# ATARI 810 DISK DRIVE

# FIELD SERVICE MANUAL

I

# TABLE OF CONTENTS

# SPECIFICATIONS

# TECHNICAL SPECIFICATIONS
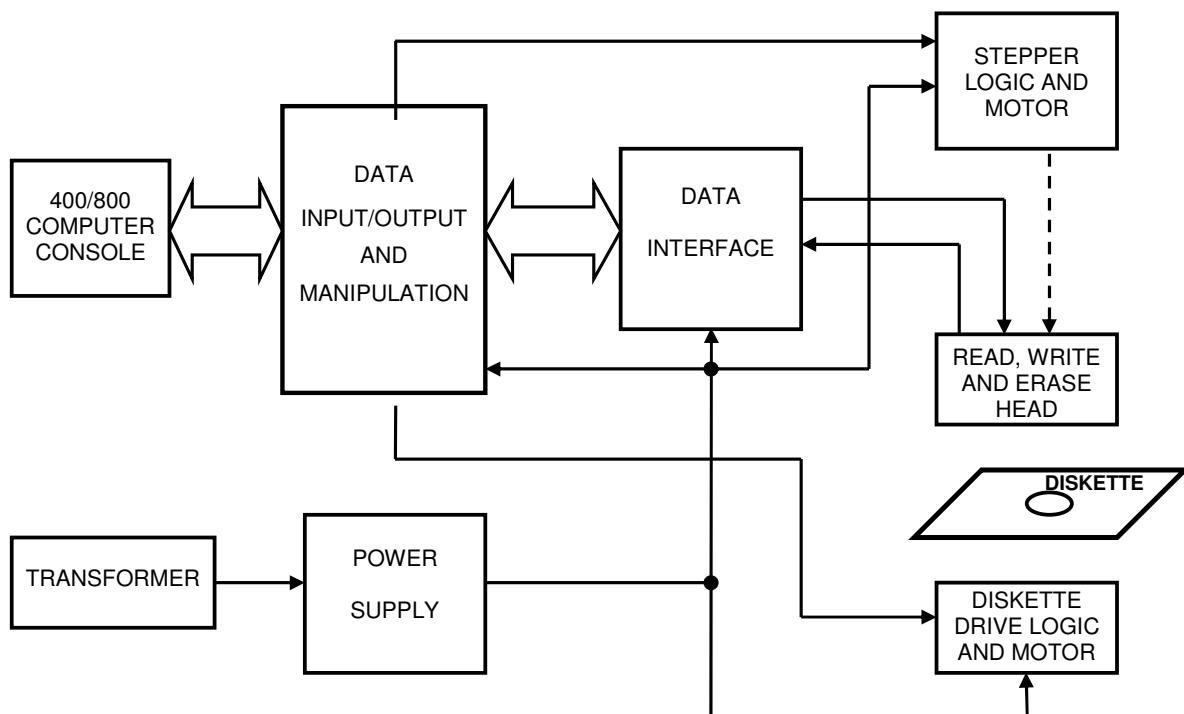
1.  Uses ANSI standard 5¼ inch diskettes in a
    soft sectored format.

2.  40 tracks at 48 TPI track density.

3.  Single density (FM), single sided
    recording.

4.  Over 90K bytes storage per diskette.

5.  709 sectors of 128 bytes each.

6.  Minimum data access time: 236 milliseconds.

7.  Average data transfer rate: 6000 bits per
    second.

8.  Automatic stand-by capability (built in
    microprocessor).

9.  Up to four Drives can be daisy chained to a
    single 400/800 Computer Console (w/minimum
    16K RAM) via select switches at the rear of
    the Drive.

10. Drives directly interface with the ATARI
    400/800 Computer Console (16K RAM) or
    indirectly through the ATARI 850 Interface
    Module or 820 Printer.

# THEORY OF OPERATION

# THEORY OF OPERATION

The ATARI 400/800 Computer Console with 16K of RAM
installed connects directly to the 810 Floppy Disk
Drive. The Drive may also be daisy chained through
the 820 Printer 6r the 850 Interface Module. Up to
four Disk Drives can be connected to a single
Console.
Refer to the Disk Drive Operators Manual for
installation and operating instructions.
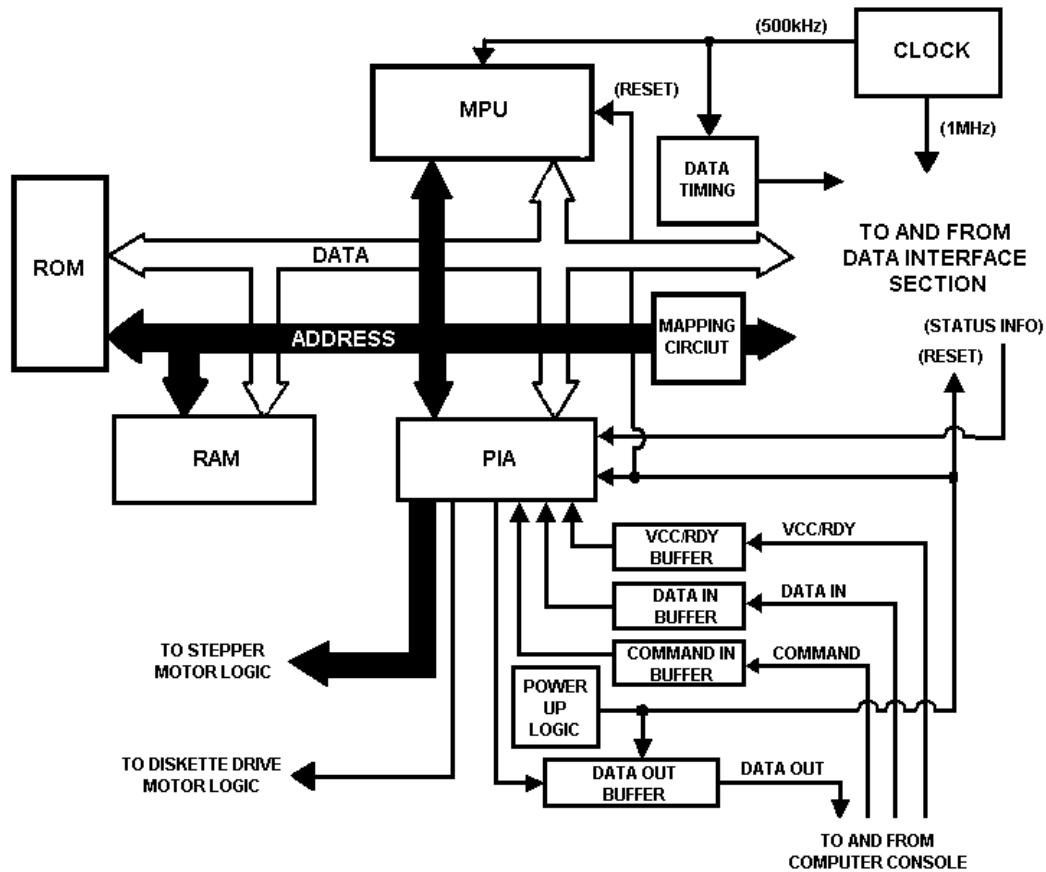


**ATARI 810 FLOPPY
DISK DRIVE**

The ATARI 810 Floppy Disk Drive consists of the following major sections:

- Data Input/Output and Manipulation
- Data Interface
- Read/Write and Erase Heads
- Stepper Motor and Logic
- Diskette Drive Motor and Logic
- Power supply

## DATA INPUT/OUTPUT AND MANIPULATION SECTION



Data Input/Output and Manipulation Section

Data, control commands and a VCC/RDY signal from the Computer Console enter the Disk Drive through either of the two serial I/O connector jacks at the rear of the Drive chassis.
Each of the three main signal input lines are buffered for static protection and to reduce power consumption on the 800 I/O lines.
Data is sent by the Console in serial format, with checksums accompanying the data for validity verification.

The Drive's PIA is primarily a buffering and signal formatting device, with no decision making or computational capability. It is responsible for the following:
- Applying the Console's serial outputs to the Data 2nd Address Busses when requested by the Drive's Microprocessor Unit (NW).
- Assisting in the control of the Read/Write and Erase head position by buffering commands sent to the Stepper Motor Logic.
- Assisting in control of the Diskette Drive Motor Logic.
- Providing 128 bytes of RAM for temporary storage of status information and data sent by the Data Interface Section for application to the MPU.

The MPU provides the primary decision making and computational capabilities for the Disk Drive. The Drive's MPU is responsible for the following:
- Controlling data transfers, through its control over the Common Data and Address Busses.
- Interpreting and controlling the accomplishment of Console commands (temporarily stored in FLXM) and Disk Drive operating instructions (permanently stored in ROM).
- Controlling the Stepper, Disk Drive and Motor Logics, which are buffered by the PIA.

The Drive's ROM contains specific operating
instructions used by the MPU to accomplish a variety
functions.
These functions include telling the Disk controller
(WD1771-01) what task to perform.
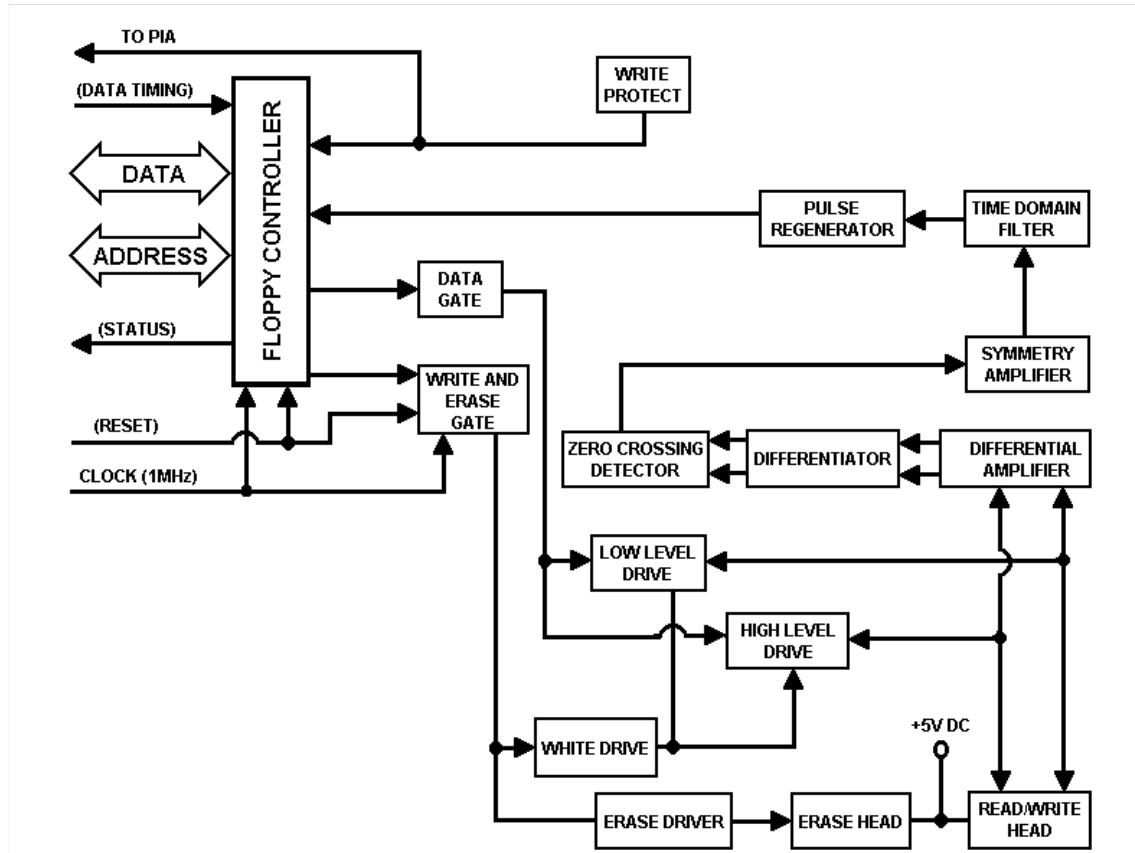
The Drive's RAM is used by the MPU for temporary
storage of both data and system information.

The Drive's Data Output Buffer transfers the
formatted data through the PIA to the Data Out line
going to the Computer Console.

The Drive's Power Up Logic circuit resets the MPU,
PIA and Data Interface Section whenever the Disk
Drive is turned on. The RESET references the
electrical circuits to their starting conditions.
Additionally, the Power Up Logic circuit locks the
Data Output Buffer off during a short period when the
Drive is turned on. This prevents random pulses
generated by the Drive's circuitry (during the
initializing period) from being sent to the Console.

The Drive's Clock circuitry generates both a crystal
controlled 1 MHz and a 500 kHz clock signal. The
1 MHz signal is used by the Data Interface Section.
The 500 kHz signal is used both as a clock signal to
the MPU, and to the data exiting from the Data Input/
Output and Manipulation Section into the Data
Interface Section.

# DATA INTERFACE SECTION



Data Interface Section
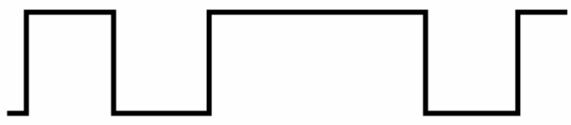
The major element of the Data Interface Section is a Floppy Disk Controller (FDC). The FDC is a highly specialized microprocessor. It-is responsible for the following activities:

- Combining data, timing and data validity pulses into the serial format to be recorded.
- Separating the above and providing the output data in parallel during a read operation.
- Controlling the Write and Erase Logic circuitry during a write operation.
- Generating the data validity codes (called Cyclic Redundancy Checks – or CRC's) during a write operation, and checking them during a read operation.

The Drive's Write and Erase Logic circuitry is
controlled by, and receives its data from the FDC.
Initially, the Data Gate converts the leading edge of
each pulse (data, clock, etc.) into a single
corresponding change of signed level. These levels
then determine the polarity of the Drive's currents
applied to the Read/Write Head through the High and
Low level Drives, The Write Driver limits the write
currents.



The FDC combines clock
pulses with data to form
a serial signal.



The Data Gate converts
each pulse's rising edge
into a logic level
change, as shown.

Basically, this is the signal applied to the head
during a write operation. The high levels out of the
Data Gate turn on the High level Driver, and the low
levels turn an the Low level Driver.
The Write and Erase Gate turns on both the Write and
Erase Drivers during a write operation, and turns
them off during a read operation. The Erase Driver
drives the Erase Head during a write operation. See
the Read/Write and Erase Head discussion for further
information.
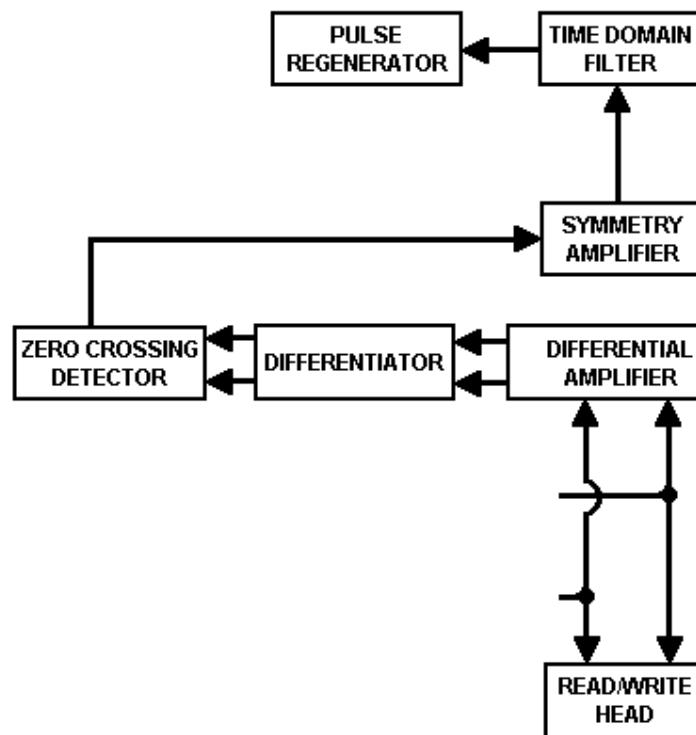
Major elements of the Drive's Read Data Conditioning
circuitry are:
  • Differential Amplifier – Initial amplification of
    Read/Write Head signals.
  • Differentiator – Squaring up the two differential
    amplifier outputs.
  • Zero Crossing Detector – The single output
    changes level whenever the two ,180° out-of-phase
    input signals cross their zero axis
    coincidentally (eliminates false pulses caused by
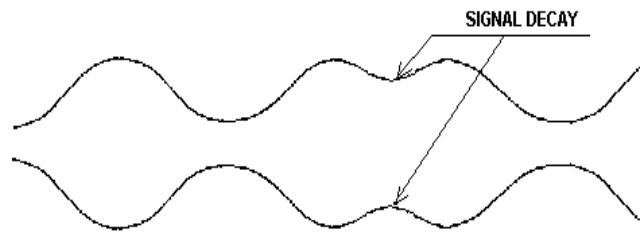
Read/Write Head signal decay, rather than intentional signal level changes).
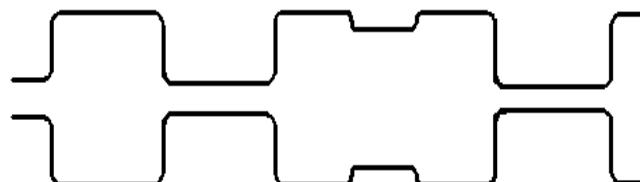
- Symmetry Amp – Ensures exact zero referencing of the signal.
- Time Domain Filter – Trims and further shapes the signal.
- Signal Gate – Produces a single pulse out for each logic level transition at its input. This results in the reproduction of the original FDC signal.

During a read operation the Read/Write Head produces two 180° out-of-phase signals. These are very weak, highly distorted versions of the original signals produced by the Write Logic Data Gate. The Read Data Conditioning circuitry must amplify, square up and filter the read signals to reproduce the original serial string of bits produced by the FDC. This reproduced signal is returned to the FDC by the Read Data Conditioning circuitry (see figure below).

SIGNAL DECAY
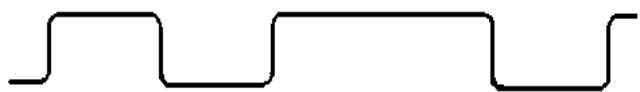
Two 180' out-of-phase signals are generated by head during a read operation and amplified by the Differential Amplifier.
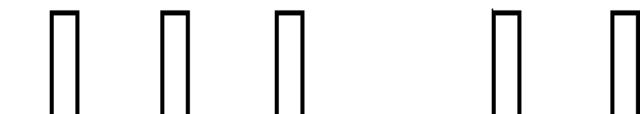
The Differentiator squares the two out-of-phase signals.

The Zero Axis Crossing Detector provides a single output, further squared and now without any signal decay effects.

The Time Domain Filter provides a signal with very sharp leading and trailing edges.
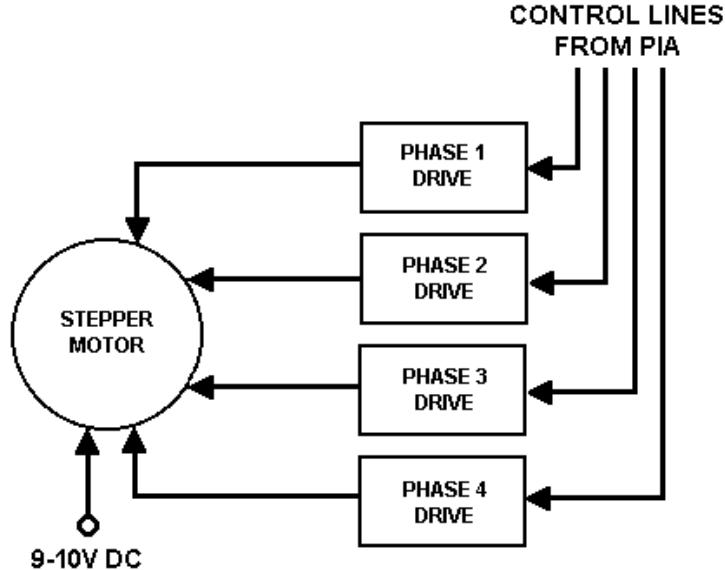
The Pulse Regenerator converts each logic level change into a single pulse, recreating the original signal produced by the FDC during the write operation.

The Drive's Write Protect circuit senses the presence or absence of a special notch in one side of the diskette casing. A write protected diskette's notch will be covered with an opaque tape. The circuit is basically an LED/photo transistor sensor, whose output is buffered before being applied to the FDC. With an unprotected diskette, the sensor signal allows the FDC to write data onto the diskette.

# STEPPER MOTOR AND LOGIC

The Stepper Motor is a four phase motor with a 3.6°
rotor rotation per step. The motor has a total of 100
poles, providing 100 rotor steps for the motor's full
360° rotation.



Stepper Motor and Logic
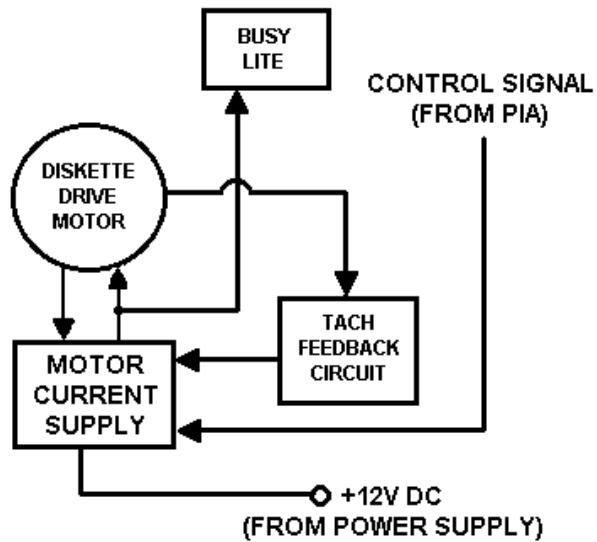
Each step change in the motor is translated
through a steel band connection to a single track
change far the Read/Write and Record Head assembly.
The diskette is divided into 40 tracks, so-the full
range of the Stepper Motor is not used.
The Stepper Logic is controlled from the PIA. The
four PIA signals are logic levels acting as the
Stepper Motor's four phase inputs. These levels, in
their various possible combinations, drive the
Stepper Motor to reposition the head assembly from
track to track.
The Stepper Motor is supplied with a nominal 3 to 10V
DC from the Power Supply.

# DISKETTE DRIVE MOTOR AND LOGIC

The Diskette Drive Motor is a DC motor that indirectly drives the diskette. The motor includes an internal tachometer, whose output is monitored in the Tach Feedback circuit. Variations in motor speed, as sensed by the Tach Feedback circuit, vary the current supplied to the motor. Diskette speed is set to 290 RPM ± 1%.

Diskette Drive Motor and Logic

Motor rotation is translated into diskette rotation via a pulley (attached to the motor shaft), a drive belt and a flywheel attached to a diskette drive spindle.
When a diskette has been inserted into the Disk Drive and the front door has been latched closed, the diskette is centered and clamped to the spindle by a clutching cone assembly.
Whenever the Diskette Drive Motor is supplied with power, the Drive's BUSY lite (LED) is turned on.
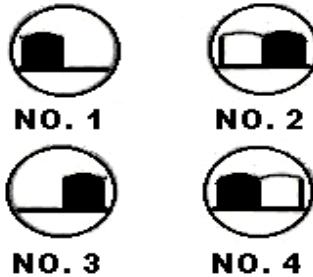
# DISK DRIVE SELECT

## DRIVE CODE NO.



A double "Single pole – Double throw" switch gives
the Disk Drive operator the ability to assign a
number to, and therefore a code for addressing, each
of up to four Drives that could be daisy chained
together.
The switch is accessible at the rear of the Drive
chassis. The switch settings are read by the Drive's
MPU through the PIA.
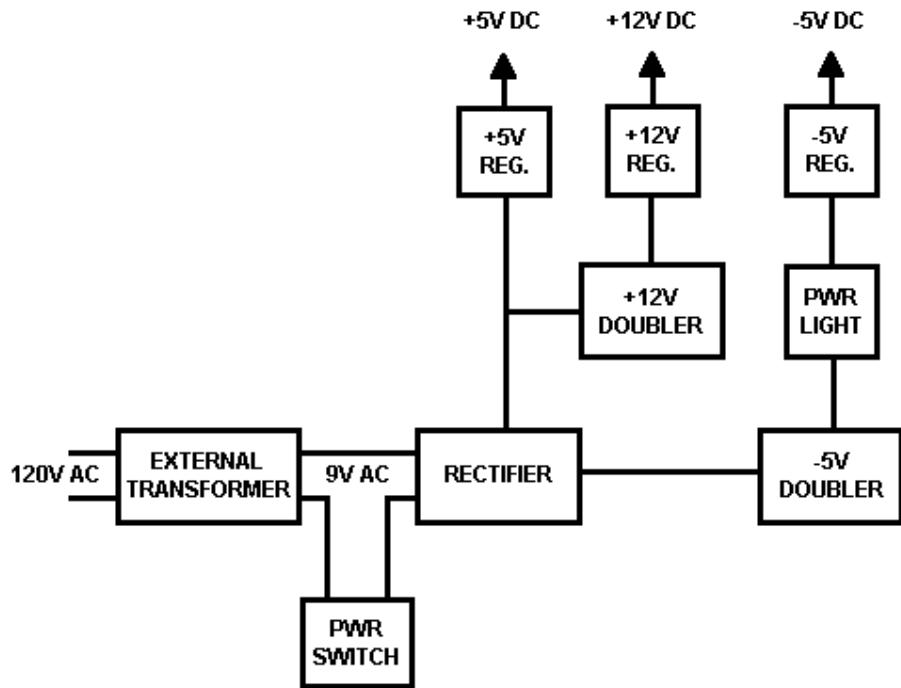
## POWER SUPPLY

An external step-down transformer is supplied with
each Drive. The 120V AC line Power is dropped to 9
VAC by the transformer. This 9V AC enters to the
Drive through the "PWR" jack at the back of the
chassis.
Turning the Drive's front panel "PWR" switch ON
applies the 9 VAC to a full wave bridge rectifier.
The Power Supply provides the following:

- The unregulated 9–10V DC Diskette Drive Motor
  Supply.
- A regulated +5V DC.
- A regulated +12V DC (initially produced by a
  voltage doubler circuit).
- A zener regulated –5 VDC (also produced by a
  voltage doubler circuit).

+5V DC  +12V DC  -5V DC

+5V REG.   +12V REG.   -5V REG.

+12V DOUBLER   PWR LIGHT

120V AC   EXTERNAL TRANSFORMER   9V AC   RECTIFIER   -5V DOUBLER

PWR SWITCH

A "PWR ON" lite (LED) is turned on through the -5 VDC
section of the supply.
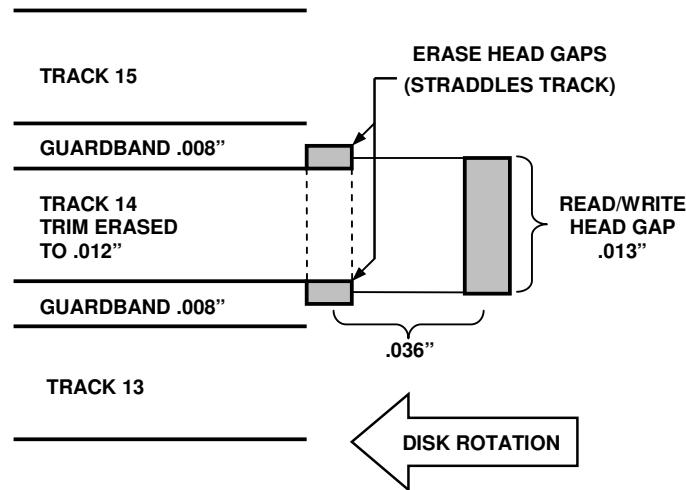
## READ/WRITE AND ERASE HEADS

A magnetic head converts electrical currents into
magnetic fields, and vice-versa. The Read/Write
Head consists primarily of two ferrite core halves,
wound with a centertapped coil. The centertap is
connected to the regulated +5V DC from the Power
Supply. One end of the coil is connected to the
High level Driver and the other end to the Low
level Driver.

## WRITE OPERATION

Each logic level causes current to flow in one half
of the coil, with a high in one direction and a low
in the other. These currents set up corresponding
magnetic fields in the core halves, with a high
represented by a field in one direction, and a low by
a field in the opposite direction.

2-13

When the ferric oxide coating on the diskette is in
contact with the head, it completes the magnetic path
between the core halves. In response to the change
in direction of the magnetic field (logic level
change) passing through the diskette's coating, the
oxide particles realign themselves. Particle
alignment in one direction represents a high level,
and alignment in the other direction a low level.



During a write operation, the magnetic fields
coupling
through the diskette print a relatively wide (.013")
path of aligned particles. In order to prevent one
recorded track from interfering with either the next
inner or next outer track, a blank space, called a
guardband, is created between tracks. The Erase Head
creates these guardbands.
It straddles the Read/Write Head in such a way that
just after (.036") the data is written onto the
diskette, the Erase Head "tunnel" erases the track
width down to .012", leaving .008" guardbands between
tracks.

# READ OPERATION

During a read operation, the very small fields
existing due to particle alignment on the diskette
couple through the head core halves. The diskette is
rotating, causing the specific field being felt in
the core halves to change for each change in particle
alignment (i.e. change of recorded logic level). The
changing fields in the core halves generate
corresponding currents in the head coil windings. It
is these very small signals that are applied to the
differential amplifier.
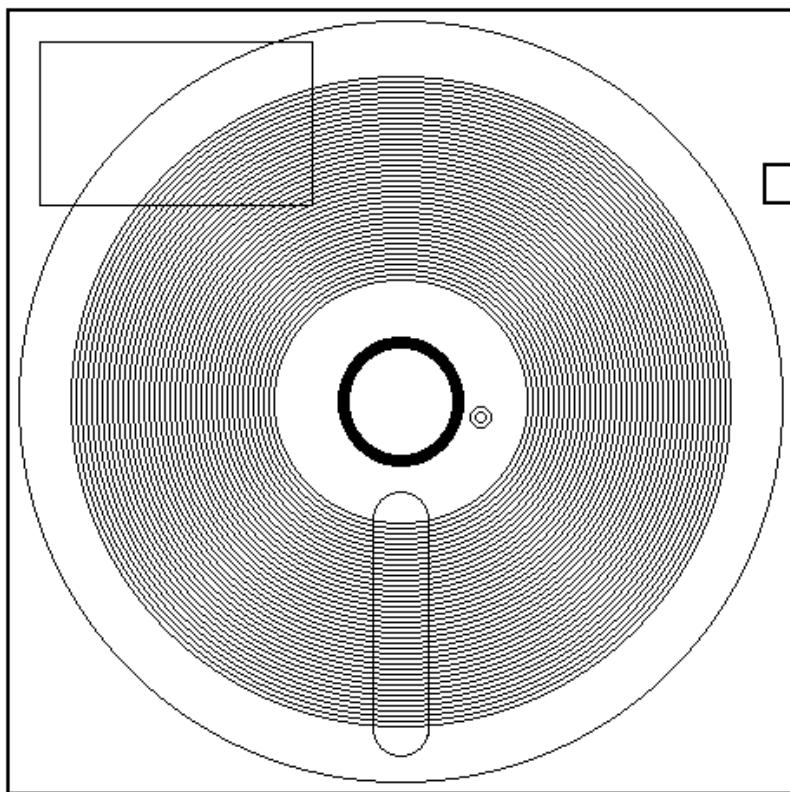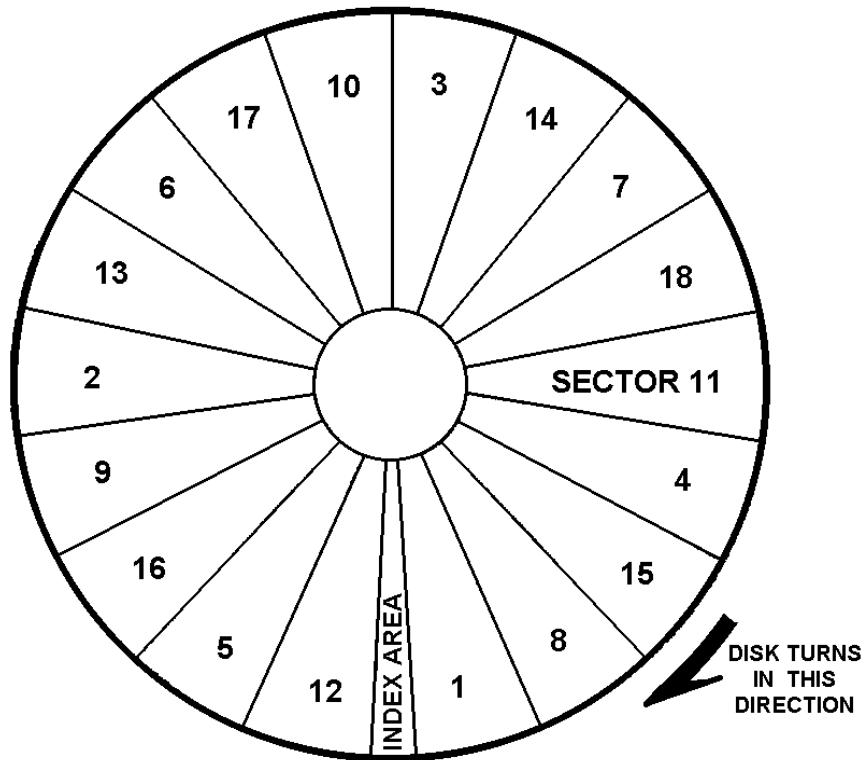
# DISKETTE FORMATTING

The specific arrangement of information recorded onto
a diskette is called the diskette format. Unless a
Master Diskette is to be used, the diskette must be
initially formatted with a Disk Operating System
(DOS)
software program.
The DOS software divides the diskette into 19 pie-
shaped slices, 18 of which are called sectors. These
are not
the same as the "709 FREE SECTORS" referred to when
you list the directory of a disk. Because the
diskette
division is accomplished totally through software,
this process is called "soft sectoring". The 18
sectors are equal in size, but the 19th (very narrow)
slice acts as an index to define the start of each of
the 40 tracks.

