
255D Mounting Assembly

Contents

Section 1.	Description	1
Section 2.	255D Mounting Assembly Cabling and Installation.	4
Section 3.	255/257 Module Installation	11
Section 4.	2555/A Alarm and Access Module Installation	12
Section 5.	Regulatory Statements	13
Section 6.	Specifications	14
Section 7.	Acronyms	14
Section 8.	Testing, Technical Assistance, Repair and Return	15

1. Description

Overview

- 1.1 This section includes:
- Mounting Assembly features
 - Accessories
 - 255 T1 Echo Canceller system components
 - 255A/255D comparison table
 - Reference documents

Reason for Change

- 1.2 This practice has been revised to update the Reference Documents subsection.

Mounting Assembly Features

- 1.3 The primary features of the 255D Mounting Assembly are:
- Accommodates sixteen 255- or 257-Series T1 Echo Canceller Modules
 - Reversible mounting ears allow flush mounting for equipment cabinet installation or center mounting for relay racks
 - Shorting contacts are provided for T1 facility continuity in unequipped module positions
 - 50-pin female telco-style connectors for the T1 PCM streams
 - Underwriters Laboratories (UL) and Canadian Standards Association (CSA) recognized
 - FCC Part 15 (Class A) and Industry Canada (Class A) compliant when equipped with the 80.2094 EMI (electromagnetic interference) door assembly
 - Front panel access to the Maintenance serial communications port (SCP) via the 2555/A Alarm and Access Module
 - 25-pin D-subminiature connectors for the RS-232D-compatible Control and Maintenance ports

- IN and OUT jacks for the Control and Maintenance SCPs eliminate the need for special daisy-chain cables; up to 128 modules can be placed onto the same link with straight-thru cables
- Redundant –48VDC power inputs
- Individual major and minor alarm outputs for each module installed in the mounting assembly via wire-wrapping pins
- Shelf major and minor alarm outputs via a single set of wire-wrapping pins

Accessories

1.4 Optional accessories for the 255D Mounting Assembly are as follows:

- 50-pin wire-wrap adapter for the T1 ports (four required per 255D) 51.0102
- EMI door assembly 80.2094
- Heat baffle for installation between multiple 255D Mounting Assemblies 80.2098
- 23-inch Rack Adapter Kit for the 255D 80.2120
- 23-inch Rack Adapter Kit for the 80.2098 heat baffle 80.2121

255 System Components

1.5 The 255 T1 Echo Canceller System components are summarized in Table 1-1.

Model	Description	Application
2551	32ms T1 Echo Canceller Module	Provides echo cancellation on endpaths with up to 32ms of delay
2551A	64ms T1 Echo Canceller Module	Provides echo cancellation on endpaths with up to 64ms of delay
2551C	64ms T1 Echo Canceller Module	Intended for use in mixed analog/digital cellular networks
2571	32ms T1 Echo Canceller Module	Provides echo cancellation on endpaths with up to 32ms of delay
2572	64ms T1 Echo Canceller Module	Provides echo cancellation on endpaths with up to 64ms of delay
2554G	32ms Endpath Expansion Subassembly	Extends maximum endpath of 2551 to 64ms
2554H	64ms Endpath Expansion Subassembly	Extends maximum endpath of 2551A to 128ms
2555	Alarm and Access Module	Provides SCPs and shelf alarms
2555A	Alarm and Access Module	Provides SCPs, shelf alarms, and flash programming voltage
2557	T1 Test Access Module	Provides bantam jack access to the send and receive T1 facilities
2563A	Signaling Tone Disabler Subassembly	Disables echo cancellation in ITU-T No.5, No. 6 and No. 7 signaling schemes
Continued on Next Page		

Table 1-1 255 System Components

Model	Description	Application
2563B	High Level Compensation (HLC) Subassembly	Prevents high receive-in audio levels from overloading near-end analog circuits
2563C	Signaling Tone Disabler/HLC Subassembly	Combines the functions of the 2563A and 2563B on one subassembly
255A	16-position Mounting Assembly	T1 connections via wire-wrapping pins
255D	16-position Mounting Assembly	T1 connections via four 50-pin female telco connectors
2574G/H	Additional Delay Expansion Subassemblies	Increases the modules' endpath delay capabilities

