DIMENSION® 600/2000 PBX
TONE PLANT TEST
(PROC 509)

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 509.

1.2 The attachment provides test and troubleshooting procedures for the tones generated by the LC04, LC05, (or LC204) circuit packs.

you can't pull a LC204 board out to make it busy - use PROC 560 - you have to have a working tone plant in the mod you're in to get dial tone if you have a planned tone it probably won't show up as a failure - make tone plants busy one at a time to isolate it. if all the tone plants in your mod are busy you won't get dial tone from another mod

ATTACHMENT

PROC 509 (10 pages)

Reason for Issue:
New Section

Manager, Denver PBX PECC

PRIVATE

Printed in U.S.A.

PROCEDURE 509 - TONE TESTS

A. DESCRIPTION

Procedure 509 should be used when the NETWORK TONE-509 indicator on the Alarm Panel is turned on.

Procedure 509 is used to:

- Test the dial tone and audible ringback tone failures within a module, which would cause the MAJOR alarm to be turned on.
- Test for network order incomplete failures, which would also cause the MAJOR alarm to be turned on.
- Test for all other tone failures, which would cause the MINOR alarm to be turned on.
- Monitor and display the connection status of LC04 and LC05 (or LC204).
- Retire the alarm when all tone circuits pass Test 2.

Three tests are available:

- Test 1 - Failure history.
- Test 2 - Tests all tone plants.
- Test 3 - Tests an individual tone continuously or tests all tones on a particular tone plant continuously.

TEST 1:	TEST 2:	TEST 3:	FAILURE CODES:
DISPLAYS FAILURE HISTORY. USE 'NEXT CIRCUIT' TO DISPLAY NEXT FAILED CIRCUIT. USE 'CLEAR DATA', 'EXECUTE' TO CLEAR FAILURE HISTORY.	TESTS ALL TONE PLANTS. USE 'NEXT CIRCUIT' TO DISPLAY NEXT FAILED CIRCUIT.	TESTS A PARTICULAR CIRCUIT CONTINUOUSLY. USE 'NEXT CIRCUIT' TO ADVANCE TO NEXT CIRCUIT. ALL TONES ARE INITIALLY ENABLED FOR TESTING. FOR FIELDS 6-13; ENTER A 2 TO ENABLE A PARTICULAR TONE. ALL OTHER TONES ARE THEN DISABLED FOR TESTING. USE THE CHANGE FIELD SEQUENCE (CHG_FLD, FIELD NO., ENTER, ENTER) FOR THE ENABLED FIELD TO RESTORE ALL TONES FOR TESTING.	0=PASS 1-255=SEE TOP 998=ALL TONES NOT TESTED 997=NO TONE MONITOR CONNECTION 999=NTWK ORDER INCOMPLETE 998=NO TIME SLOT

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	EQUIPMENT LOCATION				TEST 3												CP UNPLUGGED	
TEST NO	TEST 3 MODULE	TEST 3 CAB	CARR	SLOT	BUSY	REORDER	AUD RB	SPEC AUD RB	DIAL	RECALL	MISC	INCPT	FAILURE CODE	NUMBER OF TONE PLANTS	NUMBER OF FAILED TONE PLANTS	FAILED TONE PLANT INDEX	SLOT 5	SLOT 6
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
2.		0.	0.	2.	6.	1.	1.	1.	1.	0.	0.	0.	0.	240		6.		3.		1.	0.	1.		509

FIELD 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19

B. FIELD DEFINITIONS AND CODES

Field	Code	Definition
1	1-3	Test number.
2	0-24	Module number.
3	0-4	Cabinet number.
4	0-4	Carrier number.
5	5, 6	Slot number of tone plant.
	Dash	Inconclusive data.
6	0	Busy tone.
	1	No busy tone.
	2	Single test tone*.
	Flashing Dash	Tone under test for all tone plants (Test 2).
	Dash	Tone not tested (Test 3).
7	0	Reorder tone.
	1	No reorder tone.
	2	Single test tone*.
7 (Contd)	Flashing Dash	Tone under test for all tone plants (Test 2).
	Dash	Tone not tested (Test 3).
8	0	Audible ringback tone.
	1	No audible ringback tone.
	2	Single test tone*.
	Flashing Dash	Tone under test for all tone plants (Test 2).
	Dash	Tone not tested (Test 3).
9	0	Special audible ringback tone.
	1	No special audible ringback tone.
	2	Single test tone*.
	Flashing Dash	Tone under test for all tone plants (Test 2).
	Dash	Tone not tested (Test 3).

