Error Description	Diagnostic Action
Control Panel	9. Remove forms from printer. Press the online switch. Does the alarm sound? YES: Go to step 10. NO: Measure for approximately + 5 Vdc from pin CN6-18 on driver circuit card to ground pin on driver circuit card. Is there + 5 Vdc? YES: Replace print mechanism assembly. See Section 5, "Removal/Replacement and Adjustments." NO: Measure for a voltage pulsing from 0 to + 12 Vdc at pin 10 of control panel. Use pin 8 for ground. See Section 4, "Locations." Power off and back on before taking voltage reading. It will only pulse eight times. Does voltage pulse 0 to + 12 Vdc? YES: Replace control panel. See Section 5, "Removal/ Replacement and Adjustments." NO: Replace control cards. See Section 5, "Removal/ Replacement and Adjustments."

Error Description	Diagnostic Action
Control Panel	10. Does the No Paper light go on? YES: Control panel checks good. Return to page 3-1400-1, "Printer Entry." NO: Measure for approximately +10 to +12 Vdc at pin 3 of control panel. Is there +12 Vdc? YES: Replace both control cards. See Section 5, "Removal/Replacement and Adjustments." NO: Replace control panel. See Section 5, "Removal/Replacement and Adjustments."

Offline Diagnostic Test

Description

An offline diagnostic test can be run to verify correct operation of the printer mechanism (motors, ribbon drive, print head, etc.) and print quality. A sample of the ripple patterns is shown below.

Operating Procedure

Press and hold the line feed switch while you position the printer Power switch to ON.

To stop the test before it is completed:

Set the printer Power switch to OFF.

IBM 80 CPS Matrix Printer

```
...STUVWXYZ[\_
JPQRSTUVWXYZ[\]^_`abcu_
'QRSTUVWXYZ[\]^_`abcdefghi j..
)RSTUVWXYZ[\]^_`abcdefghi jklmno..
RSTUVWXYZ[\]^_`abcdefghi jklmnopqrstuv..
3TUVWXYZ[\]^_`abcdefghi jklmnopqrstuvwxyz {|.
'UVWXYZ[\]^_`abcdefghi jklmnopqrstuvwxyz {|}~
JVWXYZ[\]^_`abcdefghi jklmnopqrstuvwxyz {|}~ ■
/WY''-          '-hi jklmnopqrstuvwxyz {|}~ ■ ı
                  '-noqrstuvwxyz {|}~ ■ ■
                     '-uvwxyz {|}~ ■ ■
                       '-{|}~ ■ ■
                          ■ ■ |'
```

IBM 80 CPS Graphics Printer

```
...STUVWXYZ[\.
RSTUVWXYZ[\]^_`abcdety..
STUVWXYZ[\]^_`abcdefghi jkl..
TUVWXYZ[\]^_`abcdefghi jklmnopqr..
UVWXYZ[\]^_`abcdefghi jklmnopqrstuvwxy_
VWXYZ[\]^_`abcdefghi jklmnopqrstuvwxyz {|}~ái
WXYZ[\]^_`abcdefghi jklmnopqrstuvwxyz {|}~áió
XYZ[\]^`abcdefghi jklmnopqrstuvwxyz {|}~áióú
v-               '-lmnopqrstuvwxyz {|}~áióúñ
                    '-rstuvwxyz {|}~áióúññ:
                      '-wxyz {|}~áióúññ国:
                        '-|}~áióúññ国Q,
                          '-国Q¿'
```

Notes:

Synchronous Data Link Control (SDLC) Communications Adapter

You have entered this PIC because you have an 15XX error code or have identified a Synchronous Data Link Control (SDLC) communications failure.

1. Set the Power switch on the system unit (and expansion unit if attached) to Off.
2. Insert your Advanced Diagnostics diskette in drive A.
3. Set the Power switch on the expansion (if attached) and the system unit to On.

The screen shown below should be displayed.

```
The IBM Personal Computer
ADVANCED DIAGNOSTICS
Version 2.XX (C)Copyright IBM Corp 1981, 1982

SELECT AN OPTION

0 - RUN DIAGNOSTIC ROUTINES
1 - FORMAT DISKETTE
2 - COPY DISKETTE
3 - PREPARE SYSTEM FOR RELOCATION
9 - EXIT TO SYSTEM DISKETTE

ENTER THE ACTION DESIRED
? _
```

CONTINUE

Follow the steps below to run the diagnostic routines.

1. Press 0 (RUN DIAGNOSTIC ROUTINES) then press Enter.

(Skip Step 2 if you only have one display adapter installed.)

2. Press Y or N (IS A MONITOR ATTACHED TO EVERY DISPLAY ADAPTER (Y/N) ?) then press Enter.
3. Press Y or N (IS THE LIST CORRECT (Y/N) ?) then press Enter. (If the list is not correct, follow the instructions on your display and correct the list before answering yes.)
4. Press 0 (RUN TESTS ONE TIME) then press Enter.
5. Select 15 (SDLC COMMUNICATIONS ADAPTER) then press Enter.
6. Press Y or N (IS AN IBM COMMUNICATIONS CABLE ATTACHED?) then press Enter.

The screen should now say to install the wrap plug on either the SDLC adapter, or on the IBM Communications Cable.

```
TESTING - SDLC COMMUNICATIONS ADAPTER

IS AN IBM COMMUNICATIONS ADAPTER CABLE
ATTACHED TO THE SDLC ADAPTER? (Y/N) y

DISCONNECT THE CABLE AT THE MODEM AND
INSTALL THE WRAP PLUG ON THE END OF
THE CABLE.

PRESS ENTER WHEN READY
```
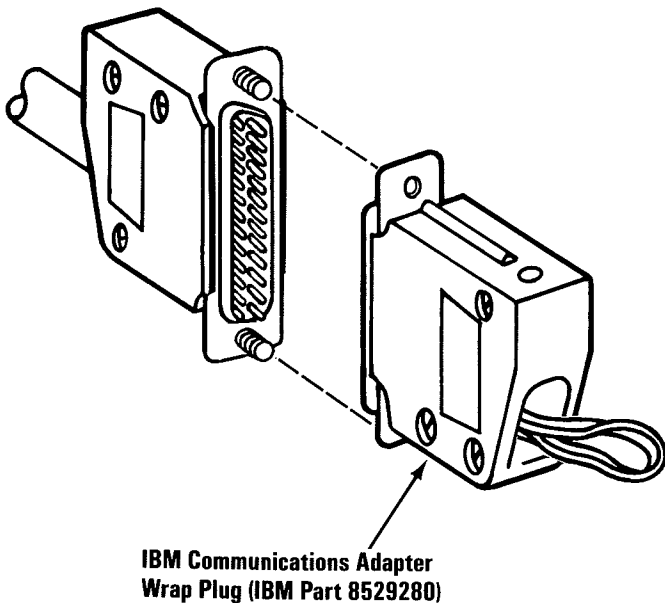
IS AN IBM COMMUNICATIONS CABLE ATTACHED?

NO Go to page 3-1500-4.

YES

1. Refer to the figure below and install the wrap plug on the modem end of the IBM Communications Adapter Cable.
2. Press Enter to begin the test. The test may take up to 15 seconds.

IBM Communications Adapter Wrap Plug (IBM Part 8529280)

DOES THE MESSAGE ON YOUR DISPLAY INSTRUCT YOU TO INSTALL THE WRAP PLUG ON THE SDLC ADAPTER?

NO Go to page 3-1500-5.

YES

1. Remove the communications cable (if attached) from the SDLC adapter.
2. Refer to the figure below and install the wrap plug on the SDLC adapter.
3. Press Enter to begin the test. The test may take up to 15 seconds.
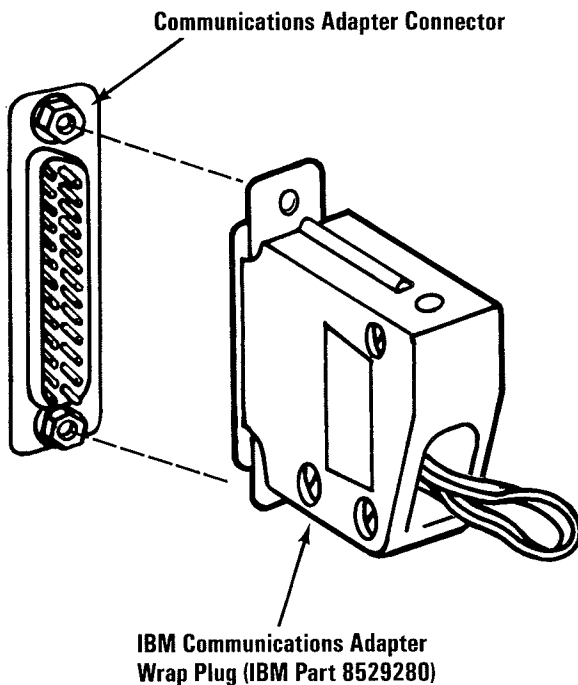
Communications Adapter Connector

**IBM Communications Adapter
Wrap Plug (IBM Part 8529280)**

DID THE TEST RUN WITHOUT AN ERROR?

NO If the error message says to replace the cable, do so. If it says to replace the SDLC adapter, do so. See Section 5, "Removal/Replacement and Adjustments."

YES |

You have gone through the PICs without solving your problem. The following steps should help you find additional audio or visual symptoms.

1. Check the entire system for loose or damaged connectors.
2. Return to page 3-2 and review "Start."
3. Select "UTILITIES" in the diagnostic menu, start an error log, and select "RUN TESTS MULTIPLE TIMES." This will allow you to operate the machine thoroughly and identify the failing symptom. When you have identified the symptom, go to page 3-2, "Start," or the appropriate PIC for the symptom you received.

If you have followed these procedures and still have an unsolved problem, you should seek technical assistance.

Notes:

Fixed Disk Drive

You have entered this PIC because you have a 17XX error code or have identified a fixed disk drive problem.

WARNING: Normal shipping and handling can result in permanent loss of all data and formatting on the fixed disk drive(s). It is recommended that all files be backed up onto diskettes.

1. Set the Power switch on the system unit and expansion unit to Off.
2. Load your Advanced Diagnostics diskette in drive A.
3. Set the Power switch on the expansion unit and system unit to On.
4. After the diskette loads, press 0 (RUN DIAGNOSTIC ROUTINES).
5. Verify the installed devices. If any devices are missing from the installed devices list, follow the instructions on the display to add the missing options.
6. When the SYSTEM CHECKOUT Menu is displayed, select 0 (RUN TESTS ONE TIME).

The following screen is displayed:

```
1 - S SYSTEM BOARD
18 - S EXPANSION OPTION
2 - S 128KB MEMORY
3 - S KEYBOARD
4 - S MONOCHROME & PRINTER ADAPTER
6 - S 1 DISKETTE DRIVE(S) AND ADAPTER
9 - S PRINTER ADAPTER
11 - S ASYNC COMMUNICATIONS ADAPTER
17 - E 2 FIXED DISK DRIVE(S) & ADAPTER
14 - S MATRIX PRINTER

ENTER THE NUMBER(S) OF OPTIONS TO TEST
OR PRESS ENTER TO SELECT ALL OPTIONS _ \!/ _
                                      / ! \
```

CONTINUE ➤

1. Select 17 (FIXED DISK DRIVE AND ADAPTER) and then press Enter.

The fixed disk drive adapter is then tested, if the test completes without an error the following is displayed.

```
TESTING – X FIXED DISK DRIVE(S) & ADAPTER

0 – RUN FIXED DISK TEST
1 – RUN MEASUREMENTS TEST
2 – FORMAT FIXED DISK
9 – EXIT FIXED DISK TESTS

ENTER THE ACTION DESIRED ? –
```

WAS THE ABOVE MESSAGE DISPLAYED WITHOUT AN ERROR?

NO Replace the fixed disk drive adapter. See Section 5, "Removal/Replacements and Adjustments."

YES

If your system only has one fixed disk drive, go to page 3-1700-4.

1. Set the Power switch on the system unit and expansion unit to Off.
2. Disconnect the data connector J3 and control connector J1 from fixed disk drive D (see Section 4, "Locations").
3. Load your Advanced Diagnostics diskette in drive A.
4. Set the Power switch on the expansion unit and system unit to On.
5. After the diskette loads, press 0 (RUN DIAGNOSTIC ROUTINES).
6. Verify the installed devices. If any devices are missing from the installed devices list, follow the instructions on the display to add the missing options.
7. Press 0 (RUN TESTS ONE TIME) then press Enter.
8. Select 17 (FIXED DISK DRIVE AND ADAPTER) and then press Enter.

The following screen is displayed:

```
TESTING – X FIXED DISK DRIVE(S) & ADAPTER

0 – RUN FIXED DISK TEST
1 – RUN MEASUREMENTS TEST
2 – FORMAT FIXED DISK
9 – EXIT FIXED DISK TESTS

ENTER THE ACTION DESIRED ? _
```

Fixed Disk

CONTINUE

1. Press 0 (RUN FIXED DISK TEST) and then press Enter.
2. When "ENTER DRIVE ID (C/D)" is displayed, press C (for drive C) then press Enter.
3. When "DO YOU WANT TO PERFORM FIXED DISK WRITE TESTS ON DRIVE C: (Y/N)" is displayed, press Y (yes) or N (no) and then Enter.

The following message should be displayed:

```
PERFORMING SEEK TEST
PERFORMING WRITE TEST
PERFORMING TRACK ZERO TEST
PERFORMING SURFACE SCAN
PLEASE STAND BY

0 - RUN FIXED DISK TEST
1 - RUN MEASUREMENTS TEST
2 - FORMAT FIXED DISK
9 - EXIT FIXED DISK TESTS

ENTER THE ACTION DESIRED ?
```

DID THE TEST COMPLETE WITHOUT AN ERROR?

NO If the error prompt is "REPLACE DRIVE C", go to page 3-1700-11 and format drive C. If the error prompt is "CHECK DRIVE C: AND ADAPTER", go to the next page.

YES Go to page 3-1700-11 and format drive D.

1. Set the Power switch on the system unit and expansion unit to Off.
2. Remove fixed disk drive C from the expansion unit. See Section 5, "Removal/Replacement and Adjustments."
3. Set the fixed disk drive on the power supply cover so that the logic board faces up and the face plate faces the right side of the unit as shown below.
4. Reconnect control connector J1, data connector J2, and the power connector.
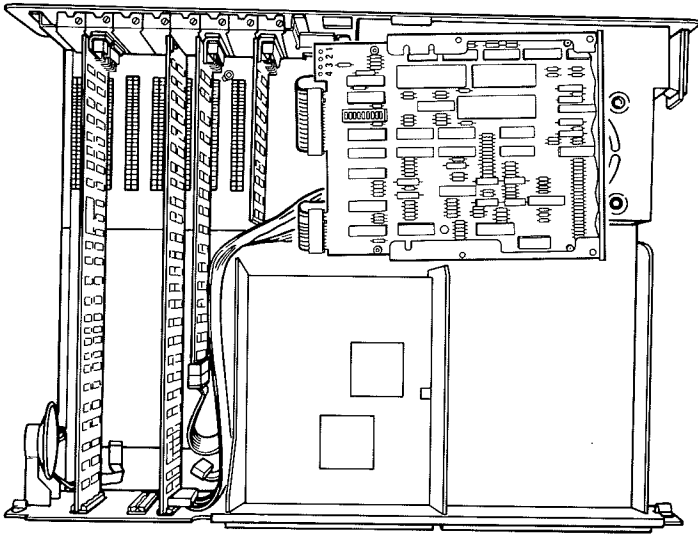
Fixed Disk

CONTINUE

1. Load your Advanced Diagnostics diskette in drive A.
2. Set the Power switch on the expansion unit and system unit to On.
3. After the diskette loads, press 0 (RUN DIAGNOSTIC ROUTINES) then press Enter.
4. Verify the installed devices. If the fixed disk drive is missing from the installed devices list, follow the instructions on the display to add option 17 (fixed disk drive).
5. When the SYSTEM CHECKOUT Menu is displayed, press 0 (RUN TESTS ONE TIME) then Enter.

The following screen is displayed:

```
 1 – S SYSTEM BOARD
18 – S EXPANSION OPTION
 2 – S 128KB MEMORY
 3 – S KEYBOARD
 4 – S MONOCHROME & PRINTER ADAPTER
 6 – S 1 DISKETTE DRIVE(S) AND ADAPTER
 9 – S PRINTER ADAPTER
11 – S ASYNC COMMUNICATIONS ADAPTER
17 – E 2 FIXED DISK DRIVE(S) & ADAPTER
14 – S MATRIX PRINTER

ENTER THE NUMBER(S) OF OPTIONS TO TEST
OR PRESS ENTER TO SELECT ALL OPTIONS
```

CONTINUE

1. Select 17 (FIXED DISK DRIVE AND ADAPTER) and then press Enter.
2. Press 1 (RUN MEASUREMENTS TEST) then press Enter.
3. When "ENTER DRIVE ID (C/D)?" is displayed, press C then press Enter.
4. Measurement Test 1 is now running. Take the voltage readings at the power connector lands indicated below. Do not press any keys on the keyboard until you are instructed to do so by the PIC.

Fixed Disk Drive Power Connector			
Min Vdc	Max Vdc	−Lead	+Lead
+ 4.8	+ 5.2	2	4
+11.5	+ 12.6	3	1

Power Connector

Type 1   Type 2
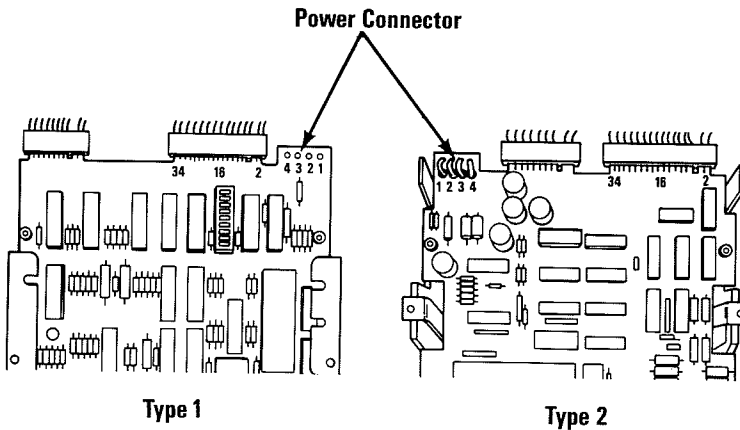
Fixed Disk

With Measurement Test 1 still running, measure the voltages for a high or low reading as indicated in tables A and B.

Note: A High reading is 2.5 Vdc to 3.0 Vdc. A Low reading is .1 Vdc to .5 Vdc.

Table A		
Connector	Pin	Voltage
J1	2	Low
J1	4	Low
J1	14	Low
J1	18	Low
J1	26	Low

Table B		
Connector	Pin	Voltage
J1	8	Low
J1	10	Low
J1	12	High
J1	22	Low

Control Connector J1

Type 1   Type 2
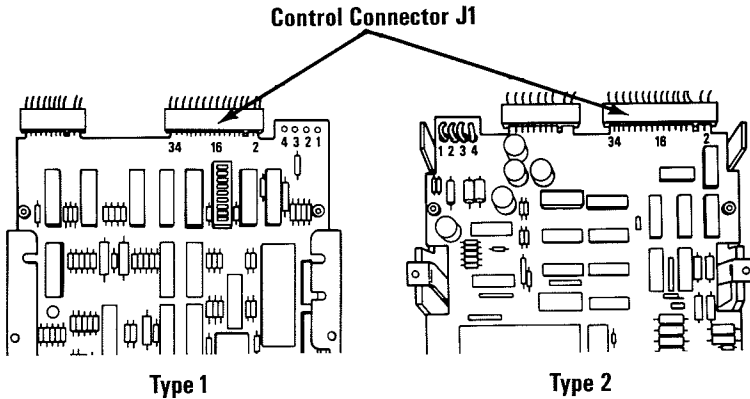
ARE THE VOLTAGES IN TABLES A AND B CORRECT?

NO If any of the voltages in Table A are incorrect, check the fixed disk cable then replace the fixed disk adapter.
If any of the voltages in Table B are incorrect, go to page 3-1700-11 and format drive C.
If both tables have incorrect voltages, replace the fixed disk adapter. See Section 5, ''Removal/ Replacement and Adjustments.''

YES

1. Press the spacebar once. "MEASUREMENT TEST 2 RUNNING" is now displayed on your screen. Do not press another key or spacebar until instructed to do so by the PIC.
2. Measure the voltages for a high or low reading as indicated in tables C and D.

   Note: A High reading is 2.5 Vdc to 3.0 Vdc. A Low reading is .1 Vdc to .5 Vdc.

Table C		
Connector	Pin	Voltage
J1	24	Low
J1	26	Low
J1	34	Low

Table D		
Connector	Pin	Voltage
J1	10	High
J1	12	High

Control Connector J1

Type 1   Type 2
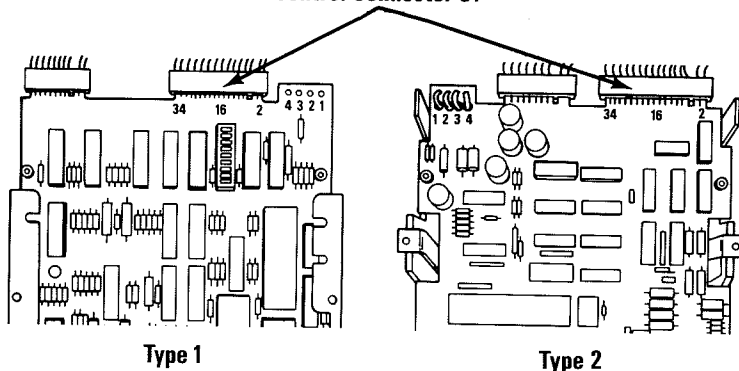
ARE THE VOLTAGES IN TABLES C AND D CORRECT?

NO If any of the voltages in Table C are incorrect, check the fixed disk cable then replace the fixed disk adapter.
If any of the voltages in Table D are incorrect, go to page 3-1700-11 and format drive C.
If both tables have incorrect voltages, replace the fixed disk adapter. See Section 5, "Removal/ Replacement and Adjustments."

YES

Fixed Disk

1. Press the spacebar once. "MEASUREMENT TEST 3 RUNNING" is now displayed on your screen. Do not press another key or spacebar until you complete the measurement test.
2. Measure the voltages for a high or low reading as indicated in tables E and F.

   Note: A High reading is 2.5 Vdc to 3.0 Vdc. A Low reading is .1 Vdc to .5 Vdc.

Table E		
Connector	Pin	Voltage
J1	6	Low

Table F		
Connector	Pin	Voltage
J1	12	Low

Control Connector J1

Type 1   Type 2

ARE THE VOLTAGES IN TABLES E AND F CORRECT?

NO If the voltage in Table E is incorrect, check the fixed disk cable then replace the fixed disk adapter.
If the voltage in Table F is incorrect, go to page 3-1700-11 and format drive C.
If the voltages in both tables are incorrect, replace the fixed disk adapter. See Section 5, "Removal/Replacement and Adjustments."

YES Go to page 3-1700-14.

You have entered this page because you have identified a failing fixed disk drive. Before replacing a drive, you should try to format that drive first, then rerun diagnostics. Since all data on the fixed disk drive is destroyed during format, this should be the very last step taken before replacing a drive. After you format a fixed disk drive, the lost data can be loaded from the backup diskette onto the fixed disk drive.

To Format a Fixed Disk Drive

WARNING: All data on the fixed disk drive will be destroyed when formatted. Before loading data from backup diskettes, refer to the DOS manual for a description of the FDISK, FORMAT, BACKUP and RESTORE commands.

1. Set the Power switch on the system unit to Off.
2. Install any fixed disk drives and reconnect any data/control connectors that were removed while testing.
3. Load your Advanced Diagnostics diskette in drive A.
4. Set the Power switch on the expansion unit and system unit to On.
5. After the diskette loads, press 0 (RUN DIAGNOSTIC ROUTINES) then press Enter.

Fixed Disk

CONTINUE ➡

1. Verify the installed devices. If any devices are missing from the installed devices list, follow the instructions on the display to add the missing options.
2. When the SYSTEM CHECKOUT menu is displayed, press 0 (RUN TEST ONE TIME) then Enter.
3. Select 17 (FIXED DISK DRIVE AND ADAPTER) then press Enter.

The following screen is displayed:

```
TESTING — X FIXED DISK DRIVE(S) & ADAPTER

0 — RUN FIXED DISK TEST
1 — RUN MEASUREMENTS TEST
2 — FORMAT FIXED DISK
9 — EXIT FIXED DISK TESTS

ENTER THE ACTION DESIRED ?  _ ⵊ _
```

CONTINUE

1. Press 2 (FORMAT FIXED DISK) then press Enter.
2. When "ENTER DRIVE ID (C/D)" is displayed, press C or D (depending on which drive you want to format) then press Enter.
3. When "ARE YOU SURE YOU WANT TO CONTINUE (Y/N)" is displayed, press Y then press Enter.
4. After the format routine completes, go to page 3-1700-1 and rerun fixed disk diagnostics. Then return to this page and answer the question below.

DID THE ERROR REMAIN AFTER USING THE FORMAT ROUTINE?

NO The problem has been corrected and the backup data can be loaded from diskette.

YES Replace the fixed disk drive that failed. See Section 5, "Removal/Replacement and Adjustments."

3-1700-13

You have gone through the PICs without solving your problem. The following steps should help you find additional audio or visual symptoms.

---

1. Check the entire system for loose or damaged connectors.
2. Return to page 3-2 and review "Start."
3. Select "UTILITIES" in the diagnostic menu, start an error log, and select "RUN TESTS MULTIPLE TIMES." This will allow you to operate the machine thoroughly and identify the failing symptom. When you have identified the symptom, go to page 3-2, "Start," or the appropriate PIC for the symptom you received.

If you have followed these procedures and still have an unsolved problem, you should seek technical assistance.

Expansion Unit

You have entered this PIC because you were unable to complete the POST, you have an 18XX error code, or you suspect the expansion unit is failing. Make sure that all cables are seated correctly.

1. Set the Power switch on the system unit and expansion unit to Off.
2. Insert your Advanced Diagnostics diskette in drive A.
3. Set the Power switch on the expansion unit to On.
4. Set the Power switch on the system unit to On.
5. Proceed with running diagnostic routines, verify installed devices, and choose the system checkout you desire.
6. Select 18 (EXPANSION OPTION) then press Enter.
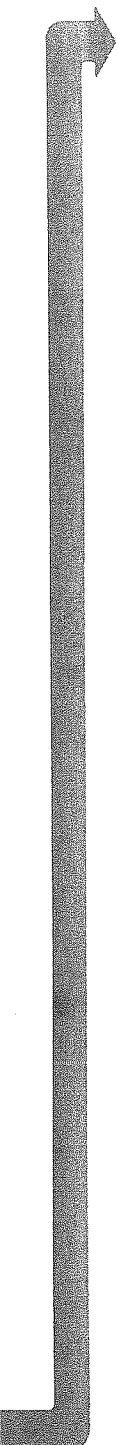
You may receive an error message similar to the one below.

```
TESTING - EXPANSION OPTION
   X:XX:XX
ERROR - EXPANSION OPTION      18XX S
   Data - XXXX =   XX / XX   SW = X
PRESS ENTER TO CONTINUE
?  _ \!/ _
     /|\
```

DID YOU GET AN 18XX ERROR CODE SIMILAR TO THE ONE ABOVE?

NO Go to page 3-2 "Start."

YES ▸

Find the error code listed below.

Go to the page listed in the table above for your error code.

1. Set the Power switch on the system unit and expansion
    unit to Off.
2. Disconnect the expansion cable at the system unit.
3. Make sure the Advanced Diagnostics diskette is loaded.
4. Set the Power switch on the system unit to On.
5. Proceed with running diagnostic routines, verify your
    installed devices and, choose the system checkout
    desired.
6. Select 18 (EXPANSION OPTION) then press Enter.

```
TESTING – EXPANSION OPTION
   X:XX:XX
ERROR – EXPANSION OPTION        1820 E
   Data – XXXX =   XX / XX   SW = X
PRESS ENTER TO CONTINUE
? – ___ –
```

DID YOU GET AN 1820 ERROR CODE?

NO Replace the extender card. See Section 5,
"Removal/Replacement and Adjustments."

YES ⟹

1. Set the Power switch on the system unit and expansion unit to Off.
2. Connect the expansion cable at the system unit. (If it was removed in an earlier step.)
3. Remove all option adapters from the expansion unit, except the receiver card.
4. Make sure the Advanced Diagnostics diskette is loaded.
5. Set the Power switch on the expansion unit to On.
6. Set the Power switch on the system unit to On.
7. Proceed with running diagnostic routines, verify devices installed, and choose the system checkout desired.
8. Select 18 (EXPANSION OPTION) then press Enter.

```
TESTING – EXPANSION OPTION
   X:XX:XX
ERROR – EXPANSION OPTION        18XX S
   Data – XXXX =   XX / XX   SW = X
PRESS ENTER TO CONTINUE
?  – ̠\|/ –
       ⁄|\
```

DID YOU GET AN 18XX ERROR CODE?

NO Go to page 3-1800-11.

YES

You may have a voltage problem.

1. Set your multimeter to the 12 Vdc scale.
2. Check the expansion board power connector for the voltages listed in the table.

Voltage Connectors			
Min Vdc	Max Vdc	−Lead	+ Lead
2.4	5.2	5	1
4.8	5.2	5	10

Expansion
Board
Connectors

Power Supply
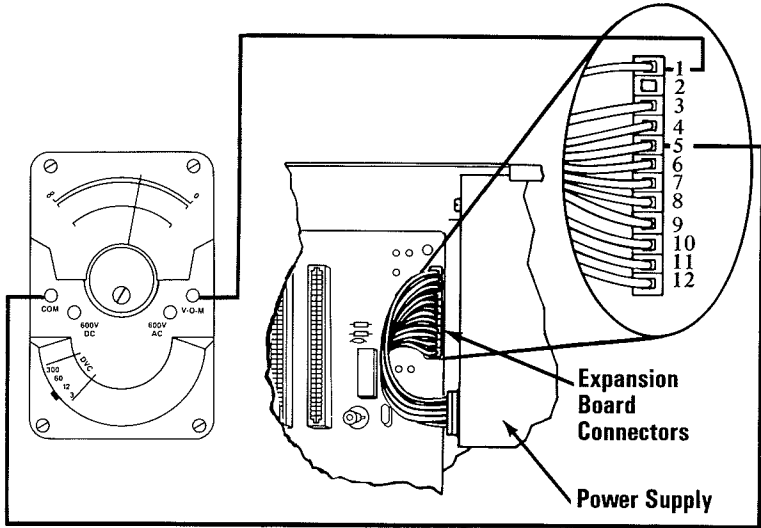
ARE ANY OF THE VOLTAGES NOT WITHIN THE CORRECT VALUES?

NO Replace the receiver card. See Section 5, "Removal/Replacement and Adjustments."

YES

1. Set the Power switches on the system unit and expansion unit to Off.
2. Remove the power connector from the right side fixed disk drive.
3. Set the Power switch on the expansion unit to On.
4. Set the Power switch on the system unit to On.

Power Connector

TYPE 1   TYPE 2
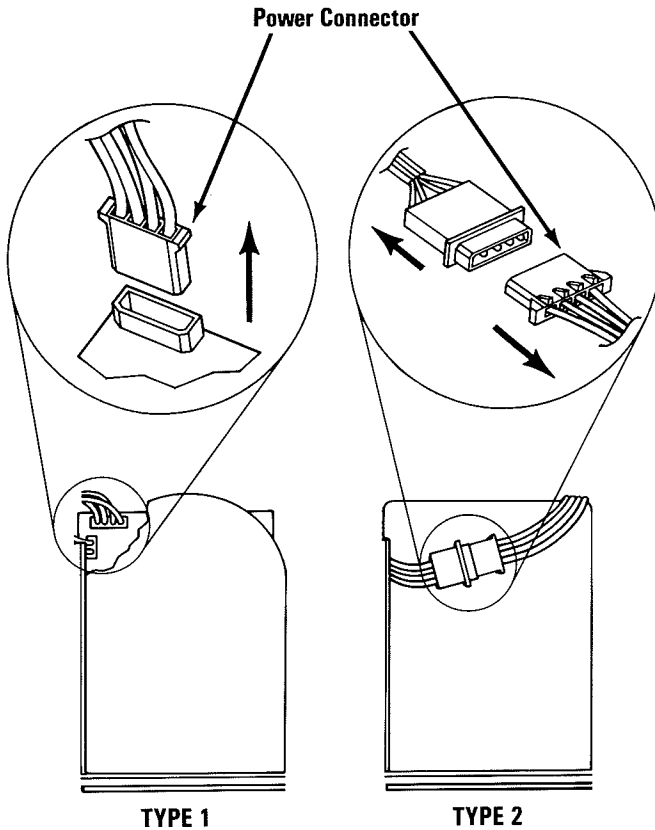
DID THE FAILING SYMPTOM REMAIN?

NO Replace the right side fixed disk drive assembly. See Section 5, "Removal/Replacement and Adjustments."

YES

Note: If you only have one fixed disk drive, continue on the next page.

1. Set the Power switches on the system unit and expansion unit to Off.
2. Remove the power connector from the left side fixed disk drive.
3. Set the Power switch on the expansion unit to On.
4. Set the Power switch on the system unit to On.

Power Connector

TYPE 1   TYPE 2
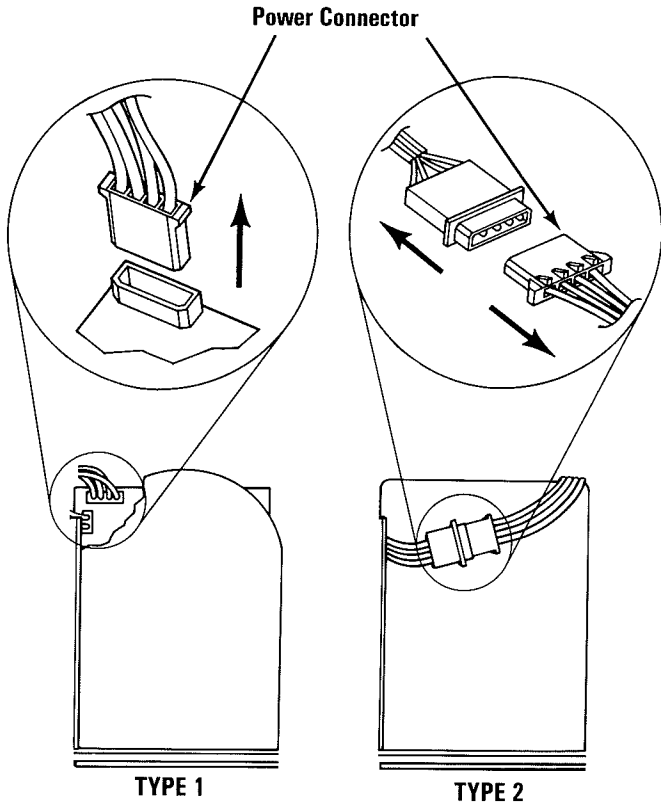
DID THE FAILING SYMPTOM REMAIN?

NO Replace the left side fixed disk drive assembly. See Section 5, "Removal/Replacement and Adjustments."

YES

Check the rest of the power supply output voltages to the expansion board.

1. Set your multimeter to the 12 Vdc scale.
2. Check the expansion board power connector for the voltages listed in the table.

Voltage Connectors			
Min Vdc	Max Vdc	−Lead	+ Lead
4.5	5.4	9	6
11.5	12.6	7	3
10.8	12.9	4	8
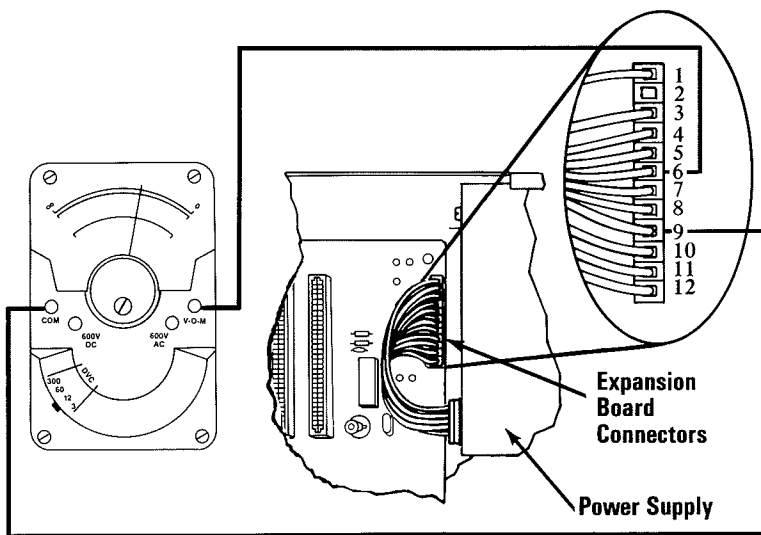
Expansion
Board
Connectors

Power Supply

ARE THE VOLTAGES WITHIN THE CORRECT VALUES?

NO Replace the expansion unit power supply. See Section 5, "Removal/Replacement and Adjustments."

YES

Check the fixed disk drive voltages.

1. Reconnect the fixed disk drive power supply connectors.
2. Refer to the diagram below for the proper voltage readings. You should get the same readings on both fixed disk drive connectors.

Fixed Disk Drive Connector			
Min Vdc	Max Vdc	−Lead	+ Lead
4.8	5.2	2	4
11.5	12.6	3	1
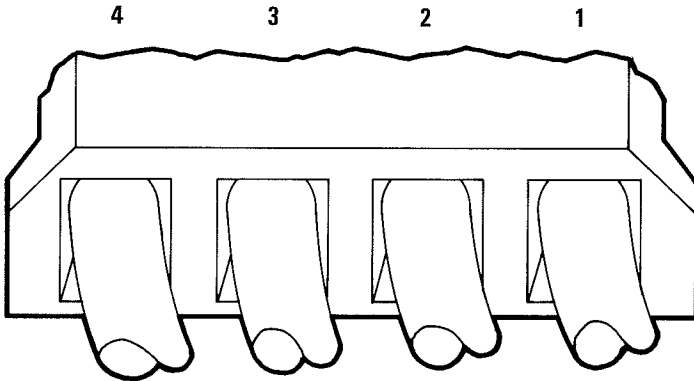
ARE THE VOLTAGES WITHIN THE CORRECT VALUES?

NO Replace the expansion unit power supply. See Section 5, "Removal/Replacement and Adjustments."

YES

1. Set the Power switch on the system unit and the expansion unit to Off.
2. Set your multimeter to the Ohms × 1 scale.
3. Remove all option adapters (including the receiver card) from the expansion slots in the expansion unit.
4. Remove the expansion board power connectors and take resistance measurements on the expansion board pins listed in the table.

− Lead	5	6	7	8	8	8
+ Lead	3	4	9	10	11	12
Minimum Resistance	50 ohms	50 ohms	50 ohms	50 ohms	50 ohms	50 ohms

Ohms Adjust Control

Expansion Board Connectors

Top View Power Supply
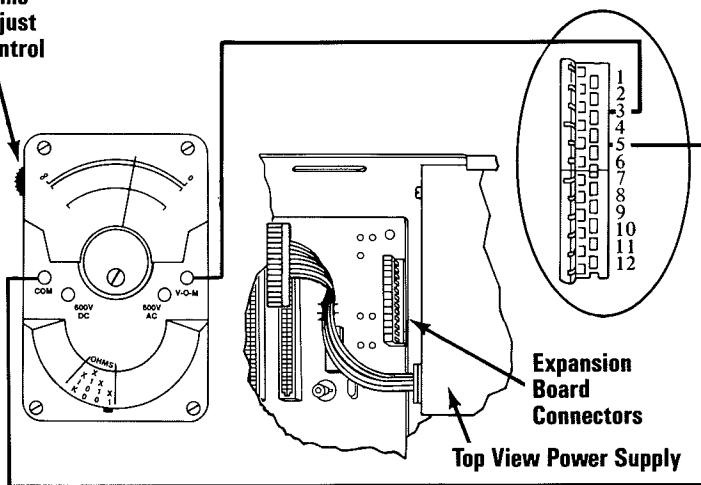
ARE ANY OF THE RESISTANCE MEASUREMENTS BELOW THE MINIMUM SHOWN IN THE TABLE?

NO Replace the expansion unit power supply. See Section 5, "Removal/Replacement and Adjustments."

YES Replace the expansion board. See Section 5, "Removal/Replacement and Adjustments."

One of the option adapters plugged into the expansion
board may be failing.

1. Set the Power switches on the system unit and the
   expansion unit to Off.
2. Replace one option adapter.
3. Make sure the Advanced Diagnostics diskette is loaded.
4. Set the Power switch on the expansion unit to On.
5. Set the Power switch on the system unit to On.
6. Proceed with running diagnostic routines, verify
   installed devices, and choose the system checkout you
   desire.
7. Select 18 (EXPANSION OPTION) then press Enter.

```
TESTING – EXPANSION OPTION
   X:XX:XX
ERROR – EXPANSION OPTION   18XX S
   Data – XXXX = X / X   SW = X
PRESS ENTER TO CONTINUE
?  _ \ ! / _
      / ! \
```

DID YOU GET AN 18XX ERROR CODE?

NO Repeat the steps above until the failing option
adapter is found.

YES Replace the option adapter you just plugged in
the expansion board. See Section 5, "Removal/
Replacement and Adjustments."

Your screen will look similar to the one below. Verify that the switch settings on the extender card correctly reflect the "Memory Segment." Use the "Extender Card Switch Settings" chart in Section 6.

"Memory Segment"

```
TESTING – EXPANSION OPTION
   X:XX:XX
ERROR – EXPANSION OPTION        1819 S
   Data – XXXX =   X  |  (X)  SW = X
PRESS ENTER TO CONTINUE
?  – ☼ –
```
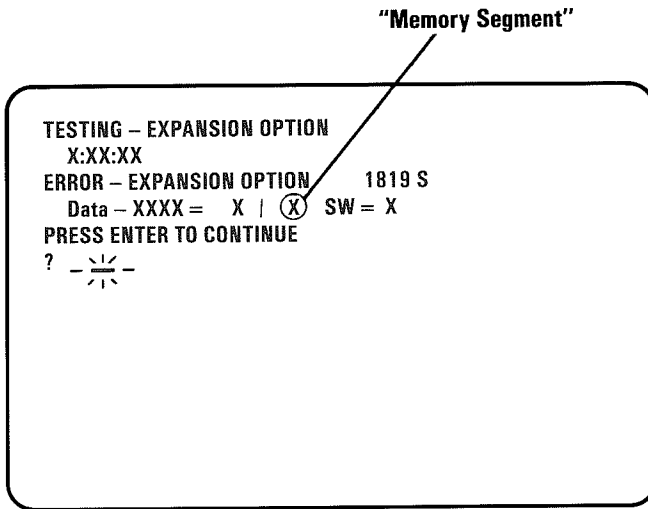
ARE THE EXTENDER CARD SWITCHES SET TO CORRECTLY REFLECT THE "MEMORY SEGMENT"?

NO Set the extender card switches to reflect the correct "Memory Segment."

YES Replace the extender card. See Section 5, "Removal/Replacement and Adjustments."

Binary Synchronous Communications (BSC)

You have entered this PIC because you have a 20XX error code or have identified a problem with binary synchronous communications (BSC).

1. Check that the jumpers are set correctly on the BSC adapter(s). See Section 4, "Locations."
2. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
3. Insert your Advanced Diagnostics diskette in drive A.
4. Set the Power switch on the expansion unit (if attached) and the system unit to On.

The menu below should be displayed.

```
The IBM Personal Computer
ADVANCED DIAGNOSTICS
Version 2.XX (C)Copyright IBM Corp 1981,1982

SELECT AN OPTION

0 - RUN DIAGNOSTIC ROUTINES
1 - FORMAT DISKETTE
2 - COPY DISKETTE
3 - PREPARE SYSTEM FOR RELOCATION
9 - EXIT TO SYSTEM DISKETTE

ENTER THE ACTION DESIRED
? _
```

CONTINUE

Follow the steps below to run the diagnostic routines.

1. Press 0 (RUN DIAGNOSTIC ROUTINES) then press Enter.

(Skip Step 2 if you have only one display adapter installed.)

2. Press Y or N (IS A MONITOR ATTACHED TO EVERY DISPLAY ADAPTER (Y/N) ?) then press Enter.
3. Press Y or N (IS THE LIST CORRECT (Y/N) ?) then press Enter. (If the list is not correct, follow the instructions on your screen and correct the list before answering yes.)
4. Press 0 (RUN TESTS ONE TIME) then press Enter.
5. Select 20 (BSC ADAPTER) then press Enter.
6. Press Y or N (IS AN IBM COMMUNICATIONS ADAPTER CABLE ATTACHED TO THE BSC ADAPTER (Y/N) ?) then press Enter.

    The screen should now instruct you to install the wrap plug on either the BSC adapter, or on the IBM Communications Adapter Cable.

```
TESTING - BSC ADAPTER
IS AN IBM COMMUNICATIONS ADAPTER CABLE
ATTACHED TO THE BSC ADAPTER? (Y/N)?
Y

DISCONNECT THE CABLE AT THE MODEM AND
INSTALL THE WRAP PLUG ON THE END OF
THE CABLE.
PRESS ENTER WHEN READY.
?
```
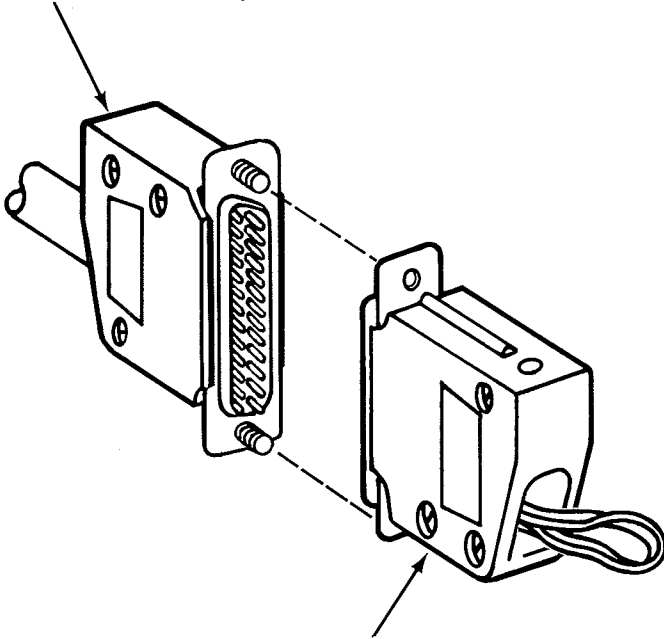
IS AN IBM COMMUNICATIONS ADAPTER CABLE ATTACHED?

NO Go to page 3-2000-4.

YES

1. Refer to the figure below and install the wrap plug on the modem end of the IBM Communications Adapter Cable.
2. Press Enter to begin the test. The test may take up to 15 seconds.

**IBM Communications Adapter Cable (Modem End)**
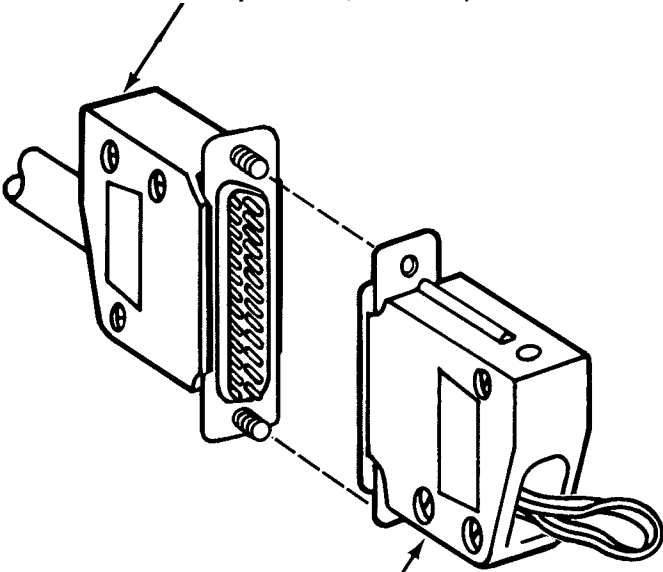
IBM Communications Adapter Wrap Plug (IBM Part 8529280)

DOES THE MESSAGE ON YOUR SCREEN INSTRUCT YOU TO MOVE THE WRAP PLUG FROM THE END OF THE CABLE TO THE CONNECTOR ON THE BSC ADAPTER?

NO   Go to page 3-2000-5.

YES

1. Remove the communications cable (if attached) from the BSC Adapter.
2. Refer to the figure below and install the wrap plug on the BSC Adapter.
3. Press Enter to begin the test. This test takes up to 15 seconds.
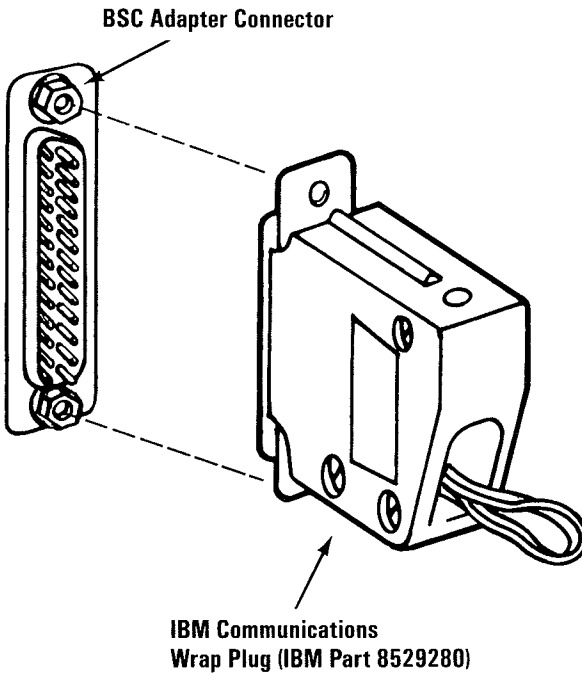
BSC Adapter Connector

**IBM Communications
Wrap Plug (IBM Part 8529280)**

DID THE TEST RUN WITHOUT AN ERROR?

NO If the error message says to replace the cable, do so. If it says to replace the BSC Adapter, do so. See Section 5, "Removal/Replacement and Adjustments."

YES Go to page 3-2000-6.

You may have an error message similar to the one below.

```
X:XX:XX
ERROR - BSC ADAPTER    20XX X
REPLACE THE BSC ADAPTER.
```

DID THE TEST RUN WITHOUT AN ERROR MESSAGE?

NO Replace the BSC Adapter.

YES

You have gone through the PICs without solving your problem. The following steps should help you find additional audio or visual symptoms.

---

1. Check the entire system for loose or damaged connectors.
2. Return to page 3-2 and review "Start."
3. Select "UTILITIES" in the diagnostic menu, start an error log, and select "RUN TESTS MULTIPLE TIMES." This will allow you to operate the machine thoroughly and identify the failing symptom. When you have identified the symptom, go to page 3-2, "Start," or the appropriate PIC for the symptom you received.

If you have followed these procedures and still have an unsolved problem, you should request technical assistance.

Alternate Binary Synchronous Communications (Alt. BSC.)

You have entered this PIC because you have a 21XX error code or have identified a problem with alternate binary synchronous communications (Alt. BSC).

1. Check that the jumpers are set correctly on the BSC and alternate BSC adapters and that you do not have an SDLC adapter installed. See Section 4, "Locations."
2. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
3. Insert your Advanced Diagnostics diskette in drive A.
4. Set the Power switch on the expansion unit (if attached) and the system unit to On.

The menu below should be displayed.

```
The IBM Personal Computer
ADVANCED DIAGNOSTICS
Version 2.XX (C)Copyright IBM Corp 1981, 1982

SELECT AN OPTION

0 - RUN DIAGNOSTIC ROUTINES
1 - FORMAT DISKETTE
2 - COPY DISKETTE
3 - PREPARE SYSTEM FOR RELOCATION
9 - EXIT TO SYSTEM DISKETTE

ENTER THE ACTION DESIRED
? _
```

CONTINUE

3-2100-1

Follow the steps below to run the diagnostic routines.

1. Press 0 (RUN DIAGNOSTIC ROUTINES) then press Enter.

(Skip Step 2 if you have only one display adapter installed.)

2. Press Y or N (IS A MONITOR ATTACHED TO EVERY DISPLAY ADAPTER (Y/N)?) then press Enter.
3. Press Y or N (IS THE LIST CORRECT (Y/N)?) then press Enter. (If the list is not correct, follow the instructions on your screen and correct the list before answering yes.)
4. Press 0 (RUN TESTS ONE TIME) then press Enter.
5. Select 21 (ALT BSC ADAPTER) then press Enter.
6. Press Y or N (IS AN IBM COMMUNICATIONS ADAPTER CABLE ATTACHED TO THE ALT BSC ADAPTER (Y/N)?) then press Enter.

The screen should now instruct you to install the wrap plug on either the Alternate BSC Adapter, or on the IBM Communications Adapter Cable.

```
TESTING – ALT BSC ADAPTER
IS AN IBM COMMUNICATIONS ADAPTER CABLE
ATTACHED TO THE ALT BSC ADAPTER (Y/N)?
Y

DISCONNECT THE CABLE AT THE MODEM AND
INSTALL THE WRAP PLUG ON THE END OF
THE CABLE.
PRESS ENTER WHEN READY.
?
```

IS AN IBM COMMUNICATIONS ADAPTER CABLE ATTACHED?

NO Go to page 3-2100-4.

YES

1. Refer to the figure below and install the wrap plug on the modem end of the IBM Communications Adapter Cable.
2. Press Enter to begin the test. The test may take up to 15 seconds.

IBM Communications Adapter Cable (Modem End)

IBM Communications Adapter
Wrap Plug (IBM Part 8529280)

DOES THE MESSAGE ON YOUR SCREEN INSTRUCT YOU TO MOVE THE WRAP PLUG FROM THE END OF THE CABLE TO THE CONNECTOR ON THE ALT BSC ADAPTER?

NO Go to page 3-2100-5.

YES

1. Remove the communications cable (if attached) from the Alternate BSC Adapter.
2. Refer to the figure below and install the wrap plug on the Alternate BSC Adapter.
3. Press Enter to begin the test. This test takes up to 15 seconds.

