

DIMENSION® 600/2000 PBX
CARTRIDGE TAPE TEST
(PROC 500)

1. GENERAL

- 1.1 This section is issued in order to make available the information contained in the Administration and Maintenance Manual, 500-497, PROC 500 (versions 1 and 2).
- 1.2 The attachment provides test and troubleshooting procedures for the minirecorder cartridge tape.

ATTACHMENT

PROC 500 (17 pages)

Reason for Issue:
New Section

Manager, Denver PBX PECC

PRIVATE

THE INFORMATION CONTAINED HEREIN SHOULD NOT BE DISCLOSED TO UNAUTHORIZED PERSONS. IT IS MEANT SOLELY FOR USE BY AUTHORIZED BELL SYSTEM EMPLOYEES.

PROCEDURE 500, VERSION 1 - TAPE TEST, VERSION 1

PROC 500, VER 1

A. DESCRIPTION

Procedure 500, Version 1, should be used when any of the following conditions exist:

- CONTROL TAPE-500 and MINOR alarm indicators on the Alarm Panel are turned on.
- Procedure 515 indicates Procedure 500 should be used to find the source of the alarm.

Procedure 500 is used to:

- Display recorded tape system faults.
- Retire the tape alarms.

Procedure 500, Version 1, is a display-only procedure that includes only one test; Test 1. Test 1 displays the tape system failure history.

TEST 1-DISPLAYS FAILURE HISTORY. USE 'NEXT UNIT' TO ADVANCE TO NEXT FAILURE. USE 'CLEAR DATA', 'EXECUTE' TO CLEAR FAILURE HISTORY AND TAPE ALARM.	TAPE OPERATIONS (FLD 2)			CART STATUS ENCODES:(FLD 3)
	0=PASS	8=LOAD PROGRAM, TRACK 4	16=COMPARE PROGRAM, TRACK 4	1-TAPE OFF REEL, 2=CART NOT IN POSITION, 3=BOTH
	1=READ TRNSL, TRACK 1	9=VERIFY TRNSL, TRACK 1	17=WRITE TRNSL, TRACK 1	TAPE LOC ENCODES:(FLD 4)
	2=READ PROGRAM, TRACK 2	10=VERIFY PROGRAM, TRACK 2	18=WRITE TRNSL, TRACK 3	1=EDT, 2=BOT, 3=BOTH
3=READ TRNSL, TRACK 3	11=VERIFY TRNSL, TRACK 3	19=POSITION PROGRAM, TRACK 2	DATA ERR ENCODES:(FLD 5)	
4=READ PROGRAM, TRACK 4	12=VERIFY PROGRAM, TRACK 4	20=POSITION PROGRAM, TRACK 4	1=DATA LOST, 2=OVFL, 3=BOTH	
5=LOAD TRNSL, TRACK 1	13=COMPARE TRNSL, TRACK 1	21=VELOCITY ERROR	SPEED ENCODES:(FLD 8)	
6=LOAD PROGRAM, TRACK 2	14=COMPARE PROGRAM, TRACK 2	22=RETENSION ERROR RECOVERY	1=SLOW, 2=FAST, 3=BOTH	
7=LOAD TRNSL, TRACK 3	15=COMPARE TRNSL, TRACK 3			
ISSUE 5 FLIPCHART	PROC 500, VER 1			

FLIPCHART ISSUE 5		TAPE TEST, VER 1												PROC 500
TEST NO	TAPE OPERATION	FAILURE CODES							TOTAL FAILURES	FAILURE INDEX	FAILURE HISTORY		HOURS SINCE 23 HOUR RUN TAPE	
		CART STATUS	TAPE LOC	DATA ERR	LD PT OR ERLY WARN	CRC	SPEED	FAILURES PER HOUR			FAILURES BEGAN HOURS AGO			
1		3	4	5	6	7	8	9	10	11	12	13	14	

1.	1.	2.	2.	-	1.	-	1.	-	-	-	-	3.	3.	7.	3.	14.	500
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B. FIELD DEFINITIONS AND CODES

