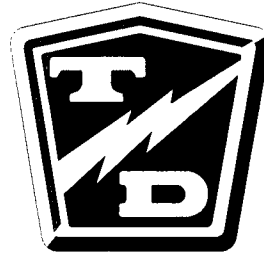


**TAYLOR-DUNN<sup>®</sup>**



## **MANUAL MR-380-25**

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*OPERATORS and MAINTENANCE  
MANUAL*

This Manual Covers Serial  
Numbers: 130187 & 136048

MODELS:

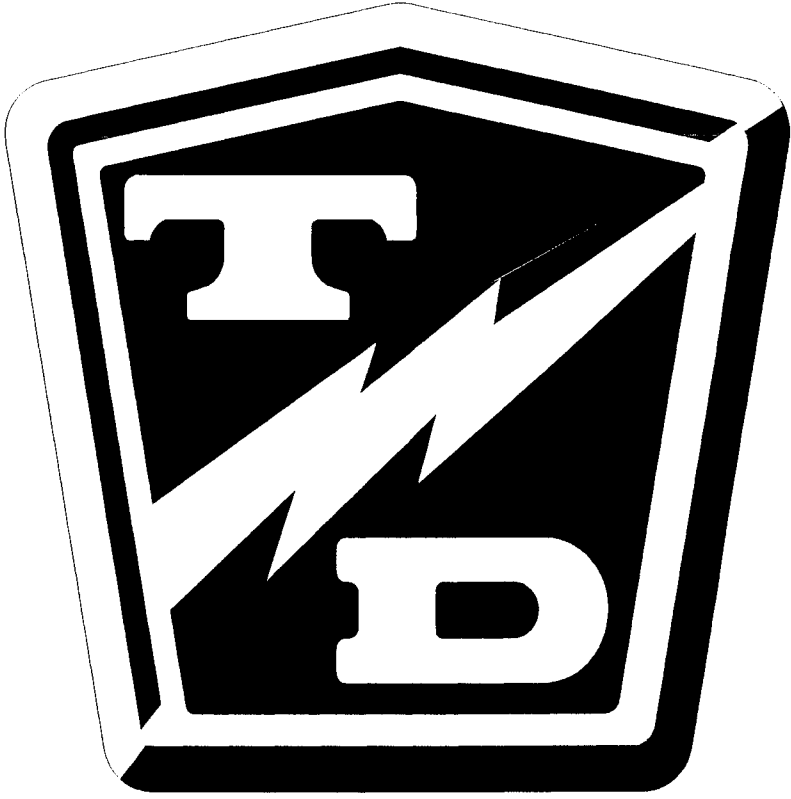
R3-80

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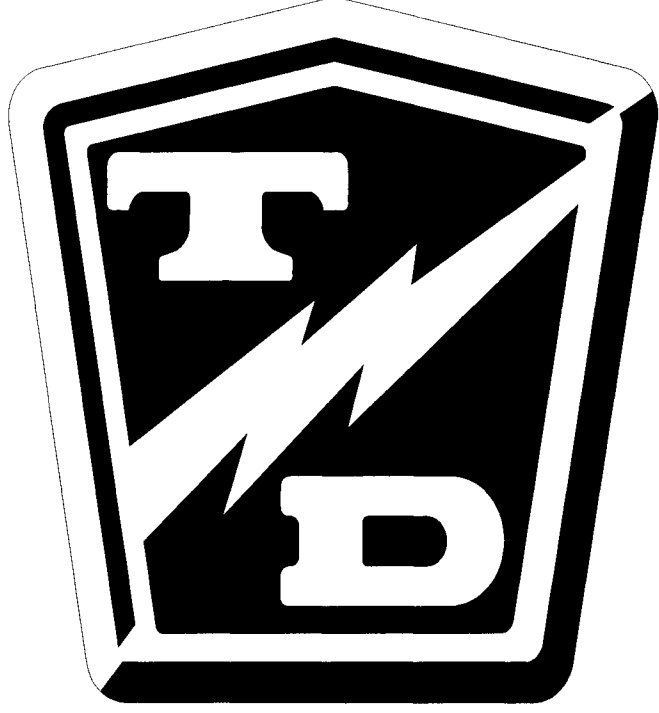
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**TAYLOR-DUNN**



# *Introduction*



## ABOUT THIS MANUAL

This manual provides you with information you need to safely operate and maintain this vehicle.

We assume that those who will perform maintenance or repair operations are trained vehicle service technicians capable of performing minor and major repairs and are qualified to use the tools required.

We also assume that they have or will attend a training program designed to familiarize them with the safe operation and use of this particular vehicle.

This manual contains the following major sections:

### ***SECTION 1: INTRODUCTION***

Contains information about how to use this manual, a description of the Huskey, how to do an incoming inspection and vehicle specifications.

### ***SECTION 2: SAFETY RULES AND OPERATIONAL INFORMATION***

Provides safety rules and guidelines describes the driver training program and explains the operation of each control on the Huskey.

### ***SECTION 3: MAINTENANCE PROCEDURES***

Contains a scheduled maintenance checklist, lubrication diagram, troubleshooting guide, and detailed maintenance procedures.

### ***SECTION 4: ILLUSTRATED PARTS***

Includes an illustration and parts list for each assembly that has replaceable parts for the Huskey.

### ***SECTION 5: ILLUSTRATED OPTIONAL PARTS***

Includes an illustration and parts list of the most popular optional parts that can be installed on the vehicle.



SPECIALY REQUESTED OPTIONS ARE NOT COVERED IN THIS MANUAL. THE SERVICE AND REPAIR OF THESE OPTIONS MAY BE COVERED IN A SEPERATE SUPPLEMENT OR THEY MAY BE SHOWN WITH THEIR PARTS IN AN ILLUSTRATED PARTS LIST.

## NOTATIONAL CONVENTIONS

The following types of notations are used throughout this manual:

### **▲ WARNING**

*A warning alerts you of something that may cause injury to yourself or others. Be sure you exercise special care and follow any instructions provided in a warning message.*

### **▲ CAUTION**

*A caution informs you of something that may cause damage to the vehicle. Be sure you exercise special care and follow any instructions provided in a caution message.*



A NOTE PROVIDES ADDITIONAL INFORMATION ABOUT A SUBJECT.

**Section 1***VEHICLE DESCRIPTION*

This manual applies to vehicles with serial numbers starting at 130187.

The R3-80 is designed to be driven on smooth surfaces in and around industrial plants, nurseries, institutions, motels, mobile home parks and resorts. It is not to be driven on public highways.

The R3-80 is available in speeds ranging approximately from 7 m.p.h. to 15 m.p.h.. These are the speeds at which the truck can travel on a level surface with no load. Exceeding these speeds may result in steering difficulty, motor damage, and/or loss of control. It is equally important that the vehicle not be towed faster than 5 m.p.h..

Various options are available to enable you to customize the vehicle to suit your particular needs (consult your Taylor-Dunn® salesperson or representative for current options).

This vehicle conforms to requirements for Type E vehicles as described in O.S.H.A. Standard Section 1910.178 (Powered Industrial Trucks) and with all applicable portions of the American National Standard for Personnel and Burden Carriers (ANSI B56.8).

The model and serial number for this vehicle are imprinted on a decal located on the inner left side of the front cowl. The vehicle serial number is stamped in the frame, either to the right of the battery connector mount or in the left rear corner next to the battery.

**STANDARD SPECIFICATIONS**

SPECIFICATION TABLE	
ITEM	SPECIFICATION
Standard Dimensions	243.8 L X 112.4 W X 118.1 H Centimeters
	96 L X 44.25 W X 46.5 H Inches
Dry Weight	500 kg (Less Batteries)
	1100 Lbs.
Turning Radius	284 Centimeters
	112 Inches
Brakes	Front Disc (Optional Hydraulic)
	Rear Disc (Mechanical Standard or Optional Hydraulic)
Motor	DC Series Wound, 6hp @ 1200 rpm
Tires	5.70 X 8 Load Range B
Tire Pressure	90 psi max.
Maximum Towed Load	2,273 kg (On Level Surface)
	5,000 Lbs. (On Level Surface)
Battery	6, 217 a.h. Batteries, 36volt system



**Section 1***TAKING DELIVERY OF YOUR VEHICLE*

THIS VEHICLE SHOULD BE INSPECTED IMMEDIATELY AFTER DELIVERY. Use the following guidelines to make sure there are no obvious problems.

---

*INSPECTING THE VEHICLE*

- ◆ Examine the contents of all packages and accessories that may have come in separate packages with this vehicle. Make sure everything listed on the packing slip is there. Nothing should look broken or damaged.
- ◆ Examine any visible wiring for obvious signs of damage. Check that all connections are secure.
- ◆ Check that battery connections are tight and all cells are filled.
- ◆ Inspect the tires for obvious wear or damage. Check the tire pressure. Make sure that all wheel lugs are secure.
- ◆ Check the body, seat, trim, and other external parts for obvious damage.

---

*CHECKING THE CONTROLS*

Operate each of the following controls before turning on the key-switch:

- ◆ Accelerator pedal
- ◆ Brake pedal
- ◆ Forward - reverse selector switch
- ◆ Battery disconnect switch (Optional)
- ◆ Key-switch
- ◆ Parking brake
- ◆ Steering wheel
- ◆ Horn
- ◆ Lights

Each control should operate smoothly and easily without sticking or requiring undue effort.

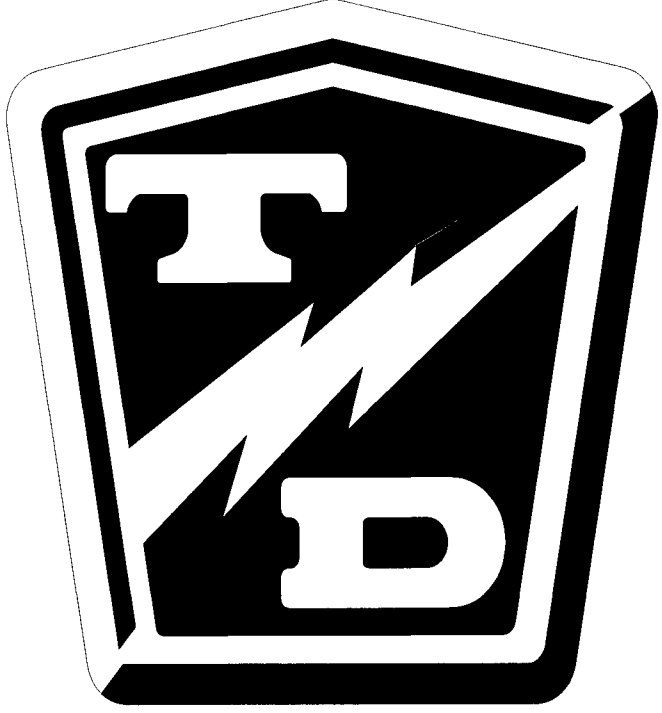
### WHAT TO DO IF YOU FIND A PROBLEM

If you find a problem with this vehicle you must immediately file a claim with the carrier. The claim must be filed within 48 hours of receiving this vehicle. Forward a copy of the damage claim to your Taylor-Dunn<sup>o</sup> dealer.

### **⚠ WARNING**

*Do not repair modify or adjust any part of this vehicle unless you are authorized to do so. Incorrect repairs may result in injury to yourself and others and cause the invalidation of your warranty.*

**TAYLOR-DUNN**



*Safety Rules and  
Operational Information*



## Section 2

**Safety Rules and Guidelines**

It is the responsibility of the owner of this vehicle to assure that the operator understands the various controls and operating characteristics of this vehicle. As well as, obeying the following safety rules and guidelines (extracted from the American National Standards Institute Personnel and Burden Carriers ANSI B56.8).

This vehicle is designed to be driven over smooth surfaces in and around places such as warehouses, nurseries, motels, parks, and resorts. Before you drive this vehicle, please observe the following safety rules and guidelines:

**⚠ WARNING**

*This vehicle is not designed to be driven on public highways. The drive is built to order. It is available in speeds ranging from 7 mph to 15 mph. The truck travels on a level surface with no load at this speed. Do not exceed this speed. Exceeding this speed may result in steering difficulty, motor damage, and/or loss of control. It is not designed to be towed more than 5 mph.*

- ◆ Do not drive this vehicle unless you are a qualified and trained operator.
- ◆ Keep all body parts (head, arms', legs') inside this vehicle while it is moving.
- ◆ Drive slowly when making a turn especially if the ground is wet slippery or when driving on an incline.
- ◆ This vehicle may overturn easily if turned sharply when driving at high speeds, especially when on an incline.
- ◆ Drive only on level surfaces or on surfaces having an incline of no more than 10% (5.6 degrees.).
- ◆ Do not drive over loose objects, holes, or bumps.
- ◆ Observe all traffic regulations and speed limits (15-mph max.).
- ◆ Keep to the right under normal conditions.
- ◆ Maintain a safe distance from all objects.
- ◆ Keep the vehicle under control at all times.
- ◆ Yield right of way to pedestrians, ambulances, fire trucks, or other vehicles in emergencies.
- ◆ Do not overtake another vehicle at intersections, blind spots, or other dangerous locations.
- ◆ Keep a clear view ahead at all times.

## *DRIVER TRAINING PROGRAM*

The owner of this vehicle shall conduct an Operator Training program for all those who will be operating this vehicle. The training program shall not be condensed for those claiming to have previous vehicle operation experience. Successful completion of the Operator Training program shall be required for all personnel who operate this vehicle.

The Operator Training program shall include the following:

- ◆ Operation of this vehicle under circumstances normally associated with your particular environment.
- ◆ Emphasis on the safety of cargo and personnel.
- ◆ All safety rules contained within this manual.
- ◆ Proper operation of all vehicle controls.
- ◆ A vehicle operation and driving test.

---

## *DRIVER QUALIFICATIONS.*

Only those who have successfully completed the Operator Training program are authorized to drive this vehicle. Operators must possess the visual, auditory, physical, and mental ability to safely operate this vehicle as specified in the American National Standards Institute Controlled Personnel and Burden Carriers ANSI B56.8.

The following are minimum requirements necessary to qualify as an operator of this vehicle:

- ◆ Demonstrate a working knowledge of each control.
- ◆ Understand all safety rules and guidelines as presented in this manual.
- ◆ Know how to properly load and unload cargo.
- ◆ Know how to properly park this vehicle.
- ◆ Recognize an improperly maintained vehicle.
- ◆ Demonstrate ability to handle this vehicle in all conditions.

## Section 2

*VEHICLE CONTROLS*

The following describes the use of each control on this vehicle.



SOME CONTROLS ARE OPTIONAL EQUIPMENT AND MAY NOT BE INSTALLED ON THIS VEHICLE.

---

**Key-Switch**

A key-switch located on the right side of the instrument panel turns on the vehicle. Rotate the key clockwise to turn the vehicle on counterclockwise to turn the vehicle off.

The key-switch should be in the off position and the key removed, whenever the operator leaves the driver's seat.

This switch is also designed to secure and disable the vehicle. You can remove the key **ONLY** when the key-switch is in the OFF position.

---

**Seat Interlock Switch**

A switch located under the driver's seat disables the vehicle when the driver leaves the seat. The driver must be seated for the vehicle to operate.



THIS IS AN ADDED SAFETY FEATURE AND SHOULD NEVER BE BY-PASSED.

---

**Forward-Reverse Switch**

The forward-reverse rocker switch, located on the dash, determines the direction of travel (forward or reverse) of the vehicle. Push the top of the switch to make the vehicle go forward. Push the bottom of the switch to go in reverse.

**DO NOT SHIFT** from forward to reverse or vice-versa while the vehicle is in motion. Make sure the vehicle is completely stopped before shifting.

The Forward-Reverse switch has a neutral position. The Forward-Reverse switch should be in the neutral position with the park brake set whenever the operator leaves the driver's seat.

---

**Accelerator Pedal**

The accelerator pedal located to the right of the brake pedal. It controls the speed of the vehicle, is designed for right foot operation only, operates the same way as the accelerator pedal in an automobile, and controls the vehicle's speed.



DEPRESS THE PEDAL TO SPEED THE VEHICLE UP. RELEASE THE PEDAL TO SLOWDOWN.

---

## Steering

The steering wheel and steering system is an automotive type. To turn right, turn the steering wheel to the right (clockwise). To turn left, turn the steering wheel to the left (counter clockwise).

---

## Foot Brake Pedal

The foot brake pedal located to the right of the steering column is for operation with the right foot only. It works the same as the brake in an automobile. Applying pressure to the brake pedal slows the vehicle according to the amount of pressure you apply. Removing your foot from the pedal releases the braking action.

---

## Park Brake Lever

The parking brake is actuated with a hand lever, which is located between the driver and passenger seats. To set the parking brake, push down on the brake pedal and pull the lever up until it locks. To release the park brake, pull up, push the release button, and lower the handle.

## CAUTION

*Do not operate the vehicle with the parking brake applied. Severe motor/control damage will result.*

---

## Horn Button

The horn button is located on the right side of the dash panel or in the center of the steering wheel. Depress the button to sound the horn, release it to turn it off.

---

## Headlights and Accessories (Optional)

The headlight switch is located on the left side of the instrument panel. An accessory switch, if any, is adjacent and to the right of it.

---

## Hour Meter (optional)

The hour meter is located to the right of the battery status indicator. This tracks the number of hours the vehicle has been in operation.

---

## Battery Status Indicator

The battery status indicator is located to the right of the accessory switch. The normal operating range is in the green zone. The vehicle needs charging if it is in the yellow zone to the left. If it is in the red zone to the left, the vehicle should be taken out of service immediately to be charged.



**Section 2***Vehicle Operational Guidelines*

---

**Driving**

- ◆ Slow and sound the horn when approaching a corner or other blind intersection.
- ◆ No horseplay or dangerous driving.
- ◆ Do not drive this vehicle in hazardous areas unless this vehicle is approved and labeled for such operation.
- ◆ Immediately report any accident or vehicle problem to your supervisor.

---

**Loading and Unloading**

- ◆ Do not load cargo that can easily fall off this vehicle.
- ◆ Do not exceed the cargo load capacity of this vehicle.
- ◆ Do not carry more than the maximum number of passengers allowed for this vehicle.
- ◆ Be extra careful when handling cargo that is longer, wider or higher than this vehicle.

---

**Parking**

- ◆ Set the parking brake and place shift switch in neutral before leaving the vehicle.
- ◆ If you will be away from this vehicle turn off the key-switch, remove the key and take the key with you.
- ◆ If you park this vehicle on an incline block the wheels.
- ◆ Do not block fire aisles, fire equipment, or stairways.

---

**Towing**

To tow these vehicles attach a tow strap to the front bumper tow-bar and place the forward/reverse shift lever in the neutral position. Use another driver to steer this vehicle while it is being towed. Be sure the driver uses the brakes when the towing vehicle slows or stops.

**⚠ WARNING** *Do not exceed 5 MPH or carry any passengers while towing this vehicle.*

---

*Storing and Returning to Service*

- ◆ Do not store batteries in a discharged condition. Fill, charge, and clean batteries fully before putting in storage
- ◆ Lube all grease fittings. Spray all exposed metal surfaces with a light oil.
- ◆ Clean and dry all exposed electrical connections.
- ◆ Inflate tires to proper pressure and then block them off the ground.
- ◆ If stored for a prolonged period the batteries should be charged as follows;

Storage Temperature	Charge
Below 40° F	Every 6 months
40° - 60° F	Every 2 months
Above 60° F	Once a month

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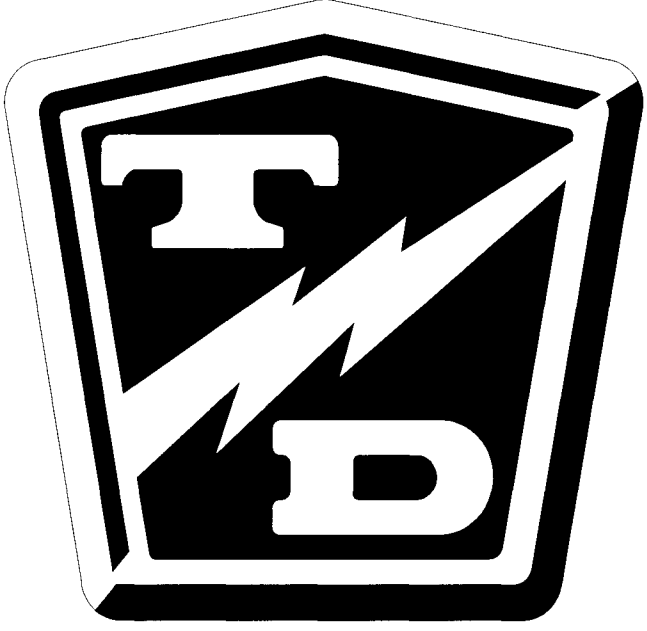
**Returning To Service**

Check state of charge of batteries and charge if necessary.

Perform **ALL** maintenance checks in the periodic checklist in section 3.

Test drive before putting into normal service.

**TAYLOR - DUNN**



# *Maintenance and Service Procedures*



**Section 3**

This section explains how to perform the scheduled maintenance procedures. Use the Maintenance Checklist to determine how often you should perform each procedure. Vehicle maintenance or repairs should only be performed by a qualified mechanic.

This section contains the following:

- ◆ Maintenance guidelines.
- ◆ Maintenance checklist.
- ◆ Lubrication chart.
- ◆ Troubleshooting guide.
- ◆ Detailed maintenance procedures.
- ◆ Avoid fire hazards and have fire protection equipment present in the work area. Do not use an open flame to check level or leakage of battery electrolyte. Do not use open pans of fuel or flammable fluids for cleaning parts.
- ◆ Ventilate the work area properly.
- ◆ Regularly inspect and maintain in a safe working condition, brakes, steering mechanisms, speed and directional control mechanisms, warning devices, lights, governors, guards and safety devices.

## **Maintenance Guidelines**

- ◆ Allow only qualified and authorized personnel to maintain repair adjust and inspect the vehicle.
- ◆ Before starting any repairs or maintenance immobilize the vehicle by turning the key switch off, removing the key and setting the park brake.
- ◆ Disconnect both of the main battery leads before working on or disconnecting any electrical component or wire.
- ◆ Block the chassis with jack stands before working under a raised vehicle.
- ◆ Conduct vehicle performance checks in an authorized area where safe clearance exists.
- ◆ Before starting the vehicle, follow the recommended safety procedures in Section 2, "Safety Rules and Operational Information."
- ◆ Inspect and maintain battery limit switches, protective devices, electrical conductors and connections in conformance with Taylor-Dunn's recommended procedures.
- ◆ Keep the vehicle in clean condition to minimize fire hazards and facilitate detection of loose or defective parts.

*Severe Duty Inspection: If these vehicles are operated in severe conditions all service procedures should be carried out twice as often as stated in the table on the next page. In addition the whole vehicle should be inspected monthly for signs of damage and repaired immediately.*

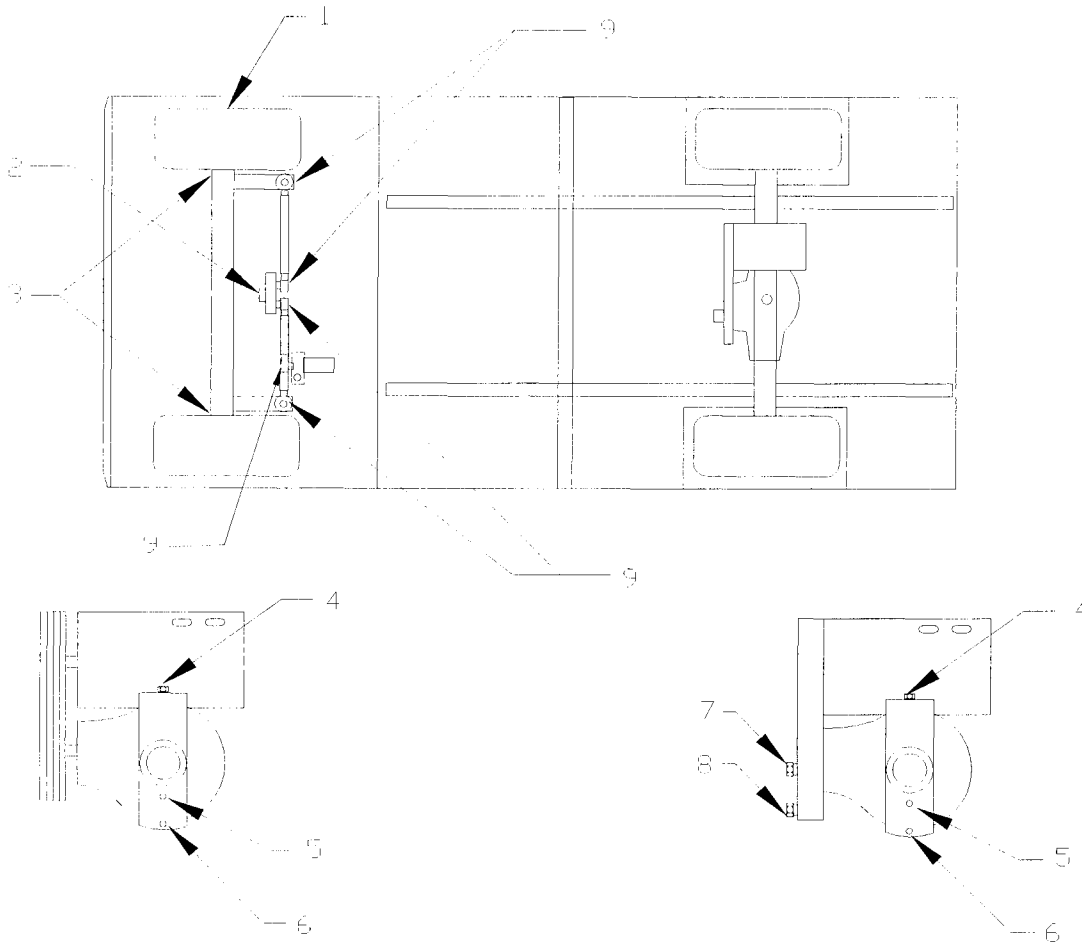
**The following list is meant as a guide and is not all inclusive.**

***SEVERE CONDITIONS refer to operation:***

- ◆ In extreme temperature.
- ◆ On bumpy, dusty, or ill maintained roads.
- ◆ In excessively wet areas.
- ◆ In corrosive or contaminated areas.
- ◆ At or near maximum capacity for more than 50% of the operating time.
- ◆ On multiple shifts.

Periodic Maintenance Checklist					
Maintenance Item	Weekly (20hrs)	Monthly (80hrs)	Quarterly (250hrs)	Semi - Annual (500hrs)	Annually (1000hrs)
Check Condition of Tires (pg 3-45)	X				
Check and Fill Batteries (pg 3-42)	X				
Check Brake System (pg 3-7 to 3-18)		X			
Check Steering System (pg 3-19 to 3-24)		X			
Lubricate Vehicle (pg 3-4)			X		
Clean and Tighten All Wire Connections			X		
Wash and Service Batteries (pg 3-42 to 3-43)			X		
Check Park Brake (pg 3-15)				X	
Check Front Wheel Bearings (pg 3-25)				X	
Check Rear Axle Oil (pg 3-31)				X	
Change Rear Axle Oil (pg 3-31)					X
Check and Tighten all Nuts and Bolts					X
Clean and Repack Front Wheel Bearings (pg 3-25)					X

# R3-80 LUBRICATION CHART



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#	Description	Locations	Lubricant Type
1	Front Wheel Bearings	2	High Temperature Wheel Bearing Grease
2	Steering Pivot Pin	1	General Purpose Grease
3	King Pin	2	General Purpose Grease
4	Drive Fill Plug	1	SAE 140 API GL-5 Hypoid Gear Oil 2-1/4qts.
5	Drive Level Plug	1	
6	Drive Drain Plug	2	
7	Chain Case Fill/Level Plug	1	SAE 140 API GL-5 Hypoid Gear Oil
8	Chain Case Drain Plug	1	
9	Ball Joints	6	General Purpose Grease

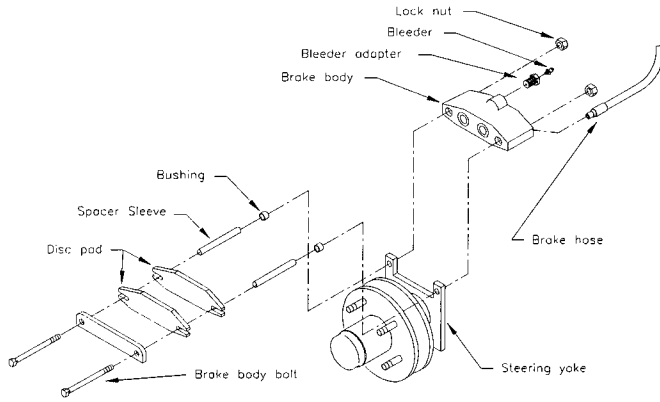
*TROUBLESHOOTING GUIDE*

Symptom	Probable Cause
Steering Pulls in One Direction	Front End Out of Alignment
	Low Tire Pressure
Hard Steering	Dry Lube Points in Steering Linkage
	Damaged King Pin/Ball Joint
	Low Tire Pressure
Excessive Steering Play	Worn Ball Joints
	Mis-Adjusted or Worn Steering Gear
	Loose Steering Linkage
Lack of Power or Slow Operation	Brakes or Parking Brakes Dragging
	Worn Drive Gears
	Front End Out of Alignment
	Defective Speed Control
Abnormal Noise	Worn Drive Gears or Bearings
	Worn Front /Rear Axle Bearings
	Loose Lug Nuts
	Motor Bearings Worn
Oil Leak in Rear Bearing Area	Rear Wheel Bearing and/or Gasket Failed
	Drive Over Filled
Brake Pedal Soft or Spongy	Air in Brake Lines
Brake Pedal Low	Brake Worn (1/16" Wear Limit)
	Brake Fluid Low
	Brakes Out of Adjustment
Braking Power Low	Brake Worn (1/16" Wear Limit)
	Brake Pads Contaminated with Fluid
	Brake Pedal Linkage Binding
	Brakes Out of Adjustment
	Air in Brake Lines



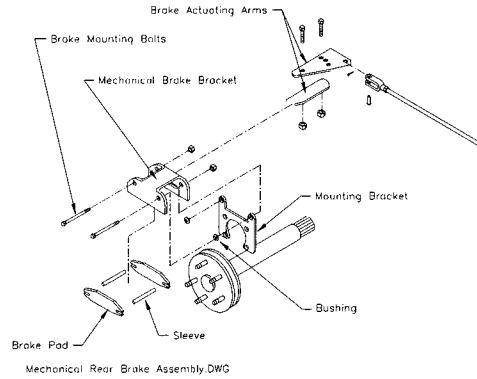
**Section 3**

**OPTIONAL FRONT HYDRUALIC BRAKES**



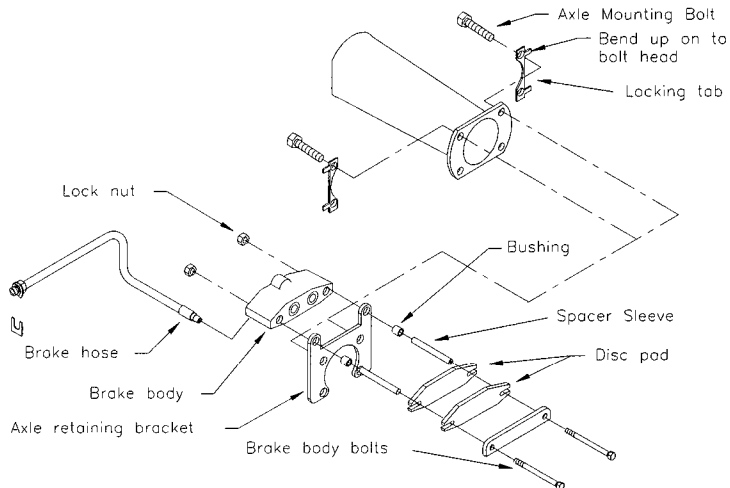
Optional Front Hydraulic Brakes.DWG

**MECHANICAL REAR DISC BRAKES (STANDARD)**



Mechanical Rear Brake Assembly.DWG

**OPTIONAL REAR HYDRUALIC BRAKES**



Rear Hydraulic Brakes.DWG

## Brakes

This section covers the installation and repair of the brake systems that are installed on the R3-80. This vehicle comes equipped either with the standard mechanical rear brakes or a hydraulic brake system.

Be sure that you are fully aware of the brake system installed on the vehicle you are working on, before continuing. You should be prepared to dispose of any and all used brake fluid. Do not attempt to reuse any fluids that are discharged from the brake system while servicing it.

### **⚠ CAUTION**

*BRAKE FLUID IS CORROSIVE AND WILL DAMAGE PAINTED AREAS. AVOID SPILLING FLUID ON ANY SURFACE*

### **⚠ WARNING**

*The OEM does not supply asbestos fiber-brake pads/shoes with this or any vehicle. However, there is the possibility that the OEM brake pads/shoes were replaced with those containing asbestos fibers. Since this possibility does exist the brake pads should be handled as if, they do contain asbestos.*

*Never use an air hose or dry brush to clean brake assemblies. Use an OSHA, approved vacuum cleaner or any alternate method approved by OSHA to minimize the hazard caused by airborne asbestos fibers and brake dust.*

*Do not grind, sand, break, or chisel the brake pads/shoes as this will cause unnecessary dust possibly releasing asbestos fibers into the air.*

*Always wear protective clothing and a face shield when working on the brake pads.*

*Inhaled asbestos fibers have been found to cause cancer and respiratory diseases.*

*Do not drive the vehicle if any worn or broken part is detected in any part of the brake system. The cause of the damage must be repaired immediately.*



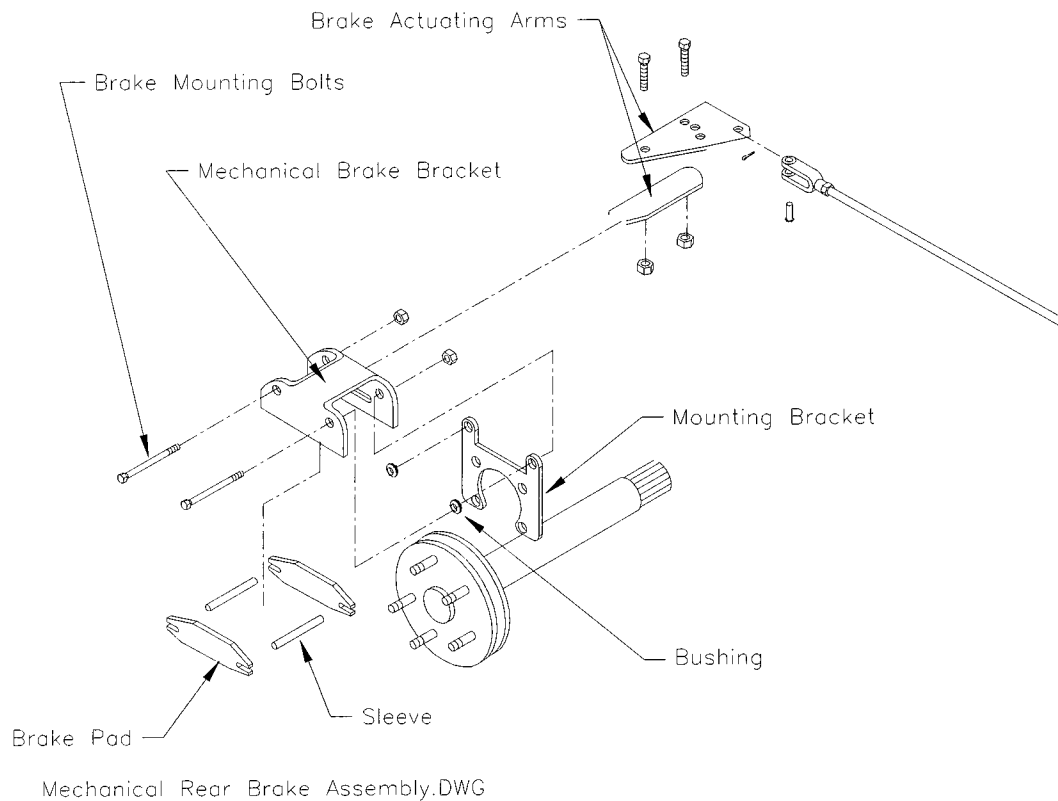
THE PARK BRAKE SYSTEM IS IDENTICAL REGARDLESS OF THE BRAKE SYSTEM INSTALLED IN THE VEHICLE. HOWEVER SINCE THERE ARE SOME MINOR DIFFERENCES BE SURE TO LOCATE THE FIGURE THAT MATCHES THE BRAKE SYSTEM INSTALLED ON YOUR VEHICLE.

### **IMPORTANT:**

*When applying or releasing the park brake the foot pedal must be depressed in order to relieve undue stress on the park brake lever and its linkage. Failure to do this will cause undue wear on the park brake lever and its parts.*

# Standard Mechanical Rear Disc Brakes

This vehicle comes standard with rear mechanical disc brakes. Here we will cover the servicing of those parts that are unique to these brakes. However things like changing the brake pads are covered in the “Hydraulic Disc Brakes,” section and will not be repeated here. For reference you will find a figure below showing the mechanical disc brake assembly.



**Brake Figure 1: Mechanical Brake**

## Mechanical Brake Linkage Adjustment

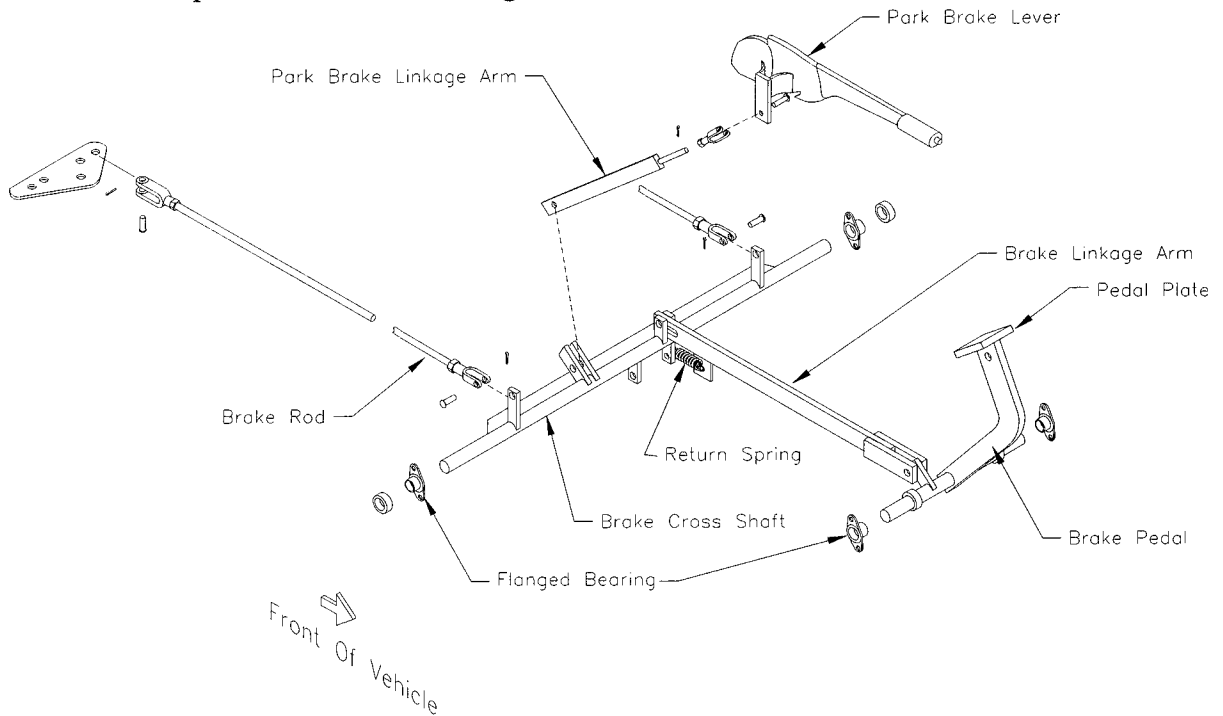
If the brake pedal travels to the floorboard and does not have full braking power, the pedal linkage is out of adjustment. Refer to Brake Figure 1 and 2.



THE BRAKE PADS AND DISCS SHOULD BE INSPECTED AND REPLACED, IF NECESSARY, BEFORE ANY ADJUSTMENTS ARE MADE.

To adjust the mechanical brake linkage:

1. Place blocks under the wheels to prevent vehicle movement.
2. Disconnect the main positive and negative at the batteries.
3. Loosen the jam nut on the brake rods.
4. Rotate the brake rods until the linkage is tight, and without any brake drag.
5. Tighten the jam nut on the brake rods being sure the rods do not turn.
6. Test drive the vehicle, checking for even braking. Additional adjustment may be required for balanced braking.



**Brake Figure 2: Mechanical Brake Linkage**

**Section 3**

**Balanced Braking**



THIS PROCEDURE IS MEANT FOR BOTH THE MECHANICAL AND HYDRAULIC BRAKE SYSTEMS. REFER TO THE TWO FIGURES ON THE OPPOSITE PAGE TO SEE THE DIFFERENCE BETWEEN THE HYDRAULIC AND MECHANICAL BRAKE SYSTEMS.

It is important that the two brake rods be adjusted evenly to prevent uneven pressure from being applied to either set of brakes.

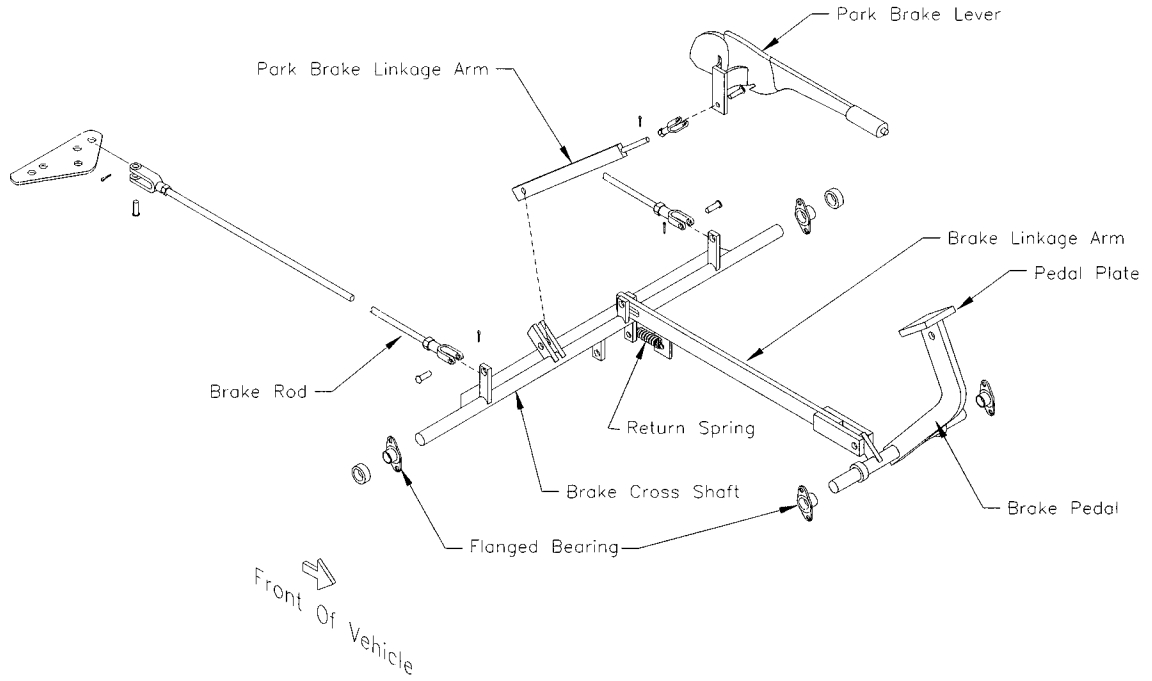
If you have adjusted the brake linkage or have replaced any part of the mechanical brake system you should check for balanced braking. This is a two man operation, one to apply pressure to the brake pedal while the second inspects the brake rods. It is also equally important that this be done for the park brake when the vehicle is equipped with hydraulic brakes.

1. Disconnect the main positive and negative battery terminals from the battery.
2. Raise the rear of the vehicle off the ground and support it with jack stands.
3. Release the park brake lever.
4. Check one of the brake rods for play.
5. Check the opposite brake rod for play as well. It should have the same amount of play in it as the first brake rod.

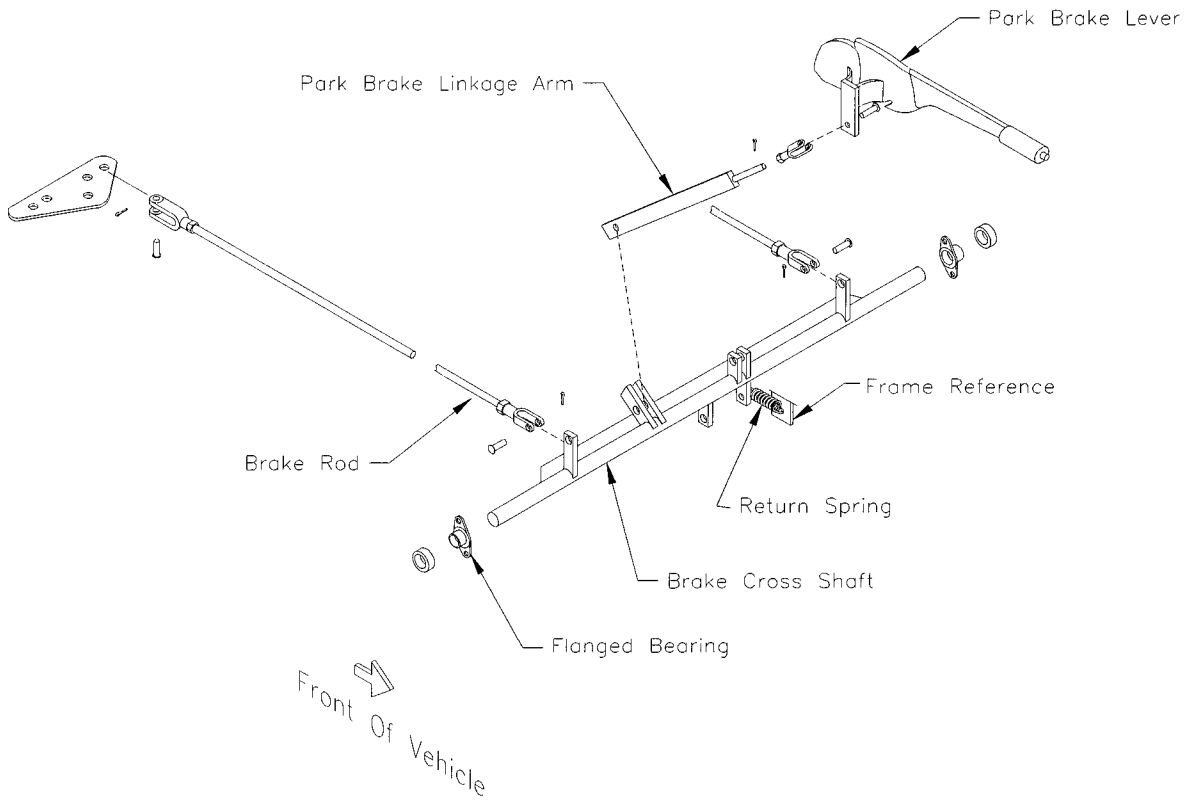
**HINT:** If the two rods do not have the same amount of play in them readjust them and check them again. Once the two rods have the same amount of play, they are considered balanced.

6. Lower the vehicle and reconnect the batteries.
7. Test drive the vehicle and check for any brake drag or insufficient braking.
8. If there is a problem, readjust the brakes as needed and repeat steps 1 through 7 again.

## Complete Mechanical Brake Linkage



## Park Brake Linkage for Hydraulic Brake System



**Section 3**

*Rear Brake Replacement (Mechanical)*

To replace the rear brakes:

1. Place blocks under the front wheels to prevent vehicle movement.
2. Disconnect the main positive and negative at the batteries.
3. Raise the rear of the vehicle and support with jack stands (see WARNING!-this page).
4. Disconnect the brake rod from the brake actuating arm.
5. Remove the brake mounting bolts, sleeves, brake pads, and mechanical brake bracket.
6. Inspect the sleeves and mounting bracket bushings for wear. The sleeves should not be flared or cracked, and the sleeves should not fit loosely in the bushings. The bushings should be snug to the sleeves, while still allowing them to slide.
7. Replace the sleeves or bushings as necessary.
8. Reinstall the mechanical brake bracket, sleeves, brake pads, and mounting bolts to the mounting bracket. Use new locknuts.

**⚠ WARNING** *Always use a lifting strap, hoist, and jack stands, of adequate capacity to lift and support the vehicle. Failure to use lifting and support devices of rated load capacity may result in serious injury.*

9. Tighten the bolts to 12 ft-lbs.

## Replacing the Brake Pedal and Linkage

To replace the brake pedal or linkage:

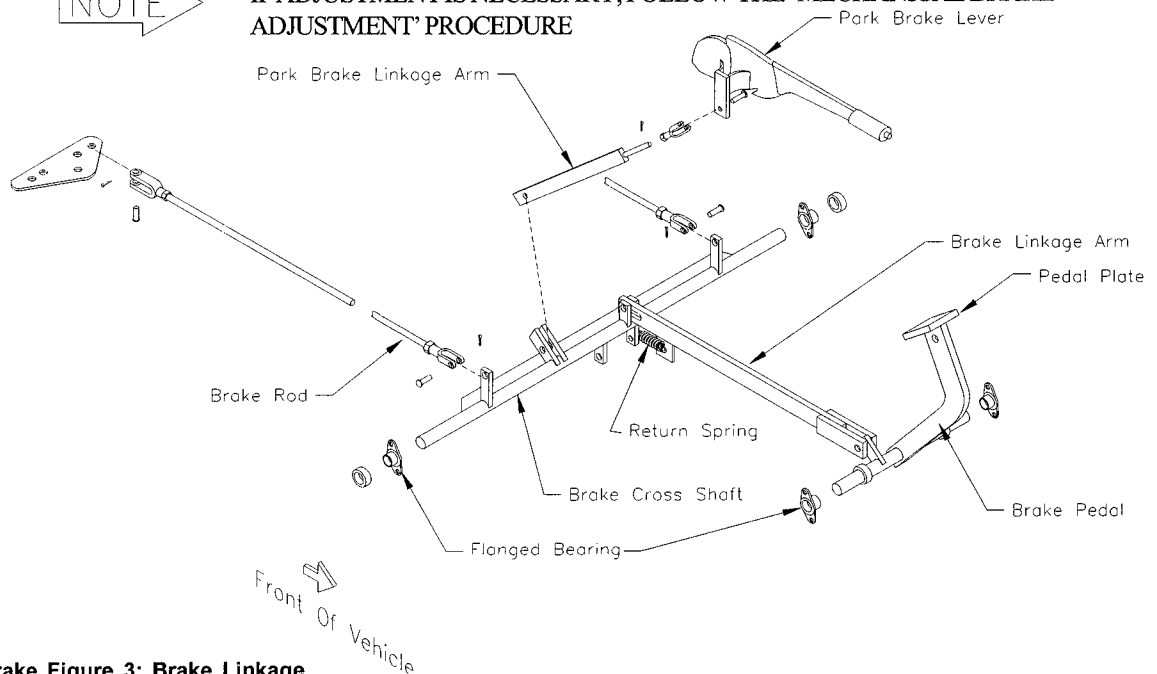
1. Place blocks under the front wheels to prevent vehicle movement.
2. Disconnect the brake linkage arm from the brake pedal.
3. Remove the pedal plate from the brake pedal.
4. Remove the flanged bearings holding the brake pedal in place.
5. Remove the brake pedal and replace as necessary.
6. Remove the return spring and replace as necessary.
7. Remove the brake linkage arm from the brake cross shaft and replace as necessary.
8. Reinstall all brake and linkage components by reversing the procedure above. Always use new cotter pins (**see WARNING!**).

### **⚠ WARNING**

*Always use new cotter pins. Cotter pins used more than once are weakened and may break, resulting in linkage and brake failure.*



IF ADJUSTMENT IS NECESSARY, FOLLOW THE 'MECHANICAL BRAKE ADJUSTMENT' PROCEDURE



**Brake Figure 3: Brake Linkage**



## Hydraulic Disc Brakes

The hydraulic disc brakes, available on these vehicles are not adjustable. However, they do need to be periodically inspected, for any possible leaks and to check the wear of the brake pads and, rotors. Follow the procedures below to service these brake systems.



THE BRAKE ROTORS ARE AN INTEGRAL PART OF EACH AXLE AND HUB. IF THE ROTORS ARE DAMAGED OR WORN, THE AXLE OR HUB MUST BE REPLACED. BE SURE TO ALWAYS USE DOT5 SILICONE BASE BRAKE FLUID TO MAINTAIN MAXIMUM CORRSION RESISTANCE.

### Brake Pads

To remove and replace the brake pads:

1. Place blocks under the wheels to prevent vehicle movement.
2. Disconnect the main positive and negative terminals from the batteries.
3. Raise either the front or rear of the vehicle, (depending on which set of brakes you are working on,) and support the vehicle with jack stands.

### ⚠ WARNING

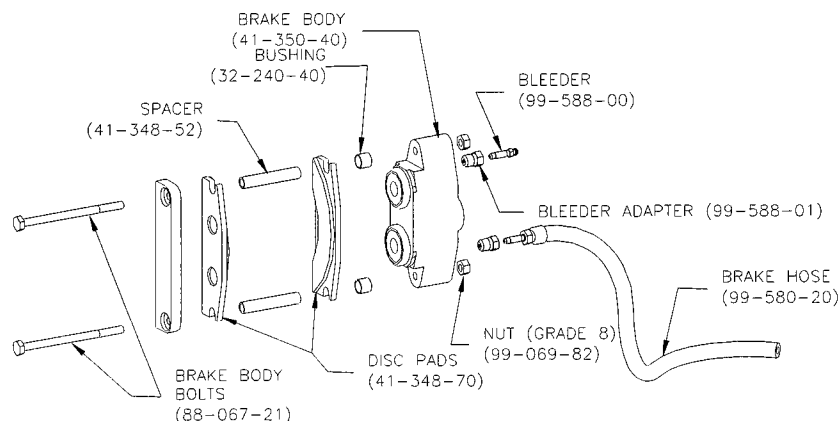
*Always use a lifting strap, hoist, and jack stands, of adequate capacity to lift and support the vehicle. Failure to use lifting and support devices of rated load capacity may result in serious injury.*

4. Remove the wheels.
5. Remove the two 1/4" brake body bolts (See Brake Figure 4 Below).

### ⚠ WARNING

*Do not let the brake body hang by the brake hose. Support the brake body to prevent damage to the hose.*

6. Inspect the spacers for wear and replace as necessary.



Brake Figure 4: Exploded View of Disc Brake Assembly

7. Replace the spacer bushings in the axle retainer bracket.
8. Replace the brake pads and reassemble the brake to the retainer bracket (*See Brake Figure 3 on the previous page*).

**⚠ WARNING**

*Always use new locknuts and bolts. Locknuts and bolts become less effective if used more than once. If the locknuts or bolts holding the brake to the drive come loose, serious injury may occur.*

9. Install new grade 8 locknuts and brake mounting bolts.
10. Tighten the bolts to 11 ft-lbs.
11. Test the brakes to ensure proper installation and braking.

**Repairing the Brake Body**

1. Remove the brake body. Refer to replacing the brake pads.
2. Carefully remove the two pistons, rubber boots and o-rings.

**⚠ WARNING**

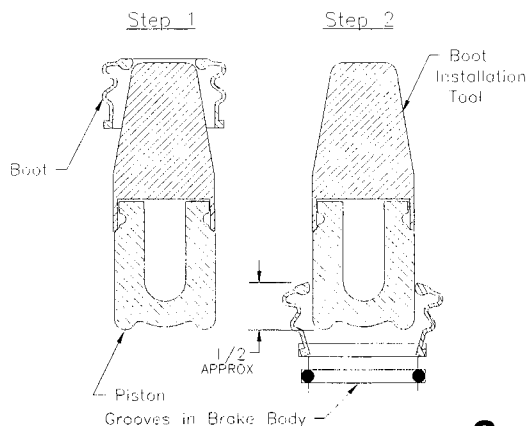
*The pistons are very brittle and break easily*

3. Clean and dry the brake body completely.
4. Make sure there are no contaminants left in the brake body.
5. Inspect the interior of the brake body. If any damage or wear is found it must be replaced.
6. Reassemble the brake body using clean DOT 5-brake fluid as a lubricant.
7. Use tool #41-350-13 to install the rubber boots.(Refer to Figure Below.)
8. Install the brake body.

