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# Ω OMEGA® User's Guide



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## HHCL10 Cable and Pipe Locator



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**WARNING:** These products are not designed for use in, and should not be used for, human applications.



# CABLE & PIPE LOCATOR

## USER'S MANUAL



## HHCL10

*Please read this manual carefully and thoroughly before using this product.*

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## INTRODUCTION

On jobs ranging from installing a through-the-wall air-conditioner to renovating a house with new wiring and plumbing, it is vital to know the locations of existing electrical cables and wires, as well as those of metal and non-metal pipes carrying water and gas. Without access to the building's construction drawings, there is no way to be sure that an action as simple as driving a nail into a wall will not produce an electric shock—or far worse.

The HHCL10 Cable & Pipe Locator was designed to address this serious safety issue with maximum flexibility. The HHCL10 consists of two main units—a transmitter and a receiver—and a set of accessories. The two main units work together in the following way in most applications. The user attaches the transmitter to an existing cable or wire (or metal pipe). In response to the push of front-panel buttons, the transmitter sends a radio-frequency current and a digital identifying code down the cable or wire. The current generates an electric field that can be sensed by the receiver if its nose (probe) is positioned nearby—even on the other side of a wall, floor or ceiling. Circuits in the receiver convert the weak induced voltage into a signal strong enough to be displayed graphically and digitally. Other circuits read the identifying code to confirm the source of the signal. By manipulating the strength of the transmitted signal and the sensitivity of the receiver, the user can precisely locate cables, wires or pipes behind walls or under floors, as well as discontinuities within them.

The system is equipped with several functions and features that improve its utility, accuracy and reliability. One is the inclusion of big, bright LCDs, visual and audible indications, and mutable loudspeakers—as well as an LED flashlight—on both units. Another is the system's full compatibility with single-pole and two-pole circuits. Other examples include the ability of either unit to measure AC/DC voltage, just like a voltmeter. The transmitter even automatically tests its own functioning and displays the results.

---

## KEY FEATURES AND BENEFITS

- Makes it safe to break through a wall by revealing and locating hidden cables, electrical lines, and water/gas supply pipelines up to 6.6 ft. (2m) behind it
- Eliminates the need to find and read construction drawings before starting a job
- Detects breaks and short circuits in buried cables, electrical lines and floor-heating systems
- Identifies the circuit breaker or fuse associated with any energized or de-energized 110V outlet
- Traces branch-circuit sockets that have been accidentally plastered over
- Transmitter and receiver communicate using any of eight codes; each displays readings on a big, bright, multi-function graphic LCD. Both units also include a flashlight (for illuminating dark areas) and a mutable beeper/buzzer.
- The transmitter displays its transmission power level (any of three levels), transmission code, battery status, any voltages it detects, and the results of its functional self-test
- The transmitter or receiver also can operate as AC/DC voltmeter with a range of 12 to 600V

- The receiver has variable sensitivity, a backlit display, a loudspeaker and a 10-minute Auto Power Off function. It can display the transmitter's power level and transmission code, the battery status of both units, and the amplitude of detected induced AC voltages
- Both units are compatible with one- and two-pole circuits
- Additional transmitters are available to make locating short-circuits and cable breaks more accurate
- Includes a metal grounding rod
- The transmitter is powered by one 9V battery; the receiver by six "AAA" batteries

## SAFETY INSTRUCTIONS

Prior to using the transmitter, inspect the unit, its test leads and any attached clips or probes carefully for any signs of damage or wear. It is crucial that the instrument and its accessories remain structurally sound. **DO NOT USE** the transmitter if you detect any signs of damage.

Do not exceed the transmitter's overvoltage rating of CAT III 300V at any time.

Although it is safe to connect the transmitter directly to live circuits, use best-practice insulation measures in accordance with industrial safety codes to avoid electric shock and harm.

When near dangerously high voltages, make measurements only under the supervision of a qualified electrician.

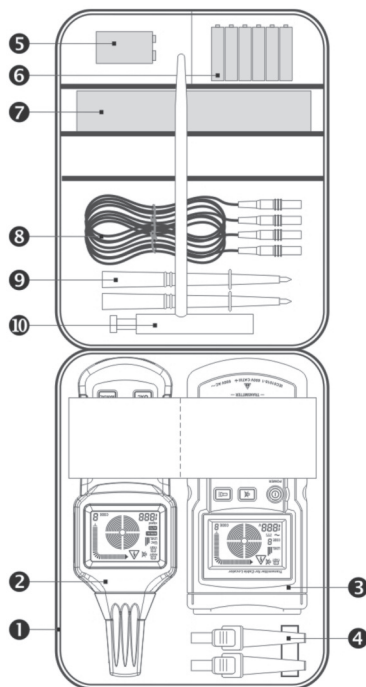
## WHAT'S IN THE BOX

The HHCL10's transmitter, receiver and accessories come in a black canvas pouch inside an illustrated cardboard box.