Field	Code	Definition
1	1	Test number.
2		Tape operation in progress when the fault occurred:
	1	Read translation, track 1.
	2	Read program, track 2.
	3	Read translation, track 3.
	4	Read program, track 4.
	5	Load translation, track 1.
	6	Load translation, track 2.
	7	Load translation, track 3.
	8	Load program, track 4.
	9	Verify translation, track 1.
	10	Verify program, track 2.
	11	Verify translation, track 3.
	12	Verify program, track 4.
	13	Compare translation, track 1.
	14	Compare program, track 2.
	15	Compare program, track 3.
	16	Compare program, track 4.
	17	Write translation, track 1.
	18	Write translation, track 3.
	19	Position program, track 2.
	20	Position program, track 4.
	21	Velocity error.

Field	Code	Definition
2 (Contd)	22	Re-tension error recovery. A problem other than positioning was corrected by re-tensioning the tape.
3		Cartridge status:
	1	Tape off reel.
	2	Cartridge not in position.
	3	Codes 1 and 2.
4		Tape location:
	1	End of tape.
	2	Beginning of tape.
	3	Codes 1 and 2. Multiple failures could also produce this code.

B. FIELD DEFINITIONS AND CODES (Contd)

Field	Code	Definition
5		Data error:
	1	Data lost while more data was expected.
	2	Overflow. A tape interrupt was not processed within 330 microseconds.
	3	Codes 1 and 2.
6	1	Load point or early warning: The tape was at the load point near the beginning of tape or early warning marker near the end of tape when the failure occurred.
7	1	CRC error.
8*		Speed error:
	1	Tape motion too slow during read operation.
	2	Tape motion too fast during read operation.

Field	Code	Definition
8* (Contd)	3	Codes 1 and 2. Multiple failures could also produce this code.
9*	Dashes	Not implemented.
10	0-6	Total number of recorded failures.
11	0	Failure summary. Index of failures being displayed.
	1-6	
12	0-99	Approximate number of failures per hour.
13	0-17	Elapsed time (in hours) since the first recorded failure.
14	0-23	Elapsed time (in hours) since the last 23-hour run tape operation occurred.†
*Not implemented in Feature Package 7, Issue 1 software.		
†In duplicated common control systems, the last 23-hour run tape may have occurred in the processor now off-line.		
CRC - Cyclic redundancy check		

C. TEST PROCEDURES

A description of what the tape test does and how it is run follows:

Call in Procedure 500:

PROC NO.; 500; ENTER

Test 1 is automatically selected.

Test Operation:

To start Test 1, depress the EXECUTE key. EXECUTE takes a snapshot of the failure summary and displays it on the MAAP as follows:

Field	Contents
10	Total tape system failures.
11	0, indicating failure summary.
12,13	Failure summary.
14	Elapsed time since last 23-hour run tape.

The failure summary displays all tape failures that have occurred.

Depressing the NEXT UNIT key displays the first

tape system failure in the failure history. The display includes the following:

Field	Contents
2	Tape operation in progress when failure occurred.
3-8	Related failure codes.
10	Total tape system failures.
11	Incremented by 1.
12, 13	Failure history.
14	Dashed.

After the first tape system failure is displayed, depressing NEXT UNIT repeatedly displays the failure histories of the remaining failures. Depressing NEXT UNIT after all failure histories have been displayed, dashes all fields except field 1. Depressing NEXT UNIT again causes Test 1 to be executed, starting the sequence over with an updated failure summary.

Refer to paragraph 2C in the introduction of Section 4 for information on clearing the failure history. Clearing the tape system failure history turns off the CONTROL TAPE-500 indicator.

D. REPAIR GUIDE

CAUTION
Certain tape control malfunctions may destroy information on the tape cartridge. It is recommended that one spare tape cartridge be kept on site and also one kept at the local operating telephone company office. If only one spare tape is readily available, do not put it into the minirecorder until the fault has been cleared or unless all of the tape control units (ie, LC29, LC30, and the minirecorder) have been replaced.

