211097

CIRCUIT TESTER

USER MANUAL

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Table of Contents

Cargo 211097 instructions 1
Hook-up and quick self-test 2
Turning the audio tone on and off 2
Circuit breaker....3
Voltage and polarity testing....3
Continuity testing 4
Activating components out of vehicle's electrical system 5
Testing trailer lights and connections 6
Activating electrical components in the vehicle....7
Activating electrical components with Ground 8
Checking for bad ground contact 9
Following and locating short circuits 9
Red/Green polarity indicator and audio tone 9
Modes 9
Modes chart 11

IMPORTANT TIP:
When powering-up components, you can increase the life of your Cargo 211097 switch, if you first press the switch, then contact the tip to the component. The arcing will take place at the tip instead of the contacts of the switch.

INTRODUCTION
The Cargo 211097 is the most revolutionary circuit tester to date. The Cargo 211097 literally speeds you through the diagnosing of 12 to 24 volt automotive electrical systems. After connecting the Cargo 211097's clips to the vehicle's battery the automotive technician can determine at a glance, the voltage level and the polarity of a circuit without running for a voltmeter or reconnecting hook-up clips from one battery pole to the other. The power switch allows the automotive technician to conduct a positive or negative battery current to the tip for activating and testing the function of electrical components without wasting time with jumper leads. And the Cargo 211097 is short circuit protected. It tests for bad ground contacts instantly without performing voltage drop tests. It allows you to follow and locate short circuits without wasting precious fuses. The Cargo 211097 can also test for continuity with the assistance of its auxiliary ground lead. With a flip of the power switch, you will know at a glance that your Cargo 211097 is functionning without running to the battery as you would otherwise have to do with simple test lights. The Cargo 211097's long cable allows you to test along the entire length of the vehicle without constantly searching for ground hook-ups. An absolute must for every automotive technician looking for a fast and accurate solution to electrical systems diagnostics.
Before using the tester please read the instruction book carefully.

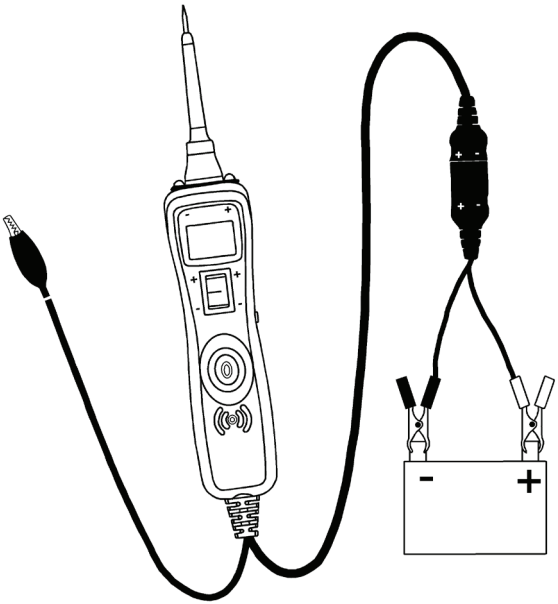
WARNING
When the testers switch is depressed battery current/ voltage is conducted directly to the tip which may cause sparks when contacting ground or certain circuits. Therefore the tester should NOT be used around flammables such as gasoline or its vapors. The spark of an energized Cargo 211083 could ignite these vapors. Use the same caution as you would when using an arc welder.

Cargo 211097 is NOT to be used with 110/220 volt home electrical, it is only for use with 12-24 volt systems.

HOOK-UP
Unroll the cable.
Connect the RED battery hook-up clip to the POSITIVE (+) terminal of the vehicle's battery.
Connect the BLACK battery hook-up clip to the NEGATIVE (÷) terminal of the vehicle's battery.
When the tester is first connected to a battery (power source), it will sound a quick high and then low beep and go into "Power Probe Mode" (See Mode #1 on page 9) and the 2 bright white LEDs 8dual head lights9 will be on to illuminate the test area of the probe tip.

