DIMENSION® 2000 PBX
DUPLICATE PROCESSOR TEST
(PROC 521)

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 521.

1.2 The attachment provides test and troubleshooting methods for a duplicated control (two processors) system.

ATTACHMENT

PROC 521 (9 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.

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PROCEDURE 521 - DUPLICATE PROCESSOR CONTROL AND TEST

A. DESCRIPTION

Procedure 521 should be used when the NETWORK OTHER-515 and MAJOR alarm indicators are turned on.

Procedure 521 is used to:

- Display duplication channel failures.
- Perform various tests on the duplication circuitry (LC132/LC134, LC143, LC146, LC147 in both processors).
- Initiate a soft switch from the on-line processor.

Three tests are available:

- Test 1 - Failure history.
- Test 2 - Displays processor status and health code of both processors, and tests the duplication channel.
- Test 3 - Allows updating of the memory and a soft switch.

TEST 1:	TEST 2:	TEST 3:	NOTES:	FAILURE CODES:
DISPLAYS FAILURE HISTORY. USE 'CLEAR DATA', 'EXECUTE' TO CLEAR FAILURE HISTORY.	TESTS THE DUPLICATION CHANNEL AND DISPLAYS FAILURE CODE IN FIELD 11. USE ONLY IN ONLINE PROCESSOR.	DISPLAYS HEALTH CODE OF BOTH PROCESSORS. USE 'NEXT UNIT' TO SWITCH PROCESSORS IF SWITCH STATUS PERMITS.	1. PROC STATUS (FIELD 2): 0=OFFLINE 1=ONLINE 2. SWITCH STATUS (FIELD 12): 0=SWITCH PERMITTED 1=SWITCH PERMITTED BUT OTHER PROCESSOR IN BIT SWAP. 2=SWITCH NOT PERMITTED	FIELD 11 0=PASS 1-9=PROCESSOR STATUS 11-19=DOUBLE WRITE FF 21-29=MEMORY UPDATE FF 31-39=READ/WRITE 41-49=BLOCK TRANSFER 99=OFFLINE PROC RELOAD SEE DOCUMENTS FOR DETAILED LISTING FIELD 17 0=PASS 1=CHAN ACKNOWLEDGE 2=READ/WRITE 3=162
CAUTION: THE OFF-LINE PROCESSOR MAY RELOAD IF A PROCEDURE IS ACTIVE IN THE OFF-LINE PROCESSOR WHILE THIS TEST IS EXECUTING.		SPECIAL ERROR CODE: 80=ILLEGAL SWITCH ATTEMPT		

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TEST NO 1	PROCESSOR STATUS 2	HEALTH CODE: HARDWARE 3	SOFT B 4	SOFT A 5	BIT SWAP 6	HEALTH CODE OF OTHER PROCESSOR: HARDWARE 7	SOFT B 8	SOFT A 9	BIT SWAP 10	FAILURE CODE 11	SWITCH STATUS 12		FAILURE HISTORY: FAILURES PER HOUR 13	FAILURES BEGAN (HOURS AGO) 14	MOST RECENT FAILURE: HOURS AGO 15	MINUTES AGO 16	FAILURE CODE 17	PROC 521
2.	1.	0.	0.	0.	0.	0.	0.	0.	0.	31.	-.	-	-	-.	-	-.	-	-	-	-.	-	-.	-	-.		521

FIELD 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

B. FIELD DEFINITIONS AND CODES

Field	Code	Definition
1	1-3	Test number.
2		Processor status:
	0	Off-line.
	1	On-line.
3		On-line health code (hardware):
	0	Healthy.
	1	Bad hardware.
4		On-line health code (software B):
	0	Healthy.
	1	Major software problem.
5		On-line health code (software A):
	0	Healthy.
	1	Minor software problem.
6		On-line health code bit swap:
	0	Healthy.
	1	In bit swap.
7		Off-line health code (hardware):
	0	Healthy.
	1	Bad hardware.
8		Off-line health code (hardware):
	0	Healthy.
	1	Major software problem.
9		Off-line health code (software A):
	0	Healthy.
	1	Minor software problem.
10		Off-line health code bit swap:
	0	Healthy.
	1	In bit swap.

