AEGIS

INSTRUCTION MANUAL

for

TraceAll

Fuse & Circuit Breaker Identifier
Power Cable Tracer
Cable & Pipe Locator
Cable Pair Identification Set

CZ01829-DRW01-05

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Congratulations on your purchase of an Aegis TraceAll

We are sure you will be satisfied with its performance and reliability. Please read these instructions carefully before using your TraceAll and refer to them from time to time to ensure you are always familiar with its operation.

If you require further information on any Aegis instruments, please contact us by way of phone, fax or e-mail.

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Safety Warning

This instrument is to be used as an aid only in locating hidden cables or pipes. Good safety practices should always be observed.
Contact with live circuits can result in injury or death.
Use of this test instrument must be conducted by a competent and appropriately trained person.

Care must be taken at all times to ensure personal safety.

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1. SAFETY WARNINGS

Mains Tracer
The mains tracer function of the TraceAll is primarily designed to trace a cable from a known point, or to correctly identify the fuse a circuit is fed from.
While every attempt has been made to ensure that all mains cables will be detected when the device is correctly used in accordance with the instructions in this manual, it is not possible to guarantee this in every circumstance.
The TraceAll is not a substitute for good working practices when dealing with mains voltages and risk of electric shock will still exist.
Only trained personnel should undertake mains and telecommunications cable work.

Cable and Pipe Locator
Before connection of the TraceAll to any cable, both ends of the cable should be disconnected from any attached equipment.
In the case of high voltage or power cables, suitably qualified personnel must be used to perform the disconnection, and to ensure that any charge build-up on the cable is removed to render it safe to work on.
Only trained personnel should undertake telecommunications cable work.

Pair Identifier
When working with telephony cables, always ensure the pair is vacant or that a working service is idle before connecting the oscillator to the line.
The pair identifier is not designed for operation with 240 VAC mains power.
Only trained personnel should undertake telecommunications cable work.

Wherever this symbol is observed please refer to the following notes:

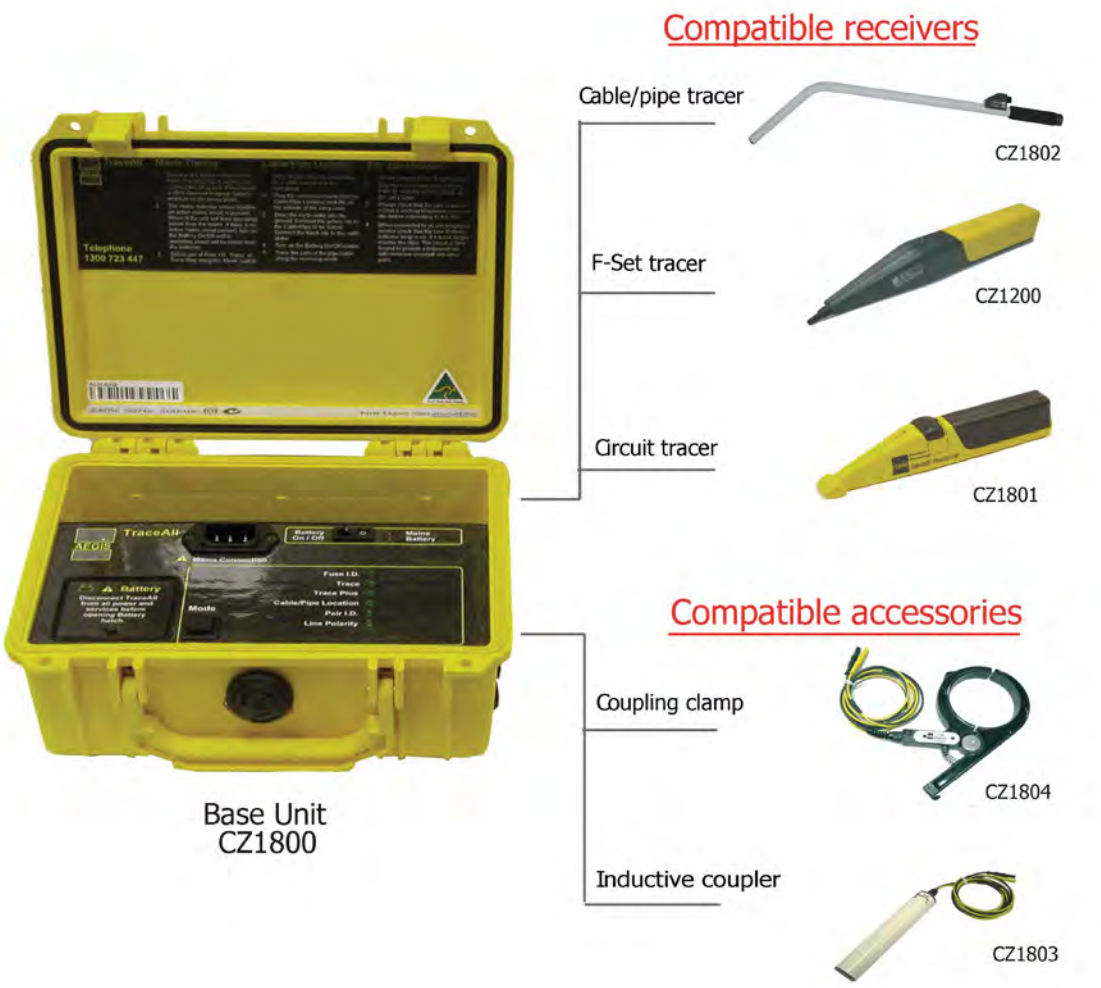
- When making any connection with the TraceAll to a data network or telephone cable, be aware that hazardous voltages may exist. Disconnect the TraceAll from all power and output connections before opening battery hatch.
- Ensure the Mains Connection socket is kept free of any foreign matter.
- The TraceAll is a double insulated instrument. The earth pin in the “Mains Connection socket” is used for signal purposes only.
- Close the lid and secure latches when using the TraceAll outside, i.e. Cable/Pipe Location and Pair I.D..
- When using outdoors the unit must only be operated using battery power.
- Do not allow any liquid to enter the unit. If any liquid enters the unit it must be returned to the manufacturer for repair. Liquid may breach internal insulation barriers and result in a safety hazard.
- If the TraceAll is used in a manner that is not specified by the manufacturer the protection provided by the equipment may be impaired.

2. INTENDED USE

The TraceAll can be configured to connect to both active and inactive networks via direct or inductive connection for your chosen application

- Applications:
  - Mains circuit tracing
  - Fuse identification
  - Cable/Pipe location – above ground and underground
  - Pair identification

The TraceAll is a modular tracing system with various options. Components may be added depending upon your requirements.



