# Celerity-4TEL

## LDU 100/FMU Alcatel Litespan 1540 Interface Guide

D15-624-95

TERADYNE

This document contains information on one or more Teradyne products. Product-specific information may not be applicable to all markets. Please consult your system release specifications before using this document.

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# Safety Information

## Introduction

Operations and maintenance personnel should read and understand the following information before operating or servicing the system.

The procedures in this document provide for safe, efficient installation, operation or servicing of Teradyne products. Non-compliance with Teradyne procedures can lead to serious, or even fatal, personal injury or damage to equipment.

Read and understand all Teradyne safety requirements contained within the documentation, as well as safety requirements for any third-party manufacturer's equipment associated with the system.

 Danger: The instructions contained in this manual are for authorized and trained personnel only. Do not perform any installation or servicing procedures unless you are authorized and trained to do so.

## Safety Practices

The following safety practices should be observed by all system users:

- Operations personnel and service technicians must be trained in the location and nature of potentially lethal hazards of the equipment.

- Only qualified personnel should be allowed access to the equipment. Operators (users) must not be allowed access to hazardous areas of the product.

- System maintenance technicians must remove personal conductive items (such as rings, watches, jewelry, etc.) before servicing the system. Technicians must not carry metal objects in pockets where they can fall into contact with electrical connections.

- When working inside the Teradyne equipment, it is advisable to have an assistant present. At the minimum, notify someone in the area of your actions before and upon the completion of service.

- Tools, food, liquids, or any other miscellaneous items should not be placed on any of the system's surfaces.

- Proper electrostatic safety precautions should be followed to prevent damage to people and equipment.

- Do not block system air vents. They must be kept clean and free of all dust and debris.

- Visitors to the system area should have qualified supervision.

- Built-in system safety features must not be circumvented, for example:

    - The system must be properly earthed to the local building earth at all times.

    - All fuses must be replaced with the correct fuse.

Ensure the documentation that clearly explains all safety aspects of the equipment is accessible at all times to all operators and service technicians.

# Safety Labeling

Symbols and labels applied to system components and used in the product manuals are derived from requirements of I.E.C 417 for internationally recognized labeling and OSHA 29 CFR 1910 for U.S. recognized labeling.

The **PRIMARY PROTECTIVE EARTH** symbol identifies the primary earth connection for the entire system. All safety earths are referenced back to this point.

The **PROTECTIVE EARTH** symbol identifies any connection point where a safety earth wire is added to the hardware. This would normally be any conductive point referenced to the safety earth wire of the Main AC service wiring, internal AC wiring, or safety earth to a particular sub-assembly.

The **CHASSIS EARTH** symbol identifies where an earth is connected to a chassis point for earth reference or other function, such as static discharge.

The **BLACK HIGH VOLTAGE FLASH** symbol defines any connection where a hazardous voltage (greater than 60V), either DC or AC, may be present.

The **INFORMATION** symbol indicates that there is important servicing or operating information in the manual. It is placed in close proximity to the area discussed.

The **ELECTROSTATIC FLASH** symbol identifies any component that is susceptible to electrostatic discharge. An ESD wrist-strap should be used at all times when touching these components.

# Chapter 1: Document Overview

## 1.1 Introduction

This document describes how to check the interfaces between the Celerity-4TEL system and the switch cluster when LDUs (Loop Diagnostic Units) are installed in a Litespan 1540 environment. It also describes the testing of switch built-in test units that may also be used by the Celerity-4TEL system to carry out a limited line test if an LDU is not available for the line that is to be tested.

**Note:** The switch built in test units are known by the generic term Foreign Measurement Unit (FMU).

This chapter provides an introduction to the document and contains the following sections:

| Section | Title |
|---------|-------|
| 1.1 | Introduction |
| 1.2 | Document Audience |
| 1.3 | Document Content |
| 1.4 | Document History |
| 1.5 | Document Conventions |
| 1.6 | Related Documents |
| 1.7 | Document Feedback |

## 1.2 Document Audience

This document is for installation technicians who are familiar with Teradyne equipment and the switch environment.

## 1.3 Document Content

The information in this document is organized as follows:

- Chapter 1, "Document Overview", describes the contents, history, and conventions of this document.

- Chapter 2, "Test Access Overview", describes the 4TEL line test architecture in the Litespan 1540 environment.

- Chapter 3, "Prerequisites", describes the switch and Celerity-4TEL build/modification status required before starting work on an interface. It also describes the site data that you will need to carry out the interface tests.

- Chapter 4, "TSC Configuration", describes TSC (Test System Controller) configuration requirements for this switch environment. This is reference material for use when configuring the TSC. The document ***TSC System Configuration Guide*** describes how to map the information in TSC data.

- Chapter 5, "Switch Configuration", describes special switch software requirements for Celerity-4TEL operation in this switch environment.

- Chapter 6, "Checking Functionality at the Interfaces", describes how to check the operation at the Celerity-4TEL interfaces with the switch.

- Appendix A, "LDU Test Bus Terminations", describes the test bus terminations at the 4TEL LDUs.

- Appendix B, "TSC/Switch Communications", describes the protocols used for TSC/Switch communication.

- Appendix C, "Interface Checksheets", illustrate recommended checksheets for the recording of test data and results.

- Appendix D, "Powering the LDU 100 Up or Down", describes how to power the LDU 100 up and down correctly.



Warning: Equipment damage may result if the incorrect procedure is used to power the LDU up or down.

## 1.4 Document History

Refer to Table 1-1 for the development history of this document.

**Table 1-1: Document History**

| *Issue* | *Date* | *Reason for Issue* |
|---------|--------|--------------------|
| 1 | May 2007 | Original issue for WR6.3/ST6. |

## 1.5 Document Conventions

The following sections identify conventions used in this document.

**Hazards**

Hazards are identified in the text as follows:

 Danger: denotes hazards that may result in personal injury unless the correct precautions are observed.

 Warning: denotes hazards that may result in equipment damage unless the correct precautions are observed.

 Caution: denotes procedures that may result in service disruption unless the correct precautions are observed.

**System Messages**

This document uses a ruled box and a Courier typeface to represent system messages that appear on your PC/terminal screen or printer.

*Example:*

```
Communication Problem: Bad Checksum
```

Variable values or text are shown in italics (normally as one word). "Variable" in this context indicates any generic representation of data. Thus, "*filename*" in the example below indicates that the system will display the appropriate file name.

*Example:*

```
Corrupt File: filename
```

**Keyboard Entries**

This document uses bold text to represent data or commands that you type in at your PC or terminal keyboard.

*Example:*

Type **config**.

Key names enclosed in angle brackets, such as **<Enter>**, **<Tab>**, or **<Ctrl>**, denote the use of the appropriate key. The example below indicates that you should type in the six characters c, o, n, f, i, and g, and then press the ENTER key.

*Example:*

Type **config<Enter>**.

Key names linked with a plus sign indicate that the keys should be pressed simultaneously; hold the command key(s) down, and at the same time, press the alphanumeric key(s). The example below indicates that you should hold down the CONTROL key, and then press the alphanumeric P key.

*Example:*

Press **<Ctrl>** + **P**.

Variable values or text are shown in italics (normally as one word). "Variable" in this context indicates any generic representation of data. Thus, the example below indicates that you should type the word "ping," followed by the appropriate IP address. Then, press the ENTER key.

*Example:*

Type **ping *ipaddress*<Enter>**.

# 1.6 Related Documents

The Teradyne documents listed below provide further relevant information about the LDU and TSC:

- ***LDU Commissioning and Acceptance Guide***

- ***LDU Maintenance Commands***

- ***LDU Detailed Level Procedures Guide***

- ***TSC System Configuration Guide***

- ***TSC Maintenance Commands***

## 1.7 Document Feedback

Teradyne encourages you to provide feedback on our documentation. Send any comments or questions via e-mail to:

documentation@btd.teradyne.com

Your comments help us provide you with better information products.

# Chapter 2: Test Access Overview

## 2.1 Introduction

This chapter provides an overview of the system interfaces and the interface procedures in this document. This chapter contains the following sections:

| Section | Title |
|---------|-------|
| 2.1 | Introduction |
| 2.2 | Test Access Overview |
| 2.3 | TSC/LDU Communications |
| 2.4 | LDU Test Bus Connection |
| 2.5 | Procedure Overview |

## 2.2 Test Access Overview

Figure 2-1 shows the deployment of Celerity-4TEL line test units in a Litespan 1540 environment. The switch components that the Celerity-4TEL system is interfaced to comprise a Litespan Management System (LMS1353) and the peripheral Litespan access nodes (LS1540).

The LMS1353 provides overall management of the LS1540 access nodes and is thus the system element with which the TSC communicates to access line information, set up test access to lines, and request switch internal line tests. The LS1540 are the system elements at which lines are terminated and at which line access is provided.

The Celerity-4TEL system components that carry out the line tests are Loop Diagnostic Units (LDUs) located at the access nodes. These are test heads that measure conditions on a line under the control of the Celerity-4TEL TSC (Test System Controller).

The interactions between the Celerity-4TEL system and the switch are:

1.  A learn transaction during which the TSC requests line information from the LMS via the Switch Learn Port (SLP). The information returned by the switch is used to build and maintain line records in the TSC database.

2.  A line test transaction that requests appropriate actions in the switch to carry out one of two types of test:

- A metallic test performed by a 4TEL LDU. The TSC initiates the test by requesting line access via the LMS Switch Access Port (SAP). When the LMS indicates that the line has been accessed, the TSC communicates with the appropriate LDU to test the line. Finally the TSC indicates to the LMS when the line under test should be released. In the case of a test performed by an LDU, the LMS1353 recognizes two types of line access mechanisms:

  - The DRY-LOOP-TEST that enables an LDU to carry out the entire range of DC and AC measurements in a parametric test.

  - The EXTERNAL-TEST that enables LDU to pull dial tone from the line card on which the line under test resides.

  During a metallic test, the switch provides 4-wire access to the line comprising an OUT connection to the line pair that runs from the MDF to the subscriber and an IN connection from the MDF (Main Distribution Frame) to the switch line circuit. The LDU configures this test connection to provide the facility to test inwards, outwards, etc.

