

# mTDR-070 Advanced Waveform Cable Fault Locator

The mTDR070 is a high-end TDR instrument designed to meet today's most demanding network cabling problems. Advancing beyond the numeric readout, the mTDR070 displays the actual waveform or "signature" of the cable.

Keeping to its traditional ways, the mTDR070 displays the actual waveform or signature of the cable thereby enabling engineers and technicians to pinpoint any impedance reflections along the length of the cable.



## FEATURES

- Purpose designed for CATV, CCTV, Telephone line & Coax Cable
- Locate cable and connector faults in all types of coaxial and twisted pair cable
- Range from 3.2m ~16,000m (10.4ft ~ 50,000ft)
- Resolution: 1cm (variable up to 50m)
- Measurement accuracy: Coax  $\pm 0.01m$  plus  $\pm 0.01\%$  of reading
- Two active cursors with individual control
- Changeable zero point
- 8 selectable pulse widths for different ranges
- Automatic event search
- Waveform storage up to 100
- Useable battery time display
- 320 X 240 back-lit LCD
- 48 propagation memory storage
- Large & clear waveform display of full trace for accurate diagnosis
- Efficient power management
- Zoom for detailed examination
- 2 years warranty

## STANDARD ACCESSORIES

- 2m long Alligator clip
- User's manual
- 12V Nickel Metal Hydride battery pack, 4000mAh
- DC 12~14V / 2A adaptor
- 8m / 75 coaxial cable
- Soft carrying bag
- BNC to BNC connector
- BNC to F connector
- RS 232 serial communication cable
- Shoulder strap
- NanoWave™ installation CD

## APPLICATIONS

- Applicable for any cable consisting of at least two insulated metallic elements
  - Ideal tool for all technicians, linemen, and construction personnel
  - CATV Network Maintenance
  - Telephony Network Maintenance
  - Security System Maintenance
  - Electric Power Distribution Maintenance
- Refer "TDR Application" in industry

# TDR use in industry

## **\_Telecommunications**

Time Domain Reflectometers have been used as standard equipment by all major telecomms carriers and operators for many years.

The major operators in countries such as Germany, France, Italy, Australia, UK and Japan have more than 1000 TDRs each.

Cable installation, fault finding and preventive maintenance on metallic cables, whether twisted pair telecomms, coaxial or LV power distribution, are the primary applications.

## **\_Cable Installation**

Historically, the only test performed when installing a cable was a resistance test to ensure there was not a short or open circuit. If found, the fault-finding department was called in to diagnose and repair the fault. This proved very expensive, so more and more telecomms carriers and operators are buying small, low cost instruments such as the mTDR-010 or mTDR-020, which are very simple to use, and instructing the cable installer to correct faults as he performs his normal installation function. This reduces costs and adds value.

## **\_Cable Fault Finding**

Some cable faults, such as intermittent faults, reverse, splits and resplits, or water ingress, are difficult to pinpoint with simple instruments. These have the ability to evaluate two cable pairs at the same time, i.e. one good pair and one faulty pair, and can display any difference between these pairs. This is especially good for noisy or wet cables where partial faults are difficult to spot on their own.

## **\_CATV**

CATV network systems carry a very precise signal and it is essential that the cable is in first class condition, since faults such as opens and shorts can be detected, as can minor damage to the cable, such as pinching, loose connections and splits.

## **\_Power : Low Voltage Distribution**

TDRs are used extensively on low voltage (LV) systems in the power distribution network. It is common to use them with the NanoWave software of mTDR-070 to build a database that can be used to compare installation traces with today's traces. This is effective with intermittent faults, where the smallest difference can indicate where the main fault lies. Medium to High Voltage : Main Equipment :

A TDR is used in the high voltage (HV) network as a quick and easy method of detecting open and short circuits, and is often one of the first tests used before calling for a high voltage test van or setting up a surge generator. Many high voltage faults can be found very quickly using this method.

