



SLC[®]-2000 Access System

SPQ[®] 442 2-Wire Current-Sink Special Services E SPOTS[®] Channel Unit — SAC1AH0

Features/Functions

- Four electronically provisioned channels
- Two-wire special service applications
 - Loop or ground start, local or FX
 - Direct-inward-dial trunks (DPT), local or FX
 - Private line, voice or data (TO)
- Reverse battery capability for LSAS applications
- On-hook transmission (OHT)
- Supports *CLASS** services including CND
- Fast forward disconnect
- Faceplate test access to tip and ring
- Faceplate BUSY LEDs
- Inventory read-out
- Conforms to appropriate industry standards

* Service Mark of Bell Communications Research, Inc.

Description

This data sheet describes the *SPQ 442* 2-wire special services quad E *SPOTS*[®] channel unit (CU) (COMCODE 107100562), used in the *SLC-2000* Access System. The *SPQ 442* is a current sink unit and is primarily intended for use in 2-wire nonlocally-switched ground-start and loop-start special services, 2-wire nonswitched private lines, and direct-inward-dial (DID) trunks; the unit performs very much like the dual *AUA42*() *SLC* Series 5 CU. The unit can be installed in a *SLC-2000* system equipped with Release 3.2 (or later) COT, RT or Multi-Services Digital Services Terminal (MSDT). It can be used in universal configurations, integrated configurations serving nailed-up non-locally switched special services, and in an RT configured for integrated network access (INA-RT). The unit may interface with a switching machine, other transmission equipment, or cable. The connecting wire or cable must conform to the carrier serving (CSA) design rules (see AT&T 363-205-010).

The *SPQ 442* channel unit provides four channels of service. Each channel can be provisioned independently of the others to provide any of the following three functions:

- Foreign exchange, office end (FXO) -- The FXO function is used for a loop-start or ground-start application, nonlocally-switched or locally-switched. Typically, nonlocally-switched applications are foreign exchange trunks and lines and off-premises PBX station lines. Locally switched applications include Centrex, secretarial lines, and PBX trunks.
- Dial pulse terminating (DPT) -- The DPT function with loop reverse battery signaling is used for a DID application, with either dial pulse or multifrequency addressing. For this function, the CU is located only in the RT or MSDT.
- Transmission only (TO) -- The TO function is used for a private line application, with no DC signaling. The CU provides sealing current loop-back (loop closure). (Sealing current prevents the build-up of high resistance in splices.)

The *SPQ442* in conjunction with the *SPQ443* provides the following features that enhance service in loop-start/ground-start applications:

- Forward Disconnect -- transmits an open battery signal code when the disconnect interval exceeds 50 msec.
- On-hook Transmission (OHT). In the FXO mode and when provisioned for OHT=YES, the *SPQ442* transmits voiceband signals in each direction, but with reduced gain, when the unit receives on-hook signaling code. When provisioned for OHT=NO, it still provides OHT during the silent interval of ringing. These characteristics mean the *SPQ442* is compatible with calling number/name delivery (CND) and other OHT services. In the DID mode the CU always provides OHT.

- Reverse battery detection -- In a universal configuration, reversal of battery polarity is detected and signaled to the *SPQ443* CU at the RT/MSDT, supporting the line side answer supervision (LSAS) feature. When the *SPQ442* in FX mode and TD=NO detects reverse battery ("reverse loop current feed", RLCF, in the terminology of TR-TSY-000057), the CU transmits the A,B signaling code 0/1, 0/1 in the *SLC-2000* bitstream to the RT. The *SPQ443* at the RT responds by applying RLCF toward the station. (Bellcore Technical Reference Bulletin #1 dated October 1994, Change to TR-TSY-000008* Issue 2, August 1987, Revision 1, September 1993, adds this new 0/1, 0/1 signaling code for LSAS applications.)