1. Pouch
2. Receiver
3. Transmitter

### Accessories

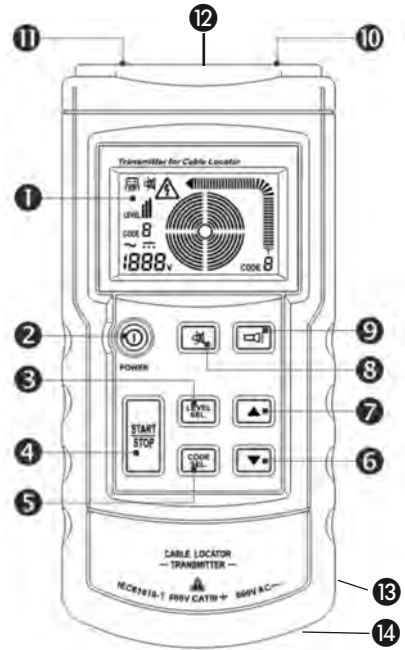
4. Attachable red and black alligator clips with shrouded banana jacks
5. "9V" battery
6. 6 "AAA" batteries
7. User's manual
8. 5 ft. (1.5m) long red and black universal test leads with shrouded banana plugs
9. Attachable red and black test probes with lantern-type tips and shrouded banana jacks
10. Grounding rod



**Fig. 1. How the HHCL10 is packaged**

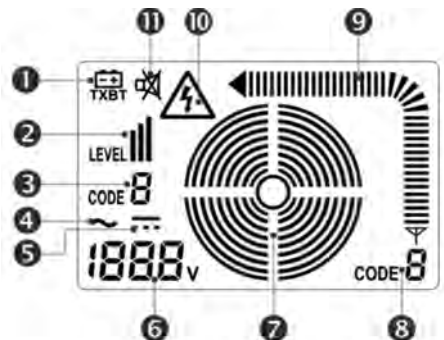
# PRODUCT OVERVIEW

1. LCD
2. ⏻ (POWER on/off) button
3. Transmission power (I, II or III) **LEVEL SEL.** button
4. Transmitting code **START/STOP** transmission button
5. Transmitting **CODE SEL.** button. **Press and hold to enter selection mode; press briefly to exit.**
6. ▼ button (press to reduce power level/change transmitting code). Levels I, II and III and codes F (default), E, H, D, L, C, O and A are available.
7. ▲ button (press to increase power level/change transmitting code)
8. 🚫 (Mute) on/off button
9. 🔦 (Flashlight) on/off button
10. + jack
11. ⚡ (ground) jack
12. Flashlight (on top)
13. Fold-out stand (on back)
14. Battery compartment (on back)








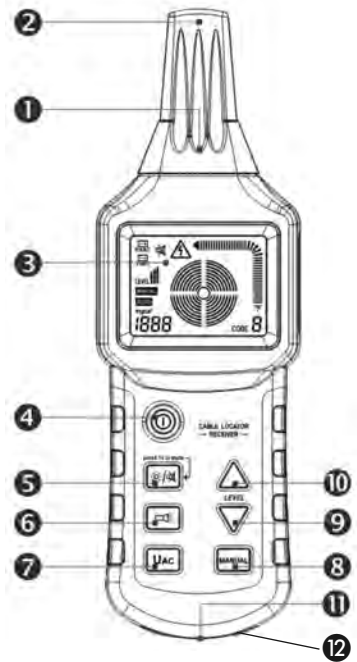
**Fig. 2. The transmitter's controls, display and physical features**

1. 🔋 (Transmitter battery status) icon
2. Transmission power level (I, II or III)
3. Transmitting code
4. AC line voltage
5. DC line voltage
6. Line voltage measured (in voltmeter mode)
7. Transmitting status
8. Code being transmitted
9. Transmission signal amplitude
10. ⚡ (Line voltage detection mode) icon
11. 🚫 (Mute on) icon







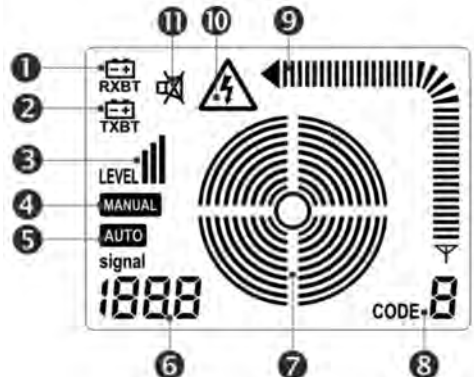
**Fig. 3. All possible indications on the transmitter's LCD**

