OPERATION
AND
MAINTENANCE MANUAL
WITH
PARTS LIST

MODEL: C 4-10 TOWMASTER

SERIAL NUMBER: 91989 & UP

YEAR: January, 1991 & UP

MANUAL NUMBER: MC-410-01

- IMPORTANT -

READ AND FOLLOW INSTRUCTIONS GIVEN IN SAFETY & OPERATIONS AND THOSE SECTIONS RELATED TO YOUR SERVICE AND REPAIR RESPONSIBILITIES

TAYLOR-DUNN
Commercial and Industrial Vehicles Since 1949

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Table of Contents

SECTION 4: SERVICE PROCEDURES (continued)

SECTION 5: ILLUSTRATED PARTS BREAKOUT 65

LIST OF FIGURES

LIST OF FIGURES (continued)

LIST OF TABLES

LIST OF FIGURES (continued)

This page reserved for future expansion use

Section 1.
INTRODUCTION

ABOUT THIS MANUAL

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

We assume that those who will perform maintenance operations are trained vehicle service technicians capable of performing routine maintenance procedures such as changing a tire, using a voltmeter, and so forth.

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

This manual contains the following major sections:

SECTION 1: INTRODUCTION

—contains information about how to use this manual, a description of the C 4-10 tow tractor, how to do an incoming inspection, and vehicle specifications.

SECTION 2: VEHICLE OPERATION

—provides safety rules and guidelines, describes the driver training program, and explains the operation of each control on the C 4-10 tow tractor.

SECTION 3: MAINTENANCE PROCEDURES

—contains a scheduled maintenance checklist, lubrication diagram, troubleshooting guide, recommended spare parts list, and detailed maintenance procedures for the C 4-10 tow tractor.

SECTION 4: SERVICE PROCEDURES

—contains service procedures, in alphabetical order, for each assembly found in the C 4-10 tow tractor. Each major heading contains procedures organized in logical order.

SECTION 5: ILLUSTRATED PARTS

—includes an illustration and parts list for each assembly that has replaceable parts for the C 4-10 tow tractor.

NOTATIONAL CONVENTIONS

The following types of notations are used throughout this manual:

WARNING!

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

Caution!

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

Note: *A note provides additional information about a subject.*

Tip: *A tip is a suggestion that you might find helpful for a specific procedure.*

VEHICLE DESCRIPTION

Note: *This manual applies to vehicles with serial numbers starting at* **91989.**

The TOWMASTER tractor is designed to tow heavy loads through narrow aisles and over smooth outdoor surfaces. The vehicle provides excellent maneuverability and operational comfort.

The vehicle can handle a total trailing load (cargo and trailer) of up to 12,500 lbs. Various options are available to enable you to customize the vehicle to suit your particular needs (consult your Taylor-Dunn salesperson or representative for current options)

This vehicle conforms to requirements for Type E vehicles as described in O.S.H.A. Standard Section 1910.178 (Powered Industrial Trucks) and with all applicable portions of the American National Standard for Controlled Industrial Tow Tractors (ANSI B56.9-1987).

The model and serial number for this vehicle are imprinted on a decal located under the driver's seat.

STANDARD SPECIFICATIONS, TOWMASTER (MODEL C 4-10)

ITEM	SPECIFICATION
Standard Dimensions w/out Cab (Length x Width x Height)	214.6 X 92.1 X 125.7 cm
	84 ½" X 36 ¼" X 49 ½"
Standard Dimensions with Cab (Length x Width x Height)	214.6 X 92.1 X 190.5 cm
	84 ½" X 36 ¼" X 75"
Standard Weight, Less Battery	523 Kg (1150 lbs)
Turning Radius	236.2 Cm (93")
Hill Climbing Ability	Max 10% incline
Draw Bar Pull	113.6 Kg (250 lbs) normal 454.5 Kg (1000 lbs) ultimate
Hitch Height	23.8 cm MIN. to 37.8 cm MAX
	9 ½ to 14"
Trailing Load	5682 Kg (12,500lbs) Maximum (cargo and trailer)
Speed Controller	Stepless solid state controller
Tires	5.70 x 8 load range C pneumatic
Motor	NEMA rated 36 volt. 10 hp (@1400 rpm) intermittent duty. 3.5 hp (@2800 rpm) normal duty

STANDARD SPECIFICATIONS, TOWMASTER (MODEL C 4-10, continued)

ITEM	SPECIFICATION
Battery Size	49.5 x 89.5 x 58.4 cm Maximum (no cover)
	19 ½" X 35 ¼" X 23"
Battery Weight	750 Kg (1650 lbs) Maximum, 591 Kg (1300 lbs) Minimum
Battery Specifications	Max Amps 510 AH @ 6 hr rate
Battery Connector	SBX- 175 (with 12 volt negative tap)

TAKING DELIVERY OF YOUR VEHICLE

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

Inspecting the Vehicle

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

Checking the Controls

Try each of the following controls before turning on the keyswitch:

- accelerator pedal
- brake pedal
- forward - reverse switch
- parking brake
- steering wheel
- horn
- lights

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

What To Do If You Find A Problem

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

Caution!

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

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Section 2.
VEHICLE OPERATION

SAFETY RULES AND GUIDELINES

Note: *It is the responsibility of the owner of this vehicle to ensure that the operator understands the various controls and operating characteristics of this vehicle, and obeys the following safety rules and guidelines (extracted from the American National Standards Institute, Controlled Industrial Tow Tractor — ANSI B56.9).*

Driving

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

WARNING!

Do not drive this vehicle on public roads and highways. Do not exceed 10 MPH at any time. Speeds in excess of 10 MPH may cause steering difficulty and loss of control.

- Do not drive this vehicle unless you are a qualified operator
- Keep all body parts (head, arms, legs) inside this vehicle while it is moving
- Drive slowly when making a turn, especially if the ground is wet, slippery, or when driving on an incline

WARNING!

This vehicle may overturn easily if turned sharply when driving at high speeds, especially when on an incline.

- Drive only on level surfaces or on surfaces having an incline of no more than 10%
- Do not drive over loose objects, holes or bumps
- Observe all traffic regulations and speed limits
- Keep to the right under normal conditions
- Maintain a safe distance from all objects
- Keep the vehicle under control at all times
- Yield right of way to pedestrians, ambulances, fire trucks or other vehicles in emergency situations
- Do not overtake another vehicle at intersections, blind spots or other dangerous locations
- Keep a clear view ahead at all times
- Slow down and sound the horn when approaching a corner or other blind intersection
- Avoid dangerous activities such as stunt driving or horseplay
- Do not drive this vehicle in hazardous areas unless this vehicle is approved and labelled for such operation
- Immediately report any accident or vehicle problem to your supervisor

Parking

- Set the parking brake before leaving the vehicle
- If you will be away from this vehicle, put the forward/reverse switch in the off position, set the parking brake, turn off the keyswitch and remove the key
- If you park this vehicle on an incline, block the wheels; use only the brakes to stop the vehicle on an incline
- Do not block fire aisles, fire equipment or stairways

Towing

- To tow this vehicle, attach a tow strap to the front bumper tow bar and place the forward/reverse switch in the off position.
- Use another driver to steer this vehicle while it is towed; be sure the driver uses the brakes when you slow or stop the towing vehicle.

WARNING!

Do not exceed 5 MPH while towing this vehicle.

VEHICLE CONTROLS

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

Note: *Some controls are optional equipment and may not be installed on this vehicle.*

Accelerator pedal

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

Depress the pedal to speed the vehicle up. Release the pedal to slow down.

Note: *The foot brake pedal will need to be used to slow this vehicle on a down grade.*

Reverse warning alarm (optional)

A warning alarm sounds whenever the vehicle is in reverse, keyswitch is on, and the accelerator pedal is depressed.

Forward - Reverse Switch

The forward - reverse switch, located on the instrument panel to the right determines the direction of travel (forward or reverse) of the vehicle. It is a rocker type switch. Depress the upper part of the switch to go forward. Depress the lower part of the switch to go in reverse.

Note: *The switch has a center "OFF" position. The switch should be in this "OFF" position whenever the operator leaves the driver's seat.*

Deadman seat interlock

The deadman seat interlock, located under the drivers seat, is designed to allow operation of the vehicle only when the driver is seated. This is a safety feature and should never be bypassed.

Foot brake pedal

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

Parking brake lever

The parking brake lever is located to the right of the drivers seat. To set the parking brake , pull up on the lever. Push the button on the end of the lever to release the parking brake and push down.

Headlight switch

A headlight switch, located on the instrument panel, turns the headlight and taillights on or off. It is a rocker type switch. To turn the lights on, push the upper half of the switch. To turn the lights off, push the lower half of the switch.

Emergency Power Shut Off Switch

The emergency power shut off switch is located to the left of the driver's seat. It is a large red knob. To cut all power to the vehicle, push the knob down. To reset the switch, pull up on the knob until it clicks in place.

Note: *This switch should only be used in case of an emergency. Excessive use may cause premature wear on the switch contacts.*

Horn button

The horn button, located on the steering wheel, operates like the horn on a standard automobile. Depress the button to sound the horn, and release the button to stop.

Keyswitch

A keyswitch, located on the right side of the instrument panel, is designed to secure the vehicle and disable its operation. You cannot remove the key when the keyswitch is in the ON position. Rotate the key clockwise to turn the vehicle on, counterclockwise to turn the vehicle off

Steering

The steering system is similar to standard automobiles. To turn right, turn the steering wheel clockwise . To turn left, turn the steering wheel counterclockwise .

Windshield wiper switch (optional)

The windshield wiper control switch turns the electric windshield wiper on and off. It is a rocker type switch. Push the upper half of the switch to turn on the wiper. Push the lower half of the switch to turn off the wiper.

Remote Hitch Release (optional)

The remote hitch release is a T-handle located to the left of the driver's seat. Pull up the handle to unlatch the hitch. Push up on the handle to reset the hitch to hook up to a trailer.

WARNING!

The trailer and the tow vehicle may move when the hitch release is pulled. Do not release a trailer on an incline unless proper wheel blocks are in place. Always check for proper hitch up or unhitch before driving.

DRIVER TRAINING PROGRAM

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

The Operator Training program shall include the following:

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

Qualifications Of Driver

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 Industrial Tow Tractor — ANSI B56.9.

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 likely to be encountered.

Section 3.
SCHEDULED MAINTENANCE

INTRODUCTION

This section explains how to perform the scheduled maintenance procedures. Use the Maintenance Checklist to determine how often you should perform each procedure.

This section contains the following:

- Maintenance checklist
- Lubrication chart
- Troubleshocting guide
- Recommended spare parts list
- Detailed maintenance procedures
- Special tools

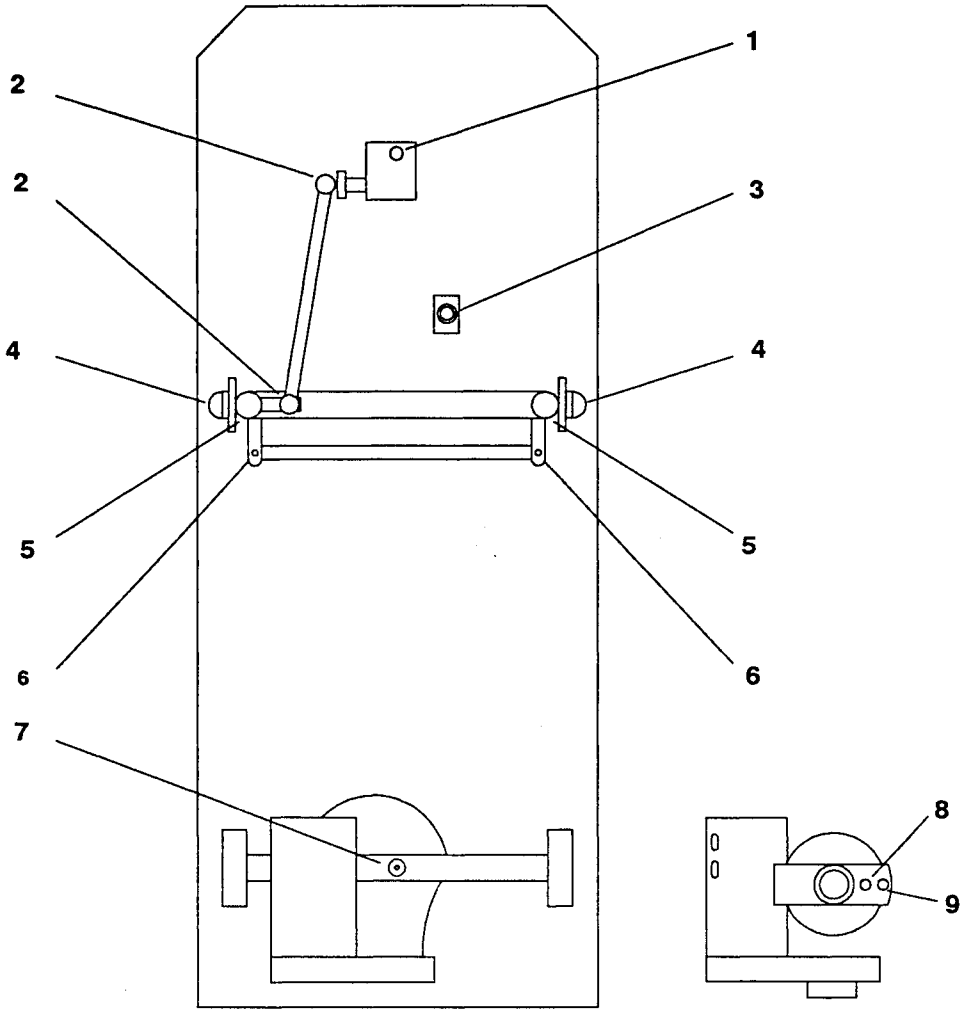
MAINTENANCE CHECKLIST

WARNING!

To prevent uncontrolled starts, disconnect the main battery leads and remove the ignition key before performing maintenance on the vehicle.

PERIODIC MAINTENANCE CHECKLIST					
Maintenance Item	Weekly (30 hrs)	Monthly (120 hrs)	Quarterly (360 hrs)	Semi-yearly (720 hrs)	Yearly (1440 hrs)
*Check and adjust brake system .	-	✔	-	-	-
*Lubricate front wheel bearings (2 zerk fittings)	-	-	-	✔	-
*Check brake lining for wear.	-	-	✔	-	-
*Adjust front bearings.	-	-	✔	-	-
*Lubricate steering gear box.	-	-	-	✔	-
Check and fill batteries (use distilled water only).	✔	-	-	-	-
Wash batteries with water (use soda if necessary)	-	-	✔	-	-
Check motor brushes	-	-	-	-	✔
Check tire pressure	✔	-	-	-	-
Check front end alignment	-	-	✔	-	-
Lubricate all Zerk fittings.	-	✔	-	-	-
Lubricate all moving parts without Zerk fittings (use all-purpose oil).	-	-	✔	-	-
Clean and tighten all wire connections.	-	-	✔	-	-
Drain rear axle differential ; refill with SAE 30 oil. (DO NOT USE HYPOID 90W)	-	-	✔	-	-
Clean and repack front wheel bearings (use wheel bearing grease)	-	-	-	✔	-
NOTE: Items with an asterisk (*) are related to safety.					

LUBRICATION CHART



ITEM #	DESCRIPTION	QTY	LUBRICANT TYPE
1	Steering Gear Box	1	General Purpose Grease
2	Steering Ball Joints	3	General Purpose Grease
3	Brake Master Cylinder	1	DOT #5 Brake Fluid
4	Front Wheel Bearings	2	See Section 4, Service Procedures
5	King Pin	2	General Purpose Grease
6	Ball Joint	2	General Purpose Grease
7	Rear Axle Filler Plug	1	SAE 30 Motor Oil
8	Drive Chain Level/Filler Plug	1	
9	Drive Chain Drain Plug	1	

TROUBLESHOOTING GUIDE

SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
Steering pulls in one direction	Loose wheel bearing	Adjust wheel bearing
	Low tire pressure.	Fill tires to 80 psi
	Loose front axle mounting	Tighten mounting bolts.
Hard to steer	Loose wheel bearing	Adjust wheel bearing
	Low tire pressure	Fill tires to 80 psi
	Worn ball joints	Replace ball joints
	Unlubricated ball joints	Lubricate ball joints
	Worn king pin bushings	Replace king pin bushings
	Unlubricated king pin bushings	Lubricate king pin bushings
Brakes feel soft	Air in brake lines	Fill master cylinder and bleed brake lines
	Bad seals in master cylinder	Rebuild or replace master cylinder
	Oil on brake pad lining	Find oil source and correct, replace brake pads
	Dirt on brake pad lining	Clean brake pad lining
	Bind in linkage	Loosen or realign brake linkage
	Weak pedal return spring	Replace pedal return spring
No brakes	Bad seals in master cylinder	Rebuild or replace master cylinder
	Broken connection in linkage	Replace linkage

TROUBLESHOOTING GUIDE (continued)

SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
Lack of power or slow operation	Dragging brake	Re-adjust brakes
	Tight front wheel bearing	Re-adjust front wheel bearing
	Defective rear axle bearing	Replace bearings
	Bind or drag on differential	Repair differential
	corroded battery connections	Clean or replace
	defective or worn motor brushes	Clean or replace
	Low battery voltage	Fill and charge battery or replace battery
	Loose wire connections	Check wires and connections
	No continuity through motor	Repair or replace motor
Motor does not run	Motor or solenoids	Check motor and solenoids
	Dead battery	Replace or recharge battery
	Loose wire connections	Check wires and connections
Controller does not operate	Loose wire connections	Check wires and connections
	No accelerator output	Replace accelerator
	Defective seat switch	Replace seat switch
	Defective keyswitch	Replace keyswitch
	Low battery voltage	Charge battery
Thump or grinding noise in drive axle	Motor bearing	Replace motor bearing
	Loose motor on base	Tighten and adjust motor
	Defective gears in differential	Replace gears
	Defective bearing in differential	Replace bearing

RECOMMENDED SPARE PARTS LIST

The following table lists the parts recommended to have on site to allow timely repair of the vehicle.

PART #	DESCRIPTION	QTY.
13-742-13	Tire and Wheel Assembly, 5.70 x 8	1
62-033-00	Accelerator Module	1
62-205-00	Speed Controller	1
71-039-00	Forward/Reverse Switch	1
71-110-00	Brake Light Switch	1
71-120-00	Keyswitch	1
71-039-10	Switch, Push Button w/Seal	2
72-501-38	Solenoid, SPST, 36 volt, 100 amp	1
72-501-39	Solenoid, SPDT, 36 volt, 100 amp	2
73-004-20	Horn, 12 volt	1
75-149-75	Power Pac Harness	1
80-017-00	Tapered Bearing, 1"	4
80-410-20	Flange Bearing, .750"	2
85-250-00	Spring, 1.625" x 3.625"	1
96-827-14	Park Brake Cable Assembly	2
98-200-00	Brake Pedal Pad, Rubber	1
98-254-00	Accelerator Pedal, Aluminum	1
NOTE: The quantity indicated is per vehicle		

SPECIAL TOOLS

The following table lists tools which may be unique and will aid in the troubleshooting of this vehicle.

MAINTENANCE PROCEDURE	USE THIS TOOL:	TO DO THIS:
Electrical Service	Mutimeter	check electrical system
	Hydrometer	measure the specific gravity of the battery electrolyte
	Accelerator Module Test Box (62-027-30)	check accelerator and connections
	Test Light (62-027-00)	check controller output
	High Current Ammeter	check motor current

MAINTENANCE PROCEDURES

WARNING!

Batteries contain sulfuric acid. Severe burns can result from contact with skin, eyes, or clothing. Wear acid-proof protective equipment such as face shield and gloves when working with batteries.

WARNING!

Possible high temperatures. Batteries can supply high currents. Do not short any terminals on the battery. Check for correct polarity before attaching wires and jumpers to the battery. Do not lay any tools or lifting chains on top of the battery.

Battery

The batteries should be checked for proper electrolyte level and cleaned to maintain optimum charge. Do not allow the electrolyte level to get low or the battery to remain dirty.

1. Check the electrolyte level, fill with distilled water up to the correct level.
2. Clean the batteries with water. Thoroughly dry the battery surface using dry rags.

Caution

Do not overfill the batteries. If the top of the batteries appears wet before you fill or wash it, it is probably due to leaky or loose cell covers. Tighten or replace covers.

3. Clean the cell posts, connectors and steel tray with water.

Caution

While cleaning the batteries make certain to keep solenoids, controller and battery charger from getting wet or damp.

Charging The Battery

To charge the battery, umplug the battery at the control panel assembly. Plug the battery into the charger plug.

Caution

Do not plug the charger into the control assembly. Severe damage to the controls may result.

The two lid latches may be moved to the latched position while the compartment lid is open. After the charger is connected, the lid can be carefully closed to rest on the two latch pins. This will prevent the latch cord from being cut.

Always latch the compartment lid before driving the vehicle.

Caution

Do not drive with the component lid unlatched or open.

WARNING!

EXPLOSION HAZARD. Batteries produce explosive gases when in use and when being charged. Charge batteries in a well-ventilated area.

Caution

Do not use a high amperage boost charger.

Caution!

Do not reverse the battery cables.

Storing The Battery

Always charge the batteries before storing for long periods and recharge every two months. If the climate is very hot, store the batteries in a cool place to extend the shelf life of the battery.

Storing the batteries during long periods of inactivity or during cold months can cause the battery plates to erode and lose their charge.

Parking Brake Cable

Visually inspect the brake cables for signs of wear or cracks. Visually inspect the end connections for broken wire strands.

Caution!

Replace any worn or damaged cables immediately.

Brake Hoses and Lines

Visually inspect the brake hoses and lines for signs of leakage, wear or cracks.

Note: *This vehicle has four wheel brakes. Check all hoses and lines.*

Caution!

Replace any worn or damaged lines or hoses immediately.

Master Cylinder

Remove the master cylinder cap bolt and check the brake fluid level. The fluid should be within 3/8" to 1/2" from the top of the fill port.

Note: *The cylinder cap bolt is accessible by removing the driver seat. The cap is located by the right mud guard.*

Caution!

Use only DOT #5 brake fluid. If the brake fluid becomes contaminated, flush the system and fill the master cylinder with new DOT #5 brake fluid. Mixing fluid types could cause brake failure.

Tires

Inspect the tires by doing the following:

1. Check the tires for nicks or grooves and replace if necessary.
2. Ensure that the tire is properly seated on the rim.
3. Ensure that all the lug nuts are installed and secure.
4. If the tires are pneumatic, check for proper inflation. Load Range C tires should be inflated to 75 psi cold.

Section 4.

SERVICE PROCEDURES

WARNING!

Before performing general maintenance on any part of the tractor, be sure to turn off the keyswitch, remove the key and disconnect both the main positive and negative battery leads.

BRAKE SYSTEM

The brake system consists of:

- brake lines
- brake pedal linkage
- front brakes
- hand brake linkage
- master cylinder
- rear brakes

Caution!

Do not drive the vehicle if a leak is detected in any part of the hydraulic brake system. The cause of the leak must be repaired immediately.

Tip: *Check the location of the leak to help determine the defective component.*

Brake Troubleshooting

SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
Low or spongy pedal	Linings worn	Replace brake pads
	Leak in brake system	Repair leak
	Master cylinder faulty	Repair or replace master cylinder
	Air in brake system	Bleed brake system
	Piston O-rings worn or damaged	Repair or replace brake calipers
Brakes drag	Pedal return spring weak or broken	Replace spring
	Brake line damaged	Repair as necessary
	Caliper piston sticking	Repair or replace caliper
	Master cylinder faulty	Repair or replace master cylinder
	Piston boot unseated	Repair or replace caliper
Brakes pull	Tires improperly inflated	Inflate tires to proper pressure
	Oil or grease on pads	Replace lining, repair cause
	Axle or disc bent	Replace axle assembly
	Piston frozen in caliper	Repair or replace caliper
Hard pedal but hard to stop	Oil or grease on pads	Replace lining, repair cause
	Brake pads worn out	Replace pads
	Piston frozen in caliper	Repair or replace caliper
	Brake line damaged	Repair as necessary

Brake Troubleshooting (continued)

SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
Clunking noise when brakes are applied	Loose mounting bolts	tighten mounting bolts
	Worn spacers and bushings	Replace
	Loose mounting bolts	tighten
Scrapping or grinding noise when brakes are applied	Worn brake pads	Replace pads and disc
	Loose mounting bolts	tighten
Noise when brakes are applied	Discs and pads worn or scored. Note: Brakes generate noise and heat to dissipate energy and stop the vehicle. As a result, an occasional squeal is normal. This squeal can be aggravated by severe environmental conditions such as cold, heat, snow, salt, mud, etc. This occasional squeal is not a functional problem and does not indicate any loss of brake effectiveness.	Discs and pads worn or scored
	Disc brakes burred or rusted calipers	Clean or deburr
	Dirty, Greased, contaminated or glazed brake pads	Replace pads
	Bent axle and disc	Replace axle and disc
	Loose brake body bolts	Tighten
Chirping or squeaking noise when brakes are not applied	Bent axle and disc	Replace
	Misadjustment of master cylinder push rod	Adjust
	Weak or broken pedal return spring	Replace
	Worn spacers and bushings	Replace
	Worn or misadjusted wheel bearings	Adjust or Replace
	Brake mounting plate bent	Replace

Brake Lines

You must bleed the hydraulic brake lines whenever you disconnect or replace any part of the hydraulic system, or when the fluid level is allowed to get too low in the master cylinder.

To bleed the brake lines, use one of the following methods:

- manual bleeding
- using a brake bleeder

Note: *Manually bleeding the brake lines requires two people: one to press on the brake pedal, the other to open and close the bleeder valves.*

Manually Bleeding Brake Lines

To bleed the brakes manually, do the following:

1. Fill master cylinder to the top with DOT #5 brake fluid.

Caution!

Be sure you use only DOT #5 brake fluid. Mixing fluid types could cause brake failure.

2. Loosen the bleeder valve on the rear left wheel.
3. Have someone apply brake pedal pressure to force the fluid and air out of the lines.

Note: *Be sure your assistant pushes the brake pedal all the way down and holds it down until you close the bleeder valve. Releasing the brake pedal before you close the bleeder valve will pull air back into the system.*

4. Close the bleeder valve.
5. Release brake pedal pressure.
6. Repeat steps 3 to 5 two more times until air pockets and bubbles stop and a clear stream of brake fluid appears, then close the bleeder valve.

Note: *Make sure to maintain the fluid level in the master cylinder above half full during the entire procedure.*

7. Repeat steps 2 to 6 for the rear right wheel, the front left wheel, and the front right wheel, in that order.
8. Add fluid to the master cylinder until the fluid is 1/2" from the top, then replace the master cylinder cover.

Using a Brake Bleeder

To bleed the brakes using a brake bleeder, do the following:

1. Fill master cylinder to the top with DOT #5 brake fluid.

Caution!

Be sure you use only DOT #5 brake fluid. Mixing fluid types could cause brake failure.

2. Attach brake bleeder to the master cylinder.
3. Loosen the bleeder valve on the rear left wheel cylinder until air pockets and bubbles stop and a clear stream of brake fluid appears, then close the bleeder valve.
4. Repeat the previous step for the rear right wheel, the front left wheel and the front right wheel, in that order.
5. Remove brake bleeder.
6. Add fluid to master cylinder until the fluid is 1/2" from the top, then replace the master cylinder cover.

Brake Pedal Linkage

To adjust the brake pedal linkage, do the following (see Figure 1).

1. Raise and support the vehicle.

WARNING!

