Updated: 14-Aug-98
Status: Being reviewed

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This document covers the subject that every Model 100, 102 and 200 computer cold starts ... where it appears that all files are lost. Don't despair. Don't panic. Armed with this information, you may recover your .DO files, easily. Includes discussions covering all possible options available. You will never loose another file.

- Cold start recovery
- Cold start and reset perimeters

COLD RESTART RECOVERY
For Model 100, 102 and 200 Computers
by TRACY ALLEN

Cold start! All your work disappears from your menu and the date reverts to 01/01/00! Don't panic. You may still be able to recover your text documents DO NOT start on a new text document! Immediately enter BASIC and type in the following short program:

```
OPEN "IT" FOR OUTPUT AS 1
FOR X=????? TO HIMEM : PRINT#1,CHR$(PEEK(X)); : NEXT
```

You should type this in without line numbers. Type in the first line, from OPEN through 1, then press ENTER. Then type in the second line all the way from the FOR through the NEXT, then press ENTER.

NOTE: Substitute the appropriate value for the amount of memory you have in place of the ?????. For a 32K M100/102 use ?????=32768. For a 24K M100/102 use ?????=40960. And for a T200 (in the 24K bank that is cold started!) use ?????=40960. Be very careful also to put in the colons, semicolons and parentheses where called for.

After you hit ENTER, the recovery process takes five minutes, during which nothing seems to be happening. Wait it out. When the OK prompt reappears, tap <f8> to return to the menu, and you will see the one document file "IT.DO". You may edit "IT.DO" using TEXT. There will be junk at the beginning and at the end. The junk at the beginning is the remains of your BASIC programs (if any). You may recognize a lot of the stuff that identifies them, like prompts or DATA statements they contain. Sorry, it is generally impossible to recover BASIC programs.

You use the <f7> key and the cursor keys to select the junk at the beginning of the file, up to the recognizable start of your documents, and then press <f6> to delete it. Now, move to the end of your recognizable text. What comes after is the remnants of your machine language programs (if any) and assorted other unrecoverable gibberish. Use <f7> and the cursor keys to select that stuff, and then use <f6> to eliminate it. Then copy one character from the text (<f7> ... select any character ... <f5>), to clear out the paste buffer. Now go back to the menu <f8>. You should see IT.DO reduced in size and the FREE MEMORY increased in size (depending on how many documents vs. programs and free memory you had before the cold start). Now you can go into TEXT again and either save the whole mess of documents onto a printer or tape or what have you, and/or you can cut and paste to chop the long document up into its proper pieces.

COLD STARTING A MODEL 100/102

It is "very important" to periodically cold-start the 80C85 processor, i.e. Model 100, 102, and 200 computers--especially when you use them with machine language programs. It's good for the machine.

Cold-starting (AKA cold-booting, re-booting, etc.) is accomplished by holding down on the <shift> <ctrl> and <break>

keys with one hand, pressing in and holding the <reset> button on the back edge with the other hand, then releasing the <reset> ... release the other three keys.

Reset the day, date, and time

1. Go into BASIC, key in and enter the following:
2. DATE$="dd/mm/yy"
3. DAY$="mon" or... tue, wed, thu, fri, sat, sun
4. TIME$="hh:mm:ss"

Call the option ROM if you have one

1. Go into BASIC, key in and enter the following:
2. CALL 63012

If you have a Traveling Software ROM

1. Go into BASIC, key in and enter the following:
2. CALL 63013,1

Load FLOPPY from a TPDD2

1. Connect the tpdd2 to the Model 100 or 102
2. Insert the Utility Disk, close the door and leave the drive off
3. Go into BASIC, key in and enter the following:
4. RUN"COM:98N1E ...hit <enter>
5. Then, turn on tpdd2

If you have a TPDD, refer to The Whole Enchilada document entitled, RAM & Storage Options.

Return
The Whole Enchilada

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RAM AND STORAGE OPTIONS FOR MODEL T

Available RAM and Storage Comparison Chart

MODEL	BANKS	K-EA	BP	XR	XR4	RP	RD	TPDD	TPDD2	COMP
Model 100	1	32	y	y	y*	y	y	y		
Model 102	1	32	y	y	y	y	y	y		
Model 200	3	24	y		y	y	y	y		
NEC8201	2	32				y	y	y		
WP2	1	24			y		y	y		

BP = Booster Pak
XR = extRAM
XR4 = XR4
RP = RAMPAC (*)requires special cable
RD = RAM Disk
TPDD = Tandy Portable Disk Drive
TPDD2 = Tandy Portable Disk Drive 2
COMP = Another computer

One of the most confusing areas for Model T owners is RAM (memory), vs. temporary storage, vs. permanent storage, vs. ROMware (Aka: Firmware) vs. option ROMware. As a fellow Model T user you need to understand these concepts. And I, as an expert on this subject, need to put it into terms you can understand ... maybe not the first time through, but eventually.

It's hard to know exactly where to start so I've decided to simply annotate a collection of facts. I am sure you will come to understand your options through these facts.

Memory vs. Storage
Memory is the work-space of the computer--much like the top of your desk. Storage is used for long-term, safe-keeping--just like a filing cabinet. Unfortunately, since the Model 100 also uses memory (RAM) for file storage, owners often over-trust memory with their data files, and never or seldom copy their files to storage (tape or disk).

Save your work in progress on a regular basis. Always keep your important files up-to-date, and out of the memory of your Model 100 when not in use. Keep only those files you are currently working with in the Model 100. And again, save your work in progress files to storage on a regular basis as you make important changes.

Capacity calculations
Throughout the following discussion, the term K is used. K equals 1024 bytes. A "byte" is equal to a character, e.g., A, Q, 4, %, are all bytes. People commonly ask questions about K, or storage capacity, in terms of how many pages of text will a certain amount of K hold. It's a reasonable question when K has no meaning. Let's say you have a 32K Model 100 (32 x 1024 = 32768 bytes). After system overhead--fancy words for RAM being used by the computer just to operate--you have about 29000 (actually 29638 bytes) bytes available; slightly less then 29K. Given the average page of text when printed with 1 inch margins on 8" x 11" paper in Pica (10 cpi (characters per inch) horz / 6 lpi (lines per inch) vert) you get about 2500 cpp (characters per page). Divide 29000 by 2500 and you get 11.6 pages for this example.

ROMware
Model T's have built in software (ROMware - Aka: Firmware) in a permanent storage area called a ROM (Read Only Memory), with the ability to add more ROMware (option ROM). ROMware executes directly from within the address space of the ROM, thus leaving RAM (working memory) available for data file development, or BASIC and machine language storage and execution.