Table 1-1 255 System Components**255A/255D Comparison**

1.6 Table 1-2 provides a comparison of features for the 255A and 255D Mounting Assemblies.

Feature	255A	255D
T1 connections with wire-wrapping pins	Yes	No
T1 connections with 50-pin telco connectors	No	Yes
Accepts 2555A Alarm and Access Module (provides programming voltage for firmware updates)	Yes	Yes
IN and OUT jacks for SCPs	Yes	Yes
Individual major and minor alarm contacts for each 255 T1 Echo Canceller	Yes	Yes
Shelf alarm contacts for the major and minor alarms	Yes	Yes
Redundant power inputs	Yes	Yes
UL recognized	Yes	Yes
FCC Part 15 (Class A) compliant	No	Yes
Accepts 80.2120 23-inch mounting ears	Yes	Yes

Table 1-2 255A/255D Feature Comparison**Reference Documents**

- 1.7 The practices listed below may be obtained through your Tellabs representative or by contacting any Tellabs office listed in Section 8.
- 2551 and 2551A T1 Echo Cancellers practice 76.812551
 - 2551C T1 Echo Canceller practice 76.812551C
 - 2571 and 2572 T1 Echo Canceller Modules practice 76.81257X
 - 25VX Audio Processors practice 76.8125VX
 - 255 Feature Package 1.2.0 Release Note 76.81255RN120
 - 255A 16-position Mounting Assembly (wire-wrapping pins) practice 76.810255A
 - 2555/A Alarm and Access Modules practice 76.812555
 - 2557 T1 Test Access Module practice 76.812557
 - 257D 23-inch T1 Echo Canceller Mounting practice 76.810257D

2. 255D Mounting Assembly Cabling and Installation

Overview

- 2.1 This section describes the 255D's:
- relay rack configuration
 - power connections
 - PCM (T1) connections
 - alarm connections
 - SCP connections

Inspection

- 2.2 Visually inspect the equipment upon its arrival to detect any possible shipping damage. If damage is found, immediately file a claim with the carrier. If the equipment has been stored, reinspect it prior to installation.

Relay Rack Configuration

- 2.3 Up to eight 255D Mounting Assemblies can be installed in a standard 7-foot relay rack (see Figure 2-1). Contact your Tellabs representative for pre-wired relay rack configurations.

79.0580 Fuse Panel
255D
255D
80.2098 Heat Baffle
255D
255D
80.2098 Heat Baffle
255D
255D
80.2098 Heat Baffle
255D
255D

Figure 2-1 Typical 7-Foot Rack Layout

Power Connections

Warning: To ensure compliance with UL safety requirements, connect the equipment to a 48VDC supply source that is electrically isolated from the AC source. The 48VDC source is to be reliably connected to earth.

- 2.4 Input power connections to the 255D must be made with 14 to 18AWG wire. The 255D accepts two –48VDC feeds, both positive ground referenced. For complete redundancy each feed must be capable of independently supplying sufficient current for the entire shelf. Power input terminals are located in the lower left and lower right corners of the mounting assembly's backplane (see Figure 2-2). To connect power to the 255D:
1. Ensure that the –48VDC supply is off and route the A and B power feeds to the power input terminals labeled A POWER and B POWER that are located at the lower left and lower right corners of the 255D's backplane.
 2. Connect the positive battery connection of the A power feed to the +BAT connector of the left-hand terminal block. Connect the negative battery connection of the A power feed to the –BAT connector of the same terminal block.
 3. Repeat step 2 for the B power feed at the right-hand terminal block.
 4. Make connections to the frame ground connectors of the A and B power terminals in accordance with local practice.

Note: When using 255 Modules that are running 255 System Firmware Revision H (or higher), the loss of a single power feed will result in a minor alarm. The loss of both power feeds will result in a major alarm regardless of the version of 255 Module firmware that is being used.

