OPERATING MANUAL
CTU / ADL
CHANNEL TIMING UNIT
AUTOMATIC DELAY LINE

April 2013

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1-1 INTRODUCTION ADL

The ADL Automatic Delay Line is installed at base station sites, and used in simulcast networks to phase match transmit audio driving all base stations. It operates on voice or data traffic, and provides a range of delay adjustment, 16 dB of amplitude adjustment, and polarity correction.

1-2 CONTROL / REMOTE CONTROL

LAN or touch-tone control provides a convenient means of setting ADL's. Remote control saves time and resources by eliminating the need to dispatch a truck to remote sites. The touch-tone (DTMF) Indicator on the front panel lights when valid touch-tones are detected.

1-3 THEORY OF OPERATION

ADL’s work with a Channel Timing Unit (CTU) that is deployed at the central control point. 1 PPS Inputs on the ADL’s and the CTU permit both devices to be time synchronized to Coordinated Universal Time (UTC). The 1 PPS is normally supplied by Master Oscillators that are synchronized via GPS.

When the channel is idle, the Channel Timing Unit (CTU) sends a test signal to all ADL’s. The ADL’s measure Link delay and amplitude, and make any needed adjustments. When the channel is keyed, the CTU shuts off the test signal and passes normal audio traffic to the ADL’s.

1-4 DELAY

Total Hold Delay = Link Delay + Bulk Delay. Hold Delay is the total delay needed to insure that traffic applied to all transmitters is precisely in phase. The ADL maintains a set “Hold Delay” on all links. An increase in Link Delay causes a compensating decrease in Bulk Delay to maintain Hold Delay.

1-5 FLAT GAIN

Flat Gain amplifies or attenuates all frequencies to compensate for the link loss to each site. Flat Gain can be controlled manually or automatically. With automatic ON, the ADL compares the measured Link Level to a settable (dBm) Level Reference. If Link Level moves away from the reference, Flat Gain adjusts to compensate. Flat Gain is 0.0 dB when measured Link Level equals the reference. Level Reference is settable from -20 to +4 dBm in 0.1 dB steps. The Flat Gain range is -6 to +10 dB in 0.1 dB steps.

1-6 POLARITY

Polarity matching is a must for simulcast networks! The ADL can be manually set for Normal or Inverted to maintain the same, “Normal” (in-phase) polarity to all transmitters. Polarity is operated in manual mode.
1-7 TONE KEYING Where DC PTT transport is not available, the CTU will detect voter generated tone keying for the purpose of turning the test signal OFF. Tone keying is passed through to the ADL’s at the transmitter sites, and ADL’s are normally set to pass tone keying through to the base stations. In the event that base stations require DC keying, ADL’s can be configured to: detect tone keying, provide a PTT contact, and remove the guard tone.

1-8 ADDRESSING The LAN Port is assigned a unique IP address by the user. ADL’s and CTU’s are shipped with a default IP address.

DTMF Touch-tones can be used for remote control when transmit sites are not accessible by LAN. Since multiple ADL’s serve the same radio channel, an addressing arrangement is used. This permits each ADL to be individually controlled by a unique two-digit address. Once set, the ADL’s can be made “deaf” to further touch-tone commands with the security feature. The security feature disables touch-tone control so that delay lines can not be altered by random touch-tones.

1-9 MOUNTING ADL’s (and CTU’s) can be wall mounted or rack mounted. They are wall mounted using slotted screw holes in the base. Rack mounting requires 1.75 inches (1U) of vertical space. A DLP-19, rack-mounting panel will accommodate up to four units.

1-10 I/O and POWER A two-piece connector with screw locks is provided for signal and power wires. Standard Power is 12 VDC (ADL-12). Options are: ADL-24 (24 VDC) and ADL-48 (48 VDC). An AC to 12 VDC Adapter is available. The DAC-12 powers up to four ADL’s or CTU’s.

1-11 SPECIFICATIONS ADL

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency Range</td>
<td>4 Hz to 3400 Hz</td>
</tr>
<tr>
<td>I/O Impedance</td>
<td>600 ohm - balanced, floating</td>
</tr>
<tr>
<td>I/O Return Loss</td>
<td>Greater than 26 dB</td>
</tr>
<tr>
<td>Input/Output Level</td>
<td>+10 dBm maximum</td>
</tr>
<tr>
<td>Nonlinear Distortion</td>
<td>Less than 1%</td>
</tr>
<tr>
<td>Noise</td>
<td>-60 dBm nominal</td>
</tr>
<tr>
<td>Bulk Delay Range</td>
<td>300 to 700,000 microseconds in 1 microsecond steps</td>
</tr>
<tr>
<td>Delay Measurement</td>
<td>0 to 700,000 microseconds</td>
</tr>
<tr>
<td>Gain Range</td>
<td>1 microsecond resolution</td>
</tr>
<tr>
<td>Gain Range</td>
<td>- 6 dB to +10 dB, 0.1 dB steps</td>
</tr>
<tr>
<td>Level Measurement</td>
<td>-20 to +4 dBm. 0.1 dB resolution</td>
</tr>
<tr>
<td>Polarity Control</td>
<td>Normal or Inverted selection</td>
</tr>
<tr>
<td>Security</td>
<td>Manual operation</td>
</tr>
<tr>
<td>Tone Keying</td>
<td>LLGT -10 to +4 dBm, 5 mSec typ.</td>
</tr>
<tr>
<td>Knob Down</td>
<td>Digital &amp; Analog: Modem &lt; -30 dBm</td>
</tr>
<tr>
<td>PTT Output</td>
<td>Contact closure, 60 mA max</td>
</tr>
<tr>
<td>Notch Filter</td>
<td>Rejection: -50 dB at 2175 Hz nominal</td>
</tr>
<tr>
<td>1 PPS Input</td>
<td>UTC (Coordinated Universal Time), 1 Pulse Per Second Input</td>
</tr>
<tr>
<td>Input Z: &gt;1.5K Ohm / TTL Logic</td>
<td></td>
</tr>
<tr>
<td>Time mark: Low to Hi transition</td>
<td></td>
</tr>
<tr>
<td>Minimum pulse width: 1 uSec.</td>
<td></td>
</tr>
<tr>
<td>LAN Port</td>
<td>Ethernet 10 Base-T, Compatible with 100 / 1000 Base-T Networks</td>
</tr>
<tr>
<td>Link / Activity LEDs</td>
<td></td>
</tr>
<tr>
<td>Comm: Telnet Session / Hyperterminal Interface: Simple Menu</td>
<td></td>
</tr>
<tr>
<td>Touch-Tone Control</td>
<td>Addressable: 00 to 98</td>
</tr>
<tr>
<td>Detector Range</td>
<td>-20 to +4 dBm</td>
</tr>
<tr>
<td>On / Off Time</td>
<td>100 / 20 mSec minimum</td>
</tr>
<tr>
<td>DTMF LED</td>
<td>ON = valid Touch-Tone</td>
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<tr>
<td>Command ACK</td>
<td>976 Hz Acknowledgment Tone</td>
</tr>
<tr>
<td>DTMF Security</td>
<td>8 Character sequences</td>
</tr>
<tr>
<td>Environmental</td>
<td>-30° to +60°C, 0 to 95% R.H.</td>
</tr>
<tr>
<td>Power Requirements</td>
<td>-12: 10 - 18 VDC / 250 mA max</td>
</tr>
<tr>
<td>Options: 24: 19 - 36, 48: 37 - 72 VDC</td>
<td></td>
</tr>
<tr>
<td>Dimensions</td>
<td>1.7&quot; H x 4.25&quot; W x 9.4&quot; D</td>
</tr>
<tr>
<td>Weight</td>
<td>1.3 lb., 0.6 kg</td>
</tr>
</tbody>
</table>

