

CONTENTS

23-060	Safety
23-070	Tools
23-090	Diskette Protection
23-100	Diskette Drive Assembly
23-110	Latch Assembly
23-120	Collet
23-130	Cover Assembly
23-140	Pressure Pad Actuator
23-150	Head and Pressure Pad Cleaning
23-160	Leadscrew and Head Carriage Assembly
23-165	Leadscrew Cleaning
23-170	Drive Motor
23-180	Hub Assembly
23-190	Drive Pulley
23-200	Belt Path
23-210	Idler Assembly
23-220	Data Head
23-230	Leadscrew Wheel
23-240	Lower Limit Stop
23-250	Upper Limit Stop
23-260	Stepper Motor and Bracket
23-270	Phototransistor
23-280	Light-Emitting Diode
23-290	File Control Card
23-300	Cable and Card Locations
23-310	Diskette Quality Service Check
23-311	Diskette Failure Descriptions
23-313	Diskette Test Description
23-315	Diskette Figure
23-317	Diskette Quality Service Check for Level 1 Attachments
23-319	Diskette Quality Service Check for Level 2 Attachments

23-060 SAFETY

DANGER

The drive motor case may be hot and may burn your hand. When the drive motor is operating, do not touch the drive motor case or the drive belt.

CAUTIONS

1. The 33FD can be damaged if it is not operated or serviced correctly. Caution notices throughout this section indicate hazardous areas.
2. To prevent damage to the leadscrew and carriage, lubricate the leadscrew only with a very thin layer of IBM No. 6 oil when the head carriage is reinstalled. To prevent damage to the head, remove the diskette and clean the head only with isopropyl alcohol and a clean cloth (see paragraph 23-150).

23-070 TOOLS

CE Alignment Tool

The CE alignment tool (part 2200698) is used to do the following:

- Align the data head by adjusting the data head to track 0.
- Adjust the phototransistor assembly by mechanical alignment.

Head Cleaning Tools

- Brush (part 2200106)
- Isopropyl alcohol (part 2200200)
- Cloth (part 2108930)

Note: If the pressure arm pad needs replacement, order bill of material 2200751, 33FD pressure arm pad field replacement procedure. This bill of material contains parts and instructions.

23-090 DISKETTE PROTECTION

Damaged diskettes should not be inserted into the diskette drive. Diskettes that are physically damaged, (creased or bent) or contaminated with foreign materials (dust, marks from your fingers, cleaning fluid, etc.) can cause the head to lift from the diskette. This can cause operation errors, equipment errors, or head damage.

Placing a heavy item on a diskette can damage the diskette.

Long Term Storage

Place diskettes in their envelopes and store them in the following environment:

Temperature: 50 to 125 degrees F (10.0 to 51.1C)

Relative humidity: 8% to 80%

Maximum wet bulb: 85 degrees F (29.4C)

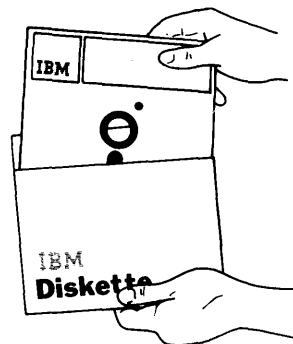
If a diskette is at a temperature outside of the machine operational range, wait 5 minutes before use. The diskette should be removed from its shipping container during this time, but should be kept in its envelope.

Shipping and Receiving

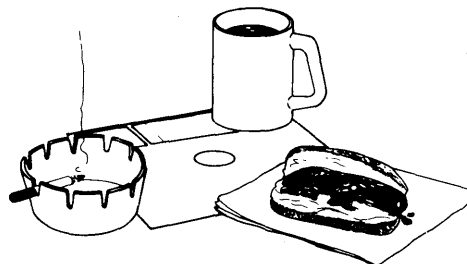
Send diskettes inside the original shipping container. A paper envelope does not give good enough protection. Ensure you label the container: **DO NOT PLACE NEAR TOO MUCH HEAT (125 degrees F or 51.5 C) OR IN DIRECT LIGHT.**

When you receive diskettes, check for container and diskette damage. Keep the container so you can store the diskettes or send them later.

Return a diskette to its envelope when it is removed from the diskette drive.

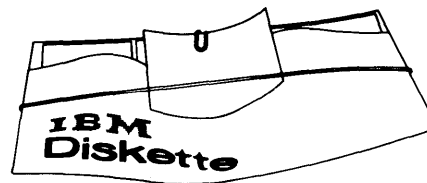


Do not lay diskettes near smoke or other things that can cause the diskette to be contaminated.

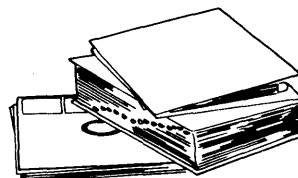


23

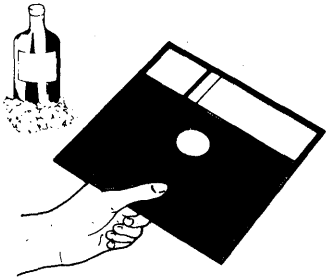
Do not use clips or rubber bands on a diskette.



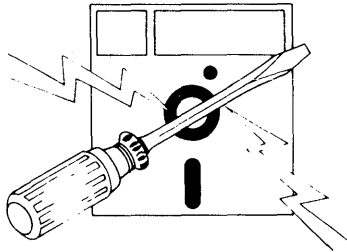
Do not place heavy books on diskettes.



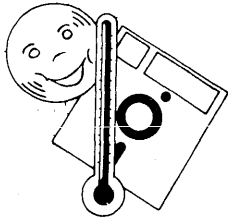
Do not touch or attempt to clean diskette surfaces.
Contaminated diskettes will not work correctly.



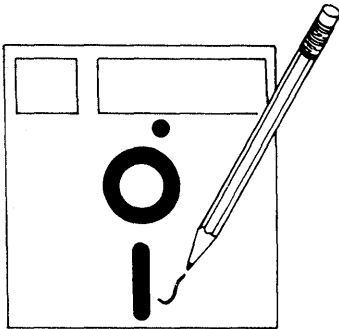
Do not place diskettes near magnetic materials.
Data can be lost from a diskette exposed to a magnetic field.



Do not expose diskettes to heat greater than
51.5° C (125° F) or direct sunlight.



Do not write outside the label area on diskettes.



23-100 DISKETTE DRIVE ASSEMBLY

Removal and Replacement

The 33FD and its mounting frame should be removed from the machine when making adjustments, removals, and replacements.

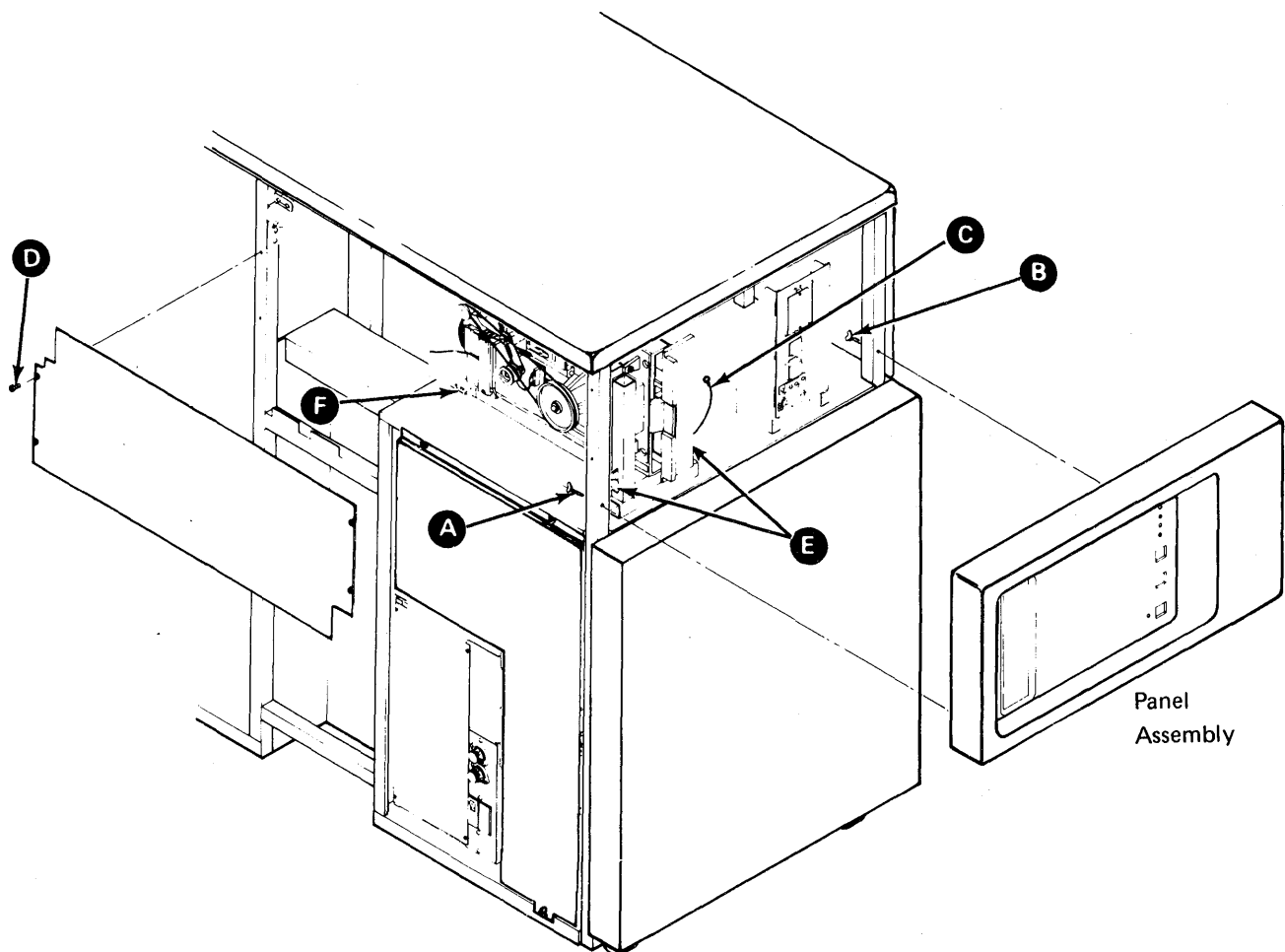
1. Set Power to O (operator panel).
2. Open the diskette drive cover.
3. Open the front left side cover and remove screw **A**, and open the front right side cover and remove screw **B**. Remove the panel assembly.
4. Remove the ground wire **C**.

5. Remove the 4 side panel screws **D** and the side panel.
6. Turn the locks **E**; remove the 33FD and mounting frame from the machine.
7. If power is not needed, disconnect the cables so the unit can be moved to a convenient location.

CAUTION

Ensure that the cables are clear of the bracket **F** when the 33FD and mounting frame are reinstalled.

8. To reinstall, reverse the above procedure.



23-110 LATCH ASSEMBLY

Removal and Replacement

1. Remove the 33FD from the machine (see paragraph 23-100).
2. Loosen the top cover mounting screws **A**, and remove the cover.
3. Remove the two latch mounting screws **C**.
4. Pull latch **B** out toward the front of the cover.
5. To reinstall, reverse the above procedure.

23-120 COLLET

Removal and Replacement

1. Set Power to O (operator panel).
2. Remove the 33FD from the machine (see paragraph 23-100).
3. Remove the covers (see paragraph 23-130).
4. Remove mounting screw and washer **G**.
5. Remove collet assembly **E**, spring, and washer **D**.
6. Remove collet **F**.
7. To reinstall, reverse the above procedure.

23-130 COVER ASSEMBLY

Removal and Replacement

CAUTION

Do not let the pressure pad arm hit the head.

