DIMENSION ® 600/2000 PBX

PIC DATA CHANNEL TEST

(PROC 530)

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 530.

1.2   The attachment provides test procedures for the Peripheral Interface Circuit (PIC) data channel.

ATTACHMENT

PROC 530 (15 pages)

Reason for Issue:
New Section

Manager, Denver PBX PECC

PRIVATE

Printed in U.S.A.

A. DESCRIPTION

Procedure 530 should be used when the following conditions exist:

- The NETWORK OTHER-515 indicator on the Alarm Panel is turned on.

- Procedure 515 indicates Procedure 530 should be used to find the source of the alarm.

Procedure 530 is used to:

- Display failures associated with peripherals (the LC34/366, peripheral interface circuit, and peripheral device).

- Test all circuits for LC34/366 data link response.

- Test a select peripheral circuit (PIC) for correct operation.

- Retire the alarm when all circuits pass Test 4 or 5.

Five tests are available:

- Test 1 — Failure history

- Test 2 — Tests all circuits for data link response

- Test 3 — Tests an individual circuit continuously for data link response

- Test 4 — Tests an individual circuit continuously for correct response

- Test 5 — Tests an individual peripheral port continuously using an external loop-around connector

TEST 1:	TEST 2:	TEST 3:	TEST 4:	TEST 5:	FAILURE CODES (FIELD 8):	OTHER CODES:
DISPLAYS FAILURE HISTORY. USE 'NEXT CIRCUIT' TO DISPLAY NEXT FAILED CIRCUIT. USE 'NEXT DATA' TO DISPLAY ADDNL FAILURE CODES IN FIELD 8. USE 'CLEAR DATA', 'EXECUTE' TO CLEAR FAILURE HISTORY	TESTS ALL CIRCUITS FOR DATA LINK RESPONSE. USE 'NEXT CIRCUIT' TO DISPLAY NEXT FAILED CIRCUIT. USE TEST 4 OR 5 TO CLEAR ALARMS.	TESTS A PARTICULAR CKT CONTIN-UOUSLY FOR DATA LINK RESPONSE.	TESTS A PARTICULAR CIRCUIT CONTINUOUSLY FOR CORRECT INTERNAL RESPONSE.	SAME AS TEST 4 EXCEPT PERIPHERAL PORT TESTED WITH AN EXTERNAL LOOP AROUND CONNECTOR.	0=PASS 9=EXT LOOP AROUND 1=LC34 ADDRESSING 10=EIA DATA ERRORS 2=LC34 LOOP AROUND 11=PIC BUFFER ERRORS 3=LC34 SPEED 12=PERIPHERAL DATA 4=DATA CHANNEL ERRORS 5=PIC DATA ERRORS 13=PERIPHERAL NOT 6=PIC STATUS DETECTED 7=PIC INIT 14=PRS ERRORS 8=PIC SELF TEST	FIELD 2: FIELD 11: 8-PRINTER 1-110 9-LDS INTFC 2-300 10-PRS,11-CRT 3-1200 FIELD 7: 4-2400 0-NOT BUSIED 5-9600 1-BUSIED OUT 2-ALRMD, NOT BUS(TST 1) 3-ALRMD, BUS (TEST 1)
		CAUTION: SERVICE DISRUPTED. CIRCUIT MUST BE BUSIED OUT.				
		USE 'NEXT CKT' TO ADV TO NEXT DEVICE ASSIGNED TO DISPLAYED DEVICE TYPE, USE 'NEXT UNIT' TO ADV TO NEXT DEVICE TYPE.				

