

ENGINE 4H SERIES

SECTION 6D1
ENGINE ELECTRICAL

Contents

BATTERY	6D1-2
General Description	6D1-2
Diagnosis	6D1-2
On-vehicle Service	6D1-3
Main Data and Specifications	6D1-4

BATTERY

General Description

There are six battery fluid caps at the top of the battery. The battery is completely sealed except for the six small vent holes at the side. These vent holes permit the escape of small amounts of gas generated by the battery. This type of battery has the following advantages over conventional batteries:

1. There is no need to add water during the entire service life of the battery.
2. The battery protects itself against overcharging. The battery will refuse to accept an excessive charge.
(A conventional battery will accept an excessive charge, resulting in gassing and loss of battery fluid.)
3. The battery is much less vulnerable to self-discharge than a conventional type battery.

Diagnosis

Visual Inspection

Inspect the battery for obvious physical damage, such as a cracked or broken case, which would permit electrolyte loss.

Replace the battery if obvious physical damage is discovered during inspection.

Check for any other physical damage and correct it as necessary. If not, proceed to "Hydrometer check".

Hydrometer Check

There is a built-in hydrometer (Charge test indicator) at the top of the battery. It is designed to be used during diagnostic procedures.

Before trying to read the hydrometer, carefully clean the upper battery surface.

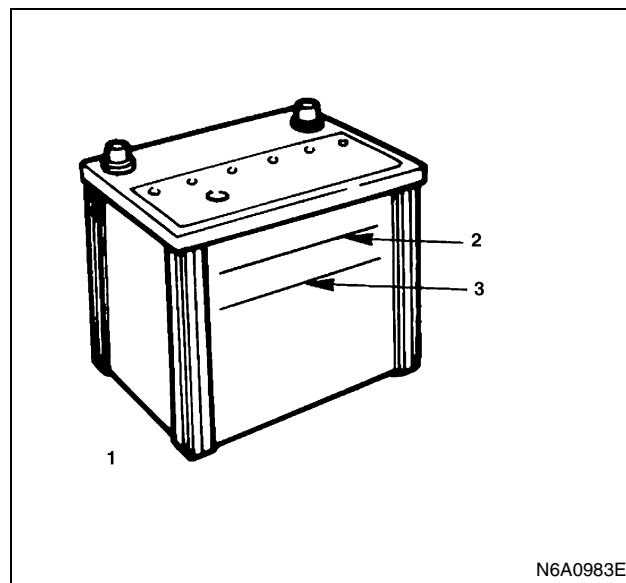
If your work area is poorly lit, additional light may be necessary to read the hydrometer.

- a. BLUE RING OR DOT VISIBLE - Go to "Voltage check".
- b. BLUE RING OR DOT NOT VISIBLE - Go to "Fluid level check".

Fluid Level Check

The fluid level should be between the upper level line and lower level line on side of the battery.

- a. CORRECT FLUID LEVEL - Charge the battery.
- b. BELOW LOWER LEVEL - Replace battery.



Legend

1. Battery
2. Upper level
3. Lower level

Voltage Check

1. Put voltmeter test leads to battery terminals.
 - a. VOLTAGE IS 12.4V OR ABOVE - Go to "Load test".
 - b. VOLTAGE IS UNDER 12.4V - Go to procedure 2 below.
2. Determine fast charge amperage from specification.
(See Main Data and Specifications in this section).
Fast charge battery for 30 minutes at amperage rate no higher than specified value.
Take voltage and amperage readings after charge.
 - a. VOLTAGE IS ABOVE 16V AT BELOW 1/3 OF AMPERAGE RATE - Replace battery.
 - b. VOLTAGE IS ABOVE 16V AT ABOVE 1/3 OF AMPERAGE RATE - Drop charging voltage to 15V and charge for 10 — 15 hours.
Then go to "Load test".
 - c. VOLTAGE IS BETWEEN 12V AND 16V - Continue charging at the same rate for an additional 3-1/2 hours. Then go to "Load test".
 - d. VOLTAGE IS BELOW 12V - Replace battery.

Load Test

1. Connect a voltmeter and a battery load tester across the battery terminals.
2. Apply 300 ampere load for 15 seconds to remove surface charge from the battery.
Remove load.

3. Wait 15 seconds to let battery recover. Then apply specified load from specifications (See Main Data and Specifications in this section).

Read voltage after 15 seconds, then remove load.

- 1) VOLTAGE DOES NOT DROP BELOW THE MINIMUM LISTED IN FOLLOWING TABLE - The battery is good and should be returned to service.
- 2) VOLTAGE IS LESS THAN MINIMUM LISTED - Replace battery.

ESTIMATED TEMPERATURE		MINIMUM VOLTAGE
°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

The battery temperature must be estimated by feel and by the temperature the battery has been exposed to for the preceding few hours.

On-vehicle Service

Battery Charging

Observe the following safety precautions when charging the battery:

1. Never attempt to charge the battery when the fluid level is below the lower level line on the side of the battery.
In this case, the battery must be replaced.
2. Pay close attention to the battery during the charging procedure.
Battery charging should be discontinued or the rate of charge reduced if the battery feels hot to the touch.
Battery charging should be discontinued or the rate of charge reduced if the battery begins to gas or spew electrolyte from the vent holes.
3. In order to more easily view the hydrometer blue dot or ring, it may be necessary to jiggle or tilt the battery.
4. Battery temperature can have a great effect on battery charging capacity.
5. The sealed battery used on this vehicle may be either quick-charged or slow-charged in the same manner as other batteries.
Whichever method you decide to use, be sure that you completely charge the battery. Never partially charge the battery.