A brief run down on built in ROMware follows:

Model 100/102

The Model 100 and Model 102 include: A BASIC interpreter for development and execution of BASIC programs (creates and runs .BA files - Aka: Microsoft, tokenized files). A simple text editor with extremely limited print-formatting capabilities, called TEXT (creates and edits .DO files - Aka: ASCII files). A TELCOM program for accessing the built in modem at 300 baud, or external serial devices (including external modems) at up to 19200 baud (downloads and uploads .DO files). An ADDRSS program dedicated to accessing a TEXT-built file called ADRS.DO--TELCOM also accesses the ADRS.DO file for autodialing phone numbers. A SCHEDL program dedicated to accessing a TEXT-built file called NOTE.DO.

Model 200
The Model 200 includes all ROMware associated with the Models 100 and 102, with the addition of a spreadsheet program called Multiplan. The Model 200's internal modem is capable of tone dialing vs. the Model 100/102's pulse dialing modem. The OS (operating systems) allows for bank switching, and copying files between banks.

NEC PC8201A
Includes all of the ROMware as Model's 100 and 102 with some differences in the BASIC command structure, i.e., Model 100/102 programs need to be modified to run on the NEC.

WP-2
The WP-2 is a dedicated word processing computer. It's text editing program includes a dictionary and thesaurus, and a capable print-formatter; as well as an address book. ROMware includes a TELCOM program with xmodem capabilities--unlike all the other models--and a built in DOS (disk operating system) for accessing the TPDD2, or external computer emulating the TPDD2.

Base RAM
Model T computers are unique in that they use RAM as both a working area and a temporary storage area. Their RAM is expandable within strict limits. ROMware usually does not use RAM for operations. RAM-based BASIC (.BA) and machine language (.CO) programming is also available--these use RAM for execution, as well as storage.

Model 100's and 102's may be expanded to 32K (less OS overhead) in one, contiguous bank. You may not exceed the 32K barrier but you can add banks of 32K. In the past--a long time ago--a few 3rd party inventor/manufacturers, like American Cryptronics and PG Designs, made add-on, 32K banks (2x, 3x units). However, neither of these firms are still in the Model T marketplace; thus their RAM banks are no longer available. Today, the extRAM, XR4 devices by EME Systems, sold through Club 100, and the Booster Pak, offer RAM banks as well as multiple option ROM image, or physical, swapping/management.

Model 200's come with 24K in one bank, expandable to 2 more banks (3 total) of 24K each (less OS overhead). The OS (Operating System) within the Model 200 is already programed to use all three banks--if present, of course. Note: Model 200 RAM banks are separate; not contiguous, i.e., 3, 24K banks, not 1, 72K bank. The extRAM is available for the Model 200, giving it an additional 24K bank (4, total). The XR4 is not available at this time for the Model 200.

The NEC PC8201A offers users 2, 32K RAM banks (less OS overhead). Neither the extRAM nor the XR4 is available for the NEC8201. Booster Pak and rampac are not available for the NEC8201, either. Most all of our option ROMware is available for the NEC8201.

The WP-2 computer is limited to one, 24K bank (less OS overhead), leaving little room for temporary file storage. However, to its credit, the WP-2's OS (operating system) is programed to accept a 128K RAM disk chip. Available through Club 100, the 128K RAM disk chip is actually a storage area, only. You do not work in it, but use it like you would a disk drive, i.e., create your files in RAM, save a copy to the RAM disk chip, then delete the original file in RAM; thus freing RAM for more file creation.

Files may be freely copied to and from RAM and the RAM disk chip. Furthermore, the RAM disk chip is isolated from the cold, reboot process that wipes out all files in RAM, i.e., when the computer cold boots--for whatever reason--files lost in RAM, yet stored in the RAM disk chip, may be copied back into RAM from the RAM disk chip; and are as up-to-date as the last copy stored.

extRAM
This is a 32K RAM (24K in the Model 200) that fits entirely in the option ROM socket. Under program control, the extRAM may be used as a RAM disk, or swapped as a RAM bank, or used as a ROM by copying stored ROM images from disk or rampac. ROM images swap quickly. So it's like having a multi-ROM bank when used in this manner.

XR4

The XR4 is exactly like having four extRAMs in one, 128K memory. Thanks to innovative packaging technology, it all fits inside the option ROM socket in less then 1/4 cubic inch, and draws less then 1 microamp from the Model T's internal backup battery.

You may configure each of the XR4's four banks independently as ROM-images, or as RAM-file-banks. The XR4MNU program, provided, allows you to set the bank of the XR4 that you need to be the Tandy's option ROM at any given time. With ROM images it allows you to activate or deactivate the images by name. With RAM banks, it shows you the bank's file directory and allows you to load and save files between XR4 and RAM (or even send files directly to a printer or to the serial port), rename and kill files, and even swap workspaces of files with one keystroke.

Booster Pak
Probably the finest RAM disk, and ROM holder/swapper ever created. The Booster Pak comes with 96K of RAM-disk storage, and the capacity to hold 11 more devices, i.e., 11, 32K RAM chips, or 11, option ROMs, or 11 RAM and ROM combinations.

The Booster Pak (available for Model 100 and 102, only) attaches to the entire bottom of your computer, raising it up about 1/2 inch. RAM and ROMs are easily added. And, unlike the extRAM and XR4, ROMs are added physically, not logically, Aka: image swapping.

The Booster Pak includes TS-DOS and X-Tel within its system ROMs, eliminating the need to purchase this ROMware separately. Furthermore, TS-DOS, X-Tel and BASIC include an extended command set for direct, Booster Pak RAM file access.

When working within the Booster Pak's OS, your files are swapped from Booster Pak RAM to base RAM automatically upon selection, then stored again upon exit. Thus, nothing is lost during a cold restart. Furthermore, files larger then 32K may be created within Booster Pak RAM, making it a great, database machine, or researcher's data collection machine.

rampac
The rampac is an external, battery-backed, removable, 256K storage module--like a RAM disk chip. It connects to the system bus of the Model 102 and Model 200, directly, and to a Model 100 via a special cable. The rampac comes with built in OS (operating system) software for saving, loading, renaming, and killing files on the rampac. When coupled with an extRAM or XR4, ROM images swap almost instantly. Note: Since the rampac is battery powered, and since it is critical that rampac uses never, ever remove or attach their rampac while their computer is on, we highly recommend storing files on permanent storage media (tape, disk, or another computer) for safe keeping.

Magnetic media storage
Yes, disk, other computers, and tape storage is still the best way of keeping a large number of files, and a good way to keep your files from being destroyed. After everything is said and done, large RAM, RAM disks, RAM banks, etc., are nice but nothing beats magnetic storage media (tape and disk) for safe, multiple file storage and access. Besides, every RAM-device mentioned herein may be considered only temporary storage. Thus, files will be lost to these RAM-based devices more often then files lost to disk or tape storage. These, of course, are words to the wise.