- A switch internal test (EMEAS-TEST) performed by a switch test unit (FMU) during which the FMU performs measurements requested by the TSC on the line specified by the TSC. The switch passes the test data from the FMU back to the TSC. The FMU test is restricted to the capabilities of the switch in-built test unit and does not provide sufficient data for the full detailed dispatch analysis that the 4TEL metallic test enables.
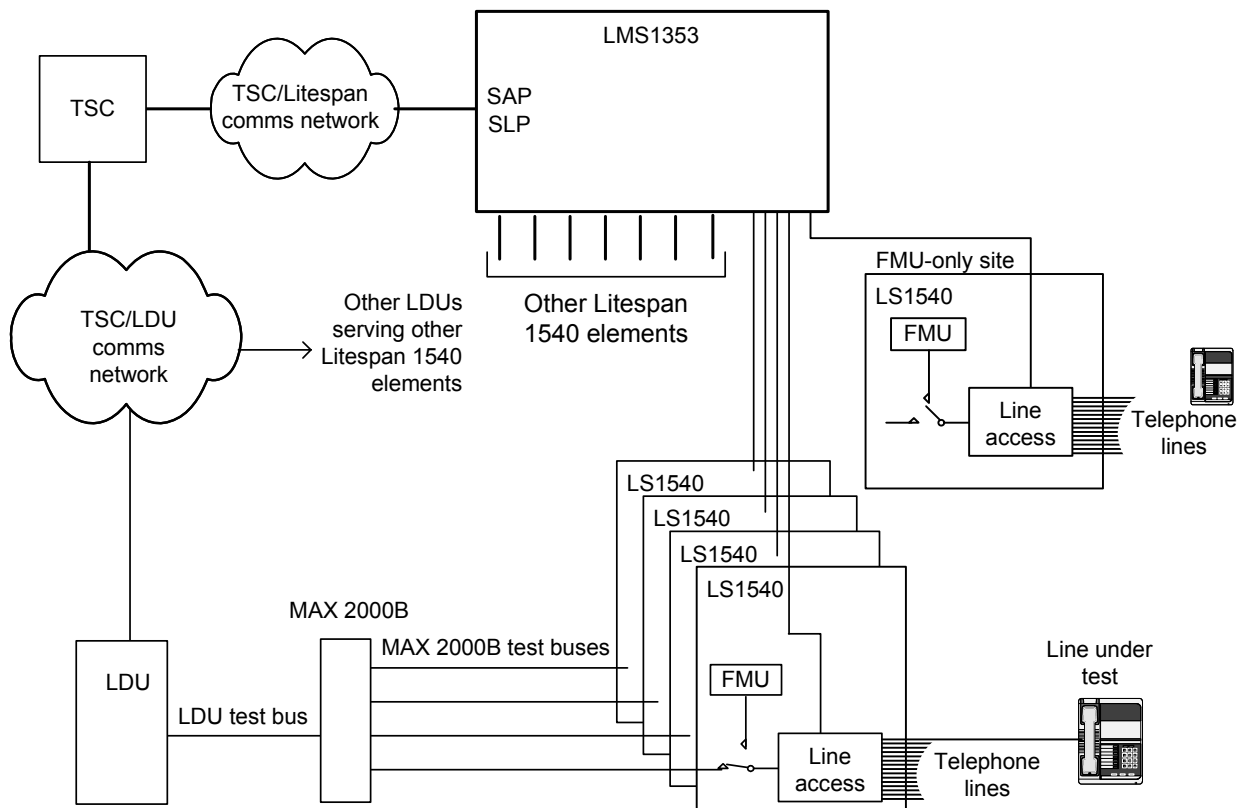
SAP - Switch Access Port
SLP - Switch Learn Port
Note:  The SAP and the SLP are LMS ports implemented in the 1353 gateway software that
        the Celerity-4TEL system uses for line access and line learn functions
LMS - Litespan Management System, a telephony EMS (Element Management System)
LS1540 - Litespan cluster elements
FMU - Foreign Measurement Unit. In the LS1540 this is known as the Test Unit or TACC
MAX 2000B - Teradyne test bus selection matrix

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**Figure 2-1: Celerity-4TEL Interfaces in Litespan 1540**

## 2.3 TSC/LDU Communications

An LDU is installed with a test bus connection via the MAX 2000B to each rack with four LS 1540 elements. The MAX 2000B is controlled by the LDU to connect the LDU test bus to the appropriate MAX 2000B outlet and thence to the appropriate access node (LS1540). TSC/LDU communications comprise test requests from the TSC (when the switch has provided test access at the test port). The LDU carries out the tests and communicates the results to the TSC.

As shown in Figure 2-2, TSC/LDU communications in a Litespan switch uses one of two technologies:

- LDUs with access to a server port on the LAN/WAN network may use TCP/IP communication.

- LDUs that do not have access to a server port on the LAN/WAN network use dial-up modem technology.

M = Modem
TS = Terminal server
Site A: TCP/IP communication over a LAN/WAN network.
Site B: Dial-up modem communication over the PSTN network.

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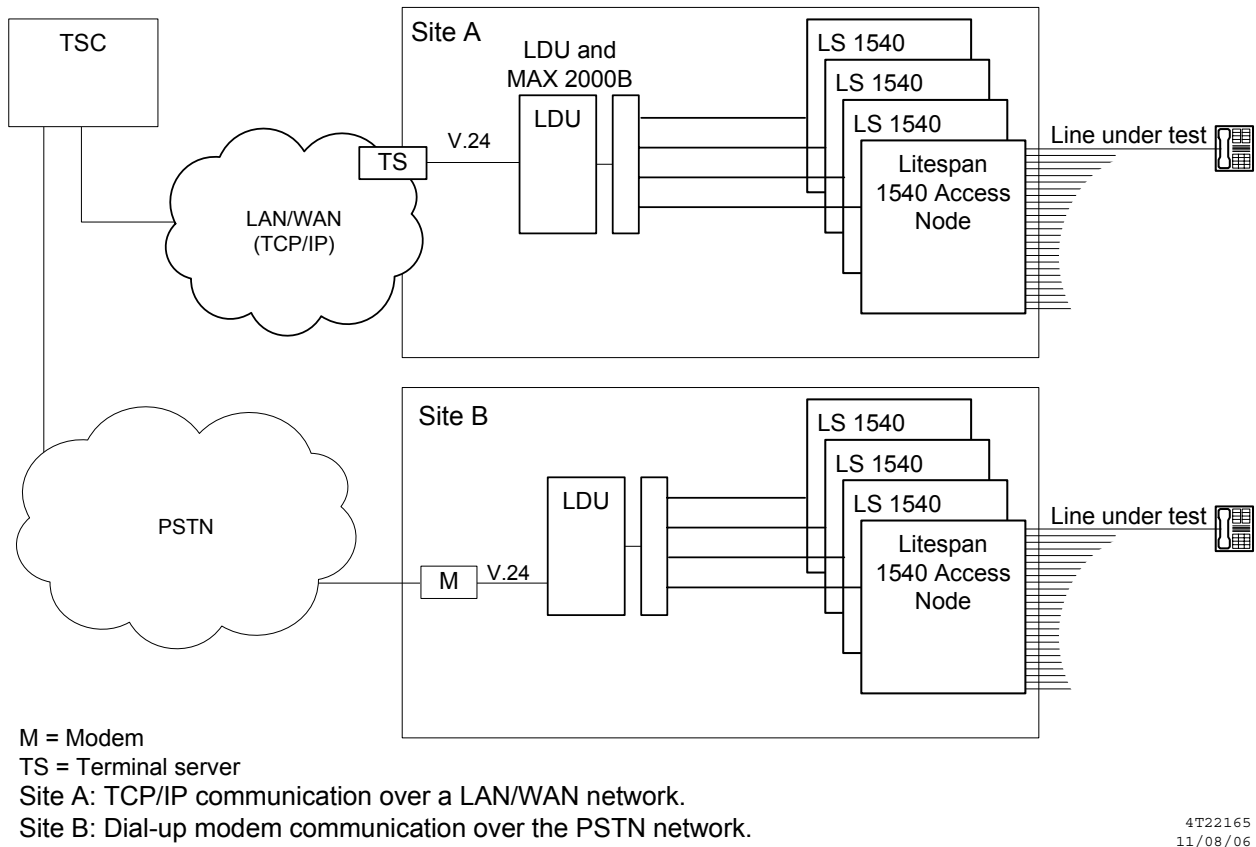
**Figure 2-2: TSC/LDU Communications**

## 2.4 LDU Test Bus Connection

As shown in Figure 2-3, the LDU test bus is connected to a Litespan 1540 test port via a 4-wire test bus.



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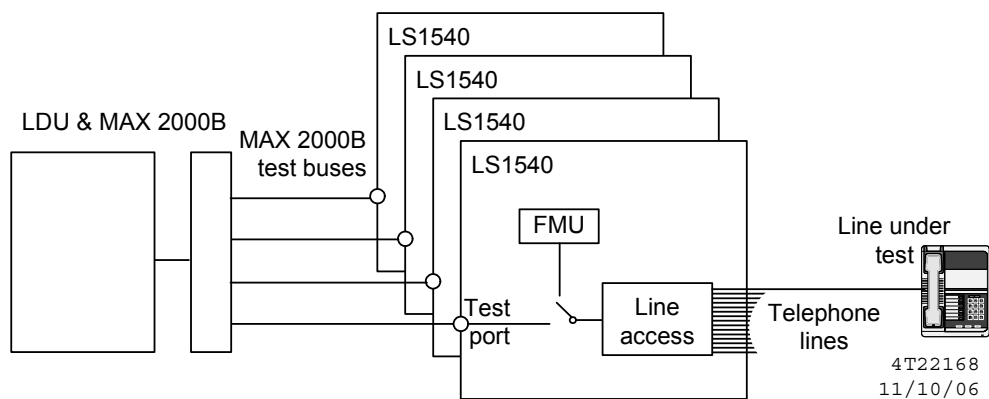
**Figure 2-3: LDU Test Bus Connection**

## 2.5 Procedure Overview

Configure and test the interfaces as follows:

1. Check that the pre-requisites in Chapter 3 have been met.

2. Verify that LDU test bus connections and SAPs are mapped in TSC data - see Chapter 4 and the ***TSC System Configuration Guide***.

3. Verify that any special switch requirements are met for Celerity-4TEL operation in the switch - see Chapter 5.

4. Verify operation across the interfaces - see Chapter 6.

# Chapter 3: Prerequisites

## 3.1 Introduction

This chapter contains the following sections:

| Section | Title |
|---------|-------|
| 3.1 | Introduction |
| 3.2 | Celerity-4TEL Equipment |
| 3.3 | Switch Equipment |
| 3.4 | Required Test Data |
| 3.5 | Personnel and PC/Terminal Requirements |

The requirements listed in this chapter should be met before attempting to set-up, and test Celerity-4TEL/switch interfaces.

## 3.2 Celerity-4TEL Equipment

Check that all LDUs in the installation have been installed in accordance with **LDU Installation**.

## 3.3 Switch Equipment

This Interface Guide applies to Litespan 1540 switches running software release V2.5.42. Check compatibility with future builds and software releases by consulting Teradyne.

## 3.4 Required Test Data

Some switch data is required to enable the interface functions to be checked. Checksheets illustrated in Appendix C are the suggested medium for compiling the data. The data should be collected before checking the interface operation as equipment timeouts may hamper the verification procedures if you do not have the required data to hand when carrying out the verification procedure.

## Test Lines

A number of "test lines" and associated exchange data are required to check the test access and learn functions.

Follow the procedure below to record the necessary test data.

**1.** Fill in the preliminary information on the checksheets (see Figure 3-1).

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**TSC/LMS1353 LEARN AND LINE ACCESS CHECKSHEET**

**1** SITE DETAILS

District | *Borsetshire*       Switch | *Ambridge*

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**Figure 3-1: Checksheet Preliminary Information**

**2.** Identify and record a suitable test line to check the switch learn function. This should be an unassigned line that can easily be assigned. It can be either a POTS or an ISDN line. Record the line as test line 1 on the TSC/LMS learn and line access checksheet – see Figure 3-2.

---

**TSC/LMS1353 LEARN AND LINE ACCESS CHECKSHEET**

**1** SITE DETAILS

District | [ ]          Switch | [ ]

**2** TEST DATA

DN

Test line 1 (unassigned)     *421 8 11234567*

Test line 2 (assigned)     *421 8 11234500*

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**Figure 3-2: Test Lines for Learn and Line Access Checks**

**3.** Identify and record a suitable test line to check the switch line access function. This should be an assigned line that can easily be busied out. It can be either a POTS or an ISDN line. Record the line as test line 2 on the TSC/LMS learn and line access checksheet – see Figure 3-2.

Test line 2 may be any telephone line that:

- Is free from service-affecting faults (the moderate fault condition on a sample line is acceptable).

---

- Can be busied out conveniently.

- Will not disrupt service to customers, i.e., is not a current customer's line.

4.    For each access node, identify and record a suitable test line to check the switch line access function at the LDU test bus and the FMU functionality. It can be either a POTS or an ISDN line. Where there is no LDU fitted (Access node 2 in Figure 3-3) only the FMU test is carried out.

This test line may be any telephone line that:

- Is accessible at the access node in question. This may be checked by using a learn command as described in Appendix C.

- Is free from service-affecting faults (the moderate fault condition on a sample line is acceptable).

- Can be busied out conveniently.

- Will not disrupt service to customers, i.e., is not a current customer's line.



**Figure 3-3: Test Lines for LDU/LS1540 Line Access Checks**

5.    Check that all of the access nodes in the switch are listed. Those without an LDU will only require the FMU functionality to be tested.