**⚠ WARNING**

*The 1/4" gr. 8 locknuts for the brake body bolts must be replaced.*

9. Tighten the new retaining bolt lock nuts to 11-ft lbs.
10. Bleed the brakes. (*Refer to "Bleeding the Brakes," on page 3-16.*)
11. Lower and test-drive the vehicle.



**Brake Figure 5: Rubber Boots**

**Section 3**

*Bleeding the Brakes*

You must bleed the entire hydraulic system to remove any air from the system, after removing brake lines, hoses or the master cylinder. The best way to bleed the brakes is to have one person at the brake pedal, and another person opening and closing the bleeder valve at each wheel.

Before beginning this service or any service read the “**Maintenance Guidelines**,” on page 3-2 and follow each of the bulleted items before continuing.

Make provisions to catch and properly dispose of the brake fluid in the hydraulic brake system.

**▲ CAUTION** *BRAKE FLUID IS CORROSIVE AND WILL DAMAGE PAINTED AREAS. AVOID SPILLING FLUID ON ANY SURFACE.*



**NOTE** YOU SHOULD START THIS PROCEDURE AT THE WHEEL/BRAKE BODY FURTHEST FROM THE MASTER CYLINDER, AND THEN WORK YOUR WAY TO THE WHEEL/BRAKE BODY CLOSEST TO THE MASTER CYLINDER.

To bleed the brake system, follow these procedures:

1. Add DOT-5 brake fluid to the master cylinder. **(If needed.)**
2. Apply pressure to the brake pedal and pump it once or twice, for maximum pedal height.
3. Attach a clear hose to the bleeder valve.

**HINT:** *The hose should be long enough to reach the bottom of the drip pan.*

4. With a drip pan under the hydraulic brake body. Loosen the bleeder valve on the hydraulic brake body, about 3/4 of a turn.
5. Depress and hold the foot pedal to the floor, while tightening the bleeder valve.
6. Slowly release the foot pedal allowing it to return to its released position.
7. Repeat steps two-(2) through six- (6) until the air is expelled from the line.

**HINT:** The hose attached to the bleeder valve can be used to check if the air has been expelled from the brake line. Let the end of the hose, rest under the surface of the fluid in the drip pan. When air-bubbles no longer escape from the tube as the pedal is being depressed, then the line is void of air.

8. Check and add brake fluid to the master cylinder as needed
9. Then repeat this process with each of the other wheels.

**⚠ CAUTION** *Do not allow the fluid level in the master cylinder too get to low, as air may enter the brake lines. Keep the level high by constantly adding fluid*

When finished, top off the master cylinder with fluid to 1/4 from the top of the chamber and replace the cover.

**Section 3**

*Replacing the Master Cylinder*

Before beginning this service or any service read the “**Maintenance Guidelines,**” on page 3-2 and follow each of the bulleted items before continuing.

Make provisions to catch and properly dispose of the brake fluid in the hydraulic brake system.

**⚠ WARNING**

*Avoid ingesting and/or contact with skin or eyes. Always wear protective clothing and a face shield when working with or around brake fluid.*



**SKIN CONTACT:**

*Flush area immediately with water for several minutes.*



**EYE CONTACT:**

*Immediately flush the eye with water for fifteen (15) minutes and call physician.*



**INGESTION:**

*Induce vomiting immediately and call a physician.*

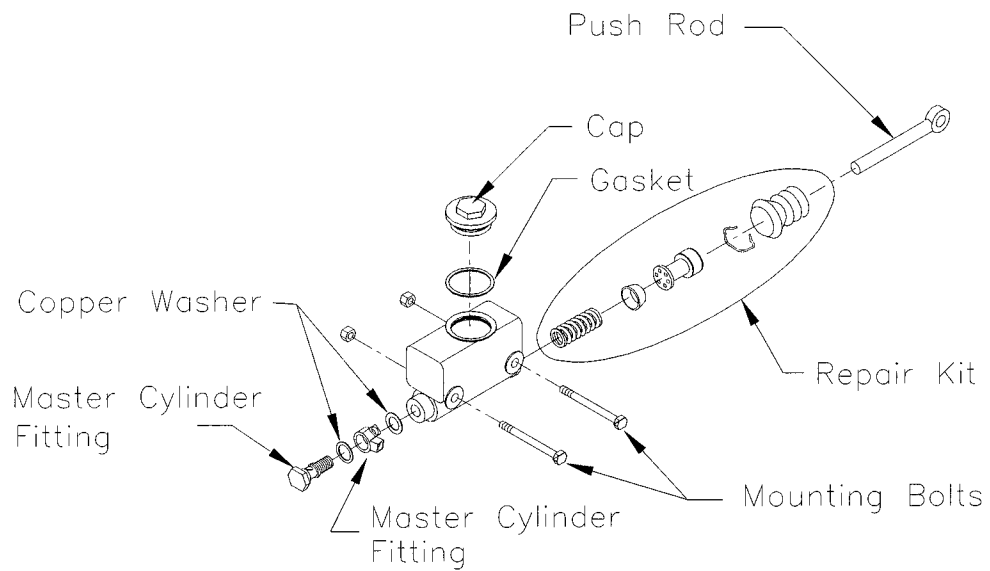
**⚠ WARNING**

**KEEP OUT OF REACH OF CHILDREN.**

**BRAKE FLUID IS CORROSIVE AND WILL DAMAGE PAINTED AREAS. AVOID SPILLING FLUID ON ANY SURFACE.**

1. Place blocks under the rear wheel to prevent vehicle movement.
2. Disconnect the batteries.
3. Remove the cap from the master cylinder and, pump all of the brake fluid from the master cylinder and dispose of it properly.
4. Remove the brake line(s) from the master cylinder fitting.
5. While supporting the master cylinder, remove the mounting bolts.
6. Install the new master cylinder in reverse order.
7. Fill the master cylinder with fresh DOT 5 brake fluid 1/4” from the top of the master cylinder.

8. Bleed the brakes and check for leaks.
9. Check the brake fluid level again and fill as needed.
10. Test drive.



**Brake Figure 6: Master Cylinder**

**Section 3**

*Filling and Checking the Fluid Level*

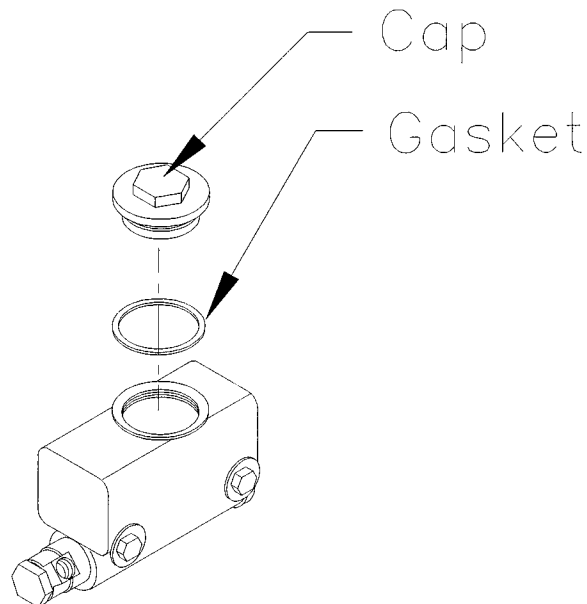
To fill check the brake fluid-level follow these procedures:

1. Clean the cover and exterior of the master cylinder and the surrounding area.
2. Remove the cap from the top of the master cylinder and visually check the level of fluid in the master cylinder.



THE FLUID SHOULD BE 1/4" FROM THE TOP OF THE MASTER CYLINDER'S OPENING. DO NOT FILL THE MASTER CYLINDER PAST THIS POINT AS IT WILL RESULT IN LEAKS.

3. Add DOT 5 Brake Fluid as needed and replace the cap on the master cylinder.

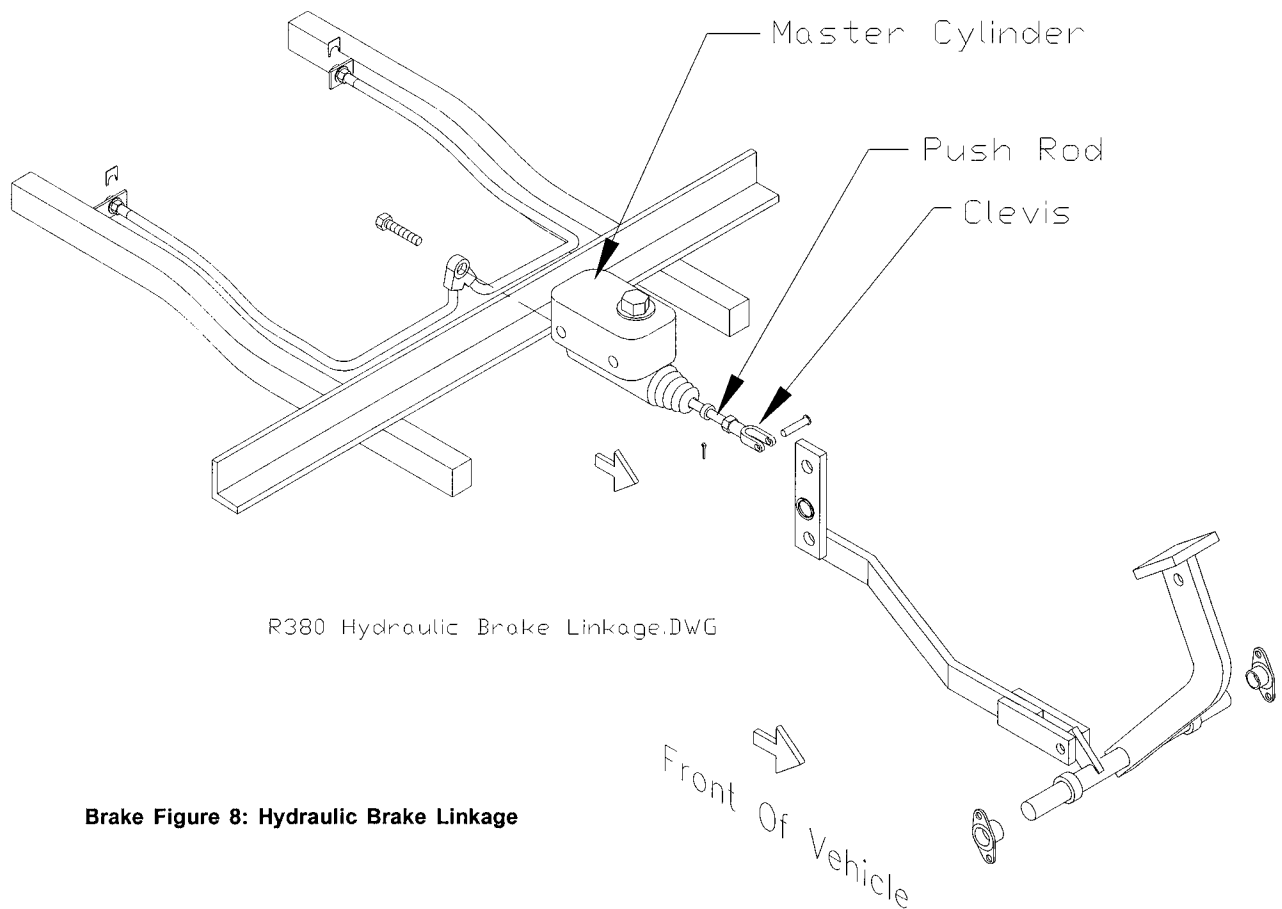


**Brake Figure 7: Filling Master Cylinder**

## Hydraulic Brake Push Rod Adjustment

To adjust the hydraulic brake push rod linkage use the following procedure and refer to Brake Figure 8 on below:

1. Place blocks under the wheels to prevent vehicle movement.
2. Disconnect the main positive and negative at the batteries.
3. Loosen the jam nut at the clevis on the push rod.
4. Turn the push rod counterclockwise until it contacts the head of the piston in the master cylinder.
5. Shorten the push rod by turning clockwise one turn until the push rod just clears the head of the piston. The push rod should be slightly loose.
6. Tighten the jam nut to the clevis.

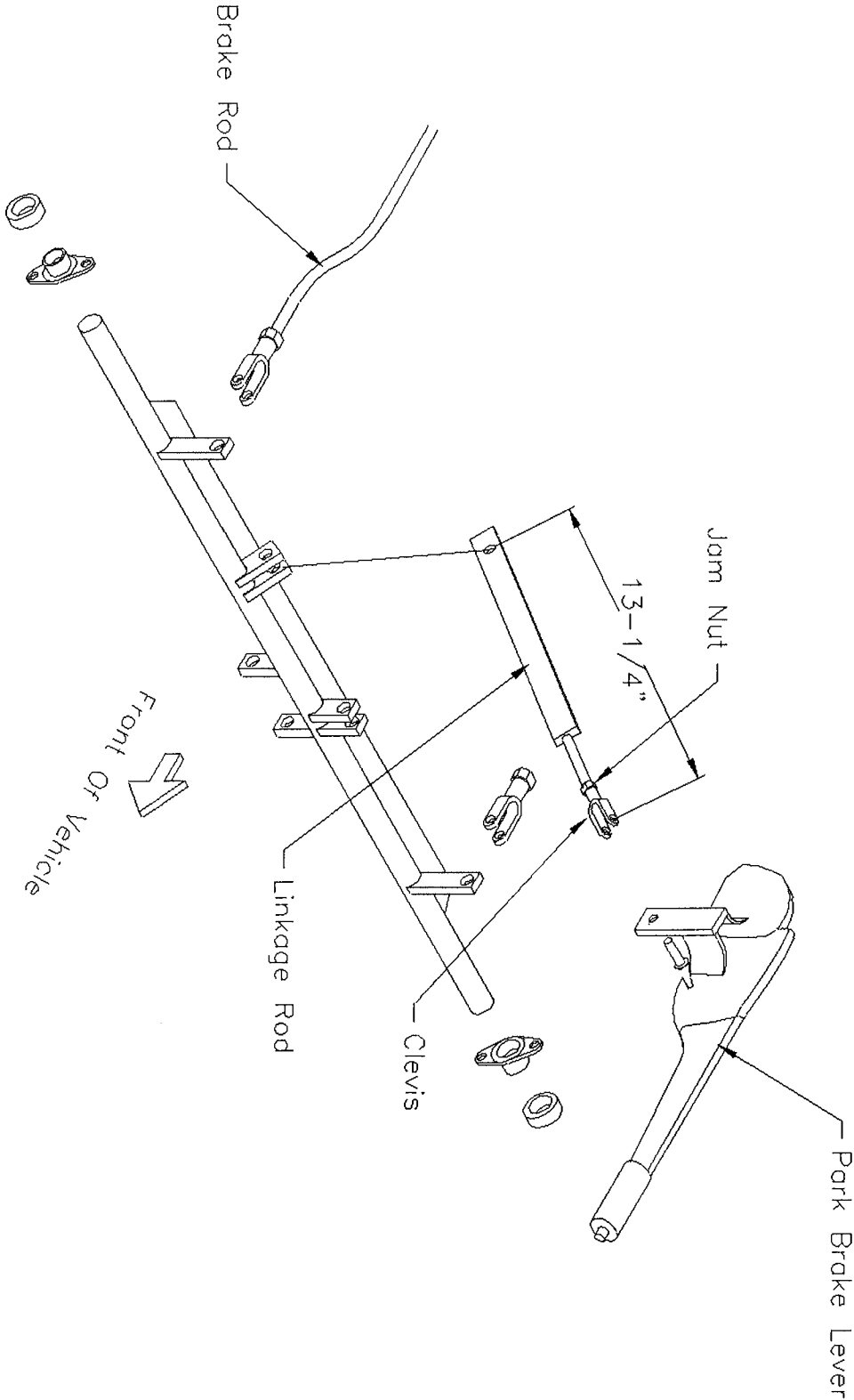


**Brake Figure 8: Hydraulic Brake Linkage**



Section 3

# Parking Brake



Park Brake Figure 9: Exploded View of Parking Brake

## Adjustment

This adjustment should be made only if the park brake lever has been replaced. Other than this instance there is no need to make adjustments to the park brake lever linkage. If you do replace the park brake linkage, refer to the figure on the previous page and follow the procedure below.



THE BRAKE LINKAGE MUST BE ADJUSTED BEFORE ADJUSTING THE PARK BRAKE LINKAGE.

1. Place blocks under the wheels to prevent vehicle movement.
2. Disconnect the main positive and negative at the batteries.
3. Loosen the jam nut at the clevis attached to the park brake lever.
4. Remove the clevis pin and rotate the clevis so that when reconnected, the park brake lever engages the ratchet lock on the second to fifth tooth.



BEFORE PULLING UP ON THE PARK BRAKE LEVER BE SURE TO APPLY PRESURE TO THE FOOT BRAKE FIRST. THEN PULL STRAIGHT UP ON THE LEVER. THIS WILL REDUCE THE STRESS ON THE LINKAGE ROD AND THE PARK BRAKE LEVER.

5. Reinstall the clevis pin. **Always use new cotter pins (see WARNING!).**
6. Tighten the jam nut at the clevis.

### **WARNING**

*Always use new cotter pins. Cotter pins used more than once can become weak or broken. Failure to use new cotter pins may cause the ball joint to become disconnected resulting in loss of steering and serious injury*

**Section 3**

## **Front Axle and Steering**

### *Axle Removal*

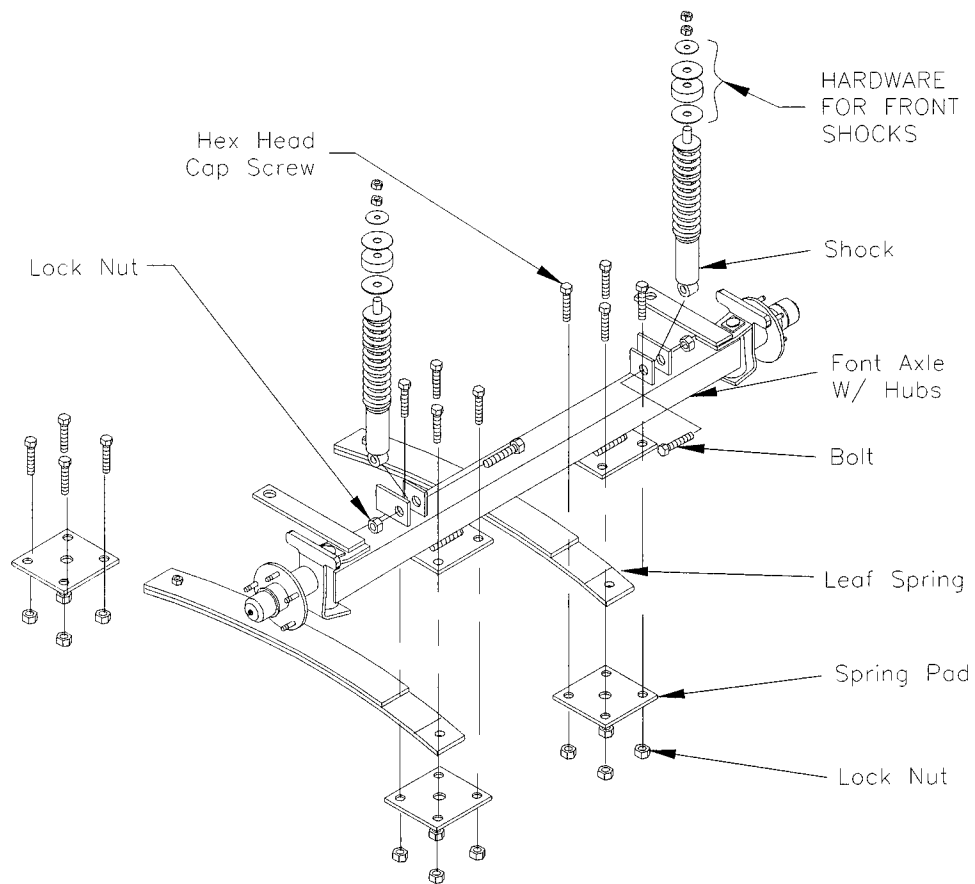
1. Disconnect the batteries.
2. Lift the front end and support with jack stands.
3. Block the rear wheels to prevent the truck from rolling.
4. Remove both front wheels.
5. Disconnect the brake hoses from the disc brake bodies (if equipped).

**⚠ CAUTION** *Brake fluid will drip from the open brake lines.*

6. Remove the drag links from the steering yokes.
7. Remove the bolts holding the leaf springs to the axle.

**⚠ CAUTION** *Support the axle with additional stands or tie it up to the frame to prevent it from falling.*

8. Remove the bolts from the shock mounts on the axle.
9. Remove the axle from the truck.



## *Axle Installation*

**Front Axle Figure 1: Front Axle and Suspension**

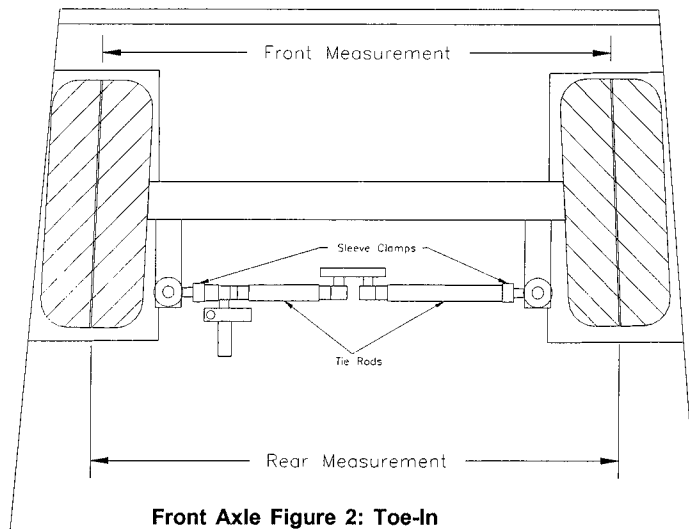
1. Install in reverse order.
2. Tighten spring hanger snugly. The spring should not pivot.
3. Tighten the drag link ball joint to 40-45 ft. lbs.



IF THE AXLE IS NOT EQUIPPED WITH HYDRAULIC BRAKES SKIP STEP 4 AND PROCEED TO STEP 5.

4. If the front axle is equipped with hydraulic brakes. Bleed the front brakes and check for leaks.
5. Lower the vehicle and test drive.

**Section 3**



*Aligning the Front End*

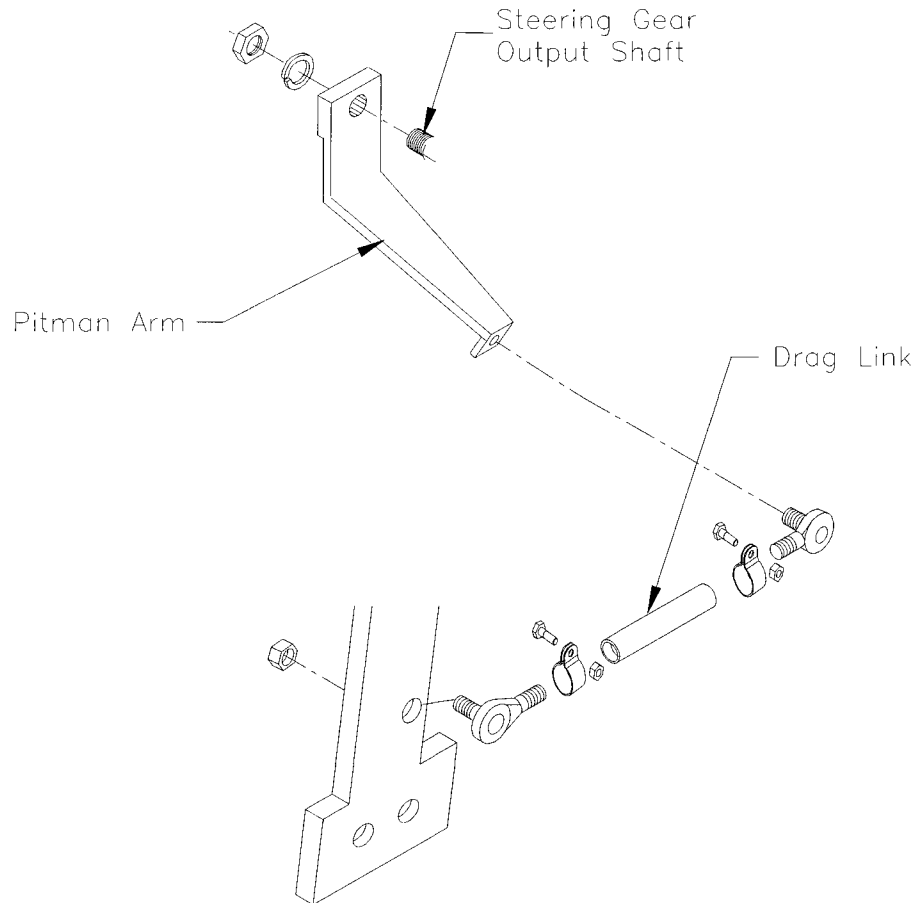


CASTER AND CAMBER ARE SET AT THE FACTORY AND DO NOT REQUIRE ADJUSTMENT.

1. Raise the front end of the vehicle and support with jack stands.
2. Center the steering. (Refer to the Figure above.)
3. With a piece of chalk, mark a line around the center of both tires by holding the chalk against the tire while turning the wheel.
4. Loosen the ball joint clamps at each end of the tie rod so the adjusting sleeve can be turned.
5. Lower front end back on the ground.
6. With the wheels in the straightforward direction measure the distance between chalk lines at the front and the rear of the tires.
7. Adjust the tie rod sleeve until the distance from mark to mark across the front of the tires is the same as the distance from mark to mark across the rear.
8. Tighten the ball-joint clamp nuts securely.

*Centering the Steering*

1. Remove the pitman arm from the steering gear.
2. Align the front wheels straight ahead and tie or clamp in position.
3. Center the steering gear.
  - a.) Turn the gear all the way to the left.
  - b.) Turn back three turns, and tie it off so it can not move.
4. Install the pitman arm while keeping the front wheels in the straight-ahead position. Tighten nut to 70-ft lbs.
5. Remove and center the steering wheel on the steering shaft while keeping the front wheels in the straight-ahead position.
6. Install the steering wheel nut and cap.



Front Axle Figure 3: Drag Link and Pitman Arm

## Repairing the Front Axle

---

### Steering Yoke/Bushings

1. Remove the bearing cap, spindle nut and the wheel/hub assembly.

**CAUTION** *Catch the outer bearing as it falls out.*



REMOVE THE DRAG LINKS FROM THE YOKE (ONLY IF THE YOKE IS TO BE REPLACED).

2. While supporting the yoke, remove the kingpin nut, king pin and bearing pack.
3. Remove the yoke from the axle.
4. Clean and replace as necessary all bearings, nuts, washers and bushings.



IF THE BUSHINGS ARE REPLACED, THEY MUST BE BROACHED OR REAMED TO 0.8780 +0/- .001 AFTER THEY ARE PRESSED INTO THE YOKE.

5. Install in reverse order.
6. Tighten the kingpin nut.

**CAUTION** *The thrust bearing must be orientated correctly.*

7. Tighten the drag link ball joint nut (if it was removed) to 40-45 ft. lbs. Use a NEW cotter pin.
8. Install the front wheel.
9. Tighten spindle nut to 30-ft. lbs. to seat bearings.
10. Back off spindle nut until the hub turns, but is not loose. Then install a NEW cotter pin.
11. Install the bearing cap.

*Wheel Bearings*

1. Remove the tire/wheel assembly
2. Remove the bearing cap and spindle nut.
3. Remove the hub from the spindle.

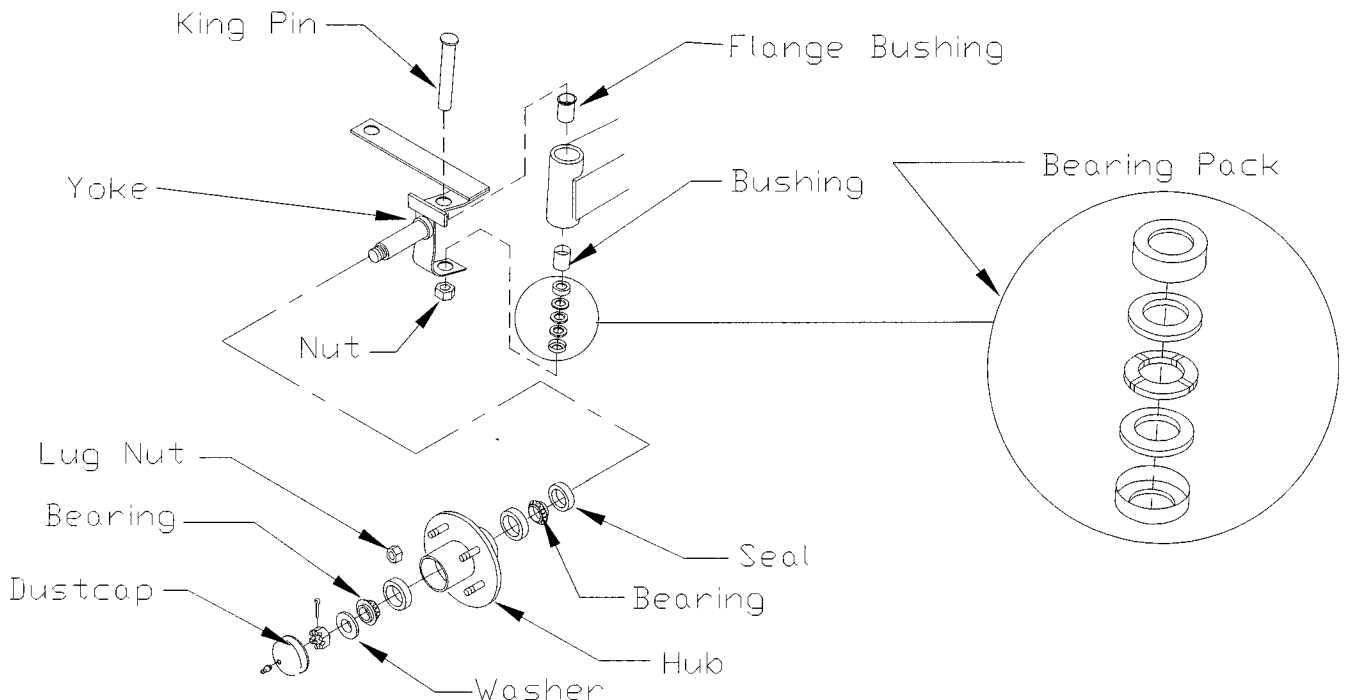
**CAUTION** *Catch the outer bearing as it falls out*

4. Clean all grease from the inside of the hub and bearings.
5. Inspect and replace the races and bearings as a set.

**CAUTION** *It is recommended to replace both the left and right wheel bearings at the same time.*

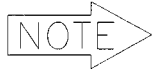
6. Assemble in reverse order, using new grease seals.
  - a.) Pack inner and outer bearings with grease.
  - b.) Tighten the spindle nut to 30-ft. lbs. while rotating the hub to seat bearings.
  - c.) Back off spindle nut until the hub turns, but is not loose. Then install a new cotter pin.

7. Install the bearing cap.





Section 3  
Ball Joints

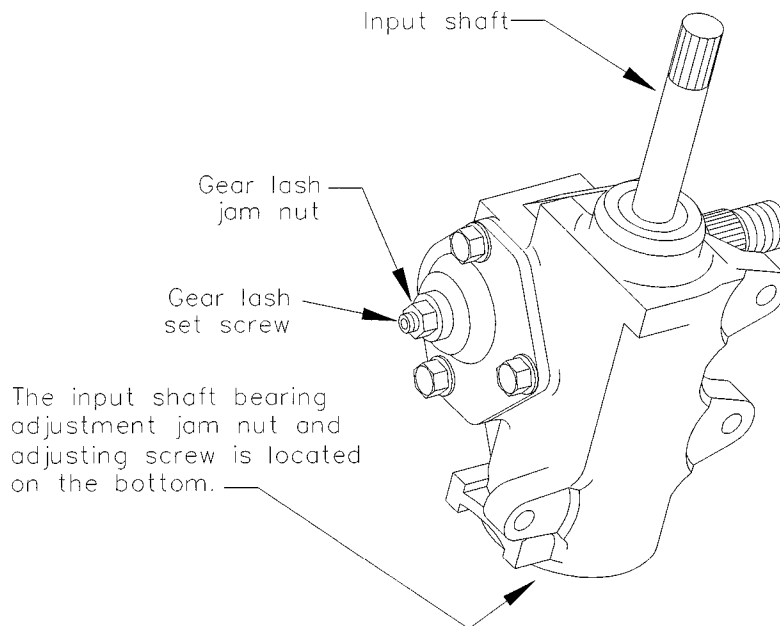


IT IS RECOMMENDED TO REPLACE ALL THE BALL JOINTS AS A SET.

1. Loosen the ball joint clamp. Note its position on the sleeve.
2. Remove the ball joint nut, and then remove the ball joint using a pickle fork.
3. Count the number of turns while removing the ball joint from the drag link or tie rod.
4. Lightly lubricate the threads on the new ball joint and install into the drag link or tie rod counting the same number of turns as when removed.
5. Install the ball joint into the steering arm and tighten nut to 40-45 ft, lbs. Use a NEW cotter pin.
6. Lube the new ball joint.
7. Realign the front wheels.
8. Tighten the ball joint clamps securely.

**CAUTION**

*Make sure the clamps are in their original position noted in step 1. Turn the steering all the way from left to right to make sure there is no interference.*



Front Axle Figure 5: Steering Gear

## Steering Gear Adjustment

---

### Endplay

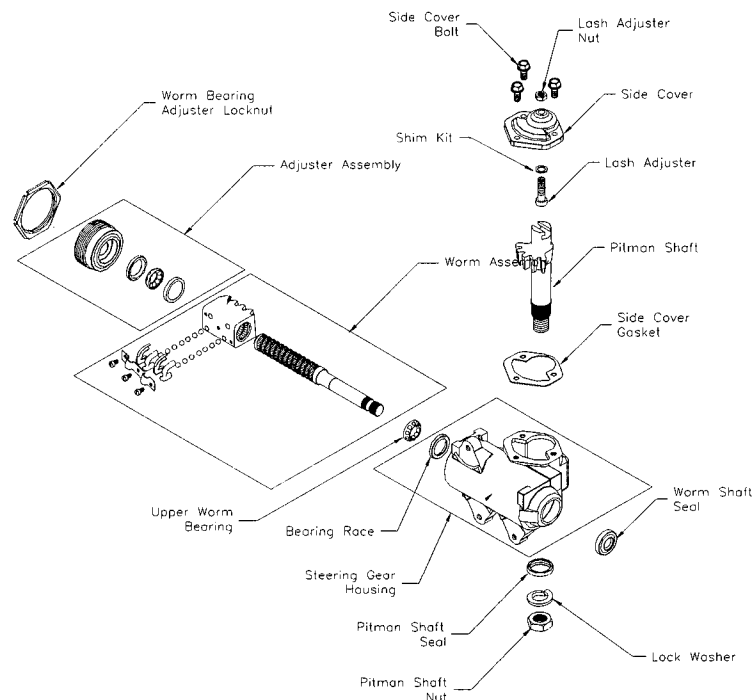
1. Loosen the input shaft bearing adjustment jam nut.
2. Tighten the adjusting nut so that there is no endplay or wobble in the input shaft.
3. Tighten the jam nut.

---

### Gear Lash

1. Remove the pitman arm. Note its position.
2. Loosen the jam nut for the gear lash set screw.
3. Tighten the setscrew so that there is a slight drag when the steering gear passes through the center of its travel (about three- (3) turns from lock).
4. Tighten the jam nut. Do not allow the setscrew to turn while tightening.
5. Install the pitman arm in its original position. Tighten to 70-ft. lbs

Front Axle Figure 6: Exploded View of Steering Gear



**Section 3**

*Adjusting the Toe-in*

The toe-in is the angle of the front wheels. Either in or out, and is determined by measuring the distance from the center of one tire to the center of the other tire.

Toe-in should be checked periodically as routine maintenance, and should be set after replacement of the front axle, axle yokes, or steering adjustment sleeve.

To adjust the toe-in follow the procedure below and refer to Front Axle Figure -6 on the next page:

1. Place blocks under the rear wheels to prevent vehicle movement.
2. Disconnect the main positive and negative at the battery.
3. Raise the front end of the vehicle and support it with jack stands.

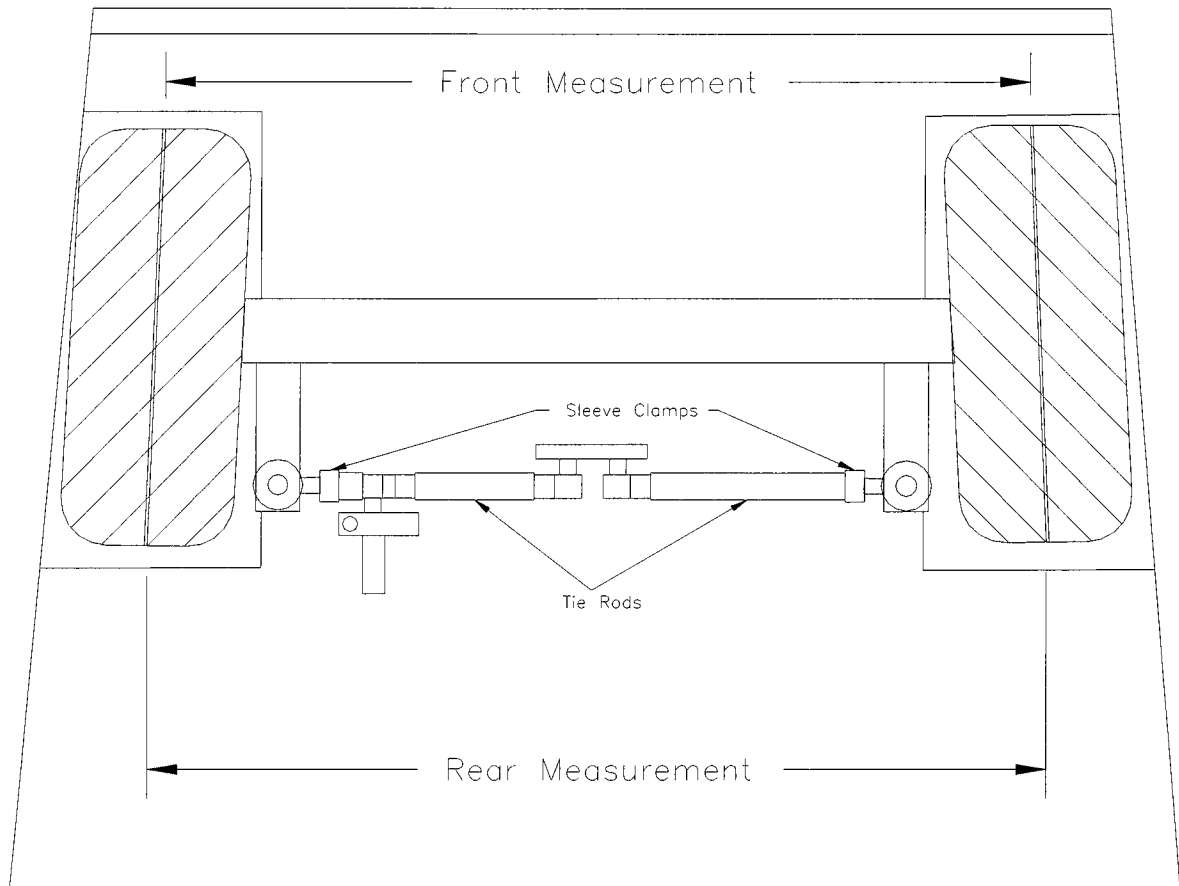
**▲ WARNING**

*Always use a lifting strap, hoist, and jack stands, of adequate capacity to lift and support the vehicle. Failure to use lifting and support devices of rated load capacity may result in serious injury.*

4. Using a marking pencil, rotate the tire while holding the pencil against the center of the tire. This will draw a line around the center of the tire. Mark both tires.
5. Loosen the steering adjustment sleeve clamps, so that the sleeve may be turned.
6. With the wheels straight ahead, measure the distance from the line on the one tire to the line on the other tire. First at the front of the tires, then at the back. Toe-in should be 0" difference between the two dimensions, to 1/4" less on the front measurement.
7. Adjust the steering adjustment sleeves until the toe-in is as described above.
8. Tighten the clamps on the adjustment sleeves.



TURN THE STEERING WHEEL TO BOTH LOCKS (LEFT/RIGHT), TO MAKE SURE CLAMPS DO NOT CONTACT ANYTHING.

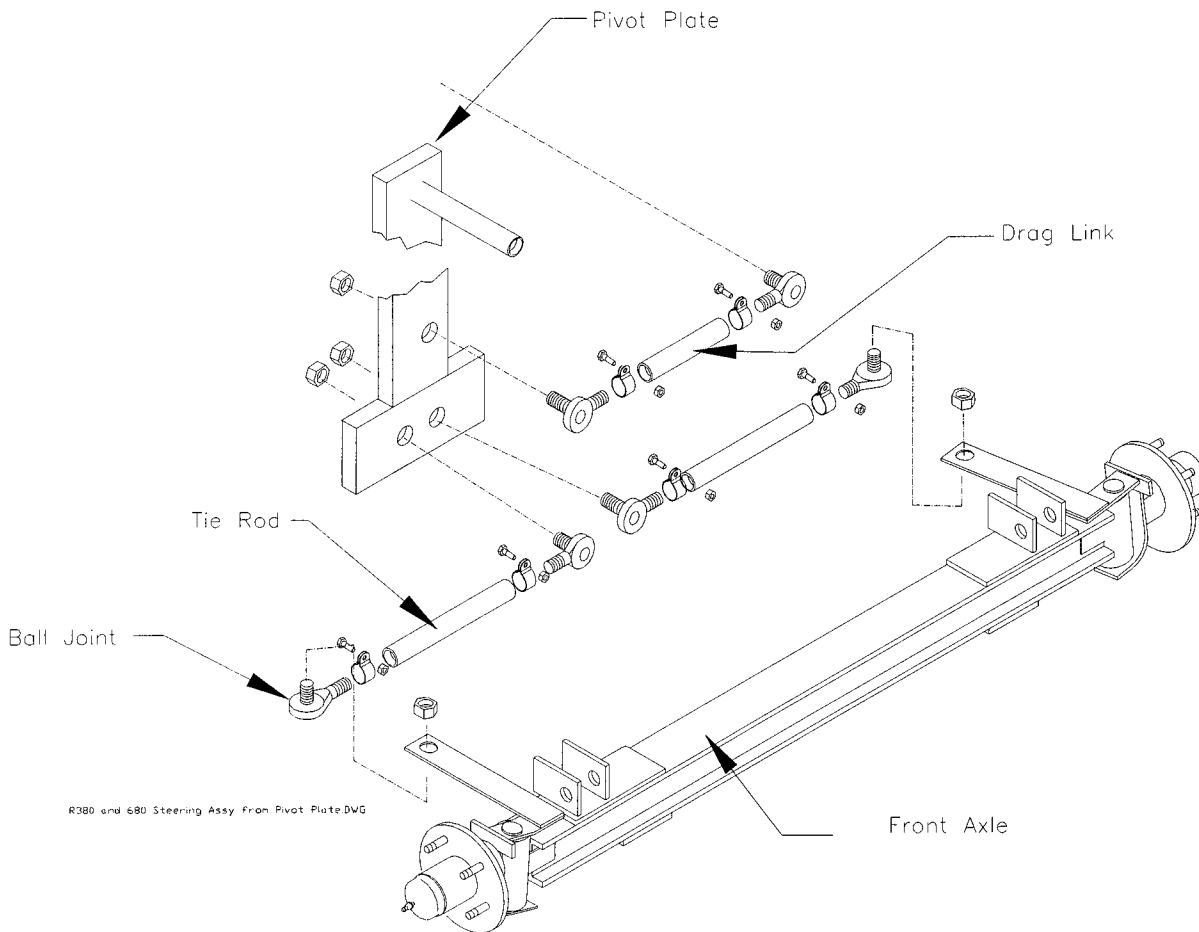


**Front Axle Figure 7: Toe-In**

**Section 3**

*Steering*

The steering system consists of the steering wheel, column or tower, shaft, steering gear, pitman arm, drag link, pivot plate, and tie rods. Some of these parts are shown complete in the figure below. Study these parts and their locations for future reference. This figure or portions of it are duplicated in the appropriate locations to effect any repairs or services to the steering of this vehicle.



**Front Axle Figure 8: Steering Components**

In this segment, we will discuss how to remove and replace these parts from the steering system, with the exception of removing the steering wheel. The steering system has been designed for the easy removal and replacement of parts.

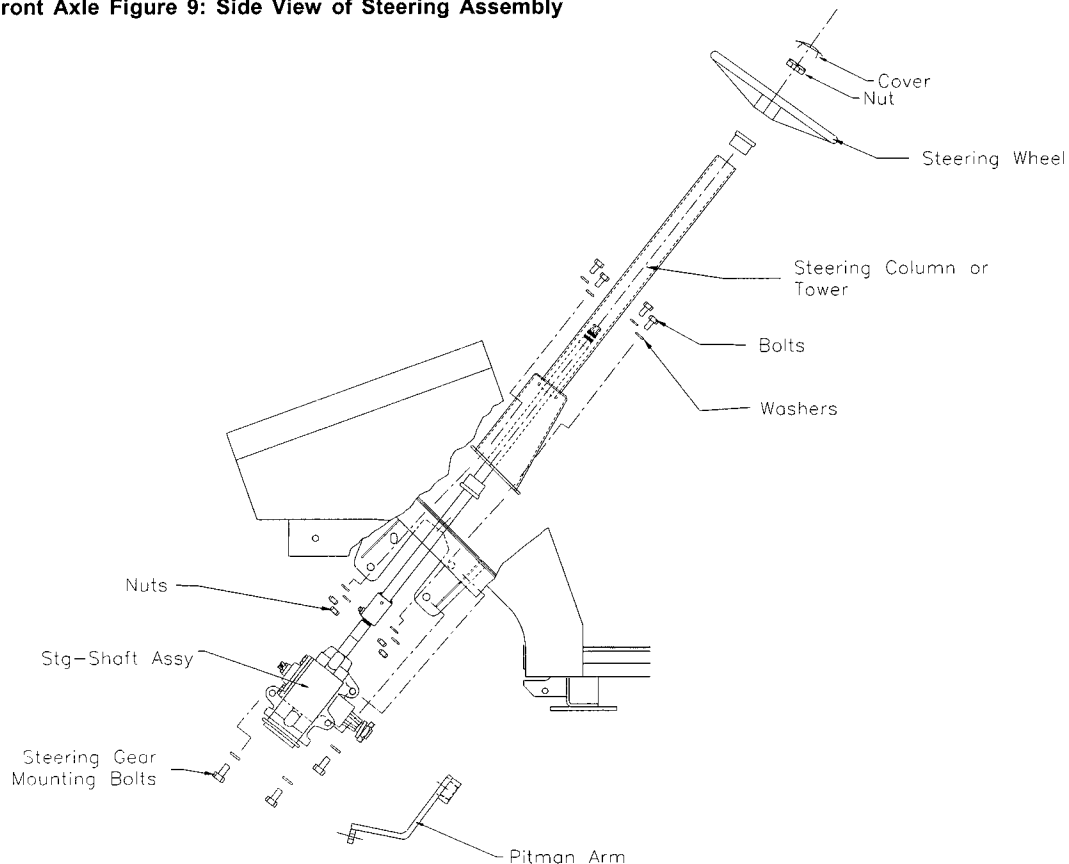
### *To Remove the Steering Wheel*

In order to remove the steering wheel refer to the following procedure:

1. Turn the key-switch off and disconnect the battery.
2. Place Blocks under the rear wheel to prevent vehicle movement.
3. Remove the horn button from the center of the steering wheel and disconnect the button from the wires.
4. Using a slide hammer, remove the horn button collar.
5. Remove the nut from the center of the steering wheel.
6. The steering wheel may have to be hit with a dead blow hammer in order to free it from the steering shaft.

In order to install a new steering wheel reverse the order of the procedure above.

**Front Axle Figure 9: Side View of Steering Assembly**



**Section 3**

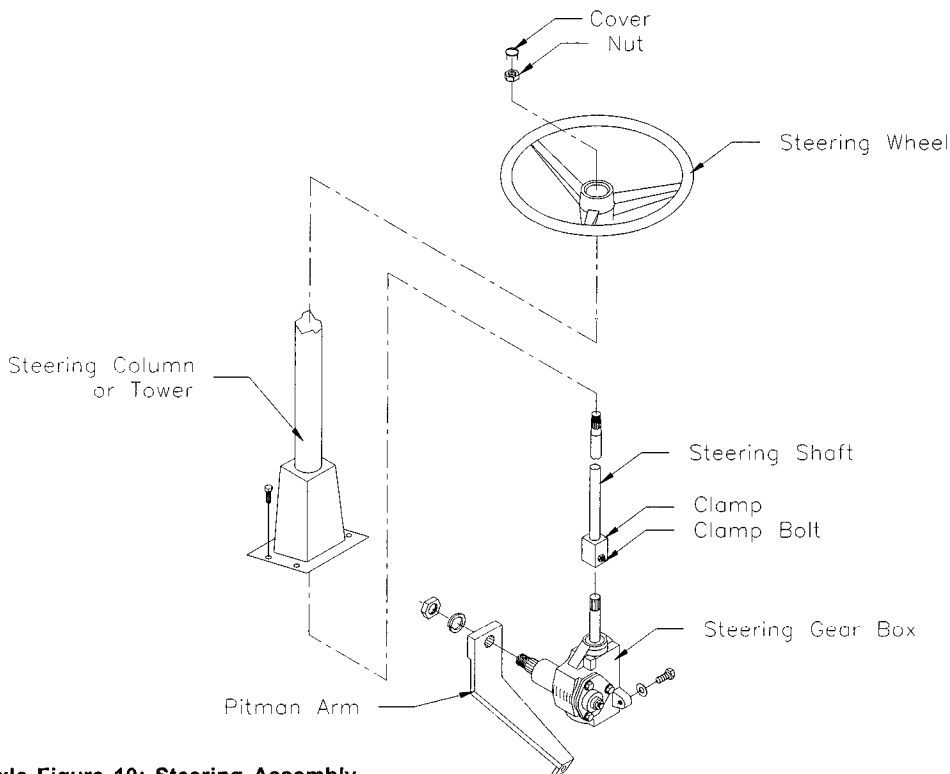
*To Remove the Steering Column or Tower*

To remove these components of the steering system, use the following procedure and refer to Figures 10 and 11.

1. Place blocks under the rear wheels to prevent vehicle movement.
2. Disconnect the main positive and negative at the battery.
3. Disconnect the wire plug going to the horn button. (If so equipped.)
4. Remove the cover from the right side of the steering tower and the four bolts holding the tower to the floorboard.
5. Loosen the clamp at the base of the steering shaft and remove the bolt from the clamp.
6. Remove the steering column and tower from the vehicle.



WHEN THE STEERING COLUMN AND TOWER ARE REMOVED THE HORN WIRE AND STEERING WHEEL WILL COME OFF AS WELL. BE SURE THAT YOU HAVE DISCONNECTED THE HORN WIRE BEFORE REMOVING THE TOWER AND COLUMN.



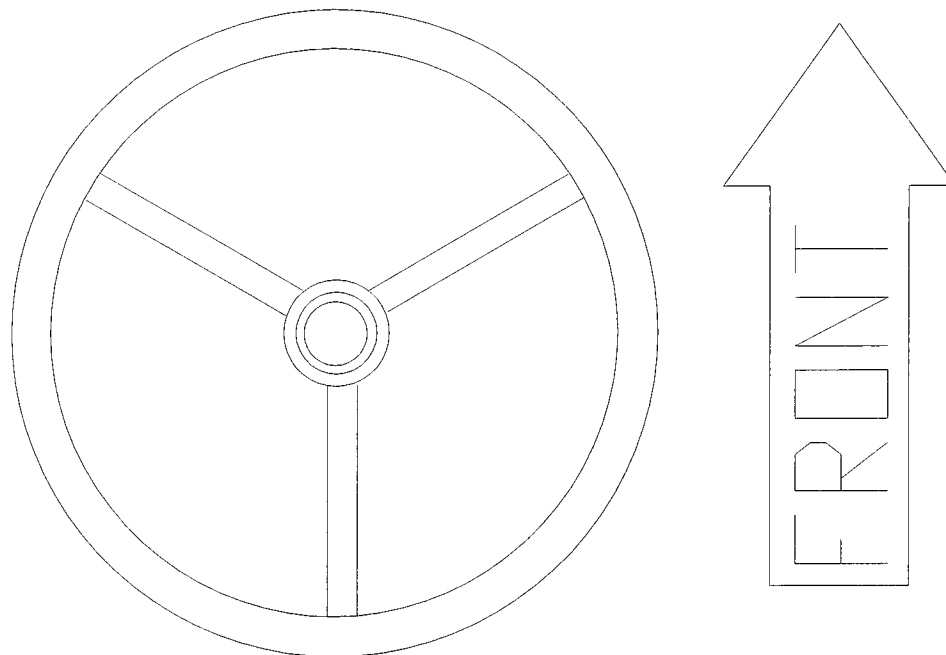
**Front Axle Figure 10: Steering Assembly**

## *To Reinstall the Steering Column/Tower*

At this point, the vehicle should still have blocks behind the wheels and the front end raised and being supported by jack stands. The pitman arm is on the steering gear and the other remaining parts are installed.

To replace the steering column and tower follow these procedures:

1. Remove the jack stands and lower the vehicle to the ground. With the blocks still in place behind the wheel and the battery still disconnected.
2. Turn the steering wheel so that is aligned properly and the wheels are straight ahead. See Front Axle Figure 11.
3. Put the steering column and tower assembly into place. Line up the clamp at the end of the steering column. With the steering gear input shaft.
4. Insert the bolt into the clamp and tighten the clamp on the input shaft.
5. Line up the



**Front Axle Figure 11: Position of Steering Wheel**



**Section 3**

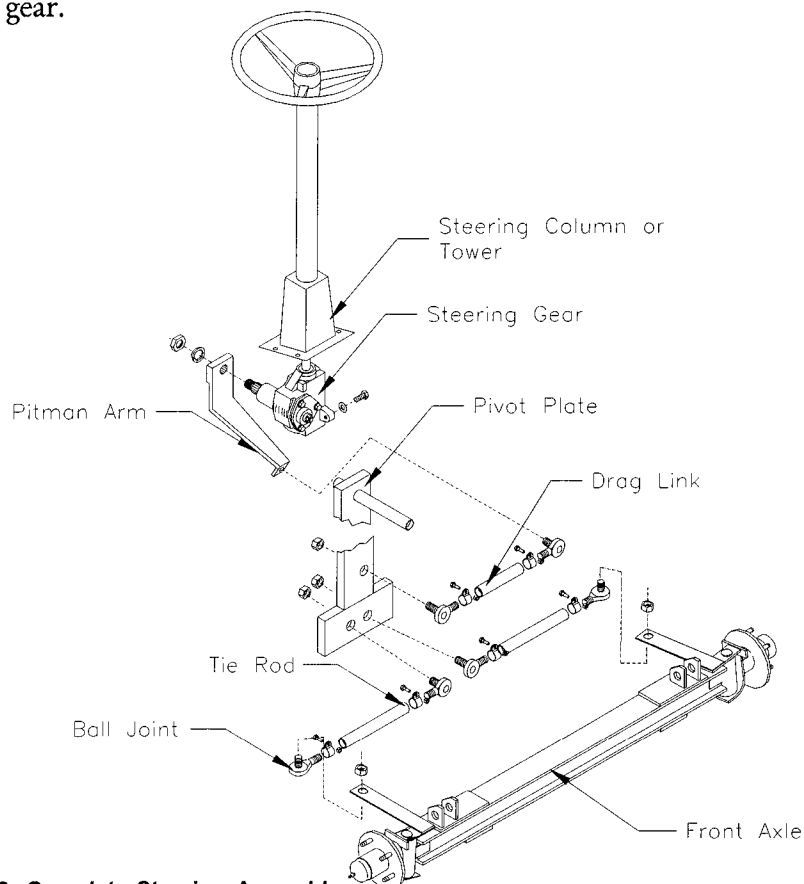
*Removal of Steering Gear*

For the proper removal of the steering gear, use the following procedure:

1. Place blocks under the front wheels to prevent vehicle movement.
2. Disconnect the main positive and negative battery terminals from the battery.
3. Raise the front of the vehicle and support it with jack stands.