10  3  14  17  7  6  18  13  SECTOR 11  2  4  9  15  16  8  5  12  1

INDEX AREA

DISK TURNS IN THIS DIRECTION

All 40 tracks receive the same formatting as follows:
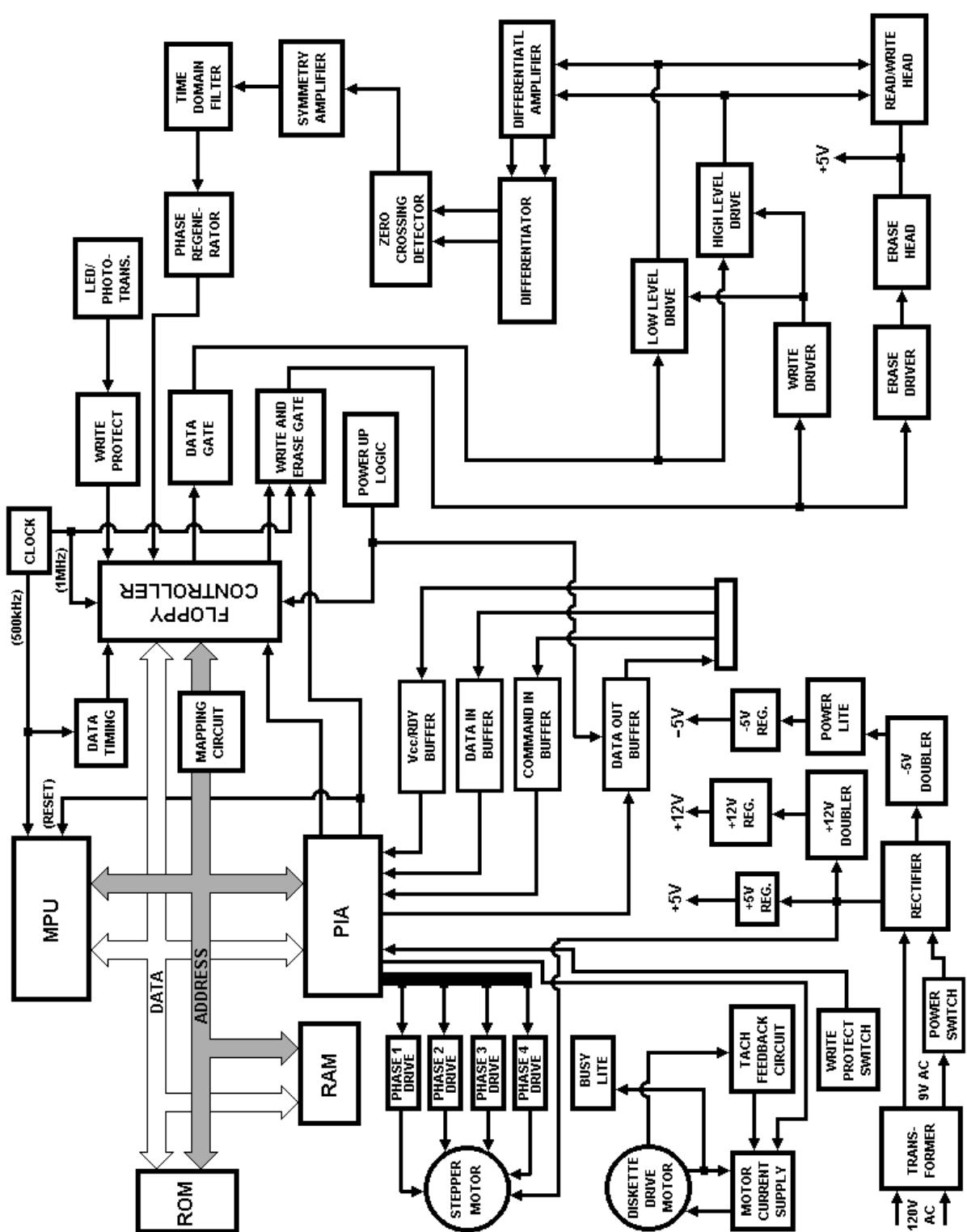
```
      ┌  256  bytes      00
  *   |    1  byte       FC   (index mark)
      └   11  bytes      00 or FF
      ┌    6  bytes      00
      |    1  byte       FE
      |    1  byte       Track Number (00 thru 27 hex)
      |    1  byte       00
      |    1  byte       Sector Number (01 thru 12 hex)
      |    1  byte       00
 **   |    1  byte       CRC byte 2
      |    1  byte       CRC byte 1
      |   17  bytes      00 (or 11 bytes FF and 6 bytes 00)
      |    1  byte       FB (data address mark)
      |  128  bytes      Data (FF for blank fill)
      |    1  byte       CRC byte 2
      |    1  byte       CRC byte 1
      └   11  bytes      00 or FF
```

Cyclic Redundancy Checks (CRC's) are generated in the
Drive's Floppy Disk Controller (FDC) during a write
operation. The FDC uses the recorded CRC's during a
read operation to verify the data. CRC's are similar
in function to the checksums used between the
Computer Console and the Disk Drive's MPU.
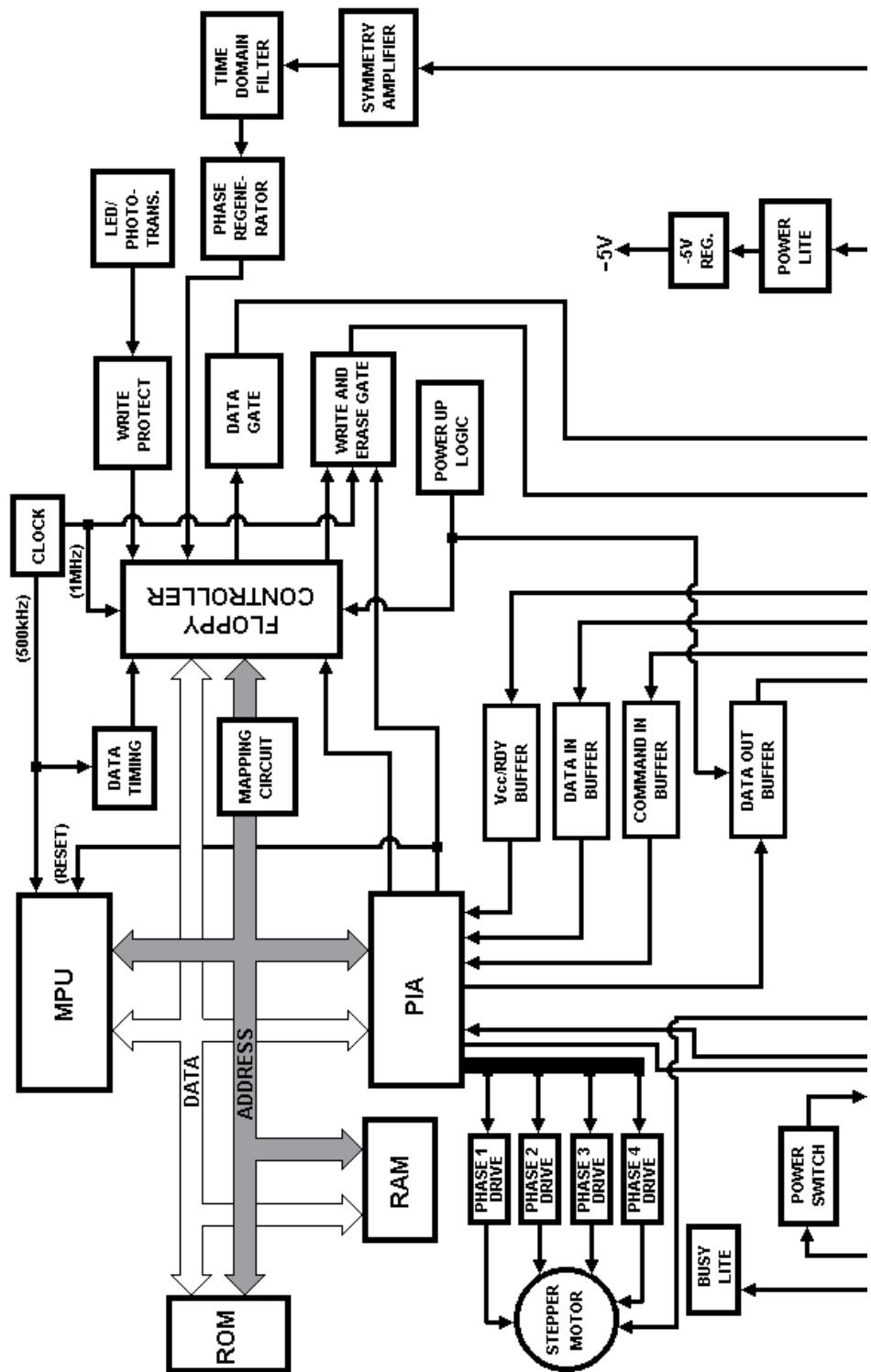
 * Appear only once per track for indexing.
** Repeated 18 times per track, producing the
   full 18 sectors.

# BLOCK DIAGRAMS

# AND
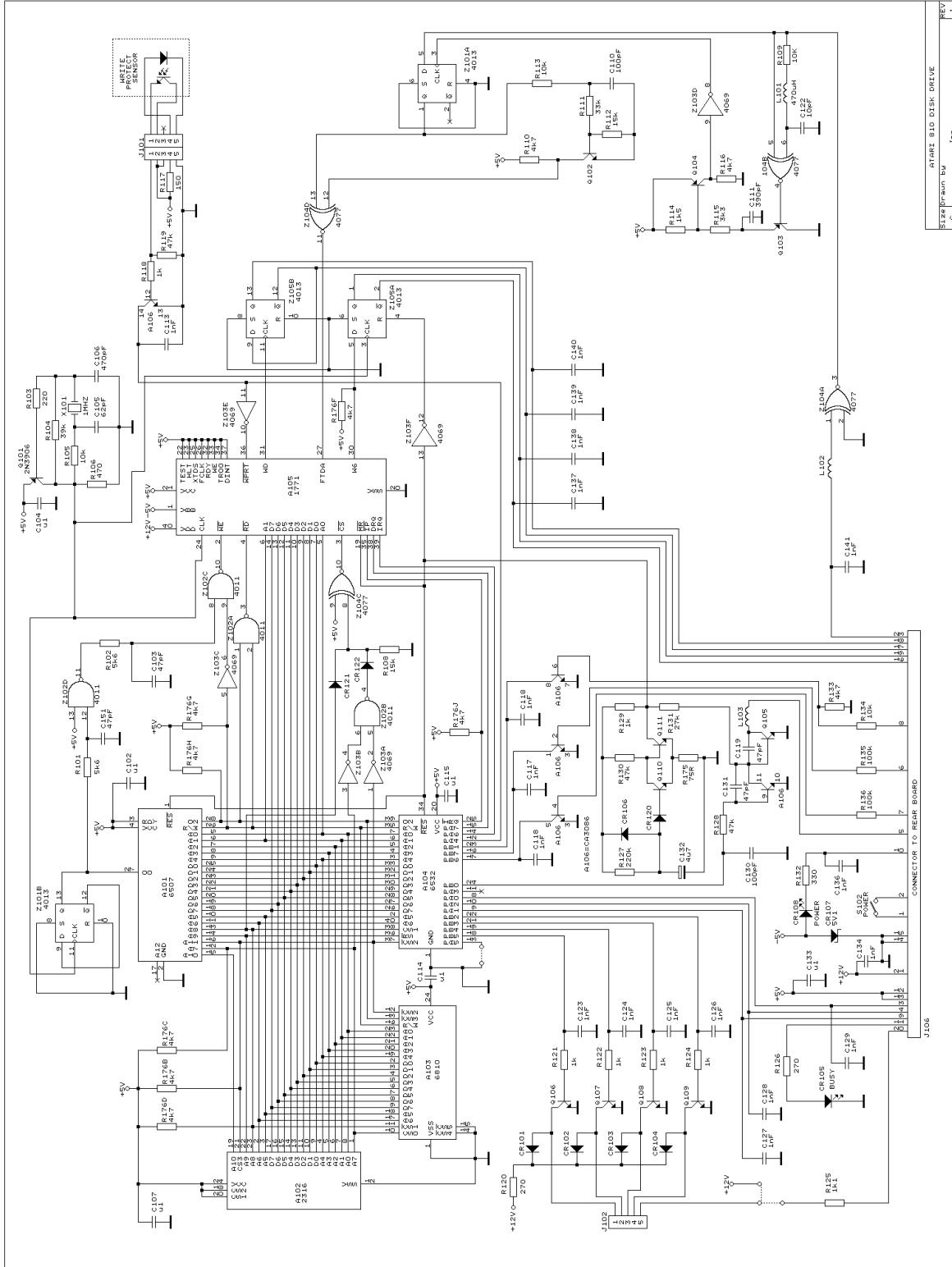
# SCHEMATICS

On the following pages are block diagrams and
schematics for the Disk Drive. Further understanding
of the system's operation can be obtained by
comparing these.
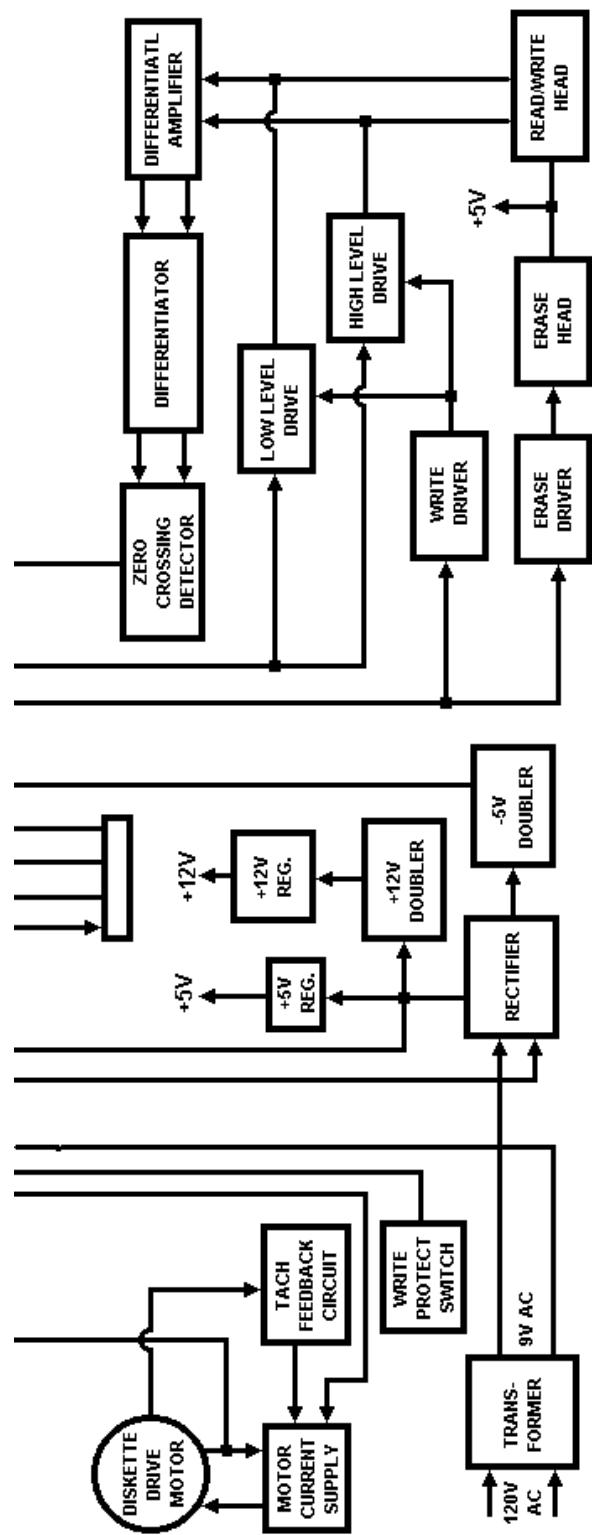
**ATARI 810 DISK DRIVE BLOCK DIAGRAM**
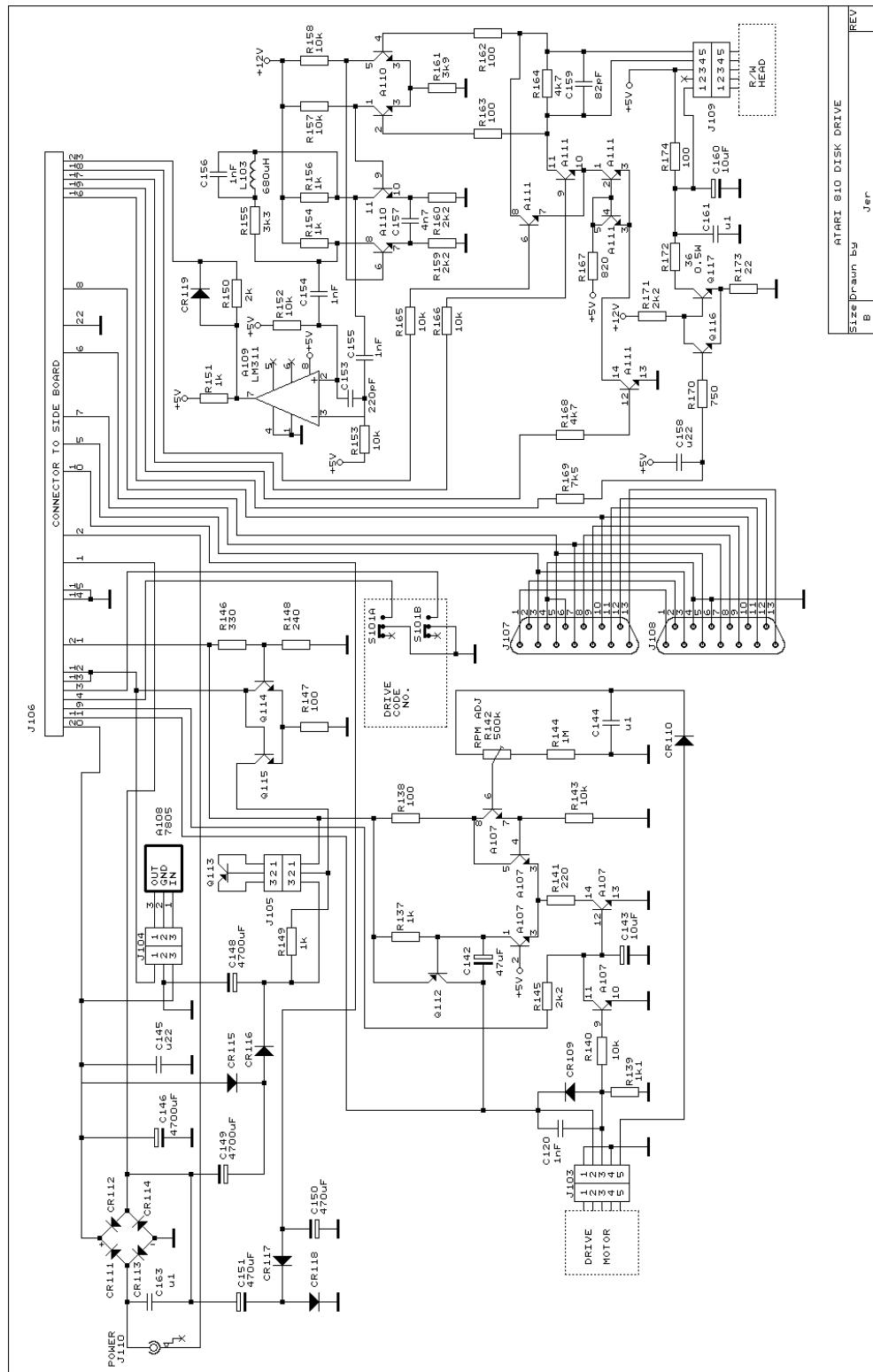
**ATARI 810 SIDE BOARD BLOCK DIAGRAM**

**ATARI 810 SIDE BOARD SCHEMATIC DIAGRAM**

3-4

**ATARI 810 REAR BOARD BLOCK DIAGRAM**

**ATARI 810 REAR BOARD SCHEMATIC DIAGRAM**
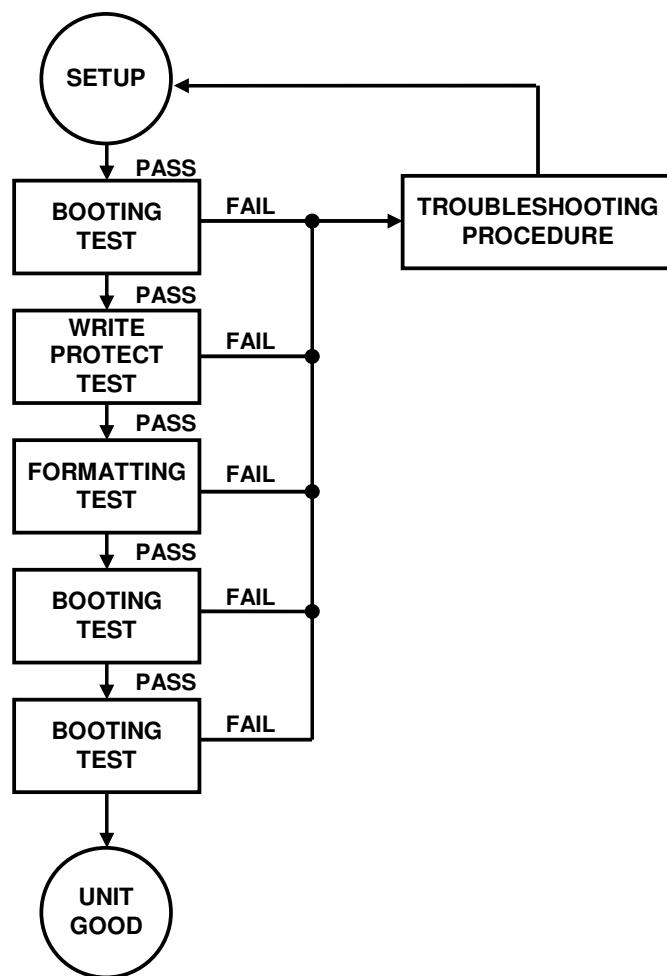
# FLOPPY QUICKCHECK

This procedure should he completed both as a
pre-service checkout and a final (post-service)
checkout for the Disk Drive.
As a pre-service checkout, it will assist in
identifying problems in the Drive.
As a final checkout, it will ensure that all repairs
and alignments were successfully completed.
This procedure follows this flow chart:

```
                         SETUP  ◄───────────────────────┐
                           │                            │
                           │ PASS                        │
                           ▼                             │
                      ┌──────────┐   FAIL          ┌──────────────────┐
                      │ BOOTING  │────────●───────►│ TROUBLESHOOTING  │
                      │   TEST   │        │        │    PROCEDURE     │
                      └──────────┘        │        └──────────────────┘
                           │              │
                           │ PASS         │
                           ▼              │
                      ┌──────────┐  FAIL  │
                      │  WRITE   │────────●
                      │ PROTECT  │        │
                      │   TEST   │        │
                      └──────────┘        │
                           │              │
                           │ PASS         │
                           ▼              │
                      ┌──────────┐  FAIL  │
                      │FORMATTING│────────●
                      │   TEST   │        │
                      └──────────┘        │
                           │              │
                           │ PASS         │
                           ▼              │
                      ┌──────────┐  FAIL  │
                      │ BOOTING  │────────●
                      │   TEST   │        │
                      └──────────┘        │
                           │              │
                           │ PASS         │
                           ▼              │
                      ┌──────────┐  FAIL  │
                      │ BOOTING  │────────┘
                      │   TEST   │
                      └──────────┘
                           │
                           ▼
                         UNIT
                         GOOD
```

All tests must be completed in the sequence shown.

The following are required to perform these procedures:

  A. Atari 400/800 Computer Console with a BASIC cartridge and minimum 16K RAM installed.
  B. I/O cables and Console/Drive power packs.
  C. TV.
  D. Master Disk File Manager diskette with writeprotect notch taped.
  E. Blank scratch diskette (not write-protected).
  F. Prerecorded sample diskette with DOS and sample programs recorded on a known "good" Disk Drive.

I

<u>SETUP</u>

1. Connect the Drive to the Console and connect both to power.
2. Turn the Drive ON and wait for the BUSY lite to go off. If BUSY lite does not come on and then go off, recheck connections then refer to the Troubleshooting Guide.

<u>BOOTING TEST</u>

  1. Insert A Master Disk File Manager diskette into the Drive and close the Drive's door.
  2. Turn the Console OFF, then ON. Verify that data is transferred from the diskette to the Console RAM (turn up the TV sound and listen for the "buzz. ..buzz...buzz...etc" , this should take about 10 seconds). When completed, the TV screen should display the word READY.
  3. If the TV displays any ERRORS or does not show READY very shortly, repeat step 2. If the system still will not "BOOT UP", recheck your Console/Drive system and hookup for misconnections or gross equipment failures. If none are found and the system continues to ERROR, refer to the Troubleshooting Guide in this manual.
  4. When the system has booted:
    a. type DOS (Disk Operating System)
    b. press the RETURN key

5.    Verify that the DOS menu appears on the TV
      screen. Refer to the Troubleshooting Guide if
      you encounter an ERROR on the TV screen.

WRITE PROTECT TEST

This test must be completed with the write-protected
Master diskette installed. The TV screen should be
displaying the DOS menu from the Booting Test.
    1. At the Console:
        a. type I (capital letter)
        b. press RETURN
        c. type 1 (number one)
        d. press RETURN
        e. type y
        f. press RETURN t
    2. Verify that, the TV screen displays ERROR-144.
       If it does, the write protect circuit is
       operating correctly, go on to step 3. If it does
       not:
        a. Repeat Step 1 again.
        b. If the ERROR-144 still does not appear, refer
           to the Troubleshooting Guide.
    3. Remove the Master diskette from the Drive.

FORIMATTING TEST

CAUTION: The formatting operation erases the contents
of a diskette.
This test must be completed with the DOS from the
Master diskette still stored in the Console RAM.
    1. Insert a non-write-protected scratch diskette
       into the Drive and close the door.
    2. At the Console:
        a. press SYSTEM RESET
        b. type DOS
        c. press RETURN
        d. type I (capital letter)
        e. press RETURN
        f. type 1 (number one)
        g. press RETURN
        h. type Y
        i. press RETURN

3. Verify that after about 45 seconds OE formatting
   the Drive's BUSY lite turns OFF and no ERRORS
   have been displayed on the TV screen (refer to
   the Troubleshooting Guide for any ERRORS).
4. At the Console:
   a. type A
   b. press RETURN
   c. press RETURN
   d. Verify that "709" or "FREE SECTORS 709" is
      displayed at bottom of screen. If not, refer
      to the Troubleshooting Guide.
5. Press RETURN to get back to "MENU"

WRITE VERIFICATION

This test must immediately follow the FORMATTING
TEST.
1. At the Console:
   a. type I
   b. press RETURN
   c. type Y
   d. press RETURN
2. Verify that the TV screen displays SELECT ITEM
   after a short period of time. If it does not,
   refer to the Troubleshooting Guide.
3. At the Console:
   a. type A
   b. press RETURN
   c. press RETURN
4. Verify that the TV screen displays DOS.SYS and
   number of sectors used, followed by the number
   of sectors remaining. If it does not reseat the
   procedure. If the second attempt fails, refer to
   the Troubleshooting Guide.

```
DISK OPERATING SYSTEM II VERSION 2.05
COPYRIGHT 1980 ATARI

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

SELECT ITEM OR RETURN FOR MENU
A
DIRECTORY--SEARCH SPEC,LIST FILE?

   DOS      SYS 039
   DUP      SYS 042
626 FREE SECTORS

SELECT ITEM OR RETURN FOR MENU
■
```

    5. Delete the file as follows:
       a. At the Console:
          1. press RETURN
          2. type D
          3. press RETURN
          4. type DOS.SYS
          5. press RETURN
          6. type y
          7. press RETURN
       b. After a "SELECT ITEM" appears, at the
         Console:
          1. type A
          2. press RETURN
          3. press RETURN
       c. Verify that the TV screen indicates that
         there are 709 free sectors remaining.
    6. Remove the blank scratch diskette from the Drive.

