



9348 Service Information

SY31-0697-02



Take Note

Before using this information and the product it supports, be sure to read the general information under "Notices" on iii.

Third Edition (January 1992)

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Notices

Safety Notices in This Manual

Danger Notices

A danger notice indicates a hazard that could possibly cause death or serious personal injury.

The following danger notices pertain throughout this manual.

DANGER

An electrical outlet that is not correctly wired could place hazardous voltage on metal parts of the system or the products that attach to the system. It is the customer's responsibility to ensure that the outlet is correctly wired and grounded to prevent an electrical shock.

- 1. To prevent a possible electrical shock when installing the device, ensure that the power cord for that device is unplugged before installing signal cables.**
- 2. To prevent a possible electrical shock when adding the device to a system, disconnect all power cords, if possible, from the existing system before connecting the signal cable to that device.**

DANGER

To prevent a possible electrical shock from touching two surfaces with different electrical grounds, use one hand, when possible, to connect or disconnect signal cables. (RSFTD004)

DANGER

To prevent a possible electrical shock during an electrical storm, do not connect or disconnect cables or station protectors for communications lines, display stations, printers, or telephones. (RSFTD003)

DANGER

To prevent an automatic power-on during service procedures, set the keylock switch on the system unit control panel to the Manual or Secure position.

DANGER

Ensure that you complete the following step. An electrical outlet that is not correctly wired could place hazardous voltage on the metal parts of the system or the products that attach to the system. (RSFTD018)

Caution Notices

A caution notice indicates a hazard that could possibly cause minor personal injury.

Warning Notices

Warning indicates a hazard that could possibly cause damage to a program, device, system, or data.

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About This Manual

Who Should Use This Manual

This manual may refer to products that are announced, but not currently available, or to products that had not been announced when this manual was printed. IBM makes no commitment to provide any unannounced products referred to herein. The final decision to announce any product is based on IBM's business and technical judgment.

Service representatives should use the procedures and information in this manual to repair the 9348 tape unit.

This manual uses a specific range of words so that the text can be understood by service representatives in countries where English is not the indigenous language.

It is assumed that the service representative using this manual has a basic understanding of the 9348 tape unit.

How This Manual Is Arranged

This manual contains:

- Lists of safety notices that appear in this manual
- A table of contents showing all the procedures in this manual and the page on which each procedure starts
- Chapters containing:
 - Analyzing Problems
 - Part Locations
 - Service procedures
 - Cleaning
 - Safety Inspection Guide
 - Parts Catalog
 - Part Number Index
- Appendixes containing diagnostic information
 - A Control Panel Operations
 - B Diagnostic Tests
 - Note:** Appendix B contains reference information and is to be used by second-level support personnel.
 - C Logs
 - D Configurations
- A Glossary of terms.
- An index of key words used in this manual

Related Printed Information

See the 9348 manual *Customer Information*, SA21-9567, for information on operating the tape unit.

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Chapter 1. Analyzing Problems

Starting the Service Call

If you have a reference code, go to "Reference Codes" on page 1-2.

If you do not have a reference code, but you have a status code from the 9348 control panel, go to "Status Codes" on page 1-32.

If you do not have a reference code or a status code, go to the system console and use the procedures the system has for analyzing the problem. For example, look in the system error log to determine the reference code. Then go to "Reference Codes" on page 1-2.

If you do not have a reference code because the tape unit cannot generate a reference code, power off this tape unit, then power it on again.

If *** xx or F999 occurs, go to "Status Codes" on page 1-32.

If the tape unit does not respond, go to "No Response Service Check" on page 1-35.

If you have a reference code that is not in "Reference Codes" on page 1-2, go to reference code FFD7 on page 1-29.

If the operator or the system report excessive write or read errors, go to reference code 0022 on page 1-6.

If the front panel access door will not open, go to the "Front Panel Assembly Removal" on page 3-30 and "Front Panel Assembly Installation" on page 3-35 procedures and exchange the door solenoid.

If both density lights (1600 and 6250) are off or if both density lights are on when the tape is loaded, then the tape is blank, written at some other density, or has a damaged ID burst. Exchange the tape with a good tape.

If the File Protected light is always on when a tape is loaded with the write enable ring in place, or the File Protected light will not come on when a tape is loaded with the ring removed, go to reference code 0070 on 1-15.

Reference Codes

When the customer reports a 9348 unit reference code:

1. Find the reference code in one of the reference code tables on the following pages.
2. Perform each action described in the Action column, in the sequence shown, until the problem is corrected.

The FRUs with the highest percent of probable cause should be exchanged first unless you are instructed to do differently. If exchanging a FRU with the highest percent of probable cause does not correct the problem, then install the original item and exchange the failing item with the next highest percent of probable cause. Continue to exchange and install the FRUs, one at a time, until the problem is corrected.

The connector card, part number 21F7924, should be checked visually for bent pins or other damage when a read/write card, controller card, or buffer card is listed as a FRU. The connector card is not always listed as a FRU.

Sometimes a low percent FRU will be tested first because it is easier to isolate it from the other FRUs.

Information on how to run the tests listed in the reference code tables is located in "Running Diagnostic Tests" on page A-5.

Test Parameters

Some tests in the Action column need a test parameter to be keyed in before running the test. For example, test 98 needs parameter A to be 6250 or 1600.

If the parameter is not specified in the Action column for a test that needs a parameter, use the parameter that appears in the status display (default).

Intermittent Problems

If a problem is intermittent and all the tests in the Action column run correctly, use the FRU percent to determine the sequence for exchanging FRUs.

Reference Code Tables

Figure 1-1 (Page 1 of 3). Command Reject Reference Codes

Ref. Code	Part Number	Probable Cause	Action
0001	Tape 21F7930	90% 9%	No tape is loaded. Load a tape and attempt the operation again. If the reference code continues to occur, exchange the FRU. Run test 2 to verify the repair.
0002	Operator 21F7917	90% 9%	You have attempted to get access to the tape unit from the system while the tape unit was not online. Press the Online button to put the tape unit online. Then attempt the operation again. If the reference code continues to occur, exchange the FRU. Verify the repair by writing to tape from the system.
0004	Tape 21F7950 21F7930	85% 9% 5%	If there is no write-enable ring on the tape, install one. Then attempt the operation again. If the reference code continues to occur, exchange the FRU. Run test 2 to verify the repair.
0005	Lic int code 21F7930	90% 9%	A tape is loaded and preventing the diagnostic from being run. Remove the tape and run test 76. If the reference code continues to occur, exchange the FRU. Run test 76 to verify the repair. If the reference code continues to occur, contact your next level of support.
0006	Operator 21F7919 21F7930	70% 25% 4%	If the front door or the top cover is open, close it. Then attempt the operation again. If this reference code continues to occur, run test 88. The status display will be blank if the doors are closed correctly. The word DOOR will appear in the display if either the door or the top cover is opened. If DOOR appears in the display when the door and top cover are closed, exchange the FRUs as needed, and run test 88 after each FRU is exchanged to verify the repair.
000A	Tape 21F7923 21F7933	70% 15% 10%	The tape unit cannot read a tape that has not been initialized or is not written with the correct density. The tape must be initialized at 1600 or 6250 bits per inch. Also, the tape path may be dirty. Clean the tape path; see "Cleaning Procedure" on page 4-3. Run test 150 and 177 to verify the repair. If this reference code continues to occur, exchange the read/write card and run test 162 to verify the repair.
000B	Operator 21F7923 21F7933 21F7930	50% 35% 10% 4%	The tape unit cannot write on the tape. Ensure that the tape is at BOT and attempt the operation again. If this reference code continues to occur, exchange the tape sensor card and attempt writing from the system to verify the repair. If the reference code continues to occur, exchange the remaining two FRUs as needed; and run test 151 after each of these FRUs is exchanged to verify the repair.
000D	21F7931 Lic int code	95% 4%	The tape was already at BOT when a backspace command was sent from the system to the tape unit. This is not permitted. If this did not occur, exchange the FRU and attempt the operation again. If the reference code continues to occur, contact your next level of support.

Figure 1-1 (Page 2 of 3). Command Reject Reference Codes

Ref. Code	Part Number	Probable Cause	Action
000F	Tape Lic int code	95% 4%	<p>The tape was 10 feet beyond EOT when a write command was received from the system. The EOT marker may be too far from the end of the tape. Verify that the EOT marker is correctly placed. See reference code 0060 for a method to find the EOT marker. The <i>9348 Customer Information</i> manual contains more information on looking for an EOT marker.</p> <p>If you found that the EOT marker was not correctly placed, attempt the operation again with a new tape. Do not attach an EOT marker to the customer's tape at this time. You may lose data if you attach an EOT marker to the failing tape.</p> <p>If this reference code continues to occur, contact your next level of support.</p>
0010	56F0080 21F8063 21F7926 Lic int code	55% 20% 20% 4%	<p>The command received from the system by the tape unit was illegal. Ask the operator to correct the command and to attempt the operation again.</p> <p>If the command was correct and the reference code continues to occur, exchange the FRUs as needed, and run test 10 after each exchange to verify the repair.</p> <p>If this reference code continues to occur, contact your next level of support.</p>
0011	56F0080 21F8063 21F7926 Lic int code	55% 20% 20% 4%	<p>The command received from the system by the tape unit contained an illegal parameter. Ask the operator to correct the command and to attempt the operation again.</p> <p>If the command was correct and the reference code continues to occur, exchange the FRUs as needed, and run test 11 after each exchange to verify the repair.</p> <p>If this reference code continues to occur, contact your next level of support.</p>
0012	21F8063 Lic int code	95% 4%	<p>The command received from the system by the tape unit contained an illegal TEST * or INFO * number. Correct the command and attempt the operation again.</p> <p>If the command was correct and the reference code continues to occur, exchange the FRU. Then attempt the operation again to verify the repair.</p> <p>If this reference code continues to occur, contact your next level of support.</p>
0013	21F8063 Lic int code	95% 4%	<p>The command received from the system by the tape unit attempted to run a test that is not remotely accessible. Ensure that the test is remotely accessible.</p> <p>If the test is remotely accessible and the reference code continues to occur, exchange the FRU. Then attempt the operation again to verify the repair.</p> <p>If this reference code continues to occur, contact your next level of support.</p>
0014	Operator 21F8063 21F7926	90% 5% 4%	<p>Cancel was pressed on the tape unit control panel when a test was being run. Attempt the test again.</p> <p>If this reference code continues to occur, exchange the FRUs as needed. Attempt the test again after each FRU is exchanged to verify the repair.</p>

Figure 1-1 (Page 3 of 3). Command Reject Reference Codes

Ref. Code	Part Number	Probable Cause	Action
0015	Operator 21F8063 Lic int code	75% 20% 4%	Test 38 was run with more steps entered than are permitted. Enter the correct number of steps and attempt the test again. If this reference code continues to occur, exchange the FRU. If the reference code continues to occur, contact your next level of support.
0016	Operator 21F8063 Lic int code	75% 20% 4%	The system has requested a density that is not available on the tape unit. Select 1600 or 6250 bits per inch and attempt the operation again. If this reference code continues to occur, exchange the FRU and attempt the operation again to verify the repair. If the reference code continues to occur, contact your next level of support.
0017	Operator 21F8063 Lic int code	95% 2% 2%	A test was run to exercise a processor but an illegal processor was selected. Correct the test and attempt the operation again. If this reference code continues to occur, exchange the FRU. If the reference code continues to occur, contact your next level of support.
0018	21F8063 21F7926 Lic int code	60% 30% 9%	The system has requested a write record length that is more than is permitted by the tape unit. Select a correct record length and attempt the operation again. If this reference code continues to occur, exchange the FRUs as needed. Attempt the test again after each FRU is exchanged to verify the repair. If the reference code continues to occur, contact your next level of support.
001C	21F7926 21F8063 Lic int code	65% 25% 9%	The system has requested data from the buffer when no data was available. Correct the command and attempt the operation again. If this reference code continues to occur, exchange the FRUs as needed. Attempt the operation again after each FRU is exchanged to verify the repair. If the reference code continues to occur, contact your next level of support.
001D	21F7926 21F8063 Lic int code	65% 25% 9%	The system attempted to put data into the buffer when the buffer was full. Correct the command and attempt the operation again. If this reference code continues to occur, exchange the FRUs as needed. Attempt the operation again after each FRU is exchanged to verify the repair. If the reference code continues to occur, contact your next level of support.
001E 001F	Tape 21F8063 21F7926	70% 24% 5%	Test 129 was run with a defective configuration tape. This problem may be caused by a bad tape or a dirty tape path. Clean the tape path; see "Cleaning Procedure" on page 4-3. Load a tape that is known to be good and attempt the operation again with a configuration tape that is known to be good. If this reference code continues to occur, exchange the FRUs as needed. Attempt the operation again after each FRU is exchanged to verify the repair.

Figure 1-2 (Page 1 of 4). Tape Read Reference Codes

Ref. Code	Part Number	Probable Cause	Action
0020	21F7926 21F7923	60% 39%	The buffer is receiving data quicker than it can process it. Exchange the FRUs as needed. Run test 2 after each FRU is exchanged to verify the repair.
0021	Tape 21F7923 21F7933	60% 25% 14%	<p>A gap was detected before the end of data during a read operation. This problem may be caused by a bad tape or a dirty tape path. Clean the tape path; see "Cleaning Procedure" on page 4-3. Load a tape that is known to be good and attempt the operation again, or run test 2 to verify the repair.</p> <p>If this reference code continues to occur, exchange the FRUs as needed, and run test 2 after each FRU is exchanged to verify the repair.</p>
0022 0023 0024	Tape 21F7933 21F7923	85% 9% 5%	<p>Three or more (0022), two (0023), or one (0024) tracks were in error during a read operation. This problem is most likely caused by a bad tape or a dirty tape path. Clean the tape path; see "Cleaning Procedure" on page 4-3. Load a tape that is known to be good and attempt the operation again, or run test 2 to verify the repair. Run test 99 to check the read thresholds.</p> <p>If this reference code continues to occur, clean the head again and run the diagnostics again. If you continue to get one of these reference codes, exchange the FRUs as needed, and run test 2 after each FRU is exchanged to verify the repair.</p>
0025	Tape 21F7923 21F7933	60% 25% 14%	<p>A cyclical redundancy check (CRC) error occurred during a read operation. This problem may be caused by a bad tape or a dirty tape path. Clean the tape path; see "Cleaning Procedure" on page 4-3. Load a tape that is known to be good and attempt the operation again, or run test 2 to verify the repair.</p> <p>If this reference code continues to occur, exchange the FRUs as needed, and run test 2 after each FRU is exchanged to verify the repair.</p>
0026	Tape 21F7923 21F7933	60% 25% 14%	<p>An auxiliary cyclical redundancy check (ACRC) error occurred during a read operation. This problem may be caused by a bad tape or a dirty tape path. Clean the tape path; see "Cleaning Procedure" on page 4-3. Load a tape that is known to be good and attempt the operation again, or run test 2 to verify the repair.</p> <p>If this reference code continues to occur, exchange the FRUs as needed, and run test 2 after each FRU is exchanged to verify the repair.</p>
0027	Tape 21F7923 21F7933	60% 25% 14%	<p>An irrecoverable error occurred during a read operation. This problem may be caused by a bad tape or a dirty tape path. Clean the tape path; see "Cleaning Procedure" on page 4-3. Load a tape that is known to be good and attempt the operation again, or run test 2 to verify the repair.</p> <p>If this reference code continues to occur, exchange the FRUs as needed, and run test 2 after each FRU is exchanged to verify the repair.</p>

Figure 1-2 (Page 2 of 4). Tape Read Reference Codes

Ref. Code	Part Number	Probable Cause	Action
0028	Tape 21F7923	60% 39%	<p>The error detection circuits detected one track in error during a read operation. This problem may be caused by a bad tape or a dirty tape path. Clean the tape path; see "Cleaning Procedure" on page 4-3. Load a tape that is known to be good and attempt the operation again, or run test 2 to verify the repair.</p> <p>If this reference code continues to occur on good tapes, exchange the FRU and run test 2 to verify the repair.</p>
0029	Tape 21F7923	60% 39%	<p>A cyclical redundancy check (CRC) error occurred during a read operation. This problem may be caused by a bad tape or a dirty tape path. Clean the tape path; see "Cleaning Procedure" on page 4-3. Load a tape that is known to be good and attempt the operation again, or run test 2 to verify the repair.</p> <p>If this reference code continues to occur on good tapes, exchange the FRU and run test 2 to verify the repair.</p>
002A	21F7923	99%	<p>An error that is not known occurred during a read operation. If this reference code continues to occur, exchange the FRU and run test 2 to verify the repair.</p>
002B	Tape 21F7923 21F7933	60% 25% 14%	<p>A data block timeout error occurred during a read operation. This problem may be caused by a bad tape or a dirty tape path. Clean the tape path; see "Cleaning Procedure" on page 4-3. Load a tape that is known to be good and attempt the operation again, or run test 2 to verify the repair.</p> <p>If this reference code continues to occur, exchange the FRUs as needed, and run test 2 after each FRU is exchanged to verify the repair.</p>
002C	Tape 21F7923 21F7933	60% 25% 14%	<p>An error occurred while the tape unit was attempting to detect a block of data. This problem may be caused by a bad tape or a dirty tape path. Clean the tape path; see "Cleaning Procedure" on page 4-3. Load a tape that is known to be good and attempt the operation again, or run test 2 to verify the repair.</p> <p>If this reference code continues to occur, exchange the FRUs as needed, and run test 2 after each FRU is exchanged to verify the repair.</p>
002D	Tape 21F7923 21F7933	60% 25% 14%	<p>The tape unit could not detect the end of a block of data during a read operation. This problem may be caused by a bad tape or a dirty tape path. Clean the tape path; see "Cleaning Procedure" on page 4-3. Load a tape that is known to be good and attempt the operation again, or run test 2 to verify the repair.</p> <p>If this reference code continues to occur, exchange the FRUs as needed, and run test 2 after each FRU is exchanged to verify the repair.</p>
002E	Tape 21F7923 21F7933	60% 25% 14%	<p>A bad interblock gap occurred after the identification (ID) block during a read operation. This problem may be caused by a bad tape or a dirty tape path. Clean the tape path; see "Cleaning Procedure" on page 4-3. Load a tape that is known to be good and attempt the operation again, or run test 2 to verify the repair.</p> <p>If this reference code continues to occur, exchange the FRUs as needed, and run test 2 after each FRU is exchanged to verify the repair.</p>

Figure 1-2 (Page 3 of 4). Tape Read Reference Codes

Ref. Code	Part Number	Probable Cause	Action
002F	Tape 21F7923 21F7933	60% 25% 14%	<p>A timeout occurred during the interblock gap check. This problem may be caused by a bad tape or a dirty tape path. Clean the tape path; see "Cleaning Procedure" on page 4-3. Load a tape that is known to be good and attempt the operation again, or run test 2 to verify the repair.</p> <p>If this reference code continues to occur, exchange the FRUs as needed, and run test 2 after each FRU is exchanged to verify the repair.</p>
0030	Tape 21F7923 21F7933	60% 25% 14%	<p>The tape unit detected an interblock gap that was too short. This problem may be caused by a bad tape or a dirty tape path. Clean the tape path; see "Cleaning Procedure" on page 4-3. Load a tape that is known to be good and attempt the operation again, or run test 2 to verify the repair.</p> <p>If this reference code continues to occur, exchange the FRUs as needed, and run test 2 after each FRU is exchanged to verify the repair.</p>
0031	Tape 21F7923 21F7933	60% 25% 14%	<p>A block overrun error occurred during a read operation. This problem may be caused by a bad tape or a dirty tape path. Clean the tape path; see "Cleaning Procedure" on page 4-3. Load a tape that is known to be good and attempt the operation again, or run test 2 to verify the repair.</p> <p>If this reference code continues to occur, exchange the FRUs as needed, and run test 2 after each FRU is exchanged to verify the repair.</p>
0032 0033	Tape 21F7923 21F7933	60% 25% 14%	<p>The tape unit detected an identification (ID) block (0032) or read a tape mark (0033) that was not correct. This problem may be caused by a bad tape or a dirty tape path. Clean the tape path; see "Cleaning Procedure" on page 4-3. Load a tape that is known to be good and attempt the operation again, or run test 2 to verify the repair.</p> <p>If this reference code continues to occur, exchange the FRUs as needed, and run test 2 after each FRU is exchanged to verify the repair.</p>
0035	Tape 21F7923 21F7933	60% 25% 14%	<p>This reference code may be caused by a bad tape or a dirty tape path. Clean the tape path; see "Cleaning Procedure" on page 4-3. Load a tape that is known to be good and attempt the operation again, or run test 2 to verify the repair.</p> <p>If this reference code continues to occur, exchange the FRUs as needed, and run test 2 after each FRU is exchanged to verify the repair.</p>
0039	21F7923	99%	<p>An error occurred during a read-tape-mark operation. If this reference code continues to occur, exchange the FRU and run test 2 to verify the repair.</p>
003A 003B 003C	21F7923 21F7933 Tape	50% 35% 14%	<p>Tracks with gain too low (003A), too high (003B), or too low and too high (003C) were detected during a read-channel autocalibration. This problem may be caused by a bad tape or a dirty tape path. Clean the tape path; see "Cleaning Procedure" on page 4-3. Load a tape that is known to be good and attempt the operation again, or run test 99 to verify the repair.</p> <p>If this reference code continues to occur, exchange the FRUs as needed, and run test 99 after each FRU is exchanged to verify the repair.</p>

Figure 1-2 (Page 4 of 4). Tape Read Reference Codes

Ref. Code	Part Number	Probable Cause	Action
003F	Operator 21F7923 21F7933	75% 20% 4%	<p>A test was run to read data from the tape, but no data was found. Ensure that the tape has data by recording on it if necessary and attempt the operation again.</p> <p>This reference code can occur if the read or write cable is not correctly seated. Reseat the read and write cables and attempt the operation again to verify the repair. If this reference code continues to occur, exchange the FRUs as needed. Attempt the operation again after each FRU is exchanged to verify the repair.</p>

Figure 1-3 (Page 1 of 6). Tape Write Reference Codes

Ref. Code	Part Number	Probable Cause	Action
0040	21F7926 21F7923	65% 34%	<p>A buffer underrun error occurred during a write operation. Run test 0. If test 0 fails or if this reference code continues to occur, exchange the FRUs as needed. Run test 0 after each FRU is exchanged to verify the repair.</p>
0041	Tape 21F7923 21F7933	60% 25% 14%	<p>A gap was detected before end of data during a write operation. This problem may be caused by a bad tape or a dirty tape path. Clean the tape path; see "Cleaning Procedure" on page 4-3. Load a tape that is known to be good and attempt the operation again, or run test 0 to verify the repair.</p> <p>If this reference code continues to occur, exchange the FRUs as needed, and run test 0 after each FRU is exchanged to verify the repair.</p>
0042	Tape 21F7933 21F7923	60% 25% 14%	<p>Three or more tracks were in error during a write operation. This problem may be caused by a bad tape or a dirty tape path. Clean the tape path; see "Cleaning Procedure" on page 4-3. Load a tape that is known to be good and attempt the operation again, or run test 2 to verify the repair.</p> <p>If this reference code continues to occur, run test 98 to check the read channel gain values. If these values are not good, run test 99 to set new values and run test 2 to verify the repair.</p> <p>If this reference code continues to occur, exchange the FRUs as needed, and run test 2 after each FRU is exchanged to verify the repair.</p>
0043	Tape 21F7933 21F7923	60% 25% 14%	<p>Two tracks were in error during a write operation. This problem may be caused by a bad tape or a dirty tape path. Clean the tape path; see "Cleaning Procedure" on page 4-3. Load a tape that is known to be good and attempt the operation again, or run test 62 (with parameter A set to 6) to verify the repair.</p> <p>If this reference code continues to occur, run test 98 to check the read channel gain values. If these values are not good, run test 99 to set new values and run test 2 to verify the repair.</p> <p>If this reference code continues to occur, exchange the FRUs as needed, and run test 62 (with parameter A set to 6) after each FRU is exchanged to verify the repair.</p>

Figure 1-3 (Page 2 of 6). Tape Write Reference Codes

Ref. Code	Part Number	Probable Cause	Action
0044	Tape 21F7933 21F7923	60% 25% 14%	<p>One track was in error during a write operation. This problem may be caused by a bad tape or a dirty tape path. Clean the tape path; see "Cleaning Procedure" on page 4-3. Load a tape that is known to be good and attempt the operation again, or run test 12 (with parameter A set to 0) to verify the repair.</p> <p>If this reference code continues to occur, run test 98 to check the read channel gain values. If these values are not good, run test 99 to set new values and run test 2 to verify the repair.</p> <p>If this reference code continues to occur, exchange the FRUs as needed, and run test 12 (with parameter A set to 0) after each FRU is exchanged to verify the repair.</p>
0045	Tape 21F7933 21F7923	60% 25% 14%	<p>A cyclical redundancy check (CRC) error occurred during a write operation. This problem may be caused by a bad tape or a dirty tape path. Clean the tape path; see "Cleaning Procedure" on page 4-3. Load a tape that is known to be good and attempt the operation again, or run test 12 (with parameter A set to 0) to verify the repair.</p> <p>If this reference code continues to occur, exchange the FRUs as needed, and run test 12 (with parameter A set to 0) after each FRU is exchanged to verify the repair.</p>
0046	Tape 21F7933 21F7923	60% 25% 14%	<p>An auxiliary cyclical redundancy check (ACRC) error occurred during a write operation. This problem may be caused by a bad tape or a dirty tape path. Clean the tape path; see "Cleaning Procedure" on page 4-3. Load a tape that is known to be good and attempt the operation again, or run test 12 (with parameter A set to 0) to verify the repair.</p> <p>If this reference code continues to occur, run test 98 to check the read channel gain values. If these values are not good, run test 99 to set new values and run test 2 to verify the repair.</p> <p>If this reference code continues to occur, exchange the FRUs as needed, and run test 12 (with parameter A set to 0) after each FRU is exchanged to verify the repair.</p>
0047	Tape 21F7933 21F7923	60% 25% 14%	<p>An error that could not be recovered occurred during a write operation. This problem may be caused by a bad tape or a dirty tape path. Clean the tape path; see "Cleaning Procedure" on page 4-3. Load a tape that is known to be good and attempt the operation again, or run test 2 to verify the repair.</p> <p>If this reference code continues to occur, exchange the FRUs as needed, and run test 2 after each FRU is exchanged to verify the repair.</p>
0048	Tape 21F7923 21F7933	60% 25% 14%	<p>The error detection circuits detected one track in error during a write operation. This problem may be caused by a bad tape or a dirty tape path. Clean the tape path; see "Cleaning Procedure" on page 4-3. Load a tape that is known to be good and attempt the operation again, or run test 12 (with parameter A set to 0) to verify the repair.</p> <p>If this reference code continues to occur, exchange the FRUs as needed, and run test 12 (with parameter A set to 0) after each FRU is exchanged to verify the repair.</p>

Figure 1-3 (Page 3 of 6). Tape Write Reference Codes

Ref. Code	Part Number	Probable Cause	Action
0049	Tape 21F7923 21F7933	60% 25% 14%	<p>A cyclical redundancy check (CRC) error occurred during a write operation. This problem may be caused by a bad tape or a dirty tape path. Clean the tape path; see "Cleaning Procedure" on page 4-3. Load a tape that is known to be good and attempt the operation again, or run test 12 (with parameter A set to 0) to verify the repair.</p> <p>If this reference code continues to occur, exchange the FRUs as needed, and run test 12 (with parameter A set to 0) after each FRU is exchanged to verify the repair.</p>
004A	21F7923	99%	<p>An error that is not known occurred during a write operation. If this reference code continues to occur, exchange the FRU and run test 12 to verify the repair.</p>
004B	Tape 21F7923 21F7933 21F8063	55% 30% 10% 4%	<p>A data block timeout error has occurred during a write operation. This problem may be caused by a bad tape or a dirty tape path. Clean the tape path; see "Cleaning Procedure" on page 4-3. Load a tape that is known to be good and attempt the operation again, or run test 12 (with parameter A set to 0) to verify the repair.</p> <p>If this reference code continues to occur, exchange the FRUs as needed, and run test 12 (with parameter A set to 0) after each FRU is exchanged to verify the repair.</p>
004C	Tape 21F7923 21F7933 21F8063	60% 22% 13% 4%	<p>An error occurred while the tape unit was attempting to detect a block of data. This problem may be caused by a bad tape or a dirty tape path. Clean the tape path; see "Cleaning Procedure" on page 4-3. Load a tape that is known to be good and attempt the operation again, or run test 12 (with parameter A set to 0) to verify the repair.</p> <p>If this reference code continues to occur, exchange the FRUs as needed, and run test 12 (with parameter A set to 0) after each FRU is exchanged to verify the repair.</p>
004D	Tape 21F7923 21F7933 21F8063	60% 23% 13% 4%	<p>The tape unit could not detect the end of a block of data. This problem may be caused by a bad tape or a dirty tape path. Clean the tape path; see "Cleaning Procedure" on page 4-3. Load a tape that is known to be good and attempt the operation again, or run test 2 to verify the repair.</p> <p>If this reference code continues to occur, exchange the FRUs as needed, and run test 2 after each FRU is exchanged to verify the repair.</p>
004E	Tape 21F7923 21F7933	60% 25% 14%	<p>A bad interblock gap occurred after the identification (ID) block. This problem may be caused by a bad tape or a dirty tape path. Clean the tape path; see "Cleaning Procedure" on page 4-3. Load a tape that is known to be good and attempt the operation again, or run test 2 to verify the repair.</p> <p>If this reference code continues to occur, exchange the FRUs as needed, and run test 2 after each FRU is exchanged to verify the repair.</p>
004F	Tape 21F7923 21F7933	60% 25% 14%	<p>A timeout occurred during the interblock gap check. This problem may be caused by a bad tape or a dirty tape path. Clean the tape path; see "Cleaning Procedure" on page 4-3. Load a tape that is known to be good and attempt the operation again, or run test 2 to verify the repair.</p>
			<p>If this reference code continues to occur, exchange the FRUs as needed, and run test 2 after each FRU is exchanged to verify the repair.</p>

Figure 1-3 (Page 4 of 6). Tape Write Reference Codes

Ref. Code	Part Number	Probable Cause	Action
0050	Tape 21F7923 21F7933	60% 25% 14%	<p>An erase verify error has occurred. This problem may be caused by a bad tape or a dirty tape path. Clean the tape path; see "Cleaning Procedure" on page 4-3. Load a tape that is known to be good and attempt the operation again, or run test 100 (with default parameters) to verify the repair.</p> <p>If this reference code continues to occur, exchange the FRUs as needed, and run test 100 (with default parameters) after each FRU is exchanged to verify the repair.</p>
0051	Tape 21F7923 21F7933	60% 25% 14%	<p>A 1600 density identification (ID) detect error has occurred. This problem may be caused by a bad tape or a dirty tape path. Clean the tape path; see "Cleaning Procedure" on page 4-3. Load a tape that is known to be good and attempt the operation again, or run test 12 to verify the repair.</p> <p>If this reference code continues to occur, exchange the FRUs as needed, and run test 12 after each FRU is exchanged to verify the repair.</p>
0052	Tape 21F7923 21F7933	60% 25% 14%	<p>A 1600 density identification (ID) verify error has occurred. This problem may be caused by a bad tape or a dirty tape path. Clean the tape path; see "Cleaning Procedure" on page 4-3. Load a tape that is known to be good and attempt the operation again, or run test 2 to verify the repair.</p> <p>If this reference code continues to occur, exchange the FRUs as needed, and run test 2 after each FRU is exchanged to verify the repair.</p>
0053 0054	Tape 21F7923 21F7933	60% 25% 14%	<p>A 6250 density identification (ID) detect (0053) or verify (0054) error has occurred. This problem may be caused by a bad tape or a dirty tape path. Clean the tape path; see "Cleaning Procedure" on page 4-3. Load a tape that is known to be good and attempt the operation again, or run test 2 to verify the repair.</p> <p>If this reference code continues to occur, exchange the FRUs as needed, and run test 2 after each FRU is exchanged to verify the repair.</p>
0055	Tape 21F7923 21F7933	60% 25% 14%	<p>A 6250 automatic read adjust detect error has occurred. This problem may be caused by a bad tape or a dirty tape path. Clean the tape path; see "Cleaning Procedure" on page 4-3. Load a tape that is known to be good and attempt the operation again, or run test 62 (with parameter A set to 10) to verify the repair.</p> <p>If this reference code continues to occur, exchange the FRUs as needed, and run test 62 (with parameter A set to 10) after each FRU is exchanged to verify the repair.</p>
0056	Tape 21F7923 21F7933	60% 25% 14%	<p>A 6250 automatic read adjust verify error has occurred. This problem may be caused by a bad tape or a dirty tape path. Clean the tape path; see "Cleaning Procedure" on page 4-3. Load a tape that is known to be good and attempt the operation again, or run test 2 to verify the repair.</p> <p>If this reference code continues to occur, exchange the FRUs as needed, and run test 2 after each FRU is exchanged to verify the repair.</p>

Figure 1-3 (Page 5 of 6). Tape Write Reference Codes

Ref. Code	Part Number	Probable Cause	Action
0057	Tape 21F7923 21F7933	60% 25% 14%	A 6250 automatic read adjust identification (ID) detect error has occurred. This problem may be caused by a bad tape or a dirty tape path. Clean the tape path; see "Cleaning Procedure" on page 4-3. Load a tape that is known to be good and attempt the operation again, or run test 62 (with parameter A set to 11) to verify the repair. If this reference code continues to occur, exchange the FRUs as needed, and run test 62 (with parameter A set to 11) after each FRU is exchanged to verify the repair.
0058	Tape 21F7923 21F7933	60% 25% 14%	A 6250 automatic read adjust identification (ID) verify error has occurred. This problem may be caused by a bad tape or a dirty tape path. Clean the tape path; see "Cleaning Procedure" on page 4-3. Load a tape that is known to be good and attempt the operation again, or run test 2 to verify the repair. If this reference code continues to occur, exchange the FRUs as needed, and run test 2 after each FRU is exchanged to verify the repair.
0059 005A	Tape 21F7923 21F7933	60% 25% 14%	A bad tape mark was detected during a write (0059) or a write verify (005A) operation. This problem may be caused by a bad tape or a dirty tape path. Clean the tape path; see "Cleaning Procedure" on page 4-3. Load a tape that is known to be good and attempt the operation again, or run test 62 (with parameter A set to 12) to verify the repair. If this reference code continues to occur, exchange the FRUs as needed, and run test 62 (with parameter A set to 12) after each FRU is exchanged to verify the repair.
005B	Tape 21F7923 21F7933	60% 25% 14%	A bad gap was detected during a write operation. This problem may be caused by a bad tape or a dirty tape path. Clean the tape path; see "Cleaning Procedure" on page 4-3. Load a tape that is known to be good and attempt the operation again, or run test 2 to verify the repair. If this reference code continues to occur, exchange the FRUs as needed, and run test 2 after each FRU is exchanged to verify the repair.
005C	21F7926 21F7923	70% 25%	A buffer parity error occurred during a write record operation. Attempt the operation again or run test 12. If this reference code continues to occur, exchange the FRUs as needed, and run test 12 after each FRU is exchanged to verify the repair.
005D	Tape 21F7923 21F7933 21F8063	50% 30% 15% 4%	No data was detected during a write record verify operation. This problem may be caused by a bad tape or a dirty tape path. Clean the tape path; see "Cleaning Procedure" on page 4-3. Load a tape that is known to be good and attempt the operation again, or run test 12 to verify the repair. If this reference code continues to occur, exchange the FRUs as needed, and run test 12 after each FRU is exchanged to verify the repair.

Figure 1-3 (Page 6 of 6). Tape Write Reference Codes

Ref. Code	Part Number	Probable Cause	Action
005E	Tape 21F7923 21F7933	70% 20% 9%	<p>No tape mark was detected during a write tape mark verify operation. This problem may be caused by a bad tape or a dirty tape path. Clean the tape path; see "Cleaning Procedure" on page 4-3. Load a tape that is known to be good and attempt the operation again, or run test 62 (with parameter A set to 12) to verify the repair.</p> <p>If this reference code continues to occur, exchange the FRUs as needed, and run test 62 (with parameter A set to 12) after each FRU is exchanged to verify the repair.</p>
005F	Tape 21F7923 21F7933	70% 20% 9%	<p>No identification (ID) was detected during a write ID verify operation. This problem may be caused by a bad tape or a dirty tape path. Clean the tape path; see "Cleaning Procedure" on page 4-3. Load a tape that is known to be good and attempt the operation again, or run test 2 to verify the repair.</p> <p>If this reference code continues to occur, exchange the FRUs as needed, and run test 2 after each FRU is exchanged to verify the repair.</p>

Figure 1-4 (Page 1 of 4). Tape Positioning/Servo Reference Codes

Ref. Code	Part Number	Probable Cause	Action
0060	21F7932 21F7931 21F7927 21F7935 56F0091 21F7945 Tape	30% 26% 20% 10% 5% 5% 4%	<p>The tape unit has lost tape tension. The tape may not have an end-of-tape (EOT) marker.</p> <p>If the tape has run off the supply reel, manually pass the tape back through the tape path and wind it around the supply reel. Turn the supply reel counterclockwise by hand while looking for the EOT marker. The EOT marker should appear in approximately 25 revolutions. If there was no EOT marker, attempt the operation with another tape. Installing an EOT marker on the failing tape may cause loss of data on the failing tape. The <i>9348 Customer Information</i> manual contains more information on looking for an EOT marker.</p> <p>If the tape was not the problem, check that the buffer spring is good. Clean the tape path (see "Cleaning Procedure" on page 4-3). Then run test 85. If test 85 fails, exchange FRU 21F7935 and run test 85 again to verify the repair.</p> <p>If the problem has not been found, run test 84. If test 84 fails, exchange FRU 21F7931 and run test 84 again to verify the repair.</p> <p>If the problem has not been found, check that the cable for FRU 21F7932 is attached correctly. Run test 86. If test 86 fails, exchange FRU 21F7932 and run test 86 again to verify the repair.</p> <p>If the problem has not been found, check that the cable for FRU 21F7931 is attached correctly. Run test 94. If test 94 fails, exchange FRU 21F7931 and run test 94 again to verify the repair.</p> <p>If the reference code continues to occur, exchange the remaining FRUs as needed, and run test 95 after each FRU is exchanged to verify the repair.</p>

Figure 1-4 (Page 2 of 4). Tape Positioning/Servo Reference Codes

Ref. Code	Part Number	Probable Cause	Action
0061 0062	21F7932 21F8063 21F7924	70% 20% 5%	<p>A tape speed (0061) or accelerating (0062) error has occurred. Run test 86. If test 86 fails, exchange FRU 21F7932 and run test 86 again to verify the repair.</p> <p>If test 86 did not fail during the start, run test 95. If test 95 fails, exchange the remaining FRUs as needed, and run test 95 after each FRU is exchanged to verify the repair.</p>
0063	21F7927	99%	<p>The servo is not responding correctly. Run test 95. If test 95 fails, exchange the FRU and run test 95 again to verify the repair.</p>
006E	Operator 21F7930 21F7950 21F8063 21F7924	35% 25% 15% 15% 4%	<p>The tape unit indicates that there is no tape reel in the unit. If a tape reel is not on the supply hub, place one on it. If a tape reel is on the supply hub, remove the reel and place it on the supply hub correctly. Then load the tape.</p> <p>If the reference code continues to occur, run test 89. If test 89 fails, check the supply hub flags; see "Motors and Hubs Removal" on page 3-78. If the flags are damaged, exchange the supply hub.</p> <p>If the supply hub is good and the reference code continues to occur, exchange the remaining FRUs as needed, and run test 89 after each FRU is exchanged to verify the repair.</p>
006F	56F0022 21F8063 21F7924	70% 20% 5%	<p>The supply hub has failed to engage the tape reel. Check that the supply hub screw is tight. If the reference code continues to occur, run tests 91 and 92 and observe the supply hub clamp locking and unlocking operation. If the supply hub clamps do not work correctly, exchange the FRUs as needed, and run tests 91 and 92 to verify the repair.</p>
0070	Operator 21F7930 21F7950 Tape 21F8063 21F7924	40% 25% 15% 10% 5% 4%	<p>The tape reel is not seating correctly. Ensure that the tape reel being used is not distorted. Correctly place a tape reel on the supply hub and run test 89. If test 89 fails, check the supply hub flags. See "Motors and Hubs Removal" on page 3-78. If the flags are damaged, exchange the supply hub.</p> <p>If the supply hub is good and the reference code continues to occur, exchange the remaining FRUs as needed, and run test 89 after each FRU is exchanged to verify the repair.</p>
0071	Operator 21F7930 21F7950 Tape 21F8063 21F7924	60% 20% 10% 5% 2% 2%	<p>The tape unit is detecting a tape reel that is inverted. Remove the tape reel and place it on the hub correctly. Run test 89. If test 89 fails, check the supply hub flags; see "Motors and Hubs Removal" on page 3-78. If the flags are damaged, exchange the supply hub.</p> <p>If the supply hub is good and the reference code continues to occur, exchange the remaining FRUs as needed, and run test 89 after each FRU is exchanged to verify the repair.</p>
0072	Tape 21F7930	55% 45%	<p>The tape is failing to come off the tape reel. This problem may be caused by static. Crimp the tape leader. The 9348 <i>Customer Information</i> manual contains more information on preparing the tape.</p> <p>When the tape is correctly crimped, observe the tape loading through the top cover. If the tape leader is coming off the reel and the reference code continues to occur, run test 87. If test 87 fails, exchange the FRU and run test 87 again to verify the repair.</p>

Figure 1-4 (Page 3 of 4). Tape Positioning/Servo Reference Codes

Ref. Code	Part Number	Probable Cause	Action
0073	Operator 21F7930 Tape 21F7945 21F7950 21F7927 21F8063 21F7932	50% 18% 15% 7% 3% 3% 2% 2%	<p>Tape is jammed in the tape path. Ensure that nothing is obstructing the tape path; see "Cleaning Procedure" on page 4-3. If the tape path is clean, run tests 91 and 92 and observe the supply hub clamp locking and unlocking operation to determine if the supply hub or the hub lock solenoid is bad. If the supply hub is not turning, check the cable to the supply motor and then the supply motor.</p> <p>If there were no problems to this point, run test 87 to test the remaining FRUs (21F7930, 21F8063, and 21F7932). If test 87 fails, exchange the remaining FRUs as needed, and run test 87 after each FRU is exchanged to verify the repair.</p>
0074	21F7935 21F7931 21F8063 21F7924	40% 30% 20% 5%	<p>The tape unit cannot keep the tape in tension. Run test 85 to test FRU 21F7935.</p> <p>If the tension arm is correct, run test 84. If test 84 fails, exchange FRU 21F7931 and run test 84 again to verify the repair.</p> <p>If the problem has not been found, run test 95 to test the remaining FRUs. If test 95 fails, exchange the remaining FRUs as needed, and run test 95 after each FRU is exchanged to verify the repair.</p>
0076	Operator 21F7919 21F7930	70 25% 4%	<p>If the front door or the top cover is open, close it. Then attempt the operation again.</p> <p>If this reference code continues to occur, run test 88. The status display will be blank if the doors are closed correctly. The word DOOR will appear in the display if either the door or the top cover is opened. If DOOR appears in the display when the door and top cover are closed, exchange the FRUs as needed, and run test 88 after each FRU is exchanged to verify the repair.</p>
0077	Tape 21F7923 21F7933	60% 30% 9%	<p>The tape unit failed to read the tape identification (ID) after a rewind operation. This problem may be caused by a bad tape or a dirty tape path. Clean the tape path; see "Cleaning Procedure" on page 4-3. Load a tape that is known to be good and attempt the operation again, or run test 2 to verify the repair.</p> <p>If this reference code continues to occur, exchange the FRUs as needed, and run test 2 after each FRU is exchanged to verify the repair.</p>
0078	Tape 21F7931 21F8063	50% 45% 4%	<p>The tape unit cannot detect the beginning-of-tape BOT marker. The <i>9348 Customer Information</i> manual contains more information on the BOT. If the tape has a correct BOT marker, run test 94. If test 94 fails, this problem may be caused by a bad tape or a dirty tape path. Clean the tape path; see "Cleaning Procedure" on page 4-3. Load a tape that is known to be good and exchange the FRUs as needed, and run test 94 after each FRU is exchanged to verify the repair.</p>
0079	Operator	99%	<p>"Cancel" was pressed on the tape unit front panel while the tape unit was operating. Inform the operator that pressing "Cancel" will stop the job.</p>
007A	Host 56F0080 21F8063	80% 14% 5%	<p>The tape unit received a reset command from the host system. If the system did not send a reset, run test 140. If test fails, exchange 56F0080 and run test 140 to verify the repair. If it passes, attempt to read or write again from the host system.</p> <p>If the reference code continues to occur, exchange the remaining FRU and attempt the operation again to verify the repair.</p>

Figure 1-4 (Page 4 of 4). Tape Positioning/Servo Reference Codes

Ref. Code	Part Number	Probable Cause	Action
007D 007E 007F	Tape 21F7932 21F8063	65% 25% 9%	The tape unit failed to put the tape in position correctly. This problem may be caused by a bad tape or a dirty tape path. Clean the tape path; see "Cleaning Procedure" on page 4-3. Load a tape that is known to be good and attempt the same read or write operation again. If this reference code continues to occur, run test 86. If test 86 fails, exchange the FRUs as needed, and run test 86 after each FRU is exchanged to verify the repair.

Figure 1-5. Tape Unit Controller Reference Codes

Ref. Code	Part Number	Probable Cause	Action
0080	21F7930 21F8063 21F7950 21F7926 21F7924	60% 20% 10% 5% 4%	<p>The encoder failed to detect the size of the tape reel. Run test 89. If test 89 fails, check the supply hub flags; see "Motors and Hubs Removal" on page 3-78. If the flags are damaged, exchange the supply hub.</p> <p>If the supply hub is good and test 89 continues to fail, exchange the remaining FRUs as needed, and run test 89 after each FRU is exchanged to verify the repair.</p>
0083	Tape 21F7930 21F7945 21F7927	70% 20% 5% 4%	<p>The tape cannot pass through the tape path. This problem may be caused by a damaged tape leader. Crimp the tape leader. The 9348 <i>Customer Information</i> manual contains more information on preparing the tape. When the tape is correctly crimped, observe the tape loading through the top cover.</p> <p>If the tape passes into the tape path correctly and the reference code continues to occur, run test 89. If test 89 fails, exchange FRU 21F7930 and run test 89 to verify the repair. If test 89 did not fail and the reference code continues to occur, exchange 21F7945. Do a load-tape operation to verify the repair.</p>
0084	21F7927 21F7945 56F0022	60% 25% 14%	<p>An open loop motor control error has occurred. Run tests 91 and 92 and observe the supply hub clamp locking and unlocking operation. If the supply hub does not work correctly, exchange FRU 56F0022 and run tests 91 and 92 to verify the repair.</p> <p>If the supply hub worked correctly and the reference code continues to occur, run test 95 to isolate the remaining FRUs. If test 95 fails, exchange the remaining FRUs as needed, and run test 95 after each FRU is exchanged to verify the repair.</p>
0085	21F7923 21F8063 21F7932 21F7924	60% 25% 10% 4%	<p>A gap timer circuit error has occurred. Run test 2 to isolate the FRUs. If test 2 fails, exchange the FRUs as needed, and run test 2 after each FRU is exchanged to verify the repair.</p>

Figure 1-6. Buffer Controller Reference Codes

Ref. Code	Part Number	Probable Cause	Action
00A0 00A1	21F7926 21F7923 56F0080	75% 15% 9%	<p>A data parity error has occurred. If this reference code continues to occur, run test 140 to isolate FRU 56F0080. If test 140 fails, exchange 56F0080 and run test 140 to verify the repair.</p> <p>If test 140 did not fail at the start, run test 2. If test 2 fails or if the reference code continues to occur, exchange the FRUs in sequence as needed, and run test 2 after each FRU is exchanged to verify the repair.</p>
00A2	21F7926 21F7923	75% 24%	<p>A byte-count error has occurred during a read operation. If the reference code continues to occur, exchange the FRUs as needed, and run test 2 after each FRU is exchanged to verify the repair.</p>
00A4	Operator	99%	<p>Configuration parameter 55 is not set to 0. Set configuration parameter 55 to 0. See "Changing Configuration Values" on page D-1.</p>
00A5	56F0080 Lic int code	80% 19%	<p>A zero-byte record was read by the tape unit or requested by the system. This is illegal.</p> <p>If a zero-byte record was not read or requested, exchange the FRU and attempt the operation again to verify the repair. If the reference code continues to occur, contact your next level of support.</p>
00A8	Tape 21F7932 21F7923 21F8063	55% 30% 10% 4%	<p>The tape unit lost synchronization between tape position and records written during a backspace operation. This problem may be caused by a bad tape or a dirty tape path. Clean the tape path; see "Cleaning Procedure" on page 4-3. Load a tape that is known to be good and attempt the operation again or run test 86 to verify the repair.</p> <p>If this reference code continues to occur, exchange the FRUs as needed, and run test 86 after each FRU is exchanged to verify the repair.</p>
00BF	microcode	99%	<p>An illegal condition has occurred in the tape unit microcode.</p> <p>If this reference code continues to occur, contact your next level of support immediately. If possible, do not disturb the error condition on the tape unit.</p>

Figure 1-7 (Page 1 of 2). Interface Controller Reference Codes

Ref. Code	Part Number	Probable Cause	Action
00C0	Lic int code	99%	The tape unit has received an illegal command. This is a program problem beyond the unit interface. If the reference code continues to occur, contact your next level of support.
00C2	Lic int code	99%	The tape unit received a command descriptor block with an illegal field. This is a program problem beyond the unit interface. If the reference code continues to occur, contact your next level of support.
00C3	Lic int code	99%	The tape unit has received an illegal mode select value. This is a program problem beyond the unit interface. If the reference code continues to occur, contact your next level of support.
00C4	Lic int code	99%	The tape unit has received an illegal mode length. This is a program problem beyond the unit interface. If the reference code continues to occur, contact your next level of support.
00C5	Lic int code	99%	The tape unit has received fixed mode, but fixed bit is not set in the command byte. This is a program problem beyond the unit interface. If the reference code continues to occur, contact your next level of support.
00C7	Lic int code	99%	The tape unit has received a command byte compare. This is an illegal command. This is a program problem beyond the unit interface. If the reference code continues to occur, contact your next level of support.
00C8	Operator	99%	Cancel was pressed on the tape unit front panel. Put the tape unit online. Inform the operator that pressing the Cancel button will stop the job.
00C9	Lic int code	99%	The tape unit has received a command with the wrong length indicator on and the fixed bit set. This is a program problem beyond the unit interface. If the reference code continues to occur, contact your next level of support.
00CA	Lic int code	99%	The tape unit has received a rewind command while it is offline. This is a program problem beyond the unit interface. If the reference code continues to occur, contact your next level of support.
00CC	56F0080 21F7926 21F7923	45% 39% 15%	A parity error has occurred. If this reference code continues to occur, exchange the FRUs as needed. Attempt the operation again after each FRU is exchanged to verify the repair.
00CD	Lic int code	99%	The tape unit has received a command with an illegal status page. This is a program problem beyond the unit interface. If the reference code continues to occur, contact your next level of support.
00D0	56F0080 21F7926	70% 25%	A reset that was not expected has occurred. If this reference code continues to occur, exchange the FRUs as needed. Attempt the operation again after each FRU is exchanged to verify the repair.
00D1	56F0080	99%	An interrupt that was not expected has occurred on the interface. If this reference code continues to occur, exchange the FRU. Attempt the operation again to verify the repair.
00D2	Lic int code	99%	The tape unit has received a command to write a record that is too long. This is a program problem beyond the unit interface. If the reference code continues to occur, contact your next level of support.
00D3	Lic int code	99%	A verify immediate command was received. This is illegal. This is a program problem beyond the unit interface. If the reference code continues to occur, contact your next level of support.

Figure 1-7 (Page 2 of 2). Interface Controller Reference Codes

Ref. Code	Part Number	Probable Cause	Action
00D4	Lic int code	99%	An illegal message was received from the host. This is a program problem beyond the unit interface. If the reference code continues to occur, contact your next level of support.
00D5	Lic int code	99%	The host is using an illegal address for the tape unit. This is a program problem beyond the unit interface. If the reference code continues to occur, contact your next level of support.
00D7	Lic int code	99%	Immediate bit set without Immediate Response mode. This is a program problem beyond the unit interface. If the reference code continues to occur, contact your next level of support.
00D8	Lic int code	99%	The host is using an illegal page in mode select. This is a program problem beyond the unit interface. If the reference code continues to occur, contact your next level of support.
00D9	Lic int code	99%	The tape unit has received a command with an illegal length value. This is a program problem beyond the unit interface. If the reference code continues to occur, contact your next level of support.
00DA	Lic int code	99%	The tape unit has received a command with an illegal header value. This is a program problem beyond the unit interface. If the reference code continues to occur, contact your next level of support.
00DB	Lic int code	99%	The tape unit has received a message with a value in a field that should be zero. This is a program problem beyond the unit interface. If the reference code continues to occur, contact your next level of support.
00DC	56F0080 21F7926	70% 25%	The data written to the buffer did not match the requested length. If this reference code continues to occur, exchange the FRUs as needed. Attempt the operation again after each FRU is exchanged to verify the repair.
00DD			The power-on self-test has failed. If F999 appears in the status display on the front panel of the tape unit, see "Status Codes" on page 1-32. If F999 is not in the display, make the problem occur again until F999 appears.
00DE	Controller 56F0080 cable Terminator Lic int code	50% 25% 10% 9% 5%	A bus protocol error has occurred. Do a write and read operation from the host system. If this reference code continues to occur, exchange the FRUs as needed. Do a write and read operation again after each FRU is exchanged to verify the repair. The part number for the signal cable must be obtained from the label on the signal cable which is used in this system. If the reference code continues to occur, contact your next level of support.
00DF	Controller 56F0080 cable Terminator Lic int code	50% 25% 10% 9% 5%	The host system failed to select the tape unit before a time-out occurred. Do a write and read operation from the host system. If this reference code continues to occur, exchange the FRUs as needed. Do a write and read operation again after each FRU is exchanged to verify the repair. The part number for the signal cable must be obtained from the label on the signal cable which is used in this system. If the reference code continues to occur, contact your next level of support.

Figure 1-8 (Page 1 of 3). 3xx Tape Unit Controller Diagnostic Reference Codes

Ref. Code	Part Number	Probable Cause	Action
0301	21F8063 56F0081	95% 4%	A read-only storage test error has occurred. This reference code can occur if the program modules were moved and a module pin has been bent. Ensure that any modules that were moved are correct. Run test 41. If this reference code continues to occur, exchange the FRUs as needed, and run test 41 after each FRU is exchanged to verify the repair.
0302	21F8063 21F7926	95% 4%	A direct-access storage test error has occurred. Run test 50. If this reference code continues to occur, exchange the FRUs as needed, but power the tape unit off and then on again after each FRU is exchanged. This will force test 42 to run and verify the repair.
0303	21F8063	99%	A direct-access storage test error has occurred. Run test 43. If this reference code continues to occur, exchange the FRU and run test 43 to verify the repair.
0304	21F8063	99%	A direct-access storage test error has occurred. Run test 44. If this reference code continues to occur, exchange the FRU and run test 44 to verify the repair.
0308	21F8063	99%	A timer test error has occurred. Run test 49. If this reference code continues to occur, exchange the FRU and run test 49 to verify the repair.
0309	21F8063	99%	A microprocessor test error has occurred. Run test 45. If this reference code continues to occur, exchange the FRU and run test 45 to verify the repair.
0314	21F8063 21F7926 21F7924	54% 40% 5%	Run test 2. If this reference code continues to occur, exchange the FRUs as needed, and run test 2 after each FRU is exchanged to verify the repair.
0346	21F7931 21F7930 21F8063 21F7924	65% 20% 10% 4%	The BOT/EOT sensor cable may not be connected. Check that the cable to FRU 21F7930 is connected correctly. Run test 89. If this reference code continues to occur, exchange the FRUs as needed, and run test 89 after each FRU is exchanged to verify the repair.
0348	21F7932 21F8063 21F7924	75% 20% 4%	The speed encoder cable may not be connected. Check that the cable to FRU 21F7932 is connected correctly. Run test 86. If test 86 fails, exchange 21F7932 and run test 86 to verify the repair. If test 86 was correct at the start, run test 95. If this reference code continues to occur, exchange the remaining FRUs as needed, and run test 95 after each FRU is exchanged to verify the repair.
0349	21F7931 21F8063 21F7924	75% 20% 4%	The BOT/EOT sensor cable may not be connected. Check that the cable to FRU 21F7931 is connected correctly. Run test 45. If this reference code continues to occur, exchange the FRUs as needed, and run test 45 after each FRU is exchanged to verify the repair.
034A	21F7938 21F8063 21F7917 21F7924	75% 10% 10% 4%	The front panel cable may not be connected. Check that the front panel cable (FRU 21F7931) is connected correctly. Run test 0. If this reference code continues to occur, exchange the FRUs as needed, and run test 0 after each FRU is exchanged to verify the repair.

Figure 1-8 (Page 2 of 3). 3xx Tape Unit Controller Diagnostic Reference Codes

Ref. Code	Part Number	Probable Cause	Action
034B	21F7941 21F8063 21F7924	75% 20% 4%	The interface cable may not be connected. Check that the interface cable (FRU 21F7941) is connected correctly. Run test 0. If this reference code continues to occur, exchange the FRUs as needed, and run test 0 after each FRU is exchanged to verify the repair.
034C	21F8063 56F0080 21F7924 21F7941 21F7926	40% 35% 15% 5% 4%	Check that the interface cable (FRU 21F7941) is connected correctly. Run test 0. If this reference code continues to occur, exchange the FRUs as needed, and run test 0 after each FRU is exchanged to verify the repair.
034D	21F8063 56F0080 21F7924	45% 35% 19%	If this reference code continues to occur, exchange the FRUs as needed, and run test 0 after each FRU is exchanged to verify the repair.
034E	21F7927 21F8063 21F7924	75% 20% 4%	A 48-volt power supply unit (PSU) failure has occurred. Run test 0. If this reference code continues to occur, exchange the FRUs as needed, and run test 0 after each FRU is exchanged to verify the repair.
034F 0350 0351 0352	21F8063	99%	An analog-to-digital circuit (ADC) or a speed digital-to-analog circuit (DAC) error has occurred. Run tests 76, 78, and 0. If this reference code continues to occur, exchange the FRU and run tests 76, 78, and 0 after the FRU is exchanged to verify the repair.
0353	21F7927 21F7935 21F8063	70% 20% 5%	A supply motor loop error has occurred. Run test 80. If test 80 fails, exchange 21F7927. If test 80 did not fail, run test 76. If test 76 fails, exchange the remaining FRUs as needed, and run test 76 after each FRU is exchanged to verify the repair.
0354	21F7927 21F7935 21F8063	70% 20% 5%	A take-up motor loop error has occurred. Run test 80. If this reference code continues to occur, exchange the FRUs as needed, and run test 80 after each FRU is exchanged to verify the repair.
0355 0356	21F8063	99%	Quadrature decoder or tachometer circuit error has occurred. Run tests 77 and 82. If either test fails or if this reference code continues to occur, exchange the FRU and run tests 77 and 82 after the FRU is exchanged to verify the repair.
0357	21F7916 21F8063 21F7924	75% 20% 4%	The door failed to open. Check if the door is binding or not aligned. Repair it by adjustment. If a bind or bad alignment cannot be corrected, exchange 21F7916. If the door is aligned and not binding and this reference code continues to occur, exchange the remaining FRUs as needed, and run test 88 after each FRU is exchanged to verify the repair.
0358	21F7935 21F8063 21F7924	75% 15% 9%	There is excess tension arm movement. Run test 85. If test 85 fails, exchange 21F7935 and run test 85 again to verify the repair. If test 85 did not fail in the beginning, run test 95. If test 95 fails or if this reference code continues to occur, exchange the remaining FRUs as needed, and run test 95 after each FRU is exchanged to verify the repair.
0359	21F7945 21F8063 21F7927	75% 15% 9%	The servo accelerates too slowly. Run test 95. If test 95 fails or if this reference code continues to occur, exchange the FRUs as needed, and run test 95 after each FRU is exchanged to verify the repair.

Figure 1-8 (Page 3 of 3). 3xx Tape Unit Controller Diagnostic Reference Codes

Ref. Code	Part Number	Probable Cause	Action
0361	21F7932 21F8063 21F7927	75% 15% 9%	A tape speed error has occurred. Run test 86. If test 86 fails, exchange 21F7932 and run test 86 to verify the repair. If test 86 did not fail at the start, run test 95. If test 95 fails or if this reference code continues to occur, exchange the remaining FRUs as needed, and run test 95 after each FRU is exchanged to verify the repair.
0362	21F7945 21F8063 21F7927	75% 15% 9%	A tape acceleration error has occurred. Run test 95. If test 95 fails or if this reference code continues to occur, exchange the FRUs as needed, and run test 95 after each FRU is exchanged to verify the repair.
0364 0365 0366	21F7936 21F8063 21F7923	75% 15% 9%	The tape lifter (TL) may not be working or may be working too slowly. Check that the TL cable is connected correctly and that the TL is not binding. Run test 90 to verify the repair. If test 95 fails or if this reference code continues to occur, exchange the FRUs as needed, and run test 95 after each FRU is exchanged to verify the repair.
036F	21F7930 21F7950 21F7927 56F0022 21F8063 21F7945	40% 40% 15% 2% 1% 1%	The supply hub clamps will not engage the tape reel. Ensure that the sensor card (21F7930) is installed so that it touches the left side of the opening under the supply reel motor. Ensure that the cable on the supply reel motor (21F7945) is connected correctly. Run test 91 to raise the supply hub (21F7950) clamps and test 92 to retract them. If the supply hub turns, the motor is good. If the clamps come up, the hub lock solenoid (56F0022) is good. If one or two clamps do not come up correctly, exchange the supply hub. If the solenoid armature does not pick, suspect the solenoid (56F0022), the motor/power card (21F7927), or the controller card (21F8063). If this reference code continues to occur, exchange the FRUs as needed and run test 91 after each FRU is exchanged to verify the repair.
0372	21F7923	99%	This reference code occurs when the read/write card (21F7923) is not correctly installed in its connector on the connector card.
03FF	21F7926 21F8063 21F7924	85% 10% 4%	The buffer controller is not responding. This reference code will occur if the buffer card or controller card was exchanged and modules U502 and U602 on the buffer card or modules U1, U4, or U19 on the controller card were not removed from the old card and inserted into the new card, or were not correctly installed on the new card. Ensure that the modules are correctly installed on the cards and run test 0 to verify the repair. If this reference code continues to occur, exchange the FRUs as needed, and run test 45 after each FRU is exchanged to verify the repair.

Figure 1-9 (Page 1 of 2). 04xx Buffer Controller Reference Codes

Ref. Code	Part Number	Probable Cause	Action
0401	21F7926 56F0021	95% 4%	<p>A read-only storage test error has occurred. This reference code can occur if the program modules were moved and a module pin has been bent. Ensure that any modules that were moved are correct. Run test 41.</p> <p>If this reference code continues to occur, exchange the FRUs as needed, and run test 41 after each FRU is exchanged to verify the repair.</p>
0402	21F7926 56F0080 or 21F8030	95% 4%	<p>A direct-access storage (battery-powered) test error has occurred. Power the tape off and then on again to force test 46 to run.</p> <p>If this reference code continues to occur, exchange the FRUs as needed. Power the unit off and then on again after each FRU is exchanged to verify the repair.</p> <p>Notes:</p> <ol style="list-style-type: none"> 56F0080 is the 9348-001 and 9348-002 interface card. 21F8030 is the 9348-011 and 9348-012 interface card.
0403	21F7926	99%	<p>A direct-access storage test error has occurred. Run test 43.</p> <p>If this reference code continues to occur, exchange the FRU and run test 43 to verify the repair.</p>
0404	21F7926	99%	<p>A direct-access storage test error has occurred. Run test 44.</p> <p>If this reference code continues to occur, exchange the FRU and run test 44 to verify the repair.</p>
0405	21F7926	99%	<p>A direct-access storage test error has occurred. Run test 45.</p> <p>If this reference code continues to occur, exchange the FRU and run test 45 to verify the repair.</p>
0407	21F7941 56F0080 or 21F8030 21F7926 21F7924	45% 30% 20% 4%	<p>A continuity test error has occurred. This reference code can occur if there is a bent pin or damaged connector on the connector card. Inspect the connector card for damage. Run test 45 to test the continuity of the connectors.</p> <p>If the reference code continues to occur, exchange the FRUs as needed, and run test 45 after each FRU is exchanged to verify the repair.</p> <p>Notes:</p> <ol style="list-style-type: none"> 56F0080 is the 9348-001 and 9348-002 interface card. 21F8030 is the 9348-011 and 9348-012 interface card.

Figure 1-9 (Page 2 of 2). 04xx Buffer Controller Reference Codes

Ref. Code	Part Number	Probable Cause	Action
0409 040A 0433 0434 0435 0436 0437 0438 0439 043A 043E 0446 0447 0448 0449 044A 044B 044C 044D 044E 044F 0450 0451	21F7926	99%	A microprocessor test error has occurred. Run tests 40, 48, 120, 121, and 122. If any of these tests fail, exchange the FRU and run all the tests again to verify the repair.
0481 0482 0483 0484	Operator 21F7926	74% 25%	Test 129 was run with a defective configuration tape. Attempt the operation again with a configuration tape that is known to be good. If this reference code continues to occur, exchange the FRU and attempt the operation again to verify the repair.
04FF	21F7941 56F0080 21F7926 21F7924	50% 35% 10% 4%	There is no response across the interface. This reference will occur if the interface card was exchanged and module U51 was not removed from the old card and inserted into the new card. Ensure that module U51 is correctly installed on the card. If module U51 was correct, reseal the interface cable connectors and the power cable connector on the interface card. Run test 45 (continuity test) to verify the repair. If the reference code continues to occur, exchange the FRUs as needed, and run test 45 after each FRU is exchanged to verify the repair.

Figure 1-10 (Page 1 of 2). 06xx Interface Controller Reference Codes

Ref. Code	Part Number	Probable Cause	Action
0601	56F0080 56F0021	95% 4%	A read-only storage test error has occurred. This reference code can occur if the program modules were moved and a module pin has been bent. Ensure that any modules that were moved are correct. Run test 41. If this reference code continues to occur, exchange the FRUs as needed, and run test 41 after each FRU is exchanged to verify the repair.
0602	56F0080	99%	A direct-access storage (battery-powered) test error has occurred. Power the tape off and then on again to force test 42 to run. If this reference code continues to occur, exchange the FRU. Power the unit off and then on again after the FRU is exchanged to verify the repair.
0603 0604	56F0080	99%	A direct-access storage test error has occurred. Run tests 43 and 44. If either of these tests fail, exchange the FRU and run the tests again to verify the repair.
0607	21F7926 56F0080	60% 39%	A continuity test error has occurred. This reference code can occur if there is a bent pin or damaged connector on the connector card. Inspect the connector card for damage. Run test 45 to test the continuity of the connectors. If the reference code continues to occur, exchange the FRUs as needed, and run test 45 after each FRU is exchanged to verify the repair.
0609	56F0080	99%	A microprocessor test error has occurred. Run test 40. If test 40 fails, exchange the FRU and run test 40 again to verify the repair.
0646 0647 0648 0649 064A 064B 064C 064D 064E 0650 0651 0652	56F0080	99%	An interface error has occurred. Run tests 140 and 141. If either of these tests fail, exchange the FRU and run the tests again to verify the repair.
065B	56F0080 21F7926	95% 4%	An interface error has occurred. Run test 60. If test 60 fails or if this reference code continues to occur, exchange the FRUs as needed, and run test 60 after each FRU is exchanged to verify the repair.
0660 0661 0662 0663 0664 0665 0666 0667 0668	56F0080	99%	An interface error has occurred. Run test 140. If test 140 fails, exchange the FRU and run test 140 again to verify the repair.

Figure 1-10 (Page 2 of 2). 06xx Interface Controller Reference Codes

Ref. Code	Part Number	Probable Cause	Action
066E	56F0080	75%	A read or write loop error has occurred.
066F	21F7941	20%	Run test 60. If test 60 fails or if this reference code continues to occur, exchange the FRUs as needed, and run test 60 after each FRU is exchanged to verify the repair.
0670	21F7926	4%	
0671			
0672			

Figure 1-11 (Page 1 of 2). 0Cxx Multiprocessor and 0Exx Microcode Reference Codes

Ref. Code	Part Number	Probable Cause	Action
0C07	21F7926 56F0080 21F8063	39% 30% 30%	A continuity test error has occurred. This reference code can occur if there is a bent pin or damaged connector on the connector card. Inspect the connector card for damage. Run test 45 to test the continuity of the connectors. If the reference code continues to occur, exchange the FRUs as needed, and run test 45 after each FRU is exchanged to verify the repair.
0C0E 0C0F 0C10 0C11 0C12 0C13	21F7926 56F0080 21F8063	39% 30% 30%	A multiprocessor error has occurred. Run tests 50, 51, 52, 53, and 54. If any of these tests fail, exchange the FRUs as needed, and run all the tests again after each FRU is exchanged to verify the repair.
0C66	21F8063 21F7926 21F7923	50% 45% 4%	A multiprocessor error has occurred. Run test 61. If test 61 fails or if this reference code continues to occur, exchange the FRUs as needed, and run test 61 after each FRU is exchanged to verify the repair.
0C67 0C68	21F8063 21F7926	50% 49%	A multiprocessor error has occurred. Run tests 61 and 62. If either of these tests fail, exchange the FRUs as needed, and run both tests again after each FRU is exchanged to verify the repair.
0C69	21F8063 21F7926 21F7923	50% 45% 4%	A multiprocessor error has occurred. Run test 61. If test 61 fails or if this reference code continues to occur, exchange the FRUs as needed, and run test 61 after each FRU is exchanged to verify the repair.
0C6A	21F8063 21F7926	50% 49%	A multiprocessor error has occurred. Run test 61. If test 61 fails or if this reference code continues to occur, exchange the FRUs as needed, and run test 61 after each FRU is exchanged to verify the repair.
0C6B	21F8063 21F7926 21F7923	50% 45% 4%	A multiprocessor error has occurred. Run test 61. If test 61 fails or if this reference code continues to occur, exchange the FRUs as needed, and run test 61 after each FRU is exchanged to verify the repair.
0C6E 0C6F 0C70 0C71 0C72 0CC8	21F7926 56F0080	50% 49%	A multiprocessor error has occurred. Run test 60. If test 60 fails or if this reference code continues to occur, exchange the FRUs as needed, and run test 60 after each FRU is exchanged to verify the repair.
0Cxx			If a "0Cxx" reference code appears that is not in this table, check under the "04xx" and "06xx" reference codes to see if the "xx" appears in those codes. Then use that "04xx" or "06xx" reference code.

Figure 1-11 (Page 2 of 2). 0Cxx Multiprocessor and 0Exx Microcode Reference Codes

Ref. Code	Part Number	Probable Cause	Action
0Exx			All 0Exx reference codes are tape unit microcode errors and should be reported to your next level of support.

Figure 1-12. Reference Codes Generated By The Host System

Ref. Code	Part Number	Probable Cause	Action
FFD5	Operator Terminator Cable Controller 21F8063 56F0080 21F7941 21F7924	65% 05% 05% 05% 05% 05% 04%	<p>The tape unit is not communicating with the system.</p> <p>If the tape unit cannot power on, go to "No Response Service Check" on page 1-35.</p> <p>If the tape unit can power on and the power-on diagnostics run correctly, run test 2 to isolate FRUs inside the tape unit. If test 2 fails, exchange the FRUs inside the tape unit in sequence as needed, and run test 2 after each FRU is exchanged to verify the repair.</p> <p>If test 2 was correct, attempt the customer's job again to get more information. When a failure occurs, exchange the FRUs in sequence as needed, and attempt the customer's job after each FRU is exchanged to verify the repair.</p>
FFD6	21F7926 21F8063 56F0080 21F7941 21F7924	40% 30% 20% 5% 4%	<p>The tape unit has stopped with *** XX in its status display where xx is any number from 1 to 10. Exchange the FRUs as needed in the sequence shown. Power on the tape unit after each FRU is exchanged to verify the repair. If the power comes on successfully, the problem has been corrected and this procedure is complete. If the power does not come on successfully, continue this procedure with the next FRU until the problem is corrected.</p>
FFD7	21F7926 21F8063 21F7924	40% 40% 19%	<p>A reference code that is not listed was sent from the tape unit to the system. Run test 0. If a listed reference code now occurs, go to that reference code and follow the procedure for it. If the reference code that is not listed in the table continues to occur, exchange the FRUs as needed in the sequence shown. Run test 0 after each FRU is exchanged to verify the repair.</p> <p>If the reference code continues to occur, contact your next level of support.</p>
FFF6			<p>The tape unit sent statistical data to the host system. This is not an error condition. The FFF6 reference code is logged when the tape is unloaded by the host system.</p> <p>If the tape is unloaded by pressing the Unload button, a FFF6 reference code will not be logged until a tape is loaded again and a command is received from the host system.</p>
FFF8	56F0081	99%	<p>The attached 9348 tape unit does not support synchronous data transfer. Synchronous data transfer might improve the save/restore performance of the 9348 tape unit.</p> <p>The tape unit will continue to operate and does not need immediate attention. Call your service representative to install new EPROMs to enable synchronous data transfer.</p>

Figure 1-13 (Page 1 of 2). Part Number Table

Part Number	Part Description	Service Procedure
21F7914	Power switch	"Front Panel Assembly Removal" on page 3-30.
21F7916	Front cover	"Front Panel Assembly Removal" on page 3-30.
21F7917	Control panel	"Front Panel Assembly Removal" on page 3-30.
21F7919	Microswitch	"Front Panel Assembly Removal" on page 3-30.
21F7923	Read/write card	"Card and Battery Removal" on page 3-15.
21F7924	Connector card	"Connector Board Removal and Installation" on page 3-26.
21F8063	Controller card	"Card and Battery Removal" on page 3-15.
21F7926	Buffer card	"Card and Battery Removal" on page 3-15.
21F7927	Motor/power card	"Motor/Power Card Removal" on page 3-42.
56F0080 or 21F8030	Interface card	"Interface Card Removal" on page 3-101. See Chapter 6, "Parts Catalog" on page 6-1. Notes: 1. 56F0080 is the 9348-001 and 9348-002 interface card. 2. 21F8030 is the 9348-011 and 9348-012 interface card.
56F0021	Program module kit	"Program Module Removal and Installation" on page 3-29.
21F7930	Tape sensor PCB	"Sensors and Sensor Card Removal" on page 3-48.
21F7931	BOT/EOT sensor	"Tension Arm and BOT/EOT Sensor Removal" on page 3-59.
21F7932	Speed encoder	"Speed Encoder Removal" on page 3-52.
21F7933	Read/write head	"Head Plate Assembly Removal" on page 3-67.
56F0022	Hub lock solenoid	"Hub Lock Solenoid and Hub Release Lever Removal" on page 3-97.
21F7935	Tension arm	"Tension Arm and BOT/EOT Sensor Removal" on page 3-59.
21F7936	Tape lifter	"Tape Lifter Removal" on page 3-56.
21F7937	Speed encoder cable	"Speed Encoder Removal" on page 3-52.
21F7938	Front panel cable	"Front Panel Assembly Removal" on page 3-30.
21F7939	Motor control cable	"Placing the 9348 in the Service Position" on page 3-1.
21F7941	Interface cable	"Interface Card Removal" on page 3-101.
21F7945	Reel motor	"Motors and Hubs Removal" on page 3-78.
56F0078	Door latch solenoid	"Front Panel Assembly Removal" on page 3-30.
21F7948	Cooling fan	"Cooling Fan Removal" on page 3-114.
21F7949	Take-up reel	"Motors and Hubs Removal" on page 3-78.
21F7950	Supply hub	"Motors and Hubs Removal" on page 3-78.
21F7952	Fuse 3.15 A	"Fuse Removal and Installation" on page 3-110.
21F7958	AC power module	"AC Power Module Removal" on page 3-119.
21F7969	Blower	"Blower Motor Removal" on page 3-90.

Figure 1-13 (Page 2 of 2). Part Number Table

Part Number	Part Description	Service Procedure
79X3795 or 70F9671 or 00G0968	Terminating plug	See "Rear" on page 2-5 for location. See Chapter 6, "Parts Catalog" on page 6-1. Notes: 1. 79X3795 is the 9348-001 and 9348-002 terminator. 2. 70F9671 is the 9348-011 and 9348-012 terminator. 3. 00G0968 is the RISC 6000 terminator.
Controller	Controller card	This controller card is located in the system. See your system information.
Lic int code	Licensed Internal Code	This is the licensed internal code that is located in the system controller card. See the system information.

Status Codes

When the customer reports a status code, find the status code in the following table and perform the recommended action.

Figure 1-14 (Page 1 of 2). Status Codes	
Status Code	Description and Action Recommended
xyyF999	<p>Power-on self-test failed.</p> <ul style="list-style-type: none"> • Press the Enter button to get access to the error code. • When ERR xxx is displayed, copy down the error code (xxx). • Add zeros to the left of the error code to make it a four digit reference code. • Go to "Reference Codes" on page 1-2 and perform the action for that reference code.
xyyE022	<p>The tape has lost tension.</p> <ul style="list-style-type: none"> • Press ENTER to see the reference code associated with this status code. The reference code for this status code is usually 0060. • Go to "Reference Codes" on page 1-2 and perform the action for the reference code. • This status may be caused by a bad tape that adheres to the head, cleaner block, or guide rollers.
xyyE033	<p>The tape did not load.</p> <ul style="list-style-type: none"> • Clean the tape path. See "Cleaning Procedure" on page 4-3 and attempt to load the tape again. • Ensure that the tape has been correctly prepared and attempt to load the tape again. The 9348 <i>Customer Information</i> manual describes how to prepare the tape. • If the problem continues, perform the following steps to identify the reason for the failure: <ul style="list-style-type: none"> – Obtain the newest error code; see "Error Log Information (INFO 0)" on page C-1. – Add zeros to the left of the error code to make it a four digit reference code. – Go to "Reference Codes" on page 1-2 and perform the action for that reference code.
xyyE044 xyyE055 xyyE066	<p>There is no BOT marker on the tape.</p> <p>The tape reel is inverted.</p> <p>The front door or tape door is open.</p> <ul style="list-style-type: none"> • Correct the problem. • If the problem continues, press ENTER to see the reference code associated with the status code. • Then go to "Reference Codes" on page 1-2 and perform the action for the reference code.

