KIMBALL MIDWEST

Circuit Check Pro

22-832

User Manual

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Safety Precautions and Warnings

To prevent personal injury or damage to vehicles and/or the test tool, read this instruction manual first and observe the following safety precautions at a minimum whenever working on a vehicle:

- Always perform automotive testing in a safe environment.
- Wear safety eye protection that meets ANSI standards.
- Keep clothing, hair, hands, tools, test equipment, etc. away from all moving or hot engine parts.
- Operate the vehicle in a well ventilated work area: Exhaust gases are poisonous.
- Put blocks in front of the drive wheels and never leave the vehicle unattended while running tests.
- Use extreme caution when working around the ignition coil, distributor cap, ignition wires and spark plugs. These components create dangerous voltages when the engine is running.
- Put the transmission in PARK (for automatic transmission) or NEUTRAL (for manual transmission) and make sure the parking brake is engaged.
- Keep a fire extinguisher suitable for gasoline/chemical/electrical fires nearby.
- Don't connect or disconnect any test equipment while the ignition is on or the engine is running.
- Keep the tool dry, clean and free from oil/water or grease. Use a mild detergent on a clean cloth to clean the outside of the test tool, when necessary.
- When the power switch in the tool is depressed battery current/ voltage is conducted directly to the tip which may cause sparks when contacting ground or certain circuits. Therefore the tool should NOT be used around flammables such as gasoline or its vapors. The spark of an energized tool could ignite these vapors. Use the same caution as you would when using an arc welder.
- Haphazardly applying voltage to certain circuits can cause damage to a vehicle's electronic components. Therefore, it is strongly advised to use the vehicle manufacturer's schematic and diagnosing procedure while testing.

2. Test Tool Specifications

- DC voltage range : 0-65V in one tenth incriments
- Resistance range : 0-100KΩ
- Frequency response of tone pass through 0Hz to 10Khz.
- Circuit Breaker
- Rating current: 1-10 Amp
- Testing Standard:

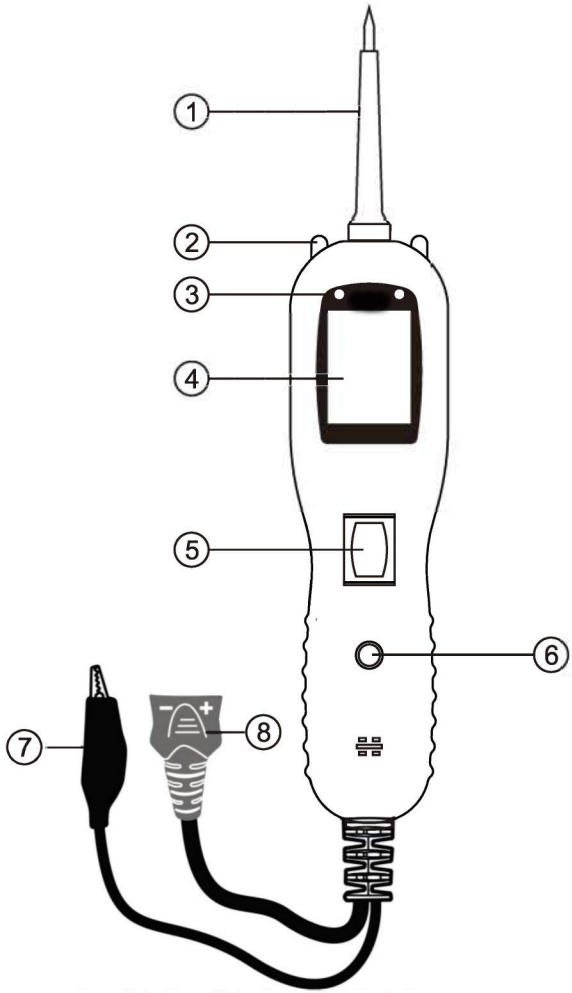
  100% current : Hold > 1 hour
  150% current: trip in one hour
  200% current: trip in 3-30 seconds.
  300% current: trip in 0.5-4.0 seconds.