When a tape system alarm is indicated, the following steps should be performed to determine whether the tape in the system is defective or there is a hardware fault and then to repair the faulty unit:

NOTE
A normally operating tape system (no tape alarm turned on) occasionally has positioning errors and re-tension error recoveries. For the present diagnostic purposes, these errors can be ignored.
Velocity testing is not presently implemented.
System initialization (INIT A) disables interrupts which may cause tape errors that cannot be duplicated. If suspected, Procedure 520 should be used to investigate this possibility.

Step	Isolation Procedure
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1	If the tape system alarm came on while no MAAP, Remote Maintenance, Administration
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Step	Isolation Procedure
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	and Traffic System (RMATS), Customer Administration Center System (CACS), or Customer Administration Panel (CAP) activity was in progress, take the corrective action indicated, in the order listed, in Table 500-1 based on the symptoms observed.
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2	If the tape system alarm comes on while the craftsperson is performing maintenance, the following steps should be performed.
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	(a) Record what the craftsperson was doing when the alarm came on.
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	(b) Run Procedure 500 as soon as possible.
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	(c) Record the displayed failures.
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	(d) Clear the alarm and failure history.
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	(e) Repeat the sequence that caused the tape alarm.
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	(f) If the alarm returns, proceed to Step (g).
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	(g) Based on the symptoms observed, take the corrective action indicated, in the order listed, in Table 500-2.
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Table 500-1. Tape Test Repair Procedure for Step 1

Symptom	Corrective Action
1. Procedure 500 will not load.	<p>(a) Remove the following fuses;</p> <ul style="list-style-type: none"> • - 48FAC5 • - 9FAC2 • + 5FAC1 <p>(b) Perform the tape head and puck cleaning procedure</p> <p>(c) Replace the fuses removed in Step (a) and perform the "RUN TAPE" procedure with the original tape cartridge.</p> <p>(d) Replace the following units, one at a time. Leave the replacement unit(s) and the original tape cartridge in the system.</p> <ul style="list-style-type: none"> • LC29 • LC30 • minirecorder <p>(e) Reinitialize the system by setting the TEST SELECT switch to "9" and toggle the ENABLE key. If the problem is not cleared, replace the next unit in Step (d) and reinitialize.</p> <p>(f) In the event that all of the above units have been replaced and the system fails to reinitialize with the original tape, it is probable that the malfunction has destroyed the</p>

Symptom	Corrective Action
1. (Contd)	tape record. Replace the original tape cartridge with the spare tape cartridge and reinitialize the system.
2. Procedure 500 loads and only combinations of tape operations 9, 11, 17 or 18 (write/verify operations) are displayed in field 2.	<p>The translation on tape 1 has been improperly updated.</p> <p>Clear the tape system alarm and failure history.</p> <p>Perform the run-tape (RUN TAPE; EXECUTE) on tape 1 to confirm the problem. If the operation succeeds, tape 1 has been corrected. Further diagnosis is not possible.</p> <p>If the run-tape operation is unsuccessful, clear the alarm and failure history.</p> <p>Perform a run-tape operation on tape 2. If the operation is successful, tape 1 is defective.</p> <p>If the tape system alarm turns on again, there is a hardware write or verify problem.</p>

TABLE 500-1. Tape Test Repair Procedure for Step 1 (Contd)

Symptom	Corrective Action
2. (Contd)	After the hardware problem is corrected, perform a run-tape operation on both tapes to correct them.
3. Procedure 500 loads and only tape operations 6 and/or 8 (load operations) are displayed in field 2.	<p>Either run tape or the RMP cannot be loaded</p> <p>Clear the tape system alarm and failure history</p> <p>Using tape 1, attempt a run-tape operation.</p> <p>If the run-tape operation is successful, attempt to load RMP by disconnecting the MAAP and waiting approximately 1 minute. If both operations are successful, no diagnosis is possible.</p> <p>If either operation is unsuccessful, insert tape 2 in the PBX and attempt to perform the operation that failed. If the operation is successful, tape 1 is defective.</p> <p>If the operation is unsuccessful, there is a hardware load problem. The translation may need updating.</p>

