APPLICATION NOTE

What is a TDR?

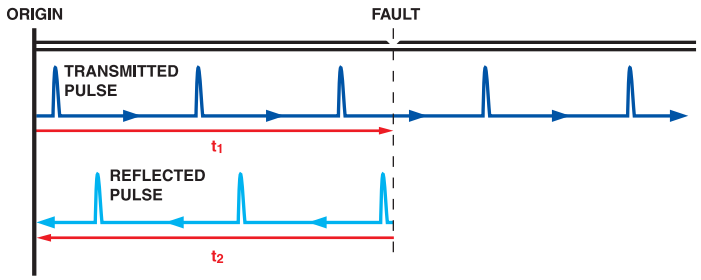
A TDR (Time Domain Reflectometer) is used for cable length measurement and fault locating on virtually all types of cable including twisted pair, coaxial and parallel conductors. Access to two conductors from one end is required.

The TDR transmits pulses of a known shape and amplitude into one end of a cable that travel along the cable at a speed determined by its Velocity of Propagation. Vp is a ratio of the speed of light.

As the pulses reach impedance changes in the insulation of the cable, indicative of a fault or cable end, reflections are caused that travel back along the cable and are identified by the TDR.

The size, shape and general nature of the reflected pulses indicate the type of fault encountered, and the time taken for the pulse to be reflected enables an accurate measurement of distance to the fault to be determined.

Time Domain Reflectometry



$$\text{Distance} = \left(\frac{t_1 + t_2}{2}\right)(c_o)(Vp)$$

c_o = Speed of light in a vacuum
Vp = Velocity of Propagation

Why use a TDR?

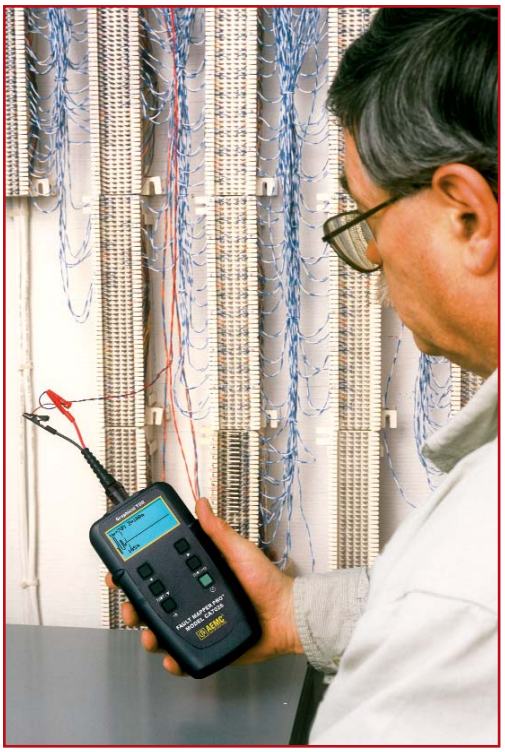
Continuity and performance of service of modern communications systems is of paramount importance, and all new installations and modifications to existing installations must be tested to ensure trouble free operation. Additionally, in the case of a fault in the cable infrastructure, it is necessary to identify, locate and rectify the situation in as little time as possible, ensuring rapid return of the service.

Applications

Electrical, communication and telecommunication engineers and contractors for testing cable installations as part of a routine preventative maintenance program. In addition, during, or after work on, all new cable installations and modifications to existing cable installations, tests can be made to ensure performance criteria are met.

Personnel involved in the location of cable faults as part of a responsive or routine maintenance program.

Electrical Inspectors performing quality checks following work on all new cable installations, and modifications to existing cable installations.



VELOCITY OF PROPAGATION

This is a measure of how fast a signal travels along a line. A radio signal travels in free space at the speed of light, approximately 3 x 108 m/sec. A signal travels in a transmission line at much less than this. In twisted pair cable the Velocity of Propagation may be between 40% and 75% of the velocity in free space. There is a direct relationship between Velocity of Propagation (V) and Wavelength:

$$V = \lambda f$$

Vp is often stated either as a percentage of the speed of light or as time-to distance. When the time-to-distance figure is used, it may be known as Propagation Delay, and will be expressed as ns/100m or ms/km.

AEMC® INSTRUMENTS
CHAUVIN ARNOUX GROUP

Contact Us

United States & Canada:

Chauvin Arnoux®, Inc.
d.b.a. AEMC® Instruments
200 Foxborough Blvd.
Foxborough, MA 02035 USA
(508) 698-2115 • Fax (508) 698-2118
www.aemc.com

Customer Support – for placing an order, obtaining price & delivery:
customerservice@aemc.com

Sales Department – for general sales information:
sales@aemc.com

Repair and Calibration Service – for information on repair & calibration, obtaining a user manual:
repair@aemc.com

Technical and Product Application Support – for technical and application support:
techinfo@aemc.com

Webmaster – for information regarding www.aemc.com:
webmaster@aemc.com

South America, Central America, Mexico, Caribbean, Australia & New Zealand:

Chauvin Arnoux®, Inc.
d.b.a. AEMC® Instruments
15 Faraday Drive
Dover, NH 03820 USA
(978) 526-7667 • Fax (978) 526-7605
export@aemc.com
www.aemc.com

All other countries:

Chauvin Arnoux SCA
190, rue Championnet
75876 Paris Cedex 18, France
33 1 44 85 45 28 • Fax 33 1 46 27 73 89
info@chauvin-arnoux.com
www.chauvin-arnoux.com