# PROCESSOR TECHNOLOGY ACCESS.

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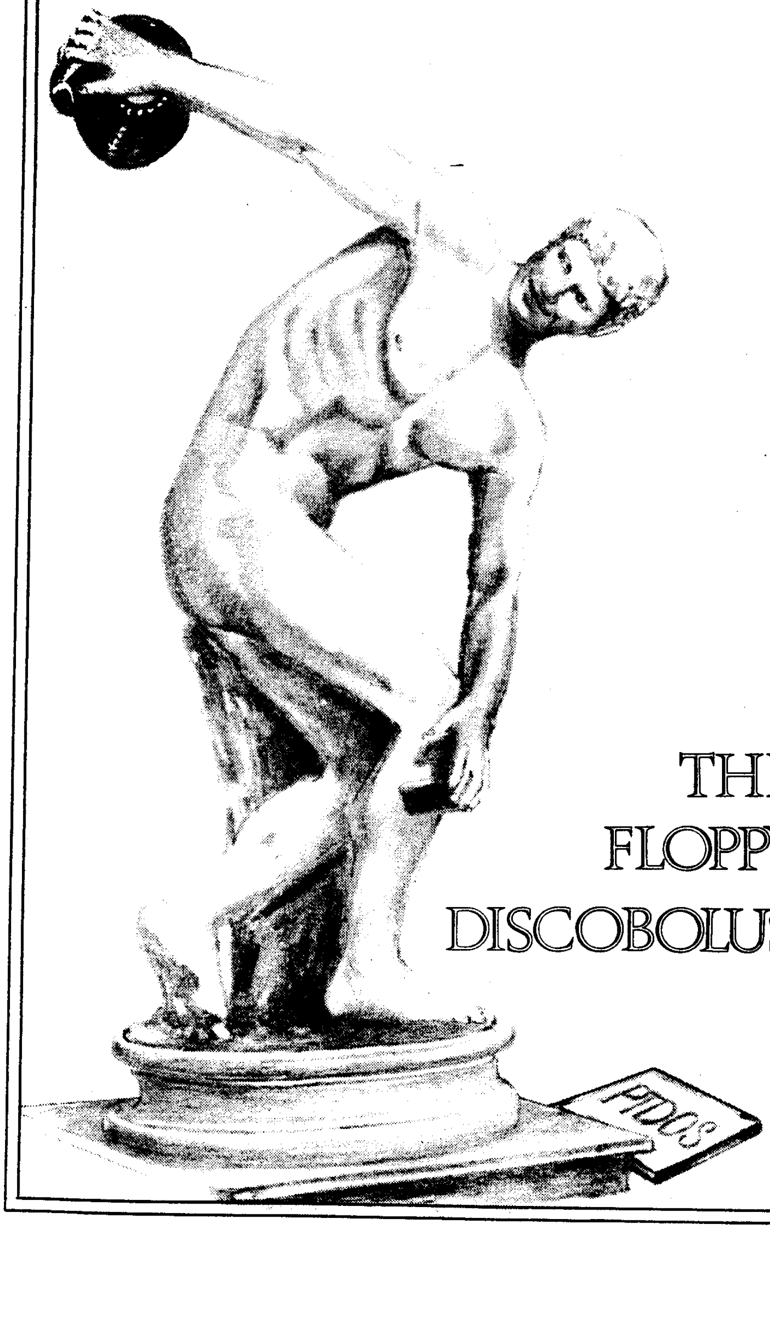
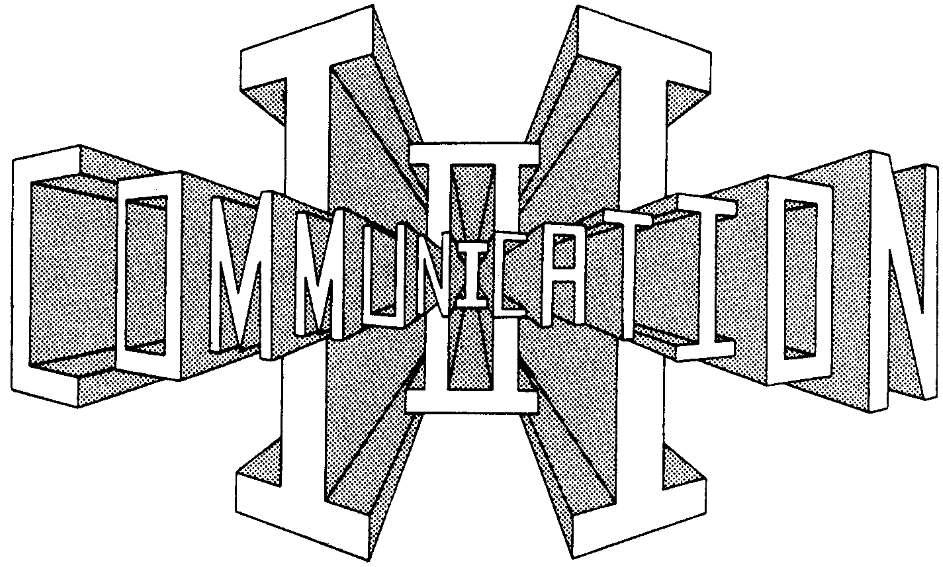


THE FLOPPY DISCOBOLUS



The feedback is starting to come in at a most gratifying rate, so we'll get on to the news of note after a brief commercial for our technical troubleshooting hotline -- call 415-829-2600 weekdays between 9:30 and noon or 1:30 to 4.

**Software availability -- good news time.** Are you ready? A good portion of Processor Technology Software is. Specifically, TREK-80, ALS-8, GAMEPAC, and BASIC/5 (all on the most-wanted list) are now available and in stock at your local dealer. No paper tape versions, though -- we're no longer producing any Processor Technology software on paper tape.

As for other software, you can currently look for SW#1 (Assembler) and MATHPAK in mid to late October; New 8080 FOCAL and 8K, and extended DISK BASIC on November 15. Incidentally, the two BASICS will have some capabilities we haven't advertised previously, such as complete matrix operations including matrix addition, subtraction, multiplication and inversion. Sure wish I'd had a Sol with 8K BASIC when I took linear algebra!

And look for some new software surprises turning up soon at your local dealer. We do appreciate your patience in waiting for software production and availability, and you won't be disappointed with the final product.

**Software cassettes.** Just a reminder that all our audio cassettes are recorded on two sides. Side 1 is in CUTS Standard (SOLOS/CUTER compatible, recorded at 1200 baud); Side 2 is Kansas City Standard at 300 baud, in case you don't have a Sol or CUTS audio cassette interface board.

**Hardware: Helios II is coming.** After many frustrating engineering and software development delays, deliveries have begun on the Processor Technology Helios II dual-drive floppy disk system. If you have one on order, either through a dealer or directly from us, rest assured that it's on its way. Unfortunately, we have so many orders we probably won't get through the entire backlog until late November or early December. If you want additional information, or you'd like to see a demonstration, check your local dealer, or give us a call.

We've been emphasizing the importance of our dealers all along, and they are your best first source. They're far more able to provide the service you deserve than we are from our distant factory, and they're always happy to hear from you. They're all authorized to perform service and repairs on all our products, and we're adding new dealers rapidly. Retail computer stores are multiplying like rabbits, in case you hadn't noticed.

*Lloyd's Second Law: Any program can be written in fewer commands.*

## ENTER THE GREAT SHOW-OFF-YOUR SOL CONTEST

## and maybe win a GPM/Sol with ALS-8/SIM-1/TXT-2 ROM set

All you have to do is tell us how you are using your Sol. The grand prize will be awarded for the most interesting and/or unusual application; runner-up gets the Software Technology MUSIC SYSTEM, an interesting way for you and your computer to make music.  And all of the more interesting entries have a chance to get published in future issues of ACCESS, with full credit to your resourcefulness and imagination.

Use the form on the back page to enter, using additional paper as needed.  We'd like to have as much technical information as possible; i.e., what kind of hardware support was needed to get Sol to do your thing?  And please be as specific as possible about when and where you're using it-business, science, industry?  At home?  What's it doing?  Have you interfaced it to your lawn sprinklers, burglar alarm, Chevrolet?  (We've heard of Sols used in the most provocative ways!)

We're holding this contest with three motives in mind.  1) To provide us with some feedback on what Sols are doing and how they're doing it, so we can direct our future efforts accordingly.  2) To give you, the Sol user, some insight into what other Sols are up to so you can pick up some nifty ideas for yours.  3) To provide a little excitement, fun and games for everyone.

The prizes will be awarded by the most impartial judges we can scout up to objectively determine the most original, unusual and imaginative application of a Sol.  Programs and developmental work you may have done are valid entries, so get those pencils going on the entry form.  Mail your entry to:

Sol Applications Contest
Processor Technology
7100 Johnson Industrial Drive
Pleasanton, CA 94566

Closing date is December 1,1977.

# Table of Contents

# A Letter From the Editor

"Any minor of order *r* in the adjugate determinant of a square matrix A is, on expansion, a certain polynomial in the elements of A, fixed in form whether A is singular or note."

**Determinants and Matrices**

"There are no Jewish midgets."

Lenny Bruce

Well, how do you like our new format? Now you can keep our deathless prose (and occasionally valuable information) neatly in a 3-ring binder instead of stacked up on the floor someplace to hide the cigarette burns. (Oh, you **liked** having something to hide the cigarette burns?) It should prove a more useful reference format, and we'll keep working on making ACCESS responsive to your needs. May even get classy soon and go to two-color.

Notes from the show circuit: We had one display at NCC (Dallas) and another at WESCON (San Francisco). Seems like computer shows are cropping up everywhere you look, and unfortunately we just don't have time to keep up with them all. It's great to see so much interest developing though -- remember back to the dark ages when you were the only computer freak in town, all of a couple of years ago?

Meanwhile, instead of going to shows we're keeping our noses to the grindstone. The first Helios shipment is out and more are on the way. ALS-8 on CUTS cassette is now shipping, and 8K BASIC is set for mid-November. Ralph has more to say about new products, so take a look at his 1-to-1 column.

By the way, if you send us software contributions, try to give them to us on CUTS cassette. That way we can run out a listing, send it off to the printer, and it turns up in the next ACCESS in a neat standard format just the way you wrote it. If we have to have the listing typeset, there's just that much more chance of an error creeping in and turning your beautiful program into a debugger's nightmare. We are getting some nifty programs from you people -- take a look at Guy Campbell's home accounting system and Melvin Schehlein's modification to avoid erasing input lines, both in this issue.

We're always interested in all forms of communication with the outside world. If you are a member of a club, or publish a newsletter yourself, I'd really like to hear about it. We might be able to exchange membership or subscription lists. That way we'd all be getting more information, and know more about each other.

Well, bye now -- y'all come see us at our new home in Pleasanton, y'heah?

Aram Attarian II

## Subscription Information

Access is published every six weeks. If you like what you see, we hope you'll send us $4.00 for a year's subscription so we can keep the info coming. Write to us at Processor Technology, 7100 Johnson Industrial Way, Pleasanton, CA 94566.

## Have You Moved?

Please notify us of your change of address. Here's a handy form:

**NAME** ________________________________________

**NEW ADDRESS** ______________________________

_______________________________________________

_______________________________________________

## READER FEEDBACK

Gentlemen:

Having picked up a copy of #2 ACCESS at the N.C.C., I've been delighted at your fresh style of presentation.

The Texas A & M Microcomputer Club is composed of a number (about 50) of micro-computer buffs who are mainly software-development oriented. If you visited the Personal Computing Faire at N.C.C. you may have seen the APL-Core booth which is a club project. Robert Arnstein and Ian Kettleborough are former members of the club.

I was wondering if it would be possible for you to send us a few copies of ACCESS whenever it is published for distribution to interested club members. MITS does this with Computer Notes, which, of course is putting the advertising into a spot where it may potentially do the most good. However Computer Notes is rather dry on occasion.

The SOL system has been demonstrated a number of times for the club and it always draws quite a bit of interest. Several members of the faculty in various computer-related disciplines are considering a purchase.

Congratulations on a very readable publication.

Sincerely,

Robert R. Weir<br>
Summer Caretaker,<br>
TAMUCC

Dear Bob:

Thanks for the strokes. We'll put you on our mailing list right away, and we'll be glad to do the same for any other clubs who care to drop us a line.

Aram

Gentlemen:

As the satisfied user of two Sol systems I have encountered a problem when using the device as a terminal. The problem occurs because of the PCR routine in the VDM section of SOLOS. The attached assembly listing should be self explanatory as a successful solution. (See p. 20, this issue.)

Secondly, how come your company wasn't directly represented at Atlantic City this year? I know by talking to friends in the computer hobby field that you are having great difficulty delivering some of your new product line. Your equipment is of such high quality across the board most of us are willing to wait. Do you have something to hide or did you opt for Boston?

Yours truly,

Melvin E. Schehlein,
Ass't. Director of CMS

Dear Mel:

Thanks for a good idea: being able to check the last input certainly helps. Your program appears on page 20 of this issue. As for the shows, the cost of hitting all the ones cropping up on the East Coast especially is just prohibitive. We wouldn't have any money left to produce Sol's with. But we will make the New York City show in October. Right about now in fact.

Aram

Dear Aram:

I recently purchased, assembled and am running a SOL-20 under SOLOS. As a first trial exercise (having only 4K), I entered Newett Awl's Choo Choo Train. After much gnashing of teeth, wringing of hands and tracking of unstructured programming, I got it running. The trick was in the instruction in location 0156H; instead of an "IN 0" (DB00), SOLOS requires an "In FC" (DB FC). This is in addition to the necessary "C3 C9C1" in 0163H to return to SOLOS.

My purpose in writing this letter is not so much to relay the above software changes as to point out where I think ACCESS could play a large part in information dissemination. I received very little information with my SOL-20, regarding how to use the various devices with SOL (tape recorders, etc.). After scanning through the SOL manual and SOLOS listing, I found the skeleton references to the memory map and port addresses.

I could not locate any information of the complete hex-to-VDM character set, including all the obscure characters like <<headlessman graphic>> and <<triple horizontal lines>>. How about some examples of programs using the subroutine calls to SOLOS, particularly for animation on the VDM? In closing, I would like to compliment you on the publication of ACCESS. It is reassuring to have some further "feed-forward" from the vendor once the hardware has been sent. Keep up the good work!

Yours truly,

Warren L. Harkness
(In SOLOS UNUM)

Warren:

Thanks for the feedback, and we will keep supplementing the manual with helpful tips via ACCESS. Also, this issue has the Choo Choo listing modified to run on Sol.

Aram

To: Processor Technology Co. ACCESS Editor

Thanks for a fine publication and outstanding products! Thought you might include this modification to the Sol system in ACCESS.

I am presently stationed in Japan with the U.S. Air Force. The domestic power here is on the European standard, that is 50hz at 100 volts. Now the SOL-20 power supply doesn't seem to mind that at all, all bus voltages are right up there, but the "swim" effect on the display could give you a splitting headache in short order.

The answer to my problem was actually quite simple. I needed four more character rows during the blanked period of the display. To obtain the extra rows I changed the preset count of U62 during the high state of VDISP, the display blanked. This change was implemented by disconnecting pin 5 of U62 from the VDISP line and tying it to ground. This gives me a total of 16 displayed and 8 blanked character rows for a total of 24 rows with 312 scan lines, a close match for the 50hz operation.

I accomplished the MOD without cutting any P.C. foil or removing the main board from the Sol chassis. Parts needed are: one Molex Pin and a short length of flexible wire.

