

BATTERY

ALL SERIES

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DESCRIPTION AND OPERATION

GENERAL INFORMATION

The standard energizer (battery) for 1974 has a one piece cover and "Flame Arrester" cell caps which are designed to prevent a spark or flame from igniting gases within the battery. See Figure 1A-1.

The "Delco Eye" cell cap has been discontinued. When jump starting or charging a battery with "Flame Arrester" cell caps, the caps must be left in place in the battery cells. All standard batteries except on an Apollo equipped with a V-8 engine have side terminals. An Apollo with a V-8 engine has a top post type battery.

All batteries are mounted in the right front corner of the engine compartment and have a negative ground. The negative terminal is grounded to the engine by an insulated copper cable. The positive terminal is connected to the starter solenoid by an insulated copper cable.

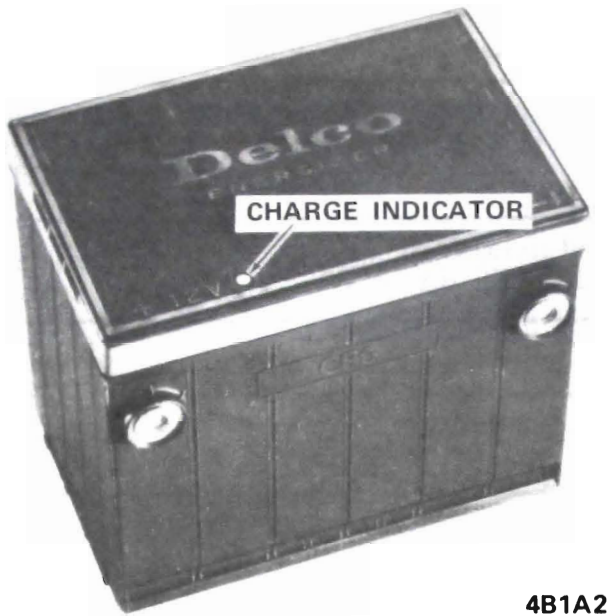
Terminal construction on side terminal batteries is such that the mating cable terminal connectors seal the junction and provide a tight clean connection

thus reducing terminal corrosion. The cable to battery connectors for top post batteries are of spring clamp design.



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Figure 1A-1 Standard Energizer



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Figure 1A-2 "Maintenance Free" Energizer

The battery has three major functions; (1) It provides a source of energy for cranking the engine; (2) It acts as a stabilizer to the voltage in the electrical system; and (3) It can, for a limited time, provide energy when the demands of the electrical units in operation exceed the output of the generator.

In order for the battery to continue functioning, it is necessary that current output be balanced by current input from the generator so that a properly charged

condition is maintained. If the output exceeds the input, the battery will become discharged and unable to supply sufficient energy.

Battery efficiency is greatly reduced by decreased electrolyte temperature, as it has a decided numbing effect on the electrochemical action. Under high discharge, such as cranking, battery voltage drops to lower values in cold temperatures than in warm temperatures and could ultimately contribute to battery freezing.

SPECIFIC GRAVITY

1.220

1.200

1.160

POINT

-35°F

-20°F

0°F

Water is the component of the battery which is lost as a result of charging and discharging, and it must be replaced (except in maintenance free batteries) before the electrolyte level lowers to the tops of the separators. If the water is not replaced and the plates become exposed, they may become permanently sulfated which would impair the performance of the plates. Also, the plates cannot take full part in the battery action unless they are completely covered by the electrolyte.

DIAGNOSIS

STANDARD BATTERY TEST PROCEDURE

Visual Inspection

1. Cracked or broken case	1. Replace battery
2. Electrolyte level below top of plates	1. Add sufficient water to cover plates
	2. Charge for 15 min. @ 15-25 amps with caps removed
	3. Connect 300 amp load for 15 sec. and proceed to specific gravity test

*** Specific Gravity (Hydrometer)**

- | | |
|---|-------------------------|
| 1. With 50 points or more variation between HIGH and LOW cell | 1. Replace battery |
| 2. Less than 50 points
* CANNOT BE PERFORMED ON MAINTENANCE FREE BATTERY | 1. Proceed to load test |

