

CONTENTS

25-020	Safety	25-700	Pulley and Clamp Removal
25-030	Tools	25-710	Pulley and Clamp Replacement
25-120	Diskette Protection	25-730	Drive Band Service Check
25-130	Diskette Drive Assembly	25-740	Drive Band Adjustment
25-420	Cover Removal	25-750	Drive Band Removal
25-430	Cover Replacement	25-760	Drive Band Replacement
25-440	Latch Assembly Removal	25-770	Idler Assembly Removal
25-450	Latch Assembly Replacement	25-780	Idler Assembly Replacement
25-460	Collet Removal	25-790	Diskette Speed Service Check
25-470	Collet Replacement	25-800	Light-Emitting Diode and Phototransistor Alignment
25-480	Head/Carriage Service Check	25-810	Light-Emitting Diode Output Service Check
25-490	Head/Carriage Adjustment	25-820	Light-Emitting Diode Removal
25-500	Head/Carriage Removal	25-830	Light-Emitting Diode Replacement
25-510	Head/Carriage Replacement	25-840	Phototransistor Amplifier Service Check
25-520	Solenoid and Bail Service Check	25-850	Phototransistor Removal
25-530	Solenoid and Bail Adjustment	25-860	Phototransistor Replacement
25-540	Solenoid and Bail Removal (Machines with Taper Pin Block)	25-930	Control Card Removal
25-545	Solenoid and Bail Replacement (Machines with Taper Pin Block)	25-940	Control Card Replacement
25-550	Solenoid and Bail Removal (Machines without Taper Pin Block)	25-950	Control Card Test Pins
25-555	Solenoid and Bail Replacement (Machines without Taper Pin Block)	25-960	Control Card Socket and Connector Pins
25-560	Belt Tracking Service Check	25-980	Control Card Logic Pins
25-570	Belt Tracking Adjustment	25-990	Cable and Card Locations
25-580	Belt Removal	25-991	Diskette Quality and Head Wear Service Check
25-590	Belt Replacement	25-992	Diskette Failure Descriptions
25-600	Drive Motor Removal	25-993	Diskette Test Descriptions
25-610	Drive Motor Replacement	25-994	Diskette Figure
25-620	Drive Pulley Removal	25-995	Diskette Quality Service Check for Level 1 Attachments
25-630	Drive Pulley Replacement	25-996	Diskette Quality Service Check for Level 2 Attachments
25-640	Idler Assembly Removal	25-997	Head Wear Service Check for Level 1 Attachments
25-650	Idler Assembly Replacement	25-998	Head Wear Service Check for Level 2 Attachments
25-680	Stepper Motor Removal		
25-690	Stepper Motor Replacement		

DANGER

1. The system supplies the alternating current and direct current power. Voltages are present on the connector terminals in the diskette drive when the drive motor is turning.
2. Motor and solenoid cases become hot after continuous use; wait enough time for parts to cool before servicing.

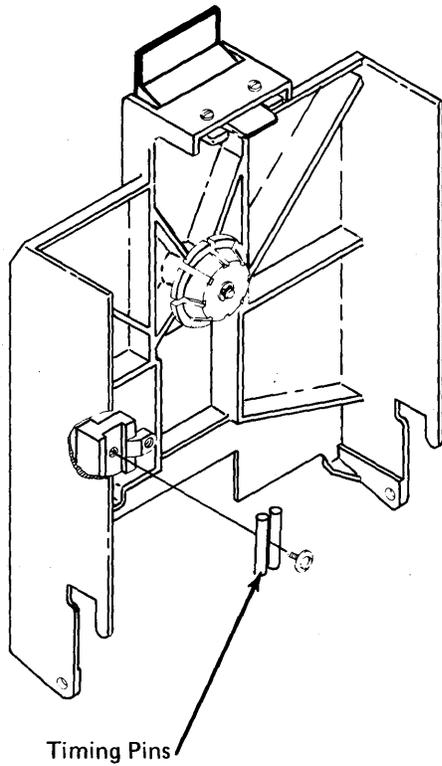
CAUTION

1. Do not use IBM cleaning fluid or other cleaning fluids near plastic parts.
2. Diskette drives can be damaged if they are not operated or serviced correctly.
3. Never use damaged diskettes in a diskette drive. Diskettes that are physically damaged (creased or bent) or contaminated by pencil marks, finger marks, or cleaning fluid can cause data errors, equipment errors, or head damage.
4. The head/carriage assembly, head timing block, and drive hub and pulley assembly are units that are adjusted and tested at the factory. The head timing block and drive hub and pulley assembly may not be changed in the field. The head/carriage assembly may be changed in the field. Do not repair or clean any part of this assembly.

25-030 TOOLS

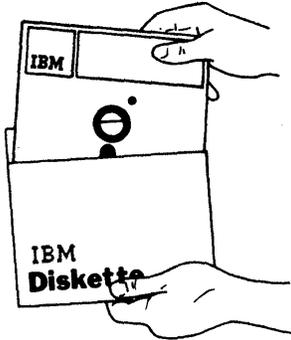
Two timing pins (part 5562019, located inside the cover assembly) are used to align the following:

- The stepper motor shaft and pulley
- The light-emitting diode assembly

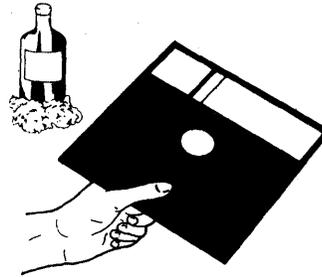


25-120 DISKETTE PROTECTION

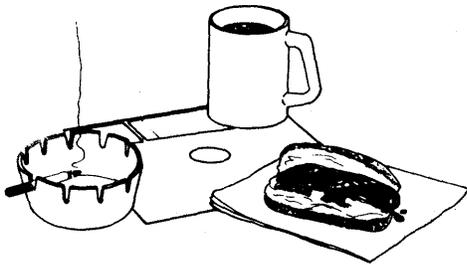
Return a diskette to its envelope when it is removed from the diskette drive.



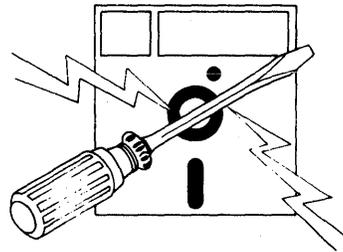
Do not touch or attempt to clean diskette surfaces. Contaminated diskettes will not work correctly.



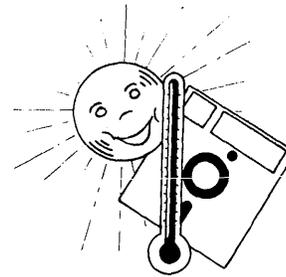
Do not lay diskettes near smoke or other things that can cause the diskette to be contaminated.



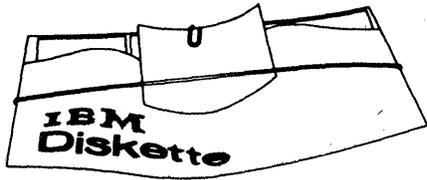
Do not place diskettes near magnetic materials. Data can be lost from a diskette exposed to a magnetic field.



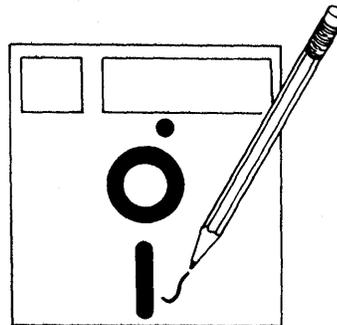
Do not expose diskettes to heat greater than 51.5° C (125° F) or direct sunlight.



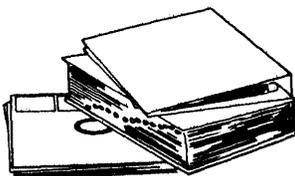
Do not use clips or rubber bands on a diskette.



Do not write outside the label area on diskettes.



Do not place heavy books on diskettes.



25-130 DISKETTE DRIVE ASSEMBLY

Removal and Replacement

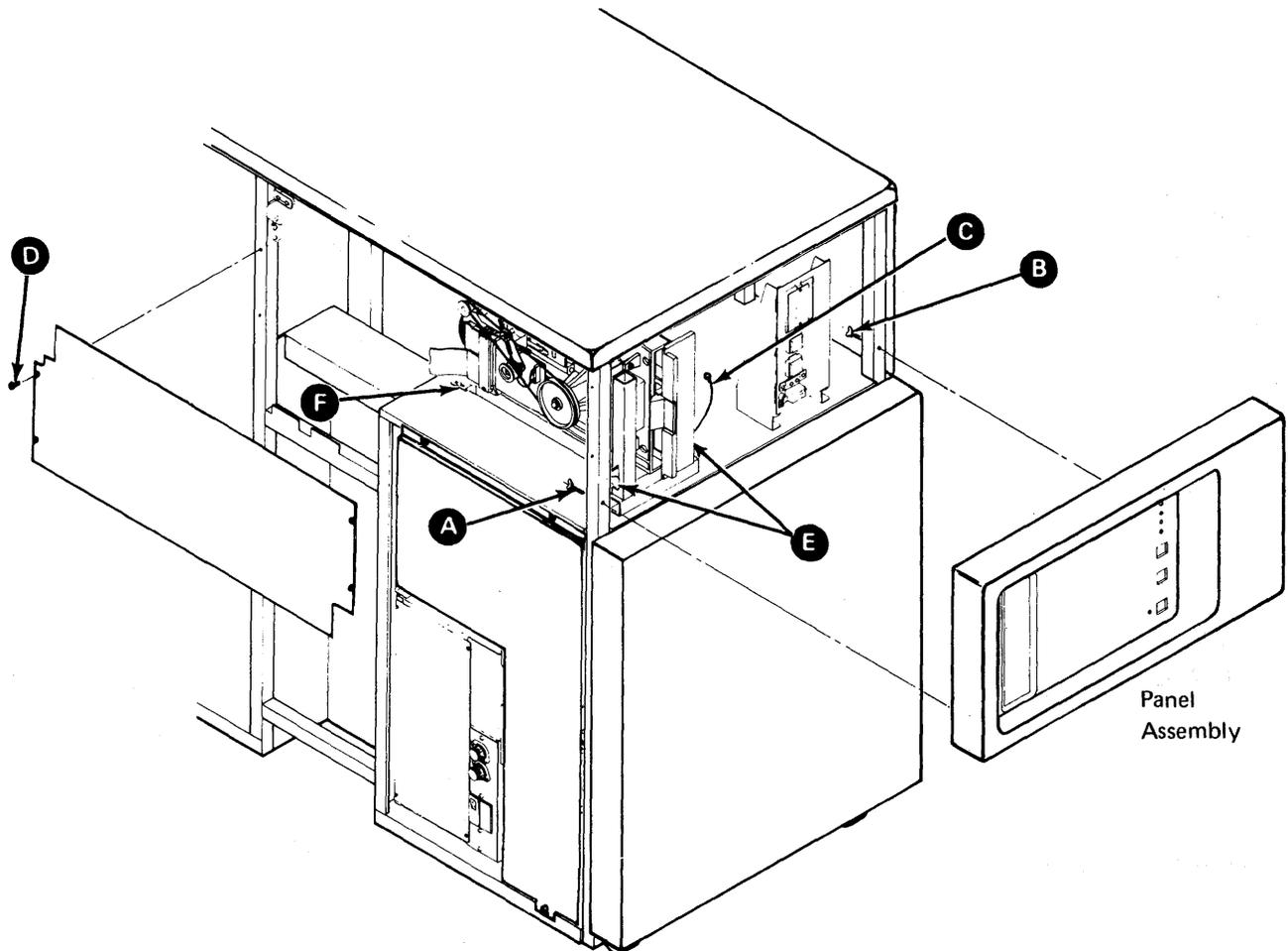
1. Set Power to O (operator panel).
2. Open the diskette drive cover.
3. Open the front left side cover and remove screw **A**; open the front right side cover and remove screw **B**. Remove the panel assembly.
4. Remove the ground wire **C**.
5. Remove the four side panel screws **D** and the side panel.

6. Remove one end of the 53FD cable clamps.
7. Turn the locks **E**; remove the 53FD and mounting frame from the machine.
8. 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 53FD and mounting frame are reinstalled.

9. To reinstall, reverse the above procedure.

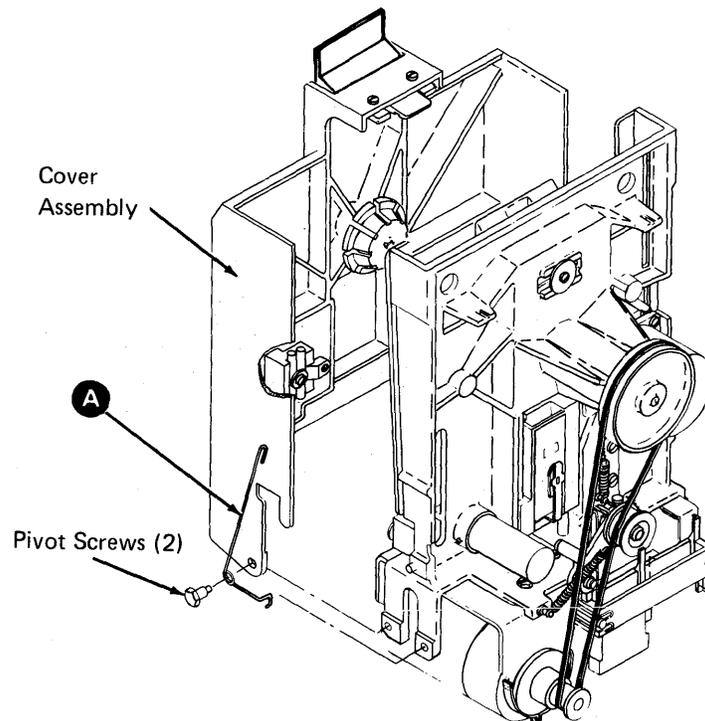


25-420 COVER REMOVAL

1. Remove the diskette drive (see paragraph 25-130).
2. Open the cover assembly.
3. Disconnect the spring **A** from the cover.
4. Loosen the two pivot screws with a wrench.
5. While holding the cover assembly remove the pivot screws.
6. Lift the cover away from the diskette drive.

25-430 COVER REPLACEMENT

1. While holding the cover assembly aligned with the mounting holes in the casting, reinstall the two pivot screws. (Ensure that spring **A** is installed.)
2. Tighten the pivot screws with a wrench.
3. Connect the spring **A** to the cover.
4. Close the cover assembly.

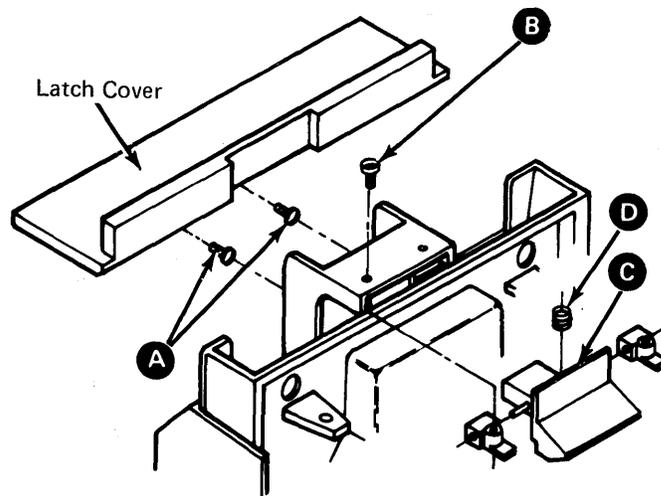


25-440 LATCH ASSEMBLY REMOVAL

1. Remove the diskette drive (see paragraph 25-130).
2. Remove the cover (see paragraph 25-420).
3. Loosen the screws **A** and remove the latch cover.
4. Open the cover assembly and remove the two latch mounting screws **B**.
5. Carefully remove the latch **C** and the two pivots by pulling the latch toward the rear of the cover assembly. Do not lose the spring **D**.

25-450 LATCH ASSEMBLY REPLACEMENT

1. Place the latch **C** into the cover assembly. Then place the two pivots in position. Ensure you reinstall the spring **D**.
2. Reinstall the two latch mounting screws **B**.
3. Reinstall the latch cover and tighten the two screws **A**.
4. Perform the cover replacement (see paragraph 25-430).
5. Close the cover.

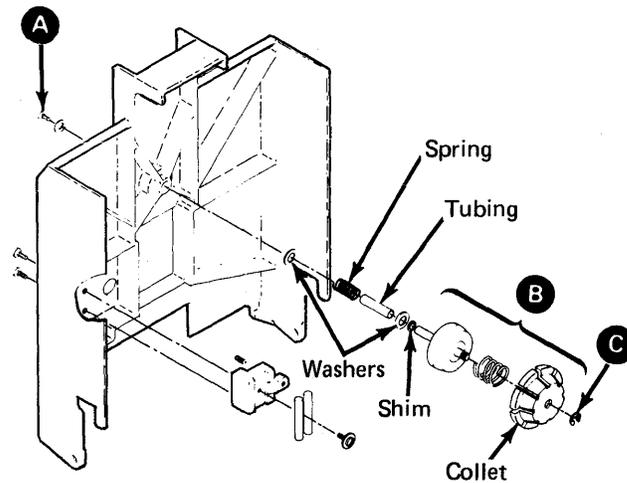


25-460 COLLET REMOVAL

1. Remove the diskette drive (see paragraph 25-130).
2. Remove the cover assembly (see paragraph 25-420).
3. Remove the mounting screw **A**.
4. Remove the collet assembly **B** and the other parts shown.
5. Remove the clip **C**; remove the collet.

25-470 COLLET REPLACEMENT

1. Reinstall the collet and clip **C**.
2. Reinstall the remaining parts on the collet assembly shaft in the order shown.
3. Reinstall the collet assembly **B** and the mounting screw **A**.
4. Reinstall the cover assembly (see paragraph 25-430).



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25-480 HEAD/CARRIAGE SERVICE CHECK

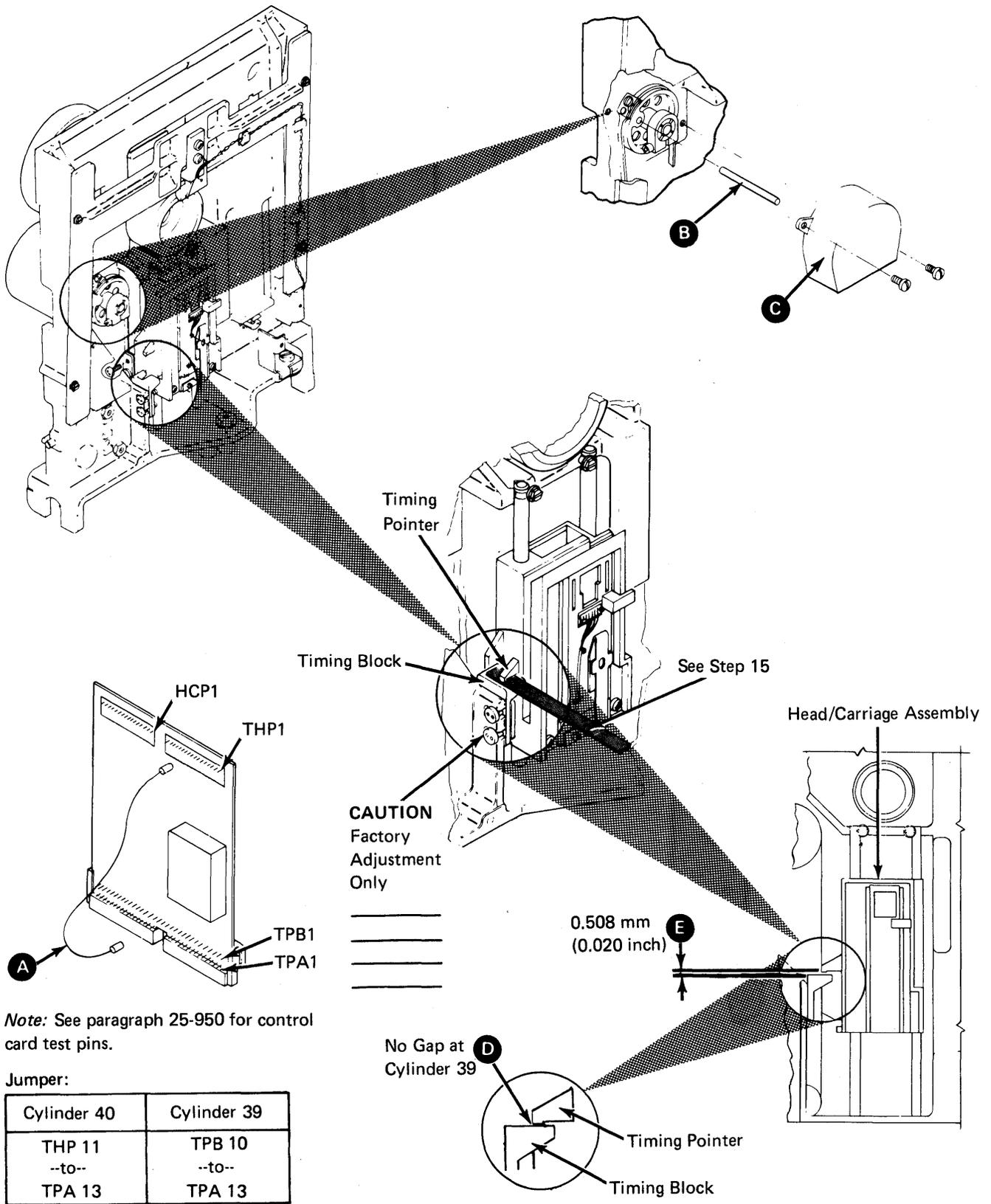
Note: Run the head alignment exerciser before performing this service check. If the head alignment is good, go to the *Diskette Quality and Head Wear Service Check* (see paragraph 25-991). If the head alignment is bad, continue with this service check.

CAUTION

The head/carriage assembly is adjusted and tested at the factory. Do not repair or clean any part of this assembly.

The head/carriage service check must be done with the diskette drive in the same position as when installed or the adjustment can be wrong.

1. Remove the diskette drive (see paragraph 25-130).
 2. Remove the cover assembly (see paragraph 25-420).
 3. Remove the wiper assembly **C**.
 4. Disconnect the drive motor power plug.
 5. Insert a strip of clean paper between the heads to keep the head surfaces from touching.
 6. Turn the stepper motor pulley by hand to about cylinder 40 and insert a timing pin **B**.
 7. Remove the attachment card at A-A2L2 to prevent the stepper motor access lines from being activated by an external source.
 8. Set Power to I (operator panel).
 9. Install a jumper **A** from TPA13 (ground) to THP11 (-align access 0).
 10. If the timing pin passes freely through the stepper motor pulley into the timing slot in the casting, go to step 11. If the timing pin does not pass freely through the stepper motor pulley into the timing slot in the casting, do the following:
 - Remove the timing pin **B**.
 - Remove the jumper **A**.
 - Set Power to O (operator panel).
 - Go to 25-490, step 5.
 11. Remove the timing pin **B**.
 12. Remove the jumper end from THP11. Then install the jumper end to TPB10 (MC-3).
 13. Verify that this is cylinder 39 by visually checking for no gap **D** between the timing pointer and the timing block.
 14. Remove the jumper end from TPB10 (MC-3). Then install the jumper end to THP11 (-align access 0).
 15. Verify that this is cylinder 40 by visually checking that the timing hole in the pulley lines up with the timing slot in the casting. (Do not use a timing pin.)
 16. If the head/carriage assembly is at cylinder 40, go to step 17. If the head/carriage assembly is not at cylinder 40, go to 25-490, step 5.
 17. Verify the 0.508 millimeter (0.020 inch) gap **E** as follows:
 - Visually checking that the head/carriage assembly does not move while carefully inserting a 0.0195 thickness gauge.
 - Visually check that the head/carriage assembly moves slightly while carefully inserting a 0.021 thickness gauge.
- Note:* Because of the torque of the stepper motor, this step can be performed only once. If it is necessary to perform this step again, go back to step 12.
18. If the adjustment is correct, go to step 19. If the adjustment is not correct, go to 25-490, step 14.
 19. Remove the jumper **A**.
 20. Reinstall the wiper assembly **C**.
- Note:* If a new head/carriage was installed, go to 25-520, step 6. If a new head/carriage was not installed, go to step 21.
21. Set Power to O (operator panel) and remove the paper from between the heads.
 22. Reinstall the drive motor power plug and the attachment card.
 23. Reinstall the cover assembly (see paragraph 25-430).



