# Atari Classics

March/April 1995
Volume 4, Number 2
$5.95

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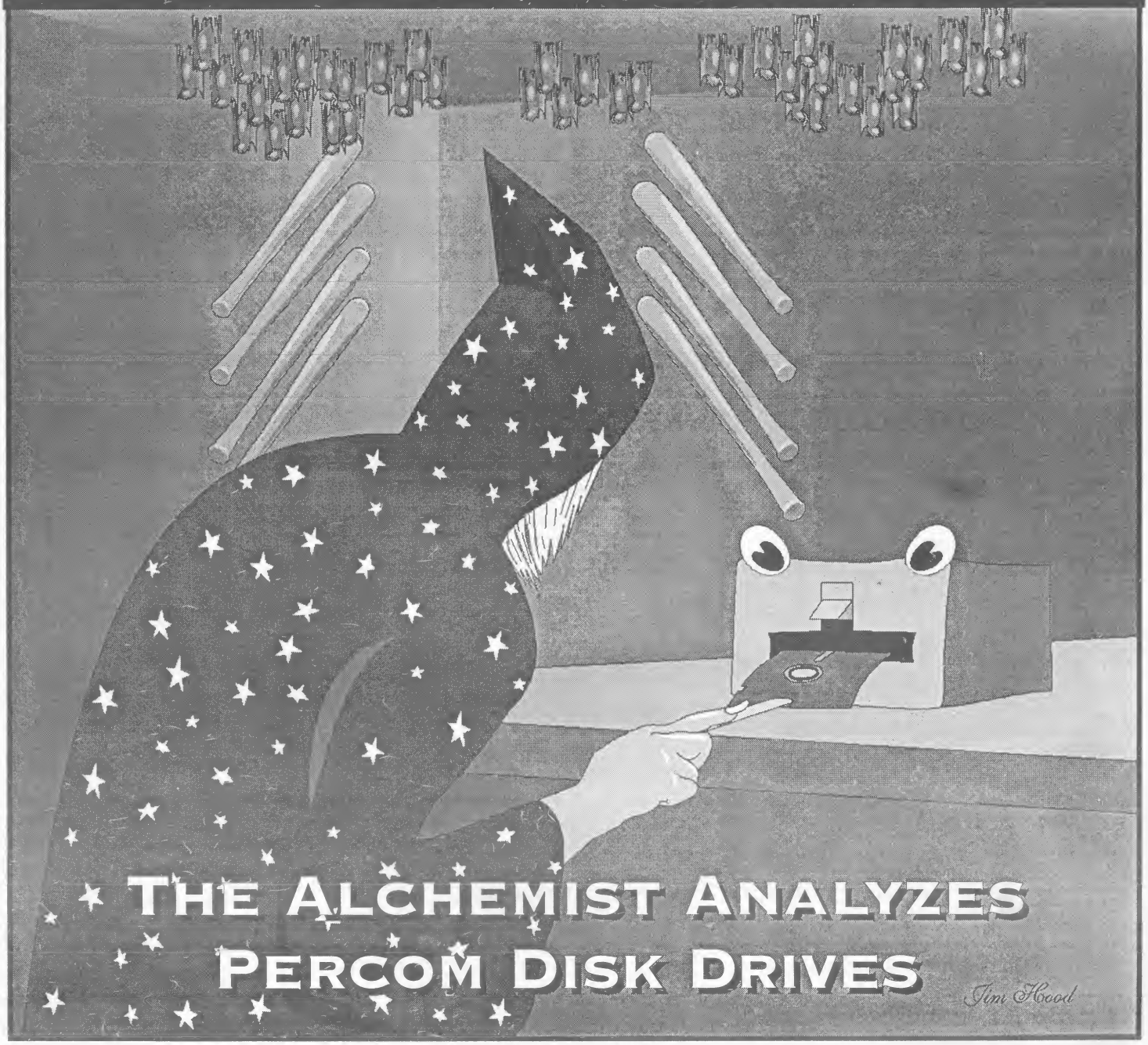

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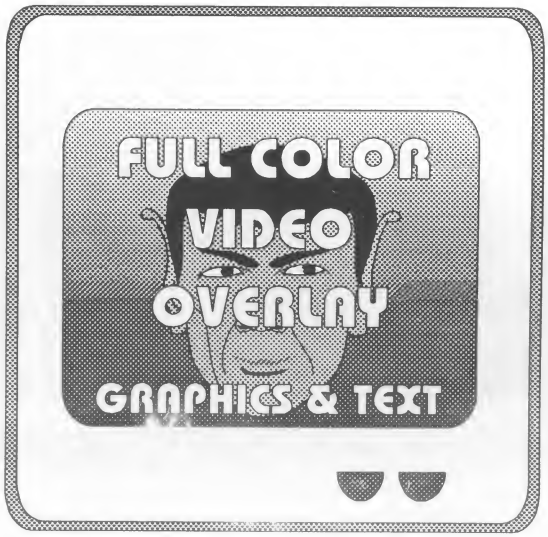


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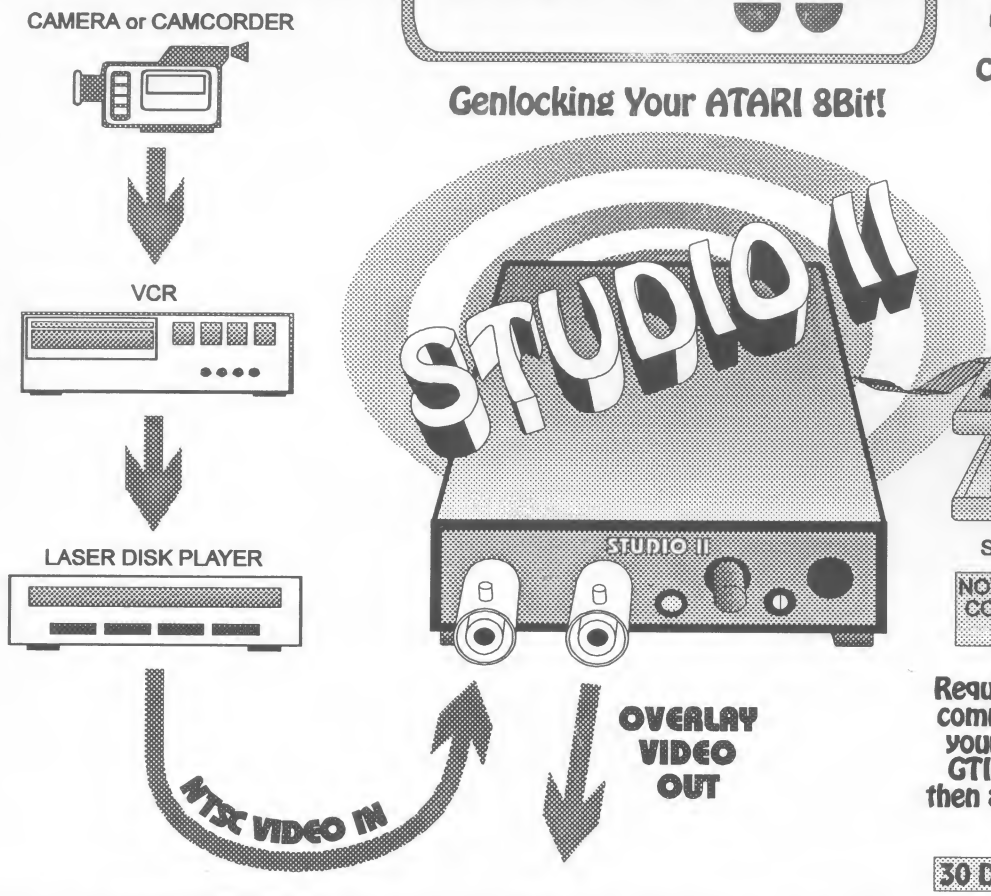


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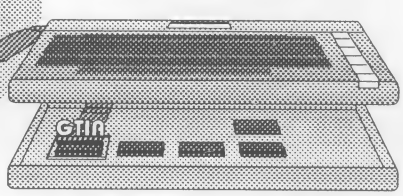


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## Letters to the Editor (and other stuff...)

Dear AC:
I am writing in regards to a project you revealed in the video issue of the 'old' Atari Classics: namely, the TTL upgrade. As I am all thumbs, I'd like to know if you would build three of the devices.....

M.R. Chicago, IL

I'd love to build you a couple of TTL upgrades, but then the mag would come out every two years or so. In fact, I'd love to do some more of the 65816 upgrade for AC and a few other hacks.... Bottom line is: if I had the time, I'd do it. I don't. Even if I do more hardware projects in AC, we will have your problem, won't we? User demand and no supplier. So, anyone out there available for upgrades? It has to be cheap and it has to be careful since the non-technical user cannot troubleshoot problems. Not much point in having lots of neat bolt-ons for the 8-bit when few, if any, can build them! You really don't need to do it all yourself - maybe get some high school or junior college kids to help with the soldering and such. Any volunteers? I'd be more than willing to help you get started. AC will even advertise your efforts at no charge.

Bob

Dear AC:
I was doing a sector read of the latest Atari Classics when the program stopped with a $90 (144) in the Y register at sector $1AB (427).....

G.M. Richmond, CA

Ah yes, the disk issue! Gee, what fun.... How hard can it be to make a couple of hundred copies of a double sided disk and mail them with the magazine? Well, let me tell you! First of all, it takes about one minute to copy a disk. That does not mean you can do 60 disks per hour. Two sides, right? Still can't do even 30 disks in an hour. So, you get more than one system copying disks. Easy. Bunch of guyz and a bunch of 8-bits. Now, how about quality control? Check every tenth disk? Seems reasonable. Isn't. We obviously had a few sneak thru that are defective. We are learning that a 1050 that works fine for 5 or 6 copies may just start making bad sectors once in a while after 20 disks or so. Of course after the mailperson folds the disk in half, you may have a little trouble getting it in your drive. No, you can't iron it flat again, but honestly, I've seen some pretty ugly disks read OK so don't give up on it just because it's a little wrinkled. Anyone with a bad or wrinkled disk can request a replacement online or by mail.

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GEnie J.Hood9

Bob

Dear AC:
Can you or any AC readers recommend a program to make a good disk library? The programs I have that should file my software do not seem quite adequate. I would like one that can list program names (alphabetized, if possible), program description, disk number and side, then printout for a 3-ring notebook.

L.S. San Bernardino, CA

Anything like that out there, folks? Maybe we could find some

enterprising soul to write one? I could certainly use a good filing system! It would be nice if the program utilized some of the newer features on our 8-bits... like a HD, SIO2PC or 256K of memory. I know there were a lot of disk catalog programs written back when the 800 was being produced - what is needed is a modern version. Something the user can modify, maybe, so put in a lot of comments and modularize it, OK?

By the way, if your are making inquiries, you might want to include some general information about your system, drive, memory, and programming languages.

I prefer good, old Atari BASICXL on an expanded, 256K machine with a DD (180K or larger) drive and a HD running MYDOS.

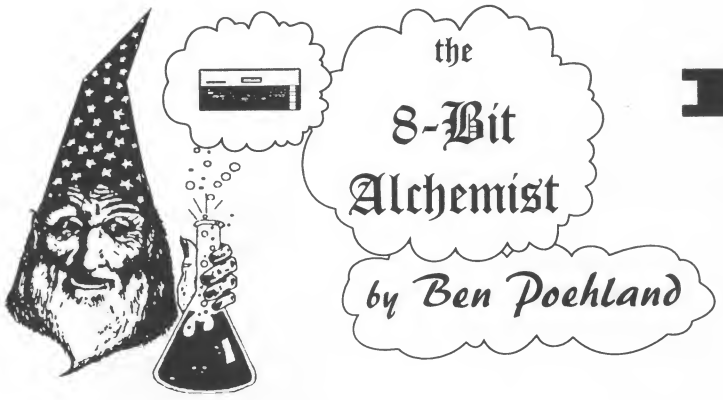
Bob

Super Video:

I would like to clarify something concerning the Super Video... and the letter from M.B. in the last issue. A couple of components were mislabeled during the editing of the original article, but the schematics are correct.

Charles Cole

OK - thanks, Charles!




# Percom Primer

## Never Say Die

Yep, I'm back. A few months ago I thought I'd never see another issue of this magazine, much less one containing yet another installment of this column. At the risk of stealing a line from Clemens, I'm pleased to state that rumors of my demise have been greatly exaggerated.

## Almost A Guru

As I look back on 10 years as a classic Atari user, I realize how much I owe to other users who helped me when I was a "newbie". One such person was a former professional colleague, Ph.D. chemist Dave Berges. By 1992 Dave had become a Mac convert, and just recently he packed up the family and took off for greener pastures out West. By way of passing he gave me what remained of his two 8-bit Atari systems.

Dave had jumped onto the Atari bandwagon a couple years before I did, so by my standards he was already an expert when I gingerly bought my first 800XL in January of 1984. He started out with an 800 and 410 tape drive. A little later he got bitten by the floppy drive bug and invested heavily in Percom drives. He was already adding a second 800XL based system with a Newell upgrade while I was still fumbling with the basics of DOS 2.0. I used to go over his house and get wowed watching him use his 80-column version of LetterPerfect. He showed me how to load object code files from DOS and how to boot DOS directly by holding down the OPTION key. Stuff I do now without even thinking, but it was all new to me back then—and Dave seemed almost a guru.

As the years went by, Dave's interest in his Ataris gradually waned while mine grew progressively stronger. At some point our roles became reversed, until in the end it was he who asked the questions and I who supplied the answers. A few years ago I repaired one of his ailing Percom drives (it had a bad voltage regulator), and developed a curiosity for them. Percoms always seem to show up at fests and swap meets, and by 1993 I had collected a basketful of them, all in various states of disrepair. The recent acquisition of Dave's old Percoms (complete with my 1991 repair notes still taped to the case) rekindled my—er, The Alchemist's—curiosity. Wiping the froth from my mouth, I dived into that basket and began fishing up pieces of dead Percoms.

## Nomenclature, Please!

Almost immediately I became confused. No two of these drives were exactly alike! There was a daunting profusion of different models. The cases were not all the same size: some were longer than others, and there was a real fat one with two drives in it. Although the drive mechanisms were all standard issue Shugart 5¼" units (as used in IBM PCs and compatibles), they were a mixture of full-height and half-height units. Even when I found several drives with the same model designation, the controller cards in them were not identical. *Hrummmph!* Why is it you must always wade through a mess on your way to the fun stuff?

After leafing through the various Percom manuals (no two of which were alike) and scanning ads in old issues of *ANALOG* and *Antic*, I pieced together the nomenclature of model designations used by Percom Data, Inc. There were basically two series of models: the RFD series and the AT88 series. The nomenclature for the model variations was as follows:

RFD4x-Sy

where: x=0 → a single-sided drive
x=4 → a double-sided drive
y=1 → a single-drive unit
y=2 → a dual-drive unit

AT88-Sy[PD]

where y has the same values and meanings as for the RFD series, and PD may or may not be indicated. If the unit has the PD designation, it is equipped with a built-in parallel printer port.

Looking over my collection of junkers, it was now easy to see exactly what I had. Among my collection were several RFD40-S1's, an RFD40-S2, and some AT88-S1PD's. (The RDF40-S2 is the fat one.) Well now, I was getting somewhere. Before you go ripping the guts out of some piece of equipment, it's always nice to have some idea what the critter is. I had eight units all together, and ultimately restored seven of them to like-new condition.

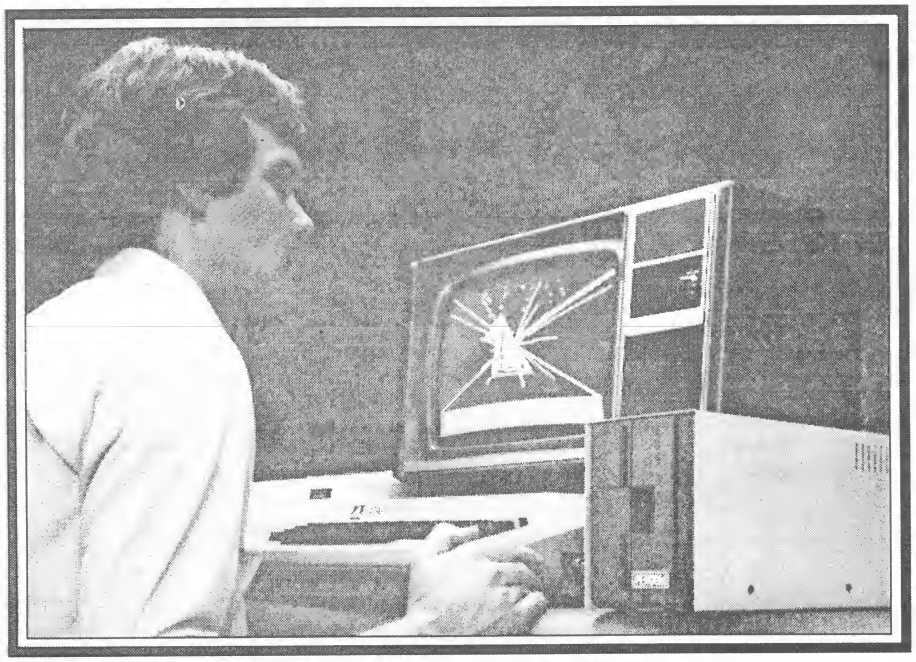
## Dumb Demons

I fired up each unit one at a time. Only two actually did something upon powerup; one of those was the one I'd repaired for Dave. The other functional unit tried to initialize itself but made a terrible meat-grinder noise (so familiar to you 810 aficionados). The other six, which were mostly RFD types, just sat there feigning ignorance of electricity. If there's anything an Alchemist hates, it's a machine that won't obey its human master. Putting aside the drives that ran, I summoned up my usual crew of trolls and gnomes and set upon the six recalcitrant units with a vengeance.

