G∃ CONTROL DATA
CORPORATION

A Guide for the
Disk Drive Operator
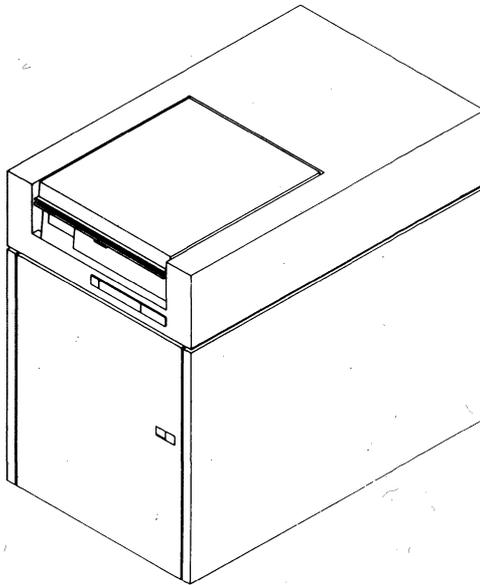
9764/9766 SMD's

| REVISION RECORD	
REVISION	**DESCRIPTION**
A 8-30-79	Manual Released
B 11-17-83	Manual updated for Editorial reasons.

CONTENTS

INTRODUCTION

Your disk drive is shipped with a set of
manuals covering the theory of operation
and maintenance of the drive. These
manuals are written primarily for the
customer engineers who service the drive.
This booklet is intended for you, the
disk drive operator. After reading it,
you will know how to operate the drive
correctly. Also, you will be aware of
what you can do to keep the drive and its
disk packs functioning properly. With a
little TLC (tender loving care), they
will serve you well.

WARNING

This equipment generates, uses
and can radiate radio frequency
energy and if not used in ac-
cordance with the instructions
manual, may cause interference
to radio communications. All
60 Hz units S/C 33 and below,
and all 50 Hz units have not
been tested for compliance with
the limits for Class A comput-
ing devices pursuant to Subpart
J of Part 15 of the FCC Rules
which are designed to provide
reasonable protection against
such interference when oper-
ated in a commercial environ-
ment. All 60 Hz units S/C 34
and above have been tested
and found to comply with the
above regulations. Operation
of this equipment in a resi-
dential area is likely to
cause interference in which
case the user at his own ex-
pense will be required to take
whatever measures may be re-
quired to correct the inter-
ference.

GETTING TO KNOW YOUR DRIVE

As you read this section, you will become
familiarized with your Storage Module
Drive (SMD). These drives are designed
to store data on removable disk packs.
The following illustration shows an SMD
in the 9764/9766 product line.
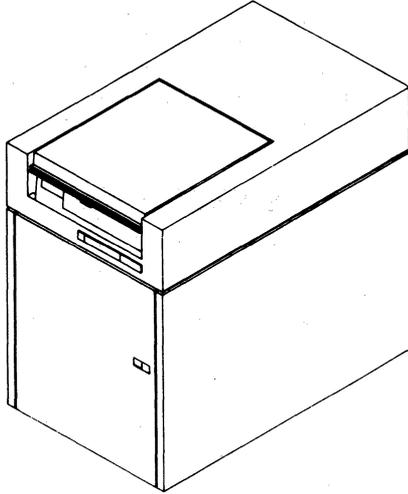
Use this section as a guide in locating
essential parts of your disk drive.
First, find the operator control panel
(on the upper lefthand part of the front
surface.
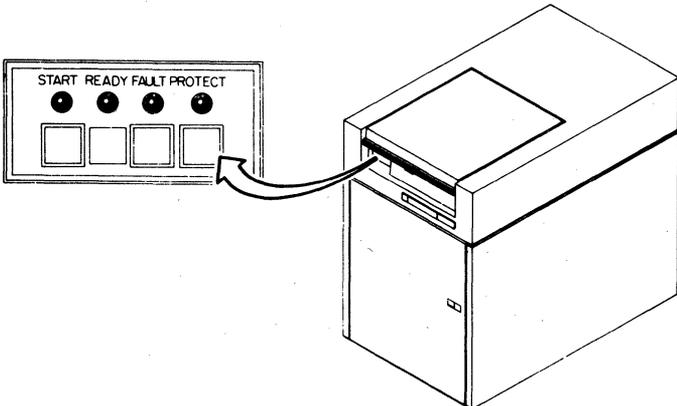
The operator control panel contains the
controls and indicators used to operate
the drive. The panel shown above is a
typical one; the panel on your drive may
be layed out differently. The individual
parts on the operator control panel are
discussed in detail in the "Controls and
Indicators" section.

