

BATTERY

CONTENTS

	page		page
GENERAL INFORMATION		BATTERY OPEN CIRCUIT VOLTAGE TEST	7
INTRODUCTION	1	BATTERY TEST	4
OVERVIEW	1	SERVICE PROCEDURES	
SAFETY PRECAUTIONS AND WARNINGS	2	BATTERY CHARGING	8
DESCRIPTION AND OPERATION		CHARGING COMPLETELY DISCHARGED	
BATTERY	2	BATTERY	8
BATTERY IGNITION OFF DRAW (IOD)	3	VISUAL INSPECTION	9
CHARGING TIME REQUIRED	3	REMOVAL AND INSTALLATION	
DIAGNOSIS AND TESTING		BATTERY	10
BATTERY BUILT-IN TEST INDICATOR	4	SPECIFICATIONS	
BATTERY IGNITION OFF DRAW (IOD)	5	BATTERY	10
BATTERY LOAD TEST	6	TORQUE	10

GENERAL INFORMATION

OVERVIEW

The battery, starting, and charging systems operate with one another, and must be tested as a complete system. In order for the vehicle to start and charge properly, all of the components involved in these systems must perform within specifications. These systems have been separated to allow easier access throughout the Service Manual. The breakdown for complete system coverage is:

- Group 0, Lubrication & Maintenance
- Group 8A, Battery
- Group 8B, Starting System
- Group 8C, Charging System
- Group 8W, Wiring Diagrams

Remember these systems are link together while testing. The diagnostic procedures used include from conventional diagnostic procedures to the more sophisticated On-Board Diagnostics (OBD) built into the Powertrain Control Module (PCM).

The following specialized equipment is needed to perform all the tests in Group 8A:

- Battery Charger (min. 0-20 amp rated)
- Digital Multi Meter (capable of reading 400 milliamps)
- Hydrometer (Except on Maintenance-Free batteries)
- Volt/Ammeter/Load Tester

The PCM controls the charging system. Its OBD capabilities monitor specific charging system functions for faults. If a fault occurs, a Diagnostic Trouble Code (DTC) is set in its memory. Fault codes and

their retrieval are covered in Group 8C, Charging System.

INTRODUCTION

The current Model Year batteries are listed in the Battery Specifications Chart. Use this chart to determine:

- Application for vehicle testing
- Maintenance-free or low-maintenance type
- Test Specifications
- Ratings and BCI Group Number

Determine the correct battery for the vehicle before testing.

From the factory, most vehicles are equipped with a maintenance-free battery, and others with a low-maintenance battery. A Hydrometer test may be required for low-maintenance batteries that is not required on maintenance-free (sealed) batteries.

NOTE: Vehicles using a Maintenance-Free battery, should be replaced with a Maintenance-Free battery.

Maintenance-free batteries have non-removable battery vent caps (Fig. 1). Water cannot be added to this battery. Under normal service the composition of this battery reduces gassing and water loss at normal charge rates. If the battery electrolyte level becomes low, this battery must be replaced.

Low-maintenance batteries have removable battery cell caps (Fig. 2). Water can be added to this battery. Under normal service the composition of this battery reduces gassing and water loss at normal charge rates.

Rapid loss of electrolyte can be caused by an over charging condition. Be certain to diagnose the charg-

GENERAL INFORMATION (Continued)

ing system before returning the vehicle to service. Refer to Group 8C, Charging System for more information.

It is important that the battery, starting and charging systems be thoroughly tested and inspected any time a battery needs to be charged or replaced. The cause of abnormal discharge, over charging or early battery failure must be corrected before a battery is replaced or returned to service.

The battery must be fully charged before any tests can be performed.

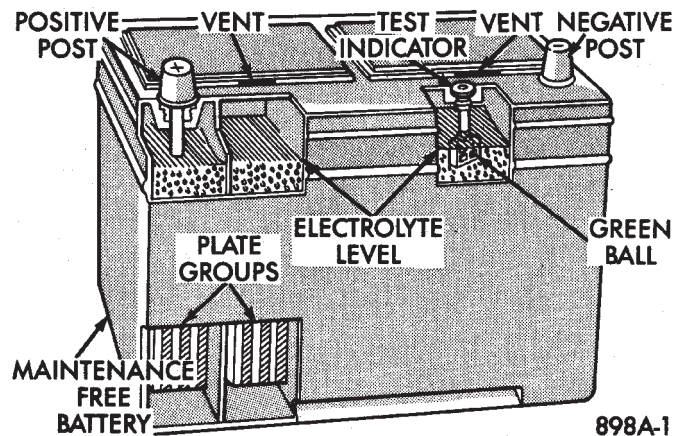


Fig. 1 Maintenance Free Battery

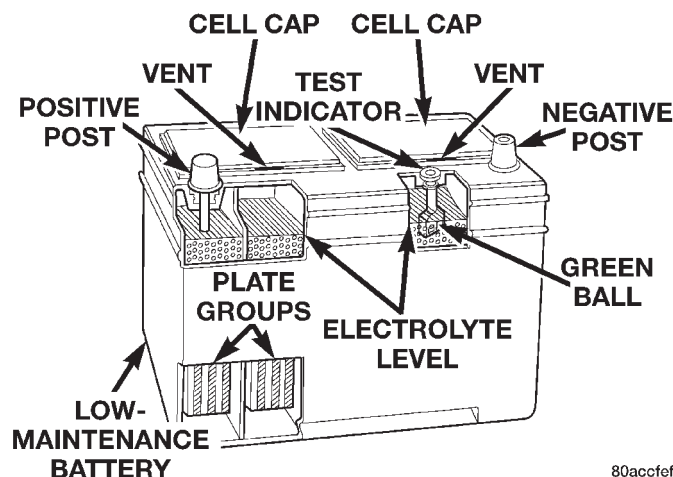


Fig. 2 Low Maintenance Battery

SAFETY PRECAUTIONS AND WARNINGS

WARNING: WEAR SAFETY GLASSES.

