

**The Best Way  
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About Your  
Business**

Revision: A

**TAYLOR-DUNN<sup>®</sup>**



*Models Included:  
E0-034-51 (E 4-51)  
E0-034-57 (E 4-57)*

## **MANUAL ME-450-05**

*Operation, Troubleshooting and  
Replacement Parts Manual*

Serial Number Starting: 137548  
with the exception of serial numbers:  
140665, 140666, 143548, 143549, 143550  
refer to manual ME-450-03



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### TAYLOR-DUNN SERVICE CENTER

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Anaheim, CA 92804  
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*B2-48 With Dump Bed Option*



*B2-10 Ambulance*



*B2-48 with Steel Cab, Foldaway  
4-Passenger Seat and Stake Sides*



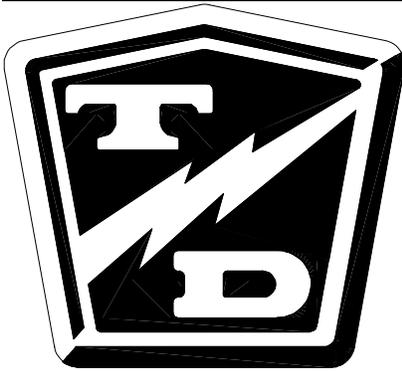
*P2-50 30,000 Pound Tow Tractor*



*ET 3000*



*ET1-50 Full Size Truck*



# Taylor-Dunn

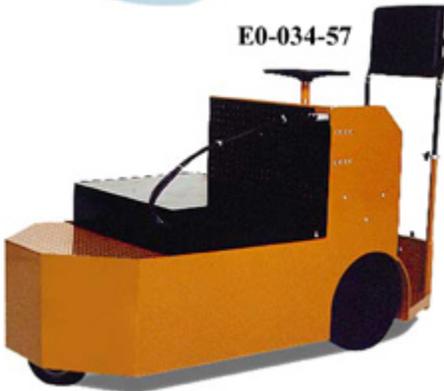
*Model E0-034-51 and E0-034-57*

*Operator and Service Manual Section Index*

E0-034-51



E0-034-57



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Refer to each sectional Table of Contents for the page number location for specific topics or procedures.





*B2-48 With Stake Side Dump Bed Option*



*SC1-00 Stock Chaser*



*E4-55 Sit Down Tow Tractor*



*C4-25 Sit Down Tow Tractor*

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# Introduction



## **ABOUT THIS MANUAL**

The purchase of this vehicle shows a belief in high quality products manufactured in the USA. Taylor-Dunn®, a leading manufacturer of electric burden and personnel carriers since 1949, wants to be sure this vehicle provides years of reliable service. Please continue to read this manual and enjoy this high quality Taylor-Dunn® vehicle.

This manual is to serve as a guide for the service, repair, and operation of Taylor-Dunn® vehicles and is not intended as a training guide. Taylor-Dunn® has made every effort to include as much information as possible about the operation and maintenance of this vehicle.

Included in this manual are:

- Vehicle Description
- Safety Rules and Guidelines
- Operational Information
- Operator Responsibilities
- Owner Responsibilities
- Control Operation and Location Information
- Maintenance and Troubleshooting Information
- Standard Parts List

Before servicing, operating, training or performing maintenance on this or any other Taylor-Dunn® vehicle, read the appropriate Taylor-Dunn® manual.

Each Taylor-Dunn® manual references the applicable models and serial numbers on the front cover.

Please, be aware of all cautions, warnings, instructions, and notes contained in this manual.

## **WHO SHOULD READ THIS MANUAL**

This manual is intended for use by anyone who is going to operate, own, perform maintenance on, service, or order parts for this Taylor-Dunn® vehicle. Each person should be familiar with the parts of this manual that apply to their use of this vehicle.

## **RESPONSIBILITIES**

### **Of the Owner...**

The owner of this or any Taylor-Dunn® vehicle is responsible for the overall maintenance and repairs of the vehicle, as well as the training of operators. Owners should keep a record of conducted training and maintenance performed on the vehicle. (OSHA Regulation, 29 CFR 1910.178 Powered Industrial Truck Operator Training).

### **Of the Operator...**

The operator is responsible for the safe operation of the vehicle, preoperational and operational checks on the vehicle, and the reporting of any problems to service and repair personnel.

### **Of the Service Personnel...**

The service personnel are responsible for the service and maintenance of the vehicle. At no time should a service person allow any untrained personnel to service or repair this or any Taylor-Dunn® vehicle. For the purposes of training, a qualified service person may oversee the repairs or services being made to a vehicle by an individual in training. At no time should an untrained individual be allowed to service or repair a vehicle without supervision. This manual is not a training guide.

### **Of the Passengers ...**

The passengers are responsible to remain fully seated, keeping their hands, arms, and legs inside the vehicle at all times. Each passenger should be fully aware of the vehicle's operation. All forms of recklessness are to be avoided. Do not engage in horseplay.



*Model B 2-10 shown with stake sides and steel cab with doors options*

## **HOW TO USE THIS MANUAL**

This manual is organized into five main sections:

### **INTRODUCTION**

This section describes how to use this service manual and how to identify your vehicle.

### **Safety Rules and Operating Instructions**

This section outlines the safety and operational issues, location and operation of controls, and the operational checks that are to be performed on this vehicle. It also includes various subjects that should be included in the operator and service training program.

### **Maintenance Service and Repair**

This section gives specific information on the servicing of the vehicle and a schedule for maintenance checks.

### **Electrical and Charger Troubleshooting**

This section identifies the troubleshooting procedures for testing the electrical system and battery charger.

### **Illustrated Parts**

This section provides an illustrated view of various assemblies. The illustrations are accompanied by tables identifying the parts.



*Model R 3-80 shown equipped with a cargo box and steel cab with doors options*

## **Conventions**

Symbols and/or words that are used to define warnings, cautions, instructions, or notes found throughout this manual. Refer to the examples below.

### **⚠ WARNING**

A shaded box with the word "Warning" and the symbol  above denotes a warning. A warning alerts the reader of a hazard that may result in injury to themselves or others. Be sure to follow any instructions contained within a warning and exercise extreme care while performing the task.

### **⚠ WARNING**

A shaded box with and the word "Warning" and the symbol  above denotes a warning. This warning alerts the reader of a high voltage hazard that may result in injury to themselves or others. Be sure to follow any instructions contained within a warning and exercise extreme care while performing the task.

### **⚠ CAUTION**

A box with the word "CAUTION" and the symbol  above denotes a caution and is used to inform the reader that property damage may occur. Be sure to exercise special care and follow any instructions contained with in a caution.

*Note: Alerts the reader to additional information about a subject.*



*Model B 2-48 equipped with the Dump Bed option*

## HOW TO IDENTIFY YOUR VEHICLE

This manual applies to vehicles with the same model and serial numbers listed on the front cover.

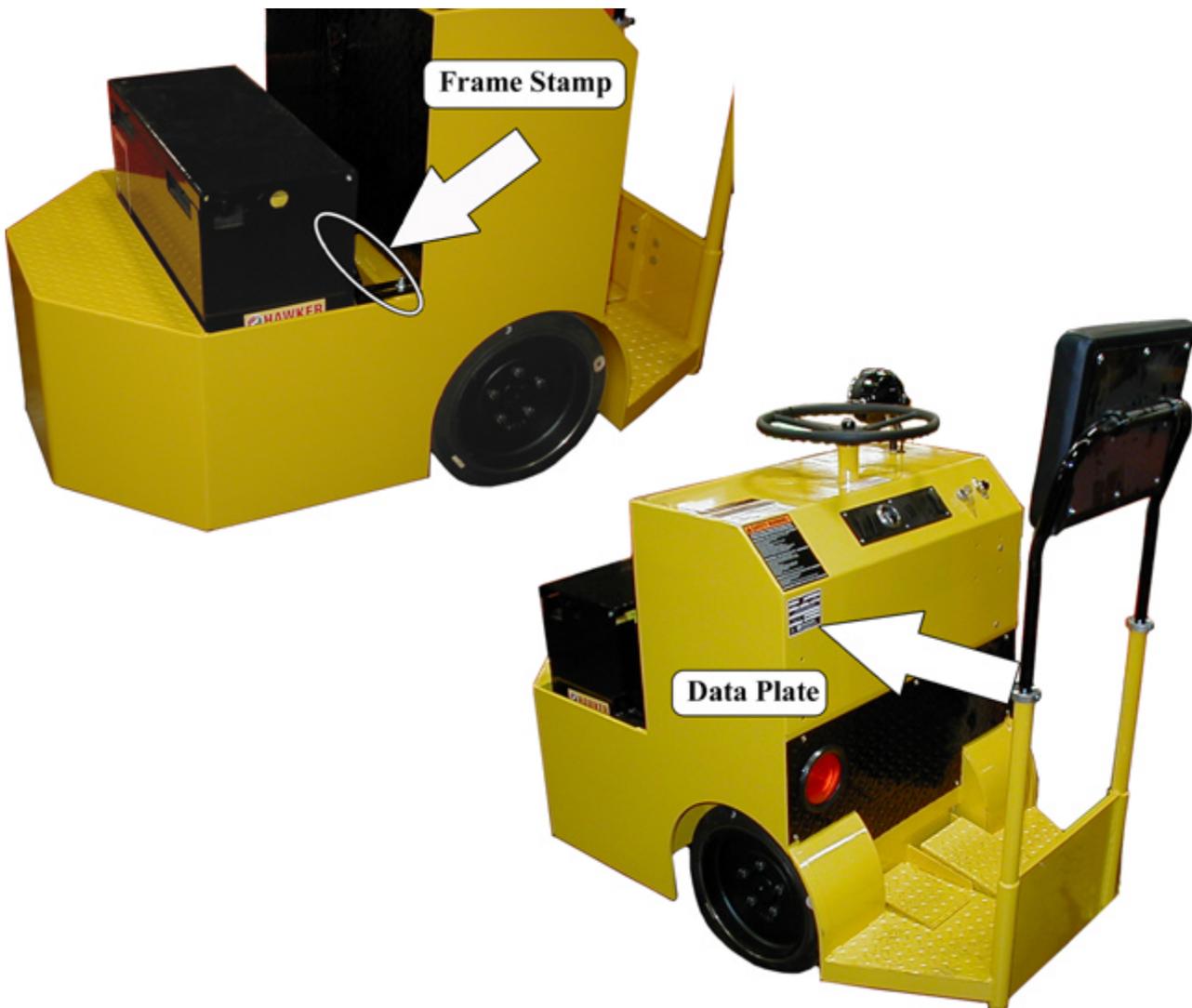
These vehicles are designed for driving on smooth surfaces in and around facilities such as industrial plants, nurseries, institutions, motels, mobile home parks, and resorts. They are not to be driven on public highways.

### **⚠ WARNING**

**This vehicle is not designed to be driven on public roads or highways. It is available in maximum designed speeds ranging from 4.5 to 6 mph. Do not exceed the maximum designed speed. Exceeding the maximum designed speed may result in steering difficulty, motor damage, and/or loss of control. Do not exceed locally imposed speed limits. Do not tow at more than 5 mph.**

This vehicle conforms to requirements for Type E vehicles as described in O.S.H.A. Standard Section 29 CFR 1910.178 (Powered Industrial Trucks) and with all applicable portions of the American National Standard for Operator Controlled Industrial Tow Tractors (ANSI B56.9).

The locations of the model and serial numbers are illustrated below:





## TAKING DELIVERY OF YOUR VEHICLE

Inspect the vehicle immediately after delivery. Use the following guidelines to help identify any obvious problems:

- Examine the contents of all packages and accessories that may have come in separate packages with the vehicle.
- Make sure everything listed on the packing slip is there.
- Check that all wire connections, battery cables, and other electrical connections are secure.
- Check battery cells to be sure they are filled.
- Check the tire pressure, tightness of lug nuts, and for any signs of damage.

Check the operation of each of the following controls:

- Accelerator
- Brake
- Parking Brake
- Key-Switch
- Forward/Reverse Switch
- Reverse Beeper (if equipped)
- Front Headlight Switch
- Steering Wheel
- Horn

## What To Do If a Problem is Found

If there is a problem or damage as a result of shipping, note the damage or problem on the bill of lading and file a claim with the freight carrier. The claim must be filed within 48 hours of receiving the vehicle and its accessories. Also, notify your Taylor-Dunn® dealer of the claim.

If there is a problem with the operation of the vehicle, **DO NOT OPERATE THE VEHICLE**. Immediately contact your local Taylor-Dunn® distributor and report the problem. The report must be made within 24 hours of receiving the vehicle and its accessories.

The only personnel authorized to repair, modify, or adjust any part of this or any Taylor-Dunn® vehicle is a factory authorized service technician.

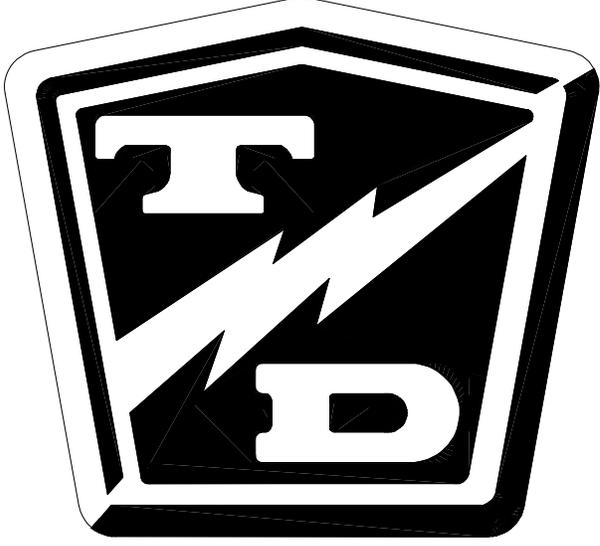
## ⚠ WARNING

**The only personnel authorized to repair, modify, or adjust any part of this or any Taylor-Dunn® vehicle is a factory authorized service technician. Repairs made by unauthorized personnel may result in damage to the vehicles systems which could lead to an unsafe condition resulting in severe bodily injury and/or property damage. Unauthorized repairs may also void the vehicles warranty.**



*Model B 2-10 Ambulance*

**TAYLOR - DUNN**

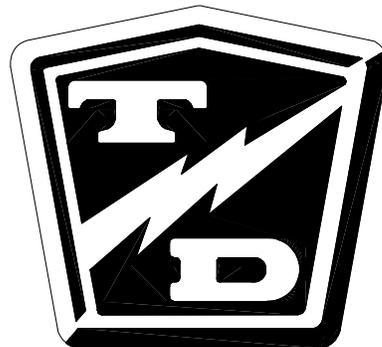


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# Safety Rules and Operating Instructions



## STANDARD SPECIFICATIONS TOW TRACTOR

ITEM	Model	SPECIFICATION
Occupancy		Driver only, no passengers
Dimensions	E 4-51 E 4-57	147L x 81W x 140H Centimeters (58L x 31.75W x 55H Inches) 193L x 81W x 140H Centimeters (76L x 31.75W x 55H Inches)
Turning Radius	E 4-51 E 4-57	124 Centimeters (49 inches) 171 Centimeters (67.5 inches)
Dry Weight (Without Battery)	E 4-51 E 4-57	442 kg (975 lbs) 575 kg (1,267 lbs)
Battery Compartment Dimensions	E 4-51 E 4-57	340L x 774W x 610H Millimeters (13.375L x 30.5W x 24H inches) 670L x 774W x 610H Millimeters (26.375L x 30.5W x 24H inches)
<b>Battery specifications:</b>		
Min/Max Battery Weight	E 4-51 E 4-57	113 kg to 463 kg (250 lbs to 1,020 lbs) 163 kg to 816 kg (360 lbs to 1,800 lbs)
Voltage	E 4-51 E 4-57	24 volts 36 volts
Connector		SB 175 Gray
Lead Length		762 millimeters (30 inches)
Position		B
Cover		Yes
Maximum Towed Load	E 4-51 E 4-57	90.7 kg (200 lbs.) Draw Bar Pull (max) 136 kg (300 lbs.) Draw Bar Pull (max) Tongue weight max. 22 kg (50 lbs)
Electrical System		Solid State Speed Control, 400 Amp
Transmission		Helical Gear, Oil Bath, Automotive Type Hypoid Differential.
Motor, DC, Series Wound	E 4-51 E 4-57	5 kW, (6.7 Horse Power) @ 935 RPM Intermittant Duty 7.45 kW, (10 Horse Power) @ 1,400 RPM Intermittant Duty
Brakes		Mechanical brake to rear differential to both rear wheels. Brake operated by integrated accelerator and brake treadle. Automatically applied Park Brake.
Steering		Chain and Sprocket Reduction to Front Fork
Tires	E 4-51 E 4-57	Two 16 x 4 x 12.125 Solid Cushion (rear) Two 8 x 2.5 Solid Cushion (front) Two 16 x 4 x 12.125 Solid Cushion (rear) Two 10 x 3.5 Solid Cushion (front)
Instrumentation		Key Switch, Horn Button, Forward/Reverse Switch

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 Operator Controlled Industrial Tow Tractors (ANSI B56.9).



## 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 (extracted from the American National Standards Institute Personnel and Burden Carriers ANSI B56.8). As well as, following the safety rules and guidelines outlined in ANSI B56.9 and listed below.

These vehicles are designed for driving on smooth surfaces in and around facilities such as industrial plants, nurseries, institutions, motels, mobile home parks, and resorts. They are not to be driven on public highways.

### **⚠ WARNING**

**These vehicles are not designed to be driven on public roads or highways. They are available in maximum designed speeds ranging from 4.5 to 6 mph. Do not exceed the maximum designed speed. Exceeding the maximum designed speed may result in steering difficulty, motor damage, and/or loss of control. Do not exceed locally imposed speed limits. Do not tow this vehicle at more than 5 mph.**

Refer to *Vehicle Operational Guidelines, Safety Guidelines* section for important safety information regarding operating this vehicle.

### **⚠ WARNING**

**Read and follow all of the guidelines listed below. Failure to follow these guidelines may result in severe bodily injury and/or property damage.**

### **⚠ WARNING**

**Before working on a vehicle:**

- 1. Make sure the key-switch is in the "OFF" position, then remove the key.**
- 2. Place the forward-reverse switch in the center "OFF" position.**
- 3. Set the park brake.**
- 4. Place blocks under the front wheels to prevent vehicle movement.**
- 5. Disconnect the main positive and negative cables at the batteries.**

## DRIVER TRAINING PROGRAM

According to ANSI B56.8, 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.



## VEHICLE CONTROLS



### **1) Headlight Switch**

The headlight switch is located on the left side of the instrument panel. Push the top of the switch to turn the lights on. Push the bottom of the switch to turn the lights off.

### **2) Accessory Switch (Optional)**

The accessory switch is located on the left side of the instrument panel and to the right of the headlight switch. Push the top of the switch to turn on the accessory. Push the bottom of switch to turn off the accessory. The accessory can be turned on with the key switch in the "OFF" position. If a vehicle is equipped with windshield wipers and one or more accessories, the windshield wipers are controlled from this switch. Other accessories are controlled from the auxiliary switch.

### **3) Battery Status Indicator, Analog**

The battery status indicator is located to the left of the hour meter. The normal operating range is in the green zone. Park the vehicle for a few minutes for an accurate reading. The vehicle needs charging if it is in the yellow zone. During and immediately following charging, the needle will be in the red zone to the right. The needle will move through the green zone toward the yellow zone as the batteries discharge. Charge the batteries when the needle is in the yellow zone. If it is in the red zone to the left, the batteries are empty and the truck should be taken out of service and charged to avoid damaging the batteries.

### **4) Hour Meter**

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

### **5) Forward-Off-Reverse Switch**

The forward-off-reverse switch, located on the right side of the instrument panel, determines the direction of travel of the vehicle. Push the top of the switch to engage the forward direction. Push the bottom of the switch to engage the reverse direction.

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

The forward-off-reverse switch should be in the center "OFF" position, with the key-switch off and the park brake set whenever the operator leaves the vehicle.

### **6) Key-Switch**

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

The key-switch should be in the "OFF" position whenever the operator leaves the vehicle.

This switch is also designed to secure and disable the vehicle. The key can only be removed when the key-switch is in the "OFF" position. Battery Status indicator

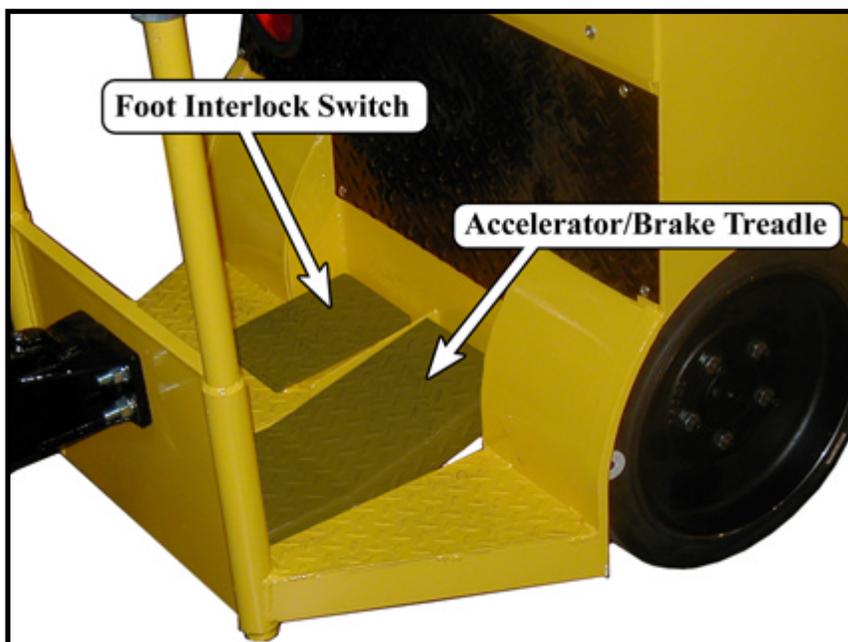
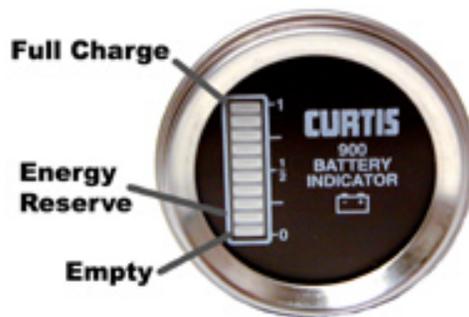
### **7) Horn Switch**

The horn switch is located on the right side of the instrument panel. Depress the switch to sound the horn, release it to turn it off.



## Battery Status Indicator, Digital Bargraph

The battery status indicator is located to the left of the hour meter. The battery status indicator has a LED bar graph that indicates the relative state of charge of the battery. The top LED will light only when connected to a fully charged battery or after completing a charging cycle. Successive lower LED's will light as the battery charge diminishes. When the second from the bottom LED's flash the battery energy status is in energy reserve and should be placed on charge as soon as possible. When the two bottom LED's are alternately flashing the batteries are empty and the truck should be taken out of service and charged to avoid damaging the batteries. The BSI will reset to fully charged only after a complete charge cycle is completed. A complete charge cycle is defined as battery voltage exceeding 2.35 volts per cell for a minimum of 6 minutes.



## Accelerator/Brake Treadle

### Accelerator:

The accelerator pedal is the treadle located on the right side of the floorboard positioned under the operators right foot. The treadle also functions as the brake pedal. Press the front of the treadle down to increase speed, release the treadle to slow down.

### Brake:

The brake pedal is the treadle located on the right side of the floorboard positioned under the operators right foot. The treadle also functions as the accelerator pedal. Press the rear of the treadle to apply the brake. The brake is automatically released when accelerating.

## Park Brake (deadman)

The parking brake is automatically applied when the accelerator treadle is released (see Accelerator and Brake above). To firmly set the parking brake, push down on the rear of the treadle after the vehicle has come to a complete stop. The brake automatically releases when the front of the treadle is depressed.

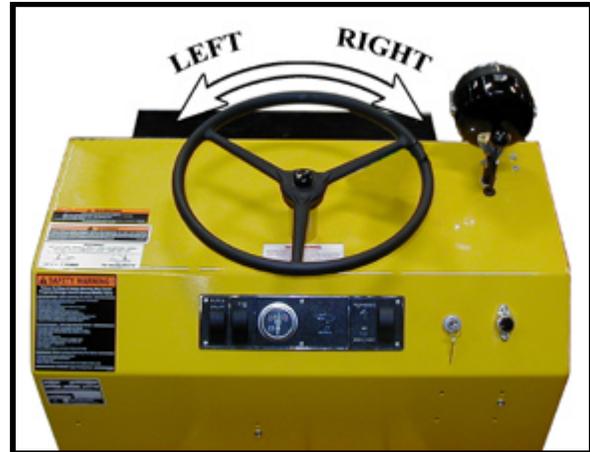
## Foot Interlock Switch

A switch or pedal located under the driver's left foot disables the power to the vehicle when it is released. The switch or pedal must be depressed for the vehicle to operate. Whenever the driver leaves the vehicle, the driver should turn the key-switch off, place the forward-off-reverse switch in the center "OFF" position, and set the park brake.



## Steering

The steering wheel and steering system are similar to an automobile. To turn right, turn the steering wheel clockwise. To turn left, turn the steering wheel counter-clockwise. If equipped with tilt steering, the release lever is located on the lower left of the steering column. Pull the lever up to reposition the steering wheel.



## Electrolyte Alarm (Optional)

The Electrolyte Alarm is located in the battery area, in the 4th battery cell from the main battery positive cable. The Electrolyte alarm is activated when the battery cell fluid level falls below the level of the probe. The alarm is an audible continuous sound along with a bi-color indicator lamp. Inspect the fluid level in all battery cells when the alarm sounds or the bi-color lamp turns from its green color to red. The vehicle batteries should then be filled and/or charged. With the fluid level at a normal operating level and/or the batteries charged the alarm and light will reset.





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## **VEHICLE OPERATIONAL GUIDELINES**

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### **Safety Guidelines**

- Only qualified and trained operators may drive this vehicle.
- Drive only on level surfaces or on surfaces having an incline of no more than 10% (5.6 degrees).
- Drive slowly when making a turn, especially if the ground is wet or when driving on an incline.
- This vehicle may overturn easily if turned sharply or when driven at high speeds.
- Observe all traffic regulations and speed limits.
- Keep all body parts (head, arms, legs) inside this vehicle while it is moving.
- 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.
- Do not drive over loose objects, holes, or bumps.
- Yield right of way to pedestrians and emergency vehicles.
- Stay in your driving lane under normal conditions, maintaining a safe distance from all objects.
- Keep a clear view ahead at all times.

### **Starting:**

Perform all necessary vehicle preparation steps, inspections, or maintenance before operating this vehicle.

1. Make sure the forward-off-reverse switch is in the center "OFF" position.
2. Set the parking brake or depress the rear of the treadle to set the brake.
3. Depress the foot interlock pedal.
4. Rotate the Key switch to the "ON" position.
5. Place the Forward-Off-Reverse switch in the desired direction of travel.
6. Slowly depress the front of the treadle.

### **While driving:**

- Slow down and sound the horn to warn pedestrians or when approaching a corner or other intersection.
- No reckless driving.
- Do not drive this vehicle on steep inclines or where prohibited.
- Immediately report any accidents or vehicle problems to a supervisor.

### **Loading and Unloading**

- Do not carry any passengers.
- This vehicle is designed as a tow tractor only. DO NOT carry any cargo on this vehicle.

### **Towing Loads:**

- Do not exceed the towing capacity of the tractor.
- Do not exceed the load capacity of the trailer. Refer to documentation supplied with your trailer for information regarding load capacity of the trailer.
- Make sure all loads are securely tied down. Refer to documentation supplied with your trailer for information regarding attaching loads to the trailer.
- Do not back up when towing more than one trailer.
- Drive slowly when towing loads with a high center of gravity.
- When turning, be sure to allow for "corner cutting" of the trailer.
- Allow for longer stopping distances when towing heavy loads.
- Allow for longer stopping distances when driving down a grade.



# SAFETY RULES AND OPERATING INSTRUCTIONS

## Parking

Before leaving the vehicle:

- Set the parking brake.
- Set the forward-off-reverse switch to the "OFF" position.
- Rotate the Key switch to the "OFF" position.

In addition:

- If parking this vehicle on an incline, turn the wheels to the curb, or block the wheels.
- Do not block fire aisles, emergency equipment, stairways, or exits.

## Towing This Vehicle

To tow this vehicle, attach a tow strap to the front bumper tow-bar.

*NOTE: If the vehicle is equipped with an automatic electric brake, do not tow the vehicle with the drive wheels on the ground.*

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. Do not tow the vehicle faster than 5 m.p.h. or its maximum designed speed, whichever is lower.

If at all possible, this vehicle should be placed on a carrier, rather than towing.

## STORING AND RETURNING TO SERVICE

Both storing your vehicle and returning it to service should only be performed by authorized personnel.

### Storing Your Vehicle

- Clean the batteries, then fill and charge before putting the vehicle in storage. Do not store batteries in a discharged condition.
- Lube all grease fittings.
- Clean, dry, and check all exposed electrical connections.
- Inflate tires to proper pressure (if applicable).
- For extended storage, the vehicle should be elevated so that the tires do not touch the ground.

If stored for a prolonged period, the batteries should be charged as follows:

### Returning to Service

Storage Temperature (F)	Charging Interval (months)
Over 60	1
Between 40 and 60	2
Below 40	6

- Check the battery's state of charge and charge if required.
- Perform ALL maintenance checks in the periodic checklist.
- Remove any blocks from the vehicle and/or place the vehicle down on to the ground.
- Test drive before putting into normal service.



## CHARGING YOUR VEHICLE

### ⚠ 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. Failure to do so may result in severe bodily injury and/or property damage.

#### New Battery Break in

New batteries require a break in period of up to 40-cycles. The batteries will not have their full capacity during this break in period and may require longer charging times.

#### Industrial Charger Operation

The charger supplied with this vehicle is either specified by or provided by the end user. Refer to the operating instruction supplied with your charger or contact the charger manufacturer for more information.

#### Charging Time

Average charging time is 8 to 10-hours. The time required to fully charge your batteries will vary depending on:

- Capacity of the batteries, higher capacity requires longer charge time.
- Output of the charger, higher output requires less charge time.
- Depth of discharge, the deeper a battery is discharged, the longer it takes to charge.
- Temperature, low temperatures require longer charge time.

It is not unusual for charge times to exceed 15-hours, especially with new batteries.

### ⚠ 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!** This may result in severe bodily injury.

### ⚠ CAUTION

The key switch must be in the "OFF" position when charging the batteries. Failure to turn the key switch "OFF" may result in damage to the vehicles electrical system.

#### To obtain the maximum battery life:

Charge the batteries only after they reach a normal discharge as indicated on the Battery Status Indicator (BSI). Failure to follow this guideline could result in the batteries entering an overcharge state, which will reduce the life of the batteries. If you find it necessary to charge the batteries before they are completely discharged we recommend waiting until they are discharged a minimum of 25% to reduce the possibility of overcharging. Refer to Vehicle Controls in this section for information on how to read the BSI.

Do not discharge the batteries beyond a normal discharge as indicated on the BSI. Refer to Vehicle Controls in this section for information on how to read the BSI.

Check the battery electrolyte once a week. Do not charge the batteries if the battery electrolyte is low. Charging when the electrolyte is low will damage the batteries and shorten their life-span. Only authorized personnel should perform battery maintenance including maintaining the battery electrolyte level. Refer to Section **Maintenance, Service and Repair** for battery maintenance information.

Do not interrupt the charging cycle. When the charger is plugged in, allow it to turn off before disconnecting. Interrupting the charging cycle could lead to overcharging or discharging the batteries too deep. Both circumstances will shorten the life of the batteries.



## PERIODIC MAINTENANCE CHECKLIST

Maintenance Item <sup>2,3</sup>	Weekly (20hrs)	Monthly (80hrs)	Quarterly (250hrs)	Semi - Annual (500hrs)	Annually (1000hrs)
Check Condition of Tires and Tire Pressure	●				
Check All Lights, Horns, BEEPERS and Warning Devices	●				
Check and Fill Batteries	●				
Check Brake System		●			
Check Steering System		●			
Check for Fluid Leaks		●			
Lubricate Vehicle			●		
Clean and Tighten All Wire Connections			●		
Wash and Service Batteries			●		
Check Park Brake				●	
Check Motor Brushes and Blow Out Motor				●	
Check Front Wheel Bearings				●	
Check Rear Axle Oil				●	
Change Rear Axle Oil					●
Check and Tighten all Nuts and Bolts					●
Clean and Repack Front Wheel Bearings					●

1, 2, 3 - See notes on following pages.

### **WARNING**

**Only properly trained and authorized technicians should perform maintenance or repairs to this vehicle. Repairs or maintenance by improperly trained or unauthorized personnel could cause improper operation of the vehicle or premature failure of components resulting in severe bodily injury and/or property damage.**



**STANDARD PERIODIC MAINTENANCE SCHEDULE  
FOR THE SMART VIEW DISPLAY**

*NOTE: The maintenance function is optional. Your vehicle may be equipped with a customized maintenance schedule*

PREVENTATIVE MAINTENANCE SCHEDULE		
MAINTENANCE LEVEL	HOUR INTERVAL <sup>1</sup>	MAINTENANCE TO BE PERFORMED <sup>2,3</sup>
1	500	Inspect the brake system including the park brake and mounting hardware
		Inspect the steering system, tighten the steering shaft coupler on the steering gear input shaft
		Lubricate the vehicle, check for leaks
		Inspect safety interlocks
		Inspect front and rear wheel bearings
		Inspect and adjust fork collar bearings (3-wheel trucks only)
		Inspect and tighten all nuts and bolts. First 500 hours and then every 1000 hours.
2	1000	Inspect and tighten all nuts and bolts
		Clean and repack front wheel bearings
		Inspect and tighten all wire connections
		Inspect the motor brushes and commutator
		Inspect the king pin bushings
		Check front end alignment
3	2000	Change oil in the drive and rear axle
		Flush hydraulic brake system
		Inspect suspension bushings
		Replace brake pedal/treadle return spring
		Inspect frame for damage

1, 2, 3 - See notes on following pages.



# **SAFETY RULES AND OPERATING INSTRUCTIONS**

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## **Daily Visual inspection:**

Tire condition and pressure.

External frame damage (body).

Operation of all lights and warning alarms and/or horns.

Smooth and proper operation of all controls such as but not limited to:

- Accelerator pedal, Brake pedal, Steering, Parking brake, etc.
- Proper operation of all locking devices such as but not limited to:
- Tool box, Removable battery trays, Cargo box, Cab doors, etc.
- Proper operation of all interlocking switches such as but not limited to:
- Key switch, Seat interlock switch, Charger interlock switch, etc.

Inspect for leaking fluids or grease.

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## **MAINTENANCE GUIDELINES FOR SEVERE DUTY APPLICATIONS**

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1. This maintenance checklist is based on the average application. If the vehicle is operated under “severe conditions”, service procedures should be conducted more frequently than specified. The frequency of service under severe conditions is determined by the use of the vehicle. The owner/operator must evaluate the operating environment to determine the increase in maintenance frequency.

In addition, the whole vehicle should be inspected monthly for signs of damage. The damage must be repaired immediately.

The following list is meant as a guide and is not all-inclusive of a “severe duty” application.

- Extreme temperature.
  - Bumpy, dusty, or ill maintained roads.
  - Excessively wet areas.
  - Corrosive or contaminated areas.
  - Frequent loading of vehicle at/near capacity.
  - Use on multiple shifts.
2. Any deficiencies found during an inspection should corrected before the vehicle is returned to service.
  3. Battery water level should be inspected on a weekly schedule.



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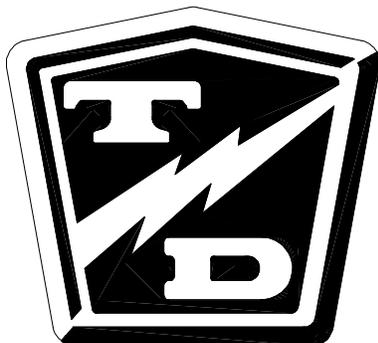


*Model C 4-25 Tow Tractor*

## Examples of other Taylor-Dunn Tow Tractors



*Model E 4-55 Tow Tractor*



# General Maintenance



## ***Maintenance Guidelines***

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### **⚠ WARNING**

**Periodic maintenance and service must be performed on this vehicle. Failure to complete these scheduled maintenance and service procedures can result in severe bodily injury and/or property damage. It is the owner and/or operators responsibility to insure that proper service and maintenance is performed on the vehicle, described in this manual.**

### **⚠ WARNING**

**Before starting any repairs:**

- 1. Make sure the key-switch is in the "OFF" position, then remove the key.**
- 2. Place the forward-reverse switch in the center "OFF" position.**
- 3. Set the park brake.**
- 4. Place blocks under the front or rear wheels to prevent vehicle movement.**
- 5. Disconnect the main positive and negative cables at the batteries.**

### **⚠ CAUTION**

**Turn the Key switch OFF BEFORE disconnecting the batteries. Disconnecting the batteries with the key switch ON may corrupt the controller programming resulting in a fault code 1 (refer to the fault table in the troubleshooting section).**

### **⚠ WARNING**

**Read and follow all of the guidelines listed below. Failure to follow these guidelines may result in severe bodily injury and/or property damage.**

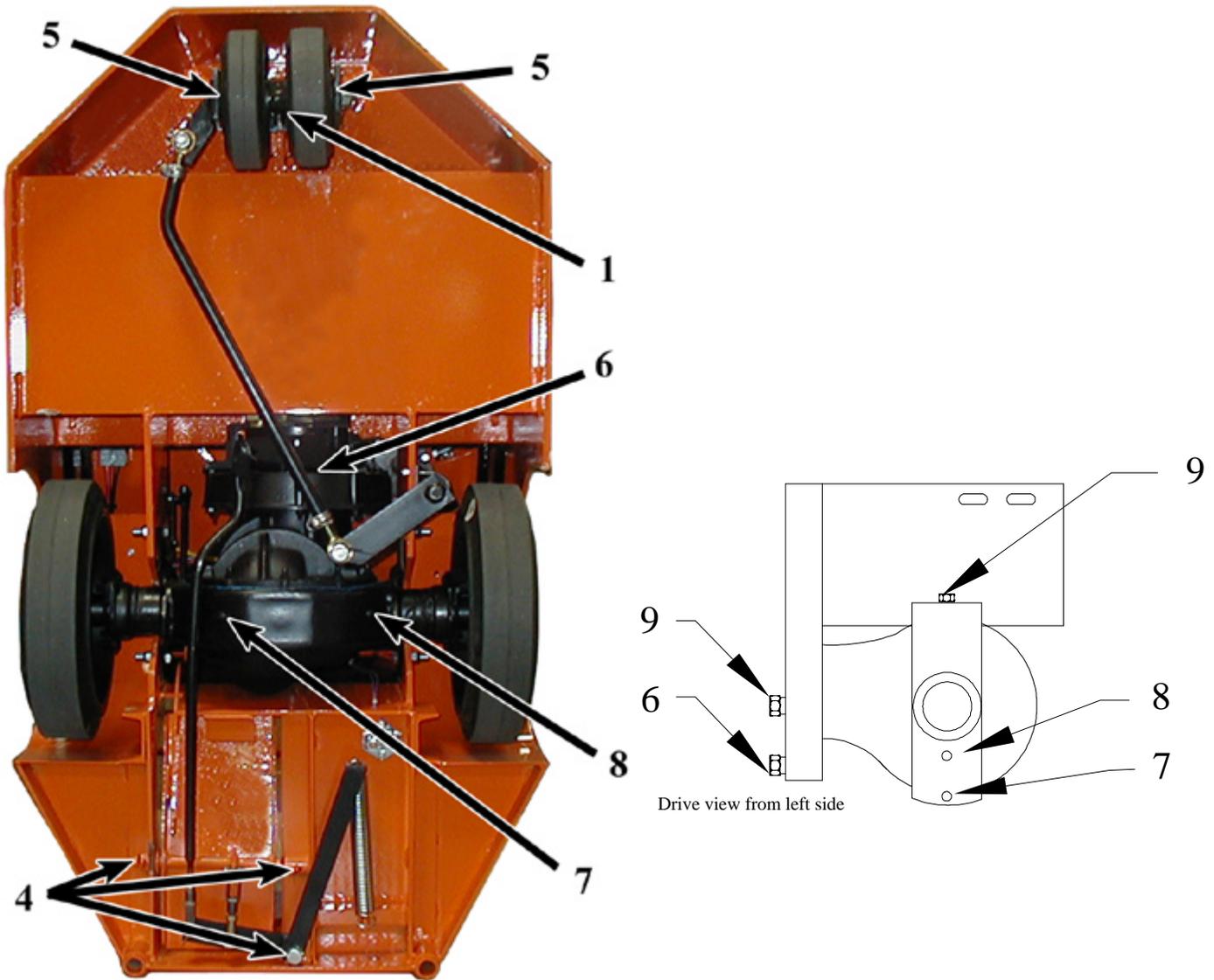
- Avoid fire hazards and have fire protection equipment present in the work area. Conduct vehicle performance checks in an authorized area where safe clearance exists.
- Before starting the vehicle, follow the recommended safety procedures in Section 2, "Safety Rules and Operational Information."
- Ventilate 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.
- 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.
- 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.
- Only properly trained and authorized technicians should perform maintenance or repairs to this vehicle.