Always use jack stands of adequate capacity when supporting the vehicle. Perform this procedure ONLY on a flat, level surface.

2. Loosen the jam nut on the clevis until the push rod turns freely.

   Tip: *The brake pedal clevis is located under the floorboard.*

3. Turn the push rod counterclockwise until it contacts the head of the piston on the master cylinder.

4. Shorten the push rod by turning clockwise 1 turn until the push rod just clears the head of the piston.

5. Tighten the jam nut to the clevis.

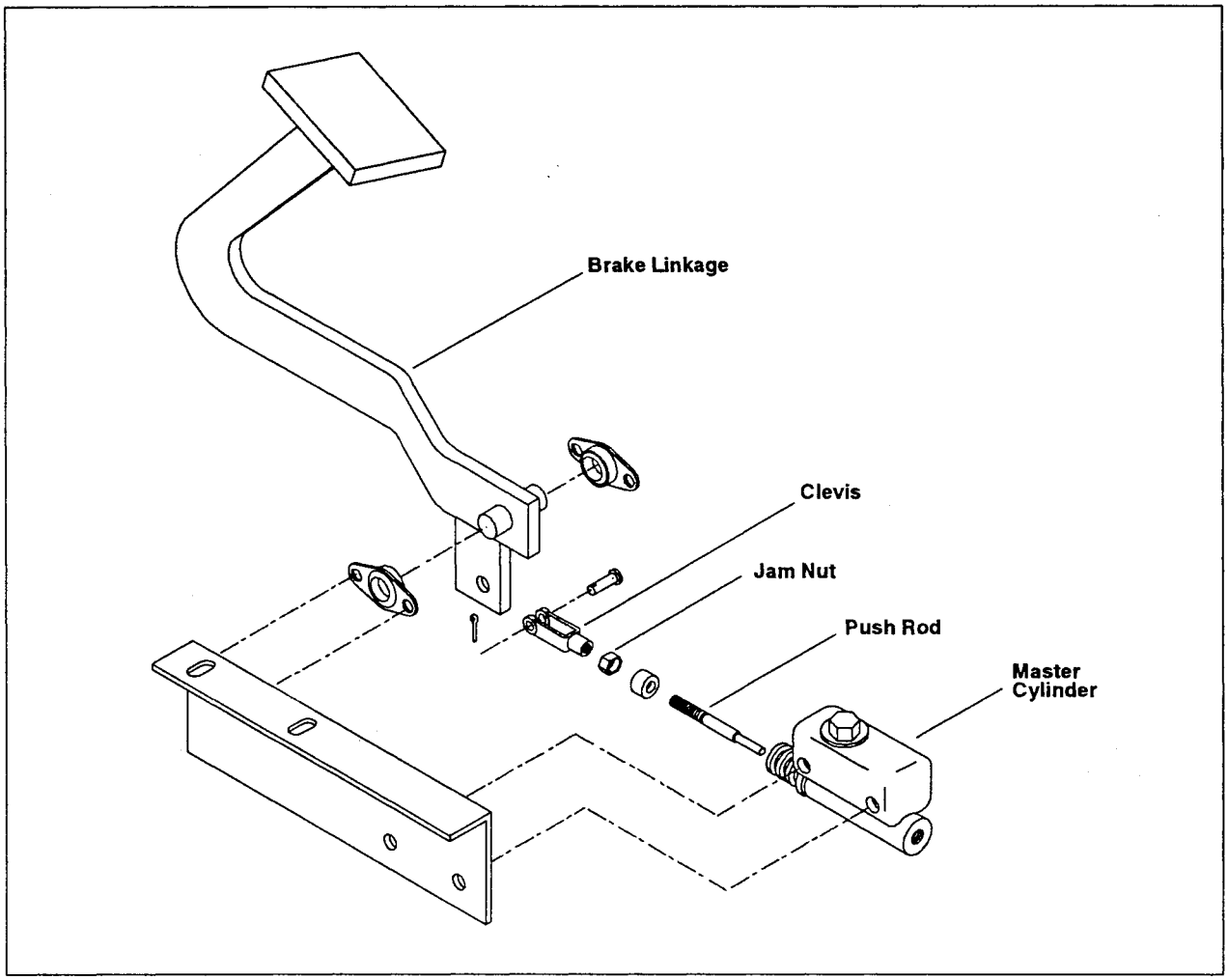


Figure 1 Adjusting the brake pedal linkage

Front Brakes

Caution!

Taylor-Dunn brake pads are non-asbestos. Even so, it is recommended that appropriate respiratory protection be used while working on brake assemblies. Do not blow off brake assemblies with an air hose.

Servicing the front brake assembly consists of:

- replacing the brake assembly
- replacing the brake pads

Caution!

If the brake cylinder is worn or cracked, or if the piston extends out through the O-ring, you must replace the entire brake assembly.

WARNING!

Locknuts will have a reduced locking capacity after being removed. Always use new high quality locknuts when repairing the brake assemblies.

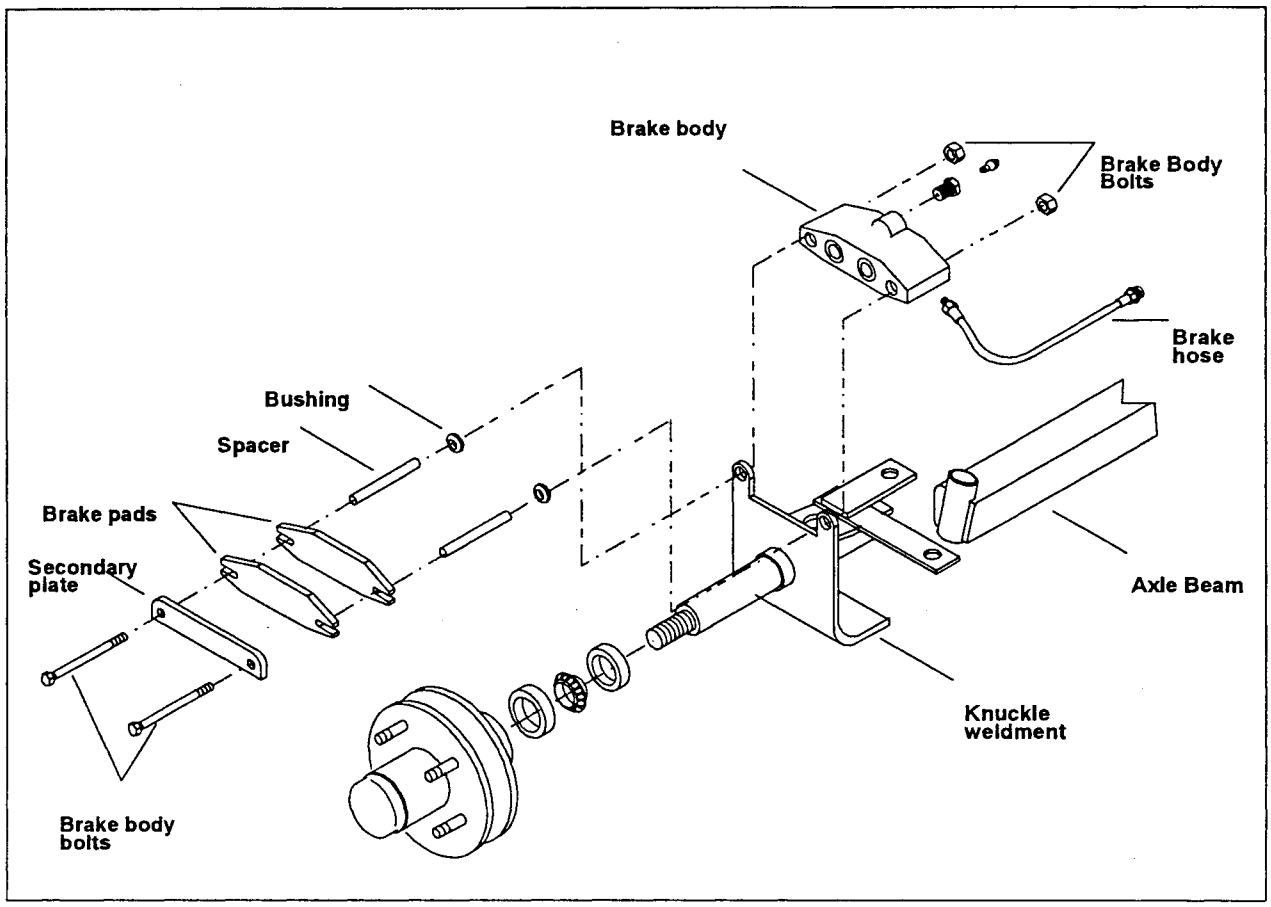


Figure 2 Replacing the front brake assembly

Replacing the Brake Assembly

To replace the front disc brake assembly, do the following (see Figure 2).

1. Raise the vehicle and support it.

WARNING!

Always use jack stands of adequate capacity when supporting the vehicle. Perform this procedure ONLY on a flat, level surface.

2. Disconnect brake hose at the caliper.

   Tip: *Cap the hose to prevent brake fluid from leaking.*

3. Remove the two brake body bolts that hold the secondary plate, pads and spacers to the brake body.

4. Remove brake pads, secondary plate and spacers.

5. Replace the spacers if they are flared or cracked.

6. Replace the bushings if they are worn.

Note: *The spacers must fit snugly in the bushings while still allowing the spacers to move.*

7. Replace the entire brake body if the boots or tops of the pistons are worn or cracked.

8. Remount the caliper assembly to the brake bracket.

9. Install the secondary plate, pads and spacers.

10. Tighten both brake body bolts to 12 foot-pounds of torque.

Note: *Use new high grade locking nuts for the brake body bolts to maximize locking capability.*

11. Attach brake hose.

12. Bleed brake lines as described in the section titled "Brake Lines".

13. Test drive the vehicle to ensure that the brakes work correctly.

Replacing the Brake Pads

To replace the front brake pads, do the following:

1. Raise the vehicle and support it.

WARNING!

Always use jack stands of adequate capacity when supporting the vehicle. Perform this procedure ONLY on a flat, level surface.

WARNING!

Locknuts will have a reduced locking capacity after being removed. Always use new high quality locknuts when repairing the brake assemblies.

2. Push the pistons back into the caliper.

   Tip: *If pistons are difficult to push, loosen bleeder valve and allow fluid to escape, then push the brake pad against the pistons. Immediately retighten bleeder valve to avoid trapping air.*

3. Remove one brake body bolt and spacer, then remove brake pads.

4. Replace old brake pads with new brake pads.

5. Re-install the pads, spacer and brake body bolt.

6. Tighten brake body bolt to 12 foot pounds of torque.

7. Turn disc by hand to be sure there is running clearance.

8. Lower vehicle and test drive for proper braking.

Master Cylinder

To repair or replace the master cylinder, do the following (see Figure 3).

Caution!

Use only DOT #5 brake fluid. If the brake fluid becomes contaminated, flush the system with new DOT #5 brake fluid and fill the master cylinder with new DOT #5 brake fluid. Mixing fluid types could cause brake failure.

1. Remove cotter pin, clevis pin and push rod from master cylinder.
2. Disconnect hydraulic lines at the master cylinder by removing the master cylinder bolt.

Note: *There are two lines on a four-wheel brake system connected to the Y-fitting. Note the location of the copper seals.*

3. Remove two mounting bolts and remove the master cylinder from chassis.
4. Clean the outside of master cylinder with brake fluid and wipe dry.
5. Remove rubber boot and locking ring.

Note: *Make sure that the piston parts do not pop out when removing the locking ring. The piston parts are under spring pressure.*

6. Remove piston and spring.
7. Remove any scoring or roughness from inside the cylinder wall with a fine hone.
8. Coat the new piston and cap with a small amount of clean DOT #5 brake fluid.

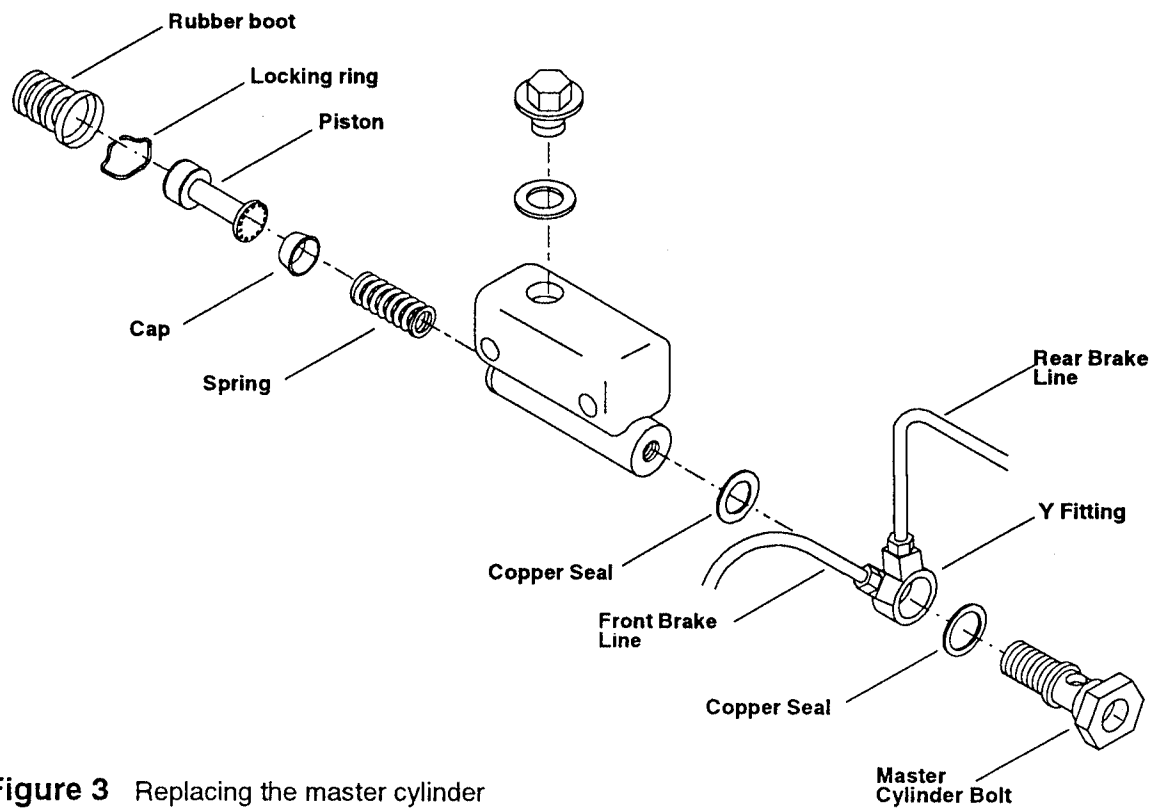


Figure 3 Replacing the master cylinder

9 Install new piston and cap.

Note: *Keep all parts clean when installing.*

10 Replace locking ring and rubber boot.

11 Replace master cylinder in chassis and reconnect hydraulic line.

12 Replace cotter pin, clevis pin and push rod on master cylinder socket.

13 Loosen jam nut, turn the push rod counterclockwise until it contacts the head of the piston on the master cylinder.

14 Shorten the push rod by turning clockwise 1 turn until the push rod just clears the head of the piston.

15 Fill the master cylinder with DOT #5 brake fluid. Bleed the brakes as described in the section titled "Brake Lines".

16 Test drive the vehicle.

Hand Brake Linkage

To adjust the hand brake linkage, do the following (see Figure 4).

1. Place the hand brake in the off position (all the way down).
2. Adjust the jam nuts on the brake cable until the cable is snug. Make sure the brake does not drag.

Note: *The jam nuts are located at the center rear of the vehicle.*

Tip: *The alignment bracket bolt may need to be adjusted to move the brake band off the drum.*

Note: *If the band is heavily worn, the brake bolt will need to be tightened.*

3. Pull up on the brake handle until it locks. It should lock within the first 5 clicks. Verify that the wheels are in a locked position.

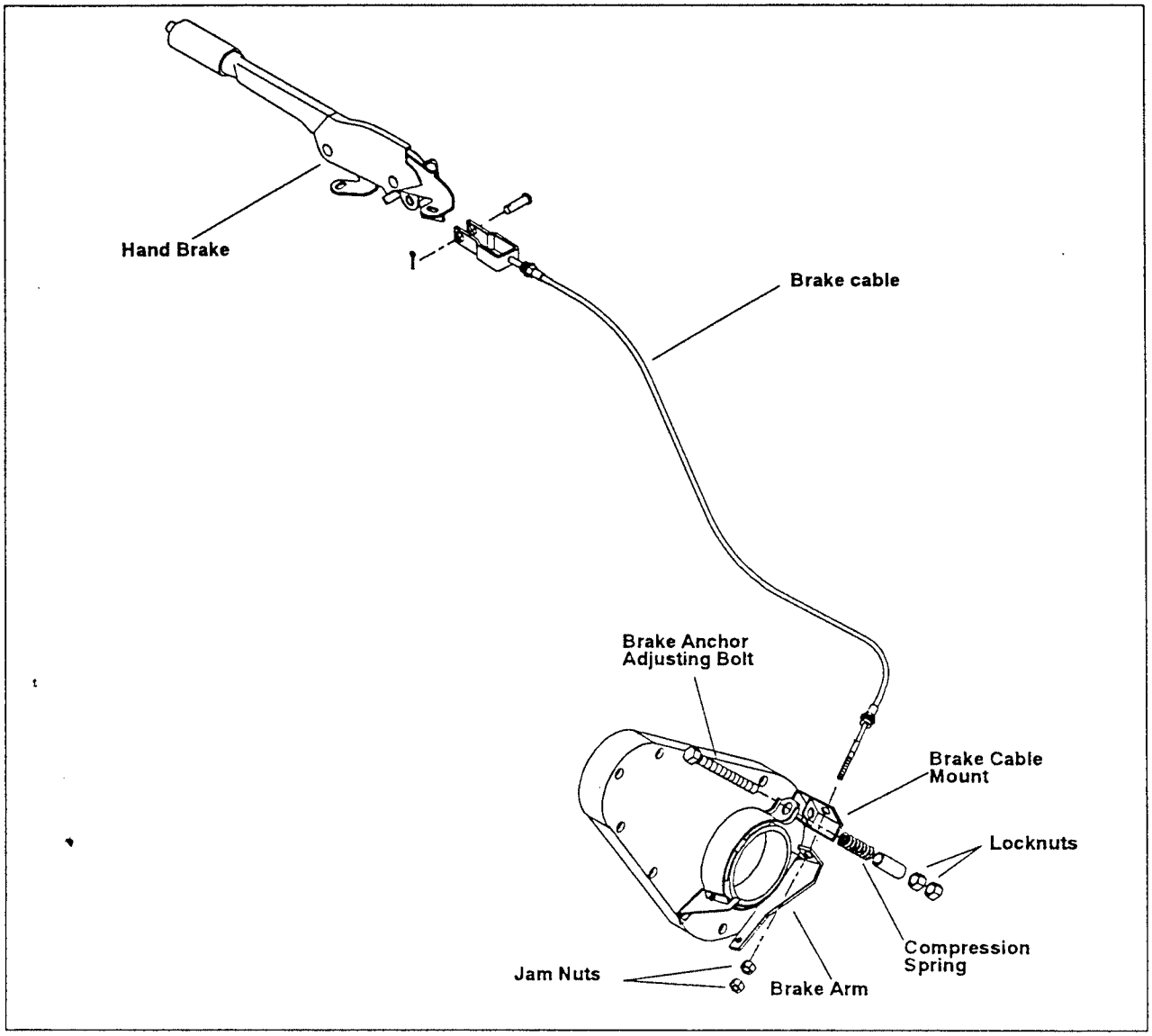


Figure 4 Adjusting the hand brake linkage

Rear Brakes

Servicing the rear brake assembly consists of:

- replacing the brake pads
- replacing the brake assembly

Caution!

Taylor-Dunn brake pads are non-asbestos. Even so, it is recommended that appropriate respiratory protection be used while working on brake assemblies. Do not blow off brake assemblies with an air hose.

Caution!

If the brake cylinder is worn or cracked, or if the piston extends out through the O-ring, you must replace the entire brake assembly.

WARNING!

Locknuts will have a reduced locking capacity after being removed. Always use new high quality locknuts when repairing the brake assemblies.

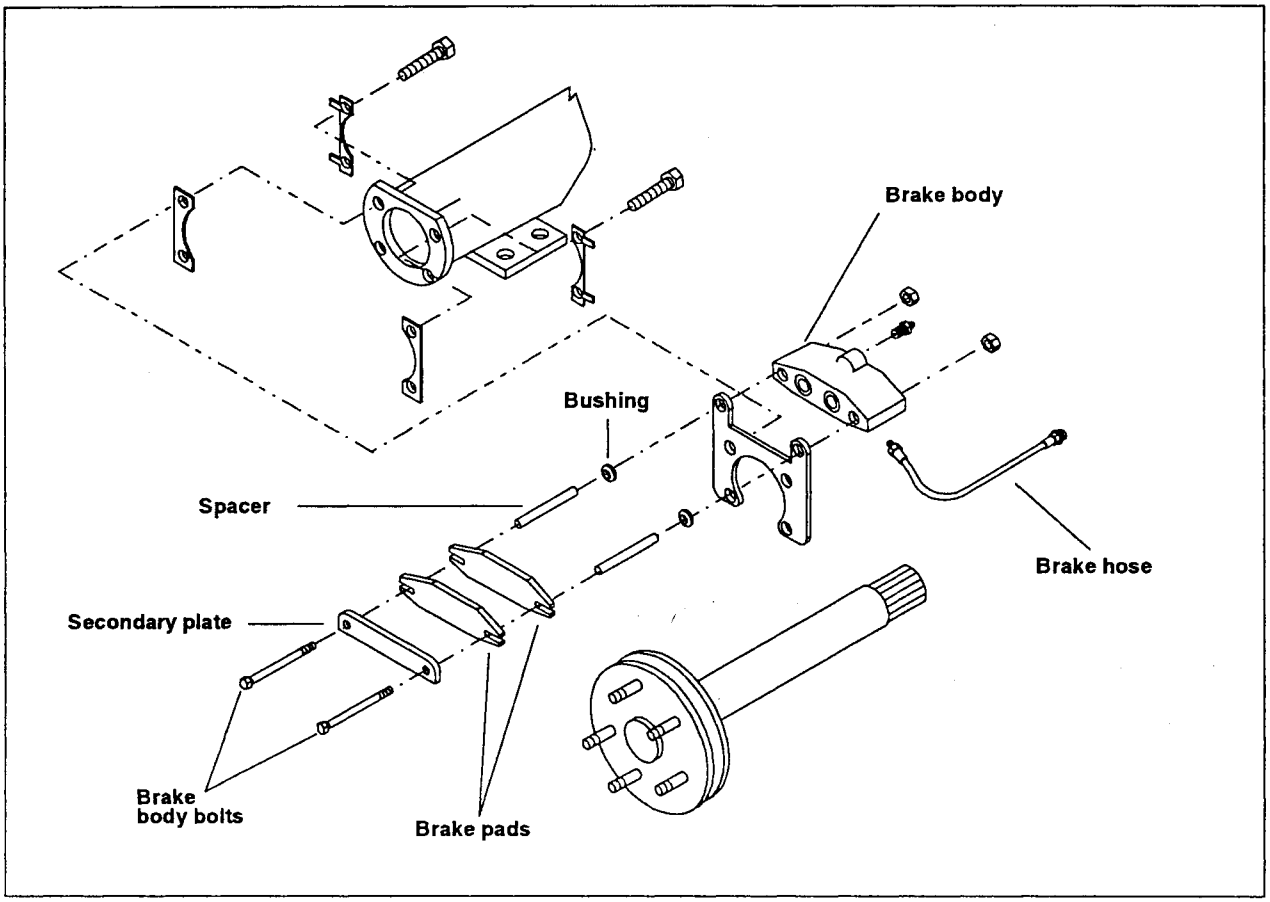


Figure 5 Adjusting the rear drum brakes

Replacing the Brake Assembly

To replace the rear disc brake assembly, do the following (see Figure 5).

1. Raise the vehicle and support it.

WARNING!

Always use jack stands of adequate capacity when supporting the vehicle. Perform this procedure only on a flat, level surface.

2. Disconnect brake hose at the caliper.

   Tip: *Cap the hose to prevent brake fluid from leaking.*

3. Remove the two brake body bolts that hold the secondary plate, pads and spacers to the brake body.

4. Remove brake pads, secondary plate and spacers.

5. Replace the spacers if they are flared or cracked.

6. Replace the bushings if they are worn.

Note: *The spacers must fit snugly in the bushings while still allowing the spacers to move.*

7. Replace the entire brake body if the boots or tops of the pistons are worn or cracked.

8. Remount the caliper assembly to the brake bracket.

9. Install the secondary plate, pads and spacers.

10. Tighten both brake body bolts to 12 foot-pounds of torque.

Note: *Use new high grade locking nuts for the brake body bolts to maximize locking capability.*

11. Attach brake hose.

12. Bleed brake lines as described in the section titled "Brake Lines".

13. Test drive the vehicle to ensure that the brakes work correctly.

Replacing the Brake Pads

To replace the rear brake pads, do the following:

1. Raise the vehicle and support it.

WARNING!

Always use jack stands of adequate capacity when supporting the vehicle. Perform this procedure only on a flat, level surface.

2. Push the pistons back into caliper.

   Tip: *If pistons are difficult to push, loosen bleeder valve and allow fluid to escape, then push the plate against the pistons. Immediately retighten bleeder valve to avoid trapping air.*

3. Remove one brake body bolt and spacer, then remove brake pads and secondary plate.

4. Replace old brake pads with new brake pads.

5. Re-install the pads, spacer and brake body bolt.

6. Tighten brake body bolt to 12 foot pounds of torque.

7. Turn disc by hand to be sure there is running clearance.

8. Lower vehicle and test drive for proper braking.

ELECTRICAL SYSTEM

The vehicle's electrical system consists of the following:

- batteries
- electrical wiring
- emergency power shut off switch
- accelerator module
- speed control module

Service procedures for each item can be found as indicated.

WARNING!

Disconnect the main battery leads and remove the ignition key before working on any part of the vehicle's electrical system.

Batteries

Batteries will provide many years of operation if properly cared for. The following suggestions should be adhered to in order to obtain the maximum life from the batteries:

- New batteries should be given a full charge prior to use.
- All cells in the battery must be good. One or more defective cells will greatly reduce the operating capacity of the battery and can shorten the life of the remaining good cells. Check the voltage across each cell after charging to insure that they are all good. Cells can also be checked using a hydrometer.
- Vehicles should be charged everyday after use or when a low indication is seen on the charge status indicator.
- Batteries should not be left in a discharged state for extended periods of time.
- Batteries which are stored over extended periods of time should be charged every month.
- Avoid running batteries down to the point where the vehicle will not operate properly.
- Ambient storage and operating temperatures affect the capacity and life of batteries. Cold temperatures reduce capacity and high temperatures reduce battery life.
- Maintain the electrolyte at the proper level. The fluid should be replaced with distilled water.
- Water consumption increases with the age of the battery.
- Keep batteries and electrical connections clean.

Electrical Wiring

The vehicle's control and power wire operates on 36 volts. All accessories (lights, windshield wiper, etc.) operate on 12 volts.

Caution!

When installing the battery, check that the 12 volt negative tape point is correct. It should be 12 volts from the main positive. Incorrect location could burn out all 12 volt accessories.

The wiring in this vehicle has been sized for the current it is to carry. When replacing any part of the wiring, use the equivalent or larger size wire.

Periodically inspect all of the wiring and connections. Look for loose or worn connections, cut wires, corroded terminals, and loose wires. Repair any defects before using the vehicle.

Caution!