Remove IC 62 from its socket. Carefully scrape a small bare spot on the large ground bus running near the left of the IC socket; just remove the solder mask, don't cut the bus. Solder the Molex Pin to a one-inch length of wire and then the wire to the ground bus. Bend pin 5 of the 93L16 IC outward 45 degrees and insert the IC in the socket leaving pin 5 projecting outwards. Now slip the Molex Socket over the protruding IC pin .... That's it. And no permanent disfigurement of my precious Sol when I returned to the land of 60hz.

I hope that others will profit from this modification.

Ray D. Congdon
1956 COMM GP/OLC
APO San Francisco CA 96343

Ray:

Thanks much.

Aram

Dear Mr. Attarian

Enclosed you will find a check for $4.00 for my 1-year subscription to ACCESS. Also, I have a few questions and suggestions.

1. I am a firm supporter of your company. If there is any way I can contribute to its continued success, let me know. I am presently unemployed, so most of my time is spent exploring my Sol 20 system. Unfortunately, I paid for my system via a loan. In another month or so, I won't be able to pay off this loan. If I don't find some sort of income soon, I may have to sell my Sol. I don't want to have to do this!! My being located in the center of the eastern megalopolis should open some possibilities. If there is anyway possible, HELP!!

So far, I have written some original programs. One demonstrates the use of control characters and the escape sequences used by BASIC5. I have also written machine subroutines which can be used with BASIC5 to produce some special effects.

I also do some hardware design. I have completed design of a 16K static memory board using MOS TEC 4104's. I am working on a few other things as well.

If there is any way I can help, even with nothing in return, please let me know. As far as some sort of income, if you can't help, maybe one of the readers can.

Note: I will relocate.

2. It is said that escape sequences can be used to generate characters in inverse video. I have not been able to figure out how to do this. Could you please shed some light on this subject.

3. In regard to a letter from Joseph P. Chalala, Willow Street, Pa., in Vol. 1, #3, I agree completely with his suggestion for a notebook type publication for ease of filing.

Well, that's al I for now. I'm sure there will be more in the future. Remember Murphy's Law of Thermodynamics which states "Things get worse under pressure." So, take the time required to do, whatever, right (within reason, of course). If not, it will cost you more later.

A dedicated Sol user,

David F. Wrobel

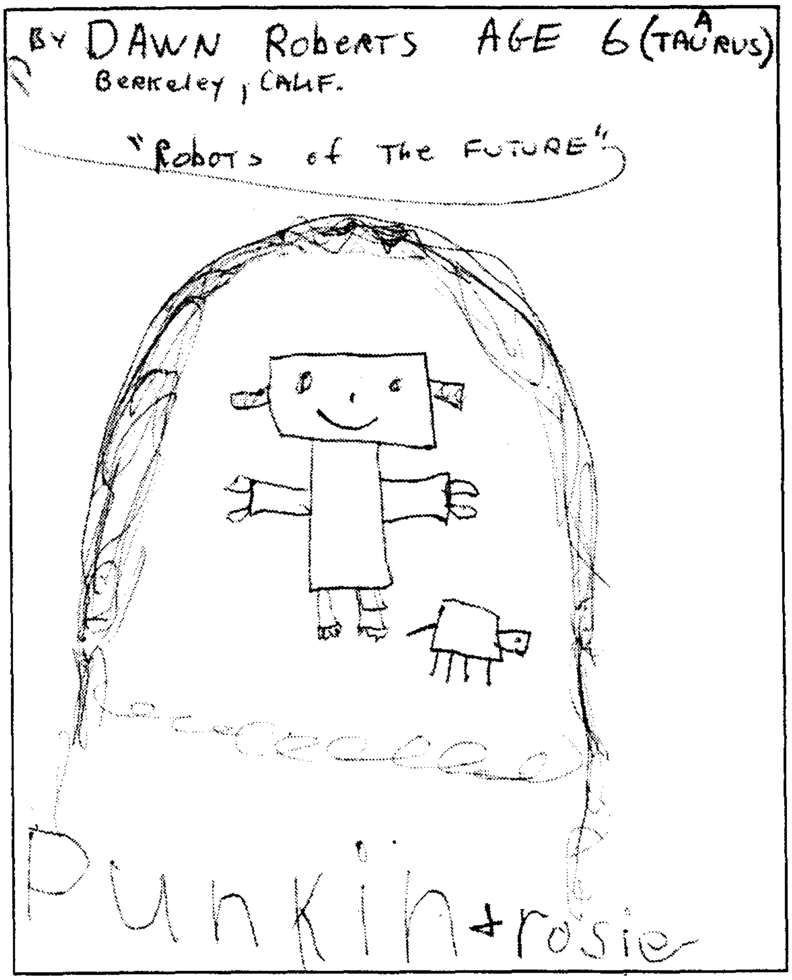
P.S. The Bayshore Amateur Computer Group, of which I am president, consists of dedicated microcomputer hobbyists. Of which, only a few are Sol owners. We would like more. We are located in central N.J. Our address is: BACG P.O. Box 132, Holmdel, N.J. 07733.

David:

There's a good reason you haven't figured out how to generate characters in inverse video-it's not true that it can be done. Sorry. Hope the new format meets your filing needs.

And can anybody out there help David find work and save his Sol?

Aram



Dear Editor:

I am always reluctant to send one of my little masterpieces in for publication, but it seems like everyone else is a little shy also, and I know that there are a lot of Sol owners, like me, anxious to try out some of its unique features.

For whatever it's worth, I'm sending a short program that makes use of the File commands in Basic 5. It's not meant to be a finished product, but it does demonstrate one way to use commands. In fact, I hope someone will pick up the ball and make a better program out of it.

The purpose of the program is to allow the user to slip last month's data tape into one file, pay the bills, update the household accounts and store the updated accounts on the other file.

I have included a sample program for setting up the original data tape, (similar to the one in the Basic 5 manual), the actual program I use for working the accounts, and a sample run.

Sincerely yours

Guy W. Campbell
5815 Buckley Drive
Jacksonville, FL 32210

Guy:

Thanks. This is the kind of creative input we really appreciate. Readers: Guy's program appears on p.17 of this issue.

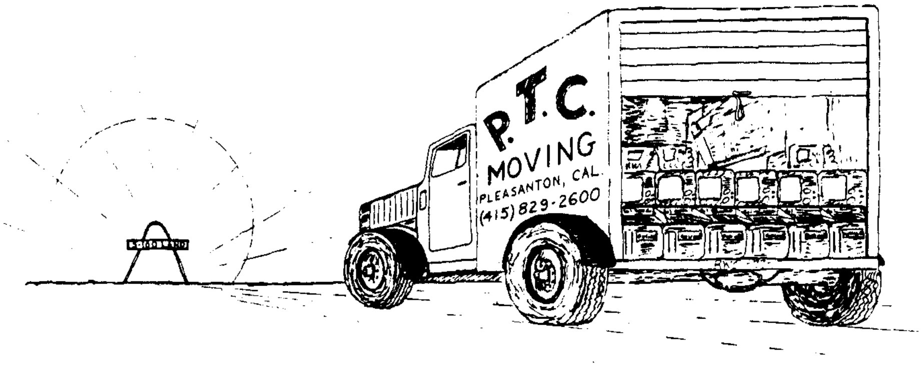
Aram

# We've Moved Again!

For the same reason as last time -- we ran out of space and outgrew the facilities again. We've now forsaken Emeryville for sunny Pleasanton, CA, just over the hill. If you're curious about the history of Pleasanton, or just curious, I refer you to a book entitled "Mammy Pleasant," by Helen Holdreage.

The new address is

Processor Technology Corp.
7100 Johnson Industrial Way
Pleasanton, CA 94566
Phone: 415-829-2600



## Join the Sol Users' Society

The Sol Users' Society got under way Sunday, July 31, when about 30-40 Sol users met for the first organizational meeting. The Society is open to everyone who has a Sol or a Sol-type compatible system, so they're hoping to see even more of you at the next meetings.

This first time out a steering committee was elected, and goals were set for the Society. These goals are:

1. To facilitate communication between Sol owners.

2. To provide feedback from Sol owners to PTC.

3. To provide a mechanism for exchanging Sol software.

4. To encourage development of Sol-compatible products by other manufacturers.

Some time was spent just getting to know one another and talking about various projects the club can tackle. Seems that most of the stuff users have to offer is software, but they're also interested in reviewing any hardware submitted to the Society, be it prototype or production. They can't supply certification, though.

One project definitely under way is a Sol Users' Society newsletter. Contributions and comments herewith solicited.

A tidbit that emerged from the first meeting: TDK Auda C-60 cassette tape performs best in a bitchopping test.

**Schedule of meetings.** The group is set to meet on Sundays Oct. 16, Nov. 20, and Dec. 18, at Varian Physics Lab, 2nd Floor, Stanford CA. Come meet the new steering committee: Bill Burns, Dave Fylstra, Ron Findlay, Ben Milander, Bill Holding, Stan Sokolow, David Fox.

For more information, please write to:

Bill Burns
4190 Maybell Way
Palo Alto, CA 94306
(no phone calls, please . . .)

# Review:

## Software Capabilities of the Helios II Disk System

The Helios II system has several capabilities I haven't seen in other disk systems on the market, and one particularly notable advantage for use with the Processor Technology Disk Operating System: you can write I/O routines for the Helios which permit the use of any I/O controller in conjunction with PTDOS, including the Cromemco D to A board and just about any homebrew board you've already built. (Maybe not some that perform DMA or make use of the I/O ports as control ports by the disk controller.)

The reason for this flexibility is that Helios treats all files as data files, including the device files used for I/O routines. These differ from regular files in that data read from or to them will come or go directly to the devices controlled by the I/O routine. With Helios, the only thing you have to worry about is to make sure you follow the guidelines in the PTDOS user's manual when you write your I/O routine.

Software support is another big plus for Helios. It offers a disk assembler, two editors (one ALS-8 type, one Nova-type), library functions, a debugger, language systems, procedures (PROCS), and full interface to PTDOS on command or assembly level.

The disk assembler allows you to generate object and listing files from a source file. You have the options of specifying if the input file is ALS-8 type, if it has line numbers, if it has form control, and a few other things.

The ALS-8 type editor is especially useful on systems with a lot of memory because you can work with text, as in the ALS-8. You have the options of scrolling forward and backward through the text, deleting characters, searching character strings, moving blocks of code, replacing string patterns with others as found. The limitation to this editor is that it requires the VDM-1.

The Nova-type editor can be run on almost any terminal, since all I/O is run through the system console routines. It will yank pages into the edit buffer, change data in the page, and write it out. If offers many of the same functions as the ALS-8 type.

Library functions allow you to assemble several source files which make up one logical program. It's done through the use of a copy verb included in the PTDOS assembler. You could expand the use of this verb to build up a library of source files which perform common functions, then concatenate these files into an object file through the assembler.

The debugger serves a function similar to that of the simulator in the ALS-8: you can run object code in a controlled environment. However, the debugger runs real time instead of the simulator's interpretive mode. You can use it to set numerous break points; examine memory in hex, character, or instruction format, alter memory or output drivers; and do several other useful debugging tasks.

The broad spectrum of language systems available includes a DISK BASIC and DISK FOCAL; FORTRAN is rumored to be among those upcoming. Language support is definitely one of the big advantages of the Helios system.

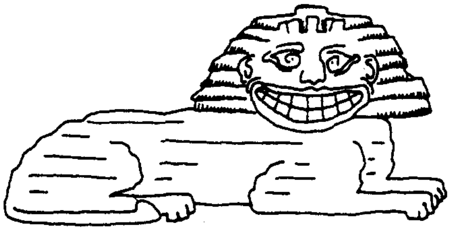
The command interpreter gives access from the console to many of PTDOS's numerous entry points. A partial list of the commands available: SPACE, OPEN, CLOSE, KILL, RANDOM, SEEK, RENAME, REATR, RETYPE, CREATE, READ, WRITE.

With PTDOS, you can also enter procedures in ALS-8 type file formats as a series of commands which may include optional statements.

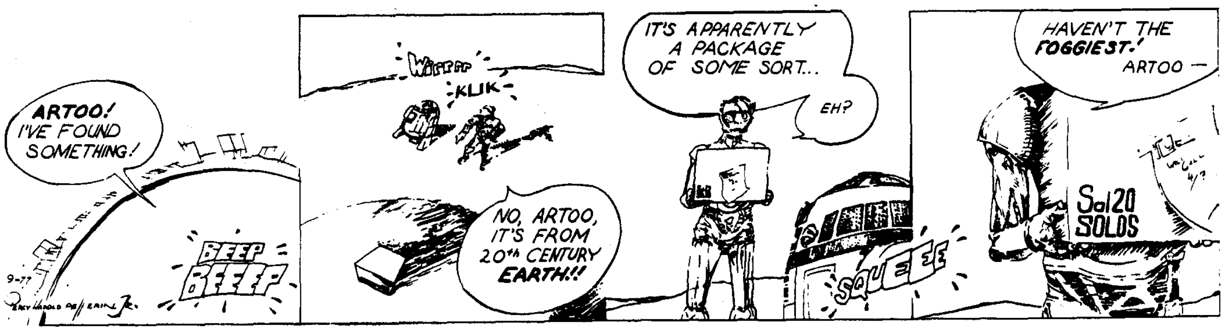
The PROCS itself is simply a list of commands which you can enter and allow to execute consecutively. Very useful for setting up, say, a 3-hour listing to print out while you get some sleep.

All in all, the Helios II disk memory system has proved well worth the time and price from this user's point of view.

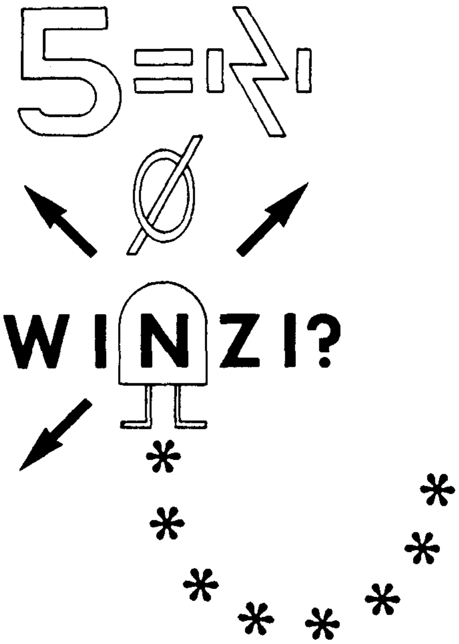
Colgate Spinx



*Cynic: One who is enough to make anyone a pessimist.*


ARTOO! I'VE FOUND SOMETHING!
BEEP BEEEP
9-77
WHEEEP
KLIK
NO, ARTOO, IT'S FROM 20th CENTURY EARTH!!
IT'S APPARENTLY A PACKAGE OF SOME SORT...
EH?
SQUEEE
HAVEN'T THE FOGGIEST.' ARTOO —
Sol 20 SOLDS

# WINZI



WINZI is a collection of programs that were originally written last summer for VDM1 and published in D.D.J. They have been rewritten for a Sol with a SOLOS personality module and addressed to use the 1K of RAM available on the Sol P.C. board.