Note: See paragraph 25-950 for control card test pins.

Jumper:

Cylinder 40	Cylinder 39
THP 11	TPB 10
--to--	--to--
TPA 13	TPA 13

25-490 HEAD/CARRIAGE ADJUSTMENT

CAUTION

The head/carriage assembly adjustment must be done with the diskette drive in the same position as when installed or the adjustment can be wrong.

1. Remove the diskette drive (see paragraph 25-130).
2. Remove the cover assembly (see paragraph 25-420).
3. Remove the wiper assembly **F**.
4. Insert a strip of clean paper between the heads to prevent the head surfaces from touching.
5. Measure the gap **B** between the stepper motor pulley and the casting. Write the measurement here.

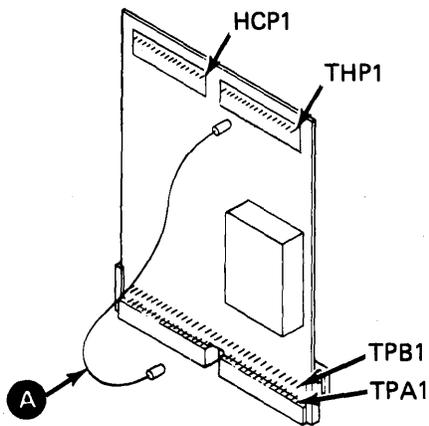
Gap is: _____
6. Loosen the clamp screw **C** so the stepper motor shaft is free to turn inside the pulley.
7. Turn the stepper motor pulley by hand to about cylinder 40 and insert a timing pin **E**.
8. Disconnect the drive motor power connector.

DANGER

Voltage is still present at the power connector when the head/carriage is disconnected and power is on.

9. Remove the attachment card at A-A2L2 to prevent the stepper motor access lines from being activated by an external source.

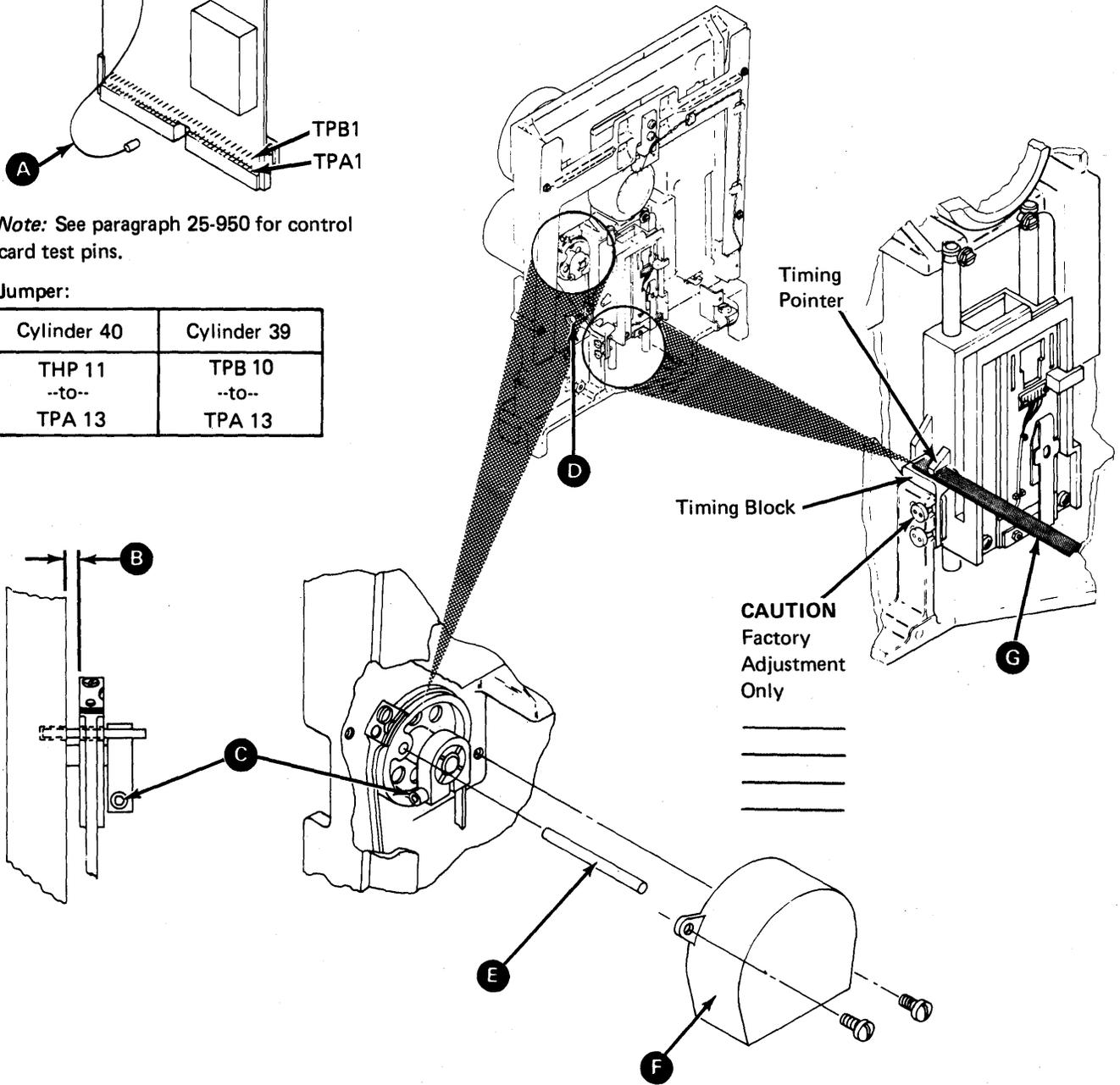
10. Set Power to I (operator panel).
11. Install a jumper **A** from TPA13 (ground) to THP11 (-align access 0).
12. Make the gap **B** the same size as the gap recorded in step 5 and tighten the clamp screw **C**. (Ensure that the timing pin passes freely through the stepper motor pulley into the timing slot in the casting.)
13. Remove the timing pin **E**.
14. Loosen the two band clamping screws **D**.
15. Remove the jumper end from THP11. Then install the jumper end to TPB10 (MC-3).
16. Remove the jumper end from TPB10. Then install jumper end to THP11 (-align access 0).
17. Verify that this is cylinder 40 by visually checking that the timing hole in the pulley lines up with the timing slot in the casting. (Do not use a timing pin.)
18. If the head/carriage assembly is at cylinder 40, go to step 19. If the head/carriage assembly is not at cylinder 40 repeat steps 6 through 17.
19. Insert a 0.5 millimeter (0.020 inch) thickness gauge **G** between the timing pointer and the timing block. (Put light finger pressure to the top of the carriage to hold the thickness gauge in place.)
20. Tighten the band clamping screws **D**. (Ensure that the drive band is straight.)
21. Go to 25-480, step 12.



Note: See paragraph 25-950 for control card test pins.

Jumper:

Cylinder 40	Cylinder 39
THP 11	TPB 10
--to--	--to--
TPA 13	TPA 13



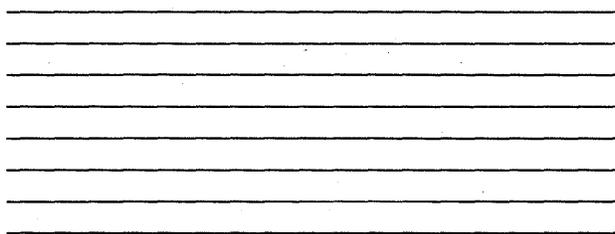
25-500 HEAD/CARRIAGE REMOVAL

1. Remove the diskette drive (see paragraph 25-130).
2. Remove the cover assembly (see paragraph 25-420).
3. Remove the wiper assembly **D**.
4. Carefully remove the head cable from the diskette drive control card. (Remember the cable path for the replacement procedure.)
5. Place the head/carriage assembly to about cylinder 40.
6. Remove the two band clamping screws **B** and the clamp. Place the head/carriage assembly at the lower limit (cylinder 00).
7. Loosen the screw **H** and remove the guide rod **G**.
8. Carefully lift and turn the head/carriage assembly to remove it from the guide rod **K**.

25-510 HEAD/CARRIAGE REPLACEMENT

CAUTION

When installing the head/carriage assembly, ensure that the bail **L** is under the tab **M** of the carriage arm. Ensure that the bail return spring **J** is installed. Also, ensure that a strip of clean paper is inserted between the head surfaces during installation.

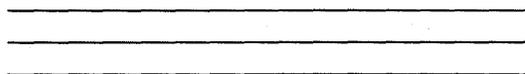


1. Carefully install the head/carriage assembly on the guide rod **K** and place the head/carriage assembly at the lower limit (cylinder 00).
2. Reinstall the guide rod **G** and tighten the screw **H**. (Ensure that the guide rod notch **F** is aligned with the screw and is seated as shown **E**.)

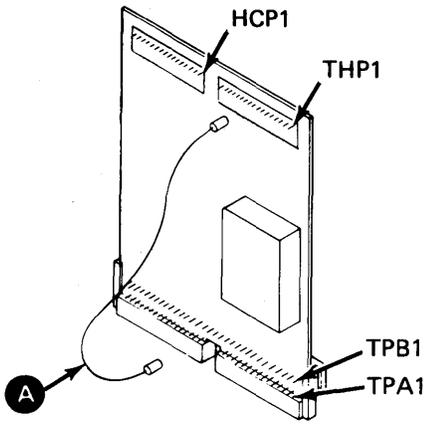
3. Place the head/carriage assembly at about cylinder 40.
4. Reinstall the clamp and the two band clamping screws **B**. (Do not tighten these two screws now.)
5. Carefully place and connect the head cable to the diskette drive control card.
6. Turn the stepper motor pulley to about cylinder 40 and insert a timing pin **C**.
7. Disconnect the drive motor power connector.

DANGER

Voltage is still present at the power connector when the head/carriage is disconnected and power is on.



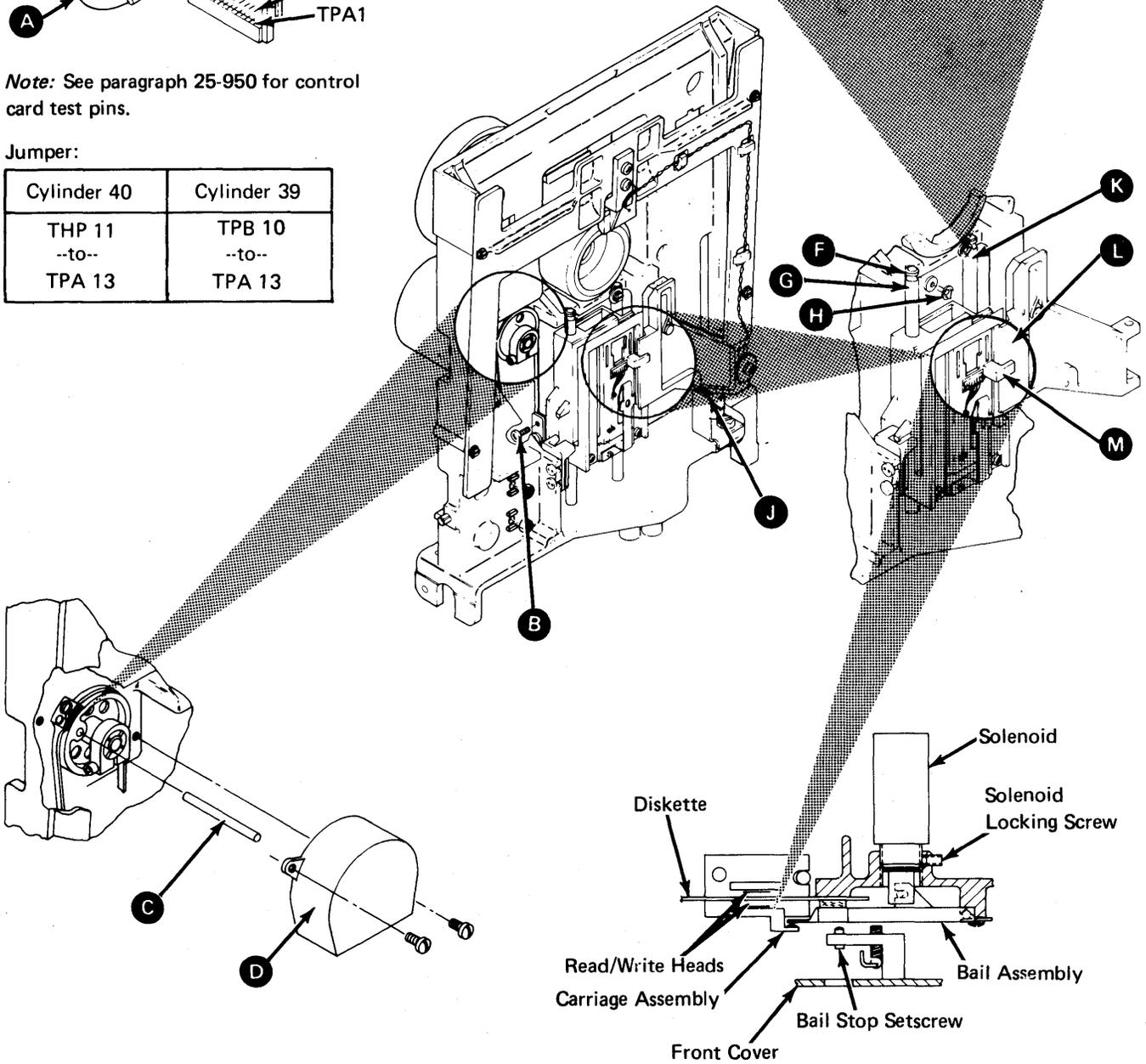
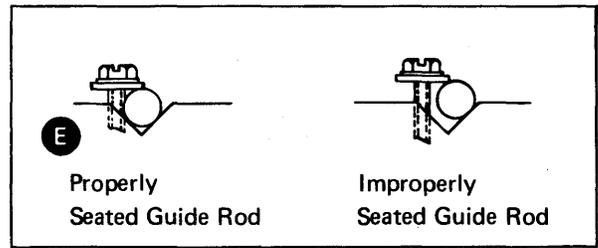
8. Remove the attachment card at A-A2L2 to prevent the stepper motor access lines from being activated by an external source.
9. Set Power to I (operator panel).
10. Install a jumper **A** from TPA13 (ground) to THP11 (-align access 0).
11. If the timing pin passes freely through the stepper motor pulley into the timing slot in the casting, go to step 12. If the timing pin does not pass freely through the stepper motor pulley into the timing slot in the casting, do the following:
 - Remove the timing pin **C**.
 - Remove the jumper **A**.
 - Set Power to O (operator panel)
 - Go to 25-490, step 5.
12. Remove the timing pin **C**.
13. Go to 25-490, step 15.



Note: See paragraph 25-950 for control card test pins.

Jumper:

Cylinder 40	Cylinder 39
THP 11	TPB 10
--to--	--to--
TPA 13	TPA 13



25-520 SOLENOID AND BAIL SERVICE CHECK

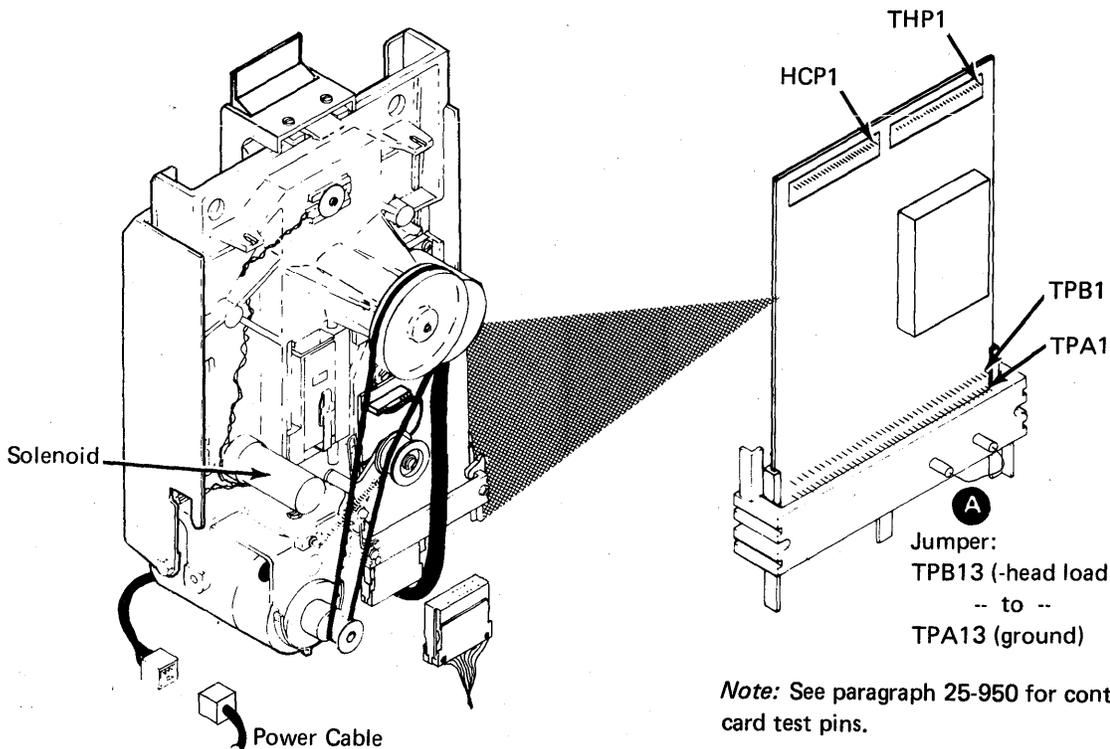
1. Remove the diskette drive (see paragraph 25-130).
2. Disconnect the drive motor power connector.

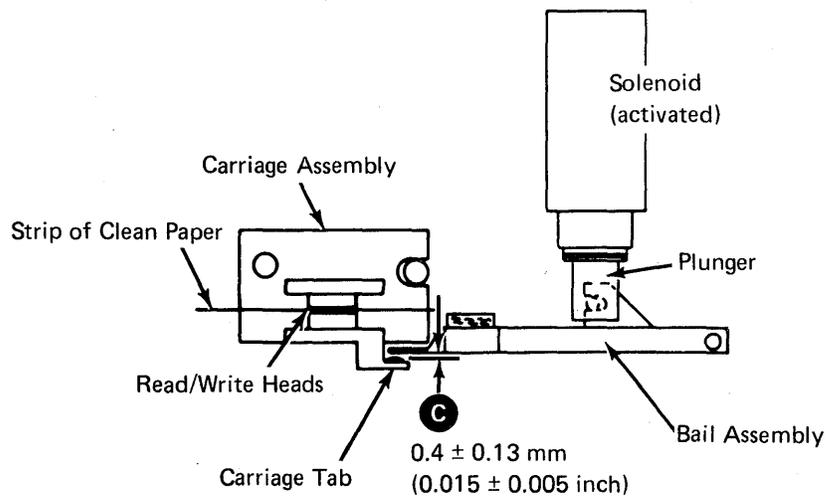
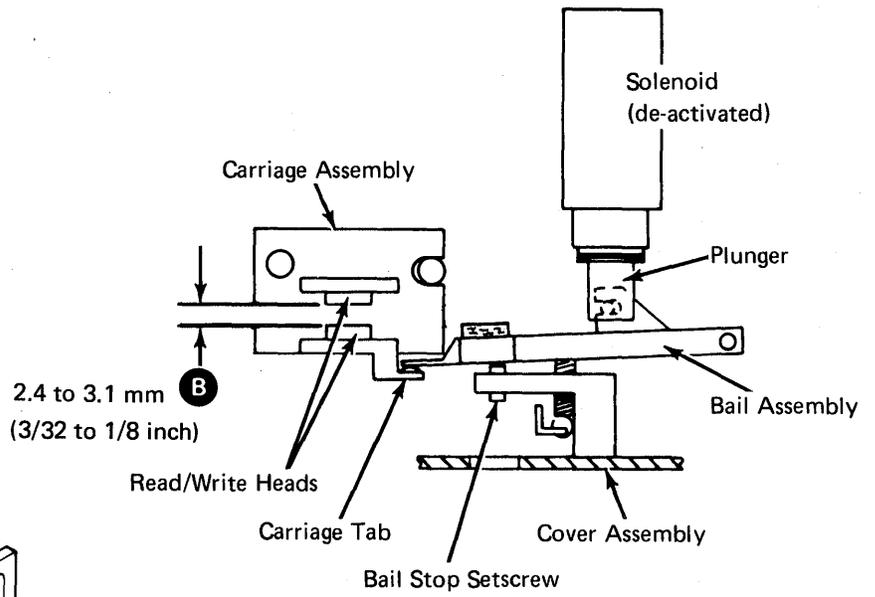
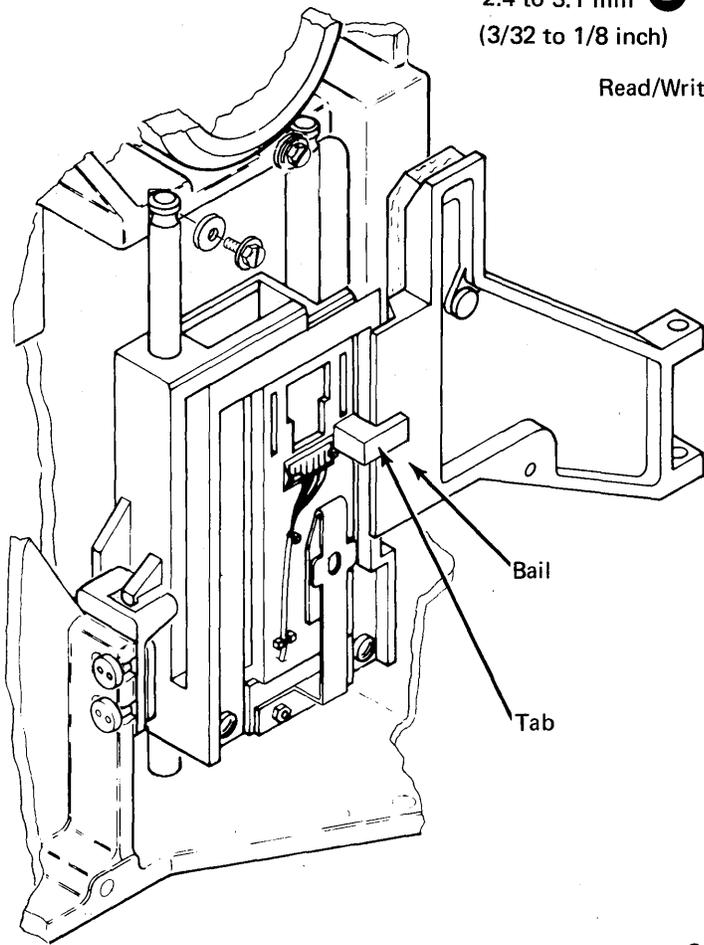
DANGER

Voltage is still present at the power connector when the diskette drive solenoid and bail are disconnected and power is on.

