TAYLOR-DUNN®

The Best Way
To Go
About Your
Business

Models Inlcuded:
SC-090-24 (SC 0-90), 24-volt system

MANUAL MA-090-00

Operation, Troubleshooting and Replacement Parts Manual

READ THIS MANUAL BEFORE OPERATION OR PERFORMING MAINTENANCE.
This manual contains important information regarding the safe operation and maintenance of this vehicle.

Serial number Starting: 171712
Ending: 191319

Revision: E, 7/1/2013

Taylor-Dunn Contact information

Service, Parts, Sales:

Taylor-Dunn has a network of dealers distributed around the globe to support our vehicles. Information regarding vehicle sales, replacement parts, or service should be obtained through your local dealer. A dealer locator can be found on the Taylor-Dunn website at www.taylor-dunn.com.

If you do not have access to the internet, you can call the factory direct at:
01 (714) 956-4040

Feedback regarding this or any Taylor-Dunn vehicle manual can be sent to:
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Anaheim, CA 92804

The Taylor-Dunn Corporation:

Leading Provider of Commercial & Industrial Vehicles since 1949

TAYLOR-DUNN®
Commercial and Industrial Vehicles Since 1949

Taylor-Dunn Manufacturing:

From the day we shipped our first vehicle in 1949, we have pursued a singular goal: to build tough, rugged, dependable vehicles to help our customers move personnel, equipment, and materials. It's that simple. For over sixty years, our standard and custom vehicles - Burden Carriers, Personnel Carriers, Stock Chasers, Electric Carts, Tow Tractors & more - have been the leading solution for customers in a broad range of industrial, commercial, and ground-support markets.

Decades of experience are an invaluable asset, and it is an asset we cherish and protect. Our guiding principle is to provide application-specific solutions, which are reliable, efficient, and economical.

Our domestic and international network of quality Taylor-Dunn Dealers and Parts & Service Support keeps our customers moving.

Tiger Tractor:

Tiger manufacturing has become a leading manufacturer of internal combustion industrial tractors and ground support equipment. With tractor capacities ranging from 3,000 - 12,000 pounds drawbar pull, they are ideal for industrial applications as well as aircraft ground support. As with all Taylor-Dunn vehicles; quality, service, support and reliability are built into all Tiger Tractor products.

Shown below is just a small sample of what Taylor-Dunn has to offer to keep your business moving:

Introduction

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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 withstake 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 equiped 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 to 10 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 Personnel and Burden Carriers (ANSI B56.8).

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

Depending on the type of data plate, it will be in one of two locations as shown above

The model SC 1-00 and SC 0-90 look identical from the exterior. The easiest method to determine your model is to look at the rear drive axle.

SC 1-00 Drive axle

SC 0-90 Drive axle

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

Notes:

Taylor-Dunn®

Model SC-090-24 (SC 0-90),24 Volt System

Service and Repair Manual Section Index

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General Maintenance
Safety and Operating Instructions
Front Axle
Steering
Brakes
Motor
Transmission
Tires and Wheels
Battery
Motor Control
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Appendix

This quick reference section index guide will assist you in locating a desired topic or procedure.

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

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Safety Rules and Operating Instructions

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STANDARD SPECIFICATIONS

ITEM	SPECIFICATION*
Occupancy	1-Operator
Dimensions	218 L X 75 W X 122.5 H Centimeters 85.75 L X 29.50 X 48.25 H Inches
Turning Radius	170 Centimeters (67 inches)
Dry Weight Without Batteries	239 kg (528 lbs)
Min/Max Battery Weights	105 kg to 145 kg (232 lbs to 480 lbs)
Maximum Load	408 kg (900 lbs)
Electrical System	4-217 Amp Hour, 6 Volt, Lead Acid Batteries, Solid State Speed Control, 270 Amp
Transmission	Helical Gear, Oil Bath, Direct Gear Drive
Motor, DC Series Wound	3.35 kW @ 935 rpm, (4.5 hp)
Maximum Recommended Speed	16 kph (10 mph)
Brakes	Rear Wheel Mechanical Drum, Hand Operated Park Brake
Steering	Clover Leaf Steering Wheel
Tires	4.80 X 8 Load Range B, Tire Pressure 60 psi max
Frame	Steel Unitized Body, Heavy Duty 16 Gauge Steel, Diamond Plate
Instrumentation	Battery Discharge Indicator, Key Switch, Horn Button, Forward/Reverse Switch, Operator Presence Interlock Switch
Charger	1kW, Built-In, Automatic

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

** - Specifications are subject to change without notice.*

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 B56.8 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 to 10 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.

Before working on a vehicle:

⚠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.**

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

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.

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.

Horn Switch

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

Headlight Switch

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

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. Refer to following pages for information on the optional Smart View gauge.

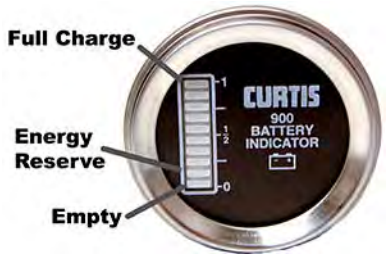
Accessory Switch (Optional)

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.

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. Refer to following pages for information on the optional Smart View gauge.

Battery Status Indicator, Digital Bargraph

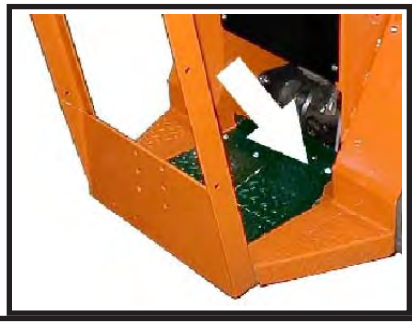


The battery status indicator is located to the left of the hour meter. The battery status indicator has a LED bar graph that indicates the relative state of charge of the battery. The top LED will light only when connected to a fully charged battery or after completing a charging cycle. Successive lower LED’s will light as the battery charge diminishes. When the second from the bottom LED flashes 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.

Steering

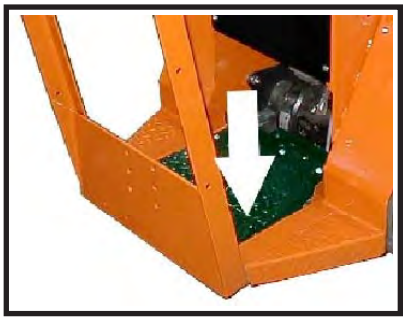
The steering wheel and steering system are similar to an automobile. To turn right, turn the steering wheel clockwise. To turn left, turn the steering wheel counter-clockwise.

Accelerator Pedal



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.

Foot Brake Pedal



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

The parking brake is actuated with a hand lever, which is located on the left side of the steering tower. To set the parking brake, depress the foot brake pedal and pull the lever up until it locks. To release the park brake, depress the foot brake pedal and push the park brake handle down.

Note: The treadle will be very difficult to depress when the park brake is applied.

Charger Interlock

The charger interlock is designed to disable the vehicle from being driven while the AC charger cord is plugged into a functioning power source.

Illustration is not available.

Foot Interlock Switch

A switch located under the left side of the operator platform disables the power to the vehicle. Pressure must be maintained on the platform 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.

Reverse or Motion Alarm (Optional)

The reverse alarm is located in the electronics compartment mounted in the speed control panel enclosure. The reverse alarm is activated when the Key switch is in the “ON” position and the Forward-Off-Reverse switch is in the reverse position. The alarm makes a repeated audible sound.

The motion alarm is the same alarm that is used for the reverse alarm, only it operates in both the forward and reverse directions.

VEHICLE OPERATION GUIDELINES

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 emergencies 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.

Note: The vehicle is equipped with a seat or foot interlock switch. This switch must be closed BEFORE the throttle is depressed.

1. Make sure the forward-off-reverse switch is in the center “OFF” position.
2. If equipped with a manual park brake, set the parking brake.
3. Hold down the foot brake (depress rear of treadle).
4. Rotate the ON-OFF switch to the “ON” position.
5. Place the forward-off-reverse switch in the desired direction of travel.
6. Release the parking brake.
8. Slowly depress the throttle pedal.

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 more than the maximum number of passengers allowed for this vehicle.
- Do not exceed the cargo load capacity.
- Do not load cargo that can fall off.
- Be careful when handling cargo that is longer, wider, or higher than this vehicle, be sure to properly secure all loads.

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.

Parking

Before leaving the vehicle:

- Set the parking brake.
- Set the forward-off-reverse switch to the ` "OFF" position.
- Rotate the start 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 the automatic electric park 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.

Using the Ladder

The maximum ladder capacity is 200 pounds.

Access the ladder from the operators platform only. Do not climb the ladder from the rear of the vehicle.

Do not operate the vehicle while the ladder is occupied.

Stay centered on the ladder and face the ladder at all times.

Use the handrails while ascending or descending the ladder.

Do not overreach, keep your waist within the ladder rails.

To use the ladder:

- Stop the vehicle.
- Set the forward-off-reverse switch to the "OFF" position.
- Turn the key switch to the "OFF" position.
- Set the parking brake.

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.

⚠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.

Signet® Charger Operation, Model HB Series

Typical Signet® Built In

The Signet® HB series chargers use a semi-automatic charging system. The charger will turn itself ON when the AC power cord is connected to the AC power source and turn itself OFF when the batteries are fully charged. Refer to the data plate on the charger for the voltage and type power required for the charger.

There is a series of LED's on the faceplate of the charger that serve two functions:

1. Status of charge. The LED's will display an approximate percent of charge during the charging cycle. Refer to the table below.
2. Error condition. All three LED's flashing is an indication of a charging problem (charger will also be beeping). Refer to the ***Charger Troubleshooting*** section for information on error codes.

Charging State	LED1	LED2	LED3
0 to 50%	Blinking	OFF	OFF
50% to 75%	ON	Blinking	OFF
75% to 100%	ON	ON	Blinking
Cycle complete	ON	ON	ON

Signet Charger Operation, Model HBS series

Typical Signet® HBS

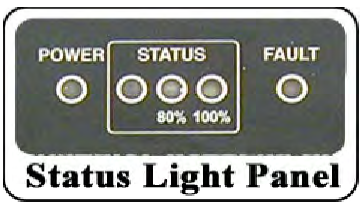
The Signet® HBS series chargers are fully automatic. The charger will turn itself ON when the AC power cord is connected to the AC power source and turn itself OFF when the batteries are fully charged. Once the charge cycle is complete, the charger will continue to monitor the batteries. If the battery voltage drops during storage, the charger will start a new cycle to keep the batteries fully charged.

Note: If the charger restarts during a short time period of storage, then it would be an indication of faulty batteries.

Refer to the data plate on the charger for the voltage and type power required for the charger.

There is a series of LED's on the faceplate of the charger that serve two functions:

1. Status of charge. The ***STATUS*** LED's will display an approximate percent of charge during the charging cycle. Refer to the table below.
2. Error condition. The ***FAULT*** LED flashing is an indication of a charging problem (charger may also be beeping). Refer to the ***Charger Troubleshooting*** section for information on error codes.



Status Light Panel

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.

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.

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.

Charging time is limited to 20-hours (HBS) or 18-hours (HB). A fault will occur if the charging time exceeds the 20-hour limit.

STORING / 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

- 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.

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

PERIODIC MAINTENANCE CHECKLIST

Taylor-Dunn
Preventative Maintenance Schedule for GT Drive with DC Motor

Date: _____ Model #: _____ Hour Meter: _____
Inspected By: _____ Serial #: _____
Serviced By: _____ Unit ID#: _____

Interval (hours) [1]	Inspected[2]	Service Required	Service Complete	Item Description
Operator Daily Checklist				Master cylinder fluid level
				Parking brake for secure hold
				Battery water level
				Tire inflation (pneumatic tires)
				Tire tread / damage
				All lights (head, tail, brake, warning, dash panel)
				Steering (hard steering, excessive play, unusual noises)
				Inspect brake and throttle pedal (play, binding, noise)
				Horn
				Motion alarm (if equipped)
				Fluid leaks (brakes, rear axle, battery, hydraulic system)
500				Adjust service and park brake systems
				Inspect all steering linkages and hardware
				Tighten steering shaft to steering gear coupler (if equipped)
				Lubricate the vehicle
				Wash batteries and clean terminals
				Inspect for fluid leaks
				Check all electrical interlocks for proper operation
				Inspect wheel bearings for play and noise
				Inspect front fork collar bearings for play and noise (3-wheel vehicle only)
				Inspect and tighten all hardware (first 500 hours only, then 1000 hours and every 1000 hours)
1000				Inspect and tighten all hardware
				Clean and repack front wheel bearings, replace grease seals
				Inspect all electrical connections for signs of overheating
				Tighten all electrical connections
				Inspect all wiring for cracks, fraying or wear
				Blow carbon from motor
				Inspect motor brushes and commutator
				Clean and lubricate motor coupler
				Inspect steering king pins for play
				Align front end
2000				Change rear axle oil
				Flush hydraulic brake system
				Inspect suspension bushings (spring, shock)
				Inspect suspension bumpers
				Replace brake pedal/treadle return spring
				Inspect frame for damage

Notes (1) and (2), Refer to “Maintenance Guidelines for Severe Duty” in the vehicles service manual

Note: A full page copy of the Periodic Maintenance Checklist is on the Vehicle Documentation CD under the [Misc] sub folder.

Form PM-0001 GT Drive / DC Motor, Revision B
06/20/2007

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 devises 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.

MAINTENANCE GUIDELINES FOR SEVERE DUTY APPLICATIONS

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.

General Maintenance

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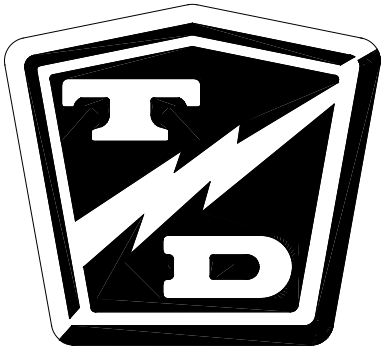


MAINTENANCE GUIDELINES

Before starting any repairs:

⚠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

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

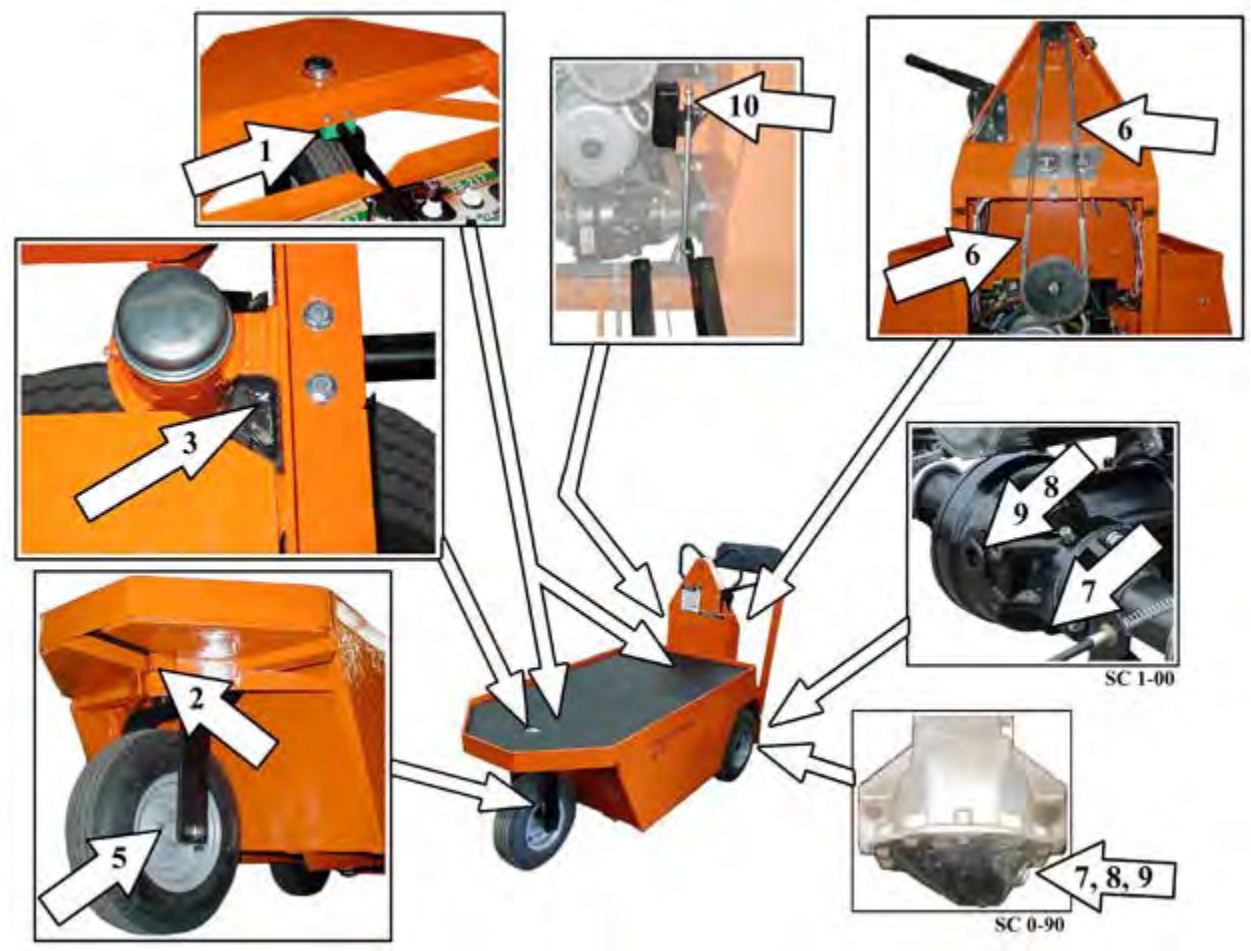
Read and follow all of the guidelines listed below. Failure to follow these guidelines may result in severe bodily injury and/or property damage.

- 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 , For Bent
	Low Tire Pressure
Hard Steering	Dry Lube Points in Steering Linkage
	Damaged Fork Spinde
	Low Tire Pressure
Excessive Steering Play	Loose Steering Chain
	Mis-Adjusted or Worn Steering Shaft
	Loose Steering Linkage
Lack of Power or Slow Operation	Brakes or Parking Brakes Dragging
	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 Low	Brake Worn (1/16” Wear Limit)
	Brakes Out of Adjustmen
Braking Power Low	Brake Worn (1/16” Wear Limit)
	Brake Pads Contaminated with Fluid
	Brake Pedal Linkage Binding
	Brakes Out of Adjustment

LUBRICATION CHART



#	Description	Locations	Lubricant Type
1	Steering Shaft Pillow Blocks	2 (not shown)	General Purpose Grease
2	Front Fork Spindle Bearings	1	General Purpose Grease
3	Steering Shaft Gears	1	General Purpose Grease
4			
5	Front Wheel Bearings	1 or 2	High Temperature Wheel Bearing Grease
6	Steering Chains	2	30 wt Motor Oil
7	Drive Drain Plug	1	-
8	Drive Level Plug	1	-
9	Drive Fill Plug,	1	30wt. motor oil
10	Accelerator Module Push Rod	1	General Purpose Grease

Front Axle

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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 rear 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 rear 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 rear wheels to prevent vehicle movement.

