have Sa equal to C04 hex. (Hex numbers only go up to F, so let's hope we never hit version G of BASIC!)

(MODEMS - from pages 7, 8)

Two of the most popular modems in recent months have been the D.C. Hayes Smartmodem and Smartmodem-1200. PolyLetter recently acquired a Smartmodem, and we will soon be releasing Smartmodem software for the Poly. This program will allow the Poly to make full use of the Smartmodem's many features, including auto-dialing. Look for details coming soon to this newsletter.

(In part two of this article, we will look at the Poly's serial port, and discuss how to connect various modems and printers to the Poly 8810/8813.)

BASIC also has two types of data files, both stored with extension ".DT". A normal text file can be a .DT file, and would have La/Sa equal to zero. BASIC also has a type of file called "fixed record length," which is useful for large files of organized data. This type of file has La equal zero, and Sa equal to the record length of the file. Since the Sa is non-zero, the editor won't edit the file; that's good, because if you edited the file and changed the length of one of the records, the entire file might become unusable.

I can think of one more type of file: the relocatable executable file. A relocatable file is one that can be run in different areas of memory. This is useful in the case of programs like Volume Manager, which reside at the top of your system memory just under MEMTOP. Unlike .GO files, a relocatable file cannot simply be loaded into memory and jumped to. It must be loaded, and relocated, by a "loader" program. The Vmgr overlay contains such a loader, and so does the WPS word processing system program. Information crucial to the relocating process is stored near the end of the relocatable file. Its location in the file is shown by the La field of the directory listing. Relocatable files usually have Sa equal to zero. There is no standard extension for relocatable files... they might be of type .DD, or .RL, or something else.

Here's a rundown on the Poly file types:

La	Sa	Name	Type
2000	2000	Gfid.OV	overlay
3200	3200	ARISE.GO	machine code program
0	0	TEXT.TX	text file
101	101	SUBDIR.DX	subdirectory
0	0	PGM1.BS	SAVE'd BASIC program
0	C04	PGM2.BS	SAVEF/SAVEP program
0	0	DATA1.DT	BASIC data file
0	56	DATA2.DT	fixed-length data
AOD	0	DRIVER.DD	relocatable program

The La and Sa of each file are stored in the disk directory, or subdirectory, containing that file. You seldom have to modify these numbers, but when you do, you have to resort to using SZAP. Russ Nobbs suggested writing a utility called STAT, which would display the magic numbers for a single file, and allow you to change them. Look for STAT in a future PolyLetter Disk-Of-The-Month.

PolyLetter

1437 Sugarwood Lane
Norcross, GA 30093
404/925-2480



PolyLetter



November/December 1983

...AND THE TORCH IS PASSED

As some of you already know, this is the last PolyLetter I will publish. Beginning in January 1984, Frank Stearns will become the editor, publisher, and owner of PolyLetter.

PolyLetter was founded in February 1980, by Mark Sutherland. Mark is a successful businessman in the Atlanta area, who has been a Poly owner for many years. He and I worked together during PolyLetter's first year of publication. In 1981, Mark turned PolyLetter over to me, so he could devote more time to his other business activities. For essentially the same reasons, I am now turning PolyLetter over to Frank.

You all recognize Frank Stearns' name from the pages of PolyLetter. Frank has written numerous articles for us, and has also developed some excellent software on the 8813. His SPELL.GO spelling-checker program is in wide use among PolyLetter readers. Frank is currently self-employed as a free-lance writer. I'm sure that as he focuses his many skills on this newsletter, his talents will help move PolyLetter into a new era of success.

During my three years as editor, it has been my pleasure to meet some of PolyLetter's subscribers, and to correspond with many more of you. I have found Poly owners to be very intelligent and hard-working people. I hope to keep in touch with you, and I want you to feel free to contact me at any time in the future.