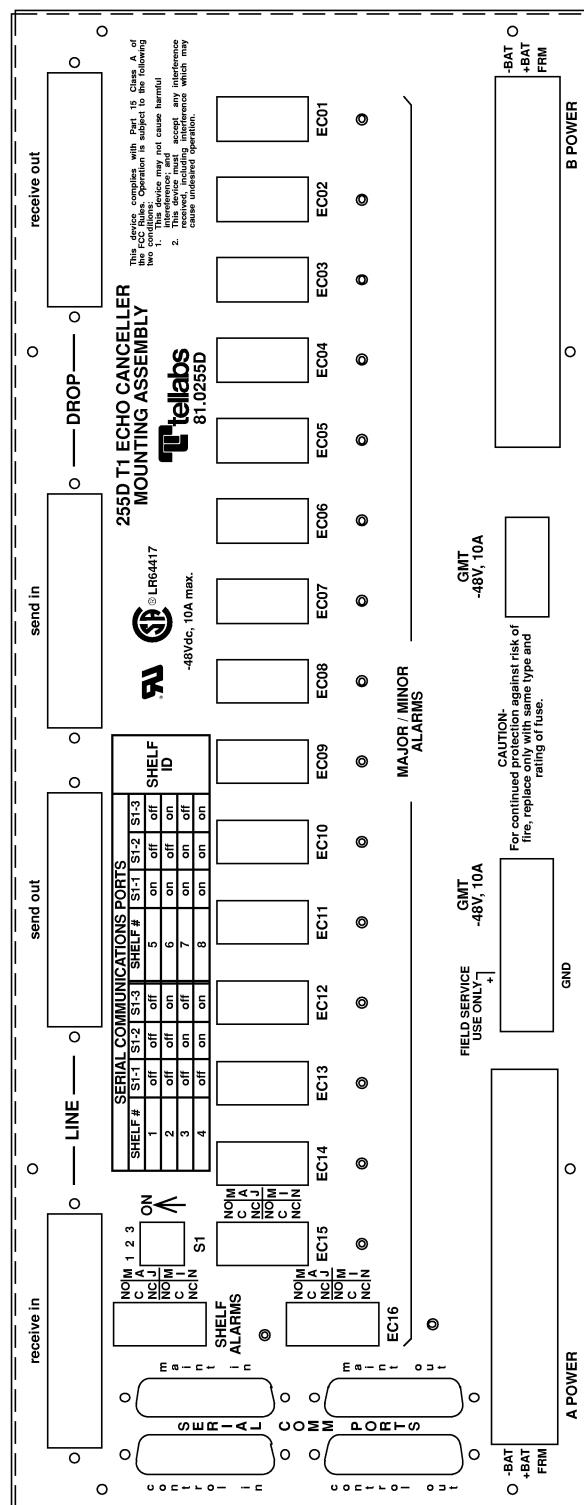


Figure 2-2 255D Backplane

PCM Connections

- 2.5 PCM connections are made to the 255D via four 50-pin female telco connectors; one each for the send-in, send-out, receive-in, and receive-out signals. PCM connections between the 255D and the DSX (digital cross-connect) should be made with 22-24AWG shielded ABAM cable.

- 2.6 Line-side connections are made to the two 50-pin connectors labeled receive-in and send-out on the upper left side of the mounting assembly (as viewed from the rear of the assembly). Cables for these two connectors should be dressed to the left side of the relay rack for ease of installation.
- 2.7 Drop-side connections are made to the two 50-pin connectors labeled send-in and receive-out on the upper right side of the mounting assembly (also as viewed from the rear). Cables for these two connectors should be dressed to the right side of the relay rack for ease of installation.
- 2.8 Tip and Ring pin assignments for the receive-in, receive-out, send-in, and send-out connectors are listed in Table 2-1. Frame ground is present on pins 25 and 50 of each T1 connector. Shield connections can be made to pins 25 and 50 in accordance with local practice.
- 2.9 The 255D is not intended to be directly connected to telephone company facilities. In most cases, a channel service unit (CSU) will be required between the telephone company's facility and the 255D.

Position In Shelf	Tip	Ring
1	26	1
2	27	2
3	28	3
4	29	4
5	30	5
6	31	6
7	32	7
8	33	8
9	34	9
10	35	10
11	36	11
12	37	12
13	38	13
14	39	14
15	40	15
16	41	16

Table 2-1 Pin Assignments for PCM Connectors

Major/Minor Alarm Connections

- 2.10 Major and minor alarm connections can be made to the 255D in two ways; either by wire-wrapping to individual connectors provided for each module installed in the mounting assembly, or by wire-wrapping to a single shelf alarm connector.

Individual Major/Minor Alarm Connections

- 2.11 Individual major and minor alarm connections for each module are provided at the connectors labeled EC01 through EC16. As shown in Figure 2-3, each connector provides a normally open (NO), normally closed (NC), and common (C) relay contact for both the major and minor alarms.