MODEL | ANCILLARY PRODUCTS
--- | ---
CTU | Channel Timing Unit / 1 required per chan.
DLP-19 | 1.7”x19” DELAY LINE PANEL Mounts 4 / 1U
DAC-12 | Universal AC to 12 VDC Power Adapter
2240A | Audio / PTT Distribution Panel / 12 Sites / 1U
2241A | Audio / PTT Distribution Panel / 24 Sites / 1U
806A | Portable TIMS / Simulcast Test Set
1-12 INTRODUCTION CTU A Channel Timing Unit (CTU) is used in simulcast radio networks to support Automatic Delay Lines (ADL’s). A CTU is required for each radio channel to provide a timing test signal so that ADL’s can measure link delay, level, and polarity to each transmitter. ADL’s use these measurements to automatically maintain optimum delay and gain. Polarity is manually set for best simulcast operation.

ADL’s are located at all transmitter sites to properly phase transmit audio. One CTU, per radio channel, is deployed at the central control point to generate the test signal. The test signal is applied to the network when the channel is idle. When Push To Talk (PTT) or tone keying is asserted, test signal is removed and normal audio traffic is passed through to the far end.

1-13 DC KEYING The primary function of the (DC) PTT Input is to signal the CTU that the radio channel is active. While the channel is keyed, the CTU is switched to “NORMAL” to pass audio traffic. When needed, a second function of the PTT Input is to generate tone keying. Tone Keying is used when the site links do not pass “DC” PTT such as E&M signalling. The CTU provides tone keying when the voter can not. Voter provided tone keying is preferred since it normally supports multiple function tones.

The PTT Input accepts all types of E/M logic, Digitac, or TTL Logic. The threshold for E/M logic is -20 Volts, and the threshold for Digitac or TTL logic is +2.5 Volts.

1-14 TONE KEYING Where DC PTT transport is not available, the CTU will detect voter generated tone keying for the purpose of turning the test signal OFF. Tone keying is passed through to the ADL’s at the transmitter sites, and ADL’s are normally set to pass tone keying through to the base stations. In the event that base stations require DC keying, ADL’s can be configured to: detect tone keying, provide a PTT contact, and remove the guard tone.

1-15 THEORY OF OPERATION The ADL measures Link Delay and makes Bulk Delay adjustments required to maintain site “Hold” Delay. It also measures the amplitude and polarity of the test signal, and automatically adjusts gain. Correct polarity is manually selected.

Site Hold Delay = Link Delay + Bulk Delay. Hold Delay is the total delay needed to insure that audio traffic applied to all transmitters is precisely in phase.

1-16 1 PPS INPUTS enable the CTU and ADL’s to be synchronized to Coordinated Universal Time (UTC). The test signal generated by the CTU has an embedded timing mark that propagates through the audio link. At transmitter sites, the ADL’s receive the test signal and use digital signal processing (DSP) to measure the time delay, loss, and polarity of the “talk out” link. Link Delay is measured in microseconds. Amplitude is measured in dBm. Polarity determines if the ADL is in phase Normal or Inverted (180° out of phase).
1-17 FIXED GAIN  The CTU provides unity gain / 0 dB amplification for all frequencies. ADL Flat Gain is adjustable from 6 dB loss to 10 dB gain in 0.1 dB steps, and it can be remotely adjusted via LAN or touch-tones. However, it is normally just setup for Automatic Gain ON and left.

1-18 MOUNTING  CTU's (and ADL's) can be wall mounted or rack mounted. They are wall mounted using slotted screw holes in the base. Rack mounting requires 1.75 inches (1U) of vertical space. The DLP-19, rack-mounting panel will accommodate up to four units. CTU's (or ADL's) are attached to the panel using four screws as shown above.

1-19 I/O and POWER  A two-piece connector with screw locks is provided for signal and power wires. Standard Power is 12 VDC (CTU-12). Options are: CTU-24 (24 VDC) and CTU-48 (48 VDC). An AC to 12 VDC Adapter is available. The DAC-12 powers up to four ADL's or CTU's.

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<tr>
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<tr>
<td>ADL</td>
<td>Automatic Delay Line</td>
</tr>
<tr>
<td>DLP-19</td>
<td>1.7”x19” DELAY LINE PANEL</td>
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<td>806A</td>
<td>Portable TIMS / Simulcast Test Set</td>
</tr>
</tbody>
</table>

1-20 SPECIFICATIONS  CTU

- **Frequency Range**: 4 Hz to 3400 Hz
- **Gain**: Fixed: 0.0 dB
- **I/O Impedance**: 600 ohm - balanced, floating
- **I/O Return Loss**: Greater than 26 dB
- **Input/Output Level**: +10 dBm max.
- **Nonlinear Distortion**: Less than 1%
- **Noise**: -60 dBmC nominal
- **PTT Input**: High Impedance / 100K Ohm
- **Logic Types**: TTL or E/M
- **M Type I,II,III**: Key <-20 V / Idle >-20 V
- **M Type IV,V,E**: Key >-20 V / Idle <-20 V
- **TTL**: Key < +2.5 V / Idle > +2.5 V
- **TTL Inv.**: Key > +2.5 V / Idle < +2.5 V
- **Tone Key**: HLGT Det: -10 to +4 dBm, 5 mSec typ.
- **Knock Down**: LLGT <-43 dBm for 350 mSec.
- **PTT Switch**: Normal: PTT asserted - passes audio
- **Idle**: Test signal applied after 5 Seconds
- **1 PPS Input**: UTC (Coordinated Universal Time), 1 Pulse Per Second
- **Input Z**: >1.5K Ohm / TTL Logic
- **Time mark**: Low to Hi transition
- **Minimum pulse width**: 1 uSec.
- **LAN Port**: Ethernet 10 Base-T, Compatible with 100 / 1000 Base-T Networks Link / Activity LEDs
- **Comm**: Telnet Session / Hyperterminal Interface: Simple Menu
- **Environmental**: -30° to +60°C, 0 to 95% R.H.
- **Power Requirements**: -12: 10 - 18 VDC / 250 mA max
  - **Options**: -24: 19 - 36, -48: 37 - 72 VDC
- **Dimensions**: 1.7” H x 4.25” W x 9.4” D
- **Weight**: 1.3 lb., 0.6 kg
2-1 INTRODUCTION This section is organized into five parts dealing with: Receiving Inspection, Receiving Operational Check, Installation Wall Mount or Rack Mount, Support and Service. Receiving Inspection consists of a visual examination and brief operational check to verify that the CTU or ADL has not been damaged in transit. Installation - Wall Mount discusses I/O and Power connections. Installation - Rack Mount discuses mounting, I/O, and Power hook-up. Support and Service includes factory assistance with applications, installation, operation, or repairs.