Use a blocking diode for any accessory to be connected to the output of the keyswitch to prevent feedback to the control system.

Figures 6 to 7 show the vehicle's electrical system.

Emergency Power Shut Off Switch

The emergency power shut off switch is a high-current shut off switch, designed to allow the driver to turn off all power to the vehicle in case of uncontrolled operation.

WARNING!

Do not bypass the emergency power shut off switch. This is a required safety feature.

Caution!

Be sure not to cross the polarity at the switch. Severe damage to the battery and wiring could result.

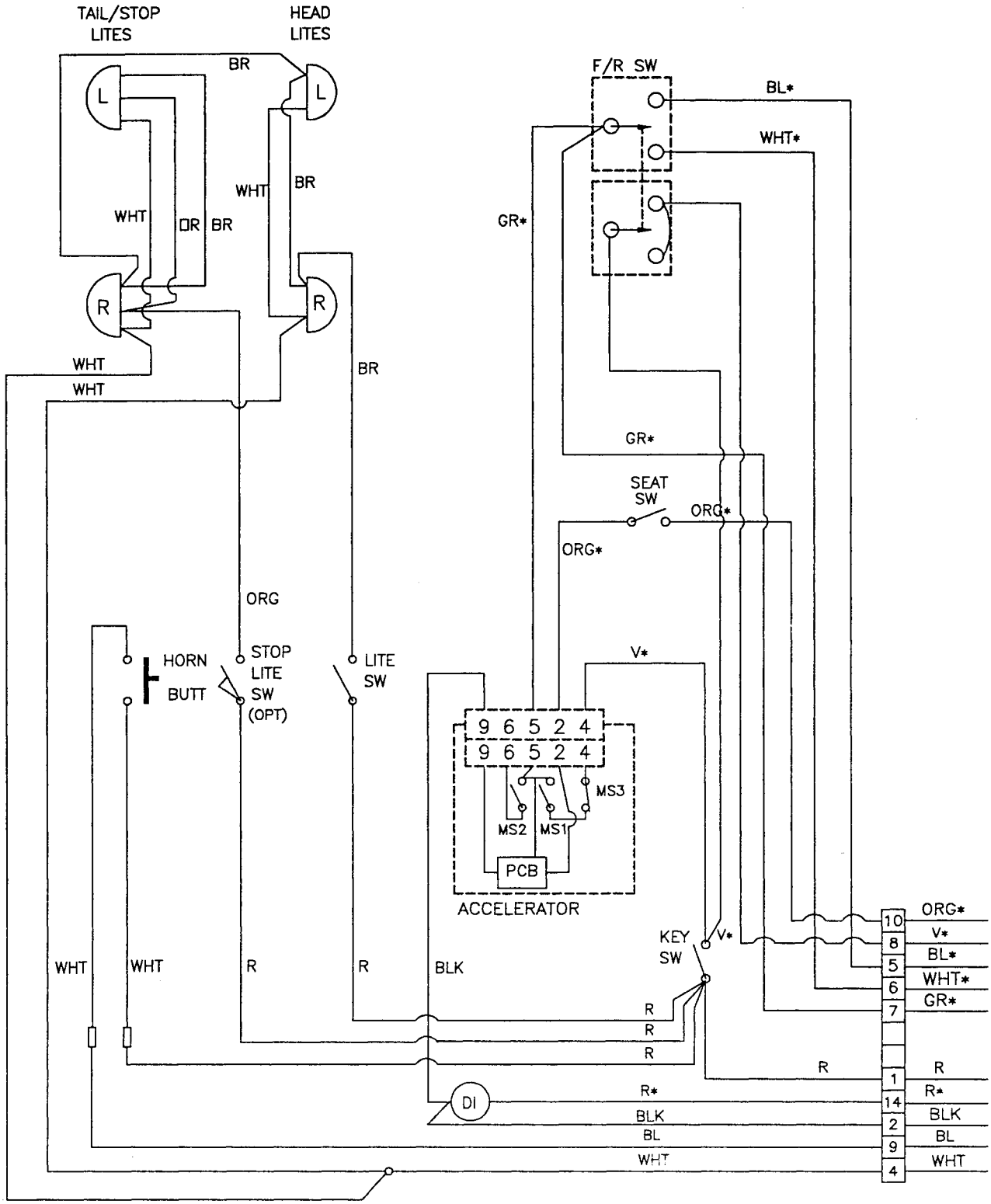


Figure 6 Detailed wiring diagram (Sheet 1 of 2)

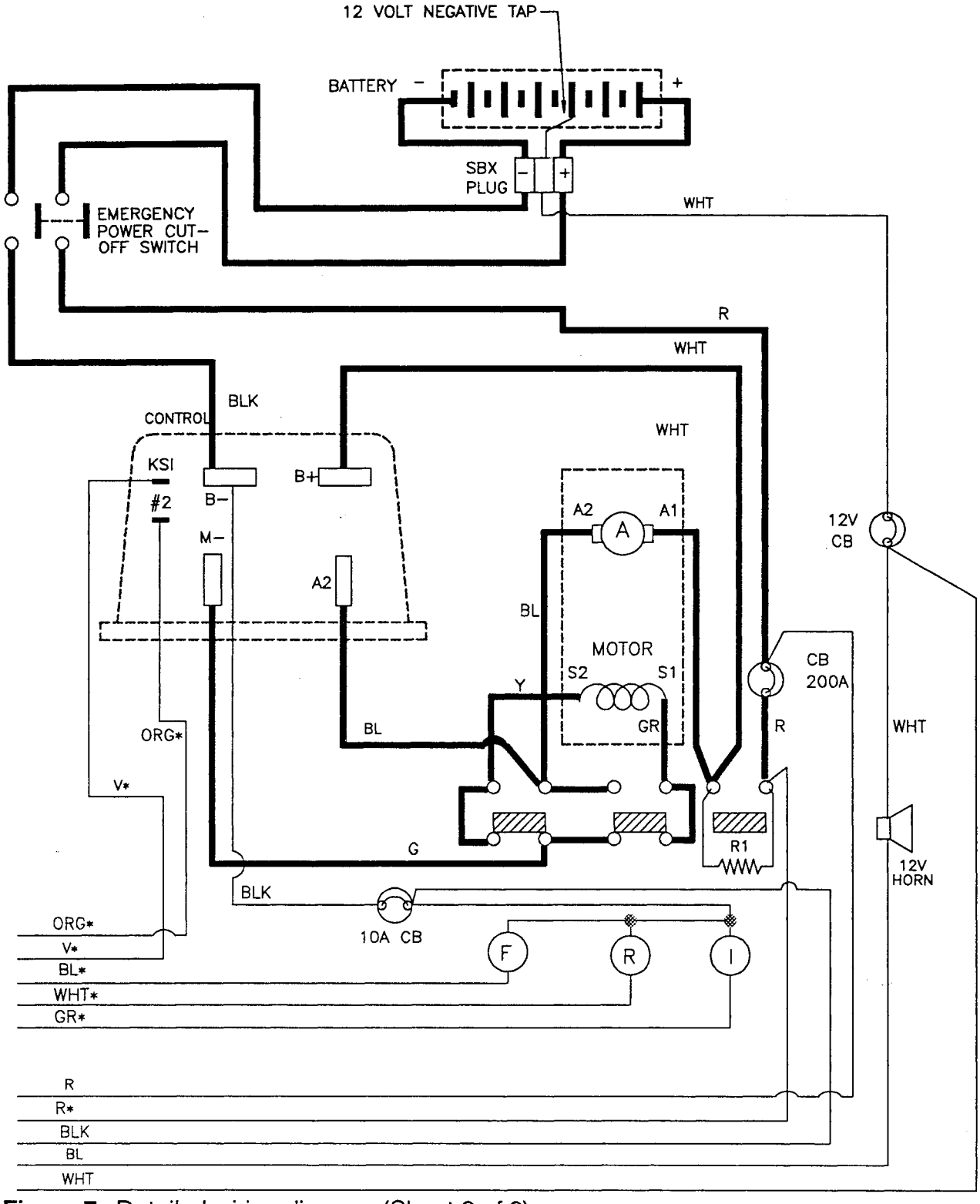


Figure 7 Detailed wiring diagram (Sheet 2 of 2)

ACCELERATOR MODULE

The accelerator module was designed to increase the reliability of the control system. The module requires very low maintenance and the components give solid state performance.

Note: *There are no adjustments that need to be made to the accelerator module. However, make sure the accelerator pedal is up and the accelerator lever is resting against the accelerator bracket. This is the off position.*

SPEED CONTROL

The speed control module consists of:

- Solenoids
- Speed controller
- Breakers

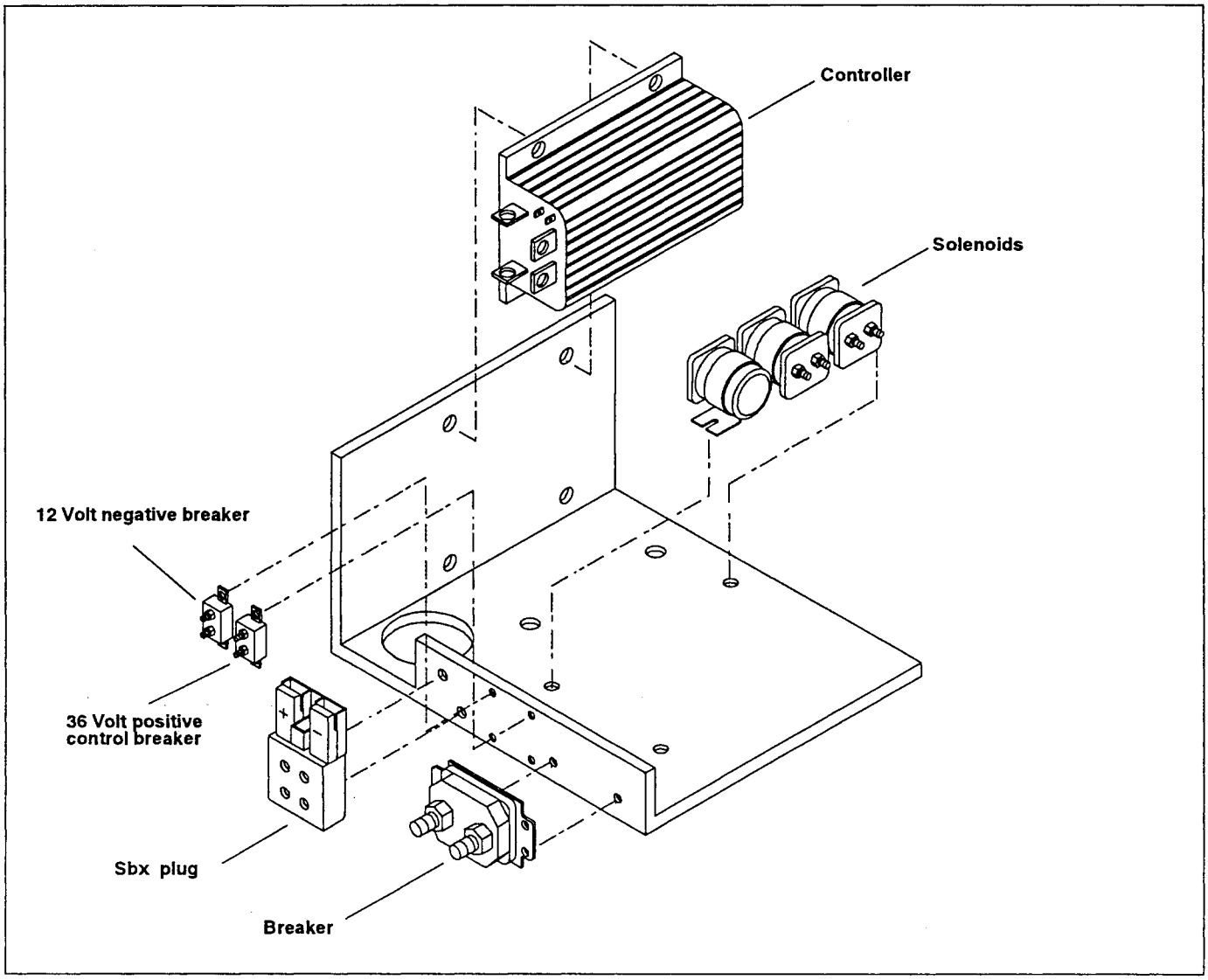


Figure 8 Speed Control

Solenoid Assembly

To repair or replace solenoids do the following (see figure 9):

WARNING!

Disconnect the main battery leads and remove the key before working on any part of the vehicle's electrical system.

1. Remove wires and buss bars.
2. Remove screws, nuts and washers on solenoids.

Note: *Mark the position of all wires and buss bars prior to removal. Make sure they are put back in their original position.*

3. Remove solenoids from panel.
4. To install solenoids, reverse procedures.

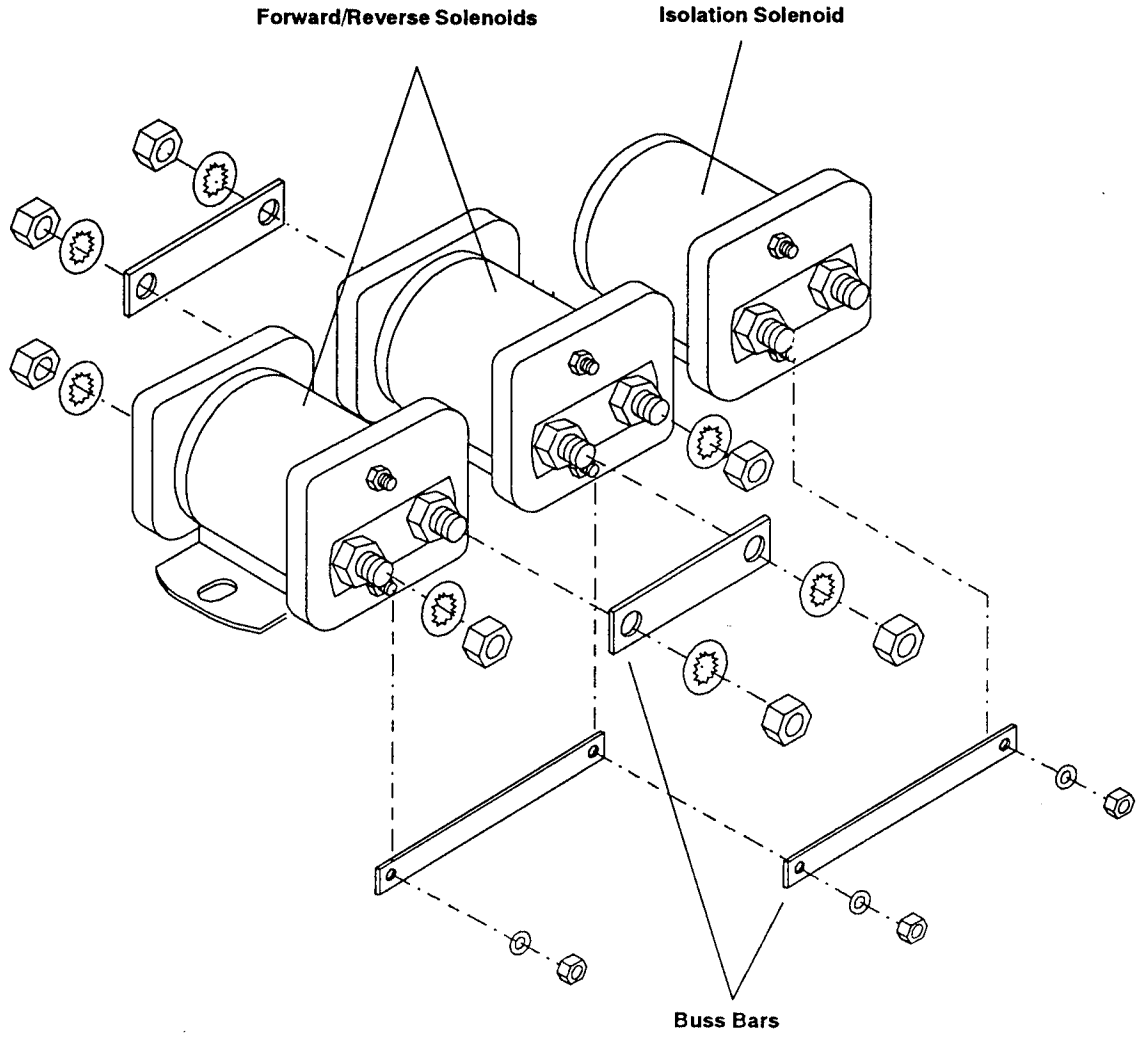


Figure 9 Solenoid Assembly

Speed Controller

The controller is designed specifically for use with electric vehicles. Its function is to provide full control of the vehicle's speed under all operating conditions.

Troubleshooting Guide

Note: *Before proceeding with any trouble-shooting, understand the basic principles of operation and be familiar with component testing and replacement procedures.*

WARNING!

Disconnect the main battery leads and remove the key before working on any part of the electrical system.

Testing the Accelerator Module

To test accelerator module do the following:

1. Unplug the accelerator wire harness.
2. Using an accelerator module test box, plug in the accelerator module pigtail.
3. Connect the B+ and B- terminals on the test box to the battery main positive and negative terminals.

Note: *Make sure the batteries are in good condition and fully charged.*

4. Set the V.O.M. to DC volt range to make the measurements. All readings must agree with the following tables.
5. With the pedal up, the following measurements should be found.

Pin Position	Pedal Up
2	0 Volts
4	36 Volts minimum
5	0 Volts
6	0 Volts

6. Slowly depress the pedal. When pin #5 measures 36 volts, the following measurements should be found:

Pin Position	#5 at 36 Volts
2	6.0 - 6.3 Volts
4	36 Volts minimum
5	36 Volts minimum
6	0 Volts

7. With the pedal fully depressed, the following measurements should be found:

Pin Position	Pedal Fully Depressed
2	11.0 - 11.5 Volts
4	36 Volts minimum
5	36 Volts minimum
6	36 Volts minimum

8. If the accelerator module fails it will need to be replaced.
9. Unplug the test pigtail and plug in the accelerator wire harness.

Test for Solenoid Operation and Keyswitch Input

WARNING!

Raise and brace the rear of the vehicle. The drive wheels must not touch the ground. Always use jack stands of adequate capacity when supporting the vehicle.

To check for solenoid operation and keyswitch input do the following:

1. Place the forward/reverse switch in the off position.
2. Turn key on and depress the pedal until the first microswitch in the accelerator module operates.
3. Measure the voltage across the coil terminals on the isolator solenoid. You should measure full battery voltage.
4. Place the forward/reverse switch in reverse.
5. Measure the voltage across the reverse solenoid. You should measure full battery voltage.
6. Place the forward/reverse switch in forward.
7. Measure the voltage across the forward solenoid. You should measure full battery voltage.

Note: *The keyswitch input terminal is KSI, top push on the terminal.*

8. Check for loose, faulty or misconnected wires, keyswitch, or forward/reverse switch if the voltage reading is low.

Note: *If the solenoid coils and keyswitch input are getting voltage, make sure the solenoids are working by connecting the voltmeter across the power terminals. Contacts should show no voltage drop.*

9. Replace solenoid if a voltage reading indicates bad or worn contacts.

Testing Speed Controller Wiring

WARNING!

Raise and brace the rear of the vehicle. The drive wheels must not touch the ground. Always use jack stands of adequate capacity when supporting the vehicle. Perform this operation only on a flat, level surface.

To test the controller power do the following:

Caution!

Check battery polarity. Severe damage to the controller will result if battery polarity is reversed.

Note: *Make sure the batteries are fully charged before proceeding.*

1. Make sure that the keyswitch is in the off position.
2. Check to see that the negative (-) battery terminal is connected to the B- terminal of the controller.
3. Connect the negative (-) voltmeter lead to the B- terminal on the controller.
4. Connect the positive (+) voltmeter lead to the battery side of the isolator solenoid.
5. The measurement should be full battery voltage.

Note: *If voltage is not present, check for loose wires, bad batteries, or faulty main circuit breaker.*

6. Connect the positive (+) voltmeter lead to the controller B+ terminal.

7. The voltmeter should have a voltage reading of 1 to 5 volts less than the full battery voltage.

Note: *If the voltage is zero or close to zero, the trouble is either a defective controller, a defective resistor across the isolator solenoid, or the wire between the isolator solenoid and the controller. If the voltmeter reads full battery voltage, then the isolator has welded and must be replaced.*

8. Trace the wire to make sure it is connected correctly.

9. Remove and test the resistor on the isolator solenoid with an ohmmeter. The ohmmeter should read 250 ohms.

Testing Controller Output

Note: *This test assumes that the accelerator module has been previously tested and is known to be functioning properly.*

Note: *The test is best performed with an analog voltmeter. Digital meters may provide erratic readings.*

1. Raise and brace the rear of the vehicle and support it. The drive wheel must not touch the ground.

WARNING!

Always use jack stands of adequate capacity when supporting the vehicle. Perform this procedure ONLY on a flat, level surface.

2. Connect the positive (+) voltmeter lead to the controller M-terminal.

3. Connect the negative (-) voltmeter lead to the controller B- terminal.

4. Turn on the keyswitch.

5. Put the forward/reverse switch in forward or reverse.

6. Operate the accelerator over its full travel while monitoring the voltmeter. The voltmeter should read nearly full battery voltage with the pedal at minimum speed and drop smoothly to near zero volts with the pedal all the way down. It also should be noted that the speed of the rear wheels progressively increases as the accelerator pedal is depressed.

7. If no voltage or low voltage readings are observed and the wheel speed is low, check the wiring, connections, solenoid, and motor for poor connections or open circuits.

8. If the voltage reading is correct at the top of the pedal travel but does not drop, check the accelerator module input to the controller. It should vary from 6 to 11 volts with respect to the B- terminal over the full travel of the accelerator module.

9. Check for battery voltage on the KSI terminal on the controller.

10. Measure the current in the M-lead while operating the accelerator over its full travel. The current should gradually increase as the accelerator is depressed to a level of 25-60 amps.

    Tip: *Use a shunt/meter setup or a clamp-on DC ammeter to measure the current.*

11. If current is flowing in the M-lead but the wheel speed is not correct, there is probably a short in the motor or wiring.

If the above test results are normal but the vehicle does not operate properly, the free wheeling or plug diode in the controller may be faulty.

To check the plug diode do the following:

1. Disconnect the battery leads.
2. Disconnect the A2 terminal on the controller.
3. Connect an ohmmeter capable of testing silicon diodes between the A2 and the B+ terminals on the controller.

   The ohmmeter should show a low resistance with the leads connected one way and a high resistance with the leads reversed.

To check the freewheeling diode do the following:

1. Disconnect the cable from the M-terminal on the controller.
2. Connect the ohmmeter between the M- and B+ terminals on the controller.
3. The ohmmeter should show a low resistance with the leads connected one way and a high resistance with the leads reversed.
4. If either of the diodes appear to be defective, replace the controller.

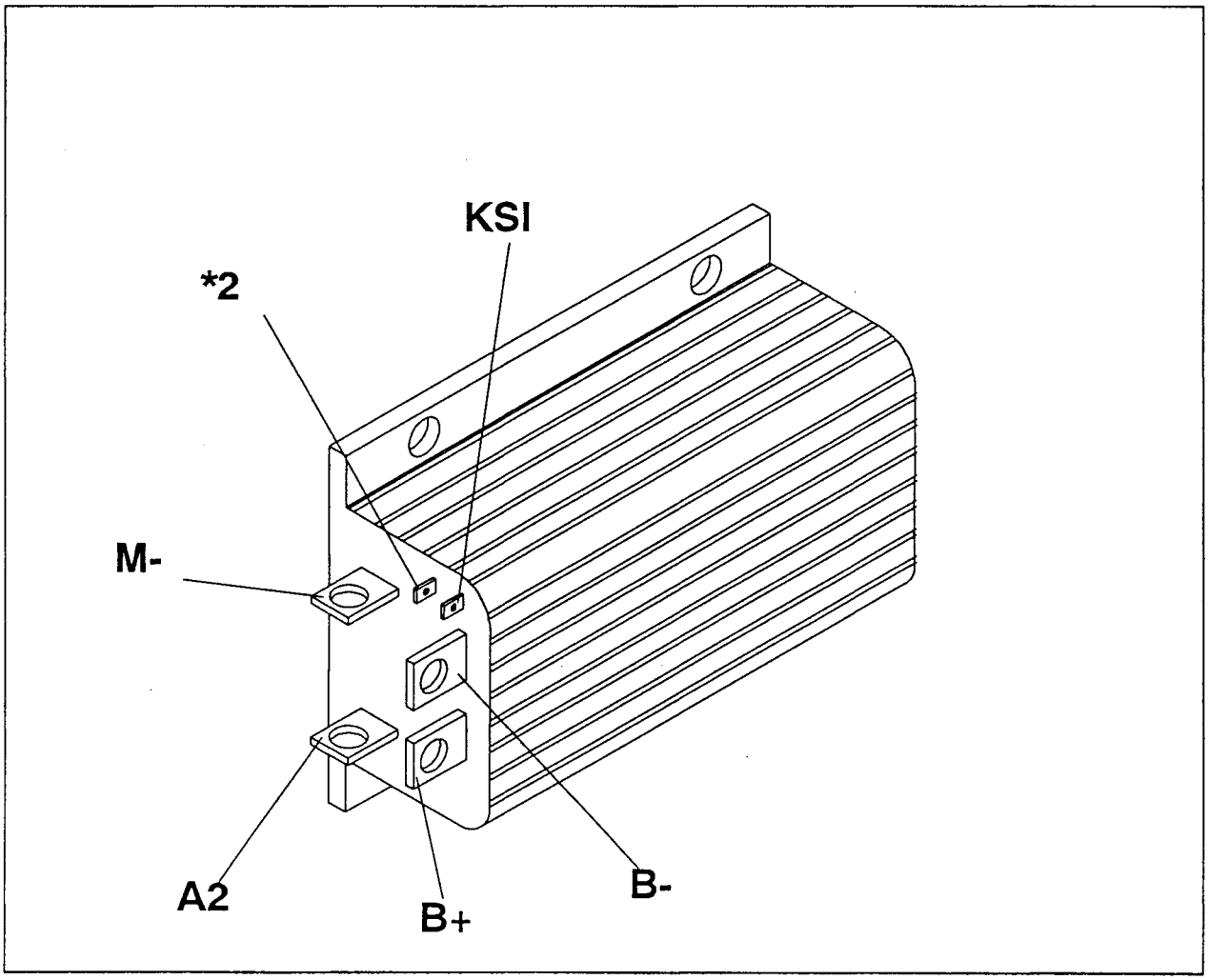


Figure 10 Speed Controller

FRONT AXLE

The front axle is designed for rugged, dependable service when properly maintained and lubricated (see Lubrication Chart in Section 3).

The steering worm gear box and steering arm are similar to those used in automobiles and require minimum maintenance.