The programs are:

**H** ic -- a random walk

**O** pps -- draw a picture without returning

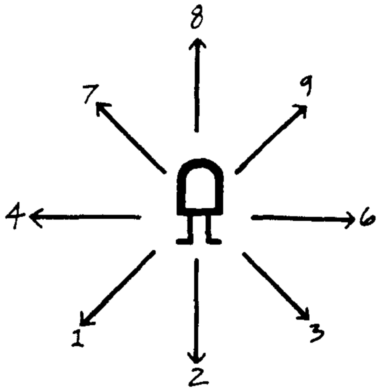
**C** hase -- make the turtle catch the bouncing bug

**L** ife-the 'game' of LIFE

The speed of Hic, Opps, Chase and Life are under control of the SET command (see SOLOS manual). Before EXecuting C900 SET S=80. If you fail to set the speed first, the speed is so fast that you won't see it happen.

Type 'H' for Hic, 'O' for Opps, or 'C' for Chase

In Hic the beastie should be moving around leaving asterisks. If it is not moving, the random number generator might not be working. It is important not to zero memory before loading this program. In particular the Data Storage area SH should be nonzero. When you get tired of watching it, hit CR and return to the executive.



In Opps, you control the direction the beastie moves. The directions are as shown, upper right.

Type the number corresponding to the desired direction. The beastie will proceed in that direction until another direction is given. '0' will stop the beastie. '5' will cause a wipe out. ' k '. If the beastie ever returns to a location where it's been a ' k' will appear and the program will return to the executive, hence the name: Opps. If you wish to return to the executive at any other time type CR.

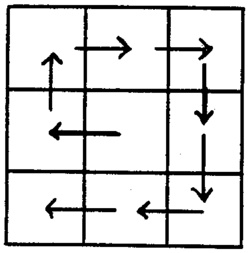
Life requires that there is an initial population of asterisks on the screen. Place them there by either Hic or Opps. Then enter Life by typing L from the executive. The CR will return you to the executive. 1K of RAM 0-3FF Hex is needed by Life as a scratchpad.

```
C900 CD C5 CA          0090  CALL CS       Clear the screen
C903 CD FE C9          0100 RET CALL KB    The executive routine
C906 FE 43             0120  CPI 'C'       branches to chase on C,
C908 CA 1D C9          0130  JZ CH
C90B FE 43             0140  CPI 'H'       Hic on H,
C90D CA 5D C9          0150  JZ HI
C910 FE 4F             0160  CPI 'O'       Opps on 0, and
C912 CA 76 C9          0170  JZ OP
C915 FE 4C             0180  CPI 'L'       Life on L.
C917 CA 09 CA          0190  JZ LI
C91A C3 03 C9          0220  JMP RET
C91D CD C5 CA          1000 CH CALL CS     Chase...Clear the screen.
C920 CD 84 CA          1005  CALL INIT     Place the bug
C923 3A CF CA          1010  LDA FO+1      at a random location
C926 77                1020  MOV M,A       on the screen.
C927 EB                1030  XCHG
C928 CD 84 CA          1040  CALL INIT     Place the turtle
C92B 3A CE CA          1050  LDA FO        at a random location
```

```
C92E 77              1060  MOV M,A       on the screen.
C92F CD F1 C9        1070 C1 CALL DL     Wait a while.
C932 CD FE C9        1075  CALL KB       Get input.
C935 36 20           1080  MVI M,20H     Put a space where you are,
C937 CD A3 C9        1090  CALL MV       then move.
C93A 3A CF CA        1100  LDA FO+1      If the bug is there,
C93D BE              1110  CMP M         you've got him.
C93E CA 9E C9        1120  JZ HLT
C941 3A CE CA        1130  LDA FO        Place turtle at new screen
C944 77              1140  MOV M,A       location.
C945 EB              1150  XCHG
C946 CD A0 CA        1180  CALL RND      The bug moves at random
C949 36 20           1185  MVI M,20H     Put a space where i t was,
C94B CD A3 C9        1190  CALL MV       then move.
C94E 3A CE CA        1200  LDA FO        If turtle is there,
C951 BE              1210  CMP M         the bugs been had.
C952 CA 9E C9        1220  JZ HLT
C955 3A CF CA        1230  LDA FO+1      Place bug at new screen
C958 77              1240  MOV M,A       location.
C959 EB              1250  XCHG
C95A C3 2F C9        1260  JMP C1        Do it all again
C95D CD C5 CA        1300 HI CALL CS     HIC...Clear the screen
C960 21 20 CE        1305  LXI H,0CE20H  Place the turtle at the
C963 36 07           1310 H1 MVI M,7     center of the screen.
C965 CD FE C9        1315  CALL KB       Should I return to the executive?
C968 CD F1 C9        1320  CALL DL       Wait awhile
C96B CD A0 CA        1330  CALL RND      Move the turtle at random
C96E 36 2A           1340  MVI M,2AH
C970 CD A3 C9        1350  CALL MV       leaving asterisk behind
C973 C3 63 C9        1370  JMP H1        Do it again.
C976 CD C5 CA        1600 OP CALL CS     Opps Clear the screen
C979 06 00           1602  MVI B,0       Place turtle at the center
C97B 21 20 CE        1605  LXI H,0CE20H  of the screen.
C97E 7E              1610 O1 MOV A,M     If you have been
C97F FE 2A           1620  CPI 2AH       here before,
C981 CA 9E C9        1630  JZ HLT        halt.
C984 36 07           1640  MVI M,7       Put the turtle on the screen
C986 CD F1 C9        1650  CALL DL       wait awhile.
C989 CD FE C9        1655 O2 CALL KB     Get input.
C98C CA 90 C9        1658  JZ O4         If none, continue
C98F 47              1660  MOV B,A
C990 78              1662 O4 MOV A,B
C991 E6 0F           1664  ANI 0FH       If it is a '0', don't move.
C993 CA 89 C9        1666  JZ O2
C996 36 2A           1670  MVI M,2AH     place asterisk in old location
C998 CD A3 C9        1680  CALL MV       then move.
C99B C3 7E C9        1690  JMP O1        Do it again
C99E 36 04           1700 HLT MVI M,4    Halt--Place '!' on the screen.
C9A0 C3 03 C9        1710  JMP RET       Return to the executive
C9A3 E6 0F           1800 MV ANI 0FH     Move
C9A5 FE 06           1850  CPI 6
C9A7 C2 AF C9        1860  JNZ M1        This routine uses the
C9AA 3E 01           1870 MVI A,1        curser move routines
C9AC C3 C0 C9        1880  JMP M3        in SOLOS (PUP, PLEFT, PDOWN,
C9AF FE 01           1890 M1 CPI 1       and PRIT) to move the
C9B1 C2 B9 C9        1900  JNZ M2        contents of the screen
C9B4 3E 06           1910  MVI A,6       1ocation pointed to
C9B6 C3 C0 C9        1920  JMP M3        by the address contained
C9B9 FE 07           1930 M2 CPI 7       in the H & L registers.
C9BB C2 C0 C9        1940  JNZ M3
C9BE 3E 0C           1950  MVI A,0CH     The right 4 bits of the
C9C0 4F              2000 M3 MOV C,A     accumulator are used
C9C1 CD E0 C9        2010  CALL SVDA     to determine the direction,
C9C4 3E 08           2020  MVI A,8       or combination of
C9C6 A1              2030  ANA C         directions, of the move.
C9C7 C4 04 C1        2040  CNZ 0C104H
C9CA 3E 01           2050  MVI A,1
```

|  |  |  |  |
|---|---|---|---|
| up | lf | dn | rt |

```
C9CC A1                 2055  ANA C
C9CD C4 15 C1           2060  CNZ 0C115H
C9D0 3E 02              2070  MVI A,2       The ASCII code for
C9D2 A1                 2080  ANA C         all of the digits except
C9D3 C4 CB CO           2090  CNZ 0C0CBH    6, 1, and 7 allows a
C9D6 3E 04              2100  MVI A,4       compass rose that
C9D8 A1                 2110  ANA C         agrees with the 10 key
C9D9 C4 0B C1           2120  CNZ 0C10BH    numeric pad. 6, 1 and
C9DC CD 1C C1           2130  CALL 0C11CH   7 are changed to agree.
C9DF C9                 2140  RET
C9E0 7D                 2200 SVDA MOV A,L   This routine assumes that
C9E1 E6 3F              2210  ANI 3FH       the contents of the H,L register
C9E3 32 08 C8           2220  STA 0C808H    pair is a screen address.
C9E6 29                 2230  DAD H         It then stores the 1ine
C9E7 29                 2240  DAD H         number in the data storage
C9E8 7C                 2250  MOV A,H       location used by SOLOS
C9E9 E6 0F              2260  ANI 0FH       called LINE. Simiarly the
C9EB E6 0F              2270  ANI 0FH       character position is stored
C9ED 32 09 C8           2280  STA 0C809H    in NCHAR for use by
C9F0 C9                 2290  RET           PUP, PLEFT, PDOWN, and PRIT
C9F1 E5                 3000 DL PUSH H      Delay...Save address.
C9F2 2A 0A C8           3005  LHLD 0C80AH   Get data byte from SET
C9F5 2C                 3010  INR L         command: SPEED
C9F6 AF                 3020  XRA A
C9F7 2B                 3030 D1 DCX H       Use it for a counter.
C9F8 BC                 3040  CMP H
C9F9 C2 F7 C9           3050  JNZ D1
C9FC E1                 3055  POP H         Restore address
C9FD C9                 3060  RET
C9FE CD 2E CO           3100 KB CALL 0C02EH Get input from keyboard.
CA01 C8                 3110  RZ            If none return.
CA02 FE 0D              3120  CPI 0DH       If it is a CR restore the
CA04 C0                 3130  RNZ           stack and return to the
CA05 C1                 3140  POP B         executive
CA06 C3 03 C9           3150  JMP RET
CA09 11 00 00           4000 LI LXI D,0     Life
CA0C 6B                 4010 L1 MOV L,E
CA0D 7A                 4020  MOV A,D       D,E points to 1K of RAM
CA0E E6 03              4030  ANI 3         used as a scratch pad.
CA10 F6 CC              4040  ORI 0CCH      H,L points to the screen
CA12 67                 4050  MOV H,A       location.
CA13 D5                 4060  PUSH D        Save the pointer
CA14 0E 00              4070  MVI C,0       initialize the counter
CA16 2B                 4080  DCX H
CA17 CD 7E CA           4090  CALL CT
CA1A 11 C0 FF           4100  LXI D,OFFCOH  Count the neighbors
CA1D 19                 4110  DAD D         of this location of
CA1E CD 7E CA           4120  CALL CT       the screen in the
CA21 23                 4130  INX H         following order:
CA22 CD 7E CA           4140  CALL CT       (5,4,7,8,9,6,3,2,1 on keypad)
CA25 23                 4150  INX H
CA26 CD 7E CA           4160  CALL CT
CA29 11 40 00           4170  LXI D,40H
CA2C 19                 4180  DAD D
CA2D CD 7E CA           4190  CALL CT
CA30 19                 4200  DAD D
CA31 CD 7E CA           4210  CALL CT
CA34 2B                 4220  DCX H
CA35 CD 7E CA           4230  CALL CT
CA38 2B                 4240  DCX H
CA39 CD 7E CA           4250  CALL CT
CA3C 23                 4251  INX H
CA3D 11 C0 FF           4252  LXI D,0FFC0H
CA40 19                 4253  DAD D
CA41 D1                 4260  POP D         Restore RAM pointer.
CA42 CD 65 CA           4270  CALL RG       Determine next generation
CA45 13                 4280  INX D         for this location and put
```



```
CA46 7A                 4290  MOV A,D       it in the RAM.
CA47 E6 04              4300  ANI 4         Do this to every screen
CA49 CA 0C CA           4310  JZ L1         location.
CA4C 21 00 CC           5000 CP LXI H,0CC00H  Copy the next generation
CA4F 11 00 00           5010  LXI D,0         as stored in the 1K of
CA52 1A                 5020 CO LDAX D        scratch pad RAM
CA53 77                 5030  MOV M,A         to the screen.
CA54 23                 5040  INX H
CA55 13                 5050  INX D
CA56 7C                 5060  MOV A,H
CA57 FE DO              5070  CPI 0D0H
CA59 C2 52 CA           5080  JNZ CO
CA5C CD F1 C9           5090  CALL DL         Wait awhile.
CA5F CD FE C9           5100  CALL KB         Should I return to the exec.?
CA62 C3 09 CA           5150  JMP LI          If not do another generation.
CA65 79                 7000 RG MOV A,C       Follow the rules of LIFE
CA66 FE 02              7010  CPI 2           to determine the next
CA68 CA 7B CA           7020  JZ R3           generation for this
CA6B D2 72 CA           7030  JNC R1          location.
CA6E 3E 20              7040 R2 MVI A,20H
CA70 12                 7045  STAX D
CA71 C9                 7050  RET
CA72 FE 03              7060 R1 CPI 3
CA74 C2 6E CA           7070  JNZ R2
CA77 3E 2A              7080  MVI A,'*'
CA79 12                 7090  STAX D
CA7A C9                 7100  RET
CA7B 7E                 7110 R3 MOV A,M
CA7C 12                 7120  STAX D
CA7D C9                 7130  RET
CA7E 7E                 8000 CT MOV A,M       Counter
CA7F FE 2A              8010  CPI '*'
CA81 C0                 8020  RNZ             If the neighbor is
CA82 0C                 8030  INR C
CA83 C9                 8040  RET             an asterisk count it.
CA84 CD A0 CA           8500 INIT CALL RND    Initialize.
CA87 E6 3F              8510  ANI 3FH
CA89 F6 CC              8515  ORI 0CCH        determine a random
CA8B 67                 8520  MOV H,A         screen location,
CA8C CD A0 CA           8530  CALL RND        place the line
CA8F 6F                 8540  MOV L,A         number in the data
CA90 C9                 8550  RET             storage of SOLOS
CA91 32 08 C8           8560  STA 0C808H      called LINE and
CA94 CD A0 CA           8570  CALL RND        the position of the
CA97 E6 0F              8580  ANI 0FH         character in NCHAR.
CA99 32 09 C8           8590  STA 0C809H
CA9C CD E0 C9           8594  CALL SVDA
CA9F C9                 8595  RET
CAA0 E5                 8600 RND PUSH H       Random number generator
CAA1 21 D3 CA           8610  LXI H,SH+3      from Peoples Computer
CAA4 06 08              8620  MVI B,8         Company,
CAA6 7E                 8630  MOV A,M         For it to work propertly
CAA7 07                 8640 RTOP RLC         the 4 data storage locations
CAA8 07                 8641  RLC             should not be zero.
CAA9 07                 8642  RLC
CAAA AE                 8650  XRA M
CAAB 17                 8660  RAL
CAAC 17                 8661  RAL
CAAD 2D                 8670  DCR L
CAAE 2D                 8671  DCR L
CAAF 2D                 8672  DCR L
CAB0 7E                 8680  MOV A,M
CAB1 17                 8690  RAL
CAB2 77                 8695  MOV M,A
CAB3 2C                 8700  INR L
CAB4 7E                 8710  MOV A,M
CAB5 17                 8720  RAL
```

```
CAB6 77                 8730  MOV M,A
CAB7 2C                 8740  INR L
CAB8 7E                 8750  MOV A,M
CAB9 17                 8760  RAL
CABA 77                 8770  MOV M,A
CABB 2C                 8780  INR L
CABC 7E                 8790  MOV A,M
CABD 17                 8800  RAL
CABE 77                 8810  MOV M,A
CABF 05                 8820  DCR B
CAC0 C2 A7 CA           8830  JNZ RTOP
CAC3 E1                 8840  POP H
CAC4 C9                 8850  RET
CAC5 CD D5 C0           8900 CS CALL 0C0D5H  In SOLOS, the routine PERSE
CAC8 3E 20              8910  MVI A,20H      erases the screen but leaves
CACA 32 00 CC           8920  STA 0CC00H     a cursor in the corner.
CACD C9                 8930  RET            Erase that too and return.
CACE 07                 9000 FO DB 7         The turtle font.
CACF 0E                 9001  DB 0EH         The bug font.
CAD0                    9010 SH DS 4         Storage for RND.
```

# Bytesaver Modification for Sol

If you want to use a Chromemco Bytesaver in the Sol, you'll need to make the following modification of the Bytesaver. Data will then be gated onto the Bus only when PDBIN is high or active, necessary in the Sol because the Data IN and Data OUT busses are connected together.