Prices
Note: All club 100 items include manuals and install guides
Note: All prices subject to change.

Item	Price
Model 100 8K	29.00
Model 102 8K	19.00
Model 200 24K	59.00
NEC 8201 8K	29.00
WP-2 RAM disk chip 128K	60.00
extRAM (software on paper)	75.00
extRAMware TPDD/DOS/Mac	15.00
XR4 (software on paper)	169.00
XR4ware TPDD/DOS/Mac	15.00
rampac	179.00
rampac Model 100 adaptor cable	20.00
Booster Pak 96K	128.00
Booster Pak 32K RAM	6.00
ROM2/Cleuseau ROM 100/102/200/NEC	49.95
TS-DOS ROM (1) 100/102/200/NEC	49.95
The Ultimate ROM II .. 100/102/200/NEC	89.95
Sardine ROM (1) 100/102/200/NEC	49.95
Multiplan ROM 100/102	49.95

CRDFIL ROM (2) ..... 100/102 ..... 49.95

1. Available on disk version for use stand-alone or via The Ultimate ROM II (both TS-DOS on disk and Sardine on disk) or Sardine ROM (TS-DOS on disk) 39.95
2. CRDFIL PC available in DOS disk version .. 24.95

Item	Model T to desktop	Price
Lapdos II	100/102/200/NEC (1) to DOS ..	39.95
WP2DOS Plus ..	WP-2 (2) to DOS	79.95
100duet	100/102 (3) to Mac	89.95
WPduet	WP-2 (4) to Mac.....	89.95
DeskLink	100/102/200 w/TS-DOS/BP (1)..	24.95

1. Lapdos II and DeskLink on 5.25 or 3.5" disk (your choice when ordering). DeskLink requires TS-DOS on the laptop or within a Booster Pac. Lapdos II and DeskLink do not include cable or adaptor. Cable required for Model T to desktop (indicate either 25M-25F or 25M-9F when ordering). Adaptor required for TPDD or TPDD2 to desktop via Lapdos II.
2. Includes 3.5" disk and 9F-9F cable
3. Everything included. Model 200 and NEC users need LOADER to use 100duet with your machine 4.95
4. Everything included.

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Is your ni-CAD dead?
by Tracy Allen, 76670,326 :(eme):

The "memory backup battery" in the model 100, 102 and 200 is a ni-CAD battery soldered to the main circuit board. If you need to replace it, it is readily available. The part number and sources are listed at the end of this article.

First, though, you should be sure that it is the ni-CAD that is causing whatever problem you are having. Perhaps your computer suffers a memory loss or other aberrant behavior, particularly after having lain off and idle for a period of time?

Or perhaps you are just uneasy about having your memory backed up by a part that might unexpectedly go bad at the most inconvenient moment. I'd guess that most of the time the ni-CAD is not to blame, and not much to worry about.

If the computer has AA cells installed, and/or if the power adaptor is plugged into an active wall outlet, it is those batteries or the AC power that provides the energy both to recharge the ni-CAD "and" to back up the memory. Fresh alkaline AAs can be counted on to hold the memory for a long, long time. Do not leave ordinary carbon cells installed, because they are more than likely to leak. Do not store the computer at high temperatures, because under hot conditions even alkalines might leak. If the computer has been stored in a wet, humid environment or has fallen into a lake (...it happens!) open the case and inspect the battery terminals for tell-tale green corrosion. That could be a serious problem, with corrosion of both the battery and the circuit board.

You have to realize that the ni-CAD is hardly ever called upon to deliver energy. The only times it discharges are:

You are replacing the AA cells. This is usually a matter of minutes or less, and even severely depleted ni-CADs should be able to handle that.

The computer is stored for a long period with no AA cells installed.

The computer is left with the AC adaptor plugged into the side, but the AC adaptor is not plugged into an active wall outlet. (Even if AAs are installed, the AC power plug disconnects them from the circuit inside the computer)

The computer is stored for years, and whatever AA cells that were in it have turned green at the ends... leaking noxious substances all over. Oh no!

The computer is stored for long periods at exceptionally high temperatures (the ni-CAD or any other batteries leak current internally), or under exceptionally humid or wet environments (moisture on the internal circuit board would cause corrosion, green spots, and current leakage especially around the battery terminals.)

To test the ni-CADs in a machine that is acting normally, just back up your files, but leave them in the memory, turn off the main power (not memory power), remove the AAs and the power adaptor, and wait one week. Reinstall the batteries or adaptor, turn on the machine and check that all the files are there and that any programs you have operate normally. If so, the battery meets the specifications that Radio Shack set for it.

On the other hand, if files disappear or become garbled or programs crash, try the experiment again for a shorter period of time. Cold start the computer, reload some files and programs, recharge the ni-CAD from some AAs or from the power adaptor for a couple of days. Now try the experiment again, for one day or even for 15 minutes. If you still lose things, you have a problem. Don't immediately jump to the conclusion that the problem is the battery. Maybe the battery is being pulled down by some component in the computer that is drawing too much current. It's like a car battery -- is it the battery, or is it the regulator?

The ni-CAD "should" hold the memory a lot longer than one week. Early 32K model 100s drew about 30 microamps

standby current, which would give a battery life projection of more than a month on a fresh 50 milliamp hour ni-CAD (.050/.00003 = 1667 hours = 69 days). More recent 102s have a better standby current, about 10 microamps, so the fresh ni-CAD on those should hold the memory for more than 200 days! In either case, Radio Shack's one week specification is conservative. Remember that the ni-CAD doesn't ever come into play unless you are replacing the AAs without a power adaptor plugged in. It usually doesn't take a week to replace the batteries, unless you're waiting for a battery sale!

If the computer has a bad attitude, the memory chips themselves may be suspect. This is especially true if you have one of the older model 100s. The old memory technology was not as good at packing all those transistors close together. I have seen memory modules that were drawing tens of milliamps in standby (instead of a couple of microamps), and also they were causing bizarre behavior from the computer.

As a quick check, measure the current drain from the AA cells or power adaptor when the computer is turned off. This drain should be less than 0.0005 amp, most of which goes into charging the ni-CAD.

If you do not have a micro-ammeter or technical skills, try going back to your basic 8K computer. Turn off memory power, remove all the memory modules you can, except for the original one. Turn the memory power back on, install some files, then see if the aberrant behavior or high current consumption goes away. If so, you will have to decide which memory module is bad. Make yourself a 16K computer using one module at a time and see which one causes the problem.

