ENGINUITY AUA39 ISSUE 4
SLC® SERIES 5-COMPATIBLE CENTRAL OFFICE TERMINAL - UNIVERSAL VOICE GRADE CHANNEL UNIT

(*CLEI™ Code: 5SC3CCA1AA)

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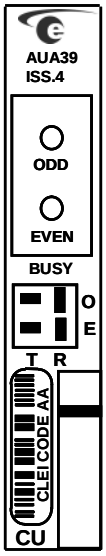
1. GENERAL

1.01 The Enginuity SLC® Series 5-compatible channel unit, Model AUA39I4, is designed for use in an AT&T SLC®Series 5 Central Office Terminal (COT) Channel Bank Assembly. The AUA39I4 is a current sink circuit that interfaces the common equipment of the channel bank to provide two, loop-start or ground-start, universal voice grade (UVG) channels (per Bellcore Technical Reference TR-TSY-000057 - Functional Criteria for Digital Loop Carrier Systems). The Enginuity AUA39I4 provides the same functions as, and can be used as a replacement for, AT&T's AUA31, AUA32, AUA38, and AUA39 channel units as well as Pulsecom's AUA39 channel unit. The Enginuity AUA39I4 is compatible with the Series 5 Features Packages A, C, Enhanced C, C2 and D. The Enginuity AUA39I4 will interface the following equipment installed at the Remote Terminal (RT): The Teltrend UVG159 and CSA59, AT&T's AUA25, AUA51, AUA58 (loop-start applications), AUA59, AUA150, AUA158 (loop-start applications), and AUA159, and with Pulsecom's AUA58 (loop-start applications), CSA59 and UVG69. The Enginuity AUA39I4 also provides full time on-hook transmission that is compatible with the new Custom Local Area Signaling Services (CLASS℠) as well as some alarm/meter reading services. The AUA39I4 also provides #5ESS interface enhancements. Specifically, the AUA39I4 supports rotary dial and flash-hooks with a #5ESS floating battery line appearance while maintaining CLASS℠ compatibility with transmission of Open Switching intervals.

CAUTION
This product incorporates static sensitive components. Proper electrostatic discharge procedures must be followed.



1.02 The AUA39I4 replaced the issue 3 AUA39 due to the addition of the line side answer supervision feature.

Whenever this practice is reissued or revised, the reason for reissue or revision will be stated in this paragraph.

1.03 Features of The Enginuity AUA39I4 are as follows:

- Microprocessor-controlled
- Provides two, 2-wire voice frequency channels
- Compatible with loop- and ground-start operation
- Meets Universal Voice Grade line unit requirements per Bellcore Technical Reference TR-TSY-000057
- Switch selectable 2-Wire impedance of 800 or 900 Ohms. The 800 Ohm switch solves the impedance mis-match on the DMS-100 switches
- Provides BUSY indication; one for each channel

- Front-panel test points permit monitoring access to both the odd and even channels
- Provides same functions as, and can be used as a direct replacement for, the following Central Office Terminal (COT) channels:
  AT&T Model AUA31,
  AT&T Model AUA32,
  AT&T Model AUA38,
  AT&T Model AUA39,
  Pulsecom Model AUA38 and
  Pulsecom Model AUA39

The Enginuity AUA39I4 can be mixed with the above units in a Central Office Terminal channel bank without restrictions

- Provides a high return loss for both off-hook and on-hook conditions
- Compatible with the following channels at the Remote Terminal (RT) end
  Teltrend Model UVG159,
  Teltrend Model CSA59,
  AT&T Model AUA25,
  AT&T Model AUA51,
  AT&T Model AUA58 (loop-start only),
  AT&T Model AUA59,
  AT&T Model AUA150,
  AT&T Model AUA158 (loop-start only),
  AT&T Model AUA159,
  Pulsecom Model AUA58 (loop-start only),
  Pulsecom Model CSA59 and
  Pulsecom Model UVG69

Forward disconnect is provided when interfacing these units

- Compatible with Pair Gain Test Controller (PGTC), Extended Test Controller (XTC), Mechanized Loop Testing (MLT) systems and Automatic Line Insulation Testing (ALIT)
- 7-year warranty

2. APPLICATIONS

2.01 The Enginuity AUA39I4 is designed for use in Central Office Terminal (COT) applications and mounts in one position of an AT&T SLC Series 5 Channel Bank Assembly. The AUA39I4 is a current sink circuit that interfaces the common equipment of the channel bank to provide two, locally-switched circuits including special service applications and plain old telephone service (POTS). Refer to Figure 1 for a typical application using The Enginuity AUA39I4.

