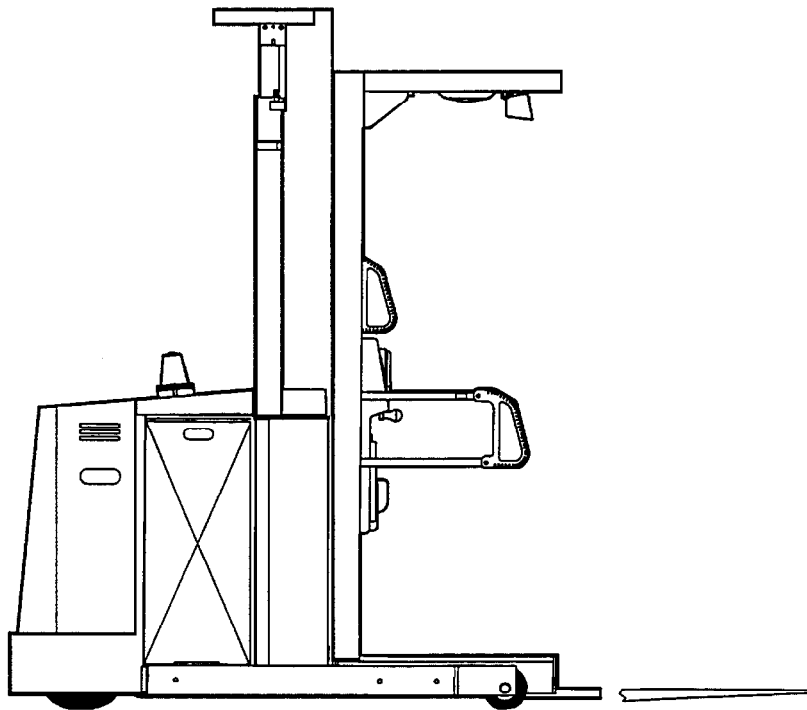


SM-613 NOS 15 SERVICE MANUAL



CLARK

Technical
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Lexington, KY
40508

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INTRODUCTION

NOTICE

This manual has been intended to give the trained serviceman procedures to maintain and service NOS 15 Order Selector.

Only trained service personnel should perform service and/or repairs to this or any other type of industrial truck.

Repair procedures have been worked out for ease of repair and to keep repair times to a minimum.

Not following these procedures or taking short cuts could result in damage to other components, longer repair times and/or a possibility of injury.

READ THIS MANUAL BEFORE ATTEMPTING TO ADJUST OR SERVICE THIS UNIT!



WARNING:

Read and observe all warnings on the unit before operating or servicing. **Do Not** operate this or any other unit without all factory installed guards, safety devices and/or shields in their secured and proper place.

"CLARK Trucks meet all applicable requirements of ANSI B56.1 at time of manufacture.

CLARK will not assume any liability for injuries or damages arising from or caused by the removal, disconnection or disengagement of any part from any of its trucks.

CLARK recommends all replacement parts are of OEM (Original Equipment Manufacturer) origin. Any modifications and/or additions which affect capacity or safe operation of CLARK trucks shall not be performed without CLARK's prior written approval.

A user should consult the Local Authorized Dealer if the user's intended application is outside the designed performance characteristics of the truck.

Dimensions and performance specifications shown may vary due to manufacturing tolerances. Performance is based on an average size truck and is affected by weight, condition of the truck, battery, optional equipment and operation area.

CLARK products and specifications are subject to change without notice."

GENERAL INFORMATION

TECHNICAL SPECIFICATIONS AND DATA NOS 15

I. SPEEDS

	<u>Loaded</u>	<u>Unloaded</u>
A. Travel	5.0 mph	6.0 mph
B. Lifting 2 Stage	38 fpm	61 fpm
C. Lowering	69 fpm	71 fpm

II. ELECTRICAL (AMP DRAW @ 24 VOLT)

	<u>Loaded</u>	<u>Unloaded</u>
A. Travel	120-160 max	115-155 max
B. Main Lift Pump	425 to 480 max	240 to 280 max
D. Steering at Relief at Travel	45 to 50 max 30-35 max	

III. HYDRAULIC

A. Capacity of Reservoir	6.3 gallons
B. Relief Pressures	
1. Main Lift	2550 psi
2. Steering	725 psi

IV. TIRES & WHEELS

A. Drive Tire	<u>Standard</u>
1. Size	12 x 4.5 x 8
2. Compound	Poly
3. Part #	13076-16
B. Load Wheel	
1. Size	6 x 3
2. Compound	Poly
3. Part #	10761-002

NOS 15 MAINTENANCE SCHEDULE**WARNING:**

Never operate a damaged or faulty truck.

Never smoke when working around truck.

Never repair, clean or lubricate any part of truck with battery connected.

Never use open flame to check electrolyte level in battery.

Never make unauthorized repairs.

Period	Time	Function
Daily		
-	-	Check water level in battery.
-	-	Check oil level transmission.
-	-	Check all wheels and tires. Remove any and all tape, plastic and material.
-	-	Check operation of truck steering and speed change including all warning and safety devices (if equipped), horn, speed limit switch, lift limit switches, lights. Ensure that unit lifts and lowers properly.
-	-	Check electric magnetic brake operation.
-	-	Check oil levels and insure unit has been greased. Check hydraulic tank with mast (forks) fully lowered. Check for and correct any leaks.
Weekly	100 Hours	
-	-	Check speed of truck and plugging distance.
*	*	Check brake linkage. Adjust as necessary. Lubricate pivot points. See lubrication chart.
-	-	Check entire truck for loose items, power and control wires, linkage, nuts and bolts.