* Used in Test 3 only. A flashing rate indicates that the tone is active.

B. FIELD DEFINITIONS AND CODES (Contd)

Field	Code	Definition
10	0	Dial tone
	1	No dial tone
	2	Single test tone*
	Flashing Dash	Tone under test for all tone plants (Test 2)
	Dash	Tone not tested (Test 3)
11	0	Recall tone
	1	No recall tone
	2	Single test tone*
	Flashing Dash	Tone under test for all tone plants (Test 2)
	Dash	Tone not tested (Test 3)
12	0	Miscellaneous tone
	1	No miscellaneous tone
	2	Single test tone*
	Flashing Dash	Tone under test for all tone plants (Test 2)
12 (Contd)	Dash	Tone not tested (Test 3)
13	0	Intercept tone
	1	No Intercept tone
	2	Single test tone*
	Flashing Dash	Tone under test for all tone plants (Test 2)
	Dash	Tone not tested (Test 3)
14		Failure codes:
	0	Pass
	1-255	Decimal value
	996	All tones not tested
	997	No tone monitor connection
	998	Network order incomplete
	999	No time slot
15	†	Number of tone plants in system
16	†	Number of failed tone plants

* Used in Test 3 only. A flashing rate indicates that the tone is active.

† Varies according to system configuration.

B. FIELD DEFINITIONS AND CODES (Contd)

Field	Code	Definition
17	0	Failure Summary (Test 1).
		Individual failures:
	1-6	Test 1.
	*	Test 2.
18	0	Circuit pack plugged into slot 5.
	1	Circuit pack in slot 5 unplugged.
19	0	Circuit pack plugged into slot 6.
	1	Circuit pack in slot 6 unplugged.
* Varies according to system configuration.		

C. TEST PROCEDURES

A list of tone plant tests, what each one does, and how each is run follows:

Call in Procedure 509:

PROC NO.; 509; ENTER

The periodic measurement tests in the on-line tone test is turned off. The board in/out test remains active. Failures detected by this test are recorded in the failure history and turn on the tone alarm.

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).

The identity 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.

Test 1:

Test 1 displays the failure history of the tone plant circuits. The failure history is generated by the on-line software.

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:

C. TEST PROCEDURES (Contd)

Field	Contents
2-5	Equipment Location.
6-13	Tone status.
14	Failure code.
15	Number of tone plants.
16	Number of tone plants failed.
17	0, indicating failure summary.
18,19	LC04 and/or LC05 (or LC204) unplugged.

After the first failing circuit is displayed, depressing the NEXT CIRCUIT key repeatedly displays the failure histories of the remaining circuits. Depressing NEXT CIRCUIT after all failure histories have been displayed dashes all fields except field 15. Depressing NEXT CIRCUIT again causes Test 1 to be executed, starting the sequence over with an updated failure history.

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

Test 2:

Test 2 tests all tone plants simultaneously. One tone on all tone plants is tested, followed by the next tone on all tone plants, and so on until all tones on all the tone plants have been tested.

To start the test, select Test 2 and depress the EXECUTE key. The WAIT indicator on the MAAP turns on. All fields are dashed except 15. Fields 6 through 13 flash sequentially for about 12 seconds each, indicating that the eight tones for each tone plant are being tested. On conclusion of the test, the WAIT indicator turns off.

If a failure is detected (failure codes 1 through 255 and 998), the NETWORK TONE 509 indicator turns on. On completion of the test, the first failed tone circuit is displayed as follows:

Field	Contents
2-5	Equipment location of first failing circuit.
6-13	Error code 1 through 255: 0s or 1s indicating tone tests failed or passed. Error code 998: dashed.
14	Failure code associated with failing circuit.
15	Number of tone plants.
16	Number of failed tone plants.
17	Incremented to 1.
18,19	Dashed.