Alternate BSC Adapter Connector

**IBM Communications
Wrap Plug (IBM Part 8529280)**
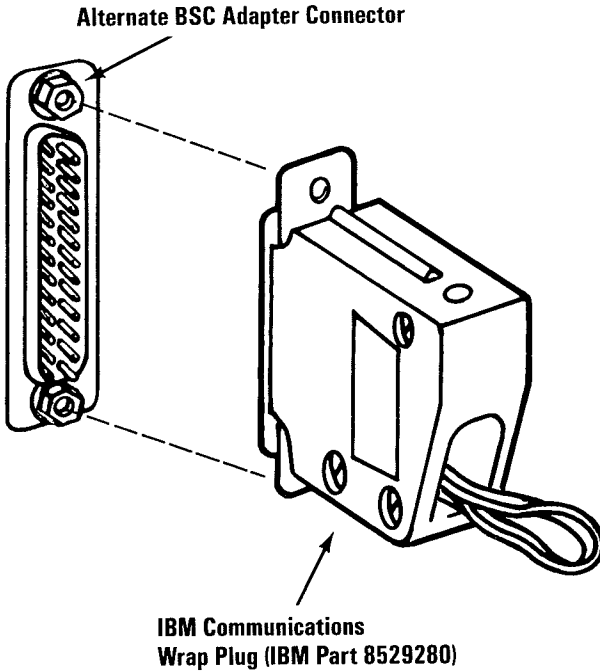
DID THE TEST RUN WITHOUT AN ERROR?

NO If the error message directs you to replace the cable, do so. If it says to replace the Alternate BSC Adapter, do so. See Section 5, "Removal/Replacement and Adjustments."

YES Go to page 3-2100-6.

You may have an error message similar to the one below.

```
X:XX:XX
ERROR – ALT BSC ADAPTER      21XX X
REPLACE THE ALT BSC ADAPTER.
```

DID THE TEST RUN WITHOUT AN ERROR MESSAGE?

NO Replace the Alternate BSC Adapter.

YES

You have gone through the PICs without solving your problem. The following steps should help you find additional audio or visual symptoms.

---

1. Check the entire system for loose or damaged connectors.
2. Return to page 3-2 and review "Start."
3. Select "UTILITIES" in the diagnostic menu, start an error log, and select "RUN TESTS MULTIPLE TIMES." This will allow you to operate the machine thoroughly and identify the failing symptom. When you have identified the symptom, go to page 3-2, "Start," or the appropriate PIC for the symptom you received.

If you have followed these procedures and still have an unsolved problem, you should request technical assistance.

SECTION 4. LOCATIONS

Diskette Drive Type 1

Diskette Drive Type 2

Diskette Drive Type 2 (Cont.)

Expansion Unit

Fixed Disk Drive

Printer (IBM 80 CPS Matrix Printer)

Printer (IBM 80 CPS Matrix Printer) (Cont.)

Keyboard

Option Adapters

Option Parameters

Safety Ground Locations

System Unit

Diskette Drive

Servo Board

Drive Motor

Right Diskette Guide

Left Diskette Guide

Cone Assembly

Write Protect Switch

Front Panel

LED Assembly

Type 1 Diskette Drive Assembly (Top View)

Cone Assembly

Index
Sensor
Cable

Index Assembly

Latch Assembly
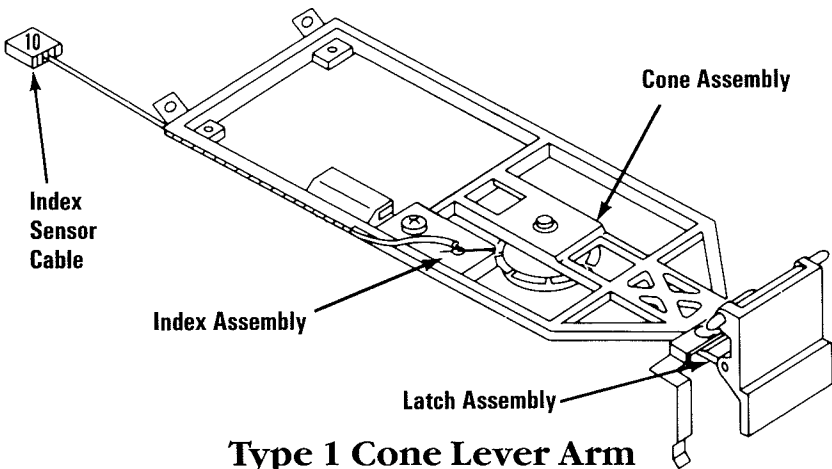
Type 1 Cone Lever Arm (Left View)

Spindle

Sleeve

Spring

Bearing

Pulley

Washer

Lock Washer

Retaining Screw
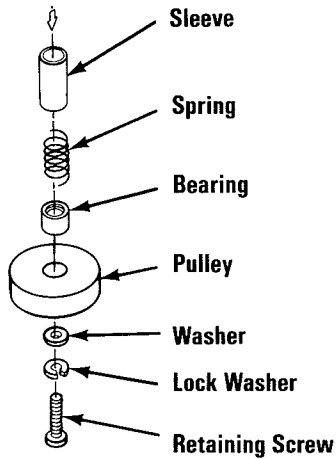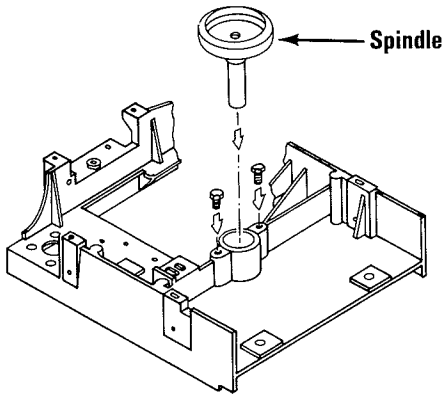
Type 1 Spindle Assembly (Left View)

Signal Cable
Connector

34   2

33   1

Power Connector

1 Through 33 On Bottom
Of Logic Board

Terminating Resistor

1   4

4   1 5   1 4   1 4   1 4   1 4   1

P13 P12 P11 P10 P9 P8   34   2

TP13   TP6   TP9   ●TP7

●TP5

●TP11

●
TP8   ●
TP12

●
TP3   ●
TP1

⊕   ●
TP10   P6   P5   ⊕

●
TP4   ●TP2
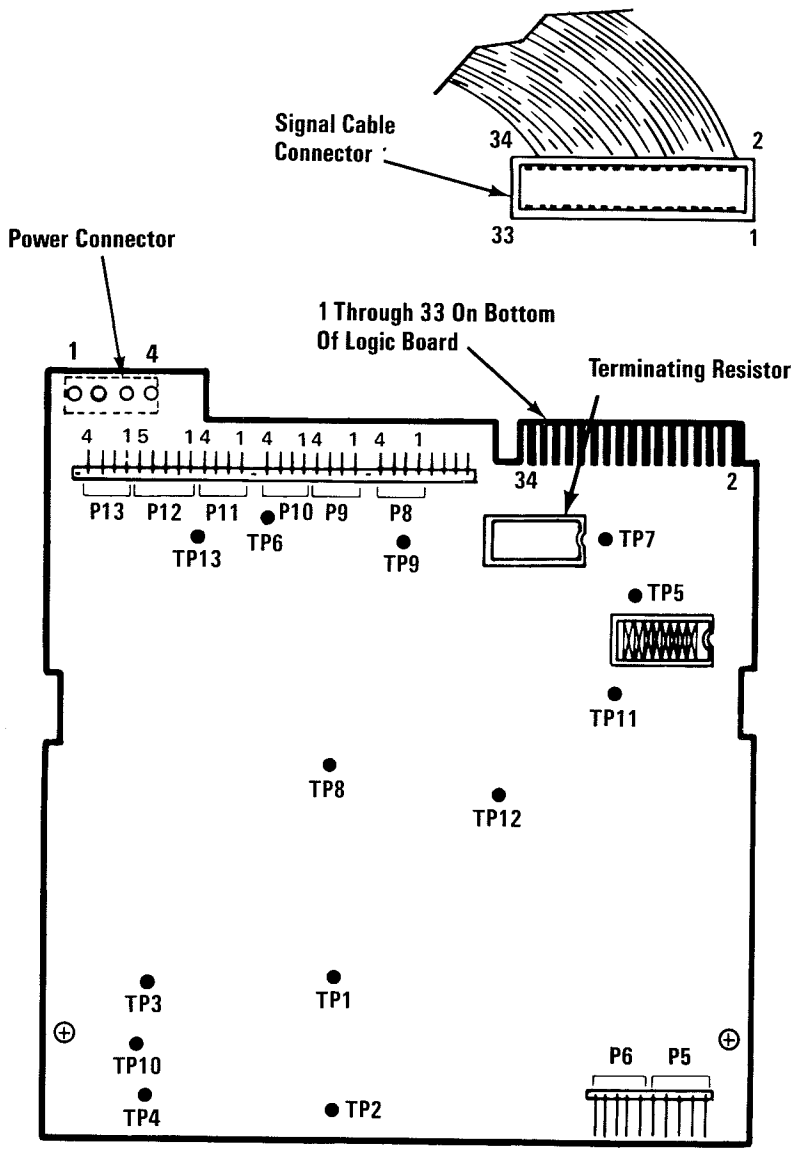
Type 1 Logic Printed Circuit Board
(Top View)

Notes:

Diskette Drive
Power Connector
J-2 Pins 1 through 4

J-3 Connector
Pins 1 through 24

Diskette Drive
Signal Cable
J-1 Connector
Even numbered pins
34 through 2 top of
the board odd Numbers
33 through 1 bottom
of the board.

Shield Plate

Index Assembly

Head Connector
J-4 Pins
1 through 10

Cone Lever Arm Assembly

Cone Assembly

Drive
Motor

Connectors to J-3

Left
Diskette
Guide

Write-Protect Switch

Spindle

Stepper Motor

Right
Diskette
Guide

LED Assembly

Latch

Front Panel

Head Connectors

Mounting Screws

Type 2 Diskette Drive Assembly

**Type 2 Diskette Drive Logic
Printed Circuit Board**

Expansion Unit

Power Supply Vent

Option Expansion Slots

Power Switch

Display Power
(IBM Monitor)

System Power
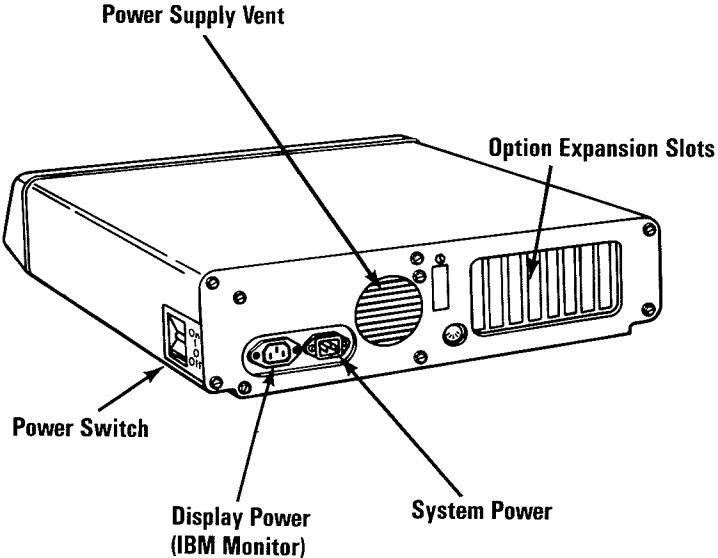
Expansion Unit
(Rear View)

Option Adapter   Receiver Card   Power Supply

Expansion Board   Slot for   Fixed Disk Drive C
                    Fixed Disk Drive D
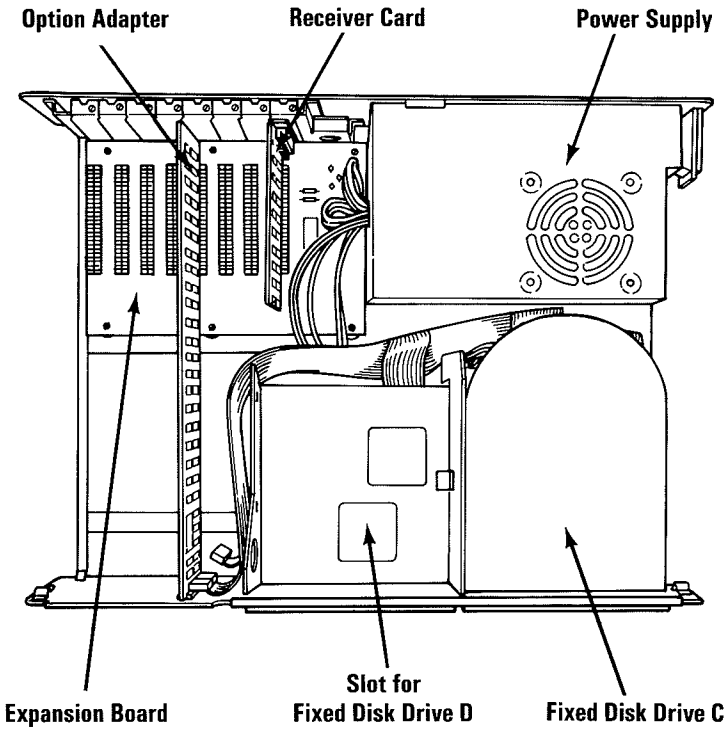
Expansion Unit
(Top View)

Expansion Unit
Expansion
Slots

J1 J2 J3 J4 J5 J6 J7 J8

Expansion
Board
Power
Connectors

Color Trimmer Capacitor
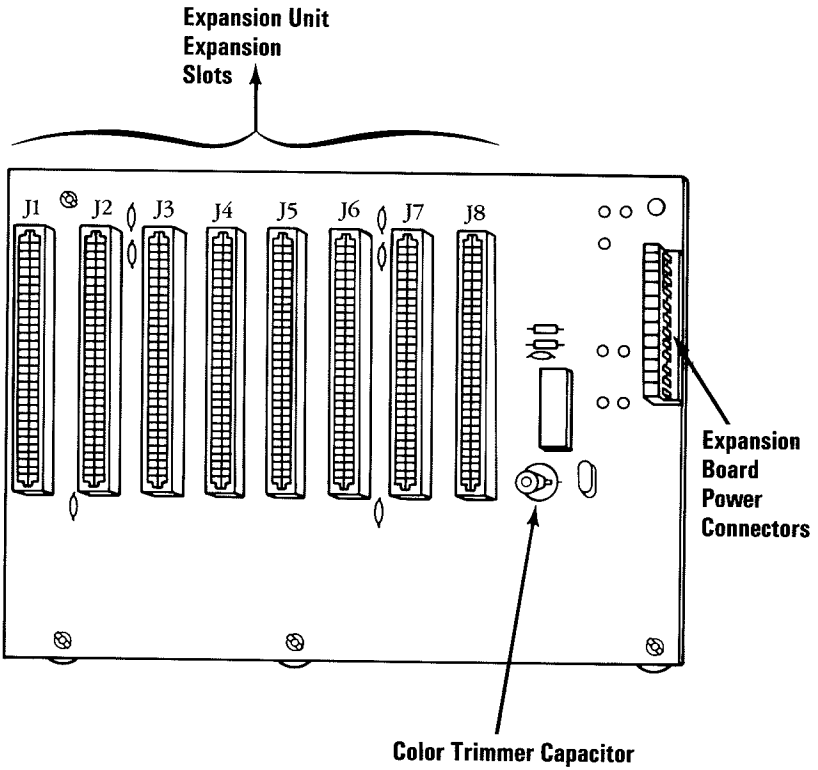
Expansion Board
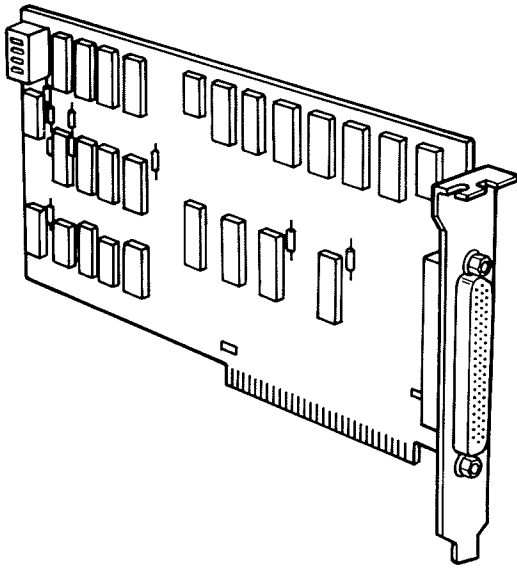
**Extender Card
(Right View)**
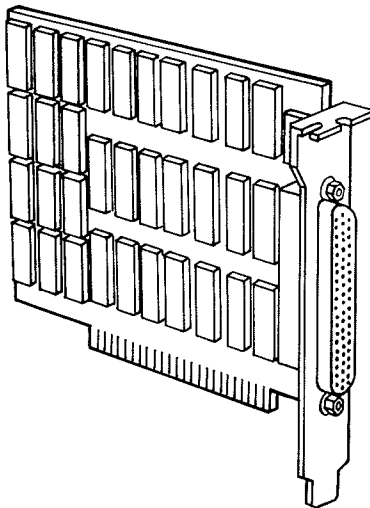
**Receiver Card
(Right View)**

10 Megabyte Fixed Disk Drive

Type 2   Type 1

Control
Connector J1

Data Connector
J2 or J3

Power Connector

Power Connector   Data Connector
J2 or J3

Control Connector J1
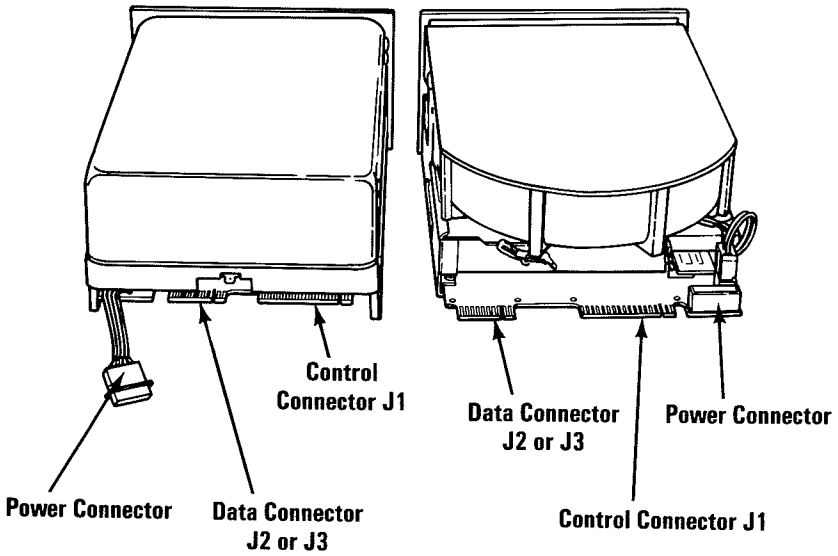
Note: The top of type 1 drives may vary slightly in appearance.

Fixed Disk Drive
(Rear View)

Notes:

IBM 80 CPS Matrix Printer

Power Transformer
Primary Cable

Fuse

**Fuse-Filter Card
(Right View)**

Carriage Motor | Forms Feed Motor | Ribbon Cartridge | Print Mechanism Assembly | Forms Tractor

Safety Shield | Power Transformer | CN6 | CN3 | CN4 | CN6

Heat Sink/ Power Transistor | CN2 | Control Circuit Card | CN5 | Driver Circuit Card

Printer
(Rear View)

Print Head Gap
Adjustment Lever   Ribbon
                    Shield

                            Print Head

                                End-Of-Forms
                                Switch

                                        Intermediate
                                        Gear

Carriage
Drive
Assembly

    Left
    Margin   Platen
    Sensor

            Carriage
            Belt   Carriage
                      Shafts

Print Mechanism Assembly
(Front View)

**Printer
(Rear View)**

CN6

CN3

CN5

CN4

CN2

CN1

CN6
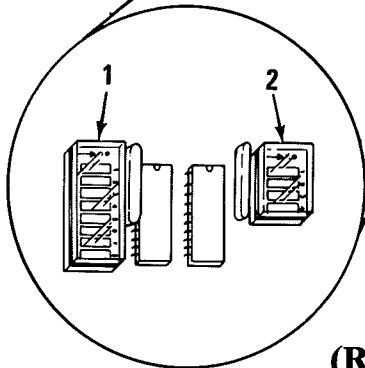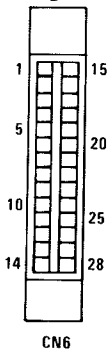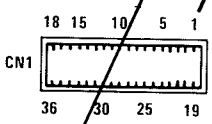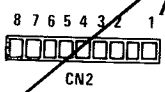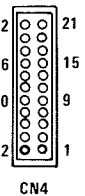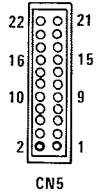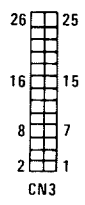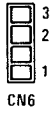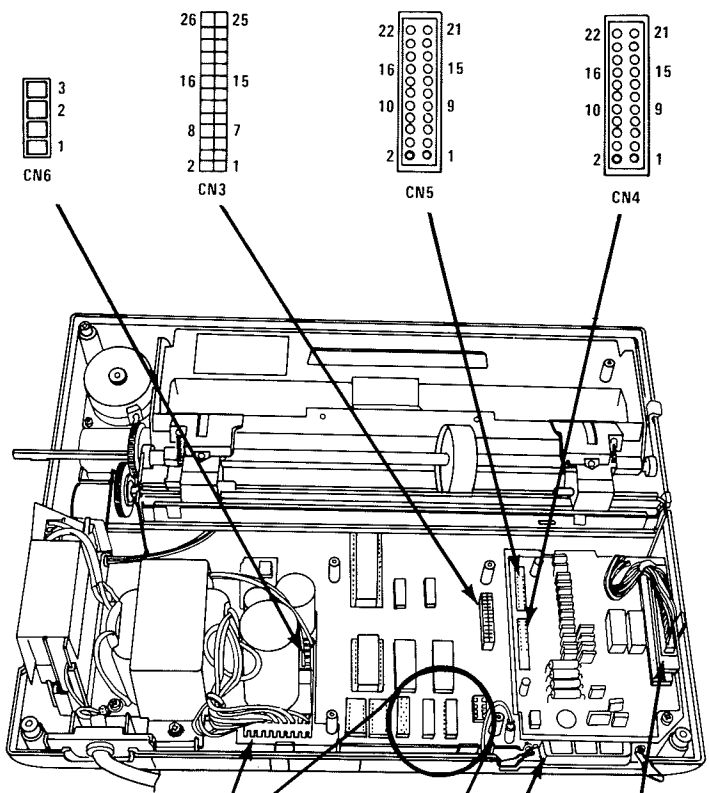
Dip Switches

Printer
Connector

System Unit
Connector
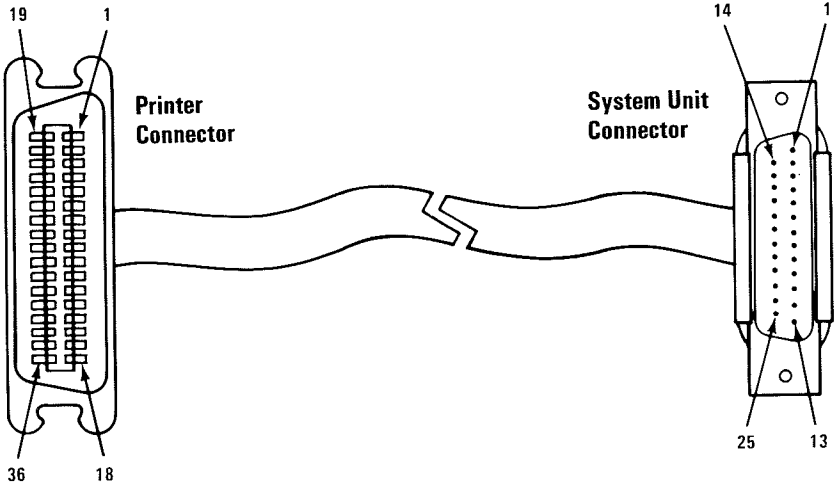
Printer Signal Cable

Printer Connector Pin Number	System Unit Connector Pin Number
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10
11	11
12	12
13	13
14	14
32	15
31	16
36	17
33	18
19	19
21	20
23	21
25	22
27	23
29	24
30	25

4-20

Top Cover

Control Panel

Base Cover
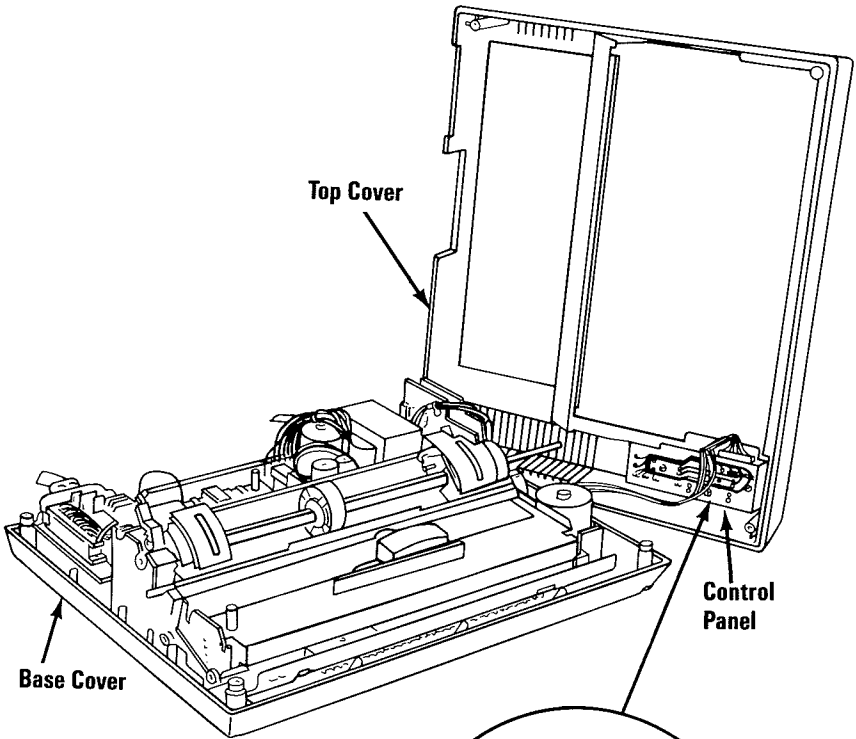
Printer
(Top View)
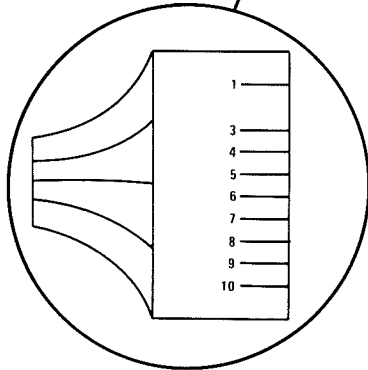
Control Panel Connector

Pin	Name
1	Online Light
2	Key
3	No Paper Light
4	Ready Light
5	Online Switch
6	Forms Feed
7	Line Feed
8	Ground
9	+ 12 Vdc
10	Alarm

COMMON

3
7
1
5

9
4
8
6
2

1

9
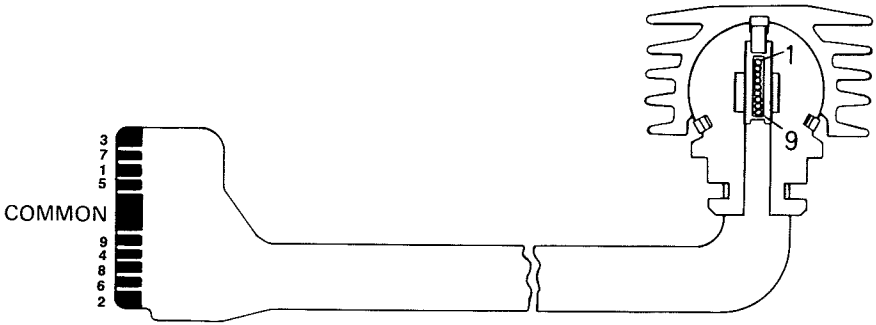
Print Head and Cable
(Rear View)

1
2
3
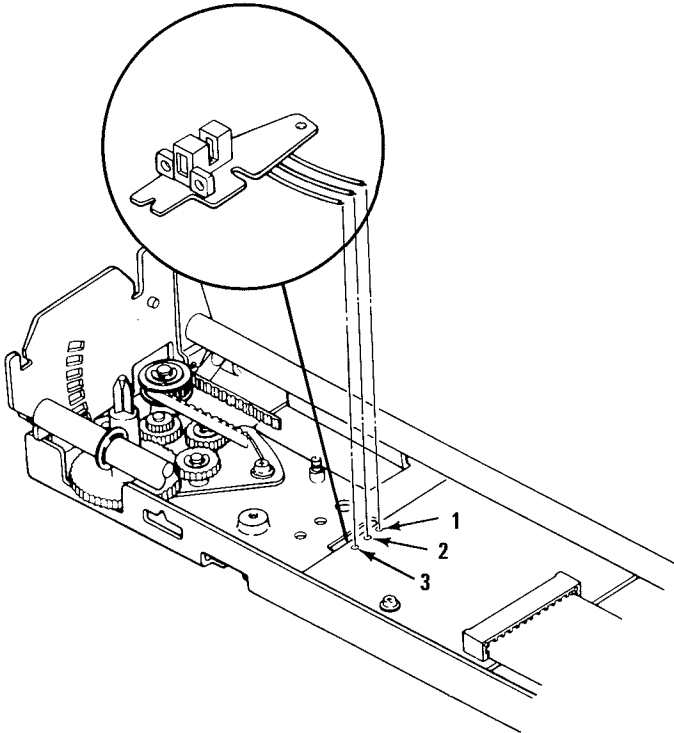
Left Margin Sensor
(Front View)

Keyboard
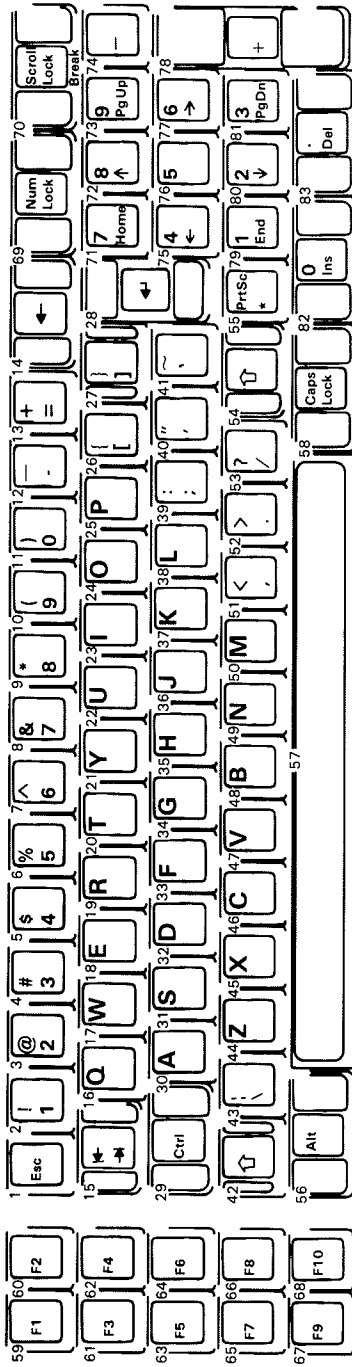
The Number To The Upper Left Designates The Key Position In The Parts Catalog (See Section 7)

Keyboard Cable

Base
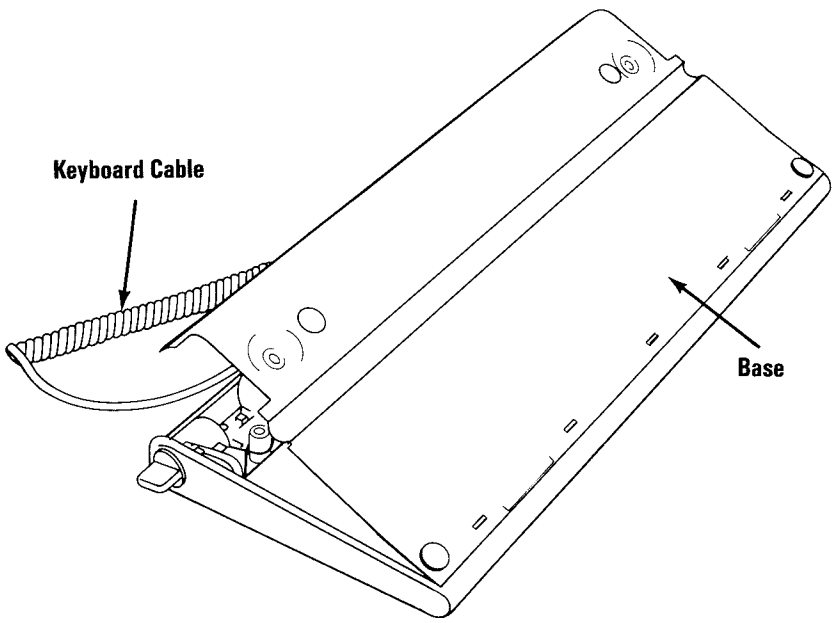
**Keyboard
(Bottom View)**

Keyboard Assembly

Top Cover
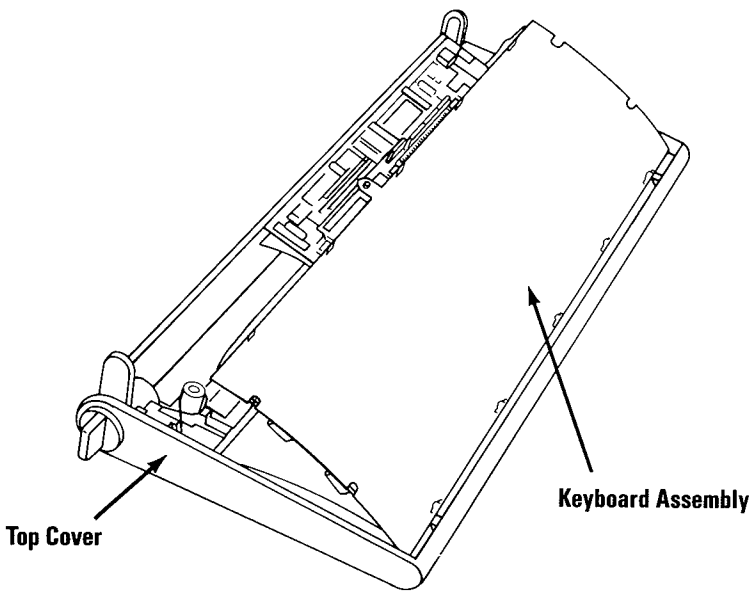
**Keyboard
(Bottom View)**

Option Adapters

**Module Position
for Primary Asynchronous
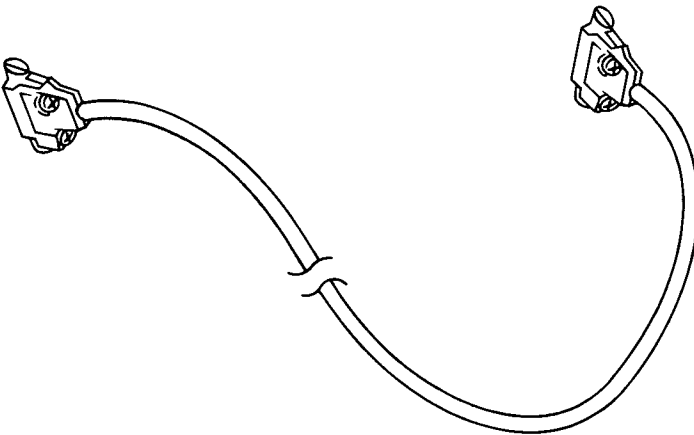Adapter**

**Module Position
for Alternate Asynchronous
Adapter**

Pluggable
Module

25 Pin D
Connector

J13
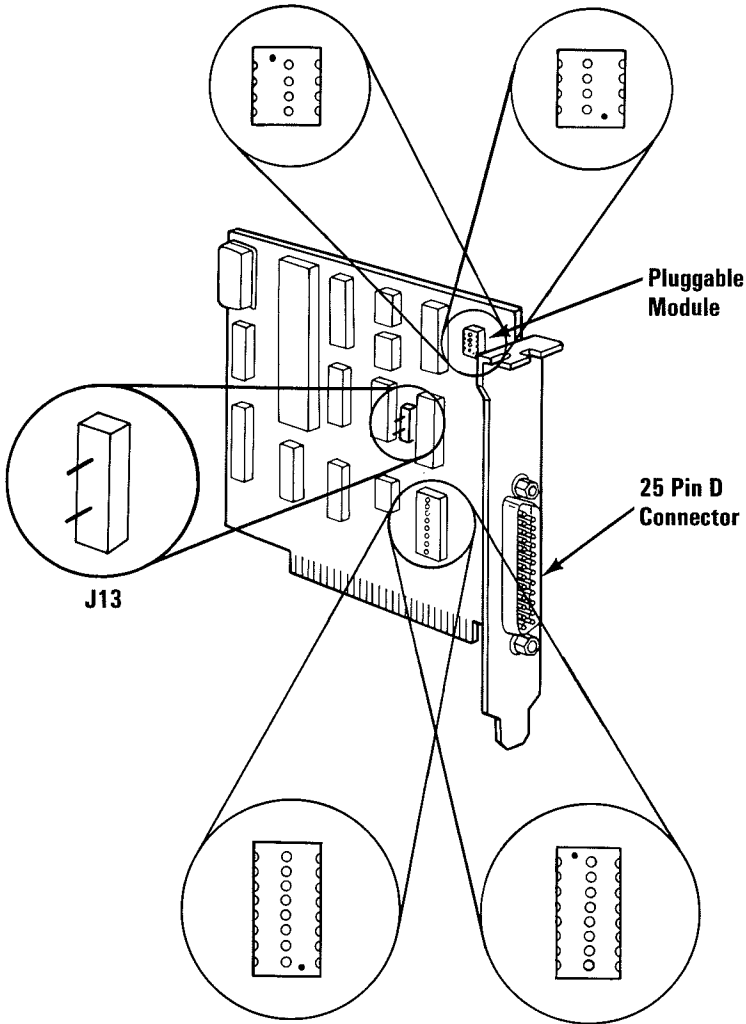
**Module Position for
Current Loop Interface**

**Module Position for
RS232-C Interface**

Asynchronous Communications Adapter
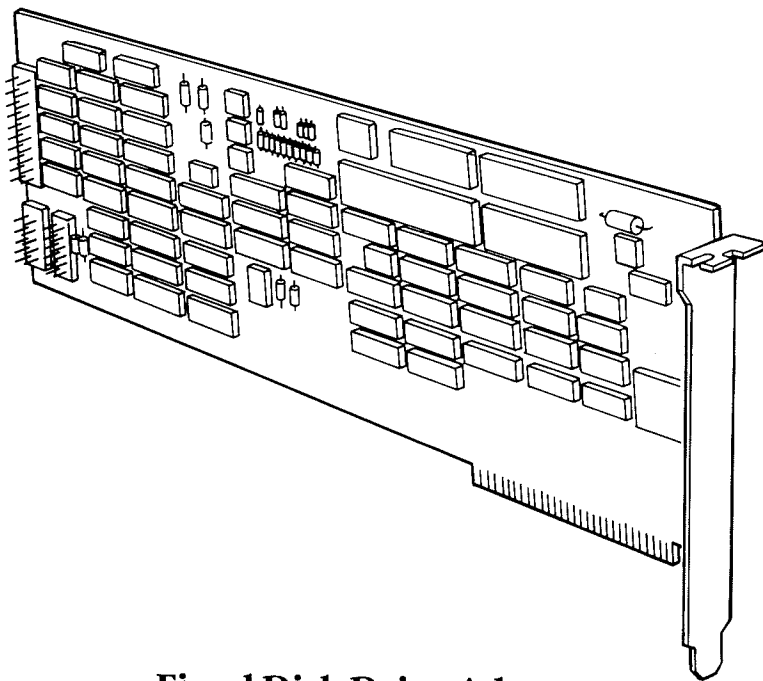## and Adapter Address (Right View)
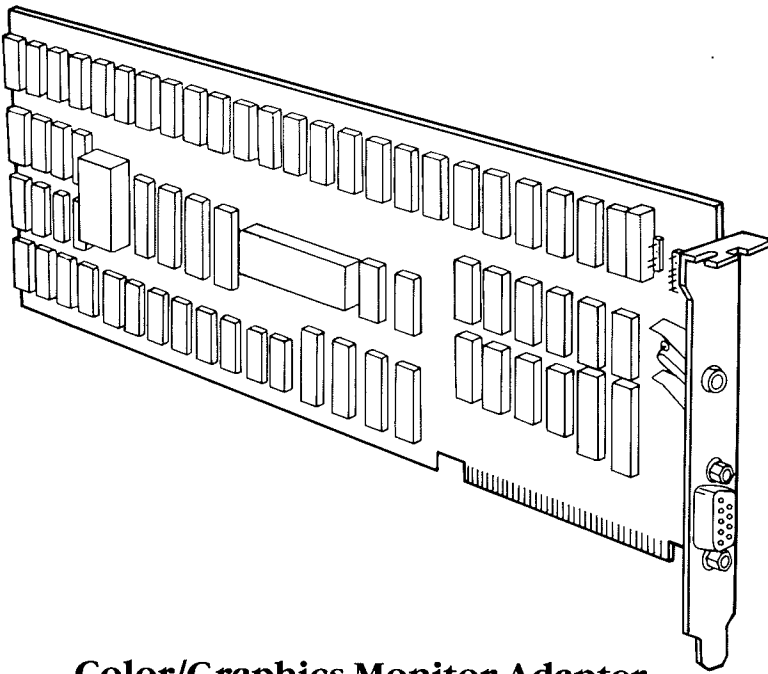
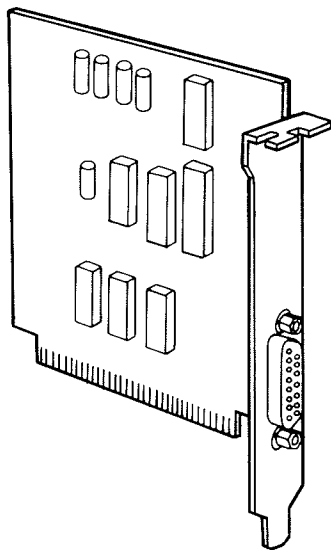**Color/Graphics Monitor Adapter
(Right View)**
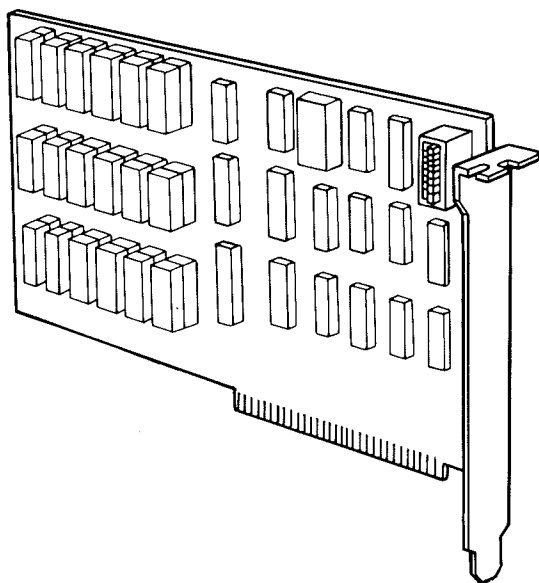

Communications Adapter Cable
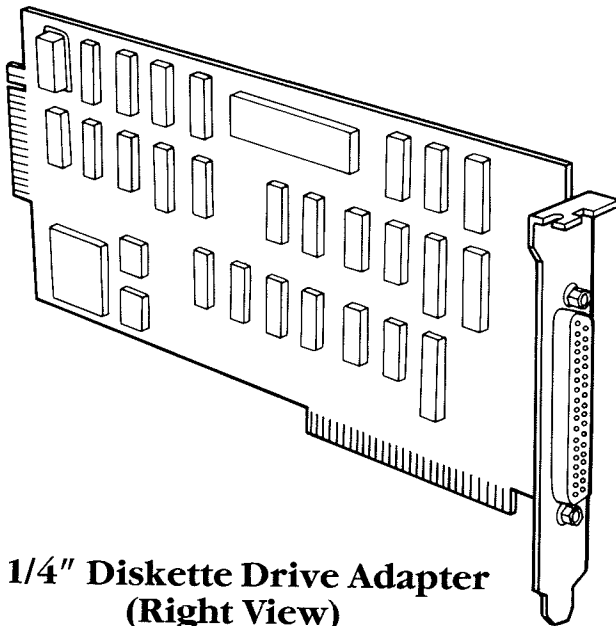
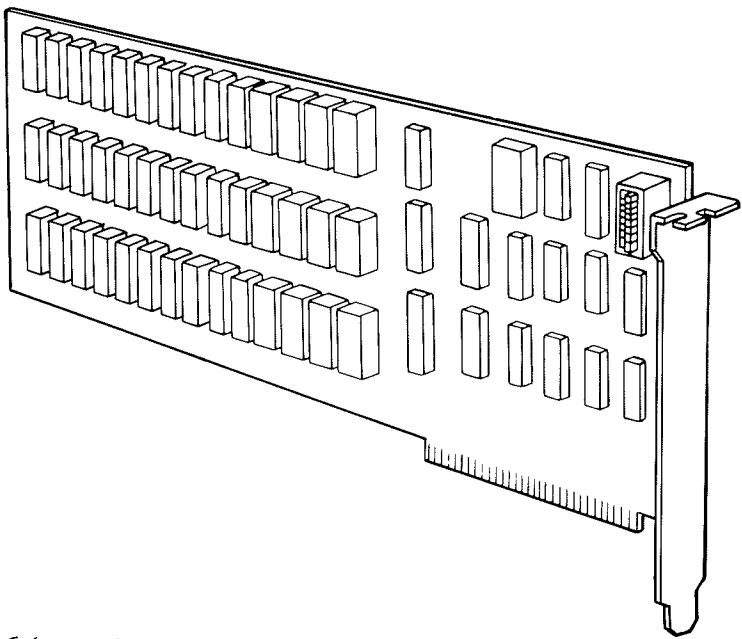**5 1/4" Diskette Drive Adapter (Right View)**

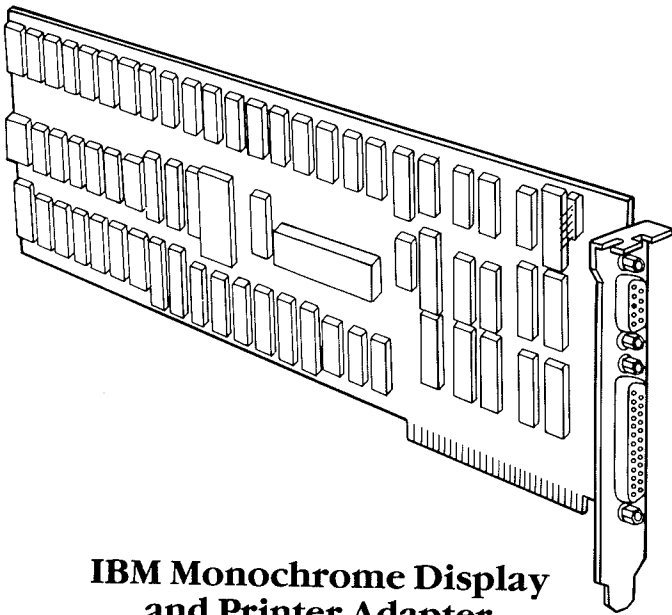**Fixed Disk Drive Adapter (Right View)**
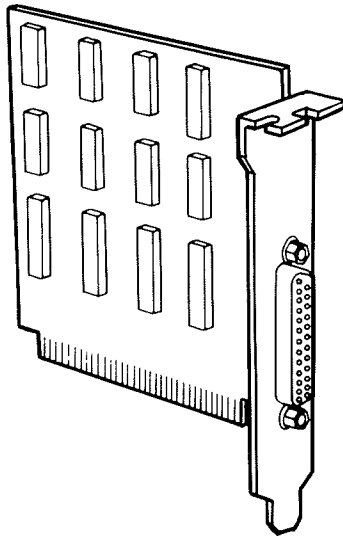
**Game Control Adapter
(Right View)**

**64 KB Memory Expansion Option
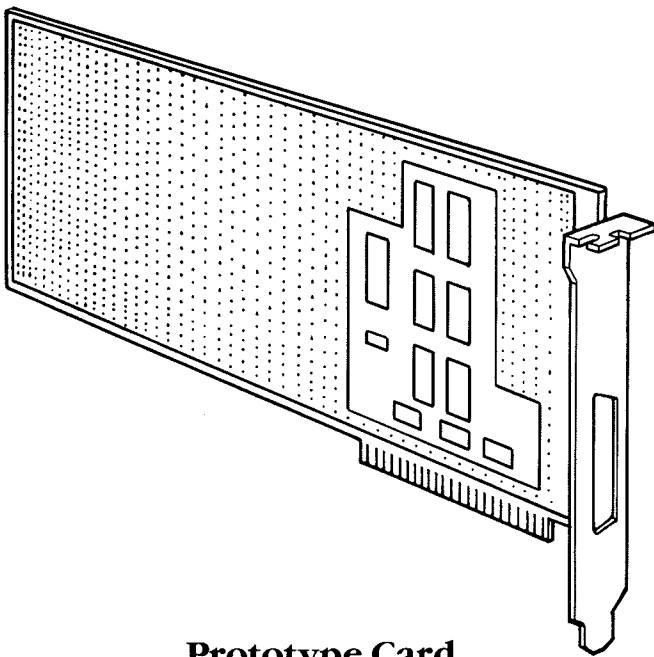(Right View)**

**64/256 KB Memory Expansion Option
(Right View)**

**IBM Monochrome Display
and Printer Adapter
(Right View)**

4-29

**Printer Adapter
(Right View)**
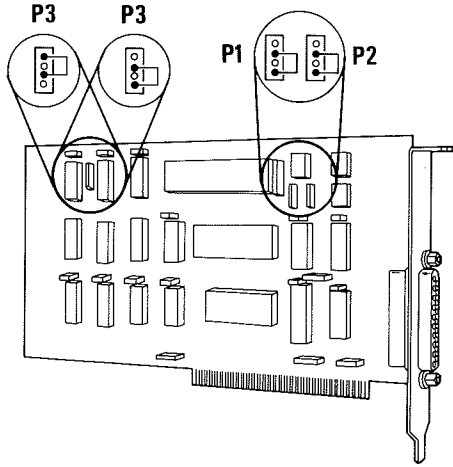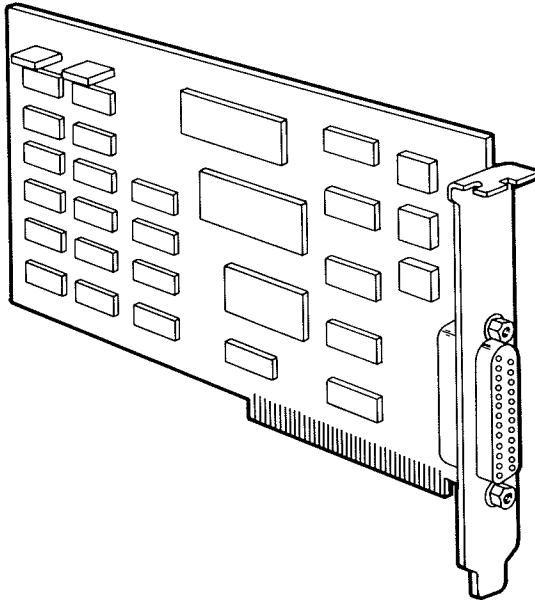
**Prototype Card
(Right View)**

Jumper Position for Primary BSC Adapter

Jumper Position for Alternate BSC Adapter

Connectors P-1 and P-2 must be jumpered as shown for correct operation of the adapter.

P3 P3

P1 P2

Binary Synchronous Communications Adapter And Adapter Address (Right View)

Synchronous Data Link Control Adapter (Right View)

Notes:

Option Parameters

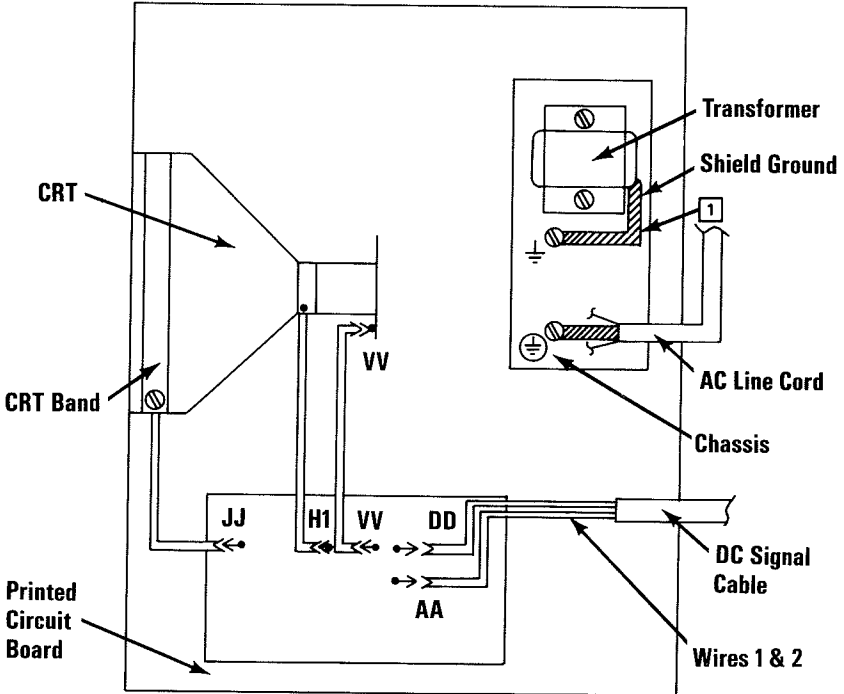|	
Monochrome Display and Printer Adapter	May be installed in the system unit only.
5-1/4" Diskette Drive Adapter	
32KB Memory Expansion Option . . .	
64KB Memory Expansion Option . . .	
64/256KB Memory Expansion Option	
BSC Adapter	May be installed in the system unit or expansion unit. SDLC and Alternate BSC are incompatible.
Game Control Adapter	
SDLC Communications Adapter	
Prototype Card	
Printer Adapter	
Color/Graphics Monitor Adapter	May be installed in the system unit. May be installed in the expansion unit only if the monochrome display and printer adapter is installed in the system unit.
Fixed Disk Drive Adapter	Will be installed in the expansion unit.
Asynchronous Communications Adapter	May be installed in the system unit or expansion unit.