DO NOT ALLOW JUMPER CABLE CLAMPS TO TOUCH EACH OTHER WHEN CONNECTED TO A BOOSTER SOURCE.

DO NOT USE OPEN FLAME NEAR BATTERY.

REMOVE METALLIC JEWELRY WORN ON HANDS OR WRISTS TO AVOID INJURY BY ACCIDENTAL ARCING OF BATTERY CURRENT.

WHEN USING A HIGH OUTPUT BOOSTING DEVICE, DO NOT ALLOW THE DISABLED VEHICLE'S BATTERY TO EXCEED 16 VOLTS. PERSONAL INJURY OR DAMAGE TO ELECTRICAL SYSTEM CAN RESULT.

TO PROTECT THE HANDS FROM BATTERY ACID, A SUITABLE PAIR OF HEAVY DUTY RUBBER GLOVES, NOT THE HOUSEHOLD TYPE, SHOULD BE WORN WHEN REMOVING OR SERVICING A BATTERY. SAFETY GLASSES ALSO SHOULD BE WORN.

DESCRIPTION AND OPERATION

BATTERY

The battery has three major electrical system functions: First, it provides an energy source for cranking the engine; second, it acts as an electrical system voltage stabilizer; third, it delivers electrical current to operate various electrical systems in the vehicle, for a limited time, when the electrical load exceeds the generator output or during engine off conditions.

The battery is a device used to store electrical energy potential in a chemical form. When an electrical load is applied to the battery terminals, an electrochemical reaction occurs within the battery. This reaction causes the battery to discharge electrical current.

The battery is made up of six individual cells that are connected in series. Each cell contains positive charged plate groups made of lead oxide, and negatively charged plate groups made of sponge lead. The dissimilar metal plates are submerged in a sulfuric acid and water solution called an electrolyte.

As the battery discharges, a gradual chemical change takes place within each cell. The sulfuric acid in the electrolyte combines with the plate material causing both plates to slowly change to lead sulfate. At the same time, oxygen from the positive plate material combines with hydrogen from the sulfuric acid, causing the electrolyte to become mainly water.

The chemical changes within the battery are caused by the movement of excess or free electrons between the positive and negative plate groups. This movement of electrons produces a flow of electrical current through the load device attached to the battery terminals. As the plate materials become more similar chemically, and the electrolyte becomes less acid, the voltage potential of each cell is reduced. However, by charging the battery with a voltage higher than that of the battery, the battery discharging process is reversed.

Charging the battery gradually changes the sulfated lead plates back into sponge lead and lead oxide, and the water back into sulfuric acid. This

DESCRIPTION AND OPERATION (Continued)

action restores the difference in the electron charges deposited on the plates, and the voltage potential of the battery cells.

For a battery to remain useful, it must be able to produce high-amperage current over an extend period. A battery must also be able to accept a charge so that its voltage potential may be restored.

In addition to producing and storing electrical energy, the battery serves as a capacitor, or voltage stabilizer, for a vehicle's electrical system. It absorbs most abnormal or transient voltages caused by the switching of any of the vehicle's electrical components.

The battery is vented to release excess hydrogen gas that is created when the battery is being charged or discharged. However, even with these vents, the hydrogen gas can collect in or around the battery. hydrogen gas is exposed to flame or sparks, it might ignite.

If the electrolyte level is low, the battery may arc internally and explode. If the battery is equipped with removable cell caps, add distilled water whenever the electrolyte level is below the top of the plates. If the battery cell caps cannot be removed, the battery must be replaced if the electrolyte level becomes low.

BATTERY IGNITION OFF DRAW (IOD)

A completely normal vehicle will have a small amount of current drain on the battery with the key out of the ignition. It can range from 5 to 25 milliamperes after all the modules time out. If a vehicle will not be operated for approximately a 20 days, the IOD fuse should be pulled to eliminate the vehicle electrical drain on the battery during storage. The IOD fuse (M1) is located in the Junction Block. Refer to the raised fuse or the cover of the Junction Block for proper fuse.

CHARGING TIME REQUIRED

The time required to charge a battery will vary depending upon the following factors.

SIZE OF BATTERY

A completely discharged large heavy-duty battery may require more recharging time than a completely discharged small capacity battery. Refer to Battery Charging Timetable.

WARNING: NEVER EXCEED 20 AMPS WHEN CHARGING A COLD -1°C (30°F) BATTERY. THE BATTERY MAY ARC INTERNALLY AND EXPLODE. PERSONAL INJURY AND/OR VEHICLE DAMAGE MAY RESULT.