GENERAL INFORMATION

NOS 15 MAINTENANCE SCHEDULE

Period	Time	Function
Weekly	100 Hours (Cont'd)	
-	-	Clean battery terminals of corrosion. Check electrolyte level. Inspect plugs and battery cables.
-	-	Check lift chains, heel of fork should not touch the floor with mast completely lowered, adjust as required.
-	-	Clean and inspect motor brushes. Use only low pressure air or vacuum.
-	-	Check all hydraulic hoses and fittings for wear or leaks, repair as required.
-	-	Inspect contact tips.
-	-	Clean any and all dirt or corrosion from terminal area of PMC Controller units.
30 Days	200 Hours	
-	-	Check steering linkage, cables and chains for proper operation. Make adjustment as needed.
*	*	Lubricate entire truck (see lubrication chart) for type and points.
-	-	Check safety devices, horn, alarms (if equipped), lift limit switch, slow speed adjustment, loose chain for operation, lanyard (tether) and belt. Repair or adjust before truck goes back into operation.
**	**	Measure forks for wear. Check for cracks or damage.
60 Days	300 Hours	
-	-	Check entire truck frame and pivoting points for cracks or worn bearings, repair or replace as needed.
-	-	Check hydraulic pressure setting, should be 2550 +/- 50 PSI.
-	-	Inspect brake rotor and pads.
-	-	Check and adjust platform rollers.
-	-	Check drive tire and torque bolts to 200 ft/lbs.

NOS 15 MAINTENANCE SCHEDULE

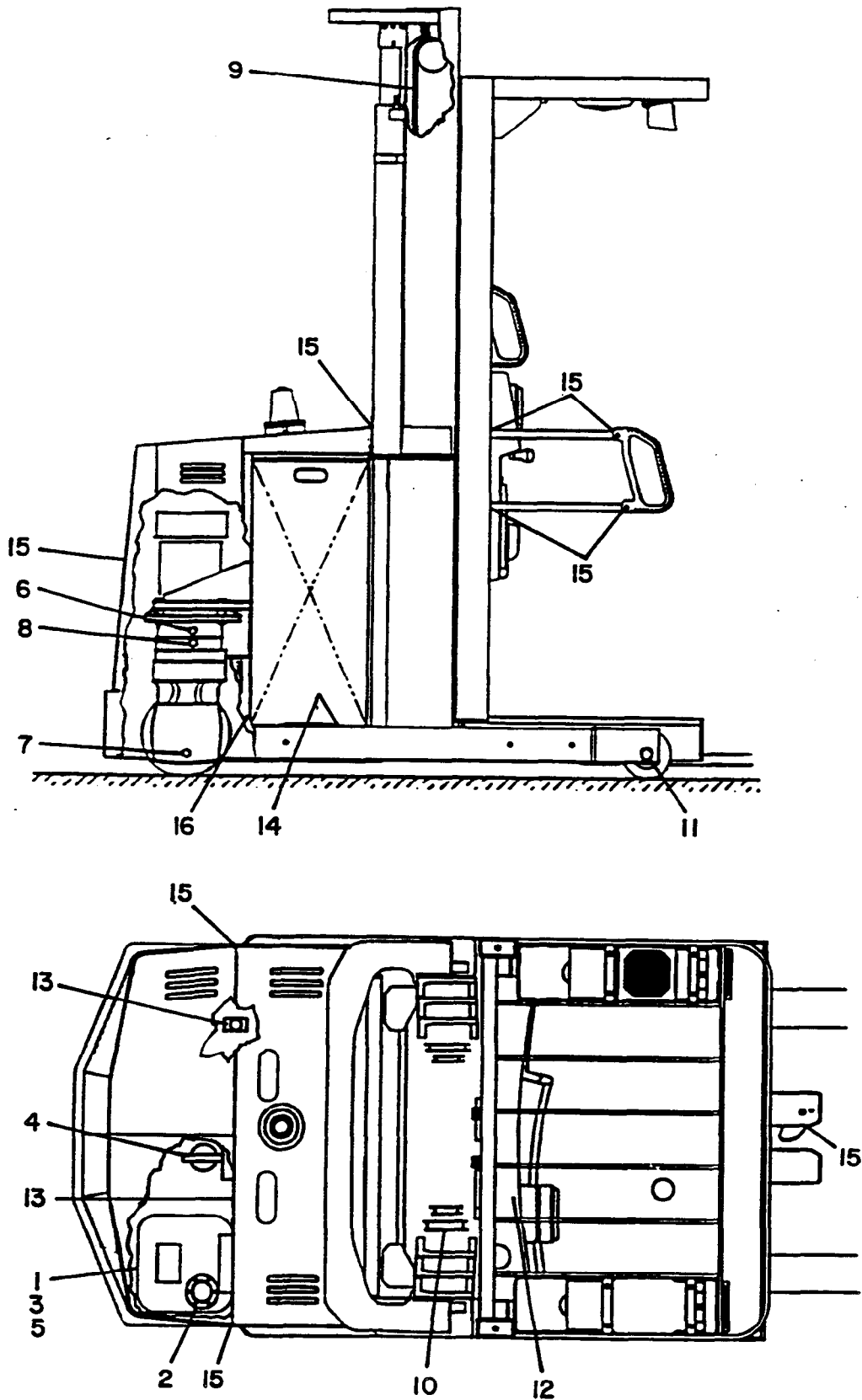
Period	Time	Function
60 Days	300 Hours (Cont'd)	
-	-	Clean drive motor and inspect commutator. Use only low pressure air or vacuum.
Yearly	1000 Hours	
-	-	Change transmission fluid, requires 3-3/4 pints refill.
*	*	Change hydraulic oil and filter.
-	-	Check amp draw reading for lift pumps and drive motors.
-	-	Check lift chain with wear gauge and replace as needed.
-	-	Check mast uprights and rollers, re-shim or replace as needed.