If you do have the technical equipment and skills, you can make some direct, conclusive tests. If you have a voltmeter, first go in and measure the voltage across the ni-cad terminals. The voltage definitely should stay above 3 volts for a while after the AA cells and power adaptor are removed. If the ni-cad voltage stays at or near zero even with the AAs installed, then you almost certainly have a ni-cad replacement in store. If the voltage from the ni-CAD rises when the AAs are installed, only to fall quickly when they are removed, you should proceed to check the standby current drain before concluding that the ni-cad is bad.

It is better to measure the standby current drain directly. You have to break into the circuit strategically to splice the ammeter between the ni-cad and the computer. The best place to do this is by cutting or unsoldering one lead of diode D22. You can resolder it when you are finished. You can do this test with the AAs installed or not, it shouldn't matter. The standby current drain with the computer turned off should be between 8 microamps for more recent model 102s, up to 30 microamps for older model 100s. If there is an excessive current problem, you can continue to monitor this standby current as you swap out the different memory modules. There is little besides the memory modules that could cause the excessive standby current consumption, except for the standby steering circuit itself. If the standby current is normal and the ni-cad won't hold a charge, you will in fact have to replace the ni-cad.

If you decide that the ni-CAD needs to be replaced, here is where to get it: 3.6 volt, 50 milliamp-hour ni-cad, the manufacturer is Yuasa, part #3-51FT/A.

Radio Shack/Tandy part number ACS-0100, costs $14.18Call Tandy National Replacement Parts at 1-800-442-2425 (keep trying!)

Newark Electronics part number 87F644, costs $6.85Find Newark in phone directory of any large metropolitan area. Newark may have a minimum order.

The battery is easy to find on the circuit board. Take care in unsoldering and soldering it, not to overheat it. Be sure to put in the new one with the correct orientation!

ni-CAD battery article
EME Systems, 2229 Fifth St., Berkeley CA 94710
(510) 848-5725

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HOW TO SALVAGE A DEFECTIVE MODEL 100 DOCUMENT FILE ON CASSETTE TAPE
by Larry Siebenmann, Berkeley CA

SECTION I
Who has not mourned the loss of a precious document file; that for some reason (usually obscure) cannot be read back from the cassette tape? The following simple BASIC "salvage" program appeared anonymously in the newsletter of our Bay Area NEC/100 User's Group, and deserves wide circulation.

(I can now reveal that the authors were in fact Frank Oechsli and Bea Vandenberg.) This program will salvage many a defective .DO file recorded on cassette tape, provided that the Model 100 is able to recognize the opening of the file as it should, printing FOUND . Stripped to its essentials the program is so simple it can be easily remembered.

```
10 MAXFILES=2: ON ERROR GOTO 100
20 SOUND ON: OPEN"CAS:" FOR INPUT AS #1
30 OPEN"rescue" FOR OUTPUT AS #2
40 IF EOF(1) THEN END
50 A$=INPUT$(1,1): PRINT#2,A$;: PRINTA$;
60 GOTO 40
100 BEEP: RESUME
```

It is lines 10 and 100 that keep the Model 100 on the salvage job in spite of the damage. That's the main idea of the program; it's simple, but delightfully effective, and applicable to many computers. To test the program, you can artificially generate reading errors by slowly depressing and releasing the pause key during loading. Normal loading would then terminate with an IO (Input Output) error; but the program BEEPS and perseveres.

In the sidebar ... I offer an embellished version RESCUE.BA tailored for the Model 100. It is worth keeping on file for emergencies. But for the moment read on; we have more to learn.

SECTION II
The above program will fail if the Model 100 cannot recognize the file header, and alas, the header is often the first thing to get damaged. But for such occasions I have been successfully using an other trick to save the day. One has only to make the Model 100 recognize any file header anywhere and then without letting its attention waver make it read the damaged file.

Here is the recipe in detail. With the cassette correctly connected, and volume around 5 or 6 (usually), move the tape to begin play just before any document file header that is undamaged; then start to run the above program listening attentively with your finger on the pause key of the cassette recorder. Depress this pause key as soon as a click is heard from within the Model 100 indicating that the header has been recognized. At this point relax and at your own pace move the tape to the beginning of the damaged file. In most cases this move can be made by depressing the rewind key or the fast-forward key even without releasing the play key. (In troublesome cases it may be necessary to detach temporarily the three leads from the cassette and play the tape to listen for the cacophonous screech that announces the file; one then depresses the pause key again, adjusts the volume to around 5 or 6 again, and reattaches the leads.) Next, one initiates the salvage of the file by releasing the pause key. When the computer stops, the file RESCUE.DO will contain the salvaged material with black blocks indicating spots where the Model 100 detected an error (delete the 1st command of line 100 if these are annoying).

SECTION III
The program may still abort before the whole file is salvaged. In this case, I suggest removing from 'RESCUE.DO' the material already salvaged, then repeating the process of the above paragraph with one difference: release the pause key to start the salvage just before the point on the tape where the last salvage operation aborted. It is safest to do this in the tiny space between two data blocks.

Perhaps other users will be able to tell us how to salvage .BA and .CO files; it is a more difficult task. Readers should be reminded that Tandy has, for reasons best understood by itself, reversed the usual roles of the two wires in the (grey) cassette recorder lead used in recording; that is why this lead must be plugged into the AUXiliary socket, rather than into the MICrophone socket as for the sister computers NEC 8201 and Olivetti M10. To forget this is one fine way to create defective cassette files that will be very hard to salvage.

SECTION IV
Incidentally NEC users rarely have to salvage cassette files as above, for the NEC is the proverbial tortoise using a slow but sure baud rate for cassette communication (600 baud compared to 1500 for the Model 100).

Prevention is always better than cure! The old adages concerning tape storage should still be heeded: use tape you can trust (not necessarily expensive tape!), keep the recorder tape head area clean, keep the recorder batteries fresh (or use wall cur rent), and try several volume levels before concluding that a file on tape is defective. Noting the continuing high prices of disk drives, I am sure that a huge number of users must still rely on cassette tape storage. The above tricks do add a measure of safety, making use of the humble cassette recorder more acceptable.

For files of lesser importance, I now dare to make just one copy, not two or three, and thereby trade off some extra safety for a measure of efficiency.

Update #1 From: BILL TEMPLETON
NOTE: In order for the program in Larry Siebenmann's recent message regarding the RESCUE.BA program, some minor changes must be made to make it run on a Model 100 as follows:

```
10 ON ERROR GOTO 100
15 MAXFILES=2:SOUNDON:CLS:PRINT
20 OPEN"CAS:" FOR INPUT AS #1
30 OPEN"salvge" FOR OUTPUT AS #2
40 IFEOF(1) THEN BEEP:BEEP:MAXFILES= 1:END
50 A$=INPUT$(1,#1):PRINT#2,A$;:PRINTA$;:GOTO40
100 PRINT#2,CHR$(239);:PRINT:PRINT"erl =";ERL;" ;  err =";ERR:BEEP:RESUME
```

The program will run with "#" symbol in lines 20, 30 and 50, although it is not required on the M100. However, the program will not run with the default setting of MAXFILES=1, and with the filename "Salvage" in line 30!