Figure 1-14 (Page 2 of 2). Status Codes

Status Code	Description and Action Recommended
xxyF777	<p>Too many read and write errors.</p> <ul style="list-style-type: none"> • Clean the tape path. • Use a tape that is known to be good and attempt the operation again. • If the problem continues, perform the following steps to find the reason for the failure: <ul style="list-style-type: none"> – Obtain the newest error code; see “Error Log Information (INFO 0)” on page C-1. – Add zeros to the left of the error code to make it a four digit reference code. – Go to “Reference Codes” on page 1-2 and perform the action for that reference code.
*** xx	<p>The power-on self-test stopped.</p> <ul style="list-style-type: none"> • Wait 2 minutes after this occurs. If it changes to F999, follow the procedure for F999. If it does not change to F999, continue here. • Exchange the following FRUs (listed below) in the order shown. • Power on the tape unit after each FRU is exchanged. If the power comes on successfully, the problem has been corrected and this procedure is complete. • If the power does not come on successfully, continue by exchanging the next FRU. • If exchanging a FRU does not correct the problem, the original item that was exchanged should be installed in the system before exchanging the next FRU as listed below: <ul style="list-style-type: none"> – 21F7926, buffer card – 21F8063, controller card – 56F0080, interface card – 21F7941, interface cable – 21F7924, connector card • If you exchanged the buffer, controller, or interface cards, ensure that the program modules have been removed from the old cards and installed on the new cards correctly. See “Card and Battery Removal” on page 3-15 and “Interface Card Removal” on page 3-101.
*****	<p>The power-on self-test has stopped.</p> <ul style="list-style-type: none"> • If you have exchanged the controller card, ensure that the modules U1, U4, and U19, have been removed from the old card and installed on the new card correctly.

Figure 1-15. Status Codes

Status Code	Description and Action Recommended
xyA001	No Tape - The tape unit is ready with no tape loaded.
xyA002	Ready - The tape unit is ready and at the beginning-of-tape (BOT).
xyA003	Pause - The tape unit is ready and not at the beginning-of-tape (BOT) or the end-of-tape (EOT).
xyA004	EOT - The tape unit is waiting at or beyond the end-of-tape (EOT).
xyB003	Loading - The tape is loading.
xyB004	Rewind - The tape is rewinding.
xyB005	Unload - The tape is unloading.
xyB111	Reading - The tape unit is reading from tape.
xyB222	Writing - The tape unit is writing to tape.
xyB099	Reset - The tape unit is being reset.
xyC001	Busy - The tape unit is completing system operations after being taken offline.
xyC002	System busy - The tape unit is waiting for the system to complete a request.
xyD001	Not permitted - The operation requested cannot be performed because the tape unit is online.
xyD002	Not permitted - The operation requested cannot be performed because the tape unit is offline.

No Response Service Check

1

Use this procedure when one or more of the following occur:

- The tape unit does not respond to system commands
- The tape unit does not respond to control panel commands
- The display lights are not on and the cooling fan is not working

2

Is the Power switch on the control panel set to the On position?

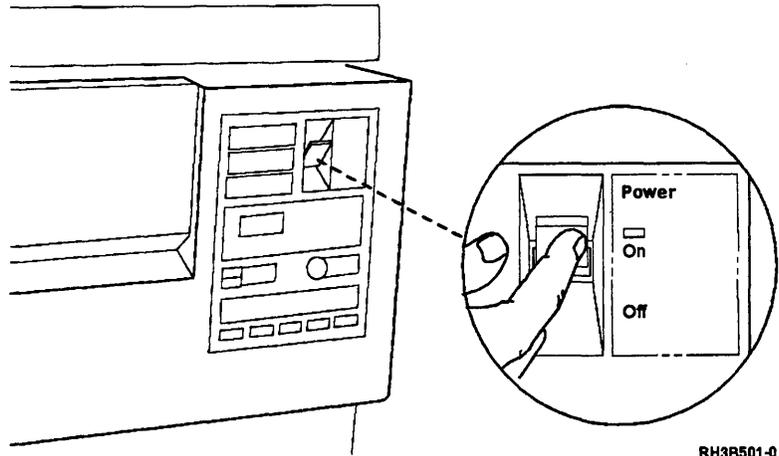
Yes **No**

↓

Set the Power switch to the On position.

Insert the CE test tape and run sequence test 2; see "Running Diagnostic Tests" on page A-5.

This ends the procedure.



RH3B501-0

3

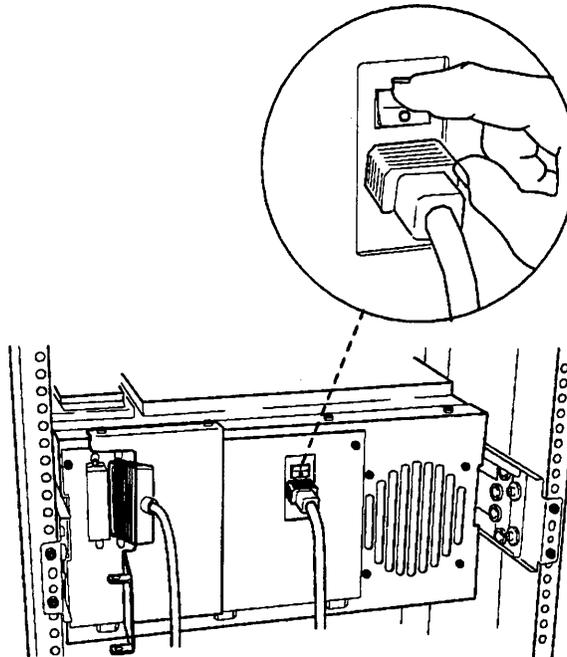
Is the ac power switch at the rear of the tape unit is set to the | (on) position.

Yes **No**

↓ Set the ac power switch to the | On position.

Insert the CE test tape and run sequence test 2; see "Running Diagnostic Tests" on page A-5.

This ends the procedure.



RH3B516-0

4

Check the fuse; see "Fuse Removal and Installation" on page 3-110.

Was the fuse blown or missing?

No **Yes**

↓ Exchange or install the fuse.

Notes:

1. If the fuse blows again, make sure it is installed right-side up.
2. If the fuse continues to blow, replace the following FRUs:
 - Part 21F7939 60%
 - Part 21F7958 39%

See "AC Power Module Removal" on page 3-119 and "AC Power Module Installation" on page 3-120.

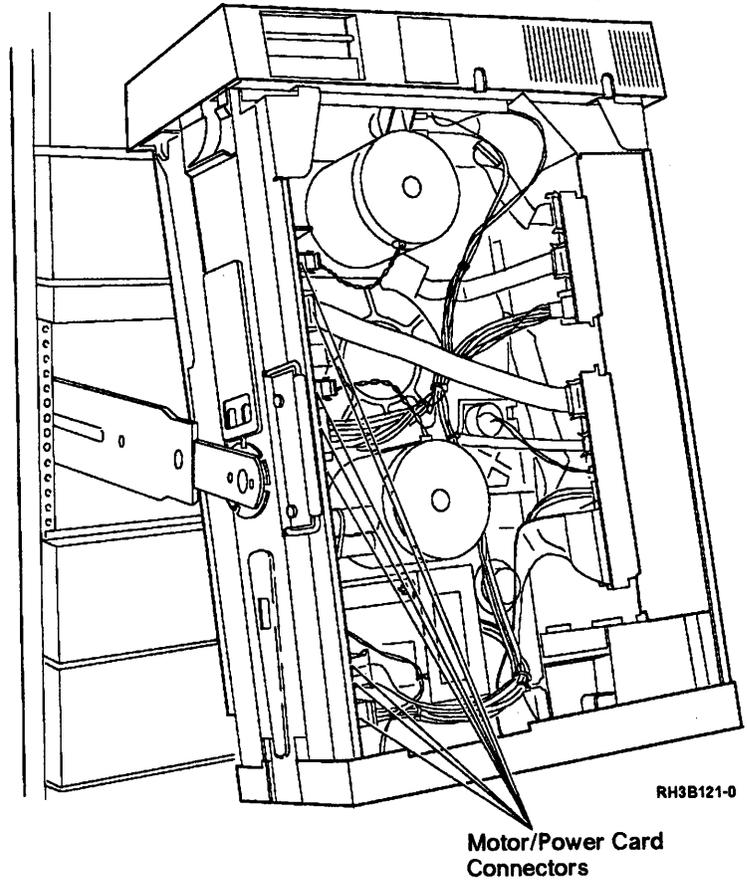
This ends the procedure.

5

Place the tape unit in the service position; see "Placing the 9348 in the Service Position" on page 3-1.

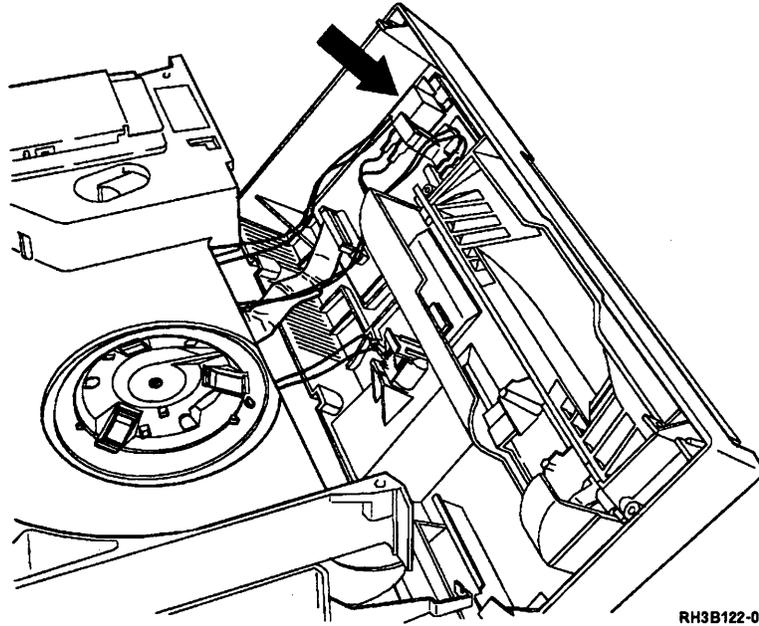
6

Ensure that all connections to the motor/power drive card are connected tightly.



7

Ensure that all connections to the control panel power switch are connected tightly.



RH3B122-0

8

Place the tape unit in the operating position; see "Placing the 9348 in the Operating Position" on page 3-9.

Insert the CE test tape and run sequence test 2; see "Running Diagnostic Tests" on page A-5.

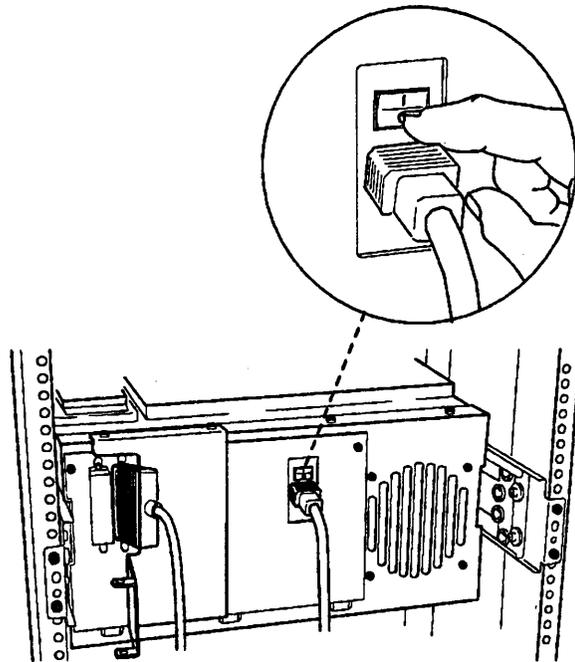
Does the problem continue to occur?

Yes **No**

↓ This ends the procedure.

9

Set the ac power switch on the rear of the tape unit to the O (off) position.



RH3B511-0

10

Are you working on a rack mounted unit?

Yes **No**

↓ Go to step 15.

11

Is the power cable connected to the rear of the tape unit and to a power outlet on the rack?

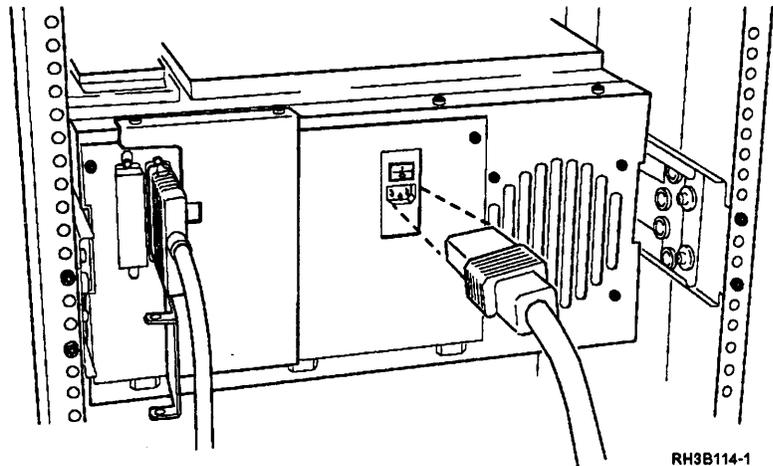
Note: If there is a circuit breaker next to the power outlet on the rack, ensure that it is set to the | (on) position.

Yes **No**

↓ Connect the power cable to the rack power outlet and to the back of the tape unit.

Insert the CE test tape and run sequence test 2; see "Running Diagnostic Tests" on page A-5.

This ends the procedure.



RH3B114-1

12

Remove the ac power cable from the rack power outlet.

DANGER

Dangerous voltage being measured. (RSFTD005)

At the back of the tape unit, look at the voltage printed on the fuse module receptacle.

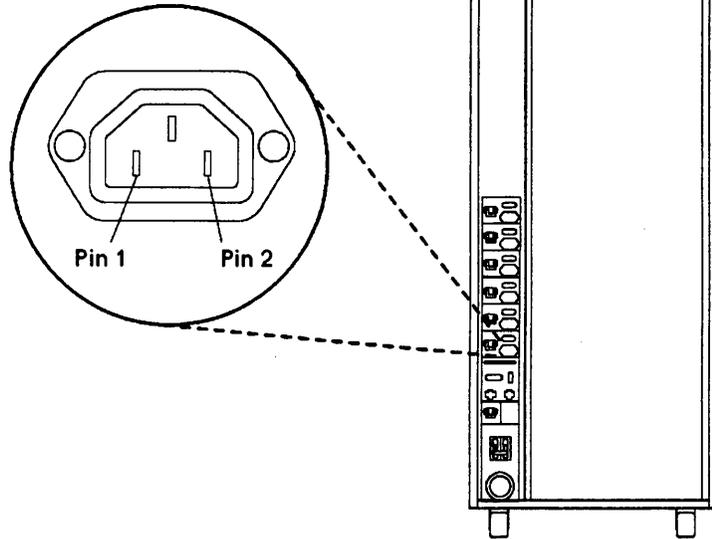
Measure the ac voltage between pins 1 and 2 on the rack power outlet.

Is the correct ac voltage present?

Yes **No**

↓ See the rack documentation for information about power problems.

This ends the procedure.



RH3B144-0

13

Connect the ac power cable to rack power outlet.

Remove the ac power cable from the rear of the tape unit.

DANGER

Dangerous voltage being measured. (RSFTD005)

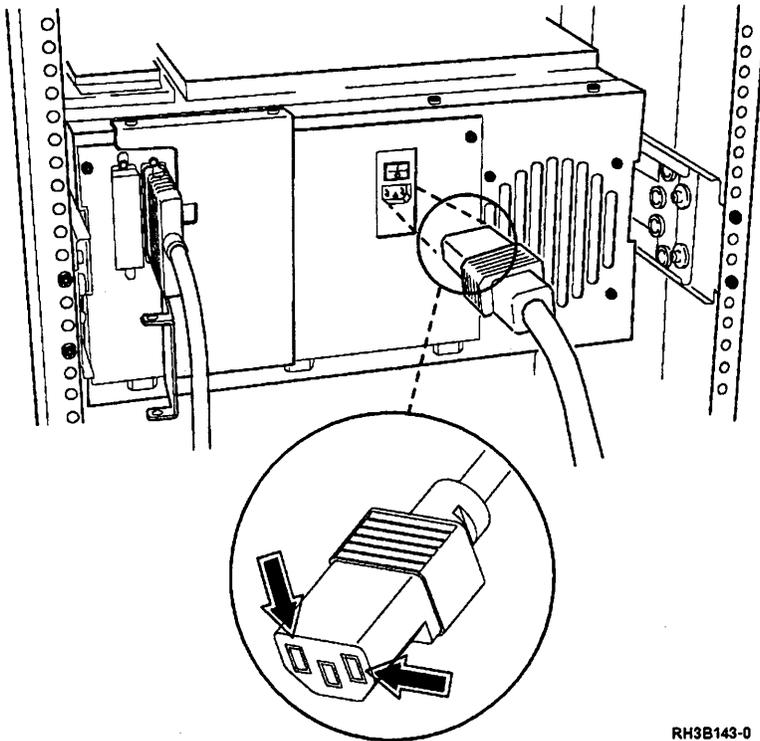
Measure the ac voltage at the end of the ac power cable that connects to the tape unit (measure the two outside pins as shown).

Is the ac voltage present?

Yes **No**

↓ If there is no voltage, exchange the tape unit power cable.

This ends the procedure.



RH3B143-0

14

Go to step 18.

15

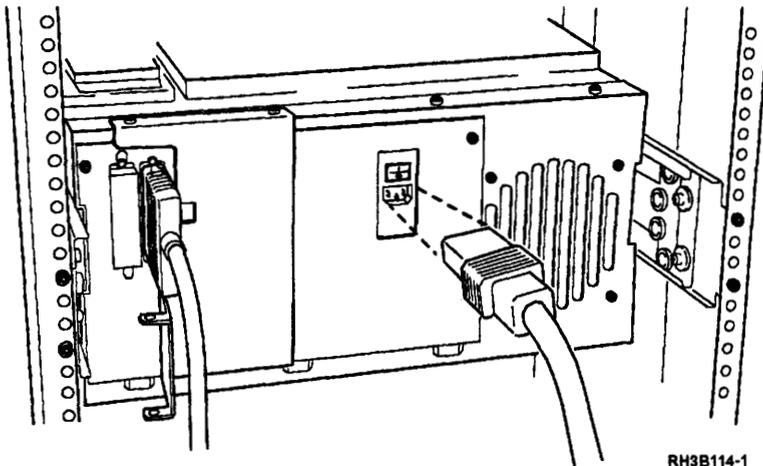
Is the power cable connected to the rear of the tape unit and to a power outlet?

Yes **No**

↓ Connect the power cable to the power outlet and to the back of the tape unit.

Insert the CE test tape and run sequence test 2; see "Running Diagnostic Tests" on page A-5.

This ends the procedure.



16

Remove the ac power cable from the power outlet.

DANGER

Dangerous voltage being measured. (RSFTD005)

At the back of the tape unit, look at the voltage printed on the fuse module receptacle.

Measure the ac voltage at the power outlet.

Is the correct ac voltage present?

Yes **No**

↓ See the rack documentation for information about power problems.

This ends the procedure.

17

Connect the ac power cable to power outlet.

Remove the ac power cable from the rear of the tape unit.

DANGER

Dangerous voltage being measured. (RSFTD005)

Measure the ac voltage at the end of the ac power cable that connects to the tape unit (measure the two outside pins as shown).

Is the ac voltage present?

Yes No

↓ If there is no voltage, exchange the tape unit power cable.

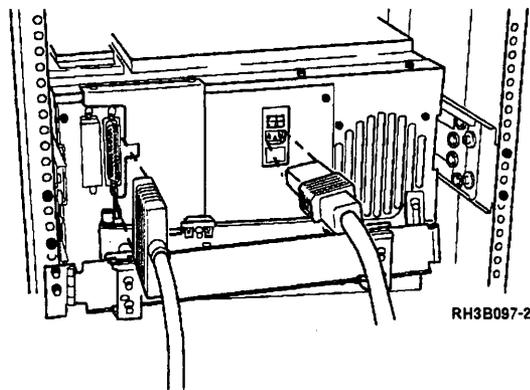
This ends the procedure.

18

DANGER

Ensure that you complete the following step. An electrical outlet that is not correctly wired could place hazardous voltage on the metal parts of the system or the products that attach to the system.

(RSFTD018)



Return the tape unit to the service position and:

- Set the ac power switch at the back of the tape unit to the O (off) position.
- Set the front panel Power switch to the Off position.
- Disconnect the power cable.
- Disconnect the signal cable.

19

Exchange the following FRUs in the order shown.

Power on the tape unit after each FRU is exchanged. If the power comes on successfully, the problem has been corrected.

If the power does not come on successfully, continue by exchanging the next FRU.

Failing item	Part Number
AC power module	21F7958
Front Panel Power switch	21F7914
Motor/Power card	21F7927
Controller card	21F8063
Transformer	21F7951

Did exchanging one of the failing items correct the problem?

Yes **No**

↓ Contact your next level of support.

20

Place the tape unit in the operating position; see "Placing the 9348 in the Operating Position" on page 3-9.

Insert the CE test tape and run sequence test 2; see "Running Diagnostic Tests" on page A-5.

Did the test run successfully?

Yes **No**

↓ Contact your next level of support.

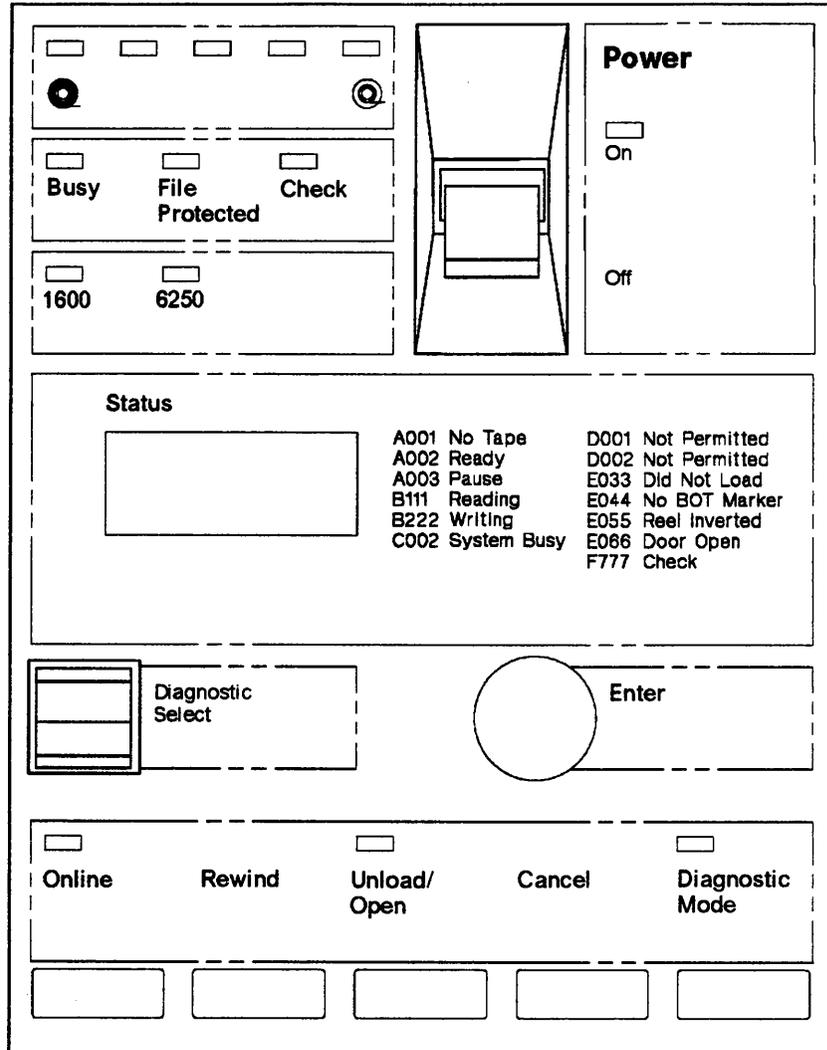
21

End of procedure

Chapter 2. Part Locations

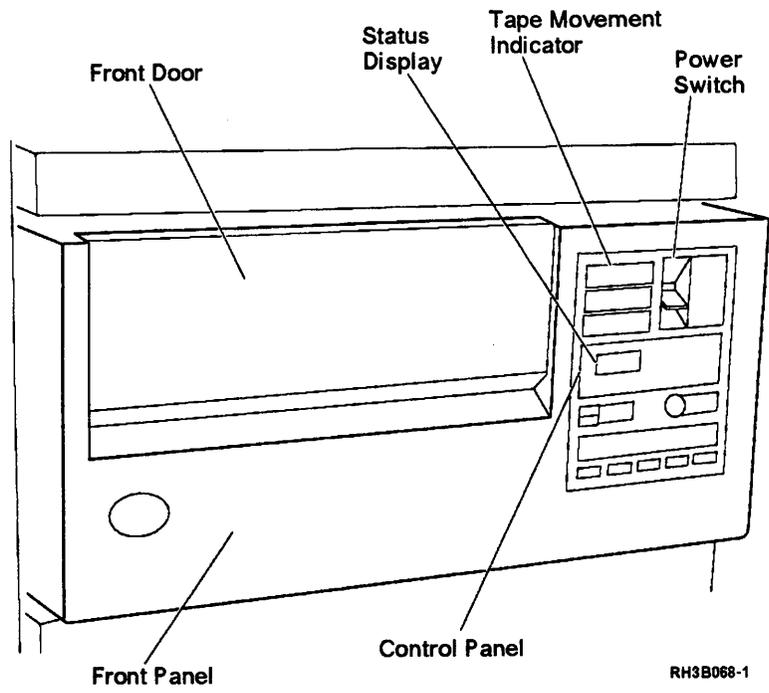
Locations

Control Panel

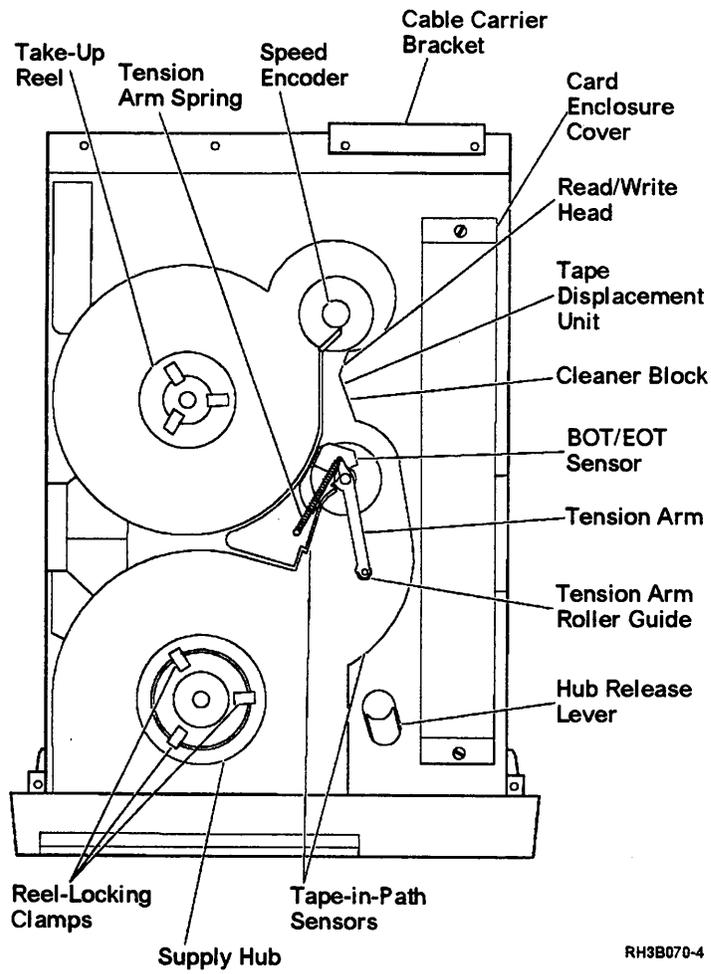


RH3B523-1

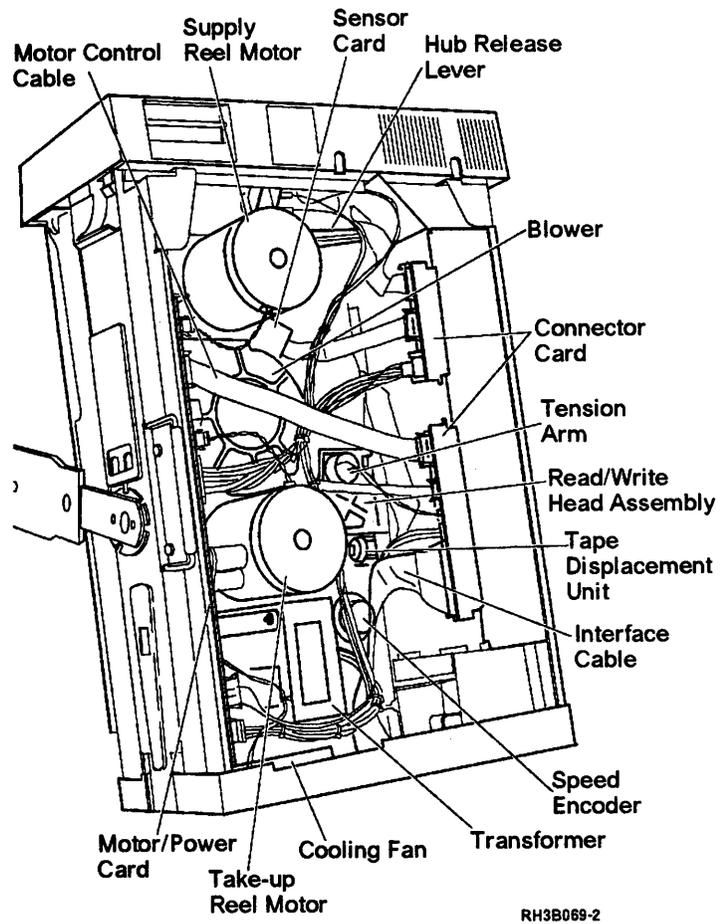
Front



Top



Bottom



Rear

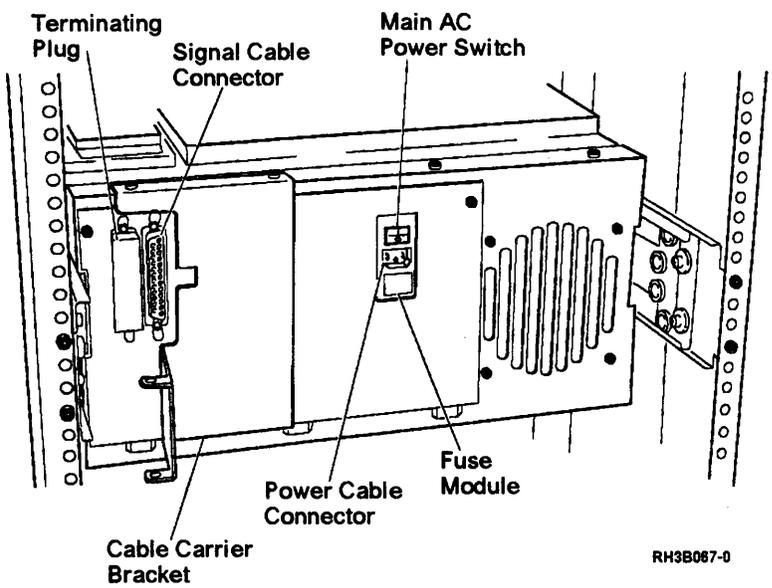
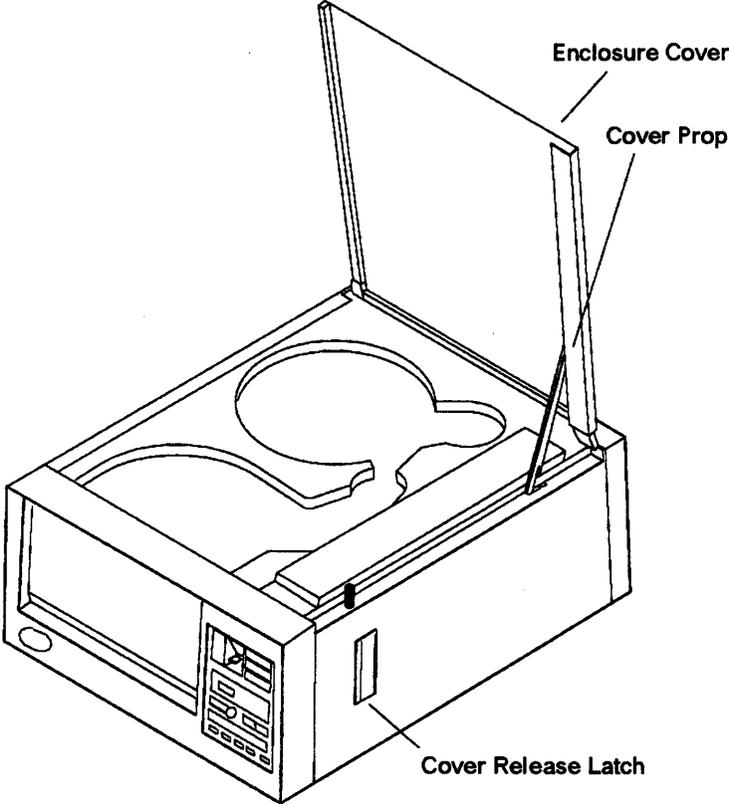


Table-top Unit



RH3B148-0

Chapter 3. Service Procedures

Introduction

Unless otherwise stated, all illustrations that show the rack mounted unit also apply to the table top unit.

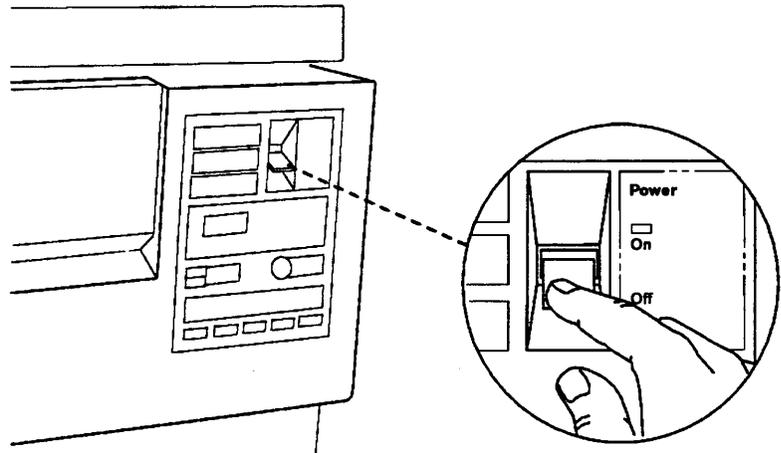
The following special tools are needed to service the tape unit.

- Handle PN 1650840
- Four-inch extension PN 6431952
- Kit (7 TORX** bits) PN 39F8407

Placing the 9348 in the Service Position

1

Set the Power switch on the control panel to the Off position.



RH3B508-0

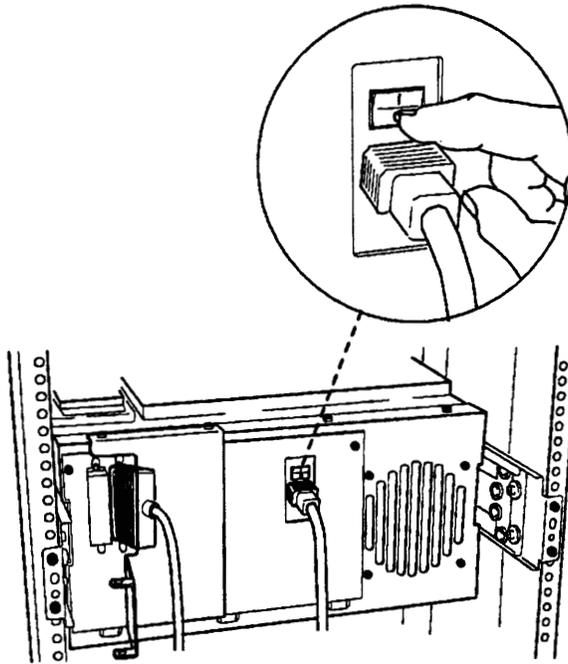
2

DANGER

Ensure that you complete the following step. An electrical outlet that is not correctly wired could place hazardous voltage on the metal parts of the system or the products that attach to the system.

(RSFTD018)

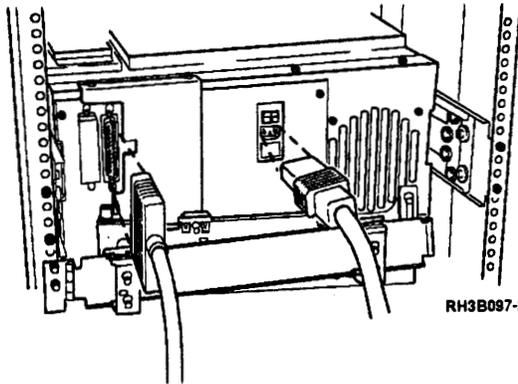
Set the ac power switch on the rear of the tape unit to the O (off) position.



RH3B511-0

3

Disconnect the signal cable and the power cable from the rear of the tape unit.

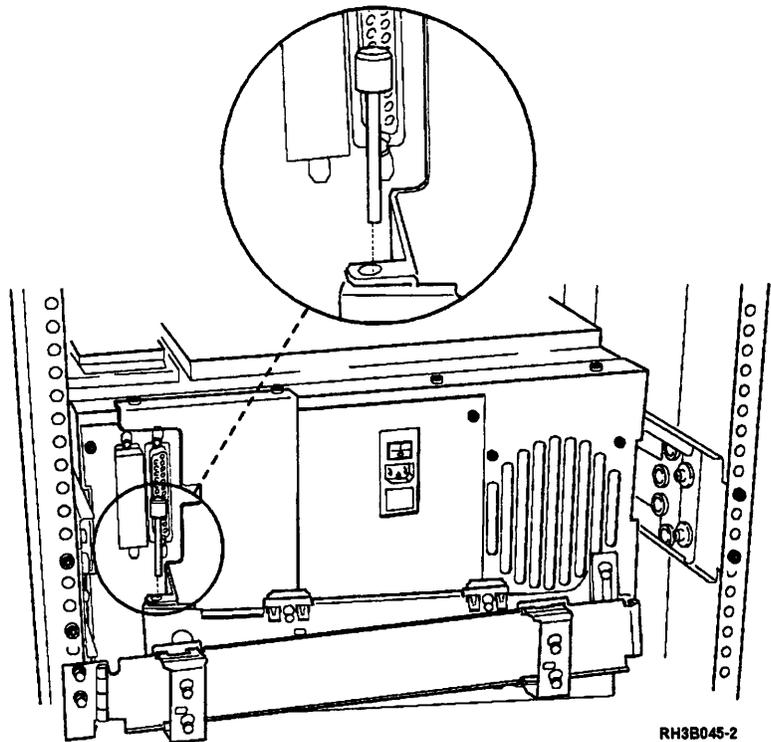


RH3B097-2

4

Note: If you are working on a table-top unit, go to step 13.

Disconnect the cable carrier from the tape unit by removing the carrier hinge screw. Do not remove the cable carrier bracket from the tape unit at this time, as the cable carrier bracket is too heavy for the cable carrier to hold in position.



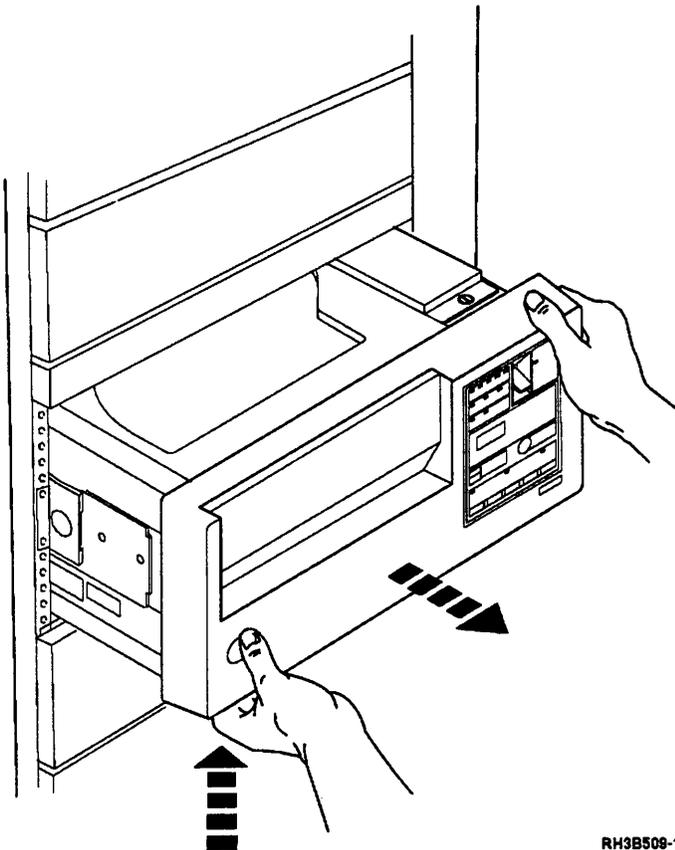
5

CAUTION:

When the unit is extended, its weight can turn over a rack that is not steady. Before you pull the unit out of the rack, ensure that a rack stabilizer is attached to the bottom front of the rack.

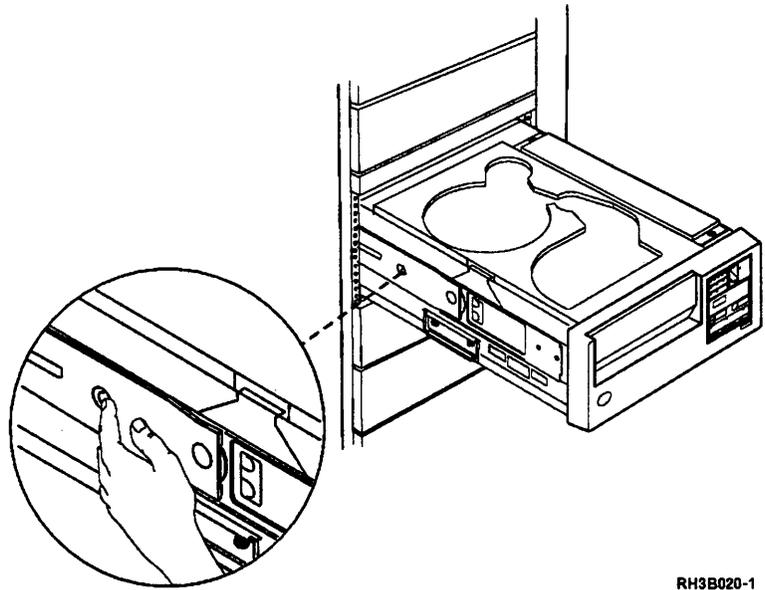
Do not pull out more than one unit at a time. The rack can turn over if you pull out more than one unit at a time.

Pull the release lever located under the front of the control panel as shown. Then pull the 9348 out of the rack until the slide locking tabs lock.



6

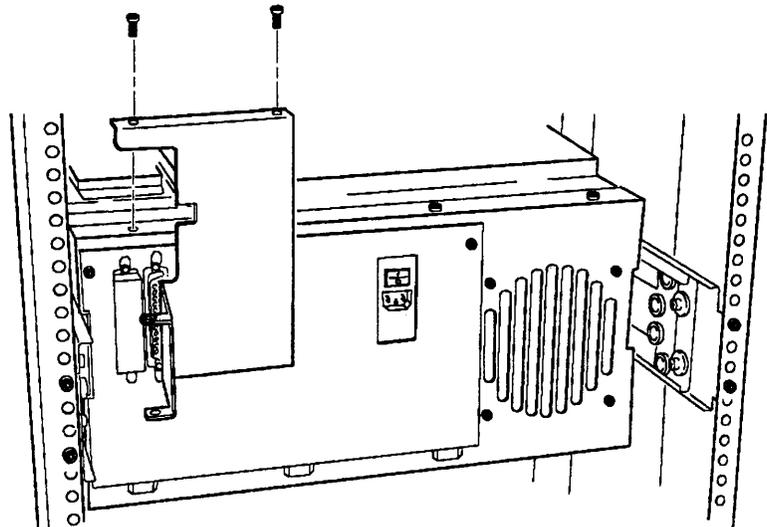
Press the locking tabs at the rear hole on the slides and pull the tape unit forward until the locking tabs lock in the front hole.



RH3B020-1

7

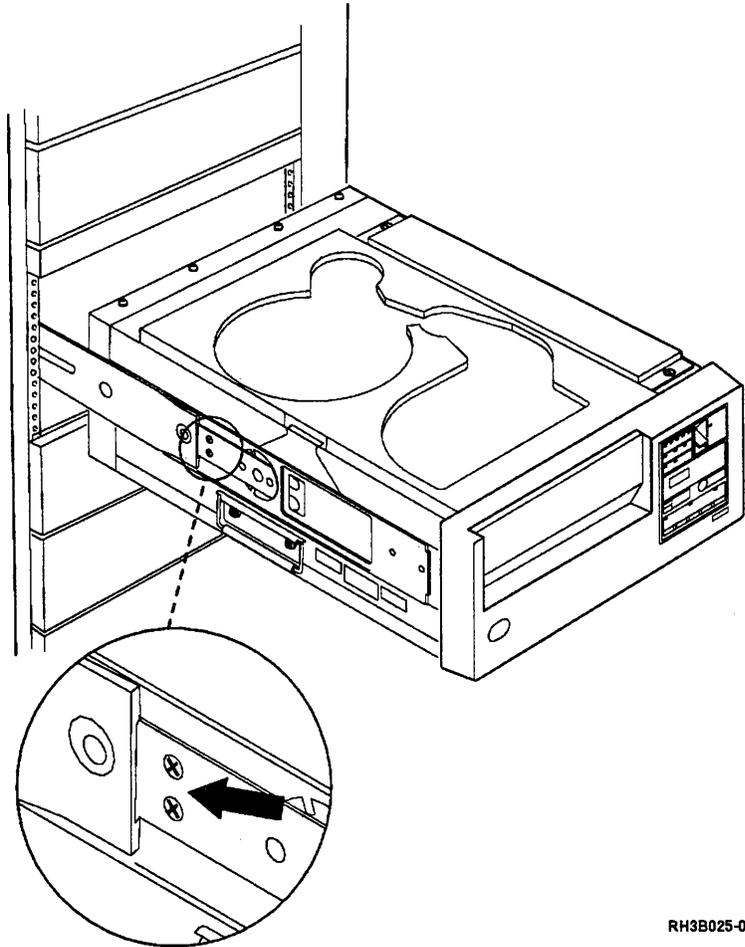
Remove the two TORX (T25) cable carrier bracket screws. Remove the cable carrier bracket so that when the tape unit is pivoted, it does not touch any of the units it is next to.



RH3B017-2

8

Remove the two TORX (T15) pivot locking screws on each side.



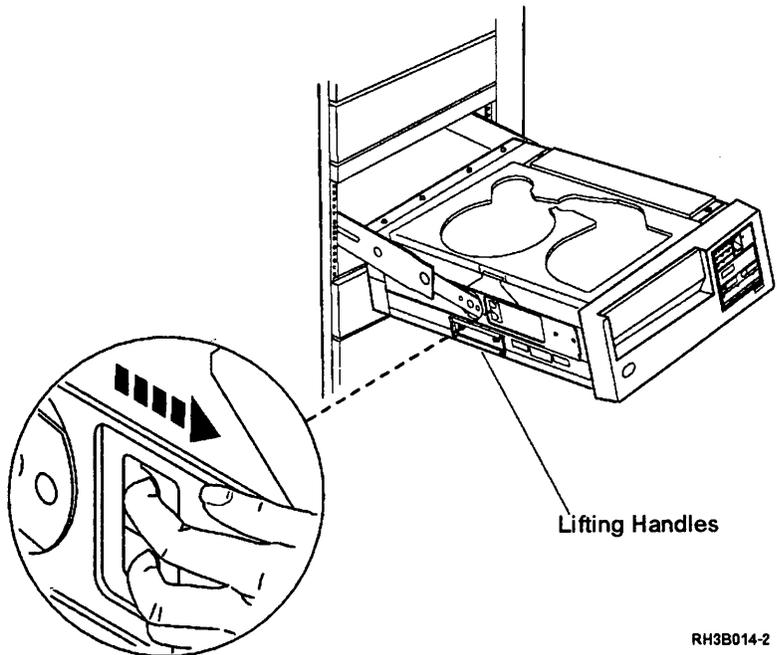
RH3B025-0

9

Warning: Do not let the tape unit pivot downward because the lifting handles will jam against the slides.

Ensure that nothing is loose on top of the tape unit (the card cover must be fastened in place or removed).

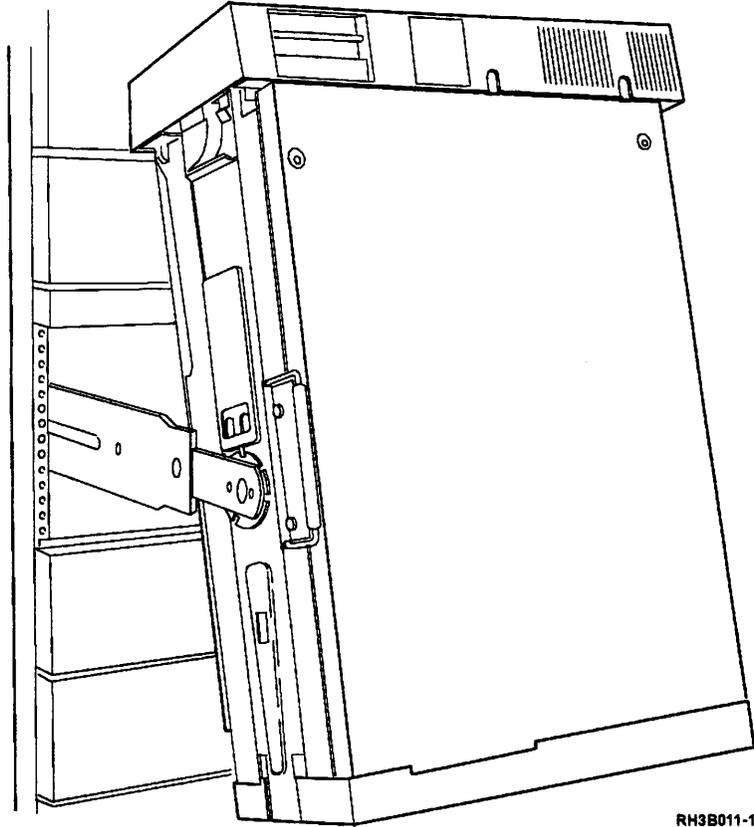
Pull the slide latch on both sides to release the slide and pivot the front of the tape unit upward.



RH3B014-2

10

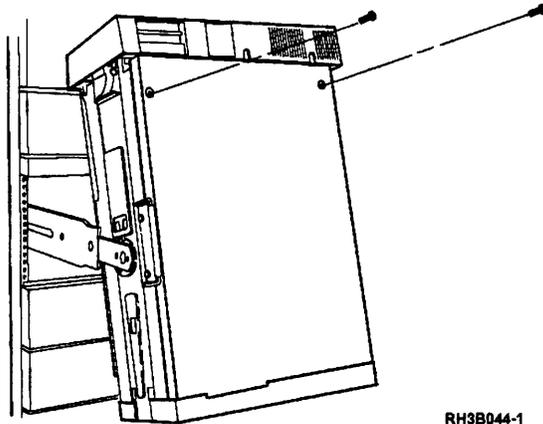
Set the slide latch so that the tape unit is in the position shown (approximately vertical).



RH3B011-1

11

Remove the two TORX (T25) screws from the bottom cover and remove the bottom cover.

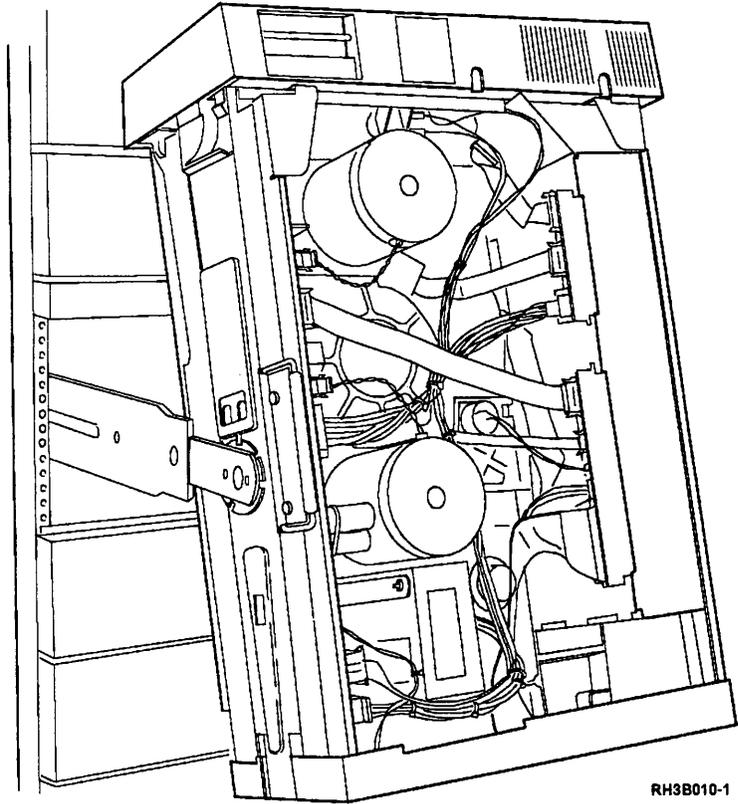


RH3B044-1

12

As you perform the service procedures, you may have to change the position of the tape unit to remove some FRUs.

The tape unit may be pivoted and locked in the vertical position shown, in a horizontal position, or in one position between the horizontal and vertical position.

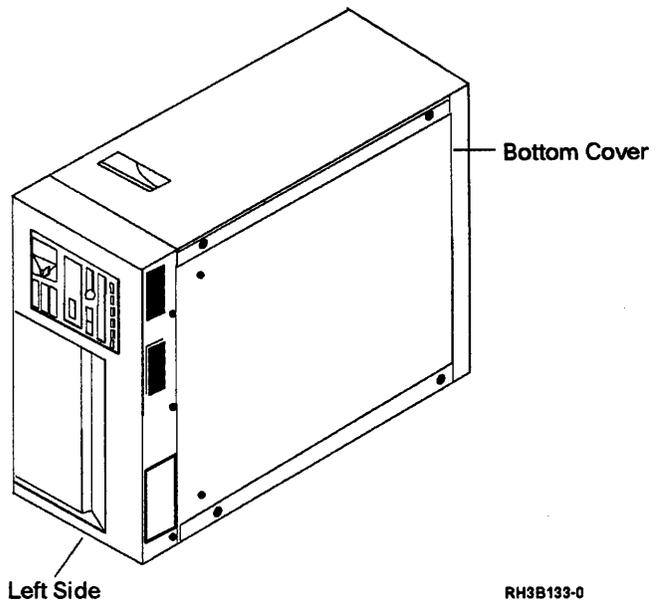


RH3B010-1

13

Turn the tape unit on its left side by lifting on its right side. One person can lift the tape unit in this manner.

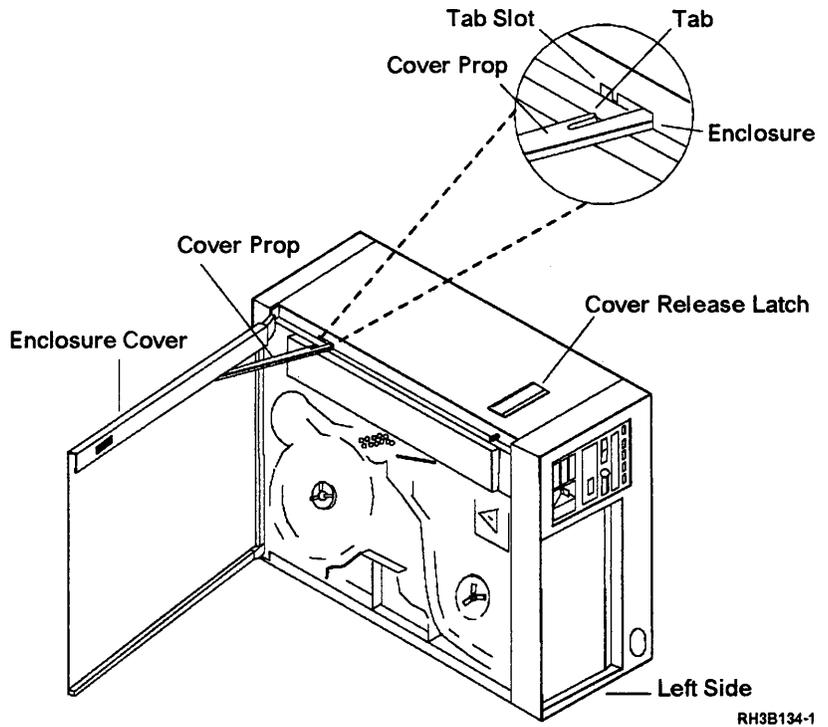
CAUTION:
The table-top unit weighs approximately 49 kg (107 lb). Do not try to lift it by yourself. Ask other service representatives for aid if you must pick up the unit.



RH3B133-0

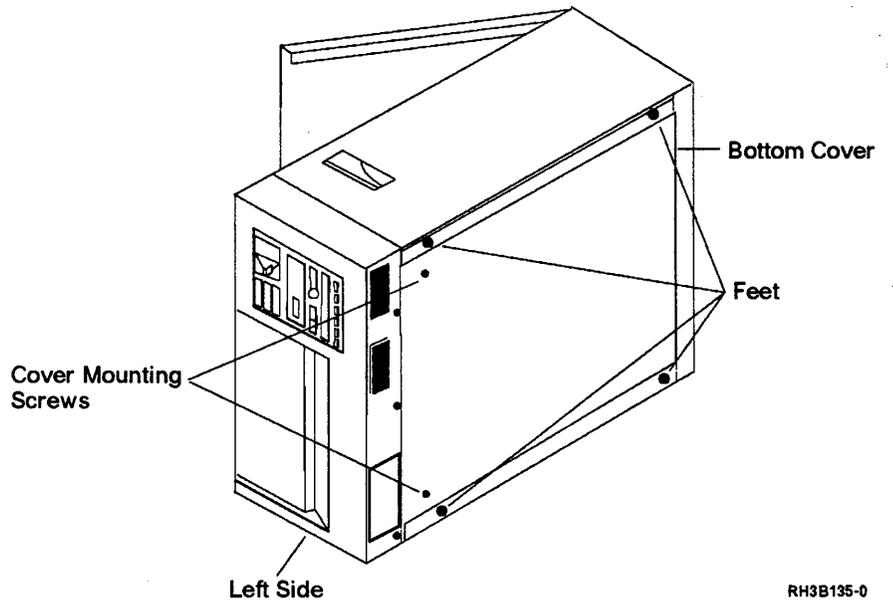
14

Press the cover release latch, and then open the enclosure cover. Then open the top cover.



15

Remove the two TORX (T25) cover mounting screws from the bottom cover, and then remove the cover.



Placing the 9348 in the Operating Position

1

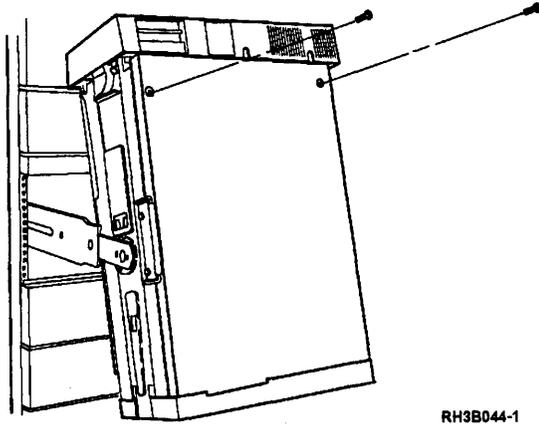
Are you working on a table-top unit?

No **Yes**

↓ Go to step 8.

2

Place the bottom cover on the tape unit and install the two TORX (T25) screws.

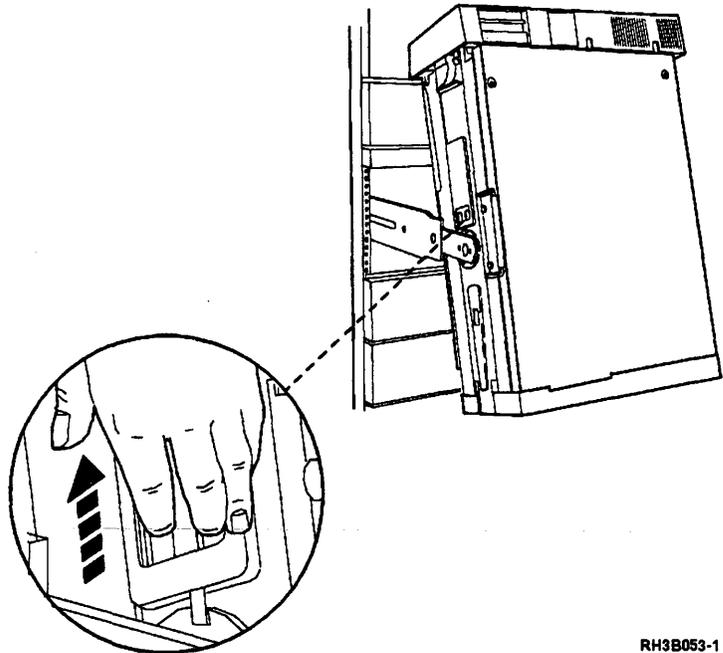


RH3B044-1

3

Pull the slide latch from the notch to loosen the tape unit.

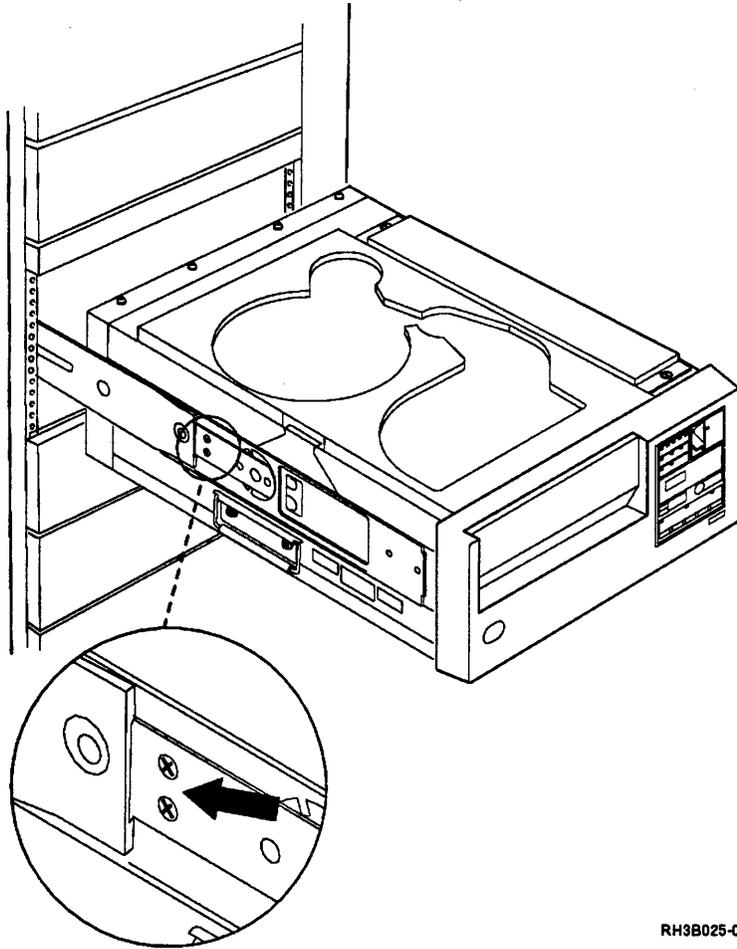
Pivot the front panel back to the horizontal position.



RH3B053-1

4

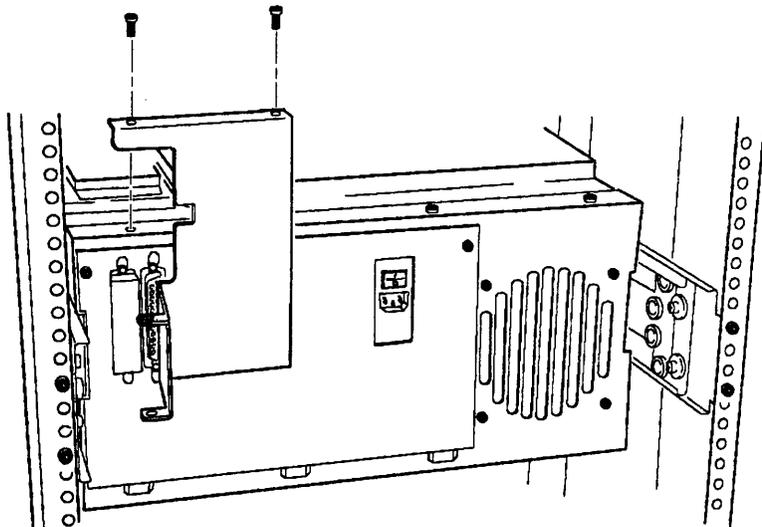
Install the two TORX (T15) pivot locking screws on each side of the slides.



RH3B025-0

5

Using two TORX (T25) screws, attach the cable carrier bracket.



RH3B017-2

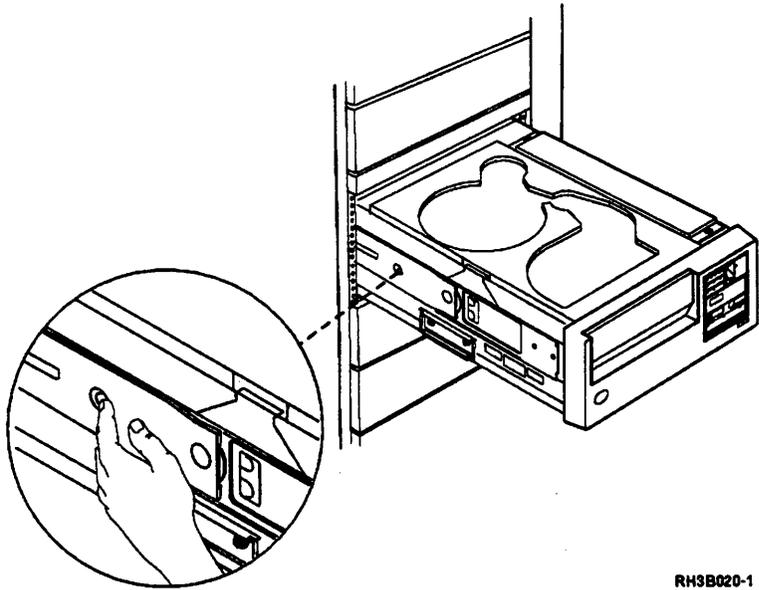
6

Slide the tape unit back into the rack:

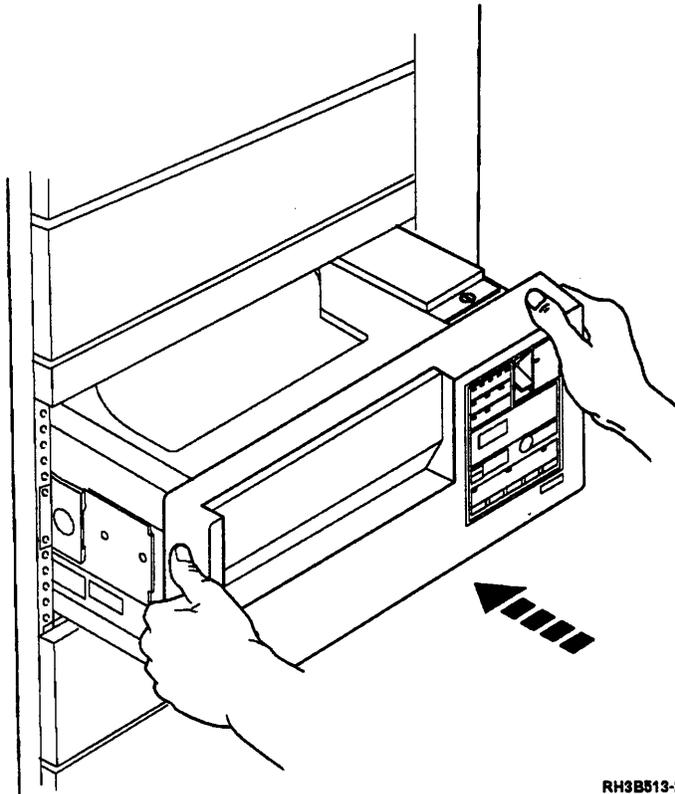
- Press the lock pushbutton on the slide (on each side of the tape unit), and carefully push the tape unit over the lock pushbuttons.
- If the 9348 stops before it is completely in the rack, press the lock pushbutton again and push the unit into the rack until it fastens in place.

CAUTION:

Ensure that your fingers are not between the front cover and the rack when you push the unit into the rack. (RSFTC094)



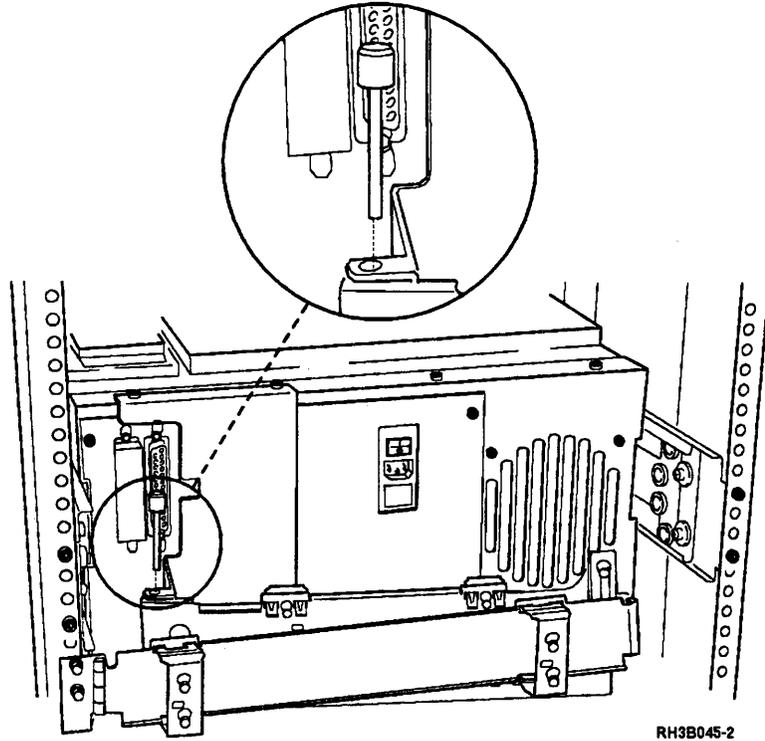
RH3B020-1



RH3B513-2

7

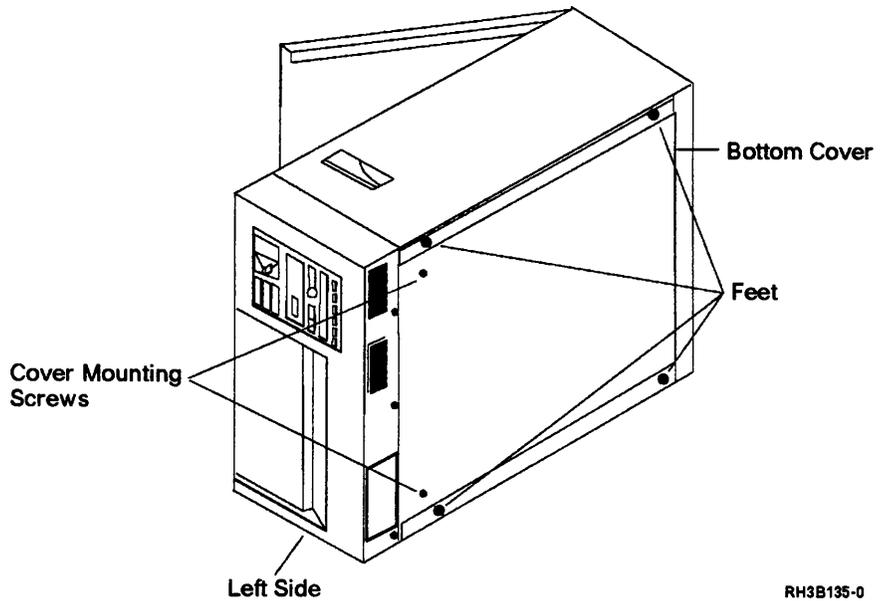
Attach the cable carrier and insert the carrier hinge screw.



8

Note: If you are working on a rack mounted unit, go to step 11.

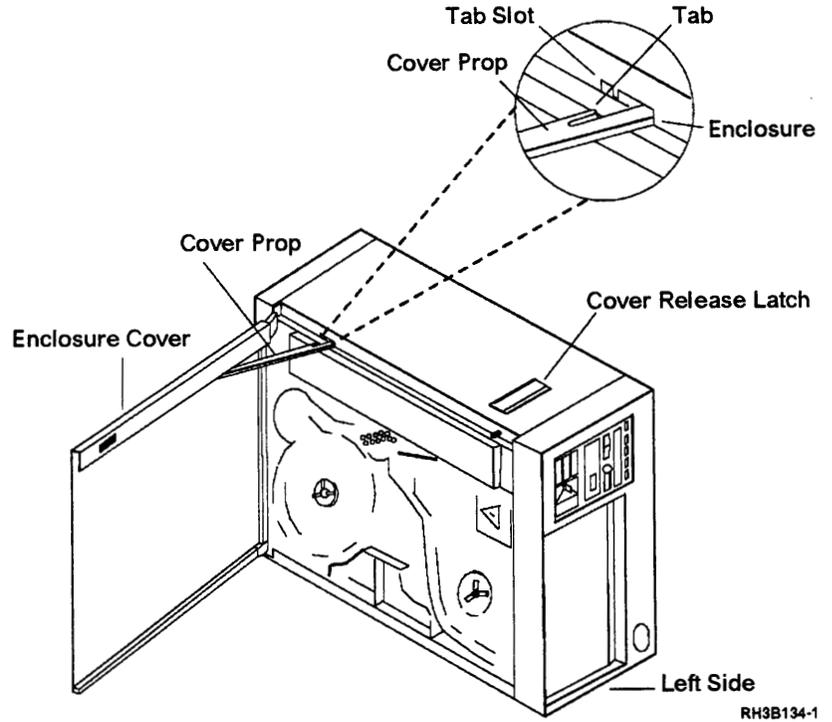
Align the screw holes in the bottom cover with those in the unit, and then install the two TORX (T25) cover mounting screws.



9

Close the top cover.

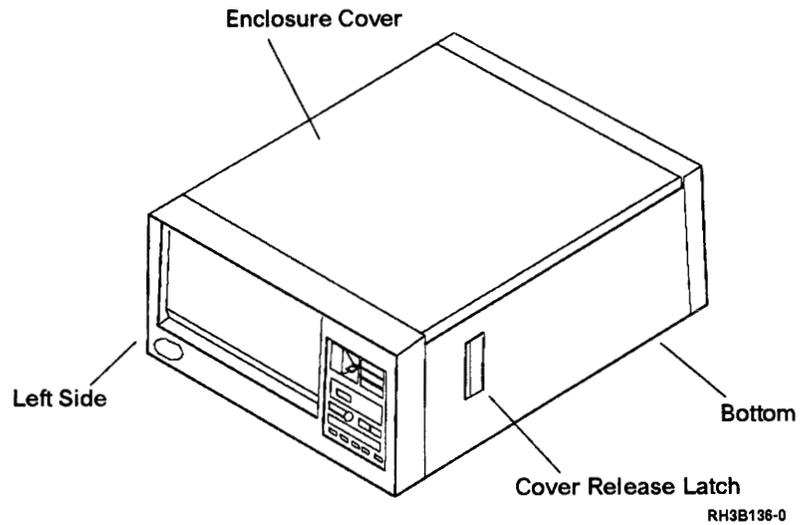
Lift the enclosure cover until the tab on the cover prop is out of the tab slot in the enclosure, and then guide the prop into the enclosure as you close the cover.



10

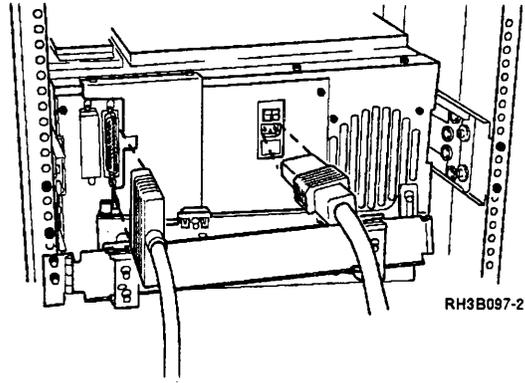
Turn the table unit on its base by carefully lowering the right side. One person may lower the tape unit in this manner.

CAUTION:
The table-top unit weighs approximately 45 kg (98 lb). Do not try to lift it by yourself. Ask other service representatives for aid if you must pick up the unit.



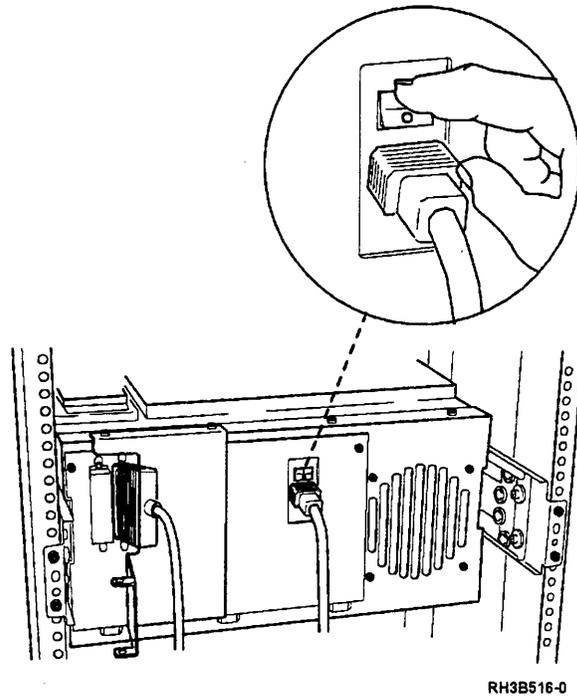
11

Connect the power cable and the signal cable.