B. FIELD DEFINITIONS AND CODES (Contd)

Field	Code	Definition
11 (Test 2 and 3 only)		Failure codes:
	0	No failures.
	1	Unable to switch processors.
	11	Double write flip-flop cannot be cleared.
	12	Double write flip-flop cannot be set.
	21	Memory update flip-flop failure when clearing.
	22	Memory update flip-flop cannot be cleared.
	23	Memory update flip-flop failure when setting.
	24	Memory update flip-flop cannot be set.
	31	Memory read/write failure on data X(5555).
	32	Memory read/write failure on data X(AAAA).
	33	Memory read/write failure on data X(FFFF).
	34	Memory read/write failure on data X(0000).
	41	Block transfer failure.
	42	Can't read failure.
	43	Data mismatch between two memories.
	99	Off-line processor in process of reloading.
12		Switch status:
	0	Switch permitted.
	1	Switch permitted, but other processor in bit swap condition.
	2	Switch not permitted.
13 (Test 1 only)	0-99	Failure summary: Sum of approximate number of failures per hour for all failing circuits.

B. FIELD DEFINITIONS AND CODES (Contd)

Field	Code	Definition
13 (Contd)	0-99	Failure History: Approximate number of failures per hour for circuit being displayed.
14 (Test 1 only)	0-17	Failure Summary: Number of hours since the oldest individual failure (to the nearest hour). Individual Failure History: Number of hours since failures started in the displayed circuit (to the nearest hour).
Number of hours since: Failure Summary: Most recent failure of any circuit. Failure History: Most recent failure of the displayed circuit.		

Field	Code	Definition
15 (Test 1 only)	0-136	Hours.
16 (Test 1 only)	0-59	Minutes.
17		On-line failure code:
	Dash	Passed.
	Blank and 1	CF failure.
	2	Read/Write failure.
	3	CF and Read/Write failures.
CF = Condition Flag		

C. TEST PROCEDURES

A list of duplicated processor control and test failure tests, what each one does, and how each is run follows:

Call in Procedure 521:

PROC NO.; 521; ENTER

Test 1 is automatically selected.

Depressing the NEXT TEST key repeatedly advances the procedure to the desired test.

Test 1:

Test 1 displays a failure history of duplicate processor control and test failures.

To start the test, select Test 1 and depress the EXECUTE key. EXECUTE takes a "snapshot" of the failure history and displays it on the MAAP. If one or more failures have occurred, the following is displayed:

Field	Contents
2	Processor status (off-line or on-line).
17	Failure code.
13-16	Failure History.

NOTE

An error code 74 occurs if the test is executed in a system that is not duplicated.

Refer to paragraph 2C in Section 4 for information on clearing the failure history.

NOTE

The alarm cause encode in Procedure 515 should be used to determine whether the processor channel is inoperative and/or processors will switch. If the processor channel is bad, run Test 2 to successfully clear the alarms and failure history. If the processors will not switch, clear the alarms and failure history. If both the processor channel is bad and the processors will not switch, Test 2 must be run successfully then Test 3 must be run to switch the processors.

Test 2:

Test 2 tests the duplication channel with five diagnostic tests.

NOTE

The processor with the highest numerical health code should be off-line unless the select switch on the alarm panel is being used.

CAUTION

The off-line processor may reload if a procedure is requested in the off-line processor while this test is executing.

To start the test, select Test 2 and depress the EXECUTE key.

Depressing the EXECUTE key begins the diagnostic tests and brings up the following display:

Field	Contents
2	Processor status.
3-10	Health codes of both processors.
11	Failure code.

The test can be stopped and restarted as follows:

STOP; EXECUTE

The NETWORK OTHER-515 indicator is automatically turned off (indicating the duplicate processor alarm is retired) when all the duplication circuits pass Test 2 and all other sources of the NETWORK OTHER-515 indicator alarm have been retired.

Test 3:

Test 3 allows for the memory updating of the off-line processor and the switching of processors (soft switch).

To start the test, select Test 3 and depress the EXECUTE key.