**▲WARNING** *Always use a lifting strap, hoist, and jack stands, of adequate capacity to lift and support the vehicle. Failure to use lifting and support devices of rated load capacity may result in serious injury.*

4. Remove the cover from the right side of the steering tower/column and remove the bolt from the clamp on the end of the steering shaft.
5. Remove the drag link from the pitman arm.
6. Remove the three bolts holding the steering gear to the frame and then remove the gear.



**Front Axle Figure 12: Complete Steering Assembly**

## *Installing the Steering Gear*

If you are, installing a new steering gear or putting one back into place follow these procedures:

1. Place blocks under the front wheels to prevent vehicle movement.
2. Disconnect the main positive and negative battery terminals from the battery.
3. Raise the front of the vehicle and support it with jack stands.
4. Center the steering wheel.

To replace components of the steering gear, use the following procedure and *refer to front axle figure 13 on page 3-41.*

1. After removing the steering gear, mount it in a vise to hold it securely. Being careful not to damage any mounting surfaces.
2. Rotate the worm shaft until it is centered.
3. Remove the pre-load adjuster nut. In addition, remove the screws holding the side-cover in place.
4. Remove the side cover by turning the adjusting screw clockwise through the cover.
5. Remove the adjusting screw and shim keeping them together.
6. Remove the pitman shaft from the housing.
7. Remove the worm-bearing-adjuster locknut, worm bearing adjuster, bearing cup and lower worm bearing. *Replace as necessary.*
8. Remove the worm shaft and ball nut assembly from housing, being careful not to damage the worm shaft seal.
5. Center the steering gear. (Refer to “Centering the Steering Gear”.)
6. While holding the gear with the mounting holes on the right side. Position the steering gear through the hole in the floorboard and line the input shaft up with the clamp on the end of the steering shaft.
7. Once the input shaft is in the clamp. Secure the steering gear to the frame using the mounting bolts. In addition, install the bolt into the clamp making sure it is secure.
8. Connect the pitman arm to the drag link.
9. Install the pitman arm on the output shaft of the steering gear. However, do not tighten the locknut into place, as you may need to make some adjustments later.

**Section 3**

10. Check the front wheels to be sure that they are straight.
11. Tighten the locknut on the steering gear output shaft to secure the pitman arm into place. Always use new locknuts.

**⚠ WARNING**

*Always use new locknuts. Locknuts become less effective after being removed, and their locking ability is diminished. Failure to use new locknuts may cause the steering column to become loose and could result in serious injury.*

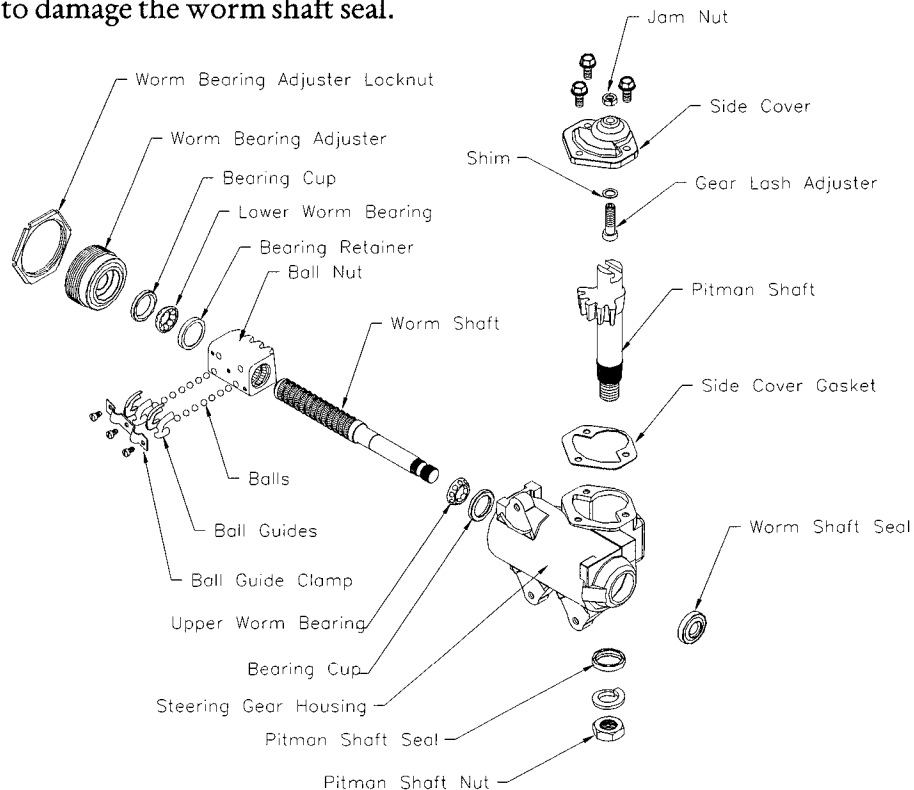
If the pitman arm and the drag link do not line up adjust the drag link so that the drag link matches the length between the centered pivot plate and the pitman arm. (See "Drag Link Adjustment".)

12. Remove the jack stands and lower the vehicle.
13. Replace the cover on the right side of the steering column/tower.
14. Connect the main positive and negative to the battery.
15. Remove the blocks from the tires and test-drive the vehicle.

## Steering Gear Disassembly and Repair

To replace components of the steering gear, use the following procedure and refer to figure 13, below.

1. After removing the steering gear, mount it in a vise to hold it securely. Being careful not to damage any mounting surfaces.
2. Rotate the worm shaft until it is centered.
3. Remove the pre-load adjuster nut. In addition, remove the screws holding the side-cover in place.
4. Remove the side cover by turning the adjusting screw clockwise through the cover.
5. Remove the adjusting screw and shim keeping them together.
6. Remove the pitman shaft from the housing.
7. Remove the worm-bearing-adjuster locknut, worm bearing adjuster, bearing cup and lower worm bearing. *Replace as necessary.*
8. Remove the worm shaft and ball nut assembly from housing, being careful not to damage the worm shaft seal.



Front Axle Figure 13: Exploded View of Steering Gear

Section 3

9. Remove the upper worm-bearing cup using a puller and slide hammer.
10. Inspect all bearings, bearing cups, seals, worm grooves, and teeth for scoring, pitting, or wear. Replace any parts having this type of wear.
11. Inspect the worm shaft seal. If damaged, remove with a screwdriver or punch, replace, and tap new seal into place.



ALL SEALS AND BEARINGS SHOULD BE PRELUBRICATED BEFORE REASSEMBLY.

12. Reinstall the upper bearing cup.
13. Position ball nut on shaft as shown in *figure 14*.
14. Divide balls into two equal groups and install into the ball nut and ball guides, using all-purpose grease to help hold them in place. Rock the worm shaft slightly to aid in installing the balls.

**▲ WARNING**

*Do not rotate the worm shaft while installing balls. Balls may enter the crossover passage between circuits in the ball nut, causing improper operation.*

15. Place upper bearing onto worm shaft.
16. Position ball nut in the center of the worm shaft grooves and install shaft, ball nut, and bearing into the housing. Be careful not to damage the worm shaft seal.
17. Install lower bearing retainer, lower worm bearing, bearing cup, worm bearing adjuster, and adjuster locknut. Adjuster should be installed just tight enough to hold the bearing in place.
18. Install pitman shaft adjusting screw and shim to pitman shaft.



SCREW MUST BE FREE TO TURN BUT HAVE NO MORE THAN .002" END PLAY. IF ENDPLAY IN SCREW IN SLOT IS TOO TIGHT OR TOO LOOSE, SELECT A NEW SHIM TO GIVE PROPER CLEARANCE.

19. Install the pitman shaft and adjusting screw with ball nut and pitman shaft gear

centered in housing.

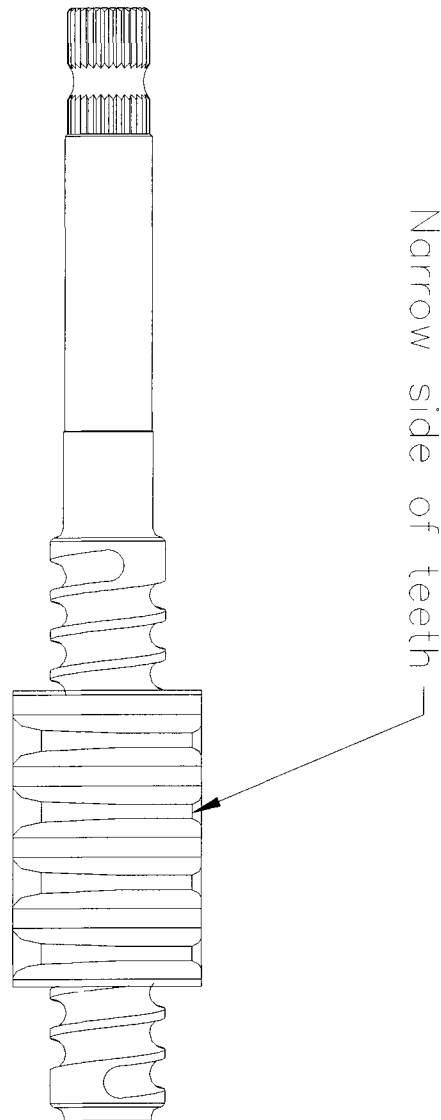
20. Install side cover and gasket onto the adjusting screw. Turn the screw counter-clockwise until it projects through the cover 5/8" to 3/4". Install the side cover bolts, leaving one out for injecting grease.
21. Tighten the pitman shaft adjusting screw so that the teeth of the shaft and the ball nut engage but do not bind.
22. Install the pitman shaft seal over the pitman shaft and into the housing.
23. Fill the steering gear with high-grade chassis lubricant through the side cover bolthole.



NEVER ALLOW THE BALL NUT TO CONTACT THE ENDS OF THE BALL RACES IN THE WORM. DAMAGE MAY OCCUR TO THE BALL GUIDES.

Turn the steering gear from one lock to the other lock checking for unusual binds

24. Make the final steering gear adjustments as described in the 'Steering Gear Adjustment' procedure.



Front Axle Figure14: Worm Shaft

**Section 3**

**End Play**

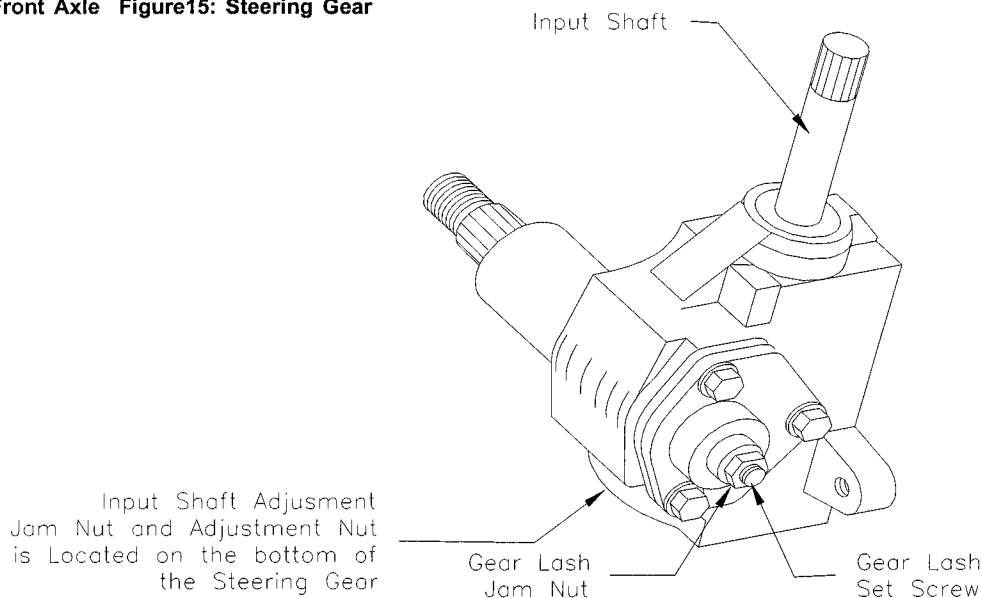
The endplay of the input shaft may be adjusted so that the input shaft does not move up and down. The only time that you should have the make any adjustments for endplay is after the gear has been repaired.

To adjust the endplay, use the following procedure and *refer to Figure 3-15*.

1. Loosen the adjustment jam nut on the bottom of the steering gear.
2. Tighten the adjusting nut so that there is no endplay and the gear turns freely.

Tighten the setscrew so that there is a slight drag when the gear passes through its center of travel. (About three turns from lock.)

**Front Axle Figure15: Steering Gear**



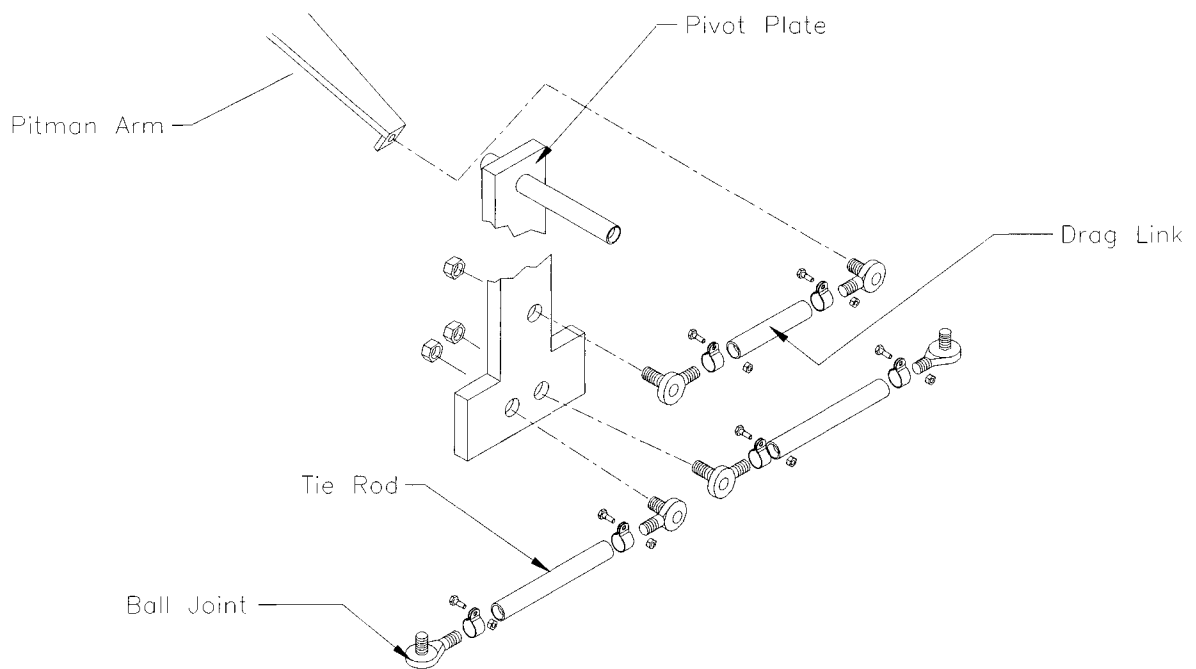
**Gear Lash**

The gear lash is the amount of play between the input shaft and the output shaft. It is how far the input shaft is turned before the output shaft begins to move. Adjusting for gear lash is a maintenance function and should be included in any maintenance schedule.

To adjust the gear lash, use the following procedure and *refer to figure 3-16*.

1. Disconnect the drag link from the pitman arm.
2. Center the steering gear.
3. Have a second person turn the steering wheel slightly in either direction and watch the output shaft to determine the amount of gear lash present.
4. If the gear lash needs adjustment. Loosen the setscrew jam nut.

5. Tighten the setscrew to decrease the amount of gear lash or loosen it to increase the gear lash. The gear lash should be set so that there is a slight drag when the steering gear passes through the center of its travel. (About three turns from lock).
6. Tighten the jam nut. Do not allow the setscrew to turn while tightening the jam nut.
7. Reinstall the drag link to the pitman arm. Always use a new cotter pins-see **WARNING!** On previous page.



**Front Axle Figure16: Ball Joint and Drag Link**



## *Replace Drag Link, Tie Rods and Ball Joints*

As part of a service or maintenance, you may need to remove and replace these parts from the steering system. Before doing this however you should check the ball joints for excessive play, which means that the ball joints are worn out and need to be replaced. The following procedure shows you how to remove these parts and replace them as needed. *See Figure 3-17.*

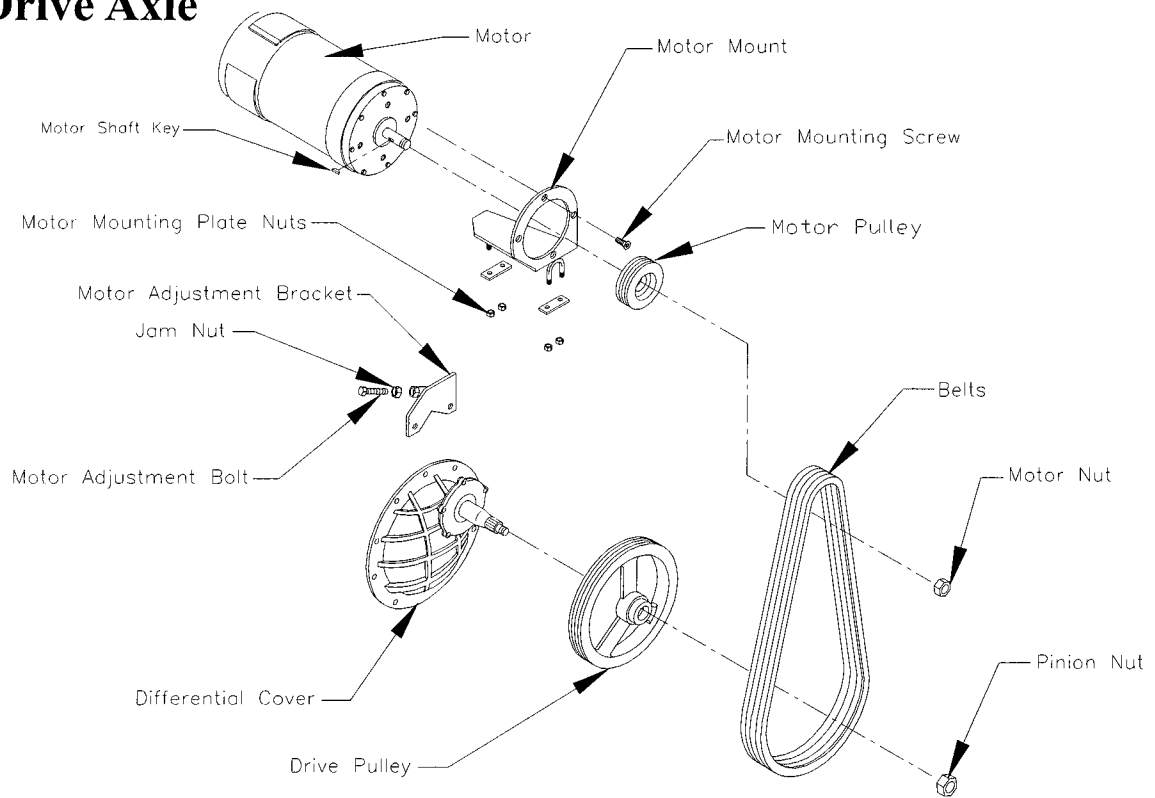
1. Place Blocks under the rear wheel to prevent vehicle movement.
2. Disconnect the main positive and negative at the battery.
3. Raise the front end of the vehicle and support it with jack stands.
4. Remove the locknuts and cotter pins from each of the joints to be replaced.
5. Remove the drag links and tie rod from their connections and install new ball joints where needed.

### **⚠ WARNING**

*Always use new locknuts and cotter pins. Locknuts and cotter pins become less effective after being removed, and their locking ability is diminished. Failure to Always use new locknuts may cause the steering column to become loose and could result in serious injury.*

6. Insert the tie rod ball joints into the yoke and secure them in place with new locknuts and cotter pins.
7. Insert the opposite end of the tie rod into the pivot plate and secure them in place with the new locknuts and cotter pins.
8. Install the drag link and adjust it and the toe-in as needed by using the appropriate procedure.
9. Check all hardware for tightness.

## Drive Axle



Drive Axle Figure 1: Belt Drive System

## Belt Drive System

The R3-80 comes with the following differential and drive configurations listed below. The servicing and repair of these configurations are covered in this section.

1. F3 Differential with Mechanical Disc Brakes (Belt Drive System & Power Traction)
2. F2 Differential with Hydraulic Disc Brakes (Power Traction System)

Before continuing you should know which configuration is installed on the vehicle you are working on. By far the easiest way to do this is to look for the hydraulic disc brakes or the presence of a chain case. If either of these are present you have a vehicle with an F2 differential and the power traction drive system and you should refer to the "Power Traction," heading on page 3-51.

The F3 drive may have either the belt drive system or the power traction system installed on it. Again check for the presence of a chain case to determine if it has the power traction system installed. After determining whether you have the power traction or belt drive system, refer to the proper headings for service instructions.

Section 3

*Belt Drive System*

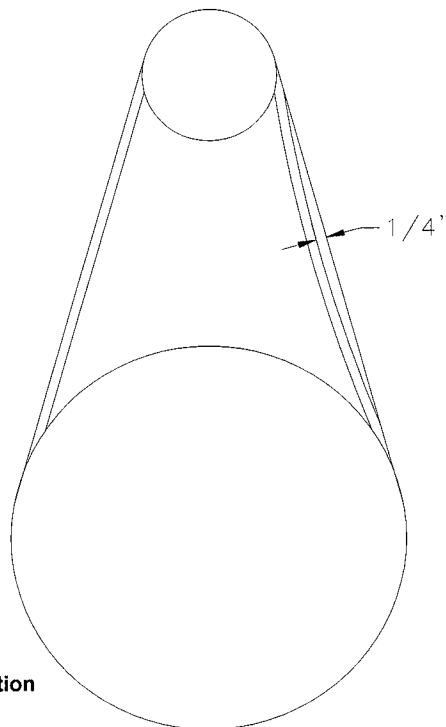
The belt drive system uses an automotive type F3 differential which has two pulleys and four V-Belts. This belt drive system is standard on the R3-80.

**Belt Adjustments**

1. Disconnect the main positive and negative battery cables, from the battery.
2. Loosen the four-(4) motor mounting plate nuts to let the motor mounting plate move freely.
3. Loosen the jam nut on the motor adjustment bracket.
4. Turn the adjustment bolt until the belts have deflection of  $1/4"$ , on each belt.
5. Tighten the four motor mounting plate nuts.
6. Tighten the adjusting screw jam nut while preventing the adjusting screw from turning.
7. Reconnect the main battery leads.



IF THE DEFLECTION OF THE BELTS IS GREATER THAN  $1/4"$  IT IS TIME TO REPLACE THE BELTS. REFER TO BELT AND PULLEY REPLACEMENT ON THE FOLLOWING PAGE.



Drive Axle Figure 2: Belt Deflection

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## Belt and Pulley Replacement

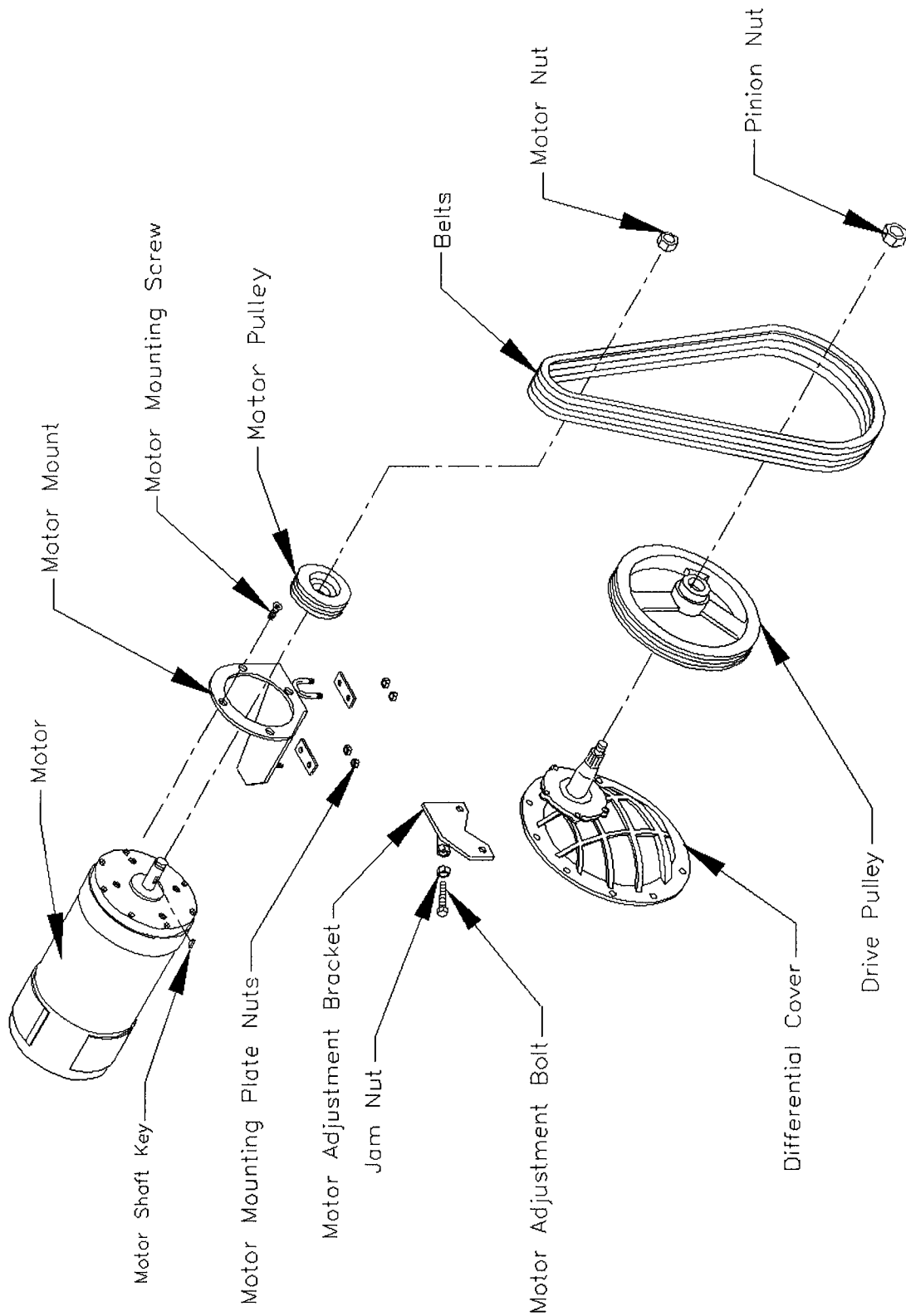
If the belts or pulleys need to be replaced, use the following procedures and the figure on the preceding and following pages.

1. Disconnect the main positive and negative battery cables, from the battery.
2. Loosen the four-(4) motor mounting plate nuts to let the motor mounting plate move freely.
3. Loosen the jam nut on the motor adjustment bracket.
4. Turn the adjustment bolt on the adjustment bracket until the belts are loose enough to remove the belts from motor pulley.



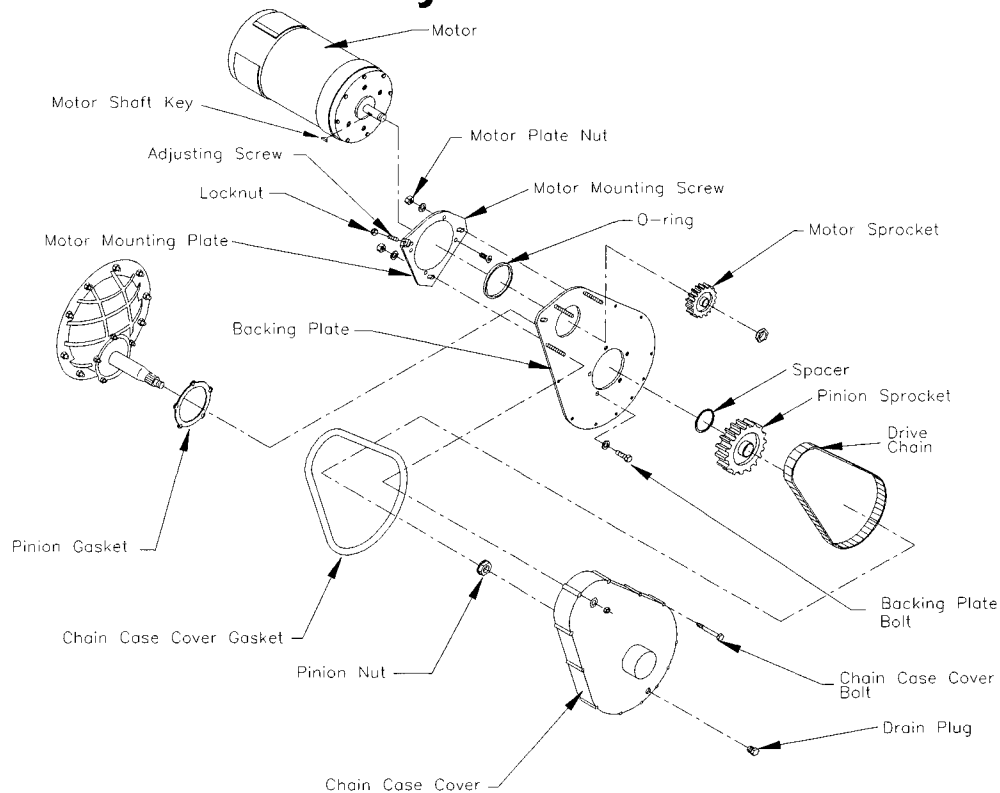
IF YOU DO NOT NEED TO REPLACE THE PULLEYS SKIP TO STEP #7.

5. Remove and replace the pulleys as needed.
6. Install the new pulley(s) and new nuts. The pinion nut should be torqued to 175 ft-lbs.
7. Install the new belts.
8. Turn the adjustment bolt until the belts have deflection of 1/4", on each belt.
9. Tighten the nuts on the motor mounting plate.
9. Tighten the adjusting screw jam nut while preventing the adjusting screw from turning.
10. Reconnect the battery and test drive.



Drive Axle Figure 3: Exploded View of Belt Drive

## Power Traction Drive System



Power Traction Figure 1: Exploded View of Chain Case

### Drive Chain Adjustments

1. Disconnect the main positive and negative battery cables, from the battery.
2. Set the park brake.
3. Place a drip pan under the chain case to catch any oil that may spill.
4. Loosen the three-(3) motor mounting plate nuts to let the motor mounting plate move freely.
5. Loosen the chain adjusting screw jam nut.
6. Turn the chain adjusting screw so the the ends of the motor fan blades have 1/8" to 1/4" of free play.
7. Tighten the three motor mounting plate nuts.
8. Tighten the adjusting screw jam nut while preventing the adjusting screw from turning.
9. Reconnect the main battery leads.



IF THE DISTANCE BETWEEN THE END OF THE ADJUSTING SCREW AND THE TOP OF THE JAM NUT IS 1/16" OR LESS IT IS TIME TO ADJUST THE CHAIN. FOR THE CHAIN ADJUSTMENT SCHEDULE REFER TO THE TABLE ON PAGE 26.

Chain Adjustment Schedule	
Interval	Period
First	100 Hours
Second	200 Hours
Following	Every 400 Hours

Chain Adjustment Schedule Table

### Motor Removal

1. Disconnect the batteries.
2. Disconnect all power leads to the motor.
3. Support the motor with a hoist and strap of sufficient capacity.
4. Remove the chain case adjusting screw.
5. Remove the three-(3) motor mounting nuts and washers.
6. Remove the motor by lifting the back end of the motor and rotating it counter-clockwise, which will move the adjusting tab off the flat on the chain case plate. The motor with the mounting plate attached should be able to slide out from under the chain.

### **CAUTION**

*Do not move the vehicle at this time as this may cause the chain to become jammed inside the chain case cover.*

### Motor Installation

1. Clean all mounting surfaces on the motor and mounting plates.
2. Apply grease to the o-ring and backing plate.
3. Make sure the o-ring is seated in the motor mounting plate correctly.
4. With a wire formed in to a hook, tie the chain up to the upper slot on the backing plate.
5. Install the motor on to the chain case backing plate and slip the sprocket under the chain.



THE CHAIN MUST BE PROPERLY SEATED ON THE LARGE SPROCKET FOR THE PROPER INSTALLATION OF THE MOTOR SPROCKET.

5. Install the mounting nut holding the motor mounting plate and motor to the chain case backing plate and leave loose.
6. With the chain loosely on the upper sprocket, remove any wire used to support the chain.

**▲ CAUTION** *Do not allow the wire to break. If the wire breaks, the chain case must be disassembled to retrieve it.*

7. Move the vehicle slightly. The motor armature should rotate. If the armature does not rotate, then the chain is not seated properly.



IF THIS OCCURS TRY REMOVING THE MOTOR AGAIN JUST AS STATED IN PREVIOUS PROCEDURE, "MOTOR REMOVAL," AND THEN REPEAT STEPS ONE-(1) THROUGH SEVEN-(7) OF THIS PROCEDURE.

8. Install the remaining hardware onto the mounting studs, finger tight.
9. Adjust the chain tension and described in "Drive Chain Adjustment," on page 3-51.



## Power Traction

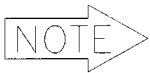
### *Removing the Power Traction Assembly*

1. Disconnect the batteries.
2. Remove the drain plug and drain the oil from the chain case.
3. Remove the brake band assembly.
4. Remove the pinion nut and brake drum from the pinion shaft.
5. Remove the remaining bolts and nuts holding the cover to the backing plate, and remove the chain case cover.
6. Loosen the chain adjusting screw completely.
7. Remove the chain, pinion sprocket, and spacers from the pinion shaft.



BEFORE REMOVING THE SPACERS FROM THE PINION SHAFT TAKE CAREFUL NOTE OF THEIR LOCATIONS AND POSITION FOR REASSEMBLY.

8. Remove the chain from the motor sprocket and remove the motor.
9. Inspect and replace the chain and sprockets as needed.
10. Reassemble the power traction assembly in reverse order, installing new gaskets and seals. Use the centering tool (TAYLOR-DUNN Part Number 41-532-50,) to center the power traction case seal on the chain case cover.



IF THE POWER TRACTION CASE SEAL IS NOT CENTERED CORRECTLY, OIL WILL LEAK ON TO THE PARKING BRAKE.

While reassembling the power traction assembly be sure to torque the pinion nut to 175 ft-lbs. and all of the chain case cover mounting bolts to 20 ft-lbs.

After you have reassembled the power traction assembly adjust the drive chain as described in "Drive Chain Adjustment," on page 51.

11. Fill the chain case with oil.
12. Test drive.

## Differential Service and Repair

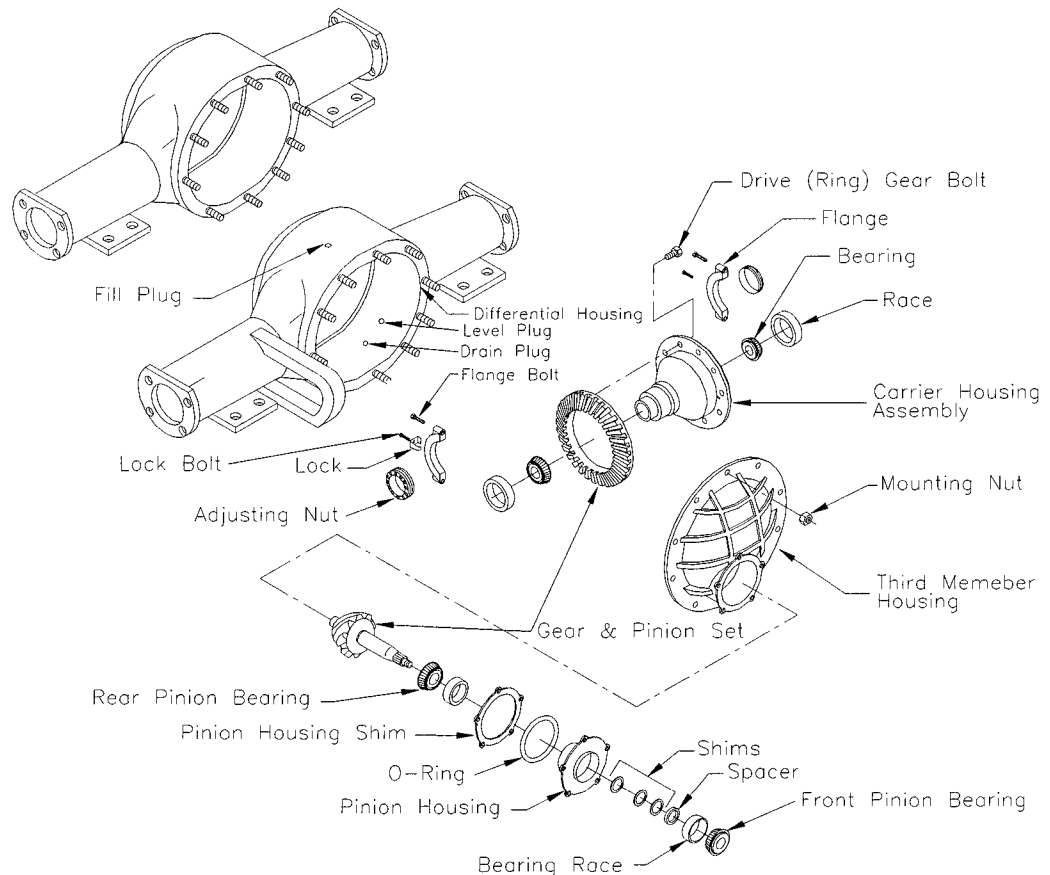


IT IS NOT NECESSARY TO REMOVE THE ENTIRE DRIVE ASSEMBLY TO PERFORM THIS PROCEDURE.

1. Raise the drive wheels and support the vehicle with jack stands.
2. Drain the oil from the power traction chain case and drive.
3. Remove the motor and power traction assemblies.
4. Remove the rear wheels and brakes.
5. Using a slide hammer, slide the axles out from the drive housing .
6. Remove the third member mounting nuts and third member from the housing.
7. Remove the carrier bearing flanges and the carrier assembly from the housing.
8. Remove the pinion housing assembly from the third member.

### **CAUTION** *Do not lose shims!*

9. Replace bearings, bearing races, and gears as needed.



Differential Figure 1: Exploded View of 3rd Member

10. Read the following list of things to remember while reassembling the differential and then reassemble it in reverse order.
  - a.) Pre-lube all bearings and gears during reassembly.
  - b.) Cross tighten ring gear bolts to 72 ft-lbs.
  - c.) If pinion bearing or gears are replaced, the drive must be reshimmmed.(See Re-Shimming the Pinion Bearings, below.)
  - d.) Use new seals.

---

### **Adjust the Backlash**

1. Install the correctly shimmed pinion gear and pinion gear housing.
2. Temporarily install the drive sprocket and brake drum. Torque the pinion nut to 100 ft-lbs.
3. Tighten the carrier bearing cap bolts to 15 ft-lbs.
4. Position the carrier assembly against the pinion gear and turn the adjusting nuts to contact the carrier bearings.
5. Loosen the adjusting nut on the toothed side of the ring gear slightly.
6. Tighten the other nut so that there is no gear backlash, but so tight to cause binding.
7. Tighten the adjusting nut on the toothed side of the ring gear so that there is .008 ot .012 backlash.
8. Tighten the carrier bearing cap bolts to 40-55 ft-lbs.

### Re-Shimming the Pinion Bearings

1. Remove the pinion housing from the third member.
2. Install the drive gear and brake drum (or equivalent spacer,) on to the pinion shaft and tighten to 100 ft-lbs.
3. The pinion gear should turn freely with zero radial play.



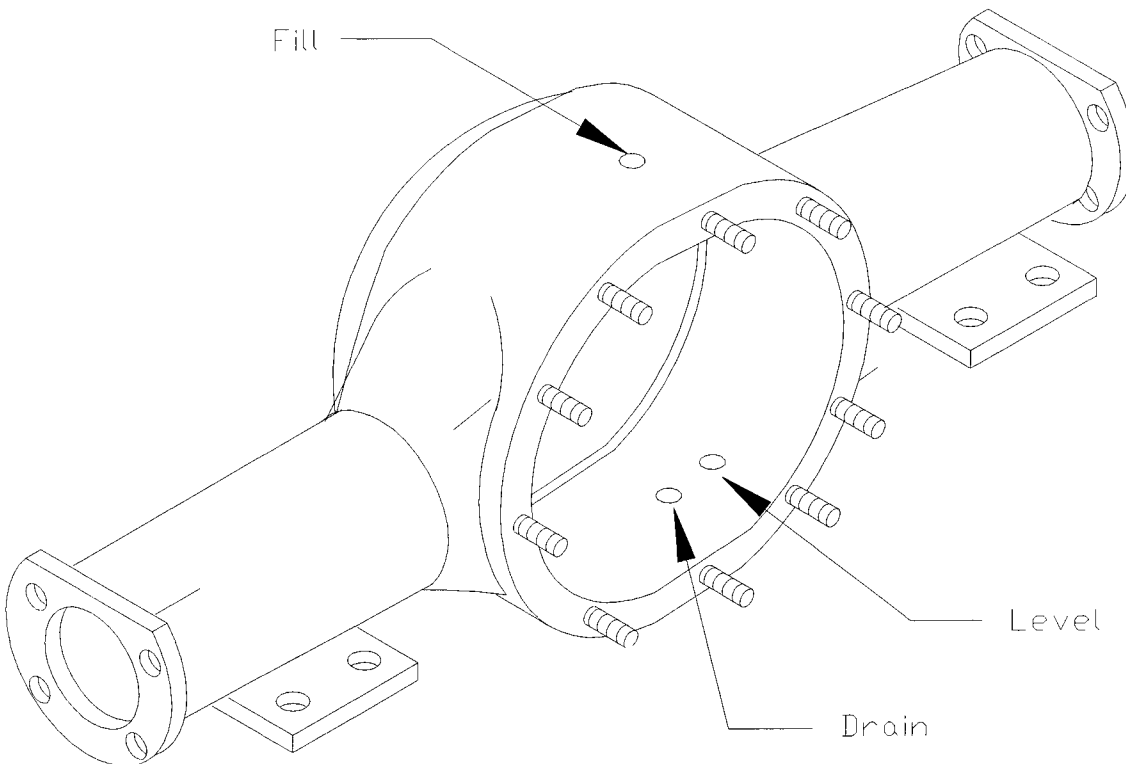
DO NOT ROTATE BEARINGS WHEN DRY, THEY MUST HAVE A LUBRICANT, OR THEY WILL BE DAMAGED.

4. Add or remove shims as necessary.

Pinion Numbering System	
If the number is	Add Shim as Follows
+0	No Adjustment
+1	Add .001 Shim
+2	Add .002 Shim
+3	Add .003 Shim
+4	Add .004 Shim
+5	Add .005 Shim
-1	Subtract .001 Shim
-2	Subtract .002 Shim
-3	Subtract .003 Shim
-4	Subtract .004 Shim
-5	Subtract .005 Shim

### Changing the Differential Oil

1. Place a three-(3) quart or larger draining pan under the drive.
2. Remove the differential and chain case drain plugs.
3. Replace the drain plugs and remove the differential fill and level plugs.
4. Install oil into the differential through the filler hole until the oil starts to come out of the level hole. (This usually about two-(2) quarts.)
5. Install the level plug.
6. Add an additional 1/2 quart into the differential fill hole for the chain case. This oil will be pumped in from the differential.
7. Install the remaining plugs.



Differential Figure 2: Fill and Drain Plugs

## Rear Axle and Bearing Replacement

1. Raise the drive wheels and support with jack stands
2. Remove the rear wheel.
3. Remove the brake assembly.

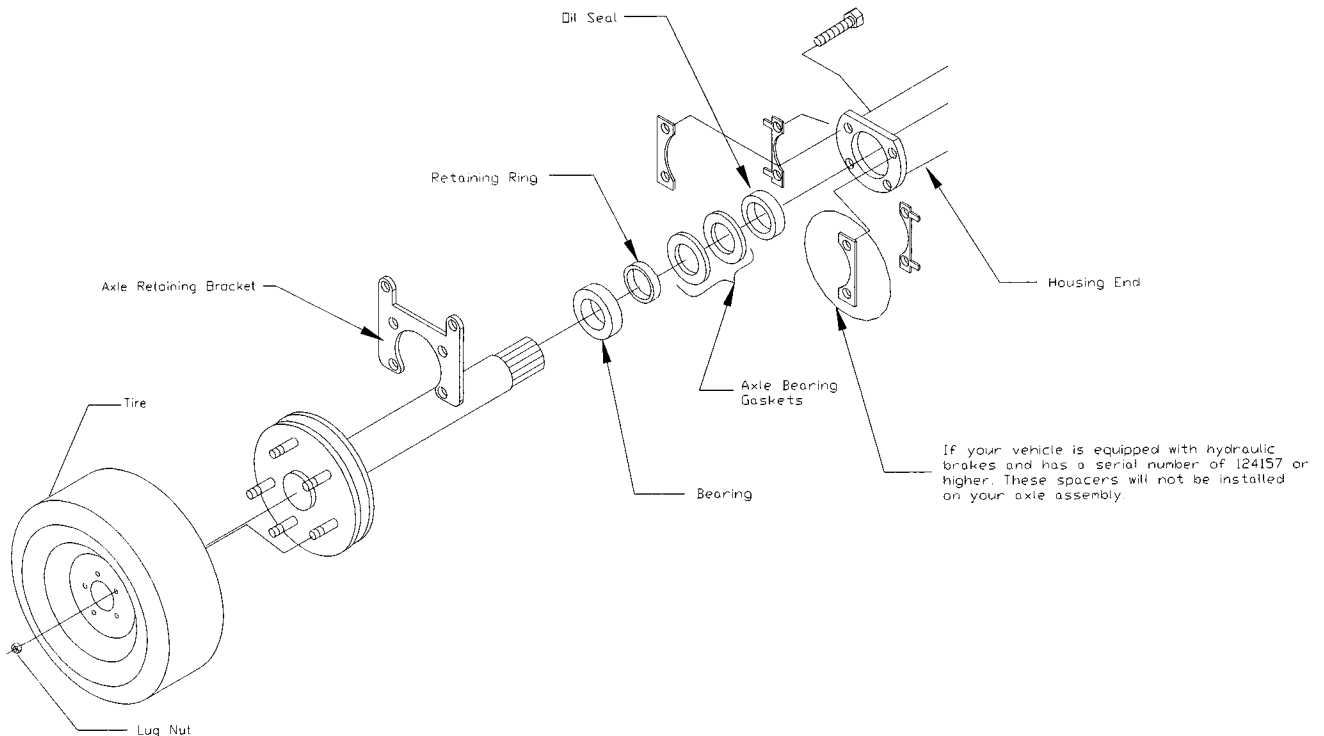
**⚠ WARNING** *Do not let the brake assembly hang by the brake hose.*

4. Using a slide hammer, remove the axle from the housing.
5. Press the retainer ring and bearing from the axle shaft, if needed.
6. Press a new bearing and retainer ring onto the axle.

**⚠ WARNING** *Do not reuse the old bearing retainer*

7. Remove and replace the oil seal and/or gaskets from the housing.
8. Install in reverse order.
9. Use new locking tabs on brake bolts.
10. Tighten the brake bolts to 35-40 ft. lbs.

**⚠ WARNING** *Failure to properly bend up the locking tabs could cause the mounting bolts to loosen and result in brake failure.*



Differential Figure 3: Exploded View of Rear Axle

**Section 3**

# **Drive Motor**

## *Motor Disassembly*

1. Remove the motor from the chain case.
2. Remove the key(s) from the shaft(s).
3. Remove the front bell housing.
4. Pull the armature out from the motor housing.
5. Remove the rear bell housing.

## *Replacing the Brushes*

1. Remove the Brush covers.
2. Remove the brush wire from the brush holder.
3. Pull the brush straight out from the brush holder.

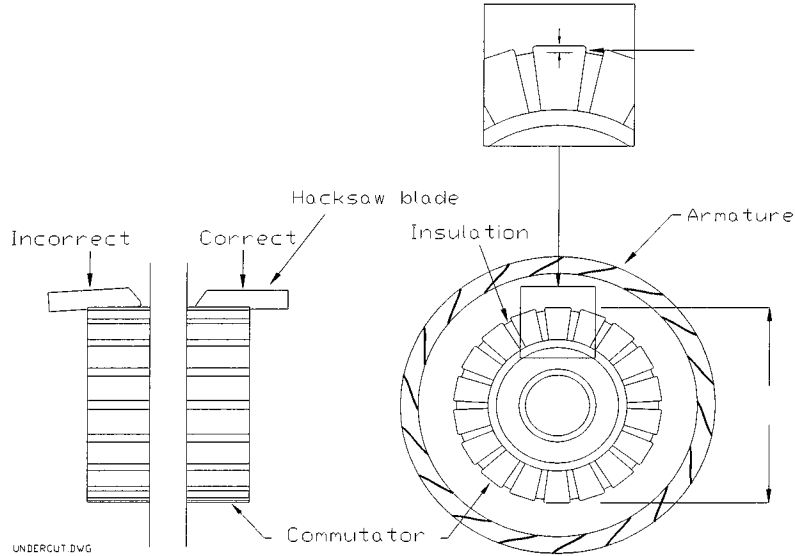


HOLD THE SPRING SO IT DOES NOT SNAP BACK DOWN INTO THE HOLDER.

4. Install in reverse order.



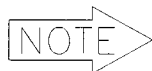
70-049-00 AND 70-054-00 MOTOR-MINIMUM BRUSH SERVICE LENGTH IS .75". IF THE BRUSHES ARE .75" OR LESS THEY MUST BE REPLACED.



**Drive Motor Figure 1: Under Cut**

*Inspecting the Armature*

1. If any solder has been thrown from the armature the motor must be replaced.



CHECK THE INSIDE OF THE MOTOR HOUSING AROUND THE COMMUTATOR FOR BITS OF SOLDER.

2. If the commutator is grooved it must be cut on a lathe.
3. Measure the undercut on the commutator.
  - a.) If less than .025" then the mica must be undercut. *See Drive Motor Figure 1 above.*
4. Measure the commutator diameter.
  - a.) 70-049-00 or 70-054-00 MOTOR-If less than 3.109" then the armature is worn out and the motor must be replaced.
5. Spin the bearings by hand.
  - a.) If any vibration or roughness is felt, they must be replaced.

HINT: *It will require a press to replace the bearings.*



Section 3  
**Battery**

**⚠ WARNING**

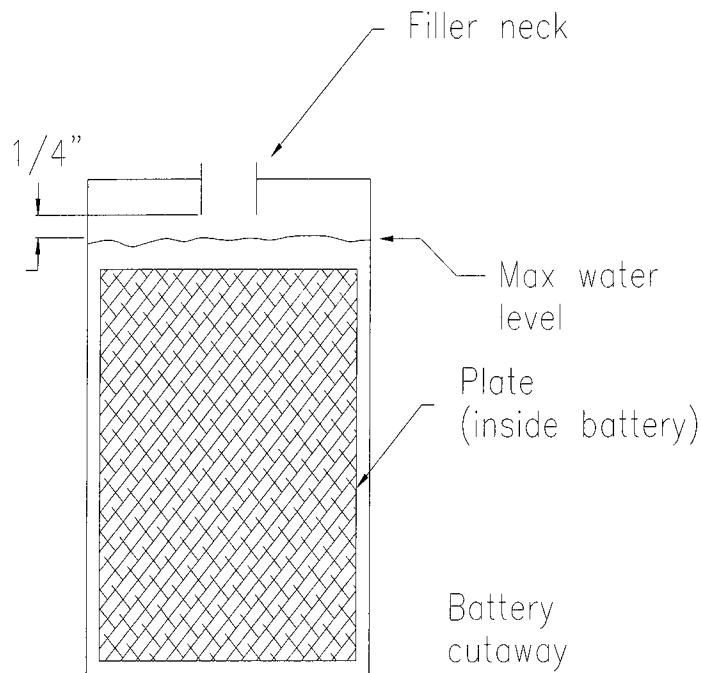
*Battery electrolyte is poisonous and dangerous. It contains sulfuric acid. Avoid contact with skin eyes or clothing. Wear rubber gloves and safety glasses while servicing batteries. DO NOT INGEST!*

**⚠ WARNING**

*Batteries produce an explosive gas when charging. DO NOT SMOKE, produce an open flame or spark while checking or servicing a battery.*

*Cleaning*

1. Dry dirt can be readily blown off with low-pressure air or brushed off.
2. Wetness or wet dirt on the covers indicates battery acid. Using a nonmetallic brush with flexible bristles wash it off with a strong solution of baking soda and hot water (1 lb. of soda to gallon of water). Continue until all fizzling stops, which indicates that the acid has been neutralized. Then rinse thoroughly with clear water. DO NOT get any of the solution into the battery cells.



**Battery Figure 1: Electrolyte Level**

## *Servicing*

1. Check the electrolyte level in all batteries. If low fill with distilled water up to the correct level (*See Battery Figure 1: Electrolyte Level on the previous page*).

**▲ CAUTION** *Do not overfill the battery. An overfilled battery may leak acid.*

2. Clean the battery (*See Battery Cleaning on the previous page.*)
3. Clean the cell posts connectors and battery box with water.

---

## **Charging**

**▲ WARNING** *Explosive mixtures of Hydrogen gas are present within battery cells at all times. Do not work with or charge battery in an area where open flames (including gas furnace or water heater pilots), sparks, cigarettes, or any other sources of combustion are present. Always provide ample ventilation in rooms where batteries are being charged.*

To charge the batteries do the following:

1. Check the electrolyte level. If low, fill with distilled water up to the correct level (see diagram).
2. Park the vehicle in an approved area for charging and plug the charger in.
3. Allow the charger to cycle completely before unplugging.

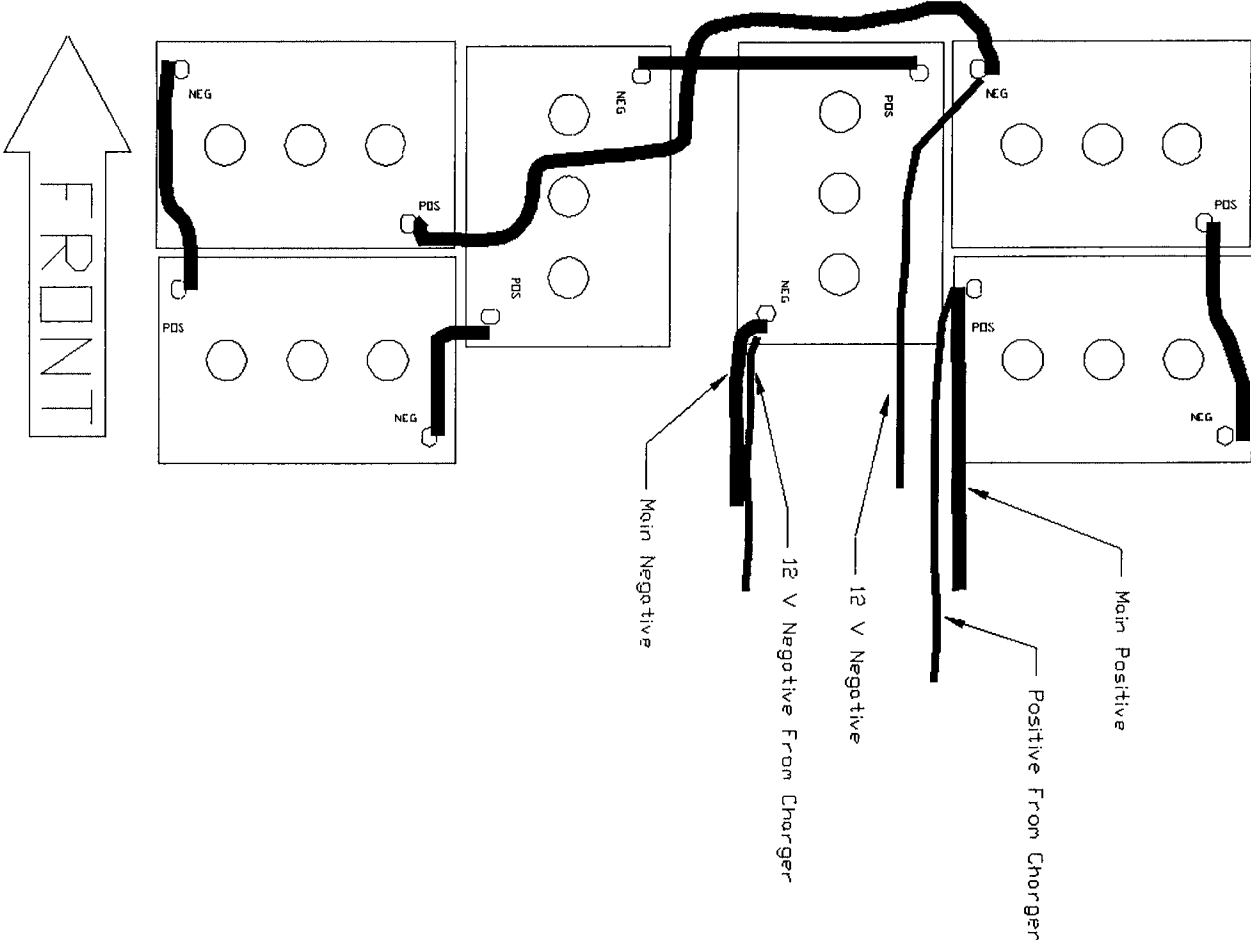
**Section 3**  
*Battery Storage*

The following pointers will help extend the life of the battery when storing your vehicle for the winter season:

- Clean and check the electrolyte level and charge level of the battery. Do not store a battery low in electrolyte or in a low state of charge.
- Recharge a battery not in use every 1 to 2 months.
- If possible, store the vehicle in a cool dry place.

