

INTELIPOINT SLC® SERIES 5-COMPATIBLE INTELLIGENT 4W ETO CHANNEL UNIT MODEL AUA441C (ISSUE 2)

(*CLEI™ Code: 5SC2XM02AA)

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9. SPECIFICATIONS

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

1. GENERAL

1.01 Teltrend's AUA441C is a SLC Series 5-compatible intelligent 4-wire Equalized Transmission Only (4ETO) plug-in. The AUA441C is designed primarily for use in Remote Terminal (RT) applications to provide an interface between the common equipment of the SLC Series 5 channel bank and a metallic analog facility. As a member of Teltrend's family of intelligent products, the AUA441C performs all the functions of a standard AUA41 module configured for 4-wire TO or ETO service. An ideal application of Teltrend's AUA441C is in 4-wire private-line data circuits. If the Remote Terminal is located on the customer's premises, and is a short cable distance from the network interface, the AUA441C can be configured as an intelligent Data Station Termination (DST). The AUA441C offers unique labor-saving features for circuit turn-up and maintenance, such as remote and automatic alignment capabilities and remote loopbacks. The AUA441C also features a terminate and leave function that permits a unit to be

installed now but not placed in service until a future time. The AUA441C is microprocessor controlled to allow comprehensive remote testing of the circuit from a Serving Test Center (STC) without the need for specialized SLC Series 5 test equipment.

1.02 This practice is being revised to change the Model number of the unit from AUA441C to AUA441CI2 and the CLEI to identify extended system compatibility. Whenever this practice is revised or reissued, the reason for revision or reissue will be stated in this paragraph.

1.03 Features of Teltrend's AUA441C are as follows:

- Temperature hardened for use in all Remote Terminal applications
- Can be programmed to operate as an intelligent ETO or as an intelligent Data Station Termination
- Compatible with Feature Packages C, C2, D, Enhanced B with special services (FPB/SS), Enhanced C with Autocut (FPC/AC) and with Integrated Network Access - Remote Terminal (INA-RT)
- Does not require, but is compatible with, a Craft Interface Unit for circuit provisioning, installation or maintenance
- Bit-stream compatible with most D3/D4/D5 and SLC Series 5, 4TO/ETO channel units
- End-to-end compatible with Teltrend's AUA441C and AUA241C, AT&T's AUA41 or equivalent units
- Acknowledgement tone identifies unit accessed as a Teltrend INTELIPORT plug
- All options are set via tone commands
- Terminate and Leave capability
- Tone-activated Loopback with automatic 20-minute timeout feature; Separate loopback frequencies for ETO and DST applications
- Analog-side terminating impedance options of 150, 600, and 1200 Ohms
- Sealing current Off, Term or Supply configuration
- Remote (manual) 3- or 4-tone alignment capability at TLP (Transmission Level Point) or DLP (Data Level Point)
- Automatic Alignment capability at TLP or DLP
- Short-Loop DST Alignment capability at TLP or DLP
- Automatically establishes proper level coordination between facility and digital carrier equipment

- Automatically compensates for up to 15.3dB (re: to 1004Hz) of attenuation to meet C5 conditioning
- Attenuator and equalizer settings automatically set through INTELIPORT's alignment sequence
- Ramp-up/ramp-down acknowledgement tone indicates alignment met/failed C5 conditioning parameters; Also provides equalizer query mode (ETO mode only) to determine equalizer's performance status
- 4-Tone Auto-Sweep or Full-Range Transponder operation (304 to 3204Hz), with quiet termination, permits remote testing of noise and tone level measurement
- Front-panel AUTO ALIGN switch permits local activation of Wire Test or Auto-Align feature
- Front-panel LED indicates status of loopback or alignment modes (ALIGN /LPBK)
- Escape feature allows return to command mode or return to idle
- Meets power cross and lightning protection requirements, per UL1459 specifications
- 7-year warranty

2.APPLICATIONS

2.01 Teltrend's AUA441C may be used in all Remote Terminal arrangements. The AUA441C is used to interface a 4-wire TO or ETO analog facility to the common equipment of a SLC Series 5 channel bank assembly. The AUA441C serves as an intelligent 4-wire ETO when used with Remote Terminals located in remote enclosures (huts, CEVs, cabinets). If the Remote Terminal is located on the customer's premises, and is a short cable distance from the network interface, the AUA441C can be provisioned as a Data Station Termination (DST). In this arrangement, the AUA441C can be used to eliminate the need for a separate DST unit. Refer to Figure 1 for typical applications of Teltrend's AUA441C in a Private Line Data circuit application.

2.02 The AUA441C can only be used in SLC Series 5 systems that have been turned-up with bank controller Feature Packages C, C2, D, Enhanced B with special services (FPB/SS), Enhanced C with Autocut (FPC/AC), and with Integrated Network Access Remote Terminal (INA-RT).

2.03 To obtain the best operating efficiency, remote stand-alone test connectors (SMAS) should be present in the central office portion of the circuit. However, if the operating company has installed the SLC Series 5 Extended Test Controller (XTC) and a test access path has been established to SARTS, then stand-alone SMAS connectors are not required.

ETO Applications

2.04 When installed in the Remote Terminal and configured as an ETO, the AUA441C is compatible, on the analog side, with most Data Station Termination units. The AUA441C has transmit path gain and post-equalization capabilities to meet C5 conditioning for standard cables, both loaded and non-loaded, to 15.3dB (referenced at 1004Hz). Transmit gain and equalization is automatically set by the AUA441C

based on a 3 or 4 tone alignment received by the unit. The automatic alignment feature is compatible with most Intelligent DSTs (such as Teltrend's Model SDS5486C). On the digital side, the AUA441C is bit-stream compatible with most D3/D4/D5 and SLC Series 5, 4-wire TO/ETO channel units.

DST Applications

2.05 Teltrend's AUA441C may be used to interface the Remote Terminal-end of a 4-wire TO circuit with customer premises equipment. Figure 1 shows a typical application where the AUA441C is used instead of a standard DST. In this application, the Remote Terminal is physically located close to the customer's network interface. The network interface should be within 0.5dB at 1000Hz (877 feet of 26 gauge cable, or 1087 feet of 24 gauge cable).

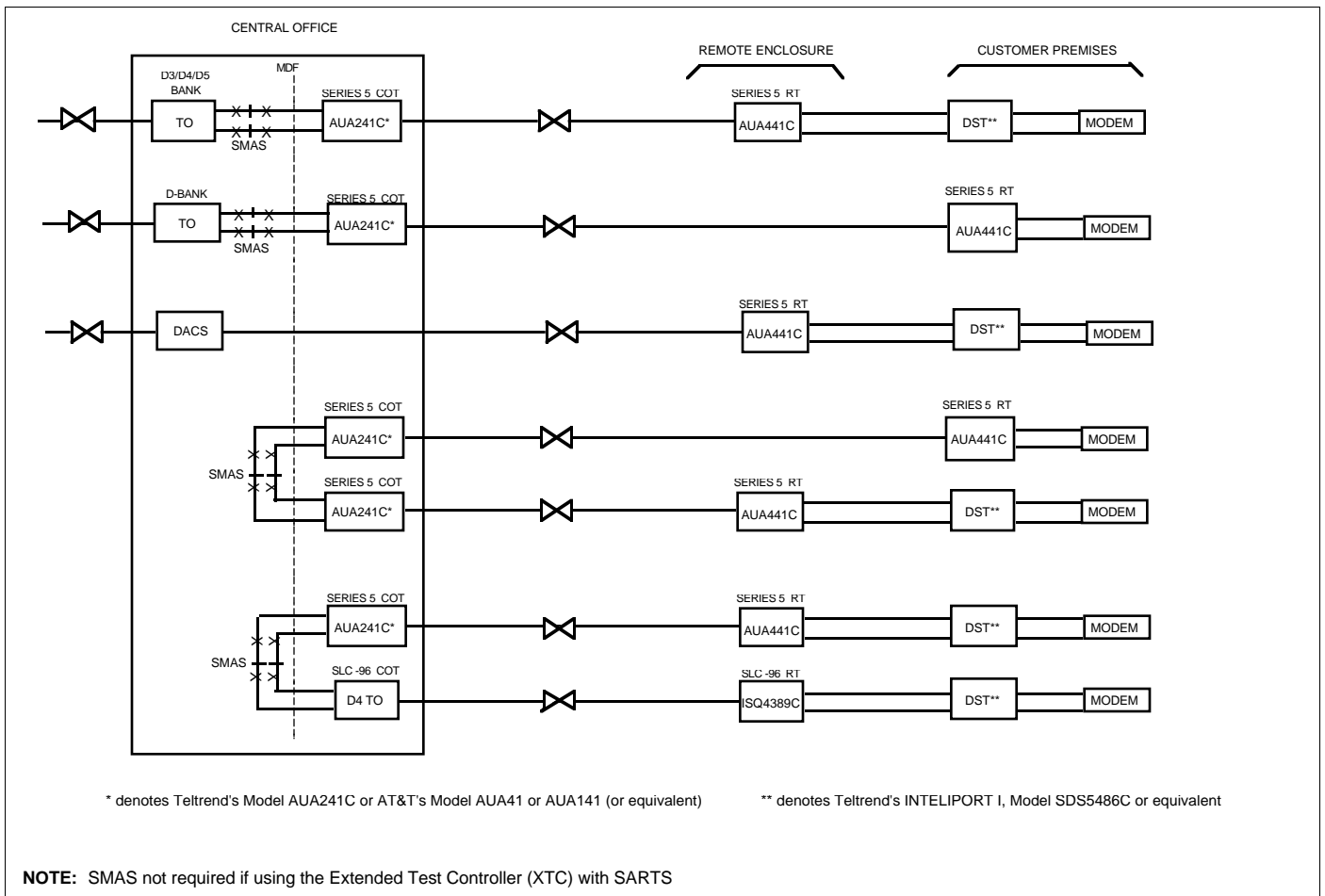


Figure 1. AUA441C Typical Application

Central Office Terminal Application

2.07 It is technically feasible to use Teltrend's AUA441C as an intelligent ETO in SLC Series 5 Central Office Terminals for extensions of 4-wire circuits via standard copper pairs. These circuits have the "A" end served by the SLC Series 5 COT/RT combination and the "Z" end served by copper loops out of the same CO. If the AUA441C is used in COT applications, test connectors (SMAS) should be installed in the circuit at the Central Office to allow remote test access. The command mode and loopback states, would be activated from the analog-side of the COT in the same manner as analog (drop) side access of an AUA441C installed in a Remote Terminal. It is expected, however, that this application will occur infrequently. Therefore, this practice does not include references to COT applications. All procedures are written assuming the AUA441C is installed at the Remote Terminal.

2.08 Questions, regarding technical compatibility of the AUA441C with other network elements, should be referred to Teltrend's Customer Service Department by calling (630) 377-1700.

3. INSTALLATION

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

CAUTION

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

Factory Settings

3.02 Teltrend's AUA441C is shipped from the factory with the following configuration parameters:

- Unit is set for the ETO Mode of operation;
- Facility-side impedance is set to 600 Ohms;
- Sealing current circuit is set to SUPPLY (ON);
- RCV OUT port is set to +5dBm TLP;
- XMT IN port is set to +5dBm TLP;
- Equalizer circuit is set for a flat gain; and
- Command Mode Activation tone is set for 2913Hz.

The operating parameters can be set for the required application by following the procedures in Section 6.

Installer Connections

3.03 Installer connections to the unit are made to the 25-pair cable connectors located on the rear of the

SLC Series 5 Channel Bank Assembly. Pin-outs for the AUA441C are listed in Table 1. The unit makes electrical connection when installed into the appropriate position of the mounting assembly.

Table 1. Installer Connections

LEAD DESIGNATION		PIN	
T	XMT IN (Tip)	FACILITY	31
R	XMT IN (Ring)		32
T1	RCV OUT (Tip)		29
R1	RCV OUT (Ring)		30
LPTT	XMT IN (Tip)	Channel Test Unit (Loop)	7
LPTR	XMT IN (Ring)		8
LPTT1	RCV OUT (Tip)		33
LPTR1	RCV OUT (Ring)		34
CHTT	XMT IN (Tip)	Channel Test Unit (Unit)	9
CHTR	XMT IN (Ring)		16
CHTT1	RCV OUT (Tip)		35
CHTR1	RCV OUT (Ring)		36
CHTE			37
NPQ		Unit	42
NQ			43
TPCM	Transmit PCM		47
RPCM	Receive PCM		46
4MHZ			44
MSG		Bank Controller Unit	41
NMP			40
NMQ			39
NSR			16
+5	S POWER		25, 50
+5	R POWER		22, 23
-5	POWER		49
GND	GROUND		13, 17, 19, 21

Wire Test Mode

3.04 The Wire Test mode is used to verify installation and station wiring after the unit is installed. The installer activates the Wire Test mode by momentarily pressing the front-panel, AUTO ALIGN button for less than five seconds. If the AUTO ALIGN button is pressed and held for longer than five seconds, the AUA441C recognizes this as a command to enter the automatic alignment sequence.

3.05 When the AUTO ALIGN button is pressed and released within the five second time frame, steady 1008Hz is applied to the XMT IN channel port (T & R - odd pair count). Interrupted 1008Hz is applied to the RCV OUT channel port (T1 & R1 - even pair count).

3.06 Station wiring is verified by connecting a Transmission Test Set, with a built-in speaker, or other suitable listening device, to the receive and transmit channel pairs at the analog-side cable connection and listening for the appropriate tones.

3.07 After verifying the tones, press the AUTO ALIGN button a second time (again for less than five seconds) to end the Wire Test mode. **NOTE:** If the AUTO ALIGN button is not pressed a second time, the Wire Test mode automatically times out one hour after initial activation. If desired, the Wire Test mode can be released remotely by sending 2913Hz for more than five seconds.

4. FUNCTIONAL OPERATION

4.01 Refer to Figure 2 (Block Diagram for the AUA441C when operating in the ETO mode) or Figure 3 (Block Diagram for the AUA441C when operating in the DST mode) as needed while reading the following description. In addition to the text, flowcharts are provided and can be used as a quick reference for accessing the AUA441C's intelligent functions.

Transmit Channel

4.02 Analog signals received from the metallic facility enter the AUA441C via pins 31 and 32 (T and R respectively). These signals pass through the Power Cross and Lightning Protection circuitry (per UL1459 requirements) and are transformer coupled to the XMT Gain/Loss circuit. The transformer provides dc isolation and couples sealing current to the circuit. Sealing current may be provisioned, via tone commands, for either supply, terminate or off. The transformer also provides a balanced terminating impedance that may be provisioned, via tone commands, for either 150, 600 or 1200 Ohms.

4.03 The 4-tone equalizer circuit and the XMT Gain/Loss circuit provide the appropriate amount of gain and equalization to achieve a 0dBm0 level required at the input of the XMT CODEC circuitry. Gain and equalization is set by the Microprocessor and depends on the mode of operation (ETO or DST). The ETO or DST mode of operation is set via tone command while in the command mode of operation (see paragraph 3.09 and 6.12 through 6.14). If the AUA441C is configured for the ETO mode, the Microprocessor automatically selects the gain and equalization based on levels received during circuit alignment (see Section 7, Table 3 for a listing of operating levels). If the AUA441C is configured for the DST mode, the equalizer is fixed for no equalization (FLAT) and the XMT Gain/Loss circuit is set at +13TLP.

4.04 The XMT CODEC converts the analog signal into an 8-bit encoded digital word. This 8-bit digital

word is then routed to the SLC Series 5 common equipment via the TPCM bus, pin 47.

Digital Channel Assignment

4.05 The AUA441C uses the odd-numbered channel associated with a physical plug-in slot of a SLC Series 5 channel bank equipped with most of the allowable feature packages (see paragraph 2.02). The even-numbered channel, associated with a physical slot, is unused. For SLC Series 5 channel banks equipped with Feature Package D or Enhanced Feature Package B with special services (FPB/SS) in the Mode II configuration, a full 64kb timeslot is assigned when the AUA441C is installed. Upon inserting the AUA441C into the channel unit position, the unit identifies itself to the bank controller as a 5SCU7D channel unit, and the bank controller provisions a carrier time slot.

Receive Channel

4.06 The SLC Series 5 common equipment routes the digital signal to the AUA441C via the RPCM bus, pin 46. The RCV CODEC circuit reconstructs the analog signal from the 8-bit encoded digital word.