Symptom	Corrective Action
4. Procedure 500 loads and only tape operations 2 and/or 4 (read operations) are displayed in field 2.	<p>The run-tape operation is unable to read the directory or a translation block.</p> <p>Clear the tape system alarm and failure history.</p> <p>Using tape 2, perform a run-tape operation. If the operation is successful, tape 1 is defective.</p> <p>If the tape system alarm turns on again, there is a hardware read problem. The translation may need updating.</p>
5. Procedure 500 loads and some combination of read, write, verify, and load errors are displayed.	<p>The error that caused the tape system alarm must be determined:</p> <p>A. Record the tape operations displayed in field 2 of Procedure 500.</p> <p>B. Clear the tape system alarm and failure history.</p>

Table 500-1. Tape Test Repair Procedure for Step 1 (Contd)

Symptom	Corrective Action
5. (Contd)	<p>C. Using tape 1, proceed as follows:</p> <ol style="list-style-type: none"> (1) Attempt to load the RMP. If unsuccessful, go to symptom 3, if successful, proceed to Step 2. (2) Clear the failure history. (3) Perform a run-tape operation. If the operation is successful, no diagnosis is possible. (4) If Step 3 is unsuccessful (ie, alarm turns on), run Procedure 500 and display the failure history. Up to four different types of errors will be present: <ul style="list-style-type: none"> • Write/verify • Read • Load (5) If both write/verify and read errors are present, the alarm cause cannot be absolutely determined.

Symptom	Corrective Action
5. (Contd)	<p>Assume a write problem and go to symptom 2.</p> <ol style="list-style-type: none"> (6) If any other combination of errors is present, the error appearing first in the list in Step 4 is the alarm cause. For example, if write/verify errors are the alarm cause, go to the applicable symptom for corrective action.
<p>RMP - Resident - most page Tape 1 - Tape in the minirecorder Tape 2 - Spare tape</p>	

Table 500-2. Tape Test Repair Procedure for Step 2

Symptom	Corrective Action
1. Procedure 500 will not load.	<p>(a) Remove the following fuses:</p> <ul style="list-style-type: none"> • - 48FAC5 • - 9FAC2 • + 5FAC1 <p>(b) Perform the tape head and puck cleaning procedure</p> <p>(c) Replace the fuses removed in Step (a) and perform the "RUN TAPE" procedure with the original tape cartridge.</p> <p>(d) Replace the following units, one at a time. Leave the replacement unit(s) and the original tape cartridge in the system.</p> <ul style="list-style-type: none"> • LC29 • LC30 • minirecorder <p>(e) Reinitialize the system by setting the TEST SELECT switch to "9" and toggle the ENABLE key. If the problem does not clear, replace the next unit in Step (d) and reinitialize the system.</p> <p>(f) In the event that all the above units have been replaced, and the system fails to reinitialize with the original tape, it is probable that the</p>

Symptom	Corrective Action
1. (Contd)	malfunction has destroyed the tape record. Replace the original tape cartridge with the spare tape cartridge and reinitialize the system.
2. Procedure 500 loads and only errors other than write and verify are displayed.	<p>Record tape operations (field 2).</p> <p>Clear the tape system alarms and failure history.</p> <p>Using tape 1, repeat the sequence that caused the tape alarm to verify the problem.</p> <p>If the tape system alarm does not return, stop corrective action. Otherwise, proceed.</p> <p>Using tape 2, repeat the action(s) that caused the alarm to be turned on. If the alarm does not turn on, tape 1 is defective.</p> <p>If the alarm turns on again, run Procedure 500. There is a hardware failure of the type displayed by the procedure.</p>

Table 500-2. Tape Test Repair Procedure for Step 2 (Contd)

Symptom	Corrective Action
<p>3. Procedure 500 loads, and combinations of tape operations 9, 11, 17, or 18 (write/verify) are displayed in field 2 (other tape operations might possibly be displayed as well.)</p>	<p>A write operation failed, indicating translation or patches on tape 1 are defective:</p> <p>A. If a run-tape operation was in progress, go to Table 500-1, symptom 2.</p> <p>B. If Procedure 490 was running when the failure occurred, proceed as follows:</p> <ol style="list-style-type: none"> (1) Clear the tape alarm and failure history. (2) Repeat the sequence that caused the tape 1 alarm. (3) If the alarm does not return, no diagnosis is possible. (4) Run Procedure 500. (5) If no write/verify operations are included in the Procedure 500 display, proceed to Step 2.