ISSUE 5
FLIPCHART   ○   ○   PROC 530   ○   ○

FLIPCHART
ISSUE 5   ○   ○   PIC CHANNEL TEST   ○   ○   PROC 530

TEST NO	DEVICE ID		EQUIPMENT LOC			MTCE BUSY STATUS	FAILURE CODE	NUMBER OF PICS	NUMBER OF PICS BUSIED OUT	TESTS 4 & 5 DATA RATE	NUMBER OF FAILED CIRCUITS	FAILED PIC INDEX	FAILURE HISTORY	
	TESTS 3,4,&5		TESTS 3,4,&5											
	DEVICE TYPE	DEVICE NUMBER	CARR	SLOT	CKT								FAILURES PER HOUR	FAILURES BEGAN (HOURS AGO)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

1.	8.	1.1.	2 3.0.3.	4.	3.	1.-.	4.	1.	9.	1.	530

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

B. FIELD DEFINITIONS AND CODES

Field	Code	Definition
1	1-5	Test number.
2*	8	Printer.
	9	Long distance billing data set.
	10	Property management system.
	11	CRT for ECF.
3*	1-28	Device number.
4*	0	Basic control carrier.
	1	Growth control carrier.
	2	I/O growth carrier.
5*	30-38	Slot number if field 4 = 0.
	20-33	Slot number if field 4 = 1 or 2.

Field	Code	Definition
6*	0,1	LC34 circuit number.
7		Maintenance-busy status of PIC: Test 1:
	0	Not busied out. Not alarmed.
	1	Busied out. Not alarmed.
	2	Not busied out. Alarmed.
	3	Busied out. Alarmed.
		Tests 2 through 5:
	0	Not busied out.
	1	Busied out.
8		Failure code:
	0	Pass.
	1	LC34 addressing.

* Input fields required for Tests 3, 4, and 5 only.

B. FIELD DEFINITIONS AND CODES (Contd)

Field	Code	Definition
8 (Contd)	2	LC34/366 internal loop around.
	3	LC34/366 speed option not low speed.
	4	No response from data channel between LC34/366 and PIC.
	5	Data errors on data channel.
	6	Internal status of PIC incorrect.
	7	PIC required initialzation by PBX.
	8	PIC internal self test.
	9	Loop around of PIC peripheral device port.
	10	Data errors on data link between PIC and peripheral device.
	11	PIC does not idicate when buffer is full.
	12	Content of messages from peripheral device not correct.

Field	Code	Definition
8 (Contd)	13	Peripheral device not detected or printer out of paper.
	14	PMS message format or data is incorrect.
9	1-34	Total number of PICs assigned in in Procedure 253.
10	1-34	Number of PICs busied cut by use of the BUSY OUT key in Test 4 or 5.
11 (Tests 4 and 5 only)		Data rate of data link to peripheral device (in bits per second):
	0	Out of range.
	1	110
	2	300
	3	1200
	4	2400
	5	9600

B. FIELD DEFINITIONS AND CODES (Contd)

Field	Code	Definition
12		Number of failed circuits:
		Test 1:
	1-6	Number of failing PICs in the failure history.
		Test 2:
	1-34	Number of PICs that failed the test.
13		Failed PIC index:
		Test 1:
	0	Failure summary.
	1-6	Index into failure history.
		Test 2:
	1-99	Index into failure table.
14 (Test 1 only)	1-99	Failure summary: Sum of approximate number of failures per hour for all failing circuits. Failure history: Approximate number of failures per hour for circuit being displayed.

Field	Code	Definition
15 (Test 1 only)	0-17	Failure summary: Number of hours since the oldest individual failure started (to the nearest hour). Failure history: Number of hours since failures started in the displayed circuit (to the nearest hour).
CRT - Cathode ray tube (terminal)		
ECF - Energy communications feature		
I/O - Input/output		
PIC - Peripheral interface circuit		
PMS - Property management system		

C. TEST PROCEDURES

A list of PIC channel tests, what each one does, and how each is run follows:

Call in Procedure 530:

    PROC NO.; 530; ENTER

    Test 1 is automatically selected.

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

    Test selection may result in the display of a "default" circuit. A default circuit is the last failing circuit detected. The location of this circuit is automatically displayed on entry to a test that requires an equipment location entry before it can be run (Test 3, 4, or 5).

    The identitiy of the default circuit is redefined when a failing circuit is displayed from the failure tables used in Test 1 or 2, or when a failure is detected by Test 3, 4, or 5.

Test 1:

Test 1 provides a failure history of PIC and associated data channel failures.

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

Field	Contents
10	Number of PICs removed from service. If none, 0.
12	Number of PIC failures.
13	0, indicating failure summary.
14, 15	Failure summary.

