

DIMENSION® 2000 AND CUSTOM PBX
(CSS201L)
TIME OF DAY CLOCK SYNCHRONIZER
(PROC 532)

CONTENTS

*This equipment makes
it self busy in busy
out until the time is
set*

1. GENERAL
2. RECORDS
3. TEST EQUIPMENT
4. MAAP DISPLAY FIELDS
5. MAAP CONTROL KEY SEQUENCES
6. PROCEDURE
7. REPAIR GUIDE

1. GENERAL

- 1.1 Procedure 532 should be called in when the NETWORK OTHER-515 and MINOR alarm indicators on the Alarm Panel are turned on.
- 1.2 Procedure 532 is used to:
 - 1.2.1 Display the equipment location of the time-of-day clock synchronizer (LC144) and related failures causing a failure indication.
 - 1.2.2 Display the maintenance busy status and alarm status of the synchronizer circuit.
 - 1.2.3 Set the time-of-day clock synchronizer to the desired time of day.
- 1.3 Three tests are available:
 - 1.3.1 Test 1 - Failure of history.
 - 1.3.2 Test 2 - Continuously tests the time of day clock circuit and software buffer.
 - 1.3.3 Test 3 - Displays and allows either or both the hardware and software time-of-day clocks to be reset.

PRIVATE

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

2. RECORDS

2.1 Form SD-97-1313 is required for recording the results of these tests.

3. TEST EQUIPMENT

3.1 1 - ITE-5632 Digital Voltmeter or equivalent.

4. MAAP DISPLAY FIELDS

4.1 The following describes each of the display fields for the PROC 532, Time of Day Clock Synchronizer format:

| | | | | | | | | | | | | | | | | |
|---|---------|--|--|---|--|-------|--|---------------|---------------|------|--|-------------------|----------------------------|---------|---------|----------|
| TEST 1: DISPLAYS FAILURE HISTORY. USE 'NEXT DATA' TO DISPLAY ADDITIONAL FAILURE CODES. USE 'CLEAR DATA', 'EXECUTE' TO CLEAR FAILURE HISTORY. | | TEST 2: TESTS TIME OF DAY CLOCK CONTINUOUSLY. USE 'NEXT DATA' TO STEP THROUGH ACCUMULATED FAILURES. | | TEST 3: DISPLAYS AND SETS THE HARDWARE AND/OR SOFTWARE TIME OF DAY CLOCK. USE 'NEXT UNIT' TO SELECT CLOCK AND DISPLAY TIME. USE 'CLEAR DATA', 'EXECUTE' TO SET CLOCKS TO DISPLAYED TIME. | | | FAILURE CODES (FIELD 3): 1=NO RESPONSE 2=BATTERY FAILURE 3=BATTERY STATUS STUCK GOOD 4=NO CHARGE SINCE LAST READ 5=SPTMR UPDATE AFTER INIT 6=SMALL CLOCK DIFF 7=LARGE CLOCK DIFF 8=BAD HDWR VALUES 9=BAD SPTMR VALUES 10=CLOCK SET FAILURE | | | | OTHER CODES: FIELD 4: 0=NOT BUSIED OUT 1=BUSIED 2=ALRND. NOT BUSY(TEST 1) 3=ALRND. BUSY(TEST 1) FIELD 6: 1=HARDWARE CLOCK 0=SOFTWARE CLOCK | | | | | |
| FLIPCHART ISSUE | | + | | + | | | PROC 532 | | | | + | | | | | |
| FLIPCHART ISSUE | | + | | + | | | TIME OF DAY CLOCK SYNCHRONIZER | | | | + | | | | | |
| EQUIPMENT LOCATION | | MTCE BUSY STAT | | FAILURE CODE | | CLOCK | | TIME AND DATE | | | | | FAILURE HISTORY | | | PROC 532 |
| TEST NO | CARRIER | SLOT | | | | | TEST 3 | | | | | FAILURES PER HOUR | FAILURES BEGAN (HOURS AGO) | | | |
| | | | | | | | MONTH | DAY | SOFTWARE ONLY | YEAR | HOURS | | | MINUTES | SECONDS | |

Field

Description

1 Test No. displays active test number (max. of 3) per the following encodes:

Encode

Description

- 1 Displays failure history
- 2 Tests time-of-day clock continuously
- 3 Displays and sets the hardware and/or software time of day clock