2-2 RECEIVING INSPECTION Prior to shipment, each CTU and ADL is tested electrically and inspected for good mechanical condition. New units should be free of mechanical defects and new (or repaired) units should be in good operating order. Inspect the equipment on receipt to insure that it has not been damaged in transit. If damage is observed, retain the shipping carton and its contents and file a claim with the freight carrier.

2-3 COMMUNICATIONS SETUP Connect 12 VDC (or other voltage per the label) to the power contacts on the green connector, observing the marked polarity.

LAN HOOKUP Connect the LAN Control Port to an Ethernet 10 Base-T compatible switch or hub using a standard RJ-45 patch cord. Alternately, connect the LAN Port directly to a PC LAN Port using a “crossover” patch cord. (Pairs 3/6 and 1/2 are cross connected.)

RJ-45 PIN FUNCTION
1 TRANSMIT DATA +
2 TRANSMIT DATA -
3 RECEIVE DATA +
6 RECEIVE DATA -

PIN ASSIGNMENTS / LAN PORT

TELNET CLIENT Telnet allows you to use your computer as a terminal to control the CTU or ADL. Install a telnet program (client) on your computer. Telnet capable HyperTerminal, “sometimes” included with Windows, is recommended. It provides a similar interface for: LAN, RS-232, or Touch-Tone communications; and stores a session file name (e.g. CTU_4966.ht).

Open HyperTerminal and in the New Connection Menu, enter ADL_YYXX (where YYXX is the CTU or ADL serial number) as the connection (session file) NAME.

Press Enter to bring up the Connect To Menu. To the right of Connect Using:, select TCP/IP. This should bring up Port Number: 23, and provide a Host address: field. Enter the default Host address: 192.168.1.XX where XX is the last two digits of the unit serial number.

IP DEFAULTS ADL / CTU IP defaults are:
- IP Address: 192.168. 1. XX
- IP Subnet Mask: 255.255.255. 0
- IP Gateway: 255.255.255.255

If other settings are required for the initial telnet session, refer to Section on RS-232 Control which describes use of the internal RS-232 Port.

Use the RS-232 Port to change (or read) IP settings from the Communications (sub) Menu.

Enter the Telnet Host address in the address box, and Click OK to activate the terminal screen.

Press Enter to bring up the CTU or ADL Main Menu.

If CTU IP parameters need to be changed from default settings, enter 7 to access the CTU Communications Menu.
If ADL IP parameters need to be changed from default settings, enter 13 to bring up the Communications Menu.

Enter 1 to change the IP Address. After all settings have been changed, enter 10 to return to the Main Menu.

2-4 INSTALLATION - WALL MOUNT  The CTU or ADL can be installed on a wall using the slotted screw holes in the base.

1. Set two screws in the wall on five inch centers to accommodate the slotted screw holes on the base of the delay line.

2. Adjust the screws such that the unit locks securely in place. Then remove the unit from the wall while connecting signal and power leads.

3. Connect a grounding wire to the Earth Ground (E GND) Lug on the rear of the CTU or ADL.

4. Fuse one of the power leads with a .25 Amp, slow-blo fuse for 12 VDC operation. Use a .1 Amp, slow-blo fuse for 24 or 48 VDC Operation. Nominal current for 12 VDC is 140 mA and 40 mA for 48 VDC Power.
CTU / ADL INSTALLATION  

Section 2

5. Connect the power leads to the Power contacts on the green connector. Observe the polarity, and leave the power off while connecting all leads.

6. Connect signal leads to the Input contacts on the green connector. Tip / Ring polarity indicators are provided so that signal polarity can be maintained.

7. Connect signal leads to the Output contacts on the green connector. Avoid signal inversion by connecting the output leads with the same polarity as the input leads. Note: The CTU and ADL maintain signal polarity - T/R Input to T/R Output with the Polarity of the ADL set to NORMAL.

8. Mount the unit on the wall and apply power.

9. Use a test set to check that the CTU or ADL is passing signal properly. See Section 2-6 on Page 2-3.

2-5 INSTALLATION - RACK MOUNT The CTU or ADL is attached to a Model DLP-19 Delay Line Panel which mounts in 1 vertical space (1U / 1.75 inches) of a 19 inch rack or cabinet

1. Attach the unit to the panel using four of the #6-32 machine screws furnished with the panel. Note that a single panel will accommodate up to four ADLs or CTUs.

2. Mount the panel to the rack or cabinet with two screws (not furnished) at either end of the panel. I/O and power wires are connected from the rear.

3. An earth ground wire does not need to be connected to the rear of the unit when its chassis is earth grounded by the rack.

4. Fuse one of the power leads with a .25 Amp, slow-blo fuse for 12 VDC operation. Use a .1 Amp, slow-blo fuse for 24 or 48 VDC Operation. Nominal current for 12 VDC is 140 mA and 40 mA for 48 VDC Power.

5. Connect the power leads to the Power contacts on the green connector. Observe the polarity, and leave the power off while connecting all leads.

6. Connect signal leads to the Input contacts on the green connector. Tip / Ring polarity indicators are provided so that signal polarity can be observed.

7. Connect signal leads to the Output contacts on the green connector. Avoid signal inversion by connecting the output leads with the same polarity as the input leads. Note: The CTU and ADL maintain signal polarity - T/R Input to T/R Output with the ADL Polarity set to NORMAL.

2-6 RECEIVING OPERATIONAL CHECK The receiving operational check is used to verify that the CTU or ADL is operational. This is a quick check to verify that new, or repaired, units pass signal. A test set is used to supply a signal to the input of the unit and measure the signal level at the output. Any accurate test set with a 600 Ohm output and input impedance will work. A Convex Model 806A TIMS Test Set is recommended, since it provides an independent delay measurement.

1. Connect the send of the test set to the INPUT of the unit. Polarity doesn’t matter.

2. Connect the receive of the test set to the OUTPUT of the unit. Polarity doesn’t matter.

3. Connect the appropriate DC Volts power supply to the power contacts on the green connector, observing the marked polarity.

4. Power the test set and adjust send and receive impedance for 600 Ohms. Put the test set in level mode, and send a 0 dBm / 1004 Hz tone to the unit.

5. If the test set is receiving 1004 Hz between -0.5 and +0.5 dBm, then the unit is passing signal with a nominal (0 dB ADL) gain setting. CTU’s have fixed 0 dB gain.