I will continue to be an active PolyLetter contributor and Poly user. I now own three Poly systems: one 8810, and two homebuilt 8813s. One of these will stay in my office at Chromatics, as a word processor. The other two will be used as I develop new hardware and software products to enhance the PolyMorphic 8810/8813 product line. Look for these products to

(Continued on page 2)

POLYLETTER UNDER NEW MANAGEMENT

In the January/February issue of PolyLetter, you'll notice a change of postmark. PolyLetter will be originating from Vancouver, Washington, instead of Atlanta, Georgia.

Bob Bybee, your PolyLetter editor for the last three years, has asked me to begin editing PolyLetter, starting with the first 1984 issue. We all owe Bob a great deal for his consistent and quality job with PolyLetter, his generosity, and his unfailing help to all subscribers that called upon him. Bob will still be with us, however, in the capacity of contributing editor.

As a Poly owner, PolyLetter has been of great comfort to me over the last four years, and I want it to continue to be so for you. Along with the NEWS section and CP/M CORNER, a few new regular columns and features will be initiated: "HOW IT WORKS" will be a series of articles explaining the deep, inner hardware and software mysteries of Poly -- ever wondered just what the CPU really does? Video board? Disk Controller? Serial Card? These will not be highly technical articles, and they will be in small, digestible pieces. PASCAL PASTURES will begin a look at structured programming, specifically, PASCAL. Poly will be offering a version for Poly in the future. (For all you scoffing BASIC programmers, I was just like you until I became a convert.)

The lead article in the next PolyLetter will be "HOW LONG CAN THE 8813 REMAIN VIABLE?" This will be an update on the PolyLetter article "Four Years Later", published well over a year ago. This time, I'd like your direct comments before the article is written. Tell me what you plan to do with your Poly over the next two years, and what you foresee in the future.

(Continued on page 2)

NEWS FROM POLYMORPHIC

For the second time in recent years, PolyMorphic has moved. Their new address is

PolyMorphic Systems
5330 Debbie Road
Santa Barbara, CA 93111

The phone number has not changed. It is still (805) 967-0468. Ken Gudis explains the move as follows: "Our lease was up in the old building, and we moved into a larger area to prepare for shipments of our new system. When we moved into the last building, we knew it was a temporary measure anyway."

New Poly systems are currently being shipped to selected OEMs and dealers, for evaluation only. Since these shipments started only recently, we don't have any indication yet of how the units are doing. PolyMorphic expects to start shipping the new systems to customers right after the first of the year.

To those of you who are growing tired of waiting, we can only say "hang in there a little longer!" In the meantime, your old reliable 8813 should keep you going, and of course PolyMorphic is still planning to support the 8813 for a long time to come.

SYQUEST BUGS FIXED

There was a bug in the software for Poly's removable-media fixed disk. If you exchanged cartridges in the Syquest drive, the system would not realize this, and you could lose a great deal of data.

The problem was due to the way "bad blocks" are handled on the Syquest drive. The system keeps a list of faulty areas on the disk, so it can avoid them. Since these bad areas are different on each disk, the system should read the "bad block list" from each disk cartridge when that cartridge is inserted. Failing to do this, the system got confused about where it should write data.

These problems have been fixed by a new release of software. Since it only affects the Syquest drive, the "fix" is only being issued to customers who have this removable-winchester drive. The operating system as a whole is not being re-released.

(TORCH - continued from page 1)

be marketed under the new company name **Poly Peripherals**. My first product, a hard disk system, is advertised in this issue.

Please note PolyLetter's new address and phone number, listed in this issue. And join me in welcoming Frank Stearns to the editorship of PolyLetter, as it enters its fifth year of publication!

(MANAGEMENT - continued from page 1)

Send your comments to:

Frank Stearns
14307 NE 13th St
Vancouver, WA 98664
206/892-3970

(The deadline for your comments is December 21, 1983.)

The "Open Forum" tradition of PolyLetter will continue. The most important source of Poly information is still you, the reader. YOU are POLYLETTER! Please drop me a line with your questions and comments -- subjects to be discussed in future articles, or other things you'd like to see in PolyLetter. And as always, your articles and suggestions for articles are welcome. Share your thoughts and experiences.

Once again, we all owe Bob a large Thank You. I will do my best to maintain his standards.