First cut the trace connecting pin 11 of IC 15 (7432) to pin 15 of IC 16 (74367). Now make these connections with small gauge insulated wire:

1. Connect pins 11 and 10 of IC 15.
2. Connect pin 8 of IC 15 to pin 15 of IC 16.
3. Connect pin 8 of IC 11 to pin 9 of IC 15.
4. Connect S-100 Bus pin 78 (PDBIN) to IC 11 pin 9. Pin 78 is the 23rd from the left on the **solder** side of the board.

## . . . AND A BYTESAVER PROGRAMMING ROUTINE

This short routine will program the contents of any 1K block of memory into a 2708 EPROM installed in socket 1 of Bytesaver. The Bytesaver should be addressed at 6000H.

A15-L, A14-H, A13-H

The routine is used as a custom command with the Solos/Cuter operating system. Enter the program at C900H, or reassemble it elsewhere if you wish. Then create a custom command by typing:

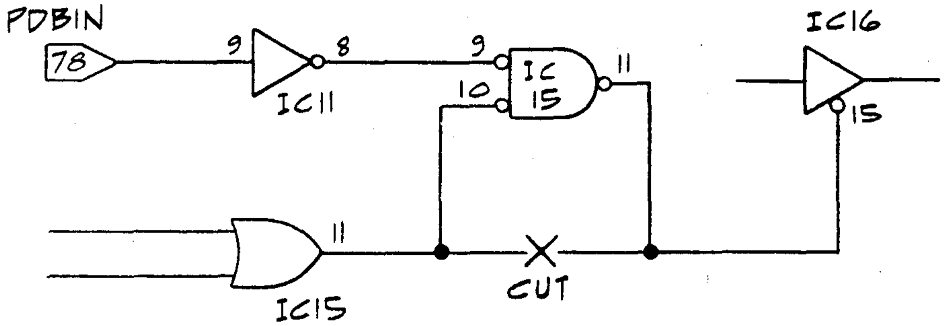
CU BURN C900 (CR)

NOTE: CR means "strike the return key;" do
not type the letters as part of the command.

If the program has been reassembled at an arbitrary address of NNNN, type: CU BURN NNNN (CR) Now to use the BURN custom command, type:

BURN AAAA (CR)

AAAA being the starting address of the 1 K block you wish to program into the 2708. The programming operation takes about 5 minutes, which is in accordance with the published programming instructions for the 2708. When the programming is complete, the routine will return control to Solos/Cutter and a prompt will reappear on the screen.



```
                0000 **
                0000 *** BYTESAVER ROUTINE ***
                0000 **
     C33A       0000 SCONV  EQU    0C33AH  GETS PARAMETERS
                0000 *
C900 CD 3A C3   0000 BURN   CALL   SCONV   SOURCE ADRS TO HL
C903 7D         0000        MOV    A,L     GET LO ADRS BYTE
C904 B7         0000        ORA    A
C905 C2 04 CO   0000        JNZ    0C004H  IT MUST BE
                0000 *
C908 22 28 C9   0000        SHLD   SAD     KEEP SOURCE ADRS
C90B 01 00 00   0000        LXI    B,0     PASS COUNT=0
                0000 *
C90E 11 00 64   0000 BLOOP  LXI    D,6400H PROM ADRS
C911 2A 28 C9   0000        LHLD   SAD     SOURCE ADRS
                0000 *
C914 7E         0000 PLOOP  MOV    A,M     GET SOURCE DATA
C915 12         0000        STAX   D       ZAP THE PROM
C916 23         0000        INX    H       BUMP SOURCE
C917 13         0000        INX    D       & PROM ADRS
C918 7A         0000        MOV    A,D     CHECK HI ADRS
C919 FE 68      0000        CPI    68H     PASS COMPLETE ?
C91B C2 14 C9   0000        JNZ    PLOOP   NOT YET
C91E 03         0000        INX    B       BUMP PASS COUNT
C91F 78         0000        MOV    A,B
C920 FE 04      0000        CPI    4       IK PASSES ?
C922 C2 0E C9   0000        JNZ    BLOOP   NOT YET
                0000 *
C925 C3 04 CO   0000        JMP    0C004H  ALL DONE
                0000 *
                0000 ** RAM AREA **
                0000 *
C928            0000 SAD    DS     2       SOURCE ADRS
                0000 *
```

# A Sol Keyboard Fix:

## So You Won't Have to Hit the Upper Case Key Each Time You Restart

*EDITOR'S NOTE: Our thanks to Jay Bell for contributing this suggestion. There are a couple of minor differences between the procedure he describes and our PTC standard modification for keyboard upper case initialization, so we're printing our version along with his.*

So after days of constructing your Sol, you're finally ready to input the first command, hit the carriage return, and check the screen. WHAAT?!! All you get is some question mark nonsense. So you check the software manual again. Sure enough, it wants uppercase. So, you put the keyboard into alpha-shift by pressing the upper case key.

Later you notice your program isn't doing what you expected, so naturally you restart the old four-phase wonder by simultaneously pressing the upper case and repeat keys. More question marks-the restart left you in lower case mode.

By now you've realized this is going to happen every time. There are three solutions: 1) Change the software to accept both upper and lower case commands. 2) Change the keyboard to come up in uppercase mode. 3) Hit the upper case key every time you restart.

Number 3 had already worn me out. I personally prefer to change software, even though I'm a hardware freak. But I figured the chances of Processor Technology changing software at this late date were sub-minimal.

Out with the keyboard schematics. The fix looked simple enough: just CLEAR the upper case flipflop rather than PRESETTING it. The keyboard gets preset when power is first applied through an RC circuit that is initially low and slowly comes up to +5 volts. Since the signal coming off the keyboard to restart the 8080 is driven by an open collector inverter, it could also be connected to the power-up RC circuit. Then whenever you reset the processor, you also reset the keyboard to its initial power-up state. To make that power-up state turn the upper case flipflop on, you cut the land leading to pin 4 of U15, and the land leading to pin 1 of U15. Then connect the trace that used to lead to pin 4 to pin 1 instead. Similarly, connect the pull-up resistor that was tied to pin 1 to pin 4 instead. Then connect pin 8 of U24 to pin 1 of U15. This last connection ties the restart signal to the clear input of U15 (as well as to the rest of the chips that are initialized at power-up).

There is only one remaining problem for the purists. The flipflop that sets the machine in the local mode will come up in an undetermined state, since its preset pin is tied to pin 4 of U15. Now that you've cut the land to pin 4 and pulled it high, the local flipflop is not being properly reset. Unfortunately, you have to remove U15 in order to cut the land to the local flipflop's preset pin, because the land runs under it on the component side of the board. If you want to be sure that the machine will come up with the local mode off, cut the land between pin 4 of U15 and pin 10 of U15, then connect pin 1 of U15 to pin 10 of U15.

Now you should be able to interact with your Sol the instant you power up or restart, without the bother of hitting the upper case key first.

THE PTC MODIFICATION:

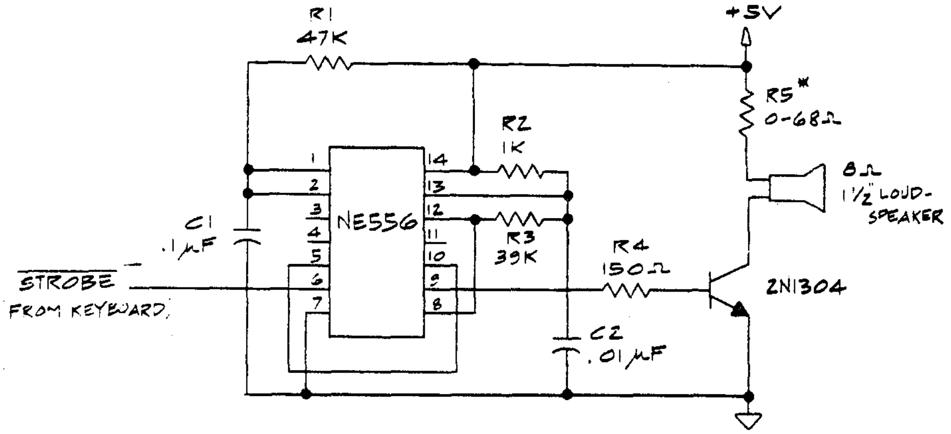
1. Cut trace located between U15 pin 4 and plate through 1/8 inches below pin on the component side.
2. Remove R31, 1.5K 1/4 watt Carbon Film, and save for later use.
3. On the Solder Side of the board:
    a. Insert one end of R31 in plate through adjacent to U15 pin 14 and solder.
    b. Bend the other lead of R31 to pin 4 of U15 and solder.
    c. Add a 5/8 inch jumper, stripped 1/8 inch from each end, to the plate through located just below U15 pin 4.
    d. Insert the other end of the jumper through plate through located just above U24 pin 12.

# A Keyclick (Audible) Circuit for Sol

Silence may be golden, but there is an advantage to making your Sol keyboard sound like a typewriter. If you're a good fast touch typist entering data from a printed source, it's easier to listen for missed keys than to glance up at the screen all the time. Thanks to Jack Kinney for this audible circuit design; he says that the sound can be altered to suit individual tastes by varying R1 burst length and R3 for burst frequency. The circuit operates as follows:

The first section of the dual timer is connected in the monostable mode, and the keyboard strobe triggers a positive-going pulse approximately four milliseconds long. This pulse is connected to the reset of the second section of the timer, which is operating in the astable mode, and is set for an output frequency of approximately 1.5 Khz, gating it "on" for a four-millisecond burst. The output transistor inverts the signal to prevent current draw in the "off" condition. The collector resistor is set for the desired loudness.

Kinney is also checking out a more complex circuit (three more IC's) which will decode the "BEL" code and produce a beep. One of the computers on the network signals for attention by transmitting the "BEL," and this will provide an audible monitor. We'll print this circuit in the next issue of ACCESS.



* R5 SELECTED FOR DESIRED VOLUME

KEY "CLICK" CIRCUIT (SOL 10/20)

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*Katchum's Correction Corollaries: (a) In debugging any type of program, no corrections can be made correctly after 1600 hours Friday. (b) The corrections will be self-evident at 900 hours Monday, (c) When in doubt divide by (2.0).*

*Goren's Law of Graphing: First draw the curves, then plot the data.*

# Run/Stop Circuits: Part II

In ACCESS #3, I described a Run/Stop circuit for user control of Sol's X-Ready line. Now here's the circuit that will let you monitor the operation of your S-100 system by connecting LED's to the buss lines. Each Light Emitting Diode is driven by 1/6 of a hex inverter package (74LS04), current limited by a 470-ohm 1/4-watt resistor for each.

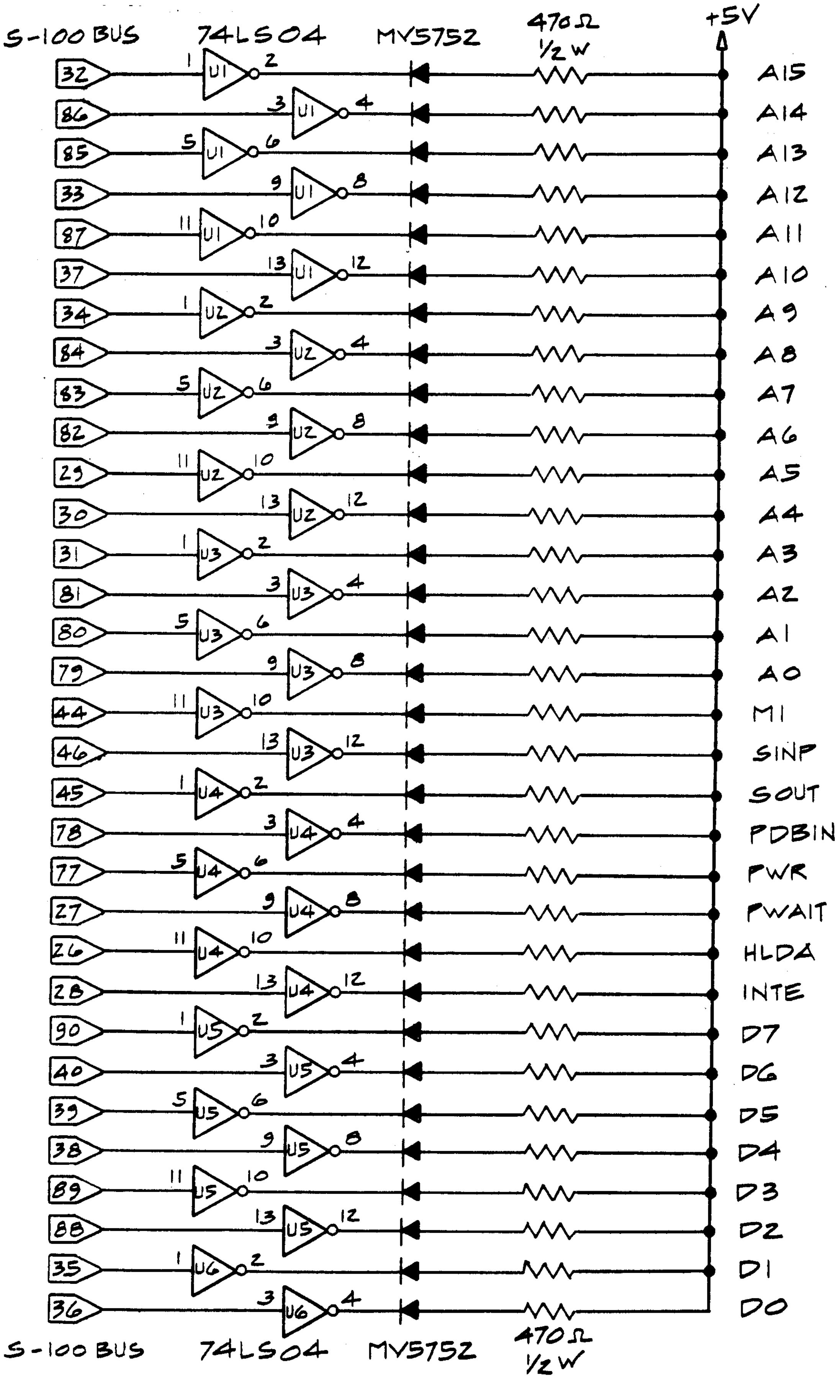
To monitor the operation of your system, compare the addresses and data displayed on the LED's as you single step, with the program listing. Most malfunctions can then be seen and corrected with very little effort. A couple of examples:

**Quick test for data and address lines.** You can discover major failures in these by toggling the reset line while the Run/Stop circuit is enabled in the Stop position. All the LED's should light when the reset line is enabled. All except M1, PDBIN, and PWAIT should darken when the line is disabled. Any LED's that don't respond as indicated reveal a malfunction in the corresponding lines and should be checked with a meter or scope.

