

# Battery Tester



## SPECIFICATIONS

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Measurement Range .....	Ferret 40 .....	Ferret 42HD
Battery Volts .....	4.0 to 19.99 .....	4.0 to 40.0
External (10 Meg) .....	0 to +/- 19.99 .....	0 to +/- 19.99
.....	0 to +/- 50.0 .....	0 to +/- 50.0
Amps (Inductive) .....	0 to +/- 199.9 .....	to +/- 199.9
.....	0 to +/- 600 .....	0 to +/- 1200
Load (15 Seconds On, 60 Off).....	500 Amps .....	600 Amps
24 Volt Charging Load .....	N/A .....	150 Amps
Amps Ripple Indicator .....	Yes .....	Yes
Load On Timer .....	Yes .....	Yes
Load Limit Indicator .....	No .....	Yes
Hot Load Indicator .....	No .....	Yes

## 24 VOLT SYSTEM TESTING

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The 42HD was designed for testing 24 volt systems. The load leads can be connected directly to 24 volts to power the tester. Additionally a load of up to 150 amps can be applied to verify the operation of the charging system. Since most 24 volt systems are made up of two 12 volt batteries, be sure to test each battery separately for an accurate test.

## INDICATOR LIGHTS

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### Amps Ripple

The Amps Ripple indicator will illuminate when AC ripple is detected from the alternator.

### Load On

The Load on Indicator will flash and the beeper will sound one time a second to help time the load test. After 16 seconds, the beeper will sound continuously indicating the end of the load test.

### Load Limit

The Load Limit Indicator will turn on when you are approaching the load capacity of the carbon pile.

### Hot (Do Not Load)

When this light turns on, do not apply a load. Let the Fan run to cool down the carbon pile.

## SAFETY PRECAUTIONS

### — Read All Instructions Before Using The Meter —

- Always wear eye protection when testing vehicles. Be extra careful near batteries and moving parts. Do not lay tools on a battery.
- Battery gas is highly explosive.
  - a. If a battery explodes flush the acid away from persons skin with generous amounts of water. Follow up with a neutralizing solution of baking soda and then more water. Treat clothing, vehicle parts, and equipment similarly. Any acid traces inside equipment must be removed by generous rinsing. Dry equipment and place in a warm 50°C (120°F) oven until thoroughly dry.
  - b. Never use a wrench on the ungrounded battery terminal until the grounded one has been disconnected. Contact between the vehicle body metal and the hot terminal can cause sparks to ignite gas or even weld tools into a battery short circuit.
  - c. Keep the space around a battery well ventilated.
  - d. Do not make sparks or allow flames near batteries.
- Before working on a vehicle set the brakes and block the wheels. Beware of automatic parking brake releases.
- Keep your work area well ventilated and free of exhaust. **Engine exhaust contains deadly poisons.** Treat Gas Detector exhaust and drain hoses the same as the vehicle tailpipe. Both give off deadly exhaust fumes.
- Avoid electrical shocks caused by getting close to live ignition wires or touching the coil TACH terminal. A person's reaction near a live engine can be more damaging than the shock.
- Keep spark producing devices at least 0.5m (18") above the floor to reduce the hazard of igniting gasoline vapor.
- Do not let test leads wind up in a moving fan or pulley. Route leads away.
- Remove finger rings and metal wrist bands. They can short terminals and become very hot from electric current.