## 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
	Worn steer shaft or jack shaft bearings
	Loose Steering Linkage or chain
Lack of Power or Slow Operation	Brakes or Parking Brakes Dragging
	Batteries Discharged or Defective
	Worn Drive Gears
	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	Brakes Out of Adjustment
Brake Pedal Low	Brake Worn (1/16" Wear Limit)
	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

*Note: This list is provided as a guide only. It is not all inclusive of causes that may result in a specific symptom.*

**Lubrication Chart**



#	Description	Locations	Lubricant Type
1	Front Fork Bearings	1	General Purpose Grease
2	-	-	-
3	-	-	-
4	Pedal Linkages	3	General Purpose Grease
5	Front Wheel Bearings	2	High Temperature Wheel Bearing Grease
6	Chain Case Drain	1	-
7	Drive Drain Plug	1	-
8	Drive Level Plug	1	-
9	Drive Fill Plug	1	SAE 140 weight API GL5 Hypoid Gear Oil

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# Front Axle Service



### INSPECT THE FRONT WHEEL BEARINGS

#### ⚠ WARNING

1. Make sure the key-switch is in the "OFF" position, then remove the key.
2. Place the forward-reverse switch in the center "OFF" position.
3. Set the park brake.
4. Place blocks under the front wheels to prevent vehicle movement.
5. Disconnect the main positive and negative cables at the batteries.

#### ⚠ 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 severe bodily injury.

6. Raise the front of the vehicle and support with jack stands.
7. Grab the top and bottom of the tire/wheel assembly. Feel for any movement or play while pulling and pushing on the top and bottom of the tire. Any movement or play is indication of loose wheel bearings or king pin.
8. Spin the front wheel(s) by hand. The wheel should stop spinning in no more than 2-revolutions. A wheel that continues to spin freely is an indication of a loose wheel bearing.

*NOTE: Refer to the **Adjust Front Wheel Bearings** section for information regarding the adjustment of the wheel bearings.*

9. Spin the wheel(s) and listen for any grinding noise. Any noise may be an indication of worn or damaged wheel bearings.

*NOTE: Refer to the **Replace Front Wheel Bearings** section for information regarding the replacement of the wheel bearings.*

10. Lower the vehicle.
11. Reconnect the main positive and negative cables at the batteries.
12. Remove the blocks from behind the wheels.
13. Release the park brake and test drive the vehicle.

### ADJUST FRONT WHEEL BEARINGS

#### ⚠ WARNING

1. Make sure the key-switch is in the "OFF" position, then remove the key.
2. Place the forward-reverse switch in the center "OFF" position.
3. Set the park brake.
4. Place blocks under the front wheels to prevent vehicle movement.
5. Disconnect the main positive and negative cables at the batteries.

#### ⚠ 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 severe bodily injury.

6. Raise the front wheel(s) off of the ground and support with jack stands.
7. Tighten the front axle until the wheel(s) do not spin freely. To test, spin the front wheel by hand. The wheel should stop spinning in no more than 2-revolutions. If the wheel continues to spin, tighten the axle nut and repeat the test.
8. Spin the wheel and listen for any grinding noise. Any grinding noise may be an indication of worn or damaged wheel bearings.

*NOTE: Refer to the **Replace Front Wheel Bearings** section for information regarding the replacement of the wheel bearings.*

9. Lower the vehicle.
10. Reconnect the main positive and negative cables at the batteries.
11. Remove the blocks from behind the wheels.
12. Release the park brake and test drive the vehicle.

## FRONT AXLE REMOVAL AND INSTALLATION

### Removal

#### **⚠ WARNING**

1. Make sure the key-switch is in the "OFF" position, then remove the key.
2. Place the forward-reverse switch in the center "OFF" position.
3. Set the park brake.
4. Place blocks under the front wheels to prevent vehicle movement.
5. Disconnect the main positive and negative cables at the batteries.

#### **⚠ 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 severe bodily injury.

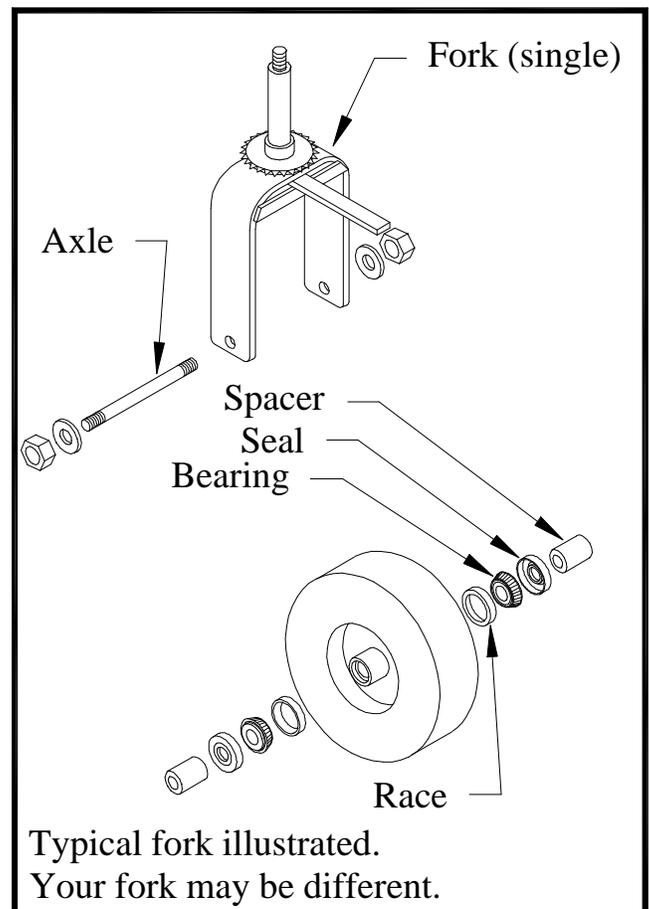
6. Remove the front axle nut.
7. Slowly raise the front of the vehicle until the axle can slide freely out of the fork. The front wheel(s) should still be resting on the ground.
8. Remove the front axle from the fork and support the vehicle with jack stands.

### Installation

1. Raise the front of the vehicle so that the hole for the axle is the same height as the front wheel hub.
2. Assemble the bearing spacers into the front wheel hub and place the front wheel(s) into the fork.
3. Insert the axle into the front fork.
4. Install the axle nut(s). Refer to **Adjust Front Wheel Bearings** section for information regarding tightening the front axle.

*NOTE: If your vehicle is equipped with two axle nuts, the nuts should be tightened equally so that the same number of axle threads are visible on both ends.*

5. Lower the vehicle.
6. Reconnect the main positive and negative cables at the batteries.
7. Remove the blocks from behind the wheels.
8. Release the park brake and test drive the vehicle.





### **REPLACE FRONT WHEEL BEARINGS**

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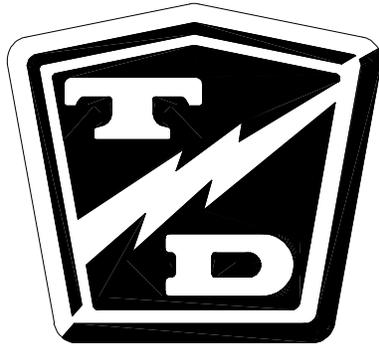
#### **⚠ WARNING**

1. Make sure the key-switch is in the "OFF" position, then remove the key.
2. Place the forward-reverse switch in the center "OFF" position.
3. Set the park brake.
4. Place blocks under the front wheels to prevent vehicle movement.
5. Disconnect the main positive and negative cables at the batteries.

#### **⚠ 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 severe bodily injury.**

6. Remove the front axle and wheel(s). Refer to **Front Axle Removal and Installation** section for information regarding removing the axle.
7. Remove the spacers, seals and bearings from the hub
8. Thoroughly clean all grease from the inside of the hub and the bearings.
9. Drive the races out from the hub.
10. Press new races into the hub.
11. Assemble in reverse order, using new grease seals.
  - a. Pack bearings with grease.
  - b. Refer to **Front Axle Removal and Installation** section for information regarding installing the axle.
12. Lower the vehicle.
13. Reconnect the main positive and negative cables at the batteries.
14. Remove the blocks from behind the wheels.
15. Release the park brake and test drive the vehicle.



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# **Steering Component Service**

## **STEERING ALIGNMENT**

### **⚠ WARNING**

1. Make sure the key-switch is in the "OFF" position, then remove the key.
2. Place the forward-reverse switch in the center "OFF" position.
3. Set the park brake.
4. Place blocks under the front wheels to prevent vehicle movement.
5. Disconnect the main positive and negative cables at the batteries.



*Centered Steering Wheel*

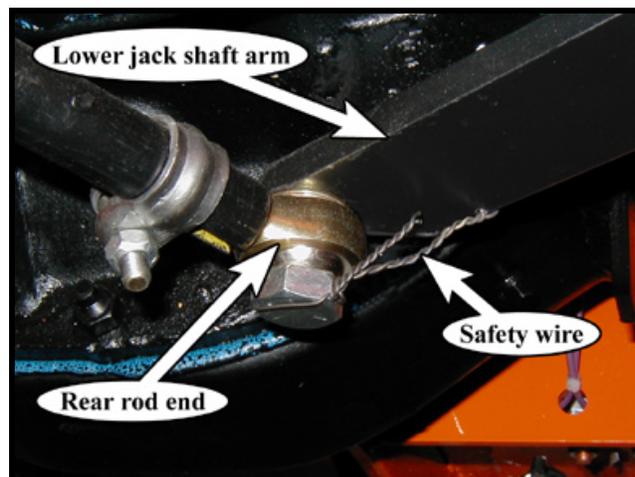
### **⚠ WARNING**

**Do not drive the vehicle while the steering wheel or front wheels are tied in position. Driving the vehicle while the steering wheel or front wheels tied in position may cause loss of control of the vehicle resulting in severe bodily injury and/or property damage.**

6. Remove the steering chain.
7. Remove the drag link.
8. Position the front fork so that it is in the full right turn position and tie off so it cannot rotate.
9. Position the steering jack shaft arm as shown in the illustration (parallel with the rear wheel).
10. Position the steering wheel so that it is centered (see illustration) and tie off so it cannot rotate.
11. Loosen the rod end clamps.
12. Adjust the drag link rod ends so that the drag link can be easily installed. Both rod ends should have approximately the same number of threads into the drag link.
13. Install the drag link.
14. Position the rod end clamps as shown in the illustration and tighten the clamp bolts.
15. Reconnect the main positive and negative cables at the batteries.
16. Remove the blocks from behind the wheels.
17. Release the parking brake and test drive the vehicle.



*Jack Shaft Arm*



*Rear Rod End with Safety Wire*

## INSPECT THE STEERING COMPONENTS

### Fork Bearings

#### **⚠ WARNING**

1. Make sure the key-switch is in the "OFF" position, then remove the key.
2. Place the forward-reverse switch in the center "OFF" position.
3. Set the park brake.
4. Place blocks under the front wheels to prevent vehicle movement.
5. Disconnect the main positive and negative cables at the batteries.

#### **⚠ 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 severe bodily injury.

6. Raise the front of the vehicle and support with jack stands.
7. Inspect for lateral play by attempting to move the fork to the left and right (not rotating), There should be no noticeable play.
8. If there is any play in the fork bearings, refer to section **Replace the Front Fork** for information regarding adjusting the fork bearings.
9. Lower the front end to the ground.
10. Reconnect the main positive and negative cables at the batteries.
11. Remove the blocks from behind the wheels, Release the parking brake and test drive the vehicle.

### Steering Chain

The steering chains are very durable and, properly lubricated, will last the lifetime of the vehicle.

Inspect the chains for corrosion. Any sign of corrosion is evidence of an improperly lubricated chain and the chain should be replaced.

Inspect each link in the chains for binding. If any binding is found, remove the chain and soak it in 30 wt. motor oil overnight and reinspect the links. Replace the chain if the binding is not corrected.

### Rod Ends

*NOTE: Rod ends will wear at the same rate. If one is worn out, then all should be replaced as a set.*

#### **⚠ WARNING**

1. Make sure the key-switch is in the "OFF" position, then remove the key.
2. Place the forward-reverse switch in the center "OFF" position.
3. Set the park brake.
4. Place blocks under the front wheels to prevent vehicle movement.
5. Disconnect the main positive and negative cables at the batteries.

#### **⚠ WARNING**

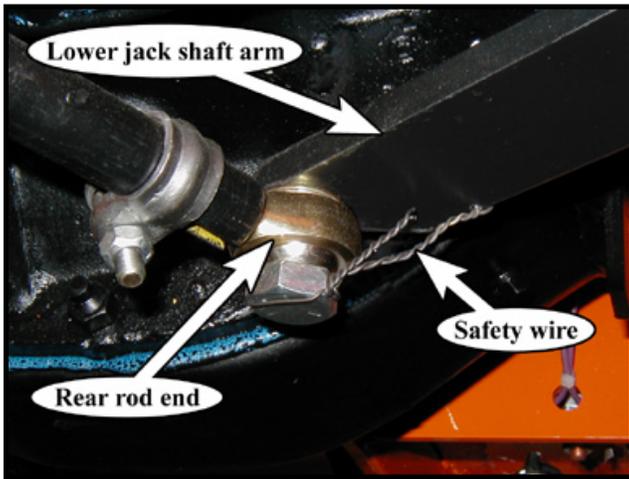
**Do not drive the vehicle while the steering wheel or front wheels are tied in position. Driving the vehicle while the steering wheel or front wheels tied in position may cause loss of control of the vehicle resulting in severe bodily injury and/or property damage.**

6. Tie off the front fork so that it cannot turn.
7. While watching the rod ends rapidly rotate the steering wheel to the left and right.
8. If the rod end housing moves up or down then the rod end is worn out and should be replaced.



## Maintenance, Service, and Repair

**NOTE:** The rear rod end must be secured with safety wire through holes in the bolt head and jack shaft arm (see illustration).



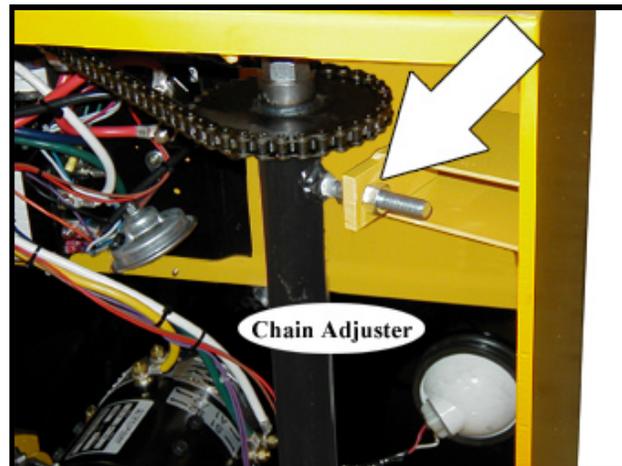
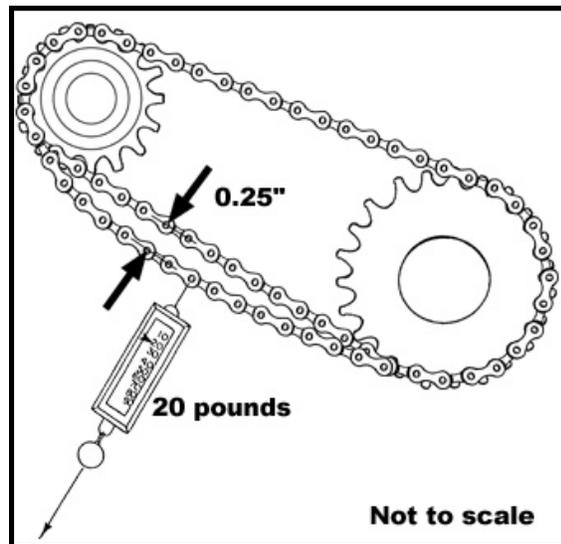
9. Untie the front fork.
10. Reconnect the main positive and negative cables at the batteries.
11. Remove the blocks from behind the wheels.
12. Release the parking brake and test drive the vehicle.

## ADJUST THE STEERING CHAIN

### ⚠ WARNING

1. Make sure the key-switch is in the "OFF" position, then remove the key.
2. Place the forward-reverse switch in the center "OFF" position.
3. Set the park brake.
4. Place blocks under the front wheels to prevent vehicle movement.
5. Disconnect the main positive and negative cables at the batteries.

6. Loosen chain adjuster locking nuts (see illustration).
7. Using the chain adjuster, tighten the steering so that it deflects approximately 1/4" with 20 pounds of force (see illustration).
8. Tighten the chain adjuster locking nuts.
9. Reconnect the main positive and negative cables at the batteries.
10. Remove the blocks from behind the wheels.
11. Release the parking brake and test drive the vehicle.



## REPLACE THE FRONT FORK

### **⚠ WARNING**

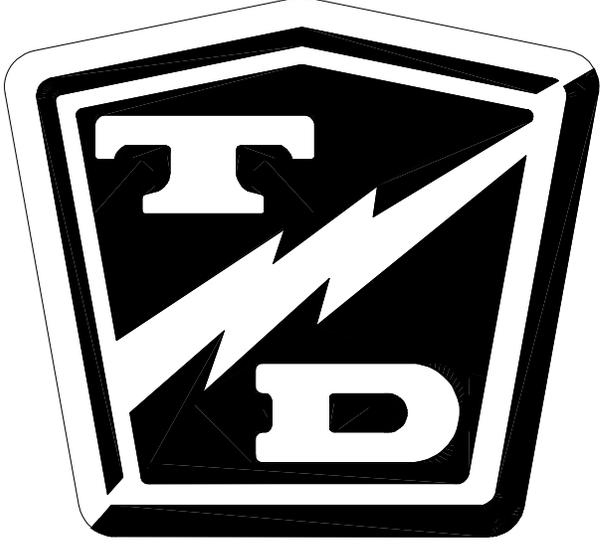
1. Make sure the key-switch is in the "OFF" position, then remove the key.
2. Place the forward-reverse switch in the center "OFF" position.
3. Set the park brake.
4. Place blocks under the front wheels to prevent vehicle movement.
5. Disconnect the main positive and negative cables at the batteries.

### **⚠ 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 severe bodily injury.**

6. Remove the front axle. Refer to section *Front Axle Removal and Installation* in *Front Axle Service* for information regarding removing the front axle.
7. Remove the rod end from the fork.
8. Loosen the fork spindle nut but do not remove it at this time.
9. Tie up or support the front fork so that it cannot fall from the vehicle and remove the fork spindle nut.
10. Remove the fork from the vehicle.
11. Thoroughly clean all parts and install in reverse order.
  - Tighten the fork spindle nut to remove all play in the fork bearings and then an additional 1/4 turn.
  - Refer to section *Front Axle Removal and Installation* in *Front Axle Service* for information regarding installing the front axle.
  - If the fork was replaced with a new fork the front end should be realigned. Refer to section *Steering Alignment* for information regarding aligning the front end.
12. Lower the wheels to the ground.
13. Reconnect the main positive and negative cables at the batteries.
14. Remove the blocks from behind the wheels.
15. Release the parking brake and test drive the vehicle.

**TAYLOR - DUNN**



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# **Brake Service**

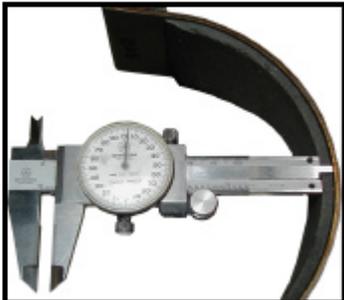
## **INSPECT THE SERVICE BRAKE**

### **⚠ WARNING**

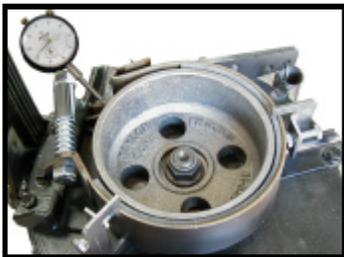
**Current Taylor-Dunn® brakes are asbestos free. However, there is the possibility that the original brakes were replaced with aftermarket parts containing asbestos. Since this possibility exists, all brake parts should be handled as if they contain asbestos. Refer to Appendix C for recommended handling precautions.**

The band brake is located on the front of the drive chain case housing, it must be removed to accurately measure the lining thickness. Refer to **Replace the Brake Lining** for information on removing the band brake.

1. Measure the thickness of the brake lining at its thinnest point. If it is 1/16-inch or less, then the brake band must be replaced.



2. Measure the run out of the brake drum. If it is more than 0.010-inches then it must be machined or replaced. Do not machine the brake drum beyond its service limits.



3. Measure the diameter of the brake drum. If it is less than 5.85-inches then the brake drum must be replaced.



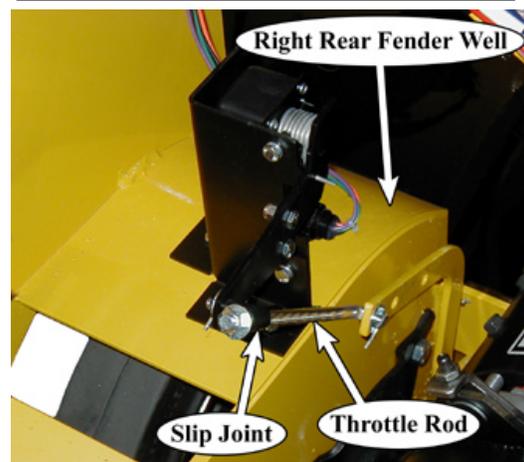
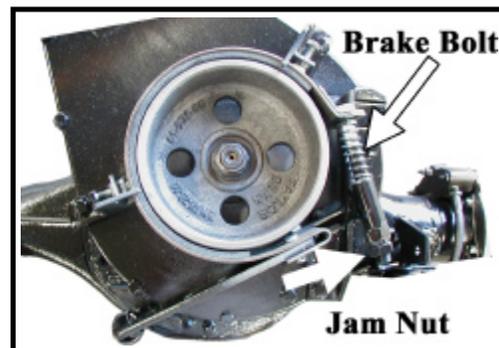
4. Inspect all brake cables and linkages for any signs of damage or wear.
5. Reconnect the main positive and negative cables at the batteries.
6. Remove blocks from behind the wheels.
7. Test drive the vehicle.

## **ADJUST THE SERVICE BRAKE**

### **⚠ WARNING**

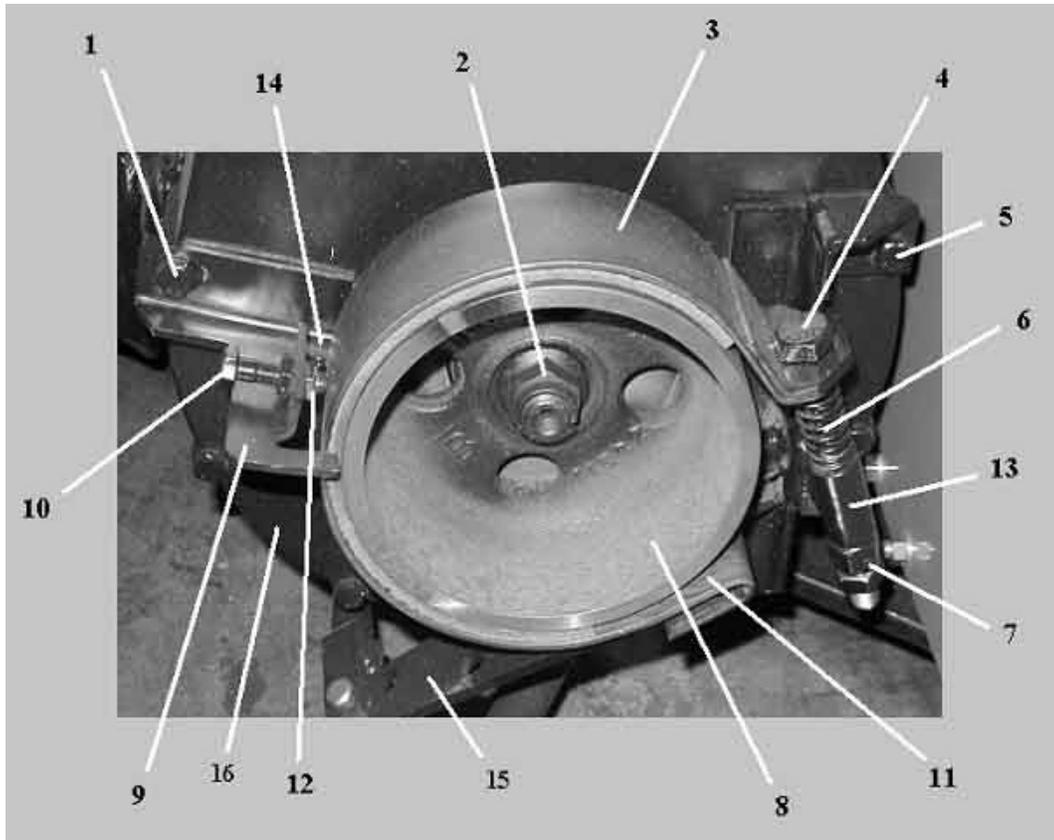
1. Make sure the key-switch is in the "OFF" position, then remove the key.
2. Place the forward-reverse switch in the center "OFF" position.
3. Place blocks under the front wheels to prevent vehicle movement.
4. Disconnect the main positive and negative cables at the batteries.

6. Depress the accelerator treadle until the stop nut on the throttle rod is in contact with the accelerator module slip joint. (see below).
7. Loosen the brake band bolt jam nut.
8. Tighten the brake band bolt until the brake starts to drag and then back off one turns.
9. Tighten the brake band bolt jam nut.
10. Release the treadle.
11. Reconnect the main positive and negative cables at the batteries.
12. Remove the blocks from the wheels.
13. Release the park brake and test drive the vehicle.





## REPLACE THE BRAKE LINING



### ⚠ WARNING

The brake band bolt, spring, lock nut, jam nut, clevis pin, and cotter pin must be replaced with new parts whenever the brake band is replaced. Failure to replace these components could cause the parking brake to fail resulting in severe bodily injury and/or property damage.

### ⚠ WARNING

1. Make sure the key-switch is in the "OFF" position, then remove the key.
2. Place the forward-reverse switch in the center "OFF" position.
3. Place blocks under the front wheels to prevent vehicle movement.
4. Disconnect the main positive and negative cables at the batteries.

*NOTE: Refer to the illustration above for locations of the components.*

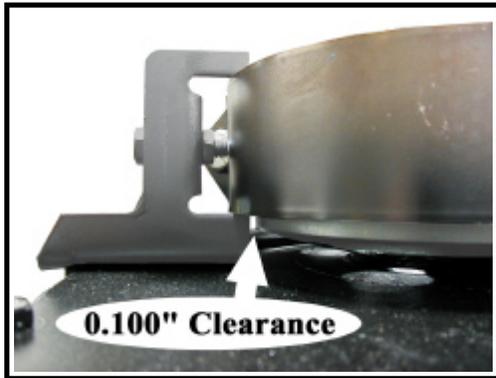
*NOTE: On most vehicle configurations, the brake drum does not have to be removed for this procedure. If the brake drum must be removed, refer to **Band Brake Drum** for this procedure.*

5. Depress the treadle to release the brake
6. Disconnect the brake linkage from the brake arm.
7. Loosen the bolt(s) (1) on the brake band alignment bracket(s) (9) and pivot them out of the way.
8. Remove the bolts (5) holding the brake band assembly to the front of the chain housing (16) and remove the brake band assembly from the drive.
9. Remove the brake band bolt (4).
10. Remove the clevis pin (11) from the brake band anchor and remove the brake band (3) from the assembly.
11. Inspect the brake arm pivot bolt for signs of wear. If any signs of wear are seen then the pivot bolt must be replaced.

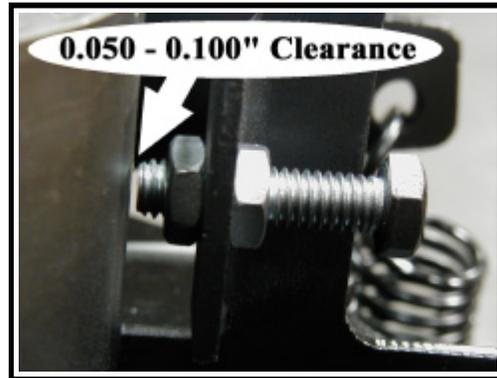


## Maintenance, Service, and Repair

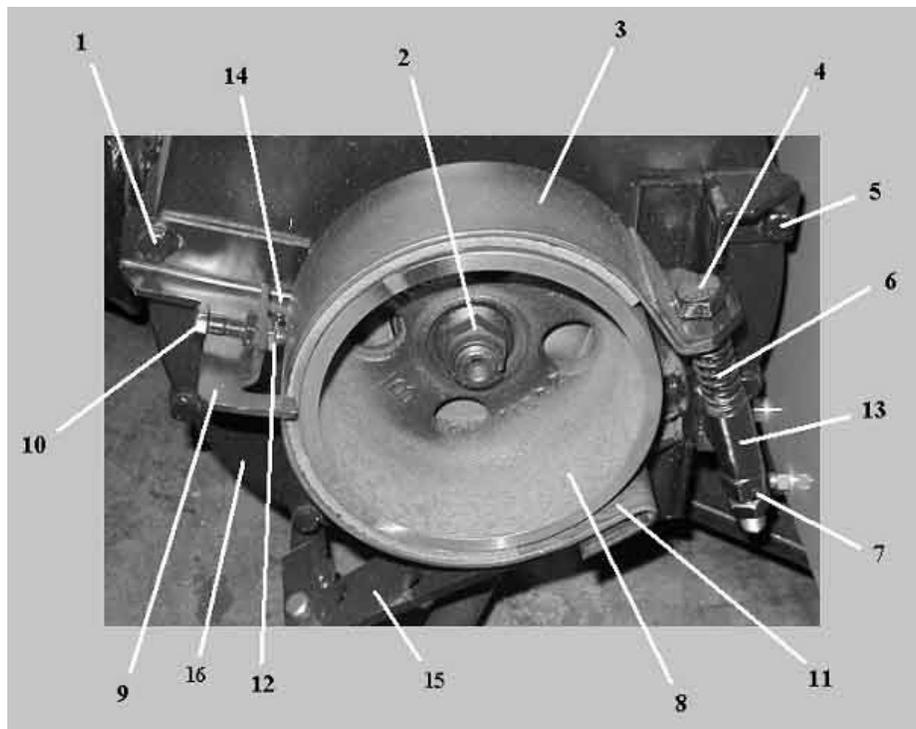
12. Tighten the brake band pivot bolt and then back off just enough so that the brake arm (15) pivots freely.
13. Install the new brake band using new hardware.
14. Install the brake band assembly onto the drive. Tighten the mounting bolts (5) just enough to keep the mounting bracket (13) against the chain case (16) but still allowing the bracket to move.
15. Tighten the brake band bolt (4) to 50 ft-lbs.
16. Tighten the brake band bracket mounting bolts (5).
17. Position the brake band alignment bracket(s) (9) so that the inner arm (14) is 0.100" away from the brake drum (8). Make certain that the alignment bracket does not come into contact with the brake drum.



18. Adjust the alignment bracket adjusting bolt(s) (10) to 0.050-0.100" away from the brake band and tighten the jam nuts (12).



19. Connect the brake linkage to the brake arm and adjust the linkage so that the brake arm is contacting the chain case when the treadle is fully depressed (level with the floorboard).
20. Release the treadle and then depress the accelerator treadle until the stop nut on the throttle rod is in contact with the accelerator module slip joint. (see below).
21. Loosen the brake band adjusting bolt (4) and adjust so that there is a slight brake drag. It may be necessary to readjust the alignment bracket adjusting bolt(s) (10) for optimum brake alignment and operation.
22. Tighten the brake band bolt jam nut (7).
23. Reconnect the main positive and negative cables at the batteries. Remove the blocks from behind the wheels and test drive.





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## REPLACE THE BRAKE DRUM

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### **⚠ WARNING**

**Current Taylor-Dunn® brakes are asbestos free. However, there is the possibility that the original brakes were replaced with aftermarket parts containing asbestos. Since this possibility exists, all brake parts should be handled as if they contain asbestos. Refer to Appendix C for recommended handling precautions.**

### **⚠ WARNING**

- 1. Make sure the key-switch is in the "OFF" position, then remove the key.**
- 2. Place the forward-reverse switch in the center "OFF" position.**
- 3. Place blocks under the front wheels to prevent vehicle movement.**
- 4. Disconnect the main positive and negative cables at the batteries.**

5. Depress the treadle to release the brake.
6. Loosen the bolt(s) on the brake band alignment bracket(s) and pivot them out of the way.
7. Remove the pinion nut and slide the brake drum off of the pinion shaft.
8. Remove the pinion seal.

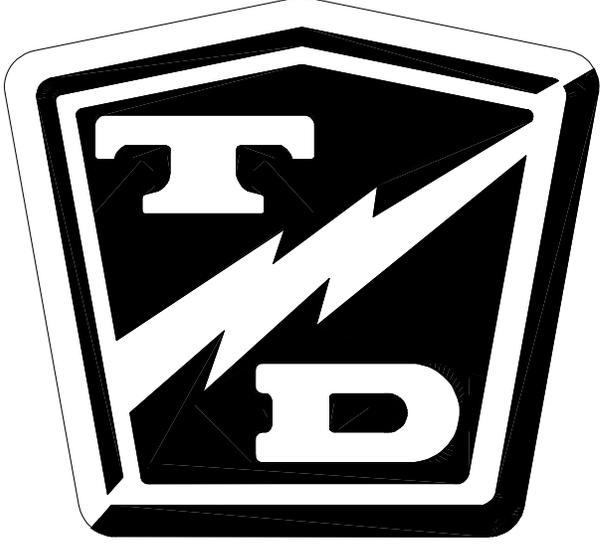
### **⚠ WARNING**

**Inspect the pinion seal for any signs of misalignment. A misaligned pinion seal could cause premature failure of the pinion seal and an oil leak. This could result in property damage and/or severe bodily injury.**

9. Lightly grease the new pinion seal and install using the pinion seal installation tool (see appendix C).
10. Install the brake drum using a new pinion nut. Torque the pinion nut to 170 ft-lbs.
11. Adjust the park brake. Refer to ***Adjust the Service Brake*** section for information regarding adjusting the brake.

12. Release the treadle.
13. Reconnect the main positive and negative cables at the batteries.
14. Remove the blocks from behind the wheels.
15. Release the park brake and test drive the vehicle.

**TAYLOR - DUNN**



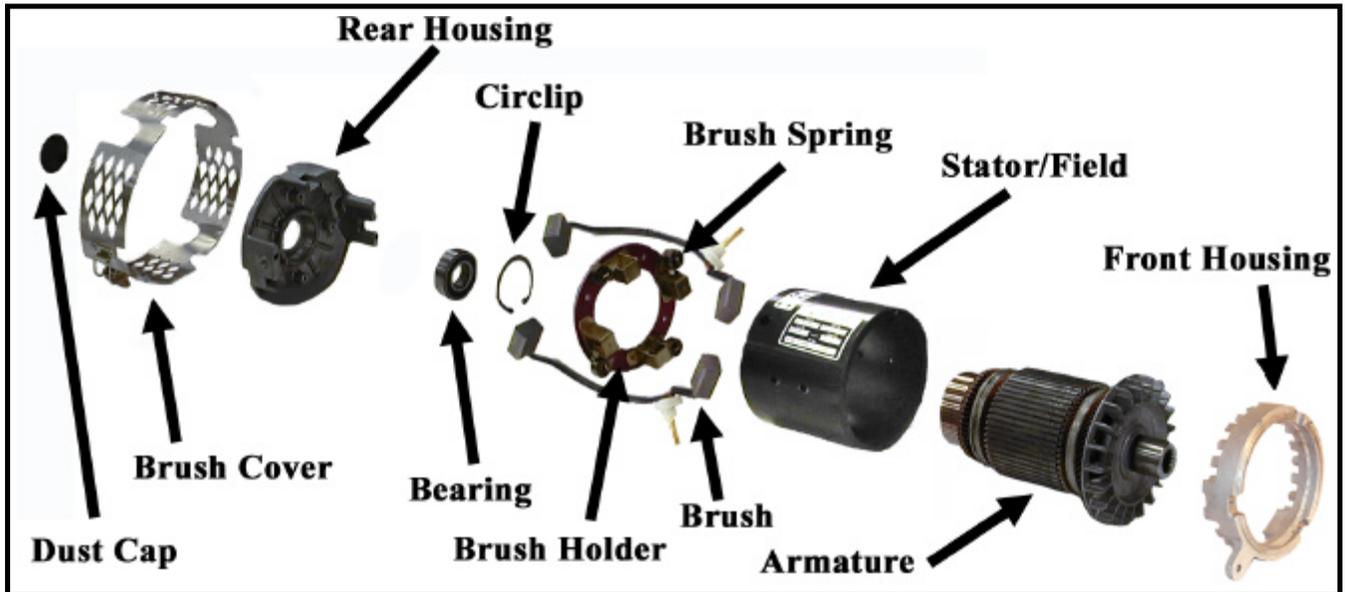
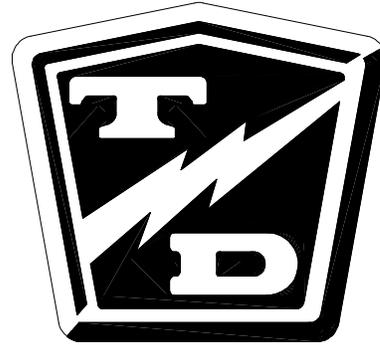
# Motor Service

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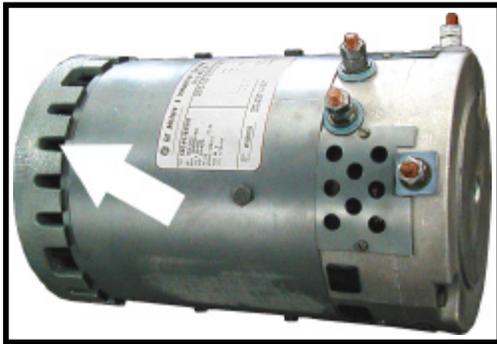
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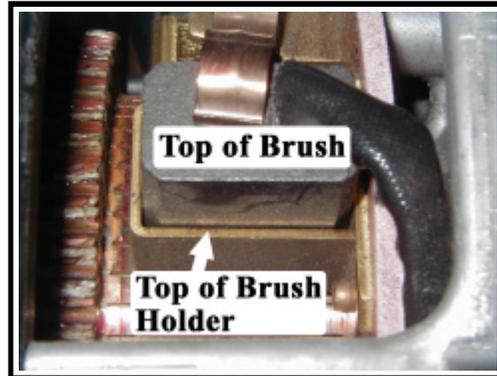


*Typical Exploded Motor*

## INSPECTING THE MOTOR BRUSHES



Typical motor with cooling fan indicated by the arrow



Typical brush and brush holder

### Motors with internal cooling fans

*NOTE:* There are four brushes in the motor. The brushes will not wear at the same rate. It is recommended that all four brushes are inspected at the same time.

*NOTE:* In some vehicle configurations it may not be possible to inspect all four brushes while the motor is in the vehicle. Refer to **Transmission Service** section for information on removing the motor.

### **⚠ WARNING**

1. Make sure the key-switch is in the "OFF" position, then remove the key.
2. Place the forward-reverse switch in the center "OFF" position.
3. Set the park brake.
4. Place blocks under the front wheels to prevent vehicle movement.
5. Disconnect the main positive and negative cables at the batteries.

6. Look through the brush cover and compare the top of the brush to the top of the brush holder. If it is even with or below the top of the brush holder then the brushes should be removed and measured. Refer to **Replacing the Brushes** section for information regarding removing the motor brushes.
7. If any one brush is less than or equal to the service limit specified in **Service Limits**, then all four brushes should be replaced.
8. Reconnect the main positive and negative cables at the batteries.
9. Remove the blocks from behind the wheels, release the park brake and test drive.

### Enclosed Motors (GE, no cooling fan)

#### General Electric Motors

### **⚠ WARNING**

1. Make sure the key-switch is in the "OFF" position, then remove the key.
2. Place the forward-reverse switch in the center "OFF" position.
3. Set the park brake.
4. Place blocks under the front wheels to prevent vehicle movement.
5. Disconnect the main positive and negative cables at the batteries.

6. Insert a 0.035" diameter wire through the brush inspection hole above each brush until it contacts the top of the brush.
7. Mark the wire to indicate how far it was inserted into the motor housing.
8. Remove the wire and measure how far into the motor the wire was inserted.
9. If any one wire insertion length exceeds the length specified in **Service Limits**, then all four brushes should be replaced. Refer to **Replacing the Brushes** section for information regarding replacing the motor brushes.
10. Reconnect the main positive and negative cables at the batteries.
11. Remove the blocks from behind the wheels, release the park brake and test drive.

## Advanced DC Motors

The enclosed Advanced DC motors must be disassembled to inspect the motor brushes. Refer to **Motor Inspection** for information regarding disassembling the motor.

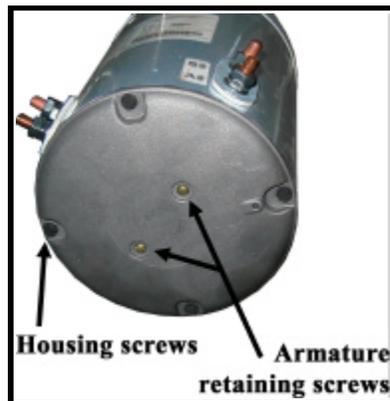
## MOTOR REMOVAL AND INSTALLATION

See the **Transmission** section for information on removing or installing the motor.

