

PCM PLUS⁺



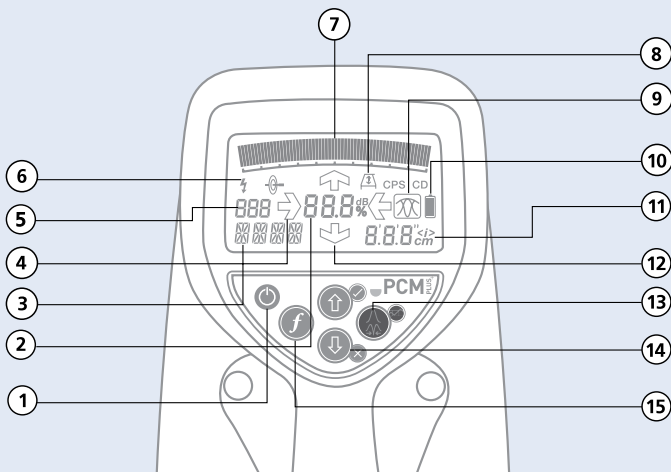
Pipeline Current Mapper

User Guide



Radiodetection
AN SPX COMPANY

PCM+ Receiver



Display Features

- 1 On/Off Key.** Press and hold for off. Press to select Setting controls (SEE BELOW).
- 2 Numeric Signal Display:** Provides a numeric representation of the signal response in a percentage.
- 3 Frequency/Mode Indicator:** Displays the selected frequency or operating mode.
- 4 Left/Right Arrows:** Indicates direction of target line; available in Null mode only.
- 5 Numeric Display:** Displays the current gain value. Also Log file index.
- 6 Power Mode:** Indicates when Power mode selected.
- 7 Bar Graph:** Displays signal strength (dB or %). Peak value is shown by a peak hold line.
- 8 Fault Find (FF) mode:** '8k Fault Find' using the Radiodetection A-Frame.
- 9 Antenna Display:** Narrow Peak (twin horizontal antenna), Null (vertical antenna).
- 10 Battery Level:** Displays battery level. No locate is possible at minimum (zero bars).
- 11 Depth or Current Display:** Displays depth or current as applicable.
- 12 Fault Find Arrows:** Indicates the direction along the pipe/utility to the measured fault. In CD mode they identify outgoing current 4/8Hz.
- 13 Antenna Select Key/Depth & Current:** Press and release selects Peak or Null mode. Sustained key press causes a data log sequence to be filed to memory in the Bluetooth device (if active).
- 14 Gain Controls / Confirm and Cancel:** Signal strength is indicated on bar graph (50% is suitable). Unit automatically switches to mid-scale gain if signal outside useful operating zone. Sustained hold of gain-up or gain-down = steps of 1dB increment/decrement.
- 15 Function Key:** Press and release to select the required frequency/operating mode.

Setting Controls

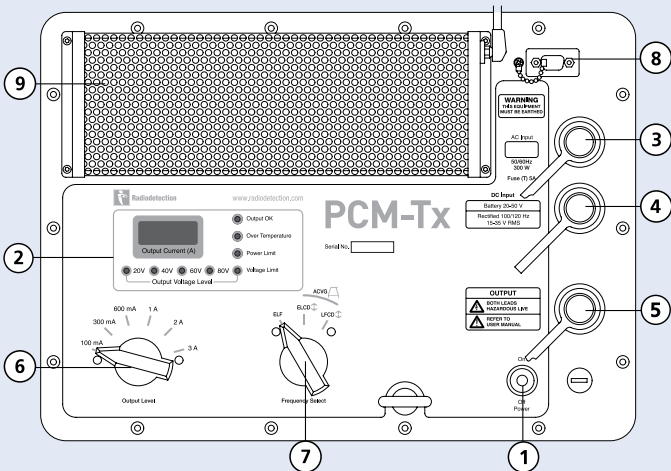
When the receiver is switched on, momentarily press the On/Off key to enter settings menu. When the menu (illustrated below) appears, use the Up and Down keys (14) to scroll through available features. To select required feature, press the On/Off key (1) and then use the Up and Down keys (14) to scroll through the available options.

