AdrenaLine ™ OSP xDSL Single-Line Conditioner Unit
– *Engineering Checklist* –

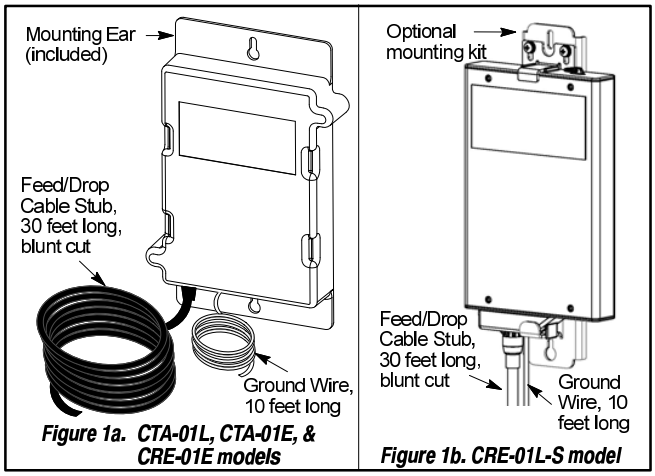

Figure 1a. CTA-01L, CTA-01E, & CRE-01E models

Figure 1b. CRE-01L-S model

Figure 1. AdrenaLine xDSL Line Conditioner

> ***- IMPORTANT NOTE -***
> *For the most current, up-to-date, AdrenaLine documentation, always go to www.charlesindustries.com/main/adrenaline.html, or call the Charles Technical Support Group for assistance at 1-800-607-8500.*

1. GENERAL

1.1 Document Purpose

This document provides a requirements checklist to facilitate the engineering and installation of the Charles Industries' Adrena-Line™ single-line series of OSP xDSL line conditioners. Figure 1 shows a typical single-line model.

> *- NOTE -*
> *Hereafter the Charles' AdrenaLine line conditioner may be referred to as the "unit" or the "AdrenaLine."*

1.2 Product Purpose and Description

The AdrenaLine Single-Line Conditioner is an analog device that improves the rate and reach of different ADSL/ADSL2/ADSL2+ technologies through noise filtering and signal amplification. The expected performance improvements are summarized in Table 1. The system uses the standard -48 Vdc POTS power for *Line Powered* units. *Express Powered* units require a separate -48 Vdc power source and cable pair.

Table 1. Expected Performance Improvements

	Bandwidth	Reach
CTA	30-100%	20-30%
CRE	80-300%	20-30%

Bandwidth improvements for the same reach, reach improvements for the same bandwidth.

1.3 Product Models and Configurations

This checklist covers the AdrenaLine models shown in Table 2.

Table 2. AdrenaLine Product Models

Part #	Description
CTA-01L	Line-Powered, Shorter Loops
CRE-01L-S	Line-Powered, Longer Loops
97-ADLMNTG-A	Optional Mounting Bracket for CRE-01L-S
CTA-01E	Express-Powered, Shorter Loops
CRE-01E	Express-Powered, Longer Loops

2. APPLICATIONS

The following applications apply:

- ❑ **Increase Rate & Reach.** Increase the rate and/or reach of ADSL/ADSL2/ADSL2+ transmission systems.
  - □ The CTA products are optimized for shorter loops.
  - □ The CRE product is designed for longer loops.
- ❑ **Boost Signal Strength.** Provide a boost to the ADSL/ADSL2/ADSL2+ signal strength in high interference situations.

3. APPLICATION NOTES

The following application notes apply:

- ❑ **Installation Limits.** Installation limits for the AdrenaLine units are summarized in Table 3.
- ❑ **Placement Calculations.** The conditioner is ideally placed at the approximate mid-point between the DSLAM and CPE for single-gauge loops. See Table 3 for loop length and placement limitations. Ideal placement for mixed gauge loops is determined using the *AdrenaLine Placement Calculator*, which is available on the Charles Industries website at the address shown below. Installation of the AdrenaLine should be as close as possible to the ideal placement location, per local or company practice.

  http://www.charlesindustries.com/main/adrenalinetool.html
- ❑ **Voice Signal.** The voice signal, when present, bypasses most of the conditioner's internal circuitry, making this a fail-safe application.
- ❑ **Packaging and Mounting.** The conditioner is packaged in hardened outside plant housings, comes with a 30 foot cable stub, and can be mounted in buried and aerial applications.

4. ADRENALINE POWER REQUIREMENTS

The following power requirements apply.

- ❑ **Voltage.** The power source for Line and Express Powered units should be -48 VDC nominal. The minimum AdrenaLine input

voltage should be -22 Vdc (off-hook). The maximum input voltage is -56 Vdc.

- ❑ **Current.** Input line current should be 35 mA minimum for *Line Powered* systems and 10 mA minimum for *Express Powered* systems. Total power consumption is approximately 250 mW.
- ❑ **Polarity.** *Line Powered* AdrenaLine systems are polarity sensitive and the Ring (Blue) must be negative in respect to the Tip (Blue/White).
- ❑ **Express Power.** One *Express Power* pair can power up to 5 single-line AdrenaLine units.

- IMPORTANT NOTE -
AdrenaLine line-powered units are polarity sensitive and should be spliced "Tip to White-Blue" and "Ring to Blue" conductors.