1. Set Power to O (operator panel).
2. Remove the 33FD from the machine (see paragraph 23-100).
3. Loosen the top cover mounting screws **A** and remove the top cover.
4. Remove the two pivot screws while holding the side cover.
5. Remove the cover carefully to prevent damage to the wires.
6. Remove the wires from the light-emitting diode and actuator. (Yellow wire goes to the light-emitting diode terminal marked Y.)
7. Remove the wires from the clip on the cover.

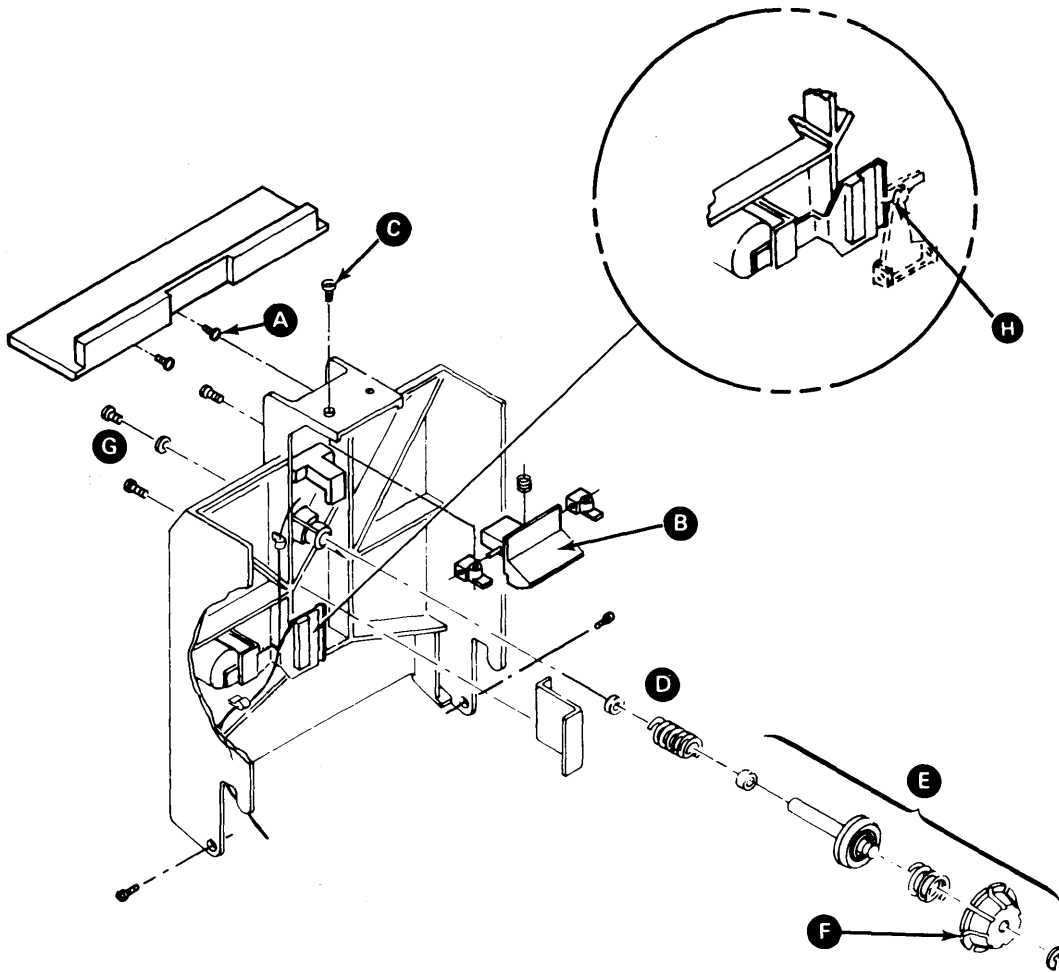
CAUTION

Before the cover screws are reinstalled, position the actuator bail under the pressure pad arm **H**.

8. To reinstall, reverse the above procedure.

CAUTION

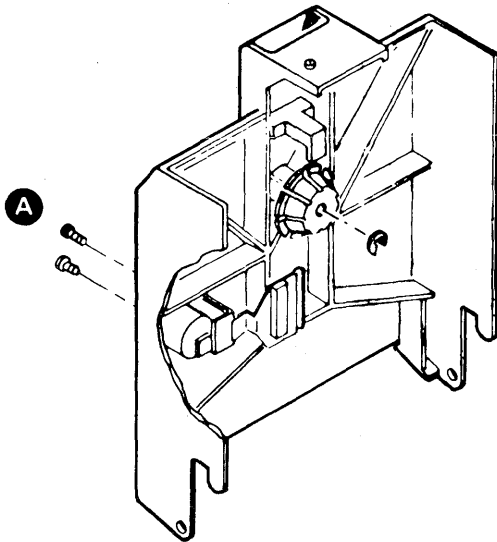
Before reinstalling cover screws, put the actuator bail under the pressure pad arm **H**.



23-140 PRESSURE PAD ACTUATOR

Removal and Replacement

1. Set Power to O (operator panel).
2. Remove the 33FD from the machine (see paragraph 23-100).
3. Remove the covers (see paragraph 23-130).
4. Remove the two screws **A**.



5. Remove the leads.
6. Remove the actuator.
7. Reinstall the actuator, leads, and cover, and do the adjustment.

CAUTION

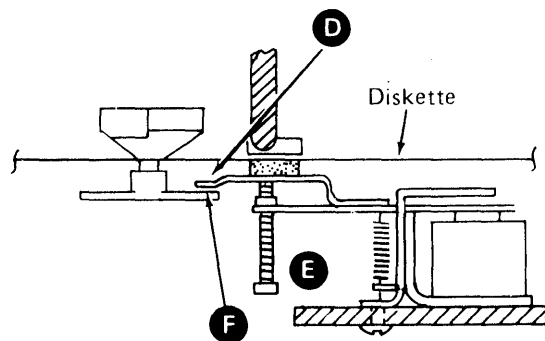
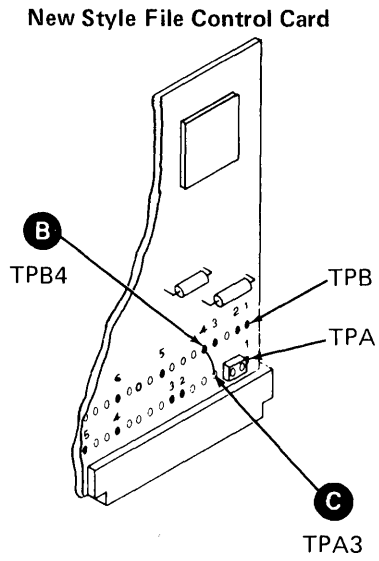
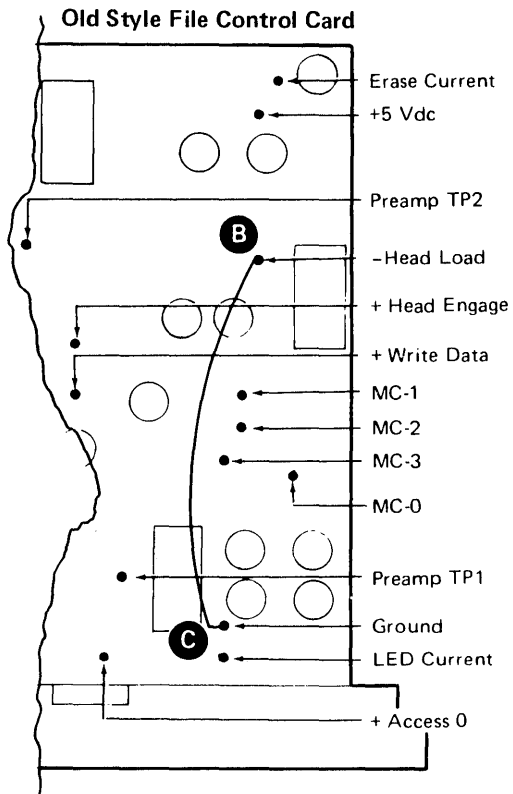
Before reinstalling the cover screws, put the actuator bail **M**, located on the cover, under the pressure pad arm **N**.



Adjustment

Note: Run the head alignment exerciser before performing this adjustment. If the head alignment is good, go to the Diskette Quality Service Check (see paragraph 23-310). If the head alignment is bad, continue with this adjustment.

1. Set Power to O (operator panel).
2. Remove the 33FD from the machine (see paragraph 23-100); then set Power to I (operator panel).
3. Insert a diskette.
4. Activate the head load coil by installing a jumper between the ground **C** and head load **B** test points on the file control card located on the 33FD.
 - a. On the old type file control card (2 wide, 3 high), test points are located on the transistor side of the card.
 - b. On the new type file control card (2 wide, 2 high), test points are the two rows of pins TPA and TPB.
5. Adjust the screw **E** until the pressure pad arm and the bail just touch **D**.
6. Turn the adjusting screw clockwise 1/2 to 3/4 turn; and check for a gap between the arm and the bail at all tracks **F**.
7. Install the 33FD in the machine.



23-150 HEAD AND PRESSURE PAD CLEANING

CAUTION

Use only the materials in the following list to clean the head and the pressure pad.

Note: If the pressure pad needs replacement, order bill of material 2200751, 33FD pressure pad field replacement procedure.

1. Set Power to O (operator panel).
2. Remove the 33FD from the machine (see paragraph 23-100).
3. With the cover open, turn the stepper motor wheel by hand until the carriage assembly is at the upper limit stop.

CAUTION

Do not let the pressure pad arm hit the head.

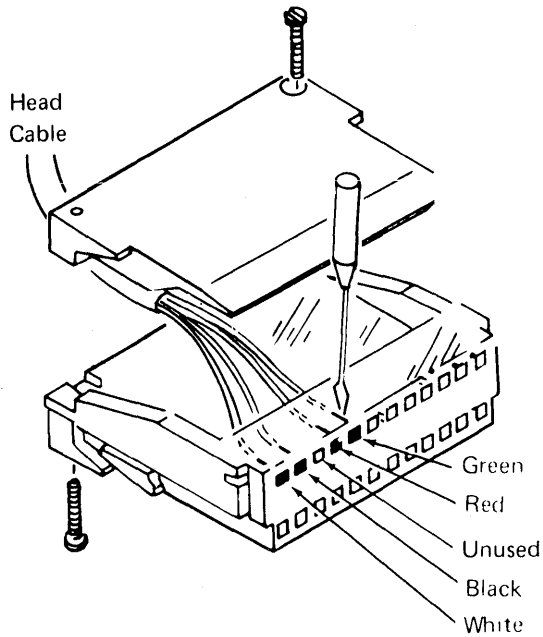
4. Pivot the pressure pad arm away from the head and check for dirt on the pad. If there is dirt on the pad, use a dry brush (part 2200106) to remove the dirt and to clean the pressure pad.
5. A cloth with fluid on it should not touch the pressure pad. Hold the pressure pad arm out, clean the head surface with isopropyl alcohol (part 2200200) on a clean cloth (part 2108930). Any other cleaning fluid may damage the head assembly.

This page is intentionally left blank.