2 Basic control carrier (Carrier 0).

3 Slot 32 of control carrier (Carrier 0).

4 Maintenance busy status of LC144 per the following encodes:

Encode

Description

- 0 Not busied out, not alarmed
- 1 Busied out, not alarmed
- 2 Not busied out, alarmed
- 3 Busied out, alarmed

4. MAAP DISPLAY FIELDS (Cont'd)

| <u>Field</u> | <u>Description</u> | | | | | | | | | | | | | | | | | | | | | | | | |
|---------------|---|---------------|--------------------|----|--------------------------------------|------|---|---|---------------------------------|---|---------------------------|---|-----------------------------------|---|---|---|---|---|--|---|--------------------------------|---|-----------------------------------|----|-------------------|
| 5 | Failure codes (see Table 1 for repair procedure): | | | | | | | | | | | | | | | | | | | | | | | | |
| | <table border="0" style="margin-left: 40px;"> <thead> <tr> <th style="text-align: left;"><u>Encode</u></th> <th style="text-align: left;"><u>Description</u></th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Test passed - no failure detected</td> </tr> <tr> <td>1</td> <td>No response from LC144</td> </tr> <tr> <td>2</td> <td>Back up batter for LC144 failed</td> </tr> <tr> <td>3</td> <td>Battery status stuck good</td> </tr> <tr> <td>4</td> <td>No change in time since last read</td> </tr> <tr> <td>5</td> <td>Software time updated by LC144 after PBX initialization</td> </tr> <tr> <td>6</td> <td>Small difference between software time and LC144 (less than 30 seconds)</td> </tr> <tr> <td>7</td> <td>Large difference between software and hardware times. Software assumed correct</td> </tr> <tr> <td>8</td> <td>Invalid time values from LC144</td> </tr> <tr> <td>9</td> <td>Invalid time values from software</td> </tr> <tr> <td>10</td> <td>LC144 test failed</td> </tr> </tbody> </table> | <u>Encode</u> | <u>Description</u> | 0 | Test passed - no failure detected | 1 | No response from LC144 | 2 | Back up batter for LC144 failed | 3 | Battery status stuck good | 4 | No change in time since last read | 5 | Software time updated by LC144 after PBX initialization | 6 | Small difference between software time and LC144 (less than 30 seconds) | 7 | Large difference between software and hardware times. Software assumed correct | 8 | Invalid time values from LC144 | 9 | Invalid time values from software | 10 | LC144 test failed |
| <u>Encode</u> | <u>Description</u> | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | Test passed - no failure detected | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | No response from LC144 | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | Back up batter for LC144 failed | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | Battery status stuck good | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | No change in time since last read | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | Software time updated by LC144 after PBX initialization | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | Small difference between software time and LC144 (less than 30 seconds) | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | Large difference between software and hardware times. Software assumed correct | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | Invalid time values from LC144 | | | | | | | | | | | | | | | | | | | | | | | | |
| 9 | Invalid time values from software | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | LC144 test failed | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | Clock types (Tests 2 and 3): | | | | | | | | | | | | | | | | | | | | | | | | |
| | <table border="0" style="margin-left: 40px;"> <thead> <tr> <th style="text-align: left;"><u>Encode</u></th> <th style="text-align: left;"><u>Description</u></th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Software clock</td> </tr> <tr> <td>1</td> <td>Hardware clock</td> </tr> </tbody> </table> <p style="margin-left: 40px;">(NOTE: Test 2 displays only the hardware time-of-day clock synchronized value. Test 3 displays input for both the hardware and software time-of-day clock synchronizer).</p> | <u>Encode</u> | <u>Description</u> | 0 | Software clock | 1 | Hardware clock | | | | | | | | | | | | | | | | | | |
| <u>Encode</u> | <u>Description</u> | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | Software clock | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | Hardware clock | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | Month (1-12) | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | Day (1-31) | | | | | | | | | | | | | | | | | | | | | | | | |
| 9 | Year - Software only: | | | | | | | | | | | | | | | | | | | | | | | | |
| | <table border="0" style="margin-left: 40px;"> <thead> <tr> <th style="text-align: left;"><u>Encode</u></th> <th style="text-align: left;"><u>Description</u></th> </tr> </thead> <tbody> <tr> <td>--</td> <td>Not used with hardware clock display</td> </tr> <tr> <td>1-99</td> <td>Year for software clock time and date display</td> </tr> </tbody> </table> | <u>Encode</u> | <u>Description</u> | -- | Not used with hardware clock display | 1-99 | Year for software clock time and date display | | | | | | | | | | | | | | | | | | |
| <u>Encode</u> | <u>Description</u> | | | | | | | | | | | | | | | | | | | | | | | | |
| -- | Not used with hardware clock display | | | | | | | | | | | | | | | | | | | | | | | | |
| 1-99 | Year for software clock time and date display | | | | | | | | | | | | | | | | | | | | | | | | |