As I removed the chassis covers and began disassembling things, an odor wafted up. Ordinary mortals cannot

detect this odor, but we Alchemists recognize it instantly: it is the smell given off by an anxious Murphy Demon whose hiding place is about to be discovered. They were sweating. They well knew their time had come. And especially, they knew The Alchemist's favorite pastime is skewering their disgusting bodies upon the point of a hot soldering iron. The odor was really pungent: it withered the little hairs inside my nose.

As Murphy Demons go, these were pathetic. They were easy to find, and the sweet smell of burnt demon flesh soon permeated the house, to the accompaniment of their usual hideous screams. But we Alchemists take no pity on these devils, and in short order I had racked up another pile of Murphy's Little Helpers. A check of all the dead drives with a voltmeter quickly showed virtually all of them had bad voltages on either their +5 or +12 volt lines. In every case, the associated regulators were blown.



Now folks, the garden-variety 7805 or 7812 linear voltage regulator is a bulk commodity item in the electronic component market. They've been manufactured for almost 20 years. Used properly, they are very tough. They have built-in thermal shutdown protection, overvoltage and overcurrent shutdown protection, and their mechanical construction (typically a TO-220 device with a built-in heat sink) is physically rugged. On a few rare occasions I had seen them fail, but never in wholesale lots like this. At first I thought Percom had simply gotten a defective lot from the manufacturer, but that idea went out the window when I observed the blown units were from different manufacturers and of different voltage ratings. The riddle was answered sadly enough when I began removing the controller cards and regulators from the drive cases.

## Stupidity Worthy Of Atari

I was astonished to discover that in all the RFD drives, insulators had been used to mount the voltage regulators to the drive chassis. Worse, no thermal transfer compound had been used between the regulator and insulator, but inexplicably the compound *was* present between the insulator and chassis. It was absurd. Whoever built these things should have been hog-tied, shot, drawn and quartered. It has been previously mentioned in these pages that upon occasion The Alchemist employs colorful expletives, and on this occasion the epithets fairly flew.

We all know Atari did some stupid things when they manufactured our computers, and I can only assume Percom must have borrowed some goons directly from Atari to accomplish such an advanced degree of negligence. The drive cases are grounded, and so is the metal mounting tab in the 78xx series voltage regulators, so no insulator is necessary! And placing thermal transfer cream on one side of the insulator but not the other is just criminal—if you don't use it on both sides, you might as well not bother. The final verdict? Thermal failure of the regulators due to the faulty way they were mounted. Good thing these guys weren't building airplanes!

As I got deeper into the guts of the drives, I saw another possible avenue of failure for the regulators. In all the RFD drives the regulators were mounted in sockets. This is a violation of one of the Basic Laws of Electronic Alchemy: "Thou shalt not draw large currents through mechanical connections." Sockets are fine for TTL gates and other devices that draw small currents, but the hefty 1.5 ampere load of the voltage regulators is no place for a socket. Corrosion must inevitably set in, the connection becomes unstable, and nasty things happen. The 78xx series regulators are known to oscillate themselves to death in conditions of unstable capacitance. What is a layer of corrosion between two pieces of metal but the formation of a capacitor? Add to that the stray capacitance created by the worthless insulator, and top it off with a whopping load of heat that couldn't be transferred to the metal case because of the lack of thermal compound. Party time for the Murphy Demons.

There was one RFD unit, obviously the oldest of the lot, with a two-piece controller card. The regulators on this one at least weren't socketed. They had been soldered in place with corrosive paste-flux solder. Why this thing worked at all (if it ever did) was beyond

me. It was just too demoralizing: I trashed it.

In the AT88 drives, thankfully there were no insulators and no sockets. But the Percom people still didn't learn their lessons: there was no thermal transfer compound used to facilitate heat transfer to the chassis. The method of regulator mounting was odd: oversize screw-thread holes had been drilled into the regulator mounting tabs so a screw could be fastened from the outside of the chassis with no corresponding nut inside. All fine and good, but the machine work was done after the regulators were soldered to the boards. The machining operation weakened the pins on one regulator: upon removing the screw, the body of this regulator fell off, leaving the pins still stuck in the board. Even the Sunnyvale Stooges could have done better than this!

## Drive Mechs

While I had all the drives apart I took a look at the drive mechs. All but one were Tandon TM-100-1A units, single-sided full-height mechs widely used in early IBM 8088 machines as well as TRS-80 computers from Radio Shack. One AT88 drive contained a half-height MPI (Micro Peripherals Inc.) mech. I hate MPI mechanisms. They are unbelievably complicated and altogether too fragile. This one looked like it had been knocked off the edge of a table and taken a hard landing. All the tiny pieces of the mech were canted in the same direction: the latch was hopelessly jammed and wouldn't accept disks. More fodder for the landfill. I replaced it with a black faced Teac 360K mech.

All the mechanisms were filthy and corroded. I checked them out one by one using the two functional controller cards. Two were stone dead, and the rest worked but sounded awful. Several were out of spec on RPMs. The latches on all of them were very stiff and sticky. Unlike the belts on Atari 1050 drives that dry rot after a few years, the belts on all these Tandon mechs were in good shape. Come to think of it, I've never seen a belt failure on one of these old full-height mechs. I salvaged parts from the dead mechs and trashed the carcasses, and replaced them with Tandon TM-100-2A double-sided mechs removed from junker IBM PC's.

It took several days' application of rags, Q-tips and a fine varnish brush to chase out all the dust bunnies, dead roaches, and gross particulate matter. Application of Teflon lube-gel (available at Radio Shack) to the latches immediately restored them to free movement and eliminated the stiffness and stickiness. Mild application of ultrafine steel wool (grade 0000) to the head carriage rails removed rust spots, but lubing the rails required The Alchemist's special technique.

Why not just squirt some oil on the rails and be done with it? Because to do so would violate another Alchemist Law: "Thou shalt not use *any* liquid lubricants in disk drives or printers." This may seem dumb, but verily there is wisdom in this Rule. Liquid lubricants never stay where you put them: they migrate. They end up where they shouldn't be, like on circuit boards or floppy disks (assuming you haven't dribbled oil all over the innards of the machine by the time you reached the desired location). Worse, oils are chemically unstable. Either the volatile components of the oil slowly evaporate and leave behind a gummy muck, or else the oil itself slowly polymerizes upon exposure to air—which also creates a gummy muck. I get enough muck in other areas of my life, thank you: I'll not have any in my disk drive.

My technique begins with a wooden Q-tip stick (available at Radio Shack). Sight along the stick until you find an area where the wood grain slants at a shallow angle, then break the stick in that area. You should end up with a long slender sliver of wood whose tip can be curled without breaking. Put a slight curl in the end of this sliver and apply a small dab of the lube-gel. You can then apply the gel very precisely to wherever you wish, even the underside of rails where you can't see very well. Working the head carriage back and forth to gain access to the rails, I applied a thin coat of gel all over the rails with my wood sliver. This eliminated most of the meat grinder noises made by the drives when the heads move.

## The Lazarus Thing

With all the demons slaughtered and the drive mechs spruced up, it remained only to give the chassis and cover of each drive a good scrubbing and reassemble everything. Controller cards and mechanisms were reinstalled, along with new regulators to replace the failed ones. There wasn't much I could do about the sockets, but at least I treated them with a 5% solution of Cramolin Red in trichloroethane to ensure gastight contact. All the insulators were trashed, and the regulators remounted directly to the drive chassis with thermal compound. (Thermal compound is available in small tubes from Radio Shack. It's a suspension of zinc oxide in silicone oil. Squeeze it into a thimble and stir it well with a wooden Q-tip stick, then use the stick to place small dabs of the cream onto the mounting tabs. When the screws are tightened, you should observe only a small seam of compound squishing out from under the tab. Big messy gobs of thermal cream are the sure sign of a bungling amateur.)

One of the noble goals of the ancient Alchemists was the restoration of life to the dead; as a modern follower of the alchemical arts, now came my supreme moment. I plugged in the remaining seven drives and turned them on one at a time. Each one briefly flickered its READY light and initialized itself with a slight noise. This is as close as I'll ever come to bringing the dead back to life, and it's a magnificent feeling.

Just having the drives respond to power isn't enough, of course. It remained to connect them to a computer for final tweaking and a thorough checkout. This required some consideration of what DOS to use for testing.

## DOS & Disk Experiments

Percom drives were shipped with either OSA+ DOS (version 2 or 4) or, later on, a Percom version of DOS-XL. I have those DOS's around here somewhere but am no big fan of them. I long

ago became addicted to SpartaDOS 3.2d for my personal use, and of course I still use AtariDOS 2.5 as a common medium of exchange with other Atarians. All the Percoms worked fine with AtariDOS 2.5.

I was delighted to discover the Percoms also work well with SpartaDOS, which opened the door to a rich variety of format possibilities. There was no problem laying down either an Atari or Sparta single-density format. Then I tried double density and found that both the RFD and AT88 drives readily performed a true double-density (180K) format. I started getting ambitious and tried an UltraSpeed (sector skew) format. Nope, the Percoms wouldn't do that. Oh well, I could live without UltraSpeed. I tried booting a Percom from a Sparta disk formatted with UltraSpeed in a 1050; it booted OK, but the bootup was S - L - O - W.

Next I tried formatting in double-sided mode using an RFD40-S1 drive in which I had installed a double-sided mechanism, and here I found weirdness. To my surprise, the drive performed a true double-sided/double-density format (360K) without complaint. I didn't trust it. I took the Percom-formatted disk, stuck it in the CSS modified XF551 drive in my main system, and commenced dumping files to it from my hard drive. The dumping continued for a good while before my 800XL called a halt and bombed out with an ERROR 162 (Disk Full) message. I did a DIR to make sure the files were really there, then a CHKDSK to see how much of the 360K had been consumed. I was relieved to see that the entire disk really was full, and confirmed it with a manual tally of the byte count for each file. But we Alchemists are not easily sold, and I would not believe the Percom RFD40-S1 capable of true DS/DD operation until I had actually retrieved files from anywhere on the disk. Placing the full disk back into the Percom, I found it was only possible to read files from the first 180K of the disk. The second 180K was inaccessible. This exercise leads me to speculate that the only difference between the RFD40 and RFD44 drives is probably the controller card ROM and the type of mechanism installed (single- or double-sided).

Users of U/S Doubler 1050's seldom bemoan the absence of double-sided operation, since it is common practice to obtain full 360K capacity by merely notching the other side of the disk and formatting the flip side. This won't work in the Percom drives, since the mechanisms require a timing hole as well as the notch. DHDN (double-hole double-notched) disks are impossible to find, so you have to make your own. I took a junker disk (one with failed media), sliced open the envelope, and trashed the magnetic media. The empty envelope provides a perfect template for marking the location of the timing hole on the opposite side of a fresh disk. Use a pencil to draw the little circle on both sides of the fresh disk. Use a single-hole hand held paper punch tool (99 cents at Staples office supply) to punch out the hole you've drawn on the disk envelope. You have to do it separately for each side of the disk; *don't* punch out a hole in the disk media! Making these DHDN disks is a bit of a chore, so it's best to make a stack of them all at one sitting.

With my DHDN disks I had no problem formatting a bunch of 360K "flippies" on the Percoms. A couple disks refused to format side B because I hadn't positioned my hole puncher squarely so the holes didn't align well. This was easily remedied by nipping out a bit more of the envelope until the holes aligned, and all the disks worked fine. With a stack of DHDN disks at hand, the Percom RFD40 or AT88 drives are functionally equivalent to a U/S Doubler upgraded 1050 without the UltraSpeed capability.

I tweaked RPM's on all the Tandon equipped drives using Sparta's RPM.COM utility. The adjustment pot is located on a small circuit board attached to the rear of the drive mechanism and easily reached with a jeweler's screwdriver. The correct speed for these drives is 300rpm, but I always set them a little low, like 295, to provide downward compatibility with disks formatted on 1050 drives that spin at 288rpm.

Finally, I experimented to check for incompatibility among my various other disk drives, using a single-density format with AtariDOS 2.5. Disks formatted with DOS on side B in my CSS upgraded XF551 and no timing hole booted up just fine in the Percom. A similar disk formatted with DOS in a U/S Doubler 1050 refused to boot in the Percom. When a DHDN disk was formatted on side B in either the 1050 or the XF551, it booted OK in the Percom. Again it can be seen that the timing hole in the Percom is involved in disk compatibility.

I didn't try writing files to side B of the non-hole disk from the 551 that booted OK in the Percom. It may be that the hole is required at formatting time and when the disk is written to, but not when the disk is read. Still, I thought it odd that the non-hole disk from the 551 was able to boot in the Percom. The situation is complicated by the fact that my 551 contains both the CSS Dual Upgrade and the Enhancement Upgrade. Further, I was recently informed by Ron Fetzer of the Ol' Hackers user group that SuperDOS has an interesting feature that permits disks formatted on either side in a 1050 to boot in a Percom even with the timing hole covered. Sheesh! I decided to leave matters alone and move on to more interesting stuff.

## Slavery Is Legal

Percom drives can be daisy-chained off the SIO just like 1050's, but I'd consider that rather a wasteful way to employ them. A neat feature of Percom drives is their ability to accept up to three add-on slave drives. These slave drives consist only of an IBM compatible mechanism and the appropriate power supply and case. You don't need another controller card in the slaves. Although new 360K drives are becoming a rare commodity, they are plentiful in the surplus/salvage market for giveaway prices. A cheap ribbon cable with crimp-on connectors attaches the slaves to the "mother" drive. You can thus add extra drives for practically nothing, and their performance will be limited only by the performance charac-

teristics of the controller card in the mother drive.

On the RFD40-S2 and AT88 drives, the slave ribbon connector requires a card-edge connector that attaches to a small circuit board extending from the rear of the drive. On the RFD40-S1 drives, the connector is a 34-pin mass termination type that connects to a socket on the rear of the drive. (It would've been nice if these guys had standardized the type of connector to use!) I tested all my Percoms with slave drives and found the setup worked pretty well, with the exception of the AT88 drives which I'll describe later. However, you have to set the configuration switches properly to avoid problems and achieve maximum utilization of the add-on hardware.

On the rear of the RFD drives is a bank of 4 switches accessed through a cutout in the chassis. These are the drive configuration switches, and they're numbered 4,3,2,1 from top to bottom as seen in Figure 1.

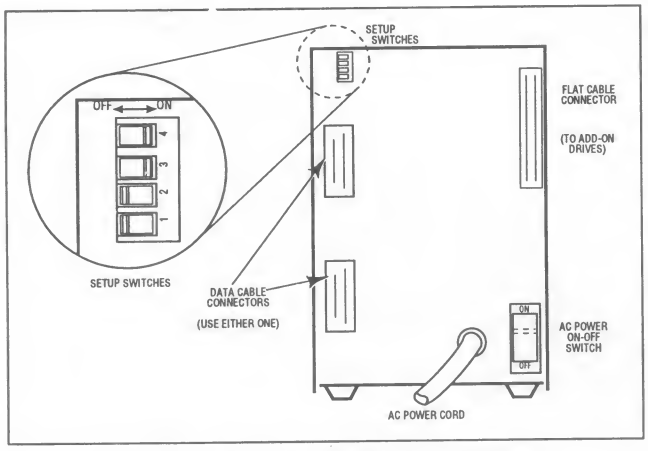



*Fig. 1: Rear View Of RFD Controller Drive*

The functions of these switches are as follows:

Switch 4: Sets density mode for the mother drive. ON for single density, OFF for double density.

Switch 3: Sets density mode for the first slave drive. ON for single density, OFF for double density.

Switches 2 and 1 are used to designate the drive number of the mother drive, according to the following table:

| | D1: | D2: | D3: | D4: |
|---|---|---|---|---|
| Switch 2: | On | On | Off | Off |
| Switch 1: | On | Off | On | Off |

I recommend that Switches 4 and 3 should always be OFF. Most Percoms will handle double density, so there's no point in hobbling performance by leaving them in single density configuration. If you use a single density disk in a drive configured for double density, the drive will automatically drop down to single density operation. However, if set to single, it won't recognize a double density disk and will bomb out with an error message. The same goes for any slave drives attached.

I had a little trouble with AT88 slaves at first. AT88's have no configuration switches like the RFD series has, so you can't tell them what the density of the slave drives should be. With a double density slave attached to an AT88, I found it would only recognize single density disks. After some fiddling around, I found it was possible to force the AT88 slave into double density mode by formatting a double density disk in the slave with SpartaDOS. After that, the drive recognized both double and single density as long as the system remained powered up.