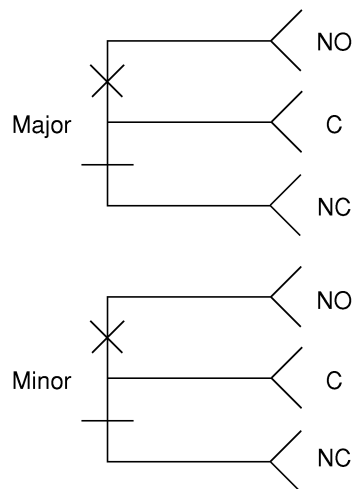


Figure 2-3 Major and Minor Alarm Contacts

Shelf Major and Minor Alarm Connections

- 2.12 The shelf major and minor alarms activate when any one of the individual major and minor alarms are active. The shelf major and minor alarm connections are made at the wire-wrapping connector labeled SHELF ALARMS. This connector provides a set of NO, NC, and C relay contacts for both the shelf major and minor alarms.

255D FCC Part 15, Subpart B, Class A Compliant Major and Minor Alarm Termination Method

- 2.13 Shielded wire connections for the major and minor alarm connections must be used for FCC Part 15 compliance.
- 2.14 Figure 2-4 is an example of a wire-wrap connection. Strip the outer insulation back to expose the braided and individual insulated wires. The exposed shield braid goes under the wire clamp, as shown in the figure.

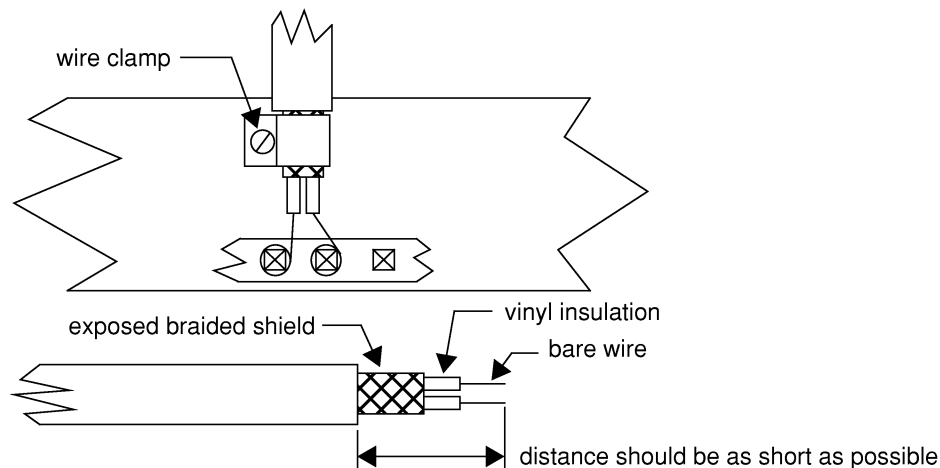


Figure 2-4 FCC Part 15, Subpart B, Class A Compliant Major and Minor Alarm Termination Method

Note: The wire clamps and clamp screws are provided in the cloth drawstring bag that is attached to the 255D.

SCP Connections

- 2.15 The Control and Maintenance SCP connections are made at four 25-pin D-subminiature female connectors located on the far left-hand side of the 255D (as viewed from the rear). IN and OUT jacks are provided for each SCP. The Control and Maintenance SCPs are configured as DCE (data communication equipment).
- 2.16 ASCII (American Standard Code for Information Interexchange) commands and the 255 or 257 menus can be accessed from both SCPs. However, the modules give higher priority to messages received at the Control SCP.

SCP Addressing

- 2.17 Prior to making connections to the 255D SCPs, each 255D to be placed on the SCP link must be assigned a unique shelf ID. The shelf ID determines the SCP address of each module installed in the mounting assembly. Table 2-2 lists the DIP switch settings for shelf ID selection.

Shelf ID	S1-1	S1-2	S1-3	SCP Addresses
1	Off	Off	Off	1-16
2	Off	Off	On	17-32
3	Off	On	Off	33-48
4	Off	On	On	49-64
5	On	Off	Off	65-80
6	On	Off	On	81-96
7	On	On	Off	97-112
8	On	On	On	113-128

Table 2-2 SCP Shelf IDs and Associated SCP Address Ranges

Cabling from a Video Terminal to a Single 255D

- 2.18 If a single 255D is to be cabled to an asynchronous video monitor (DTE [data terminal equipment]), a straight-thru cable must be used between the 255D's maint-in or control-in connector and the video terminal. A male 25-pin D-subminiature connector is required on the 255D end of the cable. See Table 2-3 for a description of a suitable straight-thru cable.