Depressing the EXECUTE key allows operation of the NEXT UNIT key and brings up the display as follows:

Field	Contents
3-10	Health codes of both processors.
11	Failure code.
12	Processor switch status.

Depressing the NEXT UNIT key enables a processor switch to be made if the switch status allows. To make a processor switch, proceed as follows:

1. At the basic control carrier, verify that the MAAP cable is plugged into the common control connector of the processor that is on-line. If the MAAP is in the on-line connector when a switch is made, the NETWORK OTHER-515 and MINOR alarm indicators are turned on in the processor that went off-line.
2. Call in Procedure 521.
3. Make sure an off-line procedure is not in the off-line processor.

4. Verify that the SELECT switch on the Alarm Panel is set to the NORMAL position.

5. Verify that the off-line processor is not halted.

6. Select Test 3 and depress EXECUTE.

   a. If the switch status field equals 2, a soft switch cannot be performed. If this is the case and a switch is required, halt the off-line processor to cause a hand switch (a switch causes a disruption of service).

   b. If the switch status field equals 0 or 1, a soft switch is possible. Depress NEXT UNIT to initiate the switch. The WAIT indicator is lit while the status memory is being transferred from the on-line memory to the off-line memory.

      If after the WAIT indicator turns off, the switch status field equals 0 and fields 2 through 11 are dashed, the switch was successful. The processor is now off-line and the NETWORK OTHER-515 alarm (automatically retires if a switch failure was its only source) may be retired.

      However, if the switch failed (field 2 contains a 1 and the failure code field contains a 1), the NETWORK OTHER-515 alarm is set and the off-line processor is probably reloaded.

   c. After the off-line processor has reloaded (as the result of a switch failure), select Test 2 and depress EXECUTE to check out the duplication channel.

   d. Follow the steps in Table 521-1, in the order listed, to correct the fault.

   e. After circuit pack replacement, use Procedure 520 to clear the health code of the off-line processor and attempt a switch to retire the alarm.

   f. If the fault was not found in Test 2, replace the following circuit packs in the order listed, attempting to clear the off-line health codes and switch processors after each replacement:

      LC146 - off-line
      LC146 - on-line
      LC132/LC134 - off-line
      LC132/LC134 - on-line

5. Check the wiring and the Alarm Panel.

> **NOTE**
>
> If the NEXT UNIT key is used in the off-line processor, error code 09 is displayed. If NEXT UNIT key is used in the on-line processor while the off-line processor is unhealthy, a a special error code 80 is displayed.

The test can be stopped and restarted as follows:

STOP; EXECUTE

D. REPAIR GUIDE

When a duplicate processor control or test failure is indicated, the following steps should be performed, in the order shown, to isolate and repair the faulty unit:

Step	Isolation Procedure
1.	Execute Test 1 and record the failure history.
2.	Execute Test 2 and record the results.
3.	Verify that Procedure 521 is in the on-line processor.
4.	Verify that the off-line processor is not halted.
5.	Verify that an off-line procedure is not in the off-line processor, because Test 2 will block transfer into the off-line processor's MAAP procedure memory buffer, which may cause the off-line processor to reload.
6.	Select Test 2 and depress EXECUTE.
7.	Do not call in any MAAP procedure in the off-line processor until Test 2 of Procedure 521 is concluded (WAIT turned off).

D. REPAIR GUIDE (Contd)

Table 521-1. Duplicate Processor Control and Test Failure Repair Procedure

Failure Code	Corrective Action
11,12,22 and 24	Replace LC143/LC455 of the on-line processor
1,21, 23,31 through 38 and 41 through 43	Replace the circuit packs in the following order, testing after each replacement, until the failure is corrected: A. LC146 of the off-line processor. B. LC143/LC455† of the off-line processor. C. LC147† of the off-line processor. D. LC146 of the on-line processor. E. LC143/LC455 of the on-line processor. F. LC147 of the on-line processor. G. LC132/LC134 of the on-line processor.
99	Stop and re-execute Test 2 after the off-line processor has completed reloading.

† At this point, LC146 of the on-line processor is the most suspect circuit. But, in replacing LC146, the system must be halted, resulting in an interruption of service.