Radiodetection®

RD 400 precision

Buried pipe and cable precision locator

- The pipe and cable locator with three location modes, two signal frequencies and very high sensitivity combined with directionality
- with peak and null responses for precision pinpointing
- that pinpoints in congested areas and excludes interference
- with push button depth readout
- the easy to use locator with the weatherproof and shock resistant housing
- the RD400 is a rugged, versatile and supremely useful location tool for daily site use in all weathers.

RD 400 precision locato

The locator comprises a handheld receiver and a signal transmitter. The transmitter applies its signal to a buried metal pipe or cable which is then located and traced with the RD400 receiver. The receiver also has two more detection modes used without the transmitter, for locating signals occurring 'naturally' on buried conductors.

Three location functions

■ *Tracing and identification.* Applying the transmitter signal to a target line enables the line to be traced. The highly sensitive RD400 receiver traces longer distances than heavier and more powerful instruments. A well insulated line can often be traced for several km/miles.

■ *Quick and simple locating sweep.* In the RD400 receiver's Power mode a simple sweep detects 50/60Hz electric energy to locate buried power cables and other nearby lines. Switch to the Radio mode to detect main telecom cables as they reradiate VLF radio energy.

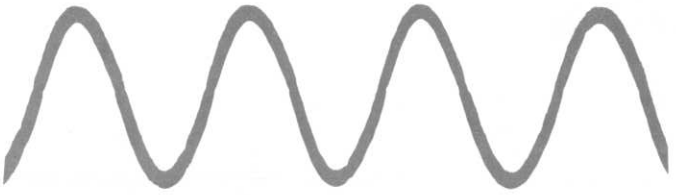
After locating and tracing a target line to the point where you have to dig, a quick RD400 sweep in the P and R modes locates the nearby cables you need to avoid.

■ *Thorough locating search.* Inducing with the transmitter and sweeping with the receiver makes a thorough search for all buried lines in an area.

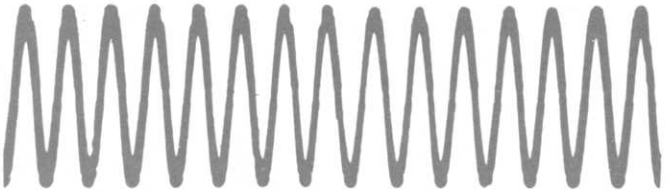
Two signal frequencies

The transmitter applies either an 8kHz or a 33kHz signal to a target line and the receiver can be switched to locate either of these signals. This choice between a low or a medium frequency signal gives the user the choice of a long distance signal with minimum coupling to nearby lines or a signal that can be easily induced onto buried lines: the most suitable frequency can be selected to trace each type of line.