## 3.5 Personnel and PC/Terminal Requirements

As the tasks that have to be carried out are not necessarily co-located, it may be necessary for two people (who are in telephone communication) to carry out the interface tests. The tasks are:

- Applying commands to the LMS. You can do this using a PC to telnet to the LMS from a suitable network server port.

- Measuring voltages on the LDU test bus. This has to be done at the LDU.

# Chapter 4: TSC Configuration

## 4.1 Introduction

Celerity-4TEL/switch interfaces and test access dependencies must be configured in TSC data. Through-system functions will not work unless the parts of the system used by the function have been mapped in this way.

Use this chapter to understand how LDUs are typically deployed in a Litespan 1540 switch and the switch data required during data entry. You will then be able to use *TSC System Configuration* to map the deployment correctly in TSC data.

The chapter comprises the following sections:

| Section | Title |
|---------|-------|
| 4.1 | Introduction |
| 4.2 | Terminology |
| 4.3 | Test Access Matrix |
| 4.4 | Interfaces |
| 4.5 | TSC Software Requirement |
| 4.6 | TSC Configuration Requirements |

## 4.2 Terminology

The Celerity-4TEL TSC communicates with the Litespan Management System LMS 1353 via a network connection and thence one of two software elements, a virtual learn port (SLP) or a virtual access port (SAP).

The LMS1353 is management system for the Alcatel LS1540 product family. It provides device configuration, services provisioning, alarm collections, inventory, testing and remote-upgrade of software in LS1540 access nodes. LMS1353 is a platform for integrated applications and for the management of subscribers' lines. One of the applications is known as DN1355 OSS Gateway and this must be running on the LMS1353 for Celerity-4TEL line test implementation in LS1540 technology.

The TSC uses the learn port to send GET-SUBS-INFO commands which are requests for line information from the LMS. It uses the access port to request either test access for a Celerity-4TEL LDU or request that the FMU carries out a test on a line. Table 4-1 correlates the Litespan terminology with the generic terms that are used in this guide.

**Celerity-4TEL System Elements**
LDU (Loop Diagnostic Unit)  a line measurement unit
TSC (Test System Controller)
MX2b (MAX 2000B) a test bus selection matrix

**Switch Elements**
LMS1353 - Litespan Management System
LS1540 - Litespan access node
TACC - switch built in test unit or FMU



**Celerity-4TEL/Litespan Interfaces**
SAP - virtual Switch Access Port
SLP - virtual Switch Learn Port
TB - 4-wire test bus connection

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```

**Figure 4-1: Celerity-4TEL/Litespan Components and Interfaces**

**Table 4-1: Terminology**

| *Litespan designation* | *Generic Term* |
| --- | --- |
| Litespan Management System (LMS) | - |
| LS1540 | Access node |
| LMS management port | SLP (Switch Learn Port) |
| LMS test port | SAP (Switch Access Port) |
| Test port | Test port |
| Test Unit (TACC) | FMU |

The LS1540 access node is usually composed of up to four shelves (subracks) as shown in Figure 4-2. Each shelf is 425 mm high and has a row of 22 slots in a 300 mm high card cage with a 125 mm high card cage beneath it as shown in Figure 4-3.

Power distribution panel

Upper card slots for 22 cards such as:
- ATLC    Analog telephone line card
- BALC    Basic access line card
- BSEC    BB shelf extension controller
- DURC    Dual ringer card
- FFLCB   Full featured analogue
          telephone line card

To MDF

AUXPB

Subrack 3

22 slots

AUXPB

Subrack 2

22 slots

AUXPB

Subrack 1

22 slots

TACC

AUXPA

Subrack 0 with TACC card in slot 21 of upper (300 mm) card cage and AUXPA card in lower (125 mm) card cage

Internal metallic test bus connected between the AUXPA/AUXPB cards in each subrack

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**Figure 4-2: LS1540 Access Node – Full Configuration of Shelves**

Slot numbers: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22

300 mm (upper card cage):

| Slot | Card |
|------|------|
| 1 | AANC AICC ASCC |
| 2 | NEHC |
| 3 | AANC AICC ASCC |
| 4 | NEHC |
| 5 | SYNTHEO TCE HLTCA PRCC PHDC EBAC |
| 6 | SYNTH HLTCA PRCC PHDC EBAC |
| 7 | LC SERV EOTC EBAC |
| 8 | LC SERV EBAC |
| 9 | LC SERV EBAC |
| 10 | LC SERV EBAC |
| 11 | LC EBAC |
| 12 | LC EBAC |
| 13 | LC EBAC |
| 14 | LC EBAC |
| 15 | LC EBAC |
| 16 | LC EBAC |
| 17 | LC EBAC |
| 18 | LC EBAC |
| 19 | LC TACC EBAC |
| 20 | LC TACC DURC EBAC |
| 21 | LC TACC DURC EBAC |
| 22 | TARCI / TARCI NB/BE |

125 mm (lower card cage): POWPA, NEHP HEMP, NEHP HEMP, AUXPA, OSDA/ PRCP/ HLTPC, Number of connectors depends on equipped cards, TARPB

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**Figure 4-3: Access Node (LS1540) Shelf Layout**

The TACC test card located in slot 21 in the upper card cage of the lowest shelf (subrack 0) contains the TACC test card that provides metallic access for the LDU test (and executes the FMU test). In the lower card cage of each subrack there is an AUXPA card (subrack 0) or AUXPB card (remaining subracks in the cabinet). This provides the metallic test bus interconnection between subracks.

Figure 4-2 shows the maximum configuration for the LS1540 access node. The smallest configuration will comprise only subrack 0 with the minimum set of hardware modules.

Where there is more than one subrack the TEST BUS connector on the AUXPA card in subrack 0 is connected to the TEST connector on the AUXPB card in subrack 1 as shown in Figure 4-3. A special bifurcated Alcatel cable is used to interconnect the metallic test bus to further subracks. This connects the TEST/DURC connector of the lower AUXPB card to the TEST and DURC connectors of the AUXPB card in the subrack above it. The TEST/DURC connector of the AUXPB card in the uppermost subrack (Figure 4-3 shows the maximum build so this is subrack 3 in this diagram) is connected to the MDF by a cable. The connector pinout is shown against the AUXPB TEST BUS connector for subrack 3 in Figure 4-4.
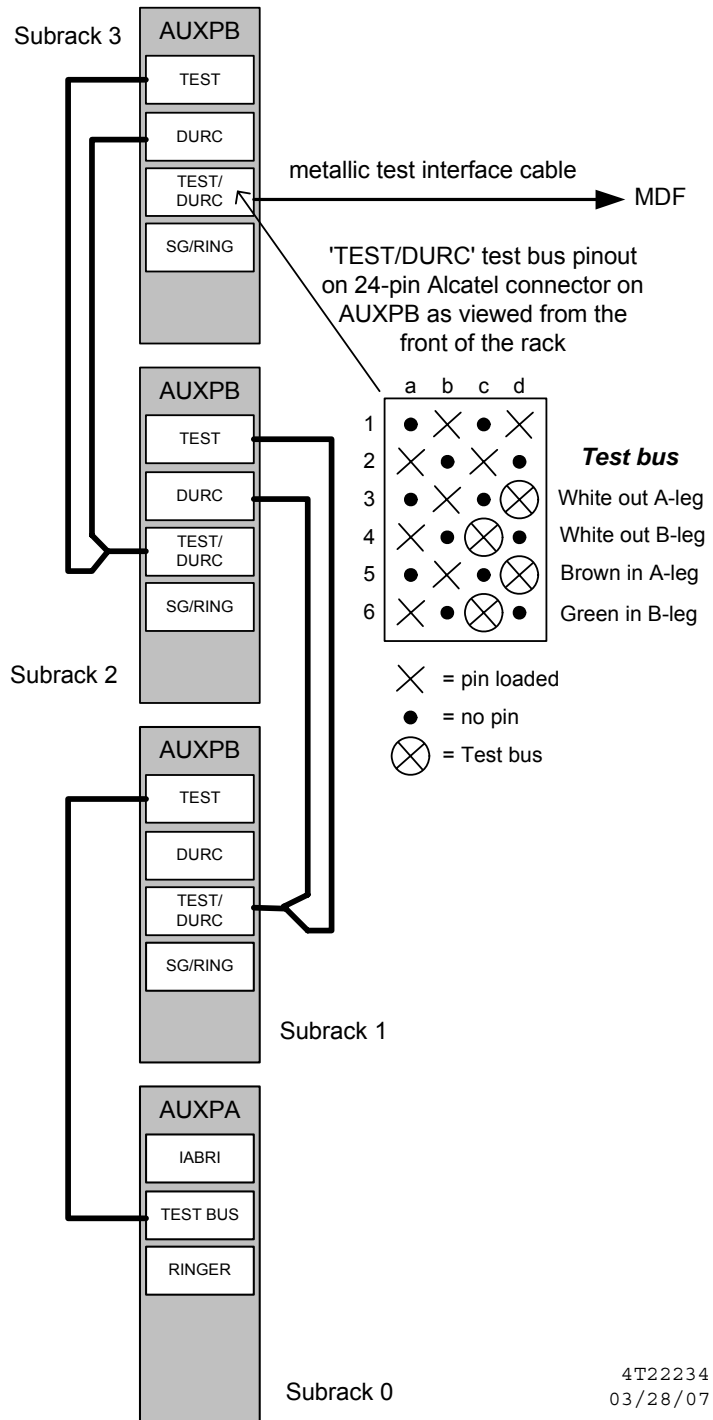
**Figure 4-4: Access Node Test Bus**

The test bus cable connected between the TEST/DURC connector and the MDF contains 4 pairs. The white/brown and white/green pair carry the test bus.

**Important:** The wiring of the test bus in the test bus cable is unusual in that the test buses are split between the two twisted pairs. Take careful note of Figure 4-5. The white/brown pair carry the IN and OUT A-legs and the white/green pair carry the IN and OUT B-legs.

TEST/DURC connector pins

Cable to MDF

Test bus OUT pair A — W — Both A-legs on white/brown pair

B — d3 B

c4

Test bus IN pair A — W — Both B-legs on white/green pair

B — d5 G

c6

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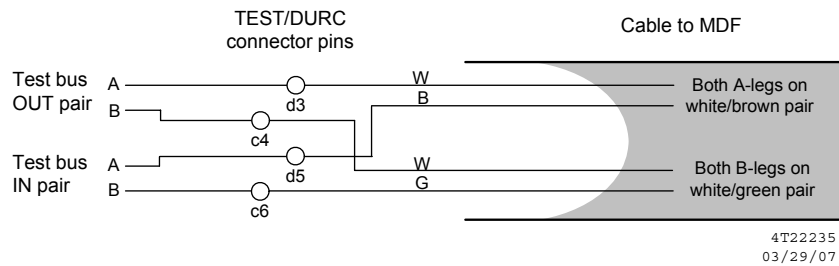
**Figure 4-5: Test Bus Cable**

# 4.3 Test Access Matrix

The Litespan test matrix is synonymous with the LS1540 access node's configuration parameters "nEFriendlyName" as far as 4TEL is concerned.

This parameter uniquely identifies one access node within the entire NGN site. It actually refers to one full LS1540 rack with four subracks with a single metallic test bus terminated on the MDF. One test access matrix also denotes the level of test blocking should two simultaneous test requests be initiated. There can be only one test executed at a given time on one LS5140 access node, the remaining three subracks will be blocked.'

The "nEFriendlyName" parameter usually consists of a geographical name given to a site, a hyphen and a decimal number from 1 onwards to identify the LS1540 rack.

# 4.4 Interfaces

### Test Ports

The Litespan test port is synonymous with the LS1540 access node's configuration parameters "nEFriendlyName" as far as 4TEL is concerned. This parameter is configured by LS1540 administrator. For detailed information please refer to Alcatel document "A1355 Socket Access Point Interface".