QUICK SELF-TEST
While the tester is in Power Probe Mode, press the power switch forward to activate the tip with a positive (+) voltage. The positive sign (+) LED should light red and the LCD display will read the battery (supply) voltage.
If the tone feature is turned on, a high pitched tone will sound.
Press the power switch rearward to activate the tip with a negative (÷) voltage. The negative sign (÷) LED should light green and the LCD display will read "0.0" (ground).
If the tone feature is turned on, a low pitched tone will sound. The tester is now ready to use. If the indicator did not light, depress the reset button of the circuit breaker on the right side of the housing and try the selftest again.

TURNING THE AUDIO TONE ON AND OFF
While the tester is in Power Probe Mode, just do a quick press of the mode button to toggle the tone on or off.
While quickly pressing (a quick press and release) the mode button, if a short high beep is heard, this means the audio tone is turned on. If a short low beep is heard, the audio tone is off.



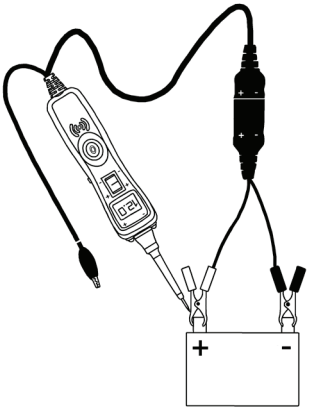
CIRCUIT BREAKER
In Power Probe Mode (Mode#1) with the circuit breaker tripped, the LCD will display the symbol
“C B“ (see page 11 for detail). All other functions of the Cargo 211097 are still active. This means that you can still probe a circuit and observe the voltage reading. When the circuit breaker is tripped, the Cargo 211097 will NOT be able to conduct battery current to the tip even when the power switch is pressed. Intentionally tripping the breaker and using the Cargo 211097 to probe can be considered an added precaution against accidental pressing of the power switch.

VOLTAGE AND POLARITY TESTING
While the Cargo 211097 is in Power Probe Mode, contact the probe tip to a POSITIVE circuit. The red positive sign “+“ LED will light and the voltmeter displays the voltage reading within 1/10th of a volt (0.1 V.).

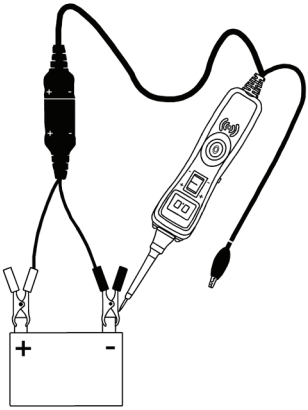
If the audio feature is turned on, a high pitched tone will sound. (See RED/GREEN POLARITY INDICATOR AND AUDIO TONE on page 9).

While the Cargo 211097 is in Power Probe Mode, contact the probe tip to a NEGATIVE circuit. The green negative sign “÷“ LED will light and the voltmeter displays the voltage. If the audio feature is turned on, a low pitched tone will sound.

Contacting the Power Probe tip to an OPEN circuit will be indicated by neither of the LED indicators lighting.