The drive number designation of the slave drive is set by jumpers on the drive itself. In half-height drives these jumpers are usually pretty obvious on the drive card where you'll see a jumper block screened for DS0, DS1, DS2 and DS3 (DS = "Drive Select"). On these drives, the settings 1, 2 and 3 are used to designate slave drives D2:, D3:, and D4: respectively. On older full-height drives the situation is messy, as there are two types of drive cards and the positions usually aren't marked. The Percom manual does a decent job of showing how to configure these mechanisms as slaves. The information is shown in Figures 2 and 3.

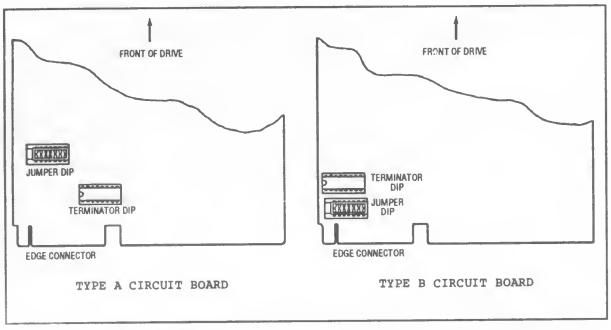



*Fig. 2: DIP Locations on Full-Height Drives*

## Beware The Terminator

All standard Shugart interface floppy drives require a resistive termination at the end of the signal chain. The nominal value of this resistance is 150 ohms, but the exact value is actually a rather sloppy number. I've seen these drives operate fine with no termination at all, but severe read/write errors occur when the resistive terminator is too low a value. I have my doubts as to whether it really even makes a difference exactly where in the cable chain the terminator resides (provided you're using relatively short cables).

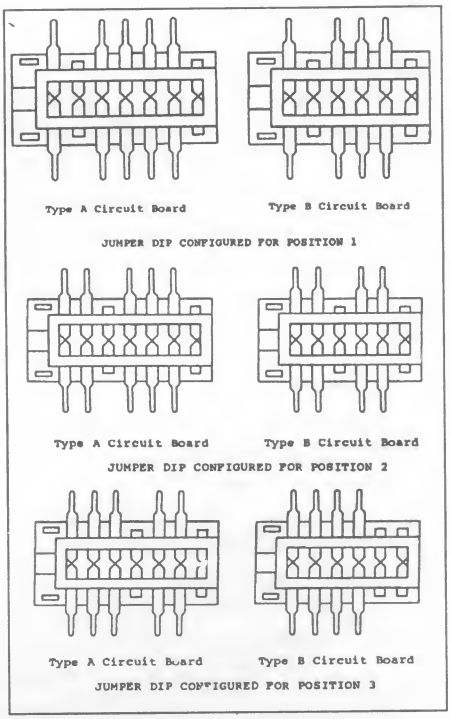



*FIG. 3: Jumper Settings For Slave Drives*

The actual terminator is typically a DIP chip package containing seven or eight resistors, sometime referred to as a "term-pak". Sometimes they are black like semiconductor chips, but more often they are a bright blue or yellow color to distinguish them from other chips. The terminator is nearly always in a socket (occasionally you'll find one soldered in place but with jumpers elsewhere on the board that will connect or disconnect it).

Although some Percom drive models have the term-pak installed in a socket on an extender card in the rear of the drive, all Percoms will accommodate terminator installation directly on the mechanism control card. I had a few odd experiences with the terminator installed on the extender card and preferred to keep it installed directly on the drive mech. When adding a slave drive, ideally you would remove the term-pak from the mother drive and place it on the last slave mechanism in the chain.

Some models with extender cards also have a six-position jumper block next to the term-pak socket (Figure 4).

These jumpers are for configuring the drive number of the mother drive in combination with any other Percom mother drives, slave drives, or Atari drives in your system. Manipulating these jumpers is a pain in the neck, so I left them all connected (jumpers all in place) and used the jumpers on the slaves to set the drive number of the slaves whenever possible. The Percom manual does a clumsy "monkey job" of showing how to manipulate these jumpers for specific drive setups laboriously illustrated "A" through "L"; tough luck if your setup doesn't match one of their illustrations! Figure 5 shows a four drive setup employing a master Percom, two slaves, and an Atari 810 drive. By substituting a US Doubler 1050 for the 810 you could could access all four drives conveniently with SpartaDOS, taking advantage of most of Sparta's advanced features with all the drives.

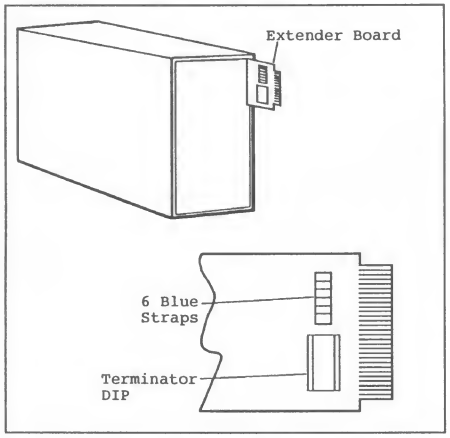



*Fig: 4: Rear View of Percom Drive*

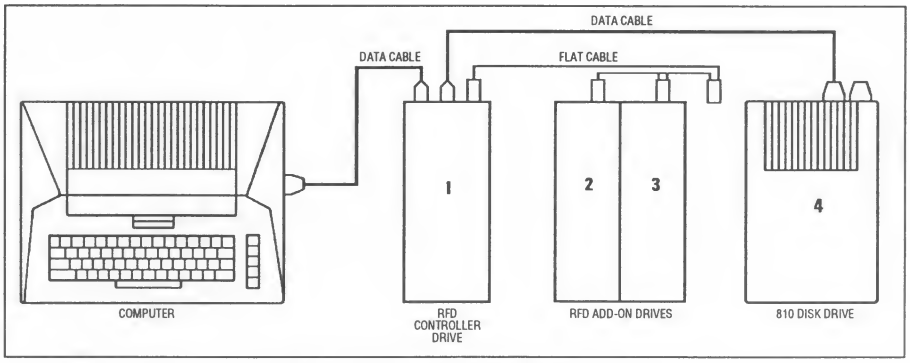



*Fig. 5: Example 4 Drive Setup*

## Some History

I'll diverge a little at this point to convey some impressions I have of Percom Data, Inc. and give a brief sketch of the company's history.

PERCOM DATA CORPORATION

Percom Data was founded around 1980 by a group of venture capitalists eager to cash in on the expanding home computer market. They used the technology developed in the 1970's by Dan Shugart Associates for floppy disk interfacing and adapted it to sell into the various home computer markets then in existence.

Until 1984, the company did fairly well in the Atari market. Despite the fact that prices on its products were outrageously high by today's standards, Percom won Atari converts by a combination of aggressive advertising and a technological edge over the competition in a market where competition was already scarce. During the First Era of the Classic Atari (the era of the 400/800 computers, 1979-1982), Percom's only serious competition was the 810 drive from Atari. Percom's offer of double density and double-sided drives combined with desirable features like built-in Epson printer interfaces appealed to the growing "power user" segment of the market. These users were typically affluent and willing to pay any price to achieve ever more productivity from their machines. Whereas the 810 drive appealed to the moderate user or to users who had gotten fed up with the hassles of tape drives, the Percom was the power user's drive of choice. Here's a sample of prices of Percom and Atari drives taken from a Lyco Computer ad in the December 1983 issue of ANALOG:

| | | |
|---|---|---|
| Percom: | AT88-S1 | $349 |
| | AT88-S2 | $535 |
| | AT88-S1PD | $449 |
| | RFD40-S1 | $499 |
| | RFD44-S1 | $575 |
| | RFD44-S2 | $899 |
| Atari: | 810 | $399 |
| | 1050 | $335 |

Then came the Computer Wars of 1984, and the whole market blew up. Fueled by a vicious 1983 price-slashing campaign by Jack Tramiel of Commodore, TI fled the market—leaving in its wake a $300 million trail of red ink. Atari absorbed staggering losses ($500 million or so) but hung on, and the long feud between Apple and IBM began in earnest. Dozens of small companies jumped into the fray, and Atari users for the first time were treated to a dazzling selection of disk drive products. The new 1050 from Atari began shipping in quantity, and there were fascinating new drives from companies that literally

sprang from the woodwork: Trak, Rana, and Indus to name a few. Competition grew fierce, and prices plummeted. Percom dealers lowered prices slightly, but by January 1985 Percom had been blown out of the Atari market.

Percom clung to existence for another year, but by the end of 1985 was no longer profitable. The company was liquidated in 1986. Percom's material assets—several tons of disk drives, parts, manuals, schematics, and other paraphernalia—were acquired by a computer repair company in Virginia which continued to offer Percom drives and service at bargain prices during 1987-1990. In 1991, the repair company gave up the ghost and sold the remaining stock of material to a private owner in the vicinity of Washington DC, after disposing of only a fraction of it in the liquidation sales.

Although Percom lasted longer than most other third-party manufacturers of floppy drives for the Classic-8's, my impression is that the company was poorly managed. During Percom's short life there were umpteen revisions of both the user manuals and the controller cards in their drives, indicating a serious weakness in quality control that came back to haunt them just as they were blindsided by a firestorm of fierce competition. Their splashy ads in ANALOG and Antic were impressive but not informative: there were no details to educate the uninformed reader why Percom drives were better than someone else's. In the early years they made top dollar selling into a cushy, relatively stable market, so they could afford some degree of squander and excess. But by 1984 the market had changed so drastically they were living in a fool's paradise and were simply swept away with the tide. By 1987 Atari Corp. had emerged as the clear winner in the disk drive market, effectively driving all the others into the dirt with a combination of low prices, mass merchandising through chain-store retail outlets, and lowered prices on the 1050 with the introduction of the XF551.

## Hardware Hacker's Paradise

I'm the sort of fellow who eats the cake part of a cupcake first and saves the icing for last. Having waded through the "cake" of this article, now near the end I'll give you the "icing".

The controller cards in Percom drives will handle 3.5" drives. It's true. I did it. It works. You can either slave a 3.5" floppy to the mother drive, or dump the 5.25" mech in the mother drive and replace it with a 3.5 incher. There are, however, some caveats. My experience was limited to 720K (Sony brand) drives which today are difficult to find. (I bought these a few years ago when Jameco Electronics in California was clearing them out at $30 apiece.) I won't guarantee what may happen if you hook up a high density 1.44 meg drive: maybe it will work, maybe not. Further, just because you hook up a 720K drive doesn't necessarily mean you'll get full 720K disk capacity. If the controller card in your mother drive is a single-sided controller, the most you'll get is 360K on your 3.5" disk, because it can't use both sides. (From the Sparta XINIT menu, select single-sided, 80 tracks, double density to get the optimum single-sided format.) If your mother drive's controller is a double-sided type, you'll be able to use the full 720K capacity of the 3.5" disk. The maximum you'll ever get is 720K even with a 1.44 meg drive installed (assuming a 1.44 meg drive will work).

Even if you don't replace the original mechs with 3.5" drives, the space occupied by those ancient full-height mechs is tempting. Midwest Micro (6910 U.S. Route 36 East, Fletcher OH 45326, 800-552-8080) still sells half-height Chinon 360K 5.25" floppy mechs for $39 apiece. I love these Chinon drives. They are completely shielded, well-made, and energy-efficient. I haven't tried this myself, but I'd be willing to bet you could replace the old power-hungry full-height Tandon mech with two of these Chinon drives mounted in the same case (the 2nd drive configured as a slave) with both of them connected to the power supply via a splitter. If your regulators have been properly re-mounted to the case, you just might get away with running both drives off the the old power supply without blowing up anything. It goes without saying this exercise is not for the timid: don't blame me if something goes PFFFFT!

And what of that parallel printer port in the AT88-SPD drives? Does it work? Yup. I made up a three foot ribbon cable with a 34 pin mass termination crimp connector at one end and the usual Centronics 36 pin connector at the other. Slapped it into my Epson L-1000 24 pin printer and began dumping some AtariWriter text files to the Epson. What can I say? It printed. Will it do graphics? I don't know: I didn't try that. I thought it pretty neat to print to a parallel printer without an external interface and the usual snake's-nest of wires.

Then I got wild. I grabbed a Digital Devices 64K printer buffer that never worked with my Epson when it was connected to the parallel port on my Black Box. Maybe it would work with the parallel port on this Percom disk drive? I had to try it! Got it all hooked up, and once again dumped text files to the Epson via the Percom printer port. Zilch. Nothing. RATS!!!! What *was* it with this print buffer anyway? It works on the parallel side: parallel data in, buffered parallel data out. I mean, parallel data is parallel data, right? RIGHT??? (From the vicinity of the buffer there came a faint high-pitched cackle, and I turned just in time to see a green web-fingered claw disappear behind the printer.)

And here, dear friends, is the classic example of how one problem leads to another. It was time for me to bid my Percoms adieu, and take another look at this parallel printer buffer. Why didn't this thing work? Perhaps the answer will be revealed in a future installment of The 8-Bit Alchemist.

# Now ALL of the best products come from CSS!

## R-Time 8 $49.95

If you use SpartaDOS or run a Bulletin Board System, you know how important it is to set the correct time/date when you boot up to maintain the proper time/date stamp on your files, or keep your BBS from deleting messages/users! The *R-time8* is a stackable cartridge that does all of this for you. It is a battery-powered electronic clock with reasonable accuracy you need only set once - programs can then access it instead of having to ask you for the current time/date. The cartridge comes with the latest disk version of SpartaDOS, the SpartaDOS manual supplement (not the full manual), and a handler (including 6502 source code) allowing you to access the *R-time8* within your own programs. Note that only SpartaDOS currently supports the time/date stamping of individual files. Add $5 for S/H.

## Action! Introductory Price $44.95

Named "The fastest, high level language available for the Atari," *Action!* has indeed become a popular language since its introduction in 1983. Many games and useful utilities have been written using this language cartridge from Optimized Systems Software. It is a high level structured language that compiles to 6502 machine code in a single pass. It incorporates features found in PASCAL, C, ALGOL, and ADA; yet it has many commands familiar to Atari BASIC.

Included with the cartridge is the *Action! Toolkit*, which has many sample programs and useful libraries for string manipulation, disk operations, graphics, and more. Also included is the *Runtime library*, which allows programs to be run without the cartridge. Comes *complete* with language cartridge, toolkit, and runtime disks and manuals. Add $5 for S/H.

## BASIC XL Introductory Price $44.95

How would you like to have a language that has the look and feel of Atari Basic, actually running Atari Basic files, yet two to four times faster, with many more built-in features and commands? *BASIC XL* is it! This is another language cartridge originally from Optimized Systems Software, the people that made the original Atari BASIC. Automatic line numbering / renumbering, string arrays, bit operators, program tracing, PRINT USING support, hexadecimal mode, and direct player/missile graphic support are just a few of the many things that set this language out ahead of standard BASIC. Add $5 for S/H.

## MAC/65 Introductory Price $44.95

This is truly THE 8-bit assembler of choice. *MAC/65* is the fastest macro assembler available, assembling thousands of lines per minute. The editor, assembler, and debugger are all built-in and directly accessible, so program development time isn't wasted. The DDT (Dunion's Debugging Tool) debugger has all you would expect - disassembly, single step, trace, and multiple breakpoints - plus many extras. Also included with the package is the *MAC/65 Toolkit*, containing examples and BASIC-like macros, allowing an easier transition into assembly language programming. This is the tool we use for all of the development work at CSS. If you want to get into machine language programming, this is it! Add $5 for S/H.

## Multiplexer New Lower Price!

This device brings the power and flexibility of larger systems to your 8-bit. *The Multiplexer* is a collection of cartridge interface boards that allow up to 8 Ataris to read and write to the same drives (typically a hard disk), access the same printer(s), and talk to each other. All computers are controlled by a single "master" computer. It is the first practial networking system for the Atari 8-bit computer.

The "common" peripherals (things that are to be shared) are connected to the master. On each slave, all disk and printer I/O is routed through the master, so no extra disk drives are needed. You may have certain peripherals local to the slave, or routed to a different number on the master.

This system is excellent for BBS SysOps; you can be using your hard disk(s) while still running your BBS uninterrupted. Another example is in a classroom situation, or anywhere a disk needs to be shared by many people. This is an excellent programming and debugging tool as well!

*The Multiplexer* sells for $149.95 for a master and two slave units with cable. Additional slave units are $49.95 each. Add $5 S/H.

## Super E-Burner Now on Sale!

The *Super E–Burner* is a PROM/EPROM programmer that plugs into your cartridge port. While a ROM permanently stores data (such as in a cartridge), an EPROM is a programmable ROM that is used for permanent or semi–permanent data storage. The *Super E-Burner* provides the special voltages and pulses need to program these devices, and at very fast speeds! It can program all EPROM sizes ranging from the 2732 to the newer 1MB EPROMs. The easy to use software allows you to read and program EPROMs and save their contents to disk.

The *Super E-Burner* regularly sells for $169.95, or $199.95 for the *Gang Super E–Burner*, which burns two EPROMs at once. Our sale price is **$149.95** for the *Super E-Burner,* or **$169.95** for the *Gang Super E-Burner*!

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## ATARI 8-BIT SUPPORT FROM RICHARD GORE

ARENA The full 50 level version of the excellent puzzle game that was a demo bonus on Page 6's issue 66 disk. Price: £5 ($10) XL/XE Disk only.