## WARRANTY

### FERRET BRAND LIMITED PRODUCT WARRANTY

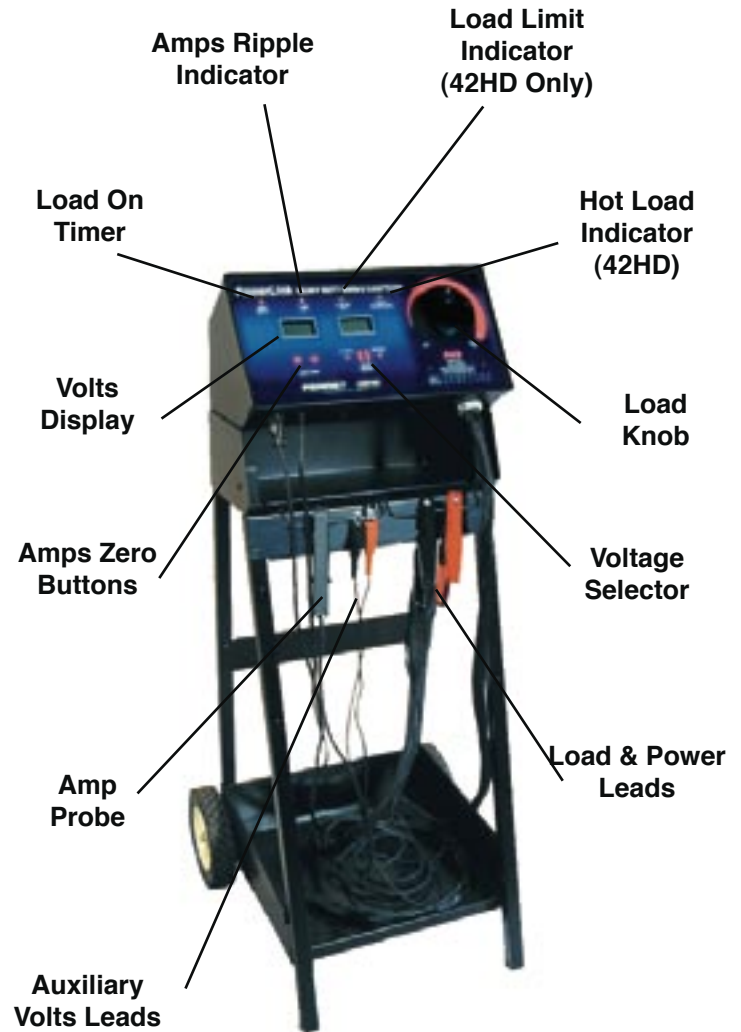
GxT, Inc. of Cheboygan Michigan, warrants to the original purchaser that FERRET brand products are free from defects in materials and workmanship for a period of two years from date of purchase. Our sole obligation for a product within the above warranties will be to repair or replace, at our option, any defective parts and return the product to the sender within the U.S.A., shipping prepaid, if it is sent to our Repair Department shipping prepaid and accompanied by proof of purchase.

This Warranty does not apply to products which have been altered outside the factory; or repaired by anyone other than the factory or its authorized service centers; or which have been damaged from accidents, negligence, or abuse; or have been used differently than described in the printed instructions. Please note that wear and tear on leads and replacement of consumable items such as: NOx Sensors, Oxygen Sensors, and paper, is not covered by warranty.

GxT Inc.'s sole liability and buyer's exclusive remedy is limited to repair or replacement of the product as stated in the Limited Product Warranty. THERE ARE NO OTHER WARRANTIES EXPRESSED OR IMPLIED INCLUDING THOSE OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE AND GxT, INC. SHALL NOT BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING FROM THE SALE OR USE OF THE PRODUCT.

Some states do not allow limitations on the length of implied warranties nor exclusion or limitations of incidental or consequential damages, so that the above limitations and/or exclusion may not apply to you.

This warranty gives you specific legal rights and you may also have other rights which may vary from state to state.



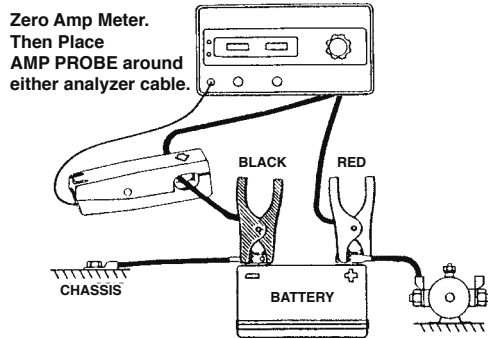
General specifications given in this manual are for 12 volt systems. There are some vehicles which will require the actual service specification values for correct test conclusions. This manual assumes that Negative Ground battery systems are being tested.

# BATTERY LOAD TEST

## CAUTION

Wear Safety Glasses, Do not break live circuits at the battery terminals, Avoid accidentally shorting the insulated battery terminal to any ground metal. Never put a wrench on a live battery wire terminal.