Press the On/Off key (1) to select the current option.

Features List

- 1** Volume: 4 levels. VOL 0 mutes the speaker and VOL 3 sets the volume to its loudest setting.
- 2** SEND: Sends logged data over a Bluetooth™ connection. Data logs are stored in an industry standard CSV format and can be read by any plain text editor.
- 3** DEL?: Erases the data log file.
- 4** BATT: Select either Alkaline or NiMH batteries.
- 5** PWR?: Selects the power mode frequency to either 50 or 60Hz.
- 6** UNIT. Select either Metric or Imperial measurements.
- 7** SIGL. Select either NORM and LOW. NORM is sufficient for most applications. Select LOW if working in poor conditions.
- 8** BLUT. Bluetooth option menu. Select Off to switch Bluetooth radio off. Select Auto to switch Bluetooth on; note in Auto mode the Receiver will connect to a bonded device. Select Pair to bond the receiver to a compatible Bluetooth device.

PCM+ TX Transmitter



The PCM+ transmitter is housed in a rugged waterproof case. To open the Transmitter, unsnap the clips located either side of the handle. In certain situations, the air pressure within the case may need to be equalised by unscrewing the small knob located by the handle.

The case must remain open during operation; this allows the Transmitter to remain at optimal temperature.

Before closing the case disconnect all cables and keep them away from the heat sink and the support strut.

Transmitter Features

- 1 On/Off switch.
- 2 LCD and LED indicators. Indicates the current output in amps and provides critical feedback on the TX's operation.
- 3 AC Input socket.
- 4 DC Input socket.
- 5 Output lead socket.
- 6 Output Level Selector: Select the output level in amps.
- 7 Frequency Selector: Selects the frequency.
- 8 Serial Port: For service personnel only.
- 9 Heat Sink: Vents heat from the transmitter during operation.

Frequency Select

The LCD displays the selected 4Hz output current in amps.

The three-position rotary switch selects the applied mapping frequencies as follows:

ELF Transmission lines

ELF maximum range:

- 35% 4Hz
- 65% ELF (128Hz or 98Hz)

ELFCD Transmission And Distribution Lines

ELF current direction (ELFCD), medium range:

- 35% 4Hz
- 30% 8Hz (current direction)
- 35% ELF (128Hz or 98Hz)

LFCD Distribution Lines

LF current direction (LFCD), alternative frequency.

- 35% 4Hz
- 30% 8Hz (current direction)
- 35% LF (640Hz or 512Hz)

The 4Hz mapping frequency is always present.

The operator has a choice of selecting the locate frequency and current direction indication if required for identification in congested areas or for fault finding.

Output Current Selector

This rotary switch allows users to select six different 4Hz current settings. These are 100mA, 300mA, 600mA, 1A, 2A, 3A.

When the PCM Transmitter is operating, the selected current will remain at a constant level, unless the input power supply limit is reached.

Warning Lights and Output Indication

Output voltage is indicated by the yellow output voltage level LEDs.

If no LED is lit the voltage is below 20V.

The 20V LED indicates that the voltage applied is between 20 – 40V.

The 40V LED indicates that the voltage applied is between 40 – 60V.

The 60V LED indicates that the voltage applied is between 60 – 80V.

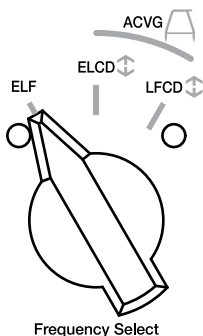
The 80V LED indicates the voltage is between 80 – 100V.

Voltage Limit

The Voltage Limit LED indicates that the Transmitter has reached its 100V output voltage limit. When this happens the resistance of the pipe or ground connection is too high. Check all connections to correct this problem.