The failure summary displays all the PIC failures that have occurred.

Depressing the NEXT CIRCUIT key displays the first failing circuit in the failure history. The display includes the following:

Field	Contents
2-6	Device identification (ID) and equipment location of the last failure of the circuit.

C. TEST PROCEDURES (Contd)

Field	Contents
8	Failure code associated with the first failure of the circuit displayed.
13	Incremented by 1.
14, 15	Failure history.

Depressing the NEXT DATA key repeatedly displays additional failure codes associated with the failing circuit, if any.

After the first failing circuit is displayed depressing the NEXT CIRCUIT key repeatedly displays the failure histories of the remaining failing circuits. Depressing NEXT CIRCUIT after all failure histories have been displayed, dashes fields 2 through 8 and 11 through 15. Depressing NEXT CIRCUIT 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.

Test 2:

Test 2 tests all the LC34/366 data channels between the PBX and the PIC for data link

response. The data channel circuit in the associated PIC is also tested.

To start the test, select Test 2 and depress the EXECUTE key. The WAIT indicator on the MAAP turns on.

If a failure is detected, the NETWORK OTHER-515 and MAJOR alarm indicators are turned on. On completion of the test, the first failed circuit is displayed as follows:

Field	Contents
2-6	Device ID and equipment location.
12	Number of failed circuits.
13	Set to 1.

On conclusion of the test (WAIT turns off), the NEXT CIRCUIT key can be depressed repeatedly to display the remainder of the failing circuits. Depressing NEXT CIRCUIT after all the circuits have been displayed, dashes fields 2 through 8 and 11 through 15. Depressing NEXT CIRCUIT again causes Test 2 to be executed (WAIT turns on) as described previously.

C. TEST PROCEDURES (Contd)

Test 3:

Test 3 is used to continuously test any circuit suspected of having intermittent data channel failures or to help trace wiring problems. The test checks out an individual LC34/366 circuit and its associated data channel wiring. The data channel circuit in the associated PIC is also tested.

Test 3 can be initialized in three ways:

1. If no failures have occurred (default circuit does not exists), field 2 blinks a dash to indicate that fields 2 and 3 are prime entry fields. The device ID can be entered in fields 2 and 3, and the test started. If desired, the equipment location can be entered in fields 4 through 6 instead, using the change sequence; eg:

CHANGE FIELD; 4; ENTER; (Carrier); ENTER; (Slot); ENTER; (Circuit); ENTER

NOTE

Either a device ID or equipment type must be entered in Test 3 before the test can be run (EXECUTE depressed).

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2. If no failures have occurred (no default circuit exists), depressing the NEXT UNIT key displays the device ID (fields 2 and 3) and equipmemt location (fields 4 through 6) of the first device number associated with the first device type in sequence. The NEXT CIRCUIT key can then be used to increment through all the device numbers of the device type displayed. NEXT UNIT can be used to increment through all the device types in the system. When a device type is displayed, the first number of that device type is automatically displayed.

3. If a failure has occurred, a default circuit is displayed. The default circuit is the last dual-speed data channel circuit that failed. Either the default circuit can be tested or another circuit can be selected, using method 1 or 2 described above.

C. TEST PROCEDURES (Contd)

To start the test, depress EXECUTE. A
flashing 0 in field 8 indicates the test is
running. If a failure occurs, the NETWORK
OTHER-515 and MAJOR alarm indicators are
turned on. The failure code for the first
failure detected is locked into field 8
and flashed. The flashing display indicates
the test is being run continuously.

```
NOTE

Correcting a fault does not clear
the failure code.  To clear the
failure code, Test 3 must be rerun;
eg:

STOP; EXECUTE
```

When it is desired to test another circuit,
stop the test, select the new circuit, and
restart the test; eg:

STOP; (Select new circuit); EXECUTE

Test 4:

Test 4 continuously tests an individual PIC

and its associated dual-speed data channel
for correct response. The PIC is busied out
during the test.

```
CAUTION
Because service is disrupted,
the consequences of busying out
a PIC must be considered before
doing so.  When a PIC connected
to a printer is busied out,
printer functions may be diverted
to another printer, if an
alternate has been assigned using
Procedure 220.
```

Test 4 can be initialized as described for
Test 3.