5. Disconnect the main positive and negative cables at the batteries.

⚠WARNING

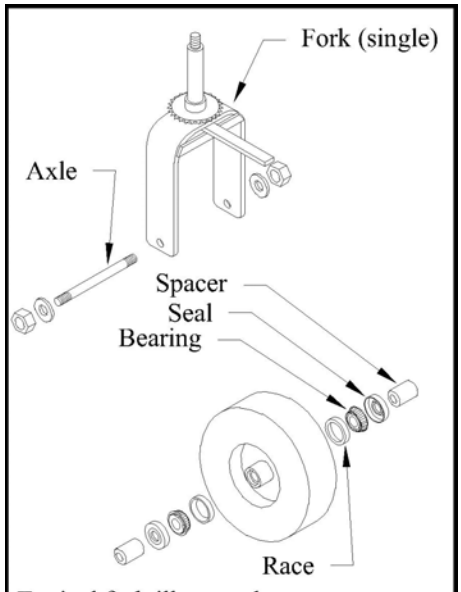
Always use a lifting strap, hoist, and jack stands, of adequate capacity to lift and support the vehicle. Failure to use lifting and support devices of rated load capacity may result in severe bodily injury.

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.



Typical fork illustrated.
Your fork may be different

REPLACE 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 rear 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.

Notes:

Steering Components

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FRONT END 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.

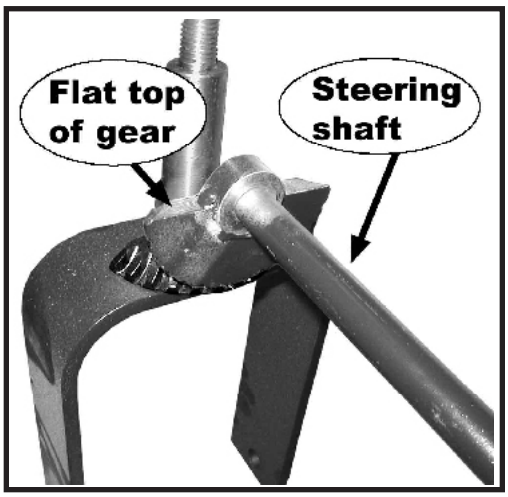
4. Place blocks under the rear wheels to prevent vehicle movement.

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. Position the front fork so that it is in the straight ahead position and tie it off so that it cannot rotate.
7. The flat top of the half gear on the steering shaft should be level. If it is not level then perform the following:
   A) Raise the front wheel approximately 1 inch off of the ground.
   B) Remove the fork spindle bearing cap.
   C) Loosen the fork nut until the steering shaft can be rotated without rotating the fork.
   D) Position the flat top of the half gear so that it is level.
   E) With the front wheel pointing straight ahead, lower the front end and tighten the fork spindle nut. Refer to section ***Replace the Front Fork*** for information regarding tightening the spindle nut.



Front fork and shaft shown outside of the vehicle

8. Center the steering wheel. Refer to section ***Center the Steering Wheel*** for information regarding centering the steering wheel.
9. Untie the front fork.
10. Adjust the steering shaft. Refer to section ***Adjust the Steering Shaft*** for information regarding adjusting the steering shaft.
11. Reconnect the main positive and negative cables at the batteries.
12. Remove the blocks from behind the wheels.
13. Test drive the vehicle.

Center the 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.

⚠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.**

6. Position the front fork in the straight ahead position and tie it off so that it cannot rotate.
7. Remove the steering chain access plate.
8. Remove the safety wire from the turn buckles and discard.
9. Loosen the turn buckles just enough to remove the chain from the lower sprocket
10. Center the steering wheel as shown in the illustration and tie it off so that it cannot rotate.

11. Position the chains so that the turnbuckles are an equivalent distance from the steering wheel sprocket. See illustration to the right.
12. Install the chain on the lower sprocket.

Steering wheel removed for clarity

13. Tighten the turnbuckles to remove all play from the steering chain.
14. Install new safety wire and tie off as shown in the illustration.
15. Untie the front fork.
16. Reconnect the main positive and negative cables at the batteries.
17. Remove the blocks from behind the wheels.
18. Release the parking brake and test drive the vehicle.

INSPECT THE STEERING COMPONENTS

Steering Wheel and Bushings

After the steering wheel has been removed, thoroughly clean the steering wheel shaft and bushings.

Measure the diameter of the steering shaft.

- If the shaft diameter is not between 0.745” and 0.0750” then the steering wheel should be replaced.

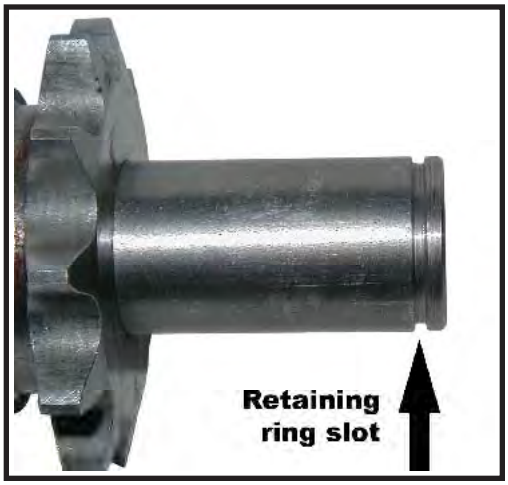
Inspect the surface of the shaft for unusual signs of wear.

- The surface should be smooth with no pits or grooves. If any unusual signs of wear are present, then the steering wheel should be replaced.

Steering shaft and sprocket

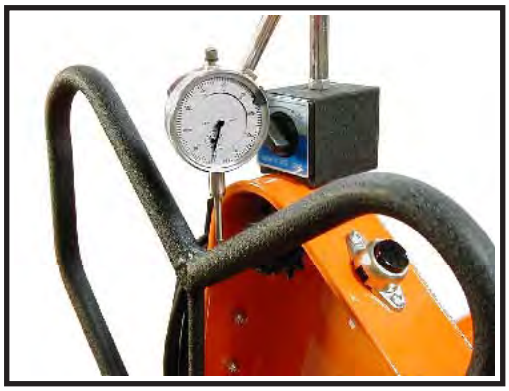
Inspect the slot for the retaining ring.

- The retaining ring slot corners should be 90 degrees with a small radius. If the corners are excessively rounded or the sides are tapered, then the steering wheel should be replaced.



Insert the steering shaft back into the collar and check for lateral play as shown to the right.

- If the lateral play exceeds 0.010 inches then the bushings should be replaced.



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.

Pillow Blocks

⚠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.

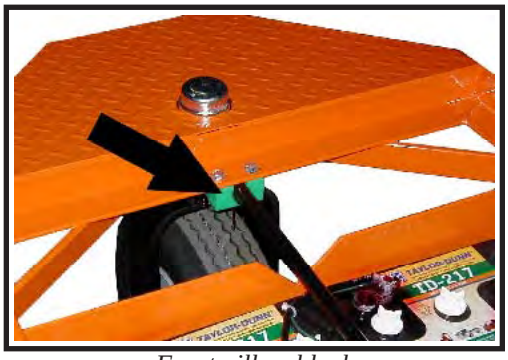
5. Disconnect the main positive and negative cables at the batteries.

⚠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.

Note: The two pillow blocks will wear at the same rate. If one is worn out, then both blocks should be replaced as a set.

6. Tie off the front fork so that it cannot turn.
7. While watching the steering shaft, rapidly rotate the steering wheel to the left and right.
8. There should not be any discernible play between the steering shaft and the pillow blocks. Any play indicates that the pillow block is worn out and should be replaced.
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.



Front pillow block

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 rear 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.
12. Release the parking brake and test drive the vehicle.

ADJUST THE STEERING SHAFT

The steering shaft is adjustable by means of a collar at the rear of the shaft. This adjustment controls the gear lash of the half gears on the shaft and front fork.

⚠WARNING

1. Make sure the key-switch is in the "OFF" position, then remove the key.

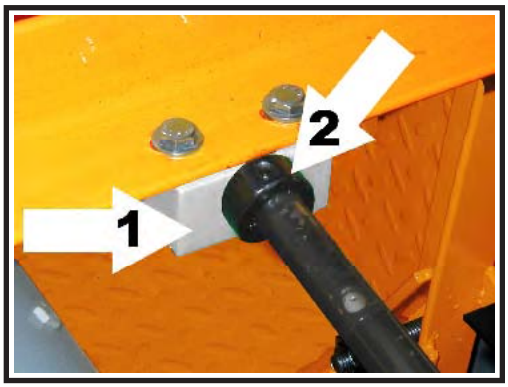
2. Place the forward-reverse switch in the center "OFF" position.

3. Set the park brake.

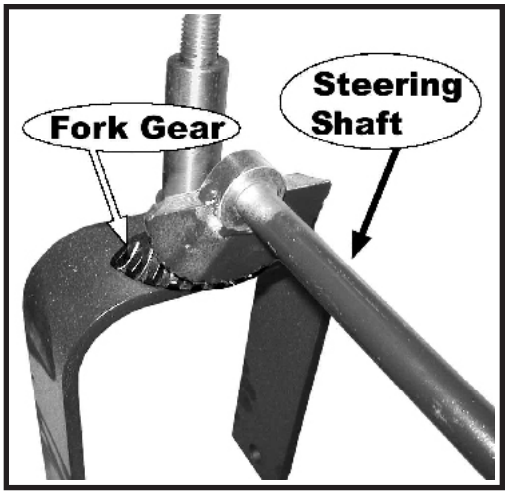
4. Place blocks under the rear wheels to prevent vehicle movement.

5. Disconnect the main positive and negative cables at the batteries.

6. Loosen the set screw on the collar.
7. Push the steering shaft half gear up against the half gear on the fork.
8. While lightly holding the two gears together, push the collar up against the rear pillow block and tighten the set screw.
9. Rotate the steering wheel from left to right. Any roughness is an indication of being too tight. Repeat the procedure and hold less tension on the gears while setting the collar.
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.



1 - Rear pillow block
2-Adjustable collar



REPLACE THE STEERING 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.

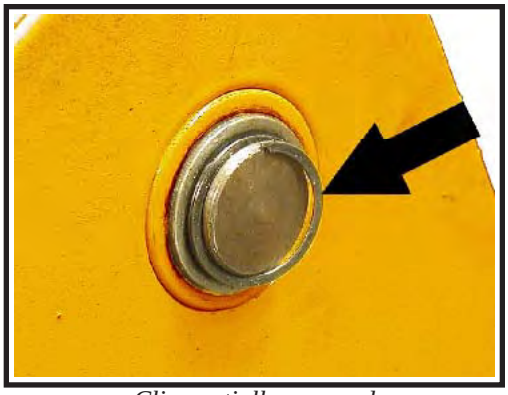
3. Set the park brake.

4. Place blocks under the front wheels to prevent vehicle movement.

5. Disconnect the main positive and negative cables at the batteries.

6. Cut the safety wire from the turn buckles and discard.
7. Remove the retaining clip and washer(s) from the steering wheel shaft.

   Note: The retaining clip goes completely around the shaft two times. Locate the end of the clip and lift the end of the clip out of the groove with a small screwdriver. The clip can then easily be removed by rotating it around the shaft. See the illustration to the right.



Clip partially removed

8. Loosen the turn buckles so that the steering chain can be lifted off of the steering wheel sprocket.
9. Remove the steering wheel.
10. Install the steering wheel in reverse order.

    Note: Lightly lubricate the steering wheel shaft.

11. Align the steering. Refer to section ***Front End Alignment*** for information regarding aligning the steering.
12. Reconnect the main positive and negative cables at the batteries.
13. Remove the blocks from behind the wheels.
14. 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.

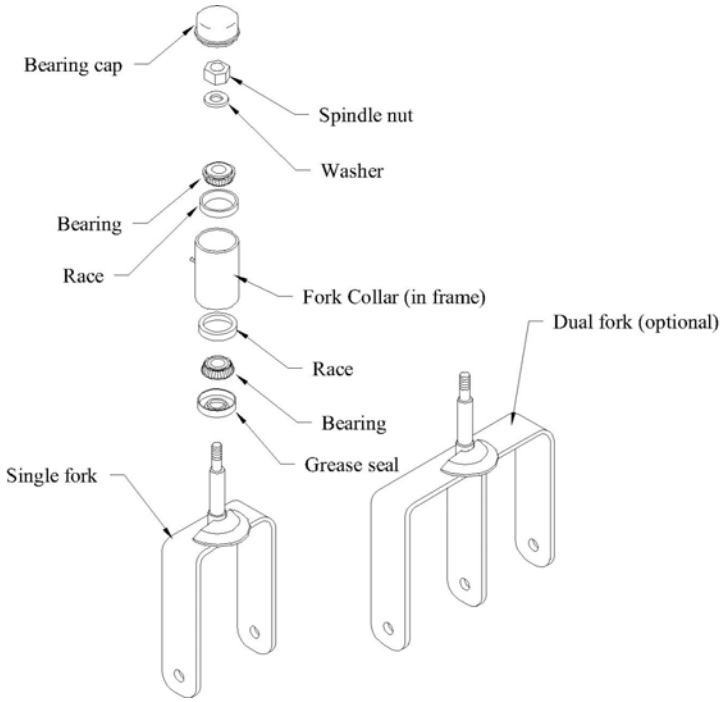
4. Place blocks under the rear wheels to prevent vehicle movement.

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 fork bearing cap.
8. While supporting the front fork so that it cannot fall out of the vehicle, remove the fork spindle nut and remove the fork from the vehicle.
9. 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 ***Front End Alignment*** for information regarding aligning the front end.
10. Lower the wheels to the ground.
11. Reconnect the main positive and negative cables at the batteries.
12. Remove the blocks from behind the wheels.
13. Release the parking brake and test drive the vehicle.



Brake Service

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AUTO-ADJUST BRAKE MECHANISM THEORY OF OPERATION

The auto-adjust mechanism is located on the bottom of the brake assembly. As the brake pad material wears down, the distance the brake shoes travel to engage the brake drum becomes longer. When the travel becomes long enough, the brake lever engages the auto-adjust lever and causes it to index a tooth on the star wheel adjuster. This rotates the adjuster, which decreases the travel needed for the brake shoes to engage the brake drum.

Note: There are no manual adjustments for the brake shoes.

Note: The symptom of a low brake pedal may indicate that the auto adjuster is not working or the brake linkage is not adjusted properly. Remove the vehicle from service and repair the brakes.

⚠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.

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.

Auto-Adjust Brake Mechanism Operation

The auto-adjust mechanism is located on the bottom of the brake assembly and accessible through the oval slot in the brake drum. As the brake pad material wears down, the distance the brake shoes travel to engage the brake drum becomes longer. When the travel becomes long enough, the brake lever engages the auto-adjust lever and causes it to index a tooth on the star wheel adjuster. This rotates the adjuster, which decreases the travel needed for the brake shoes to engage the brake drum.

Note: The only time the brakes should be manually adjusted is when an internal component of the braking system has been removed.

Note: The brakes will not require manual adjustment if any part of the external mechanical linkages or cables have been removed.

Note: The symptom of a low brake pedal may indicate that the auto adjuster is not working or the brake cable is not adjusted properly. Remove the vehicle from service and repair the brakes.

Note: The brake adjustment is inside of the left and right brake. Do not adjust the brake by means of the brake cables as this will cause misoperation of the brakes. If you hear a single "clunking" noise while braking it may be due to misadjustment of the brake cables or linkage. Refer to **Replace Brake linkages/Cables** *for information regarding proper adjustment of the cables and linkages.*

⚠WARNING

Adjusting the brakes by means of the brake cables could cause a hard brake pedal with little or no braking power. This could cause loss of control of the vehicle resulting in severe bodily injury and /or property damage.

Inspecting the Auto-Adjust Brake Mechanism

⚠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 set.**
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 rear of the vehicle and support with jack stands.
7. Using the appropriate procedure, remove the brake drum.
8. Release the park brake.
9. Back off the auto adjuster star wheel one or two turns.
10. Reinstall the brake drum and depress the bake pedal.
11. As the brake pedal is depressed, the auto adjuster indexes the star wheel adjuster causing a click.
12. Lower the vehicle.
13. Reconnect the main positive and negative at the batteries.
14. Remove the blocks from behind the wheels.
15. Test drive the vehicle

Brake Shoes

⚠WARNING

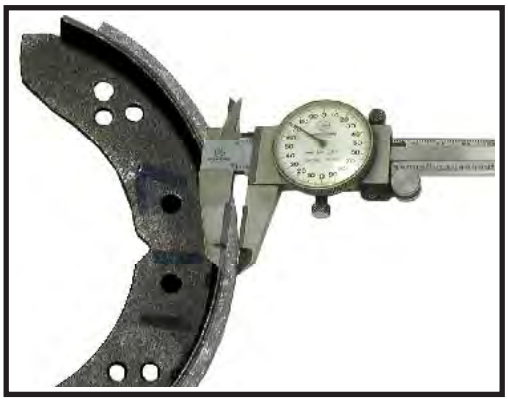
Current Taylor-Dunn® brakes are asbestos free. However, there is the possibility that the original brakes were replaced with aftermarket parts containing asbestos. Since this possibility exists, all brake parts should be handled as if they contain asbestos. Refer to appendix C for recommended handling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

Note: The wheel must be removed to accurately measure the brake shoes. Refer to **Tires and Wheels** *section for information on removing the wheel.*

Measure the brake shoe lining at the thinnest point on the shoe. If this is 1/16-inch or less then the brake shoe must be replaced.

Note: If this is a riveted lining, then the measurement must be to the top of the rivets.

It is recommended to replace the left and right side brake shoes as a set.



Brake Drum

Note: The wheel must be removed to accurately measure the brake drum. Refer to **Tires and Wheels** *section for information on removing the wheel.*

The service limit for the inside diameter of the brake drum is 6.330 inches.

If the brake drum is grooved or worn beyond the service limit then the brake drum must be replaced.

Measure the inside diameter of the brake drum in 3-places.

If the difference between any of the measurements exceeds 0.010-inches then the brake drum must be replaced.

⚠WARNING

Do not use a brake drum that is worn beyond its service limits. A drum worn beyond its service limits could fail and cause loss of brakes resulting in severe bodily injury and/or property damage.

INSPECT THE PARKING BRAKE

Wheel Park Brake

The parking brake is actuated through the same linkages as the service brake. Refer to ***Inspect the Service Brake*** section to inspect the brake pads.

⚠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.

6. Inspect all brake cables and linkages for any signs of damage or missing cotter pins.
7. Inspect the park brake handle for any signs of damage or wear.
8. Set the park brake.
9. Reconnect the main positive and negative cables at the batteries.
10. Remove the blocks from the wheels

⚠WARNING

If any sign of damage or wear is found on the park brake handle, cables, or linkages then they must be repaired or replaced immediately. Failure to repair or replace any damaged component could result in failure of the park brake causing severe bodily injury and/or property damage.

ADJUST THE SERVICE BRAKES

Note: This vehicle is equipped with self-adjusting brakes. Other than the brake linkages, there is no manual adjustment. A low brake pedal may be an indication that the auto-adjust mechanism is not functioning properly. Refer to **Inspecting the Auto-Adjust Brake Mechanism** *for information on the auto-adjust mechanism.*

ADJUST THE BRAKE LINKAGE

The treadle rod should be adjusted so that the FS-1 switch just opens whenever the treadle is released.

Before adjusting the treadle rod, inspect the automatic brake adjust mechanism for proper operation and be certain the brakes are adjusted correctly.

⚠WARNING

The rear drive wheels may rotate during the following tests.