4.07 The output of the RCV CODEC is applied to the RCV Gain/Loss circuit. The RCV Gain/Loss circuit provides the appropriate amount of gain or loss for matching the signals received to the level required for the analog facility. The level is set by the Microprocessor and depends on the mode of operation (ETO or DST). If the AUA441C is configured for the ETO mode, the Microprocessor sets the receive path level to a +5TLP (-8DLP). If the AUA441C is configured for the DST mode, the Gain/Loss circuit is set to -3TLP (-16DLP).

4.08 The signal from the RCV Gain/Loss circuit is applied to the transformer. The transformer couples sealing current to the circuit and provides dc isolation between the metallic facility and the internal circuitry of the AUA441C. Finally, the analog signal passes through the Power Cross and Lightning Protection circuitry to the metallic facility via pins 29 and 30 (T1&R1 respectively).

Command Mode

4.09 The AUA441C incorporates a Command Mode. The Command Mode is the operational state in which the AUA441C monitors its transmission paths for frequencies commanding the unit to perform certain functions. The frequency used to activate the Command Mode depends on the mode of operation (ETO/DST). In the ETO mode, Command Mode is activated by sending 2913Hz. In the DST mode, Command Mode is activated by sending 2713Hz. In either mode, upon detecting the activation tone for more than 30 seconds, the AUA441C returns a

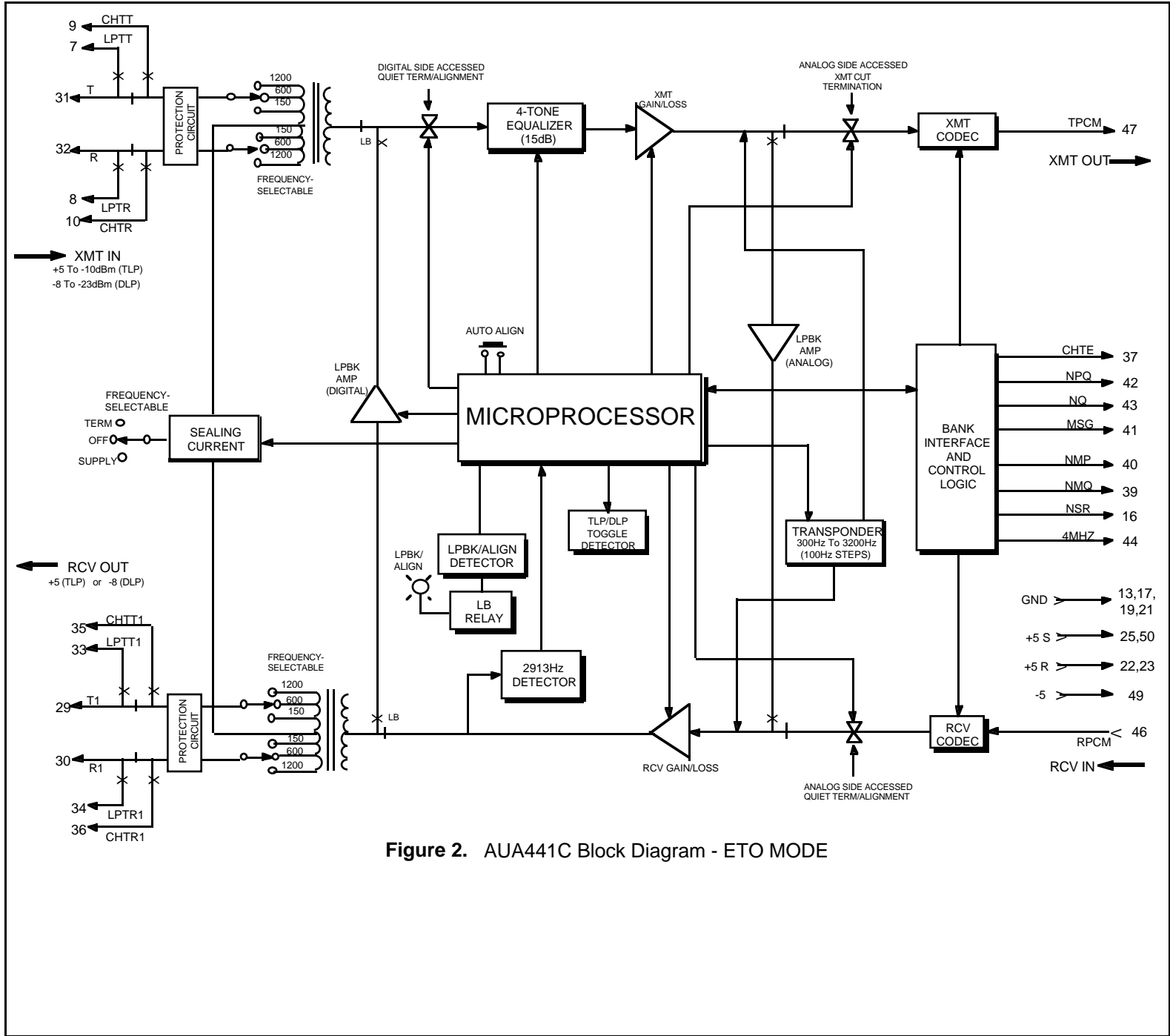


Figure 2. AUA441C Block Diagram - ETO MODE

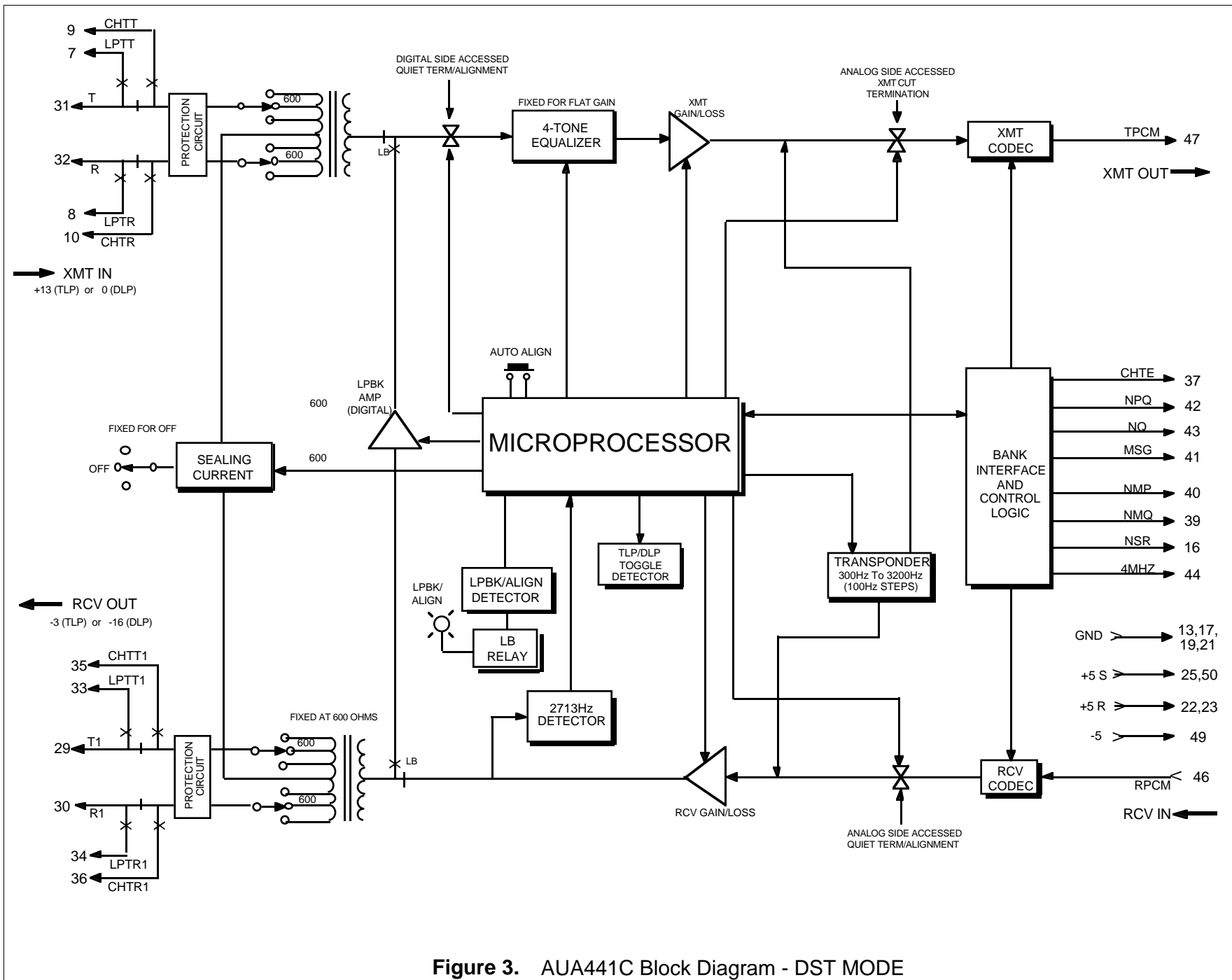


Figure 3. AUA441C Block Diagram - DST MODE

1008Hz acknowledgement tone indicating command mode initiation. Also, the front-panel LPBK/ALIGN LED will light steady when command mode is initiated.

NOTE

The tone used to activate Command Mode is the same tone used to activate the Loopback circuit. The only difference is the time frame in which the tone is sent. Tone must be applied for 1.5 sec. but less than 30 seconds to activate the appropriate loopback (analog or digital). Tone must be applied for more than 30 sec., to activate the Command Mode.

Loopback

4.10 The AUA441C has two equal level Loopback capabilities; Digital-side Loopback and Analog-side Loopback. Digital-side Loopback is initiated by sending tone via the digital carrier-side of the channel unit. Analog-side Loopback is initiated by sending tone via the analog inputs. The frequency used to initiate Loopback, again, depends on the mode of operation (2913Hz for ETO Mode; 2713Hz for DST Mode). In either case, upon detecting the appropriate activation tone for less than 30 seconds, Loopback is established only upon removal of the tone. When the AUA441C is in loopback, the front-panel LPBK/ALIGN LED flashes and a 20-minute timer is activated. The 20-minute timer limits the maximum time the Loopback circuit is activated. After the 20-minute time frame, Loopback deactivates and the AUA441C returns to idle. If desired, Loopback can be released before the 20-minute timeout period expires by re-applying the activation tone for 0.9 seconds, minimum.

Option Setting

4.11 After the AUA441C has been installed and all wiring is verified, the unit must be provisioned according to the WORD document. The unit's options are described in Section 6. All options are set from the Command Mode by sending the appropriate tones. In typical applications, tones are sent from the Serving Test Center (STC). The STC gains access to the circuit via remote test access connectors (SARTS/SMAS) located in the Central Office, on the network-side of the AUA441C. Procedures for circuit access are provided in Section 5. In some circumstances, the installer may be required to set the AUA441C options locally. Test equipment required, and methods for accessing the circuit and applying the appropriate tones are described in Section 5 also.

CAUTION

If installing an AUA441C for use as a DST in a customer-premises-mounted Remote Terminal, or if replacing an AUA441C installed as a DST with either a new unit or with a unit from Telco "C" stock, provisioning should be verified immediately to prevent the possibility of sealing current potential being applied on the circuit.

5. CIRCUIT ACCESS METHODS

5.01 Access to the AUA441C can be accomplished via the Central Office Terminal, the Remote Terminal, or from the Customer Premises. If remote test connectors (SMAS) are present in the Central Office portion of the circuit, access can be initiated from a Serving Test Center. **NOTE:** The AUA441C is not tested via the Pair Gain Test Controller because the AUA441C is used for non-switched special service circuits.

Test Equipment

5.02 If remote test access is not available, the following Transmission Measurement Sets (TMS) can be used to generate the tones required to access the AUA441C:

Hewlett-Packard 3551
Western Electric 23A
Halcyon 704A2 (or equivalent)

The TMS is also used to gain access to the AUA441C with either of the following unique SLC Series 5 test equipment via 310-type jacks:

AT&T Channel Unit Test Extender, Model 52A
AT&T Craft Interface Unit Model J99404TA-1

5.03 In most applications, tones are applied using a remote test system (SARTS). The remote test system gains access to the circuit via test access connectors (SMAS) installed in the CO portion of the circuit. Refer to Figure 1 for typical SMAS connector locations. In some cases, tones may be applied locally by a test person. The point in the circuit to apply these tones depends on the location of the installer (COT, RT or at the customer premises) and the type of test equipment available. Circuit access from the Digital side is discussed in paragraphs 5.04 through 5.11. Circuit access from the Analog side is discussed in paragraphs 5.12 through 5.18. Command and acknowledgement tones received from the AUA441C are described in Sections 6, 7 and 8.

Digital Side Access From The COT-End

5.04 From the Digital-side, access to an AUA441C installed in a Remote Terminal is normally done via the remote test system and test access connectors (SARTS/SMAS). Access can also be done by a test person located at the Central Office Terminal. To activate the circuit, the test person must apply the appropriate activation tone toward the AUA441C's RCV IN port (RPCM lead, pin 46) for the required time frame (less than 30 seconds to activate Loopback; more than 30 seconds to activate Command Mode). The AUA441C returns an acknowledgement tone via the AUA441C's XMT OUT port (TPCM lead, pin 47).

Access From Remote Test Systems

5.05 From the STC, access to the AUA441C is accomplished from systems such as SARTS via CO SMAS access points. SMAS connectors are usually wired in the circuit at the channel bank during initial installation. In this particular application, the STC accesses the SMAS connector, splits the circuit, then applies the appropriate tones on the analog side of the SMAS connector. In this manner, tones are sent to the analog-side XMT IN port of the COT channel unit (T&R). Upon activating the circuit, the STC receives the appropriate acknowledgement tones from the AUA441C via the RCV OUT port of the COT channel unit (T1 & R1).

5.06 Separate SMAS access points are not required if the CO has an Extended Test Controller (XTC) connected to SARTS and the Central Office Terminal. The XTC provides a full-splitting, metallic access to the analog ports of the COT channel unit through SMAS-type relays built onto the SLC Series 5 4W special service channel units*. In addition, the XTC provides digital bit-stream access to the circuit. Tones can be sent to, and received from, the AUA441C via the far-end bit stream access feature. The STC can use the XTC to access the COT channel unit analog-port or the far-end bit stream access feature in the same manner as separate SMAS connectors described in paragraph 5.05. [*Typically, the COT unit will be a Teltrend AUA241C or an AT&T AUA41 or AUA141].

Access Using The AT&T Channel Unit Test Extender, Model 52A And A TMS

5.07 When using the Channel Unit Test Extender, the Test Extender is first inserted into the appropriate COT channel unit position. The COT channel unit* is then inserted into the Test Extender to complete the circuit. The Test Extender provides split test access to the channel unit via 310-type jacks located on the 52A's faceplate. In this manner, the Central Office wiring side is removed from the circuit. [*Typically, the COT unit will be a Teltrend AUA241C or an AT&T AUA41 or AUA141].

5.08 The XMT side of the TMS is then connected to the CU I/O TRMT port so the appropriate tones can be sent to the AUA441C. The RCV side of the TMS is then connected to the CU I/O RCV port to receive the appropriate acknowledgement tones from the AUA441C.

Access Using The AT&T Craft Interface Unit (CIU) And A TMS

5.09 Access to the AUA441C installed in the Remote Terminal can be accomplished by using the AT&T Craft Interface Unit (CIU), Model J99404TA-1. The tester must first connect the CIU to the Channel

Test Unit installed with the COT channel bank common equipment. The tester then follows the CIU menu to access the channel unit position. [NOTE: The COT channel unit position must be provisioned to match the installed channel unit - typically, 5SCU7D]. Upon accessing the channel unit, the "Connect Test Access" (TA) option is selected. The CIU should be set for VF channel units with the signaling control OFF. See page 10 for information regarding the CIU.

5.10 When the "Metallic Test Access" option is selected, the CIU's LINE T/R and LINE T1/R1 ports are used to send and receive the appropriate tones to and from the AUA441C. To send tones, the transmit side of the TMS is connected to the LINE T/R port. To receive tones, the receive side of the TMS is connected to the LINE T1/R1 port.

5.11 When the "Digital Test Access" option is selected, the "FE" (Far End) switch should be pressed. The transmit side of the TMS is then connected to the BIT STREAM ACCESS TRMT port and the appropriate tones can be sent to the AUA441C. The receive side of the TMS is connected to the BIT STREAM ACCESS RCV port for receiving the acknowledgement tones from the AUA441C.