To start the test, busy out the circuit, and
depress EXECUTE; eg:

BUSY OUT; EXECUTE

A flashing 0 in field 8 indicates the test
is running. The data rate of the data
channel being tested is displayed in field 11.

C. TEST PROCEDURES (Contd)

If a failure is detected, the NETWORK OTHER-515 and MAJOR alarm indicators are turned on. The failure code for the first failure detected is flashed in field 8.

The NETWORK OTHER-515 indicator is automatically turned off (indicating the PIC alarm is retired) when the following conditions are met:

1. All circuits that originally were a source of the PIC alarm (as indicated by the alarm status displayed in field 3 by Test 1) have passed Test 4 or 5.

2. No default circuit exists. Default circuits are reset when they pass Test 4 or 5.

3. No other source of the NETWORK OTHER-515 alarm exists.

The PIC alarm can be retired only by Procedure 530. Because Procedure 530 tests only the PIC and associated LC34/366 data channel (not the peripherals beyond the PIC), other problems may exist even though the alarm can be retired.

NOTE

If the peripheral device associated with a PIC failure is a printer or CRT, and Procedure 530 runs successfully, the data rate displayed in field 11 should be verified correct, then Procedure 531 should be used to generate a print test message for further analysis. For long distance billing and PMS peripherals, Procedure 537 should be used.

On concluding Test 4, all circuits must be released from the busy-out condition, eg:

STOP; RLS BUSY OUT

NOTE

The BUSY OUT indicator on the MAAP turns off only when all circuits interfacing with the MAAP are no longer busied out. Therefore, use fields 7 and 10 to determine whether the circuits being tested have been released from busy out.

C. TEST PROCEDURES (Contd)

Test 5:

Test 5 continuously tests an individual PIC and its associated dual-speed data channel using an external loop-around connector. The PIC is busied out during the test.