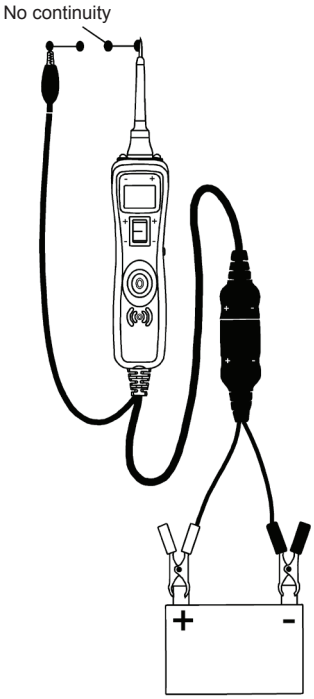


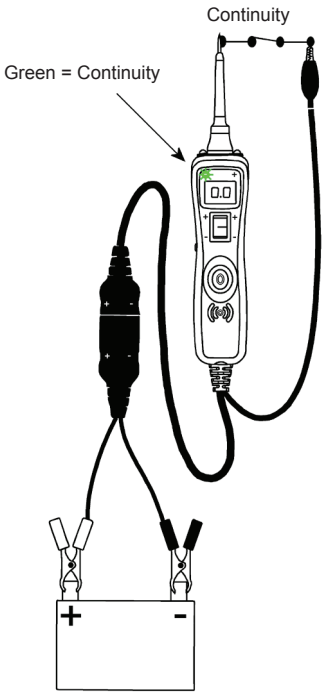
While the Cargo 211097 is in Power Probe Mode, contact the probe tip to a POSITIVE circuit. The red positive sign “+“ LED will light and the voltage reading of the circuit will be indicated on the LCD display. If the audio feature is turned on, a high pitched tone will sound.



While the Cargo 211097 is in Power Probe Mode, contact the probe tip to a NEGATIVE circuit. The green negative sign “÷“ LED will light. If the audio feature is turned on, a low pitched tone will sound.

CONTINUITY TESTING
While the Cargo 211097 is in Power Probe Mode, and by using the Power Probe tip in connection with the auxiliary ground lead, continuity can be tested on wires and components that are disconnected from the vehicle's electrical system.
When continuity is present, the green negative sign "÷" LED will light and the LCD display should indicate "0.0" volts.





ACTIVATING COMPONENTS OUT OF VEHICLE'S ELECTRICAL SYSTEM

While the Cargo 211097 is in Power Probe Mode and by using the Power Probe tip in connection with the auxiliary ground lead, components can be activated right on your hand, thereby testing their function.

Connect the negative auxiliary clip to the negative terminal or ground side of the component being tested. Contact the probe to the positive terminal of the component, the green negative sign "÷" LED indicator should light GREEN indicating continnuity through the component.

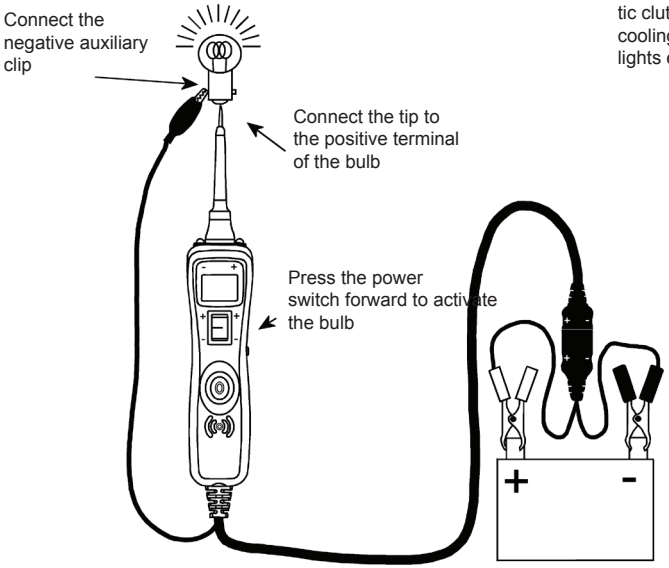
While keeping an eye on the green LED negative sign, quickly depress and release the power switch forward (+). If the green negative sign "÷" LED went out and the red positive sign "+" came on, you may proceed with further activation. If the green negative sign "÷" LED went off at that instant or if the circuit breaker tripped, the Power Probe has been overloaded.

This could happen for the following reasins:

- The contact you are probing is a direct ground or negative voltage.
- The component you are testing is short-circuited.
- The component is a high current component (i.e., starter motor).

