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<p>ISSUE #1—JAN. '84 \$4.00 64 v. the Peanut! Telecommunications! Tales of the Commodore! And ready to enter: Multi Draw 64 Graphics System! Interrupt Music Maker/Editor! A Peek at Memory! Sequential Files!</p>	<p>Sorry...Issues #1, #2, and #7 sold out! Reprint editions (programs and feature articles only) available for \$4.00 each.</p>	<p>ISSUE #12—DEC. '84 \$4.00 Buyer's guide to printers! 1525 printer tutorial! Custom characters! User Guide to KMMM Pascal! Diving into BASIC! And ready to enter: Construc- tion Co.! Space Patrol! Cross Ref!</p>	<p>ISSUE #18—JUNE '85 \$4.00 Music & graphics entry systems! How modems work! Inside the 6510! And ready to enter: Quad-print! Mapping 4.4! Towers of Hanoi! Speedy! Duck Shoot! The 6510 Simulator!</p>
<p>ISSUE #2—FEB. '84 \$4.00 Illustrated tour of the 1541! Artificial intelligence! Synapse's Ihor Wolosenko interviewed! And ready to enter: Music Maker Part II! Screen Manipu- lation! Night Attack! Relative Files!</p>	<p>ISSUE #7—JULY '84 \$4.00 MSD dual disk drive! Database buyer's guide! Training your cursor! Screen displays! File Sleuth! Users Groups! And ready to enter: Renumbering! Checklist! Math Defender! Brisk!</p>	<p>ISSUE #13—JAN. '85 \$4.00 VIC/64 OS exposed! Sprites! 1541 de- vice # disconnect switch! Ghostbusters! And ready to enter: Ultra Mail! Music Tutor! Alice in Adventureland! Mid- print! To the Top! Tape/Disk Transfer!</p>	<p>ISSUE #19—JULY '85 \$4.00 PROM programming! 3-part harmon- ies on VIC/64! Speeding pixels! And ready to enter: Auto-Append! Script Analysis! Wizard of Im! Lucky Lot- tery! Brainframe! Etch! Printat!</p>
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<p>ISSUE #5—MAY '84 \$4.00 Future of Commodore! Inside BASIC storage! Memory management on the VIC & 64! Guide to spreadsheets! And ready to enter: Math Master! Air As- sault! Biorhythms! VIC Calculator!</p>	<p>ISSUE #10—OCT. '84 \$4.00 C-64 graphics programs! Bit-mapped graphics! Joystick programming! And ready to enter: VIC 40 Column Op- erating System! BAM Read & Print! Emerald Elephant! Lawn Job!</p>	<p>ISSUE #16—APR. '85 \$4.00 Assembly language column begins! Programming the joystick! 1541 disk drive alternatives! And ready to enter: Hop Around! Faster 64! Booter! Ele- check! BASIC Trace! Space Hunt!</p>	<p>ISSUE #22—OCT. '85 \$4.00 Create cartoon characters! Infinitesimal intrigue! Inside copy protection! And ready to enter: Shotgun! Maestro! Solitaire! Mystery at Mycroft Mews! Gravinauts! 1541 Cleaning Utility! ShadeyDump!</p>
<p>ISSUE #6—JUNE '84 \$4.00 Game programming column begins! Program generators! Rupert on input- ting! Memory management continues! And ready to enter: Post Time for the 64 & VIC! Alpiner! Sound Concept!</p>	<p>ISSUE #11—NOV. '84 \$4.00 Music programs & keyboards for the 64! Graphics feature continues! And ready to enter: PTE word processor! Block Editor! Alternate Character Set for the 64! The Tunnel of Tomachon!</p>	<p>ISSUE #17—MAY '85 \$4.00 Disk drive enhancements! Install a re- set switch! Assembler escapades! And ready to enter: Super Duper! Two-Col- umn Directory! DSKDU! Raid! DOS Plus! Font Editor! Tile Time!</p>	<p>ISSUE #23—NOV. '85 \$4.00 Adventure gaming! ML sprite manipula- tion! BASIC for beginners! And ready to enter: Lightning Loader! Knight's Tour! Chopper Flight! Rhythmic Bits! Instant Bug Repellent! File Scout! Slither!</p>

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TABLE 1—DISK DRIVE CAPACITY

	1541	SFD-1001
Storage (bytes)	174,848(SS)	1,066,496(DS)
Max. Seq. File	168,656	1.05 MB
Max. Rel. File	167,132	1.04 MB
Directory Entries	144	224
Number of Tracks	35	154
Sectors/Track	17 to 21	23 to 29
Bytes/Sector	256	256
Sectors per Disk	683 664 free	4166 4133 free
BAM Sectors	1	4
Avg. File Size (sectors)	4.6	18.5
# Heads	1	2
Microprocessor(s)	6502	2 x 6502
RAM Buffer	2K	4K
Interface	VIC Serial	IEEE-488

TABLE 2—DISK SECTOR LAYOUT

1541		SFD-1001	
Track #	# of Sectors	Track #	# of Sectors
1 to 17	21	1 to 39	29
18 to 24	19	78 to 116	27
25 to 30	18	40 to 53	25
31 to 35	17	117 to 130	23
		54 to 64	
		131 to 141	
		65 to 77	
		142 to 154	

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The publisher cannot assume responsibility for errors in the above listing.

preserving the alignment of the SFD-1001. This is as it should be, since alignment is far more critical than in the 1541 due to the double track density. Disk rotation is performed by a brushless and beltless TDK direct drive motor.

The electronics are equally impressive. Not one but two 6502 microprocessors handle the internal and external operations of the SFD-1001. These are supported by a pair of 6532 Ram-I/O-Timer (RIOT) chips and a 6522 Versatile Interface Adapter (VIA) chip. We found at least 18 kilobytes of onboard ROM as well as 4 kilobytes of working RAM.

User interface and drive status indication is via two indicating light emitting diodes (LEDs) on the front panel. The first of these is a dual purpose unit which glows green for power on indication and glows red for DOS error indication. The second is a red LED on the drive door to indicate drive activity.

The SFD-1001 was intended to be

a "business" product. As such the Federal Communications Commission (FCC) requirements with regard to electromagnetic radiation are not as stringent as for consumer products such as the 1541. This is immediately apparent when the cover of the SFD-1001 is removed. The metal radiation shield, which is present in the 1541 disk drive, is not used in the SFD-1001. This does not affect the drive's performance as a computer peripheral. However, it may result in increased radio and television interference in the home. Prospective users of the SFD-1001 should be aware of this and be prepared to take corrective action. Generally all that will be required is a repositioning of the drive with respect to the affected components.

THE SOFTWARE

The SFD-1001 is equipped with version 2.7 of Commodore's DOS. It is fundamentally identical to the DOS used by the Commodore 8250 two

megabyte dual disk drive. The DOS is fully compatible with all of Commodore's standard DOS commands as described in the 1541 disk drive manual, as well as numerous other sources.

Open File capacity is significantly enhanced. Table 3 lists the available options.

**TABLE 3—SFD-1001
FILE COMBINATIONS**

0 relative and 5 sequential
or 1 relative and 3 sequential
or 2 relative and 2 sequential
or 3 relative and 0 sequential

By comparison, the 1541 only supports two sequential files or one relative and one sequential file at a time.

If you buy the SFD-1001 from Progressive Peripherals and Software you will also get a utility disk with a number of programs that have been specially modified for the extra capacities of the drive. Included on the disk are a version of Disk Doctor, a track and sector editor released into the public domain by Solidus International. The disk also contains a number of backup utilities for transferring data between a 1541 and an SFD-1001 or for just backing up SFD disks. These include several file copiers and a BAM-driven copier.

THE GOOD AND THE BAD OF IT

The best part of the SFD-1001 is its enormous capacity. It is ideally suited for database applications where the one megabyte relative file size can handle very comfortable data collections. The large capacity is also attractive to bulletin board users. The only concern we have here is heat buildup for long term operation. We were unable to test this out before this review, but we should know shortly as we intend to place the SFD into service on the *Ahoy!* Bulletin Board.

The large capacity of the SFD-1001 is also its primary limitation. Remember, this is still a single drive connected to a 64 kilobyte computer (the C-64). Backing up an entire disk will take some time, about 90 minutes in our estimation. There are just

no high speed copy utilities available for the SFD-1001. Even if a high speed copier were available, a full disk backup would be tedious. A minimum of 18 pairs of disk exchanges would be required to back up a single disk. Of course if you had two SFD-1001s, things would be a little better. A good copy utility could automatically transfer the files without your attention. Of course, this would still tie up the computer for well over an hour for each disk that you wish to copy.

We are assuming that C-64 users will be buying the SFD-1001 as a second disk, after a 1541. This makes sense unless you are willing to give up all access to C-64 commercial software which is available in 1541 format. Thus most users will be transferring their application software and data files to the SFD from a 1541. Both convenience and conservation of disk space make this a sensible idea. We found that Jim Butterfield's *COPY/ALL* did an excellent job of transferring files between a 1541 and the SFD-1001. Keep in mind as a rule copy protected software will not be transferrable to the SFD format, even if you use a copy program capable of making a backup on a 1541 disk drive. All application software will have to be put in unprotected program file format before it will be possible to transfer it.

CONCLUSIONS

The SFD-1001 is an excellent value as a high capacity online storage device—if your application and operating modes will support it. Prospective users should be aware of the long times involved in maintaining proper backups of their disk files when working when a one megabyte single disk on a 64 kilobyte system. We found the experience to be like a step back two years when the 1541 was first introduced. Even with the fastest IEEE interface, which we discuss below, the archival process will be tedious. If you are really serious about this type of data storage you may want to shop around for a Commodore 8250, a two-megabyte dual disk drive version of the SFD-1001.

IEEE-488 INTERFACES FOR THE C-64 AND OTHER COMMODORE COMPUTERS

The SFD-1001 reviewed above is just one of many IEEE peripherals, made by Commodore, which is becoming available at low cost at the present time. We expect IEEE peripherals to enjoy popularity for as long as inventories and the present pricing situation last. None of Commodore's current crop of computers will directly interface with an IEEE peripheral. An interface, much like a non-Commodore printer interface, is required. We report on three of these products. All were evaluated with the SFD-1001 disk drive and an MSD SD-2 dual disk drive. Table 4 (see page 86) lists all the interfaces and summarizes some of the results.

The CP/M boot times in Table 1 refer to the Commodore 64 CP/M 2.2 operating system and not the C-128 CP/M 3.0 version. It is without question the least expensive way to obtain hands-on experience with CP/M. The C-64 CP/M system enjoyed a brief popularity until Commodore changed the specifications of the VIC-II chip. The result was that most C-64s will not work with the CP/M cartridge which was designed for it. If you do have a working C-64 and CP/M cartridge combination, then you may benefit from an MSD-SD2 and E-Link IEEE interface combination. The former lets you define a dual drive CP/M without any loss of memory. The latter provides a slight speed improvement. Note that neither Quicksilver nor BusCard II will work with the C-64 CP/M cartridge. (Users of the C-64 CP/M cartridge may contact Morton Kevelson, P.O. Box 260, Homecrest Sta., Brooklyn, NY 11239 for more information on CP/M and the C-64.)

E-LINK

**Application: VIC 20, C-64, Plus/4,
C-16, C-128**

Progressive Peripherals and Software

2186 South Holly, Suite 400

Denver, CO 80222

Phone: 303-759-5713

Price: \$99.95

The E-Link is the simplest of the

IEEE interfaces we examined. This simplicity refers to its operation and not its construction. Internally it is at least as complex as any of these devices. It is a no-frills unit which plugs into the disk drive serial port just like a printer interface. It is the only IEEE interface which will work with the VIC 20, C-64, Plus/4, C-16, and C-128 computers. (The last in both C-64 and C-128 modes.) It is the only interface which works with the C-64 CP/M cartridge. This is because it fully emulates a serial port device when in use.

THE HARDWARE

The E-Link is housed in a plastic VIC 20 cartridge case. It is equipped with its own power supply, similar to a portable radio battery eliminator. This compact power supply provides 9 volts DC at up to 500 milliamperes to the onboard 5 volt regulator. Since the voltage regulator is inside the E-Link housing, it will get warm in use. The E-Link installation should allow for proper ventilation. The power supply, which plugs directly into a 120 volt wall outlet, is linked to the E-Link via a lightweight ten-foot wire. Since the power supply does not have an on/off switch, you should unplug it when not in use. This will greatly extend the life of the system.

The only other connections to the E-Link are a five-foot cable terminated in a disk drive serial bus connector and a PET style IEEE edge card connector (which is not gold plated). Herein lies a problem. Since the E-Link does not extend the disk drive serial bus, it will have to be the last peripheral on the serial bus chain. If this position is already occupied by a printer or printer interface, a conflict will most likely exist. These peripherals generally fail to extend the disk drive serial bus as well. To get around the problem we constructed a serial port "breakout" box complete with selector switch. Users of multiple serial port peripherals should also observe the five device limitation on this bus.

Internally, the E-Link is like any other intelligent Commodore peripheral. It has its own 65C02 micro-

GUARANTEED SOFTWARE



VIZASTAR for the C128

Vizastar, the integrated spreadsheet, database and graphics program that has the Commodore 64 world raving, is now available for the C128. It boasts 80 columns, and has over 40K of free memory in the spreadsheet. Those who already own Vizastar 64 will be pleased to know that your existing files can be read by Vizastar 128. Also, you can upgrade to the 128 version. Call us for details and pricing.

"The only other comparable product would be Lotus 1-2-3 for the IBM PC; nothing in the C64 world comes even close to the features of Vizastar."

AHOY July 85

"I found Vizastar would do anything Lotus 1-2-3 could, and then some. It's my Commodore choice to become the standard against which the others will be judged."

INFO 64 Magazine, Issue #7

"Vizastar is an exceptional package that rivals the features of programs such as Lotus 1-2-3 and offers C64 owners the kind of integrated software previously only available for higher-priced systems."

RUN Magazine, June 1985

"I scrutinized, tested and experimented with Vizastar extensively, but could find no weaknesses whatsoever. It is the most comprehensive, most flexible, most powerful and easiest to use integrated software package I've worked with."

Commodore Microcomputer, Sept/Oct 1985

"I use an IBM PC at work with Lotus 123. I feel Vizastar is just as good and in some ways better than 1-2-3."

Steven Roberson, NC. End User

"I have used Multiplan and Superbase; both are good pieces of software, but are inadequate when compared to Vizastar."

Jim Mathews, WA. End User

"So good, I bought a second C64 and Vizastar for my office. A wild bargain! You've saved me from having to buy IBM and Lotus."

Philip Ressler, MA. End User



VIZAWRITE CLASSIC for C128

This is the new word processor from Vizastar's author, Kevin Lacy and is the successor to Omniwriter, which he also wrote. All the features of Omniwriter are there, plus many significant enhancements, like auto pagination, on-line help, pull-down menus, full-function calculator and more. Up to 8 'newspaper-style' variable-width columns can help with newsletters.

Three different proportionally-spaced "near letter quality" fonts are also built-in for use with Commodore or Epson compatible printers. You can merge almost any other word processor file directly into Vizawrite, including Paper Clip and Omniwriter. Naturally, it is also compatible with Vizastar. At all times, what you see on the screen is exactly the way it will be printed out. Vizawrite can do mail-merges and has an integrated 30,000 word spelling checker that you can expand yourself.

PROGRAM SPECIFICATIONS

Both Vizawrite and Vizastar are written in 100% machine language and run in the 128's FAST mode, making it lightning fast. They require a C128 with 80 column color or monochrome monitor. Both come with a cartridge, a diskette, a backup, and a reference manual. Vizastar also includes a 50 page tutorial book. Both work with 1541 or 1571 disk drives.

RISK-FREE OFFER

Vizastar 128 is priced at \$119.97. Vizawrite's price is \$79.97, but as an introductory offer, it is now only \$69.97. Vizastar 64 XL8 is now available for \$119.97. We are so positive you will be satisfied with our programs that we offer a 15-day money-back guarantee. Try it Risk-Free. Call us today or send a check or money order. VISA/MC accepted.

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TABLE 4 — IEEE INTERFACE PERFORMANCE

Test	1541	SFD-1001	MSD SD-2
Load 30K	77		
w/Quicksilver		17	35
w/BusCard II	(note 2)	24/33	37/59
w/E-Link		45	61
Save 30K	83		
w/Quicksilver		31	61
w/BusCard II	(note 2)	31/39	63/85
w/E-Link		43	84
Scratch 30K	16	7	14
Format Disk	78	150	17
CP/M Boot (see text)			
Serial Bus			35
E-Link			27

Notes:

1. All times are in seconds
2. Dual times shown for BusCard II are with/without BASIC 4.0.

processor running at one MHz (one million cycles per second). The operating system is stored in four kilobytes of ROM. Communications are handled by a 6522 VIA (versatile interface adapter) chip.

To hook up the E-Link to your IEEE-488 peripheral you will need a PET to IEEE cable. This accessory should be available from your Commodore dealer. We have encountered some difficulty in finding one at this time.

Operation of the E-Link is straightforward. It neither adds to nor subtracts from the Commodore BASIC or DOS. It causes all IEEE peripherals connected to it to behave as serial port peripherals. The usual conflicts with device numbers will apply. If your SFD-1001 is set to device number 8, then your 1541 on the serial bus will have to be something other than 8. Operation of the SFD-1001 disk drive with the E-Link resulted in a two-to-one speed improvement as compared to the 1541. This is very good for a serial bus peripheral with no modifications to the host computer.

QUICKSILVER

Application: C-64
Skyles Electric Works
231E South Whishman Road
Mountain View, CA 94041
Phone: 800-227-9998
Price: \$139.00

Quicksilver is an enhanced IEEE interface for the Commodore 64.

When installed in the expansion port of the C-64 it adds an IEEE-488 peripheral port while retaining the use of the expansion port. It is another Bryce Nesbitt creation (see the 1541 Flash in the July issue). Of the interfaces we examined, it provided the fastest disk operation with the SFD-1001 disk drive.

THE HARDWARE

Quicksilver is housed in a VIC 20 cartridge case (there do seem to be quite a few of these still floating around) with about 50% of the circuit board extending fore and aft. The forward part of the board is configured as a 50-pin edge card plug (not gold plated) which mates with the C-64 expansion port. To complete the installation the insides of the C-64 will have to be exposed so that a miniature test clip may be connected. The hookup point is done at a resistor (R-44) which terminates on bit 0 of the 6510's onboard I/O port. The installation instructions are supplemented by three clear photographs which depict the various incarnations of the C-64 circuit board. Anybody who can open up his C-64 should be able to install Quicksilver in about 10 minutes without any difficulty.

The C-64 internal connection is to the control line which is designated HIRAM in the C-64 operating system. This handles the access to memory in the \$E000 to \$FFFF address range.

This arrangement combined with a clever bit of hardware and software trickery allows Quicksilver to peacefully coexist with the C-64 operating system. Operation should be totally transparent to most software.

The back end of the circuit board is equipped with an extension to the cartridge port for use with other C-64 cartridges. There is also a handy little reset pushbutton for reinitializing the computer. A set of four miniature switches lets you configure the board for your system. The first switch turns Quicksilver on or off. The second switch sets device 8 to the IEEE bus. The third switch sets devices 9 and 10 to the IEEE bus. The last switch sets device 4, usually a printer, to the IEEE bus. All other device numbers remain at their original ports. This should provide enough flexibility for any system. To top it off you can duplicate some device numbers. A simple POKE switches data transfers between the IEEE-488 and serial bus. Thus you can conceivably LOAD from a 1541 as device B and SAVE to an SFD-1001 also as device 8.

Connection to the IEEE device is via a built-in length of ribbon cable terminated in a single-ended IEEE connector. If your system has only one IEEE device, you will not need any additional cables with Quicksilver. Additional IEEE devices will require an IEEE to IEEE cable for each one.

Internally, Quicksilver uses a minimum of silicon to accomplish its functions. Its custom operating system lives on an eight kilobyte ROM. Communications are handled by a 6520 peripheral interface device (PID), forerunner of the 6522 versatile interface adapter (VIA). A pair of low power logic chips provide the remaining hardware support.

USER SUPPORT

Quicksilver is more than an IEEE-488 interface. It adds several handy enhancements to the operating system. To begin with, a complete DOS wedge is immediately online. This allows for the usual non-destructive directory displays, easy disk error channel reads, simple disk command issuance, and

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single key LOADs and SAVEs.

Several keyboard enhancements are provided. For example, the left SHIFT key or SHIFT LOCK will pause a program listing. All keys will auto repeat. Quote mode may be easily cancelled. The remainder of a line or screen can be easily cleared.

Quicksilver includes a built-in machine language monitor. It can be entered at startup by holding down the Commodore key when the C-64 is turned on. This will also bypass an autoboot cartridge which may be installed at the time.

Perhaps the most unique Quicksilver enhancement is the NMI debugger. This can be set to print the entire processor status on the screen whenever an NMI (non-maskable interrupt) occurs or when the RESTORE key is pressed. This can be invaluable in tracking down the cause of a system crash or the operation of erroneous machine code.

The price of all these enhancements will be trivial for most disk users. All of the Kernal's tape routines have been removed. Of course, they

can be easily restored by simply turning Quicksilver off.

Quicksilver claims to be compatible with the 1541 Flash! We were unable to verify this as we lack a Flash! However, a combination of Quicksilver and Flash! should be the fastest way to get around a system with a 1541 disk drive and an SFD-1001.

BUSCARD II

Application: C-64

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The BusCard II is the deluxe IEEE-488 interface in this group. It has about as many ports as you can shake a disk at. In terms of overall features it is nearly on par with Quicksilver, depending on how you may count your features. In terms of speed it runs a close second. If your printing needs are modest, then BusCard II can handle your printer interface needs as well. It includes a built-in parallel printer interface port.

THE HARDWARE

As we mentioned above, BusCard II is positively bristling with ports. There are two on the back, one to the right, and one to the front. This last one is the usual 50-pin printed circuit edge card plug (gold plated) which mates with the C-64 expansion port.

The complete hookup requires that a miniature test clip be attached to resistor R-44 (just like Quicksilver). Unfortunately the photographs in the manual were so indistinct that they could have been left out for all the good they will do. Installation is simple nonetheless. R-44 is one of a group of three resistors situated on-line nearly due south of the disk drive serial port on the C-64. The resistor is clearly labeled and should be easy to spot. If you can open your C-64, BusCard II can be installed in about 10 minutes or less.

The port on the rightmost edge of BusCard II is an extension to the expansion port for use by an additional C-64 cartridge. The leftmost port at the rear is the parallel printer interface. If you are going to hook up a printer you will need the BusCard printer interface cable available from Batteries Included. This is a minimum interface in that it does not do any graphics emulation or BASIC listing translation. However, BusCard II can be set to translate PET ASCII to standard ASCII if desired. This is sufficient for most word processing applications.



The remaining port at the right rear is the PET style IEEE connector. You will need a PET to IEEE cable to complete the hookup. For some reason, Batteries Included does not offer to supply this cable.

A set of eight miniature switches is directly accessible at the top of the interface. These allow individual selection of devices 4 to 10 as either C-64 serial bus or IEEE-488. Device numbers 11 and up are permanently assigned to the IEEE bus. Device four actually has two switches dedicated to it. These work in conjunction with the supplementary printer port mentioned above. The four possibilities for device 4 are serial port, IEEE, parallel with ASCII translation, and parallel without

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ASCII translation.

Since the switches are continuously read, they may be used to operate duplicate device numbers. For example, device 8 could be assigned to a 1541 disk drive as well as to an SFD-1001. Or you may connect three printers as device 4: one to the serial port, one to the IEEE port, and the last to the BusCard II parallel port.

Internally, BusCard II has an impressive collection of etched silicon. The operating system is on eight kilobytes of ROM with an extra 256 bytes of ROM on the side. Interfacing is through a 6821 Peripheral Interface Adapter and a 6532 RIOT (RAM-I/O-Timer) chip. This last chip contains 128 bytes of RAM, two bi-directional ports, and a built-in timer (definitely a riot). Several low power logic support chips complete the picture.

This collection of hardware lets BusCard II run very transparently to the C-64 operating system. By sensing the status of the HIRAM line, BusCard II can actually switch itself in and out as required. This operation is similar to that performed by Quicksilver mentioned above.

USER SUPPORT

The BusCard II operating system adds all of the BASIC 4.0 disk commands to the C-64's BASIC 2.0. These commands are equivalent to a DOS wedge enhancement. The BASIC 4.0 commands may be easily turned on or off by a SYS call in immediate mode. Interestingly enough, when BASIC 4.0 was active the BusCard II disk operations were noticeably faster, as shown in Table 4.

BusCard II incorporates a machine language monitor in its operating system. This provides the usual MLM functions such as memory display, simple disassembly, and single line assembly. Memory from \$EC00 to \$EFFF is off limits to the MLM because of the BusCard II memory control scheme.

BusCard II is a nicely finished piece of hardware. Its IEEE disk drive operation with the SFD-1001 was quite impressive. Add a printer interface port to the package and you end up with a real bargain.

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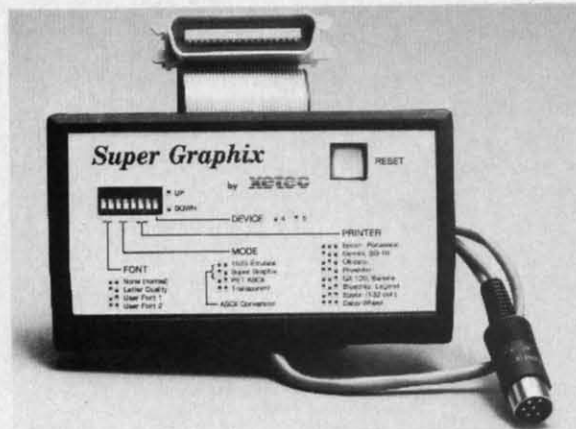
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LINEOUT

For the C-64

By Buck Childress

You finally finished removing those unwanted lines from that soon-to-be masterpiece. It really wasn't too physically demanding. But, after typing in unwanted line numbers and hitting the RETURN key several dozen times, you're beginning to suspect an advanced case of rigor mortis has a grip on your fingers and (perish the thought) brain.

Your suspicion turns to conviction when you list the final version. While in that comatose state, you inadvertently dumped several lines you wanted to keep. Oh, oh...there goes the blood pressure. Gee, that monitor sure looks strange wearing a cowboy boot!

If you're tired of slipping in and out of the fourth dimension, *Lineout* may be just what the doctor ordered to calm the savage beast. *Lineout* will automatically eliminate any amount of lines in any increment you choose.

Just load and run *Lineout*. It will ask you for the beginning (B=) and ending (E=) line numbers. Then you're asked for the increment (I=). Let's say you want to eliminate lines 200 through 450 in a particular program and these lines are in increments of 10. Just answer the B= prompt with 200, the E= prompt with 450, and the I= prompt with 10. If you make a mistake, press the INST/DEL key and enter a new answer. Be sure to press RETURN after answering each prompt. It's as simple as that. Now SYS49152, press RETURN, and let the computer do the work while you concentrate on more important things.

Since *Lineout* resides in an area of memory that's free from the actions of BASIC, it will remain undisturbed while you load, save, and eliminate lines in all the programs you want. Just SYS49152 to get 'er rolling. To put on the brakes, press RUN/STOP.

I hope *Lineout* helps make your programming a bit easier. Besides, those boots look better on your feet!
SEE PROGRAM LISTING ON PAGE 130

COMMODORE ROOTS

HIGH-RESOLUTION GRAPHICS: PART 2

BY MARK ANDREWS

Last month we began exploring the fundamentals of bit-mapped graphics: the kind of graphics that professional programmers use to write arcade-style games and other graphics-oriented programs. This month we'll see how to add joystick action to bit-mapped programs.

In a moment, we'll take a look at how joysticks can be programmed in assembly language. First, though, let's briefly review the high-resolution program called BLACKBOARD presented in last month's column. The version of the program presented last month was written in BASIC. The listing on page 122, titled BLACKBOARD.S, is an assembly language version of the same program. BLACKBOARD.S was written using a *Merlin 64* assembler. But with relatively minor modifications, it can be typed and run using any Commodore-compatible assembler-editor system (see your assembler's instruction manual for details).

There are two obvious differences between BLACKBOARD.S and its assembly language counterpart. One is that the assembly language version of the program is much longer. The other is that it runs much faster—as it should, since it's written in assembly language.

One of the most important segments of the assembly language version of the program is the subroutine called BLKFIL that starts at Line 50. This subroutine is used to clear a bit map that starts at Memory Address \$2000 and a color map that starts at Memory Address \$0400, and to fill the color map with values that will draw a pair of white lines on a black screen. The details of how this process works were explained last month.

The BLKFIL routine works extremely fast because it moves data one "page" at a time. In 6502/6510 assembly language, a "page" is a 256-byte block of data that begins at a memory address divisible by the hexadecimal number \$100—for example, the memory addresses \$0100 through \$01FF make up one page. In the BLKFIL program, the high-order byte of an address block to be filled is defined first, and then a complete page of data is moved. When all full pages have been filled with data, any remaining partial page is taken care of. This technique makes BLKFIL a very high speed routine.

In Lines 69 through 90 of the BLACKBOARD.S program, there is another noteworthy routine: a high-precision 16-bit multiplication program. This routine can mul-

tiple two unsigned 16-bit numbers and can handle a product up to 32 bits long. When the routine ends, the low half of the product is stored in a pair of variables labeled MPR and MPRH, and the high half of the product is stored in PRODL and PRODH. This subroutine is used twice in the BLACKBOARD.S program: once in Lines 134 to 148, and once in Lines 160 to 174. Neither of these routines requires the use of a 32-bit product, so neither routine makes use of the variables PRODL and PRODH. But if you ever do need a multiplication routine that can handle a 32-bit product, here is one that fills the bill.

The 16/32-bit multiplication routine is followed by a plotting routine that is much longer, but also runs much faster, than the plotting routine that accomplished the same task in last month's BLACKBOARD.BAS program.

One more point: When you type and run the BLACKBOARD.S program, you may notice that a couple of the equates in the program's symbol table don't appear in the main body of the program. Don't be too concerned about this: these equates, and their functions, will be examined later on in this column.

When you've typed and executed BLACKBOARD.S, you'll see that it works just like the BLACKBOARD.BAS program that appeared last month: it clears the bit map that starts at \$2000, sets background and dot colors (you can change them if you like), and then draws a pair of crosshairs on the screen. But be forewarned: all this takes place very fast. So don't blink, or you may miss the action. If you typed and ran last month's BLACKBOARD.BAS program, please run both programs and compare the speeds at which they run. Then you'll see very clearly why high-speed graphics programs simply cannot be written in BASIC, and are usually written in assembly language.

WRITING A JOYSTICK PROGRAM

Now we're ready to take a look at how Commodore joysticks can be programmed in assembly language. As you may know, the Commodore 64 has a pair of joystick ports that are often referred to in Commodore literature as Port A and Port B. The status of Port A can be determined by reading an 8-bit register that resides at Memory Address 56321 (or \$DC00 in hexadecimal notation).

Each of the two joysticks that can be plugged into the Commodore 64 has five on/off switches. Four of these

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switches correspond to the four primary directions in which a joystick can be moved: up, down, left, and right. If a joystick is moved diagonally, two of these switches will be activated simultaneously, and a diagonal movement of the joystick can be detected. Table 1 shows how the values of your Commodore's joystick switches can be read in BASIC and assembly language programs.

SWITCH VALUE	BINARY VALUE	MEANING
0	0000 0000	No action
1	0000 0001	Up
2	0000 0010	Down
3	0000 0011	None
4	0000 0100	Left
5	0000 0101	Left + up
6	0000 0110	Left + down
7	0000 0111	None
8	0000 1000	Right
9	0000 1001	Right + up
10	0000 1010	Right + down
11	0000 1011	None
12	0000 1100	None
13	0000 1101	None
14	0000 1110	None
15	0000 1111	None
16	0001 0000	Trigger button pressed
17	0001 0001	Trigger + up
18	0001 0010	Trigger + down
19	0001 0011	None
20	0001 0100	Trigger + left
21	0001 0101	Trigger + left + up
22	0001 0110	Trigger + left + down
23	0001 0111	None
24	0001 1000	Trigger + right
25	0001 1001	Trigger + right + up
26	0001 1010	Trigger + right + down
27	0001 1011	None

The second listing that accompanies this column, titled SKETCHER, combines the features of a high-resolution graphics program with those of a joystick-reading program. The SKETCHER routine is a computer version of those plastic, carbon-filled sketching screens that you may remember from your childhood.

If you've typed and executed the BLACKBOARD.S program, you won't have to type the SKETCHER program from scratch. Just change Line 2 of the BLACKBOARD.S program to read

2 * SKETCHER

and then replace Lines 259 through 296 of the BLACKBOARD.S program with Lines 259 through 424 as shown below.

When you've assembled the SKETCHER program, you can plug a joystick into your computer and see how the program works. By moving your joystick around, you can sketch a picture on your computer screen. Then, by pressing your joystick's trigger button, you can erase your drawing.

In addition to the SKETCHER's bit-mapping and joystick-reading routines, the program contains a few other

Continued on page 146

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SCUTTLEBUTT

Continued from page 14
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Software Exchange, 2681 Peterboro Rd., P.O. Box 5382, W. Bloomfield, MI 48033 (phone: 313-626-7208).

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Concept Development Associates has whipped up five new disks for use with the Micro Kitchen Companion for the C-64. Each of the five disks, which cover French, Italian, Chinese, Mexican, and American cooking, contains up to 180 recipes contributed by 105 of the top chefs in America. Each chef put together a complete full-course dinner from appetizer to dessert. Recommended wines are included for each course as well. Price is \$9.95 each.

For a complete catalog call 1-800-443-0100/ext. 403 or write CDA Customer Service, 7960 Old Georgetown Road, Bethesda, MD 20814 (phone: 301-951-0997).

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A line of carrying cases for microcomputers and printers from Computer Coverup, made of padded Cordura nylon, contain velcro-sealed outer pockets for storage of disks and supplies, adjustable shoulder straps, and reinforced handles.

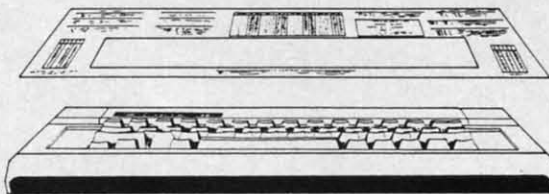
Computer Coverup, Inc., 1740 N. Marshfield, Chicago, IL 60622 (phone: 312-276-9007 or 1-800-282-2541).

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CADET'S COLUMN

A Tour of CompuServe's Commodore Information Network

By Cheryl Peterson

In last month's column, we touched on a public domain program that could be found in one of CompuServe's data libraries. This month, we're going to take a tour of the area where that program was found: the Commodore Information Network (CIN). Good reasons for finding our way there include the many Commodore users who visit (some of whom are bound to share our interests); system operators (SYSOPS), who are knowledgeable about Commodore computers and who are happy to help new users with any problems they encounter; conference visits by Commodore representatives and engineers that give everyone the chance to air their views; and the data libraries that contain a multitude of programs and help files. Run by Commodore employees and users, the CIN gets the latest news on product development and third party vendor support.

To get to the CIN, you need a 300 or 1200 baud modem, a software package for communication, a computer (any Commodore will do), and a CompuServe user number or starter pac.