## **\_Power Distribution**

The military have, on some of their bases, their own power network linked to security lighting and CCTV networks. TDRs are used to maintain and install these systems. To avoid security problems, the military prefer to use their own people to install and maintain, rather than external companies.

## **\_Signalling Networks**

TSignalling is critical in railway networks with cable running sometimes over many kilometres. Even when fibre optic cable is used, there is normally a metallic cable as back up. The mTDR-070 is ideal for this application, due to its superior long distance capability.

With the NanoWave software, a mTDR-070 can be used to build a record of the life of the cable, and preventive maintenance initiated, rather than responding to a failure which could be catastrophic.

## **\_Cable Manufacturers**

Main Equipment : mTDR-010,020 & mTDR-070

TDRs can be used for inventory management and for checking the length of cables on drums, etc. If faults are found in cables after manufacture, a TDR can be used to quickly locate the fault, as opposed to the more traditional method of halving the length of the faulty cable to locate the section that has the fault. By using a TDR, not only is it quicker to find the fault, but more efficient, as the amount of cable wasted is minimized.

## **\_Stocktaking**

Any company that buys reasonable amounts of cable, or any company that produces cable, needs to know how much they are buying or have on the shelf to sell. The mTDR series of NanoTronix can be used to measure any metallic cable, and due to its low cost, is a cheap method of verifying inventory.

## **\_Railways**

Railway networks have literally thousands of kilometres of cable from low to medium voltage to telecomms and data networks. All types of instruments are used on them depending on the application.

## **\_Shipping**

All ships carry tons of various types of cable, from telecomms to power. At sea, it is imperative that these ships are as self-sufficient

as possible. TDR technology is perfect for the diversity of problems that could arise, as they are small, portable and can measure all types of metallic cables. They are also accurate and easy to understand. A TDR is also ideal for dockyard refits and maintenance departments.

For example, Ships of the UK Royal Navy carry at least two TDRs on every voyage for general maintenance needs.

## **\_Aerials**

The signals from broadcasting companies are transmitted through aerials, and large drops of cable are used, due to the height of these aerials. The cables can get stretched, especially around the joints, giving a poor service. The mTDR-070 is used in this application, due to its high resolution and small pulse widths, and the dBRL function ensures an understanding of the return loss so the quality of the signal can also be measured.

## **\_Aerospace and Aviation**

Every airfield and airport has many kilometres of various cable, from power to telecomms to coaxial. TDRs are essential to the installations and maintenance engineers in ensuring that the systems employed are operational.

## **\_Utility companies**

Water and gas companies' pipelines often have telemetry cables installed with the pipelines, which require maintaining. These tend to be long lengths of cable, and need a TDR with good long distance ability.

## **\_Military Battlefield**

When setting up a field base exercise, cables are run overground as they offer more security than radio transmission, which can be compromised. However, with the large vehicles such as tanks involved, the cables can be damaged and TDRs are used to find the faults. The TDRs can also detect if the cables are being illegally tapped, since this shows as an impedance mismatch. Base Wiring Security Every military base has stand alone communication networks, including wide area datacomms, (WANS). These must be secure; TDRs are commonly used to ensure not only that the system is fault free, but also not illegally tapped.

## **\_Radar station**

Radar Stations use 50 Ohm high quality coaxial cable that must be free from kinks and damage. The mTDR-070 is ideal for this application due to its 5 nanosecond pulse width and dBRL function. Cellular systems used by the military have this same cable on their aerials.

## **\_Petrochemicals**

Main Equipment : mTDR-070

While not intrinsically safe, TDRs are still very useful in petrochemical plants which have sophisticated telecomms and data cable through to low to medium voltage power cables. Due to the problems of external engineers gaining access to the plant, maintenance departments often have their own TDRs and, on the most critical lines, they build a database using NanoWave software for comparison tests and maintenance.