The shroud area, located under the pack
access cover, is where the disk is in-
stalled. After observing the precautions
given in the next paragraph, you will be
instructed to open the pack access cover
and locate the spindle and heads.

Examination of the shroud area must be
done when the drive is not in use. The
pack access cover should not be opened if
the START indicator is on. In fact, some
drives are equipped with a safety device
called a pack access cover solenoid that
locks the pack access cover unless the
drive is in standby (circuit breakers on
and START indicator off). Ask your su-
pervisor to put the drive in standby
before proceeding.

Now, open the pack access cover and take
a look inside the shroud area. Referring

PACK ACCESS
COVER
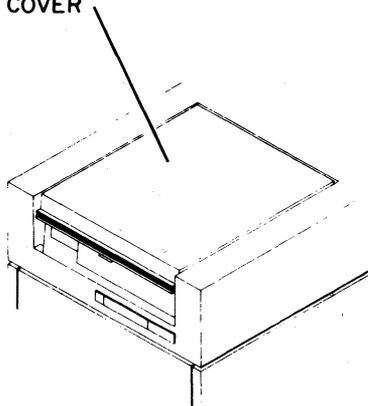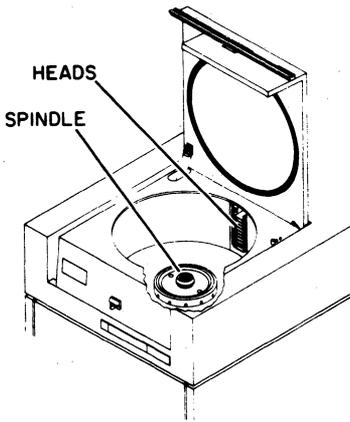
to the figure, locate the spindle and
heads.

The disk pack is mounted on the spindle.
When the pack is properly mounted, the
spindle supports it in the exact position
required for operation of the drive.

Through an opening in the rear of the
shroud area, you can see the heads.
Whenever the pack access cover is open,
the heads should be retracted to this
position. During drive operation, the
heads extend into the shroud area and fly
over the disk surfaces. If you ever dis-
cover that the heads are extended into
the shroud area when the pack access
cover is opened, call a customer engineer.
DO NOT push on the heads or attempt to
power up the drive in this situation.

Close the pack access cover. The pack
access cover should remain closed except
when you are installing or removing a
disk pack.

The following sections discuss care and
handling of the disk pack and drive, and
they contain more operating information.
As you will see, a disk drive is an easy
machine to operate.

PROPER DRIVE ENVIRONMENT

This section discusses the proper en-
vironment for the disk drive and common
sense rules to be observed in the
vicinity of the drive. By putting these
instructions into practice, you can
guarantee increased operating life and
reliability for your drive. The
guidelines pertaining to temperature and
relative humidity apply to electronic
equipment in general. The other
guidelines reflect the importance of
keeping the area around the drive clean.

During operation, room
temperature and its rate of
change are both important.
The drive will operate in a
range of 15^0 C to 32^0 C
(59^0 F to 90^0 F). The room
temperature should not
change more than 6^0 C
(12^0 F) per hour.

Relative humidity should be
kept between 20% and 80%.
High relative humidity is
a problem because it can
cause condensation in the
drive. Very low relative
humidity should also be
avoided because it can lead to particle
attraction and accumulation by static
electricity.
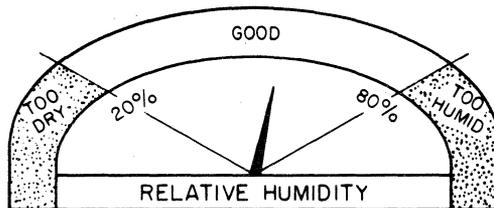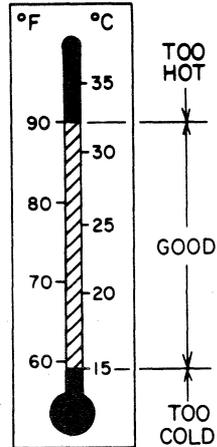
Lint, dust, smoke, and other dirt parti-
cles are enemies of disk drive operation.
However, with proper planning and disci-
pline, you can reduce their threat to the
drive. The following paragraphs offer
solutions to basic contamination problems.