6. If the test set is receiving 1004 Hz between -6 to -0.5 or between 0.5 and +10 dBm, the ADL is passing signal - but Flat Gain may have been adjusted. In this case, set flat gain to 0 dB. LINE 4 on ADL MAIN MENU.

7. If the test set is receiving less than -7 dBm or between 0.5 and +10 dBm, the ADL is passing signal properly. See Section 2-7 to contact the factory.

2-7 SUPPORT We invite your comments, questions or technical support requirements.

On the Internet: http://www.ConvexCorp.com

Jim Turner

e-mail: Turner_J@ConvexCorp.com

Tel: (703) 433-9901 / FAX (703) 433-9904

CONVEX CORPORATION
1319 Shepard Drive
Sterling, VA 20164 USA

Include a note: Trouble description
Your name / phone number
Return shipping address

2-8 WARRANTY All Convex products are warranted to be free of manufacturing defects for a period of one year from the date of shipment. At its option, Convex will either repair or replace products which prove to be defective during the warranty period. No other warranties are expressed or implied. Convex Corporation is not liable for consequential damages.

2-9 PRODUCT REPAIR SERVICE Post warranty repair service is available for Convex products. Where there is no observable mechanical damage, the ADL or CTU will be repaired for a fixed fee. Otherwise, Convex will advise as to the nature and cost of repair and, subject to customer instructions, will promptly repair and return the product.
3-1 INTRODUCTION Part 1 of this section describes deployment and operation of the CTU / ADLs using LAN control. In most cases, Part 1 is all that will be needed. Part 2 describes bench tests used to verify CTU / ADL operation. Part 3 describes use of the internal RS-232 Port. Part 4 describes updating firmware. Part 5 deals with touch tone generation, and remote control via touch tones. Part 6 discusses the Password Security Feature, Part 7 the Site Name, and Part 8 describes the ADL as a TRC / CSCI Adapter.

PART 1 / DEPLOYMENT and OPERATION

3-2 GENERAL A CTU and ADLs are used in simulcast radio systems to phase match audio traffic going to all transmitters. When the channel is idle, The CTU places a test signal on all talk-out links. ADLs use the test signal to measure link delay, amplitude, and polarity, and make any needed adjustments to keep all sites in phase.

3-2-1 CTU GENERAL The CTU needs to know when the channel is active or keyed, so that it can pass normal audio traffic to the radio sites. This is normally done by applying a “DC” PTT signal to the PTT Input. When DC PTT is not available, set the CTU to detect tone keying.

3-2-2 ADL GENERAL Determine how much Hold Delay the ADL should maintain. Hold Delay is normally set to the time delay of longest link plus a “buffer” delay. Buffer delay provides “head room” for the ADL to decrease bulk delay in the event that link delay increases. Second, set the Level Ref. for automatic gain control. Link Delay and Link Level are both precision measurements made by the ADL.
3-3 SIMPLE DEPLOYMENT / Automatic Delay, Gain ON

Before installation, check the locations of simulcast overlap centers, and transmitter deviation.

A Simulcast Overlap Center is the geographic point where the signal strength of the two closest transmitters is equal.

When simulcast overlap centers are not geographically centered between transmitters, compute Hold Delay offsets that shift phase match to the overlap center.

e.g. If an overlap center is 3 miles closer to station A than the geographic center between stations A and B, offset “A” Hold Delay +16 uS, and offset “B” Hold Delay -16 uS. Since RF propagates at 5.4 uS per mile, these offsets shift audio phase match 3 miles closer to site A and 3 miles farther from site B.

Transmitter Deviation Prior to installation, insure that all transmitters have the proper deviation. This enables the ADLs to operate with a nominal 0.0 dB gain.

1. Install the CTU at the central site, to generate link test signal used to setup the ADLs.
2. Install the first ADL at the “longest” site.
3. Use the LAN Port on the ADL to view the Main Menu.
4. Allow 30 seconds of continuous link measurements with the DTMF LED double blinking every 5 seconds.
5. Update Main Menu, and record measured Link Delay and Link Level.
6. Add a 3,000 uS “buffer” to the measured Link Delay and round up to an “even number” such as 10,000 uS. Enter this as Hold Delay on line 3. If the site’s overlap center needs to be shifted, then offset the Hold Delay.
7. Set Level Ref. on line 6 to the measured Link Level.
8. Allow 30 seconds for link measurements, update the menu, and note that Flat Gain on line 4 is 0.0 dB.

REMAINING TRANSMITTER SITES ---
9. Set the “even number” Hold Delay from step 6 into all ADLs. Those sites where overlap centers need to be shifted, offset the Hold Delay as needed.
10. Repeat steps 7 and 8 to establish and set the Level Ref. for each site.

That’s it! Let the ADLs run and use the LAN Port to verify:

a. Bulk Delay on line 1 is being adjusted to maintain the set Hold Delay. BULK DELAY = HOLD DELAY - LINK DELAY
b. Flat Gain on line 4, is being adjusted to maintain constant output level. FLAT GAIN = LEVEL REF - LINK LEVEL

3-4 CTU SETUP The CTU needs to know when the channel is keyed, so that it can pass normal audio traffic. Connect to the CTU LAN Port and bring up the MAIN MENU. Then enter 6 to bring up the PTT MENU.

3-4-1 CTU / PTT MENU. PTT control is normally accomplished by applying a “DC” PTT signal to the PTT Input. When DC PTT control is not available, Setup the CTU to detect tone keying.
Case 2 “TONE” Keying provided by the voter. Select TONE on Line 1. On Line 2, Select “Analog” for EIA Tone Keying. Select Digital & Analog for Digital paging. The CTU will detect tone keying and pass it through to the far end.

3-4-2 CTU / MAIN MENU Setup the CTU Main Menu as shown below.

CTU / LINE 3 Automatic Delay needs to be set to ON to furnish link test signal. LINE 4 sets the level of the test signal. This is normally set to -1 dBm. Set LINE 6 to HIGH if Tone Keying HLGT exceeds +4.5 dBm. This prevents overdriving the tone detection circuitry.

3-5 ADL SETUP Setup the ADL for full automatics as shown above. LINES 2, 5, 8 are set to ON.

3-5-1 HOLD DELAY Enter site Hold Delay on LINE 3. HOLD DELAY = LONGEST LINK DELAY + BUFFER DELAY + OFFSET Refer to Section 3-3 on Page 3-2. Offsets are used when simulcast overlap centers are not geographically centered between stations. Offsets shift the phase match to the overlap center.

3-5-2 LEVEL REF. Set the Level Reference on LINE 6 to the measured Link Level. Refer to 7 and 8 of Section 3-3. Flat Gain is 0.0 dB when the measured Link Level is equal to the Level Ref. If the Link Level changes, the ADL will adjust Flat Gain to compensate.