## MOTOR INSPECTION

### Disassembly

1. Remove the motor from the vehicle. See the **Transmission** section for information on removing the motor.
2. Remove the housing screws from the rear and/or front of the motor.
3. Remove the armature retaining screws from the rear housing (if equipped).



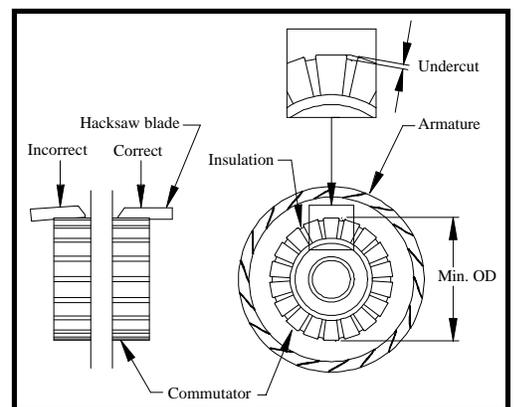
4. If this is an enclosed motor, remove the front housing end.
5. Pull the armature out of the front end of the motor housing.
6. Remove the nuts off of all of the terminals in the rear motor housing.
7. Remove the rear motor housing being careful not to damage the field coil wires.

### Inspection

1. Measure the length of each motor brush.
  - If any one brush is less than or equal to the service limit specified in section **Service Limits**, then all four brushes should be replaced. Refer to **Replacing the Brushes** section for information regarding replacing the motor brushes.
2. Measure the diameter of the commutator.
  - If the commutator is less than the minimum diameter specified in section **Service Limits**, then the motor must be replaced.



3. Measure the commutator undercut depth in 5-places around the commutator.
  - If any one of the measurements is less than the minimum undercut depth specified in **Service Limits** above, then the commutator must be undercut. Refer to **Repair Commutator** section for information regarding undercutting the commutator.

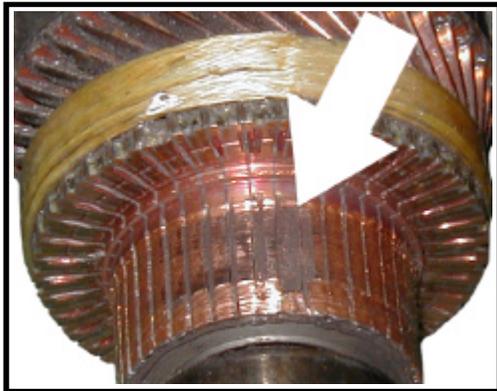


4. Inspect the commutator for grooves.
  - If the commutator is grooved then it must be machined on a lathe. Do not machine the commutator past the minimum diameter specified in **Service Limits** section. Refer to **Repair Commutator** section for information regarding machining the commutator.



## Motor Service

5. Inspect the commutator for burn marks.
  - Burn marks and/or raised commutator segments 90 or 180 degrees apart is evidence of a shorted armature. A tool called a growler is required to reliably test for a shorted armature.



*Typical burn mark on a shorted armature*

6. Inspect the commutator for raised segments. Raised segments could be a result of a stalled motor or shorted armature. A tool called a growler is required to reliably test for a shorted armature.
    - If the armature is not shorted then the raised segments can be removed by machining the commutator. Do not machine the commutator past the minimum diameter specified in **Service Limits** section. Refer to **Repair Commutator** section for information regarding machining the commutator.
  7. Visually inspect the armature windings for burnt insulation. Burnt insulation is a direct result of motor overheating and could lead to a shorted armature.
    - If the insulation is cracked or burnt, then it is recommend that the armature or motor be replaced.
- NOTE: If the armature has been burnt then there is a good possibility that the field windings may also be burnt. Symptoms indicating a shorted field include high motor current, lack of power and possibly excessive speed.*
8. Using a growler, test the armature for shorts.
    - If the armature is shorted, then we recommend that the armature or motor be replaced.
  9. Using the continuity function of digital multi meter, check the continuity around the entire commutator by placing one test lead against one of the commutator segments and the other test lead against all of the other segments one at a time. There should be continuity around the entire commutator. If any segment indicates an open circuit, then the motor must be replaced.
  10. Using the continuity function of digital multi meter, check the continuity from any one of the

commutator segments and the armature frame. If it is not an open circuit, then the armature is shorted and the motor must be replaced.

11. Rotate the motor bearing(s) by hand.
  - The bearing should not 'freewheel' but should come to a smooth stop when rapidly spun by hand. If the bearing freewheels, then grease is no longer present in the bearing and it must be replaced. Refer to **Replacing the Bearings** section for information regarding replacing the armature bearings.
  - Feel for any roughness when the bearing is rotated. If any roughness or grinding is noticed then the bearing must be replaced. Refer to **Replacing the Bearings** section for information regarding replacing the armature bearings.

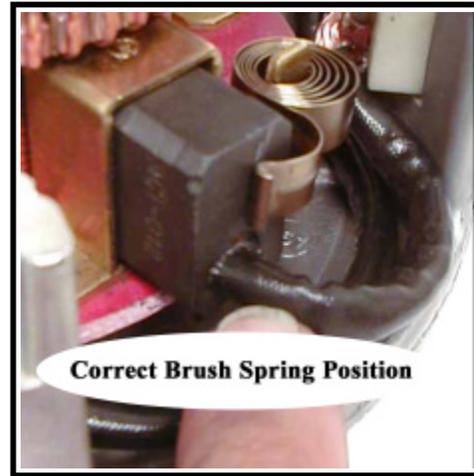
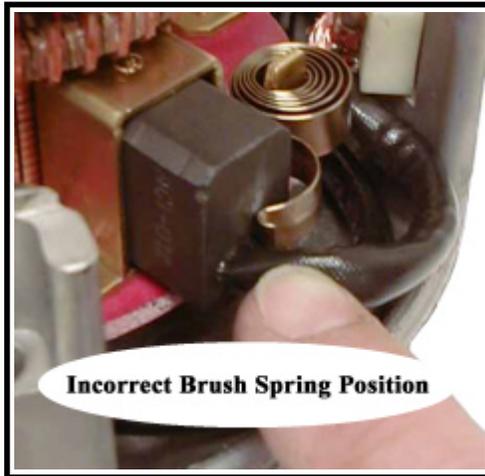
### Assembly

*NOTE: If this is an enclosed motor on a vehicle with a Power Traction primary reduction, then it is recommended to replace the armature shaft seal any time the motor is disassembled.*

1. Push the motor brushes just far enough out of the brush holder so that the brush springs hold them in place away from the commutator. See the illustration to the right.
2. Install the rear motor housing to the stator housing.
3. Lightly grease the outside diameter of the armature bearings.
4. Insert the armature through the stator housing and seat the bearing into the rear housing.
5. If equipped with armature retaining screws, install and tighten them at this time.
6. If this is an enclosed motor, lightly grease the armature shaft seal and install the front motor housing.

*NOTE: If the vehicle is equipped with a belt type primary reduction then the spring on the motor seal should be removed. Failure to remove the spring may result in a high pitched squeal from the seal.*

7. Push the motor brushes into the brush holder until the brush spring snaps into place. Be certain that the spring does not rest up against the brush wire. See the illustrations below.



*Brush Spring Orientation*

## **REPLACING THE BRUSHES**

*NOTE: It is recommended that all four brushes be replaced as a set.*

*NOTE: Motors without removable brush covers must be disassembled to replace the brushes. Refer to **Motor Inspection-Disassembly** section for information on taking the motor apart.*

*NOTE: Some motors are equipped with brush pairs. These motors must be disassembled to replace the brushes. Refer to **Motor Inspection-Disassembly** section for information on taking the motor apart. Refer to the **Motor Parts List** for your vehicles brush configuration.*

*NOTE: Some motors have brush leads that are routed through or behind the brush holder assembly. In this case, the brush holder assembly must be removed to replace the brushes.*

*NOTE: The motor must be removed from the vehicle for this procedure. Refer to **Transmission Service** section for information on removing the motor.*

### **Motors with brush covers and brushes with termination screws**

1. Remove the brush covers.
2. Loosen the brush wire retaining screw and remove the brush from the brush holder. Be careful with the brush spring and do not let it slip off of the spring mount. If the spring comes off, then the motor must be disassembled. Refer to **Motor Inspection-Disassembly** section for information on taking the motor apart.

3. Install the new brushes in reverse order.
4. Be certain that the brush springs do not rest up against the brush wires. Refer to illustrations in **Motor Inspection-Assembly** for proper brush spring position.

### **Motors with brush pairs or not equipped with brush covers**

1. Disassemble the motor. Refer to **Motor Inspection-Disassembly** section for information on taking the motor apart.

2. Remove the brush holder.

*Note: Remember the position and routing of the brush crossover leads. They must be reinstalled in the same position.*

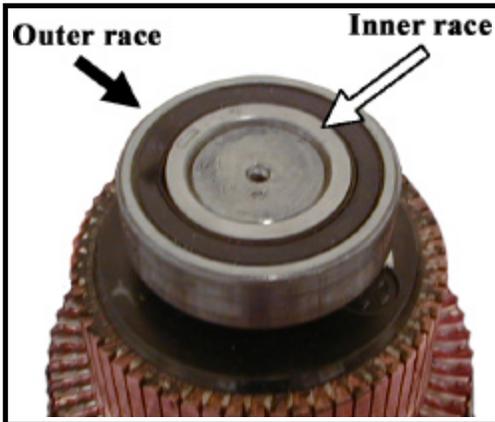
3. Remove the brush termination screws or the armature studs and remove the brushes from the brush holder.
4. Install the new brushes in reverse order.
5. Reassemble the motor. Refer to **Motor Inspection-Assembly** for information regarding reassembling the motor.

## **REPLACING THE BEARINGS**

1. The motor must be removed from the vehicle for this procedure. Refer to **Transmission Service** section for information on removing the motor.
2. Remove the armature. Refer to **Motor Inspection-Disassembly** section for information on taking the motor apart.
3. Press the armature bearing(s) off of the armature shaft.

### **CAUTION**

**Do not press against the outer race of the bearing. Pressing against the outer race will damage the bearing and may result in premature failure of the bearing. See the illustration below**

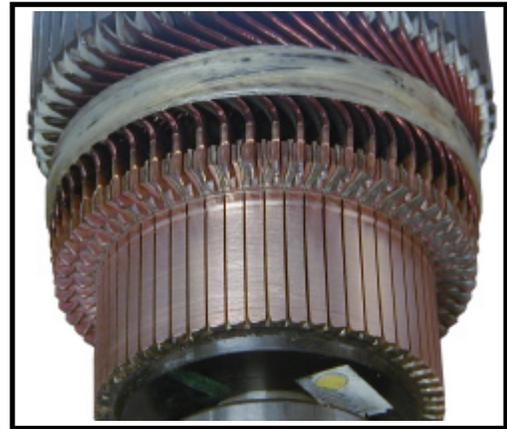


4. Press new bearing(s) onto the shaft.
5. Reassemble the motor.

## **REPAIRING THE COMMUTATOR**

1. The motor must be removed from the vehicle for this procedure. Refer to **Transmission Service** section for information on removing the motor.
2. The armature must be removed from the motor for this procedure. Refer to **Motor Inspection-Disassembly** section for information on taking the motor apart.
3. Using a lathe, cut the armature just enough to remove all grooves, depressions or ridges.
4. Measure the diameter of the commutator. If the commutator is less than the minimum diameter specified in **Service Limits**, then the motor must be replaced.
5. Thoroughly clean all copper debris from between the commutator segments.

6. Measure the commutator undercut depth in 5-places around the commutator. If any one of the measurements is less than the minimum undercut depth specified in **Service Limits**, then the commutator must be undercut.



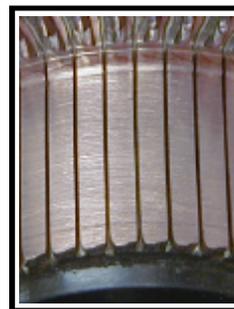
*Example of freshly cut commutator*

7. While still in the lathe, smooth the commutator with fine emery cloth.

### **Undercutting the commutator**

1. Using a small straight cut saw blade, cut the commutator insulation to the proper depth. Refer to undercut depth in **Service Limits**.
2. Once all segments have been properly undercut, mount the armature in a lathe and smooth the commutator with fine emery cloth.
3. Inspect the armature for shorts. Refer to **Motor Inspection** section for information on testing the armature.

**NOTE:** Copper debris in the undercut area can give a reading of a shorted armature.



*Properly undercut and cleaned commutator segments*

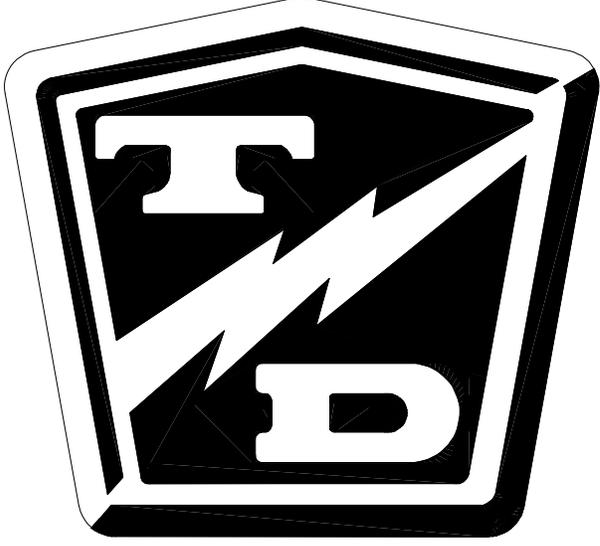
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**SERVICE LIMITS**

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Motor Specification Number	Undercut Depth		Commutator Diameter (min)		Brush Length (min)		Wire Depth (max)	
	mm	inches	mm	inches	mm	inches	mm	inches
5BC58JBS6129A	0.635	0.025	66.75	2.625	-	-	38.1	1.5
5BC58JBS6129B	0.635	0.025	66.75	2.625	-	-	38.1	1.5
5BC58JBS6129C	0.635	0.025	66.75	2.625	-	-	38.1	1.5
5BC49JB399C	0.635	0.025	78.97	3.109	19.05	0.75	-	-
5BC58JBS6110C	0.635	0.025	78.97	3.109	19.05	0.75	-	-

**TAYLOR - DUNN**



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*Typical Transmission Assembly*



# Transmission Service



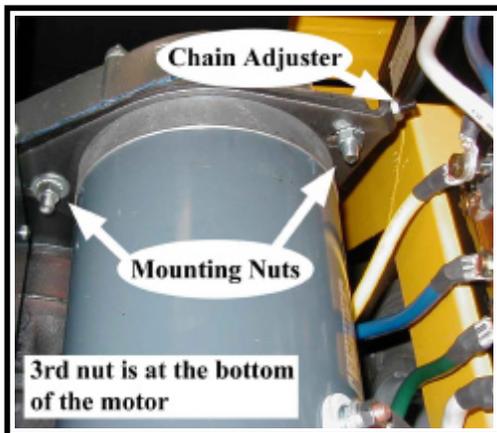
## ADJUST THE DRIVE CHAIN

*NOTE: A small amount of oil may come out when the drive motor mounting bolts are loosened.*

### ⚠ WARNING

1. Make sure the key-switch is in the "OFF" position, then remove the key.
2. Place the forward-reverse switch in the center "OFF" position.
3. Set the park brake.
4. Place blocks under the front wheels to prevent vehicle movement.
5. Disconnect the main positive and negative cables at the batteries.

6. Place a small oil drain pan under the chain case.
7. Loosen but do not remove the three drive motor mounting nuts.
8. Loosen the chain adjuster jam nut.



### ⚠ 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 severe bodily injury.**

9. Raise the drive wheels off of the ground.

### ⚠ WARNING

**Tie the vehicle to an immovable object to prevent the vehicle from moving in forward or reverse. Failure to securely tie the vehicle may result in unexpected vehicle movement resulting in severe bodily injury or property damage.**

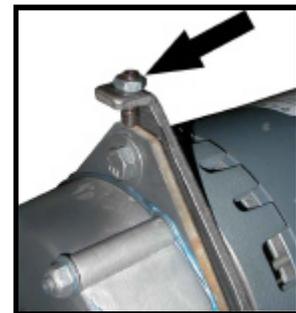
10. Tie the vehicle in place so that it cannot move.
11. Reconnect the batteries.

### ⚠ WARNING

**Rotating parts, keep hands and loose clothing clear of all moving parts. Failure to keep clear of moving parts may result in severe bodily injury and/or property damage.**

12. Close all safety interlock switches, turn the key On, place the forward-off-reverse switch in forward and fully depress the accelerator pedal.
13. Tighten or loosen the adjustment screw to obtain the minimum noise level.

*NOTE: If there is less than 1/16" of threads left on the adjustment screw (see illustration) then the drive chain has stretched beyond service limits and should be replaced. Refer to section **Chain Case** for information regarding replacing the drive chain.*



14. Release the accelerator pedal, place the forward-off-reverse switch in off, turn the key off and disconnect the batteries.
15. Untie the vehicle.
16. Tighten the adjustment screw jam nut and motor mounting nuts.
17. Wipe off any oil that may have come from behind the motor.
18. Lower the drive wheels to the ground.
19. Reconnect the main positive and negative at the batteries, remove the blocks from the wheels, and test drive.



## CHECK THE OIL LEVEL

*NOTE: The oil level in the chain case is maintained by the transmission. Oil is pumped from the 3rd member into the chain case housing. It is not necessary to check the oil level in the chain case.*

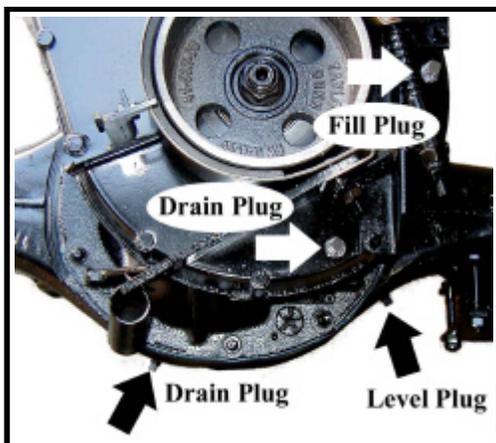
### ⚠ WARNING

1. Make sure the key-switch is in the "OFF" position, then remove the key.
2. Place the forward-reverse switch in the center "OFF" position.
3. Set the park brake.
4. Place blocks under the front wheels to prevent vehicle movement.
5. Disconnect the main positive and negative cables at the batteries.

6. Park the vehicle on a level surface.
7. Place a small oil drain pan under the drive housing.
8. Remove the drive housing level plug.
9. A small amount of oil should come out. This indicates the correct oil level.

*NOTE: If a large amount of oil comes out, then let it drain to the proper level and replace the level plug.*

*If no oil comes out, then fill the drive to the proper level and replace the level plug.*



*Typical location of oil plugs. The actual location of the level plug will vary depending on your vehicles configuration.*

## CHANGE THE OIL

### ⚠ WARNING

**Wear protective gloves when working with petroleum lubricants. Repeated contact with petroleum lubricants can result in skin disorders.**

### ⚠ WARNING

1. Make sure the key-switch is in the "OFF" position, then remove the key.
2. Place the forward-reverse switch in the center "OFF" position.
3. Set the park brake.
4. Place blocks under the front wheels to prevent vehicle movement.
5. Disconnect the main positive and negative cables at the batteries.

6. Place a large drain pan under the chain housing.
7. Remove the chain case drain plug and allow all of the oil to drain from the housing and then reinstall the drain plug
8. Place the drain pan under the drive housing.
9. Remove the drive housing drain plug and allow all of the oil to drain from the housing and then reinstall the drain plug
10. Remove the chain case fill plug and add 1-pint of oil.
11. Remove the drive housing fill plug and add 2-quarts of oil.

*NOTE: Refer to the **Lubrication Chart** for information regarding the type of oil.*

12. Replace all fill plugs.

*NOTE: Dispose of waste oil in accordance with your local regulations.*

13. Reconnect the main positive and negative at the batteries, remove the blocks from the wheels, and test drive.



### DRIVE MOTOR

#### Remove

*NOTE: In most cases it is not necessary to disassemble the chain case to remove the motor. If you find it necessary to disassemble the chain case, refer to **Transmission** section for information regarding disassembly of the chain case.*

#### ⚠ WARNING

1. Make sure the key-switch is in the "OFF" position, then remove the key.
2. Place the forward-reverse switch in the center "OFF" position.
3. Set the park brake.
4. Place blocks under the front wheels to prevent vehicle movement.
5. Disconnect the main positive and negative cables at the batteries.

6. Remove the four motor wires.
7. Loosen the drive chain adjusting screw.
8. Remove the hardware holding the motor to the chain case backing plate.
9. Lift the rear of the motor and rotate the motor so that the motor mounting plate clears the two threaded studs on the chain case backing plate and remove the motor from the drive.

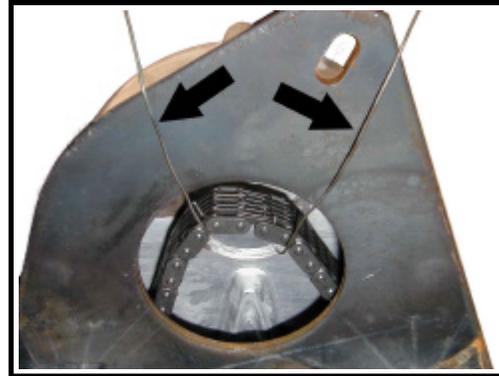
#### Install

#### ⚠ CAUTION

**Do not allow the wheels to rotate after the motor has been removed. Allowing the wheels to rotate may result in the drive chain getting bound up with the drive sprocket, locking up the transmission. Should this happen, the chain may have to**

1. Tie the chain up in position with mechanics wire as shown.
2. Slip the motor sprocket under the chain and rotate the motor so that the mounting plate goes into the threaded studs and remove wire(s) holding the chain.

3. Install the motor mounting hardware but do not tighten until the chain adjustment is complete.
4. Adjust the drive chain. Refer to **Adjust the Drive Chain** for information regarding adjusting the drive chain.
5. Connect the motor wires.
6. Reconnect the main positive and negative at the batteries, remove the blocks from the wheels, and test drive.



*Chain tied with mechanics wire*



## REAR AXLE

### Remove and Install

#### ⚠ WARNING

1. Make sure the key-switch is in the "OFF" position, then remove the key.
2. Place the forward-reverse switch in the center "OFF" position.
3. Set the park brake.
4. Place blocks under the front wheels to prevent vehicle movement.
5. Disconnect the main positive and negative cables at the batteries.

#### ⚠ 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 severe bodily injury.

6. Raise the drive wheel off of the ground.
7. Remove the wheel assembly.
8. Place a small oil drain pan under the end of the axle housing.
9. Remove the four axle retaining bolts. Secure the brake body assembly, do not let it hang by the brake hose.
10. Using a slide hammer, remove the axle from the axle housing.
11. Remove the bearing gasket and axle seal from the housing.
12. Install the axle in reverse order using a new gasket and seal.
13. Reconnect the main positive and negative at the batteries, remove the blocks from the wheels, and test drive.

### Replace the Axle Bearing

*NOTE:* The axle must be removed from the vehicle to replace the axle bearing. Refer to section **Rear Axle: Remove and Install** for information regarding removing the axle.

*NOTE:* A 10-ton press is required to replace the axle bearing.

*NOTE:* The axle bearing will be damaged when it is removed.

#### ⚠ WARNING

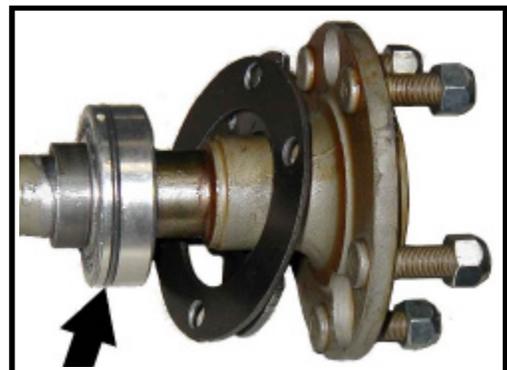
The axle bearing retainer will be damaged when it is removed. Do not reuse the axle bearing retainer. Reinstalling the original bearing retainer may result in the axle falling out of the transmission resulting in severe bodily injury or property damage.

#### ⚠ WARNING

Old axle bearings may explode while being removed. Place a cage around the axle bearing that will contain all debris if the bearing explodes. Failure to place a cage around the axle bearing could result in severe bodily injury or property damage.

1. Place the axle in a press and remove the bearing and bearing retainer.
2. Lightly lubricate the axle shaft.
3. Install a new bearing and bearing retainer and press into place.

*NOTE:* Some axle configurations have an o-ring around the axle bearing. The bearing should be orientated so that the o-ring is farthest away from the axle hub. See the illustration below.





### CHAIN CASE

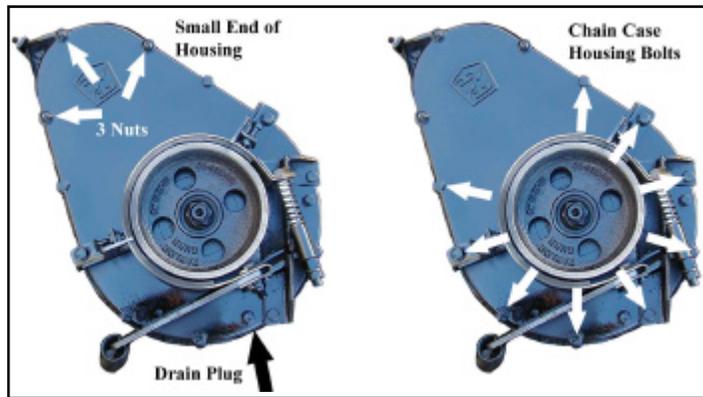
**NOTE:** Some vehicle configurations may require that the transmission be removed to disassemble the chain case. Refer to section **Transmission Assembly** for information on removing the transmission.

#### Disassemble

#### **⚠ WARNING**

1. Make sure the key-switch is in the "OFF" position, then remove the key.
2. Place the forward-reverse switch in the center "OFF" position.
3. Set the park brake.
4. Place blocks under the front wheels to prevent vehicle movement.
5. Disconnect the main positive and negative cables at the batteries.

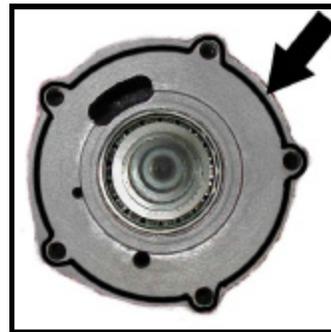
6. Place an oil drain pan under the chain case.
7. Remove the chain case drain plug and allow all of the oil to drain from the housing and then reinstall the drain plug
8. Remove the brake drum. Refer to section **Brakes: Replace the Brake Drum** for information regarding removing the brake drum.
9. Remove the nuts from the three threaded studs at the small end of the chain case housing.
10. Remove the chain case housing bolts, brake assembly, and alignment brackets.
11. Remove the chain case housing from the backing plate.
12. Remove the pinion seal from the chain case housing.
13. Loosen the motor mounting bolts.
14. Loosen the chain adjuster.
15. Remove the drive chain, motor nut and sprocket and the drive sprocket.
16. If the backing plate must be removed from the 3rd member, first remove the motor from the backing plate then remove the backing plate from the 3rd member.



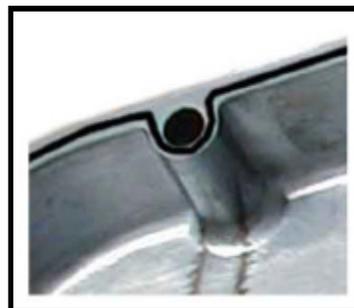
*Typical Chain Case*

#### Assemble

1. Thoroughly clean all gasket surfaces.
2. Apply a 1/8" bead of 94-430-03 gasket sealer to the face of the 3rd member.

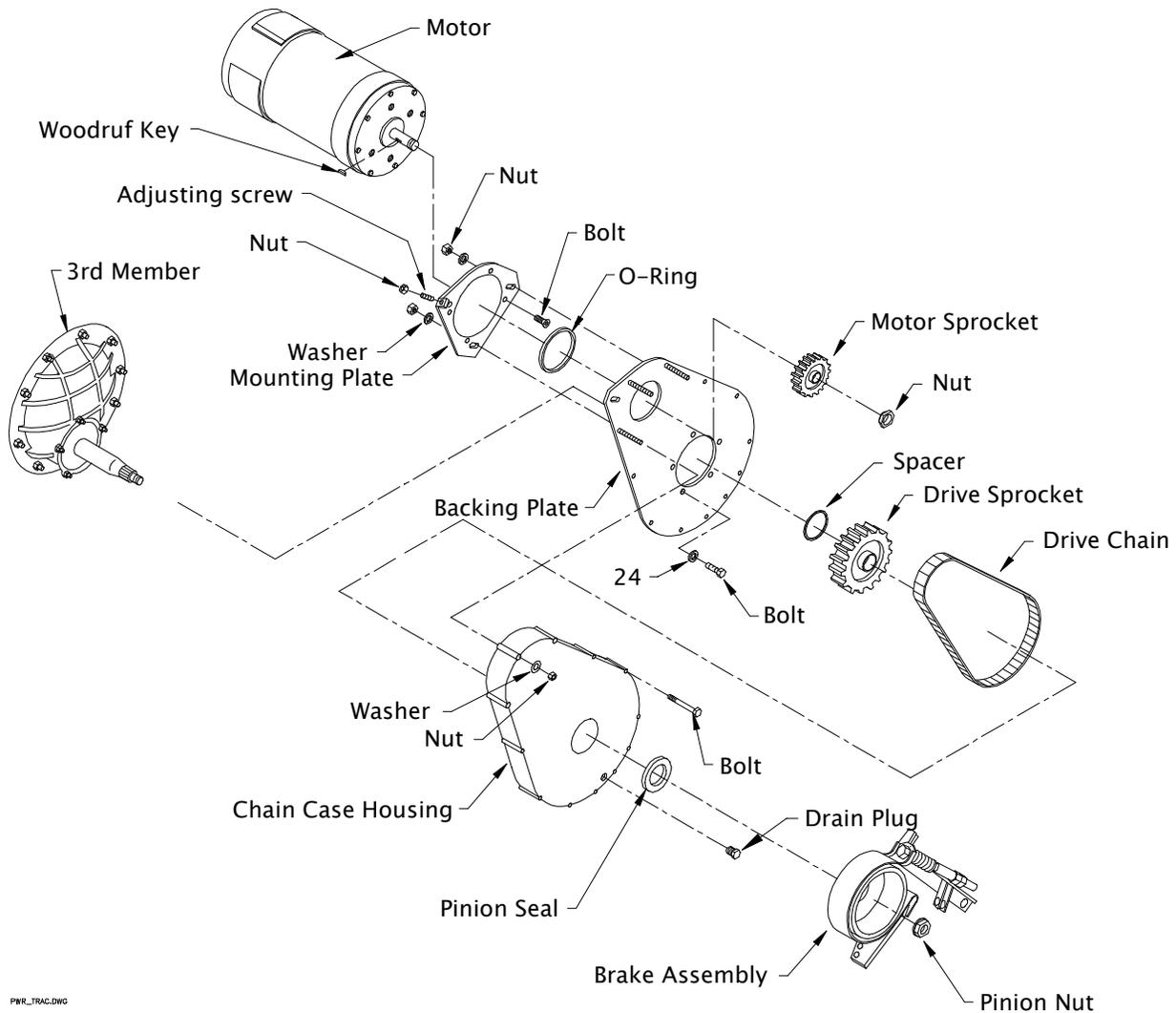


3. Install the backing plate to the 3rd member. Torque to 30-45 ft-lbs.
4. Install the motor to the backing plate. Do not fully tighten the motor mounting hardware at this time.
5. Install the motor sprocket, drive sprocket and chain. Do not adjust the chain tension at this time.
6. Apply a 1/8" bead of 94-430-03 gasket sealer to the chain case housing.



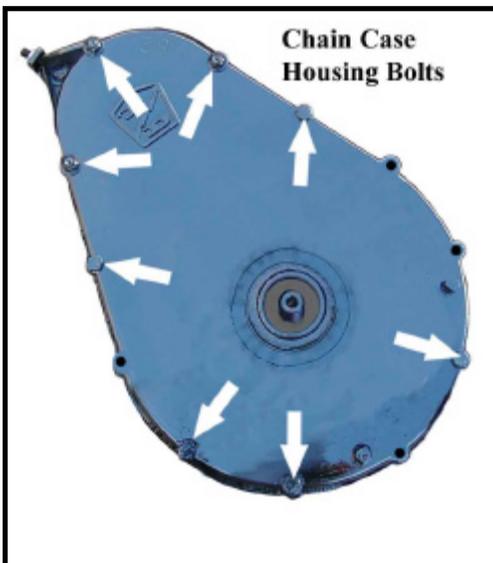
*Apply sealer around the ID of the holes*

7. Install the chain case centering tool (refer to Appendix A) into the pinion seal bore in the chain case housing.



PWR\_TRAC.DWG

8. Install the chain case housing onto the pinion shaft and tighten the pinion nut to 75 ft-lbs.
9. Install and tighten the three nuts and washers to the threaded studs and the housing bolts that are not used for the brake mounting bracket or alignment brackets.
10. Remove the centering tool and install a new pinion seal. Lightly lubricate the pinion seal lip.
11. Install the brake assembly and the brake band alignment bracket(s). Do not tighten the bolts at this time.
12. Install the brake drum. Torque to 175 ft-lbs.
13. Tighten the brake adjusting bolt to 25 ft-lbs.
14. Tighten the brake assembly mounting bolts.
15. Adjust the brake. Refer to section **Brake Service: Adjust the Brakes** for information regarding adjusting the brakes.
16. Adjust the drive chain. Refer to section **Adjust the Drive Chain** for information regarding adjusting the drive chain.



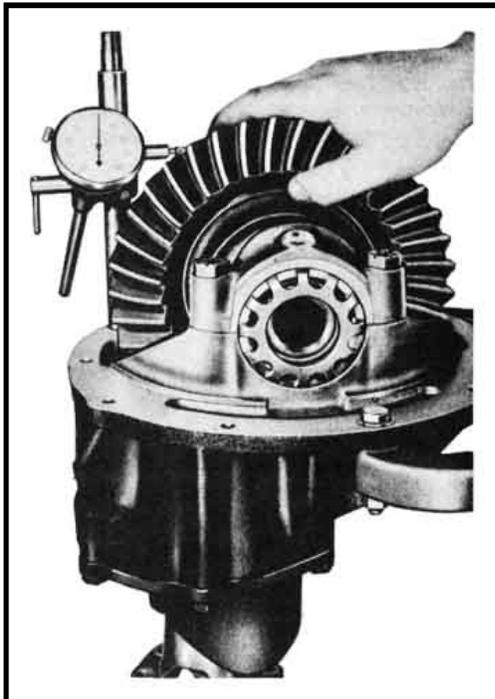


## DIFFERENTIAL ASSEMBLY (3<sup>RD</sup> MEMBER)

### Disassemble

*NOTE: Bearings and races must be replaced as a set. If any one bearing or race is worn, its mate must also be replaced. It is recommended to replace all bearings and races in the 3rd member as a set.*

1. Drain the oil from the differential housing and chain case. Refer to section **Change the Oil** for information regarding draining the oil.
2. Remove the transmission assembly from the vehicle. Refer to **Transmission Assembly: Remove and Install** for information regarding removing the transmission.
3. Remove both rear axle assemblies. Refer to section **Rear Axle: Remove and Install** for information regarding removing the axles.
4. Remove the chain case and backing plate from the 3rd member. Refer to section **Chain Case: Disassemble** for information regarding removing the chain case.
5. Remove the nuts holding the 3rd member to the axle housing and remove the 3rd member from the housing.
6. Install a spacer on the pinion shaft so that the pinion nut can be installed and tightened.



Measuring backlash

7. While rotating the pinion shaft, tighten the pinion nut to 100 ft-lbs.
8. Measure and record the ring and pinion gear backlash. This setting will be used during reassembly.
9. Remove the pinion housing and pinion gear from the 3rd member.

*NOTE: Do not lose the spacers and shims in the pinion housing or the pinion housing shim(s).*

10. If required, remove the rear tapered bearing from the pinion shaft and discard.

*NOTE: Do not remove the bearing unless it requires replacement. Removing the rear bearing will damage the bearing. Replacing this bearing will require re-shimming of the pinion shaft.*

11. If required, remove the bearing races from the pinion housing.
12. Mark the differential bearing caps and 3rd member housing so that they can be reassembled in their original location. Refer to illustration at end of section.

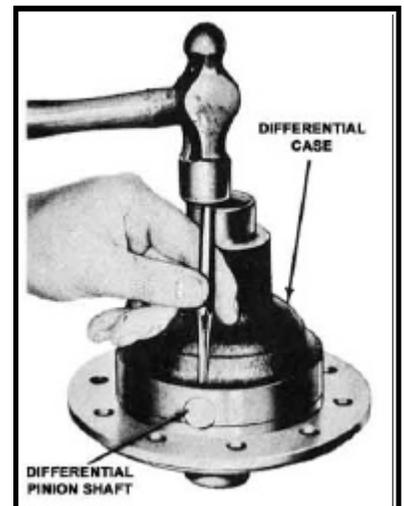
*NOTE: The caps cannot be interchanged or replaced. If the caps are lost or damaged then the entire 3rd member assembly must be replaced.*

13. Remove the differential bearing caps, bearing adjusting nuts and races.
14. Remove the differential assembly from the 3rd member.
15. Mark the ring gear and differential housing so that the ring gear can be reinstalled in the same orientation.

16. Remove the bearings from the differential housing and discard.

*NOTE: Removing the bearings will damage the bearings. Do not remove the bearings unless they require replacement.*

17. Remove the ring gear from the differential housing.
18. Remove the differential shaft locking roll pin.
19. Split the 2-piece differential housing.
20. Drive the differential pinion shaft out of the housing with a brass drift punch.
21. Remove the differential gears, axle gears, and thrust washers.





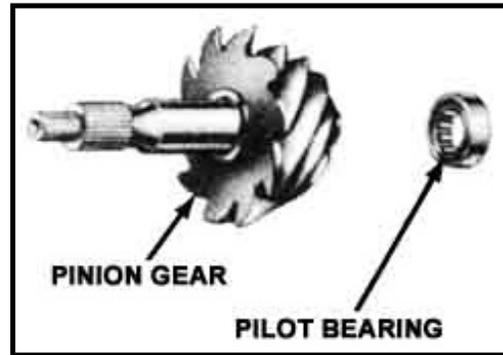
## Assemble

*NOTE: Thoroughly clean and inspect all parts before reassembly. Apply a small amount of differential oil to all gears and bearings before reassembly.*

*NOTE: Depending on your vehicle configuration, the rear pinion pilot bearing is not required and may not be installed.*

*NOTE: If the ring and pinion gear set is to be replaced then the shims for the pinion housing may have to be adjusted. Refer to section **Selecting the Pinion Housing Shim** for information on adjusting the shim.*

*NOTE: Most of our gear sets are non-hunting or semi-hunting gears. With this type of gear the pinion and ring gears must be aligned correctly. There will be two teeth marked on the ring gear and one tooth marked on the pinion gear. The one tooth on the pinion gear must be installed so that it is between the two teeth on the ring gear. The gear ratios are; 2.50, 2.70, 2.75, 3.25 and 3.00.*



## Pinion housing

1. If the rear pinion bearing was removed, install a new bearing.
2. Install the bearing races into the pinion housing.
3. Place the pinion gear into the 3rd member.
4. Install the pinion housing onto the 3rd member.
5. Install the pinion bearing spacers, shims and front bearing.
6. Install a spacer on the pinion shaft so that the pinion nut can be installed and tightened.
7. While rotating the pinion shaft, tighten the pinion nut to 100 ft-lbs.
8. Check the torque required to rotate the shaft. If the torque is not between 6 -10 in-lbs. then the bearings must be re-shimmed. Add or subtract shims as required until the torque is within specifications.

## Differential Assembly

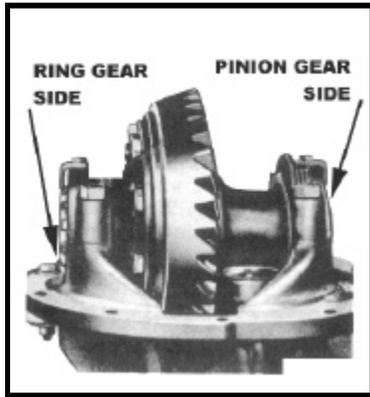
9. Reassemble the differential housing in reverse order.
10. Place the ring gear onto the differential housing matching the mark made during disassembly.
11. Install two of the ring gear bolts finger tight to align the gear.
12. Press the ring gear onto the differential housing.
13. Install the ring gear bolts and cross tighten to 65-80 ft-lbs.
14. If the differential bearings were removed, install new bearings.
15. Place races onto the differential bearings and place the differential assembly onto the 3rd member. Position the assembly so that it is just touching the pinion gear.
16. Install the bearing adjusting nuts making sure that the nuts are not cross threaded. Position the nuts so they are in contact with the bearing races.