BATTERY CHARGING TIMETABLE

OPEN CIRCUIT VOLTAGE	CHARGING AMPERAGE		
	5 AMPERES	10 AMPERES	20 AMPERES
	HOURS CHARGING AT 21°C (70°F)		
12.25 TO 12.39	6 HOURS	3 HOURS	1.5 HOURS
12.00 TO 12.24	8 HOURS	4 HOURS	2 HOURS
11.95 TO 11.99	12 HOURS	6 HOURS	3 HOURS
10.00 TO 11.94	14 HOURS	7 HOURS	3.5 HOURS
LESS THAN 10.00	SEE CHARGING A COMPLETELY DISCHARGED BATTERY		

WARNING: DO NOT CHARGE, ASSIST BOOST, LOAD TEST, OR ADD WATER TO THE BATTERY WHEN CLEAR COLOR DOT IS VISIBLE, PERSONAL INJURY MAY OCCUR.

A clear color dot shows electrolyte level in the battery is below the test indicator (Fig. 3). Water cannot be added to a maintenance free battery. The battery must be replaced. A low electrolyte level may be caused by an over charging condition. Refer to Group 8C, Generator System for test procedures.

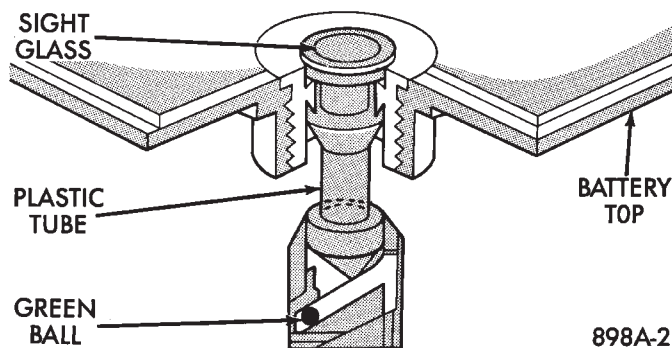


Fig. 3 Test Indicator

TEMPERATURE

A longer time will be needed to charge a battery at -18°C (0°F) than at 27°C (80°F). When a fast charger is connected to a cold battery, current accepted by battery will be very low at first. In time, the battery will accept a higher rate as battery temperature warms.

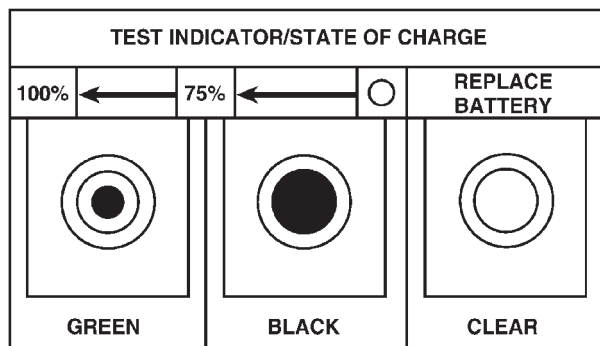
CHARGER CAPACITY

A charger which can supply only five amperes will require a much longer period of charging than a charger that can supply 20 amperes or more.

DESCRIPTION AND OPERATION (Continued)

STATE OF CHARGE

A completely discharged battery requires more charging time than a partially charged battery. Electrolyte is nearly pure water in a completely discharged battery. At first, the charging current amperage will be low. As water is converted back to sulfuric acid inside the battery, the current amp rate will rise. Also, the specific gravity of the electrolyte will rise, bringing the green ball (Fig. 4) into view at approximately 75 percent state-of-charge.



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Fig. 4 Reading Test Indicator

DIAGNOSIS AND TESTING

BATTERY BUILT-IN TEST INDICATOR

TEST INDICATOR

The Test Indicator (Fig. 5), (Fig. 4), and (Fig. 3) measures the specific gravity of the electrolyte. Specific Gravity (SG) of the electrolyte will show state-of-charge (voltage). The test indicator WILL NOT show cranking capacity of the battery. Refer to Battery Load Test for more information. Look into the sight glass (Fig. 4), (Fig. 3) and note the color of the indicator. Refer to the following description of colors:

NOTE: GREEN = 75 to 100% state-of-charge

The battery is adequately charged for further testing and may be returned to use. If the vehicle will

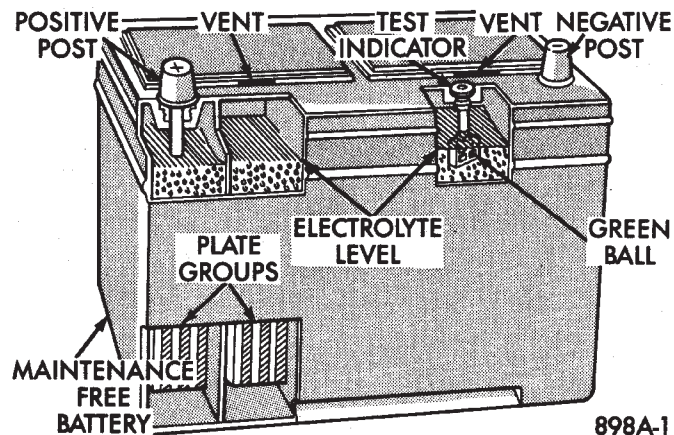


Fig. 5 Battery Construction and Test Indicator

not crank for a maximum 15 seconds, refer to BATTERY LOAD TEST in this Group for more information.

NOTE: BLACK OR DARK = 0 to 75% state-of-charge

The battery is INADEQUATELY charged and must be charged until green dot is visible, (12.4 volts or greater) before the battery is tested or returned to use. Refer to Causes of Battery Discharging in this Group for more information.