Analog Side (Drop) Access

5.12 Access via the analog side is normally done at the Remote Terminal or at the customer-end of the circuit. To activate the AUA441C, the test person must apply the appropriate tone to the AUA441C's RCV OUT port (i.e., backwards into the T1 & R1 leads, even pair count) for the required time frame (less than 30 seconds to activate Loopback; more than 30 seconds to activate Command Mode). Gaining access to the AUA441C's RCV OUT port can be done by using any of methods outlined in the following paragraphs.

Access Using The T&R And T1&R1 Pairs And A TMS

5.13 If a test person is located at the customer end of the circuit, the TMS is used to apply tone directly to the AUA441C's RCV OUT port (T1 & R1, even pair count). The receive side of the TMS is connected to the XMT IN port (T & R, odd pair count) to monitor the acknowledgement tones received from the AUA441C. If a test person is located at the Remote Terminal, access to the pairs can be accomplished directly at the protector block or at the test access connector. Upon sending the appropriate Loopback/Command Mode activation tone and upon receiving the acknowledgement tone from the AUA441C, the tester reverses the TMS connections. Tones are then sent to the AUA441C via the XMT IN port (T&R pair). Tones from the AUA441C are applied to the AUA441C's RCV OUT port (T1 & R1 pair).

Craft Interface Unit Information

Many SLC Series 5 users have deployed the AT&T Craft Interface Unit (Model J99404TA-1) for provisioning and maintaining special service circuits. **NOTE:** The Craft Interface Unit is not needed when using Teltrend's AUA441C. However, the AUA441C is compatible with the Craft Interface Unit if the CIU is used for circuit testing and maintenance.

When using the AUA441C, there is no need to load the bank controller with any channel unit slot provisioning information via the Craft Interface Unit or the Centralized Operations Processor. The bank controller automatically provisions a carrier time slot when the AUA441C is inserted, regardless of the information stored for the slot. In addition, Teltrend's AUA441C ignores any provisioning information stored in the bank controller. Teltrend's AUA441C responds to inventory queries as a 5SCU7D channel unit, indicating an AUA41-type unit is installed in the slot.

Although it is not required, the user may use the CIU to provision the channel unit position as described below. This information is ignored by Teltrend's AUA441C. However, the presence of correct information is required if the test person intends to use the CIU to gain access to the circuit for testing or to locally provision the unit using the appropriate tone commands. Also, correct information could help maintain consistency in craft operations. Example, if a tester, working at the Central Office Terminal with the CIU, queries the system to determine how the RT channel unit position is provisioned, the tester would receive a response indicating a 5SCU7D channel unit, provisioned for 4ETO or 4TO operation, is in place. Also, if an AT&T AUA41 unit is substituted for a Teltrend AUA441C used in the RT, the AT&T AUA41 would automatically be provisioned for levels close to the AUA441C operation.

The following could be input into the SLC Series 5 Remote Terminal channel unit position to approximate Teltrend's AUA441C operation in the ETO mode:

Channel Unit Type: 5SCU7D
 Function Code: ETO4
 Transmit Attenuation: 13
 Receive Attenuation: 2
 -7dB (J3): WH
 Non-Loaded/Loaded: N
 Slope: 0
 Bandwidth: 0
 Height: 0
 TRMT & RCV Impedance: 600

CAUTION

Caution should be used when substituting an AT&T AUA41 unit for Teltrend's AUA441C used in the ETO mode. The AT&T AUA41 always provides sealing current, whereas Teltrend's AUA441C can be provisioned for either sealing current supply, terminate, or off. If an AT&T unit is substituted for the AUA441C, a dc voltage will appear on the T & R pair. **NOTE:** Manual alignment may be required to adjust the AT&T AUA41 to exactly match the cable parameters.

For Remote Terminals at the customer premises, the following could be input for the channel unit position to approximate Teltrend's AUA441C operation in the DST mode and allow for circuit access via the Craft Interface Unit:

Channel Unit Type: 5SCU7D
 Function Code: TO4
 Transmit Attenuation: 16.5
 Receive Attenuation: 3
 -7dB Transmit: BK
 7dB Receive: BK

CAUTION

If an AT&T AUA41 is used to replace Teltrend's AUA441C used as a DST in a customer premises Remote Terminal application, the circuit must be re-designed to have separate Network Channel Terminating Equipment (NCTE) installed. The AT&T AUA41 cannot provide the proper attenuation in the transmit path. Also, the AUA41 automatically supplies sealing current toward the customer and does not provide for 2713Hz loopback.

Access Using the AT&T Channel Unit Test Extender, Model 52A And A TMS

5.14 When using the AT&T Channel Unit Test Extender, the Test Extender is first inserted into the appropriate channel unit position. The AUA441C is then inserted into the Test Extender to complete the circuit. [The test person should verify that the correct channel unit position is addressed.] Before testing, the test person may choose to monitor the circuit from either the protector block or from the Customer Network Interface.

NOTE

Removal and reinsertion of the AUA441C does not change any levels/parameters except for the Terminate and Leave feature and the DST's 2713Hz activation command. The 52A Test Extender should

not be used to activate Terminate and Leave because this feature is automatically deactivated any time the unit is powered down. Also, the Test Extender should not be used to provision an AUA441C for the DST mode because the 2713Hz activation tone automatically resets to 2913Hz when the unit is powered down for more than 0.5 seconds. However, when the AUA441C is configured as a DST, the DST mode's default parameters do remain set (that is, 600 Ohm impedance, sealing current OFF, equalizer flat).

5.15 The Test Extender provides split test access to the channel unit via 310-type jacks located on the 52A's faceplate. In this manner, the metallic drop side is removed from the circuit. The transmit side of the TMS is connected to the CU I/O RCV port (i.e., backwards into the AUA441C's RCV OUT port), and

tones are applied. The receive side of the TMS is connected to the CU I/O TRMT port (AUA441C's XMT IN port) to receive tones from the AUA441C. After loopback or command mode is activated, the tester reverses the TMS connections (transmit side of TMS is connected to CU I/O TRMT port; receive side of TMS is connected to CU I/O RCV port.) to perform loopback tests or command mode operations. Additional circuit verification, if desired, can be made at the protector block or at the test access connector. Once activities are complete and the AUA441C has been returned to normal, the AUA441C and the Test Extender are removed. The AUA441C is then re-inserted into the channel unit position to establish a permanent circuit.

Access Using the AT&T Craft Interface Unit (CIU) And A TMS

5.16 In this application, the AUA441C is first installed in the appropriate channel unit position. The CIU is then connected to the Channel Test Unit installed with the Remote Terminal channel bank common equipment. The channel unit position is then selected via commands per the CIU menu. **NOTE:** To gain access to the circuit when using the CIU at the RT, it is required that the channel unit position be provisioned as a 5SCU7D channel unit (see information regarding the CIU on page 10). The test person can then select the "Connect Test Access" (TA) option to access the circuit using the "Metallic Test Access" path. The CIU should be set for VF channel units with the signaling control OFF. **NOTE:** If the AUA441C is already in Loopback or in the Command Mode when test access is gained using the CIU, the unit will automatically return to idle upon connecting the CIU test access bus.

5.17 The CIU's LINE T/R and LINE T1/R1 ports are then used to send and receive the appropriate tones to and from the AUA441C. To send tones, the transmit side of the TMS is connected to the CIU's LINE T1/R1 port. To receive tones, the received side of the TMS is connected to the CIU's LINE T/R port. After Loopback or Command Mode is activated, the tester reverses the TMS connections (transmit side of TMS is connected to LINE T/R port; receive side of TMS is connected to LINE T1/R1 port). Tones are then sent and received in the normal manner. After the AUA441C has been returned to normal, CIU circuit access is released via commands per the CIU menu.

5.18 A test person working at the Remote Terminal can gain access to the AUA441C via the digital side using the Craft Interface Unit. In this applications, the procedures outlined in paragraph 5.16 are followed with the exception that the tester selects the "Digital Test Access" connection. The tester then proceeds with the instructions outlined in paragraph 5.11 with the exception that the "NE" (Near End) switch is pressed.

6. PROVISIONING

6.01 The AUA441C does not contain any physical option switches for provisioning the circuit. All circuit options are set from the Command Mode by sending the appropriate frequencies to the unit. The Command Mode can be activated by a test person located at the Central Office Terminal, the Remote Terminal or at the Customer Premises. If remote test system test connectors (SMAS) are present in the CO portion of the circuit, tones could be initiated from a Serving Test Center. The test person should access the Command Mode and set the options according to the WORD document. Section 5 describes the various methods for accessing the circuit.

ETO Command Mode (Or New Installations)

6.02 On new installations, or if the unit has been set to the default settings (see paragraph 6.06), or if the unit is configured for the ETO mode of operation, the Command Mode is activated by sending 2913Hz via the appropriate port of the AUA441C for more than 30 seconds. The 2913Hz tone can be sent from either the Digital side or from the Analog side. Upon detecting 2913Hz for more than 30 seconds, the AUA441C returns a steady 1008Hz acknowledgement tone, via the appropriate output port, indicating Command Mode is initiated. See paragraph 6.08 also.

DST Command Mode

6.03 If the unit has been in-service and is configured for the DST mode, the Command Mode is activated from either Digital or Analog side by sending 2713Hz for more than 30 seconds. Upon detecting 2713Hz, the AUA441C returns a steady 1008Hz acknowledgement tone, via the appropriate output port, indicating Command Mode is initiated.

NOTE

If the Command Mode is activated on a working circuit and the tester receives an acknowledgement tone of 2308Hz followed by 1008Hz, it indicates the unit was provisioned with the Terminate and Leave feature activated (see paragraph 6.26).

6.04 From Command Mode, various tones are used to enter sub-modes for setting options or performing tests. Refer to Table 2 for a listing of intelligent functions. **NOTE:** Each time Command Mode is activated, a 5-Minute timer is set. While in Command Mode, if no tone is sent to the AUA441C during the five minute time frame, the AUA441C, after five minutes of no activity, times out and returns to idle.

Escape To Command Mode/Escape To Idle

6.05 The AUA441C features an escape function that permits the tester to return to Command Mode, at any time, from any mode except Loopback. Return to Command Mode is accomplished by sending 2604Hz

for more than 1.5 seconds. The AUA441C may also be returned to idle, at any time, from any mode. When configured for the ETO mode, return to idle is accomplished by sending 2913Hz for more than five seconds. When configured for the DST mode, return to idle is accomplished by sending 2713Hz for more than five seconds.

Transmission Default (Pre-Service) Settings

6.06 The AUA441C features a Transmission Level pre-service mode for both ETO and DST operation. The default level setting feature is used to set, or restore, the AUA441C to the default settings whenever the unit is removed from service or when a new installation occurs.

6.07 The default level setting feature is initiated from Command Mode by sending a 3004Hz tone. Upon detecting 3004Hz, the AUA441C automatically restores the unit to the following parameters:

- Unit re-sets to ETO Mode;
- Facility impedance re-sets to 600 Ohms;
- Sealing current re-sets to SUPPLY (ON);
- XMT IN port re-sets to 0.0dBm0;
- Equalizer circuit re-sets to a flat gain and
- Command Mode Activation tone is set for 2913Hz.

Upon completion, the AUA441C returns an interrupted 1008Hz tone then returns to Command Mode.

Power Interruption

6.08 If the power feed to the unit is interrupted at any time for more than five seconds, the unit automatically changes its Command Mode activation tone for 2913Hz regardless of how the unit is provisioned. All other option settings, however, are maintained in the currently programmed position via the non-volatile memory circuit. For example, if power to the unit is interrupted and the unit is provisioned for the DST mode, the DST levels/parameters are maintained but the unit's Command Mode activation tone reverts to 2913Hz. Because of this procedure, all new installations, including unit's from "C" stock, will initially use 2913Hz to activate the circuitry.

Power Query

6.09 In addition to the Power Interruption feature, the AUA441C provides a Power Query feature. Power Query allows the tester to verify the status of the power supply circuitry to check if the power feed was ever interrupted. Power Query is activated from the Command Mode by sending 1304Hz. **NOTE:** The Power Query circuit resets after each query. The test person should perform a power query upon initial installation of the unit to reset the circuit; otherwise initial power-up of the circuit is registered as a power interruption.

6.10 Upon detecting 1304Hz, the AUA441C returns

either a ramp-up tone or a ramp-down tone. The ramp-up tone, consisting of a series of tones ranging from 408Hz to 2808Hz in ascending order, indicates power has not been interrupted since the last alignment or query. The ramp-down tone, consisting of a series of tones ranging from 2808Hz to 408Hz in descending order, indicates an interruption in power did occur. The ramp-up or ramp-down tone is applied for approximately two seconds with the last tone in the sequence being applied for approximately four seconds. After sending the ramping tone, the AUA441C automatically returns to Command Mode.

Provisioning The AUA441C

6.11 The main option to be provisioned is the mode of operation. In most Remote Terminal applications, the AUA441C is provisioned for the ETO mode. If the unit is installed in a customer-premises-mounted Remote Terminal, the AUA441C could be provisioned as a DST.

ETO Or DST Query

6.12 The ETO/DST Query feature allows the tester to verify the present mode of operation of the unit. The ETO/DST Query is activated from Command Mode by sending 3104Hz. Upon detecting 3104Hz, the AUA441C responds with an acknowledgement tone indicating the programmed setting. A 2-second alternating tone of 1008/408Hz followed by steady 408Hz indicates the unit is set to the ETO mode. A 2-second alternating tone of 1008/2808Hz followed by steady 2808Hz indicates the unit is set to the DST mode. **NOTE:** The default setting is the ETO mode.

6.13 After verifying the setting and if the setting is to be changed, follow the procedure in paragraph 6.14. If the setting is not to be changed, send 2604Hz (1.5 seconds, minimum) to return to Command Mode. To return to idle send 2913Hz for more than five seconds (if configured for ETO mode) or 2713Hz for more than five seconds (if configured for DST mode).

ETO Or DST Setting

6.14 If the unit returned to, or is in, the Command Mode, the test person must access the ETO/DST Query mode first (see paragraph 6.12). While in the ETO/DST Query mode, the test person sends 404Hz to set the ETO operating mode or 2804Hz to set the DST operating mode. Upon detecting one of these commands, the AUA441C responds with the appropriate ETO or DST acknowledgement tone indicated in paragraph 6.12. After setting the ETO/DST option, send 2604Hz (1.5 seconds, minimum) to return to Command Mode.

Table 2. Command Mode Menu

4ETO MODE DIGITAL SIDE ACCESS (COT)		4ETO MODE ANALOG SIDE ACCESS (DROP)		DST MODE DIGITAL SIDE ACCESS (COT)		DST MODE ANALOG SIDE ACCESS (DROP)	
FREQ	FUNCTION	FREQ	FUNCTION	FREQ	FUNCTION	FREQ	FUNCTION
2913Hz	COMMAND MODE	2913Hz	COMMAND MODE	2713Hz	COMMAND MODE	2713Hz	COMMAND MODE
404Hz	QUIET TERM/ TRANSMISSION RESPONSE	404Hz	QUIET TERM/ TRANSMISSION RESPONSE	404Hz	QUIET TERM/ TRANSMISSION RESPONSE	404Hz	*NOT SUPPORTED
504Hz	IMPEDANCE QUERY/SET	504Hz	IMPEDANCE QUERY/SET	504Hz	*NOT SUPPORTED	504Hz	*NOT SUPPORTED
604Hz	TANDEM TRANSMISSION RESPONSE	604Hz	TANDEM TRANSMISSION RESPONSE	604Hz	*NOT SUPPORTED	604Hz	*NOT SUPPORTED
904Hz	SEALING CURRENT QUERY/ SET	904Hz	SEALING CURRENT QUERY/ SET	904Hz	*NOT SUPPORTED	904Hz	*NOT SUPPORTED
1004Hz	*NOT SUPPORTED	1004Hz	REMOTE ALIGNMENT	1004Hz	REMOTE ALIGNMENT	1004Hz	*NOT SUPPORTED
1204Hz	EQUALIZER QUERY	1204Hz	EQUALIZER QUERY	1204Hz	*NOT SUPPORTED	1204Hz	*NOT SUPPORTED
1304Hz	POWER QUERY	1304Hz	POWER QUERY	1304Hz	POWER QUERY	1304Hz	POWER QUERY
1804Hz	AUTO-ALIGN	1804Hz	AUTO-ALIGN	1804Hz	AUTO-ALIGN	1804Hz	*NOT SUPPORTED
2304Hz	TERMINATE & LEAVE	2304Hz	TERMINATE & LEAVE	2304Hz	TERMINATE & LEAVE	2304Hz	TERMINATE & LEAVE
2604Hz	ESCAPE TO COMMAND MODE	2604Hz	ESCAPE TO COMMAND MODE	2604Hz	ESCAPE TO COMMAND MODE	2604Hz	ESCAPE TO COMMAND MODE
2804Hz	TLP/DLP TOGGLE	2804Hz	TLP/DLP TOGGLE	2804Hz	TLP/DLP TOGGLE	2804Hz	*NOT SUPPORTED
2913Hz	ESCAPE TO IDLE	2913Hz	ESCAPE TO IDLE	2713Hz	ESCAPE TO IDLE	2713Hz	ESCAPE TO IDLE
3004Hz	DEFAULT LEVEL MODE	3004Hz	DEFAULT LEVEL MODE	3004Hz	DEFAULT LEVEL MODE	3004Hz	DEFAULT LEVEL MODE
3104Hz	ETO/DST MODE	3104Hz	ETO/DST MODE	3104Hz	ETO/DST MODE	3104Hz	ETO/DST MODE

***NOTE:** If the Tester attempts to access a function that is not supported, the AUA441C returns a ramp-down tone (2808Hz to 408Hz) indicating an unsupported command and returns to the Command Mode (1008Hz).

