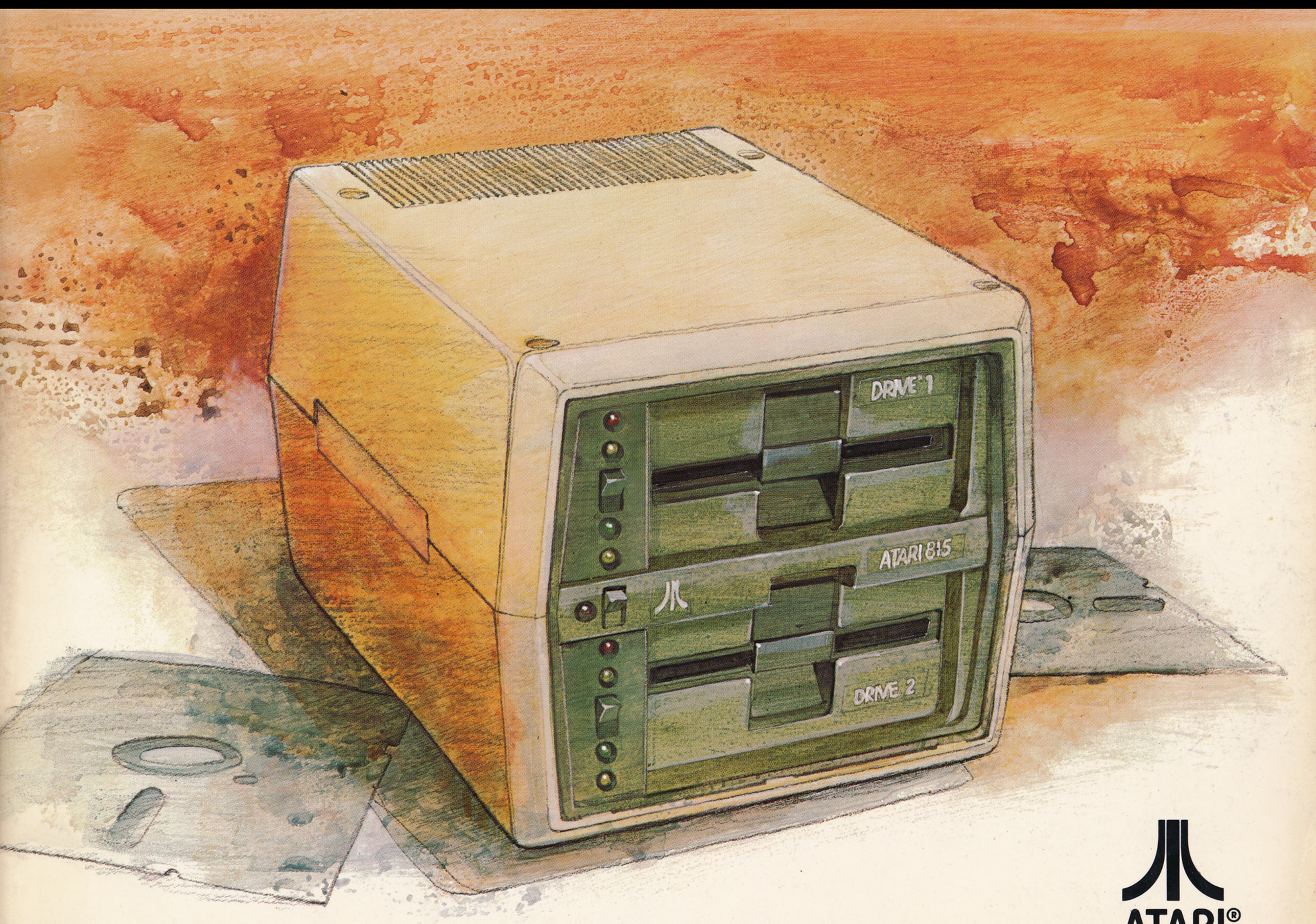
ATARI®

815™

DUAL DISK DRIVE OPERATOR'S MANUAL



ATARI®

A Warner Communications Company

ATARI® 815™
DUAL DISK DRIVE
OPERATOR'S MANUAL

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PRINTED IN U.S.A.

PREFACE

Both beginning and advanced users of the **ATARI® 815™ Dual Disk Drive** can refer to this manual as a guide. For the novice, step-by-step instruction is included for disk operations, such as diskette duplication in Section 10, and program storage and retrieval in Section 11. Not all sections of this manual are applicable to the general user. Section 16, specifying technical items such as soft-sector formatting and device control block commands, is written for those who are familiar with disk utility systems.

CONTENTS

ILLUSTRATIONS

1

INTRODUCTION

NOTE: Please read all instructions carefully before attempting to operate the ATARI 815 Dual Disk Drive. Improper use can result in damage to the system.

Your **ATARI® 815™ Dual Disk Drive** is a record/playback device that allows you to store and retrieve large amounts of computer data quickly and accurately. By attaching the Dual Disk Drive to your system, you greatly enhance the storage capacity of your **ATARI 400™** or **ATARI 800™ Personal Computer System**. This manual explains the requirements and procedures for attaching your ATARI 815 Dual Disk Drive to the computer console. Refer to the *Disk Operating System II (DOS II) Reference Manual* and the *ATARI BASIC Reference Manual* for information on how to use the features of your disk drive system.

The ATARI 815 Dual Disk Drive is a double-density drive. Each drive stores twice as much data on a diskette as the ATARI 810™ Disk Drive. "Dual" means there are two disk drives in the same housing. In comparison, therefore, the ATARI 815 Dual Disk Drive stores four times as many bytes (368K bytes on two diskettes) of information as a single-density, single-disk drive unit like the ATARI 810 Disk Drive.

When you turn OFF the computer, you lose all programs or data stored in Random Access Memory (RAM). Using your ATARI 815 Dual Disk Drive to store and retrieve information to and from diskette will eliminate the need to retype programs and data each time you want to use them.

2

UNPACKING

As you unpack your ATARI 815 Dual Disk Drive from its carton, verify that you have the following items.

- Dual Disk Drive
- I/O Data Cord (round cord with identical plugs on the ends)
- *ATARI 815 Dual Disk Drive Operator's Manual* (this book)
- *Disk Operating System (DOS) II Reference Manual*
- ATARI 815 Master Diskette CX8201
- ATARI Blank Diskette CX8202
- Peel-off labels printed DRIVE#1 through DRIVE#8

Save all original packing materials for reuse in the event that you wish to ship your equipment or store it away for prolonged periods.

3

SYSTEM REQUIREMENTS

You must have at least 16K RAM in your ATARI Personal Computer System to operate the Dual Disk Drive. If your ATARI 400 contains only 8K RAM, you can have it upgraded to 16K RAM at an authorized ATARI Service Center. For instructions on inserting additional Memory Modules™ into the ATARI 800, refer to the *ATARI 800 Operator's Manual.*

Use the ATARI 815 Master Diskette (Model no. CX8201) and ATARI blank diskettes (Model no. CX8202) with your ATARI 815 Dual Disk Drive.

Check the Drive Code setting, located on the back of the ATARI 815 Dual Disk Drive, to make sure the switch is in the 0 position. If you have more than one ATARI 815 Dual Disk Drive, you must change the Drive Code number setting on the additional disk drives to positions 2, 4, etc. See "Drive Number Codes for ATARI 815 Dual Disk Drive."

4

ATARI 815 DUAL DISK DRIVE

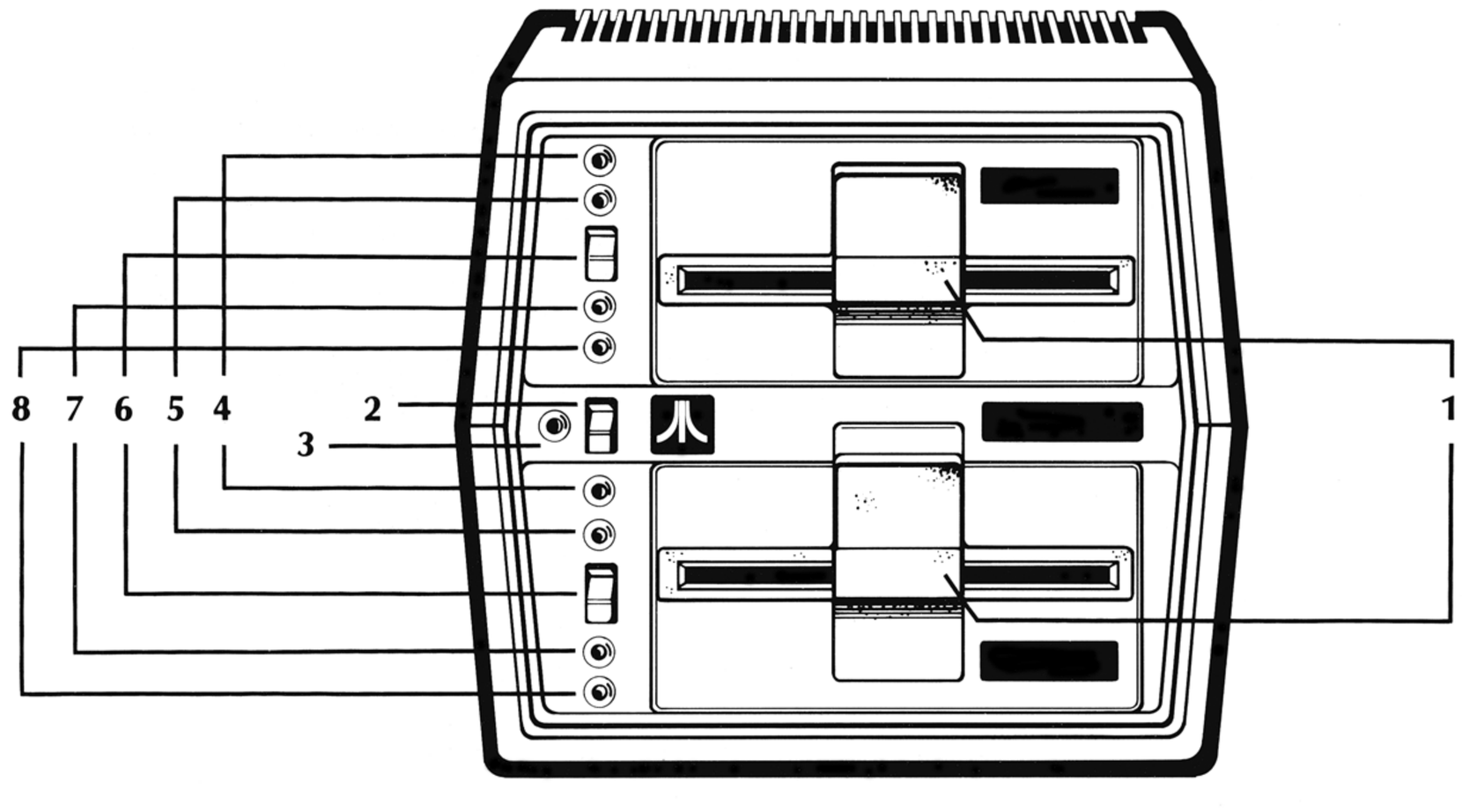

Figure 1. Front Panel Configuration of ATARI 815 Dual Disk Drive

1. Door Latch—Located above panel indentation. Pull to open door. Push to close door after diskette is in drive.

2. Power ON/OFF Switch (PWR) — Always turn power ON before inserting diskette into drive and remove the diskette BEFORE turning the power OFF.