⚠WARNING

1. Place the forward-reverse switch in the center "OFF" position.

2. Place blocks under the front wheel to prevent vehicle movement.

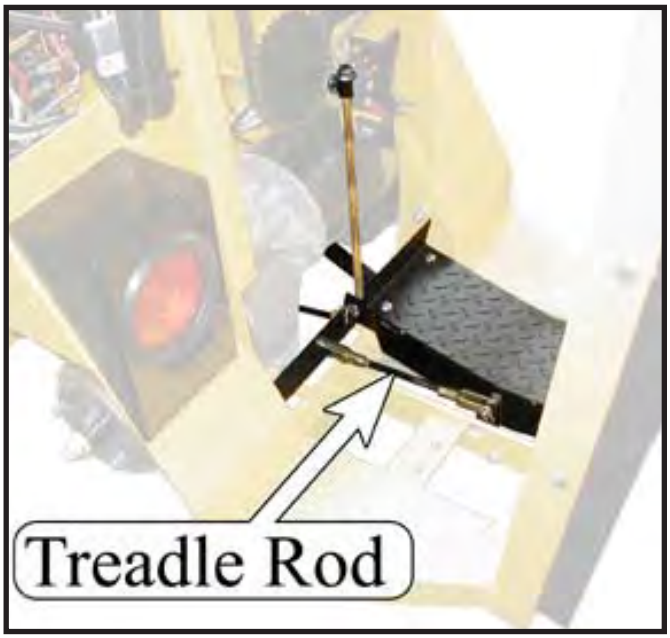
⚠WARNING

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.

3. Raise the rear wheels and support with jack stands.
4. Remove the floorboard.
5. Loosen both jam nuts on the treadle rod.
6. Place the Forward/Reverse switch in Forward and turn the key switch ON.

Note: FS-1 is closed when the solenoids pick up.

7. Tighten the treadle rod until FS-1 remains closed when the treadle is released.
8. Slowly loosen the treadle rod until FS-1 is open.
9. Tighten the jam nuts.
10. Test for proper operation by depressing the treadle and then *slowly* releasing the treadle. FS-1 should open without having to depress the rear of the treadle.
11. Install the floorboard and lower to the ground.
12. Test drive the vehicle.



ADJUST THE PARKING BRAKE

There are two adjustments for the parking brake. The primary adjustment is on the park brake handle itself. The secondary adjustment is the park brake cable under the treadle. The park brake cable does not require routine adjusments. It should only be adjusted if any part of the brake linkages are replaced.

Primary Adjustment (handle)

⚠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. Release the park brake.
7. Rotate the knob on the end of the park brake handle to adjust the brake.
   - Clockwise to tighten
   - Counter clockwise to loosen.
7. Set the park brake.
8. Reconnect the main positive and negative cables at the batteries.
9. Remove the blocks from behind the wheels.
10. Release the park brake and test drive the vehicle.

Secondary Adjustment (cable)

6. Release the park brake.
7. Remove the treadle cover.
8. Loosen the park brake cable clevis jam nut.
9. Remove the clevis pin.
10. Fully depress the treadle and clamp or tie it in the fully depressed position.
11. Pull the cable out and adjust the clevis so that the clevis pin can be inserted with the cable pulled out as far as possible.

Note: There should be no tension on the clevis pin.

12. Insert a new cotter pin and tighten the jam nut.
13. Install the treadle cover.
14. Perform the Primary Adjustment Procedure.

REPLACE REAR BRAKE SHOES

⚠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. **Confirm the electric park brake is set.**
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 rear of the vehicle and support with jack stands.
7. Using the appropriate procedure, remove the brake drum.
8. Release the park brake.
9. Remove the tension springs.
10. Remove the hold down springs.
11. Remove the auto-adjust lever spring.
12. Apply this procedure in reverse order to install the new brake shoes.

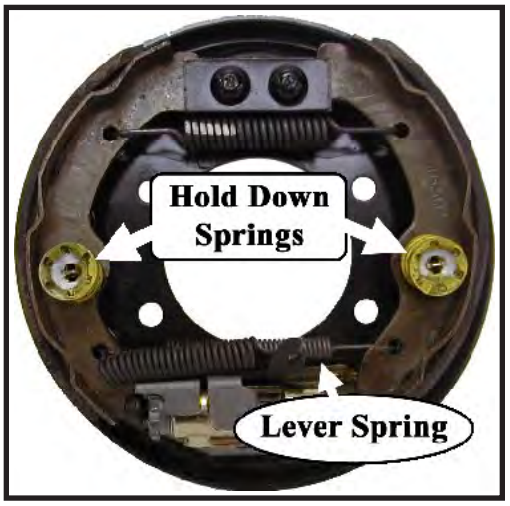
Note: Be sure all the parts are thoroughly cleaned.

Note: Be sure that the anchor points on the brake shoes are given a light coat of hi-temp grease.

13. Lower the vehicle and reconnect the main positive and negative at the batteries.
15. Remove the blocks from behind the wheels.
16. Test drive the vehicle.

⚠WARNING

Do not allow grease to contact any of the braking surfaces. Braking surfaces contaminated with grease may cause the brakes to fail resulting in property damage and/or severe bodily injury.



Motor Service

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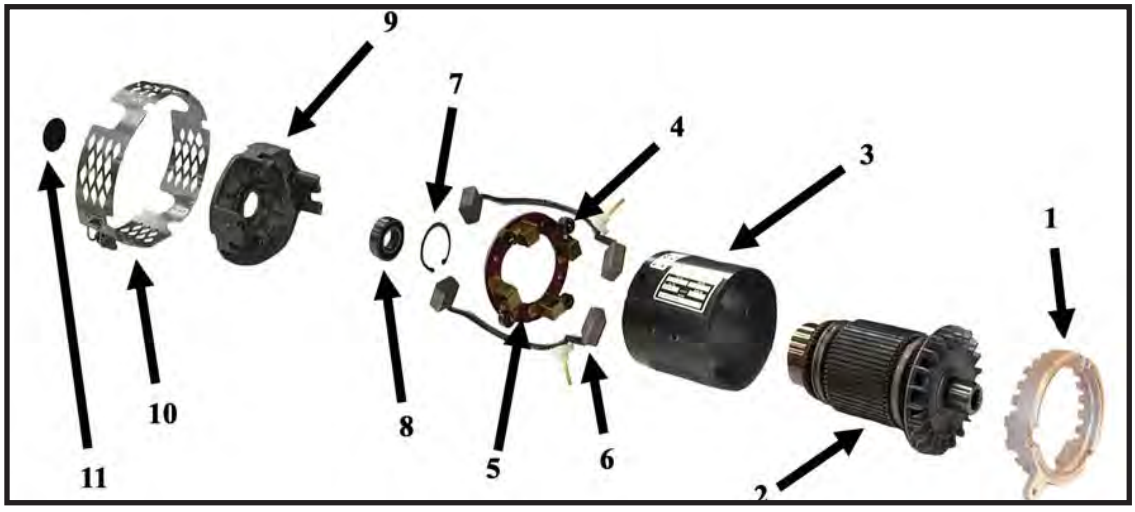


INSPECTING THE MOTOR BRUSHES

Motors with internal cooling fans

Typical motor with cooling fan indicated by the arrow

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.

MOTOR REMOVAL AND INSTALLATION

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

MOTOR INSPECTION

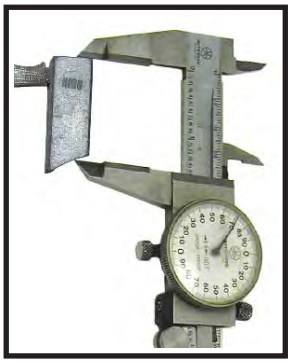
Disassembly

1. Remove the motor from the vehicle. See the ***Transmission*** section for information on removing the motor.
2. Remove the brush cover and pull the brushes out away from the commutator.
3. Remove the dust cap from the rear motor housing.
4. Place the motor in a press, and press the armature out of the rear bearing.

Note: Removing the armature will damage the motor bearing. The motor bearing should be replaced whenever the armature is removed.

5. Remove the housing screws from the rear motor housing and remove the housing from the motor.
6. Remove the nuts from the armature studs and remove the two brush assemblies.
7. Remove the bearing circlip and press the motor bearing out of the housing and discard.

Inspection

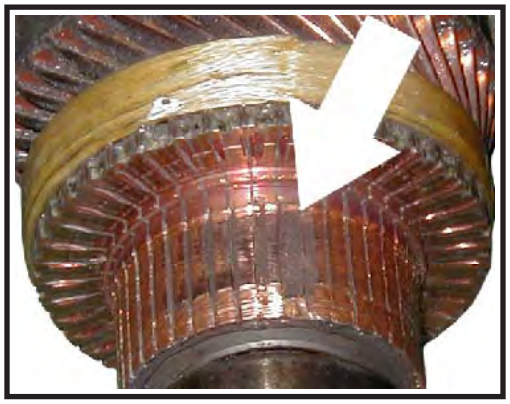


1. Measure the length of each motor brush.
   - If any one brush is less than or equal to the service limit specified in section ***Service Limits***, then all four brushes should be replaced. Refer to ***Replacing the Brushes*** section for information regarding replacing the motor brushes.
2. Measure 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*** at the end of this section, then the commutator must be undercut. Refer to ***Repair Commutator*** section for information regarding undercutting the commutator.
4. Inspect the commutator for groves.
   - 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.
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.
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.

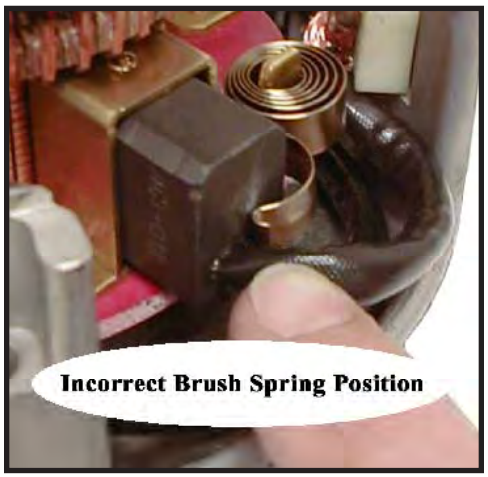
8. Using a growler, test the armature for shorts.
   - If the armature is shorted, then we recommend that the armature or motor be replaced.
9. Using the continuity function of digital multi meter, check the continuity around the entire commutator by placing one test lead against one of the commutator 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. Measure the armature and field resistance (refer to ***Service Limits*** table at end of this section). If the armature of field resistance is not within specification then the motor must be repaired or replaced.



Typical burn mark on a shorted armature

Assembly

1. Press a new bearing into the motor housing and install the circlip.
2. Install the two brush assemblies so that the brushes are 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.
3. Install the rear motor housing to the stator housing.
4. Lightly grease the inside diameter of the armature bearing.
5. Carefully insert the armature through the stator housing and onto the motor bearing in the rear housing.
6. While supporting the inner race of the bearing, press the armature into the bearing.
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).
8. Install the brush cover.



REPLACING BRUSHES/ARMATURE BEARING

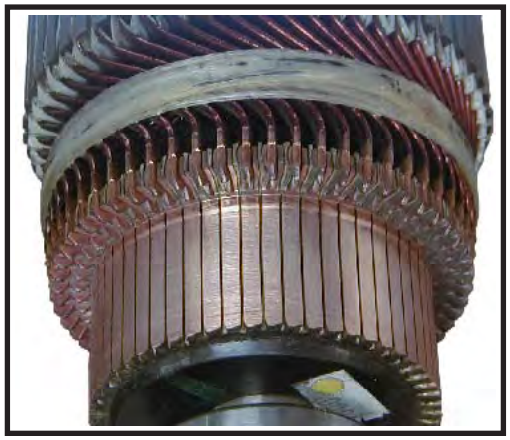
Note: It is recommended that all four brushes be replaced as a set.

Note: The motor must be disassembled to replace the brushes or the bearing. Refer to **Motor Inspection-Disassembly** *section for information on taking the motor apart.*

Note: The motor must be removed from the vehicle for this procedure. Refer to **Transmission Service** *section for information on removing 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.
7. While still in the lathe, smooth the commutator with fine emery cloth.



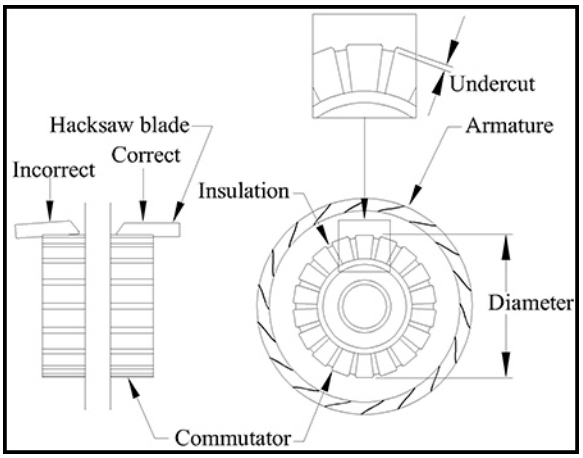
Example of freshly cut commutator

Properly undercut and cleaned commutator segments

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.



SERVICE LIMITS

Motor Specification Number	Undercut Depth		Commutator Diameter (min)		Brush Length (min)		Resistance (Ohms@75º F)	
	mm	inches	mm	inches	mm	inches	Armature	Field
70-054-40 (XP-1672 or DV1-4002)	0.635	0.025	69.85	2.75	15.87	0.625	.0116	1.20
70-054-41 (XP-1789 or DY2-4001)	0.635	0.025	69.85	2.75	15.87	0.625	0.011	0.43
70-057-40 (XP-1673 or DV1-4003)	0.635	0.025	69.85	2.75	15.87	0.625	0.008	0.58
70-052-40 (XP 1876 or DD3-4004)	0.635	0.025	69.85	2.75	15.87	0.625	0.011	0.73
70-072-41 (XP 1820A)	0.635	0.025	69.85	2.75	15.2	0.6	0.0052	0.79
70-061-40 (XP-1765A)	0.889	0.035	69.85	2.75	15.87	0.625	0.011	0.71

Note: Special and expensive motor testing equipment is required in order to accurately measure motor armature or field resistance. In most cases, this equipment is not required in order to determine if a motor is faulty. The majority of motor failures are due to an open circuit in the field or armature windings. If the symptom of the vehicle is "not running with NO motor current" then a simple continuity test of each winding is all that is required to determine if the motor is at fault.

Transmission

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CHECK OIL LEVEL

Park the vehicle on a level surface.

⚠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 drain pan that can hold a minimum of 2-quarts of oil under the transmission level plug.
7. Remove the level plug. When the plug is removed, a small amount of oil should come out. This indicates that the transmission has the correct amount of oil.

⚠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.

8. If no oil comes out, then lift the side of the vehicle with the level plug and add 11-ounces of oil through the level plug hole. See the illustration below.
9. Lower the vehicle, allow any excess oil to drain into the drain pan, and then reinstall the level plug.
10. Reconnect the main positive and negative cables at the batteries.
11. Remove blocks from behind the wheels.
12. Test drive the vehicle

Fill/Level Plug in transmission cover

CHANGE OIL

Park the vehicle on a level surface.

⚠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 drain pan that can hold a minimum of 2-quarts of oil under the transmission.

⚠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.

7. Remove the level plug then lift the side of the vehicle without the level plug and allow the oil to drain out.
8. Lower the vehicle and now lift the side of the vehicle with the level plug and add 11-ounces of oil (see illustration on preceding page).
9. Lower the vehicle, allow any excess oil to drain into the drain pan, and then reinstall the level plug.
10. Reconnect the main positive and negative cables at the batteries.
11. Remove blocks from behind the wheels.
12. Test drive the vehicle

Level Plug viewed from in front of the right rear wheel

MOTOR

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.

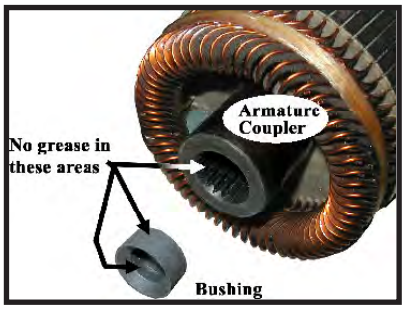
4. Place blocks under the front wheels to prevent vehicle movement.

5. Disconnect the main positive and negative cables at the batteries.

6. Remove the motor wires
7. Remove the transmission from the vehicle.
8. Remove the bolts holding the motor to the transmission housing.
9. Slide the motor off of the transmission input shaft.

Installation

1. Remove the rubber bushing from inside of the motor armature coupling.
2. Thoroughly clean all grease from the transmission input shaft, rubber bushing and the motor armature coupling.



3. Install the rubber bushing back into the motor armature coupling.
4. Lightly grease the transmission input shaft only (see illustration and caution).
5. Install the motor in reverse order.
6. Torque the motor mounting bolts to 6-8 ft-lbs.

⚠CAUTION

Do not apply grease to the armature coupler, rubber bushing or the end of the transmission input shaft. Grease applied to these areas may result in premature failure of the armature bearing.

REAR AXLE

Note: The tire/wheel assembly must be removed for these procedures. Refer to **Tires and Wheels** *section for information on removing the tire and wheel assembly.*

Remove and Install Axle - Removable Hub

⚠WARNING

1. Make sure the key-switch is in the "OFF" position, then remove the key.

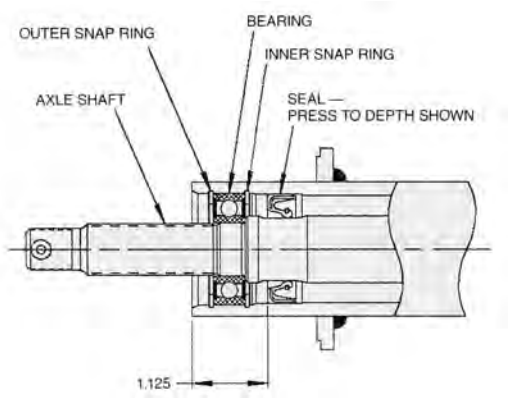
2. Place the forward-reverse switch in the center "OFF" position.

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.

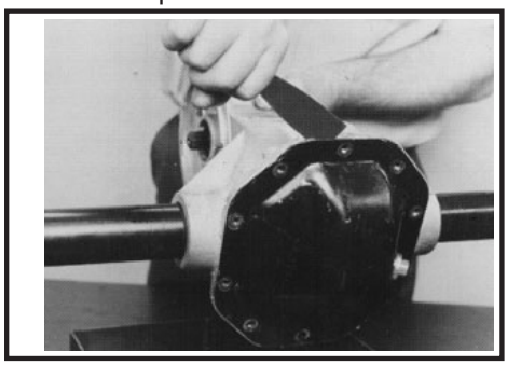
6. Remove the rear wheel. Refer to ***Replace the Rear Tire/Wheel*** section for information regarding removing the rear wheel.
7. Remove the axle hub. Refer to ***Rear Hub/Brake Drum*** section for information on removing the hub.
8. Remove the outer snap ring from the axle housing.
9. Remove the axle from the transmission assembly.
10. Remove the inner snap ring.
11. Remove the axle seal from the axle housing.
12. Install the axle in reverse order using a new axle seal.
13. Refer to ***Rear Hub/Brake Drum*** section for information on installing the hub.
14. Reconnect the main positive and negative at the batteries, remove the blocks from the wheels, and test drive.