Once you've gotten past sign-on, there are several ways to get to CIN. At the ! prompt, you can enter G CBM, which will take you to a menu offering access to the areas in CIN. Option 5, the Special Interest Groups/Forums, is the place to find friends, help, and free programs, so we'll start there. I'll get into the other areas later.

If you want to avoid the main menu and go straight into the SIG (Special Interest Group) of your choice, you enter a different command. For The Commodore Forum, enter GO CBM963. To get to the CBM Programming SIG you enter GO

CBM310. And the CIN Creative Corner is accessed by typing GO CBM962.

The Commodore Forum is probably the best place to start. Here, a nightly CO (conference) at 10 pm EDT gives members a chance to interact directly with each other. For those who've never experienced a CO, it's a fantastic way to communicate with a group of people and hear what everyone has to say. To get to the CO you enter "CO" at the **Function:** prompt. After a short pause, you should see a notice welcoming you to Channel 30 and telling you how many other people are tuned in. For most CO's, everyone will be on Channel 30. Almost immediately you should see messages start to appear on your screen.

Now comes the tough part—how you can get in on the conversation. Type something on your keyboard and then hit return. Everyone else who is tuned in will see your message on their screens within a few seconds, so try to make it something friendly like "HI!". Unless you tried to be terribly verbose and entered a message that had more than 80 characters, you should see a bunch of folks cheerfully returning your greeting. If you exceeded the 80 character limit, you'd get an error message.

If you'd like to participate incognito, you type a /han. By the way, all CO commands must be prefaced with a "/", since this is how CIS tells the difference between messages to other users and commands to the system. The system will ask what your handle is. Type in something other than your name. If you happen to see someone using the handle "Cherp," there's a reasonable chance you've run into me. If you want to find out for sure,

type /ust. This user status command will generate a list as in illustration 1. If it's me, the listing for the person using the Cherp handle will probably have an MIA listed under the node column. (Of course, you could always ask. Everyone talks to everyone else and I'm just as talkative as the rest.)

Job	User ID	Nod	ChTik Handle
10	72775.1041	T04CVK	ACCESS
26	76703.2060	FYN	1Moderator
34	72366.2645	MIA	1Cherp
35	74306.2714	DCI	1LOG
40	72507.3051	LAK	1128 Maniac
43	72157.2361	CAP	1Mike
50	76703.2047	FYN	1Jeff @ CBM
62	72247.3454	BOT	1J. Williamson
65	76703.2047	FYN	1Bill Herd
75	72416.2511	LSM	1Mark
80	73615.1156	SEA	1Betty Knight.
85	70726.1222	PPA	1Jeff
86	74025.636	OBA	1Larry P
92	76703.2045	ATJ	30SYSOP/Dave Stewart

Illustration 1: /UST listing

Probably the nicest feature of the CO's is the direct interaction with people who have a similar interest. If you have a question about some aspect of the Commodore computers someone in the CO may be able to help. If no one knows exactly what you're after they can frequently point you in the direction of someone who does. When the group is completely stymied, they'll send you to the appropriate section of the message board.

The message board is the place you came through on the way to CO. The **Function:** prompt recognizes lots of other commands besides CO. Most of them have something to do with reading the messages on the "boards." (See illustration 2.) Each SIG has 11 sections assigned different topics to coincide with user interests. Section 10 of each is the system operator's (SYSOP's) private board.

A short word about SYSOPs. The

COMPUSERVE OFFERINGS

Adapted from the CompuServe Information Service Fact Sheet

CompuServe offers information on topics from high finance to high fashion, more than 100 interactive forums, games, bulletin boards, a shopping mall, travel agencies, an encyclopedia, a news clipping service, tax tips, reference materials, newspapers, weather reports, gossip columns, magazines, and much more.

COMMUNICATIONS AND BULLETIN BOARDS

EasyPlex Electronic Mail links online friends and business contacts with instantaneous communication. The CB Simulator, high technology's partner to CB radio, puts people of all backgrounds, ages and intellects in touch with one another. Forums covering topics ranging from firefighting to medicine provide a unique setting for contributors to exchange ideas and information online.

NEWS, WEATHER AND SPORTS

The complete AP news service, *USA Today*, *The Washington Post* and the *St. Louis Post Dispatch* are some of the newsgathering outlets that put daily and latebreaking information within reach of any computer user.

ELECTRONIC SHOPPING

The Electronic Mall is an online shopping center that enables users to shop at dozens of stores such as Bloomingdale's, Waldenbooks, and Record World without leaving home. Comp-U-Store is a discount home shopping service that includes brand name items such as TVs, kitchen appliances, sporting equipment, and more. In both services, users will find discount prices and special sales.

FINANCIAL TRANSACTION SERVICES

Several banking institutions have put their services online, enabling customers to review transactions, transfer funds, and pay bills electronically. There are discount brokerage services available through the nationally known firms of Quick & Reilly and Max Ule, Inc.

TRAVEL

Some of the travel services available on CompuServe make travel easier, quicker, and less expensive. On Travelshopper booking flights, comparing airfares, and arranging for ticket delivery is just a keystroke away. The A-Z Worldwide Hotel Guide provides its reservation information and lodging descriptions of more than 25,000 hotels worldwide.

ENTERTAINMENT AND GAMES

Trivia buffs can enjoy the Multiple Choice, video game experts can battle each other, and computer and word wizards can match wits with Word Scrabble and Whiz Quiz. A number of board and card games can keep users entertained.

HOME, HEALTH AND FAMILY

Financial, medical, legal, tax, and other areas of home management and family concern are addressed by a wide range of CompuServe offerings. Databases are continually updated to provide the most current information.

MONEY MATTERS AND MARKETS

In the time it takes for investors to sift through the pages of financial publications, CompuServe users have access to a wealth of financial information. The database includes specific data on stocks, bonds, mutual funds, options, major market and industry indices, commodities markets, and publicly-owned companies. Utility programs perform portfolio valuation, screen historical data by selected criteria, create charts, report market highlights, calculate portfolio returns and provide historical quotations. A number of forecasting databases give users access to the same sources tapped by Wall Street analysts.

EDUCATION AND REFERENCE

Through reference texts such as Grolier's Academic American Encyclopedia, education-related databases, and forums, students can sift through information that would otherwise require a trip to the library. Aspiring college students can take sample tests to prepare for the SAT and College Boards and get information on colleges, grants, and financial aid, and application and recruiting policies.

Function:?

Functions:

B	- bulletins	CO	- conference
D	- delete	DL	- data libraries
E	- exit	G x	- go to page x
I	- instructions		
L	- leave a message		
M	- previous menu		
MI	- membership information		
NEW	- new/changes		
OFF	- log off	OP	- set options
QS	- quick scan	R	- read messages
R x	- run SIG x	RT	- read thread
S	- scan headers		
SD	- scan & display		
SEN	- send a message		
SN	- sub-topic names		
SS	- set sub-topic		
T	- go DISPLA	U	- user log
UST	- current users		
V	- interests	X	- database
? x	- explanations of function x		

Illustration 2: Function: options

CompuServe SIG's are similar to privately operated Electronic Bulletin Board systems running on personal computers in many cities. With some big differences: regular users are from all over the country, many people can be on the board at once, and there are usually a group of SYSOPs who don't "own" the board. SYSOPs do, however, regulate how the board is run. For the most part, they are friendly and helpful—only too happy to make new users feel at home. This can mean answering any questions you have to just sending you off to leave a message in the public message forum section most appropriate for your query.

There are a few actions that will get them riled fast. Most object to obscene language, condescending messages, and unflattering comments about any of the users. They also don't like to see copyrighted software uploaded into the data libraries. They have the power to "squelch" any users who are in CO. They can ban any user from accessing the board and if they really get offended could have a user thrown off CompuServe altogether.

Anyway, back to the boards. The central SIG feature, the message base, is set up along the same lines as many local bulletin board systems. Messages can be left to any or all other members and anyone checking

into the SIG can read all the messages that haven't been saved as private files. To read the messages, you type R at the **Function:** prompt. The system will then tell you the message numbers that are active and request a starting message number. After you type in a number, the message you've chosen will start scrolling by on the screen. At the end of it, a prompt allows you to reply or to quit reading messages. The prompt (**UA RE T**) represents the alternatives Unrelated Answer, Reply, and Terminate. Entering just a carriage return will call up the next message. By repeating the process, you can read all the messages on the board. For now, you should probably just concentrate on reading some of the messages.

Of course, once you've been around CIS for a while you pick up a few tricks. If you type RTN at the function prompt (Read Thread New), the messages will appear in a more sensible order. Instead of scrolling by in the order they were entered, all the messages related to a given topic (thread) will be displayed oldest to newest. The N stands for New, so only those messages added since the last time you read through the board would be shown. Once you've signed in as a member of a SIG, look for membership instructions under MI at the **Function:** prompt—the board will remember the last message you've read each time you leave the area.

The QS (quick scan) command will display the topics of threads currently active and their starting message numbers, making it easy to read only threads whose subject appeals to you. SS (Set Section) restricts your activities to only the section number you designate. This allows you to limit the amount of time you spend reading messages in topic areas that don't interest you. For example, you might only be curious about the new 128 and want to read only the messages in the C-128 Info Center (section 9) in the Programming SIG. An SS9 is all you need to lock out the other sections. An RTN at that point would display messages only from section 9. An SN command will dis-

play the names of all the sections.

Now that you know how to see what everyone else is saying, let's run over to those data libraries (DLs) and see what they have for us. Get back to the **Function:** prompt and type **XI**. This will give you a short description of **DLI**. The **DL** numbers are set up to correspond with the section names. Since some programs or help files apply to more than one topic, there is occasional duplication of files. After the description, you return to the **Function:** prompt. To get into a **DL**, you type **DL** and the section number you want.

Since there are three **SIGs**, there are also three separate **DLs** each with 11 sections. The fastest way to see what is included in each **DL** is to type **DIR** at the **DL#:** prompt. The **#** sign in the prompt represents the **DL** number you are in. This command gives a listing of the files, their size, and **CIS** number of the person who uploaded them. (See Illustration 3.) This information isn't terribly useful, since the filenames don't always make it obvious what the file is. If you're good at guessing games, you might like to try to figure it out.

There is a better (although more expensive) alternative. Type **BRO DL#.DIR** at the **DL#:** to search for the file **DL#.DIR**. When the system finds it, it gives a short description of the file. See illustration 3 for a

[76703.2054]
DL2.DIR 03-Aug-85 61310 98

Keywords: DL2 CATEGORY DESCRIPTION
DATA LIBRARY 2

This is the current description of all files here in **DL2 - High Level Utility**. It has been formatted in 80 columns for printing and later reference. Current as of August 3rd 1985.

Illustration 3:
Description of a data library directory file.

sample description. The prompt (**R D T**) represents Read, Download or Terminate. For this file it's best to open the buffer of your terminal package and just read the file. Since it's a text file, it doesn't need to be downloaded as a program. In fact, you might want to open the channel to your printer and just print it out there.

After you've read the file, you can save it to disk on your computer for later use. Or format it for a nice pretty printout. I will warn you, these files are long. Most take about 15 minutes to read. A **↑ P** at any point will stop the listing and get you back to a prompt you'll recognize. The listings start with the latest files and work backwards in time, so you get the most recent files first.

The files on **CIS** fall into two basic categories: text files and programs. Text files usually have extenders like

DOC, **TXT**, or **SEQ**. Programs usually end with **IMG** or **BIN**. The former can be read and buffered; the latter need to be downloaded. Downloading can be ridiculously easy, moderately easy, or impossibly difficult, depending on what software your **Commodore** is running.

If you use the **Vidtex** program sold by **CompuServe** (or another **CIS "B"** protocol compatible program), downloading is simple. Use the **"GO DEFAULT"** command to tell **CompuServe** you're using their protocol. You'll have to negotiate two menus to set the **DEFAULT** to **"Vidtex compatible."** Once that's done, all you have to do is go to the data library of your choice, **BRO** (browse) through until you find a file you want, and choose the **D** at the (**R D T**) prompt. When the screen prompts you for the name to save the file under, type in a legal file name. It's a good idea to give a name that means something to you. Hit the **RETURN** key and wait for the system to do its thing. **CIS** does an automated transfer, meaning that it controls the whole process including writing the file to disk for you. When it's done, you'll see the file description repeat and the prompt (**R D T**).

If you don't use **DEFAULT** to let **CompuServe** know that you are using its protocol, it will give you a four-option menu before starting the

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SECTION THREE
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download. Using the CIS "B" protocol functions the same as described above. The other popularly used protocol is Christensen's XMODEM protocol. Many commercially marketed programs and most public domain terminal software use this protocol. Depending on the software package you are running, there will be some commands you use to start file transfer. You'll have to check your documentation to see how your software works.

One advantage of XMODEM is that it divides the file into parts and sends each part with a special code called a checksum. The receiving software does a calculation on each part and checks the result against the checksum. If the two numbers don't match, the part (block) is resent and the receiving computer throws out the block with the error in it.

The X-On/X-Off choice is the protocol of last resort, since it doesn't do any error checking. The sending computer (CIS) just sends the data out. If it receives a signal from the

Commodore	CBM-2000
The Commodore Forum	
0	General/Help!
1	The Commodore 64
2	The Commodore 128
3	The Amiga from CBM
4	Other CBM Computers
5	Software
6	Programming
7	CBM Magazines
8	CBM User Groups
9	News from CBM

Illustration 4: Section listing from Commodore technical support area.

other computer to stop (X-Off), it pauses until it receives a resume command (X-On). Although this works, if there is any line noise or bits are dropped, the corrupted file would run erratically.

Update: shortly before this column went to press, Commodore turned the three sections of its information network over to the Toronto Pet Users Group. The commands used to get into the network haven't changed; however, Commodore employees will

no longer be running the SIGs there.

Commodore has started a smaller technical support area that can be reached by using "GO CBM-2000". The system operators from the old network will be running the new technical support area. This area's section names are contained in illustration 4.

Starting this month, I'll be available on the new expanded Viewtron service. We are in the process of setting up a special area on Viewtron just for Commodore users. Since I have been asked to be a SYSOP for the system, I'll have the latest word on what could turn out to be CompuServe's biggest competition. My user number there is 58357CCP? I'm going to be handling the beginner's section there. Feel free to visit and leave me any questions you may have. I'll do my best to help you out. I'm always interested in your opinions on both my columns and computing, so let me know how you feel. Any suggestions on subjects for future columns would be appreciated. □

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By Dale Rupert

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We will print and discuss the cleverest, simplest, shortest, most interesting and/or most unusual solutions. Be sure to identify the *name* and *number* of the problems you are solving. Also show sample runs if possible, where appropriate. Be sure to tell what makes your solutions unique or interesting, if they are.

Programs on diskette are welcome, but they must be accompanied by listings. You must enclose a stamped, self-addressed envelope if you want any of your materials returned. Solutions received by the middle of the month shown on the magazine cover are most likely to be discussed, but you may send solutions and comments any time. Your original programming problems, suggestions, and ideas are equally welcome. The best ones will become *Commodares!*

PROBLEM #24-1: PRINTING PERMUTATIONS

This problem was suggested by Bill O'Rourke (Crystal River, FL). Simply stated, the user specifies a quantity, and the computer prints out every possible arrangement of that many numbers. For example, if the user specifies 3, the computer prints out the six possible permutations of three numbers (not necessarily in this order): 123 132 213 231 312 321. Nearly trivial, you say?!

PROBLEM #24-2: PYRAMIDAL PRINTOUT

Here's one from Nolan Whitaker (Jeffersonville, KY). The user enters any word that begins and ends with the same letter. The computer makes a pyramid out of the word. If the word is "DARED", the output is

```
      D
     A  A
    R    R
   E      E
  D  A  R  E  D
```

PROBLEM #24-3: FRACTIONAL FUN

Jim Speers (Niles, MI) suggested the reverse of *Problem #20-3: Decimal Endings* which is discussed this month. Given a repeating decimal such as 0.12345345... write a program to calculate its fractional equivalent. The repeating decimal must begin with not more than two non-repeating digits, and the number of repeating digits must be six or less. (The answer to the example is 12333/99900 or 4111/33300 in lowest terms.)

PROBLEM #24-4: SECTOR STATUS

The user specifies a diskette track and sector number. The computer responds "unused" or "used" to indicate whether that sector is available or not. BASIC only. Briefest is best. Explain your solution.

There were many responses to *Problem #20-1: Screen Scramble II!* !!II elbmarcS neercS : 1-02# melborP of sesnopser ynam erew erehT

The most common mistake of the "one-liners" was to POKE the upper left corner of the screen into the lower right corner of the screen without first saving the lower right corner. Those solutions looked like this:

```
10 FOR S=1024 TO 2023 : POKE 2023-C,PEEK(S) : C=C+1 : NEXT
```

A correct solution looks like this:

```
10 FOR S=1024 TO 1523 : M=2023-C :T=PEEK(S)
20 POKE S,PEEK(M) : POKE M,T : C=C+1 : N
EXT S
```

Can you figure out what would happen if the 1523 in line 10 were replaced with 2023? The 1523 is the middle and 2023 is the end of the C-64 screen memory. VIC users must substitute values for the VIC's screen memory.

Readers used various places (besides the single variable T above) to store the data temporarily before rewriting it in reverse order to the screen. Some readers used arrays, others POKEd to free memory, and Paul Haynes (Flour Bluff, TX) used a sequential disk file. The disk file method is not the fastest way to reverse the screen, but it has the advantage of saving the screen image on

disk for future reference. Paul's solution is listed below.

```
5 REM SCREEN SCRAMBLE II BY PAUL HAYNES
10 OPEN 5,8,5,"SCREEN,S,W" : FOR X=1024
TO 2023 : PRINT#5,PEEK(X) : NEXT : CLOSE
5
20 OPEN 5,8,5,"SCREEN,S,R" : FOR X=2023
TO 1024 STEP-1 : INPUT#5,A : POKE X,A :
NEXT : CLOSE 5
```

You must save the color memory in addition to the screen memory in order to reproduce the original image. The color memory byte is at (X + 54272) for the C-64. You should be able to modify Paul's program to save and restore the color memory as well.

Ryan Yoder (Ft. Wayne, IN), James Speers (Niles, MI), and Randal Swenson (Mesa, AZ) sent machine language solutions. Randal's is for the unexpanded VIC 20. Ryan's solution for the C-64 uses 83 bytes and executes in 0.067 second! Ryan's program is contained in BASIC DATA statements, and Randal's is an assembler source code listing. James' C-64 solution is in BASIC DATA statements, and it also includes a commented assembler source listing. If you want to see their solutions, send a stamped, self-addressed envelope to *Commodores*. Clearly state the listing you are requesting.

James Dunavant (Gainesville, FL) used a combination of BASIC and an internal ROM 'move' routine. The ROM

routine transfers the screen memory up to 49152, and POKE statements move it back to the screen in reverse order. James says that line 110 is slow, but line 100 works in a flash. Line 105 makes things visible on the screen.

```
1 REM PROBLEM #20-1: SCREEN SCRAMBLE II
2 REM SOLUTION BY JAMES DUNAVANT
3 REM
100 POKE781,4:POKE782,232:POKE91,7:POKE9
0,0:POKE89,195:POKE88,0:SYS41964
105 POKE53281,1:PRINT CHR$(147):POKE5328
1,0
110 FOR I=50151TO49152STEP-1:POKE1024+C,P
EEK(I):C=C+1:NEXT
120 GOTO 120
```

James Speers (Niles, MI) came up with a very interesting solution. His program moves the screen memory to another memory location in reverse order. He then uses the screen memory page flipping technique to switch between screens. Press any key and the screen is instantly restored in line 110. You may rapidly flip screens by pressing any key. Pressing the "*" key once or twice will restore the screen to normal and exit the program. This is certainly a "flashy" little program!

```
1 REM PROBLEM #20-1: SCREEN SCRAMBLE II
2 REM SOLUTION BY JAMES SPEERS
3 REM
10 FOR I=0TO999:POKE13287-I,PEEK(1024+I):
POKE55296+I,1:NEXTI
20 POKE53272,PEEK(53272)AND150R192
100 GETZ$:IFZ$=""THEN100
110 POKE53272,PEEK(53272)AND150R16
200 GETZ$:IFZ$=""THEN200
210 IFZ$<>"*" THEN 20
```

Among the other readers with solutions to this problem are Paul Mather (Warminster, ONT), W.T. Mallison (Rocky Mount, NC), Michael Mills (Corbin, KY), Nolan Whitaker (Jeffersonville, KY), Dennis Furman, Steve Smith (Elkville, IL), Mark Maples, Mark Tillotson (Tulsa, OK), Jim Maloney (Pittsburgh, PA), Jim O'Brien (Warminster, PA), Matt Drown (Concord, NH), Allan Flippin (San Jose, CA), and Wallace Leeker (Lemay, MO). Two Warminsters!

Problem #20-2: Numeral Converter was a bit more involved than some of the other challenges, consequently the solutions are somewhat lengthy. The two programs printed below were chosen for differing reasons. Michael Marron's solution is straightforward and easy to follow. Michael said that the program could easily be extended to billions, etc. You might give that a try.

```
1 REM PROBLEM #20-2: NUMERAL CONVERTER
2 REM SOLUTION BY MICHAEL MARRON
3 REM
50 DIM D$(30),D(30)
60 FOR I=1TO27:READ D$(I),D(I):NEXT I
```

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```

70 INPUT"ENTER NUMBER IN WORDS";N$:L=LEN
(N$):WB=1
80 FOR I=WB TO L
90 L$=MID$(N$,I,1):IF L$=" " THEN 120
100 W$=W$+L$
110 NEXT I
120 IF W$="HUNDRED"THEN N=N*100:GOTO180
130 IF W$="THOUSAND" THEN N1=N*1000:N=0:
GOTO 180
140 IF W$="MILLION" THEN N2=N*1000000:N=
0:GOTO 180
150 FOR J=1 TO 27
160 IF W$=D$(J) THEN N=N+D(J):GOTO 180
170 NEXT J
180 IF I=L+1 THEN PRINT N2+N1+N : END
190 W$="" : WB=I+1 : GOTO 80
200 DATA ONE,1,TWO,2,THREE,3,FOUR,4,FIVE
,5,SIX,6,SEVEN,7,EIGHT,8,NINE,9,TEN,10
210 DATA ELEVEN,11,TWELVE,12,THIRTEEN,13
,FOURTEEN,14,FIFTEEN,15,SIXTEEN,16
220 DATA SEVENTEEN,17,EIGHTEEN,18,NINETE
EN,19,TWENTY,20,THIRTY,30,FORTY,40
230 DATA FIFTY,50,SIXTY,60,SEVENTY,70,EI
GHTY,80,NINETY,90

```

The most mysterious solution to this problem was submitted by Dennis Furman (Edwards, CA). Dennis said that his program accepts a number such as 2400 as ei-

ther "twenty four hundred" or "two thousand four hundred." Can you figure out the meaning of the values in the DATA statements?

```

1 REM
2 REM PROBLEM #20-3 : NUMERAL CONVERTER
3 REM SOLUTION BY DENNIS FURMAN
4 REM
5 DIMU(32),D(32)
6 FORI=0TO31:READU(I):D(I)=I:NEXT
7 T=0:TT=0
8 GETN$:IFN$=""THEN40
9 PRINTN$;:A=ASC(N$)
10 IFA=32ORA=13THEN80
11 C=C+(B+1)*(A-64):B=B+1:GOTO40
12 FORJ=0TO8:IFC<>U(J)THEN100
13 T=T+D(J+1):GOTO220
14 NEXTJ
15 FORK=9TO18:IFC<>U(K)THEN130
16 T=T+D(K-9)+10:GOTO220
17 NEXTK
18 FORL=19TO26:IFC<>U(L)THEN160
19 T=T+D(L-17)*10:GOTO220
20 NEXTL
21 FORM=27TO31:IFC<>U(M)THEN210
22 T=INT(T*10^(M-25))
23 IFM<>27THENTT=TT+T:T=0
24 GOTO220
25 NEXTM:PRINT"ERROR":T=0:TT=0
26 B=0:C=0
27 IFA<>13THEN40
28 IFTT=0THENPRINTT:GOTO30
29 PRINT TT+T:GOTO30
30 DATA 58,111,135,171,110,109,185,176,
94,72,241,269,412,448,275,342,506,353
31 DATA 371,387,385,295,247,314,580,326
,344,256,396,1,1,348

```

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Other excellent programs were received from Allan Flippin (San Jose, CA), C. C. Stalder (Waynesville, NC), James Borden (Carlisle, PA)—a COMAL solution, Ronald Jordan (Florence, OR), and David Hood (WindSOR, NJ).

Problem #20-3: Decimal Endings brought some very fine solutions. Thomas E. Gantner (Dayton, OH) sent his solution as well as a reprint from the *College Mathematics Journal* (November 1984) in which he published an article on "The Computation of Repeating Decimals." The algorithm is based upon the work of the great mathematician C. F. Gauss. Dr. Gantner describes the solution as follows:

Given a fraction a/b in lowest terms, let M be the number of times that 2 is a factor of b , let N be the number of times that 5 is a factor of b , and let P be the product of the remaining factors of b . Let MAX denote the larger of the two numbers M and N ; then there are MAX nonrepeating digits in the decimal expansion of a/b to the right

of the decimal point, and the decimal expansion terminates whenever $P = 1$. When $P > 1$, the period is of length L , where L is the smallest integer having the property that $10 \uparrow L - 1$ is a multiple of P .

```

10 REM PROBLEM #20-3: DECIMAL ENDINGS
20 REM SOLUTION BY TOM GANTNER (DAYTON, OH)
25 REM
30 T=10:C=0
40 FOR I=1 TO 100
50 M=0:N=0:L=1:P=I:TER=0:NUM=1
60 P%=P/2:IF 2*P% < P THEN80
70 P=P%:M=M+1:GOTO60
80 P%=P/5:IF 5*P% < P THEN100
90 P=P%:N=N+1:GOTO80
100 MAX=M:IF M < N THEN MAX=N
110 REM MAX = NO. OF NONPERIODIC DIGITS
120 IF P=1 THEN TER=1:GOSUB190:GOTO180
130 X=T
140 Y%=X/P:X=X-P*Y%
150 IF X=1 THEN GOSUB190:GOTO180
160 X=T*X:L=L+1:GOTO140
170 REM L = LENGTH OF PERIOD
180 NEXT I:END
190 REM DIGIT PRINTING ROUTINE
200 IF I=1 THEN PRINT "1/1 = 1 IS AN INTEGER":GOTO310
210 PRINT "1/";MID$(STR$(I),2);" = 0.";
220 FOR J=1 TO MAX+L
230 NUM=T*NUM:D%=NUM/I:NUM=NUM-I*D%
240 IF J=1+MAX AND TER=1 THEN300
250 IF J=1+MAX THEN PRINT """;
260 PRINT MID$(STR$(D%),2,1);
270 NEXT J
280 PRINT """
290 PRINT "PERIOD =";L;"AFTER";MAX;"DIGITS":GOTO310
300 PRINT:PRINT "TERMINATES AFTER";MAX;"DIGITS"
310 C=C+1:IF C < 5 THEN PRINT:RETURN
320 GET A$:IF A$="" THEN GOTO320
330 C=C-5:PRINT:RETURN

```

You may modify line 40 to obtain other ranges of numbers. For example, use `FOR I=821 TO 821` to see the 820-digit period of the number 821. Also change the 5 in lines 310 and 330 from 5 to 1. You may also modify the program starting at line 200 to send the output to your printer instead of the screen if desired.

The shortest solution to this problem was submitted by Robin King (Queens, NY). Robin's program factors out the 2's and 5's as described in the algorithm above. WN is then relatively prime to 10, and therefore its period of repetition is the same as for PN . To determine the period, WN is divided into 999...9 (as many 9's as necessary until the remainder is 0). The number of 9's used is the period of repetition of $1/WN$ and $1/PN$. Some

study should convince you that both solutions are using the same algorithm.

```

1 REM PROBLEM #20-3 : DECIMAL ENDINGS
2 REM SOLUTION BY ROBIN KING
3 REM
40 PN%=PN%+1 : WN%=PN% : PR%=1 : D%=9 :
IF PN%>100 THEN END
20 IF WN%=2*INT(WN%/2) THEN WN%=WN%/2 :
GOTO 20
30 IF WN%=5*INT(WN%/5) THEN WN%=WN%/5 :
GOTO 30
40 R%=D%-WN%*INT(D%/WN%):IF R%=0 GOTO60
50 PR%=PR%+1 : D%=10*R%+9 : GOTO 40
60 IF WN%=1 THEN PRINT PN%,"TERMINATING"
: GOTO 10
70 PRINT PN%,"PERIOD OF REPETITION ="PR%
: GOTO 10

```

Congratulations also to Allan Flippin (San Jose, CA), James Speers (Niles, MI), and Steven Gustafson (New Albany, IN) for their solutions and work on this problem.

No one submitted a solution to *Problem #20-4: Hyphen Help*. Several readers stated that they had worked on the problem but that it is a very complicated task. James Speers stated that he is having no difficulty with the BASIC language, but the ENGLISH language is driving him up the wall! We may still welcome and discuss any attempts or comments you may have regarding this problem. Once again, the user inputs a word, and the computer displays all reasonable ways of hyphenating it. It doesn't really sound that difficult, does it? See you next month. □

PROGRAMS WANTED

Don't be fooled by the fact that *Ahoy!* comes your way each month packed with the best games and utilities available in any Commodore magazine. We just don't have the mile-high inventory that you might imagine. But we're determined to continue bringing you the type of high quality programs you've come to expect from *Ahoy!* To that end, we've raised our rate of pay for accepted programs, and we've added staff to speed our response to your submissions. There's never been a better time to submit a program to *Ahoy!*

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FLOTSAM

I enjoyed Orson Scott Card's *Rockets, Boats, & Pigs* in *Pokes* article in the September '85 issue. He writes clear explanations about how to use the tons of features of the C-64. You ought to give this genius a promotion and make him president of Commodore land.

Thanks for the utility called *Ahoy! Dock* so that all of us can catalogue our Commodore magazines. It will take us about 10 years to do it, but *Ahoy! Dock* sure beats the *Fast Filer* published by *COMPUTE!* magazine in their July '85 issue. They must have all been drunk when they published their simple-minded program requiring you to add thousands of data statements to their BASIC program just to index the Commodore universe! After I spent two days typing in the program and after seeing what it did and didn't do, I re-formatted the disk that I had used. Luckily I came across *Ahoy!* magazine's index. Keep up the good Commodore utilities for the 64!

—Robert Desko
Endicott, NY

In your September '85 issue of *Ahoy!*, Edward Champa writes in *Flotsam* about the compatibility of Epyx *Fast Load* with *Multiplan*. He was told by Epyx that the problem is with relative files. I do not believe this is true.

I use it with other programs that use relative files without any problem. I believe the problem is with *Multiplan*. It seems that when you overwrite a file, it erases the old file first, but when it tries to write the revision, it will say "Cannot write file" and you are left with no place to go. This happened to me. Fortunately, I had a backup disk and nothing was lost.

The solution is that after you load *Multiplan*, you must turn off your disk drive and then turn it on again. Evidently *Fast Load* does something in your disk drive and by turning it off and on, you put things back to normal.

This is a solution I found by experimentation. I find that the manufacturers of software and hardware peripherals tend to blame your problems on some other part of your system, never *their* product! —R.H. Schuette
Blaine, MN

I own a Commodore 64 and have it interfaced with the Olivetti PR2300 printer. This printer requires dry ink jet ampules and not a ribbon. I have had trouble finding these ampules. I've read that over 20,000 of these printers have been sold (it can be interfaced to the Apple, IBM PC, Atari, TRS80, VIC 20, Commodore 64, and almost any other home computer).

I have found a reliable source for obtaining the ampules, and realized that many of your readers probably purchased the same printer and would be interested. The name of the company is:

Micro Data Products
P.O. Box 532276
Grand Prairie, TX 75053

I purchased a box of four ampules for \$8.95 plus \$1.00 for postage/handling, and understand that there is an additional discount for larger quantity purchases.

—E. Mahan
Duncanville, TX

I received your letter yesterday containing the *Errata* info on *Fastnew* (Sept. '85). I'm very pleased and impressed with your quick response to my letter. I completed the changes as described, and am happy to report that the *Fastnew V0316* program works great—no head bang! Thanks again for the speedy response.

I read David Allikas' *View From The Bridge* (Oct. '85) and am delighted with his positive attitude. I, for one, am sick of everyone else's pessimistic editorials and outlook. It's obvious that *Ahoy!* has been working hard to provide present Commodore owners with quality programs, while increasing content too! I've noticed a three-fold increase in content over September '84.

I am grateful that *Ahoy!* is continuing to support present Commodore users and applaud your desire to improve your service to Commodore owners. It shows, and is appreciated. Keep it up!

—Roman Gumula
North Stonington, CT



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GAMELOADER

For the C-64

By Tim Brown

In my household there are a nine-year-old and a five-year-old who are learning to use my computer. They enjoy playing the games and running some of the programs, but with a few we run into a little problem. It's hard for my kids (and sometimes myself) to remember which programs load at BASIC and which load above BASIC. *Gameloader* was written so we won't have that problem anymore.

Normally a machine language program starts at 49152 or some other address above BASIC, and must be executed with a "SYS" command. This requires remembering to load the program in non-relocatable format, i.e.: LOAD"program",8,1. After doing this, you must remember the proper address to "SYS" or it won't execute properly. Trying to get a five- and nine-year-old to remember all these numbers is not easy. *Gameloader* does all the remembering for you.

Gameloader may be used with any program that loads in non-relocatable format (i.e.: Load"programname",8,1) with a known start address, such as public domain ML software. Use of *Gameloader* with software of this nature requires that you know the execution address of the program. One exception is a program that is auto-booting. In this case the execution address need not be known, as the program will execute itself as it loads.

To get *Gameloader* to work for you, just type it in, save it, and run it. You will then only have to answer the prompts for it to construct the loader. The first prompt you will be asked for will be the original program name. Enter this information; then you will be asked the address to "SYS". After entering this information, *Gameloader* will change the name of the original program to the first letter of the original program plus an "x", construct the loader, and save the loader under the original program name. The loader that is created will now load and "SYS" the proper address of the original program. Your program now becomes "(first letterX)". From now on, you can load that program and then just run it.

Now let's examine the program line by line.

Line 5 sets screen and cursor color. These may be changed to suit the user.

Line 10 prints a title to screen.

Line 20 uses INPUT to ask for the name of the program to be converted.

Line 30 asks for the address to SYS. If there is no address given, simply press RETURN.

Line 40 copies the original program name for *Gameloader* and stores the new name in NX\$.

Line 50 will ask that you insert the disk into your drive that has the program you want to convert on it.

Lines 60-80 accept a Y/N answer.

Lines 110-117 change the original program name to NX\$'s content.

Lines 120-160 are the new loader construction routine, which is printed to the screen and saved automatically.

Lines 9000-9090 is a sound "beep" routine which will sound only when "N" is used.

Now load "original program name",8. When the "ready" prompt appears, simply type "run" and the original program will load and execute without operator intervention.

This simple utility will come in handy in time savings, compared to time spent looking through all the manuals for proper addresses. It is also easily modified. You can add statements to turn on printers before "SYSing" up, and you can add a few lines to set screen colors. On some games you can add codes to set sprite size and make the game even more interesting.

You may notice that this program is similar to an auto run type boot program, but with the auto run boot, you must still remember to load in a non-relocatable format, i.e., Load"Programname",8,1. The user must still remember to type ,8,1 after the program name or the program will not operate. With *Gameloader* all you have to do is Load"Programname",8 then run it, the same as all BASIC programs. □

SEE PROGRAM LISTING ON PAGE 129



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AHOY! 107

CLOAK

File Encryptor for the C-64 and VIC 20

By Melvin Baker

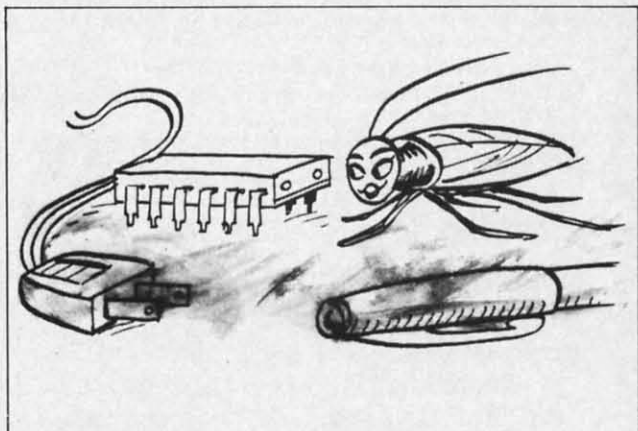
While the concepts of data encryption can themselves be fascinating, especially to a computer enthusiast, they can be quite useful in this world of electronic hackery. Perhaps you have some confidential business reports to send over the phone lines. Or maybe you've got embarrassing love letters to your sweetheart on disk. Then again, you could just be paranoid. Whatever your reason, if you have data files that you would like to maintain the privacy of, you need an encryption program.

The purpose of an encryption program is to protect your valuable data from being viewed by unauthorized persons. The encryption process makes the data appear to be a meaningless collection of random numbers. So if unwanted gets a copy of your data it is of no value to them, since it is unintelligible. But an individual who knows the encryption key can decrypt the data and restore it back to its original usefulness. *Cloak* is just such a program.

Cloak is a very easy program to use. Practically all you have to do is think of a good encryption key and answer a few simple questions. The program does the rest. *Cloak* can be run on the VIC 20 with or without memory expansion, and with changes made to only two lines as follows:

```
100 MP=828:KEY=882:BY=254:TL=13713:CS=0
186 DATA 131,054,088,135,169
```

(The *Bug Repellent* line codes following each line of the program listing on page 130 are for the C-64 only.)



"Hi there, handsome!"

The encryption process is straightforward. *Cloak* will ask for the source file name. That is the name of the disk file that you would like to protect. *Cloak* will then ask you to declare which file type that data file is. You can use *Cloak* to encrypt any sequential file. Even a BASIC program can be encrypted. Then *Cloak* asks you for the name that you would like the new encrypted file to be saved under, and which file type.

That's all there is to the encryption process. Decryption is just as easy. Simply run *Cloak* again, only this time use for the source file the name of the encrypted file. And be sure to use the exact same key that you used for the encryption. Character for character, it must be identical. When the RUN/STOP key is hit or when it is finished running, *Cloak* will automatically reset the computer. This is normal. On the C-64 you can expect *Cloak* to take approximately 13 seconds for each block processed. In other words it should take *Cloak* about 130 seconds to process a ten block file. On the VIC it's about 13 seconds per block as well.

The heart of *Cloak* is a short machine language routine that does all the actual dirty work. BASIC simply handles all the disk I/O. Since the ML routine uses the tape I/O buffer, cassette operation is not possible. Cassette would not be practical anyway, since the program both reads and writes on two different files consecutively.

The all-important item is the encryption key. It can be any group of characters that you can type into a string variable via the BASIC INPUT command. Although graphics characters are allowed in the key, you may wish to stick to simple text. It is much easier to remember a line from your favorite poem than meaningless graphics symbols.

The length of the key is somewhat important. As a general rule of thumb, the longer the key, the more secure your data will be. The maximum limit on the length of the key is 136 characters. However, in practice you are limited to the size that the BASIC INPUT buffer will allow. If you are willing to give up the INPUT command on line 112, then KY\$ could be assigned a string value and by adding characters a key with a length of up to 136 characters could be built.

The encryption process used by *Cloak* is reasonably secure. The security provided should be suitable for home use as well as small businesses or clubs. □

SEE PROGRAM LISTING ON PAGE 130

TIPS AH-OY!

Compiled by Michael Davila

Shawn K. Smith received \$40 for his *Saved Again* routine in the November installment of *Tips Ahoy!* Don Lewis banked an equal sum for *In-Code Load*, while Mark Baker's six-line *Write Protect Tab Checker* netted him \$30 (or \$5 per line!). That's just a sampling—your contribution could earn you even more. But even if you make a lousy twenty bucks, you're in disks for the year! Why not send your best original tip or suggestion, pertaining to programming or any aspect of Commodore home computing, to *Tips Ahoy!*, c/o Ion International Inc., 45 West 34th Street—Suite 407, New York, NY 10001.

NO KNOCKS AND PINGS

Cleaning your 1541's heads can be hazardous to your alignment if you spin the cleaning disk with error-producing loops such as

```
OPEN1,8,15:FORX=0TO5:PRINT#1,"V":NEXT:CLOSE1
```

In the October '85 *Ahoy!*, John DeRosa solved the problem with a utility to vary the head position, keep track of the times a cleaning disk is used, and spin the motor harmlessly by changing a bit in the 1541's memory. The following brief code, borrowed and modified from John's program, will do the job without all the bookkeeping.

```
10 PRINT"[CLR/RVS ON]DRIVE HEAD CLEANER[
22 SPACES]"
20 PRINT"**INSERT CLEANING DISK**[DWN]"
30 INPUT"SPIN DRIVE MOTOR HOW MANY SECONDS";S:S=S*60
40 OPEN1,8,15:PRINT#1,"M-R"CHR$(0)CHR$(28)
50 GET#1,X$:X=ASC(X$+CHR$(0))
60 BI=X OR 4
70 PRINT#1,"M-W"CHR$(0)CHR$(28)CHR$(01)CHR$(BI):CLOSE1:REM START DRIVE MOTOR
80 J=TI
90 IFTI-J<STHEN90
100 BI=X
110 OPEN1,8,15:PRINT#1,"M-W"CHR$(0)CHR$(28)CHR$(01)CHR$(BI):REM STOP MOTOR
120 CLOSE1:END
```

—Bert Halverson
Joplin, MO

SYS REMINDER

Trying to remember all those SYS numbers that belong to your machine language programs can be quite tedious. If a program name is ALIEN, and its SYS number

is 49152, try saving the program like this:

```
SAVE"ALIEN[SS]49152",8,1
```

When you go to list the directory, you will see "ALIEN" 49152, a little reminder of the SYS number. To load the program back into the machine type LOAD"ALIEN",8,1. This method can also be used to shorten program names, for example:

```
SAVE"1[SS]ALIEN",8,1
```

Later on just LOAD"1",8,1.

—Michael Smith
Port Hawkesbury, Canada

I/O BLUES CHANNEL

When writing a program that requires opening and closing files, such as sequential and relative files, I find it useful to put a short routine at the end of my program which cannot be accessed by the program, and will check the error channel when you need it to (since when an I/O error has occurred, it will only say "SYNTAX ERROR" and not describe what is the problem). I just type RUN 20000 (20000 being the routine starting line) and presto, you can find out what is wrong.

```
20000 OPEN 15,8,15
20010 INPUT#15,A$,B$,C$,D$
20020 PRINT A$,B$,C$,D$
20030 CLOSE15
```

I would be lost without this useful routine! —Barry Allyn
Arlington, WA

RELINER A LINE

Reliner is a handy little utility for the C-64 that renumbers your BASIC program lines in any increment you choose, between one and 255. Just run it and answer the prompt. Then, after loading the program you want to change, type SYS50000 and press RETURN. Instantly the lines in your program will be renumbered. Since *Reliner* resides in a separate area of RAM, BASIC will not disturb it. Neither will loading and saving programs. You can SYS it as often as you like.

Reliner is also handy when you're writing a program and you've had to add new lines between old. Just SYS50000, and presto, everything's renumbered. You can change the increment at any time by POKEing location two with the desired amount (i.e.: POKE2,10).

AHOY! 109

Notice that the lines in *Reline* are incremented by 10. To demonstrate how nifty and easy it is to use, answer the initial prompt with 25, then SYS50000. List *Reline* and you'll see that all the lines are now in increments of 25. POKE2,100, then SYS50000. Another listing reveals the lines now increase by 100.

Although there are some full-fledged renumbering programs (see *Renumbering Utility* by Anthony Wood, July '84) that will change any GOTO, GOSUB, and IF/THEN statements accordingly, in the interest of brevity (nine lines long = no arduous typing) I elected to omit this option. If the program you want renumbered has any of the above commands, be sure to make note, so you can change them later.

```

10 PRINT"[CLR]":FORJ=50000TO50056:READA:
POKEJ,A:X=X+A:NEXTJ
20 IFX<>7825THENPRINT"ERROR IN DATA...":
END
30 PRINT"DATA OK...":INPUT"[DOWN]DESIRED
INCREMENT (1-255)":I:POKE2,I
40 PRINT:PRINT"[DOWN]SYS50000 TO RENUMBE
R...":END
50 DATA165,2,133,253,141,3,8,169,0,133,2
54,141
60 DATA4,8,174,1,8,173,2,8,134,251,133,2
52

```

```

70 DATA165,253,24,101,2,133,253,197,2,17
6,2,230
80 DATA254,160,2,145,251,200,165,254,145
,251,160,0
90 DATA177,251,170,200,177,251,208,220,9
6

```

—Buck Childress
Salem, OR

FILE METAMORPHOSIS

Have you ever tried loading a program file into a word processor? As you all know, the results are 'weird' to say the least. Here is a simple method of converting your program (PRG) to a sequential(SEQ) file.

Load the program you wish to convert. Enter the following directly (use a different name from the original):

```
OPEN 5,8,5,"<PRG NAME>,S,W":CMD 5:LIST
```

When the program is done (you will see the cursor), enter:

```
PRINT#5:CLOSE5
```

Remember to type out the word PRINT and not to use the '?'. If you look at the directory you will see a new SEQ file on the disk. You will now be able to load or

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merge this file on a word processor with the full assurance that it will be readable.

—George E. Lang
Pittsburgh, PA

VIEW BETTER BAM

The readability of the VIEW BAM program on the 1541 TEST/DEMO disk can be greatly improved by changing the symbols used to designate the sectors. The following POKEs quickly substitute my choices. Load VIEW BAM, then POKE 3398,42:POKE 3414,46 and resave the program. This changes the full sector symbol (program line 640) to a reverse asterisk, and the empty sector symbol (program line 650) to a period.

I thought that this little routine might be useful. It accepts a character in either of two ways, as text or ASCII code. It is not necessary to specify how the character is being entered.

```
10 INPUT"TEXT CHARACTER OR ASCII";A$
20 A=ASC(A$):IF VAL("1"+A$)<>1 THEN A=VAL(A$)
30 PRINT A,CHR$(A)
40 GOTO 10
```

—Donald E. Fulton
Stoneham, MA

STOP-LIST

This short utility redefines the SHIFT keys so that when pressed they will temporarily stop the listing of a program until you let go. The SHIFT LOCK key is also redefined, making the process of proofreading directly from the screen more pleasant of a task. To use, load and run *Stop-List*; the program will then execute and erase itself. Next load in the program you wish to view and LIST.

```
10 REM ** STOP-LIST BY DAVID ROSCOE **
20 L=232:H=PEEK(56)-1:Q=PEEK(775):IFQ<167THEN80
30 POKE55,L:POKE51,L:POKE56,H:POKE52,H:POKE774,L:POKE775,H
40 FOR X=L+H*256 TO X+21:READD:POKEX,D:NEXT
50 POKEX,Q
60 DATA 72,152,72,32,159,255,169,1,44,14,1,2,208,246
70 DATA 169,0,133,198,104,168,104,76,26
80 NEW
```

—David Roscoe
Passaic, NJ

UNSEEN SPEED

The Commodore 64 is a good computer, but sometimes BASIC runs far too slow. The problem lies with the screen service routine. If you are doing a long series of calculations and find that the program takes too long,

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BridgePro®

BridgePro is the first program I've seen that provides a challenge for the average-to-excellent bridge player... The documentation is excellent and allows a new bridge player to learn the basics.

—Harvey Bernstein, *Antic Magazine*, Feb. 1985

After having tried three other bridge programs, I find that BridgePro is indeed a pro game... It is designed for both the beginner and the advanced player... I didn't find anything that could be improved upon.

—Helen Garret, *Apple-Dayton Journal*, March 1985

If you like to play bridge and don't have three other players ever-eager to play, this software is a must. For bridge freaks it's good enough to justify buying a computer... Whether you are a "master" or a beginner, this is great software.

—Christian Basler, NY
Commodore Users Group
Review, Sept. 1984



BridgePro is designed to let you learn, improve, or just enjoy the card game of bridge. The program provides complete bidding, play and scoring for 1 or 2 players. Features include random hands, bidding help, demonstration mode, hand replay/quit, best hand, auto finish, duplicate mode, and fast machine language speed.

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why not turn off the screen display until the calculations are finished! To do this simply execute the following line from your program and the screen will go blank.

```
100 POKE 53265,PEEK(53265) AND 239
```

You will find that the program will finish at least 15% faster than normal. When the calculations are finished simply execute the following line and your screen will return to normal.

```
100 POKE 53265,PEEK(53265) OR 16
```

—Saul D. Betesh
Kingston, Ontario

SPEEDY HI-RES SCREEN CLEAR

Umpteen machine language utilities have been proposed to clear a hi-res screen, because POKEing the screen clear from BASIC is so agonizingly slow—about 30 seconds.

Here is a trick that will clear most of free memory, enough for several screens, from BASIC in 2 seconds using one easily remembered line.

```
FOR X=1 TO 255:Z$=Z$+CHR$(X):NEXT
```

Use this line before pulling down the top of BASIC. In generating one 255-byte string, this loop leaves behind in dynamic string space 254 dead strings. The total number of bytes written into is an amazing 32K, so memory from 8K to 40K is cleared in only 2 seconds.

—Donald Fulton
Stoneham, MA

FASTER BASIC?

Probably the fastest way to speed BASIC is among the least known, i.e. GET# with multiple arguments. The simple file reading program below, which reads a file with GET# 2,A\$ was timed. Then line 30 was replaced with GET# A\$,B\$,C\$,D\$,E\$,F\$,G\$,H\$,I\$,J\$,K\$,L\$,M\$,N\$,O\$,P\$,Q\$,R\$,S\$,T\$,U\$,V\$,W\$. The results are given below.

	7 Sector File	55 Sector File
Single GET#	17 Sec.	144 Sec.
Mult. GET#	6 Sec.	49 Sec.

While it takes a few seconds to type such a long line, a X3 speed improvement is well worth it!

It's faster probably because each time GET# is encountered, the input must be switched from the keyboard to a specified logical channel.

—Donald Fulton
Stoneham, MA

```
10 MM=TI
20 OPEN 2,8,2,"PROGRAM,P,R"
30 GET#2,A$
40 IF ST=0 THEN 30
50 PRINT"TIME="(TI-MM)/60
60 CLOSE2
```


DIRECTORY MANIPULATOR

For the C-64

By Bob Ossentjuk

The *Directory Manipulator (DM)* is an all-BASIC utility program for the C-64 and 1541 disk drive. *DM* provides eight directory manipulation options which are accessed by the function keys. The options available are:

- f1—Relist directory
- f2—Alphabetize directory
- f3—Insert BLANK entry
- f4—Delete BLANK entries
- f5—Insert ----- entry (dashed line entry)
- f6—Insert 'REMARK' entry
- f7—Swap directory entries
- f8—Delete directory entries

When *DM* is executed it will read and display the directory of the inserted diskette. The directory display will accommodate up to 40 entries at a time. If there are in excess of 40 entries on the diskette, you will be prompted to 'HIT ANY KEY' to display the next 40 entries.

Once the display is completed, you will be prompted with 'DIRECTORY OK'. A 'YES' response will cause you to exit the *DM* program. If no directory changes have been made, the directory will not be rewritten. If changes have been made, the directory will be rewritten. In either case the diskette will be VALIDATED upon exit. If you answered 'NO' to the 'DIRECTORY OK' prompt, you will be prompted to 'SELECT DIRECTORY MANIPULATION COMMAND'.

Selection of any of the above described function keys or 'H'elp may be made at the 'SELECT DIRECTORY MANIPULATION COMMAND' prompt.

Selecting 'H' will display the HELP menu, which provides a brief description of each of the FUNCTION KEY commands. If 'H'elp has been executed and no changes have been made to the directory, you may exit *DM* without rewriting the directory.

An f1 ('RE-LIST DIRECTORY') selection redisplay the directory. If f1 has been executed and no changes have been made to the directory, you may exit *DM* without rewriting the directory.

Use of commands f2 through f8 (described below) will

cause the directory to be rewritten upon exit from *DM*:

Executing f2 ('ALPHABETIZE DIRECTORY') will sort the directory into alphabetical order. A SHELL SORT routine was used to perform this function (see line 900).

Selection of f3 ('INSERT BLANK ENTRY') causes a blank entry to be inserted into the directory at the location specified at the appropriate prompt. The blank entry will be replaced by the file/program entry of the next file/program saved to the diskette. This provides a method by which the order of directory entries can be controlled.

The f4 ('DELETE BLANK ENTRIES') command removes all blank entries from the directory.

Execution of the f5 ('INSERT ----- ENTRY') option causes a dashed line entry filename to be placed into the directory at the specified location. The dashed line can be used to delineate groups of files, comments, and/or remarks.

Selecting f6 ('INSERT REMARK ENTRY') causes the selected REMARK to be entered into the directory, as a filename, at the appropriate location. The f6 command provides a method to add comments to a diskette directory.

Choosing f7 ('SWAP DIRECTORY ENTRIES') allows any two selected entries to swap positions in the directory.

The f8 ('DELETE DIRECTORY ENTRY') command will delete the selected filename from the directory. Once the command is executed, there is no recovery of the deleted file possible.

The *Directory Manipulator* is designed to allow the user to freely reorganize and comment diskette directories. However, when you first enter the program it should be tested with a diskette that you can afford to destroy. The *DM* does write a new directory, and if the program is not properly debugged it could destroy your diskette directory.

DM is very modular and is heavily commented. The modularity facilitates easy program modification. For example, if you would like to leave out the HELP menu, simply remove line 610 and lines 1310-1390. The comments are provided to allow for easier understanding of the program. The REM statements may be left out when the program is entered if you wish to reduce entry time. □

SEE PROGRAM LISTING ON PAGE 127

Continued from page 63

programs! Operation with the DOS Wedge program loaded is sporadic, and at times the computer may hang up and have to be powered down.

The COMMTX program reads the keyboard with the GET statement until a key is pressed. It then sends the typed character to file number 2 and displays it on the screen. The COMMRX program simply sits, waiting for a character to arrive from file #2. Upon receiving a character with the GET#2 statement, it prints the character and goes back to wait for the next one.

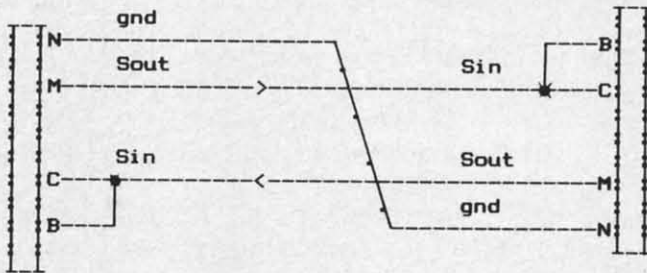


Figure 1—Connecting Two Commodore Computers in Three-Line Mode

About the only thing left to discuss is the OPEN statement that starts both of these programs. The statement

```
10 OPEN 2,2,0,CHR$(8)+CHR$(0)
```

creates a communication channel with a logical file number 2. The file number is arbitrary and may range from 1 to 255. Numbers above 127 are not recommended unless you need to send a linefeed after each carriage return. The second "2" is the device code. In this case, we are opening a port to an RS-232 device. The secondary address of 0 is used for RS-232 communications.

The two character bytes following the secondary address provide details about the serial link being opened. The first character specifies the word length, the number of stop bits, and the baud rate. The second character specifies parity, duplex mode, and handshake format. These terms are not really very difficult to understand. We will discuss them in detail.

Each character transmitted on the RS-232 link is sent in serial format. There is only one wire, and it can carry only one bit of information at a time. The ASCII value for the letter "A" is 65. In hexadecimal that is 41, and in binary the letter "A" is represented as 0100 0001. All of the standard ASCII characters have decimal values less than 128. This means that each can be represented in only seven bits of data. The eighth bit in the byte will always be zero.

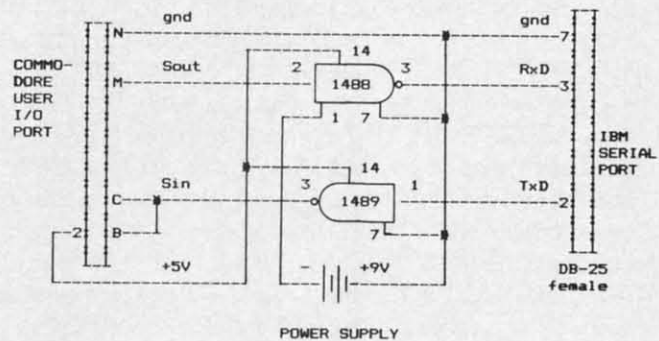
Consequently, in order to speed up serial communications, it is possible to define a serial word consisting of only seven bits instead of the normal eight used within the computer. If you were sending serial messages using

an even more limited character set, it might be possible to get by with only a six or even a five bit code. Five bits are enough to encode the whole alphabet and have a few extras ($2^5 = 32$).

We are allowed to specify the number of bits in each character to be transmitted or received. The programs in this article specify an eight-bit word length. The argument of the first CHR\$ function in the OPEN statement is the sum of three numbers representing the baud rate, the number of stop bits, and the word length. The sum is written to the control register of the serial channel. The values for specific word lengths are as follows:

Word Length	Control Register Value
8 bits	0
7 bits	32
6 bits	64
5 bits	96

The RS-232 serial transmission is asynchronous. This means that there is no clock signal between the transmitter and the receiver. In order for the two devices to communicate, each one must know how fast the stream of serial bits is sent. If the transmitter sent the code 00110011, the receiver must know the "bit-width" or the amount of time that each bit uses. If the receiver read the bits half as fast as they were sent, the receiver might conclude that the data was simply 0101. If the data is read at twice the rate that it should be, this word might be interpreted as two bytes: 00001111 00001111. The established rate of transmission and reception is called the baud rate. Both ends of the line must know the baud rate in order to communicate.



Note: Tie unused input pins (1488 pins 4,5,9,10,12,13 and 1489 pins 4,10,13) to ground to save power.

Figure 2—Connecting a Commodore Computer to an IBM-PC (RS-232)

The most common baud rates are 110, 300, 1200, 2400, 4800, 9600, and 19200 baud, but others are used as well. With our serial link, the baud rate simply means "the number of bits per second." (Purists who care about such things are quick to point out that "baud rate" for other forms of serial transmission is not as simple as "bits per second," but we will avoid such esoteria.)

The chosen baud rate value is included in the value written to the control register. Some of the values are listed in the following table:

Baud Rate	Control Register Value
110	3
300	6
600	7
1200	8
2400	10

The complete list of possible baud rates is in Figure 6-1 of the *Commodore 64 Programmer's Reference Guide*. The binary values shown in the figure must be converted to decimal as the above examples show.

Normally the line between the transmitter and the receiver sits at a logic low state. When a character is sent, it is preceded by a single logic high bit, called the "start bit." This wakes up the receiver which prepares to read in the following data bits. After the last data bit is read (as defined by the word length), at least one more bit, called the "stop bit," is received. The stop bit provides a pause before the next set of bits is received. Sometimes it is desirable to increase the gap between characters, in which case two stop bits may be specified. The values sent to the Control Register to define the number of stop bits are listed:

# of Stop Bits	Control Register Value
1	0
2	128

To communicate at 1200 baud (8) with eight data bits (0) and one stop bit (0), the value sent to the Control Registers of the transmitter and receiver must be 8 + 0 + 0. That explains the CHR\$(8) in the OPEN statement. Three hundred baud with two stop bits and seven data bits would be 6 + 128 + 32, so the OPEN statements would use CHR\$(166).

If you have trouble getting reliable communications at 1200 baud, try 300 or even 110 baud. Most problems occur when the receiver buffer fills up, because BASIC cannot empty it and process the data quickly enough. Reducing the baud rate and putting delay loops in the transmitter software are two ways of solving the problem. There should be no problem with COMMRX and COMMTX at 1200 baud as shown, since they are operating essentially at keyboard speeds.

The second CHR\$ function in the OPEN statement is optional. The CHR\$(0) indicates that we are using a 3-wire interface in full duplex mode with parity disabled. These are the default values, and the program would work the same if we omitted the CHR\$(0).

The IBM-PC counterparts to COMMTX and COMMRX are IBMTX and IBMRX:

```

1 ' IBMTX - TRANSMIT TO COMMODORE
2 ' PROGRAM FOR THE IBM-PC
3 ' --- IBMTX ---
4 '
10 OPEN"COM1:1200,N,8,1,RS,CS,DS,CD" AS
#1

```

```

20 T$=INKEY$ : IF T$="" THEN 20
30 PRINT #1,T$; : PRINT T$;
40 GOTO 20

```

```

1 ' IBMRX - RECEIVE FROM COMMODORE
2 ' PROGRAM FOR THE IBM-PC
3 ' --- IBMRX ---
4 '
10 OPEN"COM1:1200,N,8,1,RS,CS,DS,CD" AS
#1
20 R$=INPUT$(1,1)
30 PRINT R$;
40 GOTO 20

```

The OPEN statement in the IBM programs specifies COM1: as the serial port with 1200 baud, parity disabled, eight bits per character, and one stop bit, the same protocol used with the Commodore programs. The logical file number is #1. The RS, CS, DS, and CD characters are used to disable some of the other RS-232 signals in the IBM and to establish a three-wire link. The INPUT\$(1,1) statement is similar to the Commodore's GET statement, except that the program waits until one character has been received from file #1. The INKEY\$ statement is like the Commodore's GET statement for scanning the keyboard buffer.

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AHOY! 115

Remember to use the TX program in one computer and the RX program in the other. Type RUN on the receiver before typing RUN on the transmitter. That way data from the transmitter does not go into the "bit bucket" because the receiver was not ready for it.

BIDIRECTIONAL AT LAST

The COMMHS (see page 127) and IBMHS (see below) programs show how to set up bidirectional communications between two computers with software handshaking.

```

1 ' IBMHS - HANDSHAKING BETWEEN IBM AND
C-64
2 '   PROGRAM FOR THE IBM
3 '   --- IBMHS ---
4 '
10 OPEN"COM1:1200,N,8,1,RS,CS,DS,CD" AS
#1
20 T$="THIS IS IBM CALLING COMMODORE"
30 WHILE NOT EOF(1) : J$=INPUT$(1,1) : W
END 'CLEAR BUFFER
40 N=N+1 : PRINT #1,N;T$
50 GOSUB 80 'WAIT FOR HANDSHAKE
70 GOTO 40 'SEND NEXT MESSAGE
80 R$=INPUT$(1,1) : PRINT R$; : IF R$<>C
HR$(13) THEN 80
90 RETURN

```

Line 30 in both COMMHS and IBMHS clears the receiver buffer. The IBM program in line 40 increments counter N and sends the count as well as the message T\$ to the Commodore. Then it loops in line 80, displaying the return message from the Commodore. Once the IBM sees the carriage return (CHR\$(13)), it continues from line 40.

The Commodore program builds a message string M\$ character by character until it receives a carriage return CR\$ from the IBM. The PRINT# statement, just like the PRINT statement, generates a carriage return if a comma or a semicolon is not present at the end of the line. Once the Commodore has read the carriage return, it branches to line 80 where the value of N that it just received is stripped from M\$, and a new message T\$ is created and sent to the IBM.

These programs are meant to show how the two computers can pass information back and forth and how the messages may be synchronized by means of software handshaking. One computer waits in a receive loop until it recognizes that the message is complete, then it becomes the transmitter while the other computer operates in the receive loop.

You should have no difficulty modifying the IBMHS program to run on a second Commodore computer. Change the OPEN and INPUT\$ statements as well as line 30 as previously discussed. You might also modify the IBMHS program to do something with the data received from the Commodore rather than simply wait for the carriage return.

GRAND FINALE

After studying and modifying the earlier programs, you should be able to understand the sequence of the COMMHILO (see page 127) and IBMHILO (shown here) programs.

```

1 'IBMHILO - HI-LO GAME WITH THE C-64
2 '   PROGRAM FOR THE IBM-PC
3 '   --- IBMHILO ---
4 '
5 CLS 'CLEAR SCREEN
10 OPEN"COM1:1200,N,8,1,RS,CS,DS,CD" AS
#1
20 MX=1048576 : MN=0 'MAX AND MIN VALUES
30 N=(MX+MN)/2 'INITIAL GUESS
40 T$="PICK A NUMBER FROM"+STR$(MN)+" TO
"+STR$(MX)
50 GOSUB 1000 'START THE GAME
60 GOSUB 2000 'GET RESPONSE
70 IF R$<>"ALL RIGHT" THEN 40
75 ' ===== MAIN OPERATING LOOP =====
80 T$="IS IT"+STR$(N)+"?"
90 GOSUB 1000 'MAKE A GUESS
100 GOSUB 2000 'GET RESPONSE
110 IF LEFT$(R$,13)="THAT'S RIGHT!" THEN
150
120 IF RIGHT$(R$,8)="TOO HIGH" THEN MX=N

```



COMMODORE-64

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```

130 IF RIGHT$(R$,7)="TOO LOW" THEN MN=N
140 N=(MN+MX)/2 : GOTO 80
145 ' ===== END OF GAME =====
150 T$="THANK YOU." : GOSUB 1000
160 GOSUB 2000
170 CLOSE : END
1000 PRINT #1,T$      'SEND MESSAGE
1010 RETURN
2000 INPUT #1,R$     'GET RESPONSE
2010 PRINT R$
2020 RETURN

```

If you are using two Commodore computers, you must modify IBMHILO slightly. Line 5 should be replaced by PRINT CHR\$(147) to clear the screen. Line 10 should match the OPEN statement in COMMHILO. The transmit and receive subroutines at lines 1000 and 2000 should be replaced by the corresponding subroutines in COMMHILO.

Type RUN on the Commodore, then type RUN on the IBM. Sometimes the Commodore misses the first character sent by the IBM. Lines 40 and 50 in COMMHILO check to see that the proper message is received from the IBM before beginning. If not, the Commodore requests the IBM to repeat the message by sending "WHAT?" to the IBM. If the IBM does not receive "ALL RIGHT" to confirm that the Commodore is ready, it repeats the initial message.

The Commodore has picked a value N which it displays on its own screen, but it does not tell the IBM the value. The IBM makes its initial guess in lines 80 and 90 and awaits the response in line 100. The Commodore strips the numeric part of the IBM's guess in line 90 of COMMHILO and tests it against the correct value. It creates the proper message to return to the IBM in lines 110, 120, or 130. If the guess is not correct, the Commodore returns to line 80 where the number of guesses NG is incremented.

The IBM continues calculating new guesses in line 140 until it receives the response "THAT'S RIGHT!" followed by the correct number repeated and the number of guesses required. At that point the IBM politely ends the game. The Commodore returns the courtesy, and both computers close their files and stop. Line 160 in COMMHILO simply waits until the Commodore's transmit buffer is empty before closing the file. Without it, the IBM may not receive its final message. You may replace the END statements with delay loops followed by RUN if you want the game to be played repeatedly.

These programs give examples of some of the ways two computers can communicate. It is important that the messages are typed correctly. If the IBM is waiting for "ALL RIGHT" then "OK" or "ALRIGHT" simply won't do. It is possible to modify the programs to allow more flexibility in the messages. For example lines 120 and 130 of IBMHILO look only at the last characters of the message, ignoring any others. Line 130 of COMMHILO shows how to combine string and numeric constants and variables into a string that can be transmitted.

This is a very exciting project. There is something magical about sitting back and watching the two computers talk to one another. I have connected a speech synthesizer to the IBM for the *Hi-Lo* game. The IBM takes each message as it is transmitted or received and sends it to the speech synthesizer. The Commodore's messages are spoken in one voice and the IBM's messages are spoken in a different voice. So far I have not heard any arguments between them, but I wonder what might happen if one of the computers were to be slightly less than fair?

There are countless possibilities with this simple communications link between two computers. Games are only a beginning. Sharing ASCII files is certainly feasible. Now if we can get one computer to program the other one... Hmmmm. Let me know what you come up with.

Addendum: I have found that some 1488's do not operate with the five volts from the Commodore. If the IBM does not receive data properly from the Commodore you should use a second 9-volt battery instead of the five volts going to the 1488 in figure 2. Remove the five volt line from pin 14 of the 1488. The positive side of the second battery should go to pin 14 of the 1488. The negative side of the second battery should be connected to the positive side of the first battery (as well as to ground the pin 7 of the 1488 and 1489).

I was also able to eliminate the 1488 and the negative power supply by using a second gate of the 1489 instead. Try taking pin M of the Commodore connector to pin 4 of the 1489, and take pin 6 of the 1489 to pin 3 of the IBM connector. According to specifications, there is no guarantee that this will work, but it did for me. The 1489 operates properly with the Commodore's five-volt supply, reducing the circuitry to one integrated circuit, two connectors, and wire. □

SEE PROGRAM LISTINGS ON PAGE 126

Next month in the Rupert Report, we'll continue exploring the mysteries of the RS-232 interface. Sharing programs and transferring sequential files between computers is a breeze with the software and procedures we'll develop! Plus, using the dynamic keyboard buffer to let the computer edit its own programs.



"I lost my job today. They replaced me with a machine."

ERRATA

DISK ERROR CHECKER (Nov. '85)

Line 450 was omitted from the program, causing Error 18 to be reported. The missing line reads

```
450 GET#15,A$:A=ASC(A$+CHR  
$(0)):IFA>99THEN440
```

GATORS N SNAKES (Aug. '85)

Jim Sanders, author of the program, was able to correct the bug in the machine language portion which we reported on in October. Correct line 1720 to read

```
1720 DATA 200,200,200,200,  
192,16,208,239,173,1,208,2  
01
```

Our apologies for any inconvenience these errors may have caused. Remember that corrections to programs and articles published in *Ahoy!* are posted on the *Ahoy! Bulletin Board* (718-383-8909—modem, required) as soon as they are spotted.

AHOY!'S BBS

If your computer is equipped with a modem, you can call *Ahoy!'s Bulletin Board System* (718-383-8909) any hour of the day, any day of the week to exchange electronic mail with other Commodore users and download files like the following:

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Set your modem for 300 baud, full duplex, no parity, one stop bit, 8-bit word length, and dial away!

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SANTA'S BUSY DAY

For the C-64

By George Trepal

Poor Santa is having a bad day. Instead of making presents, his elves left their work in the halls and went to a football game. Santa has to fly (you knew he could, didn't you?) through the building and collect the boxes.

The building is huge, covering more than 10 screens, and resembles a maze. The screen does a four-way scroll with Santa always remaining in the middle. Plug your joystick into port #2. A new building is made for each game, so there is no hope of memorizing the floor plan. To pick up a box Santa has to fly directly over it so that his center is the same as the box's center.