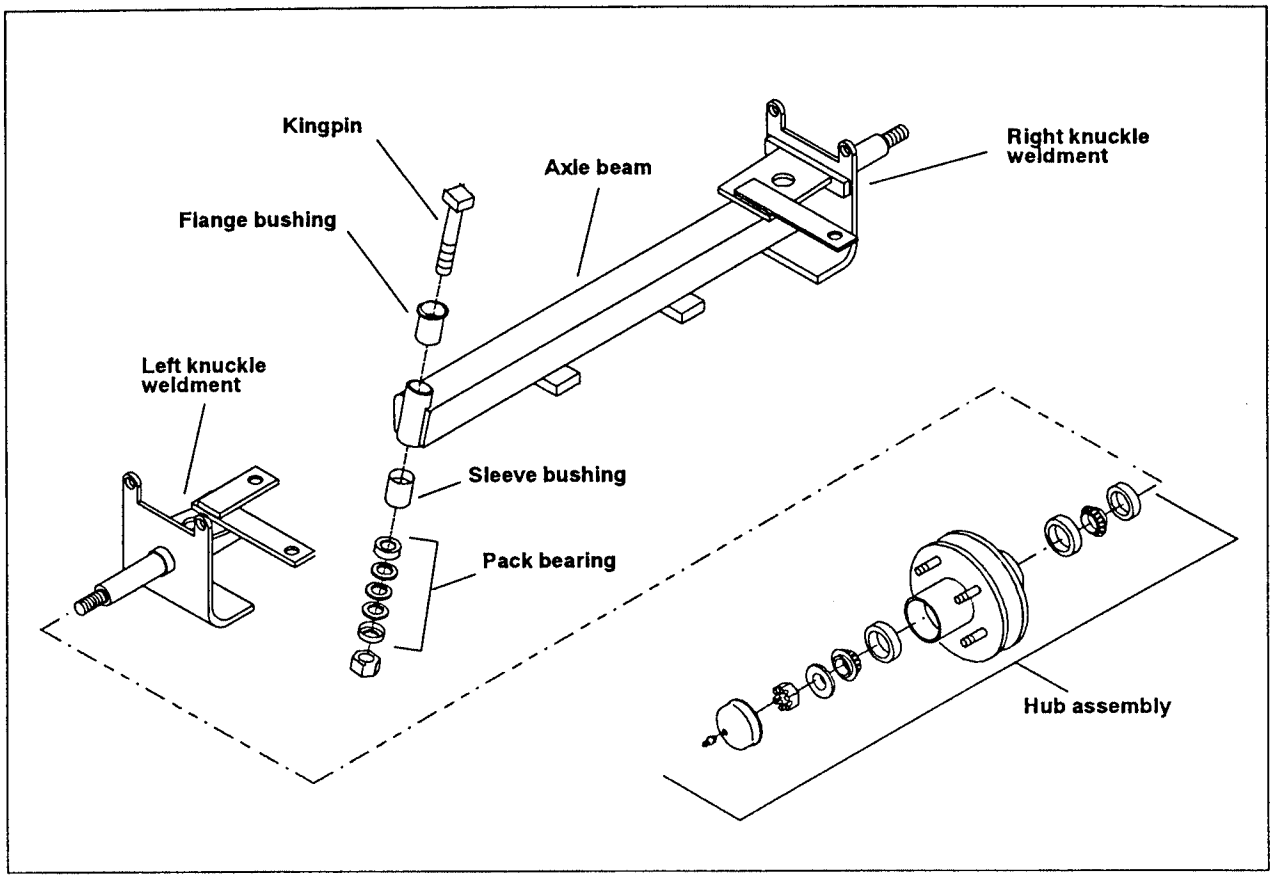


Figure 11 - Front axle

Adjusting Bearings

To clean and adjust the front axle bearings, do the following (see Figure 12).

1. Raise the vehicle and support it.

WARNING!

Always use jack stands of adequate capacity when supporting the vehicle. Perform this procedure only on a flat, level surface.

2. Remove wheel.
3. Remove caliper assembly.

Note: *It is not necessary to disconnect the brake hose. If the hose is disconnected, brake lines will need to be bled.*

4. Remove dust cap and cotter pin.
5. Unscrew spindle nut.
6. Remove outer washer and bearing.
7. Remove hub assembly from spindle.
8. Remove grease seal and inner bearing.
9. Clean roller bearings, spindle and wheel hub with a rag. Replace any worn or damaged parts.
10. Properly pack wheel bearing grease into roller bearings.
11. Reassemble inner roller bearings and grease seal into the wheel hub.

Note: *Always use a new grease seal.*

12. Mount hub assembly onto spindle.
13. Install bearing outer washer and nut.

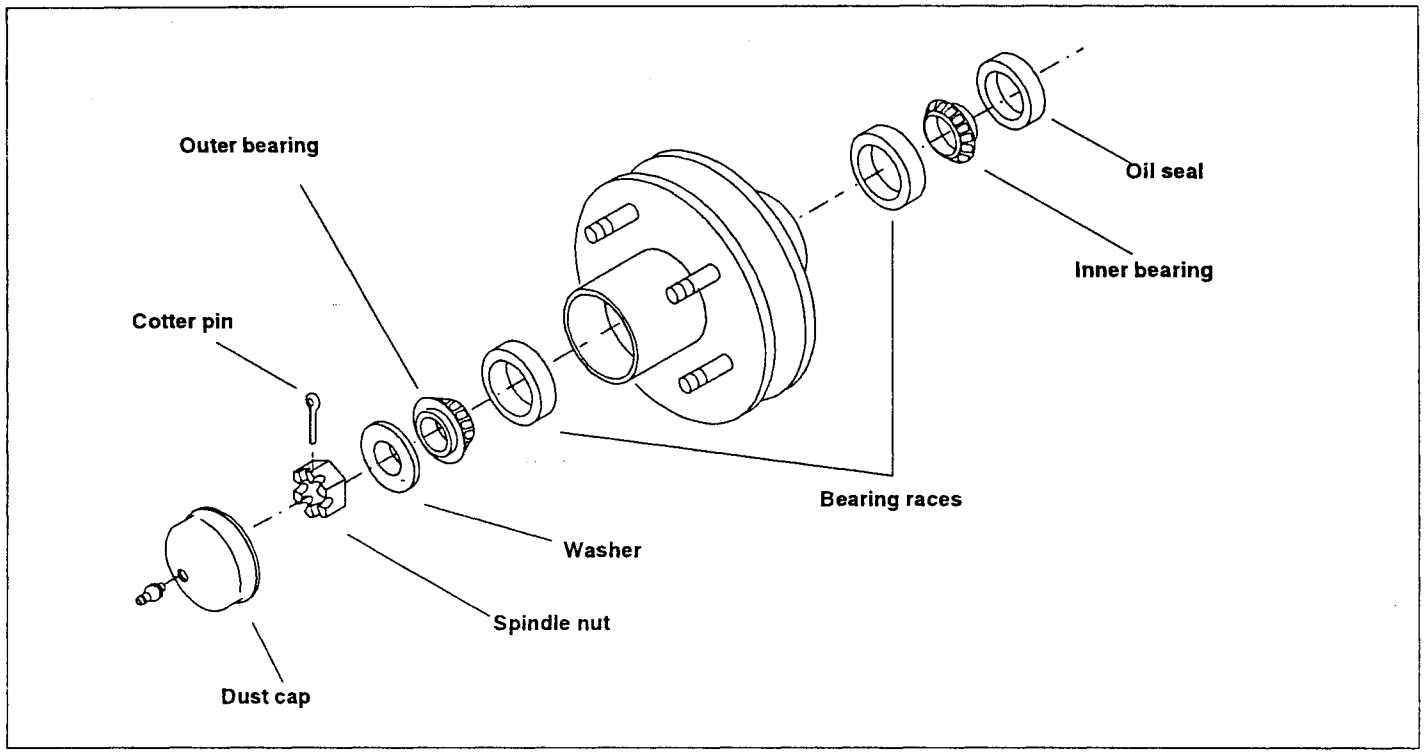


Figure 12 Adjusting the front axle bearings

14 Tighten spindle nut until you barely feel the roller bearing drag as you rotate the hub by hand, then back off the spindle nut about 1/4 turn.

Note: *The hub should now turn freely, but with no bearing end-play.*

15 Install cotter pin and dust cap.

16 Install the caliper assembly.

17 Install the wheel.

WARNING!

Keep the brake disc clean. Any contamination with oil or grease will cause brake failure. Replace the brake pads if they become contaminated.

Aligning the Front End

To align the front end for toe-in, do the following:

Caution!

Always check the alignment when the tie-rod or the ball joints are replaced.

Note: *The caster and camber are set at the factory and do not require adjustment.*

1 Raise the front end of the vehicle and support it.

WARNING!

Always use jack stands of adequate capacity when supporting the vehicle. Perform this procedure only on a flat, level surface.

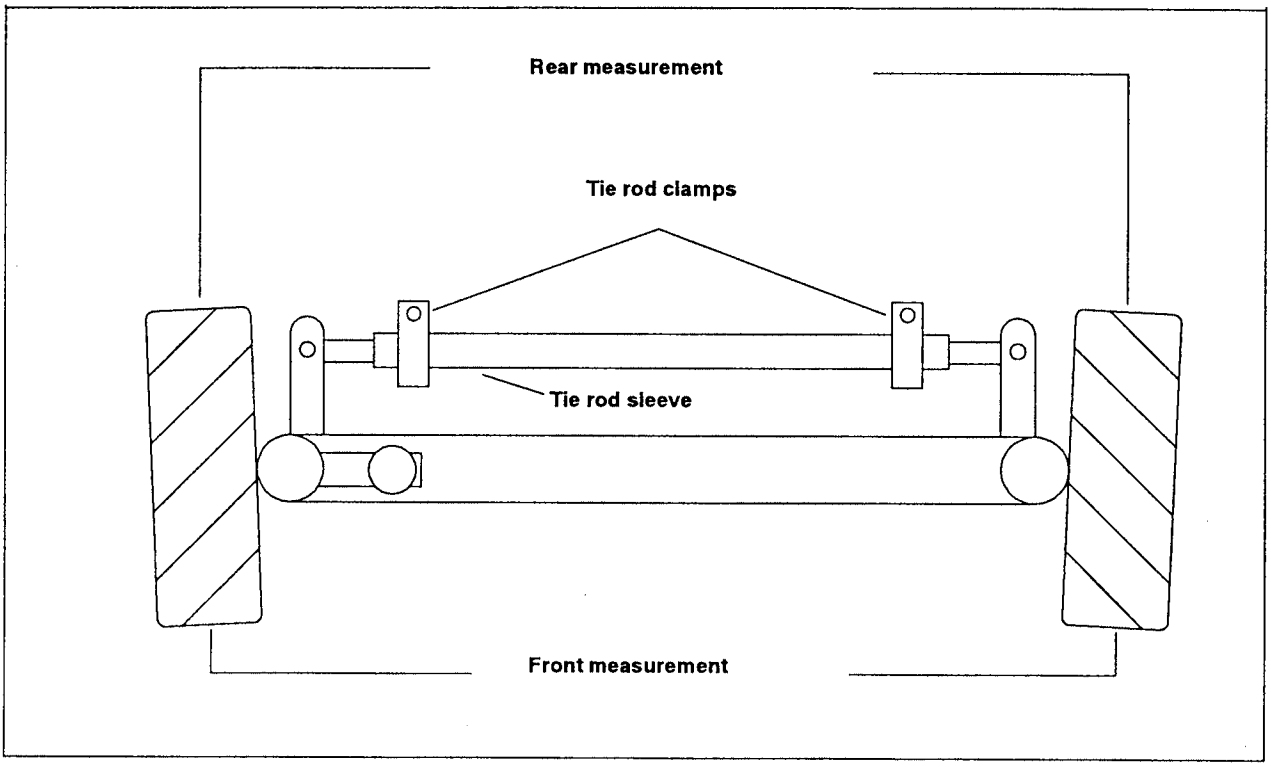


Figure 13 Aligning the front end

2. Mark the center of each front tire.

   Tip: *Hold a white chalk or other marker against the tire tread at its center while rotating the tire.*

3. Lower front end.

4. Position front wheels straight ahead.

5. Measure the distance between the marks on the rear of the front tire.

6. Measure the distance between the marks on the front of the front tire. If the rear measurement is not between 0" and 1/8" greater than the front measurement, continue with the remaining steps.

7. Loosen each tie-rod sleeve clamp until the tie-rod sleeve can be turned.

8. Turn the tie-rod sleeve until the rear measurement is between 0" and 1/8" greater than the front measurement.

9. Tighten each tie-rod sleeve clamp.

Note: *Be careful not to change the position of the tie-rod sleeve.*

Repairing King Pins and Bushings

To repair the king pins and bushings, do the following (see Figure 15):

1. Remove wheel.

2. Remove the caliper assembly.

3. Remove the dust cap and cotter pin.

4. Unscrew spindle nut.

5. Remove outer washer and bearing.

6. Remove hub assembly from spindle.

7. Disconnect the ball joints at the knuckle weldment.

8. Install spindle nut to protect the threads.

9. Remove king pin locknut from king pin.

10. Remove king pin from knuckle weldment.

    Tip: *Use a soft rod (bronze or aluminum) to drive the king pin up through the knuckle if necessary.*

11. Remove knuckle and pack bearing from axle sleeve.

12. Press bushings from axle sleeve.

13. Clean knuckle, king pin, axle sleeve and pack bearing with solvent or degreaser.

14. Press new bushings into sleeve using a bushing press.

Note: *The upper bushing is a flange bushing. The flange must be seated on the axle sleeve.*

Tip: *If you do not have a bushing press, contact your Taylor-Dunn dealer or any automotive supply house or repair shop for this service.*

15. Broach or ream the new bushings until the inside diameter is between 0.878" and 0.880".

Note: *Be sure that the bushings are in line with each other. The bottom bushing should be flush with the inside surface. The top bushing should be seated against the axle sleeve.*

16. Lubricate the pack bearing with lithium grease.

Note: *Make sure the pack bearing is assembled in the correct order shown in figure 14.*

17 Install knuckle weldments and pack bearing onto axle weldment

18 Install king pin into knuckle weldment.

19 Tighten king pin locknut until it touches the bottom of the knuckle weldment.

WARNING!

Locknuts will have a reduced locking capacity after being removed. Always use new high quality locknuts when repairing the brake assemblies.

Note: *When tightening the locknut on the king pin make sure that the knuckle weldment rotates freely.*

20 Lubricate bushings and king pin with grease using grease fittings.

21 Install hubs and bearings.

22 Adjust wheel bearings.

23 Install caliper assembly.

24 Install and tighten ball joints.

25 Align front end.

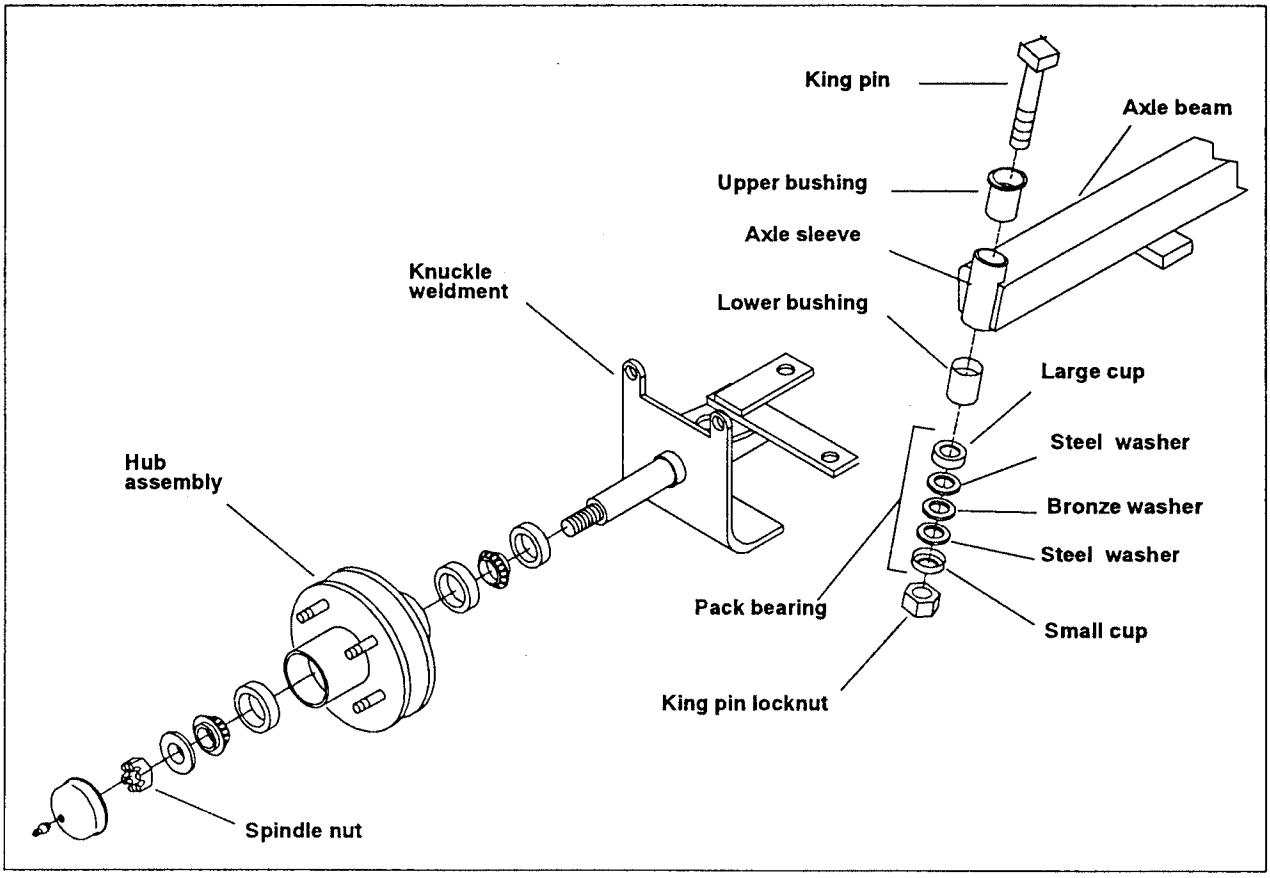


Figure 14 Repairing king pins and bushings

Replacing the Steering Assembly

To replace the steering worm assembly, do the following (see Figure 15).

1. Pry the steering wheel cap up to expose the locknut.
2. Unscrew terminals from horn button.
3. Cut terminals from horn button wires.

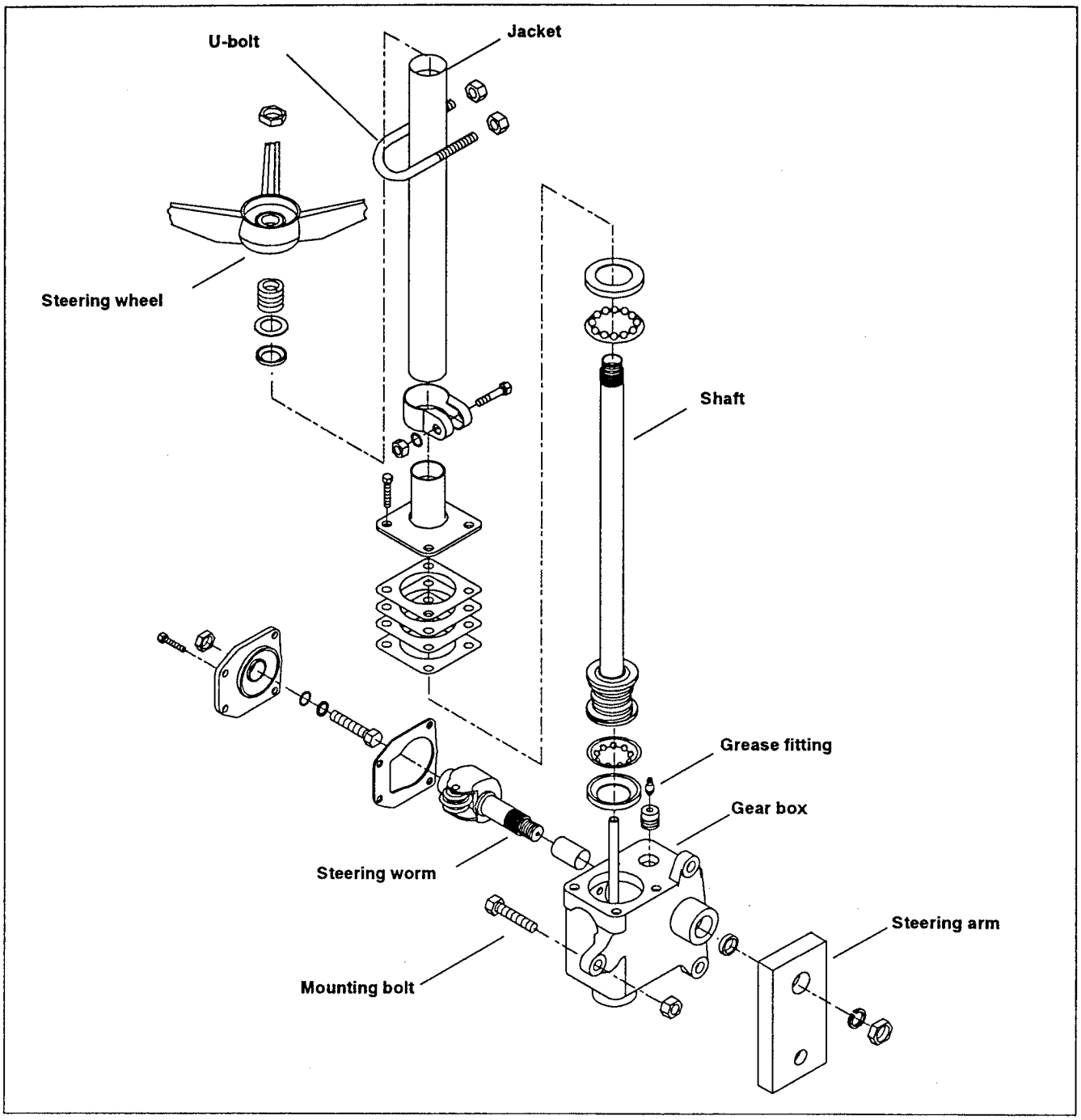


Figure 15 Replacing the steering worm

Note: *New terminals will need to be crimped onto the wires when the steering gear is installed.*

4. Pull wires out through bottom of the steering column.
5. Remove the steering wheel and steering arm.

   Tip: *Use wheel puller.*

   ☐ *Remove the steering gear cover.*

   ☐ *Remove the steering jacket U-bolt.*
6. Remove mounting bolts attaching steering gear to frame.
7. Carefully remove the steering column out of the bottom of the frame.
8. Install new steering column shaft and worm assembly using the mounting bolts and the U-bolt removed earlier.

Note: *Be sure to use new locknuts.*

9. Align front wheels straight ahead.
10. Install steering wheel (but do not tighten yet).
11. Center the steering column shaft and worm assembly.

    Tip: *Count the number of turns from full left turn to full right turn, then turn the wheel back half that number of turns.*
12. Install the steering arm. It should point straight down with the wheels straight ahead.

Note: *The steering mechanism must turn equally in each direction. If not, you must reinstall the steering arm in the proper position.*

13. Tighten the nut. Be sure to use the lockwasher. Position the steering wheel with one spoke pointing toward the driver when the wheels are straight ahead. Tighten the steering wheel nut.
14. Push the horn button wires up through the steering gear. Crimp new ring terminals (75-418-70) onto horn button wires.

    Tip: *Use a wire crimping tool or pliers. Be sure to strip the wire ends first to make electrical contact with the terminals.*
15. Screw terminals to horn button.
16. Replace steering wheel cap.
17. Lubricate the steering worm through the grease fitting.
18. Check for smooth steering.

REAR AXLE ASSEMBLY

The rear axle assembly consists of the following:

- drive chain
- power traction assembly
- differential
- rear axle

Adjusting the Drive Chain

Adjust the drive chain according to the following schedule.

DRIVE CHAIN MAINTENANCE SCHEDULE		
Adjustment	**How Often**	**Comments**
Adjustment	When	Comments
1st	at 100 hours	new unit or after installing new chain
2nd	next 150 hours	normal running conditions
3rd	next 250 hours	normal running conditions
4th and thereafter	every 400 hours	normal running conditions

To adjust the drive chain tension, perform the following (see Figure 16)

WARNING!

Disconnect the main battery leads and remove the key before working on any part of the vehicle's electrical system.

1. Tighten the three motor mounting nuts and then back off exactly one full turn.
2. Loosen the adjusting bolt lock nut.
3. Turn the adjusting screw clockwise to a torque of 20 in- lbs. Back adjusting bolt off exactly 2 ½ turns.
4. Insure that the motor is all the way back against the adjusting bolt.
5. Tighten adjusting bolt lock nut while preventing adjusting bolt from turning.
6. Tighten the three motor mounting nuts.

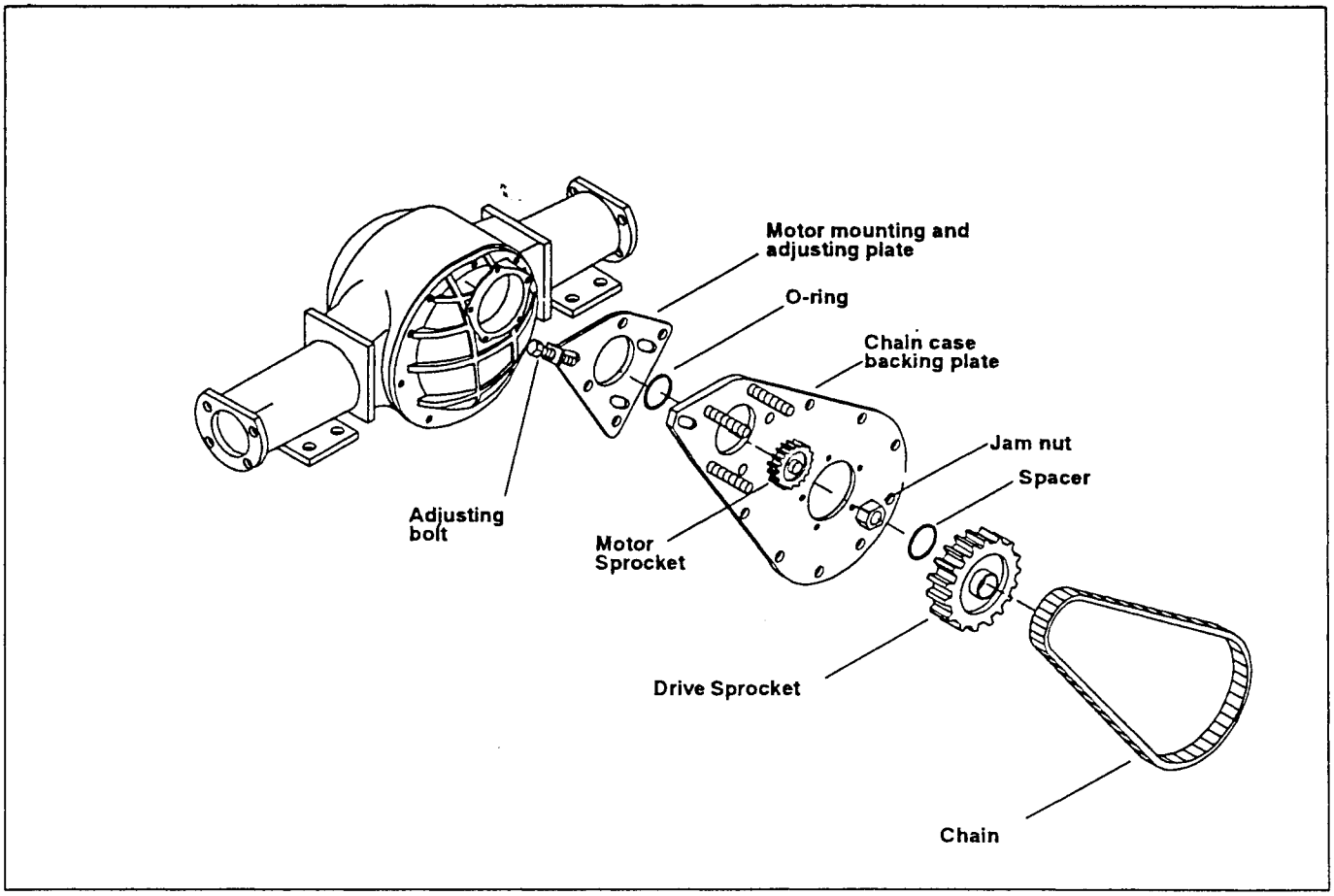


Figure 16 Adjusting the drive chain

Removing the Motor

To remove the motor without removing chain case cover, perform the following:

WARNING!