DIFFERENTIAL CASE

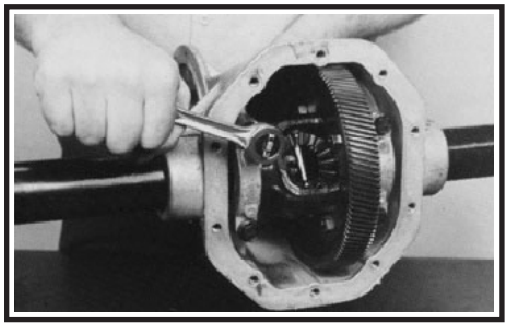
Disassemble

1. Remove the transmission from the vehicle. Refer to ***Transmission-Remove*** section for information on removing the transmission.
2. Thoroughly clean the transmission assembly before disassembly.
3. Remove the left and right axles from the transmission assembly. Refer to ***Rear Axle*** section for information on removing the axles.
4. Suspend the differential case over a drain pan that can hold a minimum of 2-quarts of oil.
5. Remove the differential case cover being careful not to bend or damage the case cover flange or the sealing surface of the differential case.

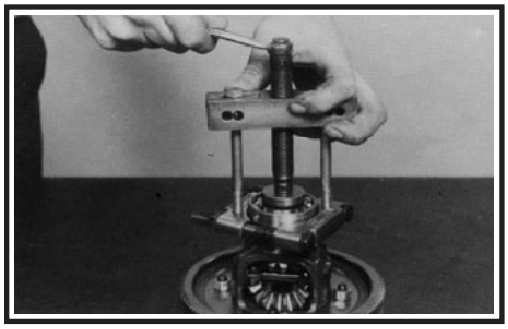


6. Remove the differential bearing caps and remove the differential assembly from the housing.

Note: The bearing caps are marked for identification. When the transmission is reassembled they must be installed in their original position.

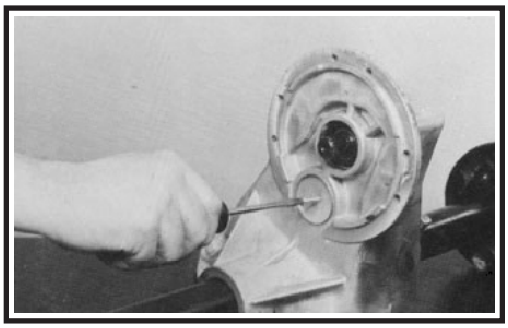


7. Remove both bearings from the differential case.

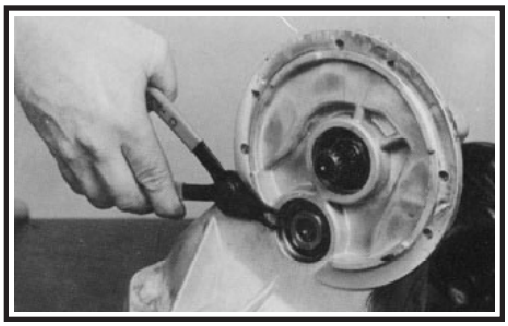


8. Remove the final drive gear from the differential housing.

9. Punch or drill a small hole into the center of both of the intermediate shaft bore plugs.
10. Thread a sheet metal screw into each plug until the bore plug is forced out.

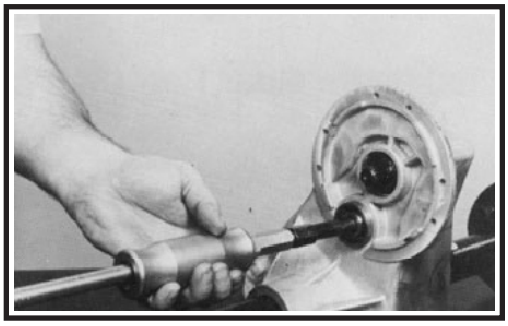


11. Remove both snap rings from the intermediate shaft bore.



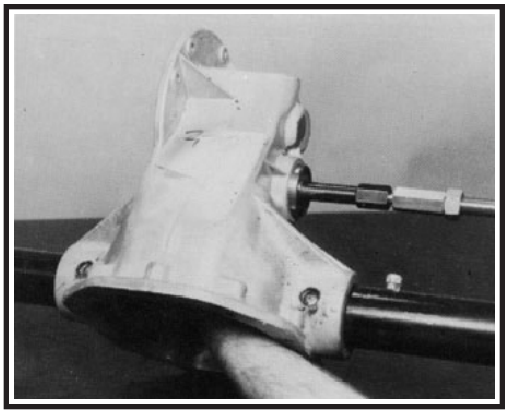
12. Using a soft metal or hard wood dowel, drive the intermediate shaft through the bearing just enough to allow clearance for an ID bearing puller. Do not attempt to drive the shaft out of the opposite end of the transmission.

13. Remove the intermediate bearing with an ID bearing puller.



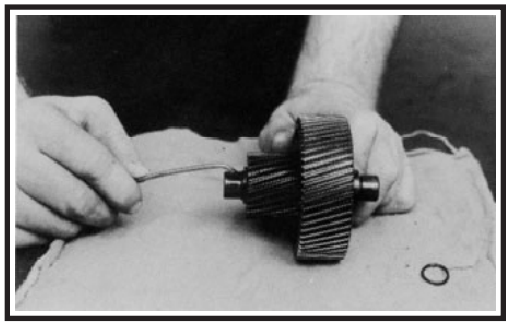
⚠CAUTION

The shaft and gear assembly must be supported by hand during the next step. Failure to properly support the shaft and gear assembly could result in damage to the gear teeth.

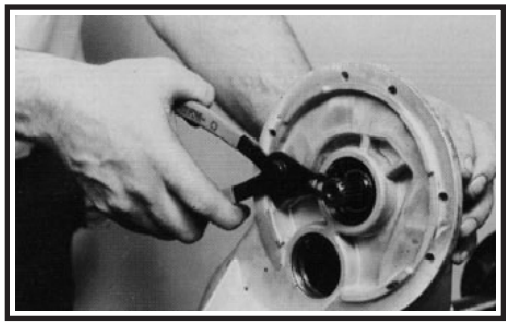


14. While supporting the shaft and gear assembly, repeat steps #12 and #13 for the opposite side bearing and remove the intermediate shaft from the housing.

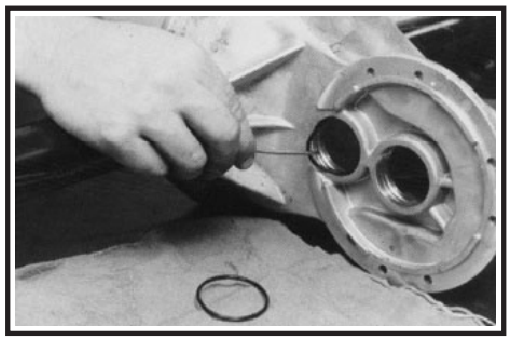
15. Remove the o-rings from each end of the intermediate shaft.



16. Remove the circlip from the input shaft.
17. Remove the input shaft from the housing.
18. Press the bearings off of the input shaft.



19. Remove the o-rings from both sides of the intermediate shaft bore and the input shaft bore and discard the o-rings.



Assemble

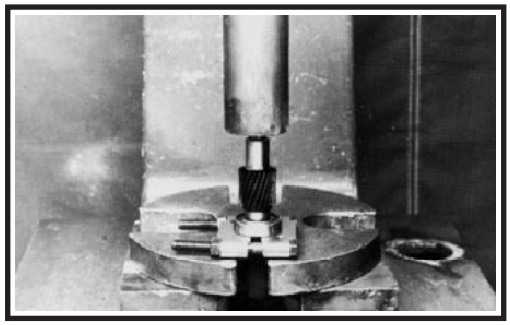
Note: When pressing bearings, do not press against or support the outer race as this will damage the bearing.

Note: All snap rings should fit tightly into their grooves. If a snap ring is loose, then it must be replaced.

Note: All internal components should fit easily together. Do not hit any shaft or component with a hard metal hammer or punch.

Note: Pre-lube all bearings, seals and o-rings before assembly.

1. Thoroughly clean all components as well as the inside of the housing.
2. Press new bearings onto the input shaft and differential case.



3. Insert new o-rings into both sides of the intermediate shaft bore, the input shaft bore and the intermediate shafts.
4. Install the input shaft into the housing and install the snap ring.
5. Insert the intermediate shaft into the housing and support in place.
6. Insert the flanged side bearing into the bearing bore. Press in just past the snap ring grove and install the snap ring.
7. Repeat the above step for the opposite bearing.
8. Thoroughly clean both sides of the intermediate bore. All contaminates must be removed.
9. Apply Loctite #RC 609 to both sides of the intermediate bore and install new bore plugs.

   Note: Drive the bore plugs until they are firmly seated against the snap rings.

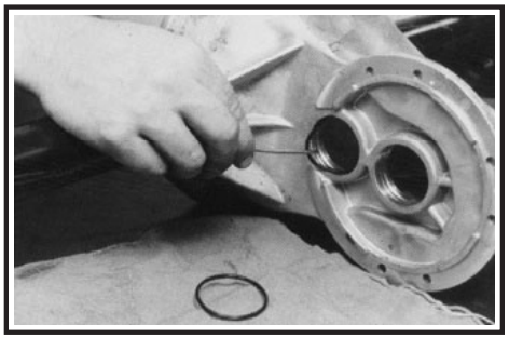
10. Install the final drive gear onto the differential housing. Torque the nuts to 35-45 ft-lbs.
11. Install the differential assembly into the drive housing and install the bearing caps. Torque the bolts to 35-45 ft-lbs.

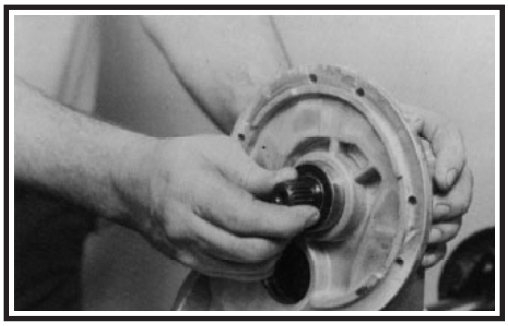
    Note: The bearing caps are marked for identification and must be installed in their original locations.

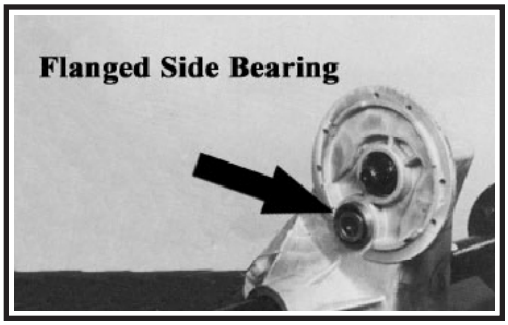
12. Place a small bead of non-acidic silicone sealant to the bottom flange of the housing.

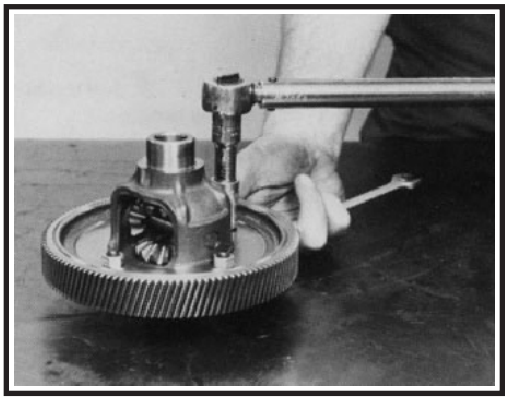
    Note: The sealant bead should be on the inside of the cover plate mounting holes.

13. Install the cover plate. Torque the bolts to 18-28 ft-lbs.
14. Install the axles using new axle seals. Refer to ***Rear Axle*** section for information on installing the axles.
15. Fill with 11 ounces of oil. Refer to the ***Lubrication Table*** for the proper type of oil.









Notes:

Tires and Wheels

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Tire Inspection 2
Replace the Front Tire/Wheel 3
Replace the Rear Tire/Wheel 3
Replace the Tire (pneumatic) 3
Repair the Tire (pneumatic) 4

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 front 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.

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 wheel.

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.

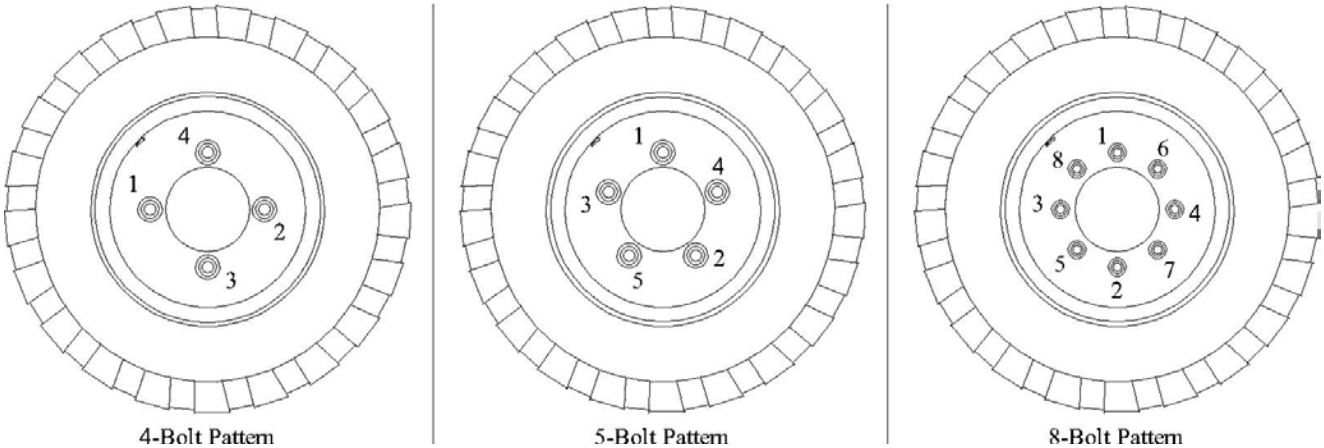
⚠WARNING

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.

Battery Service

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Watering 5
Replacing (6-volt batteries only) 6
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Storage and Returning to Service 8
Storage 8
Returning to Service 9

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.

⚠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.

⚠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

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. Dry dirt can be readily blown off with low-pressure air or brushed off.
7. Wetness or wet dirt on the batteries indicates battery acid. Using a nonmetallic brush with flexible bristles, wash the batteries 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 batteries, remove the blocks from the wheels and test drive.

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.

⚠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.

⚠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

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.

Note: A combination of the Load Test and Specific Gravity Test should be used to accurately determine the condition of the batteries.

Load Test (6-volt batteries only)

Note: The batteries must be fully charged before performing this test.

1. Clean the batteries. Refer to ***Cleaning the Batteries*** section for information on cleaning the batteries.
2. Load test each battery using a battery load test meter (available at most auto parts distributors). Follow the instructions provided with the test meter.
    - If any battery fails the load test, then it should be replaced.

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

- If all batteries fail the test you should check the charging system before replacing the batteries. Refer to ***Charger Troubleshooting*** section for information on checking the charging system.

Specific Gravity Test

Note: The batteries 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 battery will read 1100. Ideally, all cells in a battery pack will have the same reading. Any cells in a battery pack that vary by more than 30-points may be an indication of a bad cell.

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

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

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 batteries are no longer accepting a charge and should be replaced.

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

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

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

Typical Hydrometer Float

CHARGING

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

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.

⚠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.

⚠WARNING

Do not overfill the batteries. Over filling the batteries may cause the battery electrolyte to boil out of the battery and result in severe bodily injury 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.

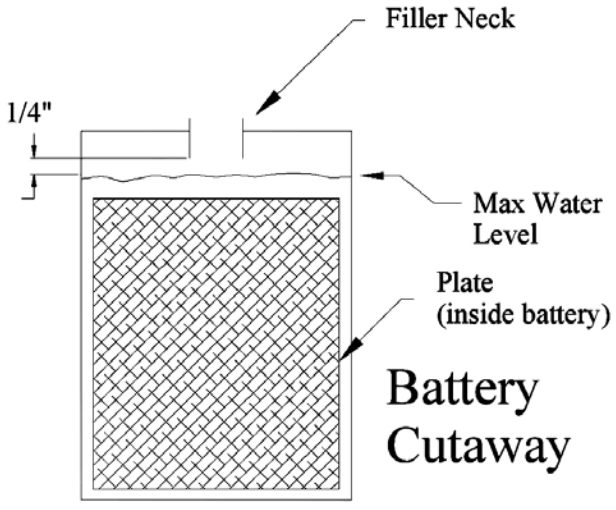
3. Set the park brake.

4. Place blocks under the front wheels to prevent vehicle movement.

5. Disconnect the main positive and negative cables at the batteries.

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 batteries 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.

6. Clean the batteries. Refer to ***Cleaning the Batteries*** section for information on cleaning the batteries.
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 batteries, remove the blocks from the wheels and test drive.



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 repainted.
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

⚠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.

⚠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.

⚠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

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.**

⚠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.

Storage

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

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

Store the vehicle or batteries in a cool, dry, well ventilated area.

If storing for more than one month, the batteries should be charged as follows:

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

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. 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. Check the electrolyte level and charge the batteries. Refer to ***Watering*** in this section for information regarding checking the electrolyte level.
8. Test the batteries. Refer to ***Testing*** section for information on testing the batteries.
9. The batteries are now ready to be put back into service.

Notes:

Motor Controller

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Motor Controller

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Inspect 2
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Adjustments.....3
Hardware Torque 4

⚠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.

REMOVE/INSTALL

NOTICE

Use a backup wrench on the terminal bolts. Failure to use a backup wrench may result in breaking the terminal seal and premature failure of the controller.

It may be required to remove the control panel from the vehicle for this procedure.

Remove

6: Using a backup wrench, remove the four terminal bolts and wires.
7: Disconnect the wires from the KSI and #2 terminals.
8: If equipped with the 7-pin in-line connector, disconnect it.
9: Remove the four bolts holding the controller to the panel and remove the controller.

Install

1: Thoroughly clean the controller base and mounting plate.
2: Install the controller to the mounting plate.
3: Attach the wires to the studs and, using a backup wrench, torque per specification listed in the table at the end of this section.
4: If equipped with the 7-pin in-line connector, install silicon dielectric grease (94-422-10: 5.3 ounce tube) into the harness plug before connecting to the controller.

INSPECT

Inspect the area around all of the terminals for cracked or separated potting compound.

Inspect the surface of each terminal for corrosion.

Any cracks or corrosion may be an indication that the terminal seal is broken and may result in premature failure of the controller.

Check the adjustment screw plugs for correct torque.

TROUBLESHOOTING

Troubleshooting the control system is not included in this manual.

All electrical troubleshooting information is included in a separate manual "Troubleshooting Electric Vehicles".

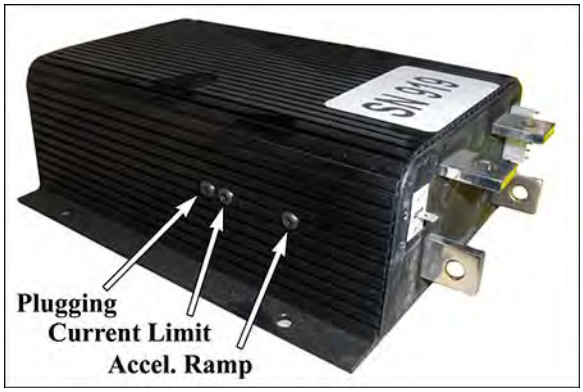
The troubleshooting manual was provided on the original vehicle documentation CD. A replacement CD or hard copy can be purchased from your authorized Taylor-Dunn distributor or can be downloaded from the Taylor-Dunn web site.

REPAIR/ADJUSTMENTS

Repairs

There are no internally serviceable components in the motor speed controller. If a controller is faulty then it must be replaced.

Note: Opening or disassembling a controller will void the controller warranty.



Adjustments

There are two or three adjustments available:

1: Acceleration Ramp: How fast the controller ramps up to full power.
2: Plugging Current: How much current is provided when reversing direction.
3: Current Limit: Maximum current (not available on all controls).