Repair or replace as necessary when inspection finds this part worn or damaged:

1. Drive or hydraulic motor brushes.
Springs should be replaced along with brushes.
 2. Brake rotor pads.
 3. Contact tips.
 4. Steering linkage and chains.
Should be replaced only, **do not repair**.
 5. Lift chains.
Should be replaced as a set only, **do not repair**.
 6. Load wheel.
 - Always repack bearing whenever a wheel is changed. Remember the largest cause of load wheel failure is material getting caught in wheel.
- * Trucks operating in freezer, wet or brine conditions must be serviced twice in the standard maintenance period and special types of lubricants should be used.
- ** OSHA requires the forks to be measured during Planned Maintenance. The forks must be replaced when the heel of the fork has had its thickness reduced to 90% of its original thickness (10% of the fork has been worn off). Refer to ANSI/ASME B56.1.

GENERAL INFORMATION

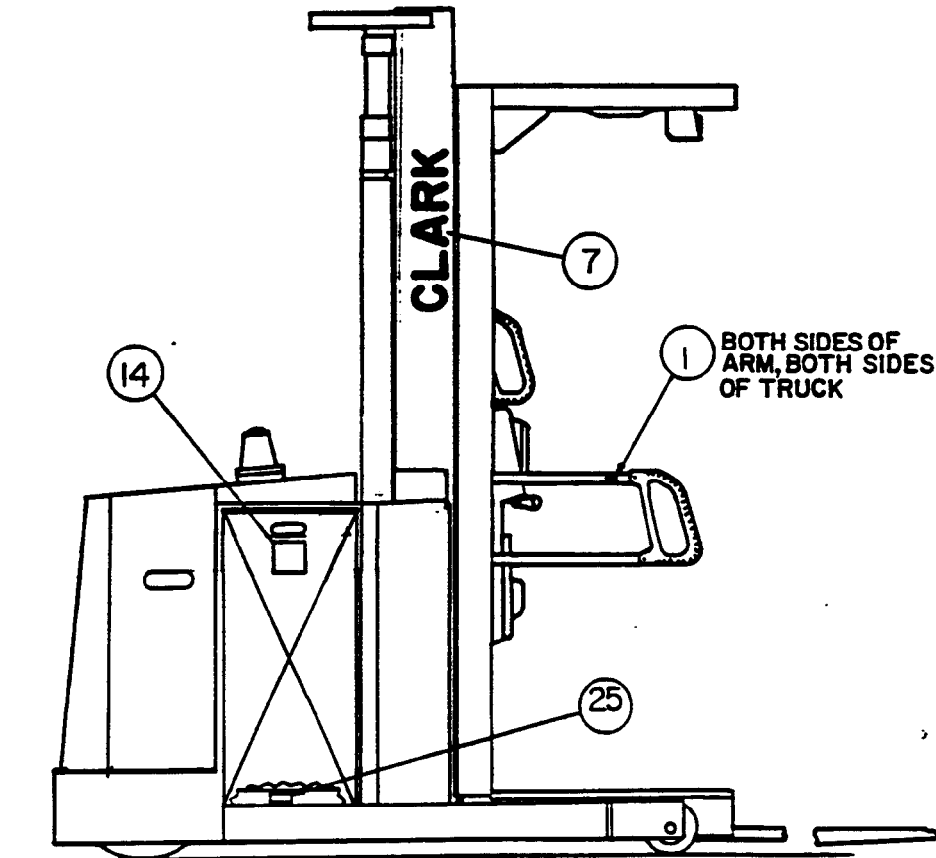
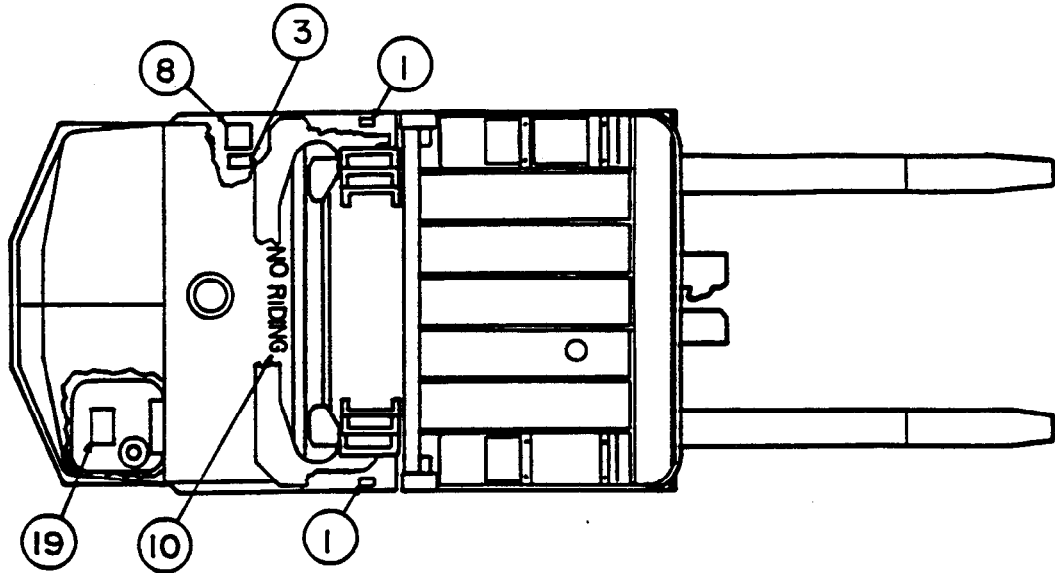
LUBRICATION CHART