In a ground-start circuit (FX0 function), the unit employs the 2.5-second delayed busy option for trunk processing, i.e., upon receipt of a carrier line failure indication, the channel unit adopts the idle condition, and after 2.5 seconds will busy out the service. In a loop-start (FXO) or DID (DPT) application the unit permanently adopts the idle condition on trunk processing.

The *SPQ 442* channel unit has transmission and signaling options which must be set before service can be provided. The unit does not have physical switches; instead, option information is written into memory registers located on the channel unit. The Craft Interface Terminal (CIT) connected to the User Interface Panel (UIP) is used. All transmission and signaling options and the function type (FXO, DPT, or TO) for any channel on the unit are set by entering commands into the CIT which then transmits the information to the system controller which stores it in nonvolatile system memory. The controller then writes the options into the CU registers when the CU is installed. If the CU is already installed, the controller writes the option information into the channel unit registers immediately after it receives the information from the CIT. Unplugging the channel unit does not erase the option information stored in system memory; reinserting the channel unit causes the options to be rewritten immediately into the CU registers by the controller.

The procedures for setting options and performing tests with the CIT are described in AT&T Practice 363-208-001, *SLC-2000 User/Service Manual*.

Table 1 lists the transmission and signaling options, and the associated ranges for the *SPQ 442*. Use the guidelines for the AUA42 in AT&T 915-710-116, *SLC Series 5 Channel Unit Application and Prescription Setting*, Issue 4, to select option settings for the *SPQ442*.

* RT-TSY-000008, "Digital Interface Between the *SLC-96* Digital Loop Carrier System and a Local Digital Switch" (TR-08). *SLC-2000* in universal configurations uses the TR-08 F_s bitstream framing format.

Table 1. Range of Settings for SPQ442 Channel Unit Options

Option	Range
Hybrid impedance (Output impedance, Structural impedance)	900 ohms or 600 ohms
Hybrid balance	0 to 15 in steps of 1
Transmit gain	-1.0 do to 6.75 dB in steps of 0.25 dB
Receive gain	-8.0 dB to 1.5 dB in steps of 0.25 dB
Equalizer slope	0 to 7 in steps of 1
On-hook transmission	Yes or No
Toll diversion	Yes or No
Signaling type	Loop-start (LS) or ground-start (GS)

Table 2 lists the allowable options for the FXO, DPT, and TO functions.

Table 2. Options for Each SPQ442 Channel Unit Function

Option	Channel Unit Function		
	FXO	DPT	TO
Hybrid impedance*	✓	✓	✓
Hybrid balance	✓	✓	✓
Transmit gain	✓	✓	✓
Receive gain	✓	✓	✓
Equalizer slope†	✓	✓	✓
Toll diversion‡	✓		
Signaling type	✓		
On-hook transmission§	✓		

* When the channel unit faces outside plant cable, the hybrid impedance should be set to 600 Ohms.

† The 1-kHz gain of the channel unit is independent of the equalizer setting.

‡ Always set TD=NO.

§ With OHT=YES, the unit provides full-time transmission while the CPE is on-hook. OHT is always enabled in DPT mode.

The SPQ 442 includes capability for plug-in inventory. The unit stores in its non-volatile memory an inventory record that includes its 10-character CLEJ* code, readable by the system controller.

The SPQ 442 conforms with key elements of the following appropriate industry criteria:

- Bellcore Technical Reference TR-NWT-000057 *Functional Criteria for Digital Loop Carrier Systems*, Issue 2, January 1993.
- Bellcore Technical Reference TR-NWT-001089 *Electromagnetic Compatibility and Electrical Safety, Generic Criteria for Network Telecommunication Equipment*, Issue 1, October 1991.
- GTE Test Procedures *Lightning Surge and Power Cross - Test Procedures*, Issue 1, January 1990.
- Underwriters Laboratories, Inc. *Standard for Telephone Equipment*, UL 1459, Second Edition with revisions through October 1, 1990.
- FCC Rules and Regulations, Part 15 *Radio Frequency Devices*.

* Trademark of Bell Communications Research, Inc.