These adjustments are accessed by removing the button head screws in the housing. The control may need to be removed from the panel to gain access to the screws.

The adjustment potentiometers (pots) are located just under the screws. Use an insulated potentiometer adjustment tool to turn the pots. Each pot has built in stops. DO NOT turn parts the stops or the pot may be damaged.

1: Acceleration Ramp: Turn clockwise for faster acceleration.
2: Plugging Current: Turn clockwise for harder plugging..
3: Current Limit: Turn counterclockwise to lower maximum current.

HARDWARE TORQUE

If hardware is not listed here, refer to standard torque values in the appendix.

Description	Inch Pounds	Newton Meters
Terminal hardware	72	8.13
Adjustment plugs	8	0.90

Notes:

Charger

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REMOVE/INSTALL

⚠WARNING

HIGH VOLTAGE

Disconnect the batteries and make sure that the AC power cord has been unplugged before disconnecting any wires or removing the cover of the charger.

Failure to follow this instruction may result in serious injury due to electric shock and/or property damage.

There are many charger options available for this model. The different charger may have different wiring connections.

Disconnect the batteries and make sure that the AC power cord has been unplugged before disconnecting any charger wires or cords.

Some charger models have disconnects close to the charger and some have full length wire and molded cords. When replacing chargers with full length wires and molded cords, DO NOT cut and splice the wires or cord. Cutting the wires or cord will void the charger warranty and may result in incorrect operation of the charger or premature failure.

TROUBLESHOOTING

Troubleshooting control system is not included in this manual.

All electrical troubleshooting information is included in a separate manual “Troubleshooting Electric Vehicles”.

The manual part number is M7-001-69 and was provided on the original vehicle CD. A hard copy can be purchased from your authorized Taylor-Dunn distributor or can be downloaded from the Taylor-Dunn web site.

Wire Diagrams

The vehicle wiring diagrams are too large to be legible when printed at this size. A full size diagram (22 x 16) is included on the CD in PDF format. You can access the diagram from a button on the CD menu.

The diagram file names are:

Chassis Wire diagram # SCH-00026.pdf

Charger AC Cords:

⚠WARNING

Charger AC power source is High Voltage. Only personnel qualified for work high voltage AC power lines should repair the charger AC power cord. Improper repair or incorrect wiring may result in an electrical shock hazard causing severe bodily injury or death by electrocution.

If you are not familiar with standard AC power wiring, then refer repair to a qualified licensed electrician.

Depending on the charging system, two different color codes are used for the AC power source.

United States Standard 120 Volt:

- White - Neutral
- Black - Hot
- Green -Ground

European Standard:

- Blue - Neutral
- Brown - Hot
- Green/Yellow - Ground

Notes:

Illustrated Parts

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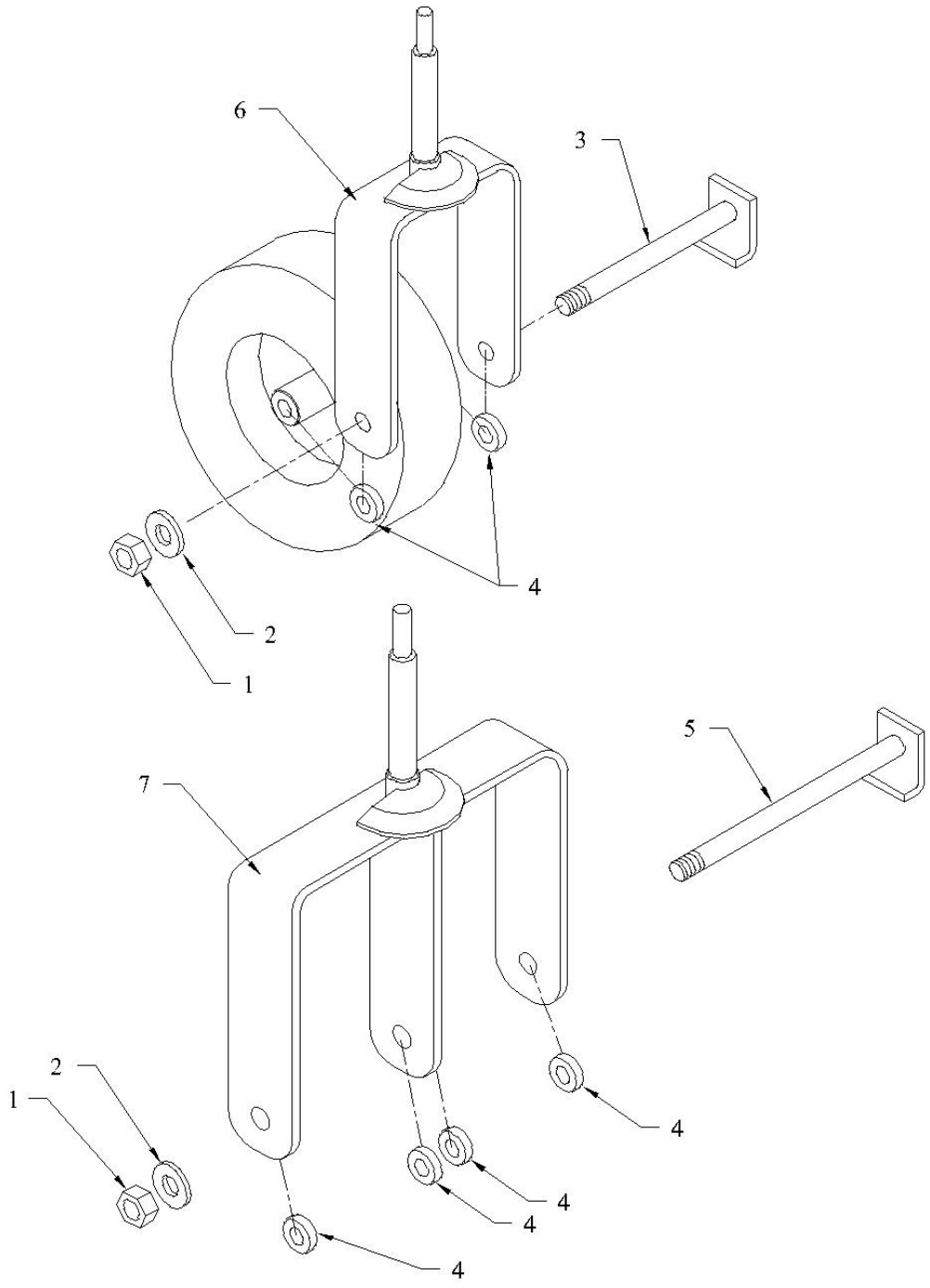
Axle (Front) and Fork

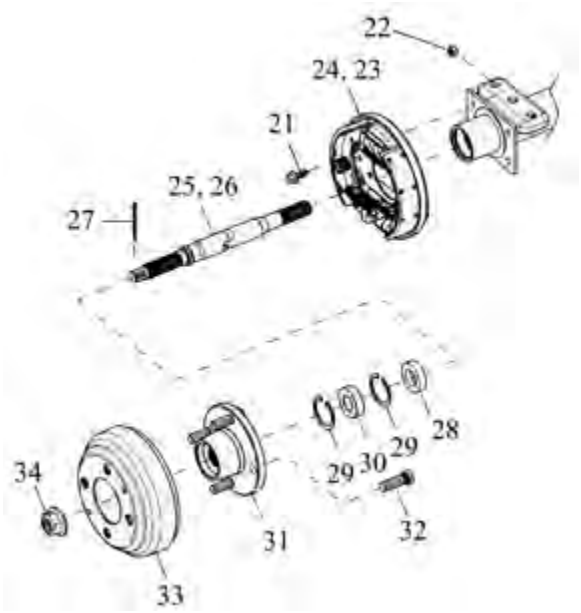


AXLE (FRONT) and FORK

Item No.	Part No.	Description	Qty
1	88-229-81	3/4NC Lock nut	1 or 2
2	88-228-61	3/4 SAE Flat washer	1 or 2
3	15-010-20	Axle, single wheel	1
4	16-010-00	Spacer	2 or 4
5	15-011-00	Axle, dual wheel	0 or 1
6	14-030-10	Fork, single wheel	0 or 1
7	14-032-10	Fork dual wheel	0 or 1

** - Not available at time of printing*

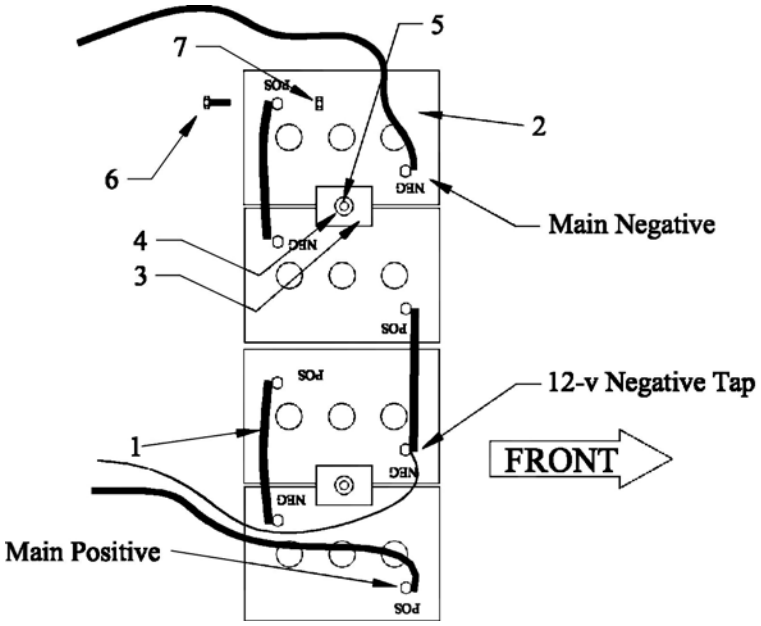
Axle (Rear)



AXLE (REAR)

Item No	Part No.	Description
21	*	Flange head screw
22	66-610-97	Lock nut
23	41-344-98	Brake assembly
24	41-344-99	Brake assembly
25	41-126-99	Axle shaft, Right
26	41-126-98	Axle shaft, Left
27	88-527-11	Cotter pin
28	45-303-20	Seal
29	45-303-10	Seal
30	80-480-20	Bearing, Ball
31	41-518-02	Hub, axle
32	66-610-28	Wheel stud
33	41-518-01	Brake drum
34	66-610-99	Lock nut

Batteries

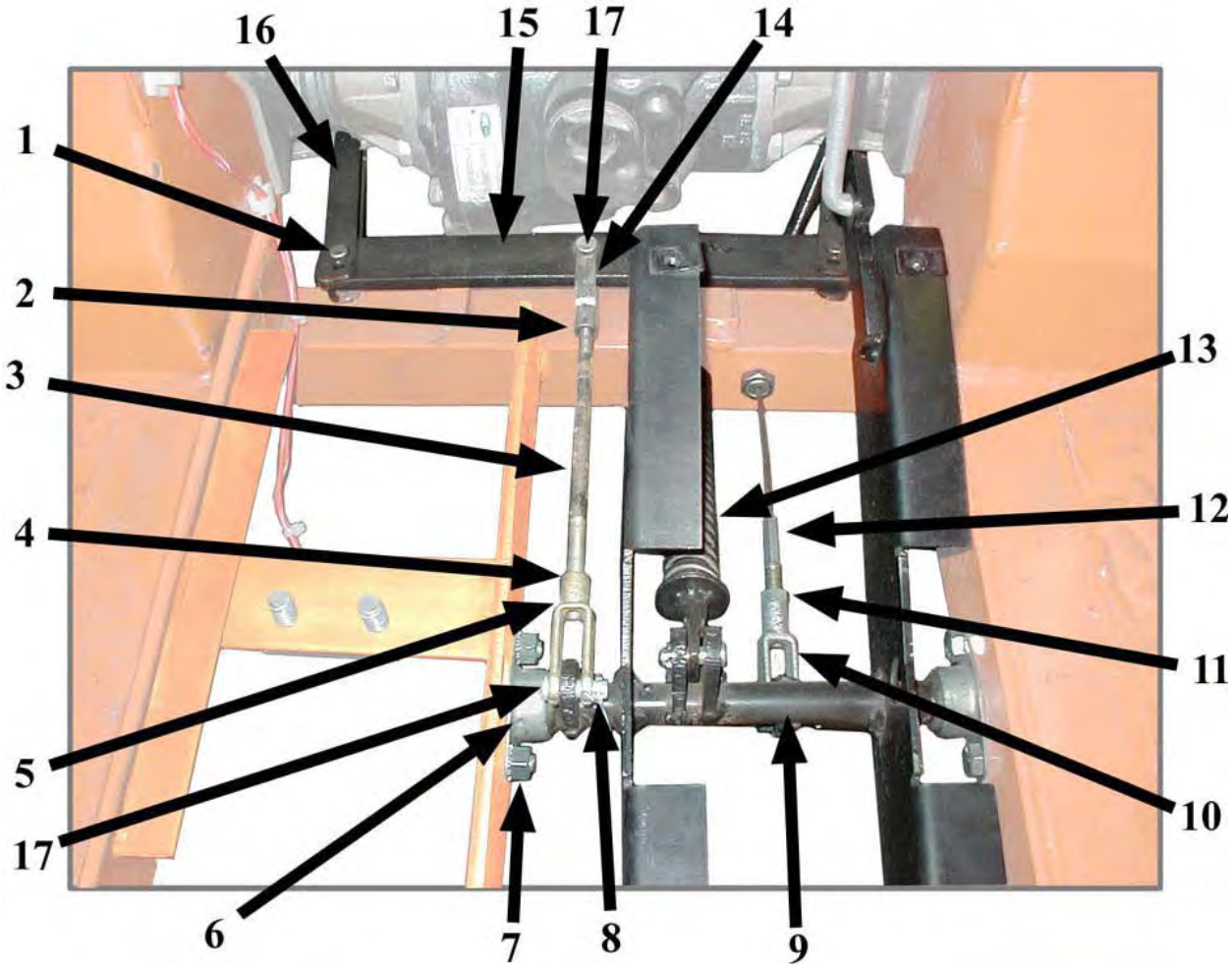


BATTERIES

Item No.	Part No.	Description	Qty
1	75-233-00	Battery jumper	*
2	77-042-00	217AH, T-105	*
	77-042-50	217AH, TD-217	*
	77-042-80	217AH, T-105 Moist charge (dry)	*
	77-044-00	230AH, T-125	*
	77-044-10	195AH, Mainenance free (Note: requires special charger)	*
	77-047-00	244AH, T-145	*
	77-047-50	250AH, TD-250	*
	77-047-80	244AH, T-145 Moist charge (dry)	*
	77-048-00	250AH, J-250	*
	77-048-80	250AH, J-250 Moist charge (dry)	*
	77-051-00	160AH Gell (Note: requires special charger)	*
3	50-243-10	Battery rod	*
4	50-250-00	Battery hold down	*
5	88-088-66	Flat washer, tin/lead plated	*
6	88-069-81	1/2NC Nylon lock nut	*
7	88-081-12	5/16NC x 1 Hex bolt, stainless steel	*
8	88-089-80	5/16NC Hex nut, stainless stell	*

* *Quantities depend on voltage configuration of vehicle.*

Brake Linkage

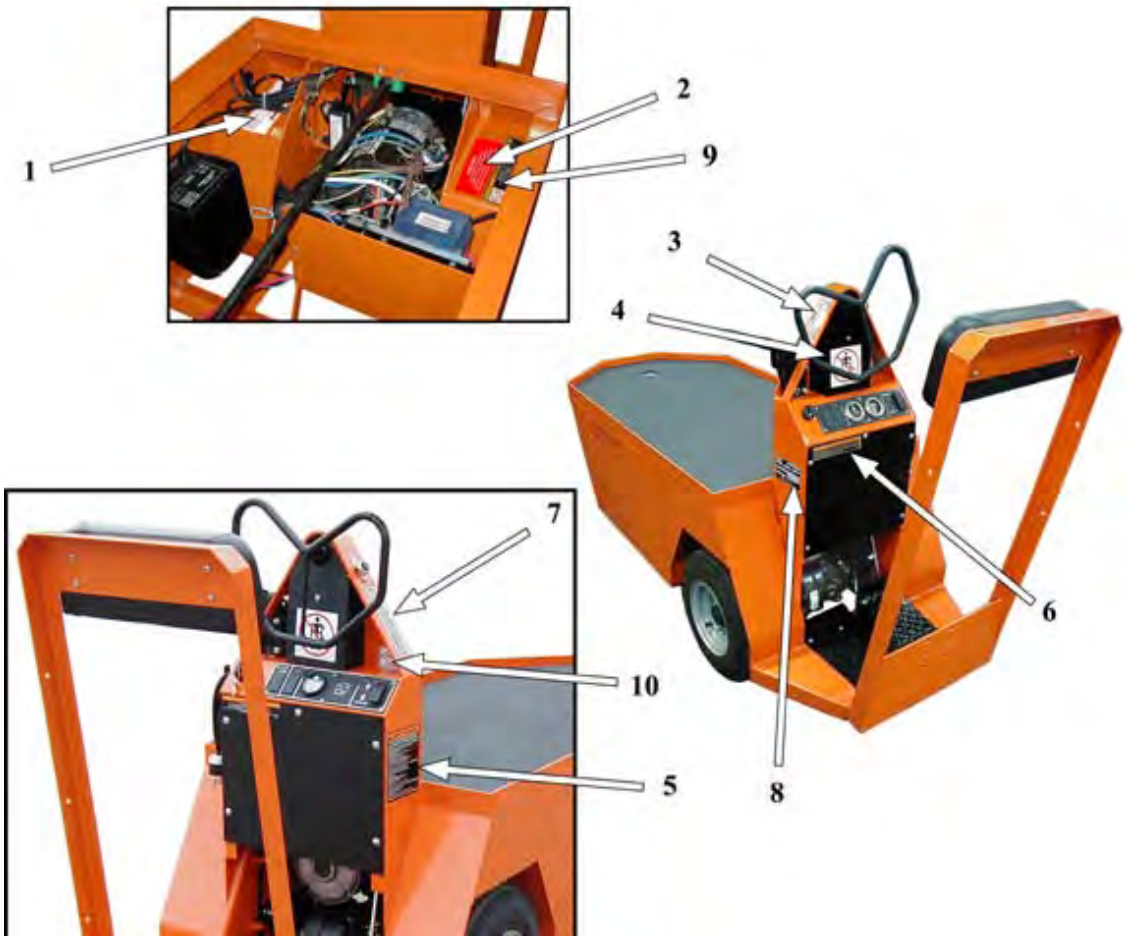


BRAKE LINKAGE

Item No.	Part No.	Description	Qty
1	96-773-00	Clevis pin	4
2	88-119-80	5/16NF Hex nut	1
3	50-002-30	Brake rod	1
4	97-202-50	5/16NF Nut, left thread	1
5	96-762-10	3/8 Clevis, left thread	1
6	80-410-20	Bushing assembly	2
7	88-109-81	3/8NC Lock Hex nut	4
	88-100-09	3/8NC x 3/4 Hex bolt	4
8	88-527-11	Cotter pin	6
9	00-150-61	Treadle weldment	1
10	96-763-00	Clevis	1
11	88-099-80	5/16NF Hex nut	1
12	96-820-25	Park brake cable	1
13	85-123-00	Spring	1
	00-150-25	Spring alighnment shaft	1
14	96-762-00	3/8 Clevis	1
15	02-100-01	Equalizer	1
16	50-002-31	Brake linnkage	4
17	96-772-00	3/8 x 1-1/8 Clevis pin	2
Not shown			
	51-340-30	Park brake handle	1

