

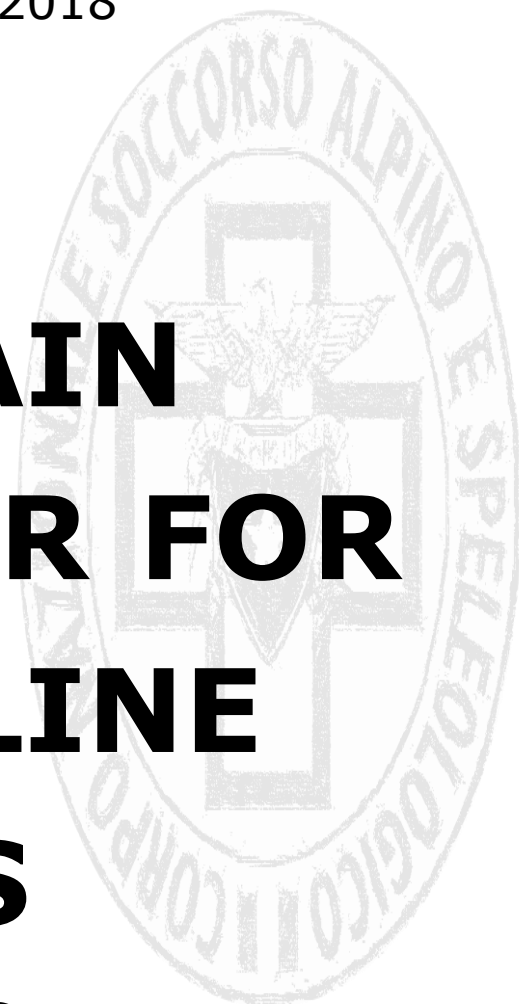
EUROPEAN CAVE RESCUE MEETING 2018

CASOLA, ITALIA, 2-4 NOVEMBER 2018

TDR TIME-DOMAIN REFLECTOMETER FOR TELEPHONE LINE ANALYSIS

CORPO NAZIONALE SOCCORSO ALPINO E SPELEOLOGICO

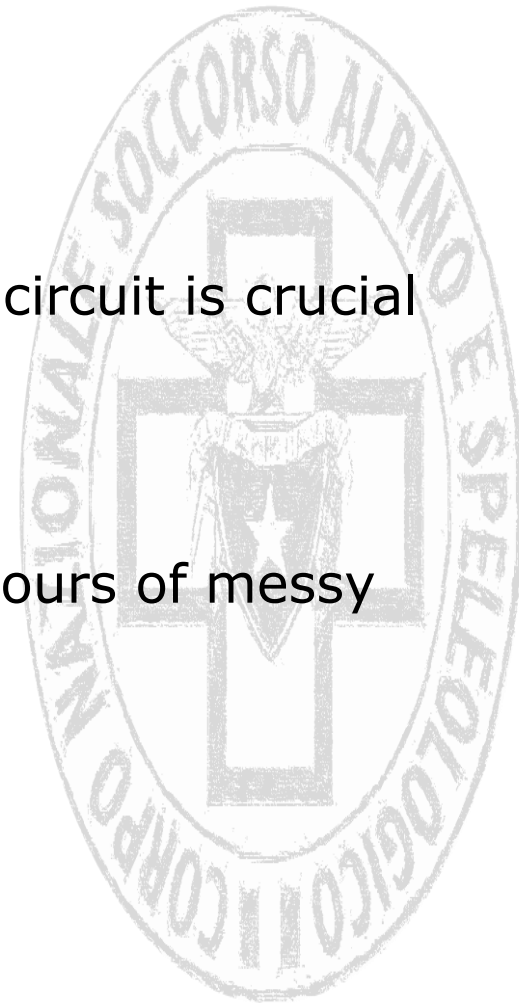
COMMISSIONE TECNICA SPELEOLOGICA



SUBJECT

Detect telephone line break or shorts circuit is crucial during cave rescue operation.

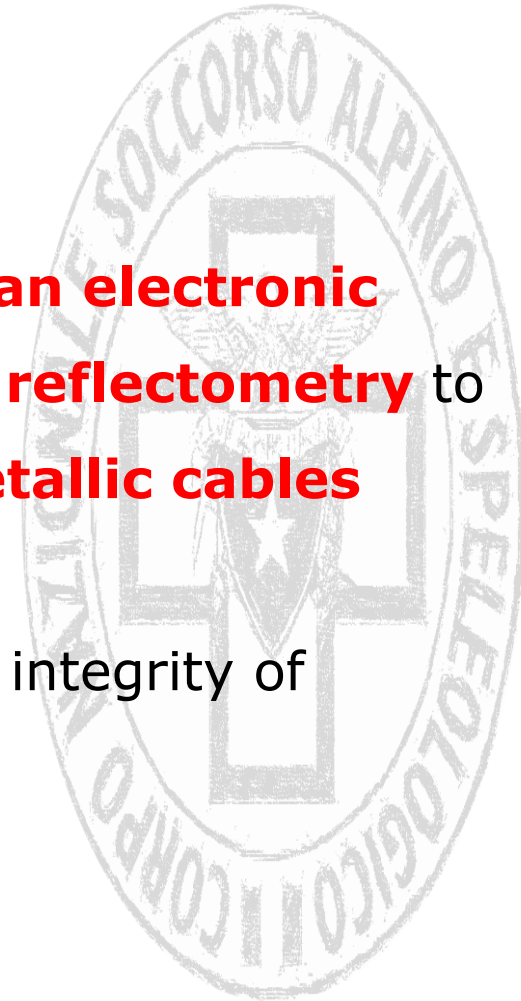
With TDR we can do that and save hours of messy troubleshooting