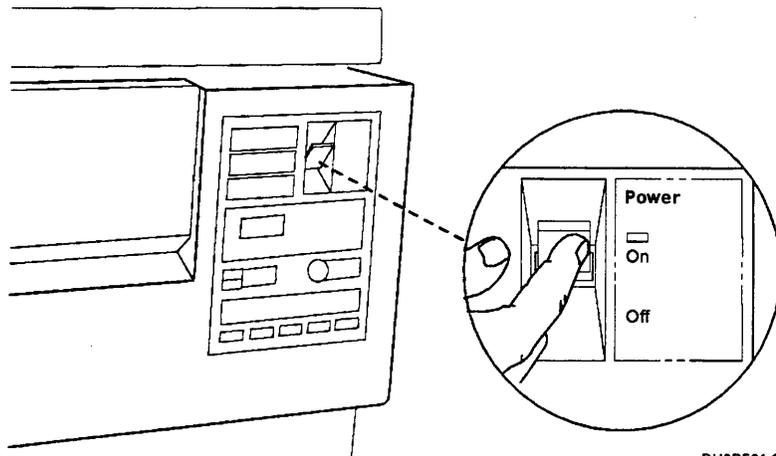
12

Set the ac power switch on the rear of the tape unit to the | (on) position.



13

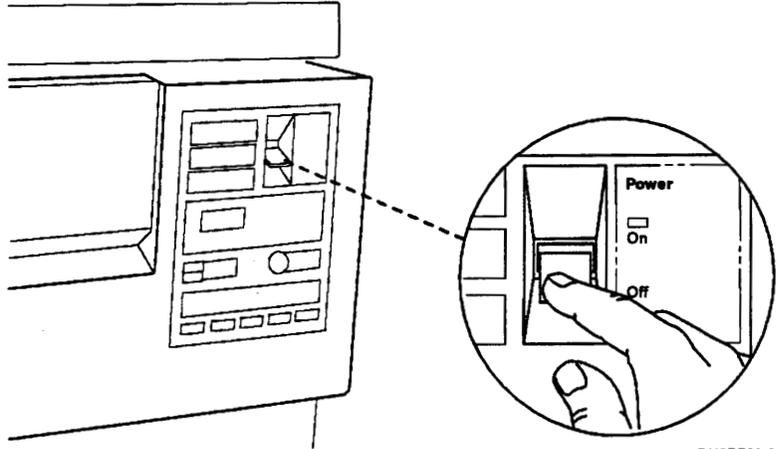
Set the Power switch on the control panel to the On position.



Card and Battery Removal

1

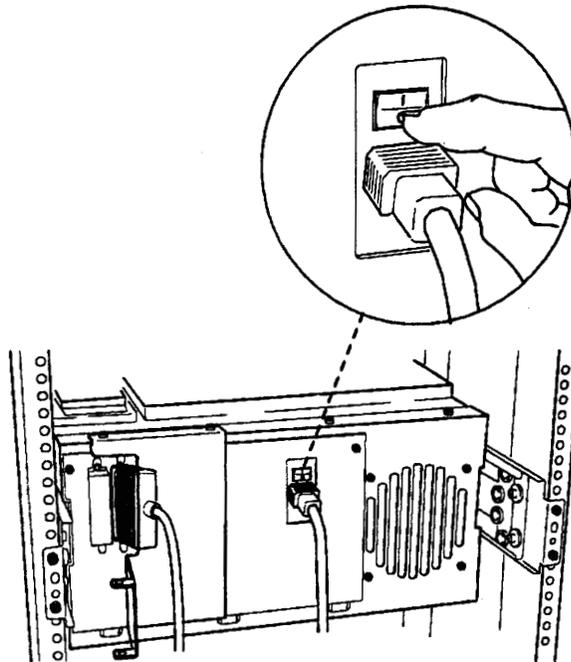
Set the Power switch on the control panel to the Off position.



RH3B508-0

2

Set the ac Power switch on the rear of the tape unit to the O (off) position.



RH3B511-0

3

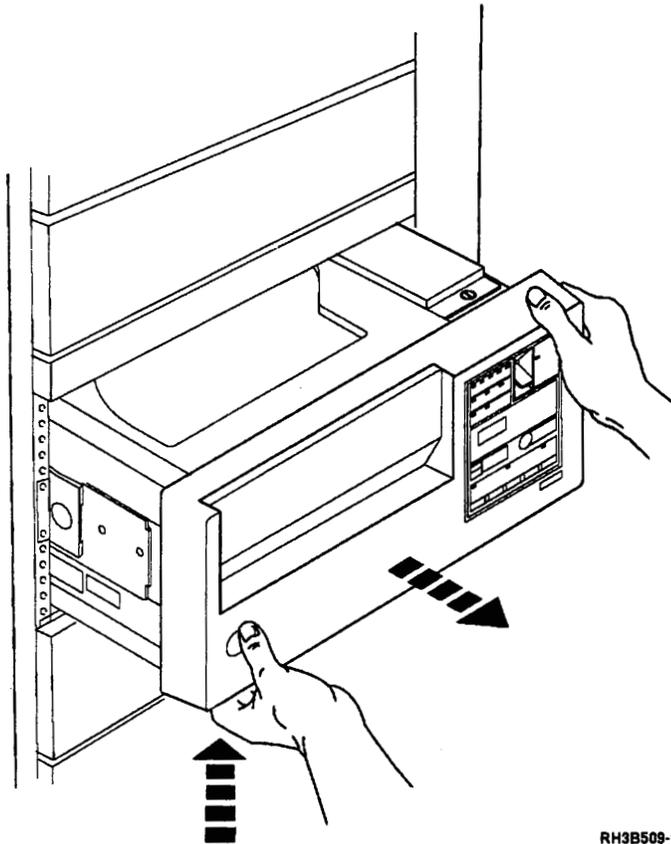
Note: If you are working on a table-top unit, go to step 4.

CAUTION:

When the unit is extended, its weight can turn over a rack that is not steady. Before you pull the unit out of the rack, ensure that a rack stabilizer is attached to the bottom front of the rack.

Do not pull out more than one unit at a time. The rack can turn over if you pull out more than one unit at a time.

Pull the release lever located under the front panel as shown. Then pull the 9348 out of the rack until the slide locking tabs lock.

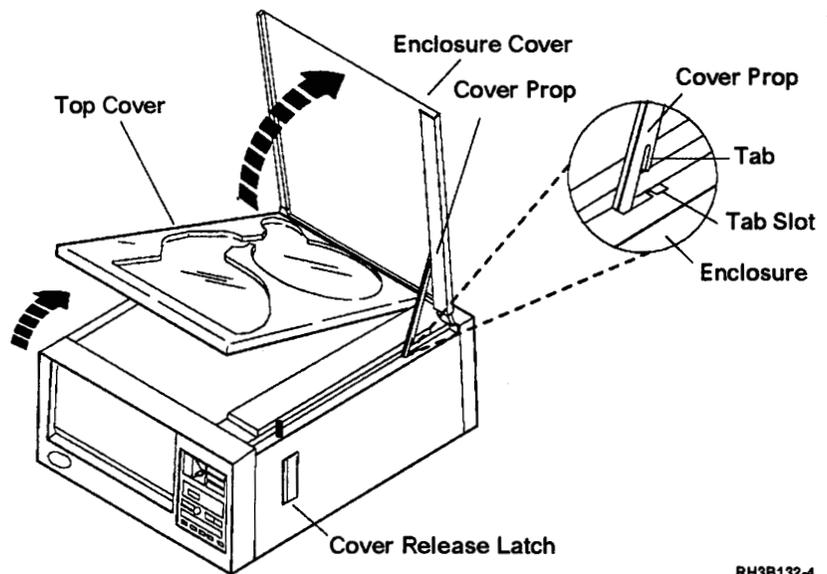


RH3B509-1

4

Note: If you are working on a rack mounted unit, go to step 5.

Press the cover release latch, and then open the enclosure cover. Ensure that the tab on the cover prop goes into the tab slot in the enclosure.



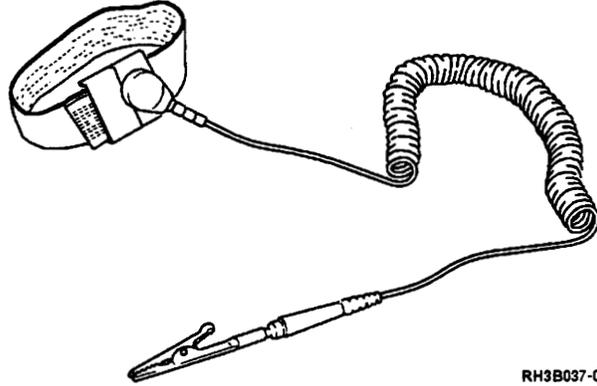
RH3B132-4

5

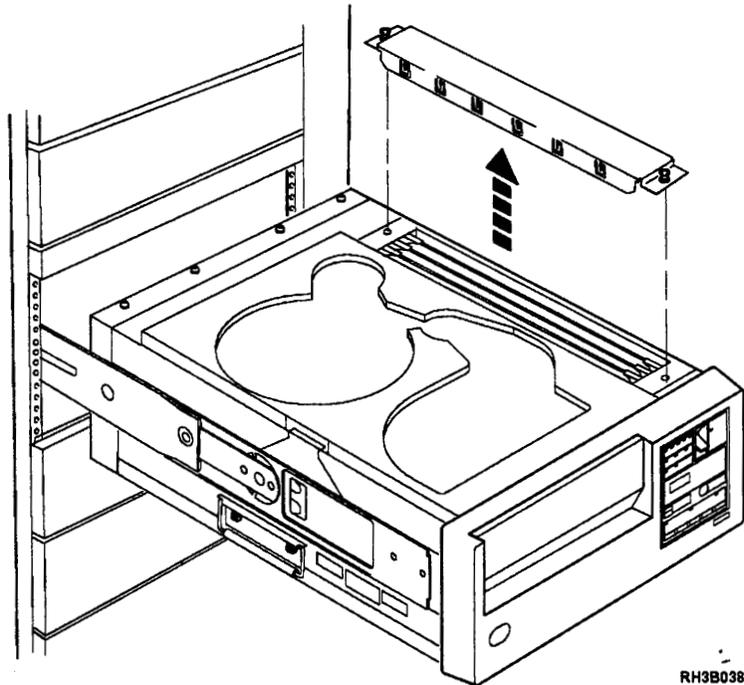
Warning: Use antistatic mats and either wrist or heel straps to prevent static damage during repair.

Remove the card enclosure cover on the right side of the tape unit.

Note: Each end of the cover is held by a spring-loaded screw. Use a flat-blade screwdriver to loosen the screws, if necessary.



RH3B037-0



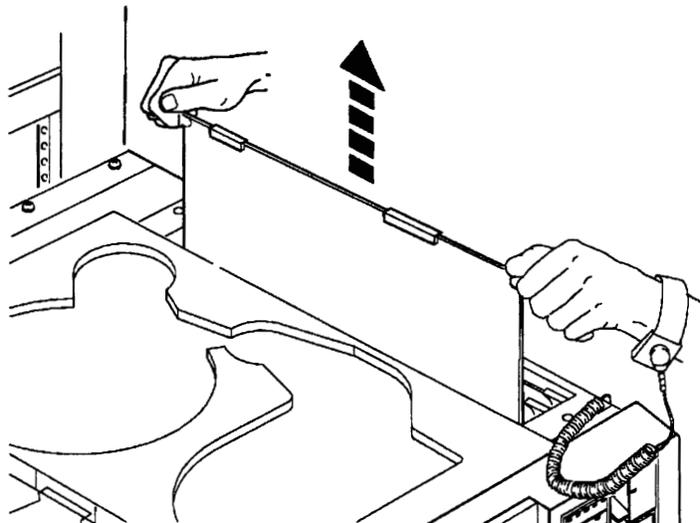
RH3B038-1

6

Remove the cards as needed. Disconnect the read and write cables from the read/write card before removing the card. The cards can only be installed in their own slots because the sockets on the cards are offset.

The location of the cards, from the center of the tape unit to the outer edge of the tape unit are:

- Read/Write card
- Controller card
- Buffer card

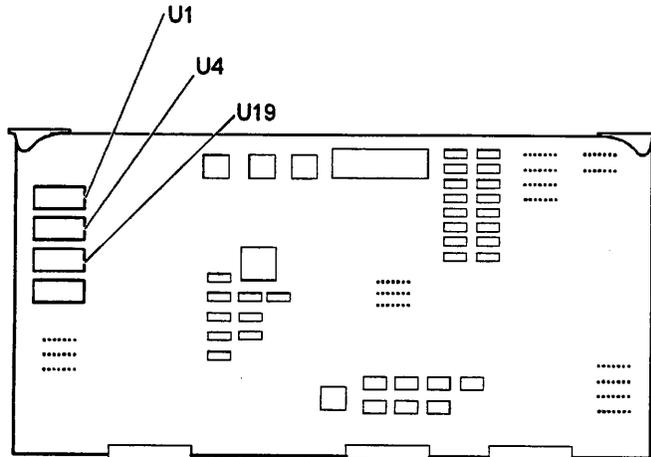


RH3B103-0

7

If the controller card is being exchanged, remove the modules indicated and plug them into the new controller card.

Use the module extracting tool, part number 9900764, or a similar tool.



RH3B091-0

8

If the buffer card is being exchanged, remove the modules indicated and plug them into the new buffer card.

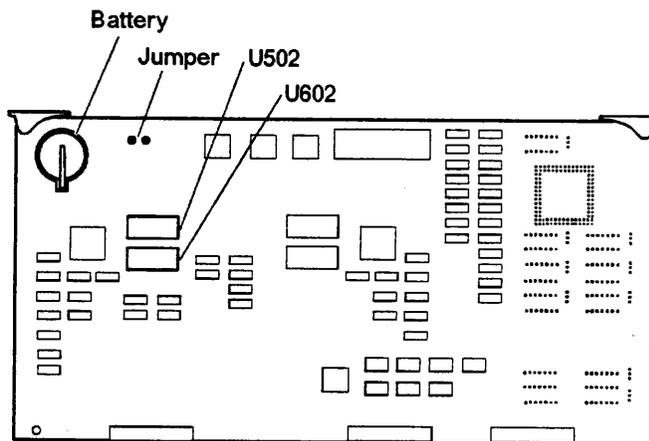
Use the module extracting tool, part number 9900764, or a similar tool.

Note: To ensure that NVRM is cleared of data corruption, do the following:

1. Jumper the two holes on the buffer card together (a paper clip can be used as a jumper).
2. Power on the 9348 and wait until F999 is indicated on the front panel display.

If any other display code is present, power off the 9348 and repeat this step.

3. Power off the 9348 and remove the jumper.



RH3B083-2

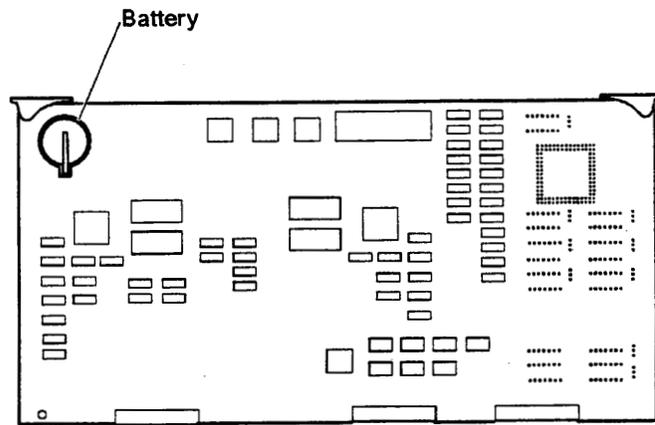
9

CAUTION:
This unit contains a lithium battery. Discard as instructed by local regulations.

CAUTION:
Do not charge the battery again, open the battery pack, or put the battery in a place hotter than 100 degrees Celsius (212 degrees Fahrenheit). (RSFTC062)

If you want to exchange the battery on the buffer card, remove the battery from the receptacle.

Note: Some buffer cards may have the battery soldered in place. Do not remove these batteries. If the battery is bad, exchange the card.



RH3B063-0

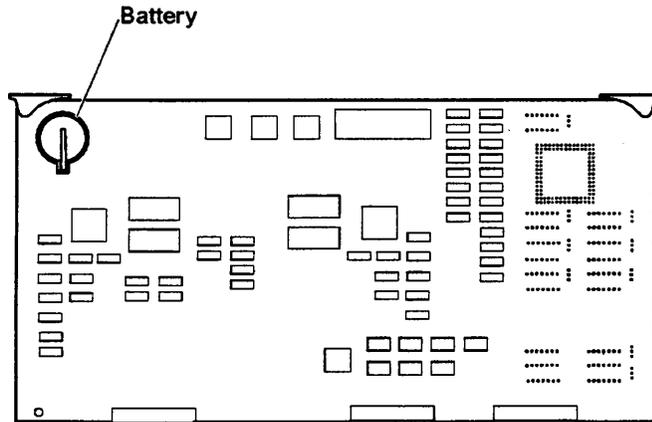
Card and Battery Installation

1

If the battery on the buffer card was removed or if the buffer card is being exchanged, remove the battery protect tab located between the battery and the battery clip.

Then measure the voltage on the battery. The voltage should be between 2.5 V and 3.0 V. Do not use the battery if the voltage is below 2.5 V.

Note: If the battery was exchanged, update CONF 15 to show the year the battery was exchanged.



RH3B063-0

2

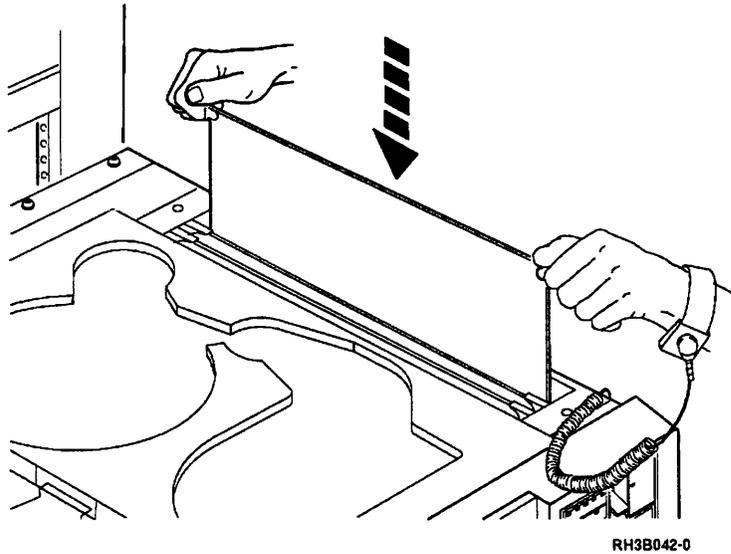
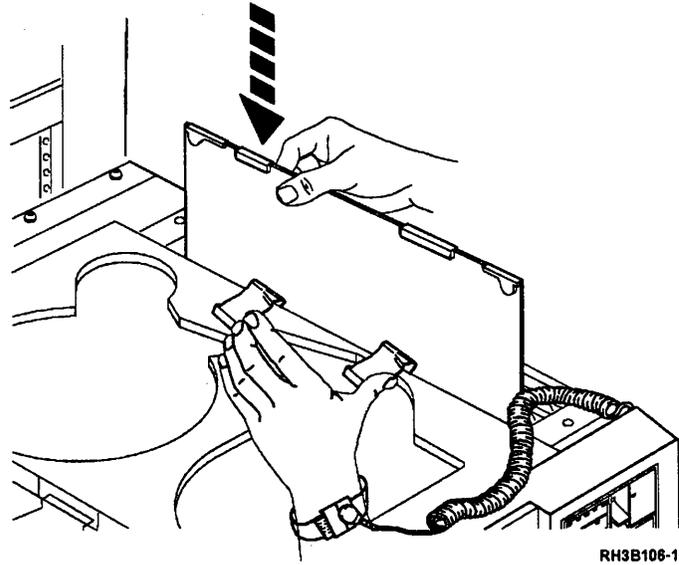
Insert and fully seat the cards.

The location of the cards, from the center of the tape unit to the outer edge of the tape unit are:

- Read/Write card
- Controller card
- Buffer card

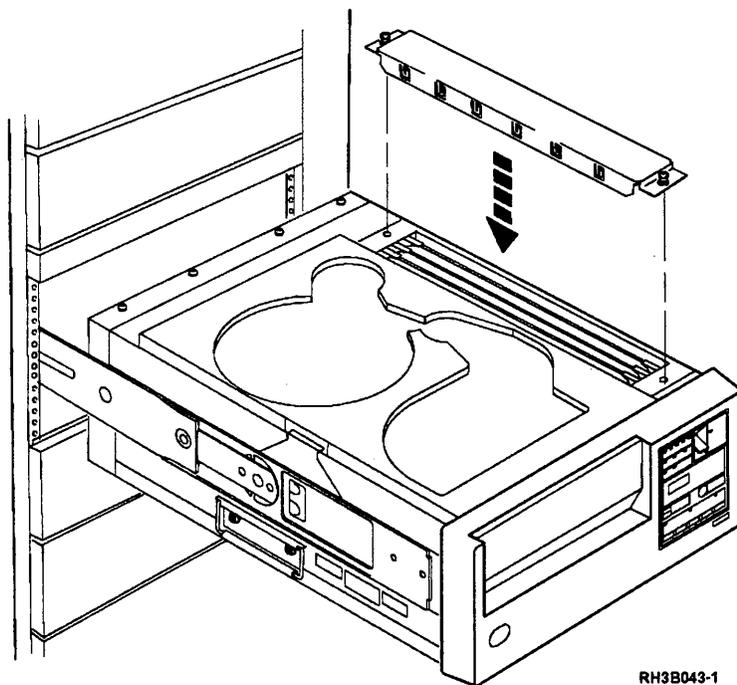
Note: When inserting the read-write card, hold the cable connectors to the side to prevent damaging the card.

If the read/write card is being inserted, connect the read and write cables to the top edge of the card.



3

Place the card cover over the top of the card enclosure with the screws offset toward the tape path. Tighten the screws.



RH3B043-1

4

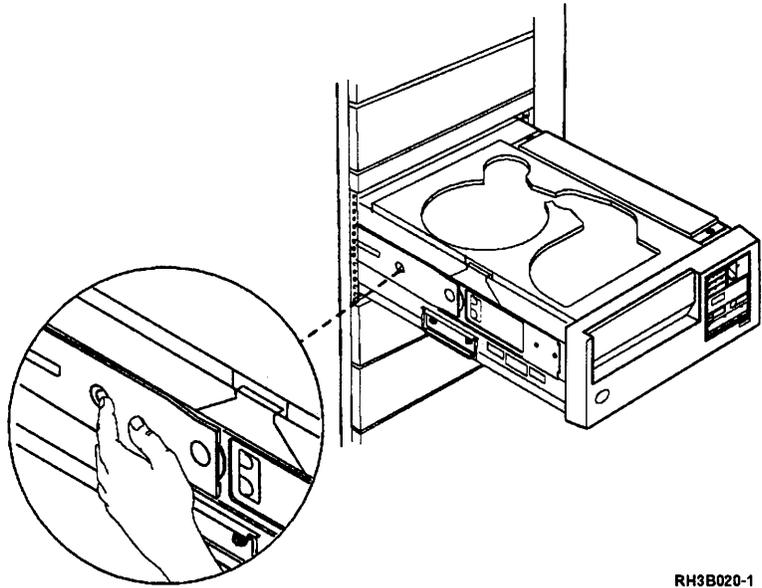
Note: If you are working on a table-top unit go to step 5.

Slide the tape unit back into the rack.

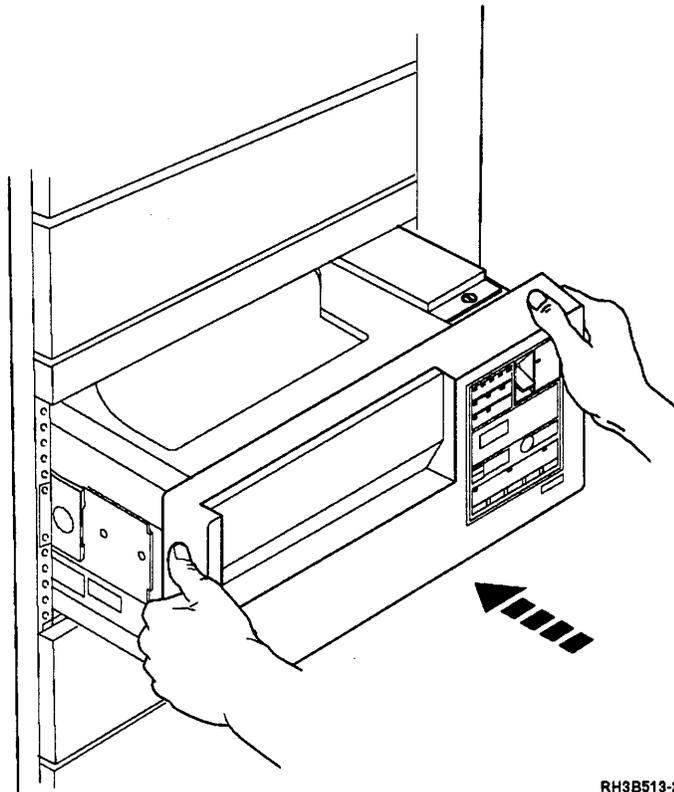
Slide the tape unit back into the rack:

- Press the lock pushbutton on the slide (on each side of the tape unit), and carefully push the tape unit over the lock pushbuttons.
- If the 9348 stops before it is completely in the rack, press the lock pushbutton again and push the unit into the rack until it fastens in place.

CAUTION:
Ensure that your fingers are not between the front cover and the rack when you push the unit into the rack. (RSFTC084)



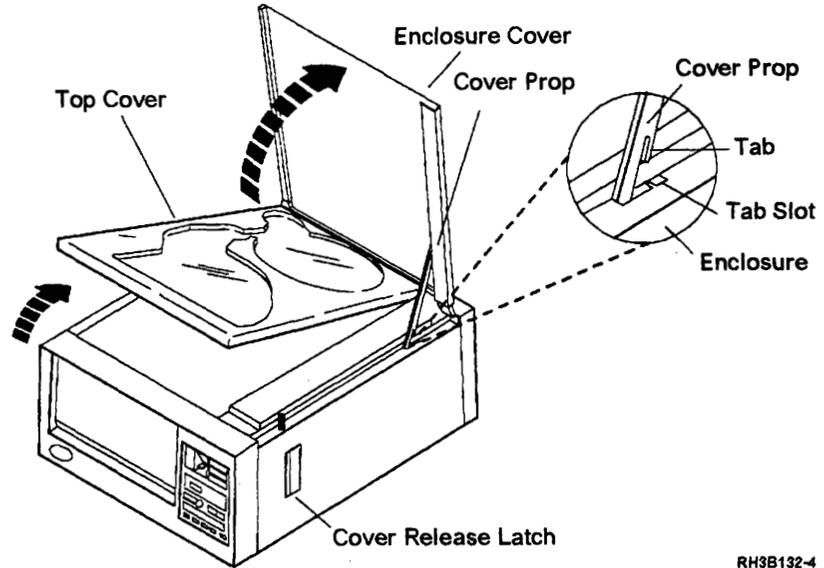
RH3B020-1



RH3B513-2

5

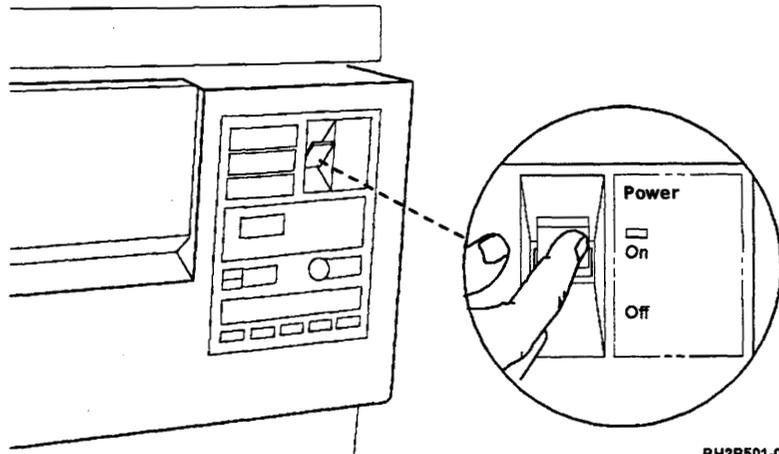
Note: If you are working on a rack mounted unit, go to step 6. Lift the enclosure cover until the tab on the cover prop is out of the tab slot in the enclosure, and then guide the prop into the enclosure as you close the cover.



RH3B132-4

6

Set the Power switch on the control panel to the On position.



RH3B501-0

7

After the battery is exchanged, F999 may appear on the status display the first time the tape unit is powered on.

If F999 appeared, set the Power switch to the Off position and then to the On position. F999 should not appear again.

8

If the read/write card, buffer card, or the battery was exchanged, insert the CE test tape and run sequence test 99. See "Running Diagnostic Tests" on page A-5.

For parameter B, select SAVE.

Note: Ensure that the read/write head is clean before you start the test, see "Cleaning Procedure" on page 4-3.

9

Run sequence test 2; see "Running Diagnostic Tests" on page A-5.

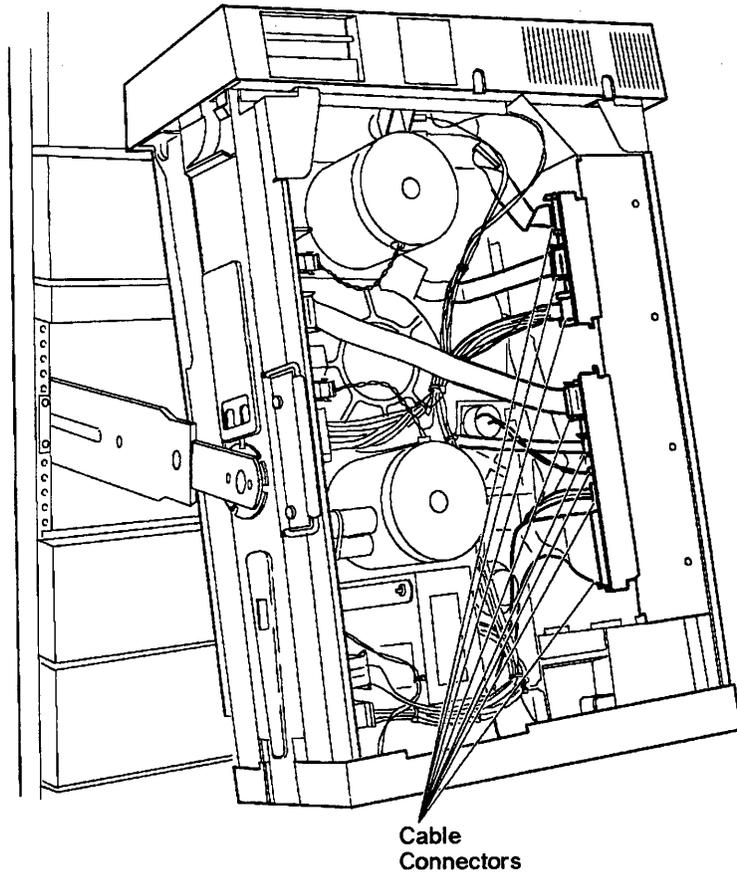
Connector Board Removal and Installation

1

Place the tape unit in the service position; see "Placing the 9348 in the Service Position" on page 3-1.

2

Remove the eight cable connectors from the connector board.

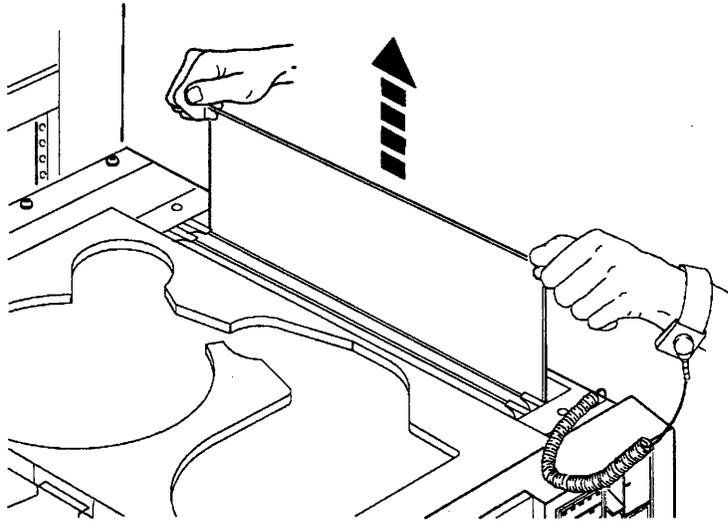


RH3B051-1

3

Remove the following cards; see "Card and Battery Removal" on page 3-15.

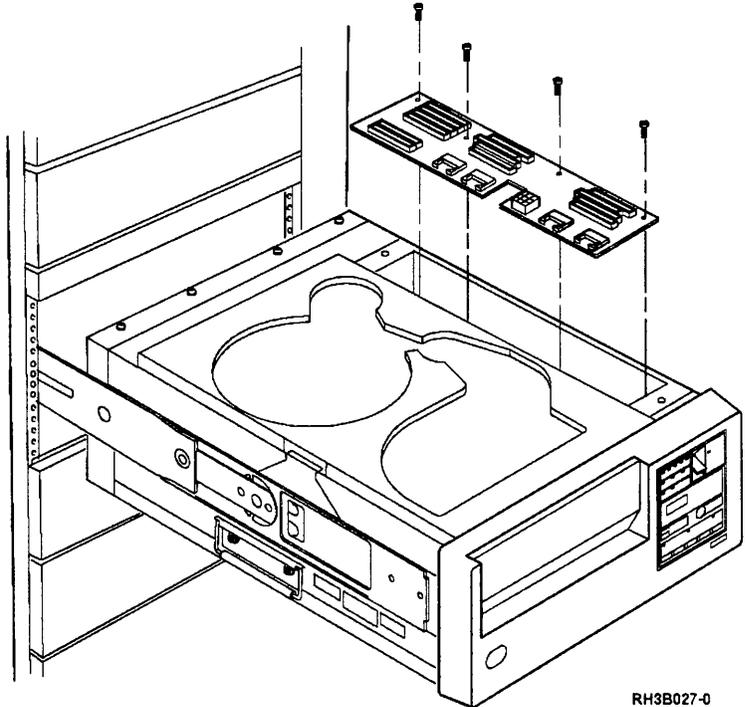
- Read/Write card
- Controller card
- Buffer card



RH3B022-0

4

Remove the four TORX (T25) screws from the connector board.



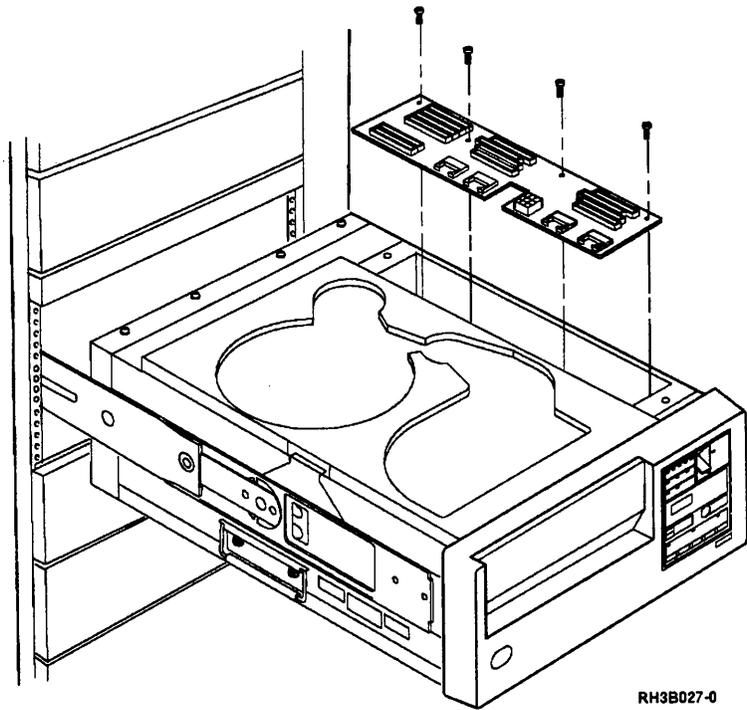
RH3B027-0

5

Remove the connector board.

Install the connector board by reversing the removal procedure.

Place the tape unit in the operating position, starting with step 6 in "Placing the 9348 in the Operating Position" on page 3-9.



RH3B027-0

6

Insert the CE test tape and run sequence test 2; see "Running Diagnostic Tests" on page A-5.

Program Module Removal and Installation

The modules in the Program Module Kit are seldom exchanged. They are called out as a FRU with a low failure rate on only three reference codes (301, 401, and 601).

The modules are normally transferred from the old card to the new card when a controller card, buffer card or an interface card is exchanged.

Note: If a module needs to be exchanged because it was damaged when it was transferred from the old card to the new card, or because the reference codes 301, 401, or 601 occurred, all modules must be exchanged.

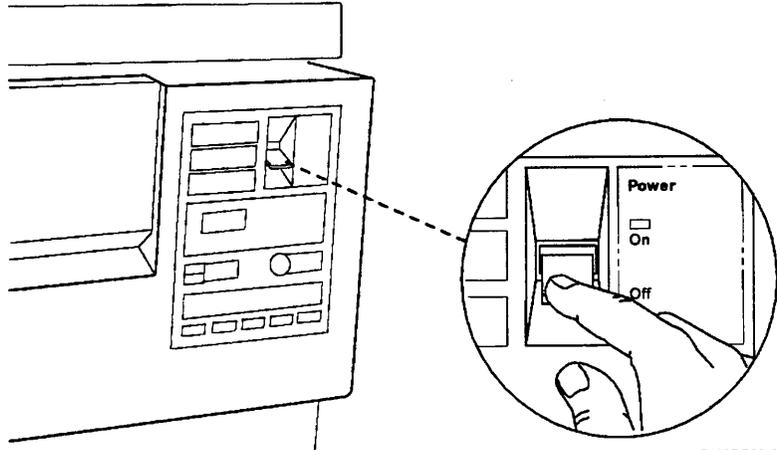
Use the procedures "Card and Battery Removal" on page 3-15 and "Interface Card Removal" on page 3-101 when it is necessary to exchange the modules.

Front Panel Assembly Removal

Use this procedure to remove the control panel card, door interlock microswitches, or door solenoid.

1

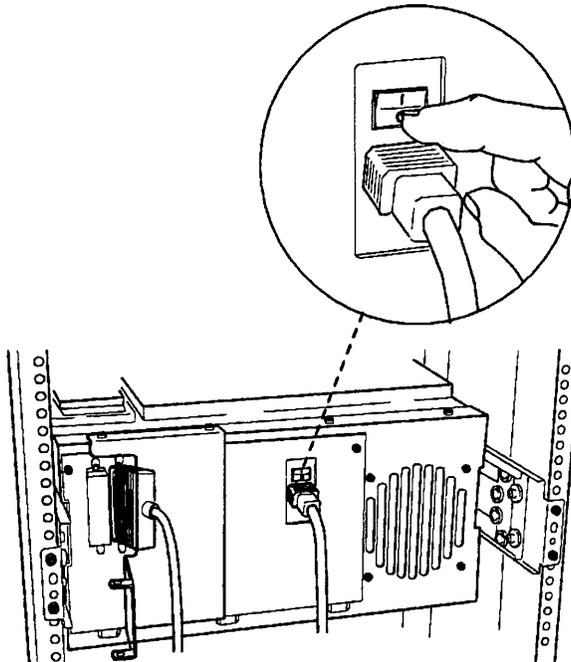
Set the Power switch on the control panel to the Off position.



RH3B508-0

2

Set the ac power switch on the rear of the tape unit to the O (off) position.



RH3B511-0

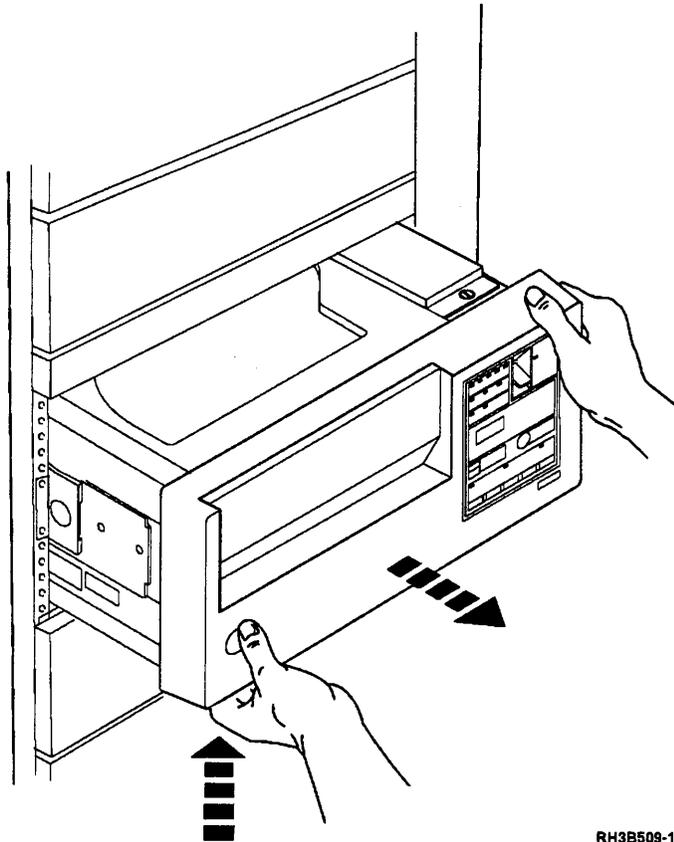
3

CAUTION:

When the unit is extended, its weight can turn over a rack that is not steady. Before you pull the unit out of the rack, ensure that a rack stabilizer is attached to the bottom front of the rack.

Do not pull out more than one unit at a time. The rack can turn over if you pull out more than one unit at a time.

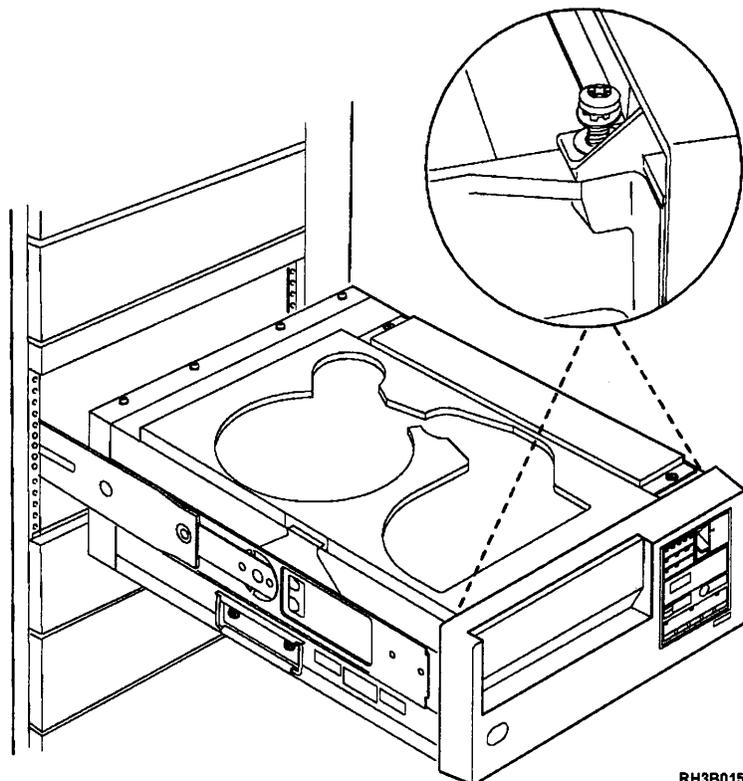
Pull the release lever located under the front panel as shown. Then pull the tape unit out of the rack until the slide locking tabs lock.



RH3B509-1

4

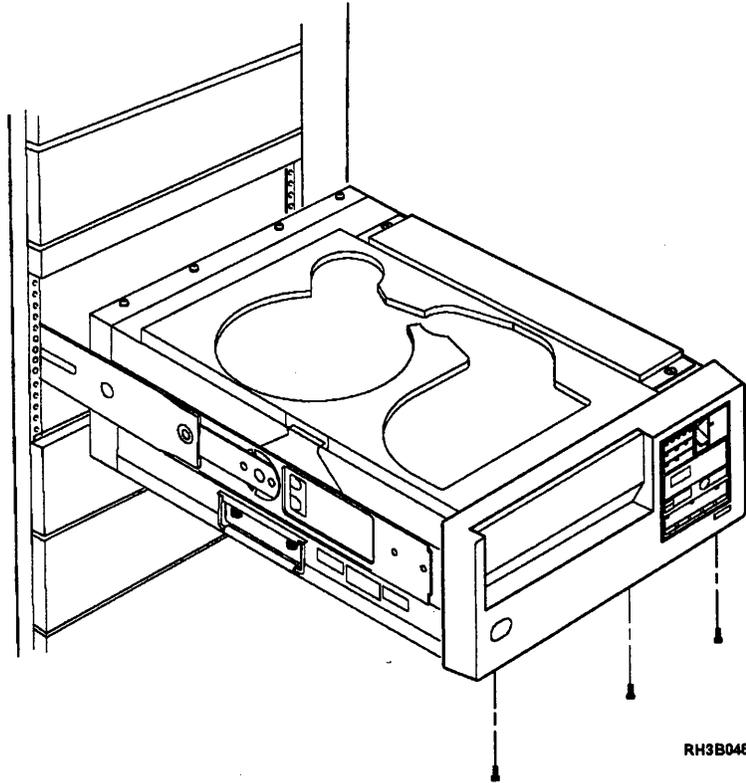
Remove the two TORX (T25) screws holding the top of the front panel to the frame.



RH3B015-1

5

Remove the three TORX (T25) screws holding the bottom of the front panel to the frame. At this point, the panel remains connected to the frame by many cables.



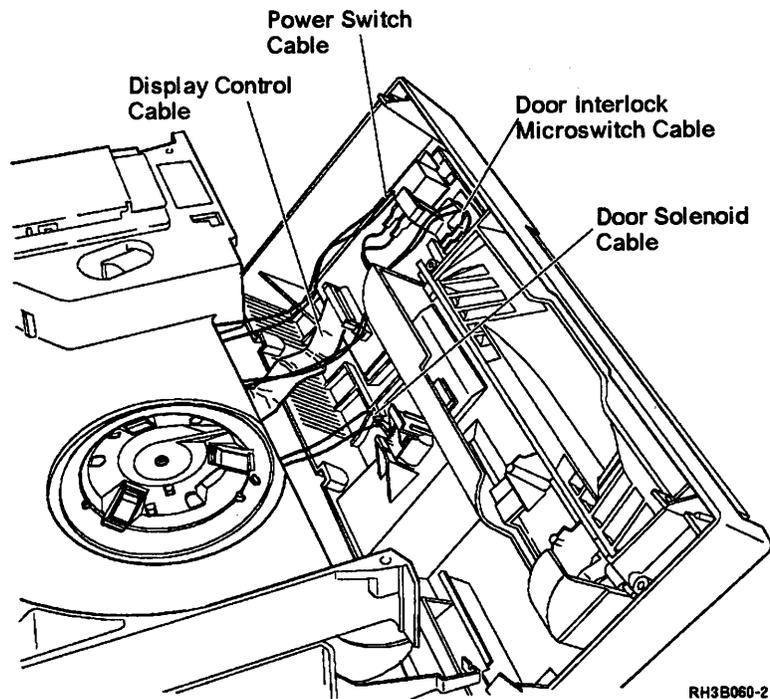
6

Remove the following cables attached to the front panel:

- Display control cable
- Door solenoid cable
- Door interlock microswitch cable
- Power switch cable

To remove the front panel, pull the top edge forward first.

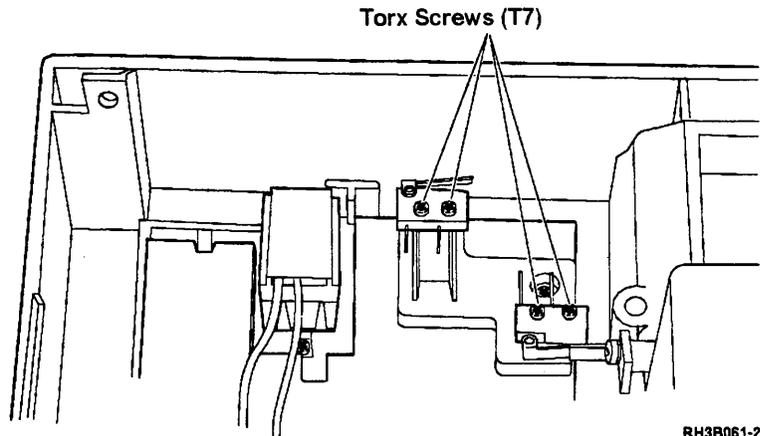
Note: Two wires go from the sensor circuit board to the microswitches. A third wire (usually a different color from the other two wires) is a jumper between the microswitches.



7

Perform this step only to remove the top cover interlock microswitch and front door interlock microswitch.

- Remove the TORX (T7) screws that hold the top cover and front door interlock microswitches.
- Remove the top cover and the front door interlock microswitches.

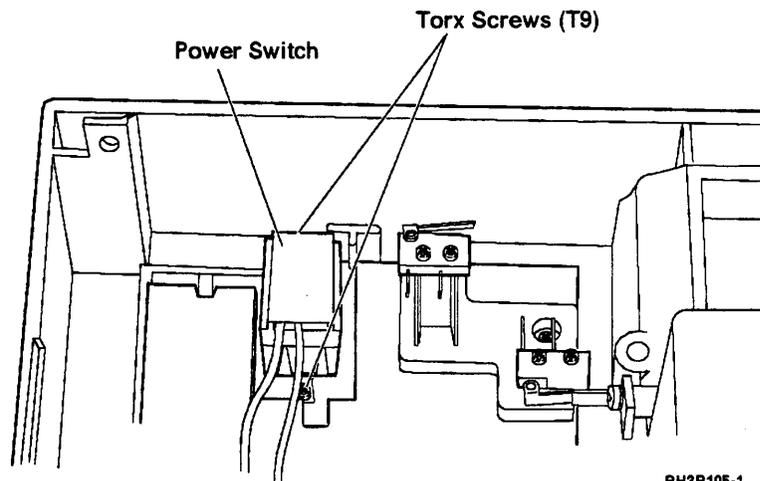


RH3B061-2

8

Perform this step only to remove the Power switch.

- Remove the two TORX (T9) screws that hold the power switch.

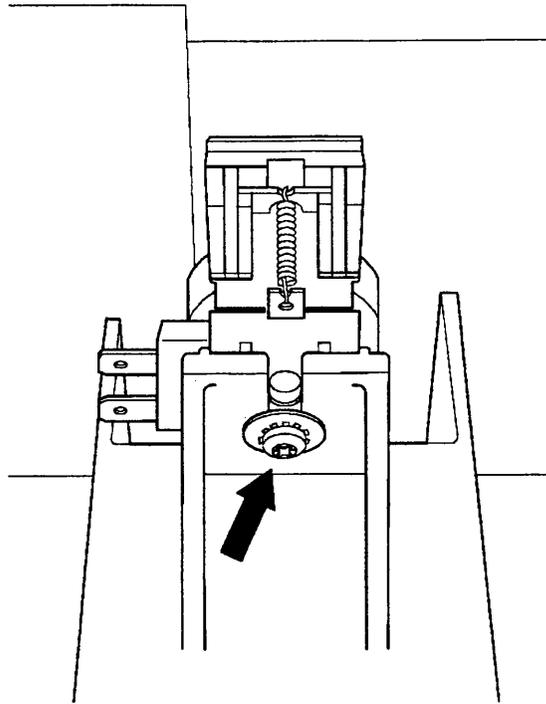


RH3B105-1

9

Perform this step only to remove the door solenoid.

- Remove the screw that holds the door solenoid.
- Remove the door solenoid.

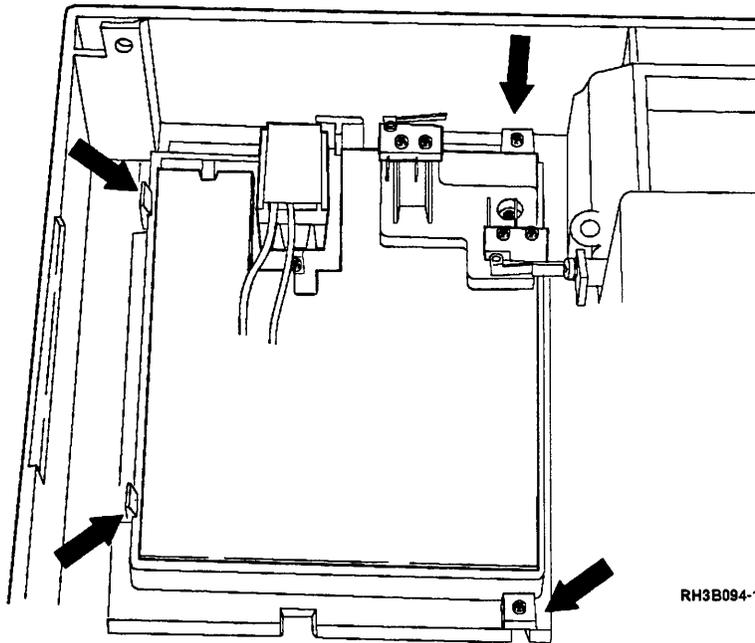


RH3B052-1

10

Perform this step only to remove the control panel card.

- Make a note of the wire locations on the three switches shown and remove the wires.
- Remove the two TORX (T9) screws that hold the right side of the control panel card to the front panel. Lift the card out from under the two clips on the left.



RH3B094-1

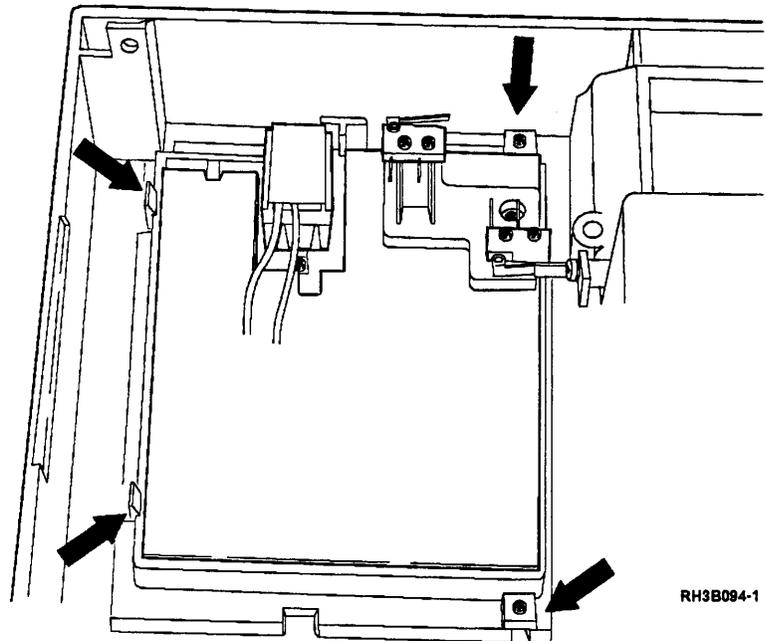
Front Panel Assembly Installation

Use this procedure to install the control panel card, door interlock microswitches, or door solenoid.

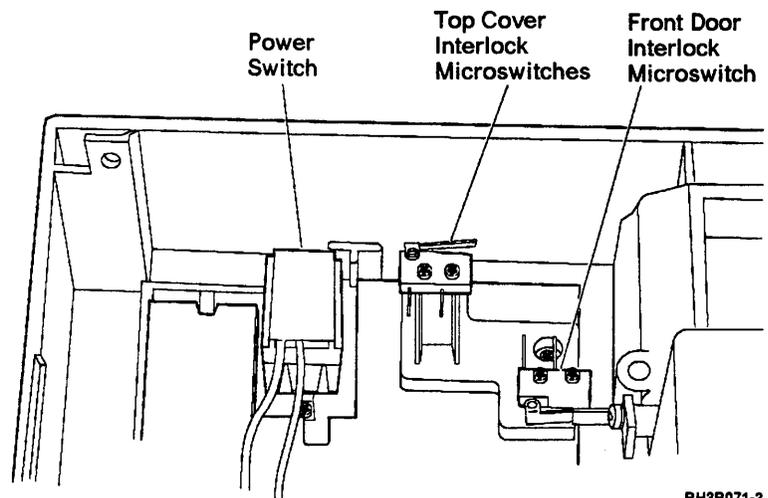
1

If the control panel card was removed, install the control panel card. Insert the card under the two clips on the left, and then insert and tighten two TORX (T9) screws on the right.

Ensure that the door interlock microswitch lever is behind the door flag.



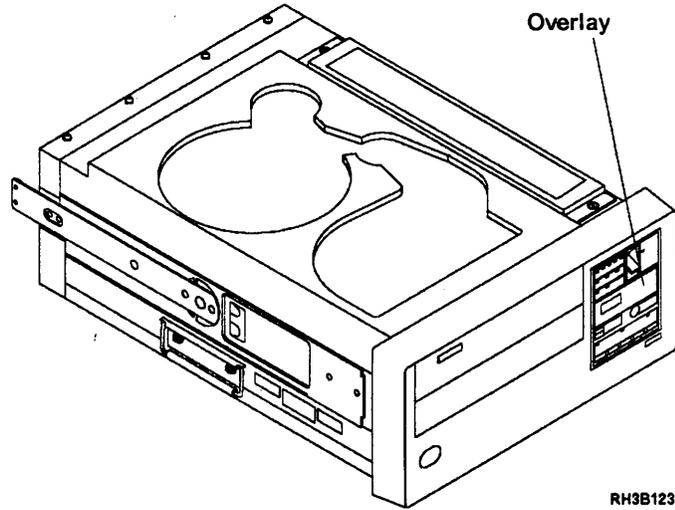
RH3B084-1



RH3B071-2

2

If the control panel card was exchanged, install an overlay with the correct language on the new control panel card. See "Assembly 1: Labels and Slides" on page 6-4.



RH3B123-0

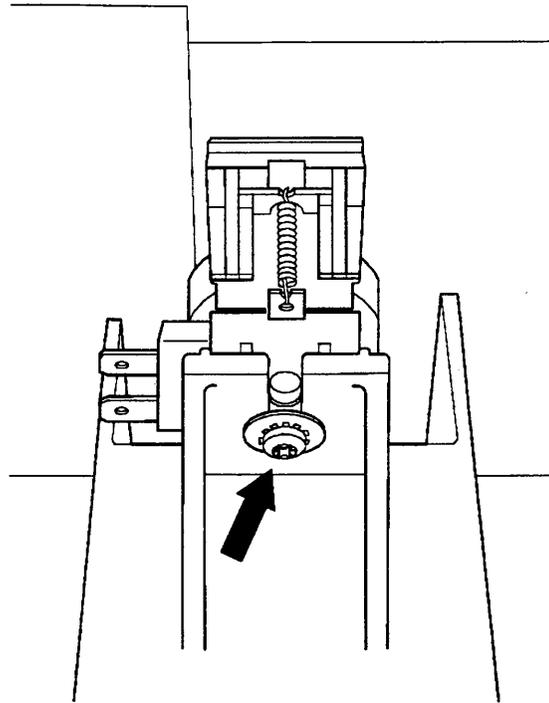
3

If the door solenoid was removed, install the door solenoid sliding the solenoid mounting screw into the slot as shown.

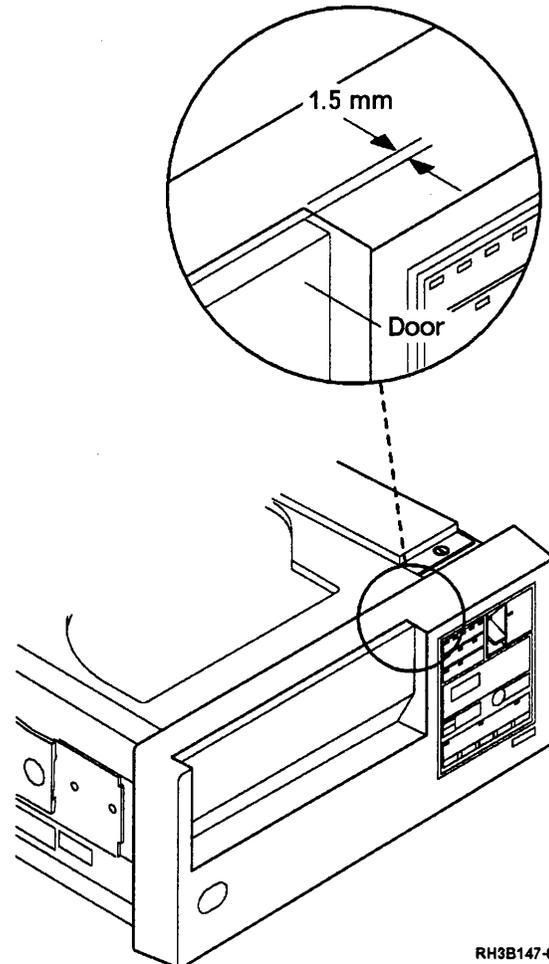
Adjustment

Adjust the solenoid in its mounting slot until there is approximately 1.5 mm of play between the door and the front panel when the door closes.

Note: Check that the door opens correctly at the end of an unload sequence.



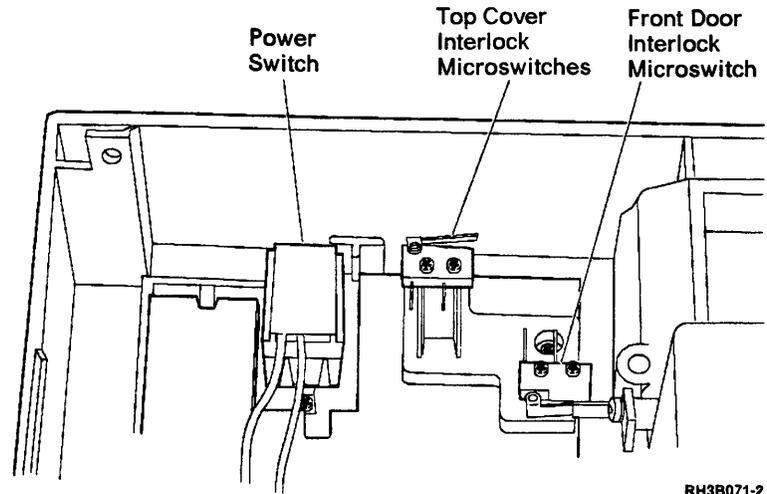
RH3B052-1



RH3B147-0

4

If the power switch, the top cover interlock microswitch, or front door interlock microswitch were removed, install them.



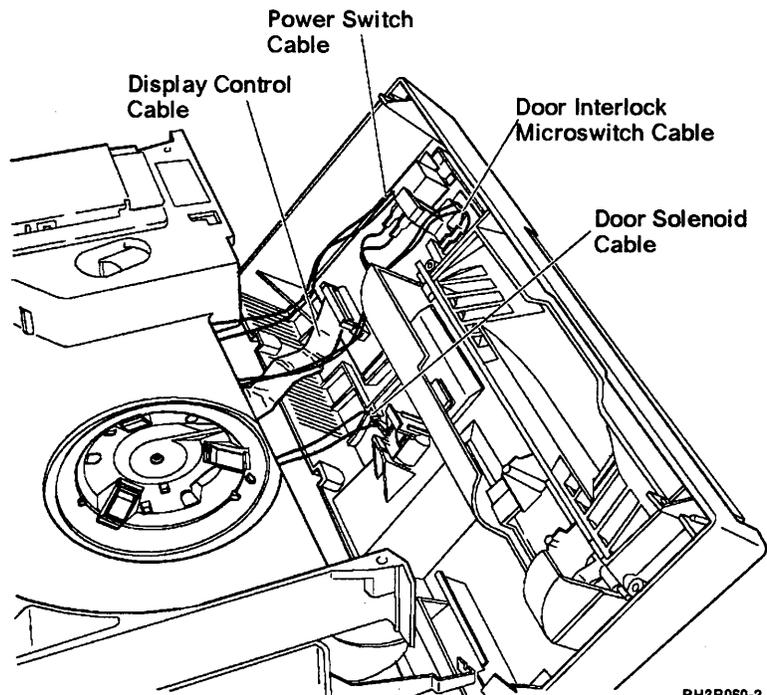
RH3B071-2

5

Install the following cables:

- Display control cable
- Door solenoid cable
- Door interlock microswitch cable
- Power switch cable

Note: Two wires go from the sensor circuit board to the microswitches. A third wire (usually a different color from the other two wires) is a jumper between the microswitches.



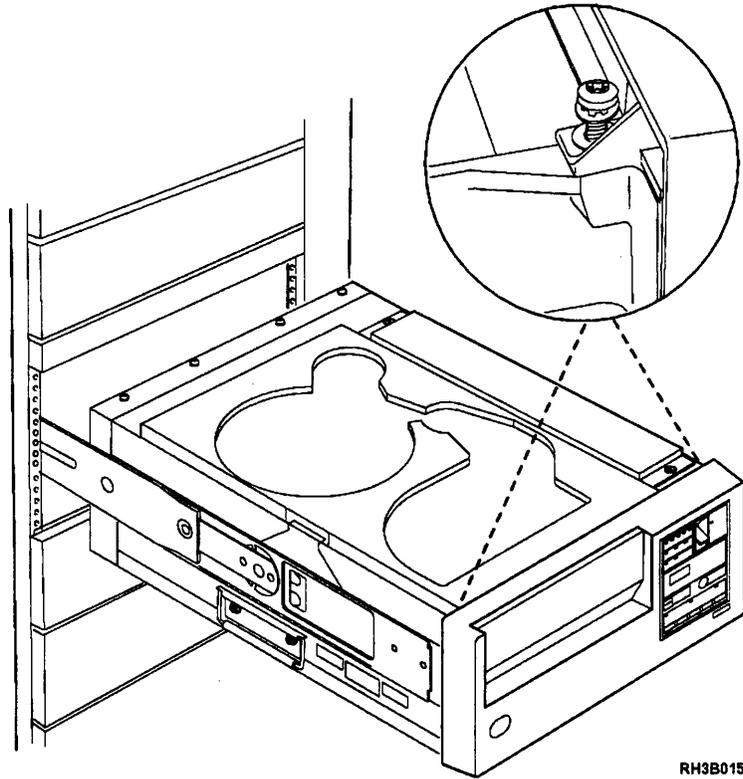
RH3B060-2

6

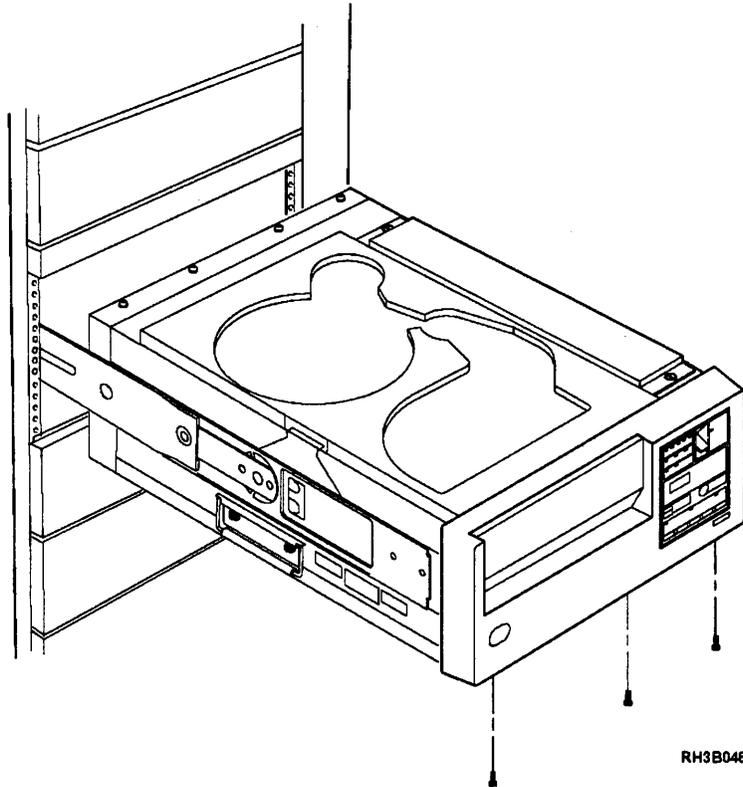
Warning: Open the top cover before installing the front panel. The top cover microswitch may be damaged if the front panel is installed while the top cover is closed.

Place the front panel (slide the bottom of panel on first) on the front of the frame.

Fasten the front panel with the five TORX (T25) screws.



RH3B015-1



RH3B046-1

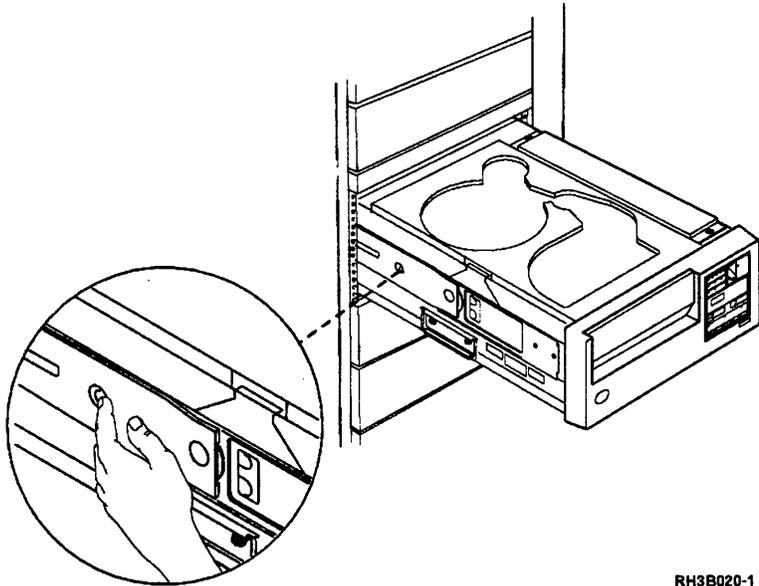
7

Slide the tape unit back into the rack:

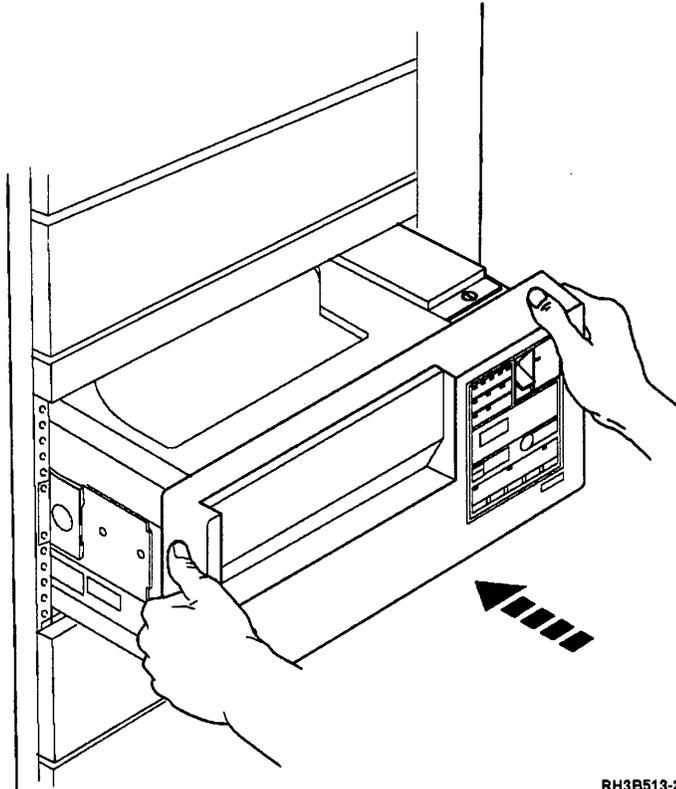
- Press the lock pushbutton on the slide (on each side of the tape unit), and carefully push the tape unit over the lock pushbuttons.
- If the 9348 stops before it is completely in the rack, press the lock pushbutton again and push the unit into the rack until it fastens in place.

CAUTION:

Ensure that your fingers are not between the front cover and the rack when you push the unit into the rack. (RSFTC084)



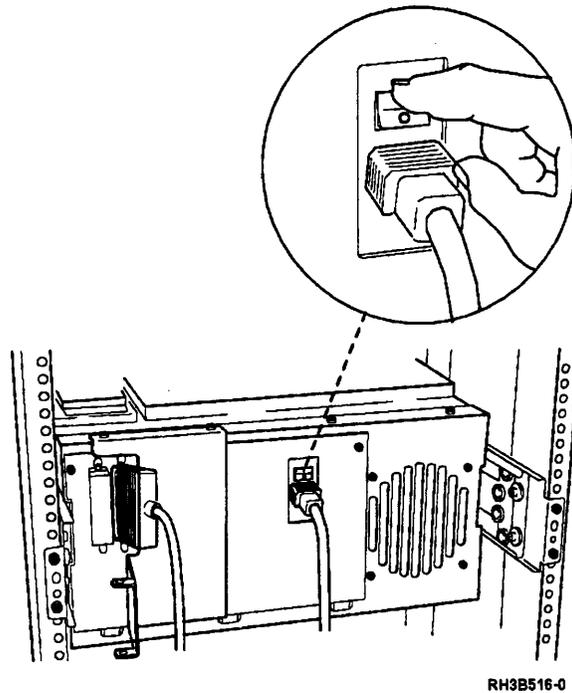
RH3B020-1



RH3B513-2

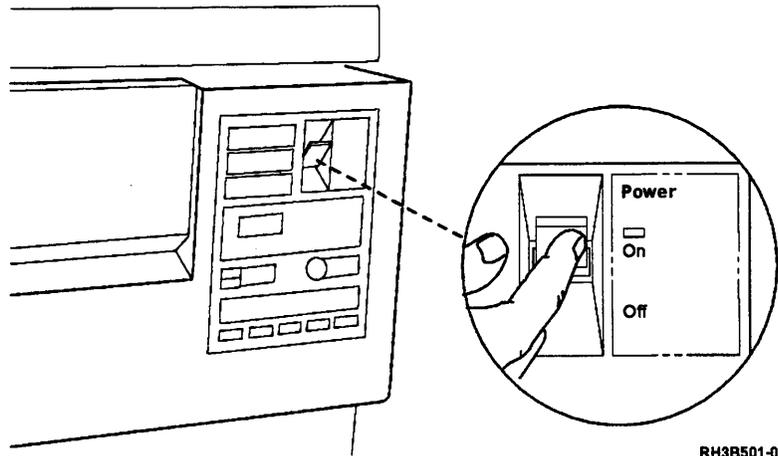
8

Set the ac power switch on the rear of the tape unit to the | (on) position.



9

Set the Power switch on the control panel to the On position.



10

If the control panel was exchanged, run tests 70, 71, and 72; see "Running Diagnostic Tests" on page A-5.

11

Insert the CE test tape and run the sequence test; see "Running Diagnostic Tests" on page A-5.

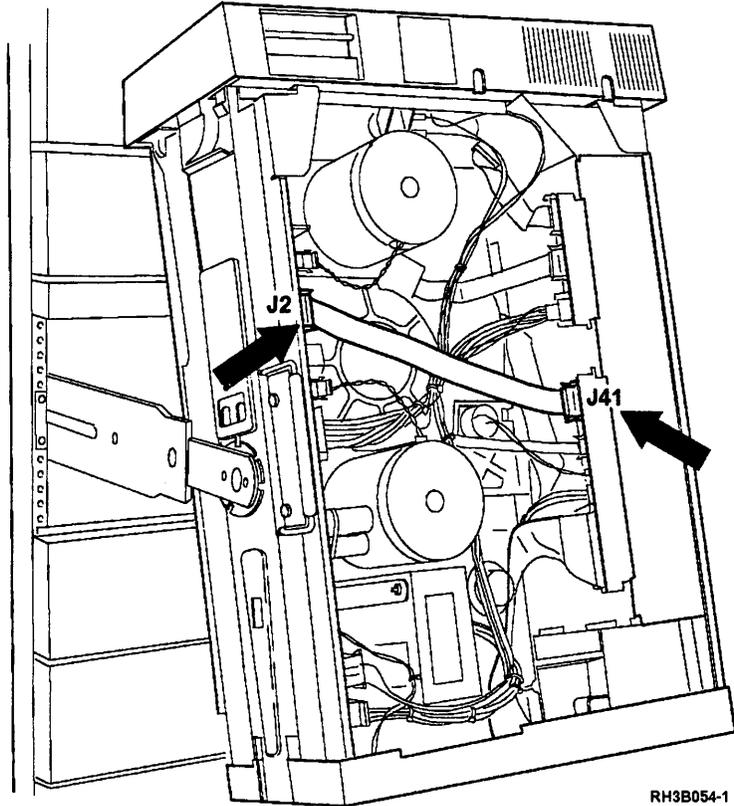
Motor/Power Card Removal

1

Place the tape unit in the service position; see "Placing the 9348 in the Service Position" on page 3-1.

2

Remove the ribbon cable that attaches J2 on the motor/power card to J41 on the connector card in the card enclosure. Place this cable in a safe place.