COMPATIBILITY TEST

This test verifies that the Drive can read programs
from a diskette recorded on a known "good" Drive.
1. Insert a sample diskette into the Drive.
2. Turn the Console OFF, then ON.
3. Verify that after about 10 seconds, the TV
   screen displays READY.
4. At the Console:
   a. type DOS
   b. press RETURN
5. Verify that the DOS menu appears on the TV
   screen, indicating that the diskette data was
   correctly loaded into the Console RAM. Refer to
   the Troubleshooting Guide in case of any ERRORS.
6. At the Console:
   a. type A
   b. press RETURN
   c. press RETURN
7. Verify that the Drive's BUSY lite comes ON as
   the Drive loads its directory listing into the
   Console. The directory should appear on the TV
   screen.
8. Choose a program you wish to load.
   At the Console:
   a. press RETURN
   b. type B
   c. press RETURN
   d. type LOAD "D:NAME OF PROGRAM"
   e. press RETURN
9. Verify that the Drive's BUSY lite comes on as
   the Drive loads the selected program. After
   several seconds, the word READY should appear at
   the top of the screen. If not, refer to the
   Troubleshooting Guide.
10.   At the Console:
      a. type RUN
      b. press RETURN
   Verify that the selected program runs correctly.
   If it ERRORS, refer to the Troubleshooting Guide.
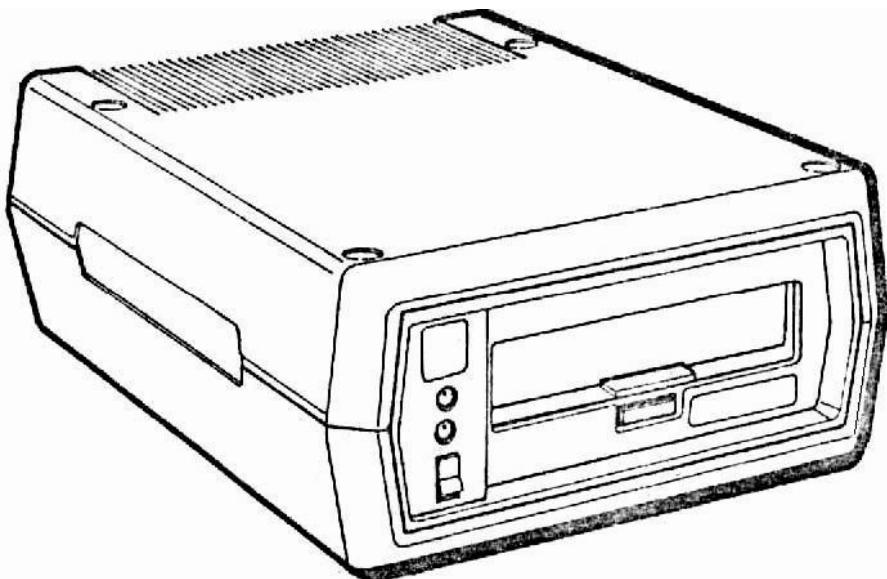
# TROUBLESHOOTING

| | SYMPTOM | POSSIBLE CAUSE | CORRECTIVE ACTION |
|---|---|---|---|
| 1 | Drive will not turn ON. | A.Defective transformer.<br>B.Electrical malfunction: Power Switch on Side PCB, Power Supply on Rear PCB. | A. Replace transformer.<br>B. Replace and/or troubleshoot PCB(s). |
| 2 | Drive will not turn OFF. | A. Defective Side and/or Rear PCB | A. Replace or repair PCBs. |
| 3 | Diskette does not turn. | A. Drive Belt has fallen off Flywheel/Pullen or is broken.<br>B. Drive Motor defective.<br>C. Clutch Cone not clamping diskette.<br>D. Electrical malfunction Drive Motor Circuit. Rear PCB. | A. Reposition or replace Drive Belt.<br>B. Replace Drive Motor.<br>C. Adjust or replace Clutch Cone assembly.<br>D. Replace and/or troubleshoot PCB. |
| 4 | Diskette speed slow or varying. | A. Drive Motor Tach line out of place.<br>B. Write Protect Circuit bad.<br>C. Drive Belt incorrectly tensioned.<br>D. Drive Belt stretched.<br>E. Electrical malfunction Drive Motor circuit Rear PCB.<br>F. Spindle Bearing freezing. | A. Connect green Motor Harness to center terminal of Write Protect Harness.<br>B. Replace transport left Side Plate.<br>C. Adjust Belt tension<br>D. Replace Drive Belt.<br>E. Replace and/or troubleshoot PCB.<br>F. Replace Spindle Bearing. |
| 5 | Diskette won't eject when front door is opened. | A. Eject mechanism need adjusting or is broken.<br>B. Clutch Cone-to-Spindle clearance (door open0too small. | A. Adjust or replace Eject Mechanism.<br>B. Shim the Clutch Cone assembly. |
| 6 | Front door won't open | A. Door latching mechanism need adjustment or is broken. | A. Adjust or replace door latch. |
| 7 | Drive/Console System not boot-up | A. Drive Motor speed incorrect.<br>B. Can't find Track 00.<br>C. Electrical malfunction Side or Rear PCB(s).<br>D. Stepper Motor malfunctioning.<br>E. Radial track misalignment.<br>F. Bad Head | A. Adjust Drive Motor speed.<br>B. Adjust Track 00 stop setscrew.<br>C. Replace and/or troubleshoot PCB(s).<br>D. Replace Stepper Motor.<br>E. Complete radial track alignment.<br>F. Replace Head assembly. |

Continue…

| | SYMPTOM | POSSIBLE CAUSE | CORRECTIVE ACTION |
|---|---|---|---|
| 8 | Occasional read errors all tracks. | A. Damaged diskette.<br>B. Dirty or magnetized head.<br>C. Worn or dirty head pressure pad.<br>D. Overstressed pressure pad arm spring. | A. Replace diskette.<br>B. Clean and demagnetize head.<br>C. Replace head pressure pad.<br>D. Replace spring or head assembly. |
| 9 | Occasional read errors inner tracks. | A. Drive Motor speed incorrect.<br>B. Electrical malfunction in read circuit. | A. Adjust Drive Motor speed.<br>B. Replace and/or troubleshoot Rear PCB, Side PCB or Head. (Check for slow Q102 or Z104 on Side PCB. |
| 10 | Occasional read errors outer tracks. | A. Drive Motor speed incorrect.<br>B. Electrical malfunction in read circuit. | A. Check to ensure diskette is not write-protected.<br>B. Replace Z105.<br>C. Replace and/or troubleshoot PCB(s), transport. |
| 11 | Drive incompatibility | A. Drive Motor speed incorrect.<br>B. Radial track misalignment. | A. Adjust Drive Motor Speed.<br>B. Replace and/or troubleshoot Rear PCB, Side PCB or Head. |
| 12 | Various errors code during operation. | A. Eject mechanism need adjusting or is broken.<br>B. Clutch Cone-to-Spindle clearance (door open0too small. | A. Adjust or replace Eject Mechanism.<br>B. Complete radial track alignment. |
| 13 | Drive writes onto write-protected diskettes. | A. Malfunctioning Write-Protect circuit. | A. Check write-protect LED/photo-transistor, wiring harness connections. Transport left sideplate. |

# DISSASSEMBLY / REASSEMBLY

# DISASSEMBLY AND REASSEMBLY
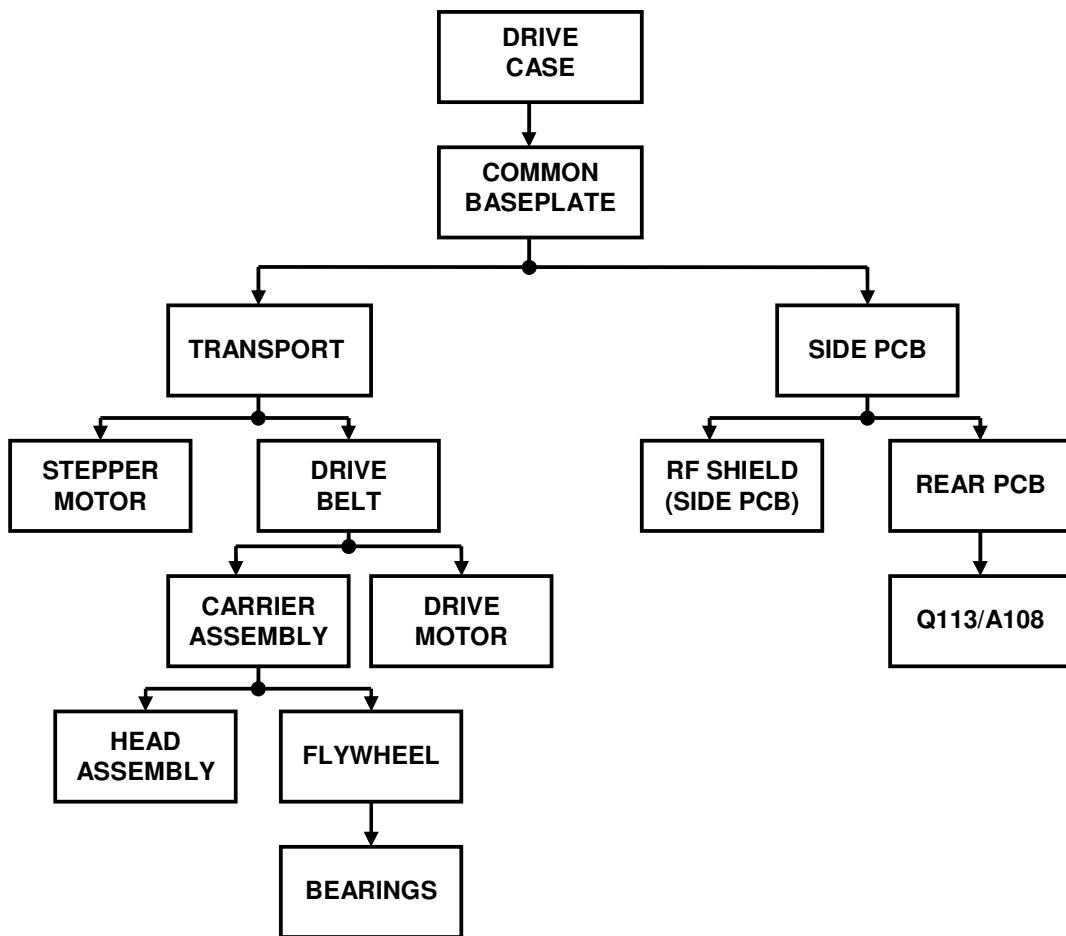
The level of Disk Drive disassembly will vary with
the specific problem encountered. Some procedures
list steps which are themselves procedures: i.e.
"Disassemble the Drive case." When you encounter an
underlined step, turn to that procedure first and
follow it before proceeding.

SPECIAL NOTES

1. Refer to the Disk Drive and 400/800 Operators
   Manuals for proper Drive setup and operation.
2. Disk Drive circuitry includes static sensitive
   MOS devices. All Drive repairs should be
   performed at static protected work surfaces.
   Anyone handling Drive PCBs should wear a
   grounding strap.
3. To prevent thread damage, use only the specified
   screws.
4. Overtightening screws will strip the threads on
   plastic and aluminum parts. Do not exceed 6 inch
   pounds torque for plastic parts, or 10 inch
   pounds torque for aluminum parts.

5. Internal wiring connections are made with wiring harnesses terminated by nonpolarized pins and jacks. Be sure all pins and jacks are correctly installed before trying to operate the Disk Drive.
6. When reassembling the Drive, ensure that all wiring harnesses are routed in such a way as to prevent them from being pinched between reassembled parts.

## DISASSEMBLY FLOW CHART
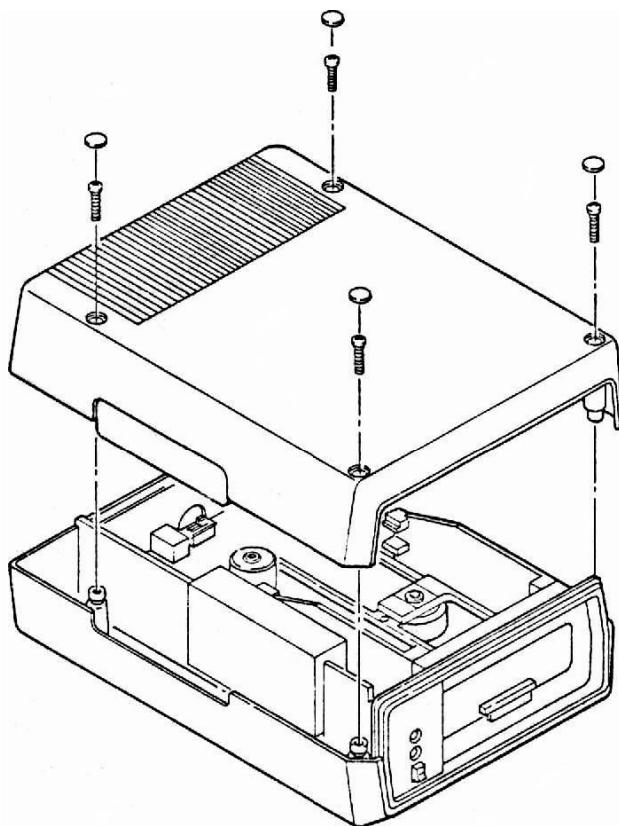


Identify the level of required and complete disassembly the sequence of steps indicated above.

# DISSASSEMBLY

I
<u>DISASSEMBLING THE DISK DRIVE CASE</u>

WARNING: Unplug the Drive's AC transformer from AC
power BEFORE opening the case.
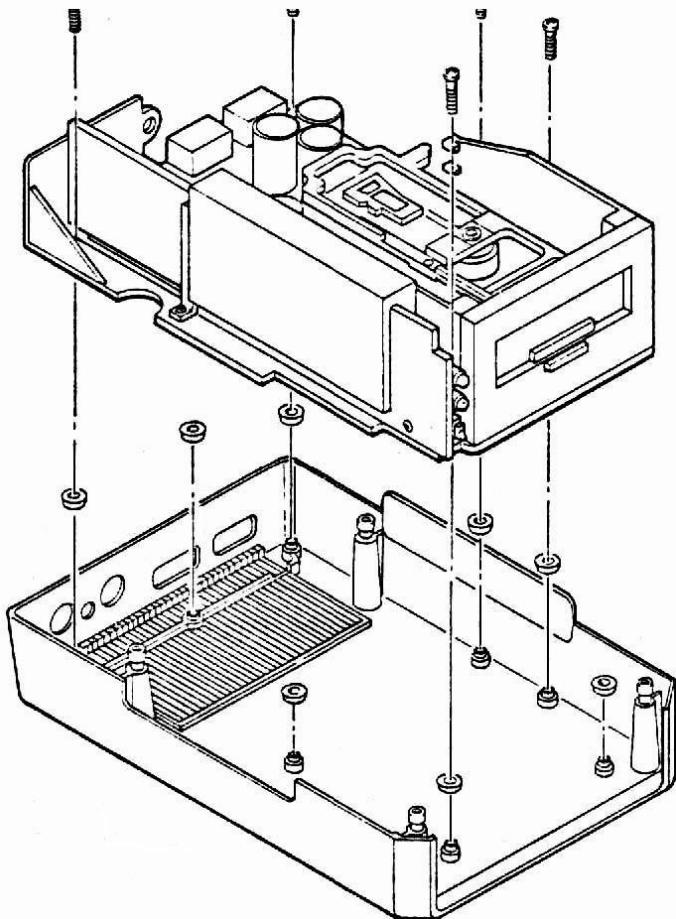


1. With the Disk Drive rightside up on a suitable
   work surface, locate and remove the four adhesive
   screw hole covers on the tophousing.
2. Locate and remove the four screws securing the
   tophousing to the base.
3. Lift the tophousing from the base, and set it
   aside.

CAUTION: The record/playback and erase head sub-
assembly is extremely sensitive to magnetic fields.
DO NOT use magnetized tools or articles when working
inside the Drive case or near the Drive transport.
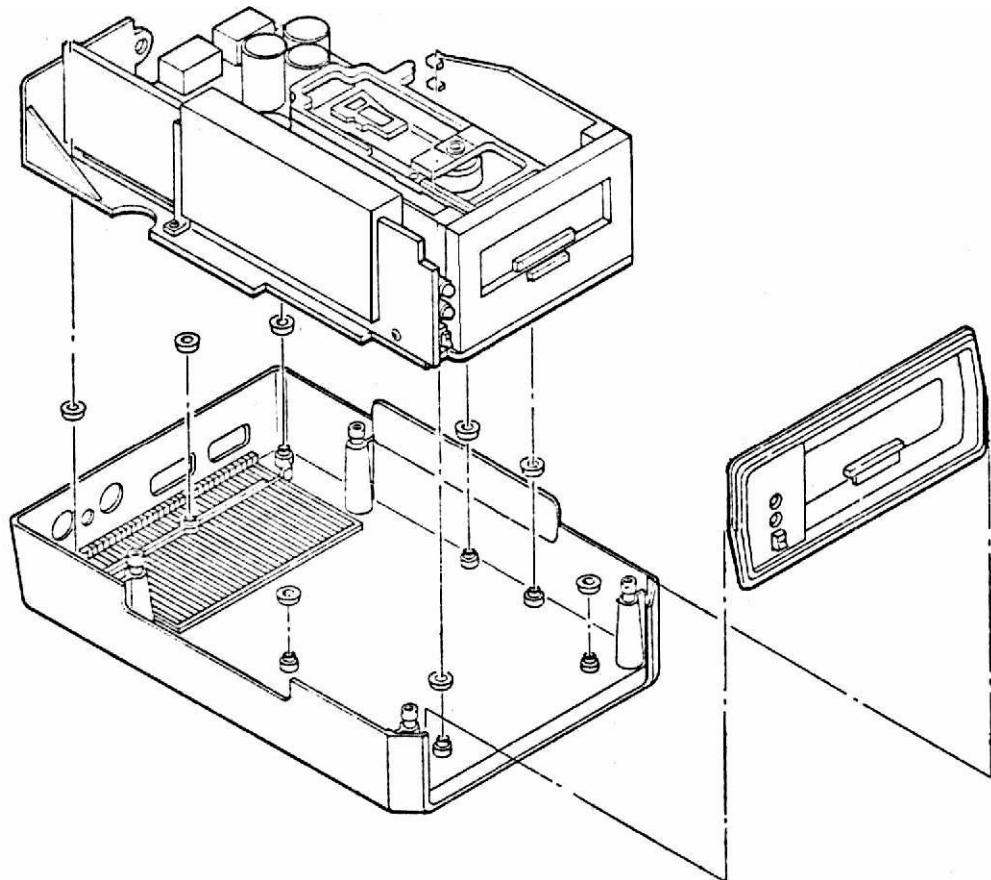
REMOVING THE COMMON BASEPLATE

     NOTE : Removal of either the side PCB, rear PCB
     or Drive transport requires removal of their
     common baseplate from the Disk Drive base.
1. Disassemble the Disk Drive case.
2. Disconnect the AC transformer power cord from the
   PWR jack at the rear of the Drive chassis.
3. Disconnect any I/O cables from the I/O CONNECTORS
   at the rear of the Drive chassis.
4. Locate and remove the five screws securing the
   common baseplate to the base.



5. Carefully lift the baseplate from the base. Note
   that each of the bosses in the base is topped
   with a rubber washer.
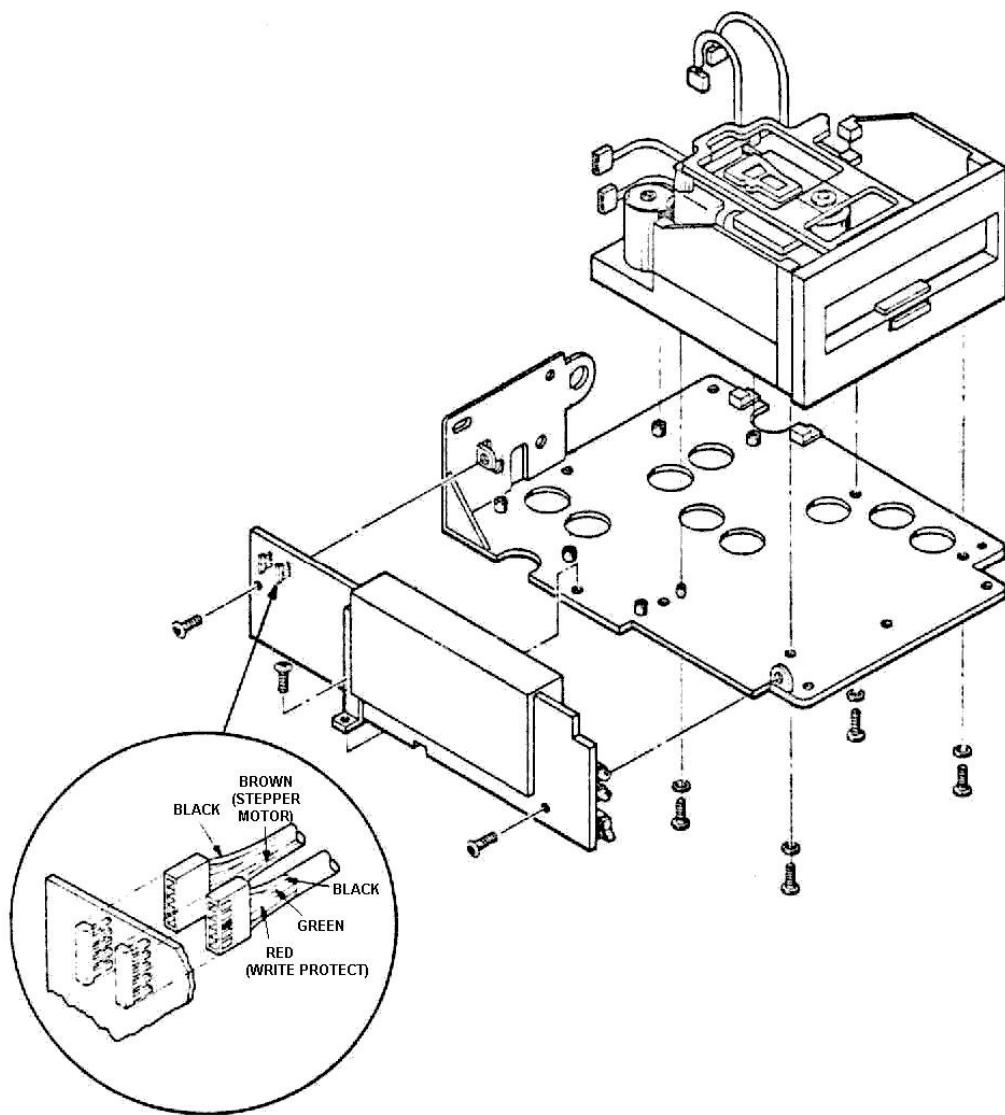
NOTE: As you lift the baseplate from the base, the
front coverplate will lift out at the same time.
Remove the coverplate from the baseplate and set it
aside.
   6. Place the baseplate on a suitable static
      protected work surface.

REMOVING THE SIDE PCB
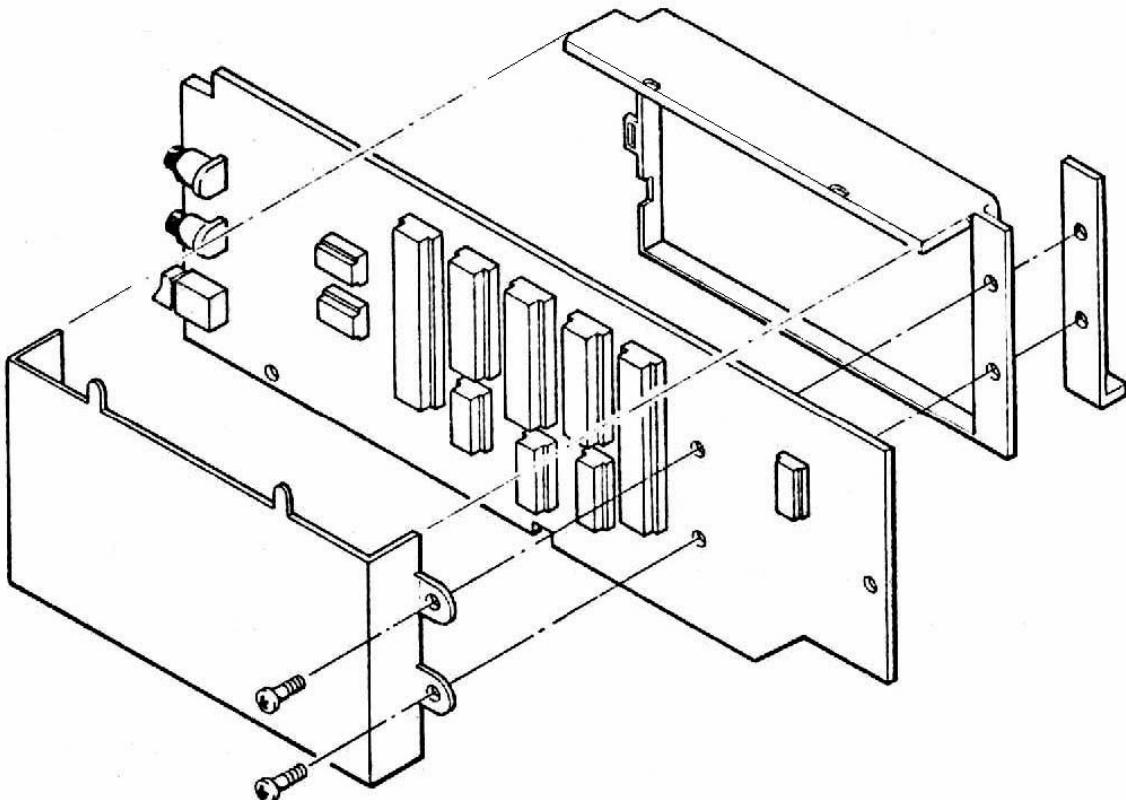
  1. Disassemble the Disk Drive case.
  2. Remove the common baseplate from the Drive base.
  3. Locate and disconnect the write protect wiring
    harness (nonpolarized – black, green, (blank),
    red, black) from the side PCB.
  4. Locate and disconnect the stepper motor wiring
    harness (nonpolarized – black, white, red, green,
    brown) from the side PCB.
    NOTE: See Appendix for alternate wiring harness
    arrangement.

BLACK

BROWN
(STEPPER
MOTOR)

BLACK

GREEN

RED
(WRITE PROTECT)

5. Locate and remove the three screws securing the
   side PCB and its center ground bracket to the
   common baseplate.
6. Grasp the side PCB at both its front edge and its
   upper rear corner. Lift the PCB straight up to
   disengage its rear jack from the row of pins
   NOTE: You may have to rock the PCB slightly to
   overcome the jack-to-pin tension between the two
   PCBs.
7. Place the side PCB on a static protected work
   surface.

REMOVING THE RF SHIELD (SIDE PCB)
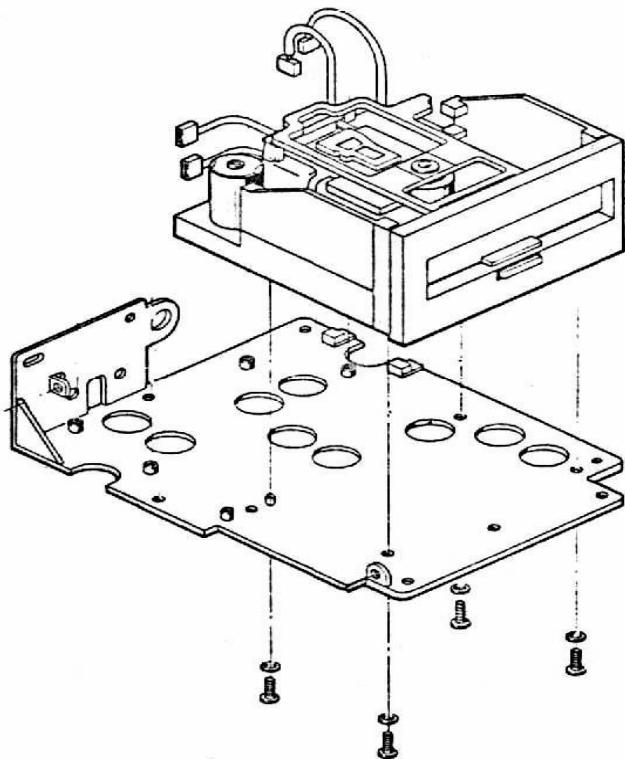
1. Disassemble the Disk Drive case.
2. Remove the common baseplate from the Drive base.
3. Remove the side PCS from the common baseplate.
4. Locate and carefully straighten the three tabs
   securing the RF shield case halves together on
   the side P6B.
   CAUTION: Excessive bending of the metal tabs will
            break them. DO NOT bend the tabs anymore
            than necessary.



5. Locate and remove the two screws securing the
   case halve to the ground bracket and PCB.
6. Carefully disengage the case halves from each
   other and the PCB. Set the case halves aside.

REMOVING THE DRIVE TRANSPORT

1. Disassemble the Disk Drive case.
2. Remove the common baseplate from the Drive base.
3. Remove the side PCB.
4. Grass the transport securely, tip the assembly upside down, and place it on a suitable work surface.
5. Locate and remove the four screws that secure the transport to the baseplate. The screws are accessible only from the underside of the baseplate.
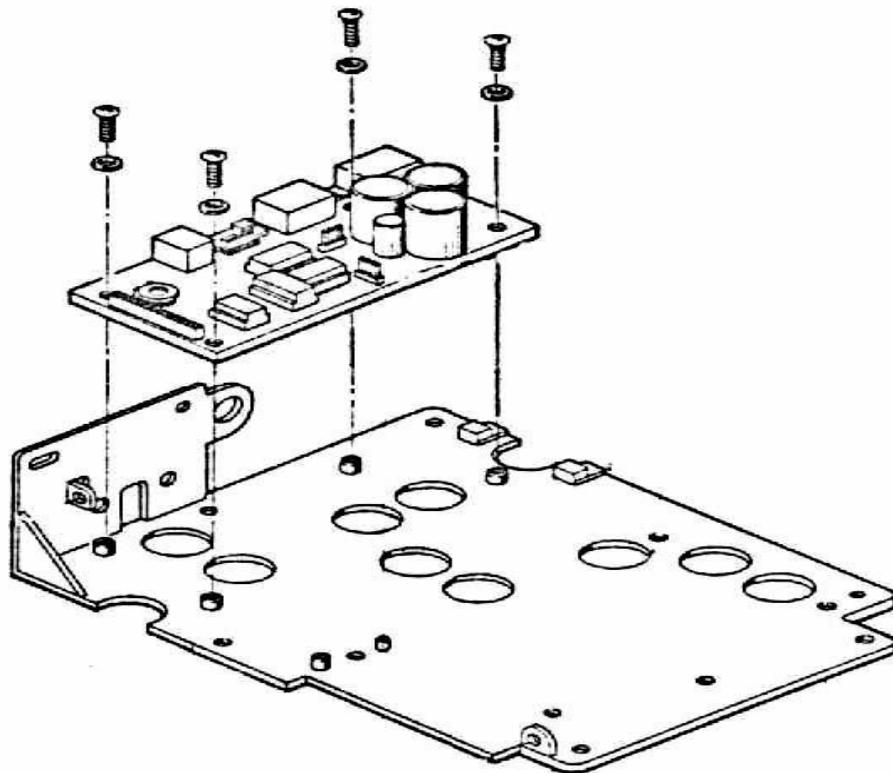


CAUTION: The transport provides critical mechanical alignments necessary for proper Disk Drive operation. Be very careful not to jar or damage the transport or any of its associated sub-assemblies and components.

6. Place the transport and baseplate on a suitable work surface.

REMOVING THE REAR PCB

1. Disassemble the Disk Drive case.
2. Remove the common baseplate from the Drive base.
3. Remove the side PC8 from the common baseplate.
4. Locate and remove the four screws securing the rear PCB to the common baseplate.
5. Grasp the rear PCB on both side edges. Carefully lift the board straight up far enough to disengage the board's two right side jacks from the six device pins.
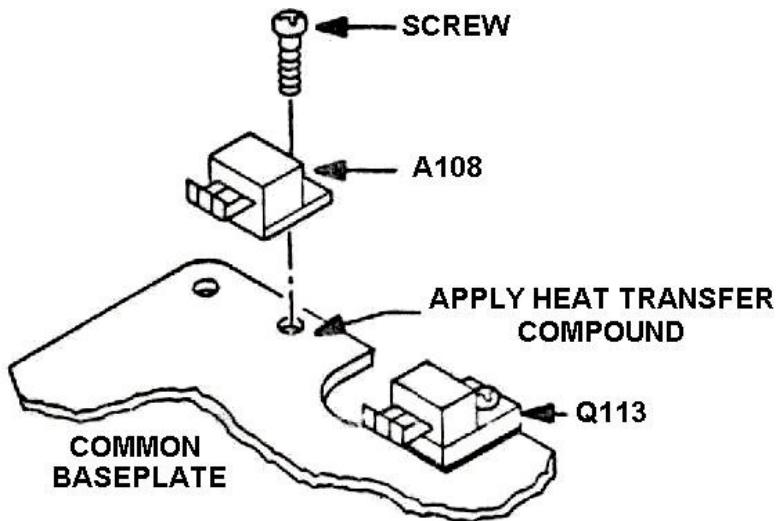


   NOTE: You may have to rock the PCB slightly to overcome the jack-to-pin tension between the PCB and the pins attached to the common baseplate.
6. Lift the rear PCB away from the baseplate and place it on a suitable work surface.

## REMOVING Q113 (TRANSISTOR)/A108 (VOLTAGE REGULATOR)

1. Disassemble the Disk Drive case.
2. Remove the common baseplate from the Drive base.
3. Remove the side PCB from the common baseplate.
4. Remove the rear PCB from the common baseplate.
5. Locate and remove the single screw securing the device (either transistor Q113 or voltage regulatorAl08) to the common baseplate.
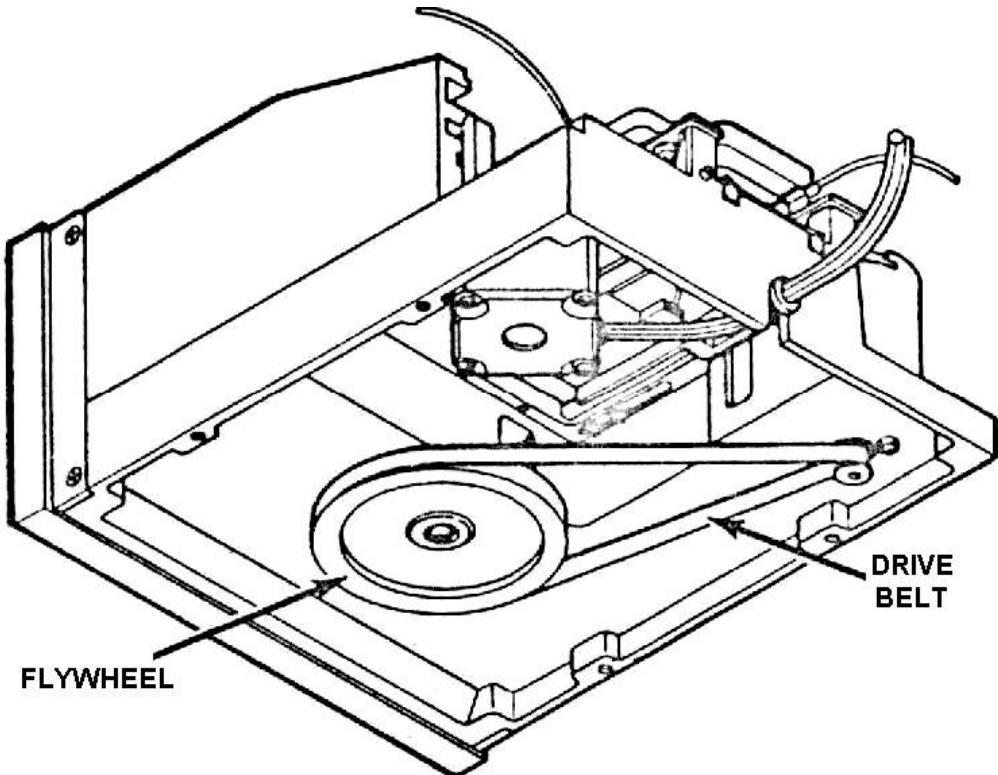


NOTE: If you are removing Q113 you should find an insulating plate between the back of the device and the common baseplate. Also, both Q113 and A108 use the common baseplate as a heatsink. Each device and Q113's insulating plate should be coated with heat transfer compound.

