

The Best Way  
To Go  
About Your  
Business

# Tiger Tractor

A Division of Taylor-Dunn<sup>®</sup> Manufacturing



*Shown with optional Cab*

*Models Included:  
TC-030-60L*

## **MANUAL MT-030-60L-A**

*Operation, Maintenance, and  
Replacement Parts Manual*

Serial Number: 183635

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### **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](http://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:  
Taylor-Dunn Manufacturing  
Attn: Tech Writer  
2114 West Ball Road  
Anaheim, CA 92804



# The Taylor-Dunn Corporation:

Leading Provider of Commercial & Industrial Vehicles since 1949



# TAYLOR-DUNN®

The best way to go about your business

## 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:

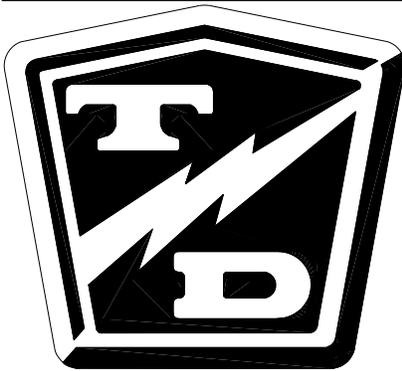
Tiger manufacturing has become a leading manufacturer of internal combustion industrial tractors and ground support equipment. With tractor capacities ranging from 3,000 - 12,000 pounds drawbar pull, they are ideal for industrial applications as well as aircraft ground support. As with all Taylor-Dunn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

## Metro Crown International (MCI):

Metro Crown International, located in Lee's Summit, Missouri is one of the world's leading suppliers of replacement parts for industrial applications and the airline ground support industry. MCI is the factory authorized OEM distributor for parts for Tiger Tractor, United Tractor, Kalamazoo, and FMC Challenger Belt Loader brands. Both domestic and international customers have come to depend upon MCI to provide quality, personalized service and to count on them for accurate, reliable answers.

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





# Tiger Tractor

*Model TC-030-60L*

*Operator and Service Manual Section Index*



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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.





*B2-48 With Stake Side Dump Bed Option*



*SC1-00 Stock Chaser*



*E4-55 Sit Down Tow Tractor*



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# Chapter - 1

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# Introduction





## **ABOUT THIS MANUAL**

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The purchase of this vehicle shows a belief in high quality products manufactured in the USA. Taylor-Dunn®, a leading manufacturer of electric and internal combustion engine powered burden, personnel carriers, and tow tractors 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 Tiger Tractors 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 Tiger Tractor, read the appropriate Tiger Tractor manual.

Each 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**

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

## **RESPONSIBILITIES**

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### **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.

## **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**

These sections gives specific information on the servicing of the vehicle and a schedule for maintenance checks.

### **Illustrated Parts**

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

### **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.*

# INTRODUCTION

## **HOW TO IDENTIFY YOUR VEHICLE**

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

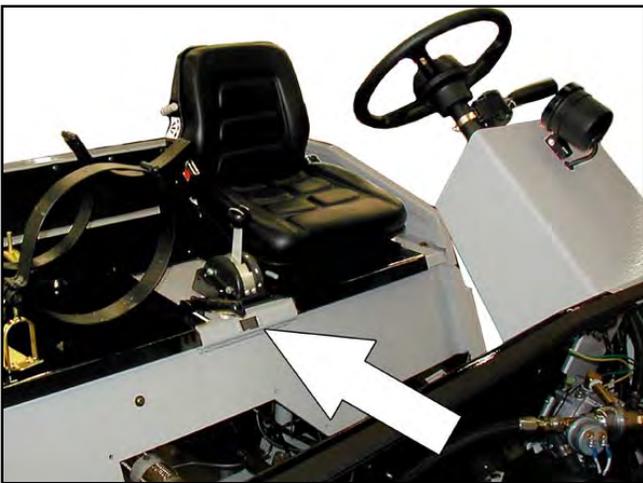
These vehicles are designed for driving on smooth surfaces in and around facilities such as industrial plants, , airports, nurseries, institutions, motels, mobile home parks, and resorts. They are not to be driven on public highways.