BUBBLE ZONE A fast blast em set on a grid being invaded by ever expanding bubbles. Collect the tokens and see how far you can advance. Price: £5 ($10) XL/XE Disk only.

JAWBREAKER Classic maze game based on Pac-Man, munch the sweets but don't forget that dental hygene! Two different mazes supplied which were originally separate games.

MOUSEKATTACK Another classic maze game, but this one involves you plumbing all the levels of Rat Alley. Addictive arcade action with a simultaneous two player mode.

Jawbreaker and Mousekattack are available separately for only £4.50 ($8) each or as a double pack for only **£6.95** ($13). They are available on disk, tape and Rambit turbo tape, please state which when ordering.

GATO High quality submarine simulation. Supplied shrink wrapped in their original packaging. Limited stocks priced at £6.95 ($14) on ROM cartridge.

**YORKY 256K** plug in memory upgrade with manual and support disk. Very few units left. Hurry this could be your last chance!
Price: £50 ($90) +p&p (UK £2, EC £3.50, world £5)

Thanks to a bulk purchase I am able to offer the following disk software titles for £4.75 ($10) each, any two for £8.50 ($17) or any three for £13 ($26). Stocks are limited and may not be replaced and are offered on a first come first served basis.

GORF - classic Space Invaders clone. XL/XEs require a translator disk.

HALLEY PATROL - a must for any astrology fan, enables you to chart Halley's comet (past and present). Also includes a descriptive slide show.

SILENT SERVICE - top class submarine simulation, great graphics.

SUMMER GAMES - take your Atari to the Olympics, great fun.

TAXICAB HILL - classic game, you take contol of a taxi, accept the phone calls and collect your fares but watch out for other traffic.

WINTER CHALLENGE - US release of Tynesoft's Winter Olympiad. Fantastic graphics winter sports simulation.

All software prices include p&p to UK, overseas please add £2 per order unless otherwise quoted. Payment by cash, cheque (payable to Richard Gore) or IMO. Prices in dollars are for USA customers and include shipping but payment must be in US dollars cash, preferably using registered post! You may order from:-

RICHARD GORE, 79 SPROTBROUGH ROAD, SPROTBROUGH, DONCASTER, DN5 8BW, ENGLAND

Plus coming soon..... new software from Germany, a Replay compatible sample sequencer and much more. Keep in touch for the details.

## PAL/NTSC UPGRADE
**by Nir Dary**

I can remember reading about PAL NTSC differences while I was living in Israel, but never had to deal with the problem until I came to the United States. Over here, many of my European games and demos didn't work properly on my NTSC systems. The music was out of synch, the screen was flickering or just garbage and some software just stuck and refused to work! I immediately called my father in Israel and asked him to ship me my 130XE PAL computer. Once it arrived, I hooked my PAL computer to my Magnavox NTSC color monitor and it worked!!!

All of my PAL programs that had a problem on my NTSC computers worked fine. Except for one minor problem: the PAL system uses a different color modulation technique and all my video was now monochrome. I could only enjoy my Atari in black & white. To get my color back, I purchased a Multi-System TV; one that can display any of the three formats, NTSC, PAL or SECAM. This solved the problem. Color was back. All of my software ran properly.

Six months later, my father sent me the rest of my Atari computers that I had left at home, four PAL machines. One, I gave to Bob Woolley so he could check his upgrades on a Pal computer. Another computer went to my friend Vince. This left me with two spare PAL machines that I could potz around with and not worry about crashing my 1meg PAL 130XE. It was time to find a better (and cheaper) solution to the PAL problem. How could we make NTSC computers work on PAL programs without spending a lot of time and money building a complete PAL system?

*[Nir, not being a technical wizard, proceeded to do what most of us 'experts' told him would be a major task - he altered an NTSC Atari to run PAL software on an NTSC monitor. Where expertise was lacking, he substituted determination and experimentation.... ed.]*

The solution is as simple as replacing the NTSC ANTIC with a PAL version and changing one byte in the OS ROM. All that great European software will work on an NTSC Atari computer (600XL, 800XL, 65XE, 130XE) in COLOR on a regular color NTSC monitor!!!

Itay Chamiel from Israel asked me if the upgrade will work on a computer with a modified OS like Ultraspeed OS+, Omniview, Omnimon etc... The answer is yes! While plugging a Pal ANTIC chip will fix a majority of the problems, I have found at least two programs that also needed the OS to be changed. It is possible to modify Omnimon, Omniview or any OS that is on a standard 27128 EPROM chip, but the Ultraspeed OS+ seems to have some sort of copy protection. You should check with the OS supplier before you copy his chips for this type of thing. If enough users inquire, they may even produce upgrades.

The modification will be available soon. It will include a PAL ANTIC chip, a modified OS, two demo disks and a small manual (it doesn't need much to explain how to plug chips!!!) The cost will be around $30 plus shipping, and the number of upgrades will be very limited since the supply of PAL ANTIC chips is minimal.

For more information, you can write me:
Nir Dary 19185 Castlebay Ln. Northridge, CA 91326

### Nir-PAL Explained

So, read the above text from Nir Dary. Sound interesting? You should hear Ben Poehland rave about T-34 (see review section). Ben is not a gamer by any means, but for THIS, he is excited. That should tell you something about how important Nir's upgrade is to the North American Atari community. Nir is from Israel, a PAL country. When he arrived in the US and had to use an NTSC computer, he realized that us local folks were really missing something. Being a true Atari citizen, and even though he acquired a PAL system for use over here, he was determined to solve the PAL problem for the rest of us. And, he did. You must have Nir's upgrade to run software like T-34 and many other great European products. Those users across the Pond are still cranking out top quality 8-bit stuff and YOU are going to miss it all unless you hack at least one of your 8-bits with this nir-PAL upgrade! (clever play on words.... not a true PAL system, but a hybrid that's just perfect for us NTSC 8-bitters)

Now, for the techie talk. The PAL software that we get from overseas is developed on a system that differs from our NTSC (US) computer in two ways: the vertical blanking interval and the color modulation technique. The VBI differences cause out of time sound and DLI interrupts, while the color differences cause a loss of color on our NTSC monitors and TVs. By a great stoke of luck, these two processes are handled by different sections of our machines and Nir managed to solve the VBI and DLI problem without affecting the color. You see, the VBI is done in ANTIC and the color is generated in GTIA. So, (it seems so obvious now) all Nir had to do was plug in a PAL ANTIC chip and leave our GTIA the way is was. Voila! PAL VBIs and NTSC color! Brilliant! The other tweak is to the OS. The OS sets the PAL flag at $62 by reading the hardware in GTIA at $D014. Since we still have an NTSC GTIA chip, we need to change $C386 to $01 (also change $C000 checksum value from $11 to $12) so the OS thinks we are really PAL. The result is a video output with a 50hz vertical frequency and 315 scan lines. You may notice a slight flicker under fluorescent lights from the 50hz, but it is not objectionable. One of my monitors required a little vertical hold adjustment and you may want to adjust height and vertical linearity for taller picture. Otherwise, it is a drop-in if you have socketed chips. If you have soldered in chips on a 130XE, be very careful about de-soldering them. You WILL trash your machine (ask Nir).

# Solution of the Month

I just love those old time adventures.... Can't solve them for dirt, though! For all you folks out there who want to introduce your kids (grandkids, younger siblings, etc.) to Atari adventuring, check out our solution of the month. This is to HELP the little darlings, not to ruin it for them, so don't just let them read the answers.

**Provided by Nir Dary**

## THE COUNT

In this adventure, your goal is to find and kill the evil vampire, Count Dracula. This is probably the most boring of the Adams Adventures because you have to do a lot of waiting for some things to happen, and exactly when they happen seems to be a random thing.

You start off in bed in Dracula's house. Get the sheets, then get up. Go North into the hallway, then West into the kitchen. Enter the dumb (waiter) and raise it, then go room. You are now in the pantry. Get the matches and the garlic, then return to the dumb waiter.

Lower the dumb twice, Now it's time to get the light source, so go Down the dungeon. Tie the sheets to the iron rings, then descend into the pit. Get the torch (it's there even though you can't see it), and climb again. you don't have to bother about the sheets again. Go back into the dumb and Raise dumb to get back to the kitchen.

When you will hear the bell ring "DING-DONG", This will tell you that the postman has delivered some mail to the house. Once you hear the bell, go to the front door. You will find a postcard with a note clipped to it. Read the postcard. Get the paper clip and drop the note.

Now, return to the kitchen, get into the dumb waiter, and lower it to the Work Room. Go into the room. Pick the lock on the closet door (with the paper clip, of course), open the door, and enter the closet. Drop the stake you're carrying, then get the vial and leave.

Back in the Work Room, close and re-lock the door, and drop the paper clip. Now go back up to the kitchen. Empty the vial (3 No-Doz tablets come out) then drop it. Take the tablets, Now you have to wait until sunset, but you must be careful here. Stop saying "wait" as soon as it starts to get dark outside, When you are starting to feel tired Eat a tablet. Then continue to wait until nightfall, at which time, light your torch.

Wait a little longer, then enter the oven. It's a solar oven, so you can never get in here during the day. Get the nailfile that's inside, and leave the oven. At this point, you have done all you can, so you might as well go back to bed. Remember to unlight the torch before going to sleep. This night you will be bitten, and there is nothing you can do about it.

The next morning, you will notice that the sheets are on the bed again. Get them, then get up. Tie the sheet to the bed, then get the sheet (loose end), open the window, go out the window, and drop the end of the sheet over the ledge.

Now climb down the sheet, go to the Window Box, then go through the window into the room. Drop the nail file here, Get the portrait of Dracula and drop it. This will reveal a secret passage. If you want to explore it, go ahead (light torch first). Just make sure you unlight the torch before you're trying to climb back up the sheets!

Well, here you have plenty of time to kill until the mailman brings a certain package. So, just mess around again until the bell rings. (But don't type: Wait!!!) At that point, go to the front door again.

Open the package. Inside are a bottle of blood and a pack of cigarettes. Get the cigarettes (make sure you say "pack"!). After that, go back down the sheets to the room with the secret passage. You should do this before night falls. Drop the pack of transylvanian cigarettes and take a cigarette, Don't forget to take the nail file.

Now wait for sunset the same way you did the night before. Once the sun sets, light your torch and go into the passage. Follow it along to the crypt. Light a cigarette, then smoke it. Dracula's (empty) coffin will appear (this is the only way to make the coffin appear).

Open the coffin and go inside. Use the file to break the bolt on the coffin, then get out again. Drop the lighted cigarette, and leave the passage. Now, take a second cigarette from the pack and just put out the torch and go to sleep.

Once again, you wake up in the bed, with the sheets. Get them, and tie them to the bed as you did the day before. Open the window and go down the sheets to the room with the secret passage. Drop the new cigarette here. Now go to the Kitchen (don't forget to unlight the torch) to the dumb waiter and from there to the Work Room. Use the clip to pick the lock on the closet door so you can get the stake. Also make sure you grab the mallet on your way out.

Now that you have the stake and the hammer, go up to the kitchen again, and from there to the bedroom and down the sheets to the secret passage. Light the torch, enter the passage, and go to the crypt. Light the cigarette Smoke the cigarette, and the coffin will appear again.

Open the coffin, go inside (yes, you must!), and apply the coup-de-grace to the vampire. TA-DA! You're a hero! (Hey, you're pretty good at this stuff. How are you with voodoo...)

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**08/25/94**

# Daisy Wheel Printer

## ATARI XDM121 PRINTER

### FOR YOUR ATARI 800/XL/XE

The Atari XDM121 daisy wheel printer is the perfect companion for your 800/XL/XE Computer. NO INTERFACE REQUIRED! The daily wheel rotates to print fully formed characters - just like those you'd get from a high-quality office typewriter. It's the ideal printer for word processing applications that require legibility and style. Sophisticated features such as bold face printing, underlining, subscripts, superscripts and international character set will greatly enhance your written work. The bidirectional, logic seeking printing methods eliminates wasteful mechanical movement, thereby allowing greater printing speed. The printer offers an array of tabbing controls and page-length options and can store these format commands in its memory. Its control panel includes three built-in functions, yet it remains uncomplicated and is a snap to use. Includes Courier 10 pitch font.

**$99.95** HDA050 (Plus $12 shipping in U.S.)

**SPECIAL: PRINTER AND SHEET FEEDER $125.00** PKG005 (Plus $18 shipping in U.S.)

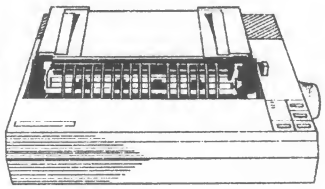
## XDM121 PRINTER SHEET FEEDER

The SHEET FEEDER attaches easily to your ATARI XDM121 Printer. It has a capacity of 200 sheets of standard typing paper and a variable width paper receiving tray. Multiple documents are automatically collated in the order printed. A manual feed slot allows you to insert single sheets by hand without removing the feeder from the printer. Works great with Atariwriter wordprocessing program. (not guaranteed to work with all word processors)

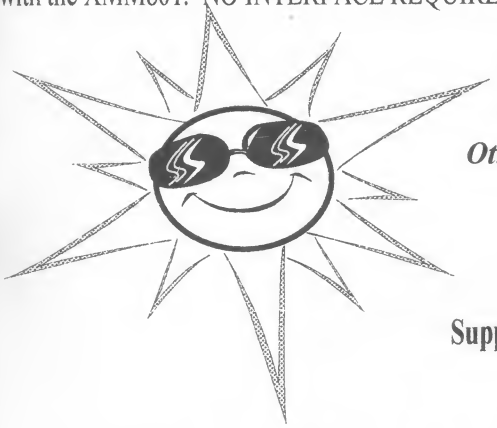
**$49.95** ACA081

# Dot Matrix Graphic Printer

## XMM801 PRINTER



The Atari XMM801 dot matrix printer is a great printer for your 400/800/Xl/XE personal computer. It has quality features such as Pica, Double Width, Proportional Elite, condensed, bold, double strike, subscripts and superscripts, underlining, and international charaters. the speed of the printer is 80 charaters per second with a full capability for graphics. You have a choice on how the paper is to be put in pinfeed or single sheet. It has an easy replaceable ribbon cartridge. It works well with AtariWriter which is a word processor You can also use Print Shop which designs and prints cards, stationery, flyers, and banners. You do need a driver to use the Print Shop with the XMM801. NO INTERFACE REQUIRED!



XMM801 Printer **$99.95 HDA046.**

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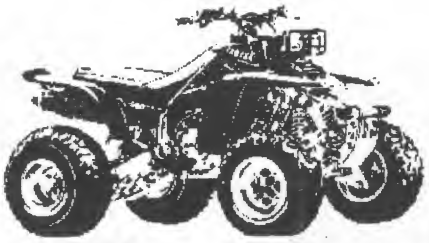

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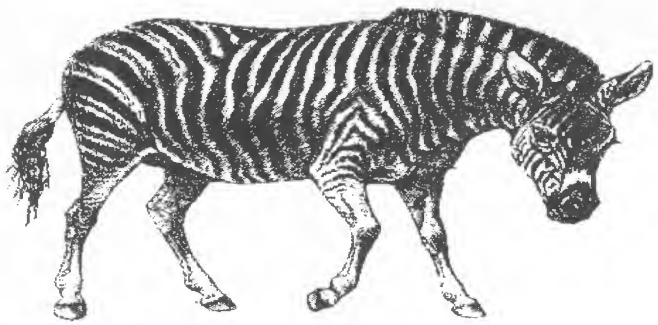
| FSA026 | 2600 VCS ..... | 20.00 |



## COMPUTER/PARTS

| | | |
|---|---|---|
| PRA005 | 400 Printed Circuit Board PCB | 10.00 |
| PRA021 | 800XL PCB ..... | 75.00 |
| PRA091 | 65XE PCB ..... | 75.00 |
| PRA092 | 130XE PCB ..... | 125.00 |
| PRA093 | XE GM Main PCB ..... | 75.00 |
| PRA022 | 1200XL PCB (64K)..... | 40.00 |
| PRA035 | 800 MAIN PCB W/ALL CHIPS ... | 10.00 |
| PRA030 | 800 CPU,GTIA,6502 & ANTIC PCB | 10.00 |
| PRA057 | 800 10K ROM PCB..... | 10.00 |
| PRA055 | 800 POWER PCB..... | 5.00 |
| PRA019 | 800 PCB SET WITH MAIN,CPU, 10K OS, POWER AND RAM... | 40.00 |
| PRA020 | 800 PCB SET LESS RAM ..... | 30.00 |
| PRA025 | 800 SPEAKER ..... | 2.00 |
| PRA082 | 1020 PRINTER PEN HOLDER WHEEL | 1.95 |
| PRA016 | CARTRIDGE CASE ..... | .75 |
| PRA062 | EPROM cartridge pcb 16k 2X2764 | 5.00 |
| PRA065 | EPROM cartridge pcb 8k 2x2532 | 4.00 |
| PRA004 | RF MODULATOR 600/800XL ..... | 7.25 |
| PRA023 | RF MOD 65/130XE ..... | 14.95 |
| PRA024 | RF MODULATOR XEGM ..... | 12.00 |