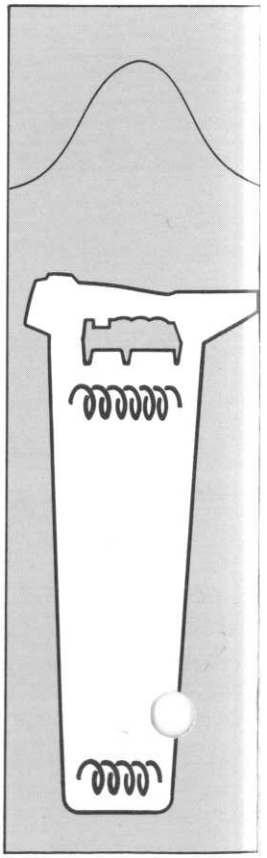
8kHz signal

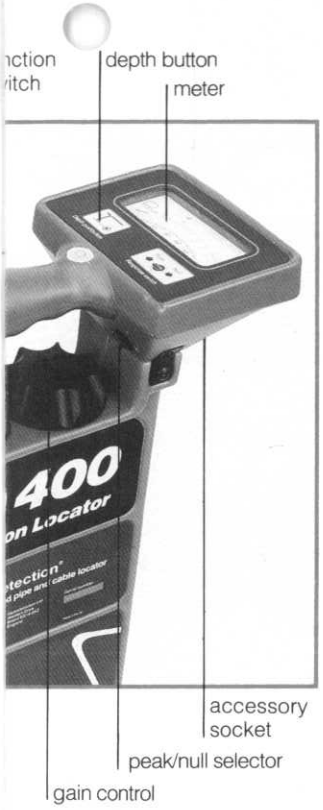


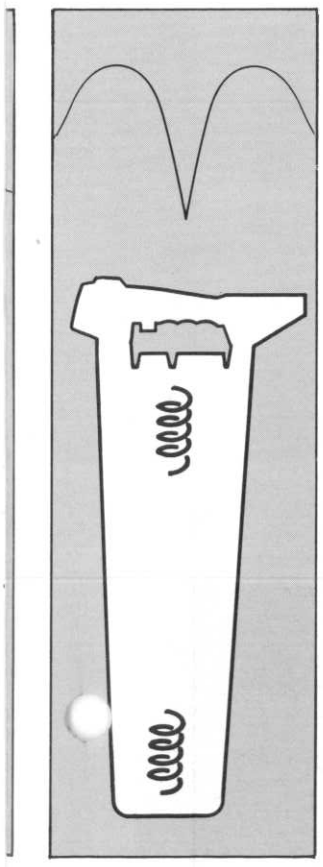
33kHz signal

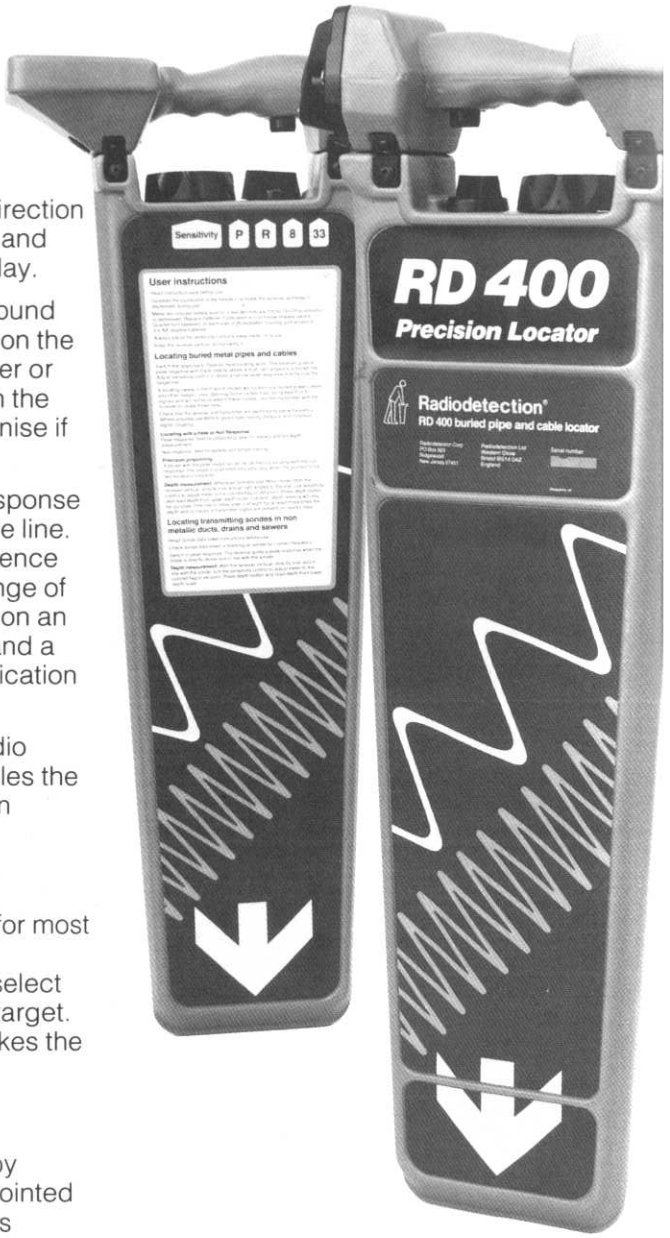


peak response









Full information and control for the user

Display is by a large meter, rather than by LCD direction symbols. The meter displays trends more clearly and provides more information than a solid state display.

A loudspeaker is standard on the receiver. The sound complements and identifies the response shown on the meter. The actual signal on the line, whether Power or Radio or from the transmitter, is amplified through the loudspeaker so the user can identify it and recognise if interference is present.

Gain control. The user has full control over the response of both meter and loudspeaker to the signal on the line. The gain can be adjusted to lose external interference and to make full use of the dynamic sensitivity range of the instrument. If the transmitter signal is present on an adjacent line the user can make measurements and a comparison to ensure positive tracing and identification of the target line.