If the batteries are removed from the vehicle, do not place them directly on the ground, concrete or solid metal surface. It is recommended to store them on a wooden pallet or equivalent.

**Battery Figure 2: Battery Configuration**



## Lestronic II Charger Troubleshooting

### *Operating Instructions and Theory of Operation Lester Lestronic II battery charger*

The Lestronic II chargers are designed as semiautomatic chargers. The charger turns itself on when the built in charger is plugged into the wall outlet or, when the portable charger is plugged into the batteries. As the battery charges, the battery voltage rises. The charger periodically checks the battery voltage and compares it to the previous reading. When the battery voltage stops rising a predetermined amount then the batteries are no longer accepting a charge and the charger shuts off. The charger will not turn back on unless the AC cord on built in chargers is disconnected from the wall outlet or, the DC plug on portable chargers is disconnected from the batteries.

The charger does not check the current state of charge when it is plugged in, it assumes that the batteries require charging when it is connected. For this reason, it is recommended to discharge the batteries approximately 50% (1175-1200 as indicated on a hydrometer) before connecting the charger. If the charger is connected before the batteries are discharged 50%, the batteries may enter an overcharge state before the charger can sense that the batteries are no longer accepting a charge.

The relay that operates the charger is powered by the batteries being charged. If the voltage on the batteries to be charged is less than approximately 65% of the rated charger DC voltage, the relay will not pick up and the charger will not turn on. In this situation, a manual charger would have to be used to bring the battery voltage up so that the Lestronic charger can sense that they are connected and turn itself on.

In typical installations, the charger will remain on for up to 12 hours depending on the state of charge of the battery when the charge cycle was started.

A charger could remain on for longer than 12 hours if;

- The charging cycle is interrupted at any time during the charging cycle.
- Defective batteries causing a fluctuating DC voltage that confuses the charger.
- A brownout (drop in AC line voltage) during the charging cycle.
- An electrically noisy charging environment.

A charger could turn off in less than 12 hours but still show symptoms of overcharging if;

- The batteries were not discharged to 50% before connecting the charger.
- The electrolyte in the batteries is too high (boil over).
- The electrolyte in the batteries is too low (excessive gassing or sulfur smell).



**THE ONLY WAY TO TEST THE CHARGER TO SEE IF IT IS TURNING OFF CORRECTLY IS TO MONITOR THE BATTERY VOLTAGE AND THE ELECTROLYTE SPECIFIC GRAVITY DURING THE CHARGING CYCLE.**

---

**Specific gravity**

Using a hydrometer take the specific gravity reading of several cells the charge cycle at 1-hour intervals. If the specific gravity of the electrolyte does not rise for three consecutive readings and the charger does not shut off then the charger is running too long.

**Battery voltage**

Using an accurate 5-1/2 digit digital voltmeter (Instek model GDM8055 or equivalent), monitor the battery voltage during the charging cycle. Take readings every 30 minutes. If the battery voltage does not increase 0.012 volts in two consecutive readings then the charger is running too long.

**Test Equipment Required for Troubleshooting:**

Digital multimeter (DMM) with diode and capacitor test function, FLUKE 79 model shown.

**IMPORTANT NOTES and INSTRUCTIONS**

- This troubleshooting guide assumes that you are familiar with the use of a digital multimeter including, voltage tests, continuity tests and diode testing. If you do not understand any part of these tests, you should refer testing to a qualified technician.
- Make sure the AC electrical socket the charger is plugged into is in good condition.
- Make sure that the AC voltage at the electrical socket is the same as the AC voltage on the charger nameplate.
- Make sure the batteries are in good condition and no less than 80% discharged as per hydrometer.
- The battery voltage must be above approximately 65% of the chargers rated DC voltage. If the batteries are below approximately 65% of the chargers rated DC voltage, the charger will not turn on (refer to 3<sup>rd</sup> paragraph on page one).
- If the charger exhibits intermittent problems, it must be in the failed mode for troubleshooting.
- Battery volts = Full voltage available at batteries at the time of test.
- This test procedure must be performed in the order it was written. If you start in the middle or skip sections when not instructed to do so, you may not get the proper results. If the test result is good, then proceed to the next test or go to the next section if instructed to do so.

***DURING ALL TESTS***

*Both drive wheels are to be supported off the ground by jack stands with the front wheels blocked.*

*The charger cabinet must remain electrically grounded.*

*Disconnect both of the battery leads and unplug the charger from the AC source before disconnecting any electrical component or wire.*

The following tests are for a built-in charger. If you have a portable charger go to page S-10.

## Troubleshooting for Built-in Charger

Disconnect the charger from the AC source.

Locate the charger harness connectors where the charger harness is connected to the trucks control harness. There will be two 10-gauge and two 14-gauge wires.

Slide the insulators off the connectors on the two 10-gauge wires and perform the following tests.

**⚠ CAUTION** *Make sure these two wires do not come into electrical contact with any other object.*

- 1) Test the voltage from the red wire to main battery negative. This voltage should be equal to the battery voltage. If it is less than the battery voltage then this wire is broken or has a bad connection. Stop here and repair the problem.
- 2) Test the voltage from the red 10-gauge wire (+) to the other 10-gauge wire (white or black depending on model). This voltage should be equal to the battery voltage. If it is less than the battery voltage, then the white (or black) wire is broken or has a bad connection. Stop here and repair the problem.

Slide the insulators back onto the connectors on the two 10-gauge wires.

Slide the insulators off the connectors on the two 14-gauge wires.

**⚠ CAUTION** *High Voltage. Do not touch the 14-gauge wires and make sure these two wires do not come into electrical contact with any other object.*

Connect the charger to the AC source and perform the following tests.

- 1) Test the voltage across the two 14-gauge wires. This voltage should be the same as the voltage at the AC receptacle (rated voltage of the charger). If it is less than the rated AC voltage of the charger then the 14-gauge white or black wire(s) is broken or has a bad connection between the charger connectors and the AC plug. Stop here and repair the problem.

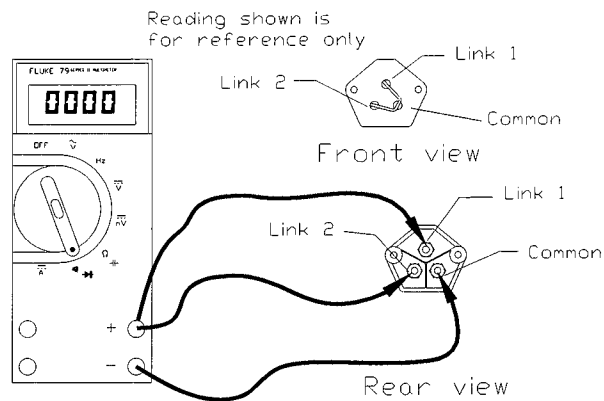


## SECTION 5

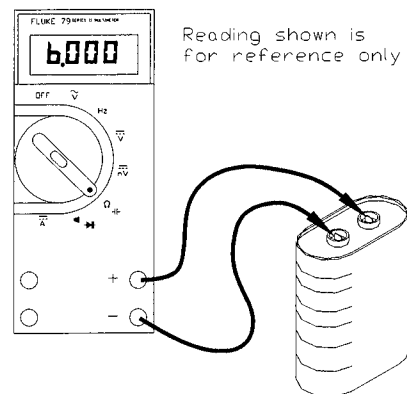
- Disconnect the charger from the AC source.
- Disconnect the batteries.
- Disconnect the charger from the trucks harness.
- Remove the charger from the truck.
- Remove the charger cover and perform the following tests.

**⚠WARNING** *HIGH VOLTAGE may be stored in the capacitor. Discharge the capacitor before continuing. Connect a 2k ohm resistor across the capacitor terminals for 10seconds. Do not touch the capacitor terminals with your hands. The resistor should be held with a pair of insulated pliers.*

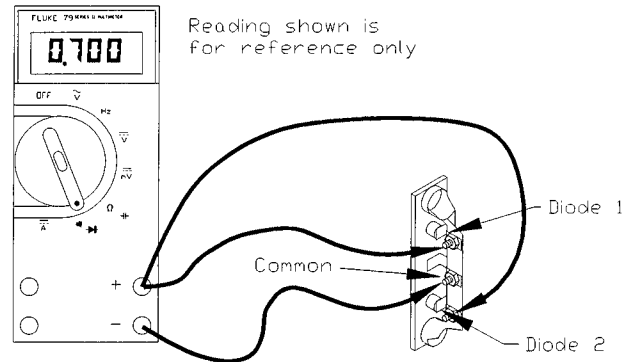
- 1) Inspect the internal wiring of the charger and repair as required.
- 2) Check the continuity of both fuse links and replace if bad.



- 3) Disconnect one transformer lead from the capacitor. Test the capacitor using the capacitor test function of your meter. It is a 6-microfarad capacitor. If the capacitor is bad, it must be replaced. **Stop here and repair the problem.**



- 4) Reconnect the transformer lead to the capacitor and disconnect one transformer lead from one of the diodes. Test each of the diodes using the diode test function of your meter. If either one of the diodes are bad, replace the diode assembly. **Stop here and repair the problem.**
- 5) Reconnect the lead to the diode.



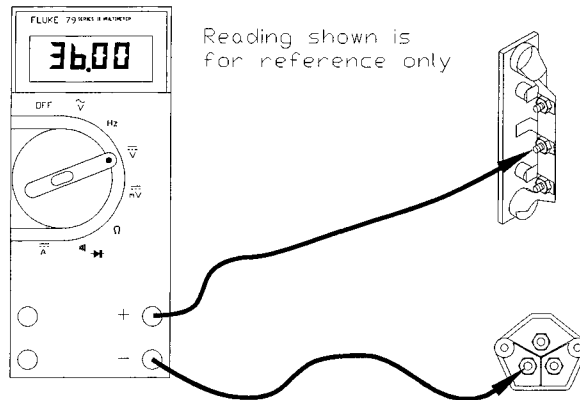
- 6) Reconnect the charger to the trucks harness and slide the wiring insulators back into place. Connect the charger to the AC source and perform the following tests.

**⚠ WARNING**

*High Voltage inside the charger. Do not touch any internal components with your hands or any conductive tools while the charger is plugged in. Once the charger has been plugged in refer to the High Voltage Capacitor Warning on previous page.*

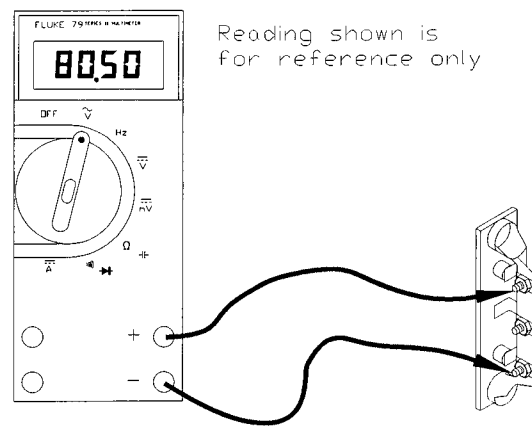
## SECTION 5

- 7) Test the voltage from the fuse assembly (-) to the diode block (+). This voltage should be equal to the battery voltage. If it is less than the battery voltage then the wires from the harness connectors to the charger are bad. **Stop here and repair the problem.**



- 8) Test the voltage across the white and black wires that are connected to the timer board. This voltage should be the same as the rated AC voltage of the charger. If it is less than the rated AC voltage of the charger then the wires from the harness connectors to the charger are bad. **Stop here and repair the problem.**
- 9) If the timer relay does not pick-up (click) when the AC source is connected, then the timer control circuit or the relay is bad. The timer must be replaced as an assembly; the relay is not available separately. **Stop here and repair the problem.**
- 10) Test the AC voltage across the transformer primary circuit. The transformer primary consists of the two solid wires with the brown fiber insulator that are connected to the timer board. This voltage should be the same as the rated AC voltage of the charger. If it is less than the rated AC voltage of the charger, then the timer relay is bad. The timer must be replaced as an assembly; the relay is not available separately. **Stop here and repair the problem.**

- 5) Test the AC voltage across the transformer low voltage secondary circuit. The transformer low voltage secondary circuit consists of the two solid wires with the brown fiber insulator that are connected to the two diodes. The voltage here will vary depending on the state of charge on the batteries. Look for a voltage between 208% and 250% of the rated DC voltage of the charger. If you do not get a voltage between 208% and 250% of the rated DC voltage of the charger, the transformer is bad and must be replaced. **Stop here and repair the problem.**



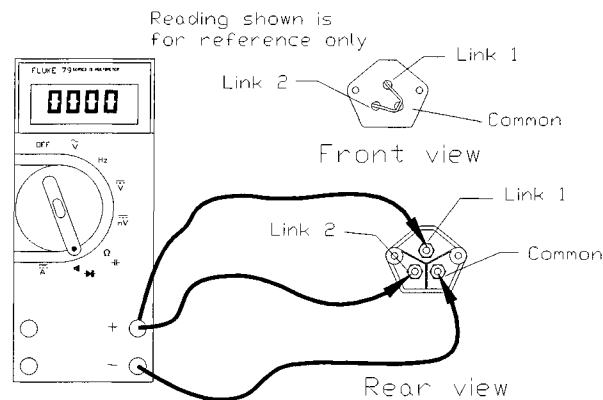
## Troubleshooting for Portable Charger

Disconnect the charger from the AC source.

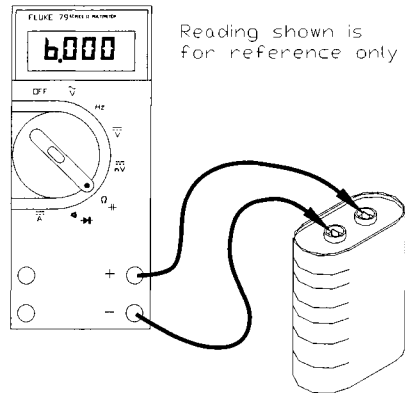
- 1) Test the voltage from the positive terminal on the DC receptacle to main battery negative. This voltage should be equal to the battery voltage. If it is less than the battery voltage then this wire is broken or has a bad connection. **Stop here and repair the problem.**
  
- 2) Test the voltage from the positive terminal on the DC receptacle to the negative terminal on the DC receptacle. This voltage should be equal to the battery voltage. If it is less than the battery voltage, then the wire on the negative terminal of the DC receptacle is broken or has a bad connection. **Stop here and repair the problem.**

Remove the charger cover and perform the following tests.

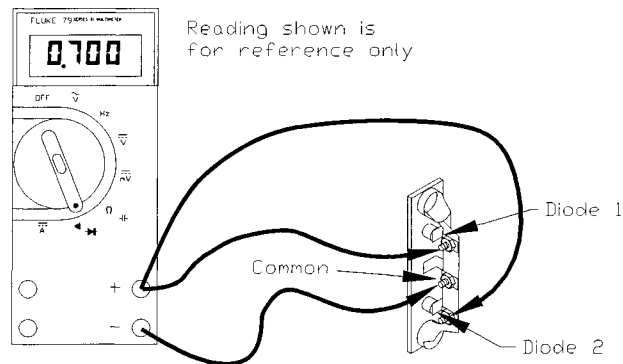
- 3) Inspect the internal wiring of the charger and repair as required.
  
- 4) Check the continuity of both fuse links and replace if bad.



- 5) Disconnect one lead from the capacitor. Test the capacitor using the capacitor test function of your meter. It is a 6-microfarad capacitor. If the capacitor is bad, it must be replaced. **Stop here and repair the problem.**



- 6) Reconnect the lead to the capacitor and disconnect one transformer lead from one of the diodes. Test each of the diodes using the diode test function of your meter. If either one of the diodes are bad, replace the diode assembly. **Stop here and repair the problem.**



- 7) Reconnect the lead to the diode.

## SECTION 5

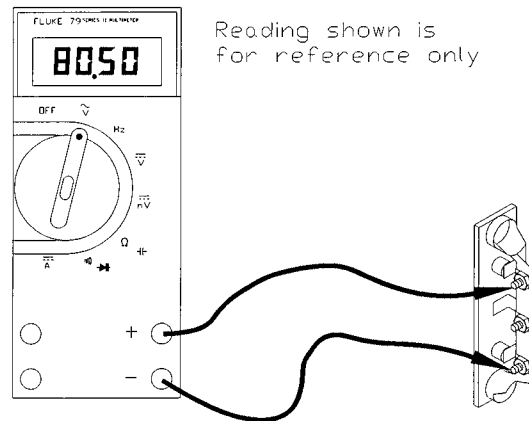
- 8) Connect the charger to the AC source. Insert the DC charger plug into the DC receptacle and perform the following tests.

**⚠WARNING**

*High Voltage inside the charger. Do not touch any internal components with your hands or any conductive tools while the charger is plugged in. HIGH VOLTAGE may be stored in the capacitor. Discharge the capacitor before continuing. Connect a 2k ohm resistor across the capacitor terminals for 10 seconds. Do not touch the capacitor terminals with your hands. The resistor should be held with a pair of insulated pliers.*

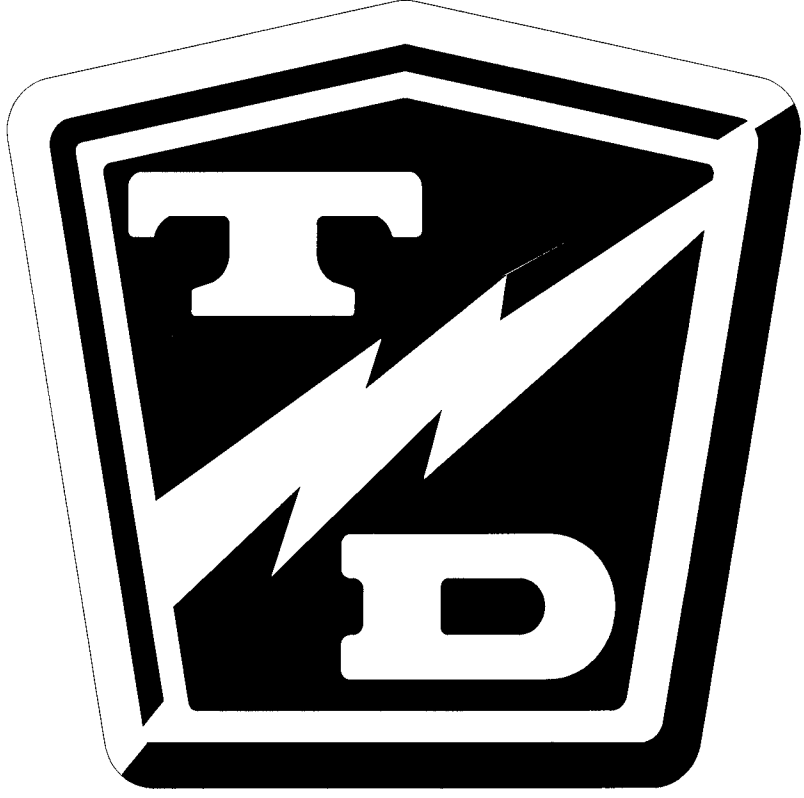
- 9) Test the voltage from the fuse assembly (-) to the diode block (+). This voltage should be equal to the battery voltage. If it is less than the battery voltage, DC cord is bad. **Stop here and repair the problem.**
- 10) Test the voltage across the white and black wires that are connected to the timer board. This voltage should be the same as the rated AC voltage of the charger. If it is less than the rated AC voltage of the charger then the AC cord is bad. **Stop here and repair the problem.**
- 11) If the timer relay does not pick-up (click) within 5 seconds of connecting the DC charger plug, then the timer control circuit or the relay is bad. The timer must be replaced as an assembly; the relay is not available separately. **Stop here and repair the problem.**

- 12) Test the AC voltage across the transformer primary circuit. This voltage should be the same as the rated AC voltage of the charger. If it is less than the rated AC voltage of the charger, then the timer relay is bad. The timer must be replaced as an assembly; the relay is not available separately. **Stop here and repair the problem.**
  
- 13) Test the AC voltage across the transformer secondary circuit. The voltage here will vary depending on the state of charge on the batteries. Look for a voltage between 208% and 250% of the rated DC voltage of the charger. If you do not get a voltage between 208% and 250% of the rated DC voltage of the charger the transformer is bad and must be replaced. Stop here and repair the problem.





**TAYLOR-DUNN<sup>®</sup>**



# Tires

## *Servicing the Tires*

This vehicle is equipped with load range B pneumatic tires, refer to the sidewall on the tire for the correct air pressure. Air pressure should be checked every 20 hours.

These tires should be checked as follows:

1. Check the tires for nicks or grooves and replace if necessary.
2. Ensure that the tire is properly seated on the rim.
3. Check wheel nuts for tightness.
4. Check the air pressure in the tires. Inflate them as needed to the specified pressure.



REFER TO THE CHART BELOW TO DETERMINE CORRECT TIRE PRESSURE.

Tire Pressure Chart						
Tire Size	Type	Part Number	Load Range	Ply Rating	PSI (MAX)	MAX. Load/Tire (lbs.)
5.70 X 8	Highway Tread	10-081-00	B	4	50	715
18 X 8.5 X 8	Highway Tread	10-093-00	B	4	35	770

## **Lubrication**

Here we will cover where and how often to lubricate the vehicle. To help identify all the lubrication points on these vehicles page 3-4 has been duplicated on the pages 42 . This diagram will help you locate all of the lubrication point on the vehicle.

Before beginning this or any service procedure review the “Maintenance Guidelines,” on page 3-2 of this manual. Be sure to follow all safety instructions, cautions, and warnings. Always wear safety goggles or glasses when working on or around the vehicles.

Make arrangements to collect and dispose of all discarded, oil, grease, oil soaked rags, grease covered rags or any other material which may used to collect or clean up lubricating oil or grease.

### *Frequency of Lubrication*

These vehicles must be lubricated on a set schedule for them to function properly and to extend their life span. The table on page 3-3 of this manual will give you an excellent guide to follow for doing this. However if the vehicle is used or operated in an extreme environment this schedule will have to be adjusted accordingly. For instance if the vehicle is operated on a daily basis in a location where it is constantly climbing inclines or ran over rough surfaces than the scheduled should be doubled. In other words if the vehicle is operated in this type of environment, then all of the maintenance items should be done twice as often. If it says on the table to perform an operation every 20 hours then it should be done every 10 hours in these conditions.

---

### **Lubricate all Zerk Fittings**

Refer first to the diagram showing the locations of the zerk fittings on the vehicle. Then starting at the front of the vehicle work your way around the vehicle applying grease to each of the zerk fittings. This procedure should be carried out every month or every 80 hours which ever occurs first.

---

### **Rear Axle Oil**

The rear axle oil level is to be checked every 6 months or 500 hours which ever occurs first. It should also be changed once every year or every 1000 hours which ever occurs first.

Refer to the diagram for the location of the fill, level and drain plugs on the drive.

For step by step procedures refer to "*Changing the Differential Oil,*" on page of this manual.

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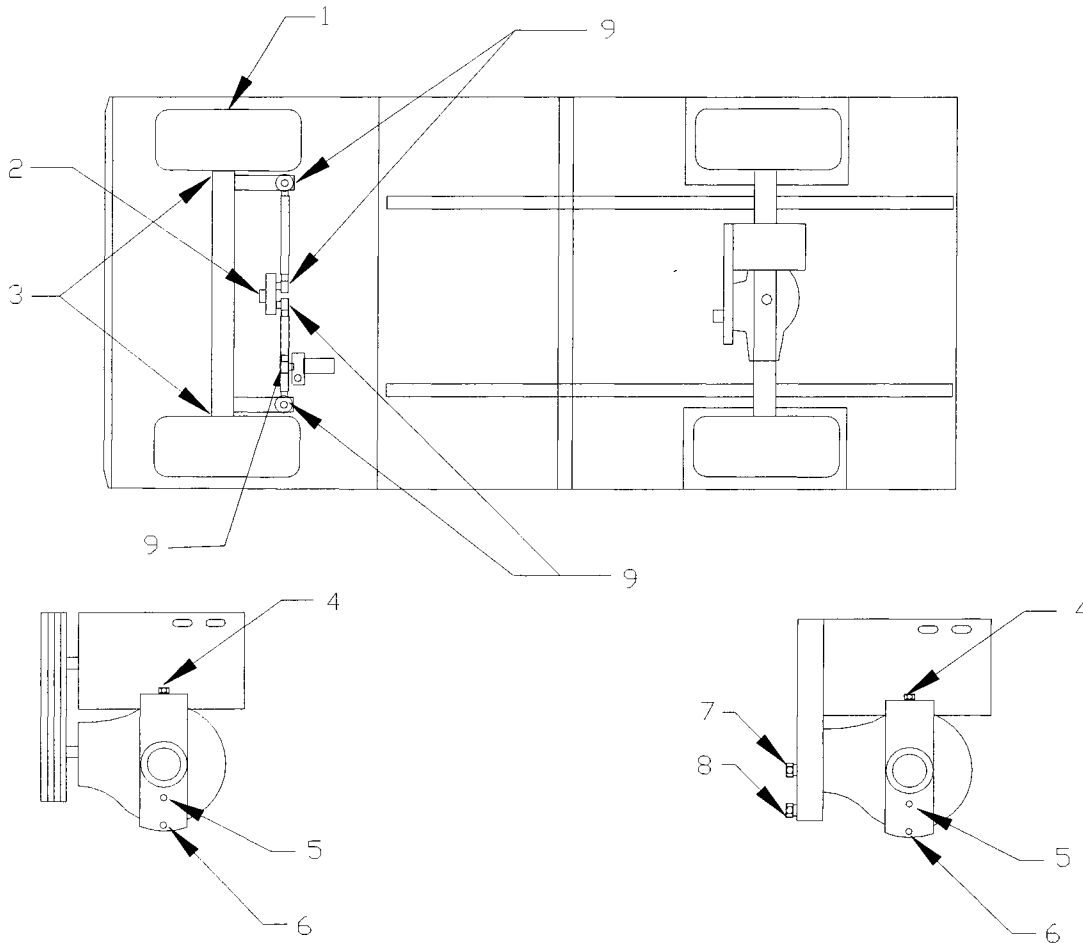
### **Clean and Repack R3-80 Front Wheel Bearings**

The front wheel bearings should be cleaned and repacked at least once every year or 1000 hours which ever occurs first. Before removing the front wheels for this service be sure to immobilize the vehicle and refer to the **Maintenance Guidelines** on page 3-2 of this manual.

For step by step procedures refer to "*Wheel Bearings,*" on page 3-28 of this manual.

Section 3

**LUBRICATION DIAGRAM FOR R3-80**



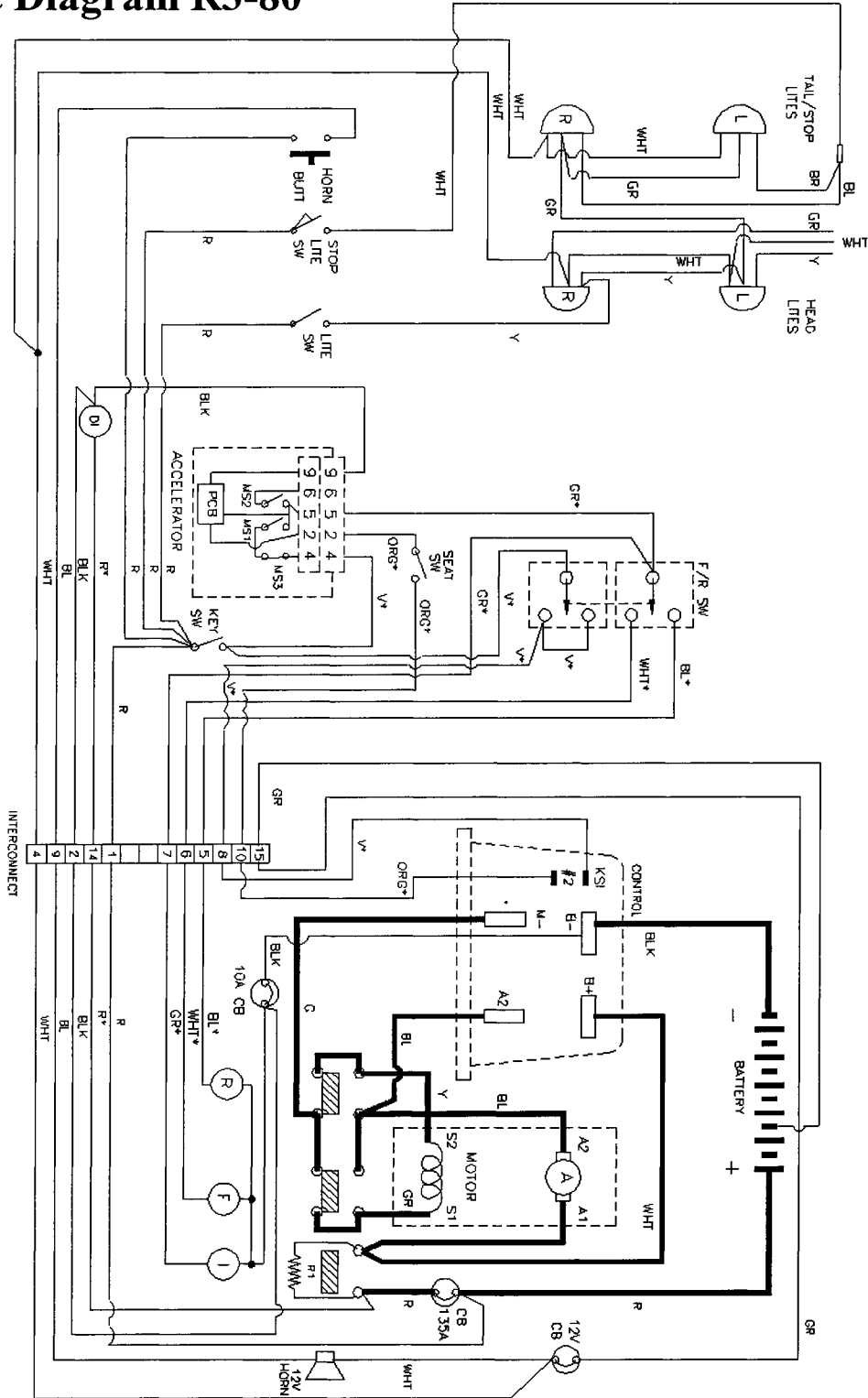
r 380tube.DWG

#	Description	Locations	Lubricant Type
1	Front Wheel Bearings	2	High Temperature Wheel Bearing Grease
2	Steering Pivot Pin	1	General Purpose Grease
3	King Pin	2	General Purpose Grease
4	Drive Fill Plug	1	SAE 140 API GL-5 Hypoid Gear Oil 2-1/4qts.
5	Drive Level Plug	1	
6	Drive Drain Plug	2	
7	Chain Case Fill/Level Plug	1	SAE 140 API GL-5 Hypoid Gear Oil
8	Chain Case Drain Plug	1	
9	Ball Joints	6	General Purpose Grease

## NOTES

Section 3

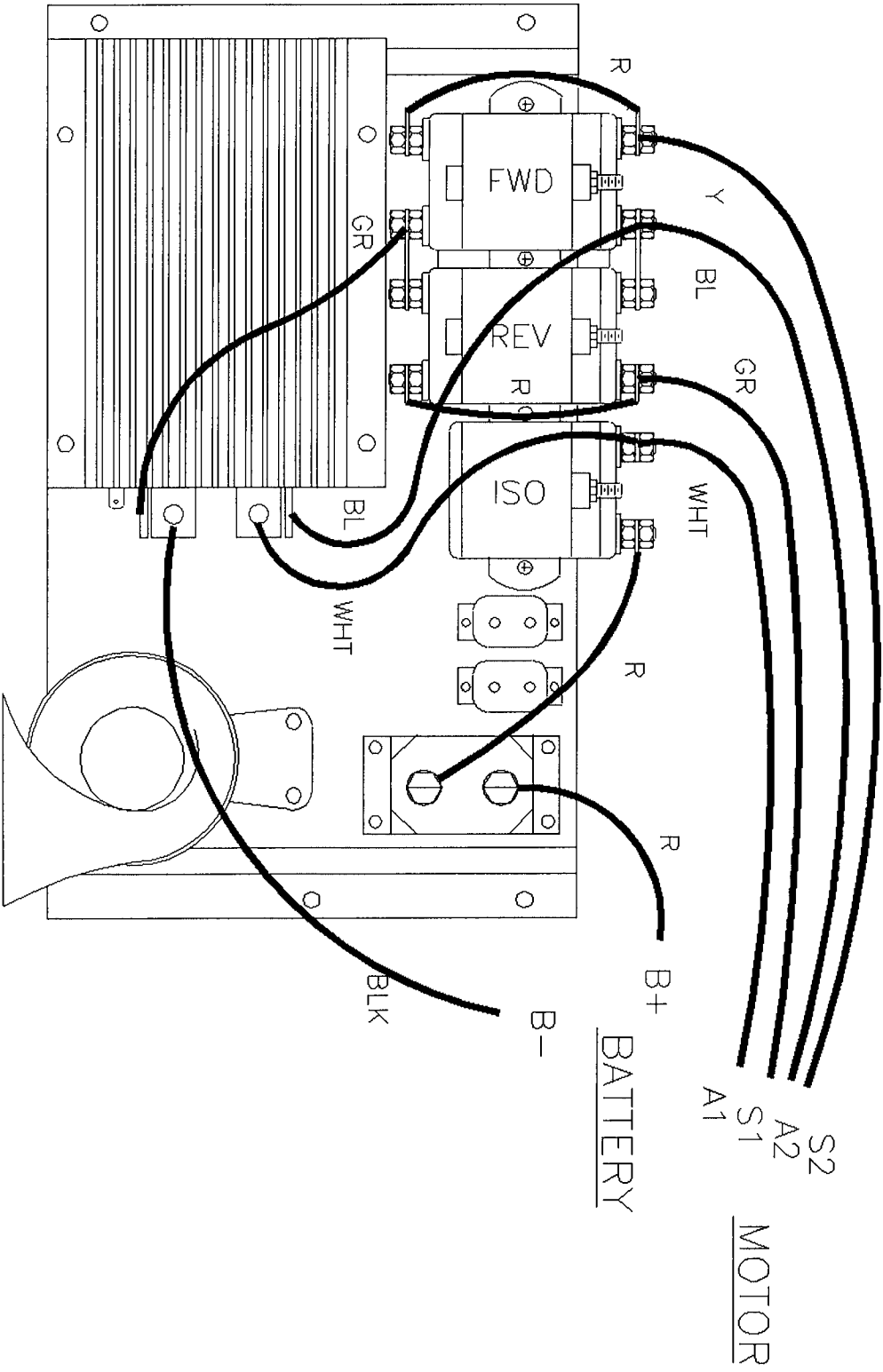
# Wire Diagram R3-80



*ELECTRICAL TROUBLESHOOTING*







Typical Control Panel

## PMC TROUBLESHOOTING

### *Test Equipment Required:*

- ◆ Digital multi-meter (DMM) with diode test function, FLUKE 79 model shown.
- ◆ Shunt or clamp-on DC Ammeter to measure up to 400 Amps.
- ◆ Test light with a rated voltage equal to or exceeds maximum battery voltage or Taylor-Dunn test light part number #62-027-00 for systems up to 48 volts.
- ◆ Test harness, Taylor-Dunn #62-027-31.

---

### **IMPORTANT NOTES and INSTRUCTIONS**

- This troubleshooting guide assumes that you are familiar with the use of a digital multi-meter including, voltage tests, continuity tests and diode testing. If you do not understand any part of these tests, you should refer testing to a qualified technician.
- Make sure the batteries are in good condition and fully charged before performing any tests.
- If the truck exhibits intermittent problems, it must be in the failed mode for troubleshooting. If it is running normally when the testing is done, you will not find the problem.
- All voltage tests are done referenced to battery negative unless otherwise specified.
- Battery volts = full voltage available at batteries at the time of test.
- All tests are done with key-switch on and any safety switches (if equipped) closed.
- **This test procedure must be performed in the order it was written. If you start in the middle or skip sections when not instructed to do so, you may not get the proper results.**
- **Perform each test in the order it is written. If the test result is good, then proceed to the next test or go to the next section if instructed to do so.**

**SECTION 4*****DURING ALL TESTS***

**⚠ WARNING** *Both drive wheels are to be supported off the ground by jack stands with the front wheels blocked.*

After any repairs are made completely test vehicle before lowering the drive wheels to the ground.

Disconnect both of the battery leads during any maintenance, or before disconnecting any electrical component or wire.

If the truck runs normally in only one direction and does not run in the opposite direction then go to the **SOLENOIDS** section.

If the truck runs slow and/or lacks power go to the **SPECIAL TROUBLESHOOTING** section.

## CONTROL WIRES AT PMC

With the F&R switch in gear (forward or reverse), depress the Accelerator pedal to engage the first micro switch *only* (creep speed) and perform the following tests.

### TEST #1:

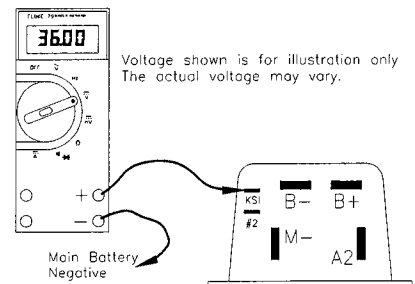
Test voltage at pin 'KSI' on the PMC control. *Refer to Control Wires Figure 1.*

#### Results:

The Voltage reading should equal the battery voltage.

#### Action:

If the result equals the battery voltage continue to TEST#2. If it does not equal the battery voltage continue on to the **KSI** section.



Control Wires Figure 1

### TEST #2:

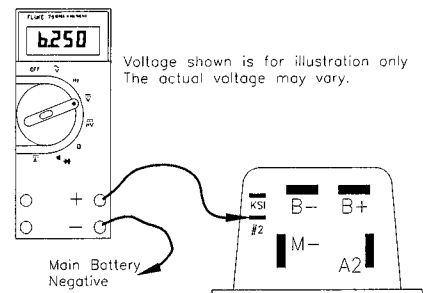
Test voltage at pin #2 at the PMC. *Refer to Control Wires Figure 2.*

#### Results:

The Voltage reading should be between 6 and 6.5 Volts.

#### Action:

If the result is between 6 and 6.5 Volts continue to the TEST#3. If the result is not between 6 and 6.5Volts, go to the **ACCELERATOR MODULE** section.



Control Wires Figure 2

## SECTION 4

With the F&R switch still in gear, depress the accelerator pedal fully.

**TEST #3:**

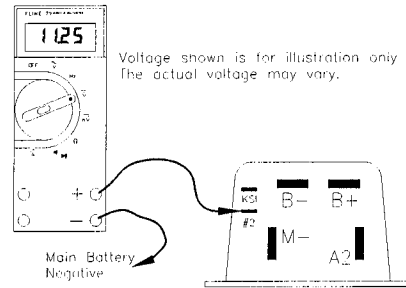
Test voltage at pin #2 on the PMC control. *Refer to Control Wires Figure 3.*

**Result:**

The Voltage reading should be between 11 and 11.5Volts.

**Action:**

If the result is between 11 and 11.5 Volts continue to the test #1 in the **POWER WIRING** section. If the result is not between 11 and 11.5Volts go to the **ACCELERATOR MODULE** section.



**Control Wires Figure 3**

---

**POWER WIRING**

# NOTE

ALL TESTS IN THIS SECTION ARE WITH THE RESISTOR AT THE ISO SOLENOID DISCONNECTED. RECONNECT THE RESISTOR WHEN EXITING THIS SECTION.

Depress the Accelerator pedal to engage the first micro switch *only* (creep speed) and perform the following tests.

**TEST #1:**

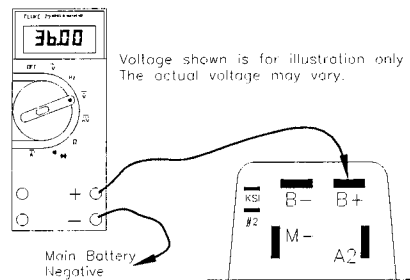
Test voltage from the main battery negative post to the 'B+' terminal on the PMC. *Refer to Power Wiring Figure 1.*

**Result:**

The Voltage reading should equal the battery voltage.

**Action:**

If the result equals the battery voltage continue to TEST#2. If it does not equal the battery voltage continue on to the **SOLENOIDS** section.



**Power Wiring Figure 1**

**TEST #2:**

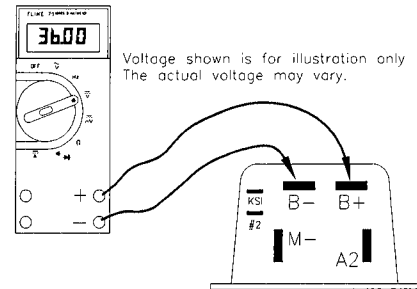
Test voltage from the 'B+' terminal on the PMC control to the 'B-' terminal on the PMC control. *Refer to Power Wiring Figure 2.*

**Result:**

The Voltage reading should equal the battery voltage.

**Action:**

If the result is equal to the battery voltage then continue to TEST #3. If the result is not equal to the battery voltage then the problem is in the wiring or connections from the main battery negative post to the 'B-' terminal on the PMC control. **Stop here and repair/replace the wiring and/or connections.**



**Power Wiring Figure 2**

**TEST #3:**

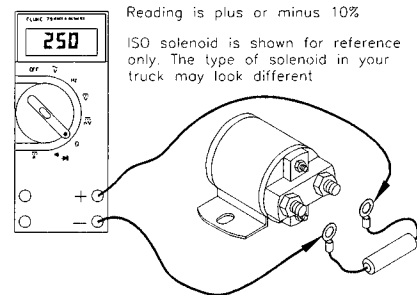
Remove the resistor from the ISO solenoid. Measure the resistor using the resistance or ohm setting on the meter and check the ISO resistor. *Refer to Power Wiring Figure 3.*

**Result:**

The reading should be 250, +/- 10%

**Action:**

If the result is 250 ohms, reconnect the resistor and continue to TEST #4. If the result is not 250 ohms then replace the resistor.



**Power Wiring Figure 3**

**NOTE** 

A DEFECTIVE RESISTOR COULD CAUSE INTERMITTENT OPERATION OF CONTROL BUT WOULD NOT STOP IT FROM WORKING.

## SECTION 4

Depress the accelerator pedal fully and perform the following tests.

**TEST 4:**

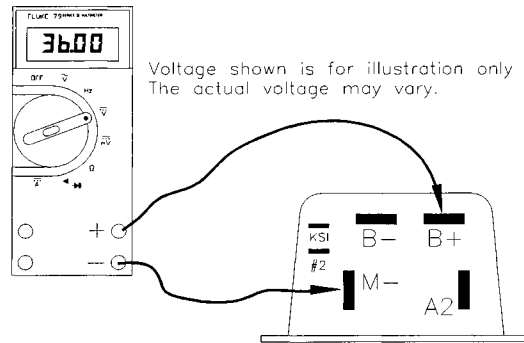
Test voltage from the 'M-' terminal on the PMC control to the 'B+' terminal on the PMC control. *Refer to Power Wiring Figure 4.*

**Result:**

The Voltage reading should equal the battery voltage +/- 1 Volt.

**Action:**

If it is within 1 volt of the battery voltage then continue to TEST #5. If it is not within 1 volt of the battery voltage then the PMC control is bad and must be replaced. **Stop here and replace the PMC Control.**

**TEST #5:**

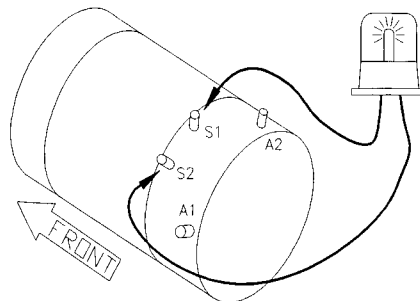
Connect the test light across the motor 'S1' and 'S2' terminals. *Refer to Power Wiring Figure 5*

**Result:**

The light should be OFF.

**Action:**

If the light is OFF then continue to TEST #6. If the light is ON then the field is open and the motor must be replaced. **Stop here and replace the motor.**



Motor shown for reference only.  
Terminal positions on your motor  
may not be in the same  
location.

**Power Wiring Figure 5**

**TEST #6:**

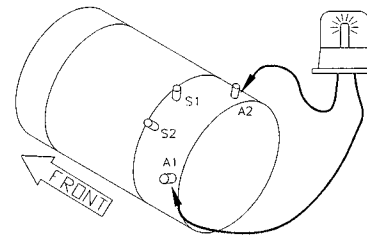
Connect the test light across the motor 'A1' and 'A2' terminals.

**Result:**

The light should be OFF.

**Action:**

If the light is OFF, go to the **SOLENOIDS** section. If the light is ON then the armature is open and the motor must be replaced. **Stop here and replace the motor.**



Motor shown for reference only. Terminal positions on your motor may not be in the same location.

**Power Wiring Figure 6**

If no fault was found up to this point then go to the SOLENOIDS section

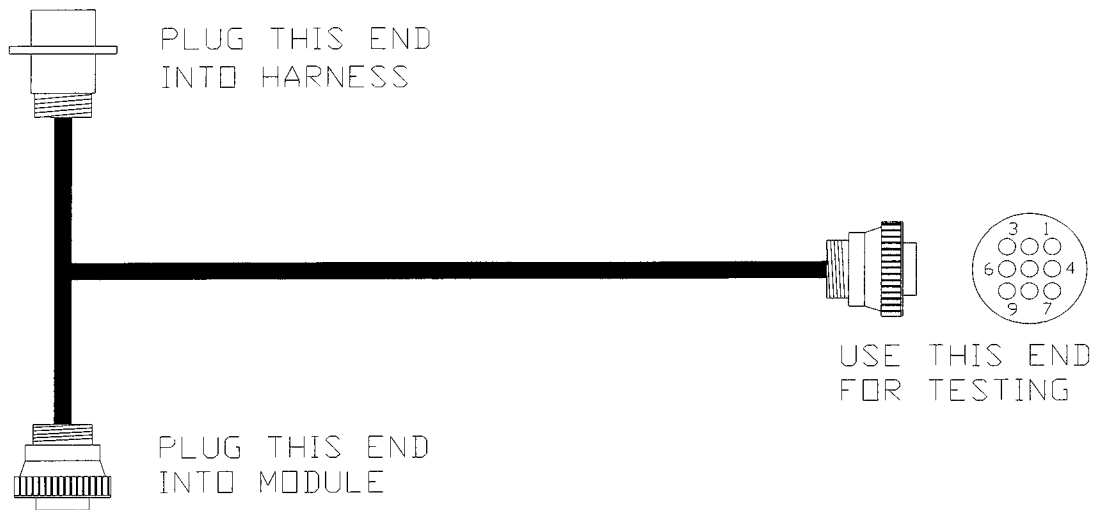


**ACCELERATOR MODULE (magnetic or solid state only)**

These tests are valid for the Magnetic and Solid State modules only. These tests will not work with the potentiometer (POT) modules. The Magnetic and Solid State modules can be identified by how many positions are available in the harness connector. The Magnetic and Solid State modules use a 9-position connector, the POT module uses a 7 position connector. The POT module is not compatible with Taylor-Dunn PMC controllers. If your truck is equipped with a POT module, it must be upgraded to a new module to be used with a PMC control. Contact your Taylor-Dunn distributor for more information.

*Note:* These tests are done at the accelerator module using the 62-027-31 test harness (see figure below). Connect the short end of the harness to the accelerator module and the trucks control harness. Testing will be done at the connector on the long end of the harness. The truck should not run with the harness connected. If your truck runs with the harness connected, there is a problem somewhere other than the accelerator module. *Refer to the Harness Figure at the bottom of this page.*

*The rear drive wheels should be raised off the ground and the vehicle supported by jack stands.*



From this point on the end view of the test harness will be shown to clarify pin positions used for testing. There are no further reproductions of this figure in this section of the manual.

Depress the Accelerator pedal to engage the first micro switch only (creep speed) and perform the following tests.

**TEST #1:**

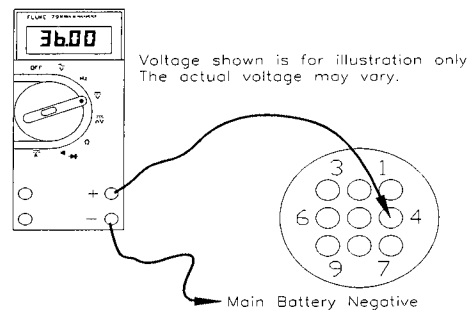
Test voltage at PIN #4 in the test harness. *Refer to Accelerator Figure #1.*

**Result:**

The Voltage reading should equal the battery voltage.

**Action:**

If it is not equal to the battery voltage then go to the **KSI** section, otherwise continue with the next test.



**Accelerator Figure 1**

**TEST #2:**

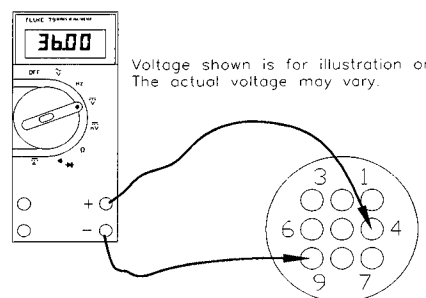
Test voltage from PIN #4(+) to PIN #9(-). *Refer to Accelerator Figure #2.*

**Result:**

The Voltage reading should equal the battery voltage.

**Action:**

If it is not equal to the battery voltage then check the wire in pin #9 to the



**Accelerator Figure 2**

## SECTION 4

circuit breaker on the control panel and the circuit breaker. **Stop here and repair the problem**, otherwise continue with the next test.

**TEST #3:**

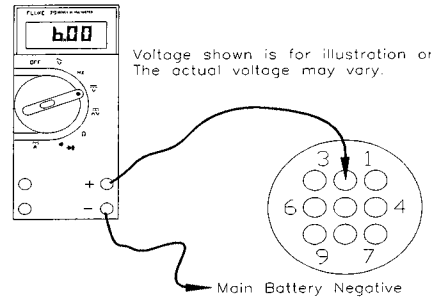
Test voltage at PIN #2. *Refer to Accelerator Figure #3.*

**Result:**

The meter should read from 6Volts to 6.5Volts.

**Action:**

If not 6 to 6.5 volts then the accelerator module is bad. **Stop here and repair the problem**, otherwise continue with the next test.

**TEST #4:**

Test voltage at PIN #5. *Refer to Accelerator Figure #4*

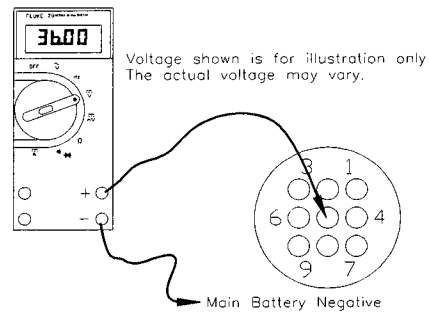
**Result:**

The voltage reading should equal the battery voltage.

**Action:**

If not equal to the battery voltage then the accelerator module is bad.

**Stop here and repair the problem**, otherwise continue with the next test.



Accelerator Figure 4

**NOTE** 

A BROKEN ACCELERATOR RETURN SPRING WILL CAUSE NO OUTPUT AT PIN #5.

Now depress the Accelerator pedal fully and perform the following tests.

**TEST #5:**

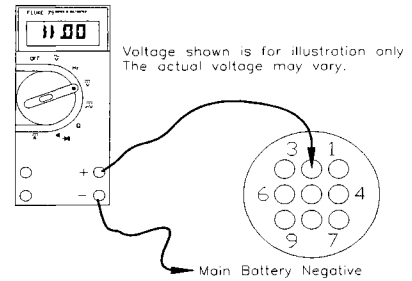
With the Accelerator pedal fully depressed, test voltage at PIN #2. *See Accelerator Figure #5*

**Result:**

Voltage reading should be between 11 and 11.5Volts.

**Action:**

If it is not 11 to 11.5 volts then the accelerator module is bad. **Stop here and replace the module**, otherwise continue on to test #6.



**Accelerator Figure 5**

**⚠WARNING**

*The following tests require the removal of wires and parts from the vehicle. Be sure to disconnect the main battery positive and negative terminals before continuing.*

**TEST #6:**

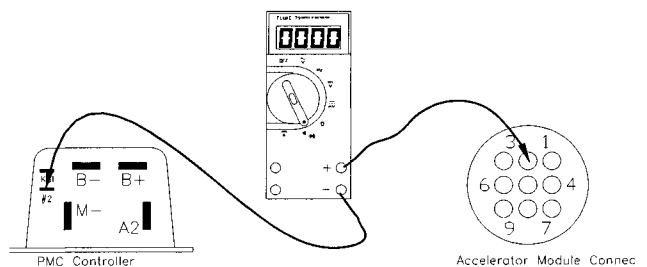
Test the continuity of pin #2 in the wire harness. By placing the meter leads on pin #2 of each end of the wire harness. *Refer to Accelerator Figure #6*

**Result:**

Should hear audible alarm, showing that there is continuity in wire.


**Action:**

If there is no continuity. **Stop here and replace the wire harness**, otherwise continue on to test #7.



**Accelerator Figure 6**

## SECTION 4

**NOTE**  SOME MODELS ROUTE WIRE #2 THROUGH A SEAT SWITCH. IF EQUIPPED WITH A SEAT SWITCH, CHECK THE CONTINUITY OF THE SEAT SWITCH WITH AN OHMMETER.

**TEST #7:**

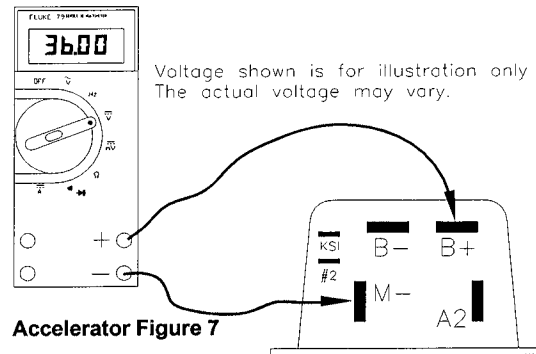
Test voltage from the 'M-' terminal on the PMC control to the 'B+' terminal on the PMC control. *Refer to Accelerator Figure #7.*

**Result:**

The Voltage reading should equal the battery voltage.

**Action:**

If it is not within 1 volt of the battery voltage then the PMC control is bad and must be replaced. **Stop here and replace the PMC.**



If no faults were found, continue with the next section, KSI.

**KSI**

**TEST #1**

Check the safety interlock switches (if equipped) for continuity. *Refer to Figures in Appendix.*

**Result:**

Should hear audible alarm, showing that there is continuity in the switch.

**Action:**

If there is no continuity. **Stop here and replace the safety interlock switch**, otherwise continue on to test #2.

**Refer to Figures in the Appendix at the end of this manual.**

**NOTE** 

DUE THE FACT THAT THERE ARE 4 POSSIBLE STANDARD SAFETY INTERLOCK SWITCHES AND MANY OPTIONAL SWITCHES, WE HAVE PLACED FIGURES OF THE STANDARD SWITCHES IN THE APPENDIX. PLEASE REFER TO APPENDIX FOR METER LEAD PLACEMENT FOR TEST #1.

**TEST #2**

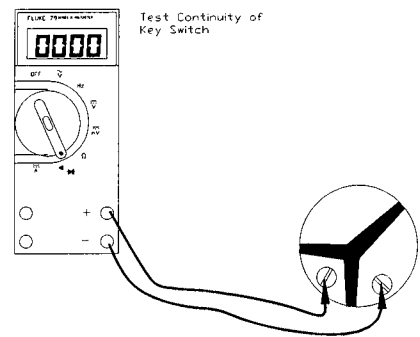
Test the key-switch for continuity. *Refer to KSI Figure #2*

**Result:**

Should hear audible alarm, showing that there is continuity in the key-switch.