2.1 Computer and Airbags Safety

The tool LED and LCD pull no more than 1 milliamp of current, therefore when using it as a test light or multimeter it is computer and airbag safe. However, when you press the switch forward, you are conducting full battery current to the tip of the probe.

To prevent power from going to the tip but still allow you to use the tool as a multimeter. Connect the extra ground lead to the tool and press the power switch forward until it trips the circuit breaker. When you are away from computer components, simple press the reset button and you are ready to power up again.

3. Using the Test Tool
3.1 Tool Description



① **Probe Tip** – Contacts the circuit or component to be tested.

② **LED Inspection Lights** – Illuminate dark work areas or work areas at night.

③ **Red/Green Polarity Indicator** – Identifies positive, negative or open circuits. The RED Indicator lights when the Probe Tip is contacting a positive circuit. The GREEN Indicator lights when the Probe Tip is contacting a negative circuit.

④ **LCD Display** – Displays test results.

⑤ **Power Switch** – Allows you to conduct a positive or negative battery current to the tip for activating and testing the function of electrical components.

⑥ **Mode Button** – Selects the work mode: AC voltage, DC voltage, resistance.

⑦ **Auxiliary Ground Lead** – Assists test as a ground lead.

⑧ **Adaptor** – Connects to the battery.

3.2 Specifications

- Display: TFT color display (160 x 128 dpi)
- Operating Temperature: 32^0F to 140^0F
- Storage Temperature: -40^0F to 185^0F
- External Power: 6, 12 or 24 VDC power provided via vehicle battery
- Dimensions(LxWxH): 7"x1.85"x1.1"
- Weight: 0.22LB

3.3 Included Accessories

1) User's Manual
2) Cigarette lighter adapter
3) Battery hookup clips
4) Probe tip
5) Rugged blow molded case

3.4 General Description

The tool is designed to reduce diagnostic time on all 6 to 30-volt vehicle electrical systems. After a simple hook-up of the tool to the vehicle's battery, you can:

- Determine at a glance if a circuit is positive, negative, or open without having to reconnect clips from one battery pole to another.
- Test for continuity with the built-in auxiliary ground lead.
- By depressing the power switch, conduct a positive or negative battery current to the probe tip for testing the function of an electrical component without the use of jumper wires.
- Test for poor ground contacts instantly without performing voltage drop tests. The tool is also short-circuit protected; the internal circuit breaker will trip if it becomes overloaded.
- Follow and locate short circuits without wasting fuses. The tool's long power cable allows you to test along the entire length of the vehicle without constantly searching for suitable vehicle grounds.

3.5 Connecting to Power

The tool is powered via the vehicle battery. Connect the RED battery clamp to the POSITIVE terminal of the vehicle's battery, and the BLACK clamp to the NEGATIVE terminal. When the tool is first connected to a battery (power source), it will sound a beep and the LED ınspectıon Lights will be on to illuminate the test area of the probe tip.

3.6 Self-Test

Before you test a circuit or component, be sure your tool is in good order by doing a quick self-test.

Press the Power Switch forward to activate the tip with a posıtıve voltage. The Red LED should light and the LCD display will read the battery voltage. A beep tone will sound. Let go of the power switch and the LED will turn off and the tone will cease.

Press the Power Switch rearward to activate the tip with a negative voltage. The Green LED should light and the LCD display will read the 0.0V (ground). A beep tone will sound. Let go of the power switch and the LED will turn off and the tone will cease. Your tool is working correctly and is now ready for use. (Figure 1)