## SAPs

The Celerity-4TEL concept of a Switch Access Port (SAP) is a switch port through which Celerity-4TEL requests line data and test access to a line. In the Litespan 1540 environment, the Celerity-4TEL dialogue with the switch is carried out by the TSC via a single networked connection to the LMS. However, the two types of TSC/LMS transaction ("learn" and "test access") engage different software elements and thus the concept is of two "virtual" ports, a Switch Learn Port (SLP) and a Switch Access Port (SAP). In Litespan terms the ports are referred to as Management (SLP) and Test (SAP). When defining TSC ports in the TSC database, there is a field (Learn Only Port) in the TSC Ports form. The value in this field is toggled between YES to indicate that the switch port is an SLP or NO to indicate a SAP – see Figure 4-6.

```
+-------------------------------------------------------------------------------+
|Add Access Port              Modify Access Port            Delete Access Port|
|View Access Port                                           List Access Ports |
+-------------------------------------------------------------------------------+
         Switch Access Port Name : Litespan SAP mgnt

         Connection Type         : Remote TCP/IP Terminal Server
          Dedicated Port Name    : portname
          Dialup DN              :

         Port Timeout            : 0     minutes
         Port Session Limit      : 16

         Learn Only Port         : YES
         Equipment Status        : UP
         Comments                :

         Username                :
         Password                :
         Usergroup               :
```

**Figure 4-6: Switch Access Ports Form Showing Port Defined as SLP**

## 4.5 TSC Software Requirement

Refer to the appropriate system release notes or contact Teradyne for the current TSC software version.

## 4.6 TSC Configuration Requirements

The TSC database maps 4TEL communications data, 4TEL measurement unit data, and telephone network data in order to provide full 4TEL line test facilities. The **TSC System Configuration Guide** describes how to use the data entry forms to build these data records.

Satisfy yourself that data records have been built for the LDU and switch before you begin installing the LDU. If necessary, refer to the **TSC System Configuration Guide** to check that this has been done. In particular, check the following:

- Host switch in which the LDU is to be installed:

  – Type/Interface: Litespan V1R2 (for FMU support and External Test).

  – Access Method: TSC Access

  – Access Method: TSC Access

  – Equipment Status: UP

  – All other parameters set as appropriate.

- SAP and SLP:

  – Switch Access Port Name: Use unique name

  – Connection type: "Remote TCP/IP Terminal Server"

  – Dedicated Port Name: As appropriate

  – Dialup DN: Leave blank

  – Port Timeout: "0"    minutes

  – Port Session Limit: "16"

  – Learn Only Port: "NO" for SAP, "YES" for SLP

  – Equipment Status: "UP"

  – Comments: Use for relevant comments if required

  – Username, Password, and Usergroup: Leave blank

- LDU if installed:

  – LDU Type: Check current applicable version with Teradyne.

  – Connection Type: Direct PPP or Dialup PPP as appropriate.

  – Equipment Status: UP

  – Test Ports: The Litespan test port is synonymous with the LS1540 access node's configuration parameters "nEFriendlyName" as far as 4TEL is concerned. This parameter is configured by LS1540 administrator. For detailed information please refer to Alcatel document "A1355 Socket Access Point Interface". Ensure that the test port is mapped to the correct LDU test bus.

  – All other parameters set as appropriate.

- TSC ports providing communication to LMS SAP, SLP and LDUs:

    – Type of port is "Remote TCP/IP Terminal Server".

    – Equipment Status: UP

    – All other parameters set as appropriate.

# Chapter 5: Switch Configuration

Switch configuration changes should only be implemented by staff with specialist knowledge of the switch and an appreciation of the effect that such changes might have on other facilities or on switch performance.

There is currently no information available on special switch software configuration required to permit Celerity-4TEL operation.

# Chapter 6: Checking Functionality at the Interfaces

## 6.1 Introduction

Use the procedures in this chapter to check all Celerity-4TEL/Litespan interfaces for correct operation.

This chapter contains the following sections:

| Section | Title |
|---------|-------|
| 6.1 | Introduction |
| 6.2 | Overview |
| 6.3 | Setting up |
| 6.4 | Checking the Learn Function at the SLP |
| 6.5 | Checking the Access Function at the SAP |
| 6.6 | Checking Line Access at the LDU |
| 6.7 | Checking the FMU Functionality |

## 6.2 Overview

Figure 6-1 provides an overview for the test procedures for the Celerity-4TEL interfaces in a Litespan switch. The procedures are detailed in the following sections.
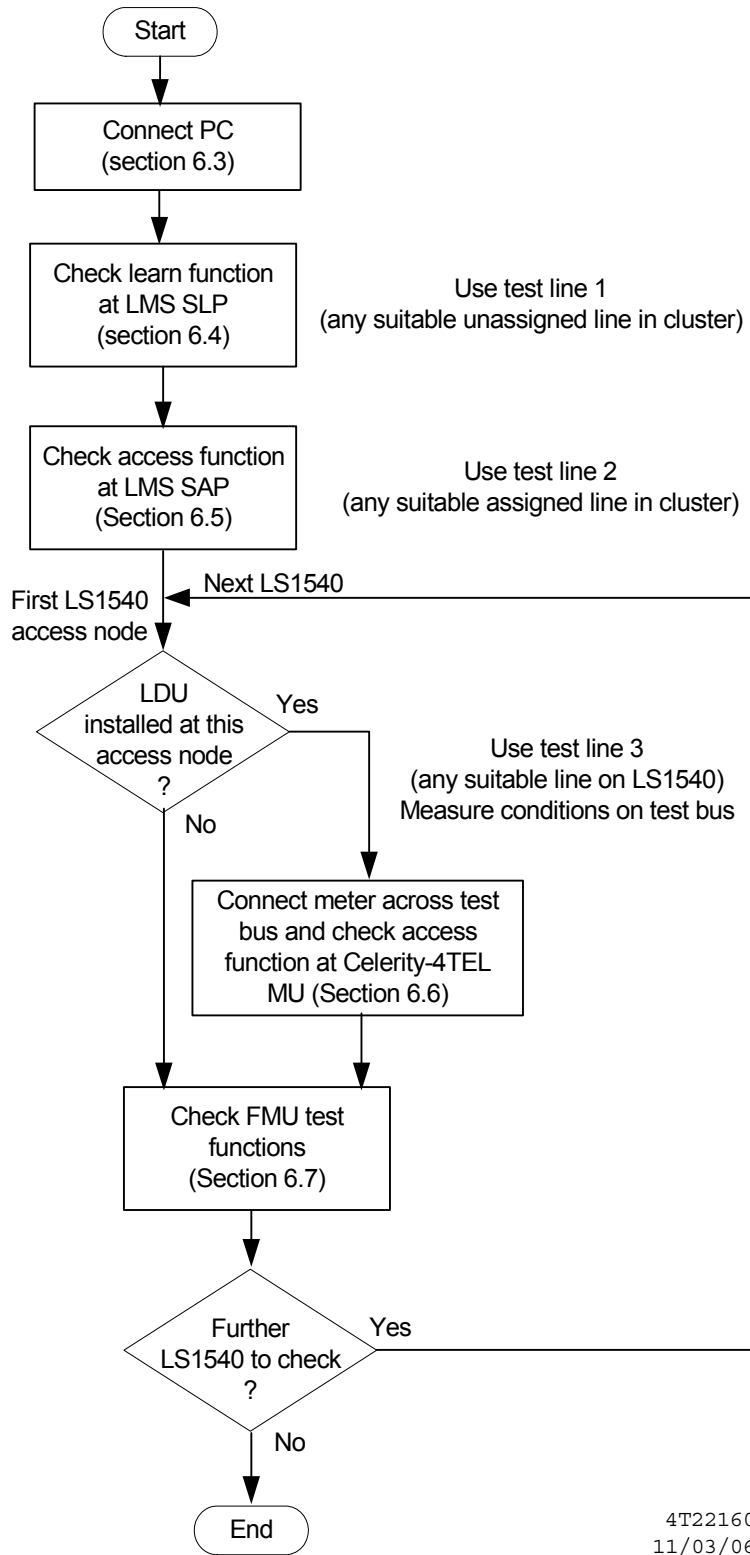
**Figure 6-1: Interface Test Procedure Overview**

## 6.3 Setting up

Check line access when all LDUs are fully installed in the switch and are connected to their designated exchange ports. Follow the procedure in this chapter. Note down any deviation from the system responses and responses given in the procedure and resolve the problem before proceeding further.

Use the test port checksheet to check off each test as it is completed.

1.      Connect your PC to a network connection that will provide a network connection to the LMS.

2.      If required, login using whatever login procedure is required by the network and/or the LMS in question to establish a session on the LMS.

## 6.4 Checking the Learn Function at the SLP

Figure 6-2 summarises the learn function check that is carried out to verify that the switch responds correctly to learn commands applied at the SLP assigned to the TSC. The procedure is detailed below.

**Note:** During the procedure in this section an unassigned line has to be assigned then returned to it's previous status. If anything prevents you from assigning and de-assigning lines you should use other Litespan facilities to ascertain that the learn function is enabled at the SLP that the TSC uses.

```
                          ┌─────────┐
                          │  Start  │
                          └─────────┘
                               │
                               ▼
              ┌────────────────────────────┐        Carry out this
              │     Request learn on       │        procedure if you can
              │     unassigned line        │        assign and de-assign
              │      (test line 1)         │        unassigned lines in
              └────────────────────────────┘        switch.
                               │
                               ▼                     If unable to do this,
              ┌────────────────────────────┐         use switch facilities
              │     Check response         │         to verify that the
              │  shows unassigned line      │         learn function is
              └────────────────────────────┘         available at the SLP
                               │                      that is assigned to
                               ▼                      4TEL
              ┌────────────────────────────┐
              │    Assign line in switch    │
              └────────────────────────────┘
                               │
                               ▼
              ┌────────────────────────────┐
              │     Repeat learn request    │
              └────────────────────────────┘
                               │
                               ▼
              ┌────────────────────────────┐
              │     Check response          │
              │     shows line now          │
              │        assigned             │
              └────────────────────────────┘
                               │
                               ▼
              ┌────────────────────────────┐
              │     Return line to          │
              │   unassigned status in       │
              │         switch              │
              └────────────────────────────┘
                               │
                               ▼
                          ┌─────────┐
                          │   End   │        4T22161
                          └─────────┘        11/03/06
             Check access function next
```

**Figure 6-2: Learn Function Test**

Follow the procedure below to check the learn function at the SLP to which the TSC is connected.

**3.** If possible (see note above) establish a network connection with the SLP using the appropriate login or other procedure if required.

**4.** Type the following command at the PC:

**GET-SUBS-INFO,1,DN,*dn1*,REQMASK, "YYYNNNNNNNNNNNY"<Enter>**

Where *dn1* is the directory number (DN) of test line 1 in full national directory number format. (Test line 1 is an unassigned line – see Chapter 3.)

**Note:** The REQMASK (data required mask) identifies the information required in the response. The "Y" characters in the mask effectively request the following information:

– DN (directory number)

– UPID (equipment number)

– NFN (the identity of the Litespan 1540 at which the line can be accessed for test)

– ST (line type, POTS or ISDN basic rate)

*The system will respond with a message in the form:*

```
GET-SUBS-INFO,LAST,1,ERROR,TOE,LE,14 => dirNumberNotInNE
```

*or*

```
GET-SUBS-INFO,LAST,1,ERROR,TOE,LE,19 => unknownSubscriber
```

Where the important parameter is the fourth which should be "ERROR" as shown and the last which shows that the number submitted in step 4 (test line 1) is a directory number not in the Network element (first example above) or an unknown subscriber (second example above).

**5.** Check that the response indicates that the line is unassigned/not known.

**6.** Assign test line 1 in the switch

**7.** Re-type the command used in step 2:

**GET-SUBS-INFO,1,DN,*dn1*,REQMASK,"YYYNNNNNNNNNNNY"<Enter>**

*The system will respond with a message in the form:*

```
GET-SUBS-INFO,LAST,1,OK,DN dirnum,UPID "eqnum",NFN "access_node",ST linetype<CR>
```

8. Check the response. The fourth parameter should now be "OK" as shown and the parameters that follow should be as follows:

   – *dirnum* should be the DN of test line 1.