Notes:

Safety Ground Locations
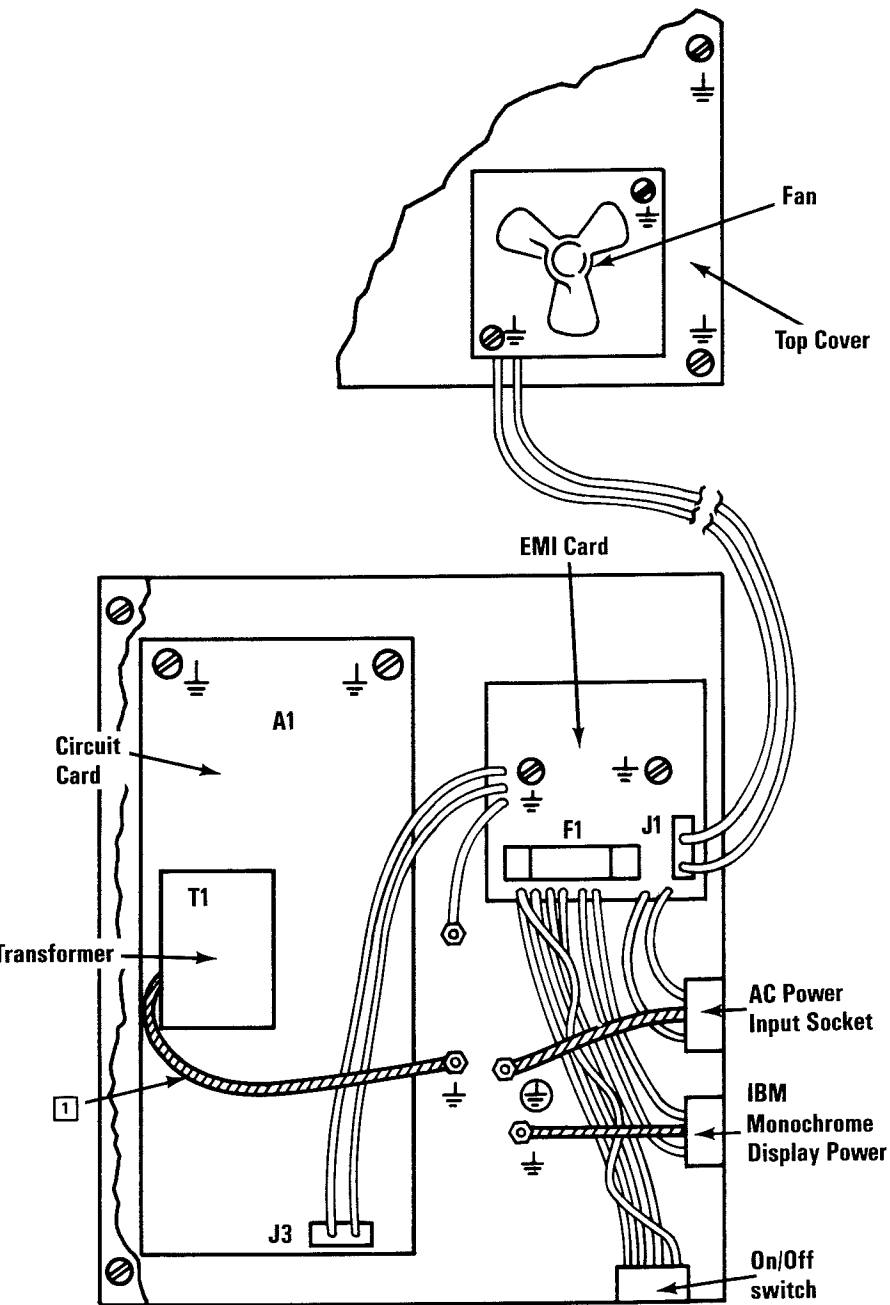
Note: JJ, H1, VV, AA
and DD joined
by printed cir-
cuit lands on
board.

IBM Monochrome Display

Legend

(symbol)	Screw Connection	/////////	Ground Lead
●	Soldered Connection	(symbol)	Primary Ground
(symbol)	Plugged Connection	⊥	Chassis Ground

1	This lead only present on 220/240 Vac machines.

Fan

Top Cover

EMI Card

Circuit
Card

A1

T1

Transformer

1

J3

F1   J1

AC Power
Input Socket

IBM
Monochrome
Display Power

On/Off
switch

System Unit & Expansion Unit Power Supply

4-36

220/240 Vac

Fuse-Filter Card   AC Power Socket   Transformer   Chassis

Fuse

110/120 Vac

AC Power Cord   Shield Ground
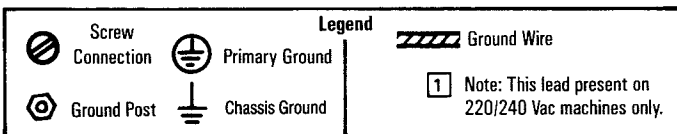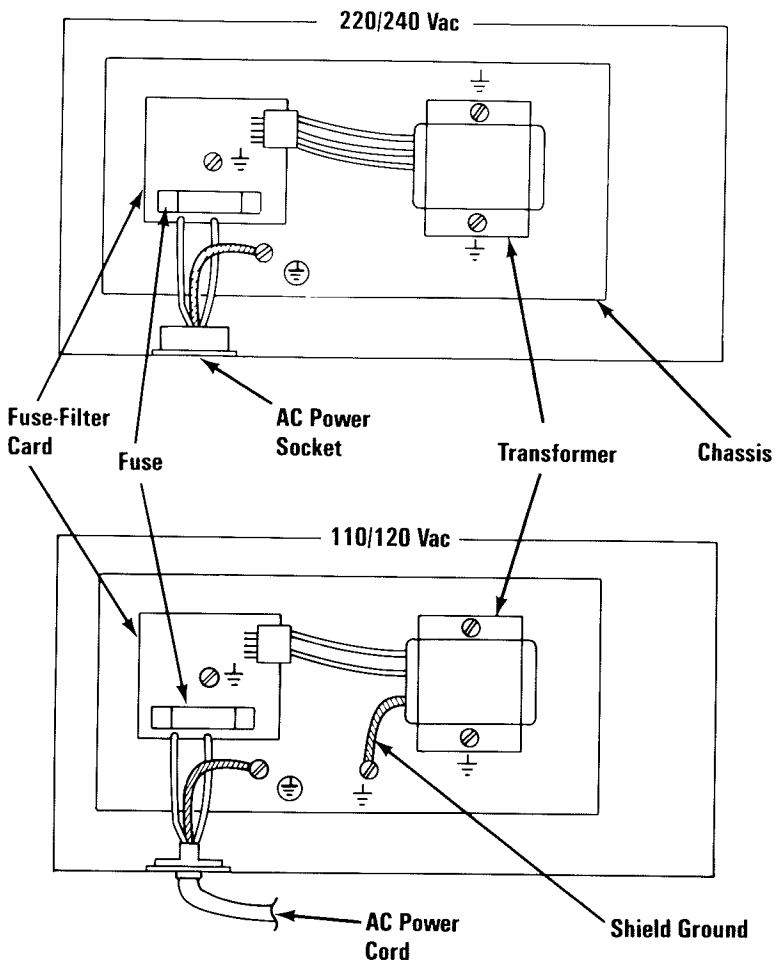
IBM 80 CPS Printer

Legend		
⊘ Screw Connection		⏚ Primary Ground
▨▨▨ Ground Lead		⏚ Chassis Ground
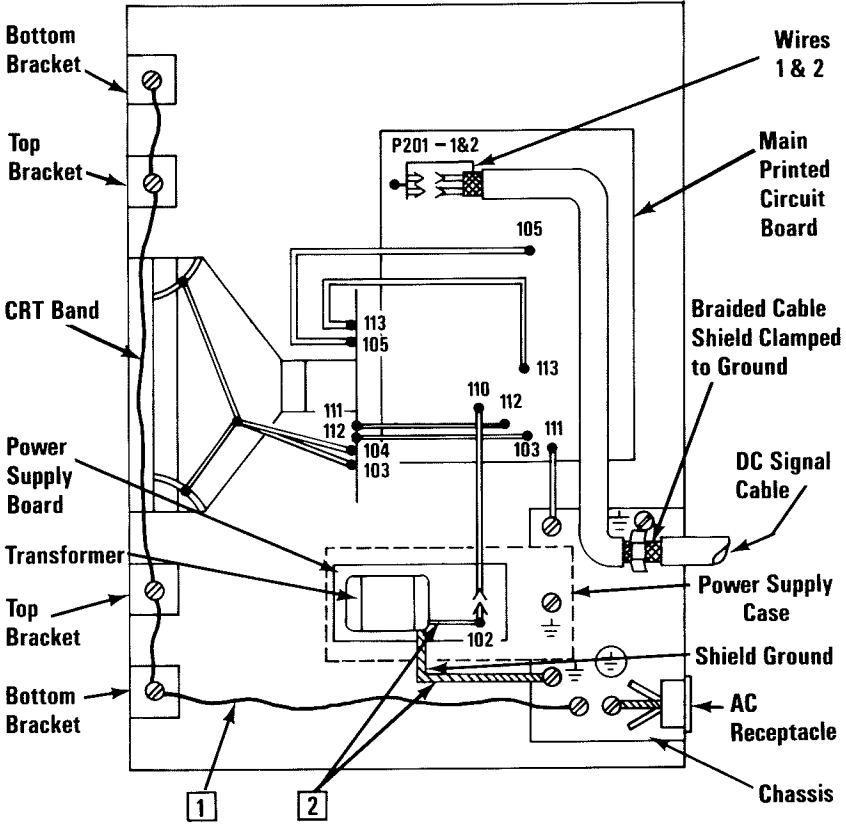
IBM Color Display

Legend

⊘	Screw Connection	▨▨▨	Ground Lead
●	Soldered Connection	⏚	Primary Ground
⇓	Plugged Connection	⏚	Chassis Ground

Note: Points 103, 105, 110, 111, 112, 113, and P201-1&2 on main board are joined by printed circuit lands.

1 Not present on U.S. only displays
2 Present only on model-002 displays

System Unit

Power
Supply
Vent

Display Power
(IBM Monitor)

System
Power

Keyboard
Connector

Cassette
Connector
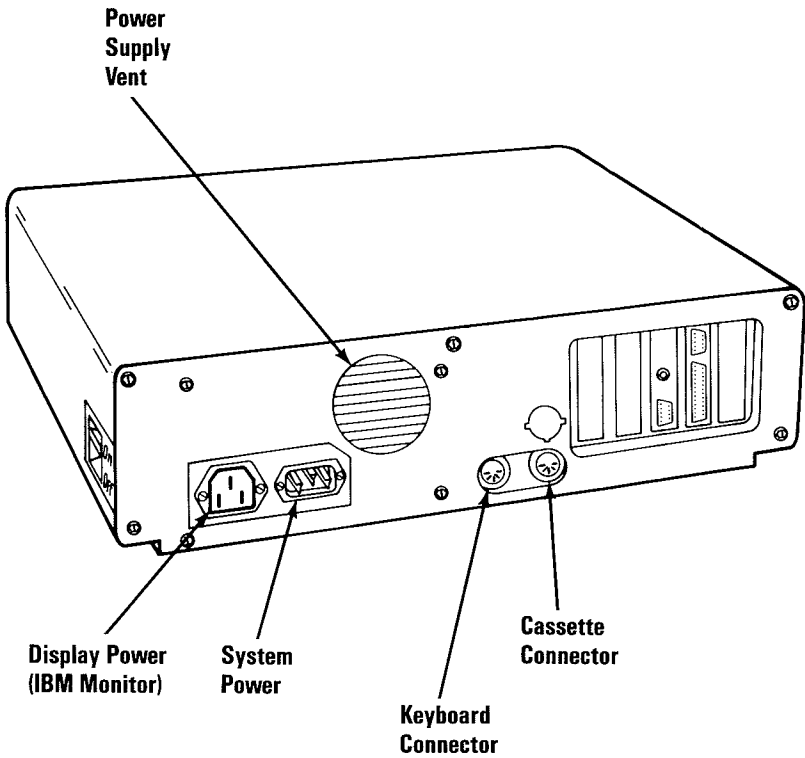
System Unit
(Rear View)

**System Unit
(Top View)**

Cassette

System Expansion Slots   Keyboard   System Board Power Connections

J1 J2   J3   J4   J5   J6   J7

Color Trimmer Capacitor

Read Only Memory

Math Coprocessor

8088 Processor

16-64K CPU or 64KB-256KB CPU

Switch Block 2

Switch Block 1

Bank 0

Bank 1

16K or 64K Random Access Memory Modules

Bank 2

Bank 3

Pin 1   Speaker Output   P3   P4

Cassette Microphone or Auxiliary Select
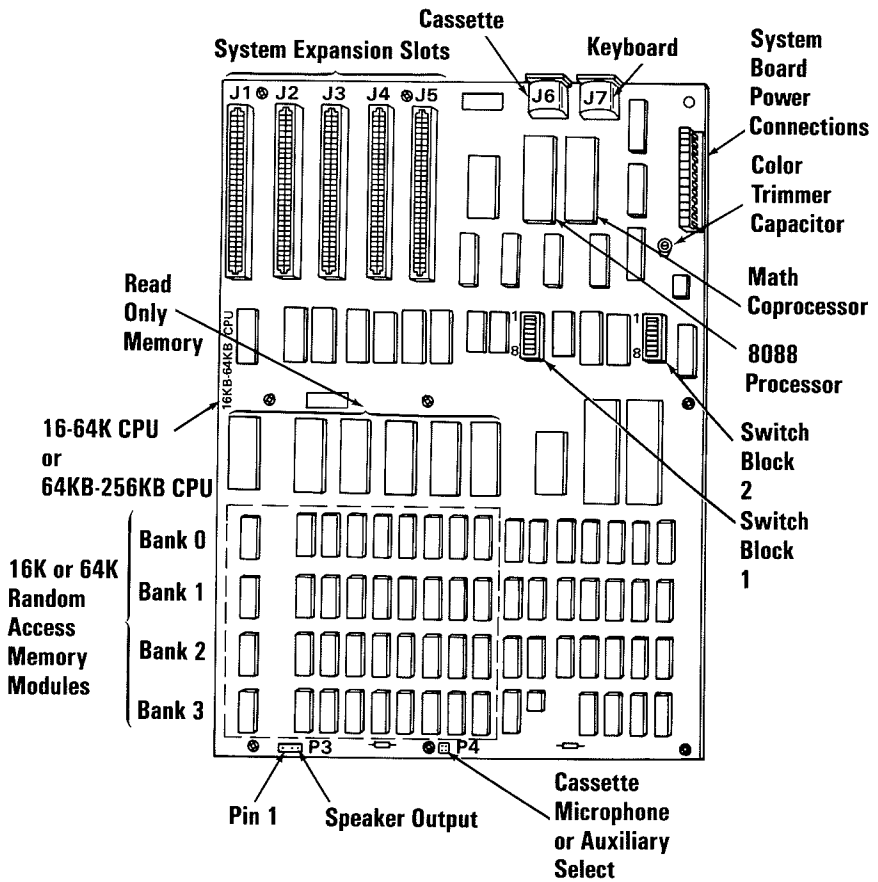
System Board (Top View)

Notes:

SECTION 5. REMOVAL/ REPLACEMENT AND ADJUSTMENTS

To use this section, locate the assembly you are servicing in the section index. Each removal, replacement, or adjustment for a field replaceable unit (FRU) is identified by a reference number. Reference numbers are located in the upper right hand corner of each page. Note that they refer to both the removal and replacement procedure for that FRU.

When a step is explained fully by another procedure, you can refer back to that procedure by using the reference number in parenthesis. For example:

1. Set the Power switch to Off.
2. Remove the system unit cover **(5900)**.
3. Remove the screw holding the speaker.
etc.

In the example, step 2 refers you to reference number **5900** for complete instructions on removal of the system unit cover.

Notes:

Diskette Drive Type 1

Diskette Drive Type 2

Fixed Disk Drive

Display

Expansion Unit

Keyboard

Printer (IBM 80 CPS Matrix or Graphics Printer)

Option Adapters

System Unit

Notes:

Diskette Drive Type 1

Cone Assembly Removal

1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Set all external Power switches off (printer, TV, etc.).
3. Unplug the system unit's (and expansion unit's) power cords from the wall outlet.
4. Disconnect all cables from the rear of the system unit.
5. Remove the system unit's cover **(5900)**.
6. Remove the diskette drive printed circuit board **(5120)**.
7. Remove the cone lever arm **(5105)**.
8. Compress the cone assembly to relieve spring tension and remove the retaining clip from the top of shaft.
9. Release the spring tension and allow the cone assembly to separate from cone lever arm.
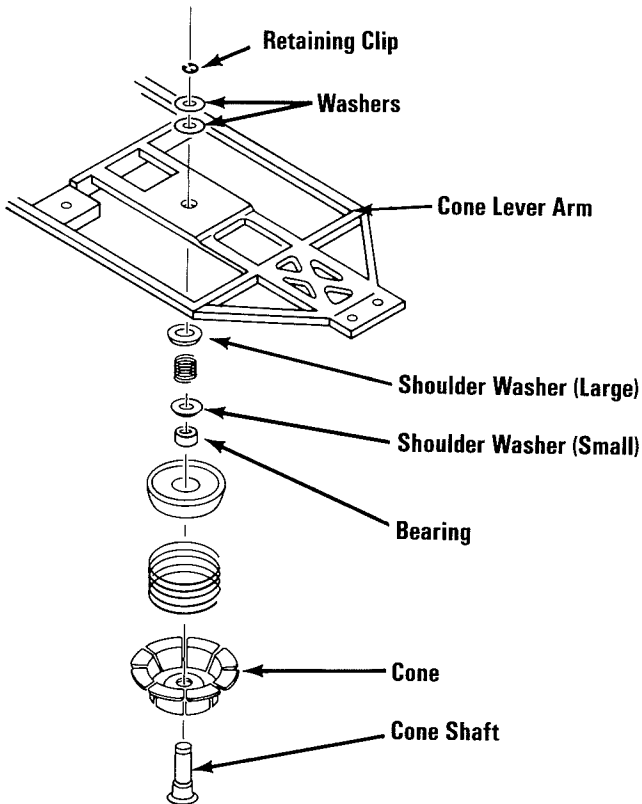
Cone Assembly Replacement 5100

1. Arrange the cone assembly parts as shown in the figure with the shaft through the cone lever arm and the spring compressed.
2. Replace the retaining clip on the shaft.
3. Replace the cone lever arm.
4. Replace the diskette drive's printed circuit board.
5. Replace the system unit's cover.
6. Reconnect all cables.
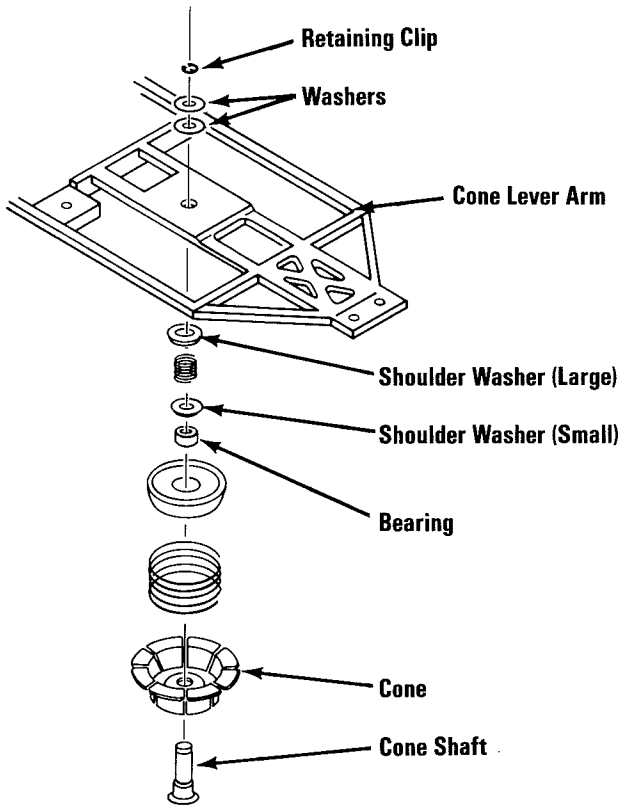
1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Set all external Power switches off (printer, TV, etc.).
3. Unplug the system unit's (and expansion unit's) power cord(s) from the wall outlet.
4. Disconnect all cables from the rear of the system unit.
5. Remove the system unit's cover (**5900**).
6. Remove the diskette drive's printed circuit board (**5120**).
7. Remove the wire tie attaching the index cable to the cone lever assembly.
8. Remove the index assembly.
9. Remove the two mounting screws for the cone lever arm and remove the wire tie(s) at the rear of the cone lever arm.
10. Slide the head carriage to the front of the diskette drive.
11. Release the upper arm by sliding the cone lever arm to the rear of the diskette drive.
12. Lift the cone lever arm out of the diskette drive.
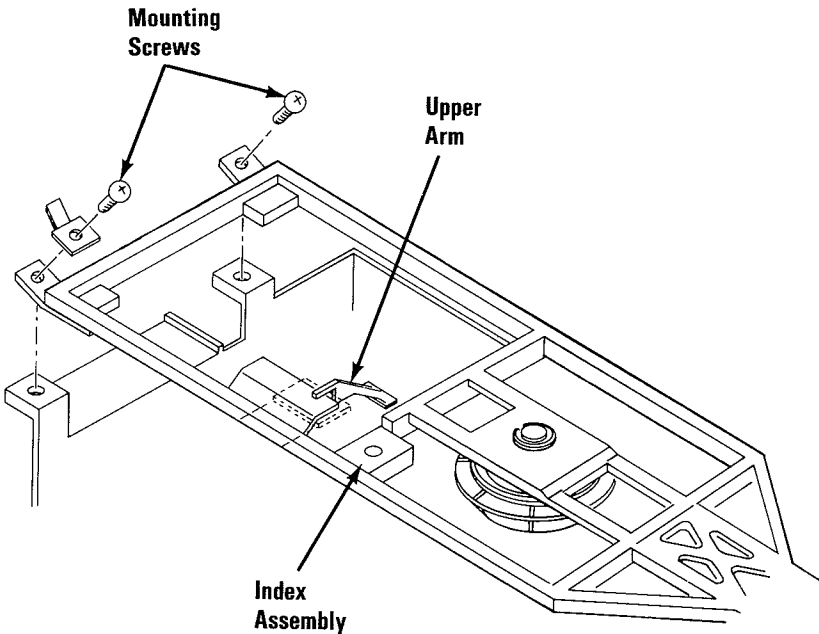
Mounting Screws

Upper Arm

Index Assembly

1. Insert the latch assembly in its tracks; move the latch to the front of the diskette drive.
2. Carefully lower the cone lever arm and lift the upper arm over the cone lever arm.
3. Replace the mounting screw(s); do not tighten.
4. Replace the index assembly with the mounting screw.
5. Tie the emitter harness to the cone lever arm.
6. Close the latch assembly to engage the cone and hub.
7. Place the cone lever arm so that the cone assembly is centered over the drive hub; tighten the screw(s).
8. Replace the diskette drive's printed circuit board **(5120)**.
9. Replace the system unit's cover **(5900)**.
10. Reconnect all cable(s).
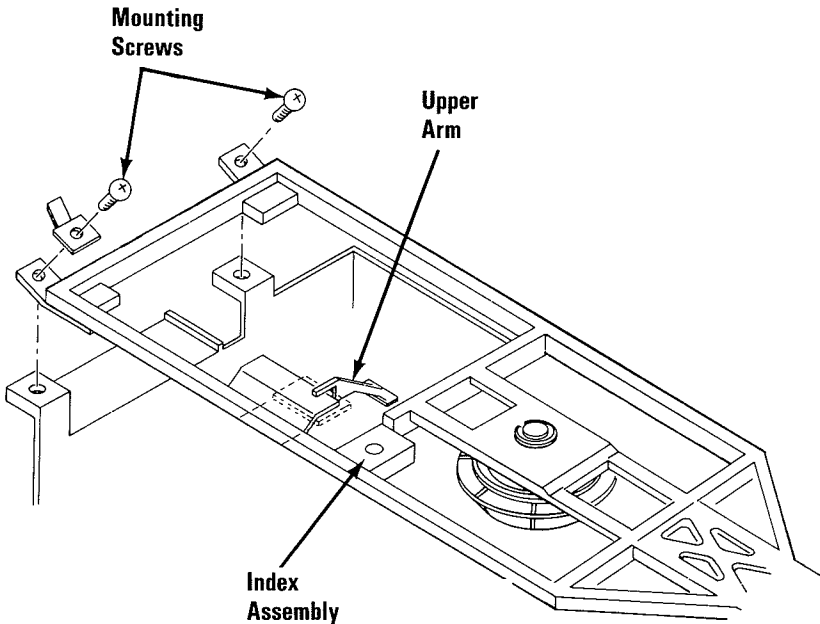
**Mounting
Screws**

**Upper
Arm**

**Index
Assembly**

1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Set all external Power switches off (printer, TV, etc.).
3. Unplug the system unit's (and expansion unit's) power cords from the wall outlet.
4. Disconnect all cables from the rear of the system unit.
5. Remove the system unit's cover **(5900)**.
6. Disconnect the signal cable from the diskette drive printed circuit board.
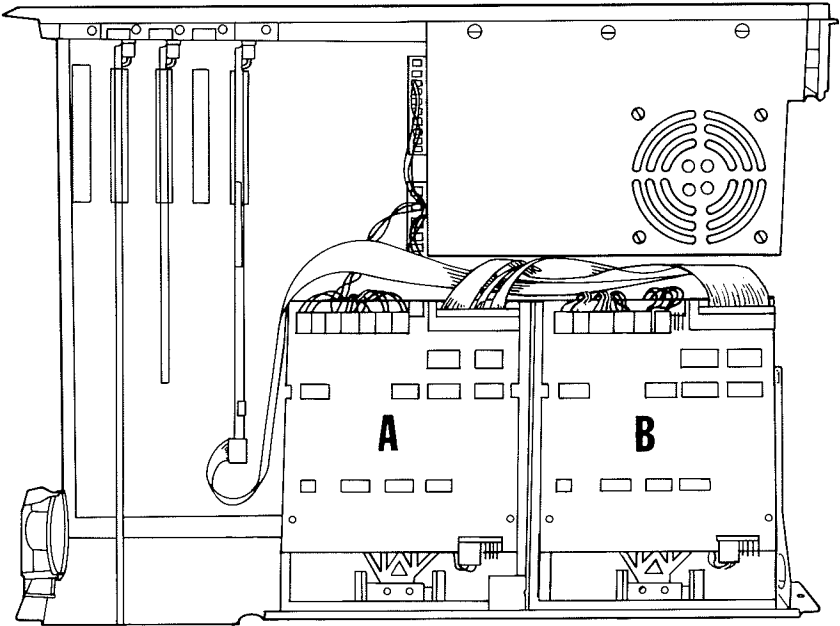
7. Some of the option adapters have to be removed in order to remove the diskette drive mounting screws.

8. Remove the two mounting screws on the left side of diskette drive A.

This connector is present only on 320KB drives.

Mounting Screws

9. Slide the diskette drive approximately two inches out of the system unit. Remove the power connector from the diskette drive printed circuit board.

This connector is present only on 320KB drives.
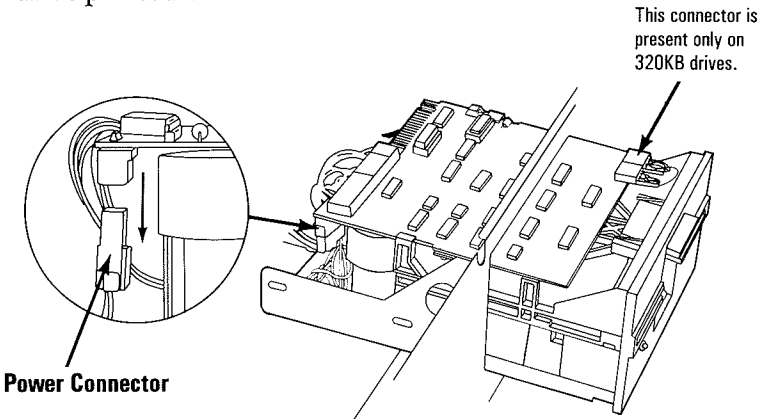
Power Connector

(Side View)

10. Remove the diskette drive from the system unit.

Type 1 5-12

Diskette Drive A Replacement 5110

1. Slide diskette drive A in until the front panel is approximately two inches from the frame. Connect the power cable to the diskette drive printed circuit board.

This connector is present only on 320KB drives.

Power Connector

Face Plate

Front Panel

(Side View)

Diskette Drive A Replacement (cont.) 5110

2. Slide diskette drive A in until the face plate is even with the front panel.
3. Route the signal cable between the diskette drive and power supply.
4. Connect the end of the signal cable to the diskette drive.
5. Install the two mounting screws. Adjust the diskette drive in or out for a clearance of .040" between the rear of the front panel and the face plate. Tighten the screws.

This connector is present only on 320KB drives.

Front Panel

Mounting Screws

Face Plate

(Side View)
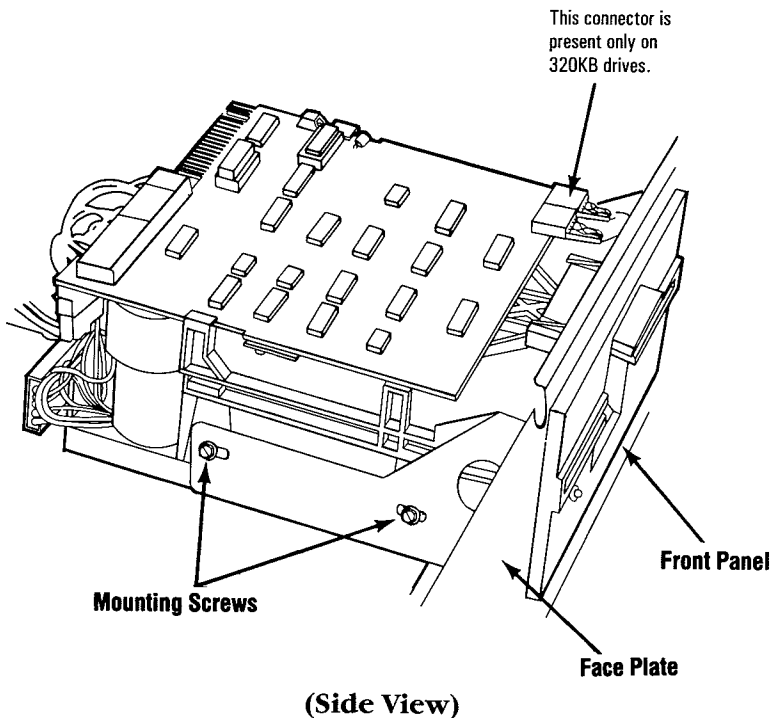
6. Install the option adapter(s) you removed.
7. Install the system unit's cover (5900).
8. Reconnect all cables.

Diskette Drive B Removal 5115

1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Set all external Power switches off (printer TV, etc.).
3. Unplug the system unit's (and expansion unit's) power cords from the wall outlet.
4. Disconnect all cables from the rear of the system unit.
5. Remove the system unit's cover **(5900)**.
6. Disconnect the signal cable from the diskette drive printed circuit board.

7. Remove the two mounting screws on the right side of the diskette drive.

Mounting Screws

8. Slide the diskette drive approximately two inches out of the system unit. Remove the power connector from the diskette drive printed circuit board.
9. Remove the diskette drive's signal cable.
10. Remove the diskette drive from the system unit.

Power Connector

This connector is
present only on
320KB drives.
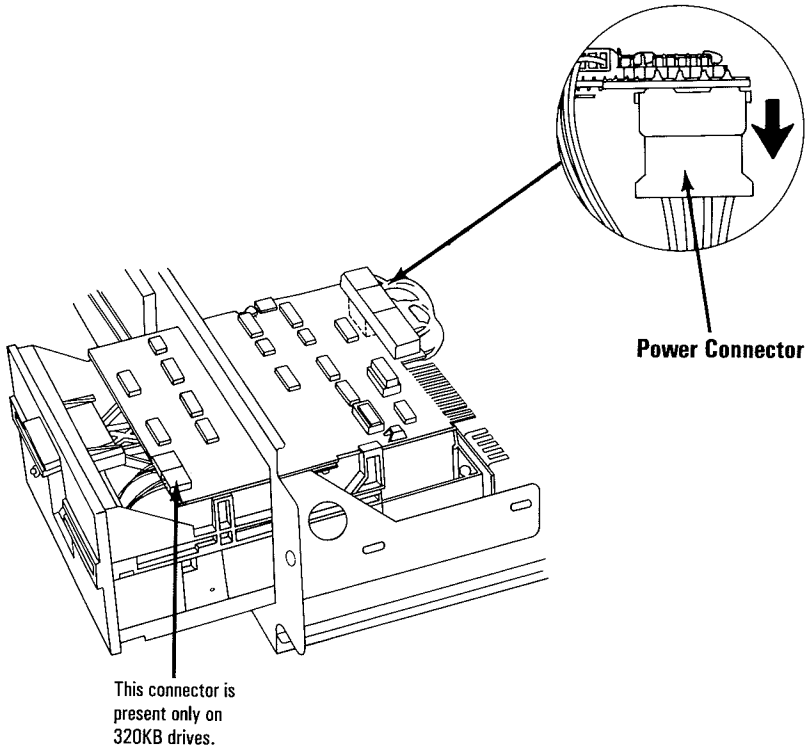
(Side View)

1. Slide the diskette drive in until the front panel is approximately two inches from the frame. Connect the power cable to the diskette drive printed circuit board.

Power Connector

Front Panel   This connector is present only on 320KB drives
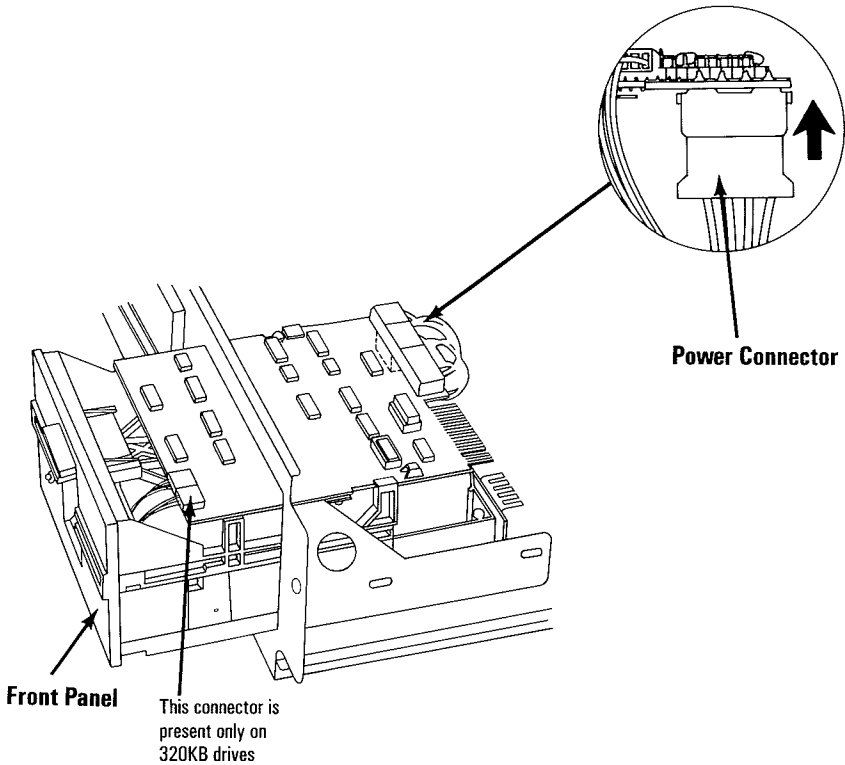
(Side View)

2.   Slide the diskette drive in until the face plate is even with the front panel.
3.   Route the signal cable between the diskette drive and power supply.
4.   Connect the end of the signal cable to the diskette drive.
5.   Install the two mounting screws. Adjust the diskette drive in or out for a clearance of .040″ between the rear of the front panel and the face plate. Tighten the screws.

B

Face Plate

Front Panel

Mounting Screws

.040″
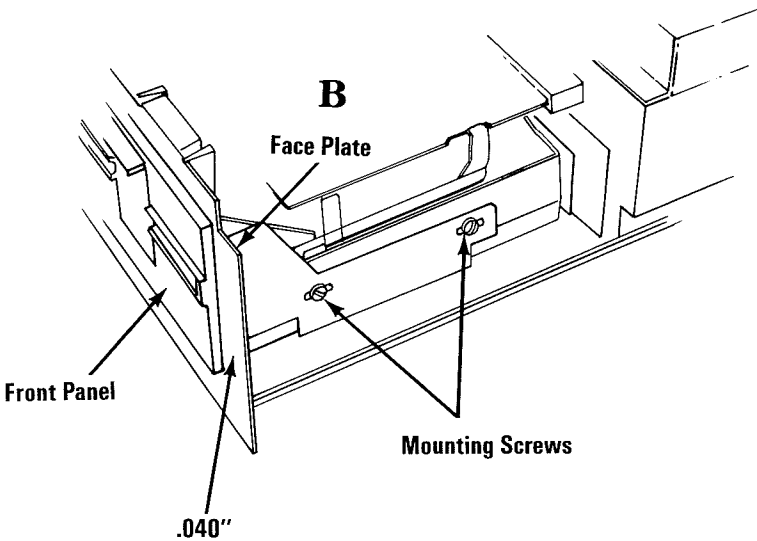
(Side View)

6.   Remove the terminating resistor only on drive B.
7.   Replace the system unit's cover **(5900)**.
8.   Reconnect all cables.

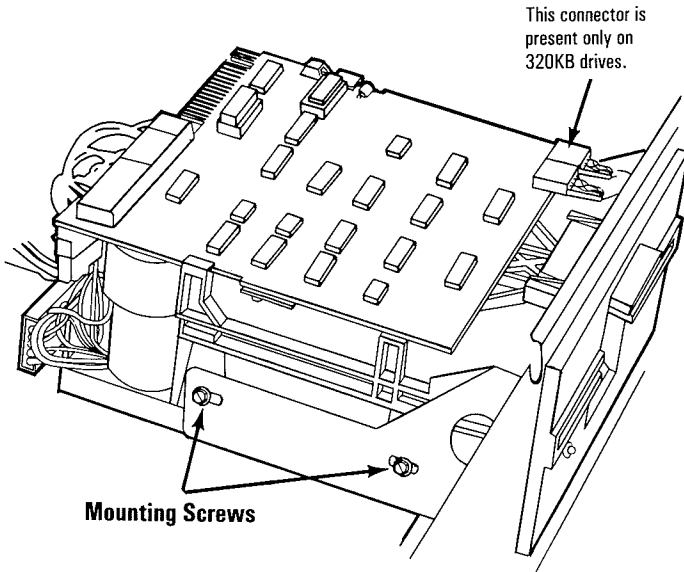# Diskette Drive Logic Printed Circuit Board Removal

1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Set all external Power switches off (printer, TV, etc.).
3. Unplug the system unit's (and expansion unit's) power cords from the wall outlet.
4. Disconnect all cables from the rear of the system unit.
5. Remove the system unit's cover **(5900)**.
6. Disconnect connectors 8 through 13 from the left rear of the diskette drive printed circuit board.
7. Disconnect connectors 5 and 6 from the right front of the diskette drive printed circuit board.
8. Disconnect the diskette drive's signal cable from the diskette drive printed circuit board.

Diskette Drive Signal Cable

This connector is present only on 320KB drives

(Top View)

9. Remove the two retaining screws from the top of the diskette drive printed circuit board.
10. Slide the diskette drive printed circuit board to the rear until the notches, **A**, line up with the guide brackets, **B**, then lift the diskette drive printed circuit board from the diskette drive assembly.
11. Disconnect the diskette drive power connector from the left rear of the diskette drive printed circuit board.

Diskette Power Connector

(Rear View)

B   **B**

A   **A**

Retaining
Screws

(Top View)   This connector is
present only on
320KB drives
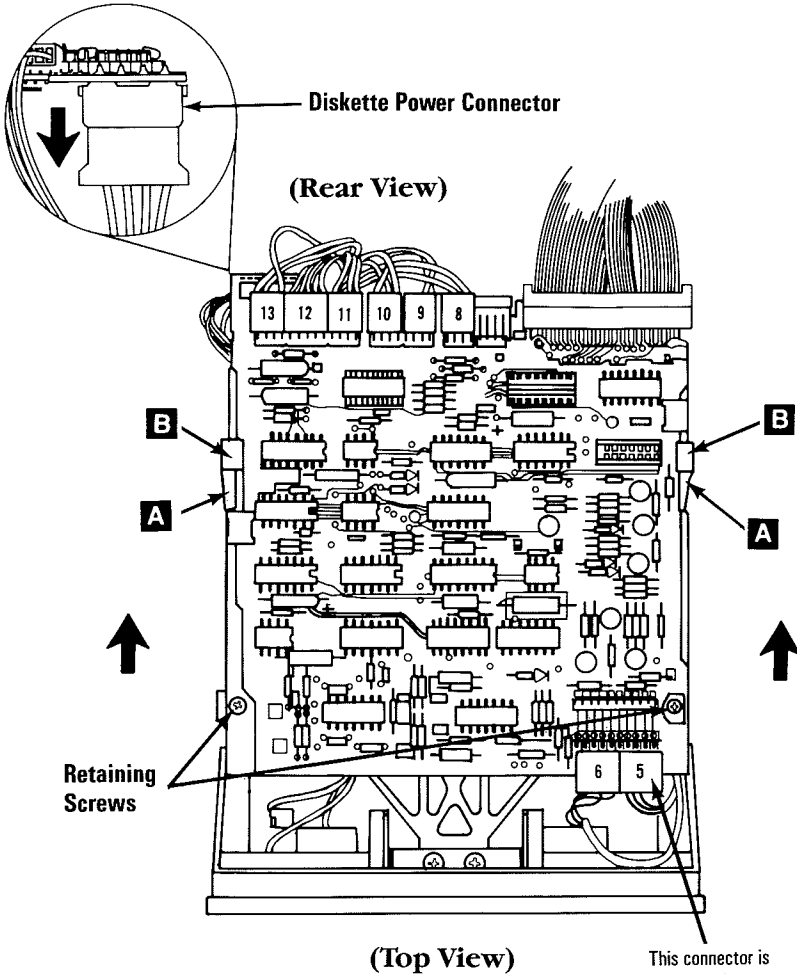
Diskette Drive Logic Printed Circuit Board Replacement

1. Connect the diskette drive's power connector at the left rear of the diskette drive printed circuit board.
2. Align the notches, **A**, on the sides of the diskette drive printed circuit board with the guide brackets, **B**, then lower the diskette drive printed circuit board onto the brackets.
3. Slide the diskette drive printed circuit board toward the front of the diskette drive until the holes in the diskette drive printed circuit board line up with the threaded holes in the frame of the diskette drive.
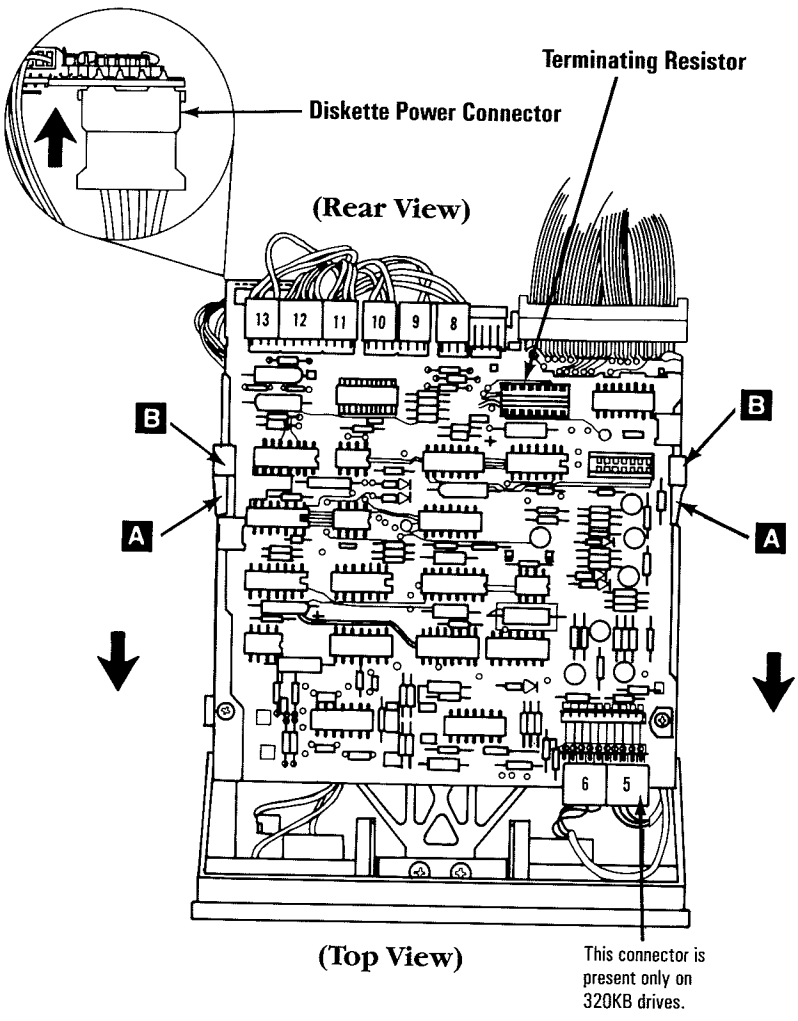
Terminating Resistor

Diskette Power Connector

(Rear View)

(Top View)

This connector is present only on 320KB drives.

4. Replace the diskette drive printed circuit board retaining screws.
5. Connect connectors 8 through 13 at the left rear of the diskette drive printed circuit board.
6. Connect connectors 5 and 6 at the right front of the diskette drive printed circuit board.
7. Connect the diskette drive's signal cable to the right rear of the diskette drive printed circuit board.
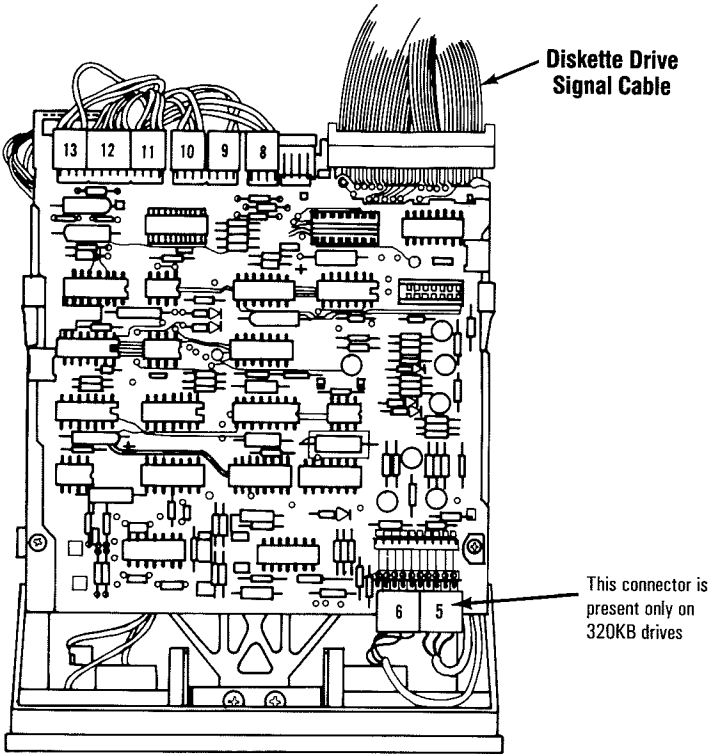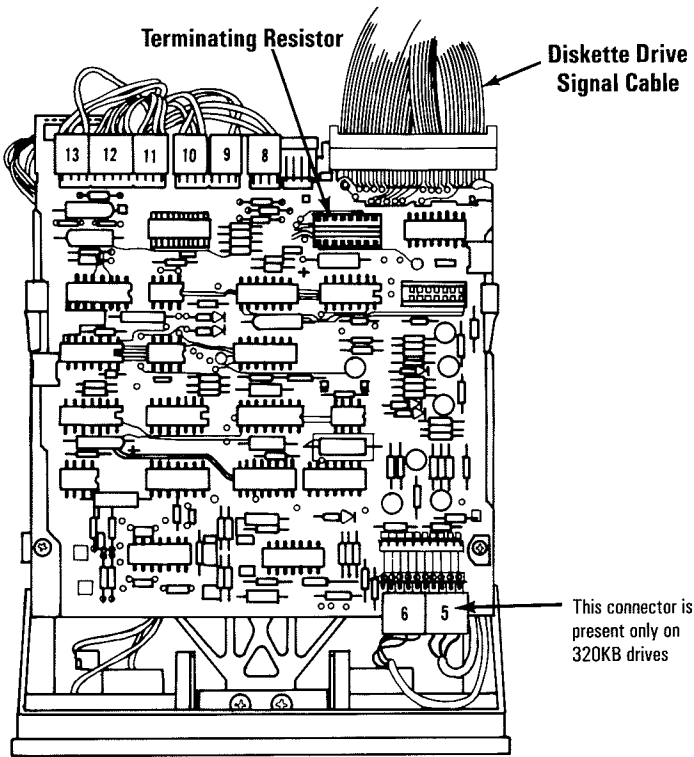

(Top View)

8. Remove the terminating resistor only on drive B.
9. Replace the system unit's cover **(5900)**.
10. Reconnect all cables.

1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Set all external Power switches off (printer, TV, etc.).
3. Unplug the system unit's (and expansion unit's) power cords from the wall outlet.
4. Disconnect all cables from the rear of the system unit.
5. Remove the system unit's cover **(5900)**.
6. Remove the diskette drive **(5110)** or **(5115)**.
7. Carefully place the diskette drive on a work surface with drive belt and pulleys facing up.
8. Lift the belt off the large pulley, then off the small pulley.
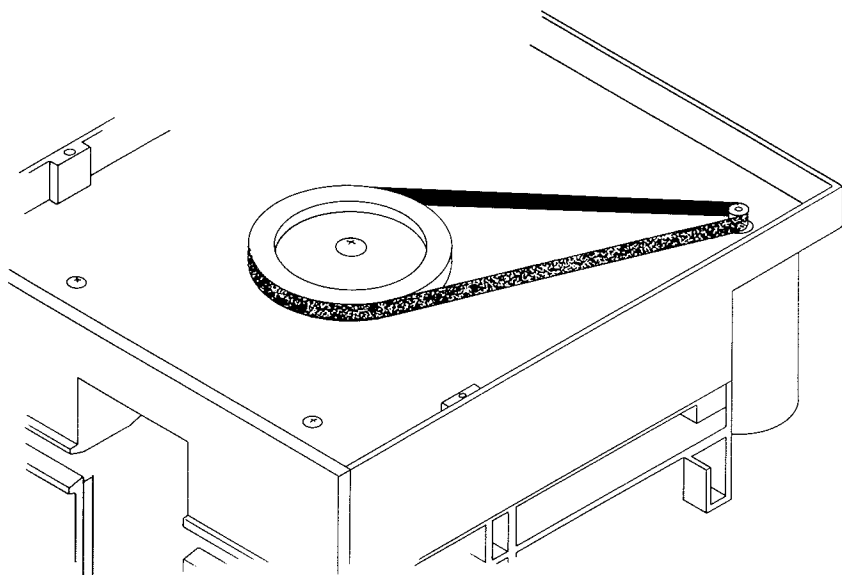
(Bottom View)

Drive Belt Replacement

1. Place the drive belt around the small pulley (dark, shiny side facing pulleys), then place the belt around the large pulley.
2. Replace the diskette drive **(5110)** or **(5115)**.
3. Replace the system unit's cover **(5900)**.
4. Reconnect all cables.

Drive Motor Removal

1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Set all external Power switches off (printer, TV, etc.).
3. Unplug the system unit's (and expansion unit's) power cords from the wall outlet.
4. Disconnect all cables from the rear of the system unit.
5. Remove the system unit's cover **(5900)**.
6. Remove the diskette drive printed circuit board **(5120)**.
7. Remove the diskette drive **(5110)** or **(5115)**.
8. Carefully place the diskette drive on a work surface with the drive belt and pulleys facing up.
9. Disconnect connector 21 from the servo board.
10. Remove the drive belt **(5125)**.
11. Remove the drive motor's mounting screws and shouldered washers.
12. Carefully pull the drive motor out of the diskette drive.

Type 1 5-24

Drive Motor Replacement   5130
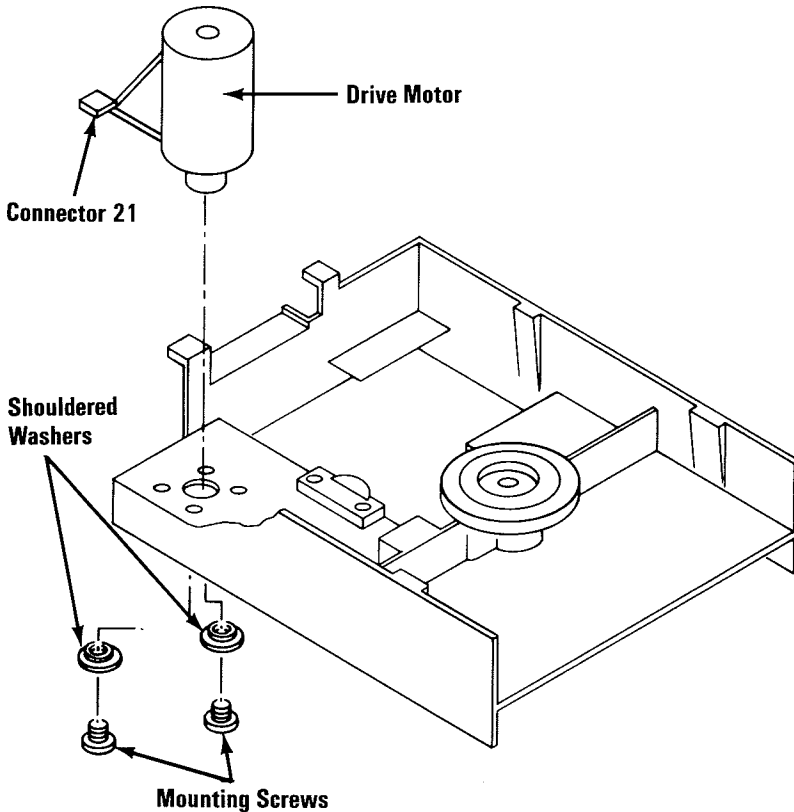
1. Place the drive motor in position, with the threaded holes in the motor aligned with the holes in the frame (motor wiring harness should face the rear of the machine).
2. Replace the mounting screws and shouldered washers.
3. Replace the drive belt **(5125)**.
4. Connect the drive motor's cable to the servo board at connector 21.
5. Replace the diskette drive **(5110)** or **(5115)**.
6. Replace the diskette drive printed circuit board **(5120)**.
7. Replace the system unit's cover **(5900)**.
8. Reconnect all cables.