2.02 The AUA39I4 provides two circuits (that is, two channels of service) per card. The AUA39I4 automatically operates in both loop-start and ground-start signaling applications. The AUA39I4 complies with the universal voice grade channel requirements as defined in Bellcore Technical Reference TR-TSY-000057 specifications. In addition to plain old telephone service, typical services provided using the AUA39I4 include:

Centrex Lines (loop-start)
Local PBX Trunk circuits (loop- and ground-start)
Direct-Out-Dial (ground-start)
800 Service Trunk (ground-start)
800 Service Lines (loop-start)
WATS Line Out (loop-start)
WATS Trunk Out (ground-start)
WATS Line, 2-way (loop-start)
Secretarial Lines (loop-start) and
Off-Premises Extensions (loop-start)

Bridging Applications

2.03 The AUA39I4 is compatible with Central Office bridging arrangements with other SLC Series 5 derived lines for loop-start services such as secretarial lines. By using bridge lifters, the Enginuity AUA39I4 may be

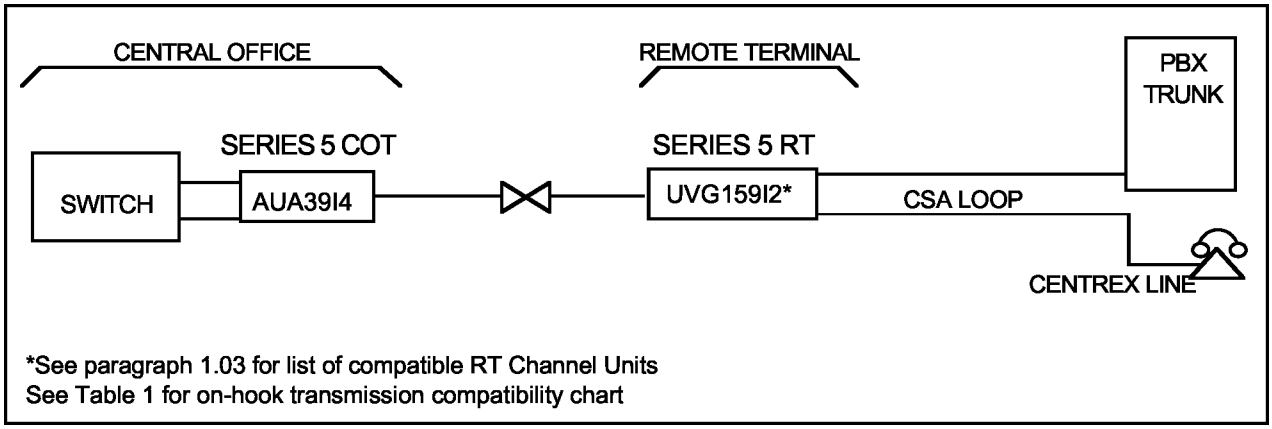


Figure 1. Typical Application For The Enginuity AUA39I4

be bridged with a standard copper pair, SLC Series 5 COT POTS channel units or with Universal Voice Grade channel units. These channel units include: The Enginuity AUA39I4 or AT&T's AUA31, AUA32, AUA38 or AUA39. **NOTE:** Central Office bridged circuits can not be tested with automated test systems (Pair Gain Test Controller, Extended Test Controller, etc.). Also, Central Office bridging will affect the on-hook transmission performance and may be incompatible with on-hook transmission services.

5-ESS Applications

2.04 If an Enginuity AUA39I4 is used with an AT&T 5-ESS® Electronic Switching System, the 5-ESS line assignment parameters for the circuit can have the ground reference (GND REF) attribute set to either YES or NO. The AUA39I4 supports rotary dial and flash-hooks with a 5-ESS floating battery line appearance, and simultaneously maintains CLASS compatibility with transmission of Open Switching intervals.