3. Power Indicator Light — Lights to indicate that power is ON.

4. Disk Drive Busy Indicator Light (BUSY) — Glows red when the disk drive motor is in motion. DO NOT OPEN DRIVE DOOR, TURN POWER OFF, OR ATTEMPT TO REMOVE THE DISKETTE WHEN THIS LIGHT IS ON.

5. Write Protect ON (WRIT PROT ON) — Lights when disk drive unit is set to provide protection against write commands to the diskette.

6. Write Protect Switch (WRIT PROT) — When this switch is in the WRIT PROT position, any diskette inserted in the drive will be protected from accidental write commands.

7. Write Light (WRIT) — Lights when program or data is being written onto diskette.

8. Read Light (READ) — Lights when diskette program or data is being read.

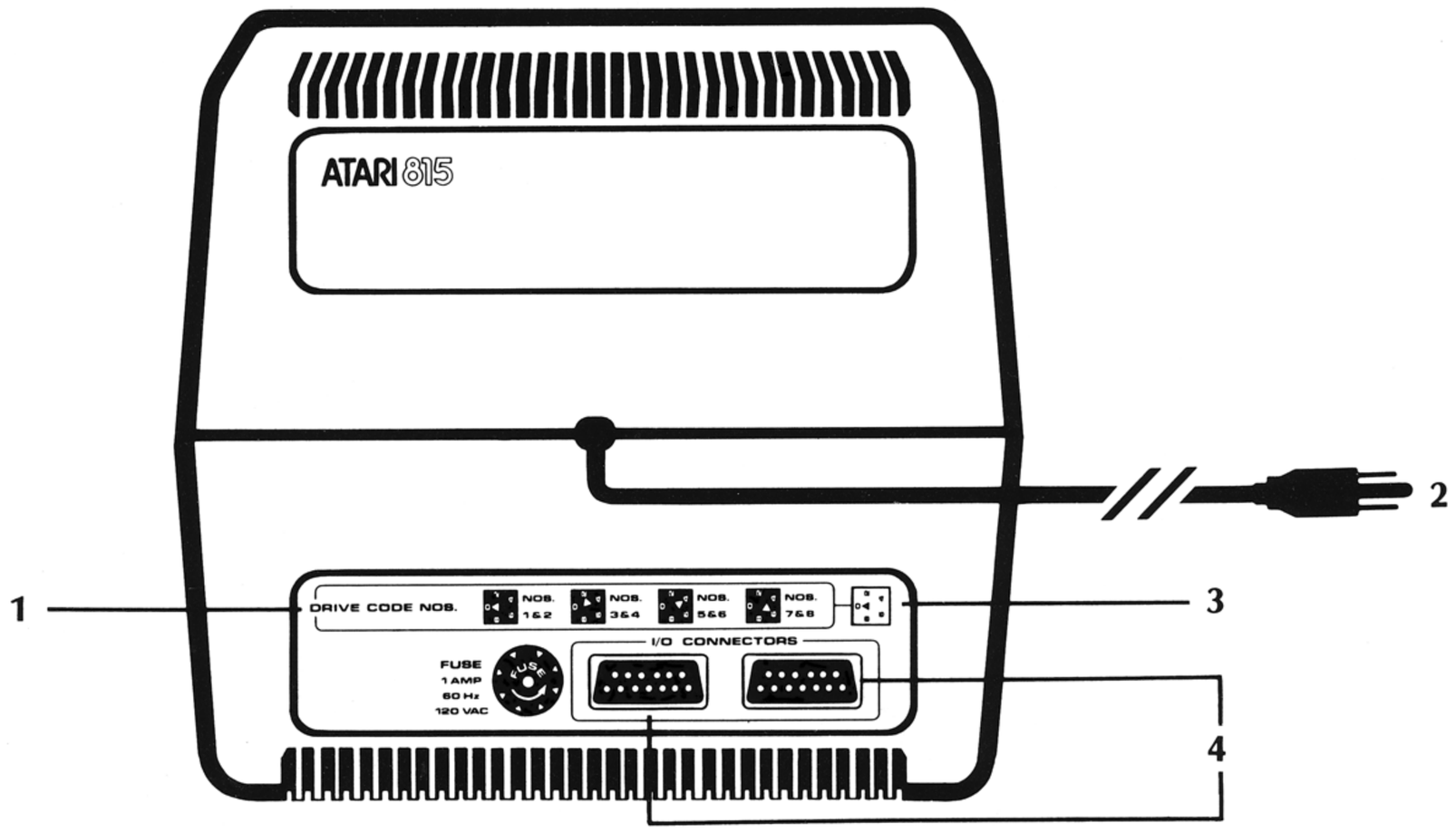

Figure 2. Rear Configuration

1. Drive Number Switch Positions

2. Power Plug — Plugs into a wall outlet.

3. Drive Number Switch — Four-position switch tells the computer console the assigned number of the disk drives. The ATARI 815 Master Diskette is ALWAYS inserted in Drive 1. You assign the disk drive numbers 1 and 2, 3 and 4, 5 and 6, 7 and 8 by using the switch positions 0, 2, 4, and 6, respectively. Ignore switch position number 8 as a maximum of four dual disk drives can be accessed at a given time. DO NOT USE THE SWITCH POSITIONS BETWEEN THE EVEN NUMBERS.

4. I/O Connectors — Identical jacks accommodate I/O data cords from the computer console or other peripheral components. Connections may be made in any order with either jack.

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DRIVE NUMBER CODES FOR ATARI 815 DUAL DISK DRIVE

A circular cutout containing a rotary switch is located at the back of the dual disk drive. The factory preset 0 position represents Drive 1 (UPPER drive) and Drive 2 (LOWER drive). The computer console recognizes the symbolic device names D1: and D2: to access programs or data stored on the diskettes in Drive 1 and Drive 2, respectively. You must reposition the rotary switch to 2, 4, or 6 on each additional dual disk drive within a given system. Use a screwdriver or thin blade to set this rotary switch to agree with the switch position diagram on the back of your dual disk drive.

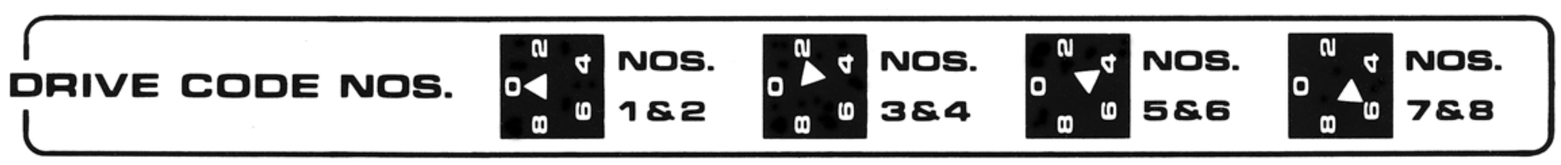


Figure 3. Drive Code Cutout Area

NOTE: THE TOP DRIVE IS ALWAYS THE ODD-NUMBERED DRIVE, REQUIRING DRIVE LABEL 1, 3, 5, OR 7.

ALWAYS SET THE DRIVE NUMBER WITH THE POWER OFF.

Within the circular cutout in the back of the ATARI 815 Dual Disk Drive is a rotary switch. Use a screwdriver or thin blade to point the white wedge-shaped triangle to the proper assignment code.

ROTARY SWITCH POSITIONS

CODE DRIVE	ASSIGNMENT
0	D1, D2
2	D3, D4
4	D5, D6
6	D7, D8
8	NOT OPERABLE

NOTE: Up to four dual disk drives can be connected to your computer console by "daisy chaining" (one unit plugs into the next).

Access the information on the diskette in a specific drive by using the command:

LOAD "Dn:filename"

where n is the number of the drive, and "filename" is the unique name of the program stored on the diskette in the drive you wish to address. The *ATARI BASIC Reference Manual* gives a full filename breakdown and detailed instruction on the use of the LOAD command.

The computer system will not confuse an ATARI 810 Disk Drive with an ATARI 815 Dual Disk Drive. The start-up procedure that loads the Disk Operating System program polls all units attached and ascertains which drives are single or double density. Before booting DOS, turn on all attached disk drives so that the computer console performs the poll. The procedure to convert programs and data from single density to double density is explained in the *DOS II Reference Manual*. If you are using an ATARI 810 Disk Drive with the ATARI 815 Dual Disk Drive, you must move the Drive Code setting on the ATARI 810 Disk Drive to a unique, addressable code position. The ATARI 810 Drive Code setting can be set to either position 3 or 4 and accessed by the device names D3: and D4:, respectively. (See *ATARI 810 Disk Drive Operator's Manual*.) Always insert the Master Diskette in Drive 1 as the DOS files are designed to load only from that drive.