1. Flashlight
2. Probe
3. LCD
4.  (Power on/off) button
5. Two-function  (backlight/mute) button. **Press briefly to turn LCD backlight on and off; press and hold to enter/exit mute mode** (in which the loudspeaker and button presses are silenced).
6.  (Flashlight) on/off button
7. **UAC** button (press to exit cable locating mode and enter line voltage detection mode)
8. **MANUAL** button (press to enter manual cable locating mode, enabling receiver sensitivity to be reduced).
9.  button (press to reduce receiver sensitivity in manual cable locating mode)
10.  button (press to increase receiver sensitivity in manual cable locating mode)
11. Loudspeaker (on bottom)
12. Battery compartment (on back)



**Fig. 4. The receiver's controls, display and physical features**

1.  (Receiver battery status) icon
2.  (Transmitter battery status) icon
3. Received transmission power level (I, II or III)
4. **MANUAL** cable locating mode indication
5. **AUTO**matic cable locating mode indication
6. One of the following indications:
  - In automatic cable locating mode, a number indicating received signal amplitude
  - In manual cable locating mode, the text **SEL** (indicating no received signal) or a number indicating received signal amplitude
  - In line voltage detection mode, the text **UAC**.
7. Concentric circles graphically representing the current receiver sensitivity. More circles indicate higher sensitivity; fewer circles indicate lower sensitivity.
8. Received transmitting code
9. Received signal amplitude
10.  (Line voltage detection mode) icon
11.  (Mute on) icon



**Fig. 5. All possible indications on the receiver's LCD**



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# SETUP INSTRUCTIONS

## ***INSTALL BATTERIES***

The HHCL10 transmitter is powered by one “9V” battery (included). The HHCL10 receiver is powered by six “AAA” batteries (also included).

### **To install the “9V” battery in the transmitter:**

1. Turn the unit over and lift the fold-out stand (Fig. 2, Callout 13) to expose the battery compartment (Callout 14).
2. Remove the one Philips-head screw securing the battery compartment cover and set it aside.
3. Remove the battery compartment cover and set it aside as well.
4. Install the supplied “9V” battery in the compartment, making sure to match the polarity marks on the battery and the flanged connectors.
5. Replace the battery compartment cover and secure it with the Philips-head screw.

### **To install the “AAA” batteries in the receiver:**

1. Turn the unit over.
2. Remove the one Philips-head screw securing the battery compartment cover (Figure 4, Callout 12) and set it aside.
3. Remove the battery compartment cover and set it aside as well.
4. Install the six supplied “AAA” batteries in the compartment, making sure to match the polarity marks on the batteries with the marks stenciled inside the compartment.
5. Replace the battery compartment cover and secure it with the Philips-head screw.

## ***INSTALL TEST LEADS***

All applications, with the exception of detecting line voltage (see p. 14), require use of the transmitter and the supplied red and black test leads (Fig. 1, Callout 8).

**To install the test leads**, remove the four caps protecting the shrouded banana plugs at both ends of the leads. Insert the plug at either end of the red lead into the + jack (Fig. 2, Callout 10) on the top of the transmitter. Insert the plug at either end of the black lead into the  $\ominus$  jack (Callout 11).

The type of application will determine whether to attach the alligator clips (Fig. 1, Callout 4) or the Lantern-type test probes (Callout 9). In most cases, the alligator clips are preferable because they produce a hands-free connection. If you do use the test probes, remember to remove both sets of caps protecting the probes’ shrouded banana plugs and lantern-type tips. Both accessory types are equipped with banana plugs that you push into the banana jacks of the test leads to make secure connections.

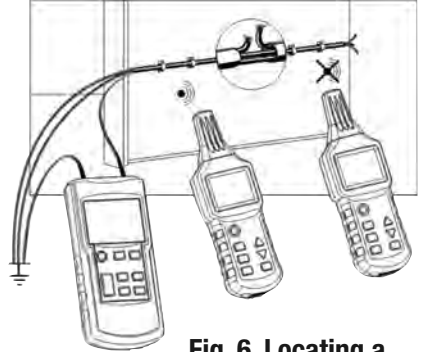
# OPERATING INSTRUCTIONS

## SINGLE-POLE CIRCUIT APPLICATIONS

For all single-pole applications described in this section, the transmitter is connected to only one conductor of a cable or AC line. The return is to ground (earth). In all of the applications in this section, the transmitter sends a digital code and an analog signal at the radio frequency (RF) of 125 kHz through the conductor to ground.