Drive Motor

Connector 21

Shouldered
Washers

Mounting Screws
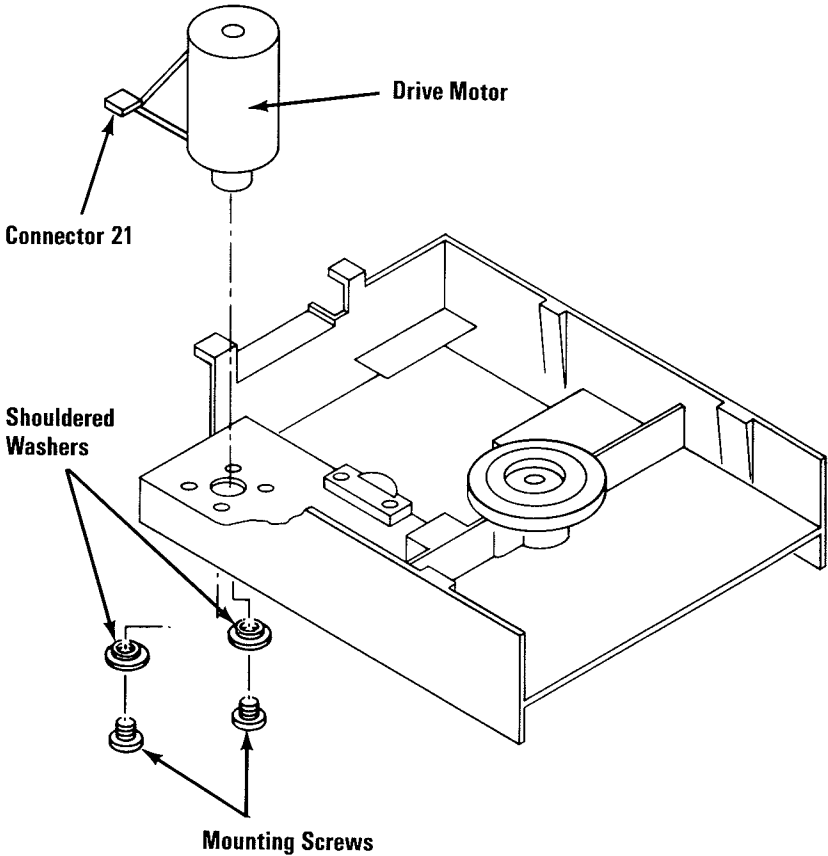
1. Insert Advanced Diagnostics diskette.
2. Set the Power switch on the expansion unit (if attached) and the system unit to On.
3. Advance to diagnostic menu 8 (refer to Diagnostic Menu Reference, Section 2).
4. In menu 8, select option 4, SPEED TEST for the diskette drive you are testing. The diskette drive's speed and the adjustment specification appear on the screen.

Note: If you are unable to load the Advanced Diagnostics diskette, or if the Speed Test will not execute, refer to the "Drive Motor Preliminary Speed Adjustment **(5136)**."

```
SPEED IS 2000

ADJUST FOR 1980 TO 2020
PRESS ANY KEY TO EXIT

SPEED IS      1999

ADJUST FOR 1980 TO 2020
```

5. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
6. Set all external Power switches off (printer, display, etc.).
7. Unplug the system unit's (and expansion unit's) power cord from the wall outlet.
8. Disconnect all cables from the rear of the system unit.
9. Remove the system unit's cover **(5900)**.
10. Remove the two mounting screws on the diskette drive that needs adjusting **(5110)** or **(5115)**.
11. Slide the diskette drive out of the system unit, approximately two inches.
12. Reconnect all cables.
13. Insert the Advanced Diagnostics diskette.
14. Set the Power switch on the expansion unit (if attached) and the system unit to On.
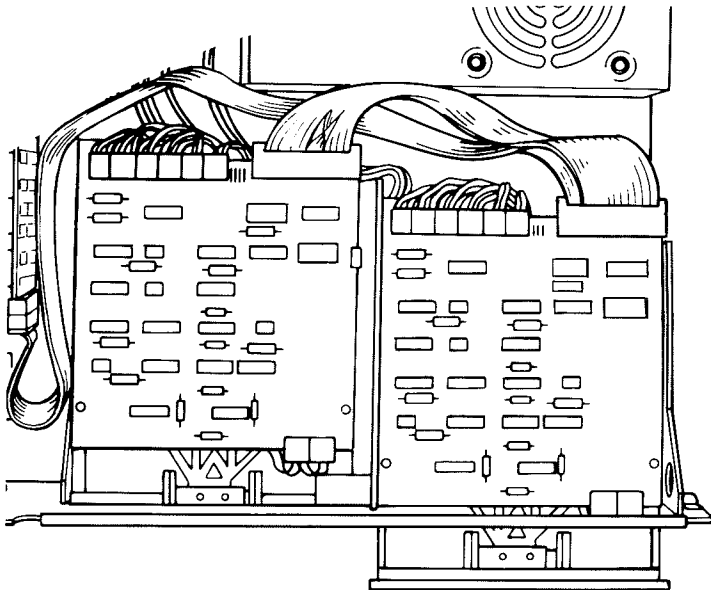
15. Advance to diagnostic menu 8 (refer to Diagnostic Menu Reference, Section 2).
16. Select option 4, SPEED TEST for the drive you are adjusting. The diskette drive's speed and the adjustment specification appear on the screen.

```
SPEED IS 2000

ADJUST FOR 1980 TO 2020
PRESS ANY KEY TO EXIT

SPEED IS     1999

ADJUST FOR 1980 TO 2020
```

17. The adjustment for the diskette drive's speed is a variable resistor on the servo board. To adjust the speed, carefully insert an insulated screwdriver down past the left end of the diskette drive's signal cable, to the adjusting screw on the top of the variable resistor.
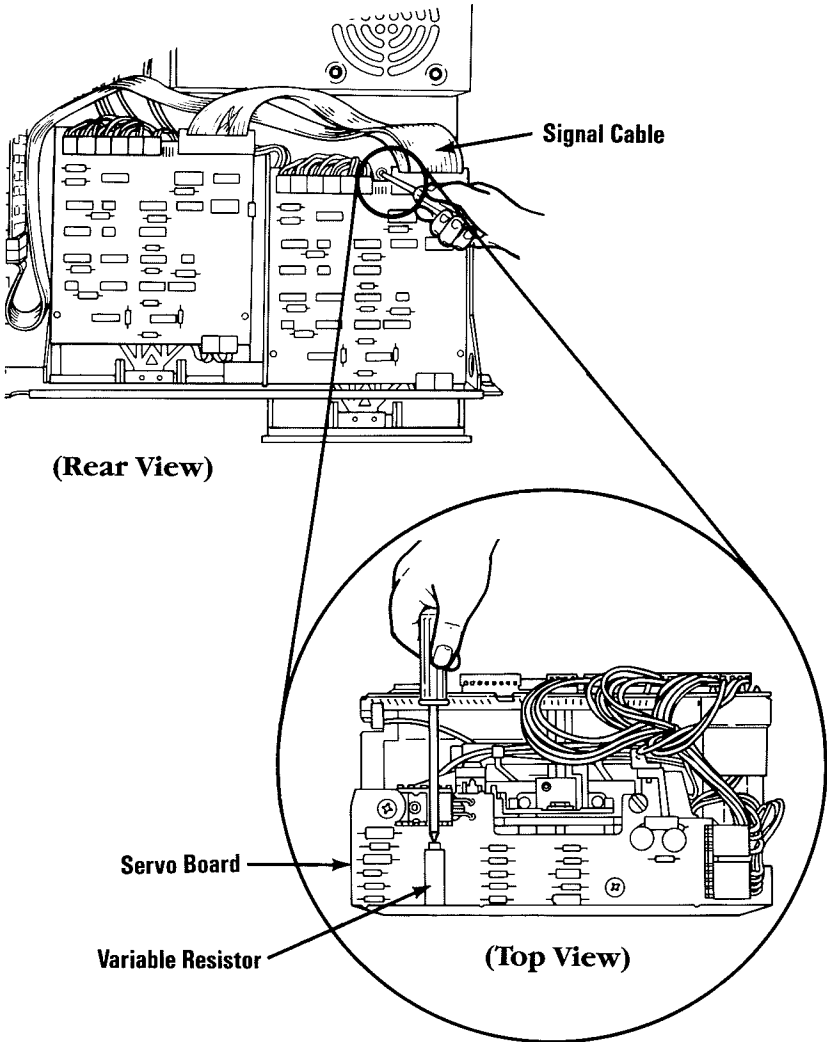
Signal Cable

(Rear View)

Servo Board

Variable Resistor

(Top View)

Type 1 5-29

18. Turn the screw until the speed shown on the screen is within the required specifications.

```
SPEED IS 2000

ADJUST FOR 1980 TO 2020
PRESS ANY KEY TO EXIT

SPEED IS     1999

ADJUST FOR 1980 TO 2020
```
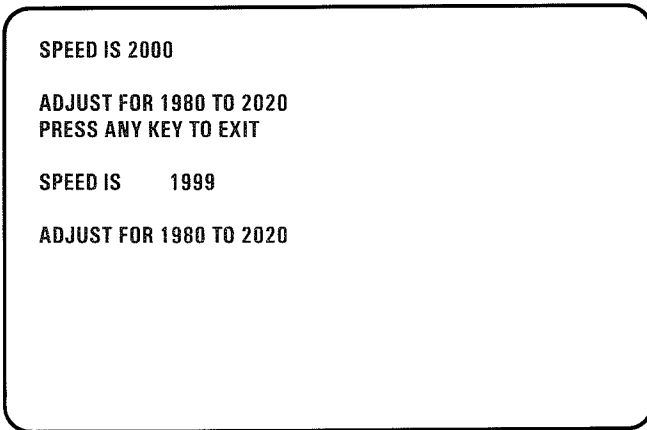
19. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
20. Set all external Power switches off (printer, display, etc.).
21. Unplug the system unit's (and expansion unit's) power cord from the wall outlet.
22. Disconnect all cables from the rear of the system unit.
23. Reinstall diskette drive **(5110)** or **(5115)**.
24. Replace the system unit's cover **(5900)**.
25. Reconnect all cables.

Drive Motor Preliminary
Speed Adjustment

Use this procedure for diskette drive A or B, or both, when the Advanced Diagnostics diskette will not load, or the Speed Test will not execute. You will need a fluorescent light for this adjustment.

1. Remove the diskette drive **(5110)** or **(5115)**.

Test Point 13

13 | 12 | 11 | 10 | 9 | 8

6 | 5

Test Point 10

(Top View)
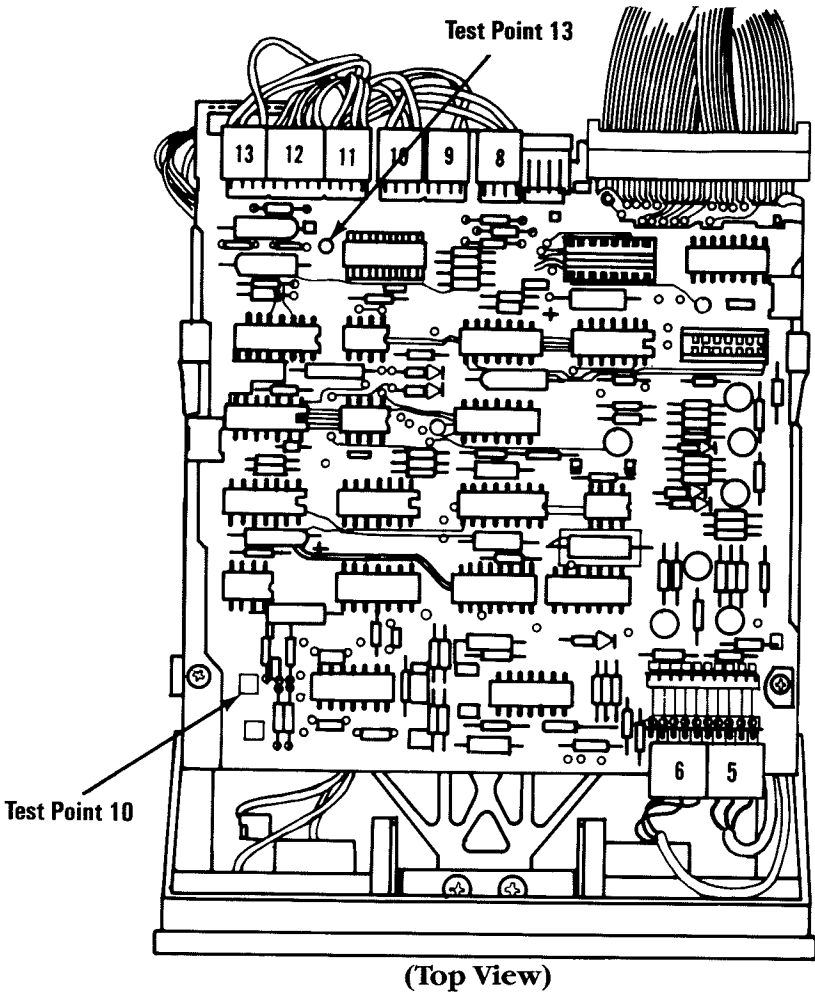
2. Insert a scratch diskette into the diskette drive.
3. Connect a jumper between test points 10 and 13 on the diskette drive printed circuit board.

4. Place the diskette drive (left side up) on the system unit's power supply as shown below.
5. Plug the power connector into the diskette drive printed circuit board, and leave the signal cable unplugged.
6. Plug the system unit's power cord into the system unit, then into the wall outlet.
7. Set the system unit's Power switch to On.
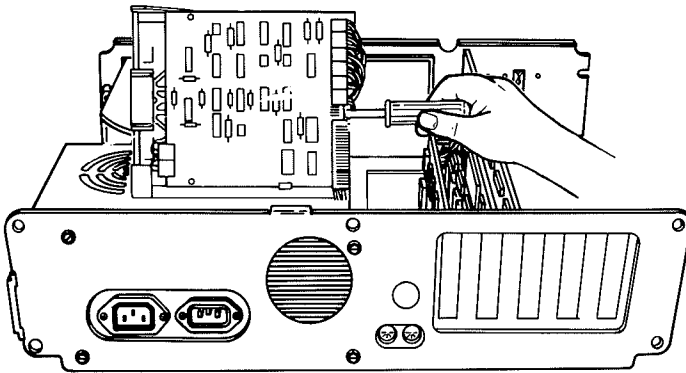
(Rear View)

8.   Observe the black strobe marks on the outer ring of the
     drive pulley and adjust the variable resistor on the servo
     board until the strobe marks appear to stand still, in
     fluorescent light.

Note: The outer ring of strobe marks is for 60 hertz, and the
inner ring is for 50 hertz.

**Bottom of
Diskette Drive**

Strobe Marks

Servo Board

Variable Resistor

(Side View)
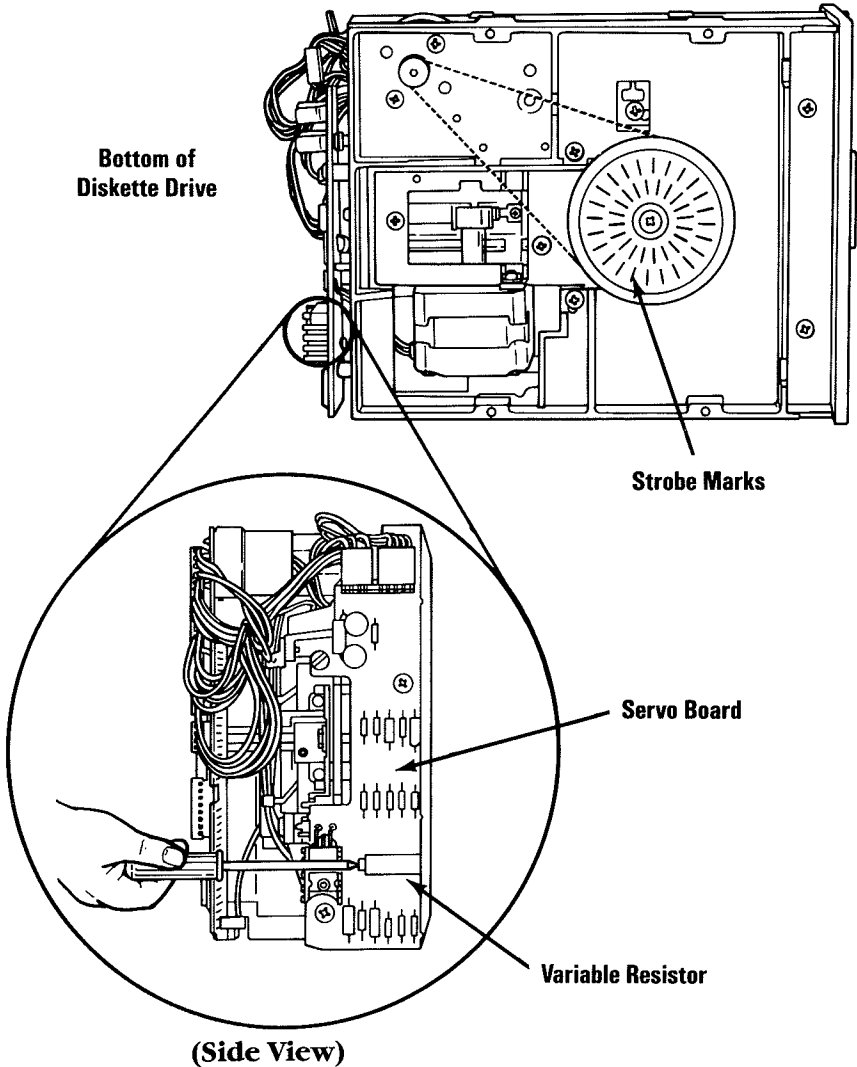
9.   Set the system unit's Power switch to Off.
10. Disconnect the system unit's power cord from the wall outlet.
11. Disconnect the system unit's power cord from the rear of the system unit.
12. Install the diskette drive **(5110)** or **(5115)**.
13. Use "Drive Motor Speed Adjustment **(5135)**" to verify the speed is within specification. Adjust if necessary.
14. Replace the system unit's cover **(5900)**.
15. Reconnect all cables.

1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Set all external Power switches off (printer, TV, etc.).
3. Unplug the system unit's (and expansion unit's) power cord(s) from the wall outlet.
4. Disconnect all cables from the rear of the system unit.
5. Remove the system unit's cover **(5900)**.
6. Remove the diskette drive **(5110)** or **(5115)**.
7. Remove the diskette drive printed circuit board **(5120)**.
8. Remove the retaining collar that holds the LED assembly to the front panel.
9. Remove the LED assembly from the front panel.
10. Remove the retaining bushings.
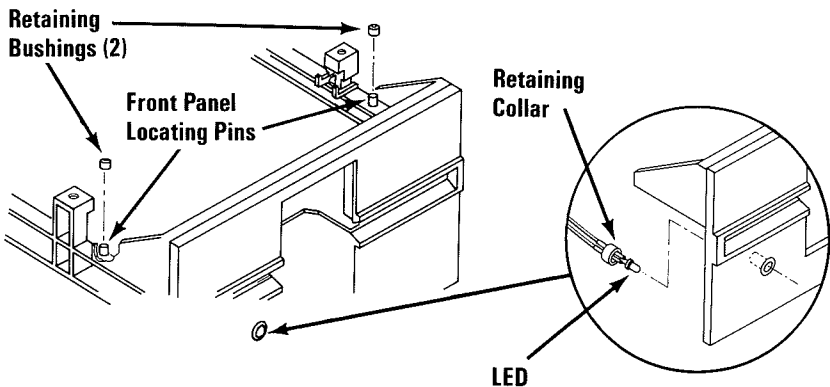
11. Carefully place the diskette drive on its side and remove the front panel mounting screws.
12. Remove the front panel from the diskette drive.

Front Panel Replacement   5140
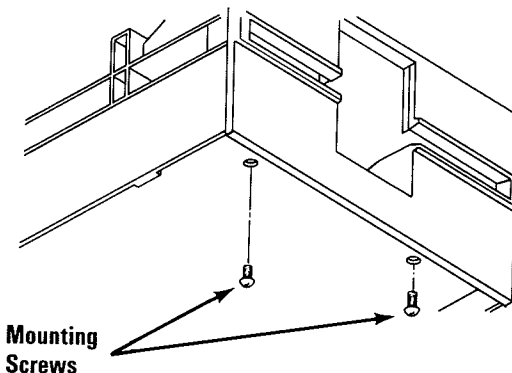
1. Insert the front panel's latch in its tracks and set the panel in place on the locating pins.
2. Install the two mounting screws that attach the front panel to the diskette drive.
3. Push the LED assembly into the grommet.
4. Push the retaining collar over the back of the LED grommet.
5. Replace the retaining bushings.

6. Replace the diskette drive printed circuit board (5120).
7. Replace the system unit's cover (5900).
8. Reconnect all cables.

1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Set all external Power switches Off (printer, TV., etc.).
3. Unplug the system unit's (and expansion unit's) power cords from the wall outlet.
4. Disconnect all cables from the rear of the system unit.
5. Remove the system unit's cover **(5900)**.
6. Remove diskette drive printed circuit board **(5120)**.
7. Close the latch and lightly hold the cone lever arm down while removing the latch mounting screws.
8. Lift the latch inhibitor out of the diskette drive.
9. Slide the latch assembly out through the slots in the rear of the front panel.

Mounting Screws

Latch Inhibitor

Latch Assembly
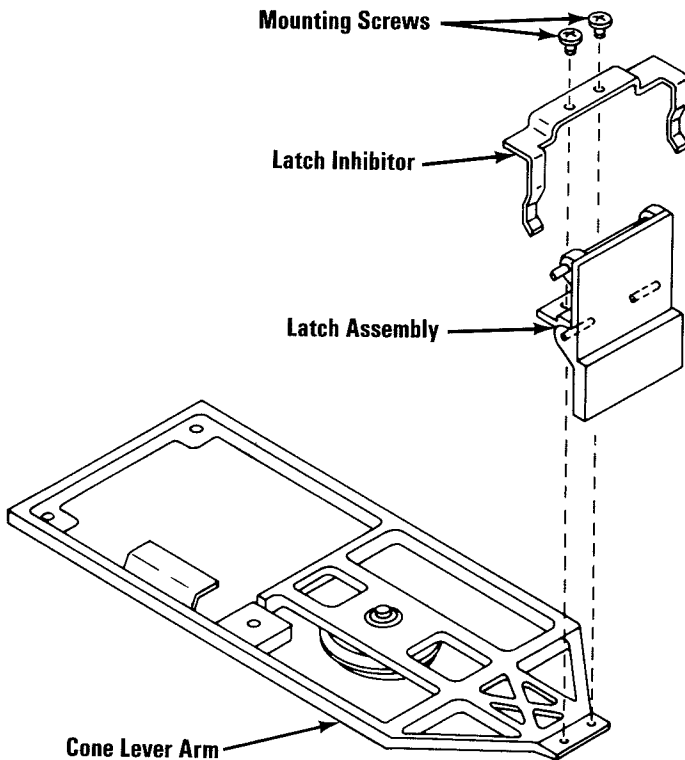
Cone Lever Arm

1. Slide the latch assembly into the slots at the rear of the front panel.
2. Lightly hold the cone lever arm down, and align the two mounting holes in the latch assembly with the holes in the front of the cone lever arm.
3. Align the latch inhibitor with the two holes in the latch assembly and replace the screws; do not tighten the screws.
4. Align the latch with the front panel, and align the latch inhibitor so it will just touch a fully inserted diskette; then tighten the screws.
5. Replace the diskette drive printed circuit board **(5120)**.
6. Replace the system unit's cover **(5900)**.
7. Reconnect all cables.

Mounting Screws

Latch Inhibitor

Latch Assembly

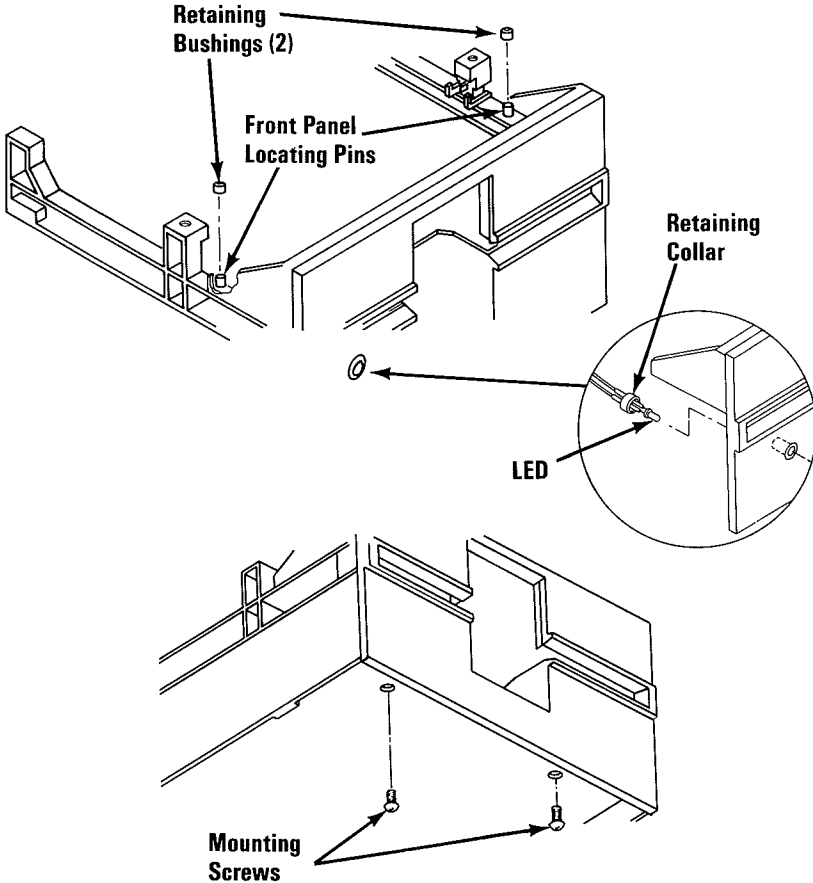Cone Lever Arm

LED Assembly Removal

1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Set all external Power switches off (printer, TV, etc.).
3. Unplug the system unit's (and expansion unit's) power cord(s) from the wall outlet.
4. Disconnect all cables from the rear of the system unit.
5. Remove the system unit's cover **(5900)**.
6. Remove the diskette drive.
7. Remove the diskette drive printed circuit board.
8. Remove the retaining bushings.
9. Carefully place the diskette drive on its side and remove the front panel mounting screws.
10. Remove the front panel from the diskette drive.
11. Remove the retaining collar that holds the LED assembly to the front panel.
12. Remove the LED assembly from the front panel.

LED Assembly Replacement

1. Push the LED assembly into the grommet.
2. Push the retaining collar over the back of the LED grommet.
3. Insert the front panel's latch in its tracks and set the panel in place on the locating pins.
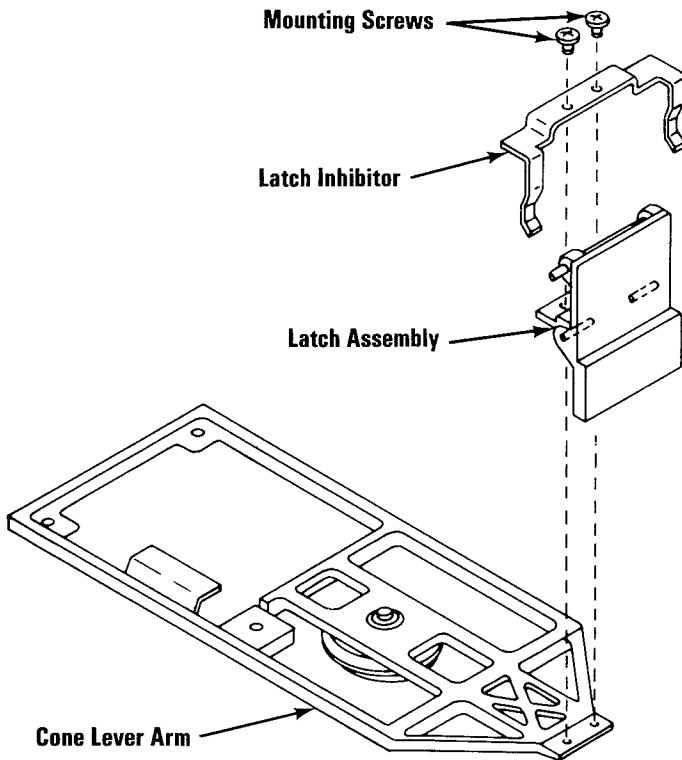4. Install the two mounting screws that attach the front panel.
5. Replace the diskette drive printed circuit board **(5120)**.
6. Replace the system unit's cover **(5900)**.
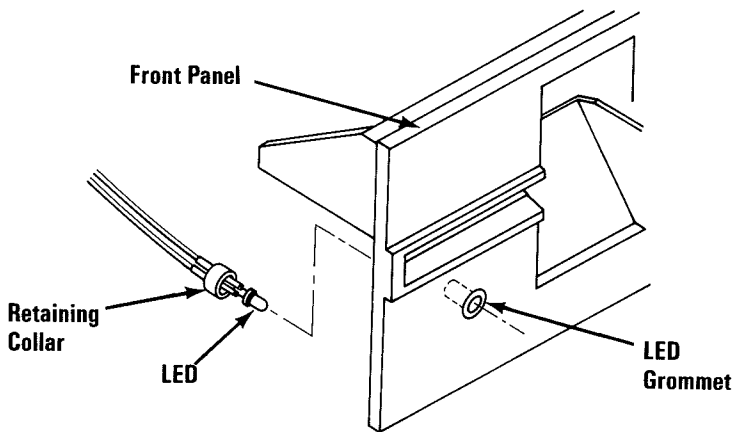7. Reconnect all cables.

Left Diskette Guide Removal   5155

1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Set all external Power switches off (printer, TV, etc.).
3. Unplug the system unit's (and expansion unit's) power cord(s) from the wall outlet.
4. Disconnect all cables from the rear of the system unit.
5. Remove the system unit's cover **(5900)**.
6. Remove the diskette drive's printed circuit board **(5120)**.
7. Remove the front panel **(5140)**.
8. Remove the retaining bushings.
9. Slide the blade of a screw driver between the frame and the rear of the left guide, carefully pry the left guide from the frame.

Left Diskette Guide

Left Diskette Guide Replacement   5155

1. Align the pins on the left guide with the mounting holes on the top of the left side frame, then lower the guide onto the frame.
2. Replace the front panel **(5140)**.
3. Replace the diskette drive printed circuit board **(5120)**.
4. Replace the system unit's cover **(5900)**.
5. Reconnect all cables.

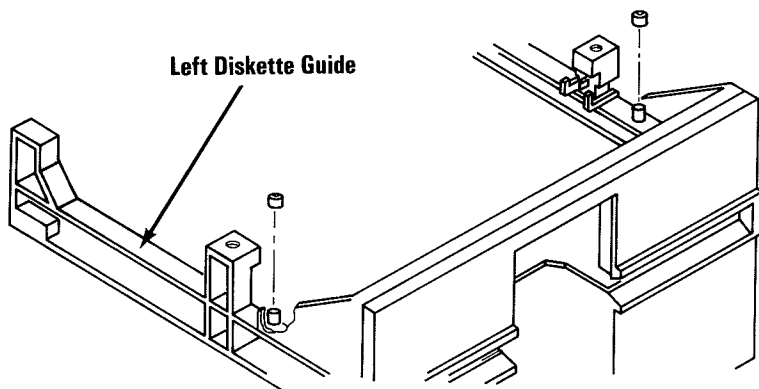# Right Diskette Guide Removal   5160

1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Set all external Power switches Off (printer, TV, etc.).
3. Unplug the system unit's (and expansion unit's) power cord(s) from the wall outlet.
4. Disconnect all cables from the rear of the system unit.
5. Remove the system unit's cover **(5900)**.
6. Remove the diskette drive's printed circuit board **(5120)**.
7. Remove the front panel **(5140)**.
8. Remove the read/write head cable from the brackets on the right diskette guide.
9. Remove the retaining bushings.
10. Slide the blade of a screw driver between the frame and the rear of the right guide, carefully pry the right guide from the frame.

Read/Write Head Cable

Right Diskette Guide
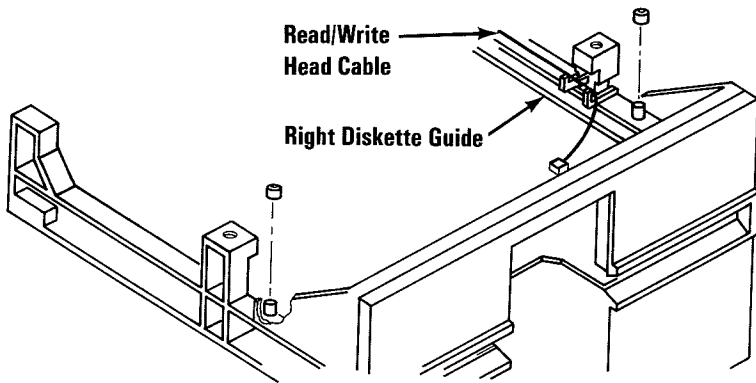
Right Diskette Guide Replacement   5160

1. Align the pins on the right guide with the mounting holes on the top of the right side frame, then lower the guide onto the frame.
2. Place the read/write head cable through the brackets on the right guide.
3. Replace the front panel **(5140)**.
4. Replace the diskette drive printed circuit board **(5120)**.
5. Replace the system unit's cover **(5900)**.
6. Reconnect all cables.
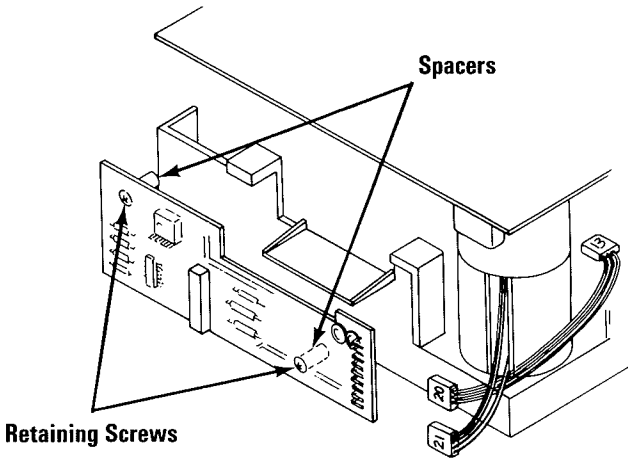
Servo Board Removal

1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Set all external Power switches off (printer, TV, etc.).
3. Unplug the system unit's (and expansion unit's) power cord(s) from the wall outlet.
4. Disconnect all cables from the rear of the system unit.
5. Remove the system unit's cover **(5900)**.
6. Remove the diskette drive **(5110)** or **(5115)**.
7. Disconnect connectors 20 and 21 from the servo board.
8. Remove the servo board's retaining screws and lift the servo board from the diskette drive. Do not lose the spacers between the servo board and the frame when removing the board.

Servo Board Replacement

1. Place the servo board in position at the rear of the diskette drive.
2. Insert the retaining screws while holding the spacers in place between the servo board and the frame.
3. Connect connectors 20 and 21 to the servo board.
4. Replace the diskette drive **(5110)** or **(5115)**.
5. Replace the system unit's cover **(5900)**.
6. Reconnect all cables.

Spindle assemblies are installed two ways in the diskette drives.

The assembly installed with hex-headed screws and retainer can be replaced.

The assembly installed by bonding cannot be replaced.

Look through the latch opening of the diskette drive and find the spindle hub. If you have the hex-headed screws under the spindle hub, continue with the removal/replacement procedure. If you do not have the hex-headed screws under the spindle hub replace the diskette drive assembly.

Hex-Headed Screw ⟶
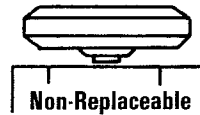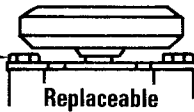
Replaceable   Non-Replaceable

1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Set all external Power switches off (printer, TV, etc.).
3. Unplug the system unit's (and expansion unit's) power cord(s) from the wall outlet.
4. Disconnect all cables from the rear of the system unit.
5. Remove the system unit's cover **(5900)**.
6. Remove the diskette drive **(5110)** or **(5115)**.
7. Remove the diskette drive printed circuit board **(5120)**.
8. Remove the cone lever arm **(5105)**.
9. Remove the drive belt **(5125)**.
10. Remove the drive pulley screw and washers.

Mounting Screw ⟶

Lockwasher

Flat Washer ⟶

Large Pulley ⟶

Type 1 5-43
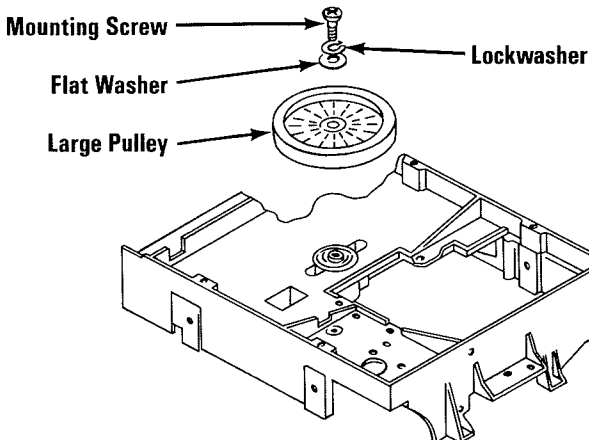
11. Remove the drive pulley by holding the spindle and twisting the pulley back and forth while pulling the pulley off.
12. Loosen the two hex-headed screws under the spindle.
13. Turn the spindle retainer counterclockwise until the retainer openings clear the hex-headed screws (see figure).
14. Remove the spindle assembly by pulling on the spindle and pushing on the spindle's shaft from the opposite side.

Retaining Slot Opening

Retaining Slot Opening

Hex-Headed
Screws

Chassis

Spindle Assembly Replacement   5170
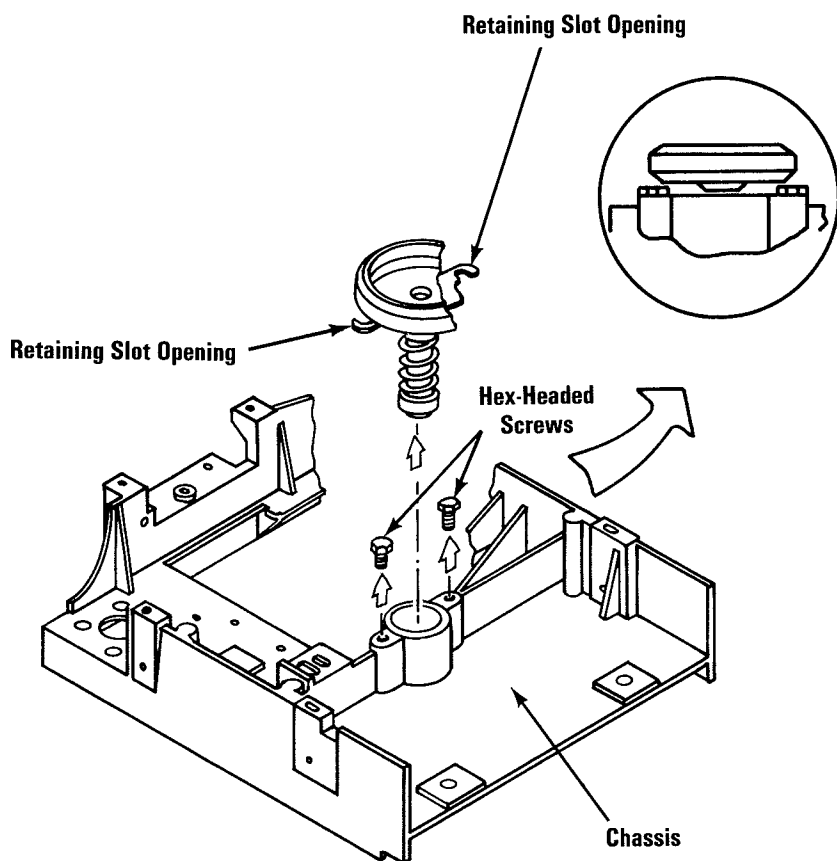
1. Insert the spindle assembly carefully into the mounting hole.
2. Turn the retainer clockwise until the retainer openings engage the hex-headed screws (see figure).
3. Tighten the two hex-headed screws.

Retaining Slot Opening

Retaining Slot Opening

Hex-Headed Screws

Chassis

4. Place the pulley on the spindle's shaft.
5. Place the pulley's screw and the washers in position and tighten the screw while holding the spindle.
6. Replace the drive belt.
7. Replace the cone arm lever assembly **(5105)**.
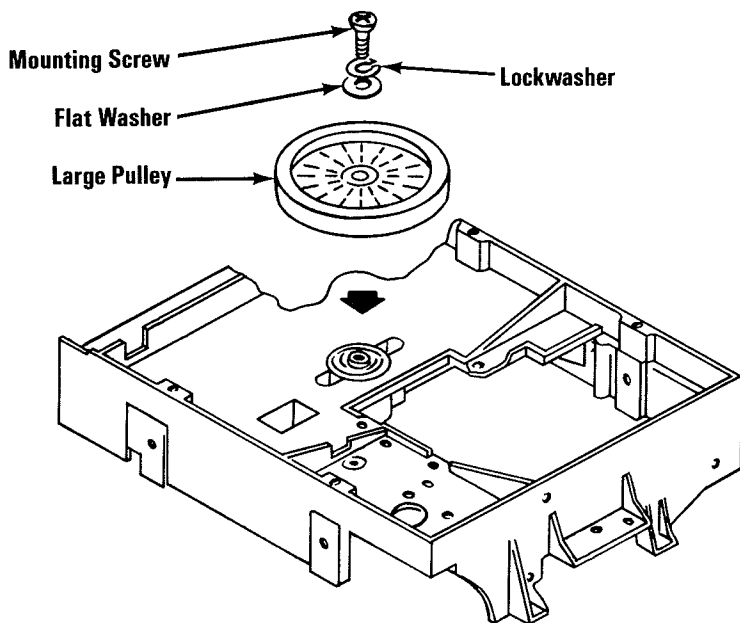
8. Replace the diskette drive printed circuit board **(5120)**.
9. Replace the diskette drive assembly **(5110)** or **(5115)**.
10. Replace the system unit's cover **(5900)**.
11. Reconnect all cables.

Write Protect Switch
Assembly Removal
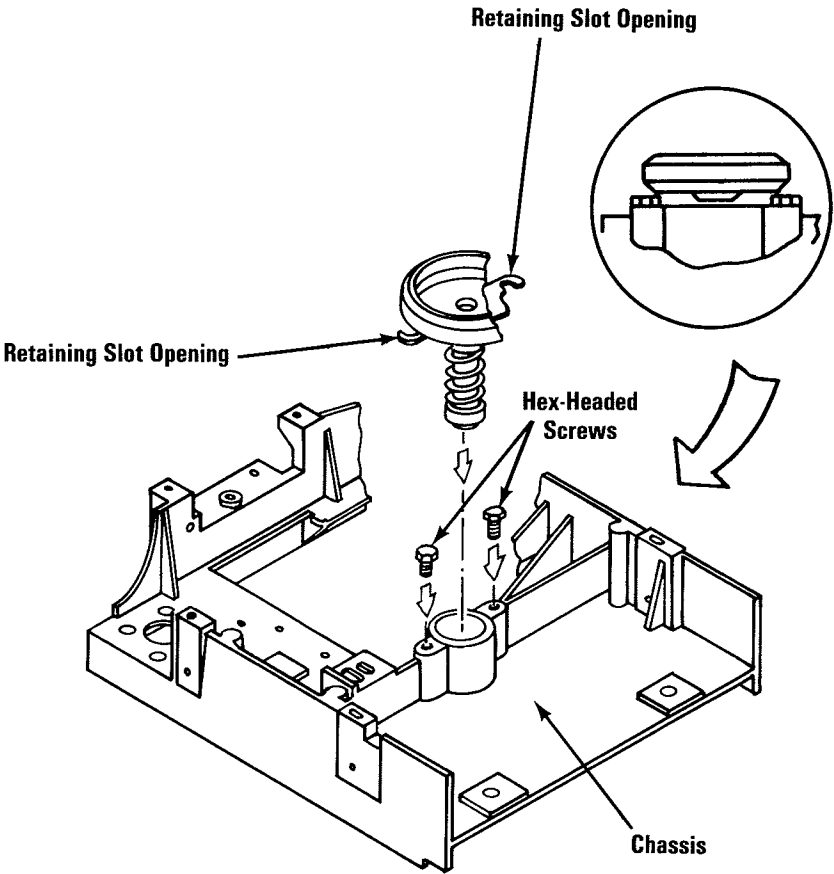
1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Set all external Power switches off (printer, TV, etc.).
3. Unplug the system unit's (and expansion unit's) power cord(s) from the wall outlet.
4. Disconnect all cables from the rear of the system unit.
5. Remove the system unit's cover **(5900)**.
6. Remove the diskette drive printed circuit board **(5120)**.
7. Remove the mounting screw for the write protect switch (left side, at the front of the diskette drive).
8. Remove the wire ties, as necessary, along the left side of the frame and the right side of the motor.
9. Remove the write protect switch assembly.

Write Protect Arm

Adjustment
Screw

Write Protect
Switch Assembly
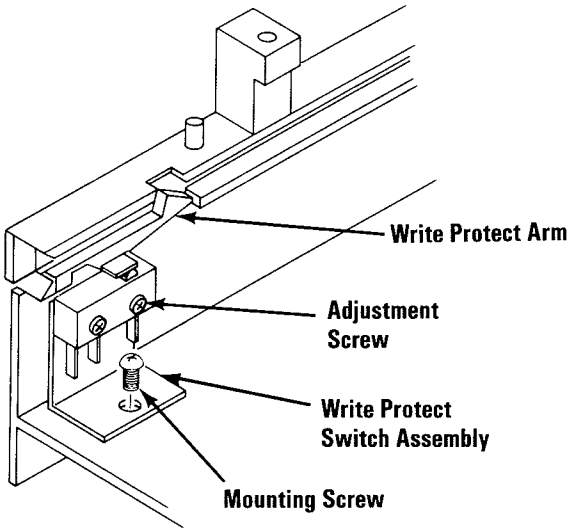
Mounting Screw

(Front View)

Write Protect Switch
Assembly Replacement

1. Place the write protect switch assembly in position on the left side, at the front of the diskette drive.
2. Replace the mounting screw for the switch assembly.

Write Protect Arm

Adjustment
Screw

Write Protect
Switch Assembly

Mounting Screw
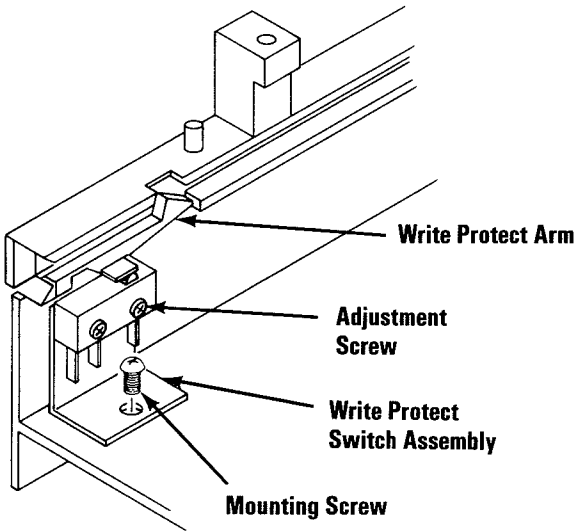
(Front View)

3. Place the cable along the left side of the frame and the right side of the motor.
4. Replace the wire ties.
5. Adjust the switch position so that when a diskette is inserted in the guides, the switch transfers without binding the diskette and the write protect assembly.
6. Install the diskette drive printed circuit board **(5120)**.
7. Install the system unit's cover **(5900)**.
8. Reconnect all cables.

Diskette Drive Type 2

Cone Assembly Removal   5181

1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Set all external power switches off (printer, TV, etc.).
3. Unplug the system unit's (and expansion unit's) power cord(s) from the wall outlet.
4. Disconnect all cables from the rear of the system unit.
5. Remove the system unit's cover **(5900)**.
6. Remove the diskette drive printed circuit board **(5185)**.
7. Remove the cone lever arm **(5182)**.
8. Compress the cone assembly to relieve spring tension and remove the retaining clip from the top of the shaft.
9. Release the spring tension and allow the cone assembly to separate from the cone lever arm.
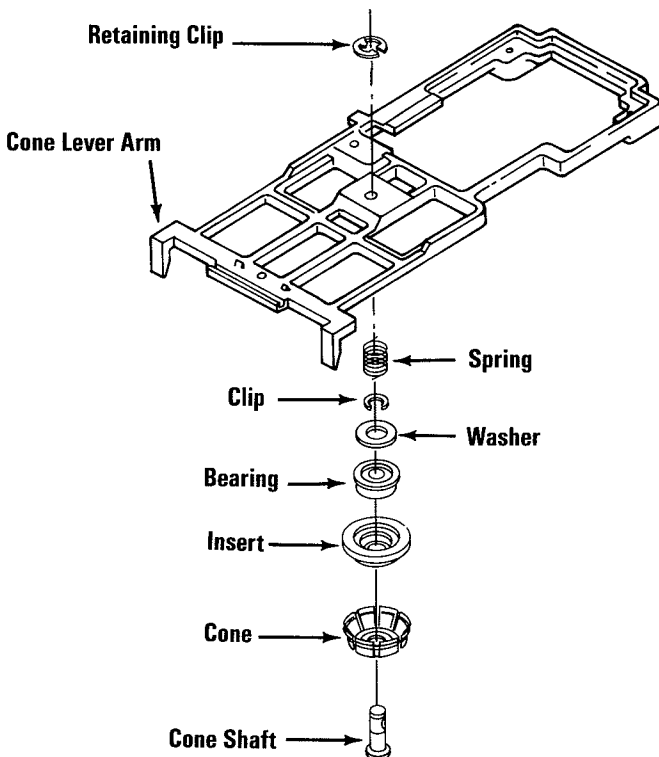
1. Arrange the cone assembly parts as shown in the figure, with the shaft through the cone lever arm and the spring compressed.
2. Replace the retaining clip on the shaft.
3. Replace the cone lever arm **(5182)**.
4. Replace the diskette drive printed circuit board **(5185)**.
5. Replace the system unit's cover **(5900)**.
6. Reconnect all cables.