23-160 LEADSCREW AND HEAD CARRIAGE ASSEMBLY

Removal

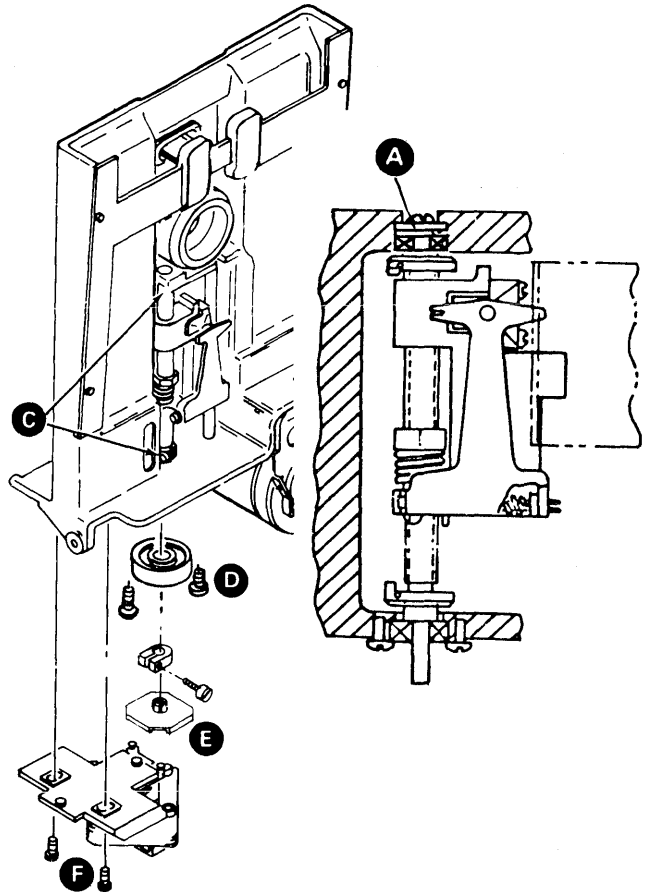
1. Set Power to O (operator panel).
2. Remove the 33FD from the machine (see paragraph 23-100). Note the path of the head cable so it has the same path after replacement.
3. Remove the leads from the connector by pushing down with small screwdriver as shown:



4. Center the head carriage on the leadscrew by turning the stepper motor wheel.
5. Remove the stepper motor **F** and leadscrew wheel **E**.
6. Remove the covers (see paragraph 23-130).
7. Loosen the clamping screws on the upper and lower stops **C**.
8. Remove the two screws and the bottom bearing **D**.

CAUTION

Do not lose the spring **A** when you remove the shaft. Note the bend in the spring, so you can reinstall it the same way.



9. Slide the leadscrew assembly down until the top clears the baseplate, then slide the assembly out.

CAUTION

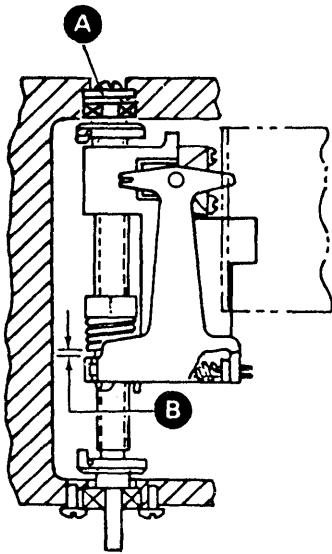
Do not let the pressure pad arm hit the head.

10. Remove the top bearing and both stops from the leadscrew.

Replacement

Note: If the leadscrew and the head carriage are disassembled, reinstall them by threading the leadscrew into the bottom of the head carriage assembly and into the carriage nut and spring. There should be approximately 0.51 mm (0.020 inch) gap **B**.

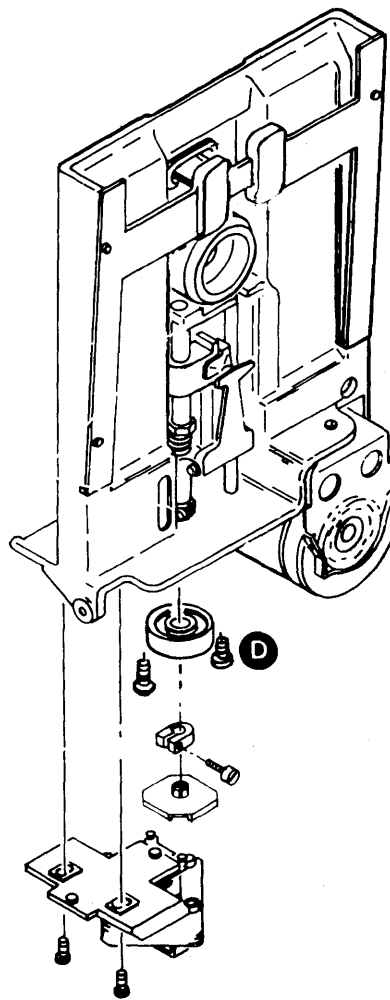
1. Center the head carriage assembly on the leadscrew and install the upper and lower limit stops.
2. Reinstall the top bearing spring **A** with the bend in the same position as when it was removed.
3. Reinstall the head carriage assembly into the baseplate (bottom end first).
4. Reinstall the two screws and the bottom bearing **D** and check for about 0.76 mm (0.030 inch) up and down movement of the leadscrew against the spring **A**.



5. Reinstall the leadscrew wheel, leadscrew wheel clamp, and stepper motor.

Note: Ensure that you use the same head cable path that you used during the removal.

6. Connect the wires (see *Removal* for wire locations). Check that the wire leads are in place and tightly fastened in the connector.
7. Do the stepper motor adjustment (see paragraph 23-260) and the data head adjustment (see paragraph 23-220).
8. Reinstall the connector.
9. Reinstall the covers (see paragraph 23-130).
10. Install the 33FD in the machine.



23-165 LEADSCREW CLEANING

CAUTION

Use only the indicated materials to clean the leadscrew.

1. Set Power to O (operator panel).
2. Remove the 33FD from the machine (see paragraph 23-100).
3. With the cover open, turn the stepper motor wheel by hand until the carriage assembly is at the upper limit stop.

CAUTION

Do not let the pressure pad hit the head at any time.

4. Clean the leadscrew with isopropyl alcohol (part 2200200) on a clean cloth (part 2108930). Use of any other cleaning fluid may damage the head assembly.
5. Evenly space about six drops of IBM No. 6 oil along the leadscrew and move the head down and up the leadscrew three or four times to distribute the oil.

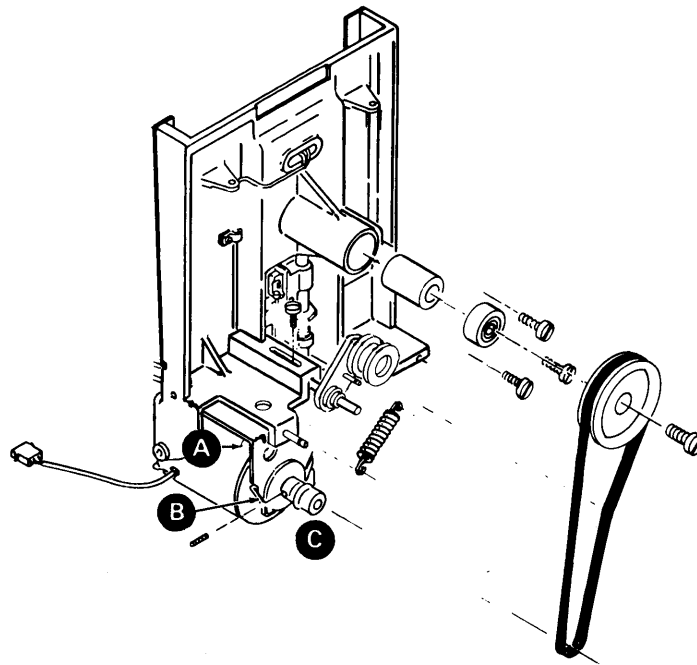
Removal

1. Set Power to O (operator panel).
2. Remove the 33FD from the machine (see paragraph 23-100).
3. Remove the belt.
4. Remove the cable clamp on the back of the mounting frame.

DANGER

The drive motor case may be hot and may burn your hand.

5. Loosen the two motor mounting clamps and remove the drive motor **(B)**.
6. Remove the drive pulley **(C)**.



Replacement

1. Reinstall the drive pulley. (Align the setscrew with flat surface on the shaft and tighten.)

DANGER

To prevent personal injury, position the two large square holes in the motor frame so the holes are under the bracket **(A)**. The holes are large enough for a finger to go through.

2. Clamp the motor to the mounting bracket.
3. Reinstall the belt.
4. Connect the cables to the 33FD.
5. Check the belt path. If necessary to adjust, see paragraph 23-200.
6. Install the 33FD in the machine.

23-180 HUB ASSEMBLY

Removal and Replacement

1. Set Power to O (operator panel).
2. Remove the 33FD from the machine (see paragraph 23-100).
3. Remove the covers (see paragraph 23-130).
4. Remove the drive belt.
5. Remove the screw **F** and pulley.
6. Remove the hub **A**.
7. Remove the three screws, that hold the bearing, the back bearing, and the spacers **C**.
8. Remove three bearing screws and bearing **B**.
9. To reinstall, reverse above procedure. Check the belt path. If necessary to adjust, see paragraph 23-200.

CAUTION

The front bearing **B** must be even with the front surface of the baseplate. To do this, tighten the screws that hold the front bearing first. The seal on the bearings should face outside.

23-190 DRIVE PULLEY

Removal

1. Set Power to O (operator panel).
2. Remove the 33FD from the machine (see paragraph 23-100).
3. Remove the drive belt.
4. Loosen the setscrew **J** and remove drive pulley **H**.

Replacement

1. Position the pulley on the shaft.
2. Align the setscrew with flat surface of the shaft and tighten.
3. Reinstall the belt.
4. Check the belt path. If necessary to adjust, see paragraph 23-200.
5. Install the 33FD in the machine.

23-200 BELT PATH

The belt must be tracking in the center of the drive pulley and hub pulley.

Adjustment

1. Set Power to O (operator panel).
2. Remove the 33FD from the machine (see paragraph 23-100).
3. De-activate the idler by removing the spring **K**.
4. Position the drive pulley so the belt path is on the center of the drive pulley and hub pulley.
5. Activate the idler and adjust so it does not change the belt path. Loosen screw **D** and slide assembly in or out to adjust. Screw **D** must be tight to check the belt path.
6. Install the 33FD in the machine.

23-210 IDLER ASSEMBLY

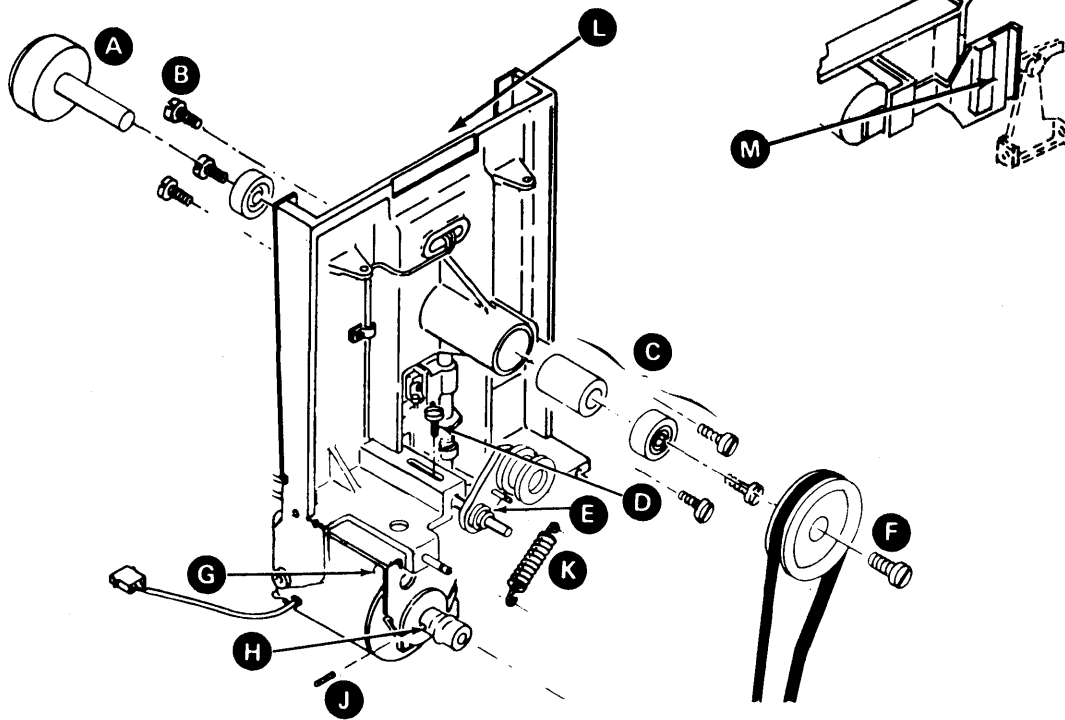
Removal and Replacement

1. Set Power to O (operator panel).
2. Remove the 33FD from the machine (see paragraph 23-100).

3. Remove the belt and spring **K**.
4. Remove the idler assembly **E**.
5. To reinstall the idler assembly spring and belt, reverse the above procedure and check the belt path. Loosen screw **D**. To adjust the assembly, slide the assembly in or out. Screw **D** must be tight to check the belt path.