### Locating a Cable or Line Break Behind a Wall

1. Attach the clip or probe at the end of the transmitter's red test lead to the conductor of the cable or line suspected of having a discontinuity.
2. Attach the clip or probe at the end of the black test lead to a suitable ground. All other cables or lines in the bundle must also be connected to the same ground (Fig. 6).
3. Power on the transmitter by pressing the **ⓘ** (**POWER**) button. The LCD will "wake up" and the beeper will sound. If the transmitter's battery is adequately charged and the mute is turned off, the only indications on the transmitter's initial screen will be **LEVEL I** and **CODE F**, both on the left side.
4. Press the **LEVEL SEL.** button. The **LEVEL I** indication will flash. Press the **▲** button once or twice to raise the transmission power level to II or III, respectively. (If you know that the cable or line "hugs" the back side of the wall, keep the power level at I; otherwise, raise it to II or III.) Then press the **LEVEL SEL.** button again to save the setting.
5. Press the **START/STOP** button to begin sending an RF signal and transmitting code "F" over the cable or line. Concentric circles will appear on the transmitter's LCD display and gradually spread, the transmitting code F will appear at lower right, and the special graphic (Fig. 2, Callout 9) will indicate the transmission amplitude.
6. Power on the receiver by pressing the **ⓘ** button. The LCD will "wake up" and the beeper will sound. If the receiver's battery is adequately charged, the only indications on the receiver's initial screen will be the text **AUTO** at lower left (indicating that the unit is in automatic cable locating mode, the default state) and a set of concentric circles in the middle.
7. Move the probe of the receiver (Fig. 4, Callout 2) slowly along the wall away from where the transmitter is connected. At this point, the receiver's LCD should be displaying the transmission power level (Fig. 4, Callout 3), the transmitting code "F" (Callout 8) and the received signal amplitude (Callouts 6 and 9). As the probe moves, the tone of the beeper also changes with the amplitude of the received signal.



**Fig. 6. Locating a cable break**

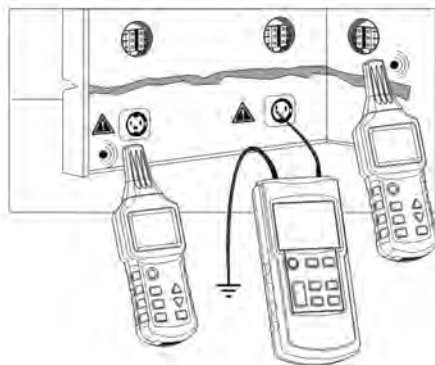
- When the probe of the receiver passes the location of the cable or line break, both indications of received signal amplitude will show a sharp reduction and then disappear. At this moment, press the **MANUAL** button on the receiver (Fig. 4, Callout 8) and move the probe slightly back in the opposite direction.
- With the receiver now in manual cable locating mode, press the ▼ button to begin reducing the receiver's sensitivity. Continue to move the probe in the original direction until the LCD loses the transmitting code, and then move the probe back slightly. If the LCD never loses the code, press the ▼ button again to further reduce the receiver's sensitivity and then move the probe again. The point at which the receiver's LCD can barely display the transmitting code is the location of the cable or line break.

### Locating a Socket, Switch or Junction Box or Tracing a Line

Before performing the following procedure, make sure the circuit is dead (unpowered) and that its neutral line and ground wire are connected and fully operational. Any exposed grounding terminal can be used to ground the transmitter. For line tracing applications, the typical maximum depth is 7 ft.

#### To locate a circuit component or trace a line:

- Attach the supplied red alligator clip or red test probe (depending on the application) to the transmitter's red test lead and then connect the clip or probe to a component known to be part of the circuit, as in Fig. 7.
- Attach the supplied black alligator clip or black test probe to the transmitter's black test lead and then attach the clip or probe to an auxiliary ground, a ground terminal of a grounded socket, or a properly grounded water pipe.
- Follow Steps 3 through 9 of the procedure detailed in "Locating a Cable or Line Break Behind a Wall" on p. 8. Remember that if the cable fed by the transmitter runs in parallel with other conductors (for example, in a cable duct) or if those conductors are crossed, the transmitter's signal is also carried by those other conductors.
- As in the previous application, a component or line can be precisely located by adjusting the transmitter's output power and then operating the receiver in manual mode and adjusting its sensitivity. In both of these applications, the stronger the signal received, the closer the receiver is to the component to be located or the line to be traced. When tracing a line, an abrupt decline in received signal power indicates a line break.