Impedance Query (ETO Mode Only)

6.15 Impedance Query allows the test person to verify the setting of the AUA441C's terminating impedance option. The default setting is 600 Ohms.

NOTE: This feature is accessible only when the AUA441C is configured for the ETO mode. If configured for the DST mode, the impedance is automatically fixed at 600 Ohms and the Impedance Query command, in this case, is invalid.

6.16 From Command Mode, Impedance Query is activated by sending 504Hz. Upon detecting 504Hz, the AUA441C responds with an acknowledgement tone indicating the programmed setting. A 2-second alternating tone of 1008/408Hz followed by steady 408Hz indicates the impedance is set for 150 Ohms. A 2-second alternating tone of 1008/1808Hz followed by steady 1808Hz indicates the impedance is set for 600 Ohms. A 2-second alternating tone of 1008/2808Hz followed by steady 2808Hz indicates the impedance is set for 1200 Ohms.

6.17 If the impedance setting is to be changed, follow the procedure in paragraph 6.18. If the setting is not to be changed, send 2604Hz (>1.5 seconds) to return to Command Mode.

Set Impedance Option (ETO Mode Only)

6.18 If the unit returned to, or is in, the Command Mode, the test person must first access the Impedance Query mode (see paragraph 6.16). While in the Impedance Query mode, the test person sends 404Hz to set the impedance to 150 Ohms, 1004Hz to set the impedance to 600 Ohms, or 2804Hz to set the impedance to 1200 Ohms. Upon detecting one of these commands, the AUA441C responds with the appropriate acknowledgement tone indicated in paragraph 6.16. After setting the impedance, send 2604Hz (>1.5 seconds) to return to Command Mode.

Sealing Current Query (ETO Mode Only)

6.19 Sealing Current Query allows the test person to verify the setting of the AUA441C's sealing current circuit. The default setting for the ETO mode is Supply (ON). **NOTE:** This feature is accessible only when the AUA441C is configured for the ETO mode. If the unit is configured for the DST mode, the internal sealing current circuit is automatically fixed for OFF and the Sealing Current Query command, in this case, is invalid.

6.20 From command mode, Sealing Current Query is activated by sending 904Hz. Upon detecting 904Hz, the AUA441C responds with an acknowledgement tone indicating the programmed setting of the sealing current circuit. A 2-second alternating tone of 1008/2808Hz followed by steady 2808Hz indicates the circuit is set to SUPPLY. A 2-second alternating tone of 1008/408Hz followed by steady 408Hz

indicates the circuit is set to OFF. A 2-second alternating tone of 1008/1808Hz followed by steady 1808Hz indicates the circuit is set for TERM (Sink).

6.21 If the Sealing Current setting is to be changed, follow the procedure in paragraph 6.22. If the setting is not to be changed, send 2604Hz (>1.5 seconds) to return to Command Mode.

Set Sealing Current Option (ETO Mode Only)

6.22 If the unit returned to, or is in, the Command Mode, the test person must first re-access the Sealing Current Query mode (see paragraph 6.20). While in the Sealing Current Query mode, the test person can program the unit to supply 20mA of sealing current (SUPPLY), provide a termination for sealing current supplied from the distant end (TERM or sink), or can be set to OFF (disabled). To change the setting, the test person sends 404Hz to set the circuit to OFF, 2804Hz to set the circuit to SUPPLY (ON), or 1804Hz to set the circuit to TERM. Upon detecting one of these commands, the AUA441C responds with the appropriate sealing current setting acknowledgement tone indicated in paragraph 6.20. After setting the sealing current option, send 2604Hz (>1.5 seconds) to return to Command Mode.

Sealing Current Flow Query

6.23 The test person can query the AUA441C to verify if sealing current is flowing or not flowing. If the unit returned to, or is in, the Command Mode, the test person must first access the Sealing Current Query mode (see paragraph 6.20). From the Sealing Current Query mode, the test person sends 1004Hz. Upon detecting 1004Hz, the AUA441C responds with either a ramp-up tone (408Hz to 2808Hz) indicating sealing current is flowing or a ramp-down tone (2808Hz to 408Hz) indicating sealing current is not flowing. After sending the ramping tone, the AUA441C automatically returns to Sealing Current Query mode and returns the appropriate acknowledgement tone indicating the programmed setting of the sealing current option.

6.24 After verifying sealing current flow, send 2604Hz (1.5 seconds, minimum) to return to Command Mode or 2913Hz (more than five seconds) to return to idle.

Terminate And Leave

6.25 Terminate and Leave allows for pre-service conditioning. Pre-service conditioning means that a unit can be installed now even though the unit is not ready for service cut-over until a later date. Terminate and Leave can also be used as a maintenance feature, in case of trouble, by disabling the circuit until a technician can be dispatched for troubleshooting. Terminate and Leave can be activated while in the ETO or DST mode and from either the Digital or Analog side.

Terminate And Leave Activate

6.26 From command mode Terminate and Leave is activated by sending 2304Hz into the appropriate port. The response from the AUA441C is as follows:

From Digital Side: Upon detecting 2304Hz, the AUA441C's 1008Hz command mode tone changes to interrupted 2308Hz. After five seconds, the AUA441C returns to idle.

From Analog Side: Upon detecting 2304Hz, the AUA441C's 1008Hz command mode tone changes to interrupted 2308Hz at -16dBm at the AUA441C's RCV OUT port (T1 & R1), then returns to idle.

NOTE: The interrupted tone of 2308Hz at -16dBm will be sent continuously when Terminate and Leave is activated and remains present until feature is released.

When Terminate and Leave is activated, the transmission path from the analog side to the digital side is open and a quiet termination is applied towards the digital side. The front-panel LPBK/ALIGN LED flashes at the rate of 1/4 second ON, 1/2 second OFF which also indicates Terminate and Leave is activated.

Terminate And Leave Release

6.27 To release Terminate and Leave, the test person must first re-enter the Command Mode by sending the appropriate activation tone (2913Hz in the ETO mode; 2713Hz in the DST mode) for longer than 30 seconds. Response from the AUA441C is as follows:

From Digital Side: When Command Mode is re-accessed, the AUA441C outputs a steady tone of 2308Hz. After five seconds, 2308Hz changes back to 1008Hz. AUA441C is in normal command mode.

From Analog Side: [NOTE: Tester must send the appropriate activation tone via the RCV OUT port (that is, backwards) at -4dBm.] When Command Mode is re-accessed, the AUA441C outputs a steady 1008Hz via the XMT IN port. Tester removes the 2913Hz/2713Hz tone. Upon removal of tone, AUA441C reapplies 1008Hz to the RCV OUT port.

7. ALIGNMENT

7.01 The AUA441C can be aligned via the Auto-Align or Remote Alignment feature. Auto Align is used to automatically align the AUA441C with an intelligent Data Station Termination at the customer-end of the circuit. Auto-align can also be used to identify whether the distant end is equipped with a non-intelligent DST or a short-loop DST. Remote Alignment is used to align only the AUA441C.

TLP/DLP Toggle

7.02 Before an alignment is performed, the tester must decide if alignment is to be done at TLP or data

level (DLP). The unit is initially programmed to align at TLP. When configured for the ETO mode, the TLP/DLP toggling feature can be initiated from either the Digital side or Analog side. When configured for the DST mode, the TLP/DLP toggling is initiated from the Digital side only.

7.03 Toggling from TLP to DLP is accomplished from Command Mode by sending 2804Hz. Upon detecting 2804Hz, the AUA441C toggles to the DLP mode, corrects the internal circuitry to accommodate the change in levels, then returns to Command Mode. Toggling is verified by monitoring the level of the 1008Hz Command Mode tone for a change of 13dB. To return to the TLP mode, send another 2804Hz while in Command Mode or return the unit to idle. **NOTE:** Each time the unit returns to idle, the TLP/DLP circuit automatically returns to the TLP mode. Whenever testing or alignment is to be done at data level, 2804Hz must be sent to toggle the DLP mode.

NOTE

Table 3 shows the operating levels for the AUA441C. If aligning the circuit at TLP, tones returned from the AUA441C during alignment will be at +5dBm when activated via the Analog side or at 0dBm when activated via the Digital side. If aligning the circuit at DLP, tones returned from the AUA441C during alignment will be at -8dBm when activated via the Analog side or at -13dBm when activated via the Digital side.

Table 3. Operating Levels

PORT	LEVELS (IN dBm)			
	ETO MODE		DST MODE	
	TLP	DLP	TLP	DLP
XMT IN (Analog Side)	+5 to -10	-8 to -23	+13	0
RCV OUT (Analog Side)	+5	-8	-3	-16

Automatic Alignment

7.04 When configured for the ETO mode, Auto Align can be initiated from either the Digital side or from the Analog side (see paragraph 7.06 through 7.09). When configured for the DST mode, Auto Align is initiated from the Digital side only (see paragraph 7.17). In either mode, Auto Align can be initiated from the Command Mode by sending 1804Hz or can be initiated from the idle state by pressing the front-panel AUTO ALIGN button* for more than five seconds. When Auto Align is initiated via the AUTO ALIGN button, alignment takes place at TLP only. ***NOTE:** The AUTO ALIGN button should be pressed only when instructed. Otherwise, pressing this button at an inappropriate time may cause circuit disruption.

7.05 While configured for the ETO mode, the AUA441C provides a unique Auto Sense feature. Auto Sense provides a means of placing the AUA441C into a “wait” state until a DST is installed at the customer end. See paragraph 7.14 through 7.16 for details.

Auto-Align - ETO mode

7.06 While configured for the ETO mode and when auto-align is initiated from the analog side, the tester must normal the circuit and disconnect all test equipment immediately after activating the auto-align feature for proper alignment to continue. Upon detecting 1804Hz, or upon sensing the AUTO ALIGN button being pressed, the AUA441C sends 2713Hz for 30 seconds (minimum) to the near-end DST to put the DST into Command Mode. Upon entering Command Mode, the DST returns 1004Hz.

NOTE

If interrupted 1024Hz is returned instead of 1004Hz, it indicates a short-loop DST. In this case, follow the Short-Loop DST alignment procedures in paragraph 7.10-7.13. If neither 1004Hz nor interrupted 1024Hz is received from the near-end DST within a two minute time frame, the AUA441C assumes the near end is equipped with a non-intelligent DST. In this case, the AUA441C sends a 1008Hz tone followed by 2713Hz for five seconds, then returns to idle.

7.07 Upon detecting 1004Hz from the DST, tones of 1008, 2808, 408 (during a 3-tone alignment), and 1808Hz (during a 4-tone alignment) are sent and received between both ends automatically. Gain and equalization is automatically set for proper level coordination. Upon completion, the same tones are looped between both ends to verify alignment settings. The alignment sequence takes about two to three minutes to complete.

7.08 Upon completion, the AUA441C returns two ramping tones indicating alignment results. The first ramping tone, consisting of either a ramp-up tone (308Hz to 3008Hz in ascending order) or a ramp-down tone (3008Hz to 308Hz in descending order), indicates alignment results of the DST. The second ramping tone, consisting of either a ramp-up tone (408Hz to 2808Hz in ascending order) or a ramp-down tone (2808Hz to 408Hz in descending order), indicates alignment results of the AUA441C. A ramp-up tone indicates alignment is within the parameters of C5 conditioning. A ramp-down tone indicates alignment is not within the parameters of C5 conditioning.

7.09 After sending the ramping tones, the AUA441C sends 2713Hz (more than five seconds) to the DST and returns to idle. The DST, upon detecting 2713Hz, also returns to idle.

Short-Loop DST Auto-Align (ETO Mode)

NOTE: When aligning a short-loop DST, the DST must be optioned for TLP as opposed to DLP for successful alignment completion. Short-Loop DST auto-align can be activated by sending 1804Hz while in Command Mode or by pressing the AUTO ALIGN button.

7.10 Upon detecting 1804Hz, or upon sensing the AUTO ALIGN button being pressed, the AUA441C sends 2713Hz for 30 seconds (minimum) to the near-end DST to put the DST into Command Mode. Upon entering Command Mode, the DST returns interrupted 1024Hz. **NOTE:** If interrupted 1024Hz is not received from the DST within a two minute time frame, the AUA441C assumes the near end is equipped with a non-intelligent DST. In this case, the AUA441C sends a 1008Hz tone followed by 2713Hz for five seconds, and returns to idle.

7.11 Upon detecting interrupted 1024Hz, the AUA441C sends 1008Hz to begin the alignment process. Upon detecting 1008Hz, the DST removes its Command Mode tone, applies a quiet termination, enters the alignment mode and aligns to the 1008Hz tone. **NOTE:** The DST may take from 10 seconds up to four minutes to complete the alignment process.

7.12 After aligning to the 1008Hz tone, the DST enters loopback and loops the 1008Hz tone back to the AUA441C. The AUA441C returns either a ramp-up tone (indicating a successful alignment) or a ramp-down tone (indicating an unsuccessful alignment). After the ramping tone, the AUA441C sends 2713Hz to return the DST to idle. If the DST is unable to complete a successful alignment at this point, the DST returns an interrupted 1008Hz tone causing the AUA441C to send a ramp-down tone to the test person.

7.13 In either case, after sending the ramping tone and after returning to idle, the AUA441C re-sends 2713Hz for 45 seconds to place the DST back into Command Mode. Upon entering Command Mode, the DST returns interrupted 1024Hz. Upon detecting interrupted 1024Hz, the AUA441C sends 408Hz to place the DST into the Automatic Gain Control (AGC) mode. While in the AGC mode, the AUA441C sends 1008Hz, 2808Hz, and 408Hz to the DST. The DST responds to each tone, one at a time, at a +5TLP level. The AUA441C aligns to each tone as it is returned. Upon completion, the AUA441C will then send either a ramp-up tone or a ramp-down tone indicating the alignment results. **NOTE:** If 1008Hz is received from the DST with more than 4dB of loss, the AUA441C will align but return a ramp-down tone. The ramp-down tone indicates the DST was used on a loop with more than 4dB of loss. Upon completion, the AUA441C re-sends 2713Hz to the DST and returns to idle.

AUTO Sense Feature (ETO Mode Only)

7.14 The Auto Sense feature provides a means of placing the AUA441C into a “wait” state until such time when a DST is installed at the customer end. The Auto Sense feature is especially useful when the DST is temporarily missing or has been removed from service. **NOTE:** Auto Sense is operational only if the AUA441C is configured for the ETO mode and only if the internal sealing current circuit is set to SUPPLY. Also, the unit at the customer end must be set for TERM (Sink).

7.15 When placed into the Auto-Align mode, either from the Command Mode by sending 1804Hz or by pressing the AUTO ALIGN button for more than five seconds, the Auto Sense feature can be enabled to automatically align the circuit when the DST is installed.

