SLC®-2000 Access System

SPQ® 443 2-Wire Current-Feed Special Services E *SPOTS*® Channel Unit — SAC1AEH

Features/Functions

- Four electronically provisioned channels
- Two-wire special service applications
  - — Loop or ground start, local or FX
  - — Direct-inward-dial trunks (DPO), 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*443 2-wire special services quad E *SPOTS*® channel unit (CU) (COMCODE 107098873) used in the *SLC*-2000 Access System. The *SPQ*443 CU is a current feed 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; it performs very much like the dual AUA43( ) *SLC* Series 5 CU. The unit can be installed in a *SLC*-2000 system equipped with Release 3.2 (or later) in a COT, RT or Multi-Services Digital Terminal (MSDT). It can be used in universal configurations, integrated configurations serving locally-switched special services and nailed-up non-locally switched special services, and in an RT configured for integrated network access (INA). The unit may interface with a switching machine, other transmission equipment, or cable. The connecting wire or cable must conform to the carrier serving area (CSA) design rules (see AT&T 363-205-010).

The *SPQ*443 CU provides four channels of service. Each channel can be provisioned independently of the others to provide any of the following three functions:

- Foreign exchange, station end (FXS) — The FXS function is used for a loop-start or ground-start application, nonlocally-switched or locally-switched. Typical nonlocally-switched applications are foreign exchange trunks and lines and off-premises PBX station lines.
- Dial pulse originating (DPO) — The loop reverse battery DPO function is used for a DID application, with either dial pulse or multifrequency addressing. For this function, the CU is located only in the COT.
- Transmission only (TO) — The TO function is used for a private line application, with no DC signaling. The unit provides sealing current to prevent the buildup of high resistance splices.

The *SPQ*443 in conjunction with the *SPQ*442 provides the following service enhancement features:

- Forward disconnect — repeats open battery intervals of 50 msec to 1 sec. After 1.1 sec, the *SPQ*443 resumes supervision.
- On-hook transmission (OHT) — In the FXS mode and when provisioned for OHT=YES, the *SPQ*443 transmits voiceband signals in each direction, but with reduced gain, when the unit faces an on-hook condition (loop open and ring not grounded). When provisioned for OHT=NO, it still provides OHT during the silent interval of ringing. These OHT characteristics make the *SPQ*443 compatible with calling name/number delivery (CND) and other OHT services. In the DID mode the channel unit always provides OHT.
- Reverse battery capability — the *SPQ*443, when paired with the *SPQ*442, supports the line side answer supervision, LSAS, feature in a R3.2 universal system (which system transmits digital signals in the Fs, *SLC* 96, framing format*). LSAS is also supported by the *SPQ*443 with

* The Fs framing format is defined in Bellcore's Technical Reference TR-TSY-000008, Issue 2, August 1987.

an integrated switch that transmits the new signaling bit code † A=0/1, B=0/1, to signal the CU located in the RT/MSDT to reverse its battery (Reverse Loop Current Feed, RLCF in Bellcore terminology). LSAS is also available, with restrictions, when the *SPQ*443 is operating in an RT in the integrated network access (INA-RT) mode (see page 5).

In a ground start (FXS function) or DID (DPO) application, the unit selects the 2.5-second delayed busy option on trunk processing, i.e., upon receipt of a carrier line failure indication, the unit adopts the idle condition, and after 2.5 secs will busy out the service. In a loop start (FXS) application the unit permanently adopts the idle condition on trunk processing.

The *SPQ*443 CU has transmission and signaling options that 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 CU. For this purpose, the SLC®-2000 craft interface terminal (CIT), and system controller are used. All transmission and signaling options and the function type (FXS, DPO, or TO) for any channel on the unit are set by entering commands into the CIT which then transmits the information to the controller where the information is stored 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 CU registers immediately after it receives the information from the CIT. Unplugging the CU does not erase the option information stored in system memory; reinserting the CU 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 363-208-001, *SLC-2000 User/Service Manual*.

Table 1 lists the transmission and signaling options, and the associated ranges for the *SPQ*443 CU. Use the guidelines for the AUA43 provided in AT&T 915-710-116, *SLC Series 5 Channel Unit Application and Prescription Setting* Issue 4, to select options for the *SPQ*443.

† Bellcore Technical Reference Bulletin #1 dated October 1994, Change to TR-TSY-000008 Issue 2, August 1987, Revision 1, September 1993 adds this 0/1, 0/1 signaling code for LSAS.

Table 1. Range of Settings for the *SPQ* 443 Channel Unit Options

Option	Range
Output impedance (Hybrid impedance, structural impedance)	900 ohms or 600 ohms
Hybrid balance	0 to 15 in steps of 1
Transmit gain	–1.0 dB 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

Table 2 lists the allowable options for the FXS, DPO, and TO functions.