**CAUTION**

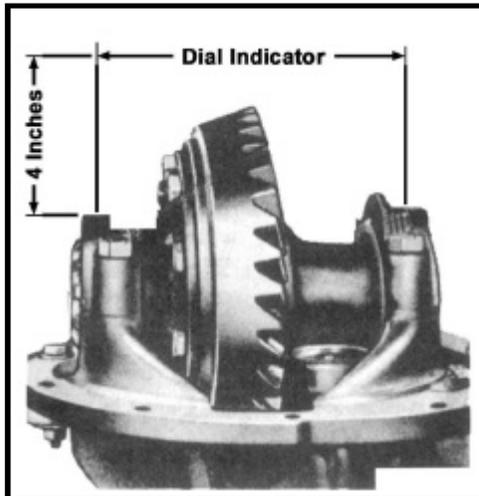
**Cross threading the nuts will damage the 3rd member housing and bearing caps. If the housing and/or nuts are damaged, the entire 3rd member assembly may have to be replaced.**

17. Install the bearing caps in their original locations and torque the bolts to 12-15 ft-lbs. making sure that the adjusting nuts still turn freely.

*NOTE: In the following procedure, "Left adjusting nut" refers to the nut on the ring gear side of the differential assembly. "Right adjusting nut" refers to the nut on the pinion gear side of the differential assembly.*



The differential bearing preload is set by measuring the case spread of the 3rd member housing. As the bearing adjusting nuts are tightened, the two differential bearing caps will be pushed (spread) away from each other. A dial indicator must be used to measure the case spread as the nuts are tightened. Mount the dial indicator so that it is 4 inches above the top of the bearing caps and parallel to the center line of the carrier bearings.



*NOTE: Be sure to continually rotate the ring gear while adjusting the bearings. This makes sure that the bearings and races remain seated correctly.*

*NOTE: One hole on adjusting nut = approximately 0.003" change in backlash. Left and right nuts MUST be turned the same amount AND in the same direction. The final direction of rotation MUST be in the tightening direction, to loosen a nut 1-hole, back off 2-holes and then tighten 1 hole. The ring gear should be rotated any time the nuts are being adjusted.*

18. Loosen the right side nut.

19. Tighten the left nut until all backlash is removed from the ring and pinion gear.

20. Tighten the right nut until a case spread of 0.010" is indicated on the dial indicator.

*NOTE: If new ring and pinion gears are used, refer to the recommended backlash that is supplied with the gear set*

21. Measure the backlash. If the backlash is not within 0.002" of the original measurement taken on disassembly or the recommended setting for new gears, then readjust the bearings as follows:

*To increase backlash, loosen the left spanner nut and then tighten the right spanner nut the same amount.*

*To decrease backlash, loosen the right spanner nut and then tighten the left spanner nut the same amount.*

22. Apply gear marking compound on both sides of 7 to 10 teeth on the ring gear.

23. While applying resistance to the pinion shaft, rotate the ring gear back and forth (not full revolutions) until a clear contact pattern is shown. Compare the contact pattern to the illustration on the following page and reshim the pinion housing or adjust the backlash as indicated on the illustration. If the pinion housing is reshimed the backlash must be reset. Go back and repeat ALL procedures in setting the backlash.

24. Tighten the bearing cap bolts to 70-85 ft/lbs (F2 drive), 55-70 ft/lbs (F3 drive) and install the spanner nut locks. Tighten the spanner nut lock bolts to 12-25 ft/lbs.

*NOTE: Final pinion nut torque on completely assembled drive, 175 ft/lbs.*



## RE-SHIMMING THE PINION HOUSING

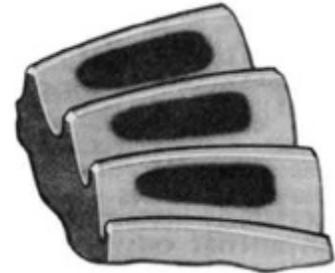
The pinion housing shim may require replacement if the ring and pinion gear or pinion housing is replaced.

Pinion housing shims are available from 0.005" to 0.021" in increments of 0.001". Locate the number printed on the flat surface of the pilot bearing shaft of the pinion gear. It should be a number ranging from -5 to +5. This is the amount in 0.001" increments to add to the "standard" shim. For example, if the number on the shaft is '-3' then the standard shim (0.015) plus '-3' equals 0.012. The correct shim would be 0.012".

If you cannot locate the number on the shaft, start with the standard shim and adjust as required per the contact pattern chart below.



**Ideal contact pattern**  
**Correct shim**  
**Correct backlash**



HEEL

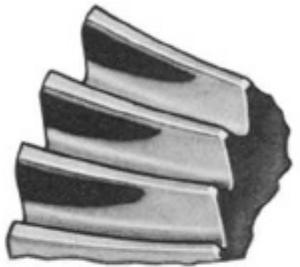
TOE

**Backlash is correct**  
**Add 0.004" shim**

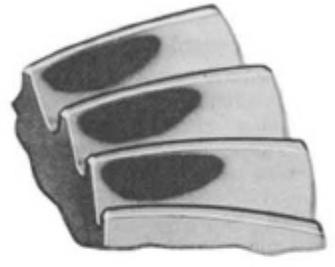


HEEL

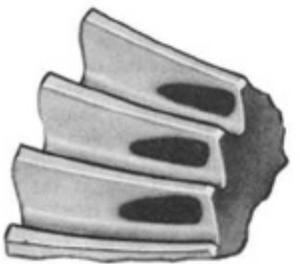
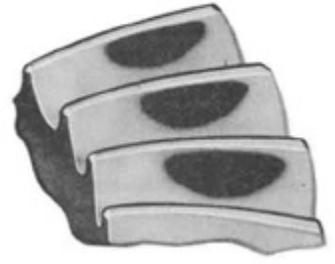
TOE



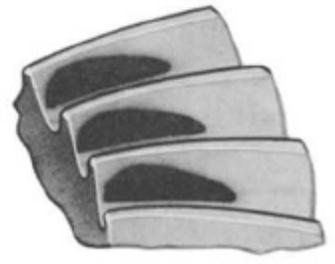
**Backlash is correct**  
**Subtract 0.004" shim**



**Shim is correct**  
**Decrease backlash 0.004"**

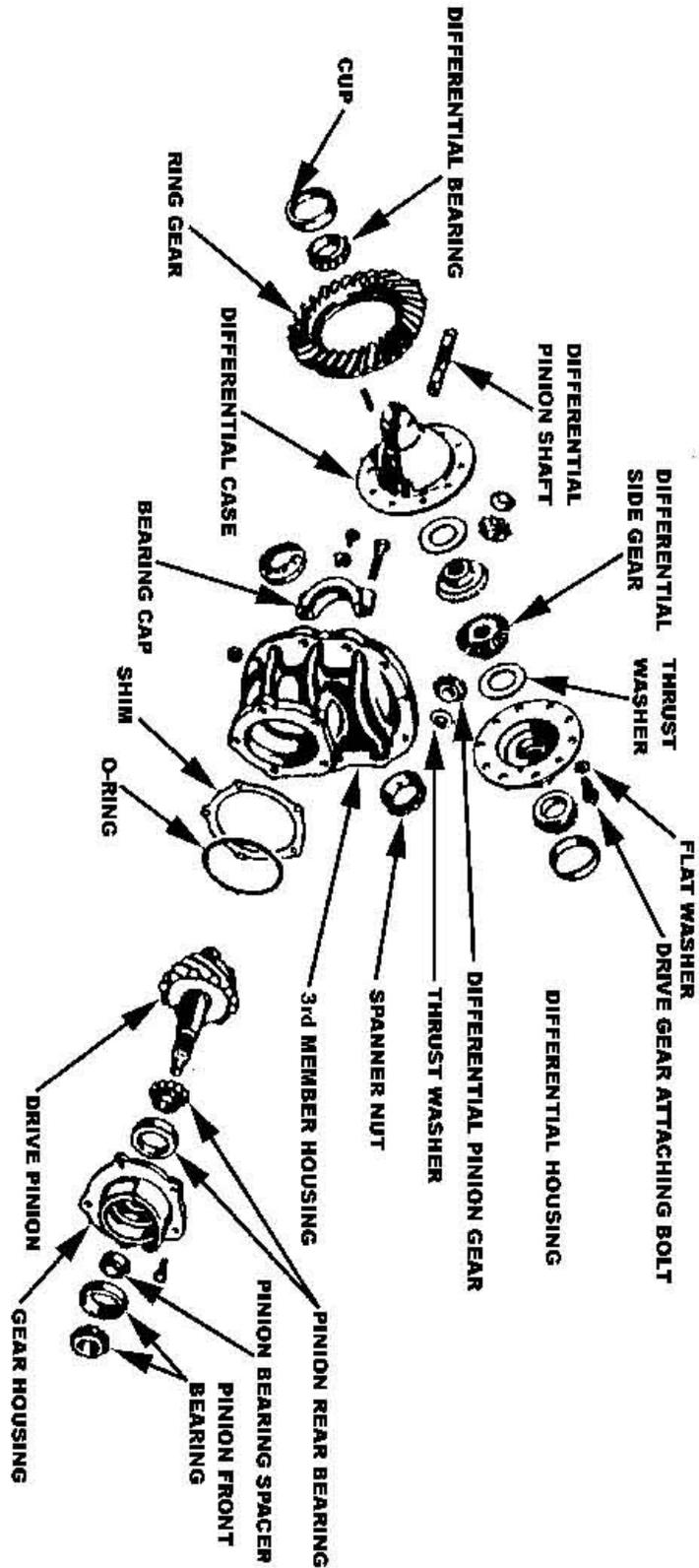


**Shim is correct**  
**Increase backlash 0.004"**





**EXPLODED VIEW**



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# Tires and wheels



## TIRE INFLATION

### ⚠ WARNING

1. Make sure the key-switch is in the "OFF" position, then remove the key.
2. Place the forward-reverse switch in the center "OFF" position.
3. Set the park brake.
4. Place blocks under the rear wheels to prevent vehicle movement.
5. Disconnect the main positive and negative cables at the batteries.

There are many tire options available with varying tire pressures. Refer to the side wall of your tire for information regarding the tire pressure for your tires.

The illustration to the right is an example of the side wall information on a tire.

Tire pressures must be checked when the tire is cold.



## PNEUMATIC TIRE INSPECTION

6. Check the tire pressure. Refer to **Tire Inflation** section for information on checking the tire pressure.
7. Inspect the tire tread depth. Minimum recommended tread depth is 1/16-inch. There are a series of tread depth wear indicators around the circumference of the tire. They will appear as 1/2-inch bands across the tread as the tire approaches its wear limit (see illustration below). Replace the tire if any tread depth indicator can be seen or any part of the tread depth is 1/16-inch or less. Refer to **Replace the Tire** section for information regarding replacing the tire.



8. Inspect for uneven tire wear on the front tires. Uneven tire wear could be a result of an improperly inflated tire or a misaligned or damaged front end.

**NOTE:** Refer to **Tire Inflation** section or **Steering Component Service** section for information on proper tire inflation or front end wheel alignment.

9. Inspect the inner and outer side walls for cracks. If any cracks are seen, then the tire should be replaced. Refer to **Replace the Tire** section for information regarding replacing the tire.
10. Inspect the valve stem for cracks. If any cracks are seen, then the valve stem should be replaced. It is also recommended that the valve stem be replaced whenever the tire is replaced.

**NOTE:** Refer to **Replace the Tire** section for information regarding replacing the valve stem.

11. Inspect the tread and side walls for debris in the rubber that could lead to a puncture. If any debris is found it should be removed and the tire inspected for a leak.

## REPLACE THE FRONT TIRE/ WHEEL

Refer to **Front Axle Service** for information on removing the front wheels.

## REPLACE THE REAR TIRE/ WHEEL

### **⚠ WARNING**

1. Make sure the key-switch is in the "OFF" position, then remove the key.
2. Place the forward-reverse switch in the center "OFF" position.
3. Set the park brake.
4. Place blocks under the front wheels to prevent vehicle movement.
5. Disconnect the main positive and negative cables at the batteries.

6. Raise the wheel to be replaced off of the ground and support with jack stands.
7. Remove the 4 or 5 wheel nuts and remove the wheel.
8. Install in reverse order.
9. Following the pattern shown on the following page, cross tighten the wheel nuts in two stages as follows:
  - 1st stage to approximately 20 ft-lbs.
  - 2nd stage to 80-90 ft-lbs.
10. Reconnect the main positive and negative cables at the batteries.
11. Lower the wheel to the ground.
12. Remove the blocks from behind the wheels.
13. Release the parking brake and test drive the vehicle.

## REPLACE THE TIRE (PNEUMATIC)

*NOTE; To replace the tire, the tire/wheel assembly must be removed from the vehicle. Refer to **Replace the Tire/Wheel** section for information on removing the tire/wheel assembly.*

Tire replacement should only be performed by personnel trained in tire replacement.

The tire replacement procedure will be unique to the type of replacement equipment being used. Refer to the instructions provided with your equipment.

Always use a new valve stem when replacing a tire.

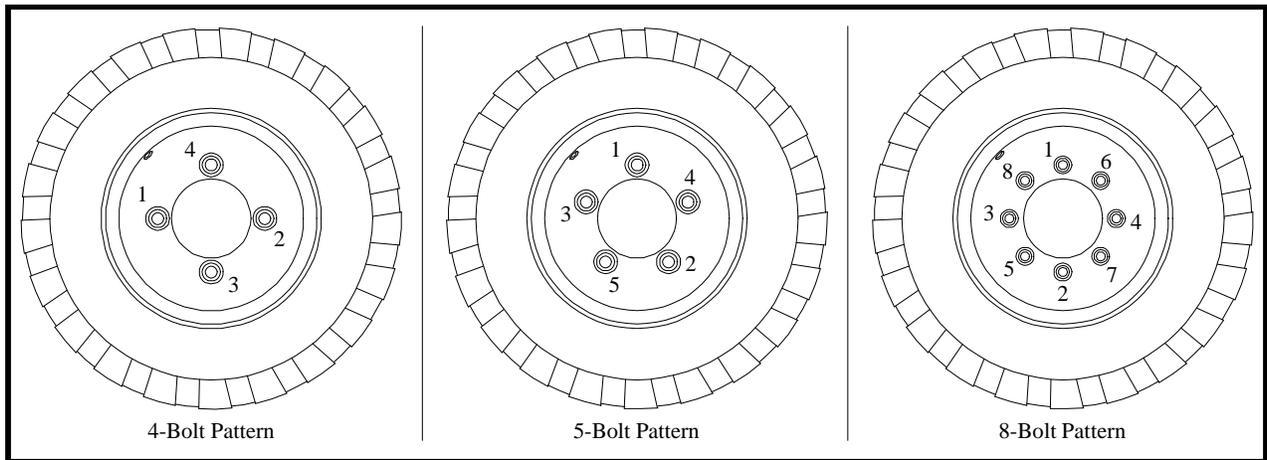
### **⚠ WARNING**

**Explosion Hazard. Fully deflate the tire before attempting to remove the tire from the wheel. Do not over inflate the tire when seating the bead. Failure to deflate the tire or over inflating the tire to seat the bead may cause explosive failure of the tire resulting in severe bodily injury or death.**

1. Remove the tire from the wheel.
2. Cut the old valve stem off of the wheel.
3. Remove the valve stem cap from the new valve stem.
4. Lubricate the valve stem with liquid soap.
5. Install a new valve stem using a valve stem tool.

*NOTE: The valve stem tool is available at most auto repair shops.*

6. Install the tire onto the wheel following the instructions provided with your tire replacement equipment.
7. Inflate the tire to the proper pressure and check for leaks.
8. Install the valve stem cap.



*Pattern for tightening the wheel nuts*

## **⚠ WARNING**

Re-torque all wheel nuts to their final value after 1-week (20-hours) of operation. Failure to re-torque the wheel nuts may result in the wheel coming off of the vehicle causing severe bodily injury and/or property damage.

## **REPAIR THE TIRE (PNEUMATIC)**

## **⚠ WARNING**

Do not attempt to repair a tire with a damaged side wall or a slice in the tread. This type of repair could fail prematurely resulting in severe bodily injury and/or property damage.

*NOTE: To properly repair a puncture, the tire must be removed from the wheel. Refer to **Replace the Tire** section for information on removing the tire from the wheel.*

It is recommended to repair a tire with a combination vulcanized plug and internal patch.

Tire repairs should only be performed by personnel trained in tire repair.

The tire repair procedure will be unique to the type of repair equipment or repair components used. Refer to the instructions provided with your equipment or repair components.

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### **⚠ 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. Failure to do so may result in severe bodily injury and/or property damage.**
- **A battery is a live electrical source. It cannot be disconnected or neutralized. Do not drop any tool or conductive object onto the battery. A conductive object that comes in contact with the battery terminals will initiate a short circuit of the battery. This could cause the battery to explode resulting in severe bodily injury and/or property damage.**
- **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! This may result in severe bodily injury.**



# Battery Service



## CLEANING

### ⚠ 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. Failure to do so may result in severe bodily injury and/or property damage.

· A battery is a live electrical source. It cannot be disconnected or neutralized. Do not drop any tool or conductive object onto the battery. A conductive object that comes in contact with the battery terminals will initiate a short circuit of the battery. This could cause the battery to explode resulting in severe bodily injury and/or property damage.

· 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!** This may result in severe bodily injury.

### ⚠ WARNING

1. Make sure the key-switch is in the "OFF" position, then remove the key.
2. Place the forward-reverse switch in the center "OFF" position.
3. Confirm the electric park brake is applied.
4. Place blocks under the front wheels to prevent vehicle movement.
5. Disconnect the main positive and negative cables at the batteries.

6. Dry dirt can be readily blown off with low-pressure air or brushed off.
7. Wetness or wet dirt on the battery indicates battery acid. Using a nonmetallic brush with flexible bristles, wash the battery off with a strong solution of baking soda and hot water (1 lb. of soda to a gallon of water). Continue until all fizzing 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.
8. Reconnect the battery, remove the blocks from the wheels and test drive.

### ⚠ CAUTION

Battery electrolyte will stain and corrode most surfaces. Immediately and thoroughly clean any surface outside of the battery that the battery electrolyte comes in contact with. Failure to clean may result in property damage.

## CHARGING

Refer to *Charging Your Vehicle* in section **Safety Rules and Operating Instructions**.

## TESTING

### ⚠ 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. Failure to do so may result in severe bodily injury and/or property damage.

· A battery is a live electrical source. It cannot be disconnected or neutralized. Do not drop any tool or conductive object onto the battery. A conductive object that comes in contact with the battery terminals will initiate a short circuit of the battery. This could cause the battery to explode resulting in severe bodily injury and/or property damage.

· 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!** This may result in severe bodily injury.

### ⚠ CAUTION

**Battery electrolyte will stain and corrode most surfaces. Immediately and thoroughly clean any surface outside of the battery that the battery electrolyte comes in contact with. Failure to clean may result in property damage.**

### Specific Gravity

#### ⚠ WARNING

1. Make sure the key-switch is in the "OFF" position, then remove the key.
2. Place the forward-reverse switch in the center "OFF" position.
3. Confirm the electric park brake is applied.
4. Place blocks under the front wheels to prevent vehicle movement.
5. Disconnect the main positive and negative cables at the batteries.

*NOTE: The battery must be fully charged before performing this test.*

The specific gravity of a cell is an indication of the actual state of charge of the cell. A fully charged cell should have a reading of 1275 to 1300 (see the illustration to the right). A discharged cell will read 1100. Ideally, all cells in a battery will have the same reading. Any cells in a battery that vary by more than 30-points may be an indication of a bad cell.

Clean the battery. Refer to **Cleaning** section for information on cleaning the battery.

Using part number **77-200-00** hydrometer, check and record the specific gravity of each cell in the battery.

If, after charging, none of the cells exceed a hydrometer reading of 1250 then there may be a fault in the charging system. If the charging system checks OK then the battery is no longer accepting a charge and should be replaced.

*NOTE: Refer to **Charger Troubleshooting** for information on checking the charging system.*



*Typical Hydrometer Float*

The highest reading will be the cell that is accepting the most charge. This reading will be used to gauge all other cells.

Compare the specific gravity readings to the highest reading, if the difference between any of the cells is more than 30-points, then that battery should be replaced.

*NOTE: Individual cells in some industrial batteries can be replaced. Contact the battery manufacturer for more information.*

Reconnect the battery, remove the blocks from the wheels and test drive.

## WATERING

### **⚠ 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. Failure to do so may result in severe bodily injury and/or property damage.

· A battery is a live electrical source. It cannot be disconnected or neutralized. Do not drop any tool or conductive object onto the battery. A conductive object that comes in contact with the battery terminals will initiate a short circuit of the battery. This could cause the battery to explode resulting in severe bodily injury and/or property damage.

· 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!** This may result in severe bodily injury.

### **⚠ CAUTION**

**Battery electrolyte will stain and corrode most surfaces. Immediately and thoroughly clean any surface outside of the battery that the battery electrolyte comes in contact with. Failure to clean may result in property damage.**

### **⚠ WARNING**

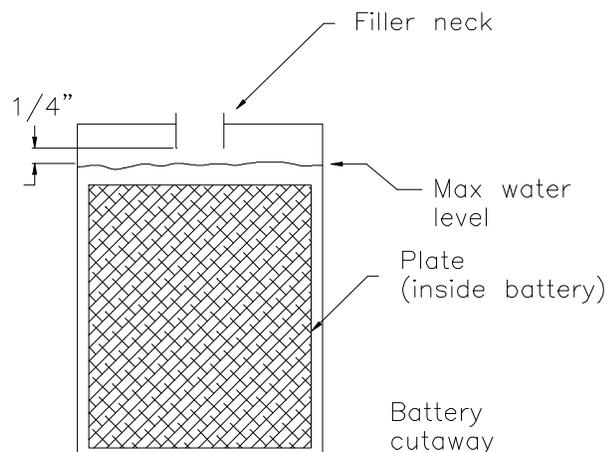
**Do not overfill the batteries. Over filling the batteries may cause the batteries to boil over and result in severe bodily injury or property damage.**

*NOTE: The electrolyte level in a battery rises while charging and will be close to its highest level after the end of a charging cycle. It is recommended to fill the battery at the end of a charging cycle. If the electrolyte is below the top of the battery plates then fill just enough to cover the plates and then top off when the charging cycle is complete.*

### **⚠ WARNING**

1. Make sure the key-switch is in the "OFF" position, then remove the key.
2. Place the forward-reverse switch in the center "OFF" position.
3. Confirm the electric park brake is applied.
4. Place blocks under the front wheels to prevent vehicle movement.
5. Disconnect the main positive and negative cables at the batteries.

6. Clean the battery. Refer to **Cleaning** section for information on cleaning the battery.
7. Check the electrolyte level in all battery cells. If low, fill to the correct level with distilled water using part number **77-201-00** battery filler, never add additional battery electrolyte to the batteries.
8. Reconnect the battery, remove the blocks from the wheels and test drive.





## REMOVING

### ⚠ 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. Failure to do so may result in severe bodily injury and/or property damage.
- A battery is a live electrical source. It cannot be disconnected or neutralized. Do not drop any tool or conductive object onto the battery. A conductive object that comes in contact with the battery terminals will initiate a short circuit of the battery. This could cause the battery to explode resulting in severe bodily injury and/or property damage.
- 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!** This may result in severe bodily injury.

### ⚠ WARNING

1. Make sure the key-switch is in the "OFF" position, then remove the key.
  2. Place the forward-reverse switch in the center "OFF" position.
  3. Confirm the electric park brake is applied.
  4. Place blocks under the front wheels to prevent vehicle movement.
  5. Disconnect the main positive and negative cables at the batteries.
6. Thoroughly clean the battery and battery compartment. Refer to **Cleaning** in this section for information regarding cleaning the batteries.
  7. Using a hoist or forklift equipped with a proper battery lifting device (see next page), slowly raise the battery out of the vehicle.
  8. Inspect the battery compartment for signs of corrosion.

### ⚠ CAUTION

Battery electrolyte will stain and corrode most surfaces. Immediately and thoroughly clean any surface outside of the battery that the battery electrolyte comes in contact with. Failure to clean may result in property damage.

9. If minimal signs of corrosion are seen, then the damaged paint should be stripped off and the entire battery compartment cleaned and repainted.
10. If there are excessive signs of corrosion, then it may be necessary to replace some of the frame members or completely rebuild the battery compartment.
11. Inspect the battery cables and terminals. If any of the cables or terminals show signs of corrosion, then they must be repaired or replaced.
12. Install the battery in reverse order.
13. Remove the blocks from the wheels and test drive.



*Typical battery lifting beam*



*Typical forklift attachment to use with the lifting beam*



## REPLACING (6-VOLT BATTERIES ONLY)

### ⚠ 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. Failure to do so may result in severe bodily injury and/or property damage.

### ⚠ 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!** This may result in severe bodily injury.

### ⚠ CAUTION

Battery electrolyte will stain and corrode most surfaces. Immediately and thoroughly clean any surface outside of the battery that the battery electrolyte comes in contact with. Failure to clean may result in property damage.

### ⚠ WARNING

A battery is a live electrical source. It cannot be disconnected or neutralized. Do not drop any tool or conductive object onto the battery. A conductive object that comes in contact with the battery terminals will initiate a short circuit of the battery. This could cause the battery to explode resulting in severe bodily injury and/or property damage.

*NOTE: If the batteries are over one year old, it is recommended to replace them as a set.*

### ⚠ WARNING

1. Make sure the key-switch is in the "OFF" position, then remove the key.
2. Place the forward-reverse switch in the center "OFF" position.
3. Set the park brake.
4. Place blocks under the front wheels to prevent vehicle movement.
5. Disconnect the main positive and negative cables at the batteries.

6. Thoroughly clean the batteries and battery compartment. Refer to **Cleaning** in this section for information regarding cleaning the batteries.
7. Remove the battery hold downs.
8. Inspect the battery hold downs for corrosion. If any signs of corrosion are seen then the battery hold downs should be replaced.

### ⚠ WARNING

**Do not leave cables on batteries that have been removed from the vehicle. Cables left on batteries could cause a short circuit resulting in battery explosion, severe bodily injury and/or property damage.**

9. Remove all battery jumpers from both posts of the battery or batteries being replaced.

*NOTE: It is recommended to replace the battery jumpers when replacing the batteries.*

10. Remove the batteries from the vehicle.
11. Inspect the battery compartment for signs of corrosion.
12. If minimal signs of corrosion are seen, then the damaged paint should be stripped off and the entire battery compartment prepped and epainted.
13. If there are excessive signs of corrosion, then it may be necessary to replace some of the frame members or completely rebuild the battery compartment.
14. Inspect the main positive and negative cables and terminals, charger cables and terminals and 12-volt tap wiring. If any of the terminals or wires show signs of corrosion, then they must be repaired or replaced.



15. Install the batteries in reverse order. Refer to the *Illustrated Parts List* for battery cable routing.
16. It is recommended to replace the battery terminal hardware when replacing the batteries.

## ⚠ CAUTION

**When torquing battery hardware, use a backup wrench on the battery bolt and tighten the nut. Failure to use a backup wrench may damage the battery post.**

17. Torque the terminal hardware to 7-8 ft.-lbs.
18. Tighten the hold downs so that the batteries are secure but not so tight as to deform the batteries.
19. Remove the blocks from the wheels and test drive.

## Moist Charge Batteries

Moist charged batteries are shipped without battery electrolyte. This allows for a much greater shelf life of the battery. Moist charged batteries must be filled with electrolyte and charged before putting into service. Battery electrolyte is a solution of acid and water that is formulated to be used in wet lead acid batteries and is available at most automotive parts distributors that carry batteries.

## ⚠ CAUTION

**Do not operate or charge a vehicle equipped with moist charged batteries until the batteries have been filled with electrolyte and charged. Operating or charging moist charged batteries before filling and charging will damage the batteries resulting in premature failure of the batteries.**

## ⚠ CAUTION

**Battery electrolyte will stain and corrode most surfaces. Immediately and thoroughly clean any surface outside of the battery that the battery electrolyte comes in contact with. Failure to clean may result in property damage.**

## ⚠ 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! This may result in severe bodily injury.**

## ⚠ WARNING

**A battery is a live electrical source. It cannot be disconnected or neutralized. Do not drop any tool or conductive object onto the battery. A conductive object that comes in contact with the battery terminals will initiate a short circuit of the battery. This could cause the battery to explode resulting in severe bodily injury and/or property damage.**

## ⚠ WARNING

1. Make sure the key-switch is in the "OFF" position, then remove the key.
2. Place the forward-reverse switch in the center "OFF" position.
3. Set the park brake.
4. Place blocks under the front wheels to prevent vehicle movement.
5. Disconnect the main positive and negative cables at the batteries.

6. Fill all battery cells with electrolyte to the proper level.
7. Thoroughly clean any spilled electrolyte from the batteries or the ground. Refer to *Cleaning the Batteries* for information on cleaning the batteries.
8. Reconnect the battery cables, connect the batteries to the charger and allow the charger to complete one charging cycle.
9. Remove the blocks from the wheels and test drive. The batteries are now ready to be put into service.



## STORAGE AND RETURNING TO SERVICE

### ⚠ CAUTION

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. Storing on the ground, concrete or solid metal surface will cause the batteries to discharge and may result in premature failure of the batteries.

### ⚠ CAUTION

Battery electrolyte will stain and corrode most surfaces. Immediately and thoroughly clean any surface outside of the battery that the battery electrolyte comes in contact with. Failure to clean may result in property damage.

### ⚠ 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. Failure to do so may result in severe bodily injury and/or property damage.

· A battery is a live electrical source. It cannot be disconnected or neutralized. Do not drop any tool or conductive object onto the battery. A conductive object that comes in contact with the battery terminals will initiate a short circuit of the battery. This could cause the battery to explode resulting in severe bodily injury and/or property damage.

· 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! This may result in severe bodily injury.

### Storage

Thoroughly clean the battery and battery compartment. Refer to **Cleaning** in this section for information regarding cleaning the battery.

Check the electrolyte level and charge the battery. Refer to **Watering** in this section for information regarding checking the electrolyte level.

Store the vehicle or battery (if removed) in a cool, dry, well ventilated area.

If storing for more than one month, the battery should be charged per the table ar right:

### Returning to Service

### ⚠ WARNING

1. Make sure the key-switch is in the "OFF" position, then remove the key.
2. Place the forward-reverse switch in the center "OFF" position.
3. Confirm the electric park brake is applied.
4. Place blocks under the front wheels to prevent vehicle movement.
5. Disconnect the main positive and negative cables at the batteries.

6. Thoroughly clean the battery and battery compartment. Refer to **Cleaning** in this section for information regarding cleaning the battery.
7. Check the electrolyte level and charge the battery. Refer to **Watering** in this section for information regarding checking the electrolyte level.
8. Test the battery. Refer to **Testing** section for information on testing the battery.
9. The battery is now ready to be put back into service.

Storage Temperature (°F)	Charging Interval (months)
Over 60	1
Between 40 and 60	2
Below 40	6

## Industrial Charger Troubleshooting

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The charger supplied with this vehicle is either specified or provided by the end user.

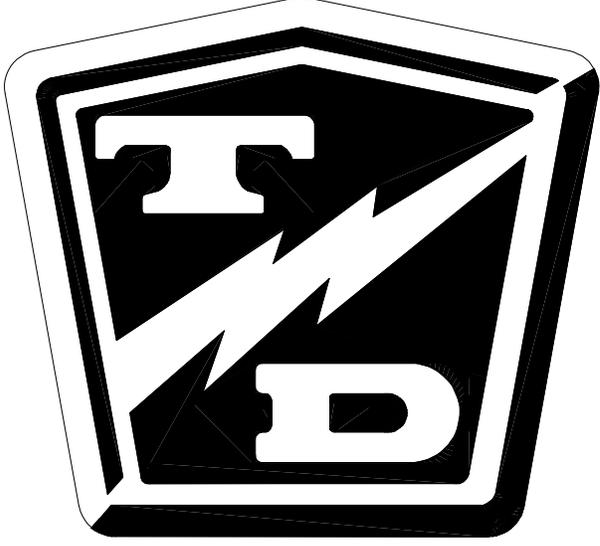
Refer to the documentation supplied with the charger or contact the charger manufacturer for more information.

### **⚠ CAUTION**

Turn the Key switch **OFF BEFORE** disconnecting the batteries. Disconnecting the batteries with the key switch **ON** may corrupt the controller programming resulting in a fault code 1 (refer to fault table).



**TAYLOR - DUNN**



# Electrical Troubleshooting

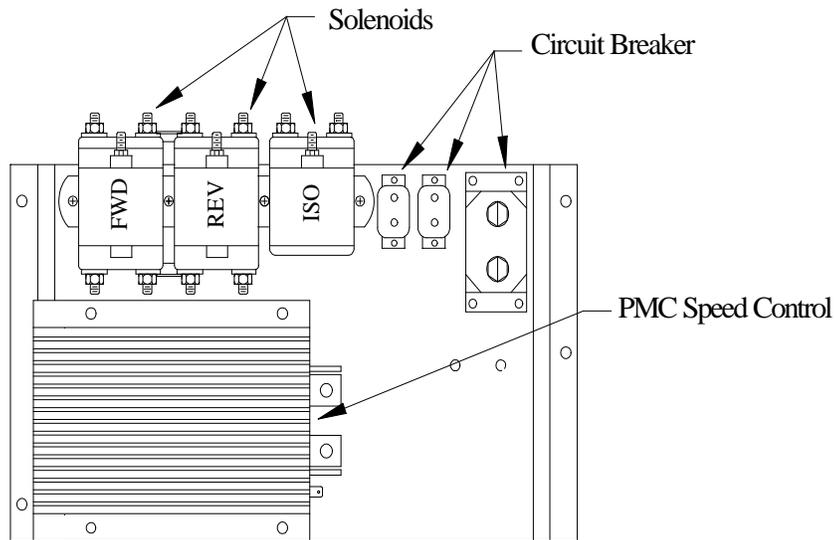
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Typical Control Panel

## **SYMPTOMS:**

If your vehicle exhibits any of the following symptoms then skip the main troubleshooting sequence and proceed to **Special Troubleshooting** in Section 4 at the end of the main troubleshooting sequence.

- Runs slow in both directions plus high armature and field current in both directions. NOTE: Armature and field current should be equal.
- Runs slow in both directions plus high armature current in both directions. NOTE: Field current will be very low.
- 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;
- 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.
- Full speed only.
- Does not run in either direction plus there is noise from motor (hum or whine) with high field current and low armature current.
- Jumps into high speed when direction is selected after depressing the accelerator pedal. Excessive spark when connecting battery
- Does not run or runs very slow with low motor current and high battery current.
- Jumps into high speed when direction is selected after depressing the accelerator pedal.

If your vehicle does not exhibit any of the above symptoms then continue with the main troubleshooting sequence on the following pages.

## **MAIN TROUBLESHOOTING SEQUENCE**

### **Test Equipment Required:**

- Digital multimeter (DMM) with diode test function, FLUKE 79 model used in illustrations.
- 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. This troubleshooting guide assumes that the vehicle is wired correctly. It is not intended to diagnose a vehicle that is not wired correctly.
- These tools are available through your local Taylor-Dunn parts distributor.

### **IMPORTANT NOTES and INSTRUCTIONS**

- This troubleshooting guide assumes that the vehicle is wired correctly. It is not intended to diagnose a vehicle that is not wired correctly.
- This troubleshooting guide is not written to be able to locate a problem if there are multiple component failures.
- This troubleshooting guide assumes the batteries are good. Charge and test the batteries before troubleshooting the control system.
- DO NOT start in the middle of this troubleshooting guide. Start at the beginning and complete each test in the order that they are written. Do not skip any test unless instructed to do so. Once a problem is found, stop testing and repair the indicated problem. When the repair is completed it is recommended that the control system be retested before lowering the drive wheels to the ground.

### **⚠ CAUTION**

**These test procedures must be performed in the order they were written. If the test result is good, then proceed to the next test or go to the next section. Failure to do so may result in incorrect test results.**

- This troubleshooting guide requires the use of a test light rated at the battery voltage of the truck and the Taylor-Dunn Accelerator Module Test Harness. Troubleshooting CANNOT be completed without these tools.



## Definitions:

- “MS-1” = The first switch in the accelerator module.
- “Battery volts” = The voltage at the batteries at the time the test is completed.
- “Pick up” = Energizing a solenoid or contactor.
- “F&R” = Forward and Reverse.
- “ISO” = Isolator.
- “Battery negative” = Main negative battery post.
- “Battery positive” = Main positive battery post.
- “PMC” = Speed control module (black box).
- “HOT terminal” = The side of a switch or solenoid that is connect to the power source.
- “COLD terminal” = The side of a switch or solenoid that power is switched to.

## DURING ALL TESTS

### **⚠ WARNING**

After any repairs are made, completely retest the vehicle before lowering the drive wheels to the ground. Failure to retest the vehicle could result in unexpected movement of the vehicle resulting in severe bodily injury and/or property damage.

### **⚠ WARNING**

The rear drive wheels may rotate during some of the following tests. Block the front wheels, raise the rear drive wheels off the ground, and support the vehicle with jack stands. Failure to do so may cause the vehicle to move and cause severe bodily injury and/or property damage.

### **⚠ WARNING**

Rotating rear drive wheels are a potential hazard. Keep hands, arms, legs and loose clothing away from the rear drive wheels while conducting tests. Failure to do so may cause serious bodily injury.

### **⚠ WARNING**

Disconnect both of the battery leads during any maintenance or before disconnecting any electrical component or wire. Failure to do so may cause severe bodily injury and/or property damage.

## START:

Read all warnings above before continuing.

If the vehicle runs normal in one direction but does not run in the opposite direction then go to the ***Solenoids*** sequence.

If none of the three solenoids pick up (click) when the accelerator pedal is depressed then go to the ***Forward & Reverse Switch*** sequence.

**Power Output Test**

**⚠ WARNING**

1. Make sure the key-switch is in the "OFF" position, then remove the key.
2. Place the forward-reverse switch in the center "OFF" position.
3. Set the park brake.
4. Place blocks under the front wheels to prevent vehicle movement.

**⚠ WARNING**

The rear drive wheels may rotate during some of the following tests. Block the front wheels, raise the rear drive wheels off the ground, and support the vehicle with jack stands. Failure to do so may cause the vehicle to move and cause severe bodily injury and/or property damage.

**⚠ WARNING**

Rotating rear drive wheels are a potential hazard. Keep hands, arms, legs and loose clothing away from the rear drive wheels while conducting tests. Failure to do so may cause serious bodily injury.

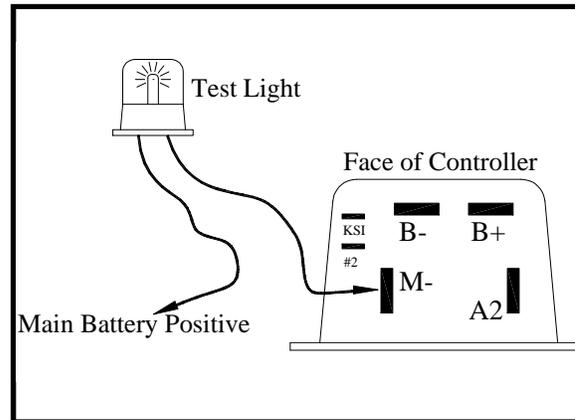
Set the test light voltage to the same voltage as the battery volts.

Connect the test light from the PMC 'M-' Terminal to battery positive.

Close all interlock switches, turn the Key Switch ON, and place the F&R Switch in Forward.

**Depress the accelerator pedal fully.**

- If the light comes ON then go to the Motor sequence.
- If the light does not come ON then continue with the next test.





## Control Wire inputs Test

### ⚠ WARNING

1. Make sure the key-switch is in the "OFF" position, then remove the key.
2. Place the forward-reverse switch in the center "OFF" position.
3. Set the park brake.
4. Place blocks under the front wheels to prevent vehicle movement.

### ⚠ WARNING

The rear drive wheels may rotate during some of the following tests. Block the front wheels, raise the rear drive wheels off the ground, and support the vehicle with jack stands. Failure to do so may cause the vehicle to move and cause severe bodily injury and/or property damage.

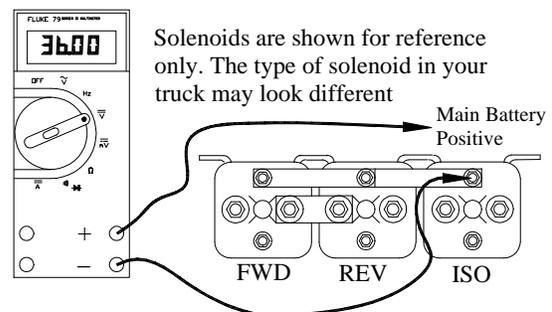
### ⚠ WARNING

Rotating rear drive wheels are a potential hazard. Keep hands, arms, legs and loose clothing away from the rear drive wheels while conducting tests. Failure to do so may cause serious bodily injury.

Connect a voltmeter across the Solenoid Negative Buss Bar and battery positive.

- If the voltage is not at battery volts then check the wiring to battery negative and the negative circuit breaker. Stop trouble shooting here and repair the problem. When the repair is completed, completely retest the vehicle before lowering the drive wheels to the ground.

The voltage shown is for illustration only. The actual voltage may vary.



