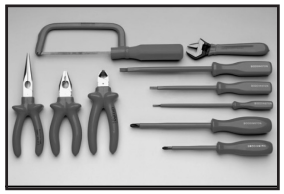
Electrical Safety Engineers

Fibreglass Ladders

Electrical Safety Gloves

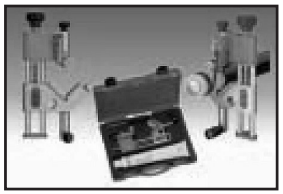


Fully Insulated Tools

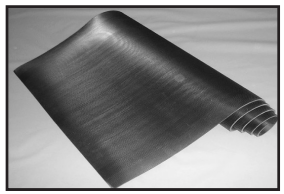
Bodtect Overhead Line Shrouding

Dielectric Safety Boots

Safety Rescue Hook



Cable Preparation Tools



Switchboard Rubber Matting

Contact Boddingtons Electrical now for any electrical safety problem.
You'll be talking to professionals!

BODDINGTONS ELECTRICAL LIMITED

INSTRUCTION MANUAL

BODCAT 33

(Buried Service Locator 33kHz)

BODCAT XD 33

(Buried Service Depth Locator 33kHz)

33kHz
Signal
Generator

BODDINGTONS ELECTRICAL LIMITED

Unit 10, Chelmsford Road Industrial Estate, Great Dunmow, Essex CM6 1HD, U.K.
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BODCAT locate services radiating a detected field. there may be some services that do not radiate and are not located.

Do not use the equipment outside of the temperature range -10³C to +50³C as the batteries may cease to function adequately.

The Cable Avoidance Tool will only locate conductive services. Plastic pipes or fibre-optic cables without tracer wires will not be located.

Geographical conditions such as hill and mountains can effectively screen radio signals and prevent a detectable ground current.

The Cable Avoidance Tool alone will not always locate every conductor so always use the Signal Generator.

The Signal Generator leads must not be connected directly to a live service.

Ensure your equipment is fully operational before going on site.

Beware of multiple services. The Cable Avoidance Tool will not always indicate close services, either side by side or one above the other.

Do not use the equipment in areas where hazardous gases may be present.

Check for underground services before using the ground stake.

Always Excavate With Care.

CE This equipment conforms to the EMC Directive 89/336/EED.

Manual Pt. No. Q999 Issue 01/04/RB

Servicing

It is strongly recommended that the BODCAT and Signal Generator Systems are serviced at least once a year by an Authorised Service Centre to ensure performance to specification. Contact your supplier for information. The date the next service is due is marked on the equipment.

What To Do If Your Equipment Develops A Fault

Before returning equipment suspected of being faulty, please check the machine carefully with a fresh set of batteries. Check the battery connections and rotate the batteries in the holder. Refer to the section on functional checks and if possible substitute known good equipment as a confirmation.

If the problem persists then contact the company from whom you purchased the equipment, OR contact Boddingtons Electrical Limited stating the date and place of purchase and indicating briefly the nature of the fault. Advice on the best course of action can then be given.

Routine servicing and re-calibration of your equipment is available from Boddingtons Electrical Limited and Authorised Service Centres. Please apply for details of our service plans.

BODCAT - 33 and BODCAT XD - 33 Specification

Controls
1. On/Off control on handle, activated when in use.
2. 3 position function select switch:
   P - Power mode for detecting live, imbalanced cables.
   R - Radio mode for detecting re-radiated radio signals.
   G - Generator mode for detecting conductors carrying the signal transmitted by the Signal Generator.
3. Sensitivity Control.
4. Depth Switch (XD Model).

Visual Indicator
High accuracy, easy to read meter with no moving parts. Shock resistant mounted behind 2mm polycarbonate panel for maximum protection.
The display gives an indication of the following:
5. Signal Strength
6. Mode
7. Battery Condition
   8 - 13 V dc
8. Depth (XD Model)

Audio Indicator
Built in waterproof loudspeaker

Depth of Detection
Conductors detected to the following typical depths:
P - 3m, R - 2m, G - 3m

Sensitivity at 1m
P - 7mA rms, R - 12µA rms,
G - 2µA rms

Frequency
The frequency and filter characteristics are chosen to yield the optimum signal to noise ratio with a high degree of accuracy.
P - 50 to 500Hz, R - 15 to 20kHz
G - 33kHz +/- 1%

Response Width
5% of depth

Location Accuracy
10% of depth

Depth Measurement (XD Model only)
G mode only, activated by the push button.
Range: 0.5 - 3.0 (line)
1.0 - 3.5m (sonde)
Accuracy better than +/- 5% of depth @ 1m

Voltage Range

Batteries
Type: 8xAA Alkaline (IEC type LR6)
Life: 40 hours intermittent use @ 20°C

Weight
2.9kg (including batteries)

Signal Generator Specification

Controls
1. On/Off and output level control
2. Continuous /Pulsed output

Typical Tracing Range
Induced mode: 200m
Direct Connected mode: 350m

Frequency
33kHz +/- 1% all models, continuous

Audio Indication
Pulsed audio tone indicating unit is operating.
Audio pitch changes to indicate good connection.
Audio and output signals change to show exhausted batteries.