4. MAAP DISPLAY FIELDS (Cont'd)

| <u>Field</u> | <u>Description</u> | | | | | | | | | | |
|---------------|--|---------------|--------------------|------|---|------|----------------------------|----|------|-------|-------------------|
| 10 | Hours of the day: | | | | | | | | | | |
| | <table border="0"> <thead> <tr> <th style="text-align: left;"><u>Encode</u></th> <th style="text-align: left;"><u>Description</u></th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Midnight</td> </tr> <tr> <td>1-11</td> <td>1 through 11 A.M.</td> </tr> <tr> <td>12</td> <td>Noon</td> </tr> <tr> <td>13-23</td> <td>1 through 11 P.M.</td> </tr> </tbody> </table> | <u>Encode</u> | <u>Description</u> | 0 | Midnight | 1-11 | 1 through 11 A.M. | 12 | Noon | 13-23 | 1 through 11 P.M. |
| <u>Encode</u> | <u>Description</u> | | | | | | | | | | |
| 0 | Midnight | | | | | | | | | | |
| 1-11 | 1 through 11 A.M. | | | | | | | | | | |
| 12 | Noon | | | | | | | | | | |
| 13-23 | 1 through 11 P.M. | | | | | | | | | | |
| 11 | Minutes (0-59) | | | | | | | | | | |
| 12 | Seconds (0-59) | | | | | | | | | | |
| 13 | Failure Index (Test 1 only): | | | | | | | | | | |
| | <table border="0"> <thead> <tr> <th style="text-align: left;"><u>Encode</u></th> <th style="text-align: left;"><u>Description</u></th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Failure summary</td> </tr> <tr> <td>1-6</td> <td>Index into failure history</td> </tr> </tbody> </table> | <u>Encode</u> | <u>Description</u> | 0 | Failure summary | 1-6 | Index into failure history | | | | |
| <u>Encode</u> | <u>Description</u> | | | | | | | | | | |
| 0 | Failure summary | | | | | | | | | | |
| 1-6 | Index into failure history | | | | | | | | | | |
| 14 | Failures per hour (Test 1 only): | | | | | | | | | | |
| | <table border="0"> <thead> <tr> <th style="text-align: left;"><u>Encode</u></th> <th style="text-align: left;"><u>Description</u></th> </tr> </thead> <tbody> <tr> <td>1-99</td> <td> Failure summary: sum of approximate number of failures per hour for all failing circuits Failure history: approximate number of failures per hour for circuits being displayed </td> </tr> </tbody> </table> | <u>Encode</u> | <u>Description</u> | 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 circuits being displayed | | | | | | |
| <u>Encode</u> | <u>Description</u> | | | | | | | | | | |
| 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 circuits being displayed | | | | | | | | | | |
| 15 | Failures began (hours ago) - Test 1 only: | | | | | | | | | | |
| | <table border="0"> <thead> <tr> <th style="text-align: left;"><u>Encode</u></th> <th style="text-align: left;"><u>Description</u></th> </tr> </thead> <tbody> <tr> <td>1-17</td> <td> Failure summary: number of hours since olders individual failure (to the nearest hour) Failure history: number of hours since failure started in the circuit displayed (to the nearest hour) </td> </tr> </tbody> </table> | <u>Encode</u> | <u>Description</u> | 1-17 | Failure summary: number of hours since olders individual failure (to the nearest hour) Failure history: number of hours since failure started in the circuit displayed (to the nearest hour) | | | | | | |
| <u>Encode</u> | <u>Description</u> | | | | | | | | | | |
| 1-17 | Failure summary: number of hours since olders individual failure (to the nearest hour) Failure history: number of hours since failure started in the circuit displayed (to the nearest hour) | | | | | | | | | | |

5. MAAP CONTROL KEY SEQUENCES

- 5.1 PROC No. 5, 3, 2, ENTER - causes program for PROC 532 to be loaded into memory from tape for execution.
- 5.2 CHANGE FIELD - for Test 3, use to change data in fields 7 through 12.
- 5.3 CLEAR DATA, EXECUTE - For Test 1, clears failure history records stored in memory by on-line maintenance. For Test 3, sets clocks to displayed time.
- 5.4 EXECUTE - Starts executing test number displayed in field 1.
- 5.5 NEXT DATA - For Test 1, displays additional failure codes. For Test 2, steps through accumulated failures.
- 5.6 NEXT TEXT - Advances procedure to the next test.
- 5.7 NEXT UNIT - For Test 3, selects clock (hardware and software) and displays time.
- 5.8 RESET - Reset displayed test to Test 1.
- 5.9 STOP - For Test 2, stops active test.

