FLAGSTAFF ENGINEERING

Desktop Conversion Systems

FLAGSTAFF ENGINEERING

8", 5 1/4" and 3 1/2" Diskette System Installation Guide

FLAGSTAFF ENGINEERING, INC.
1120 Kaibab Lane
Flagstaff, Arizona 86001
(602) 779-3341
Telex 705609
Document #8860-SIG.082887

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Flagstaff Engineering, Inc.
1120 Kaibab Lane
Flagstaff, AZ 86001
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Telex: 705609
Document number 8860-SIG.100987

3 1/2" DISKETTE DRIVES -

Single or dual drive units in external enclosure. Power supply is included. Available as 110 or 120 volt. Compatible with 3 1/2" single or double sided diskettes.

ABOUT THIS MANUAL

This manual has been designed to accommodate novice as well as expert users. The contents of this manual are labeled by sections and page numbers located at the bottom of every page. As shown from the table of contents, these numbers indicate where you are within any given part of this manual. 1-1, for example, would indicate you are located at the first page of the first section of this manual.

Each numbered section is also cross referenced by page numbers and names of sections in the manual. Please note the bottom of this page. This section of the manual, for example, is named "Introduction," section 1, page 2. Users may move freely through this manual by following page numbers or section name and numbers.

Illustrations, diagrams and schematics have been applied throughout this manual to assist users in better understanding operating processes and procedures.

Should a user find any particular series, set of instructions, processes or aspect of this manual unclear or confusing, please call FLAGSTAFF ENGINEERING's Customer/Technical Support at (602)779-3341 to help clarify and/or assist in successful operations. This service is provided free of charge to registered owners of this system for 90 days from the date of purchase.

SYSTEM DESCRIPTION

When you unpack the DISKETTE CONNECTION system from the shipping carton, you will find the following items:

1. A diskette controller card for your particular application. This card has a 37 conductor "D" connector at one end used to interface all external drives to this card.

2. 8", 5 1/4", or 3 1/2" diskette drive cabinet containing either one or two diskette drives. This unit will either contain only the diskette drive(s) or be furnished in an enclosure with its own power supply and power cord. There is an edge connector at the back of each diskette drive. This connector will be used to interface the drive(s) to your computer. 8" drives have a 50 pin conductor connector, while 5 1/4" and 3 1/2" drives have 34 conductor connectors.

3. A 37 conductor ribbon cable. The cable has a 37 pin "D" connector at one end and a 50 pin conductor or 34 conductor edge connector on the opposite end, depending upon the system configuration you have ordered. Dual drive systems are supplied with two (2) connectors at the drive end of the cable. This cable is used to connect the diskette drive(s) to the diskette controller card installed inside of your computer.

The colored stripe at one edge of the cable indicates pin 50 or pin 34 of the edge connectors, and pin 1 on the "D" connector.

4. Power connection cable for 5 1/4" and 3 1/2" disk drives supplied without external power supply. One end of the cable has a "Y" connector that fits between the existing internal 5 1/4" disk drive(s) and the IBM power connector.

5. A 5 1/4" distribution diskette labeled 'DISKETTE CONNECTION UTILITY/8.' This distribution diskette contains essential device drivers required for system operation, and also includes our excellent diagnostic and utility programs. These programs will be used to confirm proper installation of the system, and furnish utility routines for use with diskettes used in external diskette drives.

The software on this diskette must be used with IBM PC-DOS versions 2.0 or later.

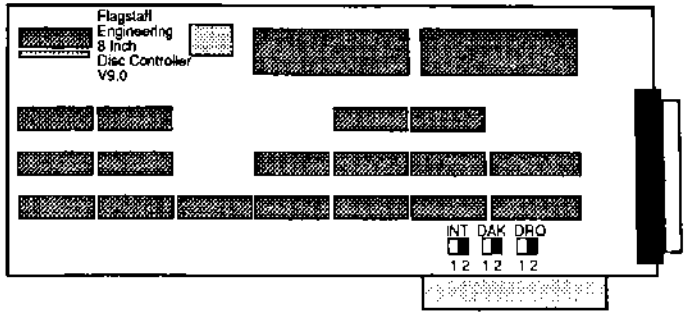
Complete information on the software included on this diskette is contained in the Utility/8 Software Documentation Manual provided to you with this system.

This distribution diskette is an important addition to your software library. *Before you do anything else with your computer*, load the DOS DISKCOPY UTILITY program from IBM and **MAKE A BACKUP COPY OF THE 5 1/4" DISTRIBUTION DISKETTE SUPPLIED WITH YOUR FLAGSTAFF ENGINEERING SYSTEM!**

After you have finished making a backup copy, *store the original diskette in a safe, secure place*.

V9.0 DISKETTE CONTROLLER

Your version 9.0 disk controller card, in the standard default configuration for DMA Channel 2, IRQ 6 operations, should look like this *(not to scale)*:



INSTALLATION FIGURE 1: V9.0 Card (soft sector)

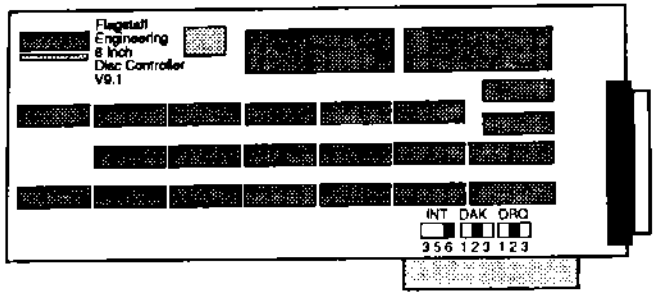
The DMA Channel Jumpers on the V9.0 controller card are connected thus:

INT 1	=	IRQ Interupt Request 3
INT 2	=	IRQ Interupt Request 6
DAK 1	=	DMA Acknowledge Channel 1
DAK 2	=	DMA Acknowledge Channel 2
DRQ 1	=	DMA Request Channel 1
DRQ 2	=	DMA Request Channel 2

NOTE: This is a multitasking controller which will operate 3 1/2", 5 1/4" and 8" disk drives.

V9.1 DISKETTE CONTROLLER

Your version 9.1 disk controller card, in the standard default configuration for DMA Channel 2, IRQ 6 operations, should look like this *(not to scale)*:



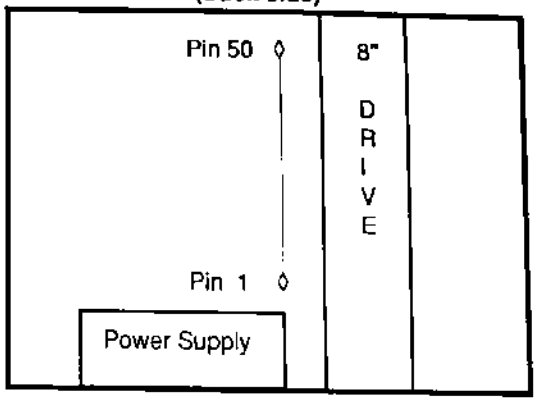
INSTALLATION FIGURE 2: V9.1 Card (w/hard sector option)

The DMA Channel Jumpers are connected thus:

INT 3	=	IRQ Interupt Request 3
INT 5	=	IRQ Interupt Request 5
INT 6	=	IRQ Interupt Request 6
DAK 1	=	DMA Acknowledge Channel 1
DAK 2	=	DMA Acknowledge Channel 2
DAK 3	=	DMA Acknowledge Channel 3
DRQ 1	=	DMA Request Channel 1
DRQ 2	=	DMA Request Channel 2
DRQ 3	=	DMA Request Channel 3

NOTE: This is a multitasking controller which will operate 3 1/2", 5 1/4" and 8" disk drives.

FLAGSTAFF 8" DISKETTE DRIVE
(Back side)

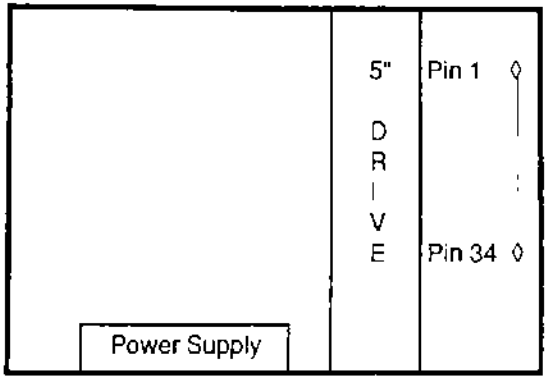


INSTALLATION FIGURE 3: 8" Diskette Drive Connections

Connect card S1 to drive P1

ALWAYS CONNECT THE RIBBON CABLE SO THAT THE COLORED STRIPE ON THE SIDE OF THE CABLE GOES TO **PIN 50** OF THE DRIVE CONNECTOR.

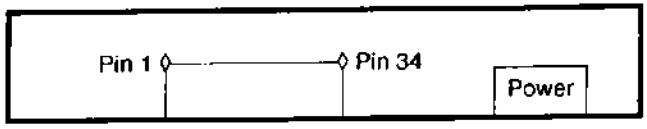
FLAGSTAFF 5 1/4" DISKETTE DRIVE
(with built in power supply)



INSTALLATION FIGURE 4.1: 5 1/4" Diskette Drive Connections

Connect card P2 to drive P1

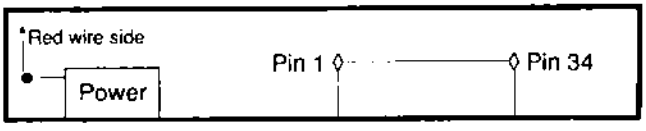
FLAGSTAFF 5 1/4" DISKETTE DRIVE
(without built in power supply)



INSTALLATION FIGURE 4.2: 5 1/4" Diskette Drive Connections

Connect card S1 to drive P1

FLAGSTAFF 3 1/2" DISKETTE DRIVE
(without built in power supply)

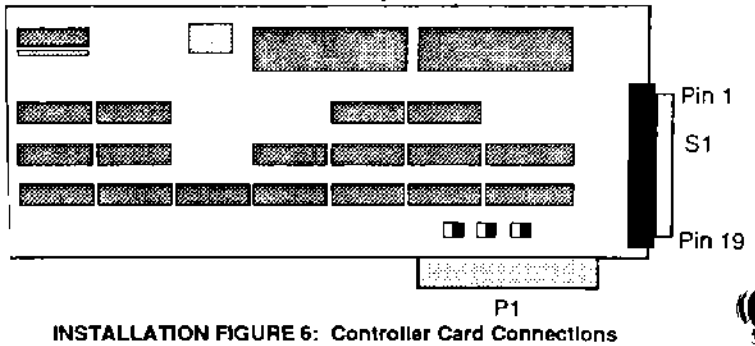


INSTALLATION FIGURE 5: 3 1/2" Diskette Drive Connections

Connect card S1 to drive P1

** IMPORTANT NOTE:* The power connector on the 3 1/2" drive connects one way only! Properly hook up the power cable by making sure the red wire side of cable connection is connected as above.

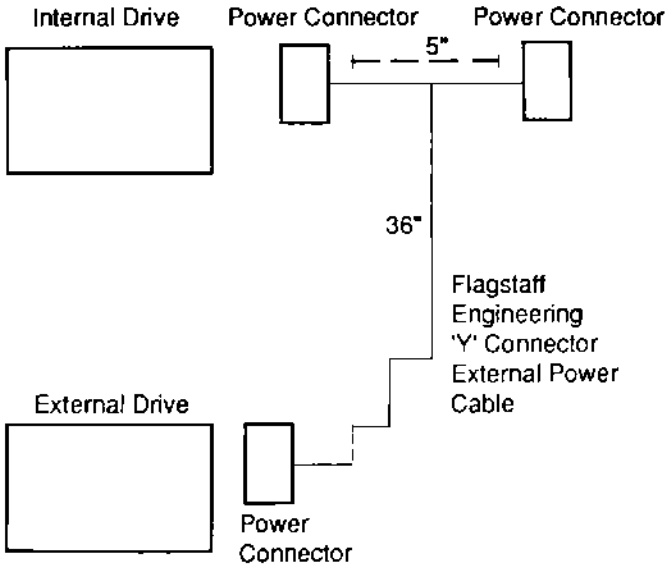
DISKETTE CONTROLLER CARD
General Layout



INSTALLATION FIGURE 6: Controller Card Connections

RED or BLUE stripes on cable edge
indicates "D" connector Pin 1.

GENERAL CONNECTION LAYOUT



INSTALLATION FIGURE 7: Diskette Drive Connections

DISKETTE CONTROLLER CARD DESCRIPTION

The diskette controller card included with your system is one of a series of types. Your card may have the hard or soft sector option installed depending upoin the system specifications given to FLAGSTAFF ENGINEERING at the time of purchase. As controller cards are updated, new versions will be released. You may check the upper left hand corner of your controller card to see which version card you have obtained.

The diskette controller card has an edge connector on the bottom of the card. The metal bracket is attached to the back edge of the card. The top of the bracket has a slot for a retaining screw used to anchor the card against the rear panel of your computer. In this manual, "Front" designates the end of the card without the retaining bracket.

A bank of jumper pins are located at the bottom of the card near the edge connector. Again, depending upon the version of the card, these connectors are layed out differently. The jumpers are labeled as INT, DAK and DRQ.

Cards will normally have straps on jumper pins marked 2. The card operates on DMA channel 2 when the jumper pins marked 2 are strapped. Likewise, cards operate on DMA channel 1 when the jumper pins marked 1 are strapped.

INT is the interrupt level request setting (IRQ) that the card operates on. Cards operate on IRQ 6 when the jumper pins marked 2 are strapped. Cards operate on IRQ 3 when the jumper pins marked 1 are strapped.

If the controller card is going to be used in a PC/XT/AT comptaible (ALL non-IBM machines), then the card should be optioned for DMA channel 1 use. See the Utility/8 software manual for examples to configure the software device driver for DMA channel 1 operation.

****** WARNING ******

Older IBM PC/AT Note

Older models of the PC/AT were supplied with long slot bus expansion connectors on the motherboard that do not have adequate separators built into the connectors. Your bus expansion connectors should have two molded-in black plastic separators that divide the connector into two sections. If you have an AT and the bus expansion connectors have only a thin piece of white plastic separating the sections of the expansion connector, you should take one of the following actions, since it is possible to misalign the controller card as much as one and a half full finger widths.

1. Have the motherboard replaced by an IBM service center since the bus expansion connectors are defective.

2. Seat the diskette controller board in one of the short slot connectors to insure proper aligment.

3. Seat the diskette controller board in one of the long slot connectors while making absolutely sure the board is as far to the rear of the connector as possible (NOT RECOMMENED).

If the controller card is misaligned, serious damage may occur to controller cards (including the Hard Disk Controller Card) and the motherboard in your AT!

HARDWARE INSTALLATION PROCEDURES

Installing Flagstaff Engineering's 8" diskette system on your IBM PC/XT/AT or comptaible is quite easy. The diskette controller card, supplied with the system, must be installed inside your computer in a vacant expansion slot. If you've previously installed IBM or other third party controller cards in your computer, the procedure will be quite familiar. If you have not installed a card inside your computer before, relax... you don't need to be an electrical or computer engineer to complete the installation.

The installation procedure is presented as a step-by-step series of instructions. Please don't hook up any part of the system until you've read through the installation instructions at least once. Becoming familiar with the parts of the system and the instructions will allow you to install the system correctly in a minimum amount of time.

To install your Diskette Connection system, perform the following steps:

1. Power down your computer. Set the power switch on the computer and any other units connected to your computer (expansion unit, external drives, etc.) to the OFF position.

2. Unplug ALL power cords from the computer unit, expansion unit, etc. WARNING--Failure to completely power off all components and unplug all power cords could result in serious electrical damage to your computer system.

3. Unhook from your computer system all attached periperhals (keyboard, monitor, etc.) and set well away from your working area.

4. Remove the plastic shipping wrapper from the diskette drive(s) unit. Open the door(s) on the diskette drive(s) and remove the cardboard insert(s) used to protect your drive's heads during shipping.

5. Remove the cover from your computer and set well aside. (See your system maintenance manual for removal.)

6. The controller card can now be installed in one of the system expansion slots located at the inside left rear of the computer unit.

7. To install the controller card, first remove the retaining screw from the expansion slot cover directly behind the system expansion slot you have selected to use.

8. Remove the expansion slot cover.

9. Hold the controller card by the top and firmly press the bottom edge connector of the card down into the expansion slot in the computer.

10. Place the retaining screw that you previously removed, through the retaining bracket at the back of the controller card and secure to the rear panel of the computer. The controller card is now installed.

11. Attach the connector of the ribbon cable supplied by Flagstaff Engineering to the edge connector at the rear of the controller card. The colored stripe that appears on the cable should be matched with Pin 1 of the edge connector.

12. DO NOT CHANGE ANY SWITCH SETTINGS INSIDE YOUR COMPUTER.

13. If you are using a 5 1/4" or 3 1/2" drive without a built in power supply, the power cable needs to be installed.

14.a On machines with one internal 5 1/4" drive, an unused cable and connector will be hooked to the machines power supply. Plug the end of the Flagstaff Engineering power cable with the 'Y' connector on it into the socket on the computer's unused power cable.

14.b On machines with two internal 5 1/4" drives, unplug the power cable from one of the internal drives. Plug the 'Y' connector end of the Flagstaff Engineering power cable into the socket into the power cable that was disconnected from the drive. Route the remaining end of the Flagstaff Engineering cable out the back of the computer. (See figure 7.)

15. Replace the cover on the computer and secure the cover to the unit with the cover mounting screws previously removed. (See your system maintenance manual for replacement.)

16. Reconnect all external drive cables.

17. Attach the connector of the ribbon cable supplied by Flagstaff Engineering to the edge connector located at the rear of the diskette drive unit. If your diskette drive unit has two drives, your interface cable will have two cable connectors. Attach a connector to each drive.

(The colored stripe that appears on the cable MUST be at pin 1 of the 8" drive's edge connector or pin 1 of a 5 1/4" drive's edge connector. See figures 3, 4, and 5.)

18. Plug any power cables from the computer, diskette drives, expansion units, etc. back into your electrical outlets.

19. Power on your computer system and external drives.

20. There should be no error messages displayed after your computer is powered up. If an error message is displayed, the most likely causes are improperly set switches inside the computer unit, cable(s) not reinstalled, or the controller card is not properly seated in the expansion socket.

If an error message occurs, power off the system and check for problems by going through the installation instructions once again to verify that all instruction steps have been properly completed. If the problem cannot be resolved, first consult the trouble shooting addendum at the end of this manual, or call Flagstaff Engineering's Technical/Customer Support department at (602)-779-3341 for further assistance.

TROUBLE SHOOTING ADDENDUM
EXTERNAL DISKETTE DRIVE SYSTEMS

This addendum is a guide to common problems and corrective actions that may be taken to resolve problems with Flagstaff Engineering external diskette drive systems. Problems that may occur with systems generally fall into one of the following three categories:

External diskette sub-system hardware problems
Environmental problems
Conversion problems

Two programs that are provided with Flagstaff Engineering systems to diagnose problems are CHECK8 and VERIFY8. These two programs help indicate specific system and environmental problems that may be manifested during the conversion process. These two programs are always to be run when a problem occurs to define the exact cause of the failure.

SUB-SYSTEM PROBLEMS

1. MACHINE WON'T BOOT

PROBLEM: Diskette controller card improperly seated in expansion slot.

REMEDY: Power off machine and reseat card.

PROBLEM: IBM floppy controller card has been replaced by external diskette controller card.

REMEDY: Restore original IBM card to system and put external diskette controller card in empty expansion slot.

2. **601 ERROR** (Occurs during boot operation.)

PROBLEM: IBM floppy controller card has been replaced by external diskette controller card.

REMEDY: Restore original IBM card to system and put external diskette controller card in empty expansion slot.

PROBLEM: Machine was re-booted (warm boot) before FLAGIO.SYS device driver returned from a external diskette operation.

REMEDY: Cold boot machine to reset DMA channels and interrupt lines.

3. **UNKNOWN ERROR MESSAGE** (Diagnostic programs report UNKNOWN ERROR when executed.)

PROBLEM: Indicates controller card is misaligned in the expansion slot, or that the card is not making contact with all the connectors in the expansion slot.

REMEDY: POWER DOWN MACHINE IMMEDIATELY. Remove the controller card and reseat the card as described in section 4.0.

4. **DRIVE NOT READY MESSAGE** (Utility and diagnostic programs report DRIVE NOT READY when executed.)

PROBLEM: Diskette drive unit unplugged.

REMEDY: Make sure power cord for Diskette drive(s) is plugged in.

PROBLEM: Diskette drive unit powered off.

REMEDY: Make sure diskette drive power switch is on.

PROBLEM: Diskette drive not connected to controller card.

REMEDY: Reseat ribbon cable connectors on diskette controller card and diskette drive(s).

PROBLEM: Ribbon cable reversed going onto diskette drive (red light always on).

REMEDY: Remove ribbon cable from drive, turn connector 180 degrees and re-attach cable (red line on cable up on drive).

PROBLEM: Device driver not being loaded when the machine is booted.

REMEDY: Make sure a CONFIG.SYS file exists on the DOS volume that the machine is booted from. The CONFIG.SYS file must specify the correct device driver for the system. The device driver must be included on the same DOS volume as the CONFIG.SYS file, or pathed to in the config.sys file.

PROBLEM: Diskette in backwards.

REMEDY: Remove diskette from drive. Insert diskette into drive with diskette label facing to the left.

PROBLEM: Inoperative 5 Volt power supply in diskette drive

REMEDY: Call Flagstaff Engineering for information on possibility of returning diskette drive for repair and service.

5. 8" DRIVE LIGHT ALWAYS ON

PROBLEM: 50 conductor ribbon cable is reversed on edge connector at rear of drive.

ACTION: Power down computer and disk drive. Remove cable from the rear of drive. Untwist the cable and reconnect with red line on cable facing up.

ENVIRONMENTAL PROBLEMS

1. DMA OVERRUN MESSAGE (Utility and diagnostic programs report DMA OVERRUN when executed.)

PROBLEM: This usually occurs only when system is installed on PC Compatibles and clones. Generally due to unsupported IBM defined control signals on bus or BIOS incompatibility. This message indicates that a DMA transfer has failed.

REMEDY: Change CONFIG.SYS file and jumpers on card to indicate DMA channel 1, IRQ3 operation.

2. COMMON ERROR MESSAGES GENERATED BY MISSING OR INCORRECT CONFIG.SYS FILE

CONFIG.SYS DMA	CONFIG.SYS IRQ	CARD JUMPERS DMA	CARD JUMPERS IRQ	CHECK8 RESULT	VERIFY8 RESULT
NONE		2	6	BAD DISK COMMAND	BAD DISK COMMAND
NONE		1	3	MACHINE REBOOT	DISK SEEK FAILED
2	6	1	3	UNKNOWN ERROR	UNKNOWN ERROR
2	6	2	3	UNKNOWN ERROR	UNKNOWN ERROR
2	6	1	6	DMA OVERRUN	INVALID DISKETTE FORMAT
1	3	2	6	UNKNOWN ERROR	UNKNOWN ERROR
1	3	1	6	UNKNOWN ERROR	UNKNOWN ERROR
1	3	2	3	DMA OVERRUN	INVALID DISKETTE FORMAT

3. DRIVE NOT READY OR UNKNOWN ERROR ON ONE DRIVE OF TWO DRIVE SYSTEM WHEN PC/36 COMPUTER INTERFACED TO SYSTEM.

PROBLEM: PC/36 configuration controlling requests for first external drive (DOS diskette drive number three).

REMEDY: Change device select jumper on 8" drive to drive select number 2, or change PC/36 start-up files so that no virtual diskette drives are defined.

4. DRIVE NOT READY OR UNKNOWN ERROR ON EXTERNAL DRIVE NUMBER ONE WHEN USED ON SYSTEM WITH IBM SUPPLIED EXTERNAL 3 1/2" DRIVE. DRIVE MAY BE INTERFACED TO IBM 3 1/2" DISKETTE CONTROLLER CARD IN AN IBM PC/AT, OR THE BACK OF THE INTERNAL IBM DISKETTE CONTROLLER CARD IN AN IBM PC OR PC/XT.

PROBLEM: IBM device driver, DRIVER.SYS set up with parameters of d/:2. Flagstaff Engineering drive and IBM external drive look like same device to system.

REMEDY: Change device select jumper on 8" drive to drive select number 2. Add parameter to FLAGIO.SYS device driver statement in CONFIG.SYS file to read as follows:

DEVICE=FLAGIO.SYS (D=2,6,3E8) (T=2,6,350) E=2

The added parameter, E=2, will pass all requests for DOS drive 2 (the first external drive) to vector being controlled by DRIVER.SYS.

DRIVE SYSTEM WHEN PC/36 COMPUTER INTERFACED TO SYSTEM.

CONVERSION PROBLEMS

1. SECTOR or TRACK NOT FOUND (Utility and diagnostic programs report SECTOR or TRACK NOT FOUND when executed.)

NOTE* This message is normal in many programs during format identification. If the message is followed by "GOOD OPERATION", then everything is as it should be. If the message persists, the following problems may be occurring:

PROBLEM: Diagnostics being performed on hard sector diskette.

REMEDY: Use double sided, double density soft sectored diskettes for diagnostic checks on system.

FLAGSTAFF ENGINEERING

8 INCH DISKETTE SYSTEM

INSTALLATION GUIDE

8850UTB update
$35.00
5.00 shipping

Gary

Catalog

Rick Wilson

CPM87-[illegible].E[illegible]
CPM8TOS.EXE
CPMDO[illegible]

FLAGSTAFF ENGINEERING
Box 1970
Flagstaff, AZ 86002
(602) 774-5188
TELEX 705609

TABLE OF CONTENTS

Installing the Flagstaff Engineering 8 inch diskette system on your IBM PC, PC/XT or PC/AT computer is quite easy. The diskette controller card supplied with the system must be installed inside your computer. If you have previously installed IBM or third party controller cards in your computer, the procedure will be very familiar. If you have not installed a card inside the computer before, relax; you don't need to be an electronics engineer to complete the installation.

The installation procedure is presented as a step-by-step series of instructions. Please don't hook up any part of the system until you have read through the installation instructions at least once. Becoming familiar with the parts of the system and the instructions will allow you to install the system correctly in a minimum amount of time.

1.0 SYSTEM DESCRIPTION.

When you unpack the 8 inch diskette system from the shipping carton, you should find the following pieces:

1.1 An 8 inch diskette drive enclosure containing either one or two diskette drives. This unit contains its own power supply and power cord. At the back of the unit is a 50 conductor edge connector . This connector will be used to interface your 8 inch drive(s) to your computer.

1.2 A diskette controller card. This card must be installed inside your computer.

1.3 A 50 conductor ribbon cable. The cable has identical 50 pin connectors on each end. This cable is used to connect the 8 inch diskette drive(s) to the diskette controller card inside your computer.