Load Test

- | | |
|--|---|
| 1. If unable to obtain specific gravity of 1.200 | 1. Charge if necessary |
| | 2. Replace battery |
| 2. If specific gravity is 1.200 or more | 1. Remove vent caps, connect 300 amp load for 15 sec. |
| 3. If "SMOKE" appears in one or more cells during load | 1. Replace battery |
| 4. If "NO SMOKE" appears | 1. Apply specified load
350 Engine 180 Amp
455 Engine 210 Amp
Sealed Battery 230 Amp |
| | 2. Read voltage at 15 sec. with load connected |
| 5. If voltage is less than specified | 1. Replace battery |
| 6. With specified voltage or greater | 1. Charge and clean battery for service |

TESTING CHARGE INDICATOR TYPE MAINTENANCE FREE BATTERY**Step 1. - Visual Inspection**

Check for obvious damage, such as a cracked or broken case that could permit loss of electrolyte. If obvious physical damage is noted, replace battery.

Step 2 - Charge Indicator Indications

a. If the Charge Indicator is dark, the electrolyte level is adequate. If the Charge Indicator is light, the electrolyte level is low and battery should be replaced. (Low electrolyte may indicate a need for checking the charging system of the vehicle.)

b. If the dark Charge Indicator has a green dot in the middle, the battery is sufficiently charged for testing. Proceed to Step 3.

If no green dot appears, charge battery until green dot appears, but not more than 50 ampere-hours - (25 amps. for 2 hours, or 10 amps. for 5 hours equals 50 ampere-hours.) Proceed to Step 3. In case of spewing, shut off charger and proceed with testing. A battery that required charging for testing may indicate a need for checking the charging system of the vehicle.

Step 3

Connect 300 ampere load across terminals for 15 seconds to remove surface charge from battery.

Step 4 - Load Test

a. Connect voltmeter and 230 ampere load across terminals.

b. Read voltage after 15 seconds with load connected, then disconnect load.

- c. If voltage is 9.6* or more, battery is good.
 d. If voltage is less than 9.6*, replace battery.

*This voltage to be used for battery temperatures of 70°F and above. For temperatures below 70°F, use the following:

Ambient Temp.	Minimum Voltage
70°F and Above	9.6
60°F	9.5
50°F	9.4
40°F	9.3
30°F	9.1
20°F	8.9
10°F	8.7
0°F	8.5

MAINTENANCE AND SERVICE OPERATIONS

Care of Wet Batteries in Storage

Batteries in stored new cars or stock, must be given regular attention to prevent sulfation of plates that may result from inactivity and self-discharge. All automotive wet batteries will slowly discharge on standing idle, whether in stored cars or stock and will self-discharge more rapidly when warm than cold. Batteries in stock should be rotated using the older ones first.

To minimize the extent of self-discharge, always store batteries fully charged and in a cool place where the temperature does not go below freezing. Every 30 days check electrolyte level, add water as required (except on maintenance free batteries) and charge at 5 ampere rate until fully charged. This will help prevent shortening battery life.

Care of Dry Charged Batteries in Storage

The "dry charged" battery contains fully charged positive and negative plates less electrolyte.

Dry charged batteries should be stored in a dry place and away from excessive heat. It should be kept in its original carton until ready to be put into service. This type battery will retain its "charged" condition indefinitely if protected from moisture and may be stacked in vertical columns, providing they are not stacked more than four high.

Preparing Dry Charged Battery for Service

In preparing a "dry charged" battery for service use

only on approved battery - grade acid electrolyte (1.265 sp. gr. at 80 degrees F.). Electrolyte should be added to "dry charged" batteries in an area where water is readily available. Read instructions on side of electrolyte container prior to using, for antidotes to use in the event that electrolyte comes in contact with the body.

WARNING: IT IS STRONGLY RECOMMENDED THAT GLASSES BE WORN AND CARE BE EXERCISED IN USING ELECTROLYTE TO PREVENT BODILY INJURY, DAMAGE TO CLOTHING OR OTHER MATERIAL.

1. Remove battery container and vent plugs.
2. Using an acid proof funnel, fill each cell to the split ring at the bottom of each vent well with electrolyte. Overfilling will cause acid corrosion in the battery area and underfilling will cause early battery failure. Check specific gravity of all cells.
3. After filling, wait five to ten minutes and add electrolyte if necessary, to bring to split ring level. Never finish filling with water.