CAUTION

Before reinstalling the cover screws **L**, put the actuator bail, located on the cover, under the pressure pad arm **M**.



23-220 DATA HEAD

To adjust the data head, you must obtain three conditions at the same time:

- The correct gap from the data head to the 33FD alignment tool
- The correct position between the stepper motor wheel and the leadscrew wheel
- The correct space between the stepper motor and leadscrew wheels

Note: This procedure aligns the data head at track 00.

Adjustment

Note: Run the head alignment exerciser before performing this adjustment. If the head alignment is good, go to the *Diskette Quality Service Check* (see paragraph 23-310). If the head alignment is bad, continue with this adjustment.

1. Set Power to O (operator panel).
2. Remove the covers (see paragraph 23-130).
3. Turn the stepper motor wheel until the head carriage is against the lower stop **H**.
4. Loosen the mounting screw and move the phototransistor assembly **A** to the left.

Note: If the phototransistor assembly is not moved, the head adjustment can be made wrong.
5. Loosen the clamping screws on the lower limit stop **H** and leadscrew wheel **J**.
6. With the stepper motor wheel and leadscrew wheel in position as in view **S**, insert a 0.51 mm (0.020 inch) thickness gauge between the wheels **L** in view **S**. Tighten screw **J** a small amount.

Note: The purpose of this step is to let the stepper motor wheel pins go into the leadscrew wheel the maximum distance with no binds.

7. Locate the white spot label or the groove on the outer edge of the hub. If the hub has both, always use the white spot. Turn the hub to put this mark 180 degrees away from the data head.

Note: This ensures that if the hub is eccentric, it is located in the same spot and that all head adjustments use the same reference point.

CAUTION

Do not let the 33FD alignment tool touch the shiny surface of the head.

8. Install the 33FD alignment tool on the hub **B**. Clamp it into place with the thumbscrew and turn the CE tool so it touches surface **D**.
9. Turn the leadscrew by holding the upper limit stop **C**; adjust for gap **E**. This gap is a number on the front of the head assembly **F**. This number represents thousandths. Example: 3 is the same as 0.076 mm (0.003 inch). Adjust for a very light drag on a 0.003 inch gauge. A 0.002 inch gauge must be free.

Note: Remove the thickness gauge from the pack to make this adjustment.
10. Ensure the stepper motor wheel and leadscrew wheel remain in position **S**; then tighten the leadscrew wheel clamping screw **J**. The top of the clamping collar should be approximately even with the top of the metal clamping surface of the leadscrew wheel **T**.

CAUTION

If the clamping collar is not tightened, machine operation causes the head to go out of adjustment. However, do not over tighten the clamping screw, because it can damage the screw or cause the screw to break.

11. Verify gap **E** setting.
12. Adjust the phototransistor **A** so that the raised edge touches the 33FD alignment tool **B**, and tighten the mounting screw.
13. Remove the 33FD alignment tool and perform lower limit stop adjustment (see paragraph 23-240).
14. Turn the stepper motor wheel at least one complete revolution and check for binds.
15. Do the upper limit stop adjustment (see paragraph 23-250).
16. If a new leadscrew wheel was installed, fill the grooves in the leadscrew wheel from 25% to 40% with IBM No. 23 grease.
17. Reinstall the covers.
18. Install the 33FD in the machine (see paragraph 23-100).

23-230 LEADSCREW WHEEL

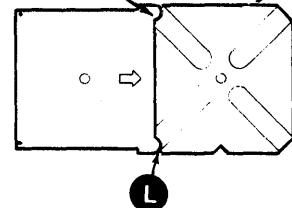
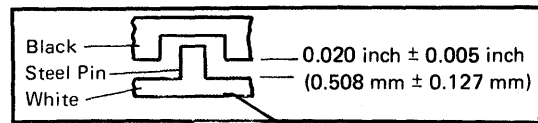
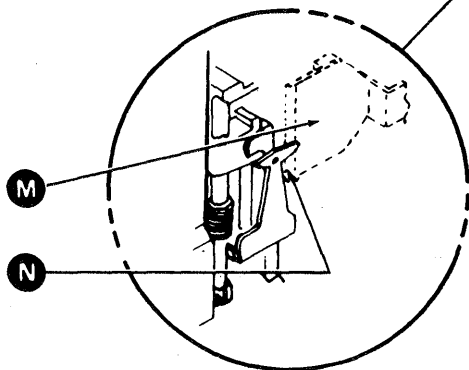
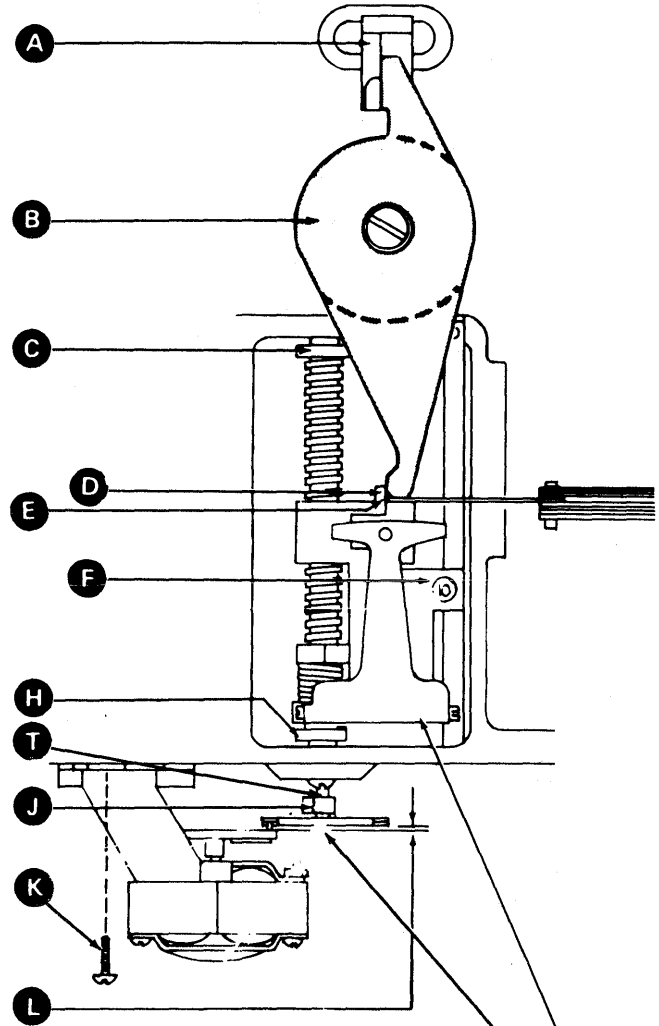
Removal and Replacement

1. Set Power to O (operator panel).
2. Remove the 33FD from the machine (see paragraph 23-100).
3. Remove the stepper motor by removing the two screws **K**.
4. Loosen the clamping screw and remove the leadscrew wheel **J**.
5. To reinstall, reverse the above procedure. Do the stepper motor adjustment (see paragraph 23-260), and head adjustment (see paragraph 23-220).

CAUTION

Before reinstalling the cover screws, put the actuator bail **M** located on the cover, under the pressure pad arm **N**.

-
-
-
6. Install the 33FD in the machine.



View **S** Bottom View of Diskette Drive

23-240 LOWER LIMIT STOP

Adjustment

1. Set Power to O (operator panel).
2. Remove the 33FD from the machine (see paragraph 23-100).
3. Ensure that the head is adjusted for track 00 and the leadscrew **J** and stepper motor wheel **U** are in position for track 00 (see paragraph 23-220).
4. Loosen clamp screw **C**. Ensure that the leadscrew is 80 to 90 degrees past track 0 in a downward direction. The wheels must be in position **A**.
5. Place the limit stop so that **F** on the lower limit stop is in front of and against **G** on the carriage.
6. Adjust **H** for 0.3 mm to 0.46 mm (0.012 inch to 0.018 inch).

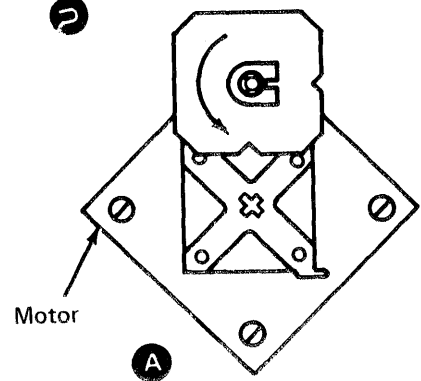
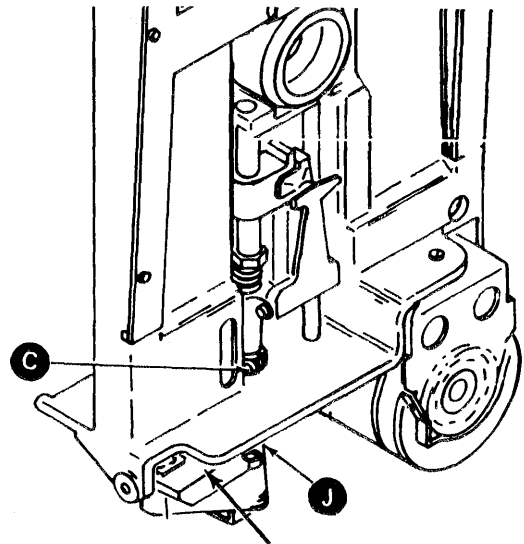
CAUTION

Do not overtighten the screw.

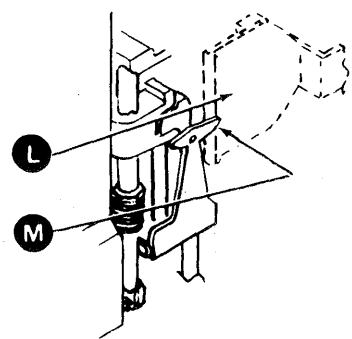
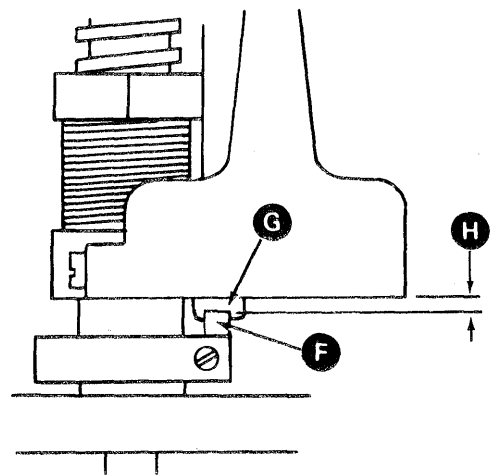
-
-
7. Install the 33FD in the machine (see paragraph 23-100).

CAUTION

Before reinstalling the cover screws, put the actuator bail **L**, located on the cover, under the pressure pad arm **M**.