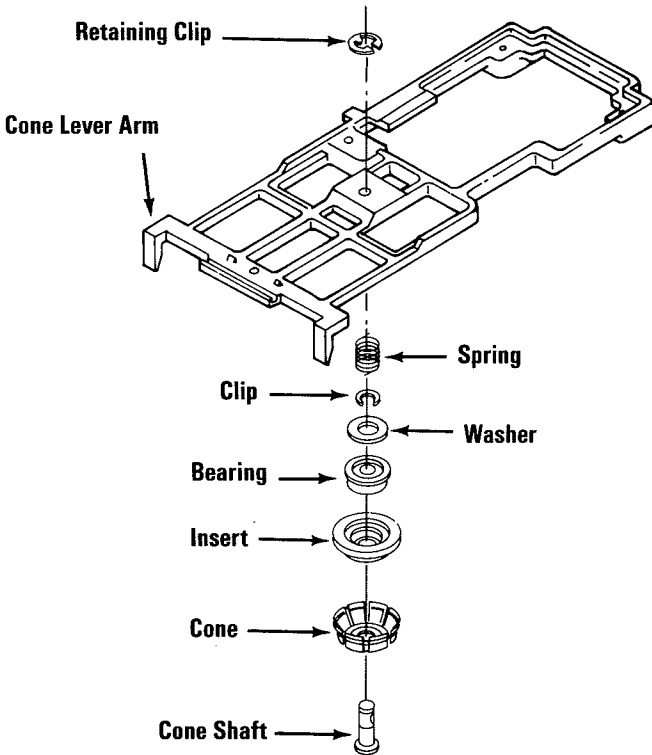Retaining Clip

Cone Lever Arm

Spring

Clip

Washer

Bearing

Insert

Cone

Cone Shaft

1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Set all external Power switches off (printer, TV, etc.).
3. Unplug the system unit's (and expansion unit's) power cord(s) from the wall outlet.
4. Disconnect all cables from the rear of the system unit.
5. Remove the system unit's cover **(5900)**.
6. Remove the diskette drive printed circuit board **(5185)**.
7. Remove the read/write head cable from the bracket, and the wire tie on the right diskette guide.
8. Remove the wire tie attaching the index cable to the cone lever assembly.
9. Remove the index assembly.
10. Remove the two mounting screws for the cone lever arm.
11. Slide the head carriage to the front of the diskette drive.
12. Release the upper arm by sliding the cone lever arm to the rear of the diskette drive.
13. Lift the cone lever arm out of the diskette drive.
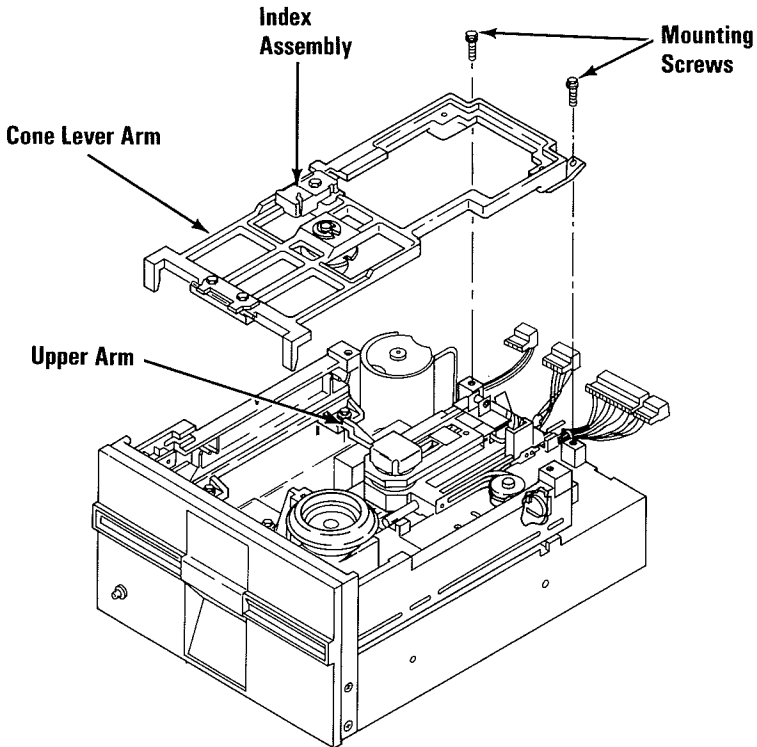
Cone Lever Arm Replacement   5182

1. Insert the latch assembly in its tracks; move the latch to the front of the diskette drive.
2. Carefully lower the cone lever arm and lift the upper arm over the cone lever arm.
3. Install the mounting screws (the shortest, silver colored screws, with the three dots on top); do not tighten.
4. Install the index assembly, mounting screw, and the washer (gold-colored with fine threads).
5. Tie the index assembly wire to the cone lever arm.
6. Route the head cables through the cone lever arm and along the right-hand diskette guide into the wire-holding bracket.
7. Tie the head cable wires to the diskette guide.
8. Close the latch assembly to engage the cone and hub.
9. Place the cone lever arm so that cone assembly is centered over the drive hub; tighten the screws.
10. Replace the diskette drive printed circuit board **(5185)**.
11. Replace the system unit's cover **(5900)**.
12. Reconnect all cables.
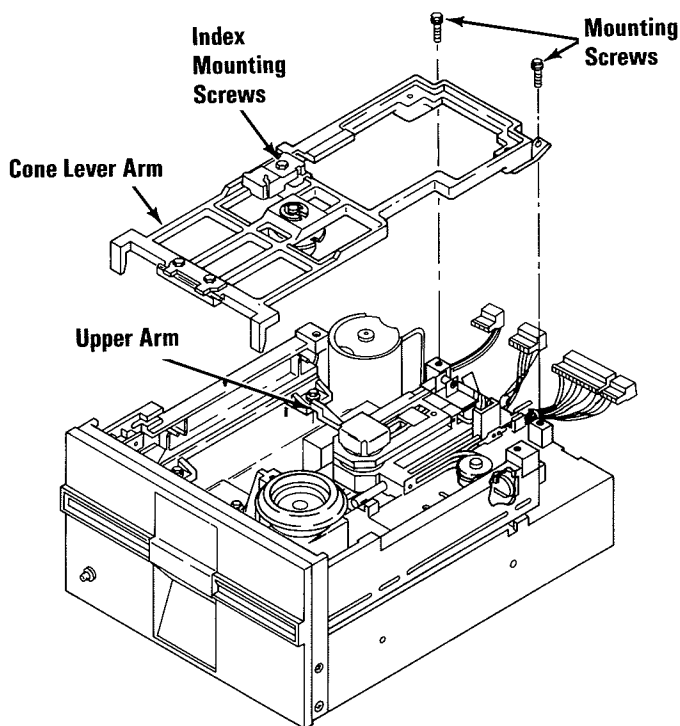
Type 2 5-52

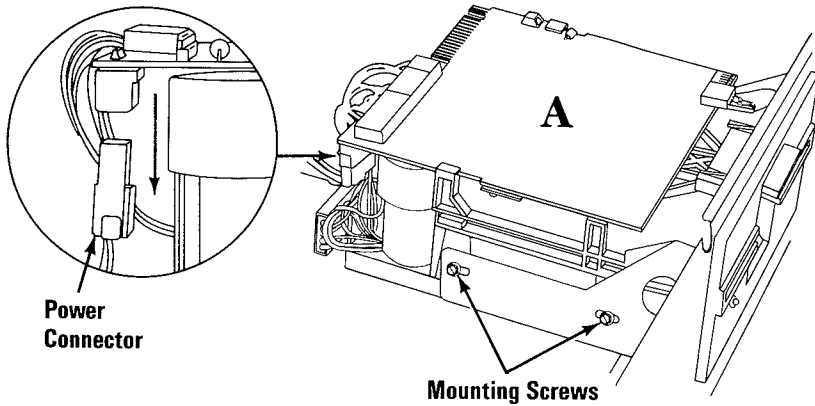1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Set all external Power switches off (printer, TV, etc.).
3. Unplug the system unit's (and expansion unit's) power cord(s) from the wall outlet.
4. Disconnect all cables from the rear of the system unit.
5. Remove the system unit's cover **(5900)**.
6. Disconnect the signal cable from the diskette drive printed circuit board **(5185)**.
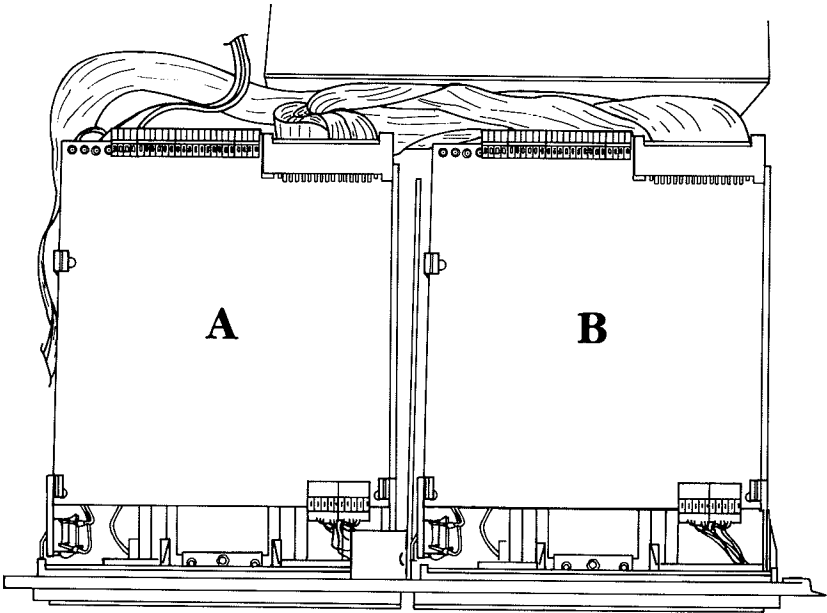
7. Remove the two mounting screws on the left side of diskette drive A.

   Note: Remove options adapters, as necessary, for access to the screws **(5800)**.

8. Slide the diskette drive approximately two inches out of the system unit. Remove the power connector from the left-rear corner of the diskette drive printed circuit board **(5185)**.

Power
Connector

Mounting Screws

9. Remove the diskette drive from the system unit.

Diskette Drive A Replacement   5183

1. Slide diskette drive A in until the front panel is approximately two inches from the frame. Connect the power cable to the diskette drive printed circuit board **(5185)**.

Power Connector   Faceplate   (Side View)   Front Panel

2. Slide diskette drive A in until the faceplate is even with the front panel.
3. Route the signal cable between the diskette drive and the power supply.
4. Connect the end of the signal cable to the diskette drive.
5. Replace the 2 mounting screws. Move the diskette drive in or out for a clearance of .040″ between the rear of the front panel and the faceplate; tighten the screws.
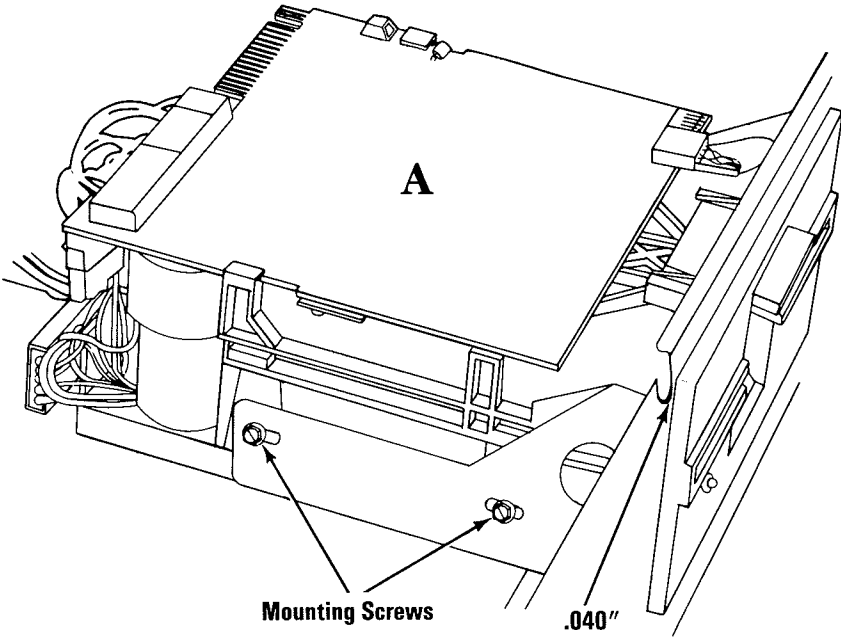
A

Mounting Screws   .040″

(Side View)

6. Replace any option adapters you removed **(5800)**.
7. Replace the system unit's cover **(5900)**.
8. Reconnect all cables.

1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Set all external Power switches off (printer, TV, etc.).
3. Unplug the system unit's (and expansion unit's) power cord(s) from the wall outlet.
4. Disconnect all cables from the rear of the system unit.
5. Remove the system unit's cover **(5900)**.
6. Disconnect the signal cable from the diskette drive printed circuit board **(5185)**.

7. Remove the two mounting screws on the right side of diskette drive B.
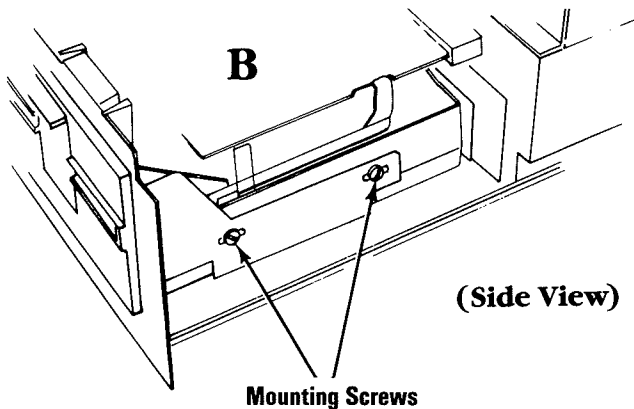
(Side View)

Mounting Screws

8. Slide the diskette drive approximately two inches out of the system unit. Remove the power connector from the left-rear corner of the diskette drive printed circuit board **(5185)**.
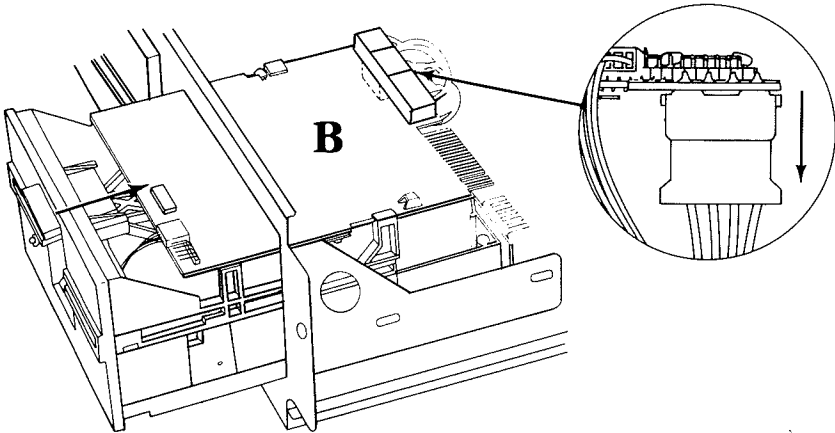
(Side View)

9. Remove the diskette drive from the system unit.

Diskette Drive B Replacement 5184

1. Slide the diskette drive B in until the front panel is approximately two inches from the frame. Connect the power cable to the diskette drive printed circuit board **(5185)**.
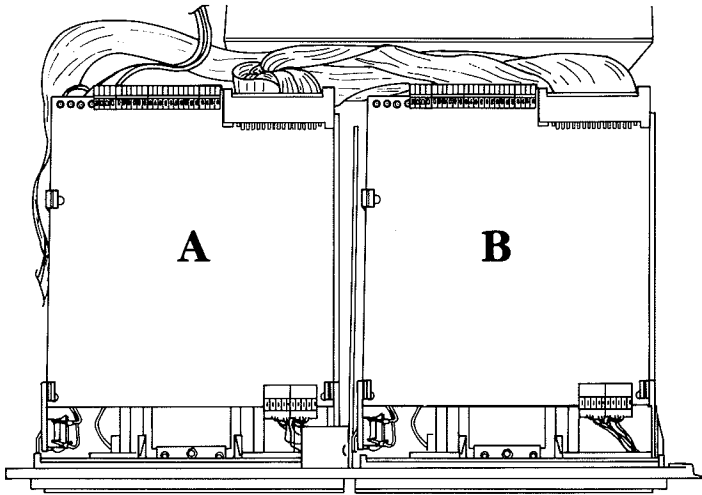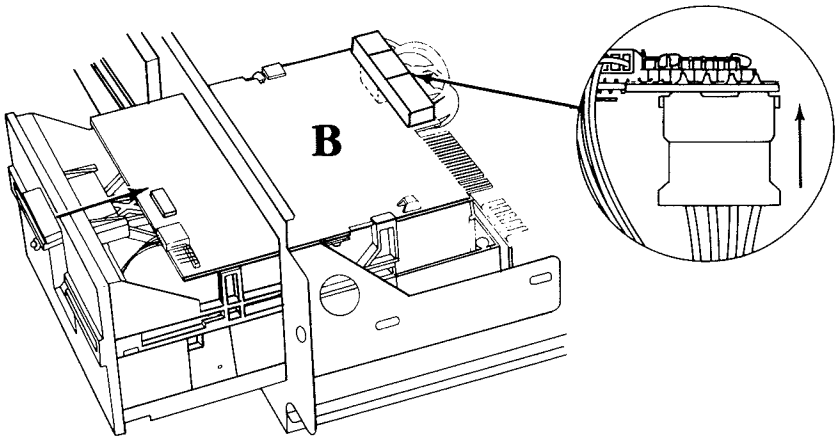

(Side View)

2. Slide diskette drive B in until the faceplate is even with the front panel.
3. Route the signal cable between the diskette drive and the power supply.
4. Connect the end of the signal cable to the diskette drive.
5. Replace the two mounting screws. Move the diskette drive in or out for a clearance of .040" between the rear of the front panel and the faceplate; tighten the screws.

B

(Side View)

.040"   **Mounting Screws**
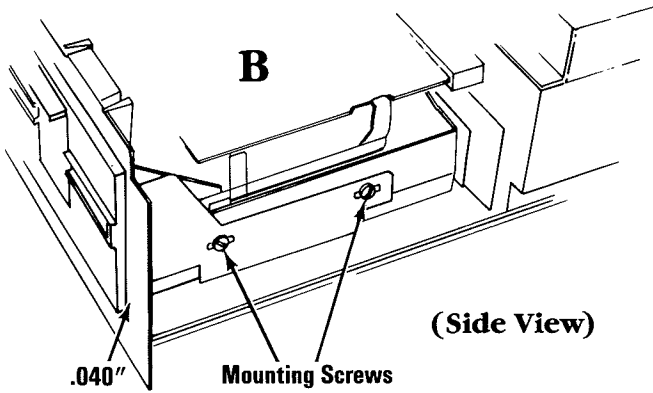
6. Remove the terminating resistor only on drive B **(5185)**.
7. Replace the system's unit cover **(5900)**.
8. Reconnect all cables.

Diskette Drive Logic Printed Circuit Board Removal 5185

1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Set all external Power switches off (printer, TV, etc.).
3. Unplug the system unit's (and expansion unit's) power cord(s) from the wall outlet.
4. Disconect all cables from the rear of the system unit.
5. Remove the system unit's cover (5900).
6. Disconnect all connectors from the rear, and the head cables from the right front of the diskette drive printed circuit board.
7. Remove the retaining screw.
8. Slide the diskette drive printed circuit board toward the rear until it clears the front guide brackets **A** .
9. Lift the right side of the diskette drive printed circuit board up and out to clear the brackets.
10. Disconnect the diskette drive's power connector from the left rear corner of the diskette drive printed circuit board.
11. Remove the shield plate.

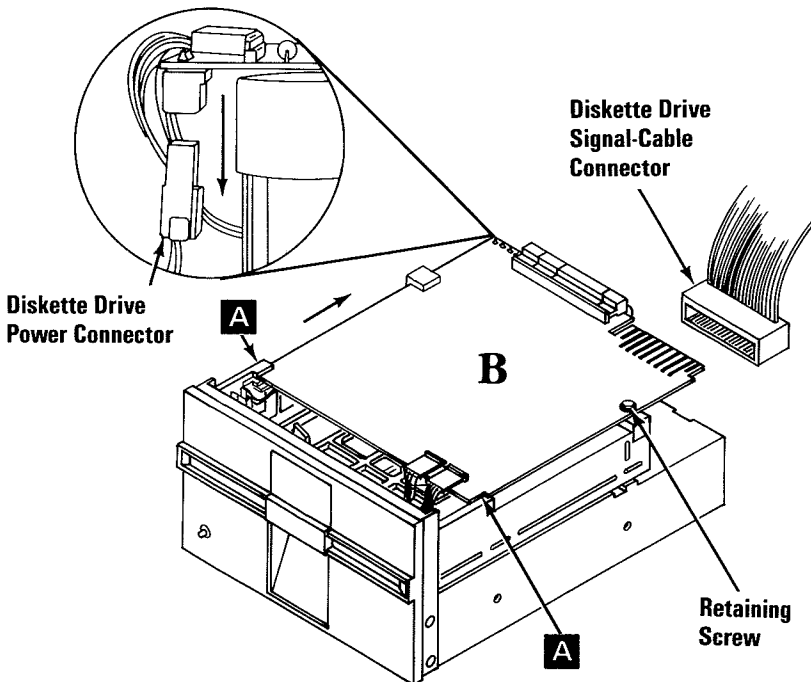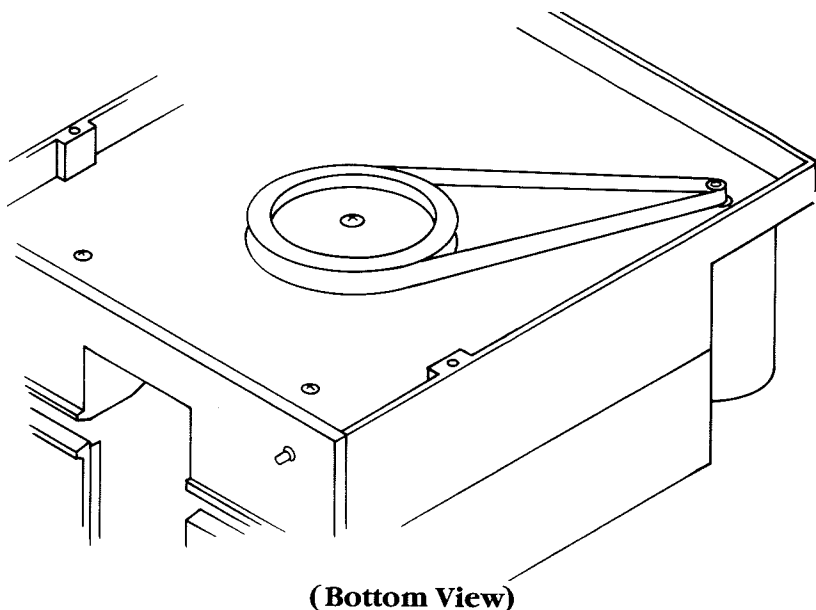Diskette Drive
Signal-Cable
Connector

Diskette Drive
Power Connector

B

Retaining
Screw

Type 2 5-61

Diskette-Drive Logic Printed-Circuit
Board Replacement   5185

1. Replace the shield plate with the metal side down.
2. Connect the diskette drive's power connector under the left rear corner of the diskette drive printed circuit board.
3. Guide the left side of the printed circuit board into the left rear guide bracket **A**.
4. Slide the printed circuit board into the front guide brackets, align the hole in the printed circuit board with the threaded hole in the right diskette guide.
5. Insert the retaining screw.
6. Connect the connectors at the left rear of the diskette drive printed circuit board. The first connector on the left is a 4-pin connector for the drive motor, the second connector is a 6-pin connector, the third connector is a 10-pin connector, and the fourth connector is a 4-pin connector.
7. Connect the diskette drive's signal cable at the right rear of the diskette drive printed circuit board.
8. Connect the head connectors, HD1 outside and HD0 inside, to the right front of the diskette drive printed circuit board.
9. Remove the terminating resistor only on drive B.
10. Replace the system unit's cover **(5900)**.
11. Reconnect all cables.
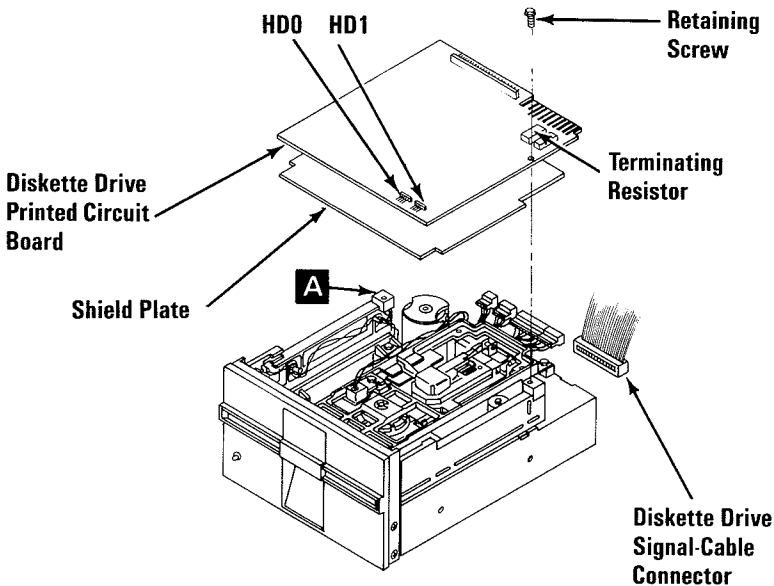
Type 2 5-62

Drive Belt Removal   5186

1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Set all external Power switches off (printer, TV, etc.).
3. Unplug the system unit's (and expansion unit's) power cord(s) from the wall outlet.
4. Disconnect all cables from the rear of the system unit.
5. Remove the system unit's cover **(5900)**.
6. Remove the diskette drive **(5183)** or **(5184)**.
7. Carefully place the diskette drive on a work surface with the drive belt and pulleys facing up.
8. Lift the drive belt off the large pulley, then off the small pulley.

**(Bottom View)**

Drive Belt Replacement   5186

1. Place the drive belt around the small pulley (dark, shiny side facing pulleys), then around the large pulley.
2. Replace the diskette drive **(5183)** or **(5184)**.
3. Replace the system unit's cover **(5900)**.
4. Reconnect all cables.

Drive Motor Removal

1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Set all external Power switches off (printer, TV, etc.).
3. Unplug the system unit's (and expansion unit's) power cord(s) from the wall outlet.
4. Remove the system unit's cover **(5900)**.
5. Remove the diskette drive **(5183)** or **(5184)**.
6. Remove the diskette drive printed circuit board **(5185)**.
7. Remove the drive belt **(5186)**.
8. Remove the drive motor's mounting screws.
9. Carefully lift the drive motor out of the diskette drive.

Drive Motor

Mounting Screws

Drive Motor Replacement   5187
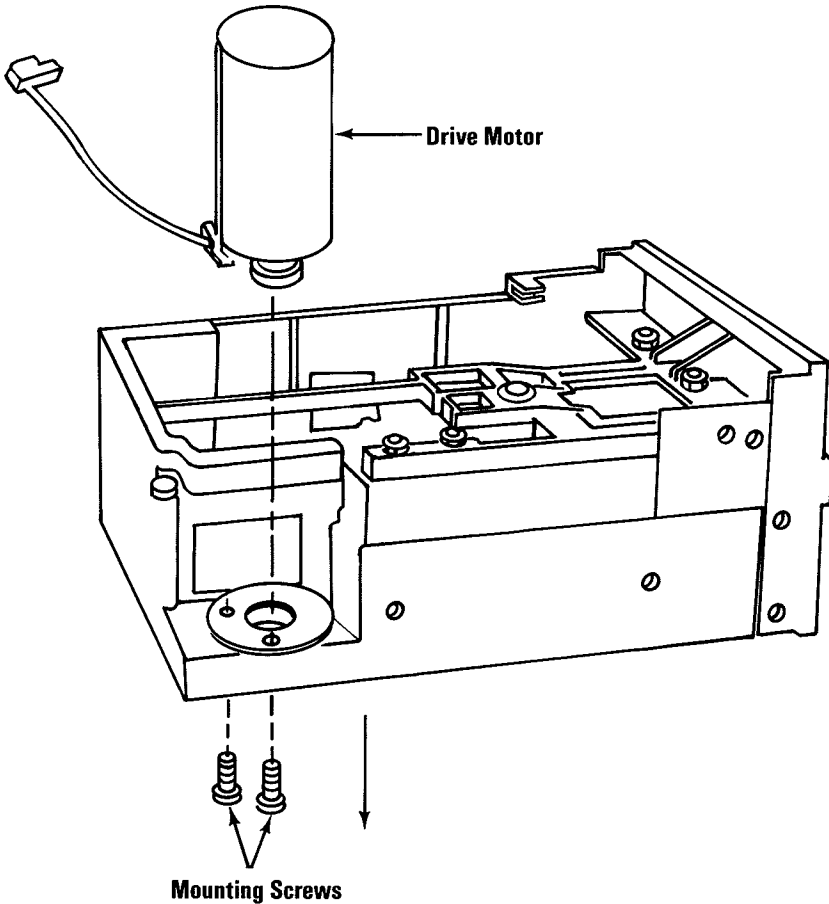
1. Insert the motor in the frame; align the threaded holes in the motor with the holes in the frame (motor wires should face the left rear corner of the drive).
2. Replace the mounting screws.
3. Replace the drive belt **(5186)**.
4. Replace the diskette drive printed circuit board **(5185)**.
5. Replace the diskette drive **(5183)** or **(5184)**.
6. Replace the system unit's cover **(5900)**.
7. Reconnect all cables.

Drive Motor

Mounting Screws

Drive Motor Speed Adjustment   5188
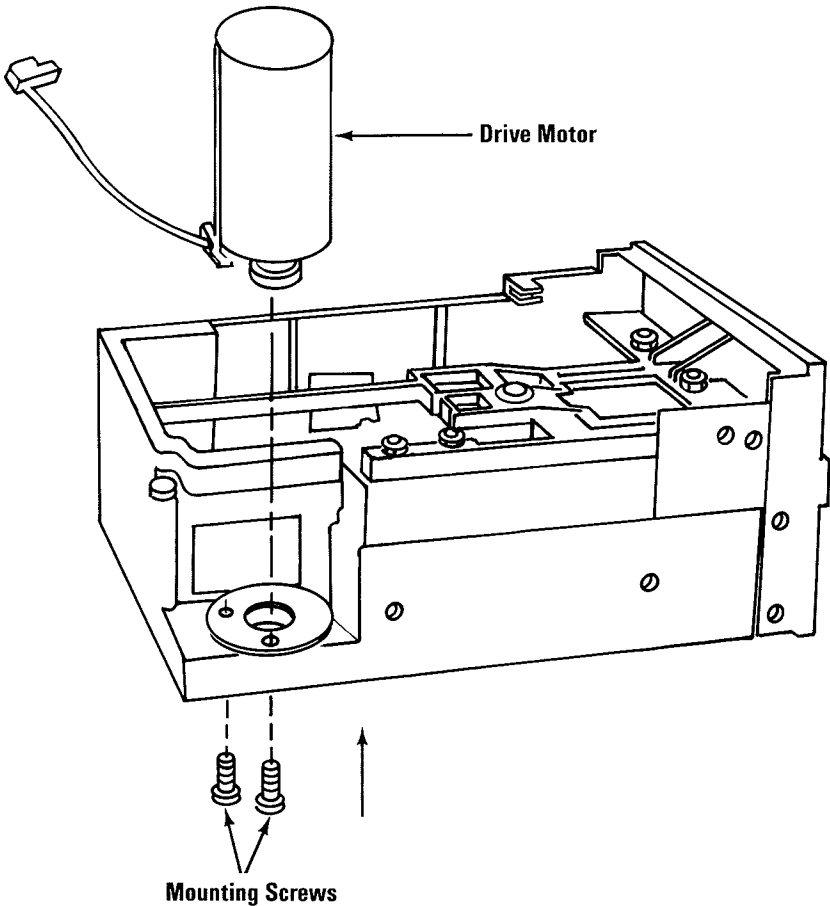
1. Insert the Advanced Diagnostics diskette.
2. Set the Power switch on the expansion unit (if attached) and system unit to On.
3. Advance to diagnostic menu 8 (refer to "Diagnostic Menu Reference," Section 2).
4. In menu 8, select option 4, SPEED TEST, for the diskette drive you are testing. The diskette drive's speed and the adjustment specification appear on the screen.

    Note: If you are unable to load the Advanced Diagnostics diskette, or if the speed test will not execute, refer to "Drive-Motor Preliminary Speed Adjustment" **(5189)**.
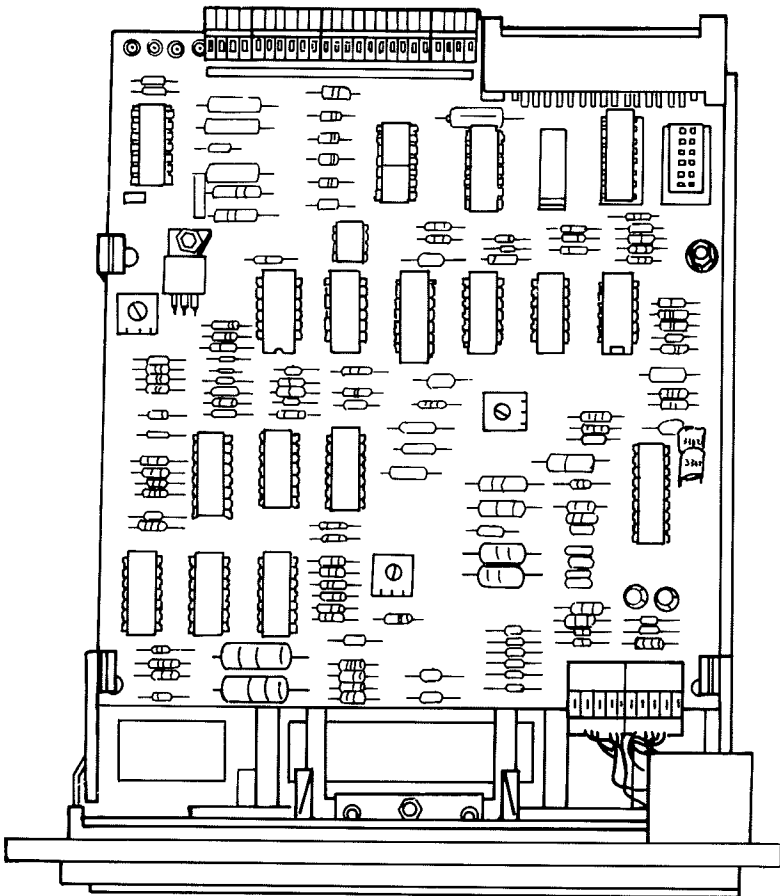
```
SPEED IS 2000

ADJUST FOR 1980 TO 2020
PRESS ANY KEY TO EXIT

SPEED IS 1999

ADJUST FOR 1980 TO 2020
```

5. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
6. Set all external Power switches off (printer, TV, etc.).
7. Unplug the system unit's (and expansion unit's) power cord(s) from the wall outlet.
8. Disconnect all cables from the rear of the system unit.
9. Remove the system unit's cover **(5900)**.
10. Reconnect all cables.
11. Insert the Advanced Diagnostics diskette.
12. Set the Power switch on the expansion unit (if attached) and the system unit to On.

13.   Advance to diagnostic menu 8 (refer to "Diagnostic Menu Reference," Section 2).
14.   Select option 4, SPEED TEST, for the drive you are adjusting. The diskette drive's speed and the adjustment specification appear on the screen.
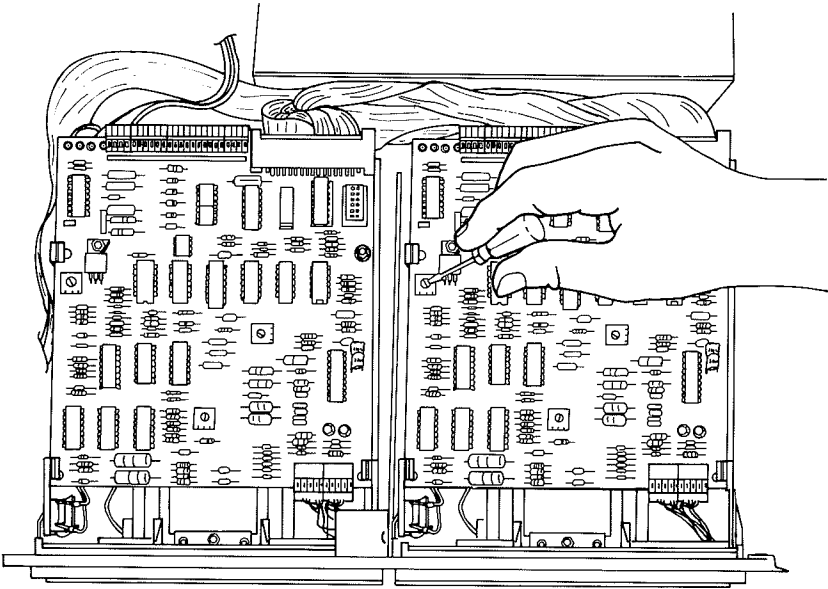
```
SPEED IS  2000

ADJUST FOR 1980 TO 2020
PRESS ANY KEY TO EXIT

SPEED IS 1999

ADJUST FOR 1980 TO 2020
```
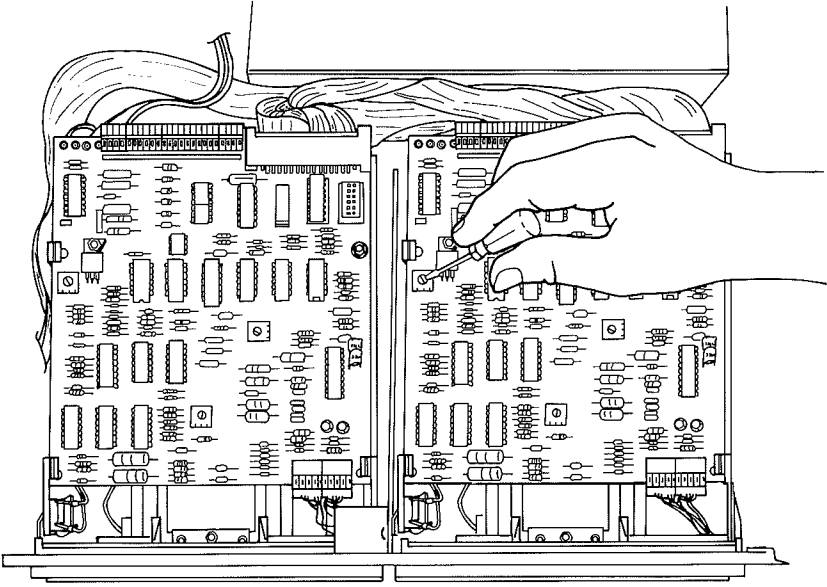
15. The adjustment for the diskette drive's speed is a variable resistor on the diskette drive printed circuit board. To adjust the speed, carefully insert an insulated screwdriver into the screw on the top of the variable resistor.

16. Turn the screw until the speed shown on the screen is within the required specifications.


17. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
18. Set all external Power switches off (printer, TV, etc.).
19. Unplug the system unit's (and expansion unit's) power cord(s) from the wall outlet.
20. Disconnect all cables from the rear of the system unit.
21. Replace the system unit's cover **(5900)**.
22. Reconnect all cables.

Drive Motor Preliminary Speed Adjustment 5189

1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Set all external Power switches off (printer, TV, etc.).
3. Unplug the system unit's (and expansion unit's) power cords from the wall outlet.
4. Disconnect all cables from the rear on the system unit.
5. Remove the system unit's cover **(5900)**.
6. Remove the diskette drive **(5183)** or **(5184)**.
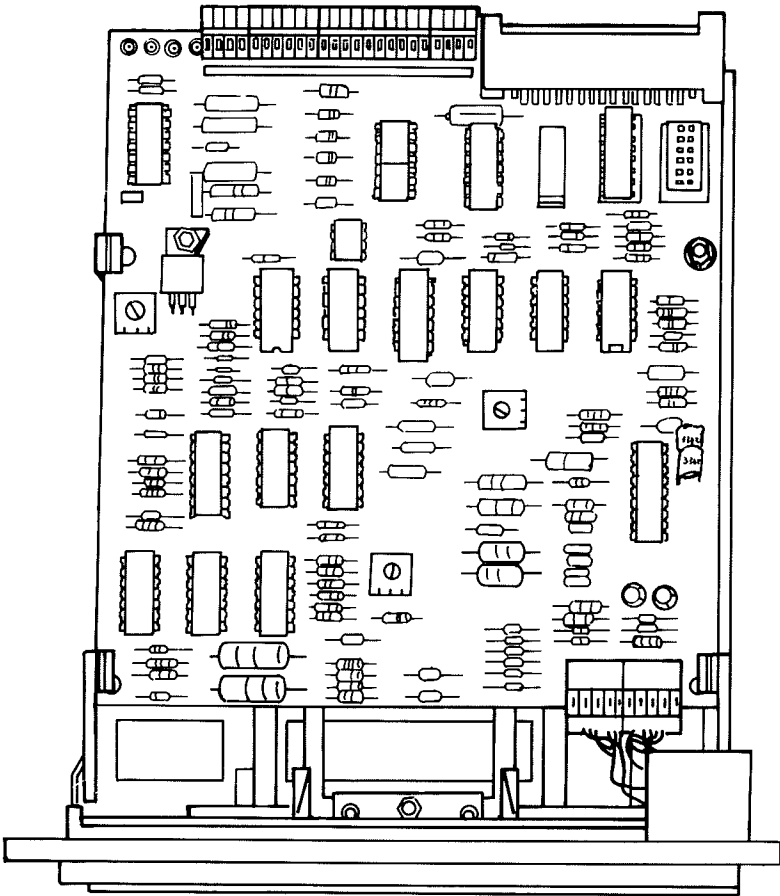
7. Insert a scratch diskette into the diskette drive.

8.   Place the diskette drive (left side up) on the system unit's power supply.
9.   Connect a jumper between J-1 pin 16 on the diskette drive logic printed circuit board and ground.
10. Plug power connector P-3 into the diskette drive printed circuit board.
11. Plug the system unit's power cord into the system unit, then into the wall outlet.
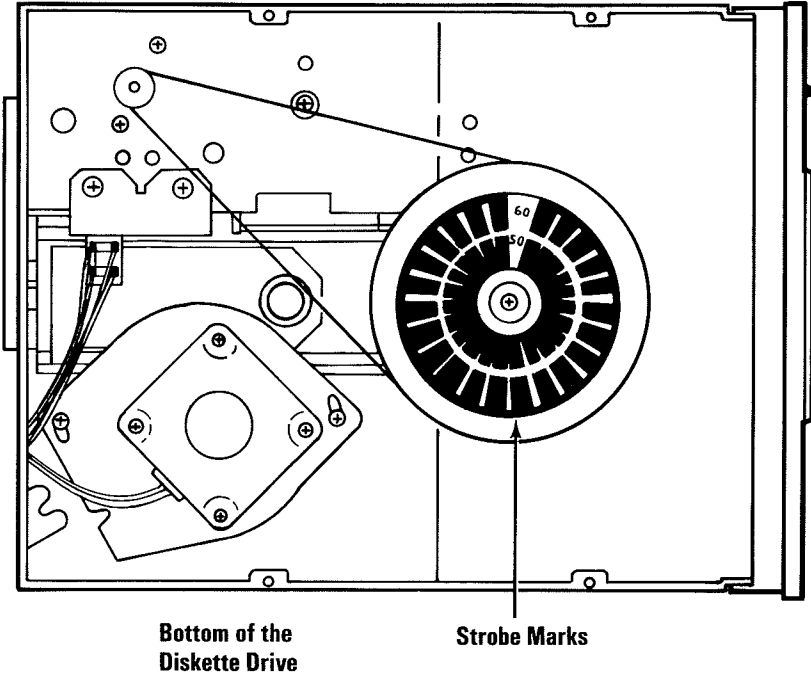12. Set the system unit's Power switch to On.

**Speed Adjustment
Variable Resistor**

J1 pin 16

34   16   2
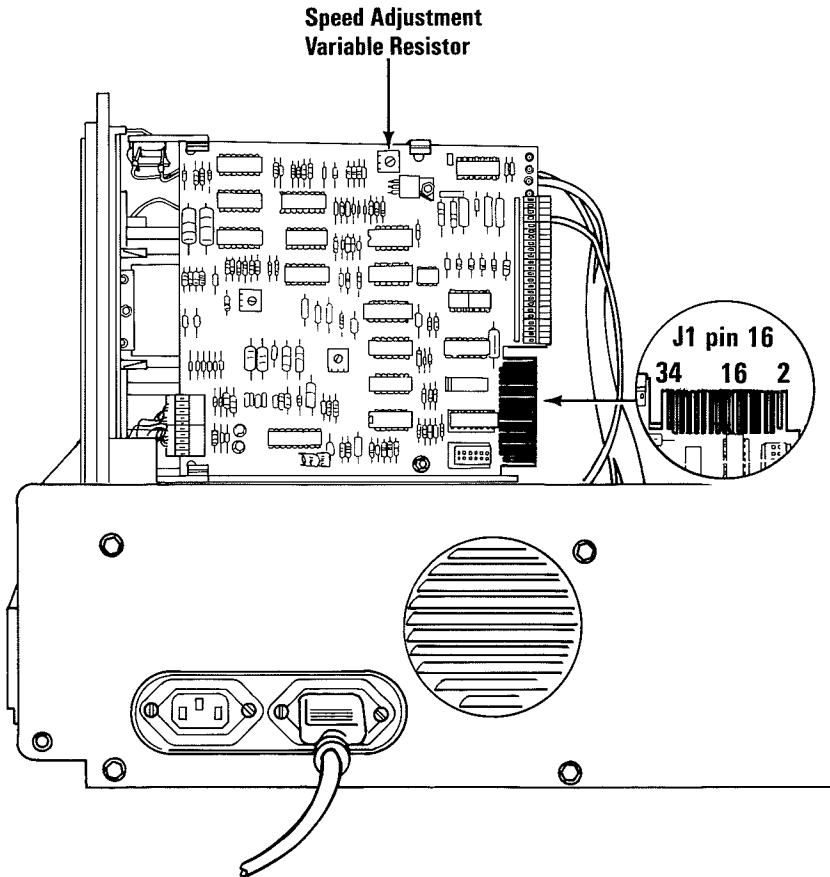
(Rear View)

13.   Observe in fluorescent light the black strobe marks on the
       outer ring of the drive pulley and adjust the variable
       resistor on the diskette drive printed circuit board until the
       strobe marks appear to stand still.

       Note: The outer ring of strobe marks is for 60 hertz, and
   the inner ring is for 50 hertz.

**Bottom of the**   **Strobe Marks**
Diskette Drive

14. Set the system unit's Power switch to Off.
15. Disconnect the system unit's power cord from the wall outlet.
16. Disconnect the system unit's power cord from the rear of the system unit.
17. Replace the diskette drive **(5183)** or **(5184)**.
18. Use "Drive-Motor Speed Adjustment" to verify that the speed is within specification. Adjust if necessary.
19. Replace the system unit's cover **(5900)**.
20. Reconnect all cables.
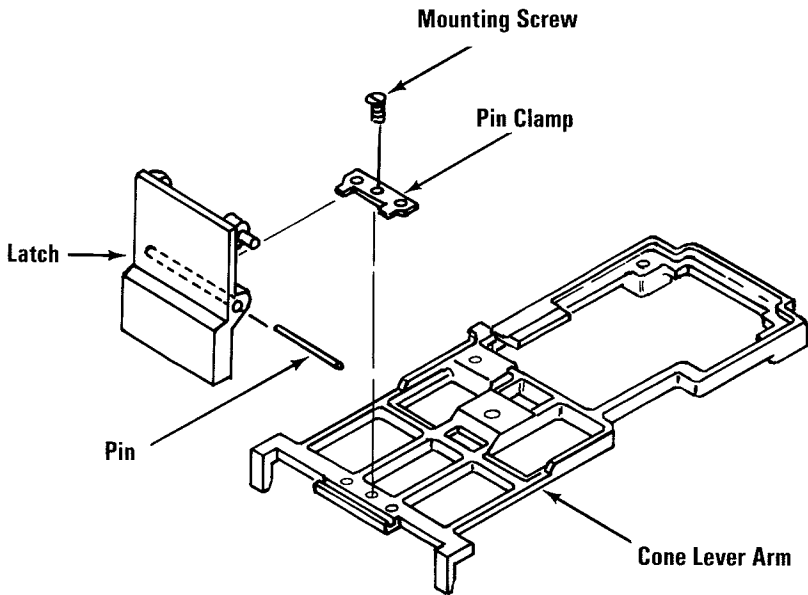
Front Panel Removal   5190

1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Set all external Power switches off (printer, TV, etc.).
3. Unplug the system unit's (and expansion unit's) power cords from the wall outlet.
4. Disconnect all cables from the rear of the system unit.
5. Remove the system unit's cover **(5900)**.
6. Remove the diskette drive **(5183)** or **(5184)**.
7. Open the latch on the front of the diskette drive.
8. Remove the diskette drive printed circuit board **(5185)**.
9. Remove the connector from the LED assembly.
10. Place the diskette drive on its right side and remove the two left front panel mounting screws.
11 Place the diskette drive on its left side and remove the two right front panel mounting screws.
12. Remove the front panel from the diskette drive.

White Lead

LED Connector

Shoulder

LED

Mounting Screws

Front Panel

# Front Panel Replacement 5190
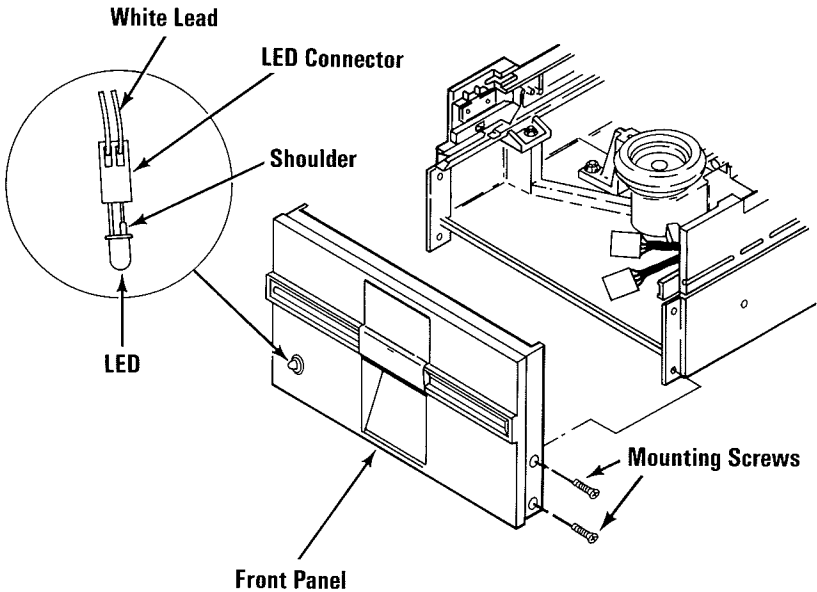
1. Install the front panel by inserting the latch in its slots and positioning the panel in place.
2. Place the diskette drive on its right side and install two mounting screws.
3. Place the diskette drive on its left side and install two mounting screws.
4. Install the LED connector, making sure the white wire goes on the shouldered lead of the LED (see figure).
5. Replace the diskette drive printed circuit board (5185).
6. Replace the diskette drive (5183) or (5184).
7. Replace the system unit's cover (5900).
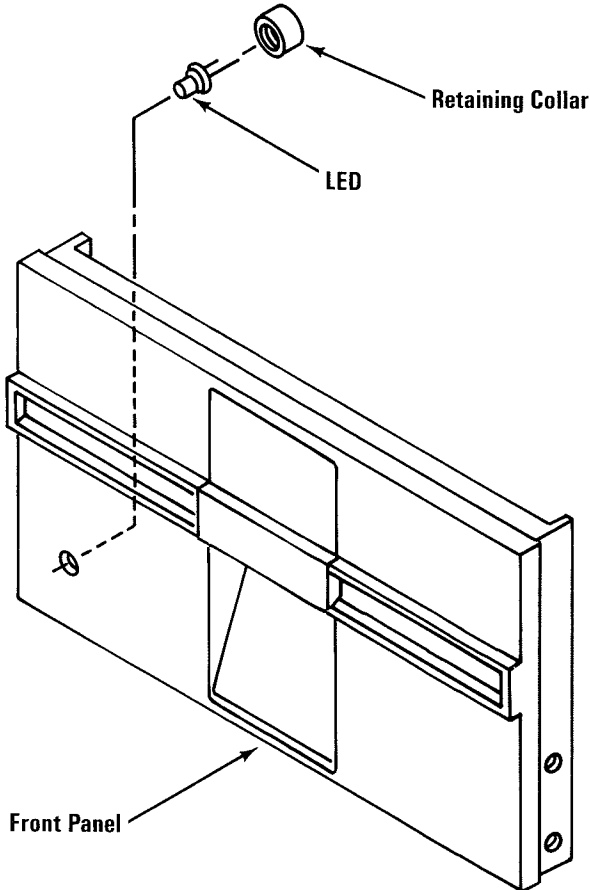8. Reconnect all cables.
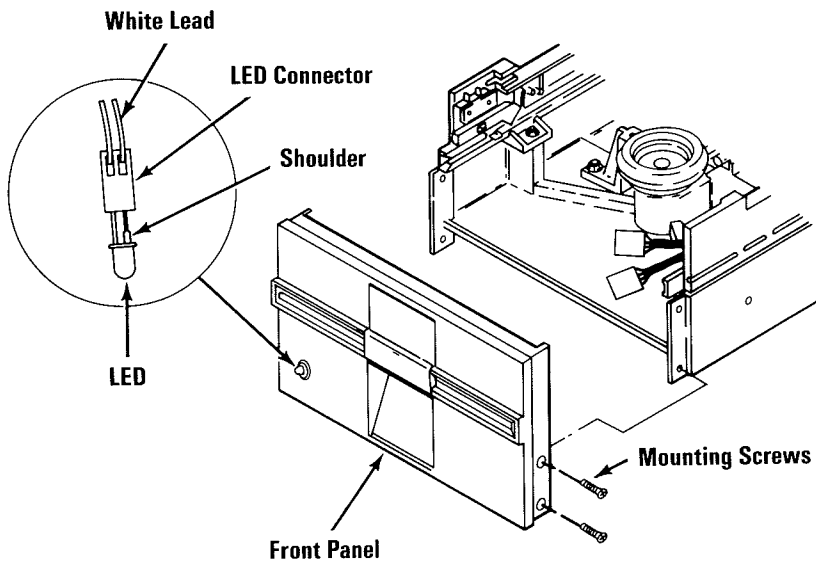
1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Set all external Power switches off (printer, TV, etc.).
3. Unplug the system unit's (and expansion unit's) power cord(s) from the wall outlet.
4. Remove the system unit's cover **(5900)**.
5. Remove the diskette drive printed circuit board **(5185)**.
6. Close the latch and remove the mounting screw holding the pin clamp.
7. Remove the pin clamp.
8. Open the latch, push the cone arm down, and remove the latch by pulling toward the rear.

Mounting Screw

Pin Clamp

Latch

Pin

Cone Lever Arm

1. Push the cone arm down and slide the latch into its slots from the rear, then close the latch.
2. Replace the pin clamp.
3. Replace the mounting screw.
4. Replace the diskette drive printed circuit board **(5185)**.
5. Replace the system unit's cover **(5900)**.
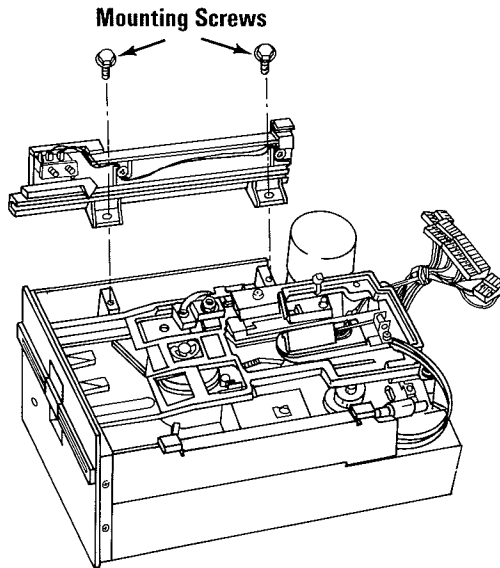6. Reconnect all cables.
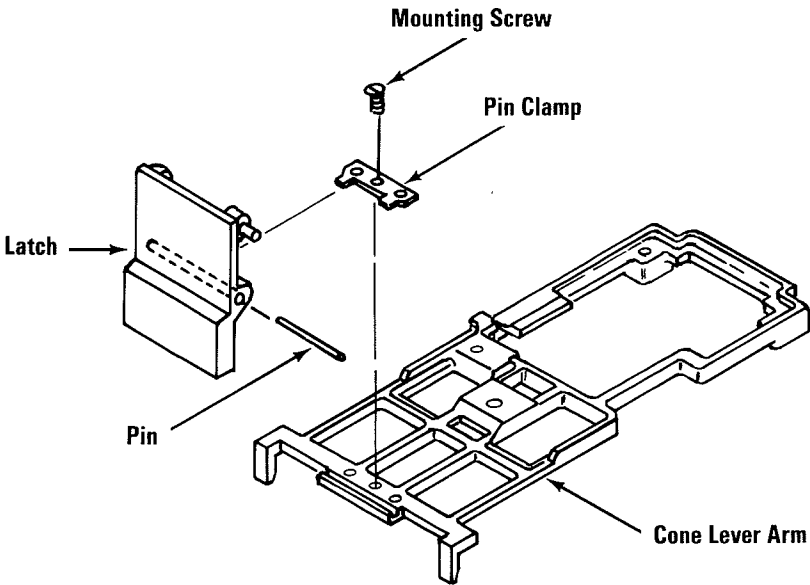
1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Set all external Power switches off (printer, TV, etc.).
3. Unplug the system unit's (and expansion unit's) power cord(s) from the wall outlet.
4. Remove the system unit's cover **(5900)**.
5. Remove the diskette drive **(5183)** or **(5184)**.
6. Remove the diskette drive printed circuit board **(5185)**.
7. Remove the front panel of the diskette drive **(5190)**.
8. Remove the retaining collar that holds the LED to the front panel.
9. Remove the LED from the front panel by pushing on the LED from the front of the front panel.

Retaining Collar

LED

Front Panel

1. Insert the LED into the front panel.
2. Insert the retaining collar over the back of the LED in the front panel.
3. Replace the front panel **(5190)**.
4. Replace the diskette drive printed circuit board **(5185)**.
5. Replace the diskette drive **(5183)** or **(5184)**.
6. Replace the system unit's cover **(5900)**.
7. Reconnect all cables.