2.05 When used with a DMS-100, the S101 (S201) switch on the Enginuity AUA39I4 is set to the 800 Ohm position. This impedance allows the DMS-100 to meet network transhybrid specifications (LSSGR). The 900 Ohm position is used for all other switch settings

3. FUNCTIONAL OPERATION

3.01 Refer to Figure 2, the Enginuity AUA39I4 functional Block Diagram, as needed while reading the following description. The AUA39I4 is designed with two independent channels of service per card. The following description serves equally for both channels; A and B.

3.02 The Enginuity AUA39I4 is used at the Central Office Terminal end of the circuit to provide a voice-frequency interface between the Switch and the Series 5 system. The line interface provides a source impedance of 800 or 900 Ohms and provides a high return loss against a terminating impedance of 900 Ohms in series with 2.16 micro-Farad terminations. The AUA39I4 provides insertion loss of 0dB in both directions of transmission. Bi-directional, on-hook transmission is provided with a high return loss for compatibility with new services, such as Caller ID, when the AUA39I4 is used with the Remote Terminal channel units outlined in Table 1.

3.03 Incoming VF signals, applied to the AUA39I4 (pins 31 and 32 for Odd channel operation; pins 29 and 30 for Even channel operation), pass through the Line Protection circuit. The Line Protection protects the AUA39I4's internal circuitry from power cross and lightning surges. From the Line Protection circuit, the signal is applied to a series of Detector and Relay circuits.

3.04 The Microprocessor interfaces the Detector and Relay circuits to perform all the basic loop call processing functions, including loop closure detection, ring trip, on-hook detection, etc.

Table 1. On-Hook Transmission Compatibility Chart

RT UNIT	UNIT MANUFACTURER	SIGNALING STATES
UVG159	Teltrend	Loop-Start/Ground-Start
CSA59	Teltrend	Loop-Start/Ground-Start
AUA58	AT&T	Loop-Start
AUA150	AT&T	Loop-Start/Ground-Start
AUA158	AT&T	Loop-Start/Ground-Start
AUA159	AT&T	Loop-Start
AUA58	Pulsecom	Loop-Start
CSA59	Pulsecom	Loop-Start/Ground-Start
UVG69	Pulsecom	Loop-Start/Ground-Start

3.05 From the Detector and Relay circuitry, the signals are applied through the transformer to the Hybrid circuit. The Hybrid performs the required 2W to 4W conversion. From the Hybrid, signals are passed into the CODEC. The CODEC provides bi-directional conversion between the analog VF signal and the 64kb/s PCM digital signal for transmission to the Remote Terminal end. Signals from the CODEC, as well as signals from the Microprocessor, are applied to the Channel Unit Logic Control circuit.

3.06 The Channel Unit Logic Control separates the bi-directional PCM digital signals and adds the required signaling into the PCM bitstream via a robbed-bit signaling scheme. The PCM digital signals are then sent to/from the channel bank common equipment where they are combined with signals from other system channel units into a 24-channel, DS1 signal.

4. PROVISIONING

4.01 The Enginuity AUA39I4 has no unique channel unit slot restrictions. The AUA39I4 may be installed in any channel unit position of the COT Series 5 Channel Bank. The AUA39I4 has an option switch which when set to the "NORM" position provides loop start and ground start operation. When the S1 switch is set to the "RSS" position, only loop start operation is provided. The factory default setting is "NORM".

CAUTION
This product incorporates static sensitive components. Proper electrostatic discharge procedures must be followed.