Carpeting and drapes,
while esthetically pleasing,
are to be avoided if at all
possible. They not only
produce lint but also col-
lect all kinds of dirt.
Eliminate them if you can -
otherwise, ensure that they
are the antistatic variety
and vacuum them frequently.
Tile floors are preferable;
if you have them, damp mop
them regularly.
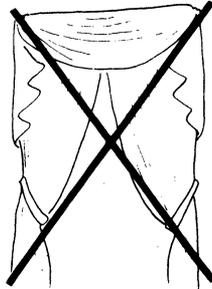
Another aspect of
proper environment is
where the drive is
located within the
computer center. For
one thing, it should
be installed in a
low-traffic area.
High-traffic areas
have problems such as
people stirring up
dust or bumping into
the drive. Also, it
should not be located
near air conditioners,

DRIVE

PRINTER

6
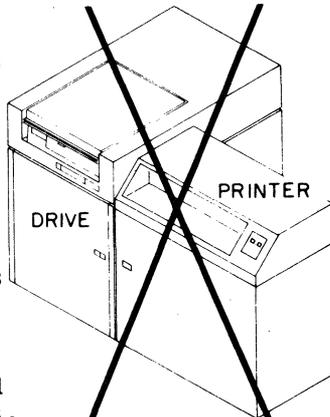
printers, card punches, or paper tape punches. Particles of dirt, ink, carbon, and paper, generated by these machines, are hazardous to disk drives.

Food and beverages should not be consumed near disk drives. If they are spilled in the drive, the cleanup could require costly downtime.

NO
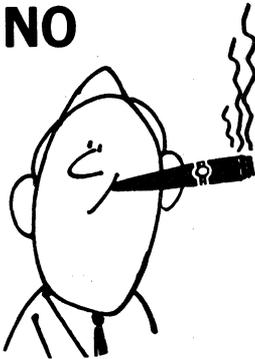
Last but not least is the problem of smoking. Smoke particles are approximately eight times larger than the distance between a disk and a head flying over it. Furthermore, since smoke particles are very sticky, they clog the drive's absolute filter rapidly. Prohibit smoking in the area around the drive.

The following illustration emphasizes the importance of eliminating dust, smoke, and other contaminants in the drive's environment. Notice that all of these contaminants are considerably larger than the head flying distance.
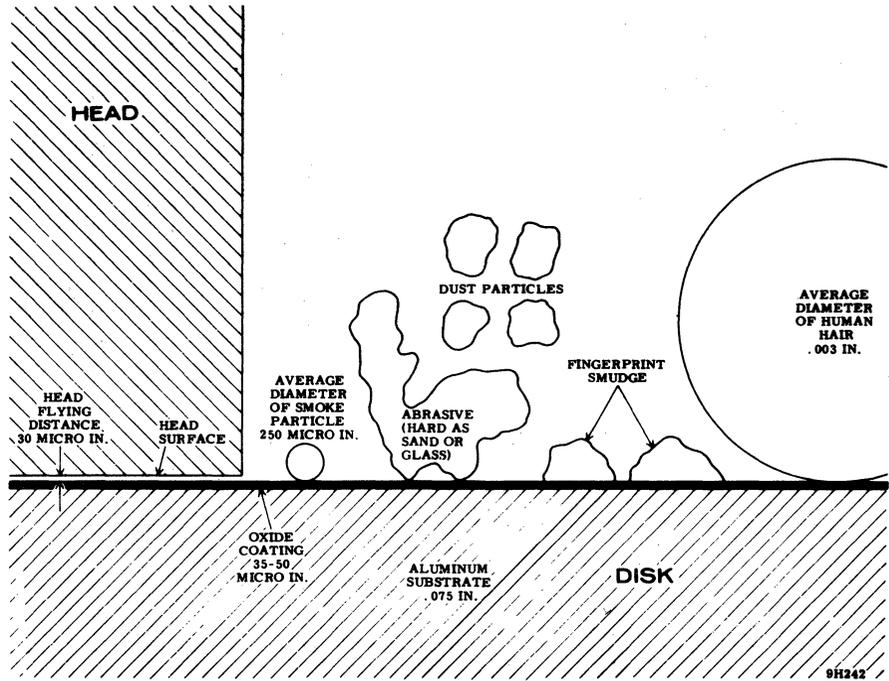
DISK PACK CARE AND HANDLING

Disk packs are manufactured with great
precision to ensure that their surfaces
are extremely flat and smooth. This
precision is maintained when the disk
packs are stored and handled in accor-
dance with the following guidelines. The
guidelines presented below fall into two
categories. Certain precautions are
aimed at cleanliness; in ordinary use,
contamination of the disk packs is mini-
mized when these measures are followed.
Other instructions relate to handling the
disk packs in such a way that their me-
chanical precision is maintained. Refer
to "Disk Pack Installation and Removal"
for the correct procedures for installing
and removing disk packs.