Update #2 From: BILL TEMPLETON
NOTE: Here's my final version of Larry's program (without REMS) that will recover .DO files from bad tape...

```
1 MAXFILES=2:ONERRORGOTO15:SOUNDON:CLS:PRINT:SCREEN0,0:E$=CHR$(27):CLS:PRINTE$;" p CASSETTE DOCUMENT FILE RESCU
2 PRINT@49,"(heavy weather option)":PRINT"  1. Depress  recorder's pause key as soon as click is heard from your"
3 PRINT"     Model 100.":OPEN"CAS:"FORINPUTAS#1:PRINT"  2. Release pause key after moving to     part of tape still to be salvaged.
4 IFINKEY$=""THEN4ELSECLS
5 OPEN"RESCUE"FORAPPENDAS#2
6 A$=INPUT$(1,#1):GOSUB7:GOSUB9:GOTO6
7 PRINT#2,A$;:PRINTA$;:IF(POS(0)MOD40)=0ANDASC(A$)<>13THENGOSUB14
8 RETURN
9 IFEOF(1)=0THENRETURN
10 BEEP:BEEP:CLS:PRINT@12,E$"p Rescue over! "E$"q
11 PRINT"   Is tape at end of file?   If not        try again after inspecting and"
12 PRINT"   evacuating RESCUE.DO. Do a string       search there for blocks'";CHR$(239);"' showing"
13 PRINT"   where errors were detected.";:END
14 PRINT@40*(CSRLINMOD7),SPACE$(40);:PRINT@40*   (CSRLINMOD7),STRING$(40,255 );:PRINT@40*((CSRLIN+5)MOD7),"";:RETURN
15 PRINT#2,CHR$(239);:PRINT:GOSUB14:PRINT"erl =";ERL;";err=";ERR:BEEP:GOSUB14:RESUME
```

Update #3 From: BILL TEMPLETON
NOTE: Change 'CPT:' in line 4 to read from one of your current filenames and try my version of Larry Siebenmann's latest RESCUE.BA program.

```
0 'RESCUE.BA, Bay area Nec/100 group, 1985
1 MAXFILES=2:ONERRORGOTO15:SOUNDON:CLS:PRINT:SCREEN0,0:E$=CHR$(27):CLS:PRINTE$;" p CASSETTE DOCUMENT FILE RESCU
2 PRINT@49,"(heavy weather option)":PRINT"  1. Depress  recorder's pause key as soon as click is heard from your
3 PRINT"     Model 100.":PRINT"  2. Release  pause key after moving to part of tape still to be salvaged.
4 OPEN"CPT:"FORINPUTAS#1:OPEN"RESCUE"FORAPPENDAS#2
5 IFINKEY$=""THEN5ELSECLS
6 A$=INPUT$(1,#1):GOSUB7:GOSUB9:GOTO6
7 PRINT#2,A$;:PRINTA$;:IF(POS(0)MOD40)=0ANDASC(A$)<>13THENGOSUB14
8 RETURN
9 IFEOF(1)=0THENRETURN
10 BEEP:BEEP:CLS:PRINT@12,E$"p Rescue over! "E$"q
```

```
11 PRINT"   Is tape at end of file?  If not       try again after inspecting and
12 PRINT"   evacuating RESCUE.DO. Do a string      search there for blocks"";CHR$(239);"' showing
13 PRINT"   where errors were detected.";:END
14 PRINT@40*(CSRLINMOD7),SPACE$(40);:PRINT@40*(CSRLINMOD7),STRING$(40,255 );:PRINT@40*((CSRLIN+5)MOD7),"";:RETURN
15 PRINT#2,CHR$(239);:PRINT:GOSUB14:PRINT"erl =";ERL;";err=";ERR:BEEP:GOSUB14:RESUME
```

RECOVER .DO FILES FROM BAD TAPE

by BILL TEMPLETON

Try using the following short program to recover your .DO files from tape! You don't have to use 'filename' after CAS: in line 1 if you just want to read the next text file on tape, and you can eliminate: PRINT#2,"***ERROR***"; if you don't want to have this inserted in the resulting SAVE.DO file every time an error occurs...

```
1 CLS:MAXFILES=2:OPEN"CAS:filename"FORINPUTAS1:OPEN"save"FOROUTPUTAS2
2 ONERRORGOTO7:print@133,"Working...
3 A$=INPUT$(1,1)
4 IFEOF(1)THEN6
5 PRINT#2,A$;:GOTO3
6 CLOSE:MAXFILES=1:MENU
7 PRINT"Error ="ERR" On line"ERL:PRINT#2,"***ERROR***";:RESUMENEXT
```

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ABOUT THE TPDD/TPDD2 DISK DRIVES

The Tandy Portable Disk Drive is made by Brother Corp. Tandy sold 2 versions of the brother portable drive. Both use standard 3.5" DSDD disks ... the instructions call for SSDD but those disks are no longer available. Buy generic disks, not Tandy, or brand name disks. Tandy, and others, charge too much and generic disks work just fine.

Name	AKA	Bytes	Files	TandyDOS
Tandy Portable Disk Drive	TPDD	100K	40	FLOPPY.CO
Tandy Portable Disk Drive 2	TPDD2	200K	80	FLOPPY

Tandy ships a disk operating system (DOS) with the drives. The FLOPPY.CO program is okay, as it loads and runs like any other .CO files, but FLOPPY does not. In fact, FLOPPY is, in many cases, disruptive. Over all, TS-DOS is far more useful. To the good, both FLOPPY.CO and FLOPPY are the only DOSes capable of image-duplication, i.e., the ability to make an exact copy of a bootable disk. Note: TSRANDOM also has this trait but is just for the TPDD, not the TPDD2.

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TPDD BOOTING INSTRUCTIONS
For the Tandy Portable Disk Drive 100K format...
Tandy Catalog Number: 26-3808

Preliminaries...

- A working Tandy Portable Disk Drive, 100K version--it says "Tandy Portable Disk Drive" on the front, not "Tandy Portable Disk Drive 2." The "2" indicates the newer drive by Tandy that formats disks to 200K instead of 100K.
- The "Utility Disk" for the TPDD--included with the TPDD and TPDD2 drives. Although these disks look identical--thank you, Tandy brains--there are major differences on the formatting and programming actually on the disk. If in doubt don't ask Tandy, call us.
- Fresh or reasonably good batteries in working condition even though you may also be using an AC adaptor.
- A TPDD cable--included--and a Model 100, 102 or 200 computer in good working condition.
- Booting the DOS (disk operating system) FLOPPY.CO

Do the following...