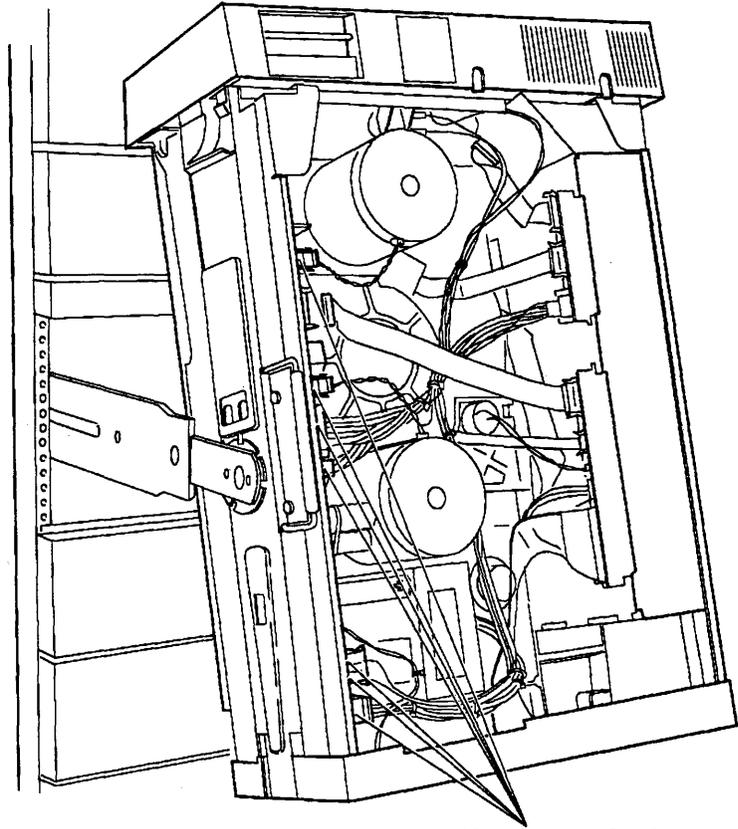
RH3B054-1

3

Remove the seven connectors from the motor/power card.

Note: Record the position of the two cables that connect to connectors J6 and J7 on the motor/power card before removing them. Label the cables if they are not already labeled.

The cable with the blue and white wires comes from the dc power switch on the front panel and goes to connector J6. The cable with two brown wires comes from the secondary winding of the transformer and goes to connector J7.



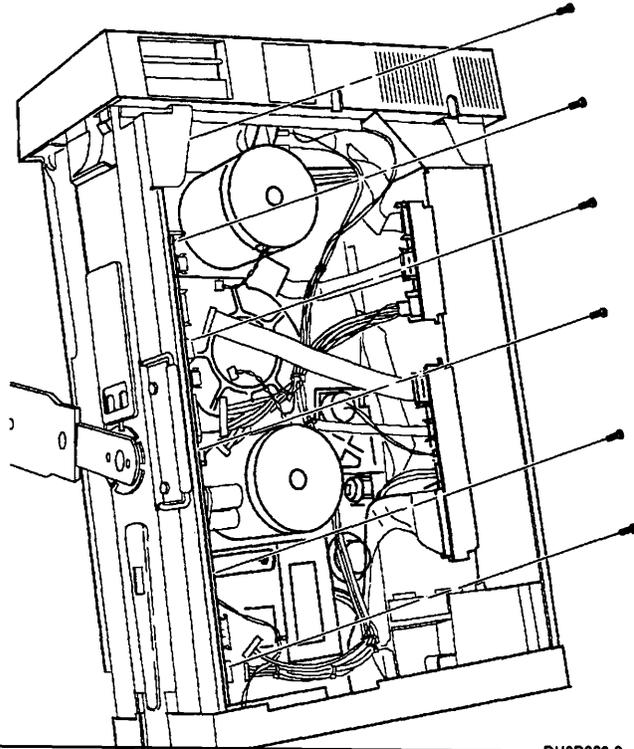
Motor/Power Card
Connectors

RH3B076-0

4

Remove the six TORX (T25) screws that hold the card to the casting.

Note: Because of the location of these screws, a long (at least six inch) TORX screwdriver is needed.



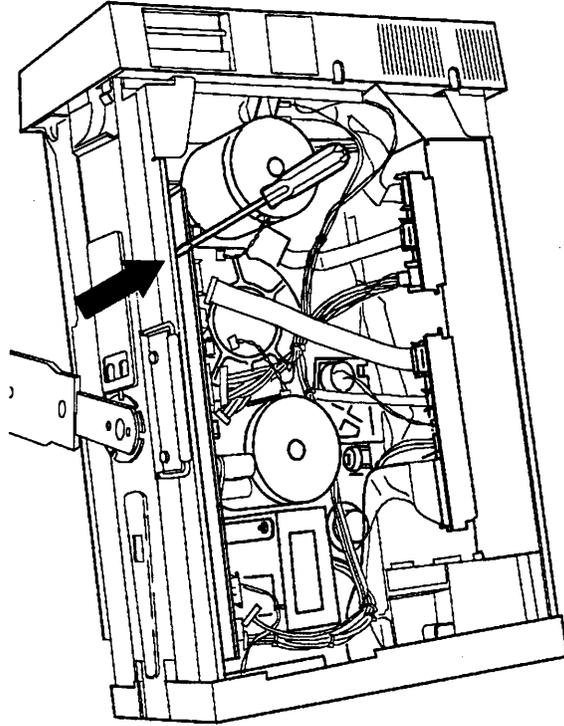
RH3B090-0

5

To permit easy removal of the motor/power card, do the following:

- Slide a flat-blade screwdriver (or similar tool) under the plastic insulating sheet (located under the card).
- Lift the edge of the sheet up on to the edge of the frame.

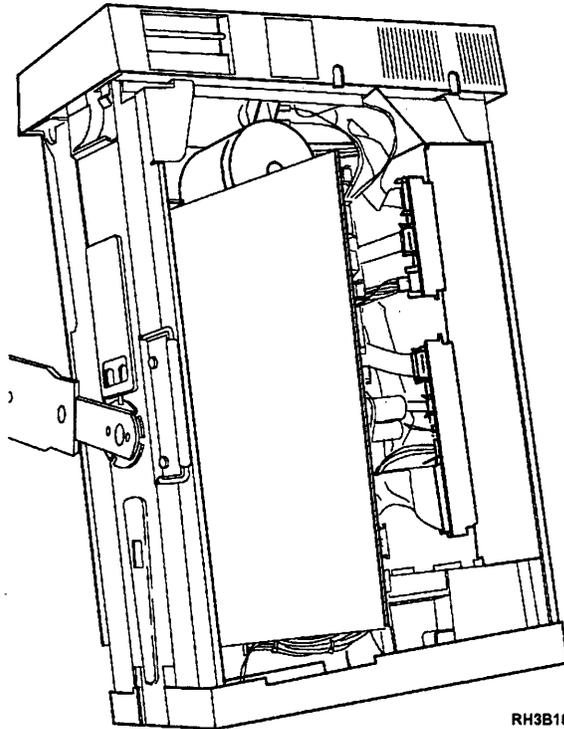
If this is not done, the sheet will jam against the frame and prevent the card from sliding out.



RH3B100-0

6

Slide the motor/power card out from the frame.

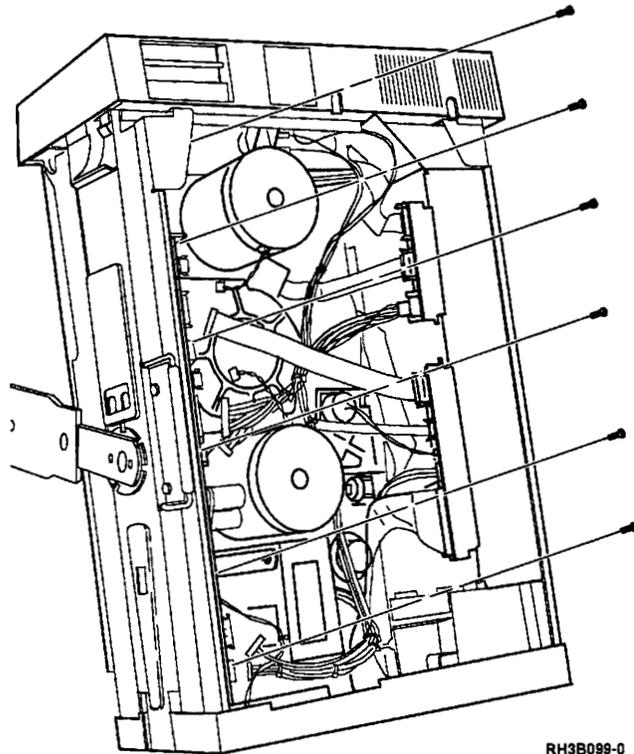


RH3B101-0

Motor/Power Card Installation

1

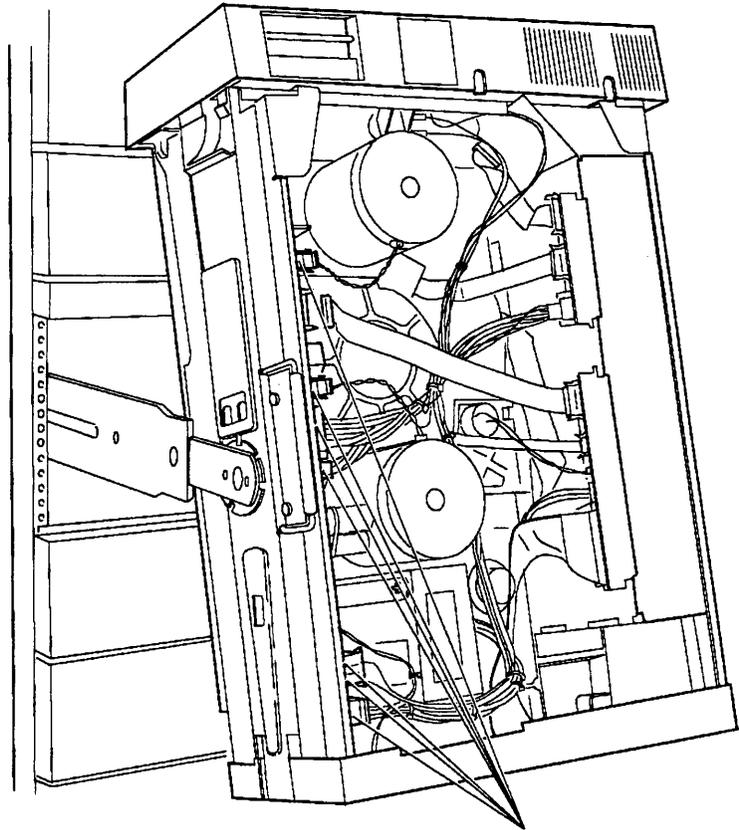
Slide the motor/power card into place and fasten it to the frame with the six TORX (T25) screws.



2

Attach the seven connectors on the motor/power card.

Note: Connect the cable with the blue and white wires to connector J6 and connect the cable with the two brown wires to connector J7.

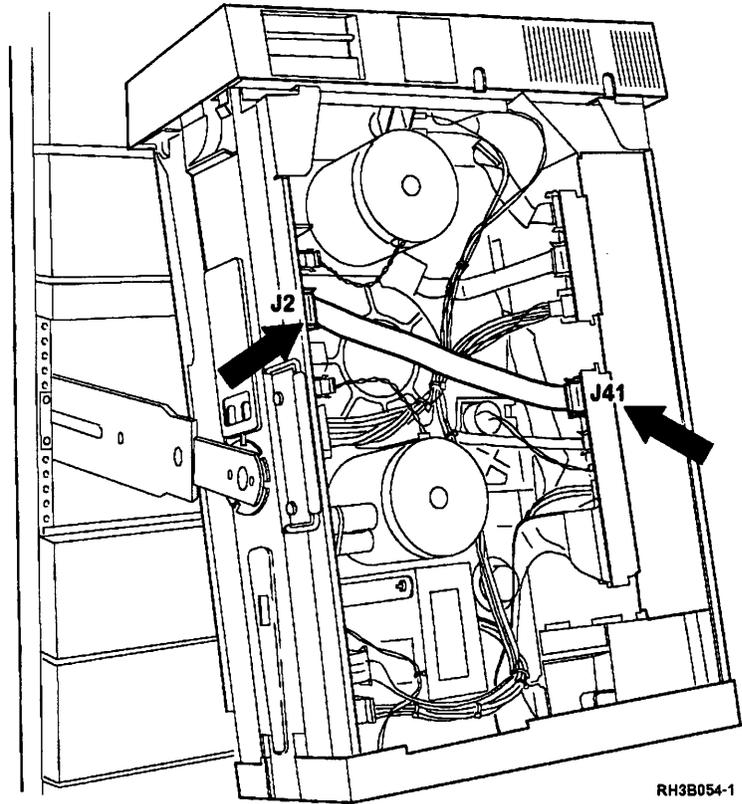


Motor/Power Card
Connectors

RH3B076-0

3

Connect the motor drive ribbon cable from J2 on the motor/power card to J41 on the connector card.



RH3B054-1

4

Place the 9348 in the operating position; see "Placing the 9348 in the Operating Position" on page 3-9.

5

Insert the CE test tape and run sequence test 2; see "Running Diagnostic Tests" on page A-5.

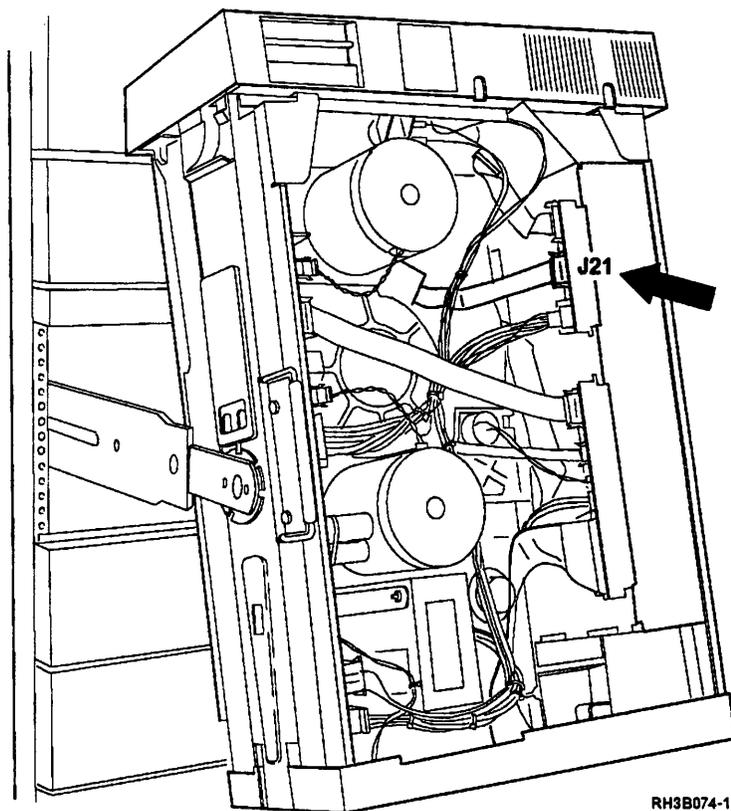
Sensors and Sensor Card Removal

1

Place the tape unit in the service position; see "Placing the 9348 in the Service Position" on page 3-1.

2

Disconnect the cable that attaches the sensor to J21 on the connector board.

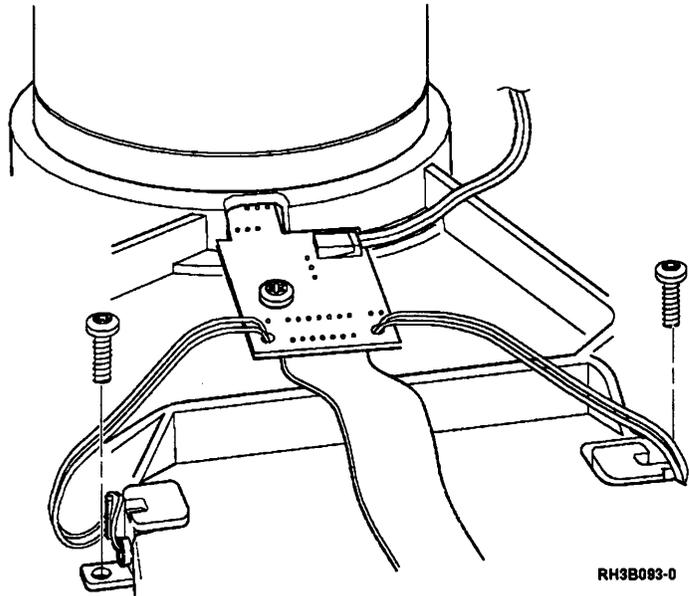


RH3B074-1

3

Remove the TORX (T25) screws from each tape-in-path sensor and pull the sensors away from the casting.

Note: At this point, the sensor card is still attached to the casting by a single screw and to the front panel by the front door open sensor wires.

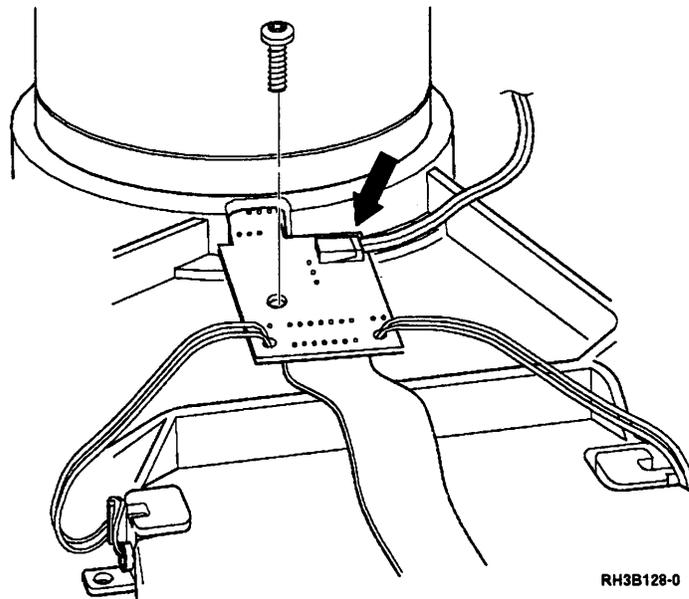


4

Disconnect the wires that go from the sensor card to the micro-switches on the front panel.

Note: This cable has a self-locking clip. Press the release on the connector before attempting to remove it.

Remove the single TORX (T25) screw that holds the sensor card to the casting. Remove the card.



Sensors and Sensor Card Installation

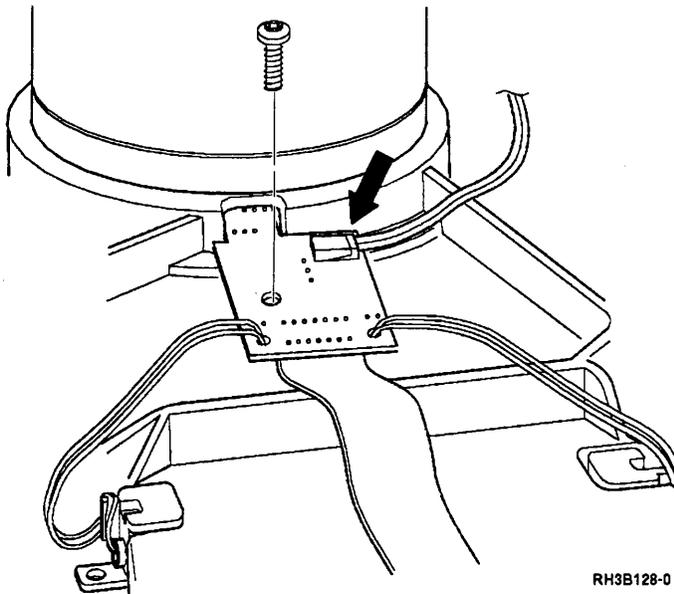
1

Place the new sensor card into position.

Insert the TORX (T25) screw that holds the card to the casting.

Hold the card against the left side of the opening under the supply reel motor. Tighten the screw.

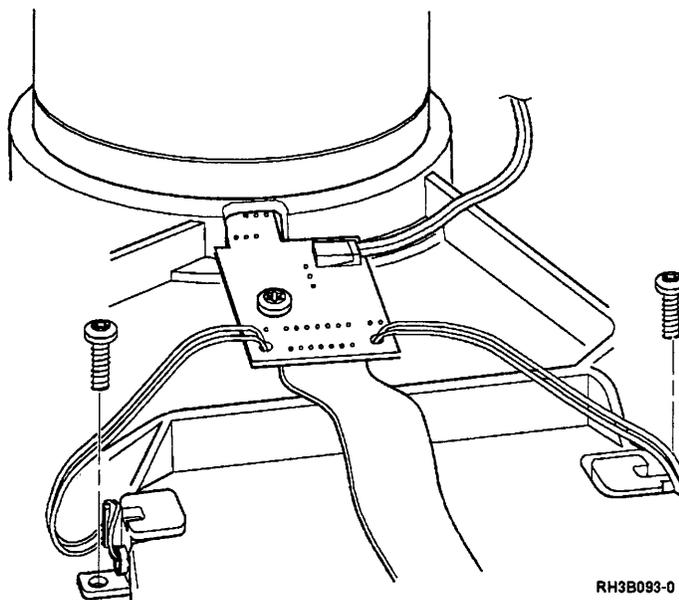
Connect the wires that go from the sensor card to the microswitches on the front panel.



2

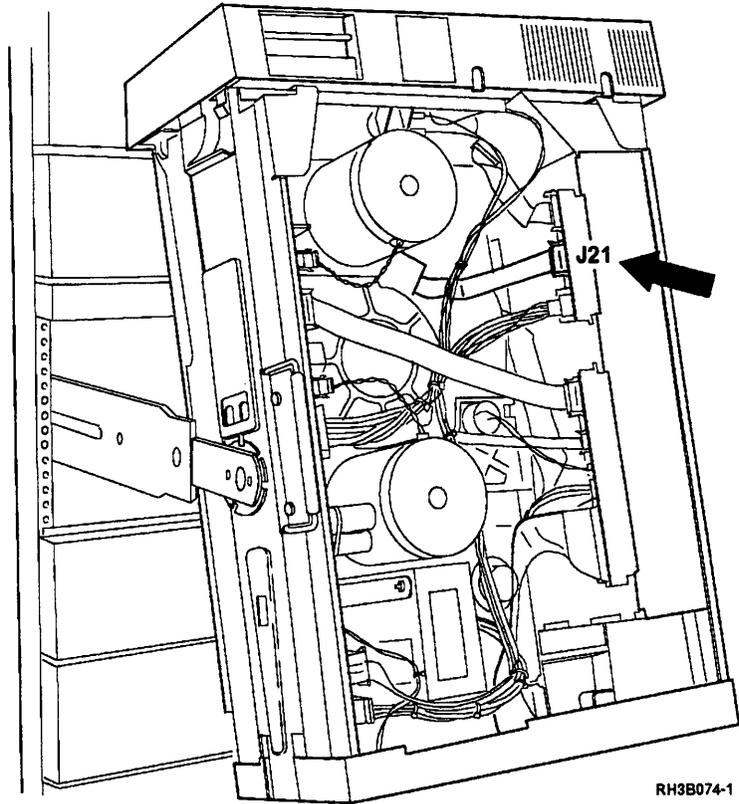
Put the two tape-in-path sensors into position.

Insert and tighten the TORX (T25) screw that holds each sensor in place.



3

Connect the ribbon cable from the sensor board to J21 on the connector card.



RH3B074-1

4

Place the 9348 in the operating position; see "Placing the 9348 in the Operating Position" on page 3-9.

5

Insert the CE test tape and run sequence test 2; see "Running Diagnostic Tests" on page A-5.

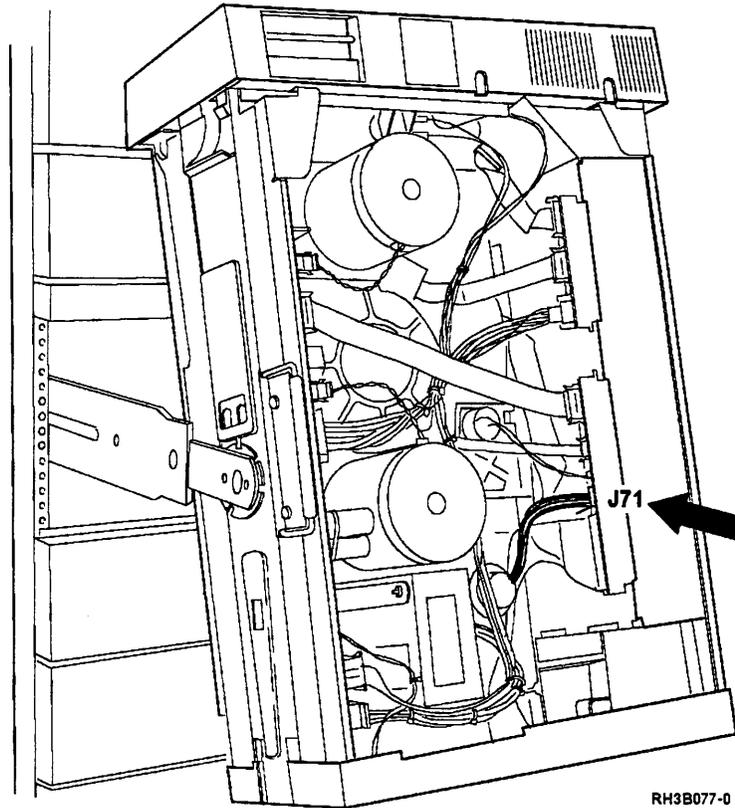
Speed Encoder Removal

1

Place the tape unit in the service position; see "Placing the 9348 in the Service Position" on page 3-1.

2

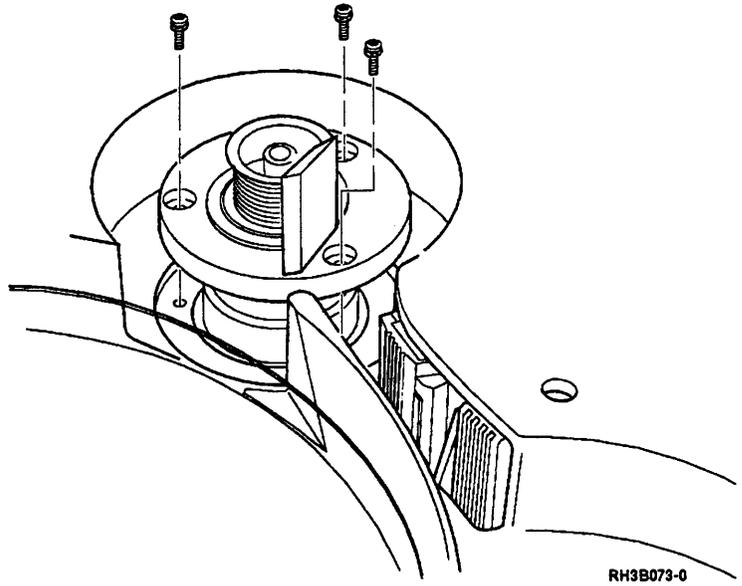
Remove the speed encoder cable from the connector (J71) labeled ENCODER on the connector card.



RH3B077-0

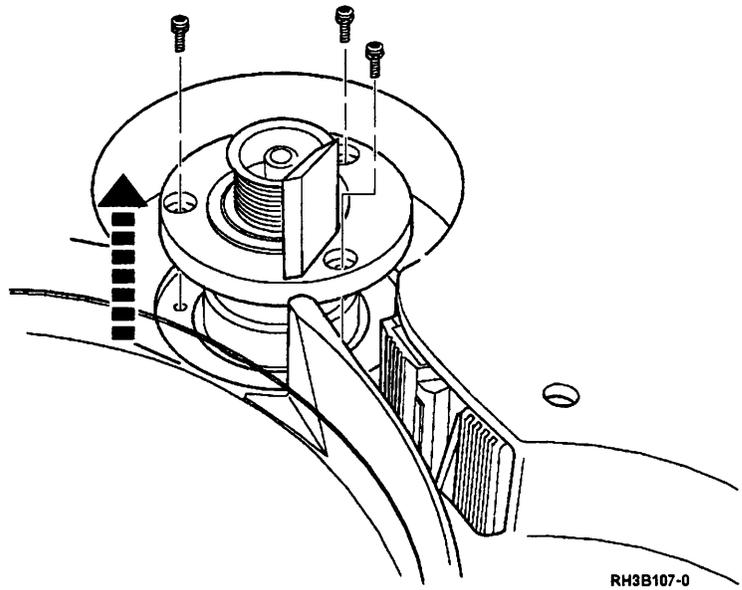
3

Remove the three TORX (T25) screws that hold the speed encoder base plate to the casting.



4

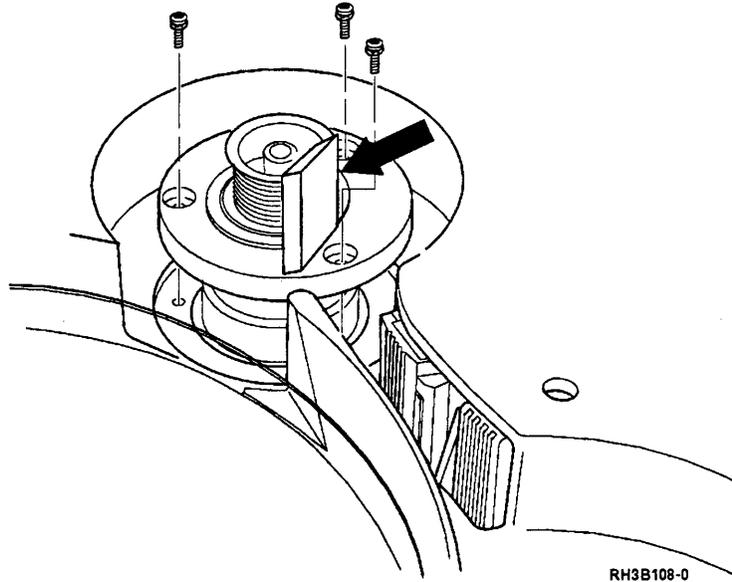
Pull the speed encoder up through the casting from the top.



Speed Encoder Installation

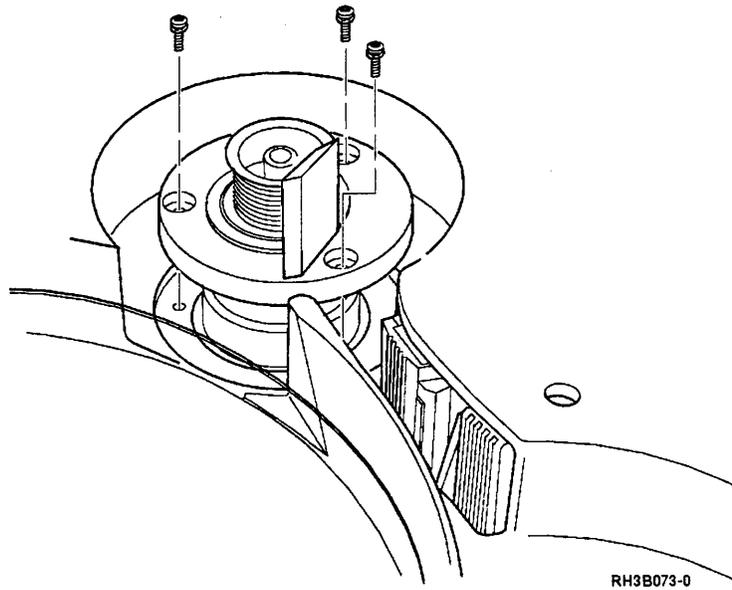
1

Insert the speed encoder through the casting so that the tape deflector is next to the tape path guide.



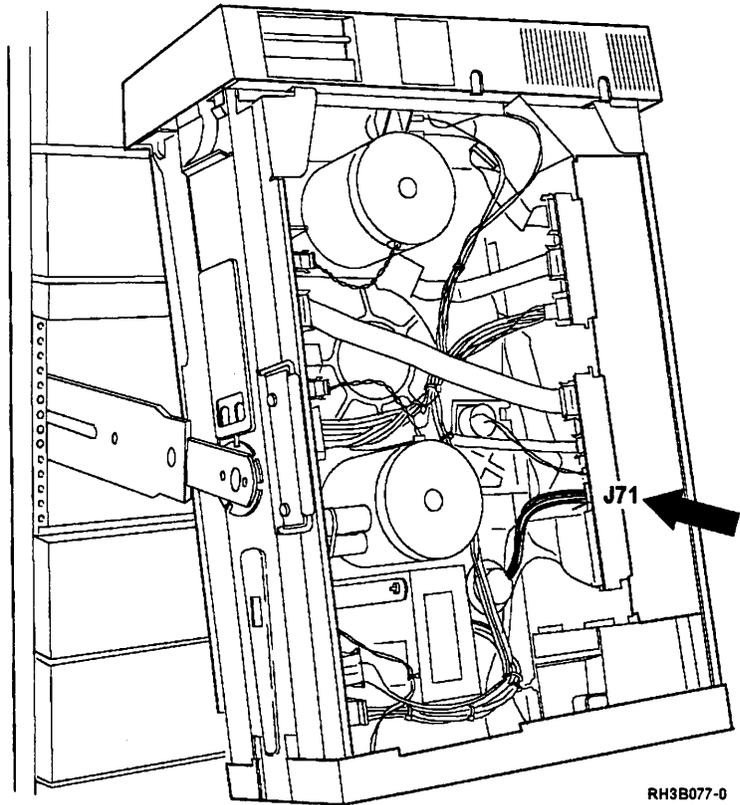
2

Insert and tighten the three TORX (T25) screws that hold the speed encoder base plate to the casting.



3

Attach the speed encoder cable to the connector (J71) labeled encoder on the connector card.



4

Place the 9348 in the operating position; see "Placing the 9348 in the Operating Position" on page 3-9.

5

Insert the CE test tape and run sequence test 2; see "Running Diagnostic Tests" on page A-5.

Tape Lifter Removal

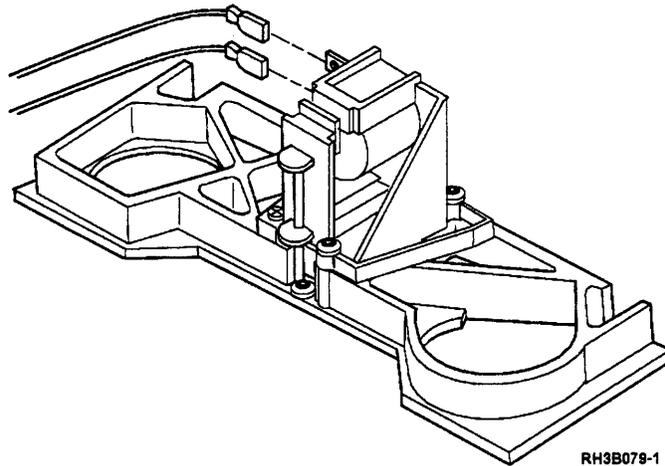
1

Place the tape unit in the service position; see "Placing the 9348 in the Service Position" on page 3-1.

2

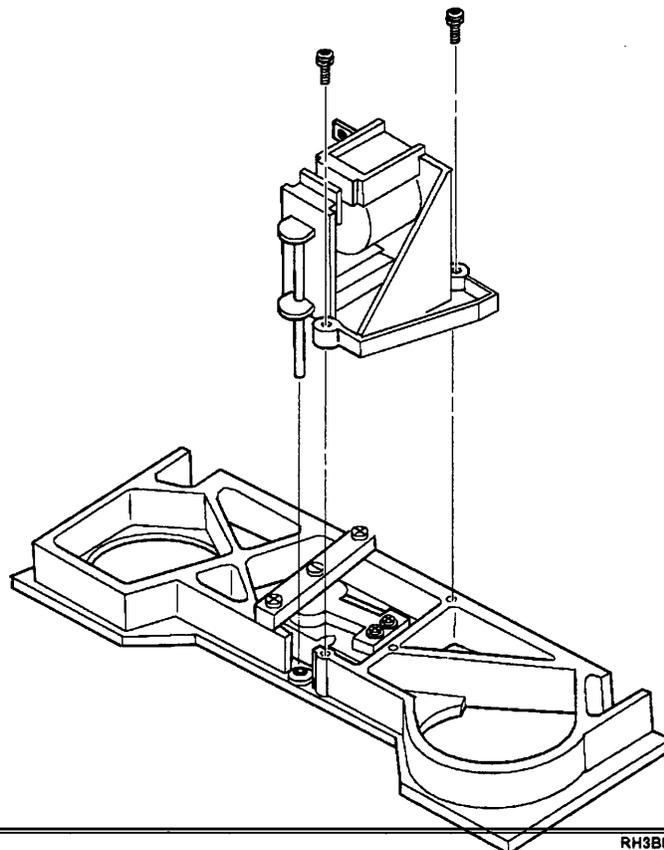
Warning: Do not loosen or remove the screws on the head plate assembly. These screws set the head skew adjustment. This is a factory adjustment only.

Remove the two wires from the clips on the tape lifter solenoid.



3

Remove the two TORX (T25) screws that hold the tape lifter in place and remove the unit.

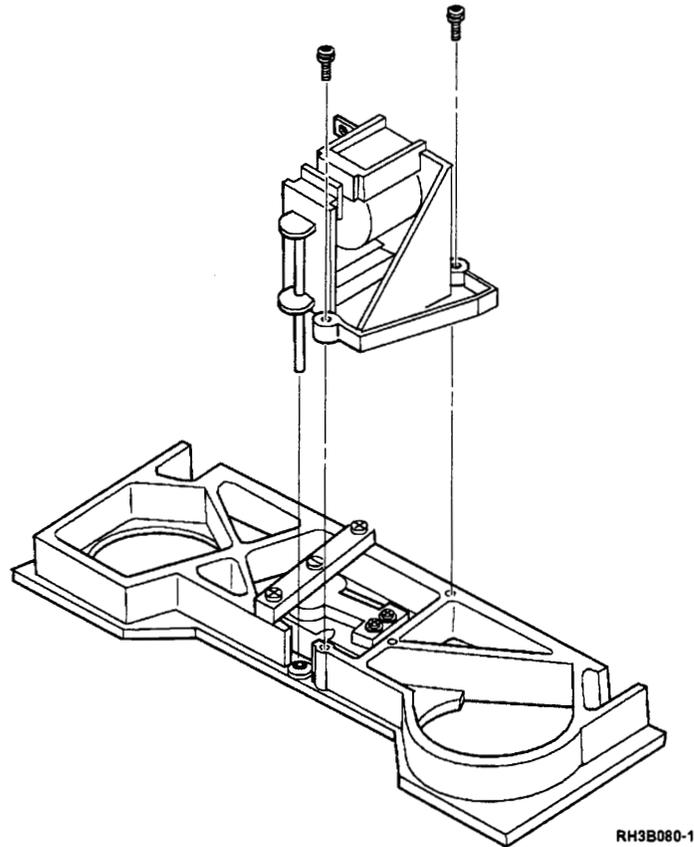


Tape Lifter Installation

1

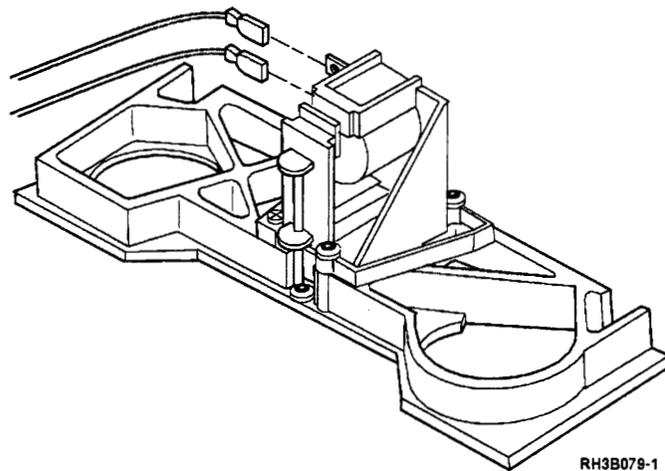
Place the tape lifter so that the rod passes between the head and the tape cleaner.

Insert and tighten the two TORX (T25) screws that hold the tape lifter in place.



2

Attach the two wires to the clips on the solenoid.



3

Place the 9348 in the operating position; see "Placing the 9348 in the Operating Position" on page 3-9.

4

Insert the CE test tape and run sequence test 2; see "Running Diagnostic Tests" on page A-5.

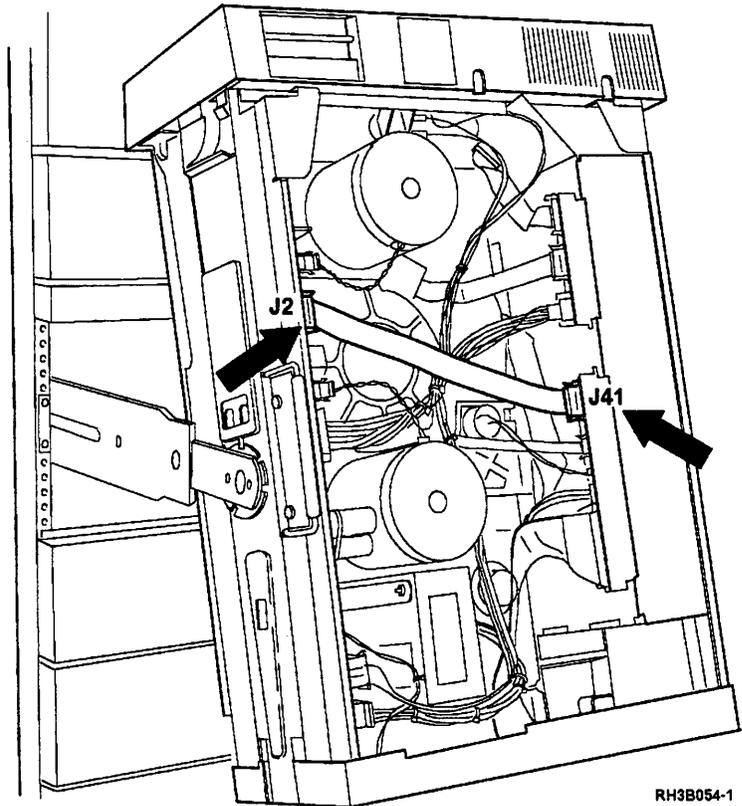
Tension Arm and BOT/EOT Sensor Removal

1

Place the tape unit in the service position; see "Placing the 9348 in the Service Position" on page 3-1.

2

Remove the motor drive ribbon cable from J41 on the connector card and from J2 on the motor/power card.

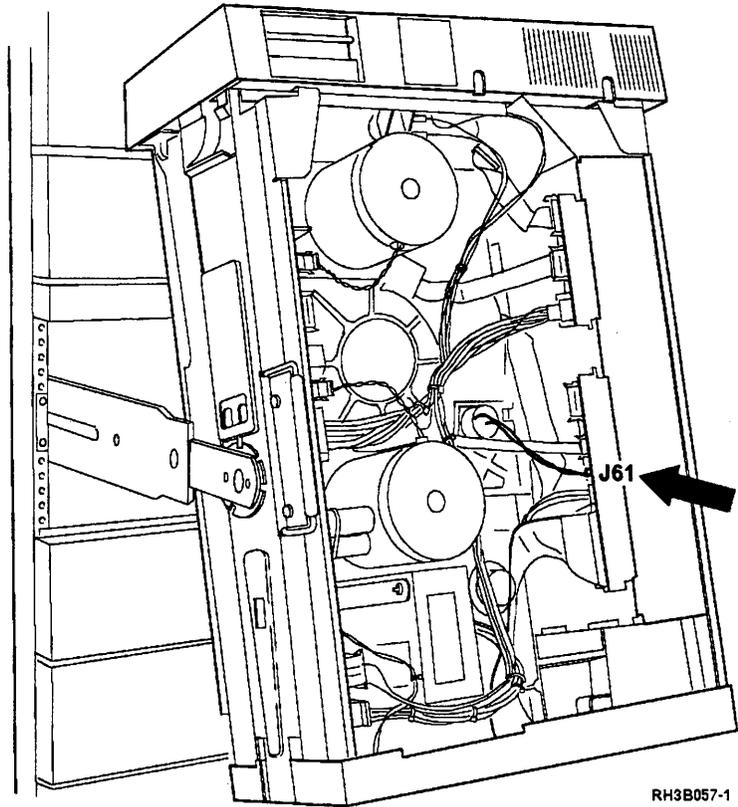


RH3B054-1

3

Note: The next two cables have self-locking clips. Press the release on the connector before attempting to remove it.

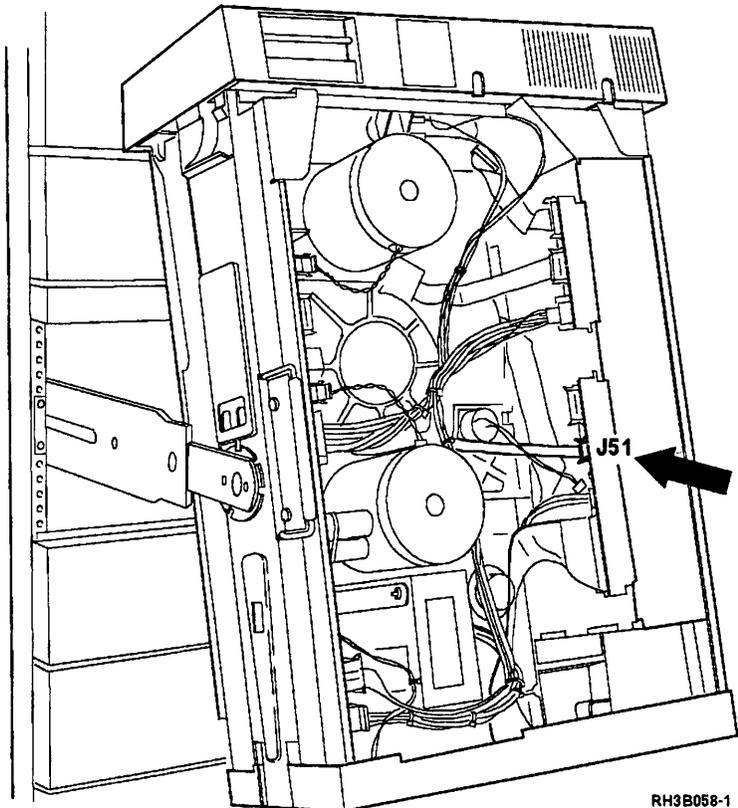
Remove the tension arm position sensor cable from the connector marked TENSION on the connector card (J61).



RH3B057-1

4

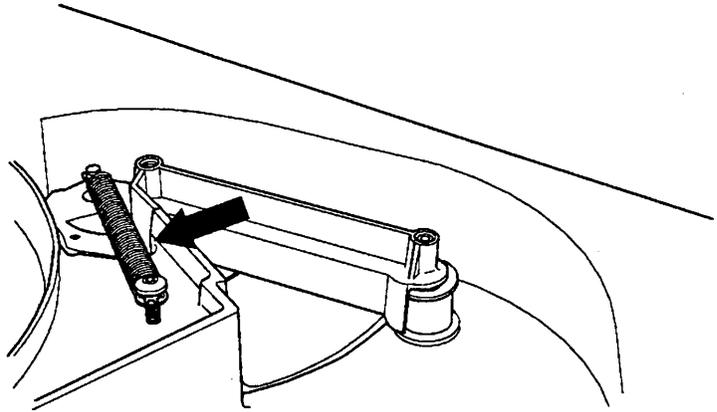
Remove the tension arm BOT/EOT sensor cable from the connector marked BOT/EOT on the connector card (J51).



RH3B058-1

5

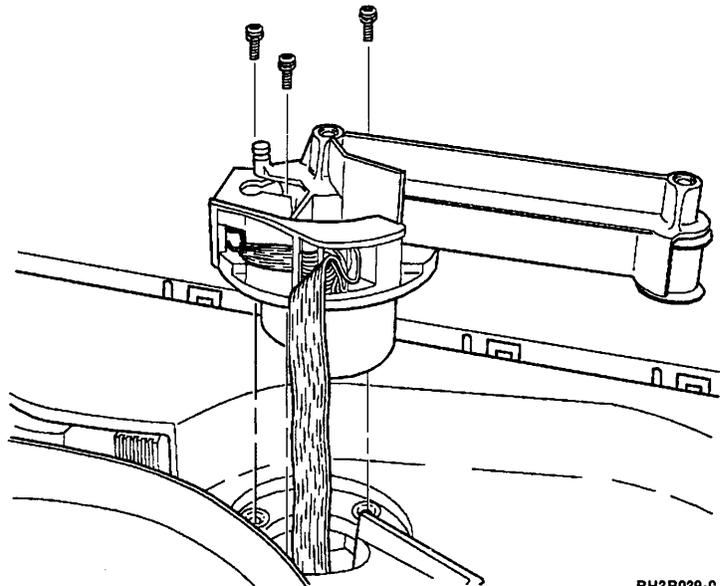
Disconnect the spring from the tension arm.



RH3B056-0

6

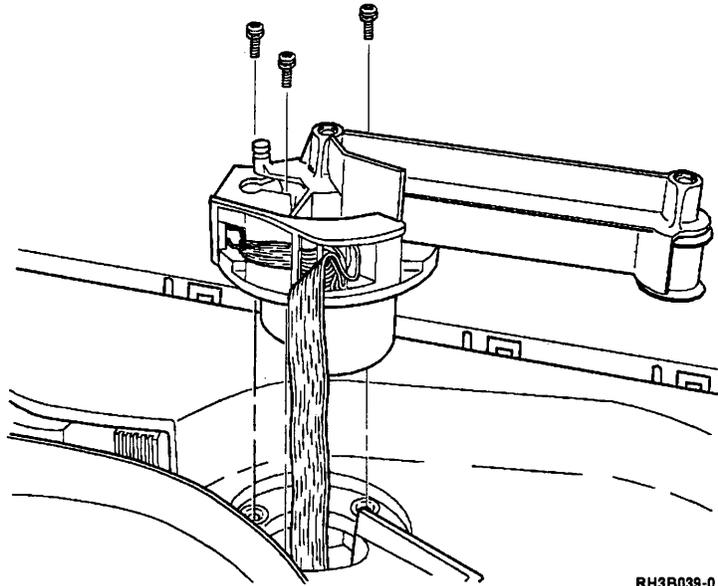
Remove the three TORX (T25) screws that hold the tension arm base plate to the casting.



RH3B039-0

7

Pull the tension arm assembly out of the casting. The BOT/EOT sensor assembly is now setting on the tension arm assembly.

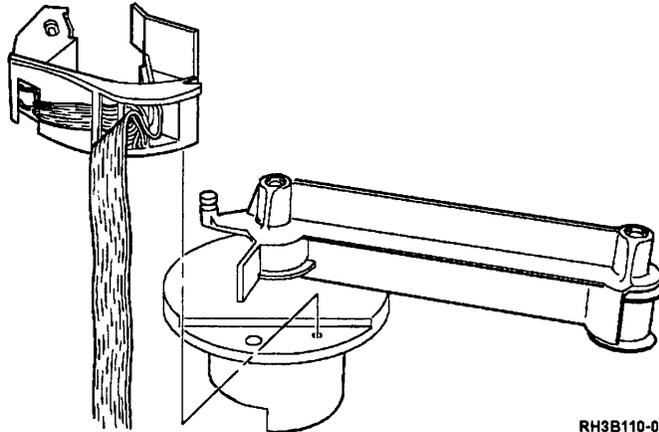


RH3B039-0

8

Lift the BOT/EOT assembly away from the tension arm assembly.

Note: You may have to move the BOT/EOT assembly a little and slightly rotate the tension arm to loosen the BOT/EOT assembly.



RH3B110-0

Tension Arm and BOT/EOT Sensor Installation

Note: Whether the BOT/EOT sensor is exchanged or the buffer arm is exchanged but the good BOT/EOT sensor is kept, replacement remains the same.

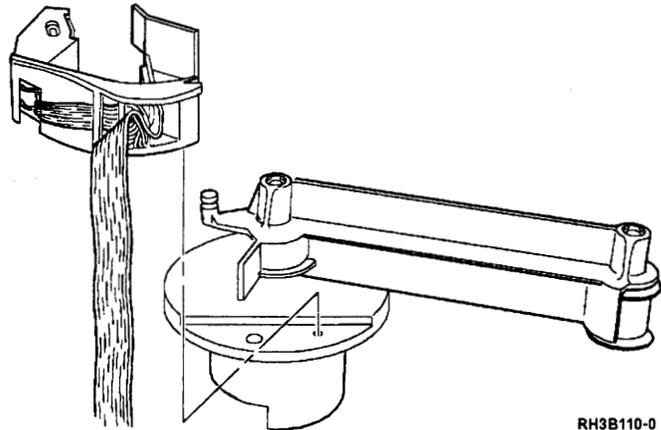
1

Put the BOT/EOT sensor assembly over the metal flag near the hub of the tension arm.

Place the sensor in position by placing the pin on the bottom of the sensor into the hole on the tension arm base plate.

Align the screw hole on the sensor over the hole on the tension arm base plate.

Once aligned, the sensor assembly should go into the depression in the tension arm base plate.



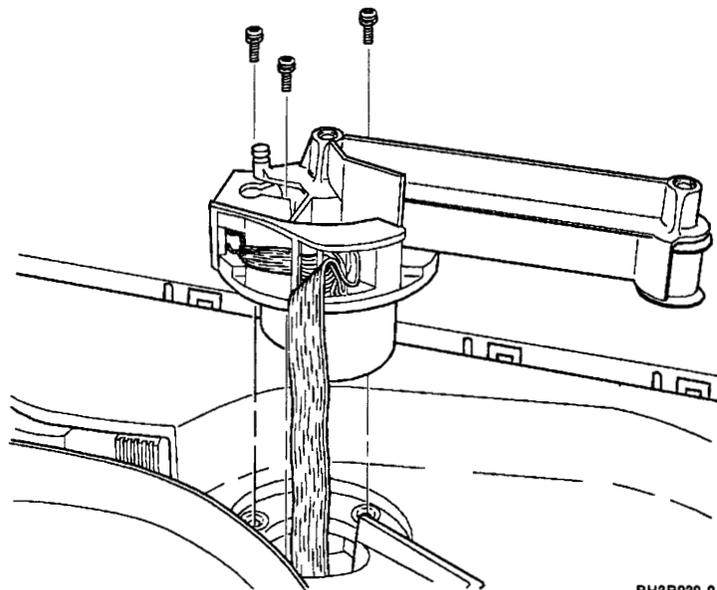
RH3B110-0

2

Insert the assembly into the casting.

Place the sensor cable (coming out from the bottom of the arm) directly through the hole.

Place the EOT/BOT cable (the wider cable) next to the sensor cable, through the gap in the casting.

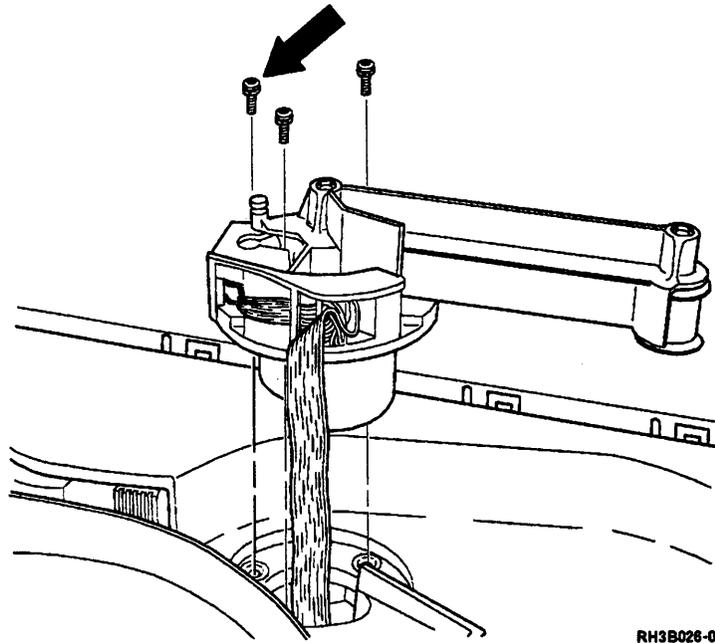


RH3B039-0

3

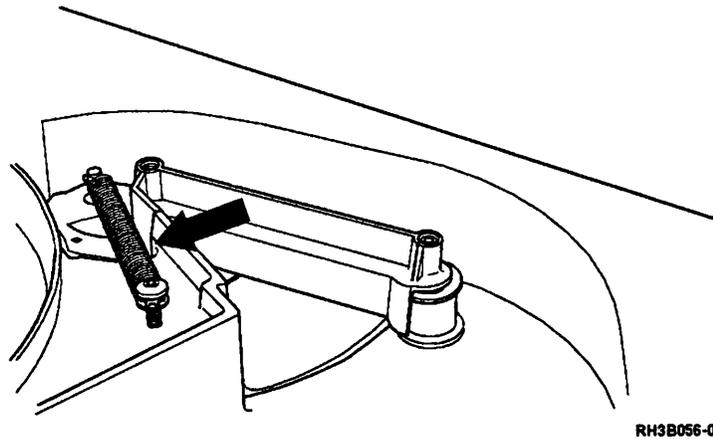
Insert the three TORX (T25) screws that connect the tension arm base plate to the head plate.

Tighten the screw indicated by the arrow first.



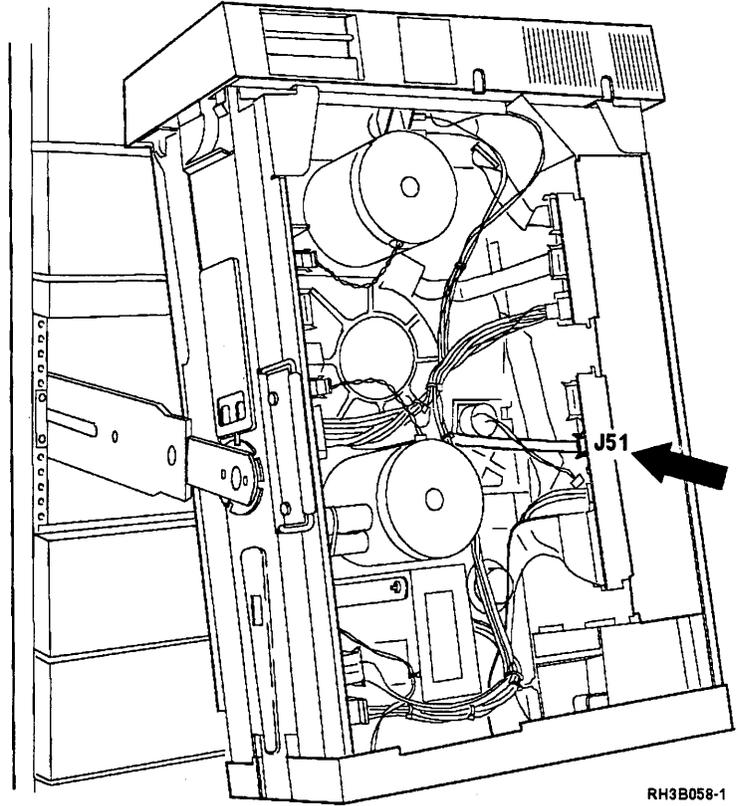
4

Put the spring back on the pin of the tension arm.



5

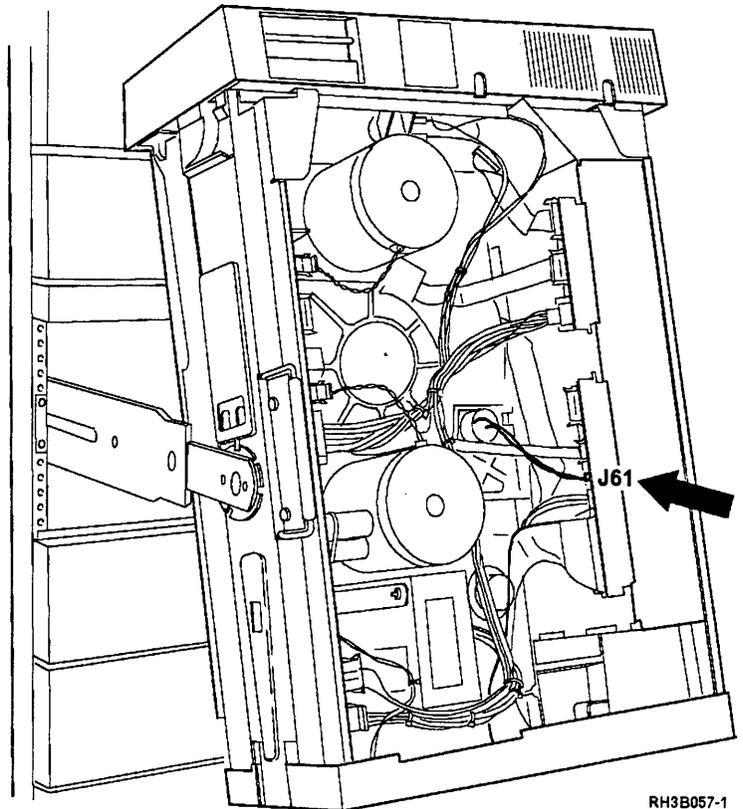
Attach the tension arm BOT/EOT sensor cable to the connector marked BOT/EOT on the connector card (J51).



RH3B058-1

6

Attach the tension arm sensor cable to the connector marked TENSION on the connector card (J61).

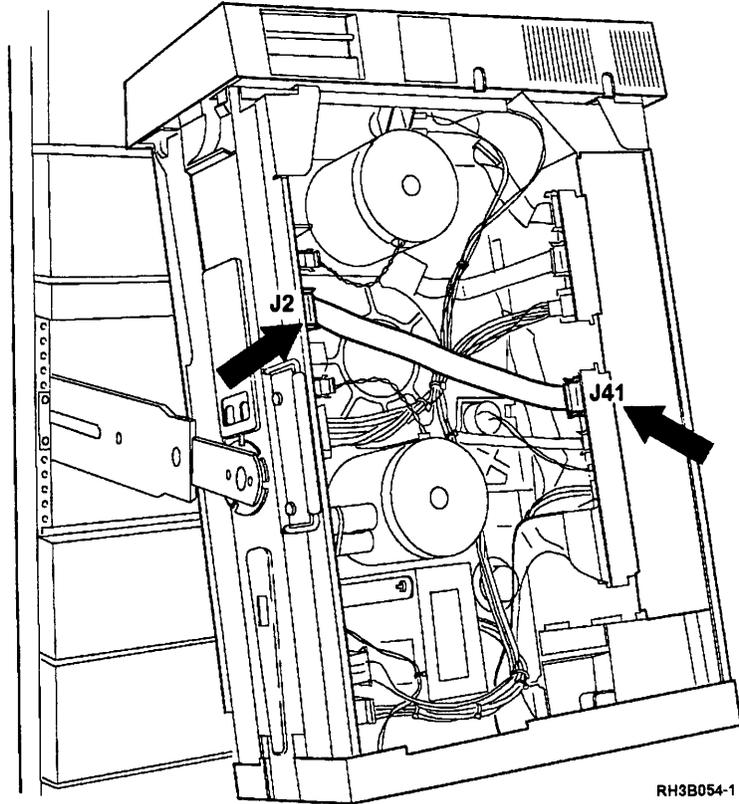


RH3B057-1

7

Attach the motor drive ribbon cable to J41 on the connector card and to J2 on the motor/power card.

Note: The connectors are made so that they can only be connected one way.



RH3B054-1

8

Place the 9348 in the operating position; see "Placing the 9348 in the Operating Position" on page 3-9.

9

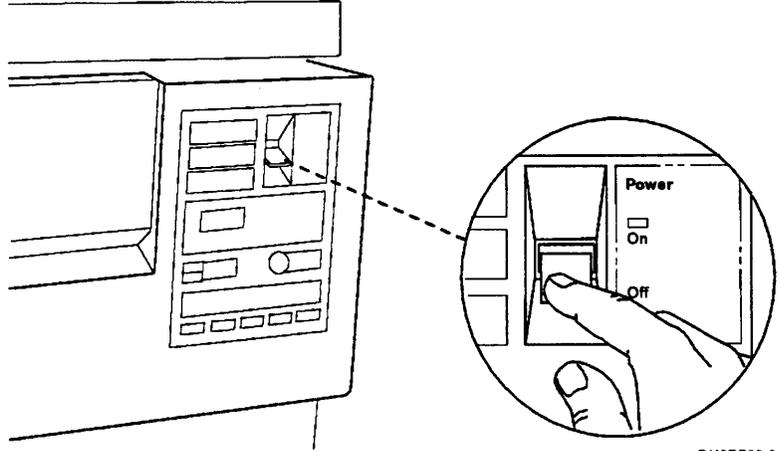
Insert the CE test tape and run sequence test 2; see "Running Diagnostic Tests" on page A-5.

Head Plate Assembly Removal

Use this procedure to remove any of the following: speed encoder, tape lifter, cleaner block, or head with plate assembly.

1

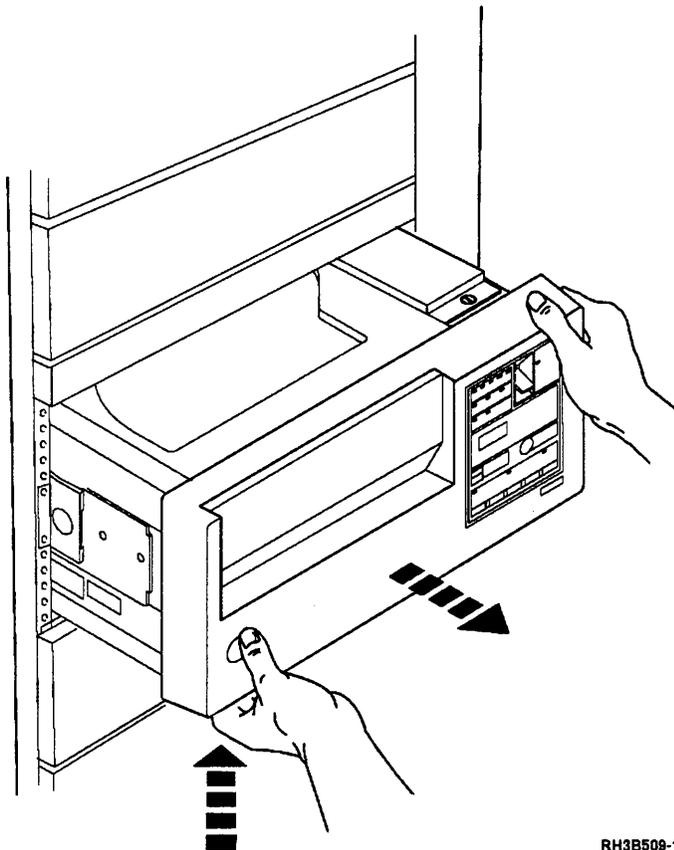
Set the Power switch on the control panel to the Off position.



RH3B508-0

2

Pull the release lever located under the front panel as shown. Then pull the 9348 out of the rack until the slide locking tabs lock.



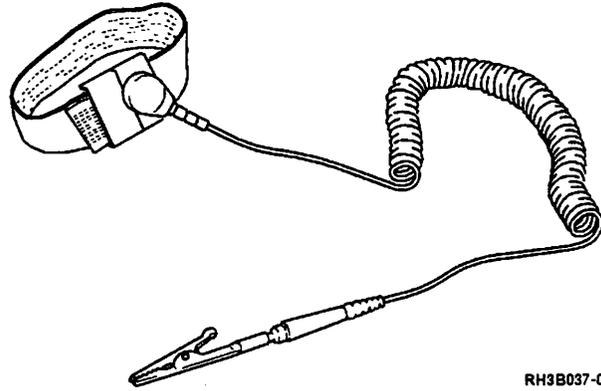
RH3B508-1

3

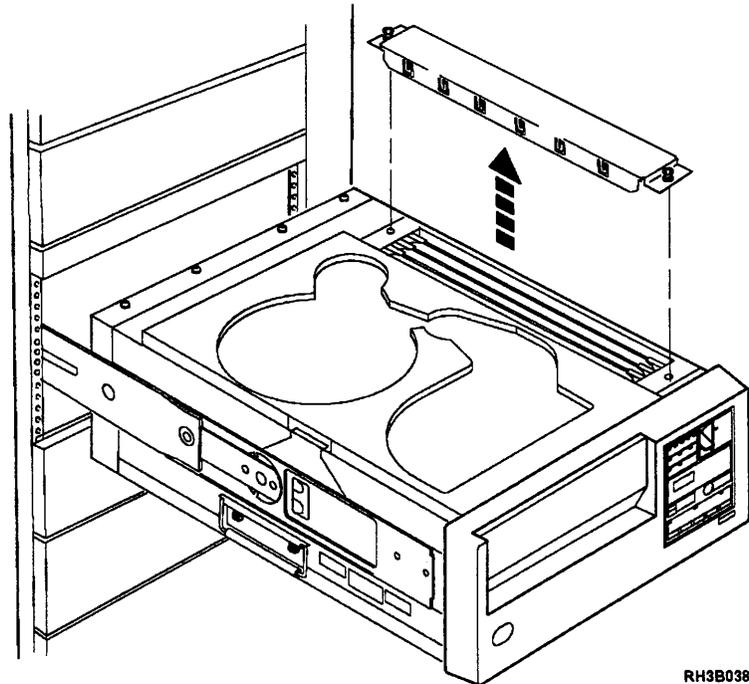
Warning: Use antistatic mats and either wrist or heel straps to prevent static damage during repair.

Remove the card enclosure cover on the right side of the casting.

Note: Each end of the cover is held by a spring-loaded screw. Use a flat-blade screwdriver to loosen the screws, if necessary.



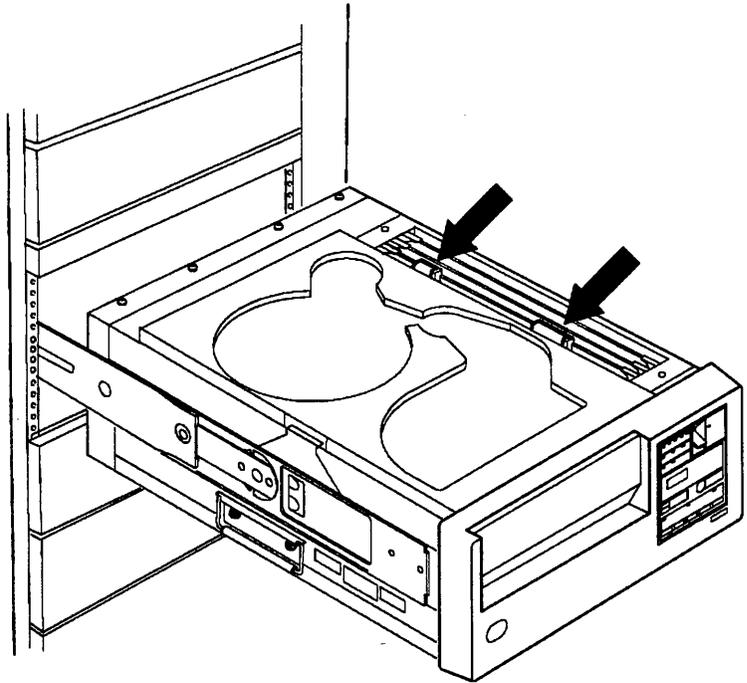
RH3B037-0



RH3B038-1

4

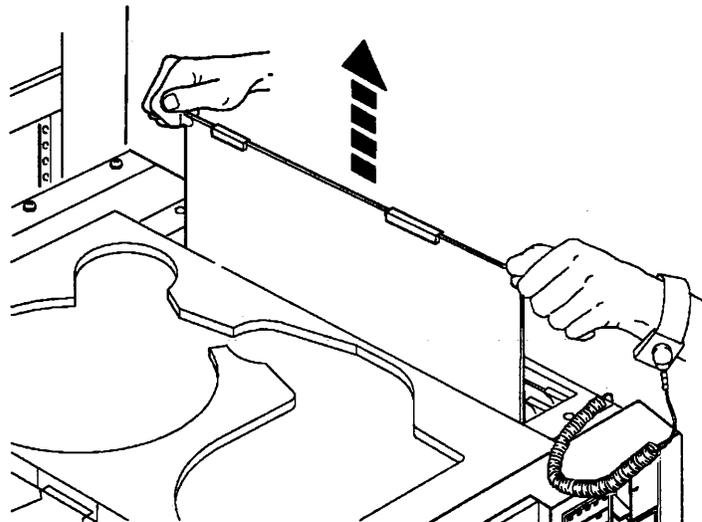
Disconnect the read cable and the write cable from the top of the read/write card.



RH3B102-0

5

Remove the read/write card from the card enclosure. This makes it easier to pull the cable connectors back through the card enclosure.



RH3B103-0

6

Warning: Ensure that the read/write head is covered during removal as the head can be easily damaged.

Cover the read/write head to protect it from being damaged during removal.

7

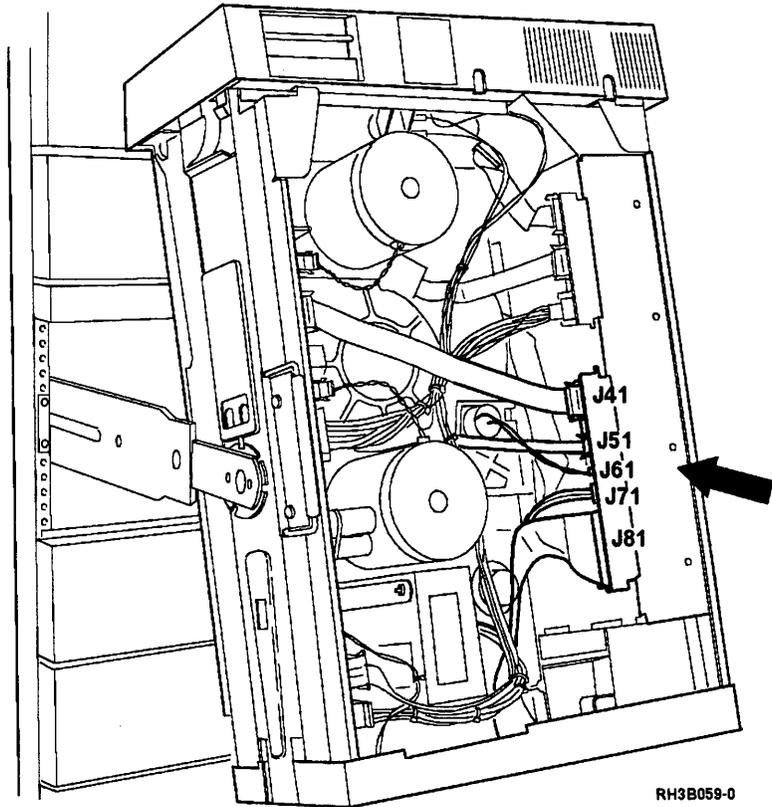
Perform the procedure "Tension Arm and BOT/EOT Sensor Removal" on page 3-59.

Then continue with step 8.

8

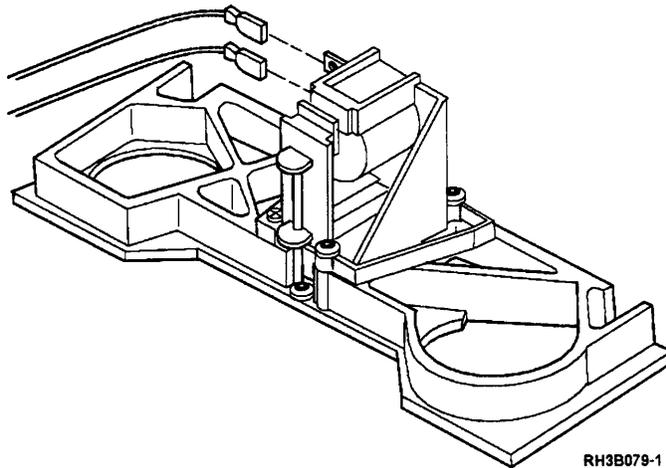
Disconnect and move the cables shown.

Note: Some cables have clips. Press the release on the connector before attempting to remove it.



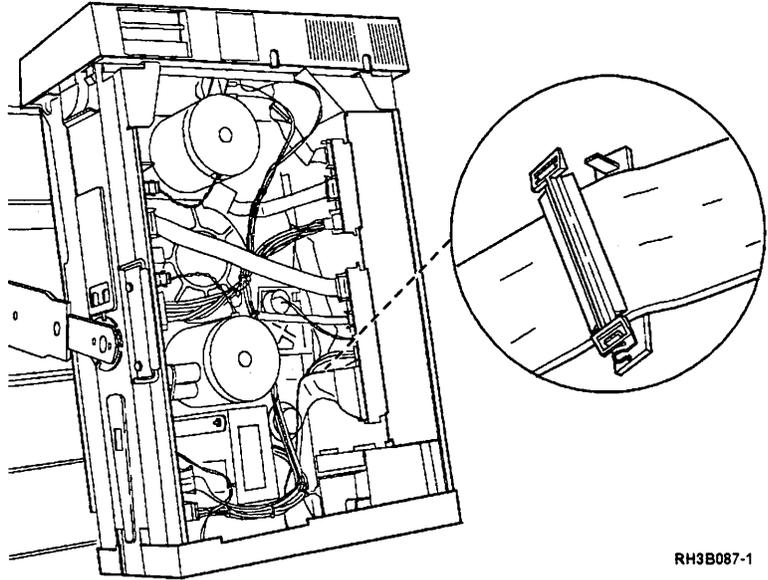
9

Disconnect the two tape lifter solenoid wires.



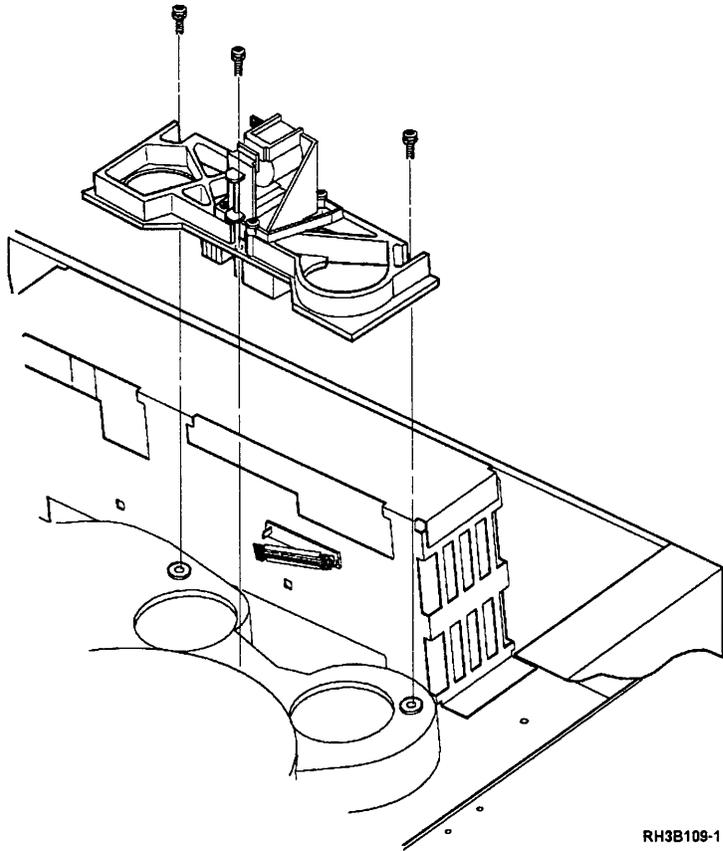
10

Open the plastic cable clip that holds the write (long) cable to the side of the card enclosure.



