
OPERATOR'S MANUAL



#9101

Includes Charger &
Adapter



#9102

Includes Charger

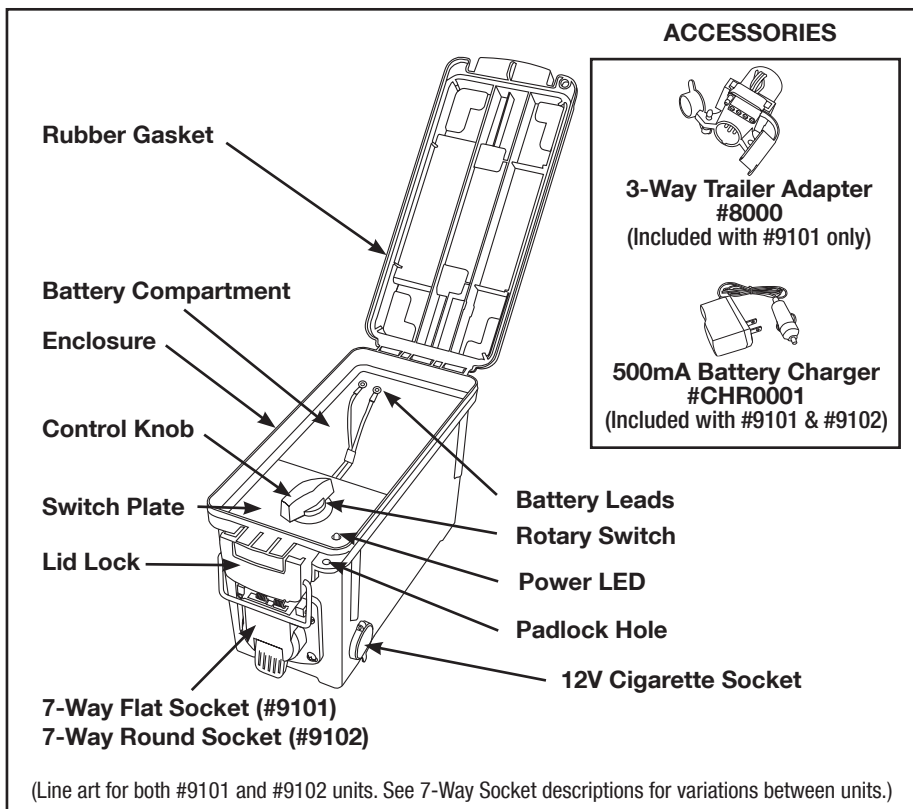
Uses Internal 12-Volt Motorcycle Battery (Battery Not Included)

#9101 Light Ranger™ MUTT® Tests 7-Way Flat (Spade), 6-Way Round and 4/5-Pin Connections

#9102 Heavy Ranger™ MUTT® Tests 7-Way Round Pin Connections

#9101 and #9102 Ranger MUTT™ PARTS

Fig. 1 - Parts Diagram



Use the reference numbers provided when ordering products and parts above.
Toll Free: 888-786-7899

IMPORTANT SAFETY INSTRUCTIONS

IT IS IMPORTANT TO READ, UNDERSTAND AND FOLLOW ALL SAFETY MESSAGES AND INSTRUCTIONS PRINTED IN THIS MANUAL AND ON THE EQUIPMENT BEFORE OPERATING. IF SAFETY INFORMATION IS NOT HEEDDED, SERIOUS INJURY OR DEATH TO THE OPERATOR OR BYSTANDERS MAY OCCUR.

DANGER: Indicates a hazardous situation, if not avoided, will result in death or serious injury. The possible hazards are shown in the adjoining symbols or explained in the text.

WARNING: Indicates a hazardous situation, if not avoided, could result in death or serious injury. The possible hazards are shown in the adjoining symbols or explained in the text.

CAUTION: Indicates a hazardous situation, if not avoided, may result in minor or major injury. The possible hazards are shown in the adjoining symbols or explained in the text.

THE FOLLOWING SAFETY ALERT SYMBOLS ARE USED IN THIS MANUAL.



SYMBOL 1: Potential burn hazard. Sparks from electrical shorts can ignite flammable liquids such as fuel or oil. Heat from electrical overloads can cause fire hazards.

SYMBOL 2: Potential electrical hazard. Batteries have enough electrical energy potential to ignite flammable liquids such as fuel or oil. Wire overloads can cause electrical failures. Shock hazard exists.