Full information from the receiver's visual and audio response plus control of the sensitivity level enables the RD400 to sort out line location and identification in congested tight corners.

Peak and null responses

The twin horizontal aerials give a peak response for most locating work that includes search, sweep and pinpointing. A switch below the meter is used to select the vertical aerials to give a null response over a target. The null response speeds up line tracing and makes the locator more versatile.

Precision pinpointing

A locate with the peak response can be verified by locating with the null response. The target is pinpointed very precisely when the position of the two locates corresponds. This confirmation of position also confirms that there is a suitable magnetic field from the target for making an accurate depth measurement.

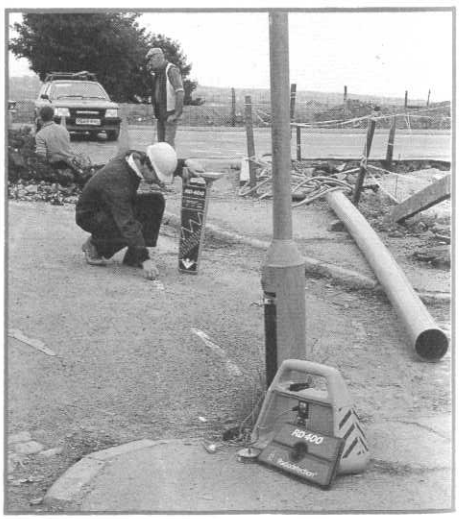
Push button depth measurement

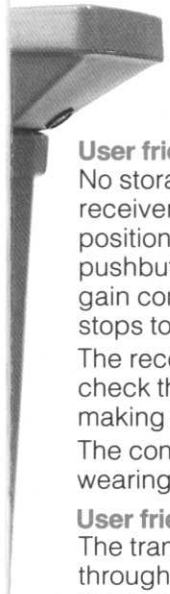
Once the RD400 receiver has pinpointed a line, set the meter and press the facia depth button to read the depth in metres or feet. Accurate to 5% of depth down to 3m/ 10ft in good conditions .

Twin aerial antenna

Signals are intercepted by two aerials, one at the bottom of the receiver and the other near the top. Electronic circuity processes the signals from the twin aerials to reduce interference and give the antenna a very directional response that enables the RD400 to be used in high interference areas where conventional locators are ineffective.

The twin aerial antenna gives a sharper and more narrow response over a line than a conventional locator.





User friendly receiver

No storage box to open, no need to fit headphones. The receiver is used in a comfortable standing or walking position. A shaped handle incorporates an on/off pushbutton that cannot be left on when not in use. The gain control and function switch incorporate mechanical stops to prevent overwinding.

The receiver incorporates a bubble level to help the user check the instrument is vertical when pinpointing or making a depth measurement.

The controls are designed for ease of use, even when wearing winter work gloves.

User friendly transmitter

The transmitter applies its signal to a line by induction through up to 2m/6ft of cover or by direct connection. In the connection mode the transmitter indicates when the signal has been successfully applied to a line by a sharp change in loudspeaker tone.

A simple snap action fastener opens the generous sized storage compartment which houses standard connection equipment that includes the connection lead (1), the spooled 10m/yard ground return lead (2) and the ground stake (3) for making a ground connection to establish a strong, easily identified signal on the line.

The shape of the transmitter is squat and stable to prevent it being blown over and the end stripes make it highly visible to passers by.

National standards

RD400 Transmitter conforms to FCC norm CFR47, part 15, sub part D.

RD400 Receiver conforms to the recommendations for instrument sensitivity of NJUG8-8/85 "Performance guide for the assessment of metallic pipe and cable locators."

NATO product code: 5895-14-4197943

User instructions

A fully illustrated step by step instruction book (7) gives comprehensive information both for a first time user and for the expert sorting out complex identification problems. Panels on the receiver and transmitter have a reminder of basic procedure.

Rugged long life location tools

Despite being a high performance locator the RD400 is built as a tool and not as an instrument. It is made for use on construction sites and in the street. The rugged enclosures and design ensure a long working life of daily use.

Sealed polyethylene housing, weatherproof double lip seals on external controls, battery compartments separated from internal circuitry all make for reliable daily site use in all weathers and climates.

RD400 carry bag

Heavy duty, padded nylon bag for carrying and storing the receiver, transmitter and accessories is available as an accessory.