NOTE: CLEAR COLOR = Replace Battery

WARNING: DO NOT CHARGE, ASSIST BOOST, LOAD TEST, OR ADD WATER TO THE BATTERY WHEN CLEAR COLOR DOT IS VISIBLE. PERSONAL INJURY MAY OCCUR.

A clear color dot shows electrolyte level in battery is below the test indicator (Fig. 4). Water cannot be added to a maintenance free battery. The battery must be replaced. A low electrolyte level may be caused by an over charging condition. Refer to Group 8C, Generator for proper test procedures on Vehicle.

BATTERY TEST

To test battery, refer to the Battery Diagnosis and Testing table and to the proper procedures.

DIAGNOSIS AND TESTING (Continued)

BATTERY DIAGNOSIS AND TESTING

STEPS	POSSIBLE CAUSE	CORRECTION
VISUAL INSPECTION CHECK FOR POSSIBLE DAMAGE TO BATTERY AND CLEAN BATTERY.	(1) LOOSE BATTERY POST, CRACKED BATTERY COVER OR CASE, LEAKS OR ANY OTHER PHYSICAL (2) BATTERY OK.	(1) REPLACE BATTERY (2) CHECK STATE OF CHARGE. REFER TO TEST INDICATOR.
TEST INDICATOR CHECK CHARGE EYE COLOR	(1) GREEN (2) BLACK (3) CLEAR	(1) BATTERY IS CHARGED. PERFORM BATTERY OPEN CIRCUIT VOLTAGE TEST (2) PERFORM BATTERY CHARGING PROCEDURE. (3) REPLACE BATTERY.
BATTERY OPEN CIRCUIT VOLTAGE TEST	(1) BATTERY IS ABOVE 12.40 VOLTS (2) BATTERY IS BELOW 12.40 VOLTS.	(1) PERFORM THE BATTERY LOAD TEST. (2) PERFORM BATTERY CHARGING PROCEDURE.
BATTERY CHARGING	(1) BATTERY ACCEPTED CHARGE. (2) BATTERY WILL NOT ACCEPT CHARGE	(1) ENSURE THAT THE INDICATOR EYE IS GREEN AND PERFORM BATTERY OPEN CIRCUIT VOLTAGE TEST (2) PERFORM CHARGING A COMPLETELY DISCHARGED BATTERY.
BATTERY LOAD TEST	(1) ACCEPTABLE MINIMUM VOLTAGE. (2) UNACCEPTABLE MINIMUM VOLTAGE	(1) BATTERY IS OK TO PUT IN USE, PERFORM BATTERY IGNITION OFF DRAW TEST. (2) REPLACE BATTERY AND PERFORM BATTERY IGNITION OFF DRAW TEST.
CHARGING A COMPLETELY DISCHARGED BATTERY	(1) BATTERY ACCEPTED CHARGE. (2) BATTERY WILL NOT ACCEPT CHARGE.	(1) ENSURE THAT THE INDICATOR EYE IS GREEN AND PERFORM BATTERY OPEN CIRCUIT VOLTAGE TEST. (2) REPLACE BATTERY.
IGNITION OFF DRAW TEST	(1) IOD IS 5-25 MILLIAMPERES. (2) IOD EXCEEDS 25 MILLIAMPERES.	(1) VEHICLE IS NORMAL. (2) ELIMINATE EXCESS IOD DRAW.

ABNORMAL BATTERY DISCHARGING

- Corroded battery posts, cables or terminals.
- Loose or worn generator drive belt.
- Electrical loads that exceed the output of the charging system due to equipment or accessories installed after delivery.
- Slow driving speeds in heavy traffic conditions or prolonged idling with high-amperage electrical systems in use.
- Defective electrical circuit or component causing excess Ignition Off Draw (IOD). Refer to Battery Ignition Off Draw (IOD).

- Defective charging system.
- Defective battery.

BATTERY IGNITION OFF DRAW (IOD)

High current draw on the battery with the ignition OFF will discharge a battery. After a dead battery is serviced the vehicle Ignition Off Draw (IOD) should be checked. Determine if a high current draw condition exists first check the vehicle with a milliamperage meter.

- (1) Verify that all electrical accessories are OFF.
- Remove key from ignition switch

DIAGNOSIS AND TESTING (Continued)

- Turn off all lights
 - Trunk lid and glove box door is closed
 - Sun visor vanity lights are OFF
 - All doors are closed
 - Allow the Illuminated Entry System to time out in approximately 30 seconds, if equipped.
 - During Transmission Control Module (TCM) power down there will be 500 milliamperes present for 20 minutes. Afterwards less than 1.0 milliampere.
- (2) Disconnect battery negative cable.

CAUTION: Always disconnect the milliampere meter before opening a door.

(3) Using an multi-meter, that has least a milliampere range of 200 mA. Set meter to the highest mA range. Install meter between the battery negative cable and battery negative post. After all modules time-out the total vehicle IOD should be less than 25 milliamperes. If ignition off draw is more than 25 milliamperes go to Step 5.

(4) Each time the milliampere meter is disconnected and connected, all electronic timer functions will be activated for approximately one minute. The Body Control Module (BCM) ignition off draw can reach 90 milliamperes.