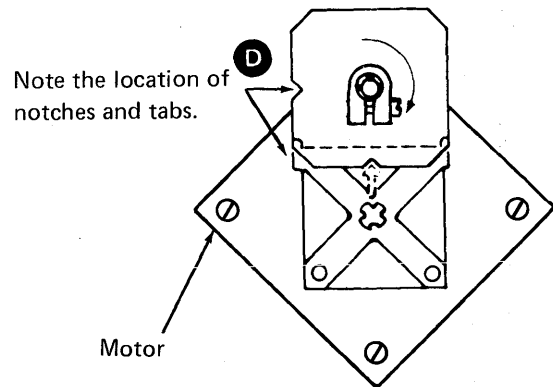
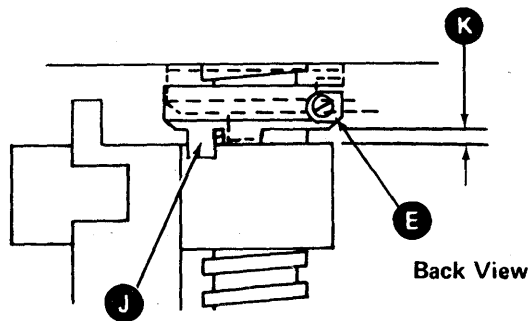
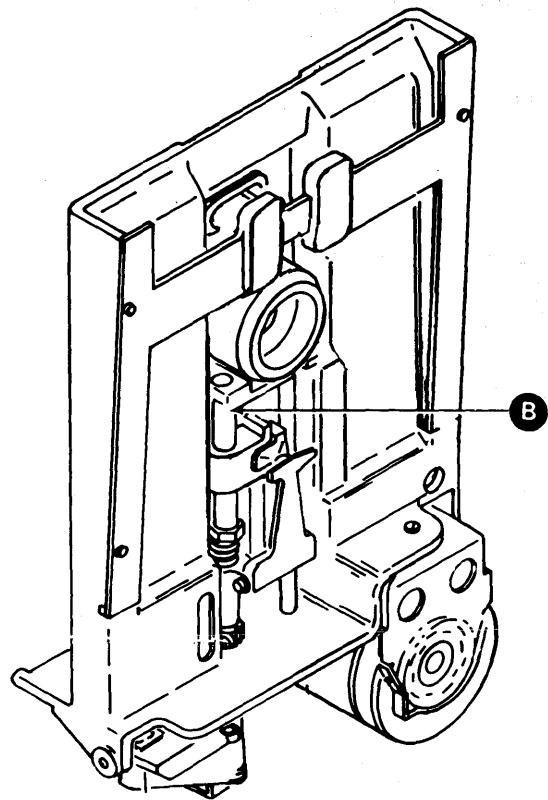
Top or front view



23-250 UPPER LIMIT STOP

Adjustment

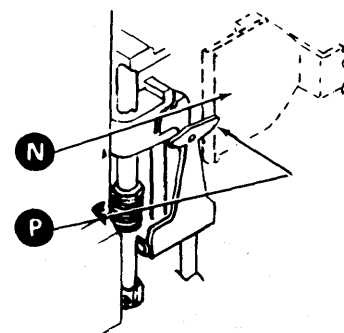
1. Set Power to O (operator panel).
2. Remove the 33FD from the machine (see paragraph 23-100).
3. Loosen the clamp screw and slide the stop **B** up as far as possible.
4. Starting at track 0, turn the stepper motor wheel 19 complete revolutions to track 76. The wheels must be aligned as shown at **D**.
5. Position the upper limit stop so **J** is behind the head carriage assembly, and the clamp screw faces directly back **E**.
6. Tighten the clamp screw while maintaining 0.76 ± 0.13 mm (0.030 ± 0.005 inch) at **K**.



7. Install the 33FD in the machine (see paragraph 23-100).

CAUTION

Before reinstalling the cover screws, put the actuator bail **N**, located on the cover, under the pressure pad arm **P**.

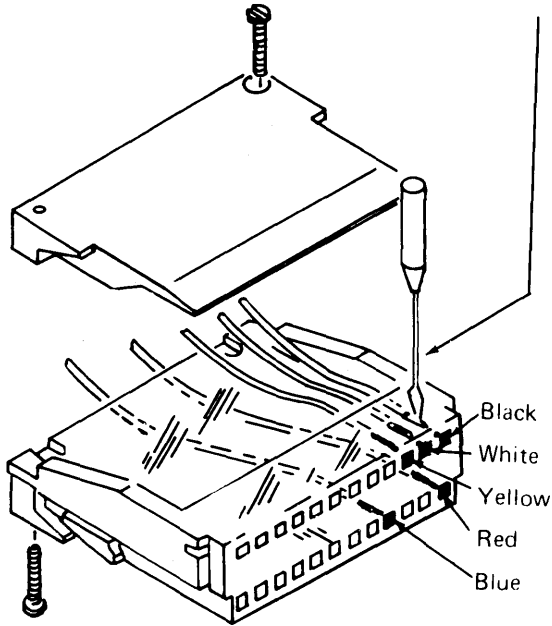


Top or front view

23-260 STEPPER MOTOR AND BRACKET

Removal and Replacement

1. Set Power to O (operator panel).
2. Remove the 33FD from the machine (see paragraph 23-100).
3. Remove the five leads from the connector.

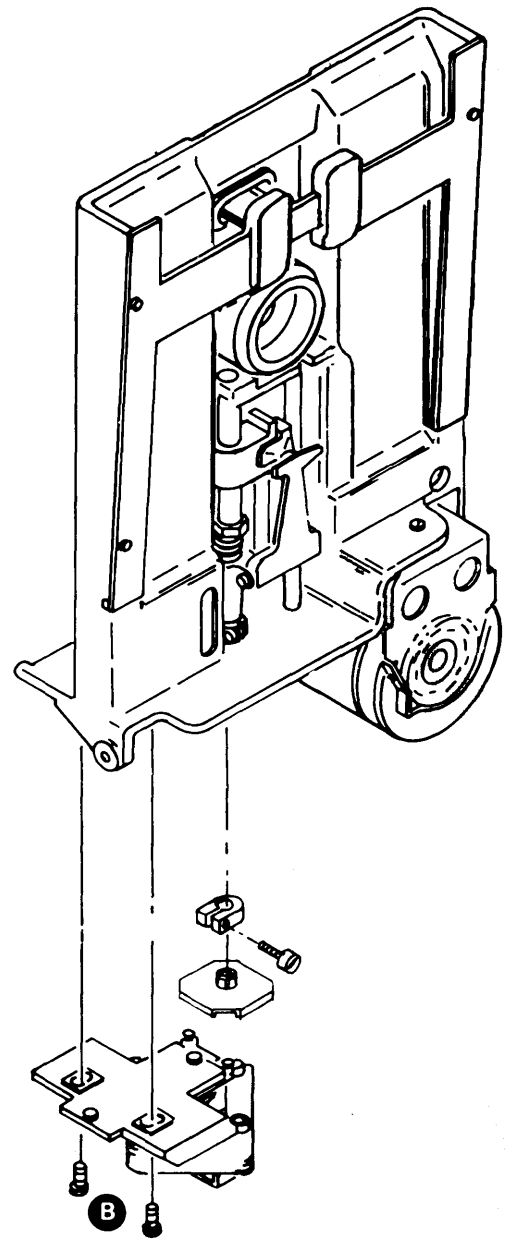


4. Remove the two screws **B**.

CAUTION

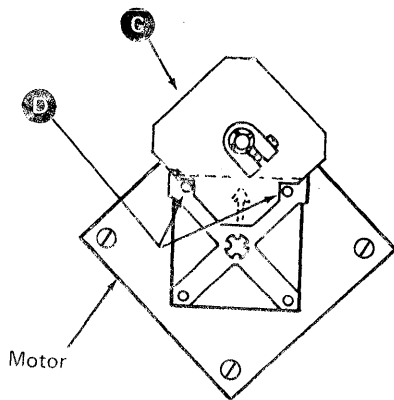
To prevent breaking parts when the stepper motor is reinstalled, ensure the pins are in the groove of the leadscrew wheel.

5. To reinstall, reverse the above procedure and do the stepper motor adjustment.
6. Install the 33FD in the machine.



Adjustment

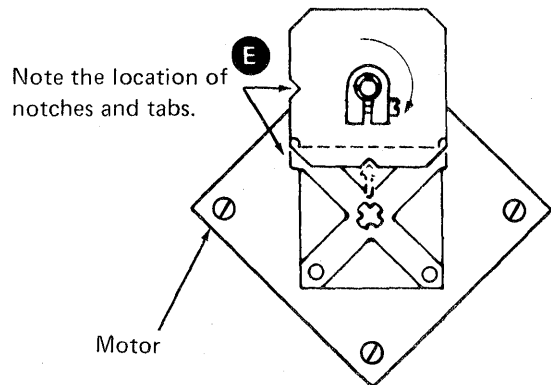
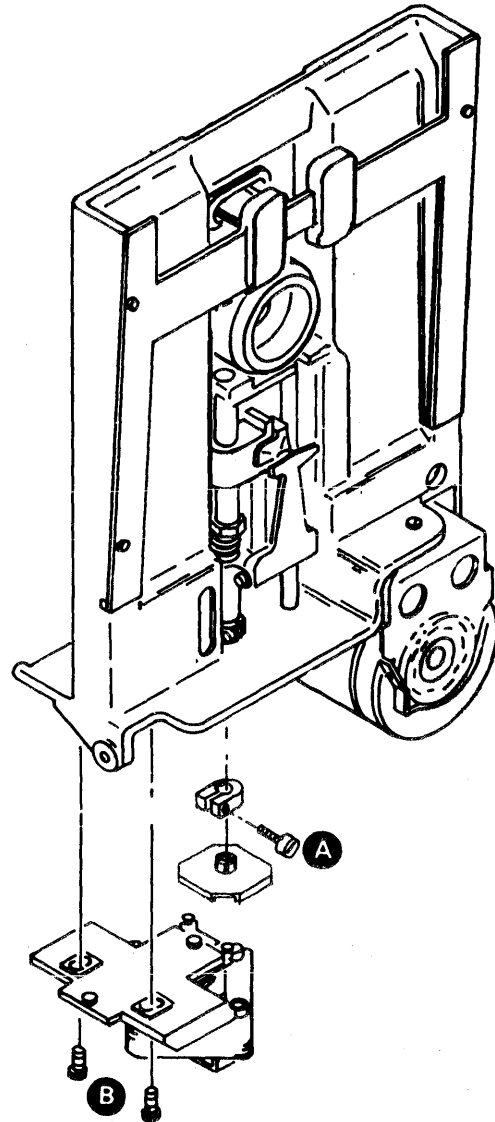
1. Set Power to O (operator panel).
2. Remove the 33FD from the machine (see paragraph 23-100).
3. Loosen the two screws **B**.
4. Move the stepper motor away from the leadscrew.
5. Loosen the clamp screw **A** and move the leadscrew wheel up until it turns freely.
6. Position the leadscrew wheel as shown in **C**.
7. Pull the leadscrew wheel down until the pins on the stepper motor wheel fit into the notches on the leadscrew wheel **D**.



Front or Top View

8. Slide the stepper motor wheel toward the leadscrew until the pins touch the notches. (There should be no gap between the pins and the notches.)
9. Tighten the two stepper motor mounting screws **B**.
10. Move the leadscrew wheel up until it turns freely.
11. Move the leadscrew wheel and slide it down on the drive pins in the position **E**.
12. Turn the leadscrew wheel and slide it down on the drive pins in the position shown.

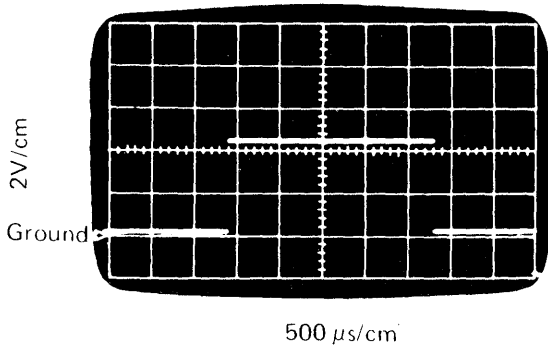
13. Do the head adjustment (see paragraph 23-220).
14. Install the 33FD in the machine (see paragraph 23-100).



