

# Automotive Analyzer

*It's More than a Multimeter*



*Operator's Manual*

# **Table of Contents**

Specifications .....	3
Static Discharge Notice.....	3
Battery Replacement / Optional Battery .....	4
Function Buttons .....	5
ON/OFF .....	5
2C/4C .....	5
Hold .....	5
Min/Max.....	5
Range .....	5
REL Zero.....	5
Key Combinations & Special Functions .....	6
Backlight Control.....	6
Power up Status .....	6
Software Version .....	6
Volts.....	7
Ohms .....	8
Amps .....	9
Lo Amps .....	10
Volts • Amps.....	11
Time.....	12
Fuel .....	13
Coil .....	14
KV Test Instructions.....	15
Fuel Injector Testing .....	16
Ignition Coil Testing .....	17
Parts & Accessories .....	18
Warranty Statement.....	20
Safety Precautions .....	21

© Copyright 2006, GxT, Inc., All Rights Reserved

## Specifications

DC Volts.....	3 Ranges	..... 1 mV to 50V
AC Volts (True RMS) .....	3 Ranges	..... 1 mV to 50V
AC Volts Peak to Peak .....	3 Ranges	..... 1 mV to 50V
Low Amps DC .....	2 Ranges	..... 10 mA to 17A
Low Amps AC (True RMS).....	2 Ranges	..... 10 mA to 17A
Low Amps AC Peak to Peak .....	2 Ranges	..... 10 mA to 17A
High Amps DC.....	1 Range	..... 1 A to 600A
High Amps AC (True RMS) .....	1 Range	..... 1 A to 600A
High Amps AC Peak to Peak .....	1 Range	..... 1A to 600A
Ohms .....	5 Ranges	..... 1 $\Omega$ to 40M $\Omega$
Continuity .....	Beeper/Bargraph	..... 0 - 100 $\Omega$
Diode Volts .....	1 Range	..... 0 to 1.999 Volts
Frequency.....	5 Ranges	..... 0 to 2KHz
Pulse Width (Up or Down) .....	2 Ranges	..... 0 mS to 200mS
RPM Inductive .....	2 or 4 Stroke	..... 0 to 10,000 RPM
Fuel Pump RPM .....	4 Ranges	..... RPM
Dwell Milliseconds.....	1 Range	..... 0 to 100%
Peak Amps .....	1 Range	..... 0 to 20.0 Amps
Build Time .....	1 Range	..... 0 - 200 mSec
Drive Time .....	1 Range	..... 0 - 200 mSec
KiloVolts (Optional) .....	1 Range	..... 0 - 40.0 kV
Operating Temp.....	0° to 45°C	.....32° to 120° F
Storage Temp .....	-20° to 60°C	..... -20° to 140° F
Case Size .....	21x10x5 cm	..... 10x16.5x9.5 in.
Lead Length .....	1.8 m	.....6 Feet
Weight .....	655 g	..... 1.6 Pounds
Power Requirements 1, Internal 9 V Battery Optional Second 9V		
Displays.....	Backlit	..... 4 and 3 1/2 Digit
.....	Bar Graph	..... 31 Segment
Input Impedance .....	High Impedance	..... 10 Megohm
PC Interface.....	RS232w/	Optional Software

## Extreme Static Discharge

In the event that the analyzer is exposed to an extreme static discharge, readings may appear to freeze. Although the unit will not be damaged by static, you may need to press any function key to restart measurements.

## ***Battery Replacement / Optional Battery***

When the LOBAT indicator comes on the display, you will need to replace the two 9 Volt batteries. Remove the 4 screws holding the boot on the unit, and remove the boot. Replace both batteries and reattach the boot.

To replace the battery, remove the 4 screws holding the protective boot to the front panel. Remove the front panel. On the back of the display board located at the bottom of the board is the primary battery location. This position must be filled with a full sized 9 volt battery. A second position towards the top of the analog board will hold a second 9 volt battery. This is an auxiliary battery that is not required for use. However, for extended battery life when connected to a PC, or extended use of the backlight a second battery is recommended.