* - *Not available at time of printing*

Decals



DECALS

Item No.	Part No.	Description	Qty
1	94-313-00	Battery Warning	1
2	94-319-00	Battery Disconnect	1
3	94-382-00	Treadle operation	1
4	94-301-43	Arms and hand inside	1
5	94-313-20	Safety warning	1
6	94-384-01	Not a motor vehicle	1
7	94-384-14	Apply park brake	1
8	94-373-10	Data plate	1
9	94-384-17	Do not spray wash	1

Frame, Seat Cushions and Deck

FRAME, SEAT CUSHIONS and DECK

Item No.	Part No.	Description	Qty
1	30-703-00	Upper chain cover	1
2	90-501-00	Deck (standard)	1
3	79-511-00	Charger cord holder	1
	79-575-30	AC cord 8 foot	1
	79-530-00	Strain releif for AC cord	1
4	03-150-43	Lower chain cover	1
5	03-150-28	Treadle plate	1
6	03-150-94	Floorboard	1
7	90-000-00	Seat back cushion	1
8	88-837-11	Screw	4
9	88-065-09	1/4NC x 3/4 Truss head machine screw	12
Not shown			
	97-211-20	1/4 U-nut (for #9)	

* - *Not available at time of printing*

Hitches

Auto Coupling Hitch

Pintle Hitch

HITCHES

Item No.	Part No.	Description	Qty
	97-808-00	Automatic Coupling hitch	
	97-804-01	Pintle hitch	
	88-140-14	1/2NC x 1-1/2 Hex bolt	4
	88-149-80	1/2NC Hax nut	4
	88-148-62	1/2 Split lock washer	4

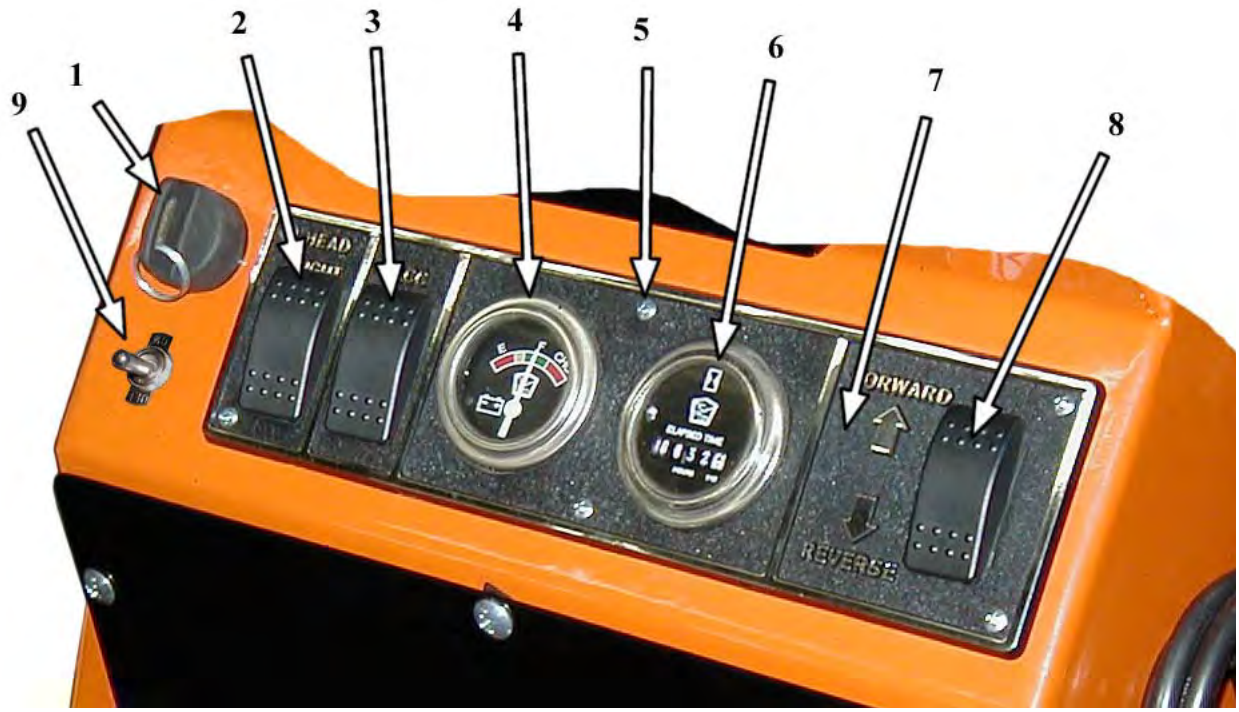
Head and Tail Lights (optional)

Illustration not available

HEAD and TAIL LIGHTS

Item No.	Part No.	Description	Qty
	72-005-00	Head light	1 or 2
	72-072-00	Replacement head light bulb	
	72-022-00	Tail lights	1 or 2
	03-150-91	Tail light housing, left	1
	03-150-92	Tail light housing, right	1
	72-022-51	Tail light grommet	1 or 2
	75-106-20	Harness	1

Instrument Panel (dash)

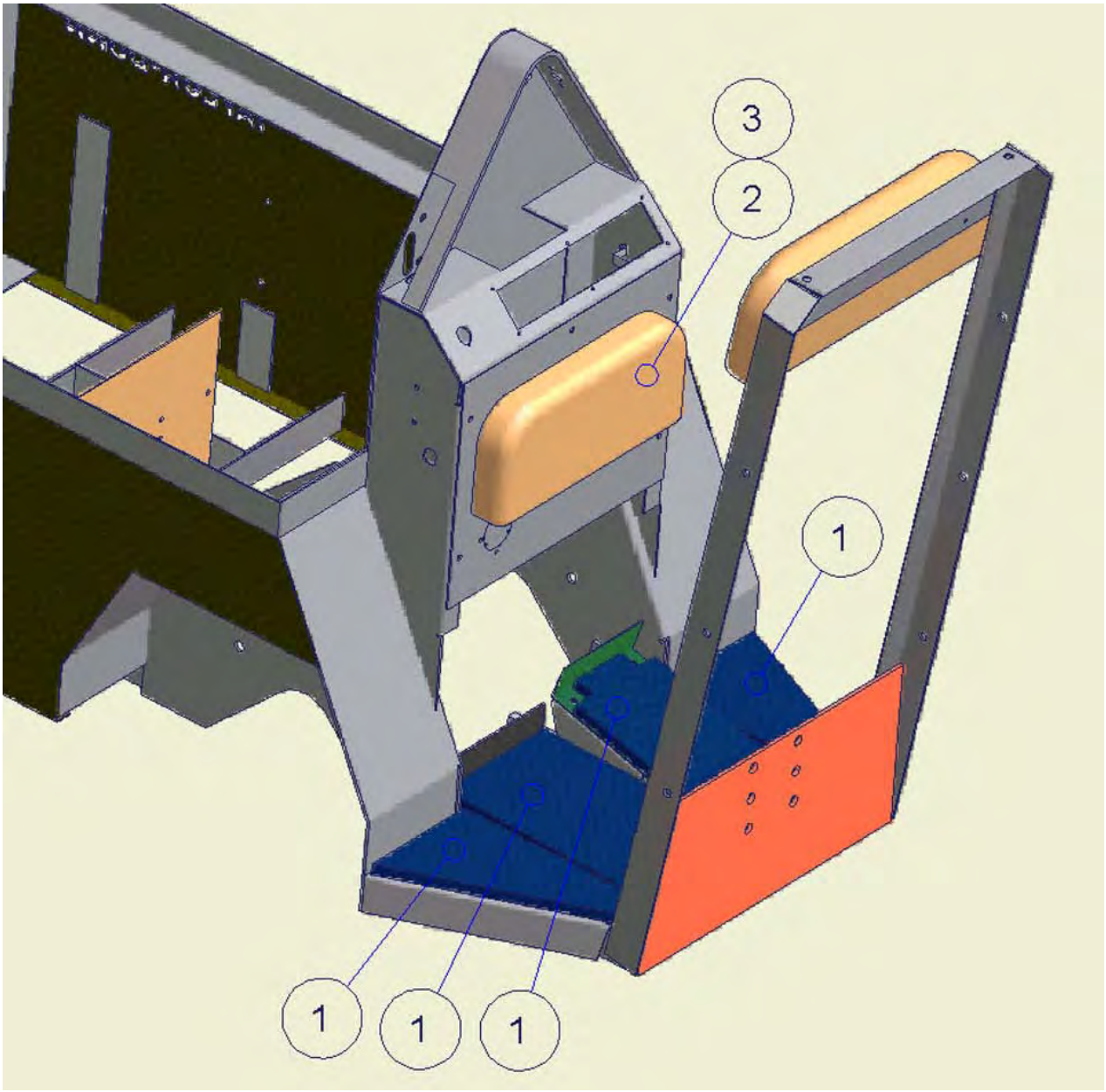


INSTRUMENT PANEL

Item No.	Part No.	Description	Qty
1	71-120-10	Key switch (standard)	1
	71-119-99	Spacer for key switch	1
	71-120-90	Replacemet key for #1 (key #2399)	1
	71-121-20	Key switch (keyed unalike)	0 or 1
2	71-039-11	Accesory switch (SPST)	0 or 1
3	71-039-11	Accesory switch (SPST)	0 or 1
4	74-009-10	Battery Status Indicator	1
5	88-817-07	#8 x 1/2 Oval head sheet metal screw	6
6	74-000-00	Hour meter	1
7	94-304-13	Dash panel	1
8	71-039-02	Forward /Reverse switch	1
9	71-100-00	Toggle switch	1
Not shown			
	71-501-00	Horn switch	1

** - Not available at time of printing*

Knee Pad and Floor Mats (optional)



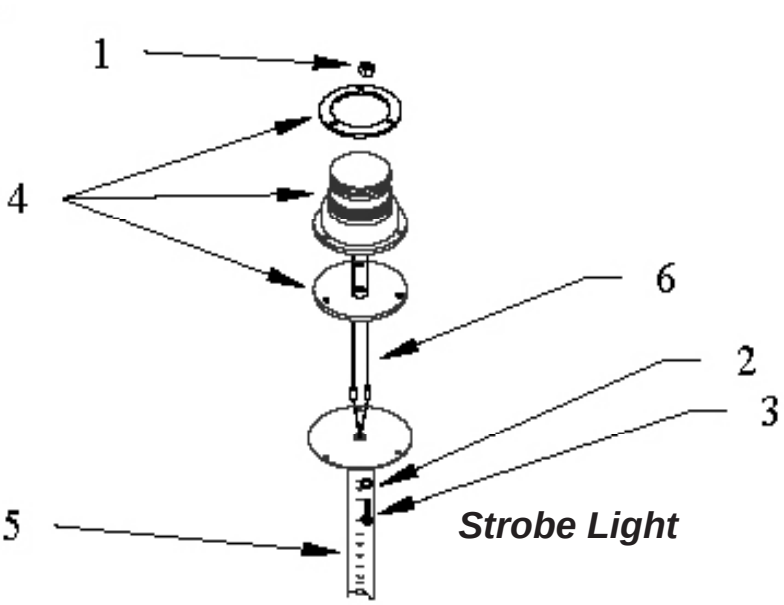
KNEE PAD and FLOOR MATS (Optional)

Item No.	Part No.	Description	Qty
1	01-103-20	Floor mats	1
2	01-159-10	Knee pad	1
3	88-837-11	#14 x 1 Phillips head screw	2
Not shown			
	94-440-00	Adhesive for floor mats (spray can)	

** - Not available at time of printing*

Ladders and Strobe Light (optional)

Ladder



Strobe Light

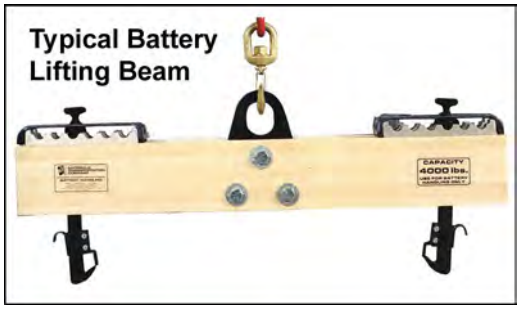
LADDER

Item No.	Part No.	Description	Qty
-	97-813-00	Ladder, 4-step	1
-	88-082-11	5/16NC x 1 Carriage bolt	8
-	88-088-62	5/16 Split lock washer	8
-	88-089-80	5/16NC Hex nut	8

LIGHT (STROBE)

Item No.	Part No.	Description	Qty
1	88-029-80	#8-32 Hex nut	3
2	88-028-62	#8 Split lock washer	3
3	88-025-06	#8-32 x 1/2 Truss head machine screw	3
4	72-023-20	Strobe light	1
5	72-451-21	Mounting pole	1
6a	75-618-00	#18 Black wre	
6b	75-618-01-09	#18 Black/White wire	
Not shown			
	98-603-00	Grommet (at base of pole)	1
	72-023-21	Replacement bulb	

Lift Out Battery Box (optional)

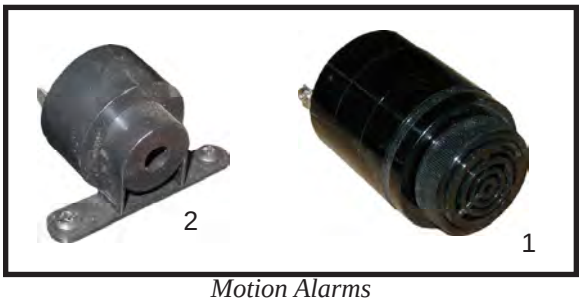


LIFT OUT BATTERY BOX

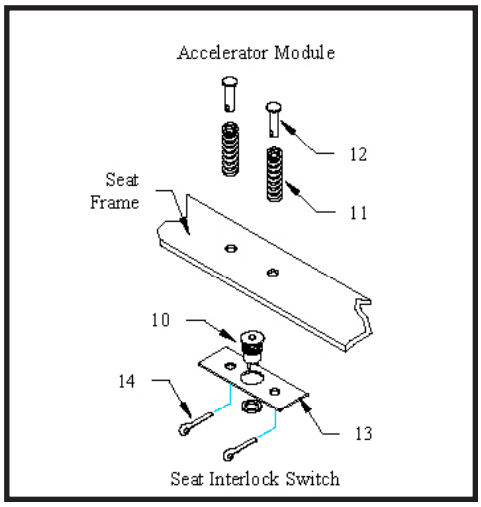
Item No.	Part No.	Description	Qty
-	75-077-10	Harness to battery	2
-	75-077-14	Harness to vehicle	1
-	77-983-00	Lift out battery box	2

** - Not available at time of printing*

Miscellaneous Electrical



Motion Alarms



Miscellaneous Wire Harness Clamps

Battery Status Meters

Hour Meters

MISCELLANEOUS ELECTRICAL

Item No.	Part No.	Description	Qty
1	73-005-05	Reverse Warning alarm	1
2	96-650-01	Wire Harness Clip, stick on	
3	96-642-00	Wire harness Clip, push mount	
5	71-501-00	Horn Switch	1
10	71-102-10	Seat interlock Switch	1
11	85-030-00	Spring	2
12	96-773-10	Clevis Pin	2
13	02-610-18	Mounting Plate	1
14	88-527-11	Cotter Pin	2
15	96-640-00	Clamp, 3/16 Push Mount	
16	96-629-80 (not shown)	Clamp, Rubber Lined 3/16 ID	
	96-630-00 (not shown	Clamp, Rubber Lined 5/8 ID	
	96-630-50 (not shown	Clamp, Rubber Lined 5/8 ID (.265 mounting hole)	
	96-631-00 (not shown	Clamp, Rubber Lined 3/4 ID	
	96-631-10 (shown)	Clamp, Rubber Lined 1.0 ID	
	96-631-15 (not shown	Clamp, Rubber Lined 1-1/2 ID	
17	96-624-00	Clamp, 1/4 Jiffy Clip	
	96-625-00 (not shown)	Clamp, 5/16 Jiffy Clip	
18	96-626-00	Clamp, 7/8 Jiffy Clip	
19	74-009-10	24v Analog Battery Status Meter	
20	74-009-12	24v Digital Battery Status Meter (optional)	
21	-	-	-
22	74-000-00	Hour meter (optional)	
Not Shown			
	75-152-60	Chassie Control Harness	1
	75-152-07	Power Harness	1
	75-152-48	Harness, control panel	1
	98-599-15	Plastic grommet for 1.75 hole	
	98-599-20	Plastic Grommet for 2.5 hole	
	73-012-40	DC-DC converter (optional)	1
	71-127-20	Brake Light Switch (optional)	1
	75-148-80	Harness for Pole Mounted Strobe Light (optional)	1
	75-107-10	Portable Charger Harness (24/36V - optional; 48V - std)	1
	JF3-86181-00-00	Portable Charger Receptacle (24/36V - optional; 48V - std)	1
	71-124-00	Emergency Battery Disconnect Switch (optional)	1

** - Not available at time of printing*

Motor

Motors, Separately Excited Field

ITEM #	DESCRIPTION	Motor Spec # / Motor Part #					
		DV1-4002 70-054-40[1]	XP1789 or DY24001 70-054-41	DV1-4003 70-057-40	XP-1786 or DD3-4004 70-052-40	203-21-4001 or XP1820A 70-072-41	DY8-4002 70-054-42
1	Front housing	70-421-10	70-421-10	70-421-10	*	*	70-421-10
2	Armature	70-400-00	70-400-00	70-400-10	*	*	70-412-30
3	Field assembly	70-209-30	*	70-209-40	*	*	*
4	Brush spring	70-412-20	70-412-20	85-403-00	70-412-20	85-403-00	70-412-20
5	Brush holder	70-170-00	70-170-00	70-173-00	70-170-00	70-173-00	70-170-00
6	Brush	70-109-00 (2)	70-109-00 (2)	70-170-10 (8)	70-109-00 (2)	70-170-10 (1)	70-109-00
7	Bearing retainer	70-417-00	70-417-00	70-417-00	70-417-00	*	70-417-00
8	Bearing	80-212-00	80-212-00	80-212-00	80-212-00	*	80-212-00
9	Rear housing	70-421-20	70-421-20	70-421-30	70-421-20	*	*
10	Brush cover	70-421-00	70-421-00	70-421-40	70-421-00	*	70-421-00
11	Dust cap	98-930-00	95-930-00	95-930-00	95-930-00	-	-
Not shown	1-1/8” lg. grade 8 Mounting bolt	88-067-17	88-067-17	88-067-17	88-067-17	-	88-067-17
	2” lg. Grade 8 mounting bolt	88-067-22	88-067-22	88-067-22	88-067-22	-	88-067-22
*		Not available at time of printing					
Note 1:		The original motor provided under part number 70-054-40 has been discontinued. It has been replaced by 70-054-41. The 70-054-41 motor has slightly more power & torque. The 70-054-40 motor can be directly replaced with the 70-054-41 motor. The 70-054-41 motor will perform with the original parameters in the Sevcon® controller; however the vehicle will have about a 15% reduction in top speed. To take full advantage of the increased performance of the 70-054-41 motor, new parameters must be programmed into the Sevcon® controller. Please contact Taylor-Dunn® Manufacturing for details on returning the controller for re-programming.				

** - Not available at time of printing*

Signet® Charger

Model HBS series charger shown

Note: There are no user serviceable components inside the charger

Note: The charger AC cord is an intergral part of the charger. When replacing the charger, do not cut and splice the AC cord. ***Cutting the AC cord will void the charger warranty.***

Note: The Signet model HBS series charger replaces all previous Signet models.