Burns may be the result. Disconnect the battery chassis cable first



1. Be sure the Load Knob is turned to OFF before connecting the analyzer cables to the battery. Take note of the safety precautions on the back cover of this manual.
2. Connect the analyzer Battery Clamps to the battery terminals; Red to positive, Black to negative. The cable jaw contact from each clamp must make a solid connection to the battery terminal to assure good voltage measurements and avoid sparks during load tests. Side terminal batteries may need special adapters attached to make solid connections for high current load tests.
4. With the Amp Probe jaws closed and not around any wires, press the Zero Amps buttons until the Amps Display shows "000"
5. Connect the Amp Probe around either analyzer load lead.

## Open Circuit Voltage Test

Measure the open circuit (no load) stabilized voltage. A stabilized battery has no "surface charge", which means that the electrolyte has had a chance to remix and shed gas bubbles after current flow has stopped. With less than 12.4 volts, first recharge the battery.

Open Ckt. Volts	12.6	12.4	12.2	12.0
% of Charge	100	75	50	25

## TYPICAL STARTER CRANKING DRAW

Engine Size	Cubic Inches	Liters	Amperes
100 to 200	1.6 to 3.2	100 to 200	
200 to 350	3.2 to 5.6	125 to 250	
350 to 500	5.6 to 8.0	150 to 300	

NOTE: Higher starter amps may be encountered if engine temperatures are extremely hot or cold.

9. Test Conclusions. The system is good if the cranking speed is satisfactory and the battery voltage stayed above 9.6 volts. If Crank Speed was slow use the following chart.

VOLTAGE	AMPS	LIKELY CAUSE
Below 9.6	High	Bad Starter or a very hot or cold engine.
Below 9.6	Low	Bad Battery or Loose Battery Terminals.
Above 9.6	Low	Connections at Starter or Solenoid.

## TECHNICAL SUPPORT & SERVICE

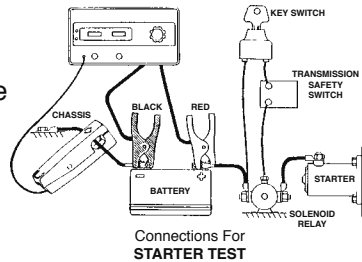
Questions or inquiries about service can be answered by contacting GxT, Inc., at: Toll Free (800) 627-5655. Fax: (231) 627-2727, Toll Free (231) 782-0616

When sending an item to the factory address it to: GxT, Inc., 520 MM Riggs Drive., Cheboygan, MI 49721-1061 Include a note describing the problem.

## STARTER TEST

When testing the starting system, first test for battery performance. With a known good battery, the starter motor, cables and starter solenoid can be checked. Starter amps should not exceed the maximum specified for the vehicle being tested, and the cranking RPM should be satisfactory.

1. Engine should be at normal operating temperature. Make sure all lights and accessories are off and vehicle doors are closed.
2. Be sure the Load Knob is turned to OFF before connecting the analyzer cables to the battery. Take note of the safety precautions on the back cover of this manual.
3. Connect the analyzer Battery Clamps to the battery terminals; Red to positive, Black to negative.
4. With the Amp Probe jaws closed and not around any wires, press the Zero Amps buttons until the Amps Display shows "000"
5. Place the Amp Probe around either of the engines battery cables.
6. Set the Volts Selector to Battery Volts.
7. Disable the ignition by either disconnecting its power, unplugging the coil primary, or grounding the coil secondary wire.
8. Crank engine for 15 seconds with ignition key and note the cranking amperage reading. Also, watch to see that the battery voltage stays above 9.6.V. Wait a few minutes for the starter to cool if the cranking test is repeated.



1. Determine the battery load test amperes from the battery test specification, CCA, or Ah ratings. To give consistent results a load test requires that a battery be at least 75% charged and not have been heavily used within the last 10 minutes.

Cold Cranking Amperes at 0°F. (CCA)

Use 1/2 the CCA for a load test. For example, 360 CCA divided by 2 equals a 180 ampere test load.

Ampere Hour Rating (Ah)

Multiply the Amp Hour Rating by 3 to obtain the load. For example, a 60 Ah battery times 3 equals a 180 ampere load.

2. Turn the Load Control Knob clockwise until the amps reading gradually reaches the required load. While the load is being applied, watch the battery voltage. After 15 seconds at the test amperage, or if the voltage goes below the minimum value, turn the load off. NOTE: The Load-on Lamp flashes and beeps once per second. After 16 seconds of load current, the beeper will sound continuously.