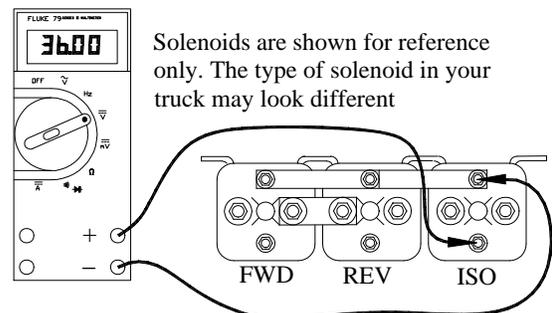
Connect a voltmeter across the ISO solenoid coil terminals.

**Close all interlock switches and turn the Key Switch ON.**

**Depress the accelerator pedal to engage MS-1 only.**

- If the voltage is not at battery volts then go to the **Key Switch** sequence.
- If the voltage is at battery volts and the ISO solenoid does not pick up (click) then the ISO solenoid has failed. Stop trouble shooting here and repair the problem. When the repair is completed, completely retest the vehicle before lowering the drive wheels to the ground.

The voltage shown is for illustration only. The actual voltage may vary.



**Control Wire inputs (continued)**

Connect a voltmeter across the PMC #2 terminal and battery negative.

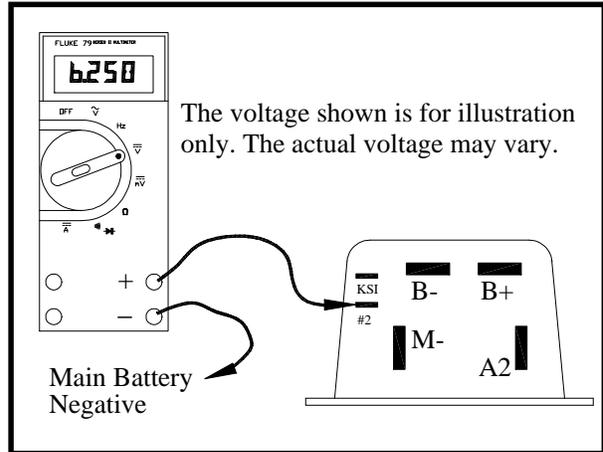
Close all interlock switches, turn the Key Switch ON, and place the F&R Switch in Forward.

**Depress the accelerator pedal to engage MS-1 only.**

- If the voltage is not between 6.0 and 6.5 volts then go to the **Accelerator** sequence.

**Depress the pedal fully.**

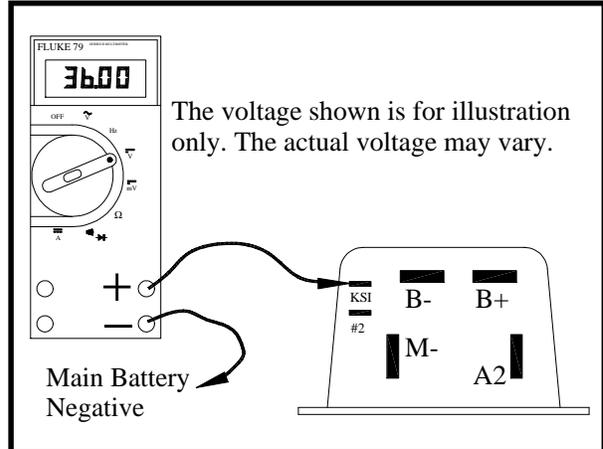
- If the voltage is not between 11.0 and 11.5 volts then go to the **Accelerator** sequence.



Connect voltmeter across the PMC KSI terminal and battery negative.

**With the pedal still fully depressed:**

- If the voltage is not at battery volts then go to the **Key Switch** sequence.
- If the voltage is at battery volts then continue with the next test.





## Power Wire Inputs

### **⚠ WARNING**

1. Make sure the key-switch is in the "OFF" position, then remove the key.
2. Place the forward-reverse switch in the center "OFF" position.
3. Set the park brake.
4. Place blocks under the front wheels to prevent vehicle movement.

### **⚠ WARNING**

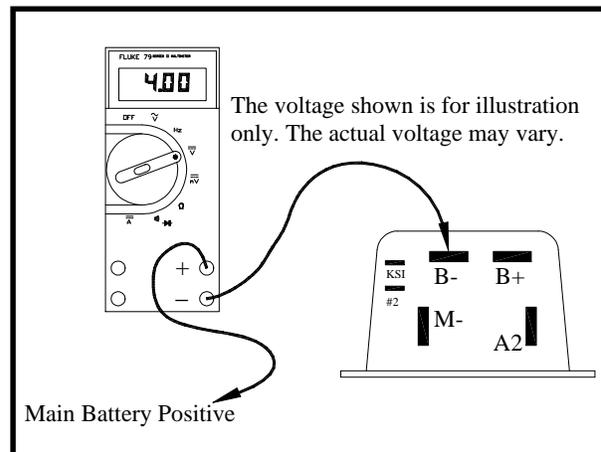
The rear drive wheels may rotate during some of the following tests. Block the front wheels, raise the rear drive wheels off the ground, and support the vehicle with jack stands. Failure to do so may cause the vehicle to move and cause severe bodily injury and/or property damage.

### **⚠ WARNING**

Rotating rear drive wheels are a potential hazard. Keep hands, arms, legs and loose clothing away from the rear drive wheels while conducting tests. Failure to do so may cause serious bodily injury.

Connect a voltmeter to the PMC 'B-' terminal and battery positive.

- If the voltage is not the same as battery volts then there is an open circuit in the wire from 'B-' to the battery. Stop troubleshooting here and repair the problem. When the repair is completed, completely retest the vehicle before lowering the drive wheels to the ground.

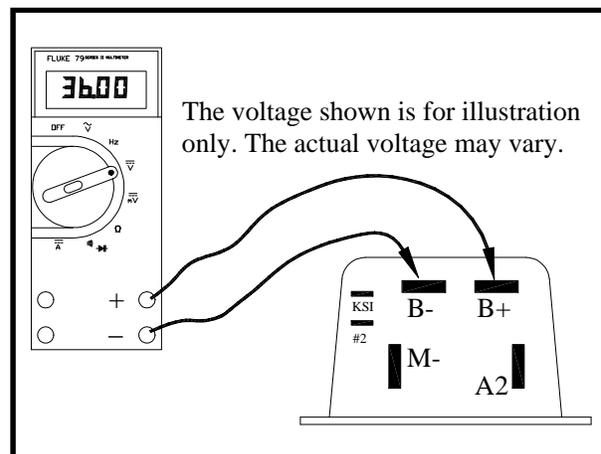


Connect a voltmeter across the PMC 'B-' terminal and the PMC 'B+' terminal.

**Close all interlock switches, turn the Key Switch ON, and place the F&R Switch in Forward.**

**Depress the accelerator pedal to engage MS-1 only.**

- If the voltage is not the same as battery volts then go to the **Solenoids** sequence.
- If the voltage is the same as battery volts then the PMC controller has failed. Stop trouble shooting here and repair the problem. When the repair is completed, completely retest the vehicle before lowering the drive wheels to the ground.



## Motor

### **⚠ WARNING**

1. Make sure the key-switch is in the "OFF" position, then remove the key.
2. Place the forward-reverse switch in the center "OFF" position.
3. Set the park brake.
4. Place blocks under the front wheels to prevent vehicle movement.

### **⚠ WARNING**

The rear drive wheels may rotate during some of the following tests. Block the front wheels, raise the rear drive wheels off the ground, and support the vehicle with jack stands. Failure to do so may cause the vehicle to move and cause severe bodily injury and/or property damage.

### **⚠ WARNING**

Rotating rear drive wheels are a potential hazard. Keep hands, arms, legs and loose clothing away from the rear drive wheels while conducting tests. Failure to do so may cause serious bodily injury.

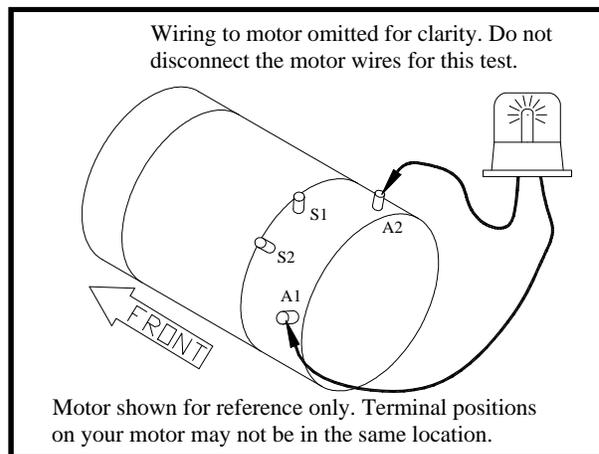
Set the test light voltage to the same voltage as the battery volts.

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

**Close all interlock switches, turn the Key Switch ON, and place the F&R Switch in Forward.**

**Depress the accelerator fully.**

- If the light comes on then the motor armature windings are open and the motor must be repaired or replaced. Stop trouble shooting here and repair the problem. When the repair is completed, completely test the vehicle before lowering the drive wheels to the ground.

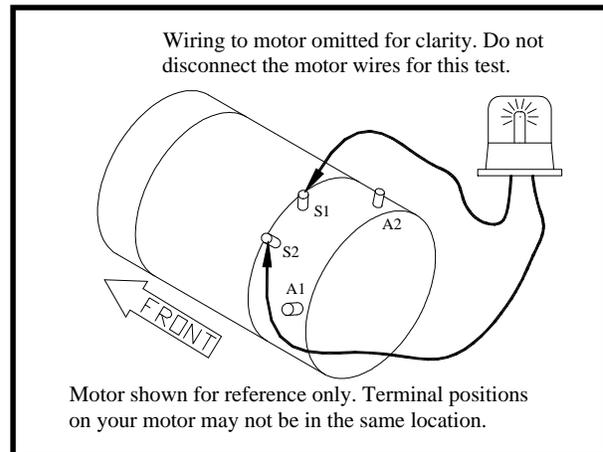


Connect the test light across the motor 'S1' and 'S2' terminals.

**Close all interlock switches, turn the Key Switch ON, and place the F&R Switch in Forward.**

**Depress the accelerator fully.**

- If the light comes on then the motor field windings are open and the motor must be repaired or replaced. Stop troubleshooting here and repair the problem. When the repair is completed, completely retest the vehicle before lowering the drive wheels to the ground.
- If the test light did not come on during either test then go to the **F/R Switch** sequence.



## Accelerator

### **⚠ WARNING**

1. Make sure the key-switch is in the "OFF" position, then remove the key.
2. Place the forward-reverse switch in the center "OFF" position.
3. Set the park brake.
4. Place blocks under the front wheels to prevent vehicle movement.

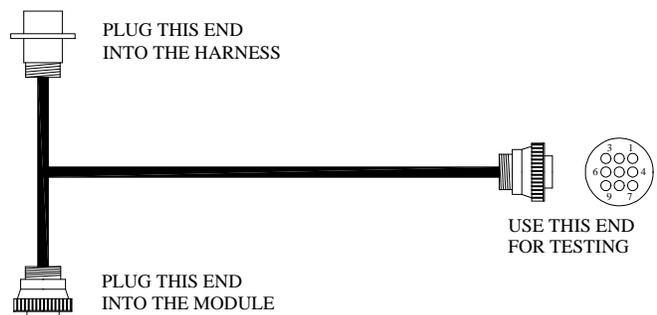
### **⚠ WARNING**

The rear drive wheels may rotate during some of the following tests. Block the front wheels, raise the rear drive wheels off the ground, and support the vehicle with jack stands. Failure to do so may cause the vehicle to move and cause severe bodily injury and/or property damage.

### **⚠ WARNING**

Rotating rear drive wheels are a potential hazard. Keep hands, arms, legs and loose clothing away from the rear drive wheels while conducting tests. Failure to do so may cause serious bodily injury.

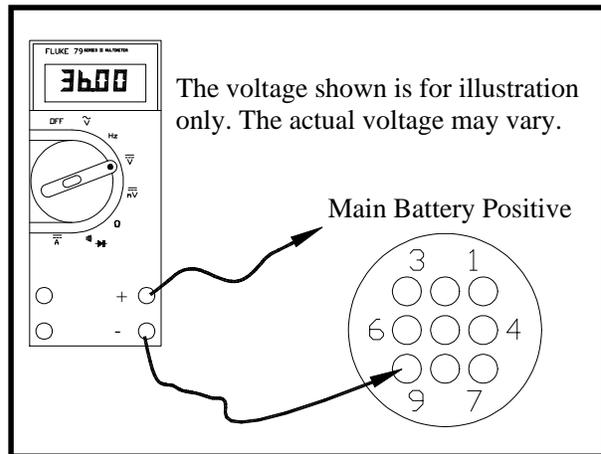
This is the accelerator module test harness part number 62-027-31. It will be used in the following tests. These tests cannot be completed without this harness. If you do not have this harness, one must be obtained before testing can continue.



Connect the accelerator module test harness to the accelerator module.

Connect a voltmeter between pin #9 in the test harness and battery positive.

- If the voltage is not at battery volts then the wiring between pin #9 in the harness and battery negative is open. Stop trouble shooting here and repair the problem. When the repair is completed, completely retest the vehicle before lowering the drive wheels to the ground.

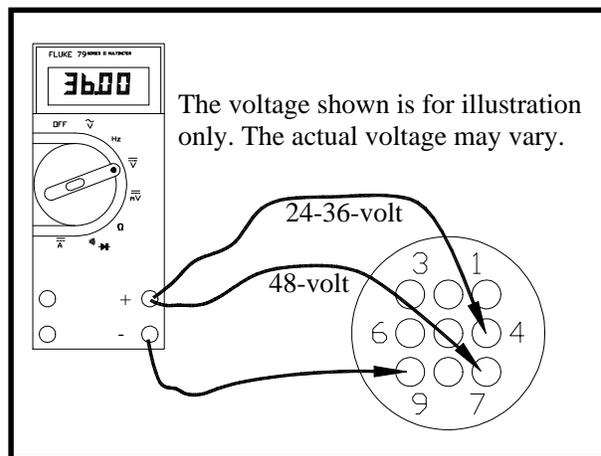


Connect a voltmeter negative probe to Pin #9 (-) in the test harness. Connect the positive probe to:

- 24 or 36 volt truck - Pin #4
- 48 volt truck - Pin #7

**Close all interlock switches and turn the Key Switch ON.**

- If the voltage is not at battery volts then go to the **Key Switch** sequence.

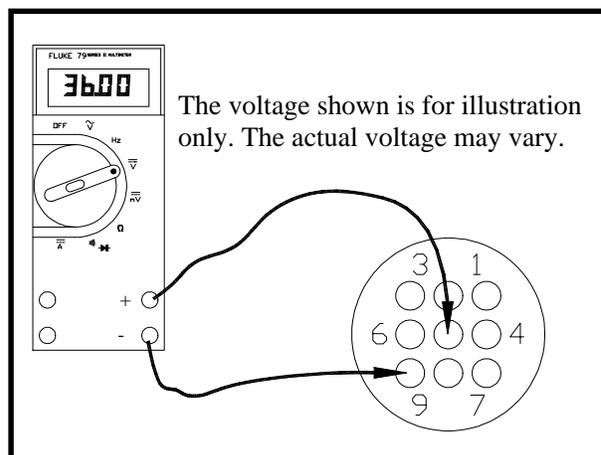


Connect a voltmeter between pin #9 (-) and pin #5 (+) in the test harness.

**Close all interlock switches and turn the Key Switch ON.**

**Depress the accelerator pedal to engage MS-1 only.**

- If the voltage is not at battery volts then the accelerator module has failed. Stop trouble shooting here and repair the problem. When the repair is completed, completely retest the vehicle before lowering the drive wheels to the ground.
- If the voltage at pin #5 is good but the test at the center terminal of the forward and reverse side of the F&R switch in the Key Switch Section failed then check the wire between the accelerator module pin #5 and the F&R switch. Stop trouble shooting here and repair the problem. When the repair is completed, completely retest the vehicle before lowering the drive wheels to the ground.





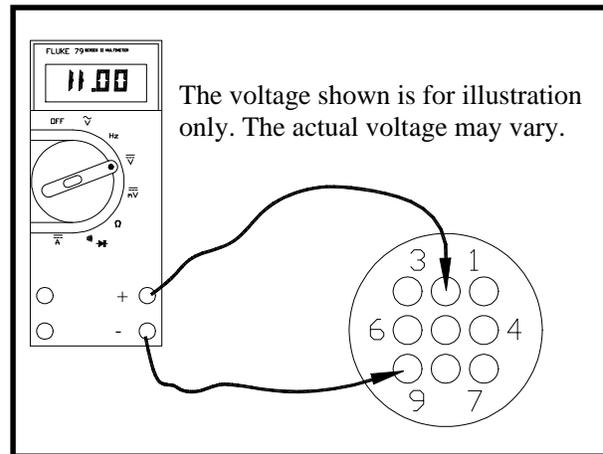
Connect a voltmeter between pin #9 (-) and pin #2 (+) in the test harness.

**Depress the accelerator pedal to engage MS-1 only.**

- If the voltage is between 6.0 and 6.5 volts and the test at the PMC #2 terminal in the Control Wire Input section failed then the wire or interlock switches between the accelerator module pin #2 and the PMC pin #2 is open. Stop trouble shooting here and repair the problem. When the repair is completed, completely retest the vehicle before lowering the drive wheels to the ground.
- If the voltage is not between 6.0 and 6.5 volts then the accelerator module has failed. Stop trouble shooting here and repair the problem. When the repair is completed, completely retest the vehicle before lowering the drive wheels to the ground.

**Now Depress the accelerator module fully.**

- If the voltage is not between 11.0 and 11.5 volts then the accelerator module has failed. Stop trouble shooting here and repair the problem. When the repair is completed, completely retest the vehicle before lowering the drive wheels to the ground.



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## STOP

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Stop, do not continue. If you reached this point without a solution, then you may have an unanticipated problem or have made an error during testing. It is important to review the trouble shooting steps that have led to this point. The tests may need to be repeated.

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**Key Switch**

**⚠ WARNING**

1. Make sure the key-switch is in the "OFF" position, then remove the key.
2. Place the forward-reverse switch in the center "OFF" position.
3. Set the park brake.
4. Place blocks under the front wheels to prevent vehicle movement.

**⚠ WARNING**

The rear drive wheels may rotate during some of the following tests. Block the front wheels, raise the rear drive wheels off the ground, and support the vehicle with jack stands. Failure to do so may cause the vehicle to move and cause severe bodily injury and/or property damage.

**⚠ WARNING**

Rotating rear drive wheels are a potential hazard. Keep hands, arms, legs and loose clothing away from the rear drive wheels while conducting tests. Failure to do so may cause serious bodily injury.

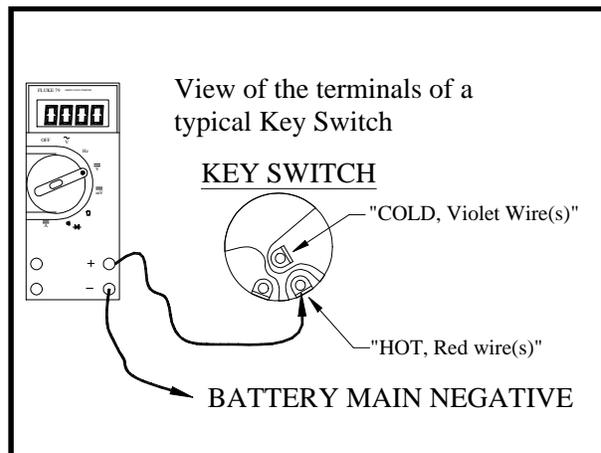
Test all interlock switches and/or interlock relays (if equipped) for continuity. Depending on the model of your vehicle, it may have a seat interlock, Foot interlock, Charger interlock, special order interlock or any combination of the above. Refer to the wire diagram at the end of this section for location of the interlocks.

*NOTE: Due to the many different configurations possible for special order interlocks, they will not be included in this text. Refer to the option list for your truck or contact your Taylor-Dunn® Representative for more information.*

If you do not know how to test for continuity, refer test to a qualified technician.

Connect a voltmeter across the HOT terminal of the key switch and battery negative.

- If the voltage is not at battery volts then check the wire between the key switch and battery positive. Stop trouble shooting here and repair the problem. When the repair is completed, completely retest the vehicle before lowering the drive wheels to the ground.

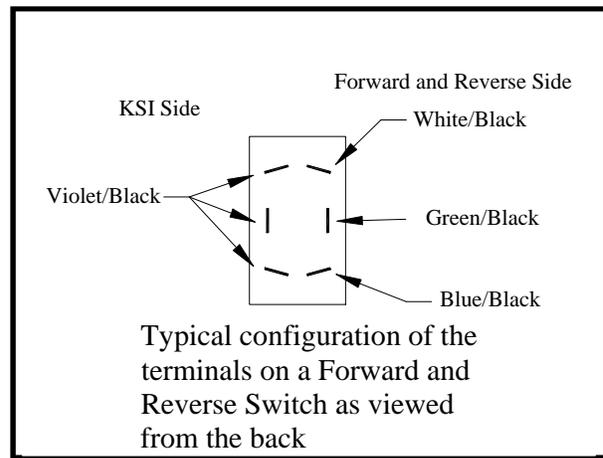
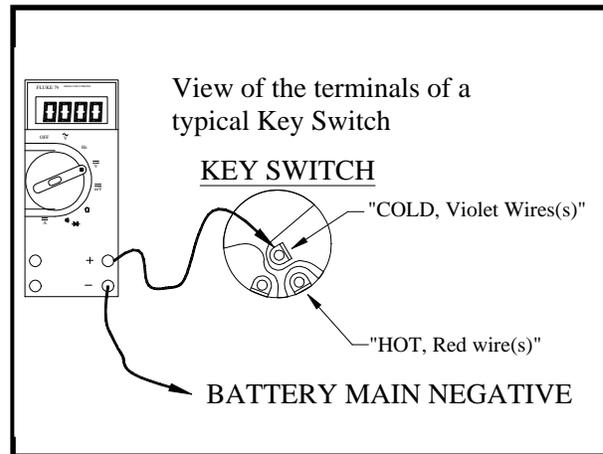


Connect a voltmeter across the COLD terminal of the key switch and battery negative.

**Turn the key switch ON.**

- If the voltage is not at battery volts then the key switch has failed. Stop trouble shooting here and repair the problem. When the repair is completed, completely retest the vehicle before lowering the drive wheels to the ground.
- If the voltage is at battery volts but the previous test at pin #4 in the Accelerator section failed then check the wire from the key switch to pin #4 at the accelerator module. Stop trouble shooting here and repair the problem. When the repair is completed, completely retest the vehicle before lowering the drive wheels to the ground.

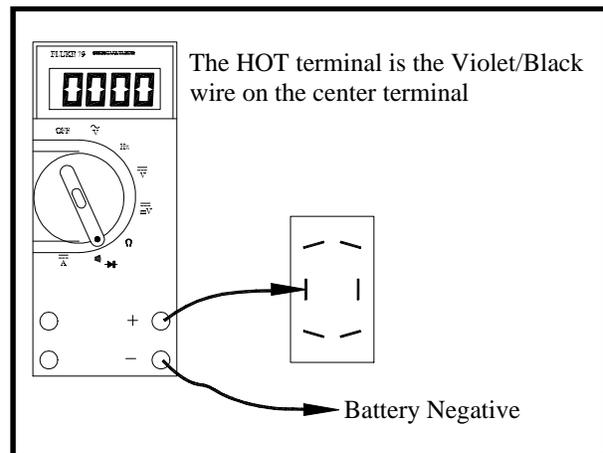
For your reference, shown at the right are the Forward and Reverse switch wire connections for a typical control system.



Connect a voltmeter across the HOT terminal of the KSI side of the F&R switch and battery negative.

**Turn the key switch ON.**

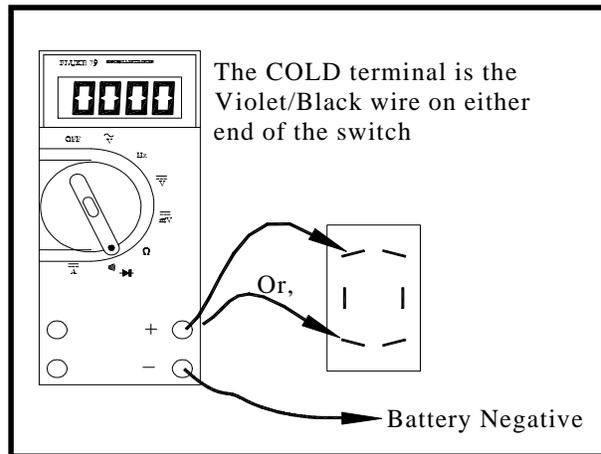
- If the voltage is not at battery volts then go to the **Accelerator** sequence.



Connect a voltmeter across one of the COLD terminals of the KSI side of the F&R switch and battery negative.

**Close all interlock switches, turn the Key Switch ON, and place the F&R Switch in Forward.**

- If the voltage is not at battery volts then the F&R switch has failed. Stop trouble shooting here and repair the problem. When the repair is completed, completely retest the vehicle before lowering the drive wheels to the ground.
- If the voltage is at battery volts and the test at the PMC KSI terminal in the Control Wire Inputs section failed then check the wiring between COLD terminals of the KSI side of the F&R switch and the PMC KSI terminal. Stop trouble shooting here and repair the problem. When the repair is completed, completely retest the vehicle before lowering the drive wheels to the ground.



### F/R switch

#### **⚠ WARNING**

1. Make sure the key-switch is in the "OFF" position, then remove the key.
2. Place the forward-reverse switch in the center "OFF" position.
3. Set the park brake.
4. Place blocks under the front wheels to prevent vehicle movement.

#### **⚠ WARNING**

The rear drive wheels may rotate during some of the following tests. Block the front wheels, raise the rear drive wheels off the ground, and support the vehicle with jack stands. Failure to do so may cause the vehicle to move and cause severe bodily injury and/or property damage.

#### **⚠ WARNING**

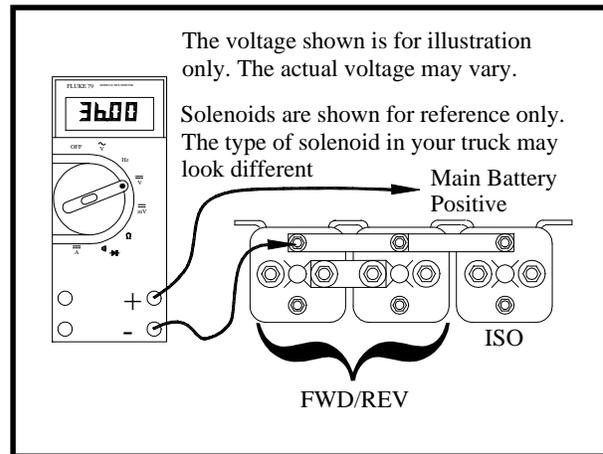
Rotating rear drive wheels are a potential hazard. Keep hands, arms, legs and loose clothing away from the rear drive wheels while conducting tests. Failure to do so may cause serious bodily injury.



Connect a voltmeter across the Solenoid Negative Buss Bar and battery positive.

**NOTE:** You may skip this test if it was completed in a previous section

- If the voltage is not at battery volts then check the wiring to battery negative and the negative circuit breaker. Stop troubleshooting here and repair the problem. When the repair is completed, completely retest the vehicle before lowering the drive wheels to the ground.

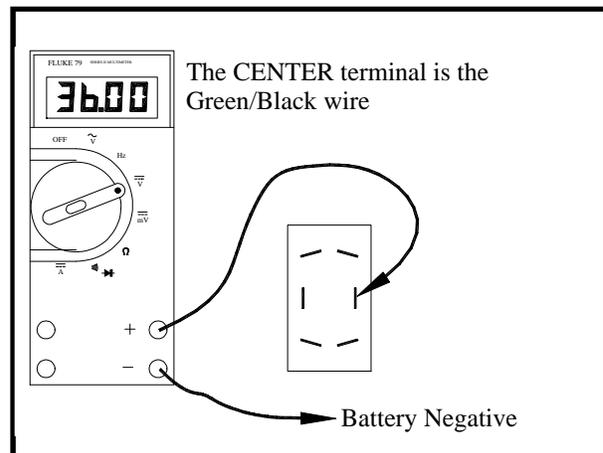


Connect a voltmeter across the center terminal of the forward and reverse side of the F&R switch and battery negative.

**Close all interlock switches, turn the Key Switch ON, and place the F&R Switch in Forward.**

**Depress the accelerator pedal fully.**

- If the voltage is not at battery volts then go to the **Accelerator** sequence.

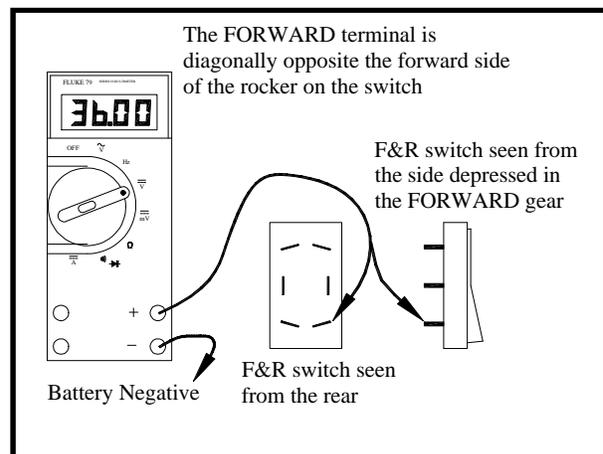


Connect a voltmeter across the forward terminal of the forward and reverse side of the F&R switch and battery negative.

**Close all interlock switches, turn the Key Switch ON, and place the F&R Switch in forward.**

**Depress the accelerator pedal fully.**

- If the voltage is not at battery volts then the F&R switch has failed. Stop troubleshooting here and repair the problem. When the repair is completed, completely retest the vehicle before lowering the drive wheels to the ground.

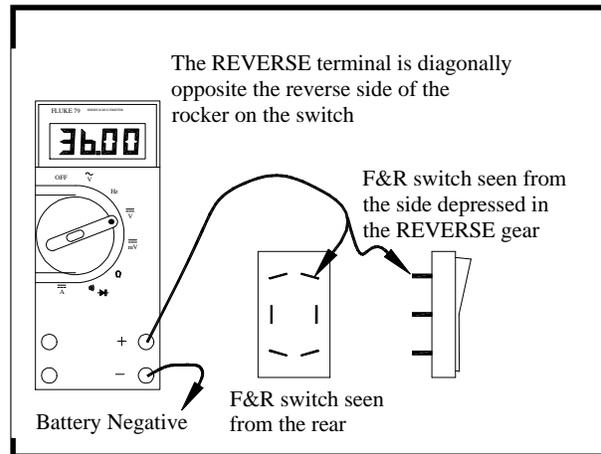


Connect a voltmeter across the reverse terminal of the forward and reverse side of the F&R switch and battery negative.

**Close all interlock switches, turn the Key Switch ON, and place the F&R Switch in reverse.**

**Depress the accelerator pedal fully.**

- If the voltage is not at battery volts then the F&R switch has failed. Stop trouble shooting here and repair the problem. When the repair is completed, completely retest the vehicle before lowering the drive wheels to the ground.
- If all tests in this section were good then check the wiring from the F&R switch to the Forward and Reverse solenoids and both the forward and reverse solenoid coils. Stop trouble shooting here and repair the problem. When the repair is completed, completely retest the vehicle before lowering the drive wheels to the ground.



## Solenoids

### **⚠ WARNING**

1. Make sure the key-switch is in the "OFF" position, then remove the key.
2. Place the forward-reverse switch in the center "OFF" position.
3. Set the park brake.
4. Place blocks under the front wheels to prevent vehicle movement.

### **⚠ WARNING**

The rear drive wheels may rotate during some of the following tests. Block the front wheels, raise the rear drive wheels off the ground, and support the vehicle with jack stands. Failure to do so may cause the vehicle to move and cause severe bodily injury and/or property damage.

### **⚠ WARNING**

Rotating rear drive wheels are a potential hazard. Keep hands, arms, legs and loose clothing away from the rear drive wheels while conducting tests. Failure to do so may cause serious bodily injury.

If the vehicle runs in forward only then skip ahead to the test sequence **Forward (does not run in reverse)**.

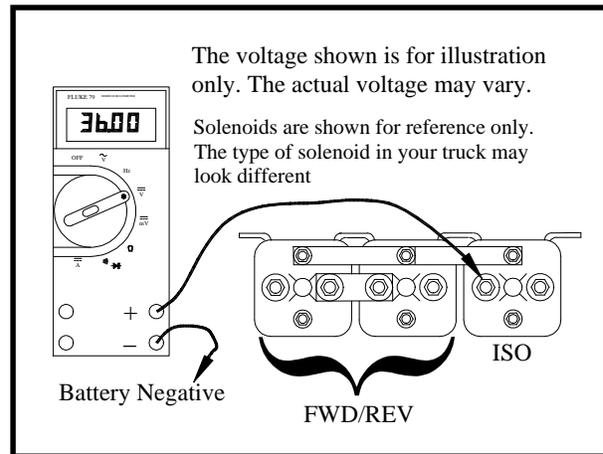
If the vehicle runs in reverse only then skip ahead to the test sequence **Reverse (does not run in forward)**.

Connect a voltmeter across the ISO solenoid COLD terminal and battery negative.

**Close all interlock switches and turn the Key Switch ON.**

**Depress the accelerator pedal fully.**

- If the voltage is at battery volts then the wire from the ISO solenoid to the PMC is bad. Stop trouble shooting here and repair the problem. When the repair is completed, completely retest the vehicle before lowering the drive wheels to the ground.

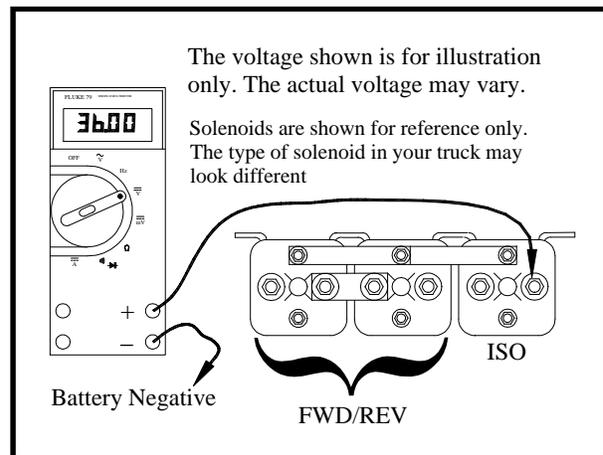


Connect a voltmeter across the ISO solenoid HOT terminal and battery negative.

**Close all interlock switches and turn the Key Switch ON.**

**Depress the accelerator pedal fully.**

- If the voltage is at battery volts then the ISO solenoid has failed. Stop trouble shooting here and repair the problem. When the repair is completed, completely retest the vehicle before lowering the drive wheels to the ground.
- If the voltage is not at battery volts then check the wiring to battery positive and the main circuit breaker. Stop trouble shooting here and repair the problem. When the repair is completed, completely retest the vehicle before lowering the drive wheels to the ground.

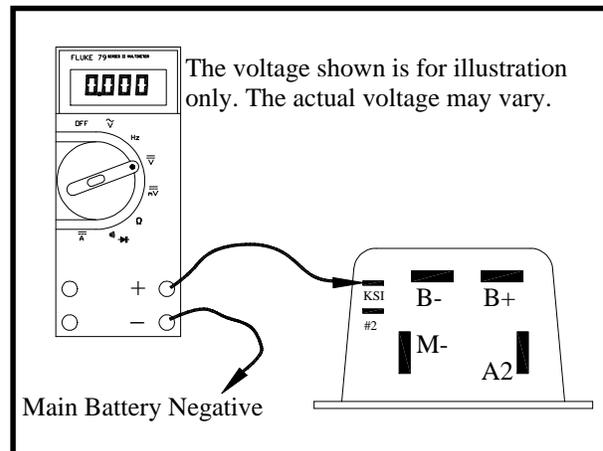


**Forward (does not run in reverse)**

Connect a voltmeter across the PMC KSI terminal and battery negative.

**Close all interlock switches, turn the Key Switch ON, and place the F&R Switch in reverse.**

- If the voltage is not at battery volts then go to the **Key Switch** sequence.

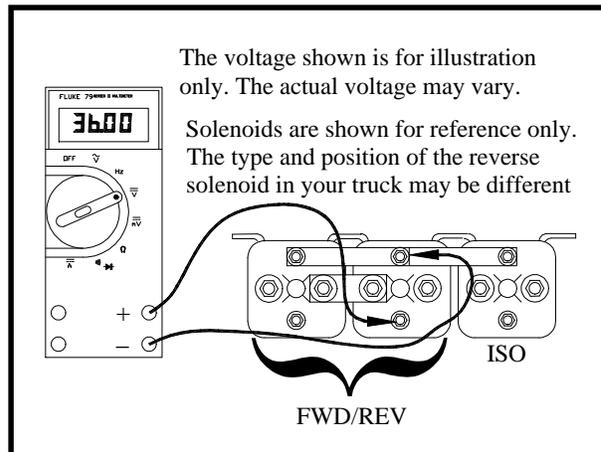


Connect a voltmeter across the Reverse Solenoid coil terminals. Refer to your vehicles wiring diagram to identify the position of the reverse solenoid.

**Close all interlock switches, turn the Key Switch ON, and place the F&R Switch in reverse.**

**Depress the accelerator pedal fully.**

- If the voltage is not at battery volts then go to the **F/R Switch** sequence.



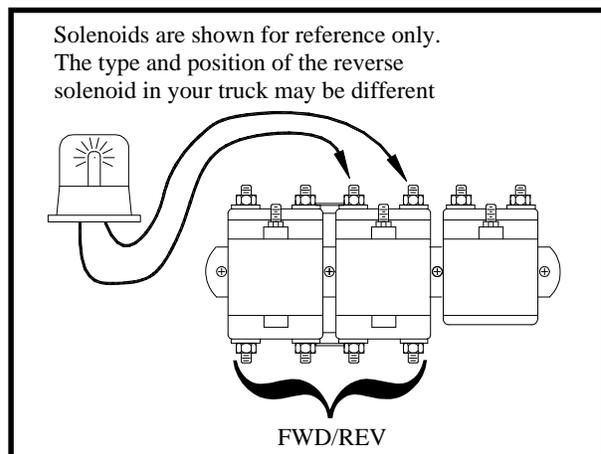
Set the test light voltage to the same voltage as the battery volts.

Connect the test light across the normally open contacts of the reverse solenoid. Refer to your vehicles wiring diagram to identify the position of the reverse solenoid.

**Close all interlock switches, turn the Key Switch ON, and place the F&R Switch in reverse.**

**Depress the accelerator pedal fully.**

- If the light comes on then the Reverse solenoid has failed. Stop trouble shooting here and repair the problem. When the repair is completed, completely retest the vehicle before lowering the drive wheels to the ground.

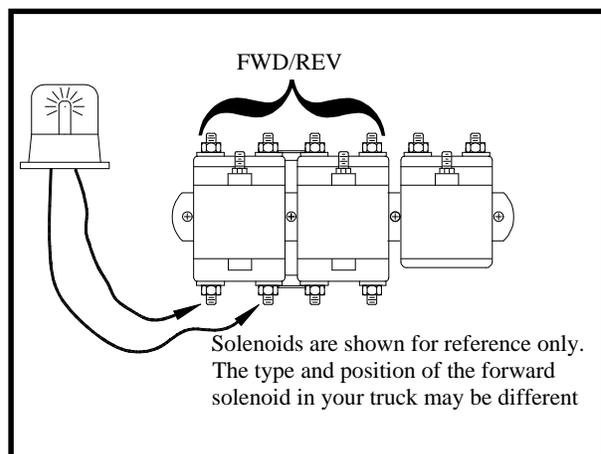


Connect the test light across the Normally Closed contacts of the Forward solenoid. Refer to your vehicles wiring diagram to identify the position of the forward solenoid.

**Close all interlock switches, turn the Key Switch ON, and place the F&R Switch in Reverse.**

**Depress the accelerator pedal fully.**

- If the light comes on then the Forward solenoid has failed. Stop trouble shooting here and repair the problem. When the repair is completed, completely retest the vehicle before lowering the drive wheels to the ground.



## STOP

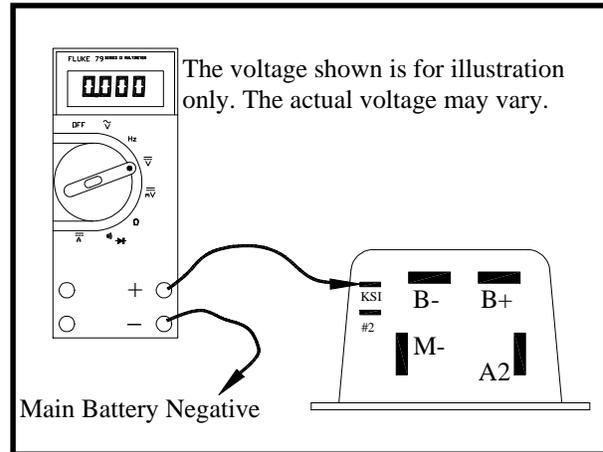
Stop, do not continue. If you reached this point without a solution, then you may have an unanticipated problem or have made an error during testing. It is important to review the trouble shooting steps that have led to this point. The tests may need to be repeated.