3. Set Power to I (operator panel).
4. Remove the cover assembly (see paragraph 25-420).
5. Insert a strip of clean paper between the heads to prevent the head surfaces from touching.
6. Install a jumper **A** from TPA13 (ground) to TPB1 (-head load) to activate the head load solenoid.
7. Verify a 0.4 ± 0.13 millimeter (0.015 ± 0.005 inch) gap **C** between the bail and the carriage arm for all of the carriage movement (cylinder 00 to cylinder 76).

8. If the gap is correct, go to step 9. If the gap is not correct, go to 25-530, step 7.
9. Remove the jumper **A**.
10. Remove the paper from between the heads.
11. Reinstall the cover assembly (see paragraph 25-430).
12. With the head load solenoid de-activated and the cover closed, visually check for a gap **B** of approximately 2.4 to 3.1 millimeters ($3/32$ to $1/8$ inch) between the head surfaces. (This gap cannot be measured.)
13. If the gap is correct, go to step 14. If the gap is not correct, go to 25-530, step 14.
14. Set Power to O (operator panel).
15. Connect the drive motor power cable. (If you came from paragraph 25-480, reinstall the attachment card at A-A2L2.)
16. Set Power to I (operator panel).



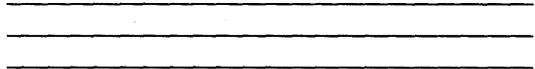


25-530 SOLENOID AND BAIL ADJUSTMENT

1. Remove the diskette drive (see paragraph 25-130).
2. Disconnect the drive motor power connector.

DANGER

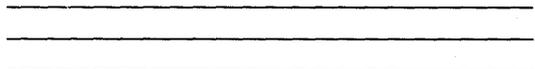
Voltage is still present at the power connector when the solenoid and bail are disconnected and power is on.



3. Set Power to I (operator panel).
4. Remove the cover assembly (see paragraph 25-420).
5. Insert a strip of clean paper between the heads to prevent the head surfaces from touching.
6. Install a jumper **E** to activate the head load solenoid.

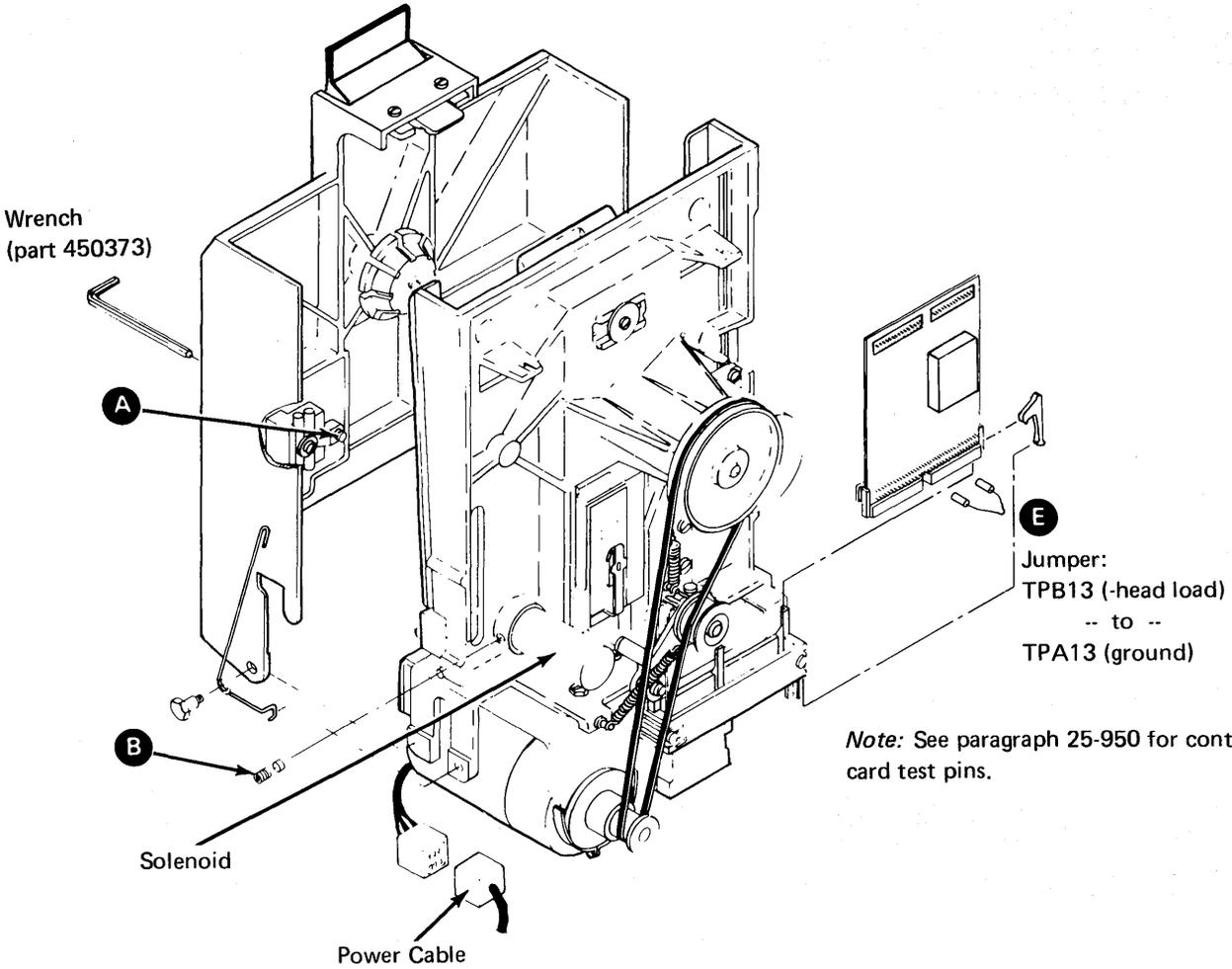
DANGER

The solenoid case becomes hot after continuous use.

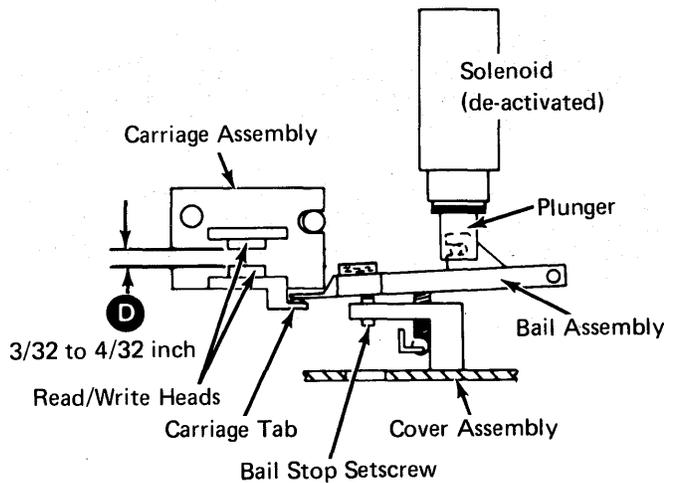
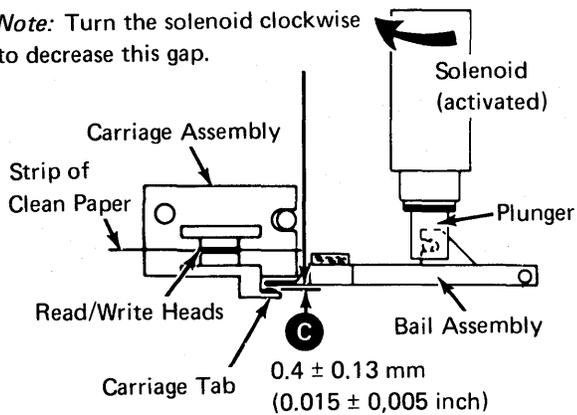


7. Loosen the solenoid locking screw **B**.

8. Turn the solenoid in the casting for a 0.4 ± 0.13 millimeter (0.015 ± 0.005 inch) gap **C** between the bail and the carriage arm (a clockwise turn decreases the gap).
9. If the gap is correct for all of the carriage movement (cylinder 00 to cylinder 76), go to step 10. If the gap is not correct for all the carriage movement, go back to step 8.
10. Tighten the solenoid locking screw.
11. Remove the jumper **E**.
12. Remove the paper from between the heads.
13. Reinstall the cover assembly (see paragraph 25-430).
14. With the head load solenoid de-activated and the cover closed, visually check for a gap **D** of approximately $3/32$ to $4/32$ of an inch between the head surfaces. (This gap cannot be measured.)
15. If the gap is correct, go to step 16. If it is not correct, turn the bail stop screw **A** clockwise until the heads just touch, then turn the screw counterclockwise one complete turn.
16. Set Power to O (operator panel).
17. Connect the drive motor power cable. (If you came from paragraph 25-480, reinstall the attachment card at A-A2L2.)
18. Set Power to I (operator panel).



Note: Turn the solenoid clockwise to decrease this gap.



**25-540 SOLENOID AND BAIL REMOVAL
(MACHINES WITH TAPER PIN
BLOCK **F**)**

1. Remove the diskette drive (see paragraph 25-130).
2. Disconnect the drive motor power connector.

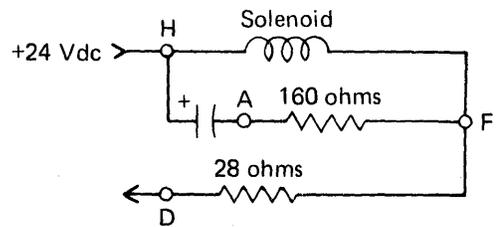
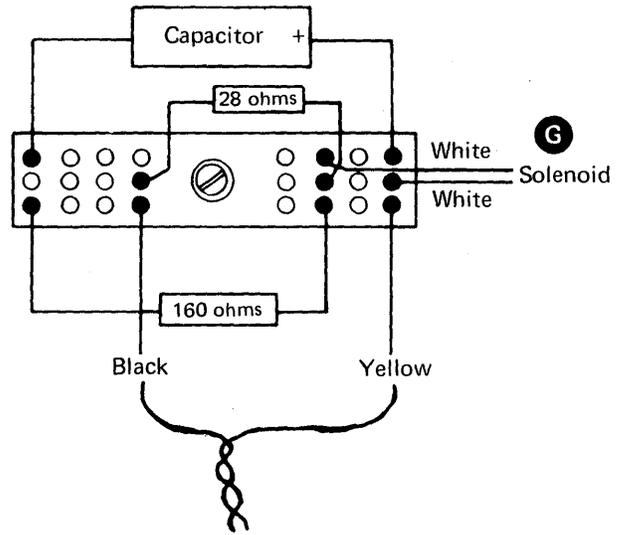
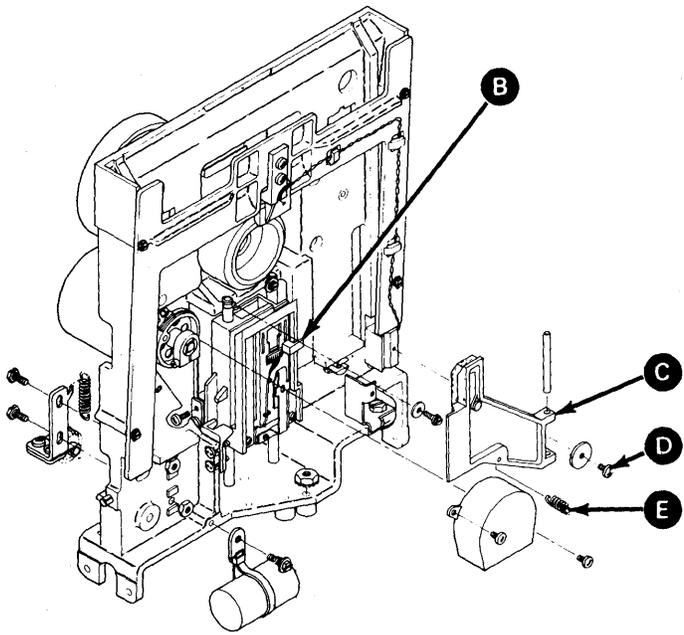
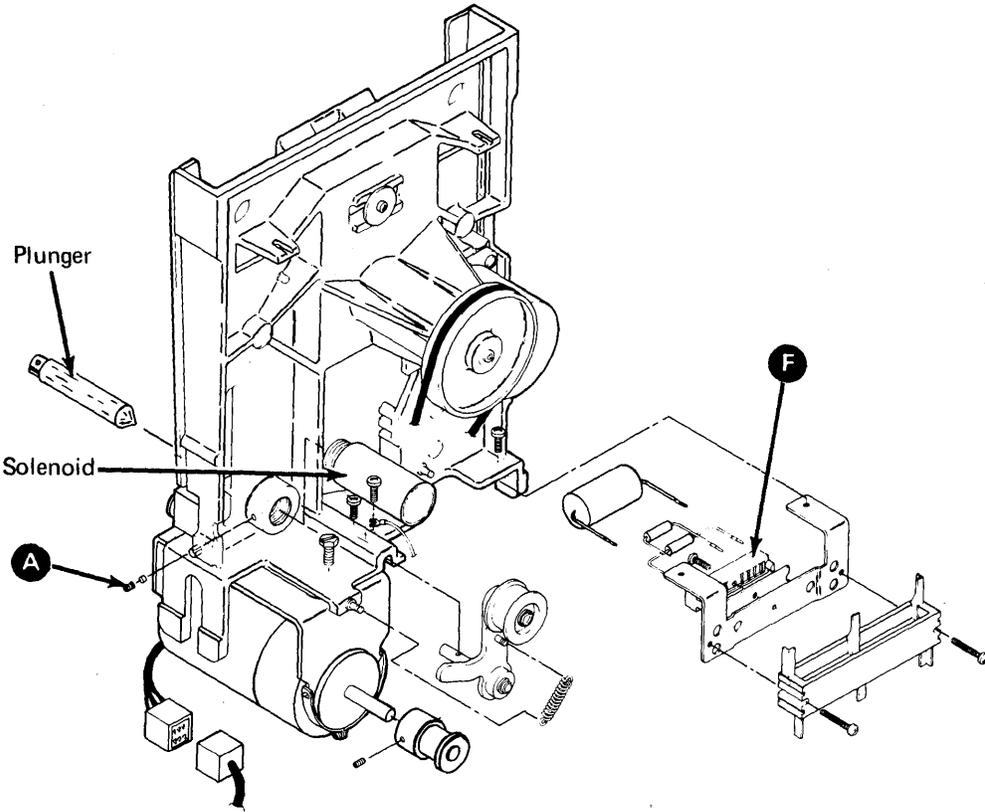
DANGER

Voltage is still present at the power connector when the solenoid and bail are disconnected and power is on.

3. Remove the cover assembly (see paragraph 25-420).
4. Insert a strip of clean paper between the heads to prevent the head surfaces from touching.
5. Remove the solenoid leads **G** from the taper pin terminal block **F**. (Remember the cable path for the replacement procedure.)
6. Remove the bail return spring **E**.
7. Remove the mounting screw **D** and the bail **C**. (This pulls the solenoid plunger out of the solenoid. Be careful not to damage the plated surface of the plunger.)
8. Remove the plunger from the bail.
9. Loosen the solenoid locking screw **A**.
10. Remove the head load solenoid by turning it counterclockwise.

**25-545 SOLENOID AND BAIL REPLACEMENT
(MACHINES WITH TAPER PIN
BLOCK **F**)**

1. Install the solenoid about four turns clockwise into the casting.
2. Install the plunger to bail. (Be careful not to damage the plated surface of the plunger.)
3. While inserting the plunger into the solenoid, reinstall the bail and the mounting screw **D**. Ensure that the bail is under the tab **B** of the carriage arm.
4. Reinstall the bail return spring **E**.
5. Carefully place and connect the solenoid leads **G** to the taper pin terminal block **F**.
6. Set Power to I (operator panel).
7. Go to 25-530, step 6.



**25-550 SOLENOID AND BAIL REMOVAL
(MACHINES WITHOUT TAPER PIN
BLOCK **F**)**

1. Remove the diskette drive (see paragraph 25-130).
2. Disconnect the drive motor power connector.

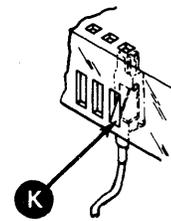
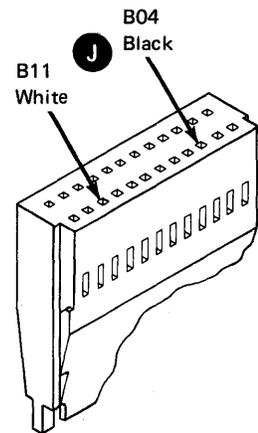
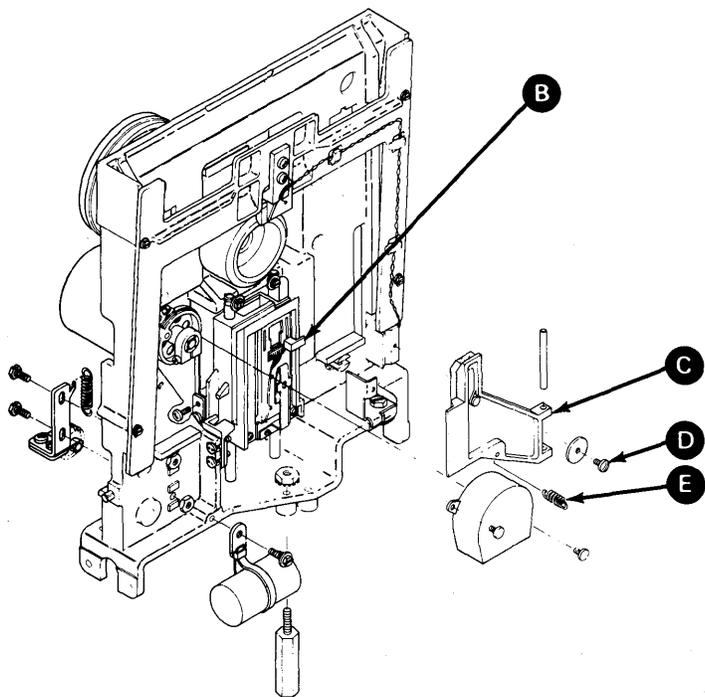
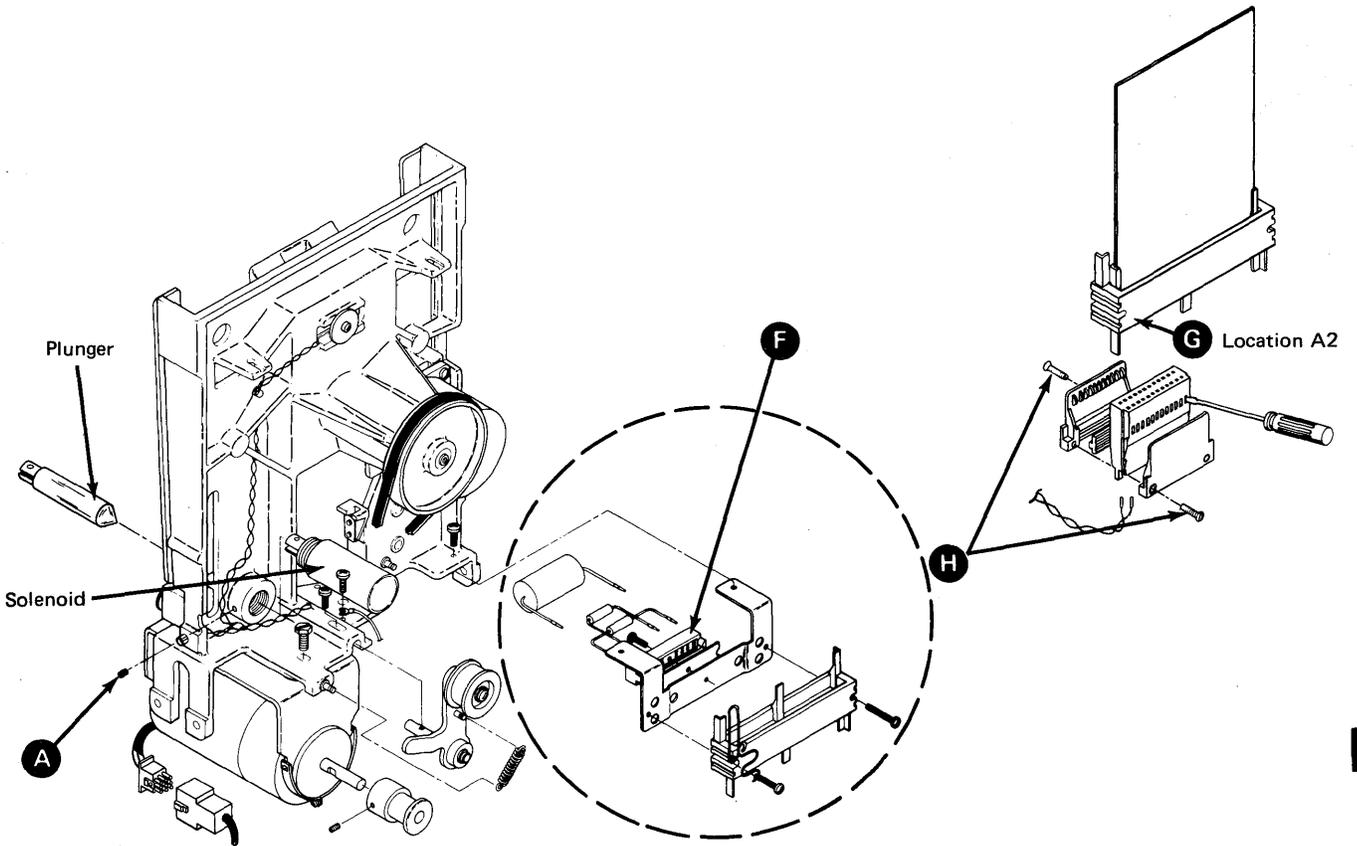
DANGER

Voltage is still present at the power connector when the solenoid and bail are disconnected and power is on.

3. Remove the cover assembly (see paragraph 25-420).
4. Insert a strip of clean paper between the heads to prevent the head surfaces from touching.
5. Remove the ball return spring **E**.
6. Remove the mounting screw **D** and the bail **C**. (This pulls the solenoid plunger out of the solenoid. Be careful not to damage the plated surface of the plunger.)
7. Disconnect the cable from location A2 **G**.
8. Remove the two screws **H** and the two connector covers.
9. Remove the solenoid leads **J** from the cable connector by pushing down on the terminal tabs with a small screwdriver.
10. Remove the plunger from the bail.
11. Loosen the solenoid locking screw **A**.
12. Remove the head load solenoid by turning it counterclockwise.

**25-555 SOLENOID AND BAIL REPLACEMENT
(MACHINES WITHOUT TAPER PIN
BLOCK **F**)**

1. Install the solenoid about four turns clockwise into the casting.
2. Install the plunger to bail. (Be careful not to damage the plated surface of the plunger.)
3. While inserting the plunger into the solenoid, reinstall the bail and the mounting screw **D**. Ensure that the bail is under the tab **B** of the carriage arm.
4. Reinstall the bail return spring **E**.
5. Insert the solenoid leads **J** into the cable connector. Ensure that the locking tabs **K** on the terminals lock in the connector slots.
6. Reinstall the connector covers and the two screws **H**.
7. Connect the cable to location A2 **G**.
8. Set Power to I (operator panel).
9. Go to 25-530, step 6.