1. Connect the TPDD to the laptop computer and turn the laptop computer on.
2. Turn the TPDD off.
3. Turn the TPDD up side down and remove the 1/2" by 3/4" dip switch cover.
4. Flip all four switches to "on" and turn the TPDD right side up. Leave the cover off for now.
5. Go into BASIC on your laptop, enter the following program and follow the steps indicated.

   NOTE: Hit <enter> after each of the following lines:

```
10 OPEN"COM:88N1DNN"FOROUTPUTAS#1
20 PRINT#1,"S10985157C00AD7EF08B3AS901FE"
30 LOAD"COM:88N1ENN",R
```

6. After keying in the program, do the following...

   SAVE"IPL" <enter>

7. Now hit your <F8> key to return to the menu...
8. Turn the TPDD on.
9. Hold the Utility Disk up to the light and make sure the write protect window is open, not closed. The write protect window is the little 1/4" square in one corner of the disk.
10. Insert the Utility disk into the TPDD and close the door.
11. Move the bar-cursor over the IPL.BA file and hit <enter>.

In less than 5 minutes, and if everything went as planned, you should now be at the menu of the FLOPPY.CO program. This is the disk operating system (DOS) that Tandy invented. FLOPPY.CO is not the best DOS in the world for the TPDD--we think our TS-DOS is better--but at least FLOPPY.CO works.

1. Remove the Utility disk.
2. Turn the TPDD "off."
3. Turn the TPDD up side down.
4. Flip all four dip switches to "off" and replace the cover.
5. Turn the TPDD right side up.

You are now ready to use your TPDD and FLOPPY.CO to access disks. This is the working condition for normal use.

You no longer need to use your Utility disk and should put it away for safe keeping. You no longer need to flip your dip switches to use the TPDD and FLOPPY.CO.

If you have further questions about FLOPPY.CO, the TPDD or TPDD2, or anything else regarding a Tandy Model 100, 102, 200 or WP-2 computer and associated equipment and programming or use, please feel free to call us. Our job is answering questions and helping our club members.

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TPDD2 BOOTING INSTRUCTIONS
For the Tandy Portable Disk Drive 200K format...
Tandy Catalog Number: 26-3814

Preliminaries...

- A working Tandy Portable Disk Drive, 200K version--it says "Tandy Portable Disk Drive 2" on the front. The "2" indicates the newer drive by Tandy that formats disks to 200K instead of 100K as a TPDD.
- The "Utility Disk" for the TPDD2. Both the TPDD and the TPDD2 come with a disk marked "Utility Disk". Although these disks look identical--thank you, Tandy brains--there are major differences on the formatting and programming actually on the disk. If in doubt don't ask Tandy personnel, call us.
- Fresh or reasonably good batteries in working condition even though you may also be using an AC adaptor.
- A TPDD2 cable--included--and a Model 100, 102 or 200 computer in good working condition.
- Booting the DOS (disk operating system) FLOPPY

Do the following...

1. Connect the TPDD2 to the laptop computer and turn the laptop computer on.
2. Turn the TPDD2 off.
3. Hold the Utility Disk up to the light and make sure the write protect window is open, not closed. The write protect window is the little 1/4" square in one corner of the disk.
4. Insert the Utility disk into the TPDD2 and close the door.
5. Go into BASIC on your laptop, enter the following program and follow the steps indicated.

   NOTE: Hit <enter> after you key in the following line:

   ```
   RUN"COM:98N1ENN
   ```

After keying in the program and hitting enter, your laptop should look like it's doing nothing. This is good. Now, do the following...

1. Turn the TPDD2 on.

In less than 5 minutes, and if everything went as planned, you should see the FLOPPY program in your menu. This is the disk operating system (DOS) that Tandy invented. FLOPPY is not the best DOS in the world for the TPDD2--we think our TS-DOS is better--but at least FLOPPY works.

You are now ready to use your TPDD2 and FLOPPY to access disks. This is the working condition for normal use. You no longer need to use your Utility disk and should put it away for safe keeping.

If you have further questions about FLOPPY.CO, the TPDD or TPDD2, or anything else regarding a Tandy Model 100, 102, 200 or WP-2 computer and associated equipment and programming or use, please feel free to call us. Our job is answering questions and helping our club members.

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TS-DOS FACTS & TRICKS

FLOPPY.CO, and FLOPPY vs. TS-DOS. If you have a Tandy Portable Drive (TPDD), you are probably using FLOPPY.CO. If you are using a Tandy Portable Disk Drive 2 (TPDD2), you are probably using FLOPPY. In both case, these disk operating systems (DOS) are not 100% compatible with the Ultimate ROM II programs ... and several other programs, as well. To recommend switching to TS-DOS on either option-ROM or disk.

Traveling Software built some interesting features into their disk operating system, TS-DOS, that are quite easy and obvious to use on all computers. There are some features, however, who's application go unappreciated.

GLOBAL FILE TAGGING
Section 5 of the manual presents "Tagging" but does not explain that use of the [G] (Global Tag) feature is a great way to dedicate a specific set of files to one disk.

Example: Let's say you use a specific set of files (more than one) for each customer or project (entity), and that the sum of the bytes of all files in the set is within available RAM for your computer. Using a separate disk for each entity, simply [G] to tag all files for that entity to load or save. In this manner, you use your disk as a file-folder for each entity. Your computer becomes your desktop for that entity at that time, only.

DUPLICATING TS-DOS
Section 3 of the manual discusses "Copying DOSxxx.CO to RAM and disk" but does not elaborate why this is a good idea. TS-DOS has three names: DOS100.CO for Model 100/102 users, DOS200.CO for Model 200 users, and DOSNEC.CO for NEC 8201 users. These are the filenames looked-for on the resident disk in the drive by the TSLOAD.CO file and the TS-DOS feature of the Ultimate ROM II and Sardine ROMs. By coping the appropriate DOSxxx.CO file to all your data disks you avoid having to insert your original boot disk each time you wish to use your DOS. This will save your original from possible damage through constant use.

Although you may copy the DOSxxx.CO file onto all your disks, you can not directly copy the boot-sector of your original TS-DOS disk. However, you may use the backup feature of FLOPPY.CO or FLOPPY--the DOS supplied by Tandy--to make an "image" copy of your entire TS-DOS disk, thus making an exact, bootable copy.

Note: A backup of any boot disk is always available for $5 from Club 100, of course.