Disconnect the main battery leads and remove the key before working on any part of the vehicle's electrical system.

1. If not already done, disconnect all motor power leads.
2. Loosen the three motor mounting nuts and the adjusting bolt lock nut.
3. Back off the adjusting bolt sufficiently to allow the motor mounting plate to fully bottom.
4. Remove the three motor mounting nuts and washers.
5. Remove the chain from the sprocket and tilt the motor to remove the motor.

Installing the Motor

To install the motor when the chain case has not been removed, do the following:

1. If applicable, clean the motor and mounting plate mating surfaces. Install motor on mounting plate using appropriate flat head screws. Tighten to 30 ft lbs.
2. If applicable, install spacers, key, sprocket, washer, and shaft nut to motor shaft. Tighten shaft nut to 75 ft lbs.

3. Place O-ring in the motor mounting plate opening.

4. Using a piece of wire, reach through the opening in the back of the chain case and lift chain above opening. Secure chain in this position by attaching a string to the chain and a suitable object.

   Tip: *Use a string that is strong yet is flexible and slides easily.*

Note: *Make sure the chain is properly seated on the large sprocket.*

5. Slip the motor sprocket into the chain case and under the chain.

6. Remove the string supporting the chain.

Note: *It is all right if the string breaks. The remaining part will not damage the power traction drive.*

7. Move the vehicle slightly and observe the movement of the motor armature. If the armature does not move, the chain is not seated.

8. Position the motor onto the studs and install washers and nuts. Only finger tighten the nuts.

9. Move the vehicle slightly and observe the movement of the armature which indicates the chain is still engaging the sprocket.

Caution!

If the chain is not properly positioned on the sprocket, severe damage can occur to Power Traction components.

10. Adjust drive chain as described in Section titled "Adjusting Drive Chain".

Disassembling and Reassembling the Power Traction Assembly

To completely disassemble and reassemble the Power Traction Assembly, do the following:

1. Drain oil from chain case.

2. Remove the pinion nut and parking brake drum. Remove bolts and nuts from the front of the chain case cover. Remove chain case cover and parking brake hardware.

3. Remove the three nuts and washers which fasten the motor to the backing plate.

4. Disengage the chain from the motor sprocket. Remove motor.

5. Remove O-ring from the motor mounting plate.

6. Remove chain, pinion sprocket and spacers from pinion shaft. Note spacer location for reassembly.

7. If required for further disassembly, remove chain case backing plate and gasket by removing five retaining bolts.

8. To reassemble, install chain case backing plate and gasket (with sealer) to differential with five bolts previously removed. Tighten to 50 ft lbs.

9. Install chain on pinion sprocket.

10. Install O-ring in motor mounting plate and attach motor and motor mounting plate to chain case backing plate.

11 Engage chain onto motor sprocket and secure motor mounting plate to chain case backing plate with three nuts and washers previously removed.

12 Adjust drive chain as described in Section titled "Adjusting Drive Chain".

13 Install chain case cover and gasket (replace if damaged) to chain case backing plate. Install parking brake hardware. Tighten cover retaining bolts and nuts. Install parking brake drum, stake pinion nut.

14 Fill chain case with appropriate oil.

15 Connect the motor power leads.

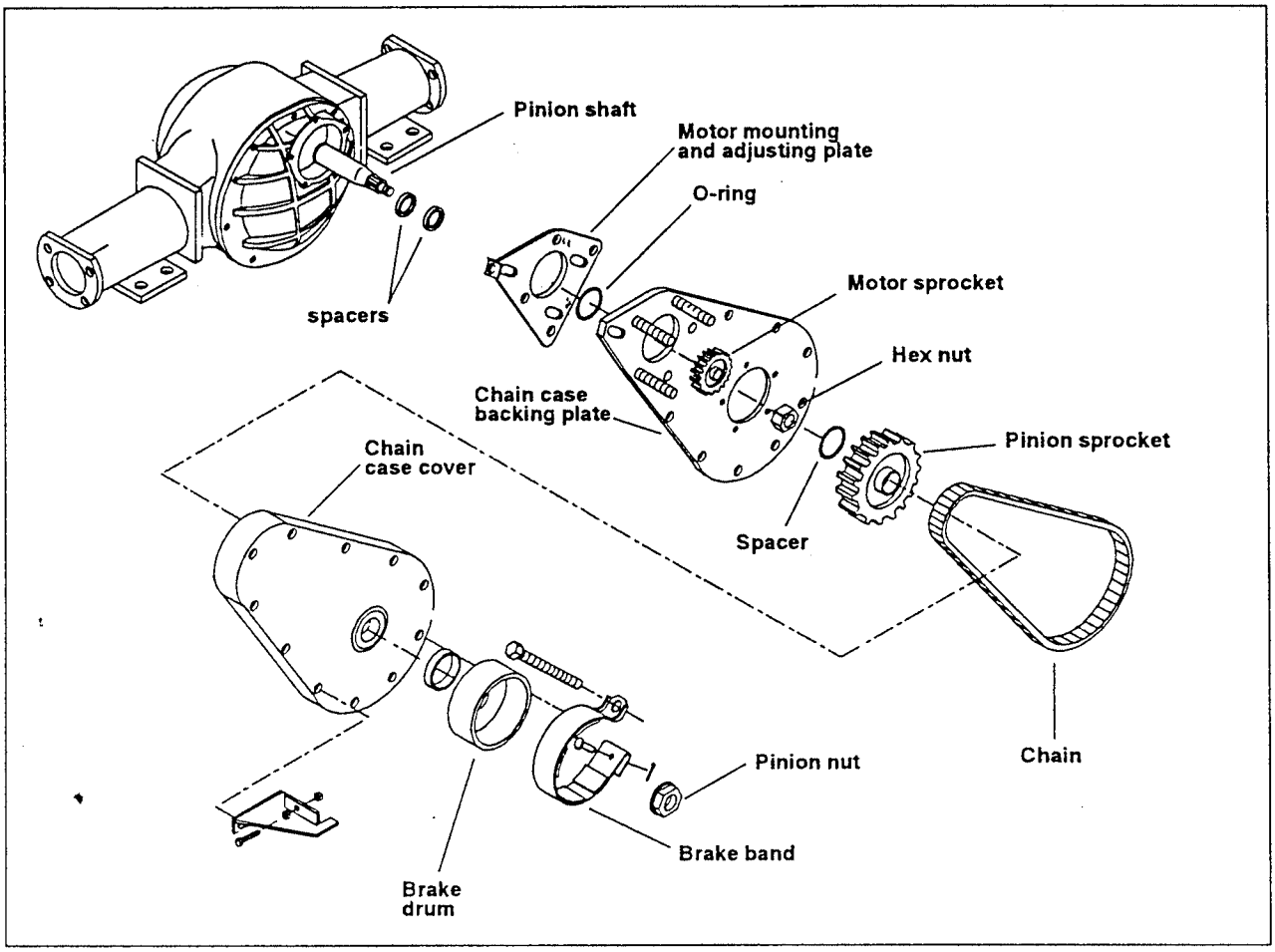


Figure 17 - Disassembling and Reassembling the Power Traction Assembly

Removing and Installing Rear Axle Bearings

To remove and replace rear axle bearings, perform the following (see Figure 15):

WARNING!

Disconnect the main battery leads and remove the key before working on any part of the vehicle's electrical system.

1. Raise and support the vehicle.

WARNING!

Always use jack stands of adequate capacity when supporting the vehicle. Perform this procedure only on a flat, level surface.

2. Remove wheel assembly.
3. Bend back locking tabs and remove four bolts holding the disc brake mounting bracket to axle housing.

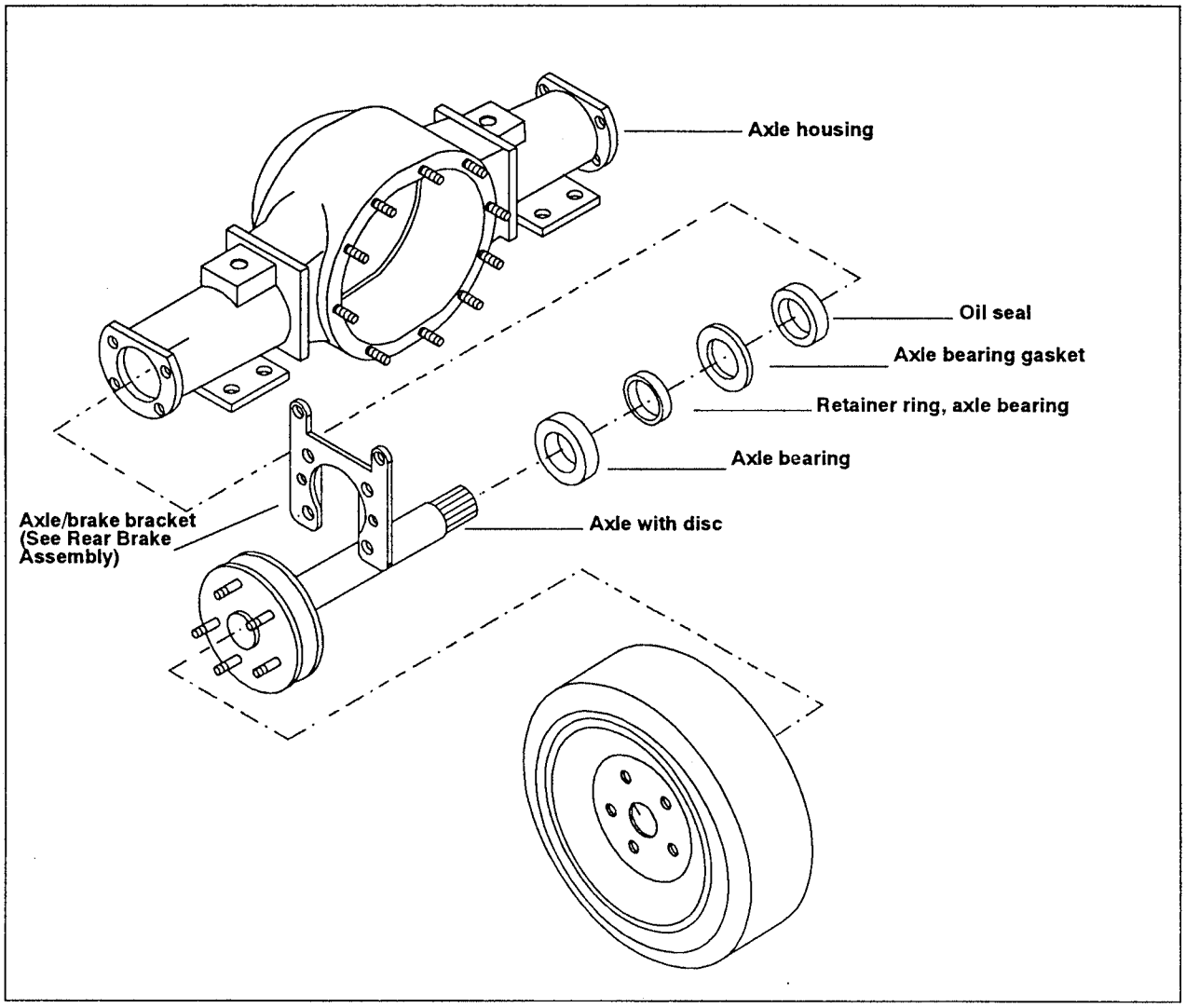


Figure 18 - Removing and installing rear axle bearings.

4. Remove brake caliper and mounting bracket.

5. Pull axle from housing.

Caution!

Use only a puller that is specifically designed for this purpose. Do not force the axle out by pounding or prying which can cause permanent damage.

6. Press the bearing retainer ring and bearing from axle.

7. Press new bearing and retainer ring onto the shaft.

8. Remove and replace oil seal and all other gaskets in the housing.

9. Install axle back into housing..

10. Install brake caliper.

11. Install four brake mounting bolts and nuts. Tighten to 35 ft lbs and bend up locking tabs.

WARNING!

Failure to properly bend up locking tabs could result in eventual loosening of brake caliper and failure of brake action.

Repairing the Differential

Disassembling the Differential

To disassemble the differential, do the following:

Note: *This procedure assumes that the differential has already been removed from the vehicle and that the brakes, axles and belt or chain drive have also been removed. Refer to appropriate sections of this chapter for these respective procedures.*

1. Remove nuts around the differential carrier housing. Remove differential carrier from axle housing.

2. Mark one differential bearing cup and bearing support to aid in proper reassembly.

3. Remove adjusting nut locks.

4. Remove the two bolts securing each bearing support cap. Remove bearing support caps.

5. Remove adjusting nuts and bearing caps.

6. Remove differential case assembly from axle housing.

7. Press differential case bearing and remove ring gear as needed.

8. Remove bolts around drive pinion retainer. Remove drive pinion assembly.

9. Remove O-ring and shim from drive pinion assembly.

10. Remove nut on outside end of drive pinion gear shaft.

11. Remove drive pinion gear shaft assembly.

12 If the drive pinion bearings must be replaced due to wear or damage, pull bearings from shaft. Press out bearing cups from housing.

Note: *Do not remove pinion bearing races from pinion shaft retainer unless the bearings are being replaced. The location of thesed cups are used to machine the flange and pilot after they are installed in the bores. If you must replace the cups, use a 0.0015" feeler gause between the new cup and the bottom of the bore to ensure proper positioning of the cup.*

Assembling the Differential

1 Lubricate all parts liberally using axle lubricant.

2 Install front pinion bearing and race onto the pinion gear.

3 Install spacers and shim onto the pinion drive gear shaft.

4 Place the pinion shaft retainer onto the pinion gear and install the pinion bearing.

5 Place spacers, sprocket and oil seal onto the spline of the pinion gear.

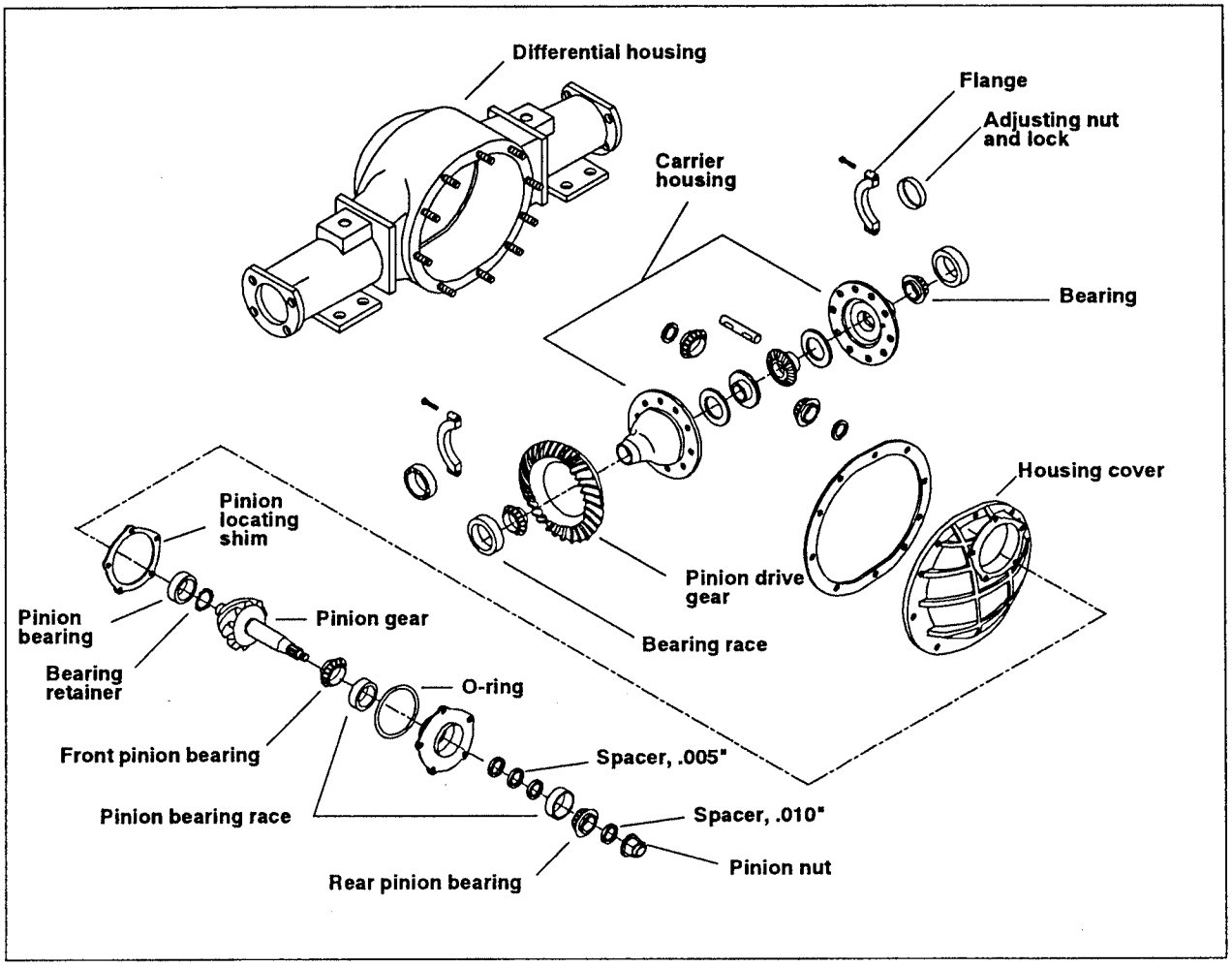


Figure 19 - Disassembling and Reassembling the Differential

6 Install pinion gear washer and nut and tighten to 100 ft lbs. of torque.

Note: *If drive pinion, bearings, etc. have been changed, the shims between the bearings may have to be changed to obtain proper adjustment of the bearings. The bearings are properly adjusted when the shaft turns freely, but the roller bearings themselves cannot be slid out on their races without rotating (i.e., no axial play).*

7 Install O-ring on pinion retainer.

8 Install drive pinion assembly into the carrier housing. If drive pinion and/or ring gear have been changed, refer to shim selection procedure later in this chapter. Otherwise install original shim.

9 Press or tap the pinion drive gear into position.

10 Install and alternately tighten each drive pinion retainer bolt by hand, then torque each bolt to 60 or 65 lbs.

Note: *The housing cover bolts will be removed later when you install the backplate assembly.*

11 Install new bearings as required on the differential case.

12 Install ring gear if removed.

13 Install the differential housing, bearing cups, adjusting nuts, and bearing supports into the differential carrier. Where applicable, install parts in their original locations.

14 Tighten the two bolts in each bearing support. Insure that bearing adjusting nuts can still be turned. If not, loosen bearing support bolts, move slightly, retighten bolts.

15 Tighten the adjusting nut on the side away from the ring gear until the drive pinion and ring gear are tightly seated (pinion shaft difficult to turn). Ensure that nut on ring gear end is loosened sufficiently. Back off adjusting nut on opposite end from ring gear ¼ turn.

16 Tighten the adjusting nut on ring gear end until there is no detectable end play in the bearings and shafts rotate freely.

Caution

Do not allow any bearing play or looseness. This causes gear noise and leads to unnecessary wear on the gears.

17 Spin the differential using an impact wrench on pinion shaft nut or by other means. The assembly should not produce excessive noise. If there is excessive noise, try loosening the adjusting nut away from ring gear ⅛ turn and then retightening adjusting nut on ring gear end. Spin assembly again. If the unit is still noisy and the ring and pinion gears are in good condition, the drive pinion shim may need to be adjusted.

18 Install adjusting locknuts.

19 Install differential carrier into axle housing with a new gasket (use gasket sealer).

20 Install differential housing bolts and tighten to 50 ft. lbs. of torque.

Selecting Drive Pinion Shims

Shims are available in 0.010" to 0.021" thickness in steps of 0.001" to correctly position the drive gear. A standard shim is 0.015" thick. Inserting a thicker shim between a pinion retainer and the carrier moves the pinion away from the drive gear.

Note: *Matched pinions and drive gears use the same number.*

Note: *A "+" or a "-" indicates whether to add or subtract the indicated amount from a standard shim.*

The following numbering system is used on pinions to indicate the amount you must add to or subtract from the standard shim:

PINION NUMBERING SYSTEM	
If number is	Adjust standard shim as follows:
0	standard shim (no adjustment)
+1	add 0.001"
+2	add 0.002"
+3	add 0.003"
+4	add 0.004"
+5	add 0.005"
-1	subtract 0.001"
-2	subtract 0.002"
-3	subtract 0.003"
-4	subtract 0.004"
-5	subtract 0.005"

Repairing the Parking Brake

To repair the parking brake, do the following:

1. Remove the pinion nut and the park brake drum.
2. Clean and inspect the drum for nicks or grooves. Replace the drum if outside diameter is less than 5.830" or if it is grooved.
3. Remove the clevis pin, adjusting bolt and brake band from transfer case.
4. Install new brake band, adjusting bolt, clevis pin and cotter pin.

WARNING!

Use a new clevis pin and adjusting bolt if the original parts show any wear.

5. Install park brake drum with new pinion nut. Stake the pinion nut with a chisel.
6. Tighten the adjusting bolt down, then back it off until the band has about .030" clearance to the drum. Adjust the alignment bracket if needed.

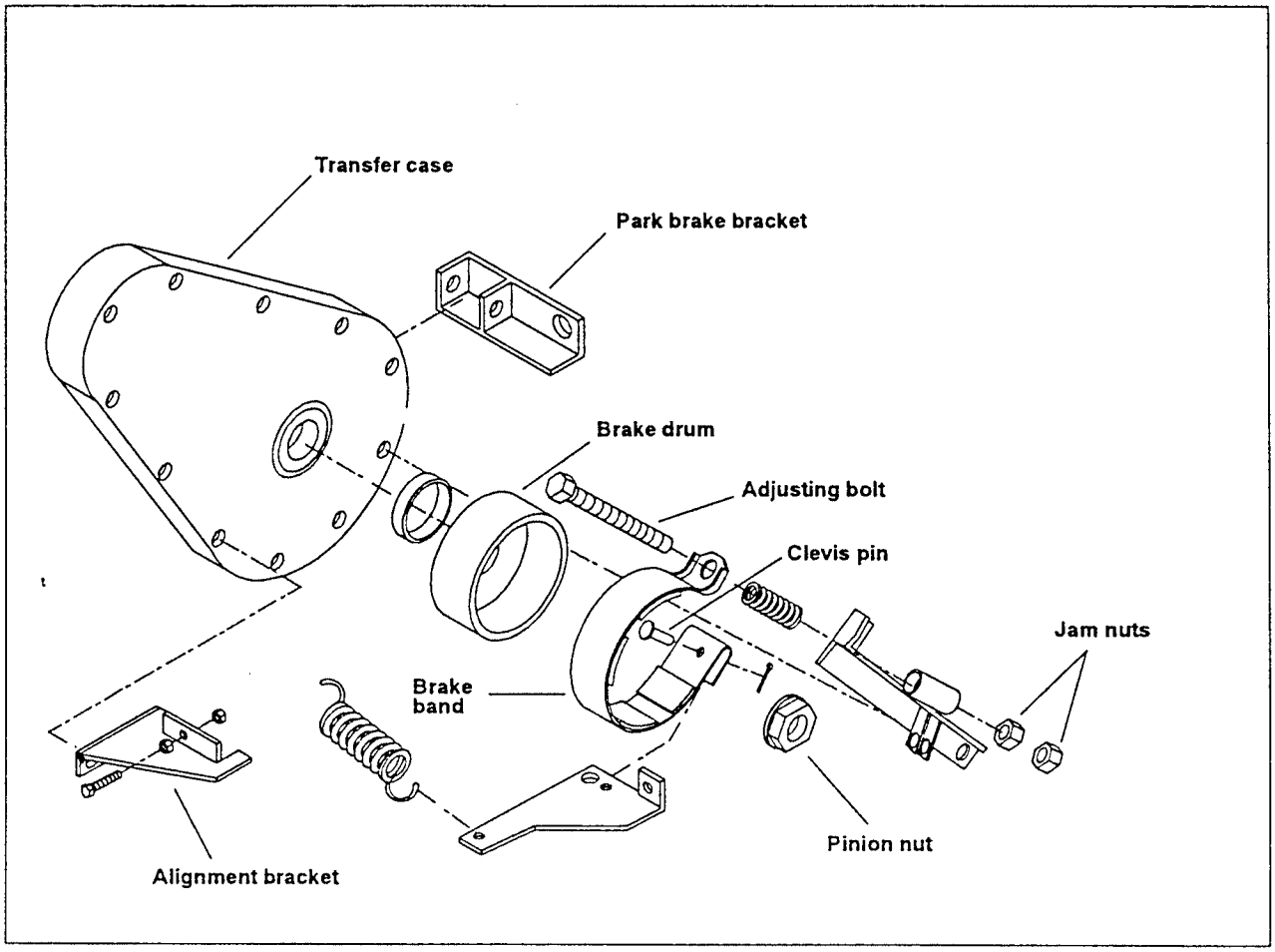


Figure 20 Repairing the parking brake

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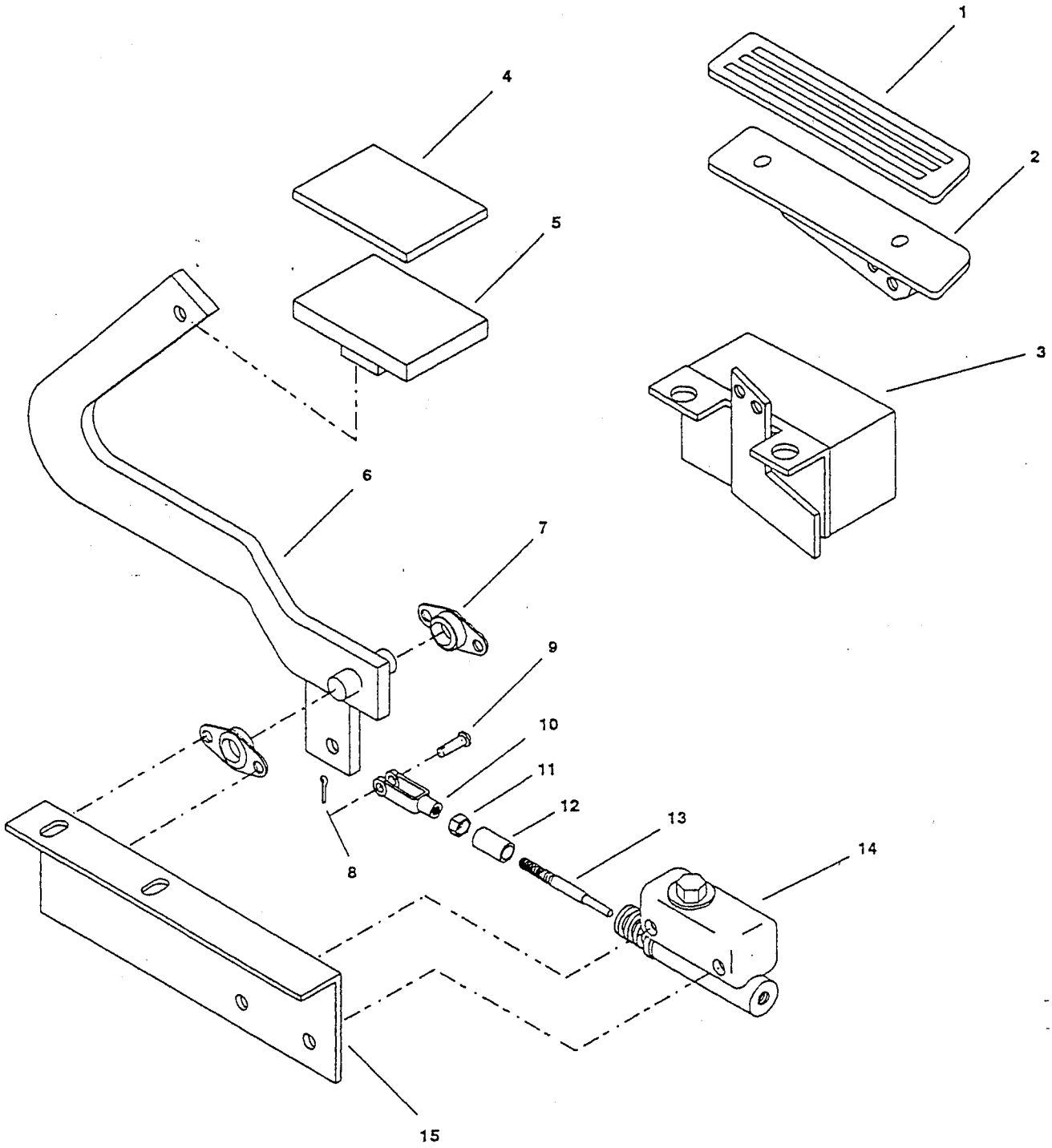
Section 5.