Keyboards (internal):

| | | |
|---|---|---|
| PRA002 | 400 MEMBRANE ..... | 10.00 |
| PRA031 | 800 (NEW)..... | 30.00 |
| PRA007 | 800XL (RECON) ..... | 25.00 |
| PRA079 | 65XE/130XE/..... | 30.00 |
| PRA018 | 1200XL ..... | 25.00 |
| PRA084 | XE GAME MACHINE ..... | 30.00 |
| PRA089 | XE GM with case & cable .... | 39.95 |

## DIAGNOSTICS

| | | |
|---|---|---|
| PRA090 | PBI Diagnostic for 130XE ... | 29.95 |
| PRA008 | 1050 DIAGNOSTIC DISK..... (NOT FOR MODIFIED DRIVES) | 15.00 |
| PRA009 | 810 DIAGNOSTIC CART..... | 15.00 |
| PRA010 | SALT 2.07 400/800 CART ..... | 15.00 |
| PRA011 | SALT SE 800XL/XE CART ..... | 15.00 |
| PRA012 | CPS SUPER SALT CART ..... | 15.00 |
| PRA014 | SUPER SALT TEST FIXTURE .... | 50.00 |

## DRIVE PARTS

| | | |
|---|---|---|
| PRA061 | 810 SIDE WITH DATA SEPARATOR | 15.00 |
| PRA058 | 810 ANALOG BOARD ..... | 10.00 |
| PRA060 | 810 POWER BOARD ..... | 15.00 |
| PRA032 | 810 MPI DRIVE MECH ..... | 25.00 |
| PRA033 | 810 TANDON DRIVE MECH ..... | 50.00 |
| PRA034 | 810 PCB SET/DS/SIDE/PWR/ANLG | 40.00 |
| HDA027 | 810 DRIVE/BASE (NO CASE).... | 50.00 |
| PRA042 | 810 TANDON DOOR ..... | 8.00 |
| PRA038 | 810/1050 TANDON DRIVE BELT . | 7.95 |
| PRA077 | 1050 WORLD STG DRIVE BELT... | 7.95 |
| PRA048 | 1050 TANDON TRK ZERO SENSOR. | 12.00 |
| PRA047 | 1050 WRLD STG TRK ZERO SENSOR | 12.00 |
| ACG087 | STICK-ON DRIVE NUMBER LABELS. | 1.00 |
| PRA041 | 1050 DRIVE MECH TANDON ..... | 75.00 |
| PRA088 | 1050 PCB ..... | 50.00 |
| PRA072 | XF5551 MECH ATARI ..... | 100.00 |
| PRA086 | XF551 MECH GENERIC ..... | 50.00 |
| PRA087 | XF551 PCB ..... | 95.00 |

## INTEGRATED CIRCUITS

| | | |
|---|---|---|
| ICA296 | 800 ANTIC .....CO12296 | 5.00 |
| ICA377 | 800 CPU 6502 .....CO14377 | 5.00 |
| ICA299 | 810 ROM C .....CO11299 | 5.00 |
| ICA329 | 810 FDC WD1771.....CO14329 | 5.00 |
| ICA099 | 850 ROM B .....CO12099 | 5.00 |
| ICA541 | 1050 EPROM L ..... | 5.00 |
| ICA001 | 1050 FDC WD2793 ..... | 19.95 |
| ICA303 | ASSEM REV B .....CO60303 | 7.50 |
| ICA502 | BASIC REV A CHIP SET ..... | 5.00 |
| ICA947 | BASIC REV C .....CO24947 | 12.00 |
| ICA991 | FREDDIE .....CO61991 | 12.00 |
| ICA805 | GTIA .....CO14805 | 5.00 |
| ICA745 | MPU 6507 .....CO10745 | 5.00 |
| ICA499 | OS ROMS (499B-599B) ..... | 5.00 |
| ICA795 | PIA 6520 .....CO14795 | 5.00 |
| ICA750 | PIA 6532 .....CO10750 | 5.00 |
| ICA294 | POKEY .....CO12294 | 5.00 |
| ICA328 | RAM 6810 .....CO14328 | 5.00 |
| ICA444 | VCS TIA 444 .....CO10444 | 5.00 |
| ICA697 | XL/XE ANTIC .....CO21697 | 12.00 |
| ICA618 | XL/XE MMU .....CO61618 | 5.00 |
| ICA598 | XL/XE OS .....CO61598 | 12.00 |
| ICA806 | XL CPU .....CO14806 | 8.00 |
| ICA472 | XL DELAY .....CO60472 | 5.00 |
| ICA953 | XE GATE ARRAY.....CO25953 | 12.00 |
| ICA696 | XF551 ROM .....C101696 | 15.00 |
| ICA235 | XF551 CPU .....C070235 | 10.00 |

## POWER ADAPTERS

| | | |
|---|---|---|
| PRA001 | 400/800/810/1050/XF551 ..... | 9.95 |
| PRA053 | XL/XE COMPUTER - 1 AMP..... | 15.00 |
| PRA006 | XL/XE COMPUTER - 1.5 AMP.... | 20.00 |
| PRA029 | XEP80/SX212/2600VCS ..... | 9.95 |
| PRA017 | 830/835 MODEM..... | 9.95 |
| PRA026 | 1010 PROGRAM RECORDER..... | 5.00 |
| PRA027 | 1030 MODEM..... | 9.95 |
| PRA028 | 1027 PRINTER 1090 interface | 20.00 |
| PRA052 | 5200 GAME MACHINE..... | 20.00 |
| PRA050 | 7800 GAME MACHINE ..... | 15.00 |

# B&C ComputerVisions

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**FAX: 408-986-9968**


## DIRECT FROM EUROPE!!! FOR YOUR ATARI XL/XE $14.95 each *(64k w/1050 req.)*

### *ASHIDO - ATD915*
Enjoy chinese stone meditation with Ashido! Try to place all stones on the board getting most points. Colorful graphics and three different stone sets.

### *BOMBER JACK - ATD911*
Another brainkiller from Ke-Soft. Help Jack to collect all gold pieces by bombing around. Lots of strategic elements combined with funny music and fast arcade action.

### *CAVERINA - ATD920*
In Caverina, you are a miner going on a magical journey through the complex underground tunnels and caves searching for precious artifacts and gems. In each level, you will come up against a series of intricate puzzles, treacherous mutants, static electric fields, dangerous rock movements and lots, lots more!!

### *DONALD - ATD917* (req. 1050 drive)
Help Donald the Duck to travel through five mysterious levels each consisting of ten screens in search for the golden eggs. Great graphics and music, cartoon-like animation.

### *DRACONUS- ATD919*
Draconus is set on an alien planet ruled by the Tryant Beast who must be obliterated in the final scene of the game. On your journey through the Layrinthine Complex you'll meet various nasties such as giant rats, bats, and sea serpents, together with a sprinkling of Terror toads and ferocious Catepelose. Harder to describe are the Bonce Blobs, Balls of Gooey matter which drips from the cave ceiling only to bound around in mid air causing ou even more problems! To help you on your way are many artifcts like the Demon Shield, Necromancer's Staff, Dragon's Eye and Morhp Helix, Flasks of Flame fluid, Energy Crystals and many spells help you on your way.

### *FRED - ATD904*
Fred is a real stone age rockstar! Being a little bolder than the rest of his tribe and bored with banging skulls together, Fred embarks on the ultimate quest to find the true meaning of caveman life. Armed with only a single figure I.Q. and a large supply of hefty rocks, this is a mission fraught wtih danger and excitement!

### *HANS KLOSS - ATD934*
World War II is going on. Hitler, alarmed by an intelligence's report about forthcoming Allies offensive, attempt to stop the allied forces. As Hnas Kloss, the allies top agent, your job is to penetrate into an underground bunker, where all the document are held.

### *MISSION SHARK - ATD924*
A Mammouth covert operation behind enemy lines. Gain access to the opposition forces' multi-level HQ and blast through to the high security areas destroying all enemy units. Deadly combat action!

### *MOUNTAIN BIKE RACER - ATD933*
Mount your all-terrain Mountain Bike ans cycle thru the most hazardous course you can imagiine.

### *OBLITROID - ATD918*
Our superhero Oblitroid is to fight the evil Tindalos in his underground fortress! Travel through four worlds, explore 170 screens in all Lots of hidden items and monsters.

### *NINJA COMMANDO - ATD905*
A Martial Arts game with brilliant graphics and 8 horizontal scrolling levels. You are Ninja, the Master of Marital Arts with all his special powers. Can you survive the Deathstars, Grenades, and machine gun fire? Only you control this Scrobatic Ninja!

### *SCARY SCHOOL - ATD906*
Your task is to have Blinky, the star pupil from the School for young Ghosts, penetrate the cunning traps in Crumtrochie Castle and avoid the cunning Ghostgbuster Red Laird McTavish. This game has fantastic graphics and sound. Hard to believe its an a-bit game!

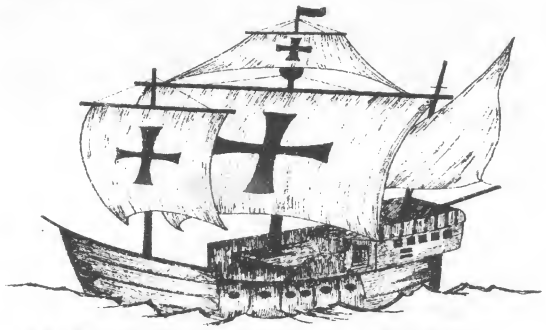
### *STACK UP - ATD907* (req. 1050 drive)
Stack Up is the ultimate arcade game mixing fast reactions, skill and brain punishment in suberbly addictive quantities. Stack Up is like Tetris in play, but only better!!

### *TAGALON - ATD925*
You must collect the marbles and get to the room with the magic purple bed deep insede the castle and avoide the baddies!

### *TECNO NINJA - ATD914* (req. 1050 drive)
Help Garagon the Tecno Ninja to find the hidden stone of Sassafras on the planet Sarcendor. Lots of nasty creatures and helpful items in 100 screens of action!

### *ZEBU-LAND - ATD912* (req. 1050 drive)
Help Zebu and his friends to escape from the 50 level maze with revolving doors and moveable blocks. Great graphics and musical tune, codes to start at each level .. best seller!

### *ZYBEX - ATD908*
Battle on your own or with a friend through the planets of the Czokan system to your final destination, Zybex. The great variety of weird and wonderful weapons ensure there are hundreds of variations on blasting your space opponents to oblivion!!



## *Other European Titles:*

### *THE BRUNDLES -- ATD949 - 34.95* (req. 1050 drive)
This game is just like Lemmings. It has 100 levels to keep you busy. The game is compatible with a joystick, numeric keypad, mouse, and the animation station.

### *GIGABLAST - ATD923 - 19.95* (req. 1050 drive)
Together with other astronauts, you are sent to the hostile planet of Arxonis to free the innocent people living on it. Five ships armed with 3 spherical bombs are under your control. You are the only hope of millions of people and and the future of the universe!

### *GLAGGS IT! - ATD921 - 19.95* (req. 1050 drive)
Be prepared to have your skills stretched to the limit in this fast paced game. Blocks with up to 8 different colors drop down in columns. It's your task to catch them and build columns of blocks in the same color. Many skill levels to test you!

### *OPERATON BLOOD - ATD935 - 23.95*
This very fast action game is similar to the arcade game Operation Wolf in mono color, you fight the enemy soldiers, tanks and helicopters.
***Light gun version - ATD939 $25.95***

### *TAIPEI - ATD922 - 19.95* (req. 1050 drive)
The game of ivory tiles, played by seafarers, scoundrels and emperors of the far east for centuries awaits. Ancient tiles are stacked randomly. 144 tiles beckon your skill and strategy in matching pairs, eliminating them from the board.

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# SOFTWARE DISCOVERIES!!

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AS LOW AS **$4.99** Each

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**KLONDIKE SOLITAIRE & SEVENS** - Two classic strategy card games. Hours of recreation. APO174 **$14.50**

**PUZZLER** - Infinite jigsaw puzzles, use our own pictures. Set difficulty level for any age group. APO150 **$11.95**

| | | |
|---|---|---|
| **DIGGERBONK** | APO107 | **$11.95** |
| **GALAHAD/ HOLY GRAIL** | APO110 | **$14.50** |
| **HALLEY PATROL** | APO159 | **$17.95** |
| **LORD OF THE ORB** | APO103 | **$14.50** |
| **OMAR** | APO140 | **$11.95** |
| **ORBIT/TRIP TO MOON** | APO168 | **$14.50** |
| **SARATOGA** | APO104 | **$14.50** |
| **SPACEWAR** | APO101 | **$11.95** |
| **SNARK HUNT** | APO105 | **$11.95** |
| **TAXI CAB HILL** | APO137 | **$14.50** |
| **WEAKON** | APO122 | **$14.50** |
| **XTAL (CRYSTAL)** | APO158 | **$14.50** |

## PRODUCTIVITY

**CREATIVE PROCESS 1.8** - An indispensible outline processor. APO151 **$17.95**

**DEEP BLUE C COMPILER & MATHLIB** - The all purpose language and math library. APO188 **$17.95**

**DEEP BLUE SECRETS** Source for Deep Blue C. APO115 **$17.95**

**FLOATING POINT PACKAGE** - Includes Extended D.D.T. - A powerful combo for assembly language. APO189 **$17.95**

**INTERLISP/65 2.5** - A subset of the standard "INTERLISP" dialect of LISP. APO191 **$17.95**

**RAMBRANDT 2.0** - The ultimate paint software on two disks. APO157 **$17.95**

**SPELL MAGIC rev. 5** - Check documents generated by other word processing programs, and in context with the document display feature. APO144 **$17.95**

**SPACE BASE** - A stellar information data base. A complete, instant Astronomy reference sourse. APO142 **$17.95**

**MAPWARE** - Add maps to your programs. 9000 pairs of coordinates available. Requires Atari Basic. APO134 **$17.95**

**MEMOREASE+** - Learn to memorize efficiently and quickly. APO163 **$17.95**

**ENHANCED DRAWIT!** - A graphics mode 7 paint package with compression utilities APO108 **$14.50**

**PRINTER DRIVER CONSTR SET** - For the AtariWriter APO131 **$17.95**

**WORD MAGIC & GRAPHICS MAGIC** - Word magic is a high-powered wordprocessor with cut-and-paste, and many font types. Graphics Magic easily inserts graphics into any document. APO130 **$14.50**

**EARTHVIEWS** - Call up 250,000 different maps and vies of the Earth instantly. Includes detailed hi-res maps. APO141 **$17.95**

**GRAPHICS SHOP** - Use your own Atari picture files for your Printshop signs, banners and letterheads APO156 **$17.95**

**COLOURSPACE** - Use your joystick to create mind-boggling light shows. APO166 **$14.50**

| | | |
|---|---|---|
| **CALC MAGIC** | APO177 | **$14.50** |
| **SPEEDREAD+** | APO164 | **$17.95** |
| **CARTOONIST** | APO124 | **$14.50** |
| **BGRAPH ENHANCMNT....** | APO190 | **$17.95** |
| **FAMILY TREE** | APO133 | **$17.95** |
| **HOMECARD** | APO175 | **$14.50** |

## ENTERTAINMENT

**ASTROLOGY**- Create beautiful charts for your family and friends. Imaginative gifts, always popular. APO167 **$14.50**

**ATARIORACLE** - The computer OUJI board. Predicts the future, answers all questions, picks LOTTO numbers. APO138 **$14.50**

**BLUE TEAM BRIDGE** - Tournament level. Play at any time, improves your bidding- or learn to play. Great graphics APO178 **$14.50**

**CHOP SUEY** - Joystick-busting, action-packed, martial arts excitement. One of our best all-time sellers. APO162 **$14.50**

**COLOSSUS CHESS 3.0** - The best Atari chess game for the serious player, beginner, or Grand Master. APO161 **$14.50**

**CRIBBAGE & SEVEN CARD STUD** - Two great card games. The poker players don't cheat, but they bluff. APO173 **$14.50**

**DRAGON'S QUEST** - A wonderful illustrated adventure game for your entire family. Fast and fantistical. APO139 **$14.50**

**KING TUT'S TOMB** - 48 dangerous, multi-screen tombs, or construct your own APO149 **$14.50**

**PAGE: AT SOFT DESCRIPTIONS 3**

## UTILITY

**BASIC VIEW** - A must for all programmers. Shows actual execution of program code while program is running. APO192 **$17.95**

**ENHANCED POKEY PLAYER** - Input and edit music. Includes tutorial. APO147 **$14.50**

**ENVISION** - Create stand-alone pictures or produce Basic and Assembler Source Codes. Requires Basic, MAC/65, SYNAssembler. Epson compatible printer. APO185 **$17.95**

**PICTURE PLUS 3.0/LISTER PLUS 1.5** - The complete graphic utility set. APO179 **$17.95**

**SCREEN PLOT** - Print color micro-screens on most plotters including the Atari 1020 plotter. APO135 **$14.50**

**SHERLOCK 1050** - Restore crashed disks with the trace option feature. APO155 **$17.95**

**SOLID OBJECT MODULE** - Create 3-D objects easily. Requires Rambrandt. APO182 **$14.50**

| | | |
|---|---|---|
| **INSTEDIT 2.0** | APO117 | **$7.50** |
| **CUSTOM BLEND** | APO118 | **$7.95** |
| **DISK SCANNER** | APO145 | **$5.95** |

## TELECOMM

**BACKTALK 1.2** - The Atari becomes a communications droid with the macro command feature. APO154 **$17.95**

**CHAMELEON CRT TERMINAL EMULATOR 4.03** - One terminal becomes five in a matter of minutes. requires 48K RAM. APO113 **$17.95**

**BBCS II - 1030/XM301 VERSION** - Build your own powerful, custom Bulletin Board. Define up to 26 terminal types and directly support up to 25 other kinds of computer. APO153 **$22.50**

# 800, XL, XE COMPUTERS AND ACCESSORIES

## PRINTERS

ATARI:DIRECT CONNECT NO INTERFACE

| | | |
|---|---|---|
| HDA050 | XDM121 Letter Quality DaisyW | 99.95 |
| PKG005 | XDM121 With Sheet Feeder ... | 125.00 |
| HDA046 | XMM801 Dot Matrix w/graphics | 99.95 |
| HDA047 | 820 (40 COLUMNS) ..... | 14.95 |
| HDA003 | 1020 COLOR PLOTTER (40 col). | 19.95 |

REQUIRE INTERFACE (850/PRCON/MPP)

| | | |
|---|---|---|
| HDG032 | STAR NX-1001 MULTI FONT .... | 159.00 |
| HDG020 | STAR NX-1000 Demo ..... | 99.95 |
| HDG019 | Citizen 120D Demo ..... | 79.95 |

Note:Make sure software & printer are compatible.