Symptom	Corrective Action
<p>3. (Contd)</p>	<ol style="list-style-type: none"> (6) Using an administration procedure, make a minor (minimal affect on service) translation change. (7) Clear the tape system alarm and failure history. (8) Perform a run-tape operation on tape 1 to exercise the write hardware. If the alarm turns on again, there is a write hardware failure. Go to Step 9. Otherwise, proceed to Step 13. (9) Change the translation back to its original value. (10) Insert tape 2 into the minirecorder.

Table 500-2. Tape Test Repair Procedure for Step 2 (Contd)

Symptom	Corrective Action
3. (Contd)	<p>(11) Do not perform a run-tape operation or attempt to put more patches onto the tape until the hardware is repaired. Tape 1 may have incorrect patches.</p> <p>(12) If the alarm does not turn on after performing Step 8, tape 1 is defective.</p> <p>(13) Change the translation back to its original value.</p> <p>(14) Insert tape 2 into the minirecorder.</p>
<p>Tape 1 - Tape in the minirecorder</p> <p>Tape 2 - Spare tape</p>	

PROCEDURE 500 - VERSION 2 - TAPE TESTS, VERSION 2

PROC 500, VER 2

A. DESCRIPTION

Procedure 500, Version 2, should be used when any of the following conditions exist:

- CONTROL TAPE-500 and MINOR alarm indicators on the Alarm Panel are turned on.
- Procedure 515 indicates Procedure 500 should be used to find the source of the alarm.

Procedure 500, Version 2 consists of four tests:

- Test 1 - Displays the alarmed tape failures and clears the tape failure history and alarm.
- Test 2 - Performs applicable read/write tests on the directory and test blocks, and performs a velocity check on the minirecorder during data transfer.
- Test 3 - Performs a read of every block on the tape.
- Test 4 - Performs a read of every block on the tape stopping on each failing block.

TEST 1: DISPLAYS ALARMED TAPE FAILURES. USE 'CLEAR DATA', 'EXECUTE' TO CLEAR FAILURE HISTORY AND ALARM.	TEST 2: PERFORM VELOCITY TEST, READ TEST ON READ ONLY TRACKS, READ/WRITE TEST ON READ/WRITE TRACKS.	TEST 3: PERFORM READ TEST ON ALL BLOCKS.	TEST 4: PERFORM READ TEST ON ALL BLOCKS. (STOPS ON EACH FAILURE). USE "NEXT DATA" TO RESUME TESTING.	FAILURE CODES: (FIELD 2) 0=PASS 1=READ 2=LOAD 3=VERIFY 4=WRITE 5=POSITION 6=RUNTAPE NOT COMPLETED	OTHER CODES: FIELD 6: 0=NO RUNTAPE FAILURES 1=RUNTAPE FAILURES SPECIAL ERROR CODE: 80=CANNOT DETERMINE LAST BLOCK ON TAPE	NOTE 1: DISPLAYS PERCENT VARIATION DURING VELOCITY TEST IN TEST 2. FLD 2 INDICATES SLOW OR FAST (NOT A FAILURE). TAPE TRACK USAGE: TRACK ACTION CONTENTS 0.2 READ/WRITE XLN.PATCH 1.3 READ ONLY PROGRAM
USE 'NEXT DATA' TO DISPLAY FAILURES.						
ISSUE 5 FLIPCHART			PROC 500, VER 2			