RD400 optional accessories

A wide range of accessories is available for extending the instrument's locating, tracing and line identification capability.

Other accessories are available to extend the scope of the RD400 to locate non-metallic sewers and ducts and for monitoring No-Dig tools and instruments.

Instructions for applying the more common accessories are included in the RD400 instruction book. More specialized accessories, instructions for their use and ordering information are detailed in separate data sheets.

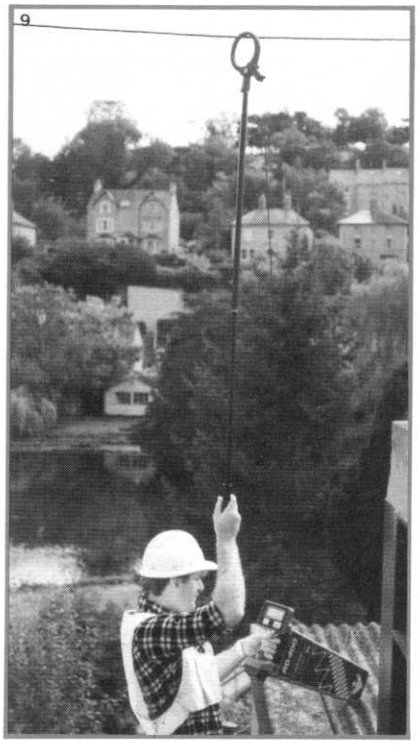
Headphones Two types are available: heavily padded 'winter' headphones or ultra light weight 'summer' headphones.

Telephone connection clip The transmitter connection lead is fitted with a special small clip that incorporates angled jaws, needle cluster and penetrating spike.

Signal clamp (4) applies a very selective transmitter signal to pipes or to live or dead cables with diameters up to 10cm/4ins.

Extension rod (5) 70cm/28in long enables the signal clamp, the clamp antenna or the small stethoscope to be applied to an overhead line or to a cable in a deep vault. Up to three extension rods can be joined together.

Plug connector (6) applies the transmitter signal to the wiring system in a building, to the supply line and the distribution cable in the street through a live domestic power socket. Most effective plugged to a 3-pin socket, it is also available with a 2-pin plug. The plug connector incorporates circuitry to protect the user and the transmitter from voltages up to 250V.

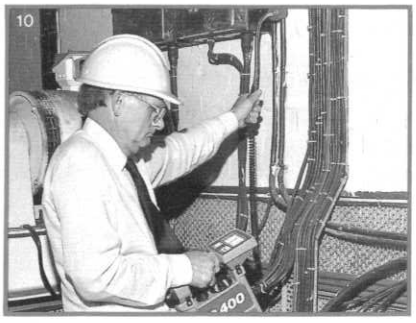


Live cable connector (8) Similar to the plug connector but specially insulated clips are suitable for connecting directly to conductors of low voltage live cables, For use only by qualified personnel. See data sheet 110.

Clamp antenna (9) is a 10cm/4in clamp that plugs into the receiver for identifying cables in exposed situations.

Stethoscope antenna (10) is an antenna with a concave head fitted to a goose neck that plugs into the receiver for identifying cables in racks or attached to walls.

Small stethoscope antenna has a small 25mm/1in concave head and can be fitted to the extension rods to identify overhead lines.

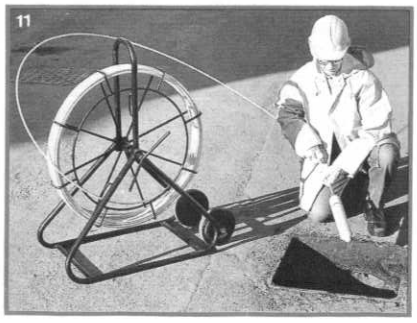


Fault Finder is a classic A frame to pinpoint damage or breaks in a buried cable sheath. The Fault Finder is a complete self contained unit for cable tracing and for locating sheath faults up to 1.5 MOhms. The transmitter needs an additional mode for use with the Fault Finder; specify the RD400FFL transmitter which is suitable for use with both the RD400 locator and Fault Finder. See data sheet 220.

RD400 LLTS Long Line Tracing System
An increasing number of buried pipes and cables have long distances between access points. The transmitter is permanently installed at an access point such as a light guide cable regeneration station and applies its signal along the length of the line to the next access point. A special low frequency receiver, the RD400 LLTS Precision LineTrace detects the signal to pinpoint and trace the line. See data sheet 210.