Retaining Collar

LED

Front Panel

Left Diskette Guide Removal   5193
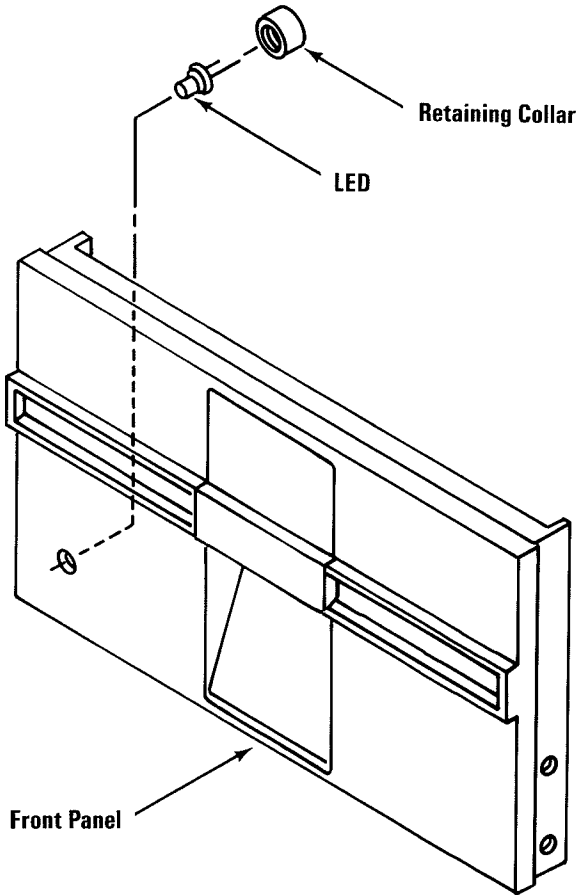
1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Set all external Power switches off (printer, TV, etc.).
3. Unplug the system unit's (and expansion unit's) power cord(s) from the wall outlet.
4. Disconnect all cables from the rear of the system unit.
5. Remove the system unit's cover **(5900)**.
6. Remove the diskette drive printed circuit board **(5185)**.
7. Remove the wires to the write protect switch.
8. Remove the screws that hold the guide to the frame.
9. Slide the guide to the rear and lift it from the frame.
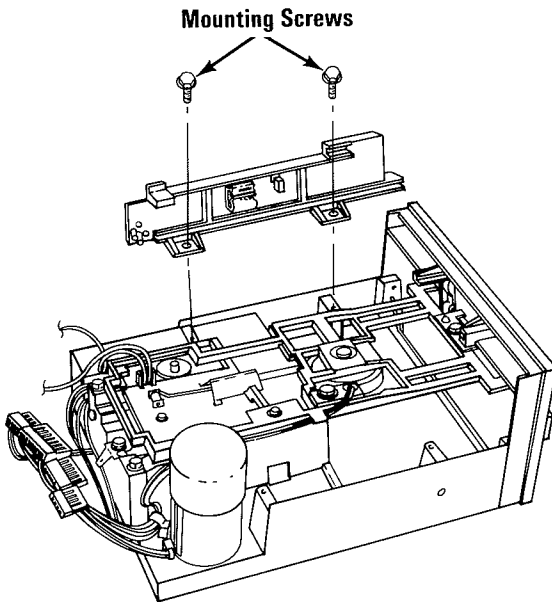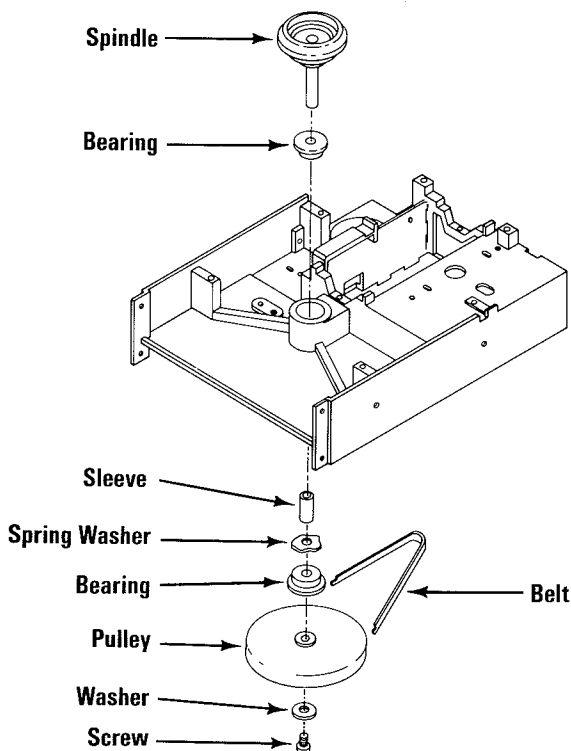
Mounting Screws

Left Diskette Guide Replacement   5193

1. Slide the guide to the front of the diskette drive, align the holes, and install the mounting screws.
2. Reroute the wires in the guide and connect the wires to the write-protect switch **(5196)**.
3. Replace the diskette-drive printed circuit board **(5185)**.
4. Replace the system unit's cover **(5900)**.
5. Reconnect all cables.

Right Diskette Guide Removal 5194

1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Set all external Power switches off (printer, TV, etc.).
3. Unplug the system unit's (and expansion unit's) power cord(s) from the wall outlet.
4. Disconnect all cables from the rear of the system unit.
5. Remove the system unit's cover **(5900)**.
6. Remove the diskette drive printed circuit board **(5185)**.
7. Remove the head cables from the diskette guide.
8. Remove the screws that hold the guide to the frame.
9. Move the guide to the rear and lift it from the diskette drive.
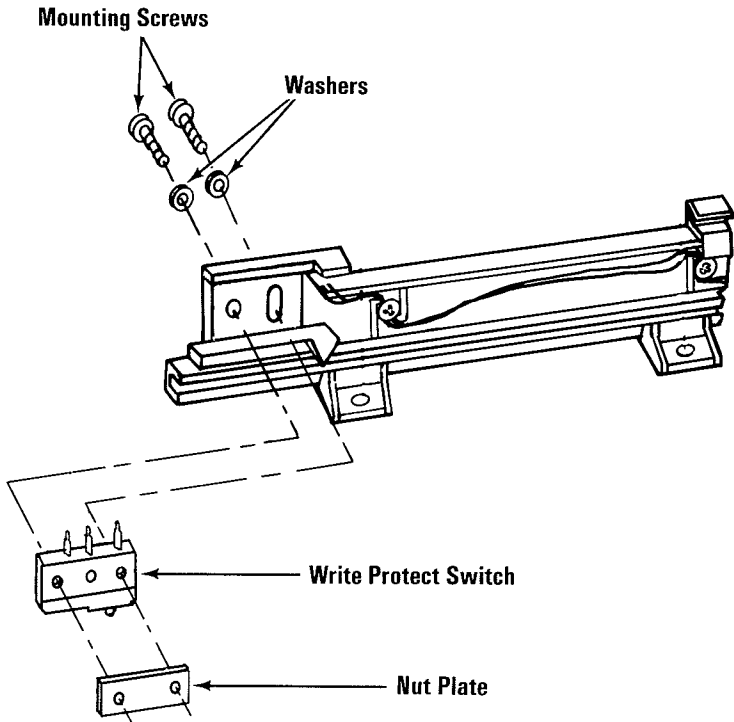
Mounting Screws

Right Diskette Guide Replacement 5194

1. Move the guide to the front of the diskette drive, align the holes, and install the mounting screws.
2. Replace the diskette drive head wires in the guide.
3. Replace the diskette drive printed circuit board **(5185)**.
4. Replace the system unit's cover **(5900)**.
5. Reconnect all cables.

1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Set all external Power switches off (printer, TV, etc.).
3. Unplug the system unit's (and expansion unit's) power cord(s) from the wall outlet.
4. Disconnect all cables from the rear of the system unit.
5. Remove the system unit's cover **(5900)**.
6. Remove the diskette drive **(5183)** or **(5184)**.
7. Remove the diskette drive printed circuit board **(5185)**.
8. Remove the cone lever arm **(5182)**.
9. Remove the drive belt **(5186)**.
10. Remove the drive pulley screw and washer(s).
11. Remove the drive pulley by holding the spindle and twisting the drive pulley back and forth while pulling on the pulley.
12. Remove the spindle assembly by pulling on the spindle and pushing on the spindle's shaft from the opposite side.

Spindle

Bearing

Sleeve

Spring Washer

Bearing — Belt

Pulley

Washer

Screw

Spindle Assembly Replacement   5195

1. Carefully insert the spindle assembly into the mounting hole.
2. Replace the sleeve, bearing, and spring washer.
3. Replace the diskette drive's pulley; hold the spindle and install the washers and the screw; turn the screw clockwise to tighten.
4. Replace the diskette drive belt **(5186)**.
5. Replace the cone lever arm **(5182)**.
6. Replace the diskette drive logic printed circuit board **(5185)**.
7. Replace the diskette drive assembly **(5183)** or **(5184)**.
8. Replace the system unit's cover **(5900)**.
9. Reconnect all cables.
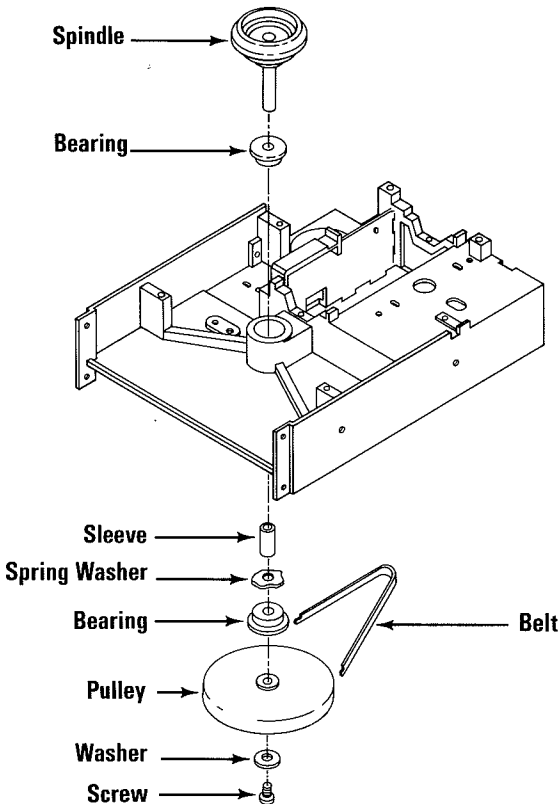
1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Set all external Power switches off (printer, TV, etc.).
3. Unplug the system unit's (and expansion unit's) power cord(s) from the wall outlet.
4. Remove the system unit's cover **(5900)**.
5. Remove the diskette drive **(5183)** or **(5184)**.
6. Remove the diskette drive printed circuit board **(5185)**.
7. Remove the connectors from the write protect switch.
8. Remove the mounting screws, washers, nut plate, and write protect switch.

Mounting Screws

Washers

Write Protect Switch

Nut Plate

Write Protect Switch Replacement   5196

1. Insert the write protect switch and nut plate in position.
2. Put the mounting screws and washers in position (do not tighten at this time).
3. Insert a diskette half way into the drive move the switch up then move it down until you hear it operate.
4. Tighten the mounting screws and check to see that the write protect switch operates when you first insert the diskette and again when the switch lever drops into the write protect notch on the diskette. Readjust if necessary.
5. Connect the connectors on the write protect switch (white wire on the center connector and the black wire on the rear connector).
6. Replace the diskette drive printed circuit board **(5185)**.
7. Replace the diskette drive **(5183)** or **(5184)**.
8. Replace the system unit's cover **(5900)**.
9. Reconnect all cables.

White Lead

Black Wire

Switch Lever

Diskette

Type 2 5-86
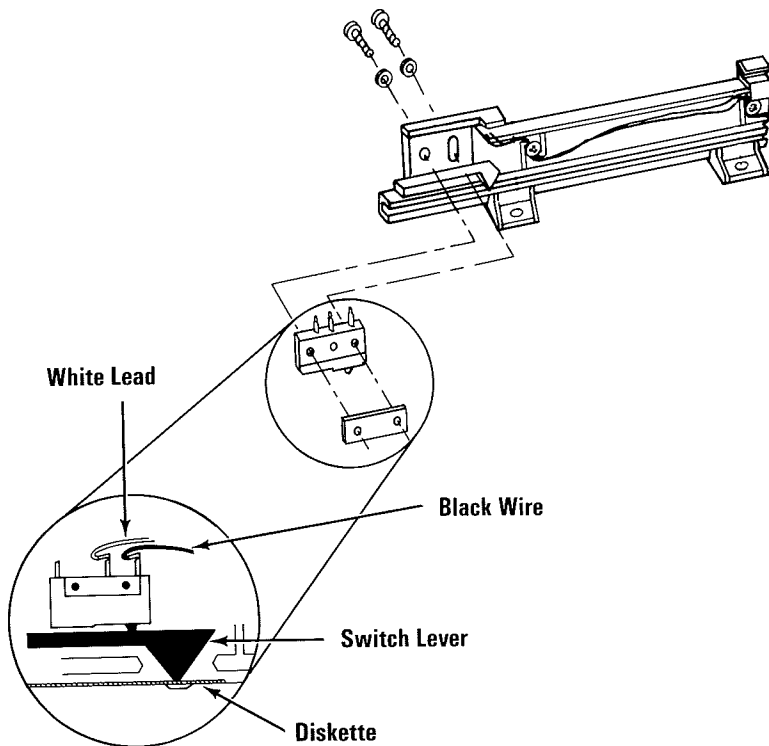
Fixed Disk Drive

Drive C Removal   5200

WARNING: Normal shipping and handling can result in
permanent loss of all data and formatting of the
fixed disk drive(s). It is recommended that all
files be backed up onto diskettes.

1. Set the expansion unit Power switch to Off, then unplug the
   expansion unit power cord and remove all cables from the
   rear of the unit.
2. Place the keyboard, display, and all external options away
   from the work surface.
3. Remove the expansion unit cover **(5900)**.
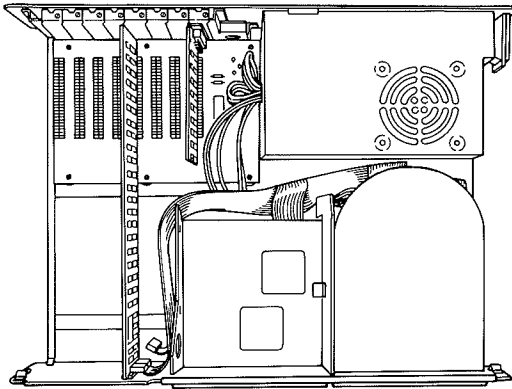
4. Tilt the unit up and remove the fixed disk drive mounting
   plate screw as shown below.

Fixed Disk/Diskette Drive
Mounting Plate

Remove this
screw

Fixed Disk
Drive C
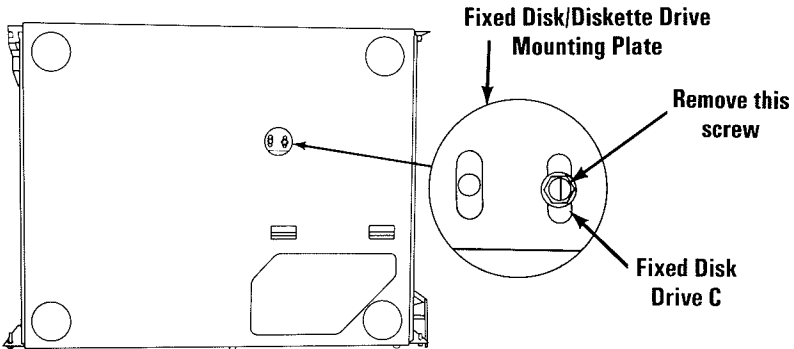
(Bottom View)

5. Remove the two mounting screws on the right side of the disk drive.

Mounting Screws
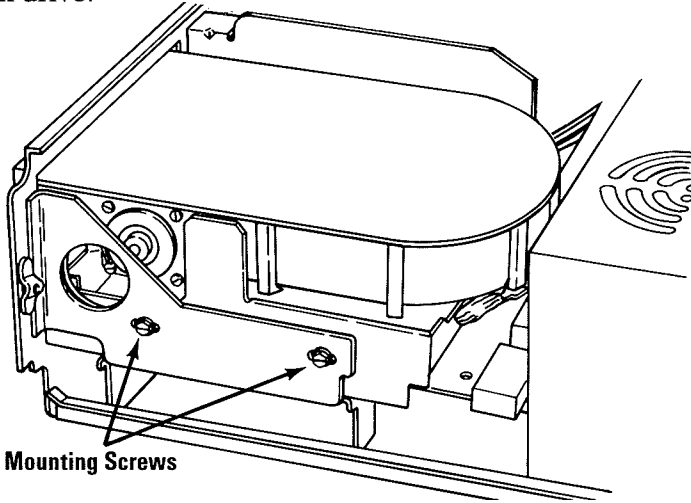
6. Unplug the power connector, control connector (J1), and data connector (J2). Then slide the drive completely out of the machine.

Fixed Disk Drive
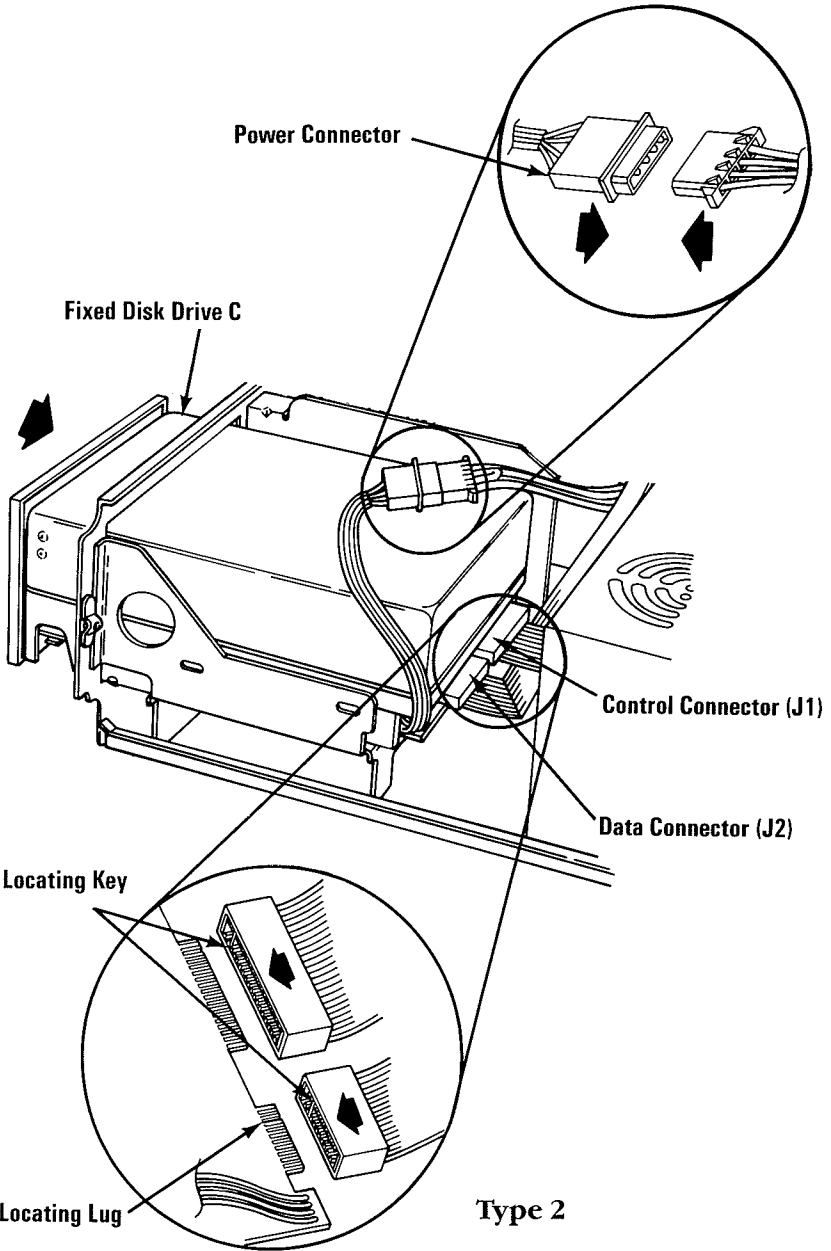
Power Connector

Control Connector (J1)

Data Connector (J2)

Type 1

Fixed Disk Drive   **Power Connector**

Control Connector (J1)
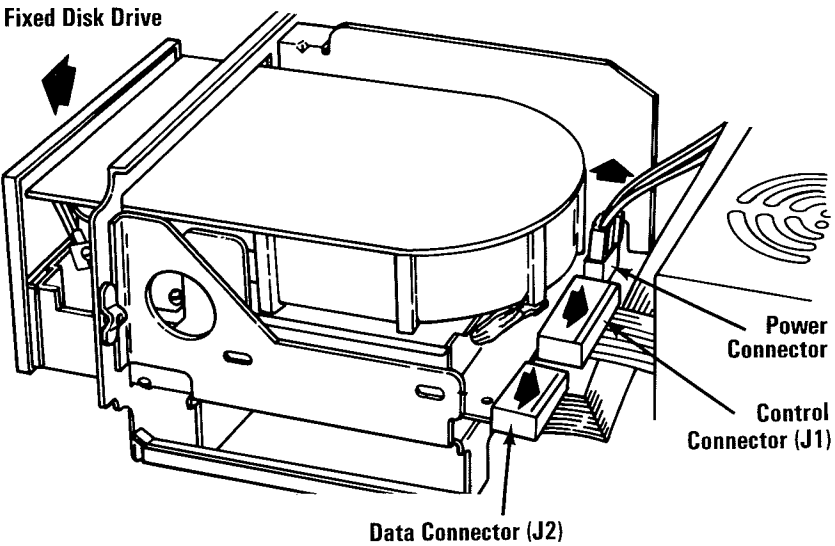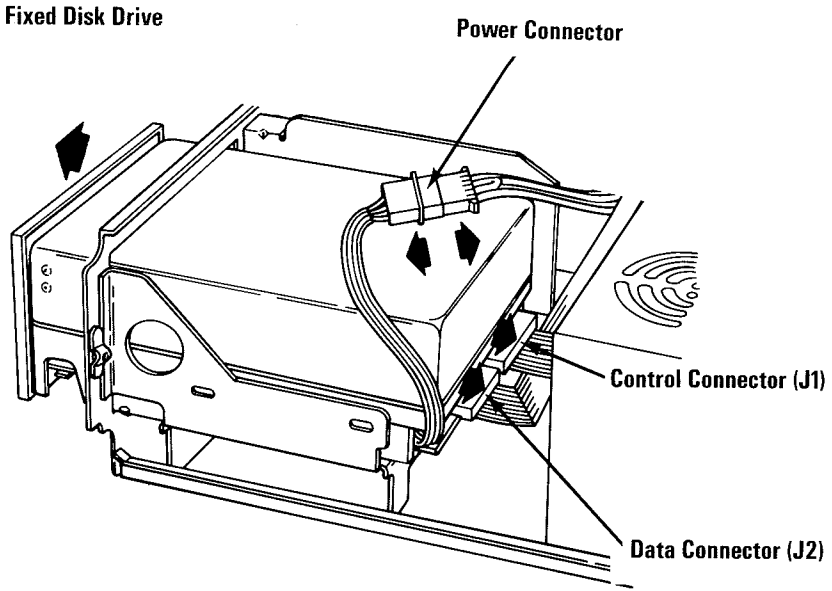
Data Connector (J2)

Type 2

1. Slide the disk drive into slot C as shown below.
2. With the front of the drive still extending approximately
   two inches out of the front panel, plug in the power
   connector, control connector J1, and data connector J2.

Power Connector

Fixed Disk Drive C

Control Connector (J1)

Data Connector (J2)

Locating Key

Locating Lug

Type 1

Power Connector

Fixed Disk Drive C

Control Connector (J1)

Data Connector (J2)

Locating Key

Locating Lug

Type 2
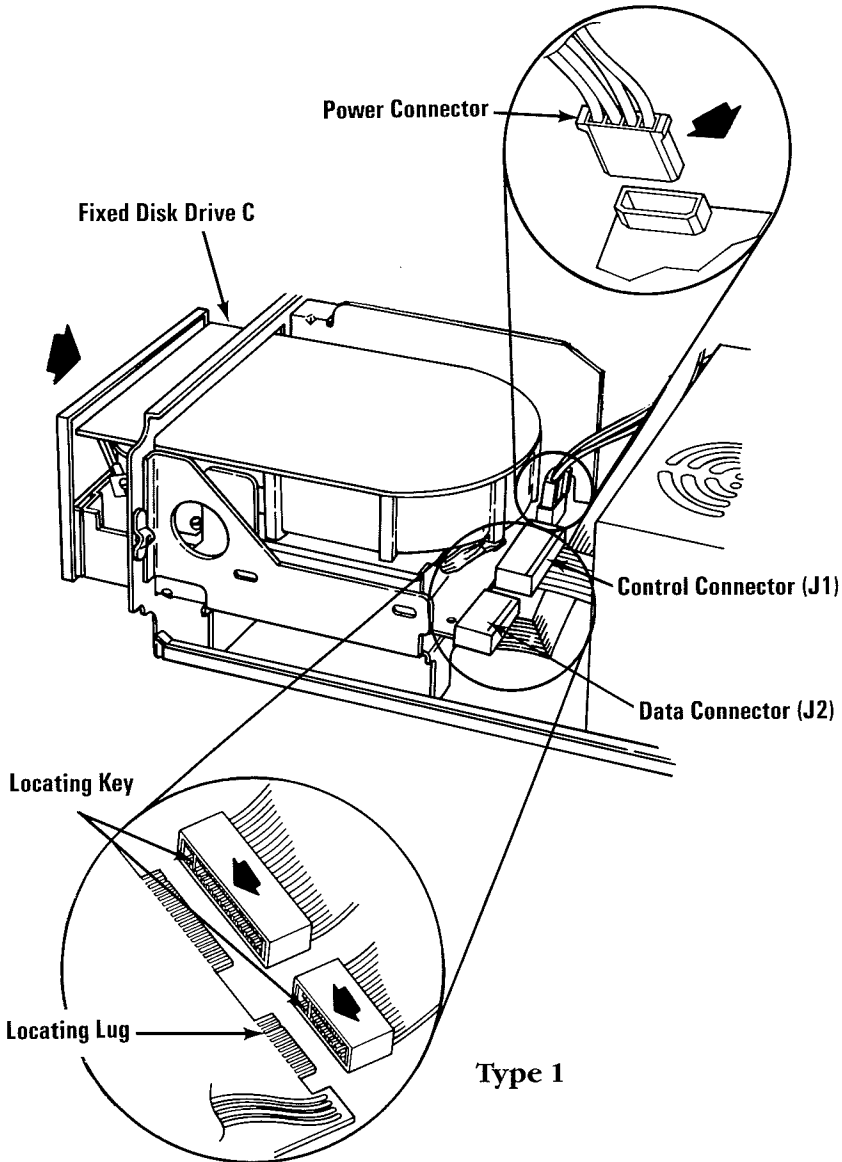
3. Slide the disk drive in until there is .040" clearance between the front mounting panel and the drive face plate.
4. Replace the disk drive mounting screws.

   WARNING: Be sure to use the same two mounting screws (long screws) that were removed from the side of the drive or damage to the drive will result.
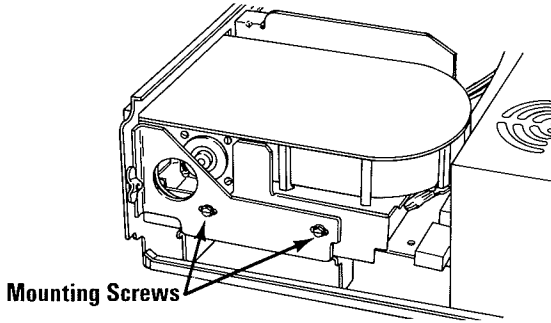
Mounting Screws

5. Tilt the unit up and replace the fixed disk drive mounting plate screw as shown below.

   WARNING: Be sure to use the same screw (short screw) that was removed from the mounting plate or damage to the drive will result.

Fixed Disk/Diskette Drive Mounting Plate

Mounting Plate Screw

Fixed Disk Drive C
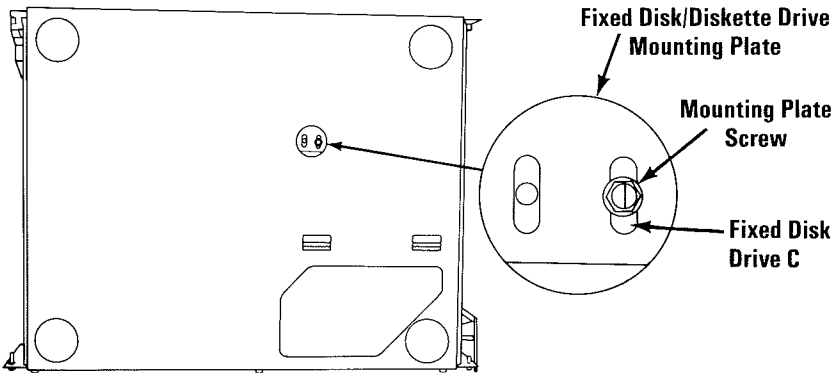
(Bottom View)

6. Replace the expansion unit cover **(5900)**.
7. Reconnect cables to the expansion unit.

Drive D Removal 5210

WARNING: Normal shipping and handling can result in permanent loss of all data and formatting on the fixed disk drive(s). It is recommended that all files be backed up onto diskettes.

1. Set the expansion unit Power switch to Off, then unplug the expansion unit power cord and remove all cables from the rear of the unit.
2. Place all external options away from the work surface.
3. Remove the expansion unit cover (**5900**).
4. Tilt the unit up and remove the fixed disk mounting plate screw for drive D.

Fixed Disk Drive Mounting Plate

Remove this Screw

(Bottom View)

Fixed Disk Drive D   Fixed Disk Drive C
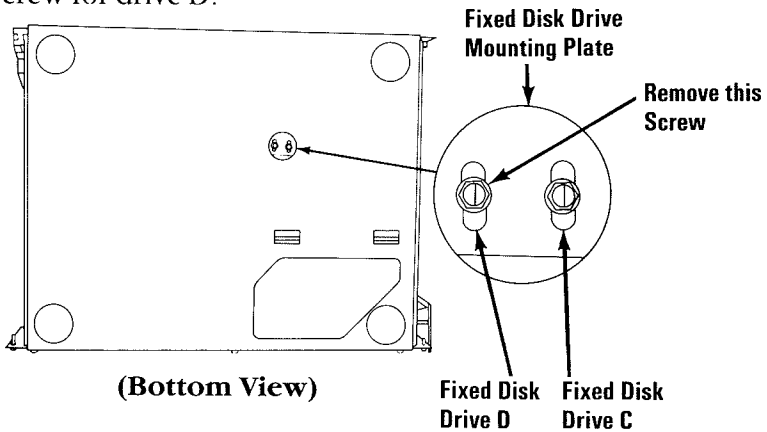
5. Remove all option adapters (**5800**).
6. Remove the mounting screws on the left side of disk drive D.

Mounting Screws
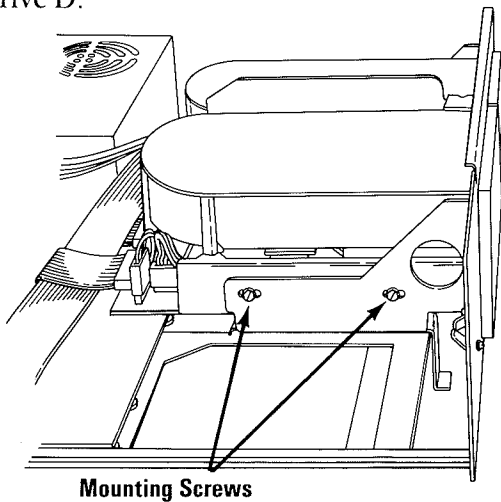
7. Slide the drive out two inches and unplug the control connector (J1), data connector (J3), and power connector.
8. Remove the disk drive from the unit.

Data Connector (J3)

Control Connector (J1)

Power Connector

Fixed Disk Drive D

Type 1

Fixed Disk Drive D

Power Connector

Data Connector (J3)

Control Connector (J1)

Type 2
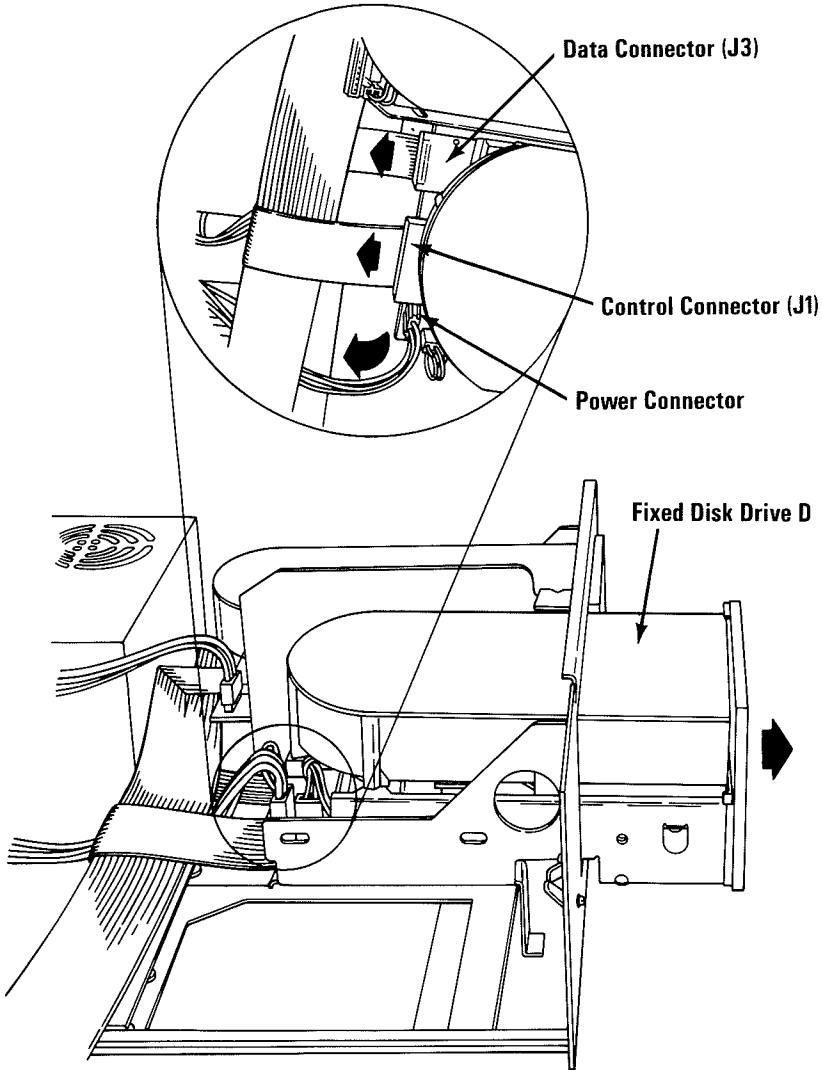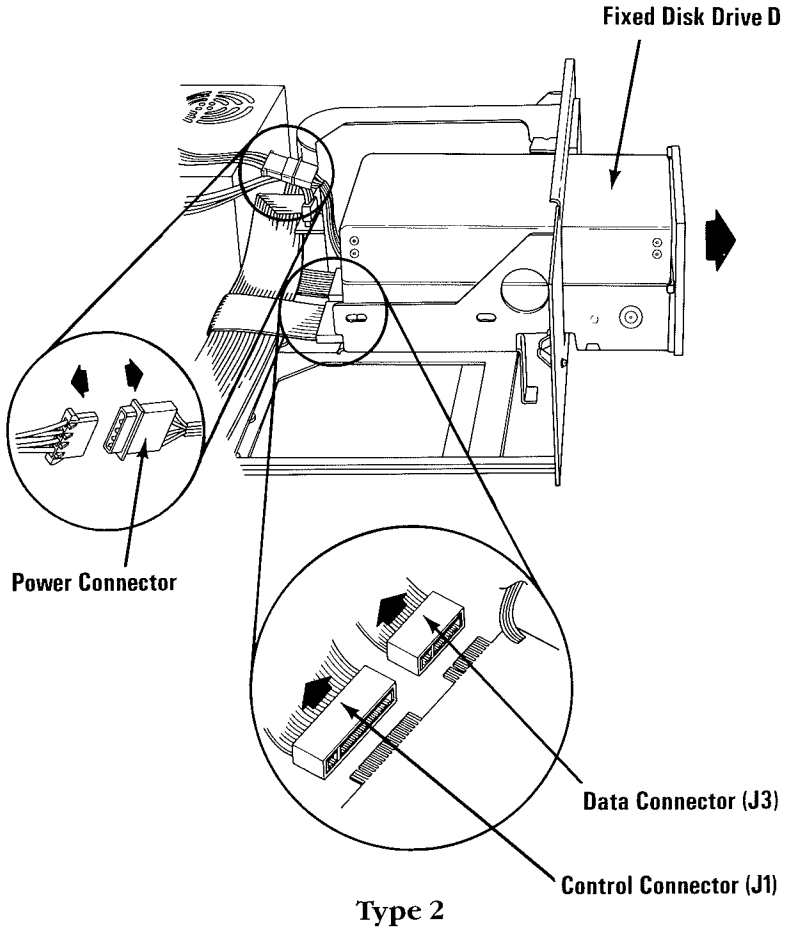
1. Slide the disk drive into slot D as shown.
2. With the front of the drive still extending approximately two inches out of the front panel, plug in the power connector, control connector (J1), and data connector (J3).

Data Connector (J3)

Control Connector (J1)

Power Connector

Fixed Disk Drive D

Type 1

Fixed Disk Drive D

Power Connector

Data Connector (J3)

Control Connector (J1)

Type 2
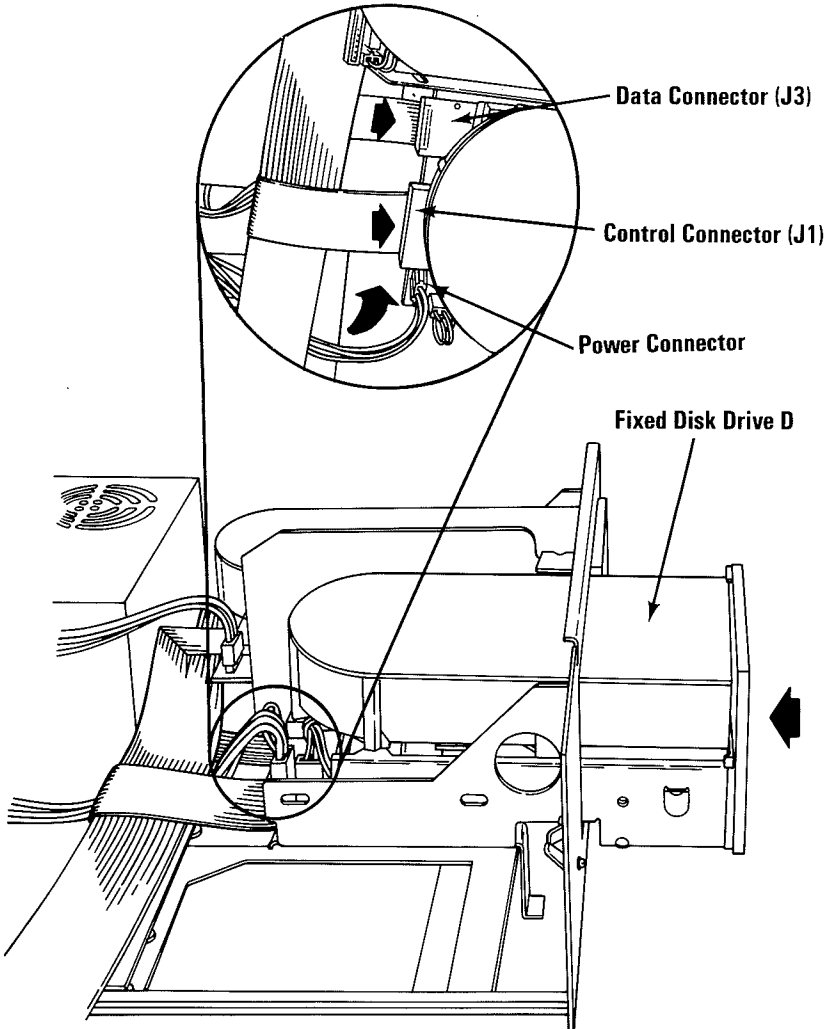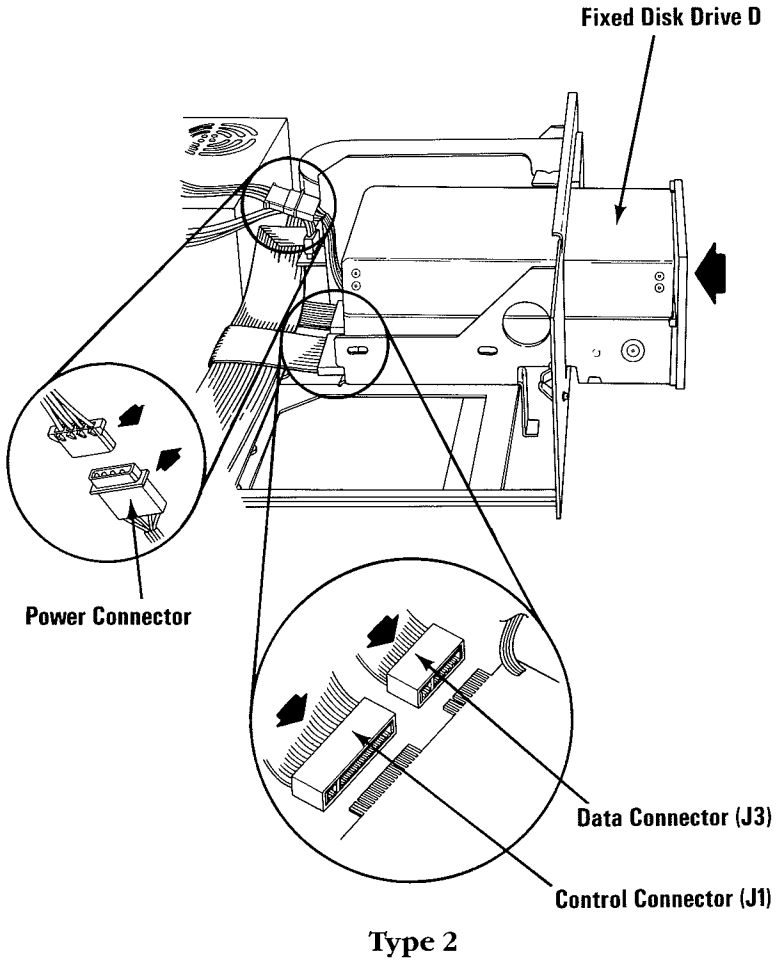
3. Slide the drive in until there is .040″ clearance between the drive face plate and the front mounting panel.
4. Replace the two mounting screws.

   WARNING: Be sure to use the same two mounting screws (long screws) that were removed from the side of the drive or damage to the drive will result.
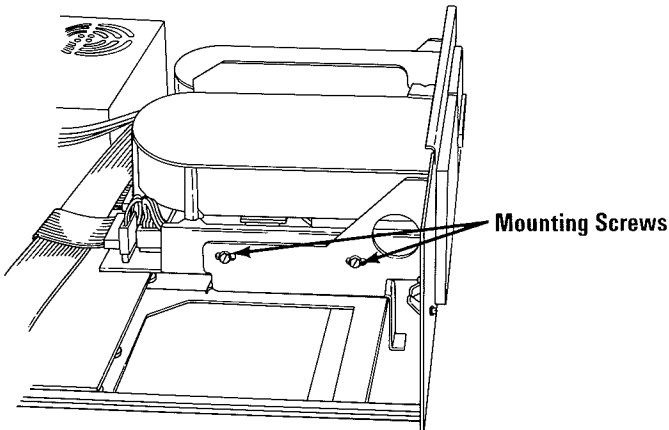
Mounting Screws

5. Tilt the unit up and replace the fixed disk drive mounting plate screw as shown below.

   WARNING: Be sure to use the same screw (short screw) that was removed from the mounting plate or damage will result.

Fixed Disk Drive Mounting Plate

(Bottom View)

Fixed Disk Drive D   Fixed Disk Drive C
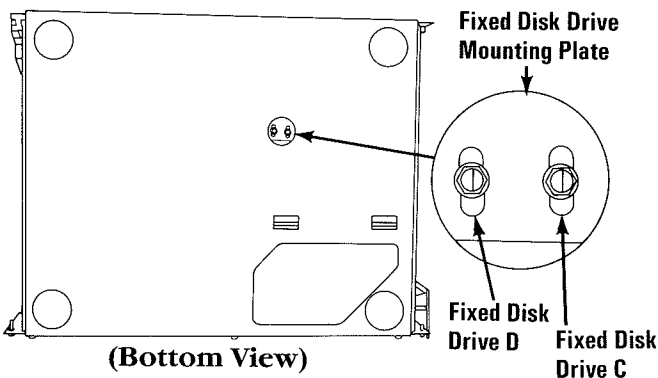
6. Replace all option adapters **(5800)**.
7. Replace the expansion unit cover **(5900)**.
8. Reconnect the cables.

Display

Monochrome Display Removal   5300

1. Set the system unit's Power switch to Off, and remove the display power cord from the rear of the system unit.
2. Disconnect the signal cable from the IBM Monochrome Display and Printer Adapter.

IBM Monochrome Display
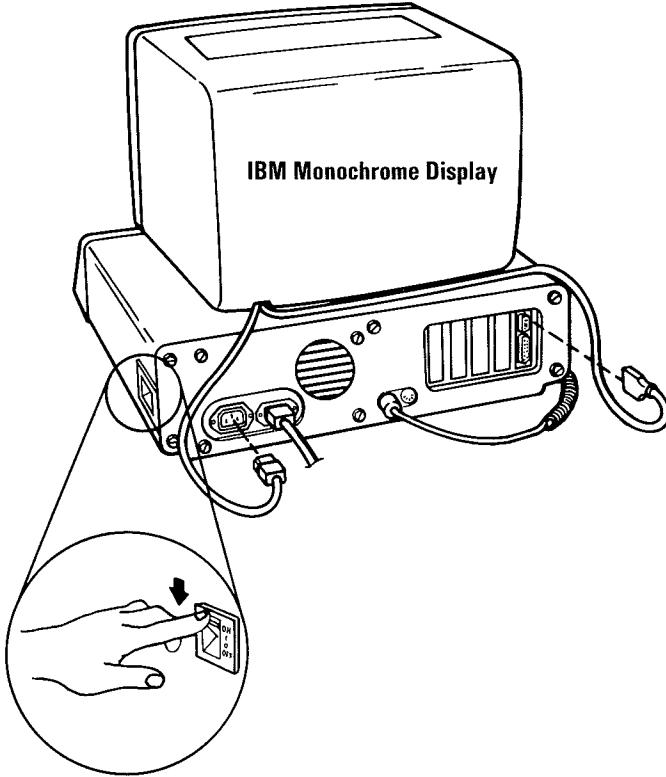
Display Replacement   5300

1. Connect the signal cable from your display to the IBM Monochrome Display and Printer Adapter.
2. Connect the display power cord to the connector at the rear of the system unit.

Color Display

Removal 5350

1. Set the system unit's Power switch (and expansion unit's Power switch, if attached) and the display's power control to Off.
2. Disconnect the display's power cord from the wall outlet.
3. Disconnect the display's signal cable from the Color/ Graphics Monitor Adapter.
4. Disconnect the display's power cord from the rear of the display.
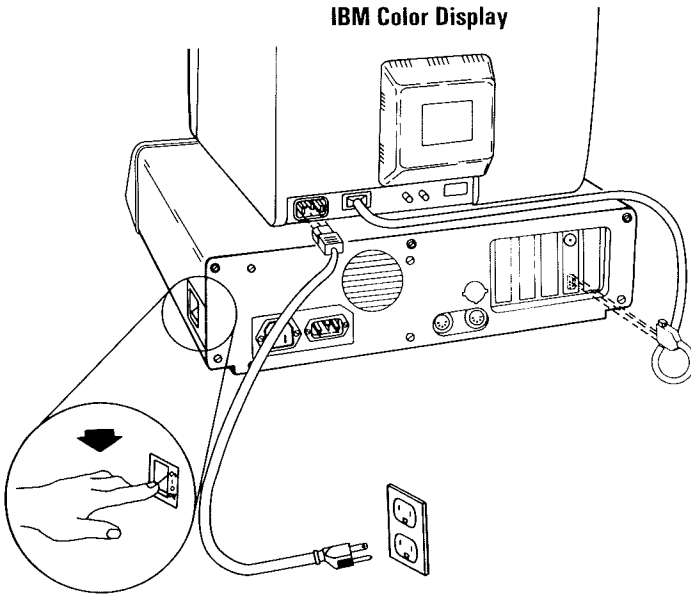
IBM Color Display

Color Display Replacement 5350

1. Connect the signal cable from the display to the Color/ Graphics Monitor Adapter.
2. Connect the display's power cord to the rear of the IBM Color Display.
3. Connect the display's power cord to the wall outlet.

Color Trimmer
Capacitor Adjustment 5360

If your display works correctly, except for an incorrect color
hue or the absence of color, adjust, in small increments, the
trimmer capacitor next to the power connectors on the system
board until the color appears. If the Color/Graphics Monitor
Adapter is installed in the expansion unit, the trimmer capacitor
on the expansion board, next to expansion slot 8 should be
adjusted (use only a nonmetallic screwdriver or aligning tool).
The hue and color controls on the color monitor must also be
set correctly at this point.

System
Board

Color
Trimmer
Capacitor
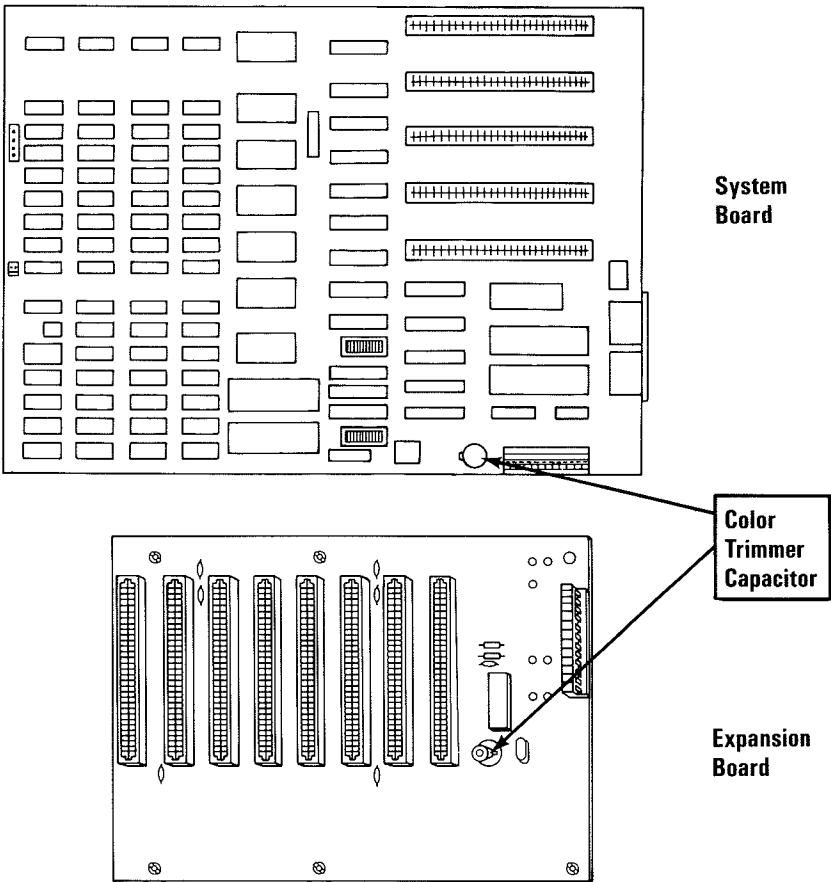
Expansion
Board

This adjustment is required only if your IBM Color Display has a vertical hold problem (screen rolling top-to-bottom or bottom-to-top).

IBM Color Display

Vertical Hold
Control
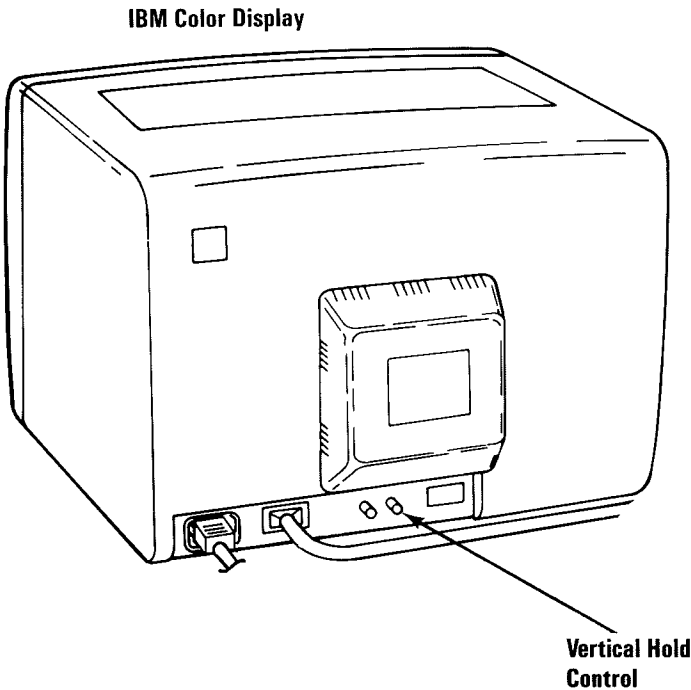
1. Set the display's power control to on.
2. Set the expansion unit's Power switch to On, then set the system unit's Power switch to On.
3. Wait for POST to complete.
4. Turn the vertical hold control clockwise as far as it will go, then turn it counterclockwise until the screen stops rolling and is stable.