DTE Side		Cable Wiring	255D Side (DCE)	
Signal	Pin Number		Pin Number	Signal
FRAME GND	1		1	FRAME GND
TXD	2		2	TXD
RXD	3		3	RXD
RTS	4		4	RTS
CTS	5		5	CTS
DSR	6		6	DSR
GND	7		7	GND
DCD	8		8	DCD
*DTR	20		20	*DTR
*This signal is only available on the Control port. It is a "no-connect" on the Maintenance port.				

Table 2-3 Video Terminal Cable Diagram

Cabling from a Modem to a Single 255D

2.19 If a single 255D is to be cabled to a modem (DCE), a null modem cable must be used between the 255D's maint-in and/or control-in connector and the modem. A male 25-pin D-subminiature connector is required on the 255D end of the cable. Refer to Table 2-4 for a description of a suitable null modem cable.


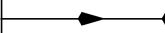
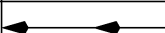

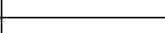
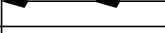



DCE Side		Cable Wiring	255 Side (DCE)	
Signal	Pin Number		Pin Number	Signal
FRAME GND	1		1	FRAME GND
TXD	2		3	RXD
RXD	3		2	TXD
RTS	4		4	RTS
CTS	5		5	CTS
DSR	6		6	DSR
GND	7		7	GND
DCD	8		8	DCD
DTR	20		20	DTR

Table 2-4 Null Modem Cable Diagram

Cabling to Multiple 255Ds

2.20 Connection to the first 255D on the daisy chain should be made in the same manner as connecting a single 255D to DTE or DCE. The next 255D Mounting Assembly is cabled to the first by connecting a second straight-thru cable from the maint-out or control-out connector of the first assembly to the maint-in or control-in connector of the second assembly. Subsequent mounting assemblies are cabled together in the same manner by connecting the control-out or maint-out connector of the previous assembly to the maint-in or control-in connector of the next assembly. Since eight shelf ID assignments are available, up to eight mounting assemblies can be linked together on the same daisy chain. Note that 255D-to-255D interconnecting cables require a 25-pin male D-subminiature connector on both ends of the cable. See Table 2-5 for a description of the interconnecting cable.

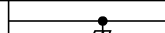
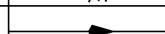
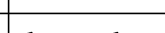
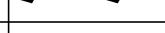
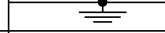
From 255D's Daisy Chain (DCE)		Cable Wiring	To 255D's Daisy Chain (DCE)	
Signal	Pin Number		Pin Number	Signal
FRAME GND	1		1	FRAME GND
TXD	2		2	TXD
RXD	3		3	RXD
GND	7		7	GND
*DTR	20		20	*DTR
*This signal is only available on the Control port. It is a "no-connect" on the Maintenance port.				

Table 2-5 Diagram for all Other Cable in Daisy Chain

- 2.21 The Maintenance SCP can only be accessed via an RJ-11 jack located on the front panel of the 2555/A Alarm and Access Module. The pin assignments for this jack are shown in Figure 2-5.

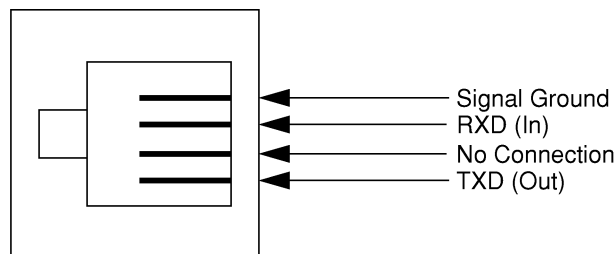


Figure 2-5 Pin Assignments for the 2555/A's Maintenance SCP RJ-11 Jack

Firmware Download Voltage

- 2.22 A terminal block, labeled FIELD SERVICE USE ONLY, is provided for applying +12V for firmware download. Application of a +12V supply is not required for normal use of the 255D. No connections should be made to this terminal block if a 2555A is installed in the 255D.

3. 255/257 Module Installation

Overview

- 3.1 This section describes how to install a module into the 255D Mounting Assembly.