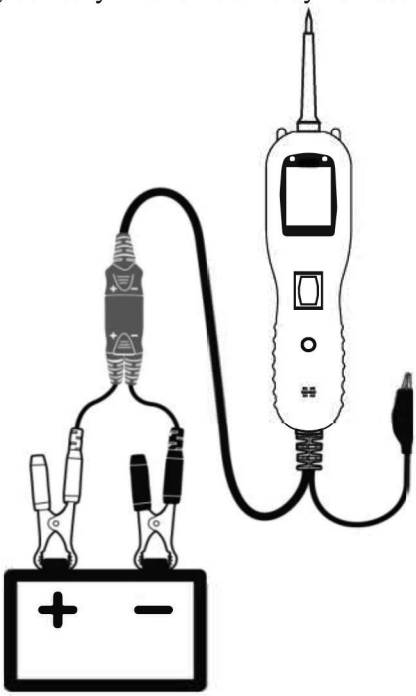


Figure 1

IMPORTANT: When powering-up components, you can increase the life of the power switch in the tool 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.

3.7 Automatic Circuit Breaker

The tool is short-circuit protected. The internal circuit breaker will trip if it becomes overloaded. The circuit breaker is a valuable test tool as well as a safety measure to protect the tool from overload.

When the circuit breaker is tripped, the LCD will display as below (Figure 2). All other functions of the tool are still active, which means you can still probe a circuit and observe the voltage reading. When the circuit breaker is tripped, the tool 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 tool to probe can be considered an added precaution against accidental pressing of the power switch.

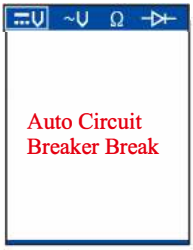


Figure 2

3.8 Work mode

There are four modes to diagnose electrical systems, they can be accessed by depressing the Mode Button and cycling through each one.

DC voltage

With the tool in DC voltage mode, contact the probe tip to a circuit, the LCD display will read the DC voltage with a resolution of 0.1 volt (Figure 3).

Figure 3

AC voltage

With the tool in AC voltage mode, contact the probe tip to a circuit, the LCD display will read the maximum voltage, the minimum voltage and frequency(Hz) (Figure 4).

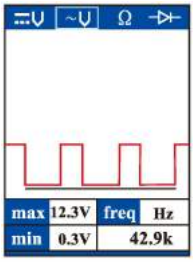


Figure 4

Resistance

With the tool in resistance mode, contact the probe tip to a circuit, then the LCD display will read the resistance between the tip and auxiliary ground lead (Figure 5).

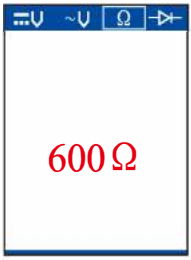


Figure 5

Diode

The diode work mode is to test the polarity of a PN junction diode (Figure 6). Contact the probe and the black alligator clip of the tool to the two poles of a diode. After getting the result, exchange the position of probe and the black alligator clip to get the other result. One of the results will have relatively larger resistance value or infinite value (reverse conduction), the other one will have smaller resistance value (forward conduction). In the measurement result with the smaller resistance value, the probe is contacting the anode and the ground lead is contacting the cathode. If the resistance value in both measurements is shown as “0.0Ω”, it means the diode is broken or damaged.

Figure 6

4. Test Applications

4.1 Voltage & Polarity Testing

With the tool in DC Voltage mode, contact the probe tip to a POSITIVE circuit. The red LED will light and the LCD displays the voltage with a resolution of 0.1V. A beep tone will sound.

Contact the probe tip to a NEGATIVE circuit, the green LED will light and the LCD displays the voltage with a resolution of 0.1V. A beep tone will sound.

Contact the probe tip to an OPEN circuit, neither LED will light (Figure 7 and 8).