LUBRICATION CHART

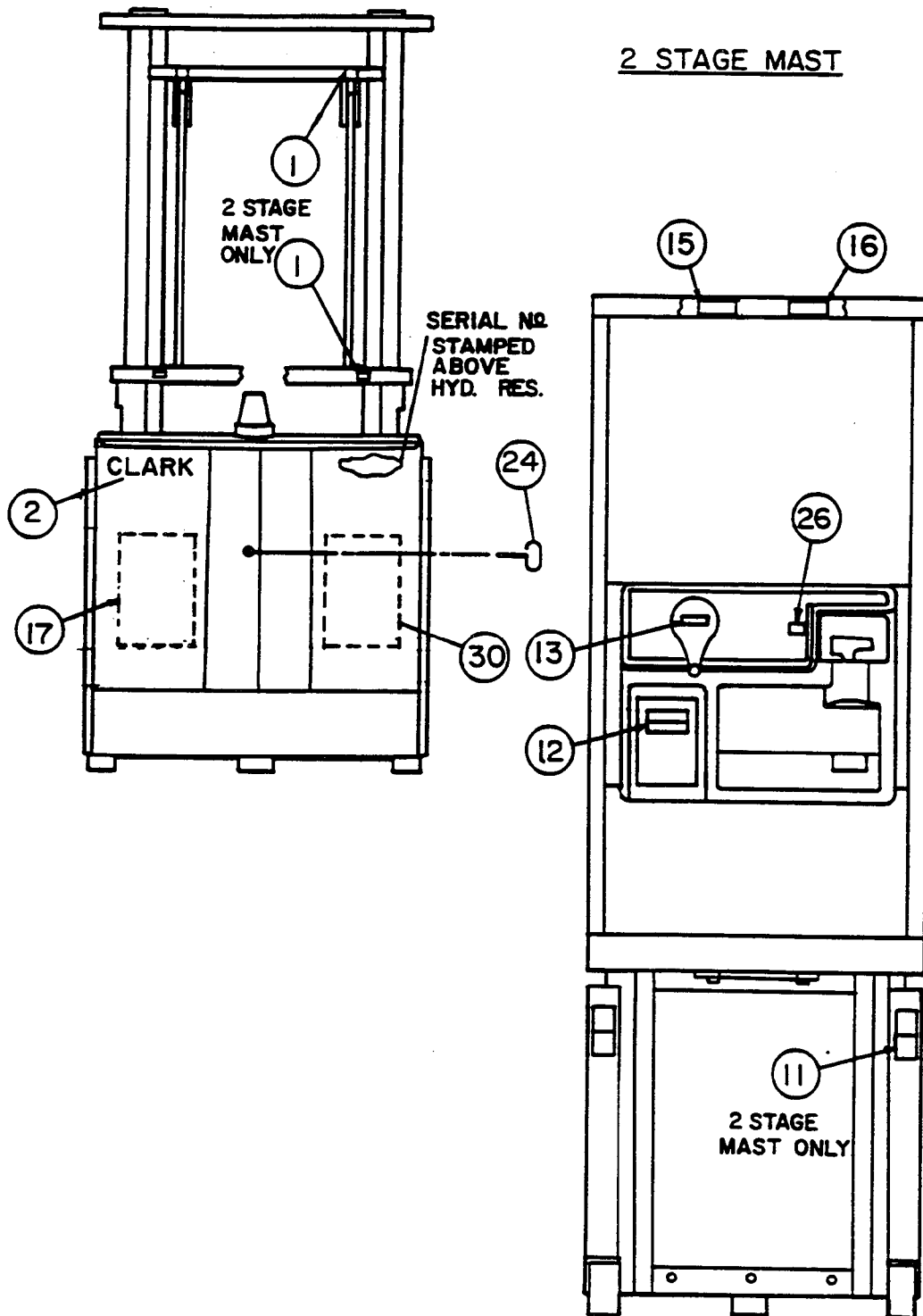
Item No.	Description	Lub. Points	Type of Lubricant	Interval
1	Hydraulic Reservoir	(1)	Valvoline Super Hydro F32-U	Check daily/Drain & clean yearly (Approx. 6 gallon capacity)
2	Hydraulic Reservoir Cap	(1)	Valvoline Super Hydro F32-U	Check 30 days or 200 hours Clean w/solvent and oil
3	Hydraulic Tank Drain	(1)		Change yearly or 2000 hours
4	Hydraulic Oil Filter	(1)	Hydraulic Oil	Replace during oil change
5	Hydraulic Reservoir Suction Filter	(1)		Clean during oil change
6	Transmission Oil Plug	(1)	80/90 Oil	Check daily/Change yearly or 2000 hours
7	Transmission Drain Plug	(1)		Change yearly; 3-3/4 pints to fill
8	Transmission Oil Level	(1)		Oil should not be below this level
9	Lift Chain		Heavy SAE Oil	Check 30 days or 200 hours
10	Chain Sheave	(2)	Mobilux #22	Check 2 weeks or 200 hours
11	Load Wheels	(2)	Mobilux #22	Check 2 weeks or 200 hours
12	Steering Box	(1)	Mobilux #22	Check yearly or 2000 hours Clean and refill
13	Sprocket, Gear Shaft (Power Steering Only)	(2)	Mobilux #22	Check 2 weeks or 200 hours
14	Battery, Roller Bearing	(8)	Mobilux #22	Check 6 months or 1000 hours Remove/Clean/Repack
15	Pivot Points	(6)	10W Oil	Lubricate 30 days or 200 hours
16	Steering Chain (2 & 3 Stage Power Steering)	(2)	10W Oil	Clean and lubricate