## ***Function Buttons***

**ON  
OFF**

Press this button to turn the multimeter on and off.

**2C/4C**

Press this button to set configure the RPM to read in 2 Cycle or 4 Cycle mode. Distributorless Ignition Systems should be set to 2 Cycle mode to correctly read RPM.

**HOLD**

Press this button to freeze and unfreeze the display.

**Min  
Max**

Pressing the Min/Max button while in certain tests will have set up the meter to capture minimum and maximum readings. Continue to press this button to view the min and max readings on the top display. Press any other test button to stop capturing minimums and maximums.

**Range**

Press the Range button to manually set the range of most tests. Press any other test button to return to auto ranging.

**REL  
Zero**

Press the REL Zero button to zero out the reading on the bottom display. Use this button to zero the low and high amps probe, or zero out the ohm meter. This function can also be used to set a base measurement as zero. Then all readings will be +/- from the base reading.

# Key Combinations & Special Functions

## Backlight Control



Press the HOLD button and the Min/Max button at the same time to turn the backlight on or off.

## Power up Status



Press the Volts and V•A buttons at the same time to disable the auto power off function. Turn the unit off, then back on. The meter will remain on until you turn it off, or the batteries run down.

## Software Version



Press the V•A, Time, Fuel and Coil buttons at the same time to display the software version of the multimeter.

## Volts



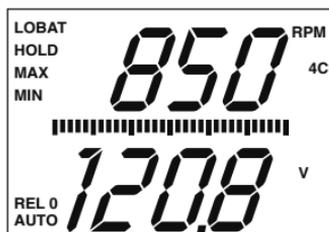
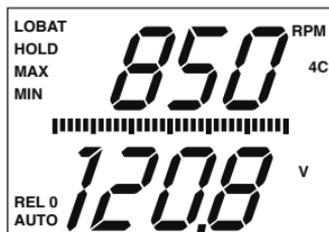
Pressing the button will cycle you through DC Volts, AC volts, and AC Peak to Peak functions.

The bargraph is an easy way to see trends in voltage being measured.

The DC volts function is a 10 meg high impedance voltmeter. The AC functions use a certified true RMS chip for accurate measurements of irregular shaped AC waveforms. The Peak to Peak function is the best measurement tool to determine the amplitude of any signal.

Note: AC auto ranging takes more time to occur than DC auto ranging. This is to allow the AC peak and rms circuits to settle after the abrupt change in scaling.

### Supported Functions:



# Ohms



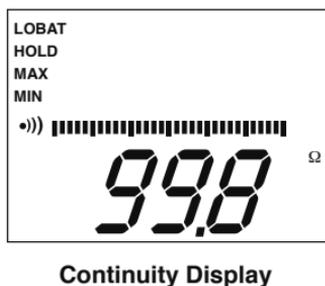
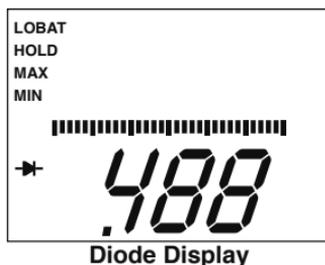
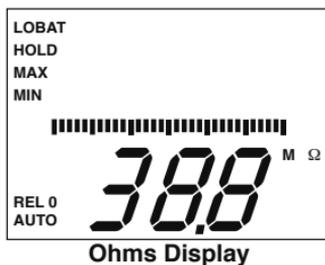
The highest Ohms range allows up to 40M Ohms to be measured. All of the ranges except the lowest use a low current source that will not forward bias semiconductor junctions. The lowest Ohms range does use source current that can cause semiconductor junctions to conduct and affect the readings.

The Diode Volts range will measure semiconductor junction voltages up to 1.999. In the reverse direction an OFL indication is expected.