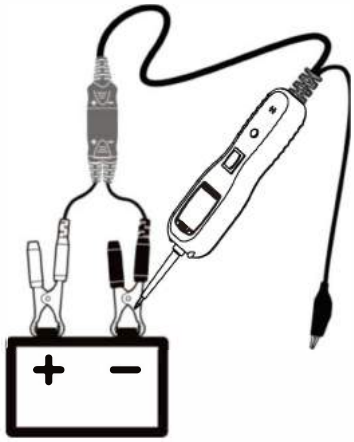


Figure 7

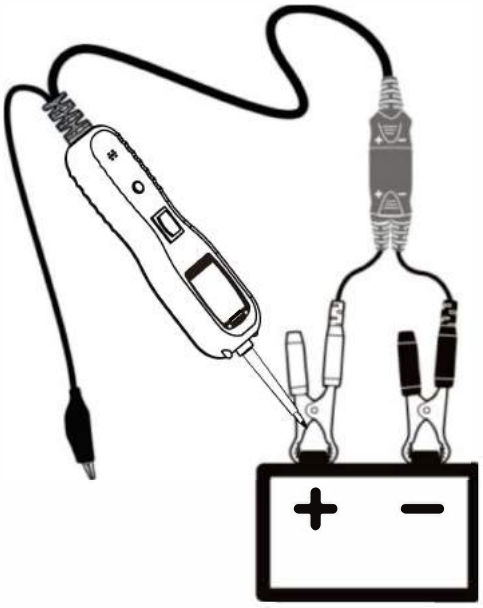


Figure 8

4.2 Continuity Testing

With the tool in Resistance mode, using the probe tip with chassis ground or the auxiliary ground lead, continuity can be tested on wires and components attached or disconnected from the vehicle's electrical system.

With the probe tip contacting a good ground, the LCD will indicate "0.0 and green LED will be on. A beep tone will sound (Figure 9).

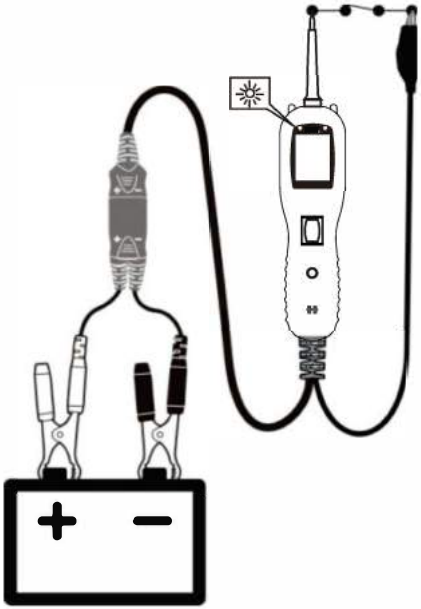


Figure 9

If the probe is not contacting a good ground the LCD indicates the resistance value (Figure 10).

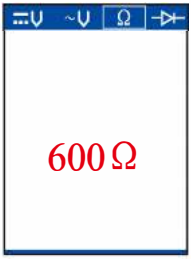


Figure 10

If the resistance value is greater than 100kΩ, the LCD will show “0L”.

Continuity can also be tested by powering up the connection using the power switch. If the circuit breaker trips you know that you have a good low resistance connection.

NOTE: You can use the probe tip to pierce the insulation on a wire. This means that you can test the circuit without disconnecting anything.

4.3 Signal Circuit Testing

Once a DTC (diagnostic trouble code) is extracted from the vehicles computer, there is a quick test you can perform to verify the code.

For example, If you suspect there is a problem with the MAP sensor circuit, follow the procedure to test the sensor:

- Set the tool in AC Voltage mode, using the probe tip with a chassis ground or the auxiliary ground lead.
- Connect a vacuum pump to the MAP sensor.
- Contact the probe tip to the MAP sensor positive terminal and observe the LCD readings which should be a sine wave in normal condition.
- Apply vacuum.
- Release vacuum and observe the LCD readings. (Figure 11)

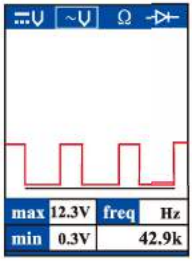


Figure 11

If the LCD readings are abnormal, there likely is a problem with the sensor.

4.4 Activating Components

With the tool in DC Voltage mode, by using the probe tip with the auxiliary ground lead, components can be activated, thereby testing their functions.