**Fig. 7. Locating a Socket, Switch or Junction Box or Tracing a Line**

## Locating a Cable or Line Break Using Two Transmitters

Attempts to locate a cable or line break by feeding the transmitter's signal into a conductor from one end may not succeed if stray electromagnetic fields are present. One way to solve this problem is to attach a second transmitter to the conductor at its opposite end.

Before you begin, make sure that the circuit is dead (unpowered) and that all transmitters and all cables or lines not being investigated are properly grounded, as in Fig. 8.

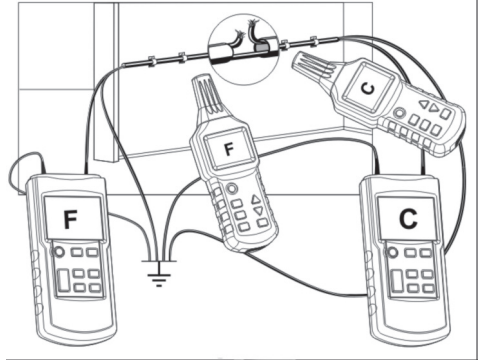
To proceed, connect both transmitters as shown in Fig. 8. Then follow Steps 3 and 4 of the procedure detailed in “Locating a Cable or Line Break Behind a Wall” on p. 8.

However, following Step 4 press and hold the **CODE SEL.** button of the second transmitter. This will cause the text **CODE F** on the left side of the LCD to begin flashing. Press the **▲** button five times to change the code from **F** to **C**. Then press and hold the **CODE SEL.** button again to save the setting.

With the first transmitter sending Code F and the second transmitter sending Code C, complete the procedure by performing Steps 5 through 9. The same HHCL10 receiver will display different codes on either side of the cable or line break. When the receiver displays no code, it is positioned directly at the break, where the codes overlap.

The use of two transmitters is particularly effective at pinpointing breaks in electric floor heating systems characterized by extremely long conductors. There are only two constraints on the technique:

1. If a shield mat is located above the heating wires, no ground connection may exist. If necessary, separate the shield from the ground connection.
2. In addition to ensuring good grounding, make sure that there is considerable distance between the grounding terminal of the transmitter and the target line. If this distance is too short, it may be impossible to precisely locate the line.

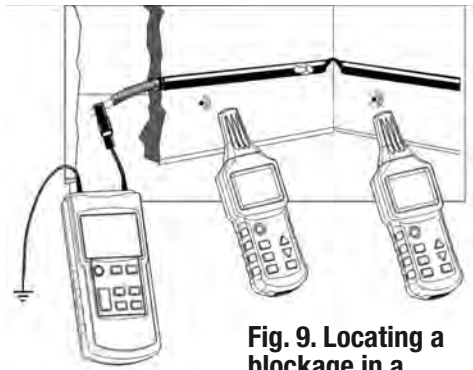


**Fig. 8. Using two transmitters to locate a cable or line break**

## Locating a Blockage in a Non-metallic Pipe

The basic procedure used in all of the previous applications also can be used to locate a blockage in a non-conductive (plastic, for example) pipe. In this case, the + terminal of transmitter is connected to a metal tube or piece of flexible conduit thin enough to be fed into the pipe, as shown in Fig. 9.

When the signal induced in the receiver drops off sharply, the receiver is directly above the blockage.



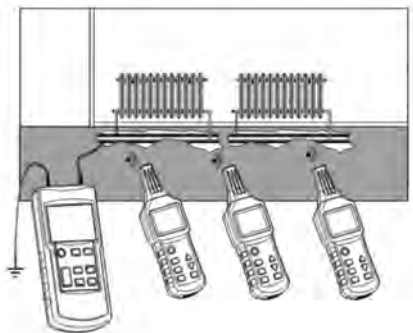
**Fig. 9. Locating a blockage in a non-metallic pipe**

## Locating a Metal Water Pipe

The basic procedure used in all of the previous applications can even be used to detect the presence of a hot or cold water pipe made of metal (such as galvanized steel).

Before proceeding:

- Make sure that all electrical equipment connected to the water distribution system is powered off.
- Make sure that the pipe to be located is not grounded. If the impedance between the pipe and ground is not large enough, the location distance will be very short.
- Use a wire to connect the transmitter's  $\oplus$  jack to ground.



**Fig 10. Locating a cold (left) or hot (right) metal water pipe**

## TWO-POLE CIRCUIT APPLICATIONS

For all two-pole applications (U.S. 240VAC) described in this section, you will create a closed circuit by attaching both test leads of the transmitter to the power circuit's conductors (lines). The exact connection depends on whether the power circuit is live (energized) or dead (de-energized).

