



BIDDLE® **CFL535E TDR**

- **Dual input and output ports**
- **15 internal memory positions**
- **RS-232 interface to a PC or printer (included software)**
- **Help menu**
- **5 user selectable pulse widths per range**
- **Trace averaging**

General Purpose Time Domain Reflectometer

DESCRIPTION

The Biddle Model CFL535E is an advanced instrument capable of identifying a wide range of cable faults using Time Domain Reflectometry. Narrow pulses of electrical energy are transmitted along the cable. The pulse travels through the cable at a velocity determined by the cable insulation. Changes in characteristic impedance of the cable will cause the pulse to be reflected which then is displayed on the instrument.

The CFL535E can be used on any cable consisting of at least two insulated metallic elements, one of which may be the sheath or shield of the cable. Dual inputs and large graphic display allow a wide range of comparative tests to be performed between cable pairs or stored traces. The instrument has 15 trace memories, which allows previous test results to be displayed. The included download software allows transfer of the waveform data to a computer, for analysis and storage for future reference.

The instrument can be closely balanced to the cable using the balance control or another cable pair, allowing long lengths of cable to be easily tested. The propagation velocity value can be adjusted to match the cable, thus permitting an accurate distance measurement to be directly read from the instrument. To enable a wide range of faults to be detected, the gain control

is fully adjustable, allowing identification of minor faults along the entire length of the cable. The fault position can be enhanced and accurately measured using the gain control.

Other setting options include changing the distance units between meters and feet, and changing the propagation velocity units between a ratio and meters per microsecond. Display contrast is fully adjustable to compensate for all viewing conditions. A backlight aids viewing in low ambient light conditions.

The CFL535E is powered by 8 LR6 (AA) manganese-alkali, nickel-cadmium or nickel-metal-hydride batteries. The batteries are housed in a carrier on the back of the unit.

APPLICATIONS

The advanced features of this TDR make it ideal for the demanding applications of cable testing.

TELEPHONY

The CFL535E TDR provides fast and accurate results when uncovering transmission related problems. The TDR shows a graphic reproduction of the transmission path, identifying the location of the fault. In addition to fault locating, the CFL535E identifies line activity such as taps or branches, load coils and transformers, capacitor networks, splices, water saturation, and crosstalk.

Field conditions such as moisture, crimps, twists and similar interference can create "clutter" that obscures small faults on the TDR screen. A single input unit identifies the initial disturbance but may not be able to identify accurately small faults beyond that initial disturbance. The CFL535E provides the features required to find these complex faults. These advanced features provide the ability to:

- Compare a good pair to a faulty pair and display the difference between the pairs.
- Eliminate distortion or unwanted reflections, such as those caused by water in the line.
- Locate crosstalk point (i.e., splits and resplits) by transmitting on one pair and receiving on another.
- Store and reproduce traces as required by corporate procedures using the 15 internal memories.

POWER

The CFL535E is an ideal tool for identifying faults on low-voltage power cable. The unit provides low voltage, high frequency pulses making it safe to use at the resident's meter. The unit clearly identifies conditions such as burnouts in aluminum conductors, shorts between phases, various splice conditions, and transformers. The CFL535E TDR also saves your utility lost revenue by accurately identifying illegal power taps.

FEATURES AND BENEFITS

- Dual input and output ports provide comparisons of good pair versus bad pair measurements. Also, by using one port as an input and the other as an output, crosstalk problems are located quickly and easily.
- Extremely lightweight (3.3 lb) for ease of use and operator comfort.
- Real-time differential measurement identifies the difference between a good pair and a bad pair in real time. This is an ideal test for locating intermittent problems in a line.
- Balanced input and output ports provide significant reduction in common mode distortion, an occurrence common with twisted pair cables. Traces are clean and easy-to-read.
- IP54 weatherproof enclosure ensures operation in inclement conditions often encountered in the field.
- 15 internal memory positions store up to 15 traces for future analysis.
- RS-232 interface transfers stored traces to a printer or PC. Software also available.
- Help menu acts as a guide to TDR functions. sample traces for reference.
- Five user selectable output pulse widths for each range enhances fault locating especially on extremely close-in faults.
- Trace averaging allows for improved fault locating on “noisy” cables by averaging a number of samples to reduce the effect of intermittent noise.
- Balance control nulls the initial transmitted pulse to allow the user to see faults close to the instrument.
- Cursor position display shows the relative location of the cursor on the full length of the range.