1.4 A 5 1/4 inch distribution diskette labeled UTILITY/8. This distribution diskette contains diagnostic and utility programs. These programs will be used to confirm proper installation of the system, and furnish utility routines for use with 8 inch diskettes. The software on this diskette must be used with IBM PC-DOS versions 2.0 or higher.

Complete information on the diagnostic and utility programs is contained in the Utility/8 Software Documentation Manual provided with your system.

2.Ø DISKETTE CONTROLLER CARD DESCRIPTION.

The diskette controller card included with your system is one of two types. The card is either a Model S or a Model D, depending on the system specifications given to Flagstaff Engineering when you placed your order. To properly install your diskette card, you must identify the type of card you have.

2.1 Card Type Identification

The diskette controller card has three edge connectors. There is an edge connector on either end of the card, and an edge connector on the bottom of the card. A metal bracket is attached to the back edge of the card. The top of the bracket has a slot for a retaining screw used to anchor the card against the rear panel of the computer. The front of the card is the end without the retaining bracket.

The controller card shipped with your system has a quality control tag located on the component side of the card. This tag will have either a letter "D", or "S" printed on it. A Model D controller card is indicated by a "D" on the tag. A Model S controller card is indicated by an "S" on the tag.

The Model S diskette controller card provides interface and control functions for 5 1/4 inch diskette drives and 8 inch diskette drives. The Model S diskette controller card is designed to replace the standard IBM controller card in your computer.

The Model S controller card can be used with an IBM PC or IBM PC/XT computer. The Model S card CANNOT be used with an IBM PC/AT computer.

The Model D diskette controller card provides interface and control functions for 8 inch diskette drives only. The Model D controller card is designed to be installed as an additional controller card inside your computer.

The Model D controller card can be used with an IBM PC, PC/XT or PC/AT computer. You must have at least one unused expansion slot available in your computer to use the Model D card.

3.0 HARDWARE INSTALLATION PROCEDURE.

To install your 8 inch diskette system, perform the following steps.

3.1 Set the power switch on the computer system and any other units connected to your computer (expansion unit, etc.) to the OFF position. Unplug ALL power cords from the computer unit, expansion unit, etc. *** WARNING *** Failure to completely power off all units and unplug ALL power cords could result in serious electrical damage to your computer system.

3.2 Unhook the monitor cable and then remove the monitor from the top of your computer. Move any external devices (keyboard, monitor, printer, etc.) away from your work area.

3.3 Remove the plastic shipping wrapper from the 8 inch diskette drive(s) unit. Open the door(s) on the 8 inch diskette drive(s) and remove the cardboard insert used to protect the drive heads during shipping.

3.4 The cover of your computer unit must be removed to install the diskette controller card. Remove the five cover mounting screws at the back of the computer.

3.5 Slide the cover toward the front of the computer unit and then set the cover aside. You can now access the system expansion slots located at the inside left rear of the computer unit.

3.6 If you are installing a Model S diskette controller card, follow instructions 3.6.1 through 3.6.11, then continue your installation by going to instruction 3.8 If you are installing a Model D diskette controller card, skip instructions 3.6.1 through 3.6.11 and start at instruction 3.7.

3.6.1 Model S Card Installation.

Install the Model S card by first locating the IBM diskette controller card supplied with the computer. The IBM diskette controller card is normally located in the expansion slot closest to the power supply. The IBM card can be easily identified by the ribbon cable that runs between the card itself, and the 5 1/4 inch diskette drives already in the computer.

3.6.2 Mark the top of the ribbon cable connector attached to the IBM card with a small piece of masking tape, or felt tipped marker to indicate the top of the connector.

3.6.3 Unscrew the retaining screw located at the top rear of the IBM diskette controller card.

3.6.4 Lift the card free from its expansion slot.

3.6.5 Remove the ribbon cable connector that you previously marked with masking tape or felt tip marker from the IBM card.

3.6.6 Place the IBM card in a safe storage area.

3.6.7 Place the ribbon cable connector with the top previously marked onto the FRONT edge connector of your Flagstaff Engineering Model S diskette controller card. Remember, the front of the Model S card is the end without the metal bracket on it.

3.6.8 Route one end of the 50 conductor cable supplied by Flagstaff Engineering through the open slot in the back of the computer unit. Both connectors of the cable are exactly the same, so either end may be used. However, the red arrow that appears on the connectors of the cable MUST be pointed up.

3.6.9 Attach the connector of the 50 conductor cable supplied by Flagstaff Engineering to the edge connector at the rear of the Model S controller card. The red arrow on the cable connector MUST be pointing up.

3.6.10 Hold the Model S controller card by the top and firmly press the bottom edge connector of the card into the expansion slot in the computer.

3.6.11 Place the retainer screw previously removed through the retaining bracket at the back of the Model S card and secure to the rear panel of the computer. The Model S controller card is now installed.

3.7 Model D Card Installation.

The Model D diskette controller card may be installed in any open system expansion slot in the computer. To install the Model D controller card, first remove the retaining screw from the expansion slot cover directly behind the system expansion slot you have selected to use.

3.7.1 Remove the expansion slot cover.

3.7.2 Route one end of the 50 conductor cable supplied by Flagstaff Engineering through the open slot in the back of the computer unit. Both connectors of the cable are exactly the same, so either end may be used. However, the red arrow that appears on the cable connectors should be pointed up.

3.7.3 Attach the connector of the 50 conductor cable supplied by Flagstaff Engineering to the edge connector at the rear of the Model D controller card. Remember, the rear edge of the card is the edge with the metal retaining bracket attached. The red arrow on the cable connector MUST be pointing up.

3.7.4 Hold the Model D controller card by the top and firmly press the bottom edge connector of the card into the expansion slot in the computer.

3.7.5 Place the retaining screw that you previously removed, through the retaining bracket at the back of the Model D card and secure to the rear panel of the computer. The Model D controller card is now installed.

3.8 DO NOT CHANGE any switch settings inside the computer.

3.9 Replace the cover on the computer and secure the cover to the unit with the five cover mounting screws previously removed.

3.10 Reconnect all external device cables.

3.11 Attach the connector of the 50 conductor cable supplied by Flagstaff Engineering to the edge connector located at the rear of the 8 inch diskette drive unit. The red arrow on the connector should be pointed up. If your 8 inch diskette unit has two drives, your interface cable will have two cable connectors . Attach a connector to each drive.

3.12 Plug any power cables from the computer, 8 inch drive, expansion unit, etc. back into your electrical outlets.

3.13 Power on your computer system and 8 inch drive.

3.14 There should be no error messages displayed after the computer is powered up. If an error message is displayed, the most likely causes are improperly set switches inside the computer unit, cable(s) not reinstalled, or the controller card not properly seated in the expansion socket. If an error message occurs, power off the system and check for problems by going through the installation instructions to verify that all instruction steps have been completed. If the problem cannot be resolved, call us at 602-774-5188 for assistance.

4.0 SOFTWARE INSTALLATION PROCEDURE

To use the 8 inch diskette drive(s) with your computer system, a software I/0 driver MUST be included in DOS when DOS is booted into your system. The following instructions will detail the installation of the I/O driver.

4.1 A 5 1/4 inch distribution diskette is included with your 8 inch diskette drive system. This distribution diskette is an important addition to your software library, since it contains diagnostic and utility programs that support the 8 inch drives. Before you do anything else with your computer, load the DOS DISKCOPY utility program from IBM and MAKE A BACKUP COPY OF THE 5 1/4 INCH DISTRIBUTION DISKETTE SUPPLIED WITH YOUR FLAGSTAFF ENGINEERING SYSTEM. After you have finished making the backup copy, store the original diskette in a safe place.

4.2 A diskette device driver module MUST be included in the DOS you boot into your computer to provide support for the 8 inch drive(s). Each volume of a diskette or hard disk that is used to boot from MUST contain a copy of the device driver module and a CONFIG.SYS file which specifies that the device driver is to be loaded into the system. Two separate device driver modules are included on the 5 1/4 inch distribution diskette. The module you copy onto bootable volumes is defined by the type of diskette controller card installed in your computer.

If you have a Model S diskette controller card, you must use device driver BIGS.COM.

If you have a Model D diskette controller card, you must use device driver BIGD.COM.

The device driver module and CONFIG.SYS file MUST be copied to the root directory of any bootable volumes. If these files are copied to sub-directories, they will not be loaded into the system when DOS is booted.

4.3 If you have a Model S diskette controller card installed in your system, perform installation steps 4.3.1 through 4.3.2 and then go to instruction 4.5. If you have a Model D diskette controller card installed in your system, perform the installation starting with instruction 4.4.

4.3.1 To support a Model S diskette controller card, copy module BIGS.COM from the distribution diskette onto bootable volumes you will be using.

4.3.2 A CONFIG.SYS file must be created on bootable volumes to specify that module BIGS.COM should be loaded into the system when DOS is booted. If your system does not already use a CONFIG.SYS file, then create the file by copying CONFIGS.SYS from the distribution diskette onto your bootable volumes. After you have copied the file, rename the file CONFIG.SYS. If your system already uses CONFIG.SYS, then the following two statements must be added to the file:

```
DEVICE=BIGS.COM
BUFFERS=4
```

4.4 To support a Model D diskette controller card, copy module BIGD.COM from the distribution diskette onto bootable volumes you will be using.

4.4.1 A CONFIG.SYS file must be created on bootable volumes to specify that module BIGD.COM should be loaded into the system when DOS is booted. If your system does not already use a CONFIG.SYS file, then create the file by copying CONFIGD.SYS from the distribution diskette onto your bootable volumes. After you have copied the file, rename the file CONFIG.SYS. If your system already uses CONFIG.SYS, then the following two statements must be added to the file:

```
DEVICE=BIGD.COM
BUFFERS=4
```

4.5 If you are already using CONFIG.SYS with your system and loading more than one device driver, CONFIG.SYS may need to be changed. Some device drivers may need to be loaded in a certain order to operate properly. The BUFFERS parameter may also need to be changed for your system to operate. If you experience a problem with this, then give us a call at 602-774-5188.

4.5.1 With CONFIG.SYS and either BIGD.COM or BIGS.COM installed on your bootable volumes, reload the DOS into your computer. If the bootable volume has been set up properly, then a message will appear on your screen verifying that the Flagstaff Engineering 8 inch diskette device driver has been loaded. This message should appear BEFORE the system date and time message.

4.6 Your 8 inch system is now installed.

5.Ø SYSTEM VERIFICATION

5.1 8 inch diskette handling. The 8 inch diskette drive units supplied with your system operate in a different manner from the 5 1/4 inch drive units on the IBM computer. 8 inch diskettes must be inserted into the drive(s) with the label side of the diskette facing left. The write protect notch on 8 inch diskettes work exactly opposite from those on 5 1/4 inch diskettes. An 8 inch diskette can only be written on when the write protect notch is covered by a diskette tab. If the write protect notch on an 8 inch diskette is uncovered, the diskette can be read by your computer, but not written to.

5.2 The 8 inch diskette drive(s) should be checked for correct operation before using the drive(s) to store data files or programs. A diagnostic program called CHECK8 is provided on the distribution diskette. The CHECK8 program is designed to test the 8 inch diskette system hardware and diagnose any problems found.

5.2.1 Use a good quality double sided double density 8 inch diskette (IBM 2D) when running CHECK8. CHECK8 will run using a single sided diskette, but only Head Ø will be checked for operation on your 8 inch drive(s). A double sided double density diskette is required to make sure both diskette drive heads are working properly.

5.2.2 USE A BLANK DISKETTE WHEN RUNNING CHECK8. ALL DATA ON THE 8 INCH DISKETTE WILL BE DESTROYED.

5.3 Load CHECK8 from the 5 1/4 inch distribution diskette. After loading, the program will display a message and prompt the user to insert an 8 inch diskette into the drive and select either the first (device 1) or second (device 2) drive unit. Insert the diskette into the drive and then type the appropriate number for the drive you want to check and press ENTER.

5.3.1 The program will then write out to and read back from the 8 inch diskette drive, all valid sector sizes for both single and double density formats. Various sections of the diskette are written to and read to verify that all valid commands which may be sent to the diskette drive work properly.

5.3.2 The number of temporary read errors displayed when running this program should not be greater than two. If any permanent errors occur, you should retry the test to see if the errors always occur at the same diskette location. If the errors occur at the same diskette location, the problem is most likely a bad spot on the diskette. Use a different diskette and rerun the program to make sure the problem was with the first diskette, and not the system.

UTILITY/8

USER'S MANUAL

FLAGSTAFF ENGINEERING, INC.
1120 Kaibab Lane
Flagstaff, Arizona 86001
(602) 779-3341
Telex 705609
Document #8860-UT8

CONTENTS

LIST OF UTILITY/8 TABLES:

INTRODUCTION

This manual is designed to assist the user with the diagnostic and utility programs that make up the Flagstaff Engineering Diskette Connection System. The Utilites/8 diskette contains the following files:

DEVICE DRIVERS AND RELATED FILES:

CONFIGD.SYS	Configuration file for diskette controller card.
CONFIGX.SYS	Configuration file with sample DOS device parameters.
FLAGIO.SYS	Device driver for diskette and tape controller cards.
FLAGX.SYS	Device driver to allow use of external devices as DOS drives.
FLAGINS.SYS	Installs table entires for FLAGX.SYS
INT13C.ASM	8088 assembler source file for device driver access.
DEMO.C	Source code in "C" for device driver access demonstration.

DIAGNOSTIC PROGRAMS:

[redacted]ECK8	Check external drive read/write.
[redacted]RIFY8	Check external drive operations.
FILEGEN	Build DOS test data file.
ID8	Display diskette sector ID's.

UTILITY PROGRAMS:

CPY8TO5	Copy external diskette data to DOS files.
CPY5TO8	Copy DOS files to external diskettes.
COPY8	Duplicate 8" diskettes using a single drive.
EDIT8	Display and edit external diskette sectors.
DOSFMT8	Format external DOS diskettes.
FMT8INS	Installation of diskette format in DOSFMT8.
DCOPY	Copy DOS file to smaller files.
DFILE	Display/edit DOS file records.

ABOUT THIS MANUAL

In the sections describing program operations, keyboard entries are indicated by key names or characters inside angle brackets:

<ENTER>	means the "ENTER" key;
<Y>	means the "Y" key;
<01001>	means the digits 0, 1, 0, 0, and 1.

PROGRAM OPERATION

The programs may be copied to and executed from any DOS diskette or hard disk volume desired. Programs are run by typing their names at the DOS system prompt:

A> <program name>

Program prompts for key entries are issued by the programs in the forms:

(DEFAULT/RANGE OF ENTRIES) and
(DEFAULT/OPTION1,OPTION2,OPTION3)

At the prompt, "ENTER DRIVE NUMBER (1/2-4)?", pressing the <ENTER> key will select the default entry of "1". Optional values may be entered by pressing <2>, <3>, or <4> followed by the <ENTER> key.

EXTERNAL DEVICE TYPES

The utility and diagnostic programs can access several types of external devices through the Flagstaff Engineering diskette controller card. The programs will prompt the user for the device type being used. External device types are indicated by a single alphanumeric character. Device types for diskettes and drives are:

Table 1: External Device Types

8: 8" diskette or drive.
5: 5-1/4" 48 TPI 360K device or drive.
Q: 5-1/4" 96 TPI 720k quad density.
H: 5-1/4" 96 TPI 1.2 meg. high density.
3: 3-1/2" 135 TPI 300 RPM drive.
(3-1/2" Data General diskettes.)

EXTERNAL DEVICE NUMBERS

The utility and diagnostic programs access up to four (4) external diskette drives through the Flagstaff Engineering diskette controller card. The programs will prompt the user for the drive number being used. External drives are indicated by a single numeric character. External drive numbers are defined as:

1: first external drive off rear of diskette controller card.

2: second external drive off rear of diskette controller card.

3: third external drive off front of diskette controller card.

4: fourth external drive off front of diskette controller card.

ABOUT 8" DISKETTES AND WRITE PROTECTION

[redacted]hose users familiar with using 5-1/4" diskettes, the method of write-protecting 8" diskettes is exactly the opposite of what you're used to. When using 8" diskettes, there must be a write-protect tab covering the notch in the side of the diskette in order to write to it. An 8"diskette is write-protected when there is no tab over the notch. Most of the diagnostic and utility programs included in this package will issue an error message similar to this:

DISKETTE WRITE PROTECTED

if the program attempts to write to a protected diskette. Write-protection is irrelevant, of course, if the diskette is only being read (such as in CPY8TO5).

DEVICE DRIVERS

When you install external drives that are connected to the Flagstaff Engineering diskette controller card, you must also install a software [redacted]dule, called a device driver, that the operating system (DOS) uses to communicate with the disk drive(s). The device driver is in a file called FLAGIO.SYS on the distribution diskette. In order for your system to use this device driver, two conditions must be met:

1. The device driver (FLAGIO.SYS) must be present in the root directory of any volumes—diskettes or hard disks—that will be used to boot the system (the "boot volume" is the disk or diskette that is first read at system start-up time). Therefore, if you plan on using a number of diskettes to start the system from (in drive A:), then each diskette must contain FLAGIO.SYS in the root directory.

2. A special file used by DOS called CONFIG.SYS must also be present in the root directory of any "boot volumes," and it must contain a statement that identifies FLAGIO.SYS as a device driver to the system. This is an ASCII file that can be created or modified with any simple text editor, or can be created directly from the keyboard (see the section in the DOS reference manual on "Creating a Batch File"). If your system doesn't already have a CONFIG.SYS file, you can copy the file CONFIGD.SYS from the distribution diskette onto your bootable volumes, then rename the file CONFIG.SYS. CONFIGD.SYS uses the default parameters for the device driver, which are suitable for the majority of IBM PC/XT/AT systems.

This statement, identifying the device driver to the system, must be present in CONFIG.SYS:

DEVICE=FLAGIO.SYS (D=2,6,3E8)

(The space before the left parenthesis is required).

This sets up the disk controller card with the default values. If these values work with your system, then you probably don't need (or even want!) to know what they mean. However, if your machine is a "clone" (non-IBM), or if you have other cards or devices installed in your machine (such as a communications adapter or a second printer), then there may be hardware or software conlicts that require changing these parameters.

See Appendix A for a fuller, more technical explanation of the device driver parameters, or contact technical support at Flagstaff Engineering for advice (602) 779-3341).

The CONFIG.SYS file must also contain a BUFFERS statement:

BUFFERS=x

where x is a number equal to or greater than 4. Add this statement if it isn't already in the file, or modify the existing one if needed.

If you are already loading other device drivers in CONFIG.SYS, you may need to change the order of DEVICE statements for the system to operate correctly. The order of statements is the order in which the device drivers are actually loaded by DOS. If changing this doesn't resolve a problem, refer to the discussion of driver parameters above. After CONFIG.SYS and FLAGIO.SYS are installed, you must reboot the system for the device driver to be installed (use the three-key <CTRL>-<ALT> <DEL> "soft" boot, or turn the machine off, then on again).

If everything has been properly set up, a message should appear verifying that the Flagstaff Engineering diskette device driver has been loaded; this message should appear BEFORE the system time and date messages, if any. If this message doesn't display, either CONFIG.SYS or FLAGIO.SYS are incorrect or are not present on the root directory of the boot volume.

Note that the device driver, FLAGIO.SYS, makes the diskette controller card and the drives attached to it available to the system as an I/O device. [redacted]s NOT, however, let the system use these external drives as DOS [redacted]ces. DOS will not be able to communicate to the drive, which means that you cannot use the DOS COPY or DIR commands on this drive, or run any applications that expect to use the drive as a DOS drive (e.g., D:). In order to make DOS recognize the drive as a DOS device, with a drive letter assigned to it, you must install a second device driver known as FLAGX.SYS. This file is also on your distribution diskette.

USING FLAGSTAFF ENGINEERING EXTERNAL DRIVES AS DOS DEVICES USING FLAGX.SYS

The secondary device driver FLAGX.SYS defines external Flagstaff Engineering drives as legal DOS devices. You must use this driver if you need to use the DOSFMT8 program, other application programs or DOS commands, such as COPY, DELETE, DIR or TYPE, to access DOS diskettes in the external drives.

FLAGX.SYS contains a table of diskette formats (maximum of 16). As [redacted]mbled, this device driver contains NO entries in the format table. [redacted]tries are placed in the table using FLAGINS. When installed, each entry in the table must be given a name of from 1 to 8 characters. This name is then used on the command line in CONFIG.SYS to pass format information for a specific external drive to FLAGX.SYS.

If only the name and device type are specified, then the device driver obtains the remaining parameters for the BPB from the boot record of a DOS diskette when it is read. This type of entry allows diskettes using different formats to be freely exchanged in the same diskette drive. For diskettes which do not have valid boot sectors, all the parameters must be filled in. In this case, the device driver will never attempt to read the boot sector from the diskette.

INSTALLING PARAMETERS INTO FLAGX.SYS (FLAGINS):

Run this program to add or modify the diskette type table in the device driver FLAGX.SYS. The location of external diskettes must be specified on the command line on CONFIG.SYS.

FLAGINS - Installing parameters into FLAGX.SYS

The general form of the secondary device driver statement is:

Device=FLAGX.SYS d=name [d=name]

d = External drive number 1 to 4
name = Format name a specified at install time with FLAGINS.

The device driver parameters (d=name) create logical drives, each with a unique drive letter (such as D:); each logical drive associated with a physical device (the drive identified by "d"), and a certain type of diskette (name); and each logical device is assigned a drive letter in sequence by DOS, starting with the existing drives in the system. If your system has two 5 1/4" drives (A: and B:) and a fixed disk (C:), the next logical drive assigned will be D:. Since the drive letters are assigned to logical, not necessarily physical, devices, you can associate more than one type of diskette with a physical drive. This can be confusing, so here's an example.

The following CONFIG.SYS statement defines four (4) logical drives:

DEVICE=FLAGX.SYS (1=IBM8SM, 1=8U, 3=QU, 4=HDU)

The device names used on the command line were created in FLAGINS. In this example, IBM8SM is a defined format, single sided 8" DOS diskette (the boot sector of the diskette will be read by the device driver to define physical format). QU is an undefined, 5 1/4", 96 TPI format. HDU is an undefined, 5 1/4" high density format.

Assuming three (3) internal drives in the system (A:, B:, and C:), four (4) logical drives will be added--D:, E:, F: and G:. The drives will be set up as follows:

Drive D: uses device number 1 (first physical drive off of external diskette controller card). "8SM", which indicates an 8", single sided, single density, DOS diskette.

Drive E: uses device number 1 (first physical drive off of external diskette controller card). It is an 8" drive that will access any valid DOS formatted, 8" diskettes.

Drive F: uses device number 3 (third physical drive off of external diskette controller card). It is a 96 TPI, 5 1/4" drive that will access any valid DOS formatted, 96 TPI, quad density diskette.

Drive G: uses device number 4 (fourth physical drive off of external diskette controller card). It is a 48 TPI, 5 1/4" drive that will access any valid DOS formatted, 48 TPI, quad density diskette.

PREDEFINED DISKETTE FORMATS

FLAGX.SYS is supplied with the following predefined format names:

Name	Format
IBM8LG	8" single sided, single density
IBM8SM	8" double sided, double density
IBMHD	5 1/4" 96 TPI, 1.2 meg, high density
IBM360	5 1/4" 48 TPI, 360k
IBM3	3 1/2", 720k
IBMQUAD	5 1/4" 96 TPI, 720k, quad density
NEC8LG	8" NEC, 1024 byte sector
8U	8" undefined
HDU	5 1/4" high density, undefined
QU	5 1/4" quad density, undefined
5U	5 1/4" 48 TPI, undefined
3U	3 1/2" , undefined

Sample run:
C> FLAGINS
Enter device driver name to install: FLAGX.SYS

```
                 F L A G S T A F F   E N G I N E E R I N G
                 DOS external device driver Installation

                      Entry name for loading     a
                      Diskette type (8/5/3/H/Q)  b

        <BPB>                                       <Physical>
                              see above                          see above
Bytes per sector                c                  Density (s/d)     k
Secotors per allocation unit    d                  Sides (1/2))      l
Reserved sectors                e                  First sector (0/1)m
Number of fats                  f                  Sectors/track     n
Number of directory entries     g
Total sectors in media          h
Media descriptor                i
Sectors per FAT                 j                  Table entry number  p

                                                          Reply

ESC=abort ENTER=Update record PgUp=Previous PgDn=Next End=Done
```

Example screen: FLAGINS to install FLAGX.SYS

Table 2: Drive Unit Numbers

	typical assignment
0: 1st internal 5-1/4" drive	—
1: 2nd internal 5-1/4" drive	—
2: 1st external* drive	8"/5-1/4"
3: 2nd external* drive	8"/5-1/4"/3-1/2"
4: 3rd external* drive	8"/5-1/4"/3-1/2"
5: 4th external* drive	3-1/2" high-density

* external drive is defined by device select jumper on drive

Drive select jumpers are as follows:

	External Drive(s)			
	1	2	3	4
8" driver	DS1	DS2	DS3	DS4
5-1/4" driver	DS0	DS1	DS2	DS3

Table 3: Device / Media Type Numbers

(see second table for media and format description)

#	diskette type
0:	5-1/4" quad density, 96 TPI
1:	3-1/2" Data General
2:	5-1/4" standard 360K PC format, 48 TPI
3:	5-1/4" PC/AT high density (1.2 megabyte)
4:	8" standard DOS interchange NEC format
5:	8" —see below
6:	8" —see below
7:	8" —see below
8,9:	currently undefined (for future use).

#	disk size	media type	no. cyls.	no. files	sector size
0:	5-1/4"	DSDD	80	112	512
1:	3-1/2"	DSDD	80	122	512
2:	5-1/4"	DSDD	40	112	512
3:	5-1/4"	DSDD	80	224	512
4:	8"	SSSD	77	68	128
5:	8"	DSDD	77	72	256
6:	8"	DSDD	77	96	512
7:	8"	DSDD	77	336	512

The device driver parameters (d=t) create logical drives, each with a unique drive letter (such as D:). Each logical drive is associated with a physical device (the drive identified by "d"), and a certain type of diskette ("t"). Each logical device is assigned a drive letter in sequence by DOS, starting with the existing drives in the system: if your system has two 5-1/4" drives (A: and B:) and a fixed disk (C:), the next logical drive assigned will be D:. Since the drive letters are assigned to logical, not necessarily physical, devices, you can associate more than one type of diskette with a physical drive. This is confusing, so an example may help.

The following CONFIG.SYS statement defines 4 logical drives:

DEVICE=FLAGIOX.SYS (2=4,2=6,4=0,5=3)

Assuming 3 internal drives in the system (A:, B: and C:), four logical drives will be added—D:, E:, F: and G:. The drives will be set up as follows:

DRIVE D: uses device number 2 (1st external drive connected to Flagstaff Engineering Controller Card), and is an 8" drive using type four (4) disks (standard DOS interchange NEC format).