Compatibility

The *SPQ442* channel unit is end-to-end compatible, in a R3.2 (or later) *SLC-2000* system in a universal configuration with the following CUs providing the noted services:

- *AUA41*(), *AUA141*, *AUA43*(), and *SPQ443* for loop start/ground start (LS/GS) applications without LSAS
- *SPQ443* for LS/GS applications with LSAS
- *AUA36*, *AUA43*(), and *SPQ443* for DID trunks
- *AUA41*(), *AUA141*, *AUA42*(), *AUA142*, *AUA43*(), *SPQ442*, *SPQ443*, for private line (TO) service

Where the RT is served by an integrated switch or the RT is operating in the integrated network access (INA-RT) mode, the *SPQ442* is also end-to-end compatible with D4-type CUs with FXS, DPO and TO functions.

There are several restrictions in the application of this unit:

- A circuit using the unit is not testable by MLT in a universal configuration using the PGTC; therefore the CU should not be used in a locally-switched circuit unless the circuit can be tested by some other test entity (e.g., SARTS).
- For DID service, the *SPQ442/443* pair is restricted to applications where the switch complies with the LSSGR Bellcore standard, and the PBX complies with ANSI standard EIA/TIA-464-A. This restriction assures that dial pulse distortion complies with TR-NWT-000057.
- The Toll Diversion (TD) option must be provisioned to NO. This restriction applies because TD=YES requires use of the extended superframe format, ESF. If TD is provisioned YES when the *SPQ442* is used in a terminal using the modified superframe format F_s , of TR-08, erratic ringing will occur; (*SLC-2000* universal configurations use this F_s framing). Although Release 4 of *SLC-2000* does use the ESF format between the RT and integrated switch when operating in the TR-303* mode, there is no application for signaling reverse battery from the *SPQ442* toward the switch in a LS/GS circuit. However, the LSAS application of reverse battery is supported in R3.2 universal applications by an *SPQ442/SPQ443* pair. See the discussion of LSAS under Description.
- When providing CND service as a feature of an FX line or trunk, with a tandem carrier link to the foreign CO that uses D4-type CUs, the circuit should be designed such that the off-hook loss toward the station of the CO-CO segment is no more than 1.0 dB.
- The *SPQ442* has not yet been verified for use in a locally-switched ground-start circuit served by a 1ESS or 1AESS switch.

* TR-NWT-000303, "Integrated Digital Loop Carrier System Generic Requirements, Objectives, and Interface" Issue 2, December 1992

Further compatibility and application information can be found in AT&T 915-710-116 where:

AUA41 is to be read AUA41(),
 AUA42 is to be read AUA42()/SPQ442,
 AUA43 is to be read AUA43()/SPQ443,
 AUA44 is to be read AUA44()/SPQ444,
 AUA54 is to be read AUA54()/SPQ454,
 SLC Series 5 is to be read SLC Series 5/SLC-2000.

This Practice in several places refers to compatibility of channel units located beyond a digital connectivity unit (DCU). The SLC-2000 system does not support DCUs, but the document can nevertheless be applied if references to DCU-equipped terminals in the text are replaced by digital switch, digital cross-connect equipment, or an INA facility used to connect a SLC-2000 RT to a D4-type terminal.

Specifications

Table 3 lists salient parameters for the 2-Wire E-SPOTS SPQ442 Channel Unit.

Table 3. Salient Parameters for 2-Wire E-SPOTS SPQ442 Channel Unit (Off-hook unless specified)

Parameter	Condition	Value
Equalization		Equalized CSA cable rolloff at 0.4 k Hz varies from 0.0 dB to 1.1 dB; at 2.8 kHz, rolloff varies from 0.3 dB to 1.75 dB
Balance capability, CSA loops	At digital line interface of channel unit facing loop, with zero transmit and receive gain.	ERL ≥ 14 SRL ≥ 9
Idle channel noise	SPQ442/SPQ443 pair	≤ 20 dBrc0
Impulse noise	Measured at 47 dBrc0 with no holding tone, on-hook & off-hook	≤ 15 counts in 15 minutes
On-hook loss, 1004 Hz, (Nominal)	OHT=YES, or during silent interval of ringing with OHT=NO; Terminated with Structural Impedance; Slope=0	Rcv Xmt (to T/R) (from T/R)
	IMP=600 ohms	2.5dB 2.5dB
	IMP=900 ohms	2.5dB 2.5dB