Output Power
300mW (max)

Voltage Range 4 - 6.5 V dc

Batteries
Type: 4xD Alkaline (IEC type LR20)
Poor battery condition is transmitted to the Cable Avoidance Tool.

Weight
3.5kg (including batteries)

Please note the performance figures can be affected by site conditions such as soil type, moisture, temperature and unusually strong electromagnetic fields.

Construction
Both units are robustly constructed with the main bodies being made from high impact plastic. they are environmentally protected to a high standard, (IP65) and have all weather capabilities. the batteries are easily replaced.

A full range of accessories are available including signal clamps and sondes. we reserve the right to alter specifications without notice.

Introduction

Congratulations on your purchase of BODCAT from Boddingtons Electrical Limited, electrical safety engineers.

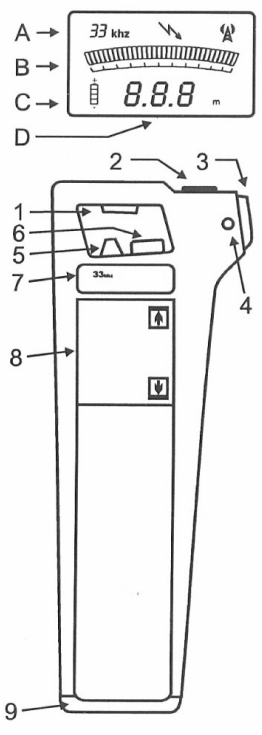
All BODCAT Tools are manufactured to exacting specifications and to an ISO 9001 approved quality system, and are designed to withstand the harshest of environmental conditions. Our commitment to Total Customer Satisfaction and over 30 years of experience designing and manufacturing locator products mean you can depend upon the quality of this Boddingtons Electrical Limited equipment.

The advantage of BODCAT over traditional cable avoidance tools are:

- Digital display
- Continuous display of mode operation
- Continuous display of frequency of operation when used with a signal generator - more and more important in today's congested frequency bands
- Continuous display of battery condition
- Superior audio quality allows true representation of the signal which is usually better than a digital reproduction
- Superior battery storage within the Cable Avoidance Tool
- Spare battery storage within the Cable Avoidance Tool
- Retractable loudspeaker that you can replace if it gets damaged. The novel design allows you to do this without affecting the water sealing.
- Wear foot that you can easily replace

The BODCAT Cable Avoidance Tool

Display



1. On-Off Switch

2. Visual Display
   - A Mode Selected
     - Power
     - Radio
     - 33kHz Generator showing frequency
   - B Signal Strength Bar Display
   - C Battery Condition
     - OK
     - Replace
   - D Depth Display XD Model

3. Removable Loudspeaker

4. Loudspeaker Release Button

5. Mode Switch
   Power - detects 50/60Hz fields
   Radio - detects the re-radiated radio fields
   Generator - detects the signal applied with the generator

6. Sensitivity Control
   Use fully clockwise. Rotate anti clockwise to reduce the response

7. Label
   Showing frequency of operation and the date of next service

8. Battery Compartment
   Open by pushing the clips apart

9. Replaceable Wear Foot

Handling

The BODCAT 33, BODCAT XD 33 and Signal Generator are rugged instruments designed for the rigours of every day use on a construction site. To ensure that the specified accuracy is maintained it is essential to treat the instruments with care by avoiding shocks, vibration and excesses of temperature.

The construction of the BODCAT and Signal Generator incorporate weather proof seals, however, they are not guaranteed to prevent water ingress if the units are immersed in water, or if the units are operated without the covers provided.

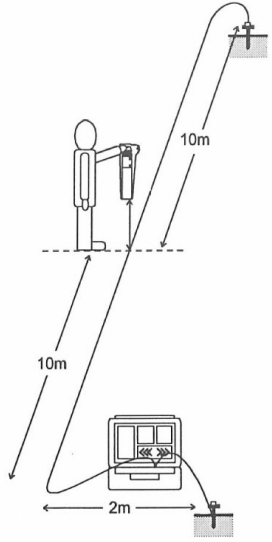
Care is required as the Signal Generator hinged lid can damage the connection leads if they become trapped.