3-5-3 POLARITY LINE 7 displays the polarity status of the ADL. Normal indicates that the ADL audio Output is “in-phase” with the Input. Inverted indicates that the Output is 180° out of phase. LINE 8 Auto Polarity defaults to OFF. Auto Polarity cannot be turned ON for this version of firmware. Auto polarity does not operate over some channel banks. Therefore this feature has been disabled pending further development.
3-5-4 ADL PTT SETUP  From the ADL Main Menu, enter 12 to access the PTT MENU. Set the PTT Menu as shown below when DC Keying is used on the link.

In this case (Line 1 = None), ADL “QUIET Mode” can be used to unkey or “amputate” the transmitter by routing DC key control through the ADL PTT Output relay.

When Tone Keying is used, set both PTT Input and PTT Output to “Tone.” This setting allows tone keying to pass through the ADL to the transmitter. In this case, the ADL PTT Output relay can be used to control CTCSS reverse burst.

If Tone Keying is required AND the base station does not detect tone keying, set PTT Input to Tone and PTT Output to DC. In this case, the ADL will:
1. Detect Tone Keying
2. Output a contact closure when keyed (Normal)
3. Insert a Notch Filter to remove guard tone.

Notes:
a. The base station is the preferred place to detect tone keying since the ADL does not support “function” tones.
b. To avoid a phase mismatch between ADL and base Notch Filters, do not use a mix of base stations and ADLs to detect tone keying on a single RF channel.

This concludes Part 1: deployment / operation via LAN control. In most cases, Part 1 is all that will be needed!
PART 2 / BENCH TESTS

3-6 EXTENDED ROUND TRIP DELAY. Extended Round Trip Delay is measured by 806A TIMS Sets. It overcomes the 12 millisecond ambiguity associated with the (Bell Labs) 83 Hz delay measurement. Extended Round Trip Delay directly measures to 1 second with 1 uS resolution. (0.001 mS)

3-6-1 EXTENDED ROUND TRIP DELAY is used to measure the input to output transmission time of a comm link or device. It is an absolute time measurement made at a single frequency - normally 1804 Hz. The test signal is first zeroed with the test set generator directly connected to the receiver. Then the signal is passed through the device under test.

PROCEDURE - EXTENDED ROUND TRIP DELAY

1. On the front panel of the 806A, select the 15 kHz Filter and select DELAY Measurement Mode. Then press the MEAS Key for about one second until the DELAY LED blinks.

2. Connect the test set SEND directly to the RECEIVE. When the display settles, ZERO the delay reading. Then wait for the zero reading to settle.

3. Connect the test set to the system under test and record the delay when the display settles.

3-6-3 NOTES: In extended mode, the instrument is setup to measure “positive” delay only. Therefore any reduction of delay after zeroing will be misinterpreted.

It can take 6 seconds for an Extended Round Trip Delay measurement to settle. The LED display blinks to indicate each new reading update.

3-7 STATIC ADL TESTS (AUTOMATICS OFF) This section describes simple tests that can be performed on the ADL to establish proper “static” operation. These tests check manual operation of the ADL against “external” test equipment with all automatic features turned off. Static tests require an 806A TIMS Test Set or similar delay / amplitude measuring equipment. However, it will be necessary to use an oscilloscope or phase meter to test the polarity feature of the ADL.

3-7-1 PROCEDURE

1. Connect per the Equipment Hookup / Extended RT Delay diagram above, then apply power voltage to the ADL. Reference Section 2-3 regarding the LAN hookup.

2. Run Hyperterminal and open a communications using a session file name with the IP Address of the ADL under test. (Re: Section 2-3 on Page 2-1).

3. Press ENTER to bring up the ADL MAIN Menu, and set the ADL as shown below.

4. Set the 806A Generator (B Jack) for 0.0 dBm / 1.804 kHz. Set the Measurement to DELAY, then press the MEAS Key for about one second until the DELAY LED blinks. This puts the 806A in Extended Round Trip Delay Mode. Set the Send and Receive Impedance to 600 Ohms, and insure that the BRDG LED is OFF.

5. Connect the test set SEND directly to the RECEIVE. When the display settles, ZERO the delay reading. Then wait for the zero reading to settle.

6. Connect the 806A to the ADL under test. Note that the Delay reading is 0.300 +/- .005 mS.

7. Use Hyperterminal to change (1) Bulk Delay to 700,000 uS, and Note that the 806A Delay reading is nominally 700.000 mS.

8. Use Hyperterminal to change (1) Bulk Delay to 300 uS, and Note that the 806A Delay reading returns to 0.300 +/- .005 mS.

9. Use the left MEAS button on the 806A to select LEVEL Measurement. Set the 806A Generator frequency to 1004 Hz and Send Level to 0.0 dBm. Verify that the ADL Output level is 0.0 +/- .3 dBm.

10. Use Hyperterminal to change (4) Flat Gain to 6.0 dB, and observe that the ADL Output Level increases to 6.0 +/- .3 dBm.

11. Use Hyperterminal to change (4) Flat Gain to 0.0 dB, and observe that the ADL Output Level returns to 0.0 +/- 0.3 dBm.

3 - 5
This section describes simple tests that can be performed on the ADL to establish proper “automatic” operation. Referring to the Equipment Hookup above, ADL2 is the unit under test. ADL1 serves a means to simulated changing conditions of a “talk out” link. ADL1 will be changed, and ADL2 will be observed to see that it properly compensate for changes introduced by ADL1.

The CTU and ADL2 are connected to synchronized 1PPS that is supplied by a Master Oscillator ( or two Master Oscillators. ) ADL1 should not be connected to the 1 PPS Source, since it will be used as “manual” delay line.

3-8-1 PROCEDURE  ( See 3-8-2 CTU SETUP )

1. Connect per the Equipment Hookup / Automatic Tests diagram above (Tip to Tip / Ring to Ring), then apply power voltage to the CTU and ADLs. Reference Section 2-3 regarding the LAN hookup.

2. Run a first appearance of Hyperterminal and open communications using a session file name with the IP Address of the ADL1 ( Re: Section 2-3 on Page 2-1 ).

3. Press ENTER to bring up the ADL1 MAIN Menu. Set the ADL Main Menu as shown above - ADL1.

4. Run a second appearance of Hyperterminal and open a communications using a session file name with the IP Address of the ADL2 - the ADL under Test.