The disk pack is
housed in a storage
canister, consisting
of top and bottom
dust covers, when it
is not installed in
a drive. After in-
stalling the disk
pack in a drive, im-
mediately place the
dust covers together
to prevent contamina-
tion of the inside of
the canister.

TOP
DUST
COVER

DISK
PACK

During removal of the
disk pack from the
drive, the top dust
cover is attached to
the disk pack. Seal
the canister imme-
diately by fastening
the bottom dust
cover to the top
dust cover. Do not
set the pack on an-
other surface before
attaching the bottom
dust cover.

BOTTOM
DUST
COVER
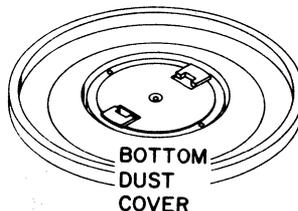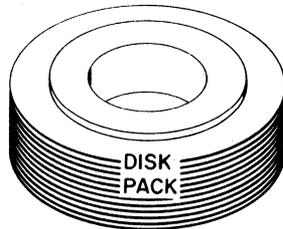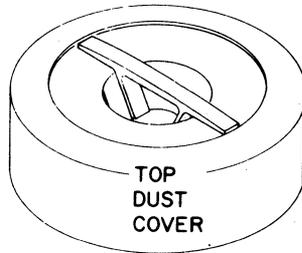
Never touch the recording surfaces on the
pack. The pack is always lifted by the
handle on the top dust cover.

The canister protects the
disk pack from contami-
nation but not from
physical abuse. If,
during handling, the
canister is dropped
or banged against
another object, it
is necessary to in-
spect the disk pack
for bent disks.
Ask your pack sales
representative to perform this inspection.
Failure to do this could result in seri-
ous damage to the drive.
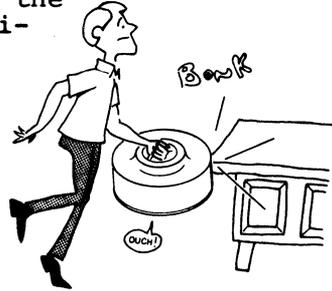
In labelling disk packs, write on a label
with a pen or felt tip marker that does
not produce any residue. Do not use a
lead or grease pencil. Then attach the
label to the top dust cover of the stor-
age canister. If the canister has an in-
dentation, place the label in the inden-
tation to ensure that it does not get
scraped off during handling. After re-
moving a label, use isopropyl alcohol to
remove any remaining adhesive residue on
the canister before attaching the new
label. Adhesive left on the cover can
contaminate both the pack and the drive.

By all means, DO NOT attach labels to the
disk pack itself. If it is necessary to
maintain a correspondence between disk
packs and storage canisters, the pack
serial number can be written on the
canister label.
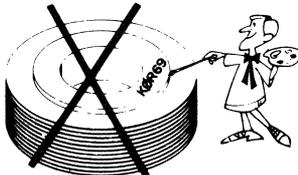
Proper storage is an important part of
disk pack care. Ideally, the storage
shelves for the disk packs should be lo-
cated in the computer-room environment,
and they should be kept free of lint and
dust. If it is necessary to locate the
shelves in a different room, allow the
pack to adjust to the computer-room
temperature for two hours before using
it.