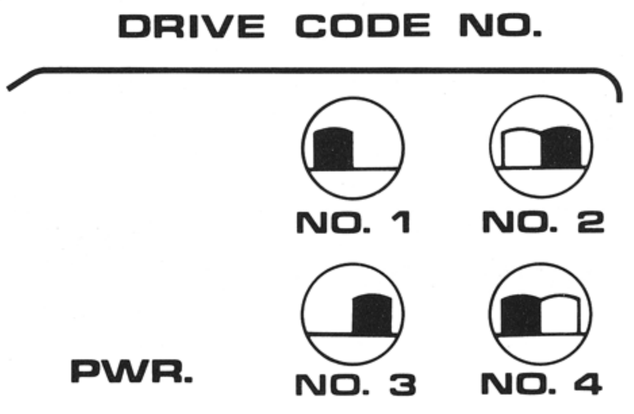


Figure 4. Drive Code Cutout Area for ATARI 810 Disk Drive

6

DISKETTE INFORMATION

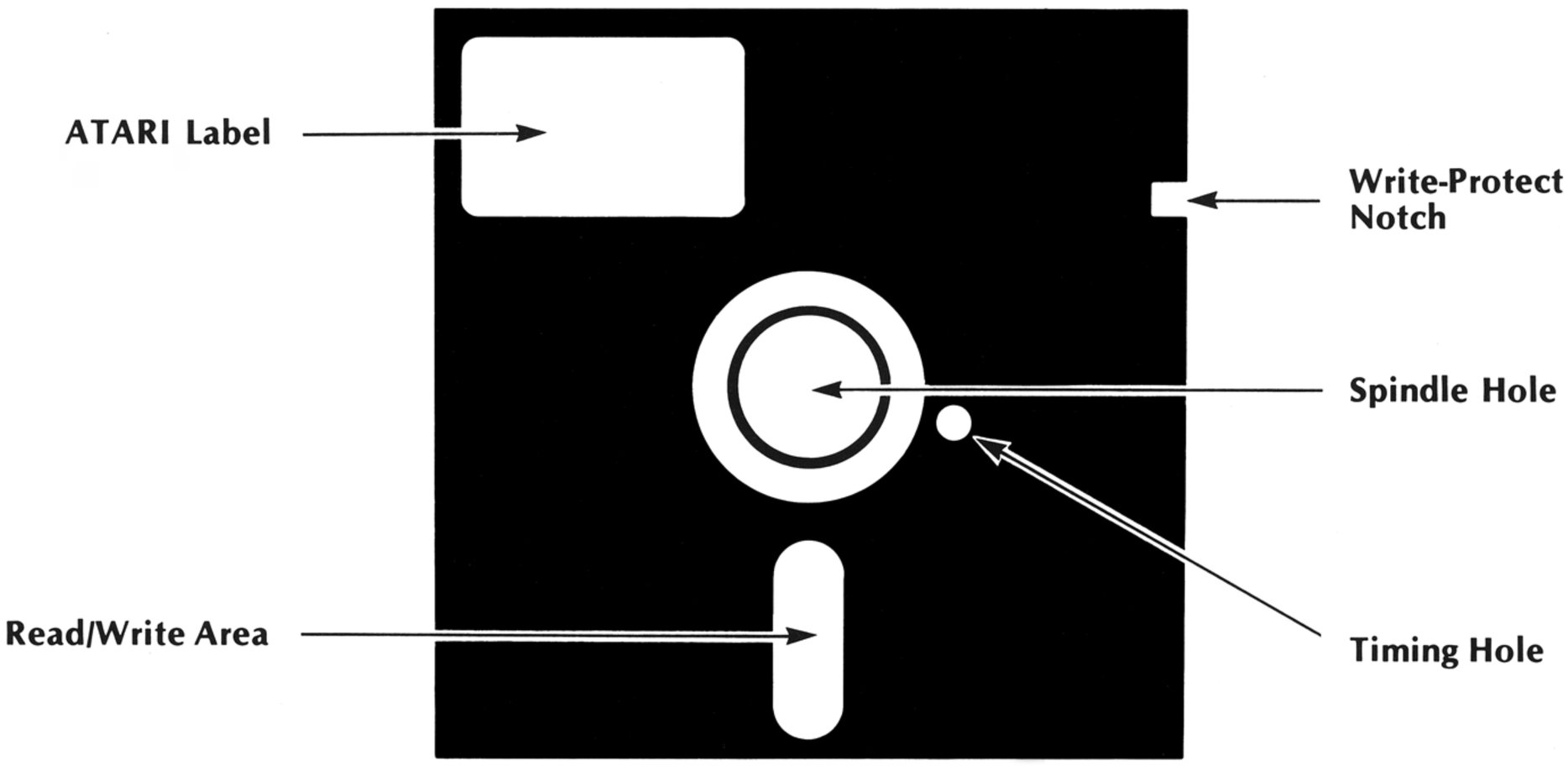


Figure 5. ATARI Model Number CX8202 Blank Diskette

A diskette is composed of two parts:

The inner portion is a flat, circular sheet of thin mylar treated with an oxide coating so that magnetic signals can be retained on its surface.

The outer surface is a stiff, protective envelope with cutout areas designed for the following specific purposes:

- The Spindle Hole seats the diskette within a disk drive unit.
- The Read/Write Hole allows for operation of a read/write disk drive head.
- The Write-Protect Notch allows for an optional write-protect feature.

DO NOT REMOVE THE DISKETTE FROM ITS PROTECTIVE ENVELOPE.

NOTE: Because of the nature of their data, some diskettes are manufactured without a write-protect notch. The ATARI 815 Master Diskette is placed in a notchless jacket to ensure a measure of protection and the integrity of its valuable programs.

Only high-quality, certified double-density diskettes for soft- sectored formatting should be used with the ATARI 815 Dual Disk Drive.

7

MASTER DISKETTE

The Disk Operating System (DOS) II programs on the ATARI 815 Master Diskette are the communication "link" between your ATARI Personal Computer and your ATARI 815 Dual Disk Drive. The *DOS II Reference Manual* contains complete instructions for using the DOS II MENU options.

The DOS programs allow you to:

- Format diskettes
- Store programs on diskette
- Retrieve programs from diskette
- Create and add to program data files
- Duplicate program files
- Erase files from a diskette
- Load and save binary files
- Move files to and from memory (RAM), the screen, diskette, printer, as well as any new peripherals that ATARI introduces.

8

SETUP PROCEDURES

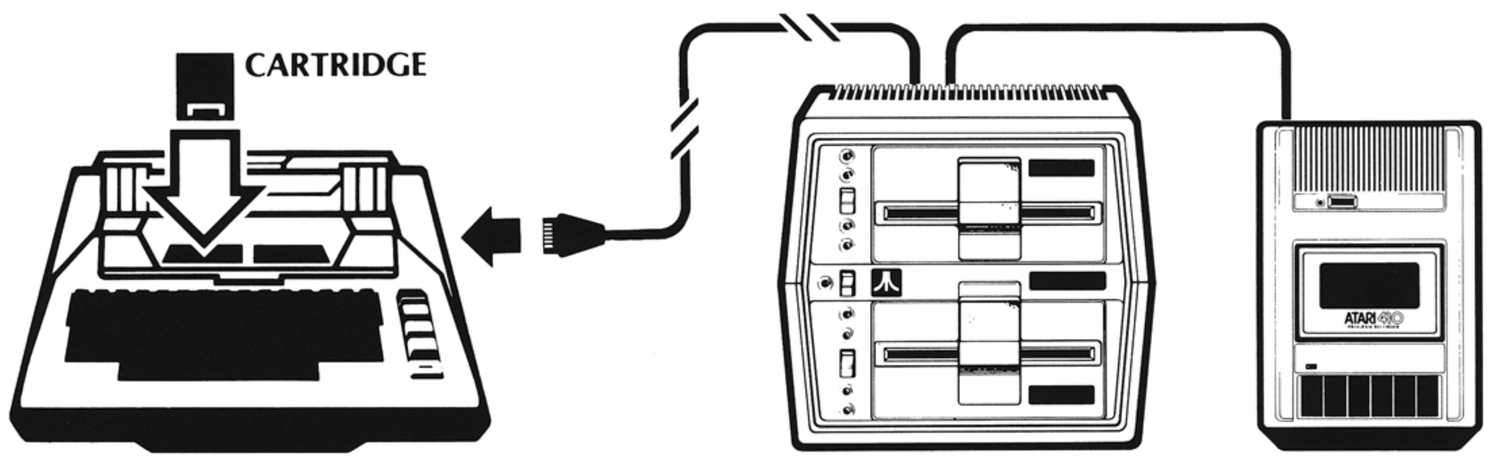
1. Verify that all switches (console AND disk drive power) are OFF.

2. Check that the computer console is properly connected to the television set and a standard wall outlet.

3. Place the disk drive unit at least 12 inches away from your television set and plug into a standard wall outlet.

4. Connect the Dual Disk Drive unit to either the computer console or another ATARI peripheral. Plug one end of the I/O Data Cord into the jack labeled I/O CONNECTORS on the back of the disk drive. Plug the other end into either the jack labeled PERIPHERAL on the computer console or one of the I/O CONNECTOR ports of another ATARI peripheral. If you connect your disk drive to another ATARI peripheral, verify that there is an I/O DATA CORD plugged into the computer console.

5. You can connect additional external components by using the other I/0 CONNECTOR port on the back of the disk drive. This process of "daisy chaining" devices allows quick and easy expansion of your ATARI 400 or ATARI 800 Personal Computer System. Follow the instructions provided with the additional components to be used.



6. The ATARI 815 Dual Disk Drive is preset to Drive Code position 0. This setting designates the UPPER disk drive as Drive 1 and the LOWER disk drive as Drive 2. Use the peel-off labels to identify the UPPER disk drive as Drive 1 and the lower disk drive as Drive 2.

7. If you are using MORE THAN ONE drive, set the rotary switches on the back of the additional ATARI 815 Dual Disk Drives to 2, 4, or 6 (see Section 5).

8. If you are using an ATARI 810 Disk Drive with the ATARI 815 Dual Disk Drive, set the Drive Code number to 3. (See the *ATARI 810 Operator's Manual* for instructions and Figure 4 for Drive Code cutout area positions). Use the peel-off DRIVE #3 label to identify the ATARI 810 Disk Drive.

9

POWERING UP THE SYSTEM

NOTE: ALWAYS INSERT MASTER DISKETTE IN DRIVE 1

For demonstration purposes, we will be using a BASIC cartridge in the computer console. Note, however, that the Disk Operating System can operate independently of the BASIC cartridge, allowing DOS to be used with all ATARI programming languages. Some DOS operations (such as duplication) can be performed without a cartridge.