WARNING

Pipelines with well-conditioned coating will likely generate a voltage warning as the current is increased.



If the 60V/80V/100V lights are illuminated, do not use excessive voltage or current, as this may result in high current density through small holidays and coating defects. This may cause minor corrosion if the transmitter is left switched on for very long periods.

LCD

The 3 digit LCD displays the 4Hz signal current in amps that is being delivered onto the pipe.

Over Temperature

If the transmitter temperature exceeds its recommended limits it will automatically shut down. Wait until the transmitter has cooled before you recommence operation.

Power Limit

This LED indicates that the external power supply is incapable of supplying the demanded power to support transmission at the selected current. The transmitter has reached its own power limit.

Switch to a lower current setting until the GREEN Output OK LED illuminates. Allow a few seconds to settle between selections.

Locating Cables or Pipes

The PCM+ can locate cables and pipes using a number of different methods and frequency types.

Passive Frequencies

Passive frequencies are detectable without the use of a transmitter. Use passive frequencies when you want to locate a conductor when using a Transmitter is not practical. The PCM+ receiver can detect the following passive frequencies:

- 50 or 60Hz from power cables
- 100/120Hz CPS signals

Active Frequencies

Active frequencies require the use of a Radiodetection transmitter to apply a locatable signal to a pipe or cable.

The PCM+ can detect a range of active frequencies; for example the frequencies that PCM+ TX is capable of transmitting.

Location Procedure

With the receiver, select a locatable mode. Note if an active frequency mode is selected; set your Radiodetection transmitter to induce a signal onto the site or directly onto a cable or pipeline.

Sweep the site holding the PCM receiver upright at your side. Continue the sweep beyond the perimeter of the site. The presence of a buried conducting pipe or cable will be indicated by a tone emitted from the loudspeaker and a spike on the bar graph.

Keep the receiver blade vertical and move slowly backwards and forwards over the conductor. Reduce the gain sensitivity for a narrower response; this will allow you to pinpoint the conductor. When directly

over the conductor and with the sensitivity level set for a narrow response, rotate the receiver on its axis until the signal minimum is found. The blade is now parallel with the conductor.

Using Portable Transmitters

In some circumstances, you may have to use a portable transmitter such as the T3 or T10 to produce a stronger locate signal. For example, the ELF signal from the PCM transmitter may be inadequate when:

- the receiver is a very long distance from PCM transmitter or when,
- locating distribution pipes from buildings where isolation joints are fitted.

Users can connect the portable transmitter to the pipeline/network at a test point or isolation joint using LF, Low Frequency (512/640Hz). You can use either the direct connection and induction methods for 8kHz location modes. PCM 4Hz measurements can be taken if the PCM transmitter is switched on.

Note that when using a portable transmitter, the PCM TX transmitter must not be set to the LF frequency.

Depth Measurement

Upon locating a cable, the Receiver will automatically display the depth in imperial or metric units. Note that depth estimations are not available in 8KFF modes.

Note: A depth measurement will not be displayed where environmental conditions are poor (e.g. weak signal or interference).

The measurement is to the center of the pipe/conductor.

The measurement accuracy is $\pm 5\%$ or better under standard earth conditions and with undistorted fields. If you intend to excavate a located pipe, it is imperative that due care is taken appropriate to the danger of personal injury and damage to infrastructure. It is recommended that depth measurement is repeated throughout an excavation.

SIGNAL CONNECTION

WARNING

Appropriate safety procedures must be followed before removing pipeline CP connection.

Before handling connection leads switch the transmitter OFF.

Procedure

- 1 Disconnect both pipe and anode cables from the rectifier
- 2 Ensure the transmitter is turned off.
- 3 Connect the White signal output lead to the pipe cable.
- 4 Connect the Green signal output lead to a suitable anode cable.

Note: If connections are reversed the current direction arrow on the PCM Receiver will point in the wrong direction.