3. SYSTEM COMPONENTS

3.1. BASE UNIT

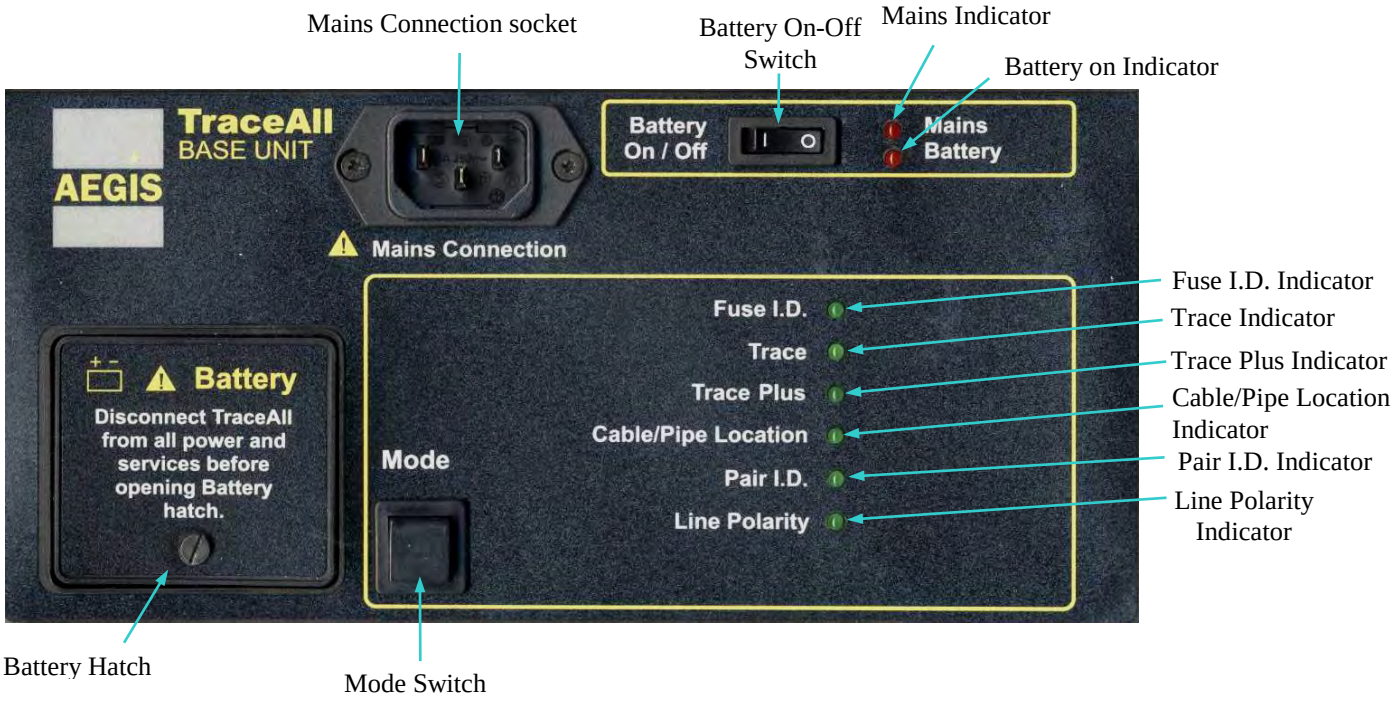


Fig. 3.1-1 Base Unit Control Panel

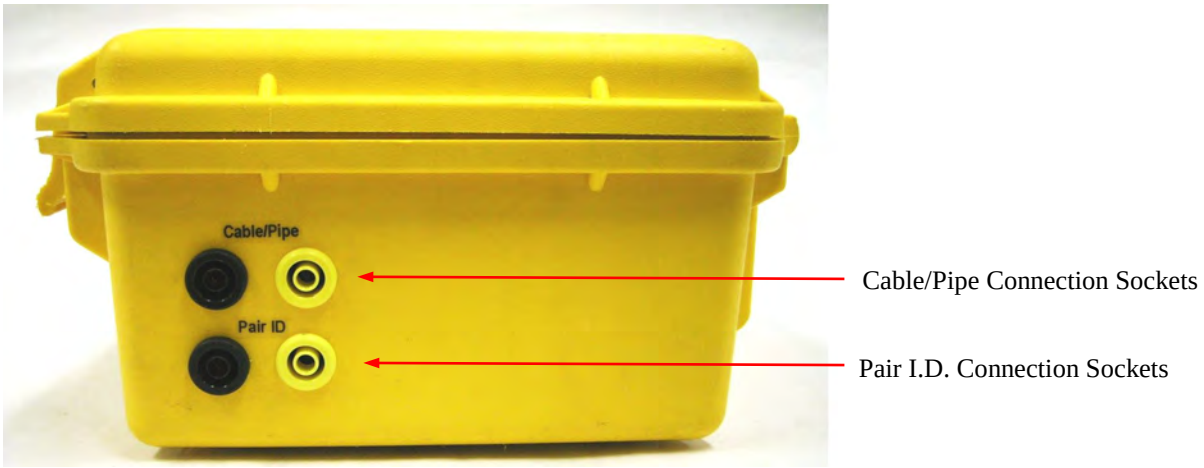


Fig. 3.1-2 Base Unit Side View

3.1.1. Connections

There are three connection sockets available: the Mains Connection socket located on the Control Panel, the Cable/Pipe connection sockets located externally on the side of the unit, and the Pair I.D. connection sockets located externally on the side of the unit.

Mains Connection Socket
This socket is used to connect the unit to a mains circuit General Power Outlet (GPO) via the supplied Mains Connection Lead. This is a dual purpose connection – it provides mains power to power the unit and provides the signal output path for mains tracing functions.

Cable/Pipe Connection Socket
This socket performs two functions – it connects the unit to the cable/pipe location lead set and accessories and switches the cable/pipe function on.

Pair I.D. Connection Socket
This socket performs two functions – it connects the unit to the Pair I.D. lead set and switches the Pair I.D. function on.

3.1.2. Controls

There are two controls on the unit: the Battery On/Off switch located on the Control Panel and the Mode switch located on the Control Panel.

Battery On/Off Switch
This switch is used to select battery powered operation when mains power is not available and for external use.

Mode Switch
This switch is used to cycle through the three mains tracing modes: Fuse I.D., Trace, and TracePlus. Each time the button is pressed the unit cycles to the next mode. This switch does not activate the Cable/Pipe mode or the Pair I.D. mode. These are activated by the corresponding socket connections.

3.1.3. Indicators

There are 9 indicators on the unit: 1 audible buzzer, 2 red coloured LEDs, and 6 green coloured LEDs. All of the LEDs are located on the Control Panel.

Mains indicator - red
The Mains indicator is illuminated when an active mains circuit is present. When it is on, the transmitter is able to draw operating power from the mains.

Battery indicator - red
The Battery indicator is illuminated when the unit is able to draw power from the internal batteries.

Fuse I.D. indicator - green
The Fuse I.D. indicator is illuminated when the unit is set to Fuse I.D. mode. If this indicator flashes it is due to a low battery condition and the batteries should be replaced.

Trace indicator - green
The Trace indicator is illuminated when the unit is set to Trace mode. If this indicator flashes it is due to a low battery condition and the batteries should be replaced.

TracePlus indicator - green
The TracePlus indicator is illuminated when the unit is set to TracePlus mode. If this indicator flashes it is due to a low battery condition and the batteries should be replaced.

Cable/Pipe Location indicator - green
The Cable/Pipe Location indicator is illuminated when the unit is set to Cable/Pipe Location mode. If this indicator flashes it is due to a low battery condition and the batteries should be replaced.

Pair I.D. indicator - green
The Pair I.D. indicator is illuminated when the unit is set to Pair I.D. mode.

Line Polarity indicator - green
The Line Polarity indicator is illuminated when the unit is connected to an active telephone service in the correct polarity.

Audio tone
The audio tone sounds as part of the continuity test provided in the Pair I.D. mode.

3.1.4. Operational Power

Mains Supply On-Off
The Mains Supply can be connected or disconnected by inserting the Mains Connection Lead into the Mains Connection socket, connecting the other end to a GPO, and then activating the power switch at the GPO. Disconnection of power is done in reverse, i.e. turn the power switch off at the GPO, remove the plug from the GPO, then remove the Mains Connection Lead from the Mains Connection socket.

Battery Supply On/Off
If working on a dead circuit, power can be supplied by the internal batteries by activating the Battery On/Off switch. If mains power is available whilst the Battery On/Off switch is activated the unit will preferentially draw power from the mains source. If the mains source was to drop out whilst the Battery On/Off switch is activated the unit will automatically switch to provide power via the internal batteries.

Low Battery Warning
If a low battery condition is detected the unit will indicate this by flashing one or more of the following indicators:

Fuse I.D.
Trace
TracePlus
Cable/Pipe Location

Changing Batteries

Ensure the TraceAll is disconnected from the mains power and all other output connections, before opening the Battery Hatch.

Remove the Battery Hatch by loosening the retaining screw with a screw driver. Remove the connector from the battery pack and then lift the battery pack out of the unit. Remove the old batteries from the battery pack. Replace with IEC-LR6 type batteries, commonly known as AA batteries. It is suggested that alkaline batteries be used to achieve maximum life. Ensure to insert the new batteries to the pack in the correct direction, as indicated on the battery pack.

Reverse the process to replace the battery pack.

Figure 7.4-1 Base Unit Battery Replacement

3.2. CABLE/PIPE TRACER

Fig. 3.2-1 Cable/Pipe Tracer

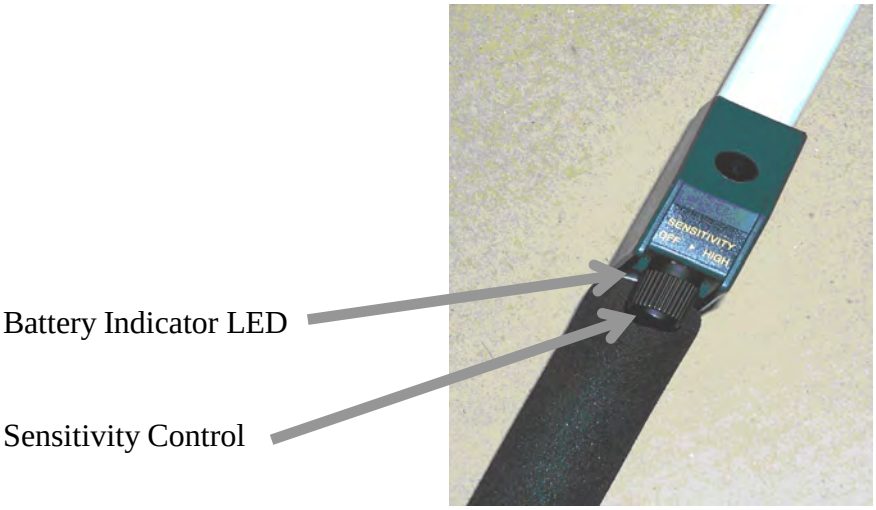


Fig. 3.2-2 Cable/Pipe Tracer Control Panel

3.2.1. Controls

There is only one control on the unit – the Sensitivity Control. It has the dual purpose of providing the On/Off function and sensitivity adjustment. This is operated by rotating the control.

3.2.2. Indicators

There are two indicators on the unit – a red LED and an audio buzzer. Both are located on the control panel of the unit.

Signal Strength Indicator

The audio buzzer sounds when signal is detected and the cable/pipe can be traced.

Battery Indicator

The battery condition is indicated by flashing the red LED.

3.2.3. Operational Power

Battery Supply On/Off

The unit is switched On/Off using the Sensitivity Control. Rotate the control clockwise to turn the unit on; rotate the control fully anti-clockwise to turn it off. A ‘click’ is felt as the unit is switched on or off.

Low Battery Warning

The flash rate of the “LED” indicates the battery condition.

Fast Flash = good battery
Slow Flash = failing battery
No Flash = change battery

Changing Batteries

The Cable/Pipe Locator operates on two readily available IEC-LR6 type batteries, commonly known as AA batteries. It is suggested that alkaline batteries be used to achieve maximum life.

The Cable/Pipe Locator battery compartment is at the end of the handle and is opened with a screwdriver, coin or similar device. Remove the old batteries and replace the new batteries noting the positive terminals face the battery hatch opening.