### **⚠ WARNING**

**This vehicle is not designed to be driven on public roads or highways. It is available in maximum designed speeds ranging from 10 to 13 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 all applicable sections as described in O.S.H.A. Standard Section 1910.178 (Powered Industrial Trucks) and with all applicable portions of the American National Standard for Operator Controlled Industrial Tow Tractors (ANSI B56.9).

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



*The frame serial number is located on the kick panel below the shifter.*



*The Vehicle Data Plate is located on the firewall to the right of the steering column.*

## 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
- Reverse Alarm (if equipped)
- Lights and electrical accessories
- Steering
- Horn
- Instruments and Gauges

## **⚠ CAUTION**

**New front wheel bearing adjustment must be inspected after the first 24 hours of operation. This includes new vehicle installations. Failure to inspect the bearings after the break in period may result in premature failure of the bearings.**

## **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 Tiger Tractor 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 Tiger tractor, 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.**



*B2-48 With Dump Bed Option*



*B2-10 Ambulance*



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



*P2-50 30,000 Pound Tow Tractor*



*ET 3000*



*ET1-50 Full Size Truck*

# Chapter - 2

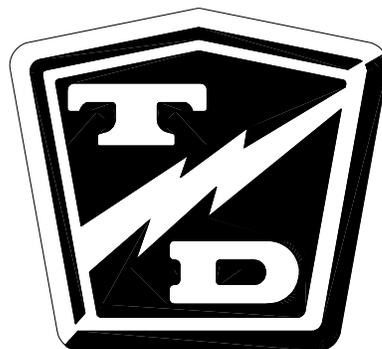
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# Safety Rules and Operating Instructions





## STANDARD SPECIFICATIONS\*

ITEM	Model	SPECIFICATION
Occupancy		Driver only, no passengers
Dimensions		105 L x 56 W x 56 H Inches (2,667 L x 1422 W x 1422 H mm)
Wheel Base		65 inches (1,663 mm)
Ground Clearance		6.5 inches (165 mm)
Turning Radius		144 inches (3,657 mm)
Dry Weight	TC-30	4,105 pounds (2,055 kg)
Battery		Group 24M, 800CCA, 135 minute reserve
Transmission		Ford C6, 3-Speed Automatic
Engine		General Motors Industrial 3.0 liter, 4 cylinder
Fuel System		Gasoline
Cooling System, Coolant Type		50/50 mixture of DexCool Long Life coolant and water
Drive Axle		Helical gearing primary reduction into standard hypoid ring and pinion secondary reduction
Suspension		Front Leaf spring, Solid Mount Rear Axle
Towing Capacity (draw bar pull, see definition later in this section)	TC-30	3,000 pounds (1,360 kg)
Brakes		Rear Wheel Dual Caliper Hydraulic Disc Hand Operated Parking Brake
Steering		Power Hydrostatic Steering
Tires		Front: 6.50 x 10 Pneumatic Load range E Rear: LT225/75R16 Load Range D
Instrumentation		Oil pressure, Coolant temperature, Battery volts, Fuel level, Hour meter
Lights		Headlight, Tail/Brake Light, Reverse light

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

\* - Specifications are for standard vehicle and 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. As well as, following the safety rules and guidelines outlined in ANSI B56.9 and listed below.

### **⚠ WARNING**

These vehicles are not designed to be driven on public roads or highways. They are available in maximum designed speeds ranging from 10 to 13 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.

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.

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

### **⚠ WARNING**

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

### **⚠ WARNING** Before working on a vehicle:

Make sure the ignition switch is in the "OFF" position.

Place the transmission shift lever in the Park or neutral position.