PAINT & DECALS

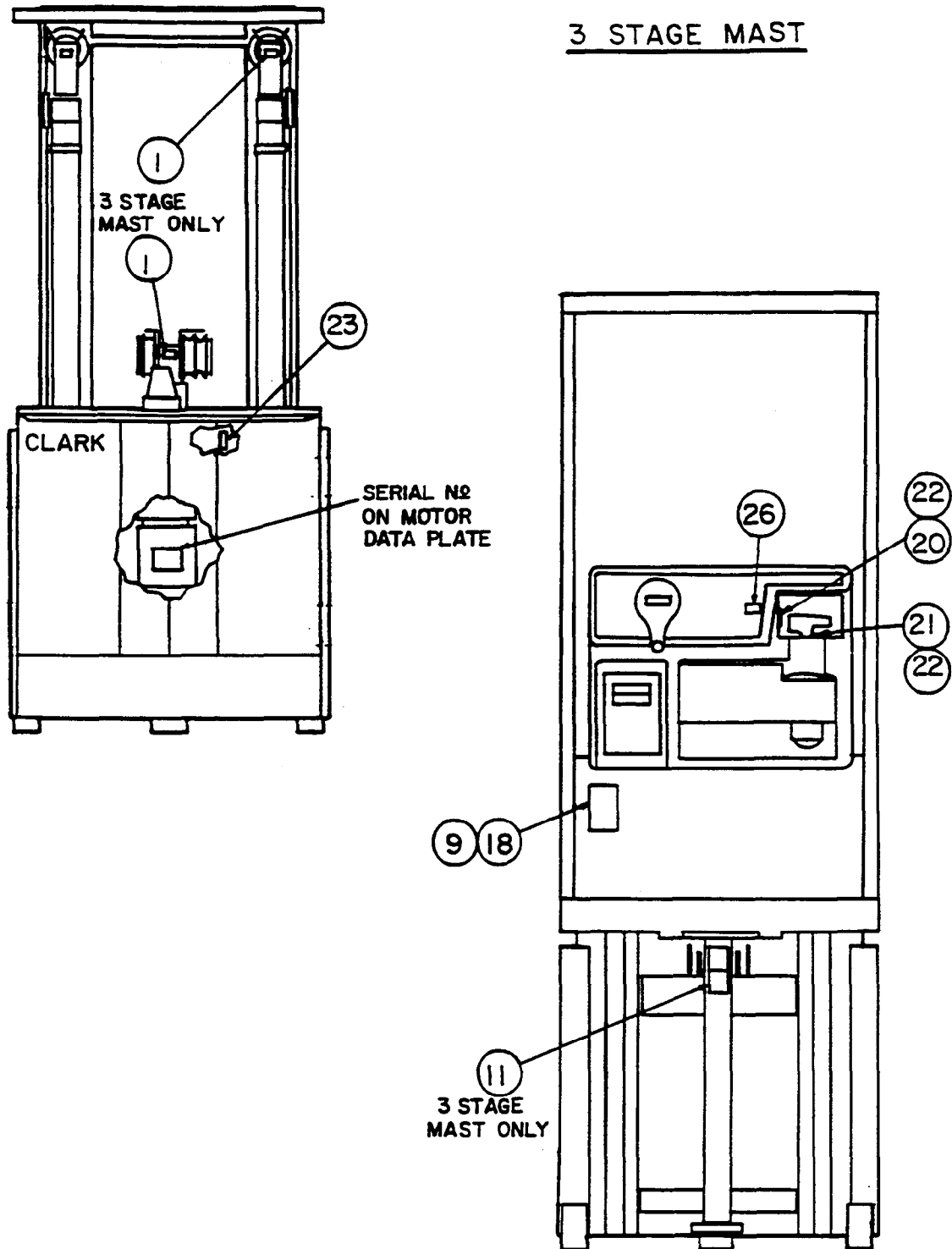


GENERAL INFORMATION

PAINT & DECALS



PAINT & DECALS



GENERAL INFORMATION

PAINT & DECALS

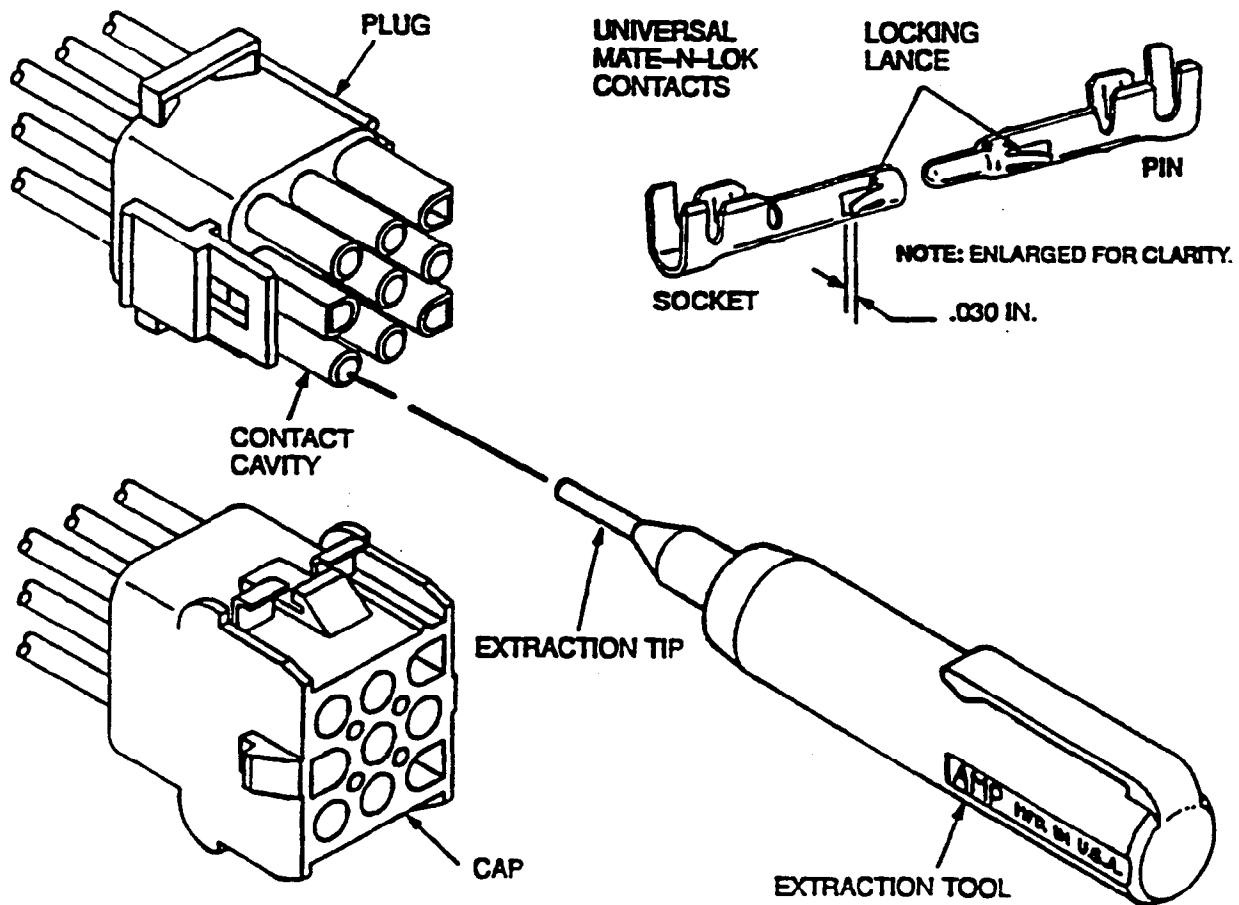
<u>ITEM NO.</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>QTY.</u>
1	97836-10K00-F1	Caution Pinch Point Label	AR
2	39250-006	Decal, "Clark" Logo	1
3	39250-004	Decal, 24V Only	1
7	39250-002	Decal, "Clark" Mast Logo	2
8	39244-002	Decal, Caution - Polarity	1
9	39137-002	Metal Tack	4
10	39204-002	Decal, "No Riding"	1
11	12485-116	Decal, Warning Forks	AR
12	39246-000	Decal, Warning - Operator	1
13	39250-003	Plate, "Clark" Logo	1
14	39250-001	Decal, Flag - USA	1
15	39248-000	Decal, Caution Safety Belt	1
16	39242-000	Decal, Caution Body	1
17	39432-006	Decal, Schematic	1
18	*	Nameplate, Serial Number & Capacity	1
19	8977-000	Decal, Hydraulic Oil	1
20	39321-000	Lift/Lower Plate	1
21	39322-000	Forward/Reverse Plate	1
22	27607-003	Rivet, Pop Open End	4
23	39435-000	Decal, Emergency Lowering	1
24	41261-031	Hex Key	1
25	39409-000	Decal, Warning Battery Gate	4
26	39438-000	Decal, Parking Brake	1
30	39251-000	Decal, Emergency Lowering Instructions	1
--	23300-034	Paint, Black (Gallon)	AR
--	23300-035	Paint, Green (Gallon)	AR

*Consult Factory with Model and Serial Number.

REPAIR TOOLS

Below is a picture of the extraction tool used for removing the pin or socket contacts used in all plug connectors on the NOS 15.

This tool is made by Amp Incorporated or can be ordered from CLARK.



<u>PART NO.</u>	<u>DESCRIPTION</u>
458994-1	Extraction Tool
41271-027	Pin
41271-071	Socket

For plug connector part numbers see appropriate parts page in the units Parts Manual. Part numbers change according to how many wires they require.

BATTERY CARE AND SERVICE

Introduction

The motive power industrial battery is the lifeblood of an electric lift truck. The battery supplies energy so that the truck can do productive work. When the battery is charged and maintained in top condition the load gets moved, material stored, paper stacked and rail cars and trailers filled and emptied. The service technician, move man and company president all depend on the electric lift truck for their livelihood. If the battery fails on the job people are out of work, the down time means lost money.