7.16 When Auto Sense is enabled, the AUA441C, upon sensing a DST installed at the near end, sends 2713Hz to put the DST into Command Mode. If, after a two minute time frame, the DST does not return Command Mode tone, the AUA441C drops 2713Hz, sends 1008Hz to the DST then looks for 1008Hz to be returned. At this point,

- 1) If 1008Hz is detected, it means a non-intelligent DST is in place at the customer's premises. Consequently, the Auto-Align sequence can not take place. The AUA441C then re-sends 2713Hz to un-loop the DST and returns to idle. The AUA441C should be aligned via the Remote Alignment feature (see paragraph 7.24 through 7.32).
- 2) If 1008Hz is not detected and sealing current is not present, the AUA441C assumes the DST is missing at the customer end. The AUA441C then reactivates the auto sense mode. During this time, the AUA441C is in a “wait” state. Tones can still be passed through either side of the circuit. While in the “wait” state, the AUA441C will recognize Command Mode and Loopback activation tones sent from the digital side. However, the front-panel LPBK/ALIGN LED remains lit and the unit will continually monitor for sealing current flow. When a DST is installed, sealing current flow is established. When sealing current flow is present for greater than 30 seconds, the AUA441C attempts to re-initiate the Auto-Align sequence. **NOTE:** Activating the Command Mode or the Loopback mode during the “wait” state will disable the Auto Sense feature.
- 3) If 1008Hz is not detected but sealing current is present, the AUA441C assumes a non-intelligent DST is installed at the customer end. In this case, the AUA441C aborts the attempt to Auto-Align and returns to idle. The AUA441C should be aligned via the Remote Alignment feature (see paragraph 7.24 through 7.32).

Alignment - DST Mode

7.17 When configured for the DST mode, no alignment is actually required because the operating parameters are fixed. However, when configured as a DST, the AUA441C supports both automatic alignment (see paragraph 7.16) and remote alignment capability (see paragraph 7.23 through 7.30). Either alignment method is activated from the Digital side only. During alignment, the AUA441C provides tone sequences that emulate the alignment response of a standard, intelligent DST. This feature is useful for interfacing automated test systems that access the circuit via SMAS connectors in the Central Office. The remote test system can initiate a standard intelligent DST alignment and receive the appropriate responses from the AUA441C, indicating the circuit is aligned.

7.18 In this application, the AUA441C, located on the customer premises and optioned as a DST, is referred to as the near end, or "A" end, of the circuit. The far-end of the circuit, located on the network side of the COT, is referred to as the "Z" end. The Z end is typically served from a remote Central Office. Digital interoffice facilities are then used to interconnect the SLC Series 5 COT to the remote office. If the Z end is provisioned with an intelligent DST, then the AUA441C's DST mode Auto-Align feature will interact with the Auto-Align capabilities of the Z-end intelligent DST.

7.19 The AUA441C sends alignment tones toward the far-end DST's RCV IN port. Adjustments are made to compensate for incorrect level settings at any point in the intermediate carrier facilities.

CAUTION

When the DST mode Auto-Align is activated from test connections (SMAS) and an end-to-end alignment is intended, the test person must normal the test access for proper alignment to continue. Alignment signals are sent from the Remote Terminal through the network to the far end DST.

7.20 The DST alignment emulation feature also supports an end-to-end alignment of the receive side of the DST at the far end of the circuit. The transmit path from the far-end DST, however, is not adjusted because the levels are fixed. Therefore, end-to-end alignment, in this case, is not necessary.

Auto Align - DST Mode

7.21 When configured for the DST mode, Auto-Align can be initiated from Command Mode by sending 1804Hz or from the idle state by pressing the AUTO ALIGN button* for more than five seconds. When Auto-Align is initiated (digital side only), the tester can monitor the sequence. Before an actual alignment is performed, the tester must first decide if alignment is to be done at TLP or DLP. See paragraph 7.02.

***NOTE**

When Auto Align is initiated via the AUTO ALIGN button, alignment takes place at TLP only. Please also note that the AUTO ALIGN button should be pressed only when instructed. Otherwise, pressing this button at an inappropriate time may cause circuit disruption.

7.22 Upon detecting 1804Hz, or upon sensing the AUTO ALIGN button being pressed, the AUA441C sends 2713Hz for 30 seconds (minimum) to put the distant end into Command Mode. Upon entering Command Mode, the distant end returns 1004Hz to the AUA441C. If 1004Hz is not received within a two minute time frame, the AUA441C assumes Station Z is equipped with a non-intelligent DST. In this case, the AUA441C sends a 1008Hz tone, resends 2713Hz for five seconds, then returns to idle.

7.23 Upon detecting 1004Hz from the distant end, tones of 1008, 2808, 408 (for 3-tone alignment), and 1808Hz (for a 4-tone alignment) are sent and received between both ends automatically. Gain and equalization is automatically set for proper level coordination. Upon completion (approximately two to three minutes), the AUA441C returns a ramp-up tone indicating the circuit is aligned (by default). The AUA441C then re-sends 2713Hz (more than five seconds) to the distant end and returns to idle.

Remote Alignment - ETO Mode

7.24 When configured for the ETO mode, Remote Alignment is initiated from the analog side only by a test person located at the customer premises. Remote Alignment is not supported from the Digital side when configured for the ETO mode.

Remote Alignment - DST Mode

7.25 When configured for the DST mode, Remote Alignment is initiated from the digital (COT) side only and is typically initiated from the distant end. Also, when configured for the DST mode, the AUA441C emulates an alignment because the levels are fixed. Remote Alignment emulation can be used to perform an end-to-end manual alignment of the receive side of a standard DST at the far end of the circuit. **NOTE:** The transmit path from the far-end DST is not adjusted because the AUA441C's operating levels are fixed.

7.26 From Command Mode, the test person should verify/record the level received at 1008Hz, then send 1004Hz to the AUA441C. Upon detecting 1004Hz, the AUA441C removes its 1008Hz tone and returns 2808Hz. The test person should verify/record this level, then send 2804Hz to the AUA441C.

7.27 Upon detecting 2804Hz, the AUA441C returns 408Hz. The test person should verify/record the level of this tone, then send 404Hz to the AUA441C.

7.28 Upon detecting 404Hz, the AUA441C returns 1808Hz. The test person should verify/record the level of this tone, then has the option of sending 1804Hz for a 4-tone alignment or 1004Hz for a 3 tone alignment. The fourth tone (1808Hz) provides a more accurate equalization when interfacing long sections of loaded cable or a mixture of loaded and non-loaded cable. **NOTE:** If the AUA441C is used with distribution cables designed to the Carrier Serving Area (CSA) concept, the fourth tone should not be necessary.

4-Tone Alignment

7.29 If 1804Hz is sent, the AUA441C aligns to four tones. Gain and equalization is automatically set. After alignment, the AUA441C returns either a ramp-up tone (408Hz to 2808Hz in ascending order) indicating alignment is within the requirements of C5 conditioning or a ramp-down tone (2808Hz to 408Hz in descending order) indicating alignment is not within the requirements of C5 conditioning.

3-Tone Alignment

7.30 If 1004Hz is sent the AUA441C aligns to three tones. Gain and equalization is automatically set. After alignment, the AUA441C returns either a ramp-up tone (408Hz to 2808Hz in ascending order) indicating alignment is within the requirements of C5 conditioning or a ramp-down tone (2808Hz to 408Hz in descending order) indicating alignment is not within the requirements of C5 conditioning.

7.31 After sending the ramp-up or ramp-down tone, the AUA441C enters loopback. Upon entering loopback, the front-panel LPBK/ALIGN LED flashes and a 20 minute timer is initiated.

7.32 While in loopback, the tester sends a series of tones to the AUA441C and verifies the level of each tone returned by the AUA441C. Loopback automatically releases after 20-minutes. If release is desired before the 20-minute timeout period, the test person can send 2913Hz (ETO mode) or 2713Hz (DST mode) for more than 0.9 seconds. Loopback releases upon removal of tone.

8. MAINTENANCE TESTING

8.01 Maintenance testing features provided by the AUA441C include:

Loopback, Equalizer/Alignment Query, a Transmission Response Test mode with quiet termination, a 4-Tone Auto-Sweep Transmission Response Test mode, a Full-Range Transmission Response Test mode and a Tandem Transmission Response Test mode.

Each feature is described in detail in the following paragraphs. See Section 5 for descriptions of the different methods for accessing the AUA441C.

Analog Side - Loopback (ETO Mode Only)

8.02 When configured for the ETO mode only, analog-side loopback is activated from the customer end of the circuit by sending 2913Hz into the AUA441C's RCV OUT port (backwards) for greater than 1.5 seconds but less than 30 seconds. If the tone is present for more than 30 seconds, the unit will activate the Command Mode.

8.03 Upon detecting 2913Hz and its removal, the AUA441C sends a 2-second alternating 1008/2808Hz acknowledgement tone over the XMT IN port, enters loopback and sets a 20-minute timeout circuit.

8.04 While in loopback, the tester sends tones to the AUA441C (via the XMT IN port) and verifies the level of each tone returned via the RCV OUT port. Loopback automatically releases 20 minutes after initial activation. If desired, loopback may be released at any time by sending 2913Hz for 0.9 seconds minimum, subsequently removing the tone. Loopback releases upon removal of tone. The automatic timeout feature ensures the transmission paths restore to normal if the 2913Hz release tone is not sent.

Digital Side - Loopback (ETO/DST Mode)

8.05 From the Digital side, loopback is activated by sending 2913Hz (ETO mode) or 2713Hz (DST mode) to the AUA441C's RCV IN port for greater than 1.5 seconds but less than 30 seconds. If the tone is present for more than 30 seconds, the unit will activate the Command Mode.

8.06 Upon detecting the appropriate tone and its removal, the AUA441C applies a 2-second alternating 1008/2808Hz acknowledgement tone over the XMT OUT port and sets a 20-minute timeout circuit.

8.07 While in loopback, the tester sends tones to the AUA441C (via the RCV IN port) and verifies the level of each tone returned via the XMT OUT port. Loopback automatically releases 20 minutes after initial activation. If desired, loopback may be released at any time by sending 2913Hz (ETO mode) or 2713Hz (DST mode) for 0.9 seconds minimum, subsequently removing the tone. Loopback releases upon removal of tone. The automatic timeout feature ensures the transmission paths restore to normal if the release tone is not sent.

Equalizer/Alignment Query (ETO Mode Only)

8.08 The AUA441C provides an Equalizer (or alignment) Query that permits the test person to verify the status of the equalizer circuit since its last alignment. When configured for the ETO mode, Equalizer Query is initiated from the Command Mode by sending 1204Hz. **NOTE:** If configured for the DST mode, the equalizer is automatically set to FLAT and the Equalizer Query command, in this case, is invalid.

8.09 Upon detecting 1204Hz, the AUA441C returns two ramping tones if the circuit was aligned via the Auto Align feature or with one ramping tone if the circuit was aligned via the remote alignment feature.

When aligned via the Auto Align feature:

The first ramping tone (ramp-up or ramp-down) indicates alignment status of the intelligent DST at the other end of the circuit. A ramp-up tone (308Hz to 3008Hz in ascending order) indicates alignment met C5 conditioning. A ramp-down tone (3008Hz to 308Hz in descending order) indicates alignment did not meet C5 conditioning.

The second ramping tone (ramp-up or ramp-down) indicates alignment status of the AUA441C. A ramp-up tone (408Hz to 2808Hz in ascending order) indicates alignment met C5 conditioning. A ramp-down tone (2808Hz to 408Hz in descending order) indicates alignment did not meet C5 conditioning.

When aligned via the Remote Alignment feature:

If only one ramping tone is returned (ramp-up or ramp-down) it indicates the AUA441C was aligned via the Remote Alignment feature. A ramp-up tone (408Hz to 2808Hz in ascending order) indicates alignment met C5 conditioning. A ramp-down tone (2808Hz to 408Hz in descending order) indicates alignment did not meet C5 conditioning.

Upon completion of the tone sequence, the AUA441C automatically returns to Command Mode.

Transmission Response Test (ETO/DST Mode)

8.10 The Transmission Response Test mode allows remote testing of noise and tone level measurements*. From Command Mode, the Transmission Response Test mode is activated by sending 404Hz for 1.5 seconds, minimum. ***NOTE:** This feature is not supported from the Analog-side (or customer drop) when optioned as a DST.

8.11 Upon detecting 404Hz, the AUA441C removes its 1008Hz Command Mode tone, enters the Transmission Response Test mode and applies a quiet termination at

the RCV IN port (when configured for ETO mode and activated from the Analog side) or

the XMT IN port (when activated from the Digital side and unit is optioned as an ETO or a DST).

8.12 During quiet termination, the test person performs noise measurements. **NOTE:** Quiet termination remains in affect for 20 minutes or until

another tone (i.e., to enter the 4-Tone Auto Sweep or Full-Range Transponder mode or to return to Command Mode or idle) is sent to the AUA441C. If tone is not received within the 20 minute time frame, the AUA441C, after 20 minutes of no activity, times out and returns to idle. If release is desired before the 20 minute time frame, send 2604Hz (more than 1.5 seconds) to return to Command Mode.

4-Tone Auto- Or Full-Range Transponder Test Mode

8.13 The AUA441C features a 4-Tone Auto-Sweep and a Full-Range Transponder mode of operation for performing tone level measurements. The 4-Tone Auto-Sweep provides for a quick level verification as the AUA441C sweeps four tones. The Full-Range Transponder provides a more detailed level verification test over a range of tones from 304Hz to 3204Hz. Both test modes are activated from the quiet termination portion of the Transmission Response Test mode only. In this test, tones are sent towards the test person.

4-Tone Auto Sweep Transponder

8.14 While in quiet termination, 4-Tone Auto Sweep is activated by sending 404Hz (1.5 seconds, minimum) as the first tone. Upon detecting this 404Hz, the AUA441C sweeps the tones of 408, 1008, 1808 and 2808Hz, each for 15 seconds, then reapplies quiet termination and resets the 20-minute timer. The 4-Tone Auto-Sweep can be repeated each time 404Hz is sent as the first tone while in quiet termination. If no tone is received within the 20 minute time frame, the AUA441C, after 20 minutes, times out and returns to idle. If release is desired before the 20 minute time frame, send 2604Hz (more than 1.5 seconds) to return to Command Mode. To return to idle, send 2913Hz (ETO mode) or 2713Hz (DST mode) more than five seconds.

Full-Range Transponder

8.15 While in quiet termination, the Full-Range Transponder is activated by sending any tone from 304Hz to 3204Hz (other than tones close to 404Hz, 2604Hz, or 2713 or 2913Hz). If 404Hz is detected as the first tone, the AUA441C activates the 4-Tone Auto-Sweep Transponder. Please note, however, that 404Hz can be sent any time after the transponder mode has begun. If 2604Hz is detected at any time, the AUA441C recognizes this as a command to return to Command Mode. When configured for the DST mode, if 2713Hz is detected at any time, the AUA441C recognizes this as a command to return to idle. Please note, however, that 2713Hz can be sent if the AUA441C is configured as an ETO. When configured for the ETO mode, if 2913Hz is detected at any time, the AUA441C recognizes this as a command to return to idle. Please note, however, that 2913Hz can be sent if the AUA441C is configured as an DST.

8.16 Upon detecting tone, the AUA441C responds by returning a similar tone (but at a 4Hz off-set) for the same duration of time tone is being received from the test person. Each time a new tone is sent, the AUA441C responds to the new tone. Each tone sent to the AUA441C should be sent in increments of 100Hz.

8.17 Following transmission of the last tone and if no other tone is sent by the test person, the AUA441C reapplies quiet termination and resets the 20 minute timer. If no tone is received within the 20 minute time frame, the AUA441C, after 20 minutes, times out and returns to idle. If release is desired before the 20 minute time frame, send 2604Hz (more than 1.5 seconds) to return to Command Mode. To return to idle, send 2913Hz (ETO mode) or 2713Hz (DST mode) more than five seconds.

Tandem Transponder Response Mode (ETO Mode Only)

8.18 In addition to the normal 404Hz-activated Quiet Term/Transponder mode, the AUA441C features a complete-loop-type (Tandem) Quiet Term/Transponder Test mode. The Tandem Quiet Term/Transponder allows a test person to perform noise and tone level measurements of both the AUA441C and the equipment at the customer's premises. The Tandem Quiet Term/Transponder can be initiated from either the Digital side or from the Analog side but only when the AUA441C is optioned as an ETO. This test is not supported when configured for the DST mode. In the Tandem Quiet Term/Transponder mode, the AUA441C will send tone toward the CPE at a fixed +5TLP level (or -8DLP); independent of the level of tone sent from the COT side.