The following instructions must be performed **IN SEQUENCE. TURN ON THE DISK DRIVE AND ATARI CONSOLE ONLY WHEN INSTRUCTED TO DO SO.**

1. Check to be sure that you have correctly accomplished all installation and set-up procedures (see Section 8).

2. Verify that your ATARI Personal Computer System contains AT LEAST 16K RAM.

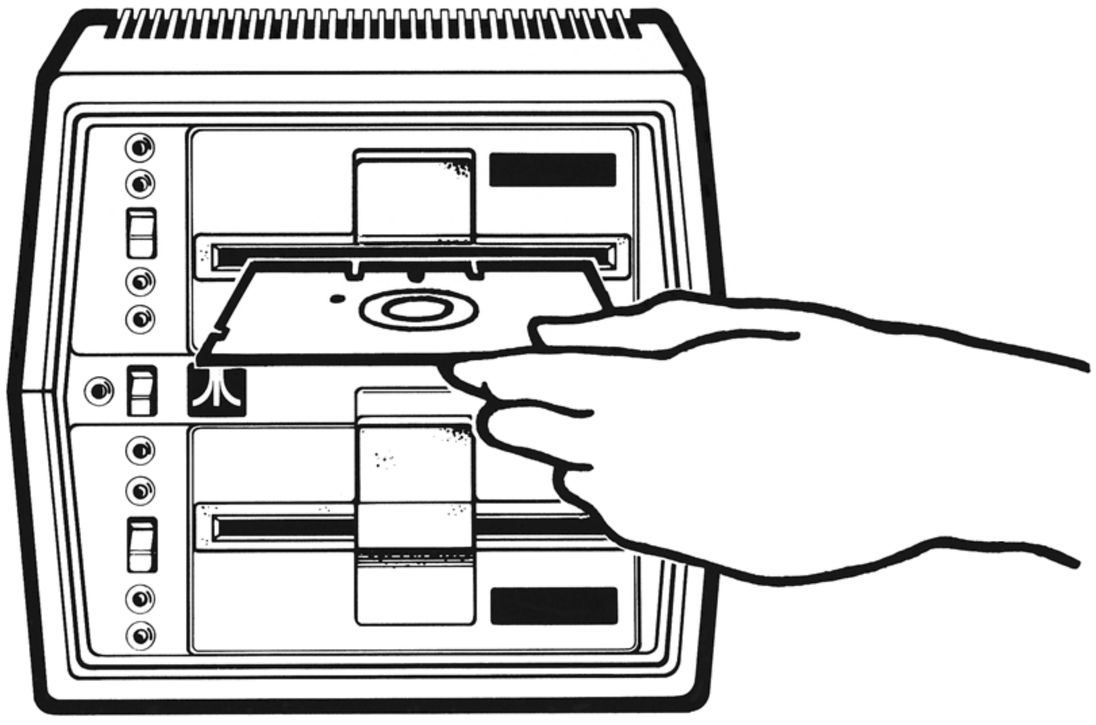
3. Turn the disk drive power (PWR) switch ON (as well as any other disk drives that are daisy-chained).

4. Remove the Master Diskette from its protective paper sleeve.

5. Open the door in the front of Drive 1 after the BUSY light goes off. Insert the Master Diskette so that the label is showing and the arrow is pointing towards the disk drive unit.

   NOTE: DO NOT TOUCH THE EXPOSED PORTION OF THE DISKETTE.

6. Gently slide the diskette into the UPPER drive (Drive 1) and close the disk drive door.



7. Insert an ATARI BASIC (computing language) CXL4002 Cartridge into the ATARI 400 or ATARI 800 cartridge slot—use the LEFT CARTRIDGE slot on the ATARI 800 computer console.

8. Turn on the television set.

9. Turn the computer console POWER switch ON. Powering on the system has now been completed.

NOTE: The Drive 1 BUSY and READ lights come on when power is first supplied to the unit. The whirring sounds and clicks from the disk drive indicate that the Disk Operating System is being loaded into computer RAM. This loading process is referred to as "booting." When the television screen displays the READY message, the loading process has been completed. (If no cartridge has been inserted as outlined previously, the screen will automatically display the DOS MENU.)

At power-on time, the ATARI 815 Dual Disk Drive does its own internal testing. Should the unit fail this test, the system goes into a "lock up" condition in which the drive will not respond to any command from an ATARI computer console. The screen displays BOOT ERROR, and the disk drive flashes its odd-numbered (UPPER drive) READ light. This failure condition indicates a disk drive hardware problem; consult an authorized ATARI service center.

Type DOS RETURN to display the DOS MENU.

Figure 6. Display of DOS MENU

Leave the system turned on and the Master Diskette in Drive 1 until completion of the next section.

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DUPLICATION OF THE MASTER DISKETTE

NOTE: ALWAYS INSERT MASTER DISKETTE IN DRIVE 1

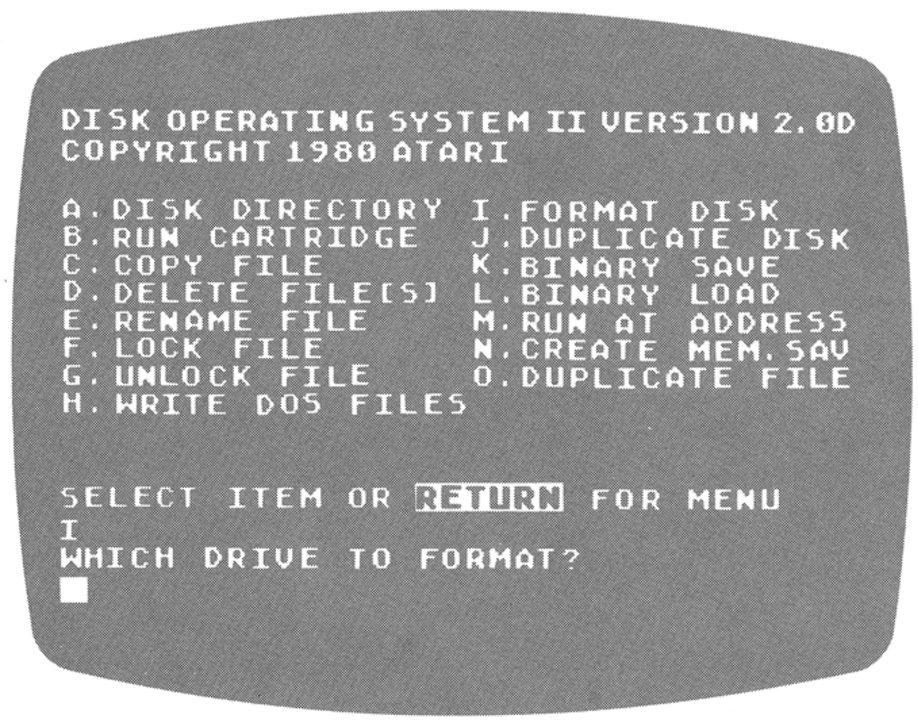
You can minimize inconvenience resulting from damaged or misplaced diskettes by creating backup files. A "backup" diskette is an exact duplication of an original. File original diskettes for safekeeping and use backup diskettes in normal disk activities.

This section provides you with a step-by-step procedure for duplicating a diskette. Since your first disk operation should be to duplicate your Master Diskette, follow the steps outlined below. In the *DOS II Reference Manual*, the backup Master Diskette is called the System Diskette.

NOTE: Verify that the DOS MENU is displayed on the television screen. If this is not the case, remove the Master Diskette from Drive 1, turn off your console and any attached peripherals, and return to Section 9 for instruction.

1. Insert the blank diskette (Model No. CX8202) into the lower drive, Drive 2. Close disk drive door.

2. Type I RETURN in response to the SELECT ITEM OR RETURN FOR MENU query of the DOS MENU to format diskette.



3. Type 2 RETURN in response to WHICH DRIVE TO FORMAT?

```
DISK OPERATING SYSTEM II VERSION 2.0D
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A.DISK DIRECTORY  I.FORMAT DISK
B.RUN CARTRIDGE   J.DUPLICATE DISK
C.COPY FILE       K.BINARY SAVE
D.DELETE FILE[S]  L.BINARY LOAD
E.RENAME FILE     M.RUN AT ADDRESS
F.LOCK FILE       N.CREATE MEM.SAV
G.UNLOCK FILE     O.DUPLICATE FILE
H.WRITE DOS FILES

I
WHICH DRIVE TO FORMAT?
2
TYPE "Y" TO FORMAT DRIVE 2
■
```

When formatting a diskette, be aware that any files previously stored on that diskette will become irretrievable. The next command safeguards against accidentally formatting a diskette that contains stored information.

4. TYPE Y RETURN in response to TYPE "Y" TO FORMAT DRIVE 2 to proceed with format instruction. (Typing N RETURN will discontinue the process and the SELECT ITEM OR RETURN FOR MENU message will appear on the screen.)

Notice that the BUSY light comes on during this procedure to indicate the motor is running. The WRIT light will come on during formatting, and the READ light then comes on when the data is read back off the diskette to verify its accuracy. This is the sequence of the LED displays for a Write with Read Verify command (see Section 16).

```
DISK OPERATING SYSTEM II VERSION 2.0D
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A.DISK DIRECTORY  I.FORMAT DISK
B.RUN CARTRIDGE   J.DUPLICATE DISK
C.COPY FILE       K.BINARY SAVE
D.DELETE FILE[S]  L.BINARY LOAD
E.RENAME FILE     M.RUN AT ADDRESS
F.LOCK FILE       N.CREATE MEM.SAV
G.UNLOCK FILE     O.DUPLICATE FILE
H.WRITE DOS FILES

WHICH DRIVE TO FORMAT?
2
TYPE "Y" TO FORMAT DRIVE 2
Y
```

5. Type H RETURN in response to the SELECT ITEM OR RETURN FOR MENU query to write DOS files.

```
DISK OPERATING SYSTEM II VERSION 2.0D
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A.DISK DIRECTORY      I.FORMAT DISK
B.RUN CARTRIDGE       J.DUPLICATE DISK
C.COPY FILE           K.BINARY SAVE
D.DELETE FILE(S)      L.BINARY LOAD
E.RENAME FILE         M.RUN AT ADDRESS
F.LOCK FILE           N.CREATE MEM.SAV
G.UNLOCK FILE         O.DUPLICATE FILE
H.WRITE DOS FILES

Y
SELECT ITEM OR RETURN FOR MENU
H
DRIVE TO WRITE DOS FILES TO?
```

6. Type 2 RETURN in response to DRIVE TO WRITE DOS FILES TO? Notice that the BUSY and READ lights come on during this procedure.

```
DISK OPERATING SYSTEM II VERSION 2.0D
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A.DISK DIRECTORY      I.FORMAT DISK
B.RUN CARTRIDGE       J.DUPLICATE DISK
C.COPY FILE           K.BINARY SAVE
D.DELETE FILE(S)      L.BINARY LOAD
E.RENAME FILE         M.RUN AT ADDRESS
F.LOCK FILE           N.CREATE MEM.SAV
G.UNLOCK FILE         O.DUPLICATE FILE
H.WRITE DOS FILES

H
DRIVE TO WRITE DOS FILES TO?
2
TYPE "Y" TO WRITE DOS TO DRIVE 2.
```

7. Type Y RETURN in response to TYPE "Y" TO WRITE DOS TO DRIVE 2. The message WRITING NEW DOS FILES will appear. The BUSY and WRIT lights will remain on during this procedure. (If you have altered DOS to perform Write with Read Verify commands, the READ light will flicker alternately with the WRIT light during this procedure. See Section 16.)

```
DISK OPERATING SYSTEM II VERSION 2.0D
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A.DISK DIRECTORY      I.FORMAT DISK
B.RUN CARTRIDGE       J.DUPLICATE DISK
C.COPY FILE           K.BINARY SAVE
D.DELETE FILE(S)      L.BINARY LOAD
E.RENAME FILE         M.RUN AT ADDRESS
F.LOCK FILE           N.CREATE MEM.SAV
G.UNLOCK FILE         O.DUPLICATE FILE
H.WRITE DOS FILES

2
TYPE "Y" TO WRITE DOS TO DRIVE 2.
Y
WRITING NEW DOS FILES
```

8. When SELECT ITEM OR RETURN FOR MENU appears, the duplication of the Master Diskette is finished. Remove the Master Diskette from Drive 1 and return to protective paper sleeve.