Make sure that the
shelves are never
in direct sunlight
or in the vicinity
of high magnetic
fields. Direct sun-
light causes the
temperature of the
pack and canister to
exceed acceptable
limits. Magnetic
fields can alter the
reliability of the data
written on the disk
pack; the fields are
high in regions near
electrical equipment
such as motors and bus
bars.
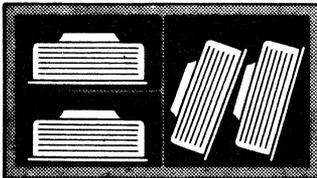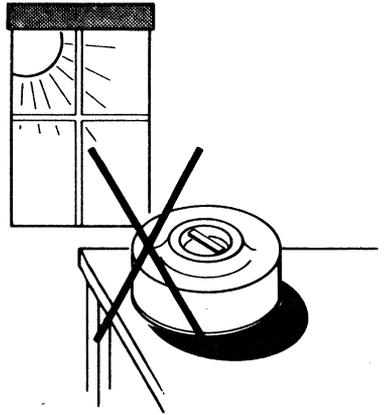
Disk packs should
always be stored
flat on the shelves.
Never place them
on edge. However,
it is OK to stack
them flat.

YES   NO

Finally, some considerations apply to
shipping and receiving packs. If a new
pack arrives in a damaged shipping carton,
inspect the pack for bent disks before
using it. The pack sales representative
will assist you in obtaining this inspec-
tion. Allow a new pack two hours to ad-
just to the temperature of the computer

room.   Also, it is a good idea to save
disk pack shipping cartons; if you ever
need to ship a disk pack, it is recom-
mended that you use the original shipping
materials.

By following the guidelines for disk pack
care and handling provided in this sec-
tion, you will minimize problems with
your packs.

DRIVE CARE AND HANDLING

Taking care of a disk drive is a team
effort involving both the operators and
the customer engineers. As an operator,
you contribute to drive care by operating
it correctly and notifying the customer
engineer immediately when problems occur.
Also, it is important that you keep the
drive clean, especially the shroud area.

You can keep the shroud area clean by
making sure that it stays sealed and
pressurized. The
shroud area is sealed
and pressurized when
the pack access cover
is closed and the blower
system is running. This
is discussed in more
detail in the follow-
ing two paragraphs.

The pack access
cover should remain
closed except when
a disk pack is being
removed or installed.
Ensure that the pack
access cover latches
securely when closing
it.
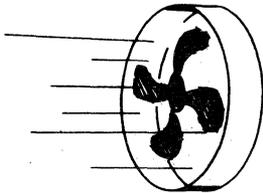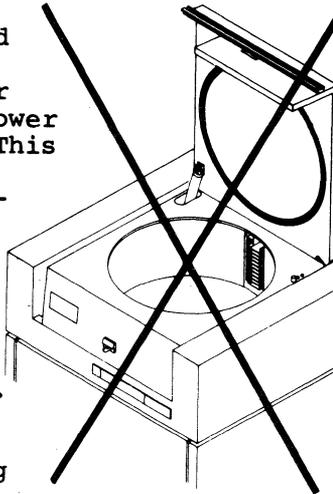
The blower motor in
the drive should be
energized at all times.
The blower motor cre-
ates pressure in the
shroud area and causes
contaminates to be ex-
pelled from this com-
partment. If the
blower motor is not running, ask the
customer engineer to turn on the drive
circuit breakers.

Inform the customer engineer immediately
if you see any dirt in the shroud area.
The customer engineer is responsible for

repairing and performing
preventive maintenance
procedures on the drive.
Part of this responsibility
includes cleaning the in-
ternal surfaces of the
drive. Unauthorized
personnel should not at-
tempt to clean the drive;
to be effective, the job
should be done with the
proper procedure and
materials.

CALL
  ME
   ANYTIME!

CONTROLS AND INDICATORS

This section contains instructions on the
operator control panel. The switches on
the panel are used by the operator to
turn the drive on and off, to clear fault
conditions in the drive, and, for some
machines, to prevent the drive from
writing on the disk pack. The Logical
Address Plug, which is inserted in an
opening in the panel, identifies the
drive in an installation having more than
one drive. Finally, the indicator
lights on the panel show whether the
drive is on, if it is in a ready or fault
condition, or whether its write function
has been disabled.

A typical operator
control panel is
shown to the right.
The panel on your
machine may look
different from the
one shown. Drives
without the write
protect option do not have the PROTECT
switch and indicator. Also, the operator
control panels on some drives have a
different layout. If you are in doubt
about interpreting your operator control
panel, refer to the operation section of
the hardware reference manual supplied
with the drive.
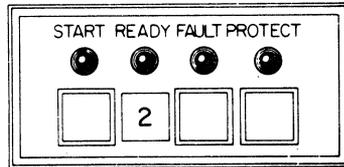
A description of each switch and
indicator follows:

START

The START indicator lights
when the drive is started
and goes out when it is
stopped.
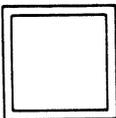
Pressing the START switch
lights the START indicator
and prepares the drive to
power up. Pressing the
START switch again turns

15

off the START indicator and causes the
drive to power down. (Refer to "Drive
Power On and Power Off.")