   – *eqnum* will be in the form *a#b#c#d#* where the elements identify the line by rack within a node (always 1), subrack, slot, and port. For example, the equipment number 4#3#02#1 indicates rack 4, subrack 3, slot 02, port 1.

     **Note:** LS1540s, are configured by Slovak Telekom, to be distinguished by the "nEFriendlyName" field in the response string. This field identifies a specific node within an NGN site. Since a node can have only one rack, the 'rack' field is always '1'.

   – *accessnode* is name of the access node which effectively identifies the test port (also the rack within a site) at which the line under the test is located and can be accessed for test.

   – *linetype* identifies the line type as either a POTS (POT) or ISDN basic rate (BA).

9. Return the test line 1 to it's unassigned status (reverse the action in step 6).

**Note 1:** You can check that you have successfully de-assigned the line by repeating step 7.

**Note 2:** Check off the tests as you carry them out (see Figure 6-3). If you have any problems resolve them before proceeding further and reference them in the "Remark/report" space provided.



**Figure 6-3: Completing the Checksheet**

## 6.5 Checking the Access Function at the SAP

Figure 6-4 summarises the access function check that is carried out to verify that the switch responds correctly to access commands applied at the SAP assigned to the TSC. The procedure is detailed below.
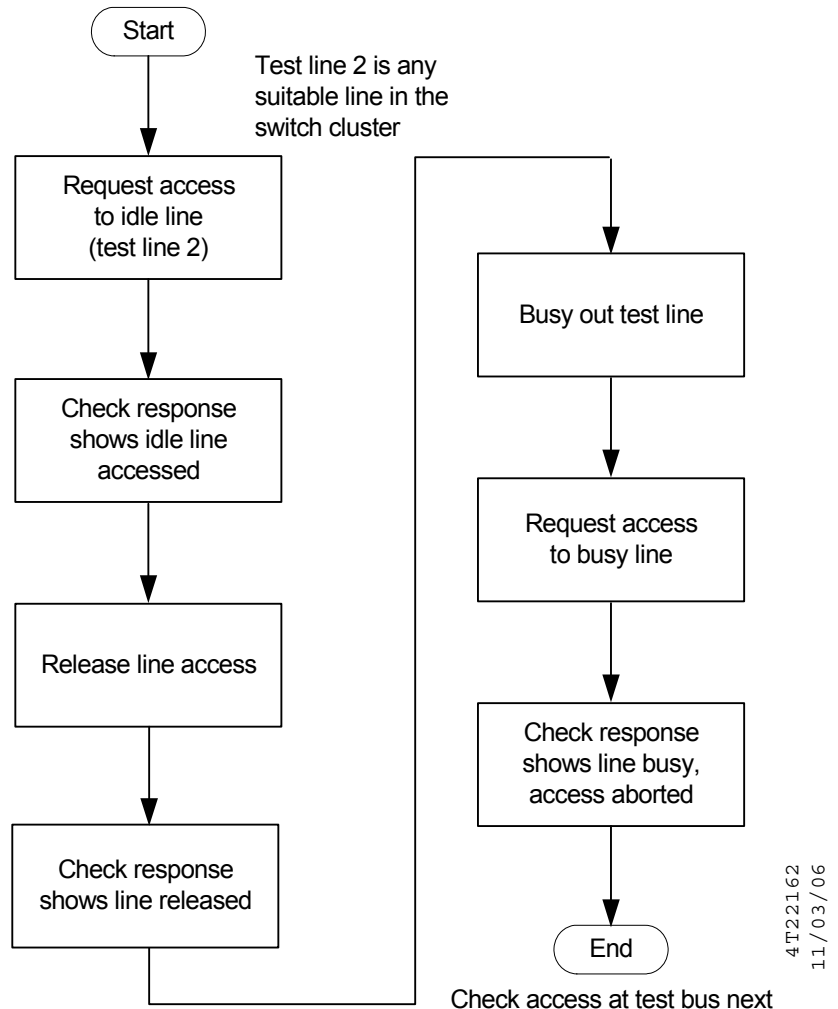


**Figure 6-4: SAP Line Access Test**

**Line Access (Idle Line)**

**10.** Establish a session on the LMS SAP using the correct login or other procedure if required.

**11.** Type the following command at the PC:

**DRY-LOOP-TEST,1,*dn2*<Enter>**

Where *dn2* is the directory number (DN) of test line 2 in full national directory number format. (Test line 2 is an idle assigned line – see Chapter 3.).

*The system will respond with a message in the form:*

```
DRY-LOOP-TEST,LAST,1,dirnum,"accessnode",OK,UP,,"eqnum",DLR connectionEstablished<CR>
```

12. Check the response. The sixth parameter should be "OK" as shown. Other significant parameters are:

    – The final field gives the result of the access. In the example shown above "DLR connectionEstablished" indicates that you have test access to *dn2* and it is an idle line. If it were busy the final field would be "DLR accessFailed". Anything else in the final field indicates an untestable line.

    The significance of *dirnum*, *accessnode*, *eqnum*, are as described in step 8.

13. Type the following command:

    **CANCEL-PERM-TEST,1,DN,*dn2*<Enter>**

    where *dn2* is the DN of test line 2 (see Chapter 3)..

    *The switch will respond:*

```
CANCEL-PERM-TEST,LAST,1,dn2,"accessnode",OK,UP,,"eqnum",TO pass,ATR connectionEstablished<CR>
```

14. Check the following parameters in the switch response:

    – The sixth parameter should be "OK" as shown in the above example.

    – The 10th parameter should be "TO pass" as shown in the above example.

    – The last parameter gives the result of the release. "ATR connectionEstablished" (shown in the above example) indicates a successful release. Any other value indicates a failure.

**Line Access (Busy Line)**

15. Busy out test line 2.

16. Repeat the access command (used in step 11) by typing:

    **DRY-LOOP-TEST,1,*dn2*<Enter>**

    *The system will respond with a message in the form:*

```
DRY-LOOP-TEST,LAST,1,dirnum,"accessnode",OK,UP,,"eqnum",DLR accessFailed<CR>
```

**17.** Check that the last field now shows that access has failed.

**Note:** LMS does not explicitly indicate that the line under test is busy. It only presents the result of the attempt for access.

**18.** Release test line 2 so that it is idle again.

## 6.6 Checking Line Access at the LDU

Figure 6-5 summarises the access function check that is carried out at each LDU. The check verifies that the line test access is correctly provided at the LDU test bus in response to commands applied at the SAP that is assigned to the TSC. The procedure is detailed below.
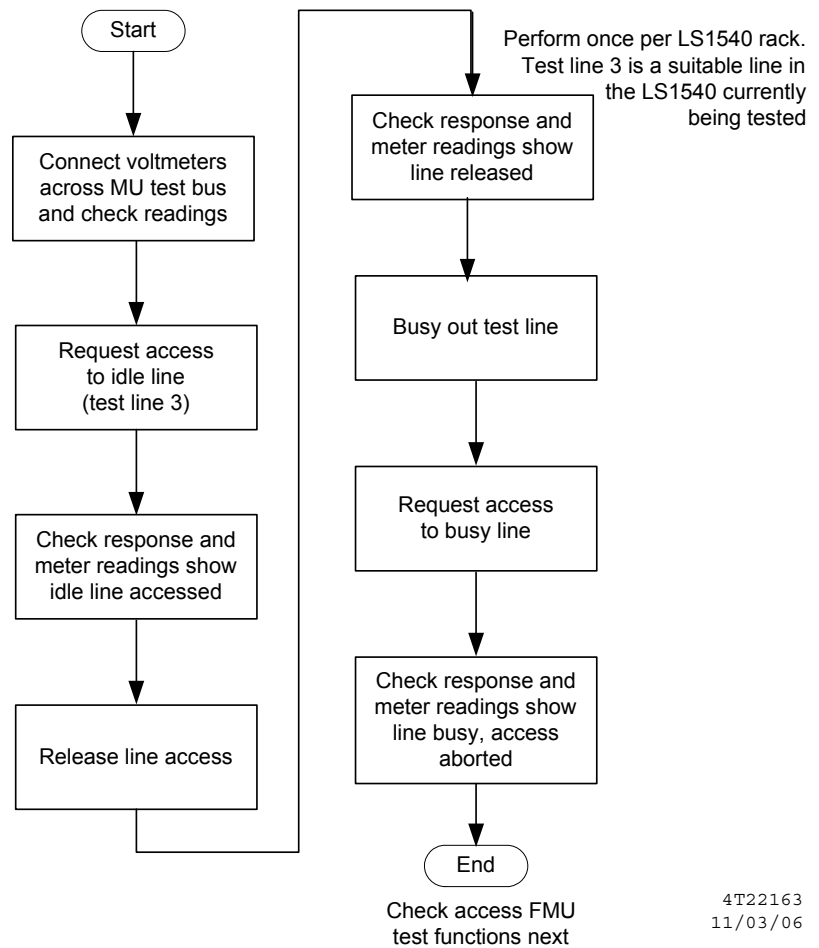


**Figure 6-5: Checking Line Access at LDU**

Follow the procedure below to test the access to the LDU test bus.

**Line Access (Idle Line)**

**19.** Disconnect the connector on the LDU that connects the LDU test pair to the LDU – see Appendix A for connections.

20. On the connector that you have removed from the LDU (which should be connected to the switch test port) Connect the voltmeter active lead to A-wire of IN bus and the earth lead to the LDU earth – see Appendix A for connections.

    Then move the voltmeter active lead to A-wire of the LDU OUT bus while keeping the earth lead at LDU earth.

21. Ensure that the PC is in communication with the SAP.

    **Note:** This was established in step 10 and, unless a timeout or some other interruption has caused the connection to have been dropped, the connection should still be intact.

22. Check the meter reading:
    – The IN bus A-leg should be 0 V.
    – The OUT bus A-leg should be 0 V.

23. Type in the access command at the PC:

    **DRY-LOOP-TEST,1,*dn3*<Enter>**

    where *dn3* is the directory number (DN) of test line 3 (an idle assigned line – see Chapter 3).

    *The system will respond with a message in the form:*

```
DRY-LOOP-TEST,LAST,1,dirnum,"accessnode",OK,UP,,"eqnum",DLR connectionEstablished<CR>
```

24. Check the voltage on the test pair and the response at the PC:
    – The IN bus A-leg should be either 50 V (POTS line) or 90 V (ISDN line).
    – The OUT bus A-leg should be 0 V.
    – The system response should show "OK" in the 6th field and "connectionEstablished" in the last field.

25. Type the following command:

    **CANCEL-PERM-TEST,1,DN,*dn3*<Enter>**

    where *dn3* is the DN of test line 3 (see Chapter 3).

    *The switch will respond:*

```
CANCEL-PERM-TEST,LAST,1,dn2,"accessnode",OK,UP,,"eqnum",TO pass,ATR connectionEstablished<CR>
```

26. Check the voltage on the A-leg s on both sides of the test bus and the response at the PC:
    – The IN bus A-leg should be 0 V.

    – The OUT bus A-leg should be 0 V.

    – The system response should show:

        – "OK" in the 6th field,

        – "TO pass" in the 10th field and

        – "ATR connectionEstablished" in the last field.