The continuity test, indicated by both the beeper symbol and the Ohms symbol being active, uses the lowest Ohms range. Anytime the reading goes below 100 the beeper will sound.

Note: The meter is equipped with a self protection device that will protect the ohms function in case the test leads are connected to battery voltage.

## Supported Functions:



# Amps

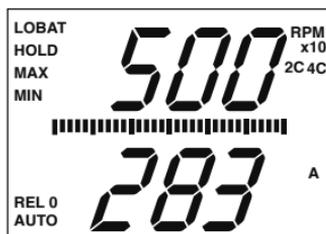


When the test is first selected the message “PLUG In HI” will be briefly displayed to remind the user that the High range Amps probe should be plugged into the Amps socket. Pressing the button will cycle you through DC Amps, AC Amps, and AC Peak to Peak Amps. The bargraph is a easy way to see trends in amps being measured.

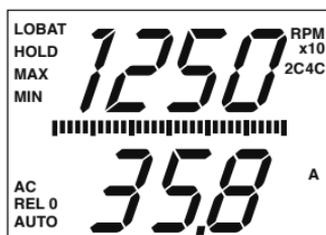
The DC Amps function can measure up to +/- 600 Amps. The AC functions use a certified true RMS chip to provide accurate interpretations of AC waveforms. The Peak to Peak function (not shown) is the best measurement tool to determine the amplitude of the signal.

Note: AC auto ranging takes more time to occur than DC auto ranging. This is to allow the AC peak and rms circuits to settle after the abrupt change in scaling.

## Supported Functions:



DC Amps Display



AC Amps Display



## Lo Amps

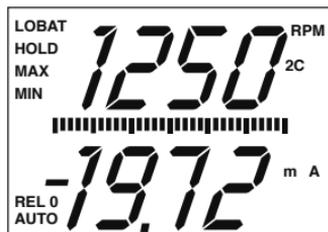


When the test is first selected the message “PLUG In LO” will be briefly displayed to remind the user that the Low range Amps probe should be plugged into the Amps socket. Pressing the button will cycle you through DC Lo Amps, AC Lo Amps, and AC Peak to Peak Lo Amps. The bargraph is a easy way to see trends in low amps being measured.

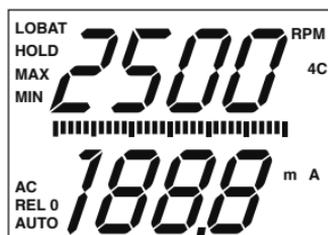
The DC Lo Amps function can measure from 10 milliamps to 20 Amps. The AC functions use a certified true RMS chip to provide accurate interpretations of AC waveforms. The Peak to Peak function is the best measurement tool to determine the amplitude of the signal.

Note: AC auto ranging takes more time to occur than DC auto ranging. This is to allow the AC peak and rms circuits to settle after the abrupt change in scaling.

### Supported Functions:



DC LoAmps Display

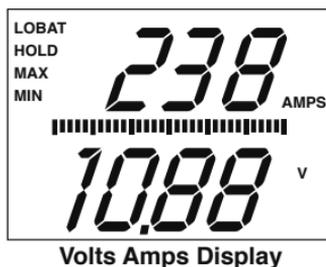


AC LoAmps Display

## Volts • Amps



Pressing the button will cycle you through the Volts•Amps Display and a Battery/Starter Test. The High range amp probe is used during this test. The Volts•Amps function displays Amps on the top display, and battery voltage on the bottom display.



The Battery/Starter Test will display a Crank Engine message (CrnEng). To set up the test, connect the test leads to the vehicle battery terminals, and place the Amp Probe onto the negative battery cable, and disable the ignition. To start the test, crank the engine. After 15 seconds of cranking the freeze readings will freeze

**Supported Functions:**



# Time



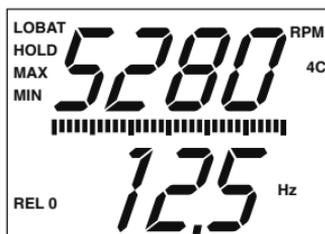
Press the Time button to cycle through Hertz, Pulse Width (Up Slope), Pulse Width (Down Slope), Dwell milliseconds, and Dwell percent tests. The RPM is detected using the Red inductive spark pickup and all time based measurements under this key are made using the voltage test leads.