### For live circuits:

Connect the transmitter's + jack to the phase line and the  $\ominus$  jack to the neutral line. If the circuit is unloaded, the modulated output of the transmitter will be coupled into the neutral line by the circuit's distributed capacitance and then return to the transmitter.

### For dead circuits:

Connect the transmitter's + jack to a terminal of any conductor, connect the  $\ominus$  jack to the terminal of another parallel conductor, and then connect the other two terminals of the circuit to each other. In this configuration, the modulated output of the transmitter will directly return to it through the power circuit.

Alternatively, the two test leads of the transmitter can be connected to the two ends of the conductor. Or the transmitter's + jack can be connected to a terminal of any conductor while the jack can be connected to the power circuit's protective grounding terminal.

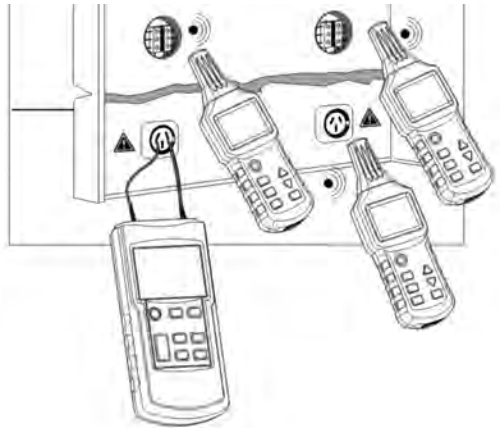
### Locating a Socket, Switch, Junction Box or Fuse or Tracing a Line

For all applications in this section:

- If the circuit is dead, the transmitter only sends a transmitting code to the component to be located.
- If the circuit is live, the transmitter not only sends encoding signals to the circuit to be detected, but also measures and displays the voltage of the live circuit.

Fig. 11 shows how to connect the transmitter and how to position the receiver to locate various components. Note the similarities and differences between this configuration and the configuration for single-pole circuits shown in Fig. 7.

To proceed, use the same procedure used for "Locating a Cable or Line Break Behind a Wall" section on p. 8. As before, a component or line can be precisely located by adjusting the transmitter's output power and then operating the receiver in manual mode and adjusting its sensitivity. In both of these applications, the stronger the signal received, the closer the receiver is to the component to be located or the line to be traced. When tracing a line, an abrupt decline in received signal power indicates a line break.

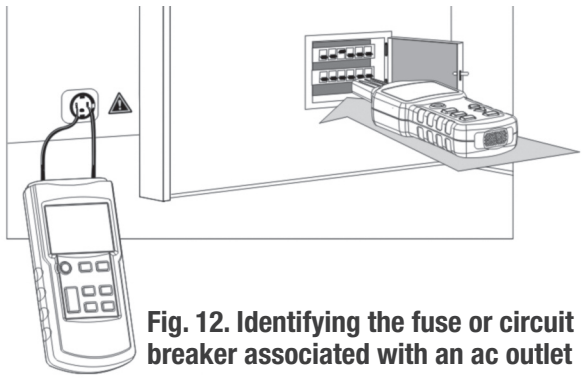


**Fig. 11. Locating a socket, switch, junction box or fuse or tracing a line**

## Identifying the Fuse or Circuit Breaker Associated with an AC Outlet

Unlike inexpensive AC-powered circuit breaker finders, the HHCL10 can identify the breaker associated with an outlet of a de-energized circuit because the HHCL10's transmitter is battery-powered.

Before proceeding with this application, you should reduce the transmitter's output current to a suitable level. Then connect the transmitter to the outlet as shown in Fig. 12.



**Fig. 12. Identifying the fuse or circuit breaker associated with an ac outlet**

The next step is to open the door of the distribution panel (breaker box). You will touch the probe on top of the receiver to all breakers or fuses in the distribution panel in turn. The breaker or fuse that produces the strongest signal in the receiver is the one associated with the outlet that the transmitter is plugged into.

## Locating a Short Circuit

A procedure virtually identical to the one on p. 8 can be used to locate a short circuit in a two-pole circuit. The only difference is that the transmitter is connected as shown in Fig. 13.

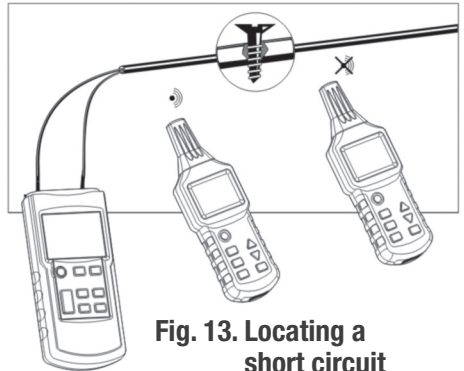
Before proceeding, de-energize the circuit. Then try to determine the impedance of the short circuit.