The battery for you lift truck represents a sizeable investment. It makes good sense to purchase the correct battery for the job. Taking care of that investment in the best possible way makes even more sense.

This text tells how to select the correct battery and how to take care of it. It also explains how that battery works. If you understand the mechanics of something you are better able to take care of it.

Some of the material presented in the text is not new. We have gathered information from the people who manufacturer batteries and related equipment. It is presented here to help you, the service technician, understand and take care of batteries.



WARNING:

When working with any battery **always** wear protective equipment, as in rubber gloves, rubber apron and protective face shield. **No Smoking** at any time when working near a battery area.

Theory and Construction of Lead-Acid Storage Batteries

Storage batteries do not actually store electrical energy. Instead they accept the electrical energy delivered to them during charging periods and convert it into chemical energy. A battery in use is said to be discharging. During discharge the chemical energy in the battery is converted into usable electrical energy.

Battery Construction

The internal construction of a lead-acid industrial motive power battery is similar to that of the common automobile battery. The interior is divided into cells. Each cell contains a set of alternating positive and negative plates called "electrodes" (See Fig. 1) There is always one more negative plate - one on each end. Separators are placed between each plate for insulation and the set is immersed in an electrolyte such as a sulfuric acid solution. An automotive battery has the same type of cells, however industrial cells are much larger and more rugged to give longer lift and increased capacity since their work load is greater.