DOS-ON
Section 6 of the manual presents the "The Resident Portion of TS-DOS" but does not explain the usefulness of this feature. With the DOS turned on you do not have to leave your active TEXT file to access your disk. Simple turn the disk on, tap your function key (on your NEC... see manual for details), enter 0:filename and tap (where "filename" is the name of the file you wish to save under), wait for the file to save, then turn off your drive to save batteries--TPDD2 users may designate 1: for bank 2.

So, why is this feature so nice? Because, you will always "know" that you have a "backup" of your RAM file as you work. It is well known that our trusty laptop computers suffer from occasional cold starts. TS-DOS users who "practice safe computing" all the time never worry about loosing files.

Another application of the DOS-ON feature is the ability to boiler-plate letters.

Example: Let's say you write lots of reply letters. Over the years you've developed a whole bunch of specific paragraphs that you continually use throughout your letters. Then let's assume that you have each paragraph in a separate file, under a numbering system (i.e., P1.DO, P2.DO, P40.DO) on one or more specifically marked disks; and you have a printout of the filenames/brief descriptions of these paragraphs.

Now, you need to compose a letter. You want a signon, paragraphs 4, 20, 17 and 37 in that order, followed by a

signoff. You start by opening a TEXT file. Then, with your DOS-ON, drive on, and specific disk in the drive, simply merge each paragraph into the open file; one right after the other. Tap your function key, enter 0:filename (where "filename" is the next paragraph you want to come into your open file), and hit . Once the file arrives, you jump to the bottom of the file (CTRL Down Arrow), hit to form an end of paragraph blank line, then select the next paragraph. Continue in this manner until your letter is complete. Lastly, personalize it as necessary, then print.

BASIC programers will also like the DOS-ON feature since it allows sequential access to files directly from disk. Again, simply add 0: to your OPEN and CLOSE file commands of, e.g., OPEN"0:filename"FOR ... whatever ... INPUT, OUTPUT, APPEND.

MODEL 200 COLD START RECOVERY
The Model 200 TS-DOS ROM has a secret, hidden feature. None of the other TS-DOS ROM's have this feature. It was discovered quite by accident by one of our Club 100 members. Let's say you suffer a cold start on your Model 200 (any bank). If you have a TS-DOS ROM installed you simply go into BASIC and key the following command: CALL 921,146 In a few moments you will be returned to the main menu where a file called RECOVR.DO will greet you. Within that file is the entire contents of memory. Simply cut and paste your way to your lost text.

MODEL 100/102 COLD START RECOVERY
Again, just by accident, a club member discovered that the Model 100/102 TS-DOS ROM also has a cold start recovery call.

The call is: CALL 63013,0

THREE TS-DOS TRICKS WITH THE URII
Unless you know otherwise, you would do the following process to save work in progress: Edit your file, exit your file and return to the URII menu, insert your TS-DOS disk, turn on your drive, select TS-DOS from the menu, respond to the HIMEM prompt with Y for yes, wait for the DOS to load, swap disks, save your file, turn off your drive, return to the menu, and reenter your file. Yes, this works but look at all the steps. There must be a better way.

Trick #1: Load the DOS100.CO file into the memory of your machine, then save it onto every data diskette you use. This will relieve the burden of having to find and use your TS-DOS master disk each time you choose to access the drive.

Trick #2: Load the DOS100.CO file into the memory of your machine and leave it there. The URII looks at RAM, first, for TS-DOS. Thus, you don't even need your drive connected to jump into your DOS for file maintenance.

Trick #3: Load and run TS-DOS. Once in the DOS, select the function key marked, DOS-OFF. This will turn it ON. Having your DOS ON means that a portion of TS-DOS will remain in HIMEM for use while in a .DO file and in BASIC. With the DOS ON, you may update any .DO file to storage without leaving that file. Here's the process:

Assuming you have turned your DOS ON and are once again at the URII menu (or even the normal Model 100 menu). Select or create a .DO file, and enter that file. Edit the file as you would normally. To update your disk storage, place formatted data disk in your drive, turn on the drive, select function key , respond to the prompt with 0:filename, and hit . The 0: tells the resident DOS to access the drive, while the word "filename" is the actual name you wish to give the file you are saving--you do not need to include the .DO extension. Wait for the drive light to turn off and your screen to return to normal, turn off the drive. Your file is saved to the name you entered.

Notes about this method . . .
The entire contents of the resident .DO file will be saved under the name you entered. If the file already exists, the old file on the disk will be completely overwritten by the new data. You will not be warned. It will simply do its job. If you accidently give the name of a different file--one you don't want to loose--that's just too bad!!

Since I use the DOS-On method when using the URII chip, I start each of my .DO files by editing the name of the file at the top of the file--then reference that entry--just so I don't forget each time I go to save.

If you use View80, you may not use the DOS-ON function as well. Both View80 and TS-DOS require the same memory addresses and thus can not work concurrently.

Resetting your Model 100 and URII chip upon a cold start.

Enter BASIC and key the following, substituting the correct information within the quotes, i.e., hh = hour, mm = minute, ss = second (a 24 hour clock), xxx = Mon, Tue, Wed, Thr, Fri, Sat, or Sun, mm = month, dd = day, yr = year.

Hit enter after each entry.

	Examples
TIME$="hh:mm:ss"	08:14:23 15:00:00
DAY$="xxx"	Mon
DATE$="mm/dd/yr"	07/07/94
MAXFILES=1	...this helps certain functions
CALL63013,1	...this calls the URII ROM

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DEAD MUNK

My Chipmunk died ... help!

Many years ago, Holms Engineering built a disk drive, called a the Chipmunk, for the Tandy, Radio Shack Model 100 computer. The disk operating system (DOS) for the Chipmunk disk drive was called CDOS and programed by PCSG in Texas. CDOS resided on a ROM in the Chipmunk and booted into the Model 100 when the machine was turned on, or when you tapped the reset key, or issued the BASIC command CALL 0.

The Chipmunk (Aka: Munk) drive connected to the Model 100 by a cable and special interface card attached to the system bus under the computer. Drive booting and operations were fast and convenient. CDOS formatted disks to 360K, supported subdirectories, and downloading or uploading directly to and from the drive from within TEXT, BASIC and TELCOM. In short, the Chipmunk drive and CDOS were wonderful.

With in a few years, Tandy Corporation replaced the Model 100 computer with the Model 102. In doing so, they changed some things. To make a long story short, the Model 102 did not support the Chipmunk disk drive without serious internal modifications which voided the warranty. Chipmunk sales died.

Chipmunk owners, today, either are still using their Munk and loving it, or have a dead Munk on their hands. Dead Munk's can not be fixed because the parts are just not available in the open market. Several of the chips used in the construction of the Chipmunk disk drive were custom manufactured by Holms Engineering.