Frank Stearns

Dear Bob:

I've tried the trick of attaching a printer to "port 0" (the second serial card) and it works! The first time I used Setup and defined a printer to be on port 0, the system would not boot. But then I connected a second serial card to port 0 and the system booted up fine.

All in all, the Poly has been an excellent machine. Many of my computer buddies can't believe some of the utilities it has. Also, I really enjoy the PolyLetter and anxiously await each issue!

Charles Steinhauser
Huntsville, Alabama

POLYSHOP

Al Levy, PO Box 71, Hicksville NY 11801, has started a new service called PolyShop. He writes:

"I will be providing parts, supplies, and software for the System 88 at competitive prices. I now have available the Diablo HyType II printer with keyboard for \$1200. The printer is warranted for 30 days, and I will provide assistance to the buyer.

"We have in stock a few CPU, video, printer and memory cards. I will upgrade a Poly 16K card to 64K, for \$100 plus shipping. This is a special price for PolyLetter subscribers only. The modified card will work with Poly CP/M.

"Applications software will be written to your specifications, at modest fees.

"A copy of the SIG/M master catalog is available in Poly 5" and 8" formats. All public domain CP/M and SIG/M programs are also available, in any Poly disk format."

Dear Bob:

I am getting ready to retire the old 8813 rather than upgrade it. I have gotten tired of waiting for "soon" to come around for the great things Poly is promising. I am waiting for my new NEC APC to arrive so I can start some serious work for my business.

I bought a copy of the new system disks while I was at PolyMorphic. You were right about the editor... it really is great for wide, columnar reports. The price was a trifle ridiculous, though.

My Poly is presently in my USAF office where it will continue to see service as my personal word processor and report generator. The Air Force has ordered IBM XT's for the office, but I have an aversion to the Great Blue Father.

Keep up the good work with the newsletter. I will continue to support you as long as possible, and as long as my system survives.

John McGaw
Anchorage, Alaska

NEW ROM SPEEDS UP 88/MS

A new ROM is available for the 88/MS which can significantly speed up all disk write operation. This ROM goes on the 88/MS controller card in the 8813 chassis. New software in this ROM will approximately double the speed of writing to the disk. This change is especially significant during IMAGE and PACK operations.

The cost of this new 88/MS ROM is \$150. Contact PolyMorphic Systems for more information.

FOR SALE: Poly 8813 with 56K, three 5" SSSD drives, MS with two 8" SSDD drives, keyboard with numeric pad, Hitachi 9" monitor, Confidence disk. \$3500 plus freight. Brian Biswanger, (403) 235-7124 days, (403) 288-7303 nights.

FOR SALE: Poly 8813, three 5" SSSD drives, Amdek green-screen monitor, Hayes Micromodem 100, keyboard with numeric pad. Software with manuals: WordMaster II, spelling checker, Mailist, General Ledger, Loan Analysis, modem, PLAN, BASIC and User's Manuals. C. J. Handlogen, (214) 349-2367.

The purpose of PolyLetter is to create a forum of ideas for users of Poly equipment. One year (six issues) subscription \$15 US and Canada, \$20 overseas. Back issues are available.

New address:
PolyLetter
14307 NE 16th Street
Vancouver, WA 98664
(206) 892-3970

PolyLetter is not affiliated with PolyMorphic Systems Inc.

- - -

Put me on your mailing list:

Name _____
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System _____
Printer _____
Uses _____
Future uses _____

MORE ON MACROS

For assembly language programming, the Poly macro-assembler can make life much simpler. We've presented some sample macros before, and here is another one. This macro, called **Cursor**, moves the cursor to any spot on the screen, and optionally turns it off or on at that location.

```
Cursor MACRO
#L    PUSH    PSW
      PUSH    H
      LHL    POS      ;get location
      MVI    M,7FH    ;kill old cursor
      LXI    H,6144+#1+64*#2
      SHLD   POS      ;install new
      IF    NOT NULL[#3]
      MVI    M,OFFH   ;turn new one on
      ENDIF
      POP    H
      POP    PSW
      ENDM
```

This macro takes three arguments: the X position on the line (0 to 63), the Y position on the screen (0 to 15, 0 at the top), and an "on" switch. The third argument can be anything, but if it exists, the cursor will be turned on at the new location. If you want the cursor to stay off, omit the third argument.