6. PROCEDURE

- 6.1 A list of time-of-day synchronizer tests, what each one does, and how each is run follows:

- 6.2 Call in Procedure 532:

- 6.2.1 PROC NO; 532; ENTER

Test 1 is automatically selected.

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

- 6.2.2 Test 1:

Test 1 provides a failure history of hardware time-of-day clock (LC144) failures. The failure history is recorded by the on-line time-of-day clock program.

6.2.2 Test 1: Cont'd

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 no failures have occurred, the following is displayed:

| <u>Field</u> | <u>Contents</u> |
|--------------|--|
| 2, 3 | LC144 time-of-day clock equipment location |
| 4 | 0 |
| 13, 14 | 0 |
| 15 | Dashed |

If the translation records indicate the machine is not equipped with an LC144, an error code 74 appears in the ERROR display. Further key inputs related to the hardware time-of-day clock are ignored by Test 1.

If one or more failures have occurred, the following is displayed:

| <u>Field</u> | <u>Contents</u> |
|--------------|--|
| 2, 3 | Equipment location of failing clock |
| 4 | Busy status of LC144 indicating whether failures recorded were severe enough to cause an alarm |
| 13 | 0, indicating failure summary |
| 14, 15 | Failure summary |

The failure summary displays all the hardware clock failures that have occurred.

Depressing the NEXT DATA key displays the failure code with the highest peg count. The display includes the following:

| <u>Field</u> | <u>Contents</u> |
|--------------|--|
| 2 - 4 | Same as for EXECUTE |
| 4 | Busy status of LC144 indicating whether failures recorded were severe enough to cause an alarm |
| 5 | First failure code |
| 7 - 12 | Dashed |
| 13 | Incremented to 1, indicating first failure code |
| 14, 15 | Failure history |

Depressing NEXT DATA repeatedly displays the remaining failure codes; in descending order of peg count. When all failure codes have been displayed, depressing NEXT DATA dashes the failure display. Depressing NEXT DATA again executes Test 1 and an updated failure summary is displayed.

Running Test 1 does not busy out the hardware clock circuit. There are no valid input fields for Test 1.

6.2.3 Test 2:

Test 2 continuously tests a combination of the hardware time-of-day clock (LC144) and the software buffer. During the test, the following are checked:

1. Whether an LC144 is provided and appears to be functional.
2. Battery status and validity of battery status.
3. Whether the hardware clock has changed since last read (read once per second).
4. Whether time and date values are within obvious bounds (non-BCD values).
5. Whether an alternating 1s and 0s pattern can be written and read from the hardware clock.

To start the test, depress the EXECUTE key. A flashing 0 in field 5 indicates the test is running. The MAAP display is as follows:

| <u>Field</u> | <u>Contents</u> |
|--------------|-----------------------------------|
| 2, 3 | Hardware clock equipment location |
| 4 | Busy/alarm status |
| 5 | Flashing 0 |
| 7, 8 | Actual time and date generated by |
| 10-12 | The hardware time-of-day clock |
| 13-15 | Dashed |

As in Test 1, an error code 74 appears in the ERROR display if the translation records indicate the machine is not equipped with an LC144 hardware clock. Key inputs related to the hardware clock are ignored by Test 2.

If a failure occurs, the MINOR alarm and NETWORK OTHER-515 indicators are turned on. The circuit is busied out, if not already busied out (field 4 = 0). The failure code for the first failure detected is locked into field 5 and flashed. The flashing display indicates the test is still being run continuously.

To stop the test, the STOP key must be depressed.

The NEXT DATA key can be used to sequence through all the failure codes associated with the failure.

6.2.3 Test 2: Cont'd

The NETWORK OTHER-515 indicator is automatically turned off by Test 2 (indicating the time-of-day clock alarm is retired) when all the following conditions are satisfied:

1. The time-of-day clock fault is cleared.
2. All other sources of the NETWORK OTHER-515 alarm are cleared.
3. No failures are detected in the first cycle of Procedure 532, Test 2.

The hardware clock is automatically released from the busy-out condition if it was passing Test 2 when the test was stopped.