BATTERY CARE AND SERVICE

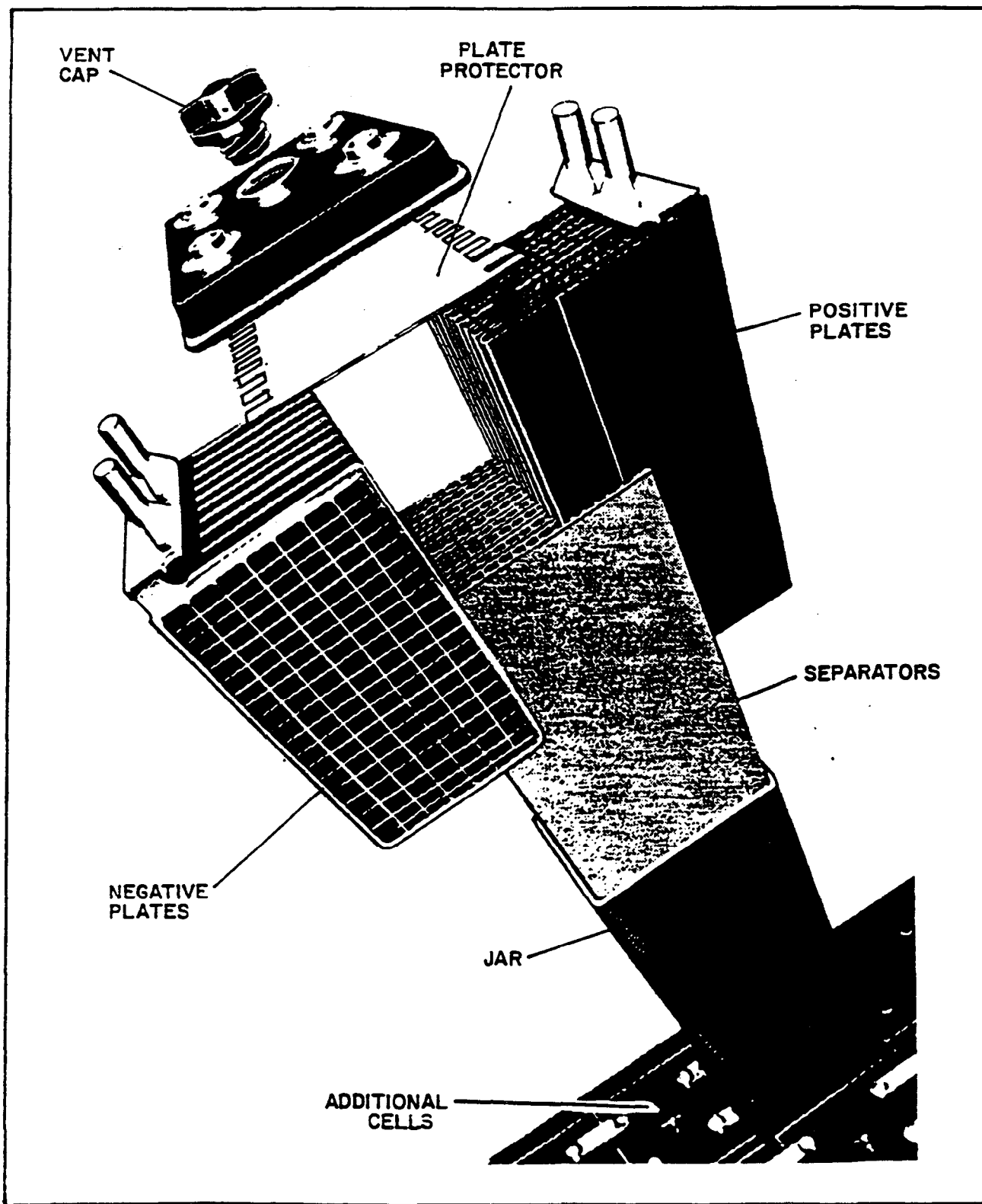


Figure 1

BATTERY CARE AND SERVICE

Specific Gravity

The strength of the electrolyte is measured in terms of specific gravity. This is the ratio of the weight of a given volume of electrolyte to an equal volume of water. Concentrated sulfuric acid has a specific gravity of about 1.835 and water has a specific gravity of 1.000. The acid and water are mixed in a proportion to give the specific gravity desired. For example, electrolyte of 1.275 specific gravity is about 27% concentrated acid and 73% water.



CAUTION:

When mixing electrolyte always pour acid into water. Never pour water into acid.

The Chemical Reaction

In a fully charged cell the electrolyte has a specific gravity that varies from 1.270 to 1.290. A discharged cell will have a specific gravity between 1.150 and 1.170 (we recommend that the battery never be discharged below 1.150). You can see that specific gravity is a convenient way to check the condition, state of charge or energy stored of the battery.

A storage battery cell develops a voltage potential when any two dissimilar metals are immersed in a suitable electrolyte. The two metals used for electrodes in lead-acid cells are Lead Peroxide (PB03) for the positive plates and Sponge Lead (Pb) for the negative (See Fig. 2). The result is a voltage potential of approximately two volts per cell. This potential does not vary regardless of cell size.