READY —— The READY indicator lights
when the drive is ready for
normal operation. On some
units, the READY indicator
flashes while the drive
motor is coming up to
speed or being powered down.

. 2 —— The Logical Address Plug
determines the logical ad-
dress of the drive. The plug is labelled
with a number between 0 and 15. Plugs
are interchangeable between drives. With
no plug installed, the drive's logical
address is 15.

FAULT —— The FAULT indicator lights
when something is wrong
with the drive.
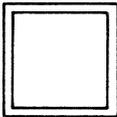
—— Pressing the FAULT switch
turns off this indicator if
the drive problem is no
longer present. If you
cannot turn off the FAULT
indicator, call a customer
engineer.

—— The PROTECT indicator indi-
cates that the drive is in
the protect mode. In the
PROTECT protect mode the drive
cannot write data.
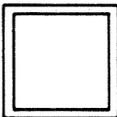
—— Pressing the PROTECT switch
places the drive in the
protect mode and turns on
the PROTECT indicator.
Pressing the switch again
restores the drive's data-
writing capability and
turns off the PROTECT
indicator.

DISK PACK INSTALLATION AND REMOVAL

Introduction

Proper handling of disk packs in an es-
sential part of operating your disk
drive. The set of disk packs at your
computer site is like a library; at
times, you will need to change packs in
the drive to make different information
available to the computer.

This section contains instructions on
installing and removing disk packs. Be
sure that you understand these procedures
before attempting them on a drive. Keep
in mind the guidelines presented under
"Disk Pack Care and Handling" when you
are changing disk packs.

Disk Pack Installation

The disk drive will not operate until a
disk pack has been installed. This in-
stallation consists of removing the pack
from its storage canister and locking it
in place in the drive. To do this, per-
form the following steps:

1. Make sure that the blower system has
   been operating for at least two
   minutes with the pack access cover
   closed. This allows time for dust
   to be expelled from the shroud area
   and blower system. If the blower
   motor is not running, ask the cus-
   tomer engineer to turn on the drive
   circuit breakers.

2. Open the pack access cover.

3. Check to see that the heads are
   retracted. If the heads are not
   fully retracted, call the customer
   engineer (refer to "Getting to Know
   Your Drive")! DO NOT push on the
   heads or attempt to install the pack
   with the heads extended!

4. Examine the shroud area of the drive for foreign objects prior to mounting the pack.

5. Squeeze the levers in the center of the bottom dust cover and remove the bottom dust cover from the disk pack. Set aside the bottom dust cover in a clean area.

6. Lower the disk pack vertically into the shroud area and set it on the spindle very gently. DO NOT bang them together! Sharp impact between the pack and the drive spindle can damage both the pack and the drive. Rotate the storage canister handle clockwise until it is tight. Then, with a gentle twist on the handle, lift the storage canister off the disk pack.

7. Set the storage canister into the bottom dust cover and set them aside for later use.

8. Close the pack access cover immediately to prevent entry of dust and contamination.

Disk Pack Removal

Disk pack removal consists of attaching the storage canister to the pack, lifting the pack and canister, and attaching the bottom dust cover to them. To do this, perform the following steps:

1. Press the START switch to stop the drive motor and unload the heads. Allow the disk pack to stop rotating ON ITS OWN before proceeding to the next step.

2. Open the pack access cover.

3. Check to see that the heads are re-
   tracted. If the heads are not ful-
   ly retracted, call the customer
   engineer (refer to "Getting to Know
   Your Drive")! DO NOT push on the
   heads or attempt to remove the pack
   with the heads extended!

4. Place the storage canister over the
   disk pack so that the post at the
   center of the disk fits into the
   storage canister handle.

5. Rotate the storage canister handle
   counterclockwise until a clicking
   sound is heard, indicating that the
   pack has separated from the spindle.

6. Carefully lift the pack vertically
   out of the drive by the canister
   handle. Avoid banging or scraping
   the pack against the spindle.