Table 3. Single-Line AdrenaLine Unit Application Limits

Model		26 AWG Cable* Min. - Max.	24 AWG Cable* Min. - Max.	22 AWG Cable* Min. - Max.
CTA-01L - Line Power, Shorter Loops	Loop Length	6 - 12.6 Kft	7.6 - 18 Kft	9.6 - 18 Kft
		500 - 1050 Ω	395 - 934 Ω	310 - 583 Ω
	Placement	3 - 6 Kft	3.8 - 9.6 Kft	4.8 - 15.4 Kft
		250 - 500 Ω	197 - 500 Ω	156 - 500 Ω
CRE-01L-S - Line Power, Longer Loops	Loop Length	11 - 15.6 Kft	13.9 - 25 Kft	17.6 - 36 Kft
		917 - 1300 Ω	723 - 1300 Ω	570 - 1166 Ω
	Placement	5 - 8 Kft	6.7 - 12.8 Kft	8.6 - 20.2 Kft
		416 - 667 Ω	348 - 664 Ω	280 - 654 Ω
CTA-01E - Express Power, Shorter Loops	Loop Length	6 - 16 Kft	7.6 - 22 Kft	9.6 - 29 Kft
		500 - 1333 Ω	395 - 1142 Ω	310 - 940 Ω
	Placement	3 - 8 Kft	3.8 - 11 Kft	4.8 - 14 Kft
		250 - 666 Ω	195 - 571 Ω	155 - 454 Ω
CRE-01E - Express Power, Longer Loops	Loop Length	16 - 21.3 Kft	22 - 28 Kft	29 - 36 Kft
		1333 - 1775 Ω	1142-1166 Ω	940 - 1166 Ω
	Placement**	6.6 - 10.7 Kft	8.8 - 14 Kft	12 - 18 Kft
		550 - 890 Ω	455 - 725 Ω	390 - 585 Ω

** Assuming buried cable at 20° C. ** Minimum CRE-01E to CPE ohm value is 500 Ω for 26 AWG, 450 Ω for 24 AWG, and 400 Ω for 22 AWG.*
Note: The nominal operating voltage is -48 VDC. The minimum AdrenaLine input voltage is -22 VDC (off-hook); maximum is -56 VDC.
Note: Power consumption is approximately 250 mW.

5. GENERAL PLANT REQUIREMENTS FOR xDSL TRANSMISSION

The following plant requirements for xDSL transmission apply.

- ❑ **Qualify/Condition the Line.** Loops must be qualified and conditioned for ADSL/ADSL2/ADSL2+ installations according to company guidelines.
- ❑ **Loaded/Nonloaded Loops.** Loops must be non-loaded. On longer, loaded loops, ADSL/ADL2/ADSL2+ compatible ***Smart Coils***, available from Charles Industries, should replace the existing *Load Coils*.
- ❑ **Bridged Taps.** All bridged taps should be removed.
- ❑ **Insulation Resistance.** Tip-Ring, Tip-Ground and Ring-Ground Insulation Resistance should be greater than 5 Meg-Ohms.
- ❑ **Input Capacitance.** Input capacitance should be equal to 0.083 uF/mile.
- ❑ **AC Voltage.** No AC Voltage should be present on Tip-Ring and a maximum of 5 VAC should be present on Tip-Ground and Ring-Ground.
- ❑ **Insertion Loss.** Insertion loss should be less than or equal to 8 dB prior to insertion of AdrenaLine (the *Line Powered* unit will add 0.4 dB nominal insertion loss and the *Express Powered* unit will add 1.2 dB nominal insertion loss).
- ❑ **C-Message noise.** C-Message noise should be less than or equal to 20 dBrnC prior to insertion of Adrenaline. (The *Line Powered* unit will add 6 dBrnC nominal, the *Express Powered* unit will add 1 dBrnC nominal.)
- ❑ **Longitudinal Balance.** Longitudinal balance should be greater than or equal to 60 dB.
- ❑ **Power influence.** Power influence should be less than or equal to 80 dBrnC.

6. DSLAM REQUIREMENTS

The following DSLAM requirements apply:

- ❑ **DSLAM Settings.** DSLAM settings should reflect the desired bandwidth, signal strength, and delay requirements of the different service offerings (Video, Data and/or Voice) and the expected bit rate improvement as a result of the AdrenaLine installation.
- ❑ **RT-based DSLAMs with Combo Blades.** Some RT-based DSLAMs have Combo Blades (Voice and ADSL/ADSL2+) that limit the line current to 20-22 mA. Only *Express Powered* AdrenaLine units can be used on these lines.

7. REFERENCES

Use the following documents as references.

- ❑ The primary reference is the "Engineering Guidelines for the Charles® AdrenaLine™ Series of OSP xDSL Line Conditioners" document.
- ❑ Each Adrenaline unit comes with an Installation Guide.

8. PRODUCT SUPPORT

8.1 Technical Assistance

If technical assistance is required, contact Charles Industries at:

800-607-8500 (Toll-free 24/7 Technical Hotline)
847-806-8500 (Tech. Service local)
847-806-8556 (Tech. Service FAX)
techserv@charlesindustries.com (email support)

8.2 Customer Service

If customer service is required, contact Charles Industries at:

Charles Industries, Ltd.
5600 Apollo Drive
Rolling Meadows, Illinois 60008-4049

847-806-6300 (Customer Service)
847-806-6653 (Customer Service FAX)
mktserv@charlesindustries.com (email)
www.charlesindustries.com (website)