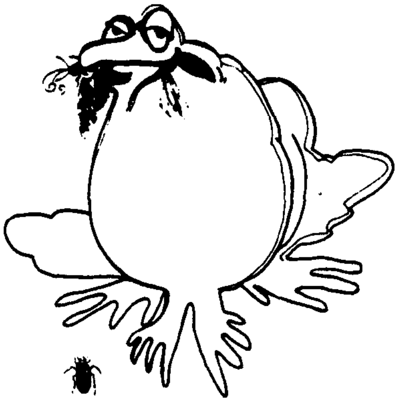
**Testing the Input/Output lines.** Single step until an input or output instruction is executing. When the SINP or SOUT LED is lit, you can stop stepping, and start following the logic signals in the I/O section, with your troubleshooting equipment.

Next issue, this series will continue with advice on implementing traps on the front panel.

Steve Wong


S-100 BUS
74LS04
MV5752
470Ω
1/2 W
+5V
32 1 U1 2 A15
86 3 U1 4 A14
85 5 U1 6 A13
33 9 U1 8 A12
87 11 U1 10 A11
37 13 U1 12 A10
34 1 U2 2 A9
84 3 U2 4 A8
83 5 U2 6 A7
82 9 U2 8 A6
29 11 U2 10 A5
30 13 U2 12 A4
31 1 U3 2 A3
81 3 U3 4 A2
80 5 U3 6 A1
79 9 U3 8 A0
44 11 U3 10 M1
46 13 U3 12 SINP
45 1 U4 2 SOUT
78 3 U4 4 PDBIN
77 5 U4 6 PWR
27 9 U4 8 PWAIT
26 11 U4 10 HLDA
28 13 U4 12 INTE
90 1 U5 2 D7
40 3 U5 4 D6
39 5 U5 6 D5
38 9 U5 8 D4
89 11 U5 10 D3
88 13 U5 12 D2
35 1 U6 2 D1
36 3 U6 4 D0
S-100 BUS
74LS04
MV5752
470Ω
1/2 W

# Bug Squad



Changes in Assembly Instructions for Sol:

**The bug:** You'll get an incorrect test result at Step 38 in the instructions; instead of the display shown in Figure 3-9, a display of random characters comes up.

**The squasher:** Install U93-74LS175 and U107-74LS367 at Step 35.

**The bug:** Your Sol doesn't work at Step 59.

**The squasher:** After you do Step 28 of the assembly, perform step 73 before proceeding to Step 29.

**The bug:** The waveforms are incorrectly shown in Figure 3-2 on page 3-15 of your Sol manual.

**The squasher:** Turn your manual upside down-the waveform shown for Pin 5-U104 is inverted. Same for Pin 7-U104.

# A Program for a Home Accounting System

Contributed by Guy Campbell

See the Letters to the Editor for Guy's comments on his program. We're delighted to get this kind of input from our readers and pass it on for all Sol users.

```
PROGRAM FOR HOME ACCOUNTING SYSTEM .

THIS PROGRAM WILL RECORD PAYMENTS, UPDATE
BALANCE AND PROVIDE ACCUMULATED INTEREST
FOR TAX PURPOSES.

NEW ACCOUNTS CAN BE ADDED ONLY BY CHANGING
THE PROGRAM.

PUT OLD DATA TAPE ON FILE #2 AND SET FOR PLAY.

PUT NEW TAPE ON FILE #1 AND SET FOR RECORD.

PRESS ANY NUMBER & RETURN TO CONTINUE. 0
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
YOUR FRIENDLY FINANCE C0.
3958 TUFFLUK STREET
CHICAGO, ILL 60683
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
ACCOUNT NUMBER - 12345A
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
BALANCE=$ 51.60                 ANNUAL INTEREST RATE= 21%
TOTAL PRINC. PAID=$ 108.00      TOTAL INT. PAID=$ 6.39
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
YOUR LAST PAYMENT WAS MADE ON 82877 FOR $ 36.00
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
ENTER CHANGES TO ADJUST BALANCE. $ 25.00
ENTER CHANGES TO ADJUST BALANCE. $ 0
YOUR PRESENT BALANCE IS $ 76.60

ENTER PAYMENT TO THIS ACCT. $36.00

ENTER TODAYS DATE 90277
```

```
PRINCIPLE PAID=$34.66           INTEREST PAID=$ 1.34

YOUR NEW BALANCE IS $41.94
TOTAL PRINCIPLE PAID TO DATE=$ 144.00
TOTAL INTEREST PAID TO DATE=$ 7.73

ACCOUNT COMPLETE
PRESS ANY NUMBER TO GET NEXT ACCOUNT. 0
***************************************************************
NEXT ACCOUNT COMES UP - WILL CONTINUE IN THIS FORMAT.
LIST
5     SET S=05
10    REM THE HOME ACCOUNTING PROGRAM
20    REM CREATED BY G. W. CAMPBELL - 1977
30    REM ORIGINAL DATA BANK (TAPE) PREPARED WITH
40    REM SEPARATE PROGRAM.
50    PRINT "PROGRAM FOR HOME ACCOUNTING SYSTEM."
60    PRINT
70    PRINT "THIS PROGRAM WILL RECORD PAYMENTS, UPDATE"
80    PRINT "BALANCE AND PROVIDE ACCUMULATED INTEREST"
90    PRINT "FOR TAX PURPOSES."
100   PRINT
110   PRINT "NEW ACCOUNTS CAN BE ADDED ONLY BY CHANGING"
120   PRINT "THE PROGRAM."
130   PRINT
140   FOR I=1 TO 1200:NEXT
150   PRINT "PUT OLD DATA TAPE ON FILE #2 AND SET FOR PLAY."
160   PRINT
180   PRINT "PUT NEW TAPE ON FILE #1 AND SET FOR RECORD."
190   PRINT
200   INPUT "PRESS ANY NUMBER & RETURN TO CONTINUE."Z
210   PRINT
220   GOSUB 770
225   FILE #1
230   FILE #2
240   READ #2,A,B,C,D,E,F,G: PRINT "END OF FILE";: GOTO 700
250   IF A=1 THEN GOSUB 1000
260   IF A=2 THEN GOSUB 1070
270   IF A=3 THEN GOSUB 1140

*****CONTINUE THIS SECTION FOR THE NUMBER OF ACCOUNTS NEEDED*****

400   GOSUB 770
410   PRINT "BALANCE=$";%Z2%;C,
420   PRINT TAB (30);"ANNUAL INTEREST RATE=";%%;B;"%";%Z2%
430   PRINT "TOTAL PRINC. PAID=$ ";F,
440   PRINT TAB(30);"TOTAL INT. PAID=$";G
450   GOSUB 770
451   PRINT "YOUR LAST PAYMENT WAS MADE ON ";%%;D,
452   PRINT "FOR $";%Z2%;E
453   GOSUB 770
460   INPUT "ENTER CHANGES TO ADJUST BALANCE. $"C1
470   IF C1=0 THEN 500
480   LET C=C+C1
490   GOTO 460
500   PRINT "YOUR PRESENT BALANCE IS $";C
510   PRINT
520   INPUT "ENTER PAYMENT TO-THIS ACCT. $"F1
521   LET T1=T1+F1
530   IF F1=0 THEN 583
531   PRINT
532   INPUT "ENTER TODAYS DATE "D1
533   LET D=D1
550   LET G1=( (B/100)*C)/12
560   LET G=G+G1
570   LET C=C-(F1-G1)
580   LET E=Fl
```

```
581   PRINT "PRINCIPLE PAID=$";(E-G1),
582   PRINT TAB(30);"INTEREST PAID=$";G1
583   PRINT
590   PRINT "YOUR NEW BALANCE IS $";C
595   LET F=F+(E-G1)
600   PRINT
610   PRINT "TOTAL PRINCIPLE PAID TO DATE=$";F
620   PRINT "TOTAL INTEREST PAID TO DATE=$";G
630   PRINT
640   PRINT "ACCOUNT COMPLETE"
650   INPUT "PRESS ANY NUMBER TO GET NEXT ACCOUNT. "Y
670   PRINT #1,A,B,C,D,E,F,G
680   PRINT
681   PRINT "****************************************************"
690   TOTO 240
700   CLOSE #2
710   CLOSE #1
720   PRINT
730   PRINT "TRANSACTIONS COMPLETE"
740   PRINT
741   PRINT "YOUR PAYMENTS TOTALED $";T1;" THIS MONTH."
750   PRINT
751   PRINT "GOODBYE, SEE YOU NEXT MONTH."
752   SET S=0
760   END
770   PRINT "----------------------------------------------------"
780   RETURN

*****THIS IS WHERE YOU PUT THE ACCOUNTS*****

1000  PRINT "YOUR FRIENDLY FINANCE C0."
1010  PRINT "3958 TUFFLUK STREET"
1020  PRINT "CHICAGO, ILL 60683"
1030  GOSUB 770
1040  PRINT "ACCOUNT NUMBER - 12345A"
1050  GOSUB 770
1060  RETURN
1070*****CONTINUE TO PUT IN ACCOUNTS IN THE SAME FORMAT.
```

THIS IS A SAMPLE PROGRAM THAT CAN BE USED TO ESTABLISH THE ORIGINAL DATA BASE TAPE.

```
LIST
10   FILE #2
20   INPUT "ACCOUNT IDENTIFICATION N0. ?"A
30   IF A=0 THEN 110
35   PRINT
40   INPUT "ANNUAL INTEREST RATE (WHOLE NUMBERS) ?"B
45   PRINT
50   INPUT "BALANCE ?"C
55   PRINT
60   INPUT "DATE AND PAYMENT (LAST PMT MADE) ?"D,E
65   PRINT
70   INPUT "TOTAL PRINCIPLE PAID ?"F
75   PRINT
80   INPUT "TOTAL INTEREST PAID TO DATE ?"G
85   PRINT
90   PRINT #2,A,B,C,D,E,F,G
100  GOTO 20
110  CLOSE #2
120  END
```

# 8080 Relocatable Assembler

```
+0000 ; (11,19,29)
+0000 ; MODIFIED SOLOS ROUTINE
+0000 ;     REVISED BY:
+0000 ;                   MELVIN SCHEHLEIN
+0000 ;                    COMMUNICATIONS & MEDIA SERVICES
+0000 ;                     TOWSON STATE UNIVERSITY
+0000 ;                      TOWSON, MARYLAND 21204
+0000 ;
+0000 ;  DATE WRITTEN: AUGUST 3, 1977
+0000 ;
+0000 ; THE PURPOSE OF THIS PROGRAM IS TO CONFIGURE THE SOL TERMINAL
+0000 ;  COMPUTER AS A STANDARD VIDEO TERMINAL TO ACCEPT THE HALF-DUPLEX
+0000 ;  CR, LF RESPONSE FROM COMMUNICATIONS AFTER HAVING SENT A CR
+0000 ;  WITHOUT ERASING THAE LAST INPUT LINE.  THIS HAPPENS BECAUSE
+0000 ;  THE SOLOS MONITOR CLEARS THE LINE FROM ITS PRESENT CHARACTER
+0000 ;  POSITION TO THE END OF THAT LINE.  DURING COMMUNICATIONS
+0000 ;  THE KEYBOARD SENDS OUT A CR, WHICH IS FEED BACK INTO THE SERIAL
+0000 ;  INPUT PORT, AND THEN SENT TO THE VDM DRIVER TO BE PROCESSED.
+0000 ;  THEN THE COMPUTER SENDS OUT A CR LF WHICH GOES TO THE VDM DRIVER
+0000 ;  CLEARING THE LAST INPUT LINE (BECAUSE THE RESPONSE CR WAS IN COLUMN
+0000 ;  1 ) THUS DENYING THE USER THE ABILITY TO CHECK THE ACCURACY OF
+0000 ;  HIS OR HER LAST INPUT.
+0000 ;

C900                          ORG     0C900H
C900              ;
C900              ;  THIS PROGRAM MODIFICATION WILL SIMPLY TEST THE CHARACTER POSITION
C900              ;   WHENEVER A CR IS RECEIVED. IF WE ARE IN COLUMN 1 THE CR IS
C900              ;   IGNORED, IF WE ARE NOT IN COLUMN 1 IT IS PROCESSED NORMALLY.
C900              ;   THE ONLY CODE THAT IS DIFFERENT FROM THE STANDARD SOLOS TERM
C900              ;   ROUTINE CAN BE FOUND IN LINES 63 TO 70 TO TEST THE CHARACTER
C900              ;   POSITION.
C900              ;   THE PROPGRAM HAS BEEN ASSEMBLED BEGINNING AT ADDRESS C900
C900              ;   SO IT CAN EASILY BE STORED IN SOL SYSTEM RAM.
C900              ;
C900              ;      +++++ TERMINAL UPDATE ROUTINE +++++
C900              ;
C900 CD 10 C3     TERMU:    CALL   PSCAN    ;FIND IF INPUT PARAMETER IS PRESET
C903 32 06 C8               STA    IPORT    ;SINP WILL USE THIS DRIVER (DEFAULT IS 1)
C906 CD 10 C3               CALL   PSCAN    ;NOW FOR THE OUTPUT DRIVER
C909 32 07 C8               STA    OPORT
C90C                                        ;
C90C CD 2E C0     TERM1U:   CALL   KSTAT    ;IS THERE A CHAR WAITING AT THE KEYBOARD
C90F CA 24 C9               JZ     TINU     ;NO, THEN WHAT ABOUT THE SERIAL INPUT PORT
C912 47                     MOV    B,A      ;THE KEYBOARD HAD ONE, PUT IT IN B
C913                                        ;
C913 FE 80                  CPI    MODE     ;IS IT A COMMAND MODE
C915 CA C0 C1               JZ     COMN1    ;YES--GET OUT OF TERMU>>AND 00 TO SYSTEM
MONT
C918 DA 21 C9               JC     TOUTU    ;NON-CURSOR KEY--SEND TO TERM PORT
C91B CD 54 C0               CALL   VDMOT    ;TO THE VDM IT IS A CURSOR CONTROL
C91E C3 24 C9               JMP    TINU     ;IS THERE A CHAR AT THE INPUT PORT
C921                                        ;
C921 CD 19 C0     TOUTU:    CALL   SOUT     ;OUTPUT IT TO THE SERIAL PORT
C924 CD 1F C0     TINU:     CALL   SINP     ;IS A CHAR WAITING AT THE INPUT PORT
C927 CA 0C C9               JZ     TERM1U   ;HOW ABOUT THE KEYBOARD?
C92A E6 7F                  ANI    07FH     ;GET RID OF THAT HIGH ORDER PARITY BIT.
C92C CA 0C C9               JZ     TERM1U   ;A NULL IS PROCESSED BY DOING NOTHING
C92F 47                     MOV    B,A      ;IT IS OUTPUT FROM 'B'
C930 FE 1B                  CPI    01BH     ;IS IT A CONTROL CHAR TO BE IGNORED
C932 D2 5E C9               JNC    TERM2U   ;NO IT IS >1B SEND TO THE VDM
C935                                        ;
C935                                        ;
C935 FE 0D                  CPI    CR       ;CR OR LF ARE SPECIAL CHARACTERS
C937 C2 46 C9               JNZ    NOCR     ;IT WASN'T A CR, BYPASS THE COLUMN TEST
C93A                                        ;
C93A 3A 08 C8               LDA    NCHAR    ;HAS A CR ALREADY PUT US IN COLUMN 1
```

```
C93D FE 00                  CPI    000H     ;THIS WILL TELL US
C93F CA 0C C9               JZ     TERMIU   ;IT IS COLUMN 1, DON'T PROCESS IT
C942 78                     MOV    A,B      ;LETS GET IT BACK
C943 C3 5E C9               JMP    TERM2U   ;IT ISN'T COLUMN 1, PROCESS IT
C946                                        ;
C946 FE 0A        NOCR:     CPI    LF       ;WAS IT A LINEFEED
C948 CA 5E C9               JZ     TERM2U   ;PROCESS IT
C94B                                        ;
C94B 3A 0C C8               LDA    ESCFL    ;A CTL CHAR---ARE WE IN AN ESC SEQUENCE
C94E B7                     ORA    A        ;IF YES THEN OUTPUT CONTROL CHAR DIRECTLY TO
C94F C2 5E C9               JNZ    TERM2U   ;WE SURE ARE LET THE VDM DRIVER HANDLE IT
C952 C5                     PUSH   B        ;SAVE THE CHARACTER
C953 06 1B                  MVI    B,ESC    ;CTL CHAR TO VDM VIA ESC SEQUENCE
C955 CD 54 C0               CALL   VDMOT    ;PUT IT ON THE SCREEN
C958 06 07                  MVI    B,7      ;SAY TO PUT OUT NEXT CHAR AS IS
C95A CD 54 C0               CALL   VDMOT    ;ALMOST READY
C95D C1                     POP    B        ;GET IT BACK
C95E              TERM2U:   EQU    $        ;LETS PUT OUT THE CHARACTER
C95E CD 54 C0               CALL   VDMOT    ;PUT IT ON THE SCREEN
C961 C3 0C C9               JMP    TERM1U   ;LETS KEEP DOING IT
C964              ;
C964              ;
C964              ;
C964              ;
C964              ;   S Y S T E M  E Q U A T E S
C964              ;   - - - - - -  - - - - - - -
C964              ;
000A              LF        EQU    00AH      ;THE LINE FEED ASCII CHAR
000D              CR        EQU    00DH      ;THE CARRIAGE RETURN ASCII CHAR
001B              ESC       EQU    01BH      ;THE ESCAPE ASCII CHAR
0080              MODE      EQU    080H      ;THE P.T. MODE CONTROL CHAR
C964                                         ;
C019              SOUT:     EQU    0C019H    ;SYSTEM OUTPUT ENTRY POINT
C01F              SINP:     EQU    0C01FH    ;SYSTEM INPUT ENTRY POINT
C02E              KSTAT:    EQU    0C02EH    ;KEYBOARD INPUT ROUTINE
C054              VDMOT:    EQU    0C054H    ;THIS ONE PUTS IT ON THE SCREEN
C1C0              COMN1:    EQU    0C1C0H    ;RE-ENTRY INTO SYSTEM MONITOR
C310              PSCAN:    EQU    0C310H    ;INPUT PARAMETER ROUTINE
C806              IPORT:    EQU    0C806H    ;CURRENT INPUT PSEUDO PORT
C807              OPORT:    EQU    0C807H    ;CURRENT OUTPUT PSEUDO PORT
C808              NCHAR:    EQU    0C808H    ;PRESENT VDM CHARACTER POSITION
C80C              ESCFL:    EQU    0C80CH    ;ESCAPE FLAG CONTROL BYTE
C964                                         ;
C964                        END
0 ERRORS DETECTED
-----------------------------------------------------------------------------
PA

  0E 01           SYMBOL TABLE

COMN1     C1C0    CR        000D    ESC       001B    ESCFL     C80C
IPORT     C806    KSTAT     C02E    LF        000A    MODE      0080
NCHAR     0808    NOCR      0946    OPORT     0807    PSCAN     C310
SINP      C01F    SOUT      C019    TERM1U    C90C    TERM2U    C95E
TERMU     C900    TINU      0924    TOUTU     C921    VDMOT     0054
```