The Hertz test measures frequency or cycles/second.

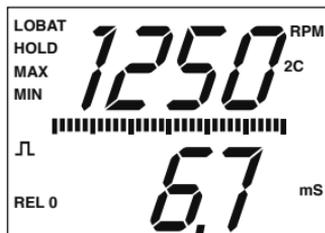
The Pulse Width test measures milliseconds when triggered using a positive or a negative slope. When measuring the Fuel Injector pulse width, a positive trigger will measure the times between fuel injector firings, and a negative trigger will measure the on time of the injector.

The Pulse Width and Dwell milliSecond tests both display in milliSeconds, however, the Pulse Width test is optimized for non-ignition signals, and the Dwell millisecond test is optimized for ignition signals.

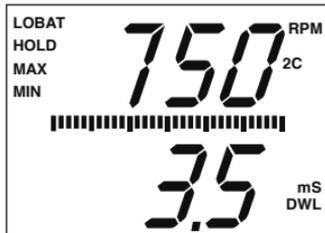
The Dwell Percent display can be used on engines with any number of cylinders. If you have dwell specified in degrees, convert degrees to percent.  $\text{Degrees} \times \frac{\text{The Number of Cylinders}}{3.6}$ . If you have an 8 cylinder engine that is supposed to have 12 degrees dwell, that would be 26.6% Dwell.  $12 \text{ degrees} \times 8 \text{ Cylinders} / 3.6 = 26.6\%$



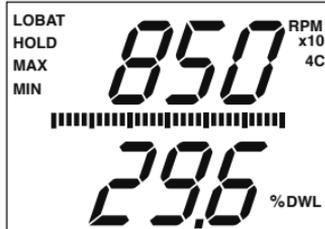
Hertz Display



Pulse Width Display



Dwell milliseconds Display



Dwell Percent Display

## Supported Functions:



## Fuel Test

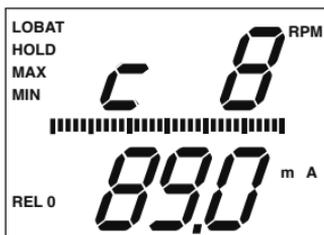


The Black amps probe will need to be connected to the wire that supplies battery power to the fuel pump. Energize the pump to read RPM and Amps, or RPM and AC Peak Amps. When the pump is running, the amperage must read as a positive number or your Fuel Pump RPM will not be correct, or stable.

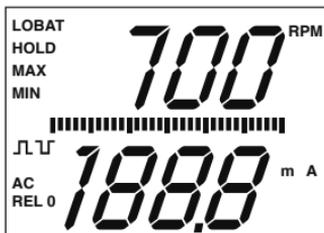
If you are not able to read the RPM confirm you are on the correct wire and have the correct number of commutators selected. The RANGE key cycles through the commutator settings. Most pumps have 6 or 8 commutators. Consult a technical information source for the correct commutator count. Each time the RANGE key is pressed the number of commutators selected is advanced and displayed briefly on the upper display preceded by an 'r'.

Pressing the FUEL key alternates between viewing the DC and AC amps readings on the lower display while the RPM is shown on the upper display.

### Supported Functions:



Fuel Pump RPM Display



Fuel Pump Amps Display



## Coil Test

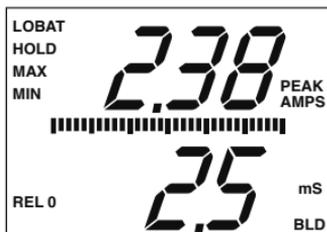


Press this button to cycle through two Current Ramping tests (Peak Amps, Build Time, Drive Time), Ignition KV, and Differential RPM.