**Line Access (Busy Line)**

**27.** Busy out test line 3.

**28.** Repeat the access command by typing:
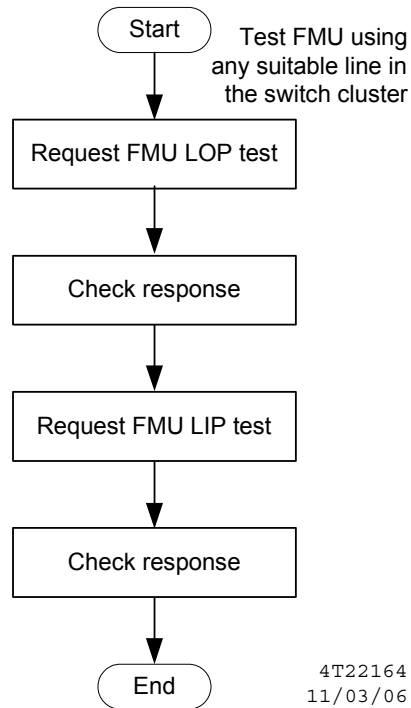
**DRY-LOOP-TEST,1,*dn3*<Enter>**

***The system will respond with a message in the form:***

```
DRY-LOOP-TEST,LAST,1,dirnum,"accessnode",OK,UP,,"eqnum",DLR accessFailed<CR>
```

**29.** Check the voltage on the A-legs of both IN and OUT test buses and the response at the PC:

    – The IN bus A-leg should still be 0 V.

    – The OUT bus A-leg should be 0 V.

    – The system response should show " DLR accessFailed " in the last field.

**30.** Remove meter connections made in step 20 and reconnect the LDU connector that you disconnected in step 19.

**31.** If there are further lines to test, repeat steps 19 to 30 on the next test line.

## 6.7 Checking the FMU Functionality

The interface described in this document enables the 4TEL system to use the switch in-built test head to test lines. This facility is checked for each Litespan 1540 using the procedure in this section. The procedure is summarised in Figure 6-6 and tests FMU functionality by checking Litespan responses to commands that the TSC will issue when attempting to test a line via the FMU. The procedure is detailed below.

```
                              ╭─────────╮   Test FMU using
                              │  Start  │   any suitable line in
                              ╰─────────╯   the switch cluster
                                   │
                                   ▼
                       ┌───────────────────────┐
                       │  Request FMU LOP test  │
                       └───────────────────────┘
                                   │
                                   ▼
                       ┌───────────────────────┐
                       │     Check response     │
                       └───────────────────────┘
                                   │
                                   ▼
                       ┌───────────────────────┐
                       │  Request FMU LIP test  │
                       └───────────────────────┘
                                   │
                                   ▼
                       ┌───────────────────────┐
                       │     Check response     │
                       └───────────────────────┘
                                   │
                                   ▼                 4T22164
                              ╭─────────╮            11/03/06
                              │   End   │
                              ╰─────────╯
```

**Figure 6-6: FMU Check**

Follow the procedure below to check that the commands that the Celerity-4TEL system uses are enabled at the SAP.

**32.**    Ensure that the PC is in communication with the SAP.

**Note:** This was established in step 10 and, unless a timeout or some other interruption has dropped the connection, the connection should still be intact.

**33.**    Type in the outward test (LOP) command:

**EMEAS-TEST,1,*dn4*,RIa,RIb,RIc,RId,RIe,RIh,VAa,VAb,VAc,VAd,VAe,VAh,VCa,VCb,VCc, VCd,VCe,VCh,ACa,ACb,ACc,ACd,ACe,ACh,CCa,CCb,CCc,CCd,CCe,CCh,CAa,CAb,CAc, CAd,CAe,CAh<Enter>**

Where:

– *dn4* is the DN for test line 4.

– The values RIa to CAh should be typed in as shown. They are test requests as explained in Appendix B.

***The system tests the line and returns the results in a reponse such as:***

```
EMEAS-TEST,LAST,1,dirnum, ,"matrix",OK,UP,POT,"eqnum",VAa 97,VAb 97,VAc 93,
VAd "testNotAllowed",VAe "testNotAllowed",VAh "testNotAllowed",VCa 0,VCb 0,VCc -100,
VCd "testNotAllowed",VCe "testNotAllowed",VCh "testNotAllowed",ACa "testNotAllowed",
ACb "testNotAllowed",ACc "testNotAllowed",ACd "testNotAllowed",ACe "testNotAllowed",
ACh "testNotAllowed",CCa "testNotAllowed",CCb "testNotAllowed",CCc "testNotAllowed",
CCd "testNotAllowed",CCe "testNotAllowed",CCh "testNotAllowed",CAa 14,CAb 29,CAc 26,
CAd "testNotAllowed",CAe "testNotAllowed",CAh "testNotAllowed",RIa 208000000,
RIb 127000000,RIc 115000000,RId "testNotAllowed",RIe "testNotAllowed",RIh 205000000<CR>
```

**Note:** The test results will differ from the example shown above. The actual values will depend on the state of the line being tested. Where measurements are not possible, the system will provide an explanatory text string such as "testNotAllowed".

**34.** Check the response:

- The parameters *dirnum*, and *eqnum* identify the directory and equipment numbers of the line under test.

- The parameter *matrix*, identifies the test matrix that provides test access to that line.

- The tests requested in step 33 are re-iterated (not necessarily in the same order) followed by the result of the test. The measurements are as indicated in Appendix B.

**35.** Type in the inward test (LIP) command:

**EMEAS-TEST,1,*dn4*,FVa FVh FCa FCh<Enter>**

*The system tests the line and returns the results in a reponse such as:*

```
EMEAS-TEST,LAST,1,dirnum, ,"accessnode",OK,UP,POT,"eqnum",FVa result,FVh result,FCa result,
FCh result<CR>
```

**36.** Check the response. The format is explained in Appendix B.

# Appendix A: LDU Test Bus Terminations

## A.1 Introduction

This appendix identifies the location and pin numbering of the test bus connections on the LDU. It contains the following sections:

| Section | Title |
|---------|-------|
| A.1 | Introduction |
| A.2 | Test Bus Terminations |
| A.3 | MAX 2000B Connections |

## A.2 Test Bus Terminations

Figure A-1 shows the location of the connectors on the LDU rear panel. In this interface, four connectors are in use. They are:

- P1, exchange battery and earth connections as described in *LDU Installation*.

- P4, sample line and test bus connections. The connector pinout is shown in Figure A-2 and connection to the MAX 2000B is described in *LDU Installation* and illustrated in Section A-2.

- J5 is the V.24 connector for TSC communications as described in *LDU Installation*.

- J6 is the V.24 connector for MAX 2000B control. The connection to the MAX 2000B is described in *LDU Installation* and illustrated in Section A-2.

**Note:** *LDU Installation* covers the connection of the MAX 2000. The MAX 2000B has exactly the same external connections. The difference is that the MAX 2000 default (inactive) condition is to connect each TEST bus IN pair through to the corresponding OUT pair at each MAX 2000 outlet. The MAX 2000B defaults to isolate the IN pair from it's corresponding OUT pair.

**Figure A-1: LDU Rear Panel**

A    C

2
4
6
A-wire ——————— 8 ——————— B-wire ⎤ Sample line
10
12
OUT, A-wire ——————— 14 ——————— OUT, B-wire ⎤
IN, A-wire ——————— 16 ——————— IN, B-wire ⎦ Test bus 1
18
OUT, A-wire ——————— 20 ——————— OUT, B-wire ⎤
IN, A-wire ——————— 22 ——————— IN, B-wire ⎦ Test bus 2
24
26
28
30
32

4T22236
03/30/07
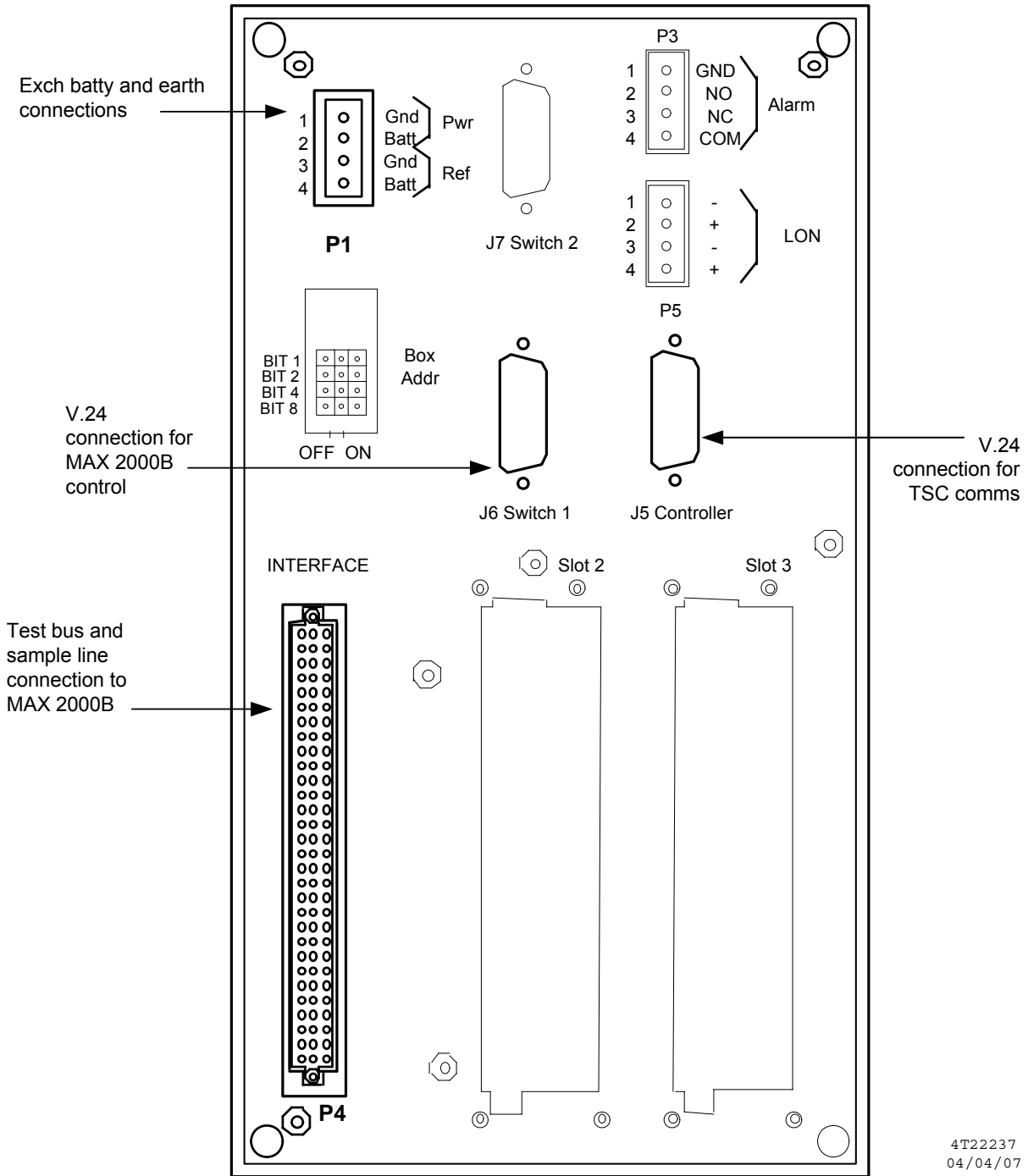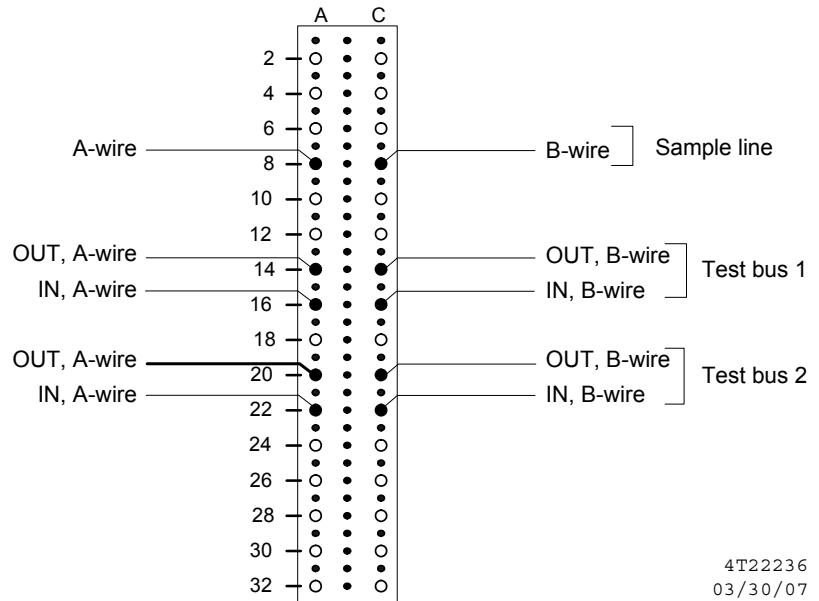
**Figure A-2: LDU Connector P4 Pinout**

## A.3 MAX 2000B Connections

*LDU Installation* covers the connection of the MAX 2000. The MAX 2000B has exactly the same external connections. The difference is that the MAX 2000 default (inactive) condition is to connect each TEST bus IN pair through to the corresponding OUT pair at each MAX 2000 outlet. The MAX 2000B defaults to isolate the IN pair from it's corresponding OUT pair.