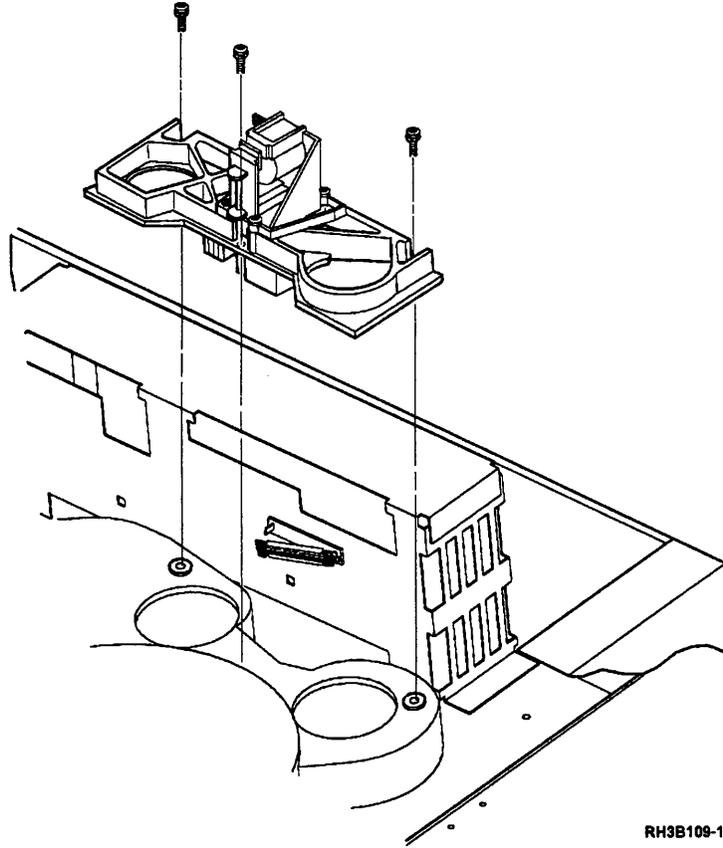
11

Remove the three TORX (T25) screws that hold the head plate assembly to the casting.



12

Pull the head plate assembly out of the frame. Carefully pull the read and write cables through the card enclosure as the head plate assembly comes through the frame.



RH3B109-1

Head Plate Assembly Installation

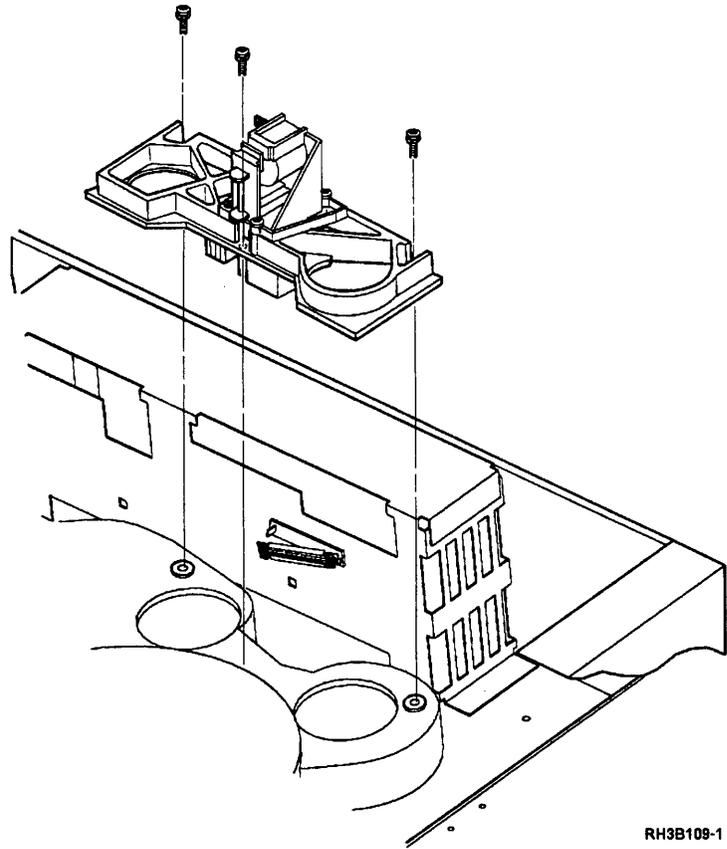
1

Warning: Cover the tape head during replacement as the head can be easily damaged.

Place the head plate assembly into its position in the casting.

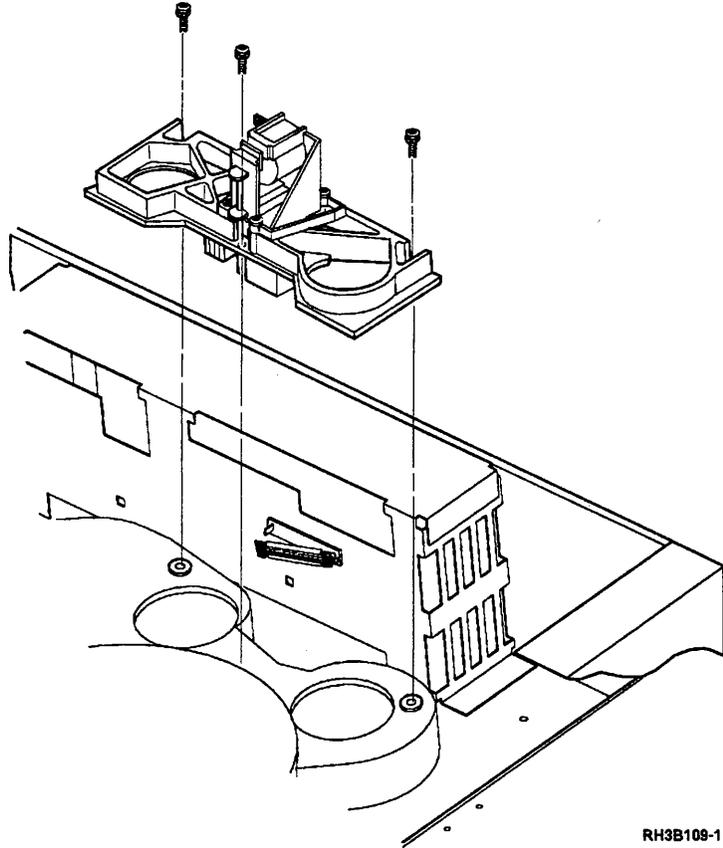
Insert the read and write cables into the card enclosure as the head plate assembly is put into position.

Note: The read and write cable connectors should face the cards in the card enclosure.



2

Insert and tighten the three TORX (T25) screws that hold the head plate assembly to the casting.



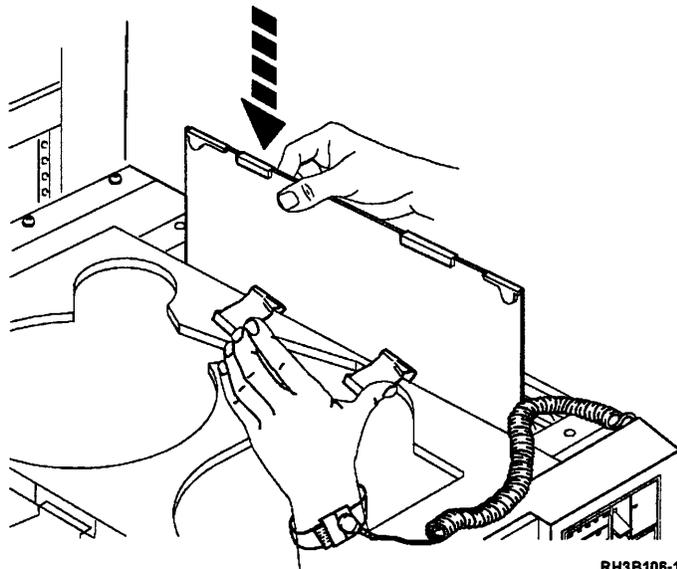
RH3B108-1

3

Warning: Use antistatic mats and either wrist or heel straps to prevent static damage during repair.

Hold the read and write cable connectors to the side. Then insert the read/write card into the card enclosure.

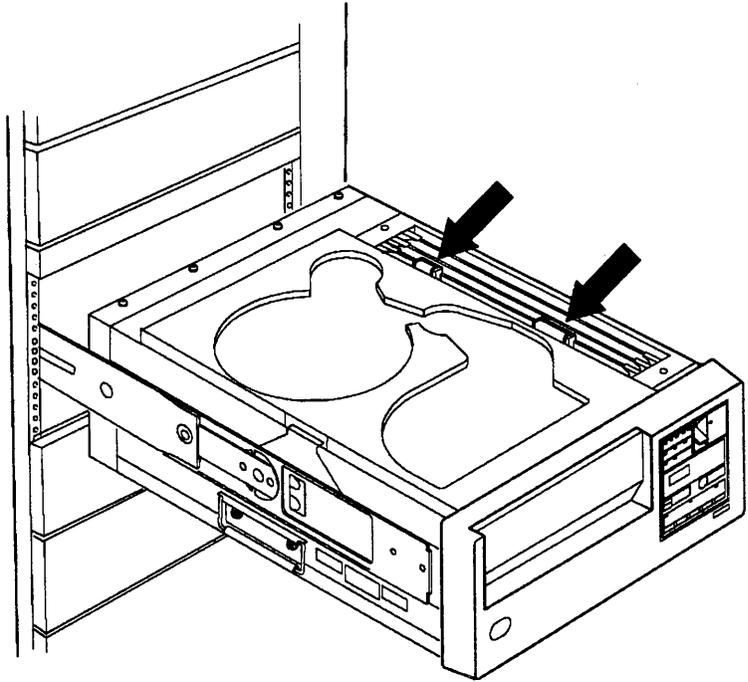
Do not leave excess read and write cable above the top of the card. Excess cable will prevent the card enclosure cover from closing.



RH3B106-1

4

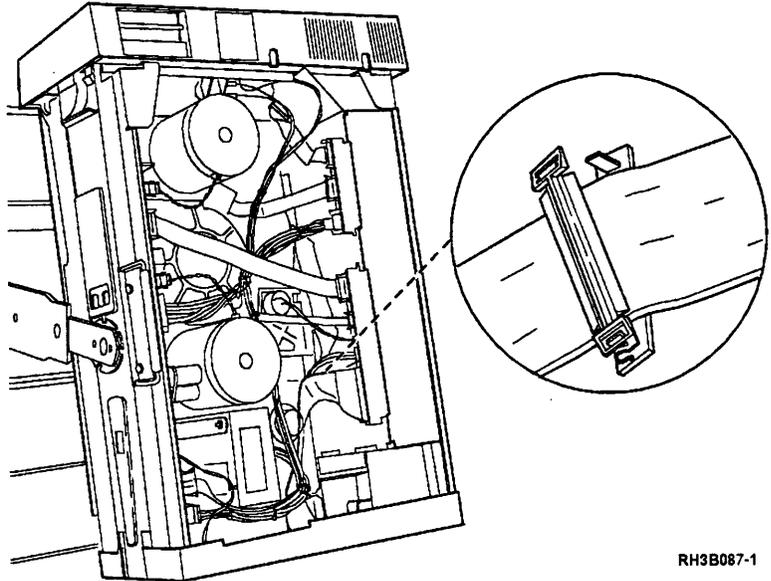
Connect the read cable and the write cable to the read/write card.



RH3B102-0

5

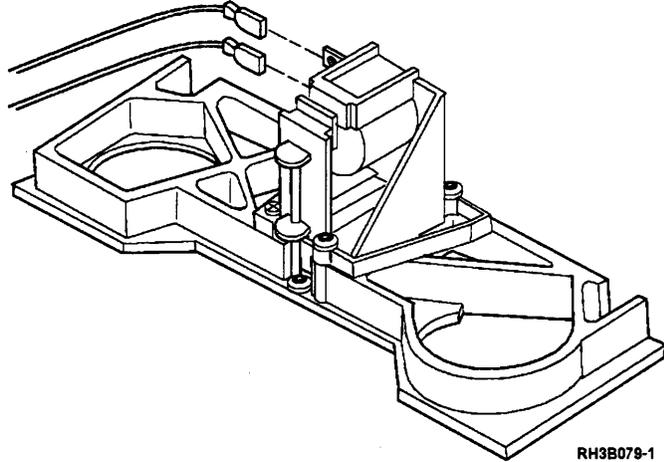
Fasten the plastic cable clip that holds the write (long) cable to the side of the card enclosure.



RH3B087-1

6

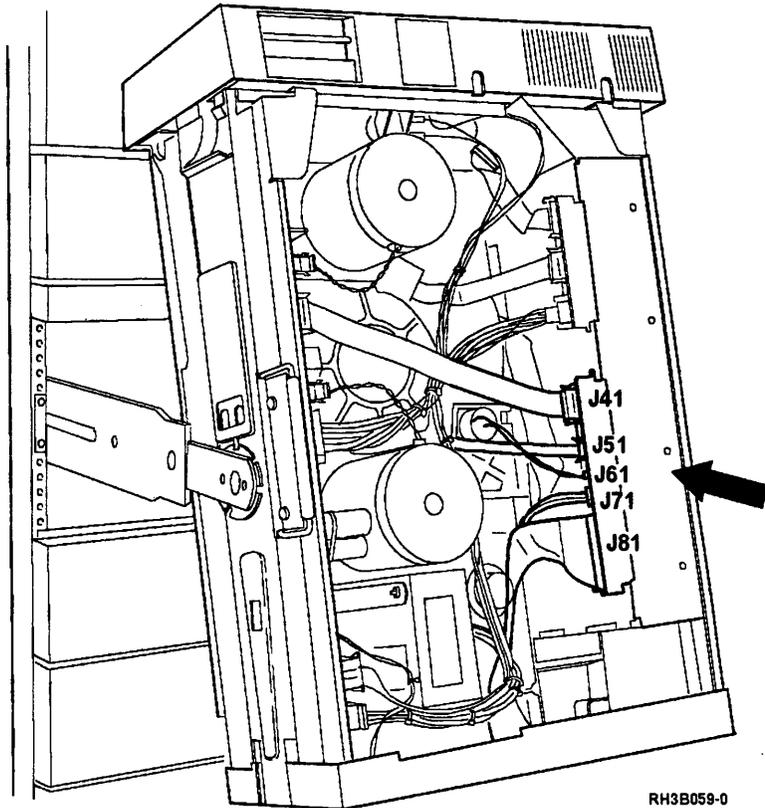
Connect the two tape lifter solenoid wires.



RH3B078-1

7

Connect the cables shown to the connector card.



RH3B059-0

8

Perform the procedure "Tension Arm and BOT/EOT Sensor Installation" on page 3-63.

Then continue with step 9.

9

Ensure that the read/write head is clean and insert the CE test tape reel.

Run sequence test 99; see "Running Diagnostic Tests" on page A-5.

Note: For parameter B, select SAVE.

10

Insert the CE test tape and run sequence test 2; see "Running Diagnostic Tests" on page A-5.

Motors and Hubs Removal

The same procedure is used to remove either the supply motor, or the take-up motor, and their hubs.

If only a hub is being removed, only do steps 3 and 4.

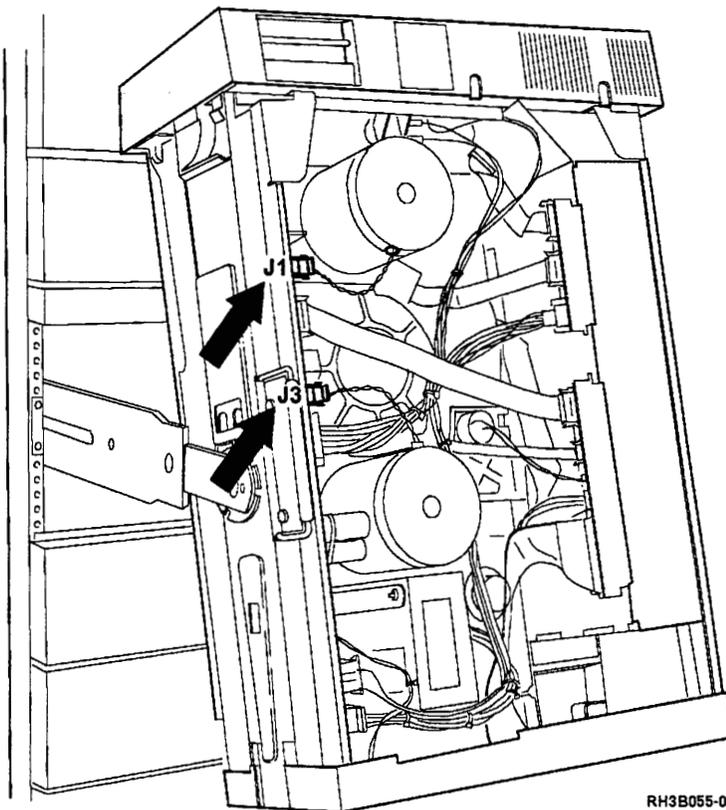
1

Place the tape unit in the service position; see "Placing the 9348 in the Service Position" on page 3-1.

2

Disconnect the motor power cable from the Motor/Power card.

- The supply motor connector is J1
- The take-up motor connector is J3

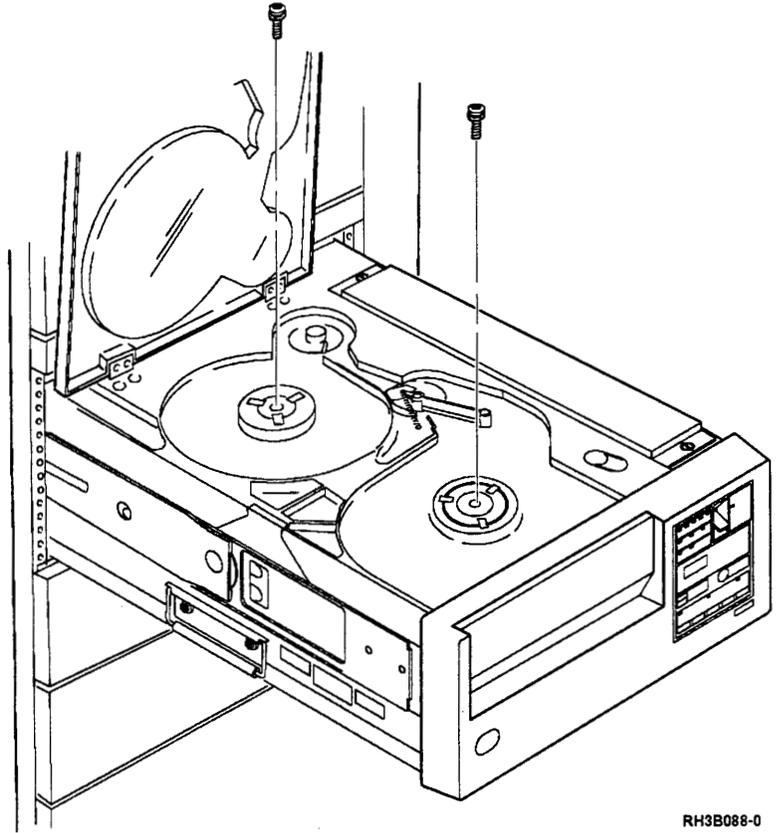


RH3B055-0

3

Loosen the TORX (T25) screw in the center of the hub.

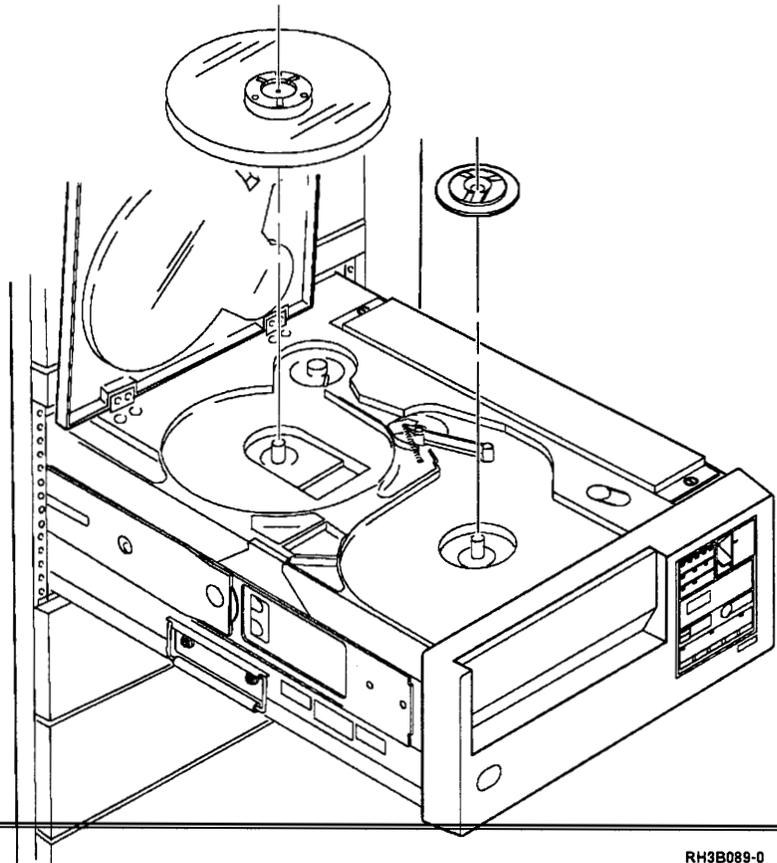
Note: The screw does not have to be removed; the screw can be lifted off with the hub.



RH3B088-0

4

Lift the hub off.

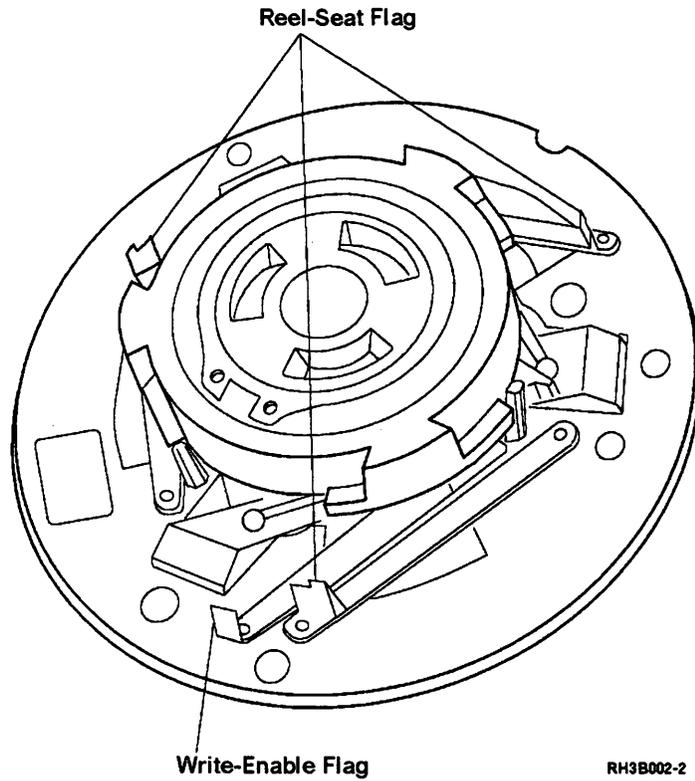


RH3B089-0

5

When the supply hub is being inspected for possible damage, turn the supply hub over and inspect the reel-seat flags and the write-enable flag.

If the flags are broken or if they do not remain in place, exchange the supply hub.



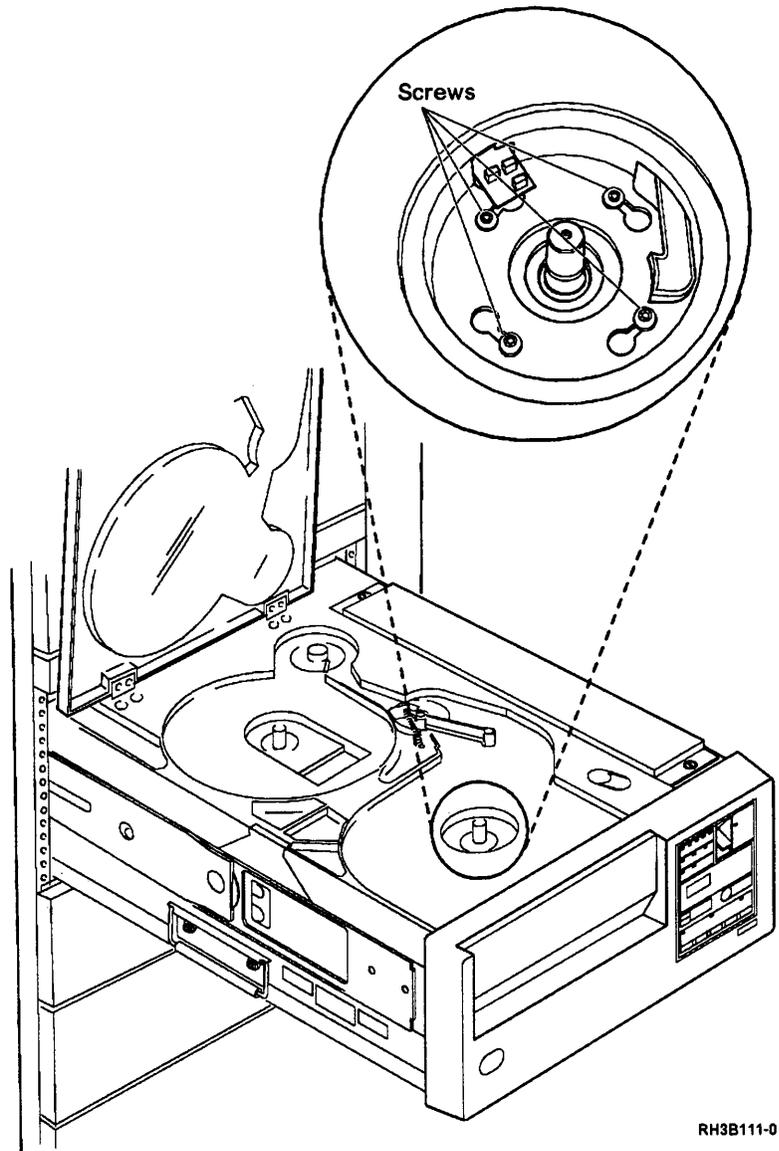
RH3B002-2

6

From the top, loosen (do not remove) the four TORX (T25) screws that hold the motor.

CAUTION:

If the motor is turned, or the screws removed, it may fall out the bottom of the tape unit.

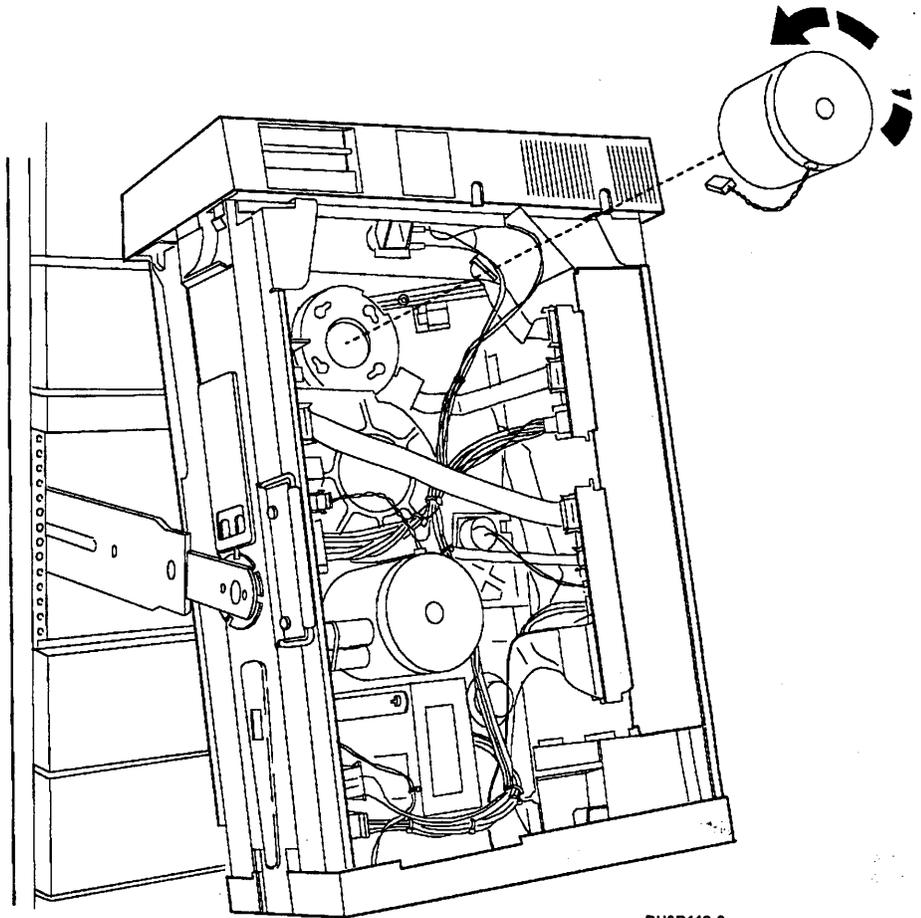


RH3B111-0

7

Warning: When removing the supply motor, it is possible to damage the sensor card with one of the motor screws.

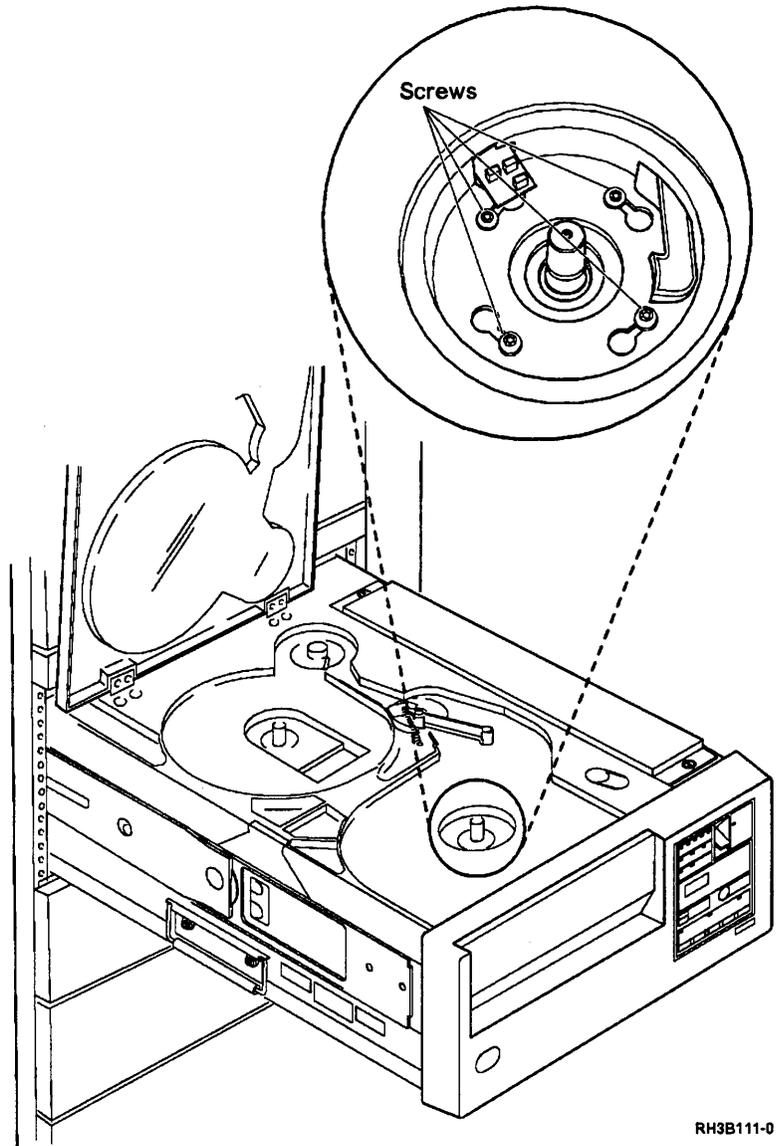
Rotate the motor until the screws enter the wide part of the slot in the casting.



RH3B112-0

3

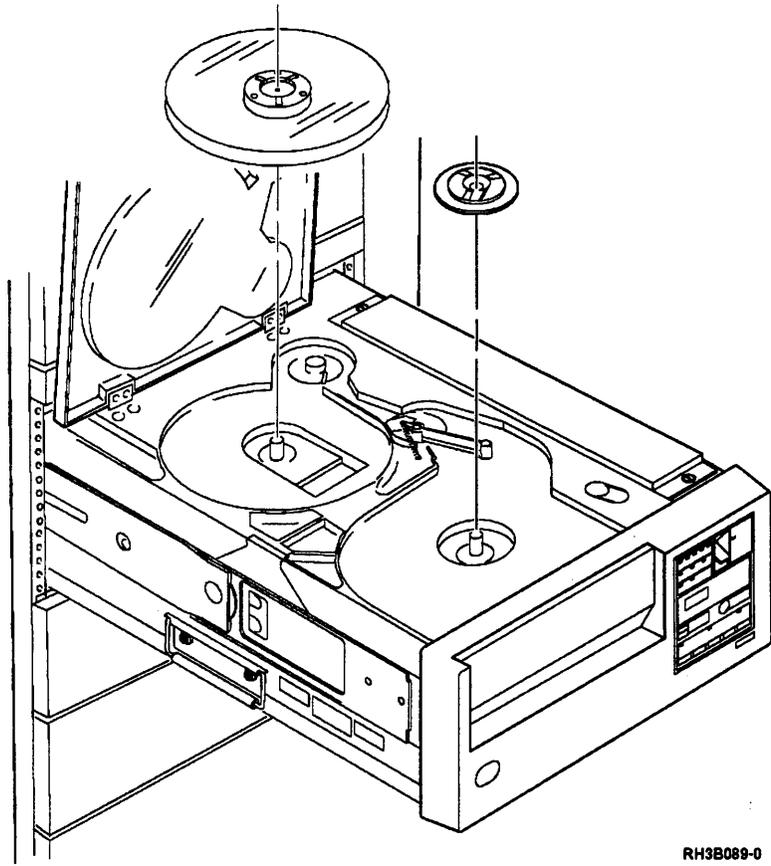
Tighten the four motor mounting screws.



RH3B111-0

4

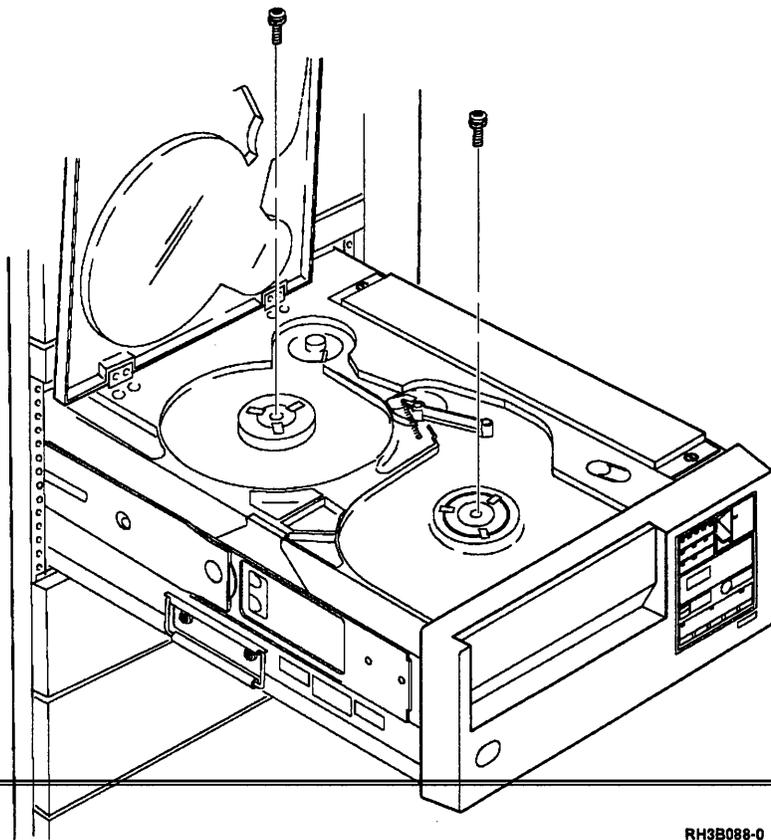
Slide the hubs on the motor shafts.



RH3B089-0

5

Insert and tighten the TORX (T25) screws in the center of the hubs.

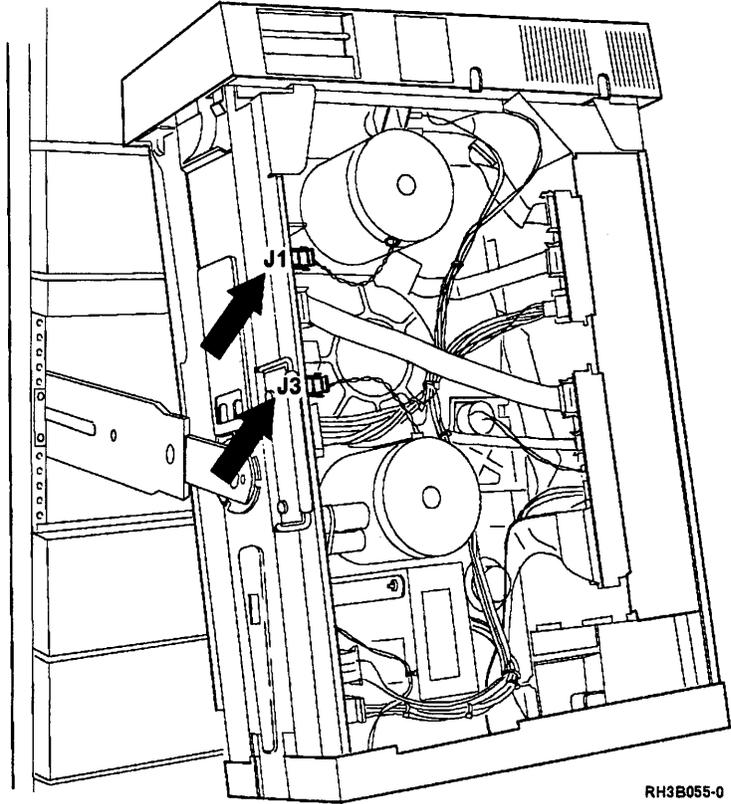


RH3B088-0

6

Connect the motor power cable to the motor/power card.

- The supply motor cable connects to J1
- The take-up motor cable connects to J3



RH3B055-0

7

Place the 9348 in the operating position; see "Placing the 9348 in the Operating Position" on page 3-9.

8

Insert the CE test tape and run sequence test 2; see "Running Diagnostic Tests" on page A-5.

Blower Motor Removal

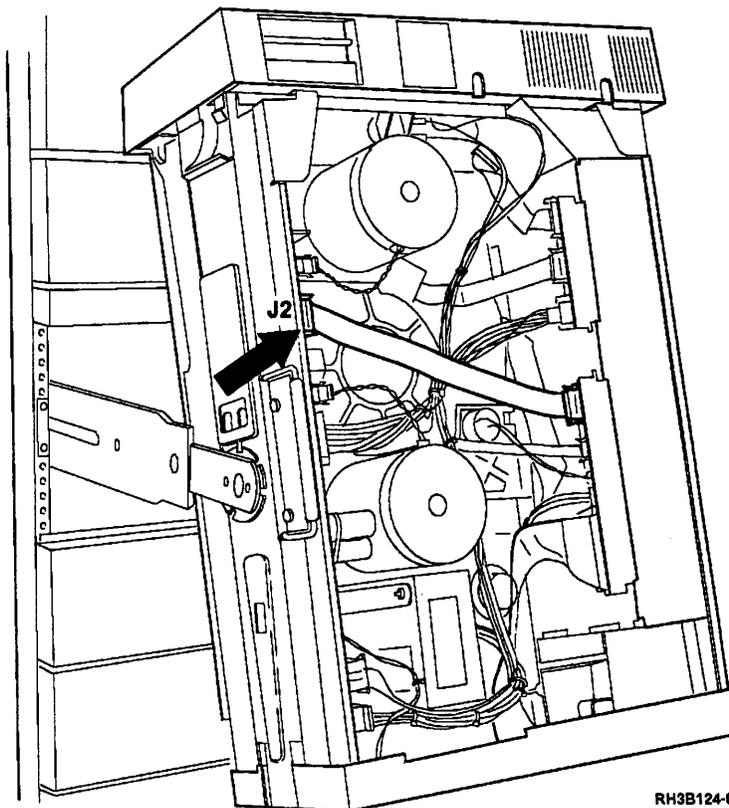
1

Place the tape unit in the service position; see "Placing the 9348 in the Service Position" on page 3-1.

2

Remove the motor drive cable from (J2) on the motor/power card.

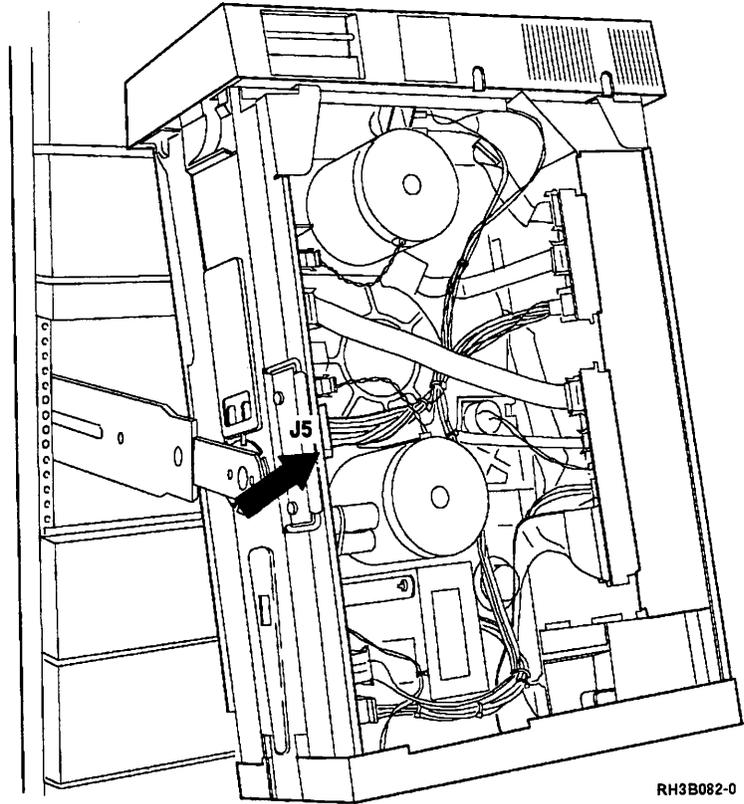
Note: It is not necessary to remove both ends of the cable for this procedure.



RH3B124-0

3

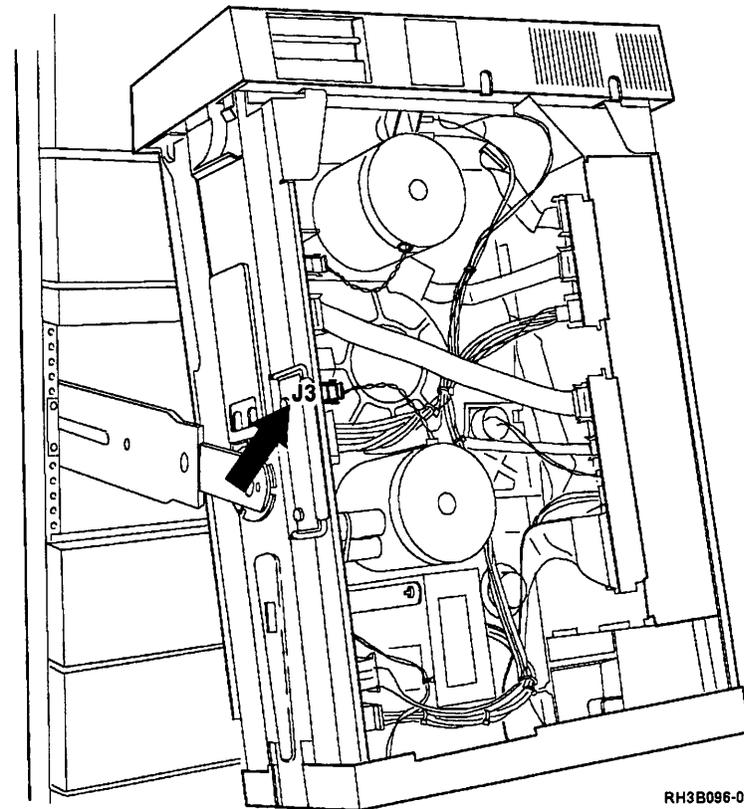
Remove the connector from J5 on the motor/power card.



RH3B082-0

4

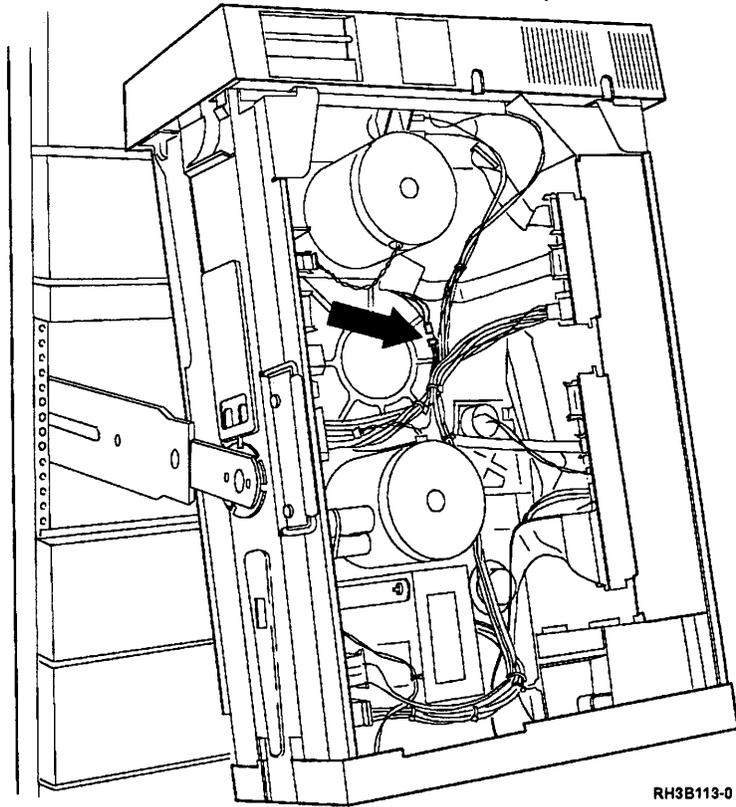
Remove the take-up motor power cable from J3 on the motor/power card.



RH3B096-0

5

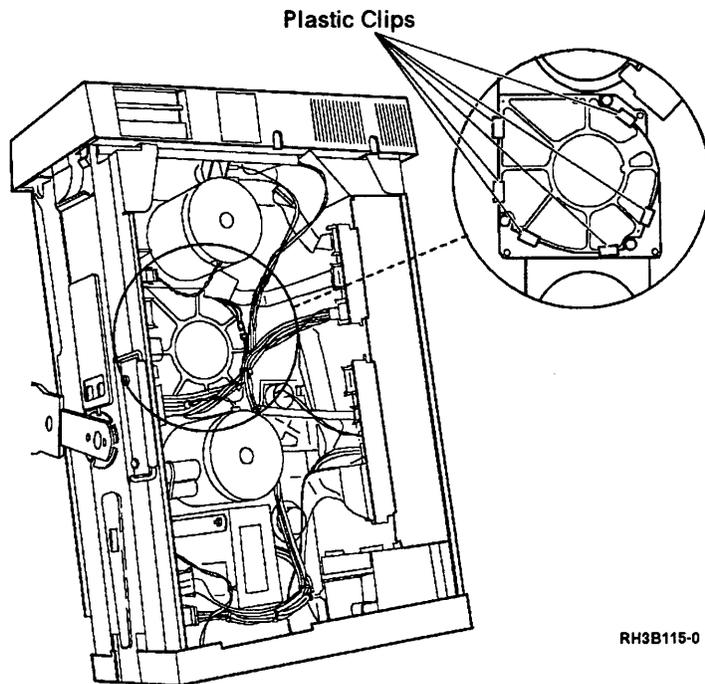
Disconnect the blower cable connector.



RH3B113-0

6

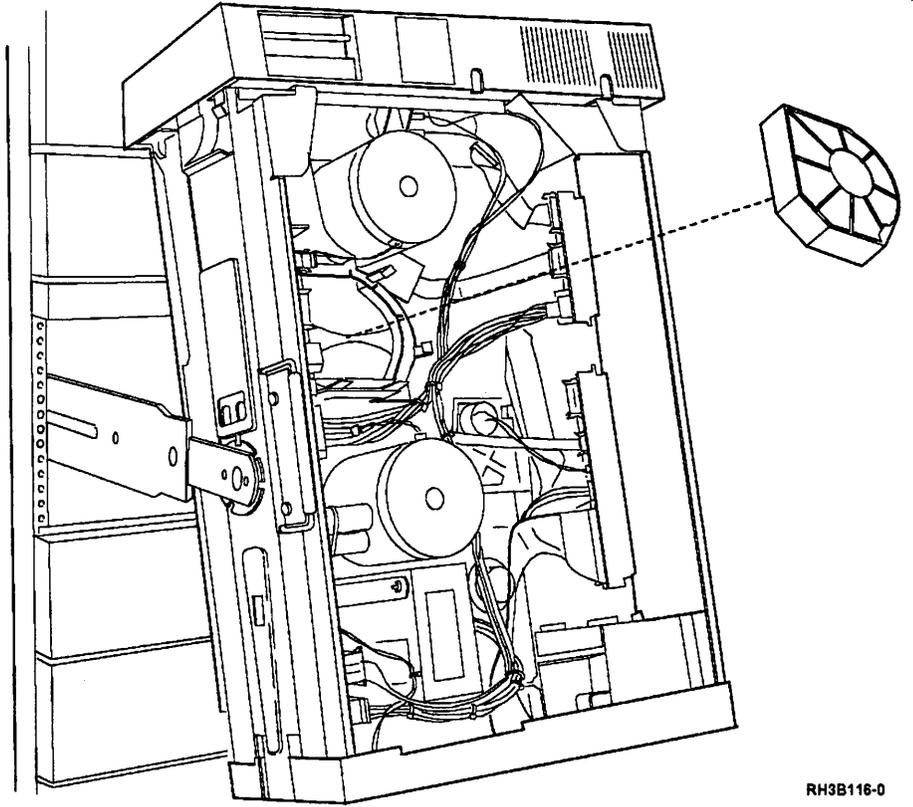
Press back the plastic clips on the air plenum that hold the blower motor in place.



RH3B115-0

7

Pull the assembly out of the frame.



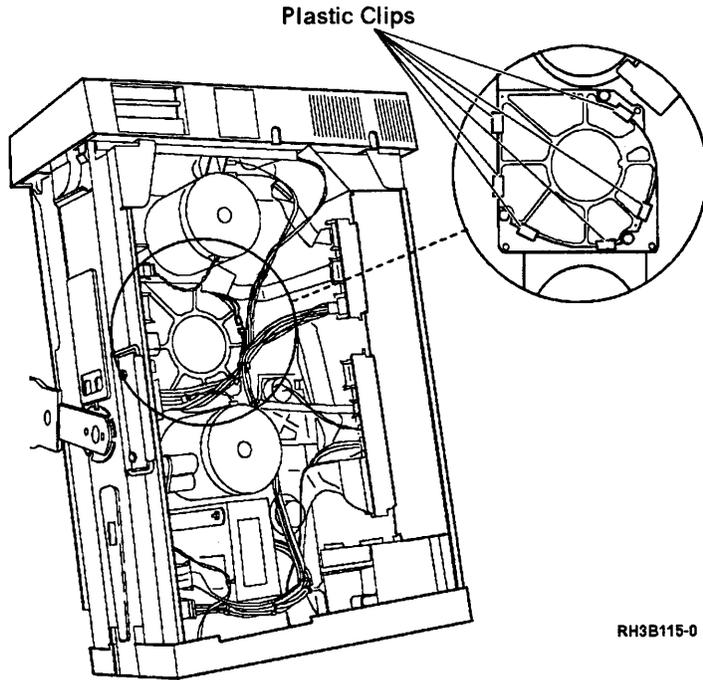
RH3B116-0

Blower Motor Installation

1

Push the blower motor into the plastic plenum until the clips hold it in place.

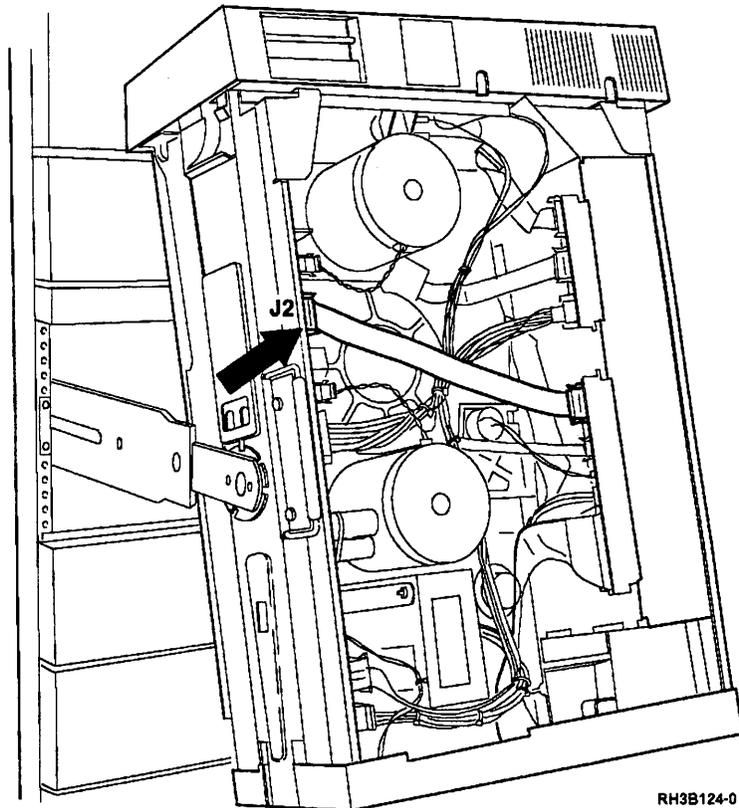
Connect the blower power cable to the blower.



2

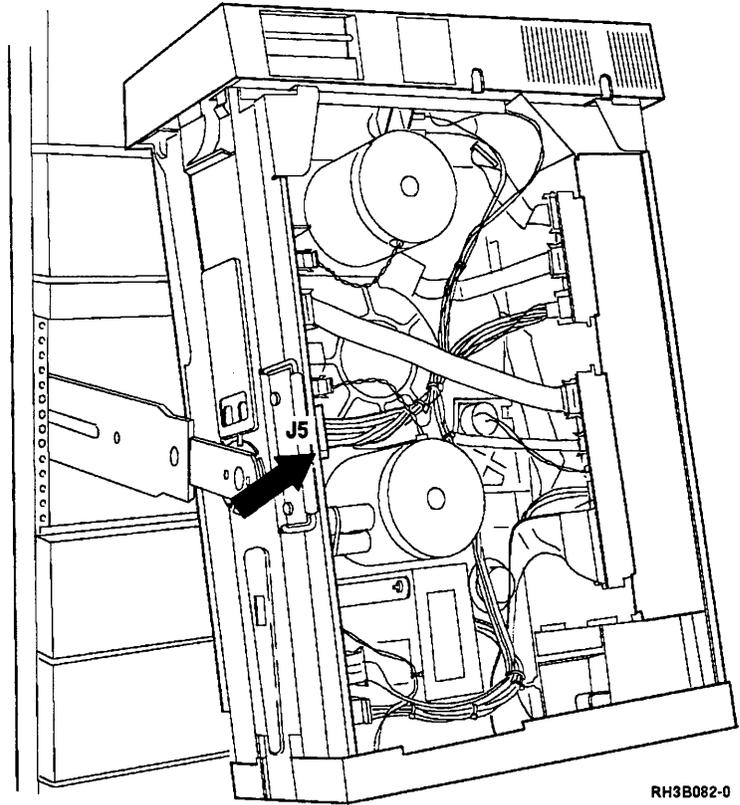
Connect the motor drive cable to (J2) on the motor/power card.

Note: The cable is made so that it can only be connected one way.



3

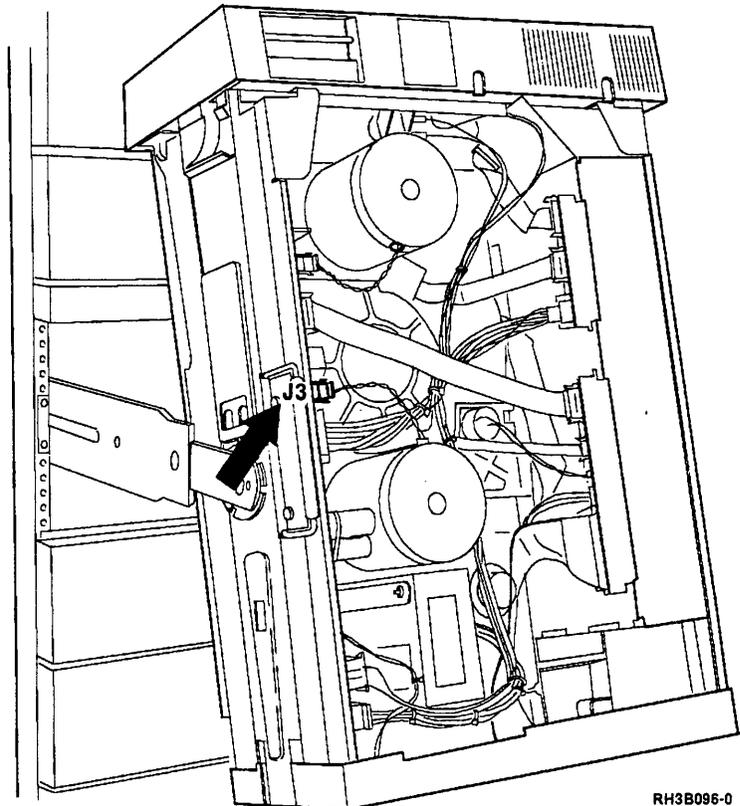
Connect the cable that was removed from J5.



RH3B082-0

4

Connect the take-up motor power cable to (J3) on the motor/power card.



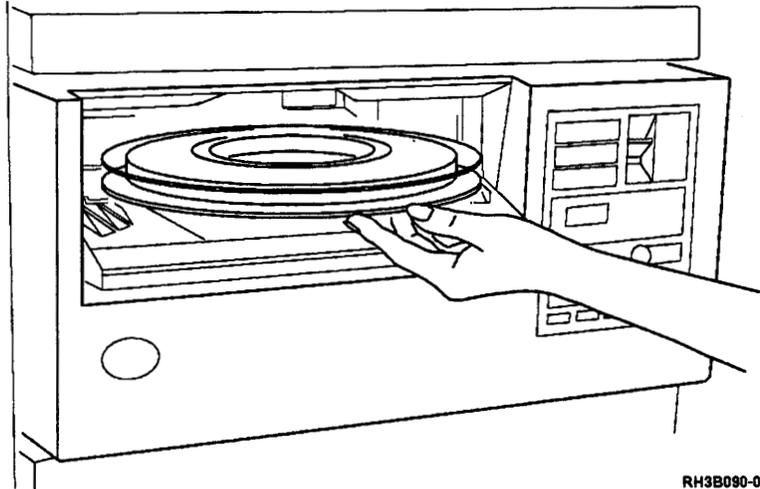
RH3B096-0

5

Place the 9348 in the operating position; see "Placing the 9348 in the Operating Position" on page 3-9.

6

Load a tape to test the blower motor. If the tape loads, the blower motor is operating.



RH3B090-0

Hub Lock Solenoid and Hub Release Lever Removal

1

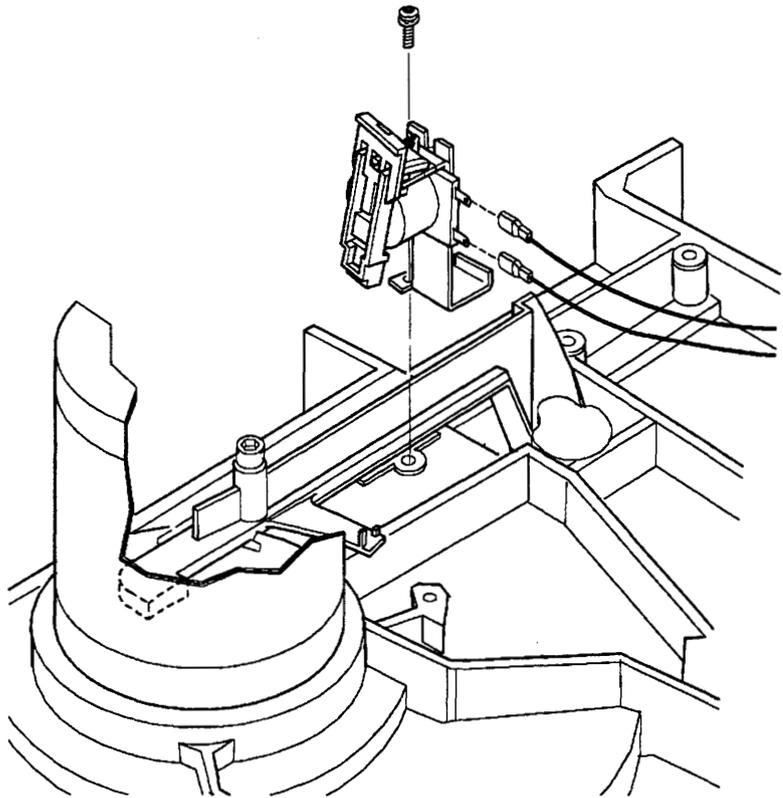
Place the tape unit in the service position; see "Placing the 9348 in the Service Position" on page 3-1.

2

Remove the two solenoid power cables.

These power cables can be disconnected at a clip connection near the supply motor.

Remove the TORX (T25) screw that holds the solenoid to the casting.

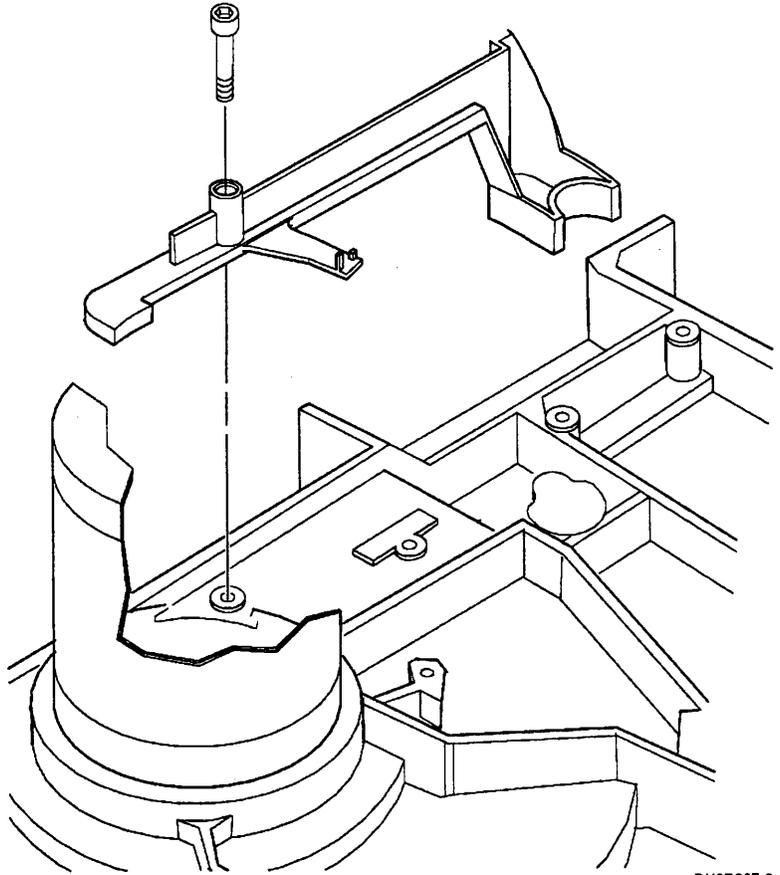


RH3B078-2

3

Perform this step only if the hub release lever must be exchanged.

Remove the screw that holds the hub release lever.



RH3B085-2

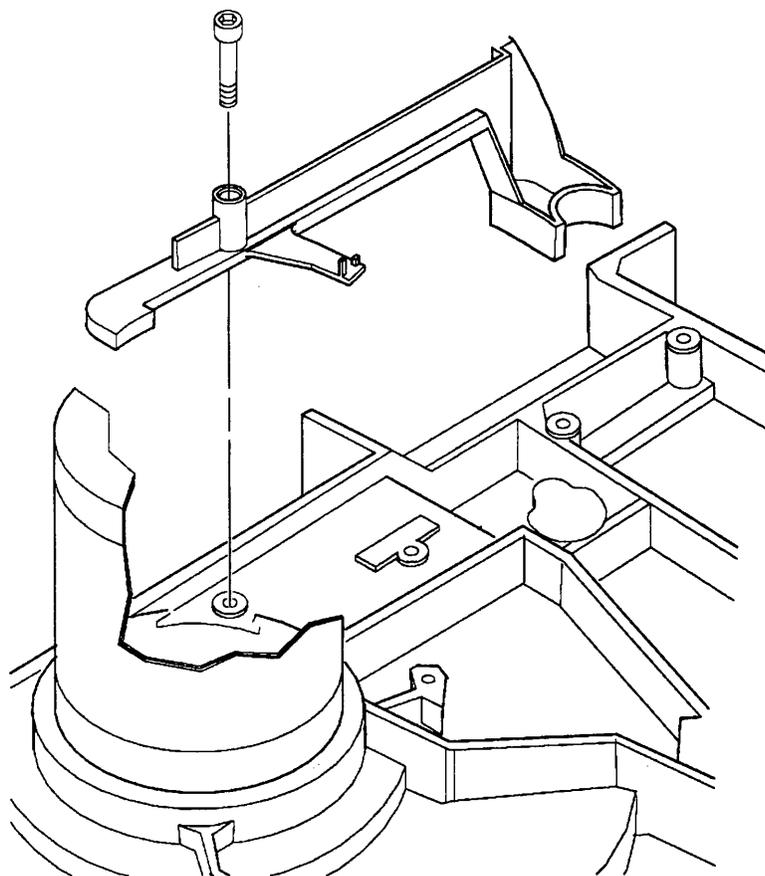
Hub Lock Solenoid and Hub Release Lever Installation

1

Perform this step only if the hub release lever was removed.

Place the hub release lever in the position shown.

Then insert the screw into the pivot point and tighten the screw.



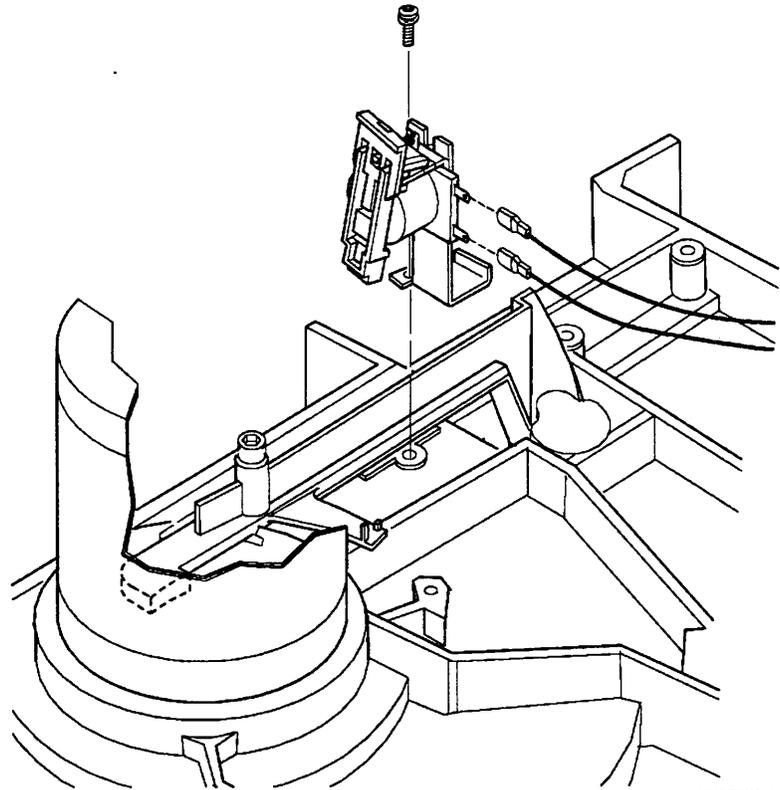
RH3B085-2

2

Insert the TORX (T25) screw that holds the solenoid to the casting.

Hold the solenoid bracket against the alignment edge on the casting. Tighten the screw.

Connect the two solenoid power cables at the clip connection near the supply motor.



RH3B078-2

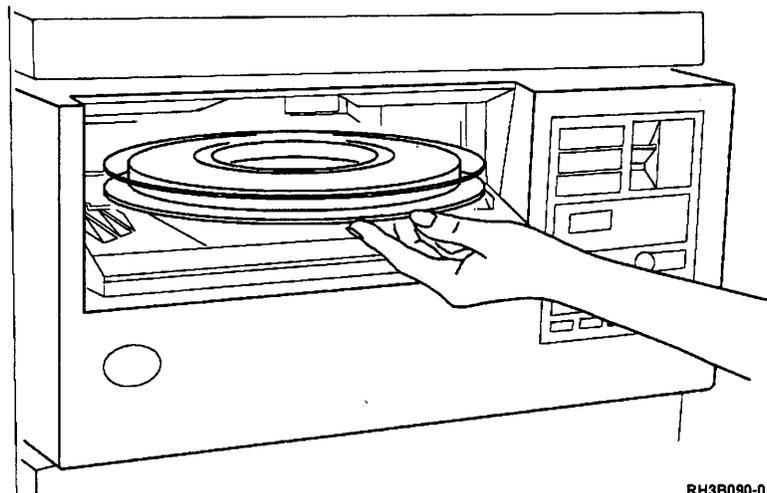
3

Place the 9348 in the operating position; see "Placing the 9348 in the Operating Position" on page 3-9.

4

Load a tape to test the hub lock solenoid.

If the tape loads correctly, the hub lock solenoid is working.

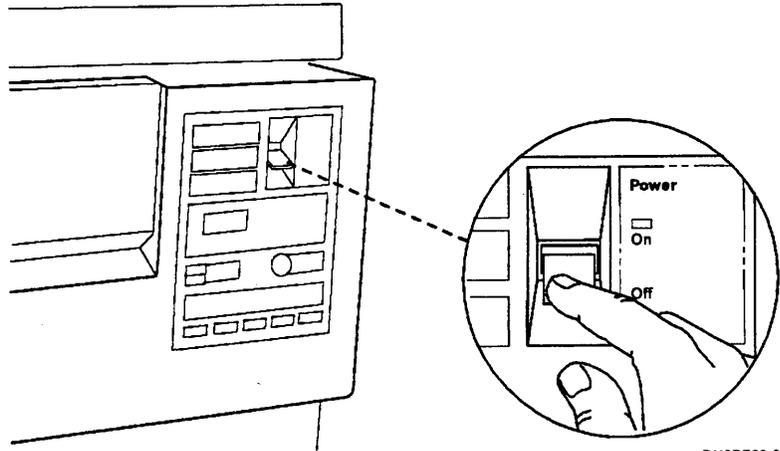


RH3B090-0

Interface Card Removal

1

Set the Power switch on the control panel to the Off position.



RH3B508-0

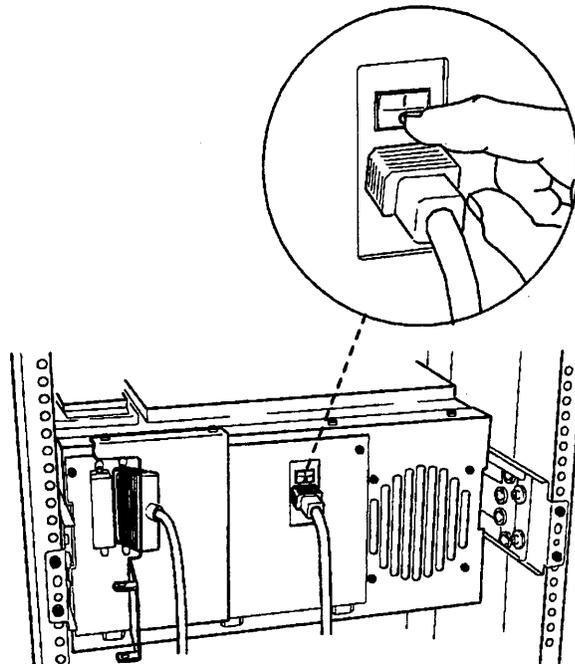
2

DANGER

Ensure that you complete the following step. An electrical outlet that is not correctly wired could place hazardous voltage on the metal parts of the system or the products that attach to the system.

(RSFTD018)

Set the ac power switch on the rear of the tape unit to the O (off) position.

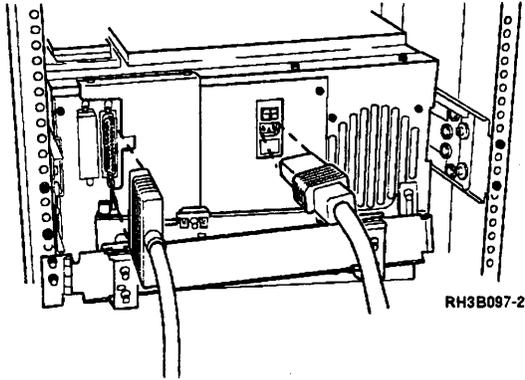


RH3B511-0

3

Disconnect the signal cable and the power cable from the rear of the tape unit.

Note: On the 9348-011 and 9348-012, there are three signal connectors instead of two as shown. The third connector is not used.

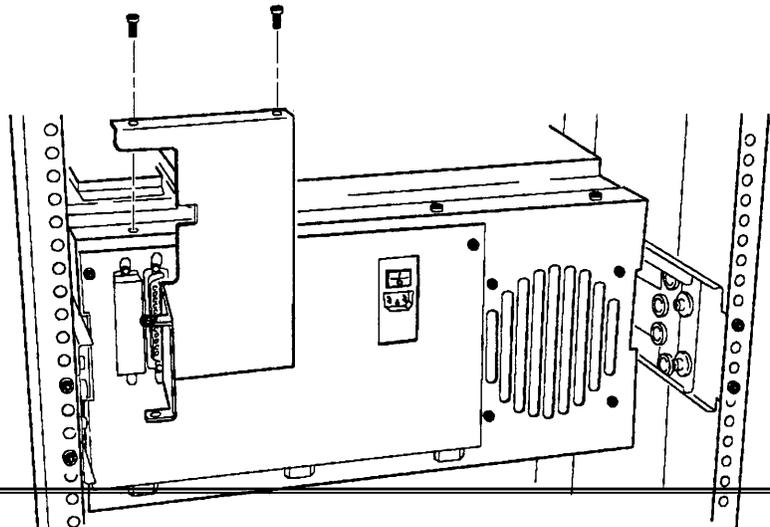
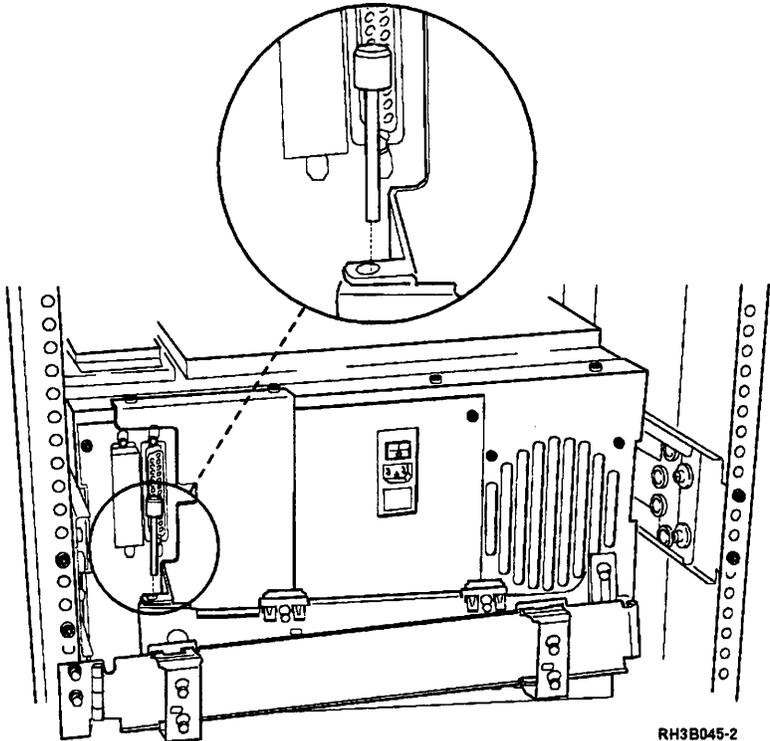


4

To prevent damage to the cable carrier and remove the carrier bracket do the following:

- Remove the cable carrier hinge screw from the cable bracket.
- Pull the tape unit out the front of the rack.
- Remove the two TORX (T25) screws and remove the cable carrier bracket.
- Place the tape unit back in the rack.

Note: If there is no unit above this one, the tape unit does not need to be pulled out the front of the rack.

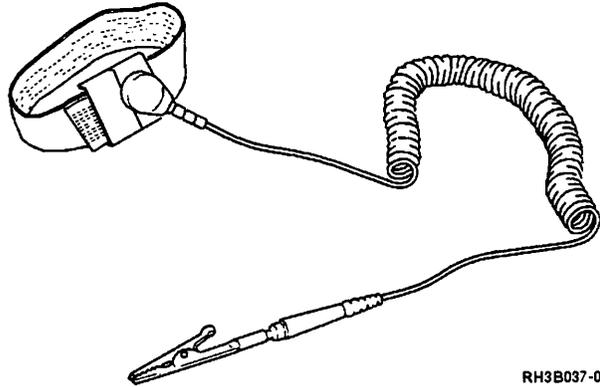


5

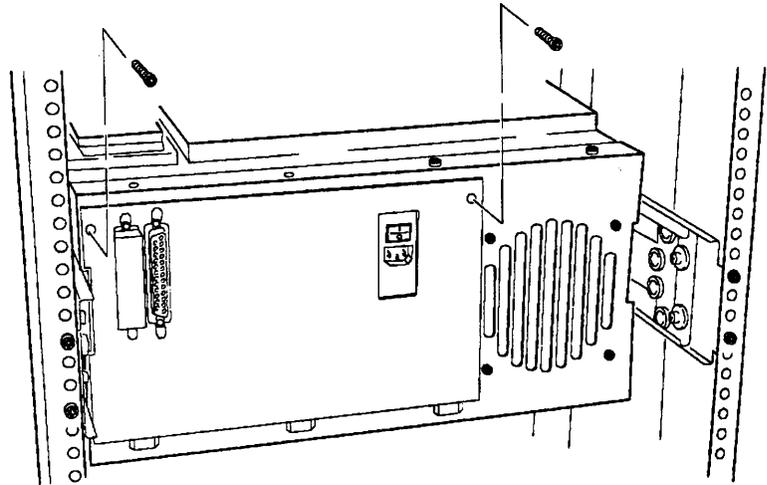
Warning: Use antistatic mats and either wrist or heel straps to prevent static damage during repair.