SYMBOL 3: Potential explosive air hazard. Pneumatic pressures used with this equipment can cause explosive failures on damaged equipment.

SYMBOL 4: Potential eye hazard. Wear OSHA approved safety glasses. Battery acid and high air pressures create hazardous situations for eyes.

SYMBOL 5: Potential chemical burn hazard. Wear protective gloves. Battery acid is corrosive and can cause skin damage.

SYMBOL 6: Potential electrical hazard. Electrical energy can cause heat and burn hazards.

SYMBOL 7: Potential fire hazard. Use caution with flammable liquids such as fuel and oil. Electrical shorts can ignite flammable liquids and wiring.

SYMBOL 8: Important information is stated.

BATTERY GASES, TESTER PREPARATION AND TESTER/CHARGER LOCATION

RISK OF EXPLOSION

- Gases produced by a battery are highly explosive.
- Wear safety goggles and protective clothing, both users and bystanders.
- Use in an area having at least four air changes per hour.
- Read, understand and follow all instructions for charger, battery, vehicle and any equipment used near battery and charger.
- Do not smoke, strike a match, place metal tools on the battery or cause a spark in the vicinity of the battery. When removing battery cables, remove the ground cable first.
- Clean terminals before charging battery. During cleaning, keep corrosive particles from eyes, nose and mouth. Use baking soda and water to neutralize acid and help eliminate airborne corrosion.
- Never allow the clamps on the charger cables to touch each other.
- Do not expose the tester or charger to rain, snow or wet conditions.
- Do not allow battery gases or acid to contact the Ranger MUTT™ cabinet. Do not place the charger directly above or below the battery.
- Fill the battery to the level specified by battery manufacturer using distilled water.
- Do not remove cell caps while charging per manufacturer's instructions.
- Make sure tester cable clamps make tight connections.
- Battery explosion can cause injury.



DC POWER ONLY

Do NOT plug directly into AC wall outlet

ACID BURNS

- Battery acid is highly corrosive sulfuric acid.
- Wear safety goggles, both user and bystanders.
- Wear safety gloves.
- Make sure someone can hear you or is close enough to provide aid when working near battery.
- Have plenty of fresh water and soap nearby. If battery acid contacts skin, clothing or eyes, flush the exposed area with soap and water for 10 minutes before seeking medical help.
- Do not touch eyes while working near battery.
- Battery acid can burn eyes and skin.



GENERAL CHARGER USE

RISK OF ELECTRIC SHOCK AND FIRE

- Before connecting power cord to the charger, make sure controls are set to off.
- DC power only.
- Do not remove or bypass the grounding pin.
- Do not operate the charger with a damaged cord or plug. Replace the cord or plug immediately.
- Position the power cord and charger cables away from the hood, doors or hot and/or moving engine parts where they could be damaged.
- Unplug the power cord using the plug rather than the cord when disconnecting the charger from the outlet.
- Unplug the power cord from the outlet before cleaning or maintaining the tester and charger. Turning off the controls does not reduce this risk.
- Do not operate the charger after a sharp impact, drop or any other damage. Do not disassemble the charger.
- Use only recommended attachments.
- Do not charge a frozen battery. Do not overcharge a battery.
- Use the charger only for lead-acid automotive batteries. Do not use the charger for charging dry cell batteries.
- Electric shock or fire can cause injury.



RISK OF ENTANGLEMENT

- Keep yourself, any clothing and the battery charger leads clear of moving parts such as fan blades, pulleys, hood and doors.
- Moving parts can cause injury.

RISK OF BURNS

- Batteries can produce short circuit current high enough to weld jewelry such as rings, bracelets and watches. You must remove them before working near batteries.
- Short circuits can cause injury.

SPECIFICATIONS

- Input: 12V DC Battery (Use Battery Compartment)
- Output: 10A @ 12V DC
- Overload Protection: Auto-Resetting Thermal Circuit Breaker
- Connection Type: #9101 - 7-Way Flat (Spade) Pin (6-Way Round and 4/5 Pin w/ Adapter)
#9102 - 7-Way Round Pin
- Control Type: Manual Rotary Switch
- Materials: ABS
- Weight: 2 lbs. (empty)

BATTERY REQUIREMENTS

- Battery Voltage: 12V DC
- Battery Protection: 10A Auto-Resetting Thermal Circuit Breaker
- Maximum Output to Trailer: 10 Amps

AUTO-RESETTING THERMAL CIRCUIT BREAKER

- The thermally activated, internal auto-resetting thermal circuit breaker requires a 30-second cooldown cycle. After this cycle, the illuminated power LED signifies that the unit is ready to test.