DRIVE E: uses the same physical device as drive D: above, since the device number is the same, but it is a separate logical drive that reads and writes type 6 disks (8", 77 cyls., 96 tpi).

DRIVE F: uses device number 4 (3rd external drive connected to Flagstaff Engineering Controller Card), and uses type 0 disks (5-1/4" quad density or 3-1/2" Data General disks), depending on the physical drive type.

DRIVE G: uses device number 5 (4th external drive connected to Flagstaff Engineering Controller Card), and uses type three (3) disks (5-1/4" high density).

When setting up the configuration parameters, keep in mind that the device type must match the physical drive it is associated with. An 8" drive cannot have a type number that tries to make it look like a 3-1/2" or 5-1/4" drive.

To format disks to use in external drives defined as DOS devices through FLAGIOX.SYS, you can use the DOSFMT8 utility program.

DIAGNOSTIC PROGRAMS

Diagnostic programs are included on the distribution diskette for use in verifying correct diskette operation and tracing diskette problems.

To exit any diagnostic program while it is running, press <CTRL> <C>. On occasion, the Control-C sequence may not terminate the program. If this occurs, press <CTRL> <BREAK> to end the program.

8" diagnostic programs include:

CHECK8.EXE	Check read/write operations of external diskette drives.
FILEGEN.EXE	Create DOS test files.
ID8.EXE	Display sector ID's from external diskettes.
VERIFY8.EXE	Verify format of external diskettes and overall system operation.

CHECK8.EXE

CHECK8 checks 8" diskettes and verifies that they can be read from and written to properly. This program is used by Flagstaff Engineering to check and verify the operation of each external drive received from the factory.

CHECK8 will verify read/write operations of the drive by configuring the diskette with various sector sizes in both single- and double-density formats. Data is written to the diskette and then read back using each format to verify operation.

After the initial read/write test, the program will reformat the diskette as double-density with 512-byte sectors. This diskette format is generally the most difficult to write data to. If the program detects an error while formatting any track, the program will display a non-zero status code. The program will then try to reformat the track in question. The retry is usually successful. If the track formatting error still occurs after 5 retries, the program will issue a message to use a different blank diskette for the test.

After formatting is complete, the program will read selected sectors on the diskette. The read operation will begin with cylinder 1, and the program will step forward 11 cylinders, reading a single sector from each cylinder. The program will then step backward 5 cylinders, again reading a single sector from each cylinder. This pattern of stepping forward 11

cylinders, and then stepping backward 5 cylinders will be repeated until cylinder 76 is reached.

After the read sequence is complete, the program will repeat the read test using a pattern of 9 forward steps and 4 backward steps. The read test will continue using patterns of 7 forward and 3 backward steps, 5 forward and 2 backward steps, 3 forward and 1 backward steps, and finishwith 1 forward step and no backward steps.

CHECK8 should be run with a good quality double-sided, double-density diskette. The program will operate with a single-sided diskette but will only verify operation of head 0 on the diskette drive.

CHECK8 will DESTROY ALL DATA on the test diskette in the external drive, so a blank diskette should be used with the program.

RUNNING CHECK8

Run CHECK8 by typing its name at the DOS system prompt. After displaying a description message, the program will then prompt the user to enter a device type (see "External Device Types," page1-2); enter <8>, <5>, <3>, <Q>, or <H> followed by <ENTER> to indicate the devicetype being tested, or press <ENTER> only to select an 8" device. The program will prompt the user to insert a blank diskette into the drive and then select the drive number to be tested.

Insert the diskette into the appropriate drive and then enter the drive number to be tested or press the <ENTER> key to select drive 1. The program will then begin testing the drive.

After the drive has been tested, the program will prompt the user to repeat or end the test. Select the appropriate option by entering <Y> or <N>, or end the program by pressing the <ENTER> key.

The number of temporary read errors displayed when running this program should not be greater than 2. It's possible that a few temporary errors might occur while running CHECK8 due simply to the quality of the diskette used. If any permanent errors occur, you should rerun the program with the same diskette to see if the errors occur at the same location. If the errors occur at the same location, it is likely that the diskette has a bad spot on its surface. Use a different diskette and rerun the program to verify correct operation of the drive.

DESCRIPTION: FILEGEN.EXE is designed to create a DOS test file for diagnostic use. The program creates sequential fixed length records containing five byte fixed fields. The five byte fields contain a 5-digit record number. The first record of the file has fields containing the characters 00001. The second record contains fields with the characters 00002, etc.

Records lengths may be from 1 to 4096 bytes. Up to 60,000 records may be created. Records may created as either ASCII or EBCDIC data. Carriage return/line feed pairs may be added to the end of each record.

RUNNING FILEGEN

Run FILEGEN by typing its name at the DOS system prompt. After displaying a program description message, the program will then prompt the user to enter a DOS file name for the test data. Enter a DOS file name and press <ENTER>. The program will prompt the user to enter the number of test data records to create.

Enter a number from 1 to 60,000 (do not include any commas), or press <ENTER> to select 100 test records. The program will then prompt the user to enter the record size in bytes.

Enter a number from 1 to 4096, or press <ENTER> to select 128-byte records. The program will ask whether the user wants to add a carriage return/line feed pair to the end of each record.

Enter <Y> to add a CR/LF, or press <ENTER> to create records without CR/LFs. The program will ask whether the user wants EBCDIC or ASCII data.

Enter <E> to select EBCDIC data, or press <ENTER> to select ASCII data. The program will generate a file using the input parameters, and then display a message indicating the number of records created. The program will then ask if the user wants to create another file. Enter a DOS file name to create another test file, or press <ENTER> to end the program.

DEFAULTS:

File name:	<ENTER> means Exit program.
Number of records:	<ENTER> means 100
Record size:	<ENTER> means 128
CR/LF in record:	<ENTER> means No
ASCII or EBCDIC:	<ENTER> means ASCII

SAMPLE RUN OF FILEGEN:

[redacted]GEN <enter>

GENERATE TEST DATA FILE PROGRAM
COPYRIGHT FLAGSTAFF ENGINEERING 9/6/85

ENTER DOS FILE NAME FOR TEST DATA - PRESS ENTER FOR NONE?
datatest.dat <enter>

ENTER NUMBER OF TEST DATA RECORDS (100/1-60000)? <enter>

ENTER RECORD SIZE IN BYTES (128/1-4096)? <96> <enter>

DO YOU WANT A CR-LF AT THE END OF EACH DATA RECORD (N/Y)?
<enter>

DO YOU WANT DATA IN ASCII OR EBCDIC (A/E)? <enter>

CREATION OF DATATEST.DAT IS COMPLETED -
100 RECORDS WERE CREATED

ENTER DOS FILE NAME FOR TEST DATA -PRESS ENTER FOR NONE?
<enter>

[redacted]

ID8.EXE

USE: Display sector IDs on external 8" diskettes.

NOTES: ID8.EXE is supplied on the distribution diskette as an aid to determining nonstandard diskette formats. The program would normally be used during over-the-phone technical assistance.

DESCRIPTION: ID8.EXE is designed to find and display sector ID numbers on external diskettes. The program is used by Flagstaff Engineering to determine the formatting of nonstandard diskettes. The program is not designed as a standard diagnostic, and should only be run at the request of Flagstaff Engineering technical support staff.

RUNNING ID8

Run ID8 by typing its name at the DOS system prompt. After a program description message is displayed, the program will then prompt the user to enter a device type (see "External Device Types," page 1-3).

Enter <8>, <5>, <3>, <Q>, or <H> followed by <ENTER> to indicate device type being tested, or press <ENTER> only to select an 8" device.

The program will then prompt the user to insert a diskette into the drive, and enter the drive number in use.

Insert the diskette into the appropriate drive and then enter the drive number to be tested or press <ENTER> only to select drive 1. The program will prompt the user for the format of the diskette being read. Enter a number from 0 to 7 to indicate one of the following formats:

Table 4: 8" Diskette Formats

0 = 128 FM	4 = 256 MFM
1 = 256 FM	5 = 512 MFM
2 = 512 FM	6 = 1024 MFM
3 = 1024 FM	7 = 2048 MFM

NOTE: for the purposes of this table, "FM" and "MFM" have the following meanings:

FM = single-density diskette
MFM = double-density diskette.

The program will prompt the user to enter the cylinder and head to be identified. Enter the cylinder and head as CCH, where "CC" is 0 through 79, and "H" is either 0 or 1.

The program will then attempt to read the cylinder selected. If the sector IDs can be read, the program will display 16 lines of status codes. These status codes can be used to determine the physical format of the diskette. The status codes for two consecutive sectors appear on each status line. Status line are in the following format:

S0S1 S2CC HHRR NN00.. S0S1 S2CC HHRR NN00

S0 = status byte 0 of NEC controller chip.
S1 = status byte 1 of NEC controller chip.
S2 = status byte 2 of NEC controller chip.
CC = cylinder number.
HH = head number.
RR = sector number (sector ID).
NN = sector size byte: 0 = 128 bytes
1 = 256 bytes
2 = 512 bytes
3 = 1024 bytes

SAMPLE RUN OF ID8:

[redacted]8

DISKETTE SYSTEM READ SECTOR ID PROGRAM
COPYRIGHT FLAGSTAFF ENGINEERING XX/XX/XX

THIS PROGRAM WILL READ AND DISPLAY ALL THE SECTOR ID ON A SPECIFIED DISKETTE TRACK.

DO YOU WANT TO TEST AN 8", 5", 3 1/2, 5"-QD, OR 5"-HD DRIVE (8/5,3,Q,H)? <enter>

INSERT 8" DISKETTE - ENTER DRIVE (1/2-4) WHEN READY? <enter>

ENTER DISKETTE FORMAT (0=128FM, 3=1024FM, 4=256MFM, 7=2048MFM)? <5> <enter>

ENTER CYLINDER AND HEAD FOR READ SECTOR ID (CCH)? <010> <enter>

READING CYL=01 HEAD=0 SECTOR=01
GOOD OPERATION

S0S1 S2CC HHRR NN

0100	0001	0001	0200	0000	0000
0100	0001	0002	0200	0000	0000
0100	0001	0003	0200	0000	0000
0100	0001	0004	0200	0000	0000
....	....	....	....		
....	....	....	....	....	....
0100	0001	000E	0200	0000	0000
0100	0001	000F	0200	0000	0000
0100	0001	0001	0200	0000	0000
0100	0001	0002	0200	0000	0000

DO YOU WANT TO REPEAT THESE TESTS (N/Y)? <enter>
A>

VERIFY8.EXE

USE: Verify format and and sector size of external diskettes. Verify read operations of external drive(s) and confirm correct head alignment.

DESCRIPTION: VERIFY8 displays the format and sector size of a formatted diskette, and identifies possible head alignment problems with external diskette drives. VERIFY8 does a good job of finding even marginal drive problems.

The program first examines cylinder 5 to determine the diskette formatting. After the format is identified and displayed, the program will measure the drive rotation speed and display the speed measurement in milliseconds. Normally, drive rotation speed is 166.7 milliseconds for 5 1/4" HD and 8" 360 RPM drives. 200 ms is normal for 300 RPM 3-1/2" and 5-1/4" quad density drives. 100.0 ms is normal for 3-1/2" 600 RPM drives.

The program will then perform a seek test to step the diskette drive heads forward and backward through all sectors on the diskette. The program will begin the seek test by reading cylinder 1, and then will step forward 7 cylinders, reading a single sector from each cylinder. The program will then step backward 3 cylinders, again reading a single sector from each cylinder. The pattern of stepping forward 7 cylinders, and then stepping backward 3 cylinders will be repeated until Cylinder 76 is reached. After this read sequence is complete, the program will repeat the read operation using a pattern of 5 forward steps and 2 backward steps, then 3 forward and 1 backward steps, and end with 1 forward step and no backward steps. The number of temporary read errors should be zero on a good diskette.

After the seek test has been completed, the program will perform a read test which reads a complete track. The number of read errors should again be zero.

The program will then perform a track loop test to verify head alignment. Cylinder 70, head 0, sector 1 will be read 100 times. The number of temporary read errors should be zero.

VERIFY8 may be run with any formatted high-quality double sided diskette. The program will operate with a single sided diskette but will only verify operation of head 0 on the diskette drive.

VERIFY8 will not destroy data on the test diskette in the 8 inch drive.

RUNNING VERIFY8

Run VERIFY8 by typing its name at the DOS system prompt. After displaying a program description message, the program will then prompt the user to enter a device type (see "External Device Types," page 1-3). Enter <8>, <5>, <3>, <Q>, or <H> followed by <ENTER> to indicate the device type being tested, or press <ENTER> by itself to select an 8" device. The program will prompt the user to insert a blank diskette into the drive and then select the drive number to be tested.

Insert the diskette into the appropriate drive and then enter the drive number to be tested or press <ENTER> only to select drive 1. The program will then begin testing the drive. After completing the test, the program will prompt the user to repeat the test or end the program. Select the appropriate option by entering <Y> or <N>, or end the program by pressing the <ENTER> key only.

It is possible that a few temporary errors will occur while running VERIFY8 depending to the quality of the diskette used. If any permanent errors occur, you should rerun the program with the same diskette to see if the errors occur at the same location. If they do, it is likely that the diskette has a bad spot on its surface. Use a different diskette and rerun the program to verify correct operation of the drive.

DEFAULTS:

Default entries for program prompts are:

Device Type:	<ENTER> means 8".
Drive number:	<ENTER> key means drive 1.
Repeat Test:	<ENTER> key means No.

DESTRUCTIVE/NONDESTRUCTIVE:

VERIFY8 **will not** destroy data on the test diskette.

SAMPLE RUN OF VERIFY8:

```
A>VERIFY8 <enter>

DISKETTE SYSTEM VERIFY PROGRAM
COPYRIGHT FLAGSTAFF ENGINEERING 3/15/85

DO YOU WANT TO TEST AN 8",5",3 1/2",5"-QD, OR 5"-HD DRIVE (8/5,3,Q,H)?
<enter>

INSERT 8" DISKETTE -
ENTER DRIVE (1/2) WHEN READY.?  <enter>

READING 8" CYL=XX HEAD=X SECTOR=XX
GOOD OPERATION

TEST 01 - DISKETTE IS 128 BYTE SECTOR - SINGLE DENSITY - SINGLE SIDE

TEST 02 - DRIVE ROTATION SPEED IS 165.8 MSEC.  (NORMAL=166.7 OR
200.0 MSEC.)

TEST 03 - SEEK TEST STARTED
READING 8" CYL=76 HEAD=0
SECTOR=13 GOOD OPERATION
TEST 03 - SEEK TEST COMPLETED -
57.72 SECONDS - 00 TEMPORARY READ ERRORS

TEST 04 - READ DATA TRACK STARTED
READING 8" CYL=76 HEAD=0
SECTOR=01 GOOD OPERATION
TEST 04 - READ DATA TRACK COMPLETED -
00 TEMPORARY READ ERRORS

TEST 05 - TRACK LOOP STARTED
READING 8" CYL=70 HEAD = 0
SECTOR=01 GOOD OPERATION XXX
TEST 05 - TRACK LOOP COMPLETED -
00 TEMPORARY READ ERRORS
DO YOU WANT TO REPEAT TESTS (N/Y)?  <enter>

A>
```

UTILITY PROGRAMS

[redacted]y programs are included on the distribution diskette for use in formatting, displaying, and copying data between DOS files and external diskettes. A single-drive 8" diskette copy program is also provided.

To exit any utility program while it is running, press <CTRL> <C>. On occasion, the Control C sequence may not terminate the program. If this occurs, press <CTRL> <BREAK> to end the program.

The utility programs include:

CPY8TO5.EXE	Copy external diskette sectors to DOS file.
CPY5TO8.EXE	Copy data from DOS files to sectors on an external diskette.
COPY8.COM	Duplicate an 8" master diskette using a single 8" drive system.
EDIT8.EXE	Display and modify data on specific sectors of an external diskette.
DOSFMT8.EXE	Format a DOS compatible external diskette.

[redacted]

CPY8TO5.EXE

This program copies specific sectors from an external diskette to a DOS file.

CPY8TO5 is designed to copy sectors from an external diskette with an erased or invalid file directory, in order to recover damaged files. The program copies the sectors onto a DOS file on a diskette or hard disk. This program should only be used with non-DOS external diskettes or those with an erased or damaged file directory. To copy DOS files on or between DOS diskettes, use the standard DOS COPY command.

Sectors from the external diskette may be copied to a DOS file on any drive, including a hard disk drive. Data can be copied from the source diskette to the destination file exactly as read, or EBCDIC-to-ASCII translation can be performed if needed. Most 8" IBM-format diskettes are recorded in EBCDIC, while DOS files on the PC are in ASCII.

The program will identify the format of the external diskette to be copied from and display the format. The sector size of the external diskette will then be used for the size of the records written to the DOS file.

SAMPLE RUN OF VERIFY8:

```
A>VERIFY8 <enter>

DISKETTE SYSTEM VERIFY PROGRAM
COPYRIGHT FLAGSTAFF ENGINEERING 3/15/85

DO YOU WANT TO TEST AN 8",5",3 1/2",5"-QD, OR 5"-HD DRIVE (8/5,3,Q,H)?
<enter>

INSERT 8" DISKETTE -
ENTER DRIVE (1/2) WHEN READY.?  <enter>

READING 8" CYL=XX HEAD=X SECTOR=XX
GOOD OPERATION

TEST 01 - DISKETTE IS 128 BYTE SECTOR -SINGLE DENSITY - SINGLE SIDE

TEST 02 - DRIVE ROTATION SPEED IS 165.8 MSEC.  (NORMAL=166.7 OR
200.0 MSEC.)

TEST 03 - SEEK TEST STARTED
READING 8" CYL=76 HEAD=0
SECTOR=13 GOOD OPERATION
TEST 03 - SEEK TEST COMPLETED -
57.72 SECONDS - 00 TEMPORARY READ ERRORS

TEST 04 - READ DATA TRACK STARTED
READING 8" CYL=76 HEAD=0
SECTOR=01 GOOD OPERATION
TEST 04 - READ DATA TRACK COMPLETED -
00 TEMPORARY READ ERRORS

TEST 05 - TRACK LOOP STARTED
READING 8" CYL=70 HEAD = 0
SECTOR=01 GOOD OPERATION XXX
TEST 05 - TRACK LOOP COMPLETED -
00 TEMPORARY READ ERRORS
DO YOU WANT TO REPEAT TESTS (N/Y)?  <enter>

A>
```

UTILITY PROGRAMS

Utility programs are included on the distribution diskette for use in formatting, displaying, and copying data between DOS files and external diskettes. A single-drive 8" diskette copy program is also provided.

To exit any utility program while it is running, press <CTRL> <C>. On occasion, the Control C sequence may not terminate the program. If this occurs, press <CTRL> <BREAK> to end the program.

The utility programs include:

CPY8TO5.EXE	Copy external diskette sectors to DOS file.
CPY5TO8.EXE	Copy data from DOS files to sectors on an external diskette.
COPY8.COM	Duplicate an 8" master diskette using a single 8" drive system.
EDIT8.EXE	Display and modify data on specific sectors of an external diskette.
DOSFMT8.EXE	Format a DOS compatible external diskette.

CPY8TO5.EXE

This program copies specific sectors from an external diskette to a DOS file.

CPY8TO5 is designed to copy sectors from an external diskette with an erased or invalid file directory, in order to recover damaged files. The program copies the sectors onto a DOS file on a diskette or hard disk. This program should only be used with non-DOS external diskettes or those with an erased or damaged file directory. To copy DOS files on or between DOS diskettes, use the standard DOS COPY command.

Sectors from the external diskette may be copied to a DOS file on any drive, including a hard disk drive. Data can be copied from the source diskette to the destination file exactly as read, or EBCDIC-to-ASCII translation can be performed if needed. Most 8" IBM-format diskettes are recorded in EBCDIC, while DOS files on the PC are in ASCII.

The program will identify the format of the external diskette to be copied from and display the format. The sector size of the external diskette will then be used for the size of the records written to the DOS file.

The data area to copy from the external diskette is defined by a starting and ending location in terms of diskette sectors. The starting and ending location of the data area to be copied is specified as CCHSS, where "CC" is a 2-digit cylinder number from 00 through 79, "H" is a 1-digit head number (either 0 or 1), and "SS" is a 2-digit sector number from 01 through 26, depending on the specific format of the diskette. The following table shows the range of possible values for various diskette formats.

Table 5: SECTOR NUMBER RANGES FOR VARIOUS DISKETTE FORMATS

diskette formats	sector # range
128-byte sector, single density/ 256-byte sector, double density	1-26
256-byte sector, single density/ 512-byte sector, double density	1-15
512-byte sector, single density/ 1024-byte sector, double density	1-8
1024-byte sector, single density/ 2048-byte sector, double density	1-4

CPY8TO5 also allows the selection of certain physical disk format parameters to allow sectors to be read from nonstandard diskettes. Both the number of sectors per track and the inter-sector gap size can be changed. For moststandard diskettes (such as IBM Diskette 1 andDiskette 2), the default values should be selected by pressing <ENTER> when these prompts appear. Since this is a fairly technical area, further discussion and tables appear at the end of this section.

RUNNING CPY8TO5

Run CPY8TO5 by typing its name at the DOS system prompt. After displaying a program identification message, the program will prompt the user to enter a device type (see "External Device Types", p. 1-3).

Enter <8>, <5>, <3>, <Q>, or <H>, followed by <ENTER> to indicate the device type being tested, or press <ENTER> only to select an 8" device. The program will then prompt the user to insert a diskette into the drive, and enter the drive number in use.

Insert the diskette into the appropriate drive, then enter the drive number to be tested or press the <ENTER> key to select drive 1.

EBCDIC-to-ASCII prompt will be displayed.

Enter <Y> to select EBCDIC-to-ASCII conversion. Enter <N> or press the <ENTER> key to copy the data "as is," with no conversion.

The program then prompts the user to enter the starting cylinder, head, and sector number for the data area on the external diskette that will copied to a DOS file. The entry format is CCHSS as explained above.

Enter the cylinder, head, and sector number as a 5-digit number with no blanks between the digits. If the <ENTER> key is pressed without entering the CCHSS, the program will end the copy operation.

The program will then prompt the user to enter the ending cylinder, head and sector number (CCHSS) of the data area to be copied.

Enter the cylinder, head, and sector number as a 5-digit number with no blanks between the digits. If the <ENTER> key is pressed without entering the CCHSS, the program will reprompt the user for CCHSS.

The program will read the first copy sector and display a format information line with bytes per sector, single or double density, and single or double sided.

If the external diskette format cannot be identified, the program will display an "unknown format" message and end the copy operation.

After the sector and format information lines are displayed, the program will prompt the user to enter the "sector number origin": this is the number of the lowest-numbered sector on the diskette. Normally, sector 1 is the first sector on each track; however, certain diskettes start with sector 0, and this option is provided to allow these diskettes to be read. If there is any question about which is the case for a diskette, we recommend that you run the diagnostic program ID8.EXE to discover the sector number origin. To select the default value, just press <ENTER>.

The next two prompts ask for the number of sectors per track and the sector gap size. As mentioned above, the default values given for these choices are correct for the majority of diskettes, and should only be changed when nonstandard diskette formats are being read. Refer to the end of this section for a more complete discussion of these parameters, or press <ENTER> to choose the default values.

SELECTING DISKETTE PARAMETERS FOR NON-STANDARD DISKETTE FORMATS

There are three (3) diskette parameters that can be changed in order to read non-standard diskette formats:

1) sector number origin
2) number of sectors/track
3) inter-sector gap size.

Sector number origin is the sector ID number of the lowest-numbered sector on each track of the diskette. Possible choices are "0" or "1", with "1" as the default. Certain diskettes are known to have sector "0"—CPM diskettes, for example. If this value is unknown, run the diagnostic program ID8.EXE to display the diskette sector IDs.

Number of sectors/track is normally tied to the diskette format. These standard values are given in Table 5 above. This option allows formats tobe read that use from 4 to 32 sectors per track. Again, if the diskette format is unknown, ID8.EXE will tell you how many sectors each track contains, by displaying each sector ID on a track.

Inter-sector gap size is set by default to the correct value for 512-byte/sector, single- or double-density standard IBM diskettes. If other types of standard IBM diskettes are used, then the values from the following table should be used for this parameter. (If the diskette is a nonstandard, non-IBM disk, then you're pretty much on your own so far as valid sector gap size goes!) The values are numbers of bytes in the inter-sector gap:

Table 6: Inter-Sector Gap Size Values

diskette type	sector gap size
128 byte/sector single density	7
256 byte/sector " "	14
512 byte/sector " "	27
256 byte/sector double density	14
512 byte/sector " "	27
1024 byte/sector " "	53

CPY5TO8.EXE

CPY5TO8.EXE is designed to copy DOS files to specific sectors of an external diskette with an erased or invalid file directory. When using CPY5TO8, the target diskette (the one being copied to) should be only:

1) a non-DOS external diskette, or
2) a DOS-formatted diskette with an erased or damaged file directory.

To copy files on or between normal DOS diskettes, use the standard DOS COPY command.

The program will identify the format of the external diskette to be copied to and display the format. The sector size of the external diskette will then be used for the size of the records copied from the DOS file. If the external diskette format cannot be recognized, the program will display an error message and end the copy operation.

The DOS file will be copied to a specific area (defined as sectors) of the external diskette. The user must enter a starting location for the data area on the external diskette that will receive the copied file. The starting location is given as CCHSS, where "CC" is a 2-digit cylinder number from 00 through 79, "H" is a 1-digit head number from 0 through 1, and "SS" is a 2-digit sector number from 01 through 26 (the range of possible sector numbers depends on the format of the diskette: see Table 5 above for valid ranges).

Data may be copied from a DOS file on any drive on the system, including a hard disk drive.

Data may be copied from a DOS file on any drive, including a hard disk drive. Data can be copied from the source file to the destination diskette exactly as read, or ASCII-to-EBCDIC translation can be performed if needed. Most 8" IBM-format diskettes are recorded in EBCDIC, while DOS files on the PC are in ASCII.

The ASCII-to-EBCDIC conversion translates an ASCII character to its EBCDIC equivalent, but no provision is made to exclude fields that contain binary or packed decimal numbers.

RUNNING CPY5TO8

Run CPY5TO8 by typing its name at the DOS system prompt. After displaying a program description message, the program will then prompt the user to enter a device type (see "External Device Types," page 1-2).

Enter <8>, <5>, <3>, <Q>, or <H> followed by <ENTER> to indicate device type being tested, or press <ENTER> only to select an 8" device.

The program will then prompt the user to insert a diskette into the drive, and to enter the drive number in use.

Insert the diskette into the appropriate drive and then enter the drive number to be tested, or press the <ENTER> key to select drive 1.

An ASCII-to-EBCDIC prompt will be displayed.

Enter <Y> to select ASCII-to-EBCDIC conversion. Enter <N> or press <ENTER> only to copy the data "as is."