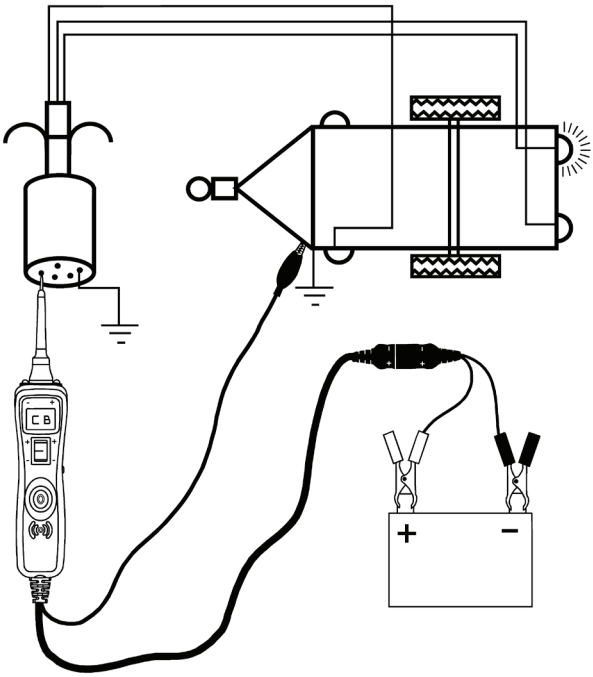
If the circuit breaker is tripped, reset it by waiting for it to cool down and then depressing the reset button.

Activate fuel pumps, magnetic clutches, starter solenoids, cooling fans, blower motors, lights etc.



TESTING TRAILER LIGHTS AND CONNECTIONS

1. Connect the tester to a good battery.
2. Clip the auxiliary ground clip to the trailer ground.
3. Probe the contacts at the jack and apply voltage to them. This lets you check the function and orientation of the connector and trailer lights. If the circuit breaker tripped, that contact is likely a ground. Reset the circuit breaker by letting it cool down and depressing the reset button until it clicks into place.



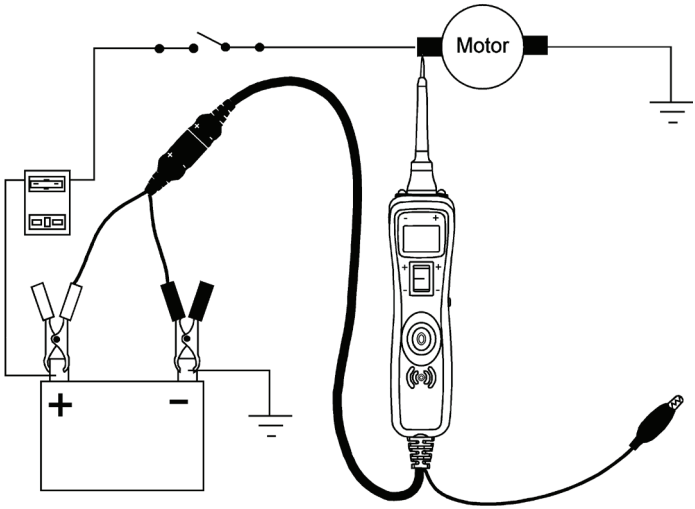
ACTIVATING ELECTRICAL COMPONENTS IN THE VEHICLE

To activate components with positive (+) voltage:
Contact the probe tip to the positive terminal of the component, the green negative sign "÷" LED should light. Indicating continuity to ground.
While observing the green indicator, quickly depress and release the power switch forward (+). If the green indicator went out and the red positive sign (+) LED came on, you may proceed with further activation. If the green indicator went off at that instant or if the circuit breaker tripped, the tester has been overloaded. This could happen for the following reasons:

- The contact is a direct ground.
- The component is short-circuited.
- The component is a high current component (i.e., starter motor).

If the circuit breaker tripped, reset it by allowing it to cool down and then depress the reset button.

WARNING: Haphazardly applying voltage to certain circuits can cause damage to a vehicle's electronic components. Therefore, it is strongly advised to use the correct schematic and diagnosing procedure while testing.



Trick: When powering-up components, you can increase the life of your tester switch if you first press the switch, then contact the tip to the component. The arcing will take place at the tip instead of the contacts of the switch.