QUICK START-UP GUIDE

SELECT A BATTERY

- The best battery to use is the YUASA YTX14 (12 Ah) or similar motorcycle type battery with top mounted posts.
- The battery must be 12-volts DC.
- Maximum battery dimensions: L: 6" x W: 4" x H: 5.75".
- Be sure to connect proper battery wires to the correct posts.
- Once the battery is installed, testing can begin.

TAKING CARE OF YOUR BATTERY

Note: Every day a battery naturally loses its charge, little by little. Batteries are temperamental and can be damaged easily. Using a battery very little and then recharging it will short cycle the battery and hurt its overall life and output. Additionally, over discharging it (exceeding 80% total discharge) and then undercharging will permanently damage the battery as well. It is not good to leave batteries in cold or hot weather. For every degree above or below room temperature (72° F), a battery loses amp hours. Also, it is not good to allow batteries to sit for weeks at a time without use or charging.

- To get the most life out of your battery, it's important to discharge about 30%-50% of its total output, then provide a full recharge. When charging is complete, remove the battery charger.
- A 500mA battery charger has been provided with your purchase. Be sure to disconnect the battery charger once it is fully charged. For any questions, please call 888-786-7899.

NOTE: Use the supplied battery charger or charger input no greater than 10A to fully charge the internal battery of the tester. It may take up to 12 hours to charge a fully drained battery.

WARNING: NEVER OPERATE TESTER WITH BATTERY VOLTAGE LESS THAN 11.5V. OPERATING ELECTRONIC DEVICES ON LOW VOLTAGE MAY SHORTEN LIFE OF AND CAUSE DAMAGE TO INTERNAL COMPONENTS. IDEAL BATTERY VOLTAGE IS 12.0V DC TO 12.5V DC.

SET-UP

- Place the tester on a flat, level surface.
- Chock trailer wheels to avoid rolling.

The Ranger MUTT™ allows for the testing of trailer electrical systems without the need of the tow vehicle. When used properly, the Ranger MUTT™ can save hours spent troubleshooting electrical issues.

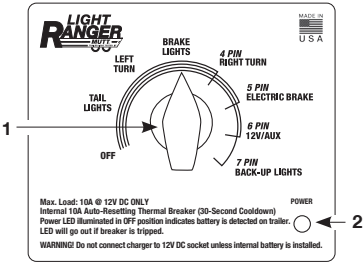
CHECK 7-WAY PIN CONNECTORS: Before operating the Ranger MUTT™, be sure the 7-way socket on the front of the Ranger MUTT™ and cable coming from the trailer are in good condition and the pins are spread to the proper width to ensure good connections.

MAINTAIN 7-WAY PIN CONNECTORS: Dielectric grease should be used on all connections to avoid corrosion. If a bad connection exists at the terminal junction, you may get an erroneous reading and the MUTT® will not work properly. Make sure that you have a solid connection in the 7-way socket.

FUNCTIONAL DESCRIPTIONS

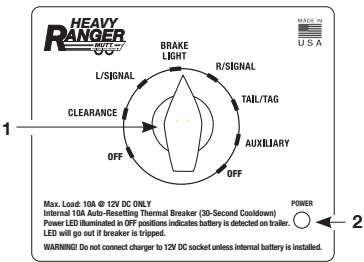
The Ranger MUTT™ is a diagnostic tool for trailers wired to North American style configurations including 7-way flat (spade), 6-way round pin and 4/5-pin harness connectors (#9101 fig. 2) and 7-way round pin configurations (#9102. fig. 3).

Fig. 2 - #9101 Control and Information Panel



1. Control Knob: Activates one selected circuit at a time. Selecting the “OFF” position will turn the unit off.
2. Power LED: Illuminates when a circuit is selected to indicate the unit is on.

Fig. 3 - #9102 Control and Information Panel



1. Control Knob: Activates one selected circuit at a time. Selecting either “OFF” position will turn the unit off.
2. Power LED: Illuminates when a circuit is selected to indicate the unit is on.