Model HBS for Flooded Batteries	
PART #	DESCRIPTION
79-303-41	36 volt Charger assembly (see note)
79-309-42	48 volt charger assembly (see note)

Model HB for Flooded Batteries	
PART #	DESCRIPTION
79-302-20	24 volt Charger Assembly (see note)
79-303-40	36 volt Charger assembly (see note)
79-309-40	48 volt charger assembly (see note)

Model HBS for GEL Batteries	
PART #	DESCRIPTION
79-303-42	36 volt Charger assembly (see note)
79-309-43	48 volt charger assembly (see note)

Model HB for GEL Batteries	
PART #	DESCRIPTION
*	24 volt Charger Assembly (see note)
K4G-CH-003	36 volt Charger assembly (see note)
79-309-41	48 volt charger assembly (see note)

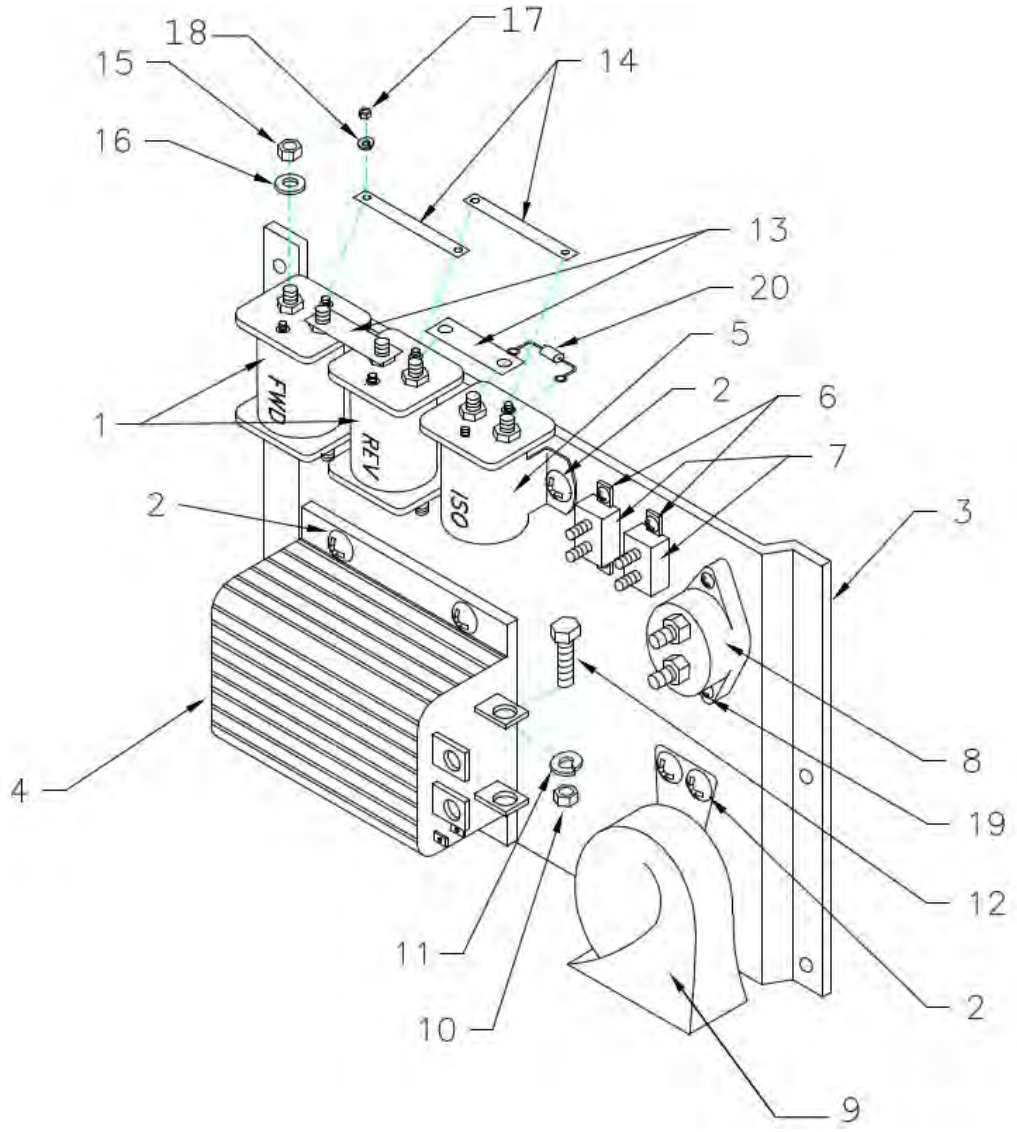
Note: The harness connectors and AC plug are not included with the charger.

QTY	PART #	DESCRIPTION
2	75-318-20	Butt splice
2	75-320-51	Knife connector
1	76-200-00	AC plug, 115v domestic

Typical Data Plate (your data plate may be different)

** - Not available at time of printing*

Speed Control Panel

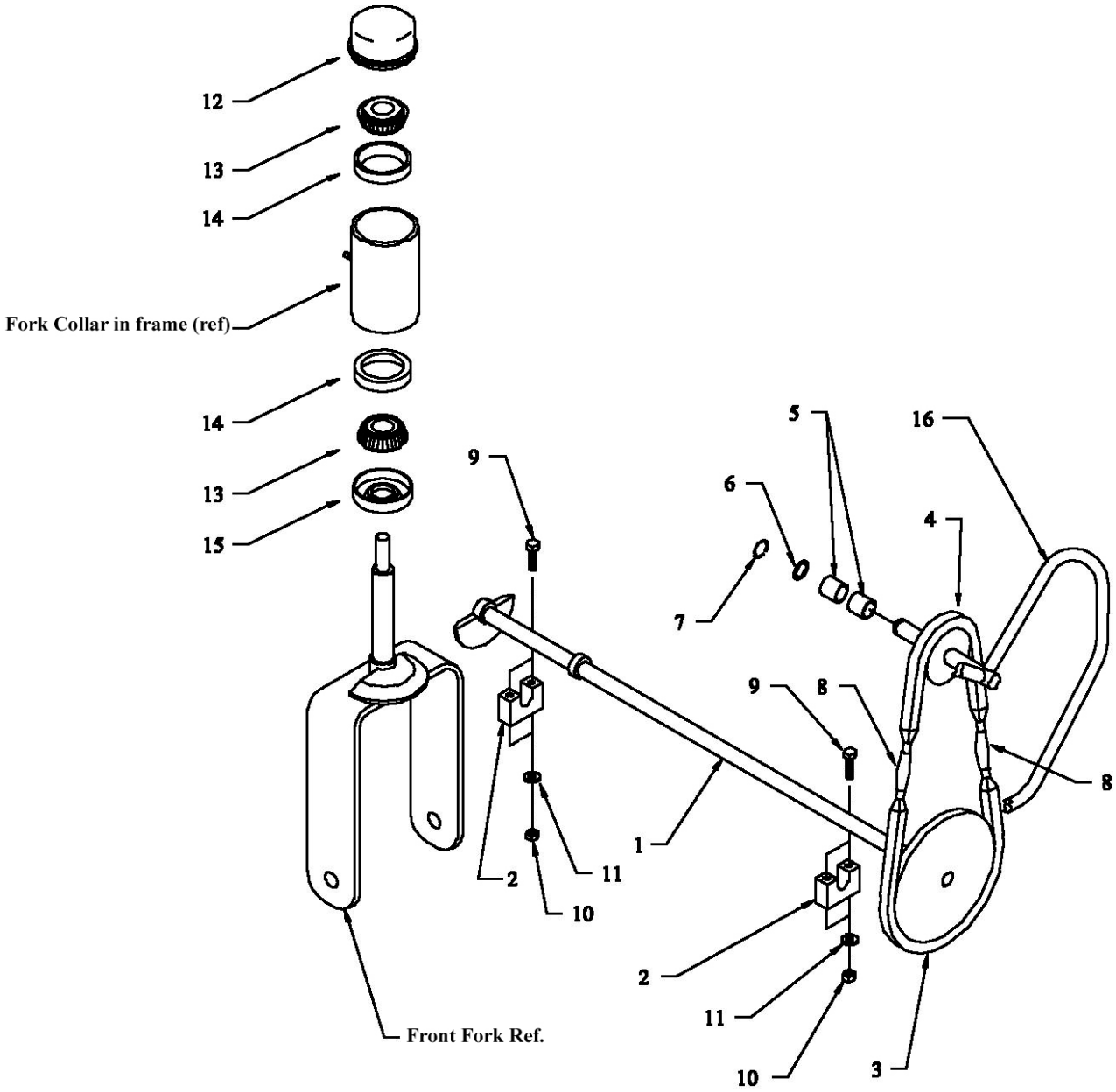


SPEED CONTROL PANEL

Item No.	Part No.	Description	Qty
1	72-501-43	Forward or Reverse Solernoid	2
2	88-838-06	Sheet Metal Screw # 14 x 1/2”	10
3	01-534-80	Panel, Control Mounting	1
4	62-204-00	Speed Controller, 275	1
5	72-501-42	ISO Solernoid	1
6	88-818-06	Sheet Metal Screw # 8 x 1/2”	4
7	79-840-00	Circuit Breaker, 10 amp	2
8	79-844-00	Circuit Breaker, 135 amp	1
9	73-004-20	Horn, 12 V	1
10	88-089-80	Nut, 5/16 NC	4
11	88-088-62	Lock Washer 5/16	4
12	88-088-11	Bolt, 5/16 NC x 1” Hex Hd	4
13	61-838-41	Bus Bar, 5/8 x 1-1/2 Hole Centers	2
14	61-838-42	Bus Bar, 3/8 x 2-5/8 Hole Centers	2
15	88-099-91	Nut, 5/16 NF Thin Pattern	10
16	88-088-63	Lock Washer 5/16” Internal Tooth	10
17	88-049-80	Nut, #10-32	5
18	88-048-62	Lock Washer, # 10	5
19	88-817-09	Sheet Metal Screw # 8 x 3/4”	2
20	78-302-50	Resistor,250 ohm, 5 watt	1
Not Shown			
	75-148-25	Harness, Control Panel	1
	75-149-25	Harness, Power Control Panel	1
	75-148-77	Harness, Control Vehicle	1

** - Not available at time of printing*

Steering Linkage

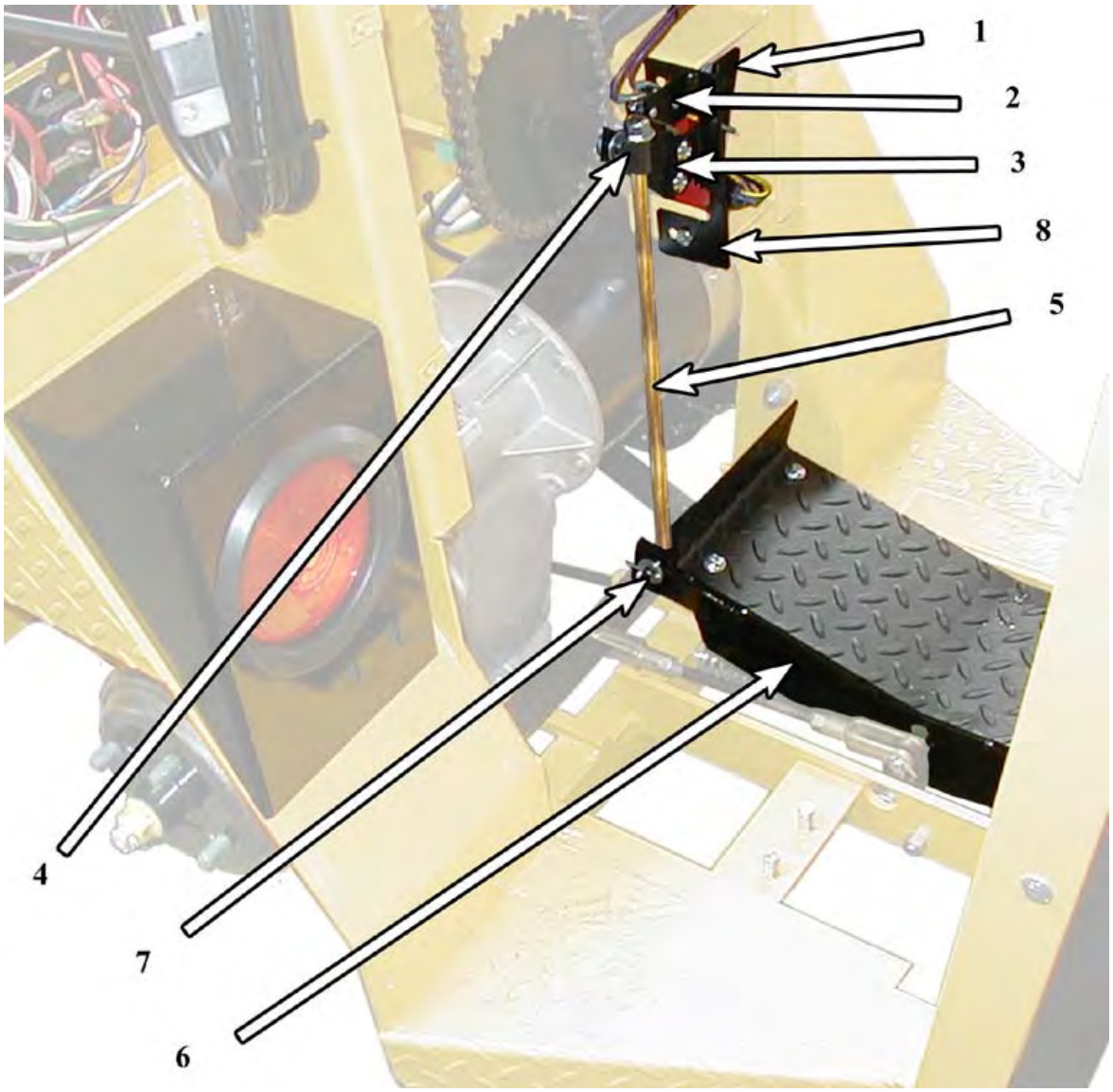


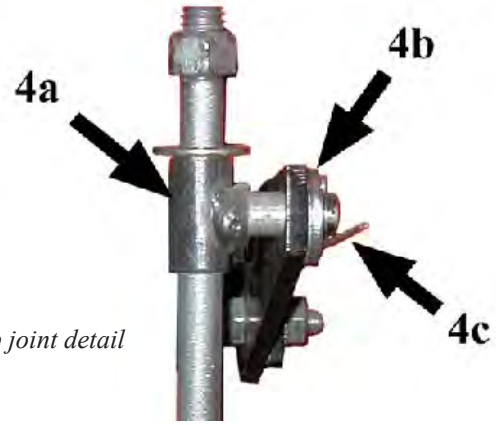
STEERING LINKAGE

Item No.	Part No.	Description	Qty
1	20-053-40	Steerng shaft, standard bed	0 or 1
2	84-005-00	Pillow block	2
3	30-249-00	Streering chain	1
4	30-249-00	Streering chain	1
	30-400-00	Steering chain master link	4
5	32-032-10	Steering bushing	2
6	88-048-63	Washer	1
7	88-840-09	Steering wheel retainer	1
8	96-900-00	Turn buckle	2
9	88-080-16	5-16NC x 2 Hex bolt	4
10	88-089-81	5/16NC Lock nut	4
11	88-068-60	1/4 Cut flat washer	4
12	92-105-00	Bearing cap	1
13	80-011-10	Bearing	2
14	80-102-00	Race	2
15	45-307-00	Grease seal	1
16	19-008-00	Cloverleaf steering wheel	1
	19-007-20	Round steering wheel	1
Not shown			
	19-159-00	Steering shaft for round steering wheel	1
	88-199-82	Steering wheel nut	1
	97-100-00	Woodruff key for round steering wheel	1
	88-228-60	3/4 Cut flat washer for fork spindle	1
	88-229-86	3/4NC Thin pattern lock nut for fork spindle	1

** - Not available at time of printing*

Throttle Linkage





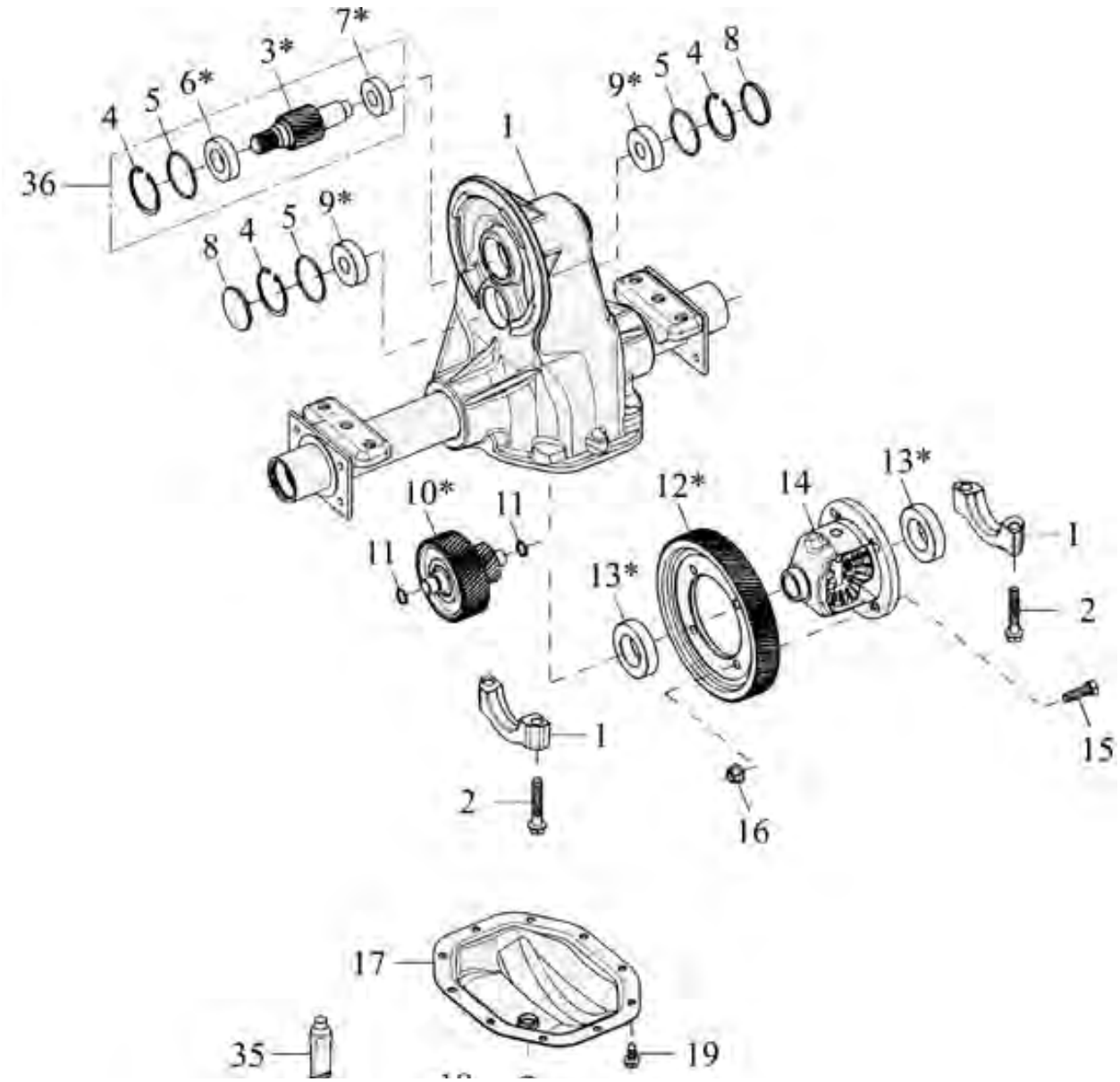
Slip joint detail

THROTTLE LINKAGE, SC 1-00

Item No.	Part No.	Description	Qty
1	62-033-48	Accelerator module	1
2	71-127-20	Brake light switch	1
3	02-150-11	Accelertor module lever	1
4a	50-481-00	Slip joint	1
4b	88-108-61	3/8 SAE Flat washer	1
4c	88-527-11	Cotter pin	1
5	50-123-31	Throttle link	1
	88-109-81	3/8NC Lock nut	1
	88-108-61	3/8 SAE Flat washer	1
6	See brake linkage	Treadle	1
7	88-527-11	Cotter pin	1
	88-108-61	3/8 SAE Flat washer	1
8	00-150-26	Bracket, Brake light switch	1