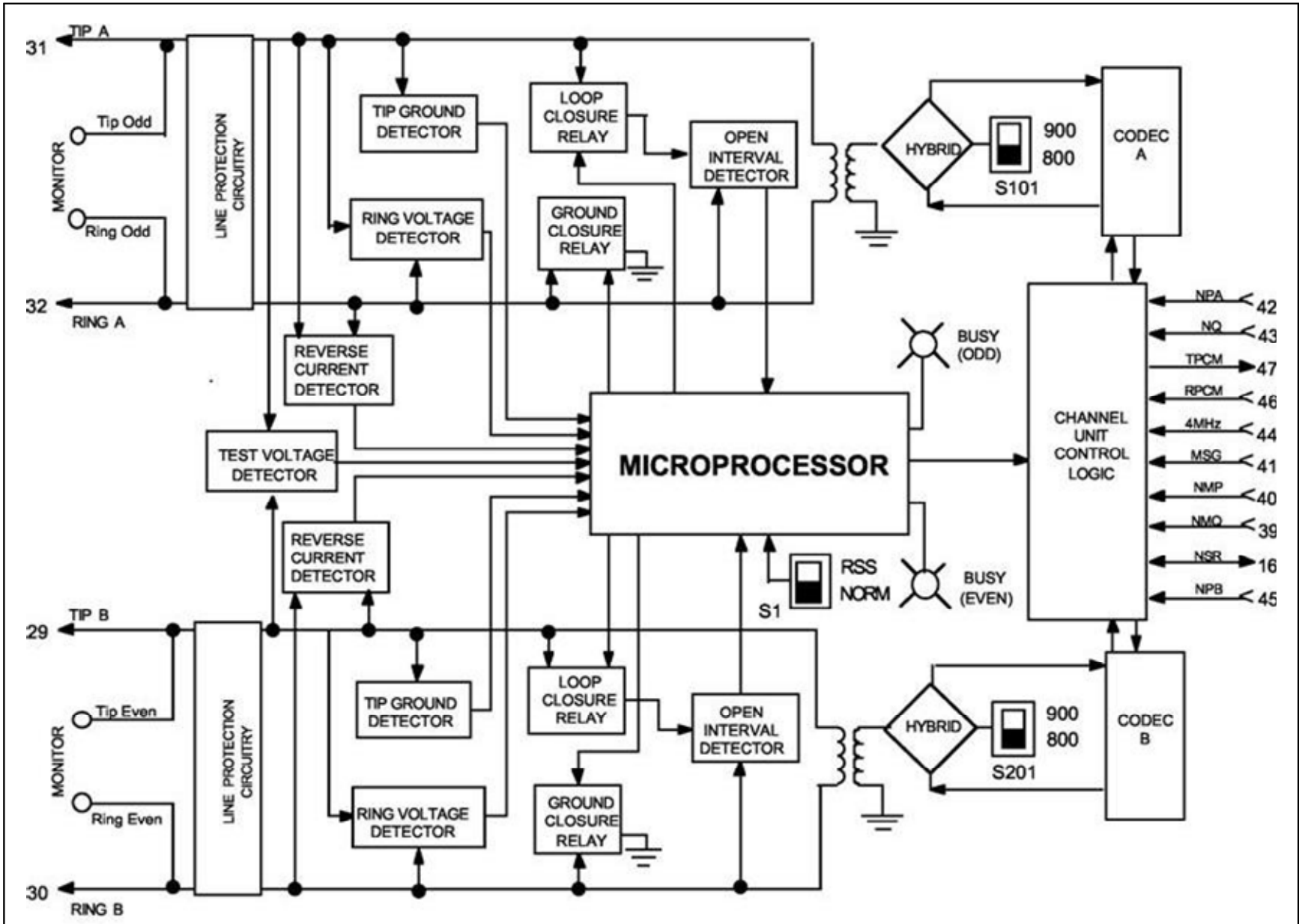


Figure 2. Block Diagram AUA39I4

5. INSTALLATION

5.01 Upon receipt of the equipment, visually inspect it for signs of damage. If the equipment has been damaged during transit, immediately report the extent of damage to the transportation company and to Enginuity.

Installer Connections

5.02 Installation consists of plugging the unit into the appropriate slot of the Central Office Terminal end of the Series 5 Channel Bank Assembly. No other connections are required. The unit makes electrical contact when the unit is installed and properly seated into the channel bank assembly's backplane connector. Pin-outs for the Enginuity AUA39I4 are listed in Table 2.

Table 2. AUA39I4 Pin-out Assignments

LEAD DESIGNATION		PIN
Tip A	To Loop	31
Ring A		32
Tip B		29
Ring B		30
TPCM	To TRU	47
RPCM		46
NPA		42
NQ		43
4MHz		44
NPB		45
MSG	To BCU / ADU	41
NMP		40
NMQ		39
NSR		16
-48V	Power	26
+5VR		22, 23
+5V		25, 50
-5V		49
GROUND		1, 13, 17, 19 20, 21

5.03 The installer verifies the cabling between the SLC Series 5 channel bank and the Main Distribution Frame by using the AT&T Channel Unit Test Extender, Model 52A, or by using the T&R Monitor points located on the AUA39I4 front panel.