(5) Remove the PDC fuses:

- Interior lamps
- Brake lamp
- IOD

(6) If there is any reading, with fuses removed there is a short circuit in the wiring. Refer to Group 8W, wiring diagrams. Repair as necessary. If reading is less than 25 mA go to Step 9.

(7) Install all fuses. After installing fuse, the current can reach 90 mA. After time-out the reading should not exceed 25 mA. If OK go to Step 10. If not, disconnect:

- Radio
- Body control module
- Remote keyless entry module

(8) Disconnect one component at time, to see if any component is at fault. If the high reading is not eliminated there is a short circuit in the wiring. Refer to Group 8W, for wiring diagrams and circuit information.

(9) Remove interior and brake lamp fuses. Install the fuses. The milliampere reading should be 2-4 mA. If reading is higher than 4 mA:

- Disconnect PCM.
- If reading is OK, replace PCM.
- If reading does not change, disconnect the TCM.
- If reading is OK, replace TCM.
- If reading stays, there is a short circuit to one of the modules. Refer to Group 8W, Wiring Diagrams.

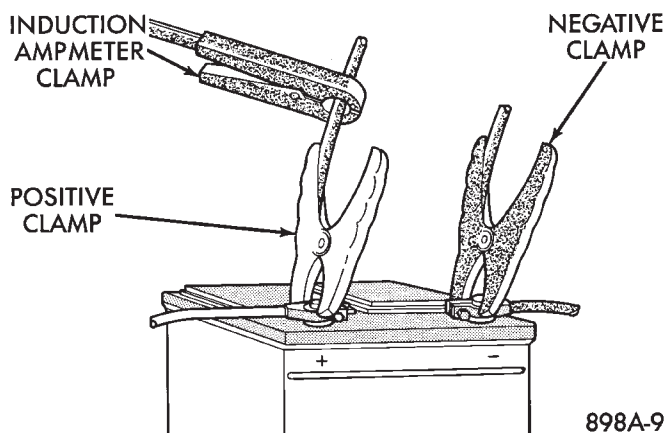
BATTERY LOAD TEST

A fully charged battery must have cranking capacity, to provide the starter motor and ignition system enough power to start the engine over a broad range of ambient temperatures. A battery load test will verify the actual cranking capability of the battery.

WARNING: IF BATTERY SHOWS SIGNS OF FREEZING, LEAKING, LOOSE POSTS, OR EXCESSIVELY LOW ELECTROLYTE LEVEL, DO NOT TEST. ACID BURNS OR AN EXPLOSIVE CONDITION MAY RESULT.

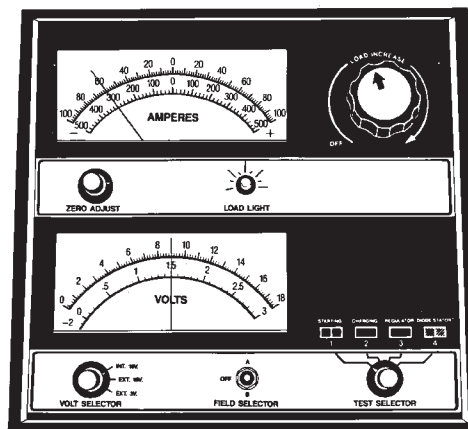
(1) Remove battery from vehicle. The battery top, cables and posts should be clean. If green dot is not visible in indicator, charge the battery. Refer to Battery Charging Procedures.

(2) Connect a Volt/Ammeter/Load tester to the battery posts (Fig. 6). Rotate the load control knob of the Carbon pile rheostat to apply a 300 amp load. Apply this load for 15 seconds to remove the surface charge from the battery, and return the control knob to off (Fig. 7).



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Fig. 6 Volt-Ammeter Load Tester Connections



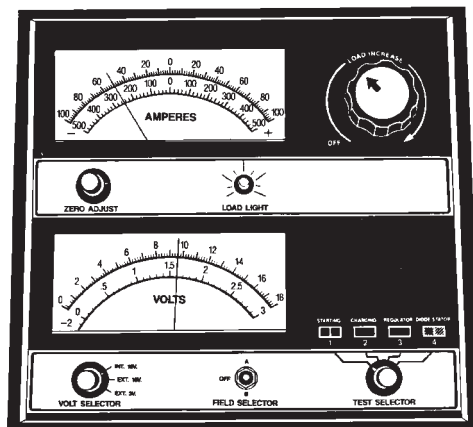
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Fig. 7 Remove Surface Charge From Battery

DIAGNOSIS AND TESTING (Continued)

(3) Allow the battery to stabilize for 2 minutes, and then verify open circuit voltage.

(4) Rotate the load control knob on the tester to maintain 50% of the battery cold crank rating for 15 seconds (Fig. 8). Record the loaded voltage reading and return the load control to off. Refer to the Battery Specifications at the rear of this Group.



898A-11

Fig. 8 Load 50% Cold Crank Rating

(5) Voltage drop will vary according to battery temperature at the time of the load test. Battery temperature can be estimated by the temperature of exposure over the preceding several hours. If the battery has been charged or boosted a few minutes prior to the test, the battery would be slightly warmer. Refer to Load Test Temperature Chart for proper loaded voltage reading.