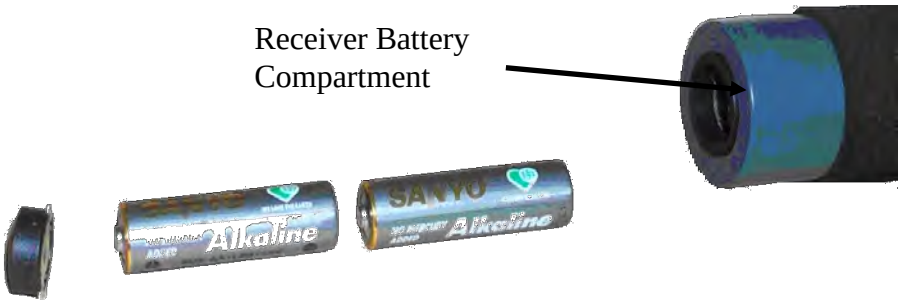


Figure 3.2.3-1 Cable/Pipe Locator Battery Replacement

3.3. CIRCUIT TRACER

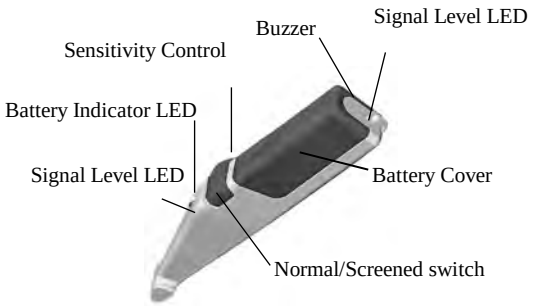


Figure 3.3-1 Circuit Tracer Receiver Features

3.3.1. Controls

There are two controls on the unit – the Sensitivity Control and the Normal/Screened switch.

Sensitivity Control

The sensitivity control has a dual purpose - it provides the On/Off function and sensitivity adjustment. This is operated by rotating the control.

Normal/Screened Switch

The Normal/Screened switch controls the mode the unit is operating in – either Normal, or Screened. This is operated by sliding backward and forward.

3.3.2. Indicators

There are four indicators on the unit – a green LED, two multicolored LEDs, and an audio buzzer.

Signal Strength Indication

The signal strength is indicated both visually and audibly. The two multicolored LEDs indicate the received signal strength, the color changing with intensity of signal. The audio buzzer sounds when signal is detected.

Battery Indicator

The battery condition is indicated by the green LED.

3.3.3. Operational Power

Battery Supply On/Off

The unit is switched On/Off using the Sensitivity Control. Rotate the control clockwise to turn the unit on; rotate the control fully anti-clockwise to turn it off. A ‘click’ is felt as the unit is switched on or off.

Low Battery Warning

The green LED is lit when the battery is in a usable condition. When the green LED is not lit the battery must be replaced.

Changing Batteries

Slide off the receiver battery cover, unclip the existing battery and replace with a new battery. The Circuit Tracer operates on one IEC-6LR61 type battery, commonly known as 9V battery. It is suggested that an alkaline battery be used to achieve maximum life.

3.4. PAIR IDENTIFIER

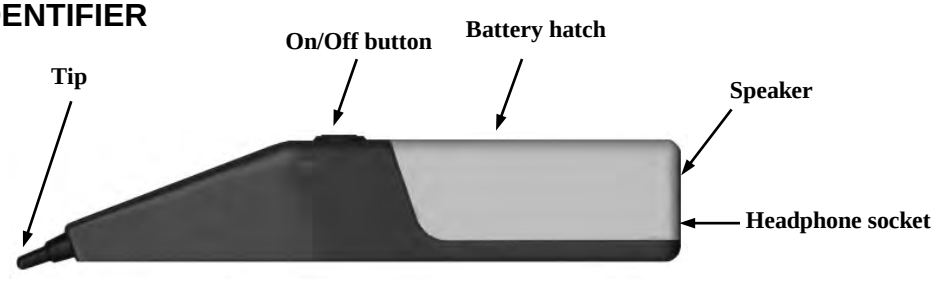


Figure 3.4-1. Pair Identifier

3.4.1. Connectors

There is a socket for an optional headset.

3.4.2. Controls

There is one control on the unit – the On/Off button. Push to operate.

3.4.3. Indicators

There is one indicator on the unit –a speaker. It is used to indicate received signal strength.

3.4.4. Operational Power

Battery Supply On/Off

The unit is switched On/Off using the momentary On/Off button. A 'click' is felt as the unit is switched on or off. When the button is released, the unit will turn off.

Changing Batteries

Slide off the Pair Identifier battery cover, unclip the existing battery and replace with a new battery. The Circuit Tracer operates on one IEC-6LR61 type battery, commonly known as 9V battery. It is suggested that an alkaline battery be used to achieve maximum life.

3.5. INDUCTIVE COUPLING ANTENNA

Figure 3.5-1. Inductive Coupling Antenna

3.5.1. Connectors

There is a pair of plugs for connecting the unit to the Base Unit.

3.5.2. Operational Power

The unit is powered by the Base Unit.

3.6. INDUCTIVE COUPLING CLAMP

Figure 3.5-1. Inductive Coupling Clamp

3.6.1. Connectors

There are a pair of plugs for connecting the unit to the Base Unit.

3.6.2. Operational Power

The unit is powered by the Base Unit.

4. APPLICATIONS

4.1. MAINS CABLE TRACING

WARNING

The mains tracer function of the TraceAll is primarily designed to trace a cable from a known point. While every attempt has been made to ensure that all mains cables can be detected when the device is correctly used in accordance with the instructions in this manual, it is not possible to guarantee this in every circumstance.

In all methods of operation a lack of detected signal does not necessarily mean that there is no circuit present. For example, a common trap is to assume only one circuit is present. Many walls will have at least two; one for power and the other for lighting. In offices there may be several power circuits present and lighting is often spread over more than one phase.

Before commencing any works in locations where electrical circuits are suspected, issues such as those in the checklist below must be considered.

- **Have I been adequately trained ?**
- **Have I followed the safety practices I was taught ?**
- **Is my equipment in good working order and am I using it correctly ?**
- **Are all safety measures in place ?**
- **Have I checked the plans ?**
- **Have I traced both the cable entry and exit paths ?**
- **Have I checked for spare cable loops ?**
- **Have I used Trace and TracePlus modes to try and detect other circuits and phases ?**
- **Do I now know where the light circuit is as well as the power circuit ?**
- **Can I cut power to this area while I do the installation ?**

The above is not a complete list. It is not a substitute for adequate training and care on the part of the user. The TraceAll is not a substitute for good working practices when dealing with mains voltages, and risk of electric shock will still exist. Only trained personnel should undertake mains and telecommunications cable work.

The TraceAll is a tool that, used correctly, can reduce the likelihood of a mains cable going undetected. Use of the TraceAll in conjunction with good safety practices will reduce the risk of injury, but it will never completely eliminate it.

The TraceAll on its own cannot ever guarantee safety.

4.1.1. Overview

The mains cable tracing function is primarily designed to perform the following functions:

- Trace the path of a cable from a known point
- Find opens
- Find shorts
- Basic pipe and cable location

The Base Unit is used to transmit a signal onto the cable by plugging into a power point on that circuit. The Circuit Tracer detects this signal and allows the user to trace the path of the cable. The following sections will show in detail how this is done.

Fig. 3-1 Components required for the TraceAll Mains Tracing System

4.1.2. The Base Unit

The Base Unit has three operational modes for Mains Circuit tracing:

Fuse I.D.: This uses a low power level making it easier to trace a single circuit.

Trace: This uses higher power for maximum range and to provide signal to other circuits on the same phase, such as lighting circuits.
TracePlus: This uses high power and to maximise the signal spread to circuits on other phases and other services.

4.1.3. The Circuit Tracer

The Circuit Tracer has two operational modes:

Normal: This mode is used for most applications allowing open, current carrying circuits to be detected.

Screened: This mode is used when interference is present. Metallic insulating materials such as sisalation sometimes cause interference; in effect, they can mask the wire. The screened mode will only detect current carrying circuits. For example, this mode will not detect an un-powered light circuit.

4.1.4. Mains Cable Tracing Operation

- Connect the Base Unit to a GPO on the circuit to be traced via the Mains connection Lead and turn on the power point. If working on a dead circuit, activate the Battery On-Off switch.
- Select Fuse I.D. mode on the Base Unit.
- Turn on the Circuit Tracer
- Select Normal mode on the Circuit Tracer.
- When holding the Circuit Tracer near the GPO the Base Unit is connected to, adjust the sensitivity until the buzzer just sounds.
- Slowly scan around the GPO in a circular motion to identify the cable entry and exit paths
- Once the cable path(s) have been identified, trace the cable in either direction moving away from the Base Unit GPO using the technique described below.

The Circuit Tracer must be held at right angle (90 degrees) to the cable being traced.