Remove the terminating plug.

Remove the two TORX (T25) panel screws.



RH3B037-0

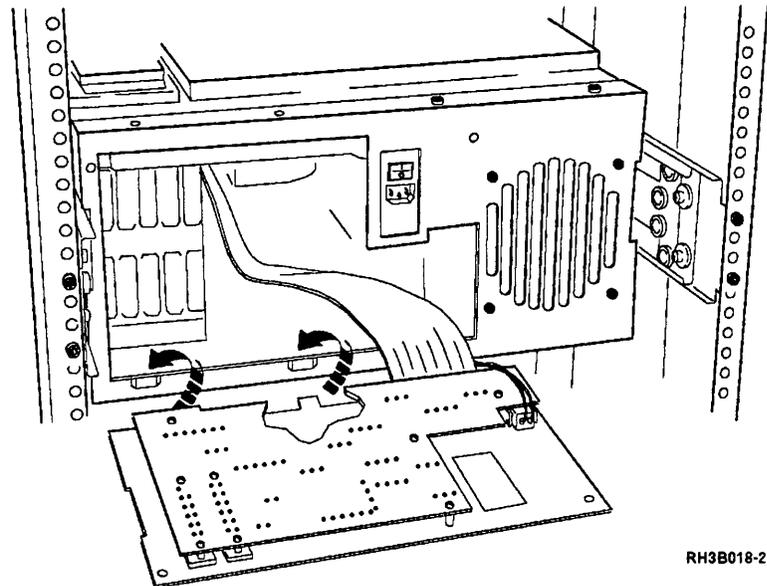


RH3B019-1

6

Rotate the interface card away from the rear panel.

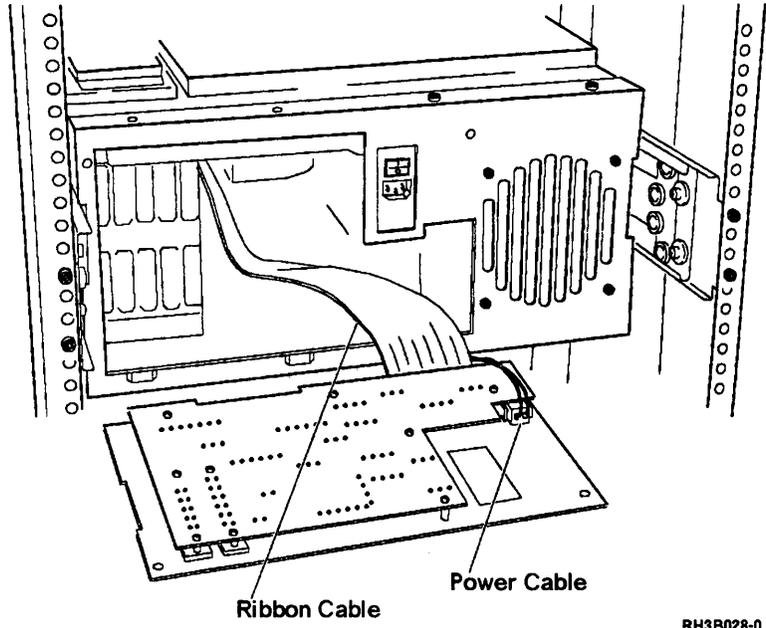
Note: Three tabs at the bottom of the card panel slide out of the three slots on the lower edge of the frame.



RH3B018-2

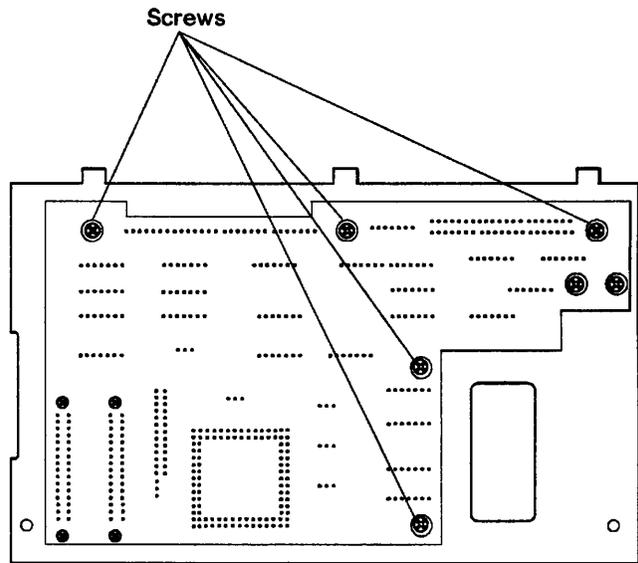
7

Disconnect the power cable and the ribbon cable from the interface card.



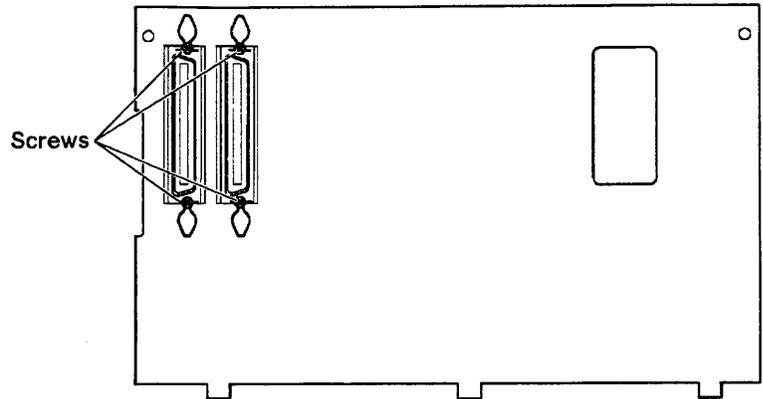
8

Remove the five screws indicated on the interface card.



9

Turn the card over and remove the four screws indicated.

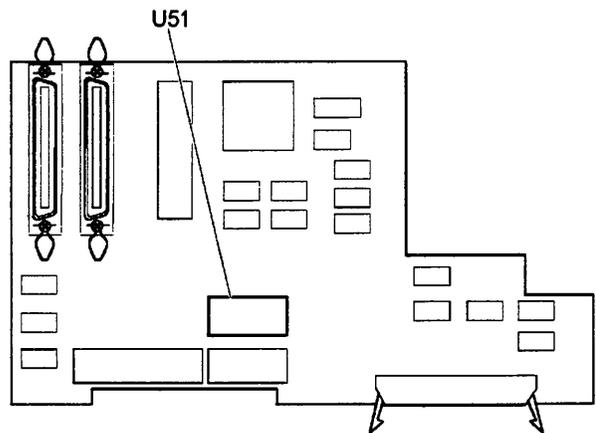


RH3B033-0

10

If you are exchanging the interface card, remove the module U51 from the old card and plug it into the new card.

Use the module extracting tool, part number 9900764, or a similar tool.



RH3B034-0

11

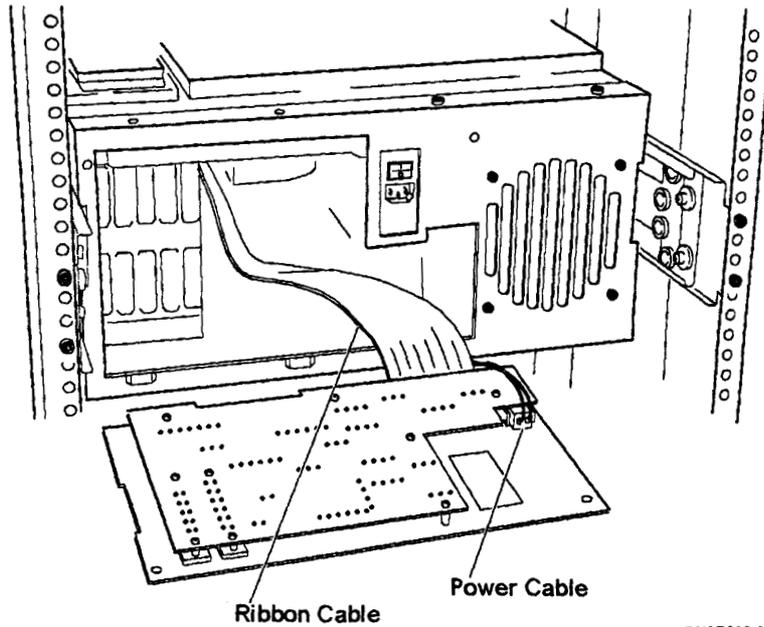
Attach the card to the metal plate by reversing steps 8 and 9.

Interface Card Installation

1

Note: If you are exchanging the interface card, ensure that you have removed the module U51 from the old card and put it in the new card.

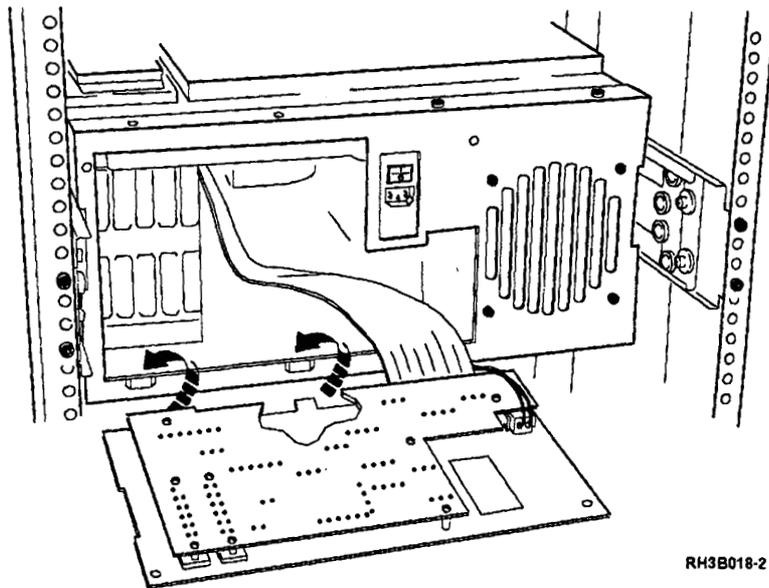
Connect the two cables to the interface card.



RH3B028-0

2

Put the tabs on the interface card panel into the slots in the frame. Rotate the card panel toward the frame.

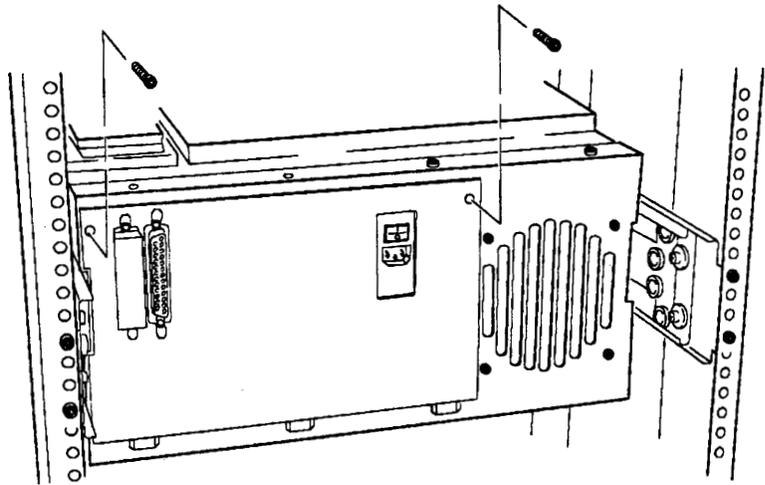


RH3B018-2

3

Insert and tighten the two TORX (T25) screws that hold the panel to the rear of the unit.

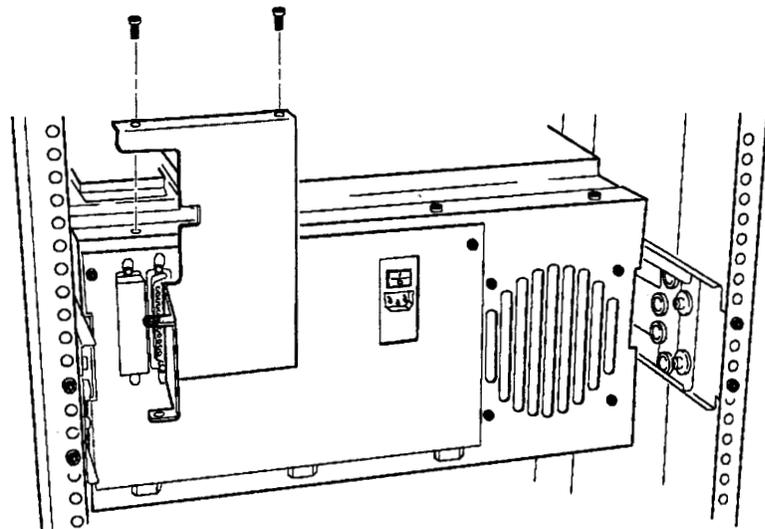
Install the terminating plug.



RH3B019-1

4

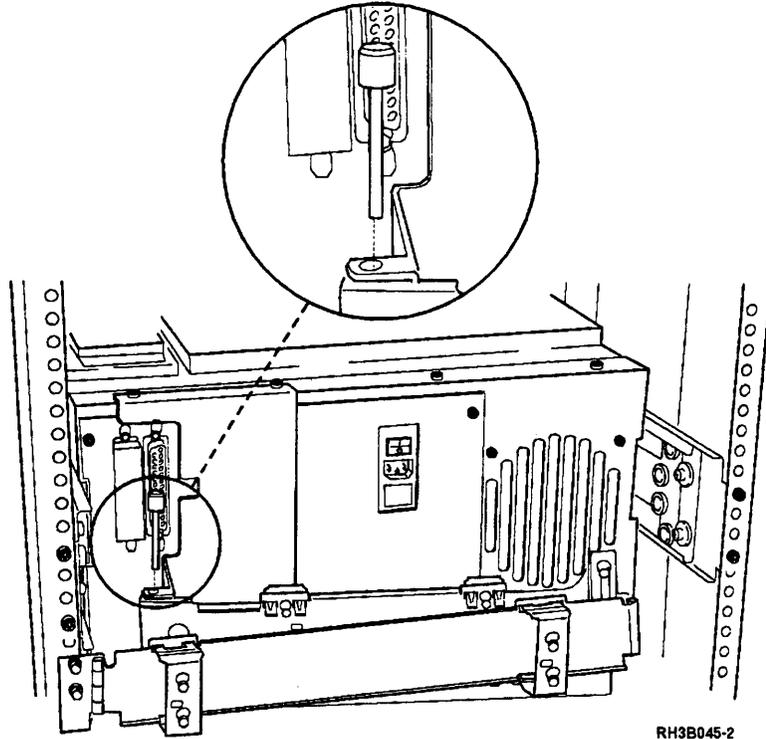
Insert and tighten the two TORX (T25) mounting screws that attach the cable carrier bracket to the tape unit.



RH3B017-2

5

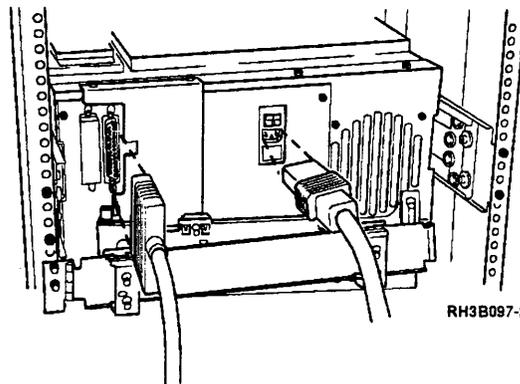
Attach the cable carrier and insert the carrier hinge screw.



RH3B045-2

6

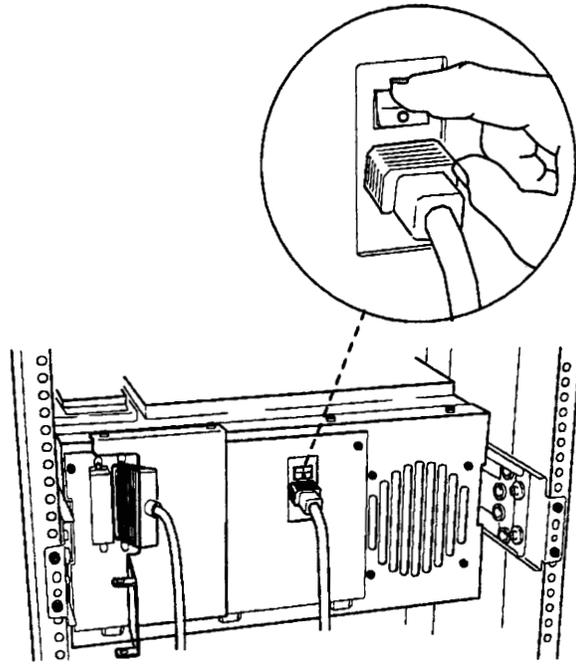
Connect the power cable and signal cable.



RH3B097-2

7

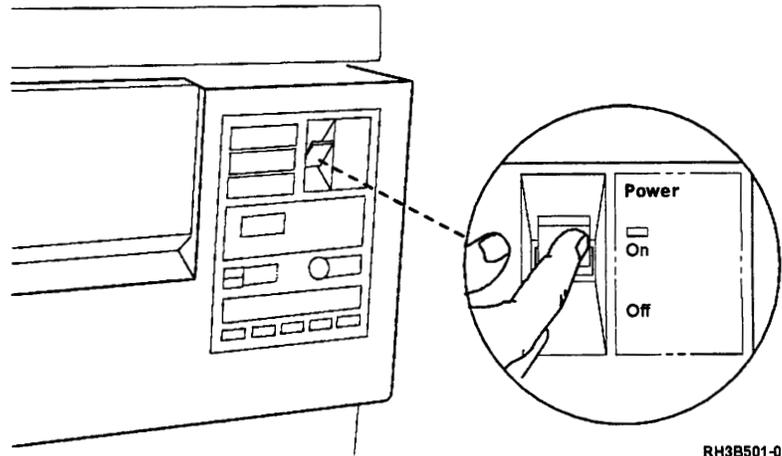
Set the ac power switch on the rear of the tape unit to the | (on) position.



RH3B516-0

8

Set the Power switch on the control panel to the On position.



RH3B501-0

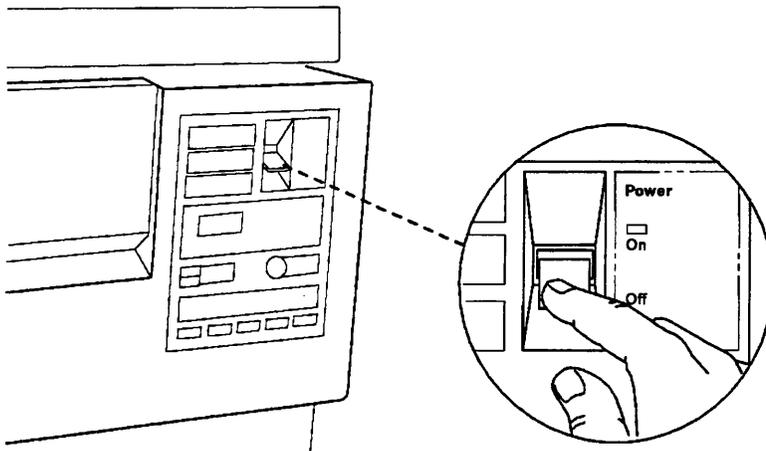
9

Run sequence test 12; see "Running Diagnostic Tests" on page A-5.

Fuse Removal and Installation

1

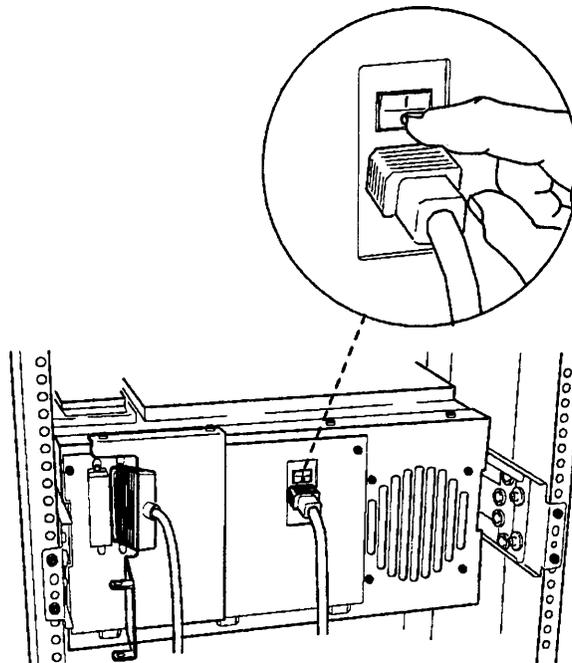
Set the Power switch on the control panel to the Off position.



RH3B508-0

2

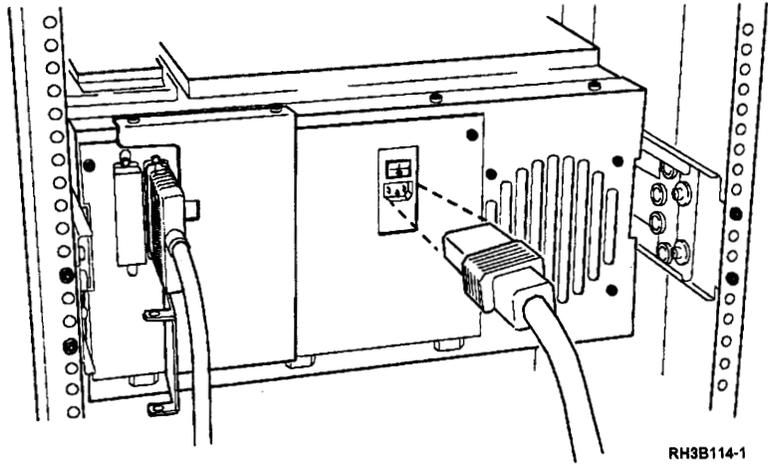
Set the ac power switch on the rear of the tape unit to the O (off) position.



RH3B511-0

3

Disconnect the power cable from the rear of the tape unit.

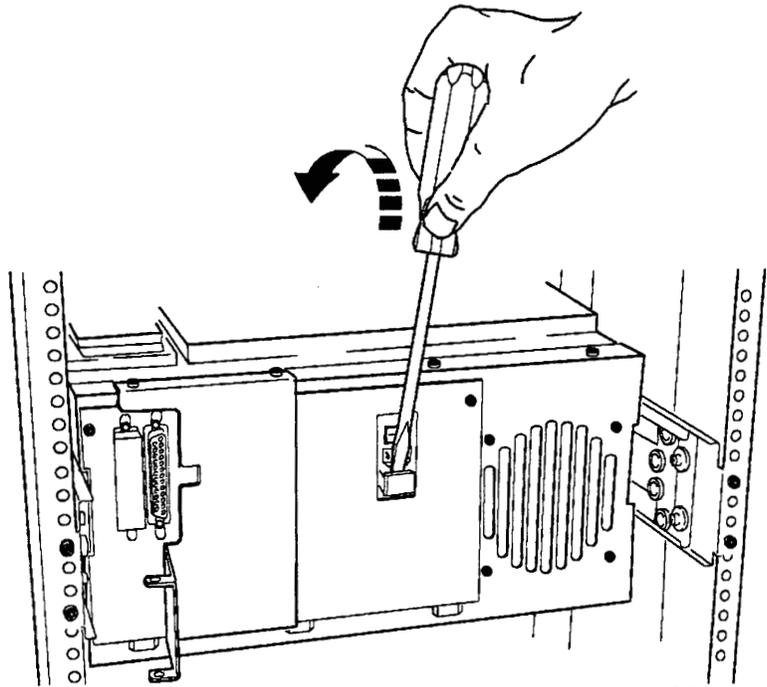


RH3B114-1

4

Insert the tip of a small screwdriver, or a similar tool, into the small slot on the edge of the fuse receptacle and loosen the fuse module.

Pull the module out.



RH3B048-2

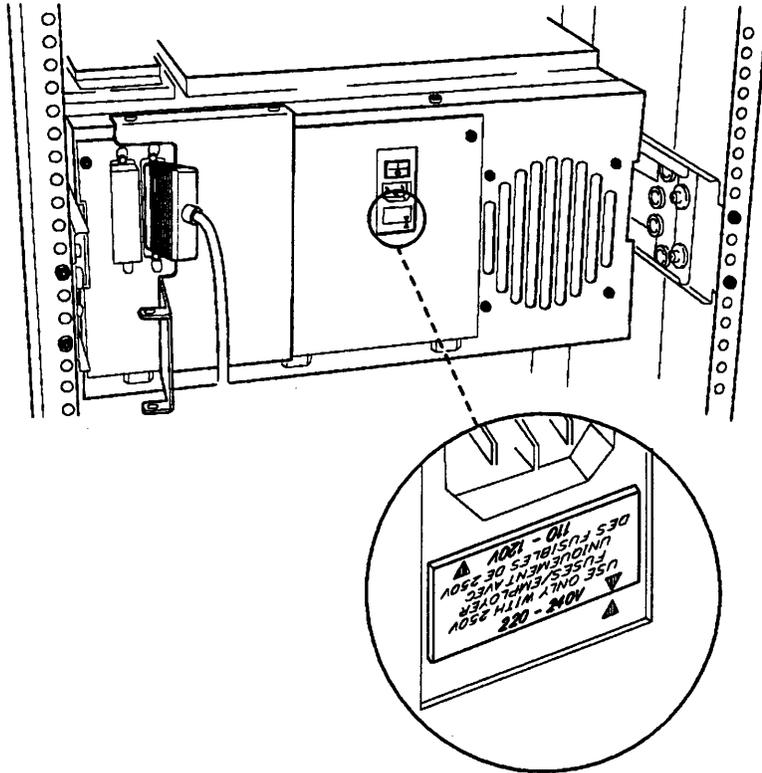
5

Warning: Exchange the fuse with one with the same rating.

The 6.0 ampere fuse must be on the side of the module nearest to the 120 V triangle and the 3.15 ampere fuse must be on the side nearest to the 240 V triangle.

Ensure that the white arrow on the fuse module lines up with the desired voltage rating printed on the fuse module receptacle.

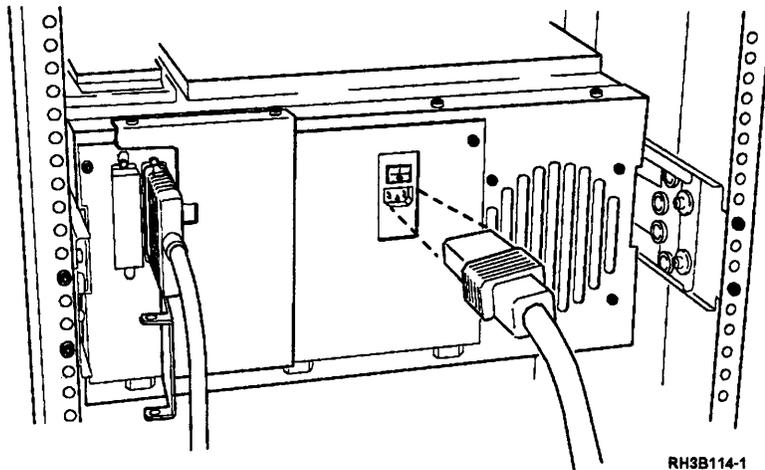
Slide the fuse module into its receptacle.



RH3B127-0

6

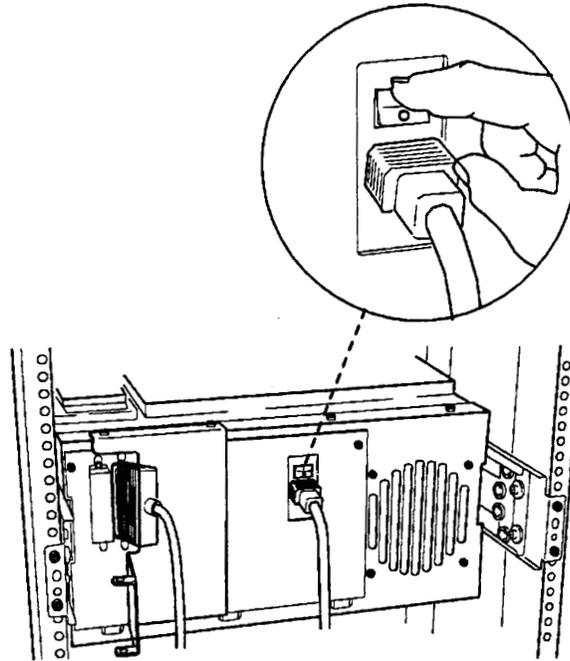
Connect the power cable to the rear of the tape unit.



RH3B114-1

7

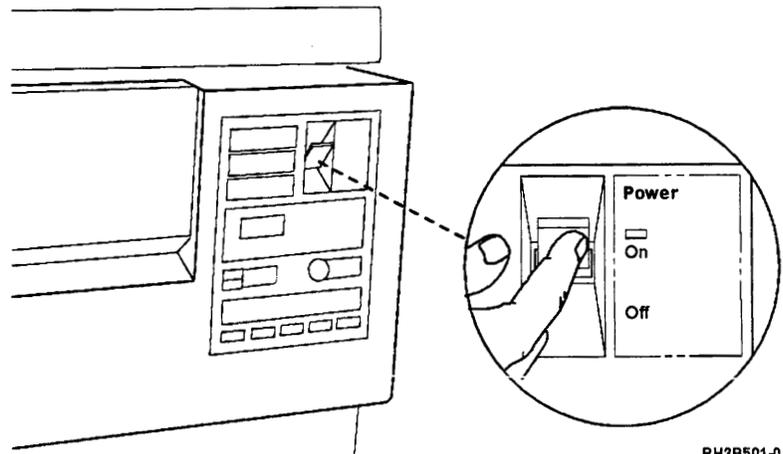
Set the ac power switch on the rear of the tape unit to the | (on) position.



RH3B516-0

8

Set the Power switch on the control panel to the On position.



RH3B501-0

9

Insert the CE test tape and run sequence test 2; see "Running Diagnostic Tests" on page A-5.

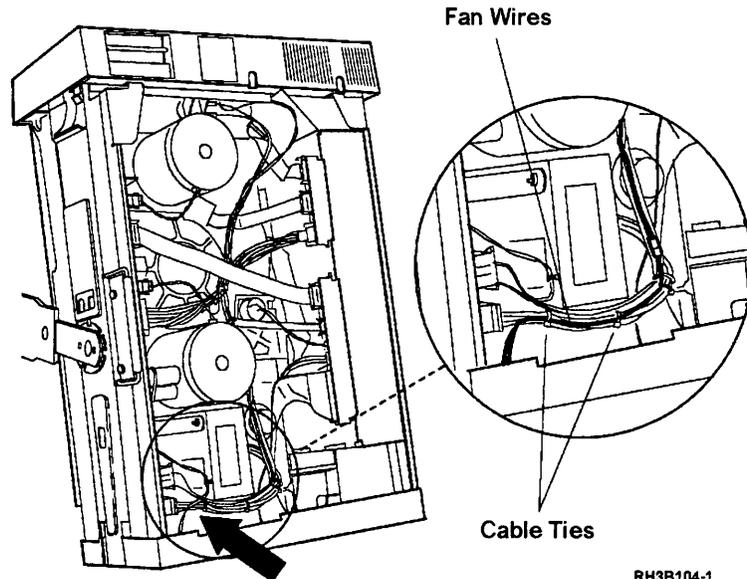
Cooling Fan Removal

1

Place the tape unit in the service position; see "Placing the 9348 in the Service Position" on page 3-1.

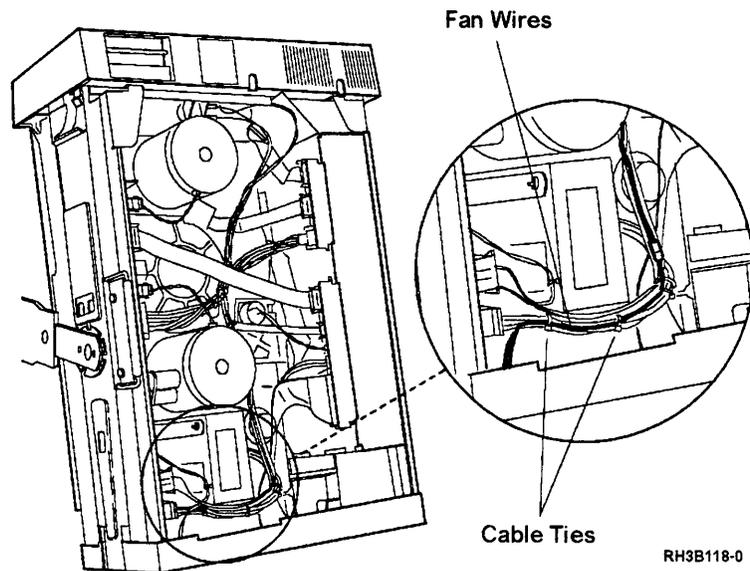
2

Follow the red and black fan power wires from the side of the cooling fan along the large group of tied cables until you reach a connector. (The connector should be located near the side of the power transformer.) Disconnect the connector.



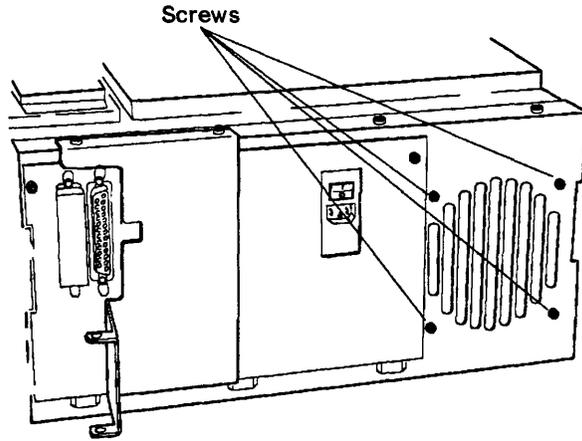
3

Cut enough of the cable ties on the large group of cables to release the red and black fan power wires.



4

Remove the four TORX (T25) screws that hold the fan to the rear panel of the tape unit.

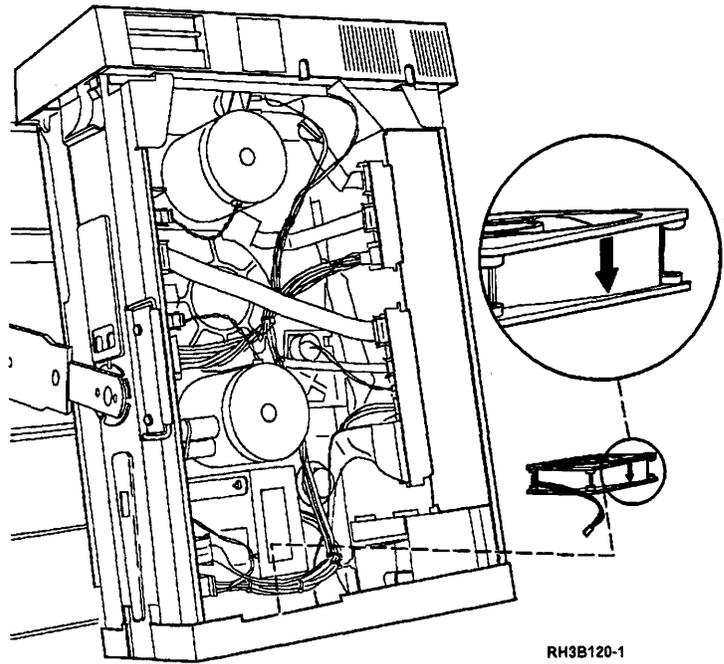


RH3B117-1

5

Lift the fan up and out of the frame.

Note: Part of the lower edge of the rear panel frame is cut away to permit the fan to slide out.



RH3B120-1

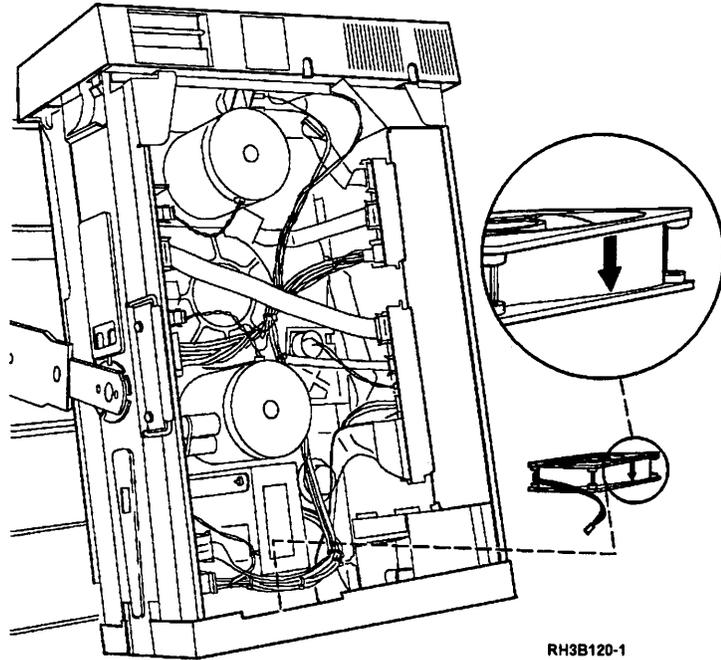
Cooling Fan Installation

1

Slide the fan into position behind the rear panel.

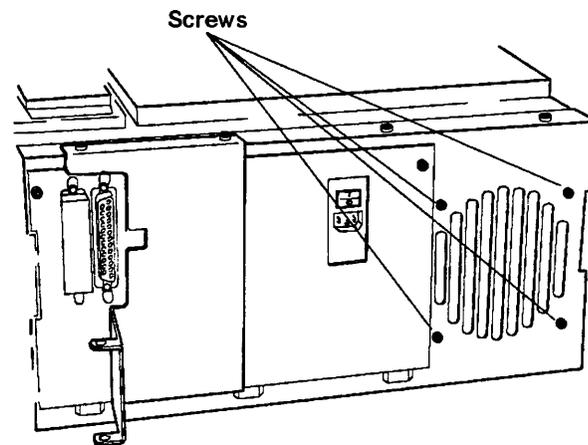
The red and black fan power wires face toward the interface card.

The air flow arrow must point to the rear of the drive (the air leaves through the rear panel).



2

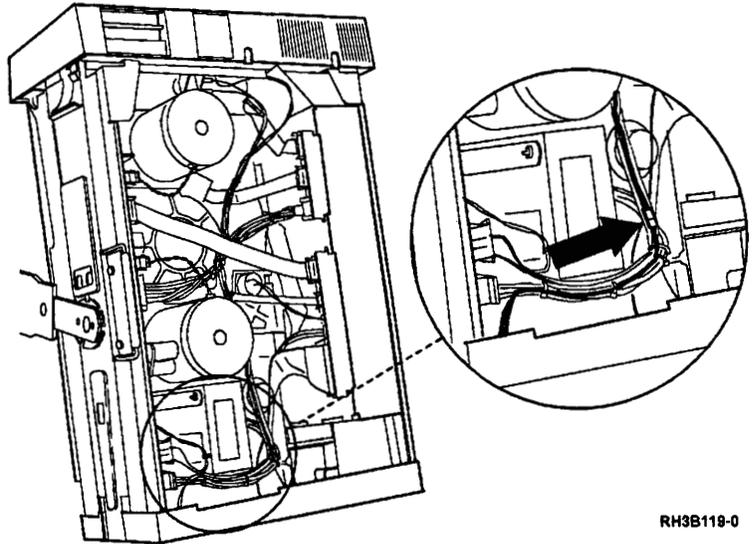
Fasten the fan to the rear panel with four TORX (T25) screws.



3

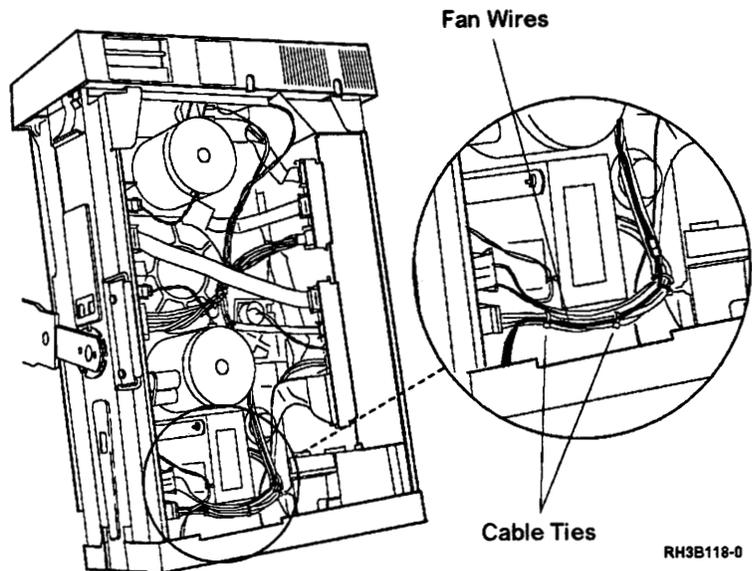
Connect the fan power connector.

Ensure the clip is tight.



4

Place the fan power wires next to the large group of cables in front of the fan. Tie the cables together as necessary.



5

Place the 9348 in the operating position; see "Placing the 9348 in the Operating Position" on page 3-9.

6

Check that the fan is operating correctly. You should feel air coming out of the slots at the rear of the tape unit.

7

Insert the CE test tape and run sequence test 2; see "Running Diagnostic Tests" on page A-5.

AC Power Module Removal

1

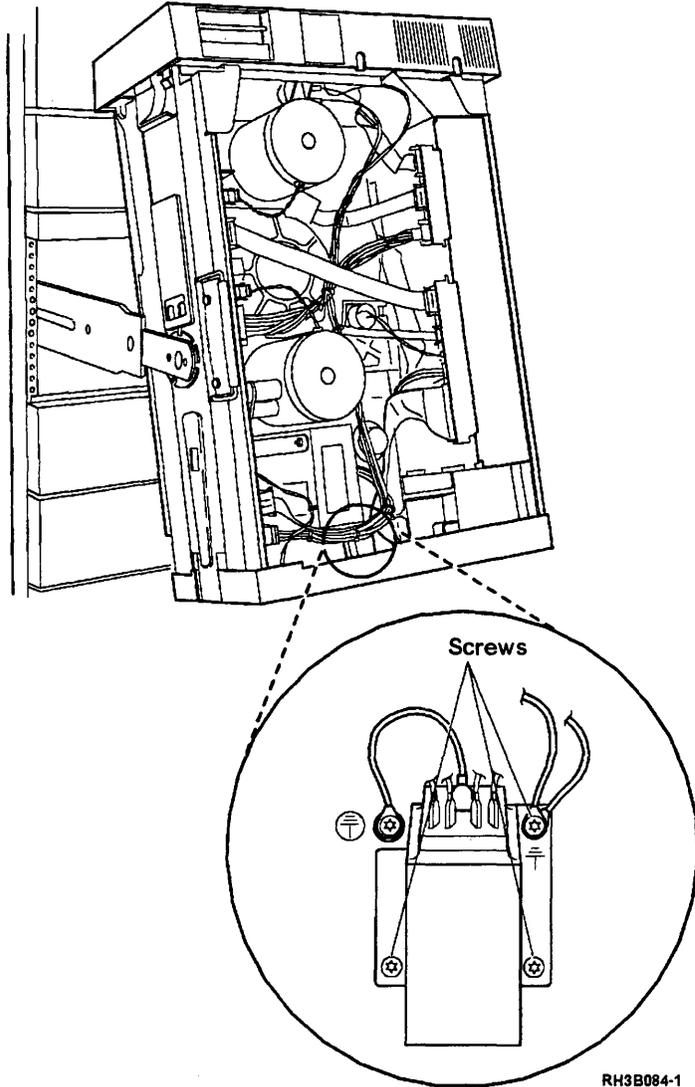
Place the tape unit in the service position; see "Placing the 9348 in the Service Position" on page 3-1.

2

Label and record the position of the wires connected to the ac power module.

Remove the wires.

Remove the three TORX (T25) screws.

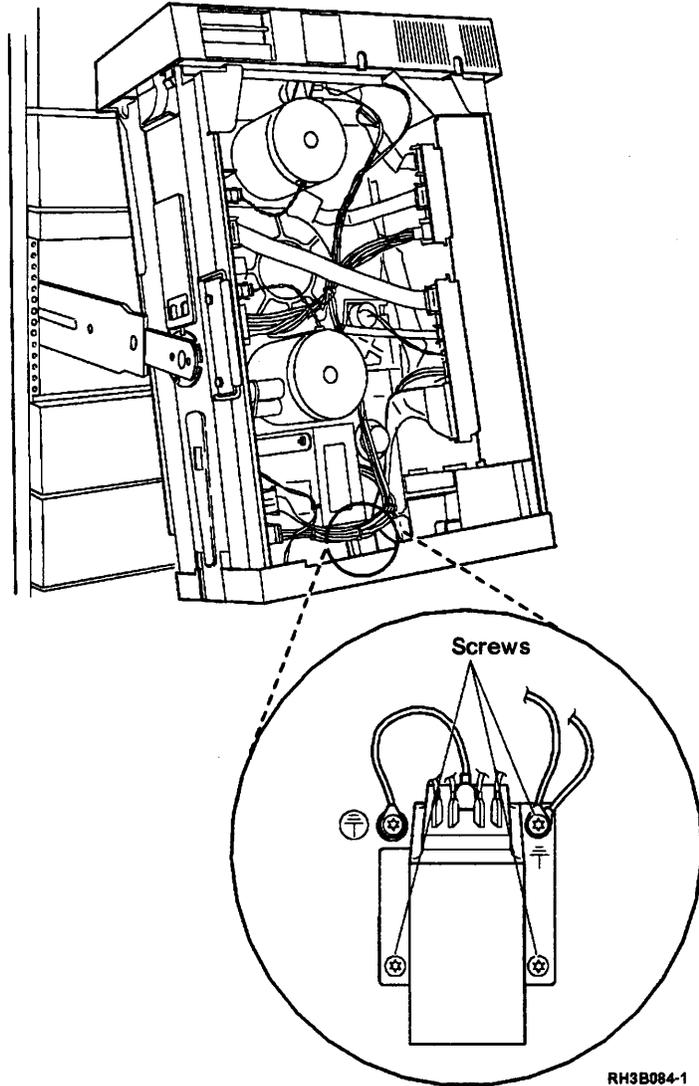


RH3B084-1

AC Power Module Installation

1

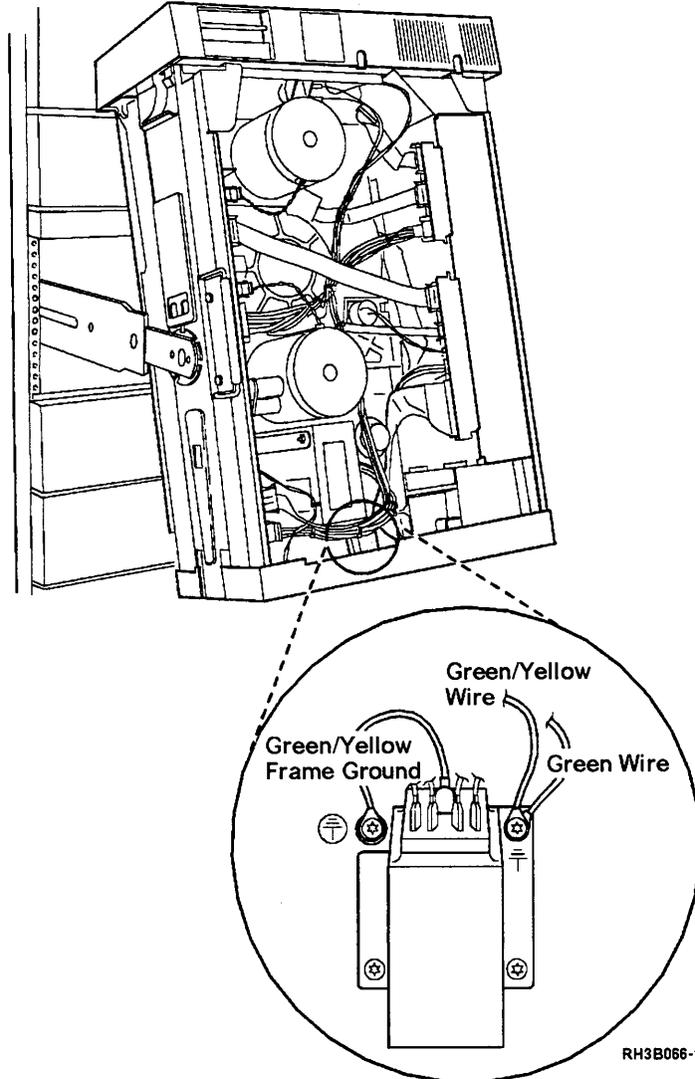
Place the ac power module in position and insert and tighten the two bottom TORX (T25) screws.



RH3B084-1

2

The green wire and the green and yellow wire must be fastened under the screw next to the ground symbol on the module as shown.



3

Connect the four remaining wires that you labeled in "AC Power Module Removal" on page 3-119 step 2 to the ac power module.

4

Place the 9348 in the operating position; see "Placing the 9348 in the Operating Position" on page 3-9.

5

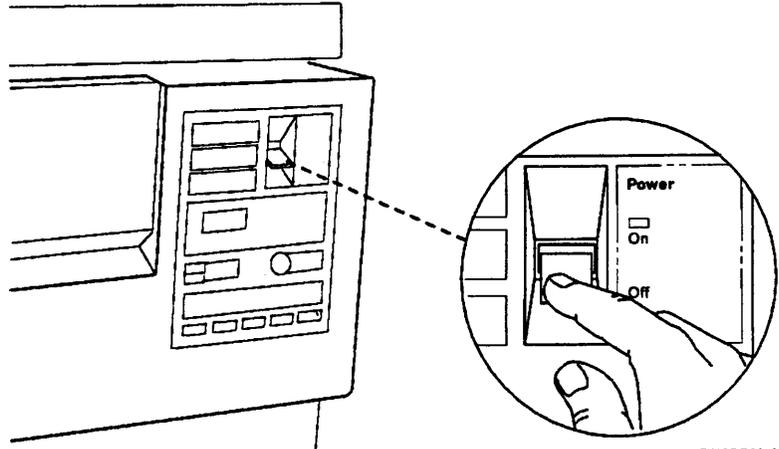
Insert the CE test tape and run sequence test 2; see "Running Diagnostic Tests" on page A-5.

Table Top Unit Enclosure Removal

1

Note: This procedure applies to the table-top unit only.

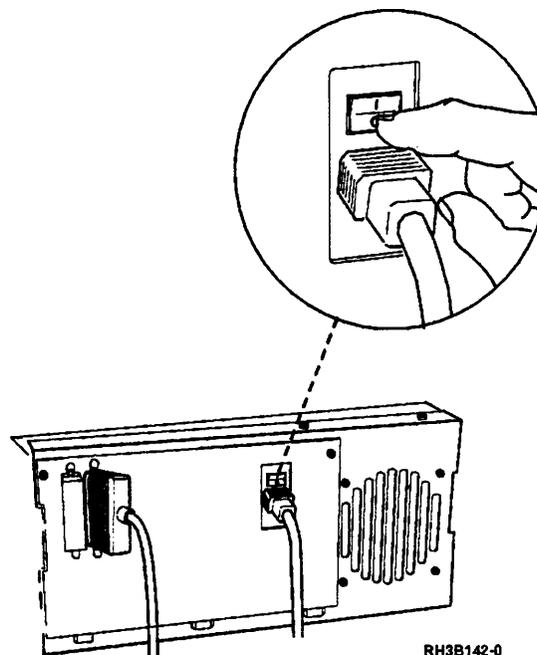
Set the Power switch on the control panel to the Off position.



RH3B508-0

2

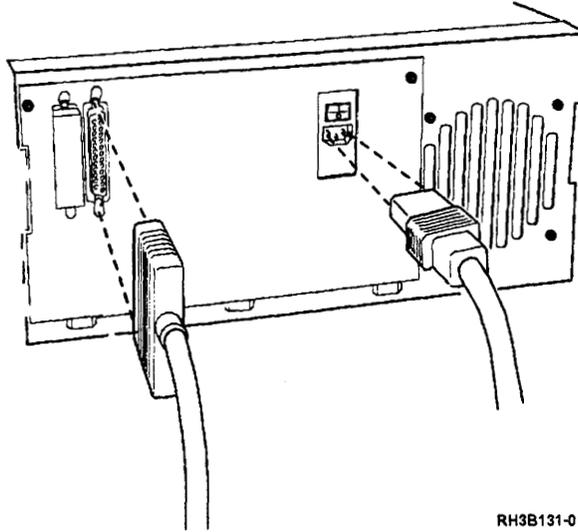
Set the AC power switch on the rear of the tape unit to the O (Off) position.



RH3B142-0

3

Disconnect the signal and power cables from the rear of the unit.



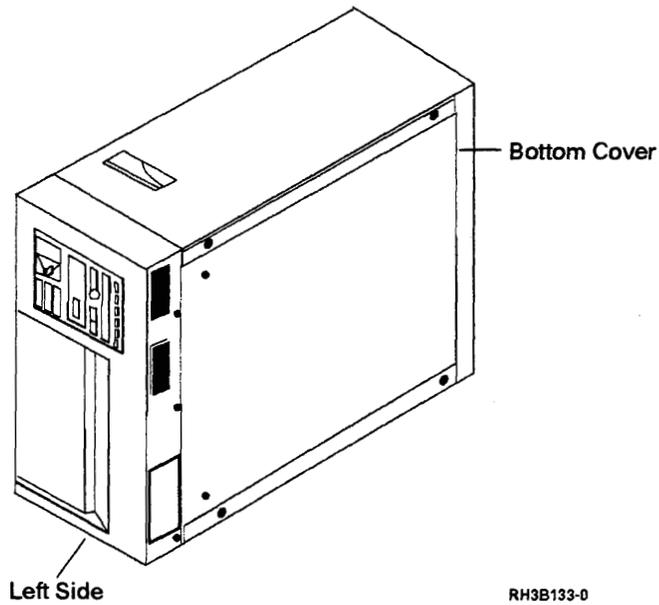
RH3B131-0

4

Turn the tape unit on its left side by lifting on its right side. One person can lift the tape unit in this manner.

CAUTION:

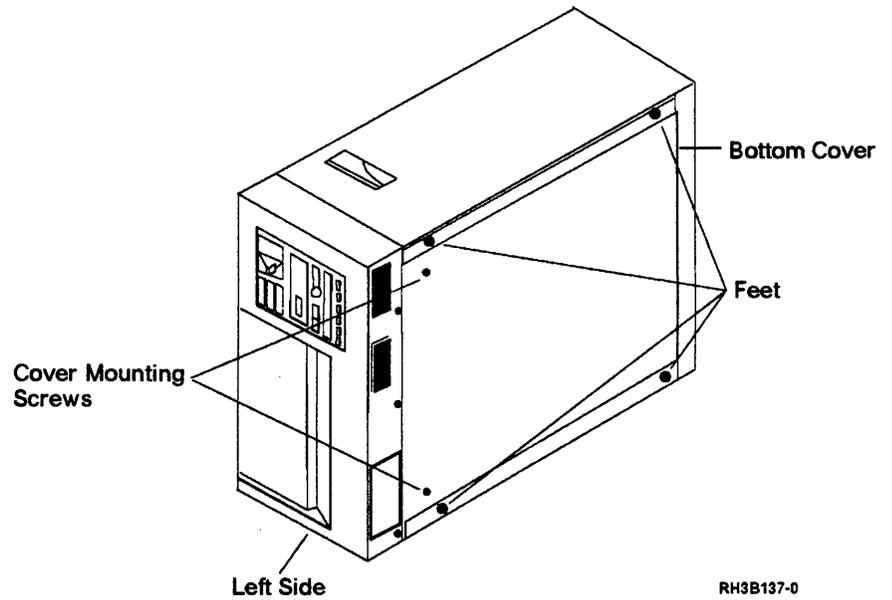
The table-top unit weighs approximately 45 kg (98 lb). Do not try to lift it by yourself. Ask other service representatives for aid if you must pick up the unit.



RH3B133-0

5

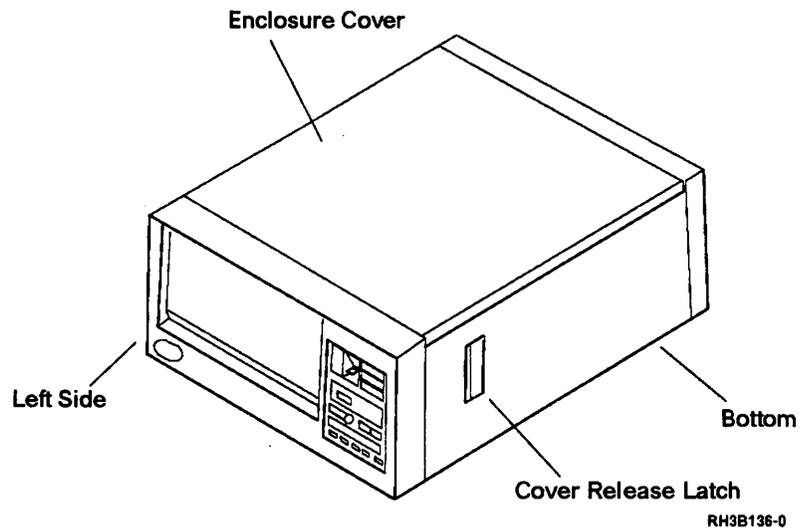
Remove the four feet by removing the four TORX (T25) mounting screws.



6

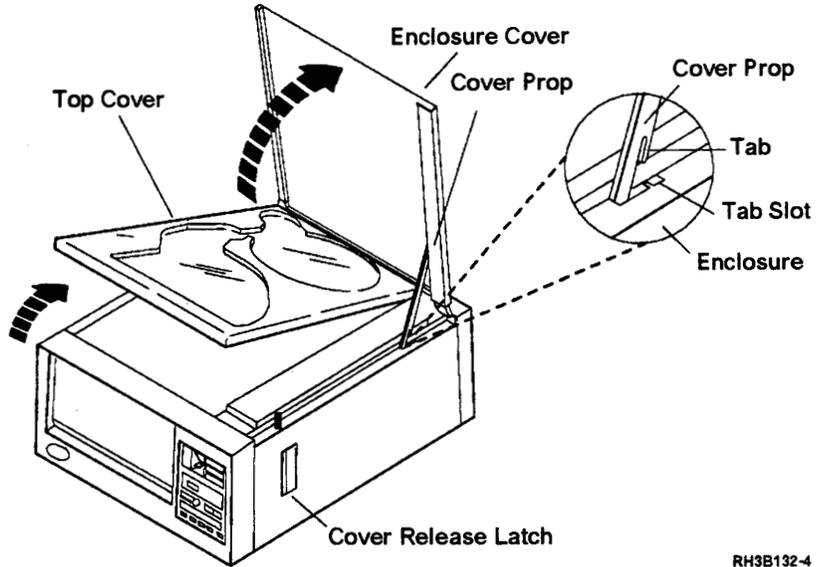
CAUTION:
The table-top unit weighs approximately 45 kg (98 lb). Do not try to lift it by yourself. Ask other service representatives for aid if you must pick up the unit.

Place the unit on its bottom side.



7

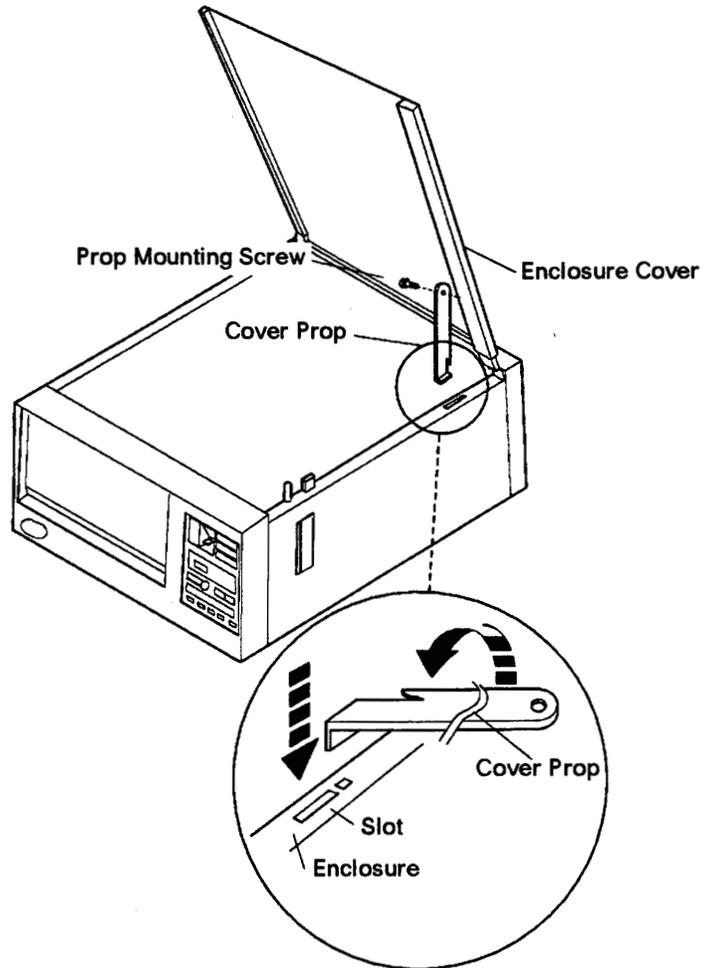
Press the cover release latch, and then open the enclosure cover. Ensure that the tab on the cover prop goes into the tab slot in the enclosure.



RH3B132-4

8

While holding the enclosure cover open, remove the TORX (T25) prop mounting screw, and then remove the prop.

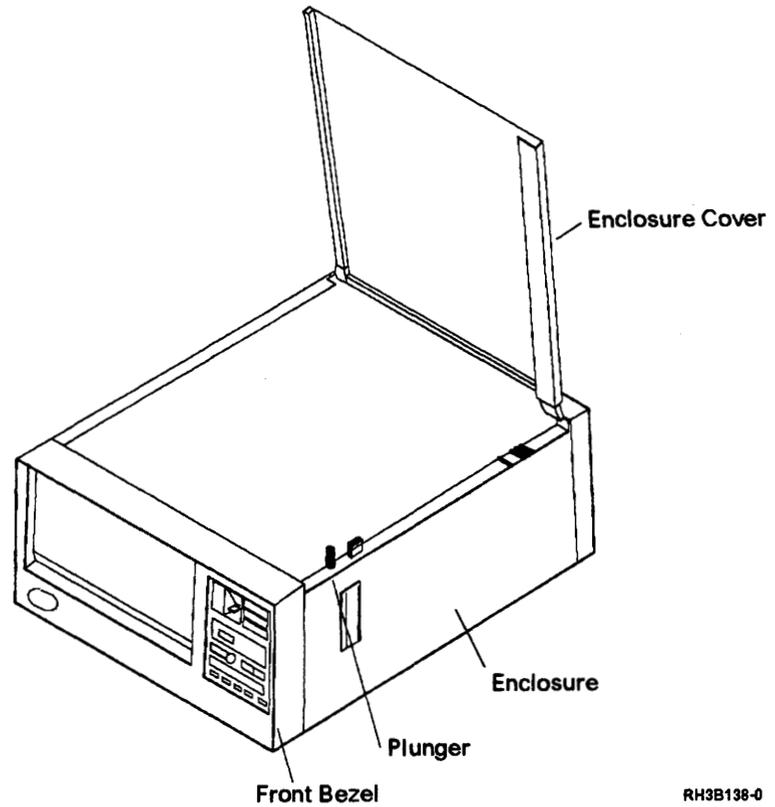


RH3B130-0

9

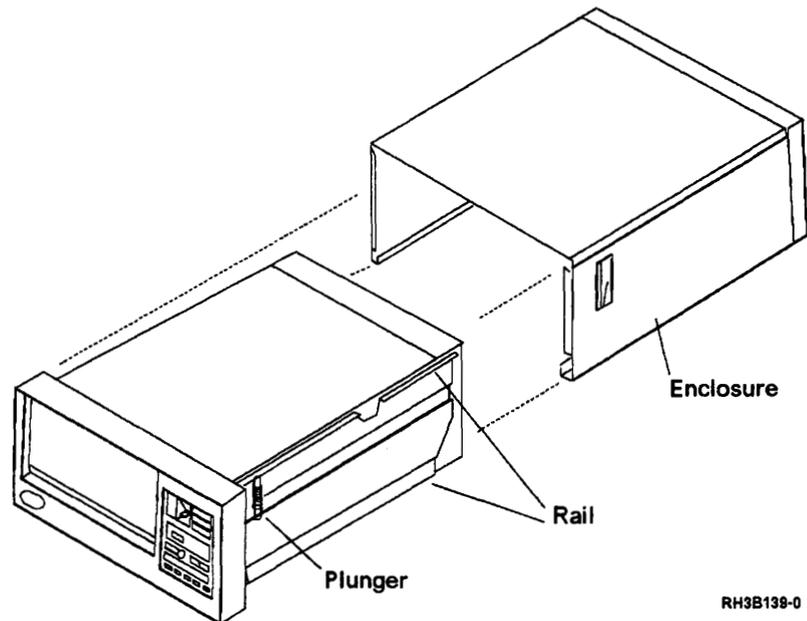
CAUTION:
Hold the enclosure cover open so that it does not close unexpectedly.

Push the plunger down until it is beneath the hole in the enclosure. While holding the plunger down, push the tape unit from the back until it clears the plunger.



10

Close the cover. Push the tape unit from the back until it is approximately halfway out of the enclosure, and then pull the unit out of the enclosure.

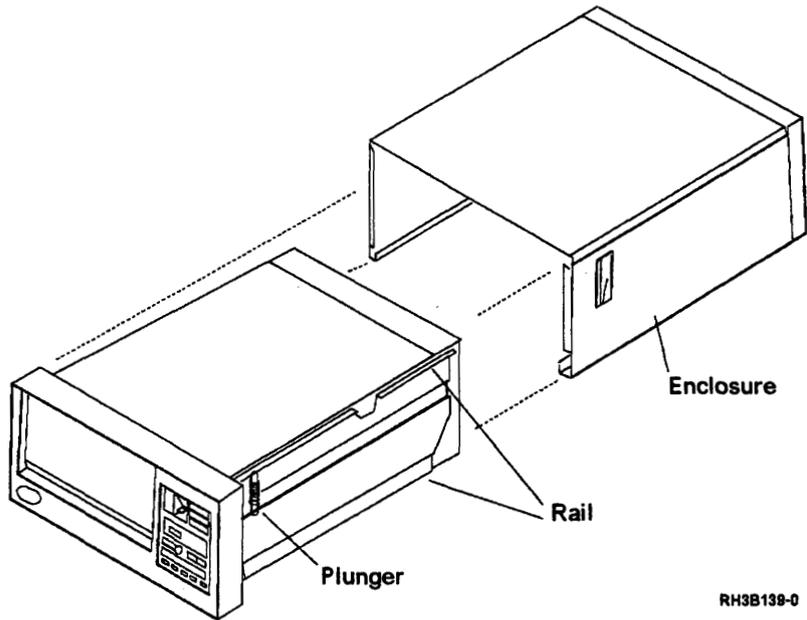


Enclosure Installation

1

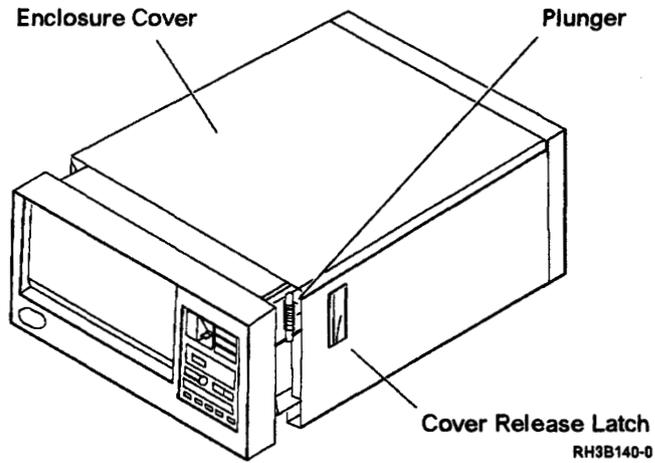
Note: This procedure applies to the table-top unit only.

Align the rails of the tape unit with the slots in the enclosure, and then push the unit into the enclosure until the plunger touches the front of the enclosure.



2

Press the cover release latch, and then open the enclosure cover.

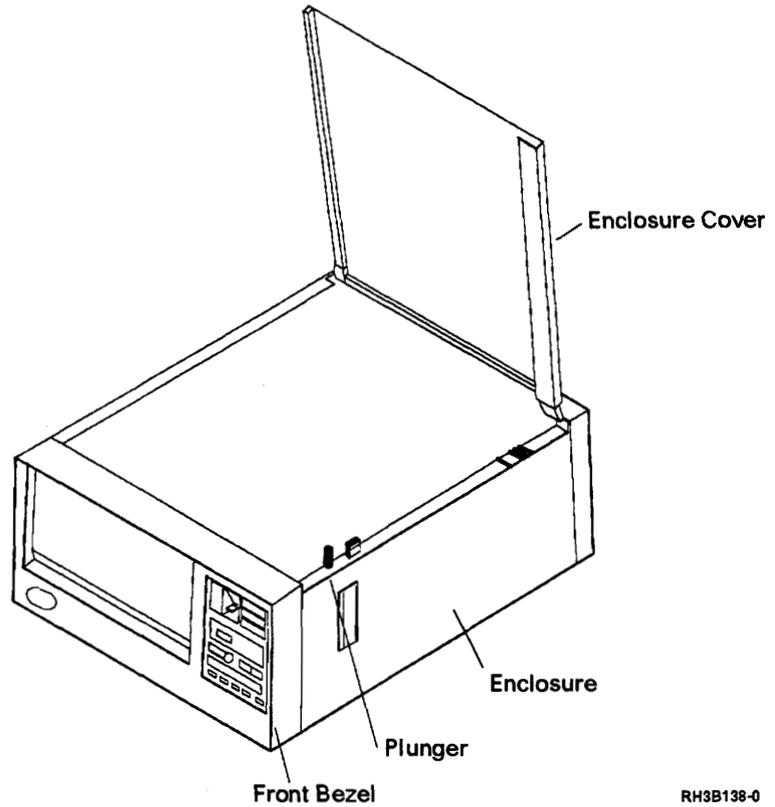


3

CAUTION:

Hold the enclosure cover open so that it does not close unexpectedly.

Push the plunger down until it is beneath the enclosure, and then push the tape unit into the enclosure until the front bezel touches the front of the enclosure. Ensure that the plunger protrudes through the hole in the enclosure.

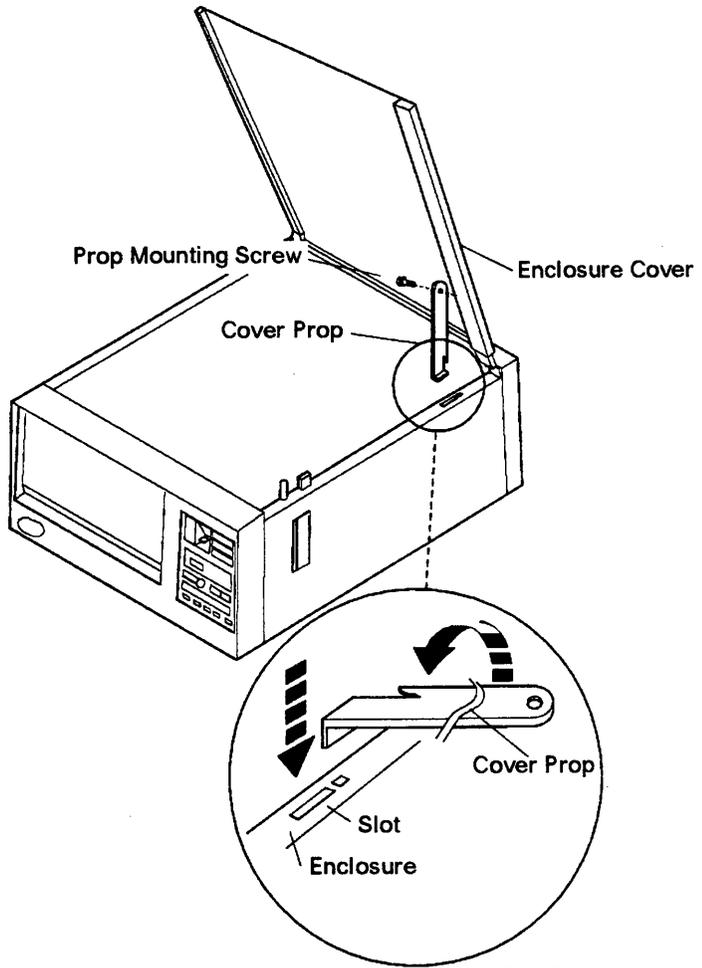


RH3B138-0

4

Note: Hold the cover prop firmly during this step. If the prop falls inside the enclosure, the enclosure must be removed to retrieve the prop.

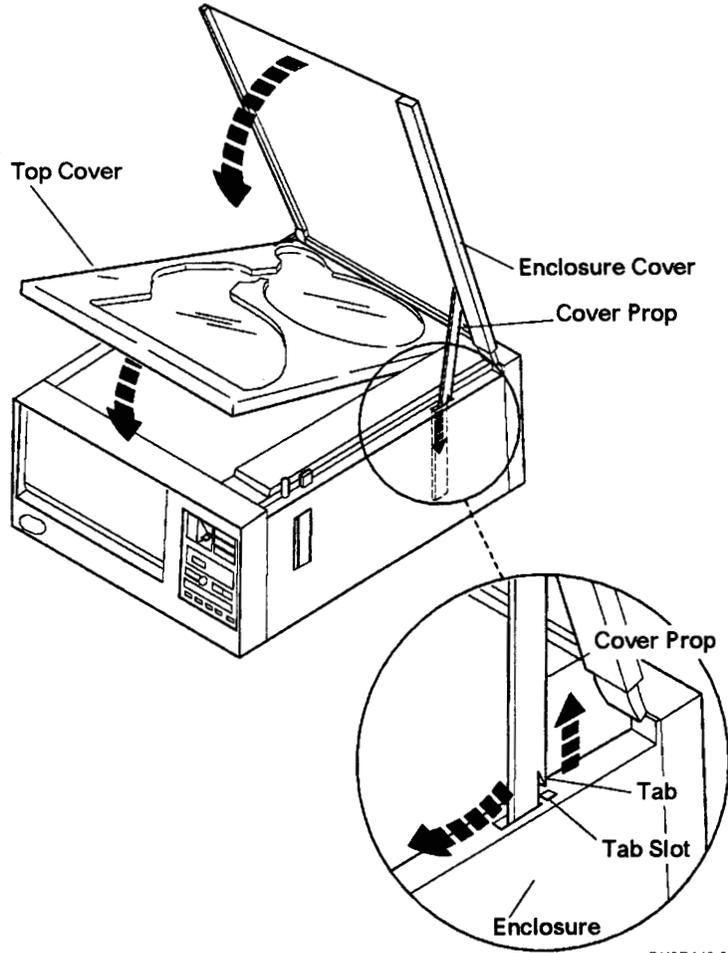
Install the prop in the enclosure slot, and then fasten the prop to the enclosure cover by installing the TORX (T25) mounting screw.



5

Close the top cover.

Lift the enclosure cover until the tab on the cover prop is out of the tab slot in the enclosure, and then guide the prop into the enclosure as you close the cover.

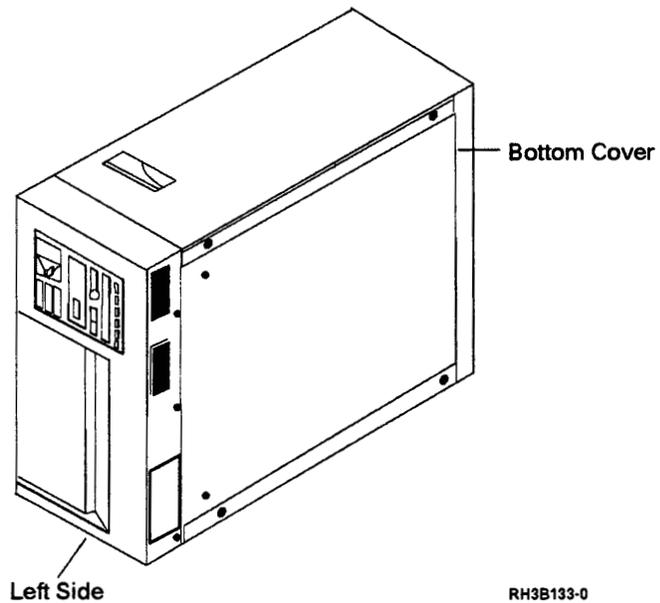


RH3B148-3

6

Turn the tape unit on its left side.