OPERATING INSTRUCTIONS

7-WAY PIN TESTING PROCEDURE (Both #9101 and #9102)

1. Install a fully charged 12V DC battery into your Ranger MUTT™.
2. Plug the trailer's 7-way pin cable into the front of the Ranger MUTT™. Be sure to push firmly until the key is down far enough for the flap to lock in behind it.
3. To begin testing your trailer, turn the Control Knob to the desired circuit.
4. The Ranger MUTT™ will send up to 10A @ 12V DC to the selected circuit, e.g., turn signals, brake lights, etc. Perform a visual inspection by walking around the trailer to verify the proper lights are illuminated.
5. Step 4 should be repeated for all lighting circuits.

WARNING: LEFT TURN AND RIGHT TURN SIGNALS FLASHING TOO QUICKLY OR TOO SLOWLY ARE AN INDICATION OF LOW BATTERY VOLTAGE. STOP AND CHARGE BATTERY IMMEDIATELY TO PREVENT DAMAGE TO TURN SIGNAL FLASHERS.

ELECTRIC BRAKE TESTING (#9101 Only)

1. To inspect electric brakes, first set the trailer on a flat, level surface. Place chocks in front and behind the wheels on one side of the trailer. Proceed to jack up the un-chocked side of the trailer until the tires are off the ground. Follow standard safety protocols such as using jack stands and not placing yourself in harm's way.
2. Ensure that the break-away cable is not disconnected. Try to turn the trailer tires that are off the ground by hand. They should turn with little effort.
3. Turn the Ranger MUTT™ Control Knob to the circuit labeled "Electric Brake." Then return to the same tires and try to turn them by hand again. You should not be able to move them. If you are able to move the tires while the electric brake is selected, this indicates that something is wrong or your trailer brakes are out of adjustment. Disconnect the Ranger MUTT™ and inspect the braking system further to identify the source of failure.
4. To test the brakes on the other side of the trailer, let the trailer down from the jack stands and repeat set-up procedure described in Step 1.

NOTE: The trailer electric brakes are applied when they receive 12-volts from the towing vehicle. During this test, the Ranger MUTT™ will simulate the tow vehicle by providing the full amount of power the trailer brakes can draw. As a general rule, each wheel or electric brake will draw approximately 1.5 - 3 amps. A trailer with four wheels equipped with electric brakes should draw a total load of 6 or more amps on the electric brake circuit. While testing, the use of an amp meter may be helpful when troubleshooting exact causes of electric brake failure.

WARNING: BE SURE TO CHOCK ALL TRAILER WHEELS BEFORE USING THIS TOOL AND ESPECIALLY BEFORE JACKING UP ONE SIDE OF THE TRAILER. FOLLOW ALL STANDARD PROTOCOLS AND COMMON SENSE PRACTICES INVOLVED INCLUDING WORKING WITH A TRAILER ON A FLAT, SOLID SURFACE AND USING PROPERLY RATED JACK STANDS. KEEP HANDS AND FEET FREE FROM TRAILER AT ALL TIMES.

SHORT CIRCUIT AND OVERLOAD TESTING

Short Circuit: When a positive power source (12V +) is directly connected to or touching the ground (-), wire insulation can wear through due to vibration; exposed copper wire can make contact with the metal trailer frame resulting in a short circuit and a blown fuse in the vehicle.

Overload: When the load (lights and/or electric brakes) attempts to draw more current (amps) than the circuit was designed to handle, this often results in blown fuses.

Summary: The Ranger MUTT™ is capable of providing up to 10A of current to a selected circuit. It is equipped with an internal, auto-resetting thermal circuit breaker, which is designed to remove power to the selected circuit when the load exceeds 10A in overload condition. Once power is removed, the circuit breaker requires a 30-second cooldown cycle until power can be reapplied. If the source of the excessive current draw, i.e., the overload condition is still present, the circuit breaker will immediately remove power once again. This process will be repeated until the source of the excessive current draw is removed. Most small trailers should not exceed 10A per circuit when wired properly. You should check the specified current draw for each light bulb or LED on the trailer circuit to determine whether it's an overload condition, short circuit condition or faulty equipment, e.g., electric brakes, lights, harnesses, etc.

NOTE: The auto-resetting thermal circuit breaker used in the Ranger MUTT™ is thermally activated and requires a short cooldown time between uses. The more often it is tripped, the longer the required cooldown time before it will become active again.