The dry charged battery may be put into service immediately after activation. However, to insure good battery performance, the following activation tests are recommended:

1. After the electrolyte level has been corrected, check the open circuit voltage. A reading of less than 10 volts indicates a reverse cell or an open circuit and the battery should be replaced.
2. Recheck specific gravity of all cells. If the specific gravity, corrected to 80 degrees F., shows more than a 30 point drop (.030) from the initial filling or one or more cells gas violently after adding electrolyte, the battery should be fully charged before use.
3. For best performance in cold weather (32 degrees F. or lower) or if the battery and electrolyte are not at 60 degrees or above at time of activation, warm battery by boost charging.

Correcting Specific Gravity Temperature Readings

Specific gravity temperature corrections can be made by adding .004 usually referred to as 4 "points of gravity", to the hydrometer reading for every 10 degrees F. that the electrolyte is above 80 degrees F., or subtracting .004 for every 10 degrees F. that the electrolyte is below 80 degrees F as illustrated in Figure 1A-3.

To obtain accurate specific gravity readings, the following should be adhered to:

1. The hydrometer must be clean.

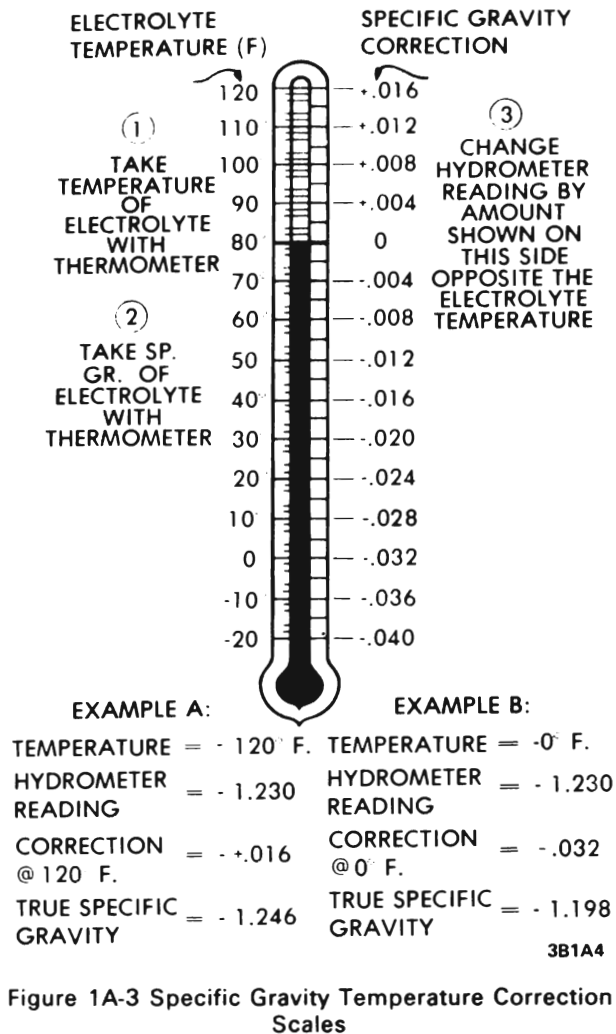


Figure 1A-3 Specific Gravity Temperature Correction Scales

2. Readings should never be taken after water has been added. The water must be thoroughly mixed with the electrolyte by charging for at least 30 minutes.

3. If the hydrometer has a built-in thermometer, draw the electrolyte into it several times to insure correct temperature.

BATTERY RECHARGING

Because of the fact an explosive gas mixture forms in each cell during charging, the area should be well ventilated and the following precautions observed:

1. Do not smoke or break a live circuit near the top of the battery as sparks could cause an explosion.

NOTE: It is recommended that the negative cable be attached to a point remote from the battery (such as the Delcotron adjusting brace). This then should be connected after the positive cable and disconnected before the positive cable is attached or removed.

2. Exercise care when attaching charger positive lead to side terminal stud to avoid contact with vehicle metal components which would result in damage to the battery.

When the battery is out of the car, terminal adapters are required to provide a place for attaching the charger leads.

With the battery in the car, the stud provided in the wiring harness is suitable for attaching the positive charger lead.

There are two separate methods of recharging batteries which differ basically in the rate of charge.

Slow Charging Method

Slow charging is the best and only method of completely recharging a battery. This method, when properly applied, may be used safely under all possible conditions of the battery providing the electrolyte is at proper level and the battery is capable of being fully charged. The normal charging rate is 5 amperes.

A fully charged battery is indicated when all cell specific gravities do not increase when checked at three one hour intervals and all cells are gassing freely.