Faceplate Features

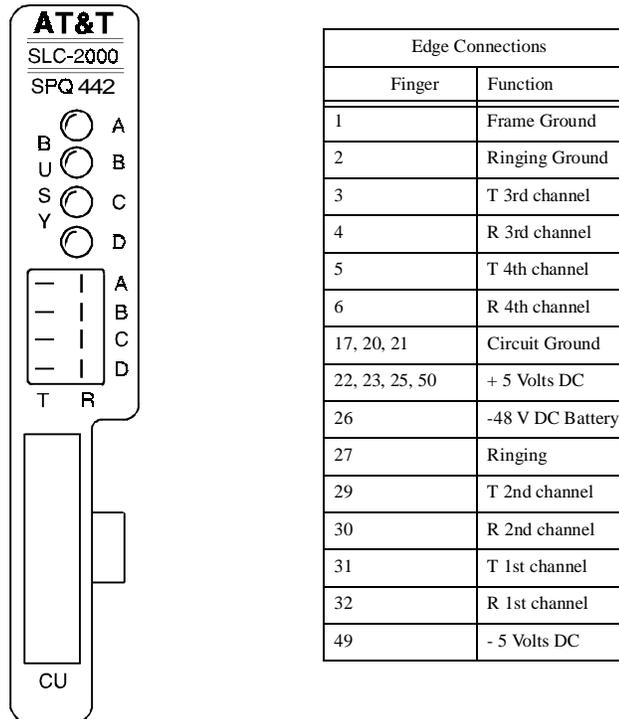
Figure 1 shows the *SPQ442* faceplate and edge connections. The *SPQ442* faceplate includes test access to tip and ring through the ITT RTG16L2H15A channel unit faceplate test cord (COMCODE 405755208). The following LED indicators are located on the faceplate.

A BUSY (Red LED): The A channel (Channel 1) is busy when lit.

B BUSY (Red LED): The B channel (Channel 2) is busy when lit.

C BUSY (Red LED): The C channel (Channel 3) is busy when lit.

D BUSY (Red LED): The D channel (Channel 4) is busy when lit.



spq442.cdr

Figure 1. *SPQ442* Faceplate and Edge Connections Diagram

References

The following documents provide additional information about the *SPQ442* and the *SLC-2000* Access System:

AT&T 363-208-000 *SLC-2000 Access System Application and Planning Guide*

AT&T 363-208-001 *SLC-2000 Access System User/Service Manual*

AT&T 363-205-003 *SLC-2000 Multi-Services Distant Terminal Feature*

AT&T 915-710-116 *SLC Series 5 Carrier System Channel Unit Application and Prescription Setting*

AT&T 363-005-383 *SPQ443 2-Wire Special Services E SPOTS Channel Unit Data Sheet*

Technical Assistance

Follow local procedures for obtaining technical assistance. AT&T also provides in-hours or emergency out-of-hours help for the *SLC -2000* Access System. Call the AT&T Regional Technical Assistance Center at 1-800-225-RTAC.

Ordering Information

Additional copies of this document (AT&T 363-005-382) are available from the Customer Information Center — call 1-800-432-6600.

Comments

Comments about this document can be directed to:

AT&T Network Systems Customer Education and Training
Documentation Services
2400 Reynolda Road
Winston-Salem, NC 27106-4606

Copyright Information

Copyright© 1994 AT&T. All Rights Reserved.

This material is protected by the copyright laws of the United States and other countries. It may not be reproduced, distributed, or altered in any fashion by any

entity including other AT&T business units or divisions without the expressed written consent of the Customer Education and Training Organization.

For permission to reproduce or distribute, please call: 908-949-3702