You'd expect anyone who could fly to have other abilities. Santa is able to pass a little way through walls, but if his center gets into a wall then OUCH!

Santa can't spend all day floating around the halls. The time used is shown as a green bar at the bottom of the screen. Running into a wall discourages the old man and he'll decide to spend less time with each crash.

The building contains over 200 boxes and two magic hearts. Each box is worth 10 points. If Santa collects a magic heart the timer is reset.

When you run the game you'll be asked if you want an easy or regular game. The easy game isn't really. The regular game is outrageously difficult. The difference is that in the easy game Santa stops when you tell him to and doesn't bounce if he hits a wall. Get him off walls quickly, since he can hit the same wall many times.

The game ends either when Santa's time is up or he collects 200 packages. To play again press any key.

The initial loading period is pretty long. The BASIC program has to be turned into machine language routines. Once the machine language is in place there will be no more delays.

To change from an easy to a regular game or vice versa press the RUN/STOP and RESTORE keys simultaneously. On some computers giving the RESTORE key short taps rather than pressing works best. The screen will clear. If you want a regular game type POKE 828,0 and if you want an easy game type POKE 828,1. Press RETURN, type SYS 49160, press RETURN again, and you'll be back in business.

Warning! This program uses most of the computer's memory. Your original BASIC program will be wiped out when you run it. Therefore be sure to save this program after you type it in without running it first!

If you know how to use a monitor you can save the machine language routines directly. The sprite data is stored between 896 and 960. The rest of the program lives between 49152 and 50491. In order to start the game SYS to 49160.


The BASIC loader program uses hexadecimal numbers that have to be converted to decimal numbers to be POKEd in place where they will become hexadecimal numbers again. Whew! The usual way to do such things is to read decimal numbers separated by commas out of data statements. My system uses no commas, has a standardized two digit number, and is 45% shorter than decimalized data would be. It's the shortness that counts when you're typing. □

SEE PROGRAM LISTING ON PAGE 144

PROGRAM LISTINGS

Attention new *Ahoy!* readers! You must read the following information very carefully prior to typing in programs listed in *Ahoy!* Certain Commodore characters, commands, and strings of characters and commands will appear in a special format. Follow the instructions and listing guide on this page.

On the following pages you'll find several programs that you can enter on your Commodore computer. But before doing so, read this entire page carefully.

To insure clear reproductions, *Ahoy!*'s program listings are generated on a daisy wheel printer, incapable of printing the commands and graphic characters used in Commodore programs. These are therefore represented by various codes enclosed in brackets []. For example: the SHIFT CLR/HOME command is represented onscreen by a heart . The code we use in our listings is [CLEAR]. The chart below lists all such codes which you'll encounter in our listings, except for one other special case.

The other special case is the COMMODORE and SHIFT characters. On the front of most keys are two symbols. The symbol on the left is obtained by pressing that key while holding down the COMMODORE key; the symbol on the right, by pressing that key while holding down the SHIFT key. COMMODORE and SHIFT characters are represented in our listings by a lower-case "s" or "c" followed by the symbol of the key you must hit. COMMODORE J, for example, is represented by [c J],

and SHIFT J by [s J].
































Additionally, any character that occurs more than two times in a row will be displayed by a coded listing. For example, [3 "[LEFT]"] would be 3 CuRSoR left commands in a row, [5 "[s EP]"] would be 5 SHIFTEd English Pounds, and so on. Multiple blank spaces will be noted in similar fashion: e.g., 22 spaces as [22 " "].

Sometimes you'll find a program line that's too long for the computer to accept (C-64 lines are a maximum of 80 characters, or 2 screen lines long; VIC 20 lines, a maximum of 88 characters, or 4 screen lines). To enter these lines, refer to the *BASIC Command Abbreviations Appendix* in your User Manual.

On the next page you'll find our *Bug Repellent* programs for the VIC 20 and C-64. The version appropriate for your machine will help you proofread our programs after you type them. (Please note: the *Bug Repellent* line codes that follow each program line, in the whited-out area, should *not* be typed in. See the instructions preceding each program.)

Also on the following page you will find *Flankspeed*, our ML entry program, and instructions on its use. □

Call *Ahoy!* at 212-239-0855 with any problems.

When You See	It Means	You Type	You Will See	When You See	It Means	You Type	You Will See
[CLEAR]	Screen Clear	SHIFT CLR/HOME		[BLACK]	Black	CNTRL 1	
[HOME]	Home	CLR/HOME		[WHITE]	White	CNTRL 2	
[UP]	Cursor Up	SHIFT ↑ CRSR ↓		[RED]	Red	CNTRL 3	
[DOWN]	Cursor Down	↑ CRSR ↓		[CYAN]	Cyan	CNTRL 4	
[LEFT]	Cursor Left	SHIFT ← CRSR →		[PURPLE]	Purple	CNTRL 5	
[RIGHT]	Cursor Right	← CRSR →		[GREEN]	Green	CNTRL 6	
[SS]	Shifted Space	SHIFT Space		[BLUE]	Blue	CNTRL 7	
[INSERT]	Insert	SHIFT INST/DEL		[YELLOW]	Yellow	CNTRL 8	
[DEL]	Delete	INST/DEL		[F1]	Function 1	F1	
[RVSON]	Reverse On	CNTRL 9		[F2]	Function 2	SHIFT F1	
[RVSOFF]	Reverse Off	CNTRL 0		[F3]	Function 3	F3	
[UPARROW]	Up Arrow	↑		[F4]	Function 4	SHIFT F3	
[BACKARROW]	Back Arrow	←		[F5]	Function 5	F5	
[PI]	PI	π		[F6]	Function 6	SHIFT F5	
[EP]	English Pound	£		[F7]	Function 7	F7	
				[F8]	Function 8	SHIFT F7	

IMPORTANT!

Letters on white background are **Bug Repellent** line codes. Do not enter them! This and the preceding explain these codes and provide other essential information on entering **Ahoy!** programs. Read these pages **before** entering programs.

BUG REPELLENT

This program will let you debug any *Ahoy!* program. Follow instructions for VIC 20 (cassette or disk) or C-64.

VIC 20 VERSION

By Michael Kleinert and David Barron

For cassette: type in and save the *Bug Repellent* program, then type RUN 63000[RETURN]SYS 828[RETURN]. If you typed the program properly, it will generate a set of two-letter line codes that will match those listed to the right of the respective program lines.

Once you've got a working *Bug Repellent*, type in the program you wish to check. Save it and type the RUN and SYS commands listed above once again, then compare the line codes generated to those listed in the magazine. If you spot a discrepancy, a typing error exists in that line. Important: you must use exactly the same spacing as the program in the magazine. Due to memory limitations on the VIC, the *Bug Repellent* will register an error if your spacing varies from what's printed.

You may type SYS 828 as many times as you wish, but if you use the cassette for anything, type RUN 63000 to restore the *Repellent*.

When your program has been disinfected you may delete all lines from 63000 on. (Be sure the program you type doesn't include lines above 63000!)

For disk: enter *Bug Repellent*, save it, and type RUN:NEW [RETURN]. Type in the program you wish to check, then SYS 828.

To pause the line codes listing, press SHIFT. To send the list to the printer type OPEN 4:CMD 4:SYS 828[RETURN]. When the cursor comes back, type PRINT#4:CLOSE 4[RETURN].

- 63000 FORX=828T01023:READY:POKEX,Y:NEXT:END AC
- 63001 DATA169,0,133,63,133,64,165,43,133,251 JL
- 63002 DATA165,44,133,252,160,0,132,254,32,228 DF
- 63003 DATA3,234,177,251,208,3,76,208,3,230 OE
- 63004 DATA251,208,2,230,252,169,244,160,3,32 OH
- 63005 DATA30,203,160,0,177,251,170,230,251,208 KO
- 63006 DATA2,230,252,177,251,32,205,221,169,58 JJ
- 63007 DATA32,210,255,169,0,133,253,230,254,32 OK
- 63008 DATA228,3,234,165,253,160,0,170,177,251 LG
- 63009 DATA201,32,240,6,138,113,251,69,254,170 BP
- 63010 DATA138,133,253,177,251,208,226,165,253,41 DD
- 63011 DATA240,74,74,74,74,24,105,65,32,210 EK
- 63012 DATA255,165,253,41,15,24,105,65,32,210 FO
- 63013 DATA255,169,13,32,210,255,173,141,2,41 PK
- 63014 DATA1,208,249,230,63,208,2,230,64,230 CB
- 63015 DATA251,208,2,230,252,76,74,3,169,236 KH
- 63016 DATA160,3,32,30,203,166,63,165,64,32 DP
- 63017 DATA205,221,169,13,32,210,255,96,230,251 EL
- 63018 DATA208,2,230,252,96,0,76,73,78,69 OI
- 63019 DATA83,58,32,0,76,73,78,69,32,35 FG
- 63020 DATA32,0,0,0,0,0 LE

C-64 VERSION

By Michael Kleinert and David Barron

Type in, SAVE, and RUN the *Bug Repellent*. Type NEW, then type in or LOAD the *Ahoy!* program you wish to check. When that's done, SAVE your program (don't RUN it!) and type SYS 49152 [RETURN].

To pause the listing depress and hold the SHIFT key. Compare the codes your machine generates to the codes listed to the right of the respective program lines. If you spot a difference, an error exists in that line. Jot down the number of lines where

contradictions occur. LIST each line, spot the errors, and correct them.

- 5000 FORX=49152T049488:READY:POKEX,Y:NEXT:END GJ
- 5001 DATA32,161,192,165,43,133,251,165,44,133 DL
- 5002 DATA252,160,0,132,254,32,37,193,234,177 DB
- 5003 DATA251,208,3,76,138,192,230,251,208,2 OF
- 5004 DATA230,252,76,43,192,76,73,78,69,32 KN
- 5005 DATA35,32,0,169,35,160,192,32,30,171 CA
- 5006 DATA160,0,177,251,170,230,251,208,2,230 CE
- 5007 DATA252,177,251,32,205,189,169,58,32,210 JE
- 5008 DATA255,169,0,133,253,230,254,32,37,193 CL
- 5009 DATA234,165,253,160,0,76,13,193,133,253 NB
- 5010 DATA177,251,208,237,165,253,41,240,74,74 MB
- 5011 DATA74,74,24,105,65,32,210,255,165,253 EP
- 5012 DATA41,15,24,105,65,32,210,255,169,13 GH
- 5013 DATA32,220,192,230,63,208,2,230,64,230 AN
- 5014 DATA251,208,2,230,252,76,11,192,169,153 NG
- 5015 DATA160,192,32,30,171,166,63,165,64,76 BF
- 5016 DATA231,192,96,76,73,78,69,83,58,32 EP
- 5017 DATA0,169,247,160,192,32,30,171,169,3 PJ
- 5018 DATA133,254,32,228,255,201,83,240,6,201 FK
- 5019 DATA80,208,245,230,254,32,210,255,169,4 FL
- 5020 DATA166,254,160,255,32,186,255,169,0,133 CL
- 5021 DATA63,133,64,133,2,32,189,255,32,192 GC
- 5022 DATA255,166,254,32,201,255,76,73,193,96 NN
- 5023 DATA32,210,255,173,141,2,41,1,208,249 NH
- 5024 DATA96,32,205,189,169,13,32,210,255,32 IM
- 5025 DATA204,255,169,4,76,195,255,147,83,67 KC
- 5026 DATA82,69,69,78,32,79,82,32,80,82 DC
- 5027 DATA73,78,84,69,82,32,63,32,0,76 ML
- 5028 DATA44,193,234,177,251,201,32,240,6,138 GN
- 5029 DATA113,251,69,254,170,138,76,88,192,0 JK
- 5030 DATA0,0,0,230,251,208,2,230,252,96 NA
- 5031 DATA170,177,251,201,34,208,6,165,2,73 DM
- 5032 DATA255,133,2,165,2,208,218,177,251,201 JA
- 5033 DATA32,208,212,198,254,76,29,193,0,169 FM
- 5034 DATA13,76,210,255,0,0,0 PA

FLANKSPEED FOR THE C-64

By Gordon F. Wheat

Flankspeed will allow you to enter machine language *Ahoy!* programs without any mistakes. Once you have typed the program in, save it for future use. While entering an ML program with *Flankspeed* there is no need to enter spaces or hit the carriage return. This is all done automatically. If you make an error in a line a bell will ring and you will be asked to enter it again. To LOAD in a program Saved with *Flankspeed* use LOAD "name".1.1 for tape, or LOAD "name".8.1 for disk. The function keys may be used after the starting and ending addresses have been entered.

- f1 - SAVES what you have entered so far.
- f3 - LOADs in a program worked on previously.
- f5 - To continue on a line you stopped on after LOADING in the previously saved work.
- f7 - Scans through the program to locate a particular line, or to find out where you stopped the last time you entered the program. f7 temporarily freezes the output as well.

- 5 POKE53280,12:POKE53281,11 LL
- 6 PRINT"[CLEAR][c 8][RVSON][15" "]FLANKSPEED[15" "]; ED
- 10 PRINT"[RVSON][5" "]MISTAKEPROOF ML ENTRY PROGRAM[6" "]; MC
- 15 PRINT"[RVSON][9" "]CREATED BY G. F. WHEAT[9" "]; DM
- 20 PRINT"[RVSON][3" "]COPR. 1984, ION INTERNA OT01

	TIONAL INC.[3"]"	DH	•1060 PRINT"?ERROR IN SAVE":GOTO1100	EI
	•30 FORA=54272TO54296:POKEA,0:NEXT	IM	•1070 PRINT"?ERROR IN LOAD":GOTO1100	GL
	•40 POKE54272,4:POKE54273,48:POKE54277,0:POKE5		•1080 PRINT:PRINT:PRINT"END OF ML AREA":PRINT	PG
	4278,249:POKE54296,15	NH	•1100 POKE54276,17:POKE54276,16:RETURN	BH
D	•70 FORA=680TO699:READB:POKEA,B:NEXT	KO	•1200 OPEN15,8,15:INPUT#15,A,A\$:CLOSE15:PRINTA	IM
DL	•75 DATA169,251,166,253,164,254,32,216,255,96	HJ	\$:RETURN	PC
DE	•76 DATA169,0,166,251,164,252,32,213,255,96	JB	•2000 REM GET FOUR DIGIT HEX	GM
OF	•80 B\$="STARTING ADDRESS IN HEX":GOSUB2010:AD=	HC	•2010 PRINT:PRINTB\$;:INPUT#15	II
KN	B:SR=B	FO	•2020 IFLEN(T\$)<>4THENGOSUB1020:GOTO2010	AD
CA	•85 GOSUB2520:IFB=0THEN80	KE	•2040 FORA=1TO4:A\$=MID\$(T\$,A,1):GOSUB2060:IFT(A	GF
CE	•86 POKE251,T(4)+T(3)*16:POKE252,T(2)+T(1)*16	IF	•2050 NEXT:B=(T(1)*4096)+(T(2)*256)+(T(3)*16)+	EH
JE	•90 B\$="ENDING ADDRESS IN HEX":GOSUB2010:EN=B	FP	T(4):RETURN	KP
CL	•95 GOSUB2510:IFB=0THEN80	MN	•2060 IFA\$>"@ANDAS<"G"THENT(A)=ASC(A\$)-55:RET	NP
NE	•96 POKE254,T(2)+T(1)*16:B=T(4)+1+T(3)*16	GE	URN	LI
ME	•97 IFB>255THENB=B-255:POKE254,PEEK(254)+1	HN	•2070 IFA\$>"/ANDAS<:"THENT(A)=ASC(A\$)-48:RET	MI
EP	•98 POKE253,B:PRINT	IL	URN	MG
GH	•100 REM GET HEX LINE	FG	•2080 T(A)=16:RETURN	MI
AN	•110 GOSUB3010:PRINT": [c P][LEFT]";:FORA=0TO8	MD	•2500 REM ADDRESS CHECK	IM
NG	•120 FORB=0TO1:GOTO210	ME	•2510 IFAD>ENTHEN1030	EB
BF	•125 NEXTB	LH	•2515 IFB<SRORB>ENTHEN1040	HG
EP	•130 A%(A)=T(1)+T(0)*16:IFAD+A-1=ENTHEN310	IK	•2520 IFB<256OR(B>40960ANDB<49152)ORB>53247THE	CE
PJ	•135 PRINT" [c P][LEFT]";	PD	N1050	PN
FK	•140 NEXTA:T=AD-(INT(AD/256)*256):PRINT" "	LK	•2530 RETURN	MJ
FL	•150 FORA=0TO7:T=T+A%(A):IFT>255THENT=T-255	IA	•3000 REM ADDRESS TO HEX	IM
3	•160 NEXT	FK	•3010 AC=AD:A=4096:GOSUB3070	EB
GC	•170 IFA%(8)<>TTHENGOSUB1010:GOTO110	MN	•3020 A=256:GOSUB3070	CE
NN	•180 FORA=0TO7:POKEAD+A,A%(A):NEXT:AD=AD+8:GOT	AB	•3030 A=16:GOSUB3070	PN
NH	0110	HO	•3040 A=1:GOSUB3070	MF
IM	•200 REM GET HEX INPUT	GC	•3070 T=INT(AC/A):IFT>9THENA\$=CHR\$(T+55):GOTO3	IM
KC	•210 GETA\$:IFA\$=""THEN210	MD	090	CJ
DC	•211 IFA\$=CHR\$(20)THEN270	KF	•3080 A\$=CHR\$(T+48)	JP
ML	•212 IFA\$=CHR\$(133)THEN4000	GE	•3090 PRINTA\$;:AC=AC-A*T:RETURN	AC
GN	•213 IFA\$=CHR\$(134)THEN4100	BJ	•4000 A\$="**SAVE**":GOSUB4200	AI
JK	•214 IFA\$=CHR\$(135)THENPRINT" ":GOTO4500		•4050 OPEN1,T,1,A\$:SYS680:CLOSE1	LH
NA	•215 IFA\$=CHR\$(136)THENPRINT" ":GOTO4700	GM	•4060 IFST=0THENEND	EO
DM	•220 IFA\$>"@ANDAS<"G"THENT(B)=ASC(A\$)-55:GOTO	LE	•4070 GOSUB1060:IFT=8THENGOSUB1200	FJ
JA	250	LL	•4080 GOTO4000	FF
FM	•230 IFA\$>"/ANDAS<:"THENT(B)=ASC(A\$)-48:GOTO	OA	•4100 A\$="**LOAD**":GOSUB4200	AB
PA	250	CG	•4150 OPEN1,T,0,A\$:SYS690:CLOSE1	MF
	•240 GOSUB1100:GOTO210	OP	•4160 IFST=64THEN110	JH
	•250 PRINTA\$"[c P][LEFT]";	OB	•4170 GOSUB1070:IFT=8THENGOSUB1200	CM
	•260 GOTO125	CJ	•4180 GOTO4100	FO
	•270 IFA>0THEN280	HG	•4200 PRINT" ":PRINTTAB(14)A\$	FG
	•272 A=-1:IFB=1THEN290	BE	•4210 PRINT:A\$=""INPUT"FILENAME";A\$	OM
	•274 GOTO140	KH	•4215 IFA\$=""THEN4210	GF
	•280 IFB=0THENPRINTCHR\$(20);CHR\$(20);:A=A-1	AD	•4220 PRINT:PRINT"TAPE OR DISK?":PRINT	DF
	•285 A=A-1	GJ	•4230 GETB\$:T=1:IFB\$="D"THENT=8:A\$="@0:"+A\$:RE	IG
	•290 PRINTCHR\$(20);:GOTO140	PL	TURN	FN
	•300 REM LAST LINE	IA	•4240 IFB\$<>"T"THEN4230	IM
	•310 PRINT" ":T=AD-(INT(AD/256)*256)	KF	•4250 RETURN	DK
	•320 FORB=0TOA-1:T=T+A%(B):IFT>255THENT=T-255	HN	•4500 B\$="CONTINUE FROM ADDRESS":GOSUB2010:AD=	MA
	•330 NEXT	ON	B	OI
	•340 IFA%(A)<>TTHENGOSUB1010:GOTO110	FL	•4510 GOSUB2515:IFB=0THEN4500	FH
	•350 FORB=0TOA-1:POKEAD+B,A%(B):NEXT	DH	•4705 GOSUB2515:IFB=0THEN4700	NK
	•360 PRINT:PRINT"YOU ARE FINISHED!":GOTO4000	JA	•4706 PRINT:GOTO4740	DI
	•1000 REM BELL AND ERROR MESSAGES	HD	•4710 FORB=0TO7:AC=PEEK(AD+B):GOSUB3030:IFAD+B	BK
	•1010 PRINT:PRINT"LINE ENTERED INCORRECTLY":PR	AG	=ENTHENAD=SR:GOSUB1080:GOTO110	EC
	INT:GOTO1100	KN	•4715 PRINT" ";:NEXTB	GN
LL	•1020 PRINT:PRINT"INPUT A 4 DIGIT HEX VALUE!":		•4720 PRINT:AD=AD+8	MN
[	GOTO1100		•4730 GETB\$:IFB\$=CHR\$(136)THEN110	JD
ED	•1030 PRINT:PRINT"ENDING IS LESS THAN STARTING		•4740 GOSUB3010:PRINT": ";:GOTO4710	
P	!":B=0:GOTO1100			
MC	•1040 PRINT:PRINT"ADDRESS NOT WITHIN SPECIFIED			
[	RANGE!":B=0:GOTO1100			
DM	•1050 PRINT:PRINT"NOT ZERO PAGE OR ROM!":B=0:G			
A	OTO1100			

BLACKBOARD.S FROM PAGE 91

```

1 *
2 * BLACKBOARD
3 *
4     ORG     $8000
5 *
6 COLOR EQU $10
7 BASE  EQU $2000
8 SCROLY EQU $D011
9 VMCSB EQU $D018
10 COLMAP EQU $0400
11 *
12 HMAX EQU 320
13 VMAX EQU 200
14 HMID EQU 160
15 VMID EQU 100
16 *
17 SCRLEN EQU 8000
18 MAPLEN EQU 1000
19 *
20 TEMPA EQU $FB
21 TEMPB EQU TEMPA+2
22 *
23 TABPTR EQU TEMPA
24 TABSIZ EQU $9000
25 *
26 HPSN EQU TABSIZ+2
27 VPSN EQU HPSN+2
28 CHAR EQU VPSN+1
29 ROW EQU CHAR+1
30 LINE EQU ROW+1
31 BYTE EQU LINE+1
32 BITT EQU BYTE+2
33 *
34 MPRL EQU BITT+1
35 MPRH EQU MPRL+1
36 MPDL EQU MPRH+1
37 MPDH EQU MPDL+1
38 PRODL EQU MPDH+1
39 PRODH EQU PRODL+1
40 *
41 FILVAL EQU PRODH+1
42 JSV EQU FILVAL+1
43 *
44 CIAPRA EQU $DC00
45 *
46     JMP     START
47 *
48 * BLOCK FILL ROUTINE
49 *
50 BLKFIL LDA FILVAL
51     LDX TABSIZ+1
52     BEQ PARTPG
53     LDY #0
54 FULLPG STA (TABPTR),Y
55     INY
56     BNE FULLPG
57     INC TABPTR+1
58     DEX
59     BNE FULLPG
60 PARTPG LDX TABSIZ
61     BEQ FINI
62     LDY #0
63 PARTLP STA (TABPTR),Y
64     INY
65     DEX
66     BNE PARTLP
67 FINI RTS
68 *
69 * 16-BIT MULTIPLICATION ROUTINE
70 *
71 MULT16 LDA #0
72     STA PRODL
73     STA PRODH
74     LDX #17
75     CLC
76 MULT ROR PRODH
77     ROR PRODL
78     ROR MPRH
79     ROR MPRL
80     BCC CTDOWN
81     CLC
82     LDA MPDL
83     ADC PRODL
84     STA PRODL
85     LDA MPDH
86     ADC PRODH
87     STA PRODH
88 CTDOWN DEX
89     BNE MULT
90     RTS
91 *
92 * PLOT ROUTINE
93 *
94 * ROW=VPSN/8 (8-BIT DIVIDE)
95 *
96 PLOT LDA VPSN
97     LSR A
98     LSR A
99     LSR A
100    STA ROW
101 *
102 * CHAR=HPSN/8 (16-BIT DIVIDE)
103 *
104     LDA HPSN

```

```

105      STA  TEMPA
106      LDA  HPSN+1
107      STA  TEMPA+1
108      LDX  #3
109 DLOOP LSR  TEMPA+1
110      ROR  TEMPA
111      DEX
112      BNE  DLOOP
113      LDA  TEMPA
114      STA  CHAR
115 *
116 * LINE=VPSN AND 7
117 *
118      LDA  VPSN
119      AND  #7
120      STA  LINE
121 *
122 * BITT=7-(HPSN AND 7)
123 *
124      LDA  HPSN
125      AND  #7
126      STA  BITT
127      SEC
128      LDA  #7
129      SBC  BITT
130      STA  BITT
131 *
132 * BYTE=BASE+ROW*HMAX+8*CHAR+LINE
133 *
134 * FIRST MULTIPLY ROW * HMAX
135 *
136      LDA  ROW
137      STA  MPRL
138      LDA  #0
139      STA  MPRH
140      LDA  #<HMAX
141      STA  MPDL
142      LDA  #>HMAX
143      STA  MPDH
144      JSR  MULT16
145      LDA  MPRL
146      STA  TEMPA
147      LDA  MPRL+1
148      STA  TEMPA+1
149 *
150 * ADD PRODUCT TO BASE
151 *
152      CLC
153      LDA  #<BASE
154      ADC  TEMPA
155      STA  TEMPA
156      LDA  #>BASE
157      ADC  TEMPA+1
158      STA  TEMPA+1
159 *
160 * MULTIPLY 8 * CHAR
161 *
162      LDA  #8
163      STA  MPRL
164      LDA  #0
165      STA  MPRH
166      LDA  CHAR
167      STA  MPDL
168      LDA  #0
169      STA  MPDH
170      JSR  MULT16
171      LDA  MPRL
172      STA  TEMPB
173      LDA  MPRH
174      STA  TEMPB+1
175 *
176 * ADD LINE
177 *
178      CLC
179      LDA  TEMPB
180      ADC  LINE
181      STA  TEMPB
182      LDA  TEMPB+1
183      ADC  #0
184      STA  TEMPB+1
185 *
186 * TEMPA + TEMPB = BYTE
187 *
188      CLC
189      LDA  TEMPA
190      ADC  TEMPB
191      STA  TEMPB
192      LDA  TEMPA+1
193      ADC  TEMPB+1
194      STA  TEMPB+1
195 *
196 * POKE BYTE, PEEK(BYTE) OR 2^BIT
197 *
198      LDX  BITT
199      INX
200      LDA  #0
201      SEC
202 SQUARE ROL
203      DEX
204      BNE  SQUARE
205      LDY  #0
206      ORA  (TEMPB),Y
207      STA  (TEMPB),Y
208      RTS
209 *
210 * MAIN ROUTINE STARTS HERE
211 *
212 * FIRST DEFINE BIT MAP AND ENABLE
213 * HIGH-RESOLUTION GRAPHICS
214 *
215 START  LDA  #$18
216      STA  VMCSB
217 *
218      LDA  SCROLY
219      ORA  #32
220      STA  SCROLY

```

```

221 *
222 * SELECT GRAPHICS BANK 1
223 *
224     LDA   $DD02
225     ORA   #$03
226     STA   $DD02
227 *
228     LDA   $DD00
229     ORA   #$03
230     STA   $DD00
231 *
232 * CLEAR BIT MAP
233 *
234     LDA   #0
235     STA   FILVAL
236     LDA   #<BASE
237     STA   TABPTR
238     LDA   #>BASE
239     STA   TABPTR+1
240     LDA   #<SCRLEN
241     STA   TABSIZ
242     LDA   #>SCRLEN
243     STA   TABSIZ+1
244     JSR   BLKFIL
245 *
246 * SET BKG AND LINE COLORS
247 *
248     LDA   #COLOR
249     STA   FILVAL
250     LDA   #<COLMAP
251     STA   TABPTR
252     LDA   #>COLMAP
253     STA   TABPTR+1
254     LDA   #<MAPLEN
255     STA   TABSIZ
256     LDA   #>MAPLEN
257     STA   TABSIZ+1
258     JSR   BLKFIL
259 *
260 * DRAW HORIZONTAL LINE
261 *
262     LDA   #VMID
263     STA   VPSN
264     LDA   #0
265     STA   HPSN
266     STA   HPSN+1
267     AGIN  JSR   PLOT
268     INC   HPSN
269     BNE   NEXT
270     INC   HPSN+1
271     NEXT  LDA   HPSN+1
272     CMP   #>HMAX
273     BCC   AGIN
274     LDA   HPSN
275     CMP   #<HMAX
276     BCC   AGIN

```

```

277 *
278 * DRAW VERTICAL LINE
279 *
280     LDA   #0
281     STA   VPSN
282     POINT LDA   #<HMID
283     STA   HPSN
284     LDA   #>HMID
285     STA   HPSN+1
286     JSR   PLOT
287     INC   HPSN
288     BNE   SKIP
289     INC   HPSN+1
290     SKIP  JSR   PLOT
291     LDX   VPSN
292     INX
293     STX   VPSN
294     CPX   #VMAX
295     BCC   POINT
296     INF   JMP   INF

```

JEWEL QUEST FROM PAGE 17

```

• 10 REM ***JEWEL QUEST*** BY BOB BLACKMER FN
• 20 PRINTCHR$(147) FG
• 30 POKE52,48:POKE56,48:CLR HJ
• 40 DEF FNRX(X)=INT(X/256) PL
• 50 DEF FNTX(Z)=X-SX*256 EA
• 60 GOSUB680:GOSUB590:GOSUB1590 AJ
• 70 POKE56334,PEEK(56334)AND254:POKE1,PEEK(1)AND251 BE
• 80 FORI=0TO63:FORJ=0TO7 JB
• 90 POKE14336+I*8+J,PEEK(53248+I*8+J):NEX TJ,I AB
• 100 POKE1,PEEK(1)OR4:POKE56334,PEEK(56334)OR1 IE
• 110 PRINT"[YELLOW][3"[DOWN]]][3"[RIGHT]] BY THE WAY, GOOD LUCK!" HF
• 120 POKE53272,(PEEK(53272)AND240)+14:POKE53270,PEEK(53270)OR16 HD
• 130 CK=0:FORCH=59TO62:FORBY=0TO7:READN:CK=CK+N OG
• 140 POKE14336+(8*CH)+BY,N:NEXTBY,CH:IFCK<>3205THENPRINT"ERROR-LINES 1160-1190":END MP
• 150 GOSUB710 CE
• 160 POKE53281,0:POKE53280,0:POKE53282,2:POKE53283,5:PRINT"[c 3]":PRINT"[CLEAR][HOME]" OC
• 170 FORL=1TO4:PRINT:NEXT:PRINT"[5" " ]<[8" "=" ]>[10" " ]<[8" "=" ]>" DD
• 180 FORL=1TO5:PRINT:NEXT:PRINT"[10" " ]<[18" "=" ]>" GE
• 190 FORL=1TO5:PRINT:NEXT:PRINT"[5" " ]<[8

```

```

"="]>[10" " ]<[8"="]>" EM •550 FORL=200TO20STEP-10:SYSF:POKES+1,L:N
•200 FORL=1TO4:PRINT:NEXT:PRINT"[18" " ]<= EXTL:POKES+4,33 PH
=>[DOWN]" HI •560 PRINT"[HOME][7"[DOWN]" ][4"[RIGHT]" ][
•210 PRINT"<[3"="]>[GREEN] ENERGY 99[c 3] RED]C O N G R A T U L A T I O N S ! !":F
<[8"="]>[GREEN] LEVEL[3" " ][c 3]<[4"="][ ORL=150TO170:POKES+1,L AA
HOME]":POKE2023,62 AD •570 SYSF:NEXT:NEXTK:POKES+4,0:PRINT"[DOW
•220 Y1=170:X=176:POKEV+2,JX(1):POKEV+3,J N][7"[RIGHT]" ][GREEN]PRESS ANY KEY TO PL
Y(1):POKE2041,198:P=193:J=1:LV=1 CA AY AGAIN" LP
•230 C=54272:F=49241:POKE700,0:POKE701,39 •580 POKE198,0:WAIT198,1:GOTO160 PC
:POKE702,57:POKE703,58:POKE704,0 MI •590 V=53248:S=54272:CK=0:FORL=12288TO123
•240 POKE2016,LV+48:POKE2016+C,5:POKEV+1, 50:READA:CK=CK+A:POKEL,A:NEXT JN
Y1:POKEV+21,2:POKE1997,57:POKE1998,57 EG •600 FORL=12352TO12414:READA:CK=CK+A:POKE
•250 PRINT"[HOME][GREEN]"TAB(7)"PRESS FIR L,A:NEXT HC
E BUTTON TO START":POKEV+21,3 AN •610 FORL=12544TO12606:READA:CK=CK+A:POKE
•260 FR=PEEK(56320)AND16:IFFR=16THEN250 DJ L,A:NEXT GC
•270 PRINT"[HOME]"TAB(7)"[26" " ]":SYS4943 •620 FORL=12608TO12670:READA:CK=CK+A:POKE
7:POKEV+30,0 OP L,A:NEXT LC
•280 SYS49152:IFPEEK(679)THENX=X+4:POKE67 •630 FORL=12672TO12734:READA:CK=CK+A:POKE
9,0:P=193 DA L,A:NEXT CG
•290 IFPEEK(680)THENX=X-4:POKE680,0:P=197 AG •640 IFCK<>13468THENPRINT"ERROR IN LINES
•300 IF(X<25)OR(X>340)THENX=25 AK 760-1150":END IK
•310 IF(PEEK(V+1)<50)OR(PEEK(V+1)>240)THE •650 POKEV+28,3:POKEV+37,15:POKEV+38,7:PO
NPOKEV+1,50 LO KEV+39,12:POKEV+40,1 CA
•320 POKE2040,P:SX=FNRX(X):LX=FNTX(Z):POK •660 FORL=STOS+24:POKEL,0:NEXT:POKES+1,20
EV,LX:POKEV+16,SX:IFLV>7THENSYSF NN 0:POKES+5,16:POKES+6,64 OB
•330 IFPEEK(V+31)<>2THENSYS49348:IFPEEK(7 •670 POKES+18,129:POKES+14,5:POKES+24,15:
04)THEN370 PL RETURN EG
•340 IFPEEK(V+30)=3THENGOSUB450 LO •680 CK=0:FORL=1TO10:READJX(L),JY(L):CK=C
•350 GETAN$:IFAN$="[F1]"THENGOSUB500 BC K+JX(L)+JY(L):NEXT BM
•360 GOTO280 CG •690 IFCK<>3286THENPRINT"ERROR IN LINES 7
•370 POKE198,0:POKE1998,48:PRINT"[HOME][6 PF
"[DOWN]" ]"TAB(15)"[GREEN]GAME OVER" NI 40-750":END IM
•380 PRINTTAB(14)"PLAY AGAIN?":PRINTTAB(1 •700 RETURN
7)"(Y/N)" JH •710 ML=49152:CK=0:FORL=MLTOML+309:READA:
AN POKEL,A:CK=CK+A:NEXT
•390 WAIT198,1:GETAN$ BM •720 IFCK<>37116THENPRINT"ERROR IN LINES
•400 IFAN$="Y"THENGOTO430 HE 1200-1580":END EN
•410 IFAN$="N"THENPOKE828,0:SYS828 FB •730 RETURN IM
•420 GOTO390 CE •740 DATA 92,88,255,88,175,136,92,185,255
•430 PRINT"[HOME][6"[DOWN]" ]"TAB(15)"[9" ,185,175,224,113,136,234,136 FI
"]":POKEV+21,0 EC •750 DATA 113,185,234,185 IO
•440 PRINTTAB(14)"[11" " ]":PRINTTAB(17)"[ •760 DATA 34,34,32,162,162,34,170,170 CK
5" " ]":GOTO220 OF •770 DATA 186,8,32,32,0,128,0,2 JF
•450 SYSF:POKES+1,9:POKES+4,17:J=J+1:IFJ= •780 DATA 20,0,8,40,0,32,40,0 NJ
11THENJ=1:GOSUB480 PN •790 DATA 128,80,0,32,80,0,8,80 DL
•460 POKEV+21,1:POKEV+2,JX(J):POKEV+3,JY( •800 DATA 0,0,112,0,2,84,0,0 EM
J):POKEV+21,3:POKEV+30,0 JO •810 DATA 85,0,0,169,64,0,33,64 FG
•470 FORL=1TO10:NEXT:POKES+4,129:RETURN EE •820 DATA 0,137,64,2,2,120,8,0 KH
•480 LV=LV+1:IFLV>9THEN530 GD •830 DATA 156,32,0,32,168,0,42 KK
•490 POKE2016,LV+48:RETURN AO •840 DATA 34,34,32,136,136,136,34,32 PH
•500 PRINT"[HOME][RED]"TAB(7)"RELAX-PRESS [ •850 DATA 32,0,32,0,0,128,0,2 NJ
GREEN]F3[RED] TO CONTINUE" FP •860 DATA 20,0,8,40,0,32,40,0 NJ
•510 POKE198,0:WAIT198,1:GETP$:IFP$<>"[F3 •870 DATA 128,80,0,32,80,0,8,80 DL
]"THEN510 IH •880 DATA 0,0,112,0,2,84,0,0 EM
•520 PRINT"[HOME]"TAB(7)"[32" " ]":SYS4943 •890 DATA 85,0,0,169,64,0,33,64 FG
7:RETURN MH •900 DATA 0,137,64,2,2,120,8,0 KH
•530 POKES+4,17:FORK=1TO10 EL •910 DATA 156,32,0,32,168,0,42 KK
•540 PRINT"[HOME][7"[DOWN]" ][4"[RIGHT]" ][ •920 DATA 34,34,32,162,162,34,170,170 CK
GREEN]C O N G R A T U L A T I O N S ! !" EH •930 DATA 186,8,32,32,0,8,0,1 HA