9. Remove the duplicate Master Diskette from Drive 2 and insert into Drive 1 for the following section example. (See *DOS II Reference Manual* for complete instruction on the use of your DOS files.)

10. Turn off the computer console. Verify the correct duplication of the DOS files by rebooting. Turn on the computer console. When the READY message appears, type DOS RETURN.

11

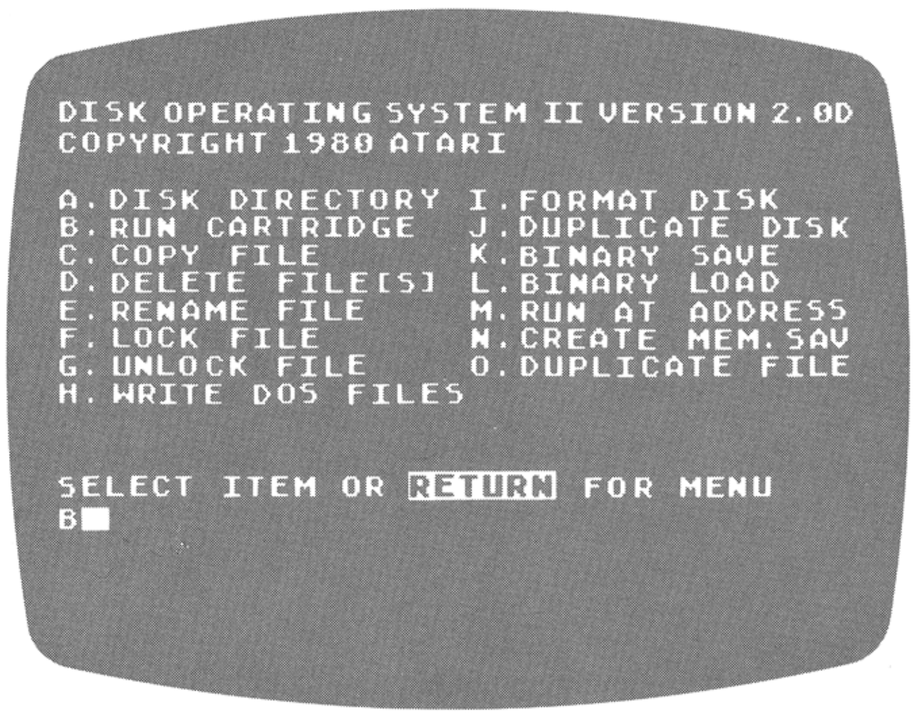
PROGRAM SAVE AND LOAD EXAMPLE

This section demonstrates a step-by-step procedure for saving a program on diskette and loading it back into RAM.

NOTE: Although you may have performed the steps in the preceding section without a BASIC cartridge inserted into the computer console, you MUST use the BASIC language to be able to perform the instructions of this section.

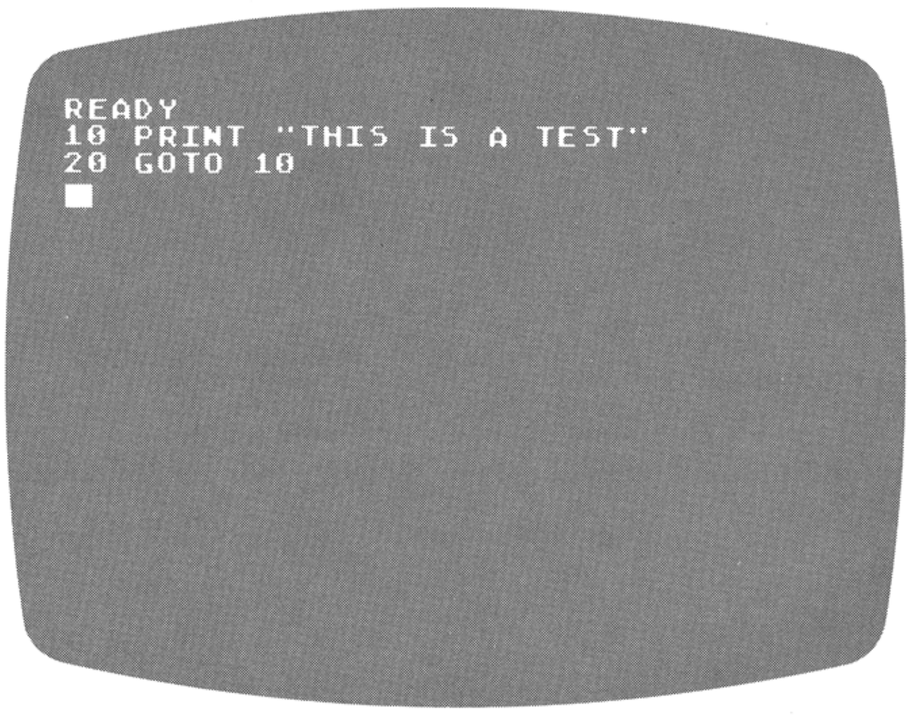
1. Type: B RETURN

Gives control to the inserted BASIC cartridge.



2. Type: 10 PRINT "THIS IS A TEST" RETURN

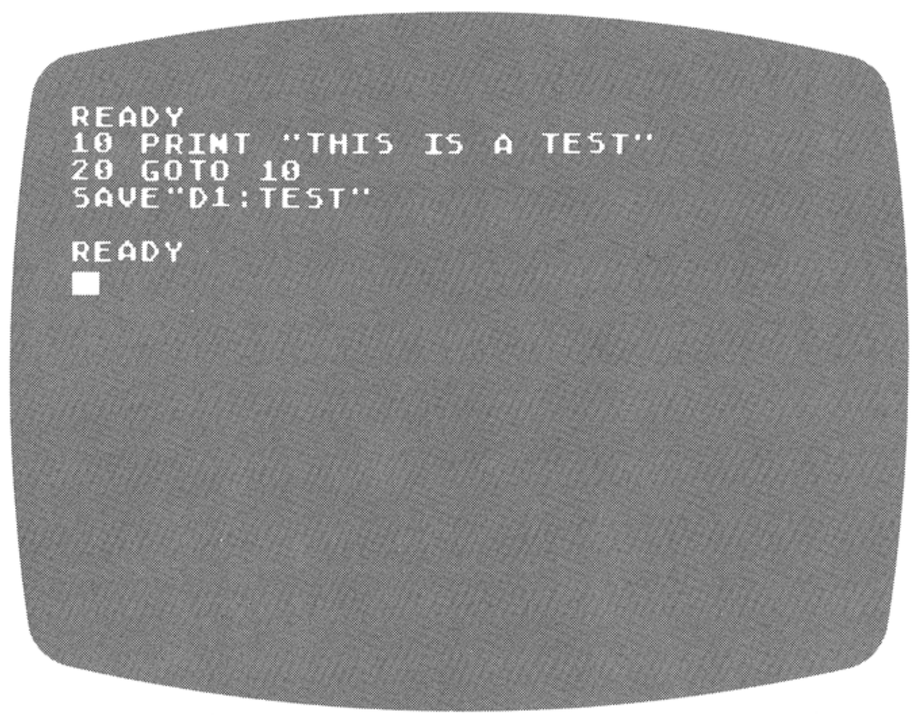
20 GOTO 10 RETURN



3. Type: SAVE"D1:TEST" RETURN

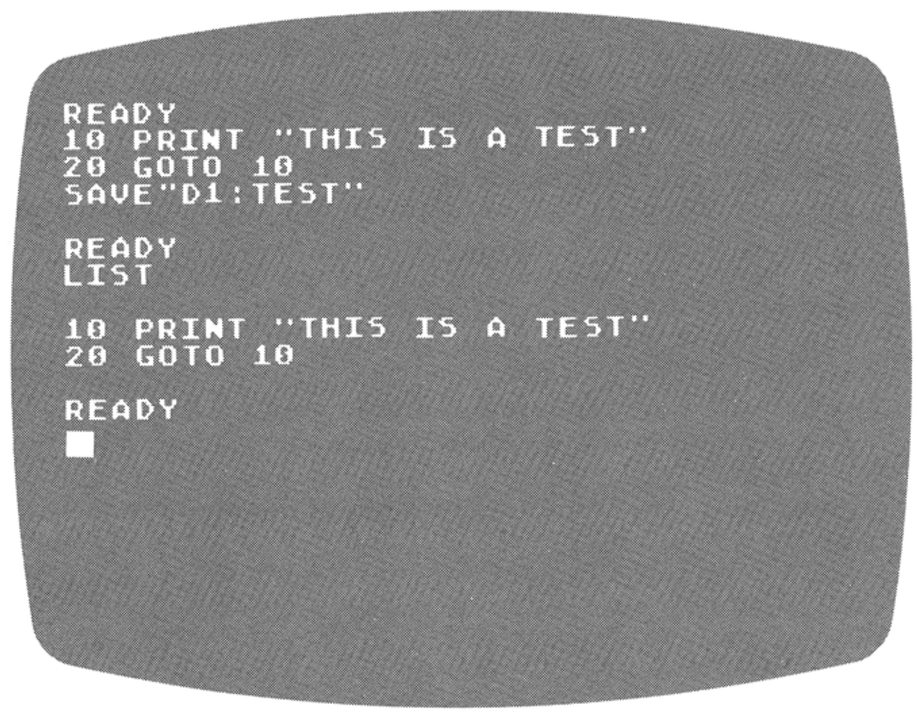
   In this step, we have named the program TEST so that we can recall the file.