The program then prompts the user to enter the starting cylinder, head, and sector number for the data area on the external diskette that will receive the copy data. The entry format is "CCHSS" as explained above for the CPY8TO5 program.

Enter the cylinder, head, and sector number as a 5-digit number with no blanks between the digits. If the <ENTER> key is pressed without entering CCHSS, the program will end the copy operation.

The program will read the first copy sector of the external diskette and display a format information line with bytes per sector, single or double density, and single or double sided. If the external diskette format cannot be identified, the program will display an "unknown format" message and the end the copy operation.

After the sector and format information lines are displayed, the program will prompt the user to enter the "sector number origin": this is the number of the lowest-numbered sector on the diskette. Normally, sector 1 is the first sector on each track; however, certain diskettes start with sector 0, and this option is provided to allow these diskettes to be read. If there is any question about which is the case for a diskette, we at Flagstaff Engineering recommend that you run the diagnostic program ID8.EXE to discover the sector number origin. To select the default value, just press <ENTER>.

The next two prompts ask for the number of sectors per track and the sector gap size. As mentioned above, the default values given for these choices are correct for the majority of diskettes, and should only be changed when nonstandard diskette formats are being read. Refer to the end of the section on CPY8TO5 in this manual for a more complete discussion of these parameters, or press <ENTER> to choose the default values.

Next, the program will ask for the name of the DOS file from which the data will be read. Enter the filename with any necessary qualifiers (such as drive letter or path names). If <ENTER> is pressed without entering any filename, the program will end the copy operation. After the output filename has been entered, the program will begin the copy operation. As sectors are written to the 8" diskette from the DOS file, a "writing" message will be displayed and updated to indicate that the copy is in progress. On completion of the copy operation, a message will be displayed indicating the total number of records (sectors) written to the diskette. The user will then be prompted to enter a starting CCHSS number for another copy operation.

The user will be prompted to enter a starting CCHSS number for another copy operation using the same DOS file: enter a new starting CCHSS or press <ENTER> to exit the copy operation.

The program will ask whether you want to copy from another file: enter <Y> to continue, or enter <N> or <ENTER> only to end the program.

DEFAULTS:

Device Type:	<ENTER> means 8" diskette.
Drive number:	<ENTER> means drive 1
Starting CCHSS:	<ENTER> means exit CCHSS prompt.
DOS File:	<ENTER> means exit copy operation.
ASCII to EBCDIC:	<ENTER> means No.
Another Copy?	<ENTER> means No.

DESTRUCTIVE/NONDESTRUCTIVE:

CPY5TO8 will not affect data in the DOS source file; however, **ALL EXISTING DATA ON THE DESTINATION SECTORS OF THE EXTERNAL DISKETTE WILL BE DESTROYED BY THE COPY OPERATION.**

SAMPLE RUN OF CPY5TO8:

```
A>cpy5to8 <enter>

COPY DOS FILE TO DISKETTE SECTORS PROGRAM
COPYRIGHT FLAGSTAFF ENGINEERING 2/6/86
THIS PROGRAM WILL COPY A DOS DATA FILE TO A SPECIFIED
LOCATION ON A DISKETTE.  THE USER CAN SPECIFY THE  STARTING
CYLINDER, HEAD, AND SECTOR FOR THE COPY. AS A USER OPTION, THE
PROGRAM CAN TRANSLATE THE DATA FROM ASCII TO EBCDIC DURING
THE COPY.  THE PROGRAM WILL AUTOMATICALLY IDENTIFY THE DISK-
ETTE FORMAT.

NORMAL CYLINDER VALUES (CC) ARE 00-79 FOR 8" AND 00-39 FOR5"
NORMAL HEAD VALUES (H) ARE 0 OR 1
NORMAL SECTOR VALUES (SS) FOR 8" ARE
                        1-26 FOR 128-SD AND 256-DD
                        1-15 FOR 256-SD AND 512-DD
                        1-8 FOR 512-SD AND 1024-DD
                        1-4 FOR 1024-SD AND 2048-DD
NORMAL SECTOR VALUES (SS) FOR 5" ARE
                        1-18 FOR 128-SD AND 256-DD
                        1-9 FOR 256-SD AND 512-DD
                        1-4 FOR 512-SD AND 1024-DD
                        1-2 FOR 1024-SD AND 2048-DD
ENTER  DISKETTE  TYPE  (8"=DEFAULT/5=5",3=3  1/2",Q=5"-QD,H=5"HD)?
<enter>
INSERT 8" DISKETTE - ENTER DRIVE (1/2-4) WHEN READY?  <enter>
DO YOU WANT ASCII TO EBCDIC CONVERSION (N/Y)? y
ENTER STARTING CYLINDER, HEAD, AND SECTOR (CCHSS)? 01001
DISKETTE IS 512 BYTE/SECTOR - DOUBLE DENSITY  - DOUBLE SIDE
ENTER SECTOR NUMBER ORIGIN (1=DEFAULT/0-1)?  <enter>
ENTER NUMBER OF SECTORS/TRACK (15=DEFAULT/4-32)?  <enter>
ENTER SECTOR GAP SIZE (027=DEFAULT/0-255)?  <enter>
ENTER DOS FILE NAME FOR COPY (A:\PATH\NAME.EXT)?
                                                    \temp\8dump.asc
WRITING CYL=01 HEAD=0 SECTOR=01 GOOD OPERATION
WRITING CYL=01 HEAD=1 SECTOR=01 GOOD OPERATION
WRITING CYL=02 HEAD=0 SECTOR=01 GOOD OPERATION
WRITING CYL=02 HEAD=1 SECTOR=01 GOOD OPERATION
WRITING CYL=03 HEAD=0 SECTOR=01 GOOD OPERATION
WRITING CYL=03 HEAD=1 SECTOR=01 GOOD OPERATION
WRITING CYL=04 HEAD=0 SECTOR=01 GOOD OPERATION
END OF COPY - 0105 SECTORS WERE COPIED
ENTER STARTING CYLINDER, HEAD, AND SECTOR (CCHSS)?  <enter>

DO YOU WANT TO COPY TO ANOTHER DISKETTE (N/Y)?  <enter>
A>
```

COPY8.COM

USE: Duplicate an 8" diskette using a single 8" drive system.

DESCRIPTION: COPY8.COM is designed to duplicate an 8" master diskette onto a blank 8" diskette using a single 8" drive system.

The program will identify the format of the master 8" diskette. If the format cannot be identified, the program will end the copy operation. The program can duplicate most 8" diskettes that are single or double sided, and single or double density with sector sizes of 128, 256, 512, 1024, or 2048 bytes per sector.

The program will duplicate the format and data of the master diskette onto a blank diskette. The program writes data to the blank diskette by formatting a sector, and then writing data to the sector. If a sector cannot be formatted on the blank diskette, an error message will be displayed and the program will end the copy operation.

After data is written to the blank diskette, the program performs a write verify. If the blank diskette cannot be write verified, an error message will be displayed and the program will end the copy operation.

The program performs the copy operation by reading data from the master diskette and and then storing the data in memory. After the data has been read into memory, the master diskette must be removed from the drive and then the blank diskette must be inserted into the drive. The stored data will then be written to the blank diskette. A maximum of 256 K bytes of machine memory is allocated for data storage during the copy operation.

RUNNING COPY8

Run COPY8.COM by typing its name at the DOS system prompt. After displaying a program description message, the program will prompt the user to verify that the master diskette to be copied is in the 8" drive.

Insert the master diskette into the drive and press <ENTER>.

The program will then read data from the master diskette and store the data in available memory. The program will prompt the user to remove the master diskette and then insert the copy diskette into the drive and press <ENTER>.

Insert the blank diskette into the drive and press <ENTER>. The data stored in machine memory will be written onto the blank diskette.

The program will prompt the user through the read-from-master, write-to-blank copy routine until the copy operation is completed. After the copy operation is complete, the program will ask whether the user wants to copy another diskette. Enter <Y> to copy another diskette, or enter <N> or the <ENTER> key only to end the program.

DEFAULTS:

Begin Copy:	<ENTER> means begin.
Continue Copy:	<ENTER> means continue.
Another Copy	<ENTER> means No.

DESTRUCTIVE/NONDESTRUCTIVE:

COPY8.COM will not destroy any data on the master diskette; however, **ALL DATA ON THE DISKETTE BEING COPIED *TO* WILL BE DESTROYED.**

SAMPLE RUN OF COPY8:

```
A>copy8 <enter>

DUPLICATE 8" DISKETTE PROGRAM
COPYRIGHT (c) FLAGSTAFF ENGINEERING 10/08/84

** MAKE SURE MASTER DISKETTE IS IN DRIVE 1 **

PRESS ENTER KEY TO START COPY  <enter>

READING 8" 128-SD CYL=00 HEAD=1
SECTOR=01 TRACK NOT FOUND
DISKETTE IS 128 BYTE SECTOR -
SINGLE DENSITY - SINGLE SIDE
READING 8" 128-SD CYL=XX HEAD=X
SECTOR=XX GOOD OPERATION
VERIFY 8"  128-SD CYL=XX HEAD=X
SECTOR=XX GOOD OPERATION
INSERT BLANK DISKETTE, PRESS ANY KEY...  <enter>

READING 8" 128-SD CYL=XX HEAD=X
SECTOR=XX GOOD OPERATION
VERIFY 8"  128-SD CYL=XX HEAD=X
SECTOR=XX GOOD OPERATION

INSERT MASTER DISKETTE, PRESS ANY KEY ...  <enter>
```

```
READING 8" 128-SD CYL=XX HEAD=X
SECTOR=XX GOOD OPERATION
VERIFY 8" 128-SD CYL=XX HEAD=X
SECTOR=XX GOOD OPERATION

DISKETTE COPY IS COMPLETED -
00 SECTORS OR TRACKS WERE SKIPPED

DO YOU WANT TO COPY ANOTHER DISKETTE (N/Y)? <enter>
A>
```

EDIT8.EXE

The EDIT8 program allows you to display and modify data on any specified sector of a diskette. This utility is useful for inspecting diskette files, for discovering how a diskette is formatted, and for "patching" changes onto a diskette, as long as you know what sectors you need to modify.

If records in a DOS file need to be edited, the DOS utility DFILE included with this package should be used instead; see Section 5.

EDIT8 can be used with any of the diskette typesdescribed in Table 1. Regardless of the diskette, data is displayed in screens of at most 256 bytes of data. When updating data, the entire sector is rewritten to diskette. As with the 8" to 5" copy programs, sectors are selected by giving a 5-digit CCHSS number, where:

CC	is a two-digit cylinder number,
H	is the head number (0 or 1), and
SS	is a two-digit sector number.

When in Display mode, the screen can be scrolled up or down, and the next or previous sector selected for display. When editing a sector, the cursor can be moved around on the screen as with a full screen text editor. Data can be displayed and entered as either ASCII or EBCDIC depending on a user-set toggle.

RUNNING EDIT8

Run EDIT8 by typing its name at the DOS command prompt. After displaying an introductory message, you will be asked to insert the diskette to display and enter the number of the external drive it is in. (Table 2 gives these numbers.) Note that this must be an external drive, not one of the internal (built-in) drives.

After the drive has been selected, the program will prompt you to give the diskette type (as in Table 1) and the starting sector number (CCHSS) to display. At any point while running EDIT8, pressing <ENTER> only at the CCHSS prompt will allow you to end the program. If the CCHSS number given cannot be read, the following message will appear and you will be asked if you want to display another diskette (pressing <ENTER> only at this point will end the program):

PERMANENT READ ERROR ON DISKETTE

When these first 3 prompts have been answered, Display mode will be entered with the first 256 bytes of the selected sector displayed. Screen 1 below shows an example of a display screen. The first column, "DISP," gives the displacement (location) of each line of data in decimal; this is the number of bytes from the beginning of the sector, starting at zero. The center and right sections of the display give the hexadecimal and character values of the sector bytes, shown in lines of 16 bytes. The <F1> key toggles the display between the ASCII and EBCDIC character sets. Any non-printable characters are shown as periods in the character display area.

When data is being displayed or edited, the bottom line on the screen shows the current CCHSS number, the sector length in bytes, whether the disk is single or double density (SD or DD), and how many sectors there are per track (shown as a range—"Sector xx to xx"). Note that a single diskette can have several different track formats (in terms of bytes-per-sector) on it; while the diskette format may vary from track to track, each sector on a track is generally identically sized. To move the display, the following keys can be used:

<PgDn>	display the next 256 bytes in sector
<PgUp>	display previous 256 bytes in sector
<UpArrow>	scroll display down one line
<DnArrow>	scroll display up one line
<Home>	display previous sector
<End>	display next sector
<ESC>	exit display screen
<F1>	toggle between ASCII and EBCDIC

To "jump" to a new sector on the diskette, just type the new CCHSS number and press <ENTER>. If the specified sector cannot be found or [redacted] amessage will so inform you, and you can enter a different number [redacted] exit the display.

EDITING SECTOR DATA

To enter Edit mode from the Display screen, use the <F9> key. The displayed data will remain in place, and the cursor will jump to the first byte in the hexadecimal display field. Any data entered now will be retained in memory until you exit from Edit mode. You can enter bytes either as hexadecimal values in the center section, or as ASCII or EBCDIC characters in the right section (depending on the setting of the display toggle which appears at the top of the section). To move the cursor from the hex entry to the character entry area or vice versa, use the <TAB> key.

When new data has been entered, it must explicitly be written by the user back to diskette by using the <F9> key. This will write the data to the diskette sector, then exit the Edit screen. If you want to write the modified sector as a "deleted sector," use <ALT> <D> instead to write and exit. If [redacted]decide you don't want the modified data written after all, the <ESC> [redacted]ey will exit without writing anything to diskette.

Screen 2 in the sample run below shows an example of an Edit mode screen.

DESTRUCTIVE/NONDESTRUCTIVE:

If Edit mode is entered and sector data is changed and written back to the diskette, the data in that sector will be permanently changed. If no data is written back to diskette, EDIT8 will not alter any of the diskette data.

SAMPLE RUN OF EDIT8

```
C>edit8
Diskette Data Display and Edit
Copyright (c) Flagstaff Engineering 07/08/86

This program displays selected data sectors from a diskette, allowing the user to
edit the data (change any bytes in the sector), then write the updated sector back
to the diskette. The data is displayed in hex along with either the ASCII or EBCDIC
interpretation. The currently displayed Cylinder, Head, and Sector (CCHSS) is
shown at the bottom of the screen along with the sector size, the high and low
sector ID on the track, and whether the diskette is single or double density(SD/
DD).
```

The following keys are usable from the display screen:

<PgDn>	Display the next 256 bytes in a sector
<PgUp>	Display the previous 256 bytes in a sector
<UpArr>	Scroll display down one line
<DnArr>	Scroll display up one line
<Home>	Display previous sector
<End>	Display next sector
<Esc>	Exit display
<F1>	Toggle between ASCII/EBCDIC character display
<F9>	Enter Edit mode to change the currently displayed sector
	Fill in CCHSS & press <ENTER> to select a new sector fordisplay

Insert diskette - enter drive number (1/1-4): <ENTER>
Enter diskette type (8"=default/5=5",3=3 1/2",Q=5"-QD,H=5"-HD): <ENTER>
Enter starting cylinder, head, sector (CCHSS): 00008

Screen 1 (Display mode):

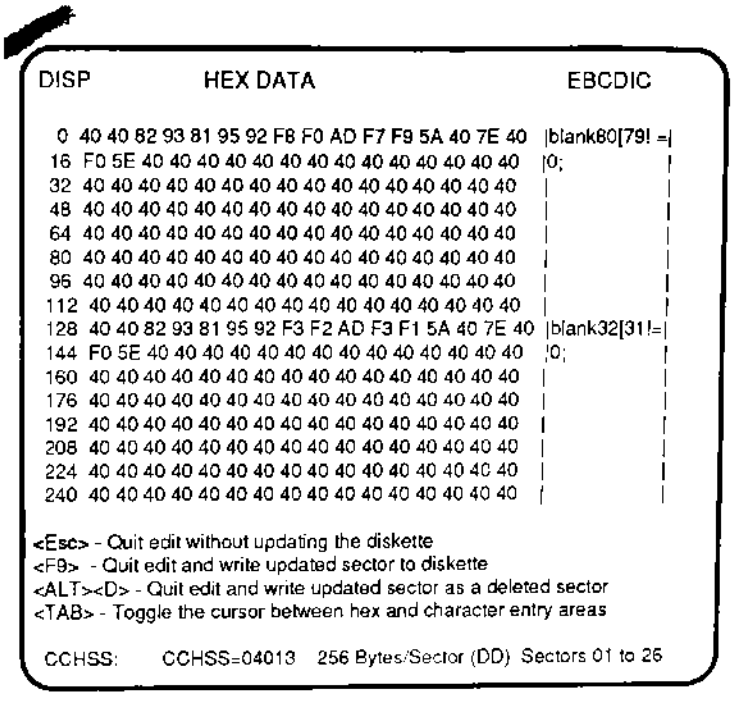
```
DISP          HEX DATA                                        EBCDIC

  0  C8 C4 D9 F1 40 E3 40 40 40 40 40 40 40 40 40 40  |HDR1 T         |
 16  40 40 40 40 40 40 40 F0 F2 F5 F6 D9 F0 F1 F0 F0  |    0256R0100|
 32  F1 F1 F0 F1 F1 F0 F5 40 40 40 40 C9 40 40 40 F8  |1101105    I   8|
 48  F6 F0 F6 F1 F1 F0 F0 F8 F0 40 F0 F0 F0 F0 40 40  |606110080 00  |
 64  40 40 40 40 40 40 40 40 40 40 F0 F1 F1 F0 F6 40  |           01106 |
 80  40 40 40 40 40 40 40 40 40 40 40 40 40 40 40 C9  |                 I|
 96  C2 D4 E2 E8 E2 E3 C5 D4 F3 F6 40 40 40 F1 40 40  |BMSYSTEM31    |
112  40 40 40 40 40 40 40 40 40 40 40 40 40 40 40 40  |              |


<Esc> -  Exit display
<F1>  -  Toggle between ASCII/EBCDIC character display
<F9>  -  Enter Edit mode to change the currently displayed sector
      -  Fill in CCHSS & press <ENTER> to select new sector for display

 CCHSS:     CCHSS=00008   128 Bytes/Sector (SD)  Sectors 01 to 26
```

Screen 2 (Edit mode):



```
DISP          HEX DATA                                        EBCDIC

  0  40 40 82 93 81 95 92 F8 F0 AD F7 F9 5A 40 7E 40  |blank80[79! =|
 16  F0 5E 40 40 40 40 40 40 40 40 40 40 40 40 40 40  |0;          |
 32  40 40 40 40 40 40 40 40 40 40 40 40 40 40 40 40  |            |
 48  40 40 40 40 40 40 40 40 40 40 40 40 40 40 40 40  |            |
 64  40 40 40 40 40 40 40 40 40 40 40 40 40 40 40 40  |            |
 80  40 40 40 40 40 40 40 40 40 40 40 40 40 40 40 40  |            |
 96  40 40 40 40 40 40 40 40 40 40 40 40 40 40 40 40  |            |
112  40 40 40 40 40 40 40 40 40 40 40 40 40 40 40 40  |            |
128  40 40 82 93 81 95 92 F3 F2 AD F3 F1 5A 40 7E 40  |blank32[31!=|
144  F0 5E 40 40 40 40 40 40 40 40 40 40 40 40 40 40  |0;          |
160  40 40 40 40 40 40 40 40 40 40 40 40 40 40 40 40  |            |
176  40 40 40 40 40 40 40 40 40 40 40 40 40 40 40 40  |            |
192  40 40 40 40 40 40 40 40 40 40 40 40 40 40 40 40  |            |
208  40 40 40 40 40 40 40 40 40 40 40 40 40 40 40 40  |            |
224  40 40 40 40 40 40 40 40 40 40 40 40 40 40 40 40  |            |
240  40 40 40 40 40 40 40 40 40 40 40 40 40 40 40 40  |            |

<Esc> - Quit edit without updating the diskette
<F9>  - Quit edit and write updated sector to diskette
<ALT><D> - Quit edit and write updated sector as a deleted sector
<TAB> - Toggle the cursor between hex and character entry areas

 CCHSS:      CCHSS=04013   256 Bytes/Sector (DD)  Sectors 01 to 26
```

DOSFMT8.EXE

DOSFMT8 will format a DOS diskette in an external drive connected to the Flagstaff Engineering diskette controller card. We recommend that you use only high-quality diskettes to avoid data errors and losses.

DOSFMT8 can create nearly any DOS format desired using 8", 5 1/4", and 3 1/2" diskettes. The program initializes the DOS FAT tables and directory based on values given by the user.

This program contains a table of diskette formats which are installed using FMT8INS. As assembled, there are NO entries in the table. Each entry in the table has a name of from 1 to 20 characters. The format for executing this program is as follows:

DOSFMT8 [/D:d] [T:type] or [/N:n]

d = External drive number from 1 to 4. If not given here, it will be asked for by the program.

type = The name of one of the types defined in the format table.

n = The number of one of the types defined in the format table

If neither /T or /N are given (or are invalid), then the program will display a list of all entries in the table.

The operator may then choose a format by number. A list of the detailed parameters for that format will then be displayed and the operator may change one or more entries. Press <ENTER> to start formatting.

If a valid /T or /N are entered, the program displays the detailed paramter list and begins to immediately format the disk. The <ESC> key may be pressed to abort a format that has started.

FMT8INS - Install the format table in DOSFMT8

Run this program to install diskette formats into DOSFMT8.EXE. The names assigned to the formats with this program must be known to the operator fo DOSFMT8 to select the correct format. Names may contain blanks, but short concise names are better for executing DOSFMT8 from the command line.

DOSFMT8 is supplied with the following predefined formats installed:

Name	Format
IBM8LG	8" single sided, single density
IBM8SM	8" double sided, double density
IBMHD	5 1/4" 96 TPI, 1.2 meg, high density
IBM360	5 1/4" 48 TPI, 360k
IBM3	3 1/2", 720k
IBMQUAD	5 1/4" 96 TPI, 720k, quad density

Using FMT8INS to install table entries in device driver DOSFMT8

This installs actual table entries into DOSFMT8, so the user should preserve a copy of DOSFMT8.EXE before running this program.

a. **Name of entry.** This is used on the command line in CONFIG.SYS to specify the type of drive/format attached to an external DOS diskette drive.

b. **The type of physical drive.**
8 = 8" drive
5 = 5 1/4" single/double denisty (48 tracks/inch)
3 = 3 1/2" 720k
H = 5 1/4" high density (96 tracks/inch, 1.2 meg)
Q = 5 1/4" quad density (96 tracks/inch, 720k)

To generate an entry which will access any DOS format found on a drive at execution time, enter **ONLY** the above two fields. To fully specify the format for faster diskette access or for formats which do not have a valid boot sector, also enter **ALL** of the following fields.

c. **System name.** An eight character name placed in the boot sector.

d. **Sector size.** Must be 128/256/512/1024 bytes.

e. **Sectors/allocation unit.** The number of sectors allocated by each FAT table entry.

f. **Reserved sectors.** The number of sectors preceeding the start of the first FAT table, which is usually one (the boot sector).

g. **Number of FATS.** The number of times the FAT table is repeated on the diskette, which is normally two times.

h. **Directory entries.** This determines the number of sectors allocated for the directory.

i. **Media descriptor.** This is a hex value. See DOS documentation for the usual values. This is largely ignored by DOS, except that the F9 value may cause problems if improperly used.

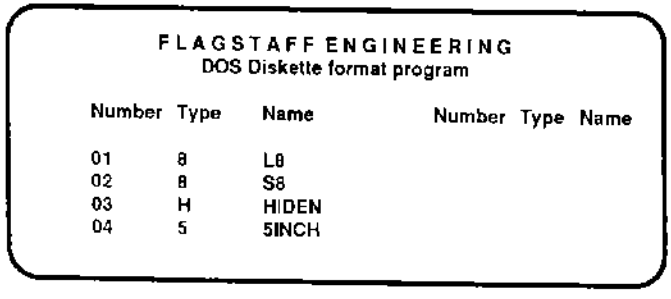
j. **Sectors/FAT.** The number of sectors occupied by one FAT table. This is determined by the sectors/allocation unit and the total sectors in the media.

k. **Sides.** This must be 1 for single, or 2 for double sided diskettes.

l. **Sector origin.** This must be 0 or 1.

m. **Density.** Must be 'S' for single or 'D' for double density.

n. **Number of cylinders.**



Sample screen: DOSFMT8 (first screen)

Sample run:

```
>FMT8INS
Enter format program name to install: DOSFMT8.EXE
```

FLAGSTAFF ENGINEERING
DOS Diskette Paramters

		See above
Format name	L8	a
Device type (8/5/3/H/Q)	8	b
System name	FLAGFMT	c
Sector size	512	d
Sectors/alloc unit	1	e
Reserved sectors	1	f
Number of FATS	2	g
Directory entries	224	h
Media descriptor	FE	i
Sectors per FAT	7	j
Sides	2	k
Sector origin (0/1)	1	l
Density (S/D)	D	m
Number of cylinders	77	n

<1>

Reply

Sample screen: **FMT8INS installation (second screen)**

DESTRUCTIVE/NONDESTRUCTIVE:

DOSFMT8 **WILL DESTROY** ALL DATA ON THE DISKETTE BEING FORMATTED.

When an entry has been entered/modified, press <ENTER> to update that table entry. Page up and down may be used to browse through the table entries. Any entry which is displayed may be altered and then updated by pressing <ENTER>. Press <END> to actually install the modified entires into the device driver. You may press <ESC> at any time to abort without updating. **Note:** actual updating does not occur, unless and until the <END> key is pressed.

Using the DOS format command

Once the format of a diskette on a drive (letter) is known by the DOS operating system, the DOS FORMAT command may be used to format diskettes on that drive. If all parameters are given at install time, the format is always known. If the parameters are being installed in from the boot sector, then at least one diskette of the desired format must have been accessed since the system has been booted.

Sector sizes larger than 512

DOS diskettes with a sector size of 1024 may be accessed. The device driver FLAGX.SYS tells DOS that the sector size is 512, but this is transparent to the user.

Disk access speed

If only one known format of diskette is going to be used in a given drive, it may be advisable to specify all the parameters when installing it in FLAG.SYS. This allows the diskette to be accessed faster since the boot sector does not need to be reread each time media change is possible. Since there is no physical diskette change line supported on the external drives, the media is assumed to be questionable if no accesses have occurred within the last five (5) seconds.

NOTE: for use on color displays, DOSFMT8, FLAGINS, and FMT8INS are all color installable using INSUTIL.

DOS FILE DISPLAY AND EDITING UTILITIES

The Utility/8 package includes DOS utility programs for use in displaying and editing DOS files, especially those that have been transferred from 8" diskettes. These programs are useful for inspecting such files after transfer to confirm the integrity of their contents, to break up large files into smaller pieces, and to do patching (editing) of data.