```

•940 DATA 66,0,0,160,128,0,160,32
 •950 DATA 0,80,8,0,80,32,0,80
 •960 DATA 128,0,112,0,1,82,0,5
 •970 DATA 80,0,20,168,0,20,32,0
 •980 DATA 20,136,0,242,2,0,232,0
 •990 DATA 128,32,0,32,168,0,42
 •1000 DATA 8,136,136,162,34,34,72,136
 •1010 DATA 138,0,32,0,0,8,0,1
 •1020 DATA 66,0,0,160,128,0,160,32
 •1030 DATA 0,80,8,0,80,32,0,80
 •1040 DATA 128,0,112,0,1,82,0,5
 •1050 DATA 80,0,20,168,0,20,32,0
 •1060 DATA 20,136,0,242,2,0,232,0
 •1070 DATA 128,32,0,32,168,0,42
 •1080 DATA 0,32,0,0,184,0,2,254
 •1090 DATA 0,0,184,0,0,32,0,0
 •1100 DATA 0,0,0,0,0,0,0,0
 •1110 DATA 0,0,0,0,0,0,0,0
 •1120 DATA 0,0,0,0,0,0,0,0
 •1130 DATA 0,0,0,0,0,0,0,0
 •1140 DATA 0,0,0,0,0,0,0,0
 •1150 DATA 0,0,0,0,0,0,0,0
 •1160 DATA 40,20,150,85,150,150,20,40
 •1170 DATA 2,10,42,170,85,85,85,85
 •1180 DATA 170,170,170,170,85,85,85,85
 •1190 DATA 170,169,165,149,85,84,80,64
 •1200 DATA 169,129,141,4,212,173,0,220
 •1210 DATA 41,8,208,10,169,1,141,167
 •1220 DATA 2,169,192,141,248,7,173,0
 •1230 DATA 220,41,4,208,10,169,1,141
 •1240 DATA 168,2,169,196,141,248,7,173
 •1250 DATA 0,220,41,16,208,9,206,1
 •1260 DATA 208,206,1,208,76,58,192,238
 •1270 DATA 1,208,169,0,141,0,220,173
 •1280 DATA 27,212,141,40,208,174,248,7
 •1290 DATA 224,194,16,8,169,192,141,248
 •1300 DATA 7,76,89,192,169,196,141,248
 •1310 DATA 7,169,59,174,188,2,172,189
 •1320 DATA 2,238,188,2,206,189,2,157
 •1330 DATA 0,4,157,224,5,153,240,4
 •1340 DATA 153,32,7,169,32,157,0,4
 •1350 DATA 157,224,5,153,240,4,153,32
 •1360 DATA 7,174,188,2,172,189,2,169
 •1370 DATA 59,157,0,4,157,224,5,153
 •1380 DATA 240,4,153,32,7,162,180,202
 •1390 DATA 142,1,212,224,0,208,248,173
 •1400 DATA 189,2,201,0,208,29,169,32
 •1410 DATA 141,39,4,141,7,6,141,240
 •1420 DATA 4,141,32,7,169,0,141,188
 •1430 DATA 2,169,39,141,189,2,169,0
 •1440 DATA 141,4,212,96,169,17,141,11
 •1450 DATA 212,162,220,160,15,142,8,212
 •1460 DATA 140,39,208,136,208,250,202,224
 •1470 DATA 200,208,240,169,12,141,39,208
 •1480 DATA 169,0,141,31,208,141,11,212
 •1490 DATA 206,191,2,173,191,2,201,47

NE •1500 DATA 208,39,169,57,141,191,2,141 PF
 KP •1510 DATA 206,7,206,190,2,173,190,2 CH
 BE •1520 DATA 201,47,208,14,169,48,141,205 GL
 FP •1530 DATA 7,141,206,7,169,1,141,192 CM
 JF •1540 DATA 2,96,173,190,2,141,205,7 CD
 MF •1550 DATA 96,141,206,7,96,169,10,162 PB
 OG •1560 DATA 0,160,39,157,0,216,157,224 GE
 NK •1570 DATA 217,153,240,216,153,32,219,232 DF
 NE •1580 DATA 136,192,0,208,238,96 MP
 KP •1590 POKE53280,0:POKE53281,11:PRINT"[CLE IB
 BE AR][HOME]"TAB(11)"[RVSON][YELLOW] JEWEL
 FP QUEST " EH
 JF •1600 PRINTTAB(17)"[GREEN]BY":PRINTTAB(12
 MF)"BOB BLACKMER[DOWN]" EH
 EK •1610 PRINT"[YELLOW][CYAN] YOU MUST GATHE
 AM R THE TEN JEWELS ON EACH [DOWN]OF NINE
 FG LEVELS."; CP
 FG •1620 PRINT" YOU ACCOMPLISH THIS BY [DOW
 FG N]FLYING A GYROCOPTER IN THE JEWEL ROOM.
 FG " CP
 FG •1630 PRINT"[RIGHT][DOWN]TO FLY USE THE J
 PD OYSTICK IN PORT #2 AND [DOWN]PUSH LEFT
 FB OR RIGHT."; PL
 DB •1640 PRINT" TO FLY UP PUSH THE [DOWN]FI
 AG RE BUTTON. TO GET A JEWEL JUST TOUCH [D
 CN OWN]IT "; IO
 LM •1650 PRINT"WITH YOUR LANDING PODS. DONT
 GM TOUCH[3" "][DOWN]THE VELVET ON WHICH THE
 FD Y SIT "; JO
 CM •1660 PRINT"OR THE[5" "][DOWN]ROBOT GUARD
 LF S WHICH PATROL FOR THEY SAP [DOWN]YOUR
 MG ENERGY." PI
 OE •1670 PRINTTAB(4)"[RVSON][YELLOW]PRESS F1
 LP TO PAUSE DURING GAME" NF
 JN •1680 PRINTTAB(8)"[RVSON]PRESS ANY KEY TO
 CO BEGIN[HOME]":POKE198,0 OF
 LD •1690 WAIT198,1:PRINT"[CLEAR][3"[DOWN]]"
 MG 3"[RIGHT]"JUST A MOMENT[3"."][DOWN]":RE
 GG TURN KD
 ON
 FJ
 BL
 LF
 PH
 KD
 FO
 DM •0 REM << COMMTX - TRANSMIT TO IBM OC
 IC •5 REM - COMMODORE PROGRAM - MD
 HM •6 REM - -- COMMTX -- EH
 AD •7 REM - RUPERT REPORT #24 PP
 HM •8 REM - THE IBM CONNECTION KB
 OO •9 REM - LO
 GG •10 OPEN 2,2,0,CHR\$(8)+CHR\$(0) NG
 AE •20 GET K\$: IF K\$="" THEN 20 DF
 LL •30 PRINT#2,K\$; : PRINT K\$; BI
 KL •40 GOTO 20 OK

THE IBM CONNECTION FROM PAGE 61

COMMTX

COMMRX

```

.0 REM << COMMRX - RECEIVE FROM IBM
.5 REM - COMMODORE PROGRAM -
.6 REM - -- COMMRX --
.7 REM - RUPERT REPORT #24
.8 REM - THE IBM CONNECTION
.9 REM -
.10 OPEN 2,2,0,CHR$(8)+CHR$(0)
.20 GET#2,R$: IF R$="" THEN 20
.30 PRINT R$;
.40 GOTO 20

```

```

KI
MD
EN
PP
KB
LO
NG
OD
EP
OK

```

```

SUB 1000 : GOTO 80
.130 T$="THAT'S RIGHT! MY NUMBER IS "+G$+
". YOU TOOK"+STR$(NG)+" GUESSES."
.140 GOSUB 1000 : GOSUB 2000
.150 T$="YOU'RE WELCOME." : GOSUB 1000
.155 REM >WAIT TILL DONE TRANSMITTING<
.160 IF PEEK(673) AND 1 THEN 160
.170 CLOSE 2 : END
.1000 PRINT#2,T$ :REM TRANSMIT T$
.1010 RETURN
.2000 R$="" :REM RECEIVE R$
.2010 GET#2,A$:IF A$="" THEN 2010
.2020 IF A$=CHR$(13) THEN 2040
.2030 R$=R$+A$ : GOTO 2010
.2040 PRINT R$ : RETURN

```

```

PG
MC
PG
NK
DE
GO
JB
CP
IM
JL
AB
HJ
DP
NL

```

COMMHS

```

.0 REM << COMMHS - HANDSHAKE WITH IBM
.1 REM - COMMODORE PROGRAM -
.2 REM -- COMMHS --
.3 REM RUPERT REPORT #24
.4 REM THE IBM CONNECTION
.5 REM
.9 REM 1200 BAUD, 8 BITS/CHR, 1 STOP BIT,
NO PARITY
.10 OPEN 2,2,0,CHR$(8)+CHR$(0)
.20 CR$=CHR$(13)
.25 REM CLEAR THE RECEIVE BUFFER
.30 GET#2,R$: IF ST<>8 OR ST<>0 THEN 30
.35 REM === MAIN LOOP ===
.40 GET#2,R$: IF R$="" THEN 40
.50 M$=M$+R$
.60 PRINT R$;: IF R$=CR$ THEN GOSUB 80
.70 GOTO 40
.75 REM - TRANSMIT HANDSHAKE MESSAGE -
.80 T$="MESSAGE #"+STR$(VAL(M$))+ " RECEIV
ED"
.90 PRINT#2,T$ : M$="" : RETURN

```

```

HA
MD
CN
ON
EC
JD

```

DIRECTORY MANIPULATOR FROM PAGE 113

```

.10 REM *****
.20 REM * DIRECTORY MANIPULATOR INIT *
.30 REM *****
.40 PRINT"[CLEAR]"TAB(9)"[BLACK]DIRECTORY
MANIPULATOR[CYAN]"
.50 PRINTTAB(5)"[DOWN][RVSON]INSERT DISKE
TTE TO MANIPULATE":GOSUB1430
.60 DIMF$(144);FORI=1TO11:FL$=FL$+CHR$(0)
:NEXT:TY$=CHR$(131)+CHR$(18)+CHR$(0)
.70 DIMS%(18):S%(1)=1:FORI=1TO17
.80 IFI=6THENS%(I+1)=2:NEXT
.90 IFI=12THENS%(I+1)=3:NEXT
.100 S%(I+1)=S%(I)+3:NEXT
.110 T=18:S=1:N=1:OK=0
.120 SP$="":FORI=1TO16:SP$=SP$+CHR$(160):
NEXT
.130 REM *****
.140 REM * INIT DISK UNIT *
.150 REM *****
.160 OPEN15,8,15,"I0":GOSUB1550
.170 PRINTTAB(12)" DISK UNIT OK ![DOWN]"
.180 REM *****
.190 REM * READ DIRECTORY ROUTINE *
.200 REM *****
.210 OPEN2,8,2,"#"
.220 PRINT#15,"U1";2;0;T;S
.230 GOSUB1550
.240 GET#2,T$,S$:REM * TRACK & SECTOR OF
NEXT DIR ENTRY *
.250 T=ASC(T$+CHR$(0)):S=ASC(S$+CHR$(0))
.260 FORI=1TO8
.270 F$="":FORX=1TO30:REM * GET DIRECTORY
ENTRIES *
.280 GET#2,B$:B=ASC(B$+CHR$(0)):IFX=1THEN
A=B
.290 IFX=4THENC=B
.300 F$=F$+CHR$(B):NEXTX
.310 IFA<>0OR(A=0ANDC=160)THENF$(N)=F$:N=

```

```

NK
JD
NK
EJ
NH
KM
IF
CB
HO
JG
AK
BJ
LO
ID
LO
IN
PE
OG
PD
OG
DO
AM
GG
EH
MK
JD
JI
BO
KE
HM

```

COMMHILO

```

.0 REM << COMMHILO - HI-LO GAME WITH IBM
.1 REM - COMMODORE PROGRAM -
.2 REM -- COMMHILO --
.3 REM RUPERT REPORT #24
.4 REM THE IBM CONNECTION
.5 REM
.6 PRINT CHR$(147)
.10 OPEN 2,2,0,CHR$(8)+CHR$(0)
.20 N=INT(RND(0)*1048576)
.30 N$=STR$(N)
.40 GOSUB 2000
.50 IF LEFT$(R$,13)<>"PICK A NUMBER" THEN
T$="WHAT?" : GOSUB 1000 : GOTO 40
.60 T$="ALL RIGHT" : GOSUB 1000
.70 PRINT"( MY NUMBER IS";N;)"
.80 GOSUB 2000 : NG=NG+1
.90 G$=MID$(R$,6) :V=VAL(G$) :G$=STR$(V)
.100 IF G$=N$ THEN 130
.110 IF V>N THEN T$=G$+" IS TOO HIGH" : G
OSUB 1000 : GOTO 80
.120 IF V<N THEN T$=G$+" IS TOO LOW" : GO

```

```

CO
MD
LB
ON
EC
JD
FG
NG
GB
IA
FL
KF
HN
IP
GI
FB
FF
HP

```

```

N+1
.320 GET#2,B$,B$:NEXTI:REM * DIR ENTRIES
2-7 GARBAGE 1ST 2 BYTES *
.330 IFT<>0THEN220
.340 REM *****
.350 REM * PRINT DIRECTORY ROUTINE *
.360 REM *****
.370 Z=1:OD=0:P1=20:PG=P1:X=INT((N-1)/2)+
1:IF(N-1)-(2*(X-1))=1THENX=X+1:OD=1
.380 XX=X-1:PC=INT(XX/PG):IF(XX/PG)-PC<>0
THENPC=PC+1
.390 IFXX>PGTHENX=PG+1
.400 FORI=1TOXX:PRINT"[BLACK]"RIGHT$(STR$(
Z),2)"[CYAN]";MID$(F$(Z),4,16):Z=Z+1
.410 IFOD=0OR(OD=1AND2*XX<>X)THENPRINTTAB
(19)"[UP] [BLACK]"RIGHT$(STR$(X),2)"[CYAN
]";MID$(F$(X),4,16):X=X+1
.420 IFINT(I/PG)=1ANDPC>=2THENPG=PG+P1:GO
SUB1430:PC=PC-1:GOTO440
.430 GOTO460
.440 Z=X:IFPC=>2THENX=Z+P1
.450 IFPC=1THENX=INT(((2*XX)-(2*I))/2)+Z
.460 NEXTI
.470 CLOSE15:CLOSE2
.480 REM *****
.490 REM * CHECK DIR OK? *
.500 REM *****
.510 PRINT:PRINT"[DOWN]DIRECTORY OK (Y/N)
";:INPUT"3"[RIGHT]"N3"[LEFT]";OK$
.520 IFOK$<"Y"ANDOK$<"N"THENPRINT"3"[U
P]";:GOTO510
.530 IFOK$="Y"ANDOK=0THENGOTO1660:REM * E
XIT DIR MANIPULATOR *
.540 IFOK$="Y"ANDOK=1THENGOTO730:REM * RE
-WRITE DIRECTORY *
.550 REM *****
.560 REM * SELECT MANIP CMD *
.570 REM *****
.580 PRINT"[DOWN]SELECT DIRECTORY MANIPUL
ATION COMMAND:"
.590 GETCM$:IFCM$=""THEN590
.600 IFCM$="[F1]"THENPRINT"RE-LIST DIRECT
ORY[DOWN]":GOTO370
.610 IFCM$="H"THENGOSUB1340:GOTO370
.620 OK=1:IFCM$="[F2]"THENPRINT"ALPHABATI
ZE DIRECTORY":GOSUB920:GOTO370
.630 IFCM$="[F3]"THENPRINT"INSERT BLANK E
NTRY":GOSUB1010:GOTO370
.640 IFCM$="[F4]"THENPRINT"DELETE BLANK E
NTRIES":GOSUB1050:GOTO370
.650 IFCM$="[F5]"THENPRINT"INSERT [RVSON]
[5"-][RVSOFF] ENTRY":GOSUB1130:GOTO370
.660 IFCM$="[F6]"THENPRINT"INSERT 'REMARK
' ENTRY":GOSUB1170:GOTO370
.670 IFCM$="[F7]"THENPRINT"SWAP DIRECTORY
ENTRIES":GOSUB1230:GOTO370
.680 IFCM$="[F8]"THENPRINT"DELETE DIRECTO
RY ENTRY":GOSUB1280:GOTO370

```

```

ID .690 PRINT"[CLEAR]":GOTO580
.700 REM *****
NL .710 REM * RE-WRITE DIRECTORY *
MI .720 REM *****
CE .730 PRINT"[CLEAR][DOWN] [RVSON]WRITING
NEW DIRECTORY[3".]PLEASE WAIT![RVSOFF][
DOWN]"
.740 F$="":FORI=1TO32:F$=F$+CHR$(0):NEXTI
.750 OPEN15,8,15,"I0":GOSUB1550
.760 PRINTTAB(12)"DISK UNIT OK ![DOWN]"
.770 OPEN2,8,2,"#":X=INT((N-1)/8):XX=0:IF
((N-1)/8)-X<>0THENX=X+1
.780 FORI=1TOX:PRINT#15,"B-P: ";2;0:REM *
POSITION BUFFER POINTER *
.790 T=18:IFI=XTHENT=0:REM * SET NEXT DIR
SEC POINTER TO 0 IF LAST SECTOR *
.800 PRINT#2,CHR$(T);CHR$(S%(I+1));:REM *
POINTER TO NEXT TR/SE OF DIR *
.810 FORZ=1TO8:XX=XX+1
.820 IFXX=>NTHENPRINT#2,F$;:GOTO850
.830 PRINT#2,F$(XX);:REM * PUT DIR ENTRIE
S INTO BUFFER *
.840 IFZ<>8ANDXX<>(N-1)THENPRINT#2,"SG";:
REM * TRASH BYTES FOR DIR ENTRIES 2-7 *
.850 NEXTZ
.860 PRINT#15,"U2: ";2;0;18;S%(I):REM * WR
ITE DIR SECTOR *
.870 PRINT"WRITING TRACK 18 SECTOR"STR$(S
%(I))
.880 NEXTI:CLOSE2:CLOSE15:GOTO1660
.890 REM *****
.900 REM * ALPHABATIZE DIRECTORY *
.910 REM *****
.920 X=N
.930 X=INT(X/2):IFX=0THENRETURN
.940 FORI=1TO((N-1)-X):Y=I
.950 Z=Y+X:IFMID$(F$(Y),4,16)<=MID$(F$(Z)
,4,16)THEN970
.960 FF$=F$(Y):F$(Y)=F$(Z):F$(Z)=FF$:Y=Y-
X:IFY>0THEN950
.970 NEXT:GOTO930
.980 REM *****
.990 REM * INSERT BLANK ENTRY *
.1000 REM *****
.1010 GOSUB1490:F$(BL)=CHR$(0)+CHR$(0)+CH
R$(0)+SP$+FL$:RETURN
.1020 REM *****
.1030 REM * DELETE BLANK ENTRIES *
.1040 REM *****
.1050 FORI=1TON-1:IFASC(F$(I))=0THEN1070
.1060 NEXT:RETURN
.1070 FORX=BLTON-1
.1080 IFBL<N-1THENF$(X)=F$(X+1)
.1090 NEXT:N=N-1:GOTO1050
.1100 REM *****
.1110 REM * INSERT ----- ENTRY *
.1120 REM *****
.1130 GOSUB1490:F$(BL)=TY$+"[16"-]" +FL$:

```


IMPORTANT! Letters on white background are **Bug Repellent** line codes. **Do not enter them!** Pages 119 and 120 explain these codes and provide other essential information on entering **Ahoy!** programs. Refer to these pages **before** entering any programs!

NM
FC
NI
FC
FG
NE
IN
PE
JD
KD
MA
FO
MP
MK
CJ
LH
NM
PO
GF
NO
KN
OA
KN
FP
GO
HI
EA
KF
OD
FC
OP
FC
LH
JL
AE
JL
AE
EJ
OL
AO
HJ
FC
CC
FC

```

RETURN
.1140 REM *****
.1150 REM * INSERT 'REMARK' ENTRY *
.1160 REM *****
.1170 GOSUB1490:PRINT"ENTER REMARK:";:INP
UTRM$:IFLEN(RM$)>16THEN1170
.1180 IFLEN(RM$)<16THENFORI=1TO(16-LEN(RM
$)):RM$=RM$+CHR$(160):NEXT
.1190 F$(BL)=TY$+RM$+FL$:RETURN
.1200 REM *****
.1210 REM * SWAP DIRECTORY ENTRIES *
.1220 REM *****
.1230 PRINT"1ST ";:GOSUB1490:A=BL:PRINT"2
ND ";:GOSUB1490:F$(B)=F$(A):F$(A)=F$(BL)
.1240 F$(BL)=F$(B):RETURN
.1250 REM *****
.1260 REM * DELETE DIRECTORY ENTRY *
.1270 REM *****
.1280 GOSUB1490:FORX=BLTON-1
.1290 IFBL<N-1THENF$(X)=F$(X+1)
.1300 NEXT:N=N-1:RETURN
.1310 REM *****
.1320 REM * HELP MENU *
.1330 REM *****
.1340 PRINT"[CLEAR][DOWN][3" "[RVSON]DIR
ECTORY MANIPULATOR HELP MENU[DOWN]"
.1350 PRINT"[3" "]F1 -> RE-LIST DIRECTORY
[DOWN]":PRINT"[3" "]F2 -> ALPHABATIZE DI
RECTORY[DOWN]"
.1360 PRINT"[3" "]F3 -> INSERT BLANK ENTR
Y[DOWN]":PRINT"[3" "]F4 -> DELETE BLANK
ENTRIES[DOWN]"
.1370 PRINT"[3" "]F5 -> INSERT [RVSON][5"
-"][RVSOFF] ENTRY[DOWN]":PRINT"[3" "]F6
-> INSERT 'REMARK' ENTRY[DOWN]"
.1380 PRINT"[3" "]F7 -> SWAP DIRECTORY EN
TRIES[DOWN]":PRINT"[3" "]F8 -> DELETE DI
RECTORY ENTRY"
.1390 GOSUB1430:RETURN
.1400 REM *****
.1410 REM * HIT KEY SUBROUTINE *
.1420 REM *****
.1430 PRINT:PRINTTAB(13)"HIT ANY KEY[3"!
][DOWN]"
.1440 GETCK$:IFCK$=""THEN1440
.1450 RETURN
.1460 REM *****
*****
.1470 REM * LOC OF ENTRY/MOVE DIR ARRAY E
NTRIES SUBROUTINE *
.1480 REM *****
*****
.1490 PRINT"LOCATION OF ENTRY:[4" "][4"[L
EFT]";:INPUTBL:IFBL>N-1ORBL<1THENPRINT
"[UP][UP]":GOTO1490
.1500 IFCM$="[F7]"ORCM$="[F8]"THENRETURN

```

```

OL .1510 N=N+1:FORI=N-1TOBL+1STEP-1:F$(I)=F$
KN (I-1):NEXT:RETURN CJ
DK .1520 REM ***** CF
KN .1530 REM * DISK STATUS CHECK * DA
.1540 REM ***** CF
MB .1550 INPUT#15,EN,EM$,ET,ES:IFEN<>0THENGO
TO1600 CJ
MO .1560 RETURN IM
IK .1570 REM ***** CE
KN .1580 REM * DISK UNIT ERROR ROUTINE * MF
NG .1590 REM ***** CE
KN .1600 PRINT"[CLEAR]"TAB(12)"[RVSON]DISK U
NIT ERROR!" NK
BG .1610 PRINT"[DOWN]ERROR # -"EN"[LEFT]; TR
KO ACK -"ET"[LEFT]; SECTOR -"SE DH
OG .1620 PRINT"[DOWN]ERROR MSG - "EM$:END HO
JC .1630 REM ***** NK
OG .1640 REM * EXIT DIRECTORY MANIPULATOR * BN
JH .1650 REM ***** NK
AO .1660 PRINT"[CLEAR][DOWN]MANIPULATE ANOTH
ER DISKETTE (Y/N)";:INPUT"[3"[RIGHT]"N[
3"[LEFT]"]";AN$ GJ
DM .1670 IFAN$<>"Y"ANDAN$<>"N"THEN1660 EI
MF .1680 PRINT"[DOWN]DISKETTE BEING VALIDATE
D":OPEN15,8,15:PRINT#15,"V":PRINT#15,"I"
BA :CLOSE15 CL
.1690 IFAN$="Y"THENRUN OC
.1700 END IC

```

GAMELOADER FROM PAGE 107

```

AA .1 REM ***** JL
.2 REM * GAMELOADER * LI
.3 REM * BY TIM BROWN * PK
.4 REM ***** JL
CO .5 POKE53281,12:POKE53280,12:PRINT"[CLEAR
][BLACK]" KJ
PO .10 PRINT"[DOWN][DOWN]BASIC LOADER CONSTR
UCTION" IB
FC .20 INPUT"ENTER PROGRAM NAME";NA$ NO
JL .30 INPUT"[DOWN]ENTER ADDRESS TO SYS";AD$ EN
CE .40 NX$=LEFT$(NA$,1)+"X":AD=VAL(AD$) FL
IM .50 PRINT"[DOWN][DOWN]INSERT PROGRAM DISK
INTO DRIVE" CO
JO .60 PRINT"[5"[RIGHT]"Y/N" FK
.70 GETA$:IFA$<>"Y"ANDA$<>"N"THEN70 KG
BN .80 IFA$="N"THENGOSUB9000:GOTO50 EP
JO .100 PRINT"[CLEAR][4"[DOWN]"NOW CONSTRUC
TING LOADER" MJ
.110 OPEN1,8,15:PRINT#1,"R0:"+NX$+"="+NA$ GA
.115 INPUT#1,E,E$:IFE>0THENPRINT"[CLEAR][
5"[DOWN]"ERROR !":CLOSE1:GOTO10 EO
AA .117 CLOSE1:PRINT"[CLEAR]":PRINT"[3"[DOWN

```

```

]"]NEW[3"[DOWN]""]"
.120 PRINT"100 IFA=0THENA=1:LOAD"CHR$(34)
NX$CHR$(34)",8,1"
.130 PRINT"110 PRINT"CHR$(34)"READY"CHR$(
34)
.140 PRINT"130 SYS"AD":NEW"
.145 PRINT"SAVE"CHR$(34)NA$CHR$(34)",8"
.150 PRINT"[HOME]";:FORR=631TO644:POKER,1
3:NEXT
.160 POKE198,13:END
.9000 S=54272:FORE=STOS+28:POKEE,0:NEXT
.9010 POKE54296,15:POKE54277,0:POKE54278,
240
.9020 POKE54275,1:POKE54274,0
.9030 POKE54273,33:POKE54272,135:POKE5427
6,65
.9040 FORT=1TO500:NEXT:POKE54276,64
.9050 POKE54296,0
.9090 RETURN
    
```

```

NH .142 K=0:IFQ$=""THEN146
.144 K=ASC(Q$)
MO .146 POKEBY,K:SYS828:K=PEEK(BY)
.148 PRINT#3,CHR$(K);:IFERTHEN140
MG .150 GOSUB158:PRINTDK$:IFERTHEN154
JI .152 PRINT" ALL DONE."
KK .154 CLOSE2:CLOSE3:CLOSE15:END
.156 REM DISK ERRORS
OJ .158 ER=0:INPUT#15,E1,E2$,E3,E4
KD .160 DK$=STR$(E1)+CHR$(32)+E2$
LA .162 IFE1>20THENER=1:DK$=CHR$(18)+DK$
.164 RETURN
MK .166 DATA 222,135,090,041,121
FO .168 DATA 063,132,255,132,178
.170 DATA 203,129,179,122,138
IE .172 DATA 121,254,135,026,210
GL .174 DATA 054,054,121,203,129
PK .176 DATA 112,234,120,051,103
IM .178 DATA 235,129,026,211,070
.180 DATA 255,129,211,121,255
.182 DATA 134,211,122,210,235
.184 DATA 129,178,186,086,170
.186 DATA 131,054,152,134,169
.188 DATA 093,141,002,003,169
.190 DATA 003,141,003,003,169
EI .192 DATA 060,133,251,169,003
BE .194 DATA 133,252,160,000,132
OB .196 DATA 253,177,251,073,122
.198 DATA 145,251,200,192,054
DI .200 DATA 208,245,169,114,133
HK .202 DATA 251,169,003,133,252
.204 DATA 096,255,-7
LJ
OM
AC
IP
PF
DM
DL
CN
LL
AM
OA
EC
CL
HL
LB
    
```

NH
KO
GE
CI
FE
FA
NA
JM
JL
HD
OA
IM
EJ
CH
FH
PN
AD
NM
CJ
EI
HI
KN
AE
CN
OD
AC
HF
IO
GP
FG
AB
HB

CLOAK FROM PAGE 108

```

.100 MP=828:KEY=882:BY=254:TL=13776:CS=0 MN
.102 PRINT"[CLEAR]DATA CLOAK[DOWN][DOWN]" EI
.104 READ K:IFK<0THEN108 BE
.106 CS=CS+K:POKEMP,K:MP=MP+1:GOTO104 OB
.108 IF CS<>TL THENPRINT"[RVSON]ERROR="CS
:GOTO154 DI
.110 PRINT"OKAY":SYSKEY:KEY=KEY-1 HK
.112 PRINT"ENCRYPTION KEY":INPUT KY$:IFKY
$=""THEN154 LJ
.114 PRINT"SOURCE FILENAME":INPUT N1$:IFN
1$=""THEN154 OM
.116 PRINT"FILE TYPE (P/S/U)":INPUT SF$:I
FSF$=""THENSF$="P" AC
.118 PRINT"NEW FILENAME":INPUT N2$:IFN2$=
""THEN154 IP
.120 PRINT"FILE TYPE (P/S/U)":INPUT NF$:I
FNF$=""THENN2$="P" PF
.122 SF$=","+LEFT$(SF$,1)+",R":NF$=","+LE
FT$(NF$,1)+",W" DM
.124 N1$="0:"+LEFT$(N1$,16)+SF$:N2$="0:"+
LEFT$(N2$,16)+NF$ DL
.126 PRINT"OPENING ";N1$:OPEN15,8,15,"I" CN
.128 OPEN2,8,2,N1$:GOSUB158:PRINTDK$:IFER
THEN154 LL
.130 PRINT"OPENING ";N2$ AM
.132 OPEN 3,8,3,N2$:GOSUB158:PRINTDK$:IFE
RTHEN154 OA
.134 FORLP=1TOLEN(KY$):POKEKEY+LP,ASC(MID
$(KY$,LP,1)):NEXTLP EC
.136 POKEKEY+LP,0:PRINT"CRYPTING WAIT" CL
.138 ER=1 HL
.140 GET#2,Q$:IF STATUS AND 64 THENER=0 LB
    
```

LINEOUT FROM PAGE 90

```

.1 REM ** LINEOUT ** BUCK CHILDRESS ** BO
X 13575, SALEM, OR 97309 ** 9,15,85 MA
.2 PRINT"[CLEAR][BLACK]LOADING AND CHECKI
NG DATA[3".""] DK
.3 FORJ=49152TO49447:READA:POKEJ,A:X=X+A:
NEXT ID
.4 IFX<>35036THENPRINT"[DOWN]ERROR IN DAT
A[3".""]":END LA
.5 PRINT"[DOWN]DATA IS OK AND LOADED[3"."
"] FE
.6 PRINT"[DOWN]SYS 49152 TO ACTIVATE[3"."
"]":END EE
.7 DATA169,6,133,252,160,0,132,251,185,19
9,192,32 LJ
.8 DATA210,255,200,196,252,144,245,132,25
4,169,0,133 OL
.9 DATA253,169,0,133,204,32,228,255,240,2
47,201,13 FI
.10 DATA240,26,201,20,240,214,201,48,144,
    
```

235,201,58
 •11 DATA176,231,230,253,166,253,224,6,176
 ,223,32,210
 •12 DATA255,76,25,192,165,253,240,213,230
 ,252,230,252
 •13 DATA230,252,230,251,164,254,165,251,2
 01,2,240,180
 •14 DATA201,3,176,10,165,252,24,105,5,133
 ,252,76
 •15 DATA8,192,169,32,32,210,255,160,0,185
 ,120,4
 •16 DATA153,48,193,200,192,38,144,245,160
 ,43,185,199
 •17 DATA192,32,210,255,200,192,88,144,245
 ,169,8,133
 •18 DATA198,169,13,160,0,153,119,2,200,19
 2,8,144
 •19 DATA248,169,19,32,210,255,76,49,168,1
 60,0,185
 •20 DATA225,5,153,50,193,200,192,6,144,24
 5,160,0
 •21 DATA76,118,192,160,0,185,48,193,153,1
 84,5,200
 •22 DATA192,29,144,245,162,0,189,31,193,1
 53,184,5
 •23 DATA232,200,224,9,144,244,96,147,17,1
 7,17,66
 •24 DATA61,32,32,32,32,32,58,69,61,58,73,
 61
 •25 DATA147,17,17,17,73,70,66,62,69,84,72
 ,69
 •26 DATA78,80,79,75,69,49,57,56,44,48,58,
 69
 •27 DATA78,68,17,17,13,63,66,17,13,17,17,
 80
 •28 DATA79,75,69,50,49,52,44,53,13,145,14
 5,145
 •29 DATA83,89,83,52,57,51,50,51,17,13,17,
 17
 •30 DATA17,17,17,83,89,83,52,57,51,48,53,
 58
 •31 DATA2,61,2,43,9,58,63,2