Transmitting sondes are small self contained waterproof transmitters that enable the RD400 to locate and trace non metallic ducts and sewers (11). Sondes are propelled along the drain or duct attached to rods, to a high pressure water jet or with the Radiodetection FlexRod (data sheet 70). An extensive range of sondes is available and is fully detailed in data sheet 80. The smallest is only 13mm/0.5in diameter and the largest can be located at depths down to 15m/50ft.

In addition to locating sewers and ducts, sondes can be used to extend the usefulness of the RD400 receiver to monitor horizontal boring tools and other No-Dig tools, (data sheets 130 and 180) to pinpoint iron gas pipe joints (data sheet 170) and to locate water leaks from plastic pipes (data sheet 060).



Receiver

Detection system
Switch selectable
- Radiodetection patented twin horizontal coil system for directionality and interference rejection.
- Vertical coil array for null response and rapid, convenient tracing.
- Input socket for receiver accessories. Coil systems are disabled automatically when an accessory is connected.

Instrument response
Peak response when blade is vertically above conductor and at 90° to it and Null response when blade is pointing at conductor.

Output devices

Analog moving coil meter
85mm/3½in scale
1% resolution
Linear response to signal strength

Loudspeaker
Threshold inhibits speaker for signals less than 15% of meter full scale.

Output sound derived directly from detected signal - alien signals can be audibly identified.

3.5mm stereo jack for headphones; disables loudspeaker.

Controls

On/off trigger
Spring return switch ensures unit is never left on inadvertently.

Sensitivity control
Rotary control permits infinitely variable adjustment.

Depth switch
Momentary push-button for performing depth measurement.

Function switch
Selects P, R, 8, 33.

Peak/Null selector

Modes and performance

Mode	Frequency	Sensitivity†
Power	50Hz to 6kHz	10mA at 50/60Hz
Radio	15kHz to 30 kHz	60μA
8kHz	8192Hz	30μA
33kHz	32768Hz	3.5μA

† minimum current on conductor at depth 1m to yield 15% meter deflection, signal to noise ratio better than 6dB.

Dynamic range
80dB

Accuracy
Peak mode
Plan location 5% of depth.

Depth measurement ±5% of depth (8kHz or 33kHz signal on a single, straight conductor).

Twin parallel conductors carrying equal signals can be found with accuracy better than 10% of depth when their separation is greater than 1.5 times their depth.

Null mode
Resolution: 1% of depth
Accuracy: 2% of depth, if signal is interference free.

Tracing depth
Quoted sensitivities above are for 1m/40" depth. In P, 8 and 33 modes, sensitivities at other depths are changed by the following factors.

0.2m/8"	0.14
0.5m/20"	0.4
1.0m/40"	1.0
2.0m/79"	2.5
5.0m/197"	8.2

Depth measurement
Meter scale calibration

Metres: 0.1 to 3m 'Line'
0.5 to 8m 'Sonde'

Feet: 6" to 10' 'Line'
2' to 26' 'Sonde'

Vertical guide
Omni-directional spirit bubble enables vertical positioning to within ½ degree of arc.

Batteries
8 x 1.5V AA, alkaline (IEC LR6)

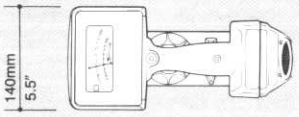
Typical drain: 40 mA

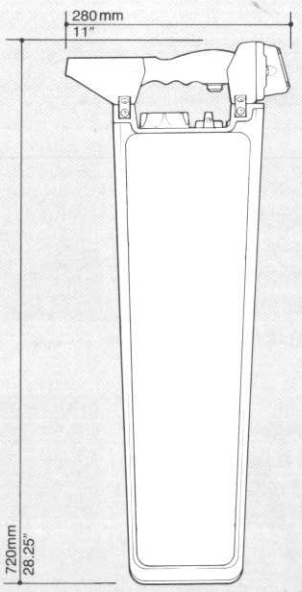
Life: 40 hours intermittent use at 20°C, 68°F.

Battery test: Activated momentarily every time main on/off switch is activated. Battery status indicated on meter scale.

Unit is protected against inadvertent polarity reversal.

Weight
Net 2.9kg (6½lb) with batteries.





Transmitter

Signal
Continuous sine wave, changes to pulse to warn of low battery.