The DOS file utility programs are:

DCOPY.EXE	Generates smaller multiple files from a large DOS file.
DFILE.EXE	Displays records, searches for data and patches records in a DOS file. DCOPY.EXE

DCOPY will copy part of an existing DOS file to a separate file, or copy a large DOS file into several smaller files. The program allows a large DOS file to be copied to multiple 5-1/4" diskettes when the original file size exceeds the capacity of a single 5-1/4" diskette. Large files may also be split up to allow transfer of file segments to 8" diskettes.

Files may be copied to and from any DOS file. The record length may be set by the operator to any logical record length required. Any number of records may be copied to the target file.

DCOPY.EXE

DCOPY will copy part of an existing DOS file to a seperate file, or copy a large DOS file into several smaller files. The program allows a large DOS file to be copied to multiple 5-1/4" diskettes when the original file size exceeds the capacity of a single 5-1/4" diskette. Large files may also be split up to allow transfer of file segments to 8" diskettes.

Files may be copied to and from any DOS file. The record length may be set by the operator to any logical record length required. Any number of records may be copied to the target file.

RUNNING DCOPY

Run DCOPY by typing its name at the DOS command prompt. After displaying a program description message, the program will then prompt the user to enter the name of a DOS file to copy from: enter the file name using standard DOS syntax, including any necessary specifiers such as drive or path names.

The program will then prompt the user for a logical record size. This can be any number that does not exceed the total number of characters in the file. Enter the record size, or select variable-size records by pressing <ENTER> only.

The program will then prompt the user to enter a target DOS file name to copy to: enter the file name using standard DOS syntax.

The program will prompt the user for the number of records to be transferred.

Press the <ENTER> key to copy all records in the file, or enter the number of records to copy. The program will copy the indicated number of records into the target file, and then display the number of records transferred.

The user will be prompted to insert a new diskette or choose a fixed (hard) disk.

If copying to a 5-1/4" diskette, place the next diskette in the drive and press the <ENTER> key. If copying to files on hard disk, press the <ENTER> key only to continue.

The program will then prompt the user to enter a new target DOS file name to copy to.

Enter the new file name using standard DOS syntax, or select the previously entered output file name by pressing the <ENTER> key only.

The program will prompt the user for the number of records to be transferred.

Press the <ENTER> key to copy all records in the file, or enter the number of records to copy.

The program will copy the indicated number of records into the target file, and then display the number of records transferred. If the complete input file has been transferred, a message will be displayed indicating the total number of records copied from the input file to the multiple output files.

The user will be prompted to insert a new disk if the target disk becomes full and the copy operation is not complete.

When the copy operation is complete, the user will be prompted to enter a new input file name. Enter a new DOS file name, or press <ENTER> only to end the program.

SAMPLE RUN OF DCOPY:

```
C>dcopy <enter>

THIS PROGRAM WILL COPY A SINGLE INPUT DOS FILE INTO MULTIPLE
OUTPUT FILES.

ENTER INPUT FILE NAME: c:test

ENTER RECORD LENGTH (CR=VARIABLE): <enter>

ENTER OUTPUT FILE NAME (CR=SAME AS PREVIOUS OUTPUT):
<a:test1.doc>

ENTER RECORDS TO TRANSFER (CR=ALL): <100>

00100 RECORDS COPIED TO OUTPUT FILE.
OUTPUT FILE COMPLETE.  MOUNT NEW VOLUME, PRESS ANY KEY...
<enter>

ENTER OUTPUT FILE NAME (CR=SAME AS PREVIOUS OUTPUT):
<a:test2.doc>

ENTER RECORDS TO TRANSFER (CR=ALL): <enter>

00200 RECORDS COPIED TO OUTPUT FILE.
COPY COMPLETE 00300 TOTAL RECORDS COPIED.

ENTER INPUT FILE NAME: <enter>
C>
```

DFILE.COM

DFILE is used to display, edit and search for data in DOS files. A file may be displayed using any logical record size desired by the user. Records are displayed as hexadecimal values with both EBCDIC and ASCII translations displayed for each value. Records may be edited (patched) as ASCII or EBCDIC characters or as hexadecimal byte values.

When the program is loaded, a '>' prompt will appear on the screen. The program uses the following commands (items in CAPS are keyword entries that must be given; lowercase items are user-supplied entries). For the search commands, the search data must start one space after the command keyword.

<ENTER>	Display starting at next record until end of file is hit.
nnnn	Display record number nnnn.
SA aaaaaa	Search for ASCII string "aaaaaa" (no quotes needed).
SE eeeeeee	Search for EBCDIC string "eeeeee" (no quotes needed).
SX xx xx xx	Search for hexadecimal string "xx xx xx".
PA rrrr oooo	Patch data in record number "rrrr" at offset "oooo" (both numbers are given as decimal numbers). See below for an explanation of the patching process.
C	Cancel display. Use to select another file or to write patched data to disk.

SEARCHING FOR DATA WITH DFILE

The operation of all the search commands above is similar, except for the type of data being searched for. For the string (ASCII/EBCDIC) searches, DFILE takes any characters entered one space after the command (SA or SE) as the text to search for. Since no delimiters are required here, any characters including single and double quotes can be searched for.

After the search command is given, you will be asked for the record number with which to start the search. Enter the record number (in decimal), or press <ENTER> only to start the search at the top of the file.

If any matches are found, the record number and offset of the match will displayed. The program will then ask you if you want to continue the search. At this point, typing <Y> only will continue the search (DFILE doesn't wait for you to hit <ENTER> here); any other key will end the search and re-display the command prompt ">".

PATCHING RECORDS WITH DFILE

When the PA command is given, a prompt appears showing the record number, offset from the start of the record, and the first byte at that offset given in hexadecimal, ASCII and EBCDIC. The prompt looks like this:

0048 39 9/.:

meaning that at offset 48 (decimal) in the requested record, the first byte is a hex 39; the values separated by the slash are the ASCII and EBCDIC characters, respectively (a period indicates that the character is non-displayable in that character set). When the patch prompt appears, you can either type in new data to replace data in the record, or press <ENTER> only to end the patch process. Patch data can be entered as ASCII or EBCDIC strings or as a series of pairs of hexadecimal digits. ASCII strings are indicated by using apostrophes ("single quotes") around the string, while EBCDIC strings are enclosed by double quotes. Hexadecimal data must be entered as 2 digits per byte, each pair separated by one space.

When patching records, any changes entered are kept in machine memory only until the session is ended with the "C" command, when the data will actually be written out to disk. Any data entered will be written even if you exit the program using <CTRL> <BREAK> (not recommended). If no patches are made, nothing will be written out to the file.

RUNNING DFILE

Run DFILE by typing its name at the DOS command prompt. After displaying a program description message, the user will be prompted to enter thename of a DOS file to display.

Enter the file name using standard DOS syntax, including any necessary drive and path name specifiers.

The program will then prompt the user for logical record size. This can be any number that does not exceed the total number of characters in the file. Enter the record size, or select the default size of 16 bytes by pressing <ENTER> only.

The program will display the command prompt ">" and wait for the user's input. Press the <ENTER> key to begin displaying the file at record number 0 (the first record in the file), or enter any of the commands described above.

If a record number is entered, 128 bytes of data will be displayed as lines of 16 bytes each. The data is displayed by record number and offset (distance) from byte zero of the record. The data is displayed as hexadecimal values, with an ASCII translation to the left of the display. Directly under the ASCII translation is an EBCDIC translation of the same data.

Selected records may be displayed and patched, or the display session ended with the "C" command and another file selected (or the program ended).

SAMPLE RUN OF DFILE:

```
C>dfile  <enter>

DUMP A DOS FILE AND TRANSLATE TO ASCII AND EBCDIC.

FILE NAME TO DUMP:   rhoasc.tbl  <enter>
LOGICAL RECORD SIZE:  <enter>
FILE SIZE IS 00002 RECORDS PLUS 00000 BYTES LONG.> <enter>
0000      0000 40 40 40 .....40 40    |@@@.....@@|
                                      |          |
          0016 40 40 40 .....40 40    |@@@.....@@|
                                      |          |
          0032  .                     |..........|
                                      ..........
                                      ..........
          0112 30 90 40 .....3D 22    |0.@.....="|
                                      |..       ..|
> <0001> <enter>
0001      0000 30 61 62 .....40 F1    |0ab.....@q|
                                      |./.....1|
          0016 F2 6A 6B.....92 24     |rjk.....|
                                      |2.,.....k.|
          0032  .                     |..........|
                                      ..........
          0112 30 31 32 .....40 40    |012.....@@|
                                      |..........  |
> <PA 0001 02> <enter>

0002 62 b/.: <'this'> <enter>
          0112 30 90 40 .....3D 22    |0.@.....="|
                                      |..       ..|
> <0001> <enter>
0001      0000 30 61 62 ... ....40 F1 |0ab.....@q|
                                      |./..... 1 |
          0016 F2 6A 6B.....92 24     |rjk.....|
                                      |2.....k.|
          0032                        |..... .....|

                                      ..........
          0112 30 31 32 .....40 40    |012.....@@|
                                      |..... ..... |
```

```
> <PA 0001 02> <enter>

0002 62 b/.: <'this'> <enter>
0112      30 90 40 .....      3D 22   |0.@.....="|
                                      |..       ..|

> <0001> <enter>
0001      0000 30 61 62 .....40 F1   |0ab.....@q|
                                      |/.....  1 |
          0016 F2 6A 6B.....92 24     |rjk.....  |
                                      |2.,.....k.|
          0032 . . . ..... . .       |..........|
               . . . ..... . .       ..........
                 . . . ..... . .     ..........
          0112 30 31 32 .....40 40   |012.....@@|
                                      |..........|

> <PA 0001 02> <enter>

0002 62 b/.: <'this'> <enter>
C>
```

APPENDIX A: DEVICE DRIVER SUPPLEMENTAL INFORMATION

This section supplements the section on using the Flagstaff Engineering device drivers; it is intended for use by those with special system configuration problems or by programmers using the Flagstaff Engineering disk/tape drives and controller cards. The device driver (FLAGIO.SYS) parameters are covered in detail. The secondary device driver, FLAGIOX.SYS, is covered in the device driver section of this manual.

DEVICE DRIVER PARAMETERS

The general form of the device driver statement for FLAGIO.SYS is:

(1) DEVICE=FLAGIO.SYS [(dev=c,i,a)]
[(dev=c,i,a)]

where:

- dev either "T" for a tape controller or "D" for a disk controller
- c the DMA channel which the controller uses, a number from 1 to 3.
- i the IRQ (interrupt request) level the controller is uses: in practice, this is a number from 3 and 6.
- a the port address of the card, given as 3 hexadecimal digits.

Note that the square brackets are not included in the statement itself; they indicate that the enclosed items are optional. In this case, this means that the device driver can be installed with no parameters at all, in which case the default values are used (see below). One or two sets of parameters can be given, in order to install the device driver for a disk or tape controller or both.

Default values are:

for tape controller card:

dev=T, c=2, i=6, a=350

(the "i" parameter is ignored for tape, but must be included in the list)

for disk controller card:

dev=D, c=2, i=6, a=3E8

CHANGING DEVICE PARAMETERS

If there is any question of conflicts arising from the use of a Flagstaff Engineering disk or tape controller card in your system, read this section thoroughly to determine if you need to deviate from the default parameters given above. Otherwise, set up your system using the given defaults, then follow the procedures given in this manual and the installation guide to test the system. If there are problems, you may need to change parameters. If you're not sure what you're doing, our best advice is—**GET HELP**. It is very easy to get into trouble here! If in doubt, call technical support at Flagstaff Engineering,(602) 774-5188, for assistance.

WHAT THE DEVICE DRIVER PARAMETERS MEAN

nnel is the number of the DMA (direct memory access) channels tobe used by the controller. Valid channel numbers are 1 through 3.

IRQ level is a the hardware interrupt request level number to be used by the controller. Basically, this number is a priority number that the system hardware uses to determine which devices in the system take precedence when interrupts from these devices are serviced. Valid IRQ level numbers for the Flagstaff Engineering FLAGIO.SYS device driver are from 3 to 6. The following table shows the devices assigned to these IRQ levels in the IBM PC/XT/AT:

Table 8: IRQ level assignments

IRQ level	port/device	assignment
3	serial port 2	"COM2:"
4	serial port 1	"COM1:"
5	parallel port 2	2nd printer
6	diskette controller	(internal drives)

Source: *IBM Technical Reference.*

CHANGING THE DMA CHANNEL:

DMA channel 2 is normally used by the Flagstaff Engineering tape and diskette controllers; this is the same channel used by the internal diskette controller. Usually the only time the DMA channel needs to be changed is when the system is a compatible non-IBM machine ("clone"), in which case DMA channel 1 should be used.

The DMA channel specified on the device driver parameter line (1) above must match the channel selected on the controller card by changing jumpers. See the appropriate Installation Manual for instructions on selecting the DMA channel option, and be sure to follow all precautions! **NOTE**: if your machine is an IBM-XT, DMA channel 3 is used by the fixed disk controller if present. In this case, only DMA channels 1 or 2 should be selected for use by the Flagstaff Engineering external controller card.

CHANGING THE IRQ LEVEL

If you change from DMA channel 2, you may need to change the IRQ level along with it: see the table below, for recommended settings. For the tape controller device driver, the IRQ level parameter is ignored (always set to 6). If you need to use a non-standard IRQ level because of system conflicts, you need to know what IRQ levels are assigned to the devices connected to your system: refer to Table 1, above. For example, if you have a 2nd printer on a parallel port, it uses IRQ 5 and makes this IRQ level unusable by other devices. COM1: and COM2: are normally used for asynchronous communications adapters (e.g., modems or networking), but can also be reassigned (via the DOS MODE command) to drive a serial printer or other device. The point is that you need to select an IRQ level for the external drive (tape or disk) that will not conflict with existing devices on the system.

CHANGING THE CONTROLLER PORT ADDRESS

(For this section, some familiarity with computer hardware and terminology is assumed. If you are not knowledgable in this area, you'd be better off not poking around here without help!)

The option of changing the base address of the controller card is provided as a way of resolving potential conflicts with other devices installed on the system. Both the tape and disk controller cards occupy 8 consecutive port addresses, starting at the base address. By default, the controller cards use these port addresses (the first address is the base):

TAPE: 350 (hex)
DISK: 3E8 "

The address of the diskette controller card is not currently selectable, but new releases of these cards will have this feature.

As with the DMA channel (above), the port address given on the device driver command line (1) must match the address physically selected by jumpers on the controller card; see the Installation Manual for your external drive. In general, any address from 000 to hex 3F8 can be selected. In practice, most addresses are already reserved for other devices (both internal and external) and cannot be used. You should consult a system manual, such as the IBM Technical Reference, as well as documentation for any "add-ons" in your system, to find which addresses can be used. If in doubt, get help, or call technical support at Flagstaff Engineering.

APPENDIX B: USER-WRITTEN PROGRAM SUPPORT

Advanced users of the Diskette Connection who need to design their own application programs will find two files of special interest on the distribution diskette. The files are DEMO.C and INT13C.ASM.

DEMO.C is a short demonstration program written in Microsoft/Lattice 'C'. The program reads the first two tracks of an 8" diskette and stores the data in a DOS file.

The program calls assembler routines from an object module named INT13C.OBJ. The source code is provided in INT13C.ASM. This module provides a user interface to external drives attached to the Flagstaff Engineering diskette controller card.

DEMO.C must be compiled with your own C compiler and tested on your machine before linking INT13C.OBJ with your own programs.

INT13C.ASM is a source file written in 8088 assembler language. This source file can be assembled into a linkable object module. Parameter passing structures will need to be modified to support calls from FORTRAN, BASIC, or other compilers that do not pass parameters in thesame manner as Microsoft/Lattice C.

These programs are provided on an "as is" basis to be used as a starting point for user-designed custom applications. Modified versions of these modules will not be supported by Flagstaff Engineering. For those needing more information on parameter-passing specifications for various compilers, *The Programmer's Guide To The IBM PC* by Peter Norton, Microsoft Press, is recommended.

DEMO.C

DEMO.C is provided as a sample C program to access external drives through device drivers FLAGIO.SYS, and FLAGIOS.SYS.

The following routines are defined in the program. All of these routines pass back an integer return code of zero if successful and a-1 if unsuccessful, with the exception of the FIND8 routine which passes back the diskette format if it is found or a -1 if it is not found.

The following parameters are specified in the routine calls:

[redacted]:	the external drive number (2 - 5).
[redacted]der:	the diskette (0-79)
head:	the diskette head (0 or 1).
sector:	the starting sector for the operation (1 to 26).
#recs:	number of sectors to read/write.
buffer:	the address of the buffer to read/write to/from.
fmt:	diskette format:
	0 = 128 byte single density, 8" drive.
	1 = 256 byte single density, 8" drive.
	2 = 512 byte single density, 8" drive.
	3 = 1024 byte single density, 8" drive.
	4 = 256 byte double density, 8" drive.
	5 = 512 byte double density, 8" drive
	6 = 1024 byte double density, 8" drive.
	7 = 2048 byte double density, 8" drive.
	8 - 15 indicate same formats as 0 - 7 for 5 1/4" or 3 1/2" drives.

Drive, cylinder, head, sector, #recs, and fmt are processed as byte [redacted] but may be defined as integers. Buffer is the address of the buffer [redacted]he read, write or set format operation. The following routine calls are included in this file:

A. rc = READ8 (drive,cylinder,head, sector,#recs,buffer);

Read one or more sectors from the 8" diskette.

B. rc = WRITE8 (drive,cylinder,head, sector,#recs,buffer);

Write one or more sectors to the 8" diskette.

C. rc = VERIFY8 (drive,cylinder,head,sector,#recs,buffer);

Read-verify one or more sectors. This is the same as read except the data is not actually transferred.

D. rc = RDDEL8 (drive,cylinder,head, sector,#recs,buffer);

Read deleted sectors. This is the same as READ8 except that deleted sectors are also read if encountered.

E. rc = WRTDEL8 (drive,cylinder,head, sector,#recs,buffer);

Write deleted sectors. This will write sectors out as deleted

F. rc = FORMAT8 (drive,cylinder,head,sector, #recs,buffer);

Format sectors. This command is normally issued for a complete track at a time. The 'buffer' parameter must point to a buffer formatted with 4 bytes for each sector on the track. The 4-byte entry for each sector is defined as follows:

0 - Cylinder number.
1 - Head number.
2 - Sector number (normally starts with sector 1 on a track).
3 - Sector size (0 = 128, 1 = 256, 2 = 512, 3 = 1024, 4 = 2048).

G. rc = RESET8 (drive);

This recalibrates the drive (seeks cylinder 0).

H. rc = SET8 (drive,fmt); or rc = SET8 (drive,8,buffer);

This sets up the 8" drive logic to process the specified diskette format. This routine (or FIND8) MUST be used prior to using any of the functions to access the diskette. The 'fmt' parameter must be 0 to 15 as defined above; if user-specified format parameters are used, then the user must supply a 12-byte buffer containing the diskette setup parameters.

I. rc = FIND8 (drive,cylinder,head);

This routine will determine the format of the diskette on the requested track (cylinder & head). If the format is found, a value of 0 to 7 will be returned. If the diskette is unreadable a value of -1 will be returned.

INT13C.ASM

EMBLY LANGUAGE INTERFACE TO INTERRUPT 13H
ROM BIOS CALLS FOR FLAGIO.SYS DEVICE DRIVER

REGISTER USAGE

On entry to each function:

AH -	Function number
AL -	Number of sectors
BX -	Address of buffer ES:BX)
CH -	Cylinder number
CL -	Sector number
DH -	Head number (0 or 1)
DL -	Drive number (2, 3, 4, or 5)

On return from each function:

AH -	Return status code:	ST1 bits:
0 -	operation was OK	—
2 -	bad address mark found	0
3 -	disk write protected	1
4 -	sector not found	7
5 -	deleted sector(s) found	* see during read operation note
8 -	DMA overrun (across 64K)	4
16 -	bad CRC (data error)	5

* **NOTE**: this status is returned only for a normal read operation (function 2) andcorresponds to ST2 bit 6. This status is never returned for function 6, Read Deleted Sectors.

AL - number of sectors

FUNCTIONS:

AH = 0 Reset drive
AH = 1 Read status of last operation nto AL
AH = 2 read sector(s) into memory
AH = 3 Write sector(s) from memory
AH = 4 Verify sectors(s)
AH = 5 Format track. Format values are in data pointed to by ES:BX, with four bytes for each sector on the track

0 - Cylinder
1 - Head
2 - Record (sector) number
3 - Sector size:
0=128, 1=256, 2=512, 3=1024, 4=2048

AH = 6 Read deleted sector(s) into memory.
Except for hard errors, this function will always return a status code of 0. Therefore, function A should be called in order to check the 3 status bytes.

AH = 7 Write deleted sector(s) from memory

AH = 8 Set format. The format code is contained in AL. Sector size and recording method for values of AL are:
0 - 128 FM 8" 5 - 512 MFM 8"
1 - 256 FM 8" 6 - 1024 MFM 8"
3 - 1024 FM 8" 7 - 2048 MFM 8"
4 - 256 FM 8"
8-15 - format same as 0-7 but for 5 1/4"
16 - use user-supplied format parameters.

Format parameter values are in 12 bytes pointed to by DS:SI. Default parameters for each value of AL are given in the following table:

Table 9: Format Parameter Values

	offset											
AL	0	1	2	3	4	5	6	7	8	9	10	11
0:	CF	02	7F	00	1A	07	80	1B	F6	19	00	01
1:	CF	O2	7F	01	0F	OE	FF	2A	F6	19	00	01
2:	CF	02	7F	02	08	1B	FF	3A	F6	19	00	01
3:	CF	02	7F	03	04	47	FF	8A	F6	19	00	00
4:	CF	O2	7F	01	1A	0E	FF	36	F6	19	00	00
5:	CF	02	7F	02	0F	1B	FF	54	F6	19	00	00
6:	CF	02	7F	03	08	35	FF	74	F6	19	00	00
7:	CF	O2	7F	04	04	99	FF	FF	F6	19	00	00
8:	CF	02	7F	00	12	07	80	09	E5	19	00	03 *
9:	CF	02	7F	01	08	18	FF	30	E5	19	00	03 *
10:	CF	02	7F	02	04	46	FF	87	E5	19	00	03 *
11:	CF	02	7F	03	02	C8	FF	FF	E5	19	00	03 *
12:	CF	02	7F	01	12	0A	FF	0C	E5	19	00	02 *
13:	CF	02	7F	02	09	1B	FF	54	E5	19	00	02 *
14:	CF	02	7F	03	04	80	FF	F0	E5	19	00	02 *
15:	CF	02	7F	04	02	C8	FF	FF	E5	19	00	02 *
16:	—user-supplied format parameters—											

(* **NOTE:** lines 0-7 are parameters for 8"diskettes; lines 8-15 are for [redacted]d 3-1/2" diskettes.)

[redacted]able 10 has the diskette type description corresponding to lines 0-15 in this table.

Following are the meanings of the format parameter bytes:

offset	meaning
0:	controller parm byte 1
1:	controller parm byte 2
2:	Motor turn off wait
3:	Sector size: 0=128, 1=256, 2=512, 3=1024, 4=2048
4:	Sectors per track
5:	- Gap length
6:	- DTL
7:	- Gap length
8:	- Format fill character
9:	- Head settle time (ms)
10:	- Motor wait
11:	- Bit 0—recording method: 0 = MFM, 1 = FM Bit 1—diskette size: 0 = 8", 1 = 5-1/4" or 3-1/2"

AH = 9: Read sector ID's (on currently selected track)

AH = A: Acquire results of read sector ID (function 9). This function can be called to check status of any previous operation. Returns 7 bytes pointed to by DS:BX formatted as follows:

+0 - S0 (diskette status byte 0)
+1 - S1 " " " 1
+2 - S2 " " " 2
+3 - Cylinder
+4 - Head
+5 - Record (sector) number
+6 - Sector size:
0=128, 1=256, 2=512,
3=1024, 4=2048

The three status bytes, S0-S2, are actually set by the diskette controller chip, and contain status information not returned in the AH register. For a detailed description of thesebytes, including bit layout and meaning, see the documentation for either the Intel 8272 or the NEC 765 floppy disk controller (FDC).

Table 10: Diskette Format Types

format # (AL. Table 9)	size	bytes/ sector	recording method
0	8"	128	FM
1	8"	256	FM
2	8"	512	FM
3	8"	1024	FM
4	8"	256	MFM
5	8"	512	MFM
6	8"	1024	MFM
7	8"	2048	MFM
8	3"/5"	128	FM
9	3"/5"	256	FM
10	3"/5"	512	FM
11	3"/5"	1024	FM
12	3"/5"	256	MFM
13	3"/5"	512	MFM
14	3"/5"	1024	MFM
15	3"/5"	2048	MFM

For further information on the BIOS calls, register usage, etc., see the IBM PC Technical Reference Manual and the Intel or NEC documents mentioned above (either one can be used to program the floppy disk controller).

TABLEDIT.COM

Included with this Flagstaff Engineering software package is the program TABLEDIT which allows you to edit the translation table files used by other programs herein. These files contain 256-byte lookup tables which are used to translate characters between one character set and another (usually between ASCII and EBCDIC). TABLEDIT allows you to replace the characters at any position in the translation table file enabling you to create a customized table for your application. For instance, if you are copying files from one system in EBCDIC to DOS files in ASCII, but need to translate certain characters differently then the standard EBCDIC-to-ASCII conversion, you can specify these characters in a modified translation table file.

HOW TRANSLATION TABLES WORK

The translation table is a file which specifies a new value for each possible value of a character. Since each byte (character) can have any of 256 possible values, the table contains 256 entries. Each entry is simply a byte which contains the new value corresponding to that position in the table. When an incoming byte is found whose value corresponds to the position in the table, the byte at that position becomes the new value.

For example, consider the following mini-table (assume a system where every character can have 10 possible values): the top row is the position in the table, the bottom row is the actual table.

```
-0- -1- -2- -3- -4- -5- -6- -7- -8- -9-
 5   6   7   8   1   1   1   9   4   3
```

First of all, notice that the positions start from zero, not one. This is because the possible values of the bytes in this system go from zero to 9, just as the values of bytes on a computer system go from 0 to 255. So, we can talk about the "zeroth" to the "ninth" position.

When bytes come in to be translated, their value becomes a position in the table—for example, the incoming byte '4' would "point" to position 4:

```
                V
-0- -1- -2- -3- -4- -5- -6- -7- -8- -9-
 5   6   7   8   1   1   1   9   4   3
```

The translation process simply takes the character at the position pointed to (4) and uses that character as the new value—in this case, '1'. Since there are is an entry in the table for each possible value of a character, all characters can be translated.