   The Drive 1 BUSY and WRIT lights will come on. (Again, the Write with Read Verify command will cause the WRIT and READ lights to flicker alternately during this procedure.) The BUSY light will go out at completion of the DOS operation.



4. Type: LIST RETURN

   As you can see, the SAVE operation does not erase any programs from RAM.



5. Type: NEW RETURN

   Erases any program in RAM.

```
READY
10 PRINT "THIS IS A TEST"
20 GOTO 10
SAVE"D1:TEST"

READY
LIST

10 PRINT "THIS IS A TEST"
20 GOTO 10

READY
NEW

READY
■
```

6. Type: LIST RETURN

   Verifies that no current program exists in RAM.

```
READY
10 PRINT "THIS IS A TEST"
20 GOTO 10
SAVE"D1:TEST"

READY
LIST

10 PRINT "THIS IS A TEST"
20 GOTO 10

READY
NEW

READY
LIST

READY
■
```

7. Type: DOS RETURN

   The READ light comes on. This command lists the DOS MENU.

```
DISK OPERATING SYSTEM II VERSION 2.0D
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A. DISK DIRECTORY      I. FORMAT DISK
B. RUN CARTRIDGE       J. DUPLICATE DISK
C. COPY FILE           K. BINARY SAVE
D. DELETE FILE[S]      L. BINARY LOAD
E. RENAME FILE         M. RUN AT ADDRESS
F. LOCK FILE           N. CREATE MEM.SAV
G. UNLOCK FILE         O. DUPLICATE FILE
H. WRITE DOS FILES

SELECT ITEM OR RETURN FOR MENU
■
```
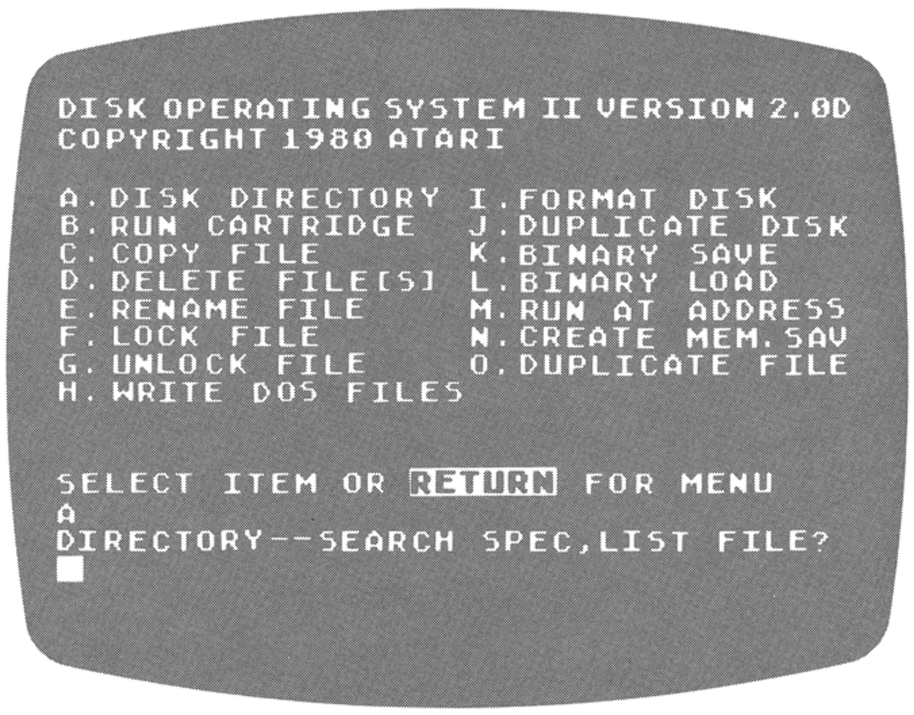
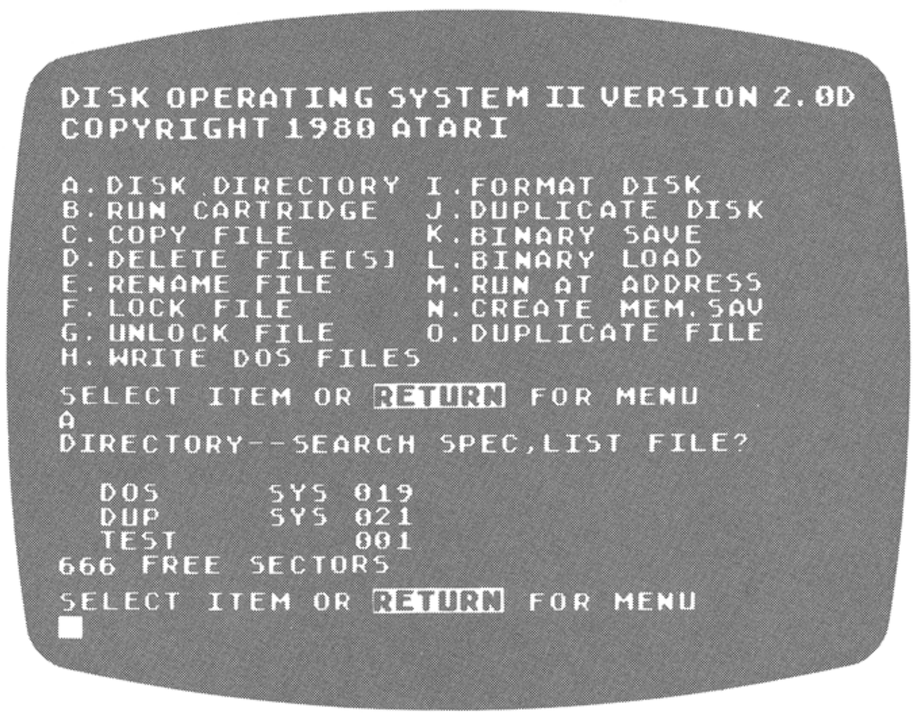
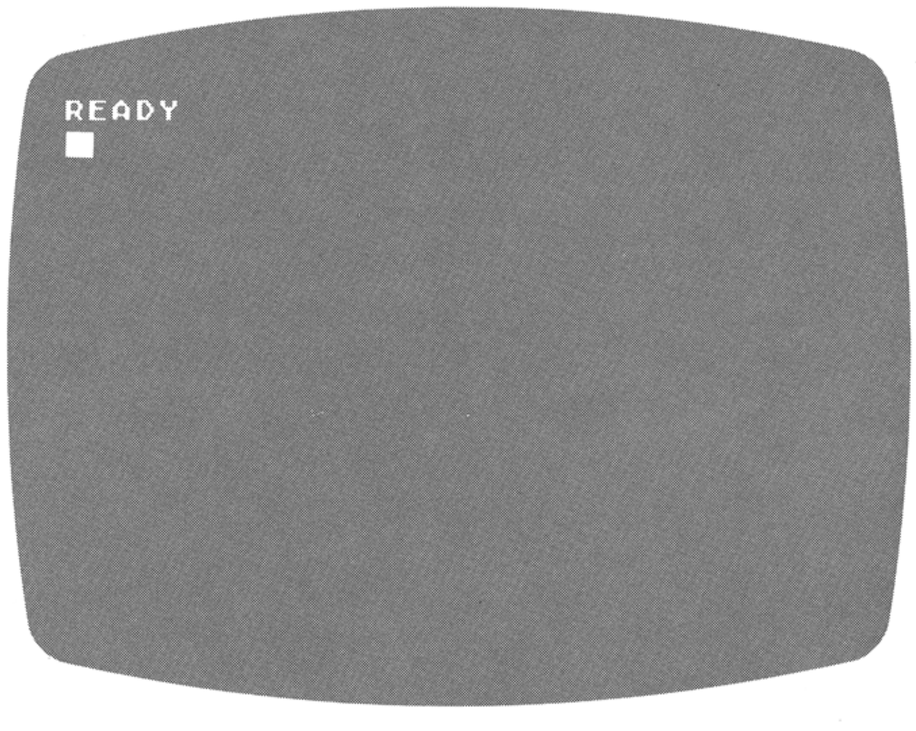

8. Type: A RETURN
Sets up to display the disk directory.



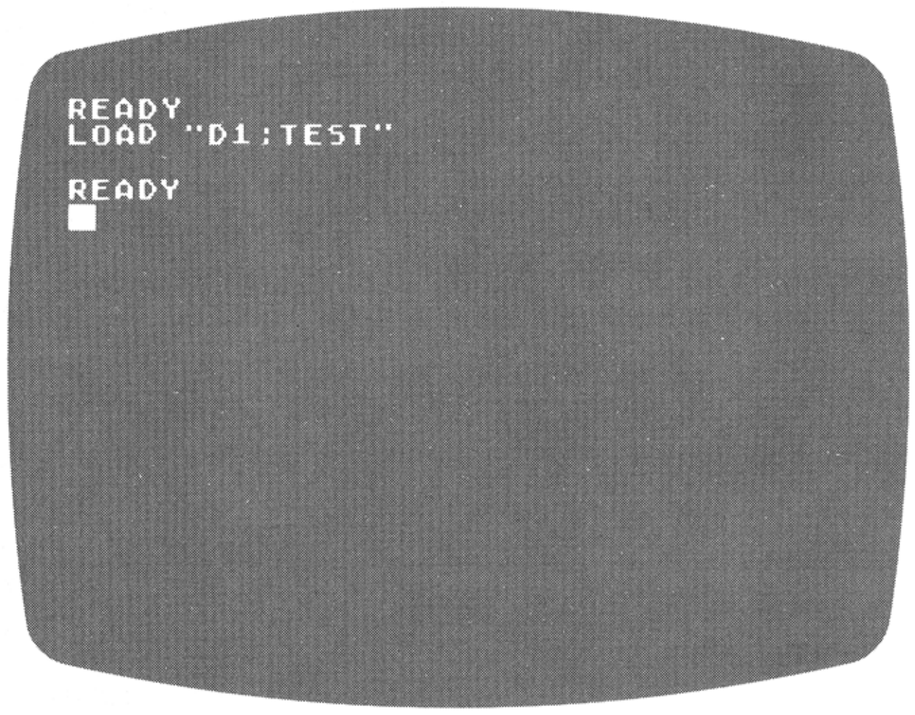
9. Press: RETURN
Displays the disk directory and shows that the program, listed as TEST, has been saved on the diskette in Drive 1.