## INTERFACES

PRINTER:

| | | |
|---|---|---|
| ACA028 | MPP-1150 ..... | 49.95 |
| ACA029 | MPP-1151 (FOR 1200XL) ..... | 74.95 |
| HDA038 | OKI 10 PLUG & PRINT (NO BOX) | 29.95 |

PRINTER & MODEM (Cables Extra):

| | | |
|---|---|---|
| ACA002 | ATARI 850 INTERFACE..(RECON) | 74.95 |
| ACA036 | P:R: CONNECTION Special $$$ | 49.95 |

## JOYSTICKS/CONTROLLERS

| | | |
|---|---|---|
| ACG500 | ATARI CX-40 JOYSTICK ..... | 6.50 |
| ACG519 | ATARI PRO JOYSTICK 7800 recon | 9.95 |
| ACG503 | EPYX 500XJ JOYSTICK ..... | 14.95 |
| ACG523 | PROSTICK II JOYSTICK ..... | 6.95 |
| ACG514 | BP PROSTICK(STD W/GRIP HANDLE) | 6.95 |
| ACG513 | REMOTE CONTROL JOYSTICK (2). | 19.95 |
| ACG506 | SLIK STICK JOYSTICK ..... | 9.95 |
| ACG530 | TAC-30 JOYSTICK ..... | 16.95 |
| ACA520 | ATARI CX-80 TRAKBALL ..... | 9.95 |
| ACA518 | ATARI TRAKBALL (RECON)..... | 4.95 |
| ACA006 | PADDLE CONTROLLERS ..... | 9.95 |
| ACA505 | BEST LIGHT GUN XL/XE ..... | 24.95 |
| ACA053 | ATARI LIGHT GUN/BUGHUNT .... | 44.95 |
| ACA057 | LIGHT GUN like new(UNBOXED) | 19.95 |

## JOYSTICK PARTS

| | | |
|---|---|---|
| PRG045 | PADDLE CONTROLLER POTS (2) .. | 1.00 |
| CAG009 | 6 INCH MOUSE EXTENDER ..... | 6.00 |
| CAG006 | 10 FOOT JOYSTICK EXTENDER ... | 5.00 |
| CAA015 | JOYSTICK REPLACEMENT CABLE .. | 3.00 |
| PRG042 | ATARI JOYSTICK PCB ..... | 1.50 |
| PRG040 | JOYSTICK INSERT (1) ..... | 1.50 |
| PRG041 | JOYSTICK HANDLES (2) ..... | 3.95 |
| PRG055 | PADDLE CABLE ..... | 1.50 |

## EQUIPMENT COVERS

CUSTOM FIT:

| | | |
|---|---|---|
| ACA071 | 825 PRINTER ..... | 4.95 |
| ACA072 | 2600 COVER (OLD STYLE) ..... | 4.95 |
| ACA034 | 800 COMPUTER ..... | 10.95 |

GENERIC GREY NYLON:

| | | |
|---|---|---|
| ACG150 | UNIVERSAL COVER U2 ..... FITS 800XL/810/1050/130XE/1027 | 7.95 |
| ACG151 | UNIVERSAL COVER U4 ..... FITS 12" MONITOR | 12.95 |
| ACG152 | UNIVERSAL COVER U7 ..... FITS 800/1200XL/STAR PRINTER/ 825/XDM121/XMM801 | 8.95 |

CLEAR PLASTIC CUSTOM FIT:

| | | |
|---|---|---|
| ACA059 | 130XE KEYBOARD SKIN ..... | 19.95 |

## PRINTER SUPPLIES

RIBBONS:

| | | |
|---|---|---|
| SUG500 | Atari 820 Purple ..... | 9.95 |
| SUG501 | Atari 825 Black ..... | 6.00 |
| SUG002 | Atari XMM801/SMM804 Black... | 9.95 |
| SUG514 | Atari XDM121 Black Mylar.... | 9.95 |
| SUG518 | Atari XDM121 Black Fabric .. | 14.95 |
| SUG504 | Atari 1025 Spool Black..... | 3.00 |
| SUG502 | Atari 1029 Black ..... | 7.95 |
| SUG519 | 1025 OUTDATED RIBBON 12 Pack | 5.00 |
| SUG510 | NX-10/NP-10/NB-10 STAR Black | 7.95 |
| SUG511 | NX-1000/1001 STAR Black..... | 7.95 |
| SUG512 | NX-1000 RAINBOW STAR ..... | 10.95 |
| SUG069 | NX-1020 STAR Black ..... | 9.95 |

PENS:

| | | |
|---|---|---|
| SUG506 | 1020 PEN SET Black Atari ... | 1.00 |
| SUG516 | 1020 PENS 10 SETS Black .... | 5.00 |
| SUG507 | 1020 PEN SET COLOR Atari ... | 3.00 |
| SUG517 | 1020 PENS 10 SETS Color .... | 10.00 |

ROLLERS:

| | | |
|---|---|---|
| SUA002 | 1027 INK ROLLERS Atari ..... | 5.95 |
| SUA005 | 1027 INK ROLLER 10 Pack .... | 20.00 |

Note:These are getting old but still work. Sorry no fresh ones.

PARTS:

| | | |
|---|---|---|
| PRA082 | 1020 PEN Holder Wheel ..... | 1.95 |
| PRG054 | 801/804 LOCK Lever ..... | 5.00 |
| PRA083 | XDM121 WHEEL 10 Courier .... | 15.00 |
| PRA085 | XDM121 WHEEL 12 Courier .... | 17.50 |
| ACA081 | XDM121 Sheet Feeder ..... | 49.95 |

PAPER:

| | | |
|---|---|---|
| SUA004 | 820 PAPER (2 ROLLS) ..... | 3.90 |
| SUA003 | 822 THERMAL PAPER (2 ROLLS). | 3.95 |
| SUA001 | 1020 PAPER (2 ROLLS) ..... | 3.95 |
| SUG003 | ADDRESS LABELS PIN FEED 1000 | 7.00 |
| SUG037 | ADDRESS LABLES PIN FEED 5000 | 19.95 |
| SUG008 | DISK MAILER ENVELOPE ..... | .50 |

## DISKS AND SUPPLIES

DISKSETTES:

| | | |
|---|---|---|
| SUG052 | 5-1/4" ATARI FORMATTED ..... | 10.00 |
| SUG067 | 5-1/4" OPTIMA IN PLASTIC BOX | 5.00* |
| SUG046 | 5-1/4" 810/1050 (not XF551) | 3.00* |
| SUG062 | 5-1/4" 810/1050/XF551 ..... | 4.00 |

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# TextPRO v5.2 Manual

## edited by Dale Wooster January 1995

7113 W. Pasadena, Glendale, AZ 85303

*Review by Charles A. Cole Sierra Vista, AZ*

Over the years, I have tried each new release of the TextPRO word processor that was created by Mike Collins and Ronnie Riche. All of these releases, however, suffered from the same basic problem: lack of clear documentation.

This is something that is not unique to TextPRO. Documentation is usually the last thing a programmer thinks of, and they always seem to assume that everyone thinks the same way they do, and knows what is running through their minds as they write the documentation.

This stumbling block always led me back to AtariWriter Plus as my favorite word processor. I knew how to use it without having to dig through a long, complicated manual, it did just about everything I wanted a word processor to do, and my familiarity with it made it feel as comfortable as an old shoe. It was consistent, albeit limited in its capabilities.

With the release of TextPRO v5.20X, with its add-in modules and macro programming language, I was determined to make a more concerted effort to tame this beast and learn how to use it once and for all. No program was going to get the better of me!

Alas, that old bugaboo of poor documentation reared its ugly head again. This time, however, a campaign was initiated by Rick Reaser, the Atari 8-bit editor for *Current Notes* (CN) magazine, to assemble a team of editors and tackle the documentation problem head on. The progress of Rick's efforts, however, remain a mystery.

Frank Walters of Fort Walton Beach, Florida, wrote a very excellent series of articles for CN explaining the power of the TextPRO Macro language, including many useful examples. Still, the basic documentation problem existed.

Then, I happened to notice an item in *Nybbles and Bytes*, the newsletter of The Northwest Phoenix Atari Connection (N.W.P.A.C.) of Phoenix, Arizona, (where else?) that the club president, Dale Wooster, has a TextPRO v5.20X manual for sale. The more I read, the better it sounded: color cover, fully indexed, a set of program diskettes with "How To" files and macros available separately, a command wall chart and a printer command wall chart printed in NLQ, professionally bound, updated specifically for the v5.20X release of TextPRO. And the price was right: $12.00. Two 2-disk sets are available. The first set at $6.00 includes the complete ready to run TextPRO v5.20 program and all of the documentation manual files, including the "How To" files. The second set, $4.00, contains additional macros and the original ARCed DOC files. I opted for the manual and first set of disks. Dale ships orders by Priority Mail in the US at no additional charge.

OK, so what do you get for your 12 bucks? A 106 page, spiral-bound manual printed on 8 1/2 x 11 inch paper, printed on both sides of each page in NLQ type on a Star Micronics printer, using enhanced text, underlining, bold, and other print features to highlight important items. The manual comes with a full color front cover, and plastic protective covers over both the front and back covers of the manual to keep them clean. A very professionally produced product!

Content-wise, Dale has, over the years, kept Ronnie Riche's original documentation updated as each new version of TextPRO was released. In the process of updating, Dale has resolved many of the complaints I had with the original documentation, and added explanatory notes to clarify difficult passages. In this latest effort, he has added comments throughout which pertain only to the v5.20X version, and completely re-indexed the entire manual to reflect his additions, updates, and notes. Additionally, he included a TextPRO Command Summary wall chart, and a Star NX1000 Rainbow printer command wall chart which is also compatible with most Epson printers. If you have a different type of printer and know the decimal codes you can easily modify the wall chart to suit your printer.

TextPRO has *finally* begun to be understandable to me, and I am now beginning to have more confidence in its features, thanks to Dale's editing. Part of the problem in the past has been my hardware, which is not stock at all. The really frustrating thing about TextPRO for me, until now, was that the manual had not been kept up-to-date by Ronnie Riche to reflect changed keystroke commands. Dale's manual appears, so far, to be completely tested and fairly bullet-proof, even for my modified 130XE with the U.S. Plus OS chip from Computer Software Services and 364K RAM, SpartaDOS X cartridge, and other modifications which affected previous versions.

So, what it all boils down to is this: If you want the most powerful word processor that has ever been available for our beloved Atari 8-bit computers, and an instruction manual that is a first-class product to go along with it, then you definitely should order Dale's manual and disks.

Nits: OK, you just knew this had to come up sooner or later, right? Nothing is perfect, no matter how much effort is put into it. Yes, I have a couple of minor nits to pick.

Call it personal weirdness if you wish, but I have never liked documents printed on a computer printer with the "Full Justification" turned on. If you're not familiar with this term, full justification means that both the left and right margins are straight down the page; like this article. Computer printers accomplish this by padding short lines with extra spaces between words to push the last character of the last word on the line all the way out to the right margin. I have always preferred a so-called "ragged-right" margin. Full justification works fine for newer, professional type-

setting machines, where spaces between every word in the line are adjusted to fill out the line, or even minute spacing is added between letters if the line is still short. But on a computer printer, this is sometimes accomplished by adding as many as five or six extra spaces between the first few words, and then no extra spaces between the rest of the line. This makes for difficult reading. Dale, unfortunately, configured TextPRO for full justification.

In a few cases, it seems that Dale may have retained Ronnie Riche's original text. Ronnie tended to run thoughts together into one long sentence. Here is an example, selected purely at random from Dale's manual. On page 10, Para 2.3 reads, in part:

> Deleting and Moving Text; (Cut & Paste) To delete text you have great flexibility in the TP editor. Just go to the spot from which you want to start the deletion and use the; CTRL-D Delete text command; The command line will turn RED and the prompt; "Delete [S,W,P,F]: RETURN to exit" will appear.

When I was attending school in the 1940s and 1950s, there seemed to be more emphasis placed on grammar and punctuation than there is today. If I were writing the above paragraph, I would probably come up with something like this:

> 2.3 Deleting and Moving Text (Cut & Paste): To delete text, you have great flexibility. Just go to the spot where you want to begin the deletion, and type CTRL-D (Delete Text). The command line will turn RED, and the prompt, "Delete [S,W,P,F]: RETURN to exit", will appear.

Other than these two minor problems, I have found Dale's TextPRO manual to be the first one that I have ever been able to comprehend, and his index makes it very easy to find what you are looking for.

This manual of Dale's is highly recommended for all TextPRO users.

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# PROGRAMMING THE 65816

*James Hague*

## Part 1: What's New

There is something both exciting and comfortable about the introduction of the 65816 into the Atari world. Exciting because it adds more raw capability to be explored and used in interesting new ways. Comfortable because it remains simple and true to the 6502 philosophy. Indeed, anyone still programming the 6502 in the mid-1990s probably isn't going to be too keen on something that overturns their way of thinking and adds unwanted complexity. Heck, you can slide into the 65816 without even knowing it; if you ignore the 16-bit stuff, it basically is a 6502.

### 65C02 Pleasantries

Well, not really a 6502, but a 65C02. The 65C02 adds some tweaks to the 6502 instruction set. Tweaks that may be minor, but will strike a note of rightness with longtime 6502 programmers.

You can now push and pull the X and Y registers directly with PHX, PLX, PHY, and PLY, and transfer data between them with TXY and TYX. You can increment the accumulator with INC A (or INA as it is sometimes called). You can zero a memory location without loading a register with zero using STZ—Store Zero. There's a two-byte unconditional branch with a snickery name: BRA. And there are two nifty bit manipulation instructions that, unfortunately, are somewhat restrictive. TSB (Test and Set Bits) sets the bits of the operand that have corresponding bits set in the accumulator. TRB (Test and Reset Bits) clears the bits of the operand that have corresponding bits set in the accumulator. An example is definitely in order:

```
LDA #1
TSB TEMP
```

This sets the low order bit of the value stored at TEMP. Unfortunately, these instructions are somewhat awkward to use in common situations, because indexed addressing modes are not available.

The last gleeful tweak is a variation on the indirect indexed addressing mode—good ol' "(ZPAGE),Y". The new addressing mode is simply "indirect." It drops the comma-Y from the indirect indexed mode and works as you'd expect. "LDA (TEMP)", where TEMP is a zero page variable, uses the values at TEMP and TEMP+1 as an address and fetches the value at that address.

### The Gateway To 16-Bits

The 65C02 enhancements are old hat to anyone who ever got bored and read the obscure portions of the MAC/65 manual. Let's get to the good stuff!

I expected the back-door to 16-bit mode to be through the mysterious unused bit in the processor status register, as this bit was always mentioned as being for future expansion, but this is not the case. The truth is even more obscure.

Deep inside the 65816 somewhere is a bit that indicates whether the processor is in 65C02 mode or 65816 mode. But this bit is not addressable; not directly anyway. There is a quirky little instruction, XCE, that exchanges the carry bit and the "emulation" bit, as the hidden bit is called. When it is set, the processor acts as a tried and true 65C02. When it is clear, it becomes a full-bore 16-bit processor. Whisper the incantation:

```
CLC
XCE
```

and you're on your way.

### Big Deal #1: 24-Bit Addressing

There are two major features you have at your disposal when you switch to native 65816 mode: 24-bit addressing and 16-bit processing. 24-bit addressing is the showier of the two. It's definitely useful, but considering the impressive software that has been written in 32K or even 16K, it's a bit flighty for many applications. In a Super Nintendo game I wrote in 1994, I reached out of the lower 64K in fewer than twenty of 12,000 lines of code. At the risk of miffing those few programmers that *do* need to address monstrous amounts of data, I'm going to only lightly touch the 24-bit topic so I can spend more time on Big Deal #2.