Inspection and Static Precautions

- 3.2 The 255 and 257 Modules are static sensitive and, therefore, are shipped in a protective anti-static bag. When you remove a module from its protective bag, be sure to wear a grounded wrist strap to protect it from possible static discharge damage.
- 3.3 Visually inspect the equipment upon its arrival to detect any possible shipping damage. If damage is found, immediately file a claim with the carrier. If the equipment has been stored, reinspect it prior to installation.

Installation Procedure

- 3.4 Any 255 or 257 Module can be installed in slots 1 through 16 of the 255D Mounting Assembly (see Figure 3-1 for module locations).

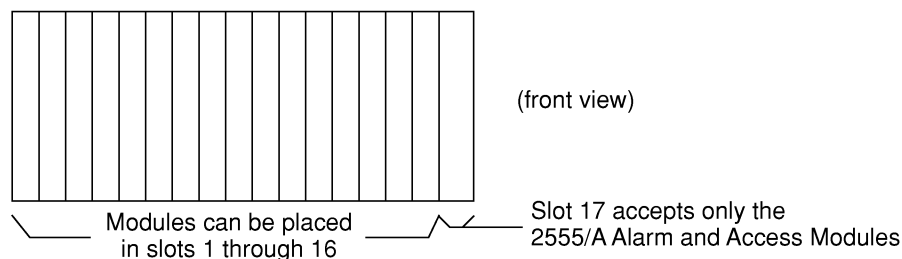


Figure 3-1 Module Placement in the 255D

- 3.5 To install a module into the 255D:
 1. Apply power to the shelf; insert the module into the shelf and ensure that it is firmly seated in the edge connector.
 2. Observe the front panel for the following:
 - the power LED illuminates
 - a flashing bar is present in the mode and option displays (for about 40 seconds)
 - the fault LED is off
 3. If no DS1 (digital signal level 1) is applied to the module, then both the send-in and receive-in local alarms will flash for 2.5 seconds and then glow steadily.
 4. If DS1 is applied to the module, only the power LED will be on.
 5. If the module's fault LED illuminates, the module should be considered defective. The front panel display error code should be recorded and the module returned to Tellabs. See the 255 or 257 T1 Echo Cancellor practice for further details.

4. 2555/A Alarm and Access Module Installation

Overview

- 4.1 This section describes:
 - the features of the 2555/A
 - how to install the 2555/A Modules in the 255D Mounting Assembly

Inspection and Static Precautions

- 4.2 Visually inspect the equipment upon its arrival to detect possible shipping damage. If damage is noted, immediately file a claim with the carrier. If the equipment has been stored, reinspect it prior to installation.
- 4.3 The 2555/A Module is static sensitive and, therefore, is shipped in a protective anti-static bag. When you remove a module from its protective bag, be sure to wear a grounded wrist strap to protect it from possible static discharge damage.

2555 Description

- 4.4 The 2555 Alarm and Access Module provides:
 - the RS-232D-compatible interface between the 255D and the modules
 - the shelf major and minor alarm contacts and indications
 - access to the Maintenance SCP through a front panel mounted RJ11 jack
 - A Power and B Power indications

2555A Description

- 4.5 The 2555A is identical to the 2555, but also provides +12V to the modules during firmware download.

Note: The 2555/A Modules can be removed from the mounting assembly while the modules are in service without affecting traffic.

Installation Procedure

- 4.6 Slot 17, the far right-hand slot (as viewed from the front of the assembly), is reserved for the 2555/A Alarm and Access Modules. To install the 2555/A into the 255D:
1. Insert the module into the far right-hand slot and ensure that it is firmly seated in the edge connector.
 2. Verify that the green A Power and B Power LEDs illuminate (assuming battery connections have been made to both the A and B power feeds).
 3. Verify that the red fault LED is off.
 4. If **no** modules have been installed, verify that the major and minor LEDs on the 2555/A are both off.
 5. If modules **have** been installed and all PCM alarms are off, verify that both the major and minor LEDs on the 2555/A are off.
 6. If the module's fault LED illuminates, the module should be considered defective and returned to Tellabs, as directed in Section 8.

5. Regulatory Statements

FCC Warning Statement

- 5.1 Federal Communications Commission (FCC) Rules require that you be notified of the following:
- This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15, Subpart B of the FCC Rules, which are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment, when properly installed and equipped only with Tellabs 255 or 257 T1 Echo Cancellation Modules. (For installation instructions, refer to Section 2.)
 - This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.
 - Operation of this equipment in a residential area is likely to cause harmful interference, in which case users will be required to correct the interference at their own expense.
 - Changes or modifications not expressly approved by Tellabs Operations, Inc. can void the user's authority to operate the equipment.