Here are some examples:

```
Cursor 0,0      ;cursor to home

Cursor 0,0,ON   ;home, and on

Cursor 0,8      ;left edge,
                ;halfway down

Cursor 32,8,ON  ;center screen,
                ;and on
```

When should you use macros? Consider what a macro does for an assembly language program. It allows you to write a one-line command for some complex function, such as moving the cursor. Macros tend to make your job as a programmer easier, by putting more of the burden on the macro-assembler. This will cause the assembler to take longer assembling your file (not a big problem, usually).

The object code from a macro will usually be larger, and run a little slower, than it would if you had written the functions by hand. Again, this is not normally a big problem. If you run into time or space constraints in your code, you

5 MEGABYTES FOR \$1990

You asked for it! You needed a low-cost hard disk subsystem, with no hassles, compatible with your Poly 8813 or 8810. You wanted to extend the usefulness of your Poly system by adding vast amounts of storage, with super-fast disk access time, and no changes to your existing programs.

You've got it! The **Poly Peripherals Hard Disk III** is a complete mass storage system for the Poly 8813/8810. It is the first low-cost hard disk to be offered for your Poly.

Features include:

5 megabytes of formatted storage - equivalent to four 88/MS drives, or fifty-five 5" SSSD disks, or 19,582 sectors, all simultaneously online!

Lightning-fast access. Don't ever use a hard disk unless you plan to buy it... you'll never be satisfied with floppys again.

Poly's CONFIGURE program allows you to divide the drive into up to 19 "volumes" for separating your files into logical groups.

Reliable, field-proven components, including a Xebec controller and MiniScribe disk drive.

The Poly Peripherals Hard Disk III is completely compatible with the Poly operating system, using Volume Manager. It comes with all necessary hardware, device driver software, and complete installation instructions. Call or write for more details, including system requirements. Or send check or money order for \$1990 to

Poly Peripherals
1437 Sugarwood Lane
Norcross, GA 30093

No CODs, please. Shipping is included in this remarkable price!

can always go back in and remove the macros later.

You probably should not use macros if your code is destined to end up in ROM. ROM space is expensive, and if you run out, you can't often add more ROM to your system.

MODEMS AND COMMUNICATIONS

In the first half of this article, we explained what a modem is used for, and also described some of the types of modems available for small computers today. This time we will concentrate on the Poly's serial interface, and how you can use it with various types of modems and printers.

This is an article I've been meaning to write for a long time. In my almost-five-year association with Poly equipment, I've done more work with the Poly serial interface than with any other part of the machine. The Poly serial port is flexible enough to be used with almost any piece of RS232 equipment you can buy. The trick, of course, is knowing how to use it!

Half the battle is hardware, and the other half is the software; let's talk software first. The Poly operating system contains software which allows you to use nearly any kind of printer with the serial port. The **Setup** program and the **Printer** command let you "teach" the system about your printer. Then you can use the PRINT command, or the formatter, or any BASIC program that writes to the printer, and they will all know how to talk to the printer as you have defined it. Using the serial port in an output-only mode like this is quite simple. To use it for input as well as output (as you would with a modem), you need different software. Last issue's article gave some examples of the programs you might use to talk to a modem.

So the remaining problem is hardware. In order to hook up a new piece of equipment to the Poly serial port, whether it be a printer or a modem, you will need an understanding of how the port is wired. (Don't stop reading... this will get a little technical, but I promise you can follow it if you try!)

Most of you have looked inside your Poly at one time or another, and seen the "serial mini-card" on the back panel. It's a small circuit board, about 2" by 3", which holds the RS232 connector to the back of the machine. On this card is a plug, the size and shape of a 16-pin IC chip, which has some wires on it. This plug is sometimes called the "header plug" or "jumper plug." It functions like a switchboard. By changing the wires on it,

you can rearrange the signals that appear at the RS232 connector on the back.