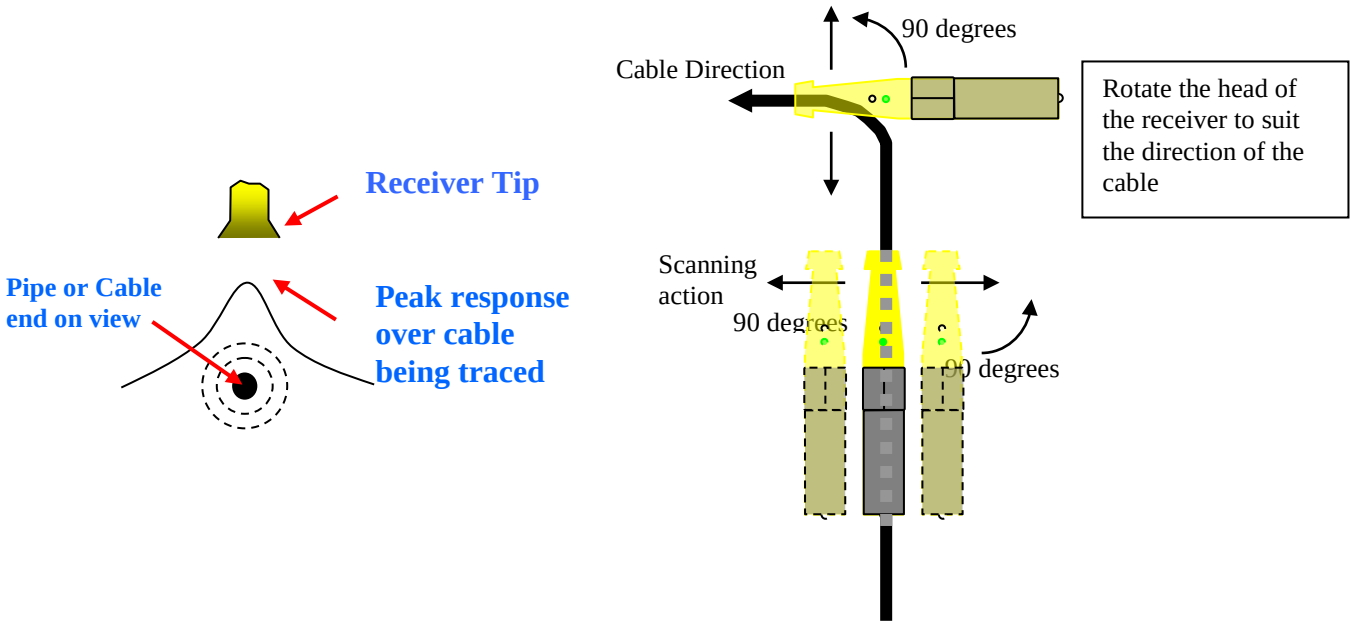


Figure 4.1.4-1

The signal level is indicated in 3 ways. The indicator near the battery indicator changes colour according to the signal level. A second indicator at the rear of the receiver is wired in parallel and shows the same colours. It is placed there to ease viewing of the signal level when the receiver is held above eye level or in hard to reach places.

- Off – little or no signal
- Green – low signal level
- Orange – medium signal
- Red – strong signal level

The Sensitivity Control allows adjustment of the amplification of the received signal. Adjust this control until a suitable signal reception is achieved. A strong signal level is always desired for tracing. As you move further away from the Base Unit the sensitivity will need to be increased. If you move back toward the Base Unit the sensitivity may need to be decreased.

If the sensitivity control is fully adjusted and you still cannot receive an acceptable signal return to the Base Unit and adjust the Mode switch until Trace mode is selected. Return to the last known cable position and recommence tracing.

If further signal reception is required the Base unit can be switched to TracePlus mode. In TracePlus Mode the signal can, and will, couple to most other services, such as, phone, antenna systems, water, gas etc. Care must be taken to ensure that only your target cable is traced.

Magnetic metals will always hide the circuit under investigation; however, by using TracePlus mode, most metal fixtures, i.e. metal conduits, will be able to be traced. It simply means that the conduit is traced, not the wire. Open circuits cannot be detected in this mode.

Open circuits

- Set up the same as tracing a live cable.
- As the receiver moves along the path of the cable the signal will suddenly drop off then rise again.
- Rotate the receiver over the null point to make sure it is not just a twist in the cable.
- If the signal null persists then this is the location of the open circuit.

Short Circuits

- The same as for an open circuit but the signal does not increase again on the other side.

Tracing dead cables

- This is the same as tracing a live cable.
- The Base Unit must power the cable via battery. Ensure the Battery On/Off switch is activated.
- The receiver must be in Normal Mode.

Tracing long cables

- Switch the transmitter to Trace Mode if the signal is not carrying far enough in Fuse ID mode. This provides the same signal configuration but slightly higher signal strength.

Tracing other circuits

- This is the same as for long cables; switch the transmitter to Trace Mode if the signal is not carrying far enough in Fuse ID mode.

Tracing other phases

- Switch the transmitter to TracePlus Mode.

Tracing with Sisalation

- Sisalation can mask the transmitter signal and cause the whole wall to look as if it is live. In this case you can do one of the following:-
- For live circuits, switch the receiver to Screened. This will reduce the masking effect.
- For dead circuits, use Fuse ID mode and approach the wall from the other side, with the receiver in Normal Mode if possible.

4.2. FUSE AND CIRCUIT BREAKER IDENTIFICATION

WARNING

The fuse and circuit breaker identification function of the TraceAll is primarily designed to correctly identify the fuse/circuit breaker a circuit is fed from. While every attempt has been made to ensure that all fuses and circuit breakers can be correctly identified when this device is correctly used in accordance with the instructions in this manual, it is not possible to guarantee this in every circumstance.

In all methods of operation a lack of detected signal does not necessarily mean that there is no circuit present. Furthermore, different fuses and circuit breakers will be indicated in different ways, depending upon their individual construction. For example, incorrect use of the device can indicate the incorrect fuse or circuit breaker.

Before commencing any works in locations where electrical circuits are suspected, issues such as those in the checklist below must be considered.

- **Have I been adequately trained ?**
- **Have I followed the safety practices I was taught ?**
- **Is my equipment in good working order and am I using it correctly ?**
- **Are all safety measures in place ?**
- **Have I checked the plans ?**
- **Have I checked for spare cable loops ?**
- **Have I used Trace and TracePlus modes to try and detect other circuits and phases ?**
- **Do I now know where the light circuit is as well as the power circuit ?**
- **Can I cut power to this area while I do the installation ?**

The above is not a complete list. It is not a substitute for adequate training and care on the part of the user. The TraceAll is not a substitute for good working practices when dealing with mains voltages, and risk of electric shock will still exist. Only trained personnel should undertake mains and telecommunications cable work.

The TraceAll is a tool that, used correctly, can reduce the likelihood of a mains cable going undetected. Use of the TraceAll in conjunction with good safety practices will reduce the risk of injury, but it will never completely eliminate it.

The TraceAll on its own cannot ever guarantee safety.

4.2.1. Overview

The fuse and circuit breaker identification function is primarily designed to find the fuse or circuit breaker on a circuit.

The Base Unit is used to transmit a signal onto the cable by plugging into a power point on that circuit. The Circuit Tracer detects this signal and allows the user to identify the fuse or circuit breaker. The following sections will show in detail how this is done for a number of circumstances.

Fig.4.2-1 Components required for the TraceAll Mains Tracing System

4.2.2. The Base Unit

The Base Unit has two operational modes for fuse and circuit breaker identification:

Fuse I.D.: This uses a low power level for shorter length circuits.

Trace: This uses high power for maximum range.

TracePlus: This mode is **not** to be used for fuse and circuit breaker identification.

4.2.3. The Circuit Tracer

The Circuit Tracer has one operational mode for fuse and circuit breaker identification:

Normal: This mode is **not** to be used.

Screened: This mode must be used for fuse and circuit breaker identification.

4.2.4. Finding the right fuse

- Connect the Base Unit to the GPO that you wish to locate the fuse for via the Mains Connection Lead and turn on the power point. If working on a dead circuit, activate the Battery On-Off switch.
- Either Fuse I.D. mode or Trace mode can be used depending upon the signal strength required.
- Select Fuse I.D. mode on the Base Unit if the GPO is closely located to the power distribution board where the fuse is located (typically 50m or less)

- Select Trace mode on the Base Unit if the GPO is not closely located to the power distribution board where the fuse is located (typically 50m or more)
- Turn on the Circuit Tracer
- Select Screened mode on the Circuit Tracer.
- For positive identification, adjust the sensitivity until the buzzer is heard, only over the one fuse.
- When finding fuses, a small change in the sensitivity control makes a big difference to how many fuses trigger the buzzer.
- A buzzer also sounds when the signal indicator flashes orange or red. The buzzer is the best way to discriminate signal level when finding a fuse. Adjust the sensitivity control until the buzzer sounds for only one fuse.
- Certain appliances dramatically effect the signal strength on a circuit. For example, switch mode power supplies in computers and portable heaters will significantly reduce the signal available. If you cannot receive an adequate signal this may be the cause. Removing these appliances will assist. If you have too much signal strength you can reduce the strength by plugging in and turning on such an appliance.
- In some cases, when trying to ID a fuse, the wire loom may be routed close to the switchboard faceplate. This can cause a strong signal to be detected at that point. If this is suspected, then it may be necessary to release the mounting screws of the faceplate to expose the loom route and thus allowing you to ensure that you are only tracing the fuse signal.

4.2.5. Finding the right circuit breaker

Due to the nature and construction of circuit breakers, in particular the coil within the trigger mechanism, the result of the identification can be affected. That is, the electromagnetic field can still be detected and the position pinpointed using the Circuit Tracer, but at times, the orientation for the directional antenna must be arranged to suit the orientation of this trigger coil within the circuit breaker.

- Connect the Base Unit to the GPO that you wish to locate the circuit breaker for via the Mains Connection Lead and turn on the power point. If working on a dead circuit, activate the Battery On-Off switch.
- Either Fuse I.D. mode or Trace mode can be used depending upon the signal strength required.
- Select Fuse I.D. mode on the Base Unit if the GPO is closely located to the power distribution board where the circuit breaker is located (typically 50m or less)
- Select Trace mode on the Base Unit if the GPO is not closely located to the power distribution board where the circuit breaker is located (typically 50m or more)
- Turn on the Circuit Tracer
- Select Screened mode on the Circuit Tracer.
- Orient the circuit tracer according to the particular circuit breaker type being identified (see following descriptions).
- For positive identification, adjust the sensitivity until the buzzer is heard, only over the one circuit breaker.
- When finding circuit breakers, a small change in the sensitivity control makes a big difference to how many circuit breakers trigger the buzzer.
- A buzzer also sounds when the signal indicator flashes orange or red. The buzzer is the best way to discriminate signal level when finding a circuit breaker. Adjust the sensitivity control until the buzzer sounds for only one circuit breaker.

- Certain appliances dramatically effect the signal strength on a circuit. For example, switch mode power supplies in computers and portable heaters will significantly reduce the signal available. If you cannot receive an adequate signal this may be the cause. Removing these appliances will assist. If you have too much signal strength you can reduce the strength by plugging in and turning on such an appliance.
- In some cases, when trying to ID a circuit breaker, the wire loom may be routed close to the switchboard faceplate; this can cause a strong signal to be detected at that point. If this is suspected, then it may be necessary to release the mounting screws of the faceplate to expose the loom route and thus allowing you to ensure that you are only tracing the circuit breaker signal.