ACTIVATING ELECTRICAL COMPONENTS WITH GROUND

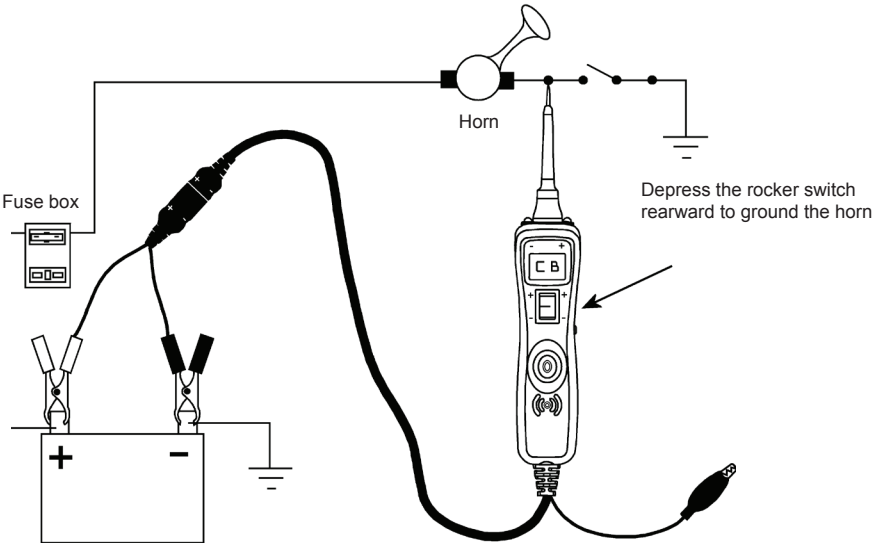
Contact the probe tip to the negative terminal of the component, the LED indicator should light RED.

While keeping an eye on the red positive sign “+“ LED, quickly depress and release the power switch rearward (-). If the red indicator went out and the green negative sign (÷) came on you may proceed with further activation. If the green indicator went off at that instant or if the circuit breaker tripped, the tester has been overloaded. This could have happened for the following reasons:

- The contact is a direct positive voltage.
- The component is short-circuited.
- The component is a high current component (i.e., starter motor).

If the circuit breaker tripped, reset it by allowing it to cool down and then depress the reset button.

WARNING: With this function, if you are contacting a protected circuit, a vehicle’s fuse can be blown or tripped if you apply ground to it.



CHECKING FOR BAD GROUND CONTACT
Probe the suspected ground wire or contact with the probe tip.

Observe the green negative sign "÷" LED. Depress the power switch forward then release. If the green negative sign "÷" LED went out and the red positive sign "+" came on, this is not a true ground. If the circuit breaker tripped, this circuit is more than likely a good ground. Keep in mind that high current components such as starter motors will also trip the circuit breaker.

FOLLOWING AND LOCATING SHORT CIRCUITS
In most cases a short circuit will appear by a fuse or a fusible link blowing or an electrical protection device tripping (i.e., a circuit breaker). This is the best place to begin the dearch. Remove the blown fuse from the fuse box.
Use the Power Probe tip to activate and energize each of the fuse contacts. The contact which trips the Cargo 211097 circuit breaker is the shorted circuit. Take note of this wire's identification code or color. Follow the wire as far as you can along the wiring harness, for instance if you are following a short in the brake light circuit you may know that the wire must pass though the wiring harness at the door sill. Locate the color-coded wire in the harness and expose it. Probe through the insulation with the Power Probe tip and depress the power switch forward to actovate and energize the wire. If the Power Probe circuit breaker tripped you have verified the shorted wire. Cut the wire and energize each end with the Power Probe tip. The wire end which trips the Power Probe circuit breaker again is the shorted circuit and will lead you to the shorted area. Follow the wire in the shorted direction and repeat this process until the short is located.