TEST 6-WAY ROUND AND 4/5-PIN TRAILERS WITH 3-WAY ADAPTER

TESTING PROCEDURE

The #9101 Light Ranger™ MUTT® is designed to test trailers with 6-way round and 4/5-pin connectors with the use of the 3-way adapter. The faceplate on the Ranger MUTT™ shows which functions are supplied for each pin layout. For example: a 5-pin trailer is wired for tail lights, left turn, brake lights, right turn and electric brakes, but not 12V aux. or backup lights. Consequently, when those circuits are selected on the Ranger MUTT™, they do not power anything on a 5-pin trailer. See fig. 2 for the #9101 faceplate layout. The supplied adapter provides an easy way to plug 4, 5 or 6-pin trailers into the Light Ranger™ MUTT®. A brief explanation of how to get started is provided below.

1. Plug the 3-way adapter into the 7-way socket on the Ranger MUTT™.
2. Be sure to push firmly until the key is down far enough for the flap to lock in behind it.
3. Plug the trailer into the proper terminal on the 3-way adapter. NOTE: The 5-pin connector also works for 4-pin trailer sockets.
4. To begin testing the trailer, turn the control knob to the desired circuit (as indicated on the faceplate).
5. Once the knob is turned to the selected circuit, power is being sent to the corresponding wire on the trailer.
6. Follow the 7-way pin testing procedure (pg. 7) section for further information.

TROUBLESHOOTING

The Ranger MUTT™ is an analog trailer tester designed to help confirm trailer wiring configuration, proper amperage draw, functioning lights, electric brake operation and proper ground connections. Keep in mind that many electrical problems are the direct result of a bad ground connection. By maintaining tight, clean and sealed ground connections, you can eliminate guesswork and improper diagnosis.

We also provide industry-standard wiring diagrams to help you with trailer repairs. The Ranger MUTT™ is wired to meet the accepted standard wiring configurations for the industry. Trailers which are improperly wired or wired to “personal” specifications may render the Ranger MUTT™ less effective.

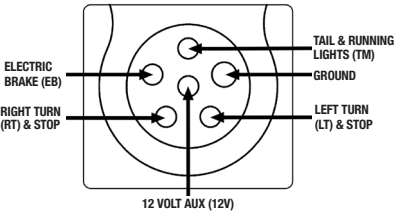
PROBLEM	POSSIBLE CAUSE
Ranger MUTT™ does not turn on.	Verify the power LED is illuminated. Check battery connections and charge the battery if needed.
Ranger MUTT™ is on, but trailer lights do not light up.	First, verify that the Ranger MUTT™ power stays on when power is applied to the trailer. A low battery will power the Ranger MUTT™, but when power is sent to the trailer, the load may cause the Ranger MUTT™ to shut down. Check for faulty operating trailer lights, wiring, ground, battery polarity, etc.
Wrong circuit is powered on trailer.	The trailer is not wired to standard specifications. If possible, rewire trailer connector to match the Ranger MUTT™ diagrams.
I do not hear the trailer's electric brakes engaging.	Trailer electric brakes often do not make noise when engaging. You must safely jack up the trailer and spin the wheel while applying the brake to verify proper operation. Another method is to check amperage load. Most electric brakes draw approximately 1.5 amps per wheel. Check manufacturer specifications for additional information.
One circuit powers two sets of lights.	The trailer has crossed wires, or one terminal has two wires connected at the pin.
The Power LED keeps turning off and on again.	Check battery connection and voltage. The Ranger MUTT™s auto-resetting thermal circuit breaker trips in overload and short circuit conditions. The Ranger MUTT™ is designed for a maximum output of 10A DC @ 12-volts. If a trailer circuit exceeds this draw or there is a short circuit, the Ranger MUTT™s auto-resetting thermal circuit breaker will continue to pulse with power until the issue is resolved.

TYPICAL TRAILER WIRING

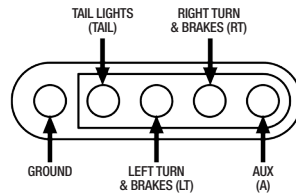
NOTE: The standard wiring pictured in fig. 4 is viewed from the front of the connector. Not all trailers/vehicles are wired to this standard. The use of an electrical circuit tester is necessary to ensure proper match of a vehicle's wiring to a trailer's wiring. On the 6-way plugs, the 12V wire and electric brake wire may be reversed on some trailers (particularly horse trailers).