LA OSUB 2000 CM
 •13 GOSUB 900 DB
 CK •14 SYS 38046:POKE 648,140 AE
 •15 REM ** ENABLE SPRITES OD
 EJ •16 FOR I=0 TO 199:NEXT:POKE ES,31:POKE 3
 6839,32 HM
 FE •17 PRINT LL\$BL\$LL\$"[RVSON]PRESS BUTTON[R
 VSOFF] TO CREATE 'GYPSY VIDEO'";:GOTO 10 BO
 GJ 0 GD
 •19 REM ** LOAD SUBROUTINE
 DB •20 FOR I=XB TO XE:READ A:POKE I,A:NEXT:P
 RINT "[RVSON].[RVSOFF]";:RETURN MG
 PF •90 POKE 53265,0:RETURN MO
 •95 POKE 53265,91:RETURN PH
 HP •98 REM *** ACTION LOOP *** KJ
 •100 IF C0%>0 THEN C0%=0:GOTO 300 KB
 FP •196 GOTO 100 CF
 •298 REM *** END HANDLING *** AB
 FL •299 REM ** PUT VIDEO MEMORY BACK TO FIRS
 T BLOCK, AND SCREEN MEMORY TO 1024 EG
 BN •300 GOSUB 90:POKE ES,0:REM DISABLE SPRIT
 ES LO
 HN •304 REM RESTORE VIDEO/SCREEN MEMORY AK
 •305 POKE 56578,PEEK(56578)OR3:POKE 56576
 ,(PEEK(56576)AND 252)OR 3 MB
 ON •310 POKE 53272,20:POKE 648,4:SYS 40768 OJ
 CJ •360 POKE 37894,PEEK(45):POKE 37895,PEEK(
 46) PA
 HN •365 POKE 43,0:POKE 44,128:POKE 45,255:PO
 KE 46,159 HA
 LD •370 SAVE "@0:GYPSY VIDEO",8,1 DH
 •375 POKE 43,1:POKE 44,8:POKE 45,PEEK(378
 94):POKE 46,PEEK(37895) HC
 IC •380 POKE 657,0:POKE 792,71:POKE 808,237 PK
 PC •385 GOSUB 95:POKE 37952,0:POKE 37953,0 GI
 •390 SYS 65126 KI
 FK •598 REM *** ARRANGE MEMORY *** KB
 •600 VB=32768:POKE 56578,PEEK(56578)OR3:P
 OKE 56576,(PEEK(56576)AND 252)OR 1 CN
 NF •602 SB=0:POKE 53272,(SB*16)+4:SB=VB+1024
 *SB MO
 AD •604 BB=SB/256:POKE 648,BB AK
 JB •611 REM ** SPRITE COLOR TABLE LA
 •612 CT(0)=53287:FOR I=1 TO 7:CT(I)=CT(I-
 1)+1:NEXT AN
 •614 HT(0)=53248:FOR I=1 TO 7:HT(I)=HT(I-
 1)+2:NEXT KC
 •616 VT(0)=53249:FOR I=1 TO 7:VT(I)=VT(I-
 1)+2:NEXT AJ
 KF •618 HR=53264 FB
 PI •620 ES=53269 FE
 KE •622 POKE 53271,0:POKE 53277,0:POKE 53275
 ,0:POKE 53276,30 GD
 NO •628 EM=53276 EK
 •630 POKE 53285,15:POKE 53286,7 FK
 EF •635 FOR I=0 TO 7:BC(I)=255-BS(I):NEXT LB
 GA •638 REM *** INITIALIZE VALUES *** DK
 •640 PRINT "[c 7]"; KM

GYPSY STARSHIP

FROM PAGE 18

VIDEO SETUP

•1 REM *** VIDEO SETUP *** KF
 •2 REM CREATES 'GYPSY VIDEO' FOR 'GYPSY' PI
 •5 POKE 55,255:POKE 56,127:POKE 643,255:P
 OKE 644,127:PRINT "[CLEAR]" KE
 •7 F\$=" ":C0%=0:C1%=0:C2%=0:C3%=0:C4%=0:C
 5%=0:C6%=0:SP%=0 NO
 •8 DEF FN PG(X)=INT(X/256):DEF FN LO(X)=X
 -256*(INT(X/256)) EF
 •10 GOSUB 90:GOSUB 600 GA
 •12 PRINT "[CLEAR]";:GOSUB 95:GOSUB 700:G

•642 POKE 53281,0	AF	DISABLE TIMER INTERRU., QUIT	NJ	9
•644 POKE 53280,0	AE	•2006 REM LDA 53265 AND#127 STA 53265 LDA #1 STA 53274 STA 56333 CLI RTS	PK	•23
•646 POKE CT(0),7:POKE CT(1),5:POKE CT(2),2:POKE CT(3),6:POKE CT(4),12	EE	•2007 DATA 173,17,208,41,127,141,17,208,169,1,141,26,208,141,13,220,88,96	LA	13
•659 REM *** ML TABLE SETUP ***	CA			
•661 POKE 37920,4:POKE 37921,4	CB	•2019 REM *** ANIMATION SHELL ***	KJ	•23
•663 POKE 37922,1	PO	•2020 XB=38144:XE=38176:GOSUB 20	DD	•23
•665 POKE 37923,0	PA	•2023 DATA 206,32,148,240,3,108,10,148	BE	•23
•667 POKE 37924,1:POKE 37925,1	FL	•2026 DATA 173,33,148,141,32,148	ED	•23
•669 POKE 37936,1	AJ	•2029 DATA 206,34,148,208,5,169,8,141,34,148,174,34,148,202	OK	9
•671 POKE 37940,1	PO			
•673 POKE 37941,0	PA	•2032 DATA 173,35,148,240,6	LH	•23
•675 POKE 37926,3:POKE 37928,3	GI	•2035 A=192:B=248:FOR I=38177 TO 38219 STEP 6:POKE I,189:POKE I+1,A:POKE I+2,148	MN	•23
•677 POKE 37927,0:POKE 37935,0:POKE 37943,0	MA	•2036 POKE I+3,141:POKE I+4,B:POKE I+5,131:A=A+8:B=B+1:NEXT	BG	•23
•679 POKE 53282,1:POKE 53283,7:POKE 53284,9	GD	•2039 POKE 38225,108:POKE 38226,10:POKE 38227,148	KK	•23
•694 POKE 657,128	BJ			
•696 RETURN	IM	•2049 REM *** MOVEMENT COUNTER ***	HI	•23
•699 REM *** INTRO SCREEN ***	PN	•2050 XB=38272:XE=38288:GOSUB 20	EL	•23
•700 PRINT "[CLEAR][5"[DOWN]]"TAB(14)"[s G][s Y][s P][s S][s Y][SS][s P][s I][s L][s O][s T]"	KL	•2051 X=38272:POKE 37896, FN LO(X):POKE 37897, FN PG(X)	EI	•23
•710 PRINT:PRINT TAB(6)"[RVSON][s Y][s O][s U][s R][SS][s S][s H][s I][s P][SS][s I][s S][SS][s B][s E][s I][s N][s G][SS][s P][s R][s E][s P][s A][s R][s E][s D][RVSOFF]":PRINT:PRINT	NO	•2052 POKE 37898, FN LO(X):POKE 37899, FN PG(X)	MC	•23
•715 RETURN	IM	•2055 DATA 206,36,148,240,3,108,12,148	GC	6
•898 REM *** SPRITE POSITIONS ***	KA	•2058 DATA 173,37,148,141,36,148,108,2,148	EA	D
•900 FOR I=1 TO 4:POKE HT(I),20+INT(RND(9)*220)	DK	•2059 REM ** BITSET SUBROUTINE **	EI	•23
•901 POKE VT(I),50+INT(RND(9)*190):NEXT	JM	•2060 XB=38314:XE=38323:GOSUB 20	BM	•23
•902 POKE HR,0	IJ	•2063 DATA 185,74,148,13,16,208,141,16,208,8,96	EH	•23
•909 REM ** PUT STARS ON THE SCREEN	MF	•2069 REM ** BITCLEAR SUBROUTINE **	KG	•23
•910 PRINT "[CLEAR]";:FOR I=0 TO 49:POKE VB+INT(RND(9)*1024),46:NEXT	EO	•2070 XB=38324:XE=38335:GOSUB 20	CK	89
•915 FOR I=0 TO 8:POKE VB+INT(RND(9)*1024),42:NEXT	IK	•2073 DATA 185,74,148,73,255,45,16,208,141,16,208,96	CF	•23
•919 REM ** STARSHIP POSITION	LP	•2099 REM *** XMOVE ***	EL	•23
•920 POKE 53248,175:POKE 53249,150	AE	•2100 XB=38400:XE=38467:GOSUB 20	CJ	10
•921 REM ** STARSHIP DIRECTION	CN	•2103 DATA 169,1,57,75,148,240,3,32,128,150	GE	4
•922 POKE VB+1016,16	ED	•2109 DATA 169,2,57,75,148,240,3,32,192,150	CM	8
•930 LL\$="[HOME][23"[DOWN]]"	BE	•2119 DATA 169,4,57,75,148,240,17,185,74,148,45,16,208,240,6	KM	•23
•931 BL\$="[39" "]:BL\$=BL\$+BL\$+" "	AM	•2122 DATA 32,0,151,76,44,150,32,64,151	FE	•23
•946 RETURN	IM	•2128 DATA 169,8,57,75,148,208,1,96,185,74,148,45,16,208,240,4	HN	•23
•1998 REM *** MACHINE LANGUAGE ***	OA	•2131 DATA 32,128,151,96,32,192,151,96	OB	•23
•1999 REM ** STARTUP SYS ROUTINE	JO	•2139 REM *** UPMOVE SUBROUTINE ***	NE	14
•2000 POKE 37888,PEEK(788):POKE 37889,PEEK(789)	LB	•2140 XB=38528:XE=38561:GOSUB 20	BL	•23
•2001 XB=38046:XE=38079:GOSUB 20	AI	•2143 DATA 190,1,208,202,138,217,90,148,208,3,32,146,150,138,153,1,208,96	BB	•23
•2002 REM SET INTERRU.VECTOR TO INTERRU.HANDLER#1 AND SCANLINE 234	CI	•2146 DATA 173,48,148,208,4,232,76,247,149,190,91,148,202,76,247,149	OB	•23
•2003 REM SEI LDA#0 STA 788 LDA#154 STA 789 LDA#234 STA 53266	GP	•2159 REM *** DOWNMOVE SUBROUTINE ***	PI	5
•2004 DATA 120,169,0,141,20,3,169,154,141,21,3,169,234,141,18,208	PA	•2160 XB=38592:XE=38625:GOSUB 20	CJ	•23
•2005 REM HIGH BIT, ENABLE SCAN INTERRU.,		•2163 DATA 190,1,208,232,138,217,91,148,208,3,32,210,150,138,153,1,208,96	NF	•23
		•2166 DATA 173,48,148,208,4,202,76,247,14		41

NJ	9,190,90,148,232,76,247,149	OM	•2575 DATA 32,80,153,76,208,152	FI
PK	•2179 REM *** LEFTMOVE (HI BIT SET) ***	KO	•2578 DATA 173,53,148,240,13,173,31,208,4	CD
LA	•2180 XB=38656:XE=38669:GOSUB 20	GC	1,1,240,3,32,112,153,76,208,152,96	AI
KJ	•2183 DATA 190,0,208,202,16,3,32,180,149,	DC	•2579 REM ** UNMOVE **	PK
DD	138,153,0,208,96	KJ	•2580 XB=39120:XE=39148:GOSUB 20	OB
BE	•2199 REM *** LEFTMOVE (HI BIT CLR) ***	LH	•2583 DATA 169,1,141,40,148,172,75,148,18	OC
ED	•2200 XB=38720:XE=38756:GOSUB 20	FL	5,121,148,141,75,148	KL
OK	•2203 DATA 190,0,208,202,138,217,106,148,	PA	•2586 DATA 160,0,32,0,150,172,75,148,185,	AP
LH	208,3,32,82,151,138,153,0,208,96	CM	121,148,141,75,148,96	HH
MN	•2206 DATA 173,48,148,208,4,232,76,247,14	CL	•2599 REM ** INTERRUPT HANDLER 1 **	OO
BG	9,190,107,148,202,32,170,149,76,247,149	BE	•2600 XB=39424:XE=39449:GOSUB 20	JH
KK	•2219 REM *** RIGHTMVE (HI BIT SET) ***	MI	•2601 FOR I=36856 TO 36860:POKE I,48:NEXT	ON
HI	•2220 XB=38784:XE=38820:GOSUB 20	LP	•2602 REM CLEAR INTERR.FLAG, RESET VECTOR	PJ
EL	•2223 DATA 190,0,208,232,138,217,107,148,	CL	, SET NEW SCANLINE	EK
EI	208,3,32,146,151,138,153,0,208,96	ND	•2603 REM LDA#15 STA 53273 LDA#64 STA 788	AA
MC	•2226 DATA 173,48,148,208,4,202,76,247,14	AN	LDA#254 STA 53266	FA
GC	9,190,106,148,232,32,180,149,76,247,149	BL	•2604 DATA 169,15,141,25,208,169,64,141,2	NK
EA	•2239 REM *** RIGHTMVE (HI BIT CLR) ***	OI	0,3,169,254,141,18,208	OO
EI	•2240 XB=38848:XE=38861:GOSUB 20	PI	•2605 REM CHANGE SCREEN POINTER AND QUIT	BH
BM	•2243 DATA 190,0,208,232,208,3,32,170,149	EC	•2606 REM LDA#52 STA 53272 PLA TAY PLA TA	AI
PH	,138,153,0,208,96	BO	X PLA RTI	FE
KG	•2399 REM *** BASIC MOVEMENT HANDLER ***	FC	•2607 DATA 169,52,141,24,208,104,168,104,	JN
CK	•2400 XB=38336:XE=38346:GOSUB 20	DN	170,104,64	IA
CF	•2403 DATA 160,59,177,45,170,188,56,148,7	AD	•2615 FOR I=35840 TO 35903:POKE I,0:NEXT	DD
EL	6,0,150	AN	•2620 XB=39488:XE=39510:GOSUB 20	KD
CJ	•2469 REM ** REPORT NON-SPRITE-0 WRAPS AN	OM	•2621 REM CLEAR INTERR.FLAG, RESET VECTOR	LD
GE	D EDGES TO BASIC	EH	, SET NEW SCANLINE	PP
CM	•2470 XB=38391:XE=38399:GOSUB 20	PG	•2622 REM LDA#15 STA 53273 LDA#0 STA 788	PN
KM	•2473 DATA 192,0,208,1,96,140,55,148,96	PM	LDA#234 STA 53266	CJ
FE	•2499 REM *** READ JOYSTICK ***	IF	•2623 DATA 169,15,141,25,208,169,0,141,20	JP
HN	•2500 XB=38912:XE=38972:GOSUB 20	BJ	,3,169,234,141,18,208	LI
DB	•2502 X=38912:POKE 37890,FN LO(X):POKE 37	LH	•2624 REM SET SCREEN POINTER, JUMP TO ANI	MF
NE	891,FN PG(X)	FG	M. SHELL	CL
BL	•2508 DATA 173,0,220,141,45,148,41,16,208	DB	•2625 REM LDA#4 STA 53272 JMP 38144	KJ
BB	,8,169,1,141,39,148,32,0,153	BC	•2626 DATA 169,4,141,24,208,76,0,149	BK
OB	•2511 DATA 173,45,148,41,15,201,15,208,3,	BC	•2699 REM ** BASIC VARIABLE SUBROUTINES	BC
PI	108,12,148,73,15,141,75,148,32,128,152	FI	•2700 XB=39168:XE=39174:GOSUB 20	DE
CJ	•2514 DATA 160,0,32,0,150,32,160,152,173,	AM	•2701 REM ** REPORT FIREBUTTON - C0%	NK
NF	4,148,141,10,148	DC	•2703 DATA 160,10,169,1,145,45,96	MP
	•2516 DATA 173,5,148,141,11,148,108,12,14	LH	•2709 REM ** REPORT SPRITES TO BASIC	AC
	8	EH	•2710 XB=39184:XE=39222:GOSUB 20	DF
	•2529 REM *** INTERR.MOVE.HANDLER ***	PG	•2711 REM C1%=EDGEWRAP, C2%=S/S COLLIS.	
	•2530 XB=38976:XE=39009:GOSUB 20	PM	•2713 DATA 160,17,173,55,148,240,2,145,45	
	•2531 POKE 37892,FN LO(XB):POKE 37893,FN	IF	,160,24,173,49,148,240,2,145,45	
	PG(XB)	BJ	•2714 REM C3%=S/FOREG.COLLIS.	
	•2534 DATA 160,0,32,0,150,32,160,152	LH	•2716 DATA 160,31,173,50,148,240,2,145,4	
	•2537 DATA 206,40,148,208,243,173,38,148,	LH	5	
	141,40,148	FG	•2718 DATA 169,0,141,49,148,141,50,148,14	
	•2540 DATA 173,8,148,141,10,148,173,9,148	DB	1,55,148,96	
	,141,11,148,108,12,148	BC	•2719 REM ** REPORT MOVEMENT	
	•2549 REM *** SET SHAPE 0 ***	DB	•2720 XB=39232:XE=39241:GOSUB 20	
	•2550 XB=39040:XE=39057:GOSUB 20	BC	•2721 REM C4%	
	•2553 DATA 173,35,148,208,9,172,75,148,18	FI	•2723 DATA 160,38,169,1,145,45,141,47,148	
	5,63,148,141,248,131,32,64,153,96	AM	,96	
	•2569 REM ** SPRITE 0 COLLISION ROUTINE	DC	•2729 REM ** REPORT SPRITE 0 BOUNCE/S	
	•2570 XB=39072:XE=39111:GOSUB 20	LH	•2730 XB=39248:XE=39257:GOSUB 20	
	•2573 DATA 173,52,148,240,16,173,30,208,1	LG	•2731 REM C5%	
	41,41,148,41,1,240,6		•2733 DATA 160,45,173,41,148,41,254,145,4	

5,96	DH	•3020 DATA 0,40,0,3,170,192,62,170,148,16	
•2739 REM ** REPORT SPRITE 0 BOUNCE/F	MA	2,170,143,42,255,252,2,255,192,0,40,0	JC
•2740 XB=39280:XE=39289:GOSUB 20	CF	•3021 DATA 0,40,0,3,106,192,61,106,188,24	
•2741 REM C6%	DC	1,106,143,62,171,252,2,171,192,0,40,0	LA
•2743 DATA 160,52,169,1,145,45,141,42,148,96	LP	•3022 DATA 0,24,0,3,90,192,61,90,188,81,9	
•2898 REM *** WRAPUP ***	HC	0,143,63,234,188,3,234,128,0,24,0	EL
•2900 XB=40704:XE=40741:GOSUB 20	CB	•3023 DATA 0,20,0,3,86,192,61,86,188,241,	
•2901 REM ** SET COLLISION VECTOR	FI	86,138,61,255,168,1,255,128,0,20,0	OP
•2902 X=40704:POKE 37900, FN LO(X):POKE 37901, FN PG(X)	HB	•3024 DATA 0,20,0,3,85,128,61,85,104,241,	
•2908 DATA 173,30,208,141,49,148,173,31,208,141,50,148,32,16,153	ED	85,74,63,223,252,3,223,192,0,20,0	DG
•2909 REM MOVE THE NEXT PLANET	JO	•3025 DATA 0,20,0,3,149,192,62,149,124,24	
•2910 REM LDX 37934 DEX BNE+2 LDX #4 STX 37934 LDY(37944),X JSR 38400	FN	2,149,79,63,253,252,3,253,192,0,20,0	ML
•2911 DATA 174,46,148,202,208,2,162,4,142,46,148,188,56,148,32,0,150	HL	•3026 DATA 0,40,0,2,169,192,62,169,124,24	
•2915 REM END INTERRUPT ROUTINE	CM	2,169,79,63,255,252,3,255,192,0,40,0	JI
•2916 REM PLA,TAY,PLA,TAX,PLA,RTI	GF	•3027 DATA 0,40,0,2,170,0,42,170,188,162,	
•2917 DATA 104,168,104,170,104,64	IK	170,143,63,255,212,3,255,192,0,40,0	KO
•2949 REM ** RESTORE VIDEO (UNSYS)	KF	•3058 GOSUB 3985	GI
•2950 XB=40768:XE=40792:GOSUB 20	HF	•3059 REM ** SPRITE ANIMATION TABLES	DM
•2951 REM SET INTERR. VECTOR TO NORMAL HO USEKEEPING, TIMED INTERRUPTS	CI	•3060 FOR I=38088 TO 38112 STEP 8:FOR J=0	
•2952 REM SEI LDA 37888 STA 788 LDA 37889 STA 789	FB	TO 7:READ A:POKE I+J,A:NEXT:NEXT	MI
•2953 DATA 120,173,0,148,141,20,3,173,1,148,141,21,3	CC	•3061 REM ** ANIMATION TABLE DATA	DN
•2954 REM LDA#0 STA 53274 LDA#129 STA 563 33 CLI RTS	AK	•3062 DATA 24,25,26,27,28,29,30,31	EO
•2955 DATA 169,0,141,26,208,169,129,141,13,220,88,96	KA	•3063 DATA 32,33,34,35,36,37,38,39	EO
•2998 REM *** SET UP SPRITE SHAPES ***	BK	•3064 DATA 27,26,25,24,31,30,29,28	OO
•2999 REM ** PLANETS	AK	•3065 DATA 37,36,35,34,33,32,39,38	BG
•3000 FOR I=34304 TO 34816 STEP 512:FOR J=0 TO 448 STEP 64:FOR K=0 TO 20	AO	•3098 REM *** SPRITE 0 SHAPES ***	IL
•3001 READ A:POKE I+J+K,A:NEXT	AO	•3099 REM ** SPRITE 0 DIRECTION TABLE	KK
•3002 FOR K=21 TO 63:POKE I+J+K,0:NEXT:NEXT:GOSUB 3985:NEXT	FF	•3100 FOR I=37952 TO 37961:READ A:POKE I,	
•3009 REM ** PLANET 1 SHAPE DATA	HM	A:NEXT:GOSUB 3985	PH
•3010 DATA 0,40,0,0,175,0,82,191,192,82,175,128,2,191,128,0,171,0,0,40,0	DC	•3101 DATA 16,20,0,22,23,21,0,18,17,19	HA
•3011 DATA 0,40,0,0,190,0,2,255,128,5,190,128,5,254,128,0,175,0,0,40,0	IL	•3102 REM ** SPRITE 0 ANIMATION TABLE	PB
•3012 DATA 0,40,0,0,250,0,3,254,128,2,90,128,3,90,128,0,190,0,0,40,0	DM	•3103 FOR I=0 TO 7:POKE 38080+I,16+I:NEXT	PC
•3013 DATA 0,40,0,0,234,0,3,250,128,3,229,128,3,229,128,0,250,0,0,40,0	HF	•3104 REM ** SPRITE 0 SHAPES	KN
•3014 DATA 0,40,0,0,170,0,3,234,80,3,170,80,3,170,128,0,234,0,0,40,0	JN	•3105 FOR I=33792 TO 34240 STEP 64:FOR J=0 TO 18 STEP 3	AD
•3015 DATA 0,40,0,0,170,20,3,170,212,2,170,128,2,170,192,0,170,0,0,40,0	CA	•3106 READ A:POKE I+J,A:POKE I+J+1,0:POKE I+J+2,0:NEXT	AM
•3016 DATA 0,40,0,0,170,64,2,171,192,2,170,192,2,171,192,0,170,0,0,40,0	NH	•3107 FOR J=21 TO 63:POKE I+J,0:NEXT:NEXT:GOSUB 3985	GL
•3017 DATA 0,40,0,5,171,0,6,175,192,2,171,192,2,175,192,0,170,0,0,40,0	JJ	•3109 REM ** SPRITE 0 DATA	BM
•3019 REM ** PLANET 2 SHAPE DATA	GP	•3110 DATA 8,28,28,28,54,34,0	EI
		•3111 DATA 6,14,28,120,240,48,32	KA
		•3112 DATA 0,224,62,31,62,224,0	KN
		•3113 DATA 32,48,240,120,28,14,6	OO
		•3114 DATA 0,34,54,28,28,28,8	PK
		•3115 DATA 4,12,15,30,56,112,96	LB
		•3116 DATA 0,7,124,248,124,7,0	BK
		•3117 DATA 96,112,56,30,15,12,4	GB
		•3298 REM ** SPRITE MOVEMENT DATA	GL
		•3300 X=0:FOR I=37944 TO 37951:POKE I,X:X=X+2:NEXT	AH
		•3305 X=1:FOR I=37962 TO 37976 STEP 2:POKE I,X:X=X*2:NEXT	OD
		•3310 FOR I=37963 TO 37977 STEP 2:READ A:POKE I,A:NEXT	OL
		•3311 DATA 0,5,6,10,9,0,0,0	MA
		•3316 FOR I=37978 TO 37992 STEP 2:READ A:POKE I,A:NEXT	LO

.3317 DATA 50,43,43,43,43,43,43,43
 .3319 FOR I=37979 TO 37993 STEP 2:READ A:
 POKE I,A:NEXT
 .3320 DATA 231,242,242,242,242,242,242,24
 2
 .3322 FOR I=37994 TO 38008 STEP 2:READ A:
 POKE I,A:NEXT
 .3323 DATA 23,0,0,0,0,0,0,0
 .3325 FOR I=37995 TO 38009 STEP 2:READ A:
 POKE I,A:NEXT
 .3326 DATA 80,87,87,87,87,87,87,87
 .3328 FOR I=38010 TO 38019:READ A:POKE I,
 A:NEXT
 .3329 DATA 2,1,0,8,10,9,0,4,6,5
 .3331 POKE 37934,1
 .3985 PRINT "[RVSON]![RVSOFF]";
 .3990 RETURN

PLANET SETUP

.1 REM *** PLANET SETUP ***
 .2 REM MAKES 'GYPSY PLANETS' FOR 'GYPSY'
 .5 POKE 53265,PEEK(53265)OR 64
 .10 OPEN 2,8,2,"GYPSY PLANETS,SEQ,WRITE"
 .14 REM * PLANET NAMES *
 .15 B\$="":B=0:X\$=CHR\$(13)
 .16 READ A\$
 .17 IF A\$="[5\"X"]" THEN PRINT#2,A\$:GOTO 5
 0
 .18 GOSUB 45:PRINT#2,A\$:PRINT A\$
 .19 B=B+1:GOTO 16
 .21 DATA ANDALUSIA,IBERIA,HIBERNIA,CALEDO
 NIA,GALES,GAUL,LUSITANIA,ATLANTIS
 .22 DATA MISERICORDIA,SALAMANCA,CATALONIA
 ,LANGUEDOC,NAVARR,SCANDIA,ULSTER,ZULU
 .23 DATA KURDISTAN,ARMENIA,SAMARIA,GALILE
 E,SALEM,PLYMOUTH,ERITREA,OGADEN
 .24 DATA HADRAMAWT,SHONA,NDEBELE,UZBEKSKA
 YA,BURYAT,KHALKHA,AIMAQ,PRADESH
 .25 DATA PANDIT,KALASH KAFIR,BORUSH,SHERP
 A,LEPCHA,GURUNG,NEPHILIM,THAI
 .26 DATA PERSIA,BACTRIA,SARDIS,LACONIA,ET
 RURIA,DALMATIA,VENETIA,DACIA
 .27 DATA IBANA,MAORI,WIKMUNGKAN,WALBIRI,J
 IGALONG,KUKUKUKU,GOILALA,ARAPESH
 .28 DATA YAP,FANG,BIAFRA,HAUSA,MALINKE,DO
 GON,DRUZIA,SHEBA
 .29 DATA KABAB,HOMR,MYCENAE,KNOSSOS,LATIU
 M,BILBAO,CANTABRIA,ROMANY
 .30 DATA BOHEMIA,SILESIA,ESTONIA,LITHUANI
 A,FLANDERS,BRETAGNE,ORANGE,QUECHUA
 .31 DATA OLMECA,TEOTIHUACAN,TIKAL,TITICAC
 A,MACCHU PICCHU,GE,GUARANI,XINGU
 .32 DATA BAHIA,AMAHUACA,AYMARA,AINU,YANOM
 AMO,OTAVALO,GUAJIRO,KOGI
 .33 DATA COSTENOGA,CHEROKEE,DAKOTA,HOPI,S
 HOSHONE,QAPAW,WACO,KICKAPOO
 .34 DATA WAMPANOAG,CADDO,SHAWNEE,CREEK,AP
 ACHE,PUEBLO,NAVAHO,ARAPAHO

PI .35 DATA ACADIA,MANCHURIA,TIBET,SHOGUN,HA
 KKA,TAIPEI,HUNAN,HMONG JO
 GK .36 DATA ROCANNON,ARRAKIS,MEDEA,TERMINUS,
 URTH,RAMA,TREASON,WORTHING FO
 BG .37 DATA TRONDHEIM,NAUVOO,DESERET,EREWHON
 ,RIVERWORLD,TROUT,INWIT,DANDELION FI
 ID .38 DATA WOZNIAK,JOBS,BUSHNELL,TRAMIEL,PO
 URNELLE,TURING,ASKY,UNIVAC FF
 IA .39 DATA NIVEN,BISHOP,O'NEILL,VARLEY,MART
 IN,KESSEL,KILROY,VONNEGUT JL
 JD .40 DATA YOLEN,NORTON,BRUMMET,BOVA,ASPRIN
 ,TURTLEDOVE,RUCKER,LIAVEK OP
 IL .41 DATA SWANWICK,SHINER,VAN NAME,WYLDE,F
 OWLER,SHEPARD,MEACHAM,SCHIFF PI
 FD .42 DATA FERMAN,MOYNIHAN,IACocca,MINAS GE
 RAIS,MOAB,EDOM,CANAAN,SUMER CG
 LB .43 DATA BABYLON,BILOXI,MISHAWAKA,SCHOLZ,
 MAYHAR,CARTHAGE,KEIZER,POIUYT,XXXXX FE
 AH .44 REM CONVERT STRINGS NH
 NG .45 D\$="":FOR I=1 TO LEN(A\$):C\$=MID\$(A\$,I
 IM .46 D\$=D\$+CHR\$(ASC(C\$)OR 192):NEXT A\$=D\$:
 MK .47 RETURN LA
 NO .48 REM ** WORLD TYPES AA
 AM .49 FOR I=0 TO 5:READ A\$:PRINT#2,A\$:PRINT
 GM I,A\$:NEXT LG
 EJ .51 DATA A SPACE STATION,A LARGE MOON,A S
 MC MALL ROCKY PLANET AG
 OJ .52 DATA UNINHABITED,POPULATED BY HUMANS,
 JO POPULATED BY ALIENS LD
 NH .59 REM ** GYPSY NAMES PF
 DJ .60 FOR K=0 TO 32:READ A\$:GOSUB 45:PRINT#
 FC 2,A\$:PRINT K,A\$:NEXT BB
 HB .65 DATA RANA,MARA,MISHAK,DOC,GRANNY,VISH
 ,FINGERS,HOPPER,LOOP,DRAM,HACK,POCK JP
 NJ .66 DATA WILL,ALEC,BOOKER,CLAM,FIZZ,IGOR,
 JACQUES,KING,NOOSE,OPAL,QUINK,RABBIT NI
 BC .67 DATA SHAKER,TOFF,ULLY,YACKITY,ZIPPER,
 KAGAN,THUMB,BLADE,GREGORIO PH
 MJ .98 REM ** UNINHABITED WORLDS PO
 OF .99 FOR I=0 TO 9:READ A\$,B\$,C\$,D\$,E\$,F\$,G
 \$:PRINT#2,A\$X\$B\$X\$C\$X\$D\$X\$E\$X\$F\$X\$G\$ PO
 LC .100 PRINT I,A\$:NEXT EI
 CE .101 DATA COLD BARE ROCK WITHOUT WATER OR
 WIND BL
 NK .102 DATA FELL INTO A CREVICE,GOT LOST AN
 D FROZE TO DEATH NL
 GA .103 DATA SET OFF AN AVALANCHE AND WAS CR
 USHED AL
 PC .104 DATA A PURE VEIN OF PLATINUM,A CLIFF
 CARVED WITH AN ALIEN LANGUAGE MA
 OJ .105 DATA THE ORIGINAL VOYAGER SPACECRAFT OM
 FD .106 DATA A THICK IMPENETRABLE LAYER OF V
 INES AND FERNS IC
 BL .107 DATA WAS DEVoured BY A MAN-EATING PL
 ANT,SANK INTO A HIDDEN BOG HM
 .108 DATA DIED OF VIOLENT ALLERGIES TO PO
 LLEN GJ