6. Lift the device (Q113 or A108) from the baseplate and set aside.

REMOVING THE TRANSPORT DRIVE BELT
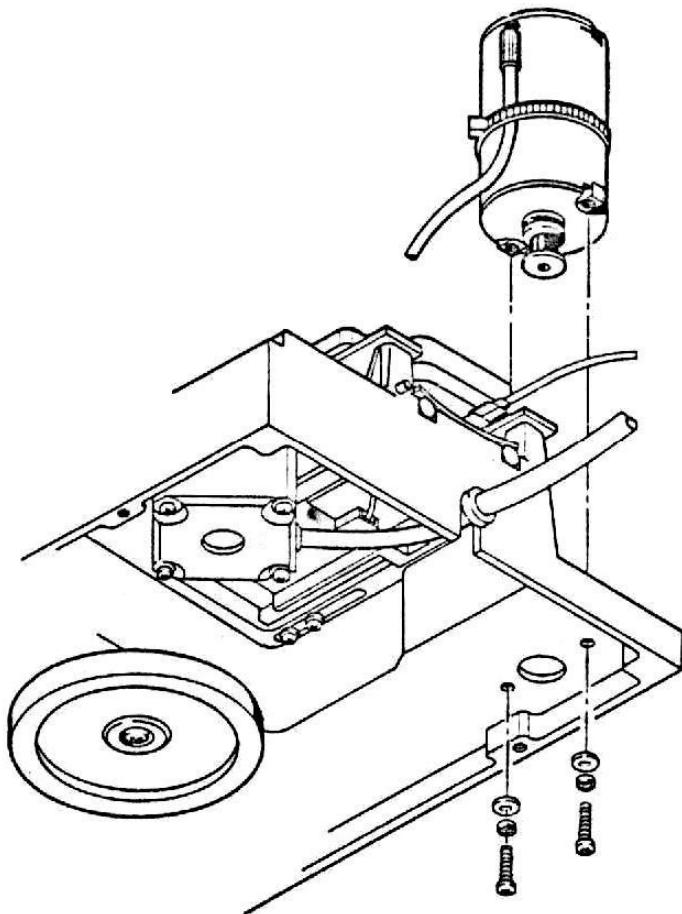
1. Disassemble the Disk Drive case.
2. Remove the common baseplate from the Drive base.
3. Remove the Drive transport from the common
   baseplate.
4. Carefully lay the transport on its side.
5. Locate and remove the drive belt.



NOTE: TO remove the drive belt without stretching or
damaging rotate the large flywheel (naked for strobe)
while easing the belt off the outside edge of the
flywheel.

REMOVING THE TRANSPORT DRIVE MOTOR
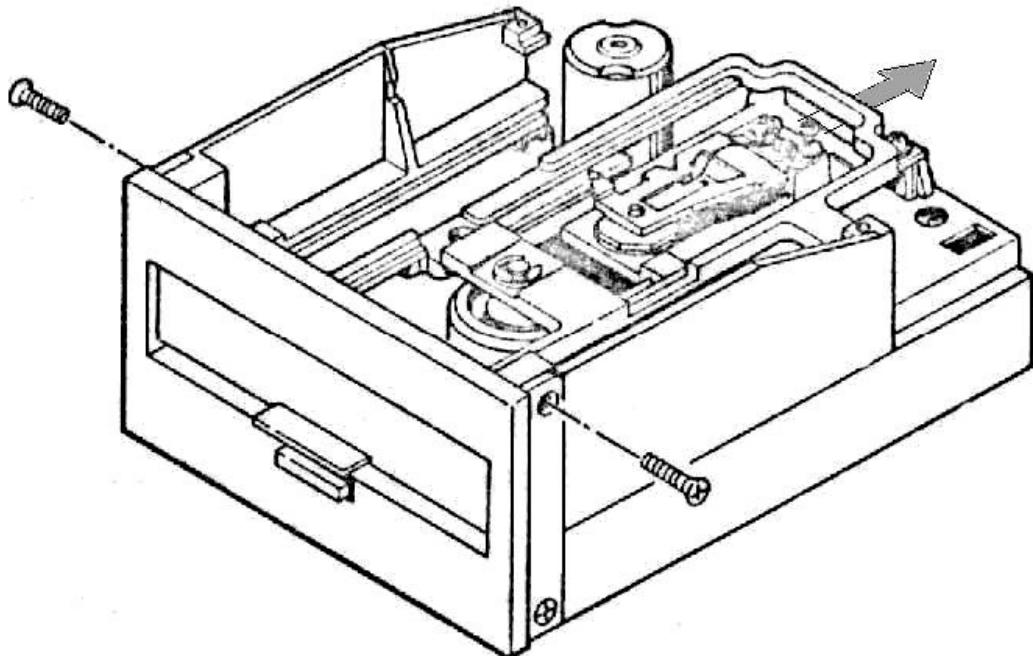
1. Disassemble the Disk Drive case.
2. Remove the common baseplate from the Drive base.
3. Remove the Drive transport from the common baseplate
4. Remove the drive belt from the transport.
5. Locate and disconnect the single black ground lead coming from the drive motor wiring harness and going to the transport casting.
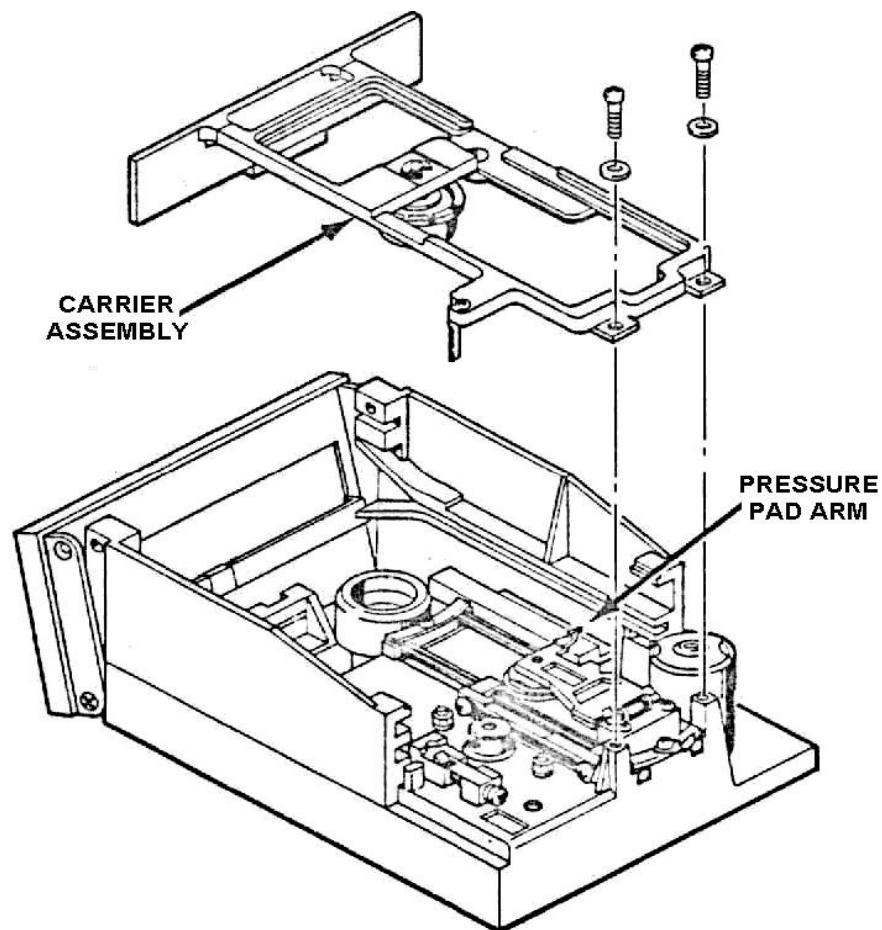


6. While supporting the drive motor with one hand, locate and remove the two screws securing the drive motor to the transport casting.
7. Separate the drive motor from the casting.

REMOVING THE CARRIER ASSEMBLY

1. Disassemble the Disk Drive case.
2. Remove the common baseplate from the Drive base.
3. Remove the Drive transport from the common baseplate.
4. Locate the head assembly and slide the assembly all the way to the rear of its travel.



5. Locate and loosen approximately two full turns, but do not remove, the two screws securing the carrier assembly to the rear of the transport casting.
6. Locate the four screws securing the front panel bezel to the side guide assemblies and the transport casting.
7. Loosen (do not remove) the two bottom screws approximately four full turns.
8. Remove the two top screws.

**CARRIER ASSEMBLY**

**PRESSURE PAD ARM**
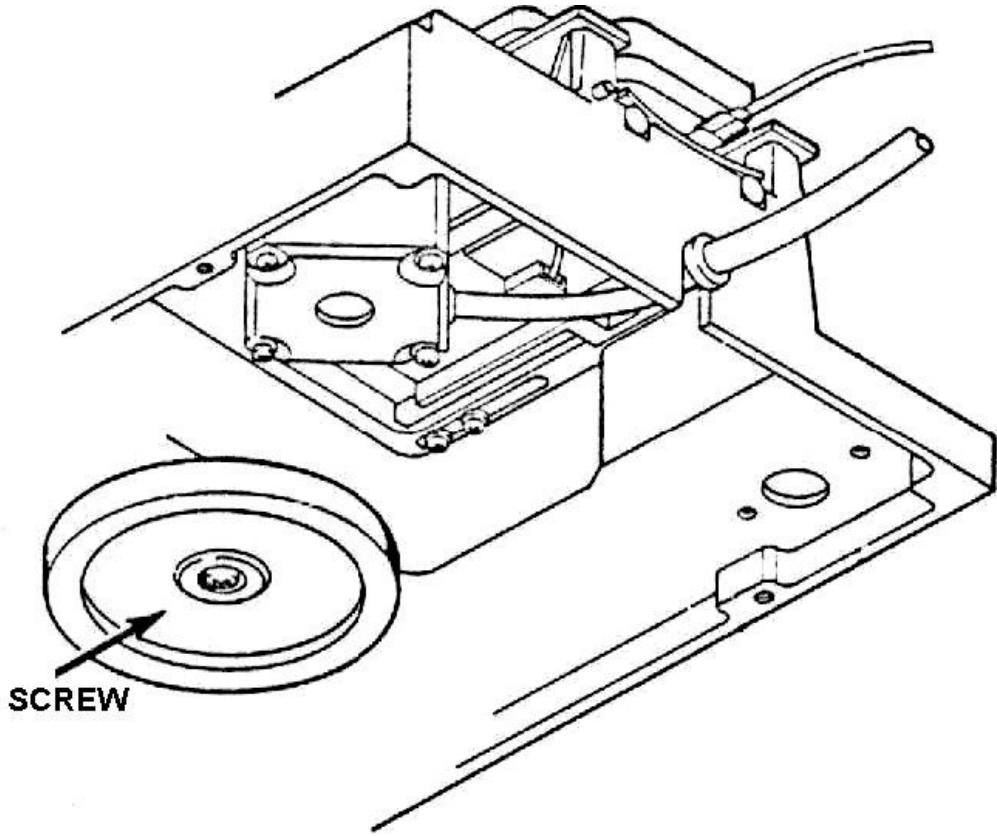
9. Push the door release button at the front of the transport to disengage the carrier assembly from the door latch. Lift the assembly far enough to clear the latch mechanism and release the button. Lower the door to a resting position.
10. Now completely remove the two screws at the rear of the transport casting.
11. Pull the top of the front panel bezel forward.
12. Carefully, lift the carrier assembly out of the transport.

CAUTION: You will have to tilt the carrier assembly slightly to clear the head assembly's pressure pad arm. DO NOT lift the pressure pad arm higher than it would be lifted by the door arm during normal Drive operation. Lifting the pad arm too far will distort its pressure spring changing the pressure pad's loading effect on the head.

6-15
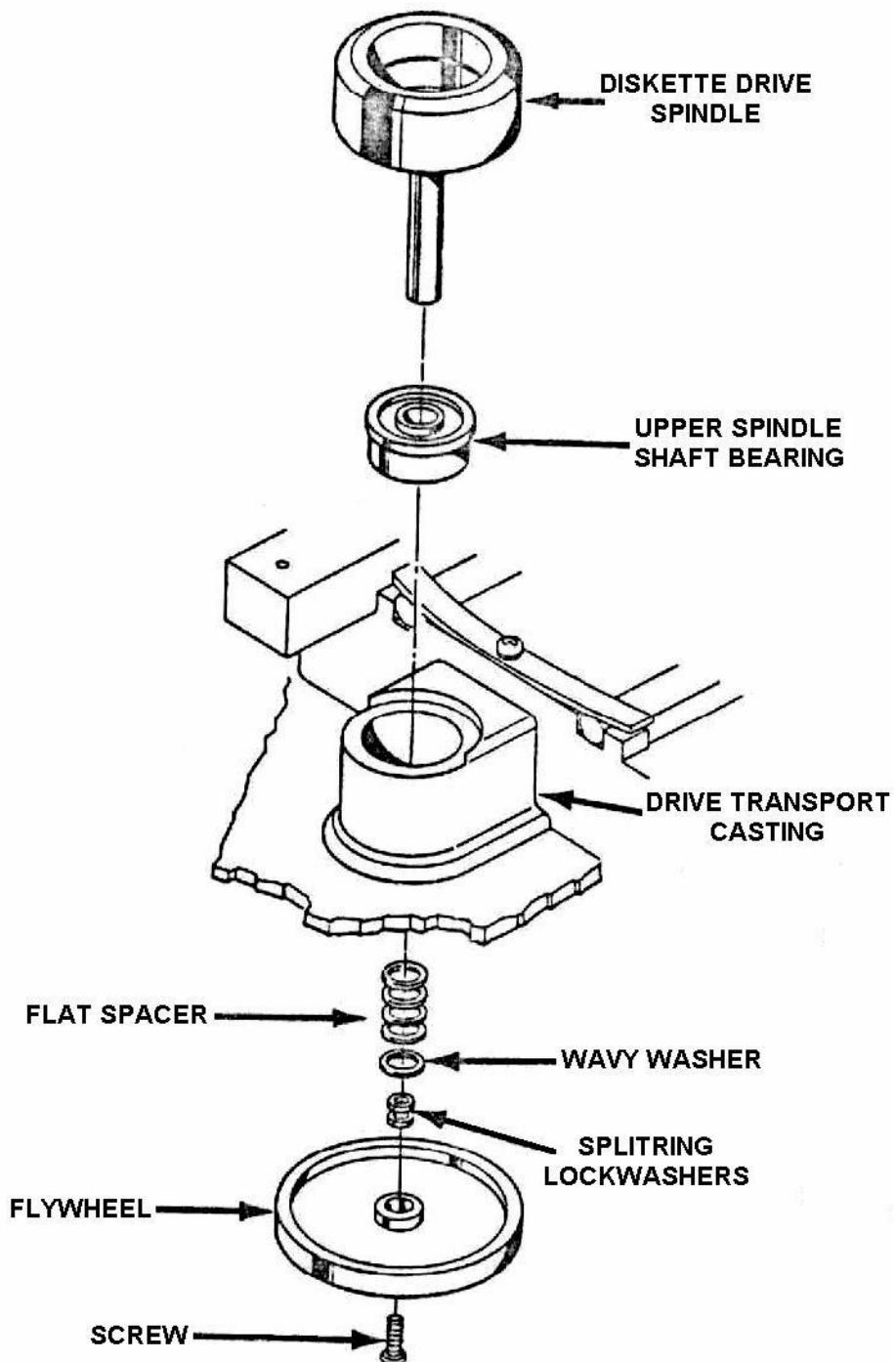
REMOVING THE TRANSPORT FLYWHEEL/DRIVE SPINDLE

1. Disassemble the Disk Drive case.
2. Remove the common baseplate from the Drive base.
3. Remove the Drive transport from the comma baseplate.
4. Remove the drive belt from the transport. .
5. Remove the carrier assembly from the transport.
6. Carefully lay the transport on its side.



**SCREW**

7. Locate the single screw in the center of the flywheel. Holding the flywheel with one hand, remove the screw.
   NOTE: See the following illustration of the flywheel/casting/spindle relationship. The specific number and placement of the washers is very important and helps to determine diskette speed during operation. DO NOT lose any of the washers you remove during this step.

DISKETTE DRIVE
SPINDLE

UPPER SPINDLE
SHAFT BEARING

DRIVE TRANSPORT
CASTING

FLAT SPACER

WAVY WASHER

SPLITRING
LOCKWASHERS

FLYWHEEL

SCREW

8. Being very careful not to lose any washers, hold
   the drive spindle with one hand and carefully
   pull the flywheel away from the casting with the
   other hand.
9. Pull the spindle from the casting.
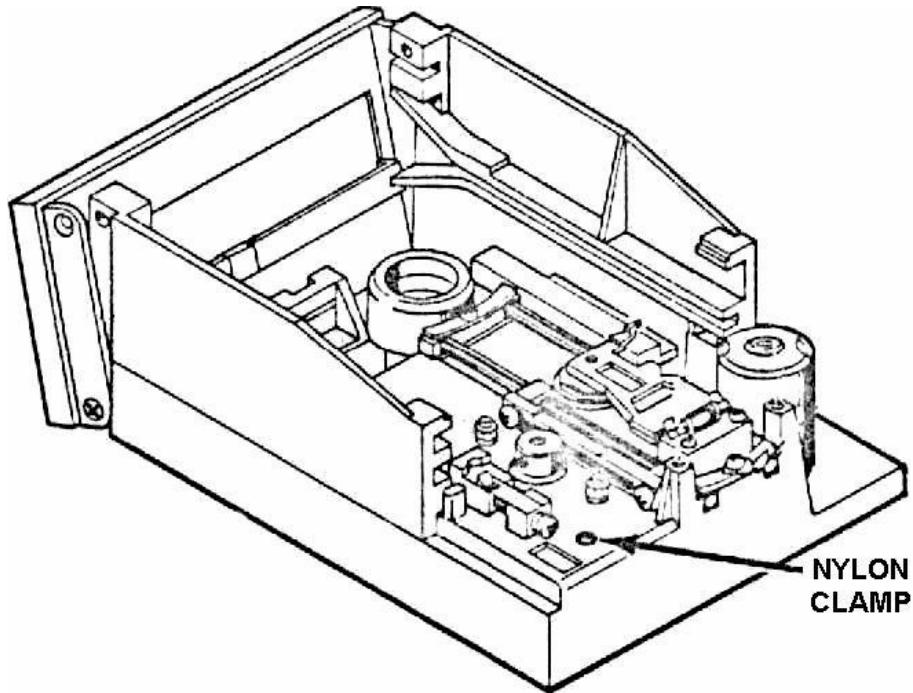
REMOVING THE TRANSPORT SPINDLE SHAFT BEARINGS

1. Disassemble the Disk Drive case.
2. Remove the common baseplate from the Drive base.
3. Remove the Drive transport from the common baseplate.
4. Remove the Drive belt from the transport.
5. Remove the carrier assembly from the transport.
6. Remove the flywheel and drive spindle from the transport.
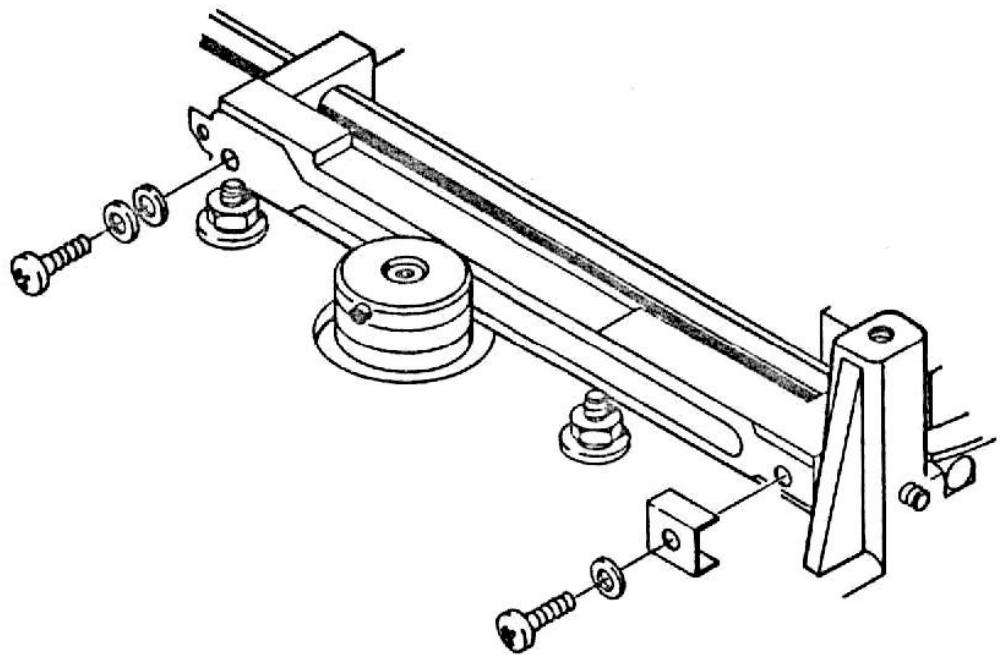

7. The top spindle shaft bearing may have lifted from the casting when you removed the drive spindle. If it did not, very carefully pry the bearing out of the casting.
8. Very carefully push the bottom bearing out of the casting (push from the top side of the casting, being very careful not to damage the casting bore).

REMOVING THE HEAD ASSEMBLY

1. Disassemble the Disk Drive case.
2. Remove the common baseplate from the Drive base.
3. Remove the Drive transport from the common baseplate.
4. Remove the Drive belt from the transport.



NYLON
CLAMP

5. Locate the nylon clamp securing the record/playback and erase head I/O wiring harness to the right rear corner of the casting. Release the clamp from the casting.
6. Push the head assembly as far to the rear of the Drive as it will slide.
7. Locate and remove the ground lead (black wire from the drive motor wiring harness) faston from the rear of the casting.
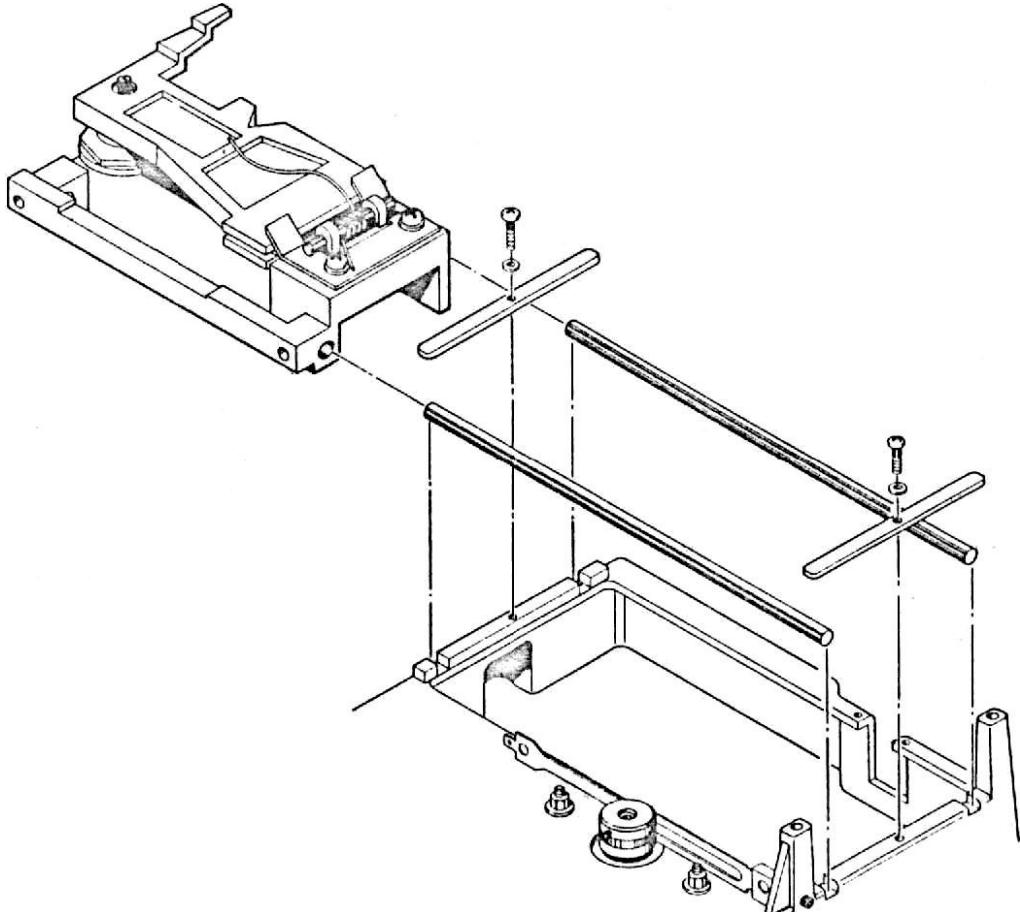
8. Locate the two screws securing the stepper motor
   positioning band to the right side of the head
   assembly.
   a. Remove the rear screw, being very careful not
      to crimp or damage the band, and noting the
      screw and washer arrangement.
   b. Slide the head assembly carriage forward
      enough to allow you to remove the front band
      screw. Remove the front screw, again noting
      the screw and washer arrangement.

NOTE: The stepper motor positioning band is very
delicate and very important to the operation of the
Drive. DO NOT kink or damage the band in any way.

9. Locate the two screws securing the carriage
   guiderod clamps to the drive casting.

10. Remove the two screws and lift the guiderod
    clamps away from the assembly.

11. Carefully pry the two guiderods up out of their
    locating notches in the drive casting.
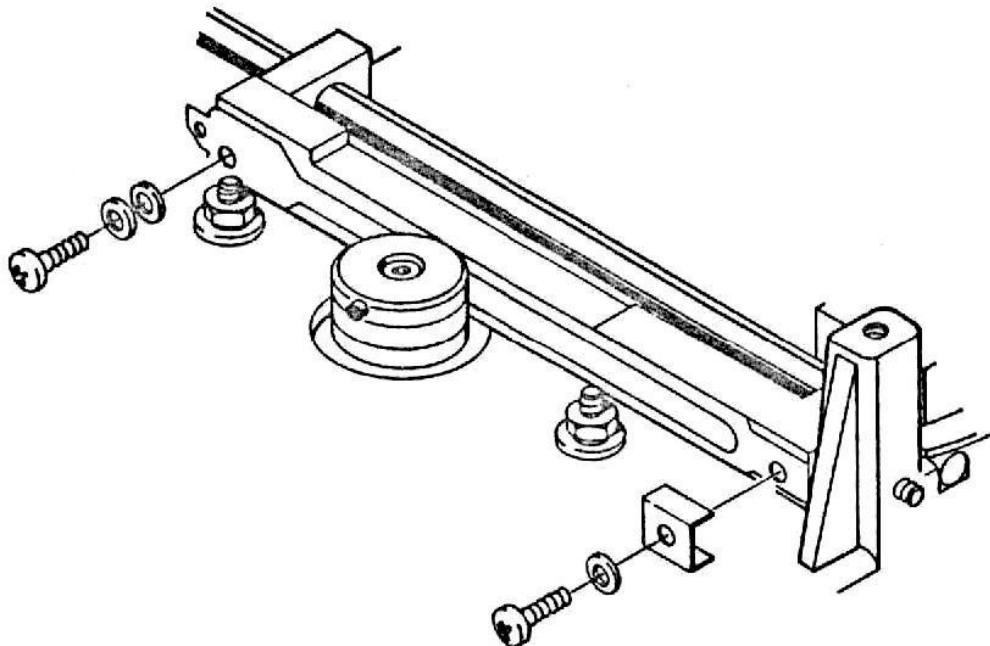


12. Gently lift the head assembly carriage and
    guiderods away from the casting. You will have to
    feed the head I/O cable through the casting at
    the same time.
    CAUTION: The head is subject to external magnetic
    fields. DO NOT use magnetized tools or allow the
    head to get near any equipment producing strong
    magnetic fields.
13. Slide the guiderods out of the carriage.

REMOVING THE STEPPER MOTOR
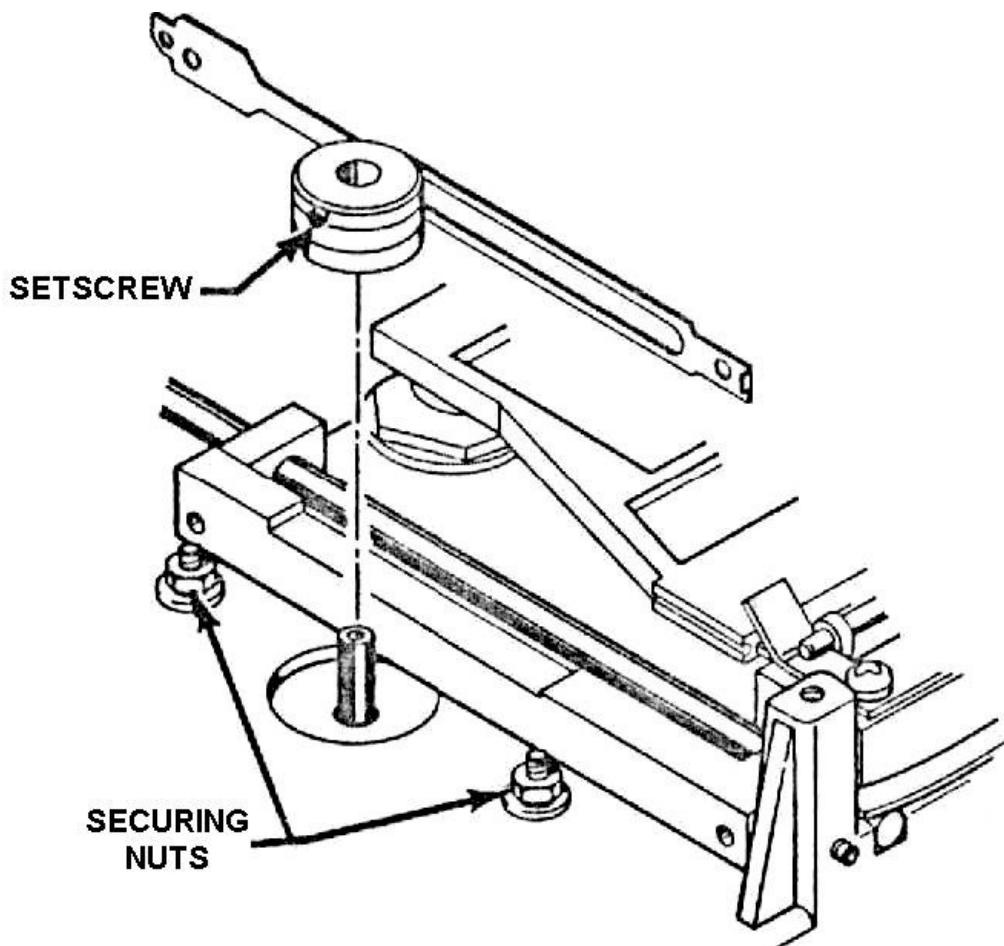
    1. Disassemble the Disk Drive case.
    2. Remove the common baseplate from the Drive case.
    3. Remove the Drive transport from the common baseplate.



    4. Locate the two screws securing the stepper motor positioning band to the right side of the head assembly.
      a. Remove the rear screw, being very careful not to crimp or damage the band, and noting the screw and washer arrangement.
      b. Slide the head assembly carriage forward enough to allow you to remove the front band screw. Remove the front screw, again noting the screw and washer arrangement.

NOTE: The stepper motor positioning band is very delicate and very important to the operation of the Drive. DO NOT kink or damage the band in any way.

5. Locate the allen-head setscrew securing the head positioning strap pulley to the stepper motor drive shaft (topside of casting).
6. Back the setscrew out about 1turn (counterclockwise).



7. Remove the band/pulley from the stepper motor shaft and set it aside.
8. Locate the two nuts securing the stepper motor to the casting.
9. Lay the casting on its left side.
10. While supporting the stepper motor with your right hand, remove the two securing nuts.
11. Carefully separate the motor from the chassis, while pulling the motor wiring harness out of its chassis slot.

# REASSEMBLY

```
┌──────────┐  ┌──────────┐  ┌──────────┐  ┌──────────┐  ┌──────────┐  ┌──────────┐
│ STEPPER  │  │   HEAD   │  │ BEARINGS │  │  DRIVE   │  │ Q113/A108│  │ RF SHIELD│
│  MOTOR   │  │ ASSEMBLY │  │          │  │  MOTOR   │  │          │  │(SIDE PCB)│
└──────────┘  └──────────┘  └──────────┘  └──────────┘  └──────────┘  └──────────┘
```

FLYWHEEL

CARRIER ASSEMBLY

DRIVE BELT

DRIVE BELT ADJ.

REAR BOARD

TRANSPORT

HEAD TRACK ALIGN

HEAD CLEAN

COMMON BASEPLATE

SIDE PCB

SPEED CNTRL ADJ.

TRACK 00 STOP ADJ.