Cleaning
To prolong operational life it is recommended that equipment is cleaned regularly with a sponge dampened with warm water. A mild soap may be used if required. The use of solvents or detergents should be avoided.

Do not allow moisture in the battery compartments or near the connectors.

Storage
The equipment should be stored in a clean, dry place. The temperature should not exceed the range -10°C to +50°C. If stored for long periods the batteries should be removed.

Functional Check of Depth Measurement (BODCAT XD 33 Only)



An area free of services, metal structures etc. should be chosen (beware of reinforced car parks). A search with the BODCAT in all 3 modes will help confirm the absence of other services. An insulated cable or wire 20m+ (not supplied) is laid out on the ground surface and the far end connected to a ground stake and earthed. The near end is connected to the Connected Mode lead (red).

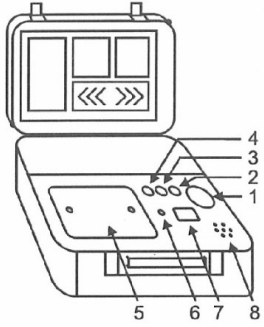
The standard Ground Lead (black) should be laid out at right angles to the 20m wire and earthed at the far end with a ground stake. the plug should be inserted in the correct connector on the Signal Generator.

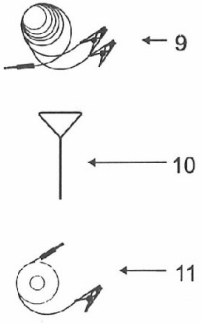
The Signal Generator is tuned on and the output level adjusted so that a low tone is heard. The BODCAT should then be held vertically above and at a known height above the longer wire, approximately mid-way along it, i.e. 10m from the Signal Generator.

The depth can then be measured. It is best to make a few readings at different depths (Beware - metal step ladders affect the accuracy!).

The BODCAT Signal Generator or Transmitter

Transmission Frequency 33kHz





Works with Standard and Depth (XD) Models.

1. On-Off Switch and Output Level Control
2. Loud/Mute Switch
3. Pulsed/Continuous Switch
   pulsed
   continuous
4. Connection Socket
   For directly connecting signal to service
5. Battery compartment
6. Earth Socket
   For connecting to ground stake
7. Service Due Label
8. Loud Speaker
   Indicates good batteries and good connection
9. Connection Lead with clips and magnet
10. Ground Stake with easy to retract handle
11. Long Earth Lead

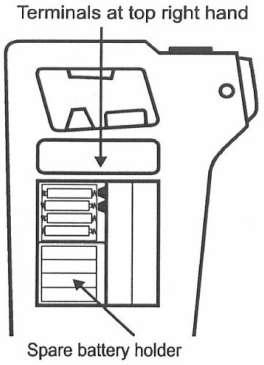
Batteries

Do not change batteries in confined spaces where gas may be present.

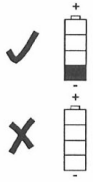
Only alkaline batteries are recommended.

Do not leave discharged batteries in the equipment.

Dispose of batteries in accordance with local regulations and guidelines.



The BODCAT 33 and XD 33 use 8AA cells (IEC LR6) 1.5V batteries.



Battery Check (Display)

At least one segment of the battery symbol should be filled in for good batteries.

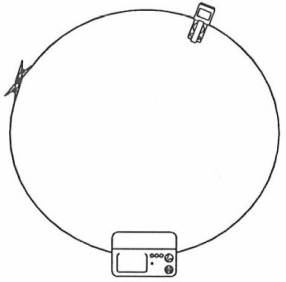
Exhausted batteries do not fill in any of the segments in the battery symbol.

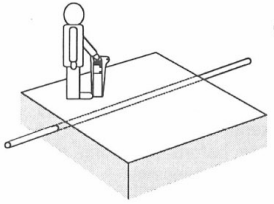
Signal Generator Transmitter Check

A) Battery Condition
Select Continuous. Good batteries will be shown by a loud clear audio tone. Bad batteries give a double pulse tone.

B) Induced Mode
This can only be checked in conjunction with a BODCAT as above. If the unit does not meet the results required, repeat the test with another BODCAT to determine whether the Signal Generator is suspect.