6.2.4 Test 3:

Test 3 enables the craftsman to set the software and/or the hardware time-of-day clock.

To start the test, depress the EXECUTE key. The MAAP displays the following:

| <u>Field</u> | <u>Contents</u> |
|--------------|--|
| 2, 3 | Hardware clock equipment location |
| 4 | Busy/alarm status |
| 5 | Dashed |
| 6 | 0, indicating software clock |
| 7-12 | Transitional display of the software clock |
| 13-15 | Dashed |

Depressing the NEXT UNIT key causes the hardware clock to be displayed as follows:

| <u>Field</u> | <u>Contents</u> |
|----------------|--|
| 2-5 | Same |
| 6 | 1, indicating hardware clock |
| 7, 8, 10-12 | Transitional display providing a real-time readout of the actual time and date generated by the hardware clock |
| 9 | Dashed |

6.2.4 Test 3: Cont'd

Repeated use of the NEXT UNIT toggles the display between the two clocks.

Either or both of the clocks can be set as follows:

| <u>Step</u> | <u>Procedure</u> |
|-------------|---|
| 1. | Use NEXT UNIT to toggle between the two clocks to determine which of the two are correct. |
| 2. | Leave the correct clock displayed. |
| 3. | Depress CLEAR DATA; EXECUTE. The last clock displayed is set to equal the clock currently being displayed. |
| 4. | If neither clock appears to be correct, toggle to the software clock and input new time and date values using the change field sequence. CHANGE FIELD; 7; ENTER; (Month); ENTER; (Day); ENTER; (Year); ENTER; (Hours); ENTER; (Minutes); ENTER; (Seconds); ENTER |
| 5. | Depress CLEAR DATA; EXECUTE. Both clocks are set to the input values. |

Note: When a system does not include a hardware clock, the software clock can still be set using Procedure 532.

7. REPAIR GUIDE

- 7.1 Using Test 1, step through the failure history and record the results. Note which failure codes are accompanied by an alarm-sent indication (encode 2 or 3 in field 4).
- 7.2 Execute Test 2 and record any failures. If the circuit passes the test, the time-of-day clock alarm is retired. If the circuit was busied out, it is released from that condition.
- 7.3 Based on the results of the test, take the corrective action indicated (in the order listed) in Table 1, Failure Codes Table.
- 7.4 If failures were detected and the LC144 circuit pack was replaced, execute Test 3 (CLEAR DATA, EXECUTE) to set the clock synchronizer to the correct time before rerunning Test 2.
- 7.5 If an error code 80 appears while attempting to set the clock, indicating failure may still exist on the LC144 circuit pack, execute Test 2 again.

TABLE 1

FAILURE CODES TABLE
(SEE WARNING NOTE)

| <u>Failure Code</u> | <u>Description</u> | <u>Corrective Action</u> |
|---------------------|---|--|
| 0 | Test passed | No failure detected |
| 1 | No response from LC144 | 1. Replace LC144 2. Replace the associated LC132 (or LC134) |
| 2 | Backup battery for LC144 failed | 1. Check the battery 2. Replace LC144 3. Check the battery wiring |
| 3 | Battery status stuck good | Replace LC144 |
| 4 | No change in time since last read | Replace LC144 |
| 5 | Software time updated by LC144 after PBX initialization | This is not an alarmable condition, and therefore, does not require repair procedure |
| 6 | Small difference between software time and LC144 (less than 30 seconds) | There are small differences in the software and hardware clocks resulting in the software clock being updated by the hardware Some counts are expected and do not indicate a fault condition. If field 4 indicates that an alarm has been sent: Replace the LC144 Replace the LC143 |
| 7 | Large difference between software and hardware times. Software assumed correct (greater than 30 seconds). | There is a large difference in the software, and hardware clocks have resulted in the hardware clock being updated by the software clock: Replace the LC144 Replace the LC143 |
| 8 | Invalid time values from LC144 | Replace LC144 |
| 9 | Invalid time values from software | This is a software problem that cannot be corrected with hardware |

TABLE 1 (Cont'd)

| <u>Failure Code</u> | <u>Description</u> | <u>Corrective Action</u> |
|---------------------|--------------------|---|
| 10 | LC144 failed test | LC144 failed alternating ones and zeros pattern test. Replace LC144 |

WARNING NOTE: Replacement of circuit packs in the processor carrier requires that the processor be halted by depressing the HALT/GO switch to HALT position.

Reason for Issue:

New Section

Manager, Denver PBX PECC