**Action:**

If there is no continuity. **Stop here and replace the key-switch**, otherwise continue on to test #3.



**KSI Figure 2**

## SECTION 4

## TEST #3

Test the F&R switch for continuity in forward and reverse. *Refer to KSI Figure #3*

## Result:

Should hear audible alarm, showing that there is continuity in the switch.

## Action:

If there is no continuity. **Stop here and replace the F&R switch**, otherwise continue on to test #4.

## TEST #4:

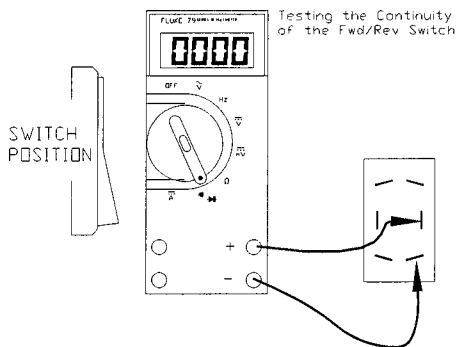
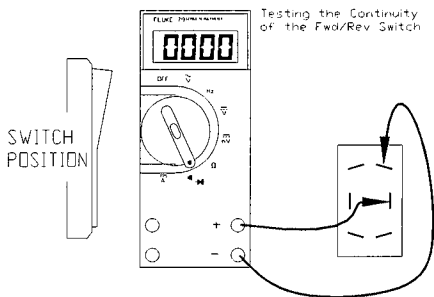
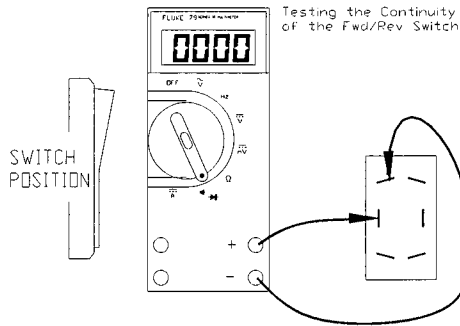
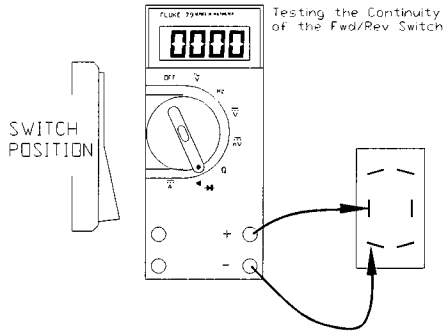
Test the control wires for continuity and visually inspect them for opens.

## Result:

Should hear audible alarm, showing that there is continuity in wire. There should not be any cracks in the wire insulation or any of the wire strands broken.

## Action:

If there are opens, cracks in the insulation or broken wire strands. **Stop and replace the faulty control wires**, otherwise continue on to the next section Solenoids.



KSI Figure 3

**NOTE** 

IF YOU REACHED THIS POINT WITHOUT A SOLUTION, THEN YOU MAY HAVE AN UNANTICIPATED PROBLEM OR HAVE MADE AN ERROR DURING TESTING

**SOLENOIDS**

**TEST #1:**

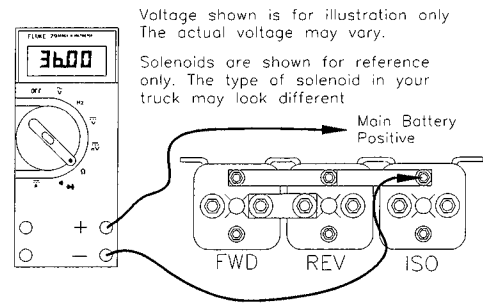
Remove the resistor from the ISO solenoid. Measure the resistor using the resistance or ohm setting on the medter and check the ISO resistor. *Refer to Solenoids Figure 1.*

**Result:**

The reading should be 250 +/- 10% (225 to 275 ohms).

**Action:**

If the result is 250 ohms, reconnect the resistor and continue to TEST #2. If the result is not 250 ohms then replace the resistor.



**Solenoids Figure 1**

**NOTE** 

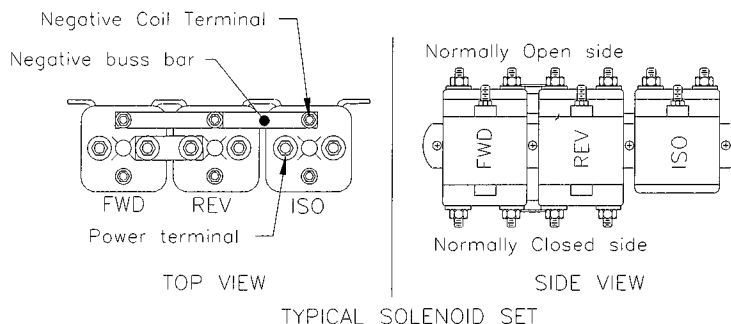
A DEFECTIVE RESISTOR COULD CAUSE INTERMITTENT OPERATION OF CONTROL BUT WOULD NOT STOP IT FROM WORKING.

RECONNECT THE MAIN POSITIVE AND NEGATIVE BATTERY CABLES AND CONTINUE WITH THE TEST PROCEDURES.

If your truck runs in forward only then go to the **FORWARD ONLY** section.

If your truck runs in reverse only then go to the **REVERSE ONLY** section.

If your truck does not run in either direction, continue with testing on the next page.



**TYPICAL SOLENOID SET**



## SECTION 4

Place the F&R switch in neutral and perform the following tests.

## TEST #1:

Depress the accelerator pedal and listen for the ISO solenoid to click.

## Result:

Should hear the ISO solenoid click.

## Action:

If the ISO solenoid clicks then go to the **ISO** section.

If the ISO solenoid does not click then continue with the next test.

## Test #2:

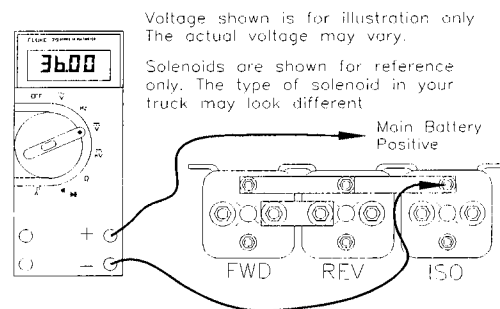
Test voltage from the battery positive terminal to the negative coil terminal on the ISO solenoid. *Refer to Solenoids Figure #2.*

## Result:

The voltage reading should equal the battery voltage.

## Action:

If it is not equal to the battery voltage then check the negative control wiring and the negative circuit breaker. **Stop here and repair the problem**, otherwise continue with the next test.



Solenoids Figure 2

Now depress the Accelerator pedal fully and perform the following tests.

## TEST #3:

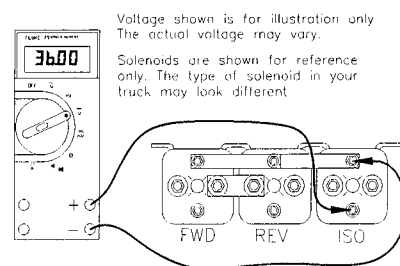
Test voltage across the ISO coil terminals. *Refer to Solenoids Figure #3.*

## Result:

The voltage reading should equal the battery voltage.

## Action:

If not equal to the battery voltage then check the wiring, the MS1 switch output (pin 5 of the accelerator module), all safety interlock switches and the key-switch. **Stop here and repair the problem**, otherwise continue to the next test. *(Cont'd on Next Page.)*



Solenoids Figure 3

Action (Cont'd From Bottom of Page 18):

If the voltage across the ISO coil terminals is equal to the battery voltage then the ISO coil is bad and the solenoid must be replaced. **Stop here and repair the problem**, otherwise continue on to the next section ISO.

**ISO**

**TEST#1**

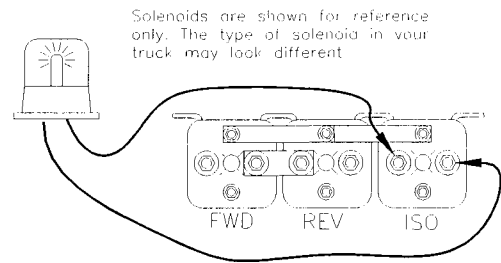
Connect the test light across the ISO power terminals and depress the accelerator pedal fully. **ISO Solenoids Figure #1.**

**Result:**

The light should not come on.

**Action:**

If the light comes on when the pedal is depressed then the ISO solenoid contacts are open and the solenoid must be replaced. **Stop here and replace the ISO solenoid.**



**ISO Solenoids Figure 1**

If the light does not come on, then check the power wiring to the batteries and the power wiring to the PMC for opens. **Stop here and repair the problem.**

**NOTE** 

IF YOU REACHED THIS POINT WITHOUT A SOLUTION, THEN YOU MAY HAVE AN UNANTICIPATED PROBLEM OR HAVE MADE AN ERROR DURING TESTING.

## SECTION 4

**FORWARD ONLY**

## TEST #1:

Place the F&R switch in neutral and depress the accelerator pedal. While listening to the solenoids, keep the pedal depressed and move the F&R switch to reverse.

## Result:

You should hear the reverse solenoid click.

## Action:

If the reverse solenoid clicks then go to the **REVERSE CONTACTS** section, otherwise continue with the next test.

## TEST #2:

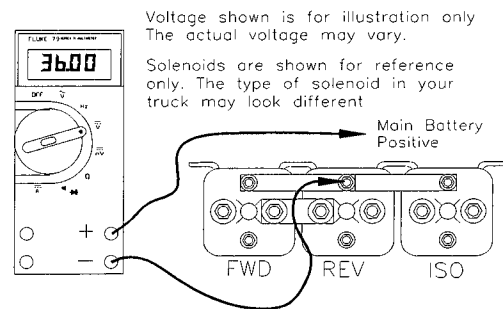
Check voltage from the main battery positive terminal to the negative coil terminal on the reverse solenoid. **Forward Solenoid Figure #1.**

## Result:

The voltage reading should equal the battery voltage.

## Action:

If not equal to the battery voltage then check the solenoid negative bus bar for loose connections. **Stop here and repair the problem,** otherwise continue with the next test.



**Forward Solenoid Figure 1**

**TEST #3:**

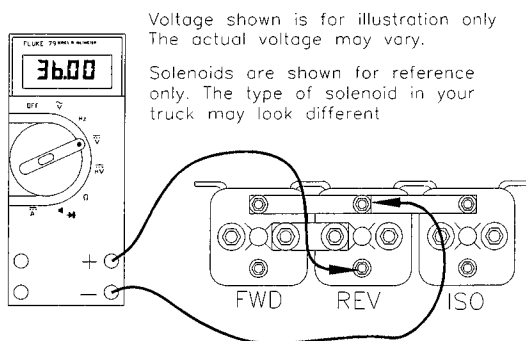
Check the voltage across the reverse solenoid coil. **Refer to Forward Solenoid Figure #2**

**Result:**

The voltage reading will be either battery voltage or zero.

**Action:**

If equal to the battery voltage then the reverse solenoid is bad and must be replaced. **Stop here and replace the Reverse Solenoid**, otherwise continue with the next test.



**Forward Solenoid Figure 2**

If not equal to the battery voltage, check the control wiring and the F&R switch for open or bad connections. **Stop here and repair the problem**, otherwise continue with to the next section Reverse Contacts.

**REVERSE CONTACTS**

**TEST #1:**

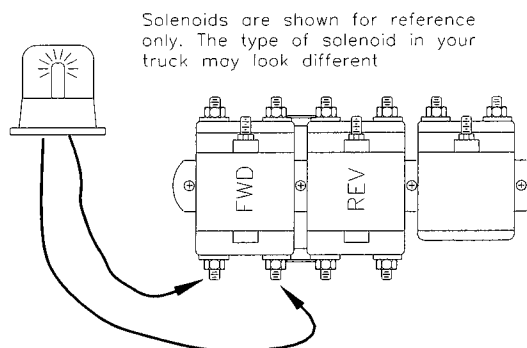
Connect the test light across the normally closed contacts of the *forward* solenoid, place the F&R switch in reverse, depress the accelerator pedal fully. **Reverse Contacts Figure #1.**

**Result:**

The light should not come on.

**Action:**

If the light comes on when the pedal is depressed then the forward solenoid contacts are open and the solenoid must be replaced. **Stop here and repair the problem**, otherwise continue with the next test.



**Reverse Contacts Figure 1**

## SECTION 4

## TEST #2:

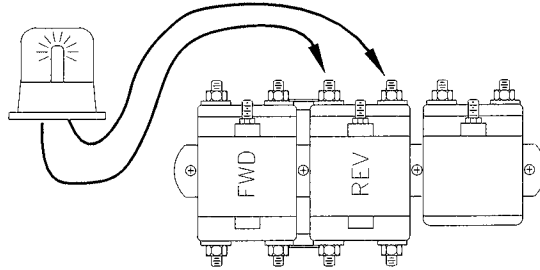
Connect the test light across the normally open contacts of the *reverse* solenoid and depress the accelerator pedal fully. *Refer to Reverse Contacts Figure #2.*

## Result:

Refer to the ACTION, below.

## Action:

If the light comes on when the pedal is depressed then the reverse solenoid contacts are open and the solenoid must be replaced. **Stop here and repair the problem.**



Reverse Contacts Figure 2

If the light did not come on at all, then check all power wiring for opens. **Stop here and repair the problem.**

**REVERSE ONLY**

**TEST #1:**

Place the F&R switch in neutral and depress the accelerator pedal. While listening to the solenoids, keep the pedal depressed and move the F&R switch to forward.

**Result:**

The Forward solenoid should click.

**Action:**

If the forward solenoid clicks then go to the **FORWARD CONTACTS** section, otherwise continue with the next test.

**TEST #2:**

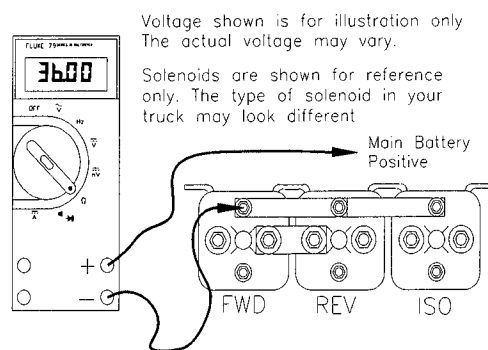
Check voltage from the main battery positive terminal to the negative coil terminal on the forward solenoid. *Refer to Reverse Figure #1.*

**Result:**

The voltage reading should equal the battery voltage.

**Action:**

If not equal to the battery voltage then check the solenoid negative bus bar for loose connections. **Stop here and repair the problem,** otherwise continue with the next test.



**Reverse Figure 1**

## SECTION 4

## TEST #3:

Check the voltage across the forward solenoid coil. *Refer to Reverse Figure #2.*

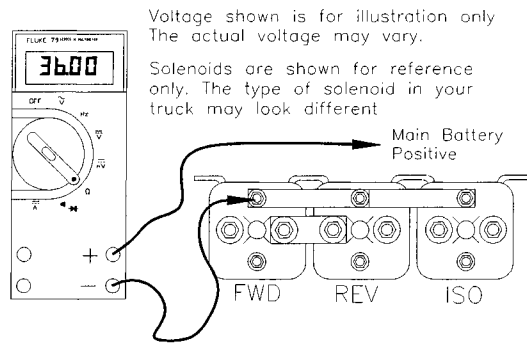
## Result:

Refer to the Action below.

## Action:

If equal to the battery voltage then the forward solenoid is bad and must be replaced. **Stop here and repair the problem,** otherwise continue with the next test.

If not equal to the battery voltage, check the control wiring and the F&R switch. **Stop here and repair the problem,** otherwise continue with the next section Forward Contacts.



Reverse Figure 2

**FORWARD CONTACTS**

**TEST #1:**

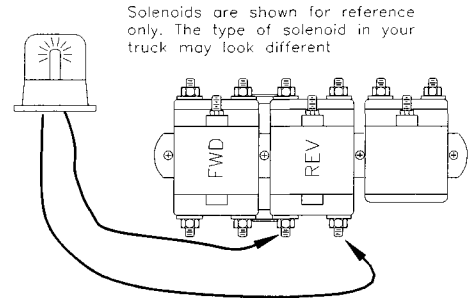
Connect the test light across the normally closed contacts of the *reverse* solenoid, place the F&R switch in forward and depress the accelerator pedal fully. *Refer to Fwd Figure #1.*

**Result:**

The light should not come on.

**Action:**

If the light comes on when the pedal is depressed then the reverse solenoid contacts are open and the solenoid must be replaced. **Stop here and repair the problem,** otherwise continue with the next test.



**Fwd Figure 1**

**TEST #2:**

Connect the test light across the normally open contacts of the *forward* solenoid and depress the accelerator pedal fully. *Refer to Fwd Figure #2.*

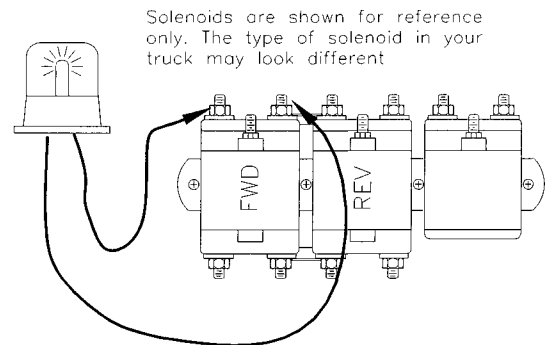
**Result:**

Refer to Action below.

**Action:**

If the light comes on when the pedal is depressed then the forward solenoid contacts are open and the solenoid must be replaced. **Stop here and repair the problem.**

If the light did not come on at all, then check all power wiring for opens. **Stop here and repair the problem.**



**Fwd Figure 2**

**NOTE** 

IF YOU REACHED THIS POINT WITHOUT A SOLUTION THEN YOU MAY HAVE AN UNANTICIPATED PROBLEM OR HAVE MADE AN ERROR DURING TESTING.



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## SPECIAL TROUBLESHOOTING

Read symptoms carefully, the symptoms must be exactly as stated to go to the proper section. If your symptoms are different from what is represented here, you have an unanticipated failure and should contact your Taylor-Dunn service representative.

Eliminate all possible mechanical problems before starting the electrical troubleshooting. Make sure your batteries are in good condition and fully charged. Some examples of mechanical problems that could be misinterpreted as an electrical problem;

- Dragging brakes
- Binding drive gears or chain
- Tight or frozen 3<sup>rd</sup> member bearings
- Tight or frozen wheel bearings
- Overloaded truck (refer to vehicles manual for load restrictions)

The truck should be able to be pushed easily by hand on a hard level surface.

Continuous testing under high current could lead to overheating and failure of otherwise good components. ***Do not*** perform tests that involve high current for more than 2 seconds at a time. Allow 5 minutes between high current tests for cooling.

### ***DURING ALL TESTS***

Both drive wheels are to be supported off the ground by jack stands with the front wheels blocked.

After any repairs are made completely test vehicle before lowering the drive wheels to the ground.

Disconnect both of the battery leads during any maintenance, or before disconnecting any electrical component or wire.

Testing should be done with the drive wheels off the ground, supported with jack stands. In this situation, high current would be considered as any continuous reading over 65 Amps.

**NOTE:** Your Amp meter may peak in excess of 200 Amps for a very short amount of time (milliseconds) and then level off to a normal reading. The normal current reading will vary depending on the model of truck, the motor installed, and the drive configuration.

<b>SYMPTOMS</b>		<b>GO TO</b>
➤	Runs slow in forward and reverse with normal motor current.	ACCELERATOR MODULE (Previous section)
➤	Runs slow in both directions plus high armature and field current in both directions. NOTE: Armature and field current should be equal.	MOTOR
➤	Runs slow in both directions plus high armature current in both directions. NOTE: Field current will be very low.	SOLENOIDS (this section)
➤	Runs normal in one direction only plus runs slow or lacks power in the opposite direction with high armature current in the opposite direction or;	SOLENOIDS (this section)
➤	Accelerates slowly and exceeds normal speed in the opposite direction with high armature current only. NOTE: Field current will be very low in the opposite direction.	
➤	Accelerates slowly and exceeds normal speed in both directions plus high armature current. NOTE: Field current will be very low.	SOLENOIDS (this section)
➤	Full speed only.	PMC CONTROL
➤	Does not run in either direction plus there is noise from motor (hum or whine) with high field current and low armature current.	PLUGGING DIODE
➤	Excessive spark when connecting battery	ISO (this section)
➤	Does not run or runs very slow with low motor current and high battery current.	FREEWHEEL DIODE
➤	Jumps into high speed when direction is selected after depressing the accelerator pedal.	HPD

## MOTOR

High motor current in both the field and the armature that is accompanied with a lack of power would indicate a shorted armature and/or field.

Another symptom that may exist is a jumping or stuttering at low speeds and/or the motor will not run unless the armature is manually rotated. If this symptom exists, it indicates that there may be open segments in the armature, worn out or stuck motor brushes. Visually inspect the brushes, if they are OK, continue with the testing below.

Disconnect the four motor wires and perform the following tests.

### TEST #1:

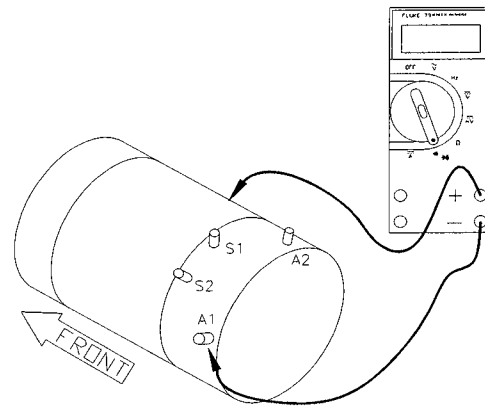
Check continuity from 'A1' to the frame of the motor. *Refer to Motor 1.*

#### Result

You should not get a continuity reading. The display should read -OL-.

#### Action:

If you have continuity from 'A1' to the frame of the motor then the motor armature or armature circuit (brushes) are shorted. **Stop here and repair the problem**, otherwise continue with the next test.



Motor shown for reference only. Terminal positions on your motor may not be in the same location.

Motor 1

**TEST #2:**

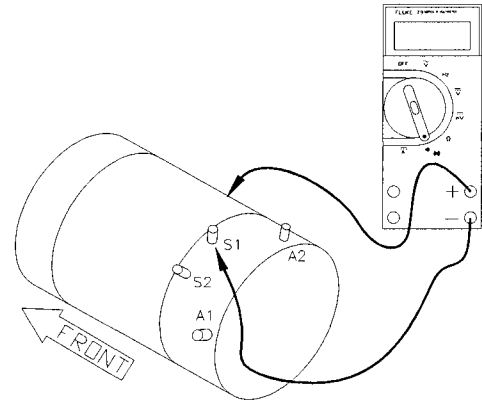
Check continuity from 'S1' to the frame of the motor. *Refer to Motor 2.*

**Result**

You should not get a continuity reading. The display should read -OL-.

**Action:**

If you have continuity from 'S1' to the frame of the motor then the motor field is shorted. **Stop here and repair the problem, otherwise continue to Motor Inspection.**



Motor shown for reference only. Terminal positions on your motor may not be in the same location.

**Motor 2****Motor Inspection**

1. Remove and disassemble the motor.
2. Visually inspect the inside of the brush end housing. If you can see any silver specs of metal around the inside of the housing, it indicates that the armature has overheated and melted the solder around the commutator. The armature is bad and the motor must be replaced. **Stop here and repair the problem, otherwise continue with the next TEST #3.**
3. Visually inspect the armature wires where they loop around at the shaft end of the armature. The insulation should be a light to medium reddish brown color. If the insulation is dark brown to black or the insulation is cracked and peeling then the armature has been overheated and burnt, the motor must be replaced. **Stop here and repair the problem, otherwise continue with the next TEST #3.**

## SECTION 4

## TEST #3:

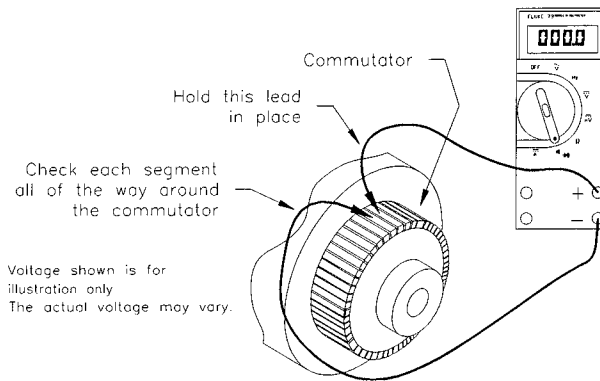
Perform a continuity test around the armature commutator. Place one of the test leads on a single commutator segment. While holding the first test lead on the segment, check the continuity to the other segments around the commutator. *Refer to Motor 3.*

## Result:

The meter reading should be 0000.

## Action:

If you find an open segment the armature is bad and the motor must be replaced. **Stop here and repair the problem.**



Motor 3

NOTE 

IF YOU REACHED THIS POINT WITHOUT A SOLUTION THEN YOU MAY HAVE AN UNANTICIPATED PROBLEM OR HAVE MADE AN ERROR DURING TESTING.

## PMc CONTROL

Disconnect the wire from the 'M-' terminal on the PMc control and tape it off to prevent electrical contact. Turn the key-switch on, close all interlock switches (if equipped) and depress the accelerator pedal to engage the first micro switch only (creep speed) and perform the following tests

## TEST #1:

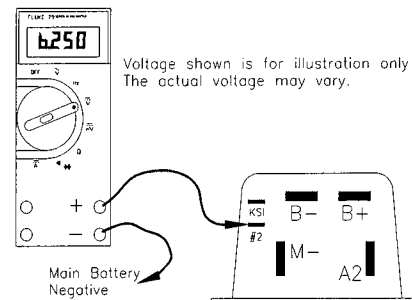
Test the voltage at pin #2 on the PMc controller. *Refer to PMc 1.*

## Result

The meter reading should be between 6 and 6.5Volts.

## Action:

If the voltage at pin #2 is not 6 to 6.5 volts then go to the **ACCELERATOR MODULE** in the previous section, otherwise continue with TEST #2.



**TEST #2:**

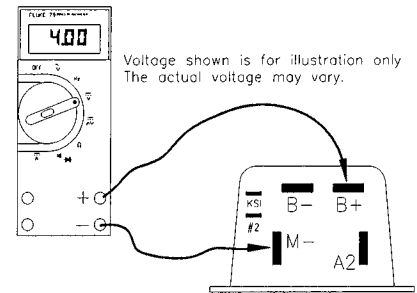
Test the voltage across 'B+' and 'M-' on the PMC control.

**Result:**

The meter reading should not be equal to the battery voltage. *Refer to PMC 2.*

**Action:**

If you have full battery voltage then the PMC control is shorted and must be replaced. **Stop here and repair the problem**, otherwise continue with the next test.



**PMC 2**

If the voltage at pin #2 is correct and the voltage at 'M-' is correct then there is a short in the harness between the wire connected to the PMC 'M-' and main battery negative. **Stop here and repair the problem.**

**NOTE** 

IF YOU REACHED THIS POINT WITHOUT A SOLUTION THEN YOU MAY HAVE AN UNANTICIPATED PROBLEM OR HAVE MADE AN ERROR DURING TESTING.

## PLUGGING DIODE

Remove the wires from the 'B+' and 'A2' terminals on the PMC control and perform the following test.

### TEST #1:

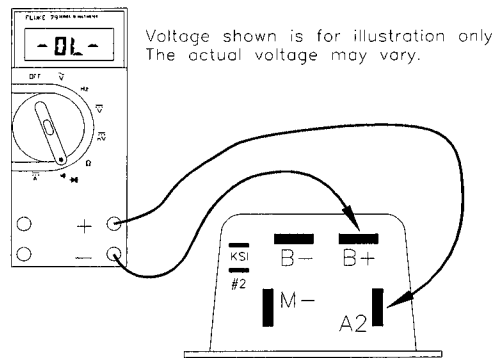
Using the diode test function on your DMM check for the presence of a diode across 'B+' and 'A2' on the PMC control. *Refer to Diode 1.*

### Result:

This should read as an open connection. The meter reading will be -OL-.

### Action:

If you find this diode shorted then the PMC control must be replaced. **Stop here and repair the problem.**



Diode 1

## NOTE

IF YOU REACHED THIS POINT WITHOUT A SOLUTION THEN YOU MAY HAVE AN UNANTICIPATED PROBLEM OR HAVE MADE AN ERROR DURING TESTING.

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## FREEWHEEL DIODE

Remove the wires from the 'B+' and 'M-' terminals on the PMC control and perform the following test

**TEST #1:**

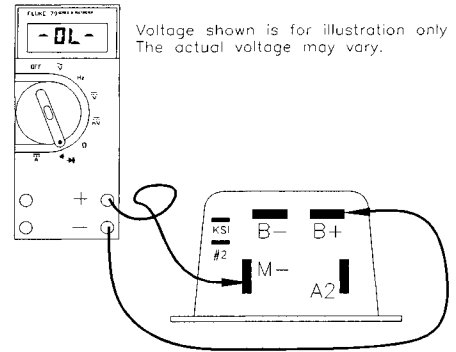
Using the diode test function on your DMM check for the presence of a diode across 'B+' and 'M-' on the PMC control. **Refer to Diode 2.**

**Result:**

This should read as an open connection. The meter reading will be **-OL-**.

**Action:**

If you find this diode shorted then the PMC control must be replaced.  
**Stop here and repair the problem.**



## NOTE

IF YOU REACHED THIS POINT WITHOUT A SOLUTION THEN YOU MAY HAVE AN UNANTICIPATED PROBLEM OR HAVE MADE AN ERROR DURING TESTING.



## SECTION 4

## ISO

Remove the wires and the resistor from the ISO solenoid and perform the following tests.

## TEST #1:

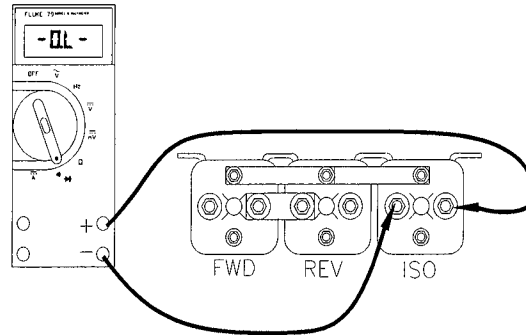
Test continuity across the ISO power contacts. *Refer to ISO 1.*

## Result:

The meter should autorange or show an OL on the display.

## Action:

If the meter reading is not -OL- then the contacts are closed, the contactor should be replaced. **Stop here and replace the ISO solenoid,** other wise continue to TEST #2.



ISO 1

## TEST #2:

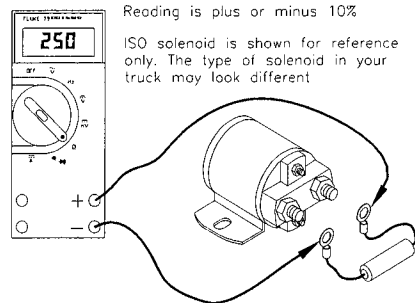
Disconnect and test the ISO resistor. Connect the meter to each end of the resistor and measure the resistance. *Refer to ISO 2.*

## Result:

The meter reading should be 250 (+/- 10%) 225 to 275.

## Action:

If it is not 250 ohms (+/-10%) then replace the resistor. **Stop here and repair the problem.**



ISO 2

NOTE 

IF YOU REACHED THIS POINT WITHOUT A SOLUTION THEN YOU MAY HAVE AN UNANTICIPATED PROBLEM OR HAVE MADE AN ERROR DURING TESTING.

## SOLENOIDS

There is a very slight possibility that a failure in the motor could cause these symptoms. Perform the tests covered in the **MOTOR** section first. If the motor is OK, continue with the following tests.

Remove the wires from the 'S1' and 'S2' terminals on the motor. Remove the wire from the 'M-' terminal on the PMC control. Make sure none of these wires can come into electrical contact with the frame or any other wire.

With the key-switch on and the forward and reverse switch in neutral, perform the following tests.

### TEST #1:

Check continuity from the motor 'A2' terminal to the wire that was connected to the motor 'S1' terminal. **DO NOT** make this test to the 'S1' terminal, just the wire. **Refer to Solenoid 1.**

### Result:

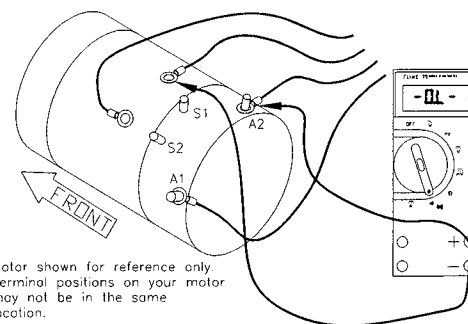
This should read as an open connection. The meter reading will be -OL-.

### Action:

If it reads as a short then one of the following has occurred;

- The reverse solenoid is shorted or,
- The wire connected to the motor 'S1' terminal is shorted to the wire connected to the motor 'A2' terminal or,
- The wire connected to the motor 'S1' terminal is shorted to the wire connected to the PMC 'A2' terminal.

**Stop here and repair the problem, otherwise continue with TEST #2.**



**Solenoid 1**

## SECTION 4

## TEST #2:

Check continuity from the motor 'A2' terminal to the wire that was connected to the motor 'S2' terminal. **DO NOT** make this test to the 'S2' terminal, just the wire. **Refer to Solenoids 2.**

## Result:

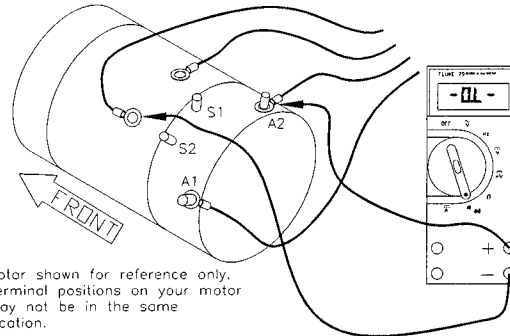
This should read as an open connection. The meter reading will be -OL-.

## Action:

If it reads as a short then one of the following has occurred;

- The forward solenoid is shorted or,
- The wire connected to the motor 'S2' terminal is shorted to the wire connected to the motor 'A2' terminal or,
- The wire connected to the motor 'S2' terminal is shorted to the wire connected to the PMC 'A2' terminal.

**Stop here and repair the problem,** otherwise continue with TEST #3.



Solenoid 2

With the key-switch on and the F&R switch in forward, depress the accelerator pedal and perform the following tests.

## TEST #3:

Check continuity from the wire that was connected to the PMC 'M-' terminal to the wire that was connected to the motor 'S2' terminal. **Refer to Solenoid 3.**

## Result:

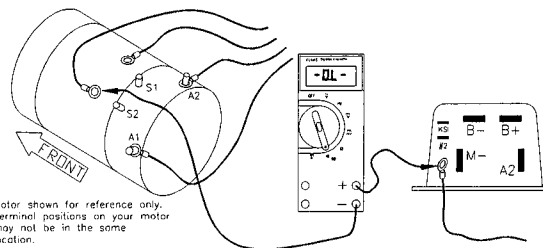
This should read as an open connection.

## Action:

If it reads as a short then one of the following has occurred;

- The forward solenoid is shorted or,
- The wire connected to the PMC 'M-' terminal is shorted to the wire connected to the motor 'S2' terminal.

**Stop here and repair the problem,** otherwise continue with the next TEST #4.



Solenoid 3

With the key-switch on and the F&R switch in reverse, depress the accelerator pedal and perform the following tests.

**TEST #4:**

Check continuity from the wire that was connected to the PMC 'M-' terminal to the wire that was connected to the motor 'S1' terminal. *Refer to Solenoid 4.*

**Result:**

This should read as an open connection. The meter reading will be -OL-.

**Action:**

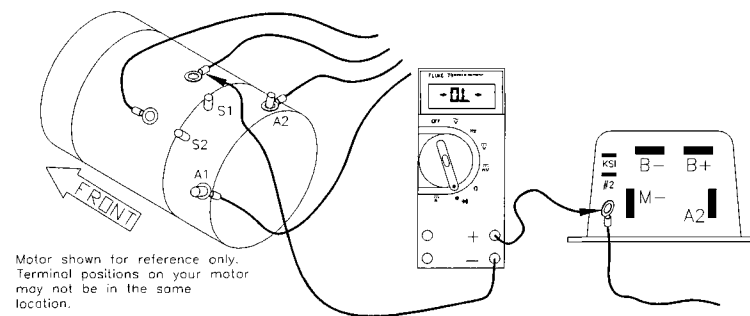
If it reads as a short then one of the following has occurred;

- The reverse solenoid is shorted or,
- The wire connected to the PMC 'M-' terminal is shorted to the wire connected to the motor 'S1' terminal.

**Stop here and repair the problem.**

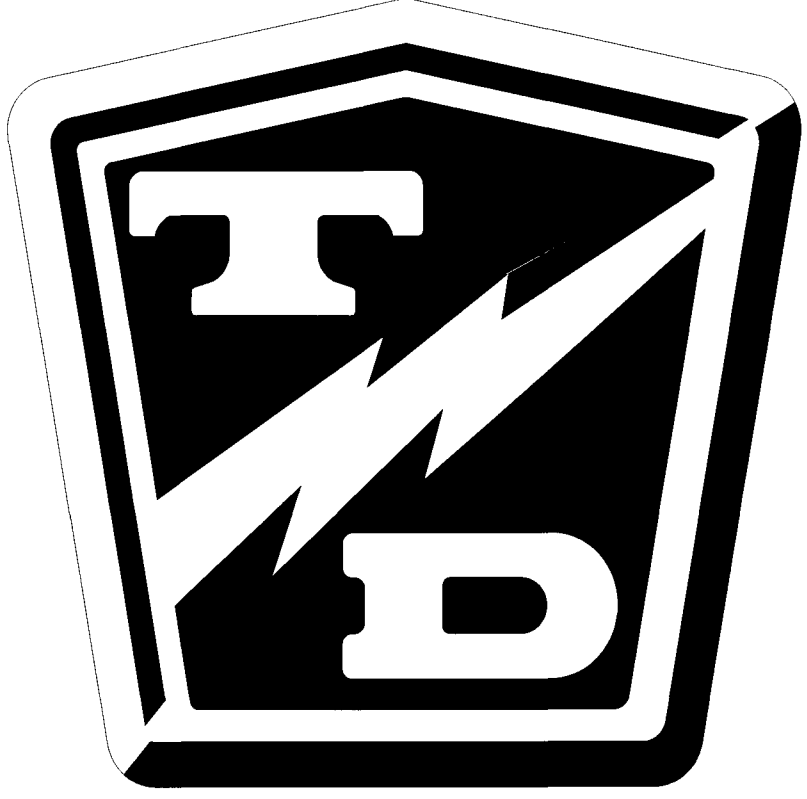
IF YOU REACHED THIS POINT WITHOUT A SOLUTION THEN YOU MAY HAVE AN UNANTICIPATED PROBLEM OR HAVE MADE AN ERROR DURING TESTING.

**NOTE** 



**Solenoid 4**

**TAYLOR-DUNN**

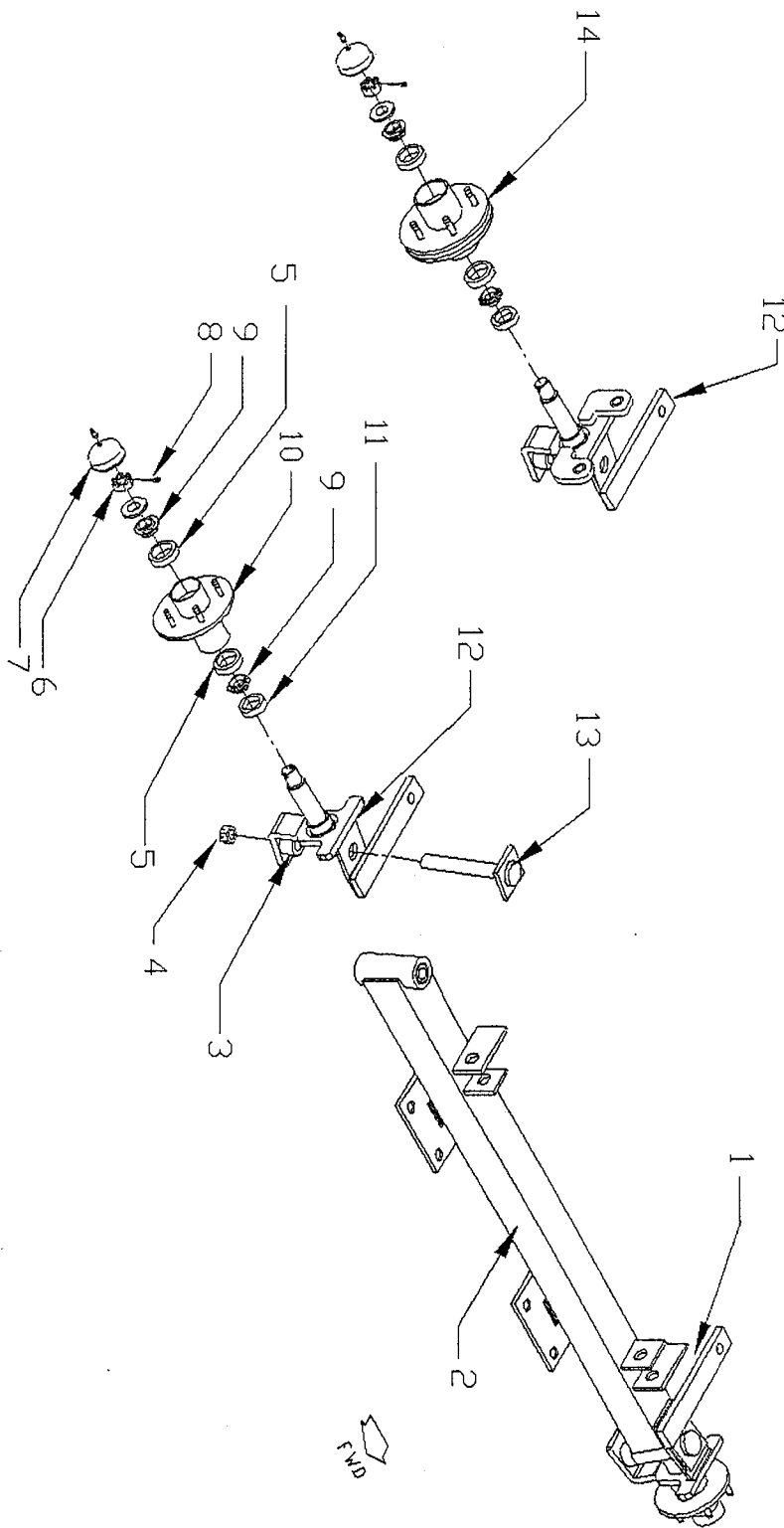


# *Illustrated Parts List*



Section 4

# STANDARD FRONT AXLE



FRONT AXLE			
ITEM #	PART #	DESCRIPTION	QTY
1	14-380-80	Yoke, Left Side Without Brakes (Standard)	1
	14-240-08	Yoke, Left Side With Brakes (Optional)	1
	*14-380-92	Yoke, Left Side Without Brakes (Standard)	1
	*14-380-85	Yoke, Left Side With Brakes (Optional)	1
2	15-380-33	Front Axle Beam	1
	*15-380-31	Front Axle Beam	1
3	80-309-10	Bearing Pack	2
4	88-289-81	Nut	2
5	80-103-00	Bearing Race	2
6	88-239-85	3/4"NF, Slotted Nut	2
7	92-104-00	Dust Cap W/ Grease Fitting (Standard Axle)	2
	92-104-01	Dust Cap W/O Grease Fitting (Optional Axle W/Hyd Brakes)	2
8	88-527-11	1/8" X 1" Steel Cotter Pin	2
9	80-017-00	1" Bearing	2
10	12-124-15	Hub, W/O Disc (Standard Axle W/O Brakes)	2
11	45-338-00	Seal	2
12	14-380-81	Yoke, Right Side Without Brakes (Standard)	1
	14-240-07	Yoke, Right Side With Brakes (Optional)	1
	*14-380-93	Yoke, Right Side Without Brakes (Standard)	1
	*14-380-86	Yoke, Right Side With Brakes (Optional)	1
13	21-009-10	King Pin	2
14	12-158-10	Hub, With Disc (Optional Axle)	2

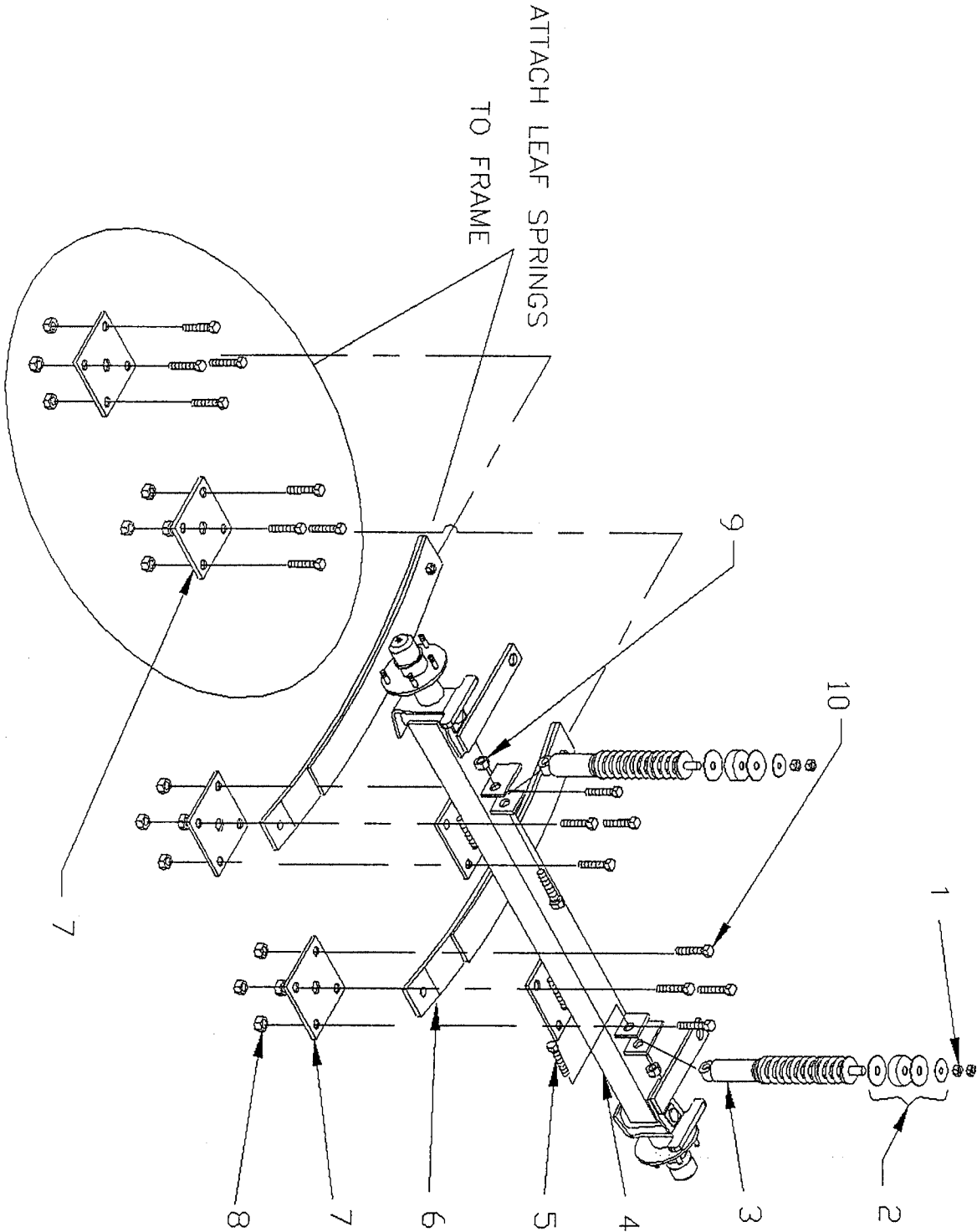
\*THESE PARTS ARE FOR VEHICLES WITH SERIAL NUMBERS LESS THAN 124156



Section 4

# FRONT SUSPENSION

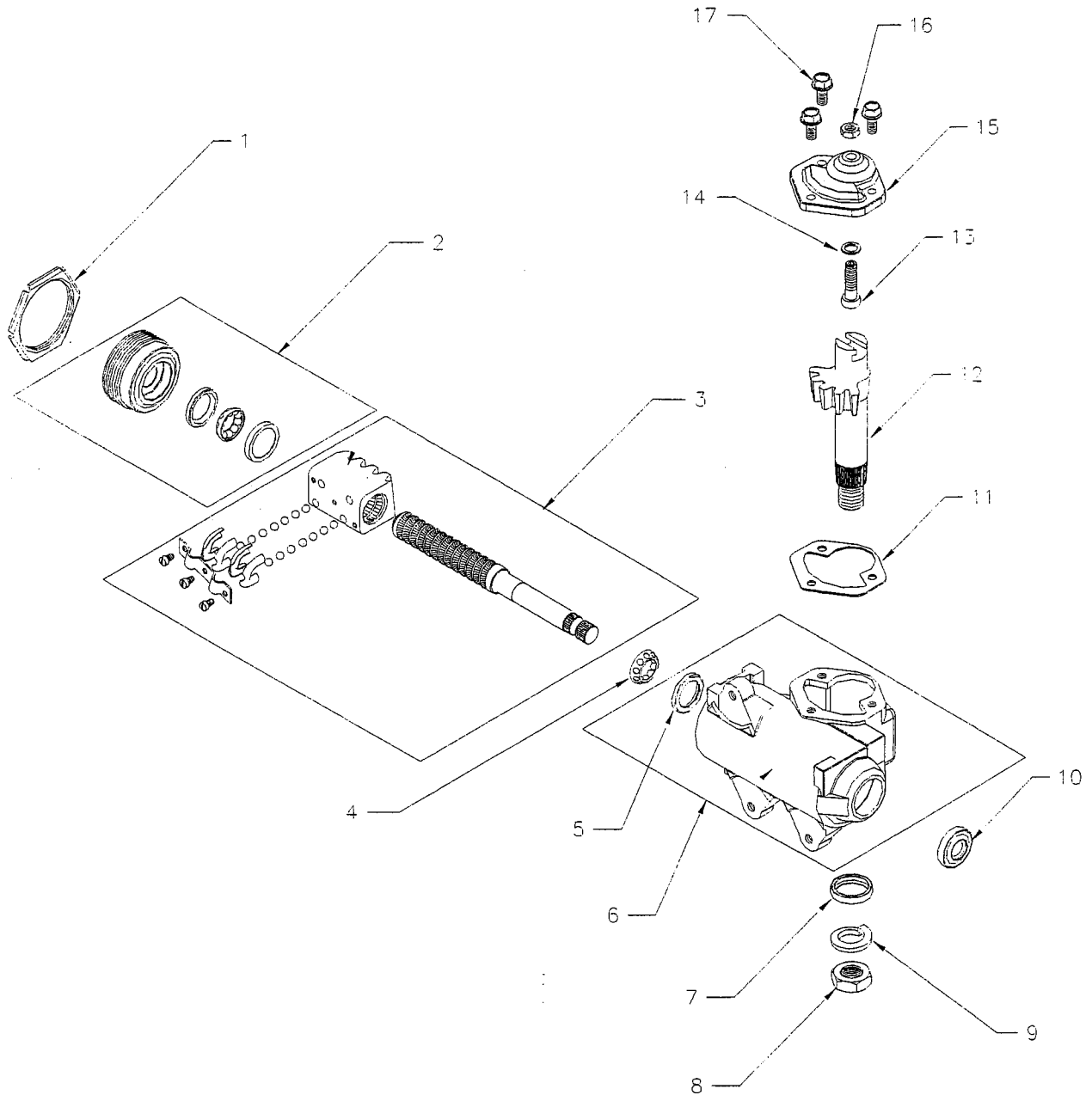
R380 Front Suspension, Jh



FRONT SUSPENSION			
ITEM#	PART #	DESCRIPTION	QTY
1	88-119-80	3/8" NF HEX HD Nut	4
2	86-006-01	Hardware, Shock Mounting	2
3	86-006-00	Shock Absorber	2
4	See Pg 4-3	Assy Front Axle W/Hubs	1
5	88-121-19	7/16" X 2-3/4" NC HEX Cap Screw GR5	2
6	85-506-01	Spring, 2 Leaf	2
7	01-680-61	Plate, Spring Pad	4
8	88-109-81	3/8" NC Lock Nut	16
9	88-129-81	7/16" NC Lock Nut	2
10	88-100-15	3/8" X 1-3/4" NC HEX Head Screw	16

Section 4

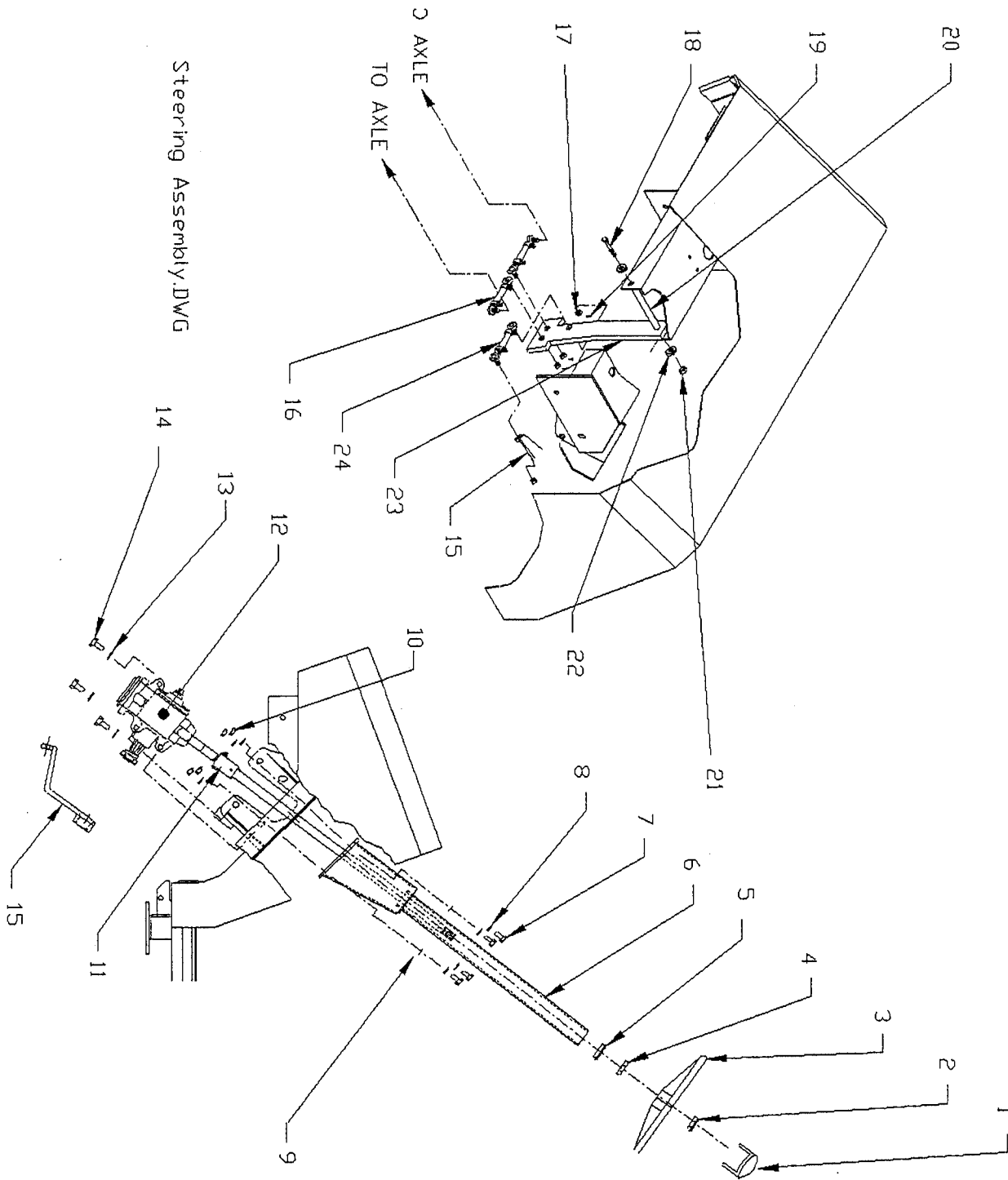
# STEERING GEAR



STEERING GEAR			
ITEM#	PART #	DESCRIPTION	QTY
1	18-308-70	Locknut, Worm Bearing Adjuster	1
2	18-308-71	Adjuster Assembly	1
3	18-308-72	Worm Assembly	1
4	18-308-23	Upper Worm Bearing	1
5	18-308-22	Upper Worm Bearing Race	1
6	18-308-77	Housing, Steering Gear	1
7	18-308-78	Seal, Pitman Shaft	1
8	18-308-80	Nut, Pitman Shaft	1
9	18-308-81	Lock Wahser, Pitman Shaft	1
10	18-308-79	Seal, Worm Shaft	1
11	18-308-82	Gasket, Side Cover	1
12	18-308-76	Pitman Shaft	1
13	18-308-75	Lash Adjuster	1
14	18-308-85	Shim Kit	1
15	18-308-84	Side Cover	1
16	18-308-86	Nut, Lask Adjuster	1
17	18-308-83	Bolt, Side Cover	3