7. Examine the shroud area of the drive
   for foreign objects.

8. Close the pack access cover immedi-
   ately.

9. While squeezing the levers in the
   center of the bottom dust cover,
   attach it on the storage canister.
   See "Disk Pack Care and Handling"
   for tips on storing the disk pack.

DRIVE POWER ON AND POWER OFF

Introduction

This section contains instructions on how
to start or stop your disk drive. It is
necessary to stop the drive to change
disk packs. If the drive is not being
used for an extended time, you may decide
to turn it off.

If you have any problems when performing
the Power On and Power Off procedures,
refer to the section entitled "Problems
to Look For."

Power On

1. Make sure that the blower system has
   been operating for at least two
   minutes with the pack access cover
   closed. This allows time for dust
   particles to be expelled from the
   shroud area and blower system. If
   the blower motor is not running, ask
   the customer engineer to turn on the
   drive circuit breakers.

2. Install the disk pack according to
   the directions in "Disk Pack Instal-
   lation and Removal."

3. Press the START switch and observe
   that the following sequence of
   events occurs:

   A. The START indicator lights
      immediately.

   B. The drive motor starts, and in
      some units, the READY indicator
      begins to flash. In certain
      systems containing more than one
      drive, only one drive will start
      at a time.

C. After approximately 30 seconds, the READY indicator lights and remains on. The drive is now powered up and ready for use by the system.

Power Off

1. Press the START switch on the control panel to turn off the START indicator. Allow the disk pack to stop rotating before proceeding to the next step. (If the READY indicator is flashing, wait for it to go off).

2. Remove the disk pack according to the directions in "Disk Pack Installation and Removal."

PROBLEMS TO LOOK FOR

This section discusses how you, the
operator, should be on the lookout for
problems with your disk drive. Sometimes
you can solve a problem yourself. If
not, try calling your customer engineer
(CE) on the phone to get directions on
how to solve it. For a more serious
problem, it will be necessary for the CE
to make a service call. By approaching
a problem in these three steps, you can
often avoid an unnecessary service call.

Although preventive maintenance is
usually performed by CEs, in some cases
drive operators are expected to do part
of it. You, your supervisor, and your CE
should decide how much you get involved
in maintenance. If it is decided that
you should be responsible for doing pro-
cedures not explained in this booklet
(shroud cleaning, for example), ask the
CE for directions in doing them. Be sure
to exercise caution not to try "do-it-
yourself" repairs beyond your capability.

The following table lists the solutions
to some common drive problems.

PROBLEM	WHAT TO DO
START/STOP	
START switch is pressed and START indicator stays off.	1. Ask supervisor to ensure that power cable is connected to site power. 2. Ask supervisor to ensure that drive circuit breakers are on. 3. Call CE.
START switch is pressed, START indicator lights, but drive motor does not start.	1. Ask supervisor to ensure that controller is turned on. 2. If another drive is being powered up at this time, wait for its READY indicator to come on. 3. Ensure that disk pack is installed. 4. Ensure that pack access cover is latched. 5. Call CE.

PROBLEM	WHAT TO DO
Drive is running, START switch is pressed, and drive motor does not stop.	1. Do not stop drive by turning off circuit breakers or removing site power. 2. Call CE.
FAULT CONDITION	
FAULT light stays on after FAULT switch is pressed.	1. Call CE. (See Head Crash discussion below).
DISK PACK	
Disk surfaces are dirty.	1. Have pack inspected and cleaned by vendor.
Disk pack has been dropped.	1. Ask vendor to inspect disk pack before you use it again.
Disk pack canister is cracked.	1. Replace canister.
Table continued on next page	

PROBLEM	WHAT TO DO
HEADS: RETRACTION & CRASH	
A head crash may have occurred. Its symptoms are: • Screeching or pinging noise • Burning odor • High data error rate	1. Turn off drive immediately. 2. Do not put crashed pack in another drive. 3. Do not put a good pack in crashed drive. 4. Call CE.
Heads are not retracted with pack access cover opened.	1. Do not push on heads. 2. Do not remove or install disk pack. 3. Call CE.
Table continued on next page	

PROBLEM	WHAT TO DO
SHROUD & PACK ACCESS COVER	
Shroud area is dirty.	1. Ask CE to clean it.
Pack access cover will not open.	1. Ensure that circuit breakers are on but that drive has not been started.
Pack access cover does not latch.	1. Try to latch it again. 2. Call CE.