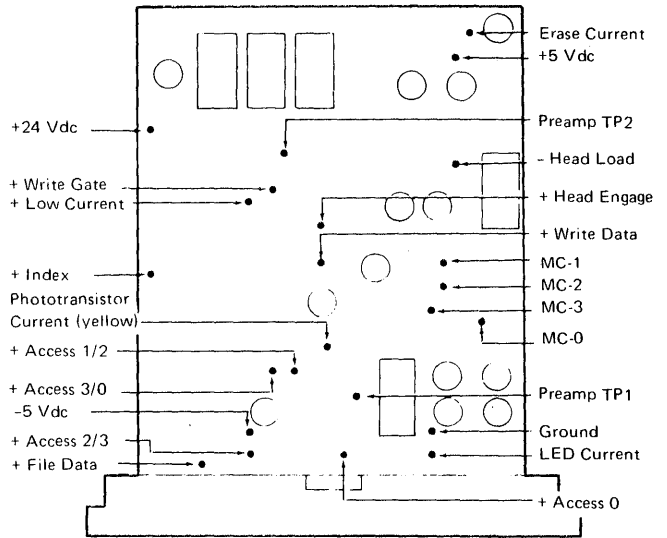
Top or Front View

Service Check

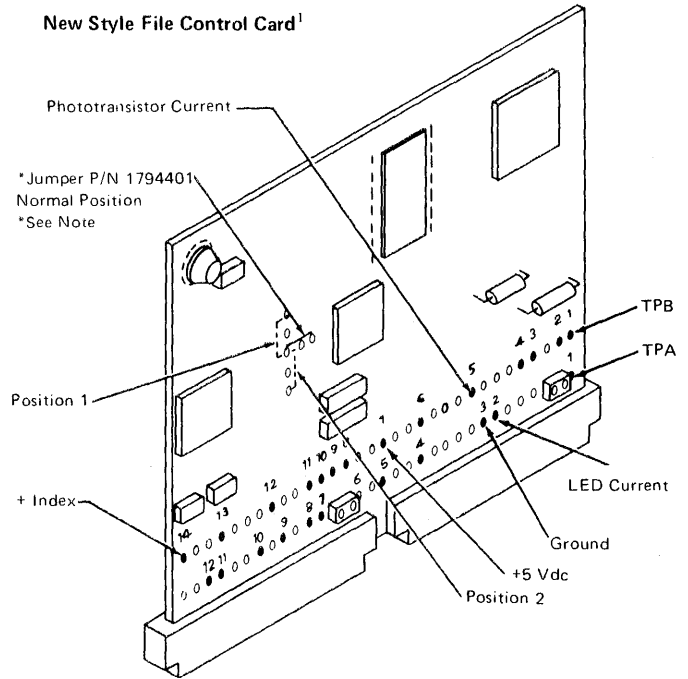
1. Set Power to 0 (operator panel).
2. Remove the 33FD from the machine and disconnect the drive motor plug (see paragraph 23-100).
3. Attach the positive probe of the volt ohm meter (15 Vdc scale) to the +5 Vdc test point and the negative probe to the phototransistor current test point on the file control card located on the 33FD.
4. Close the diskette drive cover, and set Power to 1 (operator panel). The volt ohm meter should read 3.5 Vdc to 5.5 Vdc.
5. Open the diskette drive cover and insert a diskette backward and close the cover. The volt ohm meter should read 0.0 Vdc to 0.5 Vdc.
6. Connect the drive motor plug.
7. If a scope is available, connect the probe to '+Index'. Check for an index pulse width of 1.7 to 8.0 ms. Check for approximately 160 ms between index pulses.
8. Set the Power to 0 (operator panel), check that the cables are connected; then install the 33FD in the machine.



Old Style File Control Card¹



New Style File Control Card¹



¹ On the old style file control card (2 wide, 3 high), test points are located randomly on the component side of the card. On the new style file control card (2 wide, 2 high), test points are brought out to two rows of pins labeled TPA and TPB.

Note: If a problem is experienced with multiple index due to shine-through, the threshold level of the index amplifier can be increased by paralleling input resistance. Position 1 will increase the threshold by a factor of 5; position 2 will increase the threshold by a factor of 25. The threshold level should not be raised more than is necessary to ensure proper operation.

Adjustment

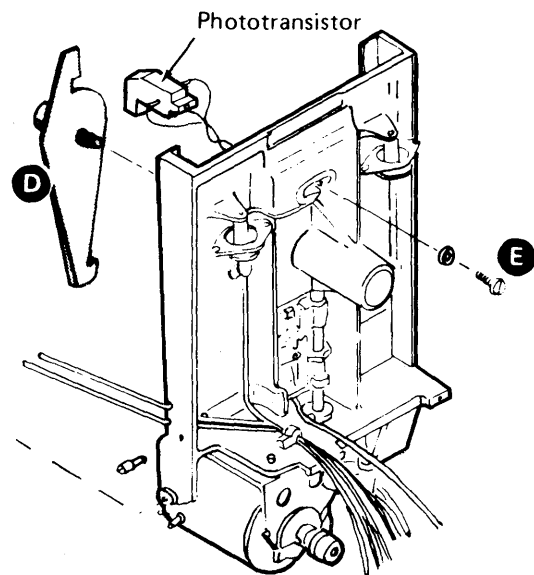
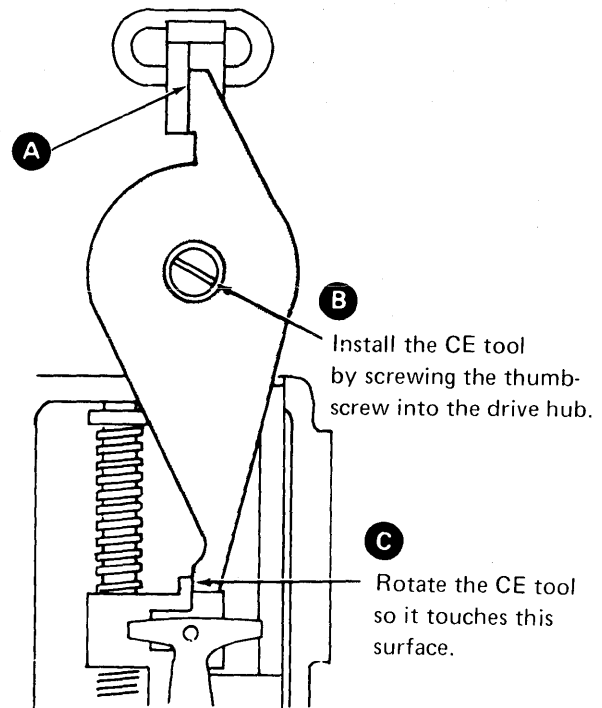
1. Set Power to O (operator panel).
2. Remove the 33FD from the machine (see paragraph 23-100).
3. Seek to track 0.
4. Remove the covers (see paragraph 23-130).
5. Loosen the mounting screw **E**, and move the phototransistor to the left.
6. Install the CE tool **D** by screwing the thumbscrew into the drive hub **B**. Turn the tool until it touches surface **C**.
7. Adjust the phototransistor so that the higher edge touches the CE tool **A**.
8. Tighten the mounting screw.
9. Remove the CE tool.
10. Reinstall the covers (see paragraph 23-130).
11. Install the 33FD in the machine.

Removal

1. Set Power to O (operator panel).
2. Remove the 33FD from the machine (see paragraph 23-100).
3. Seek to track 0.
4. Remove the covers, (see paragraph 23-130).
5. Remove the mounting screw **E**.
6. Remove the leads.

Replacement

1. Reinstall the leads. (Yellow wire goes to terminal marked Y.)
2. Reinstall the mounting screw, but do not tighten.
3. Complete the replacement by going to the adjustment starting at step 5.



23-280 LIGHT-EMITTING DIODE

Service Check

1. Set Power to O (operator panel).
2. Remove the 33FD from the machine (see paragraph 23-100).
3. Set Power to I (operator panel).
4. Attach the positive probe of the volt ohm meter to the light-emitting diode current test point and the negative probe to the grounded test point on the file control card located on the 33FD (see paragraph 23-290 for test points). Voltage should measure +1.0 to +1.6 Vdc.
5. Set Power to O (operator panel) and install the 33FD in the machine.

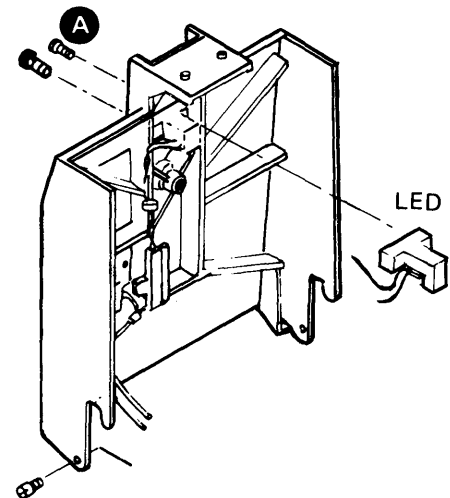
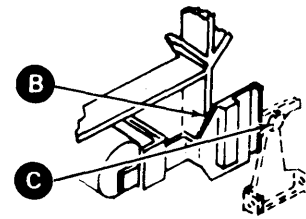
Removal and Replacement

1. Set Power to O (operator panel).
2. Remove the 33FD from the machine (see paragraph 23-100).
3. Remove the covers (see paragraph 23-130).
4. Remove two mounting screws **A**.
5. Remove leads. (Yellow wire goes to terminal marked Y.)
6. To reinstall, reverse above procedure.

CAUTION

Before reinstalling the cover screws, place the actuator bail **B**, located on the cover, under the pressure pad arm **C**.

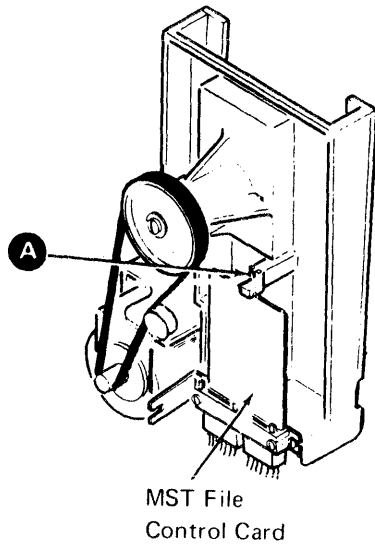
23



23-290 FILE CONTROL CARD

Removal and Replacement

1. Set Power to O (operator panel).
2. Remove the 33FD from the machine (see paragraph 23-100).
3. Loosen screw **A** and turn bracket 90 degrees. Tighten the screw.
4. Remove the file control card.
5. To reinstall, reverse the above procedure. Ensure that you reseat the card correctly in the socket and clamping bracket.