# ALS-8 to Sol Patch

```
               0000 *
               0001 * This program alters the ALS-8 ram to
               0002 * allow an ALS-8 that has not been updated
               0003 * to interface with a Sol-20 using Solos.
               0004 *
               0005 *
               0006 * Change standard input port to Sol
               0007 * keyboard.
               0008 *
D09F           0009        ORG    0D09FH
D09F FC        0010        DB     KDATA
               0011 *
               0012 * Alter STAT routine in ALS-8 to match Sol
               0013 * keyboard status port and compliment data
               0014 * availible flag.
               0015 *
D0A4           0016        ORG    0D0A4H
D0A4 DB FA     0017 STAT   IN     KSTAT
D0A6 2F        0018        CMA
D0A7 E6 01     0019        ANI    KDR
D0A9 C9        0020        RET
               0021 *
               0022 * This output driver saves the accumulator
               0023 * and register B before calling SOUT in
               0024 * Solos.  It also checks the keyboard to see
               0025 * if an escape has been hit.  If so, a lump
               0026 * will be made to FORMS in ALS-8.  IF not,
               0027 * registers A and B will be popped off the
               0028 * stack after the character has been printed.
               0029 *
               0030 OUTP8  PUSH   PSW
D0AA F5        0031        PUSH   B
D0AB C5        0032        CALL   STAT
D0AC CD A4 D0  0033        JZ     NOCHR
D0AF CA BB D0  0034        IN     KDATA
D0B2 DB FC     0035        ANI    7FH
D0B4 E6 7F     0036        CPI    ESC
D0B6 FE 1B     0037        JZ     FORMS
D0B8 CA 60 E0  0038 NOCHR  CALL   SOUT
D0BB CD 19 C0  0039        POP    B
D0BE C1        0040        POP    PSW
D0BF F1        0041        RET
D0C0 C9        0042 *
               0043 * Now make SYSIO and OUT8 point to this
               0044 * version of OUTP8 as the standard output
               0045 * driver.
               0046 *
               0047        ORG    0D096H  SYSIO output driver
D096           0048        DW     OUTP8
D096 AA D0     0049 *
               0050        ORG    0D0D0H  second byte of OUT8
D0D0           0051        DW     OUTP8
D0D0 AA D0     0052 *
               0053 ESC    EQU    1BH     ASCII escape
001B           0054 KDR    EQU    01H     data available flag
0001           0055 SOUT   EQU    0C019H  Solos output entry
C019           0056 KDATA  EQU    0FCH    Sol keyboard data port
00FC           0057 KSTAT  EQU    0FAH    keyboard status port
00FA           0058 FORMS  EQU    0E060H  entry point to ALS-8
E060           0059 *
               0060 * One more thing needs to be mentioned.
               0061 * A non-updated version of the TXT-2
```

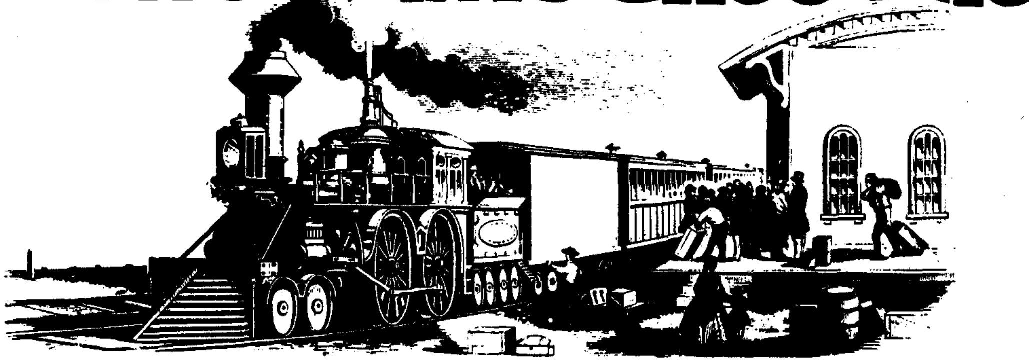
```
0062 * editor does not reset the hardware
0063 * scrolling port on a Sol. If this is
0064 * not done before entering the editor
0065 * the first line of the file may be
0066 * on a line other than the first line
0067 * of the screen. One remedy for this
0068 * is to always hit the CLEAR key before
0069 * executing the TXT-2 editor.
0070 *
```

# Intel paper Tape Loader for Sol

```
                    0000        LST
     1EFF           0000 STAK   EQU    $-1
                    0000 *
1F00 31 FF 1E       0000        LXI    SP,STAK
1F03 CD 06 1F       0000        CALL   READ
1F06 CD 45 1F       0000 READ   CALL   TTYIN
1F09 FE 3B          0000        CPI    ';'
1F0B C2 06 1F       0000        JNZ    READ
1F0E CD 2A 1F       0000        CALL   CHAR
1F11 57             0000        MOV    D,A
1F12 C8             0000        RZ
1F13 CD 2A 1F       0000        CALL   CHAR
1F16 67             0000        MOV    H,A
1F17 CD 2A 1F       0000        CALL   CHAR
1F1A 6F             0000        MOV    L,A
1F1B CD 2A 1F       0000        CALL   CHAR
                    0000 *
1F1E CD 2A 1F       0000 LOOP   CALL   CHAR
1F21 77             0000        MOV    M,A
1F22 23             0000        INX    H
1F23 15             0000        DCR    D
1F24 C2 1E 1F       0000        JNZ    LOOP
1F27 C3 06 1F       0000        JMP    READ
                    0000 *
1F2A CD 45 1F       0000 CHAR   CALL   TTYIN
1F2D CD 3D 1F       0000        CALL   HEX
1F30 07             0000        RLC
1F31 17             0000        RAL
1F32 17             0000        RAL
1F33 17             0000        RAL
1F34 5F             0000        MOV    E,A
1F35 CD 45 1F       0000        CALL   TTYIN
1F38 CD 3D 1F       0000        CALL   HEX
1F3B 83             0000        ADD    E
1F3C C9             0000        RET
                    0000 *
1F3D D6 30          0000 HEX    SUI    48
1F3F FE 0A          0000        CPI    10
1F41 D8             0000        RC
1F42 D6 07          0000        SUI    7
1F44 C9             0000        RET
                    0000 *
1F45 DB F8          0000 TTYIN  IN     0F8H
1F47 E6 40          0000        ANI    64
1F49 CA 45 1F       0000        JZ     TTYIN
1F4C DB F9          0000        IN     0F9H
1F4E E6 7F          0000        ANI    7FH
1F50 C9             0000        RET

CHAR    1F2A    HEX     1F3D    LOOP    1F1E    READ    1F06
```