10. Type: B RETURN
Gives control to the inserted BASIC cartridge.



11. Type: LOAD "D1:TEST" RETURN
The read light on Drive 1 will come on. The READY message appears on the screen.



Type: RUN RETURN for the computer to execute the program. The screen will fill with the message:

THIS IS A TEST
THIS IS A TEST
THIS IS A TEST

To stop the program, press the BREAK key. The screen displays the message "STOPPED AT LINE x" where "x" is the program line being executed at time of termination. If the screen message ERROR (with an error number) appears, check the *ATARI BASIC Reference Manual* for help in tracking down the source of the error.

HELPFUL HINTS

- Form the habit of identifying the file contents of all of your diskettes by using stick-on labels.

- So that you can "boot" DOS at power up from any of the diskettes on which you have saved programs or data, write the DOS files on all of your diskettes. Remember that DOS uses 40 sectors of the diskette and must be taken into account when saving programs and data to avoid the DISK TOO FULL error message.

- Write-protect at least one duplicate Master Diskette by adding a write-protect tab as demonstrated in Figure 7 so that you will always have one backup copy of your Master Diskette.

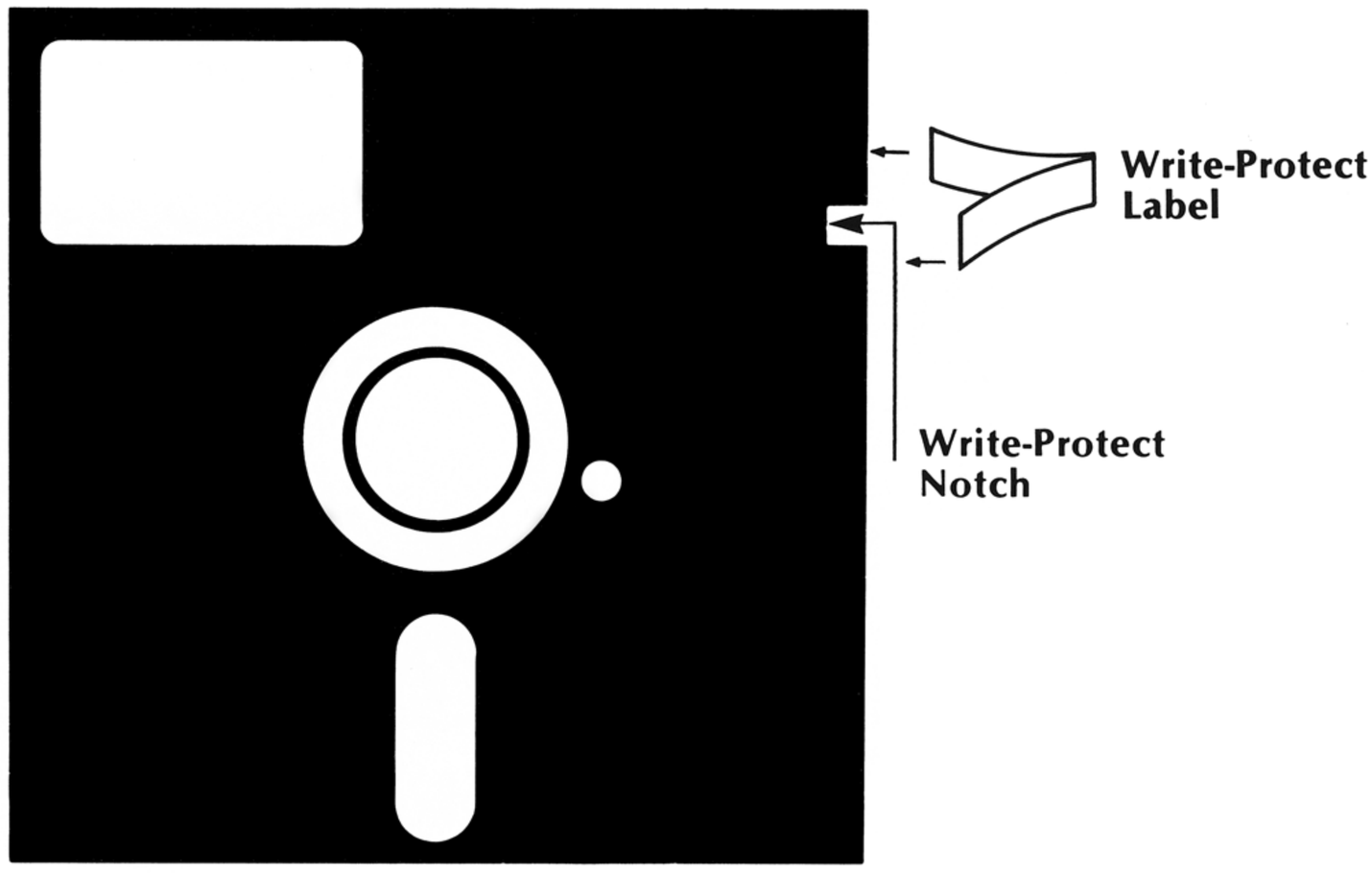


Figure 7. Write-Protecting a Diskette

NOTE: If you have not used a write-protect tab and still wish to write-protect a diskette, insert the diskette and use the WRIT PROT switch. Turning the WRIT PROT switch ON will activate its indicator light and prevent writing to the diskette in that drive. Either write-protect method is effective.

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CARE OF THE DUAL DISK DRIVE

- Place your disk drive at least 12 inches away from your television set or monitor to prevent signals emitted during the television's operation from altering the data stored on diskettes.

- Keep the doors of the disk drive closed to prevent dust from harming the unit or diskettes. Never store diskettes in the disk drive.

- Keep smoke and ash from cigarettes away from your disk drive and diskettes.

- Place coffee cups and liquid containers far away from diskettes and computer equipment to avoid spill damage.

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CARE OF DISKETTES

Because your diskettes are precision parts, carefully follow safety procedures for use, handling, and storage to help maintain diskette quality and preserve the integrity of the data. With proper care, you can minimize the chance of losing valuable programs and data.

The diskette is housed in a nonremovable, black plastic jacket. Since the diskette rotates within this jacket, damage to the jacket will result in damage to the diskette. Therefore, we recommend the following care:

- Store your diskettes in their protective paper sleeves and stand them on edge to prevent damage to the jacket and the magnetic surface of the diskette.
- Never write on a diskette or on the identification label of the diskette with an erasable pencil or a ball-point pen. We recommend writing on the label with a fiber-tip pen BEFORE you attach it to the diskette.
- Never attach paper clips or anything abrasive to a diskette.
- Cover the write-protect notch on the diskette with a rectangular aluminum label to prevent all write operations to the diskette (see Figure 7.) This label must be removed to write to diskette. (Some diskettes don't have this notch, and thus are already write-protected).
- Never touch the exposed magnetic surface of the diskette itself.
- Never wet or wash a diskette. If necessary, use a soft cloth or spray it with compressed air.
- Never BEND the diskette. Handle your diskettes with care, especially when loading or unloading them into the disk drive.
- Heat is one of your diskette's worst enemies. Never store a diskette in direct sunlight or near a source of excessive heat.
- Magnetic fields are another of your diskette's enemies. Keep diskettes away from magnets and electrical equipment (even telephones and television sets) to avoid loss of data.

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TROUBLESHOOTING

If the dual disk drive does not operate as expected, check the following list of common mistakes.

ERROR 144	No diskette in disk drive Disk drive door open Diskette write-protected
ERROR 170	File not on diskette
ERROR 160 or 138	Disk drive not attached or not turned on. Improper disk drive numbering.

If any disk error should occur, **DO NOT TURN OFF THE DISK DRIVE OR OPEN THE DOOR WHILE THE DRIVE MOTOR IS RUNNING.**

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REORDER INFORMATION

Please use the following part numbers to avoid mistakes when ordering items from your ATARI dealer:

Item	Part Number
I/O Data Cord	CA14122
ATARI 810/815 Blank Diskettes	CX8202
ATARI 815 Master Diskette	CX8201

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TECHNICAL SPECIFICATIONS

1. Each individual ATARI 815 Dual Disk Drive has the following features:
   - Power (PWR) ON/OFF switch.
   - Built-in 6507 microprocessor for use as a disk controller and interface to the computer console.

2. The ATARI Dual Disk Drive requires
   - Operating and storage environment
     - Temperature 10°C to 42°C (50°F to 108°F)
     - Relative humidity: 20% - 80% (noncondensing)
   - Shipping environment
     - Temperature: −40°C to 71°C (−40°F to 160°F)
     - Relative humidity: 8% - 90% (noncondensing)
   - Power requirements
     - 120 VAC, 75 watts (maximum)

3. Each drive within the disk drive unit has the following features:
   - BUSY indicator light that tells you the motor is operating.
   - Write protect (WRIT PROT) switch.
   - Write protect indicator light (WRIT PROT ON).
   - Write (WRIT) indicator light.
   - Read (READ) indicator light.

4. Each ATARI 815 Dual Disk Drive uses Cyclic Redundancy Check (CRC) to check for errors.

5. The error recovery rate is as follows:
   - Soft errors rate is 1 per 10^7 bits read.
   - Hard errors (data lost and unrecoverable) is 1 per 10^{10} bits read.
   - Seek errors rate (doesn't position to correct track) 1 per 10^6 seeks.

6. The average access time for each diskette is 70 msec.; the maximum access time is 210 msec.

7. The ATARI diskette media life is 3,000,000 passes on a single track.

8. Up to four ATARI 815 Dual Disk Drives can be attached to your ATARI Personal Computer System.

9. Each ATARI 815 Dual Disk Drive uses two 5¼ inch, soft-sectored, certified double-density diskettes.

10. Each diskette has 40 tracks with 18 sectors per track for a total of 720 sectors (13 are used for software control) per diskette.

11. The ATARI 815 Dual Disk Drive stores 256 bytes of "user data" in each sector. Three bytes of each sector, however, are reserved for file linkage.

12. 178,871 bytes per diskette are available for programs and data.

13. Approximately 82 additional bytes per sector (these bytes have no impact on user data area) are reserved for soft sector formatting so that the disk controller can:

    - "Sync" on individual sectors; i.e., the disk controller will verify track positioning and determine the correct placement of the physical beginning of the named sector (called ID field).