Jump Starting

Jump Starting With An Auxiliary (Booster) Battery

Caution:

Never push or to the vehicle in an attempt to start it. Serious damage to the emission system as well as other vehicle parts will result.

Treat both the discharged battery and the booster battery with great care when using jumper cables.

Carefully follow the jump starting procedure, being careful at all times to avoid sparking.

WARNING:

FAILURE TO CAREFULLY FOLLOW THE JUMP STARTING PROCEDURE COULD RESULT IN THE FOLLOWING:

1. **SERIOUS PERSONAL INJURY, PARTICULARLY TO YOUR EYES.**
2. **PROPERTY DAMAGE FROM A BATTERY EXPLOSION, BATTERY ACID, OR AN ELECTRICAL FIRE.**
3. **DAMAGE TO THE ELECTRONIC COMPONENTS OF ONE OR BOTH VEHICLES PARTICULARLY.**

Never expose the battery to an open flame or electrical spark. Gas generated by the battery may catch fire or explode.

Remove any rings, watches, or other jewelry before working around the battery. Protect your eyes by wearing an approved set of goggles.

Never allow battery fluid to come in contact with your eyes or skin.

Never allow battery fluid to come in contact with fabrics or painted surfaces.

Battery fluid is a highly corrosive acid.

Should battery fluid come in contact with your eyes, skin, fabric, or a painted surface, immediately and thoroughly rinse the affected area with clean tap water.

Never allow metal tools or jumper cables to come in contact with the positive battery terminal, or any other metal surface of the vehicle. This will protect against a short circuit.

Always keep batteries out of the reach of young children.

Jump Starting Procedure

1. Set the vehicle parking brake.
If the vehicle is equipped with an automatic transmission, place the selector lever in the "PARK" position.
If the vehicle is equipped with a manual transmission, place the shift lever in the "NEUTRAL" position.
Turn "OFF" the ignition.
Turn "OFF" all lights and any other accessory requiring electrical power.
2. Look at the built-in hydrometer.
If the indication area of the built-in hydrometer is completely clear, do not try to jump start.

6D1-4 ENGINE ELECTRICAL

3. Attach the end of one jumper cable to the positive terminal of the booster battery.
Attach the other end of the same cable to the positive terminal of the discharged battery.
Do not allow the vehicles to touch each other.
This will cause a ground connection, effectively neutralizing the charging procedure.
Be sure that the booster battery has a 12 volt rating.
4. Attach one end of the remaining cable to the negative terminal of the booster battery.
Attach the other end of the same cable to a solid engine ground (such as the A/C compressor bracket or the generator mounting bracket) of the vehicle with the discharged battery.
This ground connection must be at least 450 mm (18 in) from the battery of the vehicle whose battery is being charged.

WARNING:

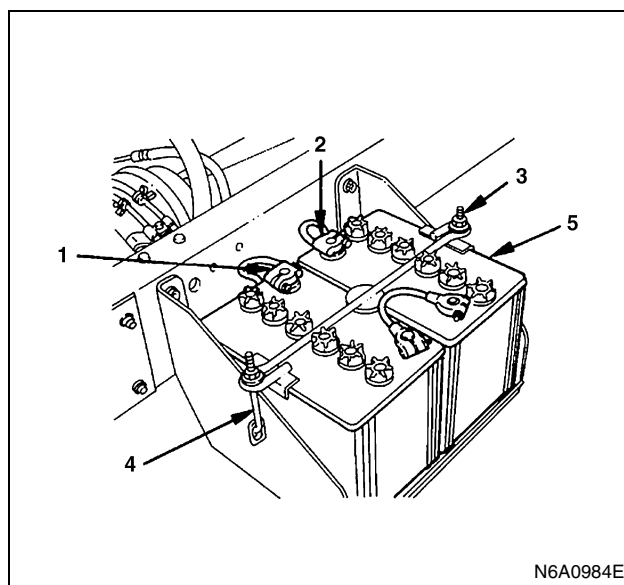
NEVER ATTACH THE END OF THE JUMPER CABLE DIRECTLY TO THE NEGATIVE TERMINAL OF THE DEAD BATTERY.

5. Start the engine of the vehicle with the good battery.
Make sure that all unnecessary electrical accessories have been turned "OFF".
6. Start the engine of the vehicle with the dead battery.
7. To remove the jumper cables, follow the above directions in the reverse order.

Be sure to first disconnect the negative cable from the vehicle with the discharged battery.

Removal

1. Negative cable
2. Positive cable
3. Retainer screw and rods
4. Retainer
5. Battery



Installation

To install the battery, follow the removal procedure in the reverse order, noting the following points:

1. Make sure that the rod is hooked on the body side.

Main Data and Specifications

Model	(JIS)	65D23R	75D23R	80D26R	115E41R	DELCO 31-750
Voltage	(V)	12	12	12	12	12
Cold-Cranking Performance	(Amp)		520	356		750
Reserve Capacity	(Min.)		180	133		160