RED/GREEN POLARITY INDICATOR AND AUDIO TONE
The "RED/GREEN Polarity Indicator" lights-up when the probe tip voltage matches the battery voltage within ± 0.5 V. This means that if you contact a circuit that is not a good ground or a good hot, you will see this instantly by the "RED/GREEN Polarity Indicator" NOT lighting. The Audio Tone runs parallel to the "RED/GREEN Polarity Indicator" and will also NOT react when contacting a circuit that does not match the battery voltage within ± 0.5 V.

MODES
Using the advanced features and modes is optional. However, understanding them will expand your diagnosing capabilities. The LCD display indicates voltage levels of the circuit along with an identifying symbol showing what mode it is in. the additional features contain 5 modes which gives specific information about how the circuit is reacting. **The 5 modes can be accessed by depressing the MODE button and through each one.**

Mode #1 Power Probe Mode:
While the Cargo 211097 is in "Power Probe Mode" and the probe tip is floating (not contacting a circuit), the LCD backlight is on but the display is blank. If the audio tone is turned on you will see a speaker symbol in the lower right corner of the display.
Once you contact the probe tip to a circuit the LCD display will indicate the average voltage level of the circuit. The red/green polarity indicator (See section Red/Green Polarity Indicator and Audio Tone) will respond also, showing whether the circuit is positive or negative.
A secondary feature in this mode is the peak threshold detection and signal monitoring. When contacting a signal generating circuit such as a speaker wire with audio signals on it, the Cargo 211097 detects the peak to peak signals and displays the peak to peak voltage in the display, the sound of the signals will be monitored and heard through the Cargo 211097 speaker. The peak to peak threshold levels are pre-selected by the operator in "Mode 5". See Mode #5 for more information on setting threshold levels.
Placing the Cargo 211097 tip next to a sparkplug wire (NOT probing directly), allows you to monitor the sound of the ignition pulses at the same time display a peak to peak reading. The Cargo 211097 senses the pulses in ignition wires through capacitive coupling (DO NOT CONTACT PROBE TIP DIRECTLY TO THE SECONDARY IGNITION CIRCUIT). By monitoring each plug wire in this way you can locate missing cylinders.

Mode #2 Negative Peak Mode:
The Negative Peak Mode monitors a positive circuit and captures the lowest voltage that it has dropped to. To do this: Place the Cargo 211097 in "Negative Peak Mode" by pressing and holding the mode button for 1 second until you hear a low pitched beep and the LCD display indicates a negative (÷) sign in the lower left corner. The display should also indicate a reading of "0.0" with the probe floating. (This is because no voltage is present). Probe the positive circuit you want to test and tap the mode button once. The LCD display will show the lowest detected voltage of the circuit. If the circuit drops in voltage at anytime, a new lowest reading will be captured and displayed. You can then do a quick tap of the mode button once again to reset the LCD display and indicate the new voltage level on the circuit. Reset the LCD display by doing a quick tap of the mode button as often as necessary.

An APPLICATION for the use of the "Negative Peak Mode": Lets say you have a circuit that is suspect of

loosing a connection and the voltage drops, causing something to turn off or malfunction. Probing the circuit and monitoring it in "Negative Peak Mode" will instantly indicate as the circuit drops in voltage. You can monitor the circuit while wiggling wires and pulling on connectors to see if the voltage drops. Since the minimum voltage reading is captured and held on the display, you can inspect it at a later time. You could also perform a battery crank test.

Mode #3 Positive Peak Mode:
The "Positive Peak Mode", monitors the probed circuit and captures the highest detected voltage. Place the Cargo 211097 into "Positive peak Mode" by pressing and holding the mode button for 1 second until you hear a beep. Repeat this until you hear a quick high pitched beep and the LCD display indicates a positive (+) sign in the lower left corner. The display should also indicate a reading of "0.0" with the probe tip floating. Probe the circuit and the Cargo 211097 instantly displays and holds the highest voltage reading. This means you can remove the probe from the circuit and the voltage reading remains displayed for your reference. Reset the LCD display by doing a quick tap of the mode button.