Circuit Breaker Construction

Many circuit breakers that have been investigated are constructed so as not to require different positioning of the Circuit Tracer from that of normal Fuse ID, however some require a different orientation.

The following photographs and explanations detail the procedure to adopt for the circuit breaker types investigated and will give you an insight into how to confidently locate the correct circuit breaker.

It must be highlighted that all these Circuit breakers perform the task of, “Circuit breakers”, very satisfactorily and that it is only the orientation of the trigger coil that determines the need for the special procedures to be used to allow the TraceAll to perform the identification with the desired outcome.

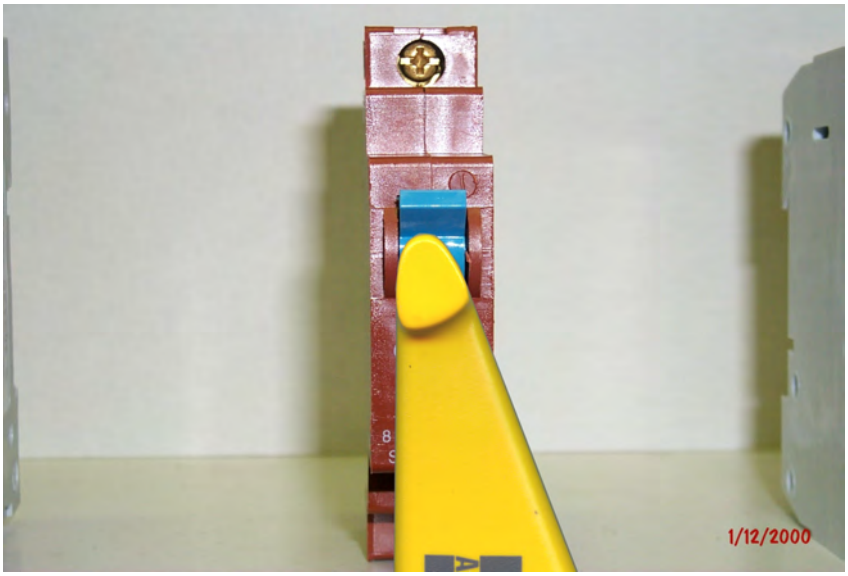
The following list is by no means a complete list and it is essential good working practices are followed when performing electrical works of any kind.

Standard Circuit Breaker Identification

Below is shown a Merlin Gerin C60N C16 Circuit Breaker. The trace position for the Circuit Tracer receiver is the same as for standard tracing of a fuse, centering on the switch. Many circuit breakers are traced or Identified in this manner.

Clipsal Circuit Breaker (4CB 116)

Below is shown a Clipsal Circuit Breaker, 4CB 116, often referred to as the Clipsal "Terracotta" circuit breaker. The Circuit Tracer is positioned as shown in the picture, centered on the switch.



Merlin Gerin Residual Current Device (RCD), [D vigi, C20]

Below is shown a Merlin Gerin RCD D vigi C20. The Circuit Tracer is positioned as shown in the picture, importantly to the right, but in line with, the switch.

If the mains is connected, confirmation of correct identification can be obtained by switching off the circuit breaker. The Mains indicator light in the Control Panel of the Base Unit will be extinguished.

If there are different types of circuit breakers on the one power board they each must be scanned according to their particular construction.

4.3. CABLE AND PIPE LOCATION

WARNING

Before connection of the TraceAll to any cable both ends of the cable should be disconnected from any attached equipment.

In the case of high voltage or power cables, suitably qualified personnel must be employed to perform the disconnection, and to ensure that any charge build-up on the cable is removed to render it safe to work on.

4.3.1. Overview

The cable/pipe location function is primarily designed to perform the following functions:

- Trace the path of an underground cable/pipe from a known point
- Find an underground pipe/cable
- Determine the depth of an underground cable/pipe
- Couple to the target cable/pipe either directly or indirectly.

The Base Unit is used to transmit a signal onto the cable/pipe by either direct connection to that cable/pipe or by indirect inductive coupling. The Cable/Pipe Tracer is then used to scan the ground to determine the path of the cable/pipe. The following sections show how this is done.

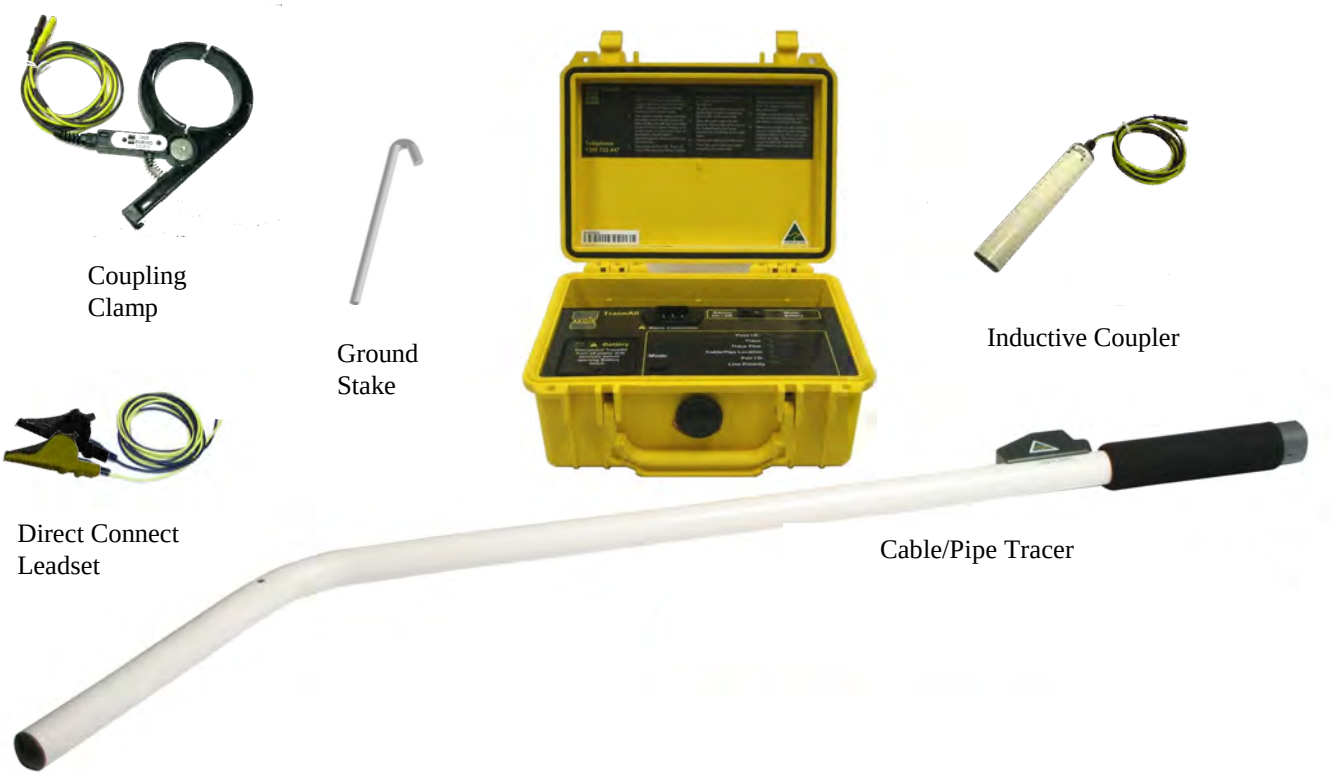


Figure 4.3.1-1 Components required for the Cable/Pipe Location function.

4.3.2. The Base Unit

The Base Unit has three operational modes for cable/pipe location. The operational mode is determined by the lead or device connected to the cable/pipe sockets on the side of the Base Unit.

Direct Connection: Direct connection uses the Direct Connect Leadset and enables signal connection to a conductive object such as a metallic cable or pipe. Direct connection is always the preferred method as it provides the strongest signal coupling and the least signal spread onto other cables and pipes.

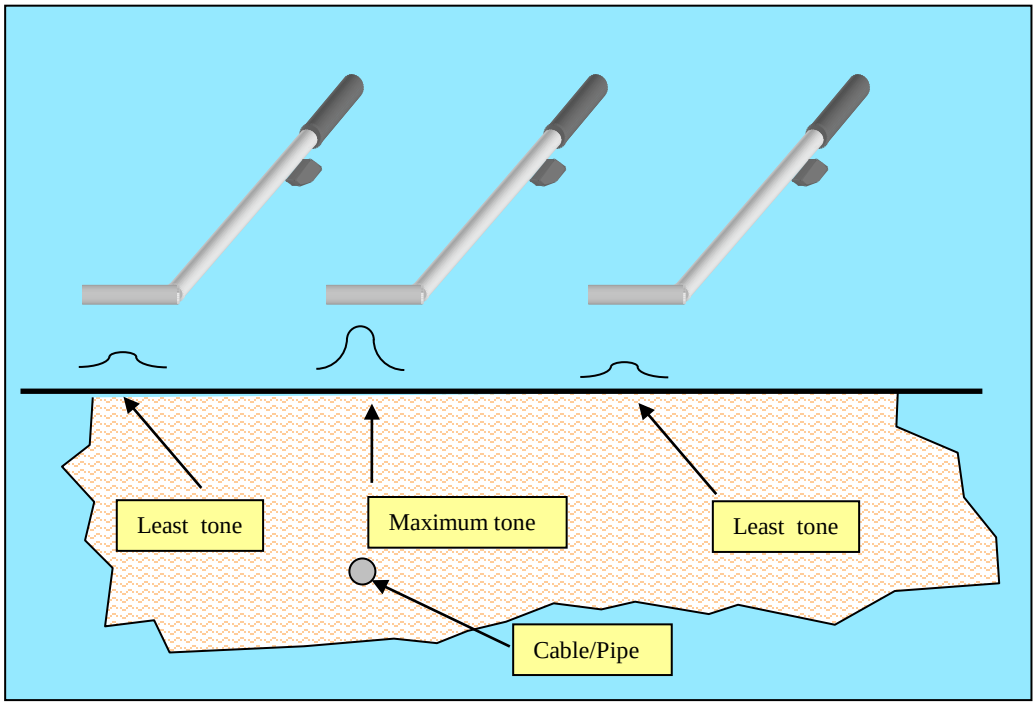
Coupling Clamp: The Coupling Clamp is used for indirectly applying signal to a cable or pipe where the metallic conductor cannot be accessed, however the outer surface of the cable or pipe is accessible. This is particularly useful for tracing live cables such as high voltage circuits, underground power connections, and live telephone services without having to interrupt supply. This is usually the second choice for connection as the coupling of the signal is not as good as a direct connection.