**Reverse (does not run in forward)**

Connect a voltmeter across the PMC KSI terminal and battery negative.

**Close all interlock switches, turn the Key Switch ON, and place the F&R Switch in forward.**

- If the voltage is not at battery volts then go to the **Key Switch** sequence.

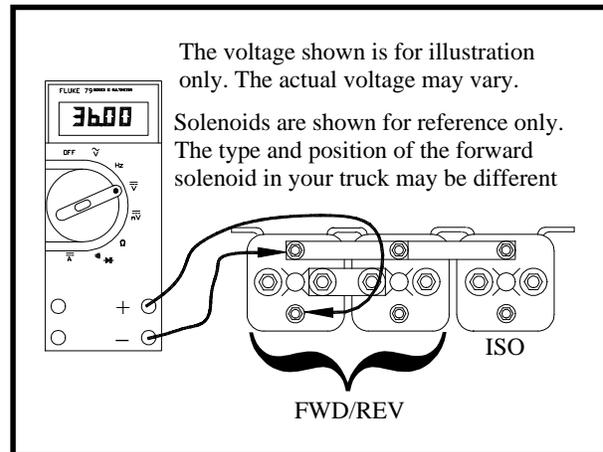


Connect a voltmeter across the Forward Solenoid coil terminals. Refer to your vehicles wiring diagram to identify the position of the forward solenoid.

**Close all interlock switches, turn the Key Switch ON, and place the F&R Switch in forward.**

**Depress the accelerator pedal fully.**

- If the voltage is not at battery volts then go to the **F/R Switch** sequence.



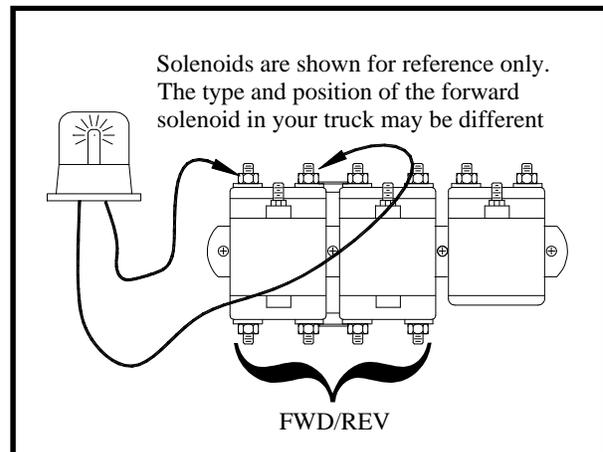
Set the test light voltage to the same voltage as the battery volts.

Connect the test light across the Normally Open contacts of the Forward solenoid. Refer to your vehicles wiring diagram to identify the position of the forward solenoid.

**Close all interlock switches, turn the Key Switch ON, and place the F&R Switch in forward.**

**Depress the accelerator pedal fully.**

- If the light comes on then the Forward solenoid has failed. Stop trouble shooting here and repair the problem. When the repair is completed, completely retest the vehicle before lowering the drive wheels to the ground.



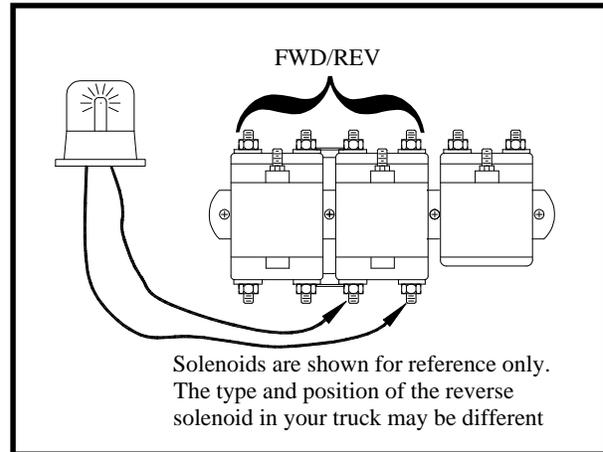
Set the test light voltage to the same voltage as the battery volts.

Connect the test light across the Normally Closed contacts of the Reverse solenoid. Refer to your vehicles wiring diagram to identify the position of the Reverse solenoid.

**Close all interlock switches, turn the Key Switch ON, and place the F&R Switch in Forward.**

**Depress the accelerator pedal fully.**

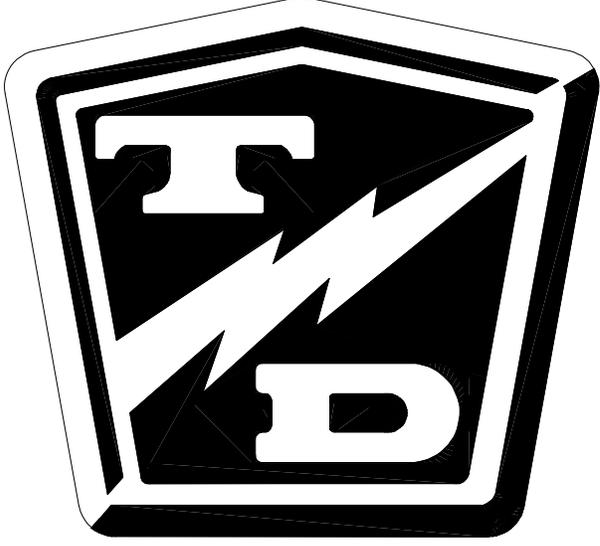
- If the light comes on then the Reverse solenoid has failed. Stop trouble shooting here and repair the problem. When the repair is completed, completely retest the vehicle before lowering the drive wheels to the ground.



## STOP

Stop, do not continue. If you reached this point without a solution, then you may have an unanticipated problem or have made an error during testing. It is important to review the trouble shooting steps that have led to this point. The tests may need to be repeated.

**TAYLOR - DUNN**



## Special Troubleshooting Guide

This section is specific to the symptoms listed below. Each troubleshooting sequence assumes that all listed symptoms are present. Do not use this section unless the truck has all listed symptoms.

<b>SYMPTOMS</b>		<b>GO TO</b>
➤	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
➤	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;  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.	SOLENOIDS
➤	Accelerates slowly and exceeds normal speed in both directions plus high armature current. NOTE: Field current will be very low.	SOLENOIDS
➤	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
➤	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

### Section 4, Special Troubleshooting Table of Contents

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## ⚠ WARNING

1. Make sure the key-switch is in the "OFF" position, then remove the key.
2. Place the forward-reverse switch in the center "OFF" position.
3. Set the park brake.
4. Place blocks under the front wheels to prevent vehicle movement.
5. Disconnect the main positive and negative cables at the batteries.

## ⚠ WARNING

The rear drive wheels may rotate during some of the following tests. Block the front wheels, raise the rear drive wheels off the ground, and support the vehicle with jack stands. Failure to do so may cause the vehicle to move and cause severe bodily injury and/or property damage.

## ⚠ WARNING

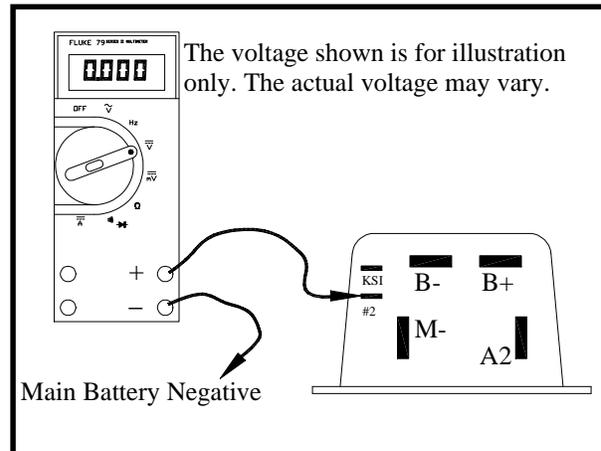
Rotating rear drive wheels are a potential hazard. Keep hands, arms, legs and loose clothing away from the rear drive wheels while conducting tests. Failure to do so may cause serious bodily injury.

## PMC CONTROL

Disconnect the wire from the 'M-' terminal on the PMC control and tape it off to prevent electrical contact. Connect a volt meter across the PMC #2 terminal and battery negative.

**Turn the key-switch on, close all interlock switches (if equipped), depress the accelerator pedal to engage the first micro switch only (creep speed), then perform the following tests:**

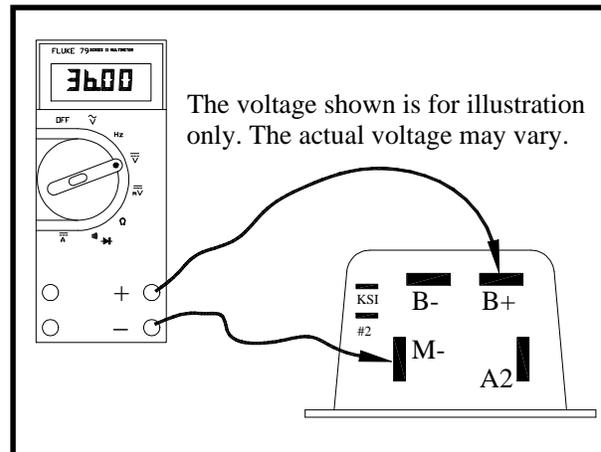
- The meter reading should be between 6 and 6.5 volts.
- If the voltage at pin #2 is not 6 to 6.5 volts, then go to the **ACCELERATOR** sequence in the Main Troubleshooting Sequence, otherwise continue with the next test.



Connect a volt meter across the PMC B+ and PMC M- terminals.

**Turn the key-switch on, close all interlock switches (if equipped), depress the accelerator pedal to engage the first micro switch only (creep speed), then perform the following tests:**

- The meter reading should not be equal to the battery voltage.
- If you have full battery voltage then the PMC control is shorted and must be replaced. Stop trouble shooting here and repair the problem. When the repair is completed, completely retest the vehicle before lowering the drive wheels to the ground, otherwise continue with the next test.



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 trouble shooting here and repair the problem. When the repair is completed, completely retest the vehicle before lowering the drive wheels to the ground.

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## STOP

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Stop, do not continue. If you reached this point without a solution, then you may have an unanticipated problem or have made an error during testing. It is important to review the trouble shooting steps that have led to this point. The tests may need to be repeated.

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## PLUGGING DIODE

### **⚠ WARNING**

1. Make sure the key-switch is in the "OFF" position, then remove the key.
2. Place the forward-reverse switch in the center "OFF" position.
3. Set the park brake.
4. Place blocks under the front wheels to prevent vehicle movement.
5. Disconnect the main positive and negative cables at the batteries.

### **⚠ WARNING**

The rear drive wheels may rotate during some of the following tests. Block the front wheels, raise the rear drive wheels off the ground, and support the vehicle with jack stands. Failure to do so may cause the vehicle to move and cause severe bodily injury and/or property damage.

### **⚠ WARNING**

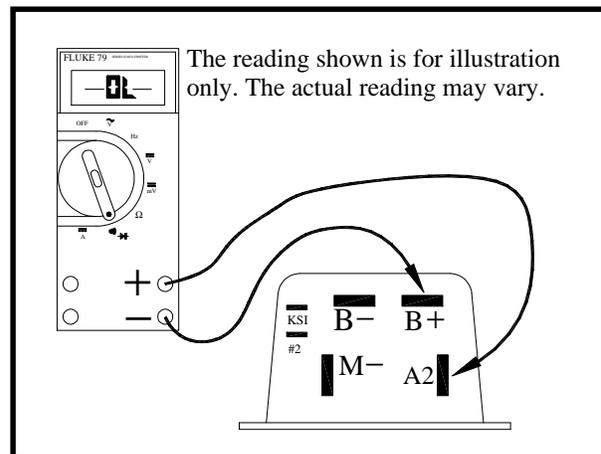
Rotating rear drive wheels are a potential hazard. Keep hands, arms, legs and loose clothing away from the rear drive wheels while conducting tests. Failure to do so may cause serious bodily injury.

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

Using the diode test function on the DMM check for the presence of a diode across 'B+' and 'A2' on the PMC control..

If you do not know how to test for a diode, refer test to a qualified technician.

- If the diode is open or shorted, then the PMC control must be replaced. Stop trouble shooting here and repair the problem. When the repair is completed, completely retest the vehicle before lowering the drive wheels to the ground.



## **STOP**

Stop, do not continue. If you reached this point without a solution, then you may have an unanticipated problem or have made an error during testing. It is important to review the trouble shooting steps that have led to this point. The tests may need to be repeated.

## FREEWHEEL DIODE

### **⚠ WARNING**

1. Make sure the key-switch is in the "OFF" position, then remove the key.
2. Place the forward-reverse switch in the center "OFF" position.
3. Set the park brake.
4. Place blocks under the front wheels to prevent vehicle movement.
5. Disconnect the main positive and negative cables at the batteries.

### **⚠ WARNING**

The rear drive wheels may rotate during some of the following tests. Block the front wheels, raise the rear drive wheels off the ground, and support the vehicle with jack stands. Failure to do so may cause the vehicle to move and cause severe bodily injury and/or property damage.

### **⚠ WARNING**

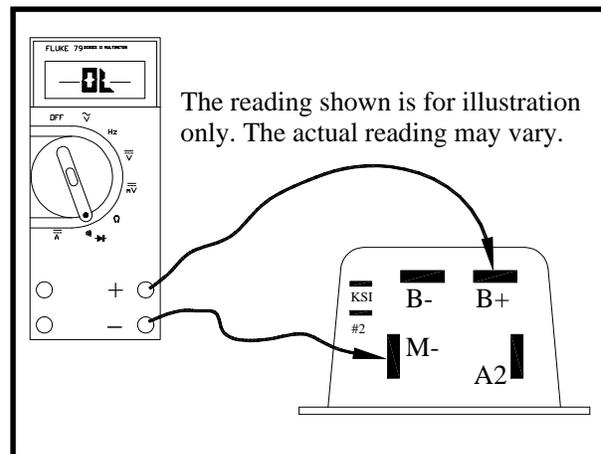
Rotating rear drive wheels are a potential hazard. Keep hands, arms, legs and loose clothing away from the rear drive wheels while conducting tests. Failure to do so may cause serious bodily injury.

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

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

If you do not know how to test for a diode, refer test to a qualified technician.

- If the diode is open or shorted, then the PMC control must be replaced. Stop trouble shooting here and repair the problem. When the repair is completed, completely retest the vehicle before lowering the drive wheels to the ground.



## **STOP**

Stop, do not continue. If you reached this point without a solution, then you may have an unanticipated problem or have made an error during testing. It is important to review the trouble shooting steps that have led to this point. The tests may need to be repeated.



## ISO

### **⚠ WARNING**

1. Make sure the key-switch is in the "OFF" position, then remove the key.
2. Place the forward-reverse switch in the center "OFF" position.
3. Set the park brake.
4. Place blocks under the front wheels to prevent vehicle movement.
5. Disconnect the main positive and negative cables at the batteries.

### **⚠ WARNING**

The rear drive wheels may rotate during some of the following tests. Block the front wheels, raise the rear drive wheels off the ground, and support the vehicle with jack stands. Failure to do so may cause the vehicle to move and cause severe bodily injury and/or property damage.

### **⚠ WARNING**

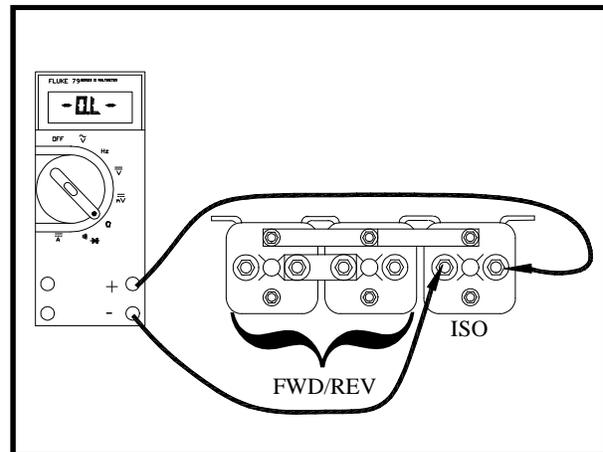
Rotating rear drive wheels are a potential hazard. Keep hands, arms, legs and loose clothing away from the rear drive wheels while conducting tests. Failure to do so may cause serious bodily injury.

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

Test continuity across the ISO power contacts.

If you do not know how to test for continuity, refer test to a qualified technician.

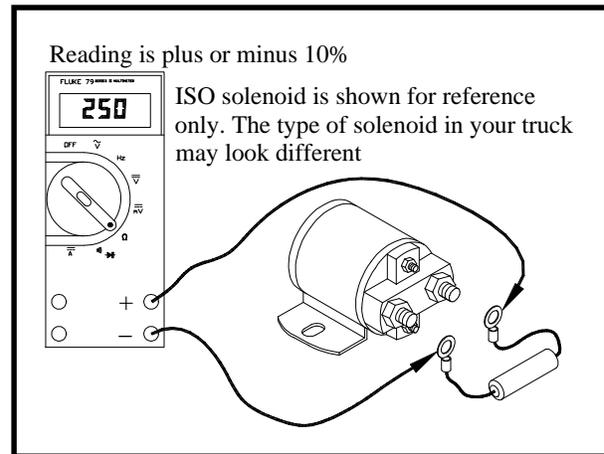
- This should be an open circuit. If it is not an open circuit then the contactor should be replaced. Stop trouble shooting here and repair the problem. When the repair is completed, completely retest the vehicle before lowering the drive wheels to the ground, other wise continue to the next test.





Connect the meter to each end of the resistor that was removed from the ISO solenoid and measure its resistance.

- The meter reading should be 250 Ohms (+/-10%). If it is not 250 ohms (+/-10%), then replace the resistor. Stop trouble shooting here and repair the problem. When the repair is completed, completely retest the vehicle before lowering the drive wheels to the ground.



## STOP

Stop, do not continue. If you reached this point without a solution, then you may have an unanticipated problem or have made an error during testing. It is important to review the trouble shooting steps that have led to this point. The tests may need to be repeated.



## **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.

### **⚠ WARNING**

1. Make sure the key-switch is in the "OFF" position, then remove the key.
2. Place the forward-reverse switch in the center "OFF" position.
3. Set the park brake.
4. Place blocks under the front wheels to prevent vehicle movement.
5. Disconnect the main positive and negative cables at the batteries.

### **⚠ WARNING**

The rear drive wheels may rotate during some of the following tests. Block the front wheels, raise the rear drive wheels off the ground, and support the vehicle with jack stands. Failure to do so may cause the vehicle to move and cause severe bodily injury and/or property damage.

### **⚠ WARNING**

Rotating rear drive wheels are a potential hazard. Keep hands, arms, legs and loose clothing away from the rear drive wheels while conducting tests. Failure to do so may cause serious bodily injury.

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.

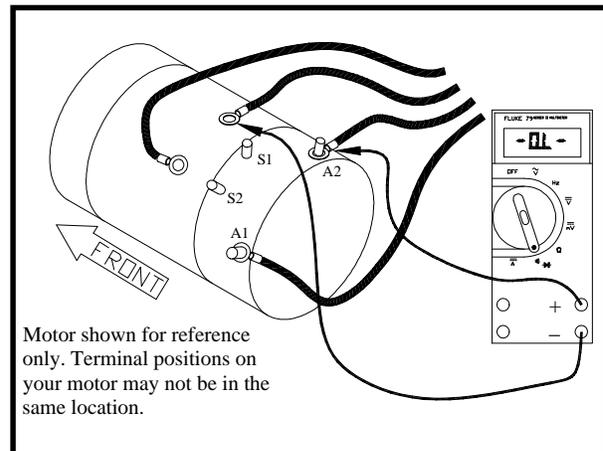
Reconnect the batteries.

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

- 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 Figure 1.

If you do not know how to test for continuity, refer test to a qualified technician.

- This should be an open circuit, if it reads as a short, then one of the following has occurred:
  - A) The reverse solenoid is shorted.
  - B) The wire connected to the motor 'S1' terminal is shorted to the wire connected to the motor 'A2' terminal.
  - C) The wire connected to the motor 'S1' terminal is shorted to the wire connected to the PMC 'A2' terminal.

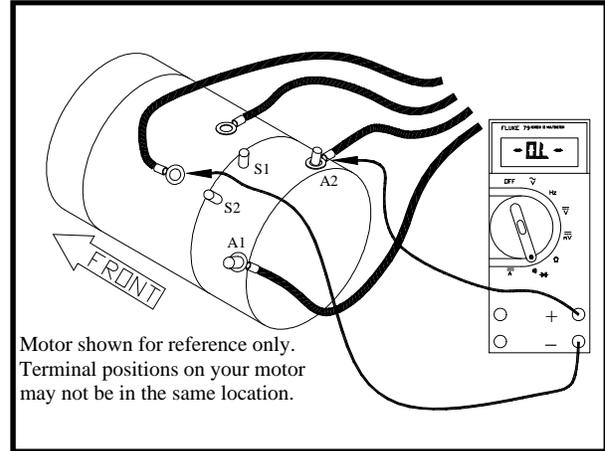


Stop trouble shooting here and repair the problem. When the repair is completed, completely retest the vehicle before lowering the drive wheels to the ground, otherwise continue with the next test.

- 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.

If you do not know how to test for continuity, refer test to a qualified technician.

- This should read as an open circuit. If it reads as a short then one of the following has occurred:
  - A) The forward solenoid is shorted.
  - B) The wire connected to the motor 'S2' terminal is shorted to the wire connected to the motor 'A2' terminal.
  - C) The wire connected to the motor 'S2' terminal is shorted to the wire connected to the PMC 'A2' terminal.



Stop trouble shooting here and repair the problem. When the repair is completed, completely retest the vehicle before lowering the drive wheels to the ground, otherwise continue with the next test.

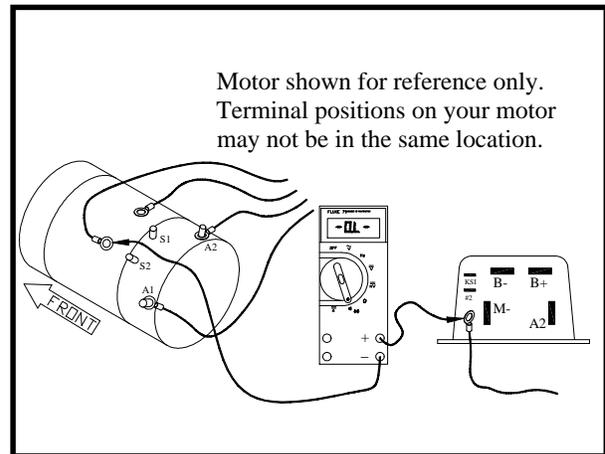
**With the key-switch on and the F&R switch in forward, depress the accelerator pedal and perform the following tests:**

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

If you do not know how to test for continuity, refer test to a qualified technician.

- This should read as an open circuit. If it reads as a short, then one of the following has occurred:
  - A) The forward solenoid is shorted.
  - B) The wire connected to the PMC 'M-' terminal is shorted to the wire connected to the motor 'S2' terminal.

Stop trouble shooting here and repair the problem. When the repair is completed, completely retest the vehicle before lowering the drive wheels to the ground, otherwise continue with the next test.





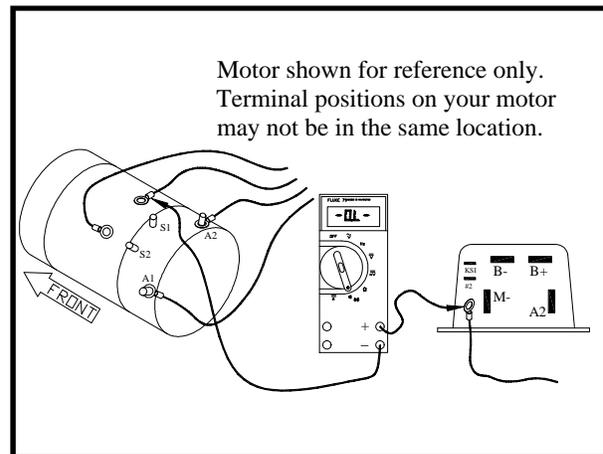
**With the key-switch on and the F&R switch in reverse, depress the accelerator pedal and perform the following tests:**

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

If you do not know how to test for continuity, refer test to a qualified technician.

- This should read as an open circuit. If it reads as a short, then one of the following has occurred:
  - A) The reverse solenoid is shorted.
  - B) The wire connected to the PMC 'M-' terminal is shorted to the wire connected to the motor 'S1' terminal.

Stop trouble shooting here and repair the problem. When the repair is completed, completely retest the vehicle before lowering the drive wheels to the ground



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## STOP

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Stop, do not continue. If you reached this point without a solution, then you may have an unanticipated problem or have made an error during testing. It is important to review the trouble shooting steps that have led to this point. The tests may need to be repeated.

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## MOTOR

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

Another symptom that may exist is 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. Visually inspect the brushes, if they are OK, continue with the testing below.

### **⚠ WARNING**

1. Make sure the key-switch is in the "OFF" position, then remove the key.
2. Place the forward-reverse switch in the center "OFF" position.
3. Set the park brake.
4. Place blocks under the front wheels to prevent vehicle movement.
5. Disconnect the main positive and negative cables at the batteries.

### **⚠ WARNING**

The rear drive wheels may rotate during some of the following tests. Block the front wheels, raise the rear drive wheels off the ground, and support the vehicle with jack stands. Failure to do so may cause the vehicle to move and cause severe bodily injury and/or property damage.

### **⚠ WARNING**

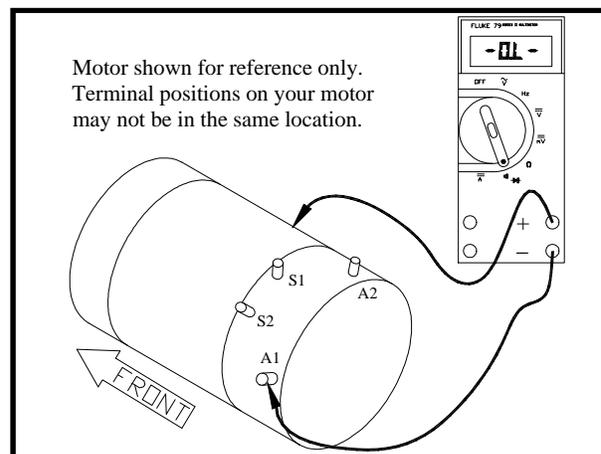
Rotating rear drive wheels are a potential hazard. Keep hands, arms, legs and loose clothing away from the rear drive wheels while conducting tests. Failure to do so may cause serious bodily injury.

Disconnect the four motor wires and perform the following tests:

Check continuity from 'A1' to the frame of the motor..

If you do not know how to test for continuity, refer test to a qualified technician.

- This should be an open circuit. If there is continuity from 'A1' to the frame of the motor, then the motor armature or armature circuit (brushes) are shorted. Stop trouble shooting here and repair the problem. When the repair is completed, completely retest the vehicle before lowering the drive wheels to the ground, otherwise continue with the next test.

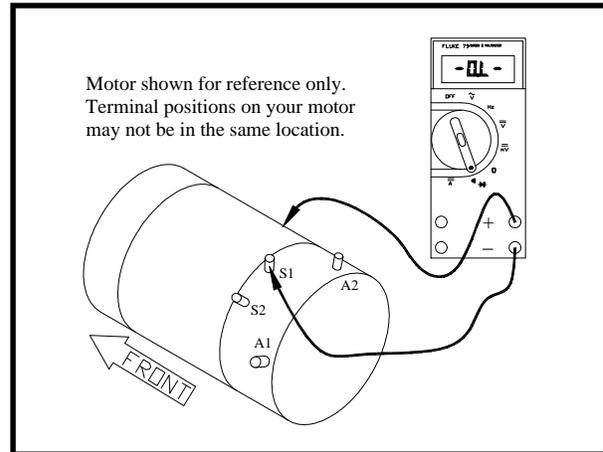




Check continuity from 'S1' to the frame of the motor.

If you do not know how to test for continuity, refer test to a qualified technician.

This should be an open circuit. If there is continuity from 'S1' to the frame of the motor, then the motor field is shorted. Stop trouble shooting here and repair the problem. When the repair is completed, completely retest the vehicle before lowering the drive wheels to the ground, otherwise continue to Motor Inspection.

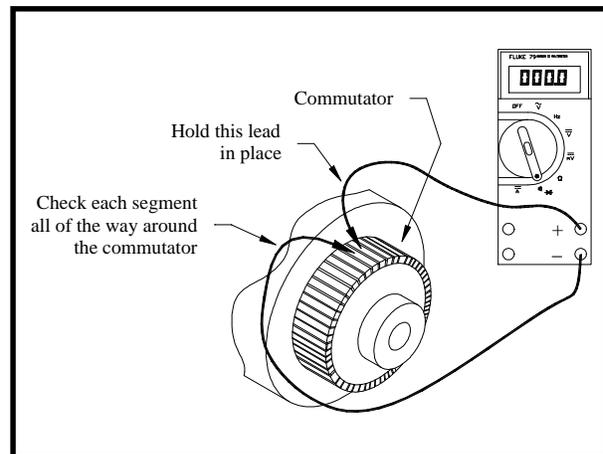


## Motor Inspection

1. Remove and disassemble the motor.
2. Visually inspect the inside of the brush end housing. If there are 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. 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.
4. 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.

If you do not know how to test for continuity, refer test to a qualified technician.

- There should be continuity on each commutator segment. If an open segment is found, the armature is bad and the motor must be replaced. Stop trouble shooting here and repair the problem. When the repair is completed, completely retest the vehicle before lowering the drive wheels to the ground.



## STOP

Stop, do not continue. If you reached this point without a solution, then you may have an unanticipated problem or have made an error during testing. It is important to review the trouble shooting steps that have led to this point. The tests may need to be repeated.

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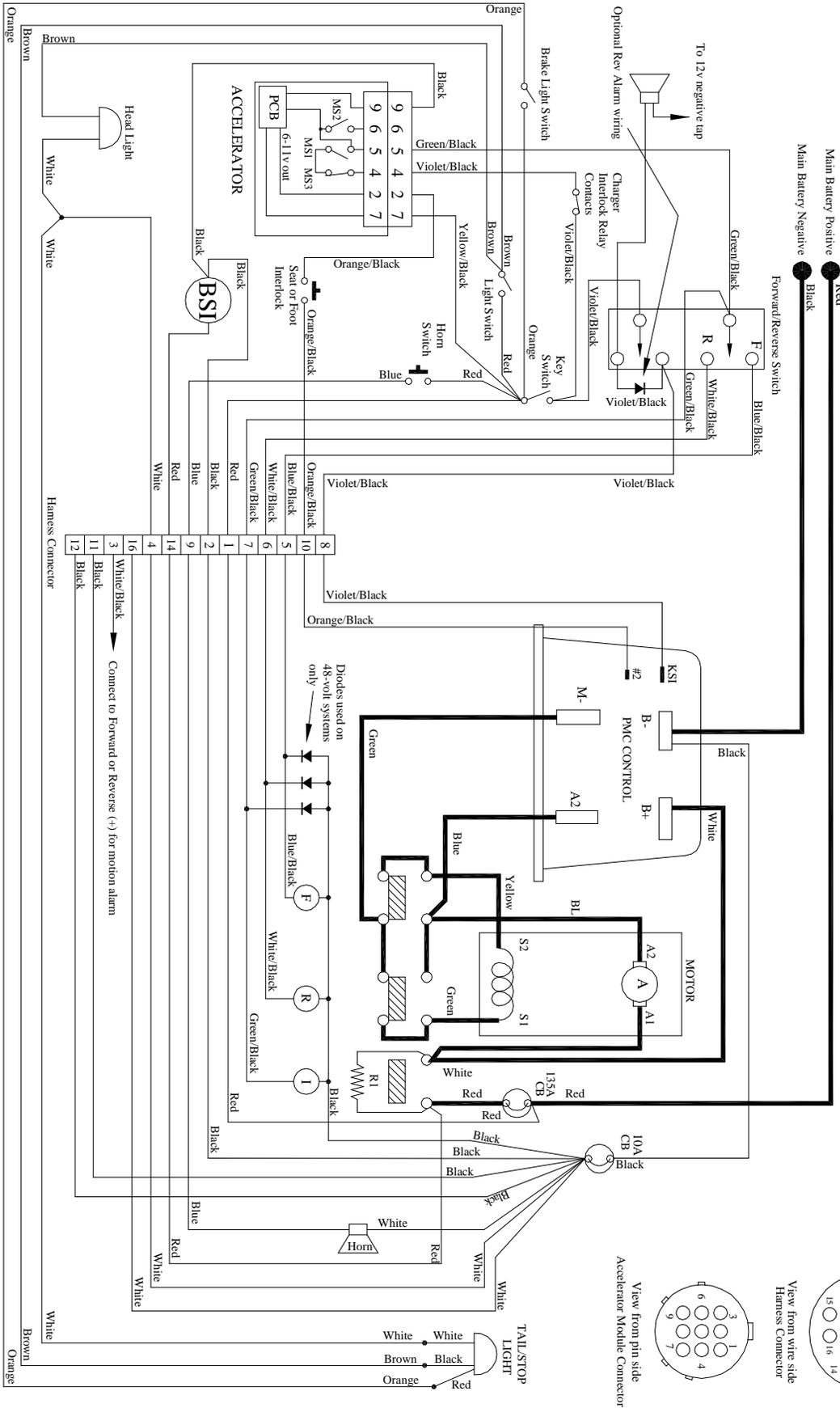
Complete Vehicle ..... 2



# Wire Diagrams

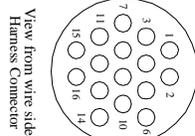
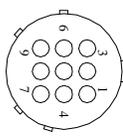
**Typical PMC control system**

Some components on diagram may not be installed on all vehicles



The charger interlock is optional and may not be installed on your vehicle. If equipped with the charger interlock option the interlock relay will be located in the main charger cabinet or in a separate module external of the charger.

- I** Isolator solenoid or contactor coil
- F** Forward solenoid or contactor coil
- R** Reverse solenoid or contactor coil
- BSI** Battery Status Indicator
- CB** = CIRCUIT BREAKER
- R1** = 250 OHMS 5W RESISTOR



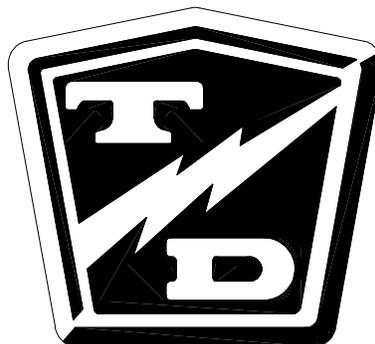
# Illustrated Parts

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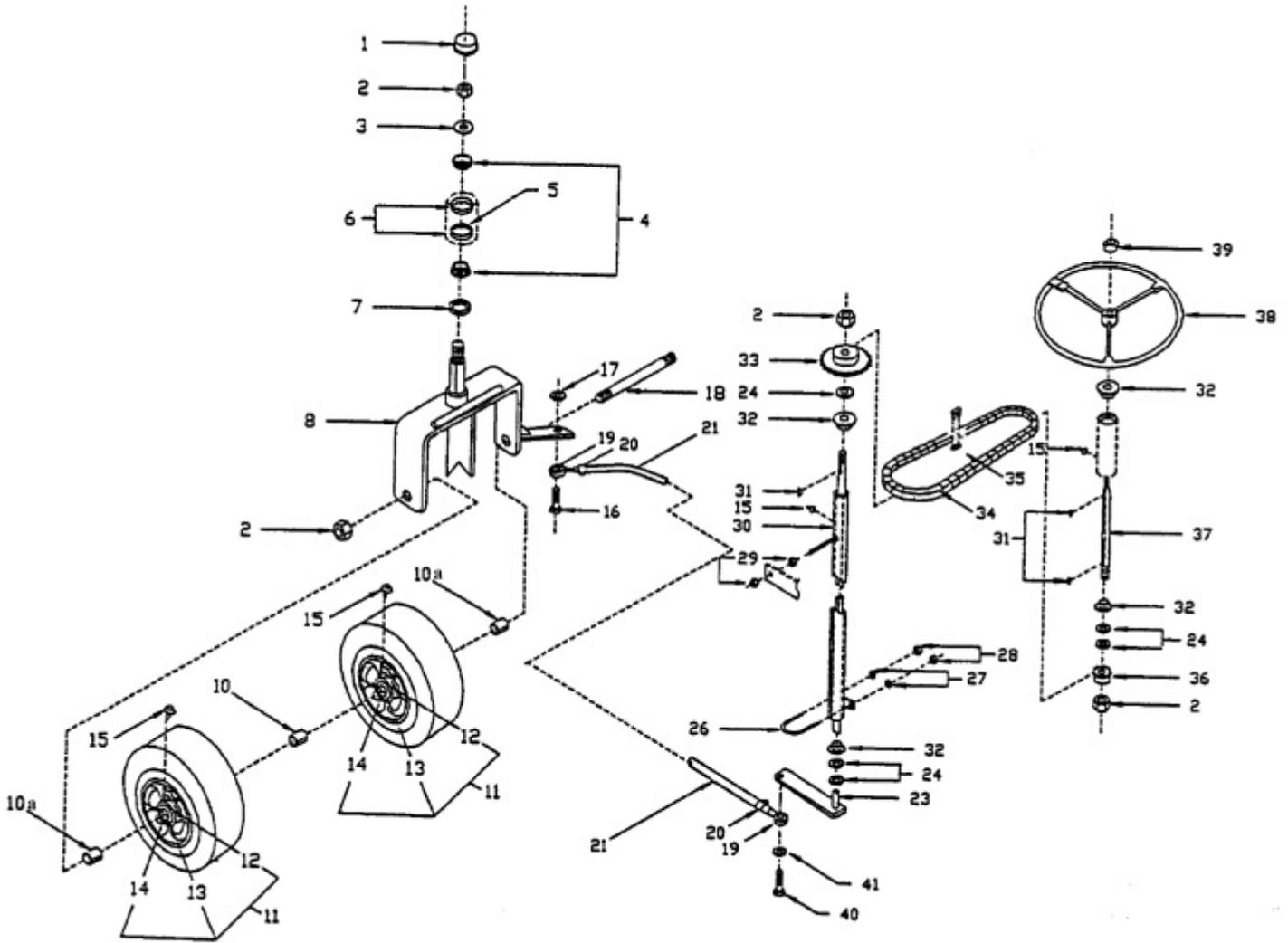
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## Front Wheels/Steering (E 4-51)

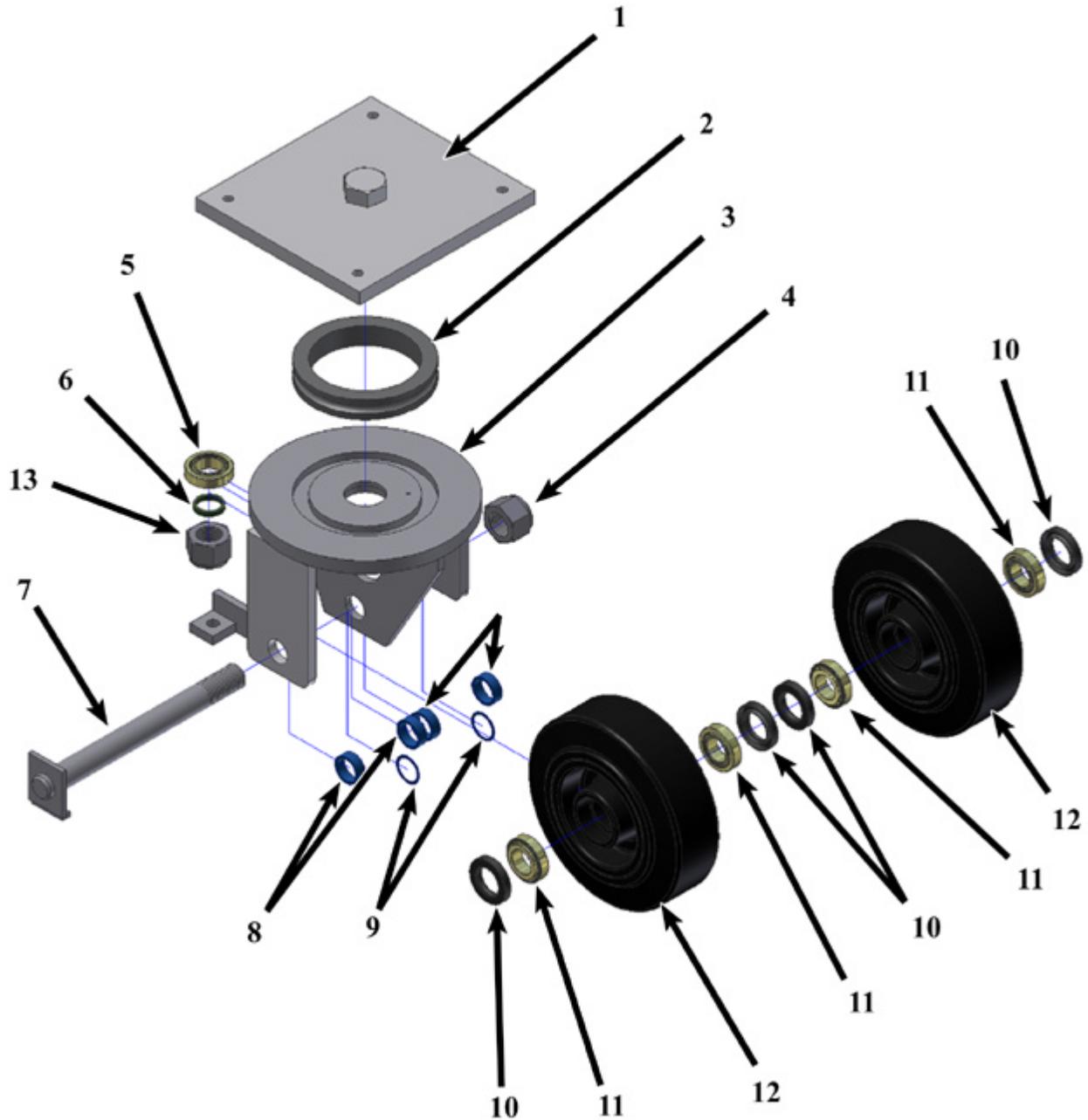


<b>TITLE</b>			
Item No.	Part No.	Description	Qty
1	92-105-00	Bearing cap	1
2	88-229-81	nut	1
3	88-228-61	Washer	1
4	80-011-00	Bearing	2
5	17-001-10	Collar (w/races) This is a weld on part	1
6	80-102-00	Race	2
7	45-307-00	Seal	1
8	14-084-10	Fork	1
9	-	-	-
10	16-406-11	Spacer, fork	1
	Supplied with wheel	Spacer, wheel bearing	4
11	13-904-00	Wheel (includes bearings spacers and seals)	2
12	Supplied with wheel	Bearing	4
13	Supplied with wheel	Race	4
14	Supplied with wheel	Seal	4
15	Supplied with wheel	Grease fitting	2
16	88-180-15	5/8 X 1-3/4 NC HEX HD SCR	1
17	88-189-82	5/8 NC THIN FLEXLOCK NUT	1
18	15-010-20	Axle shaft	1
19	86-521-98	Rod end, left thread	1
	86-521-99	Rod end, right thread	1
20	86-510-00	Clamp	2
21	18-041-52	Drag link (E 4-51 only, see following page for E 4-57)	1
22	-	-	-
23	20-146-00	Jack shaft	1
24	16-405-00	Spacer	5
25	-	-	-
26	96-102-00	U-bolt	1
27	88-088-62	5/16 LOCK WASHER	2
28	88-089-80	5/16 NC HEX NUT,S/S	2
29	88-149-80	1/2 NC HEX HD NUT	2
30	32-047-00	Tube, jack shaft	1
31	97-100-00	Woodruff key	1
32	80-400-10	Bearing	4
33	30-010-00	Sprocket	1
34	30-246-00	Chain	1
35	30-400-00	Master link	1
36	30-002-00	Sprocket	1
37	20-145-00	Steering shaft	1
38	19-007-20	Steering wheel	1
39	88-199-82	5/8 NF HEX HD JAM NUT	1
40	96-317-00	BOLT,5/8 X 1-1/2 NC,GR5 W/HOLE	1
41	88-188-64	EXTERNAL TOOTH LOCK WASHER	1