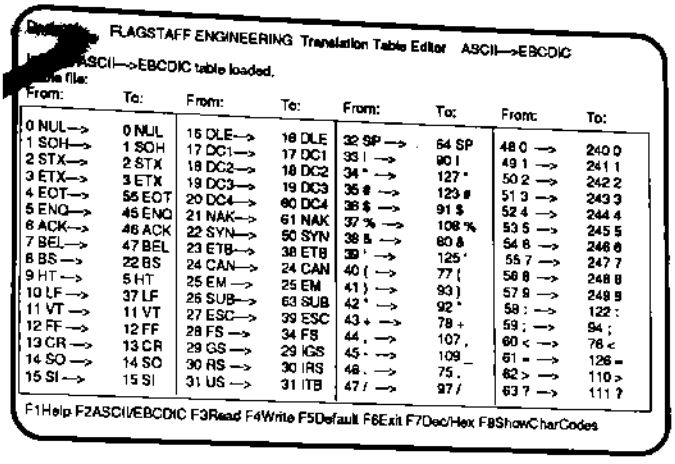
Notice that this example table has some repeated characters. Not all characters in the table need to be unique. In fact, the standard translation tables internal to TABLEDIT contain many repeated characters: for instance the NUL character (the "zeroth" character in both ASCII and EBCDIC) is used to "fill" vacant positions in both the ASCII and EBCDIC tables that have no defined values.

WHAT THE TABLE EDITOR DOES

Changing a translation table consists of substituting new values at certain positions in the table file. This is a fairly simple process, since the files are always the same size—256 bytes—and this can be done with programs such as DEBUG and even by some text editors. TABLEDIT makes this job much easier, by displaying each entry in the table and allowing you to type in new values where wanted. Each value is displayed in 4 possible ways—numerically in either decimal or hexadecimal, and as characters (either visually as IBM display characters, or as a two-or three-letter mnemonic code for control characters). After all changes have been made, the modified file can be written back to diskette. You can also create new translation table files from scratch.

RUNNING TABLEDIT

Run the program by typing its name at the DOS command prompt, followed (optionally) by the name of the translation table file you want to edit. (If you omit the file name, you can specify the file later.) The one program display screen will appear.



This screen shows the first screen of the translation table. There are 4 screens, each showing 64 characters. Each character is shown as an entry as follows:

nnn CCC —> nnn CCC

The left side ("FROM") is the table position, corresponding to the incoming characters to be translated. The right side ("TO") is the new value to be used for this position. "nnn" is the numeric value (either decimal or hexadecimal, depending on the current setting which is shown at the upper right of the screen). "CCC" is the character, shown either as a single character or as a 2- or 3-letter mnemonic code for control characters. If a value is represented as such a mnemonic code, it will be highlighted on the screen to make it stand out.

To replace a value at a certain table location, you simply type in the desired new value at that location. This can be done either by typing a new numeric value in the numeric field, or by typing any keyboard character in the character field. As new values are entered, all fields will be changed to reflect the new value.

To move from entry to entry and from numeric to character fields, you use the following keys:

<cursor right>	- these move from entry to entry
<cursor left>	
<cursor up>	
<cursor down>	
<TAB>	- moves from numeric to character fields
<SHIFT> <TAB>	- moves backwards from numeric to character fields
<PgUp>	- displays previous screen
<PgDn>	- displays next screen
<backspace>	- deletes numbers entered in decimal mode; moves back to first digit in hex mode.

In addition, the eight (8) function keys displayed at the bottom of the screen are programmed to perform the following jobs:

<F1> - HELP

This displays one screenful of help information. To return to editing, hit the <ESC> key. The editing screen is restored upon return.

<F2> - ASCII/EBCDIC TOGGLE

This toggles the display between ASCII-to-EBCDIC and EBCDIC-to-ASCII display. The first character set is the "FROM" set, the second is the "TO" set. In the example screen shown, "FROM" is shown as ASCII, "TO" as EBCDIC.

This toggle also effects the "default" (internal) translation table which will be loaded by the <F5> key—see below for explanation. Changing this toggle does not change the value of any table entries, only their representation.

<F3> - READ FILE

This key reads a translation table from disk into the editor's workspace. The file currently named in the "Table file" field will be loaded. If this field is blank, you will be asked to enter a filename here. Any errors encountered while reading the file (such as file not found) will be reported on the status line (screen line 3).

When the file is loaded, TABLEDIT tries to determine what type of table it is and displays the type on the status line. See "How Table Type is Determined," below.

Note that loading a table replaces whatever is in the editor's workspace. When editing more than one table, be sure to save a table before loading another.

<F4> - WRITE FILE

This key writes the translation table currently in memory to disk. The file currently named in the "Table file" field will be written. If this field is blank, you will be asked to enter a filename here. Any errors encountered while writing the file will be reported on the status line.

Writing to a table file replaces whatever was originally in the file with the new table, so be careful when writing files. If you want to create a modified copy of a table file, you can change the name of the file before writing it. It is also a good idea to make backup copies before editing, using the DOS "COPY" command.

<F5> - LOAD DEFAULT TRANSLATION TABLE

This replaces the entire translation table in editor memory with an internal "default" table, containing a standard translation sequence. (These standard sequences are taken from IBM's *System/370 Reference Summary*, recognized as an industry standard reference.) This function is useful for building a translation table "from scratch," where only a few characters need be changed.

There are two internal tables—one for ASCII-to-EBCDIC, the other for EBCDIC-to-ASCII. The current setting of the character-set toggle determines which one will be loaded with <F5>. This toggle is shown at the upper right of the screen, and is set with the <F2> key (see above).

Note that this function replaces whatever was in the editor workspace, so you should save any needed changes before loading the internal table.

<F6> - EXIT

This key ends the TABLEDIT program. Before exiting to DOS, you will be asked if you really want to leave, in case you forgot to save a changed table file. Answering 'Y' to this prompt will exit to DOS; any other key will continue the editing program.

<F7> - DECIMAL/HEX TOGGLE

This key toggles the numeric field representation between decimal and hexadecimal. The current setting of this toggle is shown at the upper right of the screen. This mode affects the way numeric data is entered in entry fields. In decimal mode, there are 3 digit positions, and the <backspace> key removes the leftmost digit, or changes the value to zero if there is only one digit in the field. Using the number keys will add one digit to the number, until 3 digits have been entered. In hexadecimal mode, two digits are always displayed. The cursor starts on the left (high-order) digit, and entering a digit here will move the cursor to the right digit. The <backspace> key moves the cursor back to the left digit.

Changing this toggle does not change the value of any table entries, only their representation.

<F8> - TOGGLE "SHOW CHARACTER CODES"

This toggle controls the representation of table entries in the character fields. With the toggle on, control characters (e.g., carriage return, line feed, tab, etc.) are shown as a 2- or 3-character menmonic code (CR, LF, TAB, etc.). With the toggle off, all characters are shown as IBM screen display characters. This character set doesn't correspond to any other character set in common use, since "high ASCII" values above 127 decimal are special characters peculiar to the IBM PC.

The mnemonic codes displayed are taken from the IBM *System/370 Reference Summary*, recognized as an industry standard reference.

FLAGSTAFF ENGINEERING

UTILITY/8

SOFTWARE DOCUMENTATION MANUAL

HP → PC

Mike Mowery
Porta Soft (801) 2266704

Rick Wilson

ADDRESS 3E8
DMA CHAN
IRQ 6

FLAGSTAFF ENGINEERING
Box 1970
Flagstaff, AZ 86002
(602) 774 5188
TELEX 705609

Document Number 0860 UT8.0525

TABLE OF CONTENTS

This manual provides program documentation for the diagnostics and utilities supplied with the Flagstaff Engineering 8 inch diskette system. The programs may be copied to and executed from any diskette or hard disk volume desired.

The programs are described in the following format:

1. Program Name.
2. Use.
3. Miscellaneous notes.
4. Description.
5. Operation.
6. Defaults.
7. Destructive/Nondestructive.
8. Sample Program Run.

To load the programs, use the standard DOS load command syntax:

```
A> [PROGRAM NAME]
```

In the program operation sections of the manual, keyboard entries are indicated by bracketed characters:

[ENTER] equals the enter key.
[Y] equals the Y key.
[01001] equals the digits 0,1,0,0, and 1 typed on the keyboard.

The following software modules should be included on your Utility/8 diskette:

CONFIG8.SYS	BIG8.COM
CONFIGD.SYS	BIGD.COM
BIGFMT.COM	BIGIFMT.COM
ALIGNB.EXE	CHECKB.EXE
DISPLAY8.EXE	VERIFY8.EXE
COPY8TO5.EXE	COPYSTOR.EXE
COPY8.COM	

Note: CONFIG8.SYS, CONFIGD.SYS, BIG8.COM, AND BIGD.COM are support modules for the 8 inch drive system. These four modules are covered in the system installation guide.

All material presented in this document is believed to be as correct and accurate as humanly possible. Please address all inquiries or comments concerning this manual to:

Technical Support & Documentation
Flagstaff Engineering
Box 1970
Flagstaff, Arizona 86002

Diagnostic programs are included on the Utility/8 diskette for use in verifying correct diskette operation and diagnosing diskette problems.

To exit any diagnostic program while it is running, press [CTRL] [C]. On occasion, the Control C sequence may not terminate the program. If this occurs, press [CTRL] [BREAK] to end the program.

8 inch diagnostic PROGRAMS INCLUDE:

ALIGN8.EXE	Check head alignment of 8 inch diskette drives.
CHECK8.EXE	Check read/write operations of 8 inch diskette drives.
VERIFY8.EXE	Verify format of 8 inch diskette and head alignment of 8 inch drives.

USE:

Check and verify the head alignment of the 8 inch diskette drive(s).

NOTES:

The ALIGN8 program REQUIRES a special Digital Master Alignment Diskette. The alignment diskette is available from Flagstaff Engineering for an additional charge.

DESCRIPTION:

This program is used by Flagstaff Engineering to inspect and verify operation of each 8 inch drive received by the factory. The ALIGN8 program is designed to check head alignment of an 8 inch drive unit by performing three specific measurements. These measurements are:

(1.) Drive Rotation Speed
(2.) Track Offset
(3.) Head Skew (Azimuth)

Rotational speed is calculated from the index pulse timing. The nominal drive rotation speed is 166.7 milliseconds (360 RPM).

Track Offset is measured by reading various tracks that have the data sectors recorded at slight offsets from the track centerline. Most drives should be able to read data with offsets of plus or minus .010 inch.

Head Skew is measured in minutes of arc (60 minutes equals 1 degree). Most drives appear to function correctly with a head skew of plus or minus 42 minutes.

OPERATION:

Load ALIGN8.EXE. On completion of the program load, a program description message will be displayed. The program will then prompt the user for the drive unit to test.

Select the drive to test by entering the appropriate number or pressing [ENTER] to select drive 1. The program will then prompt the user for LOOP/NON-LOOP operation. The loop option is useful in making adjustments to the head alignment or the drive rotational speed. The NON-LOOP option should be selected to check head alignment.

Select the LOOP/NON-LOOP option by entering [Y] or [N] at the prompt, or select non-looping operation by pressing the [ENTER] key. The program will begin testing the drive after the prompt is answered.

The program will display the measured rotational speed in milliseconds, the track offset as a positive and negative offset in thousandths of an inch (+XX equals +.ØXX inch, -XX equals -.ØXX inch), and the azimuth measurement as a range from positive to negative minutes of arc.

After testing the drive, the program will then prompt the user to repeat or end the test. Select the appropriate option by entering a [Y] or [N], or end the program by pressing the [ENTER] key.

DEFAULTS:

Default entries for program prompts are:

Drive Number: [ENTER] key equals drive 1.
Loop Option: [ENTER] key equals No.
Repeat Test: [ENTER] key equals Yes

DESTRUCTIVE/NONDESTRUCTIVE:

ALIGN8 will not destroy data on the test diskette.

SAMPLE RUN:

```
A>  [ALIGN8] [ENTER]

8" DISKETTE SYSTEM ALIGNMENT
DIAGNOSTIC PROGRAM
COPYRIGHT FLAGSTAFF ENGINEERING 9/24/83



INSERT 8" MASTER DISKETTE -
ENTER DRIVE (1/2) WHEN READY.?  [ENTER]

DO YOU WANT TO LOOP ON EACH TRACK
UNTIL KEY IS PRESSED (N/Y)?  [ENTER]

DRIVE ROTATION TEST (NORMAL=166.7 MSEC)
 166.6 MSEC
```

(ALIGN8.EXE cont)

```
PROGRESSIVE OFFSET TEST
CYL=03  HD=0  +11 -10
CYL=03  HD=1  +11 -12
CYL=38  HD=0  +11 -11
CYL=38  HD=1  +9  -10
CYL=41  HD=0  +9  -12
CYL=41  HD=1  +12 -10
CYL=70  HD=0  +12 -11
CYL=70  HD=1  +10 -10
CYL=73  HD=0  +10 -9
CYL=73  HD=1  +8  -10
AZIMUTH ROTATION TEST
CYL=76  HD=0  +42 -34
CYL=76  HD=1  +36 -38

DO YOU WANT TO
REPEAT TESTS (N/Y)?  [ENTER]
A>
```

USE:

Check and verify read/write operations of the 8 inch diskette drive(s).

DESCRIPTION:

This program is used by Flagstaff Engineering to check and verify operation of each 8 inch drive received from the factory. The CHECK8 program is designed to verify correct read/write operations of the 8 inch drive heads.

CHECK8 will verify read/write operations of the drive by configuring the diskette with various sector sizes in both single and double density formats. Data is written to the diskette and then read back from each format to verify operation.

After the initial read/write test, the program will reformat the diskette as double density with 512 byte sectors. This diskette format is generally the most difficult format to write data to. If the program detects an error while formatting any track, the program will display a non-zero status code. The program will then try to reformat the track in question. The retry is usually successful. If the track formatting error still occurs after 5 retries, the program will issue a message to use a different blank diskette for the test.

After formatting is complete, the program will read selected sectors on the diskette. The read operation will begin with Cylinder 1, and the program will step forward 11 cylinders, reading a single sector from each cylinder. The program will then step backward 5 cylinders, again reading a single sector from each cylinder. This pattern of stepping forward 11 cylinders, and then stepping backward 5 cylinders will be repeated until Cylinder 76 is reached.

After the read sequence is complete, the program will repeat the read test using a pattern of 9 forward steps and 4 backward steps. The read test will continue using patterns of 7 forward and 3 backward steps, 5 forward and 2 backward steps, 3 forward and 1 backward steps, and end with 1 forward step and no backward steps.

CHECK8 should be run with a double sided, double density 8 inch diskette (IBM 2D). The program will operate with a single sided diskette but will only verify operation of head 0 on the diskette drive.

CHECK8 will DESTROY ALL DATA on the test diskette in the 8 inch drive, so a blank diskette should be used with the program.

OPERATION:

Load CHECK8. On completion of the program load, a program description message will be displayed. The program will then prompt the user to insert a blank 8 inch diskette into the drive and then select the drive unit number to be tested.

Insert the diskette into the appropriate drive and then enter the drive number to be tested or press the [ENTER] key to select drive 1. The program will then begin testing the drive.

After the drive has been tested, the program will prompt the user to repeat or end the test. Select the appropriate option by entering a [Y] or [N], or end the program by pressing the [ENTER] key.

The number of temporary read errors displayed when running this program should not be greater than two. It is possible that a few temporary errors will occur while running CHECK8 due to the quality of the diskette used. If any permanent errors occur you should rerun the program with the same diskette to see if the errors occur at the same location. If the errors occur at the same location it is likely that the diskette has a bad spot on its surface. Use a different diskette and rerun the program to verify correct operation of the drive.

DEFAULTS:

Default entries for program prompts are:

Drive number: [ENTER] key equals drive 1.
Repeat Test: [ENTER] key equals End.

DESTRUCTIVE/NONDESTRUCTIVE:

CHECK8 WILL DESTROY ALL DATA ON THE TEST DISKETTE.

(CHECK8.EXE cont.)

SAMPLE RUN:

```
A>  [CHECK8] [ENTER]

8" DISKETTE SYSTEM DIAGNOSTIC PROGRAM
COPYRIGHT FLAGSTAFF ENGINEERING 5/10/83

INSERT BLANK 8" DISKETTE -
ENTER DRIVE (1/2) WHEN READY.?  [ENTER]

TEST Ø1 - VERIFY CARD AND CABLE OK
TEST Ø2 - FORMAT 128 BYTE SINGLE DENSITY
VERIFY 8" CYL=1Ø HEAD=Ø SECTOR=Ø1
GOOD OPERATION
TEST Ø2 - FORMAT 128 BYTE SINGLE DENSITY
VERIFY 8" CYL=1Ø HEAD=1 SECTOR=Ø1
GOOD OPERATION
TEST Ø3 - FORMAT 256 BYTE SINGLE DENSITY
VERIFY 8" CYL=1Ø HEAD=Ø SECTOR=Ø1
GOOD OPERATION
TEST Ø3 - FORMAT 256 BYTE SINGLE DENSITY
VERIFY 8" CYL=1Ø HEAD=1 SECTOR=Ø1
GOOD OPERATION
TEST Ø4 - FORMAT 512 BYTE SINGLE DENSITY
VERIFY 8" CYL=1Ø HEAD=Ø SECTOR=Ø1
GOOD OPERATION
TEST Ø4 - FORMAT 512 BYTE SINGLE DENSITY
VERIFY 8" CYL=1Ø HEAD=1 SECTOR=Ø1
GOOD OPERATION
TEST Ø5 - FORMAT 1Ø24 BYTE SINGLE DENSITY
VERIFY 8" CYL=1Ø HEAD=Ø SECTOR=Ø1
GOOD OPERATION
TEST Ø5 - FORMAT 1Ø24 BYTE SINGLE DENSITY
VERIFY 8" CYL=1Ø HEAD=1 SECTOR=Ø1
GOOD OPERATION
TEST Ø6 - FORMAT 256 BYTE DOUBLE DENSITY
VERIFY 8" CYL=1Ø HEAD=Ø SECTOR=Ø1
GOOD OPERATION
TEST Ø6 - FORMAT 256 BYTE DOUBLE DENSITY
VERIFY 8" CYL=1Ø HEAD=1 SECTOR=Ø1
GOOD OPERATION
```

(CHECK8.EXE cont.)

```
TEST 07 - FORMAT 512 BYTE DOUBLE DENSITY
VERIFY 8" CYL=10 HEAD=0 SECTOR=01
GOOD OPERATION
TEST 07 - FORMAT 512 BYTE DOUBLE DENSITY
VERIFY 8" CYL=10 HEAD=1 SECTOR=01
GOOD OPERATION
TEST 08 - FORMAT 1024 BYTE DOUBLE DENSITY
VERIFY 8" CYL=10 HEAD=0 SECTOR=01
GOOD OPERATION
TEST 08 - FORMAT 1024 BYTE DOUBLE DENSITY
VERIFY 8" CYL=10 HEAD=1 SECTOR=01
GOOD OPERATION
TEST 09 - FORMAT 2048 BYTE DOUBLE DENSITY
VERIFY 8" CYL=10 HEAD=0 SECTOR=01
GOOD OPERATION
TEST 09 - FORMAT 2048 BYTE DOUBLE DENSITY
VERIFY 8" CYL=10 HEAD=1 SECTOR=01
GOOD OPERATION
TEST 10 - FORMAT ENTIRE DISKETTE
TO 512 BYTE SECTORS
WRITING 8" CYL=XX HEAD=X SECTOR=XX
GOOD OPERATION
READING 8" CYL=XX HEAD=X SECTOR=X
GOOD OPERATION
DISKETTE DIAGNOSTIC IS COMPLETED -
00 TEMPORARY READ ERRORS

DO YOU WANT TO REPEAT TESTS (N/Y)?
[ENTER]
A>
```

[redacted]:

Verify format and and sector size of 8 inch diskette. Verify read operations of 8 inch drive(s) and confirm correct head alignment.

DESCRIPTION:

VERIFY8 is designed to display the format and sector size of a formatted 8 inch diskette, and identify possible head alignment problems with 8 inch diskette drives. Verify8 does a good job of identifying even marginal drive problems.

When the program is run, it will first examine cylinder 5 to determine the diskette formatting. After the format is identified and displayed, the program will measure the drive rotation speed and display the speed measurement in milliseconds. Nominal drive rotation speed is 166.7 milliseconds.

The program will then perform a seek test to step the diskette drive heads forward and backward through all sectors on the diskette. The program will begin the seek test by reading cylinder 1, and then will step forward 7 cylinders, reading a single sector from each cylinder. The program will then step backward 3 cylinders, again reading a single sector from each cylinder.

The pattern of stepping forward 7 cylinders, and then stepping backward 3 cylinders will be repeated until Cylinder 76 is reached. After this read sequence

is complete, the program will repeat the read operation using a pattern of 5 forward steps and 2 backward steps, then 3 forward and 1 backward steps, and end with 1 forward step and no backward steps. The number of temporary read errors should be zero on a good diskette.

After the seek test has been completed, the program will perform a read test which reads a complete track. The number of read errors should be zero.

The program will then perform a track loop test to verify head alignment. Cylinder 70, head 0, sector 01 will be read 100 times. The number of temporary read errors should be zero.

VERIFY8 may be run with any formatted 8 inch diskette (IBM 2D). The program will operate with a single sided diskette but will only verify operation of head 0 on the diskette drive.

VERIFY8 will not destroy data on the test diskette in the 8 inch drive.

OPERATION:

Load VERIFY8. On completion of the program load, a program description message will be displayed. The program will then prompt the user to insert an 8 inch data diskette into the drive and then select the drive unit number to be tested.

Insert the diskette into the appropriate drive and then enter the drive number to be tested or press the [ENTER] key to select drive 1.

After selection of the drive number, the program will begin testing the drive.

After completing the test, the program will prompt the user to repeat the test or end the program. Select the appropriate option by entering a [Y] or [N], or end the program by pressing the [ENTER] key.

It is possible that a few temporary errors will occur while running VERIFY8 due to the quality of the diskette used. If any permanent errors occur you should rerun the program with the same diskette to see if the errors occur at the same location.

If the errors occur at the same location it is likely that the diskette has a bad spot on its surface. Use a different diskette and rerun the program to verify correct operation of the drive.

DEFAULTS:

Default entries for program prompts are:

Drive number: [ENTER] key equals drive 1.
Repeat Test: [ENTER] key equals No.

DESTRUCTIVE/NONDESTRUCTIVE:

VERIFY8 will not destroy data on the test diskette.

(VERIFY8.EXE cont.)

SAMPLE RUN:

```
A>  [VERIFY8] [ENTER]

8"DISKETTE SYSTEM VERIFY PROGRAM
COPYRIGHT FLAGSTAFF ENGINEERING 3/15/85

INSERT 8" DISKETTE -
ENTER DRIVE (1/2) WHEN READY.?  [ENTER]

READING 8" CYL=XX HEAD=X SECTOR=XX
GOOD OPERATION

TEST 01 - DISKETTE IS 128 BYTE SECTOR -
SINGLE DENSITY - SINGLE SIDE

TEST 02 - DRIVE ROTATION SPEED IS
165.8 MSEC.  (NORMAL=166.7 MSEC.)

TEST 03 - SEEK TEST STARTED
READING 8" CYL=76 HEAD=0
SECTOR=13 GOOD OPERATION
TEST 03 - SEEK TEST COMPLETED -
57.72 SECONDS - 00 TEMPORARY READ ERRORS

TEST 04 - READ DATA TRACK STARTED
READING 8" CYL=76 HEAD=0
SECTOR=01 GOOD OPERATION
TEST 04 - READ DATA TRACK COMPLETED -
00 TEMPORARY READ ERRORS

TEST 05 - TRACK LOOP STARTED
READING 8" CYL=70 HEAD = 0
SECTOR=01 GOOD OPERATION XXX
TEST 05   TRACK LOOP COMPLETED -
00 TEMPORARY READ ERRORS

DO YOU WANT TO REPEAT TESTS (N/Y)?
[ENTER]
A>
```

UTILITY PROGRAMS

Utility programs are included on the Utility/8 diskette for use in formatting, displaying, and copying 8 inch diskettes.

To exit any utility program while it is running, press [CTRL] [C]. On occasion, the Control C sequence may not terminate the program. If this occurs, press [CTRL] [BREAK] to end the program.

The 8 inch utility programs include:

BIGFMT.COM	Format an 8 inch IBM 1, 2, or 2D diskette with 512 byte sectors.
BIGIFMT.COM	Format an 8 inch MS-DOS compatible diskette.
CPY8TO5.EXE	Copy 8 inch diskette sectors to PC-DOS file on a 5 inch diskette.
CPY5TO8.EXE	Copy data from PC-DOS files to sectors on an 8 inch diskette.
COPY8.COM	Copy an 8 inch master diskette using either a single or dual 8 inch drive system.
DISPLAY8.EXE	Display data from a specific sector of an 8 inch diskette.

USE:

Format an 8 inch diskette with 512 byte sectors.

NOTES:

Double density operation with an 8 inch diskette is critical as compared to double density operation with a 5 inch diskette. Use only high quality diskettes such as IBM, 3M, etc to avoid data errors.

DESCRIPTION:

BIGFMT.COM is designed to format a high quality double sided, double density diskette (IBM 2D) as a 1,174,528 byte capacity diskette, or a single sided diskette as a 583,680 byte capacity diskette. The diskette is formatted with 512 byte sectors, 15 sectors to a track. The diskette is double density and will support 96 files in the directory.

The program will format the diskette a track at a time. After each track is formatted, a read verify is performed. If an error occurs during the read verify operation, the program will reformat the track and perform another read verify. After 5 retries, a bad track message will be displayed and the program will end the formatting operation.

BIGFMT will not assign alternate tracks since it is the opinion of Flagstaff Engineering that a diskette that contains alternate tracks is of marginal reliability and should not be used.

OPERATION:

Load BIGFMT.COM. On completion of the program load, a program description message will be displayed. The program will prompt the user to enter the number of sides on the diskette.

Enter the number of sides to be formatted or select 1 by pressing the [ENTER] key.

The program will prompt the user to insert a blank diskette into the 8 inch drive and enter the number of the drive unit in use.

Insert a blank diskette into the drive and enter the appropriate drive unit number, or select drive 1 by pressing the [ENTER] key.

The program will format the diskette. If formatting was successful, a diskette OK message will be displayed. If formatting was not successful, the program will display the bad track location.

After formatting is complete, the program will prompt the user to enter a volume name for the diskette. The name can be a maximum of 11 characters.

Enter the desired volume name for the diskette.

The program will then prompt the user to format more diskettes.

Enter a [Y] to continue to program, or an [N] to end the program.

(BIGFMT.COM cont.)

DEFAULTS:

Number of Sides:	[ENTER] equals 1.
Drive Number:	[ENTER] equals drive
Volume Name:	[ENTER] equals blank volume label.
Continue Format:	[ENTER] equals No.

DESTRUCTIVE/NONDESTRUCTIVE:

BIGFMT.COM WILL DESTROY ALL DATA ON THE DISKETTE BEING FORMATTED.