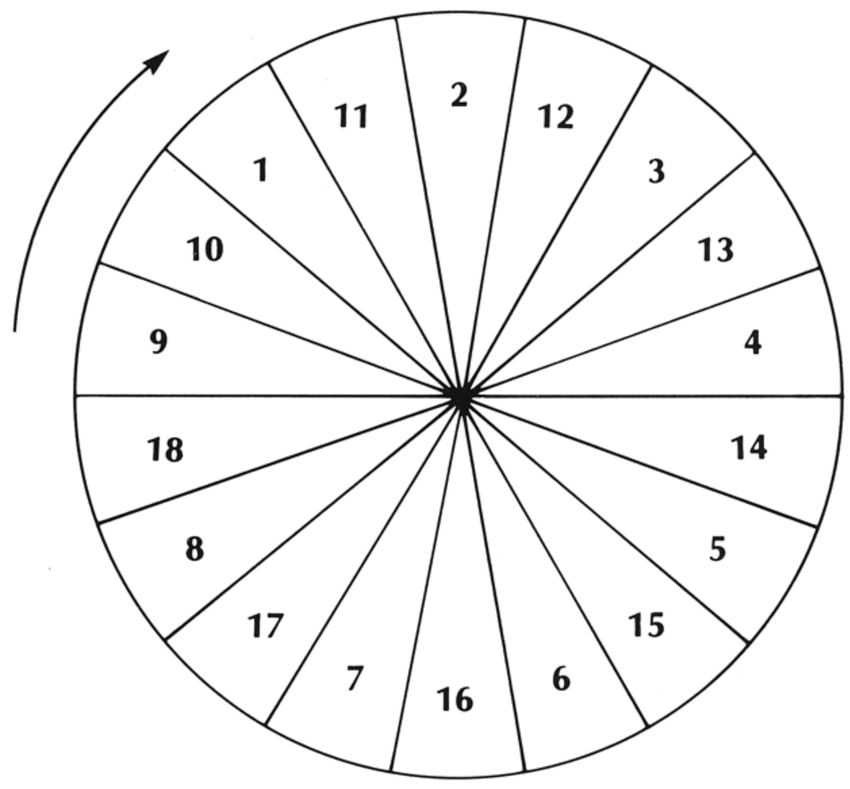

Figure 8. Staggering of Sectors During "Soft Sectoring"

- Provide a physical separation (called "gaps"—these are necessary due to slight differences from drive to drive in motor speeds) between sectors to:
  - turn on/off write head (allows some leeway between sectors to ensure adjacent sectors are not written into)
  - establish a constant data pattern to controller hardware in preparation for "sync "
- Provide for internal testing (called CRC) to ensure data is read accurately.

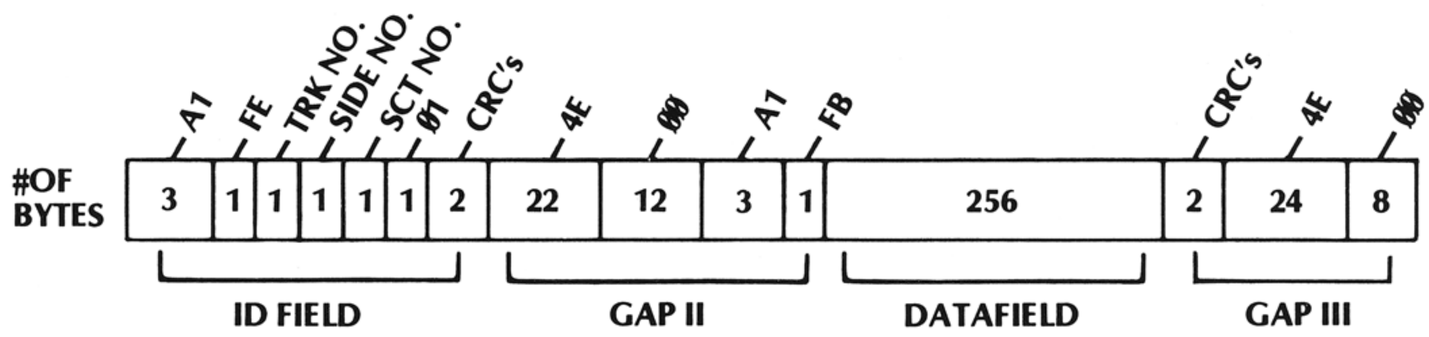

Figure 9. Breakdown of an Individual Sector

14. The disk controller completely formats the diskette in approximately 25 seconds. Any nonreadable sectors are noted and returned with the checksum upon completion of Format command.

    NOTE: The DOS will not allow any bad sectors. If the ATARI 815 Dual Disk Drive reports any bad sectors at time of formatting, a new Format command is automatically issued. Because of the amount of time required by the disk controller to establish that a sector is nonreadable (about 1.2 seconds per sector), formatting can take as long as 2½ minutes if the disk controller encounters extreme difficulty in reading (for example, a scratched diskette). Auxiliary 1 and 2 bytes of command frame are not used by the Format command.

15. The ATARI 815 Dual Disk Drive interacts with the Operating System (OS) through machine language commands contained in the Device Control Block (DCB). A brief description of the commands recognized by the DCB program follows.

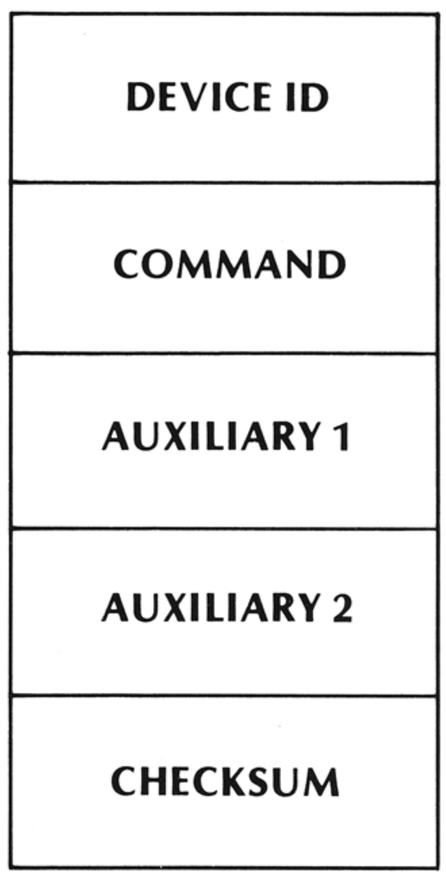

Figure 10. Command Frame Format

A command frame consists of 5 bytes of information sent from the computer to a peripheral. The Serial I/O bus utility (SIO) builds the command frame from information contained in the DCB. Byte descriptions are as follows:

- Device ID specifies which of the serial bus devices is being addressed. In the case of the ATARI 815 Dual Disk Drive, device identifications range from D1 to D8 which convert to $31 to $38.

- Command byte contains device-dependent command. Outlined in this section are those commands recognized by the dual disk drive.

- Two auxiliary bytes contain device-dependent information; such as sector identification.

- Checksum byte contains arithmetic sum of the first 4 bytes (with the carry added back after every addition).

Auxiliary 1 and 2 bytes of command frame specify sector in the following commands.

During the following procedures, the disk drive

- Turns on the spindle motor
- Steps to physical track of desired sector
- Executes standard retries if reading/writing difficulty is encountered by repeat stepping for better alignment of read/write head.

$52 READ: Reads one sector on diskette.

$50 WRITE: Writes one sector on diskette.

If extreme difficulty in reading/writing is encountered, the entire procedure takes approximately 7 seconds. The spindle motor will remain on the accessed track for approximately 3 seconds after completion of command in anticipation of another Read, Write, or Verify command.

$57 WRITE WITH READ VERIFY: Writes one sector on diskette.

Upon completion of actual write-to-media, the disk controller attempts to read back the sector just written and makes a byte-by-byte comparison of the data read from the media to the data in its internal buffers. Write with Verify ensures a high degree of integrity. However, on long program "saves," the process takes approximately 70% longer to implement than nonverified writes. Standard retries may occur if the disk controller encounters difficulty "syncing" for write or verify; therefore, 12 seconds could be required.

$56 VERIFY: Verifies one sector .

Compares data in sector on a byte-by-byte basis with the 256 data bytes received from computer console. An alternate method of ensuring a high degree of data integrity is to use a series of $56 Verify Commands with $50 Write commands in a large program "save."

$54 READ ADDRESS

Developed primarily for testing purposes, this command permits access to the internal memory of the drive. Auxiliary 1 and 2 bytes of command are used as a pointer unless these bytes specify address 0000 as the starting address. In this case, the first 17 bytes sent to computer console are pulled from the operating program of the drives or structured from internal hardware/software. These 17 bytes (known as "extended status") are useful for testing purposes and for communicating device characteristics to the operating system.

Auxiliary 1 and 2 bytes are not used by the following commands.

$55 MOTOR DELAY

When this command is received, the motor is left on and the head remains at its position for approximately 30 seconds. This command is useful when the drive may be accessed in more than 3 seconds but less than 30 seconds.

$53 STATUS

This command transmits 4 bytes specifying the status of the drive upon completion of the last command.

$20 DOWNLOAD

When this command is received, the following 256 data bytes are stored in RAM, and the accumulator contents are saved in a status location. The data is executed as a program starting with the first bytes received. Upon completion of the program, the X and Y registers and accumulator contents are stored in "status" locations. If user issues a "status" command immediately following completion of download command, the 4-byte status received will be the aforementioned registers.

WARNING

- This command was developed primarily for testing purposes.
- Program must be a **valid machine language** program.
- Program must end with an **RTS** instruction!

If you are inexperienced in use of this command, any valid media must be removed from drive to ensure that user error will not cause accidental erasure. If an error condition occurs, the drive can be recovered by turning off the unit. However, power down will erase your downloaded information.

You can customize your version of DOS by using the device control block commands. As an example, memory location 1913 contains the data that determines whether DOS will use the Write command ($50, 80 decimal) or the Write with Verify command ($57, 87 decimal). In BASIC, you need to:

POKE 1913,80

for write WITHOUT verify. If you prefer the write WITH verify command,

POKE 1913,87.

To alter the version of DOS stored on diskette so that your custom version will always boot in, type DOS and then use an "H" command (WRITE DOS FILES) from the DOS MENU to store the new version of DOS from RAM onto your diskette.

Peripherals respond to the command frame data by sending an ACK byte ($41) to the computer. If there is a problem with the command frame, the peripheral will not respond. Other serial bus control codes are:

NAK	$4E
COMPLETE	$43
ERR	$45

NAK is received if the command frame does not understand the instruction sent over the bus. COMPLETE signifies successful completion of data frame utility. ERROR is returned when the command frame has received a valid instruction but an internal error prevents the device from completing the command activity.

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