IBM Color Display

Vertical Size Control
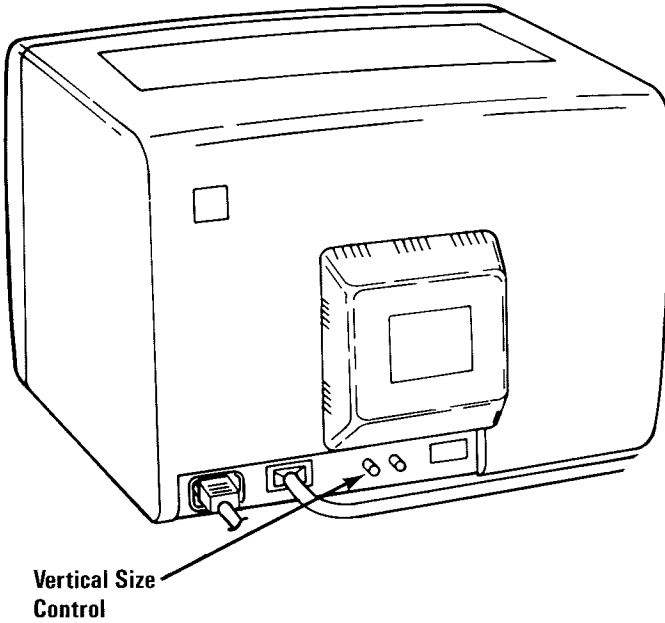
1. Set the system unit's Power switch (and expansion unit's Power switch, if attached) to Off.
2. Set the display's Power control to on.
3. Turn the brightness and contrast controls fully clockwise.
4. Turn the vertical size control fully counterclockwise. A black area should appear across the top and bottom of the screen.
5. Turn the vertical size control clockwise until the black area at the top and bottom of the screen just disappears. If one of the black areas disappears before the other, continue to turn the control until the second black area is gone.
6. Adjust the brightness and contrast controls for eye comfort.

Notes:

Expansion Unit

Expansion Board Removal   5410

1. Set the system unit and the expansion unit Power switches to Off, unplug the expansion unit power cord and disconnect all cables from the rear of the expansion unit.
2. Remove expansion unit cover **(5900)**.
3. Remove all option adapters, including the receiver card **(5800)**.
4. Remove expansion board power connectors **A** .
5. Remove expansion board mounting screw **B** .
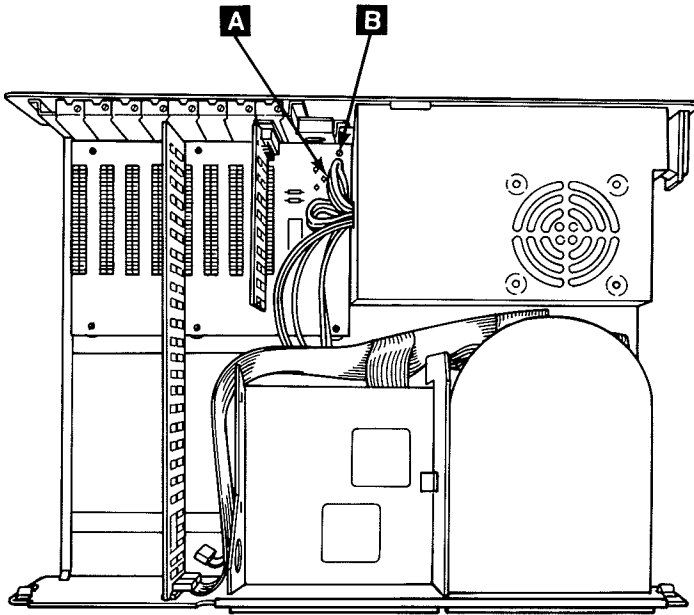
6. Slide expansion board away from the power supply (approximately 1/2″) until stand-offs **A** can be lifted from mounting slots **B** .

7. Lift expansion board up and out of expansion unit.

(Side View)

Expansion Board Replacement   5410
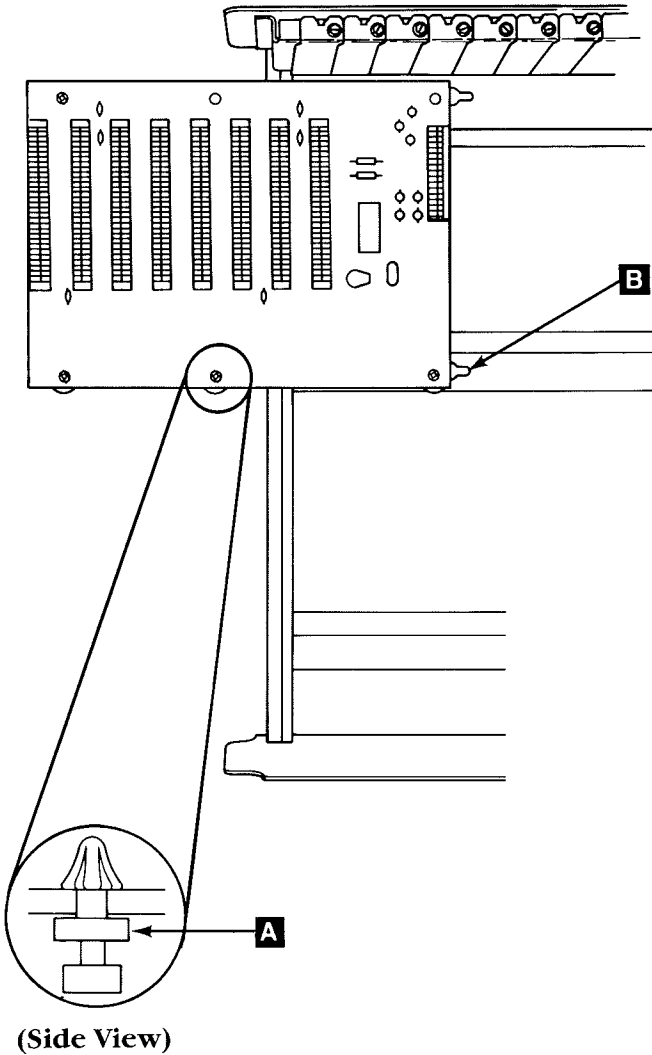
1. Position the stand-offs **A** on the expansion board into the
    mounting slots **B** .

(Side View)
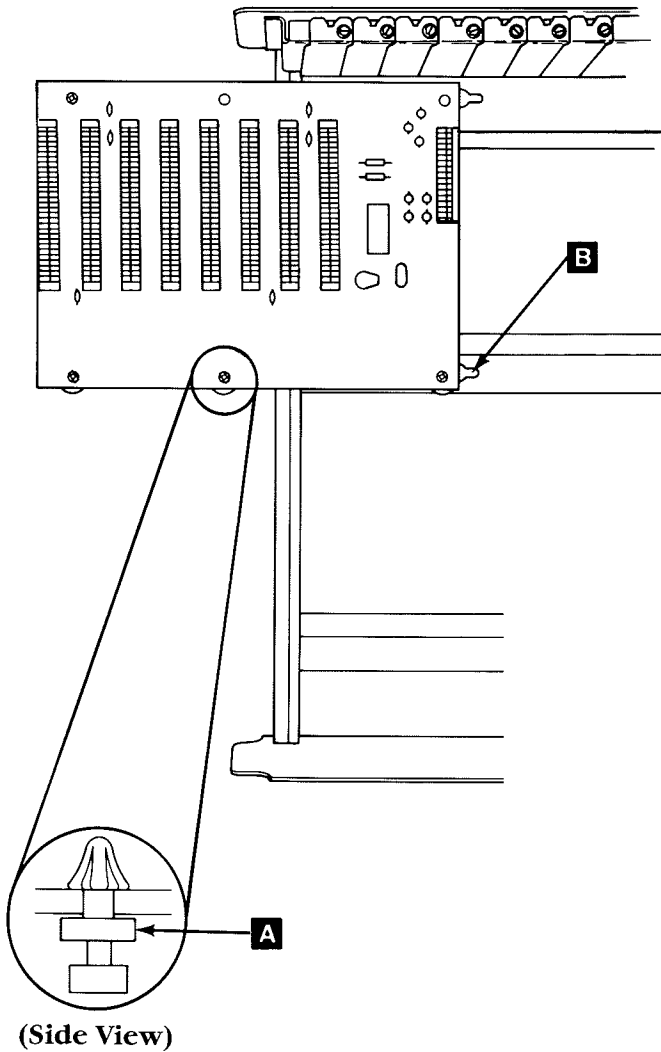
2. Slide expansion board toward power supply until holes for mounting screws are aligned.
3. Install expansion board mounting screw **C** .
4. Install expansion board power connectors **D** .
5. Install option adapters, including the receiver card **(5800)**.
6. Install expansion unit cover **(5900)**.
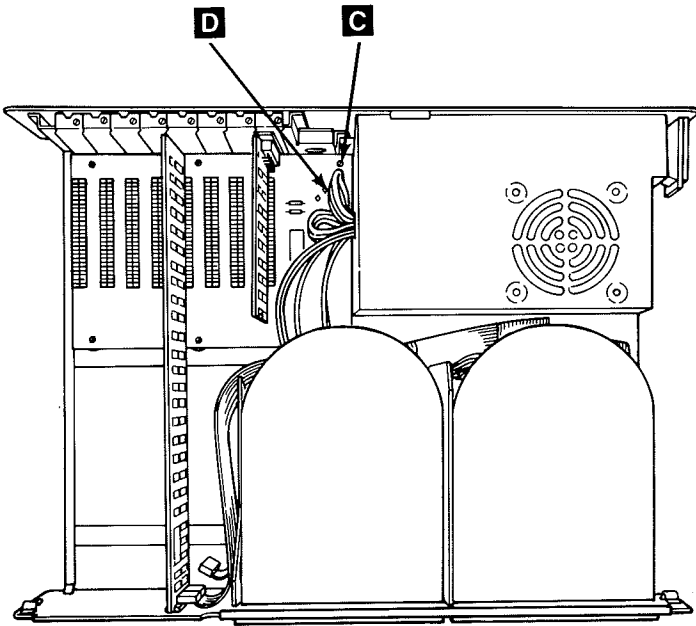
Keyboard

Keyboard Base Removal   5500

1. Set system unit Power switch to Off, and disconnect keyboard cable from rear of system unit.
2. Position the keyboard with the bottom facing up and remove the two mounting screws.
3. Rotate the base up and out of the front retaining slots.
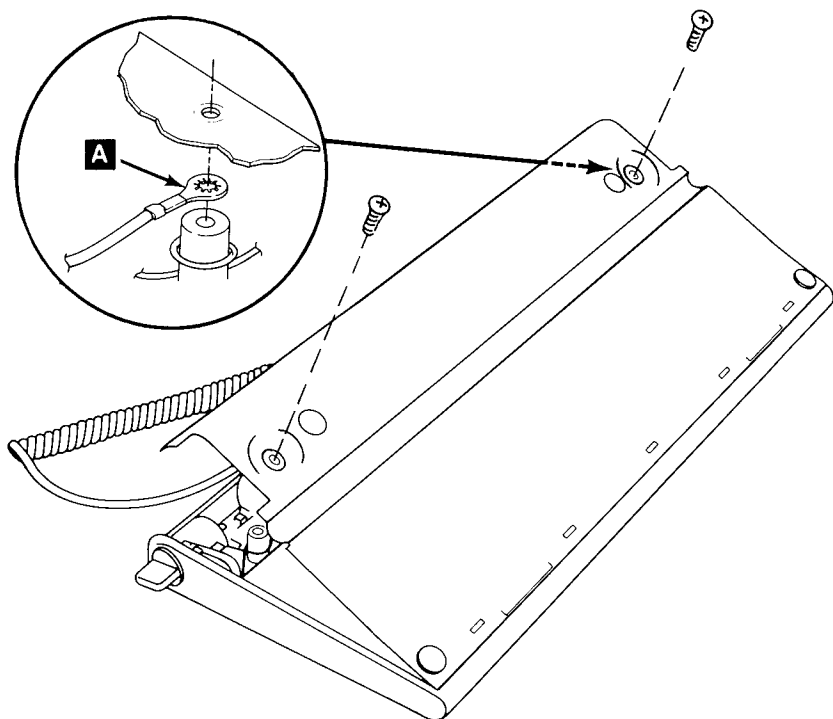
Keyboard Base Replacement   5500

1. Place the tabs on front of base into retaining slots on cover and rotate base to closed position.
2. Replace mounting screws with ground wire **A** installed on screw post as shown.
3. Reconnect keyboard cable at rear of system unit.

Keyboard Assembly Removal 5510

1. Set system unit Power switch to Off, and disconnect keyboard cable from rear of system unit.
2. Remove keyboard base **(5500)**.
3. Disconnect cable from keyboard assembly.
4. Lift rear of keyboard assembly up and then out of the cover.
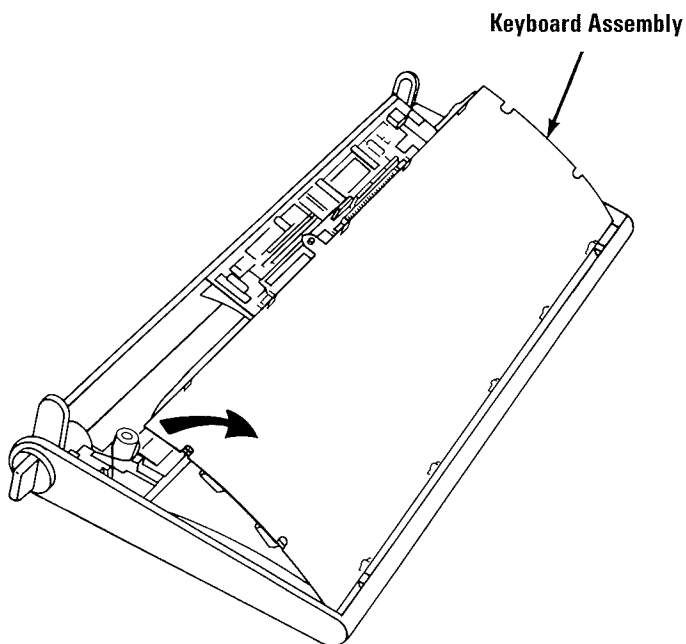
Keyboard Assembly

Keyboard Assembly Replacement 5510

1. Place front of keyboard assembly into cover.
2. Lower rear of keyboard assembly into position in cover.
3. Replace keyboard base **(5500)**.
4. Reconnect keyboard cable at rear of system unit.

# Printer (IBM 80 CPS Matrix Printer)

Carriage Belt Adjustment 5600

1. Set printer Power switch to OFF; unplug printer power cord from wall outlet and disconnect printer cable.
2. Remove forms.
3. Remove forms rack **(5640)**.
4. Remove access cover **(5630)**.
5. Remove ribbon cartridge.
6. Remove top cover **(5630)**
7. Loosen holddown screw **A** in carriage drive assembly.
8. Pivot carriage drive assembly **B** to the left to tighten belt.
9. Tighten holddown screw.
10. Loosen screws **C** in carriage motor mounts.
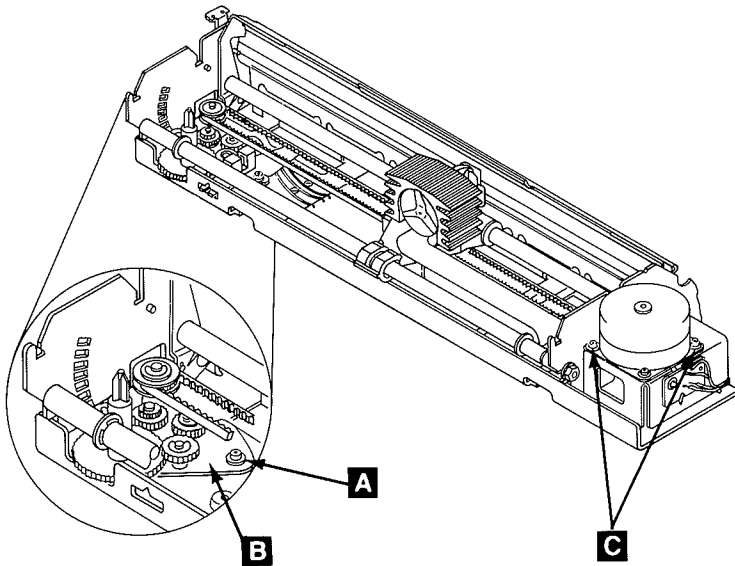
11. Position carriage motor so that motor and drive gears mesh.
12. Adjust gear backlash **D** for minimum.
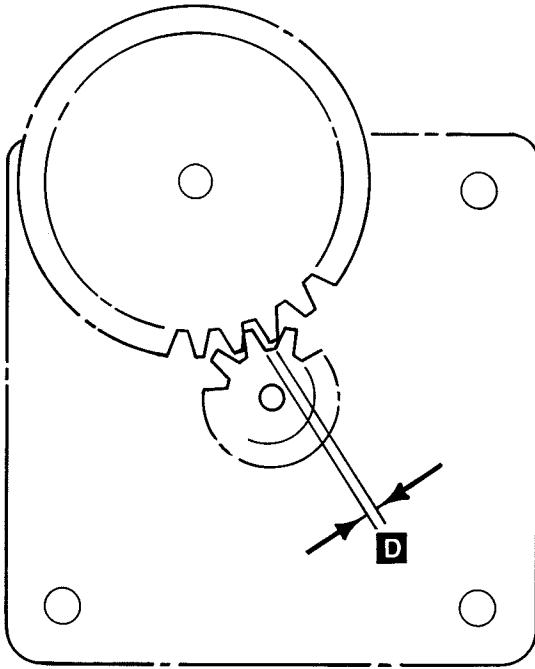
13. Tighten motor mounts screws.
14. Move print head back and forth to check for smooth gear operation with no binding.

Carriage Belt Removal   5600

1. Set printer Power switch to OFF; unplug printer power cord from wall outlet and disconnect printer cable.
2. Remove forms.
3. Remove forms rack **(5640)**.
4. Remove access cover **(5630)**.
5. Remove ribbon cartridge.
6. Remove top cover **(5630)**.
7. Remove left front and right rear screws from carriage motor mounts **A** .
8. Lift motor away from mounts to expose belt pulley **B** .
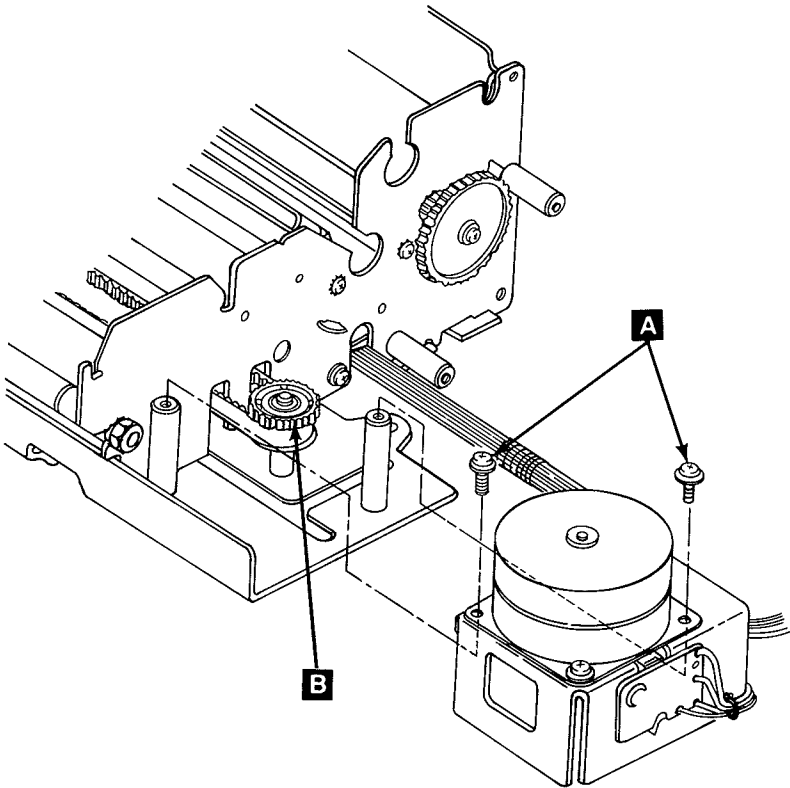
9. Pull belt from clip underneath print head carriage by pulling down on belt.
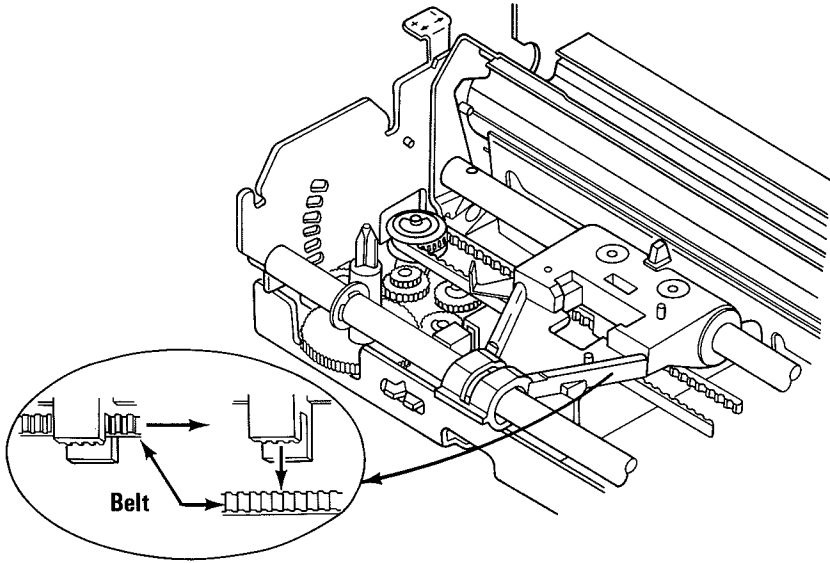
Belt

10. Loosen screw in slot in carriage drive assembly **A** .
11. Pivot carriage drive assembly to right.

A
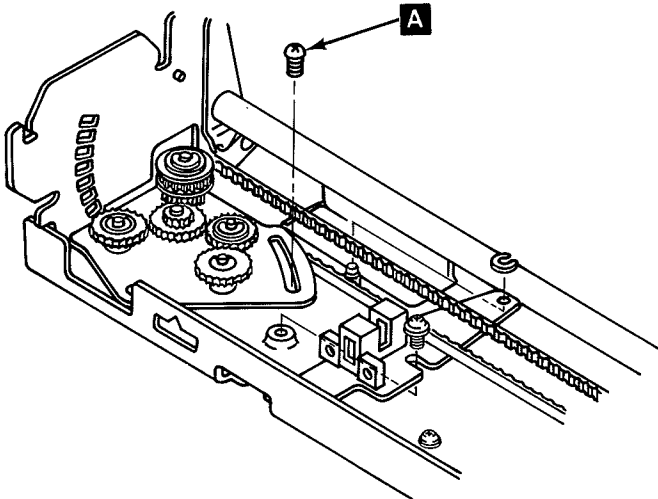
12. Lift belt off pulley at each end.
13. Guide belt **B** through opening in right side of print mechanism assembly frame.

Carriage Belt Replacement   5600
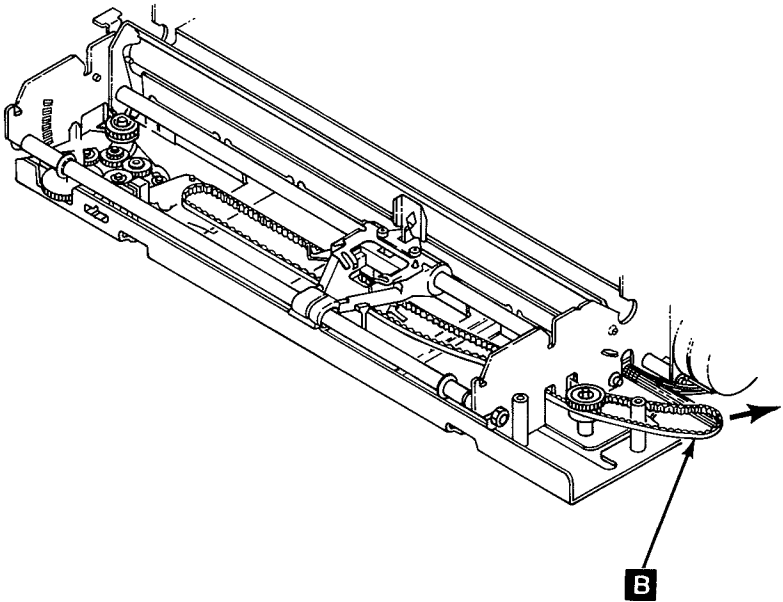
1. Insert belt through opening in right side of frame of print mechanism assembly.
2. Guide belt along base toward carriage drive assembly.
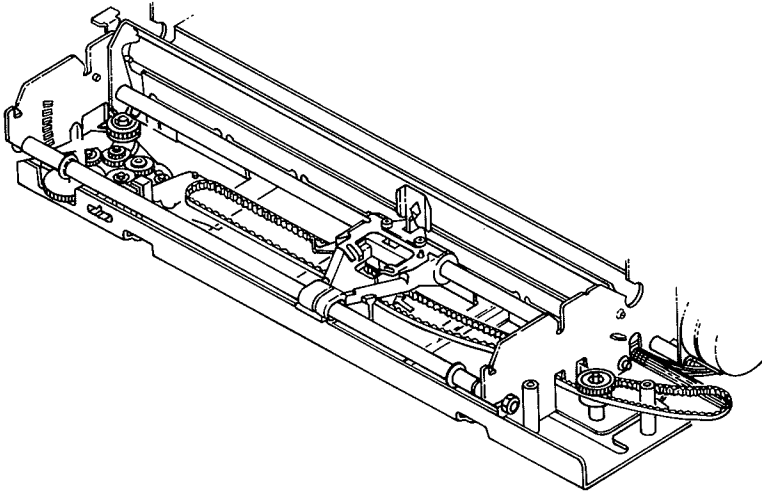
3. Place belt onto pulleys at both ends.
4. Insert belt into retaining clip under the print head carriage.
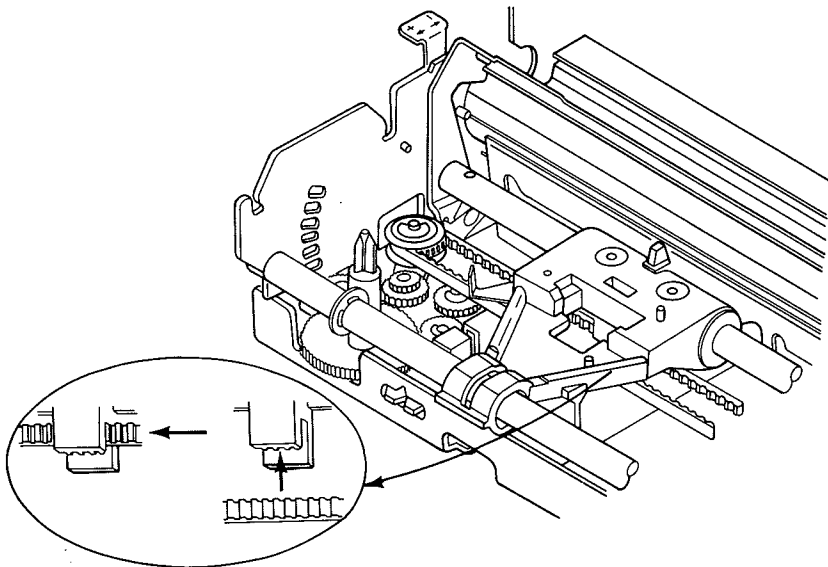
5.   Place carriage motor onto motor mounts   **A**   .
6.   Install screws into motor base (do not tighten)   **B**   .
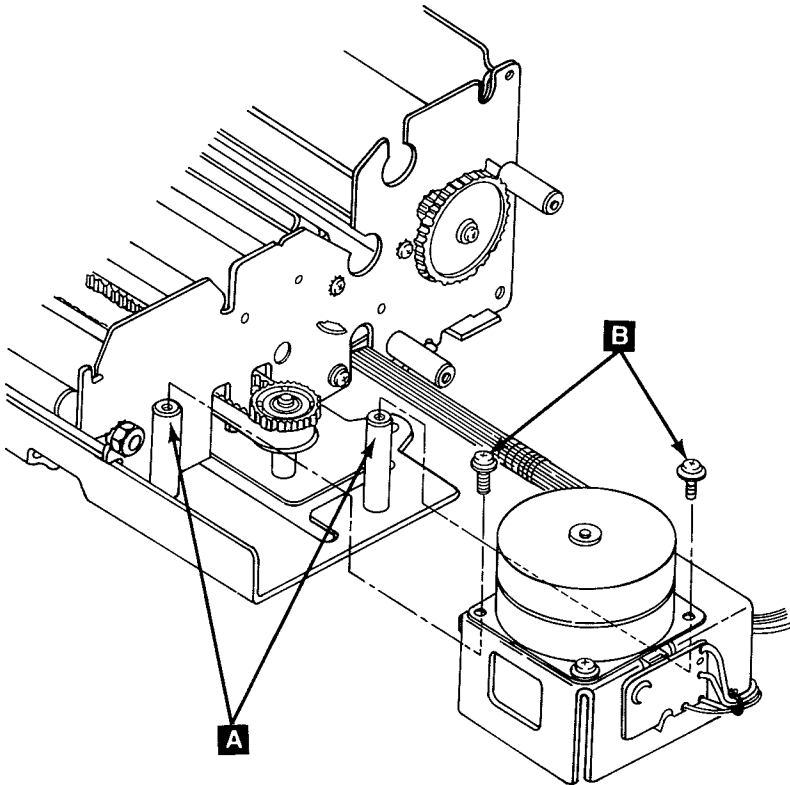
7.   Perform carriage belt adjustment **(5600)**.
8.   Replace top cover **(5630)**.
9.   Replace ribbon cartridge.
10.   Replace access cover **(5630)**.
11.   Replace forms rack **(5640)**.

Carriage Drive Assembly Removal 5605

1. Set printer Power switch to OFF; unplug printer power cord from wall outlet and disconnect printer cable.
2. Remove forms.
3. Remove forms rack (5640).
4. Remove access cover (5630).
5. Remove ribbon cartridge.
6. Remove top cover (5630).
7. Move carriage to right side of frame.
8. Loosen nuts **A** on carriage shaft **B** and pivot left end of shaft to front.
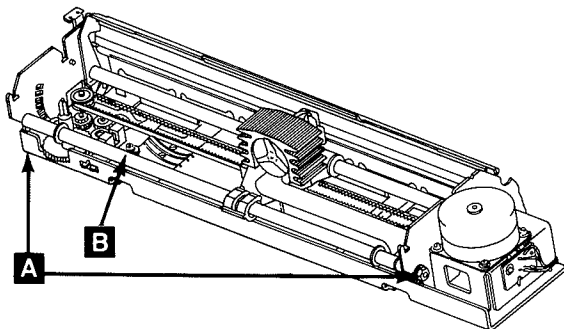
9. Remove screw **C** and clamp **D** from left margin sensor.
10. Remove carriage drive assembly retaining screw **E** .
11. Pivot carriage drive assembly clockwise, lift belt off drive pulley, lift left margin sensor off post, and lift carriage drive assembly from machine.
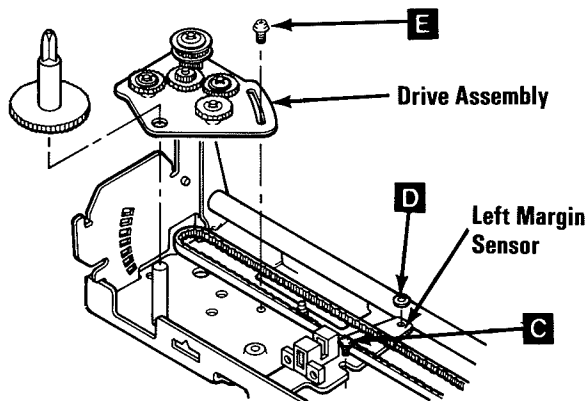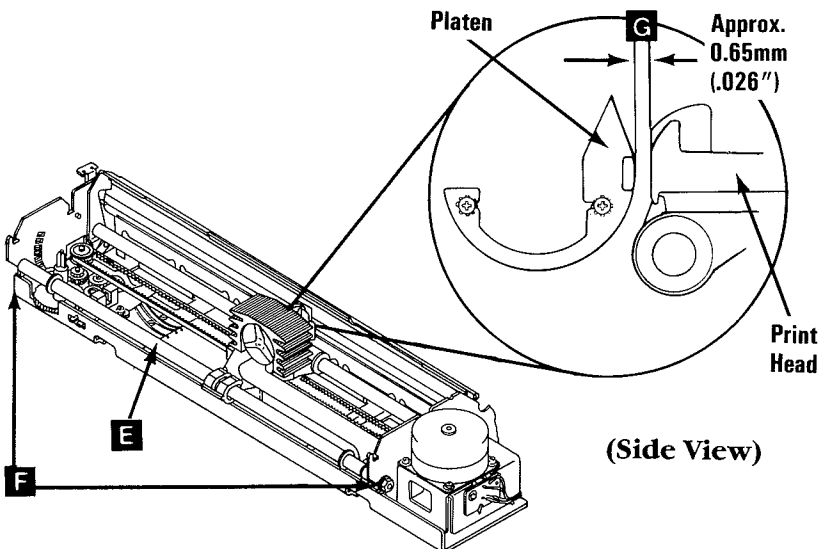
Carriage Drive Assembly Replacement

1. Position carriage drive assembly by inserting post **A** through pivot hole.
2. Replace carriage drive assembly retaining screw **B** .
3. Replace left margin sensor, screw **C** , and clip **D** .
4. Place belt over drive pulley and perform carriage belt adjustment **(5600)**.

B

Drive Assembly

D

Left Margin Sensor

A

C
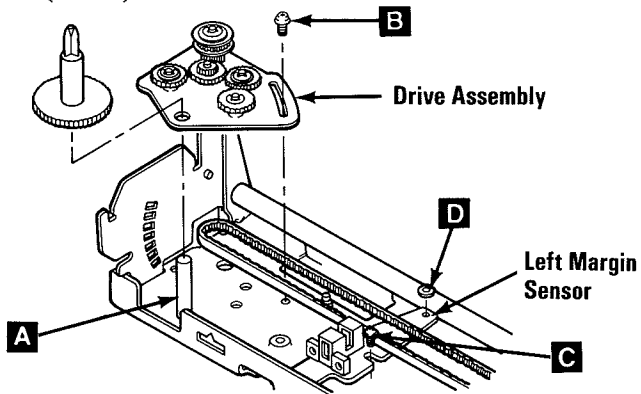
5. Pivot carrier shaft **E** into the slots on frame. Tighten nuts **F** .
6. Check print head gap **G** . Adjust if necessary **(5680)**.

Platen

G

Approx. 0.65mm (.026″)

Print Head

E

F

(Side View)

5-119

7. Perform left margin sensor adjustment **(5670)**.
8. Replace top cover **(5630)**.
9. Replace ribbon cartridge.
10. Replace access cover. **(5630)**.
11. Replace forms rack **(5640)**.

Before replacing the control circuit card, check the printer DIP switch settings. Be sure the problem is not caused by an improper DIP switch setting.

Note: Graphics printer Switch No. 1-7 must be set for local requirements. This switch selects Table 1 or 2 and is factory set to Off for U.S. English speaking countries.

Functions and conditions of Dip Switch No. 1

Graphics Printer

Switch No.	Function	On	Off	Factory Set
1-1	Not Applicable	–	–	On
1-2	CR	Print Only	Print & Line Feed	On
1-3	Buffer Full	Print Only	Print & Line Feed	Off
1-4	Cancel Code	Invalid	Valid	Off
1-5	Not Applicable	–	–	On
1-6	Error Buzzer	Sound	Does Not Sound	On
1-7	Character Generator	Table 2	Table 1	Off
1-8	Select In Signal	Fixed Internally	Not Fixed Internally	On

Matrix Printer

Switch No.	Function	On	Off	Factory Set
1-1	Not Applicable	–	–	On
1-2	CR	Print Only	Print & Line Feed	On
1-3	Buffer Full	Print Only	Print & Line Feed	On
1-4	Cancel Code	Invalid	Valid	Off
1-5	Delete Code	Invalid	Valid	On
1-6	Error Buzzer	Sound	Does Not Sound	On
1-7	Character Generator	N.A.	Graphic Pattern Select	Off
1-8	Select In Signal	Fixed Internally	Not Fixed Internally	On

## Functions and Conditions of Dip Switch No. 2

Graphics Printer

| 2-1	Form Length	12″	11″	Off
2-2	Line Spacing	1/8″	1/6″	Off
2-3	Auto Feed XT Signal	Fixed Internally	Not Fixed Internally	Off
2-4	1 in. Skip Over Perforation	Valid	Not Valid	Off

Matrix Printer

| 2-1	Not Applicable	–	–	On
2-2	Not Applicable	–	–	On
2-3	Auto Feed XT Signal	Fixed Internally	Not Fixed Internally	Off
2-4	Coding Table Select	N.A.	Standard	Off

1. Set printer Power switch to OFF; unplug printer power cord from wall outlet and disconnect printer cable.
2. Remove forms.
3. Remove forms rack **(5640)**.
4. Remove access cover **(5630)**.
5. Remove top cover **(5630)**.
6. Remove driver circuit card **(5620)**.
7. Unplug connector CN2. **A**
8. Unplug connector CN6. **B**
9. Unplug ground wire. **C**
10. Remove three screws. **D**
11. Pull control panel cable from under retaining clips. **E**
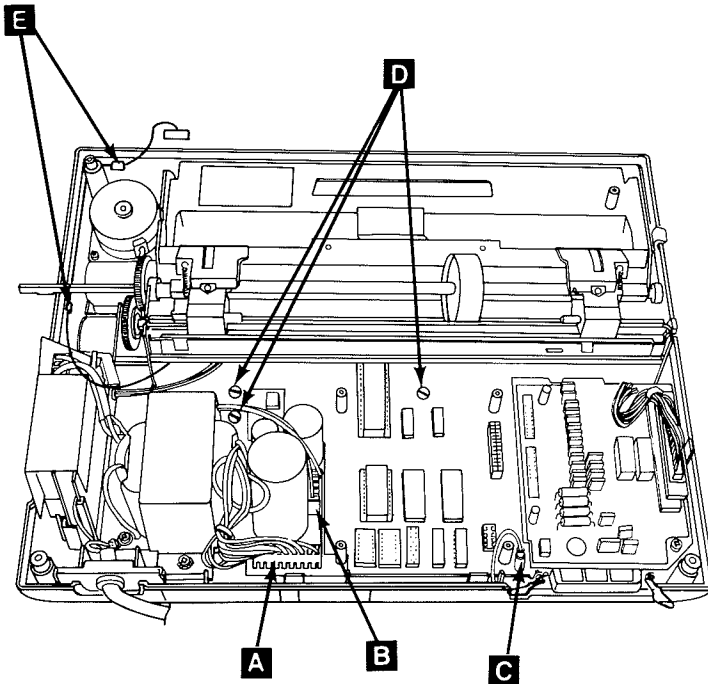
12. Press three tabs **A** , **B** , and **C** . Lift card clear of tabs.
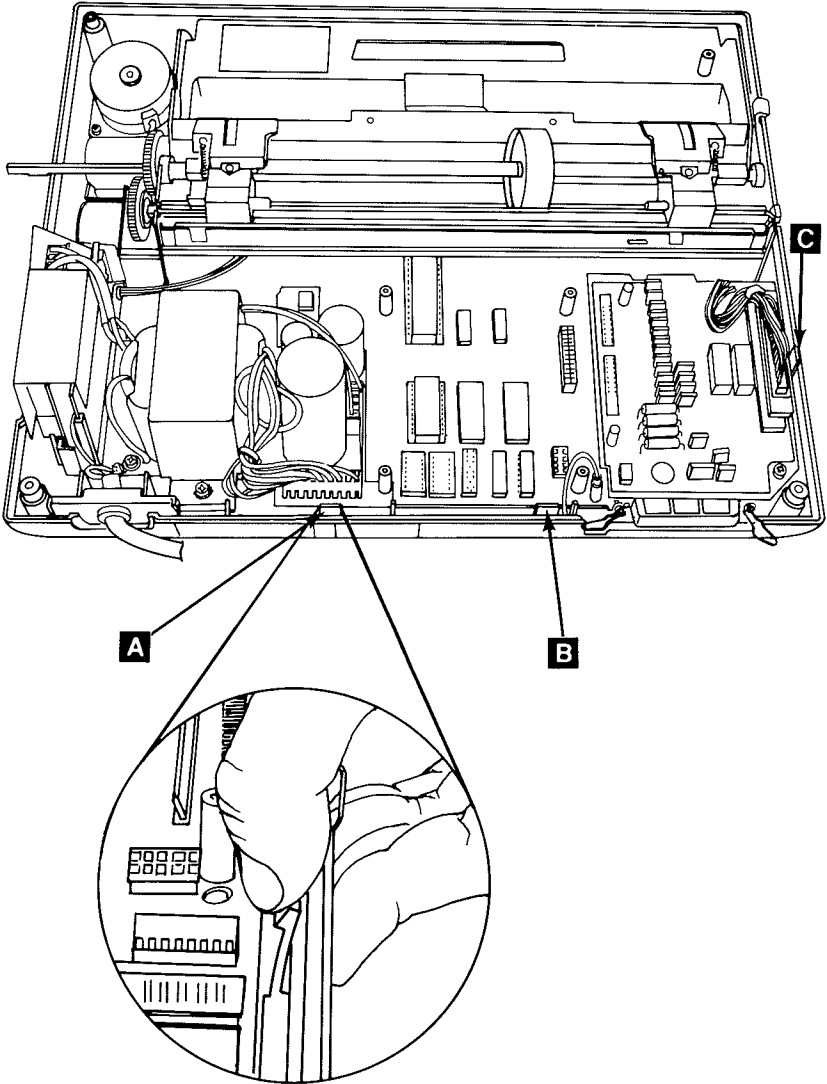
13. Lift control circuit card to clear the six posts. Carefully pull control circuit card away from print mechanism assembly.
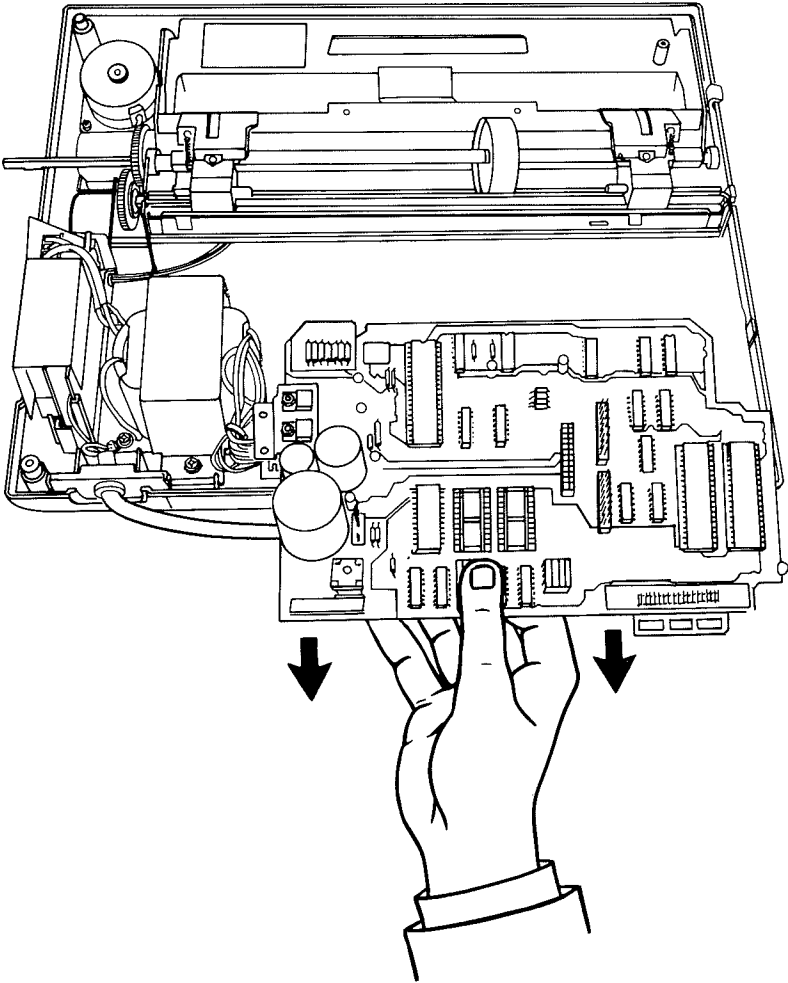
Control Circuit Card Replacement 5615

1. Guide control circuit card into open area behind print mechanism assembly.
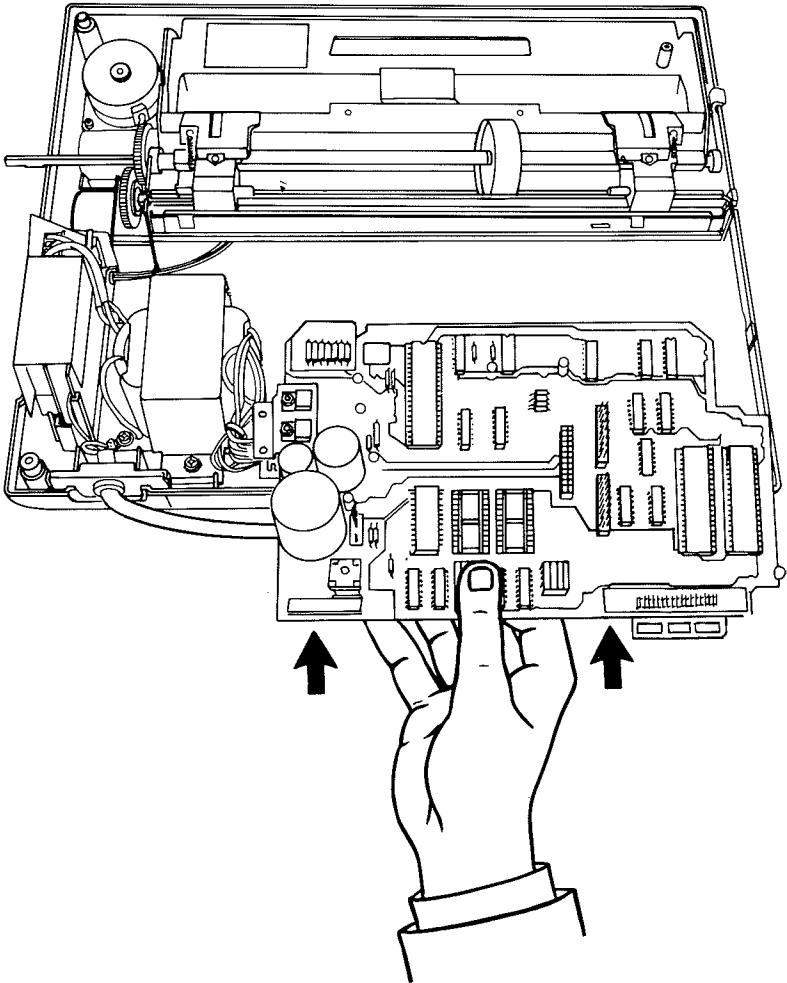
2.   Align six holes in control circuit card with six posts in base cover.
3.   Lower control circuit card onto base cover and snap the three retaining tabs **A** into place.
4.   Install 3 hold down screws **B** .
5.   Guide control panel cable along right side of base cover and around to front.
6.   Place control panel cable under two retaining clips **C** .
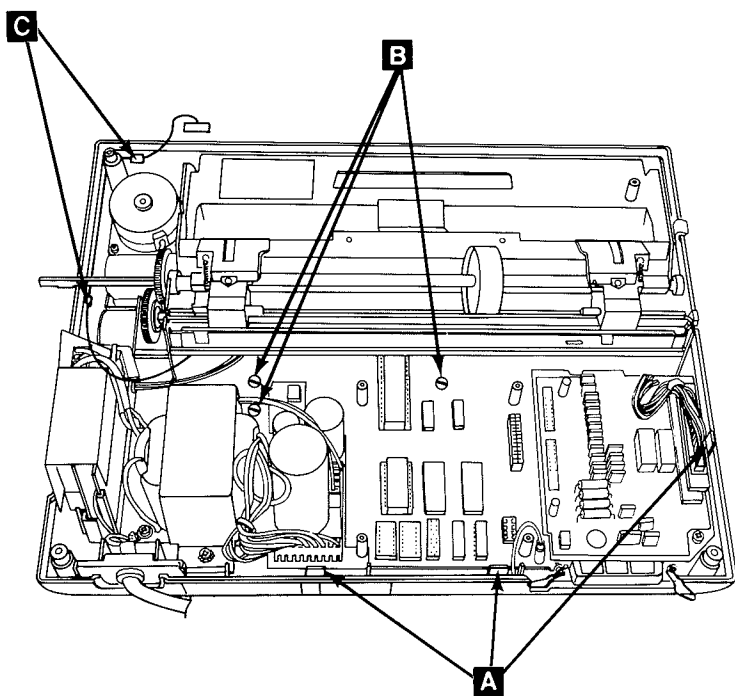
7. Connect ground wire. **A**
8. Install connector CN2. **B**
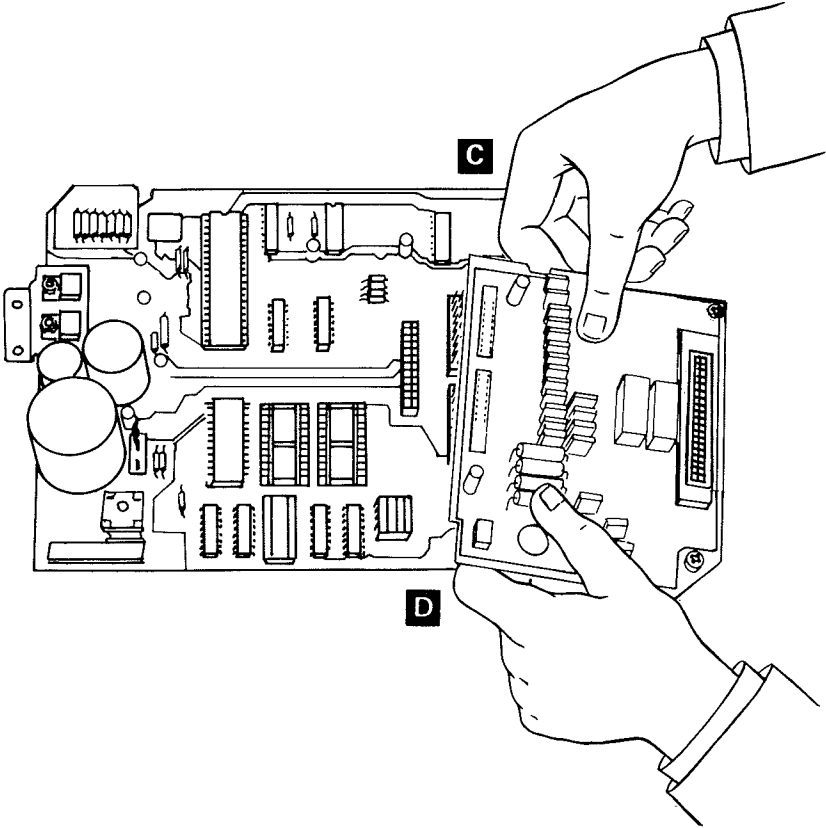9. Install connector CN6. **C**

B **C** **A**
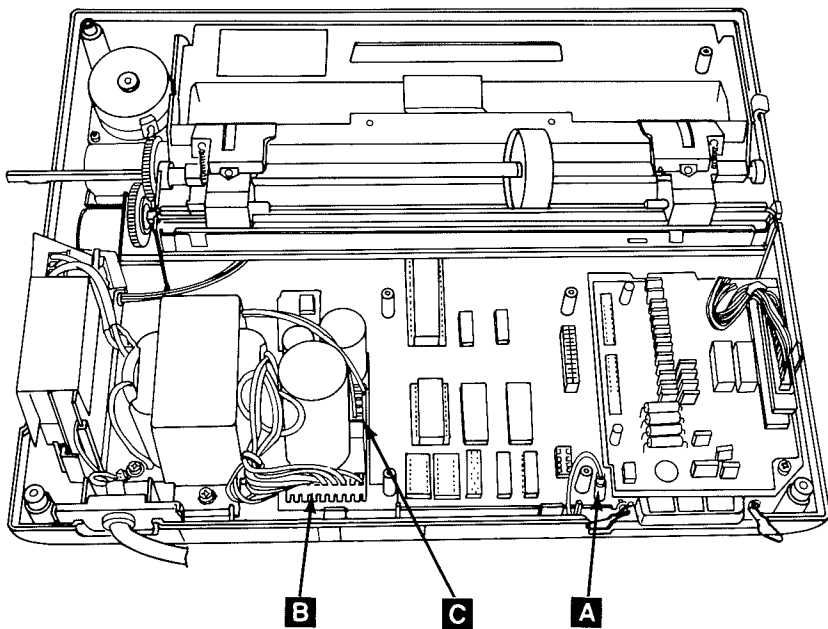
10. Replace driver circuit card **(5620)**.
11. Replace top cover. **(5630)**.
12. Replace access cover. **(5630)**.
13. Replace forms rack. **(5640)**.

1. Set printer Power switch to OFF; unplug printer power cord from wall outlet and disconnect printer cable.
2. Remove forms.
3. Remove forms rack **(5640)**.
4. Remove access cover **(5630)**.
5. Remove top cover **(5630)**.
6. Unplug connector CN6. **A**
7. Remove two screws. **B**
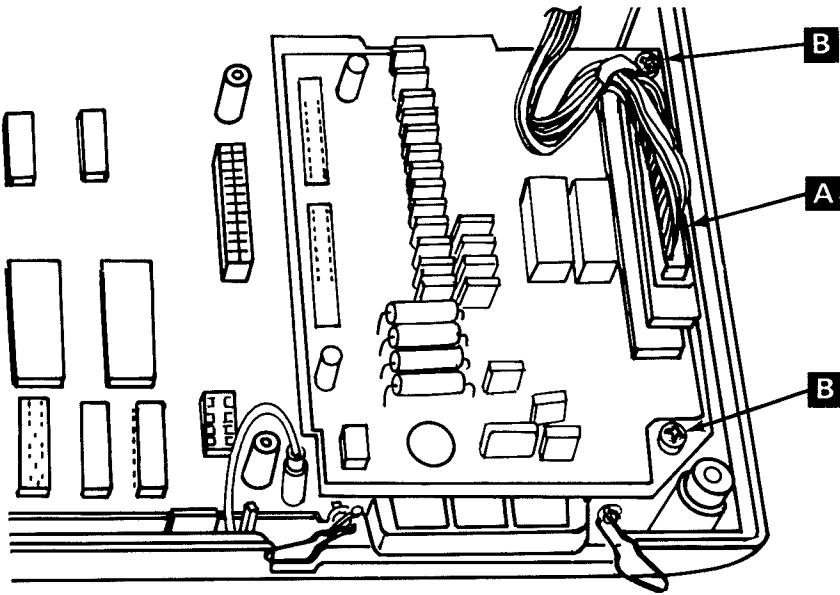
8. Disconnect driver circuit card from control circuit card at CN4 and CN5. Lift at **C** , then at **D** .