25-560 BELT TRACKING SERVICE CHECK

1. With power on, check that the drive belt is centered on the hub pulley and the drive pulley.
2. If the drive belt is not centered, go to 25-570.

25-570 BELT TRACKING ADJUSTMENT

1. Remove the diskette drive (see paragraph 25-130).
2. Loosen the idler locking screw **F** and the drive pulley set screw **D**.
3. Slide the idler assembly and the drive pulley in or out so the belt is centered on the hub pulley and the drive pulley when the drive pulley is turned counterclockwise.
4. Tighten the idler locking screw and the drive pulley set screw. Ensure that the drive pulley set screw is on the flat surface of the drive motor shaft.
5. Set Power to I (operator panel).
6. Go to 25-560.

25-580 BELT REMOVAL

1. Set Power to O (operator panel).
2. Release the idler tension by hand and remove the drive belt.

25-590 BELT REPLACEMENT

1. Install the belt, ensuring that the idler is in place as shown **A**.
2. Set Power to I (operator panel).
3. Go to 25-560.

25-600 DRIVE MOTOR REMOVAL

1. Remove the diskette drive (see paragraph 25-130).
2. Disconnect the drive motor power cable.

3. Remove the drive belt (see paragraph 25-580).

DANGER

The motor case becomes hot after continuous use.

4. Remove the two motor bracket mounting screws **E** and remove the drive motor and the bracket as an assembly. (Be careful not to lose the bail return spring and bracket **C**.)
5. Loosen the set screw **D** and remove the drive pulley.

25-610 DRIVE MOTOR REPLACEMENT

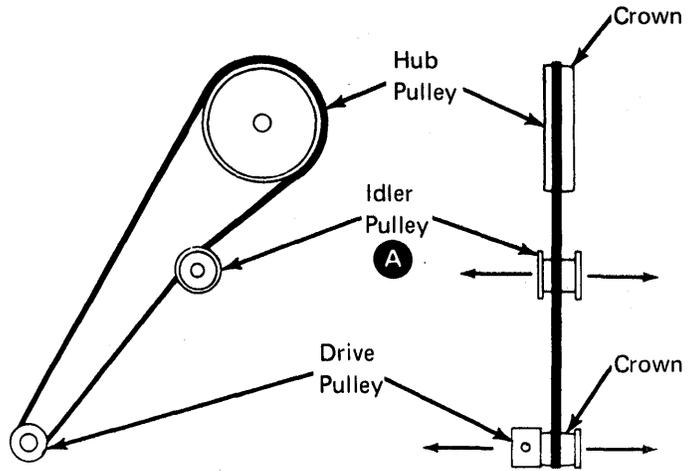
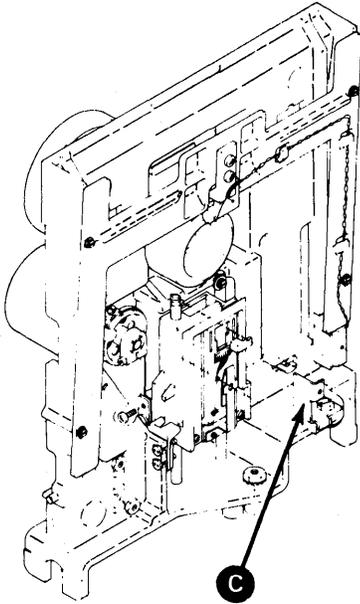
1. Reinstall the drive pulley on the new motor. Ensure that the set screw **D** is on the flat surface of the motor shaft.

DANGER

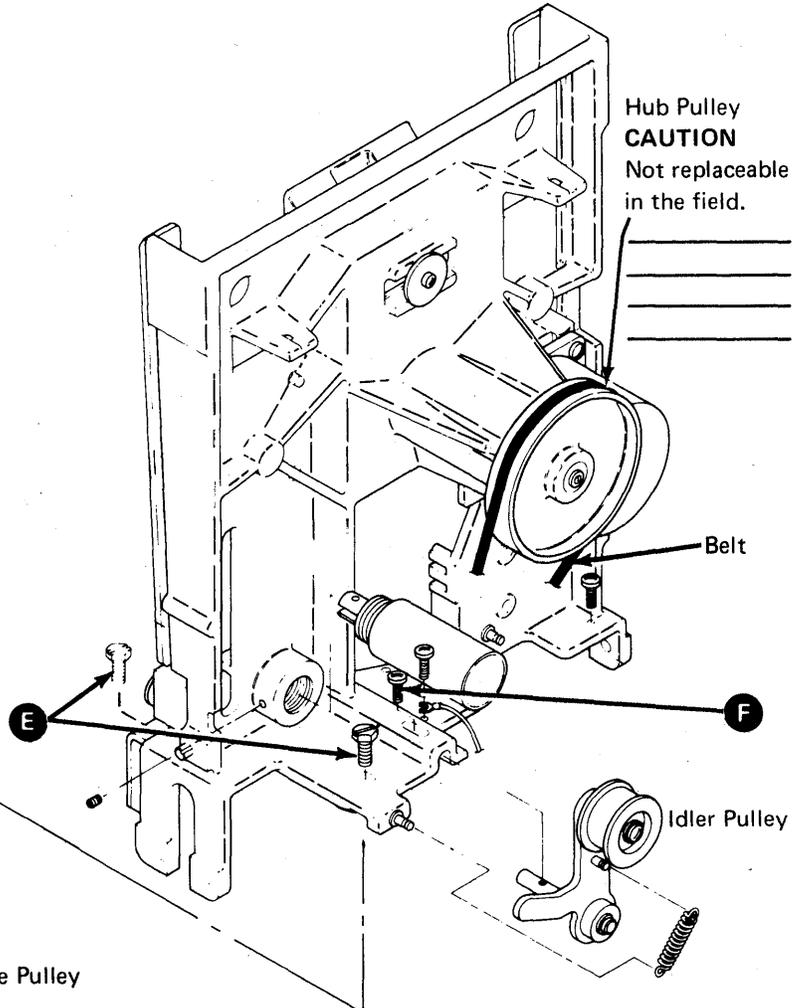
(60 Hz motors)

To prevent personal injury, if your motor case has two large holes, position the two large holes **B** in the motor frame so the holes are under the bracket.

2. Install the motor and bracket assembly and the two screws **E**. (Ensure that the bail return spring and bracket **C** is installed.)
3. Reinstall the cover assembly (see paragraph 25-430).
4. Connect the drive motor power cable.
5. Go to 25-590.



Hub Pulley
CAUTION
 Not replaceable
 in the field.



Drive Motor and
 Bracket Assembly

B

Power Cable

Flat Surface

Drive Pulley

D

Idler Pulley

Belt

E

F

25-620 DRIVE PULLEY REMOVAL

1. Remove the diskette drive (see paragraph 25-130).
2. Remove the drive belt (see paragraph 25-580).
3. Loosen the set screw **D** and remove the drive pulley.

25-630 DRIVE PULLEY REPLACEMENT

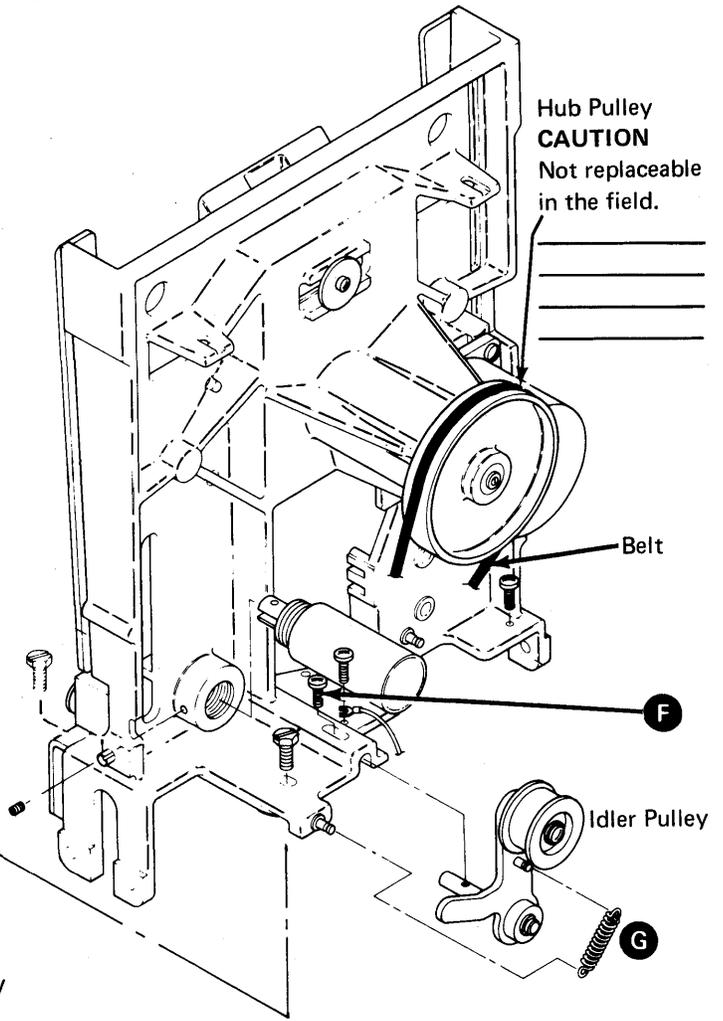
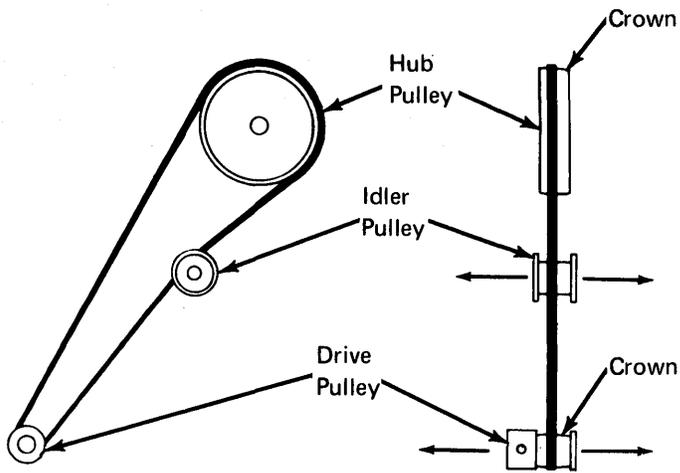
1. Install the drive pulley on the motor shaft with the set screw **D** on the flat surface of the shaft.
2. Go to 25-590.

25-640 IDLER ASSEMBLY REMOVAL

1. Remove the drive belt (see paragraph 25-580).
2. Remove the idler spring **G**.
3. Remove the locking screw **F** and the idler assembly.

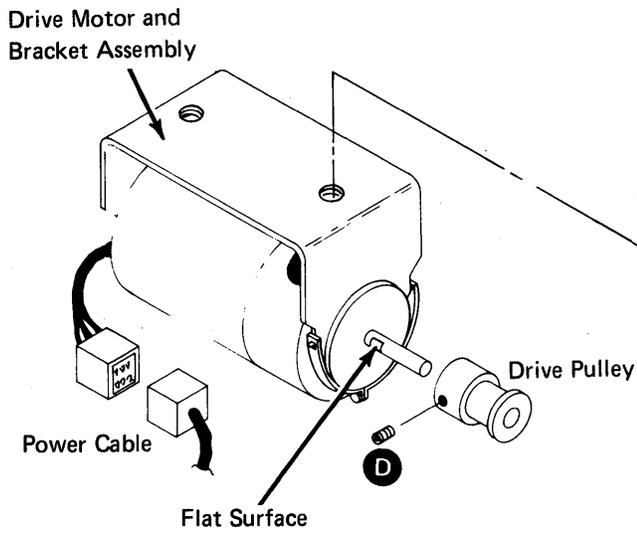
25-650 IDLER ASSEMBLY REPLACEMENT

1. Install the idler assembly and the locking screw **F** (do not tighten).
2. Reinstall the idler spring **G**.
3. Go to 25-590.



Hub Pulley
CAUTION
 Not replaceable
 in the field.

25



25-680 STEPPER MOTOR REMOVAL

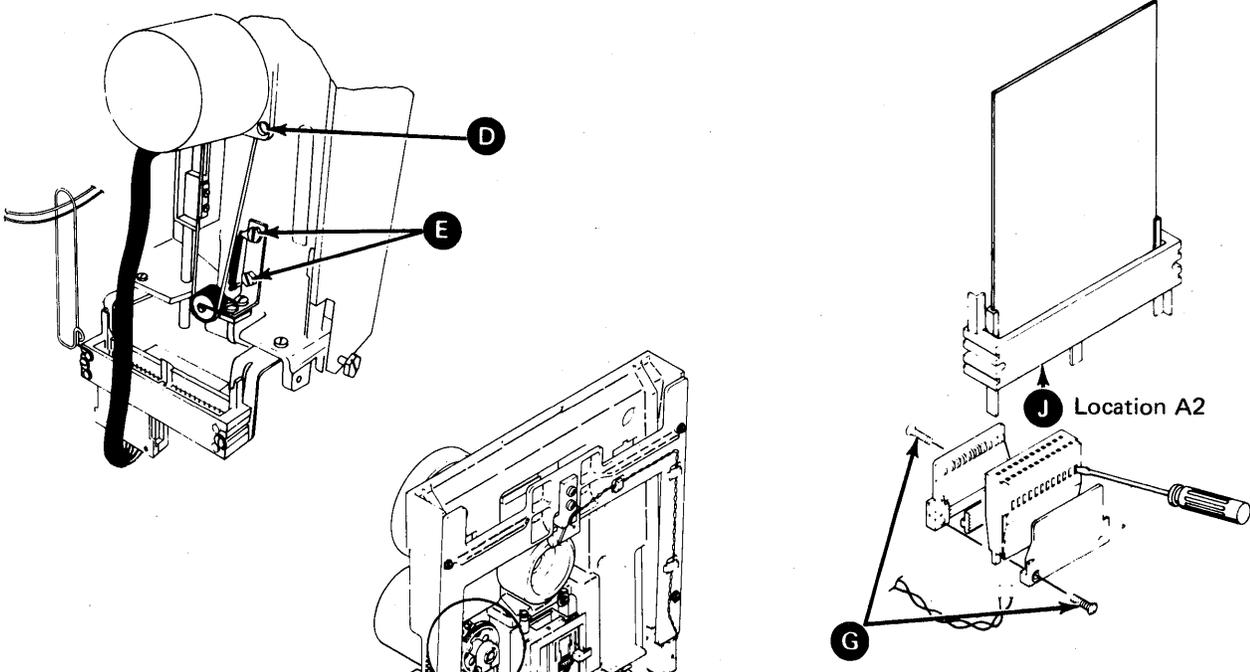
1. Remove the diskette drive (see paragraph 25-130).
2. Remove the cover assembly (see paragraph 25-420).
3. Disconnect the head cable from the diskette drive control card.
4. Remove the card retainer and the diskette drive control card.
5. Disconnect the cable from location A2 **J**.
6. Remove the two screws **G** and the two connector covers.
7. Remove the stepper motor leads **H** from the cable connector by pushing down on the terminal tabs with small screwdriver.
8. Remove the wiper assembly **F**.
9. Loosen the two mounting screws **E**. Push the idler assembly against spring tension and tighten the screws.

CAUTION

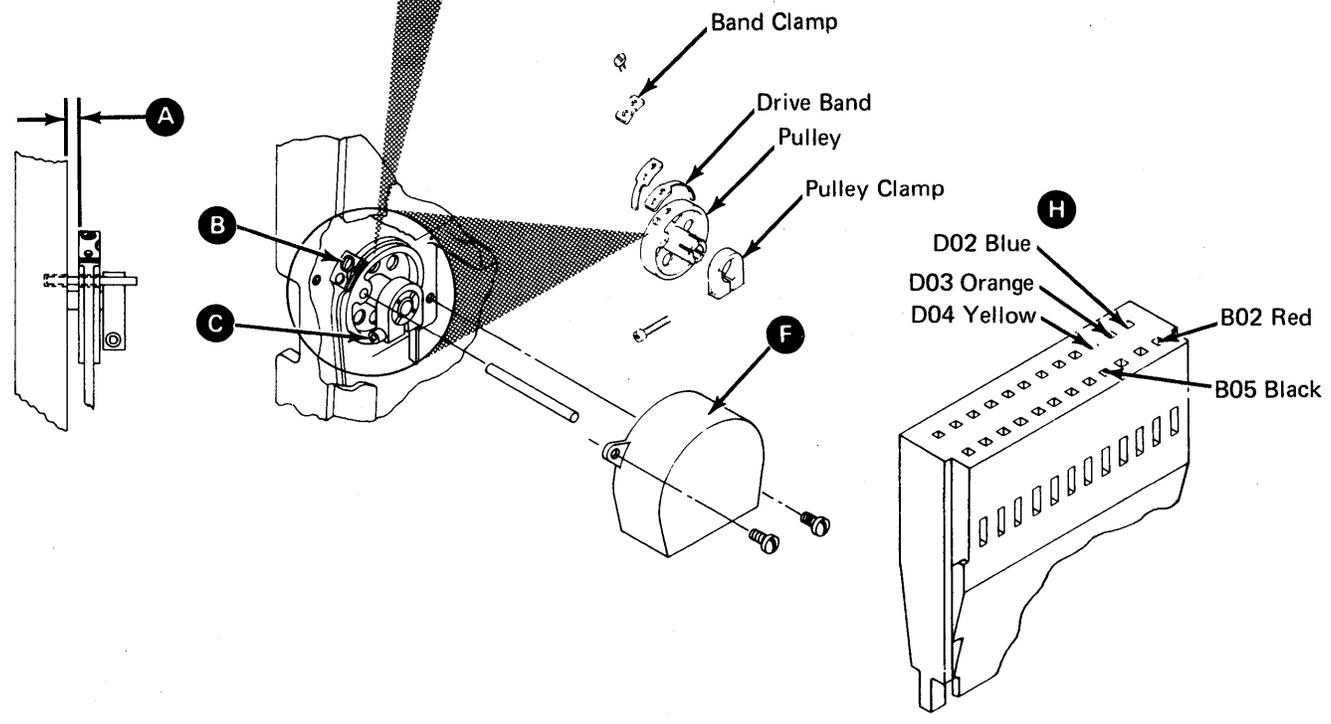
While performing the following steps, be careful not to damage the drive band.

-
-
-
10. Remove the clamp screw **B** and the band clamp.
 11. Carefully remove the drive band ends from the pulley pin.
 12. Measure the gap **A** between the stepper motor pulley and the casting. Write the measurement here.

Gap is: _____
 13. Loosen the clamp screw **C** and remove the stepper motor pulley.
 14. Remove the three stepper motor mounting screws **D** and remove the motor.



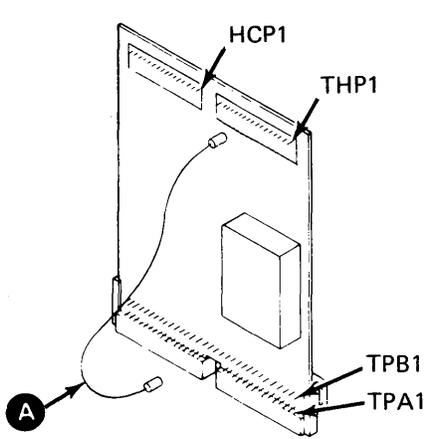
25



25-690 STEPPER MOTOR REPLACEMENT

1. Install the stepper motor using the three mounting screws **G**. (Position the motor cable toward the diskette drive control card.)
2. Insert the stepper motor leads **M** into the cable connector. Ensure that the locking tabs **K** on the terminals lock in the connector slots.
3. Reinstall the connector covers and two screws **L**.
4. Connect the cable to location A2 **N**.
5. Reinstall the stepper motor pulley. (Keep the clamp screw **E** loose so that the motor shaft can turn inside the pulley.)
6. Carefully reinstall the drive band ends on the pulley pin as shown **D**. Reinstall the band clamp (with the notch facing away from the stepper motor) and screw **C**. (Do not tighten the screw.)
7. Loosen the two mounting screws **H** and let spring tension position the idler.
8. Tighten the mounting screws and center the drive band on the idler pulley as shown **J**.
9. Reinstall the diskette drive control card and the card retainer.
10. Reinstall the head cable on the diskette drive control card.
11. Turn the stepper motor pulley to cylinder 40 and insert a timing pin **F**.
12. Disconnect the drive motor power connector.
DANGER
Voltage is still present at the power connector when the stepper motor is disconnected and power is on.

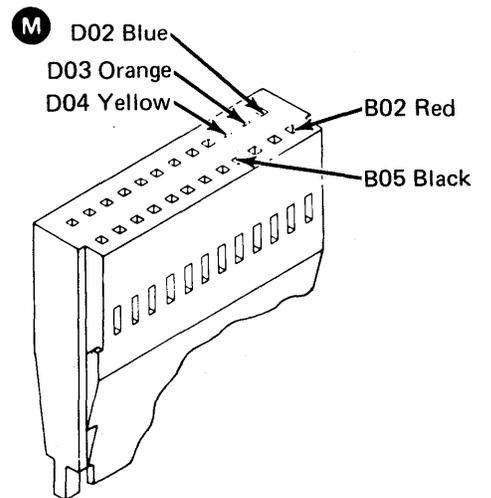
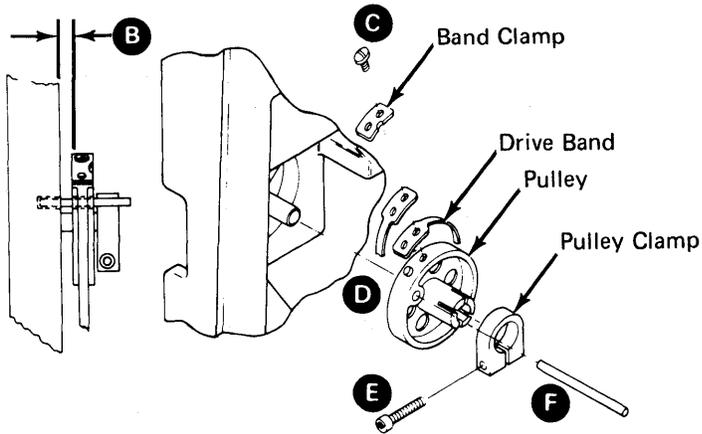
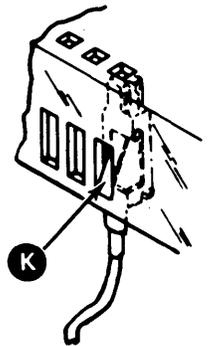
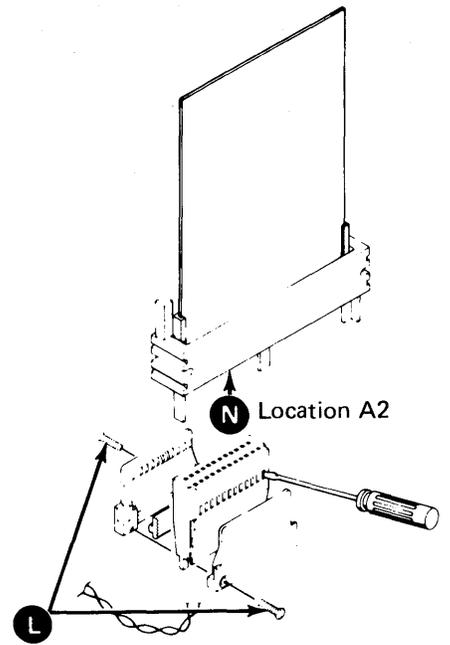
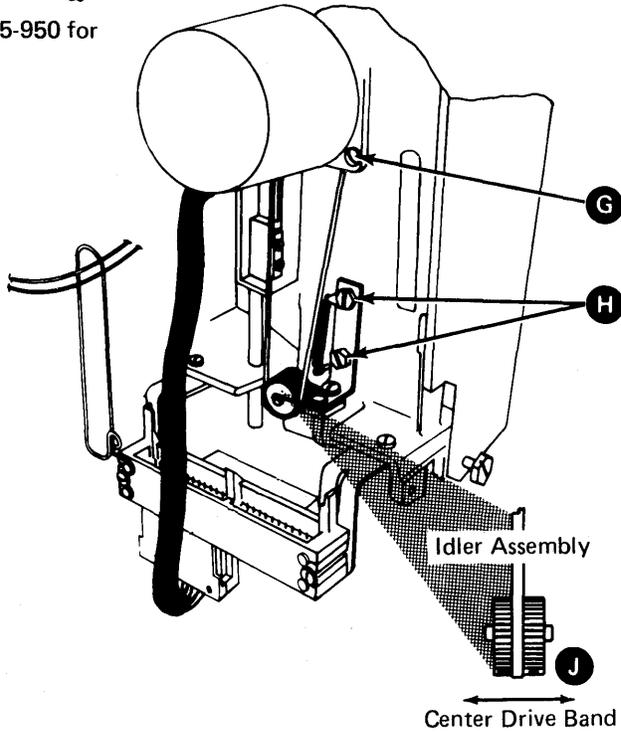
13. Remove the attachment card at A-A2L2 to prevent the stepper motor access lines from being activated by an external source.
14. Set Power to I (operator panel).
15. Install a jumper **A** from TPA13 (ground) to THP11 (-align access 0).
16. Make the gap **B** between the pulley and the casting the same size as the gap that was recorded in 25-680, step 12.
17. Tighten the clamp screw **E**.
18. Remove the timing pin **F**.
19. Remove the jumper **A**.
20. Tighten the band clamp screw **C**. (Ensure that the drive band is straight.)
21. Turn the stepper motor pulley by hand and check to see that the drive band is centered **J** on the idler pulley in all of the head/carriage assembly movement (cylinder 00 to cylinder 76).
22. If the drive band is centered, go to 25-480, step 5. If the drive band is not centered, go to 25-740, step 4.