UL Recognition

- 5.2 The 81.0255D Mounting Assembly is UL recognized to the 1950 Telephone Equipment Standards, when equipped with Tellabs 255 or 257 T1 Echo Cancellation Modules.

CSA Certification

- 5.3 The 81.0255D Mounting Assembly is CSA certified to the C22.2 225 Telephone Equipment Standard.

Industry Canada Compliance

- 5.4 The 81.0255D Mounting Assembly does not exceed the Class A limits for radio noise emissions as set out by the ICES-003 standard of Industry Canada.

6. Specifications

Physical

Dimensions	<ul style="list-style-type: none"> • Height: 19.1cm (7.5 inches) • Width: 48.3cm (19 inches) • Depth: 36.6cm (14.4 inches)
Weight	<ul style="list-style-type: none"> • 5kg (11 pounds)
Heat Dissipation	<ul style="list-style-type: none"> • Air convection

Electrical

Input Voltage	<ul style="list-style-type: none"> • -44 to -56VDC, positive ground referenced
Input Current	<ul style="list-style-type: none"> • 5A maximum, when fully loaded with sixteen 2551A Modules • 4A maximum, when fully loaded with sixteen 2551 Modules
Power Connections	<ul style="list-style-type: none"> • Via screw terminals that accept 14 to 18AWG wire
Major/Minor Alarms	<ul style="list-style-type: none"> • Via 0.045-inch square posts; connections can be made via wire-wrapping or Molex connector (part #09-50-3061) with crimp terminals (part #08-50-0106) or equivalent
SCP Connections	<ul style="list-style-type: none"> • Via female 25-pin D-subminiature connectors

Environmental

Operating Temperature	<ul style="list-style-type: none"> • 0° to +50°C (+32° to +122°F) normal
Shipping and Storage Temperature	<ul style="list-style-type: none"> • -50° to +85°C (-58° to +185°F)
Relative Humidity	<ul style="list-style-type: none"> • 5 to 95% (no condensation)

Regulatory

Safety	<ul style="list-style-type: none"> • Recognized under UL 1950 • Recognized under CSA C22.2 225 Telephone Standard
EMI	<ul style="list-style-type: none"> • Complies with FCC Part 15 (Class A) when equipped with an 80.2094 EMI door assembly • Complies with Industry Canada (Class A) when equipped with an 80.2094 EMI door assembly

7. Acronyms

ASCII	American Standard Code for Information Interexchange
C	Common
CSA	Canadian Standards Association
CSU	Channel Service Unit
DCE	Data Communication Equipment
DS1	Digital Signal Level 1 — one entire 1.544Mbit/s T1 facility
DTE	Data Terminal Equipment
EMI	Electromagnetic Interference
FCC	Federal Communications Commission
HLC	High Level Compensation — an optional feature of Tellabs echo cancellers that reduces the RCV-IN signal at the time a very high level of speech is detected

Continued on Next Page

ITU-T	International Telecommunications Union — Telecommunication Standardization Sector
NC	Normally Closed
NO	Normally Open
PCM	Pulse Code Modulation — the digital representation of the analog signal
SCP	Serial Communications Port
UL	Underwriters Laboratories

8. Testing, Technical Assistance, Repair and Return

- 8.1 The testing and troubleshooting procedures in this practice are intended as an aid in the localization of trouble to the specific equipment covered in this practice. If a situation arises that is not covered, contact Tellabs Technical Assistance via telephone (see paragraph 8.4). If the equipment seems to be defective, substitute new equipment (if possible) and conduct testing again. If the substitute operates correctly, the original should be considered defective and returned to Tellabs, as directed in paragraph 8.5. We strongly recommend that no internal (component-level) testing or repairs be attempted on the equipment. Unauthorized testing or repairs may void its warranty.
- 8.2 If trouble is encountered with the 255D or a module installed in the assembly, proceed as follows:
1. Inspect the 255D for physical damage or defects.
 2. Ensure that all modules are properly seated in their positions.
 3. Check for blown fuses (external fuse/alarm panel).
 4. Verify proper voltages at the power input connections.
 5. Ensure that battery and ground are properly connected to the assembly.
 6. Ensure that the serial communication cables (if used) are securely connected at all connection points.
 7. Ensure that all other equipment connected to the suspect 255D via the SCP is operating properly.
 8. If the problem still exists, perform the troubleshooting procedure in the Tellabs 76.812551 practice.
- 8.3 If none of the above procedures locates the problem and a second 255D is available, substitute the second 255D for the suspect unit. If the modules in the second 255D operate properly, consider the original 255D defective and return it to Tellabs for repair or replacement. Please do not assume the unit is defective until it is determined that no problems exist either with the modules or with the 255D's external wiring.