So, what do you do when you Munk dies? Munk owners have files on Munk-formatted disks, which of course can not be read by any other computer. Here are some solutions:

Solution #1
If your Munk has not died, start coping your files to a more common media like TPDD (Tandy Portable Disk Drive) disks, or to Mac or DOS disks. In all cases you will be coping one file at a time, i.e., from the Munk to the 100, from the 100 to the other media, then kill the file from the 100 and start the process again for the next file.

There's always an easy way and a hard way to do most computer tasks. There are tools you can purchase that will ease the pain, making the process quite easy. Here is a recommended list of tools to facilitate the coping of files from the Munk to other media.

(Model T = Models 100, 102, 200, NEC8201)

TS-DOS ROM - used for Model T to TPDD/TPDD2 copies
LeskLink & TS-DOS - used for Model T to DOS copies
Lapdos II - used for Model T or TPDD/TPDD2 to DOS copies
100duet - used for Model T or TPDD/TPDD2 to Mac copies

Solution #2
If your Munk is dead you have two options: 1) Find someone with a live Munk and borrow it, or 2) Hire Club 100 to copy files from your Chipmunk-formatted disks to MS-DOS formatted disks. Cost is just $5 per disk.

Solution #3
It is possible that Club 100 has spare Chipmunk drives on hand. If so, we will sell you a working Munk drive for $50 + $5 s&h UPS. We will test the Munk to make sure it works before we ship it to you, but will not warrant, replace, refund or repair it if it fails to work within any time limit what-so-ever. If this solution appeals to you, please call, first, to see if we have a Munk drive available.

Conclusion: The Chipmunk disk drive was a great drive. The Chipmunk drive was always the state of the art in Model 100 storage media. Chipmunk owners enjoy using their Munks and swear by them until their Munk dies--then they

swear at them. But at least Munk owners aren't SOL (Sort'a Out'a Luck) when their Munk dies, thanks to the many services of Club 100.

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ALL ABOUT USING TAPE FOR DIGITAL STORAGE

Believe it or not, some Model T users still use cassette tape for file storage. That's okay, though. Properly used, tape is an inexpensive, dependable storage media; given the right tape recorder and proper file-storage techniques.

TANDY TAPE RECORDERS

Using a tape recorder as an auxiliary storage device for a digital computer requires that the tape recorder handle square wave without cutting or rounding out the corners of the "square" electrical signal. Recorders used for voice or music round out the corners and can not be used reliably for the storage and retrieval of digital data.

Tandy, Radio Shack sells a variety of tape recorders but only the CCR-82 was strictly designed for digital storage. The CCR-82 has a "P" position on the volume dial that kicks in the digital circuitry. The "P" stands for "program." Using other tape recorders requires "fiddling" with the volume control, or adding other electrical devices to the line, until a suitably-reliable setting is found.

Note: In all cases, even with digital tape recorders, multiple saves and loads are recommend to assure that saved files are retrievable.

TAPE

The best tape to use for digital storage is bottom to middle of the line tapes. Do not use high fidelity tape, metal tape, or tape designed for great music recordings. Tape designed for digital (computer) storage usually come without a leader; called "leaderless" tape. A "leader" does not contain oxide on 2 to 3 inches of its leading end, and thus will not storage magnetic images.

SAVING AND LOADING .DO FILES

The .DO file is created through the built in TEXT program or via a .BA, .CO, or ROM-based program that output's or append's to an open .DO file. The .DO file is usually comprised of ASCII character codes 1 thru 127 but may include the 8 bit high codes 128 thru 255 as well. Note: Character code 0 (null) is stripped from .DO files by the TEXT editor.

The .DO file takes more space on tape then .BA or .CO files but is the most reliably saved file on tape; due to the many blocks created during the save.

To save a TEXT file, go into the .DO file you wish to save. Tap your function key, respond with the name you wish to save the file you are currently into, as, and hit . To load a TEXT file, start by using TEXT to create a blank file using any name you wish--most tape users use the same name as the name of the file they will be loading. Next, once in the named/blank file, tap you function key, enter the name of the file as saved on tape, and hit .

SAVING AND LOADING .BA FILES

The .BA file includes codes from all 256 possible character code combinations, and thus is not an ASCII file. The .BA file must be saved and loaded through the built-in BASIC interpreter program.

To save a .BA file you must first be "in" the .BA file you wish to save, i.e., the target program file must be the current loaded program file in the BASIC interpreter, and you must be in there with it. This is accomplished in two ways.

Start the .BA file running and immediately the program, thus halting its operations, leaving you at the BASIC OK prompt. Or...

Go into BASIC and issue the commands:

```
NEW
LOAD"filename.BA
```

The OK prompt once again appears. At this position, regardless how you got here, you simply issue the command:

```
CSAVE"filename
```

To load a .BA file you must first be in the BASIC interpreter. Issue the commands:

```
NEW
CLOAD"filename
```

Once the OK prompt appears, thus the file has been loaded into BASIC from tape, you must save it to the menu. Do this by issuing the command:

```
SAVE"filename
```

Note: BASIC files previously saved to tape as .DO files may be read directly into the BASIC interpreter. However, BASIC program files previously saved to tape as .BA files may not be loaded directly into an open TEXT (.DO) file.

To save a .BA file as a .DO file, simply be "in" the halted BASIC program and issue the command:

```
SAVE"filename.DO
```

Lastly, use the technique addressed above to save the .DO file to tape. (see saving a .DO file)

SAVING AND LOADING .CO FILES

The .CO file is a compiled 8088 machine language file containing character codes 0 thru 255. And, like the .BA file, is not an ASCII file, and must be loaded and saved from within the BASIC interpreter.

The .CO file must be handled carefully. Each .CO file generates three numbers. These are known as the "Top:", "End:", and "Exe:" numbers; expressed as topnumber, endnumber, and exenumber.

To save a .CO file to tape you must first load it into BASIC. It is a wise idea to clean out any other .CO files that may be present. This is done via the BASIC command:

```
CLEAR0,MAXRAM
```

The next step is to...

```
LOADM"filename
```

...using the name of the .CO file currently in memory. When you issue this command, three numbers will be presented to you, i.e., the top, end, and exe numbers. Write these numbers on the tape jacket or tape reference card.

The last step is to issue the command:

```
CSAVEM"filename.CO",topnumber,endnumber,exenumber
```

To load a .CO file from tape you, once again, must be in the BASIC interpreter. And again, it's a good idea to clean out any current .CO files:

```
CLEAR0,MAXRAM
```

Next, you must reserve space in memory (RAM) to accept the incoming .CO file, load the .CO file from tape, then save it to the menu for use. Issue the commands as follows:

```
CLEAR256,topnumber
CLOADM"filename
SAVEM"filename.CO",topnumber,endnumber,exenumber
```