LOAD TEST TEMPERATURE

MINIMUM VOLTAGE	TEMPERATURE	
	CELSIUS	FAHRENHEIT
9.6 VOLTS	21° AND ABOVE	70° AND ABOVE
9.5 VOLTS	16°	60°
9.4 VOLTS	10°	50°
9.3 VOLTS	4°	40°
9.1 VOLTS	-1°	30°
8.9 VOLTS	-7°	20°
8.7 VOLTS	-12°	10°
8.5 VOLTS	-18°	0°

(6) If battery passes load test, it is in good condition and further tests are not necessary. If it fails load test, it should be replaced.

BATTERY OPEN CIRCUIT VOLTAGE TEST

An open circuit voltage no load test shows the state of charge of a battery and whether it is ready for a load test at 50 percent of the battery's cold

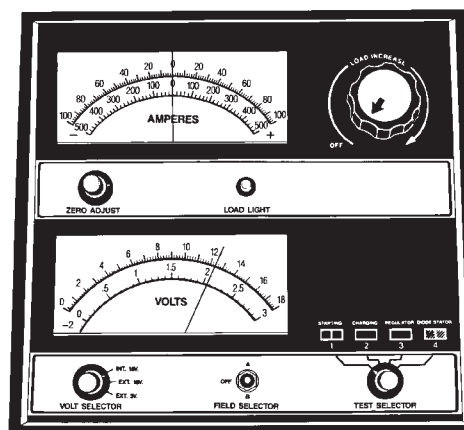
crank rating. Refer to Battery Load Test. If a battery has open circuit voltage reading of 12.4 volts or greater, and will not pass the load test, replace the battery because it is defective. To test open circuit voltage, perform the following operation.

(1) Remove both battery cables, negative cable first. Battery top, cables and posts should be clean. If green dot is not visible in indicator, charge the battery. Refer to Battery Charging Procedures.

(2) Connect a Volt/Ammeter/Load tester to the battery posts (Fig. 6). Rotate the load control knob of the Carbon pile rheostat to apply a 300 amp load. Apply this load for 15 seconds to remove the surface charge from the battery, and return the control knob to off (Fig. 7).

(3) Allow the battery to stabilize for 2 minutes, and then verify the open circuit voltage (Fig. 9).

(4) This voltage reading will approximate the state of charge of the battery. It will not reveal battery cranking capacity. Refer to Battery Open Circuit Voltage table.



898A-7

Fig. 9 Testing Open Circuit Voltage
BATTERY OPEN CIRCUIT VOLTAGE

OPEN CIRCUIT VOLTS	CHARGE PERCENTAGE
11.7 VOLTS OR LESS	0%
12.0 VOLTS	25%
12.2 VOLTS	50%
12.4 VOLTS	75%
12.6 VOLTS OR MORE	100%

SERVICE PROCEDURES

BATTERY CHARGING

WARNING: DO NOT CHARGE A BATTERY THAT HAS EXCESSIVELY LOW ELECTROLYTE LEVEL. BATTERY MAY SPARK INTERNALLY AND EXPLODE. EXPLOSIVE GASES FORM OVER THE BATTERY. DO NOT SMOKE, USE FLAME, OR CREATE SPARKS NEAR BATTERY. DO NOT ASSIST BOOST OR CHARGE A FROZEN BATTERY. BATTERY CASING MAY FRACTURE. BATTERY ACID IS POISON, AND MAY CAUSE SEVERE BURNS. BATTERIES CONTAIN SULFURIC ACID. AVOID CONTACT WITH SKIN, EYES, OR CLOTHING. IN THE EVENT OF CONTACT, FLUSH WITH WATER AND CALL PHYSICIAN IMMEDIATELY. KEEP OUT OF REACH OF CHILDREN.

CAUTION: Disconnect the **NEGATIVE** battery cable remote terminal first before charging battery to avoid damage to electrical systems. Do not exceed 16.0 volts while charging battery. Refer to the instructions supplied with charging equipment

NOTE: The battery cannot be refilled with water, it must be replaced.

A battery is considered fully charged when it will meet all the following requirements.

- It has an open circuit voltage charge of at least 12.4 volts. Refer to Battery Open Circuit Voltage table.
- It passes the 15 second load test, refer to the Load Test Temperature chart.
- The built in test indicator dot is **GREEN** (Fig. 4).

Battery electrolyte will bubble inside of battery case while being charged properly. If the electrolyte boils violently, or is discharged from the vent holes while charging, immediately reduce charging rate or turn off charger. Evaluate battery condition. Battery damage may occur if charging is excessive.

Some battery chargers are equipped with polarity sensing devices to protect the charger or battery from being damaged if improperly connected. If the battery state of charge is too low for the polarity sensor to detect, the sensor must be bypassed for charger to operate. Refer to operating instructions provided with battery charger being used.

CAUTION: Charge battery until test indicator appears green. Do not overcharge.

It may be necessary to jiggle the battery or vehicle to bring the green dot in the test indicator into view.

After the battery has been charged to 12.4 volts or greater, perform a load test to determine cranking capacity. Refer to Battery Load Test in this Group. If the battery passes the load test, return the battery to use. If battery will not endure a load test, it must be replaced. Properly clean and inspect battery hold downs, tray, terminals, cables, posts, and top before completing service.