### LOAD TEST CAUTION

**If a battery smokes while being loaded, stop testing immediately. It is not safe.**

3. Test Conclusions. If the battery voltage went below the minimum voltage from the table during the test the battery is either discharged or defective. Recharge and test again if necessary.

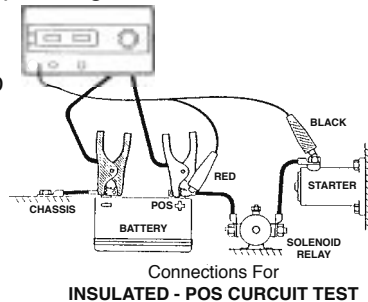
At 70°F and higher a good battery will maintain an output of 9.6 volts or more during the loading period (4.8 volts for 6 volt batteries). When a battery is cooler than 70°F, the output voltage requirement is reduced to give equivalent test conclusions per the following table:

ELECTROLYTE TEMP.		MINIMUM LOADED VOLTS
--°F--	--°C--	
70	21	9.6
60	16	9.5
50	10	9.4
40	4	9.3
30	-1	9.1
20	-7	8.9
10	-12	8.7
0	-18	8.5

USE HALF VOLTAGE FOR 6 VOLT BATTERIES.

## VOLTAGE DROP TEST

The voltage drop test is a very helpful diagnostic test for determining the condition of cables and connections for the starting charging circuit. The voltage drop test can be used on any part of the circuit. In the example below, we are checking the entire circuit from the positive side of the battery to the starter.



1. Be sure the Load Knob is turned to OFF before connecting the analyzer cables to the battery. Take note of the safety precautions on the back cover of this manual.
2. Connect the analyzer Battery Clamps to the battery terminals; Red to positive, Black to negative.
3. Select external volts.
4. Connect the external volts leads as shown in the illustration. Connect the Red auxiliary lead to the positive side of the battery. Connect the Black lead to the input terminal of the starter.
5. Disable ignition to prevent the engine from starting during the test.
4. Operate the Starter and read the voltmeter while cranking.
5. Test Conclusions. Good circuits drop less than 0.50 volts on a 12 volt system. Typically you should not have more than 0.10 volts drop per connection.

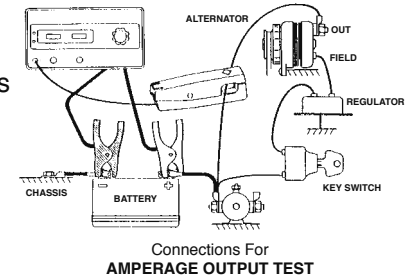
## REGULATOR CHARGING VOLTAGE

Follow the same setup and test procedure used for the alternator test, except put the Amp Probe around either battery cable. Once the charging amperage drops below 20 amps, the voltage displayed will be the regulator setting. This should be between 13.5 and 15.5 volts on a 12 volt system.

## ALTERNATOR OUTPUT TEST

Always compare test results with manufacturer's specifications before coming to conclusions regarding the performance or efficiency of charging systems and their components

1. Be sure the Load Knob is turned to OFF before connecting the analyzer cables to the battery. Take note of the safety precautions on the back cover of this manual.



2. Connect the analyzer Battery Clamps to the battery terminals; Red to positive, Black to negative.
3. With the Amp Probe jaws closed and not around any wires, press the Zero Amps buttons until the Amps Display shows "000"
4. Place the Amp Probe around the alternator output wire. Try to position the probe away from strong magnetism near the back shaft end of the alternator to avoid measurement error.
5. Display Battery Volts.
6. Start and run the engine at about 2000 RPM.
7. Turn the Load ON and increase until the battery voltage decreases to be between 12 and 13 volts while reading the output amperage.
8. Turn Load OFF and reduce RPM.
9. Test Conclusions
  - a. If the Amps Ripple lamp stayed on during the output test replace the alternator.
  - b. If the amperage abruptly decreased during the test check for a loose belt.
  - c. If output was less than 90% of rating use the voltage drop test to check output resistance.
  - d. If output did not change, full field the alternator. If the alternator output increases, replace the regulator.