C. TEST PROCEDURES (Contd)

Depressing NEXT CIRCUIT repeatedly displays the remaining failing circuits. Depressing NEXT CIRCUIT after all the failing circuits have been displayed dashes all fields except field 15. Depressing NEXT CIRCUIT again starts the sequence with the same failures. To display new results, depress the EXECUTE key.

The NETWORK TONE-509 indicator is automatically turned off (indicating the tone alarm is retired) when all tone plant circuits pass Test 2.

Test 3:

Test 3 is used to continously test, with a single tone plant, one tone circuit or all tone circuits suspected of having intermittent failures, or to trace wiring problems.

Test 3 can be initialized in two ways.

1. If no failures have occurred (default circuit does not exist), field 2 is blanked and the decimal point in that field flashed to indicate a mandatory entry field. To run Test 3, an equipment location must be entered in fields 2 and 3; eg:

   (Module); ENTER; (Cabinet); ENTER

2. If a failure has occurred, a default circuit is displayed. The default circuit is the last tone circuit that failed. Either the default circuit can be tested, or another circuit can be selected by entering it in fields 2 and 3.

   The NEXT CIRCUIT key can be used to increment the display through all the locations of that module.

To test <u>all</u> tones of the selected module, depress EXECUTE. The dashes in field 6 through 13 sequentially flash for 12 seconds as the test is being run. As the test of each tone is completed, the flashing dash in the field is replaced by a 0 (failure) or 1 (pass). The display is as follows:

Field	Contents
2-4	Equipment location.
5	Dash.
6-13	Tone plant status.
14	Failure code, if applicable.
15	Number of tone plants.
16,17	Dashed.
18,19	Circuit pack unplugged.

NOTE

Once a tone status of 1 is displayed, it will not change, regardless of the state of the tone circuit, until the test is stopped and restarted.

C. TEST PROCEDURES (Contd)

To test one circuit on a tone plant, select Test 3 and enter a module location in fields 2 and 3. Use the change field sequence to enter the desired tone; eg:

CHANGE FIELD; (No. of field to be entered); ENTER; 2; ENTER; EXECUTE

Encode 2 flashes for 12 seconds while testing is in progress. Untested tones in fields 6 through 13 contain dashes. Field 14 displays a 996 failure code, indicating that all tones are not being tested. On completion of the test, the flashing 2 is replaced by a flashing 0 (failure) or 1 (pass).

To test another tone circuit, stop the test by depressing the STOP key. Then, select a new tone circuit as described previously.

To use the NEXT CIRCUIT key, the test must be stopped. Depressing NEXT CIRCUIT repeatedly sequences the display through all cabinets containing tone plants.

To disable a selected tone circuit, a blank must be entered into the tone field for which a 2 was entered or by entering a 2 into a different tone field.

D. REPAIR GUIDE

When a tone plant failure 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 tone plant is failing and record the results.
3.	If fields 18 and/or 19 show a circuit pack is unplugged, replace LC04 and/or LC05 (or LC204).
4.	Based on the test results, take the corrective action indicated, in the order listed, in Table 509-1 for each failed circuit. After each step, repeat the test to verify that the fault has been corrected.
5.	If a suspected failed circuit is tested using Test 3 and proves to be faulty, follow the repair sequence in Table 509-1. Re-execute Test 3 after each failure code indication has been corrected.
6.	Transfer the failed circuit found in Test 2 to Test 3 and follow the repair sequence indicated in Table 509-1 for failure codes 1, 4, 11, 128, 244, and 255.
7.	To monitor the signal path of a particular tone, select the applicable tone circuit as described for testing one tone circuit in Test 3.

D. REPAIR GUIDE (Contd)

Step **Isolation Procedure**

8. After all failures have been corrected, repeat Test 1 to clear the failure history (Section 4, paragraph 2C) and Test 2 to retire the alarm.