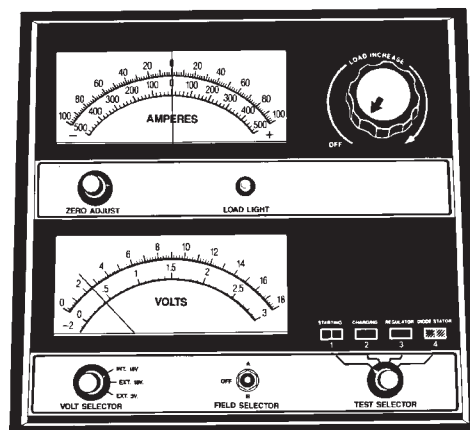
CHARGING COMPLETELY DISCHARGED BATTERY

The following procedure should be used to recharge a completely discharged battery. Unless procedure is properly followed, a good battery may be needlessly replaced.

BATTERY CHARGING RATE

VOLTAGE	HOURS
16.0 VOLTS OR MORE	UP TO 4 HOURS
14.0 TO 15.9 VOLTS	UP TO 8 HOURS
13.9 VOLTS OR LESS	UP TO 16 HOURS

(1) Measure the voltage at battery posts with a voltmeter accurate to 1/10 volt (Fig. 10). If below 10 volts, charge current will be low, and it could take some time before it accepts a current in excess of a few milliamperes. Such low current may not be detectable on amp meters built into many chargers.



898A-12

Fig. 10 Voltmeter Accurate to 1/10 Volt (Connected)

(2) Connect charger leads. Some chargers feature polarity protection circuitry that prevents operation unless charger is connected to battery posts correctly. A completely discharged battery may not have enough voltage to activate this circuitry. This may happen even though the leads are connected properly.

(3) Battery chargers vary in the amount of voltage and current they provide. For the time required for the battery to accept measurable charger current at various voltages, refer to Charging Rate Chart. If charge current is still not measurable after charging

SERVICE PROCEDURES (Continued)

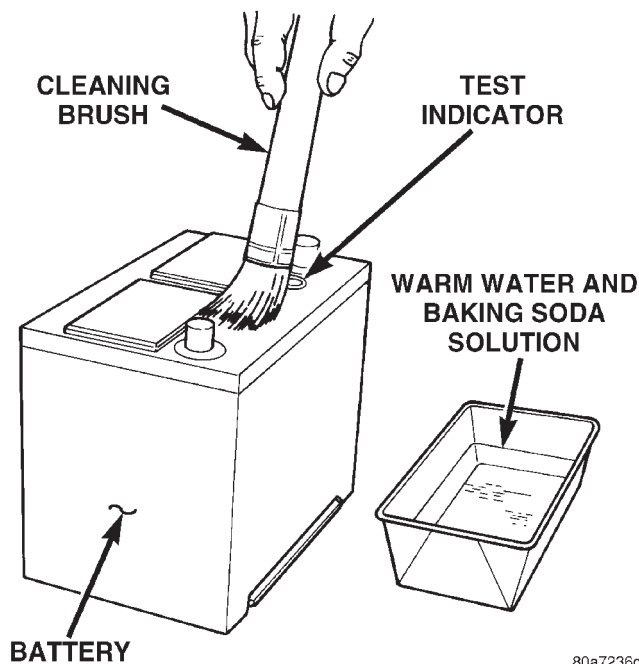
times, the battery should be replaced. If charge current is measurable during charging time, the battery may be good, and charging should be completed in the normal manner.

VISUAL INSPECTION

CAUTION: Do not allow baking soda solution to enter vent holes, as damage to battery can result.

(1) Clean top of battery with a solution of warm water and baking soda.

(2) Apply soda solution with a bristle brush and allow to soak until acid deposits loosen (Fig. 11).



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Fig. 11 Cleaning Battery

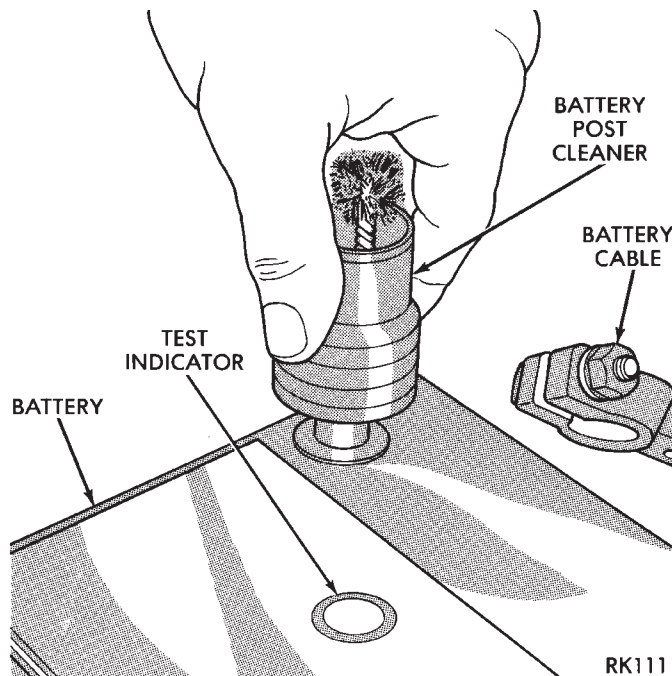
(3) Rinse soda solution from battery with clear water and blot battery dry with paper toweling. Dispose of toweling in a safe manner. Refer to the WARNINGS on top of battery.

(4) Inspect battery case and cover for cracks, leakage or damaged hold down ledge. If battery is damaged replace it.