•109 DATA A VINE THAT BEARS HIGH-CALORY FRUIT,SAP THAT HARDENS INTO JEWELS	PA	GEYSER,CHOKED TO DEATH ON FLYING ASH	FF	,A
•110 DATA AN INSECT WHOSE BITE CURES CANCER	KO	•143 DATA A RIVER OF PURE PLATINUM,THE OLDEST METEORITE EVER FOUND	GN	•22 RG
•111 DATA A MILE-THICK LAYER OF DUST	HI	•144 DATA A POOL OF SELF-REPLICATING PROTEINS--THEBEGINNINGS OF LIFE!	GP	•22 MI
•112 DATA SANK INTO THE DUST AND DISAPPEARED,CHOKED TO DEATH IN THE WIND	HP	•146 DATA A GLASS-SMOOTH SURFACE COVERED WITH THE WRECKS OF OLD STARSHIPS	DI	•22 CO
•113 DATA WAS EATEN BY A HUGE DUSTWORM,A PATCH OF EUPHORIA-CAUSING DUST	DB	•147 DATA SANK INTO THE SURFACE AND VANISHED,WAS SUCKED INTO A TINY BLACK HOLE	MN	•22 ,H
•114 DATA A NEW SPECIES OF OXYGEN-MAKING MICROBE,DIAMONDS EXCRETED BY DUSTWORMS	EG	•148 DATA GREW SMALLER AND SMALLER--AND FINALLY DISAPPEARED	KB	•22 OT
•116 DATA A SURFACE ENTIRELY ENCRUSTED WITH DAZZLING CRYSTALS	MM	•149 DATA SMALL SINGULARITIES THAT ALLOW TIME TRAVEL	AC	•23 F
•117 DATA FELL AND WAS CUT TO RIBBONS,WAS CRUSTED OVER WITH CRYSTALS	LO	•150 DATA GOLD FROM AN ANCIENT CARGO SHIP ,A RADIATION-SUPPRESSION FIELD	OJ	•23 AT
•118 DATA WENT MAD FROM THE PATTERNS OF LIGHT	IK	•198 REM ** WORLDS POPULATED BY HUMANS	AN	•23 E
•119 DATA CRYSTALS THAT HOLD MEGABYTES OF MEMORY	CN	•199 FOR I=0 TO 9:READ A\$,B\$,C\$,D\$,E\$,F\$,G\$:PRINT#2,A\$X\$B\$X\$C\$X\$D\$X\$E\$X\$F\$X\$G\$	PO	•23 -A
•120 DATA LIVING CRYSTALS THAT PAINT WITH PURE LIGHT,HUGE EMERALDS	KC	•200 PRINT I,A\$:NEXT	EI	•23 AN
•121 DATA THE HIGHLY RADIOACTIVE HUSK OF A WORLD THAT DIED IN NUCLEAR WAR	JN	•201 DATA A TRIBE OF PRIMITIVE HUNTERS AND FRUIT-GATHERERS	KF	•23 AS
•122 DATA DIED OF RADIATION POISONING,WAS KILLED BY A MUTATED VIRUS	JK	•202 DATA WANDERED OFF AND WAS EATEN,OFFENDED THE CHIEF AND WAS KILLED	HM	•23 P
•123 DATA TRIGGERED AN ANCIENT LANDMINE,A SCULPTURE OF INEFFABLE BEAUTY	GN	•203 DATA GOT FLEAS THAT CARRIED A DEADLY DISEASE	OB	•23 RN
•124 DATA THE HISTORY OF A LOST CIVILIZATION,A MUTATED SPECIES OF SENTIENT RAT	FJ	•204 DATA IVORY,PELTS,ANTHROPOLOGICAL DATA	PN	•23 O
•126 DATA THE DUSTY RUINS OF A SPECIES THAT LEFT TO VOYAGE AMONG THE STARS	ME	•206 DATA A FARMING VILLAGE WHOSE PEOPLE SCRATCH THE SOIL WITH STONE TOOLS	GG	•24 AL
•127 DATA ATE A FRUIT THAT CAUSED FATAL DYSENTERY,WAS KILLED BY A CRAZED ROBOT	EI	•207 DATA GOT ROMANTICALLY INVOLVED AND WAS AS KILLED BY A FURIOUS FATHER	PI	•24 W
•128 DATA FELL INTO A DISINTEGRATOR UNIT, A MATTER-DESTROYING DISINTEGRATOR	ON	•208 DATA GOT IN A QUARREL AND WAS MASHED WITH A STONE AX,CAUGHT A POX AND DIED	JA	•24 E
•129 DATA THE SECRET OF INSTANT MATTER TRANSFER,A GALLERY OF PRICELESS PAINTINGS	FJ	•209 DATA A DOMESTICATED FLYING LIZARD,PRIMITIVE BUT LOVELY POTS,OPALS	AC	•24 S
•131 DATA A VAST OCEAN WITHOUT A SPECK OF LAND	GD	•211 DATA A BRONZE-USING CIVILIZATION THAT BUILDS HUGE STONE MONUMENTS	IK	•24 AG
•132 DATA WAS PULLED INTO THE SEA BY A HUGE SQUID,DRANK THE WATER AND DIED	GO	•212 DATA WAS SACRIFICED TO A RAIN GOD,WAS CRUSHED UNDER A BLOCK OF STONE	NC	•24 US
•133 DATA WAS COVERED BY A HIDEOUS ALGAE AND DRIED UP IN MOMENTS	EB	•213 DATA INSULTED A PRIEST AND WAS POISONED,MAGNIFICENT STONE SCULPTURES	EI	•24 ST
•134 DATA SWIMMING OYSTERS WITH GIANT PEAPLS,IVORY TUSKS FROM DEAD NARWHALS	EK	•214 DATA A SOFT AND BEAUTIFUL METAL ALLOY,GILT DAGGERS OF CUNNING ARTIFICE	CP	•24 YE
•135 DATA A SPECIES OF GRAIN THAT GROWS IN SALT WATER	AM	•216 DATA A COASTAL VILLAGE OF SEA-FARING TRADERS	BD	•24 OT
•136 DATA A SURFACE RAVAGED BY VIOLENT STORMS AND SMOTHERING BLIZZARDS	FN	•217 DATA WAS CARRIED OFF INTO SLAVERY,WAS THROWN OVERBOARD	MJ	•24 MA
•137 DATA WAS CARRIED OFF BY THE WIND,WAS BURIED IN A SNOWDRIFT	MF	•218 DATA WAS CAUGHT 'BORROWING' A JEWEL AND WAS TORTURED TO DEATH	LO	•25 A
•138 DATA WAS GROUND TO POWDER IN A SANDSTORM,THE LOG OF THE LOST SHIP ENTERPRISE	DB	•219 DATA A SNAKE WHOSE VENOM IS SUBTLE AND STRONG,A SPECIES OF SUCCULENT FISH	LE	•29 G\$
•139 DATA A TREE WITH WOOD TOUGHER THAN STEEL,A PLANT THAT SYNTHESIZES HYDROGEN	NA	•220 DATA BEAUTIFULLY DECORATED HARPOONS AND FISH KNIVES	PN	•29 TE
•141 DATA A YOUNG PLANET WITH CONSTANT VOLCANOES AND EARTHQUAKES	GO	•221 DATA A PEOPLE WHO DWELL IN A VAST NETWORK OF CAVERNS AND BURROWS	HL	•30
•142 DATA WAS CAUGHT IN LAVA,FELL INTO A		•222 DATA WAS BURIED IN THE COLLAPSE OF A TUNNEL,ATE A POISONOUS MUSHROOM	DG	•30
		•223 DATA GOT LOST FOREVER IN A LABYRINTH		•30

FF	,AN EXQUISITELY FLAVORFUL MOLD	AD	S HYPNOTIZED AND LURED INTO OPEN JAWS	NA
GN	•224 DATA A BRIGHTLY LUMINOUS FISH,THE LARGEST EMERALDS EVER FOUND	KH	•303 DATA TOOK A SAMPLE OF CORAL THAT TURNED OUT TO BE SACRED	FC
GP	•226 DATA A HUGE CITY HOUSED IN A SINGLE MILE-HIGHBUILDING	IO	•304 DATA EXQUISITE BANSAI CORAL,PET SEAWEED THAT DOES TRICKS,SEABOTTOM SALMON	AM
DI	•227 DATA FELL (OR WAS PUSHED) FROM A BALCONY,ARGUED WITH A COP AND WAS SHOT	JD	•305 DATA CREATURES OF PURE MIND THAT DWELL BY POOLS AND STREAMS	NH
MN	•228 DATA WAS RUN OVER BY A CORRIDOR-TAXI,HIGH-POWERED ROLLER SKATES	NJ	•306 DATA DIED TRYING TO SEPARATE BODY FROM MIND,BECAME DEPRESSED AND CATATONIC	AB
KB	•229 DATA AN APHRODISIAC THAT WORKS,A PIVOTAL NEW BOOK ON PSYCHOLOGY	HA	•307 DATA WENT MAD FROM DREDGED-UP MEMORIES OF PAST CRIMES	HD
AC	•231 DATA A PEOPLE WHO LIVE IN THE TOPS OF HUGE DECIDUOUS TREES	OO	•308 DATA PROOF OF UNPROVABLE MATHEMATICAL PROPOSITIONS	LF
OJ	•232 DATA STUMBLED ON A HIGH BRANCH,WAS EATEN BY A CARNIVOROUS SLOTH	LK	•309 DATA THE SECRET OF FOLDED SPACE,A COMPLETE MAP OF THE UNIVERSE	PC
AN	•233 DATA WAS KIDNAPPED AND VIVISECTED,THE SEEDS OF A SPECIES OF SENTIENT TREE	GC	•310 DATA MONKEYISH TREE-DWELLERS THAT LIVE ONLY TO SING IN THE TREETOPS	FA
PO	•234 DATA A MOSS THAT SYNTHESIZES HELIUM-AND FLOATS	EI	•311 DATA DIDN'T WEAR EARPLUGS AND WAS ENRaptured BY SONG--FORGETTING TO BREATHE	GG
EI	•235 DATA AN ALGAE THAT SERVES AS A FAST AND POWERFUL COMPUTER	OJ	•312 DATA TRIED TO SING A DUET AND WAS PELTED TO DEATH WITH FRUIT	JL
KF	•236 DATA A WHOLE TOWN LIVING IN A HUGE BASKET SLUNG UNDER A VAST BALLOON	HP	•313 DATA ATE A TREE SLUG THAT REGENERATED 1000 TIMES INTERNALLY	FK
HM	•237 DATA LIT A MATCH AND WAS IMMEDIATELY PUSHED OFF,WAS CARRIED OFF BY A ROC	ON	•314 DATA RECORDINGS OF SONGS,AN ADVENTUROUS YOUNGSINGER OF SURPASSING TALENT	AP
OB	•238 DATA WAS EATEN BY ONE OF THE HUGE CARNIVORES ON THE SURFACE	AI	•315 DATA AN 'UNSONG BIRD' THAT GENERATES A FIELD OF SILENCE WHEREVER IT GOES	KI
PN	•239 DATA A PLANT THAT TURNS SUNLIGHT INTO USABLE HEAT,A DOMESTICATED BAT	IP	•316 DATA ON A PLANET OF DINOSAURS--A RACE OF WISEBIRDS THAT NEVER LAND	AI
GG	•240 DATA CLEVERLY ENGINEERED WINGS THAT ALLOW HUMANS TO FLY	CG	•317 DATA WAS STEPPED ON BY A BRONTOSAURUS,FELL INTO A BOG AND BECAME A FOSSIL	MG
PI	•241 DATA A FAMILY OF DRAGON BREEDERS WHO WAGER ONTHE VICIOUS WYRMFIGHTS	OK	•318 DATA TRIED TO STEAL AN EGG AND WAS PICKED UP AND DROPPED	JJ
JA	•242 DATA CAUGHT A DRAGON'S EYE AND BECAME LUNCH,WAS KILLED OVER A WYRMFIGHT BET	KG	•319 DATA MIDGET HADRODONS THAT MAKE GREAT PETS,PERFUME-EMITTING DRAGONFLIES	AN
AC	•243 DATA WAS FORCED TO MARRY A LOCAL AND STAY ON THIS WORLD	OI	•320 DATA XENOLOGICALLY FASCINATING FILMS OF MID-AIR REPRODUCTION	IE
IK	•244 DATA DRAGONS' EGGS,HALLUCINOGENIC DRAGONS' DUNG	OF	•321 DATA CREATURES THAT LIVE BY CREATING ILLUSIONIN THE MINDS OF THEIR PREY	KP
NC	•245 DATA A SMALL DRAGON PARASITE THAT CAUSES LOSTLIMBS TO REGENERATE	MN	•322 DATA TRIED TO CROSS AN IMAGINARY BRIDGE,WAS CAUGHT CHEATING AT POKER	KO
EI	•246 DATA A TRIBE OF HORSEMEN WHO TEND VAST HERDS OF WOOLLY MAMMOTHS	AO	•323 DATA DID MAGIC TRICKS THE ALIENS COULDN'T DO AND WAS TAKEN PRISONER	GK
CP	•247 DATA WAS TRAMPLED IN A STAMPEDE,ANNOUNCED A NATIVE WITH A BLOWGUN	EB	•324 DATA PERMANENT ILLUSIONS TIED TO SMALL JEWELS,A FAST-GROWING LEGUME	EM
BD	•248 DATA STOOD TOO NEAR A FLATULENT MAMMOTH AND SUFFOCATED	OF	•325 DATA A FERRET THAT IS INVARIABLY DRAWN TO HIGH INTELLIGENCE	DH
MJ	•249 DATA MAMMOTH IVORY,CHEESE MADE FROM MAMMOTH MILK	HG	•326 DATA A RACE OF SHAPECHANGERS WHO HAVE FORGOTTEN THEIR 'REAL' SHAPE	CP
LO	•250 DATA "A BREED OF SMALL, TOUGH, FAST, AND[6" "]ALMOST SENTIENT HORSES"	FK	•327 DATA WAS SHOT BY A GYPSY WHO THOUGHT IT WAS AN IMPOSTOR,GOT A FATAL ILLNESS	CA
LE	•298 REM ** WORLDS POPULATED BY ALIENS	PD	•328 DATA WENT HUNTING AND BAGGED THE WRONG PREY,A NET-SPINNING TREE	PN
PN	•299 FOR I=0 TO 9:READ A\$,B\$,C\$,D\$,E\$,F\$,G\$:PRINT#2,A\$X\$B\$X\$C\$X\$D\$X\$E\$X\$F\$X\$G\$	PO	•329 DATA SHAPE-CHANGING PROTOPLASM,OZONE-EMITTING AIRBORNE SLIME	AA
HL	•300 PRINT I,A\$:NEXT	EI	•330 DATA CLUMSY GRASS-EATING BEHEMOTHS INFESTED BY SENTIENT BLOODSUCKERS	DF
DG	•301 DATA A RACE OF SENTIENT SQUIDS THAT TEND GARDENS UNDER THE SEA	MA	•331 DATA WAS TAKEN OVER BY A SUCKER,WAS	
	•302 DATA BROKE AN AIRHOSE AND DROWNED,WA			

TRAMPLED BY AN ANGRY HERD	HP	•14 SYS 38046:POKE 648,140:PRINT VV\$(23)B	
•332 DATA SAID SOMETHING SLANDEROUS ABOUT	CM	B\$BB\$"[13" "];	MA
THE SUCKERS,SWEET-SMELLING DUNG		•15 GOSUB 260:POKE 33767,32	LH
•333 DATA AN INTELLIGENCE-ENHANCING DISTI	IA	•16 FOR I=0 TO 63:POKE 35840+I,0:NEXT:POK	HJ
LLATION OF SUCKER HORMONES		E ES,31	
•334 DATA A SUCKER-EATING BAT	HD	•17 GOTO 100	CF
•335 DATA TREES THAT GROW CLONES OF ANY C	AI	•39 REM READ JOYSTICK	DN
REATURE AS THEIR FRUIT		•40 JY=255-PEEK(56320):JB=JY AND 16	PP
•336 DATA WAS DEVOURED AND CLONED 500 TIM	DA	•41 JY=JY AND 15:IF JY=0 AND JB=0 THEN 40	OF
ES TO FORM A VILLAGE		•42 RETURN	IM
•337 DATA CLIMBED A HUNGRY TREE,CHOPPED D	GD	•50 I=INT(RND(0)*I):RETURN	BO
OWN THE CHIEF'S DAUGHTER FOR FIREWOOD		•55 FOR I=19 TO 23:PRINT VV\$(I)"[40" "];	
•338 DATA A SEEDLING OF A TREE THAT COULD	HH	:NEXT	BH
CLONE THE DEAD		•56 PRINT VV\$(19);:RETURN	CC
•339 DATA A FIBROUS PLANT WITH STEEL-LIKE	CJ	•60 C4%=0:FM=FM-1:IF FM>0 THEN RETURN	CA
THREADS,A FIRE-BREATHING MOUSE		•62 FM=TS/2:QF=QF-1:IF QF=0 THEN PRINT VV	
•340 DATA A RACE OF CATS THAT KEEP DOGS A	OP	\$(23)BB\$;:RETURN	DH
ND MICE AS SLAVES--WHILE RATS REBEL		•64 PRINT VV\$(23)BB\$VV\$(23)LEFT\$(FF\$,QF);	
•341 DATA WAS LOBOTOMIZED AND TRAINED TO	EF	:RETURN	CO
FETCH FORTHE KING OF CATS		•70 TM=TS:QS=QS-1:IF QS=0 THEN PRINT VV\$(
•342 DATA TRIED TO PET A DOG-SOLDIER,WAS	AJ	24)BB\$;:RETURN	EF
CARRIED OFF IN THE NIGHT BY A RAT PACK		•72 PRINT VV\$(24)BB\$VV\$(24)LEFT\$(SS\$,QS);	
•343 DATA A DOG THAT CAN REPEAT HOURS OF	MP	:RETURN	CJ
CONVERSA-TION WORD FOR WORD		•90 POKE 53265,0:RETURN	MO
•344 DATA MICE TRAINED AS HAIRDRESSERS,PL	ME	•95 POKE 53265,91:RETURN	PH
ANS FOR CATS TO TAKE OVER THE UNIVERSE		•98 REM *** ACTION LOOP ***	KJ
•345 DATA ROBOTS THAT EVOLVED FROM AN ANC	MC	•100 TM=TM-1:IF TM<1 THEN GOSUB 70:IF QS<	
IENT STARSHIP SERVICE STATION		1 THEN 275	MI
•346 DATA WAS CAUGHT WITH A DATA-ERASING	GJ	•105 IF C4%>0 THEN GOSUB 60:IF QF<1 THEN	
MAGNETIC DEVICE		270	EL
•347 DATA WAS MISTAKENLY LUBRICATED BY A	LB	•110 IF C4%>0 AND C5%>0 THEN GOSUB 200	BF
REPAIRBOT,BEAT THE WRONG ROBOT AT CHESS		•120 C0%=0:C5%=0	DO
•348 DATA ORGANICALLY-GROWN POSITRONIC BR	DF	•130 IF SP%>0 THEN 280	HF
AINS,A METAL-PRESERVING FUNGUS		•196 GOTO 100	CF
•349 DATA FLEA-SIZED SELF-REPLICATING REP	NB	•200 I=C5%:C5%=0:C4%=0:J=I AND 10:K=I AND	
AIRBOTS		20	KE
•990 CLOSE 2	NC	•201 WP=1:IF I>2 THEN WP=2:IF I>4 THEN WP	
•1000 END	IC	=3:IF I>8 THEN WP=4	HM

GYPSY

•1 REM *** GYPSY ***	DI	•210 QF=QF+LV:IF QF>33 THEN QF=33	LN
•2 REM FILES 'GYPSY VIDEO' AND 'GYPSY PLA	GJ	•215 PRINT VV\$(23)LEFT\$(FF\$,QF);:RETURN	NF
NETS' MUST BE ON DISK!		•220 IF QS<17 THEN QS=QS+LV:IF QS>17 THEN	
•3 REM USE 'VIDEO SETUP' AND 'PLANET SETU	MF	QS=17	GH
P' TO CREATE THESE FILES		•225 PRINT VV\$(24)LEFT\$(SS\$,QS);:RETURN	JB
•5 POKE 55,255:POKE 56,127:POKE 643,255:P	DN	•230 ON WP GOTO 400,240,400,240:RETURN	IL
OKE 644,127:CLR		•240 IF RP(WP)>0 THEN 400	FJ
•6 REM (TYPING THIS PROGRAM IS EASIER IF	LB	•245 PRINT VV\$(23)BB\$VV\$(23)"[s S][s O][s	
YOU GOSUB 95 IN DIRECT MODE RIGHT AWAY)		R][s R][s Y][c Z][c Z][s N][s O][SS][s	
•7 F\$=" ":C0%=0:C1%=0:C2%=0:C3%=0:C4%=0:C	NO	S][s U][s R][s F][s A][s C][s E][SS][s F	
5%=0:C6%=0:SP%=0		][s O][s R][SS][s L][s A][s N][s D][s I]	
•8 IF PEEK(37952)<>16 OR PEEK(37953)<>20	MF	[s N][s G]";:GOSUB 800	KL
THEN 2000		•250 PRINT VV\$(24)BB\$VV\$(24)"[RVSON]PRESS	
•9 DIM VV\$(24)	BI	BUTTON TO GO ON";:C0%=0	KO
•10 GOSUB 700:GOSUB 2100	KG	•255 IF C0%=0 THEN 255	GC
•12 GOSUB 90:GOSUB 600:PRINT "[CLEAR]";:G		•256 IF C0%=1 THEN C0%=0:GOTO 256	JJ
OSUB 95:GOSUB 900:L=FRE(9)	JB	•260 PRINT VV\$(23)BB\$VV\$(24)BB\$;	PH
•13 PRINT VV\$(23)"[RVSOFF][40" "];	KH	•265 PRINT VV\$(23)LEFT\$(FF\$,QF)VV\$(24)LEF	

T\$(SS\$,QS);:RETURN	MD	.410 POKE 53272,20:POKE 648,4	OM
.270 PRINT VV\$(23)"[RVSON][s O][s U][s T][SS][s O][s F][SS][s F][s U][s E][s L][RVSOFF]";:FOR I=0 TO 1999:NEXT:GOTO 280	JB	.415 PRINT "[CLEAR][RVSOFF]";:GOSUB 95	IA
.275 PRINT VV\$(24)"[RVSON][s O][s U][s T][SS][s O][s F][SS][s A][s I][s R][RVSOFF]";:FOR I=0 TO 1999:NEXT	LO	.416 PRINT " YOU HAVE LANDED A GROUP OF GYPSIES ON"	NE
.280 SP%=0:GOSUB 90:POKE ES,0:SYS 40768	CC	.417 PRINT " "MM\$(0,2-RP(WP));:IF PN(WP)<254 THEN PRINT " NAMED "NM\$(PN(WP))"	MN
.281 POKE 56578,PEEK(56578)OR3:POKE 56576,(PEEK(56576)AND 252)OR 3	MB	.418 PRINT VV\$(2)" (IT IS "MM\$(1,HB(WP))")"	PL
.282 POKE 53272,20:POKE 648,4:PRINT "[CLEAR]";	MC	.419 PRINT VV\$(4)" YOUR FIRST REPORT TO THE SHIP NOTES:"	CN
.283 GOSUB 95:PRINT " "GB\$" HAS REMOVED YOU AS PILOT." :I=LEN(GL\$):GOSUB 50	FL	.420 PRINT "[RVSON]"VV\$(5)PM\$(PD(WP),HB(WP))VV\$(8)"[RVSON][s W][s H][s A][s T][SS][s W][s I][s L][s L][SS][s Y][s O][s U][SS][s D][s O][SS][s N][s O][s W][c B][RVSOFF]";	LH
.284 PRINT:PRINT " WITH LUCK, "GN\$(I)" CAN PILOT"	JM	.421 ON HB(WP) GOTO 500,500	AL
.285 PRINT " THE FAMILY TO FORTUNE--AND SURVIVAL!";	JL	.422 PRINT "[BLUE]"VV\$(9)"[SS][SS][s L][s O][s O][s K][SS][s A][s R][s O][s U][s N][s D]"VV\$(10)"[SS][SS][s T][s A][s K][s E][SS][s W][s H][s A][s T][SS][s W][s E][SS][s N][s E][s E][s D]";	KP
.286 PRINT VV\$(24)"[RVSON][s P][s R][s E][s S][s S][SS][s B][s U][s T][s T][s O][s N][SS][s T][s O][SS][s C][s O][s N][s T][s I][s N][s U][s E][RVSOFF]";	OB	.423 PRINT VV\$(11)"[SS][SS][s G][s E][s T][SS][s B][s A][s C][s K][SS][s T][s O][SS][s T][s H][s E][SS][s S][s H][s I][s P]"VV\$(12)"[SS][SS][s R][s E][s S][s I][s G][s N][SS][s A][s S][SS][s P][s I][s L][s O][s T][c 7]";	FJ
.287 GOSUB 40:IF JB=0 THEN 287	IE	.424 K=9:L=K	NM
.295 GOTO 300	BP	.425 PRINT VV\$(L)RX\$VV\$(K)RR\$;:L=K	IP
.300 PRINT "[CLEAR]"VV\$(10)"[6"[SS]"[s P][s L][s A][s Y][SS][s A][s G][s A][s I][s N][c B]"VV\$(12)"[6"[SS]"[s Q][s U][s I][s T][c B][6"[SS]"];	NG	.426 GOSUB 40:IF JB>0 THEN 431	IC
.305 PRINT VV\$(2)"[RVSON]CARGO VALUE[5" "[RVSOFF][EP]"STR\$(CV*10000)	HC	.427 IF JY=1 THEN K=K-1:IF K<9 THEN K=12	NH
.306 PRINT VV\$(4)"[RVSON]SURVIVING CREW [RVSOFF] "STR\$(LEN(GL\$))	EL	.428 IF JY=2 THEN K=K+1:IF K>12 THEN K=9	KF
.307 LV=10:XV=10:FOR I=0 TO 599:NEXT	AJ	.429 IF K=L THEN 426	CM
.308 PRINT VV\$(XV)RX\$VV\$(LV)"[RVSON][c Z][RVSOFF]":XV=LV	KH	.430 GOTO 425	CN
.309 GOSUB 40:IF JB>0 THEN 315	GP	.431 PRINT VV\$(L)RX\$;:ON K-8 GOTO 432,435,480,470	MC
.310 IF(JY<>1)AND(JY<>2) THEN 309	NB	.432 I=DL(WP):GOSUB 50:IF I<3 THEN 440	CM
.311 IF LV=10 THEN LV=12:GOTO 308	OG	.433 I=EF(WP):GOSUB 50:IF I<3 AND LEN(TR\$)>0 THEN 450	AG
.312 LV=10:GOTO 308	BN	.434 GOSUB 55:PRINT "[SS][s F][s O][s U][s N][s D][SS][s N][s O][s T][s H][s I][s N][s G][SS][s W][s O][s R][s T][s H][s W][s H][s I][s L][s E][SS]";:GOTO 424	HF
.315 IF LV=12 THEN 370	JB	.435 IF FT>0 THEN GOSUB 55:PRINT "[SS][s G][s O][s T][SS][s I][s T][c K][SS]";:CV=CV+FT:FT=0:GOTO 424	KP
.320 GL\$=LEFT\$(PZ\$,33):PY\$=LEFT\$(PZ\$,TN)	ID	.436 I=DL(WP):GOSUB 50:IF I<3 THEN 440	CM
.321 GB=INT(RND(0)*33):GB\$=GN\$(GB):I=GB:GOSUB 875:PV=0	CH	.437 GOSUB 55:PRINT "[SS][s W][s H][s A][s T][c M][s S][SS][s T][s O][SS][s T][s A][s K][s E][c B][SS]";:GOTO 424	DL
.330 GOSUB 700	CH	.440 GOSUB 55:PRINT "[RVSON] PILOT! IT'S AWFUL! ";	JP
.335 GOTO 12	PF	.441 I=LEN(GL\$):GOSUB 50:PRINT GN\$(I)" JUST"	OG
.370 PRINT VV\$(24)"[RVSON]TILL NEXT TIME, GYPSY PILOT[RVSOFF]";:FOR I=0 TO 1999:NEXT	IM	.442 GOSUB 875:IF LEN(GL\$)<5 THEN SP%=1:PRINT VV\$(23)" TOO MANY LOST, PILOT!";	JA
.379 REM ** REENABLE SHIFT/COMMODORE AND RUN-STOP/RESTORE	FB	.443 PRINT AM\$(PD(WP),HB(WP),ASC(LEFT\$(DG\$,1)),0)"[RVSOFF]";	PB
.380 POKE 657,0:POKE 792,71:POKE 808,237	PK		
.390 SYS 65126	KI		
.400 QS=33:PRINT VV\$(24)LEFT\$(SS\$,QS);:POKE ES,0:SYS 40768	EK		
.401 VT(WP)=1:DG\$=LEFT\$(PZ\$,3):TR\$=LEFT\$(PZ\$,HT(WP)):FT=0	HM		
.405 POKE 56578,PEEK(56578)OR3:POKE 56576,(PEEK(56576)AND 252)OR 3	MB		

•444 I=LEN(DG\$):IF I<2 THEN 446	CK	A][s L][s S]"VV\$(14)"[SS][SS][s A][s S]	
•445 DG\$=RIGHT\$(DG\$,I-1):ON HB(WP) GOTO 507,507:GOTO 424	HP	[s K][SS][s F][s O][s R][SS][s H][s E][s L][s P]";	NL
•446 PRINT VV\$(24)"[SS][s P][s R][s E][s S][s S][SS][s B][s U][s T][s T][s O][s N][SS][s T][s O][SS][s C][s O][s N][s T][s I][s N][s U][s E][SS]";	LG	•503 PRINT VV\$(15)"[SS][SS][s T][s A][s K][s E][SS][s W][s H][s A][s T][SS][s W][s E][SS][s N][s E][s E][s D]"VV\$(16)"[SS][SS][s G][s E][s T][SS][s B][s A][s C][s K][SS][s T][s O][SS][s T][s H][s E][SS][s S][s H][s I][s P]";	AL
•447 GOSUB 40:IF JB=0 THEN 447	GK	•504 PRINT VV\$(17)"[SS][SS][s R][s E][s S][s I][s G][s N][SS][s A][s S][SS][s P][s I][s L][s O][s T][c 7]";	ED
•448 PRINT VV\$(18)GN\$(GB)" ORDERS YOU: RETURN TO THE SHIP!";	HD	•507 K=9:L=K	NM
•449 GOTO 480	CI	•508 PRINT VV\$(L)RX\$VV\$(K)RR\$;:L=K	IP
•450 GOSUB 55:PRINT "[RVSON][SS][s P][s I][s L][s O][s T][c K][SS][SS][s L][s O][s O][s K][SS][s W][s H][s A][s T][SS][s W][s E][SS][s F][s O][s U][s N][s D][c K][SS][SS]"	GA	•509 GOSUB 40:IF JB>0 THEN 515	IB
•451 PRINT AM\$(PD(WP),HB(WP),ASC(LEFT\$(TR\$,1)),1)"[RVSOFF]";	PB	•510 IF JY=1 THEN K=K-1:IF K<9 THEN K=17	NK
•452 I=10:GOSUB 50:FT=1+(I*LV):I=12-DL(WP):IF I<1 THEN 454	DK	•511 IF JY=2 THEN K=K+1:IF K>17 THEN K=9	KA
•453 GOSUB 50:FT=FT-I	DP	•512 IF K=L THEN 509	DA
•454 IF FT=0 THEN FT=1	DP	•513 GOTO 508	DB
•455 I=LEN(TR\$):IF I=1 THEN TR\$="":GOTO 457	MM	•515 PRINT VV\$(L)RX\$;:ON K-8 GOTO 520,530,540,550,560,570,580,480,470	HJ
•456 TR\$=RIGHT\$(TR\$,I-1)	MB	•520 I=DL(WP):GOSUB 50:IF I<3 THEN 440	CM
•457 ON HB(WP) GOTO 507,507:GOTO 424	HO	•521 I=EF(WP):GOSUB 50:IF I<3 AND LEN(TR\$)>0 THEN 450	AG
•470 SP%=1:GOSUB 90:GOTO 490	FF	•522 GOSUB 55:PRINT "[SS][s F][s O][s U][s N][s D][SS][s N][s O][s T][s H][s I][s N][s G][SS][s W][s O][s R][s T][s H][s W][s H][s I][s L][s E][SS]";:GOTO 507	HF
•480 GOSUB 55	PK	•529 GOTO 507	CO
•481 PRINT "[RVSON][s S][s U][s R][s V][s I][s V][s I][s N][s G][SS][s C][s R][s E][s W][SS][SS]"LEN(GL\$)VV\$(20)"[s C][s A][s R][s G][s O][SS][s V][s A][s L][s U][s E][4"[SS]"[c -]"CV*10000	DI	•530 IF HB(WP)<>1 THEN 532	AB
•482 PRINT VV\$(24)"[RVSON][SS][s P][s R][s E][s S][s S][SS][s B][s U][s T][s T][s O][s N][SS][s T][s O][SS][s C][s O][s N][s T][s I][s N][s U][s E][SS][RVSOFF]";	PI	•531 IF DL(WP)<5 THEN DL(WP)=3:GOSUB 55:PRINT "[c I][s G][s O][SS][s A][s W][s A][s Y][c I]";:GOTO 507	DJ
•483 FOR I=0 TO 599:NEXT	MF	•532 IF DL(WP)>7 AND LEN(TR\$)>0 THEN 450	DN
•484 GOSUB 40:IF JB=0 THEN 484	IB	•533 GOSUB 55:IF HB(WP)=1 THEN PRINT "[c I][s S][s O][s R][s R][s Y][c Z][c Z][s C][s A][s N][c M][s T][SS][s H][s E][s L][s P][SS][s Y][s O][s U][c I]";:GOTO 507	EJ
•490 GOSUB 800	CI	•534 PRINT "[c I][s N][s O][SS][s S][s P][s E][s A][s K][SS][s G][s A][s L][s A][s C][s T][s I][s C][SS][s L][s A][s N][s G][s U][s A][s G][s E][SS][s S][s O][SS][s S][s O][s R][s R][s Y][c I]";:GOTO 507	IB
•491 IF(PEEK(52)-PEEK(50))<4 THEN L=FRE(9)	AO	•540 IF DL(WP)<7 THEN DL(WP)=DL(WP)+1:GOTO 542	AN
•495 GOSUB 600:SYS 38046:POKE 648,140:POKE ES,31	AE	•541 GOSUB 55:PRINT "[SS][s T][s H][s E][SS][s Y][s O][s K][s E][s L][s S][SS][s D][s O][s N][c M][s T][SS][s A][s P][s P][s R][s E][s C][s I][s A][s T][s E][SS][s A][s R][s T][SS]";:GOTO 507	IH
•496 RETURN	IM	•542 GOSUB 55:PRINT "[SS][s H][s E][s A][s R][SS][s T][s H][s E][SS][s A][s P][s P][s L][s A][s U][s S][s E][c B][SS][SS][s T][s H][s E][s Y][SS][s L][s O][s V][s E][SS][s U][s S][c K][SS]";:GOTO 507	BH
•500 PRINT "[BLUE]"VV\$(9)"[SS][SS][s L][s O][s O][s K][SS][s A][s R][s O][s U][s N][s D]"VV\$(10)"[SS][SS][s A][s S][s K][SS][s Q][s U][s E][s S][s T][s I][s O][s N][s S]";	GK	•550 IF HB(WP)=1 THEN I=DL(WP):GOSUB 50:I	
•501 PRINT VV\$(11)"[SS][SS][s P][s U][s T][SS][s O][s N][SS][s A][SS][s S][s H][s O][s W]"VV\$(12)"[SS][SS][s O][s F][s F][s E][s R][SS][s T][s O][SS][s T][s I][s N][s K][s E][s R]";	MI		
•502 PRINT VV\$(13)"[SS][SS][s D][s I][s C][s K][s E][s R][SS][s W][s I][s T][s H][SS][s T][s H][s E][SS][s L][s O][s C][s			