Section 4

# STEERING ASSY

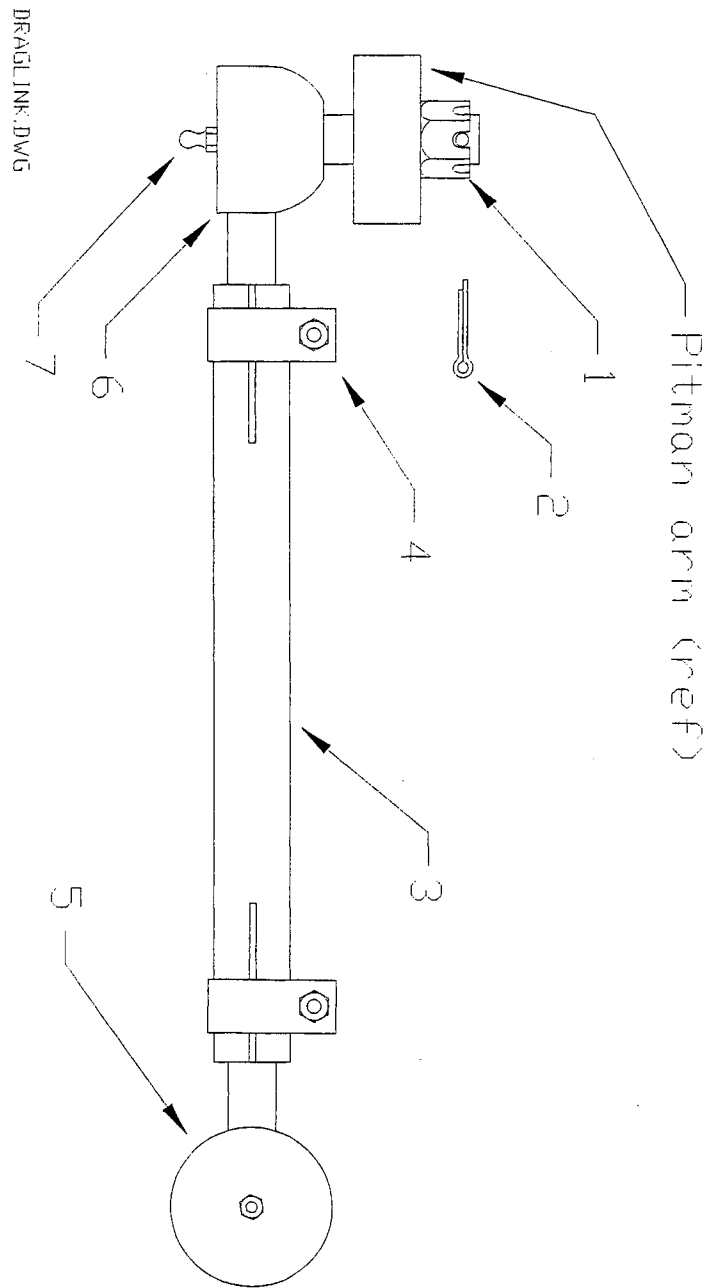


STEERING ASSEMBLY			
ITEM #	PART #	DESCRIPTION	QTY
1	19-011-23	Steering Wheel Cover	1
2	88-199-82	5/8"NF HEX Head Jam Nut	1
3	19-011-20	Wheel , Steering, 3 Spoke	1
4	97-200-00	Washer, Dust	1
5	32-248-10	3/4" ID Bushing	1
6	00-680-15	Steering Column	1
7	88-100-11	3/8" X 1" NC HEX Head Screw	4
8	88-108-62	3/8" Lockwasher	4
9	88-108-60	3/8" Cut Washer	8
10	97-211-30	3/8" U-Nut	4
11	20-031-44	Assembly, Steering, Clamp Type	1
12	18-308-21	Steering Gear	1
13	88-128-62	7/16" Lock Washer	3
14	88-120-11	7/16" X 1" NC HEX Head Cap Screw	3
15	00-680-13	Pitman Arm	1
16	50-002-07	Steering Sleeve Assembly	2
17	88-159-85	1/2-20 NF HEX, Slotted Nut	6
18	88-140-32	1/2" X 7" NC HEX Head Bolt	1
19	88-527-11	1/8" X 1" Steel Cotter Pin	6
20	32-215-00	Bearing, FLANGETURCITEF	2
21	88-149-81	1/2"NC Lock Nut	1
22	88-148-61	1/2" SAE Washer	1
23	00-680-12	Steering Arm	1
24	50-002-07	Steering Sleeve Assembly, Drag Link, 5.0"	1

80-400-10 3/4" Sealed Bearing (upper shaft)

Section 4

# DRAG LINK

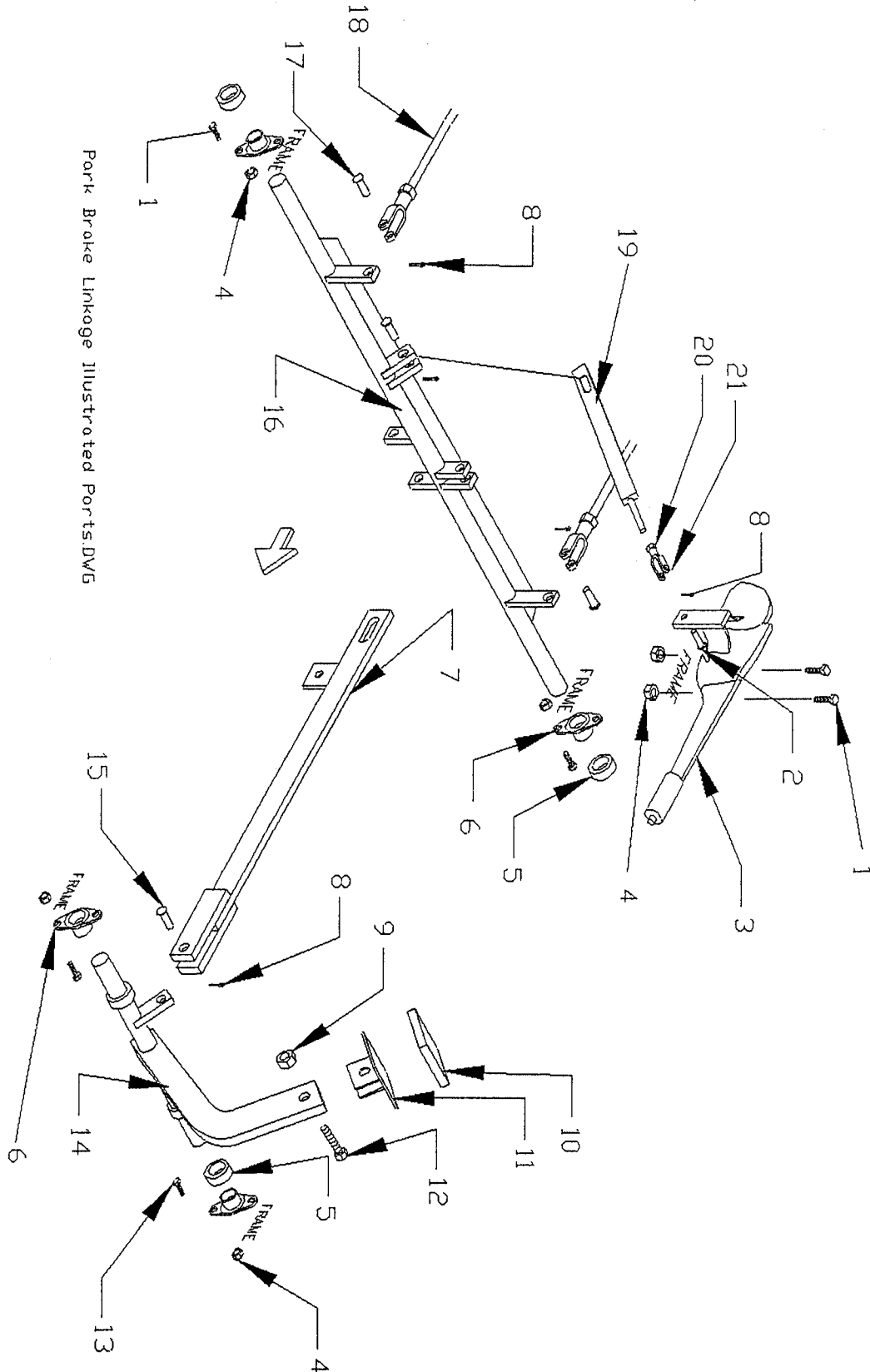


DRAG LINK			
ITEM #	PART #	DESCRIPTION	QTY
1	88-159-85	Castle Nut	2
2	88-257-11	Cotter Pin	2
3	18-020-30	Drag Link, Sleeve	1
4	86-510-00	Ball Joint Clamp	2
5	86-501-99	Ball Joint with Grease Fitting (RH)	1
6	86-501-98	Ball Joint with Grease Fitting (LH)	1
7	87-071-00	Grease Fitting	2



Section 4

# PARK BRAKE LINKAGE

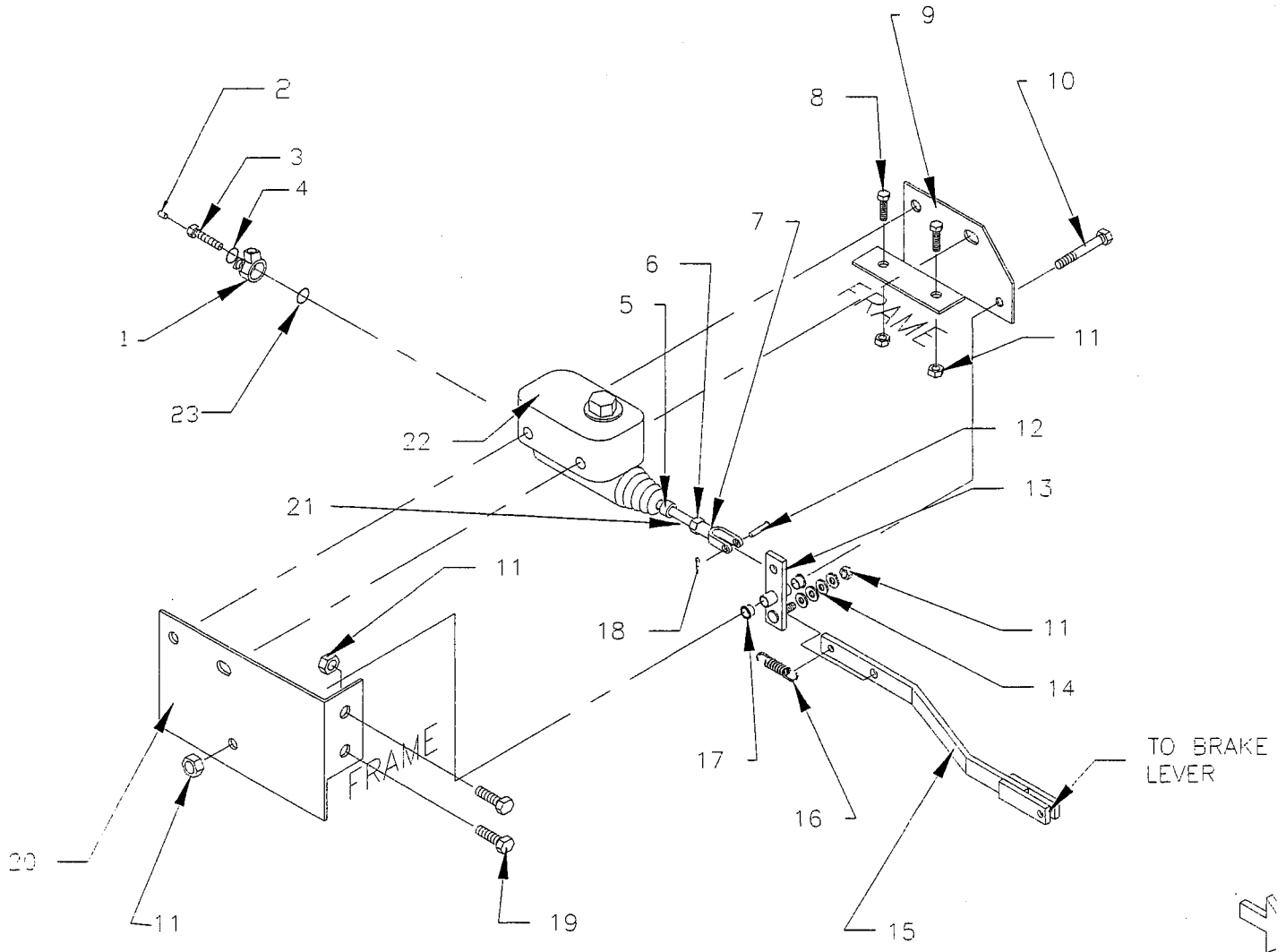


Park Brake Linkage Illustrated Parts.DWG

PARKING BRAKE LINKAGE			
ITEM #	PART #	DESCRIPTION	QTY
1	88-100-11	3/8" X 1" NC HEX Head Screw	10
2	96-773-00	5/16" X 1" Clevis Pin	1
3	51-344-10	Park Brake Lever	1
4	88-109-81	3/8"NC Lock Nut	8
5	17-110-00	3/4", Collar, Shaft	4
6	80-410-20	Bearing, 2-Bolt Flange	4
7	02-380-40	Weldment, Brake Rod	1
8	88-527-11	1/8" X 1" Cotter Pin	6
9	88-089-81	5/16" NC Lock Nut	1
10	98-200-00	Rubber Brake Pedal Pad	1
11	01-432-98	Weldment, Bake Pedal	1
12	88-080-11	5/16" X 1" NC HEX Bolt	1
13	88-100-09	3/8" X3/4" NC HEX Head Screw	8
14	02-380-39	Weldment, Service Brake	1
15	96-773-00	5/16" X 1" Clevis Pin	1
16	01-380-23	Weldment, Main Brake Shaft	1
17	96-763-00	5/16" Clevis	3
18	02-380-72	Rod, Mechanical Brake	2
19	01-380-62	Weldment, Hand Brake Linkage	1
20	88-099-80	3/8"NC HEX Head Nut	3

Section 4

# HYDRAULIC FOOT BRAKE LINKAGE



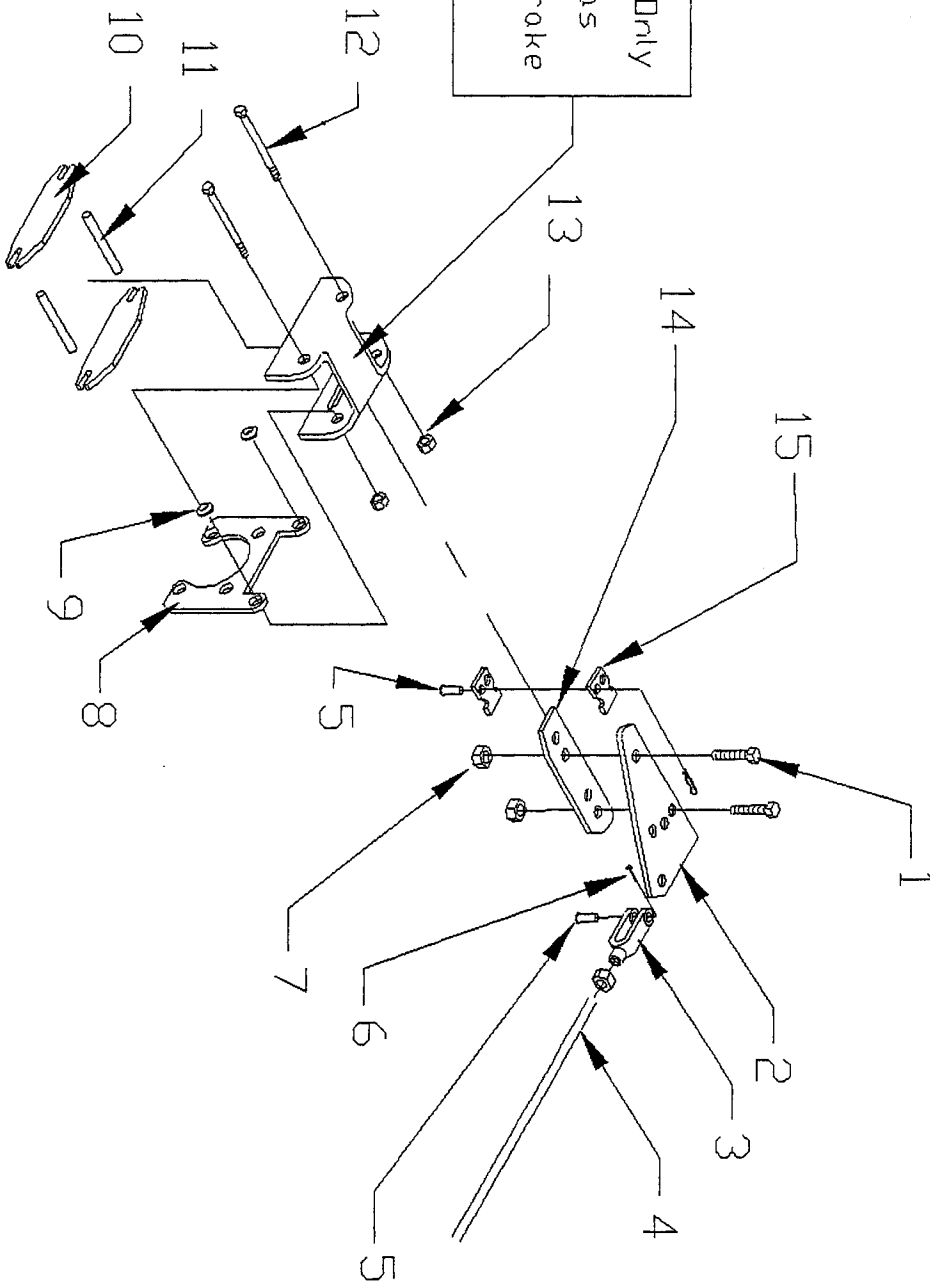
HYDRAULIC FOOT BRAKE LINKAGE			
ITEM#	PART #	DESCRIPTION	QTY
1	99-565-00	Y-Fitting	1
2	99-575-10	1/8" Pipe to 3/16" Tube Fitting, (Used in Vehicles W/ Front and Rear Hydraulic Brakes.)	1
3	99-578-00	Wagner Bolt, F3474-007, (Used in Vehicles W/ Front and Rear Hydraulic Brakes.)	1
	99-579-00	Wagner Bolt, FC673	1
4	99-571-00	Washer, Wagner #FC602	1
5	17-104-00	3/8" Collar	1
6	88-119-80	3/8" NF Hex Head Nut	1
7	96-762-00	Clevis	1
8	88-100-11	3/8" X 1" NC HEX Head Cap Screw	2
9	01-380-76	Support Plate for Master Cylinder	1
10	88-101-20	3/8" X 3" NC HEX Head Cap Screw	1
11	88-109-81	3/8" NC Lock Nut	6
12	96-772-00	3/8" X 1" Clevis Pin	1
13	00-380-77	Bellcrank, Weldment	1
14	88-108-61	3/8" SAE Washer	4
15	00-380-80	Weldment, Brake Rod, Hydraulic	1
16	85-270-00	Return Spring	1
17	32-215-00	Flanged Bearing	2
18	88-517-09	Cotter Pin	1
19	88-100-09	3/8" X 3/4" NC HEX Head Cap Screw	2
20	00-380-79	Weldment, Plate Master Cylinder	1
21	50-009-00	Push Rod	1
22	99-510-02	Master Cylinder	1
23	99-572-00	Washer, Wagner #FC603	1

Section 4

# REAR BRAKES STANDARD & OPTIONAL HYDRAULIC

## STANDARD MECHANICAL BRAKES

This Part Can Only Be Purchased as Part of the Brake Caliper.

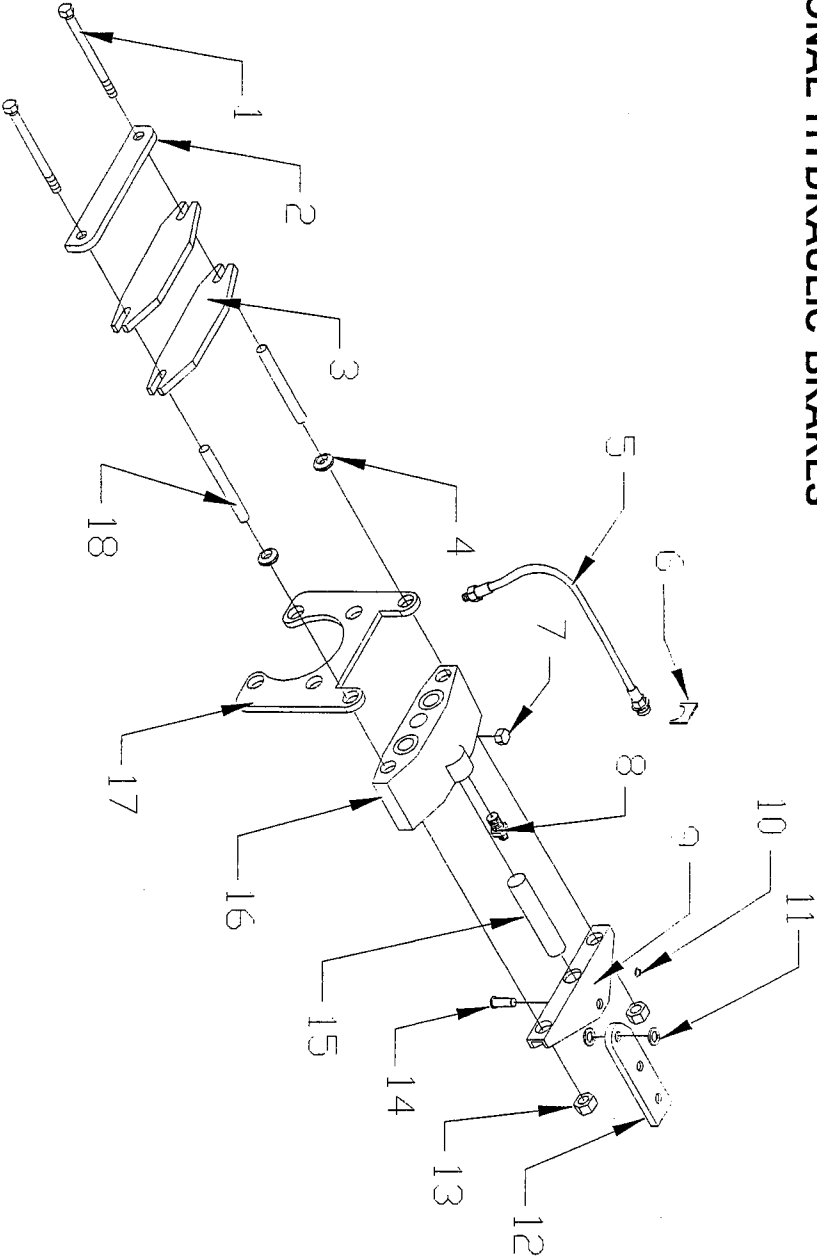


REAR BRAKES			
ITEM#	PART #	DESCRIPTION	QTY
1	88-080-09	5/16" x 3/4"NC Bolt	4
2	02-380-73	Mechanical Brake Lever	1
3	96-765-00	5/16"NF-LF Clevis	2
4	02-380-72	Mechanical Brake Rod	2
5	96-773-00	5/16" X 1" Clevis Pin	4
6	88-527-11	1/8" 1" Cotter Pin	2
7	88-069-82	5/16" NC Lock Nut	4
8	41-348-53	Brake Mounting Bracket	2
9	32-240-40	3/8" Bushing	4
10	41-348-70	Disc Brake Pad	4
11	41-348-52	Disc Brake Spacer	4
12	88-067-18	1/4" X 2-1/4" HEX Head Bolt	4
13	88-069-82	1/4" Lock Nut	4
14	41-348-51	Actuating Lever	2
15	41-348-54	Pivot Plate	4
Not Shown	41-348-98	Mechanical Brake Caliper, Left	1
	41-348-99	Mechanical Brake Caliper, Right	1

Section 4

# REAR BRAKES STANDARD & OPTIONAL HYDRAULIC (CONT'D)

## OPTIONAL HYDRAULIC BRAKES

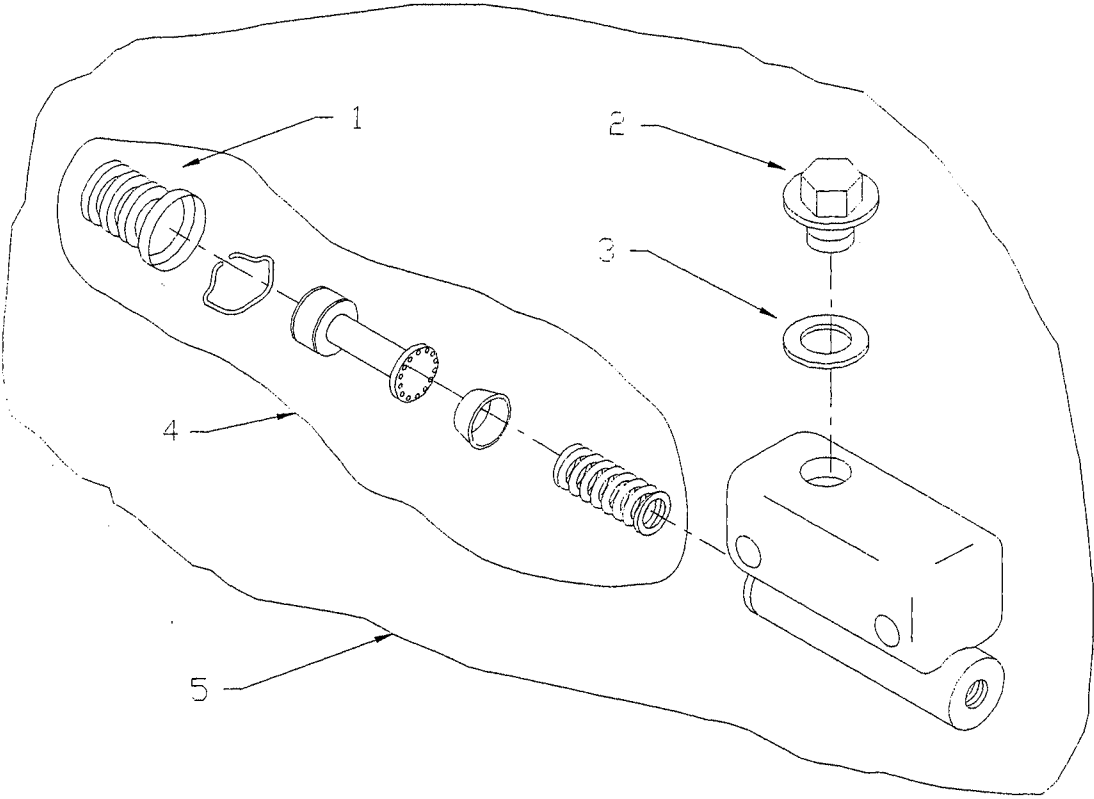


OPTIONAL HYDRAULIC REAR BRAKES			
ITEM#	PART #	DESCRIPTION	QTY
1	88-067-21	Brake Body Bolt	4
2	41-350-51	Brake Pad Backing Plate	2
3	41-348-70	Brake Pad	4
4	32-240-40	Bushing	4
5	99-580-20	Brake Hose	2
6	99-576-00	Brake Hose Clip	2
7	41-886-00	1/8" Pipe Plug	2
8	99-588-01	Bleeder Fitting	2
	99-588-00	Bleeder Valve	2
9	41-350-12	Park Brake Lever Bracket	2
10	88-840-11	5/16" Retaining Ring	2
11	88-100-00	Washer	4
12	41-350-53	Parking Brake Arm	2
13	88-069-82	Brake Body Nut (Grade 8) Do Not Reuse	4
14	41-348-52	Clevis Pin	2
15	41-350-56	Parking Brake Pin	2
16	41-350-42	Brake Body (Left and Right)	2
17	41-350-08	Axle Retaining Bracket	2
18	41-348-52	Spacer	4
Not Shown	41-350-68	Brake Body Rebuild Kit (Incl: # 7,8,13)	2



Section 4

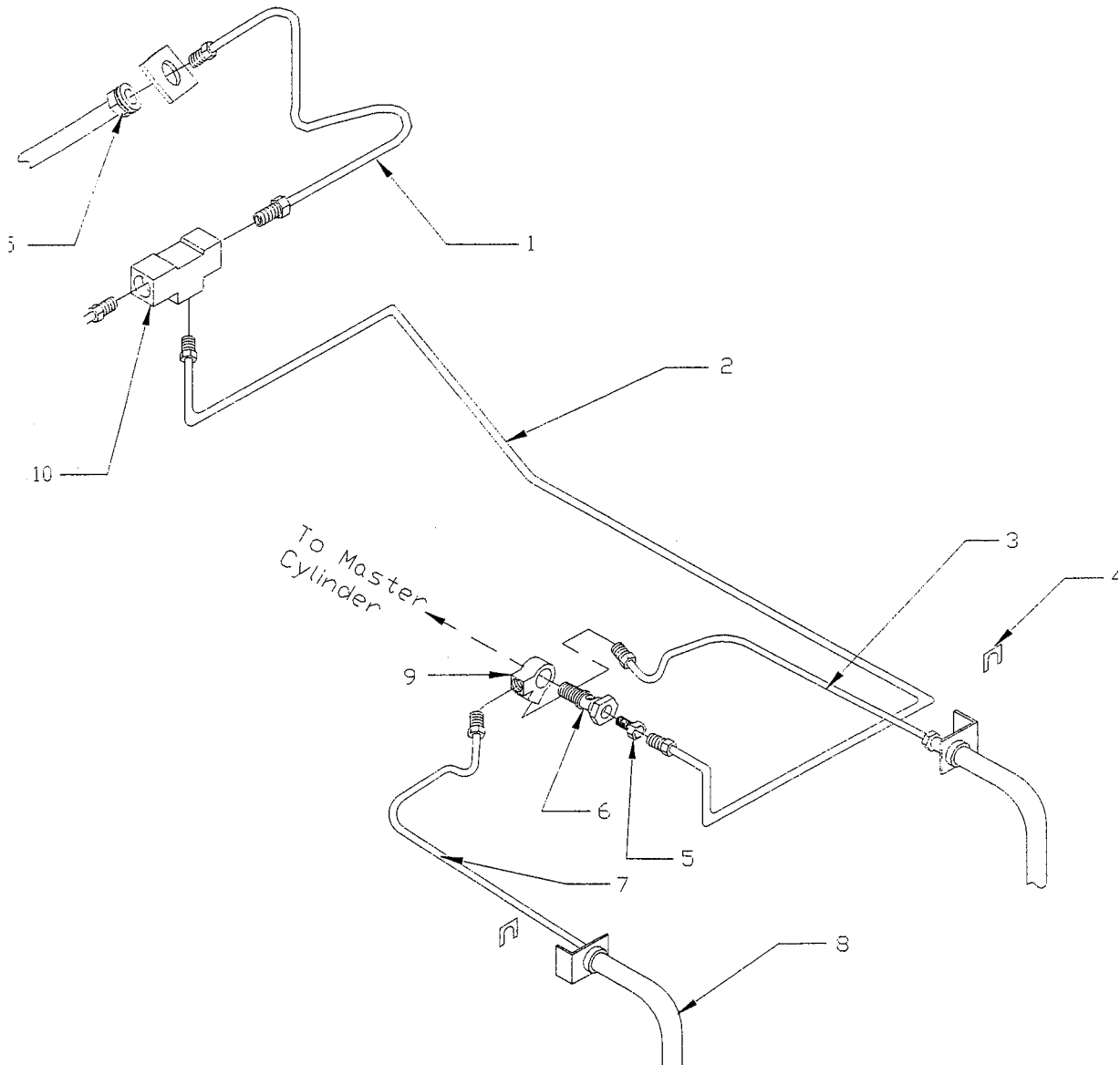
# MASTER CYLINDER



MASTER CYLINDER			
ITEM#	PART #	DESCRIPTION	QTY
1	99-510-51	Boot	1
2	99-510-52	Cap	1
3	99-510-53	Gasket	1
4	99-510-61	Rebuild Kit	1
5	99-510-02	Master Cylinder Assembly	1

Section 4

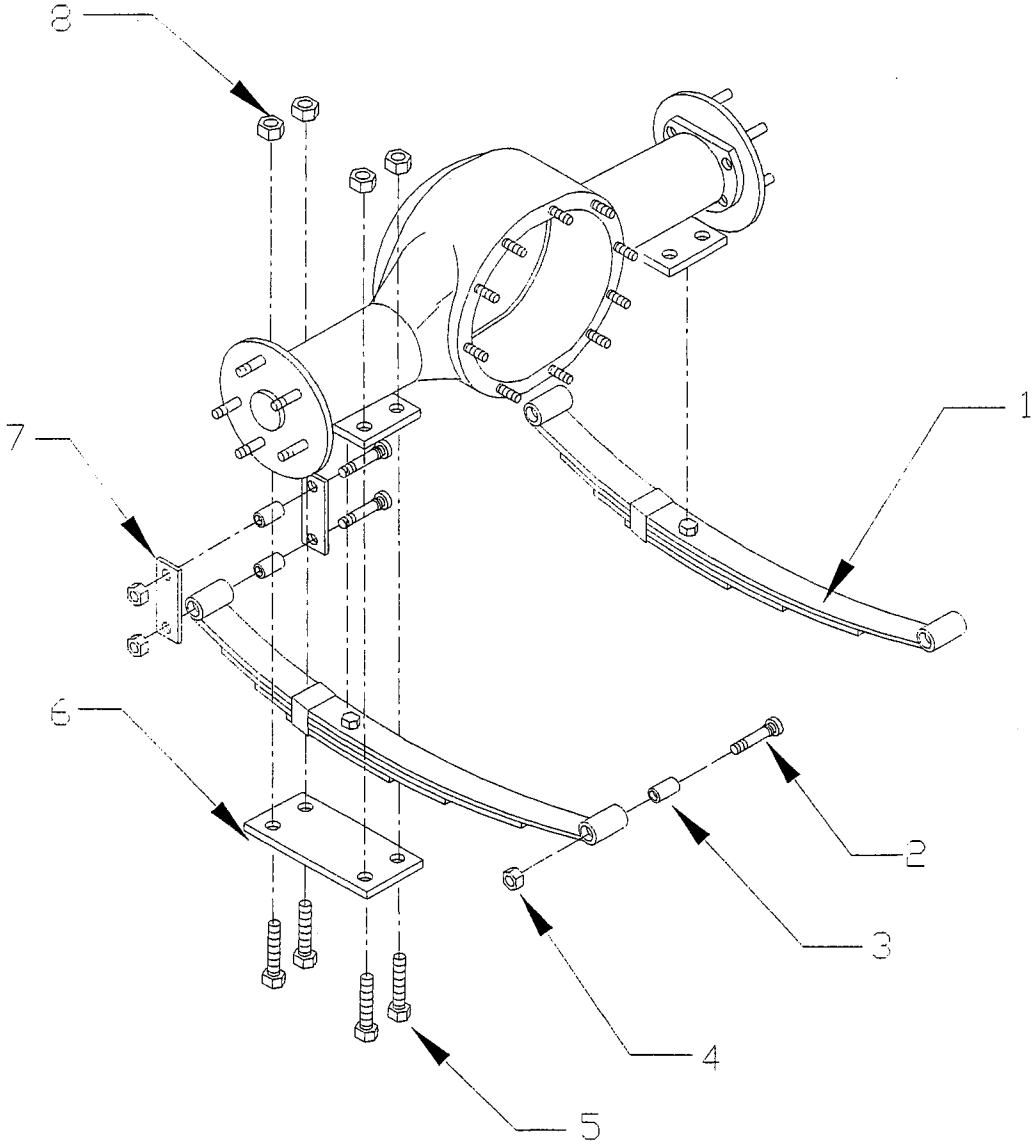
OPTIONAL BRAKE LINES AND HOSES



BRAKE LINES AND HOSES			
ITEM#	PART #	DESCRIPTION	QTY
1	99-604-56	Front Brake Line, Right, 3/16" X 20"	1
	99-604-57	Front Brake Line, Left, 3/16" X 20"	1
2	99-609-54	Brake Line, Formed, 3/16" X 72"	1
3	99-604-58	Rear Brake Line, Right, 3/16" X 20"	1
4	99-576-00	Hose Retaining Clip	4
5	99-575-10	1/8" NPT X 3/16" T, Adapter (Used with Front & Rear Hydraulic Brakes Only)	1
6	99-579-00	Wagner Bolt (Used with Rear Hydraulic Brakes Only)	1
	99-578-00	Wagner Bolt (Used with Front & Rear Hydraulic Brakes Only)	1
7	99-604-59	Rear Brake Line, Left, 3/16" X 20"	1
8	99-580-20	Brake Hose	4
9	99-565-00	Y-Fitting	1
10	99-564-00	T-Fitting (Used with Front & Rear Hydraulic Brakes Only)	1
Not Shown	99-526-01	1/8" NPTF, HEX Socket Plug, Brass (Used with Rear Hydraulic Brakes Only)	1

Section 4

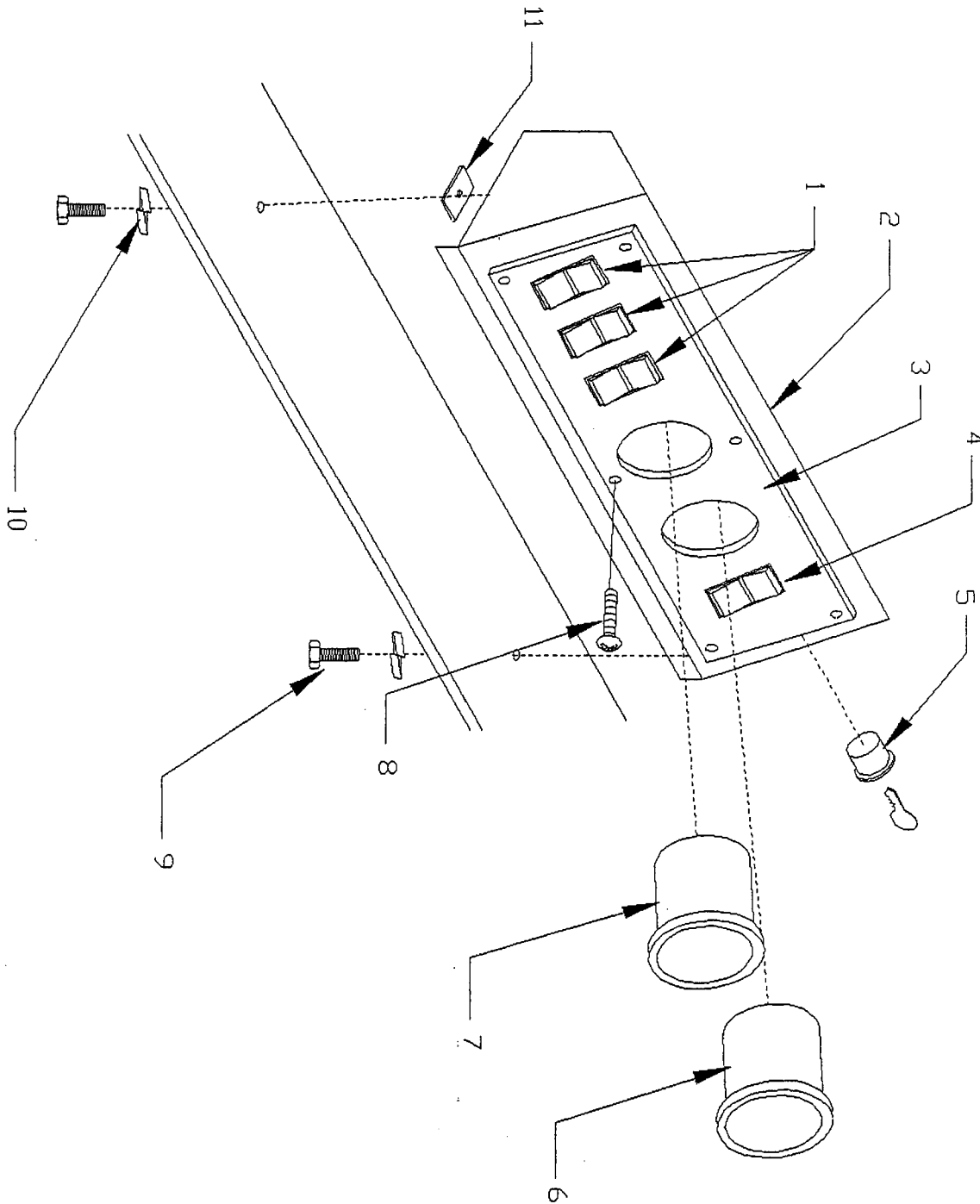
# REAR SUSPENSION



REAR SUSPENSION			
ITEM#	PART #	DESCRIPTION	QTY
1	85-507-00	Leaf Spring	2
2	96-248-00	9/16" X 3" Shackle Bolt	6
3	32-213-00	Bushing	6
4	88-169-81	9/16" NC HEX Head Lock Nut	6
5	88-100-15	3/8" NC X 1-3/4" HEX Bolt	8
6	16-861-00	Spring Pad	2
7	16-871-00	Leaf Spring Shackle Strap	4
8	88-109-87	3/8" NC Lock Nut	8

Section 4

# INSTRUMENT PANEL

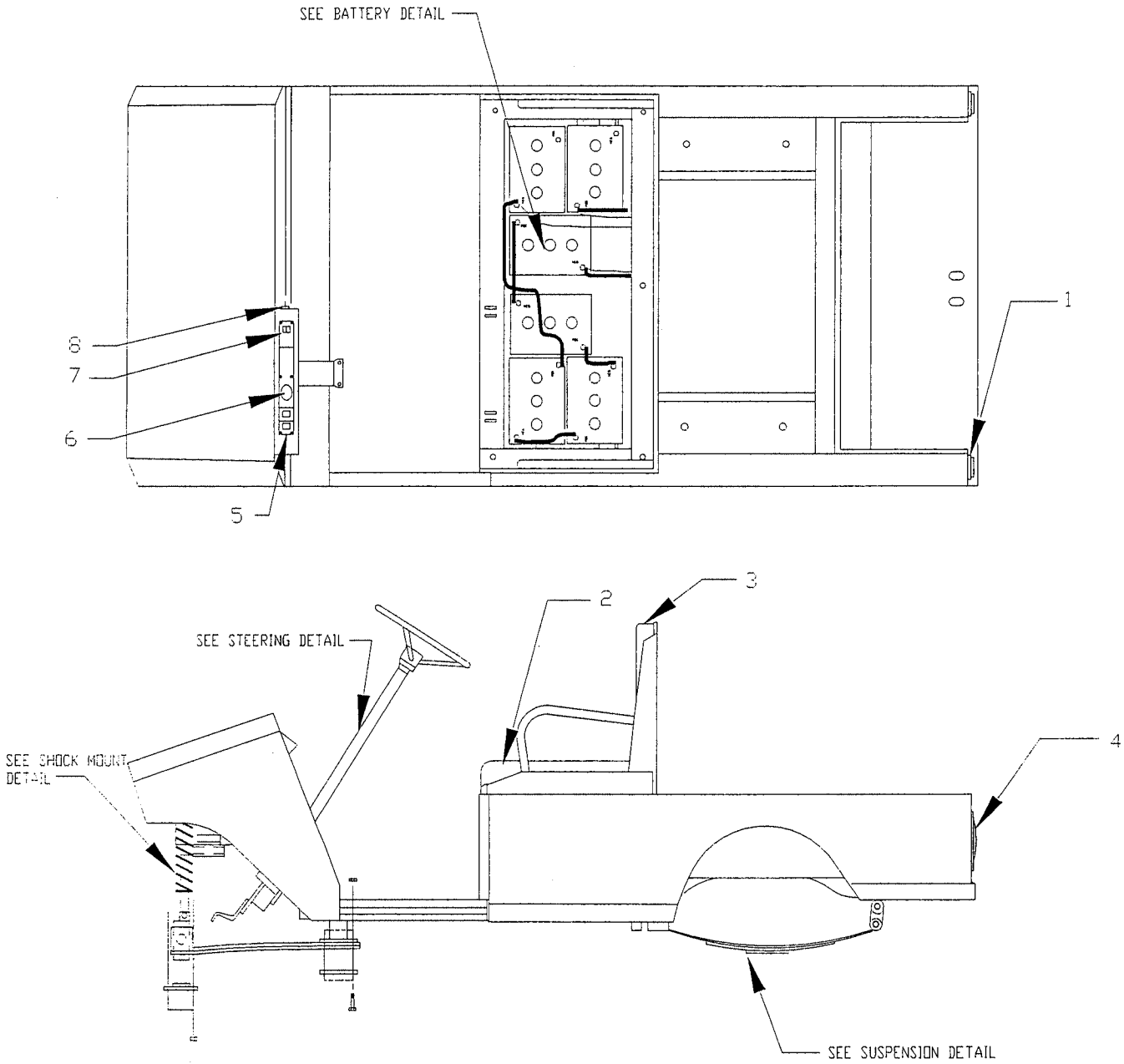


INSTRUMENT PANEL			
ITEM#	PART #	DESCRIPTION	QTY
1	71-039-10	Rocker Switch	1-3
2	01-200-44	Instrument Panel Console	1
3	94-304-10	Instrument Panel	1
4	71-039-00	Foward/Reverse Switch	1
5	71-120-00	Key Switch	1
6	74-000-00	Hour Meter (Optional)	1
7	74-009-00	Hour/Battery Status Indicator	1
8	88-817-07	#8 X 1/2" Dash Screw	1
9	88-068-62	1/4" Lock Washer	2
10	88-065-09	1/4" X 3/4" NC Phillips Truss Head	2
11	97-211-20	1/4" NC U-Nut	2



Section 4

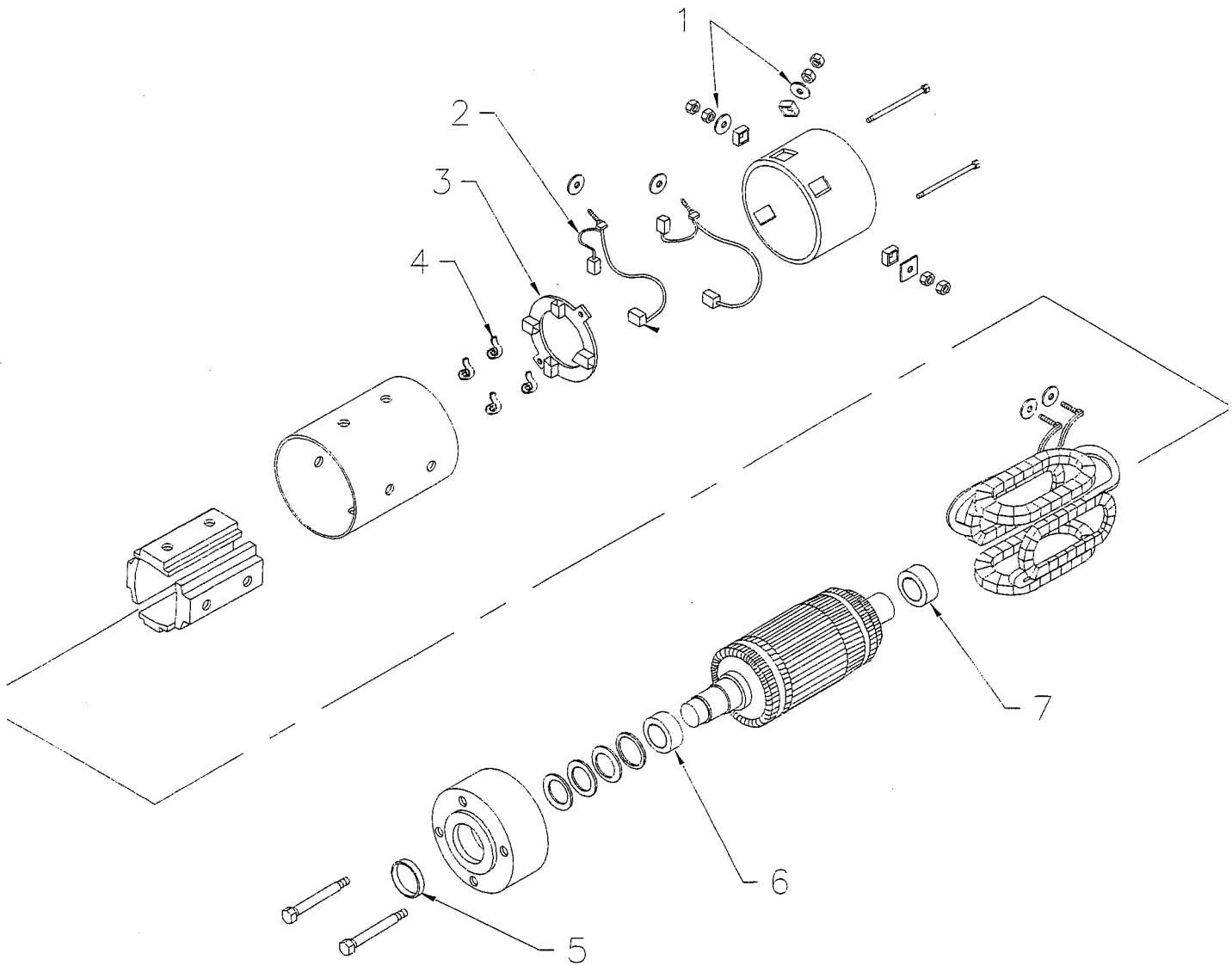
# FRAME



FRAME			
ITEM#	PART #	DESCRIPTION	QTY
1	72-022-51	Rubber Ring (For Oval Tail Light)	1
2	90-198-00	Front Seat Cushion, 16-1/2" X 21-1/4" (2 &4 Passenger Option)	2
3	90-179-00	Front Backrest, 7-3/8" X 40-1/2" (2&4 Passenger Option)	1
4	72-025-00	Oval Tail, Stop and Turn Light (With #1)	1
5	94-304-10	Instrument Panel	1
6	74-009-00	Battery Discharge Indicator	1
7	71-039-00	Forward/Reverse Selector Switch Plate	1
8	71-120-00	Keyswitch,(Ignition)	1

Section 4

# MOTORS

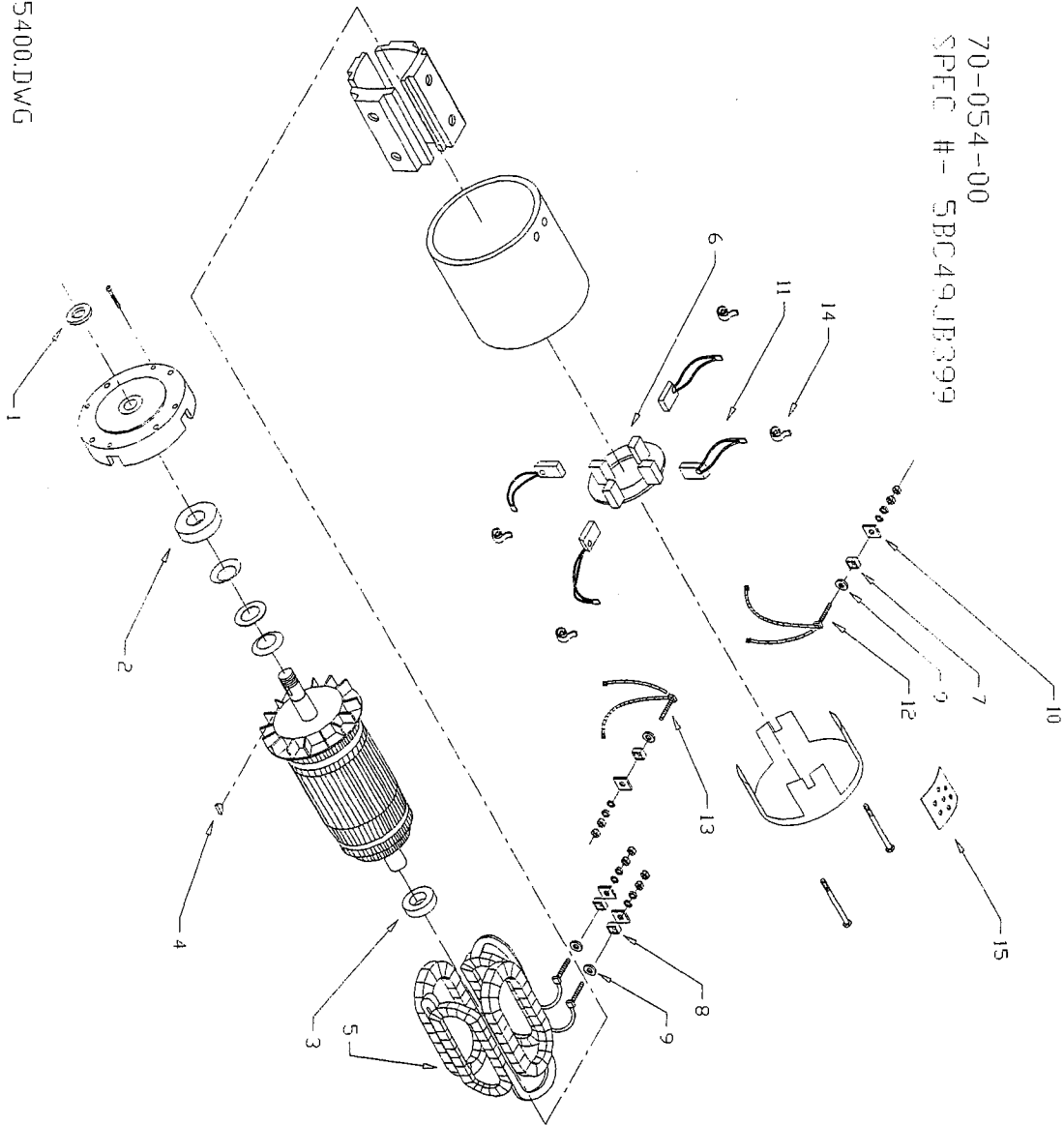


MOTOR (70-049-00)			
ITEM#	PART #	DESCRIPTION	QTY
1	70-210-62	Kit, Insulators and Motor Terminals	1
2	70-104-00	Brush Assembly W/ Stud	2
3	70-172-00	Brush Holder Assembly	1
4	85-412-00	Brush Spring	4
5	45-506-00	Oil Seal	1
6	80-504-00	Ball Bearing	1
7	80-209-00	Ball Bearing	1

Section 4

# MOTORS CONT'D

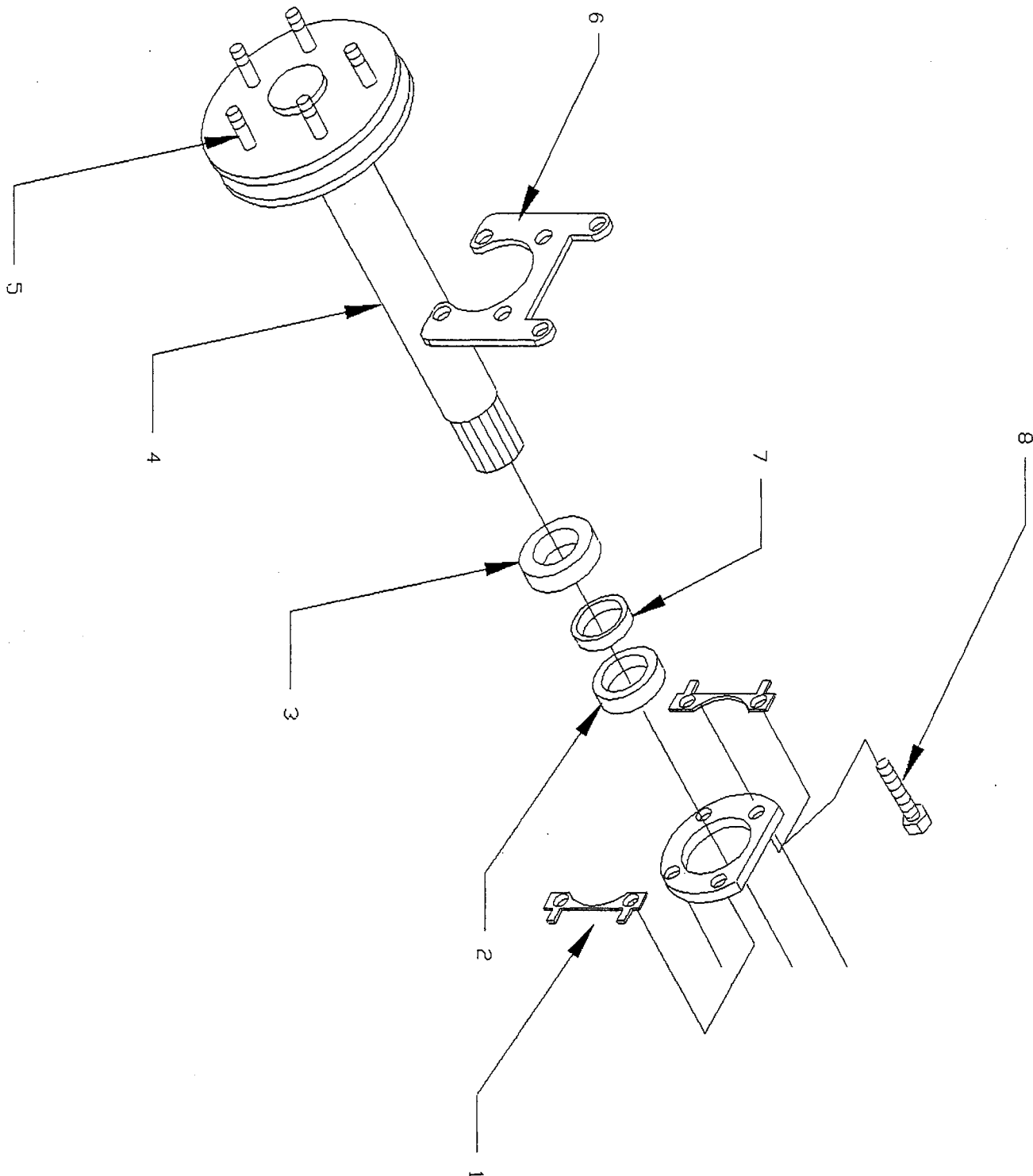
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70-054-00  
SPEC # - SBC49JB399

MOTOR (70-054-00)			
ITEM#	PART #	DESCRIPTION	QTY
1	45-508-00	Seal	1
2	80-504-00	Spacer	1
3	80-214-00	Bearing	1
4	97-100-00	Woodruff Key	1
5	70-203-10	Field Coil Set	1
6	70-188-00	Brush Holder	2
7	98-622-00	Insulator Bushing	2
8	98-623-00	Insulator Bushing	2
9	97-178-00	Fiber Washer	2
10	97-179-00	Fiber Washer	4
11	70-105-00	Brush	4
12	70-195-10	Crossover with Terminal	1
13	70-195-10	Crossover with Terminal	1
14	85-412-00	Brush Spring	4
15	30-802-00	Brush Cover	4

## Section 4

**REAR AXLE**

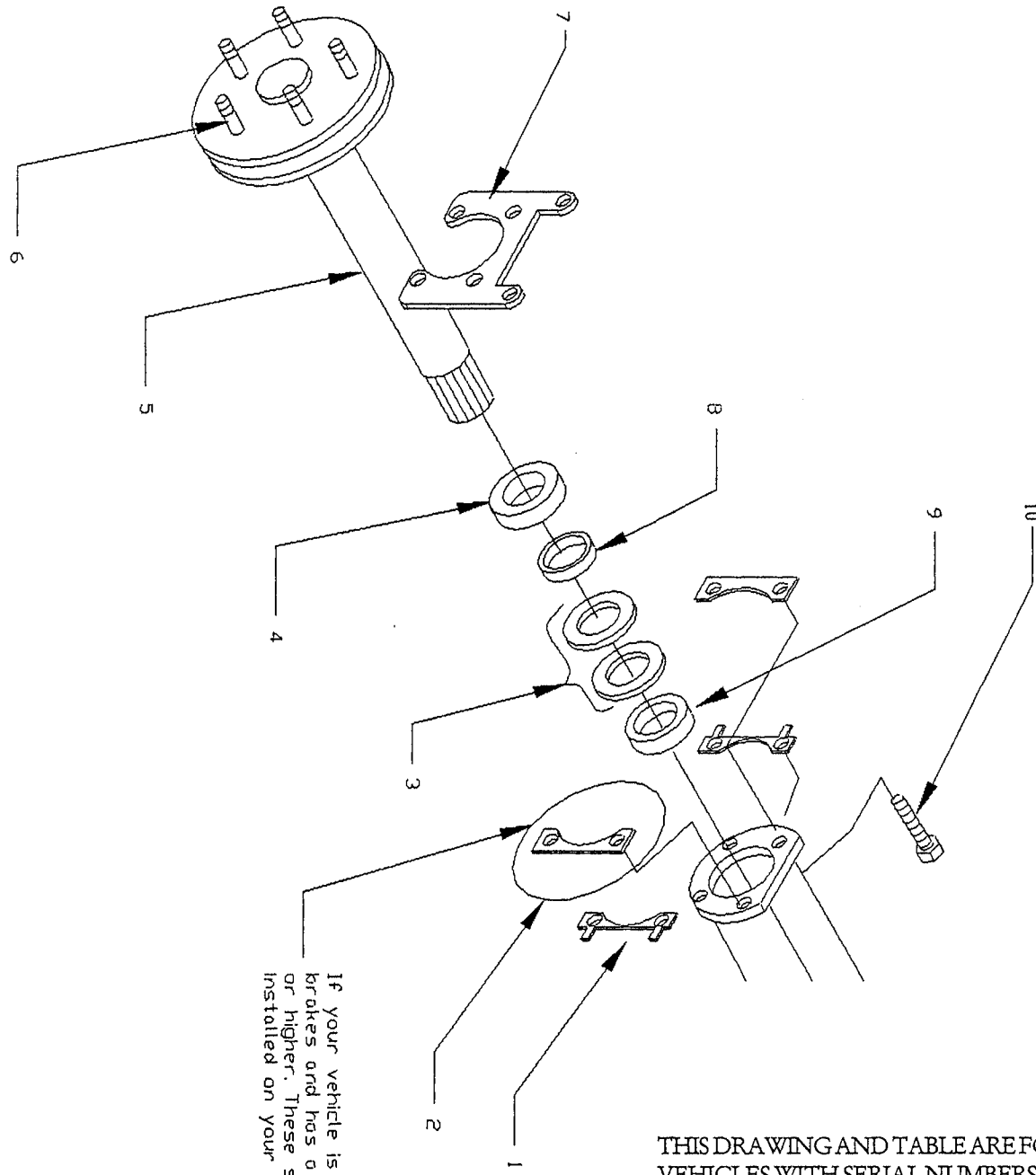
THIS AXLE IS FOR VEHICLES WITH SERIAL NUMBER OF 124157 & HIGHER. IF YOU VEHICLE HAS A SERIAL NUMBER OF 124156 OR LOWER SEE PAGE 4-36.