DRIVE CASE

FINAL CHECK
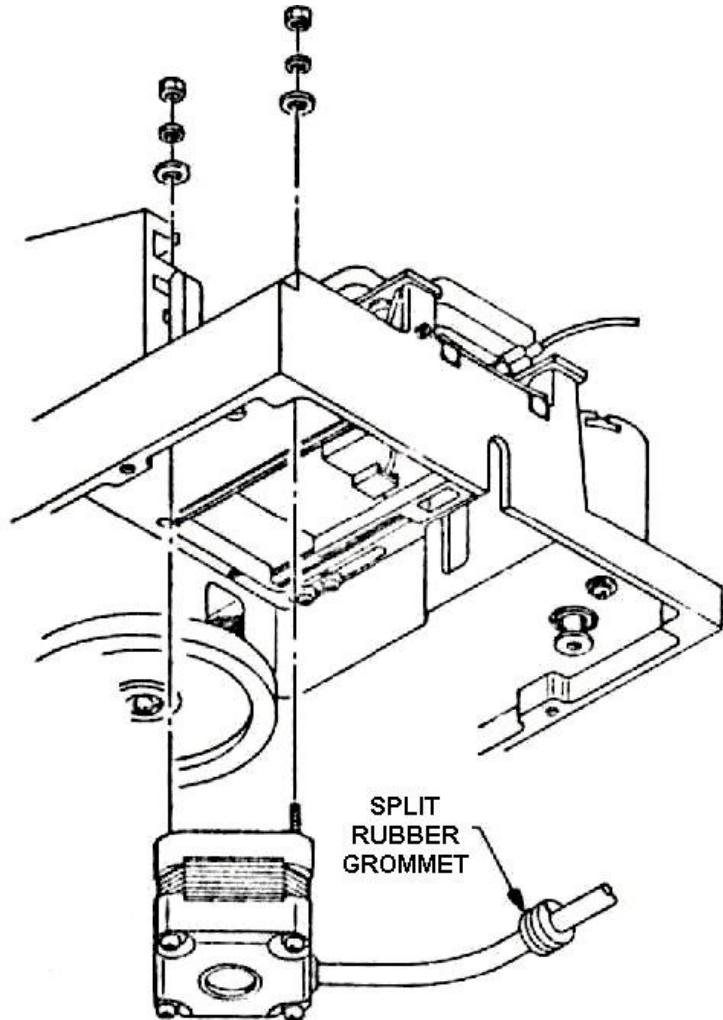
Locate the beginning point of your reassembly, and
follow the instructions called out in this flow chart
in the order shown.
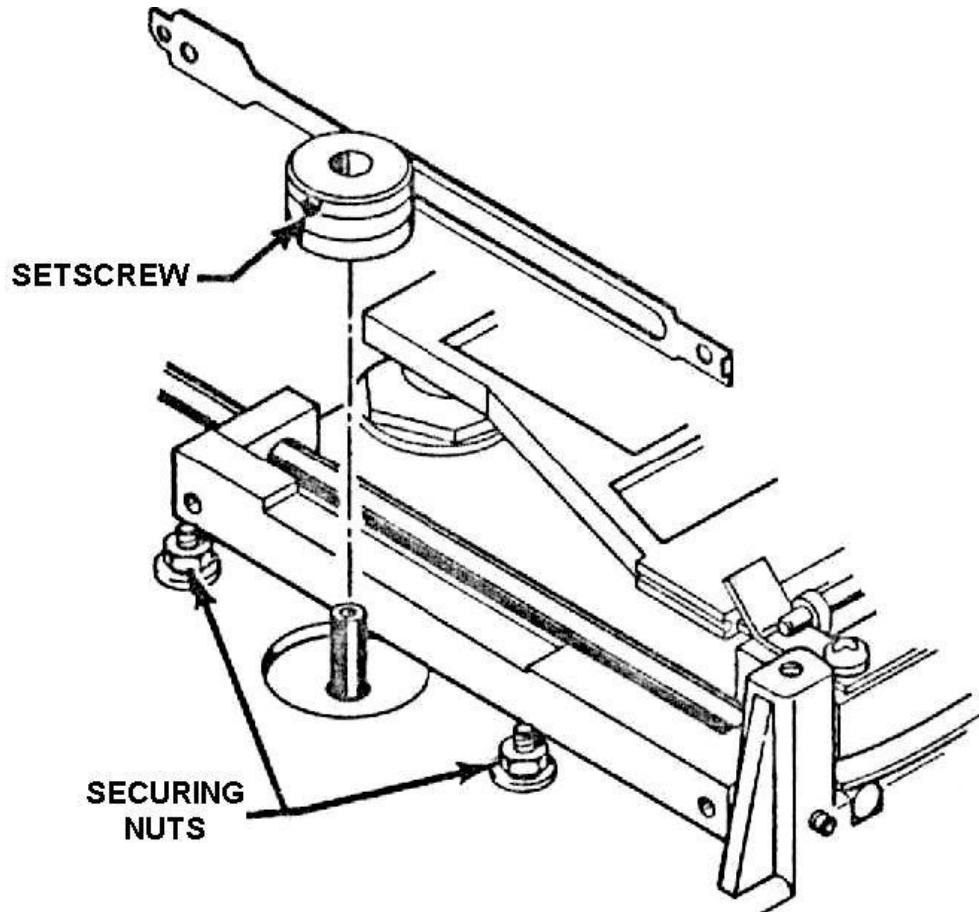
## INSTALLING THE STEPPER MOTOR

1. Install a split rubber grommet on the stepper motor wiring harness.
2. Lay the transport on its left side.
3. Position the stepper motor to the underside of the transport casting. The motor's wiring harness should lie toward the rear center of the casting.
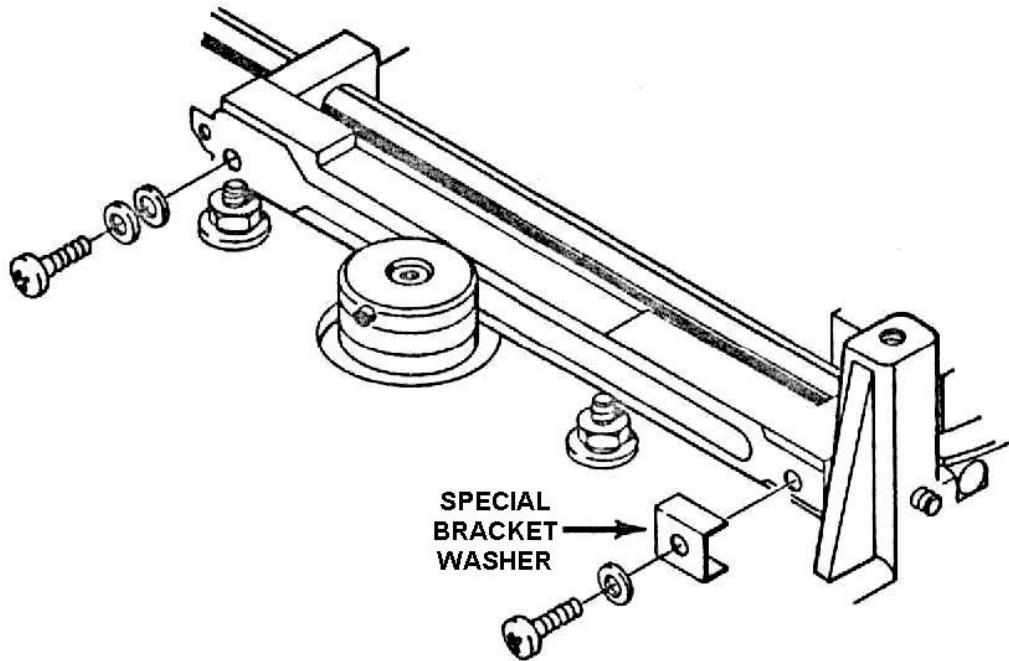


SPLIT RUBBER GROMMET

CAUTION: The head is subject to magnetization from external fields. DO NOT use magnetized tools or allow the head to get near any equipment producing strong magnetic fields.

4. Install a flatwasher, a splitring lockwasher, and a 1/4" hexnut onto each of the two stepper motor stud bolts projecting through the top of the casting. Lightly tighten the nuts.



SETSCREW

SECURING NUTS
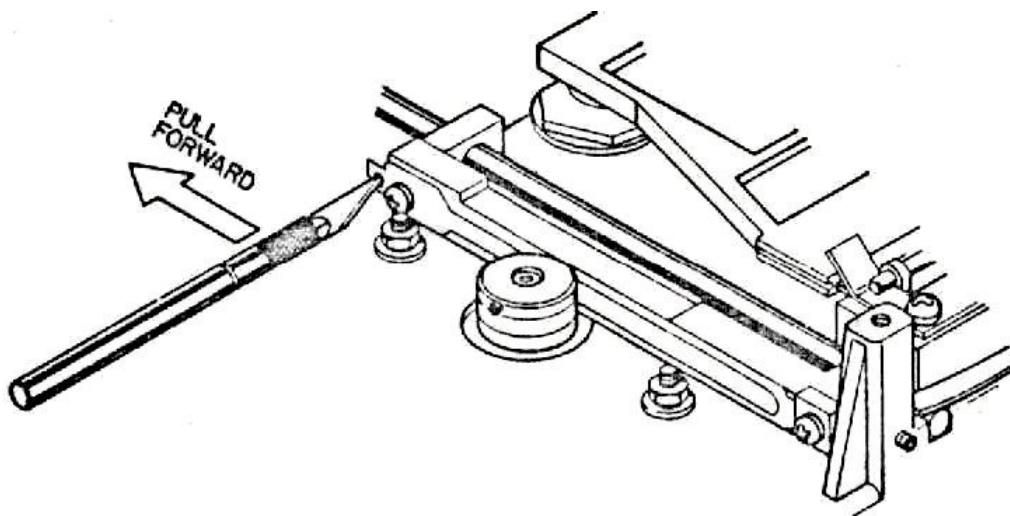
5. Carefully install the head positioning band pulley onto the stepper motor drive shaft (projecting through the top of the casting). If the pulley does not easily slip onto the motor shaft, back the pulley's allen-head setscrew a little farther out of the pulley. DO NOT tighten the setscrew at this time.

NOTE: The stepper motor positioning band is delicate and VERY important to the operation of the Drive. DO NOT kink or damage the band in any way.

**SPECIAL BRACKET WASHER** →

6. Carefully position the head assembly, so that you can connect the positioning band to the assembly's right rear corner.
7. Install, but do not tighten, the rear screw, splitring lockwasher, and special bracket washer to hold the rear section of the positioning band to the head assembly.
8. Carefully pull the front section of the positioning hand forward until its screw hole is located over the matching screw hole on the front corner of the head assembly.
9. Install, but do not tighten, the screw, splitring lockwasher, and flatwasher to secure the band to the head assembly.
10. Gently slide the head assembly back and forth on its guiderods. This will center the band pulley on the stepper motor shaft.
11. Tighten the rear band retaining screw.

CAUTION: DO NOT exceed 6 inch lbs. torque when tightening screws into plastic parts.

12. Use a pointed tool (i.e. X-acto knife point etc.)
    to hook the small hole on the front end of the
    positioning band. Pull forward slightly on the
    band while tightening the front band retaining
    screw.
13. Slide the wiring harness, grommet up into the
    slot at the rear of the transport casting.
14. Attach the transport to the common baseplate.
15. Attach the common baseplate to the Drive base.
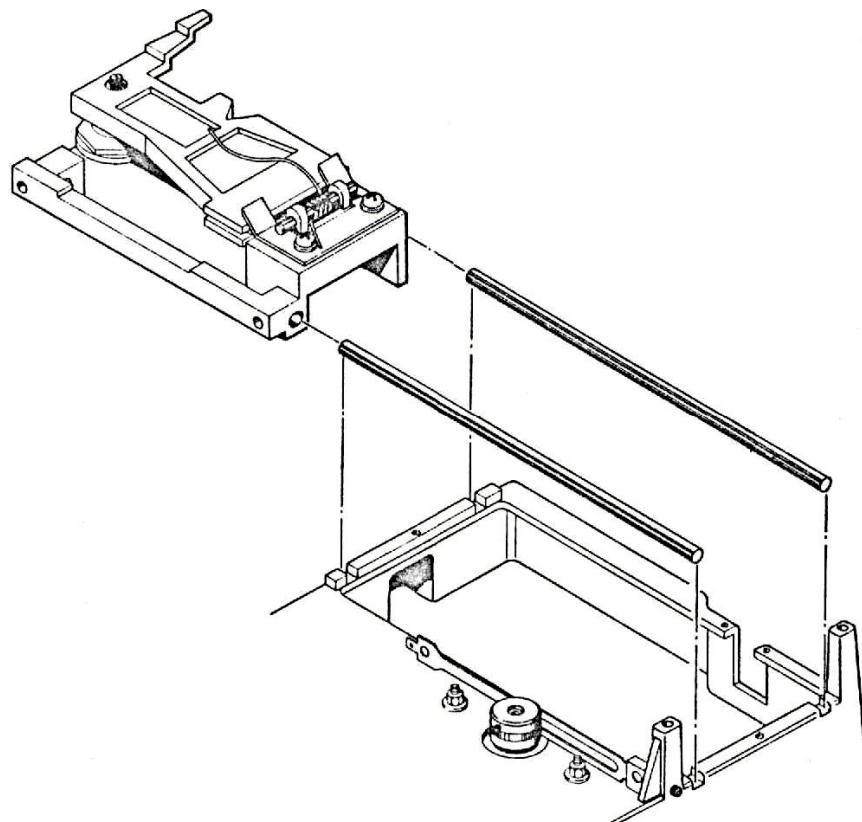

INSTALLING THE HEAD ASSEMBLY
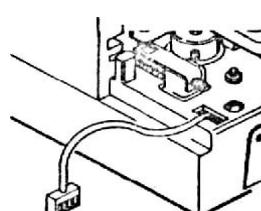
CAUTIONS: The head is subject to magnetization from
external fields. DO NOT use magnetized tools or allow
the head to get near any equipment producing strong
magnetic fields. The head is also damaged by dirt and
oils.
DO NOT touch either the head or the pressure pad with
your fingers.
DO NOT lift the pressure pad arm farther from the
head carriage than the arm would be lifted during
normal Disk Drive operations. Lifting the arm too far
will distort its pressure spring, changing the arm's
loading effect on the head during operation.
The stepper motor positioning band is delicate and
very important to the operation of the Drive. DO NOT
kink or damage the band in any way.
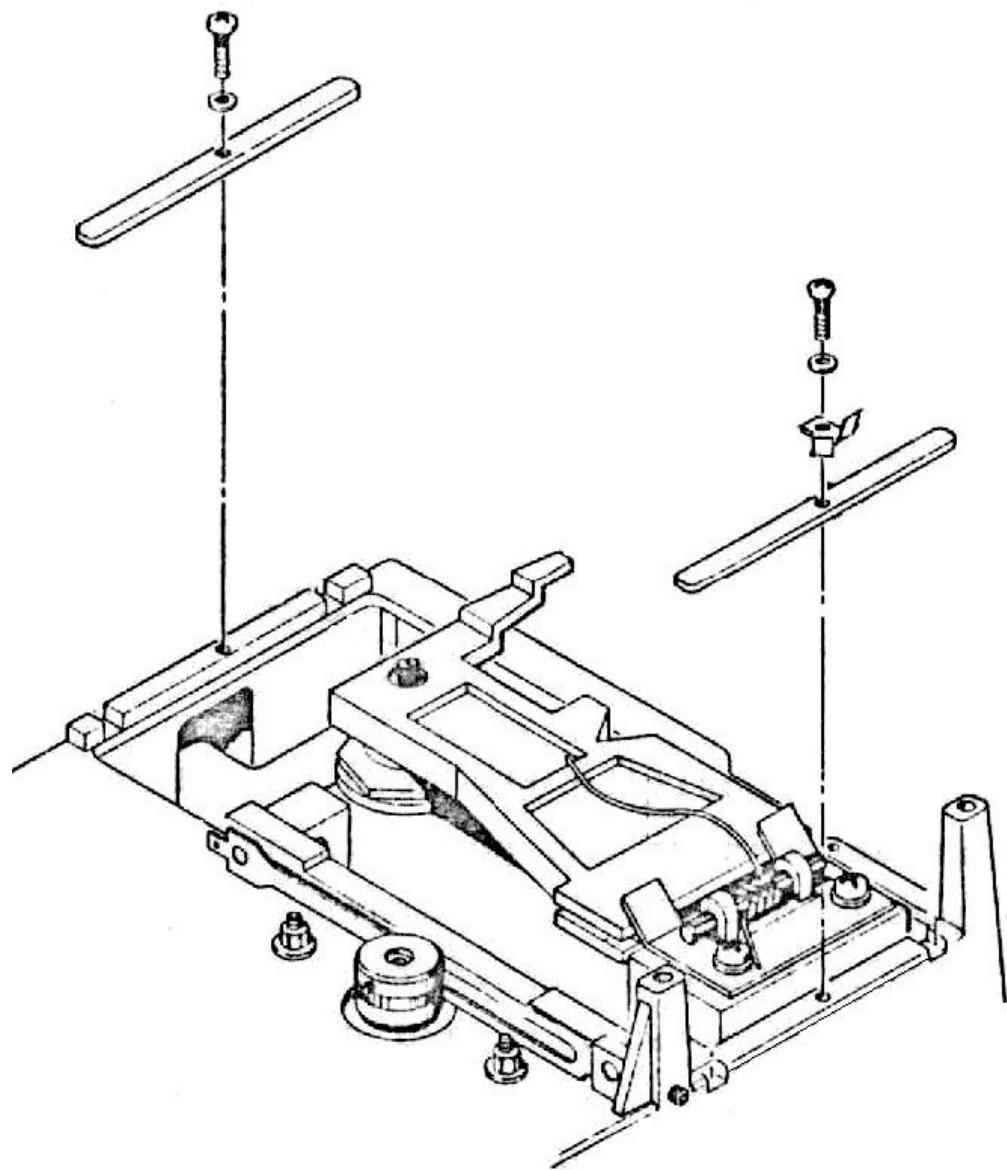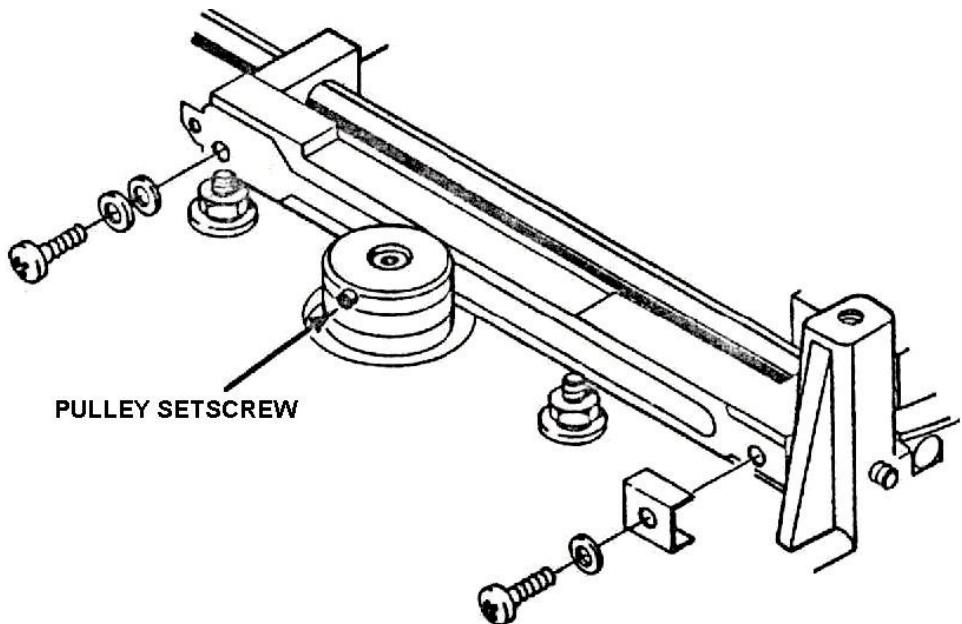
1. Slide the two guiderods into the sides of the
   head assembly carriage.
2. Carefully lower the carriage/quiderods assembly
   into position in the transport casting. Ensure
   that the head wiring harness lies down in the
   underside of the transport.
3. Wrap a small piece of masking tape
   around the head assembly's wiring
   harness, about 3" from the head.
   Install the nylon cable clamp over
   the tape and snap the clamp into
   the hole provided at the back of
   the casting.
4. Feed the wiring harness up through the
   rectangular hole at the right rear corner of the
   transport casting.
5. Center (front-to-back) the two head assembly
   guiderods in their transport casting slots.
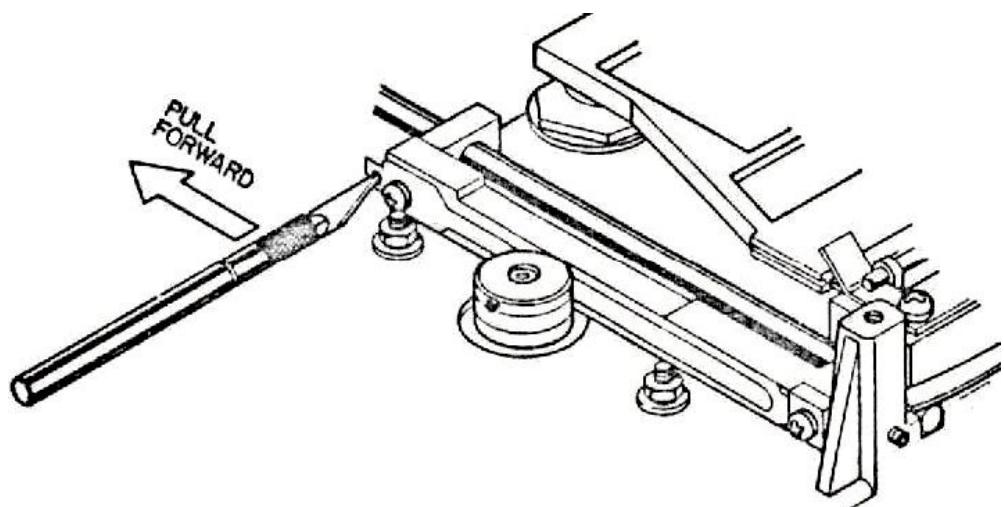
6. Position the two guiderod clamps onto the
   casting, over the ends of the guiderods.
7. Install, but do not tighten, the front clamp
   screw including a splitring lockwasher.
8. Install, but do not tighten, the rear clamp screw
   including two male faston terminals and a
   splitring lockwasher.
9. Tighten the two clamp screws to 10 inch lbs.
   torque

**PULLEY SETSCREW**

10. Carefully position the head assembly so that you
    can connect the positioning band to the assembly
    right rear corner.
11. Install, but do not tighten, the rear screw,
    splitring lockwasher, and special bracket washer
    to hold the rear section of the positioning band
    to the head assembly.
12. Carefully pull the front section of the
    positioning band forward until its screw hole is
    located over the matching screw hole on the front
    corner of the head assembly.
13. Install, but do not tighten, the screw, splitring
    lockwasher, and flatwasher to secure the band to
    the head assembly.
14. Locate the allen-head setscrew securing the
    positioning band pulley to the stepper motor
    driveshaft. Back the setscrew out
    (counterclockwise) about 1/4 turn.
15. Gently slide the head assembly back and forth on
    its guiderods. This will center the band pulley
    on the stepper motor shaft.
16. Tighten the rear band retaining screw.

CAUTION: 00 NE exceed 6 inch lbs. torque when
tightening screws into plastic parts.

6-31
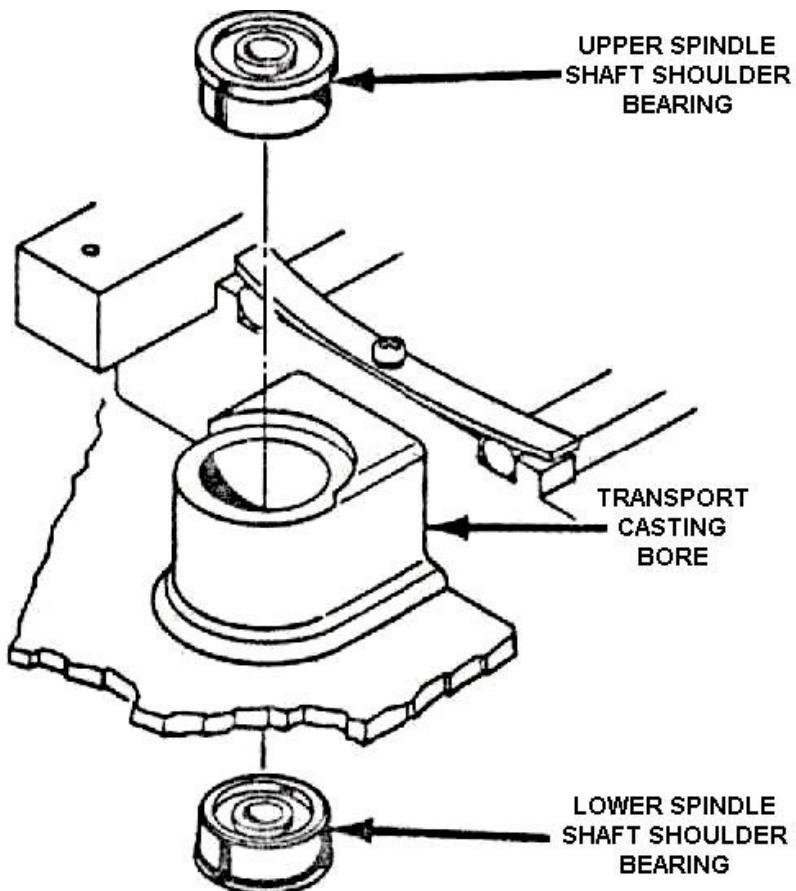
17. Use a pointed tool (i.e. X-acto knife point, etc.) to hook the small hole on the front end of the positioning band. Pull forward slightly on the band while tightening the front band retaining screw.
18. Attach the black ground lead (drive motor wiring harness) to one of the faston lugs at the rear of the transport.
19. Attach the carrier assembly to the transport.

## INSTALLING THE TRANSPORT SPINDLE SHAFT BEARINGS

1. Gently insert either the top or bottom (or both) shoulder bearings into the casting bore. There should be a slight friction fit.
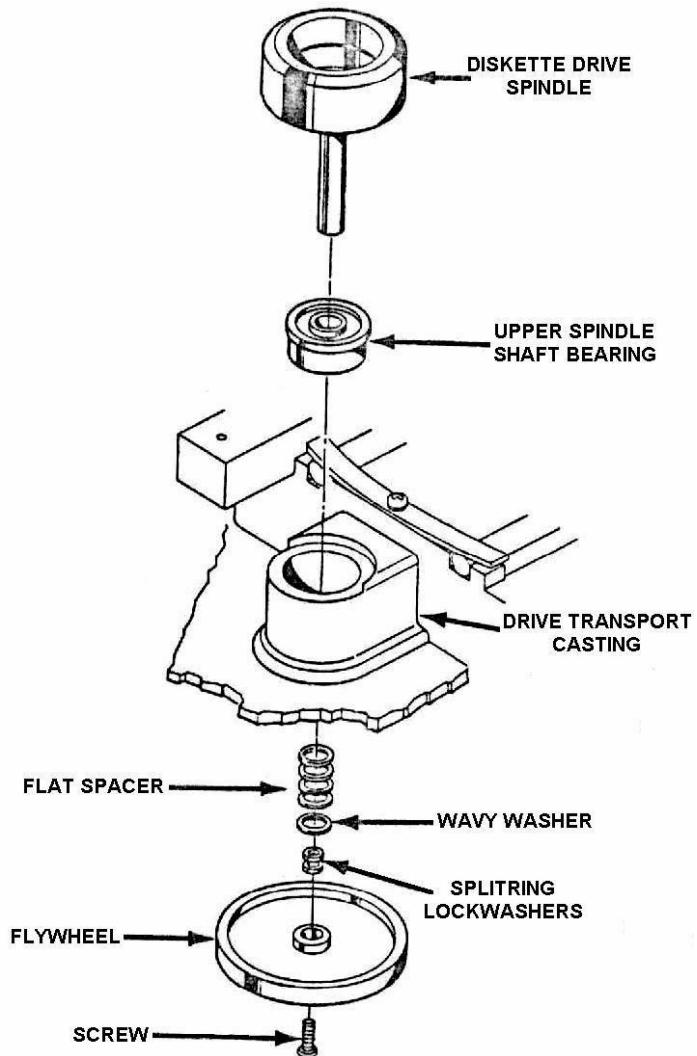
   NOTE: If excessive force is required, you probably have incorrectly identified the bearing. Obtain the correct bearing before proceeding.
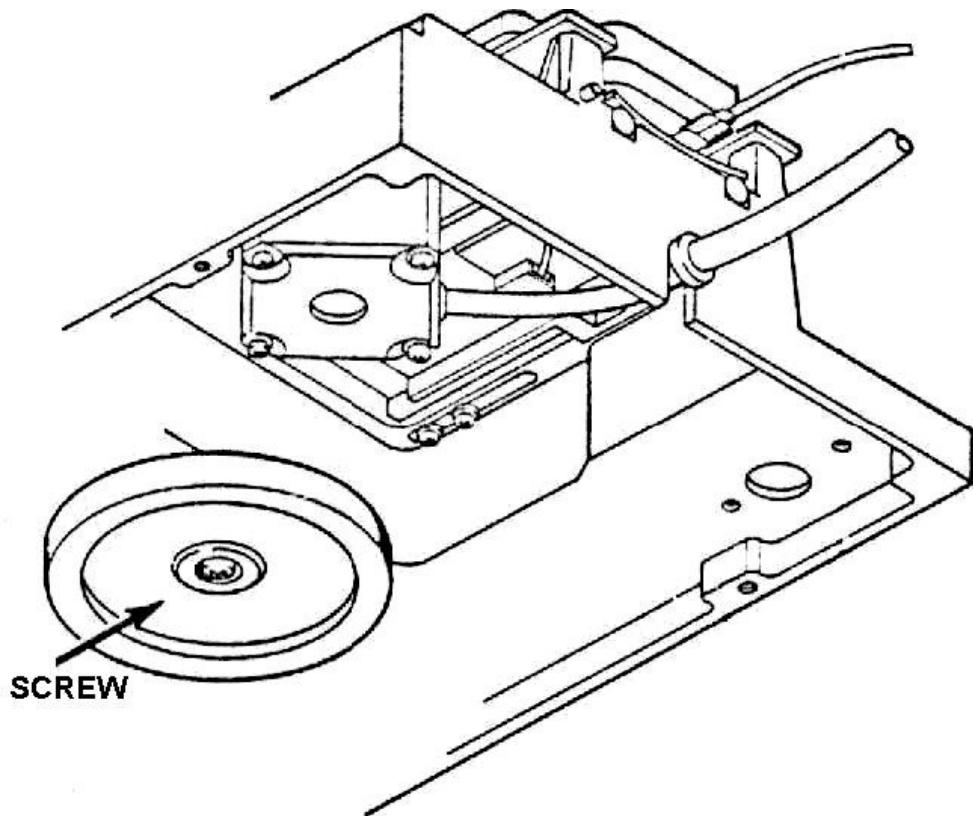


2. Ensure that the shoulder of the bearing is firmly seated flat against the casting.
3. Attach the flywheel and drive spindle to the transport.

INSTALLING THE TRANSPORT FLYWHEEL / DRIVE SPINDLE
_____

    1. Lay the transport casting on its side.



    2. From the top side of the casting, insert the
       diskette drive spindle into the shoulder
       bearings.
    3. Assemble the necessary combination of washers
       along with the flywheel and screw. See the
       illustration for the flywheel/casting/spindle
       relationship. The specific number and placement
       of the washers is very important and helps to
       determine diskette speed during operation.