8.19 From Command Mode, the Tandem Transponder is activated by sending 604Hz (for 1.5 seconds, minimum). Upon detecting 604Hz, the AUA441C removes its 1008Hz Command Mode tone, applies a quiet termination and sets a 20-minute timeout circuit. During quiet termination the test person performs noise measurements. From this point, the test person can activate the 4-Tone Auto Sweep or the Full-Range Transponder Test mode (see paragraphs 8.14 and/or 8.15 - 8.17 for details). The 4-Tone Auto or Full-Range Transponder tests, in this case, provide for level verification of the AUA441C at the customer premises equipment. **NOTE:** If the Full Range Transponder mode is used and if 2713Hz is detected, the DST at the customer premises end will initiate loopback. Tones, sent from the AUA441C to the DST, will be looped back toward the AUA441C for level verification.

8.20 Upon completion and if no other tone is sent by the test person, the AUA441C, following transmission

of the last tone, reapplies quiet termination and resets the 20 minute timer. If no tone is received within the 20 minute time frame, the AUA441C, after 20 minutes, times out and returns to idle. If release is desired before the 20 minute time frame, send 2604Hz (more than 1.5 seconds) to return to command mode. To return to idle, send 2913Hz (more than five seconds).

Procedure Overview

8.21 The procedures outlined are intended only to ascertain proper operation of the unit and, if problems should occur, to isolate those problems to the most probable area. These procedures are not designed to effect repairs or modifications. Tests beyond those outlined, or repairs made beyond replacing a faulty unit, are not recommended and may void the warranty.

8.22 If trouble is encountered, verify all installer connections. Also, check the alignment settings via the loopback mode of operation. Please also make sure the unit is properly seating and making a positive connection with the backplane connector of the mounting assembly. If trouble persists, replace the unit and repeat the procedures outlined.

Technical Assistance

8.23 If technical assistance is required, contact Teltrend's Customer Service Department by calling:

1-800-TELTREN (1-800-835-8736) or, if busy)

(630) 377-1700 (8am to 5pm - Central Standard Time)

For after hours, weekends and Holidays, call our 24-hour number (630) 377-2255.

Repair And Return Policy

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

Teltrend Inc.
620 Stetson Ave.
St. Charles, IL 60174
ATTN: Repair & Return Dept.

8.24 As specified in our warranty, Teltrend 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 will be required to ensure return of the replacement unit.

9. SPECIFICATIONS

Impedance

ETO Mode: Facility Side, frequency-selectable for 150/600/1200 Ohms; Also provides query mode (504Hz while in command mode); AUA441C responds with acknowledgement tone (see below) indicating the setting

TO CHANGE SETTING Send	AUA441C'S RESPONSE
404Hz	Alternating 1008/408 then steady 408 = 150
1004Hz	Alternating 1008/1808 then steady 1008 = 600
2804Hz	Alternating 1008/2808 then steady 2808 = 1200

DST Mode: Fixed at 600 Ohms (non-selectable)

Sealing Current

ETO Mode: Frequency-selectable for SUPPLY/OFF/TERM; Also provides query mode (904Hz while in command mode); unit responds with acknowledgement tone (see below) indicating the setting

TO CHANGE SETTING, send	AUA441C's RESPONSE
404Hz	Alternating 1008/408 then steady 408 = OFF
2804Hz SUPPLY	Alternating 1008/2808 then steady 2808 =
1804Hz TERM	Alternating 1008/1808 then steady 1808 =
1004Hz	Ramp-Up (408 to 2808Hz) indicating sealing current is flowing; Ramp-Down (2808/408Hz) indicating sealing current not flowing

DST Mode: Fixed for OFF (non-selectable)

Level Ranges:

PORT	LEVELS (IN dBm)			
	ETO MODE		DST MODE	
	TLP	DLP	TLP	DLP
XMT IN (Analog Side)	+5 to -10	-8 to -23	+13	0
RCV OUT (Analog Side)	+5	-8	-3	-16

(See also Transmission Pre-service specifications)

Transmission Pre-Service Levels - ETO or DST

Mode: Activated from Command Mode (Digital or Analog side) by sending 3004Hz; Unit returns interrupted 1008Hz, restores default settings, then returns to Command Mode:

- Unit restores to ETO configuration
- Impedance = 600 Ohms
- Sealing current to ON
- XMT IN port to 0.0dBm
- RCV OUT port to +5dBm
- Equalizer = flat
- Command Mode Activation = 2913Hz

Loopback Detector Threshold Level: -24dBm

Loopback Gain: Provides equal-level loopback transmission, referenced at 1004Hz, and is based on the difference between XMT IN and RCV OUT levels

Idle Noise: Less than 20dBm

Frequency Response: ±0.25dB from 300 to 3000Hz at full gain

Envelope Delay Distortion:

1000Hz to 2600Hz	≤75msec.
800Hz to 2600Hz	≤ 100msec.
600Hz to 2600Hz	≤ 150msec.
800 to 2800Hz	≤ 200msec.
500 to 2800Hz	≤ 350msec.
600 to 3000Hz	≤ 500msec.
500 to 3000Hz	≤ 800msec.

Operating Environment: Temperature, -40° to 185°F (-40° to 85°C); Humidity, 0 to 95% (no condensation)

Dimensions: Height, 3.5 in. (8.89cm); width, 0.64 in.(1.63cm); depth, 9.89 in. (24.9cm)

Weight: Approximately 1 lb. (0.45kg)

ORDERING INFORMATION

Order in accordance with the following:

AUA441C INTELIPORT SLC® Series 5 Intelligent 4W ETO Channel Unit

Table 4. Installer's Procedures

STEP	ACTION
1.	Install unit. Verify SC LED on (if applicable) and LPBK/ALIGN LED off (NOTE: LPBK/ALIGN/ LED will flash a few times upon initial installation then extinguish).
2.	<p>Wire Test Mode - Caution: When Wire Test mode is activated, 1008Hz is applied onto the transmission pairs. Be sure INTELIPORT is not connected to an in-service circuit where this tone may cause interference.</p> <p>Press front-panel AUTO ALIGN switch (<5 sec.). NOTE: If pressed for >5 sec., AUA441C activates the auto-align sequence.</p> <p>After pressing and releasing AUTO ALIGN switch within 5 sec. time frame, steady 1008Hz is applied to the XMT IN channel port (T & R) and interrupted 1008Hz is applied to the RCV OUT channel port (T1 & R1).</p> <p>Connect TMS, with built-in speaker, or other suitable listening device to the RCV and XMT channel pairs at the analog-side cable connection and listen for the appropriate tones.</p> <p>After verifying the tones, press AUTO ALIGN switch (<5 sec.) to end Wire Test mode.</p> <p>(NOTE: If button is not pressed a second time, Wire Test mode automatically times out after one hour)</p>

Table 5. Testing And Alignment Procedures

STEP	ACTION
1.	<p>COMMAND MODE Initiation</p> <p>From Digital Side If unit is configured as an ETO or if unit is a new installation Send 2913Hz into AUA441C's RCV IN port (>30 sec.*). Verify 1008Hz at 0dBm0 via XMT OUT port. Command mode initiated. Remove 2913Hz tone.</p> <p>If unit is configured as a DST Send 2713Hz into AUA441C's RCV IN port (>30 sec.*). Verify 1008Hz at 0dBm0 via XMT OUT port. Command mode initiated. Remove 2713Hz tone.</p> <p style="text-align: center;">*NOTE: If tone is present for less than 30 sec., the AUA441C enters loopback - see Table 6, Step 1</p> <p>From Analog Side If unit is configured as an ETO or if unit is a new installation Send 2913Hz to AUA441C's RCV OUT port (i.e., backwards for >30 sec.*). Verify 1008Hz at +5dBm0 at the XMT IN port. Remove 2913Hz tone. The 1008Hz tone at +5dBm0 reverses direction and is now applied over the AUA441C's RCV OUT port. Command Mode initiated. At this point, tones are sent via the XMT IN port</p> <p>If unit is configured as a DST Send 2713Hz to AUA441C's RCV OUT port (i.e., backwards for >30 sec.*). Verify 1008Hz at -3dBm0 at the XMT IN port. Remove 2713Hz tone. The 1008Hz tone at -3dBm0 reverses direction and is now applied over the AUA441C's RCV OUT port. Command Mode initiated. At this point, tones are sent via the XMT IN port</p> <p style="text-align: center;">*NOTE: If tone is present for less than 30 sec., the AUA441C enters loopback - see Table 6, Step 1</p>
2.	<p>ETO or DST Mode Of Operation - The ETO/DST Mode of operation is set from the Command Mode via tone commands. The AUA441C is initially programmed for the ETO Mode of operation</p> <p>Query ETO/DST Setting</p> <p>From the Digital Side From Command Mode, send 3104Hz into the AUA441C's RCV IN port.</p> <p>From the Analog Side From Command Mode, send 3104Hz into the AUA441C's XMT IN port.</p> <p>Unit responds with: -Alternating 1008Hz/408Hz followed by steady 408Hz indicating ETO setting -Alternating 1008Hz/2808Hz followed by steady 2808Hz indicating DST setting (NOTE: If setting is not to be changed, send 2604Hz to return to command mode)</p> <p>To Change ETO/DST Setting: - While still in ETO/DST Query Mode - Send 404Hz into the appropriate port to set ETO option or - Send 2804Hz into the appropriate port to set DST option.</p> <p>AUA441C responds with the appropriate ETO/DST acknowledgement tone (see above) Upon completion, send 2604Hz to return to command mode</p>
3.	<p>Unit Options - All options are set from Command Mode via tone commands. These options must be set per the WORD document. Impedance is initially set for 600 Ohms. Sealing Current circuit is initially set to ON.</p> <p style="text-align: center;">(NOTE: In DST mode, Impedance is fixed at 600 Ohms and Sealing Current is fixed for OFF)</p> <p>Query Impedance Setting (ETO Mode Only) From Command mode, send 504Hz into the appropriate port. Unit responds with: -Alternating 1008Hz/408Hz followed by steady 408Hz indicating 150 Ohm setting -Alternating 1008Hz/1808Hz followed by steady 1008Hz indicating 600 Ohm setting -Alternating 1008Hz/2808Hz followed by steady 2808Hz indicating 1200 Ohm setting (NOTE: If setting is not to be changed, send 2604Hz to return to command mode)</p>

CONTINUED

Table 5. Testing And Alignment Procedures - Continued

STEP	ACTION
3.	<p style="text-align: center;">Unit Options (Continued)</p> <p>To Change Impedance Setting (ETO Mode Only) While still in Impedance Query Mode -Send 404Hz to set 150 Ohms. AUA441C responds with 150 Ohm acknowledgement tone (see above) -Send 1004Hz to set 600 Ohms. AUA441C responds with 600 Ohm acknowledgement tone (see above) -Send 2804Hz to set 1200 Ohms. AUA441C responds with 1200 Ohm acknowledgement tone (see above) Upon completion, send 2604Hz to return to command mode</p> <p>Query Sealing Current Setting (ETO Mode Only) From Command mode, send 904Hz into the appropriate port. Unit responds with: -Alternating 1008Hz/2808Hz followed by steady 2808Hz indicating ON (SUPPLY) setting -Alternating 1008Hz/1808Hz followed by steady 1808Hz indicating TERM (terminate) setting -Alternating 1008Hz/408Hz followed by steady 408Hz indicating OFF (Disabled) setting (NOTE: If setting is not to be changed, send 2604Hz to return to command mode)</p> <p>To Change Sealing Current Setting (ETO Mode Only) While still in Sealing Current Query Mode -Send 404Hz to set circuit to OFF. AUA441C responds with OFF acknowledgement tone (see above) -Send 1808Hz to set circuit to TERM. AUA441C responds with TERM acknowledgement tone (see above) -Send 2804Hz to set circuit to SUPPLY. AUA441C responds with ON acknowledgement tone (see above) Upon completion, send 2604Hz to return to command mode or</p> <p>To Query Sealing Current Flow (ETO Mode Only) While still in Sealing Current Query Mode Send 1004Hz into the appropriate port. Unit responds with: ramp-up tone (408Hz to 2808Hz) indicating sealing current is flowing or ramp-down tone (2808Hz to 408Hz) indicating sealing current is not flowing. AUA441C then returns to sealing current query mode and responds with the programmed acknowledgement tone (see above). Upon completion, send 2604Hz to return to command mode or 2913Hz to return to idle.</p>
4.	<p>Terminate And Leave - OPTIONAL - Perform this step only if the unit is to be put in the circuit but is not ready for service cut-over at this time. Otherwise proceed to Step 5</p> <p>Terminate And Leave Enable</p> <p>From the Digital Side (ETO/DST Mode) From command mode, send 2304Hz into the RCV IN port. AUA441C's 1008Hz Command Mode tone changes to 2308Hz. Verify via the XMT OUT port. AUA441C also sends interrupted 2308Hz at -16dBm over the RCV OUT port. After 5 sec., unit returns to idle</p> <p>From the Analog Side (ETO/DST Mode) From command mode, send 2304Hz into the XMT IN port. AUA441C sends interrupted 2308Hz at -16dBm over the RCV OUT port. After 5 sec., unit returns to idle</p> <p>When the circuit is ready to be placed in service the Terminate And Leave feature can be disabled</p> <p>Terminate And Leave Disable</p> <p>From the Digital Side and If unit is configured for the DST mode: Enter Command Mode by sending 2713Hz via RCV IN port. AUA441C returns a Command Mode tone of 2308Hz. After 5 sec., the 2308Hz tone changes back to 1008Hz. Unit now in normal command mode. Remove 2713Hz.</p> <p>From the Digital Side and If unit is configured for the ETO mode: Enter command mode by sending 2913Hz via the RCV IN port. AUA441C sends 1008Hz. Unit now in normal command mode. Remove 2913Hz.</p> <p>From the Analog Side and If unit is configured for the DST mode: Enter Command Mode by sending 2713Hz at -4dBm via the RCV OUT port (i.e., backwards). AUA441C returns a Command Mode tone of 2308Hz via the XMT IN port. After 5 sec., the 2308Hz tone changes back to 1008Hz. Remove 2713Hz. 1008Hz reverses direction and is output onto the RCV OUT port. Unit now in normal command mode.</p> <p>From the Analog Side and If unit is configured for the ETO mode: Enter command mode by sending 2913Hz at -4dBm via the RCV OUT port (i.e., backwards). AUA441C sends 1008Hz. Remove 2913Hz. 1008Hz reverses direction and is output onto the RCV OUT port. Unit now in normal command mode.</p>