Charge periods of 24 hours or more may be required because of the low charging rate. See charging guide Figure 1A-4.

Quick Charging Method

In order to get an owner back on the road in the least amount of time, it is sometimes necessary to quick charge his battery. The battery cannot be brought up to a full charged condition by the quick charge method. It can be substantially recharged or boosted but, in order to bring it to a fully charged condition, the charging cycle must be finished by charging at a low or normal rate. Some quick chargers have a provision for finishing the charging cycle at a low rate to bring the battery up to a fully charged condition.

CAUTION: Too high a current during quick charging will damage battery plates.

To quick charge a battery, charge at 50 amperes for 20 minutes (50 x 20 = 1,000 ampere minutes). If charger will not give this rate, charge for an equal number of ampere minutes at the best available rate.

Used with care and employing all safeguards provided by the manufacturer, a quick charger will not damage a battery which is in good condition.

CHARGING GUIDE

Recommended Rate* and Time for Fully Discharged Condition

Watt Rating	5 Amperes	10 Amperes	20 Amperes	30 Amperes	40 Amperes	50 Amperes
Below 2450	10 Hours	5 Hours	2½ Hours	2 Hours		
2450-2950	12 Hours	6 Hours	3 Hours	2 Hours	1½ Hours	
Above 2950	15 Hours	7½ Hours	3¾ Hours	2 Hours	1¾ Hours	1½ Hours

*Initial rate for constant voltage taper rate charger.

To avoid damage, charging rate must be reduced or temporarily halted if:

1. Electrolyte temperature exceeds 125° F.
2. Violent gassing or spewing of electrolyte occurs.

Battery is fully charged when over a two hour period at a low charging rate in amperes all cells are gassing freely and no change in specific gravity occurs. **For the most satisfactory charging, the lower charging rates in amperes are recommended.**

Full charge specific gravity is 1.260 - 1.280 corrected for temperature with electrolyte level at split ring.

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Figure 1A-4 Battery Slow Charging Guide

Jump Starting With Auxiliary (Booster) Battery:

Both booster and discharged battery should be treated carefully when using jumper cables. Follow **EXACTLY** the procedure outlined below, being careful not to cause sparks:

a. Set parking brake and place automatic transmission in "Park". Turn off lights, heater and other electrical loads.

b. Remove vent caps from both the booster and the discharged batteries. Lay a cloth over the open vent well of each battery. These two actions help reduce the explosion hazard always present in either battery when connecting "live" booster batteries to "dead" batteries.

c. Attach one end of one jumper cable to the positive terminal of the Booster Battery (identified by a red color, "+" or "P" on the battery case, post or clamp) and the other end of same cable to positive terminal on **DISCHARGED BATTERY**. Do **NOT** permit cars to touch each other, as this could establish a ground connection and counteract the benefits of this procedure.

d. Attach one end of the remaining negative cable to the negative terminal (black color, "-" or "N") of the **BOOSTER BATTERY**, and the other end to the

Delcotron generator adjusting brace (**DO NOT CONNECT DIRECTLY TO NEGATIVE POST** of dead battery) taking care that clamps from one cable do not inadvertently touch the clamps on the other cable. Do not lean over the battery when making this connection.

Reverse this sequence exactly when removing the jumper cables. Reinstall vent caps and throw cloths away as the cloths may have corrosive acid on them.

CAUTION: *Any procedure other than the above could result in: (1) personal injury caused by electrolyte squirting out the battery vents, (2) personal injury or property damage due to battery explosion, (3) damage to the charging system of the booster vehicle or of the immobilized vehicle.*

PERIODIC BATTERY INSPECTION AND SERVICE

Standard batteries require very little attention, but periodic inspection is essential to assure maximum efficiency and life. The new optional maintenance free battery however, requires only an occasional external visual inspection in that it is permanently sealed and cannot be serviced.

WARNING: THE HYDROGEN GAS WHICH IS PRODUCED IN THE BATTERY CELLS DURING CHARGING IS HIGHLY EXPLOSIVE. EXTREME CARE MUST BE TAKEN TO AVOID BRINGING OPEN FLAMES, LIGHTED MATCHES, ETC., NEAR A BATTERY THAT IS, OR HAS BEEN, RECENTLY CHARGED AND IS OR HAS BEEN GASSING. LIKEWISE, CARE MUST BE TAKEN TO AVOID CAUSING ANY SPARKS NEAR A BATTERY WITH JUMPER OR CHARGER CABLES, SINCE THIS CAN ALSO SET OFF AN EXPLOSION OF THE GASSES.