C) Connection Mode
Set the minimum output level, insert the connection lead and the long earth lead to the long earth lead to create a short circuit. The pitch should change to a low tone. The leads should be arranged to create an open loop on the ground of approximately 1m diameter and with the BODCAT switched on (in G Mode) as signal is received by pointing the BODCAT closely at the cable. Do not set the Signal Generator to maximum as this will result in excessive current drain.

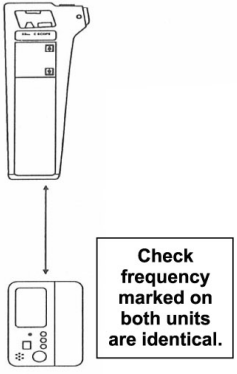




than one fluorescent light before achieving success).

C) Radio Mode

Select Radio Mode. Set the Sensitivity fully clockwise and, from a distance of less than 0.25m, point the unit at a metal conductor of length greater than 100m (for example a pipe or cable). A warbling tone, similar to that obtained from a re-tuned medium wave radio receiver, should be heard. The display should read greater than 50% full scale. With the unit still on, the Sensitivity should be reduced and the display reading should reduce (Note: this test may need to be carried out in more than one location to gain a positive signal).



Check frequency marked on both units are identical.

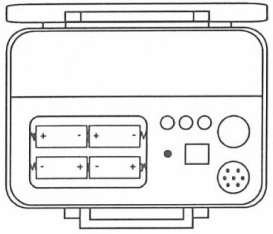
D) Generator Mode

Locate an outdoor test area that is free from extraneous fields resulting from overhead and underground cables. the area should also not be near fences, steel framed buildings, or on reinforced concrete as the signal will be reduced. Place the Signal Generator on the ground in the normal orientation and switch on - a tone should be heard. Select Continuous.

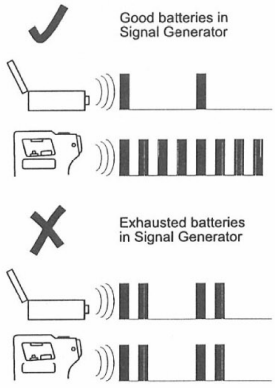
With the BODCAT in the orientation shown, and Sensitivity rotated fully clockwise, the results indicated should be obtained.

Distance	Mode	Audio Tone
6 metres	Generator	Present - full scale reading
12 metres	Generator	Less than at 6 metres
6 metres	Radio	Present
6 metres	Power	None

The Boddingtons Electrical Signal Generator



The Signal Generator uses 4 D cells, (IEC LR20) 1.5V batteries. Open the battery compartment with a coin by rotating the screw fasteners 90 degrees anticlockwise. Insert the batteries as shown in the compartment ensuring correct orientation. Each battery should be rolled when in position to ensure good contact.



Battery Check (Pulsed Output)

Good batteries will give regular slow audio pulses (2 single pulses per second), exhausted batteries will give double pulses (2 double pulses per second) from the Signal Generator loud speaker.

The BODCAT loudspeaker will detect the Signal Generator battery condition and gives rapid single audio pulses with good Signal Generator batteries and slower double pulses with exhausted batteries.

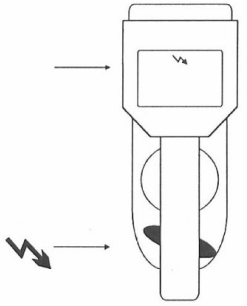
WARNING! Cable Avoidance Tools locate services radiating a detectable field. There may be some services that do not radiate and can not be located. **Always excavate with care.**

Using The BODCAT
To Locate A Buried Service

IT IS GOOD PRACTICE TO REGULARLY CHECK THE BATTERY CONDITION DURING USE

Power Mode

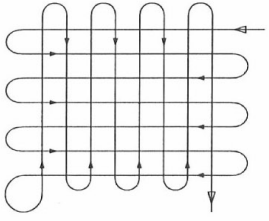
The Power (P) Mode of the BODCAT detect the electromagnetic field radiated from a live, loaded and imbalanced power cable.



N.B.
In the event that all three phase currents are equally balanced, there will in theory be no radiating field. Low voltage (415V) supplies will nearly always be imbalanced. The cable will then be radiating an easily detectable field. High voltage cables however, could be well balanced and it is therefore advisable to use the Radio mode (see page 9) before commencing digging.

Tip: Strong Power Mode fields will often induce onto other services so that an iron pipe can give a signal in Power Mode.

Searching



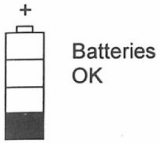
Select P and turn the Sensitivity control fully clockwise and then depress the On/Off switch. Check for the audio battery check to ensure the batteries are in good condition.