Note: See paragraph 25-950 for control card test pins.

Jumper:

Cylinder 40
THP 11
--to--
TPA 13



25-700 PULLEY AND CLAMP REMOVAL

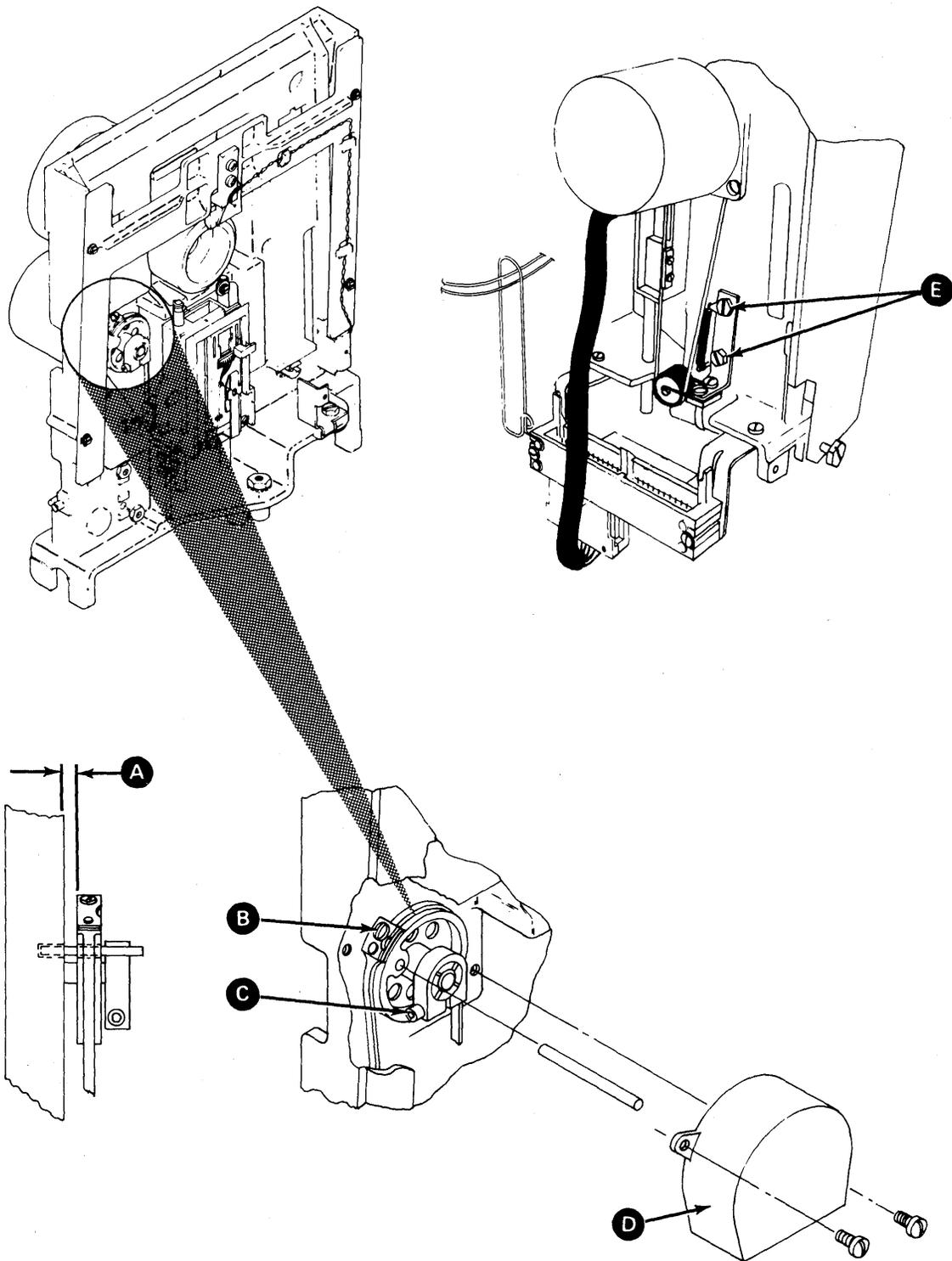
1. Remove the diskette drive (see paragraph 25-130).
2. Remove the cover assembly (see paragraph 25-420).
3. Remove the wiper assembly **D**.
4. Disconnect the head cable from the diskette drive control card.
5. Remove the card retainer and the diskette drive control card.
6. Loosen the two mounting screws **E**. Push the idler assembly against the spring tension and tighten screws.

CAUTION

During the following steps, be careful not to damage the drive band.

7. Remove the clamp screw **B** and the band clamp from the pulley.
8. Carefully remove the drive band ends from the pulley pin.
9. Measure the gap **A** between the stepper motor pulley and the casting. Write the measurement here.

Gap is: _____
10. Loosen the clamp screw **C** and remove the pulley and the clamp.



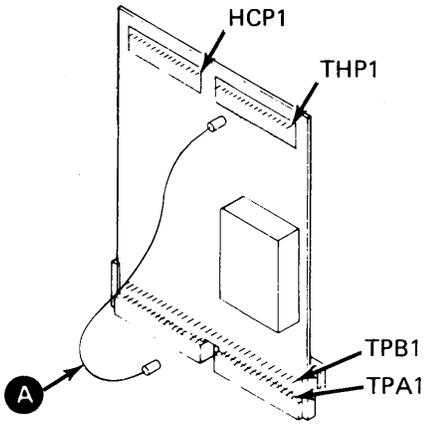
25-710 PULLEY AND CLAMP REPLACEMENT

1. Reinstall the pulley, clamp, and clamp screw **E**. (Keep the screw loose so the motor shaft can turn inside the pulley.)
2. Carefully reinstall the drive band ends on the pulley pin **D**. Reinstall the band clamp (with the notch facing away from the stepper motor) and screw **C**. (Do not tighten the screw.)
3. Loosen the two mounting screws **G** and let spring tension position the idler.
4. Tighten the mounting screws and center the drive band on the idler pulley as shown **H**.
5. Reinstall the diskette drive control card and the card retainer.
6. Reinstall the head cable on the diskette drive control card.
7. Turn the stepper motor pulley by hand to about cylinder 40 and insert a timing pin **F**.
8. Disconnect the drive motor power connector.
10. Set Power to I (operator panel).
11. Install a jumper **A** from TPA13 (ground) to THP11 (-align access 0).
12. Make the gap **B** between the pulley and the casting the same as the gap that was recorded in 25-700, step 9.
13. Tighten the clamp screw **E**.
14. Remove the timing pin **F**.
15. Remove jumper **A**.
16. Tighten the band clamp screw **C**. (Ensure that the drive band is straight.)
17. Turn the stepper motor pulley by hand and check that the drive band is centered **H** on the idler pulley in all of the head/carriage assembly movement (cylinder 00 to cylinder 76).
18. If the drive band is centered, go to step 19. If the drive band is not centered, go to 25-740, step 4.
19. Go to 25-480, step 5.

DANGER

Voltage is still present at the power connector when the pulley and clamp are disconnected and power is on.

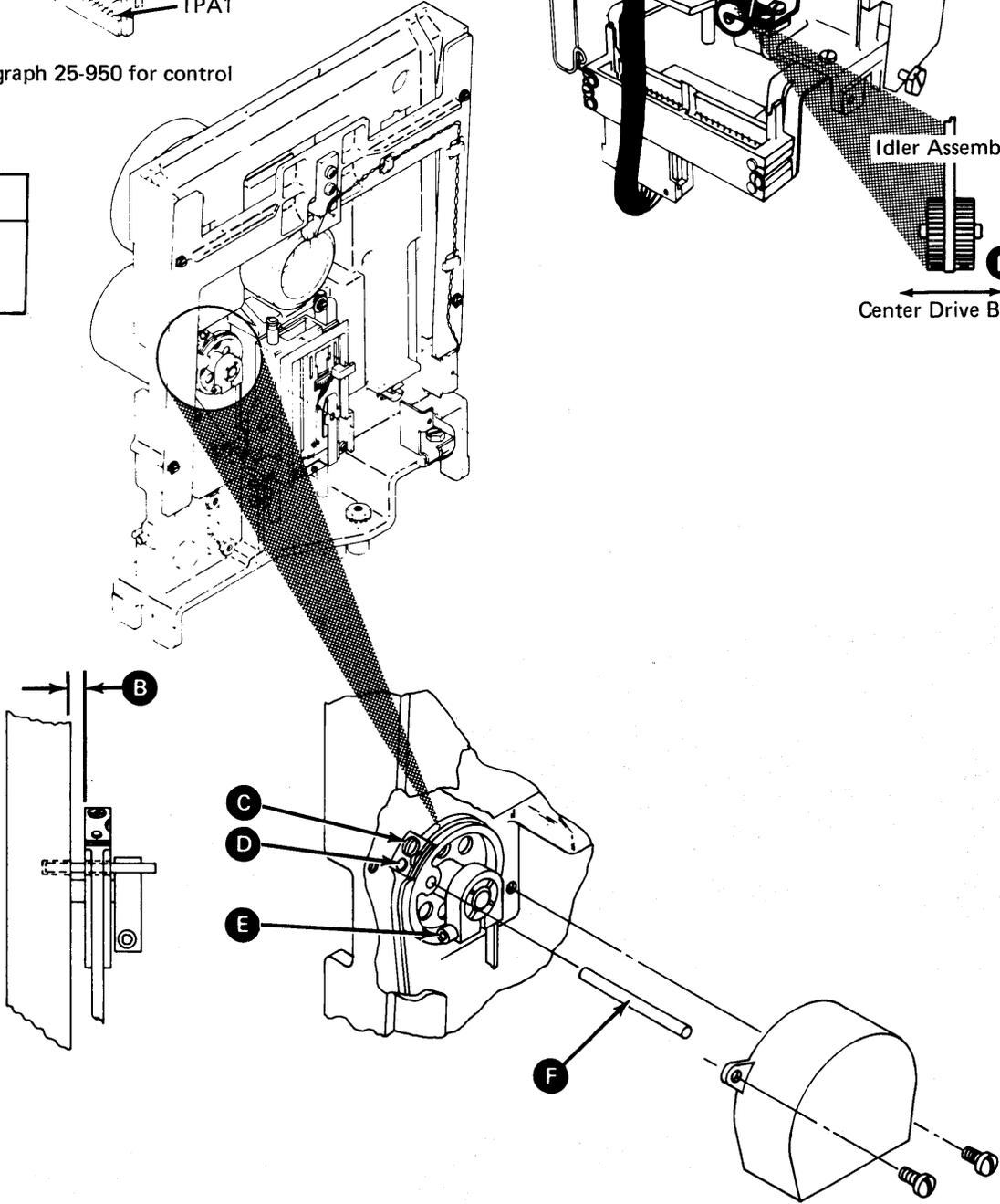
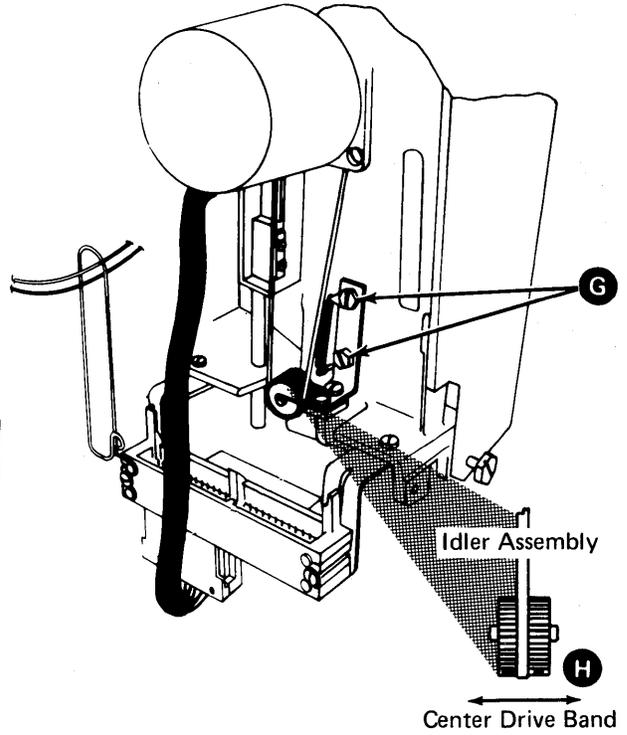
9. Remove the attachment card at A-A2L2 to prevent the stepper motor access lines from being activated by an external source.



Note: See paragraph 25-950 for control card test pins.

Jumper:

Cylinder 40
THP 11
--to--
TPA 13



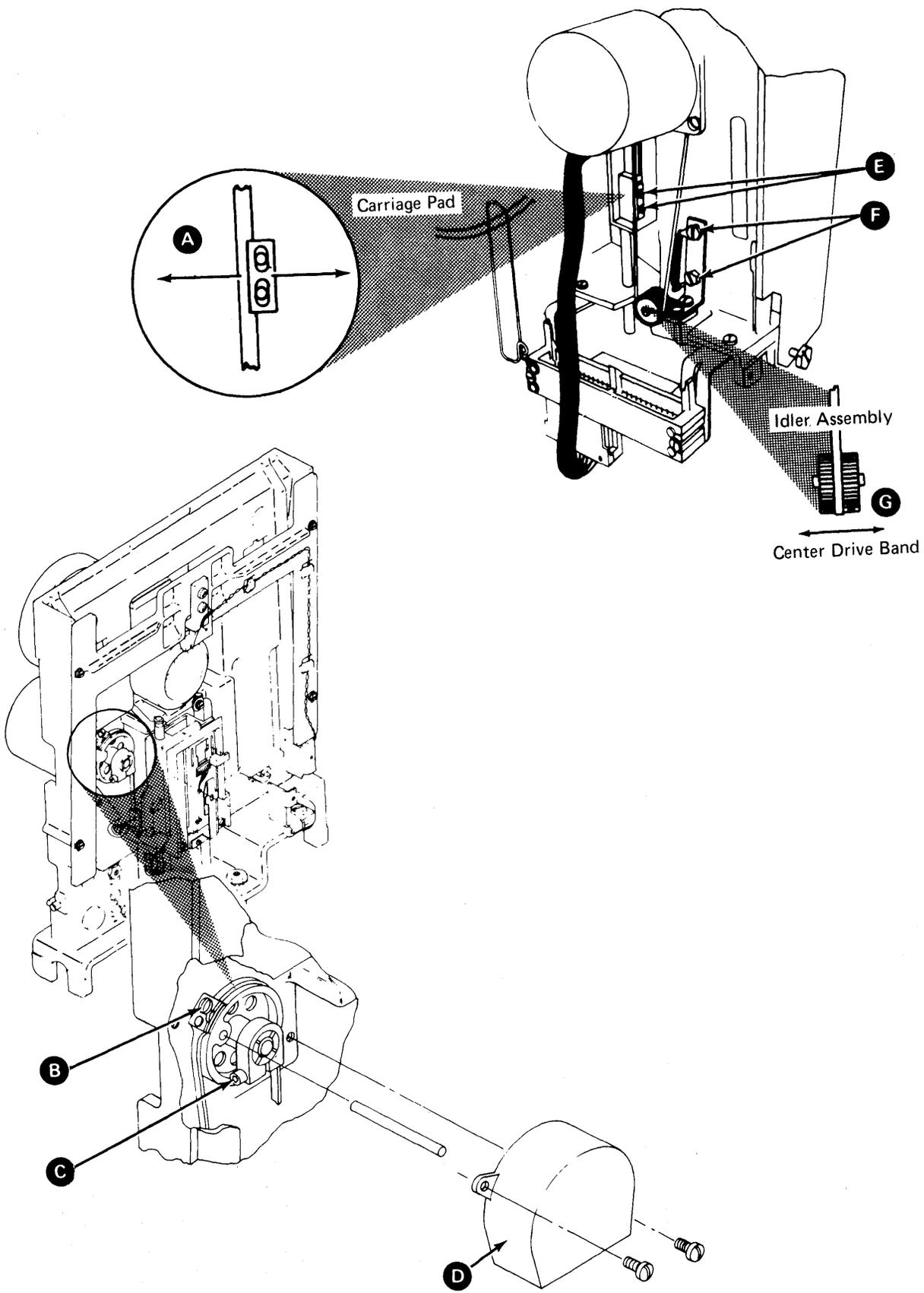
25-730 DRIVE BAND SERVICE CHECK

1. Remove the diskette drive (see paragraph 25-130).
2. Remove the cover assembly (see paragraph 25-420).
3. Remove the wiper assembly **D**.
4. Turn the stepper motor pulley by hand and check that the drive band is centered **G** on idler pulley in all of the head/carriage assembly movement (cylinder 00 to cylinder 76).
5. If the drive band is centered, go to step 6. If the drive band is not centered, go to 25-740, step 6.
6. Reinstall the wiper assembly **D**.
7. Reinstall the cover assembly (see paragraph 25-430).

25-740 DRIVE BAND ADJUSTMENT

1. Remove the diskette drive (see paragraph 25-130).
2. Remove the cover assembly (see paragraph 25-420).
3. Remove the wiper assembly **D**.
4. Disconnect the head cable from the diskette drive control card.
5. Remove the card retainer and the diskette drive control card.
6. Place the head/carriage assembly at about cylinder 40.

7. Remove the two band clamp screws **E** and the clamp.
8. Loosen the two mounting screws **F** and let spring tension position the idler. Tighten the mounting screws.
9. Turn the stepper motor pulley by hand a few times to center the drive band on the idler pulley **G**.
10. Place the head/carriage assembly by hand to about cylinder 40 and check to see that the band mounting slots **A** are centered (left to right) over the mounting holes on the carriage pad.
11. Repeat step 10 with the head/carriage assembly at cylinder 00 and cylinder 76.
12. If the mounting slots are centered, go to step 16. If the mounting slots are not centered, go to step 13.
13. Loosen the clamp screw **C**.
14. Loosen the band clamp screw **B**.
15. Place the stepper motor pulley to center the mounting slots and tighten the clamp screws **C** and **B**.
16. Move the head/carriage assembly by hand to about cylinder 40.
17. Reinstall the clamp and the two clamp screws **E** (do not tighten).
18. Reinstall the diskette drive control card and the card retainer.
19. Connect the head cable to the diskette drive control card.
20. Go to 25-490, step 4.



25-750 DRIVE BAND REMOVAL

1. Remove the diskette drive (see paragraph 25-130).
2. Remove the cover assembly (see paragraph 25-420).
3. Remove the wiper assembly **G**.
4. Disconnect the head cable from the diskette drive control card.
5. Remove the card retainer and the diskette drive control card.
6. Loosen the two mounting screws **C**. Push the idler assembly against the spring tension and tighten the mounting screws.
7. Place the head/carriage by hand at about cylinder 40.
8. Remove the two band clamp screws **A** and the clamp and place the head/carriage assembly at the lower limit (cylinder 00).
9. Remove the clamp screw **E** and the clamp.
10. Remove the drive band ends from the pulley pin and remove the band.