# Newett Awl's Choo Choo

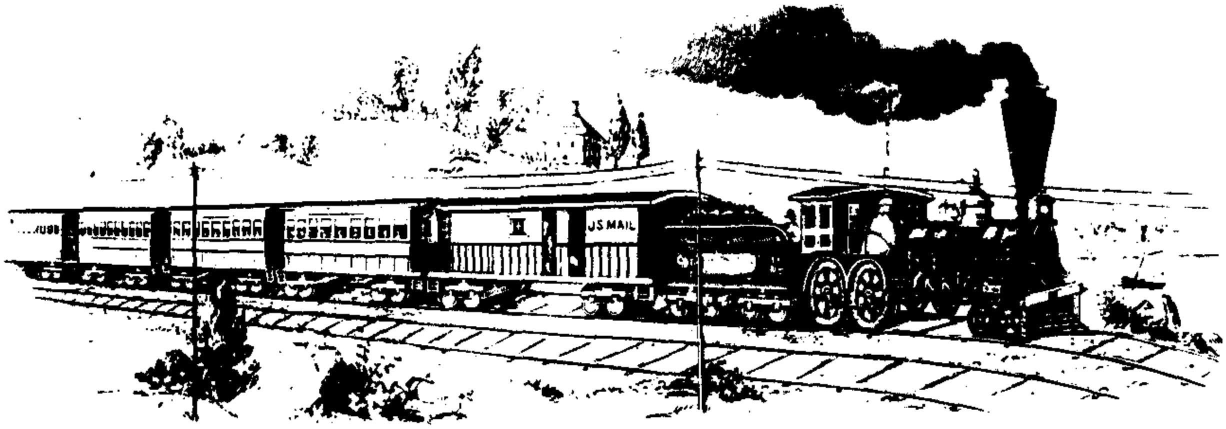


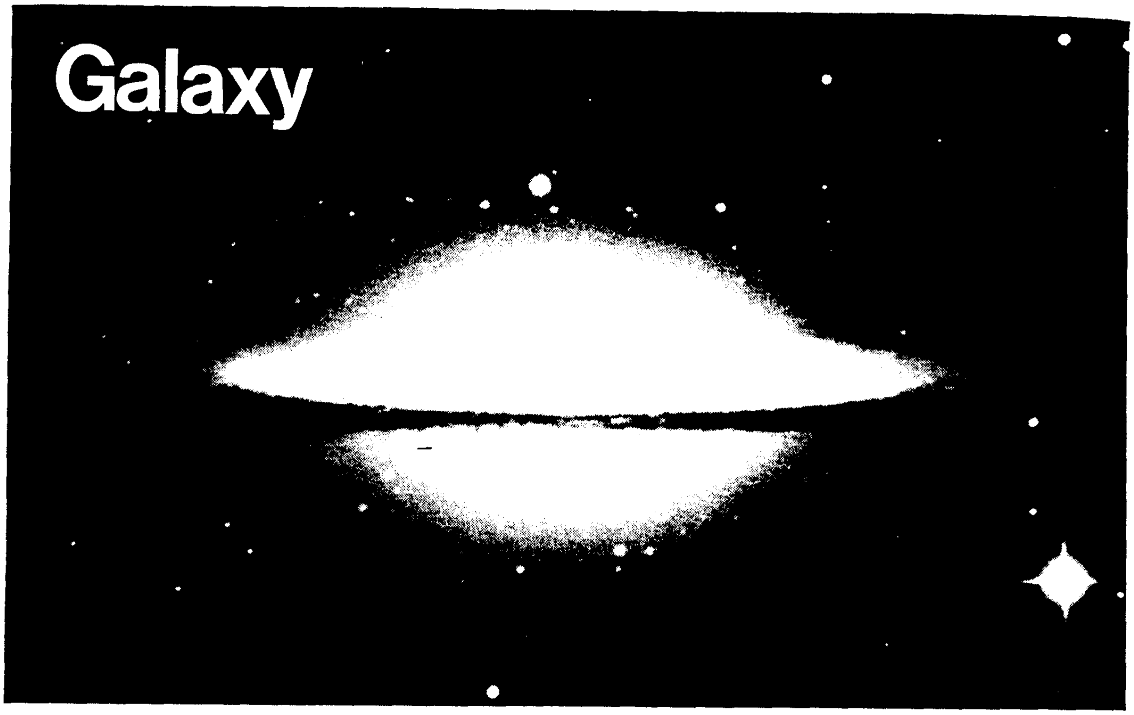
A lot of you had fun with this program when we listed it in the first issue of ACCESS. We're repeating it now with modifications to run on Sol, and we think you'll like it even better this time around.

```
                  0000 *
0100 AF           0001 TRAIN  XRA    A      ONCE UPON A TIME,
0101 D3 FE        0002        OUT    0FEH   IN A CURIOUS LITTLE
0103 21 86 02     0003        LXI    H,SHED  PLACE THERE WAS -
0106 01 00 08     0004        LXI    B,2048  ..A TINY TRAIN
0109 36 20        0005 EMPTY  MVI    M,20H   ..AND IT STAYED IN A
010B 23           0006        INX    H       ..TINY SHED
010C 0B           0007        DCX    B       ..THAT WAS ALL EMPTY
010D AF           0008        XRA    A
010E A8           0009        XRA    B
010F C2 09 01     0010        JNZ    EMPTY
0112 21 FA 03     0011        LXI    H,CLOUD   ..EXCEPT FOR A HUGE
0115 11 01 00     0012        LXI    D,1
0118 06 0E        0013        MVI    B,14   B
011A CD 50 01     0014        CALL   SMO1    I
011D 11 2B 00     0015        LXI    D,43      L
0120 06 0C        0016        MVI    B,12       L
0122 CD 50 01     0017        CALL   SMO1        O
0125 11 30 00     0018        LXI    D,48         W
0128 06 09        0019        MVI    B,9           Y
012A CD 50 01     0020        CALL   SMO1
012D 11 34 00     0021        LXI    D,52           C
0130 06 04        0022        MVI    B,4             L
0132 CD 50 01     0023        CALL   SMO1             O
0135 11 3A 00     0024        LXI    D,58              U
0138 06 02        0025        MVI    B,2                D
013A CD 50 01     0026        CALL   SMO1
013D 11 3D 00     0027        LXI    D,61                 O
0140 06 01        0028        MVI    B,1                   F
0142 CD 50 01     0029        CALL   SMO1
0145 11 3E 00     0030        LXI    D, 62                   S
0148 06 01        0031        MVI    B,1                      M
014A CD 50 01     0032        CALL   SMO1                      O
014D C3 59 01     0033        JMP    ENGIN                      K
                  0034 *                                         E
0150 19           0035 SMO1   DAD    D
0151 36 6F        0036 SMO2   MVI    M,SMOKE  ..COUGH
0153 23           0037        INX    H
0154 05           0038        DCR    B             ..COUGH
0155 C2 51 01     0039        JNZ    SMO2
0158 C9           0040        RET    .      COMING OUT OF THE STACK
                  0041 *                    OF
0159 21 A8 05     0042 ENGIN  LXI    H,SHED+322H  A TINY LOCOMOTIVE
```

```
015C 36 16        0043        MVI    M,16H   WITH A LITTLE SMOKESTACK
015E 21 AB 05     0044        LXI    H,SHED+325H  AND A LITTLE BELL
0161 36 07        0045        MVI    M,07H
0163 21 AD 05     0046        LXI    H,SHED+327H  ..AND A TINY DOME
0166 36 6E        0047        MVI    M,6EH
0168 2A 68 02     0048        LHLD   CAB1       ..AND A CAB
016B 22 B0 05     0049        SHLD   SHED+32AH  WITH WINDOWS
016E 2A 6A 02     0050        LHLD   CAB2       ..SO THAT YOU COULD
0171 22 B2 05     0051        SHLD   SHED+32CH  SEE INTO WHERE THE
0174 2A 6C 02     0052        LHLD   CAB3       ..ENGINEER AND THE
0177 22 B4 05     0053        SHLD   SHED+32EH  FIREMAN SAT.
017A 2A 6E 02     0054        LHLD   BOI1       ..IT HAD A BEAUTIFUL
017D 22 E7 05     0055        SHLD   SHED+361H  POLISHED
0180 2A 70 02     0056        LHLD   BOI2       ..BRASS
0183 22 E9 05     0057        SHLD   SHED+363H  BOILER
0186 2A 72 02     0058        LHLD   BOI3       ..WITH
0189 22 EB 05     0059        SHLD   SHED+365H  THE NUMBER
018C 22 ED 05     0060        SHLD   SHED+367H  "99" ON THE
018F 2A 74 02     0061        LHLD   BOI4       ..SIDE OF
0192 22 EF 05     0062        SHLD   SHED+369H  THE CAB
0195 2A 76 02     0063        LHLD   BOI5       ..BUT YOU COULDN'T
0198 22 F1 05     0064        SHLD   SHED+36BH  SEE EITHER THE
019B 2A 78 02     0065        LHLD   BOI6       ..ENGINEER OR THE
019E 22 F3 05     0066        SHLD   SHED+36DH  FIREMAN
01A1 2A 7A 02     0067        LHLD   FRA1       ..THE LITTLE ENGINE
01A4 22 26 06     0068        SHLD   SHED+3A0H  ALSO
01A7 2A 7C 02     0069        LHLD   FRA2       ..HAD A COWCATCHER
01AA 22 28 06     0070        SHLD   SHED+3A2H  AND LOTS OF FUNNY
01AD 22 2A 06     0071        SHLD   SHED+3A4H  WHEELS AND THE
01B0 22 2C 06     0072        SHLD   SHED+3A6H  THINGS THAT CONNECTED
01B3 2A 7E 02     0073        LHLD   FRA3       ..AND TWO VERY TINY
01B6 22 2E 06     0074        SHLD   SHED+3A8H  WHEELS AT THE VERY
01B9 2A 80 02     0075        LHLD   FRA4       ..VERY BACK
01BC 22 30 06     0076        SHLD   SHED+3AAH  ALTOGETHER IT LOOKED
01BF 2A 82 02     0077        LHLD   FRA5       ..QUITE LONELY AND YET
01C2 22 32 06     0078        SHLD   SHED+3ACH  IT APPEARED VERY
01C5 01 DF FF     0079        LXI    B,-21H     ..FUNNY JUST SITTING
01C8 21 64 06     0080        LXI    H,SHED+3DEH  THERE ON THE
01CB 36 19        0081 RAILS  MVI    M,19H   ..RAILS
01CD 03           0082        INX    B       ..WITH NOTHING AT ALL
01CE 23           0083        INX    H       ..EVER
01CF AF           0084        XRA    A       ..TO DO
01D0 A8           0085        XRA    B       ..  W E L L !
01D1 C2 CB 01     0086        JNZ    RAILS   ..LET'S RUN IT JUST FOR
                  0087 *                         FUN
01D4 21 00 CC     0088 HOSTL  LXI    H,RRY  GET TRAIN OUT OF SHED
01D7 EB           0089        XCHG   .      MOVE IT FROM SHED
01D8 21 86 02     0090        LXI    H,SHED
01DB 7E           0091 FIRE   MOV    A,M    LIGHT FIRE
01DC 23           0092        INX    H
01DD EB           0093        XCHG
01DE 77           0094        MOV    M,A    MOVE IT
01DF 23           0095        INX    H
01E0 7C           0096        MOV    A,H
01E1 EB           0097        XCHG
01E2 FE D0        0098        CPI    0D0H   END OF YARD?
01E4 C2 DB 01     0099        JNZ    FIRE   NO, MAKE MORE STEAM!
01E7 CD ED 01     0100        CALL   TRAVL  GO TAKE TRIP
01EA C3 D4 01     0101        JMP    HOSTL  NO ROUND TRIPS, JUST DO
                  0102 *                    AGAIN
                  0103 *
01ED 01 40 03     0104 TRAVL  LXI    B,64*13  MAKE TRIP 13 MILES
01F0 C5           0105 CHOO   PUSH   B        CHUFF ONCE
01F1 CD FF 01     0106        CALL   STROK    MAKE FORWARD MOTION
01F4 CD 0F 02     0107        CALL   TURN     TURN WHEELS
01F7 C1           0108        POP    B
01F8 0B           0109        DCX    B        CLICK ODOMETER
```

```
01F9 AF           0110        XRA    A
01FA A8           0111        XRA    B        13 MILES YET?
01FB C2 F0 01     0112        JNZ    CHOO     NO
01FE C9           0113        RET    .        DO NEXT TRIP
                  0114 *
01FF 21 01 CC     0115 STROK  LXI    H,0CC01H  MOV DOWN THE TRACK
0202 0E D0        0116        MVI    C,0D0H
0204 7E           0117 COAL   MOV    A,M      ADD MORE COAL
0205 2B           0118        DCX    H
0206 77           0119        MOV    M,A
0207 23           0120        INX    H
0208 23           0121        INX    H
0209 7C           0122        MOV    A,H
020A B9           0123        CMP    C        ENOUGH COAL?
020B C2 04 02     0124        JNZ    COAL     NO, PUT MORE ON!
020E C9           0125        RET
                  0126 *
020F 21 00 CC     0127 TURN   LXI    H,0CC00H  TURN WHEELS
0212 7E           0128 HISS   MOV    A,M
0213 23           0129        INX    H
0214 FE 06        0130        CPI    6        FIND COWCATCHER
0216 C2 12 02     0131        JNZ    HISS     LOOK AGAIN.
0219 23           0132 FOUND  INX    H
021A 7E           0133 AXLE   MOV    A,M
021B FE 11        0134        CPI    11H      WHAT QUARTER TURN
021D C2 31 02     0135        JNZ    NXT1
0220 11 7E 14     0136        LXI    D,147EH  NEXT QUARTER TURN
                  0137 *
0223 06 07        0138 AXL1   MVI    B,7     DO 4 AXLES
0225 72           0139 AXL2   MOV    M,D     WHEELS MOVED HERE
0226 05           0140        DCR    B       LAST WHEEL?
0227 CA 52 02     0141        JZ     WORK    I'VE BEEN WORKIN'...
022A 23           0142        INX    H      ..ON THE RAILROAD..
022B 73           0143        MOV    M,E    (SIDE RODS MOVED HERE)
022C 23           0144        INX    H      ..ALL THE LIVE..
022D 05           0145        DCR    B      ..LONG DAY.....
022E C2 25 02     0146        JNZ    AXL2
                  0147 *
0231 FE 14        0148 NXT1   CPI    14H     QUARTER TURN
0233 C2 3C 02     0149        JNZ    NXT2
0236 11 2D 13     0150        LXI    D,132DH
0239 C3 23 02     0151        JMP    AXL1
023C FE 13        0152 NXT2   CPI    13H     QUARTER TURN
023E C2 47 02     0153        JNZ    NXT3
0241 11 5F 12     0154        LXI    D,125FH
0244 C3 23 02     0155        JMP    AXL1
0247 FE 12        0156 NXT3   CPI    12H     QUARTER TURN
0249 C2 1A 02     0157        JNZ    AXLE
024C 11 2D 11     0158        LXI    D,112DH
024F C3 23 02     0159        JMP    AXL1
                  0160 *
0252 01 B4 14     0161 WORK   LXI    B,5300
0255 0B           0162 OIL    DCX    B
0256 DB FA        0163        IN     0FAH    DID THE CONDUCTOR
0258 E6 01        0164        ANI    RDA    ..FLAG US DOWN
025A DB FC        0165        IN     0FCH   CLEAR INPUT PORT
025C CA 65 02     0166        JZ     QUIT   QUITTIN' TIME
025F AF           0167        XRA    A      NO,    THEN HIGHBALL
0260 A8           0168        XRA    B
0261 C2 55 02     0169        JNZ    OIL    NO SQUEEKS, PLEASE!
0264 C9           0170        RET
                  0171 *
                  0172 *    PUT A JUMP TO WHERE EVER YOU NEED TO
                  0173 *    TO RETURN IN THE NEXT STATION.
0265 C3 04 C0     0174 QUIT   JMP    0C004H YOUR RETURN TICKET HERE
                  0175 *
     0001         0176 RDA    EQU    01H    PUT YOUR DAV FLAG HERE
     CC00         0177 RRY    EQU    0CC00H   VDM RAM
     006E         0178 SMOKE  EQU    6FH      SMOKE CHARACTOR
0268 01 10        0179 CAB1   DW     1001H    CAB DESCRIPTION
026A 10 5D        0180 CAB2   DW     5D10H     "       "
026C 7E 20        0181 CAB3   DW     207EH     "       "
026E 28 0A        0182 BOI1   DW     0A28H    BOILER DESCRIPTION
0270 0A 19        0183 BOI2   DW     190AH      "         "
0272 0A 0A        0184 BOI3   DW     0A0AH      "         "
0274 0A 5B        0185 BOI4   DW     5B0AH      "         "
0276 39 39        0186 BOI5   DW     3939H      "         "
0278 5D 20        0187 BOI6   DW     205DH      "         "
027A 06 20        0188 FRA1   DW     2006H    FRAME DESCRIPTION
027C 11 2D        0189 FRA2   DW     2D11H      "         "
027E 11 20        0190 FRA3   DW     2011H      "         "
0280 6F 2D        0191 FRA4   DW     2D6FH      "         "
0282 6F 20        0192 FRA5   DW     206FH      "         "
0284 19 19        0193 TIES   DW     1919H    TIES DESCRIPTION
0286 00           0194 SHED   NOP    .        THIS IS SHED AREA
     03FA         0195 CLOUD  EQU    $+0173H  BEGINNING OF CLOUD
```





# Galaxy

```
0001 *
0002 *
0003 *  SHOOTING STARS -- A BRAIN TEASER GAME
0004 *  AN INTERACTIVE GAME FOR 8080 COMPUTER
0005 *  THIS VERSION IMPLEMENTED FOR Sol
0006 *  DEVELOPED AND DEBUGGED WITH ALS-8
0007 *  PROGRAM DEVELOPMENT SYSTEM
0008 *
0009 *  PROGRAM ORIGINALLY SUBMITTED TO THE
0010 *  HEWLETT-PACKARD SOFTWARE LIBRARY IN BASIC
0011 *  SUBSEQUENTLY PUBLISHED BY PEOPLE'S COMPUTER
0012 *  COMPANY IN SEPT 74 AS "TEASER"
0013 *  WRITTEN IN 8008 CODE BY WILLARD I. NICO
0014 *  IN BYTE MAY 76 AS "SHOOTING STARS"
0015 *  ADAPTED TO 8080 CODE FOR USE WITH VDM-1
0016 *  BY JERRY BACON
0017 *  S.I.L. PROGRAMMING LABORATORY
0018 *  BRASILIA, D.F. BRASIL
0019 *
0020 *  DATE:  14 JAN 77
0021 *
0022 *
0023  ORG 0
0024 SHSDR LXI H,HEADR  POINT TO HEADER MESSAGE
0025  CALL SCRN     DISPLAY IT
0026  CALL KBD
0027  CPI 'N'      CHECK IF RULES WANTED
0028  JZ START  IF NOT, START GAME
0029  LXI H,PAGE1  OTHERWISE POINT TO 1ST PAGE
0030  CALL SCRN
0031  CALL KBD
0032  LXI H,PAGE2   POINT TO 2ND PAGE
0033  CALL SCRN
0034  CALL KBD
0035 START LXI D,VDM1
0036  CALL CLER    CLEAR THE SCREEN
0037  LXI B,0001H   INITIALIZE UNIVERSE
0038  MOV D,B   CLEAR SHOT COUNTER
0039 CNTST INR D  INCREMENT SHOT COUNTER
```