File Card Pin Assignment

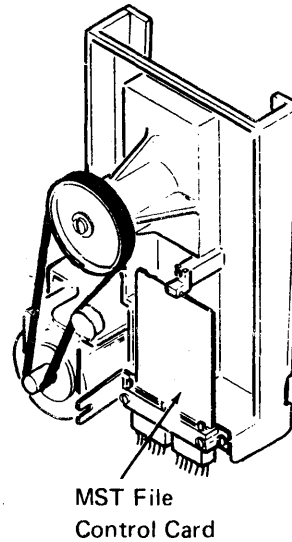
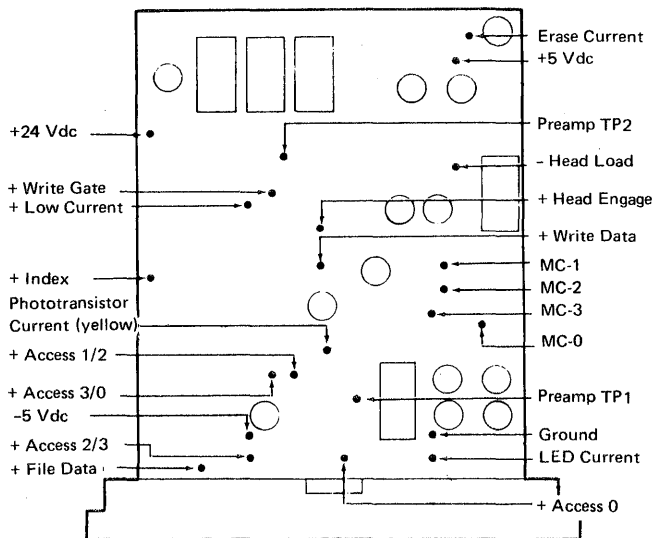
Name	Color	Old Style File Card Test Pin	New Style File Card Test Pin
Stepper Motor MC-0 (track 0)	White	B03	TPB2
Stepper Motor MC-1 (track 1)	Red	D02	TPA1
Stepper Motor MC-2 (track 2)	Yellow	B04	TPB3
Stepper Motor MC-3 (track 3)	Black	B02	TPB1
Stepper Common +24 Vdc	Blue	D05	TPA11
Head Magnet +24 Vdc	Yellow	D04	TPA11
- Head Load	Black	B05	TPB4
LED Return	Black	D06	
LED Current	Yellow	D07	TPA2
Phototransistor Return	Black	D09	
Phototransistor Current	Yellow	B08	TPB5
Head Input	Black	B12	
Head Input	White	B13	
Erase Current	Red	B10	
Head Ground and Shield	Green	B09	
Preamp TP1		D12	TPA4
Preamp TP2		D13	TPA5
Ground	Black	D08	TPA3/TPA10
+ Access 0/1		G02	TPB8
+ Access 1/2		G03	TPB9
+ Access 2/3		G04	TPB10
+ Access 3/4		G05	TPB11
+ Raw Read Data		G07	TPB12
+ Head Engage		G10	TPB13
+ Write Data		J02	TPA6
+ Erase Gate		J04	TPA7
+ Write Gate		J05	TPA8
+ Low Current		J06	TPA9
+ Index		G13	TPB14
+24 Vdc		J10	TPA11
+18 Vdc			TPB6
+5 Vdc		J03	TPB7
-5 Vdc		J11	TPA12
Ground		J08	TPA10/TPA3

Test Points

On the old type file control card (2 wide, 3 high), the test points are located on the transistor side of the card. On the new type file control card (2 wide, 2 high), the test points are the two rows of pins TPA and TPB.

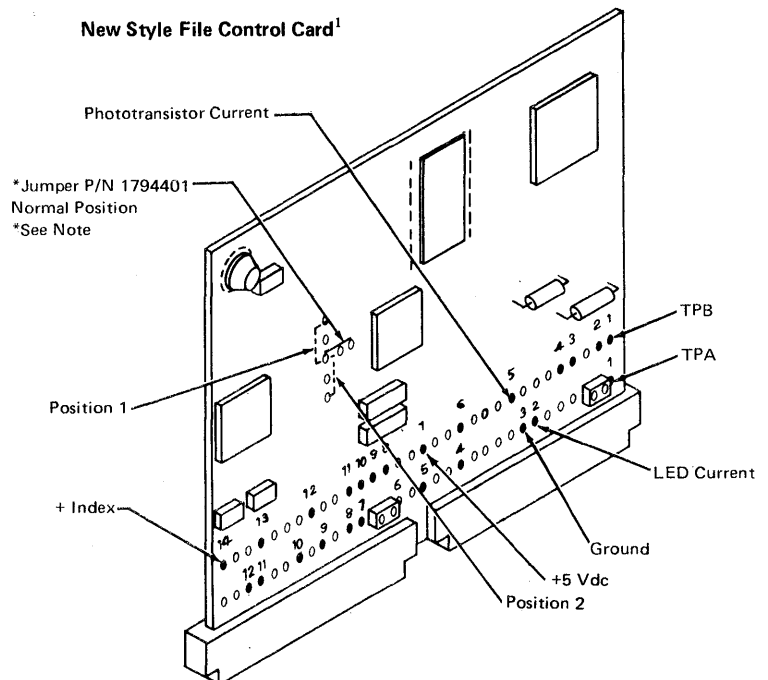
Only the major parts are shown as an aid in locating pins.

Old Style File Control Card¹



23

New Style File Control Card¹

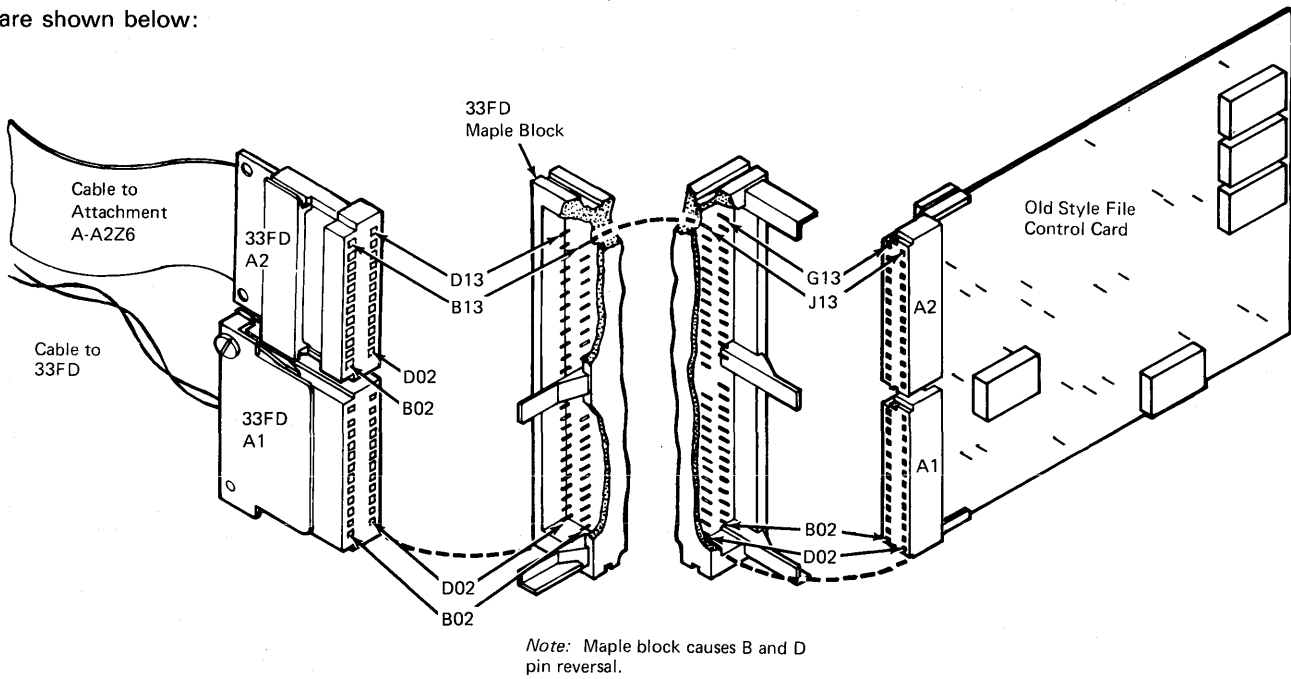


¹ On the old style file control card (2 wide, 3 high), test points are located randomly on the component side of the card. On the new style file control card (2 wide, 2 high), test points are brought out to two rows of pins labeled TPA and TPB.

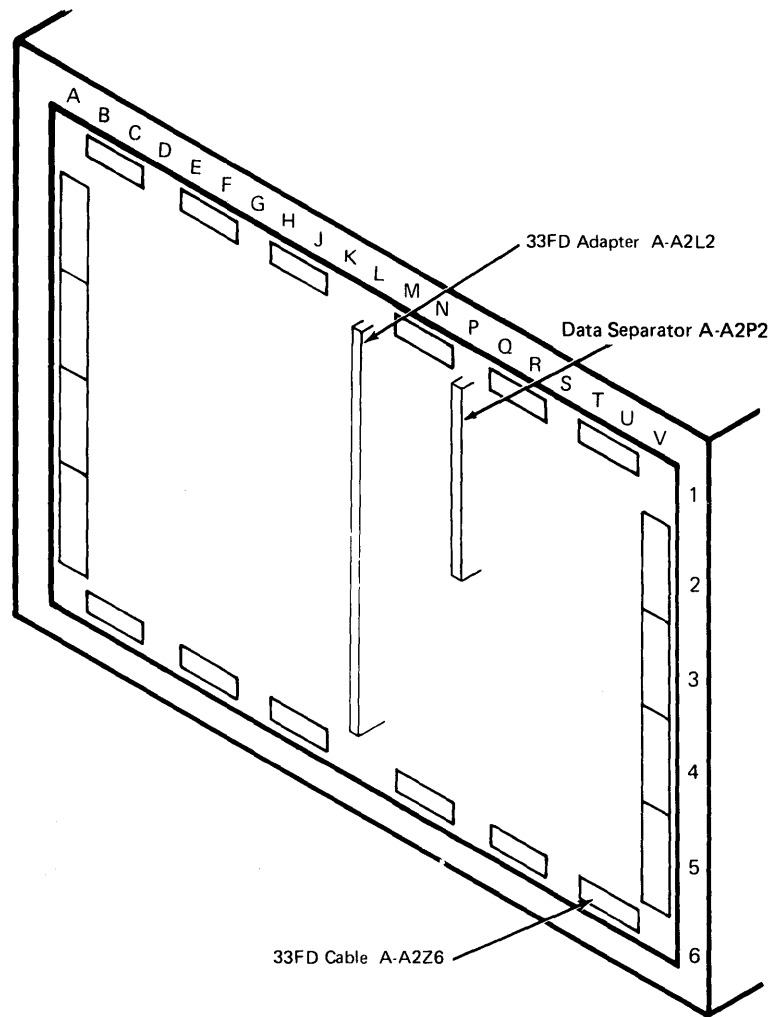
Note: If a problem is experienced with multiple index due to shine-through, the threshold level of the index amplifier can be increased by paralleling input resistance. Position 1 will increase the threshold by a factor of 5; position 2 will increase the threshold by a factor of 25. The threshold level should not be raised more than is necessary to ensure proper operation.

File Control Card Socket Pins

The file control card is installed bottom side up. Therefore, the pin numbers start at the bottom of the socket. The pin numbers, as seen from the cable side, are shown below:



23-300 CABLE AND CARD LOCATIONS



23-310 DISKETTE QUALITY SERVICE CHECK

CAUTION

The diskette quality service check must be performed with the diskette drive in the same position as when installed or the results might not be accurate.

The tests described in this paragraph will aid in determining the quality of the diskette.

Note: Some of the failures indicated by these tests cannot always be repeated.

Inspect the diskette failure descriptions, print the ERAP error history table, and run the following tests as necessary to verify the errors indicated by the ERAP.

23-311 Diskette Failure Descriptions

- A bump, scratch, crease, or fingerprint causes errors on the same sectors, usually across tracks that are next to each other.
- Too large of a center hole causes errors on sectors that are on opposite sides of the center hole. (Example: sectors hexadecimal 01 and 0E or sectors hexadecimal 06 and 13.)
- Material from the diskette jacket cause random errors.