** - Not available at time of printing*

Transmission

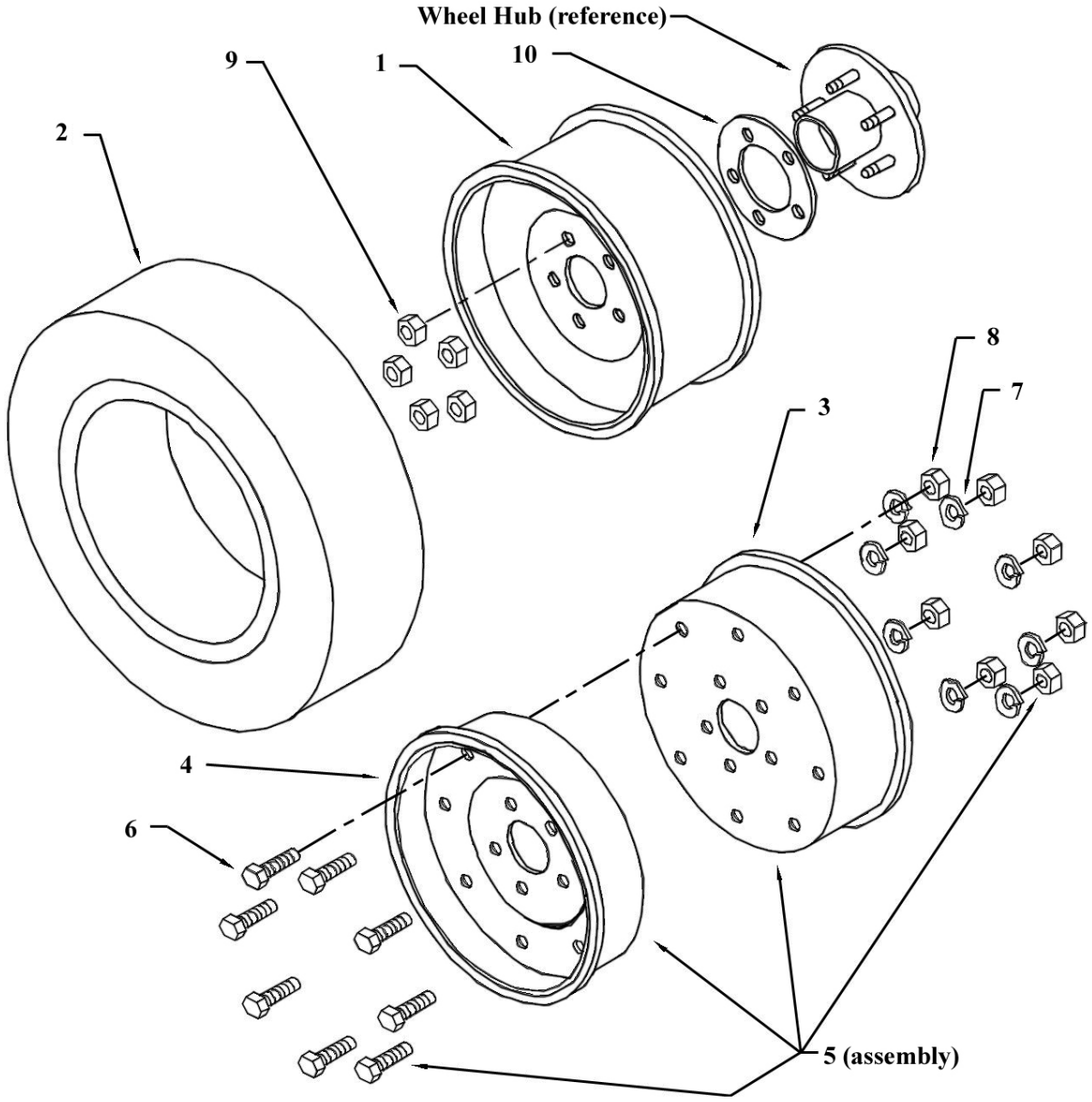


TRANSMISSION 4S-150-10

Item No.	Part No.	Description
1	Special order	Housing
2	96-330-10	Bolt
3	Order kit	Input shaft
4	88-840-12	Snap ring
5	80-715-10	‘O’ ring
6	80-480-15	Bearing
7	80-480-10	Bearing
8	41-973-00	Plug
9	66-610-35	Bearing
10	*	Intermediate gear
11	80-715-00	‘O’ rimg
12	Order kit	Final Gear
13	80-480-00	Bearing
14	66-611-04	Differential assy.
15	*	Bolt
16	*	Nut
17	66-611-15	Cover plate
18	41-127-94	Fill plug
19	66-610-68	Hex tap screw
35	94-430-04	Gasket sealer
36	*	Input gear kit
37	31-265-00	Gear set, 12.44
38	80-480-60	Bearing set

** - Not available at time of printing*

Wheels and Tires (page 1)

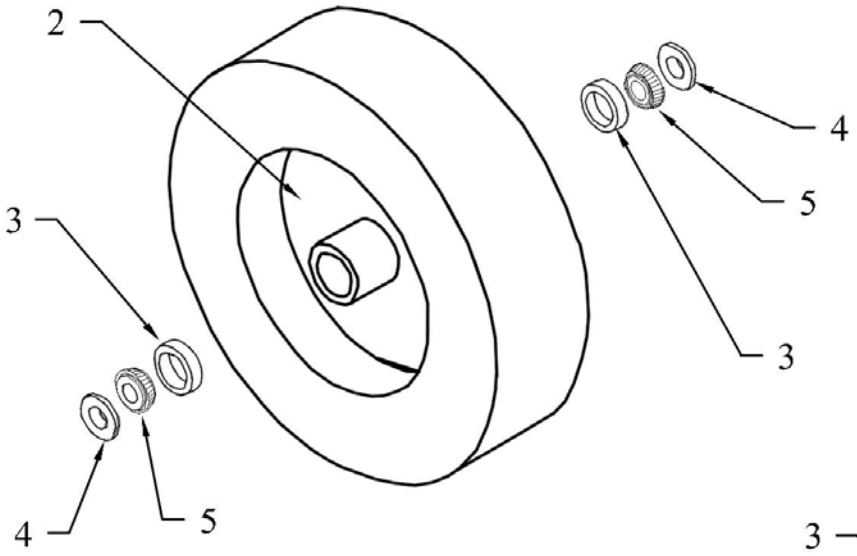


WHEELS and TIRES

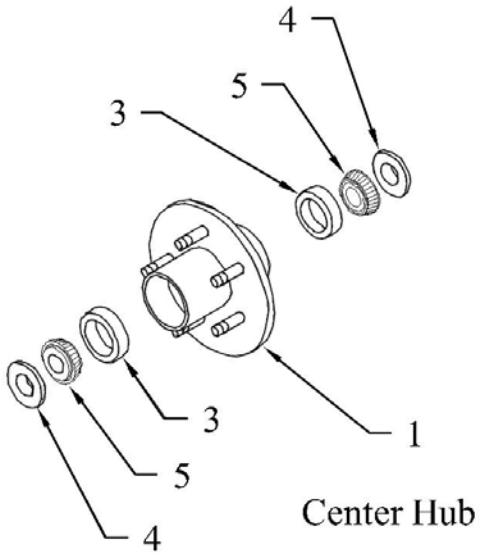
Item No.	Part No.	Description	Qty
Wheels			
1	12-012-00	5 x 8” Tubeless	
	12-054-00	11-.25 Diameter Cast Iron	
Tires			
2	10-075-00	4.80 x 8 LR B Pneumatic	
	10-076-00	4.80 x 8 LR C Pneumatic	
	10-261-00	16.25 x 11.25 Solid rubber	
	10-074-00	4.00 x 8 Man-Toter, ribbed	
	10-074-10	4.00 x 8 Man-Toter, ribbed, non-marking	
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)	
5a	12-042-20	Wheel Assembly, 3.75 bead width (includes #3a, #4a, #6, #7, #8	
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	
	13-734-11	4.80 x 8 LR B Split Rim Pneumatic	
	13-739-10	4.80 x 8 LR C Split Rim Pneumatic	
	13-734-40	4.00 x 8 Man-Toter	
	13-734-41	4.00 x 8 Man-Toter, non-markin	
	13-954-10	16.25 x 4 x 11.25 Solid Rubber, Cast Iron Wheel	
	13-576-10	4.80 x 8 with center hub bearings	

** - Not available at time of printing*

Wheels and Tires (page 2)



Wheel With Intergral Center Hub



Center Hub

WHEELS and TIRES

Item No.	Part No.	Description	Qty
1	12-120-00	Bolt on center hub (includes #3, 4, 5)	1
2	13-001-00	Wheel with intergral center hub (includes #3, 4, 5)	1
3	80-105-00	Race	2
4	45-308-00	Grease seal	2
5	80-015-00	Bearing	2

Appendixes

Contents

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APPENDIX A: TOOL LIST

The tools shown here are generic for servicing Taylor-Dunn vehicles. Not all tools will be required for servicing this vehicle.

62-027-32: Throttle Module Analyzer

Tests the throttle module in or out of the vehicle

43-201-50: Pinion Seal Installation Tool

Used to install the pinion seal on all vehicles equipped with the Power Traction primary reduction and a pinion brake or speed sensor.

62-027-00: Test Light

Used for testing electrical circuits. Switchable for 12, 24, 36, 48 volt systems.

Required to complete troubleshooting provided in the vehicle service manuals.

62-027-61 and -62: Sevcon System Handset

Diagnostics and adjustments (-62 only) of the Sevcon Power Pak and Micro Pak control systems.

62-027-64 and -65: Curtis AC System Handset

Diagnostics and adjustments (-65 only) of the Curtis AC control system.

96-500-43: PMT/C Meter Reset Module

Required to reset the PMT/C maintenance meter (special order option).

41-532-50: Chain Case Centering Tool

Used to center the chain case cover on all vehicles equipped with the Power Traction primary reduction and a pinion brake or speed sensor. Includes instructions.

Molex # 11-300-02: Pin Removing Tool

Removes 0.062 diameter pins from Molex rectangular harness connectors. Not available from Taylor-Dunn. Purchase from any local electronics distributor.

Molex # 11-300-06: Pin Removing Tool

Removes 0.093 diameter pins from Molex rectangular harness connectors. Not available from Taylor-Dunn. Purchase from any local electronics distributor.

75-442-55: Pin Removing Tool

Removes pins from Molex Mini-Fit harness connectors.

41-350-13: Disc Brake Boot Installation Tool

Assists in installing the rubber boot onto the disc brake piston.

70-440-55: Pin Removing Tool

Removes pin from Amp circular harness connectors.

77-200-00: Hydrometer

Used for testing battery electrolyte. Illustration is of a typical hydrometer, actual hydrometer type may vary.

72-201-00: Battery Filler

Used to safely add water to batteries. Equipped with splash guard and auto-shutoff when cell is full.

96-500-48: GT Drive Oil Fill Plug Tool

Used to remove the oil fill plug on GT drives. It is used with a 3/8” drive extension (not included).

75-089-00: Throttle Module Test Harness

Used in conjunction with a volt meter to test the throttle module. The module must be installed in a working control system.

Note: Part # 62-027-31 includes instructions

APPENDIX B: SUGGESTED TORQUE LIMITS

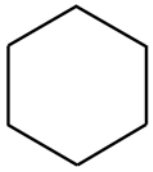
HARDWARE IDENTIFICATION

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

The grade of a metric bolt is cast directly on the head. Below is an example of a 10.9. The location and style of the text will vary.

Other Bolts

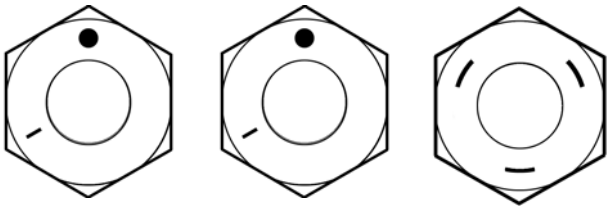
Truss Head, grade 2

Carriage Bolt, grade 2 (unless marked as above)

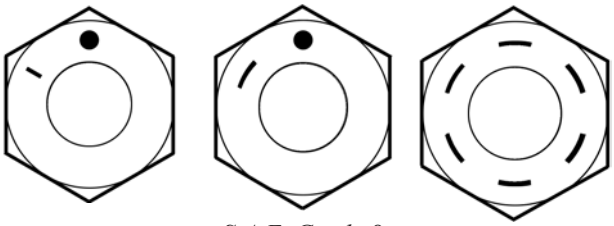
*Not available at time of printing

Hex Nuts

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



S.A.E. Grade 5



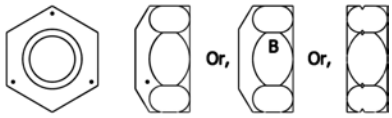
S.A.E. Grade 8

Metric Nuts

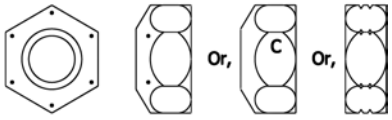
Hex Lock Nuts (stover)

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

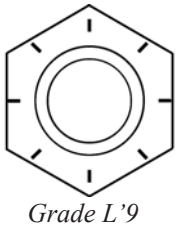
Note: Nuts with no markings are to be treated as S.A.E. Grade A



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

*Not available at time of printing

Generic Torque Values

All torque values are for clean dry zinc plated threads in noncritical steel assemblies of the same hardess specification. Reduce torque approximately 10-15% for lubricated threads.

Refer to the service section assembly procedure for critical torque values.

Imperial (inch), Foot Pounds

		Grade, SAE			
Dia.	Pitch	2	5	8	L9
#4	40	*	*	*	*
#6	32	*	*	*	*
#8	32	*	*	*	*
#10	32	*	*	*	*
#12	32	*	*	*	*
1/4	20	5.5	8.5	12.5	11
	28	6.5	10.5		
5/16	18	12.0	17.5	24.5	22
	24	12.5	19.0	*	*
3/8	16	20	30	43	40
	24	22.5	33	50	45
7/16	14	27	50	70	65
	20	36	55	77	70
1/2	13	49	75	106	95
	20	55	85	120	110
9/16	12	70	109	153	140
	18	78	121	171	160
5/8	11	97	150	212	195
	18	110	170	240	225
3/4	10	172	275	376	350
	16	192	297	420	390
7/8	9	278	429	593	565
	14	306	473	818	625
1	8	416	644	909	850
	14	466	721	1018	930
1-1/8	7	590	794	1287	1700
	12	662	891	1444	1850
1-1/4	7	832	1120	1817	2950
	12	922	1241	2012	3330

Imperial (inch), Newton Meters

		Grade, SAE			
Dia.	Pitch	2	5	8	L9
#4	40	*	*	*	*
#6	32	*	*	*	*
#8	32	*	*	*	*
#10	32	*	*	*	*
#12	32	*	*	*	*
1/4	20	7.4	11.5	16.9	14.9
	28	8.8	14.2		
5/16	18	16.2	23.7	33.2	29.8
	24	16.9	25.8	*	*
3/8	16	27.1	41	58	54
	24	30.5	45	68	61
7/16	14	37	68	95	88
	20	49	75	104	95
1/2	13	66	102	144	129
	20	75	115	163	149
9/16	12	95	148	614	190
	18	106	164	232	217
5/8	11	132	203	287	264
	18	149	230	325	305
3/4	10	233	373	510	475
	16	260	403	569	529
7/8	9	377	582	804	766
	14	415	641	1109	847
1	8	564	873	1232	1152
	14	632	978	1380	1261
1-1/8	7	800	1076	1744	2304
	12	897	1208	2364	2508
1-1/4	7	1128	1518	2463	4000
	12	1250	1682	2727	4514

Conversion Formulas:

Foot Pounds = Newton Meters x 0.737562149
Newton meters = Foot Pounds x 1.355817948

*Not available at time of printing

All torque values are for clean dry zinc plated threads in noncritical steel assemblies of the same hardess specification. Reduce torque approximately 10-15% for lubricated threads.

Refer to the service section assembly procedure for critical torque values.

Metric, Newton Meters

		Grade, N-m			
Dia.	Pitch	4.6	8.8	10.9	12.9
3	0.50	0.51	*	*	*
4	0.70	0.95	3.1	*	*
5	0.80	2.28	6.1	*	*
6	1.00	3.92	10.4	15.5	*
8	1.00	*	27.0	*	*
	1.25	9.48	25.0	37.0	*
10	1.00	*	57.0	*	*
	1.25	*	54.0	*	*
	1.50	19.1	51.0	75.0	*
12	1.25	*	96.0	*	*
	1.50	*	92.0	*	*
	1.75	32.6	87.0	160	*
14	1.50	*	150	*	*
	2.00	51.9	140	205	*
16	1.50	*	*	*	*
	2.00	79.9	215	310	*
18	1.50	*	*	*	*
	2.00	*	*	*	*
	2.50	110	300	*	*
20	1.50	*	*	*	*
	2.00	*	*	*	*
	2.50	156	430	*	*
22	1.50	*	*	*	*
	2.00	*	*	*	*
	2.50	211	580	*	*
24	2.00	*	*	*	*
	3.00	270	740	*	*
27	3.00	*	*	*	*
	3.00	398	*	*	*
30	2.00	*	*	*	*
	3.50	540	*	*	*

Metric, Foot Pounds

		Grade, N-m			
Dia.	Pitch	4.6	8.8	10.9	12.9
3	0.50	0.38	*	*	*
4	0.70	0.7	2.3	*	*
5	0.80	1.7	4.5	*	*
6	1.00	2.9	7.7	11.4	*
8	1.00	*	19.9	*	*
	1.25	7	18.4	27.3	*
10	1.00	*	42	*	*
	1.25	*	40	*	*
	1.50	14.1	38	55	*
12	1.25	*	71	*	*
	1.50	*	68	*	*
	1.75	24	64	118	*
14	1.50	*	111	*	*
	2.00	38	103	151	*
16	1.50	*	*	*	*
	2.00	60	158	229	*
18	1.50	*	*	*	*
	2.00	*	*	*	*
	2.50	81	221	*	*
20	1.50	*	*	*	*
	2.00	*	*	*	*
	2.50	115	317	*	*
22	1.50	*	*	*	*
	2.00	*	*	*	*
	2.50	156	428	*	*
24	2.00	*	*	*	*
	3.00	199	524	*	*
27	3.00	*	*	*	*
	3.00	293	*	*	*
30	2.00	*	*	*	*
	3.50	398	*	*	*

*Not available at time of printing

APPENDIX C: BRAKE LINING HANDLING PRECAUTIONS

⚠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.

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