You can directly read from or write to any address in the 24-bit address range with a single instruction. The greater than sign marks 24-bit addresses so "LDA #>$020032" grabs data from that 6-digit (!) address. The restriction is that only a few addressing modes can be used with 24-bit addresses: absolute, indexed X, indirect indexed, and the new indirect mode. These last two modes use brackets instead of parentheses and reference 3-byte addresses in page zero instead of the usual 2-byte:

```
LDY #8
LDA [TEMP],Y
```

In true 6502 fashion, the highest byte of the address is stored in TEMP+2.

Now here's where things get muddled a bit. The 65816, in some

situations, "sees" memory as being made up of 64K "banks." This works out well in a nifty visual sorta way. Given a 24-bit address, the left most two hex digits are the bank number. "$01FFFF," refers to address $FFFF in bank $01. This bank nonsense is mostly to allow addressing shortcuts. There is a register that contains the bank number to use for 16-bit absolute addresses. So when you use a traditional absolute instruction, like LDA $A000, the default bank number is tacked on to the front, making a full 24-bit address. This register defaults to $00, which is one of the ways the 65816 emulates a 6502.

## Big Deal #2: 16-Bit Processing

After executing a CLC/XCE pair, the 65816 still acts as an 8-bit processor. The A, X, and Y registers are all 8-bits, as are all accesses to memory. But be assured, things have changed. All of a sudden you have access to new instructions and addressing modes. The stack pointer is now 16-bits, letting you move the stack anywhere in the first 64K of memory. And there is a more subtle change as well: the b (break) bit of the processor status register has been removed and both it and the aforementioned unused bit now have new purposes. They control the sizes of the accumulator and index (X and Y) registers.

There are a couple of ways to directly change bits in the processor status register of the 6502. There's PLP, which pops the register from the stack, and the special purpose instructions like CLC and SED which affect specific bits. With the 65816 there's another option: the SEP and REP instructions. SEP sets bits in the P register and REP clears bits. Each instruction takes a byte-sized operand representing the bits to mess with.

These instructions are most often used to change the new bits of the P register: the bit corresponding to $10 which controls the size of memory and the accumulator, and the bit corresponding to $20 which controls the size of the index registers. A set bit means 8-bit operation and clear means 16-bit. REP $30 and all your registers are 16-bits.

Now that we've executed this funky REP instruction, what happened to the processor? For starters, all load and store operations now involve 16-bits of data. LDA $80 loads the bytes at $80 and $81 into the accumulator. All other memory referencing instructions, like INC and PLA, are now 16-bit as well. LDA $1000,X adds the 16-bit value in X to $1000 then loads the word at this address into the accumulator. In other words, business as usual, except that everything affects words instead of bytes.

Immediate values pose an interesting problem. Yes, they are now 16-bits—you can say LDA #$FFFF—but this requires three bytes of object code, instead of the usual two. With an 8-bit accumulator, LDA #0 is two bytes long. With a 16-bit accumulator, it is 3-bytes. In both cases the opcode is $A9. How does the assembler know what the current size of the accumulator is so it can generate the proper object code? You have to tell it. Whenever you change the size of the accumulator or index registers, you have to accompany it with a directive to let the assembler know the new sizes. This usually looks something like this:

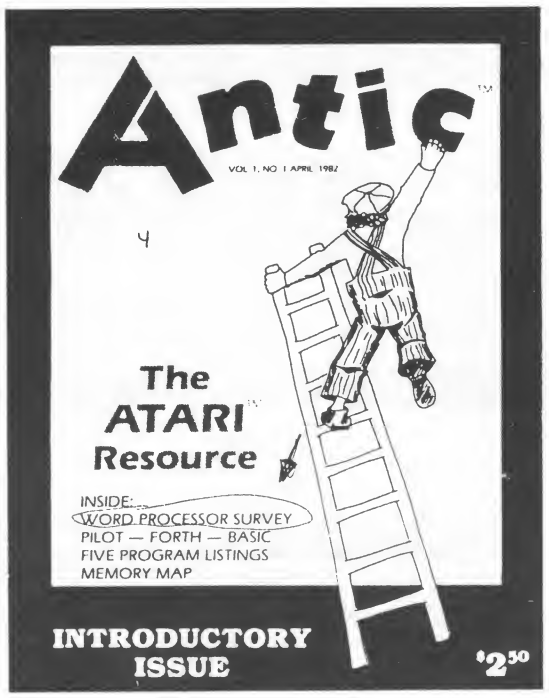
```
REP $10   ;Switch to 16-bit
accumulator
LONGA ON  ;Tell assembler
this is so
```

That's ugly, I admit, but you usually don't bink back and forth between sizes, at least not frequently. If you think this size-switching stuff is awkward, look at it this way: instead of using bits within each instruction to determine the size of the operand, causing all instructions to be larger, they have been factored out into separate instructions. This keeps all opcodes the same size as they were on the 6502 and makes for dense object code.

What happens to the upper half of a register when the register size is 8-bits? For the index registers the answer is "nothing interesting," but the accumulator is a different story. The upper half of the accumulator is still there. The XBA instruction swaps the high and low halves of the accumulator giving, basically, a hidden 8-bit register for storing temporary values. XBA stands for "exchange B and A registers," the B register being someone's pet name for the upper half of the accumulator. Taking this silly naming scheme even further, sometimes the whole 16-bit accumulator is called the C register. (And to show how arbitrary and strained these naming conventions are, there is an unused-but-reserved-for-future expansion opcode with the mnemonic WDM. That's the designer of the 65816, William D. Mensch Jr.) XBA still works when the accumulator is 16-bits, simply swapping the high and low bytes.

## Pleasantries Revisited

There's are some nice little instruction tweaks that were quietly added to the 65816, but are often missed in the glare of the other, major additions. JMP and JSR have a new addressing mode, which looks like "JMP (MEM,X)." This is like the obscure indexed indirect mode of the 6502, except that MEM doesn't have to be in page zero. X is added to MEM and the data fetched from X+MEM is used as the jump target. This is handy for setting up jump tables. Assuming X is even, in-



**Did any of you eagle-eyed oldtimers spot these covers on our last two issues?**

stead of this:

```
LDA TABLE,X  ;Get 16-bit
jump target
STA TEMP
JMP (TEMP)
```

you can use the cleaner alternative:

```
JMP (TEMP,X)
```

You can do this with JSR too, which is great because there isn't a "JSR (MEM)" instruction on either the 6502 or 65816.

Another small but right-on-the-money change is that the decimal flag is always clear upon startup, after a reset, and after an NMI. You no longer need a "CLD" at the beginning of your code and interrupt handlers.

## Oh Yeah, Those Block Move Instructions

I saved these for last because, though they are the most talked about and impressive features of the 65816, they are also rather unusual. More than instructions, they can be thought of as built-in subroutines to move blocks of data around, like memcpy in C and CMOVE in Forth. Before using the proper mnemonic, you have to set up the proper parameters.

The two block move instructions are MVN and MVP, which stand for "Block Move Next" and "Block Move Previous." The Next and Previous designations indicate the direction of the move. MVN moves data upward in memory, from low to high addresses, and is the more common of the two. MVP moves data downward, from high to low addresses.

Here's the calling sequence: put the lower 16-bits of the source address in X, the lower 16-bits of the destination address in Y, and the number of bytes to move *minus one* in the 16-bit accumulator. The actual block move instruction has two operands: the source bank and the destination bank. Here's an example to move the character set from $E000 to CHSET:

```
LDX #$E000
LDY #CHSET
LDA #1023
MVN 0,0
```

Doesn't it look as if the MVN should be a JSR to a block move subroutine? But MVN is happening in hardware, and moves data at the rate of one byte every seven cycles. I remember being very impressed when I first looked at a 65816 book and saw this instruction and I guess I still am.

## Apologies And Coming Attractions

My approach to explaining the 65816 is a bit unorthodox. Most books I have seen jump into, right up front, some of the specialized bank registers that the 65816 has and go into all sorts of quirks about register sizes and bank addressing. I opted for the simpler "you're a 6502 programmer and want to slip into the 65816" approach, at the expense of some lesser used details, instructions, and addressing modes (like stack addressing, which is handy for writing compilers but not used as often in pure assembly programs).

Stick around for part two: optimization. Things aren't quite as straightforward as they look. It's time to retire some of those 6502 programming methods....

# Are You A USER? — You CAN Get Help!

The North West Phoenix Atari Connection users' group recently sent letters to 90 other groups in an effort to update their newsletter exchange. The following list is a combination of those user groups that responded; 8-Bit groups that exchange newsletters with the San Leandro Computer Club; and all the groups listed in *Feedback*, the newsletter of the Adelaide Atari Computer Club. Some groups have "?" for computers supported. We believe those North American groups support both 8-Bit and ST users. We don't know which computers are supported by the Australian groups. You are encouraged to send additions and corrections to "You Big Dummies" at AC.

## North American User Groups

**Alamo Area Atari User Association**
AAAUA
Russell Stowe, President
P.O. Box 79-1426
San Antonio, TX, 78279-1426
8-Bit

**Atari Bay Area Computer Users Society**
ABACUS
Roger Sinasohn, President
P.O. Box 22212
San Francisco, CA, 94122
8-Bit, ST, IBM

**Atari Exchange of Louisville**
AEL
Jan Wilt, President
P.O. Box 34183
Louisville, KY, 40232
8-Bit, ST

**Diablo Valley Atari Computer Enthusiasts**
DACE
Daniel Galant, President
2834 Rockridge Drive
Pleasant Hill, CA, 94523
8-Bit, ST

**Front Range Atari Users' Group**
FRAUG
Joseph Michaud, President
3012 Rockborough Court
Fort Collins, CO, 80525
8-Bit, ST

**Garden City Atari Computer Enthusiasts**
1003 Amphion Street
Victoria, B.C., V85 4G2
8-Bit, ST

**Houston Atari Computer Enthusiasts**
HACE
Bill Anderson, President
P.O. Box 820335
Houston, TX, 77282-0335
8-Bit, ST

**Huntsville Atari Users Group**
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Huntsville, AL, 35816
?

**Indiana-Michigan Atari Group Exchange**
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South Bend, IN, 46634-1742
8-Bit, ST

**Jersey Atari Computer Society (?)**
JACS
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Delran, NJ, 08075
?

**Long Island Atari User Group**
L.I.A.U.G
Alan Sharkis, Secretary
P.O. Box 92
Islip, NY 11751
8-Bit, ST, Game Machines

**L.C.A.C.E.**
L.C.A.C.E.
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Waukegan, IL, 60079-8788
8-Bit, ST

**Miami Valley Atari Computer Enthusiasts**
M.V.A.C.E.
P.O. Box 24221
Huber Heights, OH, 45424
8-Bit, ST, IBM, Mac

**Noah 8**
3632 W. 130th Street
Cleveland, OH, 44111
8-Bit, ST

**North West Phoenix Atari Connection**
N.W.P.A.C.
Dale Wooster, President
P.O. Box 67511
Phoenix, AZ, 85082
8-Bit

**Ol' Hackers Atari User Group**
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Oceanside, NY, 11572
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**Pinellas Atari Computer Enthusiasts**
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**S.P.A.C.E.**
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New Brighton, MN, 55112
8-Bit

**San Diego Atari Computer Enthusiasts**
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P.O. Box 900076
San Diego, CA, 92190
8-Bit, ST

**San Leandro Computer Club**
SLCC
Robbie Bridges, President
P.O. Box 1506
San Leandro, CA, 94577-0374
8-Bit, ST, IBM

**Seattle Puget Sound Atari Computer Enthusiasts**
S*P*A*C*E
John Strand, President
P.O. Box 11042
Tacoma, WA, 98411-0042
8-Bit, ST

**Toronto Atari Federation**
TAF
5334 Yonge Street, Suite 1527
Willowdale, ONT, M2N 6M2
?

## Australian User Groups

**Atari Computer Enthusiasts New South Wales**
A.C.E. (N.S.W.)
Swavek Jabrzemski, President
G.P.O. Box 4514
Sydney, NSW, 2001
?

**Adelaide Atari Computer Club**
Neil Patterson, President
P.O. Box 333
Kent Town, SA, 5071
8-Bit, ST

**Burnie Atari Computer Club**
Alex Bienefelt
P.O. Box 99
Ridgley, TAS, 7321
?

**Canberra Atari Users Group**
Lindsay George, Convenor
P.O. Box 29
Lyons, A.C.T., 2606
?

**Geelong Atari Users Group**
Vic Fuller, President
P.O. Box 673
Geelong, VIC
?

**Melbourne Atari Computer Enthusiasts**
MACE
Brian Campbell, President
P.O. Box 340
Rosanna, VIC, 3084
?

**Queensland Atari Computer Enthusiasts**
Peter Peterson, President
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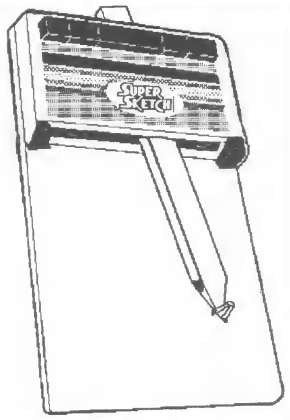


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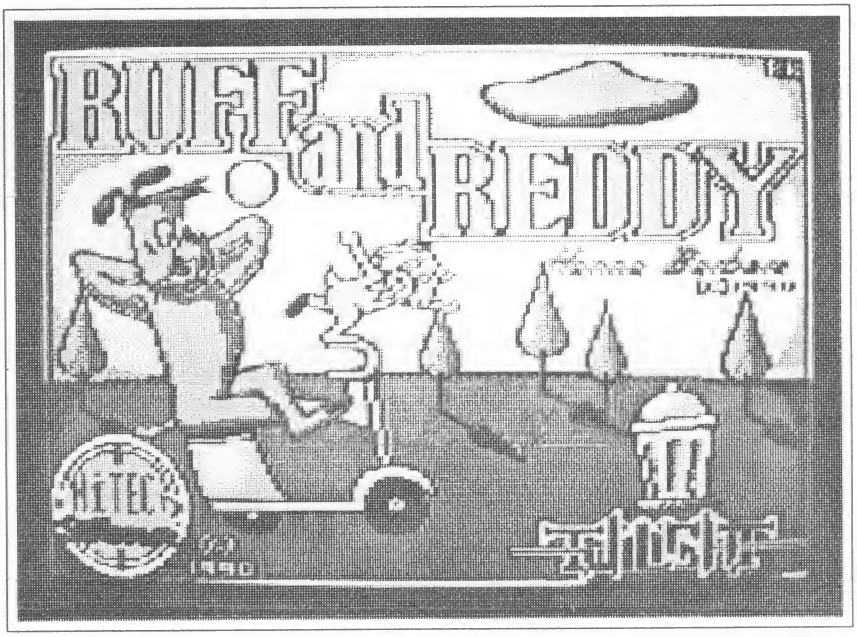
# Reviewer's Corner

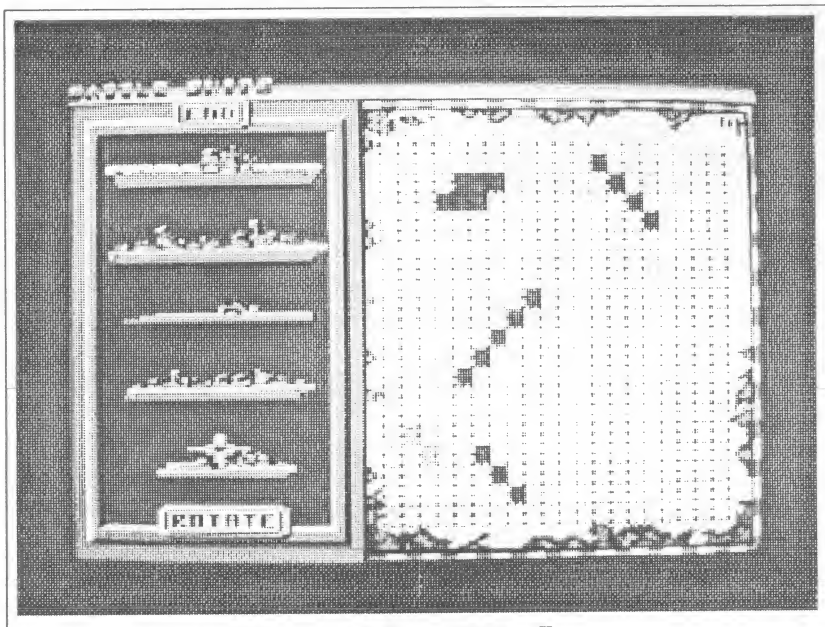
With the nir-PAL upgrade, a lot of good software is now available to North American users. In the interest of generating demand for European products, AC will reprint software reviews and/or screenshots of some of the better looking programs. Some of these may run on an NTSC machine, some may not. The plan is for users to contact our European advertisers or US dealers who may carry overseas products and request software catalogs. You'll like what you see!