25-760 DRIVE BAND REPLACEMENT

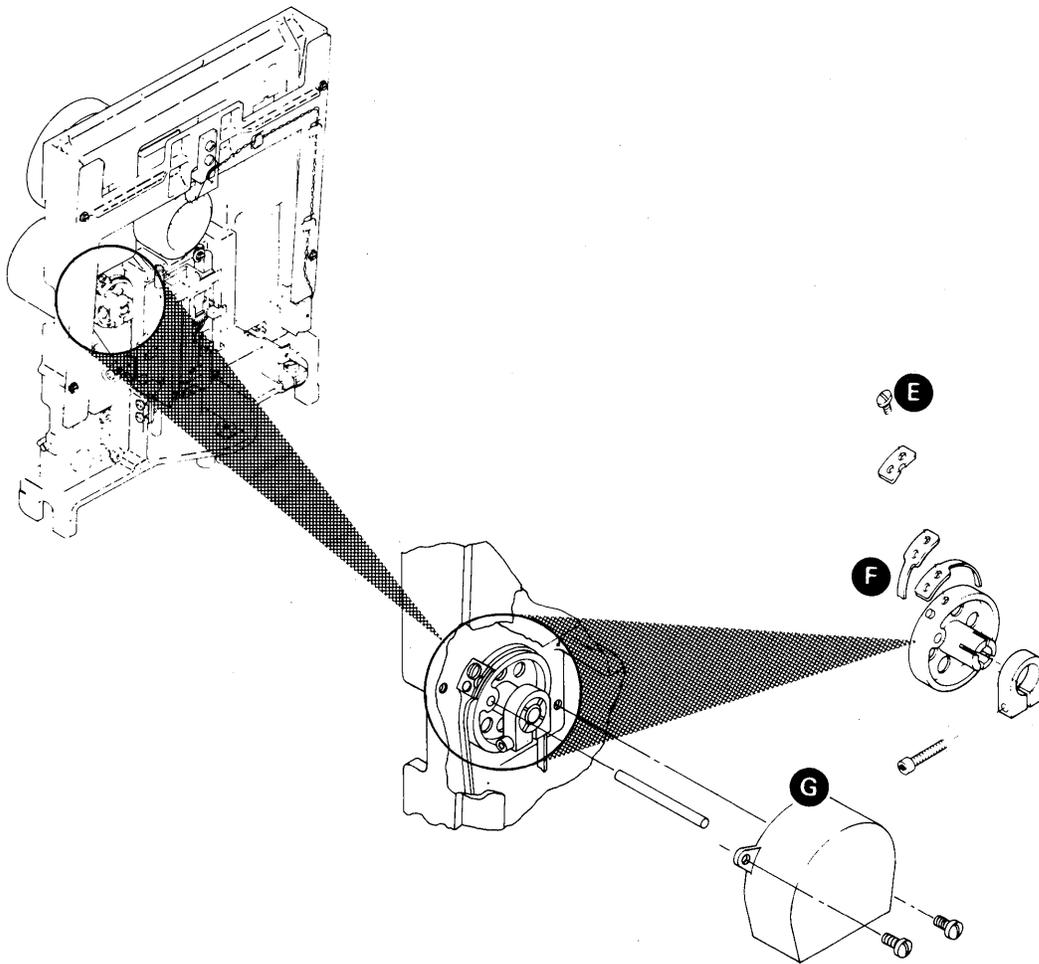
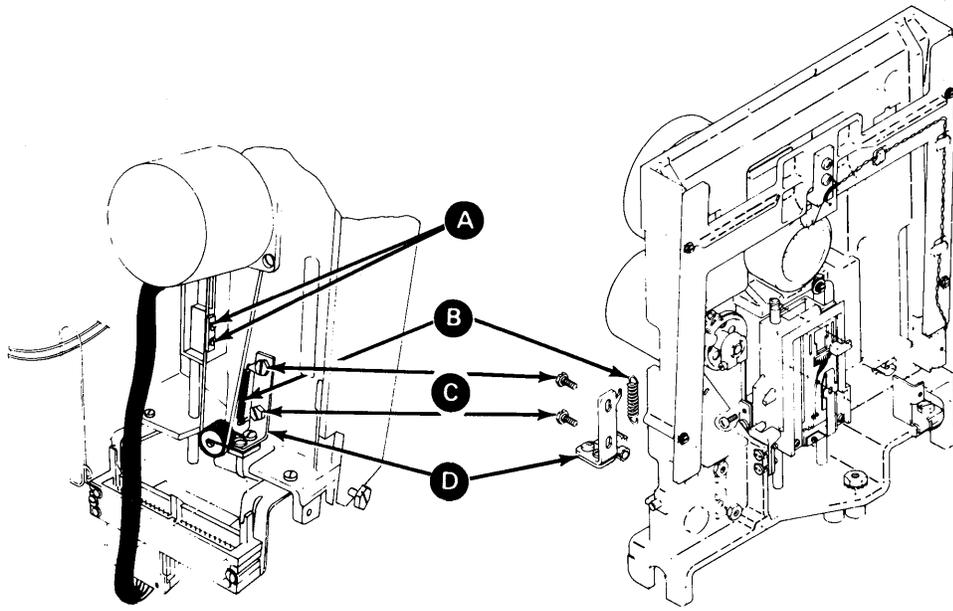
1. Place the drive band around the idler assembly.
2. Install the drive band ends on the pulley pin as shown **F**.
3. Reinstall the band clamp (with the notch facing away from the stepper motor) and the clamp screw **E**. (Ensure that the drive band is straight.)
4. Go to 25-740, step 8.

25-770 IDLER ASSEMBLY REMOVAL

1. Remove the drive band (see paragraph 25-750).
2. Loosen the two mounting screws **C**.
3. Remove the idler spring **B**.
4. Remove the mounting screws and the idler assembly **D**.

25-780 IDLER ASSEMBLY REPLACEMENT

1. Reinstall the idler assembly **D** and the two mounting screws **C** (do not tighten).
2. Reinstall the idler spring **B**.
3. Push the idler assembly against spring tension and tighten the mounting screws.
4. Go to 25-760.



25-790 DISKETTE SPEED SERVICE CHECK

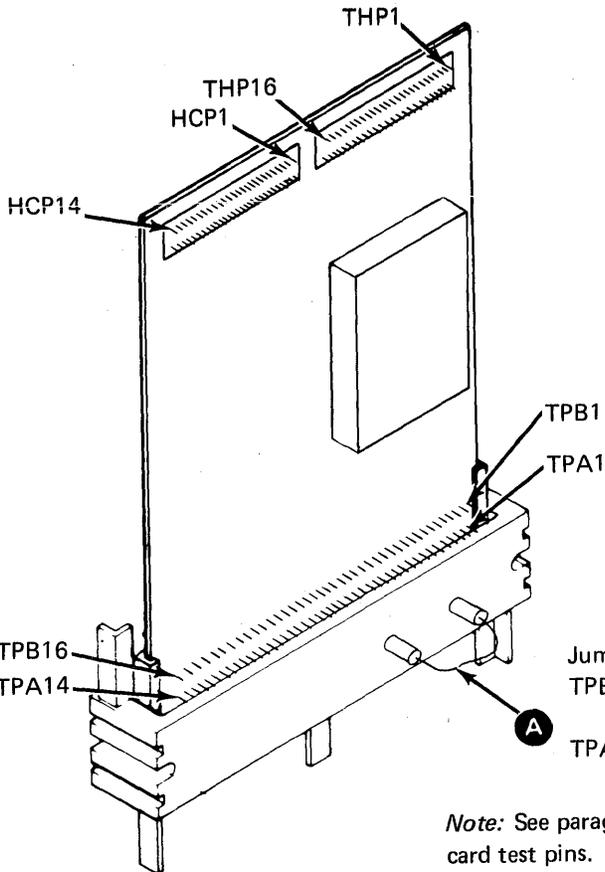
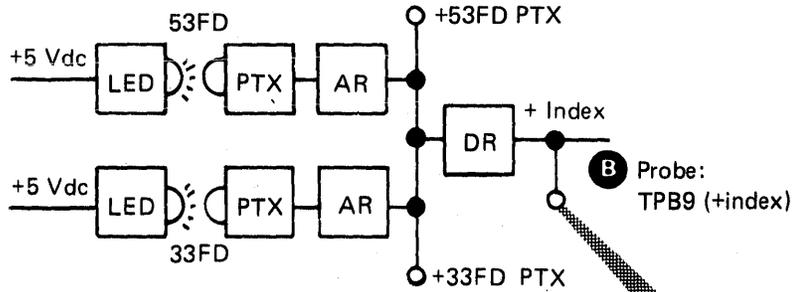
1. Insert a diskette. (Ensure that the cover assembly is closed.)
2. install a jumper **A** to activate the head load solenoid.
3. Set up an oscilloscope as shown in the table.

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

4. Observe an index pulse width of 1.5 to 3.0 milliseconds **E** occurring each 166.7 ± 4.2 milliseconds **C**. Pulse amplitude should be between 2.4 and 4.2 Vdc **D**.

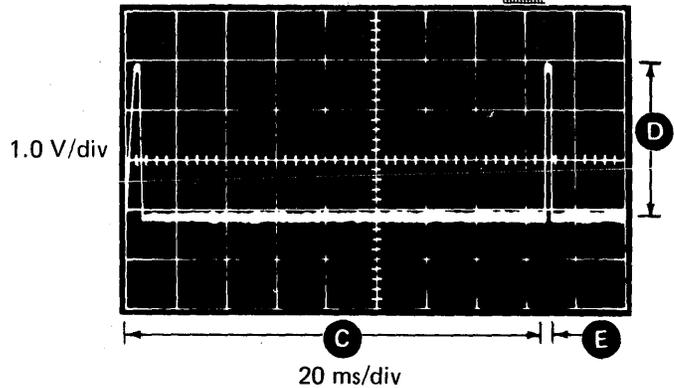
5. Remove the jumper **A**.
6. Remove the diskette.

Channel A sweep mode	Normal
Channel A level	+
Channel A coupling	DC
Channel A slope	+
Channel A source	Internal
Trigger Mode	Normal Channel 1
Channel 1 volts/division	1.0 V/div
Channel 1 input	DC
Times per division	20 ms
Channel 1 probe to B	+Index Test Pin



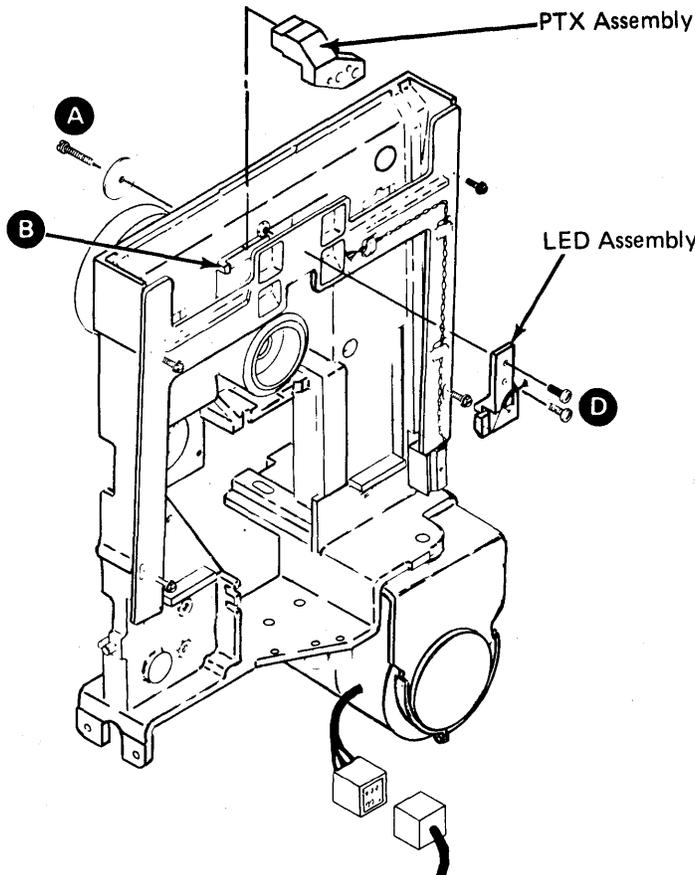
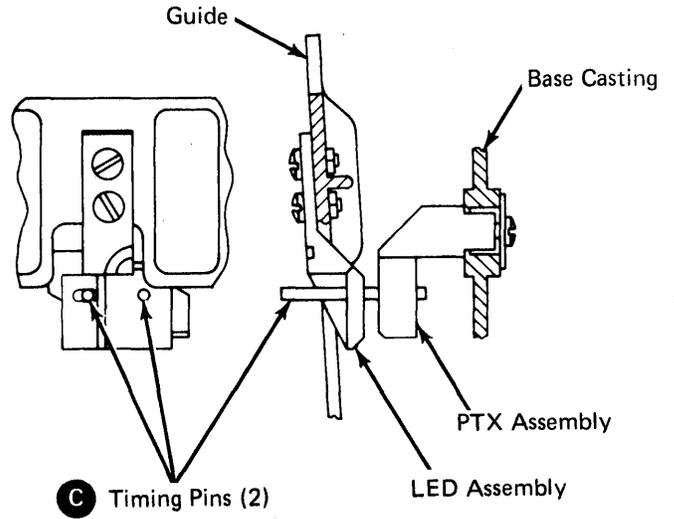
Jumper:
 TPB13 (-head load)
 -- to --
 TPA13 (ground)

Note: See paragraph 25-950 for control card test pins.



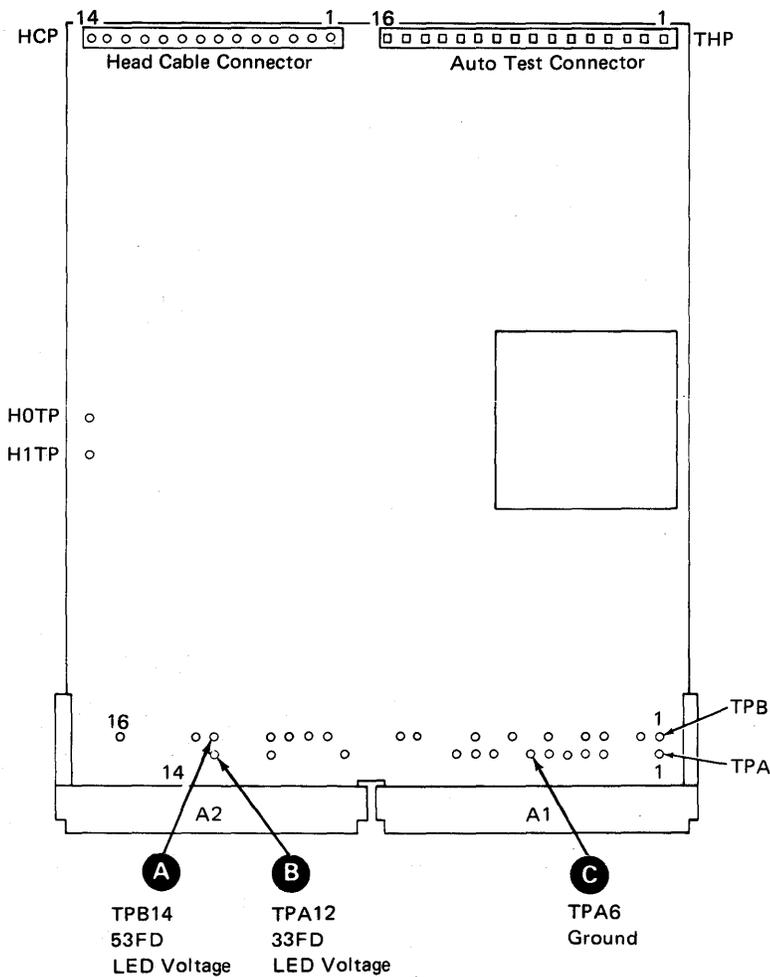
25-800 LIGHT-EMITTING DIODE AND PHOTOTRANSISTOR ALIGNMENT

1. Remove the diskette drive (see paragraph 25-130).
2. Remove the cover assembly (see paragraph 25-420).
3. Loosen the phototransistor mounting screw **A**.
4. Position the phototransistor assembly against the casting stop **B** (away from the leads) and tighten the mounting screw.
5. Loosen the two light-emitting diode mounting screws **D**.
6. Insert two timing pins **C** through the light-emitting diode into the phototransistor assembly and tighten the light-emitting diode mounting screws.
7. Remove the timing pins.
8. Reinstall the cover assembly (see paragraph 25-430).



25-810 LIGHT-EMITTING DIODE OUTPUT SERVICE CHECK

1. Set Power to I (operator panel).
2. Connect the negative probe of a multimeter to the ground test pin **C** on the diskette drive control card.
3. Set the multimeter scale to 5 Vdc and connect the positive probe to the 53FD light-emitting diode voltage test pin **A**.
4. Check for a voltage level of 1 Vdc to 2 Vdc.
5. Move the positive probe to the 33FD light-emitting diode voltage test pin **B**.
6. Check for a voltage level of 1 Vdc to 2 Vdc.



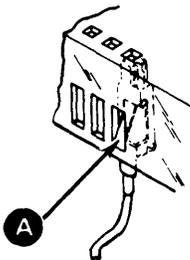
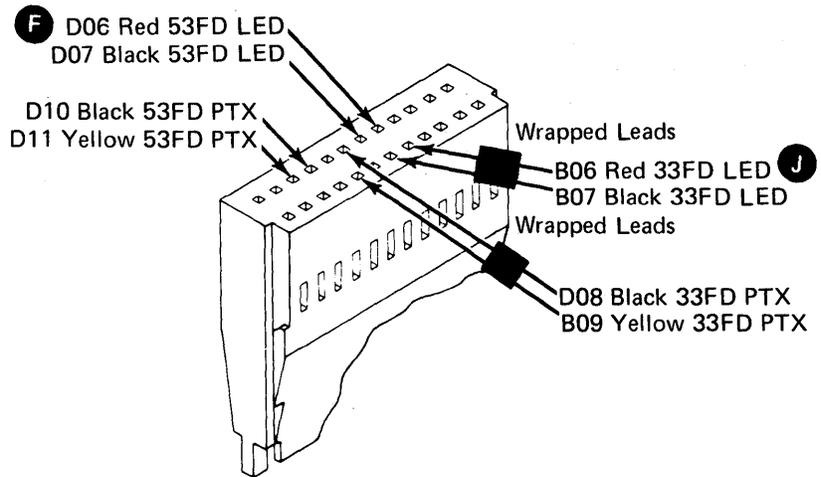
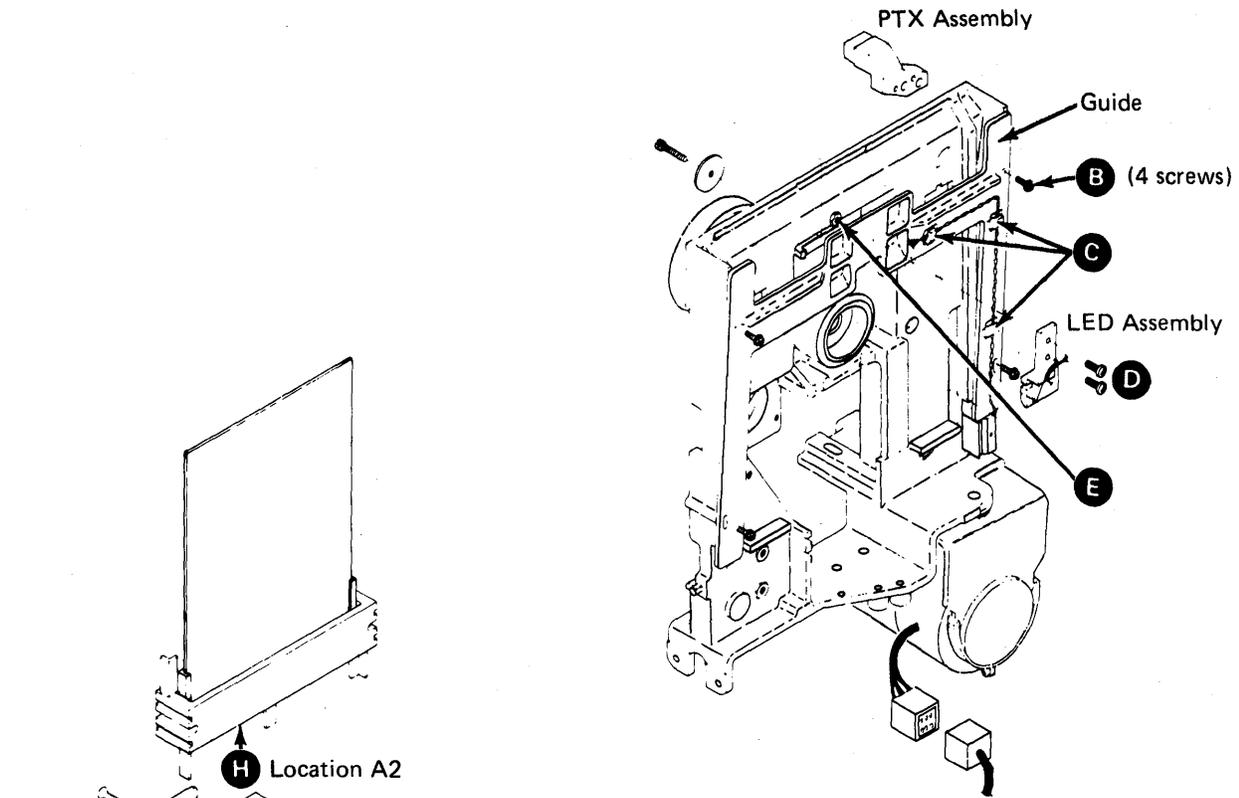
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25-820 LIGHT-EMITTING DIODE REMOVAL

1. Remove the diskette drive (see paragraph 25-130).
2. Remove the cover assembly (see paragraph 25-420).
3. Disconnect the diskette drive control cable from location A2 **H**.
4. Remove two screws **G** and the connector covers.
5. Remove the two 33FD light-emitting diode leads **J** and the two 53FD light-emitting diode leads **F** by pushing down on tabs with a small screwdriver.
6. Remove the light-emitting diode cable from the three retainers **C**. (Remember the cable path for the replacement procedure.)
7. Remove the four mounting screws **B** and the guide.
8. Remove the two light-emitting diode mounting screws **D** and nuts **E** and remove the light-emitting diode assembly.

25-830 LIGHT-EMITTING DIODE REPLACEMENT

1. Install the light-emitting diode assembly, two mounting screws **D** and nuts **E** on the guide (do not tighten). Pass the wires through the guide locating slots **C**.
2. Reinstall the guide and the four mounting screws **B**.
3. Follow the cable path through three retainers **C** and insert the two 33FD light-emitting diode leads (leads have a tube around them) **J** and the two 53FD leads **F** into the diskette drive control cable connector. Ensure that the locking tabs **A** on the terminals lock in the connector slots.
4. Reinstall the cable connector covers and the two screws **G**.
5. Plug the cable into location A2 **H** on the diskette drive control card socket.
6. Go to 25-800, step 6.



**25-840 PHOTOTRANSISTOR AMPLIFIER
SERVICE CHECK**

CAUTION

Always perform this service check with a diskette inserted backward (with the label facing the hub pulley), so that the light-emitting diode does not cause a wrong service check or destroy the phototransistor.

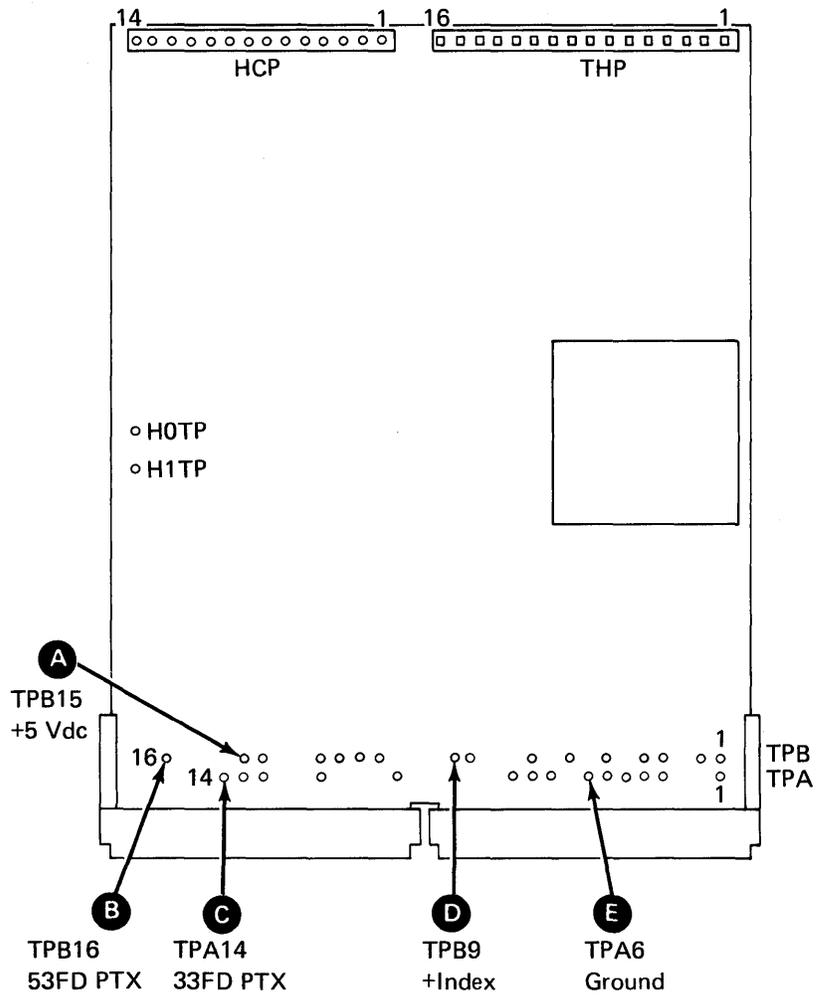
1. Remove the diskette drive from the machine (see paragraph 25-130).
2. Disconnect the drive motor power connector.