Technical Assistance

- 8.4 Contact Tellabs Technical Assistance as follows:

Location	Telephone	FAX
Tellabs International, Inc., Sucursal Buenos Aires, Argentina	+541.393.0764, .0892, or .0835	+541.393.0732
Tellabs Pty Ltd., Milsons Point NSW, Sydney, Australia	+61.2.9966.1043	+61.2.9966.1038
Tellabs Comm. Canada Ltd., Mississauga, Ontario, Canada	905/858-2058	905/858-0418
Tellabs International, Inc., Beijing, China	+86.10.6501.1873	+86.10.6501.1871
Tellabs International, Santa Fe de Bogota, Colombia	+571.623.3162 or .3216	+571.623.3047
Tellabs International, Inc., Dubai, U.A.E.	+971.4.373250	+971.4.376526
Tellabs U.K. Ltd., Bucks, England	+44.1494.555800	+44.1494.555801
Martis Oy, Espoo, Finland	+358.0.502.771	+358.0.502.7815
Continued on Next Page		

Location	Telephone	FAX
Tellabs SAS, France	+33.1.345.20838	+33.1.309.60170
Tellabs GmbH, Munich, Germany	+49.89.54.90.05.+ext. or 0 (switchboard)	+49.89.54.90.05.44
Tellabs H.K. Ltd., Hong Kong	+852.2866.2983	+852.2866.2965
Tellabs GmbH Rep. Office, Budapest, Hungary	+36.1.2681220	+36.1.2681222
Tellabs International, Inc., Bangalore, India	+91.80.6610826	+91.80.6615908
Tellabs, Ltd., County Clare, Ireland	+353.61.703000	+353.61.703333
Tellabs de Mexico	525.282.1107, .1432, .1050, or .0981	525.282.0218
Tellabs Singapore Pte, Ltd., Singapore	+65.336.7611	+65.336.7622
Tellabs South Africa, Republic of South Africa	+27.12.665.0034	+27.12.665.0084
Tellabs International, Inc., Seoul, South Korea	+82.2.589.0667 or .0668	+82.2.589.0669
Tellabs Southern Europe s.a., Barcelona, Spain	+34.3.414.70.16	+34.3.414.69.25
Tellabs AB, Stockholm, Sweden	+46.8.678.4040	+46.8.678.4041
Tellabs International, Inc., Bangkok, Thailand	+662.262.9065	+662.661.1141
USA and Puerto Rico	(800) 443-5555*	708/512-7097**
*All other Caribbean and South American locations, or if the toll-free number is busy, telephone 708/969-8800***		
**Phone number changes to 630/512-7097 effective August 5, 1996.		
***Phone number changes to 630/969-8800 effective August 5, 1996.		

Repair and Return

- 8.5 If equipment needs repair, contact Tellabs' Product Services Department with the equipment's model and issue numbers and warranty date code. You will be issued a Material Return Authorization (MRA) number and instructions on how and where to return the equipment.

Location	Telephone	FAX
Martis Oy, Espoo, Finland	+358.0.502.771	+358.0.502.7815
Tellabs Comm. Canada Ltd., Mississauga, Ontario, Canada	905/858-2058	905/858-0418
Tellabs, Ltd., County Clare, Ireland	+353.61.703000	+353.61.703333
Tellabs Operations, Inc., Lisle, IL USA	(800) 443-5555 (USA and Puerto Rico only) 708/969-8800* (other International)	708/512-7097** (both)
*Phone number changes to 630/969-8800 effective August 5, 1996.		
**Phone number changes to 630/512-7097 effective August 5, 1996.		

- 8.6 Repair service includes an attempt to remove any permanent markings made by customers on Tellabs equipment. If equipment must be marked, it should be done with nonpermanent materials and in a manner consistent with the correct handling of electrostatically sensitive devices.