When searching for short circuits in coated electric wires and cables, the depth of detection may vary because the core wires are twisted together in the jacket. Experience has it that only short circuits with a impedance lower than 20 ohms can be detected. The impedance of a short circuit can be measured with a multimeter.

If the impedance of a short circuit is higher than 20 ohms, try to use the procedure for locating a cable or line break to locate the short circuit. In doing so, it may help to increase the output power of the transmitter.

## Increasing the Detection Range on Charged Circuits

When the transmitter is connected to a two-pole circuit's phase and neutral lines, transmitted signals are physically carried in parallel. As a result, the twisting of conductors may cause signals to cancel each other out. This effect may reduce the transmitter's radius of effective detection to 2 ft. or less.



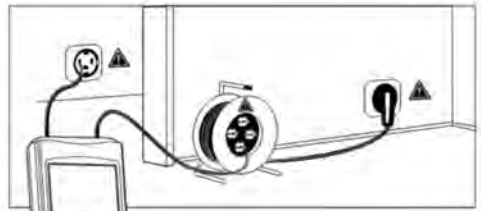
**Fig. 13. Locating a short circuit**

To counter this effect, consider making the connection shown in Fig. 14. Use of a cable reel can increase the transmitter's effective radius to 10 ft. or more.

### **USING THE RECEIVER AS A VOLTMETER**

To use the receiver as a voltmeter:

1. Press the **UAC** button (Fig. 3, Callout 7). The text **UAC** will appear at the bottom left of the LCD.
2. Position the probe near a current-carrying line. The strength of the induced signal will be indicated by the length of the received signal amplitude graphic (Fig. 4, Callout 9) and the tone of the beeper (if not muted). The higher the voltage and the shorter the distance to the circuit, the longer the graphic and the higher the beeper frequency.
3. If line voltage is detected, the familiar "Danger-AC Voltage" icon will also appear on the LCD, on the top line.



**Fig. 14. Using a cable reel to increase the transmitter's detection radius**



# SPECIFICATIONS



Transmitter	Output Signal Frequency	125 kHz
	Voltage Measurement Range/Accuracy	12 to 600V AC or DC / $\pm$ 2.5%
	Display	2.4 in. (61mm) diagonal LCD
	Dielectric Strength	400V AC/DC, max
	Overvoltage Rating	CAT III 300V
	Power Consumption	31mA (min), 115mA (max)
	Fuse Rating/Dimensions	500mA @ 1000V/6.3mm (diameter) x 32mm (long)
	Operating Temperature	32° to 104°F (0° to 40°C) @ <80% RH
	Storage Temperature	-4° to 140°F (-20° to 60°C) @ <80% RH
	Dimensions	7.5 x 3.5 x 1.7 in. (190 x 89 x 43mm)
	Weight	12.7 oz. (360g) without battery; 14.8 oz. (420g) with battery
	Power Source	One “9V” battery

Receiver	Line Voltage Detection Range	~1.3 ft. (0.4m)
	Cable & Pipe	Single-pole Applications ~6.6 ft. (2m)
	Location Range	Two-pole Applications ~ 2 ft. (0.5m)
	Display	2.4 in. (61mm) diagonal LCD with backlight
	Auto Power Off Trigger	10 minutes of inactivity
	Operating Temperature	32° to 104°F (0° to 40°C) @ <80% RH
	Storage Temperature	-4° to 140°F (-20° to 60°C) @ <80% RH
	Power Consumption	32mA (min), 89mA (max)
	Dimensions	9.5 x 3.1 x 1.5 in. (242 x 78 x 39 mm)
	Weight	9.9 oz. (280g) without battery; 12.3 oz. (350g) with battery
	Power Source	Six “AAA” batteries

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# OPERATING & MAINTENANCE INSTRUCTIONS

## **CHANGING BATTERIES**

When the  icon on the transmitter or receiver, or the  icon on the receiver begins to flash, it's time to change the power source of the indicated unit.

Before proceeding to change the transmitter's "9V" battery, power off the unit and all circuits to which it is connected and remove all connecting wires.

Detailed instructions for changing the transmitter's battery and the receiver's batteries are found on p. 7 of this manual.

If you do not expect to use the transmitter or receiver for a relatively long time (several months), remove its battery to avoid the possibility of battery acid leaking and causing damage.