DANGER

Voltage is still present at the power connector when the phototransistor amplifier is disconnected and power is on.

3. Set Power to I (operator panel).
4. Insert a diskette backward. (Ensure that the cover assembly is closed.)

5. Connect the positive probe of a multimeter (15 Vdc scale) to the index test pin **D** on the diskette drive control card.
6. Connect the negative probe of the multimeter to the ground test pin **E**.
7. Check the multimeter for a reading of less than 1 Vdc.
8. Install one end of a jumper to the 53FD phototransistor test pin **B**.
9. While observing at the multimeter, touch the other end of the jumper to the +5 Vdc test pin **A** several times. The multimeter should read 2.5 Vdc or more when the test pin is touched. (A wrong reading can occur the first time the test pin is touched.)
10. Repeat steps 8 and 9 with the jumper on the 33FD phototransistor test pin **C**.
11. Set Power to O (operator panel).
12. Remove the jumper.
13. Remove the diskette.
14. Connect the drive motor power cable.

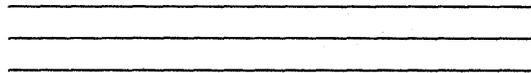


25-850 PHOTOTRANSISTOR REMOVAL

1. Remove the diskette drive (see paragraph 25-130).
2. Remove the cover assembly (see paragraph 25-420).

CAUTION

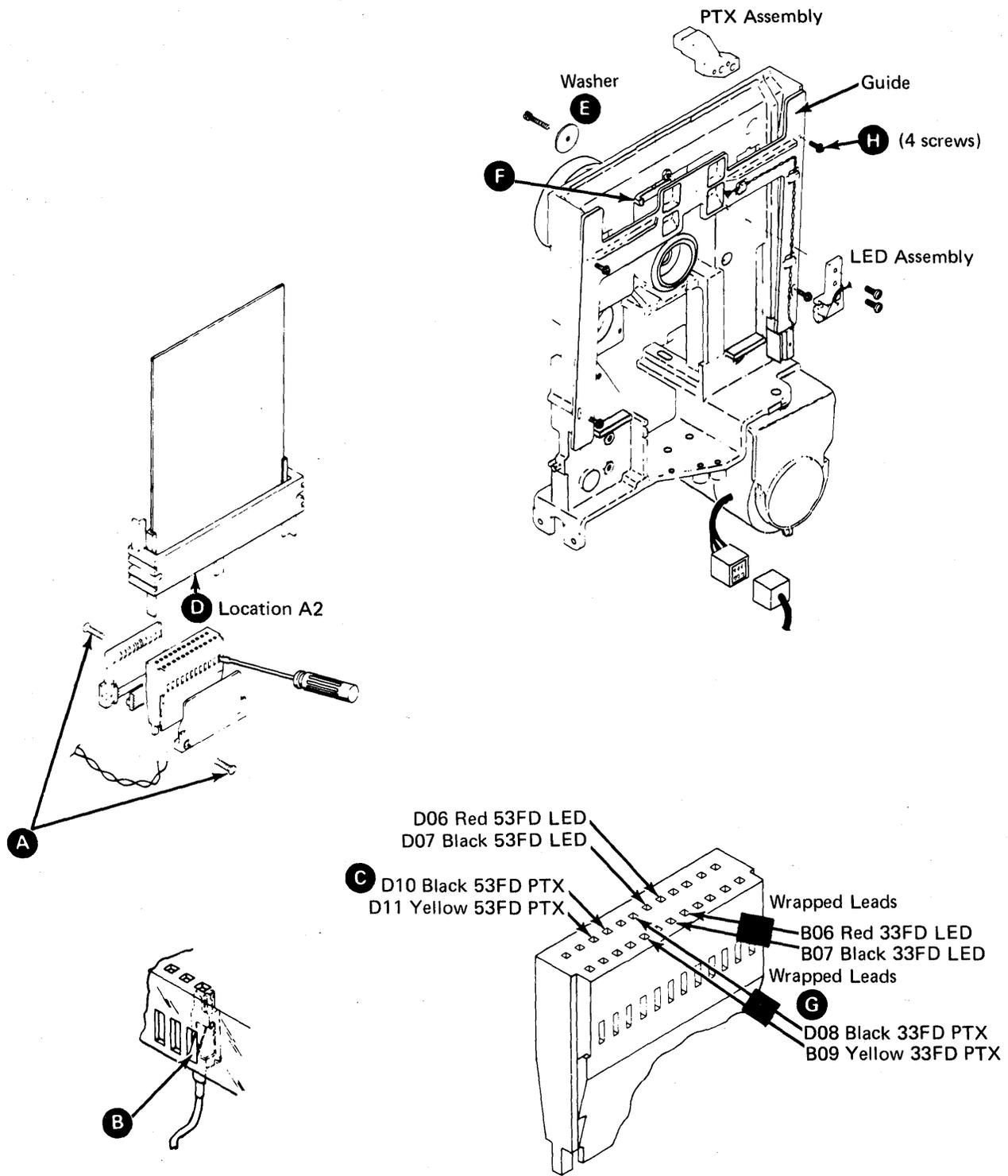
While performing the following steps, be careful not to damage the light-emitting diode leads.



3. Remove the four screws **H** and the guide.
4. Disconnect the diskette drive control cable from location A2 **D**.
5. Remove the two screws **A** and the connector covers.
6. Remove the two 33FD phototransistor leads **G** and the two 53FD phototransistor leads **C** by pushing down on tabs with a small screwdriver.
7. Remove the phototransistor mounting screw **E** and washer.
8. Remove the phototransistor assembly. (Remember the cable path for the replacement procedure.)

25-860 PHOTOTRANSISTOR REPLACEMENT

1. Install the phototransistor assembly against the casting stop **F** (away from leads) and reinstall screw **E** and washer.
2. Follow the cable path and insert the two 33FD phototransistor leads **G** (leads have a tube around them) and the two 53FD leads **C** into the diskette drive control cable connector. Ensure that the locking tabs **B** on the terminals lock in connector slots.
3. Reinstall the connector covers and the two screws **A**.
4. Plug the connector into location A2 **D** of the diskette drive control card socket.
5. Reinstall the guide and the four mounting screws **H**.
6. Go to 25-800, step 5.

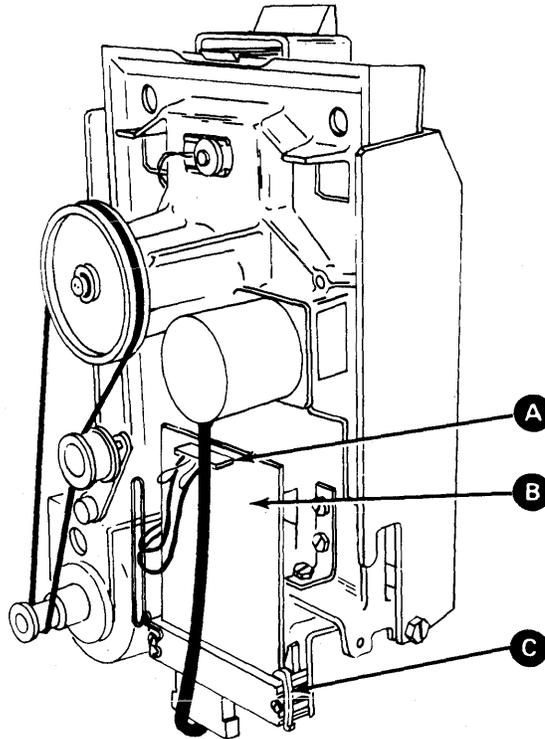


25-930 CONTROL CARD REMOVAL

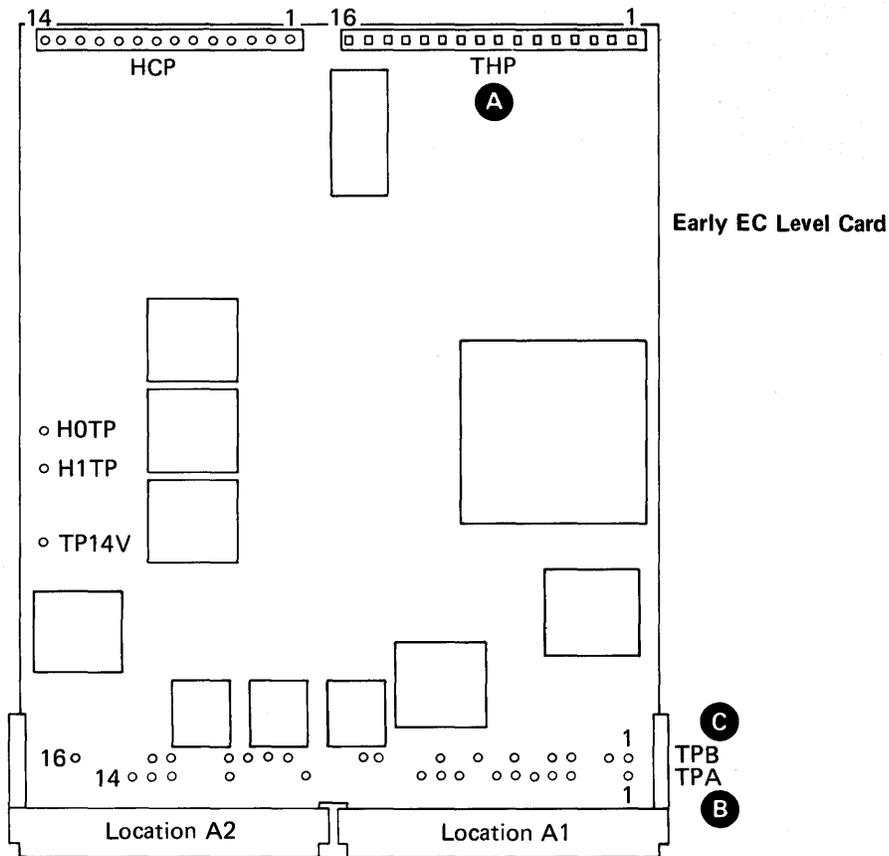
1. Disconnect the head cable **A** from the diskette drive control card **B**.
2. Remove the card retainer **C**.
3. Remove the diskette drive control card.

25-940 CONTROL CARD REPLACEMENT

1. Reinstall the diskette drive control card **B**. Ensure the card is seated in the socket.
2. Reinstall the card retainer **C**.
3. Connect the head cable **A** to the diskette drive control card.

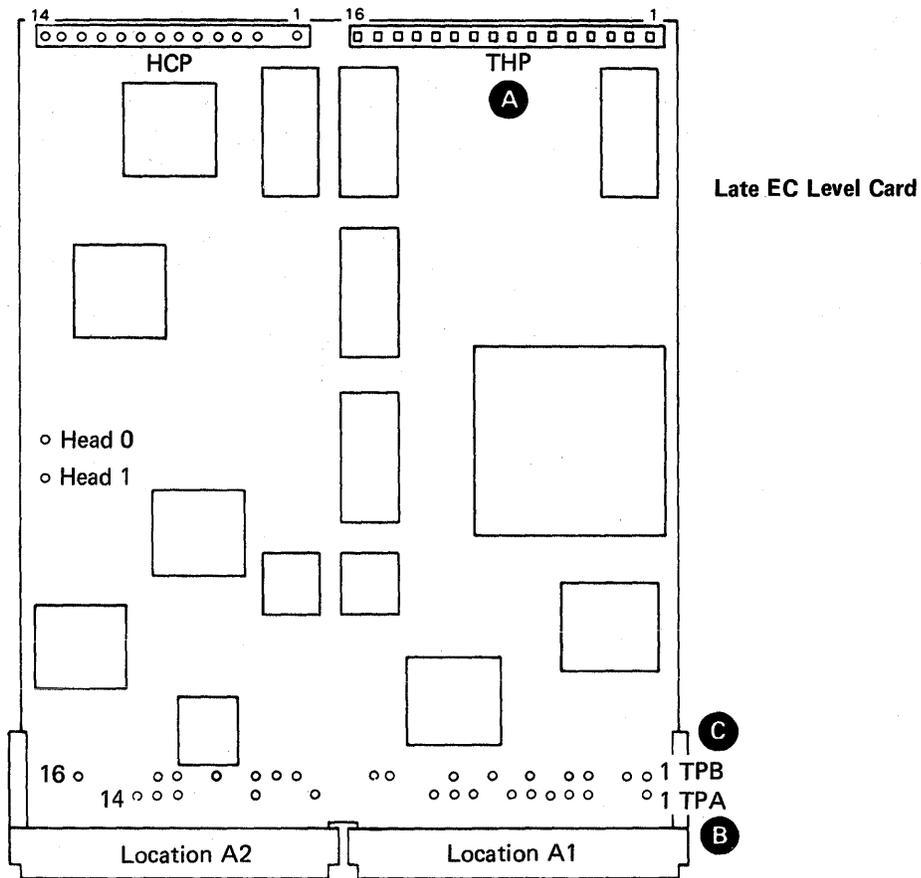


25-950 CONTROL CARD TEST PINS



25

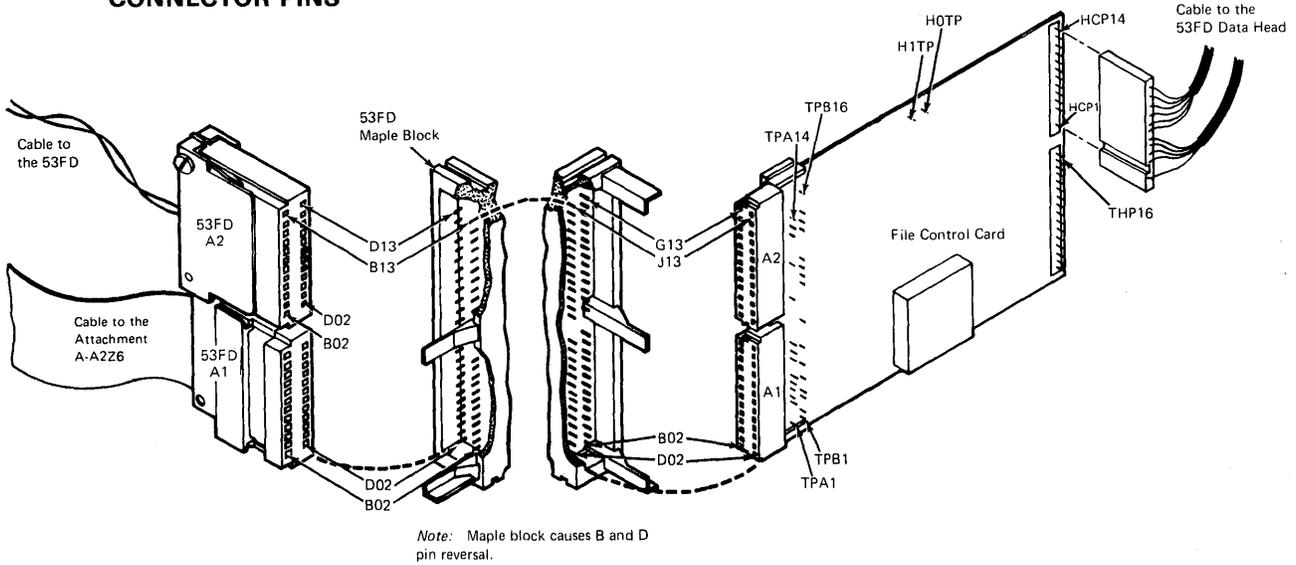
A		B		C	
THP1	+Diskette Loaded	TPA1	+Write Data	TPB1	+Access 0
THP2	+Predrive MC-3	TPA2	+Erase Gate	TPB2	+Access 1
THP3	+Predrive MC-2	TPA3	+Write Gate	TPB3	+Access 2
THP4	+Predrive MC-1	TPA4	+Inner Tracks	TPB4	+Access 3
THP5	+Predrive MC-0	TPA5	+Select Head 1	TPB5	+File Data
THP6	+53FD Index	TPA6	Ground	TPB6	+Diskette Sense
THP7	+33FD Index	TPA7	+Erase Current Sense	TPB7	+Head Engage
THP8	Diff Read A	TPA8	+24 Vdc	TPB8	+Switch Filter
THP9	Diff Read B	TPA9	-5 Vdc	TPB9	+Index
THP10	-High Gain	TPA10	MC-1	TPB10	MC-3
THP11	-Align Access 0	TPA11	MC Common	TPB11	MC-0
THP12	-High Current	TPA12	33FD LED Voltage	TPB12	MC-2
THP13	Preamp TP1	TPA13	Ground	TPB13	-Head Load
THP14	Preamp TP2	TPA14	33FD PTX	TPB14	53FD LED Voltage
THP15	-High Gain A			TPB15	+5 Vdc
THP16	-High Gain B			TPB16	53FD PTX



A		B		C	
THP1	+Diskette Inserted	TPA1	+Write Data	TPB1	+Access 0
THP2	-Hd Ld Osc (see note)	TPA2	+Erase Gate	TPB2	+Access 1
THP3	+14 Vdc	TPA3	+Write Gate	TPB3	+Access 2
THP4	Ground	TPA4	+Inner Tracks	TPB4	+Access 3
THP5	Ground	TPA5	+Select Head 1	TPB5	+File Data
THP6	+53FD Index	TPA6	Ground	TPB6	+Diskette Sense
THP7	+33FD Index	TPA7	+ Current Enabled	TPB7	+Head Engage
THP8	Diff Read A	TPA8	+24 Vdc	TPB8	+Switch Filter
THP9	Diff Read B	TPA9	-5 Vdc	TPB9	+Index
THP10	-High Gain	TPA10	MC-1	TPB10	MC-3
THP11	-Align Access 0	TPA11	+Hd Load Solenoid	TPB11	MC-0
THP12	-High Current	TPA12	33FD LED Voltage	TPB12	MC-2
THP13	Preamp TP1	TPA13	Ground	TPB13	-Head Load
THP14	Preamp TP2	TPA14	33FD PTX	TPB14	53FD LED Voltage
THP15	-High Gain A			TPB15	+5 Vdc
THP16	-High Gain B			TPB16	53FD PTX

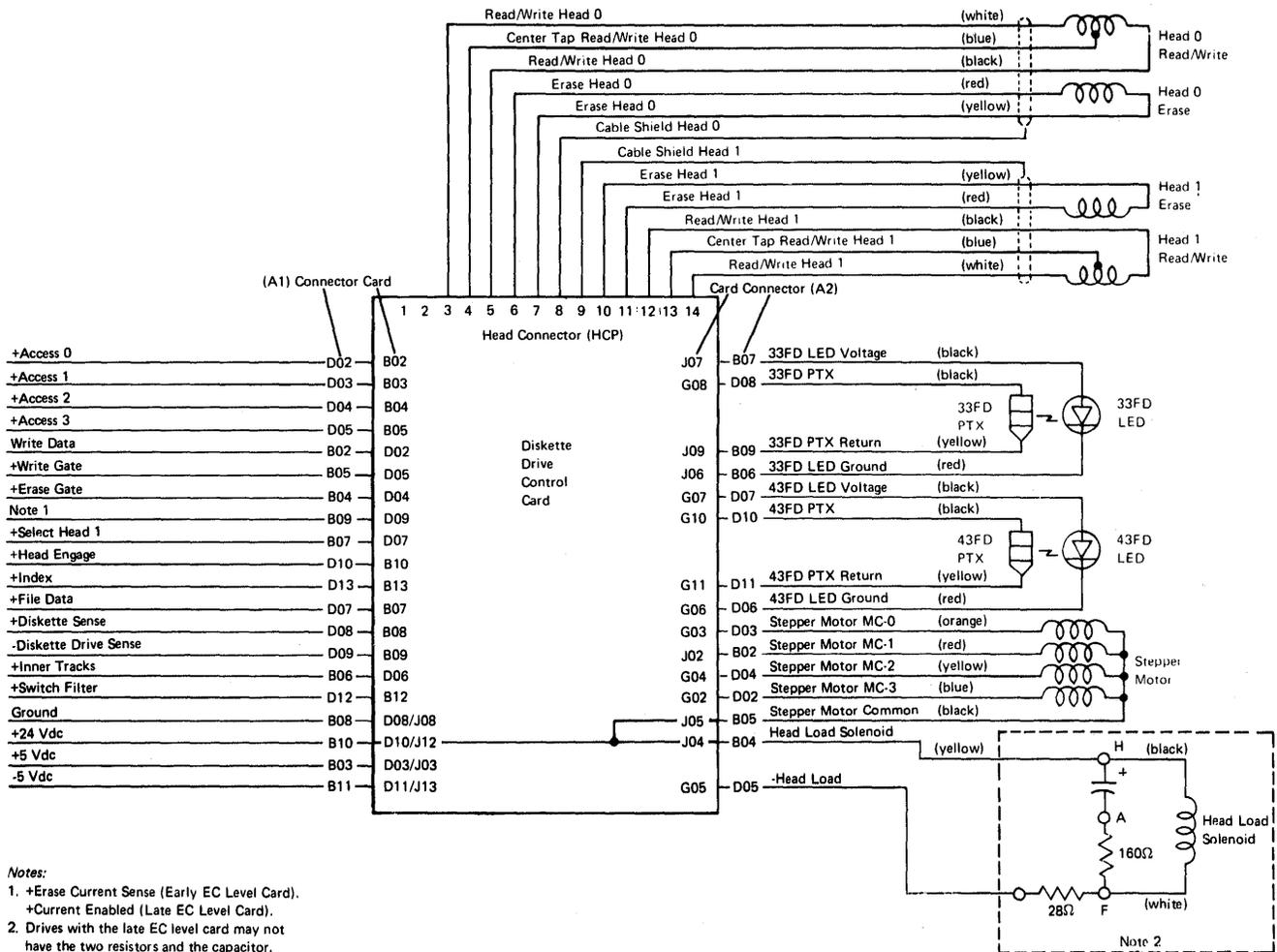
Note: A jumper must be installed from THP2 (- Hd Ld Osc) to THP4 (Ground).