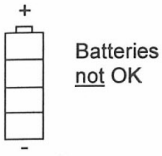
Sweep the area in a grid pattern as show in the diagram until a signal is detected. Keep the C.Scope Cable Avoidance Tool vertical at all times. Do not swing in an arc as this may result in misleading signals.

Functional Check

It is recommended that the operation of theBODCAT and Signal Generator is checked before use. Ensure that the batteries are fitted and that the contacts are secure. If the unit fails any of the criteria below, recheck in a new location before assuming service or repair is necessary.

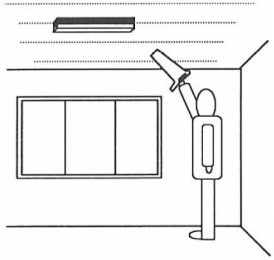
BODCAT Tool Check





A) **Battery Condition**
Check by depressing the on/off switch beneath the handle. The display will show one solid segment if the batteries are ok.

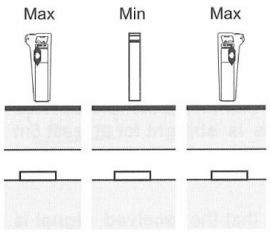
When not in use, batteries can partially recover their state of charge sufficiently to deceive the user. Always check when in use. The on/off switch must be held in for this check.

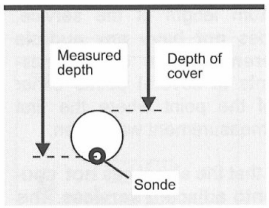


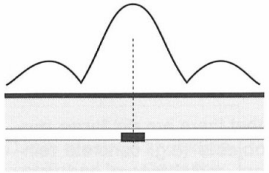
B) **Power Mode**
Select Power Mode. Set Sensitivity fully clockwise and point the body of the BODCAT at a fluorescent light from a distance of 1m. Switch the light on. A loud tone should be heard and the display should read greater than 50% full scale. (Note: it may be necessary to try this test on more

Depth Reading Using a Sonde

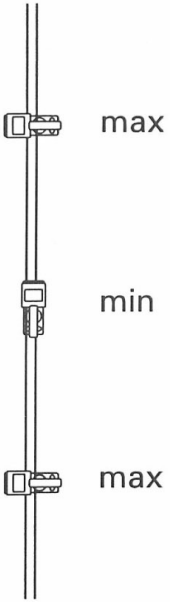
The depth reading with a sonde is achieved in much the same way as for a service, but it is necessary to push the Depth Pulse Button twice, and hold on the second push to select SONDE Mode. "SONDE" will then flash on the display. This Mode will be selected until the Depth Push Button is released.







- Ensure the sonde used emits a continuous (non pulsed)signal. (Check with the BODCAT).
- Remember the maximum signal is when the BODCAT body is in line with the direction of the probe body. Measure depth at the maximum signal point.
- The sonde may lie on the bottom of a much larger diameter service and depth will be measured to the sonde not the centre of the service.
- The sonde emits a peak signal with a side lobe on each side. Care must be taken with the sensitivity setting to ensure that the main central peak is not confused with the side bands.



Pinpointing

Rotate the BODCATl about its vertical axis until the maximum signal is indicated on the display, adjust the Sensitivity control as required to obtain a good indication.

Rotate the BODCAT until you get the maximum signal in the display. The route of the cable below will be at right angles to the position of the BODCAT when the most powerful signal is received.

Sweep the BODCAT across the cable, keeping the base of the blade level with the ground, progressively reducing the sensitivity until a narrow band of response can be heard from the speaker and a clear peak signal is seen on the display as the cable is crossed.

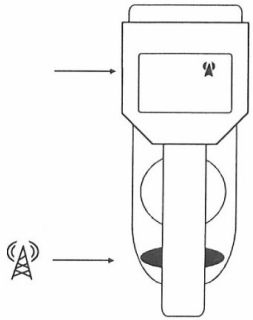
Tracing

Move along the probable length of the cable and again pinpoint its position using the minimum amount of sensitivity required to obtain a narrow response directly above the cable. Mark this position and again move further along. In this way the whole path of the cable can be traced.

CAUTION

A cable must be live and **carrying a current** to be detectable in Power Mode. If there is insufficient imbalanced current on the cable, it will not be detectable in Power Mode. Refer to Radio and Generator Mode.