Use an isolated low resistance ground such as a sacrificial magnesium anode or ground bed.

When connecting to an electrical isolation joint the other pipe section can often provide a suitable ground connection.

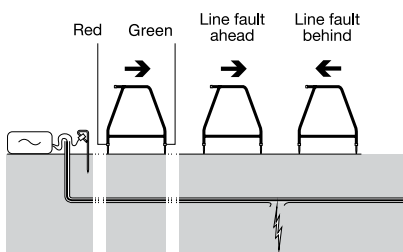
Care must be taken when using an earth stake as the resistance is often not low enough. The stake must be positioned at least 45 M /150 feet from the pipe to ensure an even current distribution.

Fault Finding

The PCM⁺ system features an A-Frame that allows users to find locate cable sheath-to-ground faults on pipes and power and telecommunication lines.

Procedure

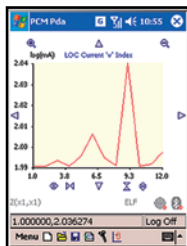
- 1 Connect the Transmitter to the pipeline and ground using the procedure described previously.
- 2 Connect the A-frame to the receiver via the expansion socket.
- 3 Switch the receiver on.
- 4 Select Fault Find mode using the Function Key; a fault find mode is indicated by the A-frame symbol on the Receiver's LCD.
- 5 Place the A-frame spikes in the ground with the red spike nearest the ground stake.
- 6 The FF arrows will display the fault direction. The arrows should point away from the ground stake and the bar graph should read zero.
- 7 Follow the cable pushing the A-Frame spikes into the ground at regular intervals and checking for FF arrows. With no fault, the arrows will flicker on and off and the dB readings will be erratic.
- 8 Keep the red spike facing the ground stake and keep the receiver in line with the A-Frame. Near a fault, the arrows will lock on and the dB reading will increase.
- 9 Move in the direction of the arrows. Find the point at which the arrows change direction.
- 10 Rotate through 90° and move back and forth to locate the fault in this direction, the intersection point will be directly over the fault.
- 11 Should the location of the cable become uncertain the Function key (15) can be used to change between locate mode and FF mode.



PDA Bridge

Radiodetection provides a PocketPC based application that receives and charts logged data from the PCM⁺ in real time. The PCM⁺ can send data logs via its integrated Bluetooth adaptor. If your PDA features a GPS receiver, the PDA Bridge application will automatically map the data to longitude and latitude coordinates.

For more information on this application and its uses go to www.radiodetection.com.



Troubleshooting

When reporting any problem to your Radiodetection Dealer or Supplier it is important to quote the unit serial number and the purchase date.

This instrument, or family of instruments, will not be permanently damaged by reasonable electrostatic discharge and has been tested in accordance with IEC 801-2. However, in extreme cases temporary malfunction may occur. If this happens, switch off, wait and switch on again. If the instrument still malfunctions, disconnect the batteries for a few seconds.

Safety Notices

Radiodetection products should be operated by qualified personnel only.

WARNING! This equipment is NOT approved for use in areas where hazardous gases may be present.

Reduce volume before using headphones.

Batteries should be disposed of in accordance with your company's occupational health and safety procedures, and/or any relevant laws or guidelines in your country.

Service and Maintenance

The PCM+ and the TX are designed so that they do not require regular calibration. However, as with all safety equipment, it is recommended that they are serviced at least once a year either at Radiodetection or an approved repair center.

Radiodetection products, including this user guide, are under continuous development and are subject to change without notice.

Go to **www.radiodetection.com** or contact your local Radiodetection representative for the latest information regarding the PCM+ or any Radiodetection product.

Training

Radiodetection provides training services for most Radiodetection products. Our qualified instructors will train equipment operators or other personnel at your preferred location or at Radiodetection headquarters.

For more information go to **www.radiodetection.com** or contact your local Radiodetection representative.

More information

For case studies or more information on the applications of the PCM+ product range, please visit **www.radiodetection.com**.

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