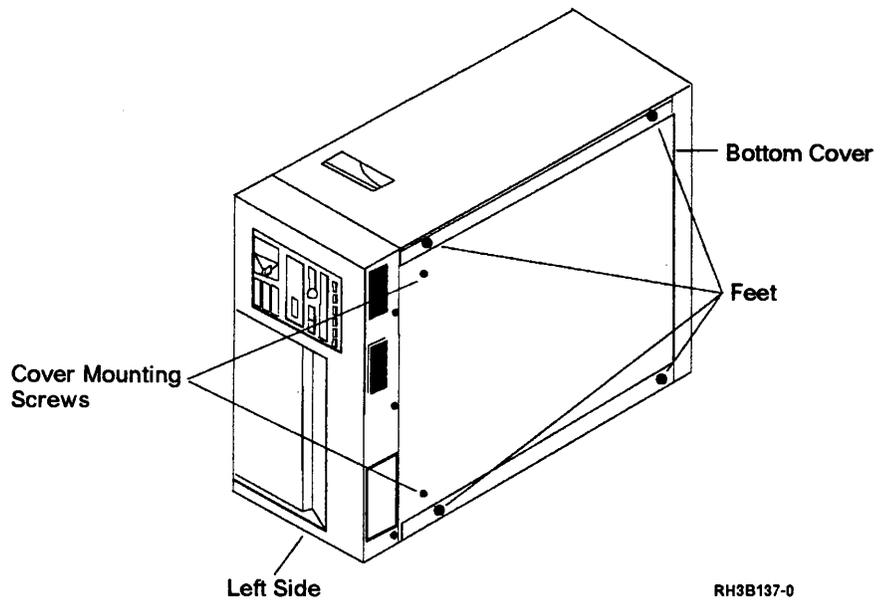
CAUTION:
The table-top unit weighs approximately 45 kg (98 lb). Do not try to lift it by yourself. Ask other service representatives for aid if you must pick up the unit.



RH3B133-0

7

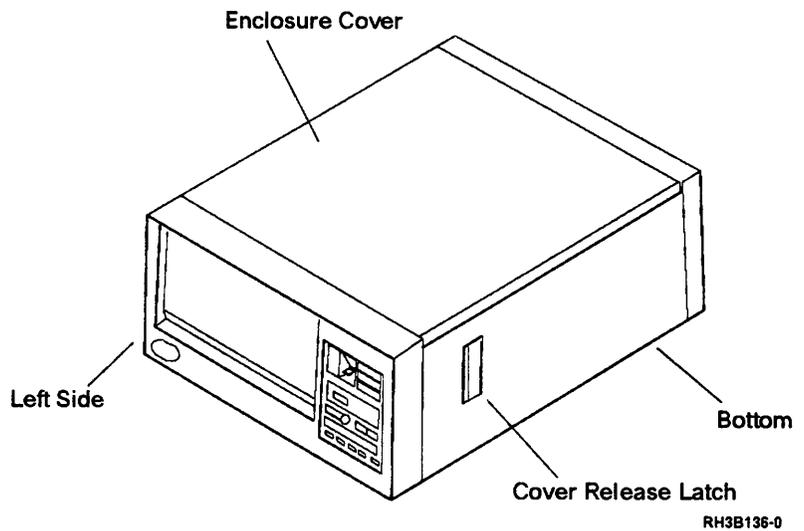
Install the four feet using the four TORX (T25) mounting screws. Tighten each screw until the foot begins to bulge.



8

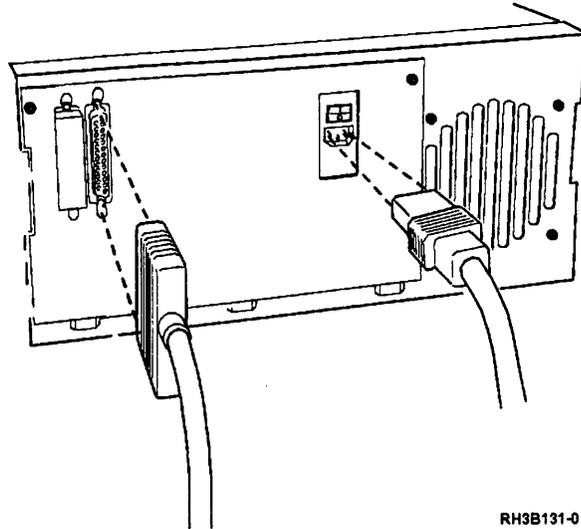
CAUTION:
The table-top unit weighs approximately 45 kg (98 lb). Do not try to lift it by yourself. Ask other service representatives for aid if you must pick up the unit.

Place the tape unit on its bottom side.



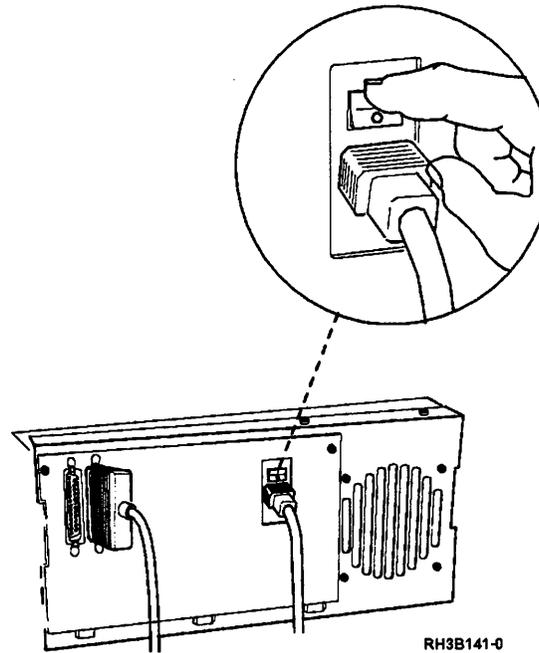
9

Connect the signal and power cables to the rear of the tape unit.



RH3B131-0

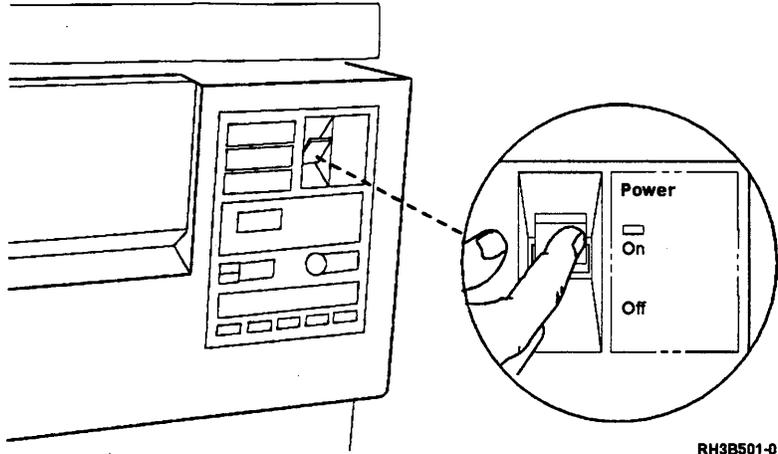
Set the AC power switch on the rear of the tape unit to the | (On) position.



RH3B141-0

10

Set the AC power switch on the control panel to the On position.



RH3B501-0

Chapter 4. Cleaning

Cleaning Recommendations

Use the following instructions to clean the tape unit.

Clean the tape path every eight hours if:

- Less than ten reels of tape are used in eight hours

Clean the tape path thoroughly every one to two hours of continuous running if:

- More than ten reels are used in eight hours

Clean the tape path thoroughly after each reel of tape if:

- Particles appear in the tape path
- You are using tape reels from outside your computer center
- You are using new or seldom used tapes

Clean the tape path immediately if:

- There is excessive dust in the computer center
- The tape unit has not been used in several days

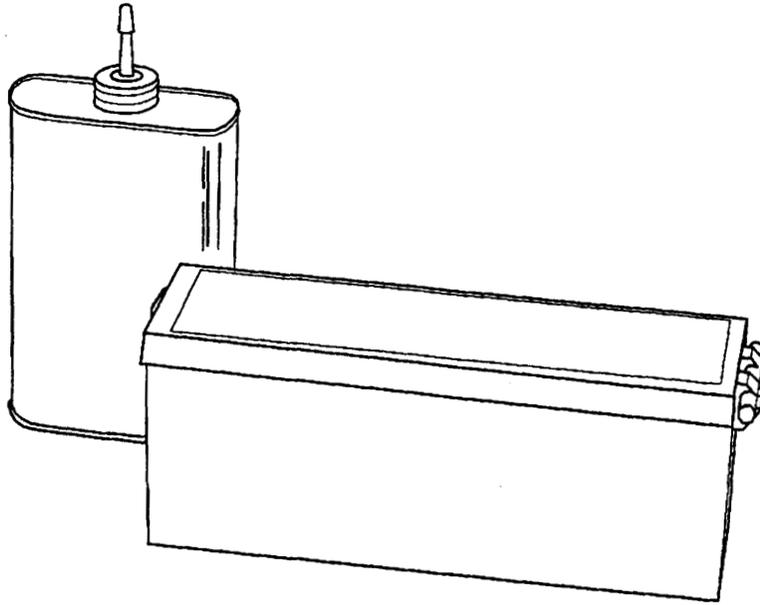
Most users find that they need to clean the tape path once after every eight-hour work period. However, if any of the problems listed above develop or if the CHECK indicator starts to occur regularly in the status display, the tape path should be cleaned more frequently. If an increased cleaning schedule does not improve reliability, check the tape reels. All old and worn tape reels should be copied immediately and then discarded.

- Ensure that the customer understands correct tape cleaning procedures.
- Ensure that the customer uses good tapes and has a program for media management.

Cleaning Supplies

Use the following items to clean the 9348:

- Tape cleaning kit, IBM part 352465 or a similar cleaning kit
- Cleaning fluid, IBM part 13F5647 or a similar cleaning fluid
- Lint-free cloth, IBM part 2108930 or a similar lint-free cloth
- Rigid cleaning tool, IBM part 2200574 or a similar tool



RF1C022-0

Warning: Do not use cleaner solutions which contain lubricants. Lubricants leave dirt on the tape head and cause the performance to go down.

Do not use standard hub cleaners or strong alcohol solutions (>20%). These solutions will damage the guides and rollers in the tape path and the tape head.

Do not use spray cleaners. The spray is difficult to control and often contains metal particles that damage the tape head.

Do not use soap and water on the tape path. Soap leaves a thick film, and water may damage electronic parts.

Discard the cloths and swabs after use. Although they appear clean, they are contaminated.

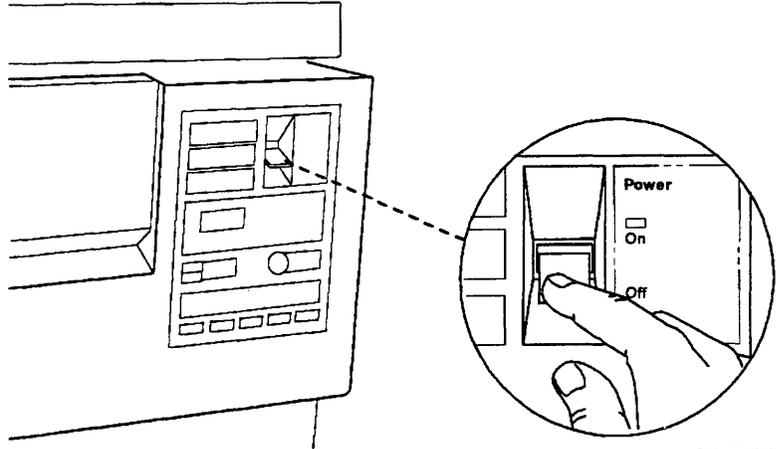
Do not use normal tissues. Although they may seem effective, they leave abrasive lint in the tape path.

When cleaning is complete, dry all tape path components. Do not load a tape when there is moisture in the tape path.

Cleaning Procedure

1

Set the Power switch on the control panel to the Off position.



RH3B508-0

2

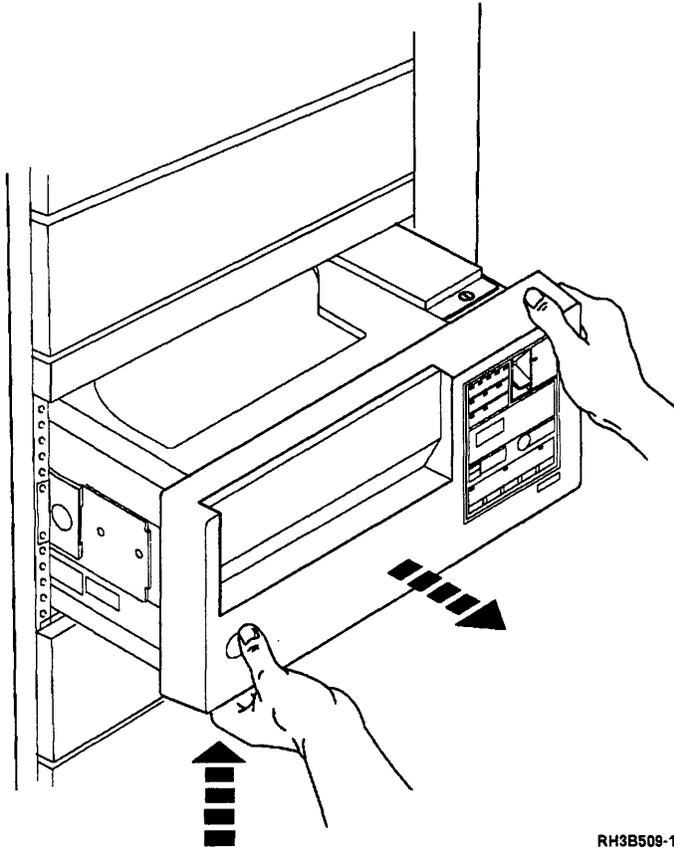
Note: If you are working on a table-top unit, go to step 3.

CAUTION:

When the unit is extended, its weight can turn over a rack that is not steady. Before you pull the unit out of the rack, ensure that a rack stabilizer is attached to the bottom front of the rack.

Do not pull out more than one unit at a time. The rack can turn over if you pull out more than one unit at a time.

Pull the release lever located under the front of the control panel as shown. Then pull the 9348 out of the rack until the slide locking tabs lock.

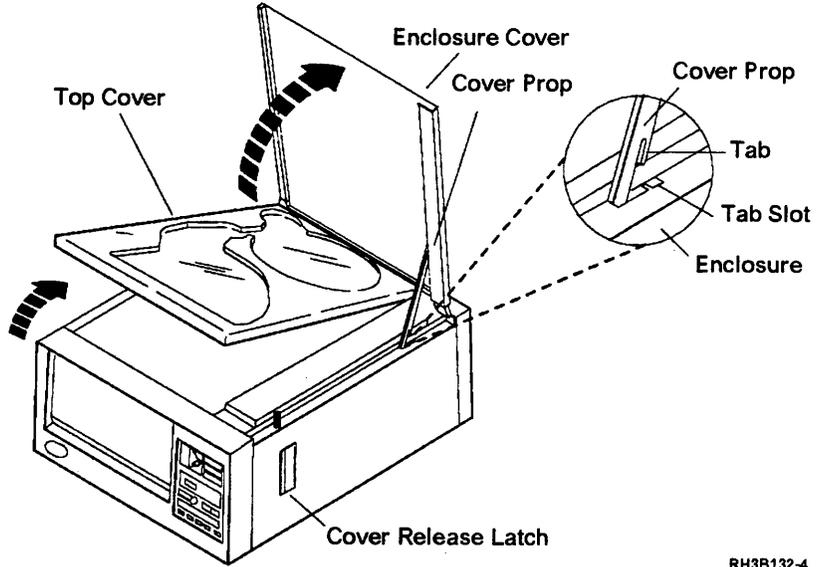


RH3B509-1

3

Note: If you are working on a rack mounted unit, go to step 4.

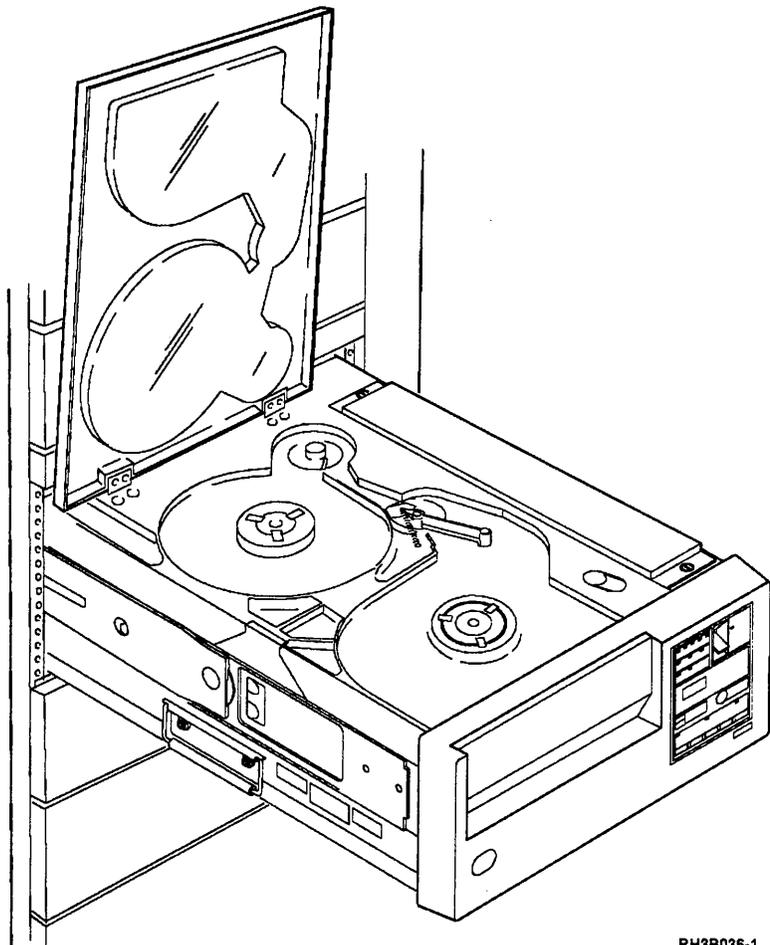
Press the cover release latch, and then open the enclosure cover. Ensure that the tab on the cover prop goes into the tab slot in the enclosure.



RH3B132-4

4

Open the top cover.



RH3B036-1

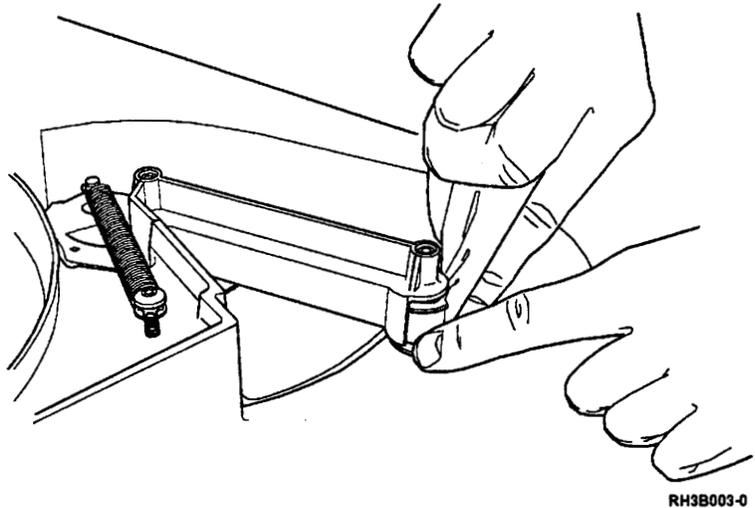
5

Put a small amount of cleaning fluid on a lint-free cloth or swab.

DO NOT put your cloths and swabs into the cleaning fluid container. This will make the cloth too damp and will make the cleaning fluid dirty.

6

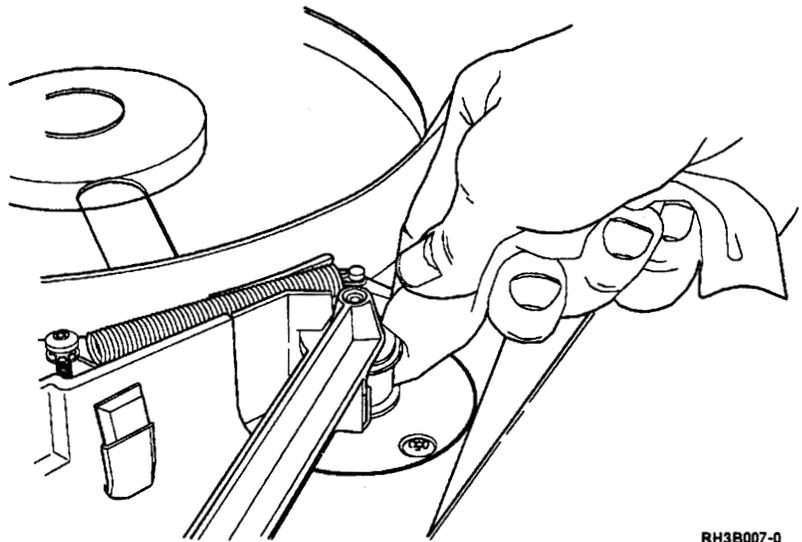
Using slight pressure in one direction and a lint-free cloth, clean the tension arm movable roller.



7

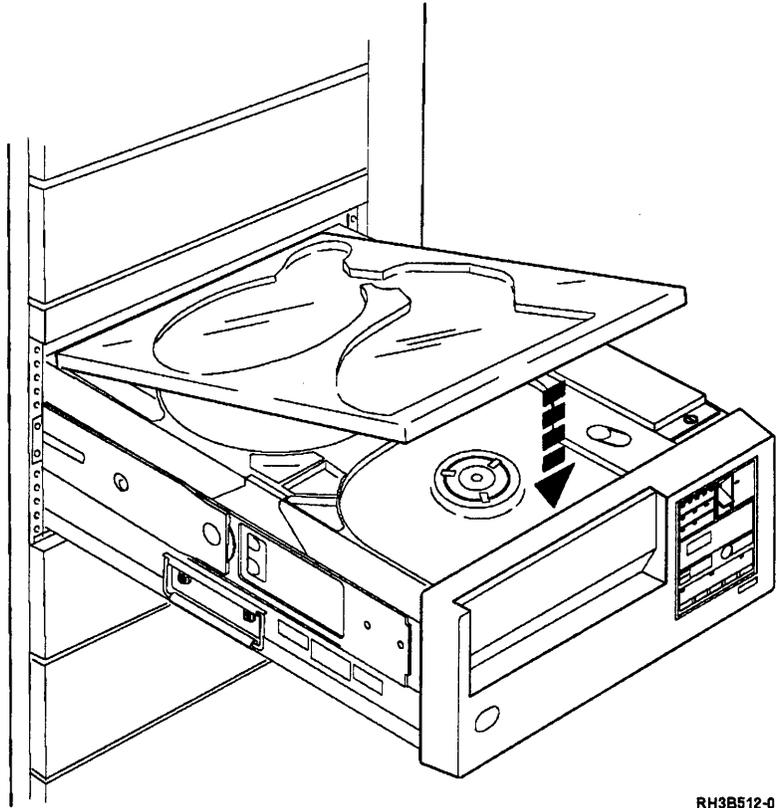
Using slight pressure in one direction and a lint-free cloth, clean the tension arm fixed guide.

Clean the flat surface of the upper and lower flanges on the guide.



14

Close the top cover.



RH3B512-0

15

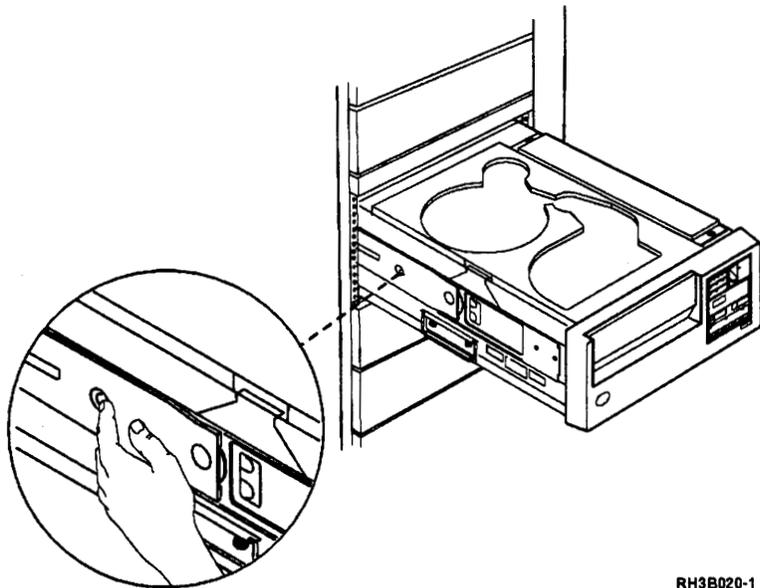
Note: If you are working on a table-top unit, go to step 16.

Slide the tape unit back into the rack:

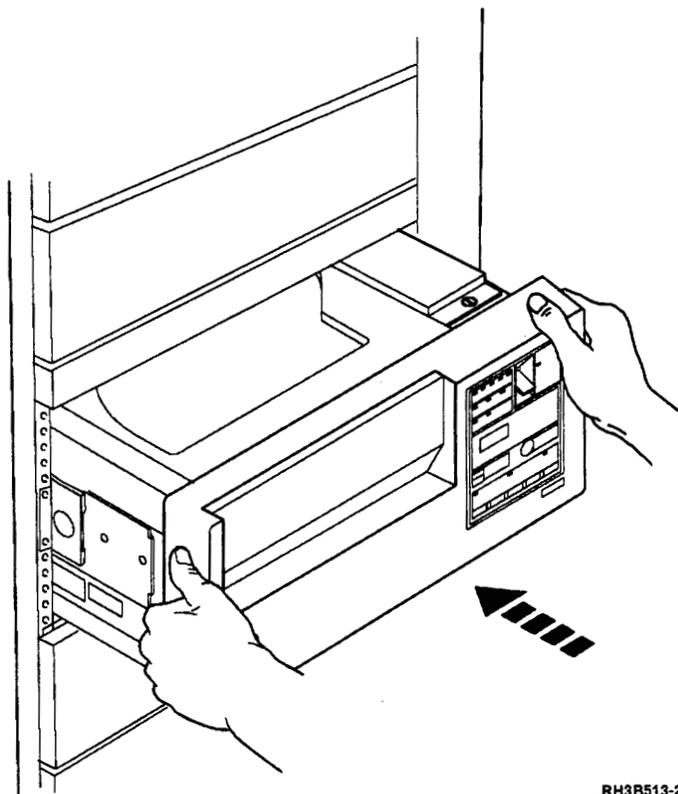
- Press the lock button on the slide (on each side of the tape unit) and push gently to slide over the lock buttons.
- If the 9348 stops before it is completely in the rack, press the lock pushbutton again and push the unit into the rack until it fastens in place.

CAUTION:

Ensure that your fingers are not between the front cover and the rack when you push the unit into the rack. (RSFTC084)



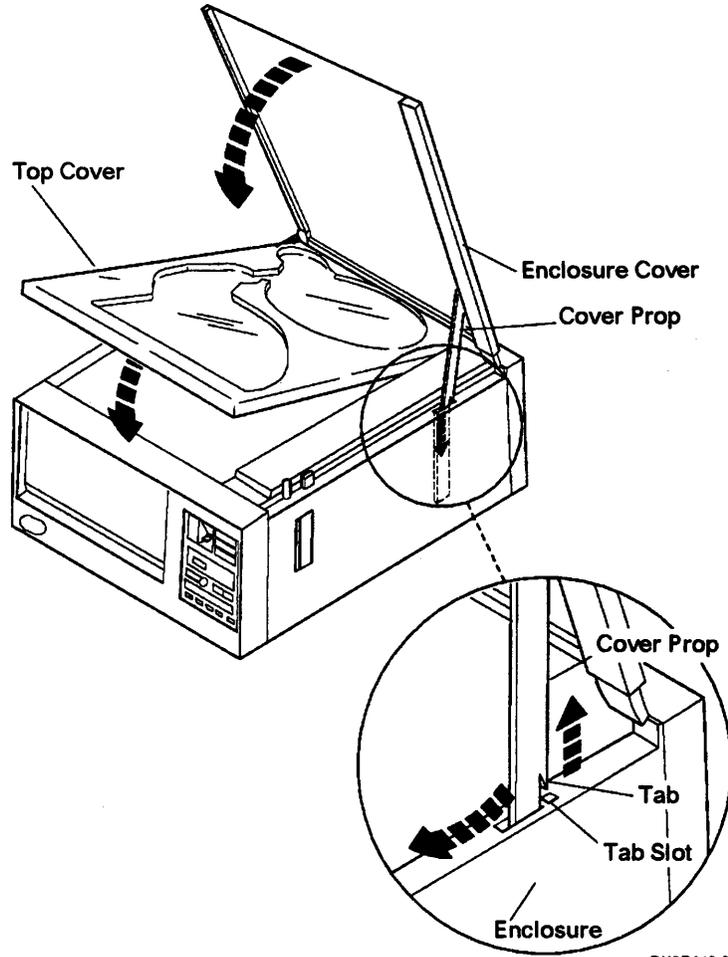
RH3B020-1



RH3B513-2

16

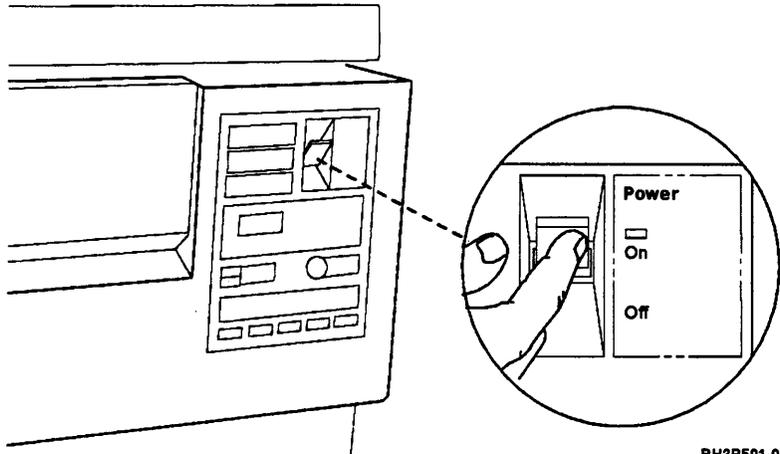
Note: If you are working on a rack mounted unit, go to step 17. Lift the enclosure cover until the tab on the cover prop is out of the tab slot in the enclosure, and then guide the prop into the enclosure as you close the cover.



RH3B149-3

17

Set the Power switch on the control panel to the On position.



RH3B501-0

Chapter 5. Safety Inspection Guide

Getting Ready

Before performing the inspection procedures in this guide, ensure that present room and electrical conditions are safe.

Power off the 9348 tape unit and disconnect the power cable from the power outlet on the rack.

Safety Conditions

If present conditions are not safe, you must determine if the condition is dangerous. For example, the following conditions are not safe:

- Electrical: In the primary power area, a frame that is not grounded
- Mechanical: Missing or damaged covers
- Other: A leaking capacitor

The problem(s) must be repaired before the 9348 tape unit is used again.

Safety Education

Before performing the inspection procedures contained in this guide, you must have completed the *General Safety Training Course*.

Chemicals

Do not use solvents, cleaners, or other chemicals not approved by IBM.

Performing the Inspection

Safety items to protect operators and service representatives from injury are included in the design and assembly of IBM machines. This inspection guide identifies areas of the machine that might not be safe. Use good sense to identify other safety conditions not covered by this inspection guide.

Reference Information

Ensure that the following reference information is available:

- Service memorandums (SMs), including engineering change announcements (ECAs) and service aids (SAs) for this machine type
- The 9348 manual *Customer Information*, SA21-9567
- *Electrical Safety for IBM Customer Engineers*, S229-8124

Covers

1

Ensure that the following items are not damaged and have no sharp edges:

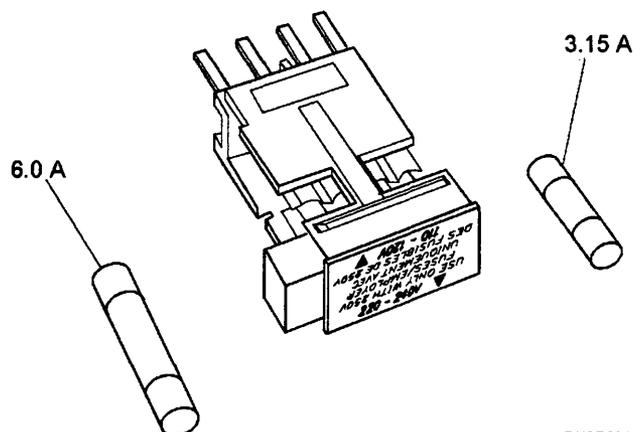
- Top cover
- Front panel
- Front door

Fuse

1

Ensure that the correct fuses are in the fuse module. See "Fuse Removal and Installation" on page 3-110.

There must be a 6.0 ampere fuse on the side of the module nearest to the 120 V triangle and a 3.15 ampere fuse on the side nearest to the 240 V triangle.



RH3B001-2

Slide Stopping Screws

1

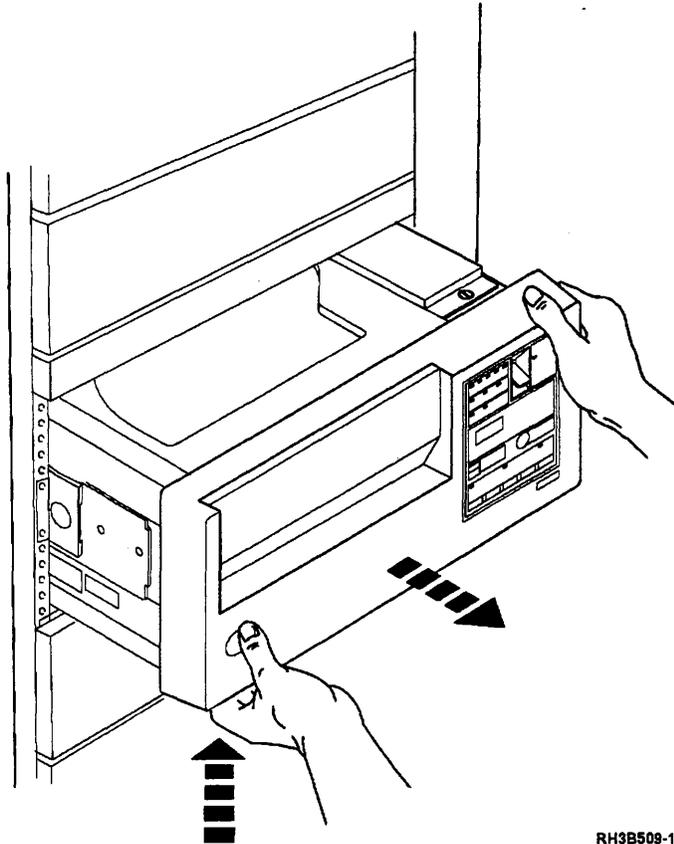
CAUTION:

When the unit is extended, its weight can turn over a rack that is not steady. Before you pull the unit out of the rack, ensure that a rack stabilizer is attached to the bottom front of the rack.

Do not pull out more than one unit at a time. The rack can turn over if you pull out more than one unit at a time.

Press the release lever located under the front panel as shown.

Then pull the tape unit out of the rack until the slide locking tabs lock.

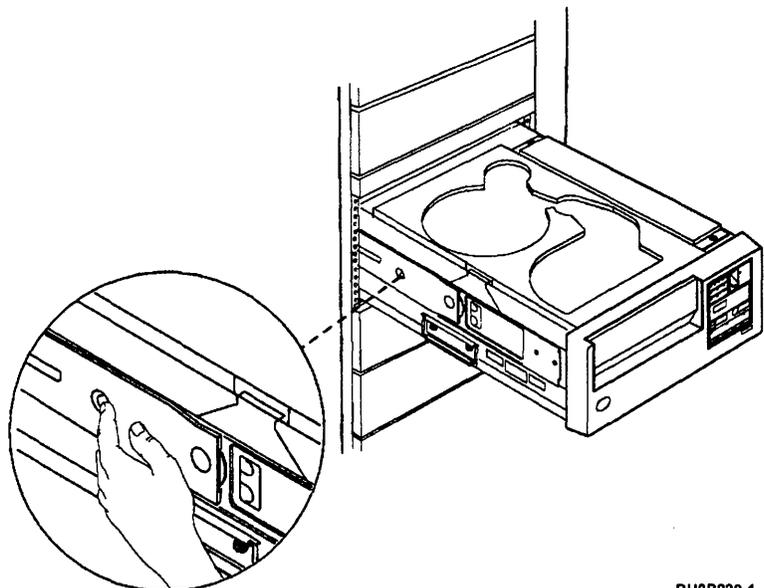


RH3B509-1

2

Press the locking tabs at the rear hole on the slides.

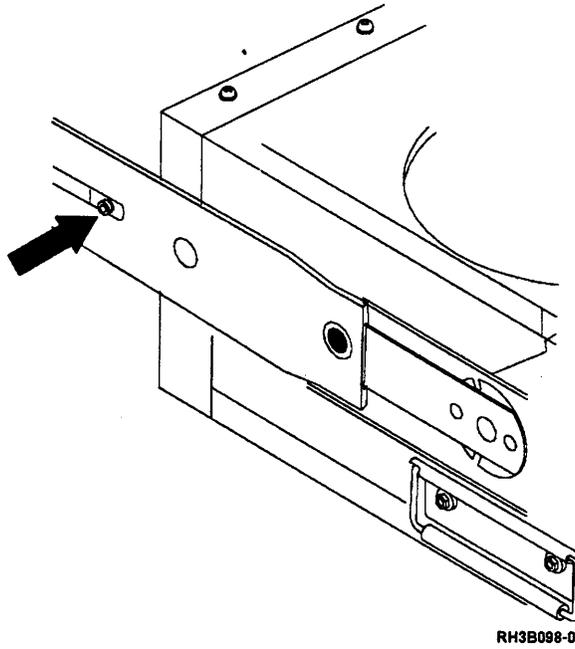
Pull the tape unit forward until the locking tabs lock in the front hole.



RH3B020-1

3

Ensure that a slide stopping screw is in place on both slides.



Pivot Locking Screws

1

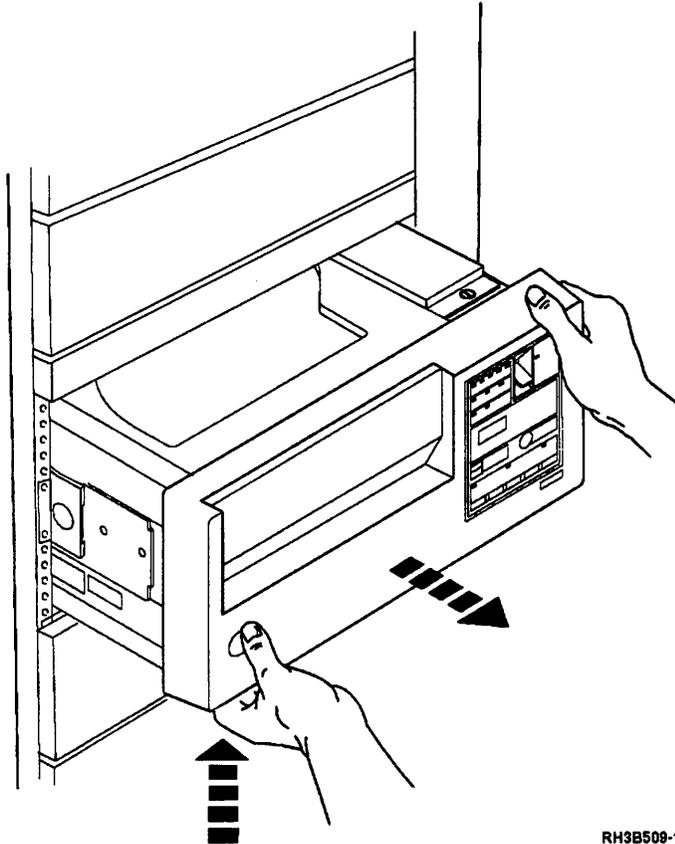
CAUTION:

When the unit is extended, its weight can turn over a rack that is not steady. Before you pull the unit out of the rack, ensure that a rack stabilizer is attached to the bottom front of the rack.

Do not pull out more than one unit at a time. The rack can turn over if you pull out more than one unit at a time.

Press the release lever located under the front panel as shown.

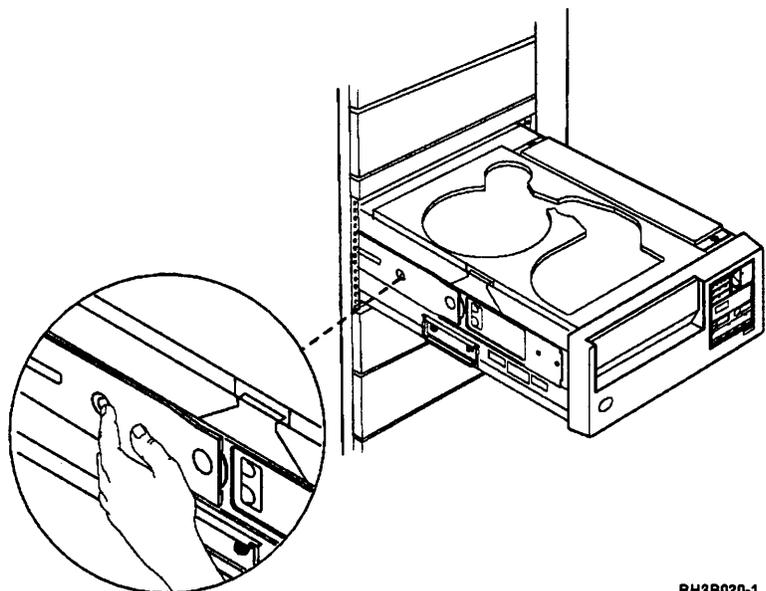
Then pull the tape unit out of the rack until the slide locking tabs lock.



2

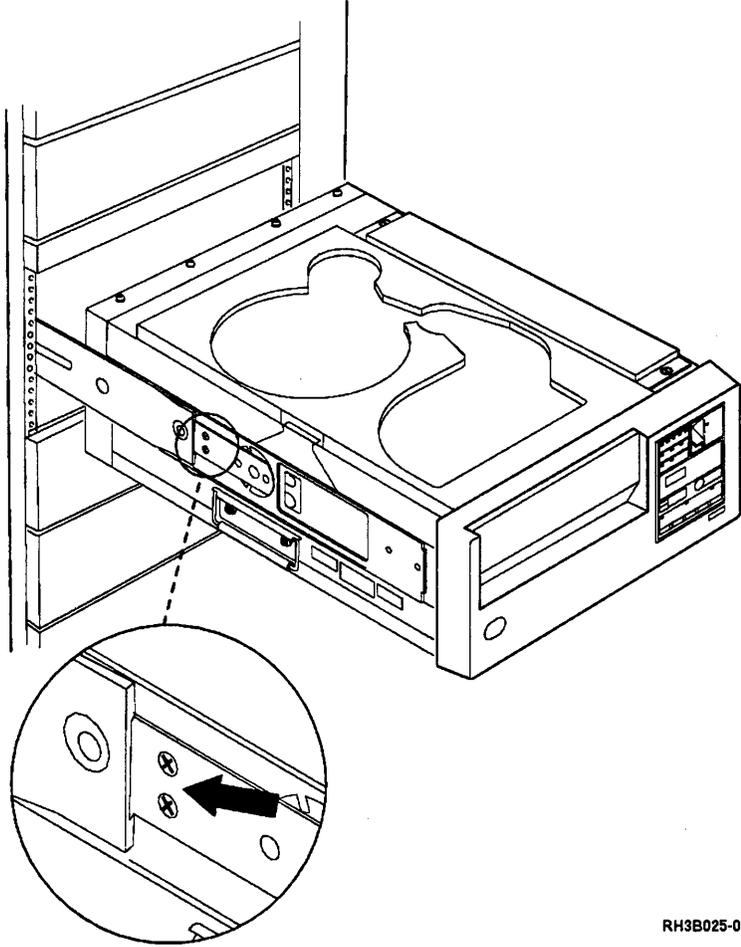
Press the locking tabs at the rear hole on the slides.

Pull the tape unit forward until the locking tabs lock in the front hole.



3

Ensure that there are two pivot locking screws in each slide.



RH3B025-0

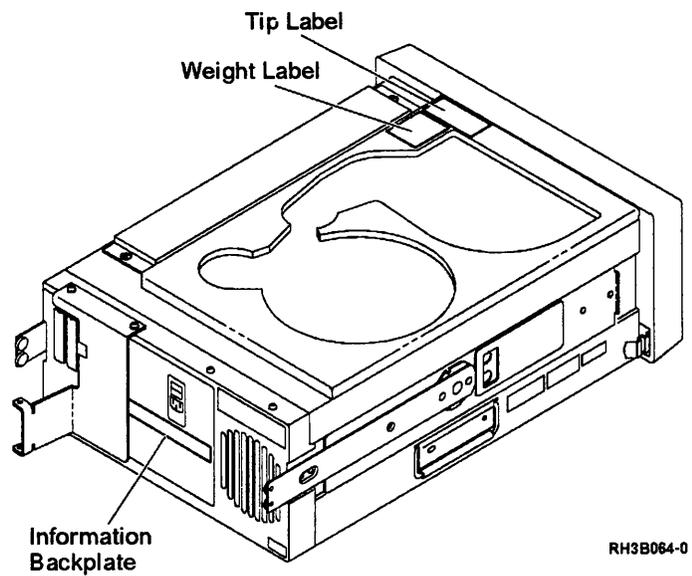
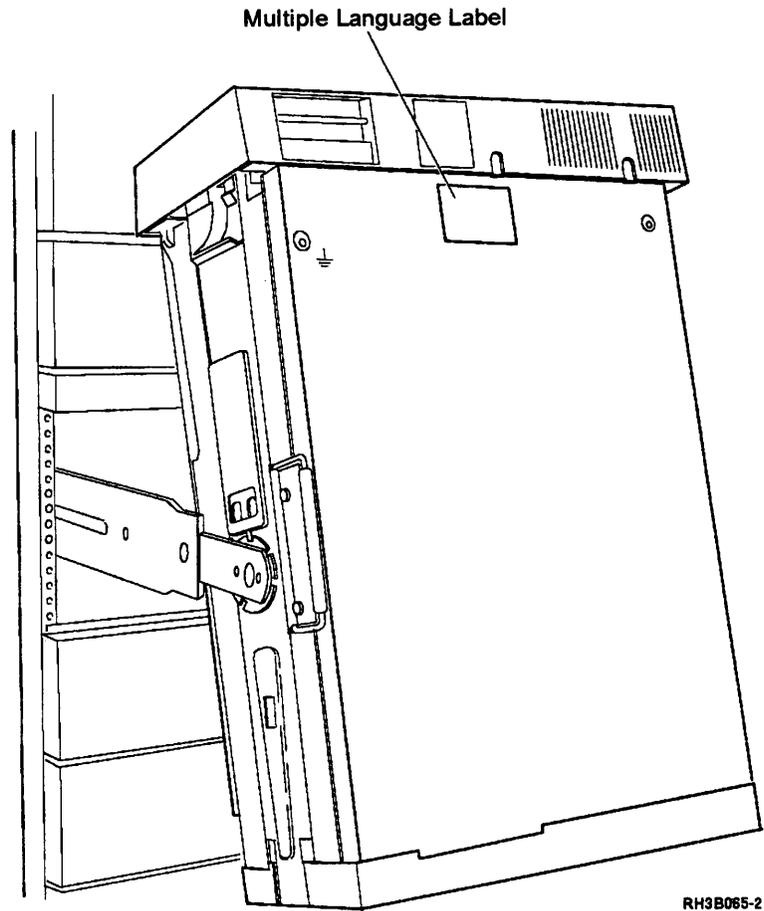
Safety Labels

1

Check the following labels:

- “Multiple Language” (bottom)
- “Information Backplate” (back)
- “Tip” (top) (rack mounted only)
- “Weight” (top)

Exchange the labels if they are damaged (not readable) or missing. See the Parts Catalog to order new labels.



Safety Grounds

1

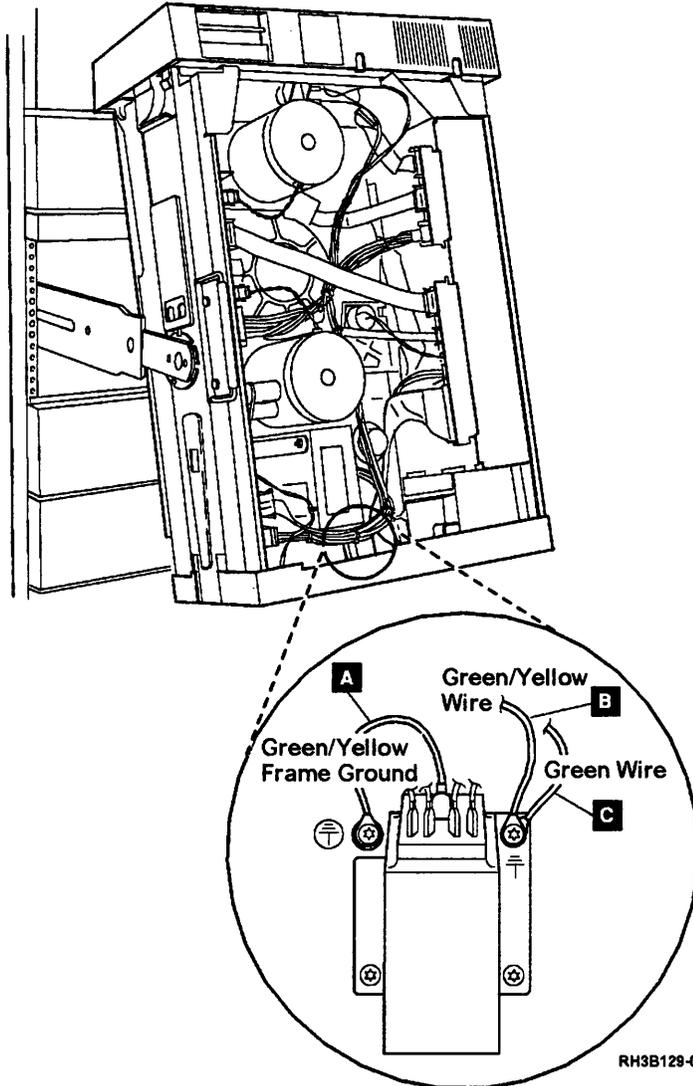
Place the tape unit in the service position; see "Placing the 9348 in the Service Position" on page 3-1.

2

Ensure that a green and yellow striped frame ground wire **A** is connected between the center connector of the ac filter and the ac filter screw.

Ensure that a green and yellow striped wire **B** is connected between an ac filter screw and the motor/power drive card.

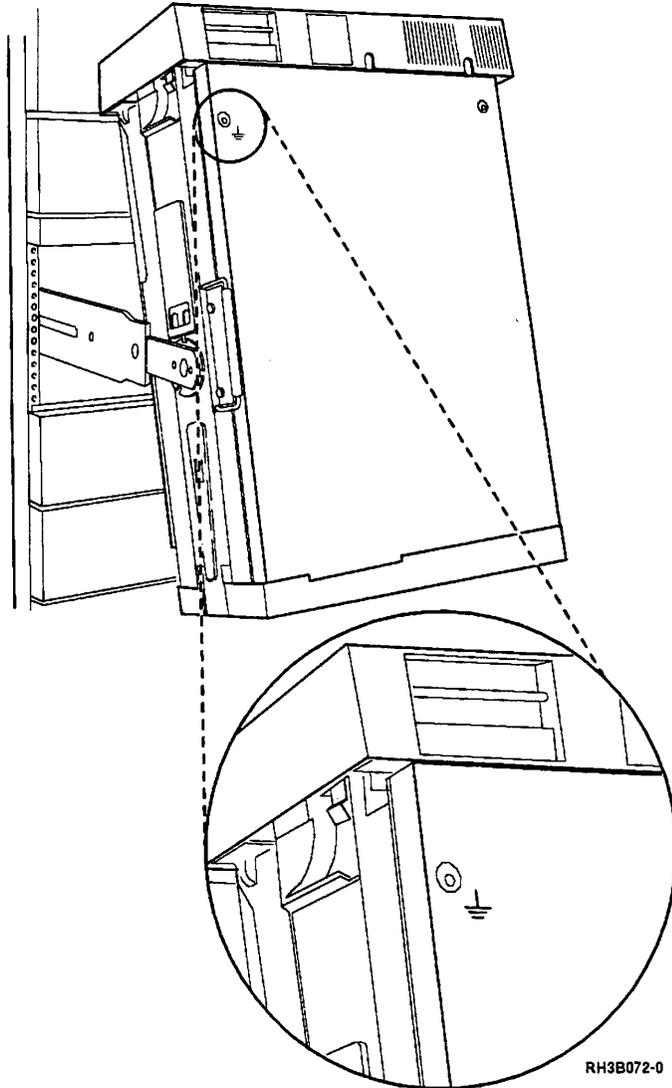
Ensure that a green wire **C** is connected between an ac filter screw and the connector card.



3

All other grounding is by means of metal-to-metal contact between screws and parts or assemblies.

This ground symbol is pressed into the bottom cover.



Power Cable

1

Power on the tape unit and observe that the power comes on.
Power off the tape unit and observe that the power goes off.

2

Disconnect the power cable from the back of the tape unit.

Check the power cable for visible cracks, wear, or damage.

3

Check for 1.0 ohm or less of resistance between the power cable ground and the power supply frame.

4

Connect the power cable to the back of the tape unit.

Chapter 6. Parts Catalog

How To Use This Parts List

- **SIMILAR ASSEMBLIES:** If two assemblies contain a majority of identical parts, they are broken down on the same list. Common parts are shown by one index number. Parts peculiar to one or the other of the assemblies are listed separately and identified by description.

- **AR: (As Required)** in the **Units** column indicates that the quantity is not the same for all machines.

- **NP: (Non-Procurable)** in the **Units** column indicates that the part is non-procurable and that the individual parts or the next higher assembly should be ordered.

- **NR: (Not Recommended)** in the **Units** column indicates that the part is procurable but not recommended for field replacement, and that the next higher assembly should be ordered.

- **R: (Restricted)** in the **Units** column indicates that the part has a restricted availability.

- **INDENTURE:** The indenture is marked by a series of dots located before the parts description. The indenture indicates the relationship of a part to the next higher assembly. For example:

Indenture Relationship of Parts

(No dot) MAIN ASSEMBLY

(One dot) • Detail parts of a main assembly

(One dot) • Sub assembly of the main assembly

(Two dot) • • Detail part of a one-dot sub assembly

(Two dot) • • Sub assembly of a one-dot sub assembly

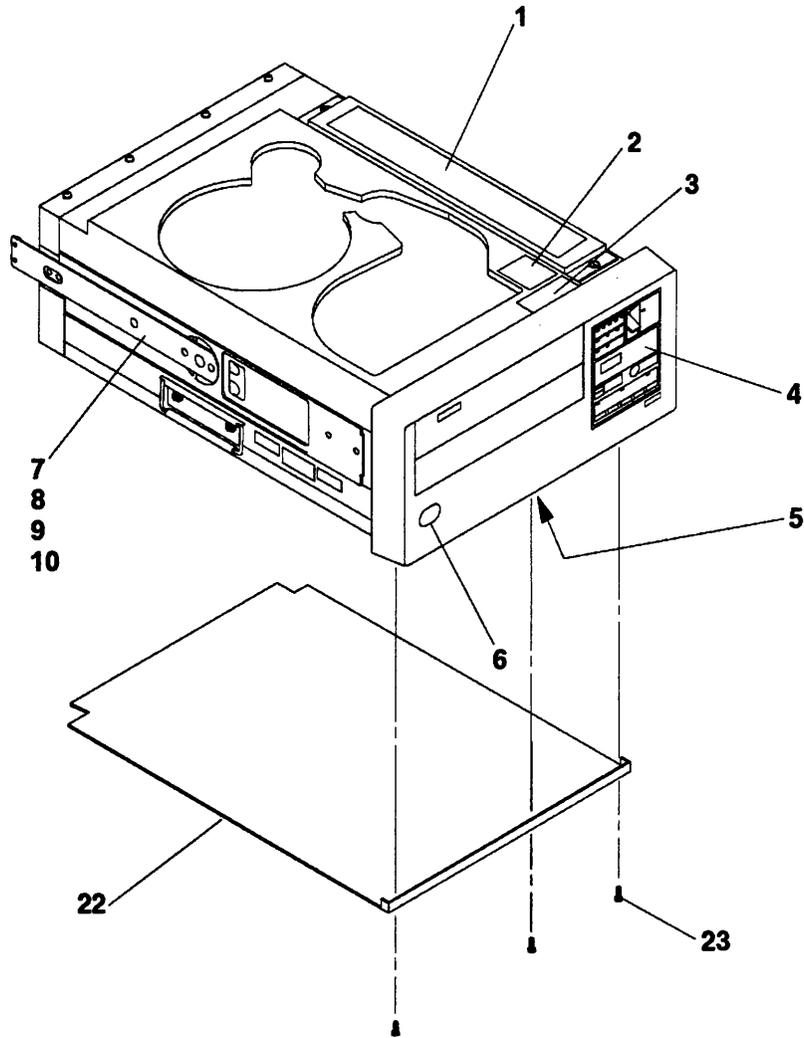
(Three dot) • • • Detail part of a two-dot sub assembly

Asm-Index	Part Number	Units	Description
3-	2512667	1	Cover Asm, Rear, Red
	2513714	1	Cover Asm, Rear, White
			For Next Higher Asm, See Assembly 1-2
-1	5373637	1	•Seal, Top
-2	5356429	2	•Clip, Retaining
-3	1847630	1	•Finger Stock Asm
-4	1847602	NR	••Channel, Finger Stock
-5	5373639	AR	•Seal, Bottom
-6	5356429	2	•Clip, Retaining
-7		NP	•Cover, Rear, Without Paint
-5	0416629	R	•Screw, Panel

Assemblies

Final Assembly	6-8
Front Cover Assembly	6-14
Labels and Slides	6-4
Line Cord Chart for Table Top Units	6-20
Table Top Assembly	6-16
Table-Top Assembly Cables	6-18

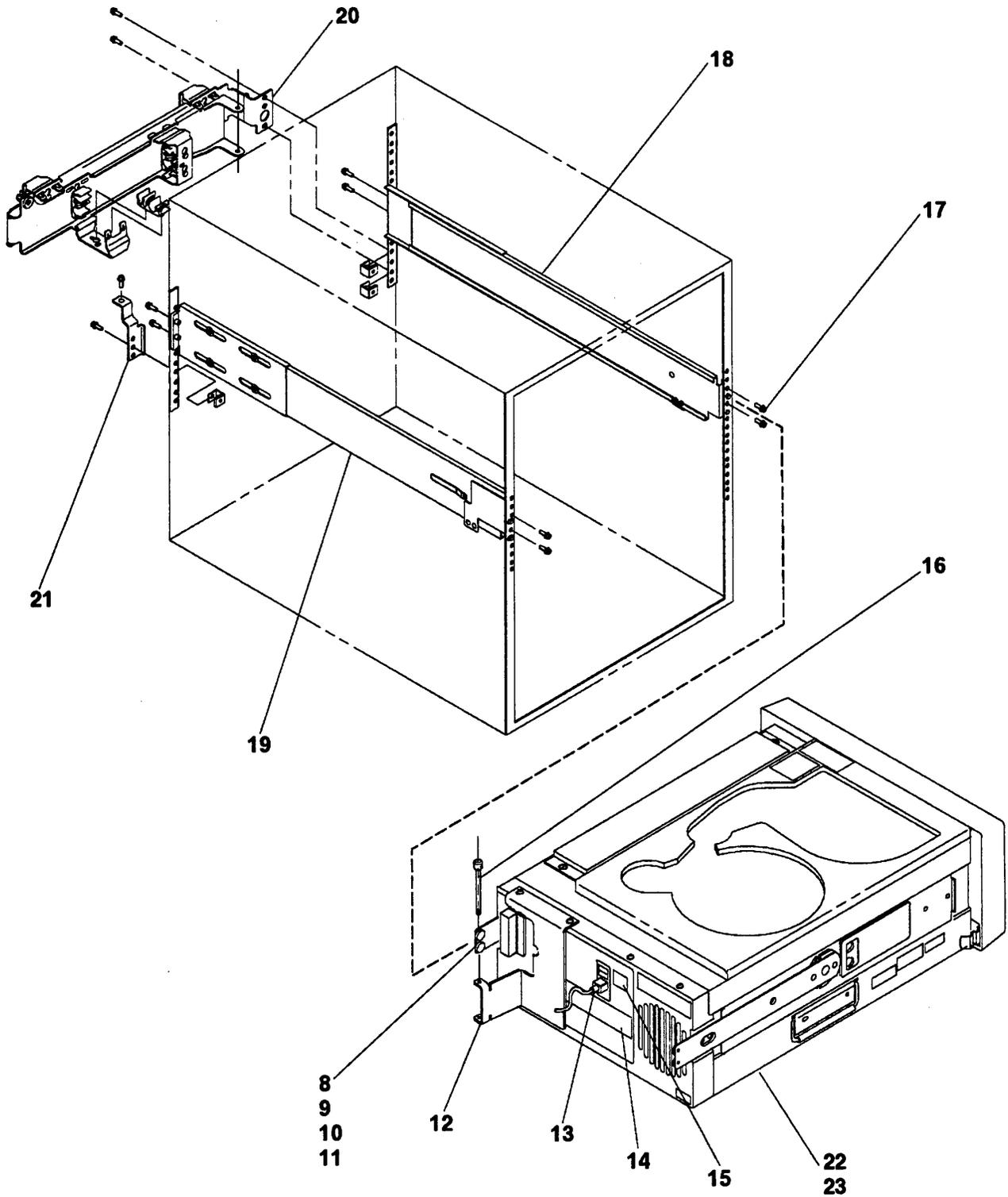
Assembly 1: Labels and Slides



RH3E020-3

Asm - Index	Part Number	Units	Description
1-1	21F7910	1	• Label, Cleaning - English
-1	21F7849	1	• Label, Cleaning - German
-1	21F7851	1	• Label, Cleaning - French
-1	21F7852	1	• Label, Cleaning - Spanish
-1	21F7853	1	• Label, Cleaning - Italian
-1	21F7863	1	• Label, Cleaning - Japanese
-1	21F7865	1	• Label, Cleaning - Chinese, Traditional
-1	21F7869	1	• Label, Cleaning - Chinese, Simplified
-1	21F7866	1	• Label, Cleaning - Norwegian
-1	21F7867	1	• Label, Cleaning - Belgian
-1	21F7870	1	• Label, Cleaning - Korean
-1	21F8051	1	• Label, Cleaning - Finland
-2	69X6171	1	• Label, Weight
-3	69X6183	1	• Caution Label - English, Canadian French
-3	6042316	1	• Caution Label - Swedish
-3	6042317	1	• Caution Label - Belgium, Dutch/French
-3	62X9969	1	• Caution Label - Japanese
-3	62X9971	1	• Caution Label - Danish
-3	62X9973	1	• Caution Label - Dutch
-3	62X9975	1	• Caution Label - Korean
-3	62X9977	1	• Caution Label - Norwegian
-3	62X9979	1	• Caution Label - Portuguese
-3	6839044	1	• Caution Label - French
-3	6839044	1	• Caution Label - Switzerland
-3	6839045	1	• Caution Label - Switzerland
-3	6839046	1	• Caution Label - Switzerland
-3	6839045	1	• Caution Label - German
-3	6839046	1	• Caution Label - Italian
-3	6839047	1	• Caution Label - Spanish
-3	6839048	1	• Caution Label - Finnish
-3	69X6192	1	• Caution Label - Chinese, Traditional
-3	69X6193	1	• Caution Label - Chinese, Simplified
-4	21F7829	1	• Overlay, English
-4	21F7830	1	• Overlay, German
-4	21F7831	1	• Overlay, French
-4	21F7832	1	• Overlay, Spanish
-4	21F7833	1	• Overlay, Italian
-4	21F7834	1	• Overlay, Japanese
-4	21F7835	1	• Overlay, Chinese, Traditional
-4	21F7836	1	• Overlay, Chinese, Simplified
-4	21F7837	1	• Overlay, Norwegian
-4	21F7839	1	• Overlay, Belgian
-4	21F7840	1	• Overlay, Korean
-5	21F7954	1	• Multilanguage Label
-6	21F7913	1	• Name Plate, IBM Logo
-7	21F7921	1	• Rail, Left Side

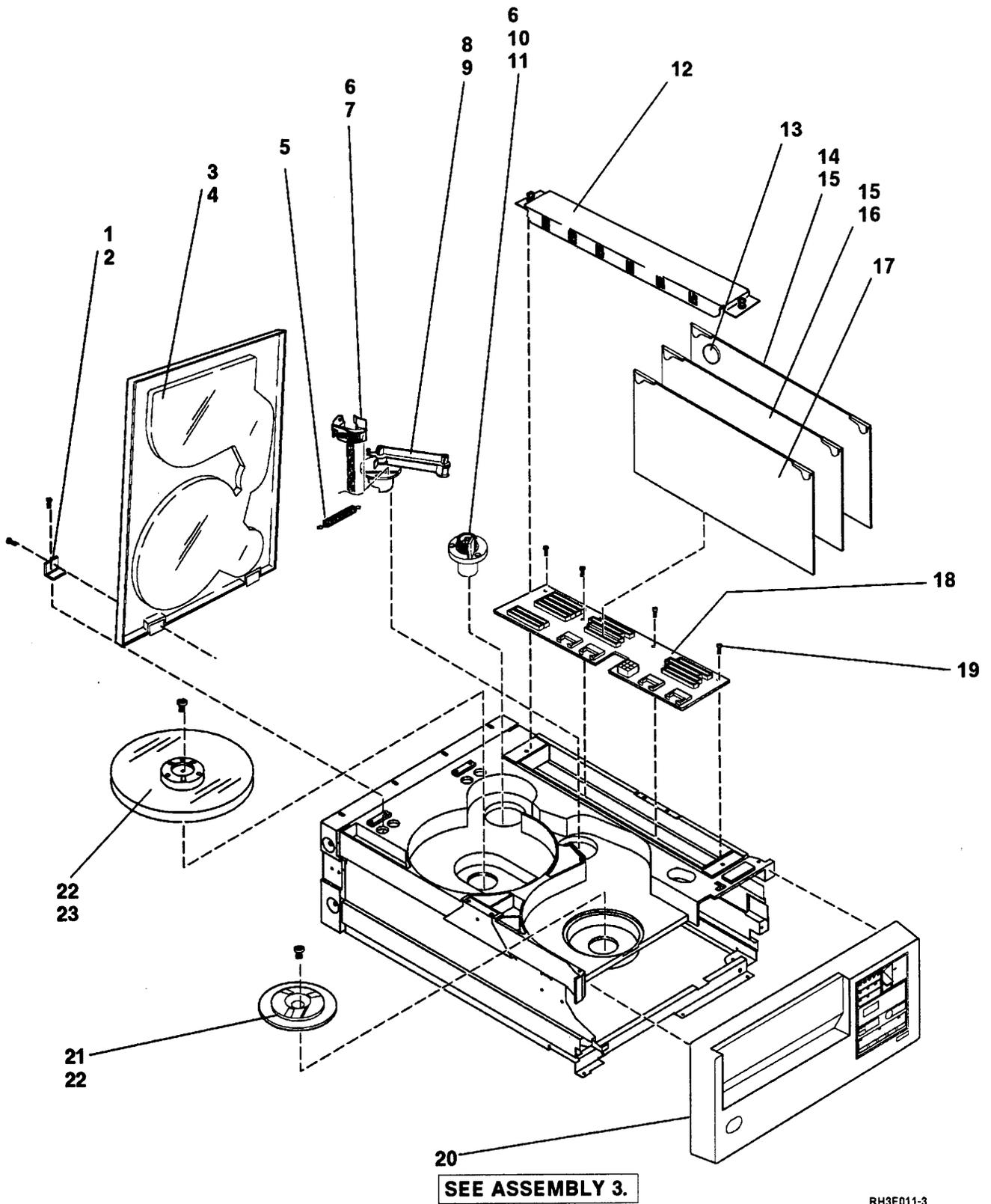
Assembly 1: (continued)



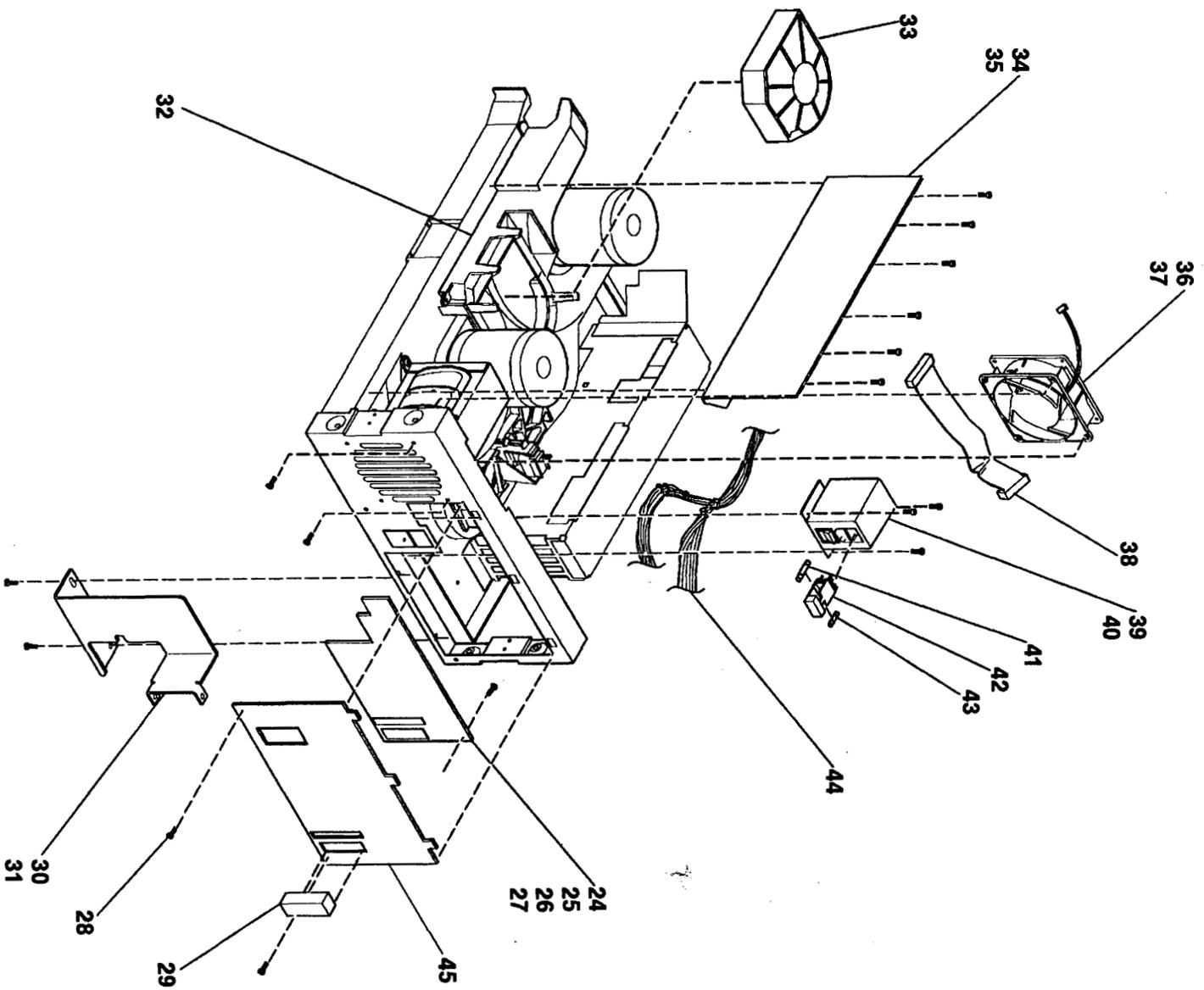
RH3E021-2

Asm – Index	Part Number	Units	Description
1-8	21F7989	4	• Screw, T25
-9	99	4	• Screw, Pivot Locking
-10	21F7922	2	• Screw, Slide Stopping
-11	21F7920	1	• Rail, Right Side
-12	21F7967	1	• Cable Carrier Bracket
-13	376038	1	• Line Cord, Canada, AG/APG
-13	6462386	1	• Line Cord, EMEA
-14	21F7964	1	• Label, Information (Back Plate), 9348-001 and 011
-14	21F8017	1	• Label, Information (Back Plate), 9348-002 and 012
-15	21F7965	1	• Label, AC Switch (On/Off)
-16	6200947	1	• Screw, Hinge
-17	1624779	12	• Screw, Hex HD
-18	21F7962	1	• Slide Assembly, Right Side
-19	21F7963	1	• Slide Assembly, Left Side
-20	6200940	1	• Cable Carrier Arm
-21	6200961	1	• Shipping Bracket
-22	21F8048	1	• Bottom Cover
-23	21F7989	3	• Screw, T25

Assembly 2: Final Assembly



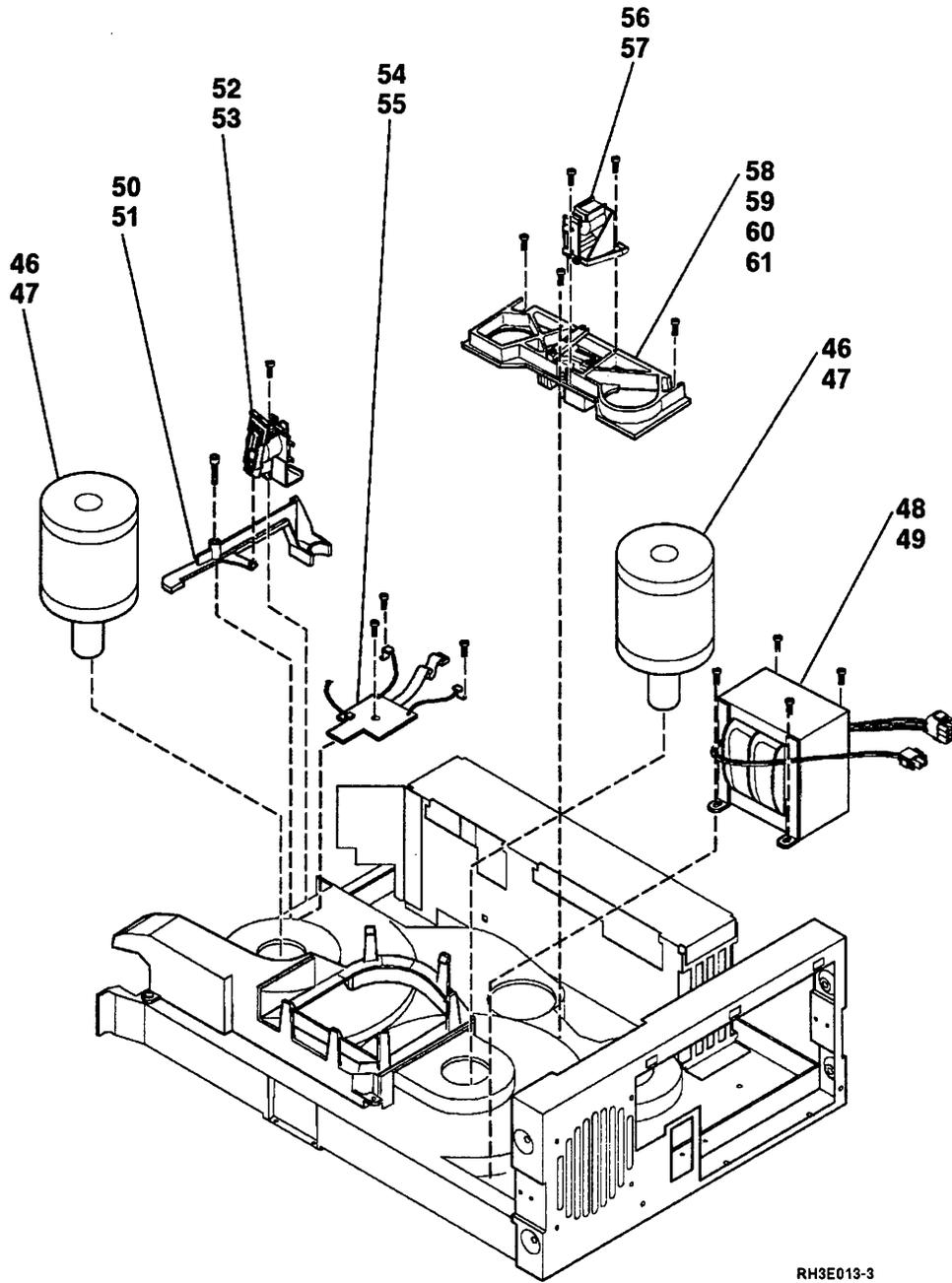
Asm - Index	Part Number	Units	Description
2-1	21F7957	2	• Cover Hinge
-2	21F7989	8	• Screw, T25
-3	21F7956	1	• Top Cover
-4	21F7955	2	• Roller Latch
-5	21F7966	1	• Tension Spring
-6	21F7989	6	• Screw, T25
-7	21F7931	1	• BOT/EOT Sensor
-8	21F7935	1	• Tension Arm
-9	21F7968	1	• Roller Guide
-10	21F7932	1	• Speed Encoder (included in part 21F7937)
-11	21F7937	1	• • Speed Encoder Cable (included in part 21F7932)
-12	21F8050	1	• Card Enclosure Cover
-13	21F7947	1	• 3-Volt Battery
-14	21F7926	1	• Buffer Card
-15	56F0081	1	• Program Module Kit
-16	21F8063	1	• Controller Card
-17	21F7923	1	• Read/Write Card
-18	21F7924	1	• Connector Card
-19	81693	4	• Screw, 6-32 x 3/8, Binder HD
-20	xxxxxxx	1	• Front Cover Assembly, (see Assembly 3)
-21	21F7950	1	• Supply Hub
-22	21F7990	2	• Screw, Hub
-23	21F7949	1	• Take-up Reel



RH3E012-3

Asm— Index	Part Number	Units	Description
2-24	56F0080	1	• Interface Card, 9348-001 and 002, differential
-24	21F8030	1	• Interface Card, 9348-011 and 012, single-ended
-25	81693	5	• Screw, 6-32 x 3/8 Binder HD
-26	56F0081	1	• Program Module Kit
-27	21F7941	1	• Interface Cable
-28	21F8032	2	• Screw, T25, Black
-29	79X3795	1	• Terminator Plug, 9348-001 and 002
-29	70F9671	1	• Terminator Plug, 9348-011 and 012
-30	21F7967	1	• Cable Carrier Bracket
-31	21F7989	2	• Screw, T25
-32	21F7986	1	• Blower Fan Duct
-33	21F7969	1	• Blower Fan
-34	21F7927	1	• Power/Motor Drive Card
-35	21F7989	6	• Screw, T25
-36	21F7948	1	• Cooling Fan
-37	21F7989	4	• Screw, T25
-38	21F7939	1	• Motor Control Cable
-39	21F7958	1	• AC Switch and Power Module
-40	21F7989	3	• Screw, T25
-41	21F7942	1	• Fuse, 6.00 Amp, 250 Volt, Fast Blow
-42	xxxxxxx	NP	• • Fuse Module (Part of 21F7958, AC Switch Assembly.)
-43	21F7952	1	• Fuse, 3.15 Amp, 250 Volt, Mini Fast Blow
-44	21F7940	1	• Harness Cable
-45	21F8056	1	• Interface Plate, 9348-001 and 002
-45	21F8046	1	• Interface Plate, 9348-011 and 012