Figure A-3 shows the way in which the LDU test bus is connected from LDU connector P4 to the MAX 2000B connector X2. It also shows the way the MAX 2000B outlets are organised on MAX 2000B connector X1. The illustration shows the LDU test bus 1 connected to the MAX 2000B inlet. If LDU test bus 2 is connected to the MAX 2000B instead of test bus 1 then the connection at the LDU is to the test bus 2 pins shown in Figure A-2 rather than the test bus 1 pins.

**Note:** MAX 2000B connectors X1 and X2 take the form of wire wrap pin fields and are located on the rear panel of the MAX 2000B. The location of LDU connectors is shown in Figure A-1.

The control signalling that the LDU uses to select and configure MAX 2000B outlets is carried out via the control cable connected between LDU connector J6 and MAX 2000B connector X2 as illustrated in Figure A-4.
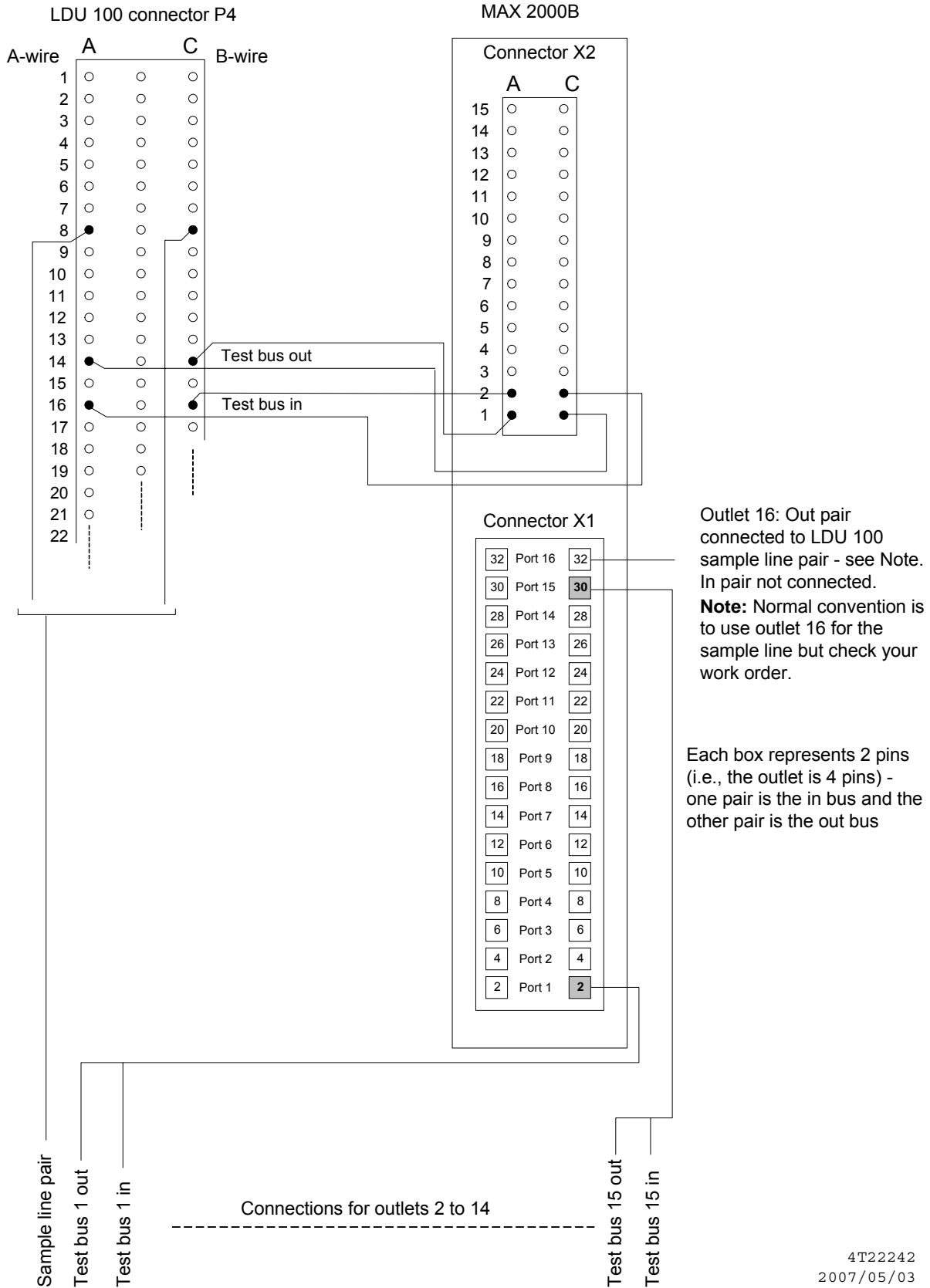
**Figure A-3: MAX 2000B Test Bus Connections**

Connector X2 on MAX 2000B
rear panel as viewed at rear
panel

Connector J6 on
LDU 100 rear panel
as viewed at rear
panel

○ = not connected

| J6 | X2 |
|---|---|
| 1    Not connected | |
| 2 | A25 |
| 3 | C25 |
| 4 ⌐ | |
| 5 | A7 |
| 6 ⌐ | |
| 7 | C26 |
| 8 | A26 |
| 9    Not connected | |

**Note:** Pins 4 and 6 linked at
connector J6 but not connected to X2

`4T22238`
`04/04/07`
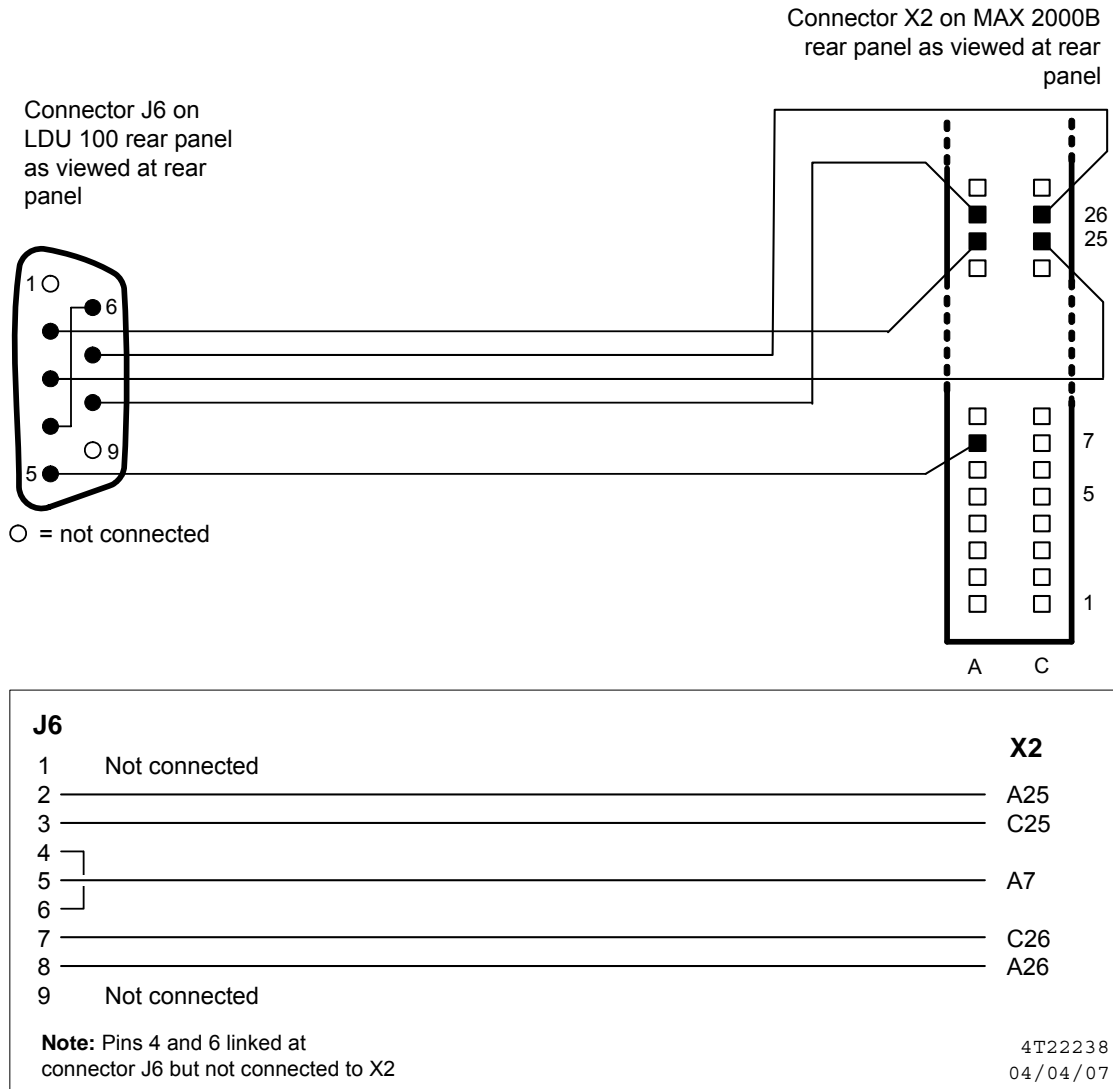
**Figure A-4: LDU 100/MAX 2000B Matrix Control Connections**

# Appendix B: TSC/Switch Communications

## B.1 Introduction

This appendix describes the switch commands and responses applicable to the Celerity-4TEL line access and test functions. It contains the following sections:

| Section | Title |
| --- | --- |
| B.1 | Introduction |
| B.2 | Accessing a Line (External Test) |
| B.3 | Releasing a Line (External Test) |
| B.4 | Other Switch Commands |
| B.5 | Switch Response Codes (External Test) |
| B.6 | FMU Tests |

## B.2 Accessing a Line (External Test)

To access a line on a switch, you need the DN of the line you wish to access (shown as *dirnum* below).

Follow the procedure below to access a line.

**1.** To access a line, type **DRY-LOOP-TEST,1,*dirnum*<ENTER>**

where *dirnum* is the DN of the line that you wish to access.

***The switch will respond:***

```
DRY-LOOP-TEST,LAST,1,dirnum,"accessnode",OK,UP,,"1#1#13#1",DLR connectionEstablished<CR>
```

**2.** Check the switch response and the following parameters:

- The final field in the reply (starting "DLR …") gives the result of the access. "DLR connectionEstablished" indicates an idle line, "DLR busyAccessAborted" a busy line. Anything else indicates an untestable line.

- The 6$^{\text{th}}$ field should be "OK".

**3.** Either:

– Repeat steps 1 and 2 for a line on another switch, or

– Repeat step 2 for another line on the current switch.

**4.** Release the line as described in Section B.3 if the line is idle.

# B.3 Releasing a Line (External Test)

Follow the procedure below to release a line.

**1.** To release a line, type
**CANCEL-PERM-TEST,1,DN,*dirnum***

where *dirnum* is the DN of the line that you wish to release.