Connect the auxiliary ground lead to the negative terminal or ground side of the component being tested. Then contact the probe tip to the positive terminal of the component, the green LED should light, indicating continuity through the component. While keeping an eye on the green LED, quickly press and release the power switch forward. If the green LED went out and the red LED came on, you may proceed with further activation. Push the power switch forward and hold it down to provide power to the component. With the power switch forward, power will flow from the positive lead on the battery, through the probe tip into the component's positive terminal, through the component, through the auxiliary ground lead, back into the tool and back to the vehicle's battery ground (Figure 12).

- Press the power switch forward to activate the bulb.
- Contact the tip to the positive terminal of the bulb.
- Connect the negative auxiliary clip.

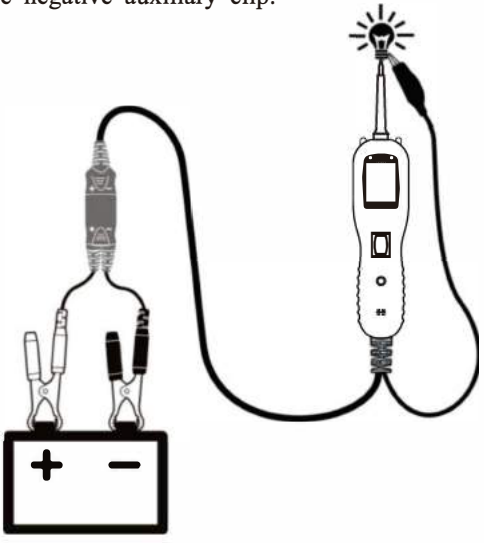


Figure 12

If the green LED went off at that instant or if the circuit breaker tripped, the tool has been overloaded. This could happen for the following reasons:

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

If the circuit breaker is tripped, reset it by waiting for it to cool down (15 sec.)

4.5 Testing Trailer Lights and Connections

With the tool in DC Voltage mode, clip the auxiliary ground lead to the trailer ground, probe the contacts at the trailer wiring connector and then apply voltage to the probe tip. This lets you check the function and orientation of the connector and trailer lights (Figure 13).

If the circuit breaker tripped, that contact is likely a ground. Reset the circuit breaker by letting it cool down for 15 seconds.

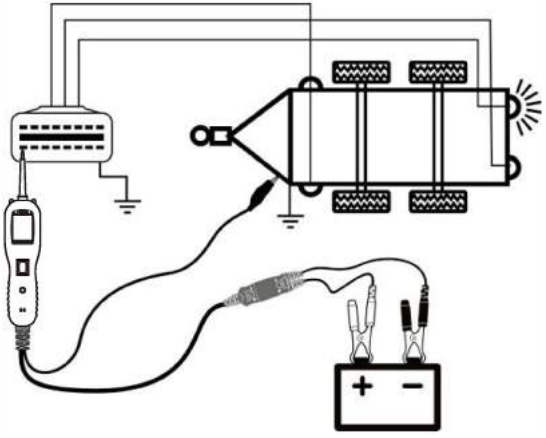


Figure 13

4.6 Activating Components in The Vehicle

With the tool in DC Voltage mode, contact the probe tip to the positive terminal of the component, the green LED should light, indicating continuity to ground. While observing the green LED,

quickly depress and release the power switch forward. If the green LED went out and the red LED came on, you may proceed with further activation. (Figure 14) If the green LED went off at that instant or if the circuit breaker tripped, the tool has been overloaded. This could happen for the following reasons:

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

If the circuit breaker is tripped, reset it by waiting for it to cool down for 15 seconds.

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

NOTE: When powering up components, you can increase the life of the power 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.