Radio Mode



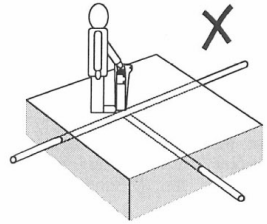
In Radio Mode the BODCAT detects re-radiated long wave radio signals.

Distant radio transmissions cause signals to flow through the ground. these signals will tend to follow the line of least resistance and therefore flow along any conductive path, such as a metallic pipe or cable that offers a lower resistance than the ground. When this happens, a field is generated which can be detected in Radio Mode.

Select R, then the procedure for detecting in Radio mode is the same as Power Mode, although signals tend to be less predictable and tend to favour some conductors, such as buried pipes and telecommunication cables, more than others.

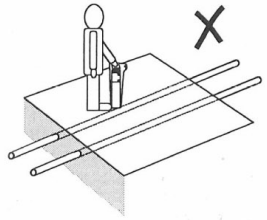
IT IS GOOD PRACTICE TO LOCATE A SERVICE IN RADIO MODE THAT HAS ALREADY BEEN LOCATED IN POWER MODE.

Depth Accuracy Checks



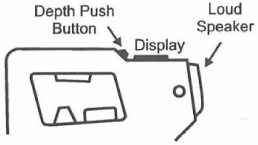
The depth measurement will be within specification if site conditions are good.

- Do not make depth measurements near bends or T's in a service. For better accuracy you should be at least 5m away from a bend or T.
- Check that **the route the service follows is straight** for at least 5m either side of the measurement point.
- Check that the **received signal** is **reasonably strong and constant** over 10m length of the service, and does **not have any audible interference.** Make depth measurements at several points either side of the point where the first depth measurement was taken.



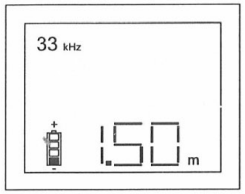
- Check that the signal has **not coupled onto adjacent services**. This is the most common cause of inaccurate depth measurements. If sufficient signal has "cross coupled" then serious errors can be introduced.

- Check that there are **no large metallic objects** (e.g. concrete reinforcement, metal fences and vehicles) near to the BODCAT as distortions to the field gradient used in depth measurement may result in errors of up to 50%.



The service must first be accurately pinpointed using the BODCAT in G Mode, ensuring the BODCAT is over the service and at right angles to it. Adjust the Sensitivity control (if necessary) so that the display reading is on the scale. Rest the BODCAT foot on the ground with the body vertical.

Press and hold down the Depth button. After a second, the depth will be shown digitally in metres.



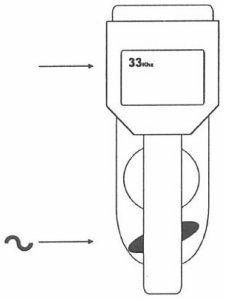
Great care must be taken when using an induced signal for depth measurement. there is a high probability of the BODCAT receiving a direct airborne signal or one from nearby services. This will cause significant errors particularly when close to the Signal Generator. However, as the distance between the BODCAT and the Signal Generator increases, then the signal becomes weaker causing other errors. **The best methods for applying the signal are by direct connection or by close coupling with a Clamp accessory**.

If the display shows these error codes take appropriate action.

000	Service too shallow (raise the Cable Avoidance Tool)
888	Service too deep.
L0	Generator signal too low.
0L	Overload - Generator signal too high

TIP:
Depth reading should be confirmed by raising the Cable Avoidance Tool by 0.5m above the ground and carrying out the depth measurement again.

Generator Mode

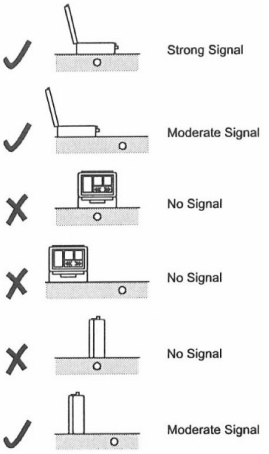


In Generator (G) Mode the BODCAT detects the field radiated from a service carrying the signal generated by the Signal Generator or Sonde.

The BODCAT and the Signal Generator (or Sonde) must the same frequency. Check the labels of both for '33kHz' for example.

Locating Using Induced Signal

The positioning of the Signal Generator is very important when inducing a signal. Some positions and orientations will produce very good signals and others none. This is true of all generators.

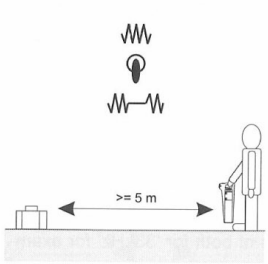


Study the diagrams to ensure that these are known.