Maintain Electrolyte Level

WARNING: DO NOT OVERFILL AS ELECTROLYTE MAY BE SPRAYED OUT BY GASSING OR MAY OVERFLOW DUE TO HEAT EXPANSION DURING CHARGING.

Add distilled water as required to maintain electrolyte level to the split ring. See Figure 1A-5.

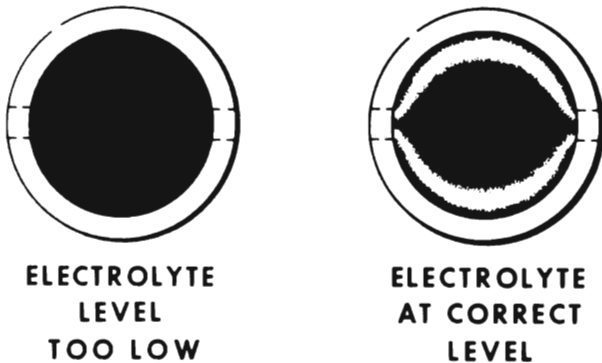


Figure 1A-5 View Inside Vent Well Showing Electrolyte

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If distilled water is not available, clean mineral free tap water should be used rather than allowing the electrolyte level to remain below the top of the plates.

In freezing weather, water should be added just before using the car or otherwise charging the battery to permit mixing with the acid and prevent freezing.

If the addition of water is required more often than every 1,000 miles, the voltage regulating system must be checked. Refer to Section on Charging System. Abnormal loss of water is an indication of an over-charged battery.

Inspecting Battery, Mounting and Cables

Visually inspect battery externally for damage or signs of abuse and internally by removing vent caps for too low electrolyte level or unusual odors. If

damage or abuse is indicated, the battery should be replaced.

To remove the battery:

1. Remove the negative cable first and then the positive cable to prevent the possibility of shorting.
2. Remove battery hold-down bolt and bracket.
3. Using Tool J-23686 remove battery as shown in Figure 1A-6.

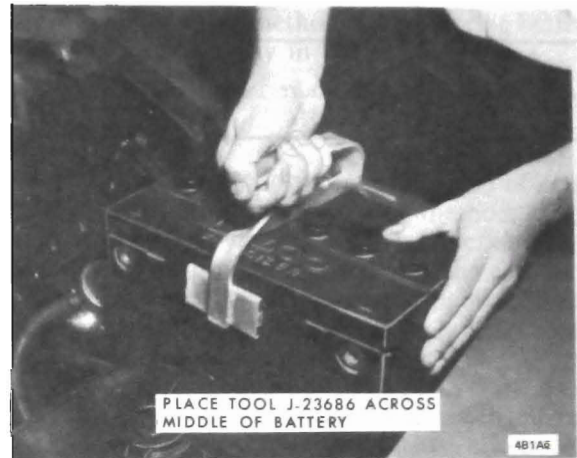


Figure 1A-6 Lifting Battery

To install the battery:

1. Using Tool J-23686, place battery in its proper location, install hold-down bracket and torque bolt to 5-7 ft.lb.
2. Install positive cable first, then the negative cable to prevent shorting.
3. Torque terminal bolts to 5-7 ft.lbs.

During an inspection, observe that the battery is properly secured. Excessive tightening of the retaining bracket may result in cracking the battery case.

Inspect battery cables to make certain they are tight at the battery, engine and solenoid. The correct torque for battery cable to battery bolts is 5-7 ft.lbs. or so the terminal cannot be readily turned by hand. Condition of cables should also be observed. They should be replaced if badly corroded or frayed.

To remove the negative battery cable:

1. Disconnect negative cable from battery.
2. Disconnect negative cable from engine by removing delcotron bracket bolt.

To install the negative battery cable:

1. Connect negative cable to engine using delcotron bracket bolt.

2. Connect cable to battery terminal and torque attaching bolt to 5-7 ft.lbs.

To remove the positive battery cable:

1. First disconnect the negative cable from the battery, then the positive cable to prevent shorting.

2. Remove wiring harness bracket screws holding bracket to engine (455 engine).

3. Disconnect cable from solenoid.

4. Disconnect cable from chassis clips and remove cable.

To install positive battery cable:

1. Position and secure cable on solenoid making sure the wire harness connection is protruding away from the exhaust manifold.