23-313 Diskette Test Description

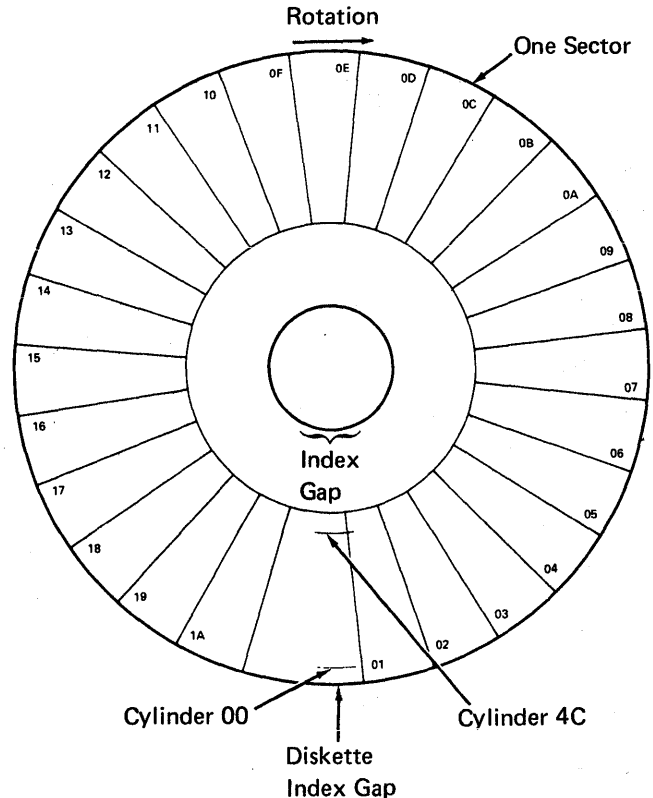
Diskette analysis—This routine reads a complete diskette (written in any IBM format) and causes a printout, which identifies the locations (logical cylinder, head, and sector) of any failures. Each sector is read only once (without trying again). To run this routine:

1. Perform a CSIPL from the DIAGB1 diskette.
2. Select the UTILITIES option on the main menu.
3. Select the EC UPDATE COPY option.

23-315 Diskette Figure

To look for visible damage, align the index hole in the diskette with the hole in the diskette jacket, then use the following figure of the diskette shown to locate the damaged area of the diskette.

Note: For a normal size figure of the diskette, see Appendix A of the 5340 System Unit Theory Diagrams Manual.



Notes:

1. The cylinder labels are hexadecimal 00 through 4C.
2. The sector labels are hexadecimal 01 through 1A as shown or hexadecimal 01 through 08.
3. The diskette is shown above as seen from the label side of diskette jacket, which is the side the pressure pad touches.

23-317 Diskette Quality Service Check for Level 1 Attachments

After determining the failing area of a diskette from the ERAP and diskette analysis printouts, the following exercisers may be run:

- Read sector exerciser—This exerciser attempts to read the sector up to 10 times and, if an error is sensed, does up to 20 read verifies to identify any failing byte. You may use this exerciser to locate the failing byte.
- Read loop exerciser—This exerciser permits you to synchronize on any byte in a sector to scope a failing area of a diskette.

The following two examples of scoping damaged diskettes show the loss of amplitude at the read circuit preamplifier. These are examples of damage such as scratches or bumps. The loss of amplitude on a diskette with a very small scratch will not be as visible.

Example 1: The diskette analysis printout indicates that the data did not compare on cylinder 24, head 1, and sector 11.

To scope this failure, do the following:

1. Set up an oscilloscope as follows:

Note: Use a Tektronix 453, 454, or a similar oscilloscope with X10 probes.

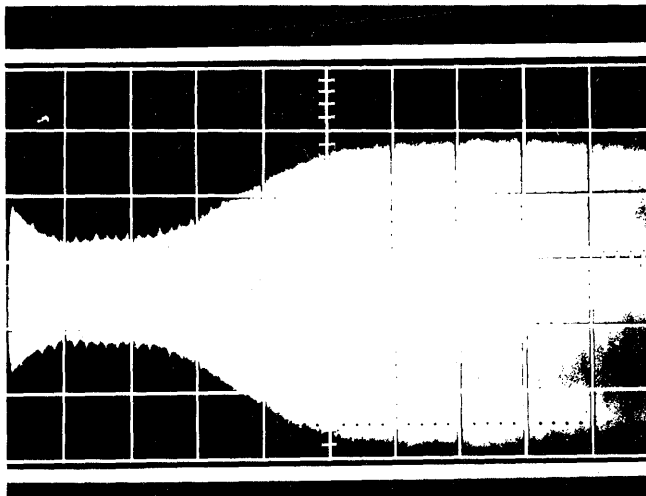
	For Old Style File Card	For New Style File Card
Channel A sweep mode	Normal	
Channel A level	+	
Channel A coupling	DC	
Channel A slope	+	
Channel A source	External	
Trigger Mode	Normal	
Channel 1 volts/division ¹	5 mV/cm	
Channel 2 volts/division ¹	5 mV/cm	
Channel 1 input	AC	
Channel 2 input	AC	
Invert	Pull out	
Times per division	0.1 ms/cm	
Channel 1 probe ²	Preamp TP1	TPA-4 (preamp TP1)
Channel 2 probe ²	Preamp TP2	TPA-5 (preamp TP2)
Connect trigger to ³	A-A1xxU02 (+MS address compare)	

¹The volts/division setting may have to be changed as the signal output is different between the inner and outer cylinders.
²See paragraph 23-290 for control card test pins.
³xx = Q2 on level 1 boards
xx = L2 on level 2 boards
See paragraph 15-110.

2. Set the Address/Data switches to F800 (CE panel) and perform an IPL.
3. Select the EXERCISERS option from the main menu.
4. Select the DISKETTE DRIVE option from the first exerciser menu.

5. Select the DISKETTE EXERCISER MODULE option from the second exerciser menu.
6. Select a recalibrate and, for this example, a seek to track 24 from the diskette exerciser test 1 command menu (enter an E after selecting the cylinder number).
7. Use the default option to execute the commands.
8. Press the Attn key (three times) to return to the diskette exerciser test 1 command menu.
9. Select the READ LOOP command and, for this example, select FM mode, cylinder 24, head 1, and sector 11 from the displays (enter an E after selecting the sector number).
10. Select the LOOP ON CMND TABLE option and turn the Address/Data switches (CE panel) from 6000 to 6010 to 6020 and so on until the failure is located.

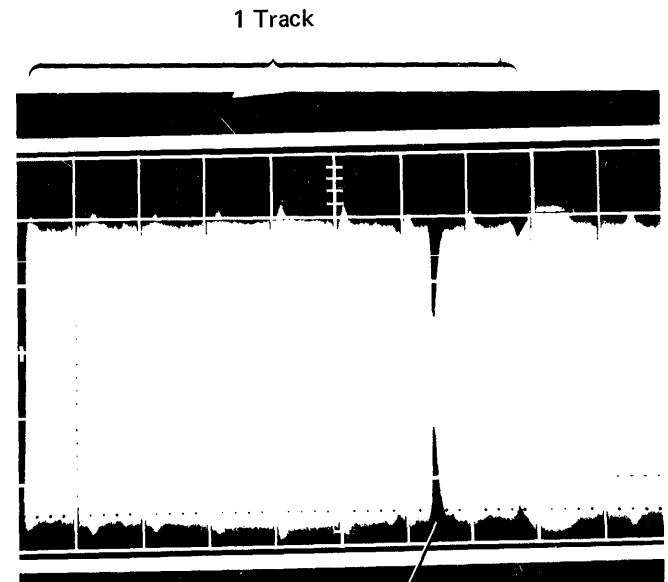
The loss of amplitude can be seen on the oscilloscope.



Example 2: To scope a damaged track (contains all ones in the ID field), the following changes must be made to the preceding procedure:

1. Set the Times Per Division on the oscilloscope to 20 ms/cm.
2. Connect the trigger to the '+Index test' pin on the old type file card (connect the trigger to TPB-14 on the new type file card).
3. In step 6 of example 1, seek to the damaged cylinder.
4. In step 9 of example 1, select the READ SECTOR command (select the head, sector number, and cylinder number that you want to scope).
5. In step 10 of example 1, select the SCOPE LOOP A CMND option.

The following oscilloscope screen image shows the damaged area of the diskette.



23-319 Diskette Quality Service Check for Level 2 Attachments

After determining the failing area of a diskette from the ERAP and diskette analysis printouts, the following exercisers may be run:

- Read sector exerciser—This exerciser attempts to read the sector up to 10 times and, if an error is sensed, does up to 20 read verifies to identify any failing byte. You may use this exerciser to locate the failing byte.
- Read loop exerciser—This exerciser permits you to synchronize on any byte in a sector to scope a failing area of a diskette.

The following two examples of scoping damaged diskettes show the loss of amplitude at the read circuit preamplifier. These are examples of damage such as scratches or bumps. The loss of amplitude on a diskette with a very small scratch will not be as visible.

Example 1: The diskette analysis printout indicates that the data did not compare on cylinder 24, head 1, sector 11.

To scope this failure, do the following:

1. Set up an oscilloscope as follows:

Note: Use a Tektronix 453, 454, or a similar oscilloscope with X10 probes.

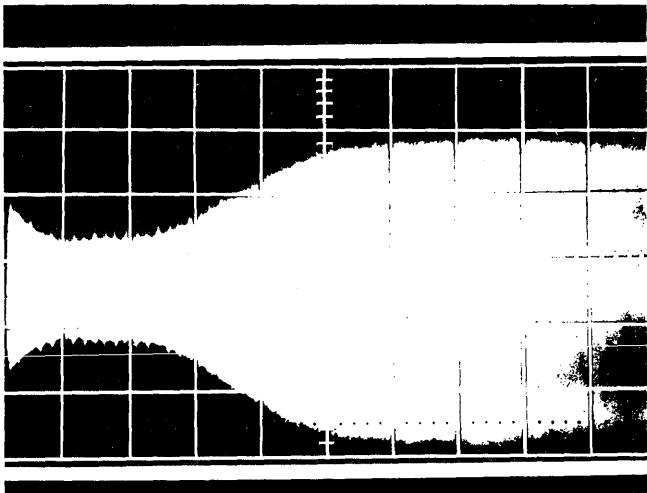
	For Old Style File Card	For New Style File Card
Channel A sweep mode	Normal	
Channel A level	+	
Channel A coupling	DC	
Channel A slope	+	
Channel A source	External	
Trigger Mode	Normal	
Channel 1 volts/division ¹	5 mV/cm	
Channel 2 volts/division ¹	5 mV/cm	
Channel 1 input	AC	
Channel 2 input	AC	
Invert	Pull out	
Times per division	0.1 ms/cm	
Channel 1 probe ²	Preamp TP1	TPA-4 (preamp TP1)
Channel 2 probe ²	Preamp TP2	TPA-5 (preamp TP2)
Connect trigger to ³	A-A1xxU02 (+MS address compare)	

¹The volts/division setting may have to be changed as the signal output is different between the inner and outer cylinders.
²See paragraph 23-290 for control card test pins.
³xx = Q2 on level 1 boards
 xx = L2 on level 2 boards
 See paragraph 15-110.

2. Set the Address/Data switches to F800 (CE panel) and perform an IPL.
3. Select the EXERCISERS option from the main menu.
4. Select the DISKETTE DRIVE option from the first exerciser menu.
5. Select the DISKETTE EXERCISER LOAD MODULE option from the second exerciser menu.

6. Select a recalibrate and, for this example, a seek to track 24 from the diskette exerciser test 1 command menu (enter an E after selecting the cylinder number).
7. Use the default option to execute the commands.
8. Press the Attn key (3 times) to return to the diskette exerciser test 1 command menu.
9. Select the READ LOOP command and, for this example, select FM mode, cylinder 24, head 1, sector length = 128, sector 11, and M/S data field 1 from the displays (enter an E after selecting the sector number).
10. Select the LOOP ON CMND TABLE option and turn the Address/Data switches (CE panel) from 0000 to 0010 to 0020 and so on until the failure is located.

The loss of amplitude can be seen on the oscilloscope.



Example 2: To scope a damaged track (contains all ones in the ID field), the following changes must be made to the preceding procedure:

1. Set the Times Per Division on the oscilloscope to 20 ms/cm.
2. Connect the trigger to the +Index test pin on the old type file card. (Connect the trigger to TPB-14 on the new type file card.)
3. In step 6 of example 1, seek to the damaged cylinder.
4. In step 9 of example 1, select the READ 1 SECTOR ON CURRENT CYL command (select the mode, head, sector length, sector number, M/S data field, and cylinder number that you want to scope).
5. In step 10 of example 1, select the SCOPE LOOP A CMND option.

The following oscilloscope screen image shows the damaged area of the diskette.