Table 2. Options for Each *SPQ* 443 Channel Unit Function

	Channel Unit Function		
Option	**FXS**	**DPO**	**TO**
Output impedance *	✓	✓	✓
Hybrid balance	✓	✓	✓
Transmit gain	✓	✓	✓
Receive gain	✓	✓	✓
Equalizer slope †	✓	✓	✓
On-hook transmission‡	✓		

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

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

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

The *SPQ*443 includes capability for plug-in inventory, storing in its non-volatile memory an inventory record that includes its 10-character CLEI code, readable by the system controller.

The *SPQ*443 channel unit 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*.

Compatibility

The *SPQ*443 CU is end-to-end compatible, in a R3.2 (or later) *SLC*-2000 system in a universal configuration, with the following *SLC*-2000 channel units providing the noted services:

- AUA42( ), AUA142, *SPQ*442, loop start/ground start (LS/GS) applications without LSAS
- *SPQ*442 for LS/GS applications with LSAS
- AUA42( ), AUA142, AUA56, and *SPQ*442 for DID service
- AUA41( ), AUA141, AUA42( ), AUA142, AUA43( ), *SPQ*442, and *SPQ*443 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 *SPQ*443 is also end-to-end compatible with D4-type channel units with FXO, DPT 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 in a universal configuration unless the circuit can be tested by some other entity (e.g., SARTS).
- For DID service, the *SPQ*442/443 pair is restricted to applications where the switch complies with the LSSGR Bellcore standard, and the PBX complies with the ANSI standard EIA/TIA-464-A. This restriction assures that the dial pulse distortion complies with TR-TSY-000057, Issue 2.
- For FX line/trunk applications where the RT is operated in the Integrated Network Access Mode (INA-RT) and connected to a D-bank at the foreign CO, LSAS cannot be enabled unless the D-bank CU can signal battery reversal compatibly (e.g., D5 FXO CUs with Toll Diversion).
- In a universal configuration, setting the Toll Diversion option of the COT CU to YES, attempting to enable the LSAS or toll diversion feature, causes erratic ringing.
- 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 channel units, the circuit should be designed such that the off-hook loss toward the station, of the CO-CO segment, is no more than 1 dB.
- The *SPQ*443 has not yet been verified for use in a locally-switched ground-start circuit served by a 1*ESS* or 1A*ESS* switch.

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( )/*SPQ*442,
AUA43 is to be read AUA43( )/*SPQ*443,
AUA44 is to be read AUA44( )/*SPQ*444,
AUA54 is to be read AUA54( )/*SPQ*454,
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 SPQ*443 channel unit.

Table 3. Salient Parameters for the 2-Wire E-*SPOTS*® *SPQ* 443 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
ERL/SRL (2-wire return loss with 4-wire path broken)	With reference to structural impedance	28/20 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	*SPQ*442/*SPQ*443 pair	20 dBrnc0
Impulse noise	Measured at 47 dBrnc0 with no holding tone, on-hook & off-hook	≤15 counts in 15 minutes
On-hook loss, 1004 Hz, (Nominal)	For OHT=YES, or during silent interval of ringing with OHT=NO; Terminated with Structural Impedance; Slope=0	Rcv (to T/R) Xmt (from T/R)
	IMP=600 ohms	2.5 dB 2.5 dB
	IMP=900 ohms	2.5 dB 2.5 dB

Faceplate Features

Figure 1 shows the faceplate and edge connectors of the *SPQ*443. The *SPQ*443 faceplate includes test access to tip and ring through the ITT RTG16L2H15A channel unit faceplate test cord (COMCODE 405755208).

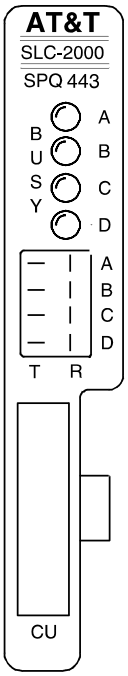
The following LED indicators are located on the faceplate of the *SPQ*443.

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.



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Edge Connections	
Finger	Function
1	Frame Gnd
2	Ringing Gnd
3	T 3rd channel
4	R 3rd channel
5	T 4th channel
6	R 4th channel
17, 20, 21	Circuit Gnd
22, 23, 25, 50	+ 5 Volts DC
26	-48 V DC Battery
27	Ringing
29	T 2nd channel
30	R 2nd channel
31	T 1st channel
32	R 1st channel
49	-5 Volts DC

spqpin.ps

Figure 1. ***SPQ*** **443 Faceplate and Edge Connections**

References

The following documents provide additional information about the *SPQ*443 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 363-005-382	*SLC-2000 Access System SPQ442 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 363-005-383) are available from the Customer Information Center — call 1-800-432-6600.

Comments

Comments about this document can be directed to:

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