5. Press ENTER to bring up the ADL2 MAIN Menu, and set up ADL2 as shown to the right on the ADL2 / Unit Under Test Menu.

6. After ADL2 has been set and had 20 seconds to run tests on the “link”, press the Enter Key to refresh the menu and observe the following:

   1. Bulk Delay is 9,700 uS +/- 5 uS
   4. Flat Gain is 0.0 +/- 0.3 dB
CTU / ADL

OPERATION

Section 3

7. Use the first appearance of Hyperterminal to access ADL1, and set the controls as follow:
   
   Set (1) Bulk Delay to 9,500 uS
   Set (4) Flat Gain to -4.0 dB

8. Use the second appearance of Hyperterminal to access ADL2. After ADL2 has had 20 seconds to run tests on the “link”, press the Enter Key to refresh the menu and observe that:
   
   1. Bulk Delay is 500 uS +/- 5 uS
   4. Flat Gain is +4.0 +/- 0.3 dB

9. Use the first appearance of Hyperterminal to access ADL1, and set the controls as follow:
   
   Set (1) Bulk Delay to 300 uS
   Set (4) Flat Gain to 0.0 dB

10. Use the second appearance of Hyperterminal to access ADL2. After ADL2 has had 20 seconds to run tests on the “link”, press the Enter Key to refresh the menu and observe that:
   
   1. Bulk Delay is 9,700 uS +/- 5 uS
   4. Flat Gain is 0.0 dB +/- 0.3 dB

11. Set ADL2 to the default settings shown above.

3-8-2 CTU SETUP for ADL TESTS / AUTOMATICS

CTU default settings will provide the necessary test signal when the 1PPS input is connected. CTU settings can be checked as follows:

1. Temporarily connect the CTU LAN Port to the Switch. Reference Section 2-3 regarding the LAN hookup.

2. Run an appearance of Hyperterminal and open communications using a session file name with the IP Address of the CTU (Re: Section 2-3 on Page 2-1).

3. Set the CTU Main Menu as shown in the right column above.

4. Select item 6 to access the CTU PTT Setup Menu. Set the CTU PTT Menu as shown in the right column above.

This concludes Part 2
PART 3 / OPERATION RS-232 PORT

3-9 INTRODUCTION This section describes the operation of the CTU Channel Timing Unit and the ADL Automatic Delay Line using the internal RS-232 Port. The RS-232 Port is provided to set up (or read) the LAN Port IP Addresses of CTUs or ADLs.

3-9-1 RS-232 CONTROL. The “internal” RS-232 Control Port can be accessed by removing the top cover from the unit. Use a Phillips head screw driver to remove four screws on each side, then lift the top cover straight up. The 9 pin, female connector is a DCE Port with the following pin out:

<table>
<thead>
<tr>
<th>Function</th>
<th>Pin</th>
</tr>
</thead>
<tbody>
<tr>
<td>DCD</td>
<td>1</td>
</tr>
<tr>
<td>RD</td>
<td>2</td>
</tr>
<tr>
<td>TD</td>
<td>3</td>
</tr>
<tr>
<td>DTR</td>
<td>4</td>
</tr>
<tr>
<td>GND</td>
<td>5</td>
</tr>
<tr>
<td>DSR</td>
<td>6</td>
</tr>
<tr>
<td>RTS</td>
<td>7</td>
</tr>
<tr>
<td>CTS</td>
<td>8</td>
</tr>
<tr>
<td>RI</td>
<td>9</td>
</tr>
</tbody>
</table>

The ADL is controlled via the internal RS-232 Port using a PC running a terminal emulation program such as Procomm or HyperTerminal. The RS-232 Port parameters are: Asynchronous, Full Duplex, DCE 8 bit ASCII / 1 Stop bit No Parity Baud Rate: 19,200 bps fixed

Setup the terminal emulation program per the port parameters above, and press the Enter Key to bring up the (CTU or) ADL Main Menu shown above.

Enter 13 (or 7) to bring up the ADL (CTU) Communications Menu so that IP Address can be set.
Enter 1 on the Communications Menu to change the **IP Address**. Items 2 and 3 are used to change the IP Subnet Mask and Gateway.

*Item 4, Update Firmware is discussed in Part 4.*

*Item 5, Change Password is discussed in Part 6.*

Select 6 to change the **Site Name**. Enter up to 20 alphanumeric characters or enter **space** character to remove a site name.

Select **7 to Disable or Enable Touch-Tone (DTMF)** Control. Set to Disable unless touch-tone are being used.

Items 8 and 9 are used to set the Touch-Tone address and zone. Touch-Tone / DTMF Addresses and Zones are discussed in Part 5 Below.

Enter **10 to return to the Main Menu** when the communication parameters have been set.

Re-install the Top Cover.

---

**This concludes Part 3**
PART 4 / UPDATE FIRMWARE

3-10 INTRODUCTION This section describes how to update the firmware on an ADL or CTU through the LAN Port. Firmware is furnished as a text file such as ADLCTUv1.27.txt. (Version 1.27) that is downloaded into the unit from the Communications Menu using the Hyperterminal file transfer feature. Refer to page 2-1 for regarding LAN communications with the ADL or CTU.

The process takes three minutes, and during that time the unit is out of service. There are two steps to the process. First the text file is loaded into RAM on the ADL or CTU. (This takes about 3 minutes.) During the loading process each record (line) of 40 characters is checked for errors. If the communications was error free, the new firmware will then be loaded from RAM into non-volatile Flash Memory. (This takes an additional 30 seconds.)

In the event of communications errors during the file transfer, an error message will appear, and the entire file transfer procedure will need to be repeated.

3-10-1 FIRMWARE UPDATE PROCEDURE

1. Copy the firmware text file into the same PC folder that is being used for Hyperterminal “session” files.
2. Setup the “session file” for 20 Milliseconds Send Line Delay. (From FILE: Select PROPERTIES, from Properties select SETTINGS, from Settings select ASCII SETUP, under ASCII Sending set (Send) LINE DELAY to 20 Milliseconds.)
3. Establish communications with the unit through the LAN Port, and access the Communications Menu.
4. Select Item 4: Update Firmware
5. Click on “Transfer” on the top tool bar.
6. Select “Send Text File” from the Transfer drop-down box.
7. From the Send Text File - Selection Screen, select the new firmware text file. e.g. ADLCTUv1.27.txt
8. Click on the Open button to start the file transfer from the PC to the unit. Wait about 2 minutes and 30 Seconds for the completion message.
9. The completion message appears on the bottom line of the Communications Menu:

   4930 Records Transferred. Writing Flash, wait 30 seconds.

10. Allow 30 seconds for the for the firmware to be written to Flash Memory. Then, press the Enter Key twice to refresh the Communications Menu.

   If the screen fails to refresh, press esc / enter to attempt to reset the ADL. If esc / enter fails to establish communications, temporarily remove power from the ADL to cause a hard reset.
11. The firmware version number will appear in the upper right corner of the menu.

   In the event of communications errors, the completion message will indicate this, and the flash write will not proceed. In this case, repeat the Firmware Update Procedure from Step 2.

   Notes re: Update Firmware via Internal RS-232 Port

   1. Procedure 3-10-1 can be used to update firmware through the internal serial port. Refer to page 3-8 regarding operation of the RS-232 Port.
   2. The serial port file transfer process takes about 6 minutes.

   This concludes Part 4
3-11 ADL TOUCH TONE CONTROL When LAN Control is not available at remote sites, touch tones can be used to remotely adjust ADL’s. This section discusses touch-tone generation.