SAMPLE RUN:

```
A>  [BIGFMT] [ENTER]

FORMAT 8" LARGE CAPACITY DOS
DISKETTE PROGRAM
COPYRIGHT FLAGSTAFF ENGINEERING 1/9/84

** MAKE SURE THE DISKETTE IS CORRECT
SINCE ALL DATA IS ERASED **

INSERT BLANK 8" DISKETTE -
ENTER DRIVE (1/2) WHEN READY.?  [ENTER]

FORMAT 8" CYL=XX HEAD=X SECTOR=XX
GOOD OPERATION
VERIFY 8" CYL=XX HEAD=X SECTOR=XX
GOOD OPERATION
FORMATTING IS COMPLETED - ØØ TEMPORARY
READ ERRORS - DISKETTE IS OK

ENTER VOLUME LABEL NAME (1-11 CHARACTERS)?
[DOSVOL] [ENTER]
WRITING 8" CYL=ØØ HEAD=Ø SECTOR=1Ø
GOOD OPERATION

DO YOU WANT TO FORMAT
ANOTHER DISKETTE (N/Y)?  [ENTER]
A>
```

USE:

Format an 8 inch interchange diskette compatible with MS-DOS.

DESCRIPTION:

BIGIFMT.COM is designed to format an 8 inch, single sided diskette into 128 byte single density sectors. The formatted diskette has a storage capacity of 252,416 bytes. The diskette directory can support up to 68 files.

8 inch diskettes formatted using BIGIFMT are compatible with most 8 inch MS-DOS systems.

The program will format the diskette a track at a time. After each track is formatted, a read verify is performed. If an error occurs during the read verify operation, the program will reformat the track and perform another read verify. After 5 retries, a bad track message will be displayed and the program will end the formatting operation.

BIGIFMT will not assign alternate tracks since it is the opinion of Flagstaff Engineering that a diskette that contains alternate tracks is of marginal reliability and should not be used.

OPERATION:

Load BIGIFMT.COM. On completion of the program load, a program description message will be displayed.

The program will prompt the user to insert a blank diskette into the 8 inch drive and enter the number of the drive unit in use.

Insert a blank diskette into the drive and enter the appropriate drive unit number, or select drive 1 by pressing [ENTER].

The program will format the diskette. If formatting was successful, a diskette OK message will be displayed. If formatting was not successful, the program will display the bad track location and end the formatting operation.

After formatting is complete, the program will prompt the user to enter a volume name for the diskette. The name can be a maximum of 11 characters.

Enter the desired volume name for the diskette.

The program will then prompt the user to format more diskettes.

Enter a [Y] to continue to program, or an [N] to end the program.

DEFAULTS:

Drive Number:	[ENTER] equals drive 1.
Volume Name:	[ENTER] equals blank volume label.
Continue Formatting:	[ENTER] equals No.

DESTRUCTIVE/NONDESTRUCTIVE:

BIGIFMT.COM WILL DESTROY ALL DATA ON THE DISKETTE BEING FORMATTED.

(BIGIFMT.COM CONT.)

SAMPLE RUN:

```
A>  [BIGIFMT] [ENTER]

FORMAT 8" STANDARD INTERCHANGE
MS-DOS DISKETTE PROGRAM
COPYRIGHT FLAGSTAFF ENGINEERING 1/9/84

** MAKE SURE THE DISKETTE IS CORRECT
SINCE ALL DATA IS ERASED **

INSERT BLANK 8" DISKETTE - ENTER
DRIVE (1/2) WHEN READY.?  [ENTER]

VERIFY 8" CYL=00 HEAD=0 SECTOR=01
GOOD OPERATION

FORMATTING IS COMPLETED - 00 TEMPORARY
ERRORS - DISKETTE IS OK

ENTER VOLUME LABEL NAME
(1-11 CHARACTERS)?  [TESTDISK] [ENTER]

WRITING 8" CYL=00 HEAD=0 SECTOR=14
GOOD OPERATION

DO YOU WANT TO FORMAT
ANOTHER DISKETTE (Y/N)?  [ENTER]
A>
```

USE:

Copy specific sectors from an 8 inch diskette to a PC-DOS file on a 5 inch diskette.

NOTES:

Use the DOS Copy command to copy files from a normal 8 inch DOS format diskette to a 5 inch DOS format diskette. CPY8TO5 should only be used with non-DOS 8 inch diskettes, or DOS 8 inch diskettes with an erased or invalid file directory.

DESCRIPTION:

CPY8TO5.EXE is designed to copy sectors from an 8 inch diskette with an erased or invalid file directory. The program copies the sectors onto a PC-DOS file on a 5 inch diskette.

The program will identify the format of the 8 inch diskette to be copied from and display the format. The sector size of the 8 inch diskette will then be used for the size of the records written to the DOS file.

The data area to copy from the 8 inch diskette is defined by a starting and ending location. The starting and ending location of the data area to be copied must be specified as CCHSS where CC equals a 2 digit cylinder number from ØØ through 76, H equals a 1 digit head number from Ø through 1, and SS equals a 2 digit sector number from Ø1 through 26 depending on the specific format of the diskette.

Normal sector values are:

01-26	128 byte sector, single density and 256 byte sector, double density diskettes.
01-15	256 byte sector, single density and 512 byte sector, double density diskettes.
01-08	512 byte sector, single density and 1024 byte sector, double density diskettes.
01-04	1024 byte sector, single density and 2048 byte sector, double density diskettes.

Sectors from the 8 inch diskette may be copied to any DOS drive and file name, including a hard disk drive.

The program will copy data from the source diskette to the destination file exactly as read.

The program supports EBCDIC to ASCII translation if needed. Most 8 inch IBM format diskettes are recorded in EBCDIC. The PC-DOS files are in ASCII.

OPERATION:

Load CPY8TO5.EXE. On completion of the program load, a program description message will be displayed. The program will then prompt the user to insert an 8 inch diskette into the drive, and enter the drive number of the unit selected.

Insert the 8 inch data diskette into the drive and select the appropriate drive address by entering a [1] or [2], or select drive 1 by pressing [ENTER].

A EBCDIC to ASCII prompt will be displayed.

Enter [Y] to select EBCDIC to ASCII conversion. Enter [N] or press the [ENTER] key to copy the data "as is".

The program then prompts the user to enter the starting cylinder, head, and sector number for the data area on the 8 inch diskette that will copied to a DOS file. The entry format is CCHSS as explained in the program description section.

Enter the cylinder, head, and sector number as a 5 digit number with no blanks between the digits. If the [ENTER] key is pressed without entering the CCHSS, the program will exit the copy operation.

The program will then prompt the user to enter the ending cylinder, head and sector number of the data area to be copied.

Enter the cylinder, head, and sector number as a 5 digit number with no blanks between the digits. If the [ENTER] key is pressed without entering the CCHSS, the program will reprompt the user for CCHSS.

The program will read the first copy sector and display a sector information line with cylinder, head, and sector number followed by a format information line with bytes per sector, single or double density, and single or double sided. If the 8 inch diskette format cannot be identified, the program will display an unknown format message and the end the copy operation.

After the sector and format information lines are displayed, the program will prompt the user to enter the DOS drive name and output file name.

Enter the drive number, file name and extension in standard DOS format (Drive:Name.Ext). If [ENTER] is pressed without entering the drive, name, and extension, the program will end the copy operation.

The program will display a sector read message and begin the copy operation. On completion of the copy operation, a message will be displayed indicating the total number of records copied to the DOS file. The user will then be prompted to enter a starting CCHSS number for another copy operation.

Enter a new starting CCHSS or press [ENTER] to exit the copy operation.

The program will prompt the user to copy from another diskette.

Enter a [Y] to continue the program, or enter a [N] or press [ENTER] to end the program.

(CPY8TO5.EXE cont.)

DEFAULTS:

Drive number:	[ENTER] equals drive 1
Starting CCHSS:	[ENTER] equals exit CCHSS prompt.
Ending CCHSS:	[ENTER] equals reprompt for CCHSS.
DOS File:	[ENTER] equals exit copy operation.
EBCDIC to ASCII	[ENTER] equals No.
Another Copy	[ENTER] equals No.

DESTRUCTIVE/NONDESTRUCTIVE:

CPY8TO5 will not destroy data on the 8 inch source diskette, however, ALL EXISTING DATA IN THE PC-DOS DESTINATION FILE WILL BE DESTROYED BY THE COPY OPERATION.

SAMPLE RUN:

A> [CPY8TO5] [ENTER]

COPY 8" DISKETTE SECTORS TO
PC-DOS FILE PROGRAM
COPYRIGHT FLAGSTAFF ENGINEERING 7/29/83

INSERT 8" DISKETTE -
ENTER DRIVE (1/2) WHEN READY.? [ENTER]

DO YOU WANT EBCDIC TO ASCII CONVERSION
(N/Y)? [ENTER]

ENTER STARTING CYLINDER, HEAD,
AND SECTOR (CCHSS)? [01001] [ENTER]

ENTER ENDING CYLINDER, HEAD,
AND SECTOR (CCHSS)? [01002] [ENTER]

(CPY8TO5.EXE cont.)

```
READING 8" CYL=01 HEAD=0 SECTOR=01
GOOD OPERATION
DISKETTE IS 256 BYTE/SECTOR -
DOUBLE DENSITY - DOUBLE SIDE

ENTER DOS DRIVE AND
FILE NAME A:NAME.EXT?  [A:TST.DOC] [ENTER]
READING 8" CYL=01 HEAD=0 SECTOR=01
GOOD OPERATION
END OF COPY - 0002 RECORDS WERE COPIED

ENTER STARTING CYLINDER, HEAD,
AND SECTOR (CCHSS)  [ENTER]

DO YOU WANT TO COPY FROM
ANOTHER DISKETTE (N/Y)?  [ENTER]
A>
```

USE:

Copy data from a PC-DOS file to a specific location on an 8 inch diskette.

NOTES:

Use the DOS COPY command to copy data from PC-DOS FILES to an 8 inch DOS format diskette. CPY5TO8 should only be used with non-DOS 8 inch diskettes, or DOS 8 inch diskettes with an erased or invalid file directory.

DESCRIPTION:

CPY5TO8.EXE is designed to copy DOS files to an 8 inch diskette with an erased or invalid file directory.

The program will identify the format of the 8 inch diskette to be copied to and display the format. The sector size of the 8 inch diskette will then be used for the size of the records copied from the DOS file. If the 8 inch diskette format cannot be recognized, the program will display a message and end the copy operation.

The DOS file will be copied to a specific area of the 8 inch diskette. The user must enter a starting location for the data area on the 8 inch diskette that will receive the copied file.

The starting location is expressed as CCHSS, where CC equals a 2 digit cylinder number from 00 through 76, H equals a 1 digit head number from 0 through 1, and SS equals a 2 digit sector number from 01 through 26 depending on the specific format of the diskette. Normal sector values are:

01-26	128 byte sector, single density and 256 byte sector, double density diskettes.
01-15	256 byte sector, single density and 512 byte sector, double density diskettes.
01-08	512 byte sector, single density and 1024 byte sector, double density diskettes.
01-04	1024 byte sector, single density and 2048 byte sector, double density diskettes.

Data may be copied from any DOS drive and file name. The source drive may be any valid DOS volume including a hard disk drive.

The program will copy data from the source file to the destination diskette exactly as read. The program also supports ASCII to EBCDIC translation if needed Most 8 inch IBM format diskettes are recorded in EBCDIC. The PC-DOS files are in ASCII.

The ASCII to EBCDIC conversion translates an ASCII character to its EBCDIC equivalent, but no provision is made to exclude fields that contain binary or packed decimal numbers.

OPERATION:

Load CPY5TO8.EXE. On completion of the program load, a program description message will be displayed. The program will then prompt the user to insert an 8 inch diskette into the drive, and enter the drive number of the unit selected.

Insert the 8 inch data diskette into the drive and select the appropriate drive address by entering a [1] or [2], or select drive 1 by pressing [ENTER].

A ASCII to EBCDIC prompt will be displayed.

Enter [Y] to select ASCII to EBCDIC conversion. Enter [N] or press the [ENTER] key to copy the data as is.

The program then prompts the user to enter the starting cylinder, head, and sector number for the data area on the 8 inch diskette that will receive the copy data. The entry format is CCHSS as explained in the program description section.

Enter the cylinder, head, and sector number as a 5 digit number with no blanks between the digits. If the [ENTER] key is pressed without entering the CCHSS, the program will exit the copy operation.

The program will read the first copy sector of the 8 inch diskette and display cylinder, head, and sector number followed by a format information line with bytes per sector, single or double density, and single or double sided.

If the 8 inch diskette format cannot be identified, the program will display an unknown format message and the end the copy operation.

After the sector and format information lines are displayed, the program will prompt the user to enter the DOS drive name and output file name.

Enter the drive number, file name and extension in standard DOS format (Drive:Name.Ext). If [ENTER] is pressed without entering the drive, name, and extension, the program will end the copy operation.

The program will display a sector read message and begin the copy operation. On completion of the copy operation, a message will be displayed indicating the total number of records copied to the 8 inch diskette.

The user will be prompted to enter a starting CCHSS number for another copy operation.

Enter a new starting CCHSS or press [ENTER] to exit the copy operation.

The program will prompt the user to copy to another diskette.

Enter a [Y] to continue the program, or enter a [N] or press [ENTER] to end the program.

(CPY5TO8.EXE cont.)

DEFAULTS:

Drive number:	[ENTER] equals drive 1
Starting CCHSS:	[ENTER] equals exit CCHSS prompt.
DOS File:	[ENTER] equals exit copy operation.
ASCII to EBCDIC:	[ENTER] equals No.
Another Copy:	[ENTER] equals No.

DESTRUCTIVE/NONDESTRUCTIVE:

CPY5TO8 will not destroy data in the PC-DOS source file, however, ALL EXISTING DATA ON THE DESTINATION SECTORS OF THE 8 INCH DISKETTE WILL BE DESTROYED BY THE COPY OPERATION.

SAMPLE RUN:

```
A>  [CPY5TO8] [ENTER]

COPY PC-DOS FILE TO
8" DISKETTE SECTORS

INSERT 8" DISKETTE
ENTER DRIVE (1/2) WHEN READY.?  [ENTER]

DO YOU WANT ASCII TO
EBCDIC CONVERSION (N/Y)?  [Y]

ENTER STARTING CYLINDER, HEAD,
AND SECTOR (CCHSS)?  [01001] [ENTER]

READING 8" CYL=01 HEAD=1 SECTOR=01
GOOD OPERATION
DISKETTE IS 256 BYTE/SECTOR-
DOUBLE DENSITY - DOUBLE SIDE
```

(CPY5TO8.EXE cont.)

```
ENTER DOS DRIVE AND
FILE NAME A:NAME.EXT?
[A:TESTFILE.DOC] [ENTER]

WRITING 8 " CYL=01 HEAD =0 SECTOR=01
GOOD OPERATION

END OF COPY - 0004 RECORDS WERE COPIED

DO YOU WANT TO COPY
ANOTHER DISKETTE (N/Y)?  [ENTER]
A>
```

USE:

Duplicate an 8 inch diskette using a single 8 inch drive system.

DESCRIPTION:

COPY8.COM is designed to duplicate an 8 inch master diskette onto a blank 8 inch diskette using a single 8 inch drive system.

The program will identify the format of the master 8 inch diskette. If the format cannot be identified, the program will end the copy operation. The program can duplicate most 8 inch diskettes that are single or double sided, and single or double density with sector sizes of 128, 256, 512, 1024, or 2048 bytes per sector.

The program will duplicate the format and data of the master diskette onto a blank diskette. The program writes data to the blank diskette by formatting a sector, and then writing data to the sector. If a sector cannot be formatted on the blank diskette, an error message will be displayed and the program will end the copy operation.

After data is written to the blank diskette, the program performs a write verify. If the blank diskette cannot be write verified, an error message will be displayed and the program will end the copy operation.

The program performs the copy operation by reading data from the master diskette and and then storing the data in memory. After the data has been read into memory, the master diskette must be removed from the drive and then the blank diskette must be inserted into the drive. The stored data will then be written to the blank diskette. A maximum of 256 K bytes of machine memory is allocated for data storage during the copy operation.

OPERATION:

Load COPY8.COM. On completion of the program load, a program description message will be displayed.

The program will prompt the user to verify that the master diskette to be copied is in the 8 inch drive.

Insert the master diskette into the drive and press [ENTER].

The program will then read data from the master diskette and store the data in available memory. The program will prompt the user to remove the master diskette and then insert the copy diskette into the drive and press [ENTER].

Insert the blank diskette into the drive and press [ENTER]. The data stored in machine memory will be written onto the blank diskette.

The program will prompt the user through the read-from-master, write-to blank copy routine until the copy operation is completed.

After the copy operation is complete, the program will prompt the user to copy another diskette.

Enter a [Y] to copy another diskette, or enter a [N] or press the [ENTER] key to end the program.

DEFAULTS:

```
Begin Copy:      [ENTER] equals begin.
Continue Copy:   [ENTER] equals continue.
Another Copy     [ENTER] equals No.
```

DESTRUCTIVE/NONDESTRUCTIVE:

COPY8.COM will not destroy any data on the master diskette, however, ALL DATA ON THE DISKETTE BEING COPIED TO WILL BE DESTROYED.

SAMPLE RUN:

```
A>  [COPY8] [ENTER]

DUPLICATE 8" DISKETTE PROGRAM
COPYRIGHT FLAGSTAFF ENGINEERING 10-08-84

** MAKE SURE MASTER DISKETTE
IS IN DRIVE 1 **

PRESS ENTER KEY TO START COPY  [ENTER]

READING 8" 128-SD CYL=00 HEAD=1
SECTOR=01 TRACK NOT FOUND
DISKETTE IS 128 BYTE SECTOR -
SINGLE DENSITY - SINGLE SIDE
READING 8" 128-SD CYL=XX HEAD=X
SECTOR=XX GOOD OPERATION
VERIFY 8"  128-SD CYL=XX HEAD=X
SECTOR=XX GOOD OPERATION
```

(COPY8.COM cont.)

```
INSERT BLANK DISKETTE,
PRESS ANY KEY...

[ENTER]

READING 8" 128-SD CYL=XX HEAD=X
SECTOR=XX GOOD OPERATION
VERIFY 8"  128-SD CYL=XX HEAD=X
SECTOR=XX GOOD OPERATION

INSERT MASTER DISKETTE,
PRESS ANY KEY ...

[ENTER]

READING 8" 128-SD CYL=XX HEAD=X
SECTOR=XX GOOD OPERATION
VERIFY 8"  128-SD CYL=XX HEAD=X
SECTOR=XX GOOD OPERATION

DISKETTE COPY IS COMPLETED -
00 SECTORS OR TRACKS WERE SKIPPED

DO YOU WANT TO COPY
ANOTHER DISKETTE (N/Y)?  [ENTER]
A>
```

USE:

Display recorded data from a specific cylinder, head, and sector of an 8 inch diskette.

DESCRIPTION:

The DISPLAY8 program is designed to display data sectors of an 8 inch diskette.

The display format is 8 Lines of 16 bytes (128 characters) represented as 2 digit hexadecimal values. Each line is followed by an offset number, relative sector number, and CCHSS indicator. Below each hexadecimal value appears two alphanumeric characters. The first character is the ASCII character represented by the hexadecimal value. The second character is the EBCDIC character represented by the hexadecimal value as represented by the following example.

```
4B 4C.....5A OFF=0000 RSN=0000 CCHSS=01001
K. L<.....Z!
C1 C2.....C3 OFF=0016 RSN=0000 CCHSS=01001
AA BB.....CC
.. ..     ..
A5 A6.....A7 OFF=0112 RSN=0000 CCHSS=01001
v &w.....'x
```

In the first line of the display, 16 hexadecimal values will be displayed between value 4B and value 5A. Directly beneath value 5A is the characters "Z!". "Z" is the ASCII character represented by hexadecimal 5A. "!" is the EBCDIC character represented by the hexadecimal value 5A.

The offset value (OFF=) indicates the byte position that the first value of the line occupies, in relation to the starting CCHSS. If the starting CCHSS is 01001 and a line of the display has an offset of 0016, then the first value of the line represents byte 16 of the sector being displayed.

The relative sector number (RSN=) indicates the position of the 128 byte record being displayed relative to the starting CCHSS. If the starting CCHSS is 01001 and the relative record number is 002, then the screen values represent the third 128 byte logical record of the display (the first record would be RSN=000).

The Cylinder, Head, and Sector identifier (CCHSS) is displayed at the end of each data line.

Directly below each hex value is a 2 character ASCII-EBCDIC code. The first character of this code is the ASCII character defined by the hex value. The second character below the hex value is the EBCDIC character defined by the hex value.

Any sector on the diskette may be displayed. After initial selection of cylinder,head, and sector, the program allows forward and backward movement through the data areas.

OPERATION:

Load DISPLAY8.EXE. On completion of the program load, a program description message will be displayed. The program will then prompt the user to insert an 8 inch diskette into the drive, and enter the drive number of the unit selected.

Insert the 8 inch data diskette into the drive and select the appropriate drive address by entering a [1] or [2], or select drive 1 by pressing [ENTER].

The program then prompts the user to enter the starting cylinder, head, and sector number of the data area to be displayed. The entry format is CCHSS where CC equals a 2 digit cylinder number from ØØ through 76, H equals a 1 digit head number from Ø through 1, and SS equals a 2 digit sector number from ØØ through 26 depending on the specific format of the diskette.

Enter the cylinder, head, and sector number as a 5 digit number with no blanks between the digits. If the [ENTER] key is pressed without entering the CCHSS, the program will exit the CCHSS prompt.

The program will determine the format of the diskette and display a format information line with bytes per sector, single or double density, and single or double sided.

The program will then display 128 bytes as hexadecimal values starting from the first byte of the CCHSS selected.

The display may then be controlled by entering the following characters:

[ENTER]	Display next 128 characters of data.
[SPACE]	Display next sector starting from byte 00.
[B]	Backup one sector and display from byte 00.
[C]	Exit display
[R]	Redisplay current sector starting from byte 00

After viewing the desired data areas, press [C] to exit the display routine. The program will then issue a prompt to end the program or display another diskette.

Enter a [Y] to display another diskette, or enter [N] or press the [ENTER] key to end the program.

DEFAULTS:

Drive Number:	[ENTER] key equals drive 1
CCHSS Number:	[ENTER] key equals exit CCHSS prompt.
Display/End:	[ENTER] key equals End.

DESTRUCTIVE/NONDESTRUCTIVE:

DISPLAY8.EXE will not destroy data on stored on the diskette.

SAMPLE RUN:

A> [DISPLAY8] [ENTER]

DISPLAY 8" DISKETTE DATA PROGRAM
COPYRIGHT FLAGSTAFF ENGINEERING 5/6/83

(DISPLAY8.EXE cont.)

```
TO CONTROL THE DISPLAY, THESE CHARACTERS
MAY BE USED;
RETURN = DISPLAY NEXT 128 CHARACTERS
SPACE = SKIP REMAINING DISPLAY
OF THIS SECTOR
B = BACKUP AND REDISPLAY PREVIOUS SECTOR
R = REDISPLAY THE CURRENT SECTOR

INSERT 8" DISKETTE - ENTER
DRIVE (1/2) WHEN READY?  [ENTER]

ENTER STARTING CYLINDER, HEAD AND
SECTOR (CCHSS)?   [01001] [ENTER]

4C 4D ....4E OFF=0000 RSN=0000 CCHSS=01001
L< M( ....N+
C1 C2 ....C3 OFF=0016 RSN=0000 CCHSS=01001
AA BB ....CC
C1 C2 ....C3 OFF=0032 RSN=0000 CCHSS=01001
AA BB ....CC
4C 4D ....4E OFF=0048 RSN=0000 CCHSS=01001
L< M( ....N+
C1 C2 ....C3 OFF=0064 RSN=0000 CCHSS=01001
AA BB ....CC
4C 4D ....4E OFF=0080 RSN=0000 CCHSS=01001
L< M( ....N+
C1 C2 ....C3 OFF=0096 RSN=0000 CCHSS=01001
AA BB ....CC
A5 A6 ....A7 OFF=0112 RSN=0000 CCHSS=01001
v &w ....'x

[C] [ENTER]

ENTER STARTING CYLINDER, HEAD,
AND SECTOR (CCHSS)?  [ENTER]

DO YOU WANT TO DISPLAY
ANOTHER DISKETTE (N/Y)?  [ENTER]
A>
```

FLAGSTAFF ENGINEERING

CP/M System File Conversion Programs

1120 Kaibab Lane Flagstaff, AZ 86001
(602) 779-3341 Telex 705609

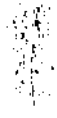
Document Number 8860-CPM, 121085

FLAGSTAFF ENGINEERING

CP/M SYSTEM FILE CONVERSION PROGRAMS

USER'S MANUAL

FLAGSTAFF ENGINEERING
Box 1970
Flagstaff, AZ 86001
(602) 779-3341
TELEX 705693



Document Number 8860-CPM-[illegible]

CONTENTS

INTRODUCTION

The File Connection from Flagstaff Engineering consists of separate file conversion program packages for use with The Flagstaff Engineering Diskette Connection 8" diskette drive system for the IBM PC/XT/AT. File Connection packages allow the user to exchange data files between the IBM PC/XT/AT and other systems that use 8" diskettes.

Systems supported by File Connection packages include IBM Host Exchange diskettes, CP/M, Digital Equipment, Allen-Bradley Numerical Control, Rolm, Honeywell, Intel ISIS, and others.

PROGRAM NAMING CONVENTIONS

File Connection program names use specific abbreviations to indicate function and system type.

System abbreviations are:

IBM	IBM Host Exchange formats .
IBI	IBM System/9000
DMA	IBM System/23 Datamaster.
EDX	IBM Series/1.
P36	IBM 5364 Desktop System/36
CPM	CP/M Systems.
DEC	Digital Equipment Systems.
DGE	Data General RDOS Systems.
ISS	Intel ISIS systems.
TRS	Tandy Radio Shack Model II
ALB	Allen Bradley Numerical Control

Function abbreviations are:

XXXFMT Format a diskette with specific file exchange parameters.

XXX8TO5 Transfer files from an 8 inch diskette to a PC-DOS volume.

XXX5TO8 Transfer files from a DOS volume to an 8 inch diskette.

XXXTOYYY Transfer files from system format XXX to system format YYY.

SYSTEM REQUIREMENTS

The File Connection requires the following minimum system configuration:

1. IBM PC, PC/XT, or PC/AT computer.

2. Flagstaff Engineering "DISKETTE CONNECTION" 8 inch diskette drive system. Hard sector diskette conversion packages require either a Model D or Model S diskette controller card with the hard sector option installed. 5 1/4" high density diskette packages require a Flagstaff Engineering High Density external 5 1/4" drive, or an IBM PC/AT with internal 5 1/4" high density drive installed.

3. Flagstaff Engineering "DISKETTE CONNECTION" I/O device driver. (See the System Installation Guide and Diagnostic and Utility Manual for more information.)