6-34
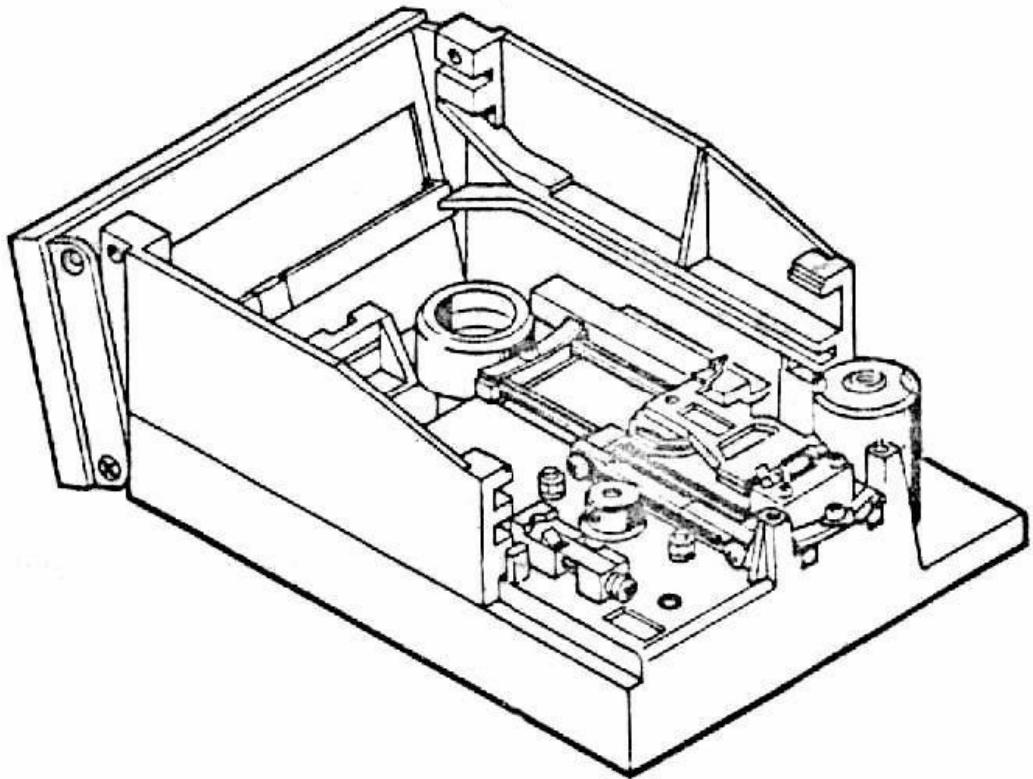
**SCREW**

4. From the bottom side of the casting, position the flywheel, screw and washer combination over the bottom of the spindle shaft. Screw the assembly together. Torque the screw to 6 inch lbs.
5. Rotate the flywheel and check for wobble, runout or binding of either the flywheel or drive spindle. Adjust the assembly as necessary.
6. Attach the carrier assembly to the transport.
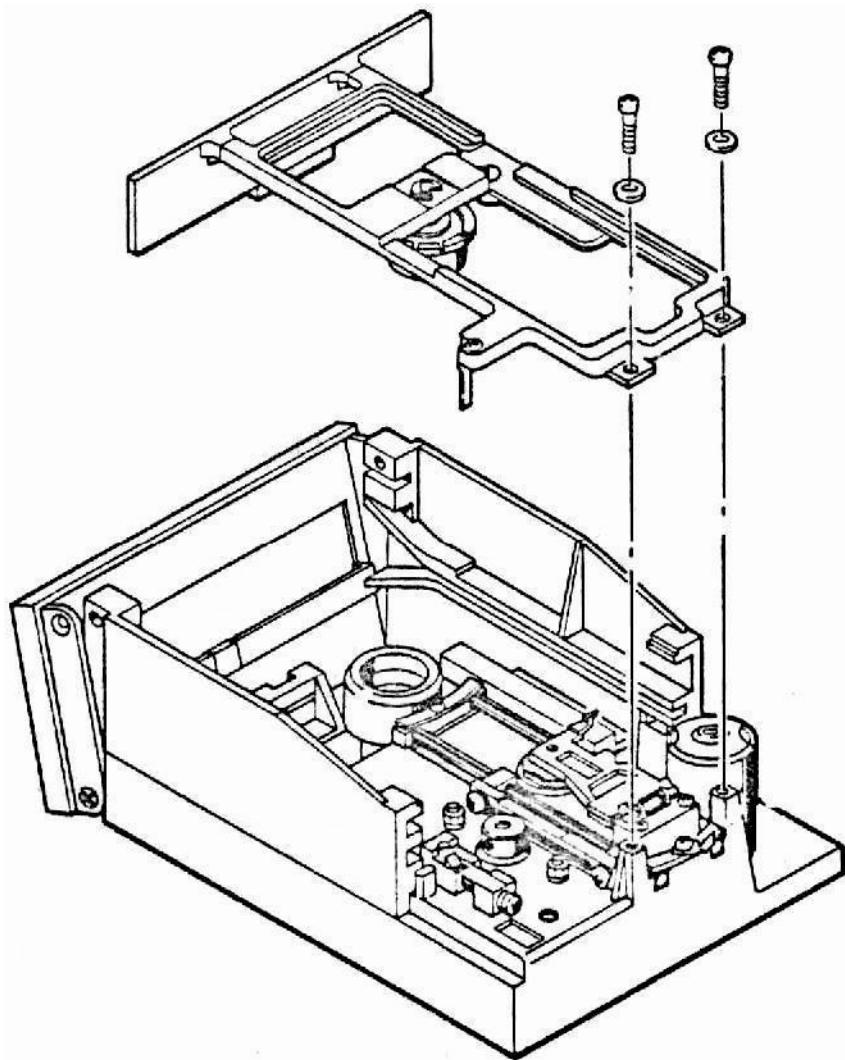
INSTALLING THE CARRIER ASSEMBLY

CAUTIONS: This procedure requires that you lift the
head assembly pressure pad arm in order to position
its lift arm onto the carrier assembly. DO NOT lift
the pressure pad higher than it would be lifted by
the carrier assembly during normal operations.
Lifting the pad arm too far will distort its pressure
spring, changing the pad's loading effect on the
head. The head is subject to magnetization from
external fields. DO NOT use magnetized tools or allow
the head to get near any equipment producing strong
magnetic fields.
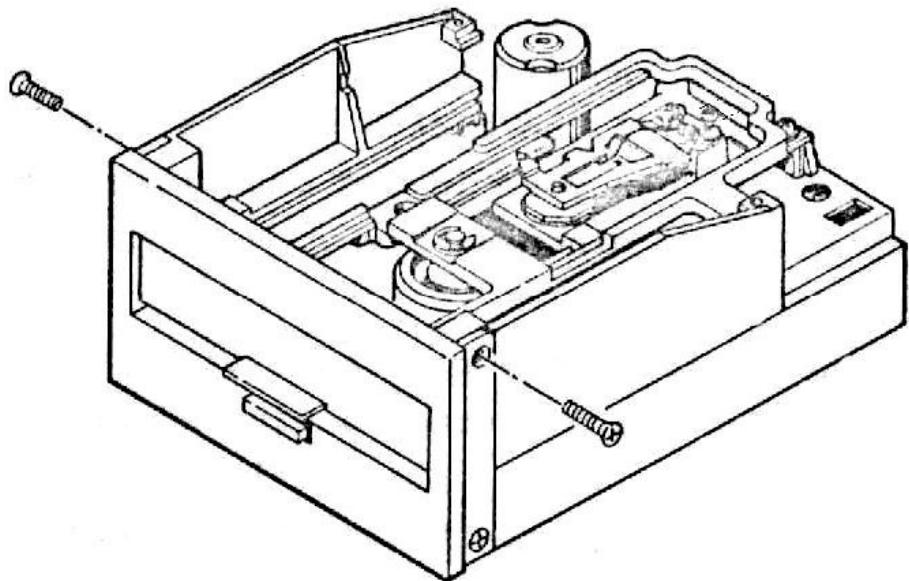
1. Ensure that the transport front panel bezel is
   tilted forward from both guide assemblies for
   extra clearance at the top.
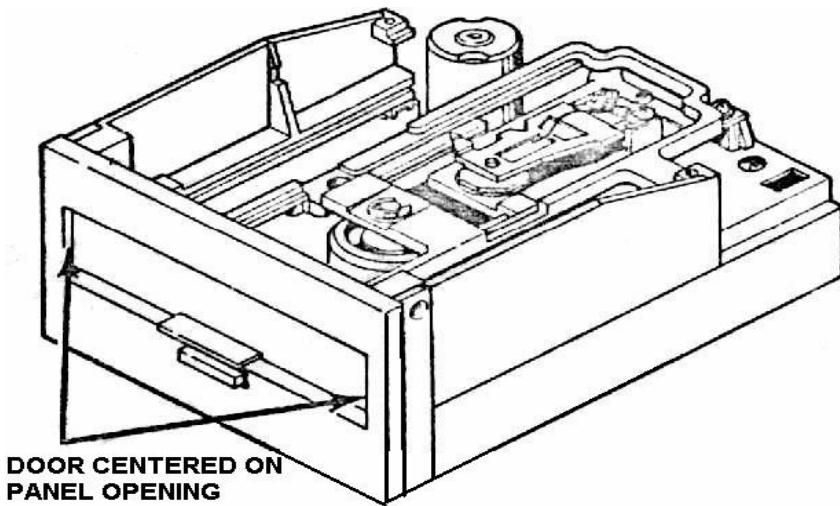
2. Carefully lower the carrier assembly into
   position over the transport casting. Lift the
   head assembly's pressure pad arm just enough to
   position it onto its carrier assembly slide area.
3. Install and slightly tighten the two screws,
   splitring lockwashers, and flatwashers at the
   rear corners of the carrier assembly.
4. Push the bezel back to its normal position and
   install the two top screws.
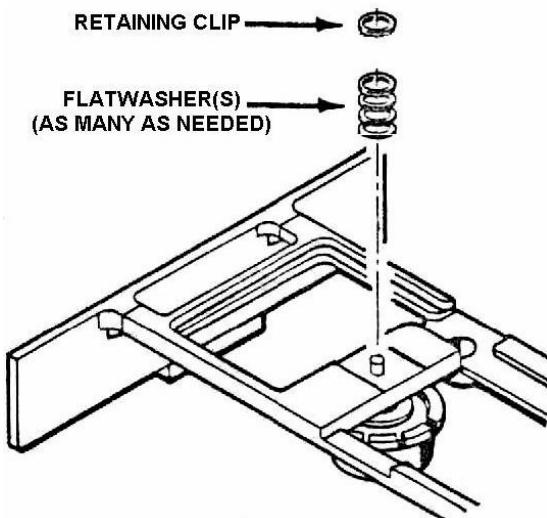
5. Tighten the four screws securing the bezel to the
   transport.
6. Latch the carrier assembly closed (down) at the
   bezel.



**DOOR CENTERED ON
PANEL OPENING**
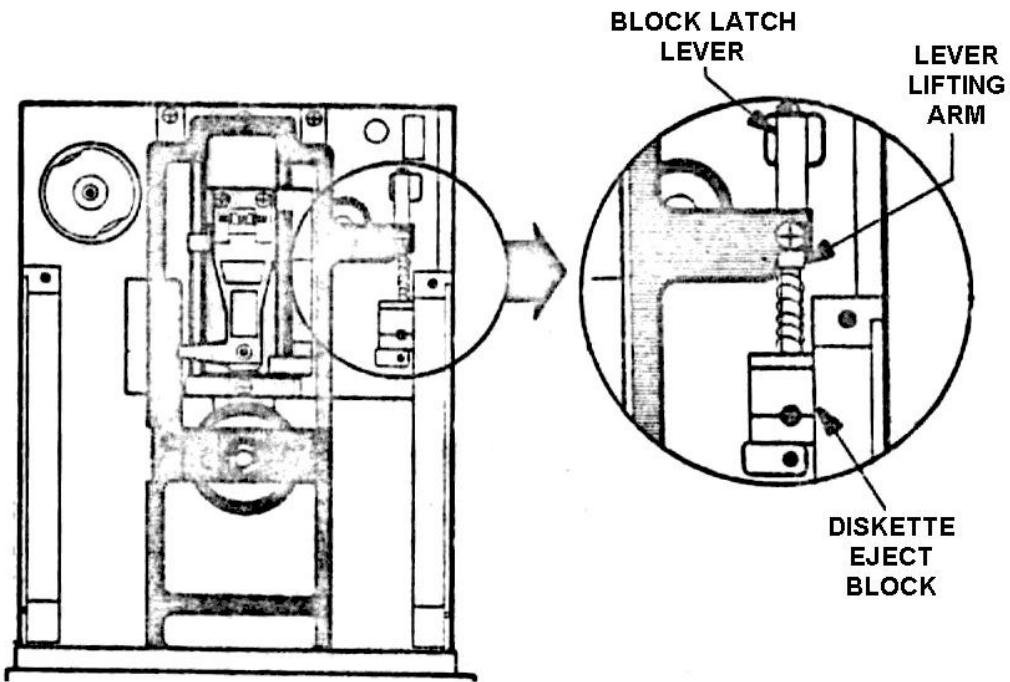
7. Horizontally center the door in the door opening
   of the bezel.

8. Tighten (10 inch lbs.) the two screws securing the rear corners of the carrier assembly to the rear of the transport casting.
9. Press the front door release button. Ensure that the door opens and the carrier assembly lifts the head assembly pressure pad arm.
10. With the door open, observe the gap between the top edge of the diskette drive spindle and the bottom edge of the clutch cone assembly. Be sure a diskette can move in and out without being scratched or pinched.

NOTE: The spindle/cone clearance is critical to ensure that the diskette is ejected when opening the front door. Too little clearance may cause the back edge of the cone to catch the edge of the diskette hub hole, preventing the diskette from being ejected. Test the ejection process using a standard diskette.
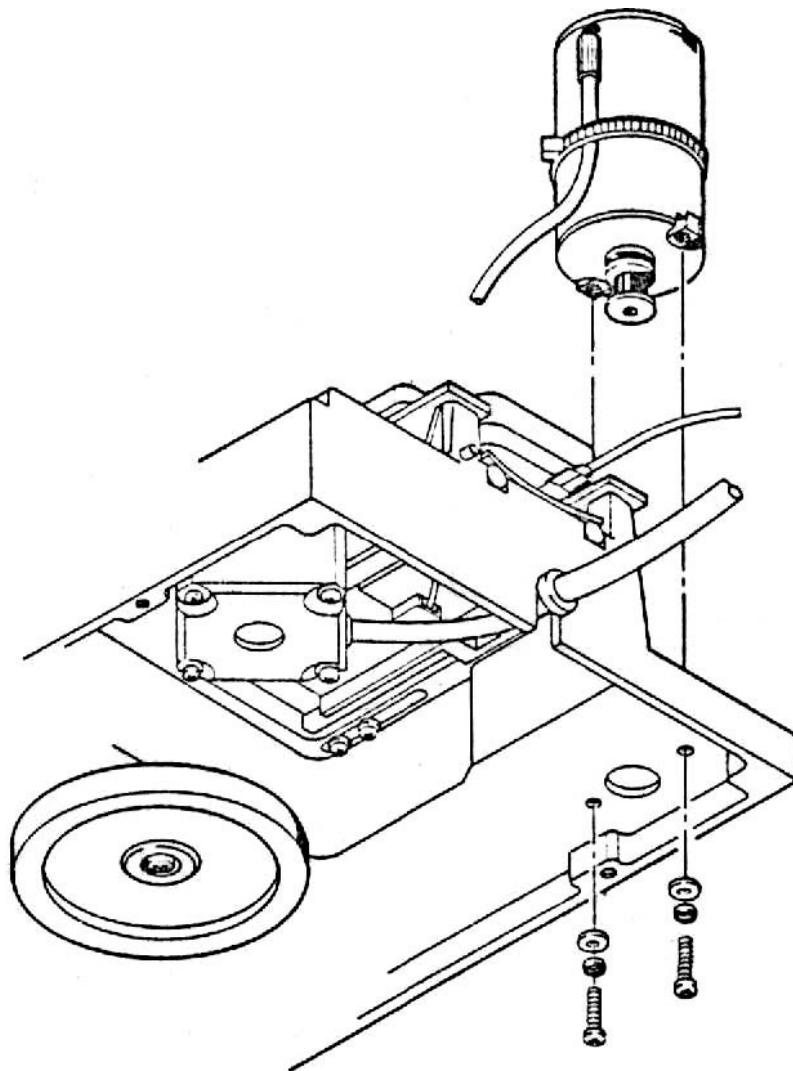


11. To adjust the clearance, compress the clutch cone into the door arm, forcing the clutch cone shaft up out of the top of the carrier assembly.
12. Locate and remove the retaining clip from the shaft.
13. Place another flatwasher over the shaft and replace the retaining clip.
14. Release the clutch cone and return to step 10.

BLOCK LATCH LEVER

LEVER LIFTING ARM

DISKETTE EJECT BLOCK
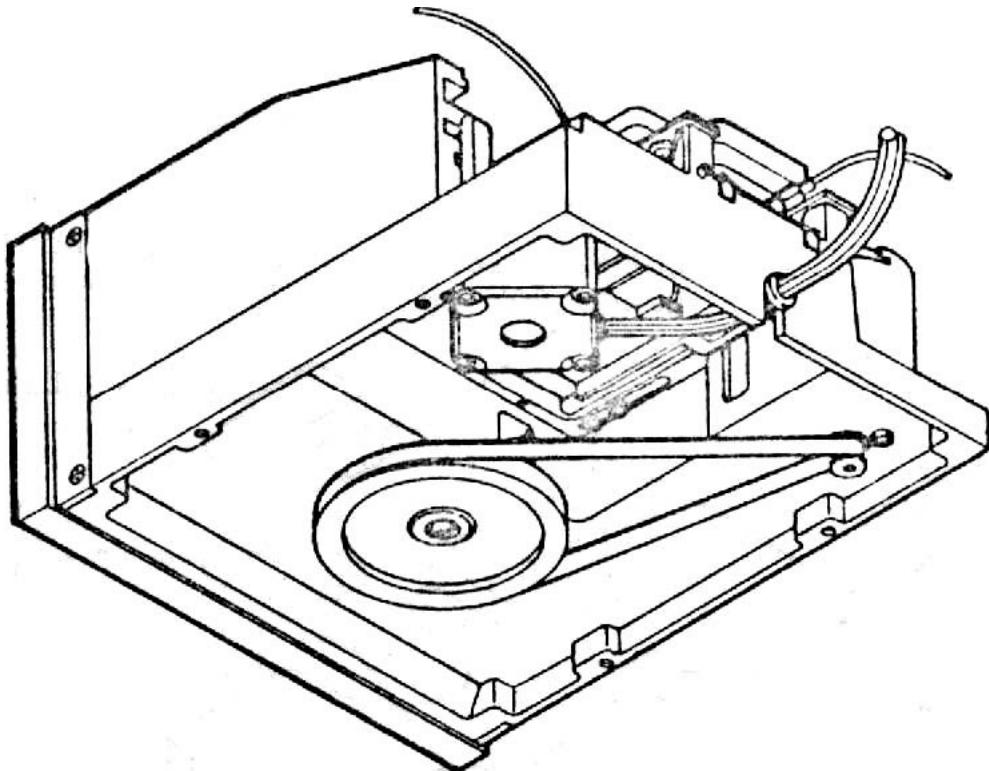
15. With the carrier assembly open, push the diskette eject block (right rear corner) until it latches into its rear position under the latch lever.
16. Close the carrier assembly and then press the release button to reopen the door.
17. Cheek to see that the diskette eject block freely returned to its forward position when the carrier assembly opened.
18. If the block did not return, bend either the latching lever or the lever lifting arm to adjust the mechanism.
19. Repeat steps 15 thru 18 until the diskette eject mechanism works as indicated.
20. If necessary, install the drive belt.
21. Attach the transport to the common baseplate.

INSTALLING THE DRIVE MOTOR

1. Lay the Drive transport on its side.
2. Position the drive motor onto the top side of the casting. The motor's wiring harness should exit the motor toward the center rear of the transport.
3. While supporting the motor with one hand, install the two screws, splitring lockwashers, and flatwashers to secure the motor to the transport.
4. Torque the two screws to 10 inch lbs.
5. Attach the drive belt to the transport.

INSTALLING THE TRANSPORT DRIVE BELT
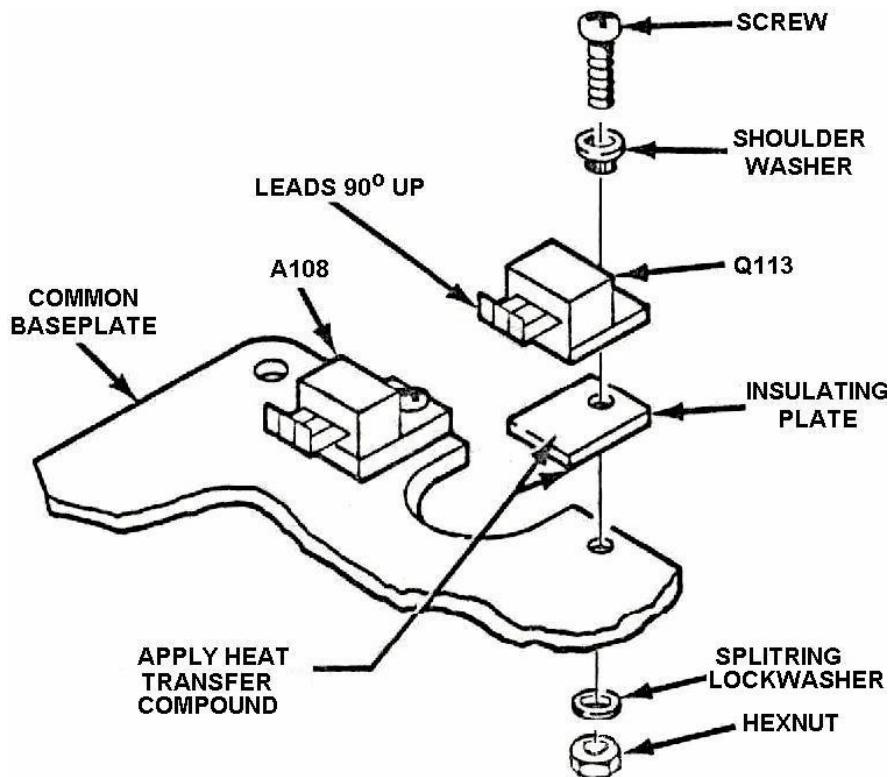


  1. Lay the transport on its side.
  2. Loop the drive belt over the drive motor drive
     hub. Carefully ease the belt onto the flywheel
     while rotatinq the flywheel.
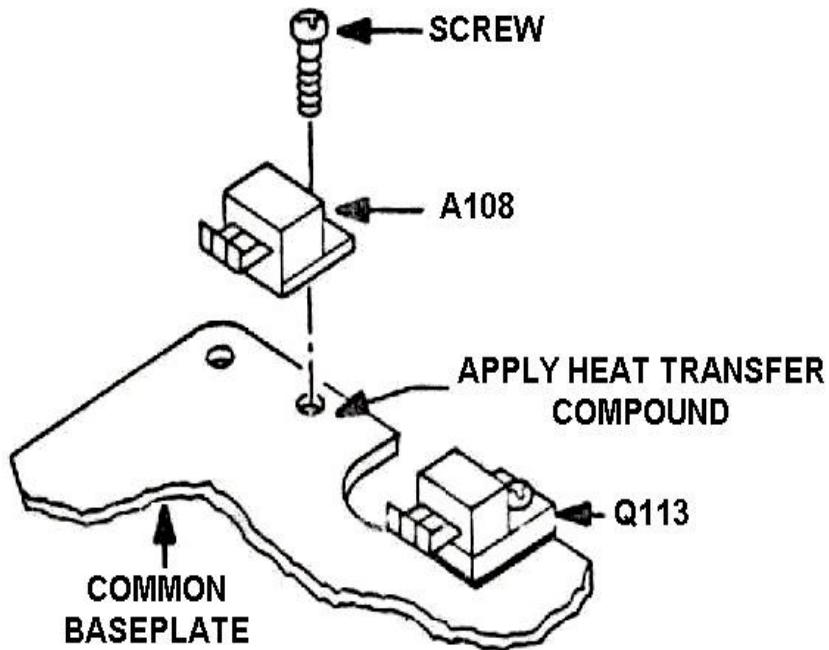
NOTE: DO NOT stretch or damage the drive belt. It is
primarily responsible for diskette speed and any
variations in diskette speed caused by a stretched or
damaged drive belt can cause errors during read and
write operations.

  3. Refer to the adjustments section of this manual
     and complete the drive belt adjustment.
  4. Attach the transport to the common baseplate.

1. Bend the leads of the device you are about to install as shown above.
2. If you are installing Q113(transistor):
   a. Apply heat transfer compound to both sides of the mica insulating plate.
   b. Place the insulating plate into location on the common baseplate.
   c. Place the transistor into position on top of the insulating plate.
   d. Secure the transistor/insulating plate combination to the common baseplate with a #4-40 x 3/8" PHIL HD. SCREW, shoulder washer, #4 splitring lockwasher, and a #4 ST2 hexnut.

3. If you are installing A108(voltage regulator):
   a. Apply heat transfer compound to the back of
      the voltage reql1ator. :
   b. Position the regulator onto the common
      baseplate.
   c. Secure the device to the baseplate with
      a #4 x 1/4 THD F PFiIL HD. screw.
4. Attach the rear PCB to the conman baseplate.

INSTALLING THE REAR PCB

1. Carefully lower the rear PCB into position on the
   common baseplate. Ensure that the six device legs
   at the right side of the baseplate are correctly
   seated into the two three-pin sockets on the PCB.
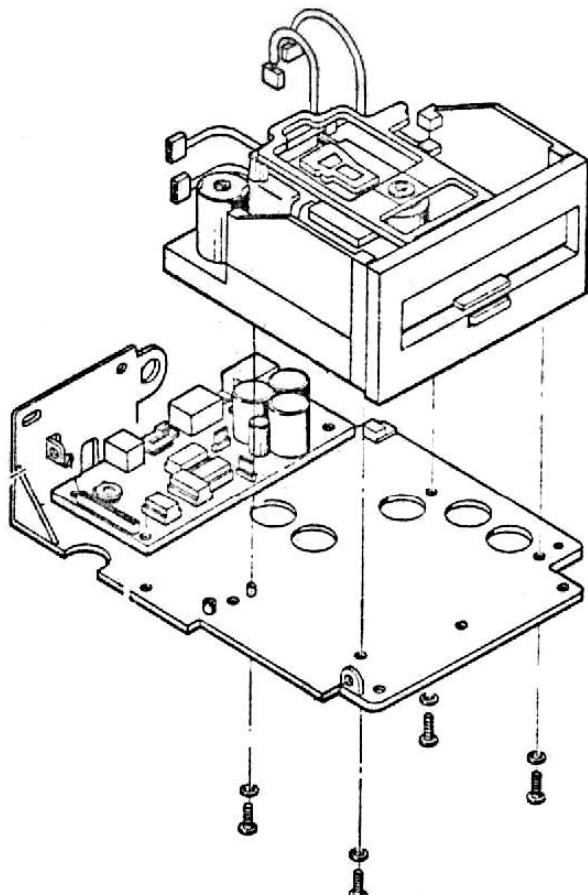


2. Install and tighten the four screws(#6-32 x 1/4"
   PHIL HD.) and lockwashers(#6 splitring) to secure
   the PCB to the baseplate.
3. Connect the transport to the common baseplate.
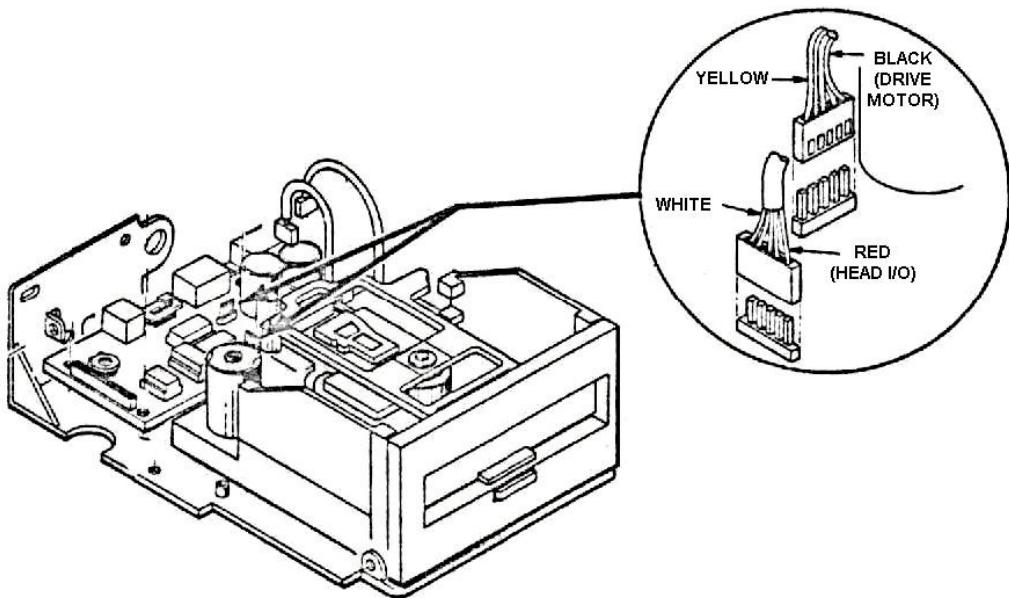
INSTALLING THE DRIVE TRANSPORT

CAUTION: The transport provides critical mechanical
alignments necessary for proper Disk Drive operation.
Be very careful not to jar or damage the transport or
any of its associated subassemblies and components.

   1. Carefully set the transport upside down on a
      suitable work surface.
   2. Gently set the transport (upside down) on top of
      the transport.



   3. Install and tighten the four screws(t6-32 x 1/4"
      PHIL HD.) and lockwashers (#6 splitring) to
      secure the transport to the baseplate.
   4. Set the assembly rightside up on the work
      surface.
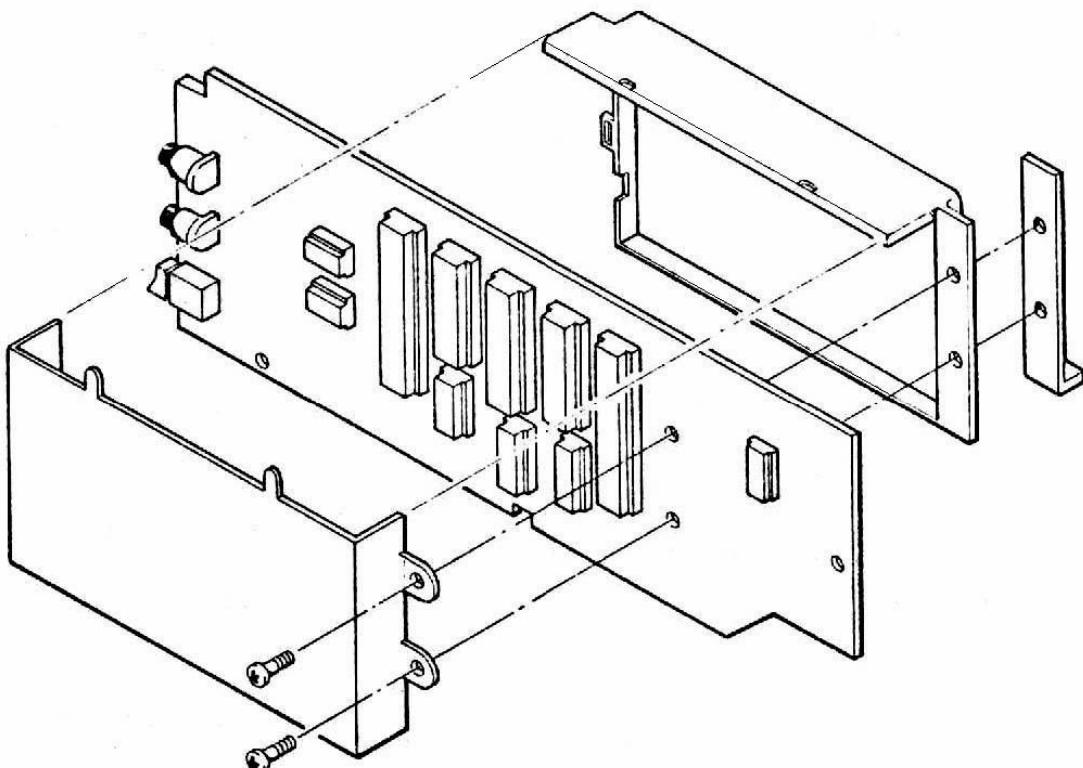
5. Locate and connect the record/playback and erase head I/O wiring harness (shieldedred, (blank), blue and either white, black or black, white) to the rear PCB (nonpolarized, X4).

6. Locate and connect the drive motor/ground wiring harness (yellow, green, blue, red, black) to the rear PCB (nonpolarized, #3).

7. If you removed the side PCB, follow the procedures to attach the PCB to the common baseplate.

8. If you did not remove the side PCB during disassembly:

   a. Locate and connect the stepper motor wiring harness (black, white, red, green, brown) to the side PCB (nonpolarized, #2).

   b. Locate and connect the write protect wiring harness (black, green, (blank), red, black) to the side PCB (nonpolarized,#1).

9. Go on to step 10.

10. <u>Attach the common baseplate to the Drive base.</u>

NOTE: See Appendix for alternate wiring harness arrangement.

INSTALLING THE RF SHIELD (SIDE PCB)
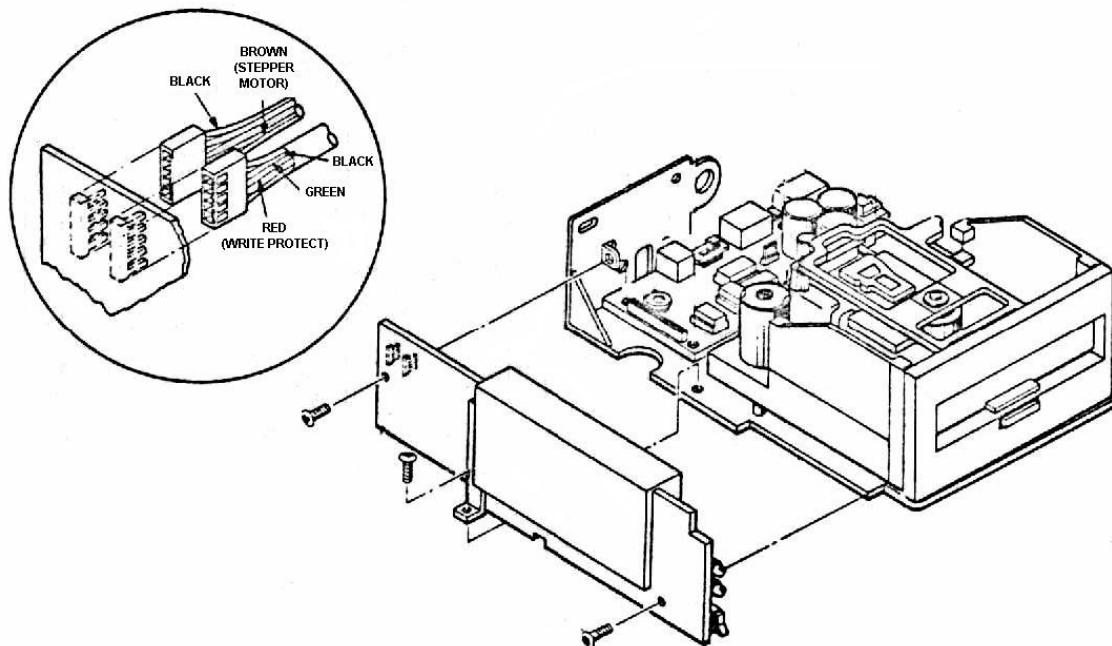
CAUTION: Excessive handling of the locating tabs on
the shield case will break them. DO NOT bend the tabs
anymore than absolutely necessary.