SPECIFICATIONS

Except where otherwise stated, this specification applies at an ambient temperature of -4° F (20° C).

General

Ranges

150 ft, 300 ft, 600 ft, 1200 ft, 3000 ft, 6000 ft, 12,000 ft, 24,000 ft, and 48,000 ft (50 m, 100 m, 200 m, 400 m, 1 km, 2 km, 4 km, 8 km, and 16 km)

Resolution

4 in. up to 600 ft (0.1 m up to 200 m)
8 in. up to 1200 ft (0.2 m up to 400 m)
0.1% of range over 1200 ft (400 m)

Accuracy

0.1% of all ranges

Gain

0 to 90 dB in steps of 6 dB

Velocity Factor

Variable from 0.300 to 0.999 in steps of 0.001

Output pulse

14 V peak to peak into open circuit

7 V peak to peak into 120 Ω

Pulse width user selectable for each range:

150 ft range: 20 ns, 40 ns, 60 ns, 80 ns, 1000 ns

300 ft range: 20 ns, 50 ns, 80 ns, 100 ns, 140 ns

600 ft range: 20 ns, 60 ns, 100 ns, 140 ns, 200 ns

1200 ft range: 40 ns, 80 ns, 160 ns, 200 ns, 400 ns

3000 ft range: 80 ns, 160 ns, 260 ns, 500 ns, 1 μs

6000 ft range: 160 ns, 260 ns, 500 ns, 1 μs, 2 μs

12,000 ft range: 250 ns, 500 ns, 1 μs, 2 μs, 4 μs

24,000 ft range: 500 ns, 1 μs, 2 μs, 4 μs, 8 μs

48,000 ft range: 1 μs, 2 μs, 4 μs, 8 μs, 16 μs

Modes

Real Time

Line 1; Line 2; Line 1 - Line 2;
Line 1 & Line 2

XTALK Memory

15 memories. M & Line 1; M - Line 1;
M & Line 2; M - Line 2

Output impedance

Balanced 120 Ω

Balance Adjustment

0 to 120 Ω

Power Down

Automatic after 5, 10 or 15 minutes with no key press. User selectable

Display

256 x 128 pixel, high definition, backlit graphics Liquid Crystal Display

Stays on for 1 minute when activated

Power

Six LR6 (AA) type batteries, Manganese-alkali or nickel-cadmium cells

Nominal voltage: 12 V for alkaline or 9.62 V for NiCad.

Low battery warning occurs at 6.5 V

Battery consumption 150 mA nominal 300 mA with back lit LCD. (10/20 hours continuous use depending on backlight dependency)

Safety

Complies with IEC61010

EMC

Complies with Electromagnetic Compatibility Specifications (Light industrial)

BS/EN50081-1-1992

BS/EN50082-1-1992

Mechanical

The instrument is designed for use indoors or outdoors and is rated to IP54.

Case Dimensions

9.8 H x 7.9 W x 4.3 D in.
(250 H x 200 W x 110 D mm)

Weight

3.3 lb (1.5 kg)

Connectors

Two pair of 4 mm safety terminals

9 way D-type connector for serial communication

Lead

6 ft (2 m)

Environmental

Operational Temperature

5° F to 122° F (-15° C to +50° C)

Storage Temperature

-4° F to +158° F (-20° C to +70° C)

Operational Humidity

95% at 104° F (40° C)

ORDERING INFORMATION

Item (Qty)	Cat. No.	Item (Qty)	Cat. No.
Biddle® General Purpose Time Domain Reflectometer	655535E	Optional Accessories:	
Included Accessories:		Mains blocking filter	EV6220-669
Test and carry pouch	EV6420-114	Miniature clip test lead set	EV6231-654
Bed of nails test lead set	EV6231-655		
Carry strap for pouch	EV6220-611		
Instruction manual	EV6172-444		