F I<3 THEN DL(WP)=DL(WP)+1:GOTO 552	FC	G][s O][s T][SS][s I][s T][c K][SS]":CV	
•551 GOSUB 55:PRINT "[SS][s T][s H][s E][s Y][c M][s V][s E][SS][s G][s O][s T][S S][s N][s O][s T][s H][s I][s N][s G][SS][s F][s O][s R][SS][s U][s S][SS][s T][s O][SS][s F][s I][s X][SS]";:GOTO 507	MN	=CV+FT:FT=0:GOTO 583	FB
•552 GOSUB 55:PRINT "[SS][s T][s H][s E][s Y][SS][s L][s I][s K][s E][s D][SS][s O][s U][s R][SS][s W][s O][s R][s K][c D][SS][s P][s I][s L][s O][s T][SS]";	DI	•581 I=DL(WP):GOSUB 50:IF I<3 THEN 440	CM
•553 IF EF(WP)>4 THEN EF(WP)=EF(WP)-1	HC	•582 GOSUB 55:PRINT "[SS][s W][s H][s A][s T][c M][s S][SS][s T][s O][SS][s T][s A][s K][s E][c B][SS]":DL(WP)=DL(WP)-2:G	GF
•554 GOTO 507	PK	OTO 585	DN
•560 IF FT<>0 THEN 563	CO	•583 IF DL(WP)<8 THEN 440	MO
•561 IF (DL(WP)>6)AND(EF(WP)<10)AND LEN(TR\$)>0 THEN 565	OO	•584 DL(WP)=DL(WP)-3:I=DL(WP):GOSUB 50:IF	
•562 GOSUB 55:PRINT "[c I][s N][s O][SS][s D][s E][s A][s L][s S][SS][s W][s I][s T][s H][SS][s G][s Y][s P][s S][s I][s E][s S][c K][c I]";:GOTO 507	OL	I<3 THEN 440	
•563 IF DL(WP)<4 THEN 562	FO	•585 PRINT "[c I][s W][s E][SS][s D][s O][s N][c M][s T][SS][s L][s I][s K][s E][SS][s Y][s O][s U][c D][SS][s T][s H][s I][s E][s V][s I][s N][s G][SS][s G][s Y][s P][s S][s I][s E][s S][c K][c I]":GO	DJ
•564 GOSUB 55:PRINT "[SS][s G][s O][s T][SS][s I][s T][c K][SS]";:CV=CV+FT:FT=0:G	CF	TO 507	DN
OTO 507		•586 IF DL(WP)<8 THEN 440	DN
•565 GOSUB 55:PRINT "[RVSON][SS][s A][s L][s L][SS][s R][s I][s G][s H][s T][c D][SS][s G][s Y][s P][s S][s I][s E][s S][c S][SS][SS][s Y][s O][s U][SS][s W][s A][s N][s T][SS][s T][s O][SS][s B][s U][s Y][SS]"	DG	•587 DL(WP)=DL(WP)-3:I=DL(WP):GOSUB 50:IF	MO
•566 PRINT "[RVSON]"AM\$(PD(WP),HB(WP),ASC	IH	I<3 THEN 440	CO
(LEFT\$(TR\$,1)),1)"[SS][c B][RVSOFF]";	CP	•589 GOTO 507	
•567 GOTO 452	FC	•600 VB=32768:POKE 56578,PEEK(56578)OR3:P	CN
•570 IF HB(WP)=1 THEN 573	LL	OKE 56576,(PEEK(56576)AND 252)OR 1	
•571 DL(WP)=DL(WP)+1:IF EF(WP)>6 THEN EF(WP)=EF(WP)-1	BA	•602 SB=0:POKE 53272,(SB*16)+4:SB=VB+1024	MO
•572 GOSUB 55:PRINT "[c I][s W][s E][c M][s L][s L][SS][s D][s O][SS][s W][s H][s A][s T][SS][s W][s E][SS][s C][s A][s N][c Z][c Z][s K][s E][s E][s P][SS][s L][s O][s O][s K][s I][s N][s G][c I]";:GO	HB	*SB	AK
TO 507		•604 BB=SB/256:POKE 648,BB	LA
•573 IF DL(WP)>7 THEN 575	AH	•611 REM ** SPRITE COLOR TABLE	AN
•574 GOSUB 55:PRINT "[c I][s J][s U][s S][s T][SS][s W][s H][s A][s T][SS][s W][s E][SS][s N][s E][s E][s D][c Z][c Z][s G][s Y][s P][s S][s Y][SS][s B][s E][s G][s G][s A][s R][s S][c K][c I]";:GOTO 5	AL	•612 CT(0)=53287:FOR I=1 TO 7:CT(I)=CT(I-1)+1:NEXT	OM
07		•613 HH(0)=53248:VV(0)=53249:FOR I=1 TO 7	FB
•575 IF EF(WP)>4 THEN EF(WP)=EF(WP)-1:GOT	OE	:HH(I)=HH(0)+I*2:VV(I)=VV(0)+I*2:NEXT	FE
O 572	CO	•618 HR=53264	PC
•576 GOSUB 55:PRINT "[c I][s T][s H][s E][s R][s E][c M][s S][SS][s N][s O][s T][s H][s I][s N][s G][SS][s W][s E][SS][s C][s A][s N][SS][s D][s O][c Z][c Z][s S][s O][s R][s R][s Y][SS][c I]";:GOTO 50		•620 ES=53269	PI
7		•622 POKE 53271,0	AG
•579 GOTO 507		•624 POKE 53277,0	DB
•580 IF FT<>0 THEN GOSUB 55:PRINT "[SS][s		•626 POKE 53275,0	FK
		•628 POKE 53276,30	LB
		•630 POKE 53285,15:POKE 53286,7	DK
		•635 FOR I=0 TO 7:BC(I)=255-BS(I):NEXT	KM
		•638 REM *** INITIALIZE VALUES ***	AF
		•640 PRINT "[c 7]";	AE
		•642 POKE 53281,0	EE
		•644 POKE 53280,0	CA
		•646 POKE CT(0),7:POKE CT(1),5:POKE CT(2)	CB
		,2:POKE CT(3),6:POKE CT(4),12	PO
		•659 REM *** ML TABLE SETUP ***	PA
		•661 POKE 37920,4:POKE 37921,4	FL
		•663 POKE 37922,1	AJ
		•665 POKE 37923,0	PO
		•667 POKE 37924,1:POKE 37925,1	PA
		•669 POKE 37936,1	MH
		•671 POKE 37940,1	GI
		•673 POKE 37941,0	MA
		•674 REM ** GO-SPEED TIMER (NUMBER OF SPR	
		ITE 0 MOVES PER INTERRUPT [1=SLOWEST])	
		•675 POKE 37926,3:POKE 37928,3	
		•677 POKE 37927,0:POKE 37935,0:POKE 37943	
		,0	
		•679 POKE 53282,1:POKE 53283,7:POKE 53284	

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,9
.690 REM
.693 REM *** SAFETY PROCEDURES ***
.694 POKE 657,128:REM DISABLE SHIFT/COMMODORE CHARACTER SET SWITCH
.695 POKE 808,234:POKE 792,193:REM DISABLE STOP AND STOP/RESTORE
.696 RETURN
.699 REM *** INTRO SCREEN ***
.700 POKE 53281,0:POKE 53280,4:POKE 53265,PEEK(53265)OR 64:PRINT "[c 7][CLEAR]";
.701 POKE 53282,7:POKE 53283,9:POKE 53284,1
.705 PRINT "[HOME][DOWN][DOWN]"TAB(14)"[RVSON][s G][s Y][s P][s S][s Y][SS][SS][s P][s I][s L][s O][s T][RVSOFF]":PRINT:PRINT
.710 PRINT "[4" "]YOU HAVE BEEN CHOSEN TO PILOT THE"
.711 PRINT "FAMILY'S STARSHIP IN SEARCH OF WORLDS
.712 PRINT "WHERE WE CAN TRADE, PUT ON SHOWS, AND"
.713 PRINT "PERHAPS FIND SOME SPECTACULAR TREASURE.":PRINT
.714 PRINT "[4" "]MOST IMPORTANT, THOUGH, IS TO KEEP
.715 PRINT "THE FAMILY SAFE. THERE ARE DANGERS OUT"
.716 PRINT "AMONG THE STARS. AND YOU MUST ANSWER"
.717 PRINT "FOR ANY LIVES THAT ARE LOST.":PRINT:PRINT
.720 PRINT "[RVSON][4" "]HOW DANGEROUS A VOYAGE DO YOU DARE ATTEMPT?"
.721 PRINT "[5"[SS]"][s V][s E][s R][s Y][SS][s D][s A][s N][s G][s E][s R][s O][s U][s S][4"[SS]""]
.722 PRINT "[5"[SS]"][s B][s O][s L][s D][SS][s B][s U][s T][SS][s N][s O][s T][s S][s C][s R][s A][s Z][s Y]"
.723 PRINT "[5"[SS]"][s P][s R][s E][s T][s T][s Y][SS][s S][s A][s F][s E][7"[SS]""]":PRINT:PRINT "(USE JOYSTICK IN PORT 2)";
.724 VV$(0)="[HOME]":FOR I=1 TO 24:VV$(I)=VV$(I-1)+"[DOWN]":NEXT:RR$="[RVSON]=[RVSOFF]":RX$="[SS]":LV=18
.725 RR$="[RVSON]=[RVSOFF]":RX$="[SS]":LV=18:XV=LV
.726 PRINT VV$(XV)RX$VV$(LV)RR$;:XV=LV
.727 JB=0:JY=0:GOSUB 40:IF JB>0 THEN LV=LV-17:GOTO 731
.728 IF JY=1 THEN LV=LV-1:IF LV<18 THEN LV=20
.729 IF JY=2 THEN LV=LV+1:IF LV>20 THEN LV=18
.730 GOTO 726
GD .731 PRINT "[CLEAR][RVSON][s L][s A][s S][s T][SS][s M][s I][s N][s U][s T][s E][SS][s I][s N][s S][s T][s R][s U][s C][s T][s I][s O][s N][s S]"
JD
CM
OA .735 PRINT:PRINT "[3" "]THE SHIP'S COMPUTER WILL LOCATE[7" "]PLANETS.":PRINT
JJ
IM .736 PRINT "[3" "] [RVSON][s G][s A][s S][s S][s G][s I][s A][s N][s T][s S][3"[SS]" "] FOR HYDROGEN FUEL[5" "]":PRINT
PN
CL .737 PRINT "[3" "] [RVSON][s R][s O][s C][s K][s Y][SS][s P][s L][s A][s N][s E][s T][s S] FOR THE ELEMENTS THAT "
ML
JF .738 PRINT " [RVSON]SUPPORT LIFE--CARBON, OXYGEN, NITROGEN"
HG .740 PRINT:PRINT "[3" "]YOUR JOB IS TO PILOT THE SHIP INTO"
JO .741 PRINT " STATIONARY ORBIT, SO IT FOLLOWS RIGHT"
FE .742 PRINT " ALONG WITH THE PLANET. FUEL AND"
OL .743 PRINT " SUPPLIES ARE TAKEN ABOARD BY MACHINES.":PRINT
LD .744 PRINT "[3" "]TO VISIT A PLANET, PRESS THE BUTTON"
KB .745 PRINT " WHILE IN STATIONARY ORBIT."
ID .750 PRINT VV$(24)"[s P][s R][s E][s S][s S][SS][s B][s U][s T][s T][s O][s N][SS][s T][s O][SS][s G][s O][SS][s O][s N]"
ME ;
PA .751 GOSUB 40
MF .760 PRINT "[CLEAR][RVSON] YOU CAN TAKE A NAP NOW--IT TAKES A[5" "]";
BH .761 PRINT "[RVSON] WHILE TO LOAD SUPPLIES ABOARD THE SHIP."
IM .765 RETURN
MF .800 RP(WP)=0:J=0
PP .805 IF(WP=2)OR(WP=4) THEN J=RND(0)*100
EI .807 IF J>88 THEN RP(WP)=1:IF J>96 THEN RP(WP)=2:PN(WP)=254:PD(WP)=10
KO .810 HB(WP)=INT(RND(0)*3):IF RP(WP)=2 AND HB(WP)=0 THEN HB(WP)=1
FN .811 DL(WP)=3+INT(6*RND(0))+LV-HB(WP):EF(WP)=6+INT(6*RND(0))-LV-HB(WP)
JO .812 HT(WP)=1+INT(3*RND(0))
FJ .820 IF RP(WP)=2 THEN RETURN
CN .822 PV=PV+1:IF PV>28 THEN SP%=1:GOTO 885
BK .825 I=LEN(PX$(HB(WP))):IF I<1 THEN 810
ED .830 J=INT(RND(0)*I)+1:GOSUB 860
PF .835 PD(WP)=ASC(MID$(PX$(HB(WP)),J,1))
JH .840 IF I>2 THEN GOTO 855
LH .845 IF I=1 THEN PX$(HB(WP))="":RETURN
KD .850 PX$(HB(WP))=MID$(PX$(HB(WP)),XQ(J),1):RETURN
CM .855 IF J=1 THEN PX$(HB(WP))=RIGHT$(PX$(HB(WP)),I-1):RETURN
CP .856 IF J=I THEN PX$(HB(WP))=LEFT$(PX$(HB(WP)),I-1):RETURN
CP .857 PX$(HB(WP))=LEFT$(PX$(HB(WP)),J-1)+R

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IGHT\$(PX\$(HB(WP)),I-(J+1)):RETURN	HH	0,2),AM\$(10,2,2,1)	CH
•860 K=LEN(PY\$):L=1+INT(RND(0)*K)	IE	•2120 TN=0:NM\$(254)="[s A][s R][s T][s I]	
•865 PN(WP)=ASC(MID\$(PY\$,L,1))	DP	[s F][s I][s C][s I][s A][s L][SS][s S][
•868 IF L=1 THEN PY\$=RIGHT\$(PY\$,K-1):RETU	OA	s A][s T][s E][s L][s L][s I][s T][s E]"	AL
RN		•2130 INPUT#2,NM\$(TN):IF NM\$(TN)="[5"X"]"	
•869 IF L=K THEN PY\$=LEFT\$(PY\$,K-1):RETUR	PF	THEN 2145	CN
N		•2140 TN=TN+1:GOTO 2130	GE
•870 PY\$=LEFT\$(PY\$,L-1)+RIGHT\$(PY\$,K-(L+1	EP	•2145 PZ\$="":FOR I=0 TO 254:PZ\$=PZ\$+CHR\$(
)):RETURN		I):NEXT:PY\$=LEFT\$(PZ\$,TN):L=FRE(9)	DP
•875 IF I=0 THEN GL\$=RIGHT\$(GL\$,LEN(GL\$)-	KO	•2150 FOR I=0 TO 1:FOR J=0 TO 2:INPUT#2,M	OM
1):RETURN		M\$(I,J):NEXT:NEXT	
•876 IF I=LEN(GL\$)-1 THEN GL\$=LEFT\$(GL\$,I	GN	•2160 FOR I=0 TO 32:INPUT#2,GN\$(I):NEXT:G	
-1):RETURN		L\$=LEFT\$(PZ\$,33)	NM
•880 GL\$=LEFT\$(GL\$,I)+RIGHT\$(GL\$,LEN(GL\$)	LG	•2161 PRINT "[CLEAR][RVSON][DOWN][8"[SS]"	
-(I+1)):RETURN		][s H][s E][s R][s E][SS][s I][s S][SS][
•885 PRINT VV\$(23)"[SS][SS][s Y][s O][s U	FE	s T][s H][s E][SS][s G][s Y][s P][s S][s	OI
][SS][s L][s E][s D][SS][s U][s S][SS][s	IM	Y][SS][s F][s A][s M][s I][s L][s Y][8"	
T][s O][SS][c R][c O][SS][s W][s O][s R		[SS]"	
][s L][s D][s S][c Z][c Z][s G][s O][s O	IO	•2163 GB=INT(RND(0)*33):GB\$=GN\$(GB):I=GB:	DD
][s D][SS][s W][s O][s R][s K][c K][3"[S		GOSUB 875	
S]"]"BB\$;	OC	•2164 PRINT "[BLUE]";:FOR I=1 TO 32 STEP	DG
•890 RETURN		2	
•900 FOR I=1 TO 4:POKE HH(I),20+INT(RND(9	IJ	•2165 PRINT ,GN\$(ASC(MID\$(GL\$,I,1))),GN\$(	LA
)*220)		ASC(MID\$(GL\$,I+1,1))):NEXT:PRINT "[c 7]"	
•901 POKE VV(I),50+INT(RND(9)*190):NEXT	MF	;	
•902 POKE HR,0		•2166 A\$="[SS][BLUE]+GB\$+"[c 7][SS][s I]	
•909 REM ** PUT STARS ON THE SCREEN	EO	[s S][SS][s H][s E][s A][s D][SS][s O][s	
•910 PRINT "[CLEAR]";:FOR I=0 TO 49:POKE		F][SS][s T][s H][s E][SS][s F][s A][s M	
VB+INT(RND(9)*1024),46:NEXT	IK	][s I][s L][s Y][c S]":L=INT((42-LEN(A\$)	HD
•915 FOR I=0 TO 8:POKE VB+INT(RND(9)*1024	LP	)/2)	
),42:NEXT		•2167 B\$="[RVSON]":FOR I=1 TO L:B\$=B\$+"[S	GF
•919 REM ** STARSHIP POSITION	AE	S]":NEXT:A\$=B\$+A\$:FOR I=LEN(A\$) TO 42	
•920 POKE 53248,175:POKE 53249,150	CN	•2168 A\$=A\$+"[SS]":NEXT:PRINT:PRINT A\$	PH
•921 REM ** STARSHIP DIRECTION	ED	•2169 PRINT " NOW THE COMPUTER WILL UPDAT	KP
•922 POKE VB+1016,16	NL	E ITS STAR"	
•929 REM ** SETUP STRINGS	BD	•2170 PRINT " CHARTS--AND THEN WE'RE ON O	JC
•931 BB\$="[RVSOFF][32" ""]	FA	UR WAY!"	
•935 FF\$="[RVSON]FUEL[28" ""]	EF	•2180 FOR I=0 TO 2:FOR J=0 TO 9:INPUT#2,P	CH
•936 SS\$="[RVSON][s S][s U][s P][s P][s L	KO	M\$(J,I)	
][s I][s E][s S][24"[SS]""]	OK	•2190 FOR K=0 TO 1:FOR L=0 TO 2:INPUT#2,A	FP
•937 QF=33:QS=33		M\$(J,I,L,K):NEXT:NEXT:NEXT	
•938 FOR I=0 TO 2:PX\$(I)=LEFT\$(PZ\$,10):NE	CO	•2195 FOR I=1 TO 2:READ PM\$(10,I):FOR K=0	OD
XT		TO 1:FOR L=0 TO 2	
•939 REM ** LEVEL OF PLAY	LI	•2196 READ AM\$(10,I,L,K):NEXT:NEXT:NEXT	JO
•940 TS=50:IF LV<3 THEN TS=20:IF LV<2 THE	PH	•2200 CLOSE 2:RETURN	JP
N TS=10		•2210 DATA A SPANKING NEW SPACE STATION W	KC
•941 TM=TS:FM=TS/2	HN	ITH A CREWOF LONELY HUMANS	
•942 XQ(1)=2:XQ(2)=1	IA	•2211 DATA GOT WAYLAID BY SEX-STARVED CRE	AI
•944 PRINT VV\$(23)" PAUSE A MOMENT FOR GA	PE	W MEMBERS AND NOW REFUSES TO LEAVE	
RBAGE DISPOSAL [3".""]";	IF	•2212 DATA STUMBLED ON ILLEGAL DRUGS AND	CI
•945 FOR WP=1 TO 4:GOSUB 800:NEXT	IM	WAS SHOT,WAS CAUGHT SELLING HOOCH	
•946 CV=1	OA	•2213 DATA AN URGENT MESSAGE OF AN ALIEN	AK
•947 RETURN		INVASION,VITAL DATA ABOUT THIS SYSTEM	
•1998 REM *** MACHINE LANGUAGE ***	HN	•2214 DATA A THRILLING NOVEL THE CREW HAS	NM
•1999 REM LOAD ML FILE	JH	WRITTEN IN THEIR ENDLESS SPARE TIME	
•2000 LOAD "GYPSY VIDEO",8,1	KH	•2220 DATA AN ANCIENT ALIEN ORBITAL VESSE	BC
•2100 OPEN 2,8,2,"GYPSY PLANETS"		L WITH A CREW OF GIANT SPEECHLESS BEES	
•2110 DIM NM\$(254),GN\$(33),MM\$(1,2),PM\$(1		•2221 DATA WENT EXPLORING--FOUND THE QUEE	

IMPORTANT!

Letters on white background are **Bug Repellent** line codes. Do not enter them! Pages 119 and 120 explain these codes and provide other essential information on entering **Ahoy!** programs. Refer to these pages before entering any programs!

- N AND WAS STUNG TO DEATH
- 2222 DATA TRIED TO BREATHE THE ALIEN AIR ,WAS KIDNAPPED AND USED FOR LARVA FOOD
- 2223 DATA A KIND OF HONEY THAT GIVES TEMPORARY TELEPATHIC ABILITIES
- 2224 DATA A STRUCTURAL BEESWAX STRONGER THAN STEEL
- 2225 DATA OBSERVATIONS OF THE BEES--INCLUDING THEIR MAGNIFICENT DANCING

- CD •49376 DATA 48038502A9068D20D08D21D020F2C04C10C1A502A0009900D89900D99900DA99 JI
- MH •49408 DATA 00DBC8D0F1A228A90D9DC0DBCAD0FA60AD43038D4F128DCF1EA9208D76128D50 EH
- HL •49440 DATA 128D801E8DA61EA90085FB8D3F03A9FF85FDA91285FCA92385FEA000A20018A5 LE
- DD •49472 DATA FD690185FDA5FE690085FEB1FB91FD18A5FD697885FDA5FE690085FEB1FB91FD OO
- KM •49504 DATA 18A5FD697885FDA5FE690085FEB1FB91FD38A5FDE9F085FDA5FEE90085FEE8E0 EF
- 49536 DATA 03D0BBEE3F03AD3F03C928D01218A5FD69F085FDA5FE690085FEA9008D3F0318 KM
- 49568 DATA A5FB690185FBA5FC690085FCA5FCC920D08AA5FBC900D084A9A08D4203A9FF8D FM

SANTA'S BUSY DAY FROM PAGE 118

- 10 REM SANTA'S BUSY DAY
- 20 REM GEORGE TREPAL
- 30 REM 2650 ALTURAS ROAD
- 40 REM BARTOW, FL 33830
- 50 PRINT"[CLEAR][6"[DOWN]] DO YOU WANT AN <E>ASY OR A <R>EGULAR"
- 55 PRINT" GAME?"
- 60 GETA\$: IFA\$<>"" THEN 60
- 70 GETA\$:IF A\$="" THEN 70
- 80 IF A\$="E" THEN POKE 828,1
- 90 C=896: CT=44: POKE53280,0
- 100 READ D\$: L=LEN(D\$): PRINT "[CLEAR][11"[DOWN]]"[WHITE]"SPC(8)"COUNTING DOWN T O ZERO ";
- 105 CT=CT-1: PRINT CT: POKE 53281,CT
- 110 FOR J=1TOL STEP2: M\$=MID\$(D\$,J,2)
- 120 H\$=LEFT\$(M\$,1): L\$=RIGHT\$(M\$,1)
- 130 H=ASC(H\$)-48: IFH>10 THEN H=H-7
- 140 L=ASC(L\$)-48: IFL>10 THEN L=L-7
- 150 P=H*16+L:IF P>255 THEN 200
- 155 POKE C,P: C=C+1
- 160 NEXT:GOTO100
- 200 IF C<1000 THEN C=49152: GOTO 100
- 210 SYS49160
- 896 DATA 00150000AA8002AAA009555806AAA40A596806FBE405EB94055554016A500159
- 928 DATA 500255600A95A82AA6AA2AAAAA29AA9A19AA9915AA95156A55055554015550ZZ
- 49152 DATA 0100D8FFFFFF2800A9008D49038D4C0385FBA90C85FCA000A92091FBC8D0FBE6
- 49184 DATA FCA5FCC99FD0F1A9568D4303A95185FBA92885FDA91285FC85FEA99320D2FFA2
- 49216 DATA 00A000AD430391FDC8C027D0F918A5FD692885FD9002E6FEE8E051D0E4A000A9
- 49248 DATA 0491FBA9FF8D0FD4A9808D12D4AD1BD4290385ADAA0AA818B900C065FB85AAB9
- 49280 DATA 01C065FC85AB18B900C065AA85FDB901C065AB85FEA000B1FDCD4303D0128A91
- 49312 DATA FDA92091AAA5FD85FBA5FE85FC4C63C0E88A2903C5ADD0BCB1FBAAA92091FBE0
- 49344 DATA 04F01A8A0AA8A20238A5FBF900C085FBA5FCF901C085FCCAD0EE4C63C0A90F8D

- LI •49600 DATA 0FD4A9808D1BD4A2D2A000AD1BD4C92730F9C99010F585FCAD1BD485FBB1FBCD NP
- BM 92730F9C99010F585FCAD1BD485FBB1FBCD
- IP •49632 DATA 4303F0E7AD420391FBCAD0DFAD4203C953F00AA9538D4203A2024CCBC1A204A9 IL
- AG •49664 DATA 309DC107CAD0FA200DC24C1DC2A220A95B9DC707CAD0FAA9018D4F0360A9988D JF
- OD •49696 DATA 4403A9218D4503A9008D4603A90F8D18D4A9018D1CD08D15D0A9B08D00D0A98C MB
- IC •49728 DATA 8D01D0A9028D27D0A90E8DF807A9018D25D0A90A8D26D0AD00DC290F8D4003CE FM
- JC •49760 DATA 4603AD4603C900D012A9008D04D4AD4803850220F2C0A9068D20D038A90FED40 CN
- EN •49792 DATA 038D4003C900F0038D4D03AD3C03C901D006AD40038D4D03AD4D03C901D0034C FC
- LG •49824 DATA BAC2C902D0034CE1C2C904D0034C08C3C908F0034C53C34C2FC3ADCC058D4103 PF
- NB •49856 DATA CD4303D008A9028D4D034C53C338AD4403E9788D4403AD4503E9008D45034C53 DJ
- AJ •49888 DATA C3AD1C068D4103CD4303D008A9018D4D034C53C318AD440369788D4403AD4503 GN
- FL •49920 DATA 69008D45034C53C3ADF3058D4103CD4303D008A9088D4D034C53C338AD4403E9 HE
- HK •49952 DATA 018D4403AD4503E9008D45034C53C3ADF5058D4103CD4303D008A9048D4D034C DA
- FO •49984 DATA 53C318AD440369018D4403AD450369008D4503A90085FDA90485FEA9008D4E03
- EL •50016 DATA 8D4703AD440385FBAD450385FCA000B1FB91FD18A5FB690185FBA5FC690085FC OL
- LN •50048 DATA 18A5FD690185FDA5FE690085FEEEE4703AD4703C928D012A9008D470318A5FB69 NF
- NM •50080 DATA 5085FBA5FC690085FCE8D0C3EE4E03AD4E03C904D0034CC2C3C903D0B2A2684C AJ
- GC •50112 DATA 6FC3AD4103CD4303D026A90885028D20D020F2C0A9088D05D4A9818D04D4A919 GL
- KA •50144 DATA 8D01D4A90A8D4903A9028D4603EE4F03AD4103C9A0D01EA90785028D20D020F2 KN
- OE •50176 DATA C0A9018D4B03A90F8D05D4A9118D04D4A9058D4603AD4103C953D026A9008502 IL
- BF •50208 DATA 20F2C0A90F8D05D4A9218D04D4A9048D4603A280A000EE21D0C8D0FAE8D0F720 DC
- AF •50240 DATA 0DC2AD4903C900F017A90F8D2C05A9158D5405A9038D7C05A9088DA405CE4903 NB
- IC 3AD4E03C904D0034CC2C3C903D0B2A2684C
- GH 50112 DATA 6FC3AD4103CD4303D026A90885028D20D020F2C0A9088D05D4A9818D04D4A919
- FM 50144 DATA 8D01D4A90A8D4903A9028D4603EE4F03AD4103C9A0D01EA90785028D20D020F2
- JG 50176 DATA C0A9018D4B03A90F8D05D4A9118D04D4A9058D4603AD4103C953D026A9008502
- DE 50208 DATA 20F2C0A90F8D05D4A9218D04D4A9048D4603A280A000EE21D0C8D0FAE8D0F720
- PI 50240 DATA 0DC2AD4903C900F017A90F8D2C05A9158D5405A9038D7C05A9088DA405CE4903

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•50272 DATA 18AD440369B485FBAD4503690585F		003EE4F03AD4F03AAA9A09DC707CAD0F8AD	NA
CA92091FB8D4103AD4B03C901D049A9008D	MF	•50400 DATA C207C932D0034CF3C4AD4F03C920D	
•50304 DATA 4B03A9008D4A0318ADC4076901C93		0484CF3C4A9008D04D48D15D0A90F8DF305	ML
AF0068DC4074CA1C4A9308DC407A9018D4A	FN	•50432 DATA A9168DF405A9058DF505A9128DF60	
•50336 DATA 03A20218BDC1076D4A03C93AF00B9		5A9028502A9008D21D020F2C0A9018DF3D9	BA
DC107A9008D4A034CC3C4A9309DC107A901	JP	•50464 DATA 8DF4D98DF5D98DF6D9A5C5C940D0F	
•50368 DATA 8D4A03CAD0DDEE4C03AD4C03C900D		AA5C5C940F0FA4C08C04C57C250ZZ	KH

COMMODORE ROOTS

Continued from page 92

noteworthy features. One of these features is a technique

called address modification. We will take a close look at this feature in next month's column.

SEE PROGRAM LISTING ON PAGE 122

SKETCHER Program

(Lines to be added to BLACKBOARD.S, page 122; see text of article!)

259 *		301	JMP	DOIT	343	STX	VPSN	385	TOOHI	LDA	#<HMAX-2		
260 *	PRINT DOT AT MIDSREEN	302 *			344	RTS		386		STA	HPSN		
261 *		303	DOWN	JSR	MOVEDN	345 *		387		LDA	#>HMAX-2		
262	LDA #VMID	304		JMP	DOIT	346	MOVEDN	LDX	VPSN	388	STA	HPSN+1	
263	STA VPSN	305 *				347		INX		389	RTS		
264	LDA #<HMID	306	LEFT	LDX	HPSN	348		STX	VPSN	390 *			
265	STA HPSN	307		LDY	HPSN+1	349		RTS		391 *	PRINT DOT ON SCREEN		
266	LDA #>HMID	308		TXA		350 *				392 *			
267	STA HPSN+1	309		BNE	DECLSB	351 *	"DOIT" SUBROUTINE			393	PRINT	JSR	CHECK
268	JSR PRINT	310		DEY		352 *				394		JSR	PLOT
269 *		311	DECLSB	DEX		353	DOIT	JSR	PRINT	395 *			
270 *	READ JOYSTICK	312		STX	HPSN	354		JMP	READJS	396		LDA	HPSN
271 *		313		STY	HPSN+1	355 *				397		PHA	
272 *	FIRST CHECK TRIGGER BUTTON	314		JMP	DOIT	356 *	MORE SUBROUTINES START HERE			398		LDA	HPSN+1
273 *		315 *				357 *				399		PHA	
274	READJS LDA CIAPRA	316	UPANDL	JSR	MOVEUP	358 *	MAKE SURE DOT IS WITHIN RANGE			400 *			
275	AND #10	317		JMP	LEFT	359 *				401		LDA	HPSN
276	BEQ START	318 *				360	CHECK	LDA	VPSN	402		BNE	SKIP
277 *		319	DNANDL	JSR	MOVEDN	361		BEQ	RAISE	403		DEC	HPSN+1
278 *	NOW READ JOYSTICK	320		JMP	LEFT	362		CMP	#VMAX-1	404	SKIP	DEC	HPSN
279 *		321 *				363		BCS	LOWER	405		JSR	CHECK
280	LDA #0F	322	NIL2	JMP	READJS	364		JMP	HCHECK	406		JSR	PLOT
281	PHA	323 *				365	RAISE	INC	VPSN	407 *			
282	AND CIAPRA	324	RIGHT	LDX	HPSN	366		JMP	HCHECK	408		PLA	
283	STA JSV	325		LDY	HPSN+1	367	LOWER	LDA	#VMAX-1	409		STA	HPSN+1
284	PLA	326		INX		368		STA	VPSN	410		PLA	
285	SEC	327		BNE	NOINC	369 *				411		STA	HPSN
286	SBC JSV	328		INY		370	HCHECK	BIT	HPSN+1	412		RTS	
287	STA JSV	329	NOINC	STX	HPSN	371		BPL	OKLOW	413 *			
288 *		330		STY	HPSN+1	372		LDA	#1	414	RELADS	DFB	UP-MODR1
289	TAX	331		JMP	DOIT	373		STA	HPSN	415		DFB	DOWN-MODR1
290	BEQ READJS	332 *				374		LDA	#0	416		DFB	NIL1-MODR1
291	LDA RELADS-1,X	333	UPANDR	JSR	MOVEUP	375		STA	HPSN+1	417		DFB	LEFT-MODR1
292	STA MODREL+1	334		JMP	RIGHT	376		RTS		418		DFB	UPANDL-MODR1
293	MODREL BNE *	335 *				377 *				419		DFB	DNANDL-MODR1
294	MODR1	336	DNANDR	JSR	MOVEDN	378	OKLOW	LDA	#<HMAX-2	420		DFB	NIL2-MODR1
295 *		337		JMP	RIGHT	379		CMP	HPSN	421		DFB	RIGHT-MODR1
296	NIL1 JMP READJS	338 *				380		LDA	#>HMAX-2	422		DFB	UPANDR-MODR1
297 *		339 *	SUBROUTINES TO MOVE UP & DOWN			381		SBC	HPSN+1	423		DFB	DNANDR-MODR1
298 *	ROUTINES TO MOVE JOYSTICK	340 *				382		BCC	TOOHI	424 *			
299 *		341	MOVEUP	LDX	VPSN	383		RTS					
300	UP JSR MOVEUP	342		DEX		384 *							

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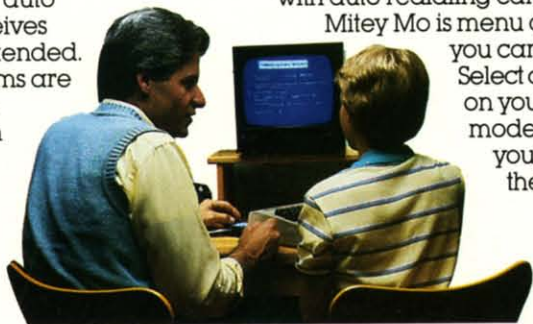
Mitey Mo turns your Commodore 64 into a telecommunications giant. It's the best-performing modem with upload/download.

Mitey Mo is being hailed as "the best price/performance communications package available." Its software has received the endorsement of the U.S. Commodore Users Group, which gives a money-back guarantee to members. It is truly the industry standard, and no wonder. It's the most user-friendly modem you can buy—it will take you online faster and easier than anything else.

Mitey Mo opens up a world of practical and exciting uses for your C-64. It lets you send and receive electronic mail, link up with community bulletin boards, play computer games with people in distant places, tap into library resources, and much more. All at your convenience.

Until Mitey Mo, Commodore's 1650 Automodem was the obvious choice when you went looking for a modem for your computer. Like Mitey Mo, it has "auto answer"—it receives data while unattended. And both modems are "auto dialers"—you dial right on the computer's keyboard. But that's about where the similarity ends.

Mitey Mo can dial up to 9



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Auto Redial	YES	NO
Smart 64 Software	YES	NO
Function Keys		
Programmable	YES	NO
Upload/Download		
Text & X-Modem	YES	NO
VT-52/VT-100 Emulation	YES	NO
Menu Driven	YES	NO
28K Software Buffer	YES	NO
Easy-to-Use Manual	YES	NO
Bell 103 Compatible	YES	YES
Multiple Baud Rates	YES	YES
Cable Included	YES	YES
Single Switch Operation	YES	NO
Warranty	3 years	90 days

Some mighty interesting features—ours and theirs. Yours to decide.

numbers sequentially. But suppose you dial a number and find it's busy. Mitey Mo has "auto redial"—it hangs up and redials immediately until it gets through. With the other modem you have to redial each time—and somebody with auto redialing can slip in ahead of you.

Mitey Mo is menu driven. It lists the things you can do on the screen.

Select a number and you're on your way. Since Automodem isn't menu driven, you'll be hunting through the manual a lot.

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