Why use a header plug? Most machines today don't. But, Poly's designers had a good idea. The header plug, in theory, allows you to use the simplest possible cable between the Poly and the external device (modem or printer). All of the complicated wiring could be done on the header plug, instead of by rewiring the cable attached to the device. Unfortunately, not all interface problems can be solved by using the header plug. So it often happens that to make a device work properly, you will need to rewire the header plug and modify the cable. Such is life.

Figure 1 shows the signals surrounding the header plug and the rear panel RS232 connector. The signals on the right are carried to/from the CPU card by the little ribbon cable that runs between the CPU and the serial mini-card. Notice that they are in pairs: receive (rx) and transmit (tx) data, CTS and RTS, and so on. (More on the functions of these signals later.) The little triangle on each signal points in the direction that signal flows. All of these connections to the CPU are on the right side of the header plug, pins 16 through 9.

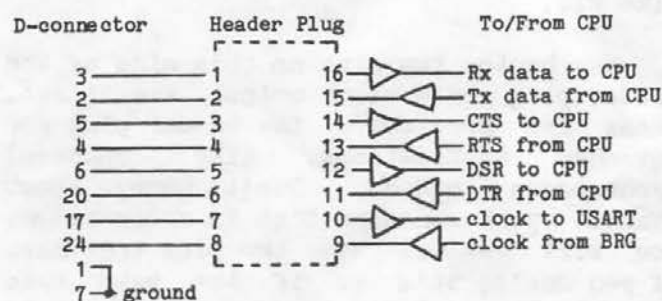


Figure 1

On the left side of the header, the signals all go directly to pins on the RS232 connector. There is no path from the CPU to the RS232 connector unless a header plug is installed. By arranging wires in the header plug, any CPU signal can be made to connect to any RS232 signal. This allows the header plug to compensate for strange wiring in the cable going to the device. But, as we'll see in a moment, there are only a few arrangements of the header plug that really make sense.

Let's start with a quick definition of the pins on the right side of the header plug. RxD and TxD are easy; they are transmitted data, out of the Poly, and received data, into the Poly. CTS is Clear To Send, an input to the Poly which says, in effect, "the external device is ready for more data." Some signal must feed CTS or else the Poly can never transmit data. Most printers use CTS to hold off or "handshake" with the Poly, to tell it to wait before sending more data.

RTS is Request To Send. It's not actively used by the Poly, but it is there, and is always placed in the "true" condition. If your printer doesn't require the use of CTS, you can connect RTS to CTS so that the Poly will be able to transmit. Remember, something must drive CTS.

DSR is Data Set Ready. In the newer printer drivers, Printer/42 and later, DSR acts like CTS: Both must be "true" before the Poly will transmit data. This change was made because of some complications in the TwinSystem printer driver. But you can ignore DSR if you make it always "true," by connecting it to RTS or DTR. What's DTR? It stands for Data Terminal Ready, and is another output from the Poly that the system always sets "true." So, it looks like RTS.

The bottom two pins on this side of the header plug are a clock output and input. These are provided at the header plug for advanced applications, like (shudder) synchronous modems. Don't worry about them... just remember that in every case, you will connect these two pins together. If you don't, it's as if the baud rate generator was turned off, and the Poly won't transmit or receive anything.

A side note: Ever wonder why the Poly won't boot if your printer is turned off? In the boot process, Exec initializes the printer by calling **Prnt.OV** to load the default printer driver, usually in **Sio.PS**. Sio tries to send a carriage return to the printer to ensure that the print mechanism is at the start of a line. If the printer is turned off, CTS will be false, so the Poly can't send that data. The whole system stops at that point in the boot process, unless the printer is turned on, or unless you interrupt it with Ctrl-Y.

Enough theory! Let's wire something.