Inductive Coupler: This is used for indirectly applying signal when the cable or pipe cannot be accessed. This method is excellent for coupling into all cables and pipes in the surrounding area however will not be specific to a single cable or pipe.

4.3.3. The Cable/Pipe Tracer

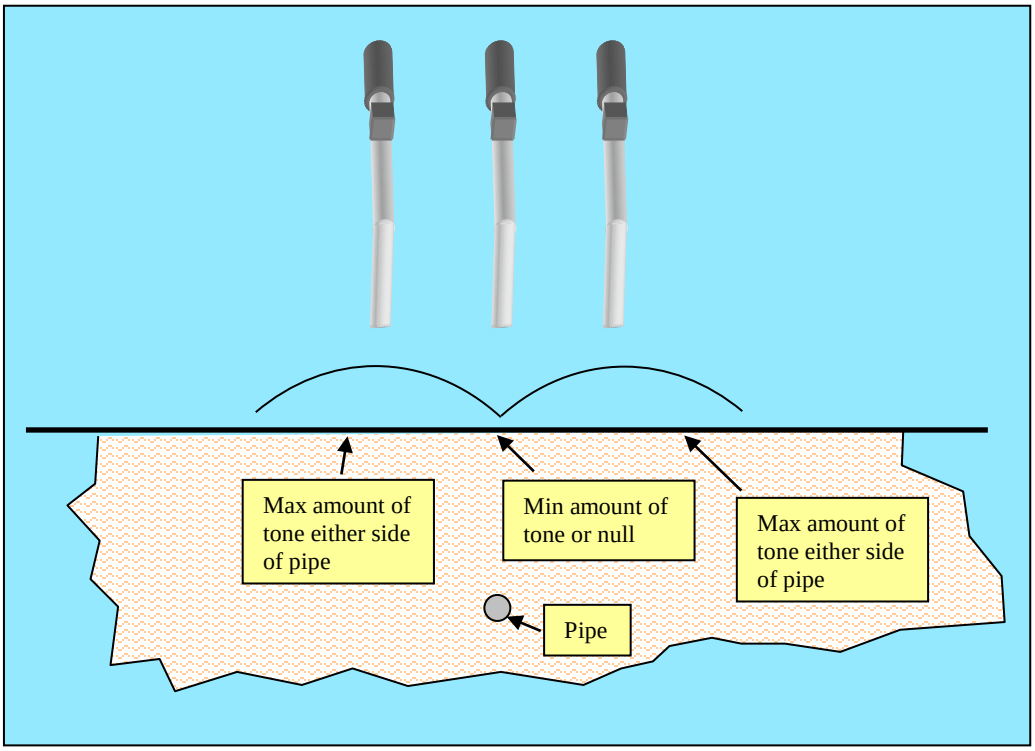
The Cable/Pipe tracer has two operational modes – peak response and null response.

Peak Response: This method provides a ‘beeping’ tone response when the Cable/Pipe Tracer is located over the target cable or pipe. To implement this, the unit must be held as indicated below.



To determine the centre point of the path of the cable or pipe decrease the sensitivity until the tone response is heard over the shortest distance achievable. The centre point will be in the middle of the tone detection range.

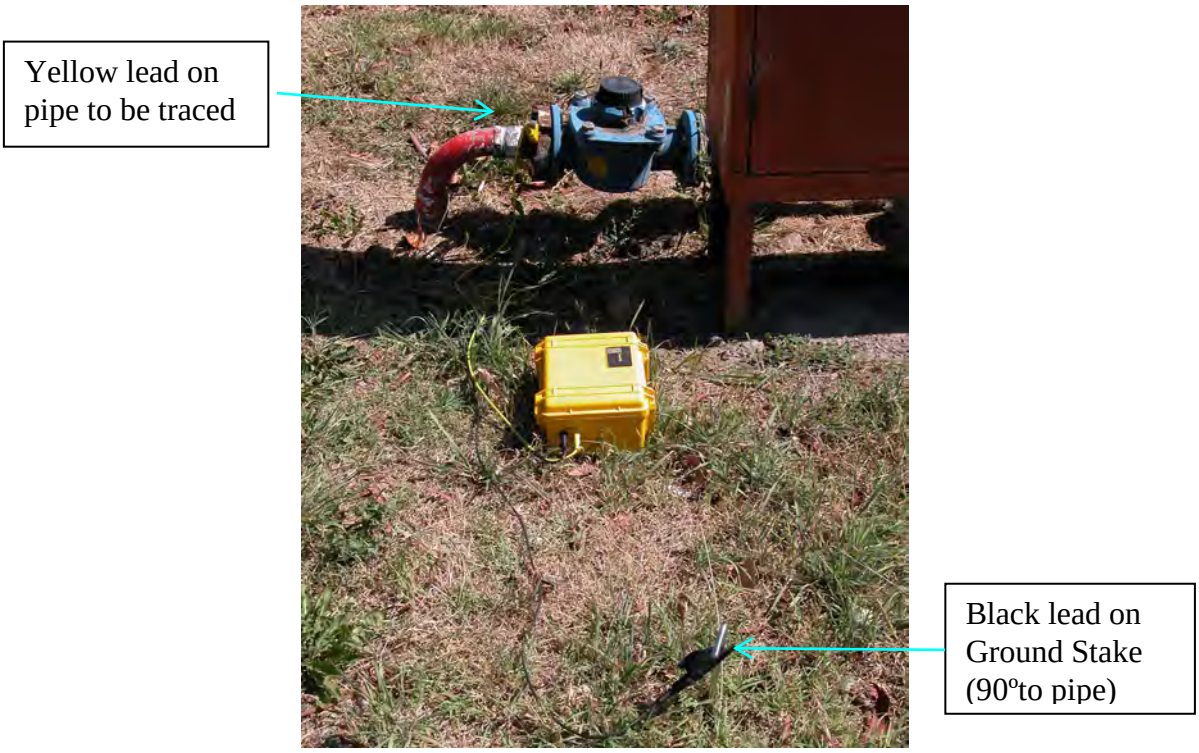
Null Response: This method provides a 'beeping' tone response either side of the target cable or pipe with silence directly above the target. To implement this, the unit must be held as indicated below.



To precisely locate the centre point of the path of the cable or pipe increase the sensitivity until the null is as accurate as can be. This can be as little as 20mm. This method is precisely accurate and must be used when determining the depth of a cable.

4.3.4. Cable and Pipe Location Operation

- Determine the position you wish to place the Base Unit and which operational mode you wish to use.
- Connect the Base Unit as follows:
    - **Direct Connection:** Connect the Direct Connect Leadset to the Cable/Pipe output sockets on the Base Unit. Connect the Yellow clip to the metallic part of the cable or pipe that is to be traced. Connect the Black clip to the Ground Stake. Push the Ground Stake into the ground, approximately ½ way, as far from the target cable or pipe as is possible (this should be at 90° to the suspected direction of path of the cable or pipe). On concrete or similar surfaces, it is usually acceptable to simply clip the lead to the ground stake lying flat on the ground surface, or to some other convenient "grounded" structure. A pool of water on a concrete surface is an ideal location for the Ground Stake if forced onto concrete.

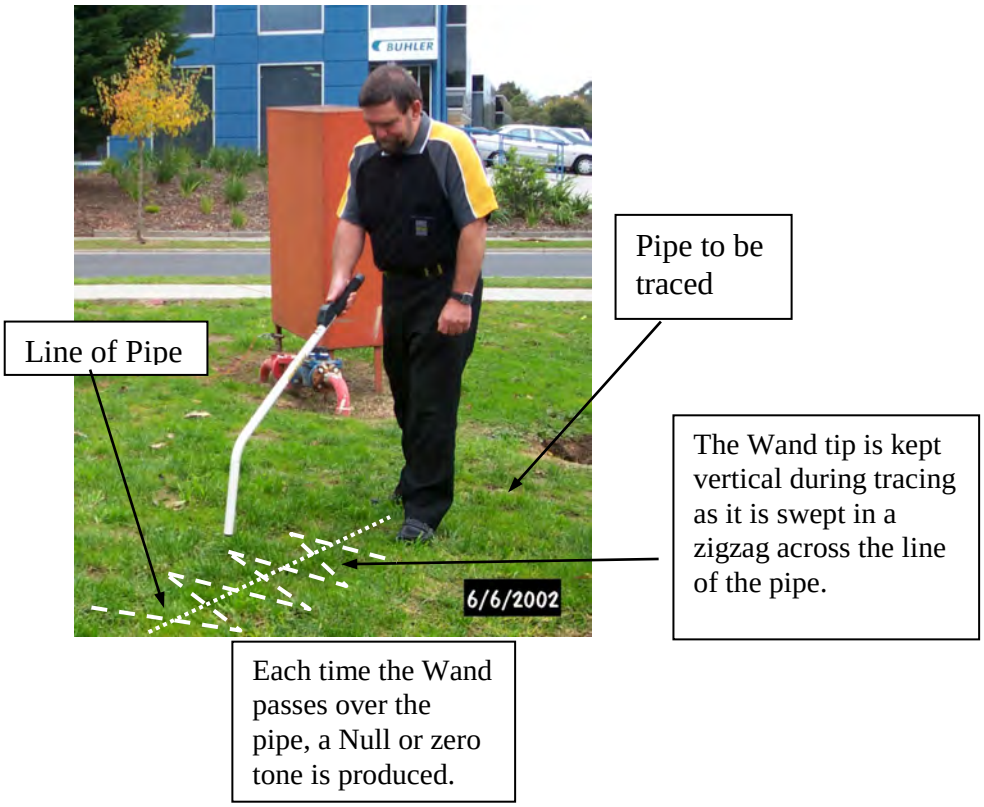


- **Coupling Clamp:** Connect the Coupling Clamp to the Cable/Pipe output sockets on the Base Unit.