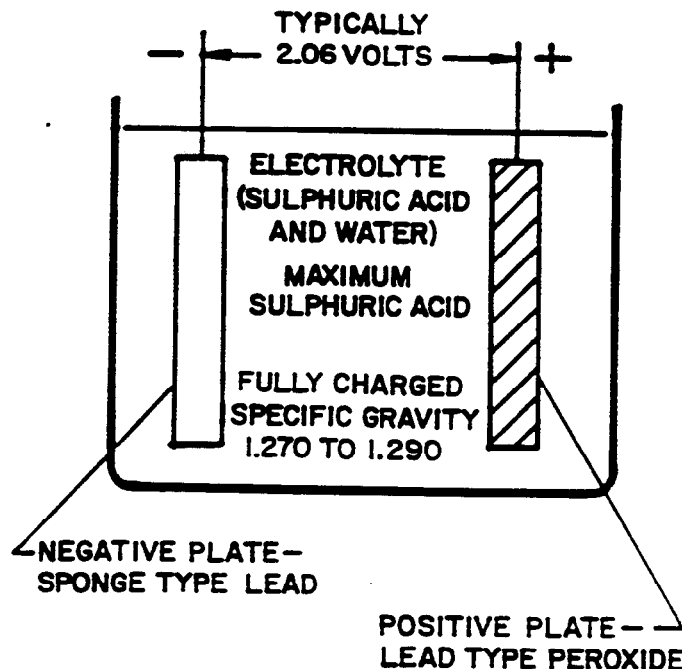
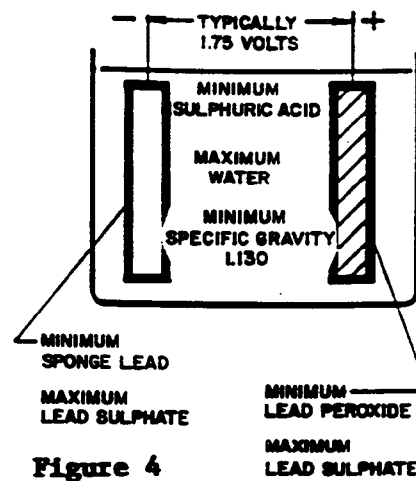
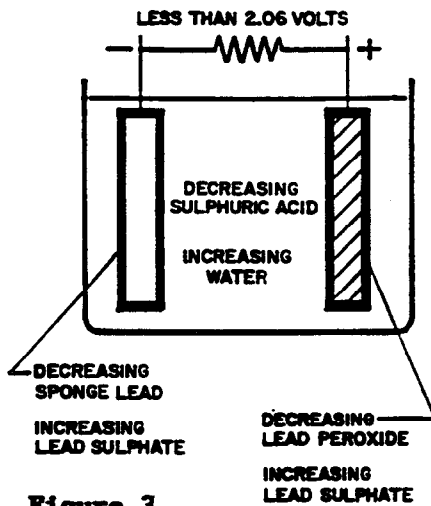


Figure 2

BATTERY CARE AND SERVICE

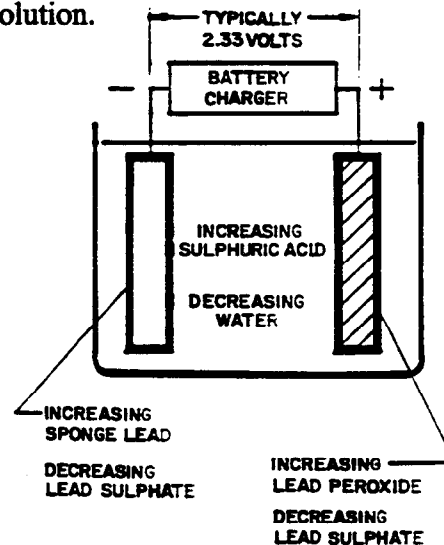
The Chemical Reaction (Cont'd)

During cell discharge, Lead Peroxide and Sponge Lead combine with sulfuric acid to form Lead Sulfate ($PbSO_4$) on both plates (See Fig. 3). This action decreases cell voltage as the two electrodes approach being of the same chemical composition (Lead Sulfate). As the sulfuric acid is removed from the electrolyte solution the specific gravity of the electrolyte decreases and approaches the specific gravity of water (See Fig. 4). The discharged cell will have a voltage potential of approximately 1.75 volts.



When a charging current is applied to a discharged cell (as shown in Fig. 5) the Lead Sulfate is broken up, the active materials are restored to their respective plates and the electrolyte again becomes a sulfuric acid solution. Cell voltage rises as the two elements become increasingly different in composition. The specific gravity of the electrolyte increases as more and more acid is formed.

Once again we have a fully charged cell, the positive electrode is Lead Peroxide, the negative electrode is Sponge Lead and the electrolyte is a sulfuric acid solution.



BATTERY CARE AND SERVICE

**WARNING:**

When working with any battery **always** wear protective equipment, as in rubber gloves, rubber apron and protective face shield. **No Smoking** at any time when working near a battery area.

Cleaning the Battery

The entire battery with its tray and connections should be kept clean and dry. This may be done by wiping with a cloth, blowing off with air or washing with water depending on the nature and amount of dust or other material which may accumulate on it.

**CAUTION:**

Do not use steam or hot water and only moderate pressure of either water or air.

Electrolyte spilled on the bottom cell covers trays or battery compartment, it never dries or evaporates. It causes grounds and corrodes any metal parts that are subject to attack from sulfuric acid.

If the top of the battery is damp with electrolyte or if electrolyte is spilled, it should be neutralized by applying bicarbonate of soda solution (one pound of soda to a gallon of water). For best results apply a warm solution. Wait until foaming action stops and then rinse off with clear water. The battery and its compartment should be washed each month (or when needed) and at least twice a year.

NOTE: If a battery is constantly wet it may be due to overfilling or overcharging.

Adding Water

A certain amount of water loss in cells is normal. Check electrolyte levels daily and replace water lost due to evaporation and electrolysis occurring during the charging process. Never allow electrolyte levels to drop below the top of the separator or plate protectors.

KEEPING THE ELECTROLYTE LEVEL WITHIN ITS PROPER LIMITS IS THE MOST IMPORTANT ITEM OF BATTERY MAINTENANCE.