In order to make communications happen, we must establish a path between the outside world and the CPU by wiring up a header plug. We will need a device to communicate with, so let's start with a simple one. An easy modem to start with is the Cat by Novation. We find its wiring diagram in the manual, and it looks like this:

<u>Pin #</u>	<u>Usage</u>
1	Gnd: Ground
2	TxD: Transmit Data (input)
3	RxD: Receive Data (output)
4	RTS: Request to Send (input)
5	CTS: Clear to Send (output)
6	DSR: Data Set Ready (output)
7	Gnd: Ground
8	DCD: Carrier Detect (output)
20	DTR: Data Terminal Ready (input)

What an overwhelming number of pins... whatever shall we do? First, try to simplify things by reading the fine print. Aha! The Cat manual says that pins 4 and 20 are ignored by the modem, so we don't need to connect these. Also, it says pins 5, 6, and 8 are always "true" outputs from the modem. We don't need to use these unless we want to. So the only important pins are 2, 3, and 7 (or 1) as a ground.

Suppose we get some RS232 connectors and build a cable with pins 2, 3, and 7 wired through from one end to the other, and all other pins left unconnected. The cable looks like this:

<u>Cat</u>	<u>Poly</u>
2 _____	2
3 _____	3
7 _____	7

Plug one end into the modem and the other end into the Poly. That would bring received data through to pin 3 on the Poly's RS232 connector, and the modem would expect the Poly to put its transmitted data on pin 2. We should wire a header that looks like this:

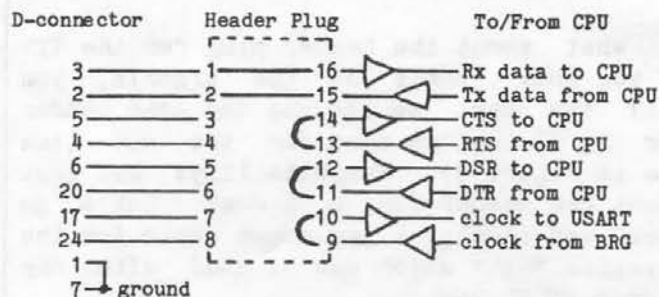


Figure 2

Trace out the signal paths until you're sure of what's going on. Transmitted data out of the Poly CPU card goes to pin 15 of the header plug. A wire on the header takes it to pin 2 of the header. Then it will go to pin 2 of the RS232 connector, where the straight-through cable will take it to pin 2 of the modem. That's what the modem wants.

Likewise, received data from the modem appears on pin 3 of the modem, then pin 3 of the Poly RS232 connector, pin 1 of the header, is wired across to pin 16 of the header, then goes to the CPU card "received data" input. The other wires on the header go from pins 9-10 to make the baud rate generator work, and 11-12 and 13-14 to allow the Poly's transmitter to operate (remember CTS and DSR have to get connected to something!).

This arrangement is fine for a modem. But it won't do much for us if we want to connect a printer to the Poly. Most printers, as we said, require handshaking... but this wiring of the header plug doesn't allow any external device to connect to CTS. Next we'll look at a printer, and see what kind of header plug it requires.

We will choose the NEC 5510 Spinwriter letter-quality printer. (This information will probably also apply to any NEC printer with a serial interface.) Again the first thing to do is, "read the manual!" Looking in the NEC manual, we find the wiring information on its serial interface is as follows:

Pin #	Usage
1	Gnd: Ground
2	TxD: Transmit Data (output)
3	RxD: Receive Data (input)
4	RTS: Request to Send (output)
5	CTS: Clear to Send (input)

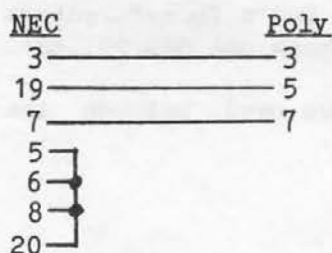
6	DSR: Data Set Ready (input)
7	Gnd: Ground
8	DCD: Data Carrier Detect (input)
19	SCA: Busy (output)
20	DTR: Terminal Ready (output)

First of all, notice the change in signal directions. For example, pin 3 is now input to the printer, but pin 3 was an output from the modem. This is typical for RS232 devices... printers (terminals) and modems have opposite beliefs about signal directions.