FLIPCHART ISSUE 5		TAPE TESTS, VER 2										PROC 500
TEST NO	FAILURE	TEST 3 & 4		FAILURE HISTORY	TOTAL FAILURES	FAILURE INDEX	FAILURE HISTORY				HOURS SINCE LAST RUNTAPE	
		TRACK	BLOCK NUMBER OR PERCENT VELOCITY VARIATION SEE NOTE 1				FAILURES PER HOUR	FAILURES BEGAN HOURS AGO	MOST RECENT FAILURE			
1	2	3	4	5	6	7	8	9	10	11	12	

4.	-	3.	27.	4.	0.	-	-	-	-	-	-	-	-	-	-	500
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FIELD 1 2 3 4 5 6 7 8 9 10 11 12

NOTE

A failure in Test 2, 3, or 4 will turn on the tape alarm. Using the clear data-execute sequence not only resets the tape alarm but also clears the on-line failure history of Test 1.

B. FIELD DEFINITIONS AND CODES

Field	Code	Definition
1	1-4	Test number.
2		Failure code:
	0	Pass.
	1	Read.
	2	Load.
	3	Verify.
	4	Write
	5	Position.
	6	Run tape not completed.
	7*	Tape velocity slot (Test 2 only).
	8*	Tape velocity fast (Test 2 only).
	9	Could not perform write test.
3	0-3	Track number.
4†		Block number (during Test 2 velocity check, this field displays the percent variation from optimum. The displayed value is in 1 percent increments):
	2-842	Short tape (maximum block range).
	2-1260	Long tape (maximum block range).
<p>* This is not a failure code. This only indicates the speed accuracy of the tape drive while Test 2 is executing. Field 2 will flash a code of 7 or 8, depending on the speed accuracy of the tape.</p> <p>† Does not apply to Test 1.</p>		

Field	Code	Definition
5†		Run tape failure flag:
	0	No failure detected.
	1	Run tape failure has occurred.
6	0-99	Total number of recorded failures. (Test 4 counts failures in this field but does not record them).
7§	0-99	Index of failures per hour.
8‡	0-99	Number of failures per hour.
9‡	0-17	Number of hours since failures began.
10‡	0-999	Number of hours since most recent failure.
11‡	0-59	Number of minutes since most recent failure.
12	0-99	Number of hours since last run tape.*
<p>‡ Applies to Test 1 only.</p> <p>§ Does not apply to Test 4.</p> <p>* In duplicated common control systems, the last run tape may have occurred in the processor not off-line.</p>		

C. TEST PROCEDURES

A list of tape tests, what each does, and how each is run follows:

Call in Procedure 500, Version 2:

PROC NO.; 500; ENTER

Test 1 is automatically selected. To select other tests, use the NEXT TEST key.

C. TEST PROCEDURES (Contd)**Test 1:**

Test 1 is used to display alarmed tape failures and clear the tape failure history and alarm.

Depressing EXECUTE begins the test. Depressing NEXT DATA steps through all of the recorded failures. When the last failure is displayed, depressing NEXT DATA displays dashes. Depressing NEXT DATA once more displays the failure summary again.

Clear the On-line Failure History and Tape Alarm:

CLEAR DATA; EXECUTE

Test 2:

Test 2 will automatically:

- Velocity check the minirecorder during data transfer operations (results are not recorded, but are displayed in fields 2, 3, and 4 while Test 2 is running) 20 times.
- Read block 2 on all tracks.
- Read/write a dummy block on tracks 0 and 2 (the dummy block is read prior to the write test ensuring valid results).

Depressing NEXT DATA steps through all previously recorded failures. Depressing NEXT DATA when the last failure is displayed (when field 6 equals field 7) dashes fields 2 through 7. Depressing NEXT DATA again sets field 7 to 0, and dashes fields 2 through 4.

Depressing EXECUTE begins the test. Test execution time is about 15 seconds after the beginning of the tape is reached. When the test is complete, fields 3 and 4 are dashed and field 7 is set to 0. Depressing STOP during the test stops the test, dashes fields 3 and 4, and sets field 7 to 0.

Test 3:

Test 3 is used to read every block on the tape. This test may take over 40 minutes to run when started from the beginning.