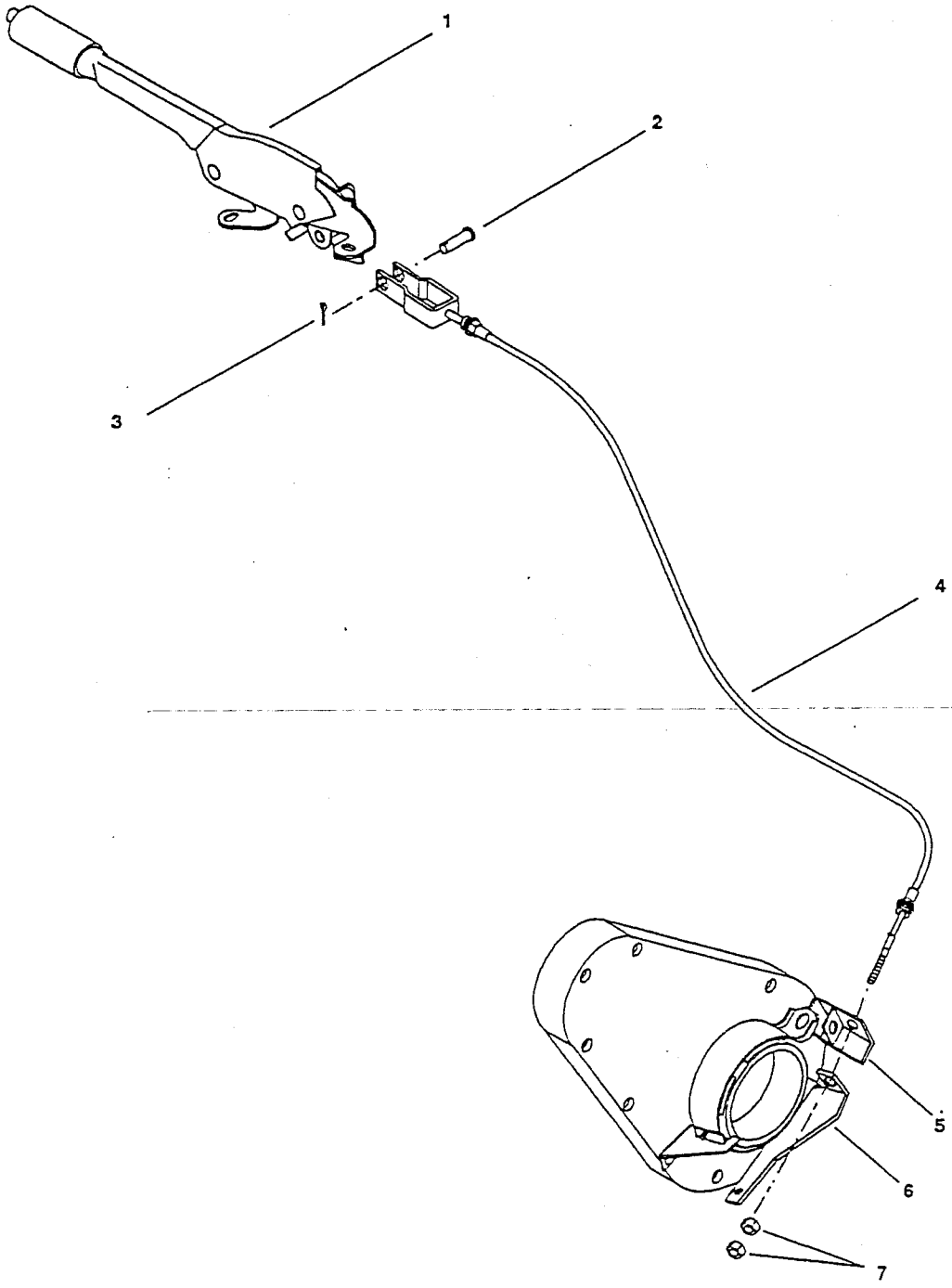
ILLUSTRATED PARTS BREAKOUT

ACCELERATOR, BRAKE PEDAL LINKAGE



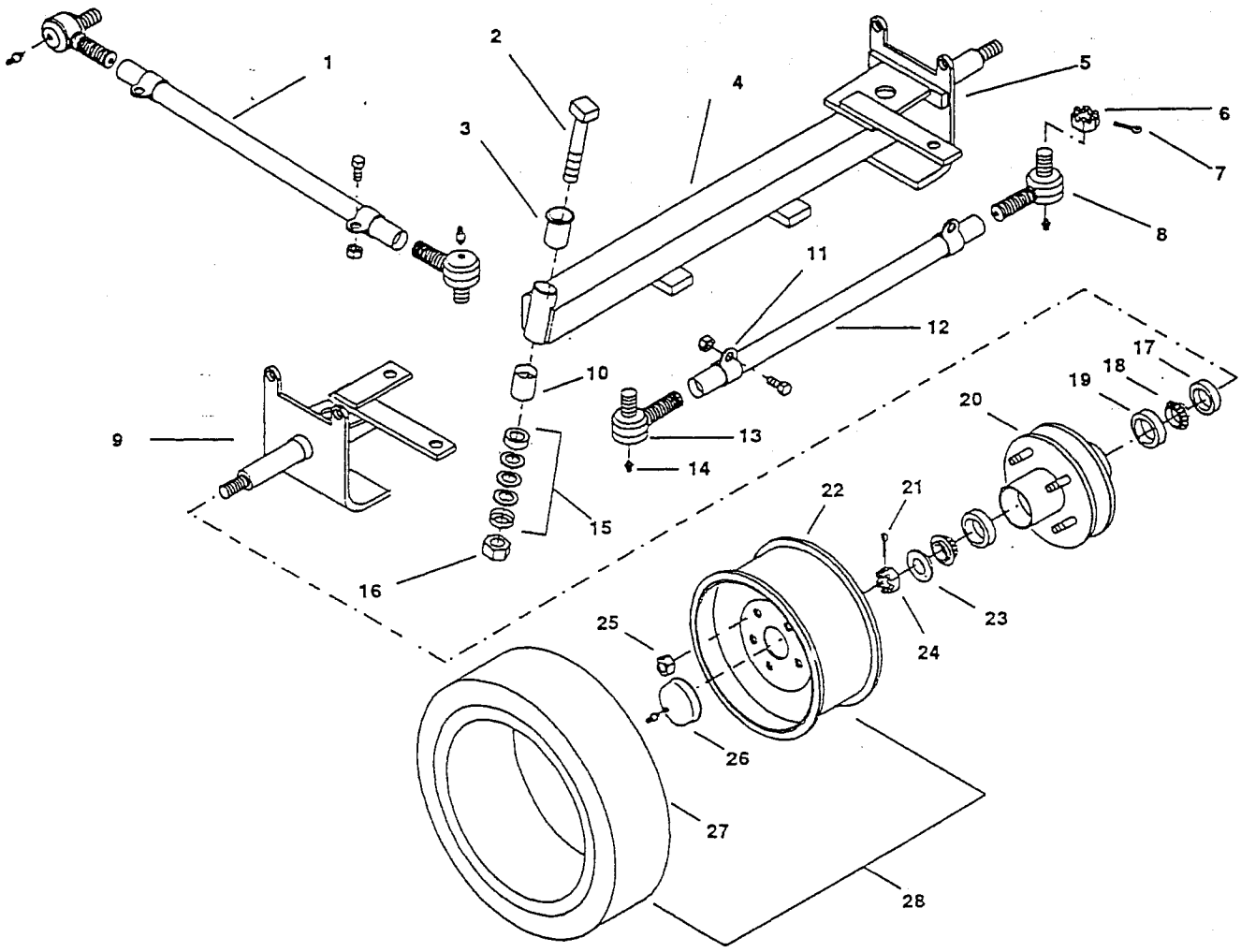
ACCELERATOR, BRAKE PEDAL LINKAGE			
ITEM #	PART NUMBER	DESCRIPTION	QTY
1	98-254-00	Pedal Pad, Accelerator, Aluminum	1
2	98-254-25	Pedal Mount, Accelerator	1
3	62-033-00	Accelerator Module, Solid State	1
4	98-200-00	Pedal Pad, Brake, Rubber	1
5	01-432-98	Weldment, Brake Pedal	1
6	00-410-17	Weldment, Brake Arm	1
7	80-410-20	Bearing, Flange	1
8	88-517-11	Pin, Cotter	1
9	96-771-00	Pin, Clevis	1
10	96-763-00	Clevis	1
11	88-119-80	Hex Head Nut, 3/8 NF	1
12	17-104-00	Collar, 3/8" Shaft	1
13	50-009-00	Rod, Master Cylinder	1
14	99-510-01	Master Cylinder	1
15	01-410-67	Mount, Brake Arm and Master Cylinder	1

HAND BRAKE LINKAGE



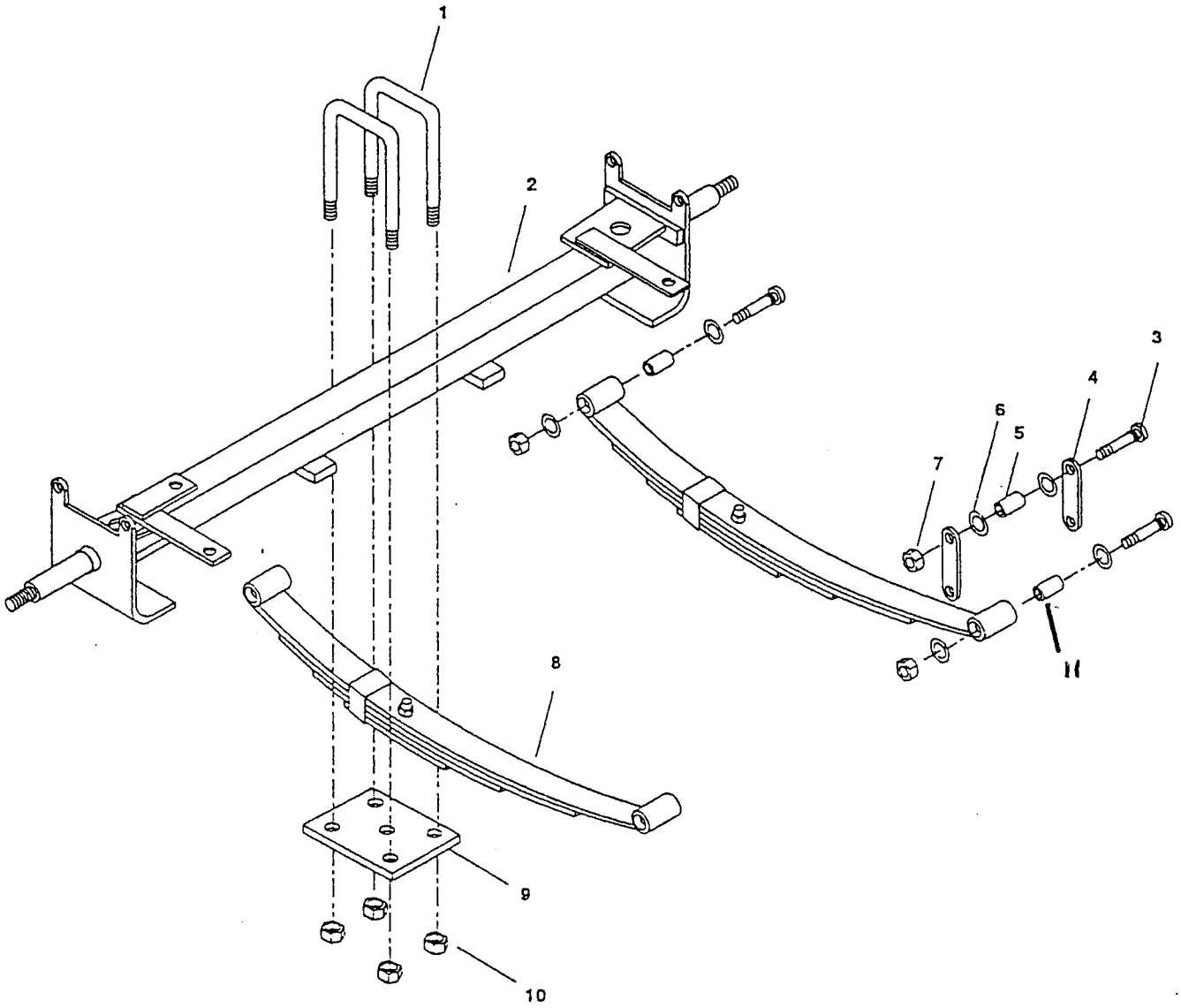
HAND BRAKE LINKAGE			
ITEM #	PART NUMBER	DESCRIPTION	QTY
1	51-343-10	Lever, Hand Brake	1
2	96-773-00	Pin, Clevis, 5/16"	1
3	88-527-11	Pin, Cotter, 1/8" x 1	1
4	96-827-14	Cable, Hand Brake, Adjustable	1
5	41-372-20	Mount, Brake Cable	1
6	50-656-03	Arm, Park Brake	1
7	88-099-91	Hex Nut, 5/16"	1

FRONT AXLE



FRONT AXLE ASSEMBLY (15-410-50)			
ITEM #	PART NUMBER	DESCRIPTION	QTY
1	18-410-05	Sleeve, Steering, Adjustable	1
2	21-009-10	King Pin	2
3	32-200-00	Bushing	2
4	15-410-51	Axle Beam	1
5	1 4-410-98	Yoke, Front Axle, Right (Tie-Rod Arm Length = 91/8	1
5a	14-410-96	Yoke, Front Axle, Right (Tie-Rod Arm Length = 6 5/8")	1
6	88-159-85	Slotted Nut, Hex head, NF	4
7	88-527-11	Cotter Pin, Steel	4
8	86-501-99	Ball Joint, Right	2
9	14-410-97	Yoke, Front Axle, Left (Tie-Rod Arm Length = 9 1/8")	1
9a	14-410-95	Yoke, Front Axle, Left (Tie-Rod Arm Length = 6 5/8")	1
10	32-204-00	Bushing	2
11	86-510-00	Assembly, Ball Joint Clamp	4
12	18-045-00	Sleeve, Steering	1
13	86-501-98	Ball Joint, Left	2
14	87-074-00	Fitting, Grease	2
15	80-309-10	Assembly, Pack Bearing	2
16	88-289-81	Locknut, Hex head, NF	2
17	45-338-00	Seal, Oil	2
18	80-017-00	Bearing, Roller, Tapered	4
19	80-103-00	Race, Bearing, Tapered	4
20	12-158-10	Hub, Wheel, 5 Stud with Disc	2
21	88-527-11	Cotter Pin, Steel	2
22	12-012-00	Wheel, 5 – Hole, 5.70 x 8	2
23	88-228-61	Washer, SAE	2
24	88-239-85	Slotted Nut, Hex Head, NF	2
25	97-236-00	Nut, Lug	10
26	92-104-00	Dust Cap with Grease Fitting	4
27		Tire, Load Range C, 5.70 x 8	4
28	13-742-13	Assembly, Tire and Wheel, 5.70 x 8	4

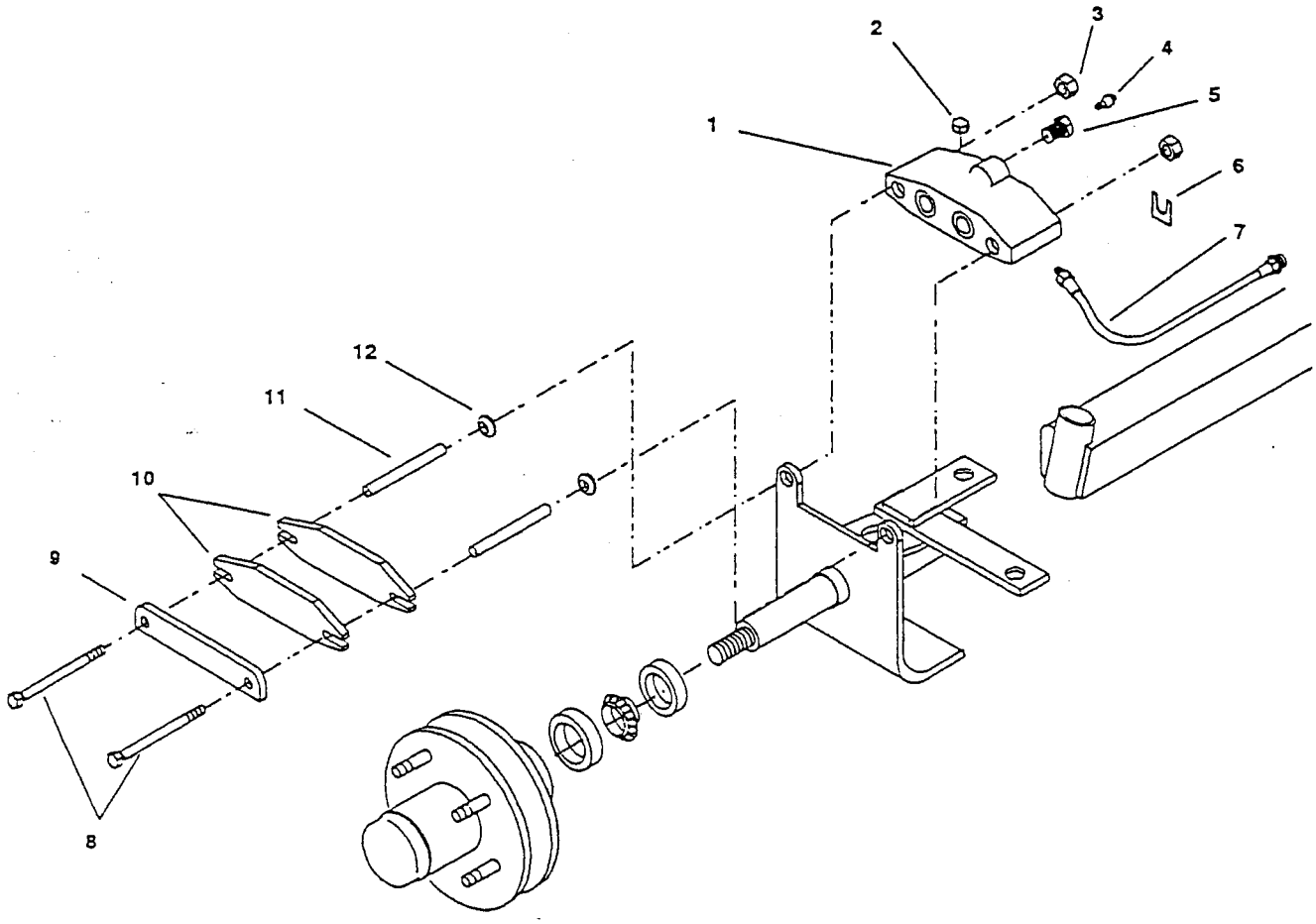
FRONT AXLE SUSPENSION



FRONT AXLE SUSPENSION			
ITEM #	PART NUMBER	DESCRIPTION	QTY
1	96-123-02	U-Bolt, Front Suspension	4
2	15-410-03	Axle Beam	1
3	96-243-10	Bolt, NC, Grade 5	6
4	16-870-10	Strap, Shackle	4
5	32-213-00	Bushing, Nylon, 1 11/16", 25/32" OD, 9/16" ID, fo Spring Eye	6
6	98-603-10	Grommet, Rubber	12
7	88-179-86	Locknut	6
8	85-512-40	Spring, Leaf, Front	2
9	16-865-02	Plate, Spring, Front Axle	2
10	88-109-87	3/8" NC Fastite Nut	8

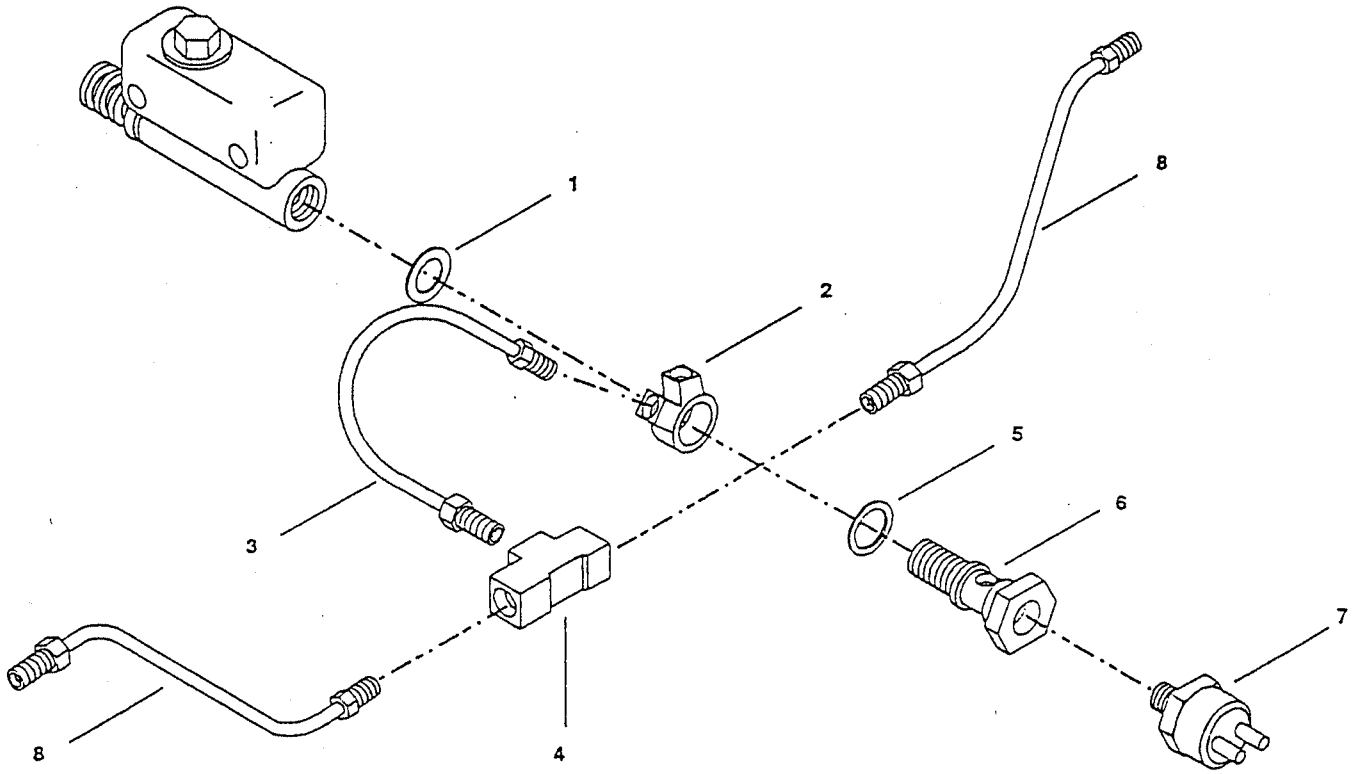
11 32-214-15 2 pc. PER EYELET (new style)

FRONT BRAKE ASSEMBLY



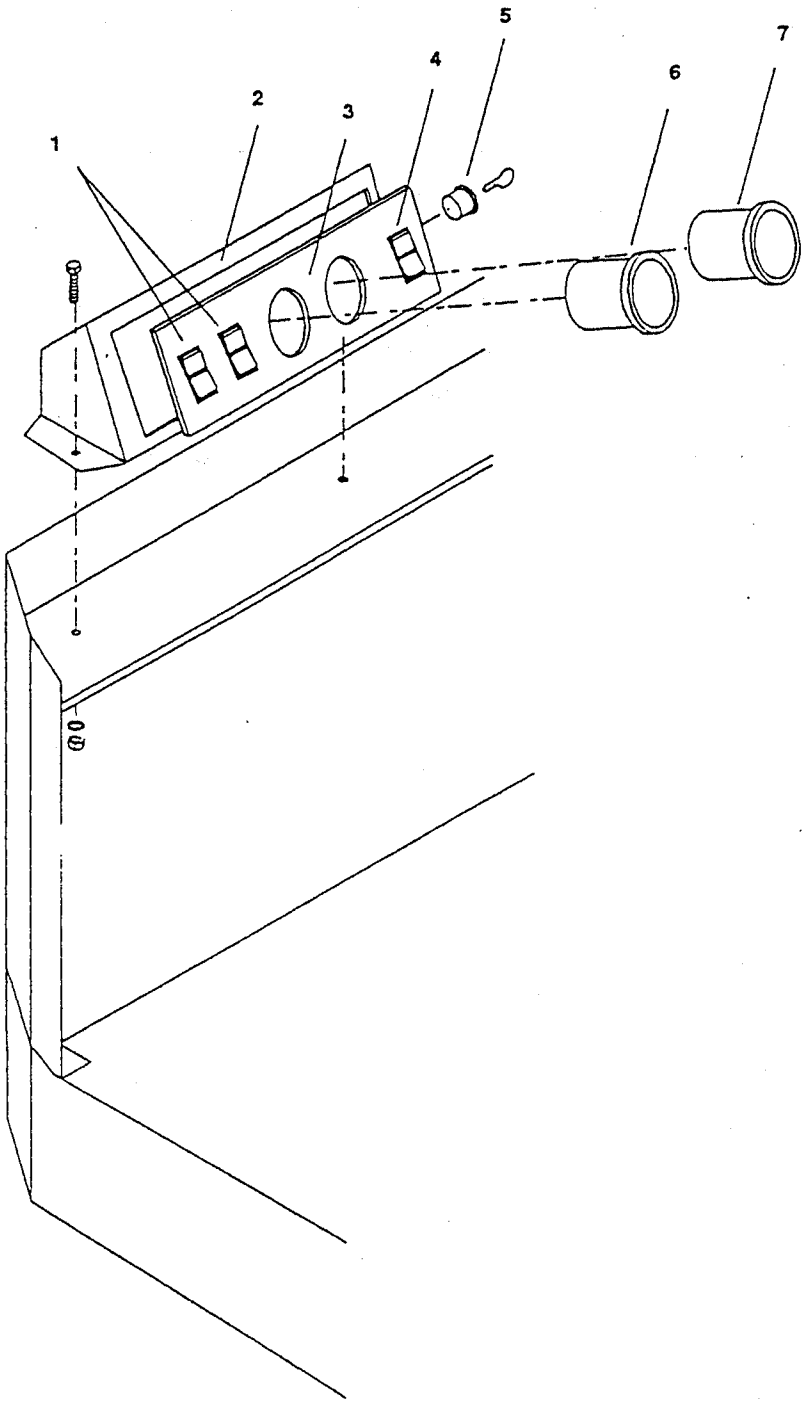
FRONT BRAKE ASSEMBLY			
ITEM #	PART NUMBER	DESCRIPTION	QTY
1*	41-350-30	Brake Body, Hydraulic with Pistons & Boots	2
2	41-886-00	Plug, Hex Head Socket	2
3	88-069-82	Locknut	3
4	99-588-00	Screw, Bleeder	3
5	99-588-01	Adapter, Threaded	3
6	99-576-00	Clip, Wagner	1
7	99-580-20	Hose, Brake, Front	1
8	88-067-21	Bolt, Hex head, NC	2
9	41-350-51	Plate, Secondary	4
10	41-348-70	Pad, Disc Brake, Hydraulic	1
11	41-348-52	Spacer, Disc Brake, Hydraulic	1
12	32-240-40	BRG,MTL BACKED TEFLON, 3/8	4
*	41-350-66	Brake Body Repair Kit	1