An APPLICATION for the use of the "Positive Peak Mode": Lets say you have a circuit that is supposed to be off and it is suspected of turning on inappropriately or getting a signal for some reason. Probing the circuit and monitoring it in the "Positive Peak Mode" will instantly indicate as the circuit increases in voltage. You can monitor the circuit while wiggling wires and pulling on connectors to see if the voltage increases. Since the maximum voltage reading is captured and held on the display, you can inspect the reading at a later time.

Maybe you have to probe a circuit deep under a dash and the display is obstructed from view. In "Positive Peak Mode" just probe the wire then remove the probe and look at your voltage reading. Connect to starter terminal to capture maximum voltage to the starter while cranking. Quickly finds voltage drops in the wiring and start connection (Soledoid).

Mode #4 Peak to Peak Mode:
The "Peak to Peak" mode measures the difference between the positive and negative peak voltage levels over a 1 second period. With this feature you can measure and monitor for example, the diode rectifier in a charging system while the engine is running. The peak to peak readings will give the technician the data necessarry to determine if a diode rectifier is defective or not. A normal peak to peak reading while testing a charging circuit is usually under 1 volt. If a defective rectifier is present the peak to peak reading will be over 1 volt and possibly over 3 volts.
When probing in "Peak to Peak Mode" the display shows activity of circuits such as fuel injectors, distributor pick-ups, cam and crank sensors, oxygen sensors, hall effect sensors. Measures flyback voltage of injectors to quickly find a problem.

Mode #5 Treshold Level Setting for the Peak to Peak Detection in Power Probe Mode:
This mode is only used to adjust the treshold voltage in "Power Probe Mode" for peak to Peak Detection and Signal Monitoring. To set the threshold level for the peak to peak detection in "Power Probe Mode", press and hold the mode button for one second until you hear the beep. Repeat this a second, third and fourth time and/or until an alternating positive (+) and negative (÷) sign is present in the bottom left corner of the LCD display. You can now toggle the threshold level by a quick tap of the mode button and observing the voltage level settings. The peak to peak threshold voltage settings loop incrementally from 0.2, to 0.5 to 1.0 to 2.0 to 5.0 to 10.0 to 50.0 and return back to 0.2 again. An audio installer would find the 0.2 V. setting convenient.
Once you select the desired threshold voltage, press and hold the mode button again until it beeps. This returns you to the "Power Probe Mode". You will know that you are in the "Power Probe Mode" when the LCD display is blank and/or with the "Speaker Symbol" shown in the bottom right corner.

Navigation	Mode#	Display	Mode/Function	Output
When the Cargo 211097 is initially connected to the vehicles battery or a 12-24 volt power supply, it enters Mode#1 automatically. To enter into Mode#2 press and hold Mode button until you hear a low pitched beep.	**#1**	  	Power Probe Mode: With Audio Tone On. Power Probe Mode: With Audio Tone Off. Power Probe Mode: With the Circuit Breaker tripped with Audio Tone On. Power Probe Mode: with the Circuit Breaker tripped with Audio Tone Off	Displays the average D.C. voltage. Displays the Peak to Peak A.C. voltage when the voltage is more than ***Mode 5 Threshold*** setting. Limited to 65 V.
To enter into Mode#3 press and hold Mode button until you hear a high pitched beep.	**#2**		Negative Peak to Peak Mode	Captures the most ***negative*** voltage transition.
To enter into Mode#4 press and hold Mode button until you hear a low to high pitched beep.	**#3**		Positive Peak to Peak Mode	Captures the most ***Positive*** voltage transition.
To enter into Mode#5 press and hold Mode button until you hear a mid pitched beep.	**#4**		Peak to Peak Mode	Displays the difference between ***Peak to Peak*** voltage.
To return to Mode#1 press and hold Mode button until you hear a high and low beep.	**#5**	 Actively alternating + to ÷ to +, etc.	Peak to Peak Threshold Setting Mode: Detects Peak to Peak in Power Probe Mode.	Sets the ***Peak to Peak Threshold Level*** for the Mode#1 display to transition from D.C. to A.C.