Depressing NEXT DATA steps through all recorded failures.

Begin Test 3 from a specific track and block:

(Track number); ENTER; (Block number); ENTER; EXECUTE

If no track or block number is selected (only EXECUTE is used), testing starts at track 0, block 2.

Depressing STOP stops the test. Fields 3 and 4 display the last block tested, and field 7 is set to 0.

The test stops automatically when the last block is tested or when the fiftieth failure is recorded.

Test 4:**NOTE**

Record the results of the last test in Procedure 500 or the errors found in a run tape.

Test 4 is used to read every block on the tape and stop on each failed block.

C. TEST PROCEDURES (Contd)

Begin Test 4 from a specific track and block:

(Track number); ENTER; (Block number); ENTER;
EXECUTE

If no track or block number is selected (only EXECUTE is used), testing starts at track 0, block 2.

The test will stop at each recorded failure. Depressing NEXT DATA resumes the test after a displayed failure.

Depressing STOP stops the test and displays the last block tested in fields 3 and 4.

D. REPAIR GUIDE

CAUTION

Certain tape control malfunctions may destroy information on the tape cartridge. It is recommended that one spare tape cartridge be kept on site and also one kept at the local operating telephone company office. If only one spare tape is readily available, do not put it into the minirecorder until the fault has been cleared or unless all of the tape control units (ie, LC29, LC30, minirecorder) have been replaced.

When a tape system alarm is indicated, the following steps should be performed to determine whether there is a tape or hardware fault. Both types of repair are covered in this section.

NOTE

System initialization disables interrupts which may cause tape errors that cannot be duplicated. If this condition is suspect, Procedure 520 should be used to investigate the possibility.

- | Step | Isolation Procedure |
|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | <ul style="list-style-type: none"> (a) Call in Procedure 500. If this procedure will not load go to the hardware replacement sequence, Table 500-3. If it still will not load, try another tape. (b) Run Test 1. Note if the run tape failure flag in field 5 equals 1. (c) If a minirecorder fuse problem was just corrected, go to Step 2; otherwise, go to Step 3. |
| 2 | <ul style="list-style-type: none"> (a) If none of the recorded failures are run tape failures, clear the failure history and repair is complete. (b) If recorded failures are run tape failures, perform a run tape. If the alarm returns, proceed to Step 3; if not, repair is complete. |
| 3 | <ul style="list-style-type: none"> (a) Display the Test 1 failure information. (b) If failure code 6 is in field 2, go to Step 2; if not, clean the read/write heads in the minirecorder and proceed to Step 4. |
| 4 | <ul style="list-style-type: none"> (a) If a hardware problem was just repaired, go to Step 6. (b) Run Test 2 to exercise the read/write hardware, the read/write micro-code, and the positioning micro-code. (c) Display the Test 2 results. If only failure code 9 is present in field 2, go to Step 5. If other failure codes appear or if the velocity error is greater than 4 percent, go to Step 7. |