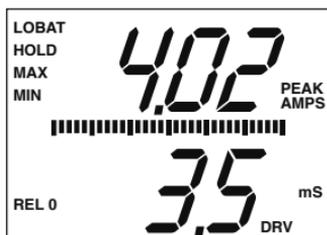
Build time is the time it takes the current driven into an injector or ignition coil to reach its peak value. Build is the equivalent to Dwell on a current limited ignition. The upper display shows the peak current that the coil was driven to. Drive time is the entire time that the injector is driven open or the ignition coil is driven prior to firing. Drive time is the equivalent to Dwell on a points and ballast type ignition system.

An optional adapter is needed to use the KV test. The adapter KV clip is attached to a spark plug wire and the magnitude of the KV peaks are displayed on the lower display. The BARGRAPH indicates activity of the KV input between numerical updates. See the expanded section on KV to learn more

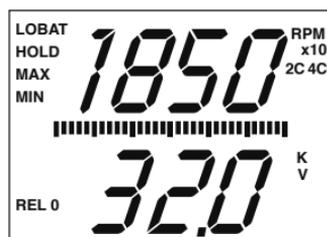
When using the Differential RPM test, RPM is shown on the upper display and the lower display is normally blank. Pressing REL0 sets and reference RPM value. While the REL0 mode is indicated the difference from the reference RPM is displayed on the lower display. A negative number means that the current RPM is lower than the reference RPM by that amount. A non-negative number means that the current RPM is higher than the reference RPM. Pressing REL0 will exit the mode and clear the lower display.



Peak Amps/Build Display



Peak Amps/Drive Display



Ignition KV Display

**Supported Functions:**

HOLD

Min  
Max

REL  
Zero

## **Coil Test - KV Test (Requires Optional Adapter)**

1. Unplug the Spark Pickup from the multimeter.
2. Connect the KV adapter to the multimeter.
3. Connect the Spark Pickup to the RPM input on the adapter.
4. Connect the ground lead to a good engine ground.
5. The capacitive pickup can be clipped on the spark plug wire being tested, or held against the wire with your hand.
6. Access the KV test on the multimeter by pressing the Coil Button three times.

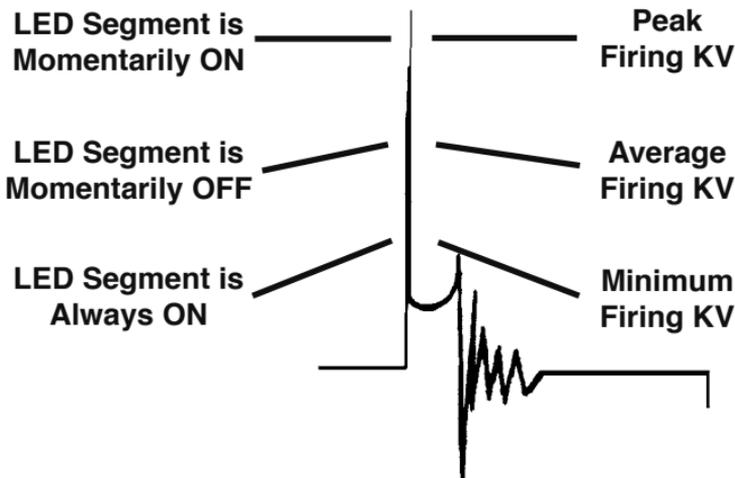
If KV is low for one or more cylinders the cause could be:

- Open Plug Wire at the Coil (KV will be very low downstream of the open)
- Narrow or Fouled Plug Gap
- Rich Mixture

If KV is High for one or more cylinders, the cause could be:

- Open Plug Wire at the Plug (KV will be very high upstream of the open)
- Wide Plug Gap
- High Resistance in Plug or Wire

A momentary high KV reading could be an indication of an ignition miss. The following graphic will show how to use the bargraphs.