2. Install wiring harness bracket.

3. Secure cable in chassis clips.

4. Connect cable to positive terminal of battery.

5. Connect negative cable to battery and torque both cable bolts to 5-7 ft.lbs.

FUSIBLE LINKS

All Buicks are equipped with fusible links. These links are attached to the lower ends of the main supply wires and connect to the solenoid. One of the main wires is a No. 12 red wire which supplies the headlight circuit and the other is a No. 10 red which supplies all electrical units except the headlights. The links consist of wire which is several gauges smaller than the supply wires they are connected to and function as additional protection to the wiring in the event of an overloaded or short circuited condition in that they will usually melt before the wiring insulation is damaged elsewhere in the circuit.

A burned out fusible link would be indicated by:

1. All electrical accessories dead except headlights or, headlights dead but all other electrical units operative.

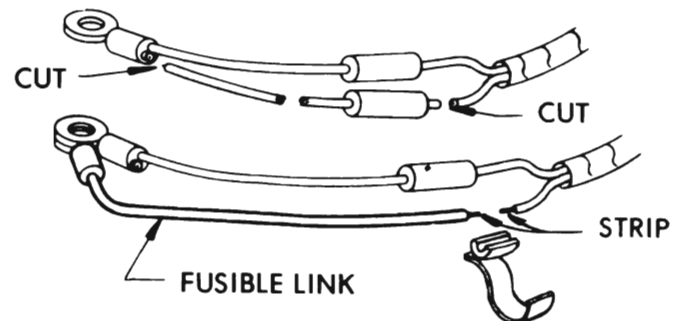
A physical check can be made to determine whether or not a fusible link is burned out. To perform this check, simply feel and, or gently pull on each link. A good link will be or remain in tact.

A burned out fusible link may be replaced as follows:

1. Disconnect negative cable from battery.

2. Cut off burned out link close to solenoid terminal.

3. Cut other end of burned out link along with solder joint from wiring harness. See Figure 1A-7.



TO REPAIR DAMAGED FUSIBLE LINK CUT OFF DAMAGED WIRE AS SHOWN. STRIP BACK INSULATION. SPLICE WIRES WITH SPLICE CLIP & SOLDER. TAPE SPLICE WITH DOUBLE LAYER OF ELECTRICAL TAPE.

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Figure 1A-7 Replacing Fusible Link

4. Strip insulation from end of new link and from end of harness wire so that each will project halfway through soldering sleeve.

5. Crimp soldering sleeve over stripped wire ends and carefully solder the joint.

6. Cover new joint tightly with a double layer of electrical tape.

7. Install new link connector eye on solenoid terminal.

8. Connect negative cable to battery torquing bolt to 5-7 ft.lb.

SPECIFICATIONS AND TOOLS

BATTERY SPECIFICATIONS

	250 "X" STD.	250 "X" H.D.	350 "X" STD.	350 "X" H.D.	350 "A" STD.	350 "A" 455 "A" H.D.	455 B-C-E	MAINTENANCE FREE EXC."X"
Make	DELCO							
Location Under Hood	RIGHT FRONT							
Terminal Type	SIDE SCREW		TOP CLAMP			SIDE SCREW		
Terminal Grounded	NEGATIVE							
Voltage	12 VOLTS							
Catalog Number	Y87	R89W	R59	R59S	R89	R89S	Y91	C89
Cold Cranking Current (Amp. at 0° F.)					335	410	360	455
Cranking Power (Watts at 0° F.)	2300	3750	2900	3250	2900	3250	3000	3750
Number of Cells and Plates/Cell	6, 9	6, 15	6, 11	6, 13	6, 11	6, 13	6, 11	6, 13
Specific Gravity, Full Charge at 80° F.	1.270 ± .010							
Bench Charging Rate, Start	5 AMPS.							
Bench Charging Rate, Finish	2 AMPS.							
Case	HARD RUBBER							
Dimensions (Overall)								
Length	9 1/16	10 1/4	10 1/4	10 1/4	10 1/4	10 1/4	12 1/32	10 1/4
Width	6 13/16	7 1/32	6 13/16	6 13/16	6 13/16	6 13/16	6 13/16	6 13/16
Height	8 3/4	8 21/32	8 3/4	8 3/4	8 3/4	8 3/4	8 3/4	8 3/4