REAR AXLE			
ITEM#	PART #	DESCRIPTION	QTY
1	41-348-59	Two Hole Clip With Locking Tabs (F3 Drive, Mech Brakes)	4
	41-350-05	Two Hole Clip With Locking Tabs (F2 Drive, Hyd Brakes)	4
2	45-301-00	Oil Seal (F2 Drive)	2
	45-399-00	Oil Seal (F3 Drive)	2
3	80-503-00	Bearing (F2 Drive)	2
	80-491-00	Bearing (F3 Drive)	2
4	41-152-10	Axle With Bearings and Lugs (F2 Drive)	2
	41-151-11	Axle With Bearings and Lugs (F3 Drive)	2
5	96-340-60	Wheel Stud Replacement Kit	10
6	41-348-53	Brake Mounting Bracket (F3 Drive, Mech Brakes)	2
	41-350-08	Brake Mounting Bracket (F2 Drive, Hyd Brakes)	2
7	32-516-00	Bearing Retainer (F3 Drive) <b>DO NOT REUSE</b>	2
	32-515-00	Bearing Retainer (F2 Drive) <b>DO NOT REUSE</b>	2
8	96-328-00	Axle Mounting Bolt <b>DO NOT REUSE</b>	8



Section 4

REAR AXLE CONT'D

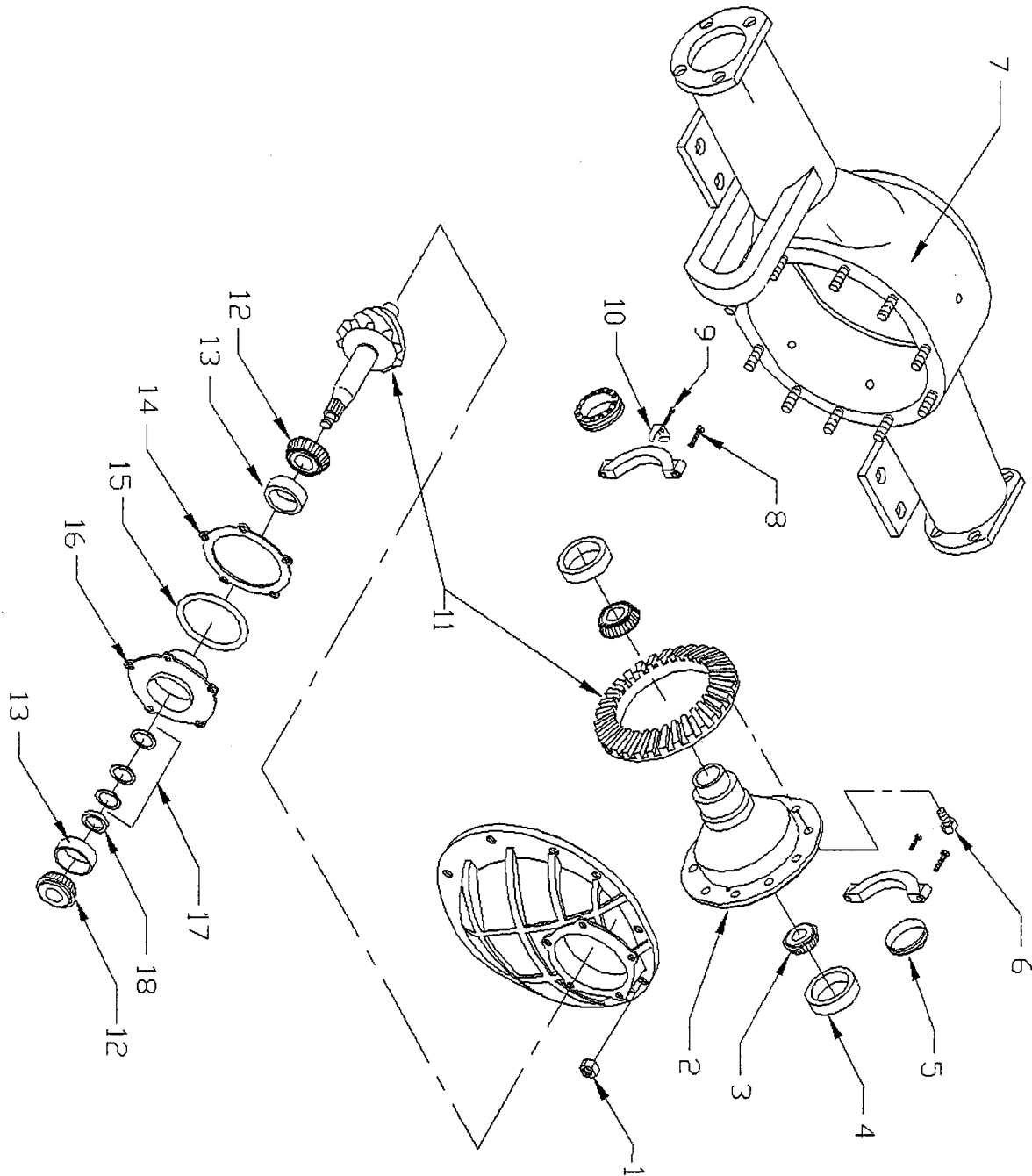


THIS DRAWING AND TABLE ARE FOR VEHICLES WITH SERIAL NUMBERS OF 124156 OR LOWER.

REAR AXLE			
ITEM#	PART #	DESCRIPTION	QTY
1	41-348-59	Two Hole Clip With Locking Tabs (F3 Drive, Mech Brakes)	4
	41-350-05	Two Hole Clip With Locking Tabs (F2 Drive, Hyd Brakes)	4
2	41-961-01	Shim (Only on F2 Drives with Hydraulic Brakes)	4
3	45-044-00	Axle Bearing Gasket	4
4	80-503-00	Bearing (F2 Drive)	2
	80-491-00	Bearing (F3 Drive)	2
5	41-152-10	Axle With Bearings and Lugs (F2 Drive)	2
	41-151-11	Axle With Bearings and Lugs (F3 Drive)	2
6	96-340-60	Wheel Stud Kit (Replacement)	10
7	41-348-53	Brake Mounting Bracket (F3 Drive, Mech Brakes)	2
	41-350-08	Brake Mounting Bracket (F2 Drive, Hyd Brakes)	2
8	32-515-00	Bearing Retainer (F2 Drive) <b>DO NOT REUSE</b>	2
	32-516-00	Bearing Retainer (F3 Drive) <b>DO NOT REUSE</b>	2
9	45-301-00	Oil Seal (F2 Drive)	2
	45-299-00	Oil Seal (F3 Drive)	2
10	96-328-00	Axle Mounting Bolt <b>DO NOT REUSE</b>	8

Section 4

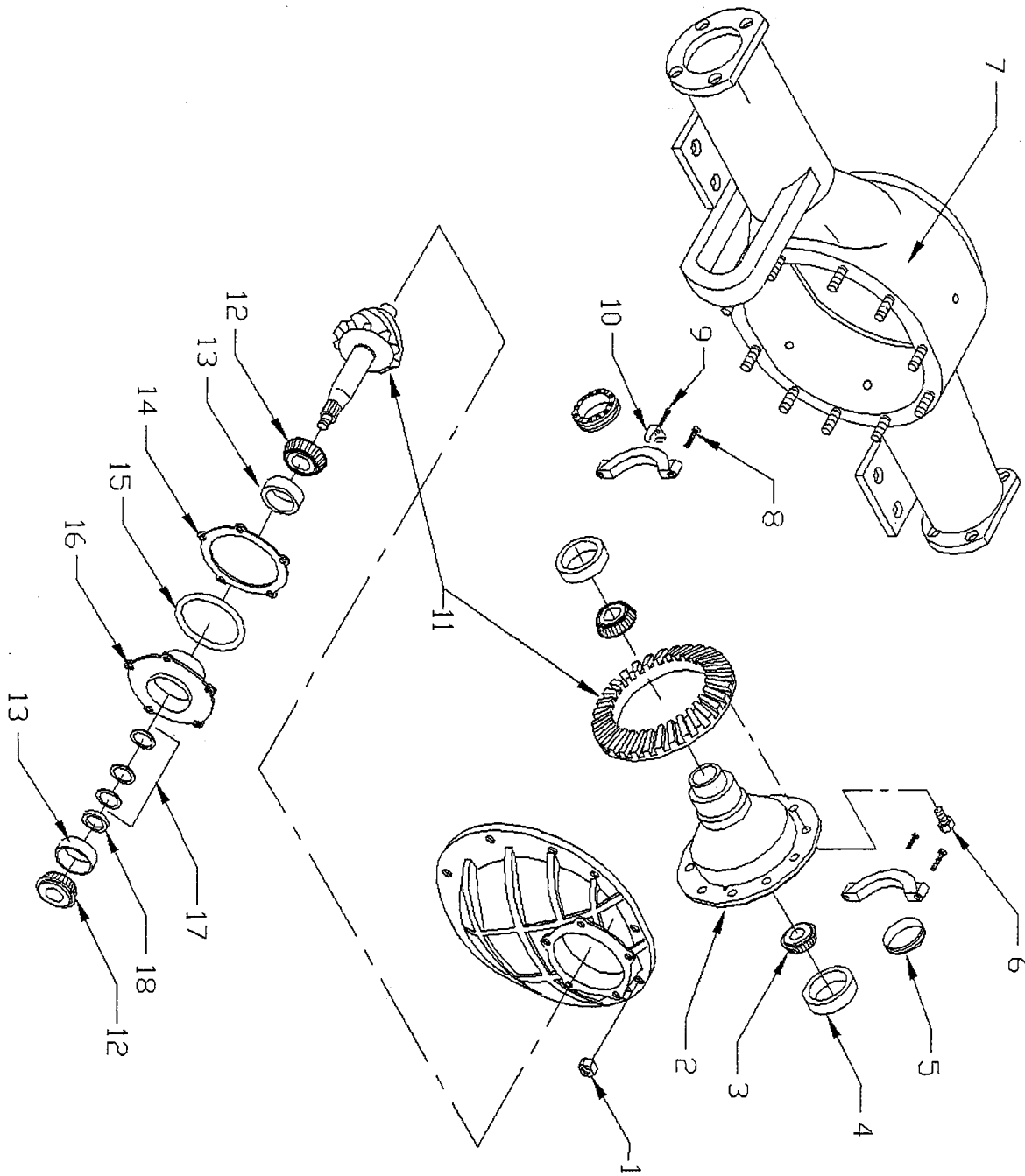
3<sup>RD</sup> MEMBER & AXLE ASSEMBLY(F3)



3RD MEMBER & AXLE ASSEMBLY(F3)			
ITEM#	PART #	DESCRIPTION	QTY
1	88-119-80	3/8" NF Nut	14
2	41-726-00	Differential Assembly	1
3	80-513-00	Carrier Bearing	2
4	80-127-00	Carrier Bearing Race	2
5	41-707-50	Bearing Adjuster Nuts 3.15 dia.	2
	41-708-50	Bearing Adjuster Nuts 2.96 dia.	2
6	96-243-00	7/16" X 7/8" Hex Bolt (Locking Head)	10
7	41-301-40	Rear End Housing, Belt Drive	1
	41-301-41	Rear End Housing, Chain Drive	1
8	88-140-16	1/2" X 2" Hex Bolt	2
	80-554-00	Front Pinion Bearing	2
9	88-080-04	5/16" X 3/8: NC Hex Bolt	2
10	41-706-50	Locking Tab	2
11	31-260-00	Ring and Pinion Gear Set (2.75)	1
	31-261-00	Ring and Pinion Gear Set (3.00)	1
	31-262-00	Ring and Pinion Gear Set (3.25)	1
	31-263-00	Ring and Pinion Gear Set (3.56)	1
	31-264-00	Ring and Pinion Gear Set (4.63)	1
13	80-125-00	Pinion Bearing Race	2
14	41-711-00	Pinion Housing Shim	1
15	80-702-00	O-Ring	1
16	41-341-90	Pinion Housing, Chain Drive	1
	41-341-91	Pinion Housing, Belt Drive	1
17	16-419-00	.002 Shim (Add Shims As Needed)	*
	16-420-00	.010 Shim (Add Shims As Needed)	*
	16-411-00	.005 Shim (Add Shims As Needed)	*
18	16-415-00	Spacer	1

Section 4

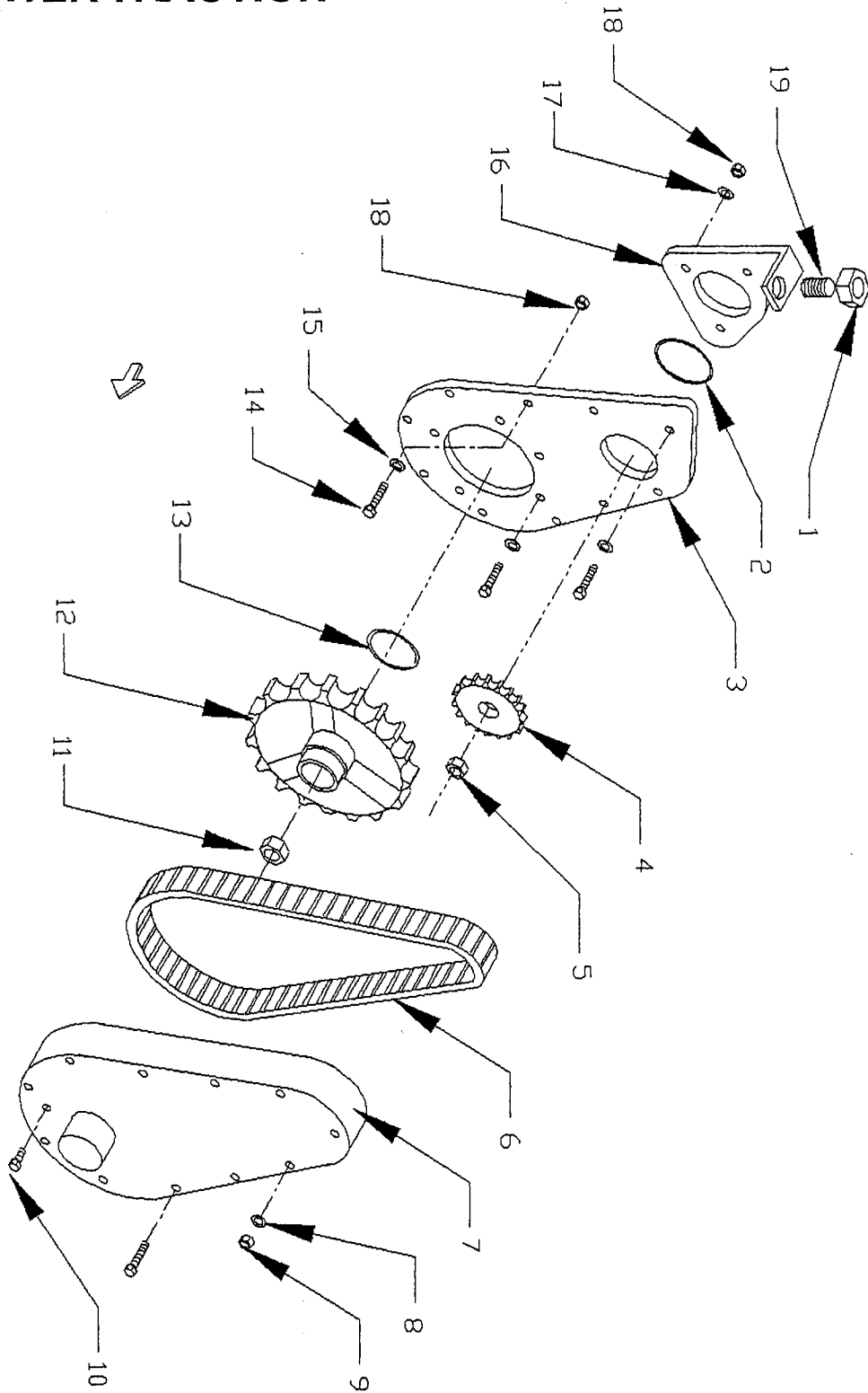
# 3<sup>RD</sup> MEMBER & AXLE ASSEMBLY (F2)



3RD MEMBER & AXLE ASSEMBLY (F2)			
ITEM#	PART #	DESCRIPTION	QTY
1	88-119-80	3/8" NF Nut	14
2	41-712-00	Differential Assembly (Small Bearing)	1
	41-713-00	Differential Assembly (Large Bearing)	1
3	80-513-00	Carrier Bearing	2
4	80-129-00	Carrier Bearing Race	2
5	41-707-50	Bearing Adjuster Nuts	2
	41-708-50	Bearing Adjuster Nuts	2
6	96-243-00	7/16" X 7/8" Hex Bolt (Locking Head)	10
7	41-291-52	Rear End Housing, Belt Drive	1
	41-291-53	Rear End Housing, Chain Drive	1
8	88-140-16	1/2" X 2" Hex Bolt	2
9	88-080-04	5/16" X 3/8" NC Hex Bolt	2
10	41-706-50	Locking Tab	2
11	31-234-00	Ring and Pinion Gear Set (3.00)	1
	31-235-00	Ring and Pinion Gear Set (2.75)	1
	31-236-00	Ring and Pinion Gear Set (2.50)	1
	31-237-00	Ring and Pinion Gear Set (3.25)	1
	31-238-00	Ring and Pinion Gear Set (4.11)	1
	31-239-00	Ring and Pinion Gear Set (5.43)	1
12	80-554-00	Pinion Bearing	2
13	80-125-00	Pinion Bearing Race	2
14	41-711-00	Pinion Housing Shim	1
15	80-702-00	O-Ring	1
16	44-340-90	Pinion Housing, Chain Drive	1
	44-340-91	Pinion Housing, Belt Drive	1
17	16-419-00	.002 Shim (Add Shims As Needed)	*
	16-420-00	.010 Shim (Add Shims As Needed)	*
	16-411-00	.005 Shim (Add Shims As Needed)	*
18	16-415-00	Spacer	1

Section 4

# POWER TRACTION

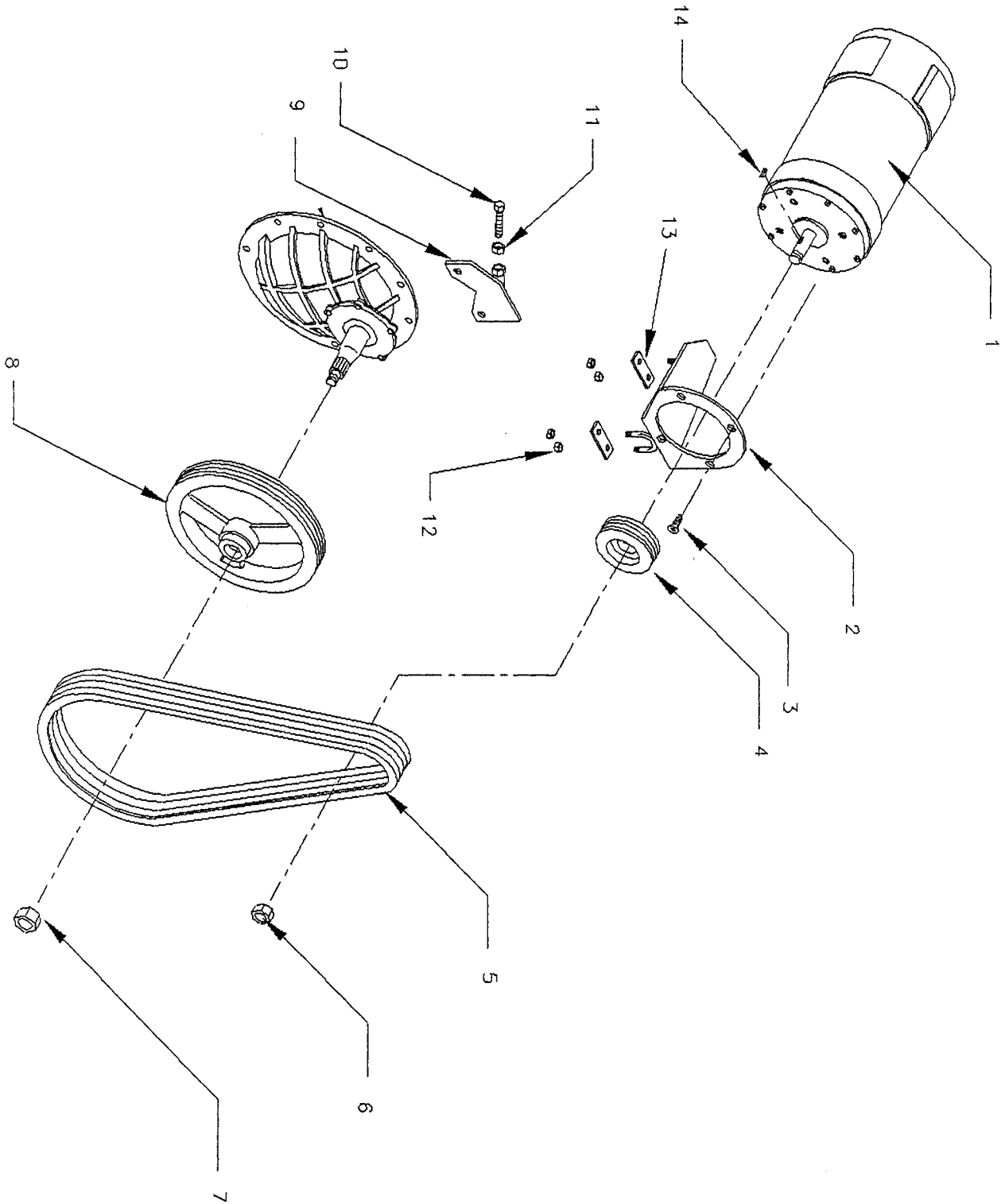


POWER TRACTION			
ITEM#	PART #	DESCRIPTION	QTY
1	88-089-80	5/16"NC Nut	1
2	80-703-00	O-Ring	1
3	44-353-10	Chain Case Backing Plate, Mechanical Brakes (F3)	1
	44-352-54	Chain Case Backing Plate, Hydraulic Disc Brakes (F2)	1
4	30-080-00	15 Toothed Sprocket (Drive Sprkt for P/N 30-504-20)	1
	30-082-00	17 Toothed Sprocket (Drive Sprkt for P/N 30-507-10)	1
5	88-239-82	3/4" NF Nut	1
6	30-504-20	Chain, 13/16"W X 37-1/2"L(For 15 T/81 T Sprockets)	1
	30-507-10	Chain, 13/16"W X 32-15/64"L(For 17 T/59 T Sprockets)	1
7	43-201-30	Chain Case cover	1
8	88-088-61	5/16" Washer	3
9	88-089-81	5/16" Locknut	12
10	41-989-00	1/4" Pipe Drain Plug	1
11	97-250-00	3/4"-20 Pinion Nut	1
12	30-094-00	81 Toothed Sprkt, Mechanical Brakes, F3(Used w/15 T )	1
	30-093-00	81 Toothed Sprkt, Hydraulic Brakes, F2 (Used w/15 T )	1
	30-095-00	59 Toothed Sprkt, Mechanical Brakes, F3 (Used w/17 T )	1
13	16-418-00	Pinion Bearing Spacer, 0.140, Mechanical Brakes (F3)	1
	16-422-00	Pinion Bearing Spacer, Hydraulic Brakes (F2)	1
14	88-101-13	3/8"NC X 1-1/4" Bolt	5
15	88-108-60	3/8" Washer	5
16	70-454-00	Motor Mount Plate	1
17	88-103-09	3/8"NC X 3/4FH Bolt	4
18	88-109-87	3/8"NC Keps Nut	4
19	88-087-11	5/16" X 1" Set Screw	1



Section 4

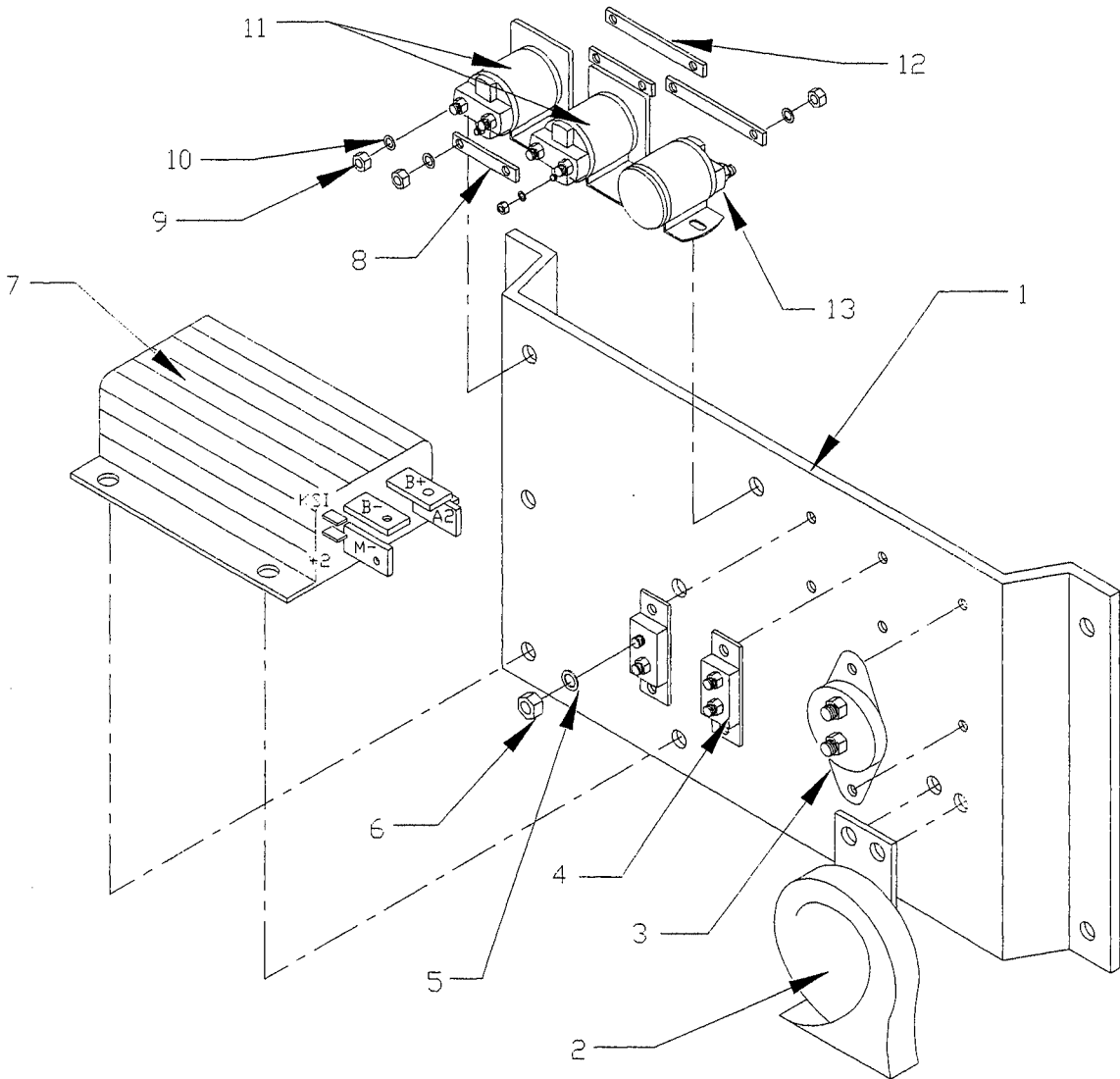
# MOTOR AND BELT ASSEMBLY



MOTOR AND BELT ASSEMBLY			
ITEM#	PART #	DESCRIPTION	QTY
1	70-049-00	Standard Motor	1
	70-054-00	Optional Motor (Not Used on Belt Drives)	1
2	00-380-96	Motor Mounting Bracket	1
3	88-103-09	3/8"NC X 3/4" Mounting Screw	4
4	30-169-00	Standard 2.65 Dia. Motor Pulley	1
	30-160-00	3.15 OD Motor Pulley	1
	30-158-00	2.43 OD Motor Pulley	1
5	30-621-00	3V425 V-Belts, Standard	4
	30-620-00	3VX400 V-Belts, Hydraulic Brakes	4
6	88-329-82	3/4" NF Thin Pattern Nut	1
7	97-250-00	Pinion Nut	1
8	30-121-00	Large Drive Pulley	1
	30-121-10	Large Drive Pulley, Hydraulic Brakes	1
9	96-316-00	1/2"NC X 3" Bolt	1
10	00-380-97	Standard Motor Adjustment Bracket (F3)	1
	41-381-10	Motor Adjustment Bracket used W/Hydraulic Brakes (F2)	1
11	88-149-80	1/2"NF HEX Head Nut	1
12	88-109-87	3/8" KEPS Nut	4
13	70-422-00	Motor Mount Strap	2
14	97-100-00	Woodruff Key	1

Section 4

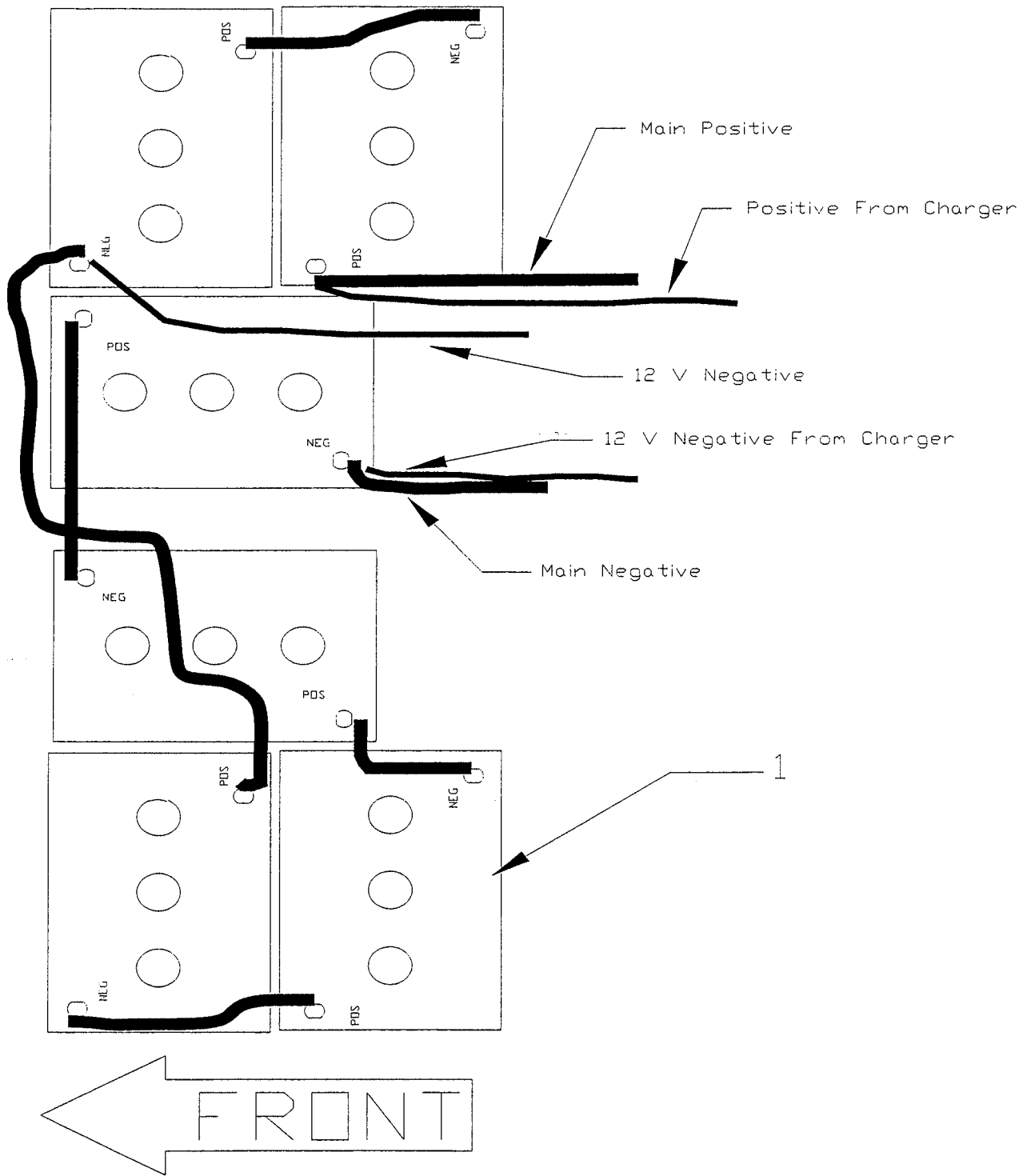
# CONTROL PANEL



CONTROL PANEL			
ITEM#	PART #	DESCRIPTION	QTY
1	01-534-80	Mounting Panel	1
2	73-004-20	12V Horn, Short Mount	1
3	79-844-00	Circuit Breaker	1
4	79-840-00	10Amp Circuit Breaker	2
5	88-048-62	#10 Lockwasher	6
6	88-049-80	10-32, Nut, HEX Head	6
7	62-204-00	275Amp Controller	1
8	61-838-41	5/8" X 1/2" Bus Bar	2
9	88-099-91	5/16" Thin Pattern Nut, HEX Head	10
10	88-088-63	5/16" Int. Tooth Lockwasher	10
11	72-501-36	36V 200Amp Solenoid, Forward/Reverse, SPDT	2
12	61-838-32	3/8" X 2-5/8" Bus Bar	2
13	72-501-38	36V 200Amp, solenoid, SPST	1
Not Shown	75-148-25	Control Panel Harness	1
	75-149-76	Power Harness	1
	75-148-76	Control Harness	1
	62-033-00	Accelerator Module Assembly	1

Section 4

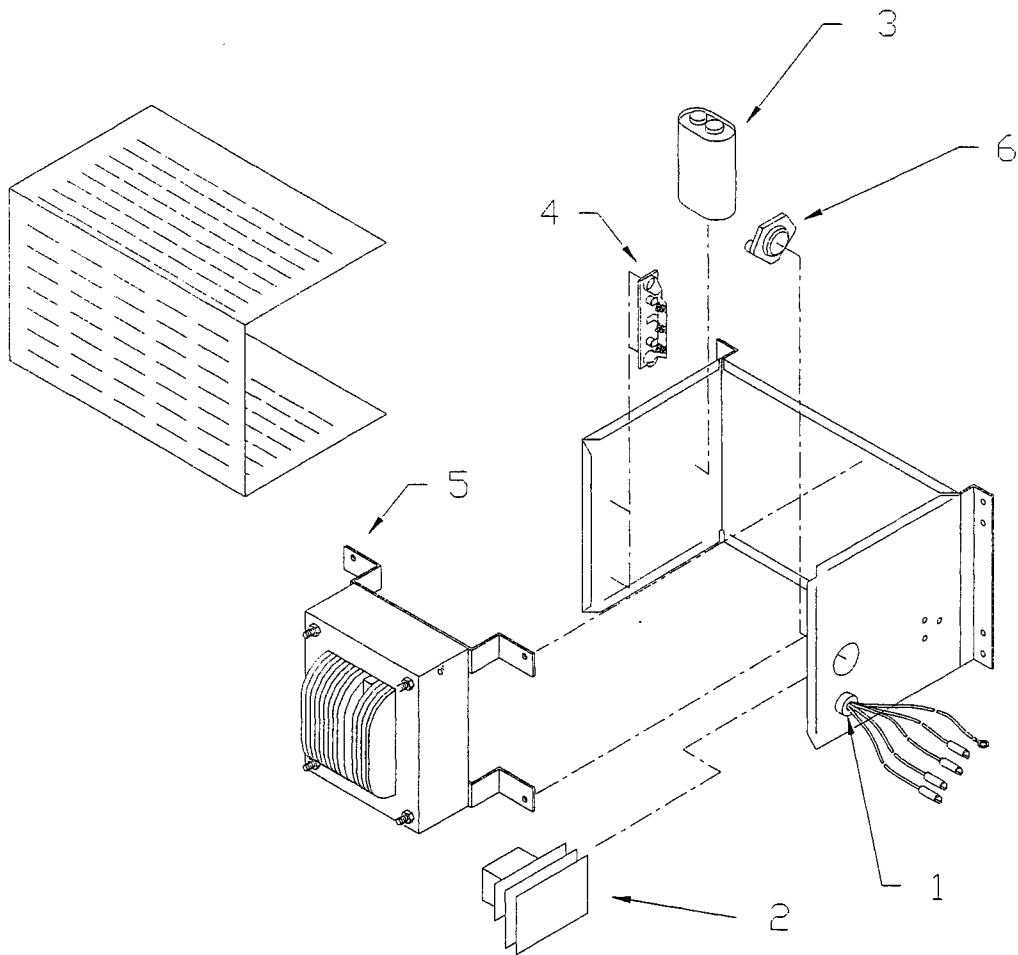
# BATTERY



BATTERY CELL			
ITEM#	PART #	DESCRIPTION	QTY
1	77-042-00	217 Amp Hour, 6Volt, 105 min	6
	77-042-50	217 Amp Hour, 6Volt, 110min	6
	77-044-00	230 Amp Hour, 6Volt, 125 min	6
	77-047-00	244 Amp Hour, 6Volt, 145 min	6
	77-047-50	250 Amp Hour, 6Volt, 145 min	6
	77-042-80	217 Amp Hour, 6Volt 105 min , Moist Charge	6
	77-047-80	244 Amp Hour, 6Volt, 145 min, Moist Charge	6
NOT SHOWN	50-243-10	Battery Hold Down Rod	2
	50-250-00	Clamp, Battery Lock, Polypropolene	2
	88-069-81	1/4" NC Nylon Insert Lock Nut	2

Section 4

# BATTERY CHARGERS

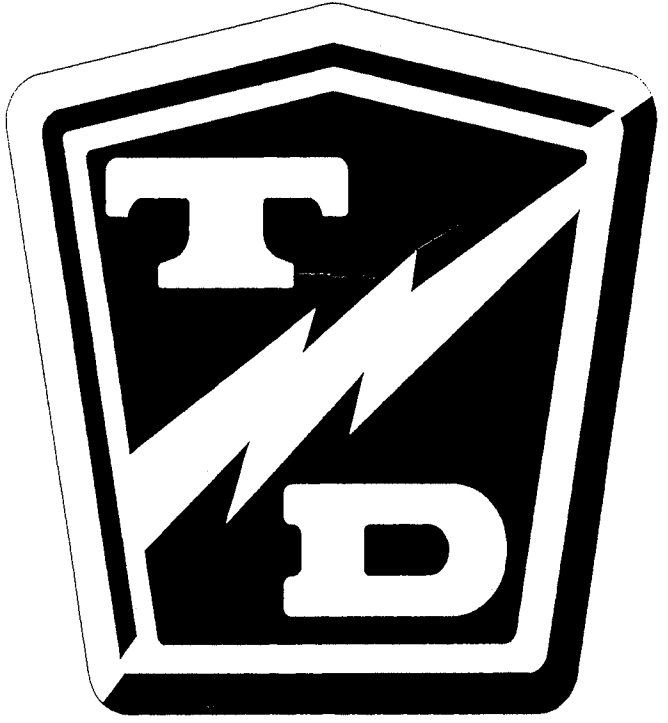


STANDARD BUILT-IN CHARGER (SPEC # 7460)			
ITEM#	PART #	DESCRIPTION	QTY
	79-305-05	Complete Charger, Les2, 36 Volt, 25 Amp, 115/60	1
1	79-530-00	Bushing	1
2	79-805-67	Timmer Assembly	1
3	79-902-00	Capacitor	1
4	79-749-13	Diode Asembly	1
5	79-644-31	Transformer	1
6	79-831-00	Fuse	1
Not Shown	79-575-30	AC Cord	1
	79-511-00	Cord Holder	1
	76-200-00	Replacement Plug	1
OPTIONAL PORTABLE CHARGER (Spec # 7710)			
	79-305-20	Complete Charger, Les2, 36 Volt, 25 Amp, 115/60	1
1	79-530-00	Bushing	1
2	79-805-63	Timmer Assembly	1
3	79-902-00	Capacitor	1
4	79-749-13	Diode Asembly	1
5	79-644-27	Transformer	1
6	79-831-00	Fuse	1
Not Shown	79-575-30	AC Cord	1
	79-511-00	Cord Holder	1
	76-200-00	Replacement Plug	1
*Other Charger	79-306-25	Complete Charger, Les2, 36 Volt, 40 Amp, 115/60(13745)	

\*THIS IS AN OPTIONAL CHARGER. YOU CAN FIND THE PART NUMBERS ON PAGES 3-57 THROUGH 3-58.



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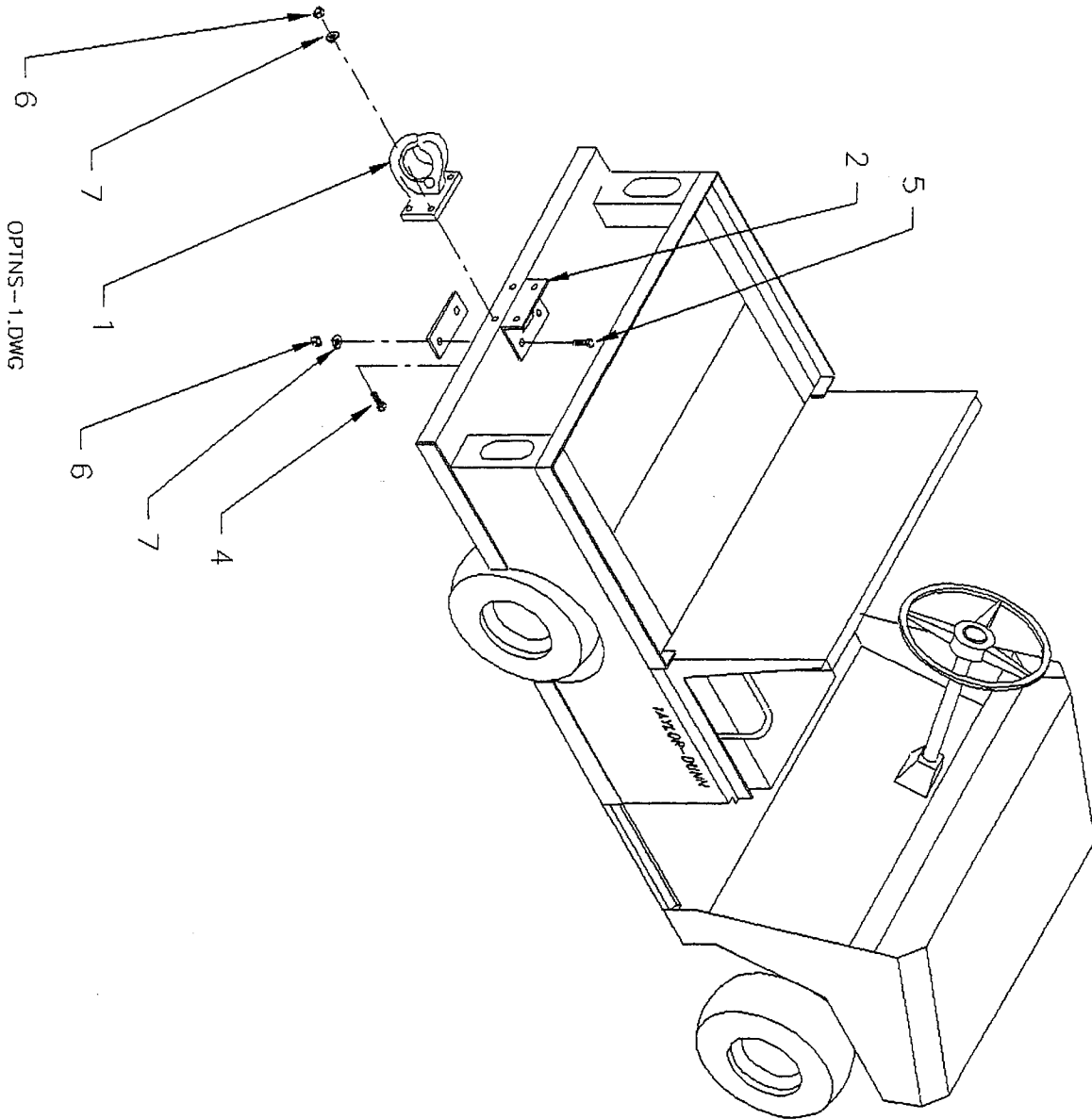


*Illustrated Optional Parts List*



Section 5

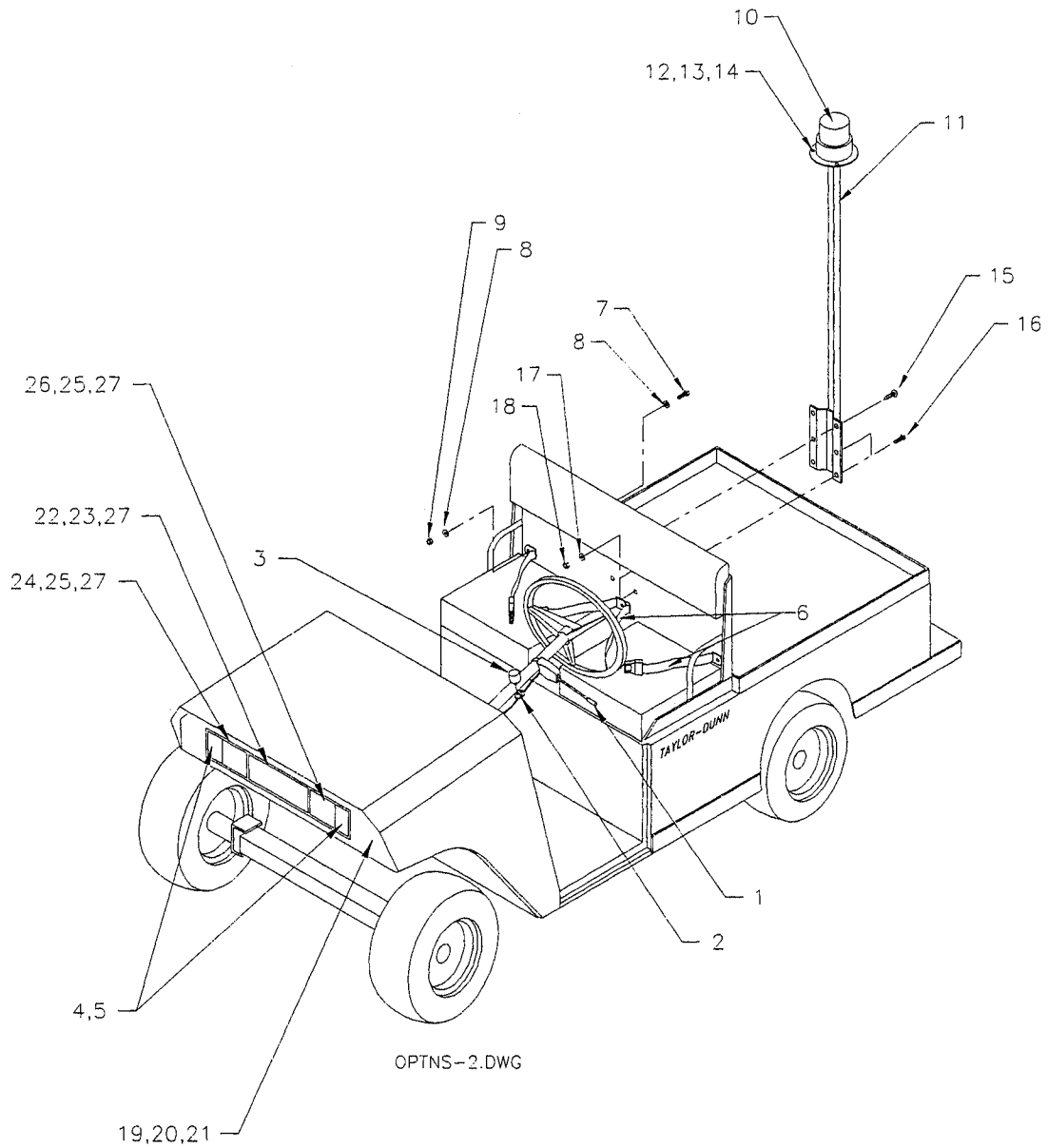
# OPTIONAL HITCH & WARNING BEEPER



OPTIONAL HITCHES & WARNING BEEPER			
ITEM#	PART #	DESCRIPTION	QTY
1	97-804-01	Pintle Type Hitch	1
2	97-835-00	Weldment, Angle for Mounting Bracket	1
3	97-835-10	Weldment, Plate for Mounting Bracket	1
4	88-140-14	1/2"NC X 1-1/2" HEX Head Bolt	4
5	88-140-11	1/2" X 1" HEX Head Bolt	2
6	88-148-62	1/2" Lockwasher	6
7	88-149-80	1/2" NC Nut	6
8	97-805-00	Mounting Bracket for 1-7/8" Ball Hitch	1
	97-807-00	Mounting Bracket for 2" Ball Hitch	1
9	97-811-00	1-7/8" Ball Hitch	1
	97-821-00	2" Ball Hitch	1
10	73-005-05	Pulsating Alarm (Warning Beeper)	1