(5) Inspect battery tray for damage caused by acid from battery. If acid is present, clean area with baking soda solution.

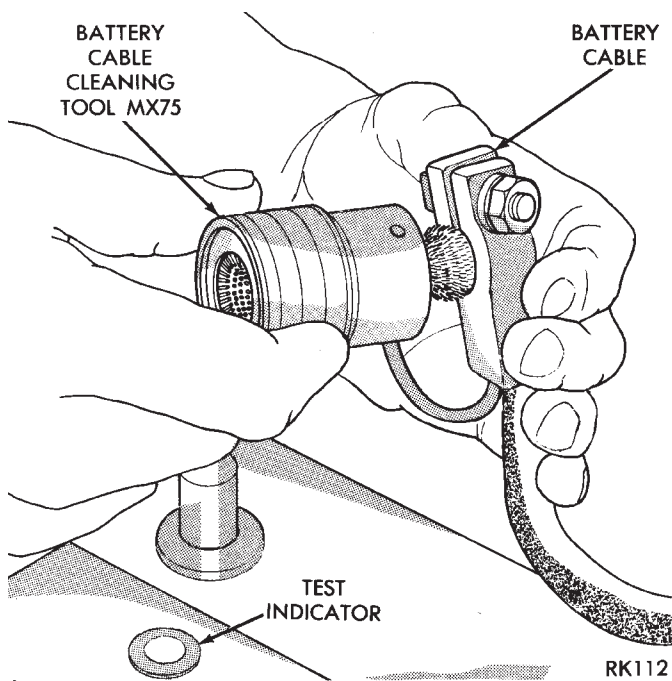
(6) Clean battery posts with a battery post cleaning tool (Fig. 12).

(7) Clean battery cable clamps with a battery terminal cleaning tool (Fig. 13). Replace cables that are frayed or have broken clamps.



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Fig. 12 Cleaning Battery Post



RK112

Fig. 13 Cleaning Battery Cable Terminal

REMOVAL AND INSTALLATION

BATTERY

WARNING: TO PROTECT THE HANDS FROM BATTERY ACID, A SUITABLE PAIR OF HEAVY DUTY RUBBER GLOVES, NOT THE HOUSEHOLD TYPE, SHOULD BE WORN WHEN REMOVING OR SERVICING A BATTERY. SAFETY GLASSES ALSO SHOULD BE WORN.

REMOVAL

- (1) Turn the steering wheel all the way to the right.
- (2) Verify that the ignition switch and all accessories are OFF.
- (3) Disconnect and isolate the negative battery cable remote terminal from the remote battery post (Fig. 14).

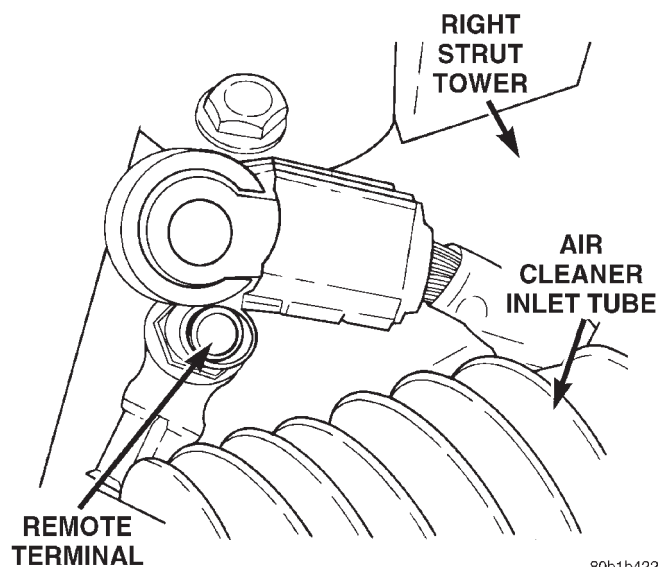


Fig. 14 Negative Battery Cable Remote Terminal

- (4) Remove air cleaner housing. Refer to Group 14, Fuel for service procedures.
- (5) Remove battery splash shield. Refer to Group 23, Body for service procedures.
- (6) Remove two short bolts to battery hold down.

(7) Slide battery rearward to disconnect the negative and positive battery terminals from battery.

(8) Slide battery toward rear of vehicle and lift out through wheel well opening.

(9) Remove battery from vehicle.

INSTALLATION

For installation, reverse the above procedures. Inspect and clean battery and attaching components before installation.

WARNING: DO NOT OVER TIGHTEN BATTERY CABLE CLAMPS, DAMAGE TO CLAMPS CAN RESULT.

(1) Tighten clamp nuts to 8.5 N·m (75 in. lbs.) torque.

SPECIFICATIONS

BATTERY

BATTERY SPECIFICATIONS

LOAD TEST (AMPS)	COLD CRANKING RATING @ -18°C (0°F)	RESERVE CAPACITY
300 AMP	600 AMP	120 MINUTES
345 AMP	685 AMP	125 MINUTES

CRANKING RATING

The current battery can deliver for 30 seconds and maintain a terminal voltage of 7.2 volts or greater at specified temperature.

RESERVE CAPACITY RATING

The length of time a battery can deliver 25 amps and maintain a minimum terminal voltage of 10.5 volts at 27°C (80°F).

TORQUE

DESCRIPTION

TORQUE

Battery Hold Down Clamp Bolt 14 N·m
(125 in. lbs.)