25-960 CONTROL CARD SOCKET AND CONNECTOR PINS

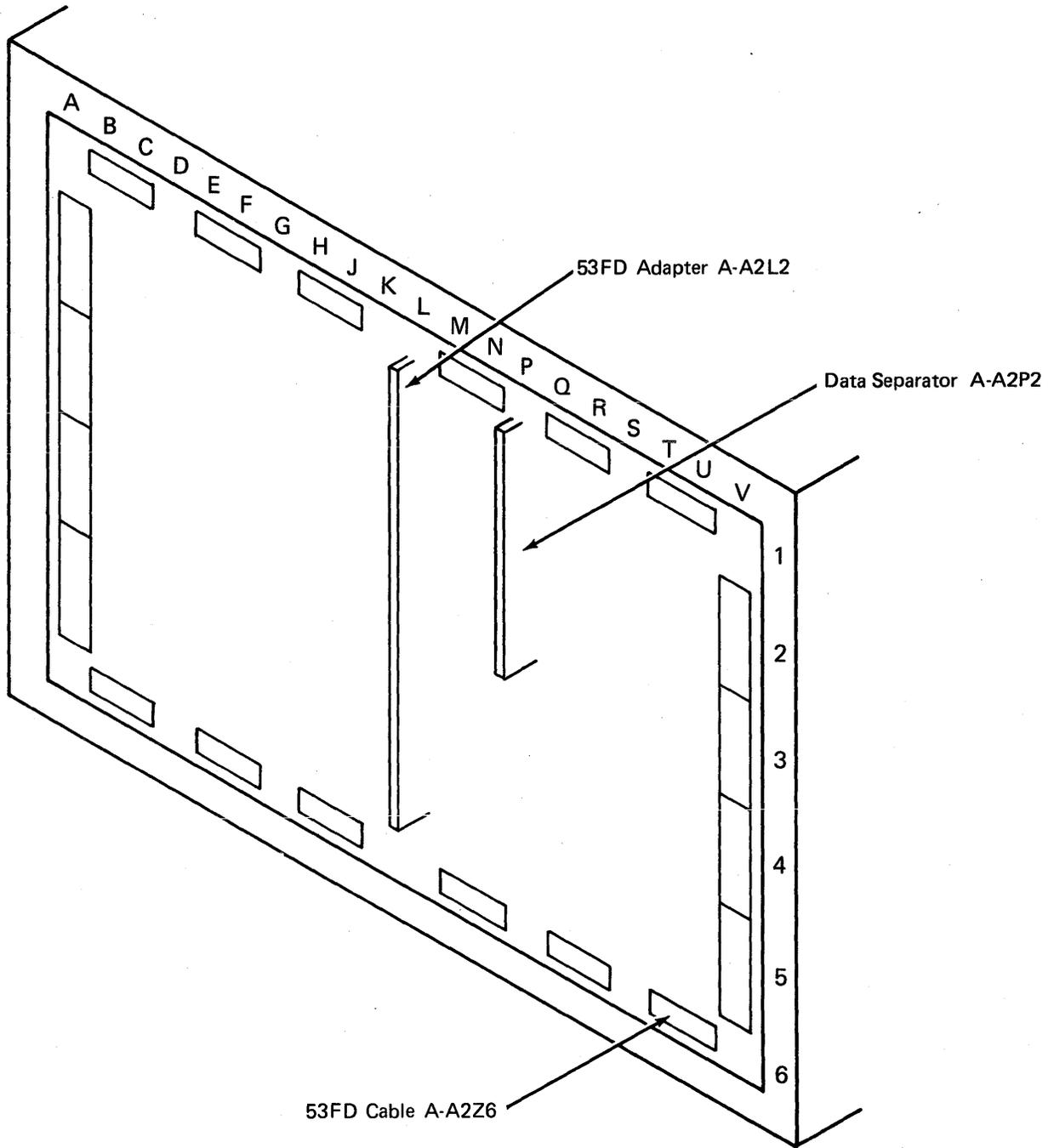


25-980 CONTROL CARD LOGIC PINS

25



25-990 CABLE AND CARD LOCATIONS



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25-991 DISKETTE QUALITY AND HEAD WEAR SERVICE CHECK

CAUTION

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

A new head will write and read correctly on most diskettes. As the head wears, the quality of the diskette becomes more important. The tests described in this paragraph will aid in determining the quality of the diskette and the condition of the head.

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.

25-992 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.
- A diskette written by a worn 33FD head causes random read errors on cylinders hexadecimal 2B through 4C when read by a 53FD.
- A worn 53FD head causes read errors on the inner tracks area of the diskette (cylinders hexadecimal 40 through 4C) when using MFM mode. If there are failures in this area, suspect a worn head. TUs E1, 9A, and 9B may be run to indicate the quality of the head in your system.

25-993 Test Descriptions

Diskette analysis—This routine reads the 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.

The following three tests are diskette TUs and are selected after taking the TU SELECT option on the main menu. (For easier use, set the Address/Data switches to F800 (CE panel) and perform an IPL before running the TUs.)

CAUTION

The following three TUs write on the diskette.

TU E1—This TU runs only on a diskette 2D. This TU writes on each sector of the diskette and then reads each sector of the diskette. The 'switch filter' line is off (not normal) when cylinders hexadecimal 3D through 4C are read. A printout identifies the location (cylinder¹, head, sector, byte, and bit) of any failures. Because of the pattern written by this TU and because the 'switch filter' line is off while reading the inner cylinders, the printout may indicate failures not found by the diskette analysis routine or failures not indicated by ERAP. Four or more data bytes that do not compare per track on cylinders hexadecimal 48 through 4C indicates that TU 9A should be run.

Note: The location of a failure indicated by this TU may be used when scoping diskette damage using the read loop exerciser.

¹The cylinder number is the number of the logical cylinder if a level 1 attachment is installed. If a level 2 attachment is installed, the identified cylinder is the physical cylinder.

TU 9A—This TU runs only on a diskette 2D diskette formatted to 256-byte sectors. This TU writes on each sector of the inner cylinders of the diskette with the 'inner tracks' line off (not normal). The same cylinders are then read with the 'inner tracks' and 'switch filter' lines off (not normal). A printout identifies the location (cylinder, head, and sector) of any failures. Because of the pattern written by this TU and because the 'inner tracks' and 'switch filter' lines were not used normally, the printout may indicate many errors on cylinders hexadecimal 49 through 4C. If the following two conditions are indicated, the head is probably worn:

- Fourteen or more sectors on cylinders hexadecimal 4B and 4C have failures.
- There are four or more failures per track on any cylinder hexadecimal 40 through 48.

For more information, check the head resolution (see paragraph 25-997 or paragraph 25-998).

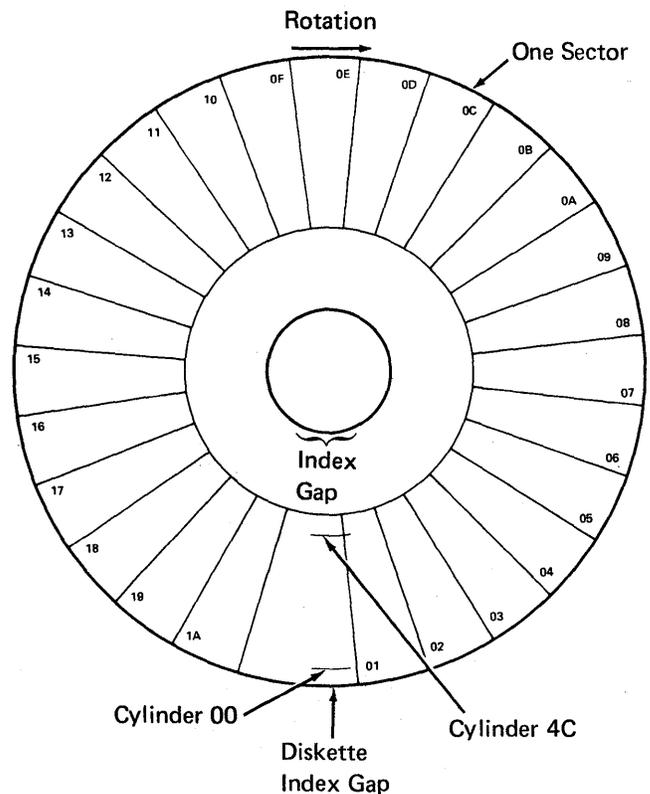
Note: Because of the difference in diskette quality, some diskettes may fail on this TU and some may not. It is typical for the failures to occur as early as 10 tracks earlier on a diskette with acceptable quality than on diskettes with the best quality.

TU 9B—This TU runs only on a diskette 2D. This TU writes on each sector of cylinder 4C with the 'inner tracks' line off (not normal) and then writes a different pattern on the same cylinder with the 'inner tracks' line on (normal). This cylinder is then read with the 'inner tracks' and 'switch filter' lines on (normal) to test the ability of the head to write over old data. Four or more failures indicates that the head is probably worn. This test should be run on more than one diskette. For more information, check the head resolution (see paragraph 25-997 or paragraph 25-998).

25-994 Diskette Figure

To correct 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 also the head 1 side of the diskette.

**25-995 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 if TU-E1 does not fail.
- 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 TU-E1 printout indicates that data did not compare on cylinder 24, head 1, sector 11, byte 93.

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.

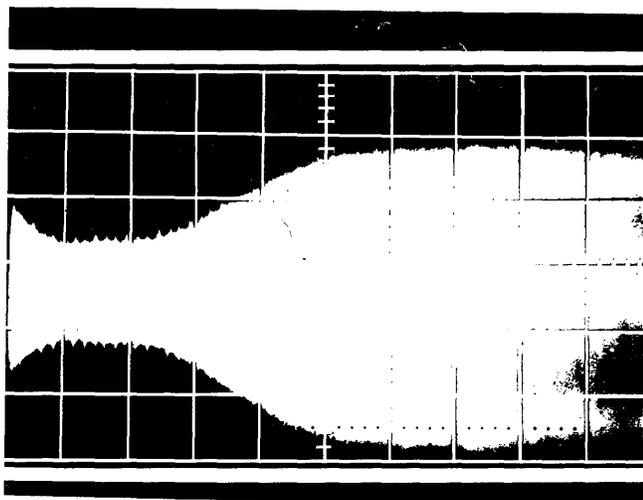
Channel A sweep mode	Normal
Channel A level	+
Channel A coupling	DC
Channel A slope	+
Channel A source	External
Trigger Mode	Normal Add
Channel 1 volts/division ¹	5 mV/cm
Channel 2 volts/division ¹	5 mV/cm
Channel 1 input	AC
Channel 2 input	AC
Invert	Pull out
Times per division	0.1 ms/cm
Channel 1 probe ²	THP-13 (preamp TP1)
Channel 2 probe ²	THP-14 (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 25-950 for control card test pins.
³xx = Q2 on level 1 boards
 xx = L2 on level 2 board
 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 MFM 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, for this example, set Address/Data switches (CE panel) to 6093 to display byte 93.

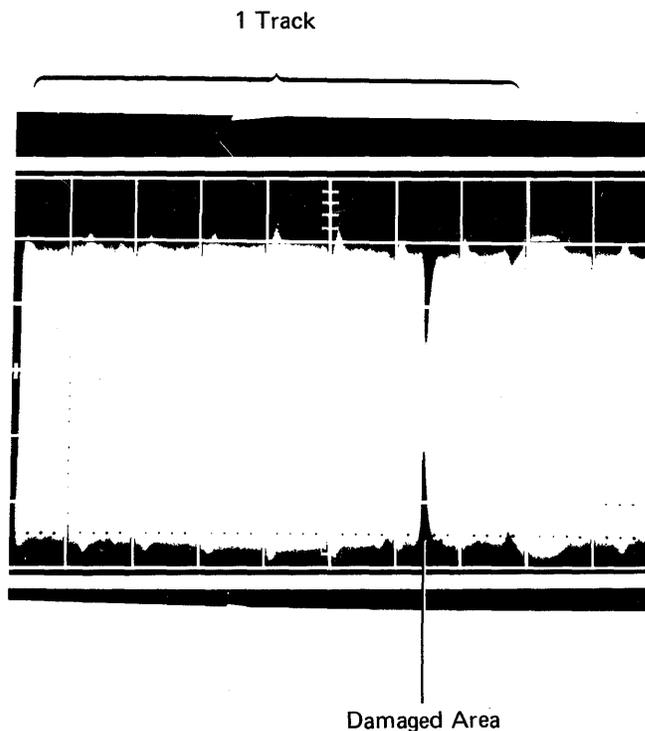
The loss of amplitude can be seen on the oscilloscope.



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 test pin TPB-9 (+index).
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.



**25-996 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 if TU-E1 does not fail.
- 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 preamp. 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 TU-E1 printout indicates that data did not compare on cylinder 24, head 1, sector 11, byte 93.

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.

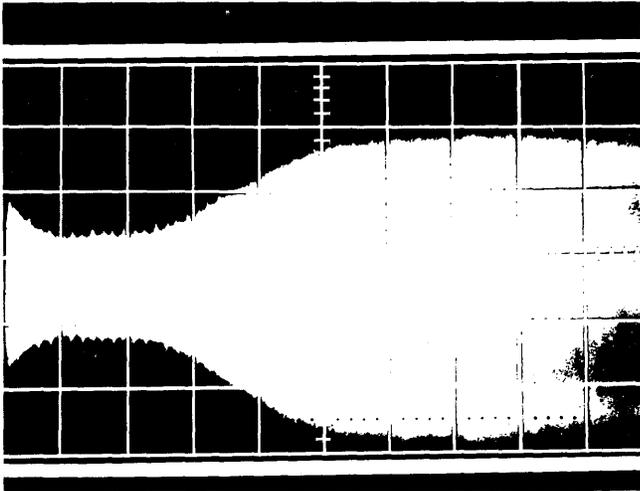
Channel A sweep mode	Normal
Channel A level	+
Channel A coupling	DC
Channel A slope	+
Channel A source	External
Trigger Mode	Normal Add
Channel 1 volts/division ¹	5 mV/cm
Channel 2 volts/division ¹	5 mV/cm
Channel 1 input	AC
Channel 2 input	AC
Invert	Pull out
Times per division	0.1 ms/cm
Channel 1 probe ²	THP-13 (preamp TP1)
Channel 2 probe ²	THP-14 (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 25-950 for control card test pins.
³xx = Q2 on level 1 boards
xx = L2 on level 2 board
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 MFM mode, cylinder 24, head 1, sector length = 256, 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, for this example, set the Address/Data switches (CE panel) to 0093 to display byte 93.

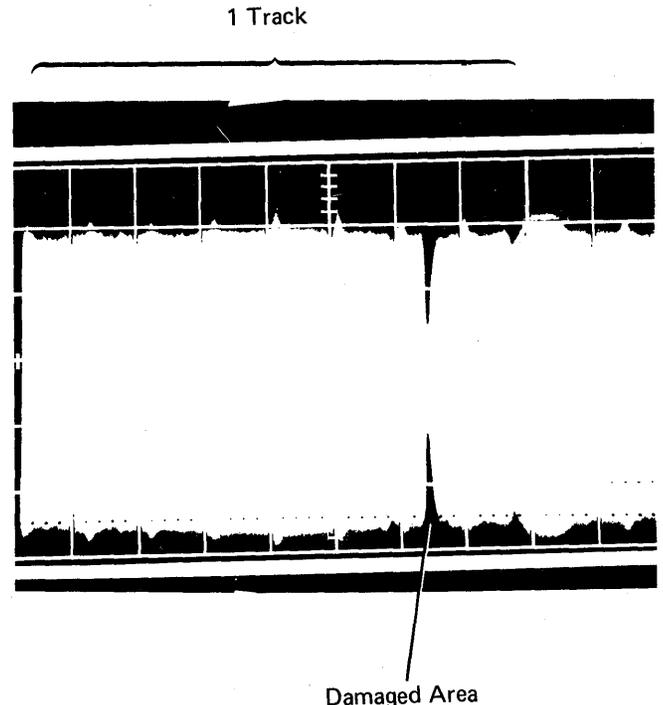
The loss of amplitude can be seen on the oscilloscope.



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 test pin TPB-9 (+index).
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.



25-997 Head Wear Service Check for Level 1 Attachments

Head wear is determined by the head resolution and the errors indicated on the inner tracks area of a diskette (cylinders hexadecimal 40 through 4C).

Head resolution is the ratio of the signal amplitude of hexadecimal FF in centimeters to the signal amplitude of hexadecimal AA in centimeters multiplied by 100.

If the head resolution of both heads is more than 50, the heads are good. If the head resolution of either head is less than 40, that head is bad and the assembly should be exchanged. When the resolution is between 40 and 50, use the ERAP data and the TU printouts to determine if the head is bad.

The head is bad if the ERAP data and the TU printouts indicate data errors on cylinders hexadecimal 40 through 4C on a diskette 2D and the head resolution is less than 50.

Example: Perform the following to scope head resolution:

1. Initialize a diskette 2D.
 - a. Perform an IPL under SSP.
 - b. Sign on the system (if the system has the password security function specified in the machine configuration you will need aid from the customer to sign on).
 - c. Initialize a diskette 2D with the following command:

INIT b ,, FORMAT

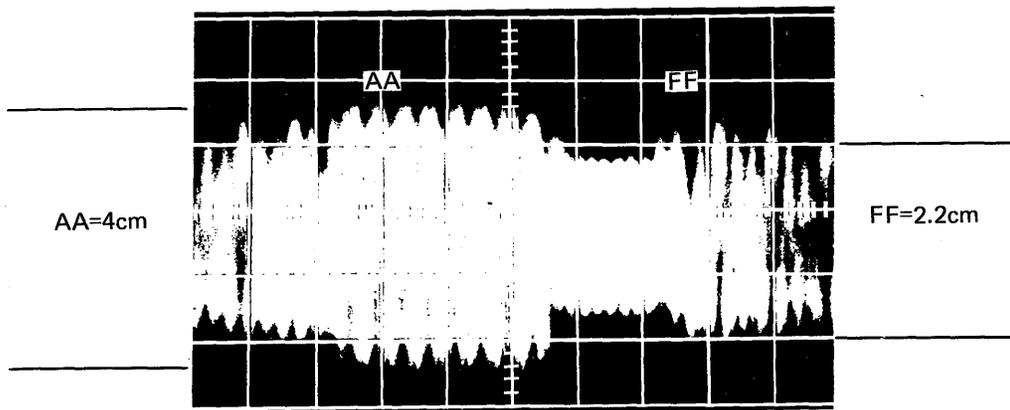
2. Set up an oscilloscope as follows:

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

Channel A sweep mode	Normal
Channel A level	+
Channel A coupling	DC
Channel A slope	+
Channel A source	External
Trigger	Normal
Mode	Add
Channel 1 volts/division	5 mV/cm
Channel 2 volts/division	5 mV/cm
Channel 1 input	AC
Channel 2 input	AC
Invert	Pull out
Times per division	20 μ s/cm
Channel 1 probe ¹	THP-13 (preamp TP1)
Channel 2 probe ¹	THP-14 (preamp TP2)
Connect trigger to	TPB-9 (+index)

¹ See paragraph 25-950 for control card test pins.

3. Move the data heads to track hexadecimal 4C and determine head resolution as follows:
 - a. Set the Address/Data switches to F800 (CE panel) and perform an IPL.
 - b. Select the EXERCISERS option from the main menu.
 - c. Select the DISKETTE DRIVE option from the first exerciser menu.
 - d. Select the 33FD/53FD DISK EXERCISER MODULE option from the second exerciser menu.
 - e. Select a recalibrate and a seek to track 4C from the diskette exerciser test 1 command menu (enter an E after selecting cylinder 4C).
 - f. Use the default option to execute the commands.
 - g. Press the Attn key (three times) to return to the diskette exerciser test 1 command menu.
 - h. Select the READ LOOP command (select MFM mode, cylinder 4C, and the head and sector that you want to scope from the displays, enter an E after selecting the sector number).
 - i. Select the LOOP ON CMND TABLE option and measure the amplitude of the hexadecimal FF and AA.



$$\text{Head Resolution} = \frac{2.2}{4} \times 100 = 55$$

25-998 Head Wear Service Check for Level 2 Attachments

Head wear is determined by the head resolution and the errors indicated on the inner tracks area of a diskette (cylinders hexadecimal 40 through 4C).

Head resolution is the ratio of the signal amplitude of hexadecimal FF in centimeters to the signal amplitude of hexadecimal AA in centimeters multiplied by 100.

If the head resolution of both heads is more than 50, the heads are good. If the head resolution of either head is less than 40, that head is bad and the assembly should be exchanged. When the resolution is between 40 and 50, use the ERAP data and the TU printouts to determine if the head is bad.

The head is bad if the ERAP data and the TU printouts indicate data errors on cylinders hexadecimal 40 through 4C on a diskette 2D and the head resolution is less than 50.

Example: Perform the following to scope head resolution:

1. Initialize a diskette 2D:
 - a. Perform an IPL under SSP.
 - b. Sign on the system (if the system has the password security function specified in the machine configuration, you will need aid from the customer to sign on).
 - c. Initialize a diskette 2D with the following command:

INITb,,FORMAT

2. Set up an oscilloscope as follows:

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

Channel A sweep mode	Normal
Channel A level	+
Channel A coupling	DC
Channel A slope	+
Channel A source	External
Trigger	Normal
Mode	Add
Channel 1 volts/division	5 mV/cm
Channel 2 volts/division	5 mV/cm
Channel 1 input	AC
Channel 2 input	AC
Invert	Pull out
Times per division	20 μ s/cm
Channel 1 probe ¹	THP-13 (preamp TP1)
Channel 2 probe ¹	THP-14 (preamp TP2)
Connect trigger to ²	A-A1xxU02 (+MS address compare)

¹See paragraph 25-950 for control card test pins.

²xx = Q2 on level 1 boards

xx = L2 on level 2 board

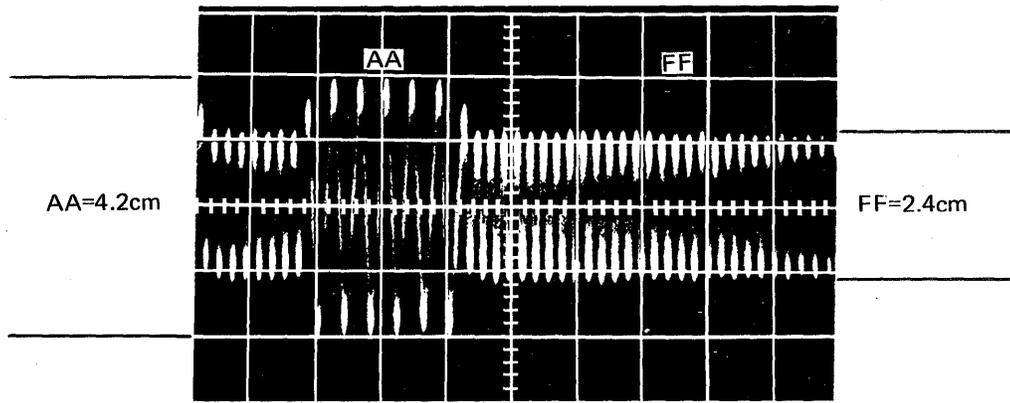
See paragraph 15-110.

3. Move the data heads to track hexadecimal 4C and determine head resolution as follows:
 - a. Set the Address/Data switches to F800 (CE panel) and perform an IPL.
 - b. Select the EXERCISERS option from the main menu.
 - c. Select the DISKETTE DRIVE option from the first exerciser menu.
 - d. Select the DISKETTE EXERCISER LOAD MODULE option from the second exerciser menu.
 - e. Select RECALIBRATE, SEEK to track 4C, and WRITE 1 SECTOR ON CURRENT CYL (select MFM mode, the head you want to scope, the sector length, the sector number, and M/S data field 1 from the displays). Enter an E after selecting M/S data field 1.
 - f. Select Y to see the COMMAND DATA FIELD option.
 - g. Select the SCROLL FIELDS option.
 - h. Change the first 8 bytes of M/S data field 1 from:

FF FF FF FF FF FF FF FF
to:

AA AA AA FF FF AA AA AA
and the @@@@S on line 11 to:
@@@@M

- i. Press the Attn key to return to the menu.
- j. Select an E to exit.
- k. Use the default option to execute the commands.
- l. Press the Attn key (three times) to return to the diskette exerciser test 1 command menu.
- m. Select the READ LOOP command (select MFM mode, cylinder 4C, the head you want to scope, the sector length, the sector number, and M/S data field 1 from the displays). Enter an E after selecting the cylinder number.
- n. Select the LOOP ON CMND TABLE option, set the Address/Data switches to 0005 (CE panel), and measure the amplitude of the hexadecimal FF and AA.



$$\text{Head Resolution} = \frac{2.4}{4.2} \times 100 = 57$$