6. TESTING

6.01 The AUA39I4 is compatible with local maintenance operations using the Pair Gain Test Controller (PGTC) and Extended Test Controller (XTC). The AUA39I4 may be used with automated test systems such as Mechanized Loop Testing (MLT) systems and Automatic Line Insulation Testing (ALIT). The AUA39I4 contains front panel test points* to the T and R leads for both the odd and even channels so Craft personnel can monitor channel operation. ***NOTE:** A test cord (AT&T part number 405525809) is required to plug into the test points on the AUA39I4.

6.02 Standard AT&T SLC Series 5 loop-start and ground-start channel unit installation test procedures should be used to test the AUA39I4. The AT&T procedures can be found in AT&T practice 363-204-402, Detailed Level Procedures 504 and 505.

Repair And Return Policy

6.03 The procedures outlined in this practice are intended only to ascertain proper operation of the unit and, if trouble should occur, to isolate those problems to the most probable area. These procedures are not designed to effect repairs or modifications. Tests made beyond those outlined, or repairs made beyond replacing a faulty unit, are not recommended and may void the warranty. If trouble is encountered, verify all installer connections and verify that the unit is making a positive connection to the backplane connector of the mounting assembly. If trouble persists, replace the unit and repeat the procedures outlined.

6.04 If technical assistance is required, contact The Enginuity Customer Service Department by calling:

1-800-980-ECOM (1-800-980-3266) or

(630) 587-1455

6.05 If a unit needs repair, call Enginuity for a Return Material Authorization (RMA) number and return the defective unit, freight prepaid, along with a brief description of the problem, to:

Enginuity Communications, Inc.
3820 Ohio Ave., Suite 12
St. Charles, Illinois 60174
ATTN: Repair And Return Dept.

6.06 As specified in our warranty, Enginuity will repair and return the unit at no charge to the customer providing the warranty of the unit has not expired. If an out-of-service situation exists, a replacement unit can be obtained; however, a purchase order number is required to ensure return of the replacement unit.

7. SPECIFICATIONS

Impedance: 900 Ω + 2.16 µF
800 Ω in parallel with 100 Ω + 0.05 µF

Insertion Loss: 0dB (transmit); 0dB (receive)

Off-Hook Echo Return Loss (ERL): >19dB (>28dB, typical), referenced at 900 Ohms + 2.16 µF, measured from the RT-end

Off-Hook Singing Return Loss (SRL): >11dB (>24dB, typical), referenced at 900 Ohms + 2.16 µF, measured from the RT-end

On-Hook Echo Return Loss (ERL): >19dB (>35dB, typical), referenced at 900 Ohms + 2.16 µF, measured from the RT-end

On-Hook Singing Return Loss (SRL): >11dB (>25dB, typical), referenced at 900 Ohms + 2.16 µF, measured from the RT-end

Longitudinal Balance: >58dB from 200Hz to 1000Hz; >53dB at 3000Hz

Frequency Response: +1.0dB to -0.5dB of loss from 400Hz to 2800Hz (relative to 1004Hz)

Idle Channel Noise: 20dBrnC, maximum

Impulse Noise: <15 counts in 15 minutes (47dBrnC0 threshold)

Intermodulation Distortion: >43dB - R2 Product (-13dBm0 Input); >44dB - R3 Product (-13dBm0 Input)

Single Frequency Distortion: <-28dBm0 from 0 to 12kHz, 0dBm0; <-40dBm0 from 1004Hz to 1020Hz, 0dBm0

Pulse Distortion: >90 P/AR (peak - to - average ratio), (-13dBm0 Input)

Electrical: Meets applicable Bellcore Technical Reference TR-TSY-000057 specifications

Operating Environment: Normal operating temperature, 40^{o} to 100^{o} F (4^{o} to 37^{o}C); Storage temperature, -40^{o} to 140^{o} F (-40^{o} to 60^{o} C); Humidity, 20 to 55% during normal operation, 0 to 95%, during storage

Dimensions: Height, 3.5 in. (8.89cm); width, 0.64 in. (1.63cm); depth, 9.8 in. (24.9cm)

Weight: Approx. 0.6 lb. (0.272kg)

ORDERING INFORMATION

Order in accordance with the following:

AUA39I4	SLC Series 5-Compatible Universal Voice Grade Channel Unit - Central Office Terminal End
	CLEI: 5SC3CCA1AA