## **CHECKING AND REPLACING THE TRANSMITTER'S FUSE**

The transmitter's fuse is designed to prevent the unit from being damaged by overload or misuse. If the fuse blows, the transmitter will be able to transmit only weak signals. If the unit passes its functional self-test but the signal it generates is weak, it is likely that the fuse has been blown. If the self-test detects no generated signal and the battery is adequately charged, it is likely that the entire unit requires repair. In this case, if the HHCL10 is under warranty, contact Omega's Customer Service Department to arrange to return the unit for repair.

To check whether the transmitter's fuse has blown:

- Disconnect the transmitter from all external circuits.
- Plug in both test leads.
- Power on the unit and press the **LEVEL SEL.** button to choose Level I.
- Press the **START/STOP** button.
- Power on the receiver and move its probe near the red test lead.
- If the fuse has not blown, the receiver will display a strong signal.

If the fuse blows while the HHCL10 is still under warranty, you should contact Omega's Customer Service Department to arrange to return the transmitter for outfitting with a new fuse. While the unit is under warranty, you should NOT attempt to replace the fuse yourself. Replacing the fuse requires opening the transmitter's housing, and doing so voids the warranty because it could disable the unit's internal safety circuits.

If the fuse blows after the warranty period has expired, you can replace it yourself with a fuse of the same rating and dimensions. The factory-installed fuse is a single-metal-wire, fast-acting type. DO NOT replace it with either a helical-metal-wire fuse or a slow-blow unit.

**To change the fuse** (if it blows following expiration of the 1-year limited warranty term), you must open the HHCL10's housing. To do so:

1. Turn the unit over and remove the two Philips-head screws at the top corners of the back half of the housing.
2. Remove the one Philips-head screw securing the battery compartment cover to the back.
3. Lift the cover to expose the other two Philips-head screws securing the two halves of the housing to each other. Remove those two screws as well.
4. Carefully separate the two halves of the housing as far as the two flanged connectors in the battery compartment allow. The transmitter's fuse—a white cylinder with silvered sleeves on both ends—should be visible seated in its holder.
5. Carefully pry the fuse out of the holder and replace it with a fast-acting ceramic fuse with a rating of 500mA @ 1000V and dimensions of 6.3mm (diameter) x 32mm (long).
6. Carefully reassemble the housing by replacing the five screws in the reverse order in which they were removed.

### **OPERATING & MAINTENANCE TIPS**

DO NOT expose either the transmitter or the receiver to:

- Direct sunlight
- High humidity or temperatures (above 104°F/40°C during operation or 140°F/60°C in storage)
- Corrosive or explosive gas
- Excessive dust
- Strong mechanical vibration or stress (dropping, for example) or electromagnetic radiation

Before using a transmitter or receiver that has been subjected to extreme temperatures, allow several hours for it to acclimate to your local conditions.

Do not open the housing of either the transmitter or receiver (except to replace the transmitter's fuse after the 1-year limited warranty period has expired). Opening the housing of, or disassembling either unit voids the product warranty and could disable its safety circuitry.

You may clean the housing of the transmitter or receiver with a clean rag and water or a mild detergent. Never use benzene, alcohol, acetone, ether, ketone, paint thinner or gasoline. After cleaning a unit, allow it to dry thoroughly before using it again.

Use a rag dipped with clean water or neutral detergent to wipe the transmitter, and then use a dry rag to wipe it again.



## WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **13 months** from date of purchase. OMEGA's WARRANTY adds an additional one (1) month grace period to the normal **one (1) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components in which wear is not warranted, include but are not limited to contact points, fuses, and triacs.

**OMEGA is pleased to offer suggestions on the use of its various products. However, OMEGA neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by OMEGA, either verbal or written. OMEGA warrants only that the parts manufactured by the company will be as specified and free of defects. OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESSED OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive, and the total liability of OMEGA with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall OMEGA be liable for consequential, incidental or special damages.**

CONDITIONS: Equipment sold by OMEGA is not intended to be used, nor shall it be used: (1) as a "Basic Component" under 10 CFR 21 (NRC), used in or with any nuclear installation or activity; or (2) in medical applications or used on humans. Should any Product(s) be used in or with any nuclear installation or activity, medical application, used on humans, or misused in any way, OMEGA assumes no responsibility as set forth in our basic WARRANTY/DISCLAIMER language, and, additionally, purchaser will indemnify OMEGA and hold OMEGA harmless from any liability or damage whatsoever arising out of the use of the Product(s) in such a manner.

## RETURN REQUESTS/INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting OMEGA:

1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering.

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