Controls
4 position function switch:
- Off
- Battery test
- 8 kHz, selects 8192 Hz output
- 33 kHz, selects 32768 Hz output

Modes
- 'Induction'
- 'Connection', automatically selected when lead or any accessory is plugged in.

Loudspeaker
Sounds to warn that the unit is energized. Variable pitch to indicate quality of signal connection.

Connection mode

Open circuit voltage V	10
Short circuit current mA	25
Max power mW	100
Optimum load ohms	350

Will deliver at least 1mA into any load impedance not exceeding 10,000 Ohms.

Output current in mA is approximately equal to 10,000/(350 + Z) where Z is the impedance of the connection in Ohms.

Loudspeaker continuity indication
Variable frequency tone. Output current of 0.1mA causes noticeable change.

Induction mode
Apparent power

8 kHz	8 VAR
33 kHz	4 VAR

Output protection
Output circuitry is protected against inadvertent connection to conductors at up to 250 V at 50/60 Hz.

Batteries
8 x 1.5V AA Alakline (IEC LR6)

Typical drain: 50 mA

Life: 30 hours intermittent use at 20°C, 68°F

Battery warning: Pulsed speaker tone and output signal (in any mode) indicates low battery.

Battery test: Checks battery under maximum load conditions.

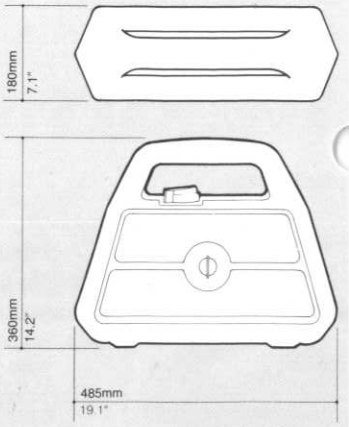
Unit is protected against polarity reversal.

Standard equipment
Storage compartment opens with a single quarter-turn fastener and contains: 200cm/80" lead with clip for line connection.

10m/11yd lead on spool with clip for ground connection.
Ground stake.

Weight
Net 3.5kg (7.7lb) with batteries.

We are continually developing our products and the design of Radiodetection equipment is subject to change without notice.



RD400 construction

Housings
Housings are grey impact-proof polyethylene mouldings reinforced for mechanical rigidity. All access points are sealed against water ingress and control shafts have a double-lip rubber seal. Aerials are plastic encapsulated and circuit boards are conformal coated. Plastic cone loudspeakers are weatherproof with protective stainless steel mesh cover.

Circuitry
Integral wiring harness links controls and coils to the two main circuit boards via proprietary plugs and sockets. Circuitry can be calibrated without dismantling. All sub-assemblies can be replaced using only a cross head screwdriver and the fine-nose pliers.

Batteries
Two quarter turn fasteners allow easy access to the battery compartments. The compartments are isolated so that corroded batteries cannot harm the circuitry.

Instructions
An illustrated user handbook is supplied.

Temperature range
– 20°C to 50°C
– 4° to 122°F

Packing information
The receiver and transmitter are packed in the same box. Gross weight 10kg (22lbs)
Carton 78 x 41 x 37cm (31 x 16 x 14in)

Ordering information

RD400 locator, receiver and transmitter	
depth scale in metres	10/RD41PN
depth scale in feet	10/RD41FTPN
Signal clamp	10/RD4CLAMPD
Extension rod	10/EXT
Plug connector 3 core	10/RD4PLC3
2 core	10/RD4PLC2
Summer headphones	10/RD40119S
Winter headphones	10/RD40119W
Carry bag for transmitter and receiver	10/RD4BAG
Telephone connection clip	10/RD4TEL
Live cable connector	10/RD4LCC
Clamp antenna	10/RD40124
Stethoscope antenna	10/RD40123
Small stethoscope antenna	10/RD40310

subtronic ltd.

Head Office:
Subtronic Ltd.,
Butlers Leap,
Rugby,
Warwickshire CV21 3RQ
Tel: Rugby (0788) 70241/2
Telex: 312242 MID TLX G
Fax: (0788) 536606

Scotland
Subtronic Ltd.,
Unit 1,
Coatbridge Business Centre,
Main Street,
Coatbridge ML5 3RB
Tel: 0236 31588

Electronic Location and Mapping of Underground Services.
Water Leak Detection.
Land Surveys.
Attribute Data-Base Compilation for Utilities.

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