3-11-1 TOUCH TONE (DTMF) GENERATION
Any suitable means can be used for generating touch tone commands such as a Butt Set. Two alternate methods of generating Touch-Tones are presented:

1. Use of an 806A TIMS Set - controlled via PC
2. Use of PC / HyperTerminal and a modem. (Normally an internal modem.) The Hyperterminal technique is preferred since it does not require an 806A Test Set.

3-11-2 TOUCH-TONES via 806A TIMS Set
The Model 806A TIMS Test Set can generate touch tones when operated with a PC. Refer to the 806A Manual Section 4-20.

3-11-3 TOUCH-TONES VIA HYPERTERMINAL
Touch-tones can also be generated using HyperTerminal (or other terminal emulation), a modem, and “AT” Commands. AT Commands are used to cause the modem to dial on a “dry” line connected to the ADL Input.

Required:
1) Desktop or Notebook Computer with an internal or external modem and HyperTerminal (or similar) terminal emulation software.
2) Cable with an RJ-11 plug on one end and the red and green wires stripped and accessible on the other end (or connectorized for network access).

Procedure:
1) Connect the RJ-11 plug into the modem’s LINE connector. Connect the other end of the cable to the input terminals of the delay line (or network access point that connects to the input of the delay line).
2) Configure HyperTerminal to communicate with the modem. (See Configuring HyperTerminal below.)
3) Command the modem to bypass dial tone (atx0).
4) Prefix all DTMF commands with atdt.

Example Session:

<table>
<thead>
<tr>
<th>Type</th>
<th>Response</th>
<th>(Remark)</th>
</tr>
</thead>
<tbody>
<tr>
<td>at&lt;enter&gt;</td>
<td>OK</td>
<td>(modem present)</td>
</tr>
<tr>
<td>atx0&lt;enter&gt;</td>
<td>OK</td>
<td>(bypass dial tone)</td>
</tr>
<tr>
<td>atdt<em>991</em>1000#&lt;enter&gt;</td>
<td>audible dtmf</td>
<td>(sets delay to 1000 usec)</td>
</tr>
<tr>
<td></td>
<td>NO CARRIER</td>
<td>(bypass sync attempt)</td>
</tr>
<tr>
<td>atdt<em>994</em>20#&lt;enter&gt;</td>
<td>audible dtmf</td>
<td>(sets gain to +2.0 dB)</td>
</tr>
<tr>
<td></td>
<td>NO CARRIER</td>
<td>(bypass sync attempt)</td>
</tr>
</tbody>
</table>

3-11-4 CONFIGURING HYPERTERMINAL
For first time setup run HyperTerminal:

In the “Connection Description” dialog box type DTMF (or any name to describe the session)

In the “Connect To” dialog box set “Connect using” to the serial port your modem is configured for (select the COM port, not your modem name if it’s in the list).

In the “COM Properties” dialog box click “OK” to accept the defaults shown or select another baud rate from the list then click “OK.”
You should now be in a terminal session with your modem. Type `at<enter>` and you should get an “OK” response from the modem.

If you don’t get an “OK” from your modem you may not have the correct COM port selected. From the “Call” menu select “Disconnect”. From the “File” menu select “Properties”. From the “Connect to” tab beside “Connect using” select the correct COM port for the modem and try to get the “OK” prompt again.

If you get an “OK” from the modem but you can’t see the command as you type. From the “Call” menu select “Disconnect”. From the “File” menu select “Properties”. From the “Settings” tab select “ASCII Setup...”. From the “ASCII Setup” dialog box check mark “Echo typed characters locally”.

If you see two letters for every letter you type. From the “Call” menu select “Disconnect”. From the “File” menu select “Properties”. From the “Settings” tab select “ASCII Setup...”. From the “ASCII Setup” dialog box uncheck “Echo typed characters locally”.

Once you’ve got HyperTerminal setup successfully you can save the setup for future use using File/Save. Then to run the previously saved session from the Menu select HyperTerminal=>DTMF.ht (or whatever name you chose earlier).

**PART 5 / TOUCH TONE CONTROL**

**3-12 ADL TOUCH TONE CONTROL** When LAN Control is not available at remote sites, touch tones can be used to remotely adjust ADL’s. This section discusses touch-tone control.

The ADL is controlled by applying touch-tones to the working channel. Referring to the Block Diagram below, the delay line is adjusted by sending touch-tone commands in place of the normal voice band traffic.

### ADL COMMUNICATIONS MENU

**3-12-1 SETTING THE DTMF ADDRESS** When ADL’s are controlled via touch-tone commands, a unique address is required for each unit to permit individual control. Even if LAN control is used, it is good practice to set the DTMF Address to a unique value - as a fallback measure. The same value as the last two digits of the IP Address usually works. However, note that DTMF Address 99 is reserved as a “universal” Address.

Connect the LAN Port Control Port on the ADL to a 10 Base-T compatible hub. ( See Section 2-3 ). Run HyperTerminal as described on page 2-1. Or use the RS-232 Port per Section 3-9 on Page 3-8.

From the ADL MAIN MENU, Enter 13 to access the COMMUNICATIONS MENU above.

Enter 8 to access the DTMF Address selection, and set the address using a unique number from 0 to 99.

Enter 7 to access the DTMF Control Menu and set the DTMF Control to “Enabled” which “unlocks” the DTMF Security Feature.

Enter 10 to return to the MAIN MENU.
3-12-2 TOUCH-TONE SETTING COMMANDS
Format: \(*xxxyyyyyzzzzzzz#\)
where: xx = two digit ADL Address 01 thru 98 (99 = Universal Address)
    yy = 1 for Bulk Delay adjustment.
        = 2 for Automatic Delay ON / OFF
        = 3 for (Automatic ) Hold Delay
        = 4 for Flat Gain (with Automatic Gain OFF)
        = 5 for Automatic Gain ON / OFF
        = 6 for (Auto Gain ) Level Reference
        = 7 for Polarity ( with Auto Polarity OFF )
        = 8 for Automatic Polarity N/A / OFF
        = 9 for Input Level Normal / High
        = 10 for Normal / Quiet
        = 11 for Quiet Timeout
zzzzzzz DELAY Setting Data
( yy = 1 ) = 300 thru 700000, Bulk Delay in uSec
( yy = 2 ) = Auto Delay: ON: 1 / OFF: 0
( yy = 3 ) = 300 thru 700000 for Auto Hold Delay
zzzzzzz GAIN Setting Data
( yy = 4 ) = 0 - 100, for Flat Gain 0 ~ +10.0 dB
    = 101 - 160, for Flat Gain –0.1 ~ –6.0 dB
( yy = 5 ) = Auto Gain: ON: 1 / OFF: 0
( yy = 6 ) = 0 ~ 40 for Level Ref. 0 ~ +4.0 dBm
    = 101 ~1200 for Level Ref. –0.1~–20.0 dBm
zzzzzzz POLARITY Setting Data
( yy = 7 ) = Polarity: Normal: 0 / Inverted: 1
( yy = 8 ) = Auto Polarity: ON: N/A / OFF: 0
zzzzzzz INPUT LEVEL Setting Data
( yy = 9 ) = Input level: NORMAL: 0 / HIGH: 1
zzzzzzz QUIET Setting Data
( yy =10 ) = NORMAL: 0 / QUIET: 1
( yy =11 ) = Quiet Time-Out: 1 thru 90
        = 0 for No Time-Out / None