PROGRAM OPERATION

File Connection programs may be copied to and executed from any PC-DOS diskette or hard disk volume desired.

To load File Connection programs, use the standard PC-DOS load command syntax:

```
A:PROGRAM NAME
```

When Word Connection programs are loaded, a message is displayed that contains the copyright date. New program versions are released periodically, and this date is used to keep track of program updates.

In the program operation sections of the manual, keyboard entries are indicated by bracketed characters.

[ENTER] equals the enter key.
[Y] equals the Y key.

File Connection programs may be aborted by pressing [CTRL] [C]. Occasionally, the Control-C sequence may not successfully terminate the program. If this occurs, press [CTRL] [BREAK] to end the program. Exiting programs through the use of [CTRL] [C] and [CTRL] [BREAK] is not recommended, and should be used with discretion.

Program prompts require key entries followed by the [ENTER] key. If the [ENTER] key is pressed without typing a character, the program will default to the first option displayed by the prompt.

Program prompts for key entries are issued by the programs in the forms:

(DEFAULT/RANGE OF ENTRIES) and
(DEFAULT/OPTION1,OPTION2,OPTION3)

At the prompt, "ENTER DRIVE NUMBER (1/2-4)?", pressing the [ENTER] key will select the default entry of [1]. Optional values may be entered by pressing [2], [3], or [4] followed by the [ENTER] key.

Many File Connection programs prompt for an optional translation table file name. The default is always an internal table built into the program.

An external translation table consists of a 256 byte lookup table where the value of a given character in the source file is used to point to a position in the table. The value stored in the specific position in the table will be used as the translated character in the output files.

An example would be an ASCII hex value of '20' (ASCII space). If a table was created to translate ASCII to a target character set, the value found at position '20' in the table would be written to the output file every time the program found an ASCII space character in the input file.

DOCUMENTATION FORMAT

File Connection program descriptions are are presented in the following format in the program description section of the manual:

1. Program Name.
2. Use.
3. Miscelloneous Notes.
4. Description.
5. Operation.
6. Defaults.
7. Destructive/Nondestructive
8. Sample Program Run

USE:

Copy a data file from an 8" CP/M diskette to a PC-DOS file.

DESCRIPTION:

The CPM8TO5 program is designed to copy data files from 8" CP/M format diskettes to PC-DOS files. The first operation that the program performs is a diskette format check. The program will identify the number of sides, density type, and sector size of the 8" diskette and display the information.

Since the program can be ended after this display, CPM8TO5 functions as a utility program to identify diskette formats. If the program cannot identify the 8" diskette format, a message will be displayed that says the diskette cannot be copied.

The program requires that the user enter several CP/M diskette parameters to determine the logical layout of the diskette. These parameters are:

1. Skew Factor
2. CP/M directory Cylinder
3. CP/M Records Per Block
4. CP/M Blocks In Directory

These parameters are described in the section on CP/M Conversion Tips.

The program copies data files from the 8" diskette by file number.

The file pointers in the directory entries are used to located the data file. A single file may be copied or the entire diskette may be copied. Up to 266 files may be copied from the CP/M diskette.

The CP/M files will be written to DOS files as 128 byte records. The file name a specific CP/M file is written to will have the same file name and extension as displayed in the CP/M directory.

CPM8TO5 will copy an 8" file to any DOS volume, including a hard disk.

If the CP/M file name already exists on the DOS volume, the DOS file will be deleted, and then recreated by the copy operation.

OPERATION:

Load CPM8TO5. On completion of the program load, a program description message will be displayed. The program will prompt the user to insert an 8" diskette into the drive, and enter the drive number of the unit selected.

Insert the 8" CP/M diskette into the drive and select the appropriate drive address by entering a [1] or [2], or select drive [1] by pressing [ENTER].

The program will display bytes per sector density type, and number of sides of the 8" diskette. The program will then prompt the user for the CP/M sector skew factor.

Enter a skew factor from 1 to 16 or press [ENTER] to select a skew factor of 6.

The program will prompt the user for the CP/M directory cylinder.

Enter a cylinder number from 1 to 9, or press [ENTER] to select cylinder 1.

The program will prompt the user to enter the number of CP/M records per block.

Enter 8, 16, 32, or 64 records per block, or press [ENTER] to select 8 records per block.

The program will prompt the user to enter the number of blocks in the CP/M directory.

Enter a number from 1 to 9, or press [ENTER] to select 2 blocks in the directory.

The program will read the CP/M diskette directory and display a list of the directory entries as file names preceded by a file number. The program will prompt the user to enter the number of the file to be copied.

Enter a number from 1 to 256 to select the file to be copied. The user may also select to copy ALL files on the 8" diskette by entering a [999]. If the option to copy all files is selected, the program will prompt the user to enter the starting file number for the copy operation. This allows copying a range of files from file n to the last file.

If [ENTER] is pressed without entering a file number, the program will exit the copy operation and prompt the user to copy from another CP/M diskette. Another diskette can be loaded at this point, or the program can be ended by pressing [ENTER].

The program will copy the 8" CP/M file selected to the DOS volume that CPM8TO5 was loaded from. The program will then display a message that the copy is complete, the number of the file copied, and the number of records copied. The directory of the files on the 8" diskette will be displayed and the user will be prompted to select another file to copy.

Enter the file number to be copied, or press enter to exit the copy operation.

DEFAULTS:

Drive Number:	[ENTER] = Drive 1.
Skew Factor:	[ENTER] = 6
Directory Cylinder:	[ENTER] = 2
Records per Block	[ENTER] = 8
Directory Blocks:	[ENTER] = 2
File Number:	[ENTER] = Return to Enter Diskette prompt.
Continue Copy:	[ENTER] = End program.

DESTRUCTIVE/NONDESTRUCTIVE:

CPM8TO5 will not destroy data on the 8" source diskette, however, IF THE TARGET FILE NAME ALREADY EXISTS ON THE DOS VOLUME, ALL ORIGINAL DATA IN THE DOS FILE WILL BE DESTROYED BY THE COPY OPERATION.

SAMPLE RUN:

```
A>  [CPM8TO5] [ENTER]

COPY 8" CP/M TO 5" DOS DISKETTE PROGRAM
COPYRIGHT FLAGSTAFF ENGINEERING 6/1/85

INSERT 8" CP/M DISKETTE -
ENTER DRIVE (1/2) WHEN READY.?  [ENTER]

DISKETTE IS 128 BYTE SECTOR - SINGLE
DENSITY - SINGLE SIDE

ENTER CP/M SECTOR SKEW
FACTOR (6/1-9)?  [ENTER]

ENTER CP/M DIRECTORY CYLINDER
NUMBER (2/1-9)?  [ENTER]

ENTER NUMBER OF CP/M RECORDS PER BLOCK
(8/16,32,64)?  [ENTER]

ENTER NUMBER OF CP/M BLOCKS IN
DIRECTORY (2/1-9)? [ENTER]

**DIRECTORY OF FILES ON 8" CP/M DISKETTE**
FILE  NAME       RECS  FILE NAME       RECS
001-TEST.ASM     0233  002-HELP.TXT    0074
003-ARCDATA.DBF  0132  004-HELP.BAK    0074

ENTER CP/M FILE FOR COPY (1-256/999-ALL) -
PRESS ENTER IF NONE? [999] [ENTER]

ENTER STARTING CP/M FILE NUMBER FOR COPY
ALL (1/1-256)? [3] [ENTER]

COPY OF #003 ARCDATA .DBF IS COMPLETED
 - 132 RECORDS WERE COPIED
COPY OF #004 HELP    .BAK IS COMPLETED
 - 74 RECORDS WERE COPIED
PRESS ENTER TO USE HDR1 NAME?  [ENTER]
```

```
**DIRECTORY OF FILES ON 8" CP/M DISKETTE**
FILE  NAME        RECS  FILE NAME       RECS
001-TEST.ASM      0233  002-HELP.TXT    0074
003-ARCDATA.DBF   0132  004-HELP.BAK    0074

ENTER CP/M FILE FOR COPY (1-256/999-ALL) -
PRESS ENTER IF NONE?  [ENTER]

DO YOU WANT TO COPY FROM
ANOTHER CP/M DISKETTE (N/Y)?  [ENTER]
A>
```

Copy a PC-DOS file to a CP/M 8" diskette.

DESCRIPTION:

The CPM5TO8 program is designed to copy DOS files from any valid DOS volume to a 8" CP/M diskette.

The program will identify and display the number of sides, density type, and sector size of the 8" diskette. If the 8" diskette format cannot be determined, the program will display a message stating the diskette cannot be copied.

The program copies a file from a DOS volume by file name. The eight character DOS file name will used as the file name in the CP/M directory entry on the 8" diskette.

An option is supported by the program to erase the 8" file directory after a copy operation has been completed. This option should be used to delete all old files from the CP/M diskette before copying to it.

OPERATION:

Load CPM5TO8. On completion of the program load, a program description message will be displayed. The program will then prompt the user to insert an 8" diskette into the drive, and enter the drive number of the unit selected.

Insert the 8" CP/M diskette into the drive and select the appropriate drive address by entering a [1] or [2], or select drive [1] by pressing [ENTER].

The program will display bytes per sector, density type, and number of sides of the 8" diskette. The program will then prompt the user for the CP/M sector skew factor.

Enter a skew factor from 1 to 16 or press [ENTER] to select a skew factor of 6.

The program will prompt the user for the CP/M directory cylinder.

Enter a cylinder number from 1 to 9, or press [ENTER] to select cylinder 1.

The program will prompt the user to enter the number of CP/M records per block.

Enter 8, 16, 32, or 64 records per block, or press [ENTER] to select 8 records per block.

The program will prompt the user to enter the number of blocks in the CP/M directory.

Enter a number from 1 to 9, or press [ENTER] to select 2 blocks in the directory.

The program will read the CP/M diskette directory and display a list of the directory entries as file names preceded by a file number.

The program will display a message indicating the file number and starting extent of any new file copied to the 8" diskette.

The program will prompt the user to erase the CP/M directory.

Press [N] or [ENTER] to continue the program, or [Y] to erase the directory. If the erase option is selected, all files on the CP/M diskette will be erased, so extreme caution should be used when selecting this option.

The user will then be prompted to enter the name of the DOS file to be copied.

Enter the DOS volume and file name in standard DOS syntax, i.e.,

VOL. ID:FILE NAME.EXT

If [ENTER] is pressed without typing a Vol. ID and file name, the program will exit the copy routine and prompt the user to exit the program or copy to another diskette.

The program will begin the copy operation and display an information line indicating write and read verify operations to Cylinder, Head, and Sector numbers of the 8" diskette. On completion of the copy operation, the program will display an information line indicating the copy is complete and the number of records copied.

The program will prompt the user to copy to another 8" diskette or exit the program.

Press [N] or [ENTER] to end the program,
or press [Y] to copy another file or copy
to a new 8" diskette.

DEFAULTS:

Drive Number:	[ENTER] = Drive 1.
Skew Factor:	[ENTER] = 6
Directory Cylinder:	[ENTER] = 2
Records per Block	[ENTER] = 8
Directory Blocks:	[ENTER] = 2
DOS File Name:	[ENTER] = Exit copy and prompt for new diskette.
Continue Copy:	[ENTER] = End program.

EXAMPLE RUN:

```
A>CPM5TO8  [ENTER]

COPY 8" CP/M TO 5" DOS DISKETTE PROGRAM
COPYRIGHT FLAGSTAFF ENGINEERING 6/1/85

INSERT 8" CP/M DISKETTE -
ENTER DRIVE (1/2) WHEN READY.?  [ENTER]

DISKETTE IS 128 BYTE SECTOR - SINGLE
DENSITY - SINGLE SIDE

ENTER CP/M SECTOR SKEW
FACTOR (6/1-9)?  [ENTER]

ENTER CP/M DIRECTORY CYLINDER
NUMBER (2/1-9)?  [ENTER]

ENTER NUMBER OF CP/M RECORDS PER BLOCK
(8/16,32,64)?  [ENTER]

ENTER NUMBER OF CP/M BLOCKS IN
DIRECTORY (2/1-9)? [ENTER]
```

```
**DIRECTORY OF FILES ON 8" CP/M DISKETTE**
FILE  NAME       RECS  FILE NAME       RECS
001-TEST.ASM     0233  002-HELP.TXT    0074
003-ARCDATA.DBF  0132  004-HELP.BAK    0074
XXXX CP/M BLOCKS IS THE
TOTAL DISKETTE CAPACITY

NEW FILE WILL BE #05 STARTING AT
BLOCK XX ON THE 8" DISKETTE

DO YOU WANT TO ERASE THE 8" CP/M FILE
DIRECTORY (N/Y)  [ENTER]

ENTER DOS FILE NAME FOR COPY B:NAME.EXT -
PRESS ENTER IF NONE  [A:TESTFILE.DOC]

FILE COPY IS COMPLETED
XXXX RECORDS WERE COPIED

**DIRECTORY OF FILES ON 8" CP/M DISKETTE**
FILE  NAME       RECS  FILE NAME       RECS
001-TEST.ASM     0233  002-HELP.TXT    0074
003-ARCDATA.DBF  0132  004-HELP.BAK    0074
005-TESTFILE.DOC 0045
XXXX CP/M BLOCKS IS THE
TOTAL DISKETTE CAPACITY

NEW FILE WILL BE #06 STARTING AT
BLOCK XX ON THE 8" DISKETTE

DO YOU WANT TO ERASE THE 8" CP/M FILE
DIRECTORY (N/Y)  [ENTER]

ENTER DOS FILE NAME FOR COPY B:NAME.EXT -
PRESS ENTER IF NONE  [ENTER]

DO YOU WANT TO COPY TO ANOTHER CP/M
DISKETTE (N/Y)?  [ENTER]
C>
```

USE:

Copy a PC CP/M-86 5 1/4 inch diskette file to a PC-DOS file.

DESCRIPTION:

The CPMTODOS program is designed to copy CP/M-86 files to DOS files on PC/XT/AT systems that run both PC-DOS and CP/M-86. The files are copied as is without any type of conversion.

OPERATION:

Load CPMTODOS. On completion of the program load, a program description message will be displayed. The program will then prompt the user to insert the 5 1/4 inch CP/M-86 diskette into a drive and enter the DOS drive letter of the drive being used.

Insert the CP/M-86 diskette and press [A] for DOS drive A, or press [B] or [ENTER] to select DOS drive B.

The program will prompt the user to enter the DOS destination drive for the files to be copied to.

Enter a letter from A to G, or press [ENTER] to select DOS drive A.

The program will read the CP/M diskette directory and display a list of the directory entries as file names preceded by a file number. The program will prompt the user to enter the number of the file to be copied.

Enter a number from 1 to 64 to select the file to be copied. The user may also select to copy ALL files on the 8 inch diskette by entering a [99].

If [ENTER] is pressed without entering a file number, the program will exit the copy operation and prompt the user to copy from another CP/M diskette. Another diskette can be loaded at this point, or the program can be ended by pressing [ENTER].

The program will copy the CP/M-86 file to the DOS volume selected by the user. The program will then display a message that the copy is complete, the number of the file copied, and the number of records copied. The directory of the files on the CP/M-86 diskette will be displayed and the user will be prompted to select another file to copy.

Enter the file number to be copied, or press enter to exit the copy operation.

When the copy operation is ended, the program will prompt the user to copy from another CP/M diskette.

Press [Y] to copy from another diskette, or press [N] or enter to end the program.

DEFAULTS:

Drive Number:	[ENTER] = Drive B.
Destination Drive Number:	[ENTER] = Drive A.
File Number:	[ENTER] = Exit copy routine.
Continue Copy:	[ENTER] = End program.

DESTRUCTIVE/NONDESTRUCTIVE:

CPMTODOS will not destroy data on the CP/M-80source diskette, however, IF THE TARGET FILE NAME ALREADY EXISTS ON THE DOS VOLUME, ALL ORIGINAL DATA IN THE DOS FILE WILL BE DESTROYED BY THE COPY OPERATION.

SAMPLE RUN:

A> [CPMTODOS] [ENTER]

COPY 5" CP/M TO 5" DOS DISKETTE PROGRAM
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INSERT 5" CP/M DISKETTE -
ENTER DRIVE (B/A) WHEN READY.? [ENTER]

ENTER DESTINATION DOS DRIVE (A/B-G)? [C]
[ENTER]

LISTING OF FILES IN 5" CP/M DIRECTORY

001-TEST.ASM 0233
002-HELP.TXT 0074
003-ARCDATA.DBF 0132
004-HELP.BAK 0074

ENTER CP/M FILE FOR COPY (1-64/99=ALL) -
PRESS ENTER IF NONE? [3] [ENTER]

COPY OF #003 ARCDATA .DBF IS COMPLETED
- 132 RECORDS WERE COPIED

LISTING OF FILES IN 5" CP/M DIRECTORY

001-TEST.ASM 0233
002-HELP.TXT 0074
003-ARCDATA.DBF 0132
004-HELP.BAK 0074

```
ENTER CP/M FILE FOR COPY (1-64/99=ALL) -
PRESS ENTER IF NONE?  [ENTER]

DO YOU WANT TO COPY FROM
ANOTHER CP/M DISKETTE (N/Y)?  [ENTER]
A>
```

USE:

Copy a PC-DOS file to a PC CP/M-86 5 1/4" diskette file.

DESCRIPTION:

The DOSTOCPM program is designed to copy DOS files to CP/M-86 files on PC/XT/AT systems that run both PC-DOS and CP/M-86. The files are copied as is without any type of conversion.

OPERATION:

Load DOSTOCPM. On completion of the program load, a program description message will be displayed. The program will then prompt the user to insert the 5 1/4" CP/M-86 diskette into a drive and enter the DOS drive letter of the drive being used.

Insert the CP/M-86 diskette and press [A] for DOS drive A, or press [B] or [ENTER] to select DOS drive B.

The program will read the CP/M diskette directory and display a list of the directory entries as file names preceded by a file number. The program will display the file number and beginning block number that will be used when a file is copied to the CP/M diskette. The program will then prompt the user to erase the CP/M directory.

Press [Y] to erase all files on the CP/M diskette, or press [N] or [ENTER] to leave the existing CP/M files on the diskette.

The program will prompt the user to enter the DOS file name to be copied to the CP/M diskette.

Enter the file name using standard DOS syntax: Volume ID:File Name.Extension

If [ENTER] is pressed without entering a file name, the program will exit the copy operation and prompt the user to copy to another CP/M diskette. Another diskette can be loaded at this point, or the program can be ended by pressing [ENTER].

The program will copy the DOS file selected by the user to the CP/M diskette. The program will then display a message that the copy is complete, and the number of records copied. The directory of the files on the CP/M-86 diskette will be displayed and the user will be prompted to copy another DOS file to the diskette.

Enter the DOS file name to be copied, or press enter to exit the copy operation.

When the copy operation is ended, the program will prompt the user to copy to another CP/M diskette.

Press [Y] to copy to another CP/M diskette, or press [N] or enter to end the program.

DEFAULTS:

Drive Number:	[ENTER] = Drive B.
Erase Directory:	[ENTER] = No.
DOS File Name:	[ENTER] = Exit copy routine.
Continue Copy:	[ENTER] = End program.

DESTRUCTIVE/NONDESTRUCTIVE:

DOSTOCPM will not destroy data on the DOS source volume, however, IF THE TARGET FILE NAME ALREADY EXISTS ON THE CP/M-86 DIRECTORY, ALL ORIGINAL DATA IN THE CP/M-86 FILE WILL BE OVERWRITTEN AND DESTROYED BY THE COPY OPERATION.

SAMPLE RUN:

```
A>  [DOSTOCPM] [ENTER]

COPY 5" DOS TO 5" CP/M DISKETTE PROGRAM
COPYRIGHT FLAGSTAFF ENGINEERING 6/21/83

INSERT 5" CP/M DISKETTE -
ENTER DRIVE (B/A) WHEN READY.?  [ENTER]

**LISTING OF FILES IN 5" CP/M DIRECTORY**

001-TEST.ASM     0233
002-HELP.TXT     0074
003-ARCDATA.DBF  0132
004-HELP.BAK     0074

NEW FILE WILL BE #05 STARTING AT BLOCK XX
ON THE 5" CP/M DISKETTE

DO YOU WANT TO ERASE THE 5" CP/M FILE
DIRECTORY (N/Y)?  [ENTER]

ENTER DOS FILE NAME FOR COPY B:NAME.EXT -
PRESS ENTER IF NONE? [A:ABC.DOC] [ENTER]

FILE COPY IS COMPLETED -
0002 RECORDS WERE COPIED
```

```
**LISTING OF FILES IN 5" CP/M DIRECTORY**

001-TEST.ASM      0233
002-HELP.TXT      0074
003-ARCDATA.DBF   0132
004-HELP.BAK      0074
005-ABC.DOC       0002

NEW FILE WILL BE #06 STARTING AT BLOCK XX
ON THE 5" CP/M DISKETTE

DO YOU WANT TO ERASE THE 5" CP/M FILE
DIRECTORY (N/Y)?  [ENTER]

ENTER DOS FILE NAME FOR COPY B:NAME.EXT -
PRESS ENTER IF NONE? [ENTER]

DO YOU WANT TO COPY FROM
ANOTHER CP/M DISKETTE (N/Y)?  [ENTER]
A>
```

CP/M 8" DISKETTE FORMATS

Various diskette formats are used on CP/M 8" systems. The file connection programs are designed to work with both single sided and double sided diskettes formatted as single or double density.

Regardless of sides or density, 8" CP/M diskettes contain 77 cylinders. The system boot loader is located on cylinder 00 and the data is written on cylinders 01 through 74. Bad diskette tracks are assigned to alternate tracks on cylinders 75 through 76.

Data tracks are formatted with different sizes and numbers of sectors. The standard formats are given below. (Sector size and sectors-per-track numbers are given in bytes.)

DY = DENSITY
SS= SECTOR SIZE
S/T = SECTORS PER TRACK
TC = TOTAL CAPACITY
SD = SINGLE DENSITY
DD = DOUBLE DENSITY

DY	SS	S/T	TC	MACHINE TYPE
SD	128	26	242,944	Universal CP/M.
SD	256	15	284,160	Fairly common.
SD	512	8	303,104	Rare
DD	256	26	985,088	Very Common.
DD	512	15	1,136,640	Rare.
DD	1024	8	1,212,416	Rare.

On all CP/M diskettes, cylinder Ø, head Ø is always formatted as 128 byte sectors in single density. The remaining tracks on the diskette are formatted with the selected density and sector size. When the first CP/M data file is written on the diskette, the file directory entry is usually recorded starting on cylinder 2, head Ø. Some systems start the directory on cylinder 1 and others use cylinder 6. Each directory contains information on the file name, the file location, and its size.

CP/M FORMAT IDENTIFICATION:

The file connection CP/M transfer programs require the user to answer various prompts on the CP/M system format of the 8" diskettes. To properly use the programs, the answers to these prompts should be known before the programs are executed. The four format prompts are:

1. Skew factor
2. Directory cylinder
3. Records per CP/M blocks
4. Blocks in the directory

These parameters are usually described in the system manual for the particular system that created the diskettes. The system manual should be used to find the correct values.

If a system manual is not available for the system that created the 8" diskette being used, the DISPLAY8 program from the Flagstaff Engineering Utility/8 diskette can be used to display various sectors of the 8" CP/M diskette.

SKEW FACTOR-

Sectors are not written to sequentially on a CP/M system diskette. Sectors on a specific track will be written to based on an offset value which is added to the sector number of the last sector used. This is referred to as Sector Skew Factor. If the skew factor for a given diskette is 6, sector 1 will be the first sector used to write data to. The next sector used will be sector 7, then 13, 19, 25, 5, 11, 17 etc., until the entire track is filled.

If the sector count results in a sector already in use, the count is incremented by one to the next sequential sector.

The standard skew factor for 128 byte single density sectors is 6. Most double density diskettes use a skew factor of 3.

Sector skew factor is difficult to determine by viewing diskette data with the DISPLAY8 program, but it can be done. The user should look for a large file that spans more then one sector. If the data at the end of the sector breaks in the middle of a string or other observable sequence, following sequential sectors may be displayed until the sector is found that contains the continuation of the data. The first sector number may then be subtracted from the second sector number to arrive at the skew factor.

DIRECTORY CYLINDER-

The CP/M diskette directory will normally appear on cylinder 1, 2 or 6. Each directory entry consists of a 32 byte entry. The first byte of the entry is ØØ for an active file. The next eleven bytes of the entry is an eight byte file name followed by a three byte file type (extension). If the directory cylinder for a particular 8" CP/M diskette is unknown, it can be easily found using the DISPLAY8 program. Load DISPLAY8 and display cylinder, head and sector Ø1ØØ1. If a series of 32 byte directory entries are not found, then display CCHSS Ø2ØØ1. Again, if the directory is not found, then display Ø6ØØ1.

CP/M RECORDS PER BLOCK and CP/M BLOCKS IN DIRECTORY -

A CP/M record is defined as 128 bytes of data. CP/M systems define files in terms of CP/M records. CP/M diskettes are divided into physical blocks of 8, 16, 32, and 64 CP/M records.

On a single sided, single density diskette with 128 byte sectors, each sector would be the equivalent of a CP/M record. If the diskette used 8 records per block with 2 blocks in the directory, 16 sectors would be reserved for directory entries. Data files would start at the 17th sector (the beginning of the 3rd block).

In a 32 byte CP/M directory entry, position twelve through fifteen (beginning from zero) indicate the number of CP/M records used for that entry. The last 16 bytes of the directory entry indicate which blocks have been allocated for the entry. The block indicators will always be a value greater than Ø1 hex. Positions containing ØØ are not allocated.

A large file can span several directory entries since the number of records per block limits the total number of records used by a single directory entry.

To determine the number of records per block on a CP/M diskette, display the first directory entry of a file using the program DISPLAY8. Count the number of positions (number of blocks allocated) in the last 16 bytes of the entry that contain a hex value greater than Ø1.

To determine the total number of records for the entry, multiply the value of position twelve in the directory entry by 128, and then add the value in position fifteen (the values displayed by DISPLAY8 are hexadecimal values and must be converted to decimal).

Divide the total number of records by the total number of blocks allocated. If the result is not a valid records-per-block value of 8, 16, 32, or 64, raise the result to the next greater records-per-block value (8.432 or 12.333 would be raised to 16).

An example CP/M entry would appear as:

```
Position  00 01 02 03 04.....12....15
Hex Value 00 50 49 50 20.....00....16

Position  16 17 18 19 20.....29 30 31
Hex Value 1A 1B 1C 00 00.....00 00 00
```

Multiply the value in position twelve (0) by 128 and then add the value in position fifteen (16 hex equals decimal value 22). The result is 22 total records. Positions 16, 17, and 18 have values greater then hex 01 so three blocks have been allocated. Divide 22 by 3, and the result is 7.333. The number is not a valid records-per-block value, so it should be raised to the next greater valid value of 8. The diskette uses 8 records per block to store data.