Section 5

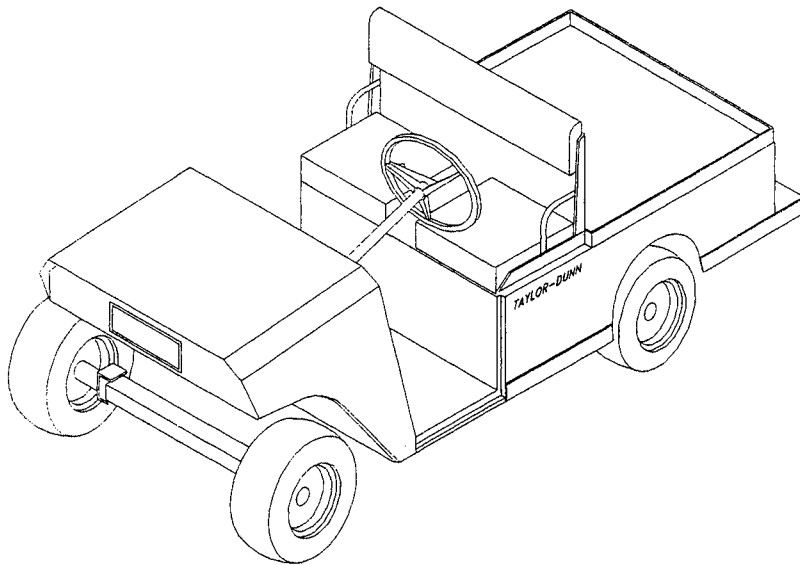
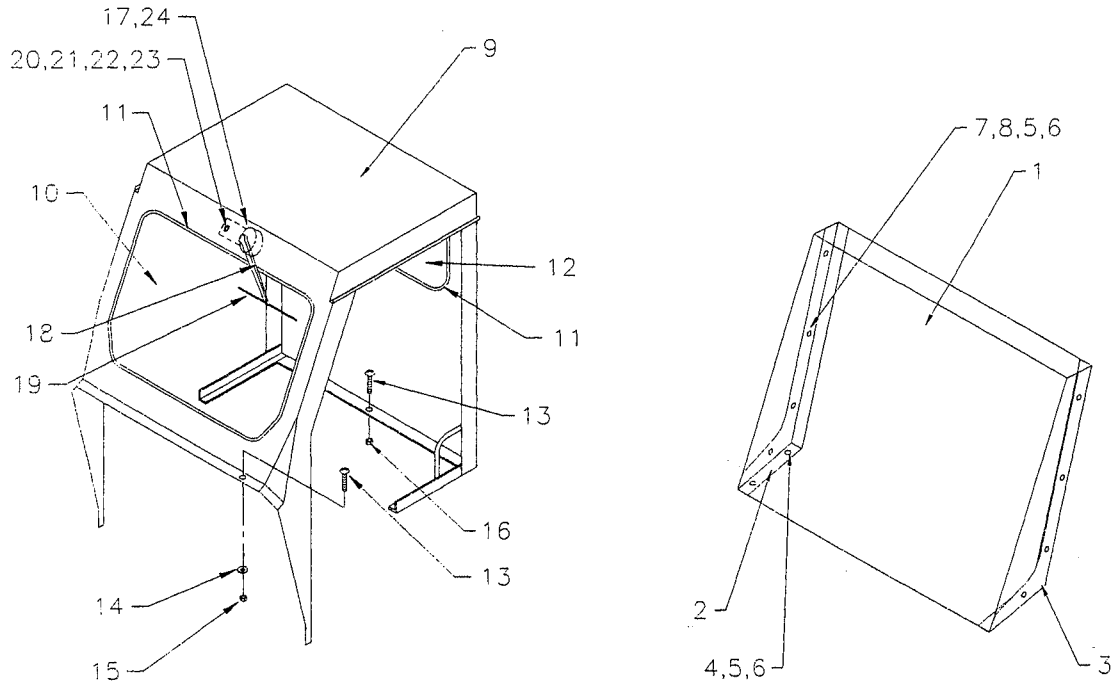
# STROBE LIGHT & OTHER FRONT END OPTIONS



STROBE LIGHT, DIRECTIONAL SIGNALS & HEADLIGHT OPTIONS			
ITEM#	PART #	DESCRIPTION	QTY
1	75-141-20	Turn Signal Switch	1
2	76-352-00	Flasher Recptacle	1
3	71-900-05	12Volt Flasher	1
4	72-082-10	12Volt Turn signal Bulb	2
5	72-082-20	Turn Signal socket	2
6	90-199-10	Seat Belt	2
7	88-151-13	1/2"NC X 1-1/4" HEX Head Bolt	3
8	88-148-61	1/2" Washer	6
9	88-159-84	1/2"NC Locknut	3
10	70-023-20	Strobe Light, Amber	1
11	72-023-25	Mounting Pole for Strobe Light	1
12	88-025-06	#8-32 X 1/2" Truss Head Screw	3
13	88-028-62	#8 Lockwasher	3
14	88-029-80	#8-32 Nut	3
15	88-817-09	#8 X 3/4" Phillips Head Sheet Metal Screw	2
16	88-065-08	1/4"NC X 5/8" Phillips Truss Head Screw	4
17	88-068-62	1/4" Lockwasher	4
18	88-069-83	1/4"NC Acorn Nut	4
Not Shown	71-100-00	Toggle Switch	1
	75-106-15	Wire Harnes for Stobe Light	1
19	02-380-47	Optional Front Nose Panel (Unpainted)	1
20	88-065-06	1/4"NC X 1/2" Phillips Truss Head Screw	6
21	88-069-87	1/4"NC KEPS Nut	6
22	94-201-10	Taylor-Dunn Name Plate	1
23	94-201-11	Fastener Strip	2
24	94-050-11	Headlight Assembly, Right	1
25	94-050-04	Headlight Retainer	4
26	94-050-10	Headlight Assembly, Left	1
27	88-817-07	#8 X 1/2" Self Tapping Screw	14

Section 5

# CAB & COWL WITH WINDSHIELD OPTIONS



OPTNS-3.DWG

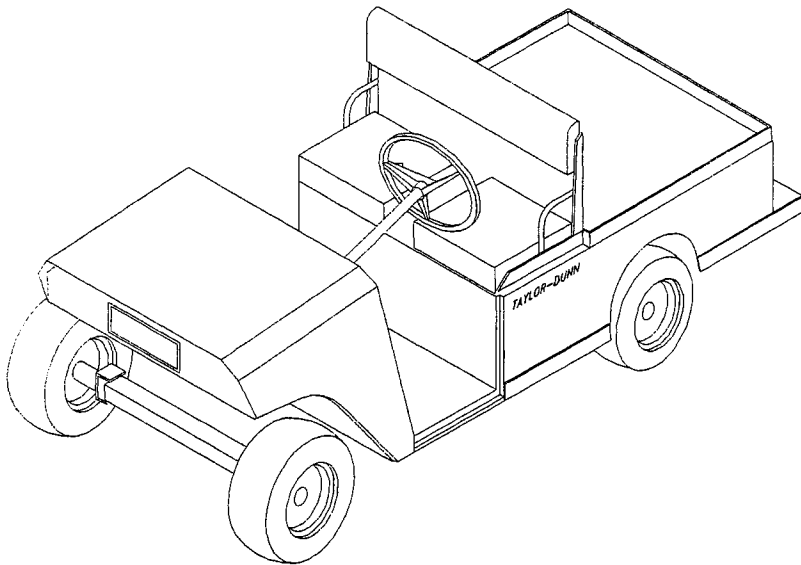
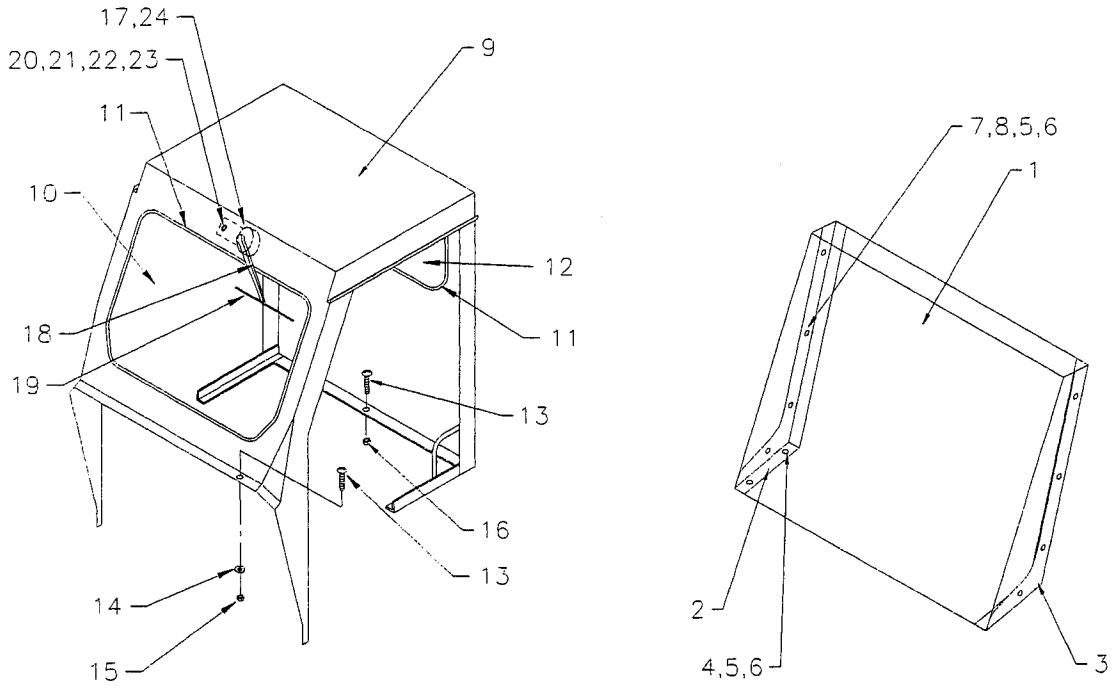
CAB & COWL WITH WINDSHIELD OPTIONS			
COWL WITH WINDSHIELD OPTION			
ITEM#	PART #	DESCRIPTION	QTY
	90-825-62	Windshield Kit	1
1	90-825-20	Plexiglass Windshield	1
2	90-825-06	Right Windshield Mounting Bracket	1
3	90-825-05	Left Windshield Mounting Bracket	1
4	88-060-09	1/4"NC X 3/4" HEX Head Bolt	4
5	88-068-62	1/4" Lockwasher	12
6	88-069-83	1/4"NC Acorn Nut	12
7	88-065-08	1/4"NC X 5/8" Phillips Head Truss Screw	8
8	88-068-61	1/4" SAE Washer	8
CAB OPTION			
ITEM#	PART #	DESCRIPTION	QTY
9	91-011-64	Cab Kit, Orange	1
	91-011-65	Cab Kit, Specify Color	1
	91-011-30	Cab Unpainted	1
10	90-852-30	Windshield	1
11	98-310-00	Rubber Channel for Windshield	1
12	90-850-10	Rear Window	1
13	88-065-09	1/4"NC X 3/4" Phillips Head Truss Screw	18
14	88-068-62	1/4" Lockwasher	13
15	88-069-83	1/4"NC Acorn Nut	13
16	88-069-81	1/4"NC Locknut	5

PARTS LIST CONTINUED ON THE NEXT PAGE.



Section 5

**CAB & COWL WITH WINDSHIELD OPTIONS  
CONT'D**



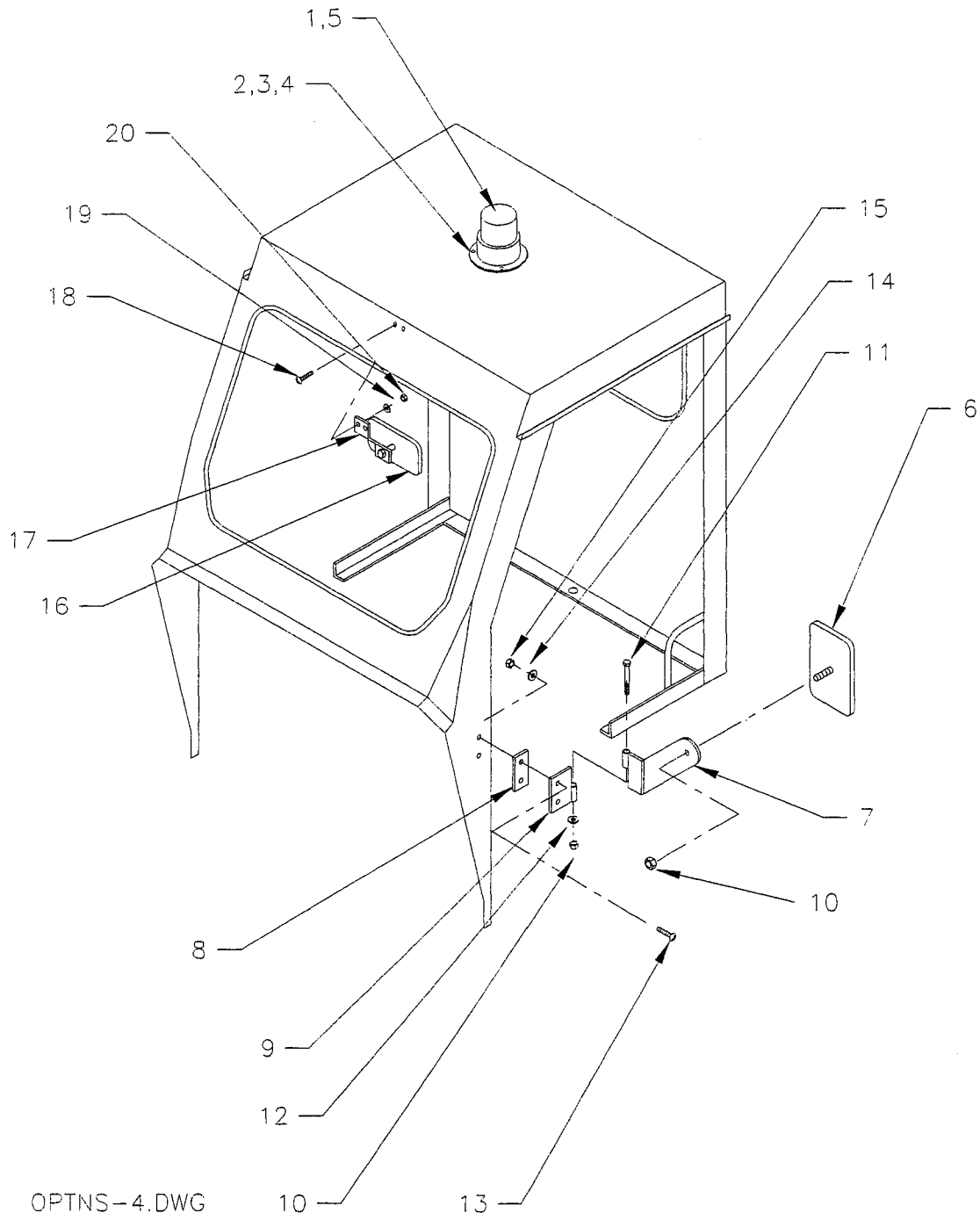
OPTNS-3.DWG

## PARTS LIST CONTINUED FROM PREVIOUS PAGE

CAB & COWL WITH WINDSHIELD OPTIONS			
WINDSHIELD WIPER OPTION			
ITEM#	PART #	DESCRIPTION	QTY
17	74-050-00	Windshield Wiper Motor	1
18	74-051-00	Windshiled Wiper Arm	1
19	74-052-00	Windshield Wiper Balde	1
20	88-065-11	1/4" X 1" Phillips Truss Head Screw	1
21	88-068-61	1/4" SAE Washer	2
22	88-069-83	1/4"NC Acorn Nut	1
23	98-603-00	3/8" ID Grommet	1
24	98-618-00	3/4" ID Groommet	1
Not Shown	75-114-15	Wiper and Light Wiring Harness	1
	71-039-10	Wiper Switch	1

Section 5

# OPTIONAL CAB ACCESSORIES

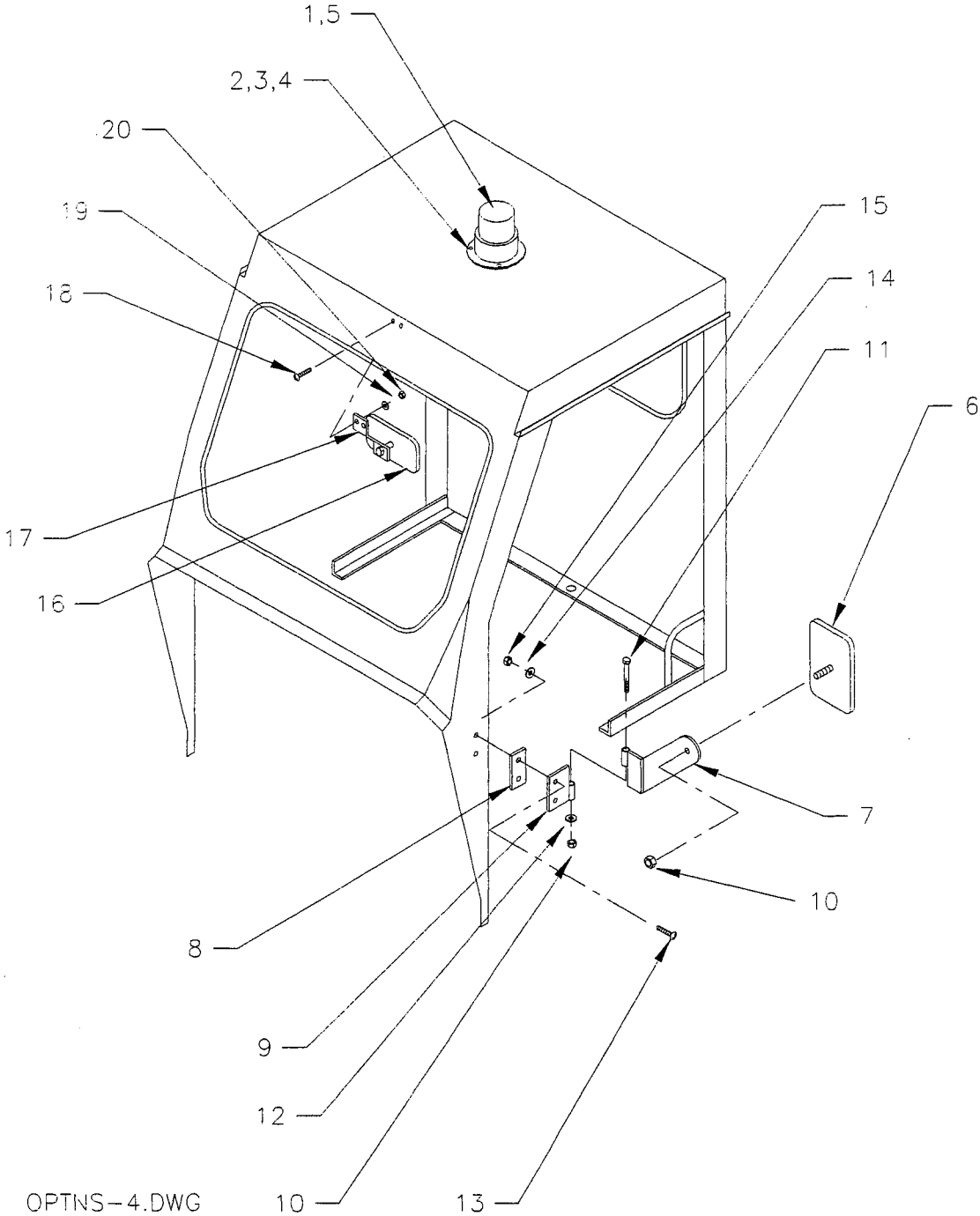


OPTIONAL CAB ACCESSORIES			
STROBE LIGHT ON CAB			
ITEM#	PART #	DESCRIPTION	QTY
1	72-023-20	Strobe Light, Amber	1
2	88-025-06	#8-32 X 1/2" Truss Head Screw	3
3	88-028-62	#8 Lockwasher	3
4	88-029-80	#8-32 Nut	3
5	98-606-00	3/16" ID Grommet	1
Not Shown	75-114-15	Wiring Harnes for Wiper and Light	1
	71-100-00	Toggle Switch	1
COWL, CAB OR DOOR MOUNTED MIRRORS			
ITEM#	PART #	DESCRIPTION	QTY
6	92-201-00	4-1/2" X 8-1/2" Mirror	1 or 2
7	92-202-12	Left Mounting Bracket	1
	92-202-13	Right Mounting Bracket	1
8	92-202-15	Spacer for Mounting Bracket	1 or 2
9	91-814-16	Left Hinge, Female	1
	91-814-17	Right Hinge, Female	1
10	88-069-81	1/4"NC Locknut	2
11	88-060-22	1/4"NC X 3-1/2" HEX Head Bolt	1
12	88-068-61	1/4" SAE Washer	2 or 4
13	88-065-09	1/4"NC X 3/4" Phillips Truss Head Screw	2 or 4
14	88-068-62	1/4" Lockwasher	2 or 4
15	88-069-83	1/4"NC Acorn Nut	2 or 4

PARTSLIST CONTINUED ON THE NEXT PAGE.

Section 5

# OPTIONAL CAB ACCESSORIES CONT'D

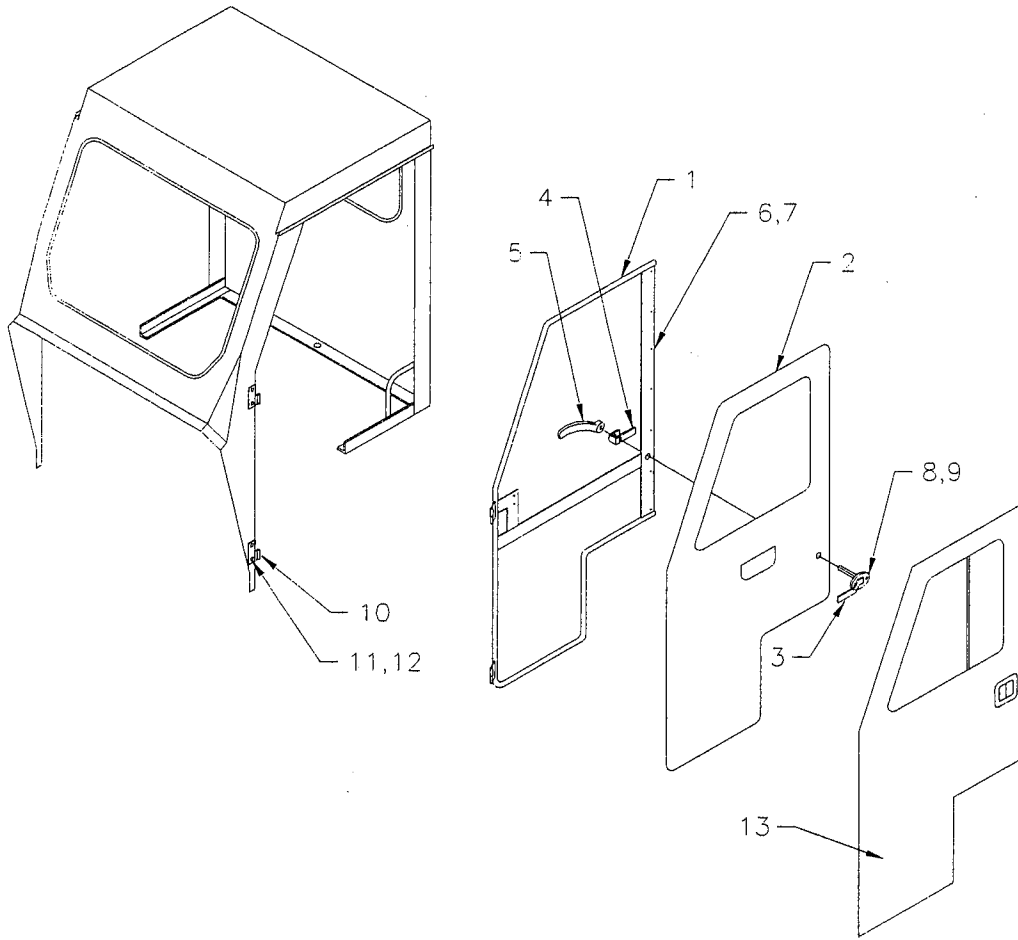


## PARTS LIST CONTINUED FROM PREVIOUS PAGE.

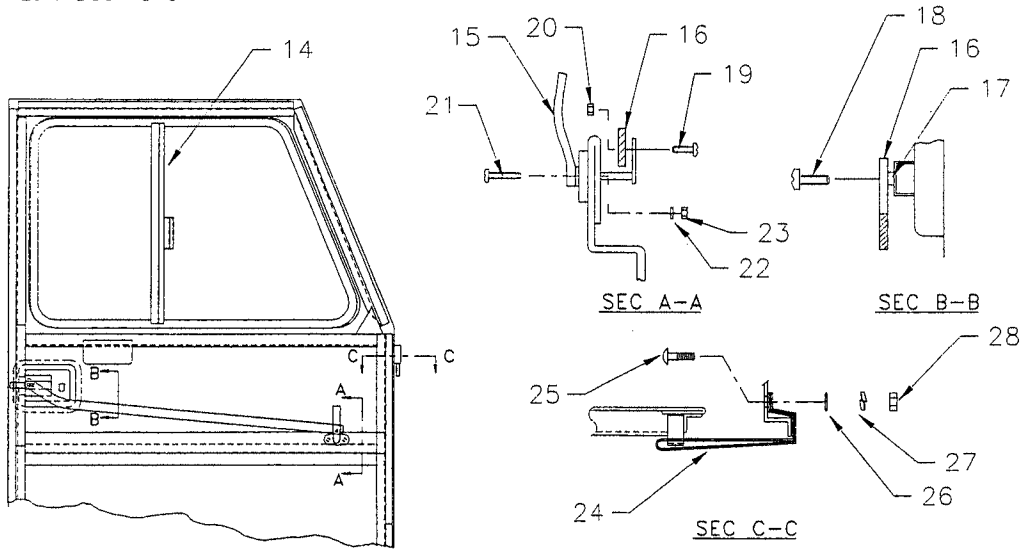
OPTIONAL CAB ACCESSORIES			
INSIDE CAB MIRROR			
ITEM#	PART #	DESCRIPTION	QTY
16	92-206-00	Inside Mirror	1
17	02-210-70	Inside Mirror Bracket	1
18	88-065-09	1/4" X 3/4" Phillips Truss Head Screw	2
19	88-068-67	1/4" Internal Toothed Lockwasher	2
20	88-069-80	1/4" NC Nut	2
WINK MIRROR INSIDE CAB			
Not Shown	92-207-00	5 Panel Wink Mirror	1

Section 5

# CAB DOOR OPTIONS



Note: Left Door Shown



OPTNS-5.DWG

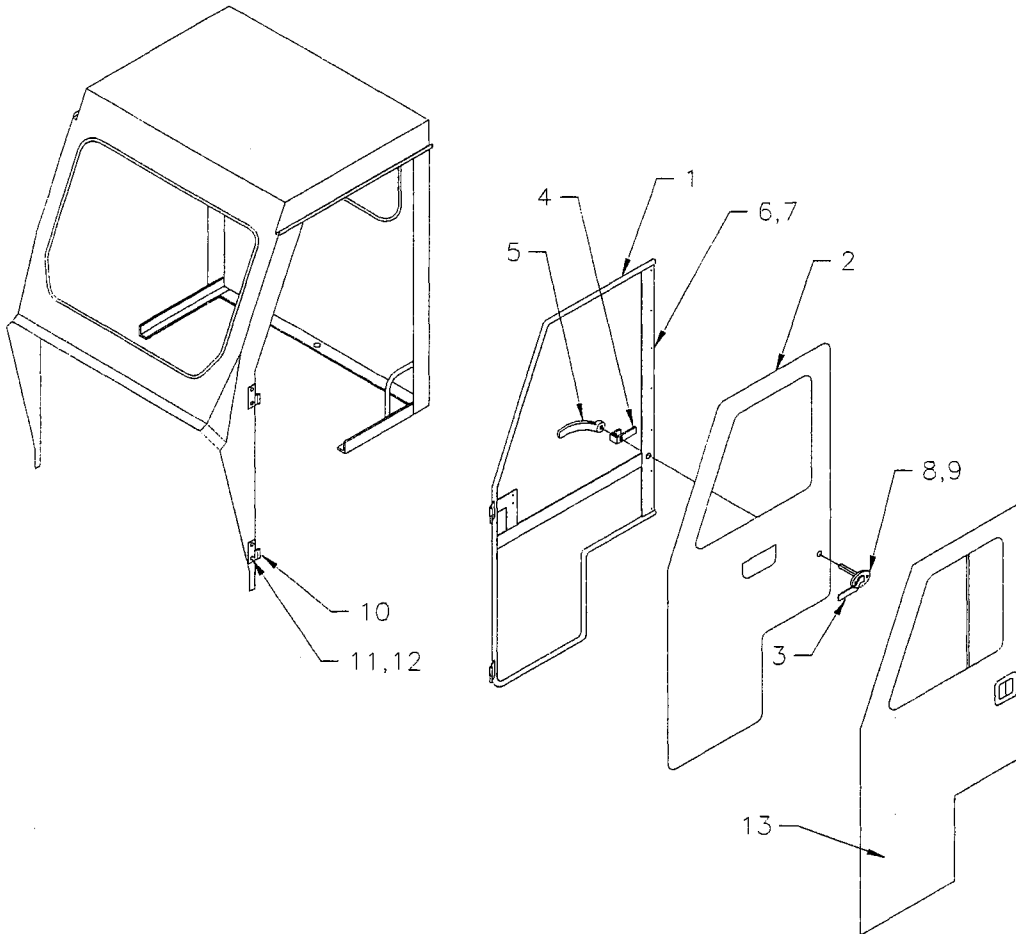
NAUGAHYDE CAB DOORS			
ITEM#	PART #	DESCRIPTION	QTY
	90-924-60	Left Door Kit	1
	90-924-61	Right Door Kit	1
1	90-923-98	Left Door Frame	1
	90-923-99	Right Door Frame	1
2	90-924-98	Left Side Curtain	1
	90-924-99	Right Side Curtain	1
3	97-315-53	Outer Handle Assembly	1
4	97-315-51	Door Latch	1
5	97-315-54	Inner Handle	1
6	97-303-03	Snap Fastener, Female	7
7	88-727-06	5/13" X 1/2" Rivit	7
8	88-025-08	#8-32 X 5/8" Truss Head Screw	2
9	88-029-86	#8-32 Locknut	2
10	91-814-10	Left Hinge, Female	2
	91-814-11	Right Hinge, Female	2
11	88-082-09	5/16"NC X 5/8" Carriage Bolt	4
12	88-089-81	5/16"NC Locknut	4

PARTS LIST CONTINUED ON THE NEXT PAGE.

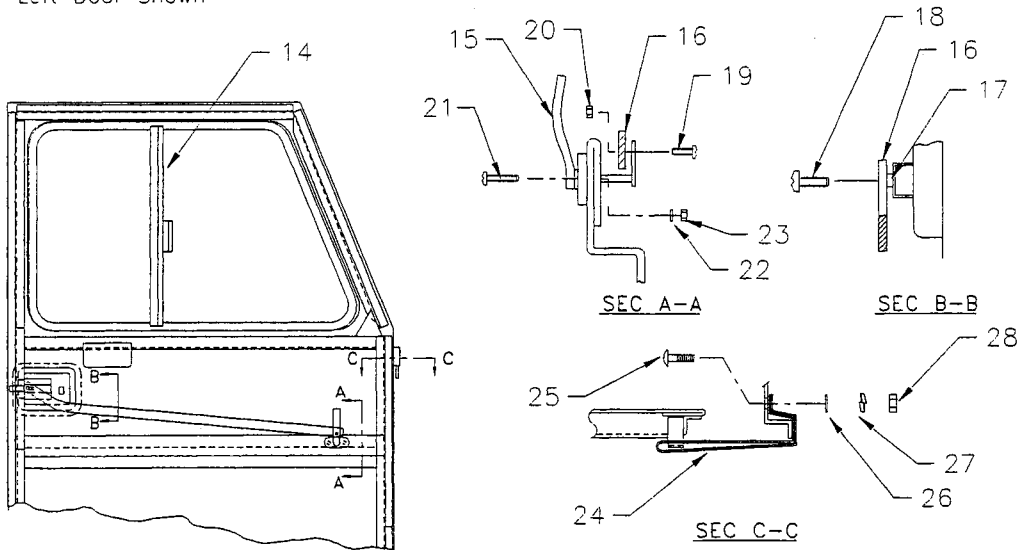


Section 5

CAB DOOR OPTIONS CONT'D



Note: Left Door Shown



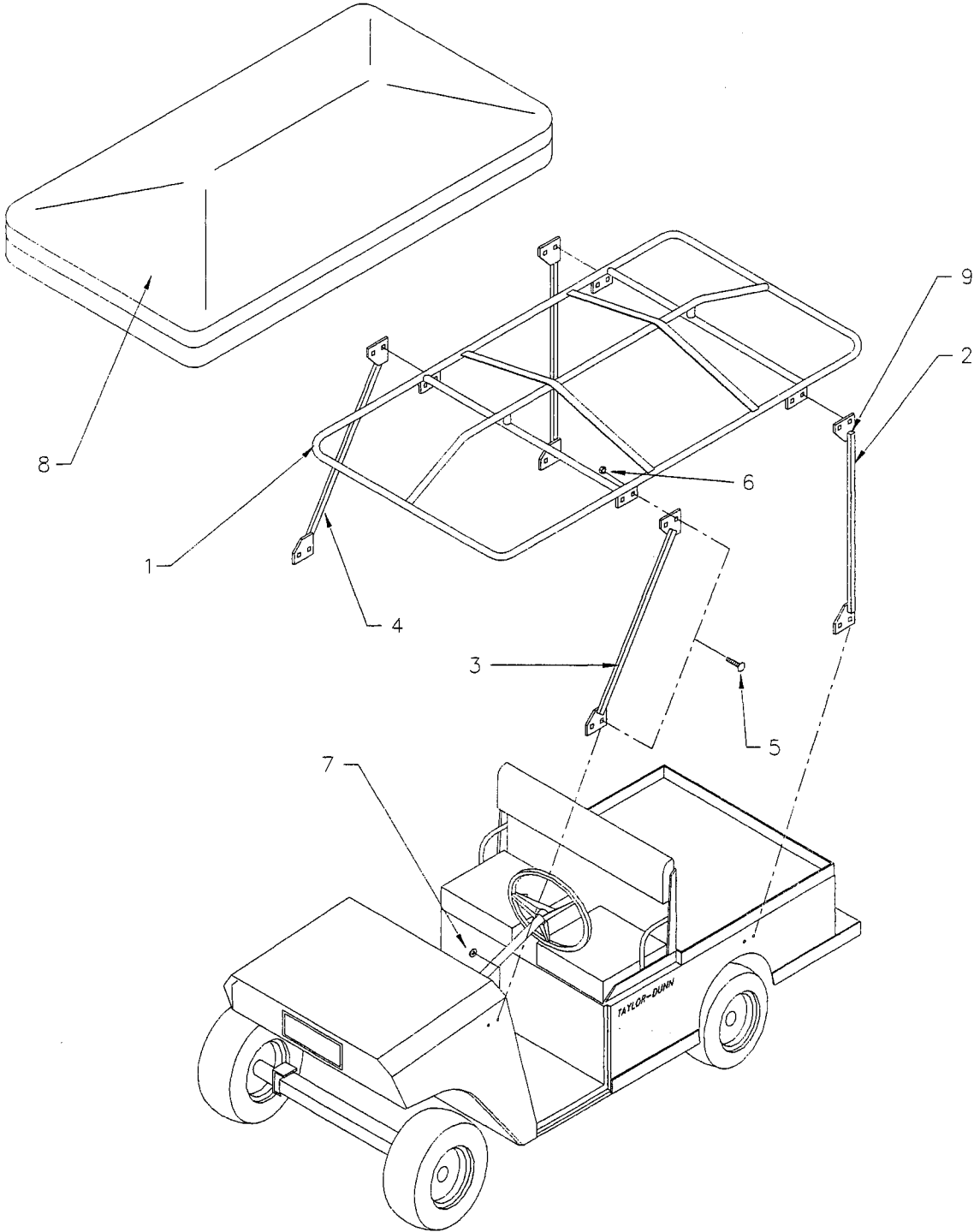
OPTNS-5.DWG

## PARTS LIST CONTINUED FROM PREVIOUS PAGE.

METAL CAB DOORS			
ITEM#	PART #	DESCRIPTION	QTY
13	91-011-66	Metal Cab Door Kit, Left, Specify Color(Incls. #10,11,12)	1
	91-011-68	Metal Cab Door Kit, Left, Orange(Incl. #10,11,12)	1
	91-011-67	Metal Cab Door Kit, Right, Specify Color(Incls.#10,11,12)	1
	91-011-69	Metal Cab Door Kit, Right, Orange(Incls. #10,11,12)	1
14	90-853-10	Left Window	1
	90-853-11	Right Window	1
15	97-315-58	Inner Door Handle	1
16	91-012-12	Connecting Bar	1
17	16-510-00	Spacer	1
18	88-065-06	1/4"NC X 1/2" Phillips Truss Head Screw	1
19	88-045-08	#10-32 X 5/8" Truss Head Screw	1
20	88-049-06	#10-32 Locknut	1
21	88-045-11	#10-32 X 1" Truss Head Screw	2
22	88-048-62	#10 Lockwasher	2
23	88-049-80	#10-32 Nut	2
24	91-012-45	Door Reatrant Strap	1
25	88-082-11	5/16"NC X 1" Carriage Bolt	1
26	88-088-60	5/16" Washer	1
27	88-088-62	5/16" Lockwasher	1
28	88-089-83	5/16" Acorn Nut	1
29	91-011-31	Left Door Weldment, Unpainted	1
	91-011-32	Right Door Weldment, Unpainted	1

Section 5

# OPTIONAL SURREY TOP COVER

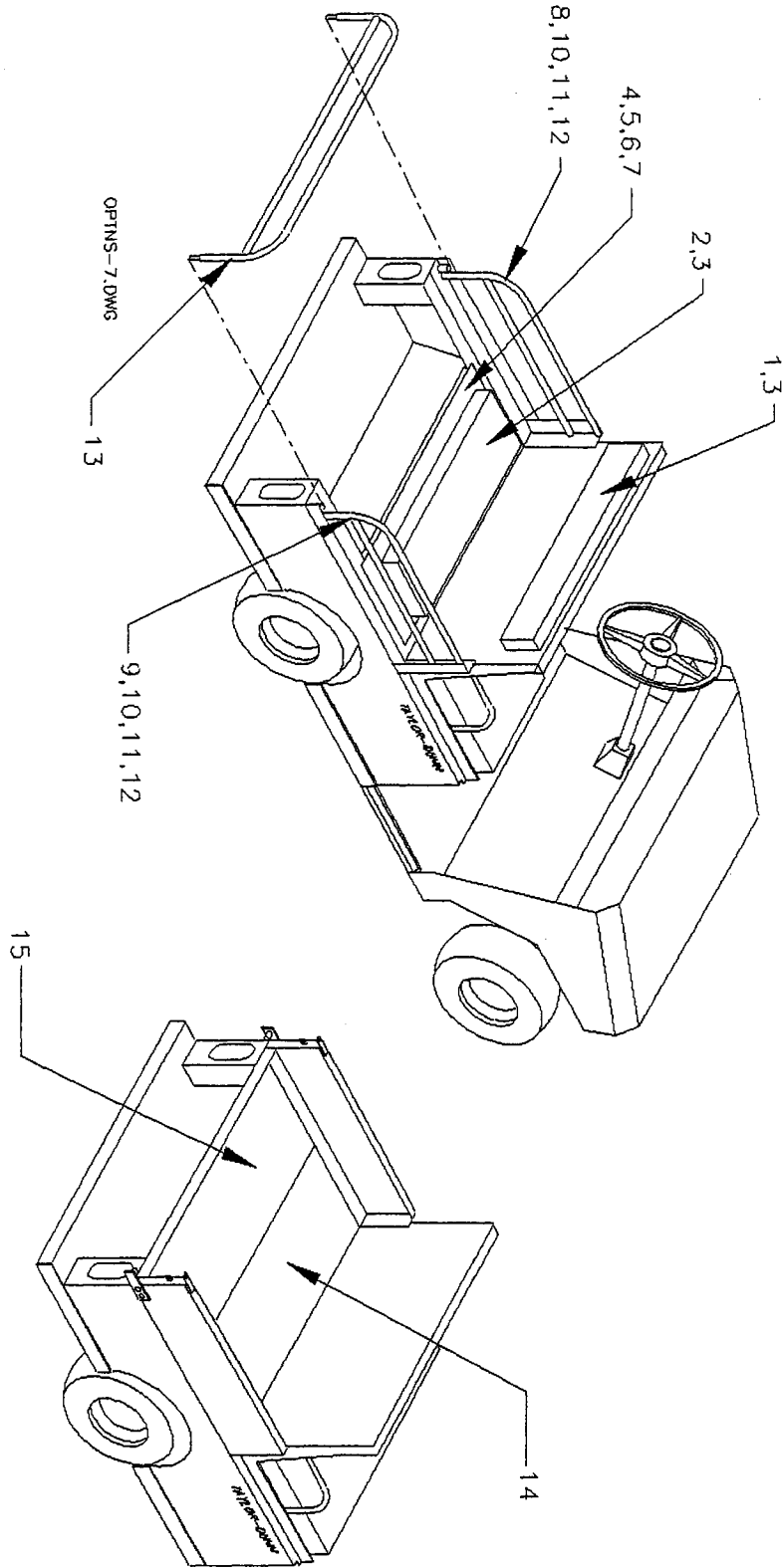


OPTNS-6.DWG

SURREY TOP COVER			
ITEM#	PART #	DESCRIPTION	QTY
	91-120-62	Surrey Top Cover Kit	1
1	91-038-00	Tubular Frame	1
2	91-038-07	Left and Right Rear Support Post for Frame	2
3	91-038-08	Front Left Support Post for Frame	1
4	91-038-09	Front Right Support Post for Frame	1
5	88-102-11	3/8"NC X 1" Carriage Bolt	16
6	88-109-81	3/8"NC Locknut	16
7	88-108-61	3/8"SAE Washer	4
8	91-038-10	Surrey Top, White	1
9	95-911-00	Plastic Cap, Square	8

Section 5

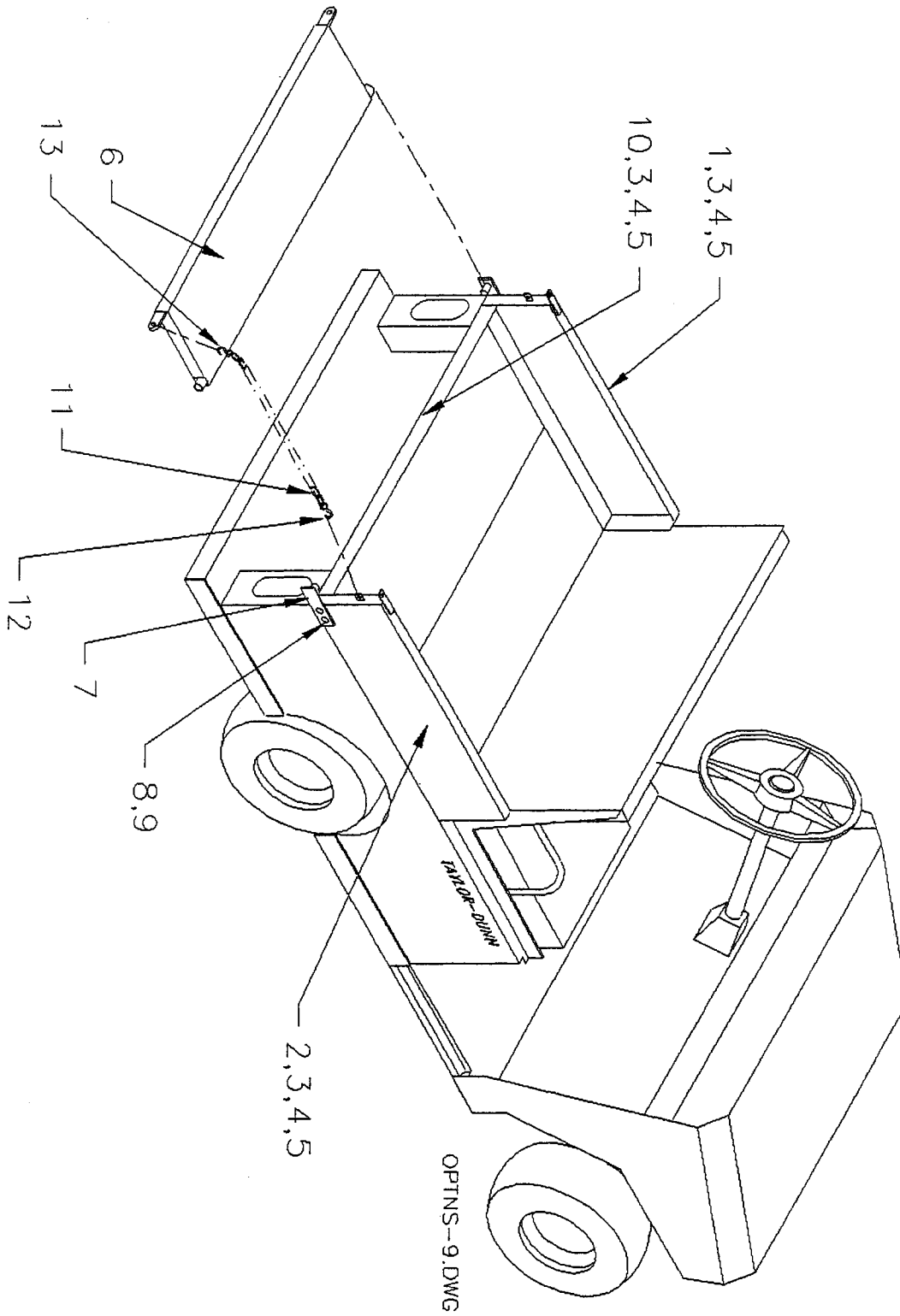
# REAR SEAT, REAR GATE & PIPE RAILS



REAR SEAT, REAR GATE & PIPE RAILS			
FOLD DOWN REAR SEAT			
ITEM#	PART #	DESCRIPTION	QTY
	90-109-63	Fold Down Rear Seat Kit	1
1	90-176-00	6" X 34" Backrest	1
2	90-177-00	Seat Cushion	1
3	88-837-11	#14 X 1" Phillips Sheet Metal Screw	8
4	00-380-67	Rear Flip Up Deck	1
5	88-065-09	1/4"NC X 3/4" Phillips Truss Head Screw	6
6	88-068-61	1/4"SAE Washer	6
7	88-069-81	1/4"NC Locknut	6
PIPE SIDE RAILS			
8	03-380-44	Left Handrail (For Serial # & Below)	1
	00-680-22	Left Handrail	1
9	03-380-43	Right Handrail (For Serial # & Below)	1
	00-680-23	Right Handrail	1
10	88-065-09	1/4"NC X 3/4" Phillips Truss Head Screw	10
11	88-068-61	1/4"SAE Washer	10
12	88-069-81	1/4"NC Locknut	10
REAR GATE			
13	01-380-68	Rear Gate (For Serial # & Below)	1
	00-680-24	Rear Gate	1
DECK BOARDS			
14	02-380-76	Rear Stationary Deck	1
15	00-380-58	Rear Diamond Deck	1
	00-380-67	Rear Flip Up Deck	1

Section 5

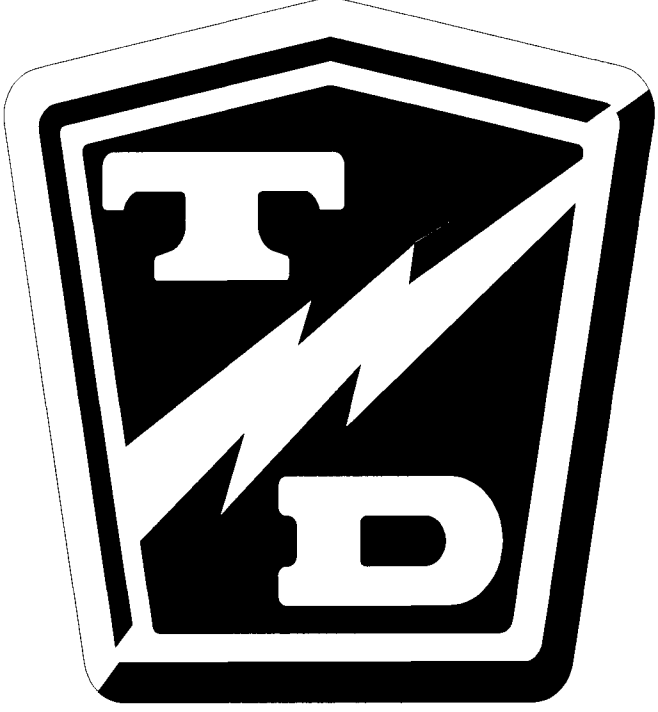
# 9" SIDE PANELS



9" SIDE PANELS & TAILGATE			
ITEM#	PART #	DESCRIPTION	QTY
	91-281-64	9" Side Panels Kit with Tailgate, Orange	1
	91-281-66	9" Side Panels Kit with Tailgate, Specify Color	1
1	03-380-38	Left Side Panel	1
2	03-380-37	Right Side Panel	1
3	88-065-09	1/4"NC X 3/4" Phillips Truss Head Screw	13
4	88-068-61	1/4"SAE Washer	13
5	88-069-81	1/4"NC Locknut	13
6	00-380-85	Tailgate	1
7	00-380-86	Right Tailgate Pivot	1
8	88-082-09	5/16"NC X 5/8" Carriage Bolt	4
9	88-089-81	5/16"NC Locknut	4
10	00-210-77	Rear Deck Angel	1
11	30-550-50	Tailgate Chain	2
12	30-551-00	S-Hook	2
13	30-551-10	Tail Gate Chain	2



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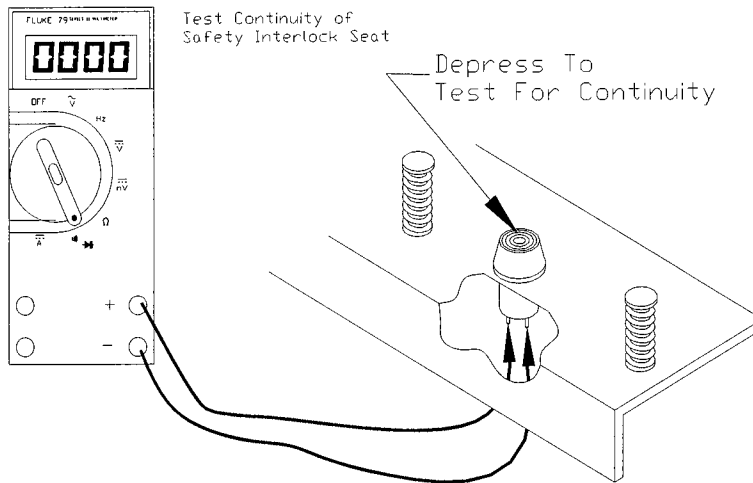
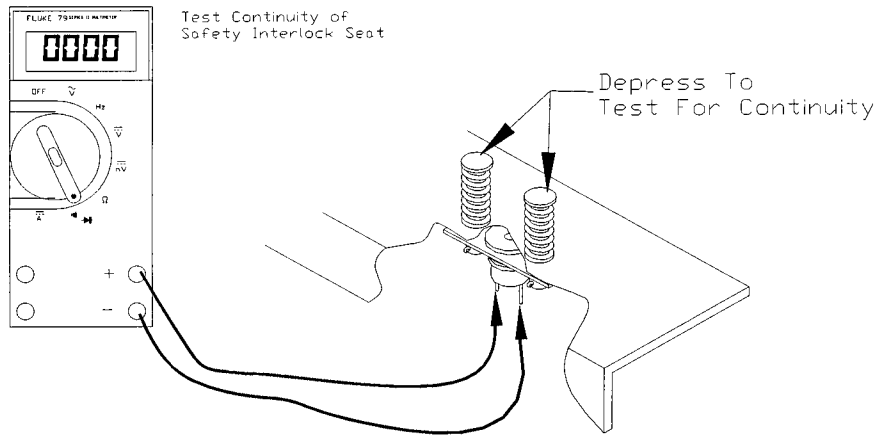
*Appendix*

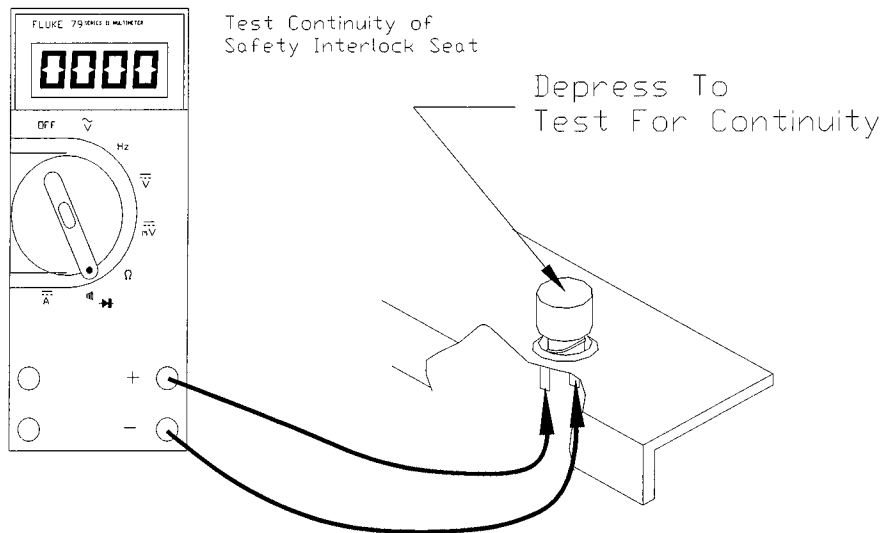
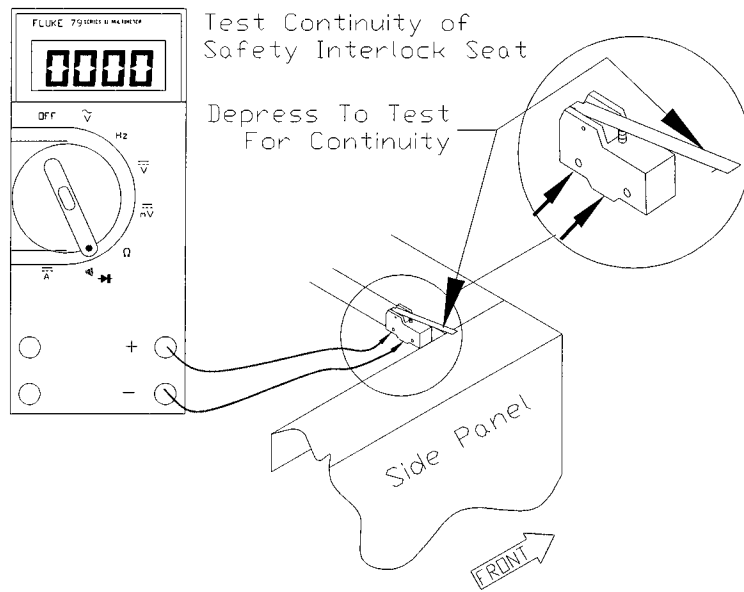


## Seat Switches

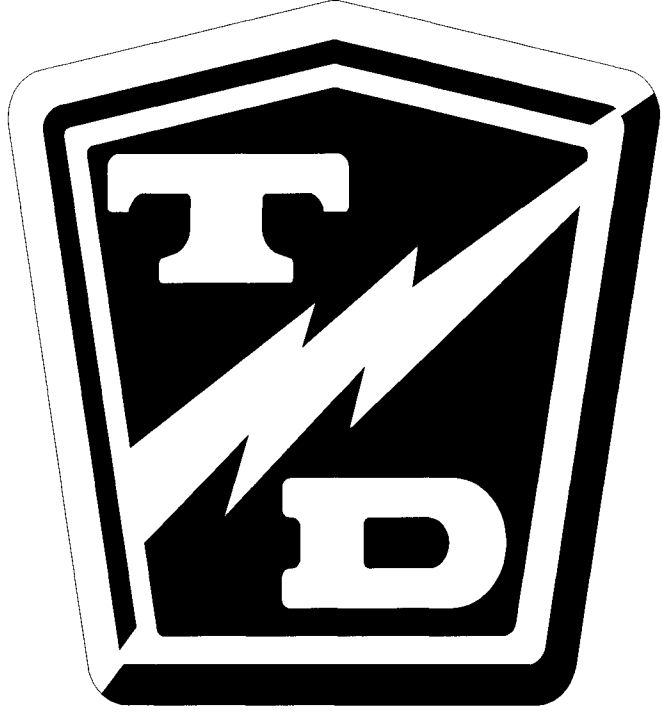
## FIGURES FOR KSI TEST

POSSIBLE SEAT SWITCH CONFIGURATIONS. SOME VEHICLES DO NOT HAVE A SEAT SWITCH.





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# NOTES





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