## RUFF & REDDY

by HI TEC (Tape) 2.99




Ruff and Reddy's Space Adventure is the first in a series of games based on famous Hanna-Barbera cartoon characters. Judging by this first release, HI TEC are onto a winner with this series! This game is set on an alien planet, and you control the character Reddy (a nicely animated cat!), who must look around different areas of the planet to find the little aliens (Lilli-punies; who thinks up these names) which will help to set free your canine buddy Ruff. The graphics are excellent; level one's screens are drawn in different shades of blue, although the cassette inlay card shows much more colourful screen shots from the Commodore 64 version. Of course, the Atari doesn't have a colour memory map like the C64, so blame the Atari hardware, not the programmer. (Are you listening, Paul Rixon!) Having said that, a little more colour could have been added, but generally the graphics are superbly designed. The movement of the various characters is excellent, with good animation and no characters rubbing each other out. Unlike many other budget priced games, this one has a good quality piece of music accompanying the action, and the gameplay matches the high quality of the graphics and sound. This game is definitely 'just one more go' material! Although based on a children's cartoon,Ruff and Reddy is probably not really suitable for very young gamesters, as the difficulty rating is pretty high! Some of Reddy's jumps have to be timed to purr-fection (groan!), but the game's characters don't jerk around in 'Jetset Willy' fashion, so it isn't half as frustrating as that game. Your three available lives don't tend to last long! With superb graphics, sound and playability, Ruff and Reddy's Space Adventure is the best platform game to be released on the Atari for some considerable time. Congratulations are in order to programmer Russell Knight and to HI TEC for supporting the Atari.




## BattleShip

## Dean Garraghty Software

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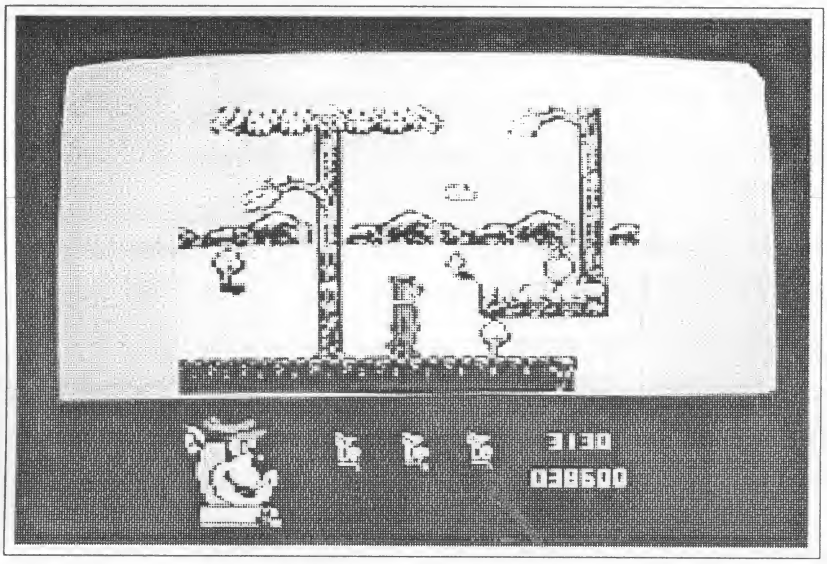
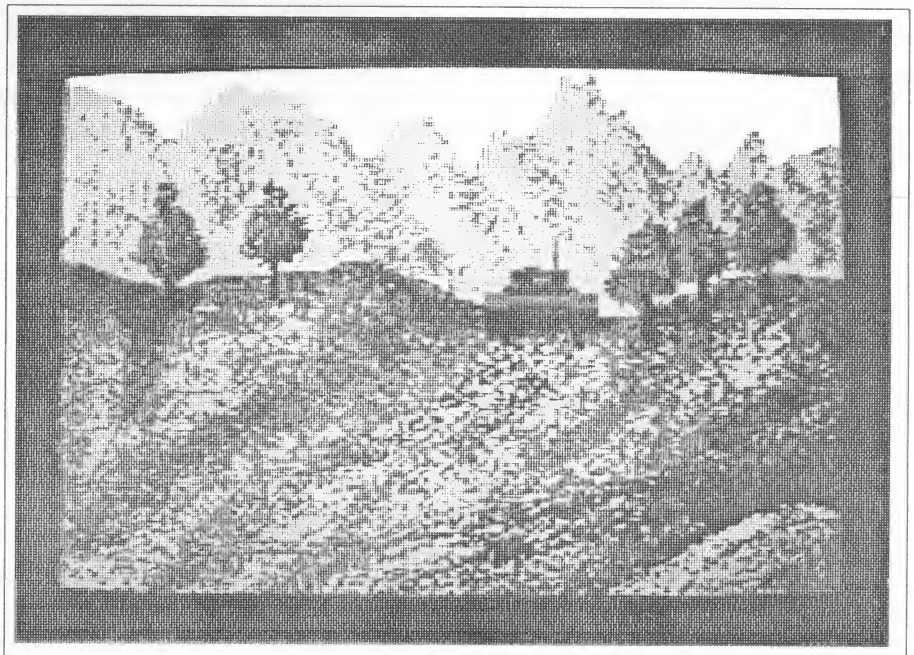


spot effects. During his escape, Yogi can collect the various edible items (he just can't resist those picnic baskets!) which are scattered around for extra points. Collecting all of the various parts of Yogi's car brings a huge points bonus but getting at them involves taking a few extra risks! There are also some invisible items lying around if you can find them! Yogi's Great Escape is very addictive indeed, but like Ruff and Reddy, requires almost pixel-perfect jumping skills. I expect the game will provide many weeks (months) of enjoyment. The playability is marred only by the multi- load cassette system; each level has to be loaded individually from the tape! The six levels are on side two of the cassette. Overall this is another excellent new game from HI TEC Software.

## YOGI'S GREAT ESCAPE

by HI TEC (Tape) 2.99

This is the second in HI TEC's series of cartoon based games, and the first of two games starring Yogi Bear. The story behind this escapade is that Jellystone Park is to be closed down, and rather than stay in a zoo for the rest of his natural, Yogi decides to make a quick getaway before Ranger Smith comes along and takes him for an even quicker getaway in the back of a transit van. The game is of the horizontally scrolling platform variety not too different from Super Mario Brothers in the arcades. There are six different levels to get through as Yogi makes his way through a forest, the wild west, a fairground, a marsh and New York City. The first level is Jellystone Park, which is shaded in murky browns. The graphics are not bad, but the chosen colours are awful. I had to turn the brightness up on my TV as the colours are all too dark. The main character of Yogi Bear is very well drawn and is alsonicely animated. The scrolling is a tad jerky but doesn't really interfere with gameplay. Unfortunately, there is not a single note of music in the game, but there are some decent



## T-34

This is the game that Ben Poehland has been raving about on the networks. As soon as we can get it away from him, maybe someone could do a nice review for us? Judging by this screen and Ben's comments, I'd like to try this one myself. It DOES require the nir-PAL upgrade.

# Speed Secrets

Larry Serflaten

Back in the days of Analog and Antic, I wrote an article for publication. After a couple of rewrites, program revisions, and spell checks, I finally sent it off to Antic. It must have been fate, but that was the month they closed up shop! I never did see my article in print.

Now with AC, I am again going to submit an article about using BASIC. If there are programmers out there who are still using the BASIC language, you may already know the tricks I am about to reveal. If not, you may look forward to adding a touch of professionalism to your BASIC programs with this article.

## POWER TO THE PEOPLE

With only a few alterations to RAM memory, you have the power to move data from anywhere in memory to any other RAM address, at amazing speeds! The program that follows will show you how to move the Atari character set to RAM, achieve the fastest screen printing speed available using only BASIC, and give you an idea about how to use this speed for character and/or player/missile animations.

## ONE MOMENT PLEASE!

No doubt you have seen a few BASIC programs that have you wait an awful long "moment" while the program does a few initialization procedures. Using the following technique, you can have your new character set in place and ready for use, in about one half second. Go ahead, if your going to, type it in now and give it a try. Be sure to time the initial interval between the time you enter RUN, and the time you see "The new font is ready." on the screen.

## PROGRAM OUTLINE

This program demonstrates a method of animation by placing different frames of an animated sequence, into memory normally used by one of the characters. To do this, the program first copies the internal character set from ROM, where it cannot be changed, to RAM, where it can be modified. It then uses a quick printing method to display a little demo window where the animation will occur, and finally loops indefinitely to animate one of the characters. As you will see, moving data, fast printing, and animation all use strings.

## DOWN TO BUSINESS

BASIC supports the use of strings quite well. To use the strings, BASIC has to know where they are in memory, how big they are, and how much space they use. Atari conveniently kept all this information grouped together in one table of data called the Variable Value Table. This table is kept in RAM, within reach of any application programmer! By altering data in this table, the programmer can change the address or the length of a string, as may be needed by the application.

In the Variable Value Table, 8 bytes are reserved for each variable used in a BASIC program. One byte determines the type of variable, another the location of its name, two more each for the location, size, and dimensioned length. The table is formed as new variables are added to the program, so DIMensioning the strings first, puts them at the start of the table and makes them easier to find.

### INITIAL SETUP Lines 0-60

Because the strings will be used under program control, the DIM statement on line 10 is used simply to set the order of the variables in the table. The size of both SRC$ and DST$ will be changed as needed, there is no need to reserve space for them. PLR$ will hold the data for the character animation, so it does need to have space reserved.

Line 20 sets up a new display list and eliminates the cursor.

The address of the table is calculated on line 30. This is the address of the first byte of the 8 bytes reserved for the first variable in the program. The 8 bytes for the second begin after the first group, the 8 bytes for the third variable follow after the second, etc.

### PLUCKING THE STRINGS

The address of a string is actually calculated from the beginning of array space. This means the value stored in the table is an offset, not an actual address of the variable. The start of array space is stored in another pointer (STARP), and this value is retrieved on line 40. Adding the offset value to STARP will produce the actual address of the start of the string.

The address of the ROM font is found using the pointer for the current font on line 50. The computer uses this address to find the start of the character set. If it is changed, then the computer will display characters according to the data found at the new address. There is no LSB for this pointer because the OS demands that any font must begin at an address divisible by 1024. Any address divisible by 1024 will have a LSB of 0 so no LSB is necessary. The program finds such an address by using the MSB of the display list, on line 60. With the above values calculated, the program is ready to begin moving the font data out of ROM and into RAM.

### **MOVING IN** Lines 100-180

Because the location pointer in the table is an offset, TEMP is used to determine what value, when added to STARP, will cause a string to reside at the FONT address. The font address is known, and STARP is known, to find the offset (or difference) is a simple calculation, as shown on line 100. TEMP is then broken into the LSB/MSB format in a subroutine at line 9000, and these values are loaded into the table on line 110. Line 120 alters the current length and dimensioned size of the variable by POKEing a 4 into the MSB of the values stored in the table. Because the program is altering values in the first group, the changes made will affect the first variable in the list. It now appears to the computer that SRC$ resides in ROM and has a length of 1024 bytes (4*256).

As with SRC$, the table is adjusted to make DST$ appear to reside at the address calculated for the new font (DEST) in lines 130-150.

Line 160 commands the computer to move the contents of SRC$ into DST$. SRC$ is the ROM font set, DST$ is where the new font will go. One command and ZIP! its done. The computer is then told to display the new font by POKEing the MSB of DEST into the current font pointer.

Lines 170 and 180 inform the user that the move is completed. Line 190 moves the first 8 bytes of the character set, into the next set of 8 bytes. This simply moves the data for the space character, into the area for the character that will be animated.

### **SPRINTING** Lines 200-280

Using TEMP again to alter the address of SRC$, lines 200-220 make SRC$ appear to reside at the same address as screen memory.

The computer does not use the ATASCII characters in screen memory. It uses internal values to represent ATASCII characters. Why? I dunno, ask Atari! (Also check why they used offsets in the value table....) Lines 230-280 assign SRC$ with ATASCII representations of the internal characters needed to produce the demo window. After a bit of use, trial and error, and other such sophisticated techniques, finding the right characters to use is not a big problem. In fact, lower case letters translate exactly. If lower case text is desired, then SRC$ may be assigned the same lower case letters needed for display. This program uses the CHR$ function to get characters into SRC$. I much rather prefer assignments; however, doing so would mean the printer for AC has to produce graphic characters for the program listing. I chose to leave out any graphic characters to give the printer a break. When using this method for printing, the SRC$="....." type of command works well, and will happen much faster than a PRINT statement could produce. After the program is typed in and RUN once, you can experiment with SRC$ which will still be pointing to the screen.

Example:

```
SRC$(100)="Hello world."
```

### **GOING UP** Lines 300-360

Lines 300-310 assign PLR$ with values needed to animate one of the characters. DST$ is still at the new font location, so making changes to DST$ will affect the new character set. You should take note that DST$ could just as easily point to a PM image table to create PM images that move up, or down, or are animated. Line 330 does the actual assignment, while TEMP is used to cycle thru the various changes needed to animate the character. The SIN calculation is used simply as a delay, the statement LO=1^1 will produce an even longer delay, or remove it entirely to see the animation happen quicker.

### EMULATIONS

Other uses are possible, such as loading arrays with formatted data (SIN/COS data), fast sound routines, bit mapped manipulation or any routines where there is a need to move data from one memory address to another. I did not cover how the computer handles arrays, or ordinary (numeric) variables, but these are also in the variable value table, each one added as it is entered into the program. Feel free to experiment on your own, use the following table as a guide:

**VARIABLE VALUE TABLE: (134,135)**

| Byte | Description Of 8 Byte Entry |
|---|---|
| 0 | Defines the type of variable |
| 1 | Locates the name in the Variable Name Table (132,133) |
| 2 | (LSB) Offset from STARP |
| 3 | (MSB) Offset from STARP |
| 4 | (LSB) Current length |
| 5 | (MSB) Current length |
| 6 | (LSB) Dimensioned length |
| 7 | (MSB) Dimensioned length |

## BASIC Listing

```
1 REM **********************
2 REM * FAST DATA MOVEMENT *
3 REM *         by         *
4 REM *   Larry Serflaten  *
5 REM *    For: AC 1995    *
6 REM **********************
10 DIM SRC$(1),DST$(1),PLR$(16)
20 GRAPHICS 0:POKE 752,1:? " "
30 VVTP=PEEK(134)+PEEK(135)*256
40 STARP=PEEK(140)+PEEK(141)*256
50 FONT=PEEK(756)*256
60 DEST=(((PEEK(561)/4)-1)*4)*256
100 TEMP=FONT-STARP:GOSUB 9000
110 POKE VVTP+2,LO:POKE VVTP+3,HI
120 POKE VVTP+5,4:POKE VVTP+7,4
130 TEMP=DEST-STARP:GOSUB 9000
140 POKE VVTP+10,LO:POKE VVTP+11,HI
150 POKE VVTP+13,4:POKE VVTP+15,4
160 DST$=SRC$:POKE 756,DEST/256
170 POSITION 9,20
180 ? "The new font is ready."
190 DST$(9,16)=DST$
200 TEMP=PEEK(88)+PEEK(89)*256
210 TEMP=TEMP-STARP:GOSUB 9000
220 POKE VVTP+2,LO:POKE VVTP+3,HI
230 SRC$(125,125)=CHR$(128)
240 SRC$(126,155)=SRC$(125)
250 SRC$(685,715)=SRC$(125)
260 SRC$(165,165)=CHR$(1)
270 SRC$(166,195)=SRC$(165)
280 SRC$(205,675)=SRC$(165)
300 FOR I=1 TO 15:READ A
310 PLR$(I,I)=CHR$(A):NEXT I
320 TEMP=1
330 DST$(9,16)=PLR$(TEMP)
340 TEMP=TEMP+1:LO=SIN(1)
350 IF TEMP>8 THEN 320
360 GOTO 330
8000 END
9000 HI=INT(TEMP/256)
9010 LO=TEMP-(HI*256)
9020 RETURN
9998 DATA 0,0,48,48,0,0,3,3
9999 DATA 0,0,48,48,0,0,3
```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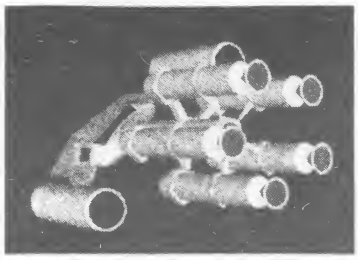
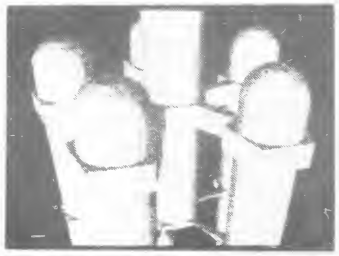
*Pitcher, rendered by MODEL BUILDER (TV Screen Photo)*

*Same Pitcher ,rendered by SURFACE SHADER (TV Screen Photo)*



*Space ship, 5 cluster rockets (TV Screen Photo)*



*Close up of cluster rockets from the top (TV Screen Photo)*

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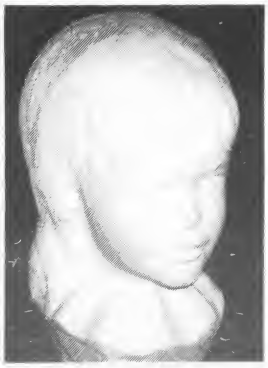

*Photo of actual bust of human head*

*3-D model rendering (TV Screen Photo)*

*3-D Model Rendering (TV Screen Photo)*

*3-D Model Rendering (TV Screen Photo)*