FRONT BRAKE LINES



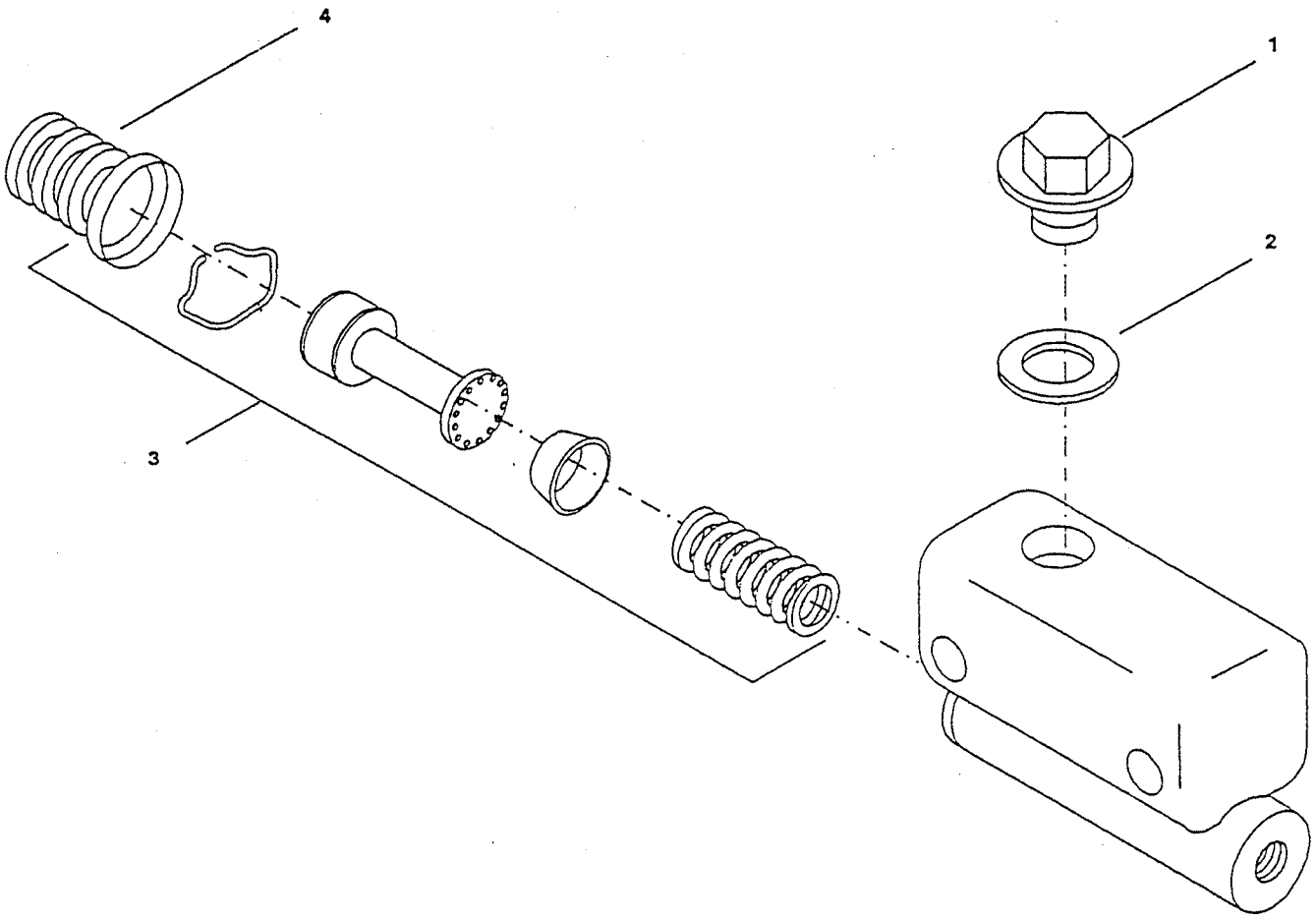
FRONT BRAKE LINES			
ITEM #	PART NUMBER	DESCRIPTION	QTY
1	99-571-00	Gasket, Copper	1
2	99-565-00	Fitting, Master Cylinder	1
3	99-600-54	Brake Line, Master Cylinder to Front	1
4	99-564-00	T-Fitting, Wagner	1
5	99-572-00	Gasket, Copper	1
6	99-578-00	Bolt, Hydraulic Swivel Fitting, Hex Head	1
7	71-110-00	Switch, Brake Light, Hydraulic	1
8	99-600-53	Brake Line, Formed	2

INSTRUMENT PANEL



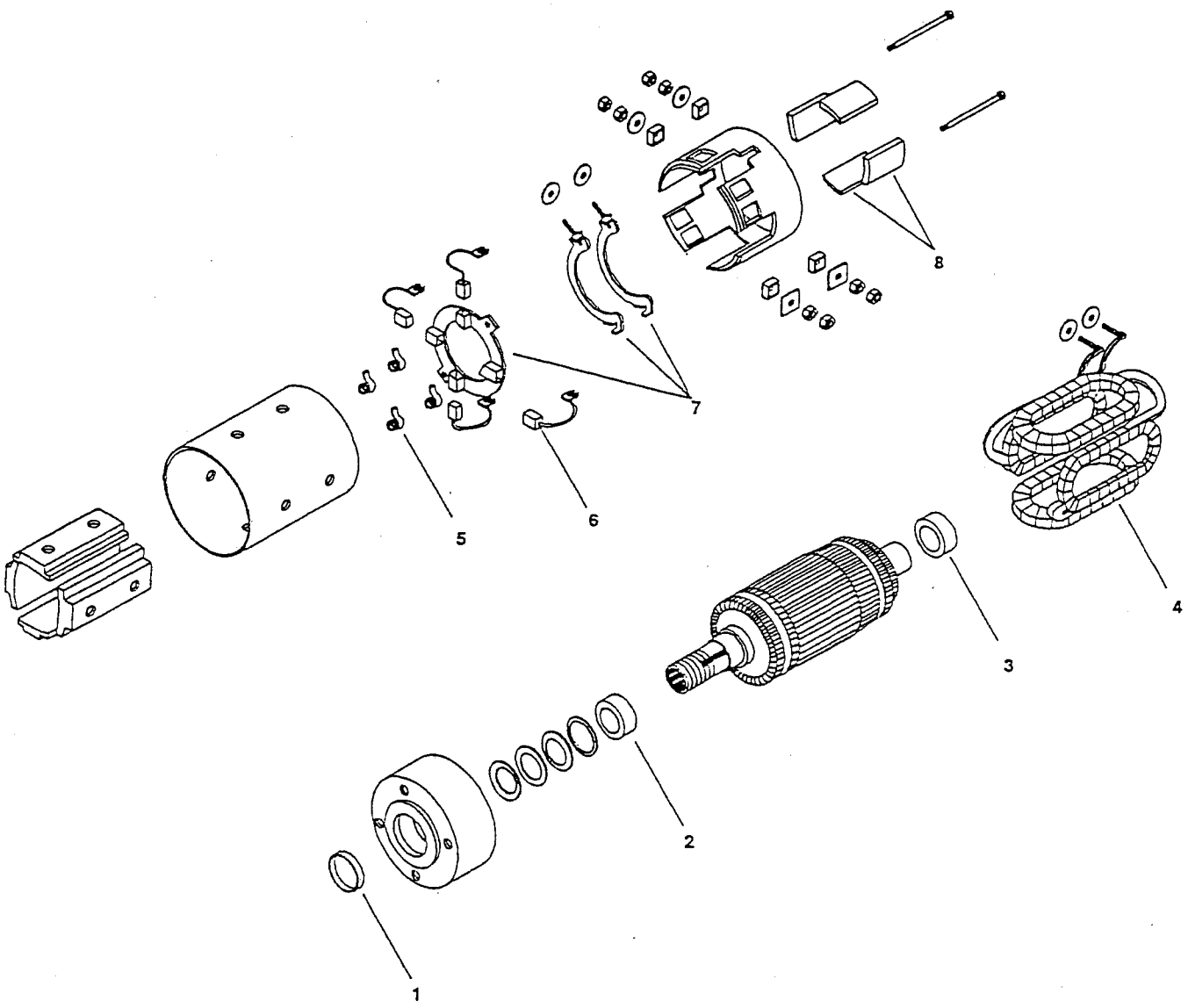
INSTRUMENT PANEL			
ITEM #	PART NUMBER	DESCRIPTION	QTY
1	71-039-10	Switch, Rocker (Optional Accessories)	1
2	00-610-01	Console, Instrument	1
3	94-304-10	Panel, Instrument	1
4	71-039-10	Switch, Rocker, Forward/Reverse	2
5	71-120-00	Switch, Ignition, with Keys	1
	71-120-80	Key Only	1
6	74-009-00	Indicator, Discharge (Battery Status)	1
7	74-000-00	Meter, Hour (optional)	1

MASTER CYLINDER



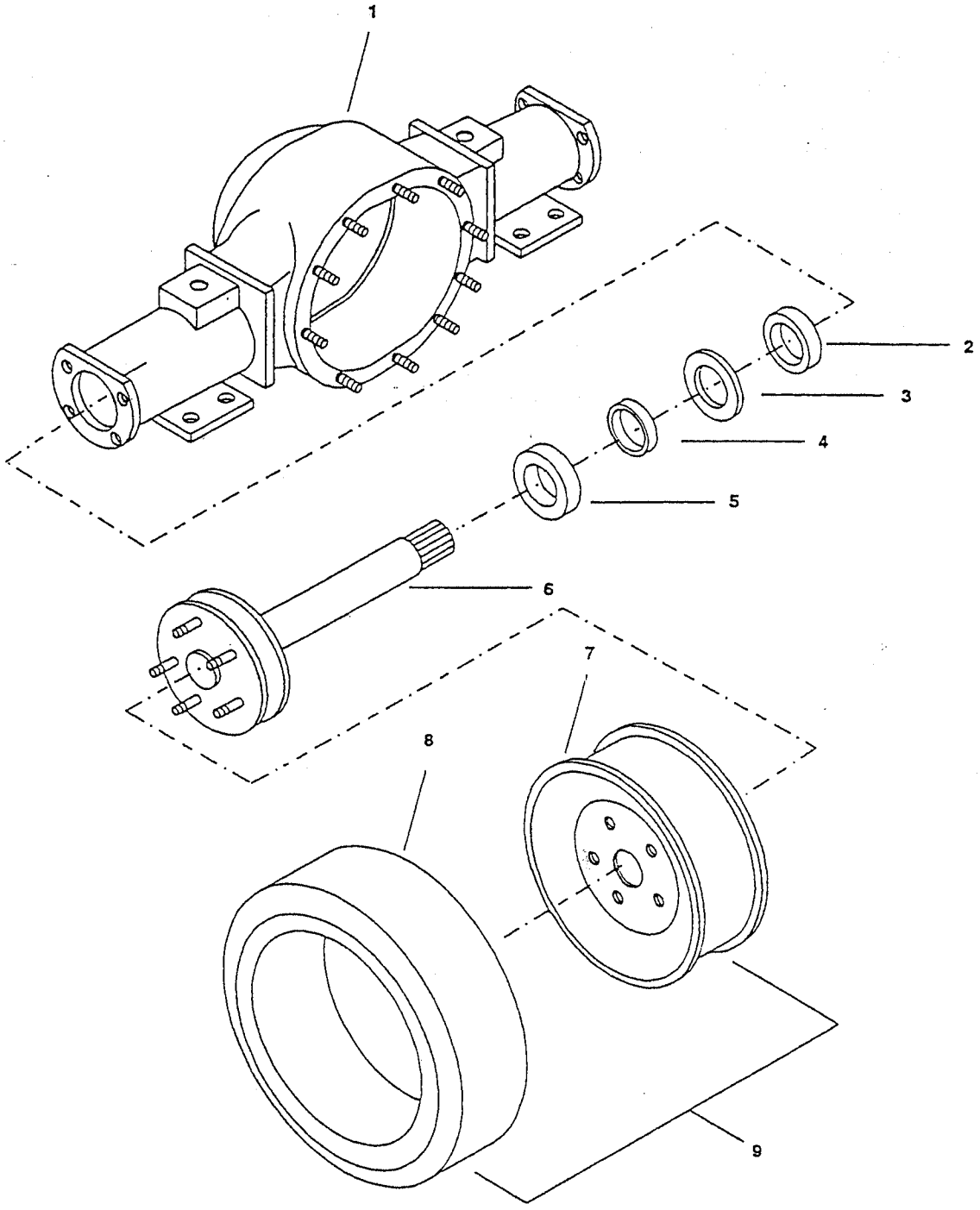
MASTER CYLINDER (99-510-01)			
ITEM #	PART NUMBER	DESCRIPTION	QTY
1	99-510-52	Cap, Master Cylinder	1
2	99-510-53	Gasket, Cap, Master Cylinder	1
3	99-510-61	Repair Kit, Master Cylinder	1
4	99-510-51	Rubber Boot, Master Cylinder	1

MOTOR



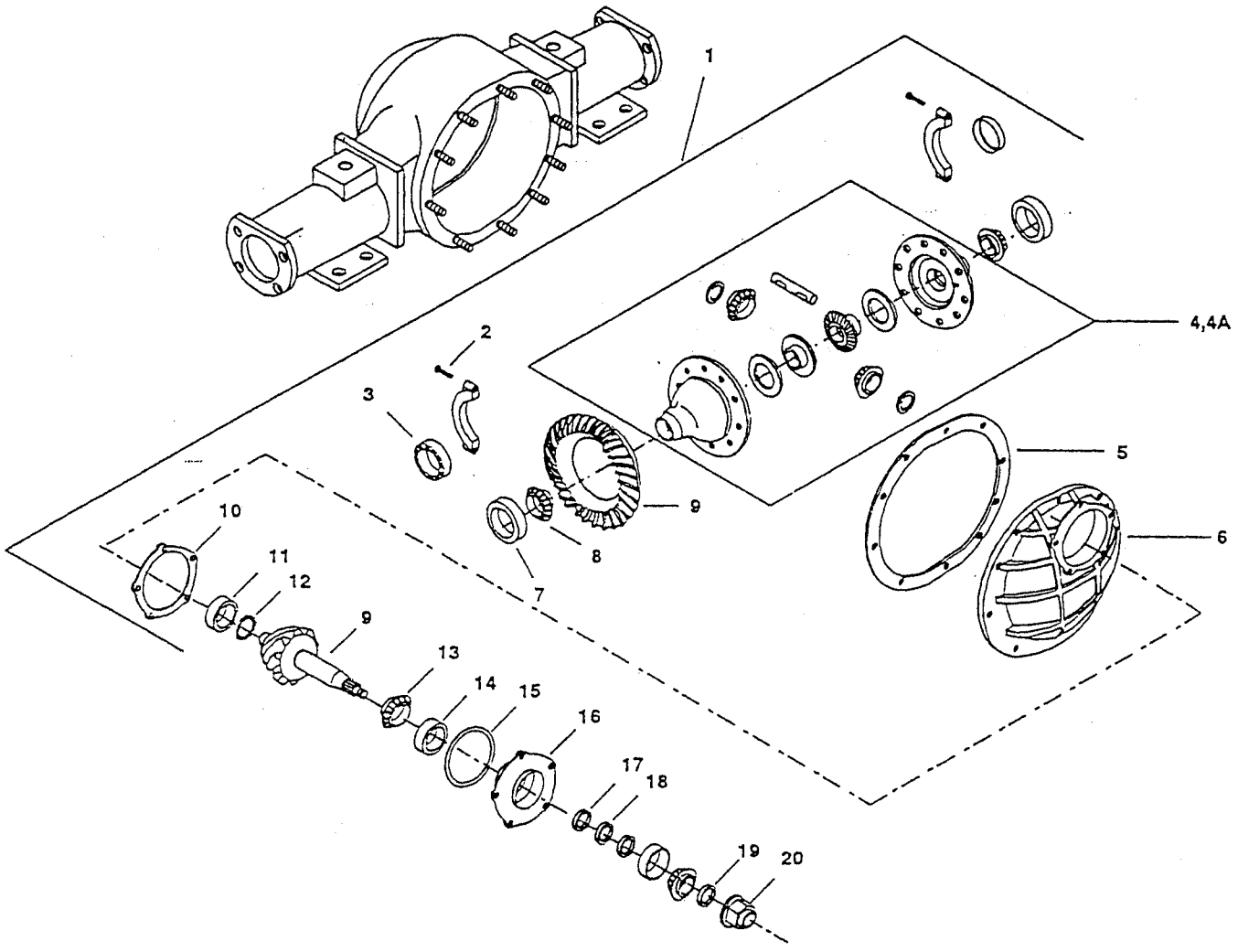
MOTOR (SPEC. NO. 5BC49JB399C)			
ITEM #	PART NUMBER	DESCRIPTION	QTY
1	45-508-00	Seal, Oil	1
2	80-504-00	Bearing, Ball, Pulley End	1
3	80-200-00	Bearing, Ball, Commutator End	1
4	70-203-10	Field Coil Assembly	2
5	85-412-00	Spring, Brush, Torsion	4
6	70-105-00	Brush, Motor	4
7	70-188-00	Assembly, Brush holder (without brushes)	1
8	30-802-00	Cover, Brush Inspection	4

REAR AXLE



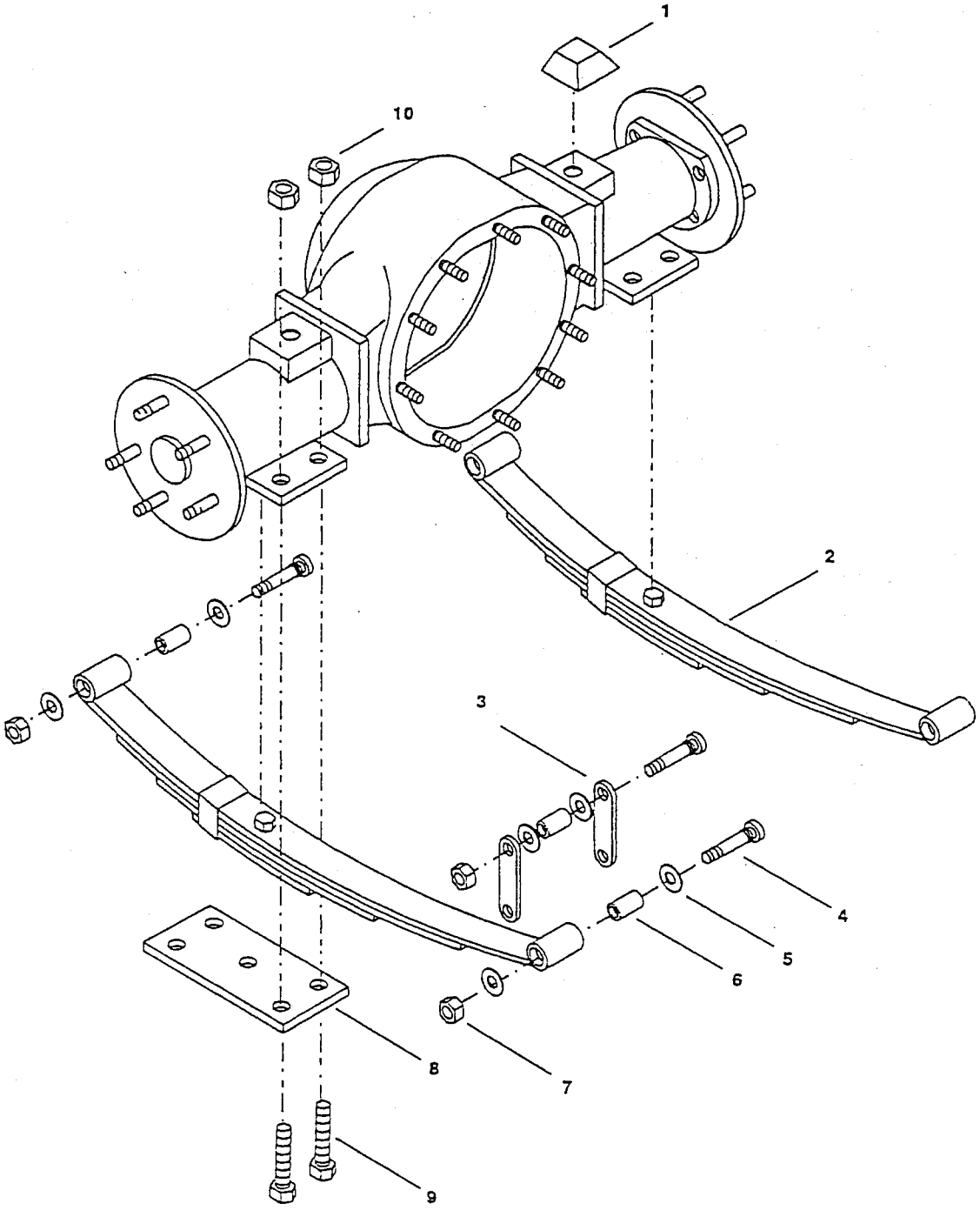
REAR AXLE			
ITEM #	PART NUMBER	DESCRIPTION	QTY
1	41-290-50	Axle Housing	1
2	45-301-00	Seal, Oil	2
3	45-045-00	Gasket, Axle Bearing	2
4	32-515-00	Ring, Retainer, Axle Bearing	2
5	80-503-00	Ball Bearing, Axle	2
6	41-152-20	Axle, 13⅛", Large Bearing with Disc	1
6A	41-152-30	Axle, 15 9/16", Large Bearing with Disc	1
7	12-012-00	Wheel, 5-Hole, 5.70 x 8	4
8		Tire, Load Range C, 5.70 x 8	4
9	13-742-13	Assembly, Tire and Wheel, 5.70 x 8, Load Range C, Hiway Tread (includes 7 and 8)	4

REAR AXLE DIFFERENTIAL



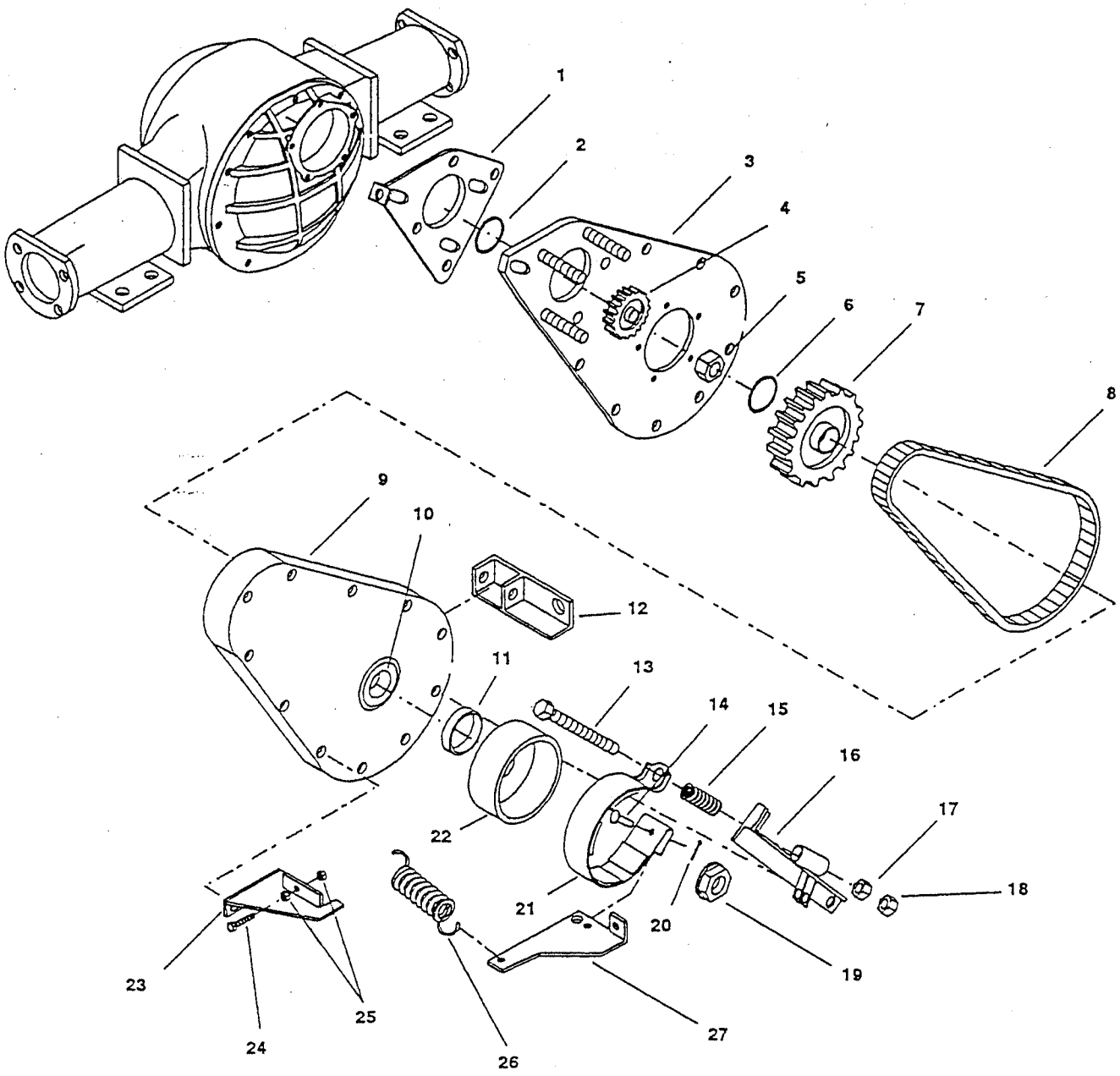
REAR AXLE DIFFERENTIAL			
ITEM #	PART NUMBER	DESCRIPTION	QTY
1	44-340-28	Assembly, Differential, 5.43 Ratio, F2 (includes items 2 - 20 except 5)	1
2	88-140-16	Screw, Cap, Hex Head	2
3	41-707-00	Adjusting Nut, Differential Bearing	2
4	41-712-00	Differential, Small Carrier Bearing, 1.628" ID	1
4A	41-713-00	Differential, Large Carrier Bearing, 1.784" ID	1
5	45-042-00	Gasket, Differential Housing	1
6	41-710-05	Cover, Differential Housing	1
7	80-129-00	Race, Bearing, Tapered	2
8	80-513-00	Bearing, Roller	2
9	31-239-00	Gear Set, Ring and Pinion	1
10	41-711-00	Shim, Pinion	1
11	80-555-00	Bearing, Ball Pinion	1
12	41-714-00	Retainer, Bearing	1
13	80-554-00	Roller Bearing, Tapered	2
14	80-125-00	Race, Bearing, Pinion	1
15	80-702-00	O-ring, Pinion	1
16	44-340-91	Flange, Pinion	1
17	16-419-00	Spacer, .002"	2-6
18	16-411-00	Spacer, .005"	2-6
19	16-420-00	Spacer, .010"	2-6
20	97-250-00	Nut, Pinion	1