Table 509-1. Test Tone Repair Procedure

Failure Code	Corrective Action
0,2,3, 5-10, 12-15	Replace LC04 or LC204.
1	Replace LC04 or LC204. Check the 620-Hz and 150-ipm wiring.
4	Replace LC05 or LC204. Check the 300-ipm and tone-monitor wiring.
11	Check whether LC04 or LC204 is unplugged or both LC04 and LC05 or LC204 are unplugged. Plug in LC04 or LC204 and retest.
16-127, 129-243, 245-254	Replace LC05 or LC204.

Table 509-1. Test Tone Repair Procedure (Contd)

Failure Code	Corrective Action
128	Listen to the busy and dial tones using Procedure 553. Procedure 553 allows transmitting the eight tones contained on LC04 or LC204 and LC05 to a test line so that nonalarmed tone failures can be analyzed. If busy and dial tones are heard, replace LC04 or LC204; otherwise replace LC05 or LC204. Check the busy tone wiring.
244	LC05 or LC204 is unplugged and must be replaced. Test all tone circuits with Procedure 553. If no tone or a steady tone is heard on a normally interrupted tone, check the 25 MSEC (TP4) test point on LC05 or LC204 with the logic probe. If a blinking indication occurs, replace LC05. If a blinking indication does not occur, investigate the 25 MSEC wiring. Test the tone circuits using Procedure 553 in the order shown in Table 509-2. If a tone is heard (other than X, since this is a valid tone), scan the associated column, until the tone output received is listed, to determine the failed circuit. Replace LC04 or LC204 if indicated.

Table 509-1. Test Tone Repair Procedure (Contd)

Failure Code	Corrective Action
244 (Contd)	If an LC05 or LC204 is indicated and has not been replaced previously, replace it. If LC04 or LC204 was not replaced above, replace it because the tone monitor may have failed. Replace LC04 or LC05 or LC204 if not replaced above. Check the wiring.
255	Listen to the dial tone on the failed tone plant by using Procedure 553. If the dial tone is not heard, replace LC04 or LC204; otherwise, investigate the time division network.
996	Only a single tone is selected for test.
997	Some tone plants were not tested because idle lines were not available to set up the tone monitor connection. Repeat Test 2, if required.
998	Use Procedure 505 to test each high-speed controller (LC130) and network I/O circuit (LC131, LC123, and LC124). NOTE If failure code 998 or 999 is displayed for one or more circuits, the procedure must be restarted or reset to continue.
999	Time slots were not available for all tone plants. If the failure code is displayed with no other failure information, then leave the procedure since all tone slots in the system are busy.

Hz – Hertz

IPM – Interruptions per minute

D. REPAIR GUIDE (Contd)

Table 509-2. Output Heard When Testing Tone Plant Using Procedure 553

Output Heard								Tone Circuit	Failed Circuit Pack	
Busy Tone (BT)	Reorder Tone (RT)	Audible Ringback (ARB)	Special Audible Ringback (SPARB)	Dial Tone (DT)	Recall Tone (ST)	Miscellaneous Tone (MT)	Intercept Tone (IT)			
X	X	X	X	DT	X	X	X	Dial Tone	LC04	LC204
X	X	X	X	DT	DT	X	X	Recall Tone		
X	X	X	X	X	X	MT*	X	Miscellaneous Tone		
X	X	X	X	X	X	MT* or 620-Hz	IT, MT or 620-Hz	Intercept Tone		
Steady BT	X	X	X	X	X	X	X	Busy Tone	LC05	
X	Steady RT	X	X	X	X	X	X	Reorder Tone		
X	X	Steady ARB	X	X	X	X	X	Audible Ringback		
X	X	Steady ARB or X	MT or Steady ARB	X	X	MT* or X	X	Special Audible Ringback		

X = Not a valid tone for indicated tone circuit.

Mnemonic (such as BT for Busy Tone) = Valid tone for indicated tone circuit.

* = Replace LC04 or LC204 first. If the failure remains, reinsert the original LC04 or LC204 and replace the LC05 or LC204 if it has not been replaced already.