CONTINUED

Table 5. Testing And Alignment Procedures - Continued

STEP	ACTION
5.	<p>TLP/DLP Toggle- INTELIPORT is initially programmed to align at TLP</p> <p>From the Digital Side (ETO/DST Mode) From command mode, send 2804Hz into RCV IN port. Unit toggles to DLP mode, corrects internal circuitry, then returns to command mode. To return to TLP, send another 2804Hz while in command mode or return unit to idle.</p> <p>From the Analog Side (ETO Mode Only; Feature is not supported from the Analog side when unit is configured as a DST) From command mode, send 2804Hz into XMT IN port. Unit toggles to DLP mode, corrects internal circuitry, then returns to command mode. To return to TLP, send another 2804Hz while in command mode or return unit to idle.</p> <p>NOTE: Each time unit returns to the idle state and the Command Mode is re-accessed, the TLP/DLP circuit automatically returns to the TLP mode. Therefore, when testing/alignment is to be done at data level, the test person must send 2804Hz into the appropriate port to toggle to the DLP mode.</p>
6.	<p>Auto Alignment</p> <p>From the Digital Side (ETO/DST Mode) - Test person can monitor alignment via the XMT OUT port. From Command Mode, perform Step 5 (if required). Unit automatically returns to Command Mode after toggling. From Command Mode, send 1804Hz via the RCV IN port. AUA441C sends 2713Hz (>30 sec.) to near-end DST. DST enters command mode and returns 1004Hz . (If interrupted 1024Hz is received, perform short-loop DST alignment - below)</p> <p>From the Analog Side (ETO/DST Mode) - Test person must remove all test equipment and normal the SMAS access in order for proper alignment to continue. From Command Mode, perform Step 5 (if required). Unit automatically returns to Command Mode after toggling. From Command Mode, send 1804Hz via the XMT IN port. AUA441C sends 2713Hz (>30 sec.) to near-end DST. DST enters command mode and returns 1004Hz . (If interrupted 1024Hz is received, perform short-loop DST alignment - below)</p> <p>When both ends are ready, tones of 1008, 2808, 408 (3-tone alignment), and 1808Hz (4-tone alignment) are sent and received between AUA441C and DST automatically. Same tones are looped between both ends to verify alignment.</p> <p>Upon completion, AUA441C returns two ramping tones indicating alignment results. First Ramping tone indicates alignment results of DST: (ramp-up tone of 308Hz to 3008Hz indicates successful alignment; ramp-down tone of 3008Hz to 308Hz indicates correct alignment of DST could not be achieved). Second Ramping tone indicates alignment results of AUA441C: (ramp-up tone of 408Hz to 2808Hz indicates successful alignment; ramp-down tone of 2808Hz to 408Hz, indicates correct alignment could not be achieved). After sending the ramping tones, the AUA441C re-sends 2713Hz (>5 sec.) to the DST and returns to idle.</p> <p style="text-align: center;">Alignment is complete.</p> <hr/> <p>Short-Loop DST Alignment (ETO/DST)*- The short-loop DST must be optioned for TLP as opposed to DLP. If DST cannot align within ± 0.25dB, the DST will loop back an interrupted 1004Hz tone. *NOTE: The short-loop DST Auto-Align feature is not supported for an AUA441C configured for the DST mode and activated from the Analog side</p> <p>From command mode, send 1804Hz into the appropriate port. AUA441C sends 2713Hz (>30 sec.) to the DST. DST enters command mode and returns interrupted 1024Hz. NOTE: If command mode tone is not received within 2-minute time frame, AUA441C sends 1008Hz followed by 2713Hz (>5 sec.), and returns to idle.</p> <p>Upon detecting command mode tone from DST, AUA441C sends 1008Hz. DST removes its command mode tone, applies quiet termination, enters alignment. and aligns to 1008Hz Upon completion, DST enters loopback and loops 1008Hz tone back to AUA441C. AUA441C aligns to looped 1008Hz and sends a ramping tone. (Ramp-up indicates successful alignment. Ramp-down indicates unsuccessful alignment). After the ramping tone, AUA441C sends 2713Hz to the DST and returns to idle. At this point, AUA441C re-sends 2713Hz (>45 sec.) to put the DST back into command mode. AUA441C then sends 408Hz to put the DST into AGC mode. While in the AGC mode, AUA441C sends 1008, 2808 and 408Hz, one at a time. Both ends align. Upon completion, AUA441C returns either a ramp-up tone or a ramp-down tone (indicating alignment results), re-sends 2713Hz to the DST and returns to idle.</p> <p style="text-align: center;">Alignment is complete.</p>

CONTINUED

Table 5. Testing And Alignment Procedures (Continued.)

STEP	ACTION
7.	<p>Remote Alignment Emulation -</p> <p>From the Digital Side: This feature is supported when the AUA441C is configured for the DST Mode Only; This feature is not supported from Digital side when configured as ETO</p> <p>From the Analog Side: This feature is supported when the AUA441C is configured for the ETO Mode Only; This feature is not supported from Analog side when configured as a DST</p> <p>From command mode, perform Step 5 (if required). Unit automatically returns to command mode after toggling.</p> <p>While in Command Mode, verify/record level received at 1008Hz, then send 1004Hz to the AUA441C via the appropriate port. AUA441C returns 2808Hz. Verify/record level received at 2808Hz, then send 2804Hz to the AUA441C. AUA441C returns 408Hz. Verify/record level received at 408Hz, then send 404Hz to the AUA441C. AUA441C returns 1808Hz. Verify/record level received at 1808Hz.</p> <p>At this point, the STC has option: <div style="text-align: center;">Send 1804Hz to perform 4-tone alignment or 1004Hz to perform 3-tone alignment.</div> </p> <p>AUA441C returns a ramp-up tone (by default), then enters loopback</p>
8.	<p>Loopback - Entered After Remote Alignment</p> <p>While in loopback, send tones to the AUA441C, one at a time, via the RCV IN port (if initiated from the Digital Side) or XMT IN port (if initiated from the Analog Side) Verify level of each tone returned by the AUA441C, via the XMT OUT port (if initiated from the Digital Side) or RCV OUT port (if initiated from the Analog Side)</p> <p>Loopback Release Loopback automatically releases 20 minutes after initial activation. If release is desired before 20-minutes, send 2913Hz (ETO mode) or 2713Hz (DST mode) into the appropriate port for 0.9 sec., then remove tone.</p>

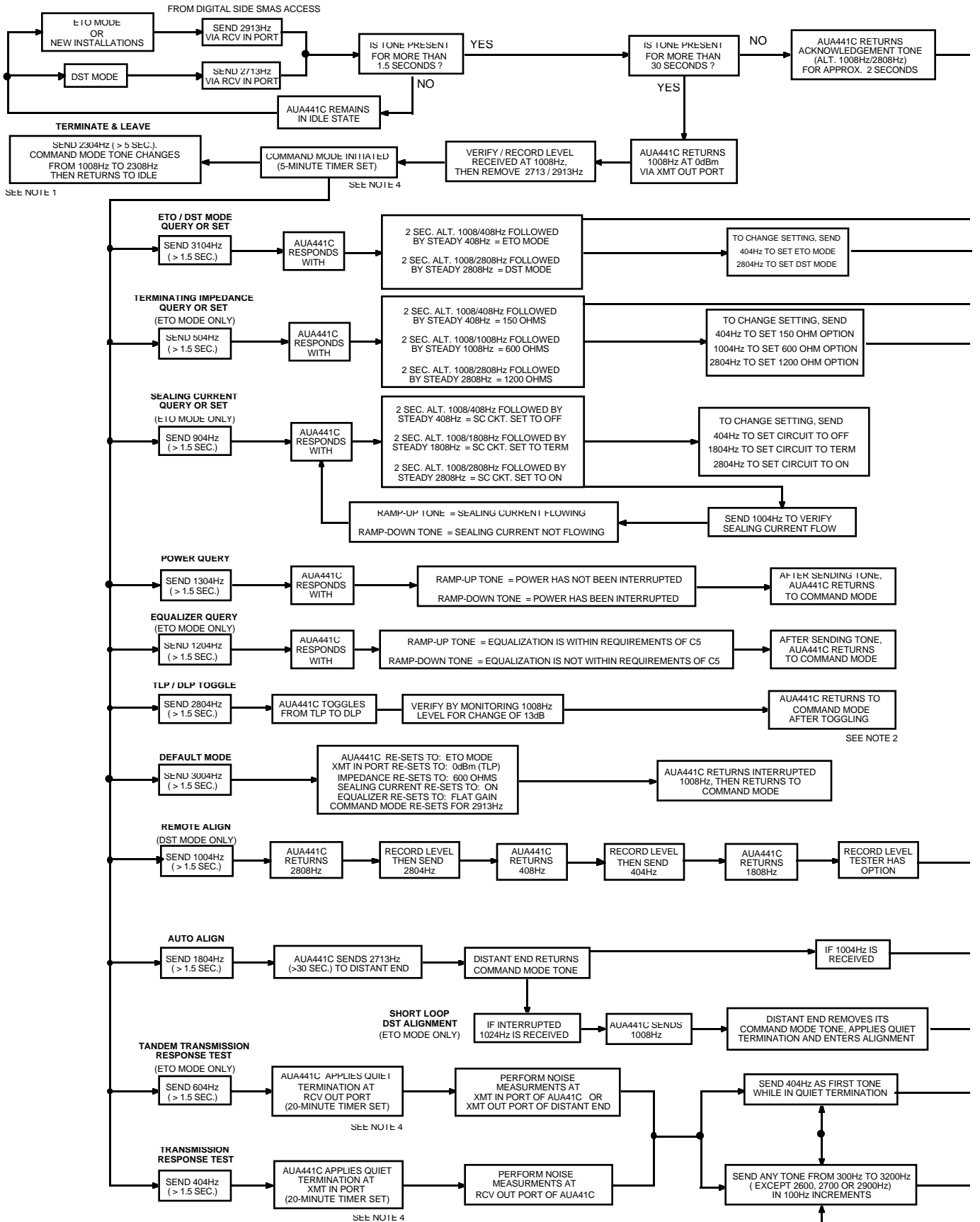
Table 6. Maintenance Testing Procedures

STEP	ACTION
1.	<p>Loopback - Accessed From Idle State:</p> <p>From the Digital Side If configured for ETO mode: send 2913Hz (RCV IN port) for >1.5 sec. but <30 sec. AUA441C sends acknowledgement tone (2-sec. of alternating 1008/2808Hz) via the XMT OUT port identifying unit accessed as Teltrend's AUA441C. If configured for DST mode: send 2713Hz (RCV IN port) for >1.5 sec. but <30 sec. AUA441C sends acknowledgement tone (2-sec. of alternating 1008/2808Hz) via the XMT OUT port identifying unit accessed as Teltrend's AUA441C.</p> <p>From the Analog Side If configured for ETO mode: send 2913Hz (RCV OUT port) for >1.5 sec. but <30 sec. AUA441C sends acknowledgement tone (approx. 2-sec. of alternating 1008/2808Hz) via the XMT IN port identifying unit accessed as Teltrend's AUA441C. If configured for DST mode: send 2713Hz (RCV OUT port) for >1.5 sec. but <30 sec. AUA441C sends acknowledgement tone (approx. 2-sec. of alternating 1008/2808Hz) via the XMT IN port identifying unit accessed as Teltrend's AUA441C.</p> <p>NOTE: If 2913Hz or 2713Hz tone is present for more than 30 sec., the AUA441C enters command mode.</p> <p>While in loopback, send tones to the AUA441C, one at a time, via the RCV IN port (if initiated from the Digital Side) or XMT IN port (if initiated from the Analog Side)</p> <p>Verify level of each tone returned by the AUA441C, via the XMT OUT port (if initiated from the Digital Side) or RCV OUT port (if initiated from the Analog Side)</p> <p>Loopback Release Loopback automatically releases 20 minutes after initial activation. If release is desired before 20-minutes, send 2913Hz (ETO mode) or 2713Hz (DST mode) into the appropriate port for 0.9 sec., then remove tone.</p>
2.	<p>404Hz Activated Transmission Response Test (ETO/DST Mode)</p> <p>From the Digital Side From command mode, send 404Hz into the RCV IN port. AUA441C applies quiet termination at the XMT IN port and sets a 20-MIN timer. During quiet termination, test person performs noise measurements at the XMT OUT port</p> <p>From the Analog Side From command mode, send 404Hz into the XMT IN port. AUA441C applies quiet termination at the RCV IN port and sets a 20-MIN timer. During quiet termination, test person performs noise measurements at the RCV OUT port.</p> <p>From the quiet termination mode, the test person can initiate one of the following:</p> <p>NOTE: If no tone sent within 20 minutes, unit times out and returns idle.</p> <p>4-Tone Auto-Sweep Mode While in quiet term, re-send 404Hz as first tone, into the RCV IN port. AUA441C sweeps 408, 1008, 1808 and 2808Hz, each for 15 sec., over the XMT OUT port (if initiated from the Digital side) or over the RCV OUT port (if initiated from the Analog side), then reapplies quiet termination and resets 20-MIN timer (see NOTE above).</p> <p>Full-Range Response Mode While in quiet term, send any tone from 304Hz to 3204Hz (except 404Hz as first tone, 2604/2713/2913Hz) AUA441C returns similar tone (but at a 4Hz off-set) over the appropriate output port (XMT OUT port if test is initiated from the Digital Side; RCV OUT port if test is initiated from the Analog side) for same duration tone is received. Repeat this procedure for as many tones as required. Upon completion and if no other tone is sent, AUA441C reapplies quiet termination and resets 20-MIN timer (see NOTE above).</p> <p>Upon completion, send 2604Hz to return to command mode or send 2913Hz (ETO mode) or 2713Hz (DST mode) to return to idle.</p>

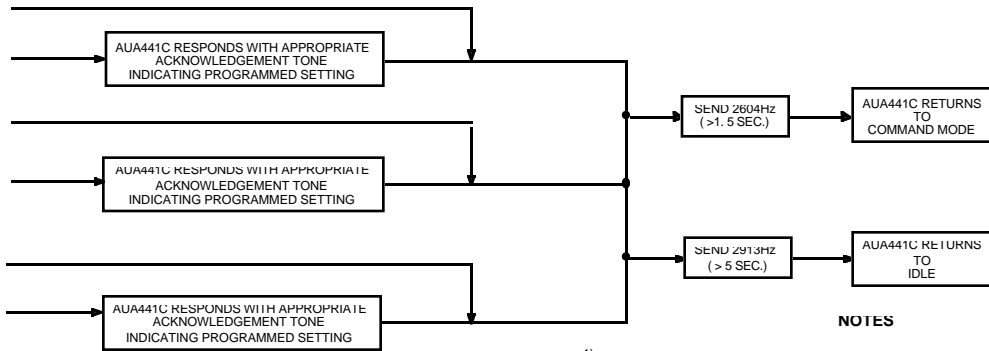
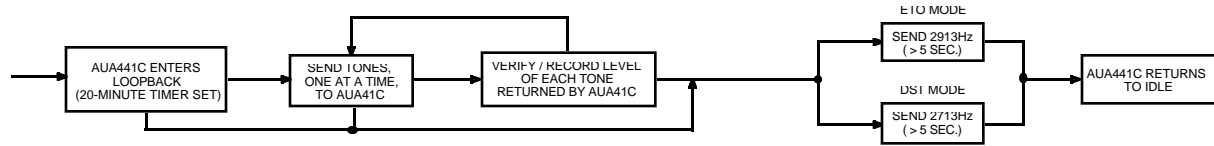
CONTINUED

Table 6. Maintenance Testing Procedures - Continued

STEP	ACTION						
3.	<p>Tandem Transmission Response Test Mode - (ETO Mode Only); Not supported when configured for DST mode</p> <p>From the Digital Side From command mode, send 604Hz into the RCV IN port.</p> <p>From the Analog Side From command mode, send 604Hz into the XMT IN port.</p> <p>AUA441C activates Tandem Transponder, applies quiet termination at XMT OUT port and sets 20-minute timer. Send 2713Hz to the AUA441C (<30 sec.). AUA441C sends 2713Hz toward DST to put DST into loopback. Complete loop is now activated. Test person performs noise measurements of AUA441C and distant end equipment. During quiet termination, test person can activate 4-Tone Auto-Sweep or the Full-Range transmission response test mode (see Step 2 on previous page).</p> <p>Upon completion, send 2604Hz to return to command mode or send 2913Hz to return to idle.</p>						
4.	<p>Equalizer Query - ETO Mode Only; Not supported when configured for DST mode. In DST mode, equalizer circuit is fixed for a flat gain</p> <p>From the Digital Side From command mode, send 1204Hz into the RCV IN port.</p> <p>From the Analog Side From command mode, send 1204Hz into the XMT IN port.</p> <p>If the AUA441C was aligned via the Auto-Align sequence, the AUA441C responds with two ramping tones. First ramping tone (ramp-up tone of 308Hz to 3008Hz or ramp-down tone of 3008Hz to 308Hz) indicates alignment status of DST; Second ramping tone (ramp-up tone of 408Hz to 2808Hz or a ramp-down tone of 2808Hz to 408Hz) indicates alignment status of the AUA441C. A ramp-up tone indicates successful alignment. A ramp-down tone indicates correct alignment could not be achieved.</p> <p>If the AUA441C was aligned via the Remote Alignment sequence, the AUA441C responds with only one ramping tone. A ramp-up tone of 408Hz to 2808Hz indicates a good alignment. A ramp-down tone of 2808Hz to 408Hz indicates correct alignment for the AUA441C could not be achieved.</p> <p>After sending the ramping tones, the AUA441C automatically returns to command mode.</p>						
5.	<p>Power Query - ETO or DST Mode (*NOTE: See paragraph 6.05 - 6.06 also)</p> <p>From the Digital Side From command mode, send 1304Hz into the RCV IN port.</p> <p>From the Analog Side From command mode, send 1304Hz into the XMT IN port.</p> <p>AUA441C responds with ramping tone. Ramp-up tone of 408Hz to 2808Hz indicates power has not been interrupted since last alignment or power query. A ramp-down tone of 2808Hz to 408Hz indicates an interruption in power has occurred. Following the ramping tone, the AUA441C automatically returns to command mode.</p>						
6.	<p>Default Level Mode</p> <p>From the Digital Side From command mode, send 3004Hz into the RCV IN port.</p> <p>From the Analog Side From command mode, send 3004Hz into the XMT IN port.</p> <p>Upon detecting 3004Hz, AUA441C restores to the following parameters:</p> <table border="0" data-bbox="354 1478 1247 1570"> <tr> <td>Unit re-sets to ETO mode</td> <td>XMT IN port re-sets to 0.0dBm(TLP)</td> </tr> <tr> <td>Impedance re-sets to 600 Ohms</td> <td>RCV OUT port re-sets to +5dBm(TLP)</td> </tr> <tr> <td>Sealing Current re-sets to ON (SUPPLY)</td> <td>Equalizer circuits re-sets for FLAT gain</td> </tr> </table> <p>Command mode activation reverts to 2913Hz.</p> <p>After restoring parameters, AUA441C automatically returns to command mode</p>	Unit re-sets to ETO mode	XMT IN port re-sets to 0.0dBm(TLP)	Impedance re-sets to 600 Ohms	RCV OUT port re-sets to +5dBm(TLP)	Sealing Current re-sets to ON (SUPPLY)	Equalizer circuits re-sets for FLAT gain
Unit re-sets to ETO mode	XMT IN port re-sets to 0.0dBm(TLP)						
Impedance re-sets to 600 Ohms	RCV OUT port re-sets to +5dBm(TLP)						
Sealing Current re-sets to ON (SUPPLY)	Equalizer circuits re-sets for FLAT gain						