REAR AXLE SUSPENSION



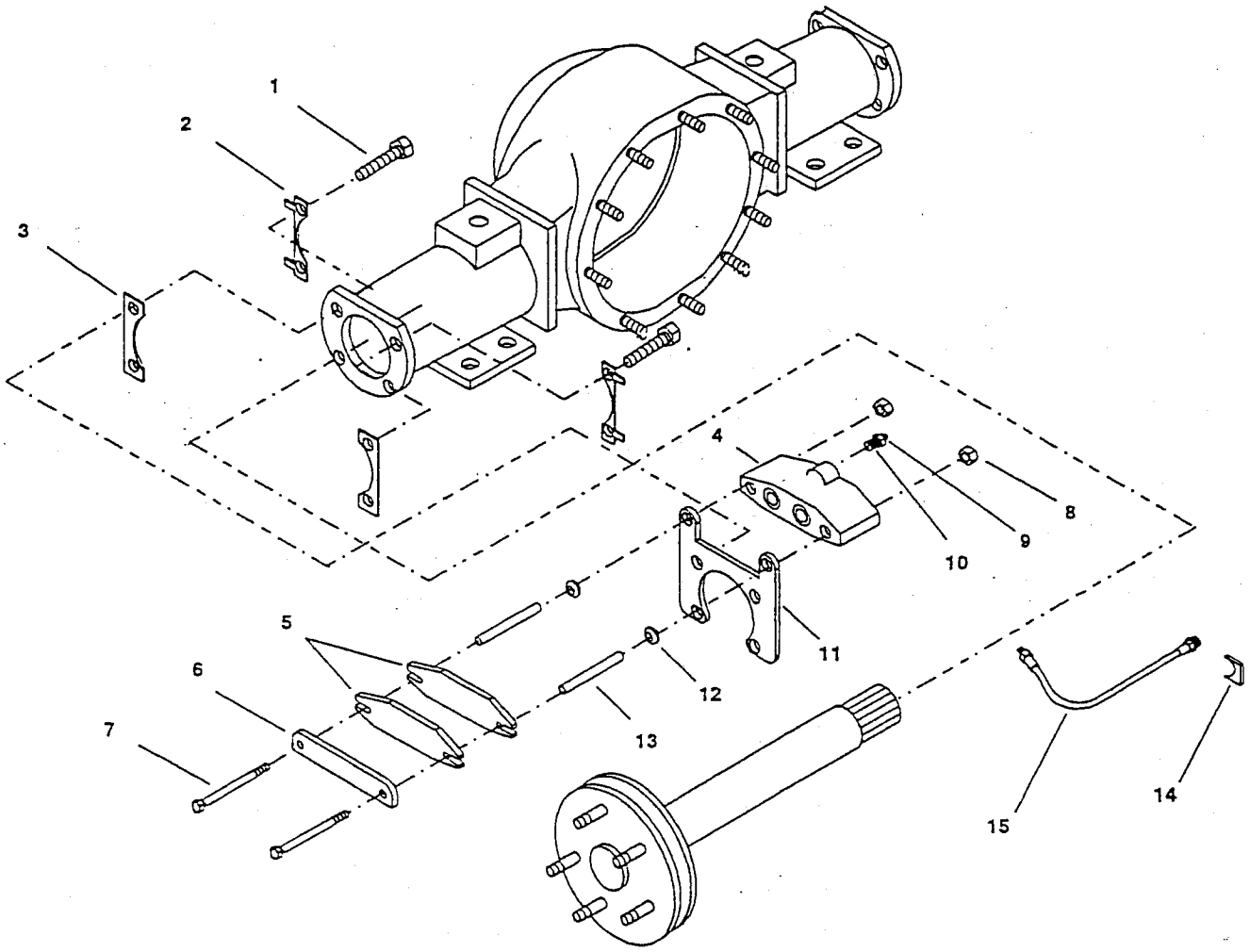
REAR AXLE SUSPENSION			
ITEM #	PART NUMBER	DESCRIPTION	QTY
1	98-753-50	Stop, Suspension, Rubber	2
2	85-513-10	Leaf Spring, Rear	2
3	16-870-10	Strap, Shackle	4
4	96-243-10	Bolt, Shackle	6
5	98-603-10	Washer, Rubber	12
6	32-213-00	Bushing, Nylon	6
7	88-179-86	Locknut	6
8	16-861-00	Pad, Spring	2
9	88-101-22	Screw, Hex Head	8
10	88-109-81	Locknut, NC	8

POWER TRACTION CASE



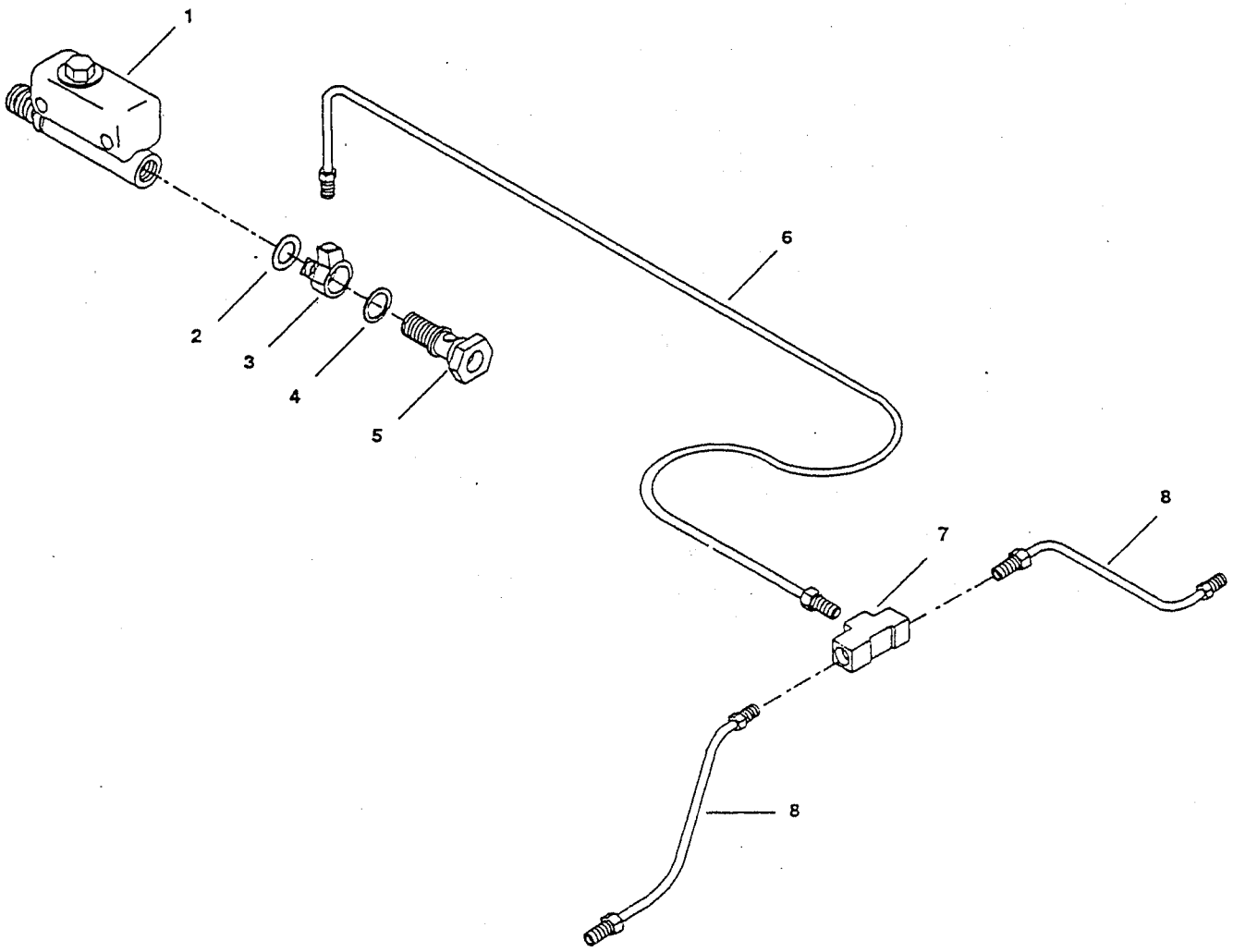
POWER TRACTION CASE			
ITEM #	PART NUMBER	DESCRIPTION	QTY
1	70-454-00	Plate, Motor Mounting and Adjusting	1
2	80-703-00	O-Ring, Motor Mount Plate Seal	1
3	44-352-53	Plate, Chain Case Backing	1
4	30-080-00	Sprocket, Silent Chain, 15 tooth	1
5	88-239-82	Hex Nut, 3/4" NF, Thin Pattern	1
5A	97-242-00	Hex Nut, 3/4" NF, Thin Pattern, MA	1
6	16-420-00	Spacer, .010"	1
7	30-093-00	Sprocket, Silent Chain, 81 tooth	1
8	30-508-20	Chain, Silent, Single Side Guide	1
9	43-201-20	Cover, Chain Case	1
10	45-331-00	Oil Seal, Gear Case	1
11	41-711-00	Shim, Drive Pinion Bearing	1
12	41-372-20	Mount, Brake Cable	1
13	96-245-10	Bolt, Full Brake Band	1
14	96-771-00	Pin, Clevis	1
15	85-060-20	Spring, Compression	1
16	41-372-10	Bracket, Brake Mounting	1
17	88-159-82	Locknut, NF, 1/2 - 20	1
18	88-159-82	1/2" NF Jam Nut	1
19	97-250-00	Pinion Nut, F2, F3, 3/4 - 20	1
20	88-517-09	Pin, Cotter	1
21*	41-661-60	Brake, Full Band Kit	1
22	41-532-00	Brake Drum	1
23	41-371-10	Bracket, Full Band Alignment	2
24	88-080-13	5/16 x 1 1/4" Hex Head Screw	1
25	88-089-91	5/16" NC Locknut	2
26	85-270-00	Spring, Extension	1
27	50-656-03	Arm, Park Brake	1
*	41-661-60	Brake Mounting Bracket Kit (Includes Items #13, 14, 15, 17, 18, 19, 20)	1

REAR BRAKE ASSEMBLY



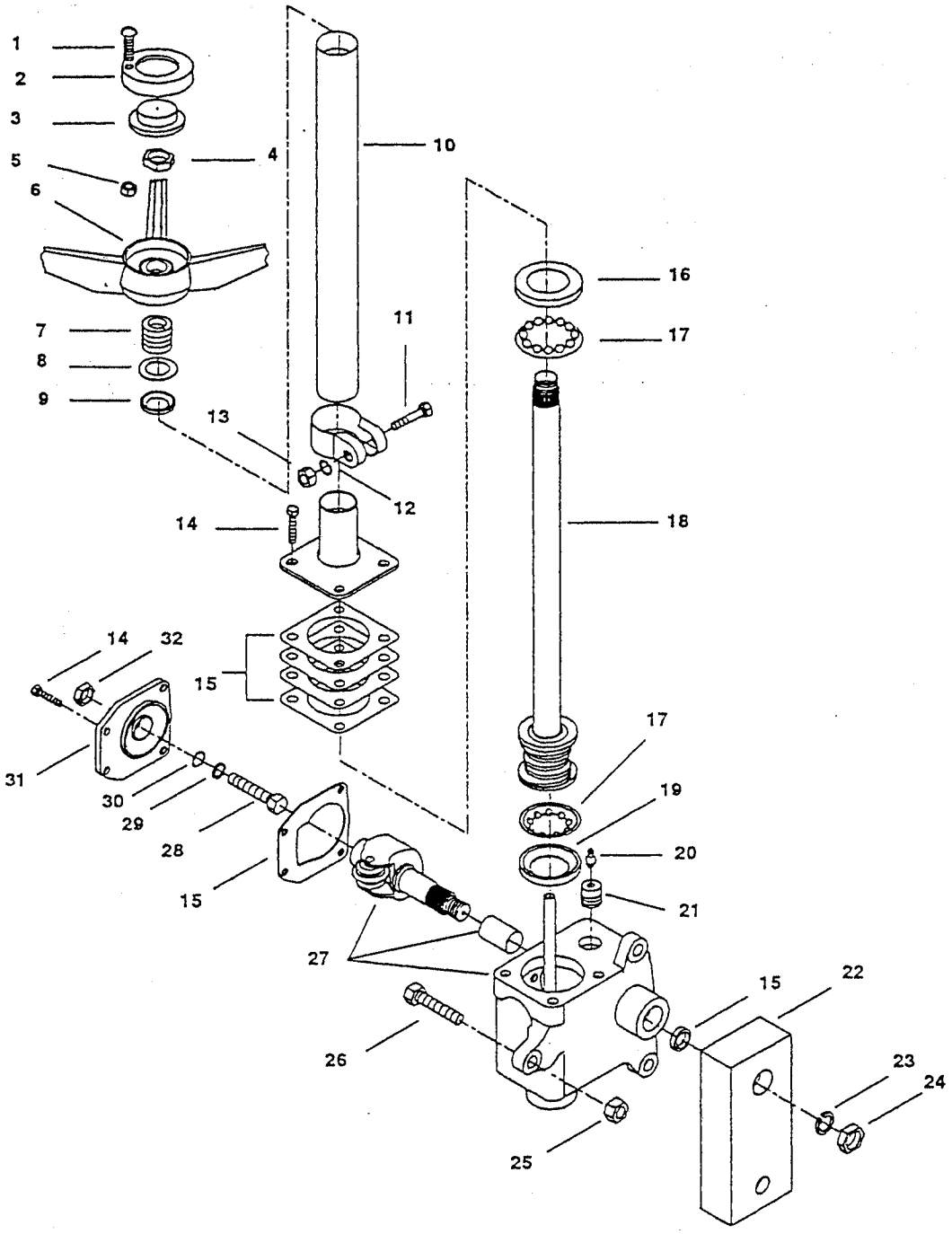
REAR BRAKE ASSEMBLY			
ITEM #	PART NUMBER	DESCRIPTION	QTY
1	96-327-00	Bolt, 3/8 x 3/4" NC, 2A Thread, Grade 5	8
2	41-350-05	Clip, 2-hole with Tab, Large Bearing	4
3	41-961-01	Shim, Large Bearing, FE Axle	4
4	41-350-68	Brake Body, Hydraulic, with Pistons, Boots and O-rings	2
5	41-348-70	Pad, Disc Brake, Hydraulic	4
6	41-350-51	Plate, Secondary	2
7	88-067-21	Bolt, Hex Head, NC	4
8	88-069-82	Locknut	2
9	99-588-00	Screw, Bleeder	2
10	99-588-01	Adapter, Threaded	2
11	41-350-08	Bracket, Hydraulic Disc Brake	2
12	32-240-40	Bushing, Plastic	4
13	41-348-52	Spacer, Disc Brake, Hydraulic	4
14	99-576-00	Clip, Wagner	2
15	99-580-20	Brake Line, Formed	2
*	41-350-66	Kit, Cylinder Repair, with Pistons, Boots, and O-rings	
*	41-350-67	Kit, Hydraulic Disc Brake, Left or Right	

REAR BRAKE LINES



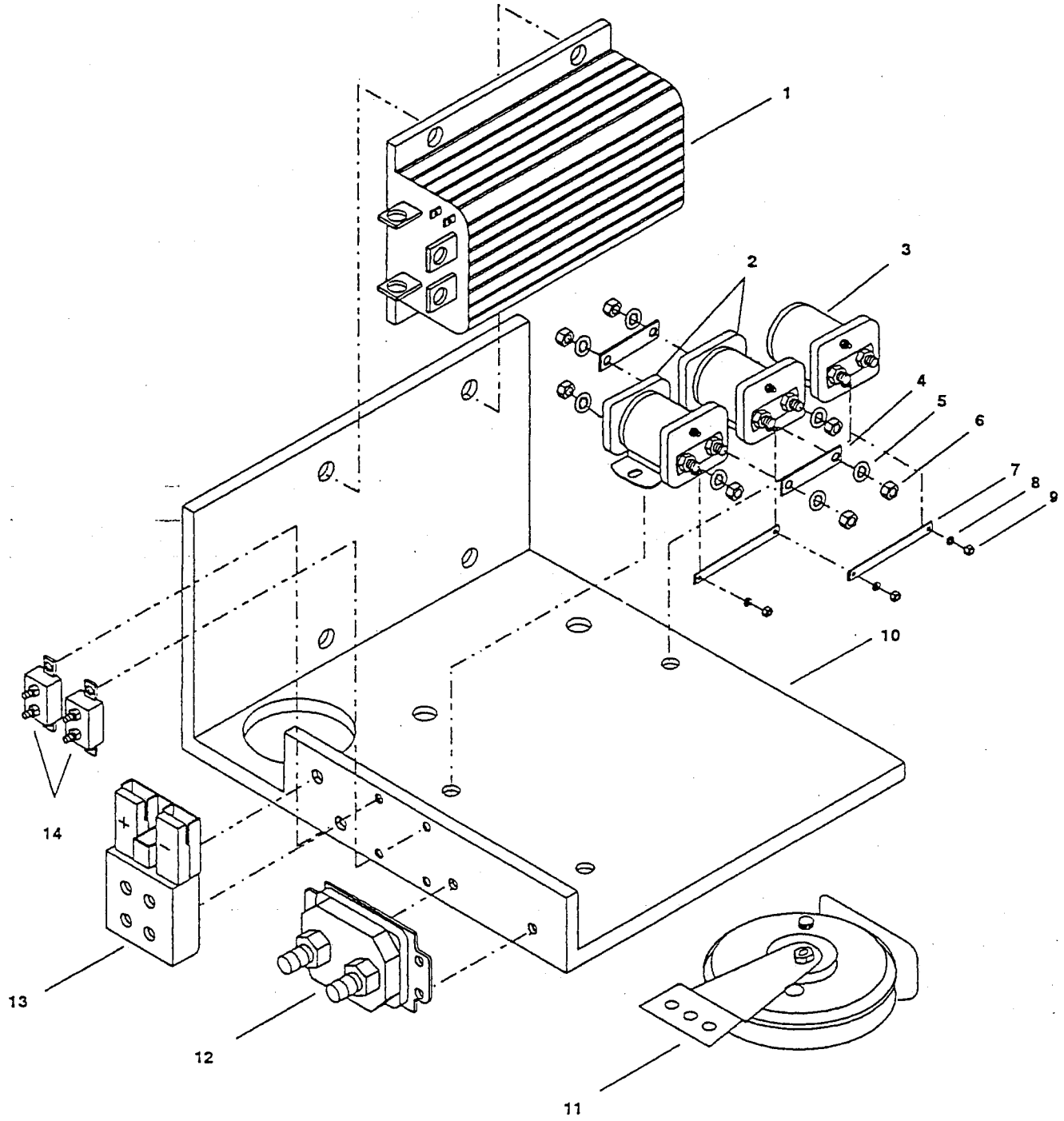
REAR BRAKE LINES			
ITEM #	PART NUMBER	DESCRIPTION	QTY.
1	99-510-01	Master Cylinder	1
2	99-571-00	Washer, Wagner	1
3	99-565-00	Y-Fitting	1
4	99-572-00	Washer, Wagner	1
5	99-578-00	Bolt, Stop Light	1
6	99-606-54	Brake Line, Mater Cylinder to Rear	1
7	99-564-00	Fitting, Tube	1
8	99-600-53	Brake Line, Formed	2

STEERING ASSEMBLY



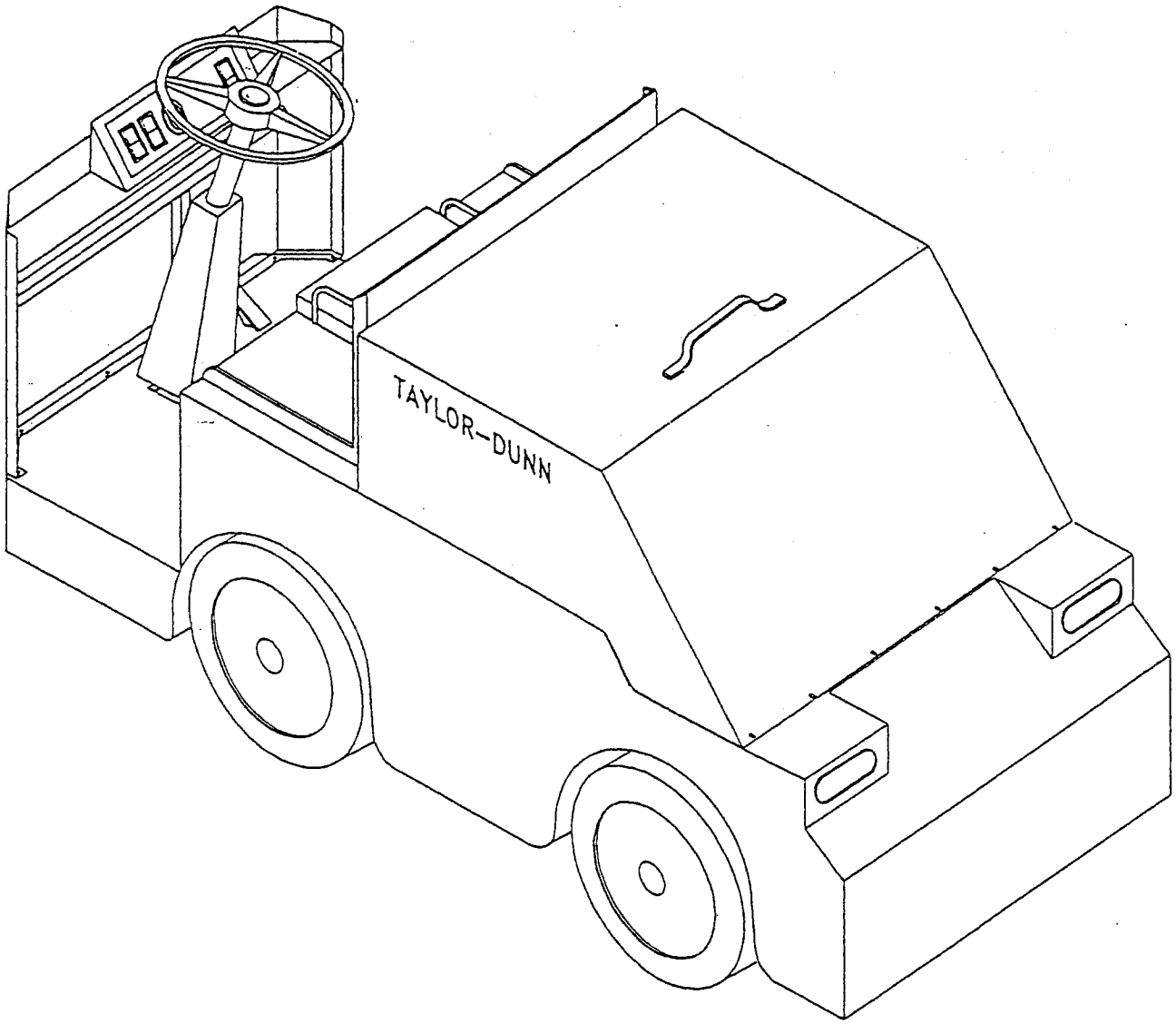
STEERING ASSEMBLY(18-313-00)			
ITEM #	PART NUMBER	DESCRIPTION	QTY.
1	88-045-06	Screw, Truss Head	1
2	19-004-20	Cap, Steering Wheel	1
3	71-501-00	Button, Horn	1
4	88-259-82	Nut, NF, Jam, 13/16"	1
5	88-049-86	Locknut, 10-32	2
6	19-003-20	Steering Wheel	1
7	85-122-00	Spring, Compression	1
8	18-307-55	Spacer, Jacket Bearing	1
9	18-307-54	Spacer, Jacket Bearing	1
10	18-307-52	Jacket, Steering Column	1
11	88-080-18	Screw, Hex Head, Cap, 5/16" x 2 1/2"	1
12	88-088-62	Lockwasher, 5/16"	1
13	88-099-80	Nut, Hex, 5/16"	1
14	88-080-09	Screw, Hex Head, Cap, 5/16" x 3/4"	8
15	18-307-42	Gasket, Seal and Shim Kit	1
16	18-307-57	Bearing Cup, Inner Worm	1
17	18-307-53	Worm Bearing Assembly	2
18	18-313-03	Shaft and Worm Assembly, Steering Column	1
19	18-307-56	Bearing Cup, Outer Worm	1
20	87-074-00	Grease Fitting, 1/4"	1
21	41-984-10	Bushing	1
22	18-103-00	Steering Arm	1
23	88-268-62	Lockwasher, 7/8"	1
24	88-279-82	Nut, Jam, NF, 7/8"	1
25	88-159-84	Locknut, NF, 1/2"	3
26	88-151-16	Bolt, Hex Head, NF, 1/2" x 2"	3
27	18-313-02	Steering Unit Assembly	1
28	18-307-64	Screw, Adjusting	1
29	18-307-65	Washer, Thrust	1
30	18-307-66	Ring, Snap	1
31	18-307-67	Cover, Shaft	1
32	88-159-82	Nut, NF, Jam, 1/2"	1

SPEED CONTROL MODULE



SPEED CONTROL MODULE			
ITEM #	PART NUMBER	DESCRIPTION	QTY
1	62-205-00	Controller, Speed	1
2	72-501-39	Solenoid, SPDT, 36 volt	2
3	72-501-38	Solenoid, SPST, 36 volt	1
4	61-838-41	Bar, Bus	2
5	88-088-63	Lockwasher	8
6	88-049-80	Nut, Hex Head, NF	5
7	61-838-42	Bar, Bus	2
8	88-099-91	Nut, Hex Head, NF	8
9	88-048-62	Lockwasher	5
10	01-410-70	Panel, Mounting, Controller	2
11	73-004-20	Horn, 12V, Short Mount, Power	1
12	79-844-20	Breaker, Circuit, 200 amp	2
13	76-020-02	Plug, SBX	1
14	79-840-00	Breaker, Circuit, 10 amp	1

C 4-10 TOW TRACTOR



ACCESSORIES AND OPTIONAL EQUIPMENT		
PART NUMBER	DESCRIPTION	QTY.
71-122-20	Horn Button, Floor Mount	1
72-025-00	Taillight	1
94-050-10	Headlight Assembly, Left	1
94-050-11	Headlight Assembly, Right	1
72-072-10	Headlight Bulb Only	2
94-201-10	Name Plate	1
90-000-00	Seat ~~Bracket~~ BACK REST	1
90-197-00	Seat Cushion	1
13-742-12	5.70 x 8 Load Range C Tire/Wheel Assembly (Optional Split Rims)	4
73-004-20	Horn, 12 Volt	1
71-124-00	Emergency Disconnect Switch	1
73-005-05	Warning Beeper, Forward or Reverse	1
97-804-01	Pintle Hitch	1
97-808-00	Automatic Coupling Hitch	1
96-811-00	Hitch Release Cable, Auto Coupling Only	1
90-924-69	Steel Door Assembly, Left, Orange	1
90-924-68	Steel Door Assembly, Right, Orange	1
90-924-60	Naugahyde Door Kit, Left	1
90-924-61	Naugahyde Door Kit, Right	1
92-201-00	Mirror, Side, 4 x 8"	1 or 2
92-206-00	Mirror, Inside Cab	1