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┌─────────────────────────────────────┐
│             CAUTION                  │
│                                      │
│  Because service is disrupted, the   │
│  consequences of busying out a PIC   │
│  must be considered before doing so. │
│  When a PIC connected to a printer   │
│  is busied out, printer functions    │
│  may be diverted to another printer, │
│  if an alternate has been assigned   │
│  using Procedure 220.                │
└─────────────────────────────────────┘
```

Test 5 can be initiated as described for Test 3.

To start the test, select Test 5 and busy out the PIC. Next, replace the cable between the PIC and the peripheral device (extension cable) with a loop-around connector (configured as shown in Fig. 530-1). Finally, depress EXECUTE to run the test; eg:

BUSY OUT; (Install connector); EXECUTE

A flashing 0 in field 8 indicates the test is running. The data rate of the data channel being tested is displayed in field 11.

If a failure is detected, the NETWORK OTHER-515 MAJOR alarm indicators are turned on. The failure code for the first failure detected is flashed in field 8. The conditions under which a PIC alarm can be retired are the same as for Test 4.

On concluding Test 5, the external loop-around connector must be removed, the extension cable between the PIC and the peripheral must be re-installed, and all circuits tested must be released from the busy-out condition, eg:

STOP; (Remove loop-around connector and reinstall cable); RLS BUSY OUT

D. REPAIR GUIDE

When a PIC channel fault is indicated, the following steps should be performed in the order shown to isolate and repair the faulty unit.

Step	Isolation Procedure
1.	Using Test 1, step through the failure history and record the results.
2.	Execute Test 2 to determine if a data channel is failing, and record test results.
3.	Based on test results, take the corrective action indicated, in the order listed, in Table 530-1.

D. REPAIR GUIDE (Contd)

2 ⟵───────────┐
3 ⟵───────────┘

6 ⟵───────────┐
8 ⟵───────────┤
20 ⟵──────────┘

2 ⟩───────────┐
3 ⟩───────────┘

6 ⟩───────────┐
8 ⟩───────────┤
20 ⟩──────────┘
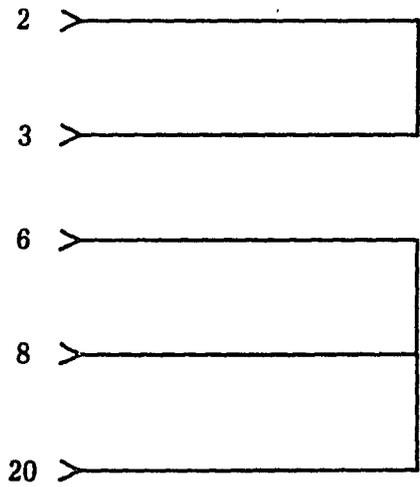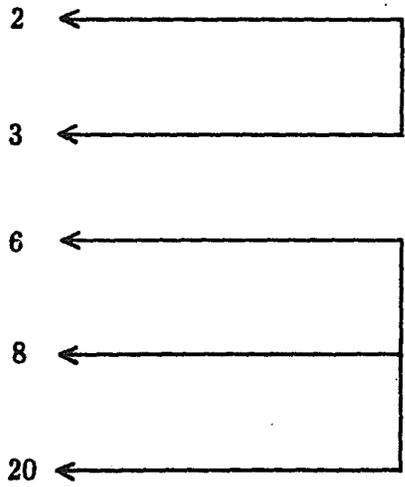
a. Group 961 of ED-1E367-11, Issue 3   b. Group 960 of ED-1E367-11, Issue 3

Fig. 530-1 — Test 5 Loop-Around Connector Wiring Configurations

D. REPAIR GUIDE (Contd)

Table 530-1.   PIC Channel Test Repair Procedure

Failure Code	Corrective Action
1	Replace the LC34/366 indicated. Replace the LC132/134 associated with the LC34/366.
2	Replace the LC34/366 indicated.
3	Verify that the speed option on the LC34/366 indicated is set to low speed. Replace the LC34/366.
4	Verify that the PIC is powered and operating, as indicated when the PC LED on the PIC is flashing. Verify that the data channel cable is connected from the PBX to the PIC. Replace the PIC. Replace the data channel repeater if present.

Failure Code	Corrective Action
5	Replace the LC34/366 indicated. Replace the PIC. Replace the data channel repeater, if present. Replace the data channel cable.
6	Replace the PIC.

7	Test 1:
	
	   PBX and/or PIC has lost power.
	
	Tests 4 and 5:
	
	   Replace the PIC.

8	Replace the PIC.
9	Test 4: Replace the PIC.

D. REPAIR GUIDE (Contd)

Table 530-1. PIC Channel Test Repair Procedure (Contd)

Failure Code	Corrective Action
9 (Contd)	Test 5: If the loop-around connector is plugged into the PIC, replace the PIC. If the circuit has passed the test with the loop-around connector plugged into the PIC, then fails the test with the loop-around connector plugged into the peripheral device end of the extension cable, replace the connector.
10	Check the extension cable between the PIC and the peripheral device. Replace the PIC. Use Procedure 537.
11	Replace the PIC.
12	Check the peripheral device. Verify that the data rate displayed in field 11 is correct. Verify that even parity is being used by the peripheral device.

Failure Code	Corrective Action
12 (Contd)	Replace the PIC. Use Procedure 537.
13	If the TR indicator on the PIC is on, replace the PIC. If the printer is out of paper, add paper. Verify that the peripheral device is turned on. Verify that the extension cable is connected between the PIC and the peripheral device. If the peripheral device is a printer, use Procedure 531 for further testing. Replace the peripheral device.
14	Verify that the PIC data rate (field 11) is in accordance with Table 530-2. Verify that PMS parity is correct (odd or even). Replace the PIC.

LED - Light emitting diode
PC - PIC check (heartbeat)
TR - Terminal ready

D. REPAIR GUIDE (Contd)

Table 530-2.   PIC Channel Data Rates

Device Type	Device Name	Data Rate Encode	Data Rate (Bits Per Second)
8	Printer	2	300
9	Long Distance Billing Data Set	1	110
10	PMS	3	1200
11	ECF CRT	4	2400