TDR

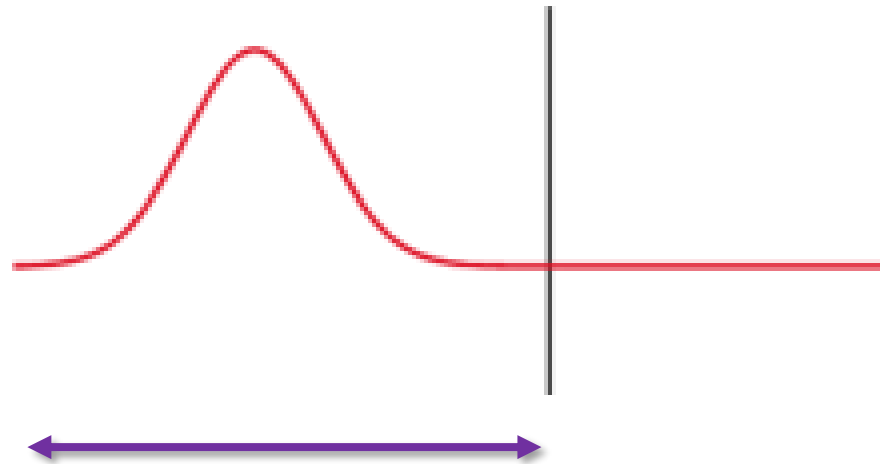
Time-domain reflectometer (**TDR**) is **an electronic instrument** that uses **time-domain reflectometry** to characterize and **locate faults in metallic cables**

Well known techniques used to check integrity of telecommunication lines



WORKING PRINCIPLE OF TDR

Propagation of an electrical impulse into the telephone line and **measurements of impulse reflection** due to discontinuity/break in the line



Time = Distance of discontinuity/break

PLUS OF TDR

TDR are ready to be used:

-) Commercial instruments ranging from 500 to 1300 €.
-) Small dimensions
-) Rather easy to use (fast learning curve)



TDR USED FOR TEST

Powered with
6 AA batteries
(1.5 Volt)

Charge life:
12 hrs.



TEST PERFORMED

Test in the "lab"

TDR + 750 m cable (250 m x 3)

Simulating:

-) open line
-) short circuit
-) line + telephone calling
-) line + working ERMES system connected



Repeated the same **test in the cave** with approximately 500 m of telephone line

RESULTS

Screen shot for

open line

Using cursor we
can find the point
where the line is
open (348 m)

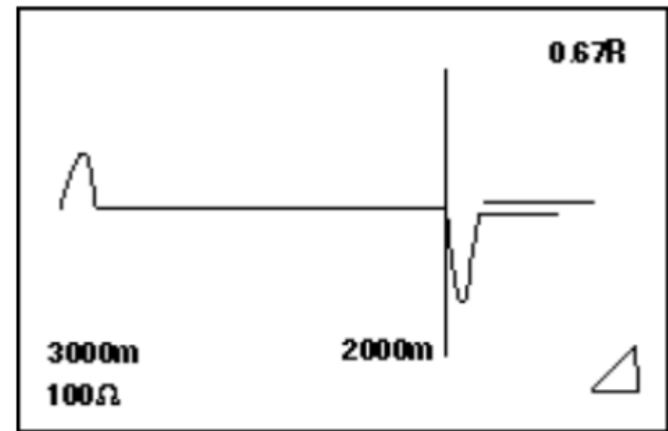


RESULTS

From the **shape of the line** you can tell **where** is the and **what is the problem!**



Open Line



Short Line

RESULTS

LINE + TELEPHONE

LINE + ERMES

Telephone call introduce noise and the line shape is “dirty” but still useful to detect break/short

TDR can interfere with Ermes and stop data transfer

But remember: TDR has to be used only when you have a problem, it is not a h24 monitoring system

CONCLUSION

TDR is a good and simple system to detect short or break in the telephone line used in cave rescue operations

TDR performed well in our test also in the cave

TDR can significantly reduce the time needed to find the cause of **communication blackout**