Induced Mode cannot be used to reliably induce a signal onto a service below reinforced concrete.

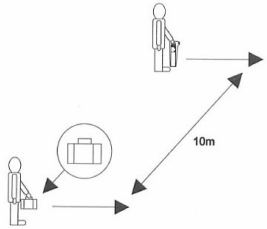
The advantages of using Induction Mode are it is quick and simple to use and a signal can be applied to a service without having to make any physical connection to it. The disadvantages are that the risk of the cross-coupling to adjacent lines is high and part of the signal strength is lost in the surrounding soil.

Unknown Service Location



Place the Generator at a convenient point on the area to be searched. Select Pulsed Output and turn on at maximum. Ensure no connector is in the Connection Socket. Take the BODCAT at least five metres away, select G mode and switch on. Adjust the Sensitivity so that the display shows a reading of 30% of full scale (adjust the Sensitivity to maximum if this cannot be achieved).

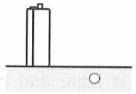
Scan the area keeping at least 5m from the Generator whilst looking for a signal peak. If a peak signal cannot be found, move the Generator about 5m from its first position and try again. Continue this procedure, moving the Generator in 5m steps, following a grid pattern, until a signal peak can be found.



Once a conductor has been located, conventional techniques can be used to find its route. Never assume the conductor is straight and has no spurs.

If two operators are available then the BODCAT and the Generator are moved together as shown.

Induction Near the Generator or Transmitter



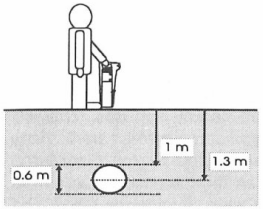
If the BODCAT is brought closer than 5m to the transmitter then the BODCAT will pick up the airborne signal and misleading results will be achieved. If it is essential to do so then use the generator on its back side as shown and not over the service.

Depth Measurement (BODCAT XD 33 Only)

It is not possible to accurately measure depths in either Power or Radio Modes.

Direct depth measurement to a service is achievable down to depths of 3m, however, to achieve the specified accuracy the service **MUST** *be* energised with a good quality Generator signal.

It is important to remember that the depth measurement indicated on the display is to the MIDDLE of the service, not the distance the service is from the surface. This is critical when the depths of large diameter services are being considered.



In the situation shown in the diagram, the display would indicate a depth of 1.3m, however the distance between the surface and the service, the depth of cover, is only 1.0m This difference. 0.3m in this case, would increase in size with larger diameter services.

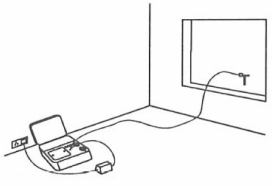
Procedure

Switch the Signal Generator to continuous output. A good quality signal must first be applied to the service using the Signal Generator, i.e. a pure signal tone with no noticeable interference or background noise which would exist on a weak signal. This can be overcome in most circumstances by increasing the Signal Generator output level or by repositioning either the Signal Generator when inducing a signal or the earth point if applying a connected signal.

TIP:
When making depth measurements the Signal Generator is usually best set to maximum

Connected Signal Using an Induction Clamp

The clamp plugs into the Connected mode socket on the Signal Generator, the audio tone will drop in pitch to indicate it is correctly inserted.



For a current to flow in the service it must be earthed at each end. If the service is a buried pipe there is usually sufficient conduction through the ground if the clamp is placed within the exposed section, but if connected to an open ended section such as a standpipe, then the end of the pipe should be connected to an earth stake as shown in the diagram.

The jaws of the clamp must be clean and closed for it to function efficiently. The range may be severely impaired otherwise.

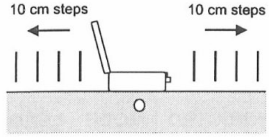
Connected Signal Using a Mains Signal Injector

A very selective signal will be applied between the live and earth connections using this method, and it is the most reliable way to locate a power distribution cable in the street.

The Injector plugs into the Connected mode socket on the Signal Generator and also to a live socket in the premises. The audio tone from the speaker will drop in pitch to indicate a success- ful connection has been made.

Note: On two wire Protective Multiple Earth (PME) systems, where there is no domestic earth connection, it may be necessary for a qualified electrician to make a remote earth connection to a suitable point in the premises, such as the cold water supply, to enable a current to flow. Local regulations must be adhered to.