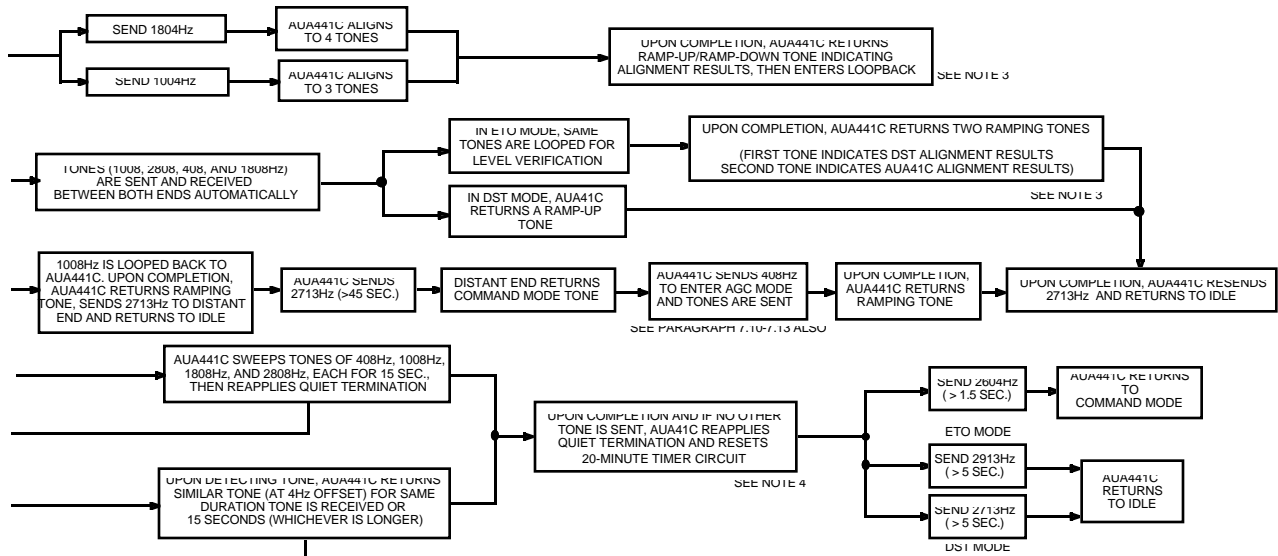


DIGITAL SIDE FLOWCHART (1)

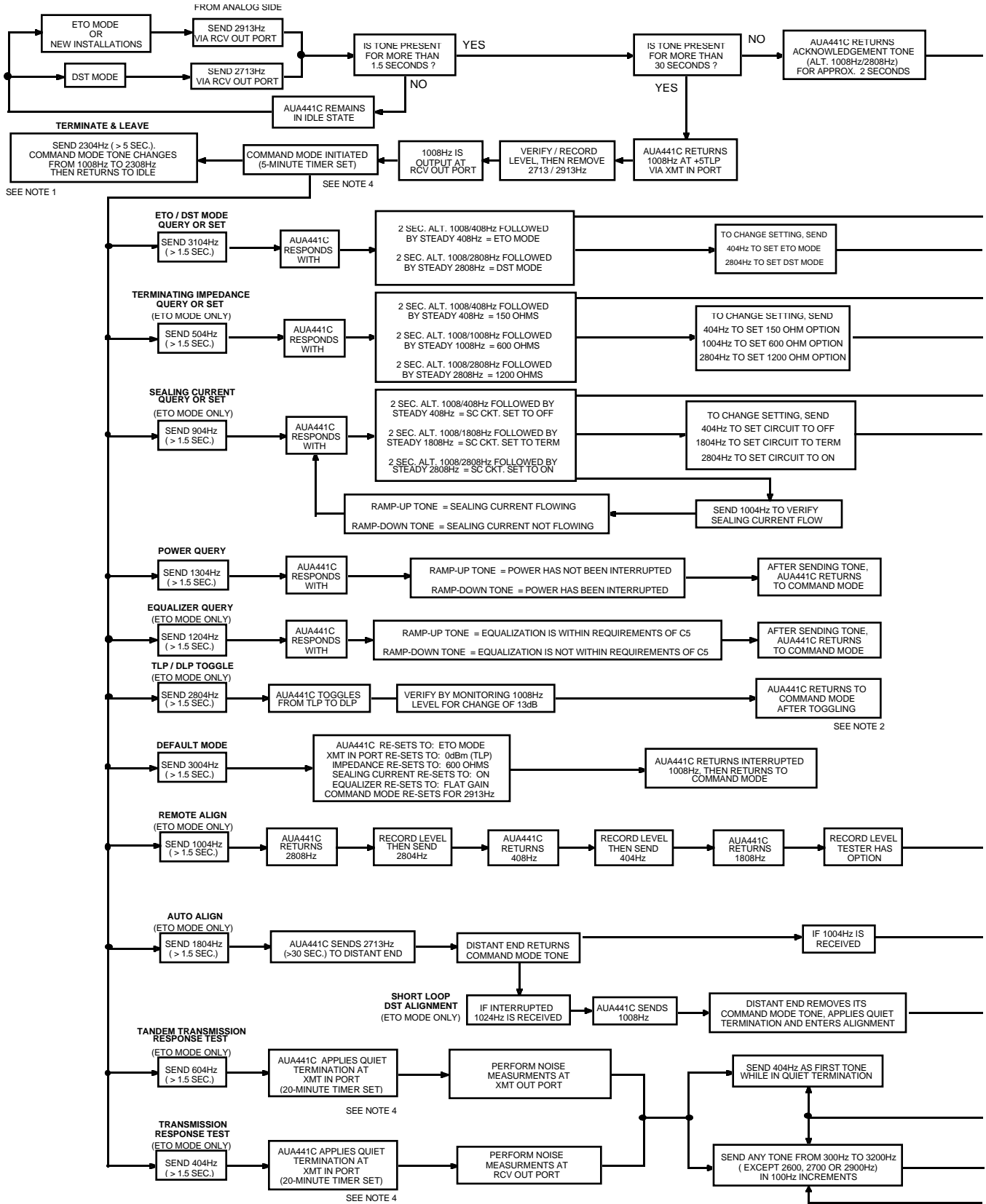


NOTES

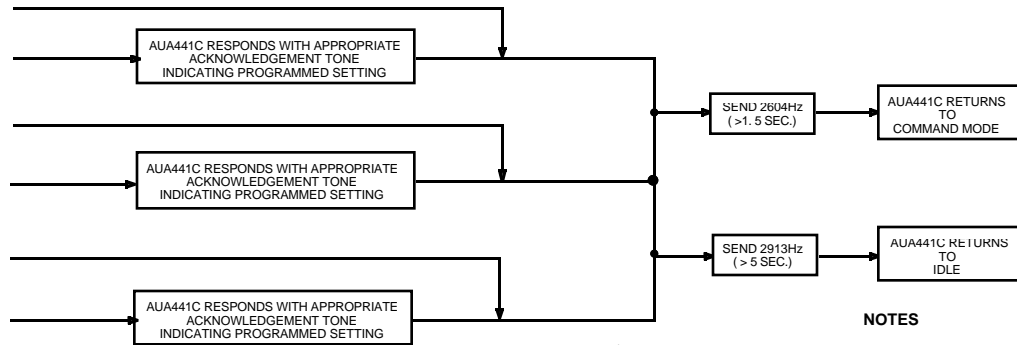
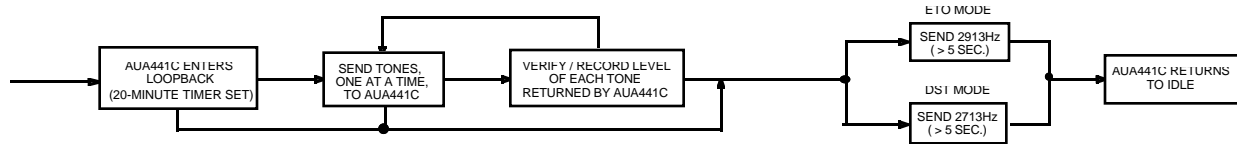
- 1) IN DST MODE: UPON DETECTING 2304Hz, 1008Hz COMMAND MODE TONE CHANGES TO 2308Hz AT -16dBm. AFTER FIVE SECONDS, AUA441C RETURNS TO IDLE.
IN ETO MODE: UPON DETECTING 2304Hz, 1008Hz COMMAND MODE TONE CHANGES TO 2308Hz AT -16dBm AND UNIT RETURNS TO IDLE.
TO RELEASE TERMINATE AND LEAVE:
RE-ENTER COMMAND MODE. COMMAND MODE TONE IS 2308Hz.
SEND 2304Hz AT -4dBm (>5 SEC.), AUA441C'S 2308Hz COMMAND MODE TONE CHANGES BACK TO 1008Hz. UNIT IS READY TO RECEIVE FURTHER INSTRUCTIONS.
- 2) UPON RETURNING TO IDLE, TLP /DLP CIRCUIT AUTOMATICALLY RETURNS TO TLP MODE. IF TESTING OR ALIGNMENT IS TO BE DONE AT DLP, TESTER MUST RE-SET DLP MODE.
- 3) RAMP-UP TONE (TONES SENT IN ASCENDING ORDER) INDICATES ALIGNMENT MET CS CONDITIONING. RAMP-DOWN TONE (TONES SENT IN DESCENDING ORDER) INDICATES ALIGNMENT DID NOT MEET CS CONDITIONING.
- 4) 5 AND 20-MINUTE TIMER CIRCUITS
IF NO TONE IS SENT WITHIN THE SPECIFIED TIME FRAME (5 OR 20 MINUTES), THE AUA441C TIMES OUT AFTER THE ALLOTTED TIME FRAME AND AUTOMATICALLY RETURNS TO IDLE.
- 5) TO ESCAPE AND RETURN TO COMMAND MODE (FROM ANY MODE, EXCEPT LOOPBACK) CAN BE DONE AT ANY TIME BY SENDING 2604Hz (>1.5 SEC.). TO ESCAPE AND RETURN TO IDLE (FROM ANY MODE) CAN BE DONE BY SENDING 2913Hz >5 SEC. (ETO MODE) OR 2713Hz >5 SEC. (DST MODE). UNIT RETURNS TO IDLE UPON REMOVAL OF TONE ONLY.



DIGITAL SIDE FLOWCHART (2)

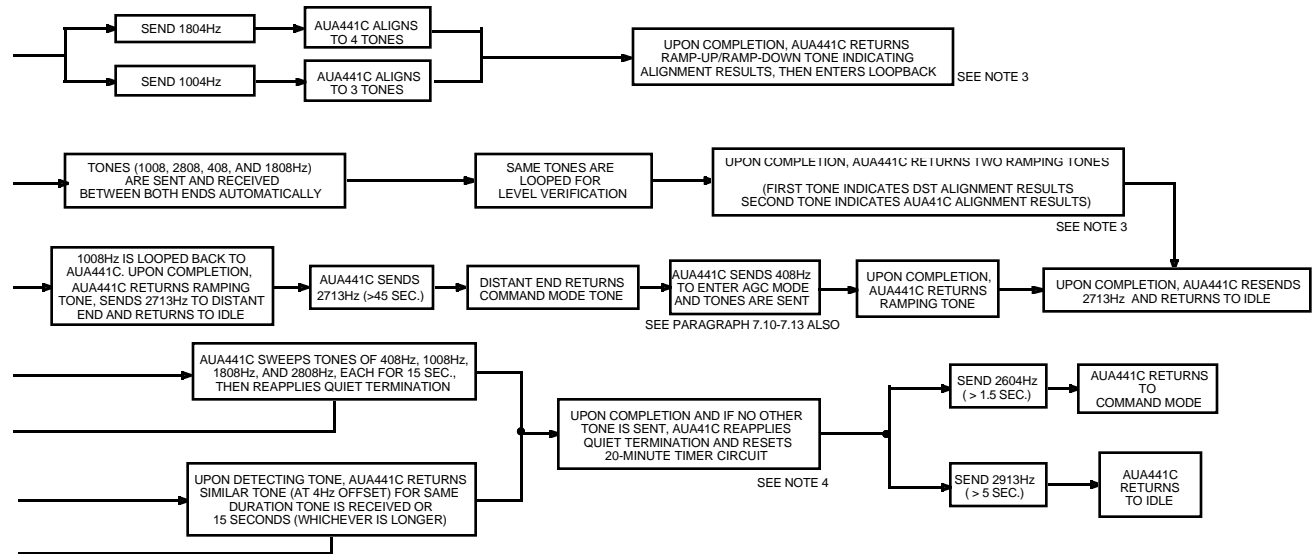


ANALOG SIDE FLOWCHART (1)



NOTES

- 1) IN DST MODE: UPON DETECTING 2304Hz, 1008Hz COMMAND MODE TONE CHANGES TO 2308Hz AT -16dBm. AFTER FIVE SECONDS, AUA441C RETURNS TO IDLE. IN ETO MODE: UPON DETECTING 2304Hz, 1008Hz COMMAND MODE TONE CHANGES TO 2308Hz AT -16dBm AND UNIT RETURNS TO IDLE. TO RELEASE TERMINATE AND LEAVE: RE-ENTER COMMAND MODE. COMMAND MODE TONE IS 2308Hz. SEND 2304Hz AT -4dBm (>5 SEC.). AUA441C'S 2308Hz COMMAND MODE TONE CHANGES BACK TO 1008Hz. UNIT IS READY TO RECEIVE FURTHER INSTRUCTIONS.
- 2) UPON RETURNING TO IDLE, TLP / DLP CIRCUIT AUTOMATICALLY RETURNS TO TLP MODE. IF TESTING OR ALIGNMENT IS TO BE DONE AT DLP, TESTER MUST RE-SET DLP MODE.
- 3) RAMP-UP TONE (TONES SENT IN ASCENDING ORDER) INDICATES ALIGNMENT MET C5 CONDITIONING. RAMP-DOWN TONE (TONES SENT IN DESCENDING ORDER) INDICATES ALIGNMENT DID NOT MEET C5 CONDITIONING.
- 4) 5 AND 20-MINUTE TIMER CIRCUITS
IF NO TONE IS SENT WITHIN THE SPECIFIED TIME FRAME (5 OR 20 MINUTES), THE AUA441C TIMES OUT AFTER THE ALLOTTED TIME FRAME AND AUTOMATICALLY RETURNS TO IDLE.
- 5) TO ESCAPE AND RETURN TO COMMAND MODE (FROM ANY MODE, EXCEPT LOOPBACK) CAN BE DONE AT ANY TIME BY SENDING 2604Hz (>1.5 SEC.). TO ESCAPE AND RETURN TO IDLE (FROM ANY MODE) CAN BE DONE BY SENDING 2913Hz >5 SEC. (ETO MODE) OR 2713Hz >5 SEC. (DST MODE). UNIT RETURNS TO IDLE UPON REMOVAL OF TONE ONLY.



ANALOG SIDE FLOWCHART (2)