Driver Circuit Card Replacement   5620

1. Align two connectors CN4 and CN5 **A** on bottom of
    driver circuit card with connectors CN4 and CN5 on control
   circuit card.

    CAUTION: CN4 and CN5 are not keyed. Verify proper
                   alignment before powering on to prevent
                   circuit card damage.

2. Connect driver circuit card to control circuit card by
    pressing down firmly on connectors. Be sure to guide
    connector CN6 cable into slot on left front edge of driver
    circuit.
3. Install two screws **B** .
4. Install connector CN6 **C** .
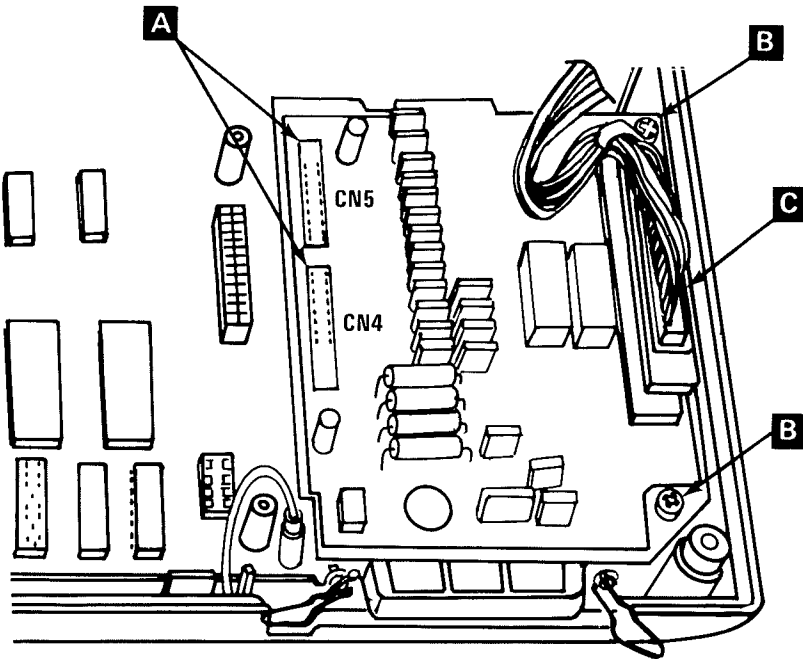
5. Replace top cover **(5630)**.
6. Replace access cover **(5630)**.
7. Replace forms rack **(5640)**.

Control Panel Removal 5625

1. Set printer Power switch to OFF; unplug printer power cord from wall outlet and disconnect printer cable.
2. Remove forms.
3. Remove forms rack **(5640)**.
4. Remove access cover **(5630)**.
5. Remove top cover **(5630)**.
6. Invert top cover.
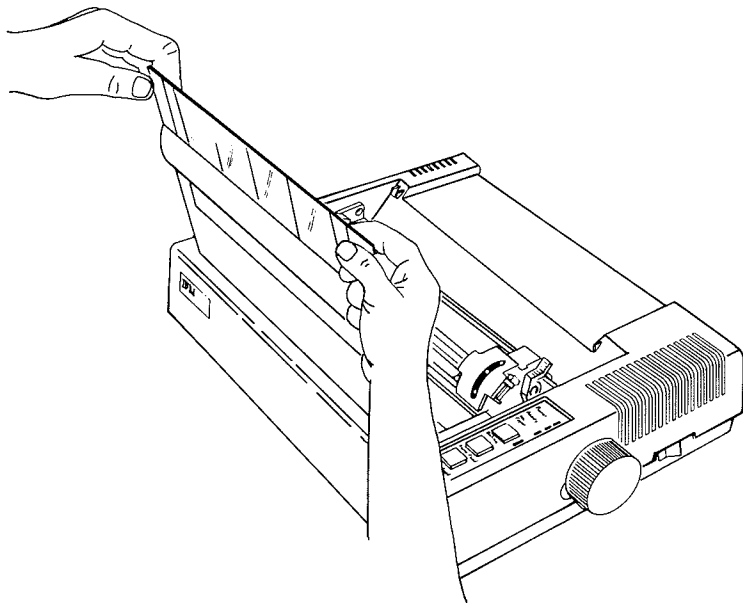7. Remove 2 screws **A** from underside of top cover.
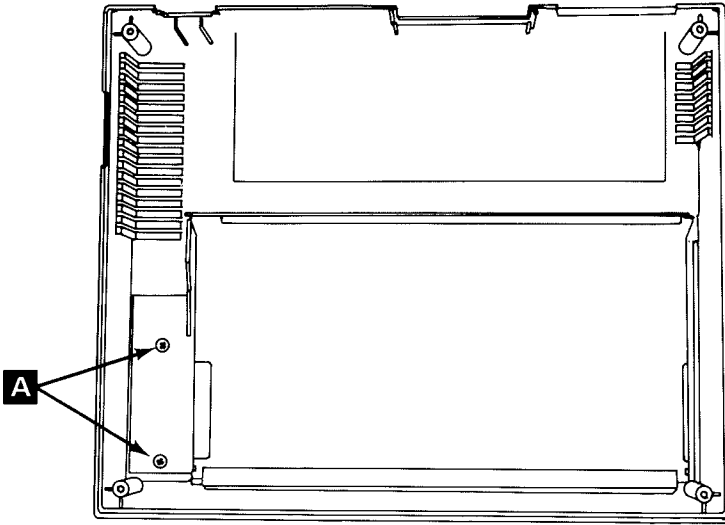
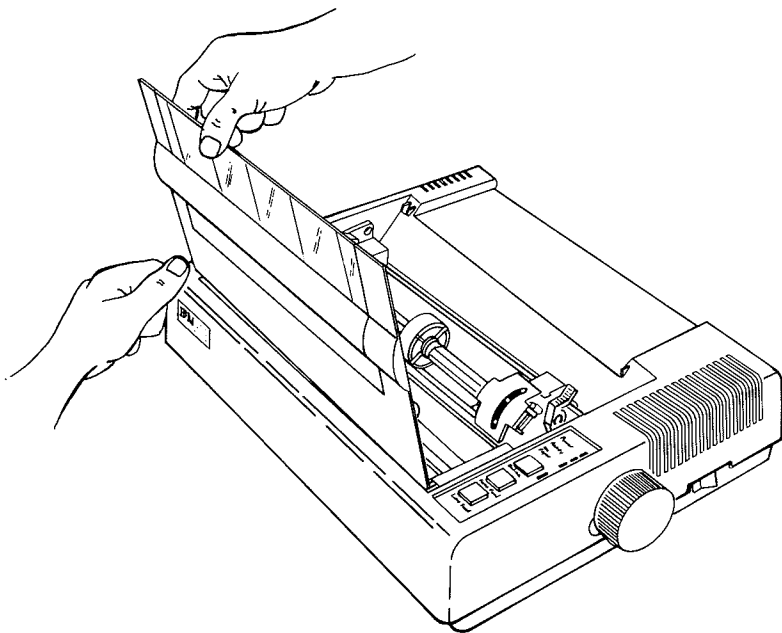

8. Lift control panel from top cover.

Control Panel Replacement 5625

1. Insert control panel into top cover.
2. Install two screws. **A**
3. Replace top cover **(5630)**.
4. Replace access cover **(5630)**.
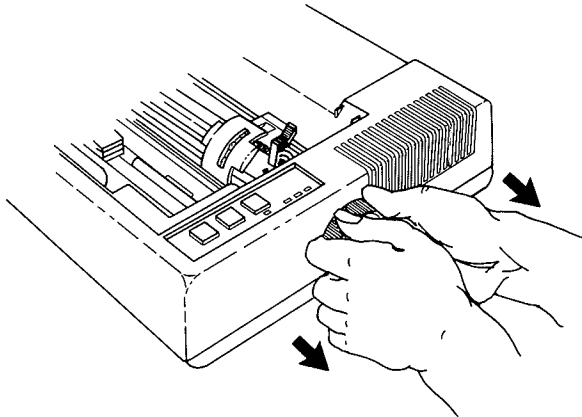5. Replace forms rack **(5640)**.

1. Raise access cover.

2. Lift cover from base as shown.

1. Set printer Power switch to OFF; unplug printer power cord from wall outlet.
2. Remove forms.
3. Remove forms rack **(5640)**.
4. Remove access cover **(5630)**.
5. Pull forms feed knob from shaft using a steady, firm pull.
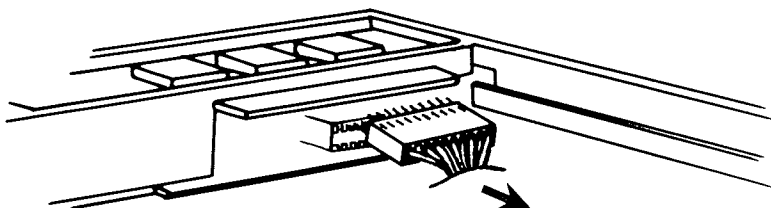

6. Turn printer upside down and place on smooth surface.
7. Loosen completely (using a Phillips screwdriver) the four corner screws in the base.
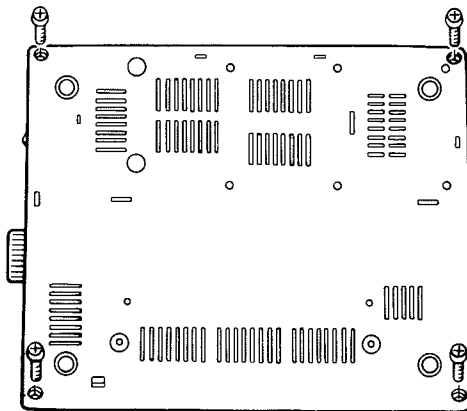
8. Turn printer rightside up.

   CAUTION: Be sure to grasp both printer and base cover.
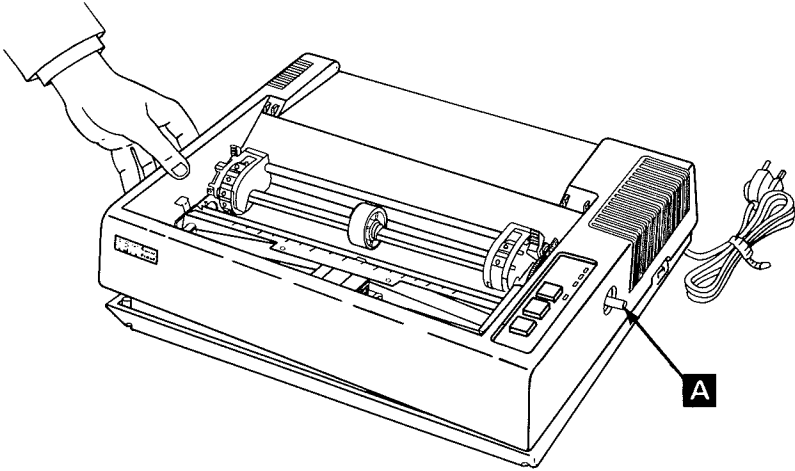
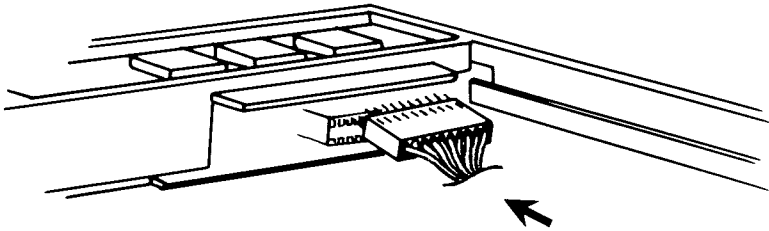9. Pull control panel cable connector from control panel in top cover.

10. Lift top cover away from base cover. Lift left side first. Then, slide top cover to right to clear forms feed shaft.
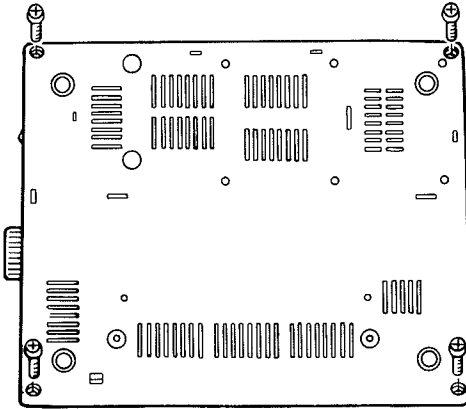
Top Cover Replacement 5630
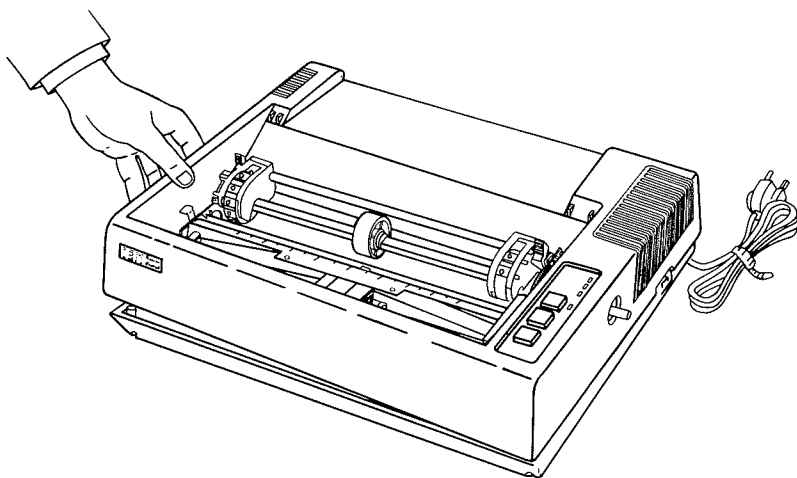
1. Position forms feed shaft through opening **A** in top cover and lower top cover onto base cover.

2. Connect control panel cable to control panel.

3. Turn printer upside down.
4. Install four screws.

5. Turn printer rightside up.
6. Replace forms feed knob **(5635)**.
7. Replace access cover **(5630)**.
8. Replace forms rack **(5640)**.

1. Set printer Power switch to OFF; unplug printer power cord from wall outlet and disconnect printer cable.
2. Remove forms.
3. Remove forms rack **(5640)**.
4. Remove access cover **(5630)**.
5. Remove top cover **(5630)**.
6. Remove power transformer **(5675)**.
7. Remove fuse-filter card/power cord **(5655)**.
8. Remove driver circuit card **(5620)**.
9. Remove control circuit card **(5615)**.
10. Remove print mechanism assembly **(5685)**.
11. Remove heat sink/power transistor assembly **(5660)**.
12. Base cover is now completely detached from other FRUs.

Base Cover Replacement 5630
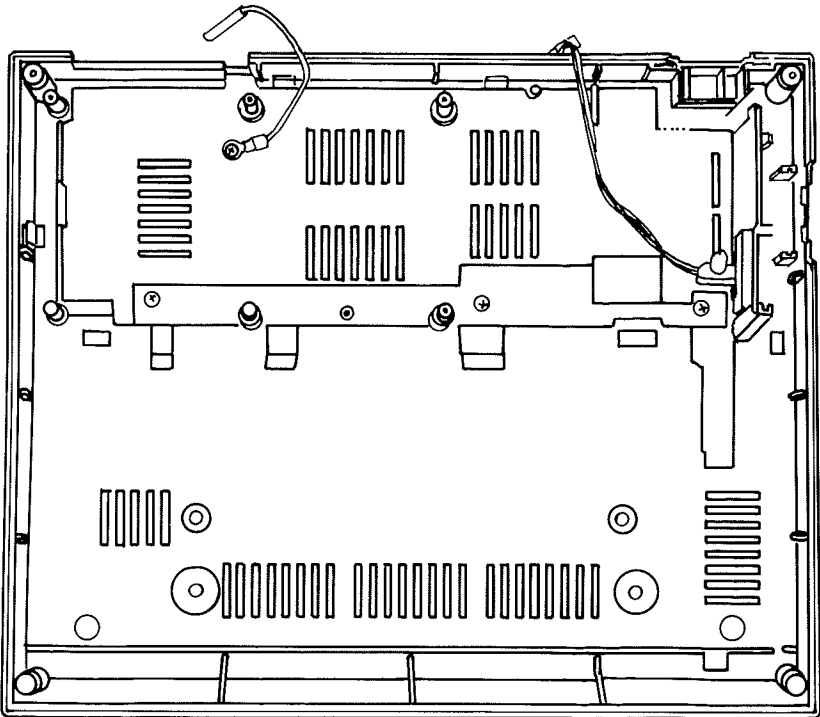
1. Set base cover on work surface.
2. Replace heat sink/power transistor assembly **(5660)**.
3. Replace print mechanism assembly **(5685)**.
4. Replace control circuit card **(5615)**.
5. Replace driver circuit card **(5620)**.
6. Replace fuse-filter card/power cord **(5655)**.
7. Replace power transformer **(5675)**.
8. Replace top cover **(5630)**.
9. Replace access cover **(5630)**.
10. Replace forms rack **(5640)**.

Forms Feed Knob Removal 5635

1. Pull forms feed knob from shaft using steady, firm pull.
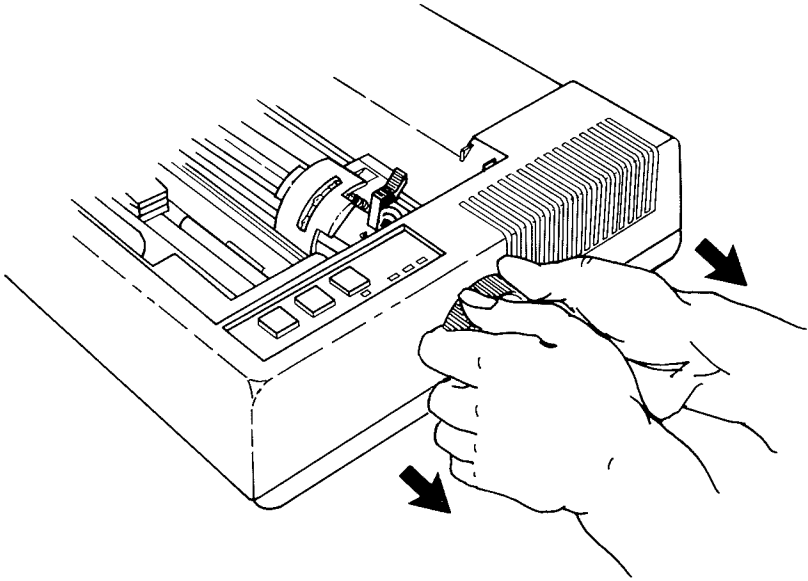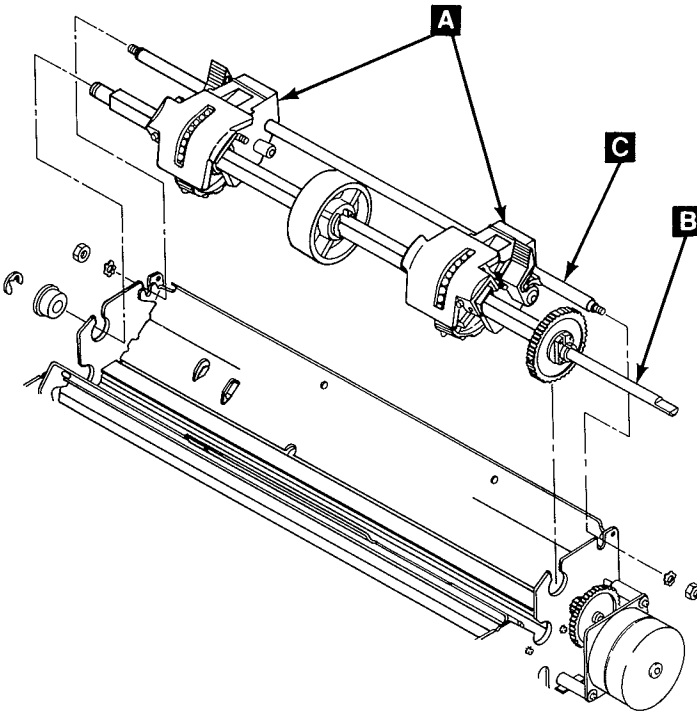
Forms Rack Removal

1. Remove forms.
2. Compress rack on one side to unhook rack from printer frame.
3. Lift rack away from frame.
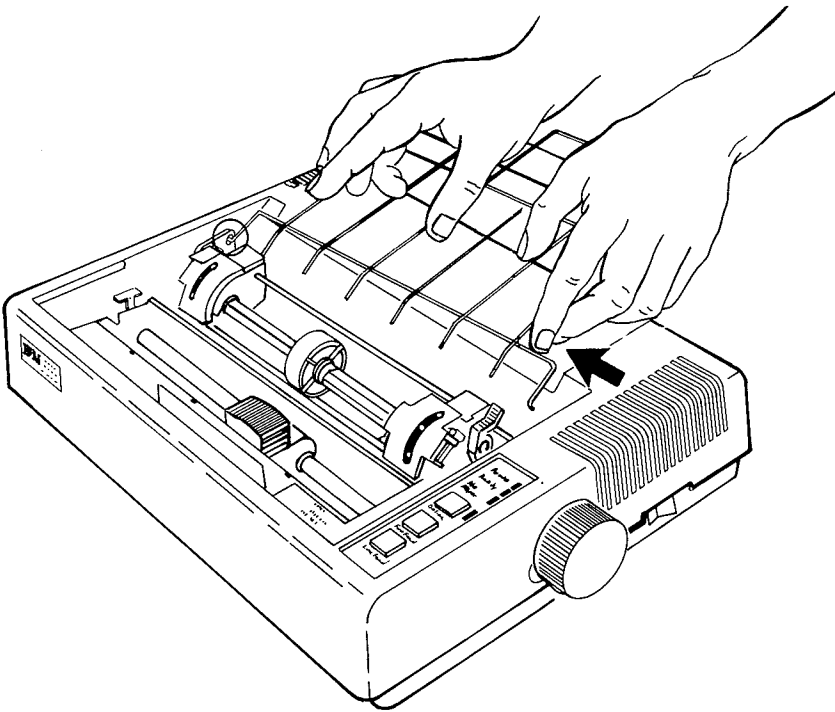
1. Set printer Power switch to OFF; unplug printer power cord from wall outlet and disconnect printer cable.
2. Remove forms.
3. Remove forms rack **(5640)**.
4. Remove access cover **(5630)**.
5. Remove top cover **(5630)**.
6. Rotate lock levers **A** to forward (released) position.
7. Loosen nuts on ends of tractor support shaft **B** .
8. Remove retaining clip on left end of guide shaft **C** and slide bushings to outside of frame.
9. Lift guide shaft, support shaft and forms tractors from machine.
10. Slide forms tractors **D** off shafts.
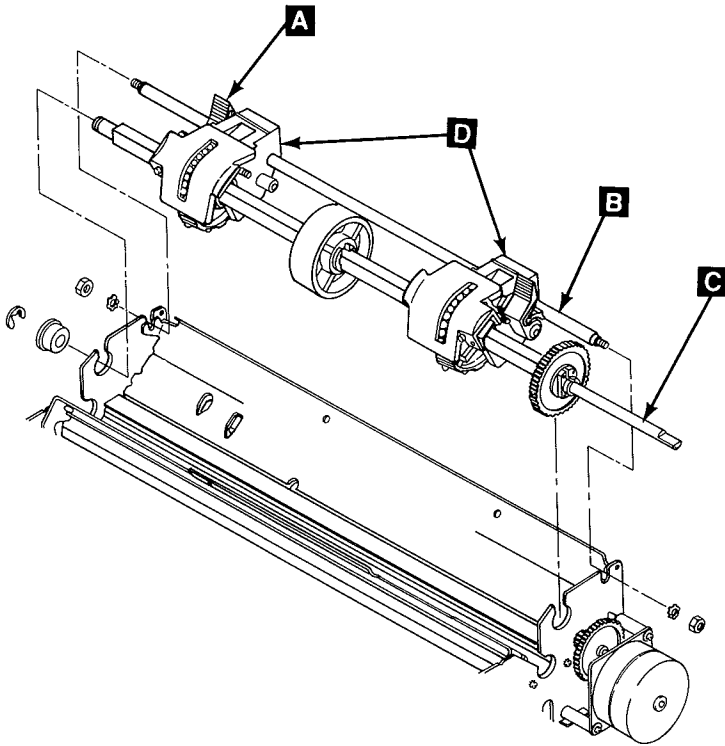
1. Slide forms tractors **A** onto guide shaft **B** and support shaft **C** .
2. Place guide shaft and support shaft into slots on frame.
3. Slide bushings on guide shaft into frame and replace retaining clip on left end of shaft.
4. Tighten retaining nuts on ends of support shaft.
5. Replace top cover **(5630)**.
6. Replace access cover **(5630)**.
7. Replace forms rack **(5640)**.

1. Set printer Power switch to OFF; unplug printer power cord from wall outlet and disconnect printer cable.
2. Remove forms.
3. Remove forms rack **(5640)**.
4. Remove access cover **(5630)**.
5. Remove top cover **(5630)**.

DANGER: Static voltage may be present on the fuse-filter card. Use caution in this area.

6. Remove safety shield on fuse-filter card **(5695)**.
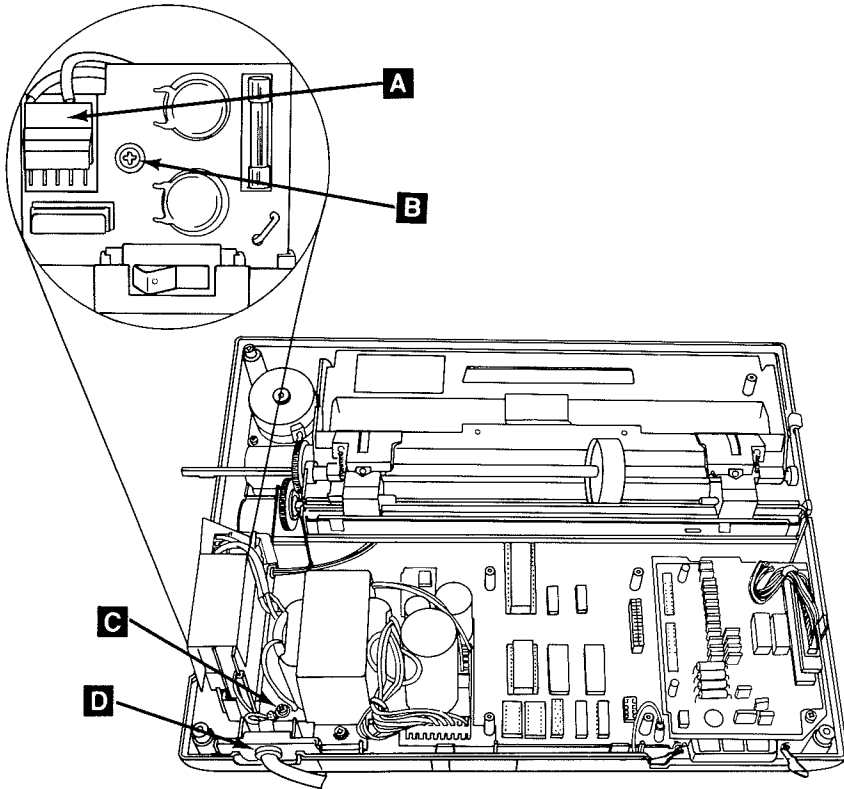7. Pull fuse **A** from holder.
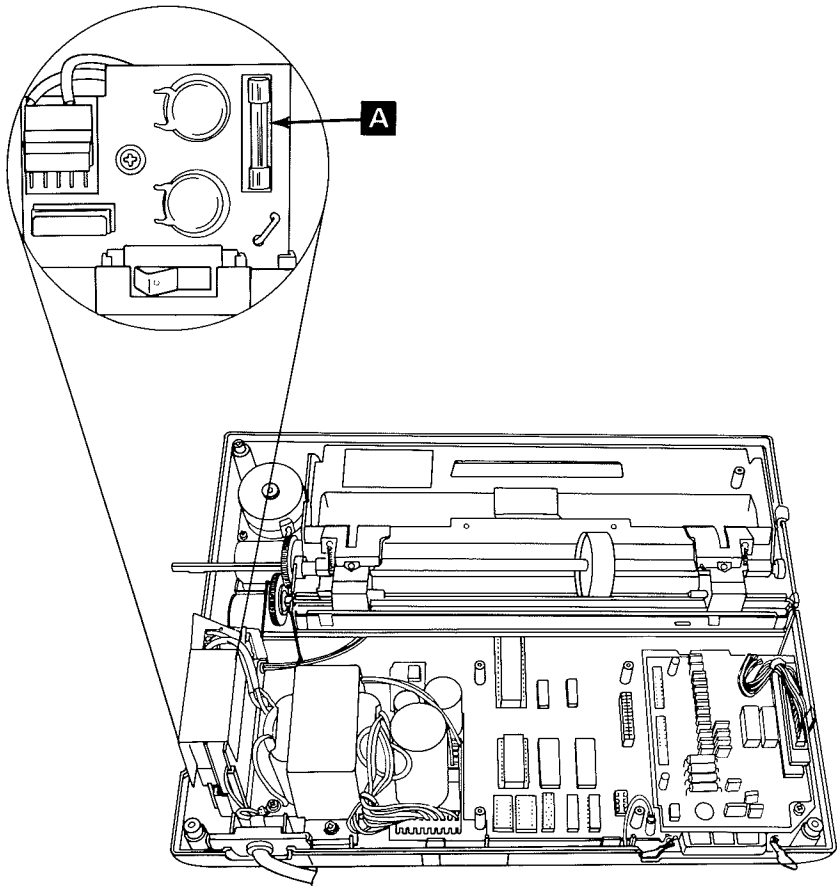
Fuse-Filter Card/Power Cord Removal

1. Set printer Power switch to OFF; unplug printer power cord from wall outlet and disconnect printer cable.
2. Remove forms.
3. Remove forms rack **(5640)**.
4. Remove access cover **(5630)**.
5. Remove top cover **(5630)**.

    DANGER: Static voltage may be present on the fuse-filter card. Use caution in this area.

6. Remove safety shield from filter-fuse card assembly **(5695)**.
7. Remove transformer primary connector **A** from fuse-filter card.
8. Remove screw **B** from center of fuse-filter card.
9. Remove screw **C** from ground terminal of printer power cord.
10. Lift strain relief **D** from slot in base cover.
11. Lift fuse-filter card from slot in base cover.

Fuse-Filter Card/Power Cord Replacement

1. Insert fuse-filter card into slot **A** in base cover.
2. Insert strain relief into slot **B** in base cover.
3. Install screw **C** into ground terminal of power cord.
4. Install screw **D** in center of fuse-filter card.
5. Connect transformer primary **E** to fuse-filter card.
6. Replace safety shield onto fuse-filter card (**5695**).
7. Replace top cover (**5630**).
8. Replace access cover (**5630**).
9. Replace forms rack (**5640**).
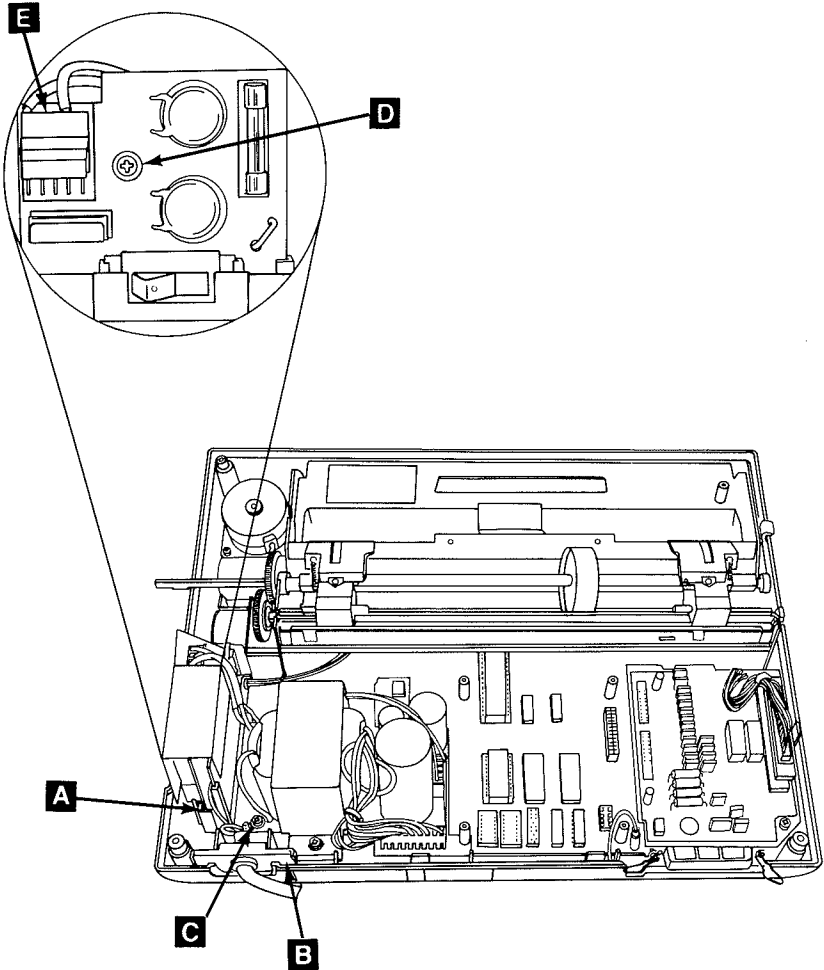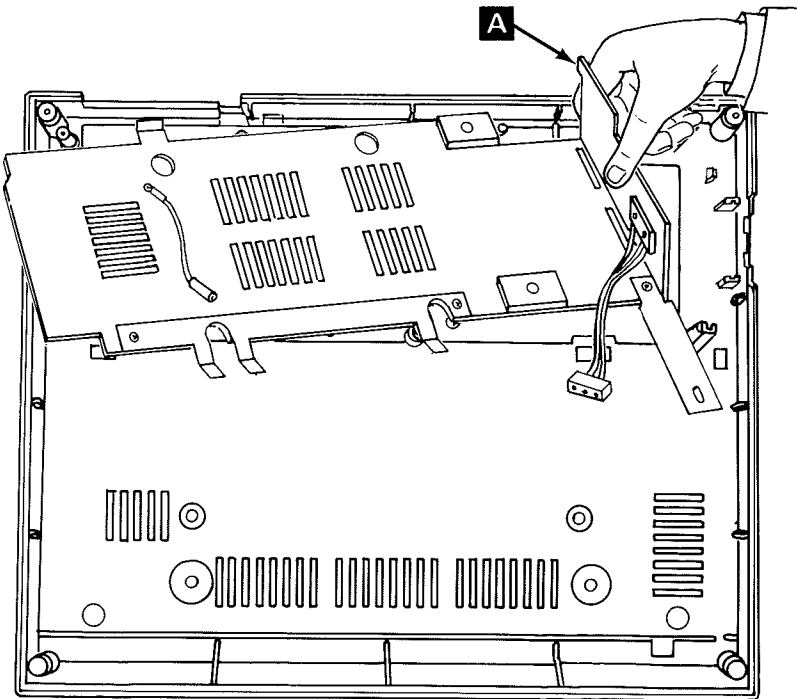
Heat Sink/Power Transistor Assembly Removal

1. Set printer Power switch to OFF; unplug printer power cord from wall outlet and disconnect printer cable.
2. Remove forms.
3. Remove forms rack **(5640)**.
4. Remove access cover **(5630)**.
5. Remove top cover **(5630)**.
6. Remove power transformer **(5675)**.
7. Remove fuse-filter card/power cord **(5655)**.
8. Remove driver circuit card **(5620)**.
9. Remove control circuit card **(5615)**.
10. Remove print mechanism assembly **(5685)**.
11. Lift heat sink assembly **A** from base cover.
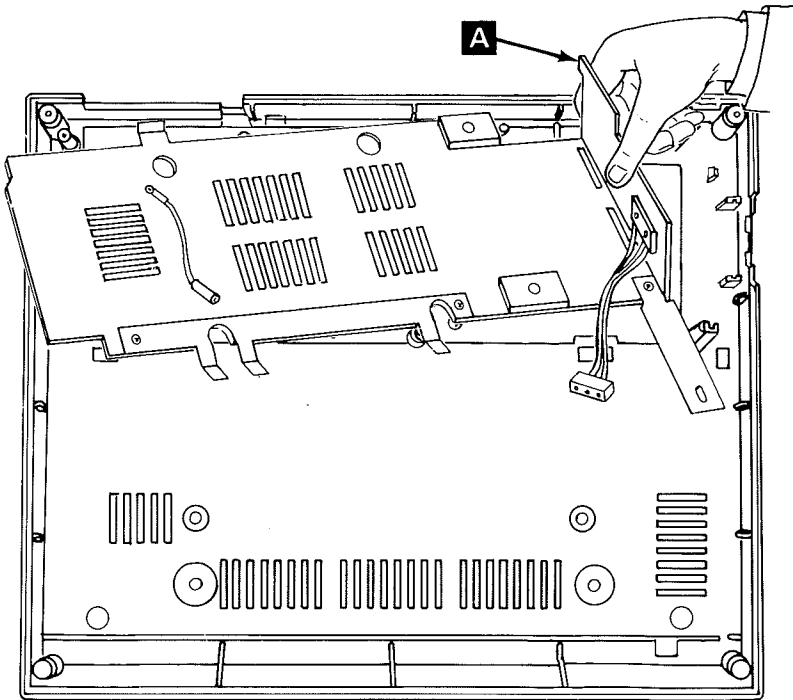
# Heat Sink/Power Transistor Assembly Replacement 5660

1. Position heat sink/power transistor assembly **A** onto base cover.
2. Replace print mechanism assembly **(5685)**.
3. Replace control circuit card **(5615)**.
4. Replace driver circuit card **(5620)**.
5. Replace fuse-filter card/power cord **(5655)**.
6. Replace power transformer **(5675)**.
7. Replace top cover **(5630)**.
8. Replace access cover **(5630)**.
9. Replace forms rack **(5640)**.

Intermediate Gear Removal   5665

1. Set printer Power switch to OFF; unplug printer power cord
    from wall outlet and disconnect printer cable.
2. Remove forms.
3. Remove forms rack **(5640)**.
4. Remove access cover **(5630)**.
5. Remove top cover **(5630)**.
6. Remove two screws **A** from forms feed motor mounts.
7. Remove intermediate gear retaining clip **B** .
8. Slide intermediate gear **C** off shaft.

**Forms Feed
Motor**

Intermediate Gear Replacement   5665
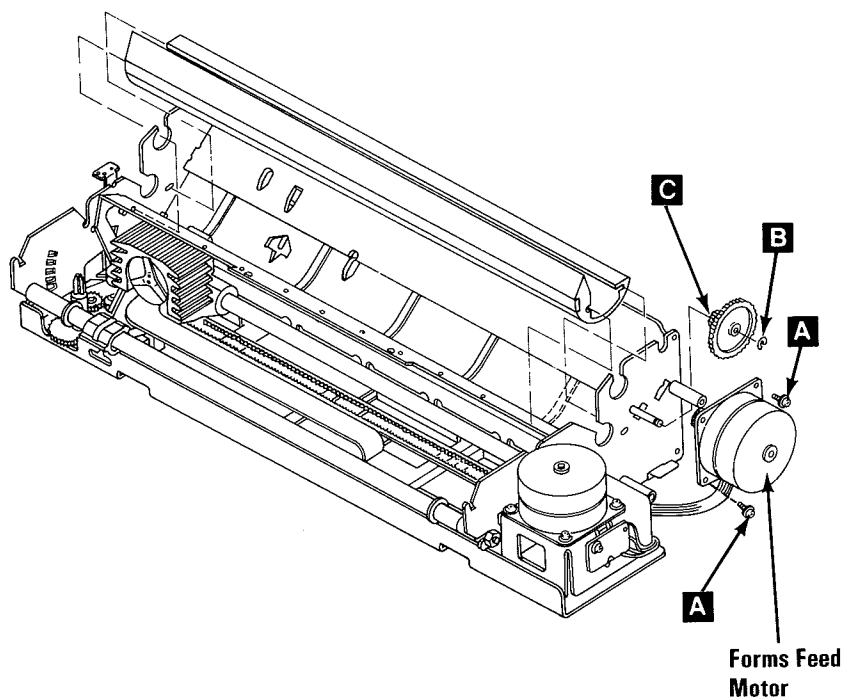
1. Slide intermediate gear **A** onto shaft.
2. Replace retaining clip **B** .
3. Place forms feed motor **C** onto mounts.
4. Install two screws **D** but do not tighten.
5. Position motor to mesh gears with minimum backlash **E** and no binding.
6. Tighten two screws.
7. Replace top cover **(5630)**.
8. Replace access cover **(5630)**.
9. Replace forms rack **(5640)**.
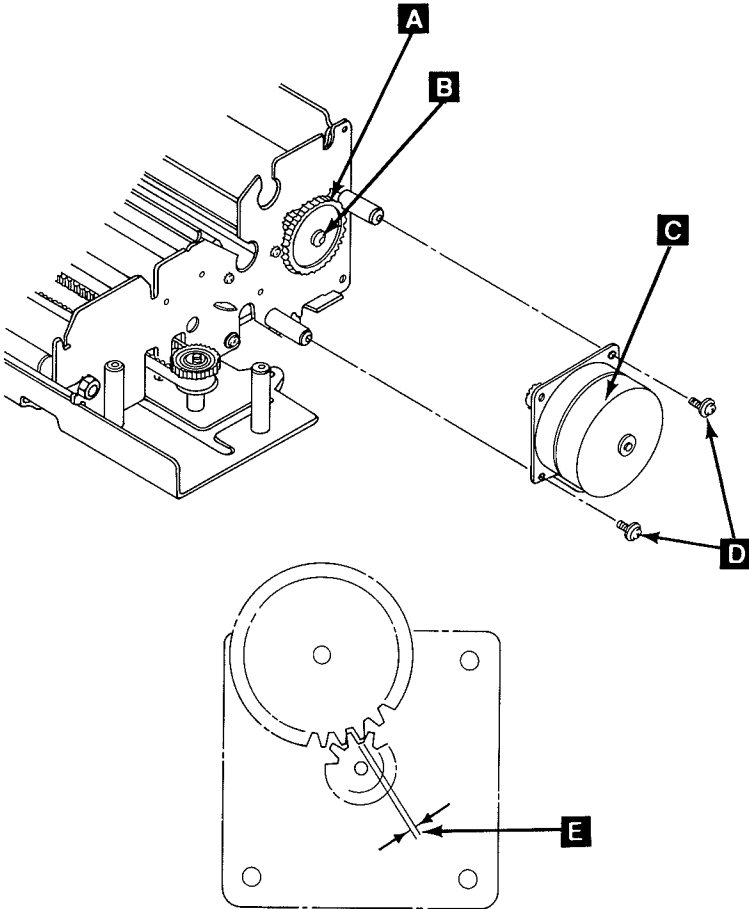
1. Set printer Power switch to OFF; unplug printer power cord from wall outlet and disconnect printer cable.
2. Remove forms.
3. Remove forms rack **(5640)**.
4. Remove access cover **(5630)**.
5. Remove top cover **(5630)**.
6. Remove ribbon cartridge.
7. Insert a sheet of paper into the printer. Position paper to the left frame.
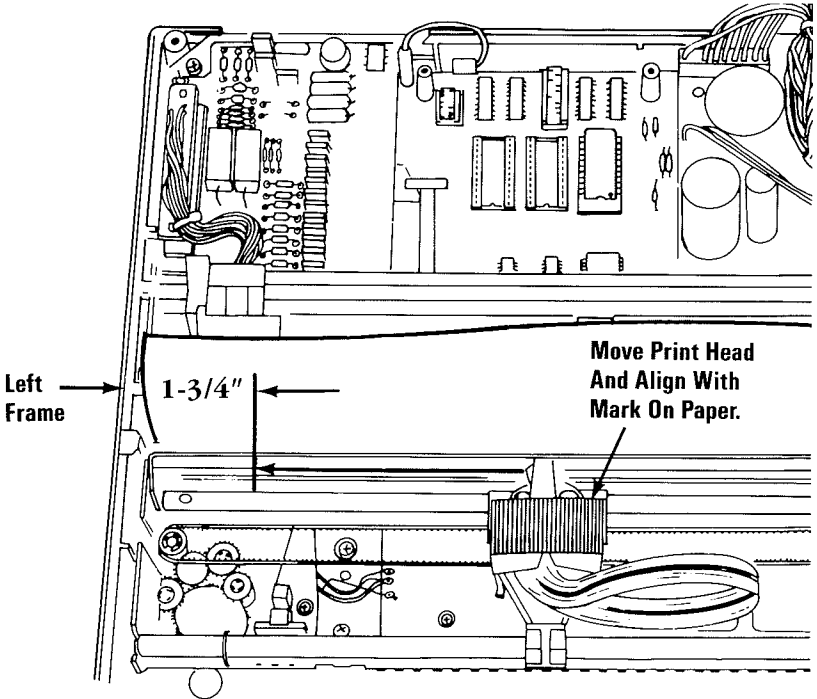8. Measure 1-3/4" from the left frame and mark the position on the paper.
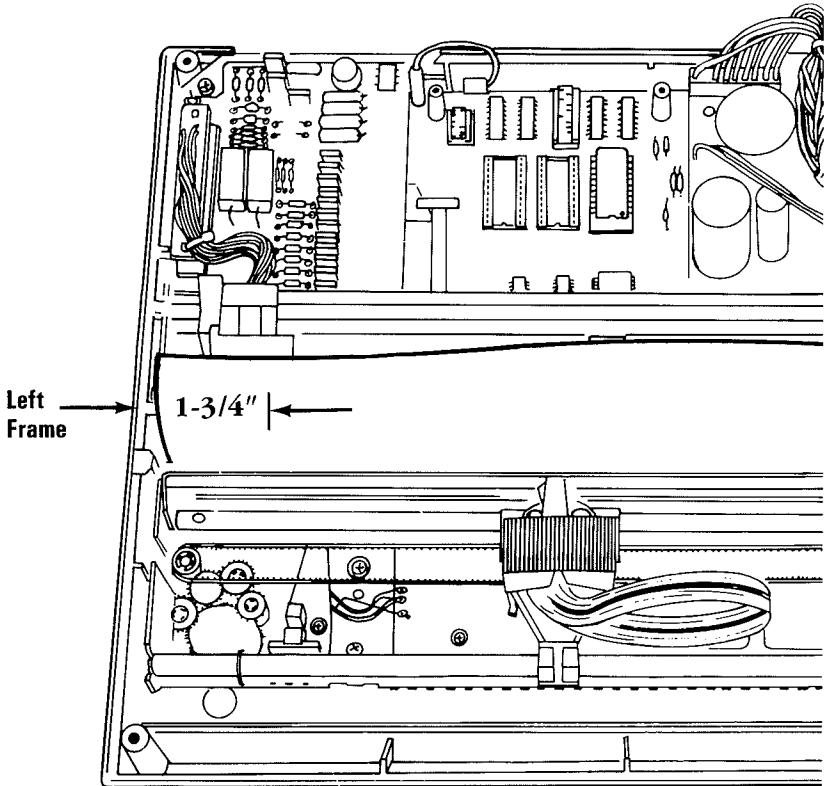
9. Loosen the left margin sensor locking screw.

Locking Screw
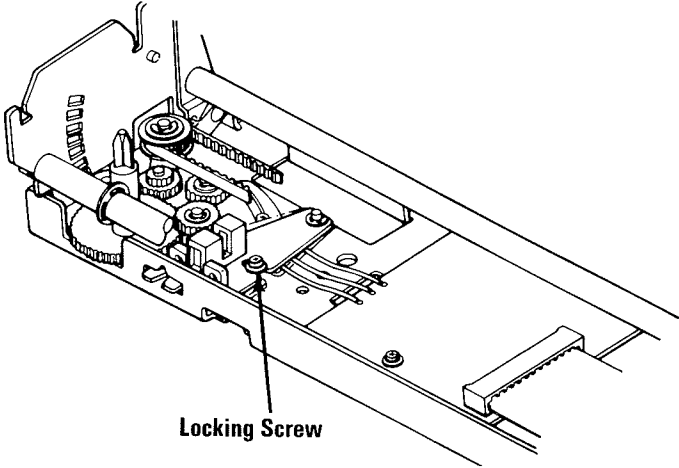
10. Plug in the printer power cord. Position the printer Power switch to ON.
11. Move the print head manually and align it with the 1-3/4" mark on the paper.

Left
Frame

1-3/4"

Move Print Head
And Align With
Mark On Paper.

12. Set your multimeter to the 12 Vdc scale.
13. Place the negative (–) lead of the meter on the ground pin of the driver circuit card.
14. Place the positive (+) lead of the meter on the yellow wire solder connection on the left margin sensor.

Negative (–) Lead to Ground Pin on Driver Circuit Card

Driver Circuit Card

Left Frame

1-3/4" |←——

**Positive (+) Lead to Yellow Wire Connection**
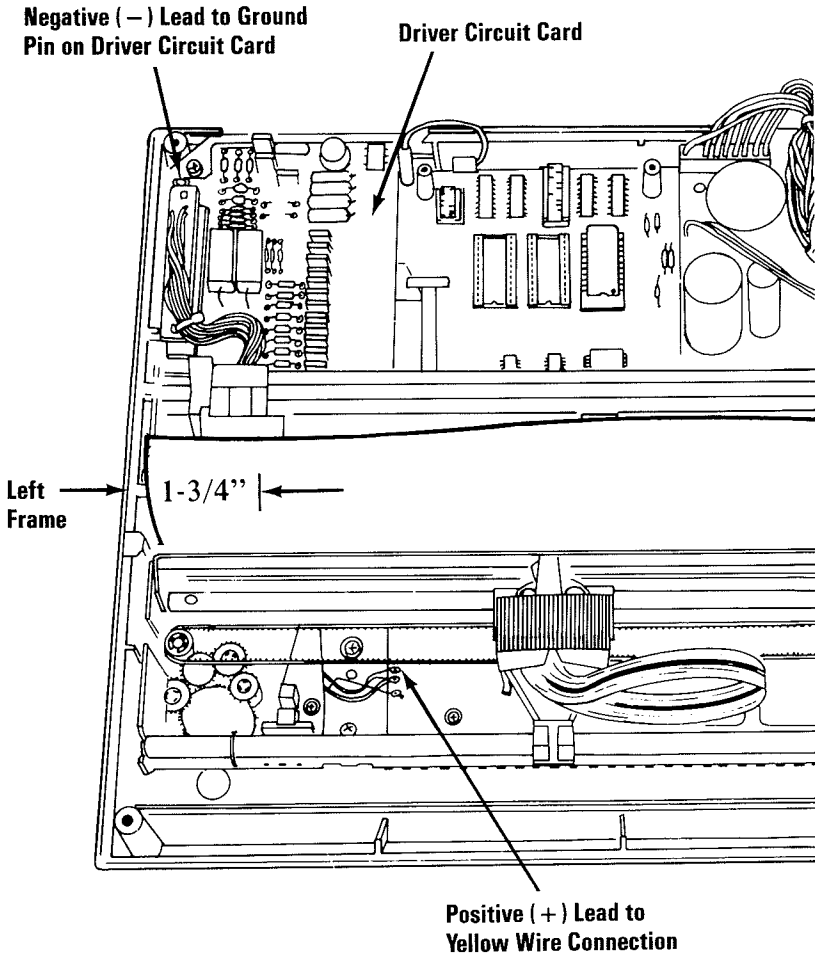
15. Move the left margin sensor to the left until the voltage reading on the meter is a down level (approximately 0 Vdc).

16. Move the left margin sensor to the right until the voltage on the meter is an up level (approximately 5 Vdc).

    Note: If the voltage reading on the meter stays at a down level, move the print head one position to the left and repeat steps 15 and 16.

17. Tighten the left margin locking screw.
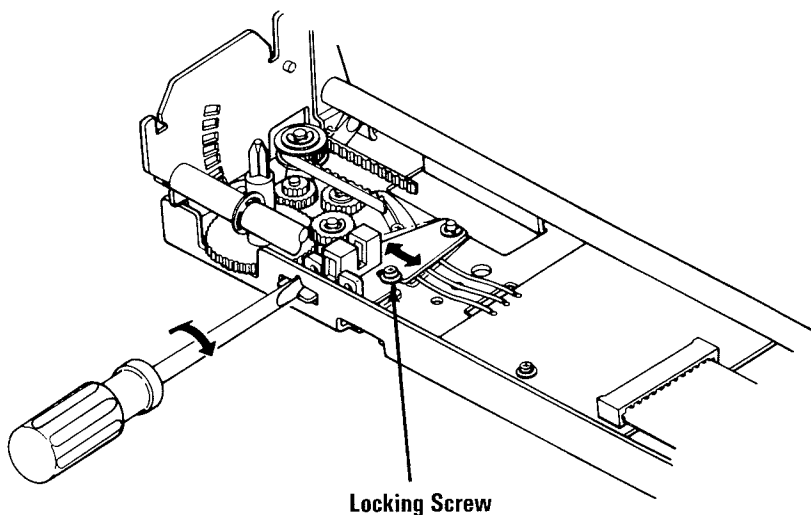
Locking Screw

18. Place the positive (+) lead of the meter on the yellow wire solder connection on the printer timing sensor (PTS) board.
19. Loosen the printer timing sensor board locking screw.
20. Move the printer timing sensor board either way until the voltage reading is an up level (approximately 5 Vdc).

Positive (+) Lead To Yellow Wire Connection

Locking Screw
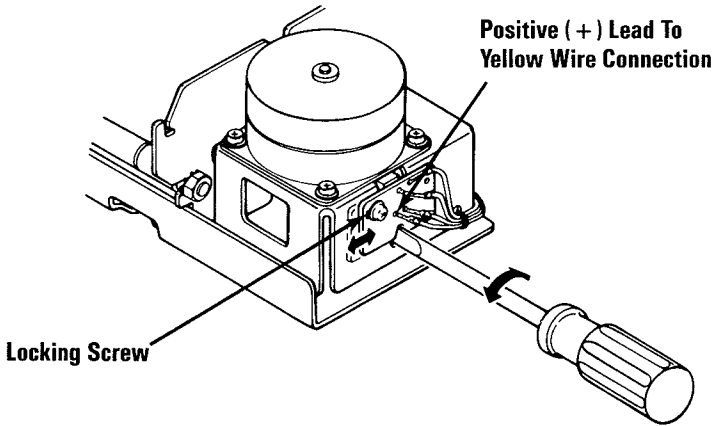
Adjustment of PTS Sensor Board

21a. Move the print head slightly to the left. The voltage reading should drop to a down level (approximately 0 Vdc). Do not allow the print head to step to the next detented position.
  b. Move the print head slightly to the right. The voltage reading should drop to a down level (approximately 0 Vdc).

Note: It is very important that the amount of pressure exerted on the print head be equal in either direction when the meter reading drops to the down level, without causing the print head to jump to the next detented position.