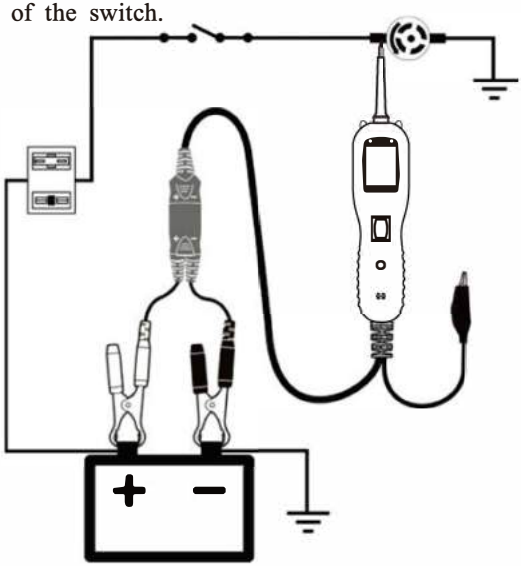


Figure 14

4.7 Activating Components with Ground

With the tool in DC Voltage mode, contact the probe tip to the negative terminal of the component, the red LED should light. While observing the red LED, quickly depress and release the power switch rearward. If the red LED went out and the green LED came on, you may proceed with further activation (Figure 15). If the green LED went off at that instant or if the circuit breaker tripped, the tool has been overloaded. This could happen for the following reasons:

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

If the circuit breaker is tripped, reset it by waiting for it to cool down for 15 seconds.

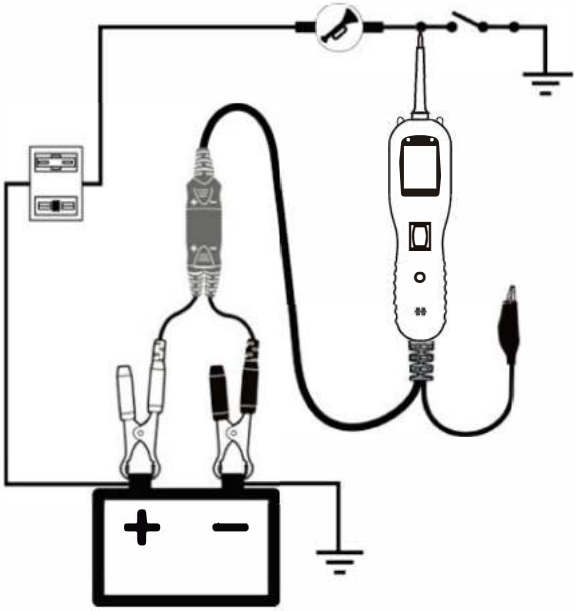


Figure 15

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.

4.8 Checking for Bad Ground Contacts

Probe the suspected ground wire or contact with the probe tip.

Observe the green LED. Depress the power switch forward then release. If the green LED went out and the red LED came on, a beep will sound, 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.

4.9 Following & 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 search.

Remove the blown fuse from the fuse box.

Use the probe tip to activate and energize each of the fuse contacts. The contact which trips the tool's 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.

Here is an example for this application:

If you are following a short in the brake light circuit, you may know that the wire must pass through the wiring harness at the door sill. Locate the color-coded wire in the harness and expose it.

Probe through the insulation with the probe tip, and depress the power switch forward to activate and energize the wire.

If the circuit breaker tripped, you have verified the shorted wire. Cut the wire and energize each end with the probe tip. The wire end which trips the circuit breaker again is the shorted circuit and it will lead you to the shorted area.

Follow the wire in the shorted direction and repeat this process until the short is located.

4.10 Red/Green Polarity LED

The Red/Green Polarity LED lights up when the probe tip voltage matches the battery voltage within ±0.4 volts. It is added information that could be valuable to the technician.

If the circuit you are testing is not within a 0.4 volt (plus or minus) of supply voltage, you will see the voltage reading on the LCD but you will not hear a tone or see a red or green LED. This tells you either you have a voltage drop in excess of 0.4 volts from battery voltage or you are probing a circuit that has an increase of a 0.4 volts or more over battery voltage. To determine battery voltage, simply remove the tip from the circuit and press the power switch forward. Battery voltage will then be displayed on the LCD. The difference between the battery voltage and what is read on the circuit is either voltage drop or voltage increase. This allows you to determine a voltage drop without running back to check the battery.

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