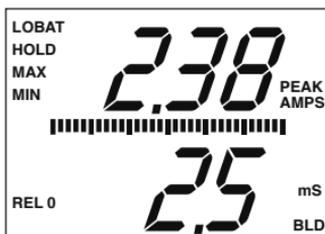




## Coil Test - Ignition Coil Application

Peak Amps is the peak current driving the coil. It is regulated by the module. A typical Peak Amp reading should be about from 5 to 10 amps.

Build Time, or ramp time, is the time it takes the amperage to reach its maximum.



Peak Amps/Build Display

Drive Time is the time the coil is actively driven.

### Analysis of Test Results

If Peak amps is low look for a bad connection between the module and coil. Long Build Time may be caused by high resistance in the connection from the ignition module to the coil. Short Build Time may be caused by a shorted coil. Build Time will be slightly longer during cranking.

Engine/ Company	Peak Amps	Build mSec	Engine/ Company	Peak Amps	Build mSec
Chrysler 3.3L	5.0	4.0	GM-2.0L	8.0	3.0
Chrysler 3.5L	5.0	4.0	GM-2.2L	9.0	3.0
Chrysler 3.8L	5.7	3.8	GM-2.3L,(Q4)	8.0	2.5
Ford 1.9L	5.0	3.1	GM-3.0L	6.5	3.8
Ford 3.0L	5.0	3.5	GM-3.1L	10.0	2.8
Ford 3.8L	5.0	3.5	GM-3.8L(Type I)	7.0	3.8
Ford 4.0L	5.0	3.5	GM-3.8L(Type II)	9.5	3.0
Ford 4.6L	5.5	3.3	Saturn 1.9L	7.6	3.3

For additional specifications, please consider purchased the SmartSpec Database.

## Parts & Accessories

### Test Lead, P/N W090-92

6 foot Shielded Test lead. BNC connector at one end, and banana jacks at the other end.



### Lo Amps Probe, P/N X926-00

Reads from 10 milliamps to 20 amps inductively. 5 Feet long.



### Hi Amps Probe, P/N X000-02

Reads from 1 amp to 600 amps inductively. 5 Feet long, opening is large enough to go around 00 cable.



### Spark Pickup, P/N X008-01

Reads RPM by connecting to any spark plug wire. 5 feet long.



### Test Clip, Black, P/N S011-30

### Test Clip, Red, P/N S011-32

Plugs into the end of the test lead. Large jaw opening makes it easy to connect to the battery, or ground for testing.



### Test Prod, Black, P/N S011-20

### Test Prod, Red, P/N S011-22

Plugs into the end of the test lead. Needle tip makes it easy to probe wires, or perform pinpoint testing.



### BNC Adapter, P/N S013-05

Adapts the meter to allow the connection of any standard banana jack inputs, such as third party temperature or pressure transducers.



## Parts & Accessories

### Serial Lead, P/N V095-PC

Plugs into the Amps jack on the meter and provides a Y adapter so you can connect your amps probe at the same time you connect to the serial port of your computer. Software is included with the cable. Win98 Compatible.



### KV Plate, P/N X015-05

A Flat metal plate that fits in the end of the KV adapter. Helps to measure ignition KV on COP and internal coil ignition.



### KV Adapter, P/N X095-K0

Plugs into the Tach jack on the meter and provides a Y adapter so you can connect the spark pickup to read RPM while you are also reading ignition KV's.



### Storage Case, P/N X095-09

Blow molded storage case holds all of the test leads and meter.



### Ferret Claws, P/N V911-01

2 3/4" Long, by 3/4" High, by 1/2" Wide makes getting into tight spots simple. Securely holds the wire in place to make piercing the wire simple and effective. Packaged in a heavy duty nylon pouch. The set includes a Red, Blue, Black, and Yellow Ferret Claw.



# ***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.

## ***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, or by e-mail to [repair@gxtauto.com](mailto:repair@gxtauto.com)

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.

# 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.

# ***Notes***

# Notes