***The switch will respond:***

```
CANCEL-PERM-TEST,LAST,1,dirnum,"accessnode",OK,UP,,"1#1#13#1",TO pass,ATR
connectionEstablished<CR>
```

**2.** Check the switch response and the following parameters:

- The final field in the reply (starting "ATR …") gives the result of the release.  "ATR connectionEstablished" indicates a successful release, and anything else a failure.

- The penultimate field should be "TO pass".

- The 6<sup>th</sup> field should be "OK".

# B.4 Other Switch Commands

The following subsections describe other commands that can be sent to the switch.

**Learn Line**

This is a request for information on a line.

Follow the procedure below to learn information on a line.

**1.** Type
**GET-SUBS-INFO,1,DN,*dirnum*,REQMASK,
"YYYNNNNNNNNNNY"<Enter>**.

where *dirnum* is the DN of the line for which you require information.

**Note:** REQMASK (data required mask) identifies the information required in the response. The mask is a string of 14 characters each of which is either "Y" or "N" as shown

above. The "Y" characters in the above example effectively request the following information:

– DN (directory number)

– UPID (equipment number)

– NFN (the identity of the access node at which the line can be accessed for test)

– ST (line type, POTS or ISDN basic rate)

***The system will respond with a message in the form:***

```
GET-SUBS-INFO,LAST,1,OK,DN dirnum,UPID "eqnum",NFN "accessnode",ST POT<CR>
```

**2.** In the switch response:

– The fourth parameter should be "OK" as shown. If it is shown as "ERROR" the line number you typed is unknown to the switch and the parameters below do not apply.

– *dirnum* should be the directory number of the line that you requested a "learn" transaction on.

– *eqnum* is the equipment number of the line in question. It will be in the form *a#b#c#d#* where the elements identify the line by rack, subrack, slot, and port. For example, the equipment number 4#3#02#1 indicates rack 4, subrack 3, slot 02, port 1.

– *accessnode* is name of the access node which effectively identifies the test port at which the line can be accessed for test.

– *linetype* identifies the line type as either a POTS (POT) or ISDN basic rate (BA).

## Pull Dial Tone (External Test)

In order to be able to do a Pull Dial Tone test a different kind of line access is required.

Follow the procedure below

**1.** Release the line (if currently accessed) as described in Section B.3.

**2.** Type **EXTERNAL-TEST,1,*dirnum*<ENTER>**

where *dirnum* is the DN of the line that you wish to access.

***The switch will respond:***

```
EXTERNAL-TEST,LAST,1,dirnum,"accessnode",OK,UP,,"eqnum",ETR connectionEstablished<CR>
```

In the switch response:

– The final field in the reply (starting "ETR …") gives the result of the access. "ETR connectionEstablished" indicates an idle line, "Wrong operation code" indicates a busy line. Anything else indicates an untestable line.

**Note:** These responses have been acquired in the pilot implementation of the LS1540 interface. It is not compliant with the switch documentation. However, this does not impact operation as the LS1540 does not permit any kind of access to a busy line.

– The 6th field should be "OK" as shown above.

3. Release the line as described in Section B.3 if the line is idle.

# B.5 Switch Response Codes (External Test)

This section describes the *access Result Value* field shown in the switch replies given earlier.

## The Access Result Field

The *access Result Value* field has the following formats:

```
DLR <value>
ETR <value>
```

Where:

• DLR indicates the response from a DRY-LOOP-TEST request

• ETR indicates the response from an EXTERNAL-TEST request

• `<value>` is the result value (see Table B-1).

**Table B-1: Result Values**

| *<value>* | *Significance* |
|---|---|
| connectionEstablished | The requested line is idle and accessed for testing. |
| accessFailed | Exchange congestion is preventing access. |
| DLR accessFailed (for DRY-LOOP-TEST) | The requested line is busy. |
| Wrong operation code (for EXTERNAL-TEST) | **Note:** These responses have been acquired in the pilot implementation of the LS1540 interface. They are not fully compliant with the switch documentation. However, this does not impact the operation as the LS1540 does not permit access to a busy line. |
| dangerousVoltage | The specified line has been marked faulty by the switch or an operator. |
| testMechanismBusy | The specified line is being tested and cannot be accessed. |
| customerOverrideAborted | The specified line has been switched out of service by the switch or an operator. |
| undefined | The specified number is illegal or not been assigned to a line. |

# B.6 FMU Tests

The command for FMU tests fall into three categories:

- Line Outward Parametric (LOP) tests. The TSC uses a string of commands that request a number of tests on the exchange line looking outward into external cable from the MDF.

- Line Inward Parametric (LIP) tests. The TSC uses a string of commands that request a number of tests on the exchange line looking in towards the exchange from the MDF.

## LOP Tests

The LOP test command that the TSC uses to request the FMU to carry out a series of 36 line tests is:

**EMEAS-TEST,1,***dirnum***,RIa,RIb,RIc,RId,RIe,RIh,VAa,VAb,VAc,VAd,VAe,VAh,VCa,VCb,VCc, VCd,VCe,VCh,ACa,ACb,ACc,ACd,ACe,ACh,CCa,CCb,CCc,CCd,CCe,CCh,CAa,CAb,CAc, CAd,CAe,CAh<Enter>**

Where:

- *dirnum* is the DN for the line that is to be tested.

- The values RIa to CAh should be typed in as shown. They are test requests each comprising;

  – A measurement code (the first two upper case characters - see Table B-2) and

  – A configuration code (the third, lower case, character - see Table B-3)

  For example the first test request RIa is requesting a measurement of the insulation resistance between the A- and B-leg.

  ***The system tests the line and returns the results in a reponse such as:***

```
EMEAS-TEST,LAST,1,dirnum, ,"matrix",OK,UP,POT,"eqnum",VAa 97,VAb 97,VAc 93,
VAd "testNotAllowed",VAe "testNotAllowed",VAh "testNotAllowed",VCa 0,VCb 0,VCc -100,
VCd "testNotAllowed",VCe "testNotAllowed",VCh "testNotAllowed",ACa "testNotAllowed",
ACb "testNotAllowed",ACc "testNotAllowed",ACd "testNotAllowed",ACe "testNotAllowed",
ACh "testNotAllowed",CCa "testNotAllowed",CCb "testNotAllowed",CCc "testNotAllowed",
CCd "testNotAllowed",CCe "testNotAllowed",CCh "testNotAllowed",CAa 14,CAb 29,CAc 26,
CAd "testNotAllowed",CAe "testNotAllowed",CAh "testNotAllowed",RIa 208000000,
RIb 127000000,RIc 115000000,RId "testNotAllowed",RIe "testNotAllowed",RIh 205000000<CR>
```

Where:

- The parameters *dirnum*, and *eqnum* identify the directory and equipment numbers of the line under test.

- The parameter *matrix*, identifies the test matrix that provides test access to that line.

- The tests listed in the request (see above) re-iterated (not necessarily in the same order) followed by the result of the test. The measurements are as indicated in Tables B-2 and B-3.

  For example the first result, VAa 97 indicates that the a.c. voltage measured between the A- and B-leg is 97 mV.

  Some results may be in the form of a text string indicating why the measurement value was not available. For example the test request VAd in the request shown in the above command requested a measurement of the a.c. voltage between the A-leg and exchange battery. The result shown above is given as "testNotAllowed".

**Table B-2: Measurement Codes**

| Code | Measurement | Units |
|------|-------------|-------|
| VA | AC voltage | mV |
| VC | DC voltage | mV |
| AC | AC current | mA |
| CC | DC current | mA |
| RI | Resistance Insulation | Ω |
| CA | Capacitance | nF |
| FV | Feed voltage | mV |
| FC | Feed current | mA |

**Table B-3: Configuration Codes**

| Code | Configuration |
|------|---------------|
| a | A-leg to B-leg (aTOb) |
| b | A-leg to earth (aTOearth) |
| c | B-leg to earth (bTOearth) |
| d | A-leg to battery (aTObattery) |
| e | B-leg to battery (bTObattery) |
| h | B-leg to A-leg (bTOa) |

## LIP Tests

The LIP test command that the TSC uses to request the FMU to carry out a series of 4 line tests is:

**EMEAS-TEST,1,*dirnum*,FVa FVh FCa FCh<Enter>**

Where *dirnum* is the DN for the line that is to be tested.

The switch response providing the test results takes the form:

```
EMEAS-TEST,LAST,1,dirnum, ,"accessnode",OK,UP,POT,"eqnum",FVa result,FVh result,FCa result,
FCh result<CR>
```

# Appendix C: Interface Checksheets

Use the following (or similar) checksheets to record test data and results:

- The TSC/LMS1353 Learn and Line Access Checksheet shown in Figure C-1.

- The The LDU/LS1540 Line Access Checksheet shown in Figure C-2.

# TSC/LMS1353 LEARN AND LINE ACCESS CHECKSHEET

**1** SITE DETAILS

District [            ]          Switch [            ]

**2** TEST DATA

DN

Test line 1 (unassigned) [            ]

Test line 2 (assigned) [            ]

**3** LEARN CHECK

| | Learn unassigned line | Assign line | Learn assigned line | De-assign line | Test completed | Remark/report ref. |
|---|---|---|---|---|---|---|
| Test line 1 | ☐ | ☐ | ☐ | ☐ | ☐ | [            ] |

**4** LINE ACCESS CHECK

| | Access line | Check response | Release line | Check response | Test completed | Remark/report ref. |
|---|---|---|---|---|---|---|
| Test line 2 | ☐ | ☐ | ☐ | ☐ | ☐ | [            ] |

**5** TEST PERFORMED BY

Name [            ]          Date [            ]

Signature [            ]          Sheet [    ] of [    ]

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**Figure C-1: The TSC/LMS1353 Learn and Line Access Checksheet**

**LDU/LS1540 LINE ACCESS CHECKSHEET**

**1    SITE DETAILS**

District [          ]                    Exchange [          ]

**2    TEST PORT CHECKS**

| | LDU | Access node (LS1540) | Test Line | Access idle line | Release | Access busy line | Release | Report ref | Test completed |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | ☐ | ☐ | ☐ | ☐ | | ☐ |
| | Switch internal test | | | ☐ | ☐ | ☐ | ☐ | | ☐ |
| 2 | | | | ☐ | ☐ | ☐ | ☐ | | ☐ |
| | Switch internal test | | | ☐ | ☐ | ☐ | ☐ | | ☐ |
| 3 | | | | ☐ | ☐ | ☐ | ☐ | | ☐ |
| | Switch internal test | | | ☐ | ☐ | ☐ | ☐ | | ☐ |
| 4 | | | | ☐ | ☐ | ☐ | ☐ | | ☐ |
| | Switch internal test | | | ☐ | ☐ | ☐ | ☐ | | ☐ |
| 5 | | | | ☐ | ☐ | ☐ | ☐ | | ☐ |
| | Switch internal test | | | ☐ | ☐ | ☐ | ☐ | | ☐ |
| 6 | | | | ☐ | ☐ | ☐ | ☐ | | ☐ |
| | Switch internal test | | | ☐ | ☐ | ☐ | ☐ | | ☐ |
| 7 | | | | ☐ | ☐ | ☐ | ☐ | | ☐ |
| | Switch internal test | | | ☐ | ☐ | ☐ | ☐ | | ☐ |
| 8 | | | | ☐ | ☐ | ☐ | ☐ | | ☐ |
| | Switch internal test | | | ☐ | ☐ | ☐ | ☐ | | ☐ |

**5** TEST PERFORMED BY

Name [          ]                         Date [          ]

Signature [          ]                     Sheet [    ] of [    ]

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**Figure C-2: The LDU/LS1540Line Access Checksheet**

# Appendix D: Powering the LDU 100 Up or Down



4T22084
02/17/05

Loosen the MTM board retaining screws and partially withdraw the MTM board (until the power indicator extinguishes) to power the LDU 100 down. Re-insert it to power the LDU 100 up and retighten the retaining screws at top and bottom (fingertight only).

***Do not*** power the LDU 100 down or up by removing or replacing fuses or the exchange battery connector.

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