The NEC is a difficult device to interface with. Before it will do much of anything, it requires a "true" signal level input on pins 5, 6, and 8. This is supposed to prevent the printer from operating until a computer is hooked to it and functioning properly. All it really does is make the interface job worse. This requirement can be satisfied, though, by noting that the NEC always sets pin 20 "true." So when we build a cable from the NEC to the Poly, we can wire pin 20 to pins 5, 6, and 8, all on the NEC end of the cable. This will enable the printer to print.

Notice the "busy" signal on pin 19. This must be routed to the CTS pin of the Poly, so that when the NEC's buffer is full of data, the Poly will stop sending. Most printer have a "busy" signal of some sort, typically on pin 19, 20, or 11 of the printer's RS232 connector. It's your job to find that signal, and connect it to the Poly's CTS input. This requires the proper cable between the Poly and the printer, and also requires the header plug to be wired properly. In some printers the "busy" signal can be set to either a positive or negative polarity by some kind of internal switch. If it doesn't work in one direction, try the other!

Here is the cable wiring we need between the NEC printer and the Poly:



And here is the header plug wiring:

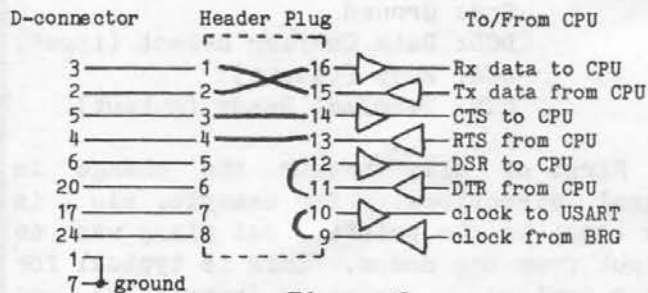


Figure 3

Why did we include some wires on the header that don't get used in the NEC cable? Changing the header plug is a bother, as we know. You must open up the 8813 chassis, which requires removing several screws, moving the video monitor, and so on. We would like to find a "universal" header plug arrangement that we can use for nearly any external device. As you'll see below, the wiring of Figure 3 will work for other devices besides an NEC printer.

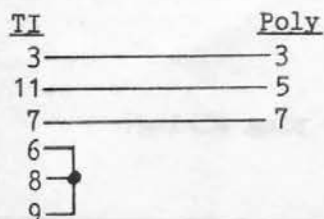
The next printer we'll try to interface with is the TI 810. Its wiring diagram is:

Pin #	Usage
3	RxD: Receive Data (input)
6	DSR: Data Set Ready (input)
7	Gnd: Ground
8	DCD: Data Carrier Detect (input)
9	Test output (true)
11	Busy (output)

The TI 810 requires a "true" signal on pins 6 and 8 before it will function. This is similar to the Poly's requirement for a "true" signal on CTS and DSR, or the NEC's need for a "true" signal on pins 5, 6, and 8. We notice that the TI has an output on pin 9 which is always in the "true" state, and can be used to satisfy pins 6 and 8. Alternatively, we could use the Poly RTS or DTR outputs to drive pins 6 and 8 of the TI.

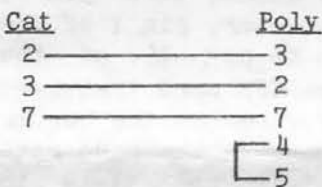
Notice that the TI's "busy" output is on pin 11, whereas the NEC's "busy" output was pin 19. Some printers use pin 20, too.

Here is the cable we need between the TI 810 and the Poly:



What about the header plug for the TI? If you look closely at the signals, you will see that we can use the same header for the TI that we used for the NEC (the one in Figure 3). **Compatibility!** But what about the header for a modem? Let's go back and make up a new modem cable for the Novation "Cat" which can be used with the header of Figure 3.