## **\_Industrial Plant**

Main Equipment : mTDR-010,020 & mTDR-070

All large industrial plants, e.g. shipyards, steelworks, power generation plants, have extensive networks for power, data and telecomms. The maintenance teams responsible for the networks use various TDRs for faultfinding and preventive maintenance.

## **\_Preventive Maintenance**

On critical cable networks such as in banks, hospitals, police, etc., individual cable traces can be stored in the memory of mTDR-070. These can be transferred to the PC and taken back to the display where comparisons can be made, live trace against memory; thereby plotting deterioration of the cable and allowing for repairs to be made before a failure occurs.

## **\_Mining**

Due to the intrinsically safe regulations, most countries do not allow TDRs down mines. However, as the mine deepens, shafts are dug from the surface and umbilical cables are dropped down. These carry telecommunications signals and power for the tools. Owing to the distances involved, these cables, especially the telecomms, become stretched and are likely to fail. TDRs are used to check the condition of these cables.

## **\_Studio Broadcasting**

Cameras in a studio have a trailing group of cables, which are dragged around the floor as the camera moves. This puts a strain on both the cable and the joints. This is bad, as quality of the signal is very important. TDRs are used to detect not only faults but also the deterioration of the cable, to aid preventive maintenance.

## **\_Outside Broadcasting**

Outside broadcast, (OB), vehicles carry an enormous amount of cables, from power cables to coaxial to telecomms, depending on the situation, e.g. sporting events can use ten or more different camera locations. On large sites, such as race tracks and golf courses, many drums of cable will be linked together to reach some of the cameras. Due to the temporary nature of the installation, cables frequently get damaged - camera cables in particular, usually Triax construction, are very vulnerable. TDRs are extensively used to quickly find the faults, as they can work on all different types of cable without re-calibration.

## SPECIFICATIONS

### PERFORMANCE

<b>Measurement range</b>	3.2 ~ 16,000m (10.4 ~ 50,000 ft)
<b>Minimum display resolution</b>	1cm(variable up to 50m)
<b>Accuracy</b>	Coax $\pm 0.01\text{m} \pm 0.01\%$ of reading
<b>Test Mode</b>	L1,M, L1&M
<b>Pulse width</b>	5,15,45,100,200,500,1,000, 2,000 ns

### INTERFACE

<b>User interface</b>	320x240 pixel back-lit LCD
<b>Maximum storage capacity</b>	100 waveforms
<b>Internal Memory</b>	256Kbyte(maximum waveforms storage capacity is up to 100)
<b>Communication port</b>	RS-232 compatible (1 start bit, 8 data bits, 1 stop bit and no parity & 38400 baud rate)
<b>Output impedance</b>	Automatic output impedance control of 25,50,75,100,125 & 150 $\Omega$
<b>Input bandwidth</b>	300MHz
<b>Effective sampling rate</b>	Effective sampling rate 10GS/s
<b>Gain</b>	0 to 66dB or better, 32 steps ,maximum sensitivity 1mV (full scale)
<b>Screen update rate</b>	Maximum 3 times per second
<b>PVF</b>	Variable from 0.300 to 0.999 in steps of 0.001 V : 90 to 300m/us V/2 : 45 to 150m/us

### OPERATING POWER

<b>Battery</b>	12V Nickel-Metal Hydride Battery(4000 mAh)
<b>Adaptor</b>	DC 12V~14V / 2A Adaptor
<b>Connector</b>	BNC Female
<b>Operating time</b>	6 hours
<b>Recharge time</b>	4 hours

### ENVIRONMENT

<b>Operating temperature</b>	-15 ( +5 ) ~ +55 ( 131 )
<b>Storage Temperature</b>	-20 ( -4 ) ~ +70 ( 158 )
<b>Humidity</b>	< 95%

### DIMENSIONS

<b>W x H x D</b>	247mm (9.7") x 267mm (10.5") x 127mm (5")
<b>Weight</b>	3.3kg (7.2pounds)