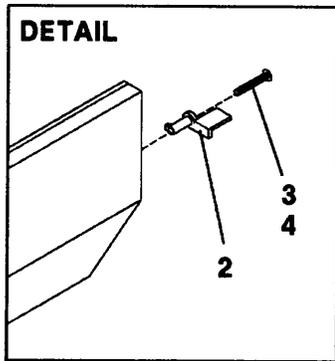
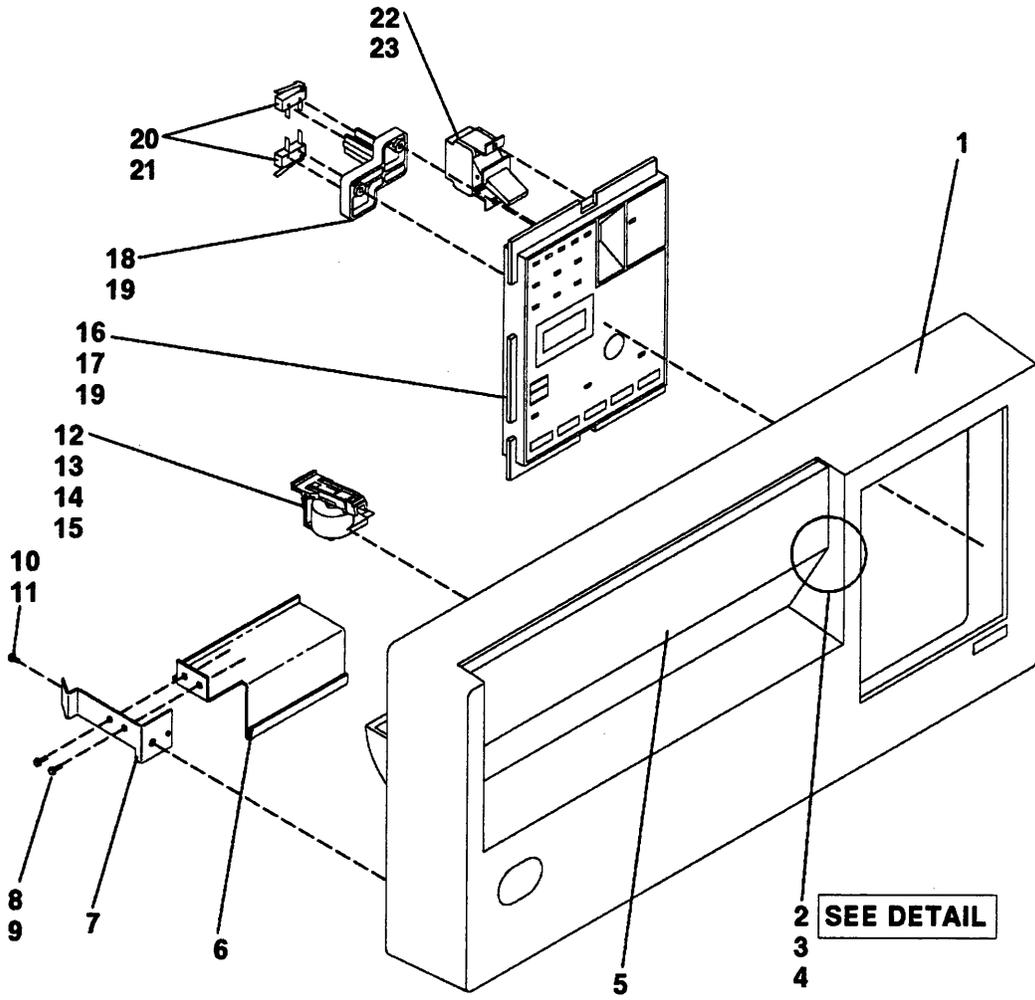
Assembly 2: (continued)



RH3E013-3

Asm – Index	Part Number	Units	Description
2-46	21F7945	1	• Reel Motor
-47	21F7989	8	• Screw, T25
-48	21F7951	1	• Transformer
-49	21F7989	4	• Screw
-50	xxxxxxx	NP	• • Hub Release Lever, (included in part 56F0022)
-51	xxxxxxx	NP	• • Pivot Screw, (included in part 56F0022)
-52	56F0022	1	• Hub Lock Solenoid
-53	21F7989	1	• Screw, T25
-54	21F7930	1	• Tape Sensor Assembly
-55	21F7989	3	• Screw, T25
-56	21F7936	1	• Tape Lifter Unit
-57	21F7989	2	• Screw, T25
-58	21F7933	1	• Read/Write Head
-59	21F7989	3	• Screw, T25
-60	21F7943	1	• • Read Cable (included in part 21F7933)
-61	21F7944	1	• • Write Cable (included in part 21F7933)

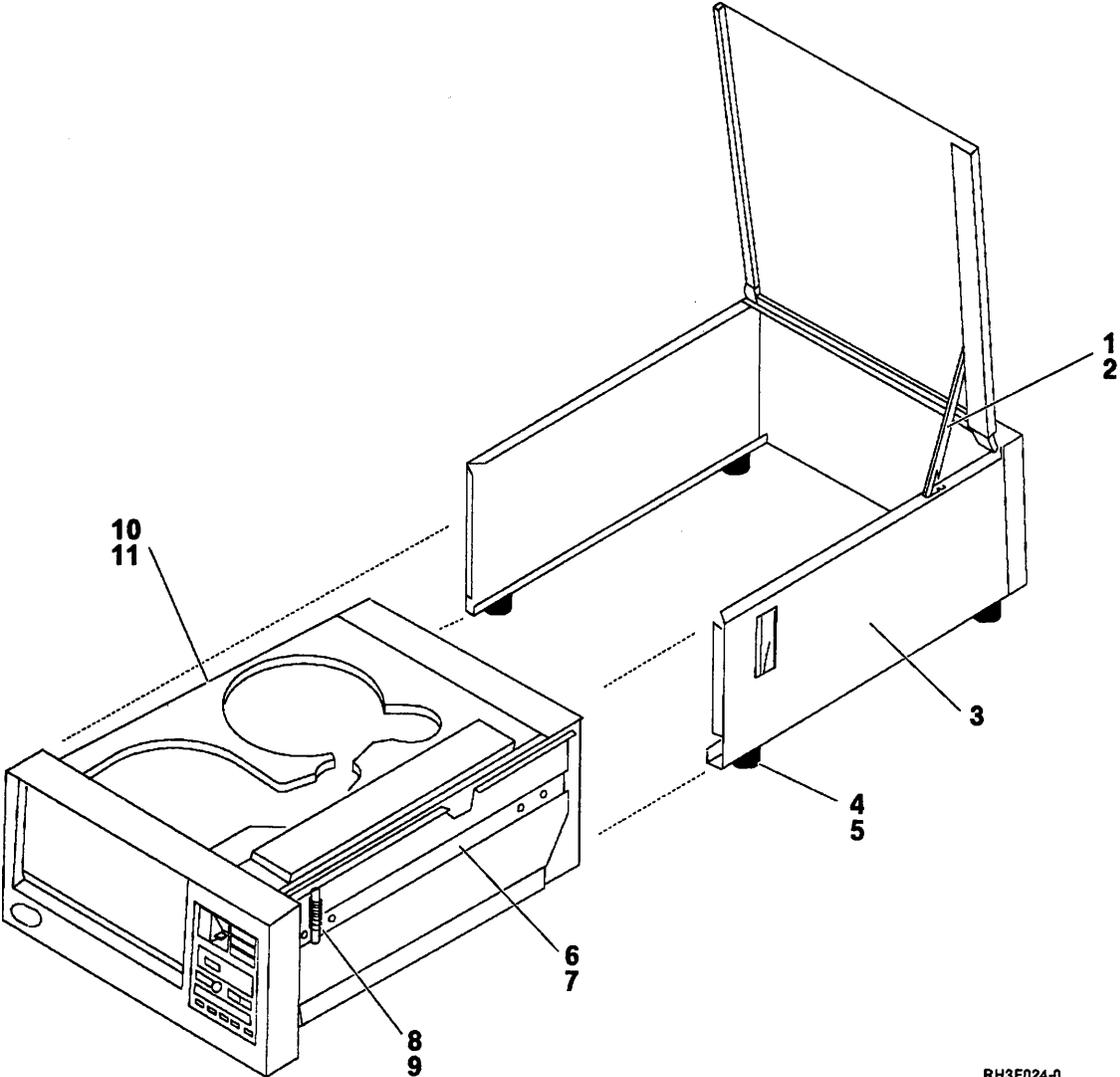
Assembly 3: Front Cover Assembly



RH3E014-3

Asm— Index	Part Number	Units	Description
3—1	21F7916	1	• Front Cover Assembly
—2	21F7953	1	• • Door Flag
—3	438551	1	• • Screw, 4-40 x 5/8, Binder HD
—4	257985	1	• • Washer, Flat
—5	xxxxxxx	NP	• • Front Door Assembly
—6	21F8013	1	• • Rack Latch Handle
—7	21F8012	1	• • Rack Latch Spring
—8	10170	2	• • Screw, 6-32 x 1/4, Binder HD
—9	56722	2	• • Washer, External Star
—10	28413	1	• • Screw, 10-32 x 5/16, Binder HD
—11	56079	1	• • Washer, External Star
—12	56F0078	1	• • Door Latch Solenoid
—13	35739	1	• • Screw, 6-32 x 7/16, Binder HD
—14	257986	1	• • Washer, Flat
—15	56722	2	• • Washer, External Star
—16	21F7938	1	• Front Panel Cable
—17	21F7917	1	• Control Panel Assembly, (requires overlay, see Assembly 1.)
—18	xxxxxxx	NP	• • Microswitch Bracket
—19	21F7988	2	• • Screw, T9
—20	21F7919	2	• • Microswitch
—21	21F7987	4	• • Screw, T7
—22	21F7914	1	• • Power On/Off Switch
—23	21F7988	2	• • Screw, T9

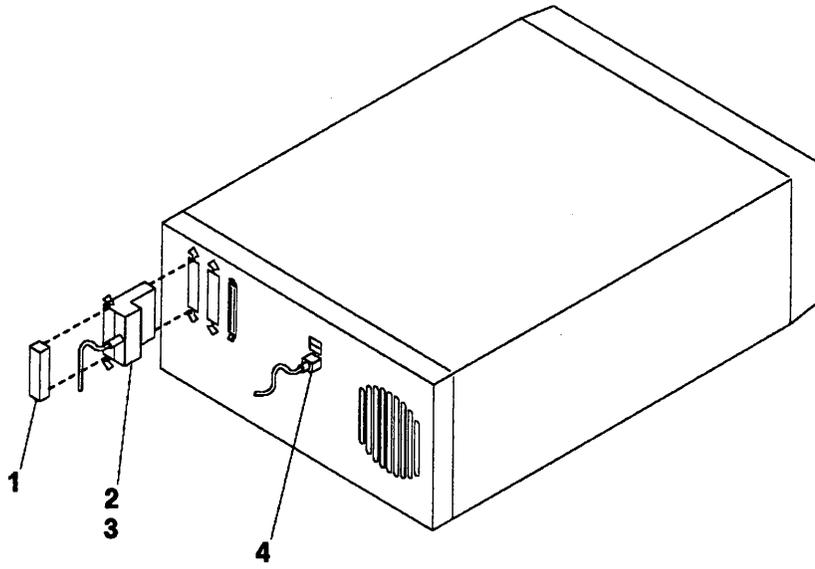
Assembly 4: Table Top Assembly



RH3E024-0

Asm - Index	Part Number	Units	Description
4-1	21F7994	1	• Enclosure Cover Prop
-2	21F7989	1	• Screw, T25
-3	21F7998	1	• Enclosure
-4	21F7995	4	• Foot
-5	21F7989	4	• Screw, T25
-6	21F7996	1	• Right Side Support
-7	337466	4	• Screw, 10-24 x 1/2
-8	21F7992	1	• Plunger
-9	21F7993	1	• Spring
-10	21F7997	1	• Left Side Support
-11	337466	4	• Screw, 10-24 x 1/2

Assembly 5: Table-Top Assembly Cables



RH3E025-0

Asm - Index	Part Number	Units	Description
5-1	79X3795	1	• Terminator Plug, 9348-001 and 002
-1	70F9671	1	• Terminator Plug, 9348-011 and 012
-1	00G0968	1	• Terminator Plug, RISC 6000 (only)
-2	6495268	1	• System to Unit Cable, 4 meter, 9348-001 and 002
-2	6495269	1	• System to Unit Cable, 12 meter, 9348-001 and 002
-2	31F4221	1	• System to Unit Cable, 9348-011 and 012, single-ended
-3	31F4222	1	• Unit to Unit Cable, 9348-011 and 012, single-ended
-4	xxxxxxx	1	• Power Cord, see Line Cord Chart

Assembly 6: Line Cord Chart for Table Top Units

Line Cord Plug

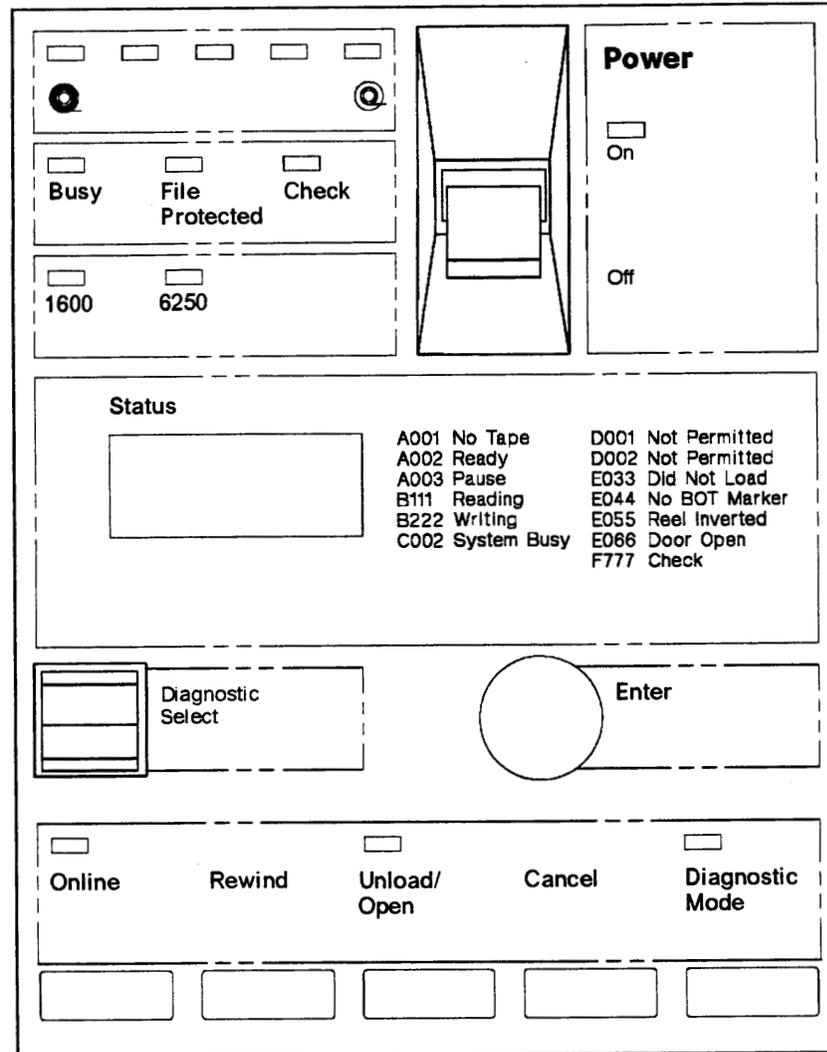
Plug	Line Cord P/N	Country
	6952301	U.S.A., (Chicago only)
	6952300	Bahamas, Barbados, Bermuda, Bolivia, Brazil, Canada, Cayman Islands, Columbia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Japan, Korea (South), Mexico, Netherlands Antilles, Nicaragua, Panama, Peru, Philippines, Puerto Rico, Saudi Arabia, Suriname, Taiwan, Trinidad, U.S.A. (except Chicago), Venezuela
	1838574	Bahamas, Barbados, Bolivia, Brazil, Canada, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Japan, Netherland Antilles, Panama, Peru, Phillipines, Taiwan, Thailand, Trinidad Tobago, U.S.A. (except Chicago), Venezuela
	6952374	Chile, Italy
	6952365	Liechtenstein, Switzerland
	6952329	Denmark
	6952383	Israel
	6952347	Bangladesh, Mynmara, Pakistan, South Africa, Sri Lanka
	6952356	Bahrain, Bermuda, Brunei, Channel Islands, Cyprus, Hong Kong, India, Ireland, Kenya, Kuwait, Malaysia, Oman, People's Republic of China, Qatar, Sierra Leone, Singapore, United Arab Emirates (Dubai), United Kingdom
	6952320	Abu Dhabi, Austria, Belgium, Bulgaria, Egypt, Finland, France, Germany, Greece, Iceland, Indonesia, Korea (South), Lebanon, Luxembourg, Netherlands, Norway, Portugal, Saudi Arabia, Spain, Sudan, Sweden, Turkey, Yugoslavia
	6952311	Argentina, Australia, New Zealand
	6952291	Paraguay, Uruguay, Colombia
	46F2119	Watertight U.S.A., (except Chicago)
	46F2038	Watertight U.S.A., (Chicago only)

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Chapter 7. Part Number Index

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10170	3-8	6-15	21F7920	1-11	6-7		2-2	6-9	6200961	1-21	6-7
28413	3-10	6-15	21F7921	1-7	6-5		2-6	6-9	6462386	1-13	6-7
35739	3-13	6-15	21F7922	1-10	6-7		2-31	6-11	6495268	5-2	6-19
56079	3-11	6-15	21F7923	2-17	6-9		2-35	6-11	6495269	5-2	6-19
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81693	2-19	6-9	21F7927	2-34	6-11		2-47	6-13	6839045	1-3	6-5
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257985	3-4	6-15	21F7931	2-7	6-9		2-53	6-13	6839046	1-3	6-5
257986	3-14	6-15	21F7932	2-10	6-9		2-55	6-13		1-3	6-5
337466	4-7	6-17	21F7933	2-58	6-13		2-57	6-13	6839047	1-3	6-5
	4-11	6-17	21F7935	2-8	6-9		2-59	6-13	6839048	1-3	6-5
376038	1-13	6-7	21F7936	2-56	6-13		4-2	6-17	69X6171	1-2	6-5
438551	3-3	6-15	21F7937	2-11	6-9		4-5	6-17	69X6183	1-3	6-5
xxxxxxx	2-20	6-9	21F7938	3-16	6-15	21F7990	2-22	6-9	69X6192	1-3	6-5
	2-42	6-11	21F7939	2-38	6-11	21F7992	4-8	6-17	69X6193	1-3	6-5
	2-50	6-13	21F7940	2-44	6-11	21F7993	4-9	6-17	70F9671	2-29	6-11
	2-51	6-13	21F7941	2-27	6-11	21F7994	4-1	6-17		5-1	6-19
	3-5	6-15	21F7942	2-41	6-11	21F7995	4-4	6-17	79X3795	2-29	6-11
	3-18	6-15	21F7943	2-60	6-13	21F7996	4-6	6-17		5-1	6-19
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00G0968	5-1	6-19	21F7945	2-46	6-13	21F7998	4-3	6-17			
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21F7831	1-4	6-5	21F7950	2-21	6-9	21F8030	2-24	6-11			
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21F7837	1-4	6-5	21F7956	2-3	6-9	21F8056	2-45	6-11			
21F7839	1-4	6-5	21F7957	2-1	6-9	21F8063	2-16	6-9			
21F7840	1-4	6-5	21F7958	2-39	6-11	31F4221	5-2	6-19			
21F7849	1-1	6-5	21F7962	1-18	6-7	31F4222	5-3	6-19			
21F7851	1-1	6-5	21F7963	1-19	6-7	56F0022	2-52	6-13			
21F7852	1-1	6-5	21F7964	1-14	6-7	56F0078	3-12	6-15			
21F7853	1-1	6-5	21F7965	1-15	6-7	56F0080	2-24	6-11			
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21F7865	1-1	6-5	21F7967	1-12	6-7		2-26	6-11			
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21F7867	1-1	6-5	21F7968	2-9	6-9	6042317	1-3	6-5			
21F7869	1-1	6-5	21F7969	2-33	6-11	62X9969	1-3	6-5			
21F7870	1-1	6-5	21F7986	2-32	6-11	62X9971	1-3	6-5			
21F7910	1-1	6-5	21F7987	3-21	6-15	62X9973	1-3	6-5			
21F7913	1-6	6-5	21F7988	3-19	6-15	62X9975	1-3	6-5			
21F7914	3-22	6-15		3-23	6-15	62X9977	1-3	6-5			
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Appendix A. Control Panel Operations



RH3B523-1

Description

The control panel contains five separate areas:

- Power switch
- Operator buttons
- Service representative buttons
- Indicators
- Status display

Operator Buttons

- **Online:** Pressing the Online button puts the tape unit on-line or off-line. The Online light flashes while the tape is loading. When the tape is loaded, the tape unit goes on-line and the Online light remains on.

If you press another button while the tape unit is on-line, the status code D001 appears in the Status display.

- **Rewind:** Pressing the Rewind button positions the tape at the BOT marker. The tape unit must be off-line to be able to use the Rewind button.
- **Unload/Open:** Pressing the Unload/Open button unloads the tape and opens the front door. The tape unit must be off-line to be able to use the Unload/Open button. If there is no tape in the tape unit, pressing the Unload/Open button opens the front door.

Warning: Do not force the front door open, always use the Unload/Open button.

- **Cancel:** Pressing the Cancel button stops all operations. If the Cancel button is pressed while operations from the system are being performed, the operations stop. Pressing the Online button allows the system to recover. The method of recovery depends on the job that was being run.

For example, if the Cancel button is pressed while the tape is loading, the tape stops loading. Press the Unload/Open button to unload the tape before continuing.

Warning: Pressing the Cancel button a second time causes all data in the storage area to be lost.

Service Representative Buttons

- **Diagnostic Mode:** Pressing the Diagnostic Mode button puts the tape unit in the diagnostic mode. This permits the service representative to run diagnostics or display machine status. Press the Cancel button one or more times to leave diagnostic mode. The tape unit must be offline to use the diagnostic mode.
- **Diagnostic Select:** When the tape unit is in the diagnostic mode, TEST *, INFO *, CONF *, or ID * appears in the status display. Pressing the Diagnostic Select button shows the options available, one at a time.
- **Enter:** Pressing the Enter button selects the option shown in the status display.
- **Cancel:** Pressing the Cancel button while a test is running will stop the test. Press the Cancel button to back out of the Diagnostic Mode.

Lights

There are 10 lights:

- **Power On:** This is on when dc power is supplied to the tape unit.
- **Online:** This is on when the tape unit is on-line and off when the tape unit is off-line. It will flash while the tape is loading.
- **Unload/Open:** This is on when the tape is unloading and while the tape is rewinding after you pressed the Unload/Open button. It is off when the tape is unloaded and during normal operation.
- **Diagnostic Mode:** The Diagnostic Mode light comes on when you push the Diagnostic Mode button, and it goes off when you push the Diagnostic Mode button again.

Note: The Diagnostic Mode button is for the service representative to use.

- 1600: This light comes on when a tape that has been recorded at 1600 bits per inch (bpi) is loaded. It goes off when the tape is unloaded.
 - 6250: This light comes on when a tape that has been recorded at 6250 bits per inch (bpi) is loaded. It goes off when the tape is unloaded.
- Note:** When a blank tape is loaded, neither the 1600 nor the 6250 light comes on. When a tape is written with a density that is unknown (neither 1600 nor 6250), both lights come on.
- Busy: This is on when the tape unit is reading, writing, or anytime you press the Online button while the system is completing an operation.
 - File Protected: This light comes on when a tape that does not have a write-enable ring on it is loaded into the tape unit. It goes off when the tape is removed from the tape unit. It remains off when a tape reel that contains a write-enable ring is loaded.
 - Check: This light flashes when there have been too many read or write errors (the head needs cleaning or the tape is bad). The Check light comes on if a load failure or device error occurs.
- Note:** Do not wait for this light to come on before cleaning the tape unit. See "Cleaning Recommendations" on page 4-1.
- Tape Movement Lights: These five lights show how much tape has moved from the supply reel to the take-up reel (loading) or from the take-up reel to the supply reel (rewinding). While the tape is loading, the light on the extreme left will flash. When the tape is loaded, the light on the extreme left will come on and stay on. The other lights come on when the tape has moved 20%, 40%, 70%, and 90% onto the take-up reel. Only one light is on at a time. When the tape is unloading, one light at a time flashes to indicate the position of the tape. When the tape is unloaded, all the lights are off.

Status Display

This area is used to supply operating information to the operator. It is also used by the service representative to show the options and test results when performing diagnostics.

The format of the status code is xx—zzzz, where:

- xx is the percentage of the tape on the take-up reel.
- — indicates that the tape unit is communicating with the system.
- zzzz is the status code indicating the current state of the tape unit.

Diagnostic Mode

The tape unit can be put into diagnostic mode after being powered on by using the following procedure:

1. If the Online light is on, press the Online button to take the tape unit offline.
2. Press the Diagnostic Mode button. TEST * is displayed to show that the tape unit is in the diagnostic mode.
3. Press the Diagnostic Select button to select the option you want. Four options are available: TEST *, CONF *, INFO *, or ID *.

INFO * Option

The tape unit contains statistics and configuration information in a battery powered storage module. This storage module permits the information to be saved when the tape unit is powered off. INFO * mode permits the statistics logs and the configuration information to be displayed. Use the following procedure to display this information.

1. Press the Diagnostic Mode button. TEST * is displayed to show that the tape unit is in the diagnostic mode.
2. Select the INFO * option by pressing the Enter button when INFO * is displayed. INFO 0 is displayed to show that the tape unit is in the INFO * mode.
3. The number displayed is the INFO log number. Use the Diagnostic Select button to select the log you want to see. Press Enter to see the log.
4. To leave the INFO * mode, press the Cancel button until INFO * is displayed.
5. To leave the diagnostic mode, press the Cancel button or the Diagnostic Mode button.

TEST * Option

The tape unit contains diagnostic tests to aid you when isolating a failure.

1. Press the Diagnostic Mode button. TEST * is displayed to show that the tape unit is in the diagnostic mode.
2. Select the TEST * option by pressing the Enter button when TEST * is displayed. TEST 0 is displayed to show that the tape unit is in the TEST * mode.
3. The number displayed is the diagnostic test number. Use the Diagnostic Select button to select the test you want to run. Press Enter to run the test.
4. To leave the TEST * mode, press the Cancel button until TEST * is displayed.
5. To leave the diagnostic mode, press the Cancel button or the Diagnostic Mode button.

Note: When the tape unit is in diagnostic mode, the Online, Rewind, and Unload/Open buttons may be used to make keying the test number easier.

- Pressing the Online button decreases the number by 10.
- Pressing the Rewind button increases or decreases the number by 100.
- Pressing the Unload/Open button increases the number by 10.

CONF * Option

The tape unit contains statistics logs and configuration information in a battery powered storage module. This storage module permits information to be saved when the tape unit is powered off. CONF * mode permits this area of the storage module to be changed. Configuration values are preset and should not be changed unless you are instructed to change them. To change configuration values, perform the following steps to change the storage module:

1. If the Online light is on, press the Online button to take the tape offline.
2. Press the Diagnostic Mode button. TEST * is displayed to that the tape unit is in the diagnostic mode.
3. Press the Diagnostic Select button until CONF * is displayed.

4. Press the Enter button when CONF * is displayed to select the CONF * option. CONF 0 is displayed to verify that you are in the CONF * mode.
Note: If you have recently completed this step CONF xxx is displayed (where xxx is the parameter that you changed).
5. The number displayed indicates which configuration parameter is selected. The value can be changed by pressing the Diagnostic Select button.
6. When CONF xxx is displayed (where xxx is the parameter you want to change) press the Enter button to select the configuration parameter you want to change.
Note: If ILLEGAL is displayed, refer to "Changing Locked Configuration Values" on page D-1.
7. Press the Diagnostic Select button to see the values available for this parameter.
8. When the desired parameter value is displayed, press the Enter button. SET xxx (where xxx is the parameter value you selected) is momentarily displayed to indicate that the parameter was changed.
9. Repeat steps 4 through 8 of this procedure for each configuration parameter change.
10. To leave the CONF * mode, press the Cancel button until CONF * is displayed.
11. To leave the diagnostic mode, press the Cancel button or the Diagnostic mode button.
12. Initialize the status registers by setting the tape unit Power switch to the Off and then On.

ID * Option

This option is used to display the ID (address). Use the following procedure to view the current value of the ID.

Note: The ID is normally set to zero and should not be changed unless you are instructed to change it for systems that attach more than one tape unit to the system controller card, or for systems that have a controller card with an ID of zero. To change the ID value, complete the steps in "Changing ID (Address) Value" on page D-2.

1. If the Online light is on, press the online button to take the tape unit offline.
2. Press the Diagnostic Mode button. TEST * is displayed to show that the tape unit is in the diagnostic mode.
3. Press the Diagnostic Select button until ID * is displayed. ID is the address parameter of the tape unit.
4. Press the Enter button. The current ID (address) is displayed.

Running Diagnostic Tests

Perform the following steps to run a diagnostic test in the diagnostic mode.

1. Identify the test to be run in the Diagnostic Test column of Figure A-1 on page A-6.
2. If "yes" is in the tape needed column, ensure that a tape is loaded. If "no" is in the tape needed column, ensure that a tape is not loaded.
3. Place the tape unit in TEST * mode, see "TEST * Option" on page A-4.

4. Press the Enter button when the diagnostic test you want to run is displayed.
5. The number of times to run the test is now displayed. The values are ONCE *, 10, 100, 1000, or LOOP *. These values are displayed one at a time by selecting the Diagnostic Select button.
6. Select the number of times to run the test by pressing the Enter button when the desired option is displayed.
7. If A is displayed, a parameter is needed to run the test. Press the Diagnostic Select button to display the parameters available for the test being run.
8. If A is not displayed, no parameter is needed to run the test. Continue with step 13.
9. Select the value of parameter A by pressing the Enter button when the correct value is displayed.
10. If B is displayed, another parameter is needed to run the test. Press the Diagnostic Select button to display the parameter values available.
11. If B is not displayed, no more parameters are needed to run the test. Continue with step 13.
12. Select parameter B by pressing the Enter button when the correct value is displayed.
13. If the test is a Sequence Test (Diagnostic tests 0–39), each test number will be displayed as it is running. Some tests run too fast for you to see the test number.
14. See Figure A-1 to determine if the test is interactive. If the test is interactive, you must aid the test. For example, you must press buttons in test 71.
15. If the test has run successfully, PASS xx will be displayed (xx is the number of the test run). Continue with step 20.
16. If the test failed, FAIL xx will be displayed (xx is the number of the test run). If you were sent here from the Reference Code table, complete steps 20 and 21 before returning to the Reference Code table. If you were not sent here from the Reference Code table, continue with step 17.
17. Press the Enter button to display ERR xxx (xxx is the error code for the failure).
18. Add zeros to the left of this code to make it a four digit reference code.
19. Go to "Reference Codes" on page 1-2 for the action recommended.
20. To leave TEST * mode, press the Cancel button until TEST * is displayed.
21. To leave Diagnostic mode, press the Cancel button or the Diagnostic Select button.

Figure A-1 (Page 1 of 4). Diagnostic Test Conditions

Diagnostic Test	Tape Needed	Interactive Test	Sequence Test
0	No	No	Yes
1	Yes	No	Yes
2	Yes	No	Yes
3	No	No	Yes
4	Yes	No	Yes
9	No	No	Yes
11	No	No	Yes

Figure A-1 (Page 2 of 4). Diagnostic Test Conditions

Diagnostic Test	Tape Needed	Interactive Test	Sequence Test
12	No	No	Yes
13	No	No	Yes
14	No	No	Yes
15	No	No	Yes
17	No	No	Yes
18	Yes	No	Yes
19	No	No	Yes
20	No	No	Yes
40	No	No	No
41	No	No	No
42	No	No	No
43	No	No	No
44	No	No	No
45	No	No	No
46	No	No	No
48	No	No	No
49	No	No	No
50	No	No	No
51	No	No	No
52	No	No	No
53	No	No	No
54	No	No	No
60	No	No	No
61	No	No	No
62	No	No	No
63	No	No	No
64	Yes	No	No
65	No	No	No
70	No	Yes	No
71	No	Yes	No
72	No	Yes	No
75	Yes	No	No
76	No	No	No
77	No	No	No
78	No	No	No
80	No	No	No
81	No	No	No
82	No	No	No
84	No	Yes	No
85	No	Yes	No

Figure A-1 (Page 3 of 4). Diagnostic Test Conditions

Diagnostic Test	Tape Needed	Interactive Test	Sequence Test
86	No	Yes	No
87	No	Yes	No
88	No	Yes	No
89	No	Yes	No
90	No	Yes	No
91	No	Yes	No
92	No	Yes	No
93	No	Yes	No
94	No	Yes	No
95	Yes	No	No
96	Yes	No	No
97	Yes	No	No
98	Yes	No	No
99	Yes	No	No
100	Yes	No	No
101	Yes	No	No
102	Yes	No	No
103	Yes	No	No
104	Yes	No	No
108	No	No	No
110	Yes	No	No
120	No	No	No
121	No	No	No
122	No	No	No
140	No	No	No
141	No	No	No
150	Yes	No	No
151	Yes	No	No
152	Yes	No	No
153	Yes	No	No
160	Yes	No	No
161	Yes	No	No
162	Yes	No	No
163	Yes	No	No
164	Yes	No	No
165	Yes	No	No
166	Yes	No	No
167	Yes	No	No
170	No	No	No
171	No	No	No

Figure A-1 (Page 4 of 4). Diagnostic Test Conditions

Diagnostic Test	Tape Needed	Interactive Test	Sequence Test
172	Yes	No	No
173	Yes	No	No
174	No	No	No
175	No	No	No

Appendix B. Diagnostic Tests

This appendix contains reference information that is to be used by second-level support personnel or a service representative who has been directed here by a service procedure.

The tape unit contains internal diagnostics to aid in analyzing problems. The procedure to run the tests is in "Running Diagnostic Tests" on page A-5.

Power-On Self-Test

When the machine is powered up, a sequence of tests are performed. The sequence used when the tape unit is powered on is different from the Test 0 (power-on) sequence started on an already powered up tape unit.

At power on, each of the processors is tested by a similar kernel test. The testing takes place in parallel between all processors to make the power-on time shorter. When all processors have completed their own tests, a power-on signal takes place between the processors. The controller card is then placed in control to start a test sequence which completes the diagnostic power up procedure.

1. Controller card
 - Kernel tests
 - Tape unit specific tests
 - Front panel lights
2. Buffer card
 - Kernel tests
 - Buffer tests
3. Interface card
 - Kernel tests
 - Interface specific tests
4. Power on signal
 - Complete dual-port direct-access storage test
 - Loop back tests

Sequence Tests

A sequence test is a group of other tests which may also be sequence tests. The purpose of a sequence test is to test more function by pressing fewer keys. When a sequence is selected, the tape unit runs the tests in the sequence until an error occurs or until the sequence completes successfully. Tests with numbers below 40 are sequence tests.

Diagnostic Test 0 (Power On)

Diagnostic Test 0 tests the digital data paths and normal machine operation. This sequence test runs tests similar to those normally run at power on time. The tests for each controller are run serially in this test, not in parallel, as in an actual power on. The tests are run in the following sequence:

- Test 13
- Test 14

- Test 15
- Test 9

Before starting this test, all tape reels must be unloaded.

Diagnostic Test 1 (General Check)

A scratch tape is needed for this test.

This test performs a complete tape unit check. It runs all power-on tests, then loads a tape and checks out all sensors. It then runs the tests in the multiprocessor, sensor, and wellness sequences.

The Sequence:

- 0 - Power on
- 165 - Load tape
- 75 - tape lifter test
- 95 - Servo Performance test
- 2 - Wellness test

Diagnostic Test 2 (Wellness Test)

A CE tape is needed for this test.

This test checks out the general read/write ability of the drive. The sequence includes the tests necessary to write a 6250 density tape, rewind and read the tape, rewind, write the tape in 1600 density, rewind and read the 1600 density tape, then rewind.

During the write process, the Enter key causes the write to end early so that the complete tape is not written. The following read pass will only read as far as the write pass had written.

The Sequence:

- 165 - Load tape
 - 174 - Clear data buffer
 - 171 - Create record in buffer (A = 1, all ones; B = 4K)
 - 171 - Create record in buffer (A = 2, alternating; B = 16K)
 - 171 - Create record in buffer (A = 3, rotating; B = 32K)
 - 177 - Write density ID (A = 6250)
 - 172 - Write buffer to tape (A = 1; loop)
 - 176 - Write tape mark
 - 176 - Write tape mark (A = 3)
 - 166 - Rewind
 - 173 - Read from tape to buffer (A = 0; loop)
 - 166 - Rewind
 - 174 - Clear data buffer
-
- 171 - Create record in buffer (A = 1, all ones; B = 4K)
 - 171 - Create record in buffer (A = 2, alternating; B = 16K)

171	-	Create record in buffer	(A = 3, rotating; B = 32K)
177	-	Write density ID	(A = 1600)
172	-	Write buffer to tape	(A = 1; loop)
176	-	Write tape mark	
176	-	Write tape mark	
166	-	Rewind	
173	-	Read from tape to buffer	(A = 0; loop)
166	-	Rewind	
174	-	Clear data buffer	

Diagnostic Test 3 (Initialize Error Rate Sequence)

Initializes the total logs in preparation for running the error rate sequence.

The Sequence:

175	-	Initialize total logs
-----	---	-----------------------

Diagnostic Test 4 (Error Rate Sequence)

A scratch tape is needed for this test.

This sequence writes a tape in 6250 density, rewinds and reads it, then performs the same operations in 1600 density. While the sequence runs, read/write errors are recorded in the total error rate log. The error rate results are shown in the total error rate logs using the INFO option and values of 3, 4, and 5.

Error rate results are collected until Sequence 3 is used to initialize the log.

Test 4 is similar to Test 2 (Wellness Test) except that hard read and write errors do not stop the test. Hard errors are only logged.

The sequence is the same as Test 2.

Diagnostic Test 9 (Multiprocessor Sequence)

This sequence starts all multiprocessor tests to check out the communication between the processors, the message bus, and the data transfer paths. It will normally start after each processor has started its own power-on sequence and made communications ready at power on.

The sequence:

- 11
- 62
- 61
- 60

Diagnostic Test 11 (Dual-Port Direct-Access Storage [RAM] Sequence)

This sequence performs all tests on the dual-port direct-access storage between all target processors.

The sequence:

- 50
- 51
- 50
- 51
- 53
- 54
- 54
- 52
- 52

Diagnostic Test 12 (Loop back Isolation Sequence)

This sequence starts all interface, buffer-initiated, and formatting-circuitry-initiated loop back isolation sequences. All hardware areas used by loop backs will be checked out. Each loop-back test is stepped through and a loop back problem should be isolated. Each test will be started with a loop back check number (parameter A) of zero and will run all loop back checks.

The sequence:

- 62
- 19
- 61
- 20
- 60

Diagnostic Test 13 (Drive Controller Power-On Test Sequence)

This sequence is started by the drive controller at power on to check out all paths and operation of the servo and motor drive circuits.

The sequence:

- 41
- 40
- 43
- 45
- 49
- 70
- 17

Diagnostic Test 14 (Buffer Controller Power-On Test Sequence)

This sequence is started by the buffer controller at power on and checks all paths and operation of the buffer circuits.

The sequence:

- 41
- 40
- 48
- 43
- 45
- 19

Diagnostic Test 15 (Interface Power-On Test Sequence)

This sequence is started by the interface controller at power on and checks all paths and operation of the specific interface.

The sequence:

- 41
- 40
- 43
- 45
- 20

Diagnostic Test 17 (Servo/Motor Drive Electronics Sequence)

A scratch tape is not needed for this test.

This sequence checks the operation of the servo and motor drive circuits. These sequence tests are not interactive.

The sequence:

- 78
- 76
- 82
- 77
- 81
- 80

Diagnostic Test 18 (Servo/Motor Drive Checkout Sequence)

A scratch tape is needed for this test.

The sequence:

- 165
- 95
- 96
- 166
- 167

Diagnostic Test 19 (Buffer Hardware Sequence)

This sequence checks the data path and operation of the data buffer registers and direct-access storage. It isolates any problems specific to the data buffer.

The sequence:

- 120
- 121
- 122

Diagnostic Test 20 (Interface – Specific Hardware Sequence)

This sequence runs through all of the interface-specific hardware tests.

The sequence:

- 140
- 141
- 142
- 143
- 144

User-Defined Sequences

A sequence consisting of up to twenty tests may be defined by the user during the time the tape unit is on. The sequence entries may consist of any existing tests or sequences. The sequence is generated by starting Test 38 and entering the test or sequence numbers in the correct order. The user-defined sequence is run using Test 39.

The sequence you generate remains (even if the tape unit is powered off) until another sequence is generated using Test 38.

Diagnostic Test 38 (Enter User-Defined Sequence)

This test permits a user-defined sequence to be generated.

Diagnostic Test 39 (Run User-Defined Sequence)

This test runs the user-defined sequence. The following is an example of a user-defined sequence:

- Select the CONF * option and press Enter.
- Select the CONF 38 value and press Enter.
- When ONCE * appears, press Enter.
- When the display turns on, press Enter.
- Select 70 (control panel light test) and press Enter.
- When ONCE * appears, press Enter.
- When the display turns on, press Enter.
- Select 93 (blower check) and press Enter.
- When ONCE * appears, press Enter.
- When the display turns on, press Enter.
- Select 39 and press Enter.
- When ONCE * appears, press Enter.

Sequence test 39 now performs the control panel light test and the blower check. The display shows PASS 39 when the sequence completes. The display shows FAIL 39 if you did not generate a correct sequence or did not do what your tests needed, for example, not loading a tape if a test in the sequence needed one to be loaded. ~~Also, you cannot instruct the tape unit to read if you did not first instruct it to write.~~

See sequence test 2 for an example of a correct sequence.

Kernel Tests

Note: All kernel tests and some multiprocessor tests are common to more than one processor. Therefore, the processor must be specified with a parameter. The possible processors are as follows:

Parameter Processor

- 0 – All processors
- 3 – Controller card
- 4 – Buffer card
- 6 – Interface card

The default processor is 0, all processors. With all processors selected, each processor which has the test defined will start the test. The tests start with the interface card and end with the controller card.

Diagnostic Test 40 (Microprocessor Operation Test)

Parameter A = 0, 3, 4, or 6.

A functional check of the microprocessor is performed.

Diagnostic Test 41 (Read-Only Storage Test)

Parameter A = 0, 3, 4, or 6.

A verification of the read-only storage is done.

Diagnostic Test 42 (Direct-Access Storage Test)

Parameter A = 0, 3, 4, or 6.

The direct-access storage that is not battery powered is tested, checking for acceptable data and saved data. The test ensures that writing to one location has no effect on other locations. This test will only run at power on.

Diagnostic Test 43 (Battery Powered Direct-Access Storage Test)

Parameter A = 0, 3, 4, or 6.

The battery powered direct-access storage is tested, checking for acceptable data and saved data. The test does not destroy data. This test is used at power on for battery powered storage and while running the power-on test sequence for all storage areas.

Diagnostic Test 44 (Complete Direct-Access Storage Test)

Parameter A = 0, 3, 4, or 6.

The direct-access storage is fully tested for acceptable data and saved data. The test also ensures that no storage modules affect other storage modules. This test does not destroy data and may be used without powering the drive on and off, but it needs a long time to run.

Controller card	–	17 minutes
Buffer card	–	72 minutes

Interface card — 4 minutes

Diagnostic Test 45 (Continuity Test)

Parameter A = 0, 3, 4, or 6.

All connectors are checked for correct continuity.

Diagnostic Test 46 (Dual-Port Direct-Access Storage Test)

The dual-port direct-access storage is tested using a test which destroys data. This test destroys data and is run only at power on. It is not accessible from the front panel.

Diagnostic Test 48 (Battery Powered Direct-Access Storage Check)

A direct-access storage test and verification of the controlled part of the battery powered storage is performed.

Diagnostic Test 49 (Timer Circuitry Test)

The timer circuitry is checked for correct counting and time.

Processor Communication Tests (50 – 59)

Diagnostic Test 50 (Onboard Dual-Port Direct-Access Storage [DPR] Test)

Parameter A = 0, 3, or 4.

This test permits the dual-port direct-access storage (DPR) to be checked out from the other side. The test performs a walking ones and zeros test in a way that does not destroy data. All of the storage may be checked with the exception of the main interrupt location.

Diagnostic Test 51 (Offboard Dual-Port Direct-Access Storage [DPR] Test)

Parameter A = 0, 4, or 6.

This test permits the dual-port direct-access storage (DPR) to be checked out from the main side. The test performs a walking ones and zeros test in a way that does not destroy data. All of the storage may be checked with the exception of the subordinate interrupt location.

Diagnostic Test 52 (Dual-Port Direct-Access Storage [DPR] Test)

Parameter A = 0, 3, or 4.

This test checks how the dual-port direct-access storage (DPR) operates when read and write commands are received at the same time.

Diagnostic Test 53 (Subordinate Dual-Port Direct-Access Storage [DPR] Interrupt Test)

Parameter A = 0, 4, or 6.

This test verifies the ability of the dual-port direct-access storage (DPR) to operate with interruptions.

Diagnostic Test 54 (Master Dual-Port Direct-Access Storage [DPR] Interrupt Test)

Parameter A = 0, 3, or 4.

This test verifies the ability of the dual-port direct-access storage (DPR) to operate with interruptions.

Loop-Back Tests

Diagnostic Test 60 (Interface Loop-Back Test)

Parameter A = loop-back check number.

Parameter A	Loop-Back Check
0	Run all loop-back checks from 1 through 3
1	Loop-back correct data
2	Data to buffer with a parity error
3	Data from buffer with a parity error

Diagnostic Test 61 (Buffer Initiated Loop-Back Test)

Parameter A = loop-back type.

Data is generated in the buffer then looped through the formatting section of the read/write card, using the multiprocessor loop-back command. Parameter A indicates the extent of the test.

Parameter A	Loop-Back Check
0	Run all loop-back checks from 1 through 5
1	Correct phase encoded (PE) data
2	Correct group-coded recording (GCR) data
3	Correct group-coded recording (GCR) data underrun
4	Correct group-coded recording (GCR) data overrun
5	GCR data with a parity error

Parameter B	Data Pattern
0	All zeros
1	All ones
2	Alternating ones and zeros
3	Rotating 0 - 255
4	Pseudorandom

Diagnostic Test 62 (Tape Unit Initiated Digital Loop-Back)

Parameter A = loop-back block type.

Loop-back data or a write pattern is generated by the controller and passed through the formatting circuits of the read/write card.

Number	Loop-Back Block Type
0	Run all block types from 1 through 13
1	1600 phase-encoded (PE) data block
2	1600 phase-encoded (PE) data block with 1 track in error
3	1600 PE density identification (ID)
4	1600 PE tape mark
5	1600 PE gap
6	6250 group-coded recording (GCR) data block
7	6250 group-coded recording (GCR) data block with 1 track in error
8	6250 GCR data block with 2 tracks in error
9	6250 GCR density identification (ID)
10	6250 GCR automatic read adjust burst
11	6250 GCR automatic read adjust identification (ID)
12	6250 GCR tape mark
13	6250 GCR gap

Diagnostic Test 63 (Digital Loop-Back Exerciser)

Parameter A = density; parameter B = tracks selector.

Digital loop back is performed using a data block in the selected density with the selected tracks turned off. Tracks selector is in the form of XY where X and Y are combinations of two tracks to disable. Tracks may be specified as 1 through 9 with 0 indicating no tracks.

Diagnostic Test 64 (Tape Unit Initiated Analog Loop-Back)

Parameter A = loop-back block type. This test needs a scratch tape.

Loop-back data or a write pattern is generated by the controller card and passed through the formatting circuit and the tape. Loop-back block type is defined in Test 62.

The operations are not repeated; therefore, tape failures cause errors when running this test.

Diagnostic Test 65 (Analog Loop-Back Exerciser)

Parameter A = density; parameter B = tracks selector. This test needs a scratch tape.

Analog loop back is performed using a data block in the selected density with the selected tracks turned off. Tracks selector is in the form of XY where X and Y are combinations of two tracks to disable. Tracks may be specified as 1 through 9 with 0 indicating no tracks.

The operations are not repeated; therefore, tape failures cause errors when running this test.

Controller Card Tests

Diagnostic Test 70 (Control Panel Lights)

Diagnostic test 70 turns on all the control panel lights and the display. Beginning with the upper-left corner, each light is turned on, in order, from left to right and top to bottom on the control panel. The display is turned on in seven parts. Note any lights that do not go on in this order. The test will indicate PASS 70 even if some of the lights do not go on. If this test is put into a loop, the lights will show the status of the tape unit each time the test is completed.

Diagnostic Test 71 (Front Panel Buttons)

Diagnostic test 71 displays the name of each button as it is pushed. DIAG, CANCEL, UNLOAD, ONLINE, REWIND, and ENTER are displayed when the Diagnostic mode, Cancel, Unload/Rewind, Online, Rewind and Enter buttons are pressed. UP and DOWN are displayed when the Diagnostic Select button is pressed on the top and on the bottom. Any differences occurring in this procedure should be noted. The test will indicate PASS 71 when the Cancel button is quickly pressed two times.

Diagnostic Test 72 (Front Panel Message Check)

This is an interactive test.

This test displays all the front panel messages.

The front panel buttons are defined as follows for the test:

Diagnostic Select Switch

Selects the next or previous message to be displayed, cycling through all the messages.

Online Resets the message pointer back to the first message.

Cancel Stops the test.

Diagnostic Test 75 (tape lifter [TL] Test)

A scratch tape is needed for this test.

Performs a write/read test with the tape lifter (TL) engaging and disengaging to verify correct TL operation.

First, the beginning of the tape is erased. Then write operations are done to the tape while engaging and disengaging the TL at successively shorter intervals. The tape is then rewound and the dropouts are counted as the tape is read.

If the test shows two or less interruptions on the tape, it gives an Inoperative error. If 15 to 21 interruptions are sensed, it reports a Slightly Low error. If 22 to 25 interruptions are sensed, a PASS condition is reported.

The response time of the TL is being tested. It is possible for the TL to intermittently bind and this condition is not detected by this test.

Diagnostic Test 76 (Digital-to-Analog Converters [DAC] Test)

The tape must be unloaded for this test.

Values are written to the digital-to-analog converters (DAC) and checked with an analog-to-digital converter.

Diagnostic Test 77 (Tachometer Test)

The tape must be unloaded for this test.

The tachometer circuit is simulated at the speed encoder inputs. A check is made for correct speed translation at the analog-to-digital converter.

Diagnostic Test 78 (Analog-to-Digital Converter [ADC] Test)

Test the analog-to-digital converter for correct operation.

Diagnostic Test 80 (Motor Drive Loop-Back Test)

The tape must be unloaded for this test.

Values are written to the motor digital-to-analog (DAC) and read back at the analog-to-digital converter.

Diagnostic Test 81 (48-Volt Power Supply Test)

The analog-to-digital converter is read for the 48-volt PSU.

Diagnostic Test 82 (Position Counter Test)

The tape must be unloaded for this test.

CHAN A and CHAN B bits are set on and off on the Quadrature Decode Circuit. A check is made for correct counts.

Diagnostic Test 84 (Tension Shutdown Check)

This is an interactive test and the tape must be unloaded.

As the operator moves the tension arm, the status display shows * when a tension shutdown limit is reached at either end of tension arm movement.

Diagnostic Test 85 (Tension Arm Sensor Check)

This is an interactive test.

As the operator moves the tension arm, the status display should change values smoothly within the range of 0 and 255, with the best value at 150.

Diagnostic Test 86 (Speed Encoder Check)

This is an interactive test.

As the operator rotates the speed encoder, the front panel displays Quadrature Decode Circuit counts. The value ranges from 0 to 4095.

Diagnostic Test 87 (Tape in Path Sensor Check)

This is an interactive test and the tape must be unloaded.

The front panel displays * when the optical sensor beam is blocked.

Diagnostic Test 88 (Door Sensors Check)

This is an interactive test.

The front panel displays DOOR when the door or the top cover is open. The Unload/Open button permits the door to be opened during this test.

Diagnostic Test 89 (Reel Encoders and Write-Enable Ring Sensor Check)

This is an interactive test. It needs a scratch tape and the tape must be unloaded.

Load a write-enabled scratch tape and rotate it manually. The front panel displays * each time a reel encoder pulse is detected. The file protected light on the front panel lights when the write-enable encoder is detected.

Diagnostic Test 90 (Tape Lifter Operation Check)

This is an interactive test.

The tape lifter is engaged. After one-half second it is retracted.

Diagnostic Test 91 (Hub Lock Check)

This is an interactive test and a tape must be loaded for this test.

This test engages the supply hub clamps.

Diagnostic Test 92 (Hub Unlock Check)

This is an interactive test.

This test retracts the supply hub clamps.

Diagnostic Test 93 (Blower Check)

This is an interactive test.

The blower is turned on for thirty seconds.

Listen and feel for air coming from the rear of the tape unit during this thirty seconds. This will verify that the blower is working.

Note: This test will always show 'PASS' at the end of thirty seconds indicating that Test 93 has ended.

Diagnostic Test 94 (EOT/BOT Sensor Check)

This is an interactive test.

The sensor detects reflective BOT and EOT markers. The front panel displays "BOT" when a BOT marker is detected and "EOT" when an EOT marker is detected. The tape must be moving for the sensor to function. Thread the tape through the tape path -- but do not tension it -- and manually turn the reels to move the BOT/EOT marker past the sensors.

Diagnostic Test 95 (Servo Performance Test)

A scratch tape is needed for this test.

A complete check of the servo system is performed. The test performs worst case repositions, forward and reverse speed checks, and high speed rewinds, for example.

Diagnostic Test 96 (Servo Reposition Exerciser)

Parameter A = forward time in seconds; parameter B = reverse time in seconds. A scratch tape is needed for this test.

The drive continuously repositions to EOT and then rewinds if parameter A is greater than or equal to parameter B. Otherwise, the tape unit repositions until it reaches BOT.

Diagnostic Test 97 (Servo Close Loops Test)

A scratch tape needed for this test.

The ability to close the servo loops is tested.

Diagnostic Test 98 (Read Channel Gain Profile Display)

Parameter A = density.

This test displays the read channel gain profile for the selected density. The display will show "TX YYY" where X is the track number (1 to 9 and A) and YYY is the gain needed for that track. The Diagnostic Select switch can be used to view all the tracks. Track A is the average of all 9 tracks. The Enter button is used to terminate gain display. The gain profiles are generated by Test 99.

Values range from 158 to 205. Typical good values are between 170 and 195.

If the range of values displayed is greater than 10, clean the read/write head and run test 99.

Diagnostic Test 99 (Read Channel Calibration Test)

Note: Ensure that the read/write head is clean before you start this test.

Parameter A = density; parameter B = SAVE/TEMP. A CE tape is needed for this test.

Calibrates the read channel gain profile. A tape which is typical of those used on the tape unit should be used for the calibration. This test writes a calibration pattern on the tape and then reads the pattern to calibrate the tape unit. The tape unit should be calibrated in both 6250 and 1600 densities. If parameter B is set to SAVE, the calculated gain profile is saved in battery powered storage. If parameter B is set to TEMP, the calculated gain profile is discarded after this test is complete.

When the test is complete, the gain is displayed (see Test 98). Values range from 158 to 205. Typical correct values are between 170 and 195.

If bad tapes are suspected, volume statistics should be run at the system.

Diagnostic Test 100 (Erase Tape Test)

Parameter A = 0, 1, or 2. A scratch tape needed for this test.

This test verifies an erase operation from the current tape position to the end-of-tape marker. The tape is rewound when the EOT is detected.

Parameter	Description
A	
0	Erase only
1	Write tape at group-coded recording (GCR) data rate first
2	Write tape at phase encoded (PE) data rate first

Diagnostic Test 101 (Write Electronics Exerciser)

Parameter A = density. A scratch tape is needed for this test.

This exerciser writes an all ones pattern in the specified density from the present tape position to the end-of-tape marker. The tape is rewound when the EOT is detected.

Diagnostic Test 102 (Read Electronics Exerciser)

Parameter A = density. A scratch tape is needed for this test.

This exerciser runs from the present tape position to the end-of-tape marker with the read electronics turned on and setup in the specified density. The tape is rewound when the EOT is detected.

Diagnostic Test 103 (Read Reverse Exerciser)

Parameter A = density. A scratch tape is needed for this test.

This exerciser positions the tape at EOT and then runs in the reverse direction to the beginning-of-tape marker with the read electronics turned on and the density selected.

Diagnostic Test 104 (Head Crosstalk Exerciser)

Parameter A = density. A scratch tape is needed for this test.

This exerciser rewinds the tape, then runs to the EOT marker with the erase head on in order to prepare the tape for crosstalk. It then runs in the reverse direction to the beginning-of-tape marker with the read and write circuits operating and the density selected.

Diagnostic Test 108 (Current Gain Profile Display)

Parameter A = display select 0, 1, or 2.

This test displays the gain profile for the tape now loaded. The gain profile is read whenever a tape is identified (following a LOAD or a REWIND) or a density identification is written.

Display Select 0 displays the load gain profile for the last tape loaded. Display Select 1 displays the load gain profile for the tape now loaded relative to the stored profile. Display Select 2 displays the present profile used for reading and writing the tape. It is the stored profile normalized to match the average gain of the tape now loaded. Gains are displayed as described in Test 98. For PE tapes, Display Select 0 and 1 will show track 4 only (the PE ID track).

Diagnostic Test 110 (Tape Pack Conditioner)

A scratch tape is needed for this test.

The tape is moved to EOT then rewound at the archive rewind speed.

Buffer Card Tests

Diagnostic Test 120 (Buffer Register Test)

Write to and read from all of the buffer card registers to verify their ability to receive and hold data.

Diagnostic Test 121 (Buffer Function Test)

Perform push and pop operations from the buffer controller, verifying counter and address operation, parity circuitry, and prefetch latching.

Diagnostic Test 122 (Buffer Storage Test)

Buffer card direct-access storage is tested for the ability to receive and hold data. This test destroys data in the data buffer.

Diagnostic Test 128

This test is not used.

Diagnostic Test 129

This test is not used.

Interface Card Tests

Diagnostic Test 140 (SCIPI Module Test)

Checks out operations of the SCIPI module.

Diagnostic Test 141 (On-Board Hardware Tests)

Checks out additional on-board functions.

Tape Unit Operational Tests

All of these tests, with the exception of host to buffer operations, need a scratch tape loaded.

Diagnostic Test 150 (Write Density ID)

Parameter A = 1600 or 6250 density. The tape must be at BOT.

Diagnostic Test 151 (Write Test Record)

Parameter A = test record size.

A single record is generated in the controller card and written to tape.

Parameter	Test Record Size (Bytes)
A	
0	1
1	256
2	512
3	768
4	1024
5	1280
6	1536
7	1792
8	2048
9	2304
10	2560
11	2816
12	3072
13	3328
14	3584
15	3840

Diagnostic Test 152 (Write Tape Mark)

Diagnostic Test 153 (Write Gap)

Parameter	Gap Length
A	
0	2.0-inch write gap
1	4.0-inch write gap
2	8.0-inch write gap
3	12.0-inch write gap
4	16.0-inch write gap
5	Erase to EOT

Diagnostic Test 160 (Verify Record)

Parameter A = blank-tape control.

A single record is read from the tape verifying the data, but without the results being placed in the data buffer. The blank-tape control parameter sets the maximum amount of blank tape the tape unit will move while looking for the record. 0 = 12 inches, 1 = 25 feet.

Diagnostic Test 161 (Forward Space Block)

Single blocks are spaced over without verifying any data in the blocks.

Diagnostic Test 162 (Backspace Block)

Single blocks are spaced over without verifying any data in the blocks. This test cannot be run from BOT. Test 161 must be run first.

Diagnostic Test 163 (Forward Space File)

Blocks are spaced over until a file mark is detected.

Diagnostic Test 164 (Backspace File)

Blocks are spaced over until a file mark is detected. This test cannot be run from BOT. Test 163 must be run first.

Diagnostic Test 165 (Load Tape)

Diagnostic Test 166 (Rewind)

Diagnostic Test 167 (Unload Tape)

Parameter	Door Control
A	
0	The door remains closed.
1	The door opens.

Note: Tests 170-175 are run by the controller card and will attempt the operation again if a failure occurs.

Diagnostic Test 170 (Write Tape Mark to Buffer)

A tape mark entry is generated in the buffer without writing it to tape.

Diagnostic Test 171 (Create Record in Buffer)

Parameter A = pattern; parameter B = record size.

A record is generated in the buffer without writing it to tape. The pattern parameter indicates the type of data to be generated.

Parameter	Pattern
A	
0	All zeros
1	All ones
2	Alternating all zeros, all ones
3	Rotating data bytes (0 .. 255)
4	Pseudorandom data
5	Use existing data in buffer storage
6	Rotating data with parity error on the last byte

Parameter	Record Size
A	
0	1 byte
1	256 bytes
2	1K
3	4K
4	16K
5	32K
6	64K

Parameter	Record Size
A	
7	128K
8	256K

Diagnostic Test 172 (Write Buffer to Tape)

Parameter A = hold data or next write control.

Write the contents of the next entry in the queue to tape. The following parameters affect the write operation:

Remove	Remove the record from the buffer following the write operation. If the test is looped more times than there are buffer entries, the test fails with an empty buffer.
Hold	Hold the record in the buffer following the write operation.
Stream	Attempt to stream by starting to write the next record in the buffer. If no write command is received, the startup is canceled and the tape is positioned again.
Single	Do not start the next write operation. Streaming will not occur.
Error normal	Stop on all errors.
Error bypass	Stop on all errors except write errors. Write errors are logged in the error and error rate logs and can be displayed using INFO.

Parameter	Description
A	
0	Remove / stream / error normal
1	Hold / stream / error normal
2	Remove / single / error normal
3	Hold / single / error normal
4	Remove / stream / error bypass
5	Hold / stream / error bypass
6	Remove / single / error bypass
7	Hold / single / error bypass

Diagnostic Test 173 (Read from Tape to Buffer)

Parameter A = hold data or next read control.

A record is read from the tape into the data buffer. The following parameters affect the read operation:

Remove	Remove the record from the buffer following the read operation.
Hold	Hold the record in the buffer following the read operation. Note that if the test is looped more times than there is room left in the buffer, the test fails with a full buffer.
Stream	Attempt to stream by starting to read the next record from the tape. If no read command is received, the startup is canceled and the tape is positioned again.
Single	Do not start the next read operation. Streaming will not occur.

Error normal Stop on all errors.

Error bypass Stop on all errors except read errors. Read errors are logged in the error and error rate logs and can be displayed using INFO.

Parameter	Description
A	
0	Remove / stream / error normal
1	Hold / stream / error normal
2	Remove / single / error normal
3	Hold / single / error normal
4	Remove / stream / error bypass
5	Hold / stream / error bypass
6	Remove / single / error bypass
7	Hold / single / error bypass

Diagnostic Test 174 (Clear Data Buffer)

All entries in the data buffer are removed.

Diagnostic Test 175 (Initialize Total Log)

The phase encoded (PE) and group-coded recording (GCR) total logs are cleared.

Diagnostic Test 176 (Buffer Write Tape Mark)

A tape mark is written to the tape, with repeats performed if necessary. The contents of the buffer are not affected. This test will not stream if looped.

Diagnostic Test 177 (Buffer Write Density ID)

(Parameter A, density 1600 or 6250; tape must be at the beginning-of-tape mark.)
The selected density ID is written to the tape, with repeats performed if necessary.
The contents of the buffer are not affected.

Appendix C. Logs

Display and Clear Logs

Clear Logs

1. Place the 9348 in the diagnostic mode; see "Diagnostic Mode" on page A-3.
2. Select the CONF* option; see "CONF * Option" on page A-4.
3. Select the clear measurements parameter to be changed.
4. Select the value you want, and press the Enter button to change the value. (SET xx will be displayed to indicate the change.)
5. To leave this mode, press the Cancel button until CONF* is displayed.
6. To leave the diagnostic mode, press the Cancel button or the Option button.

Display Logs

1. Place the 9348 in the diagnostic mode; see "Diagnostic Mode" on page A-3.
2. Select the INFO* option; see "INFO * Option" on page A-4.
3. Select the measurement to display.
4. Select the value you want, and press the Enter button to change the value. (SET xx will be displayed to indicate the change.)
5. To leave this mode, press the Cancel button until INFO* is displayed.
6. To leave diagnostic mode, press the Cancel button or the Option button.

Error Log Information (INFO 0)

Viewing the Error Log

The error log saves the last 30 errors and exception conditions. Because this information is contained in the battery-powered storage module, the information is saved through power-on and power-off cycles. To see this information follow these steps:

1. Place the tape unit in the diagnostic mode; see "Diagnostic Mode" on page A-3.
2. Select the INFO * option; see "INFO * Option" on page A-4.
3. Select the error log by pressing the Enter button when INFO 0 is displayed.
4. The error recorded by the 9348 is shown when EXX YYY is displayed.

Note: XX is the error number from 01 through 30, with the largest number being the newest error and 01 being the oldest error in the log. (The error displayed can be changed by using the Diagnostic Select switch.) YYY is the error code recorded.

5. To leave the INFO * mode, press the Cancel button until INFO* is shown.
 6. To leave diagnostic mode, press the Cancel button or the Diagnostic Mode button.
-

Clearing the Error Log

The errors saved in the error log can be cleared with the following steps:

1. Select the CONF 0 option see "CONF * Option" on page A-4.
2. Select error log by pressing the Enter button when CONF 0 is displayed.
3. Press the Diagnostic Select button to display either save or clear.
4. Select the clear option by pressing the Enter button when CLEAR is displayed; SET 0 indicates it has been cleared.
5. To leave the configuration mode, press the Cancel button until CONF * is shown.
6. To leave diagnostic mode, press the Cancel button or the Diagnostic Mode button.

Examples of errors:

Example 1.

The operator pressed the cancel button while the tape unit was running. INFO 0 shows that the last error in this case was E07 and the reference code was 0C8. A zero must be added to the left to get 00C8. This reference code and the repair action can be found in the reference code tables. The lower number is a time stamp. There are no FRUs.

```
|E07 0C8|  
|      |  
| 339242|
```

Example 2.

Pressing the Diagnostic Select button displays the previous error, E06. The reference code was 0357 (a zero must be added to the left). The FRU numbers must be ignored. Full FRU information is shown in the reference code table. T88 shows that reference code 0357 occurred when diagnostic test 88 was being run.

```
|E06 357|  
|FRU 9 |  
|FRU 3 |  
| T 88 |  
| 92506|
```

2 - Present Error Rate

INFO 2 displays soft error rate of the tape in the tape unit now.

```
| W DeDD|  
| R DeDD|
```

W DeDD Write soft error rate in bytes per write soft error
R DeDD Read soft error rate in bytes per read soft error

For example:

```
|W 2e07|  
|R 3e06|
```

In the example, the present write soft error rate is approximately 20 MB of data per error, and that the present read soft error rate is approximately 3 MB of data per error.

3 & 4 - Total Error Data

- INFO 3** Displays the GCR error data total
CONF 3 Permits the GCR data to be cleared
INFO 4 Displays the PE error data total
CONF 4 Permits the PE data to be cleared

The total error data log contains all past hard and soft errors and the total amount of data written and read. The Diagnostic Select switch is used to move from the write to the read displays.

Write displays	WH HHHH	H means that the number is hexadecimal
	WS HHHH	
	WD DeDD	D means a decimal digit
Read displays	RH HHHH	e means an exponential form
	RS HHHH	For example: 2e08 means 2 times 10
	RD DeDD	to the eighth power

WH HHHH	Hard write errors in hexadecimal (errors not corrected)
RH HHHH	Hard read errors in hexadecimal (errors not corrected)
WS HHHH	Soft write errors in hexadecimal (corrected errors)
RS HHHH	Soft read errors in hexadecimal (corrected errors)
WD DeDD	Amount of data written in bytes
RD DeDD	Amount of data read in bytes

You may clear the INFO 3 & 4 log by running sequence test 3.

5 - Total Error Rate

INFO 5 displays the total of soft error rate in bytes per error.

```
|   GCR |
| W DeDD |
| R DeDD |
|   PE  |
| W DeDD |
| R DeDD |
```

GCR	Indicates that the following two displays are the total of write and read soft error rates for operations using GCR density
PE	Indicates that the following two displays are the total of write and read soft error rates for operations using PE density
W DeDD	Write soft error rate in bytes per write soft error
R DeDD	Read soft error rate in bytes per read soft error

You may clear the INFO 5 log by running sequence test 3.

Example:

```
|   GCR |
| W 2e10 |
| R 2e10 |
|   PE  |
| W 6e09 |
| R 6e09 |
```

10 - Tape Movement Log

INFO 10 displays the tape movement log.

The tape movement log is a 6-byte value containing the amount of tape covered in 0.1-foot sections. It needs three displays:

```
| 1 DDDDD |  
| 2 DDDDD |  
| 3 DDDDD |
```

Until this log is initialized, it will display ***** indicating that the log is not working. To initialize the log, enter CONF 10 and select CLEAR to set the log to zero.

12 - Tape Unit Clock

INFO 12 displays the tape unit clock.

The tape unit clock is four bytes long. The clock is initialized to zero when the tape unit is powered up. All time stamps used in the tape unit logs use this clock. Time is displayed in hours, minutes, and seconds of operation.

```
| H DDDDD |   hours  
| M  DD |   minutes  
| S  DD |   seconds
```

Example:

```
| H  194 |   hours  
| M   27 |   minutes  
| S   04 |   seconds
```

13 - Power Cycles

INFO 13 displays the number of times the tape unit has been powered on.

```
| DDDDD |
```

Until this log is initialized, it will display ***** indicating that the log is not working. To initialize the log, enter CONF 13 and select CLEAR to set the log to zero.

15 - Battery Date

INFO 15 displays the last two digits of the year the battery was installed.

Use CONF 15 to change the battery date.

```
| DD |
```

Example:

```
| 88 |
```

20 - Drive Repositioning Statistics

INFO 20 displays tape unit repositioning statistics.

Use CONF 20 to clear tape unit repositioning statistics.

```
| FM DD |  
| FV DD |  
| RM DD |  
| RV DD |
```

Example:

```
|FM -9 |
|FV 6 |
|RM 0 |
|RV 0 |
```

FM DD Forward reposition error mean in millimeters
FV DD Forward reposition error variance in millimeters squared
RM DD Reverse reposition error mean in millimeters
RV DD Reverse reposition error variance in millimeters squared

21 - Tape Automatic load Statistics

INFO 21 displays tape automatic load statistics.

Use CONF 21 to clear tape automatic load statistics.

```
|LS DDD|
|LR DDD|
|LADDDDD|
```

Example:

```
|LS 100|
|LR 0 |
|LA 918|
```

LS DDD Percent of successful load operations
LR DDD Percent of successful load operations needing another attempt
LADDDDD Total number of load operations attempted

24 - Unit Type Number

INFO 24 displays the unit type number 9348.

25 - Program Module Kit Revision Number

INFO 25 displays licensed internal code revision numbers of all processors.

The revision number of licensed internal code in each of the processors is displayed. Four displays are shown with each display having the following format:

```
|DD DDD|
|DD DDD|
|DD DDD|
|DD DDD|
```

Example:

```
| 8 660| front panel
| 3 660| control card
| 4 660| data buffer card
|16 660| SCSI card
```

DD Processor ID number
DDD Level number (D), Revision number (DD)

26 - Unit Serial Number

INFO 26 displays the serial number of the 9348.

Appendix D. Configurations

The 9348 tape unit has various configurations which have been preset and should not be changed unless you have been directed to do so by your support level. This appendix is included for your information only.

Changing Configuration Values

Use the following procedure to change the configuration values.

1. If the Online light is on, press the Online button to take the tape offline.
2. Press the Diagnostic Mode button. TEST * is displayed to that the tape unit is in the diagnostic mode.
3. Press the Diagnostic Select button until CONF is displayed.
4. Press the Enter button when CONF * is displayed to select the CONF * option. CONF 0 is displayed to verify that you are in the CONF * mode.
Note: If you have recently completed this step, CONF xxx is displayed (where xxx is the parameter that you changed).
5. The number displayed indicates which configuration parameter is selected. The value can be changed by pressing the Diagnostic Select button.
6. When CONF xxx is displayed (where xxx is the parameter you want to change) press the Enter button to select the configuration parameter you want to change.
Note: If ILLEGAL is displayed, refer to "Changing Locked Configuration Values"
7. Press the Diagnostic Select button to see the values available for this parameter.
8. When the desired parameter value is displayed, press the Enter button. SET xxx (where xxx is the parameter value you selected) is momentarily displayed to indicate that the parameter was changed.
9. Repeat steps 4 through 8 of this procedure for each configuration parameter change.
10. To leave the CONF * mode, press the Cancel button until CONF * is displayed.
11. To leave the diagnostic mode, press the Cancel button or the Diagnostic mode button.
12. Initialize the status registers by setting the tape unit Power switch to the Off and then On.

Changing Locked Configuration Values

The tape unit has most of the configuration parameters locked to prevent them from being accidentally changed. If you have been instructed to change the locked configuration values, use the following procedure:

Note: Use "Changing Configuration Values" for reference when performing this procedure.

1. Change configuration parameter 100 to a value of 48.
 2. Change configuration parameter 101 to a value of 76.
-

3. If this change is to be made permanent, change configuration parameter 40 to a value of ON.
4. Change the locked configuration parameter to the desired value.
5. To prevent other values from being changed accidentally, change configuration parameter 40 to a value of OFF.
6. Change configuration parameter 100 to a value of 0.
7. To leave CONF * mode, press the Cancel button until CONF * is shown in the display.
8. To leave diagnostic mode, press the Cancel button or the Diagnostic Mode button.

Changing ID (Address) Value

Use the following procedure to change the ID (address) of the tape unit. After completing this procedure, verify the new ID by following the procedure described in "ID * Option" on page A-5.

1. Initialize the status registers by setting the tape unit power switch to Off and then On.
Note: Turning power off and on will not affect data in the error logs.
2. If the Online light is on, press the Online button to take the tape unit offline.
3. Press the Diagnostic Mode button. TEST * is displayed to show that the tape unit is in the diagnostic mode.
4. Press the Diagnostic Select button until CONF * is displayed.
5. When CONF * is displayed, press the Enter button to select the CONF * option. CONF 0 is displayed to verify that you are in the CONF * mode.
6. Press the Diagnostics Select button until CONF 100 is displayed.
7. Press the Enter button. 0 is displayed.
8. Press the Diagnostics Select button to increase the value displayed to 48.
9. Press the Enter button. CONF * is displayed.
10. Press the Enter button again. CONF 100 is displayed.
11. Press the Diagnostic Select button until CONF 101 is displayed.
12. Press the Enter button. 0 is displayed.
13. Press the Diagnostic Select button to increase the value displayed to 76.
14. Press the Enter button. CONF * is displayed.
15. Press the Enter button again. CONF 101 is displayed.
16. Press the Diagnostic Select button until CONF 40 is displayed.
17. Press the Enter button. OFF is displayed.
18. Press the Diagnostic Select button until On is displayed.
19. Press the enter button. CONF * is displayed.
20. Press the Enter button again. CONF 40 is displayed.
21. Press the Diagnostic Select button until CONF 79 is displayed.
22. Press the Enter button. ON or OFF is displayed.

23. Press the Diagnostic Select button until OFF is displayed.
24. Press the Enter button until CONF * is displayed.
25. Press the Diagnostic select button until ID * is displayed. ID is the address parameter of the tape unit.
26. Press the Enter button. The current ID (address) is displayed.
27. Press the Diagnostic select switch until the ID value you need is displayed, and then press the Enter button.
28. Press the Diagnostic Mode button once to exit the diagnostic mode.
29. Initialize the status registers by setting the tape unit Power switch to Off and then On.

Glossary

block. A group of data records handled as a single unit.

BOT. Reflective marker that indicates the beginning of the space available for data storage on the tape.

bpi. Bits-per-inch.

diagnostics. Tests that diagnose or detect hardware problems or errors.

density. The number of bits that can be recorded in a given length of tape; expressed in bpi. The tape unit features dual-density ANSI-standard formats, 1600 or 6250 bpi.

EOT. Reflective marker that indicates the end of the space allowed for data recording. This marker is usually placed about 27 feet from the physical end of the tape.

error log. A block of storage in the tape unit that logs recent errors.

GCR. Group-coded recording format. Allows a tape unit to write 6250 characters per inch and includes the ability to detect and correct simultaneous errors in up to two tracks.

Kb. A unit of measurement for storage, also called kilobyte. One kilobyte is equal to 1,024 bytes.

kVA. Kilovolt ampere.

load. To move tape from the supply reel, through the tape path to the take-up reel, establish tension, and

position the beginning-of-tape (BOT) marker at the start point with respect to the head.

MB. A unit of measurement for storage, also called megabyte. One megabyte is equal to 1,048,576 bytes (approximately one million).

Microswitch. A small size switch often used for interlocks.

offline. Pertaining to the operation of a functional unit that is not under the control of the system.

online. Pertaining to the operation of a functional unit that is under the continual control of the system.

pseudorandom. An ordered set of numbers that has been determined by some defined arithmetic process but is effectively a random number sequence for the purpose for which it is required.

self-test. A sequence of small test programs the tape unit runs when you turn it on. These programs check that the tape unit is functioning correctly.

transfer rate. The rate at which data is transferred from one device to another.

unload. A rewind sequence where all the tape is wound back onto the supply reel.

write-enable. To allow writing to tape; the tape is not write-protected.

write-enable ring. A ring installed on the back of tape reels. When the ring is in place, you may record data on the tape; when the ring is removed, data may not be written to the tape (tape is write-protected).

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