Examples
*991*123456# Sets Bulk Delay = 123,456 uSec.
*992*1# Sets Auto Delay = ON
*994*124# Sets Flat Gain = -2.4 dB
*995*1# Sets Auto Gain = ON
*997*0# Sets Polarity = Normal
*998*1# Sets Auto Polarity = ON
*9910*0# Sets Quiet = Normal

3-12-3 ADDRESSING (ADL Only) Delay and level are remotely controlled by touch-tones. The addressing feature is used when multiple delay lines share the same channel. This permits specific delay lines to be controlled individually. Prior to deployment, the ADL is set-up to respond to a unique two-digit address (01 to 98) per Section 3-12-1. This permits up to 98 units to be individually controlled from a common source.

3-12-4 TOUCH-TONE ADDRESS COMMANDS (ADL):
Format: \(*xx*yy#
where: xx = old address
    yy = new address

3-12-5 ADL UNIVERSAL ADDRESS 99 A universal address is provided which permits all units to be controlled simultaneously. The universal address saves the time of sending the same command to each address. An example of a universal application is the security feature. Once the ADL’s are properly adjusted, a universal security command can be sent to make all units “deaf” random touch-tones.

3-12-6 SECURITY The security feature disables the touch-tone control so that the delay lines will not be altered by random touch-tones. The security feature is activated and deactivated using a specific 8 digit sequence. Once activated the delay line will remain deaf to all touch-tone commands except one. A second 8 digit sequence which unlocks the security feature. The security feature can be applied on a selective or universal basis. Selectivity permits control activation of a single unit - keeping all other units locked. Universal application, permits all units to be locked or unlocked simultaneously.

3-12-7 TOUCH-TONE SECURITY COMMANDS:
Format: \(*xx**yy#
where: xx = address
    y = 0 to Unlock
        = 1 to Lock
Example: *99**91# Locks all units

This concludes Part 5
PART 6 / PASSWORD SECURITY FEATURE

v1.18 firmware added password protection to the CTU or ADL LAN Port. The internal RS-232 Port is not password protected to provide a means of accessing a unit when the IP address or the password is lost.

New firmware may be loaded over a prior versions. When first loaded, password is disabled so that the user can assign a password. Once the password is assigned, any reset or interruption of the Telnet session will require entering the password to access control menus.

The password is changed, or enabled, from the Communications Menu Item 5.

In the ADL, the Change Password prompt is:

Enter 4 to 10 Alphanumeric Characters or Space to Disable:

In the CTU, the Change Password prompt is also:

Enter 4 to 10 Alphanumeric Characters or Space to Disable:

Use the space character to disable the password feature. Otherwise use 4 to 10 alphanumeric characters for the password. Password is case sensitive, and non-alphanumeric characters are not allowed.

With the password is enabled, the CTU or ADL will prompt for the password at the start of a new Telnet session:

Enter ADL Password: ******

or

Enter CTU Password: ******

The password must be entered to access control menus. For security, asterisks are displayed as password characters are entered.

This concludes Part 6

PART 7 / TRANSMITTER DISABLE FEATURES

v1.19 firmware added two transmitter disable features. The first is a simple PTT Timeout that works when the ADL is detecting Tone Keying. (Item 1 = Tone), and providing DC Keying to the transmitter. The second feature can be used when the ADL is not detecting Tone Keying to prevent the transmitter from keying. The transmitter can be “amputated” from the network while the ADL is in Quiet Mode (Item 10 on the Main Menu). Amputation can be for a timed duration or until a command is set to restore the ADL to Normal.

PTT Timeout is used when Item 1 above is set to Tone. Select 5 to change or set a timeout, and providing DC Keying to the transmitter. Select Item 5 from the ADL PTT Menu, and enter 1 to 6 for a 1 to 6 minute transmitter timeout. The timeout will change the state of the PTT Relay after PTT has been active for the set time. The relay will remain in the “idle” / unkeyed state until a new EIA Tone Sequence (with high level guard tone) is detected.

CTCSS Encoders: When the ADL is passing tone keying through to the transmitter (i.e. Tone In and Tone Out), the PTT Relay tracks tone keying so that it can be used to key (synchronous) CTCSS or DCS Squelch Tone Encoders.

Tone Keying = None / Transmitter amputation. Amputation is used to temporarily remove a transmitter from the network. The transmitter may have a problem or there may be another reason to remotely shut down the transmitter.

This feature is available when the ADL is not detecting tone keying. It allows the ADL determine if the transmitter will be keyed or not. The PTT Relay is a function of the Quiet feature / Item 10. When the ADL is in Quiet Mode, the PTT Relay opens. When the ADL is Normal Mode, the relay closes. When the transmit keying circuit is routed through the PTT Relay, the ADL can remotely disable keying. Further, since Quiet Mode has a timeout feature, amputation can be timed out or manually controlled (Item 5 / Quiet Timeout = none).

This concludes Part 7
PART 8 / TRC / CSCI ADAPTER

3-15 TRC / CSCI ADAPTER (Tone Remote Control device / Conventional Simulcast Controller Interface) is a “stand alone” application of the ADL. Stand alone operation does not require the 1 PPS Input or a CTU, provided the voter has generated tone keying.

Tone Key operation is handled by on-board DSP that detects (and removes) guard tone and provides a contact closure across the PTT Output. The ADL detects 2175 Hz High Level Guard Tone (HLGT) in the range of -10 to +4 dBm and asserts PTT. Nominal detection time is 5 mSec. PTT remains asserted while Low Level Guard Tone (LLGT) is above -43 dBm. PTT is released when LLGT is gone for 350 mSec.

Other “stand alone” functions of the ADL include:
- Manual Delay: 300 - 700,000 micro seconds
- Manual Gain: -6 to +10 dB
- Manual Polarity Normal or Inverted

3-15-1 TRC / CSCI CONTROL SETTINGS There is a hidden option (for adapter or standard applications) that controls the bandwidth of the 2175 Hz Notch Filter.

From the ADL Main Menu, on the bottom line:
- Enter Menu Item to Change (1 to 15): 35
- Enter 35 to access the Notch Filter Bandwidth:
  - 2175 Notch Bandwidth: N = Narrow (100Hz)
  - W = Wide (200Hz)

Enter W for to select the Wide bandwidth.
Otherwise setup the Main Menu as shown in the right column.
The PTT Menu is set for Tone Input, and DC Output.

This concludes Part 8
# Part 9 / User Option Commands

## 3-16 User Option Command Table

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