## Front Wheels/Steering (E 4-57)

*Steering wheel, chain and jackshaft is same as E 4-51*

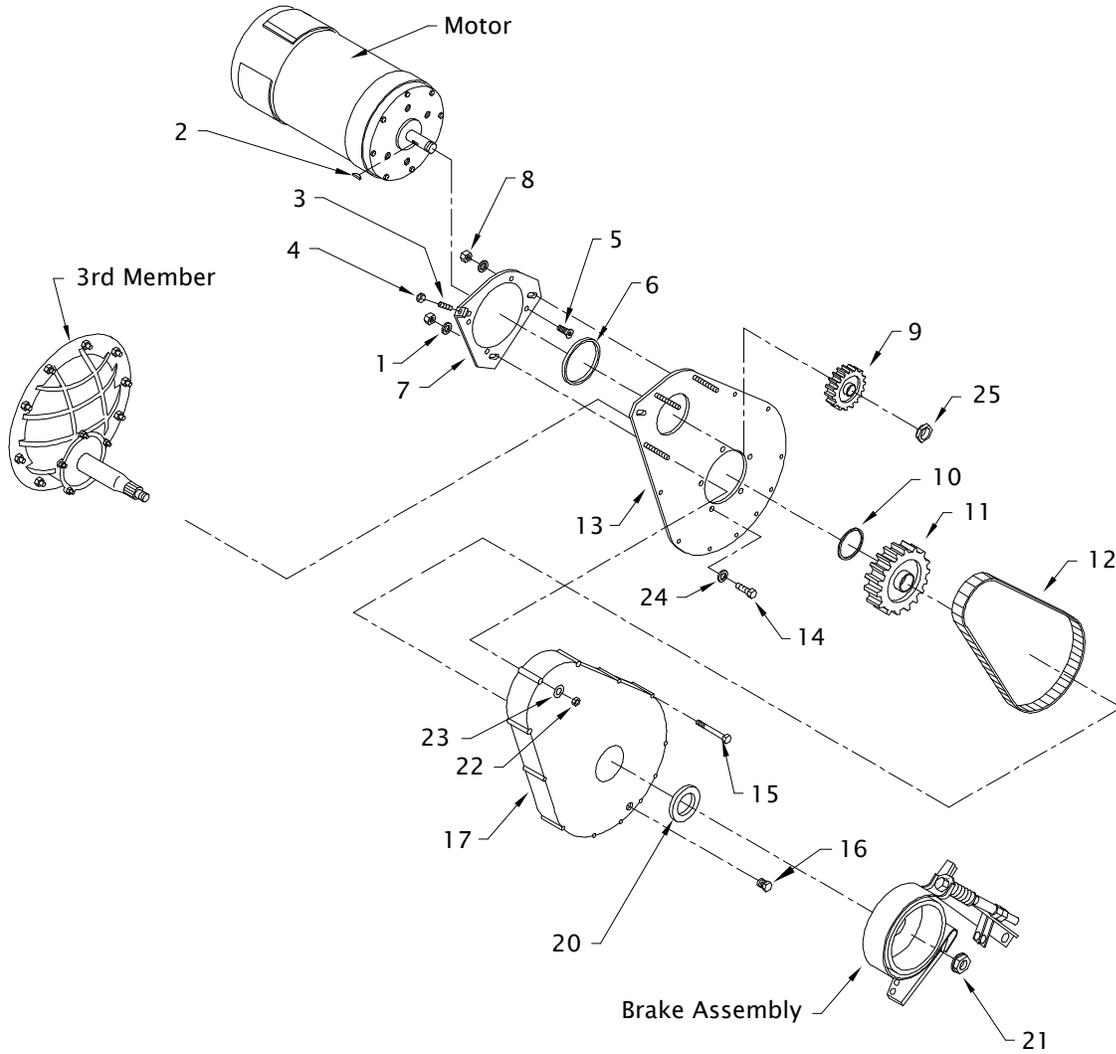


**Front Wheels and Fork (E 4-57)**

Item No.	Part No.	Description	Qty
1	14-319-00	Mounting plate	1
2	80-308-00	Bearing	1
3	14-087-00	Fork	1
4	88-389-86	1-1/4 NC LOCKNUT,PLATED	1
5	80-011-00	Bearing	1
	80-102-00	Race	1
6	16-408-00	Spacer	1
7	15-002-05	Axle	1
8	16-408-01	Spacer	4
9	16-410-00	Shims	*
10	45-307-00	Seal	4
11	80-011-00	Bearing	4
	80-102-00	Race	4
12	13-964-10	Tire/Wheel assembly	2
	12-058-10	Wheel (includes 10, 11)	2
	10-267-00	Tire (press on)	2
13	88-389-86	1-1/4 NC LOCKNUT,PLATED	1
Not shown	18-054-00	Drag Link	1



# Transmission Chain Case

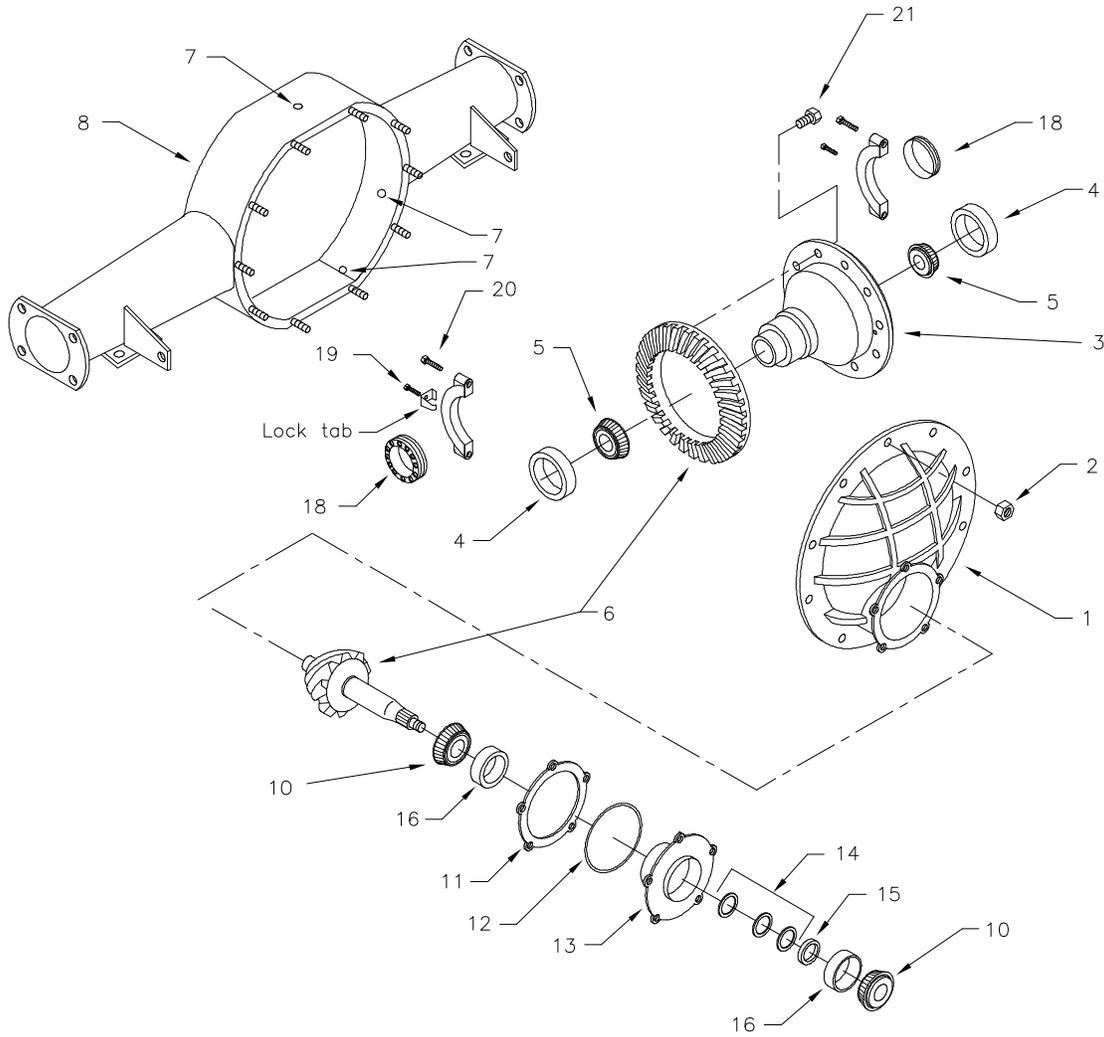


Transmission Chain Case			
ITEM#	PART #	DESCRIPTION	QTY
1	88-109-61	3/8" SAE Flat Washer	3
2	97-100-00	Woodruff Key	1
3	88-087-11	Chain Adjusting Screw	1
4	88-069-80	5/16" NC Hex Nut	1
5	88-103-09	Motor Mounting Screw, 3/8" X 3/4" NC	4
6	80-703-00	O-Ring, 4-1/2" ID X 5" OD	1
7	70-454-00	Motor Mounting Plate	1
8	88-109-87	3/8" KEPS Nut (Interegral Lockwasher)	3
9	30-070-00	15 Tooth Double Motor Sprocket	1
10	16-415-00	Spacer Main Sprocket, F2 Axle, .440" Thick	1
11	30-070-11	60 Tooth Double Pinion Sprocke (E 4-51)	1
	30-070-10	81 Tooth Double Pinion Sprocket (E 4-51, E 4-57)	1
12	30-320-11	Drive Chain, 15-81 T Double Sprocket (E 4-51, E 4-57)	1
	30-320-12	Drive Chain, 15-60 T Double Sprocket (E 4-51)	1
13	44-352-52	Backing Plate, Gear Case	1
14	88-101-13	3/8" X 1-1/4" NC Hex Bolt	5
15	88-080-20	5/16" X 3" Hex Bolt	9
16	41-989-00	Drain and Fill Plug	2
17	43-201-11	Chain Cover	1
18*	45-002-00	Chain Case Gasket	1
19*	45-021-00	Backing Plate Gasket	1
20	45-331-00	Pinion Oil Seal, Gear Case	1
21	97-250-00	Pinion Nut	1
22	88-089-81	5/16" NC Locknut	12
23	88-088-61	5/16" SAE Flat Washer	3
24	88-108-63	Internal Tooth Lock Washer	5
25	88-239-82	Motor Nut, 3/4" NF Hex Jam Nut, Thin	1

\* - No longer used on late model trucks. Replaced with Ultra-Blue RTV sealant 94-430-03



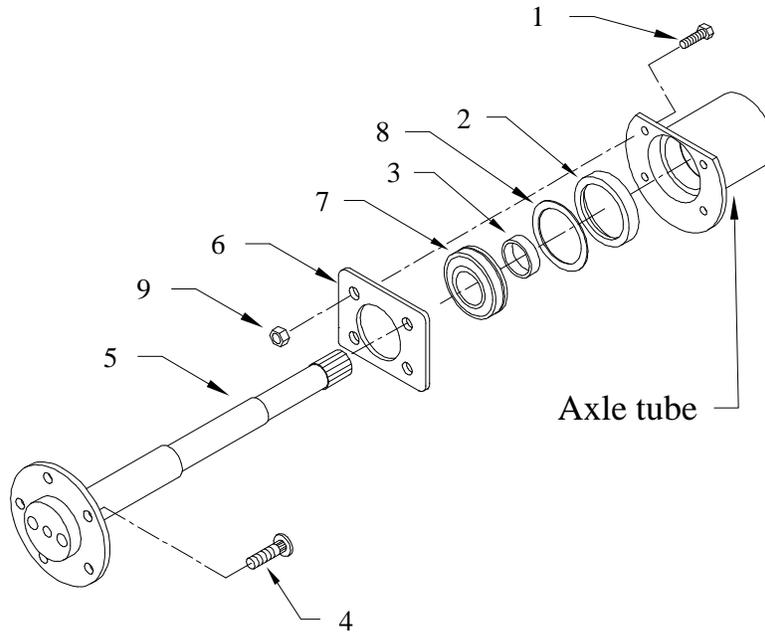
## Transmission Differential Case



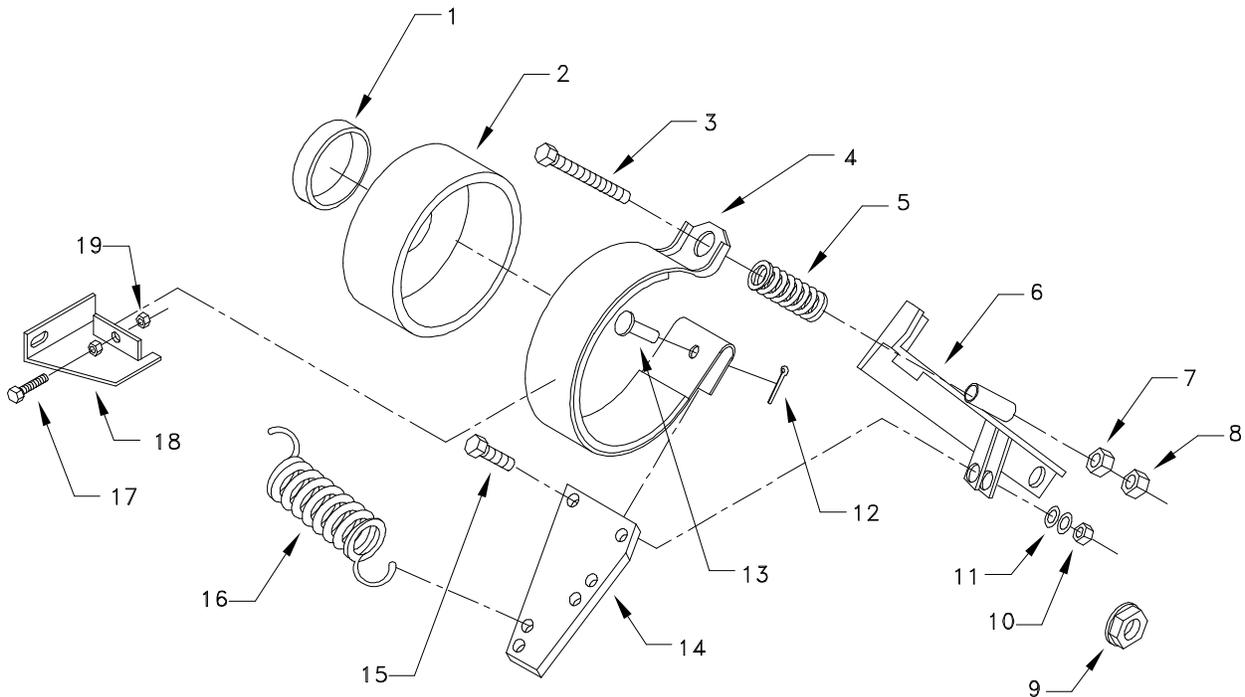
<b>Transmission Differential Case</b>			
ITEM#	PART #	DESCRIPTION	QTY
1	41-179-00	3rd member Housing (1.628 ID Carrier Bearing)	0 or 1
	41-710-00	3rd member Housing (1.784 ID Carrier Bearing)	0 or 1
2	88-119-80	3/8" NF Nut	14
3	41-712-00	Differential Assembly (1.628 ID Carrier Bearing)	0 or 1
	41-713-00	Differential Assembly (1.784 ID Carrier Bearing)	0 or 1
4	80-127-00	Carrier Bearing Race, (For 1.628 ID Carrier Bearing)	0 or 2
	80-128-00	Carrier Bearing Race, (For 1.784 ID Carrier Bearing)	0 or 2
	80-129-00	Carrier Bearing Race, (For P/N 80-513-00)	0 or 2
5	80-511-00	Carrier Bearing (1.628 ID Carrier Bearing)	0 or 2
	80-512-00	Carrier Bearing (1.784 ID Carrier Bearing)	0 or 2
	80-513-00	Carrier Bearing (1.7812 ID Carrier Bearing)	
6	31-239-00	Ring and Pinion Gear Set (5.43)	0 or 1
7	41-997-00	Oil Plug	3
8	41-290-13	Housing	1
10	80-554-00	Front Pinion Bearings	
11	41-711-00	Pinion Housing Shim	1
12	80-702-00	O-Ring	1
13	44-340-90	Pinion Housing	1
14	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)	*
15	16-415-00	Spacer	1
16	80-125-00	Pinion Bearing Race	2
18	41-707-00	Differential Bearing Adjuster Nut (For 80-511-00)	0 or 2
	41-707-50	Differential Bearing Adjuster Nut (For 80-512-00)	0 or 2
	41-708-50	Differential Bearing Adjuster Nut (For 80-513-00)	0 or 2
19	88-080-04	5/16" X 3/8: NC Hex Bolt	2
20	88-140-16	1/2" X 2" Hex Bolt	2
21	96-243-00	7/16" X 7/8" Hex Bolt (Locking Head)	10



## Rear Axle



## Rear Brakes



**Rear Axle**

Item No.	Part No.	Description	Qty
1	88-100-11	3/8 X 1 NC HEX HD SCREWBolt	8
2	45-301-00	Seal (large bearing axle only*)	2
3	32-515-00	Retainer, large bearing*	2*
	32-509-00	Retainer, small bearing*	2*
4	96-331-00	Wheel stud	10
5	41-163-05	Axle (left, large bearing*)	2*
	41-162-05	Axle (right, large bearing*)	2*
	41-163-00	Axle (left, small bearing*)	2*
	41-162-00	Axle (right, small bearing*)	2*
6	32-514-00	Retainer, axle (large bearing*)	2*
	32-511-00	Retainer, axle (small bearing*)	2*
7	80-503-00	Bearing (large*)	2*
	80-505-00	Bearing (small*)	2*
8	45-045-00	Gasket (large bearing*)	2*
	45-044-00	Gasket (small bearing, early model without o-ring**)	2**
9	88-109-81	3/8 NC LOCK NUT	8
Not shown	32-512-00	Spacer, (behind axle retainer, small bearing* only)	2

\* - Large bearing is 3.15" OD, Small bearing is 2.83" OD

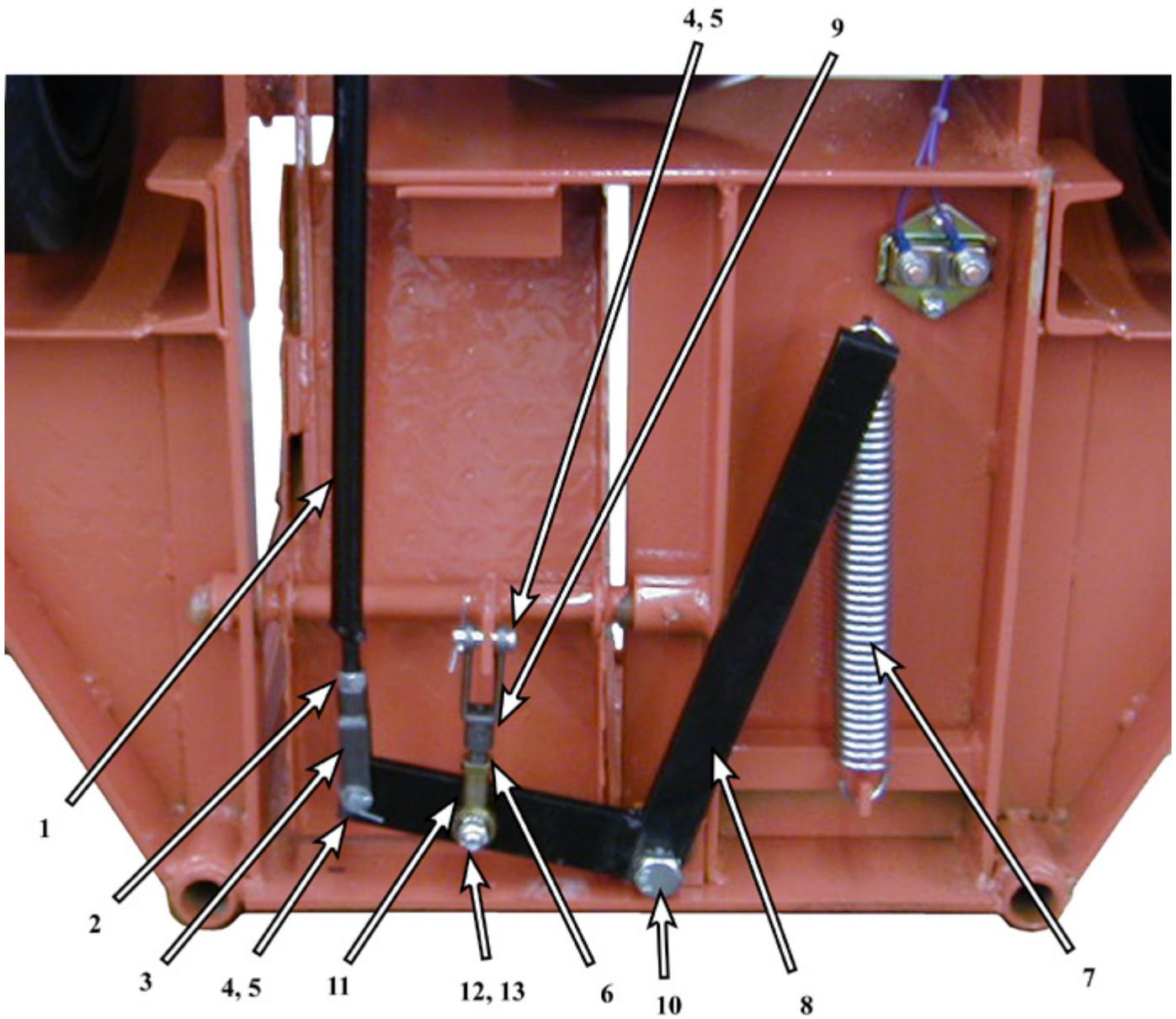
\*\* - Gasket is not required on small bearings with o-ring

**Brake**

ITEM #	PART #	DESCRIPTION	QTY
1	45-331-00	Pinion Seal	1
2	41-352-00	Brake Drum	1
3	96-245-10	Brake Adjusting Bolt	1
4	41-661-60	Brake Band Kit (Incl. #'s 3, 5, 7, 8, 9, 12, 13)	1
5	85-060-20	2-1/2" Long Spring	1
6	41-372-10	Mounting Bracket	1
7	88-159-84	1/2"-20 NF Lock Nut	1
8	88-159-82	1/2" NF Hex Jam Nut	1
9	97-250-00	Pinion Nut	1
10	88-109-81	3/8" Lock Nut	1
11	88-108-61	3/8" Lock Washer	2
12	88-517-11	3/32" X 1" Cotter Pin	1
13	96-771-00	Clevis Pin	1
14	550-656-00	Brake Arm	1
15	88-101-13	3/8" X 1-1/4" NC Grade 5 Hex Bolt	1
16	NOT USED	-	-
17	88-080-13	5/16" X 1-1/4" Hex Bolt	2
18	41-371-10	Alignment Bracket	2
19	88-089-91	5/16" Hex Jam Nut	4



## Brake linkage



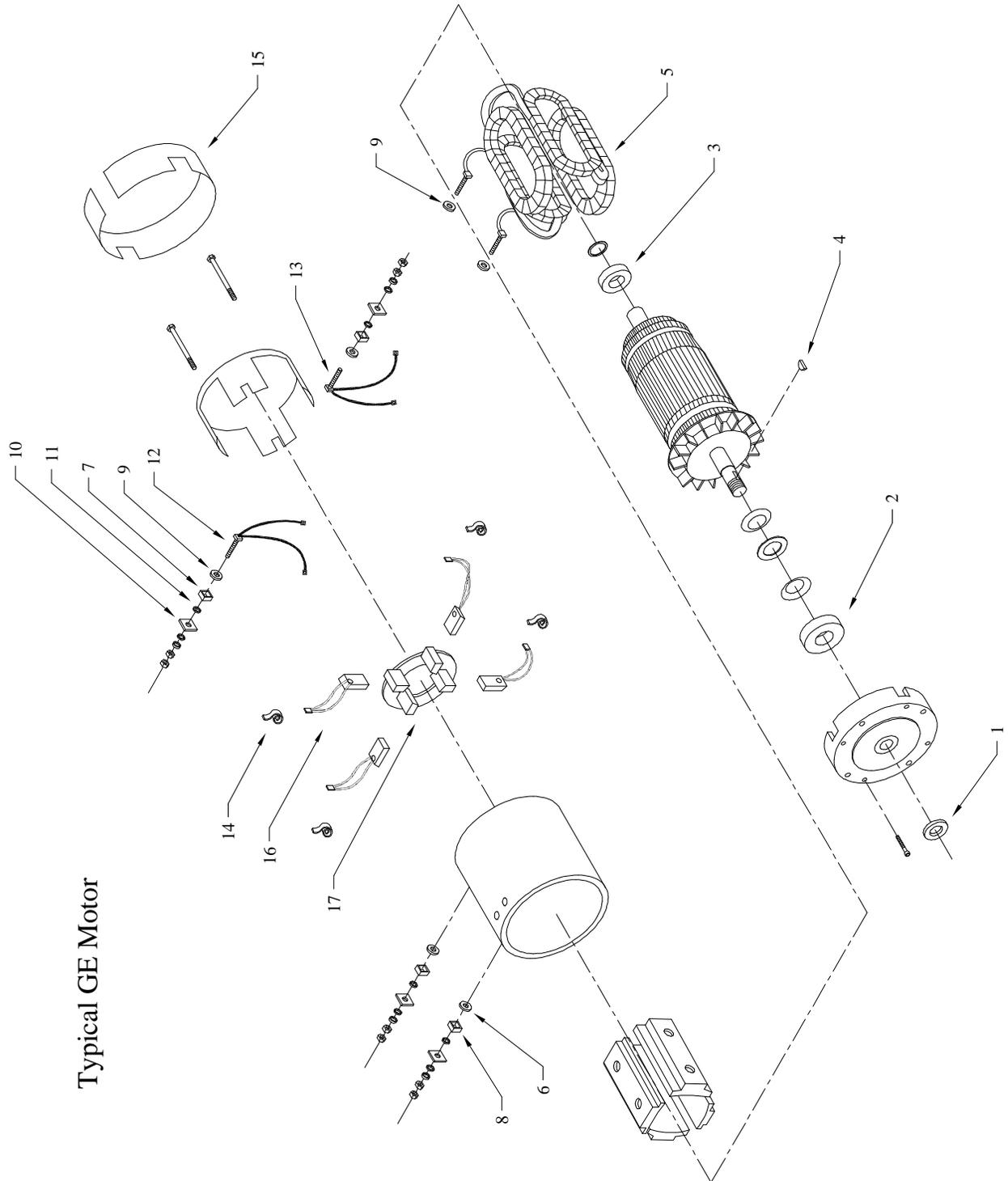
*Loacted under driver platform*

**Brake Linkage**

Item No.	Part No.	Description	Qty
1	50-027-00	Brake rod	1
2	88-119-80	3/8 NF HEX HD NUT	1
3	96-762-00	Clevis	1
4	96-772-00	Clevis pin	2
5	88-527-11	Cotter pin	2
6	50-028-00	3/8 threaded rod	1
	88-119-80	3/8 NF HEX HD NUT	1
7	85-282-00	Spring (E 4-51)	1
	85-280-00	Spring (E 4-57)	
8	50-647-00	Bell crank	1
9	96-762-00	Clevis	1
10	88-180-15	5/8 X 1-3/4 NC HEX HD SCR	1
	88-188-64	Lock washer	
11	86-520-00	Rod end	1
12	88-100-15	3/8 X 1-3/4 NC HEX HD SCR	1
13	88-109-81	3/8 NC LOCK NUT	1
	88-108-60	3/8 CUT WASHER	2



# Motor (Page 1)

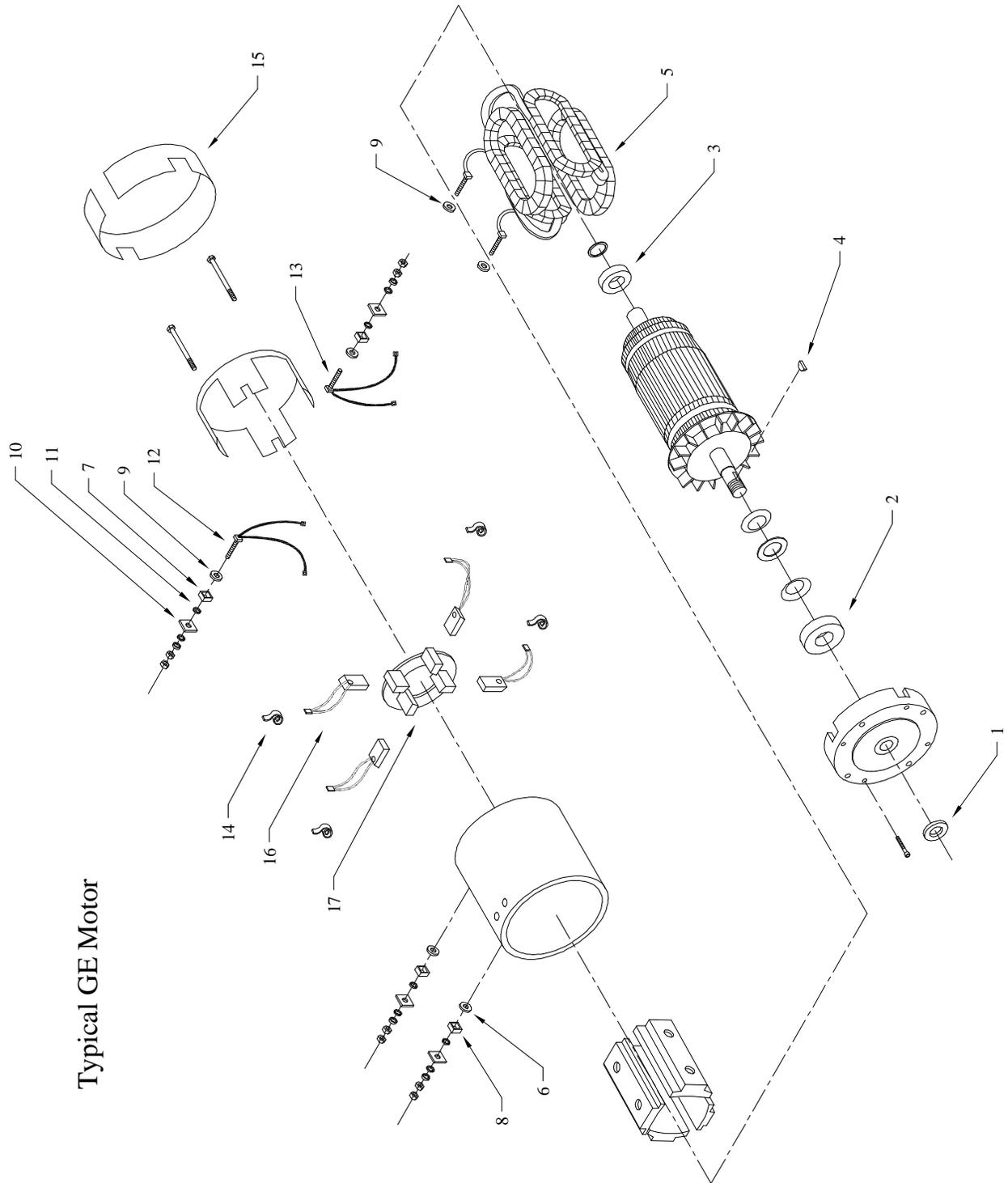


Typical GE Motor

Motors, Series Wound Field														
ITEM #	DESCRIPTION	Motor Spec #										Motor Part #		
		5BC58JBS6110C 70-049-00	5BC58JBS6129B 70-049-05	5BC49JB399C 70-054-00	XP1706A 70-054-05	5BT1326B262A 70-055-00	5BC49JB249A 70-057-10	9475-31 70-057-20	5BC49JB3043B 70-061-00	5BT1344B185 70-072-00	L94-4006 70-074-00			
1	Oil seal	45-506-00	-	45-508-00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2	Front bearing	80-504-00	-	80-504-00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
3	Rear bearing	80-209-00	80-209-00	80-200-00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4	Woodruff key	97-100-00	-	97-100-00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
5	Field winding	70-201-15	70-201-15	70-203-10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
6	Insulator	70-210-51	70-210-51	-	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7	Bushing	-	70-049-06	98-622-00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
8	Bushing	-	-	98-623-00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
9	Insulator	-	70-210-51	97-178-00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
10	Insulator	70-210-50	-	97-179-00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
11	Insulator	-	-	-	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
-	Insulator/Bushing kit	70-210-62	-	70-210-62	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
12	Crossover	-	-	70-195-10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
13	Crossover	-	-	70-195-10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
14	Brush spring	85-412-00	85-412-00	80-412-00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
15	Brush cover	-	-	30-802-00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
16	Brush	70-104-00	70-104-15	70-105-00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
17	Brush holder	70-172-00	70-172-15	70-104-10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
18	Bearing Retainer	-	32-508-15	-	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
19	5/16NC Jam nut	N/A	88-089-91	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
20	5/16 SAE Flat washer	N/A	88-088-61	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A



# Motor (Page 2)

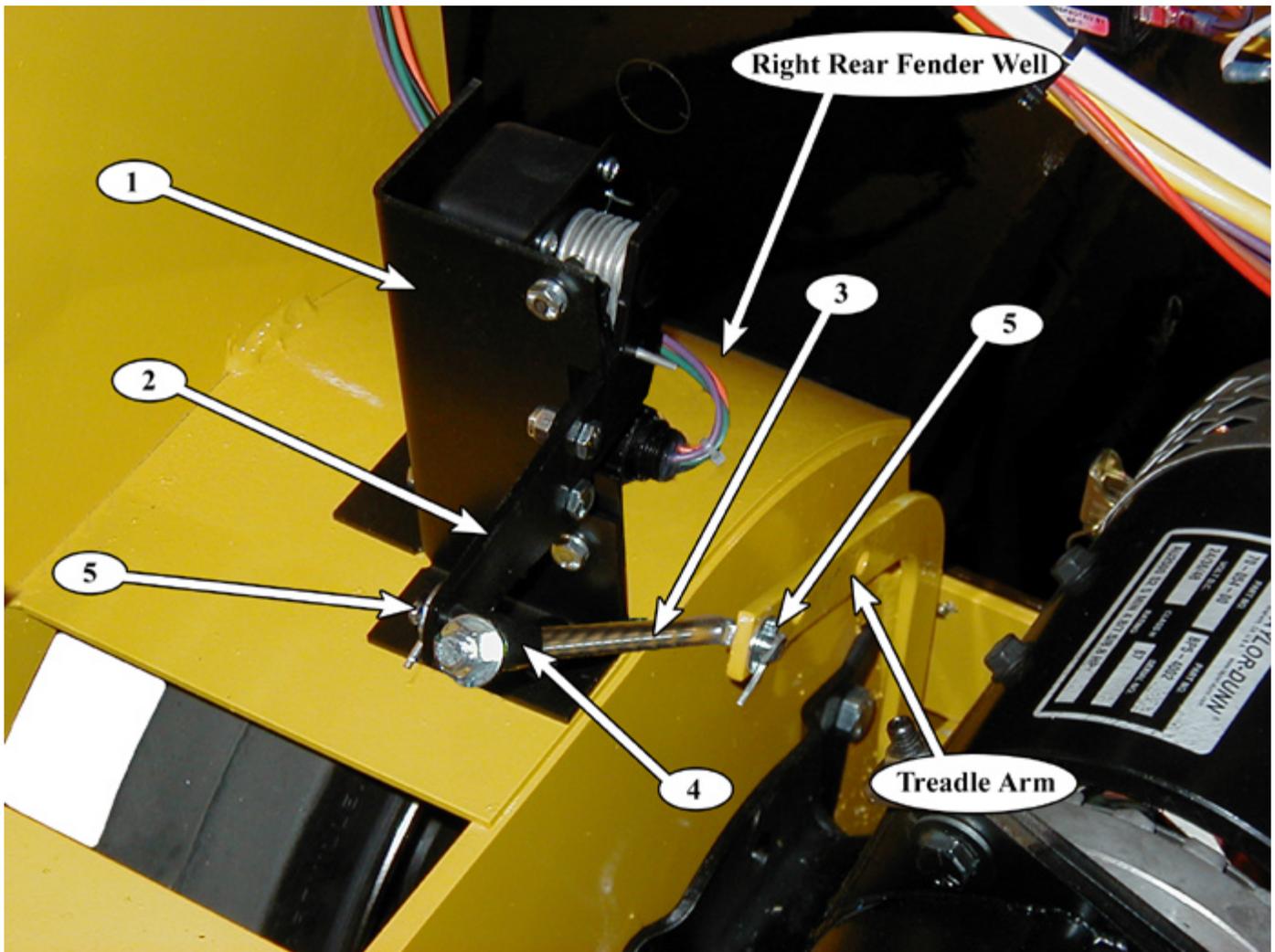


Typical GE Motor

Motors, Series Wound Field												
ITEM #	DESCRIPTION	Motor Spec # Motor Part #										
		5BC49JB430 70-054-20	N/A									
1	Oil seal	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2	Front bearing	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
3	Rear bearing	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4	Woodruff key	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
5	Field winding	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
6	Insulator	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7	Bushing	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
8	Bushing	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
9	Insulator	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
10	Insulator	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
11	Insulator	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
-	Insulator/Bushing kit	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
12	Crossover	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
13	Crossover	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
14	Brush spring	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
15	Brush cover	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
16	Brush	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
17	Brush holder	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
18	Bearing Retainer	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
19	5/16NC Jam nut	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
20	5/16 SAE Flat washer	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A



## Throttle linkage



**Throttle Linkage**

Item No.	Part No.	Description	Qty
1	01-450-29	Accelerator module mounting bracket	1
2	02-150-11	Extension lever (on module arm)	1
3	50-123-23	Rod, treadle arm to module	1
	88-109-81	3/8 NC LOCK NUT	1
	88-108-60	3/8 CUT WASHER	1
4	50-481-00	Connector, slip	1
5	88-527-11	Cotter pin	1