Fig. 4 - Trailer Wiring

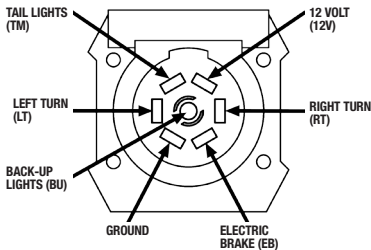
6-WAY ROUND PIN VEHICLE FEMALE SOCKET (FRONT VIEW)



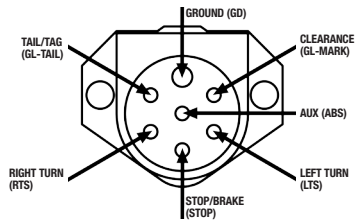
4/5 PIN VEHICLE CONNECTION (FRONT VIEW)



7-WAY FLAT (SPADE) PIN VEHICLE FEMALE SOCKET (FRONT VIEW)



7-WAY ROUND (J560) FEMALE SOCKET (FRONT VIEW)



TECHNICAL TIPS

- Never assume a battery is fully charged. Small batteries are especially prone to failure if left discharged. Always verify your battery is charged to at least 12.2 volts before using.
- Most electric problems occur at the plug. Always make sure the pins are clean before assuming something is wrong with the trailer.
- The Power LED will illuminate (even in the OFF position) when the tester is connected to a trailer that has its own on-board battery supply. This indicates that the tester recognizes voltage coming back from the trailer.
- As a best practice, limit the time engaging trailer electric brakes with this tool. Electric brake magnets get very hot and are not intended to be left on for extended periods of time.



LETTER FROM THE PRESIDENT OF IPA®

My name is Ian Vinci and I am the president of IPA®. I would like to thank you for your interest in IPA®'s product line and share my commitment to you, our products and our policies. In today's world, we have all experienced the lack of service and consideration demonstrated by many companies after you buy their products. They say whatever they can to make the sale, and then it's like pulling teeth to get any service response out of them. I know this myself firsthand and because of this, I want to be sure that your experience with IPA® meets your expectations and that IPA® never disappoints you with our service or customer response.

To prove my commitment to you, if for any reason, you are not happy with one of our products – or more importantly, with the response from our customer service department, or any member of the IPA® team – I invite you to contact me directly via my email, president@ipatools.com or call me at 888-786-7899. Your satisfaction is more important to me than the sale itself. We will not be in business for long if we don't make you completely happy with our products and service. I want IPA® to be different and be known for its quality and service.

With that said, please take a look at our product line. You will see innovative first time products that were created to help you do your job faster and better than before. I would also like to invite you to critique our products. If you can think of a better way to make them or changes that will make them work better, please contact me directly and I will be sure to look into it. If you have an innovation and would like some feedback, give me a call.

From all of us at IPA®, we thank you for taking the time to review our product line and wish you and your family the very best of everything.

Ian Vinci
President
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Limited One-Year Warranty

#9101 LIGHT RANGER™ MUTT®

#9102 HEAVY RANGER™ MUTT®

Mobile Universal Trailer Tester

Innovative Products of America® Incorporated has established a Limited One-Year Warranty Policy for the **Ranger MUTT™**, not including any wearable parts, i.e., clips, etc.

One-Year Limited Warranty/Return or Replace Policy: The product is covered for one year from the date of the original user's purchase under the stipulations of the Standard Warranty.

The product is warranted to be free from defects in workmanship or material. If there is a problem due to workmanship or material defect, Innovative Products of America® will repair or replace the product within 24-working hours after it is received by the IPA® Repair Service Center. If it is determined that the product has been tampered with or altered in any way, the warranty is void and all claims against the product will not be honored. The Warranty Repair/Return procedures require that the proof of purchase must be established (either by warranty card from the seller or by point of purchase receipt/invoice) and the manufacturer makes every attempt to return ship the product, prepaid freight, within three business days from the receipt of the returned product.

If it has been determined that the tool has been damaged due to misuse, Innovative Products of America® Incorporated will repair the tool at a cost we deem reasonable and these charges will be the responsibility of the user. We truly want you to be happy with our products, so if you have any questions, call us toll free at 888-786-7899.



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