D. REPAIR GUIDE (Contd)

- | Step | Isolation Procedure | Step | Isolation Procedure |
|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 5 | <ul style="list-style-type: none"> (a) Run Test 3 to look for bad blocks on the tape. (b) If Test 3 fails some blocks, go to Step 8. (c) If Test 3 does not show any block failures, display the failure history in Test 1. (d) If failure codes 2 or 3 appear in field 2, go to Step 9; otherwise, go to Step 6. | 7
(Contd) | <ul style="list-style-type: none"> (h) If failure code 1 appears in field 2: <ul style="list-style-type: none"> (1) Run Test 3. (2) If there are more than 10 failures in Test 3, go to the hardware replacement sequence and return to Step 4. (3) If there are less than 10 failures in Test 3, go directly to Step 4. (4) If Test 2 and 3 failures are about the same, replace the tape and return to Step 4. (5) If Test 2 and 3 failures are different, go to the hardware replacement sequence and return to step 4. |
| 6 | <ul style="list-style-type: none"> (a) Clear the tape alarm and failure history in Test 1. (b) If the run tape failure flag was a zero when Procedure 500 was entered, repair is complete. Otherwise, perform a run tape. (c) If the tape alarm returns, go to Step 1; otherwise, repairs are complete. | 8 | <ul style="list-style-type: none"> (a) Record the results of Tests 1 and 3. (b) Clear the alarm and failure history and then replace the tape. (c) Run Test 3. If Test 3 runs without failure, perform a run tape to complete repair. (d) If Test 3 failures are different than the recorded failures, insert a new tape and go to Step (c) above. (e) If Test 3 failures are the same as the recorded failures, go to the hardware replacement sequence and then return to Step 4. |
| 7 | <ul style="list-style-type: none"> (a) Record Test 1 failure information and Test 2 failures. (b) Clear the alarm and failure history and replace the tape. (c) Run Test 2. (d) Re-insert the first tape. (e) If Test 2 passes on the second tape or if it produces errors different from the recorded Test 2 errors, go to Step 5; otherwise, continue. (f) If the velocity is more than 4 percent off: <ul style="list-style-type: none"> (1) Check the power supply to the minirecorder. If voltage levels are incorrect, perform the power supply maintenance procedures and go to Step 4. (2) If the voltage levels are correct, replace the minirecorder and go to Step 4. (g) Display the Test 2 failures. If failure codes 4 or 5 appear in field 2, go to the hardware replacement section and then return to Step 4. | 9 | <ul style="list-style-type: none"> (a) Record the failure history. (b) Clear the alarm and the failure history and perform a run tape. (c) If the alarm returns, replace circuit packs LC142 and LC143 and perform another run tape. If the alarm returns again, go to the hardware replacement sequence and return to Step 4. (d) If the alarm does not return, repairs are complete. |

D. REPAIR GUIDE (Contd)

Table 500-3. Hardware Replacement Sequence

Step	Hardware Replacement
1	<p>(a) Check the power supply to the minirecorder. If the voltage levels are correct, go to Step 2. Otherwise, perform the power supply maintenance procedure to correct the problem.</p> <p>(b) Clear the tape alarm and re-run the appropriate Procedure 500 test or run tape.</p> <p>(c) If a tape alarm returns, go to Step 2. Otherwise, return to the appropriate step in the Repair Guide.</p>
2	<p>(a) Clear the tape alarm and replace circuit pack LC29B.</p> <p>(b) Re-run the appropriate Procedure 500 test or run tape.</p> <p>(c) If a tape alarm returns, go to Step 3. Otherwise, return to the appropriate step in the Repair Guide.</p>
3	<p>(a) Clear the tape alarm and replace circuit pack LC30B.</p> <p>(b) Re-run the appropriate Procedure 500 test or run tape.</p> <p>(c) If a tape alarm returns, go to Step 4. Otherwise, return to the appropriate step in the Repair Guide.</p>

Step	Hardware Replacement
4	<p>(a) Clear the tape alarm and replace circuit pack LC133.</p> <p>(b) Re-run the appropriate Procedure 500 test or run tape.</p> <p>(c) If a tape alarm returns, go to Step 5. Otherwise, return to the appropriate step in the Repair Guide.</p>
5	<p>(a) Clear the tape alarm and replace circuit pack LC132/LC134.</p> <p>(b) Re-run the appropriate Procedure 500 test or run tape.</p> <p>(c) If a tape alarm returns, go to Step 6. Otherwise, return to the appropriate step in the Repair Guide.</p>
6	<p>(a) Clear the tape alarm and replace circuit packs LC142/LC143.</p> <p>(b) Re-run the appropriate Procedure 500 test or run tape.</p> <p>(c) If a tape alarm returns, go to Step 7. Otherwise, return to the appropriate step in the Repair Guide.</p>
7	<p>(a) Clear the tape alarm and replace the minirecorder.</p> <p>(b) Re-run the appropriate Procedure 500 test or run tape.</p> <p>(c) If a tape alarm returns, check the wiring to the minirecorder. Otherwise, return to the appropriate step in the Repair Guide.</p>