- **Inductive Coupler:** Connect the inductive Coupler to the Cable/Pipe output sockets on the Base Unit. Ensure the Inductive Coupler is at 90º to the cable/pipe path.

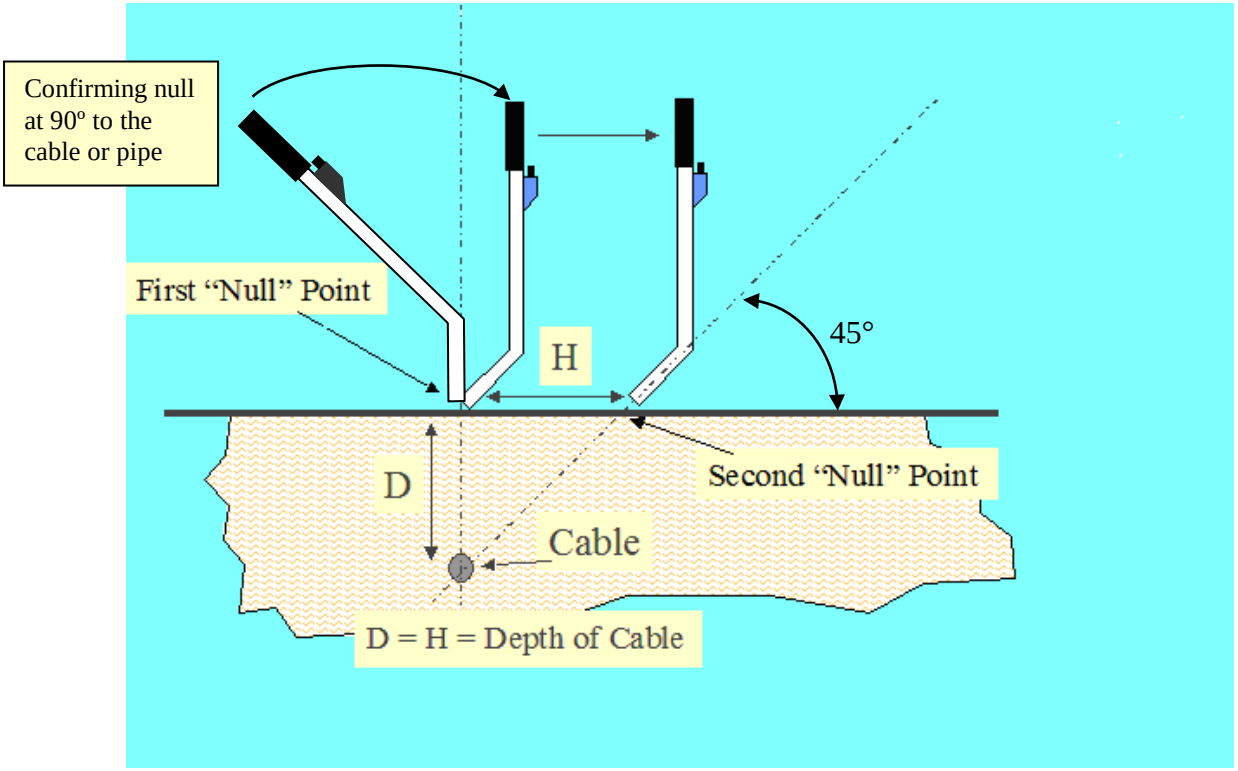
- Activate the Battery “On-Off” power switch.
- Ensure the lid of the Base Unit is closed. This prevents rain and dust from entering the Base Unit.
- With the Cable/Pipe Tracer, move 5m – 7m away from the Base Unit. There is no ability to perform any tracing within this range due to radiated signal from the Base Unit. Within this range the Cable/Pipe Tracer will most likely ‘beep’ continually.
- Turn the tracer on and adjust the sensitivity control to approximately half scale.
- Holding the Cable/Pipe Tracer in the Peak response position commence walking around the Base Unit in a circular path maintaining a constant distance from it. Ensure the Cable/Pipe Tracer remains a constant distance from the ground.
- Complete the circle noting when a beeping response was heard. If the response is continual or more than you would expect, reduce the sensitivity setting and repeat the circular scan. If, on the other hand, no beeping was received, increase the sensitivity and repeat the circular scan. The aim is to identify the path the cable or pipe takes through the circle. Once you have adjusted the sensitivity correctly the ‘beeping’ should only be heard where the cable path actually is.
- The centre point of path of the cable/pipe can be found by decreasing the sensitivity until the beeping tone is heard over the shortest distance.
- At this stage the choice can be made to stay in Peak mode or change to Null mode
- Whichever mode you choose you can now trace the path of the cable or pipe in a direction away from the Base Unit, commencing at a point on your circular scan where you identified the cable.
- The cable/pipe should be traced using a zigzag pattern as shown below. It is important to keep the Cable/Pipe Tracer oriented toward the ground correctly at all times.(vertically for

Null mode or horizontally for Peak mode) As you move further from the Base Unit you will need to increase the sensitivity control as the signal drops off.



Measuring Depth with the TraceAll

Mark the centre point of the cable or pipe line using the null response mode. Confirm this standing at 90º to the cable or pipe path. Mark this point on the ground for later reference. Referring to the diagram below, rotate the receiver so that the long section is vertical and the short section is at an angle of 45 degrees to the ground.

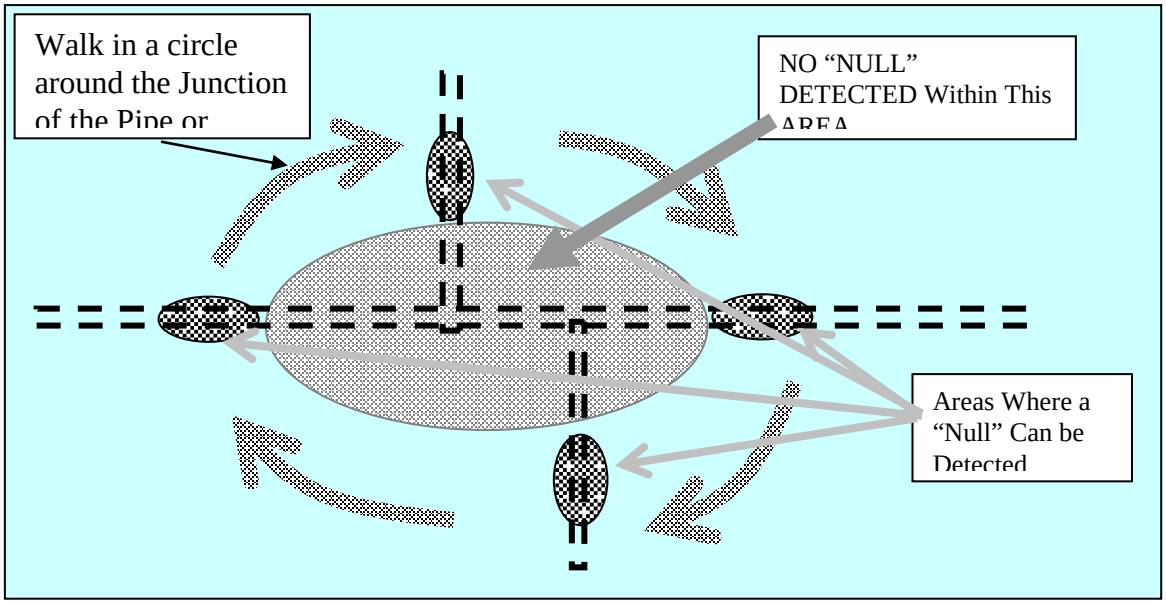


Slowly move the receiver away from the centre point of the cable or pipe until a second null is obtained. Mark this point. The distance between the two marked is the depth of the cable. For confirmation, repeat this process to the other side of the cable.

Branches in Pipes or Cables

The characteristic null signal over a cable or pipe will usually disappear in the vicinity of a branch or "T" in the service. Similarly, the signal received when in peak mode in the vicinity of a branch or "T" in the service becomes distorted. This is common for all cable locators and is the result of the radiated signal coming from both directions mixing at the branch point.

In such cases, it is possible to continue tracing any one of the branches by moving a few metres away from the branch point and locating the cable or pipe there. By scanning in a circular path around a branch point, it should be possible to identify all of the branches originating from it.



Dry Soil Conditions

Greatly improved performance can usually be achieved by pouring a bucket of water over the soil at the ground connection point (Ground Stake). A similar improvement can be obtained when the Ground Stake is resting flat on an impenetrable surface, such as concrete or bitumen.

Distortion from Steel Structures

The signal radiated from a cable or pipe will be distorted close to any steel structure, so the location accuracy of the instrument is compromised in such circumstances. However, a useful indication of the service route is still usually achievable if the sensitivity control is finely adjusted.