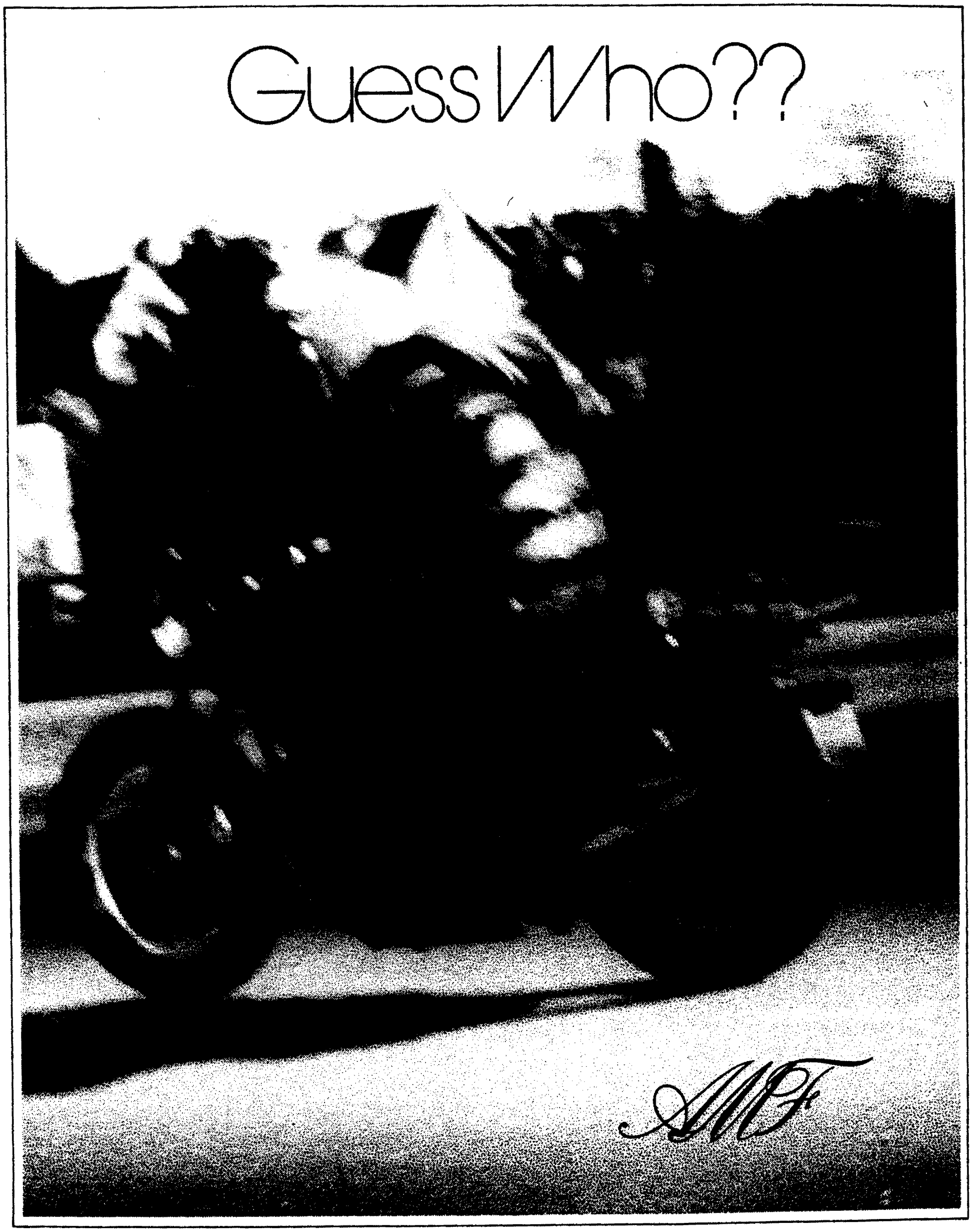
```
0040 DISP LXI H,STR1  DISPLAY UNIVERSE
0041  CALL TYPE
0042  LXI H,STR2
0043  CALL TYPE
0044  LXI H,STR3
0045  CALL TYPE
0046  LXI H,STR4
0047  CALL TYPE
0048  LXI H,STR6
0049  CALL TYPE
0050  LXI H,STR7
0051  CALL TYPE
0052  LXI H,STR8
0053  CALL TYPE
0054  LXI H,STR9
0055  CALL TYPE
0056  XRA A
0057  MOV A,C
0058  RRC
0059  LXI H,STR5
0060  CALL TYPE1
0061 WNTST MOV A,B     GET UNIVERSE PATTERN
0062  CPI 0FFH    CHECK FOR FRINGE STARS
0063  JNZ LSTST    IF NOT ALL PRESENT, CHECK FOR LOSS
0064  MOV A,C
0065  ORA A        GET CENTER STAR
0066  JNZ GTSTR    CONTINUE IF PRESENT
0067  LXI H,MESS4  IF NOT, GAME IS WON. POINT TO WIN MESS
0068  CALL SCRNB
0069 *
0070 *
0071 *
0072 *
0073 *
0074 *
0075  MVI E,'0'  INITIALIZE BINARY TO DECIMAL CONV.
0076  MOV B,E
0077  MOV C,E
0078  DCR D      GET RID OF LAST SHOT
0079  MVI A,'9'+1  SET OVERFLOW CHECK
0080 MRDEC INR E      INCREMENT 1'S
0081  CMP E      CHECK FOR OVERFLOW
0082  JNZ TALLY  CONTINUE IF NOT
0083  MVI E,'0'  OTHERWISE, RESET 1'S
0084  INR C      INCREMENT 10'S
0085  CMP C
0086  JNZ TALLY
0087  MVI C,'0'
0088  INR B      INCREMENT 100'S
0089 TALLY DCR D      DECREMENT SHOT COUNTER
0090  JNZ MRDEC
0091  MVI A,'0'
0092  CMP B      CHECK FOR LEADING 0
0093  JNZ THREE   IF NOT, DISPLAY 3 DIGITS
0094  CMP C
0095  JNZ TWO
0096  JMP ONE
0097 THREE MOV M,B DISPLAY SCORE
0098  INX H
0099 TWO MOV M,C
0100  INX H
0101 ONE MOV M,E
0102  INX H
0103  XCHG
0104  LXI H,MESS5  POINT TO REST OF WIN MESS.
0105  CALL SCRN2
0106 PRNT1 CALL KBD
```

```
0107  CPI 'Y'    CHECK FOR RESTART
0108  JZ START  IF YES, START AGAIN
0109  RET .      IF NOT RETURN TO ALS-8
0110 LSTST ORA A      CHECK FOR NO FRINGE STARS
0111  JNZ GTSTR  IF ANY ARE PRESENT CONTINUE GAME
0112  MOV A,C
0113  ORA A      IF NOT, CHECK FOR CENTER STAR
0114  JNZ GTSTR  IF PRESENT CONTINUE
0115  LXI H,MESS3  OTHERWISE POINT TO LOST MESS.
0116  CALL SCRNB
0117  JMP PRNT1
0118 GTSTR LXI H,MESS7  ASK FOR SHOT
0119  CALL SCRNB
0120 NXTST CALL KBD
0121  INX H
0122  MOV M,A     ECHO SHOT
0123  CALL DELAY
0124  MVI E,9     SET MASK COUNTER
0125  LXI H,MASK   POINT TO MASKS
0126 NXGRP CMP M       CHECK FOR SHOT
0127  JZ FOUND
0128  DCR E
0129  JZ INVAL   INVALID SHOT IF NOT FOUND
0130  INX H       POINT TO NEXT ENTRY
0131  INX H
0132  INX H
0133  INX H
0134  JMP NXGRP
0135 FOUND  INX H
0136  MOV A,M
0137  ORA A       CHECK STAR POSITION
0138  JNZ UNIV2   JMP IF FRINGE STAR
0139  MOV A,C
0140  CPI 1       CHECK FOR CENTER STAR
0141  JNZ BDFEL   IF NOT PRESENT, BAD SHOT
0142  JMP NXBYT
0143 UNIV2 MOV A,B
0144  ANA M       ISOLATE STAR SHOT
0145  JZ BDFEL   IF NOT PRESENT, BAD SHOT
0146 *
0147 *
0148 *
0149 *
0150 *
0151 NXBYT INX H
0152  MOV A,B
0153  XRA M       ALTER GALAXY
0154  MOV B,A     SAVE NEW PATTERN
0155  INX H
0156  MOV A,C
0157  XRA M       CHANGE CENTER STAR, IF NECESSARY
0158  MOV C,A
0159  JMP CNTST   COUNT SHOT AND DISPLAY NEW UNIVERSE
0160 INVAL CPI ESC     CHECK IF INVALID SHOT WAS AN ESCAPE
0161  JNZ NTVAL
0162  LXI H,MESS6  IF SO POINT TO SURRENDER MESSAGE
0163  CALL SCRNB
0164  JMP PRNT1
0165 NTVAL LXI H,MESS2  POINT TO INVALID STAR MESSAGE
0166  CALL SCRNB
0167  JMP NXTST  GO TO NEXT SHOT
0168 SCRN MOV A,D
0169  STA TEMP   SAVE D (SHOT COUNTER)
0170  LXI D,VDM1  SET SCREEN ADDRESS
0171 SCRN1 CALL CLER  CLEAR & INITIALIZE SCREEN
0172 SCRN2 MOV A,M
0173  CPI EM    CHECK FOR END OF MESSAGE
```

```
0174  JZ END
0175  STAX D     DISPLAY CHARACTER
0176  INX H
0177  INX D
0178  JMP SCRN2
0179 END LDA   TEMP  GET SAVED SHOT COUNTER
0180  XCHG
0181  MOV D,A   PUT IT BACK IN D
0182  RET
0183 SCRNB MOV A,D
0184  STA TEMP
0185  LXI D,SCRBT  SET LOWER DISPLAY ADDRESS
0186  JMP SCRN1
0187 CLER PUSH  D     SAVE STARTING ADDRESS
0188  XRA A
0189  OUT VDM   INITIALIZE VDM-1
0190 CLER1 MVI A,' ' GET A SPACE
0191  STAX D
0192  INX D
0193  MOV A,D
0194  CPI BOTT  CHECK FOR END OF SCREEN
0195  JNZ CLER1
0196  POP D     RESTORE STARTING ADDRESS
0197  RET
0198 TYPE XRA A     CLEAR A & CARRY
0199  MOV A,B   GET UNIVERSE
0200  RRC
0201  MOV B,A
0202 TYPE1 JC STAR
0203  MVI M,'0'  DISPLAY HOLE
0204  RET
0205 STAR MVI M,'*'  DISPLAY STAR
0206  RET
0207 KBD CALL DAV    KEYBOARD INPUT ROUTINE
0208  JZ KBD
0209  IN DATA
0210  ANI 127
0211  RET
0212 DAV IN STAT
0213  CMA .  CAN BE CHANGED TO A NOP
0214  ANI DAVM
0215  RET
0216 BDFEL LXI H,MESS1  POINT TO ERROR MESSAGE
0217  CALL SCRNB
0218  JMP NXTST
0219 DELAY PUSH D       2 SECOND DELAY ROUTINE
0220  PUSH PSW
0221  MVI D,2
0222 DLY1 MVI E,100
0223 DLY2 XRA A
0224 DLY3 DCR A
0225  JNZ DLY3
0226  DCR E
0227  JNZ DLY2
0228  DCR D
0229  JNZ DLY1
0230  POP PSW
0231  POP D
0232  RET
0233 TEMP DS 1
0234 *
0235 *
0236 *
0237 *
0238 *
0239 *
0240 *
```

```
0241 MESS1 ASC "HEY! YOU CAN ONLY SHOOT STARS, NOT BLACK HOLES."
0242  ASC " TRY AGAIN."
0243  DB EM
0244 MESS2 ASC "THAT WASN'T A VALID STAR NUMBER. TRY AGAIN."
0245  DB EM
0246 MESS3 ASC "YOU LOST THE GAME! WANT TO SHOOT SOME MORE"
0247  ASC "STARS?"
0248  DB EM
0249 MESS4 ASC "YOU WIN!! GOOD SHOOTING! YOU FIRED "
0250  DB EM
0251 MESS5 ASC " SHOTS. BEST POSSIBLE    SCORE IS 11 SHOTS."
0252  ASC "WANT TO SHOOT AGAIN, DEADEYE?"
0253  DB EM
0254 MESS6 ASC "YOU GIVE UP T00 EASILY! WANT TO SHOOT SOME MORE"
0255  ASC " STARS?"
0256  DB EM
0257 MESS7 ASC "YOUR SHOT?"
0258  DB EM
0259 HEADR ASC " * * * * * * * * *  S H 0 0 T I N G  S T A R"
0260  ASC " S * * * * * * * * "
0261  ASC ". . . . . . . . . . . . . . . . . . . . . . . . . ."
0262  ASC " . . . . . . . "
0263  ASC " A    B R A I N   T E A S E R   G A M E ! ! !"
0264  ASC ". . . . . . . . . . . . . . . . . . . . . . . . . ."
0265  ASC " . . . . . . . . . . . . . . . . "
0266  ASC "DO YOU WANT THE RULES?  (TYPE N FOR NO)
0267  DB EM
0268 PAGE1 ASC "THERE ARE STARS: *  AND THERE ARE HOLES: 0  IN"
0269  ASC " THE UNIVERSE.    "
0270  ASC "YOU SHOOT A STAR, (NOT A BLACK HOLE) BY TYPING "
0271  ASC "ITS NUMBER.        "
0272  ASC " 1 2 3                    "
0273  ASC " * * *                    "
0274  ASC " 0 0 0      "
0275  ASC " 4 5 6                    "
0276  ASC " * 0 *                    "
0277  ASC " 0 0 0      "
0278  ASC " 7 8 9                    "
0279  ASC " * * *                    "
0280  ASC " 0 0 0     "
0281  ASC "YOU WIN IF YOU GET THE PATTERN IN THE MIDDLE. "
0282  ASC "YOU LOSE IF YOU   GET THE PATTERN ON THE RIGHT."
0283  DB EM
0284 PAGE2 ASC "EACH STAR IS IN A GALAXY. WHEN YOU SHOOT A STAR"
0285  ASC " EVERYTHING IN   ITS GALAXY CHANGES. ALL STARS BECO"
0286  ASC "ME BLACK  HOLES AND ALL BLACK HOLES BECOME STARS."
0287  ASC " . . . . . .GALAXIES:    "
0288  ASC ". . .!. . . .       "
0289  ASC "  1  *  0    *  2  *    0  *  3    *  0  0    "
0290  ASC "0  *  0           "
0291  ASC "  *  *  0    0  0  0    0  *  *    4  0  0    "
0292  ASC "*  5  *           "
0293  ASC "  0  0  0    0  0  0    0  0  0    *  0  0    "
0294  ASC "0  *  0           "
0295  ASC " . . . . . . . . . . . . . . . . . . . . . . "
0296  ASC " . . . . . . .      "
0297  ASC " 0  0  *    0  0  0    0  0  0    "
0298  ASC "0  0  0                       "
0299  ASC " 0  0  6    *  *  0    0  0  0    "
0300  ASC "0  *  *                       "
0301  ASC " 0  0  *    7  *  0    *  8  *    "
0302  ASC "0  *  9                     "
0303  ASC " READY TO PLAY. "
0304  ASC "TYPE ANY KEY TO START.  GOOD LUCK!"
0305  DB EM
0306 *
0307 *
```

```
0308 *
0309 *
0310 *
0311 *
0312 MASK DW  0131 MASKS FOR CHANGING UNIVERSE
0313  DW 010BH
0314  DW 0232H
0315  DW 0007H
0316  DW 0433H
0317  DW 0116H
0318  DW 0834H
0319  DW 0029H
0320  DW 0035H
0321  DW 015AH
0322  DW 1036H
0323  DW 0094H
0324  DW 2037H
0325  DW 0168H
0326  DW 4038H
0327  DW 00E0H
0328  DW 8039H
0329  DW 01D0H
0330 VDM1 EQU 0CC00H
0331 SCRBT EQU 0CF00H
0332 VDM EQU 0FEH  CHANGE TO 0C8H FOR USE WITH VDM-1
0333 STR1 EQU 0CD1BH  STAR LOCATIONS
0334 STR2 EQU 0CD20H
0335 STR3 EQU 0CD25H
0336 STR4 EQU 0CD9BH
0337 STR5 EQU 0CDA0H
0338 STR6 EQU 0CDA5H
0339 STR7 EQU 0CE1BH
0340 STR8 EQU 0CE20H
0341 STR9 EQU 0CE25H
0342 STAT EQU 0FAH  KEYBOARD STATUS PORT
0343 DATA EQU 0FCH  KEYBOARD DATA PORT
0344 DAVM EQU 01H  DATA AVAILABLE MASK
0345 BOTT EQU 0D0H
0346 EM EQU 01H
0347 ESC EQU 1BH
```


Guess Who??
AMF