## **Wheels and Tires**

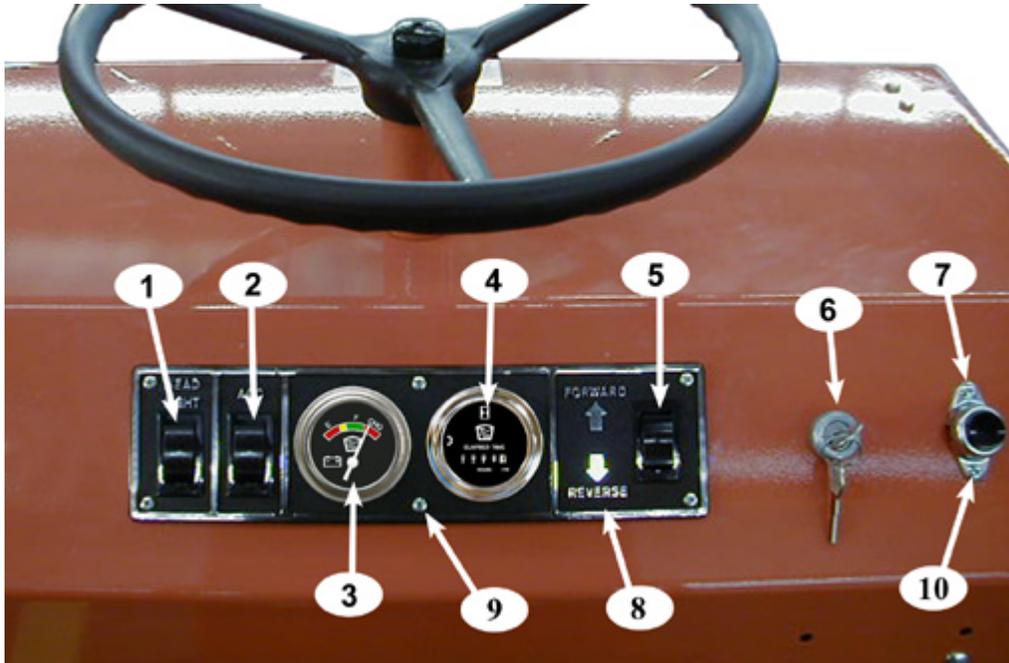
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*Illustration not available*

Wheels and Tires		
ITEM #	PART #	DESCRIPTION
1	Wheels	
	12-050-00	12-1/8 Diameter Cast Iron
2	Tires	
	10-250-00	16 x 4 x 12 Solid rubber
	10-074-00	400x8 Soft solid, ribbed (man-toter)
	10-074-10	400x8 Soft solid, ribbed, non-marking (man-toter)
	Split Rim Wheels	
3	12-041-12	Inner Wheel (2.5 bead)
4	12-041-13	Outer Wheel (2.5 bead)
5	12-041-00	Wheel Assembly, 2.5 bead width (includes #3, #4, #6, #7, #8)
3a	12-042-12	Inner Wheel (12-bolt)
4a	12-042-13	Outer Wheel (12-bolt)
6	88-110-09	3/8 x 3/4-NF Hex Bolt, grade 5
7	88-109-62	3/8 Split Lock Washer
8	88-119-80	3/8-NF Hex Nut
9	97-236-00	Wheel Nut
Not Shown	13-989-00	Valve stem, tubless tire only
	11-030-00	4.80 x 8 Tube
	Tire and Wheel Assemblies	
	13-734-00	4.80 x 8 LR B Pneumatic (E 4-51 only)
	13-734-11	4.80 x 8 LR B Split Rim Pneumatic (E 4-51 only)
	13-739-10	4.80 x 8 LR C Split Rim Pneumatic
	13-952-10	16 x 4 x 12 Solid Rubber, Cast Iron Wheel
	13-734-40	400x 8 Soft Solid (man-toter)



## Instrument Panel (dash)

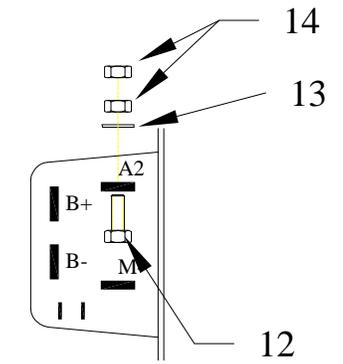
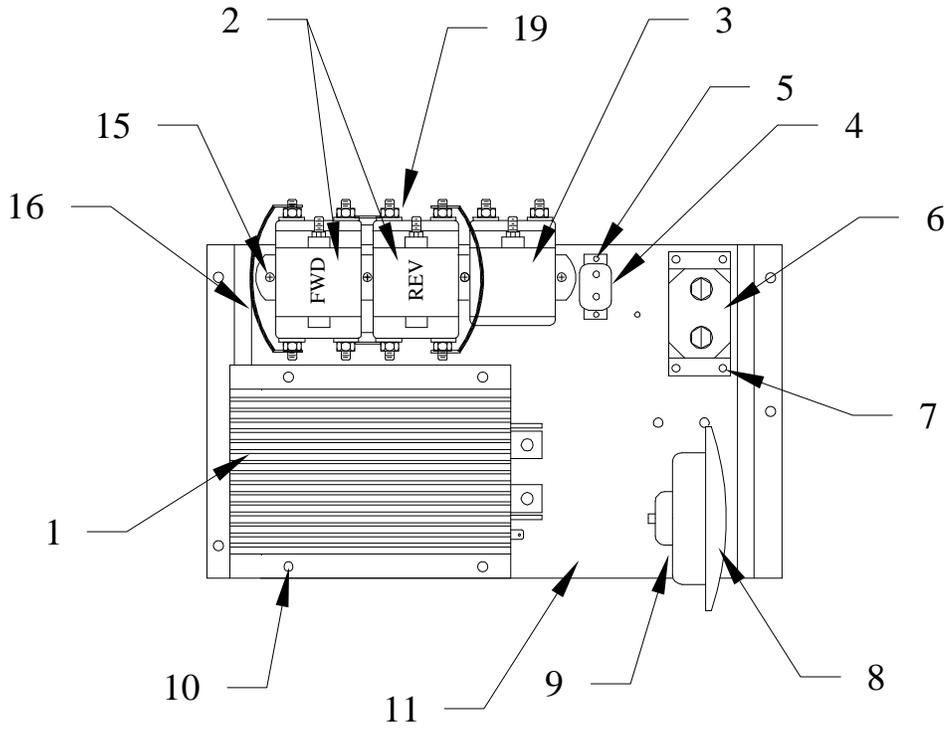


**Instrument Panel**

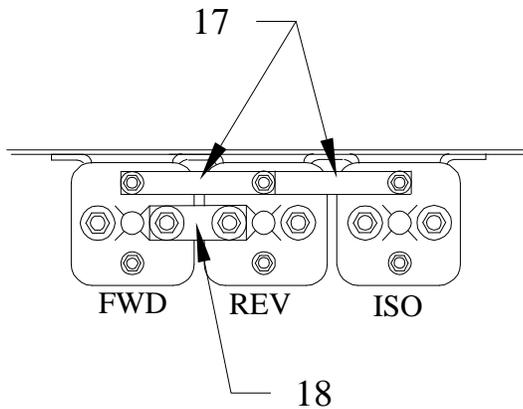
Item No.	Part No.	Description	Qty
1	71-039-11	Switch	1
2	71-039-11	Switch	1
3	74-009-10	Battery status indicator (E 4-51)	1
	74-009-00	Battery status indicator (E 4-57)	1
4	74-000-00	Hour meter	1
5	71-039-02	F&R Switch	1
6	71-120-10	Key switch	1
7	71-501-00	Horn Switch	1
8	94-304-11	Dash plate	1
9	88-817-06	Screw	6
10	88-025-08	8-32 X5/8 TRUS HD MACH SCR	2
	88-029-86	8-32 FLEXLOCK NUT	2
	88-048-61	WASHER, # 10 SAE	2



## Speed Control Panel



Face of Controller (#1)



Top of Solenoids

<b>TITLE</b>			
Item No.	Part No.	Description	Qty
1	62-205-00	Motor speed control (E 4-51)	1
	62-205-40	Motor speed control (E 4-57)	1
2	72-501-43	Forward or Reverse solenoid (E 4-51)	2
	72-501-39	Forward or Reverse solenoid (E 4-57)	2
3	72-501-42	ISO solenoid (E 4-51)	1
	72-501-38	ISO solenoid (E 4-57)	1
4	79-840-00	Circuit breaker	1
5	88-818-06	#8 X 1/2 PAN HD SCR TYPE B THD	2
6	79-844-20	Circuit breaker	1
7	88-818-06	#8 X 1/2 PAN HD SCR TYPE B THD	2
8	73-002-00	Horn (24v/36v)	1
9	88-838-06	#14X1/2 PAN HD SCR TYPE D THD	2
10	88-838-06	#14X1/2 PAN HD SCR TYPE D THD	4
11	01-534-80	Mounting plate (E 4-51)	1
	01-534-91	Mounting plate (E 4-57)	1
12	88-080-11	5/16 X 1 NC HEX HD CAP SCR	4
13	88-088-62	5/16 Split lock washer	4
14	88-089-80	5/16 NC HEX NUT,S/S	8
15	88-838-06	#14X1/2 PAN HD SCR TYPE D THD	3
16	75-235-26	Jumper	2
17	61-838-42	Buss bar (small)	2
18	61-838-41	Buss bar (large)	2
19	88-099-91	5/16 NF THIN PATTERN NUT	10
	88-088-63	5/16 LOCK WASHER,INT TOOTH	10
Not Shown	75-148-25	Harness	1
	78-302-50	Resistor (on ISO solenoid)	1



## Miscellaneous Electrical

Item No.	Part No.	Description	Qty
1	75-149-10	Power harness (E 4-51)	1
	75-149-09	Power harness (E4-57)	1
2	73-005-01	Reverse/Motion alarm	1 ...
3	75-148-13	Control harness	1
4	71-122-10	Foot interlock switch	1
5	62-033-48	Accelerator module	1
6	72-023-20	Amber Strobe light	1

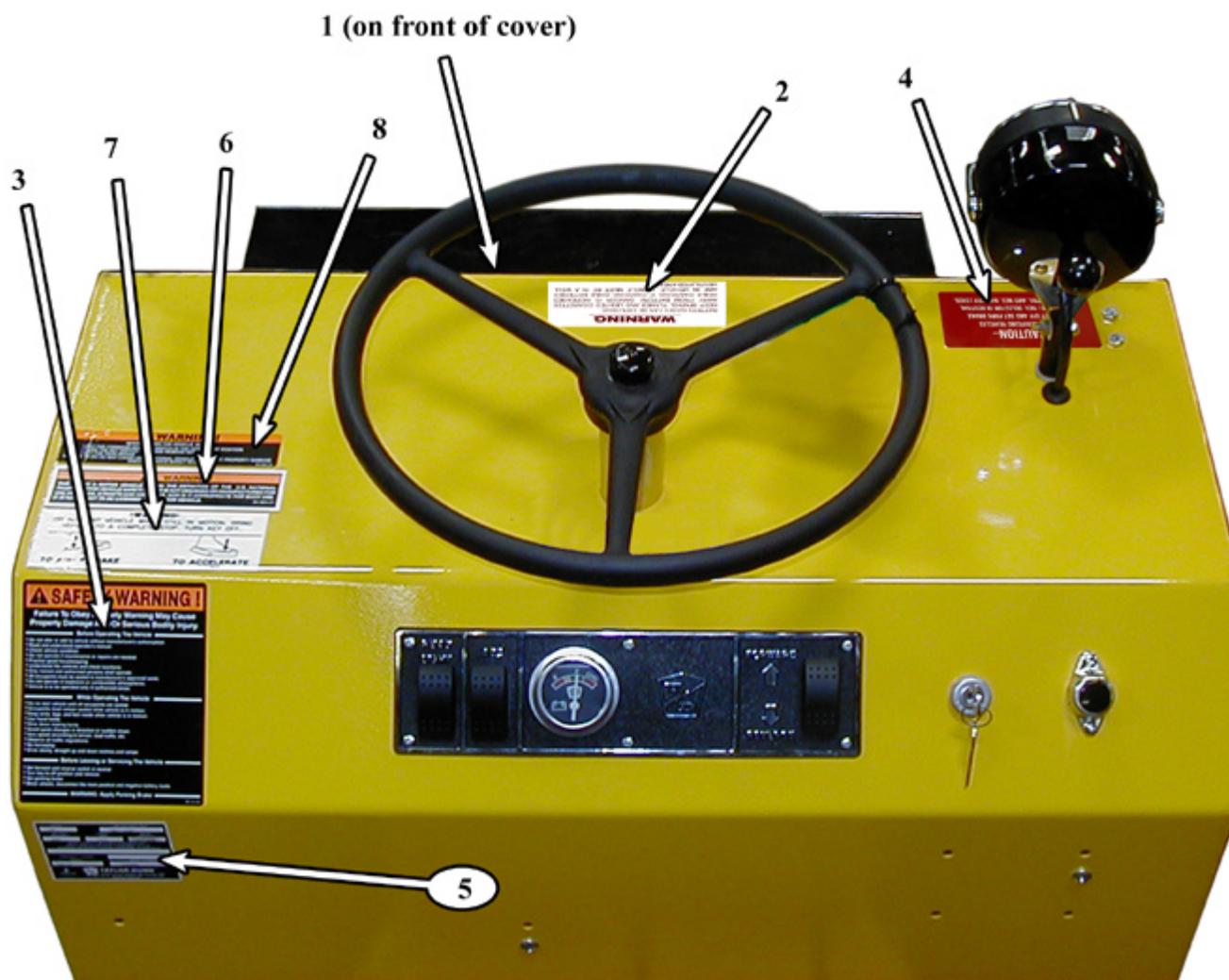
## Batteries

### BATTERIES (6-volt golf car)

Item No.	Part No.	Description
	75-231-00	Jumper, Battery, 10" long
	75-234-00	Jumper, Battery, 22" long
	75-244-00	POWER CORD,SB 175 RECEPT
	88-081-12	Bolt, 5/16NC Square Hd, Tin-Lead
	88-089-80	Nut, 5/16NC, Tin-Lead
	77-042-00	Battery, 6 Volt, 217 amp hou
	77-044-00	Battery, 6 Volt, 230 amp hour
	77-047-00	Battery, 6 Volt, 244 amp hour
	77-042-80	Battery, 6 Volt, 217 amp hour
	77-047-80	Battery, 6 Volt, 244 amp hour
	77-048-00	Battery, 6 Volt, 250 amp hour
	77-972-00	Lift out battery box (E 4-57)
	77-867-00	Spacer, battery box (E 4-57)

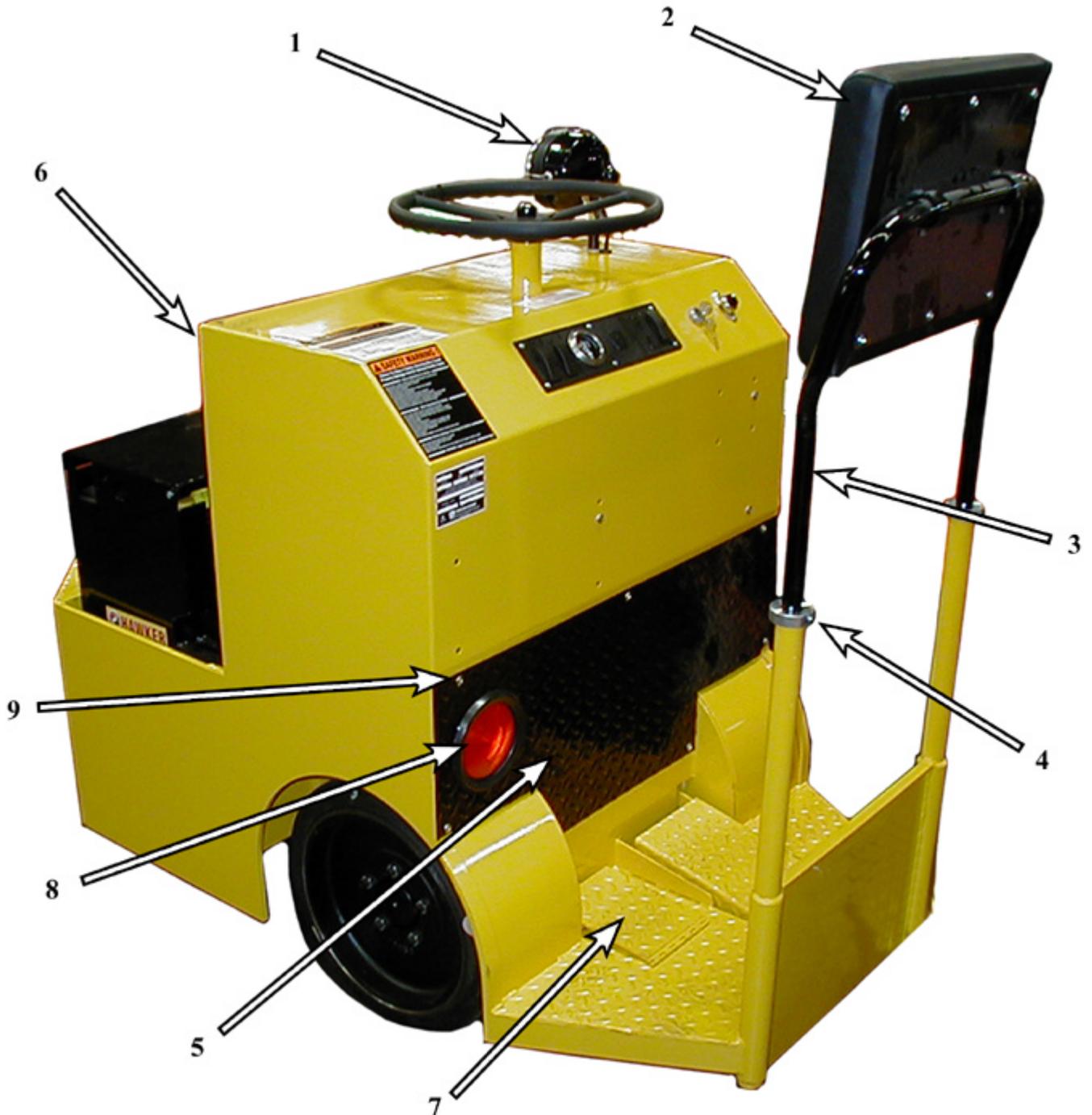
## Decals

Item No.	Part No.	Description	Qty
1	94-201-00	TAYLOR-DUNN EMBLEM	1
	88-567-91	Clip	3
2	94-313-00	DECAL, BATTERY WARNING	1
3	94-313-20	DECAL, SAFETY WARN	1
4	94-319-00	DECAL, BATTERY DISCONNECT	1
5	94-373-12	DATA PLATE	1
6	94-384-01	DECAL, NOT MOTOR VEHICLE	1
7	94-382-00	DECAL, TREADLE	1
8	94-384-14	DECAL, WARNING, WHEN LEAVING VEHICLE	1





## Miscellaneous Frame and Body

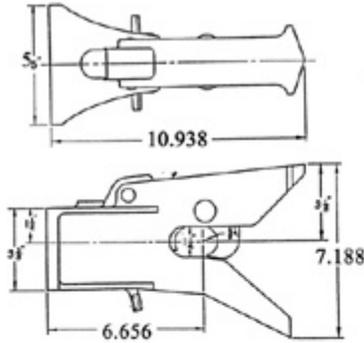


**Miscellaneous Frame and Body**

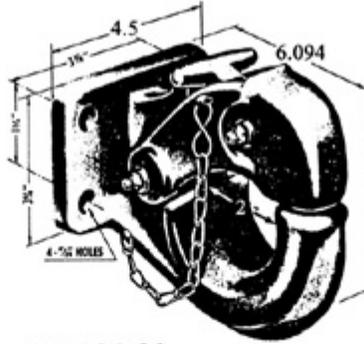
Item No.	Part No.	Description	Qty
1	72-006-00	Headlight (E 4-51)	1
	72-007-10	Headlight (E 4-57)	1
2	90-144-00	Seat back cushion	1
3	90-159-00	Seat back suport	1
4	17-113-00	Locking collar	2
	95-901-00	Knob	2
5	71-617-00	Rear cover	1
6	71-618-10	Front cover	1
7	00-450-23	Interlock switch pedal (bolt on, black)	1
8	72-024-51	Taillight housing	1
	72-024-52	Plug	1
	72-093-00	Bulb	1
	72-022-51	Taillight mounting ring	1
9	88-837-09	#14X3/4 PHILLIPS METAL SCR	7
Not shown	77-863-00	Battery clamp	1



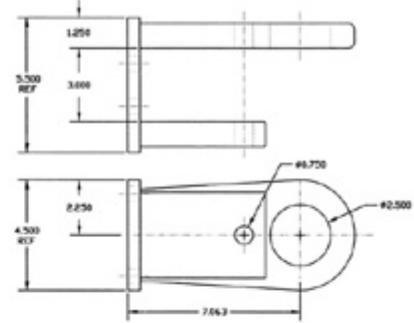
# Hitches



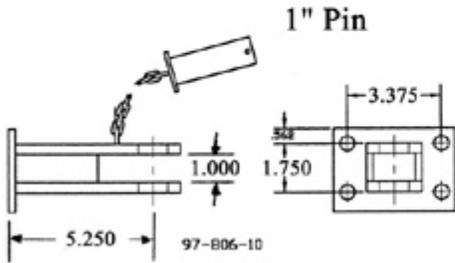
**97-808-00**  
Automatic Coupling Hitch



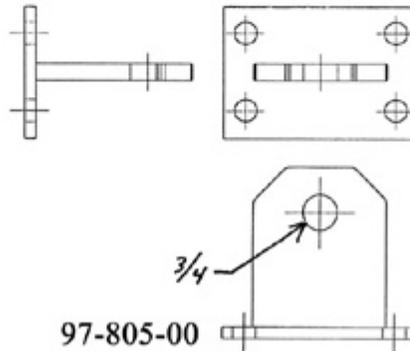
**97-804-01**  
Pintle Hitch



**Hook Pin and Eye Hitch**  
**97-809-00**



**97-806-10**  
Pin and Clevis Hitch

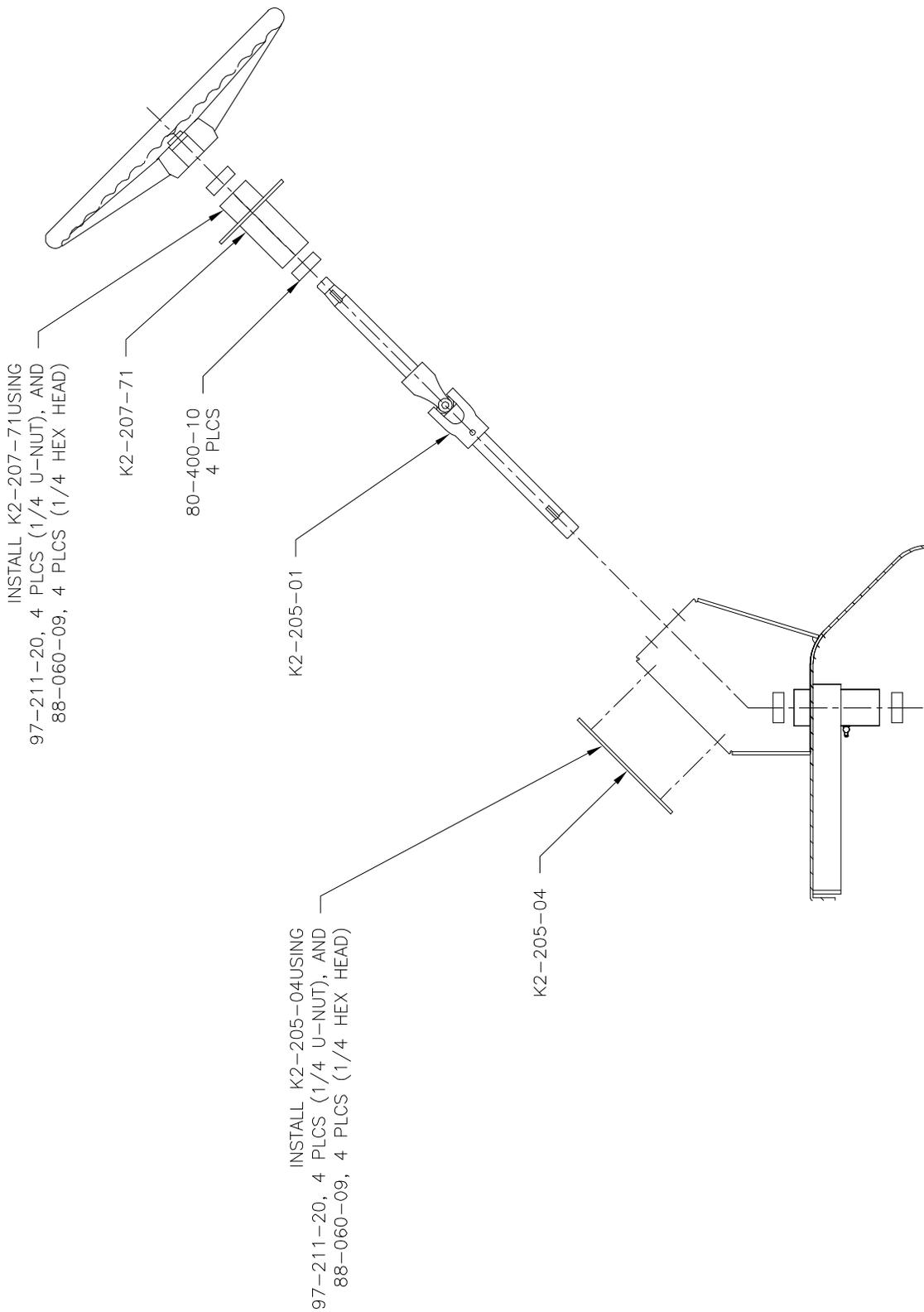


**97-805-00**  
Ball Hitch Mount

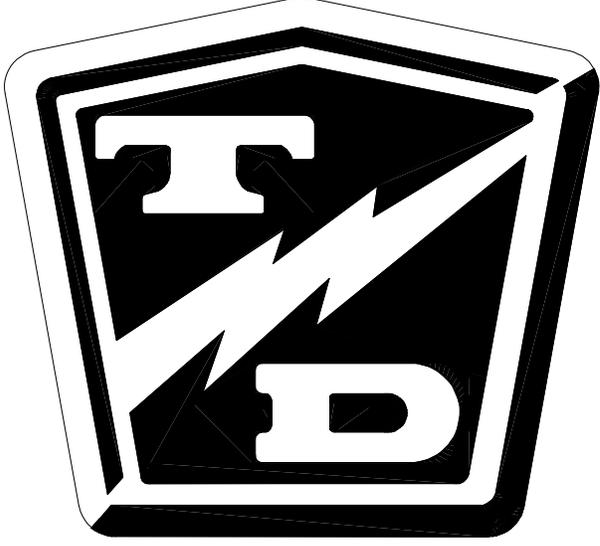
## Standard Mounting Hardware

ITEM #	PART #	DESCRIPTION	QTY
	88-140-14	1/2NC x 1-1/2 Hex bolt	4
	88-149-80	1/2NC Hex nut	4
	88-148-62	1/2 Split lock washer	4

## Tilt Steering Column (optional)



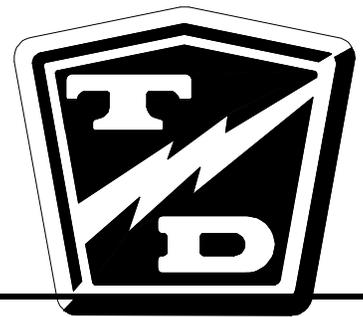
**TAYLOR - DUNN**



# Appendixes

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## APPENDIX A: SPECIAL TOOLS

DESCRIPTION	PURPOSE	PART NUMBER
Pinion Seal Installation Tool	Used to install the pinion seal on all chain drive trucks with the band style brake or the speed sensor on the chain case cover.	43-201-50
Chain Case Centering Tool	Used to center the chain case on the pinion shaft on all chain drive trucks with the band style brake or the speed sensor on the chain case cover. Includes instructions.	41-532-50
Test Light	Used for testing electrical circuits. Powered by the truck batteries, switchable for 12, 24, 36, and 48 volts.	62-027-00
Accelerator Test Harness	Used to test the solid state accelerator module part number series 62-033-XX.	62-027-31
PMC Test Kit	Includes 62-027-00, 62-027-31, and supplementary troubleshooting manual M3-001-06. For controllers equipped with pins labeled KSI and #2 only.	62-027-60
Curtis® PMC Handheld Programmer	Used to test and program the 62-215-00 PMC speed control used on early model C4-25 Huskey.	62-027-10
GE® EV1 Analyzer	Used to test the GE® EV1 speed control.	62-027-20
PMT/C Meter Reset Module	Used to reset the PMT/C maintenance meter after a maintenance is completed.	96-500-43
Sevcon® Handset Analyzer (read only)	Used to test the Sevcon® control systems and reset the Smart View display (includes instructions).	62-027-61
Sevcon® Handset Analyzer with Speed Adjust Capability	Same as 62-027-61 (above) plus allows a limited range of speed adjustment.	62-027-62
Disc Brake Boot Installation Tool	Used to install the rubber boot on all disc brake bodies.	41-350-13
Pin Removing Tool	Used to remove pins and sockets from AMP connectors.	75-440-55
Pin Removing Tool	Used to remove pins and sockets from MOLEX connectors.	75-442-55
Hydrometer	Used to check the specific gravity of battery electrolyte.	77-200-00
Battery Filler	Used to safely add water to batteries.	77-201-00
Retaining Plate Depressor	Used to hold down the retaining plate when disassembling the steering gear on trucks equipped with the tilt steering.	96-500-39
Fork Collar Weld Jig	Used when replacing the fork collar on models MX-600 and S55-36.	96-500-40
Secondary Sheave Holder	Used to hold the secondary sheave (pulley) from turning on models R6-80 and B6-10 with the Yamaha drive.	96-500-14
Solder Kit For Field Stud	Used to solder the aluminum field wire to the field stud. For use on motors with soldered connections only.	70-210-63
Pinion Gear Holding Tool	Used to align the Pinion Gear and Case during assembly and disassembly.	96-500-42

## APPENDIX B: SUGGESTED TORQUE LIMITS FOR STANDARD HARDWARE

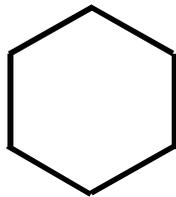
### HARDWARE IDENTIFICATION

#### Standard Head Markings

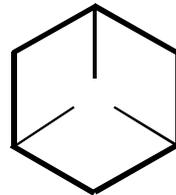
NOTE: Torque value used should be for lowest grade of hardware used. If a grade 2 nut is used on a grade 8 bolt, use grade 2 torque value.

NOTE: Toque values specified are for clean dry threads.

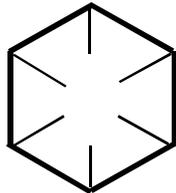
#### Hex Bolts



S.A.E. Grade 2



S.A.E. Grade 5



S.A.E. Grade 8



L'9

#### Other Bolts



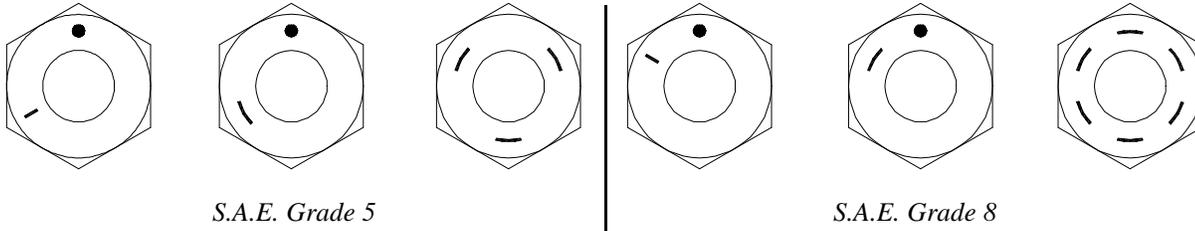
Truss Head, grade 2



Carriage Bolt, grade 2  
(unless marked as above)

**Hex Nuts**

*Nuts with no markings are to be treated as S.A.E. Grade 2*



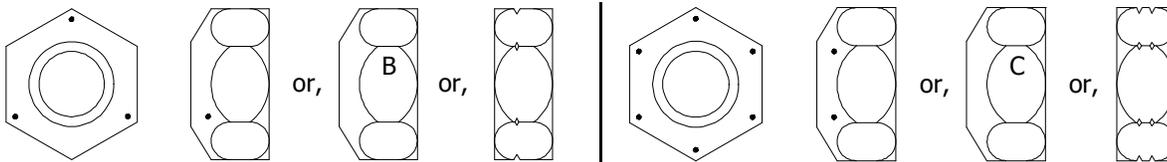
*S.A.E. Grade 5*

*S.A.E. Grade 8*

**Hex Lock Nuts (stover)**

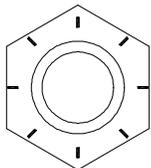
Lock nuts use a letter to indicate the grade of the nut. Grade A' locknuts would be the equivalent of Grade '2' hex nuts, Grade 'B' as Grade '5' and Grade 'C' as Grade '8'.

*NOTE: Nuts with no markings are to be treated as S.A.E. Grade A*



*S.A.E. Grade B*

*S.A.E. Grade C*



*Grade L'9*

**Other Nuts**

*Other nuts used by Taylor-Dunn® should be treated as S.A.E. grade A*

**Suggested Torque Values (non-critical hardware)**

Diameter and TPI	Grade 2 Tightening Torque (ft-lb)	Grade 5 Tightening Torque (ft-lb)	Grade 8 Tightening Torque (ft-lb)	L'9 Tightening Torque (ft-lb)
1/4-20	4-7	7-10	10-14	11
1/4-28	5-8	8-12	11-16	12
5/16-18	9-14	14-21	20-29	22
5/16-24	10-15	15-23	22-33	25
3/8-16	16-24	25-37	35-52	40
3/8-24	18-27	28-42	40-59	45
7/16-14	26-38	40-59	56-84	65
7/16-20	29-43	44-66	62-93	70
1/2-13	39-59	60-90	85-128	95
1/2-20	44-66	68-102	96-144	110
9/16-12	56-84	87-131	123-184	140
9/16-18	63-94	97-146	137-206	160
5/8-11	78-117	120-180	170-254	195
5/8-18	88-132	136-204	192-288	225
3/4-10	138-207	213-319	301-451	350
3/4-16	154-231	238-357	336-504	390
7/8-9	222-334	344-515	485-728	565
7/8-14	245-367	379-568	534-802	625
1-8	333-500	515-773	727-1091	850
1-14	373-560	577-866	815-1222	930
1.125-7	472-708	635-953	1030-1545	1700
1.125-12	530-794	713-1069	1156-1733	1850
1.25-7	666-999	896-1344	1454-2180	2950
1.25-12	738-1107	993-1489	1610-2414	3330



## Suggested Torque Values (critical hardware)

### *Torque Table*

<i>Group</i>	<i>Description</i>	<i>Ft-Lbs</i>	<i>Torque Range</i>	
			<i>In-Lbs</i>	<i>Nm</i>
<i>Brakes</i> - - - - -				
	Brake bolt (disc brake body)	11 - 11	132 - 132	15 - 15
	Brake line tube nut fittings	12 - 13	144 - 156	16.3 - 17.7
	Brake spider bolts (Dana 160mm hyd brakes)	25 - 35	300 - 420	34 - 47.6
	Brake spider bolts (Dana 160mm mech brakes)	15 - 19	180 - 228	20.4 - 25.8
	Brake spider bolts (Dana 7x1-3/4 brakes)	16 - 20	192 - 240	21.8 - 27.2
<i>Electrical</i> - - - - -				
	Battery terminals	8 - 9	96 - 108	10.9 - 12.2
<i>Front Axle</i> - - - - -				
	Front spindle nut	-	-	-
	<i>Note: Refer to maintenance section in the service manual</i>			
	King pin	-	-	-
	<i>Note: Refer to maintenance section in the service manual</i>			
<i>Rear Axle/Transmission</i> - - - - -				
	3rd member Gear case cover (GT drive)	45 - 50	540 - 600	61.2 - 68
	Axle bolt (GT drive)	275 - 275	3300 - 3300	374 - 374
	Axle hub nut (Dana)	95 - 115	1140 - 1380	129.2 - 156.4
	Axle tube to center section (Dana F-N-R)	25 - 35	300 - 420	34 - 47.6
	Carrier cap bolts (Dana)	100 - 120	1200 - 1440	136 - 163.2
	Differential Cover plate (Dana H12)	18 - 25	216 - 300	24.5 - 34
	Drain plug (Dana H12)	25 - 40	300 - 480	34 - 54.4
	Drain plug (GT drive)	21 - 25	252 - 300	28.6 - 34
	Gear case to 3rd member (GT drive)	18 - 20	216 - 240	24.5 - 27.2
	Motor mounting (GT/Dana)	6.5 - 7	78 - 84	8.8 - 9.5
	Pinion nut (F2/F3)	175 - 175	2100 - 2100	238 - 238
	Pinion nut (GT drive)	154 - 169	1848 - 2028	209.4 - 229.8
	Ring gear (Dana)	35 - 45	420 - 540	47.6 - 61.2
	Wheel lug nut	75 - 90	900 - 1080	102 - 122.4
<i>Steering</i> - - - - -				
	Ball joint clamp	28 - 32	336 - 384	38.1 - 43.5
	Ball joint nut	40 - 45	480 - 540	54.4 - 61.2
	Pitman nut (18-308-21 steering gear)	75 - 100	900 - 1200	102 - 136
	Pitman nut (18-308-25 steering gear)	181 - 217	2172 - 2604	246.2 - 295.1
	Rod end nut	20 - 25	240 - 300	27.2 - 34
	Steering shaft pinch bolt	24 - 26	288 - 312	32.6 - 35.4
	Steering wheel nut (18-308-21 steering gear)	28 - 32	336 - 384	38.1 - 43.5
	Steering wheel nut (18-308-25 steering gear)	72 - 86	864 - 1032	97.9 - 117
<i>Suspension</i> - - - - -				
	Leaf spring hangers	-	-	-
	<i>Note: Refer to maintenance section in the service manual</i>			

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## **APPENDIX C: BRAKE LINING HANDLING PRECAUTIONS**

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### **⚠ WARNING**

Taylor-Dunn does not currently supply asbestos fiber-brake pads/shoes with any vehicle. However, there is the possibility that the original brake pads/shoes were replaced with aftermarket pads/shoes containing asbestos. Since this possibility does exist, the brake pads/shoes should be handled as if they do contain asbestos.

Never use compressed air or dry brush to clean the 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.

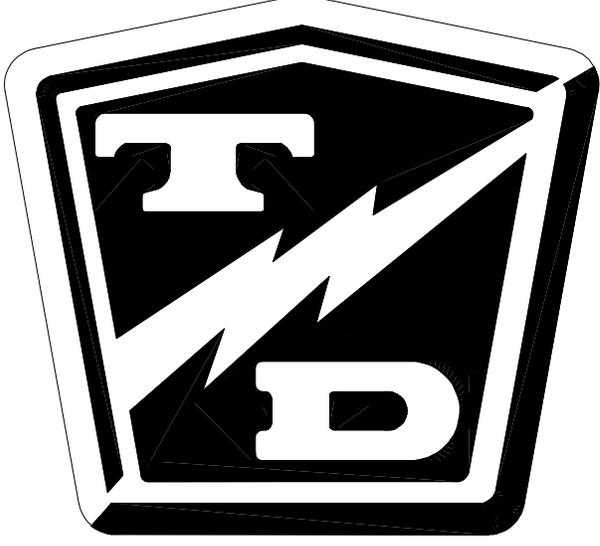
Do not grind, sand, break, or chisel the brake pads/shoes, as this will cause unnecessary dust, possibly releasing asbestos fibers in the air.

Always wear protective clothing and a respirator when working on the brake pads/shoes or their associated components.

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

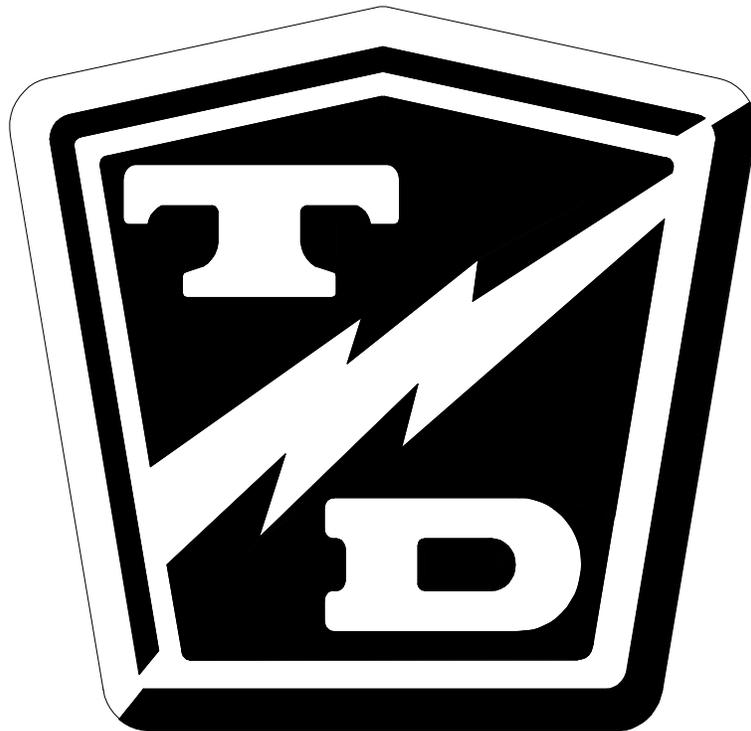
Do not drive the vehicle if any worn or broken part is detected in any part of the brake system. The cause of the damage must be repaired immediately.

**TAYLOR - DUNN**





*Model B 1-00*



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