Multiple Services

In certain cases direct electrical connection may exist between various cables and or pipes within a given area and a single current injected into one service will end up flowing in two or more services in the area.

In such cases, individual services may or may not be successfully traced! It should be understood by the user, that ideal tracing conditions occur when the signal current flows only along the service to be traced, returning to the Base Unit via the “overall ground” in the vicinity of the service.

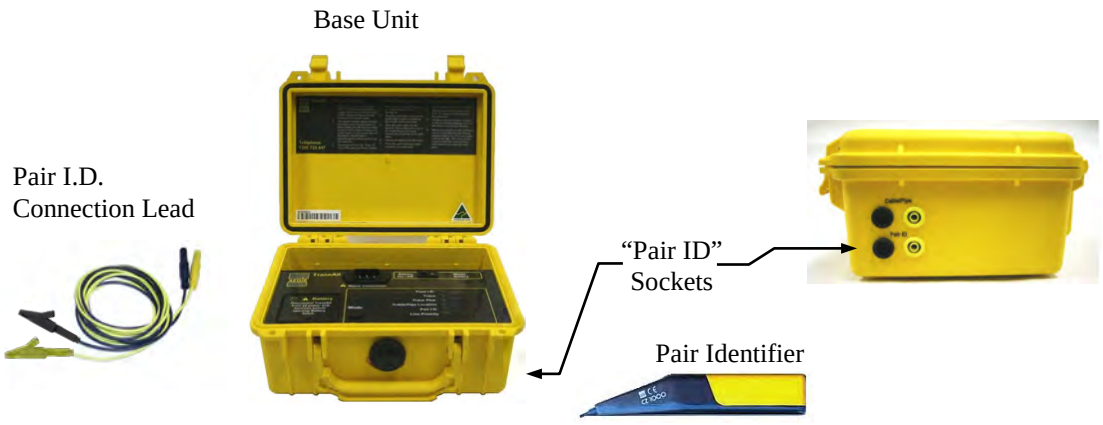
4.4. PAIR IDENTIFICATION

WARNING

When working with telephone pair cables, always ensure the pair is vacant or that a working service is idle before connecting the oscillator to the line.
The pair identifier is not designed for operation on 240 volt mains power.
Only qualified personnel should undertake telecommunications cable work.

4.4.1. Overview

The Pair ID function is used to trace or identify a single pair of a multiple pair cable.



Components required for the TraceAll Pair I.D. system.

4.4.2. The Base Unit

The Base Unit has one operational mode for pair identification. It is automatically selected when the Pair I.D. Connection lead is plugged into the Pair I.D. sockets.

4.4.3. The Pair Identifier

The Pair Identifier has one operational mode for pair identification. It is automatically selected when the On/Off switch is activated.

4.4.4. Pair ID Operation

- Connect Pair I.D. Test Lead into the Base Unit Pair ID socket.
- Activate the Battery On-Off switch.
- The Pair I.D. LED will light.
- DO NOT connect to live power cables.

- Check that the pair to be identified is vacant or, in the case of a working telephone service, that the working telephone service is idle before connecting to the line.
- Connect the crocodile clips to the pair to one end of the pair to be identified.
- If connected to an idle telephone service, check that the Line Polarity LED on the Base Unit is illuminated. This ensures the least amount of signal spread or crosstalk into other pairs within the same cable. If the Line Polarity indicator is not on, reverse the connection of the crocodile clips to line.
- Once the Base Unit set up is complete, close the lid to protect the unit from any rain, dust etc.
- Go to the other end of the cable with the Pair Identifier. Pair identification is simply a matter of eliminating all pairs that do not produce a 'warbling' tone at the receiver.
- Hold as many of the pairs as you can in one hand, separating groups of pairs slightly.
- Press and hold down the on/off button on the receiver.
- Run the receiver's tip across the groups until you hear the 'warbling' pair identification signal. This sound indicates that the pair carrying the tone is located in that particular group.
- Separate the pairs of wires in that group slightly.
- Run the receiver's tip across the wires (as indicated in 4.4.4-1) until you hear the warbling sound again.
- Home in on the pair by moving the receiver in the vicinity where the tone appeared loudest. It is best to divide the group of pairs so that the search can be narrowed down to the wanted pair.

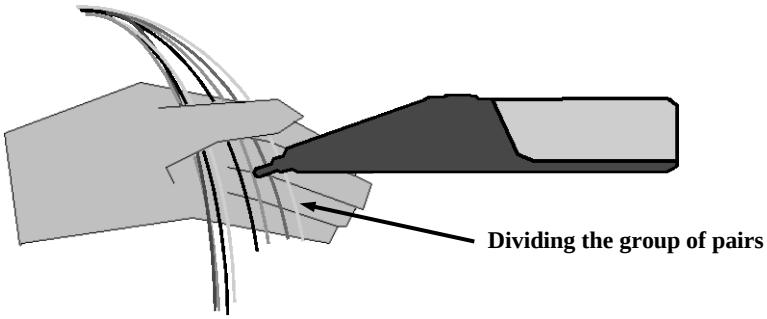


Figure 4.4.4-1. Finding the correct pair with the receiver

- When the pair with the loudest signal is located, you may want to have additional confirmation that you have the correct pair. To do this you need to check that a 'null' (minimum or zero signal) exists when the receiver's tip is located midway between the two wires of the pair.
- Spread the wires apart approximately 40 mm.
- Press and hold down the receiver's on/off button.
- Move the receiver's tip back and forth near the centre. See Fig 4.4.4-2. As the receiver moves towards the middle of the wires, the signal should decrease. In the middle of the wires, a minimum signal should be obtained. If this occurs, then you have correctly identified the pair.
- A continuity buzzer is also incorporated. If you short the wires together, an audio tone will be produced by the Base Unit.

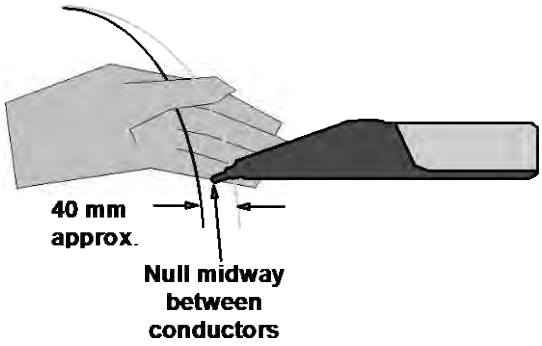


Figure 4.4.4-2. Confirming the pair identification by null signal

5. BASE UNIT SPECIFICATIONS

5.1. Electrical

Pipe & Cable Locator Output:	43Vp-p (open circuit) @ 80KHz Also protected against accidental connection to 240VAC/50Hz and up to 350VDC
Pair ID Output:	5Vp-p (open circuit) @ 2KHz warble tone Continuity measurement <35KΩ Also protected against accidental connection to 240VAC/50Hz and up to 350VDC
Mains Tracer Output:	~3.5Vp-p (open circuit) @ 80KHz
Power Supply:	240V/50Hz, 200mA, (Installation Cat2), Class I. Batteries - 6 x 1.5V size “AA” Alkaline Type IEC-LR6.
Battery Life:	Minimum 20 hours typical

5.2. Environmental

- Indoor/Outdoor use. (for outdoor operation use internal batteries only) See Warning Section 1
- Altitude up to 2000m
- Temperature: Operating 0ºC to +45ºC
Storage -20ºC to +70ºC
- Humidity 95%RH Non-condensing
- Suitable for connection to Mains supply voltage fluctuations up to + 10/ -6 % of nominal voltage (230V)
- Suitable for connection to mains circuits rated for transient Overvoltage Category II of IEC 60364-4-443
- Suitable for use within Pollution Degree 2 environments

5.3. Physical

Base Unit dimensions:	235 x 110 x 190 mm.
Base Unit mass:	1.8 kg (Inc Batteries)

5.4. Applicable Standards

Tested and certified to the full requirements of AS61010.1-2003
Manufactured under a Quality System complying to ISO9001:2000 (QEC Lic.5948)

*** These specifications and part numbers are subject to change without notice***

5.5. System Components

	Part No
TraceAll Base Unit	CZ1800
TraceAll Circuit Tracer	CZ1801
TraceAll Cable/Pipe Locator	CZ1802
TraceAll Inductive Coupler	CZ1803
TraceAll Coupling Clamp	CZ1804
TraceAll Pair Identifier	CZ1200

6. CARE AND MAINTENANCE

6.1. Warranty

The TraceAll is warranted against defects in materials and workmanship for a period of 12 months from the date of purchase. If AEGIS PTY LTD receives notice of such defects within the warranty period, AEGIS shall, at its discretion, either repair or replace the defective unit. For purposes of warranty repair or replacement, the user is required to return the defective item together with proof of purchase to AEGIS at the address on the inside front cover of this manual. The warranty does not apply for defects or damage arising from abuse, accident, misapplication, misuse or as a result of service or modification by anyone other than Aegis. Aegis is not responsible for any incidental or consequential damages resulting from the breach of any express or implied warranty, including damage to property and to the extent permitted by law damages for personal injury. Aegis does not assume liability or responsibility for any loss or damage resulting from the use of this device.

6.2. Maintenance and Servicing

Before using any components of the TraceAll check that all parts, leads and accessories are in good condition. If found to be damaged, replace with genuine Aegis parts. If any liquid has entered into the TraceAll, please return to the manufacturer for repair.

Apart from routine battery replacement, the TraceAll contains no user-serviceable parts. Any damaged or failed instruments should be returned to the manufacturer for repair.

The sender's name and return address must naturally be supplied, together with a description of the fault. If different from the return address, when applicable an invoicing address should also be given.

6.3. Cleaning

Do not immerse the TraceAll or its components in water.
To clean, simply wipe over with a damp cloth.
Do not use any harsh detergents or solvents on the TraceAll or its components.