1. Carefully position the case halves on the side
   PCB.
2. Position the ground bracket onto the side PCB.
3. Install and tighten the two screws 186-32 x 5/16"
   TRD F, PHIL HD.) to secure the ground bracket to
   the PCB and case halves.
4. Locate and bend the three tabs securing the RF
   shield case halves together.
5. Connect the side PCB to the common baseplate.
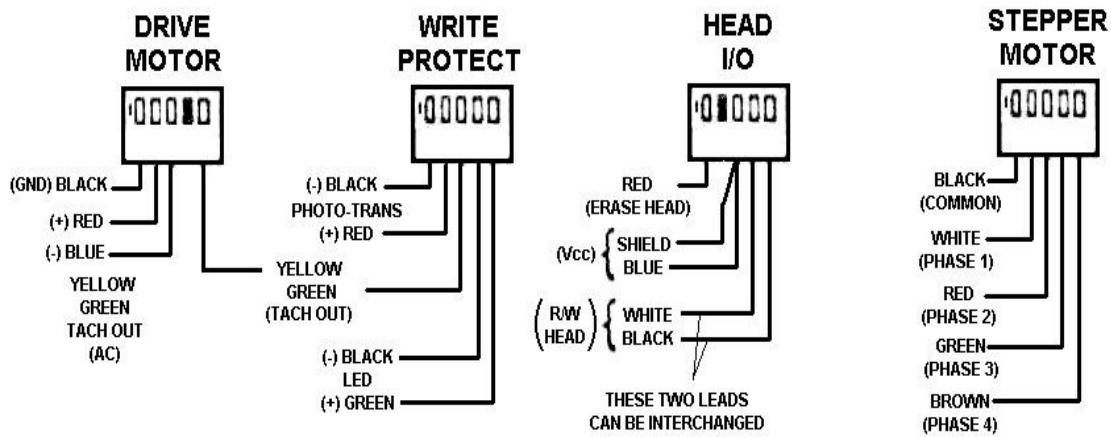
## INSTALLING THE SIDE PCB

1. Position the side PCB on the common baseplate
   (with rear PCB installed).
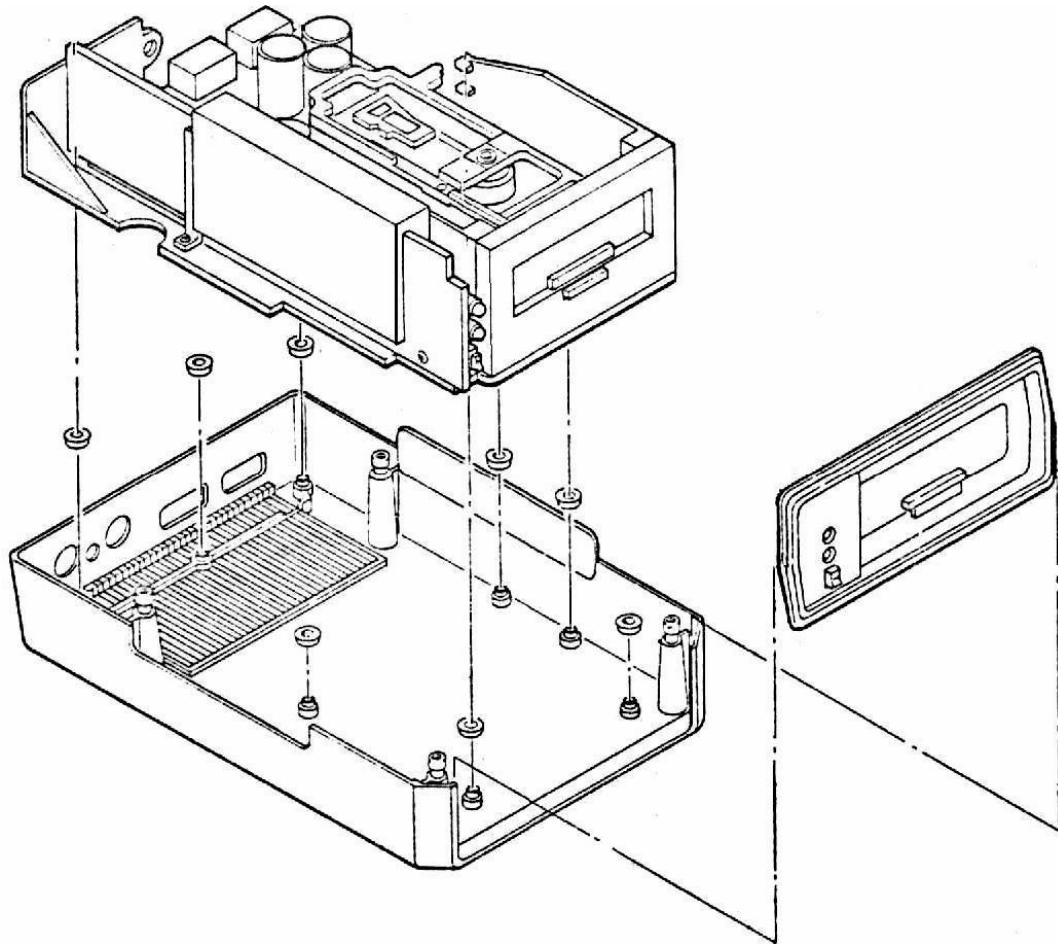


2. Gently seat the multipin socket at the rear lower
   edge of the side PCB down onto the pins
   protruding from the rear PCB.
3. Install and tighten the three screws (116-32 x
   5/16" THD F, PHIL HD.) that secure the side PCB
   and its ground bracket to the common baseplate.

4. Locate and connect the stepper motor wiring harness (black, white, red, green, brown) from the Drive transport to the side PCB (nonpolarized, 'P2).
5. Locate and connect the write protect wiring harness (black, green, (blank), red, black) to the side PCB (nonpolarized, #1).
6. Attach the common baseplate to the Drive base.



**DRIVE MOTOR**
(GND) BLACK
(+) RED
(-) BLUE
YELLOW
GREEN
TACH OUT
(AC)

**WRITE PROTECT**
(-) BLACK
PHOTO-TRANS
(+) RED
YELLOW
GREEN
(TACH OUT)
(-) BLACK
LED
(+) GREEN

**HEAD I/O**
RED
(ERASE HEAD)
(Vcc) { SHIELD
        BLUE
(R/W HEAD) { WHITE
             BLACK
THESE TWO LEADS
CAN BE INTERCHANGED

**STEPPER MOTOR**
BLACK
(COMMON)
WHITE
(PHASE 1)
RED
(PHASE 2)
GREEN
(PHASE 3)
BROWN
(PHASE 4)
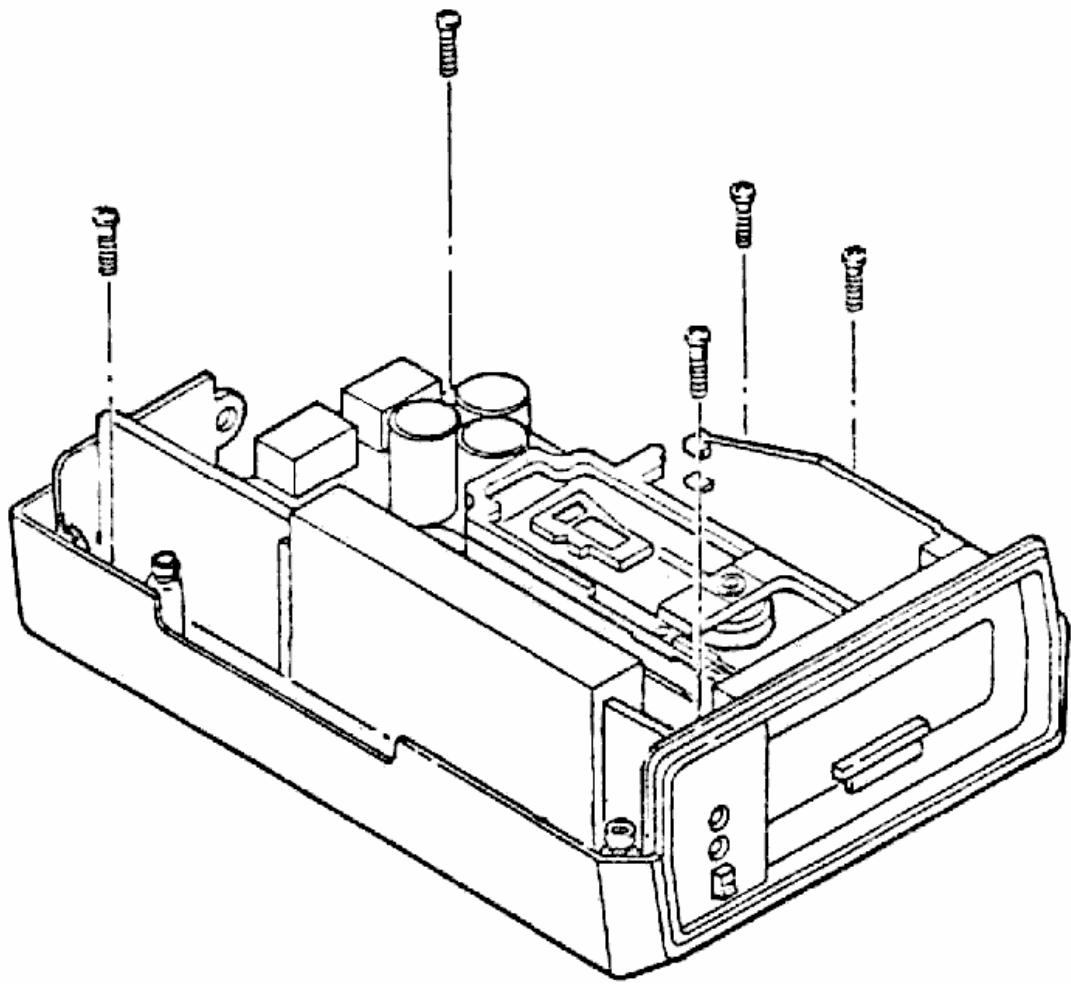
NOTE: You may also have this wiring harness arrangement.

INSTALLING THE COMMON BASEPLATE
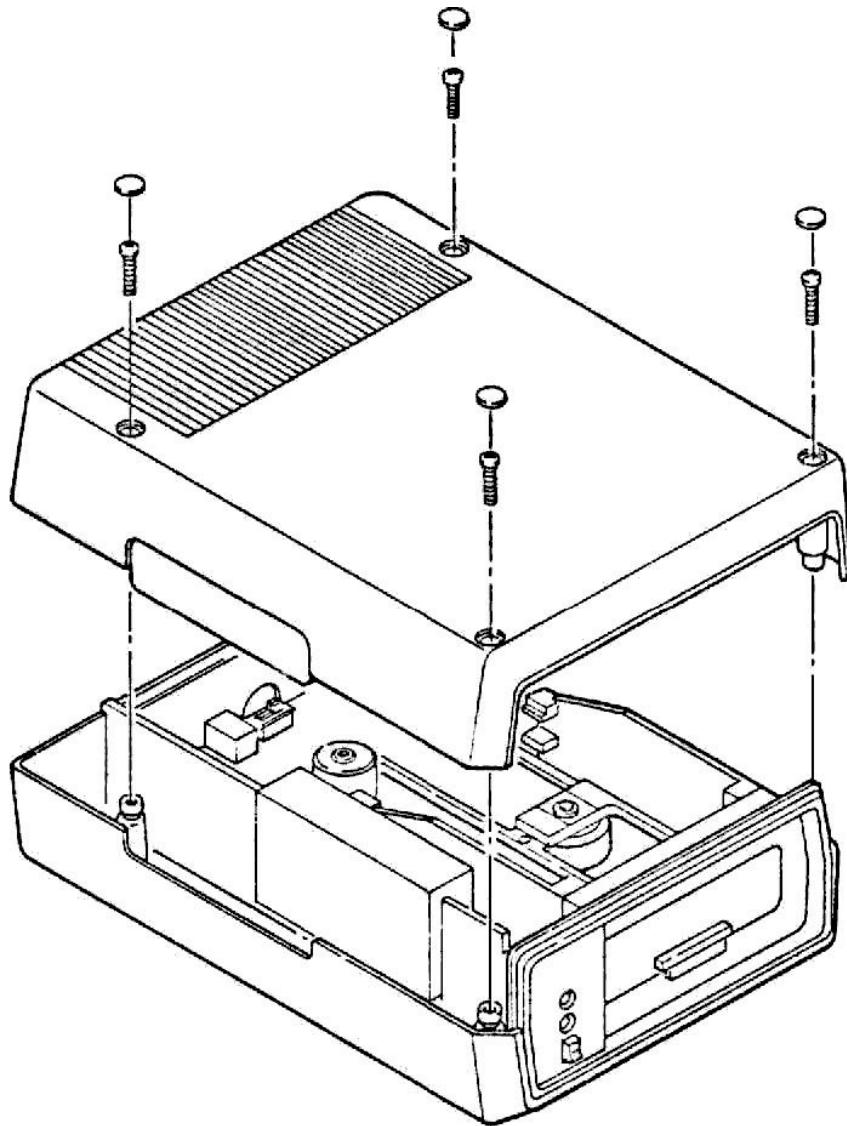


1. Ensure that every boss in the base (even those not used to secure the baseplate is topped with a rubber isolation washer.
2. Position the front coverplate onto the baseplate/transport/PCB assembly.
3. Carefully lower the baseplate into position in the Drive base, ensuring that the cover-plate is also correctly positioned in the base.
4. Install and tighten the five screws (6 - 1/2" BT. PHIL HD.) securing the common baseplate to the drive base.

5. Refer to the adjustments section of thj.s manual
   and complete the head cleaning and
   demagnetization procedure.
6. Refer to the adjustments section of this manual
   and complete the radial track aliqnment, speed
   control adjustment, and track 00 end stop
   adjustment.
7. Assemble the Drive case.

ASSEMBLING THE DRIVE CASE

1. Carefully position the tophousing onto the base and coverplate.



2. Install and tighten the four screws (#6-3/4" SHTMTL, PHIL HD.) securing the tophousing to the coverplate. Install the screw hole covers.
3. Refer to the final checkout section of this manual and complete the full checkout procedure for the Drive.
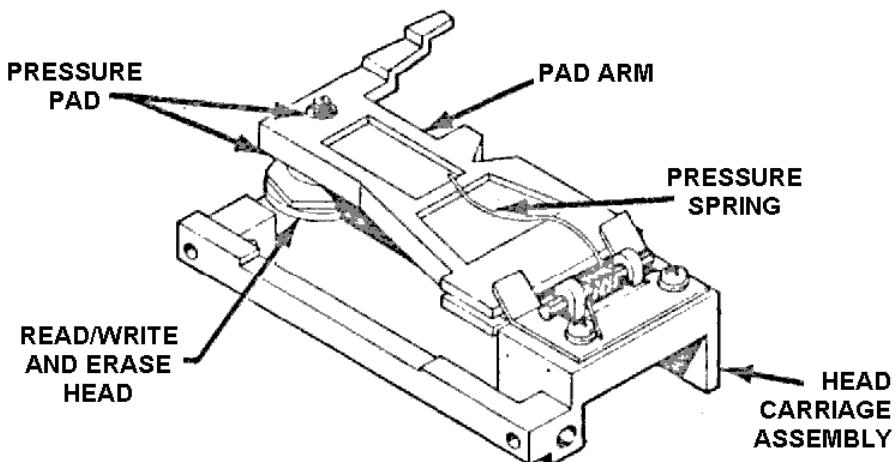
# ADJUSTMENTS

## READ/WRITE & ERASE HEAD CLEANING & DEMAGNETIZATION

Both the head and the pressure pad will accumulate
dirt and oxide particles during use. Periodic
cleaning and inspection is necessary for proper Disk
Drive operation.

CAUTIONS: The head is subject to magnetization from
external fields. DO NOT use magnetized tools or allow
the head to get near any equipment producing strong
magnetic fields.
DO NOT lift the pressure pad arm farther from the
head carriage than the arm would be lifted during
normal Disk Drive operations (i.e. front door open).
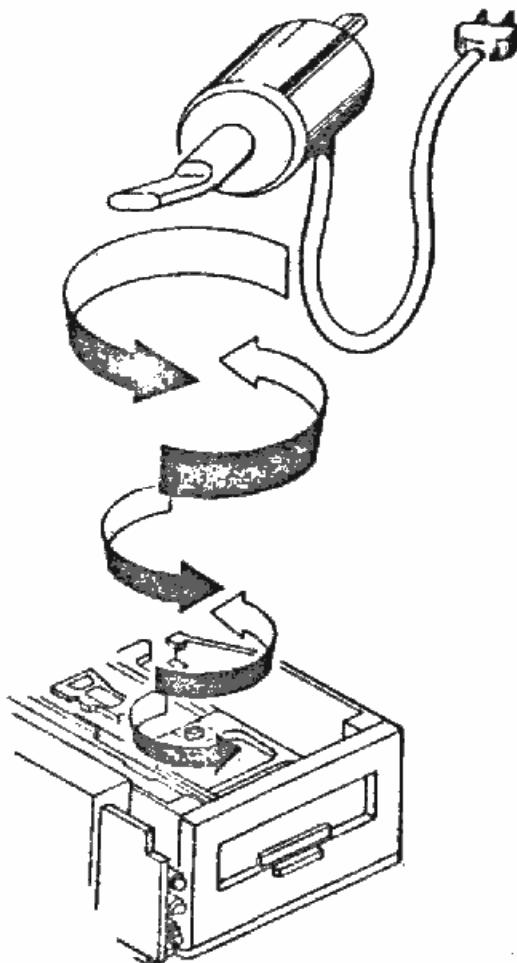


1. Use a small mirror to inspect the pressure pad
   for excessive buildup of oxides and dirt, or for
   excessive wear. Replace the head if it is worn or
   damaged.
2. Otherwise, clean the head.

NOTE: Use either a cotton swab (preferred) or a lint-
free cloth (if. chamois) moistened with either methyl
or high quality 31% isopropyl alcohol.
Wipe the head carefully to remove all accumulated
oxide and dirt. Dry the head.
CAUTION: DO NOT use carbon tetrachloride as a
cleaning solution for the head.

3. To demagnetize the head, hold the energized demagnetizing tool about 6 inches above the head. Slowly lower the tool toward the head in a spiraling motion. DO NOT allow the tool to come into contact with the head.



4. Reverse the procedure as you lift the tool away from the head. DO NOT turn the tool off until it is at least 6 inches away from the head.
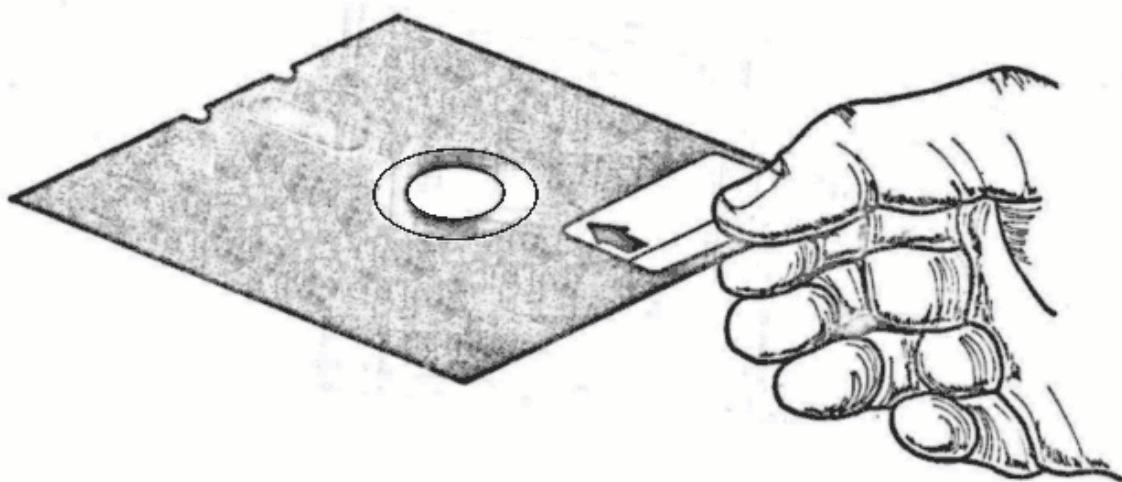
RADIAL TRACK ALIGNMENT & SPEED ADJUSTMENT

Radial track alignment and speed adjustment is
necessary to provide optimum diskette compatibility
between Drives.
The following are required to perform this procedure:
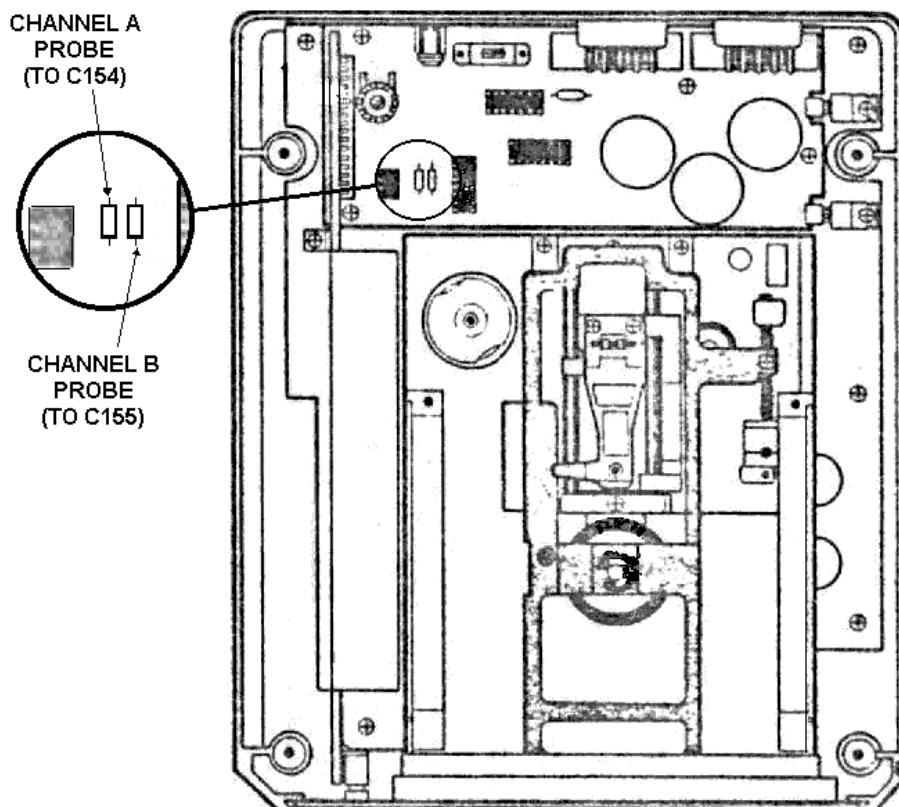
  A. Oscilloscope, dual trace with A+B function, and B
     invert function, with two probes.
  B. Atari 400/800 Computer Console with minimum 16K
     RAM installed.
  C. I/O cables and Console/Drive power packs.
  D. Disk Alignment Cartridge or Program.
  E. Master Alignment Diskette.
  F. 0.050 hex setscrew driver.
  G. Non-conductive common blade tuning wand.

CAUTIONS: Take extreme care when handling and storing
the master alignment diskette.
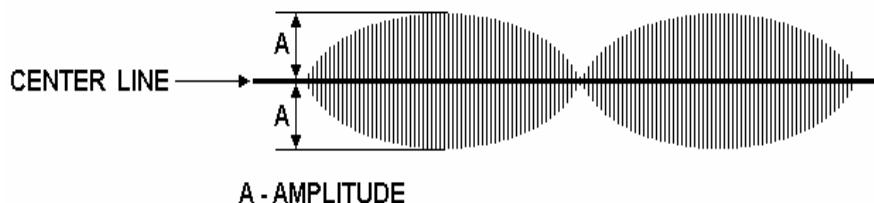


The Disk Drive PWR ON lite should be ON and the BUSY
lite should be OFF whenever you are inserting or
removing a diskette from the unit. DO NOT open the
Drive door or turn Drive power off when the BUSY lite
is on.

1. Connect the Drive to the Computer Console.
2. Turn the Drive on and wait for the BUSY lite to go off. Insert the master alignment diskette.
3. Either insert the disk alignment cartridge or load the disk alignment program into the Console.
4. Via the Console, command the Drive to read track #16.
5. Set the oscilloscope controls as follows:
   DISPLAY: A + B, B inverted
   TIME/DIV: 20msec./DIV
   VOLTS/DIV: 20mV/DIV
6. Compensate your scope probes.
7. Connect a ground probe from the scope to the faston lug ground at the rear of the transport.
8. Attach the channel A probe to the rear lead of CR154.



CHANNEL A PROBE (TO C154)

CHANNEL B PROBE (TO C155)
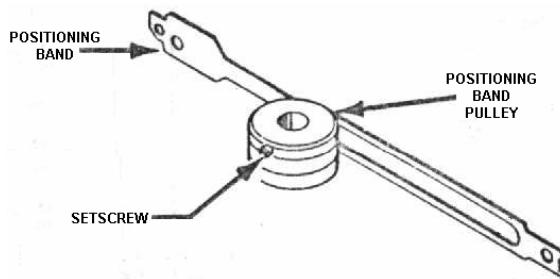
9. Attach the channel B probe to the rear lead of C155.
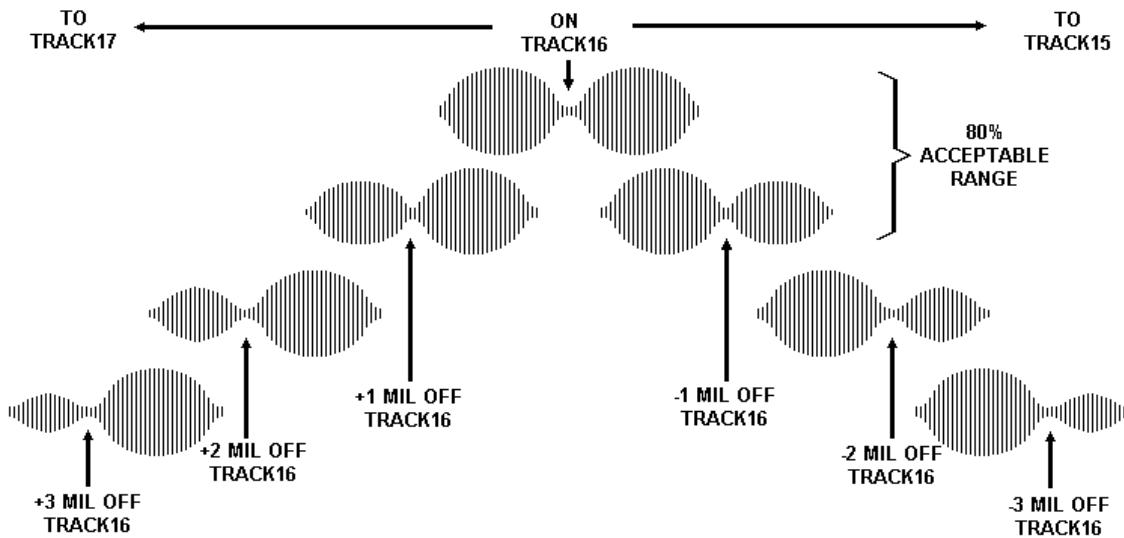
CAT'S-EYE PATTERN

10. The 'scope should be displaying a repeating
    cat's-eye lobe pattern as shown above.
    a. If the lobes are of equal amplitude, goon to
       step 11.
    b. If the lobes are of unequal amplitudes,
       proceed as follows:
     1. Locate the setscrew securing the stepper
        motor positioning band pulley to the stepper
        motor shaft.



     2. With the Drive still reading track 16, back
        the setscrew out (counterclockwise) of the
        pulley about 1/4 turn. Leave the setscrew
        driver in the pulley.
     3. Slightly rotate the pulley either clockwise
        or counterclockwise until the 'scope shows
        equal amplitude cat's-eye lobes.
     4. Tighten the setscrew and remove the setscrew
        driver.
     5. Verify that the lobes are still within 80%
        amplitude of each other. If they are not,
        return to step 2.
     6. Via the Console, command the Drive to step
        back to track 00 and return to read track 16.
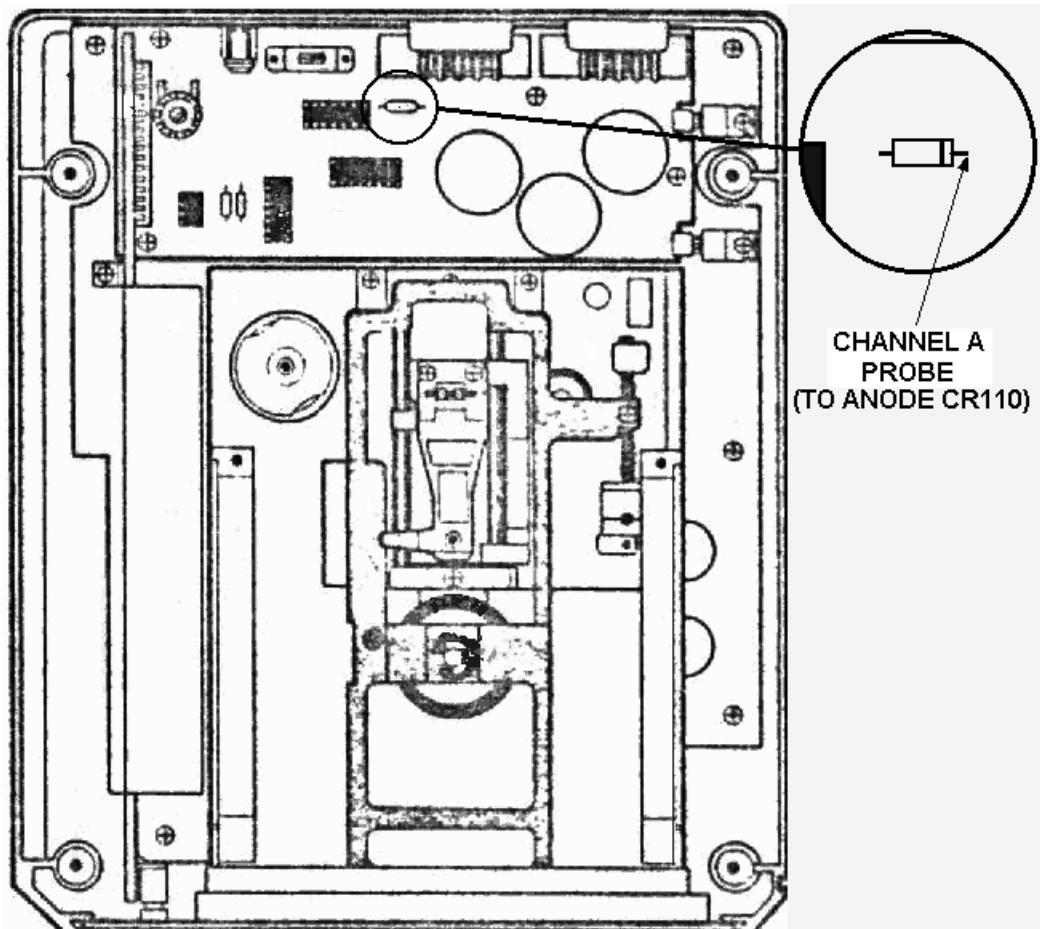
"CAT'S EYES" DISPLAY AS A FUNCTION OF READ HEAD to
TRACK 16 POSITION

    7. Verify that the lobes are still within 80%
       amplitude of each other. If they are not,
       return to step 2.
    8. Via the Console, command the Drive to step
       out to track 32 and return to read track 16.
    9. Verify that the lobes are still within 80%
       amplitude of each other. If they are not,
       return to step 2.