Using the header plug from Figure 3, the Poly's data output appears on pin 3 of the RS232 connector. This must go into pin 2 of the modem. Pin 3 is the modem's data output, which goes to pin 2 of the Poly; so pins 2 and 3 are swapped in the cable. Is this all we need to do? Not quite... the header plug in Figure 3 doesn't connect anything to Poly's CTS, which we said we always had to do. But Figure 3 provides RTS on pin 4, so we can use this to drive CTS by adding one wire to the cable. Here is the new cable for our Cat modem:



This cable can be used with the header plug of Figure 3. In fact, Figure 3 is a very useful arrangement for the Poly header plug, and can be used with a variety of external devices. Each device will, usually, need its own special cable. But armed with the knowledge in these articles, you should be able to create the RS232 cable needed for almost any device you might purchase.

A final word on RS232: Don't be afraid of it. RS232 signals are not dangerous to man or beast; the voltages only go up to plus/minus 12 volts. And if you wire the cables wrong, you can't hurt anything in the equipment. If it doesn't work, just change the cables and try again.

This article is dedicated to the many Poly owners who have wondered about the 8813 serial port; and especially to those with whom I've had the pleasure of working. Thanks to those who sent wiring diagrams, printer manuals, and even complete printers and Polys to my house. I've learned a lot about data communications from the Poly, and your assistance was extremely helpful.

DISK FAILURE MODES

In any system, there are failures which can occur. Usually we can predict the most likely types of failures, and these are called the failure modes. If we understand the failure modes of a piece of equipment, it becomes easier to tell when that piece is actually breaking down.

The Poly disk system is very carefully designed to ensure that your data will not be corrupted. When a failure does occur, the Poly is kind enough to report it to you, so you can take corrective action. Here are some of the safeguards built in to the 8813 disk system:

- Sector checksums. Every sector written to the disk has a checksum associated with it. If this sum is bad when the data is read back, it constitutes a "Checksum Error!"

- Verify after write. Every time new data is written to a disk, it is immediately verified by reading it back. If the data doesn't match, the system reports a "Verify Error!"

- Directory checksums. Any directory operations will test the checksum to be sure that the directory is good. If the checksum is wrong, you see "Disk Directory Destroyed!"

These last two items are something you don't see in most other systems, including most CP/M systems. Verifying (also known as write checking) takes a little time, but it's worth it for the peace of mind it brings.

When errors do occur on a disk, one of these messages will probably be the result. As annoying as the error message can be, it's far better to see it now than later. A little corrupted data now can lead to a lot more corruption later, if the problem is not corrected.

The safeguards built into the Poly system are designed to handle the common failure modes of a disk drive. The designers know how a disk works, so they can predict how it will fail, with a high degree of confidence. Conversely, if none of the known failure modes occur, you can have a high degree of confidence that your data is good.

Suppose you receive a disk from PolyLetter, or some other software vendor. How do you know the data on the disk is intact? If you get none of the "disk error" messages, it means your Poly can at least read the data. To be doubly sure, use the Sniff command:

```
$Sniff 3
```

If you are a software vendor, you want to be sure that the disks you send to your customers are correct. At PolyLetter we use a command-file to copy our disks for distribution. The command-file is called **COPY12**. It first initializes the disk in drive 2, then images from drive 1 to drive 2. Finally, it uses **COMP-DISK.GO** to compare the two disks. We use drive 4 as the system drive during this process. Here is what **COPY12** looks like:

```
EN
?IN
2

IM
1
2
TRIX<COMP-DISK
1
2
```

The first thing it does is **ENable** the system, since **INIT** and **IMAGE** only work in **ENabled** mode. The second command is **IN** (short for **INIT**), preceded by a question-mark. The "?" prefix prevents **INIT** from killing command-file mode. We tell it to **INIT** drive 2, and enter a blank line as the disk name. The disk name will be rewritten by **IMAGE** anyway.

Next we **IMage** from drive 1 to drive 2. Then we call **COMP-DISK** (in directory **TRIX**) to compare the disks in drives 1 and 2. If **COMP-DISK** reports no errors, we are extremely confident that the disk in drive 2 is a good copy.

The only thing this process doesn't check is that drive 2 is aligned properly. If drive 2 was out of alignment, a disk written on drive 2 (by **IMAGE**) would be readable on drive 2 (by **COMP-DISK**), and we would not know there is a problem. Running the Confidence disk regularly will point out this kind of problem before it gets critical.

PolyLetter

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