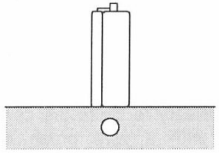
Warningl Do not use the Mains. Signal Injector on systems with voltages in excess of 260V AC. Domestic systems will normally be below this. If in doubt consult a qualified electrician and the electricity supply company prior to use.



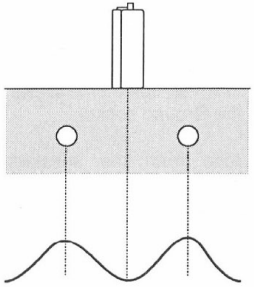
To check for multiple services

Move the Signal Generator, in steps of 10cm from the service and re-scan the area. If the peak signal remains the same width, the conductor should be considered as deep. If there are two or more shallow conductors present, their peak signals will be observed.

It is important to check for the presence of adjacent conductors running close, or parallel to the conductor you have located.



Move the Signal Generator directly over the conductor you originally located (with the Signal Generator upright as shown) so that you are no longer inducing a strong signal on to the conductor. Re-scan the area looking for another peak close to where the original peak was found. this operation should be repeated until you are satisfied that no further conductors can be located.



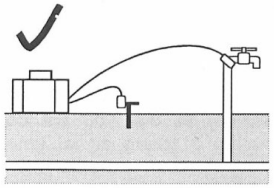
A second method is to place the Signal Generator between two conductors where it will induce a signal of similar strength, but opposite phase onto each conductor. In this case the BODCAT will indicate a clear peak reading for each conductor with a null (very little reading, or none at all) in between.

Connected Signal

This is the most efficient way of applying the Signal Generator signal to a service and should be used wherever possible.

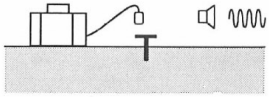
THE CONNECTED MODE LEAD MUST NEVER BE CONNECTED DIRECTLY TO A LIVE SERVICE UNLESS THE SIGNAL IS INJECTED, UTILISING THE LIVE CABLE SIGNAL INJECTOR.

Switch the Signal Generator on and listen for the pulsed tone from the loud- speaker. Plug the connected mode lead into the Connected Mode socket and connect the crocodile clip to the service, ensuring the connection is as good as possible.

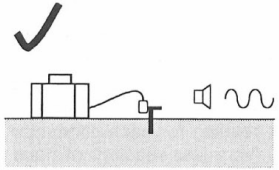


It may be necessary to clean the connection point with a wire brush or sandpaper.

Clip the Ground cable to an independent ground point using the ground stake if required. This should be at least 5 paces from the service and at right angles to the probable route it follows. Conned the other end of the earth lead to the Ground socket.

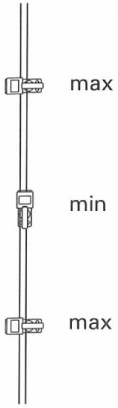


You will know when you have made a good connection to earth because the tone of the signal audible from the speaker will drop to a lower pitch.

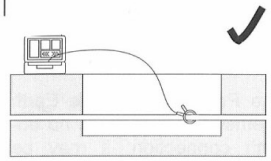


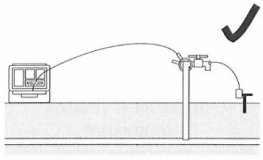
The signal level is adjusted by using the rotary control. Note, if the level is unnecessarily high this will cause excessive battery drain.

Tip: Do not connect the Ground cable to an adjacent service or metal fence that would carry the Signal Generator signal and give a second reading.



Note: This diagram does not apply when using a sonde





Locating Detectable Warning Tape
An earth connection (B) at the remote end of a length of detectable tape will provide a better signal along the tape. the 33kHz signal if injected at (A).

Take the BODCAT and select G Mode. Choose a position about 10 paces away from the connection point, adjust the Sensitivity control to maximum, or until the meter reads about 30% of full scale. Now sweep the area looking for a response just as in Power Mode.

The connected mode lead must never be connected to a live cable unless you use the live cable signal injector.

Using the BODCAT and Signal Generator to locate detectable underground Warning Tape

Many buried services are not made of metal - for example plastic pipelines, plastic water lines and concrete sewage lines. Some metallic pipelines have plastic padding between each bell joint, thus inhibiting the flow of an injected signal.

In order to detect underground warning tape, a direct connection from the Signal Generator must be made to the metallic part of the detectable tape. The tracer wire or aluminium foil in the detectable tape will of necessity be of small cross section and the best results will always be obtained if it is possible to earth the detectable warning tape about 100m from the point where the signal is injected. this will encourage the 33kHz signal to flow the whole length of the tape rather than be dissipated along the length of the route.