NOTE: Steps 6 thru 3 check the hysterisus within
the head positioning system. If you are unable to
achieve the results indicated, suspect: 1) a broken
or damaged setscrew; 2) a binding and misaligned
positioning band; 3) binding of head assembly to
guiderods; or 4) a bad stepper motor.
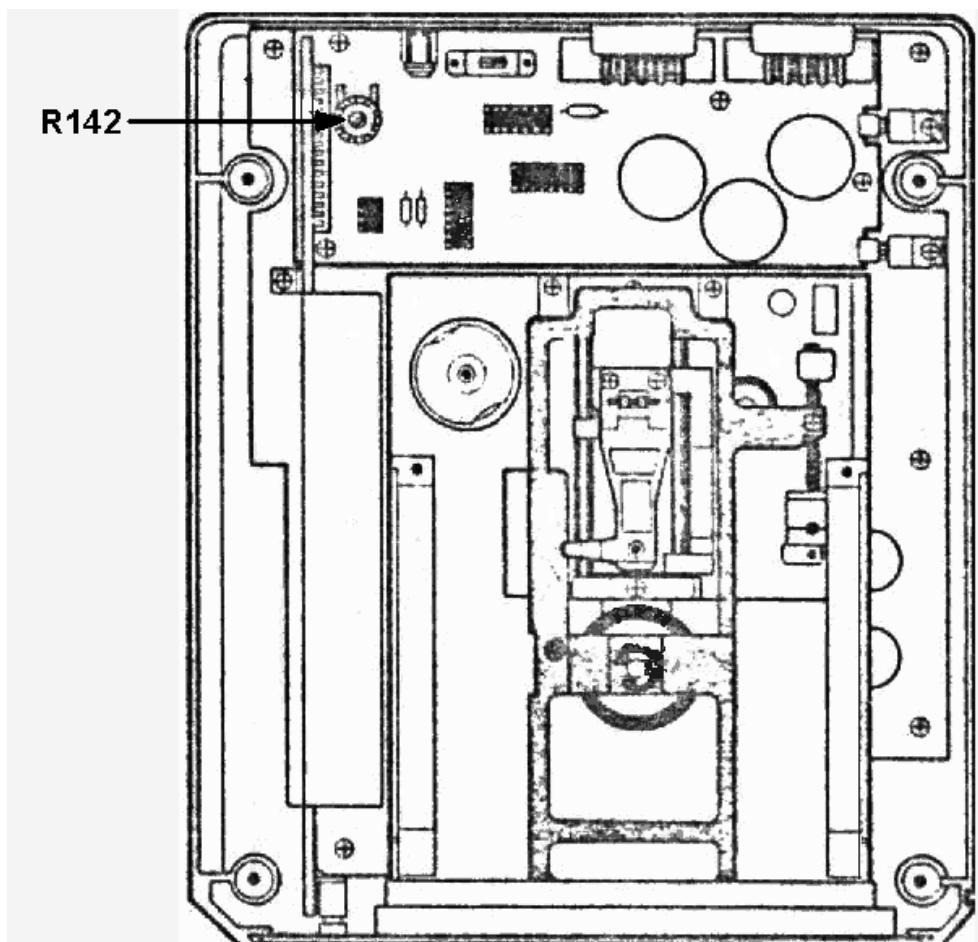
  11. Disconnect the 'scope probes (except for the
      ground lead) from the drive circuit.
  12. Reset the 'scope DISPLAY to channel A only.
  13. Attach the A channel probe to ANODE side of CR110
      (tachometer output).

CHANNEL A
PROBE
(TO ANODE CR110)

14. Command the Drive to read any track.
15. Refer to the following guide for correct
    tachometer frequencies. If the tested frequency
    is not correct, adjust R142.

SPEED ADJUSTMENT GUIDE
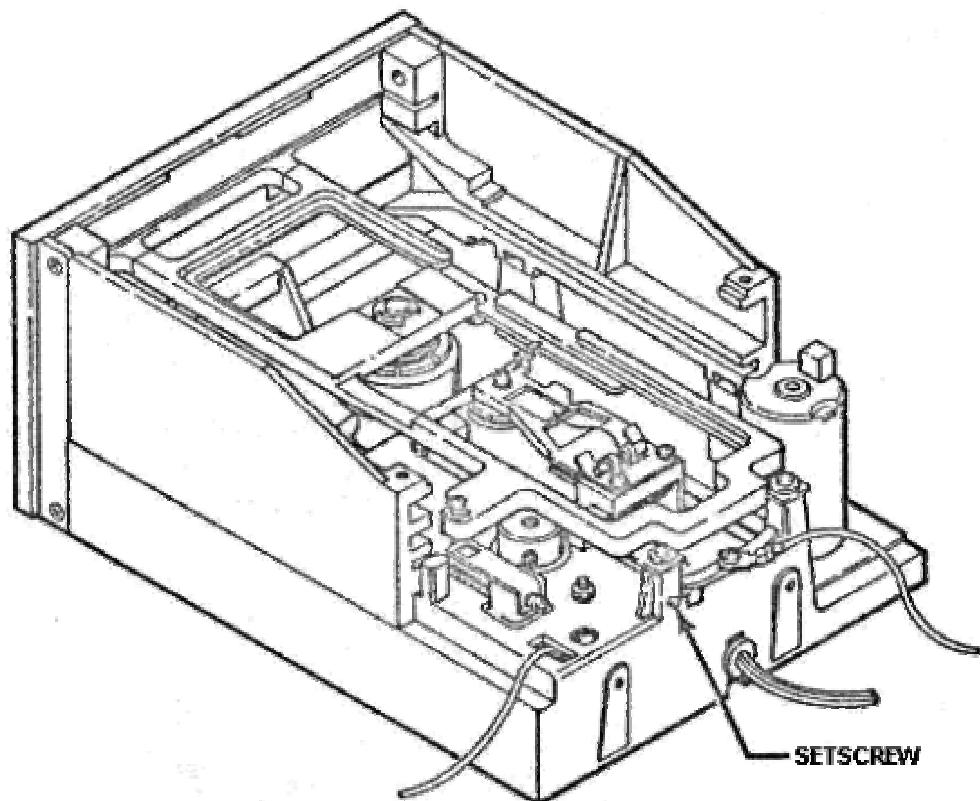
| DRIVE BELT | DRIVE MOTOR PULLEY DIAMETER | TACH FREQUENCY | ONE CYCLE TIME | DRIVE MOTOR PART NO. |
|---|---|---|---|---|
| Mylar (yellow) | .250″ | 390 Hz | 2.564 msec | 3-35003-002 |
| Mylar (yellow) | .300″ | 320 Hz | 3.125 msec | 3-35003-001 |
| Neoprene (black) | .300″ | 305 Hz | 3,279 msec | 3-35003-001 |

**R142** →
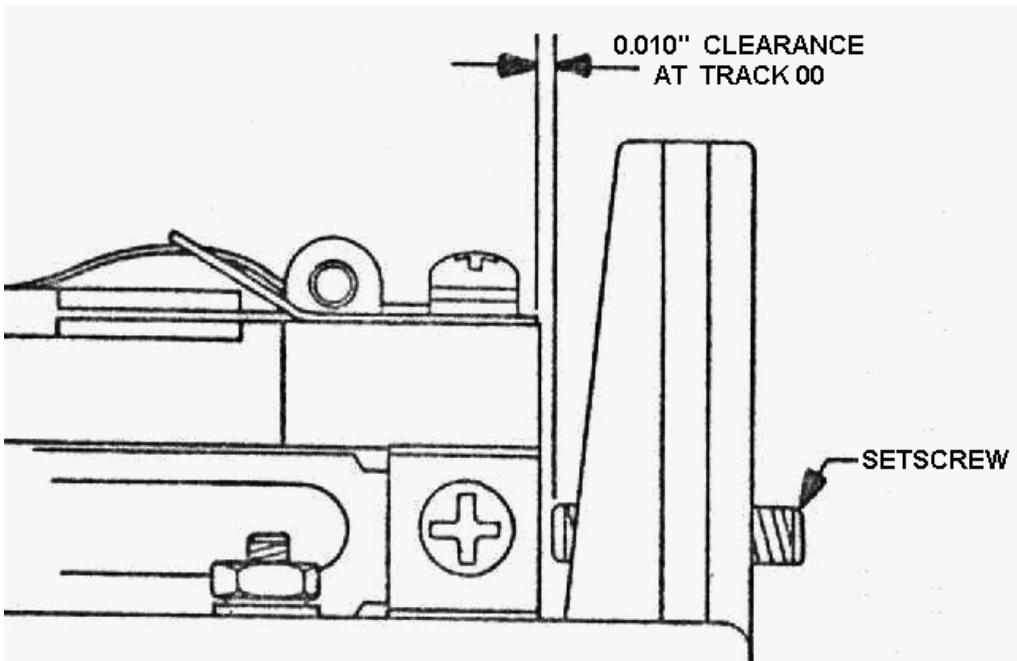
TRACK 00 STOP ADJUSTMENT

The following are required to perform this procedure:
  A. Atari 400/800 Computer Console with minimum 16K
     RAM installed.
  B. I/O cables and Console/Drive power packs.
  C. Disk Alignment Cartridge (Console) or Disk
     Alignment Program.
  D. Master Alignment Diskette.
  E. 0.050 hex setscrew driver.
  F. 0.010 inch flat or round feeler gage.

  1. Connect the Drive to the Computer Console.
  2. Turn the Drive on and wait for the BUSY lite to
     go off. Insert the master alignment diskette.
  3. Either insert the disk alignment cartridge or
     load the disk alignment program into the Console.
  4. Via the console, command the Drive to read track
     00.



  5. Locate the track 00 stop setscrew at the rear of
     the Drive transport.

0.010" CLEARANCE
AT TRACK 00

SETSCREW

6. Check and adjust as needed for a 0.010 inch
   clearance between the setscrew and the rear
   corner of the head carriage plastic molding.
7. Command the Drive to step out to any track above
   30 and then return to track 00.
8. Verify that upon returning to and reading
   track00, the carriage does not butt against the
   setscrew.
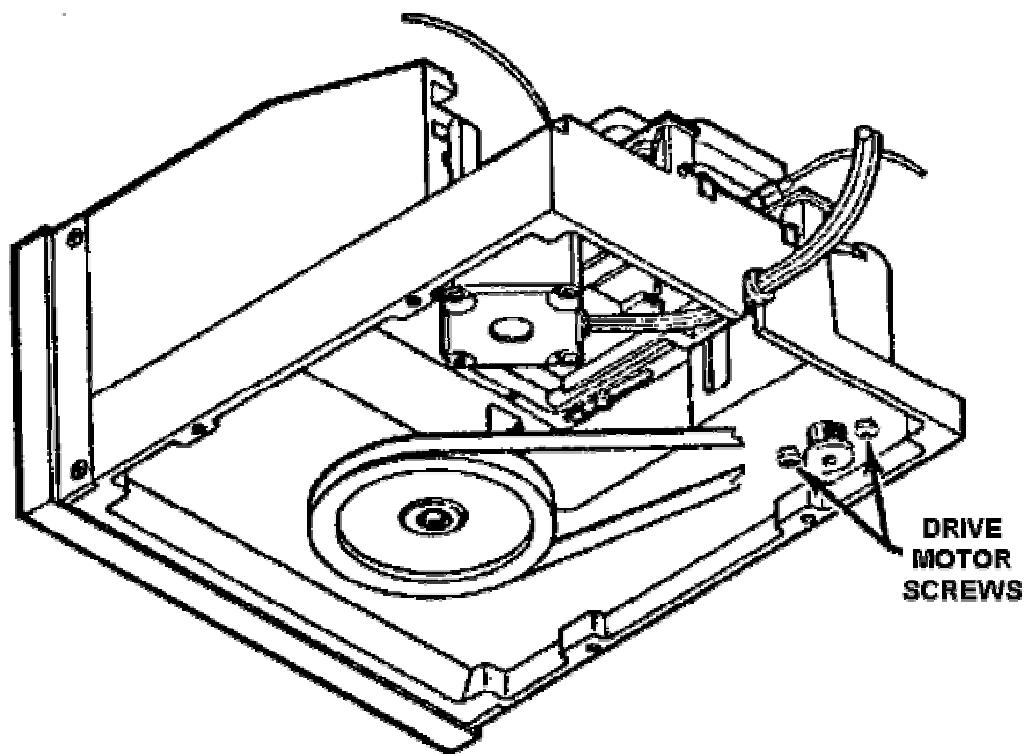
DRIVE BELT ADJUSTMENTS

Drive belt adjustments are completed with No power
applied to the unit.
The transport will have either the older (yellow)
mylar drive belt or the newer (black) neoprene
drive belt. Proper adjustment of the mylar belt
requires the USC of a tensiometer or suitable
substitute capable of measuring 17 + 1 g-rams.

MYLAR (YELLOW) DRIVE BELT
1. Loosen but do not remove the two screws
securing the drive motor to the transport casting.

**DRIVE MOTOR SCREWS**

(In this point of part "Adjustments" source has
ended)

# PARTS LISTS

| No. | PART NUMBER | DESCRIPTION | QTY |
|---|---|---|---|
| 1 | CO14757 | PRODUCT CARTON | 1 |
| 2 | CO14758-02 | END CAP | 1 |
| 3 | CO14758-01 | END CAP | 1 |
| 4 | CO15200 | DOS/FILE MGR. | 1 |
| 5 | CO14763 | INSERT | 1 |
| 6 | CA014748 | POWER ADAPTER (PACKAGED) | 1 |
| 7 | CA014862-01 | DISK PROGRAM CX8101 | 1 |
| 8 | CO14760 | INSTRUCTION MANUAL | 1 |
| 9 | CO15554 | DOOR CLOSE WARNING SHEET | 1 |
| 10 | CO16065 | INSERT SHEET | 1 |
| 11 | CO14759 | POLY BAG | 1 |
| 12 | CA014156 | FINAL ASSEMBLY | 1 |
| 13 | CA014157 | UPPER ASSEMBLY | 1 |
| 14 | CO14105 | PANEL LABEL COVER | 1 |
| 15 | CO12972 | COMMON BASE | 1 |
| 16 | CO14106 | HOLE COVER LABEL | 4 |
| 17 | 88-1010 | MOUNTING PAD | 5 |
| 18 | CA014158 | LOWER ASSEMBLY | 1 |
| 19 | CA014318 | FASTENER-BASE ASSEMBLY | 1 |
| 20 | CO14324 | FASTENER | 4 |
| 21 | CO12972 | COMMON BASE | 1 |
| 22 | CO14086 | CONNECTOR LABEL | 1 |
| 23 | ES-1004 | RUBBER FEET | 1 |
| 24 | CO14085 | SERIALIZATION LABEL | 1 |
| 25 | CA014159 | PANEL ASSEMBLY | 1 |
| 26 | CO14039 | LOGO LABEL | 1 |
| 27 | CO14082 | NAMEPLATE LABEL | 1 |
| 28 | CO12976 | DISC PANEL, PRIMARY | 1 |
| 29 | CO14026 | ALTERNATE FOR ITEM 31 | 1 |
| 30 | CA014160 | MOUNTING PLATE ASSEMBLY | 1 |
| 31 | 75-046 | LOCKWASHER | 8 |
| 32 | CAO14072 | DISK DRIVE | 1 |
| 33 | 72-1604S | SCREW #6-32X1/4 PHIL.HD. | 4 |
| 34 | 72-1406S | SCREW #4-40X3/8 PHIL.HD. | 1 |
| 35 | 72-CL404 | SCREW #4X1/4 THD.FRM.pHIL.HD. | 1 |
| 36 | CO14814 | WASHER SHOULDER | 1 |
| 37 | CO14811 | INSULATOR | 1 |
| 38 | 75-044 | LOCKWASHER | 1 |
| 39 | 75-914C | NUT #4 | 1 |
| 40 | CA014833 | PCB ASSEMBLY (REAR) | 1 |
| 41 | CA014161 | PCB SUB-ASSEMBLY (REAR) | 1 |
| 42 | CO14025 | PCB FAB | 1 |
| 43 | 72-CL605 | SCREW #6X5/16 THD.F.PHIL.HD. | 3 |

810 COVER

| No. | PART NUMBER | DESCRIPTION | QTY | |
|-----|-------------|-------------|-----|---|
| 44 | 72-16046 | SCREW #32X1/4 PHIL.HD. | 4 | |
| 45 | CA014834 | PCB ASSEMBLY (SIDE) | 1 | |
| 46 | CA014162 | PCB SUB-ASSEMBLY (SIDE) | 1 | |
| 47 | CO14024 | PCB FAB | 1 | |
| 48 | 72-CL605 | SCREW | 2 | |
| 49 | CO14138 | GROUND BRACKET | 1 | |
| 50 | CO14136 | RF SHIELD (INSIDE/COMPONENT) | 1 | |
| 51 | CO14137 | RF SHIELD (OUTSIDE/TRACE) | 1 | |
| 52 | CO12977 | MOUNTING PLATE | 1 | |
| 53 | 75-AL612 | SCREW #6-3/4 SHEETM.P.H:PHIL. | 4 | |
| 54 | 82-AL608 | SCREW #6-1/2 B.T.PHIL.HD. | 5 | |
| 55 | CA014122 | CABLE ASSEMBLY (13 PIN) | 1 | |
| 56 | CA014121 | CABLE SUB-ASSEMBLY | 1 | |
| 57 | CO11506 | SHIPPING LABEL | 1 | |
| 58 | CO14845 | WARRANTY CARD | 1 | |
| 59 | CA015303 | POLY ENVELOPE ASSEMBLY | 1 | |
| 60 | CO15304 | RETAILER WARRANTY CARD | 1 | |
| 61 | CO15305 | POLY ENVELOPE | 1 | |
| 62 | CO15936 | PUBLICATIONS QUESTIONNAIRE | 1 | |
| 63 | CA015598-XX | SERVICE CENTER LIST PACKET | 1 | |

810 COVER

| No. | PART NUMBER | QTY | DESCRIPTION |
|---|---|---|---|
| 1 | CO14179-03 | 1 | Cap, CER, AXIAL: l0pF, 20%, COG, C122 |
| 2 | CO14179-04 | 1 | Cap, CER, AXIAL: 33pF, 5%, COG, C141 |
| 3 | CO14179-02 | 4 | Cap, CER, AXIAL: 47pF, 10%, COG, c101,103,131, 119 |
| 4 | CO14179-07 | 1 | Cap, CER, AXIAL: 62pF, L0%, COG, C105 |
| 5 | CO14180-03 | 4 | Cap, CER, AXIAL: 100pF, 20%, X7R, C11O,130, 139, 140 |
| 6 | CO14180-10 | 1 | Cap, CER, AXIAL: 390pF, 5%, X7R, C111 |
| 7 | COl4180-07 | 1 | Cap, CER, AXIAL: 47OpF, 20%, X7R, C106 |
| 8 | CO14181-01 | 16 | Cap, CER, AXIAL: |
| 9 | CO14181-03 | 8 | Cap, CER, AXIAL: .001uF, +80-20%, Z5U, C113,116-118, C123-129, C134-138 |
| 10 | CO14369 | 1 | ELECTROLYTIC, RADIAL: 4.7uF, 35V, +75-10%, C132 |
| 11 | 14-51Rl | 1 | RESISTOR: 1.1Ω, 1/4W, 5%, R125 |
| 12 | 14-5151 | 1 | RESISTOR: 150Ω, 1/4W, SZ, R117 |
| 13 | 14-5221 | 1 | RESISTOR: 220Ω, 1/4W, x, R103, |
| 14 | 14-5271 | 2 | RESISTOR: 270Ω, 1/4W, 5%, R120, 126 |
| 15 | 14-5331 | 1 | RESISTOR: 330Ω, 1/4W, 5%, R132 |
| 16 | 14-5471 | 1 | RESISTOR: 470Ω, l/411, 5%. R106 |
| 17 | 14-5102. | 6 | RESISTOR: lK, 1/4W, 5%, PJ18,121-124, 129 |
| 18 | 14-5152 | 1 | RESISTOR: l.5K, 1/4W, 5%. Rl14 |
| 19 | 14-5332 | 1 | RESISTOR: 3.3K, 1/4W, 5%, R115 |
| 20 | 14-5472 | 4 | RESISTOR: 4.7K, l/4W, 5%, Rl10,116,128,133 |
| 21 | 14-5562 | 2 | RESISTOR: 5.6K, 1/4W, 5%, R101,102 |
| 22 | 14-5103 | 4 | RESISTOR: 10K, l/4W, 5%, Rl05,109,113,134 |
| 23 | 14-5153 | 2 | RESISTOR: 15K, 1/4w, 5%, R112,108 |
| 24 | 14-5273 | 1 | RESISTOR: 27K, 1/4W, 5%, R131 |
| 25 | 14-5333 | 1 | RESISTOR: 33K, l/4W, 5%, Rl11 |
| 26 | 14-5393 | 1 | RESISTOR: 39K, 1/4W, 5X, R104 |
| 27 | 14-5473 | 2 | RESISTOR: 47K, 1/4W, 5%, Rl19,130 |
| 28 | 14-5104 | 2 | RESISTOR: 100K: l/4W, 5%, R135, 136 |
| 29 | 14-5224 | 1 | RESISTOR: 220K 1/4W, 5%, R127 |
| 30 | 14-5750 | 1 | RESISTOR: 75 Ω, l/4W, 5%, R175 |
| 31 | CO14702 | 1 | INDUCTOR: 470uH, L101 |
| 32 | CO14384 | 2 | FERRITE BEAD, L102,103 |
| 33 | 31-1N914 |  | DIODE: lN914, CR120, CR121, CR122 |

810 SIDE BOARD

| No. | PART NUMBER | QTY | DESCRIPTION |
|-----|-------------|-----|-------------|
| 34 | 31-1N4001 | 5 | DIODE: 1N4001, CR10l-104 ,106 |
| 35 | CO14808-01 | 1 | DIODE, ZENER: 1n5231B, 5.1V, 5%, CR107 |
| 36 | CO14394 | 4 | TRANSISTOR: MPSA06, Q106-109 |
| 37 | 33-2N3906 | 3 | TRANSISTOR: 2N3906, Q101,103,104 |
| 38 | 34-2N3904 | 4 | TRANSISTOR: 2N3904, Q102,105,110,111 |
| 39 | CO14316 | 1 | CRYSTAL: 1.000 MHz, X101 |
| 40 | CO14386-07 | 2 | SOCKET, IC: 24 PIN |
| 41 | COl43%-08 | 1 | SOCKET, IC: 28 PIN |
| 42 | COlL3S6-09 | 2 | SOCKET, IC: 40 PIN |
| 43 | CO14356-02 | 6 | SOCKET, IC: 14 PIN |
| 44 | CO14717-01 | 1 | CONECTOR: 23 PIN. P101 |
| 45 | CO14719-02 | 2 | CONECTOR: 5 TIN. J101,102 |
| 46 | CO14397-xx | 1 | SWITCH, POWER, S102 |
| 47 | CO14024 | 1 | PCB |
| 48 | CO14379 | 1 | RESISTOR NETWORK 9X4.7K, SIP, R176 |
| 49 | CA015325 | 2 | LED & STANDOFF ASSEMBLY |
| 50 | CA011624 | 1 | PCB ASSEMBLY |
| 51 | CO11299 | 1 | IC: CUSTOM - ROM, A1.02 |
| 52 | CO14329 | 1 | IC: FLOPPY CONTROLLER - 1771, A105 |
| 53 | CO10745 | 1 | IC: CPU - 6507, A101 |
| 54 | CO10750 | 1 | IC: RIOT - 6532, A104 |
| 55 | CO14328 | 1 | IC: SRAM - 6810, A103 |
| 56 | CO14334 | 2 | IC: CD4013, Z101, Z105 |
| 57 | CO10447 | 1 | IC: CD4077, Z104 |
| 58 | CO14333 | 1 | IC: CD4011, Z102 |
| 59 | CO11465-XX | 1 | IC: CD4069, Z103 |
| 60 | CO10174-XX | 1 | IC: CA3086, A106 |
| 61 | CO14136 | 1 | INSIDE COMPONENT R.F. SHIELD |
| 62 | CO14137 | 1 | OUTSIDE TRACE R.F. SHIELD |
| 63 | 72-CL605 | 2 | SCREW, #6X5/16" THD. F. PHIL. HD. |
| 64 | CO14138 | 1 | GROUND BRACKET |
| 65 | CO14641-10 | 1 | PCB SERIAL NO. LABEL (SEE MFG. PROCEDURE) |

810 SIDE BOARD

| No. | PART NUMBER | QTY | DESCRIPTION |
|-----|-------------|-----|-------------|
| 1 | CO14179-08 | 1 | CAP, CER, AXIAL: 82pF, l0%, COG, C159 |
| 2 | 21-101474 | 1 | CAP, MYLAR FILM .47uF, 100V,10%, C152 |
| 3 | CO14180-05 | 1 | CAP, CER, AXIAL: 220pF, l0%, COG, Cl53 |
| 4 | CO14181-01 | 4 | CAP, CER, AXIAL: .001uF, +80-20%, Z5U, Cl54-256, 120 |
| 5 | CO14180-08 | 1 | CAP, CER, AXIAL: .0047uF,20%, X7R, Cl57 |
| 6 | CO14181-02 | 1 | CAP, CER, AXIAL: .01uF, +80-20%, Z5U, C147 |
| 7 | CO14181-03 | 3 | CAP, CER, AXIAL: .1uF, +80-20%, Z5U, Cl61,163,144 |
| 8 | CO10394 | 2 | CAP, MYLAR FILM .22uF,10%, C145, 158 |
| 9 | CO14181-05 | – | CAP, CER, AXIAL: .22Uf, ALTERNATE FOR ITEM 8 |
| 10 | CO14392 | 2 | CAP, ELECTROLYTIC: 10uF,16V,+50-10%, RADIAL, C143, 160 |
| 11 | CO14368 | 2 | CAP, ELECTROLYTIC: 470uF,16V,+50-10%, RADIAL, C150, 151 |
| 12 | CO14780 | 3 | CAP, ELECTROLYTIC: 4700uF,25V,+50-10%, RADIAL, C146, 148, 149 |
| 13 | 14-51R1 | 1 | RESISTOR: l.1Ω, 1/4W, 5%, R139 |
| 14 | 14-5220 | 1 | RESISTOR: 22Ω l/4W, 5%. Rl73 |
| 15 | 14-5101 | 5 | RESISTOR: 100Ω, 1/4W, 5%, R138,147,174, 162,163 |
| 16 | 14-5241 | 1 | RESISTOR: 240Ω, 1/4W, 5%, R148 |
| 17 | 14-5331 | 1 | RESISTOR: 330Ω, 1/4W, 5%, R146 |
| 18 | 14-5221 | 1 | RESISTOR: 220Ω, 1/4W, 5%, R141 |
| 19 | 14-5751 | 1 | RESISTOR: 750Ω, 1/4W, 5%, R170 |
| 20 | 14-5821 | 1 | RESISTOR: 820Ω, 1/4W, 5%, R167 |
| 21 | 14-5102 | 5 | RESISTOR: 1K, 1/4W, 5%, R137,149,151, 154,156 |
| 22 | 14-5332 | 1 | RESISTOR: 3.3K, 1/4W, 5%, Rl55 |
| 23 | 14-5202 | 1 | RESISTOR: 2K, 1/4W, 5%, Rl50 |
| 24 | 14-5222 | 4 | RESISTOR: 2.2K, 1/4W, 5%, Rl59,160,171, 145 |
| 25 | 14-5392 | 1 | RESISTOR: 3.9K, 1/4W, 5%, Rl61 |
| 26 | 14-5472 | 2 | RESISTOR: 4.7K, 1/4W, 5%, Rl64,168 |
| 27 | 14-5752 | 1 | RESISTOR: 7.5K, 1/4W, 5%, Rl69 |
| 28 | 14-5103 | 8 | RESISTOR: 10K, 1/4W, 5%, Rl40,143,152, 153,157,158,165,166 |
| 29 | 14-5105 | 1 | RESISTOR: 1M, 1/4W, 5%, Rl44 |
| 30 | 15-5360 | 1 | RESISTOR: 36Ω, 1/2W, 5%, R172 |
| 31 | I9-411504 | 1 | RESISTOR: VARIABLE 500K, R142 |
| 32 | CO14703 | 1 | INDUCTOR: 680Uh, l103 |
| 33 | 31-lN914 | 2 | DIODE: 1N914, CR110,119 |

810 REAR BOARD

| No. | PART NUMBER | QTY | DESCRIPTION |
|-----|-------------|-----|-------------|
| 34 | 31-1N4001 | 5 | DIODE: 1N4001, CR109,115-118 |
| 35 | CO14308 | 4 | DIODE: MR501, CR111-115 |
| 36 | 34-2N3904 | 2 | TRANSISTOR: 2N3904, Q116,117 |
| 37 | CO14394 | 2 | TRANSISTOR: MPSA06, Q114,115 |
| 38 | Ca015326 | 1 | TRANSISTOR & HEATSINK ASSEMBLY |
| 39 | CO15505 | 1 | CAP, ELECTROLYTIC, RADIAL, 47uF,16V |
| 40 | CO14386-01 | 1 | IC SOCKET: 8PIN |
| 41 | CO14386-02 | 3 | IC SOCKET: 14PIN |
| 42 | CO14725 | 1 | SWITCH, LOGIC, S101 |
| 43 | CO14715 | 1 | CONNECTOR: POWER JACK, J110 |
| 44 | CO12995 | 2 | CONNECTOR: 13PIN, RIGHT ANGLE, J107,108 |
| 45 | CO14719-03 | 1 | CONNECTOR: 23PIN, J106 |
| 46 | CO14716-03 | 2 | CONNECTOR:  3PIN, J104,105 |
| 47 | CO14719-02 | 2 | CONNECTOR:  5PIN, J103,109 |
| 48 | CO14796 | 4 | LATCHING FASTENER |
| 49 | CO14025 | 1 | PCB |
| 50 | CO14641-11 |  | PCB SERIAL NO. LABEL (SEE MFG. PROCEDURE) |
| 51 | CA014161 | 1 | PCB SUB-ASSEMBLY |
| 52 | CO14332 | 1 | IC: LM311, A109 |
| 53 | CO10174-XX | 3 | TRANSISTOR ARRAY, A107,110,111 |
| 54 | CO14348 | 1 | VOLTAGE REGULATOR, 7805, A108 |

810 REAR BOARD

# APPENDIX

**A**



**ATARI 810 DISK DRIVE BLOCK DIAGRAM**

**B**

ATARI 810 SIDE BOARD SCHEMATIC DIAGRAM

**ATARI 810 SIDE BOARD SILKSCREEN**

**D**



**ATARI 810 REAR BOARD SCHEMATIC DIAGRAM**

**ATARI 810 REAR BOARD SILKSCREEN**
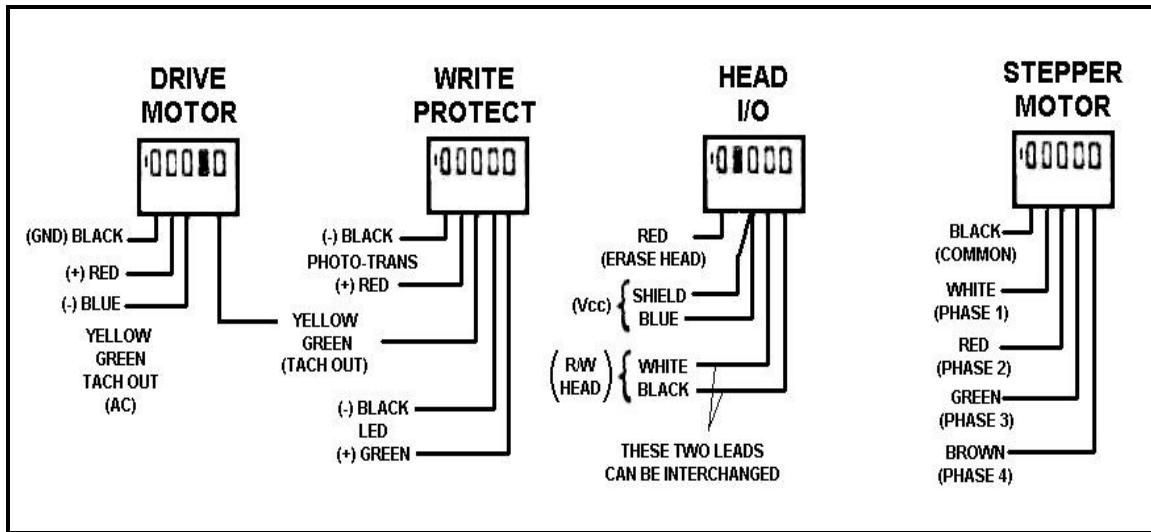
F



**ALTERNATE WIRING HARNESS ARRANGEMENT**

# G

ERROR CODES

| Error Code | Error Code Message |
|---|---|
| 2 | Memory Insufficient |
| 3 | Value Error |
| 4 | Too Many Variables |
| 5 | String Length Error |
| 6 | Out of Data Error |
| 7 | Number Greater than 32767 |
| 8 | INPUT Statement Error |
| 9 | Array of String DIM Error |
| 10 | Argument Stack Overflow |
| 11 | Floating Point Overflow/Underflow Error |
| 12 | Line Not Found |
| 13 | No Matching FOR Statement |
| 14 | Line Too Long Error |
| 15 | GOSUB or FOR Line Deleted |
| 16 | RETURN Error |
| 17 | Garbage Error |
| 18 | Invalid String Character |
| 142 | Serial Bus Data time Overrun |
| 143 | Serial Bus Data Frame Checksum Error |
| 144 | Device Done Error |
| 145 | Read After Write Compare Error |
| 146 | Function not Implemented |
| 147 | Insufficient RAM |
| 160 | Drive Number Error |
| 161 | Too Many OPEN Files |
| 162 | Disk Full |
| 163 | Unrecoverable System Data I/O Error |
| 164 | File Number Mismatch |
| 165 | File Name Error |
| 166 | POINT Data Length Error |
| 167 | File Locked |
| 168 | Command Invalid |
| 169 | Directory Full |
| 170 | File Not Found |
| 171 | POINT Invalid |

**NOTE:** The following are INPUT/OUTPUT errors that result during the use of disk drives, printers, or other accessory devices. Further information is provided with the auxiliary hardware.

| Error Code | Error Code Message |
|---|---|
| 19 | LOAD Program Too Long |
| 20 | Device Number Larger |
| 21 | LOAD File Error |
| 128 | BREAK Abort |
| 129 | IOCB |
| 130 | Nonexistent Device |
| 131 | IOCB Write Only |
| 132 | Invalid Command |
| 133 | Device or File not Open |
| 134 | BAD IOCB Number |
| 135 | IOCB Read Only Error |
| 136 | End Of File |
| 137 | Truncated Record |
| 138 | Device Timeout |
| 139 | Device NAK |
| 140 | Serial Bus |
| 141 | Cursor Out of Range |

# INDEX

# INDEX

# INDEX