Set the park brake.

Place blocks under the front wheels to prevent vehicle movement.

If working on the electrical system, remove the negative cable from the battery.

## DRIVER TRAINING PROGRAM

Per ANSI B56.9, 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 B56.9.

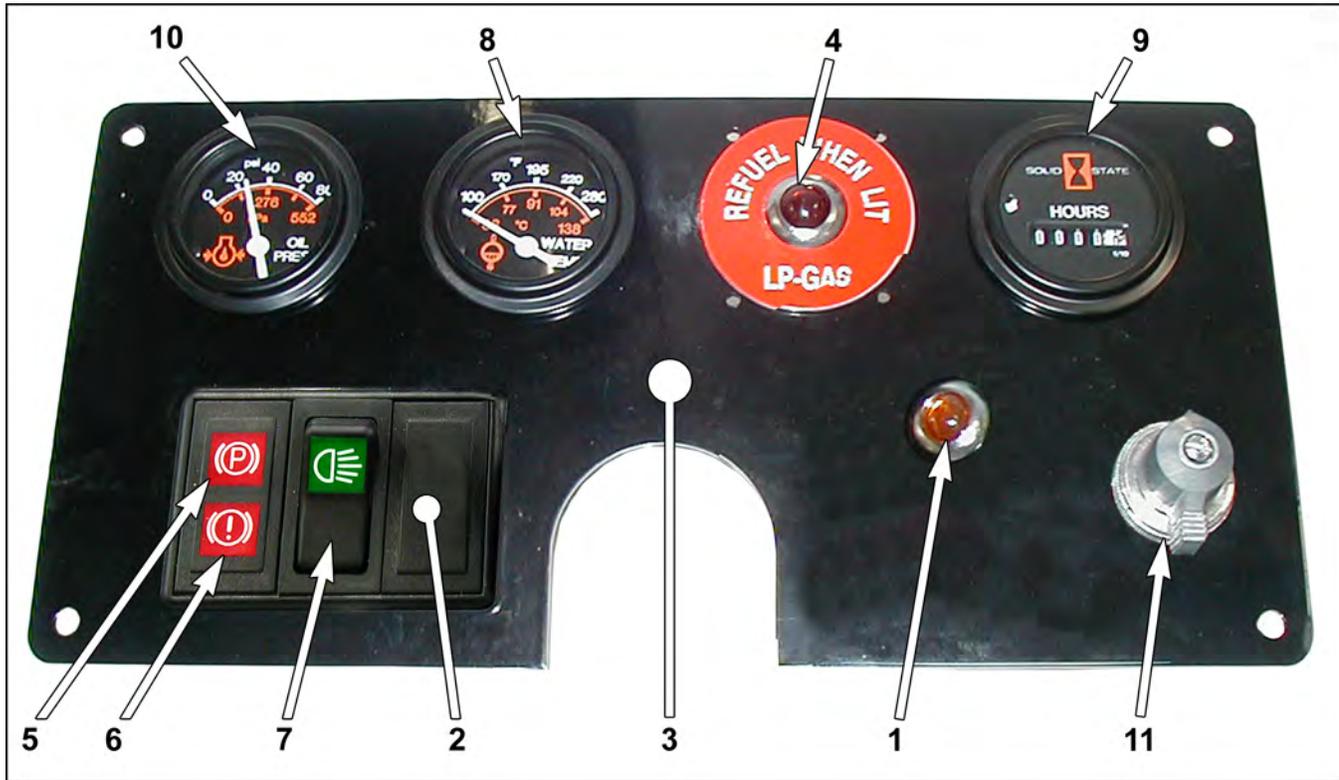
The following are minimum requirements necessary to qualify as an operator of this vehicle:

- 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.



## VEHICLE CONTROLS

### INSTRUMENT PANEL



#### **1) Check Engine Light**

When the Check Engine Light is on while the engine is running, then the ECU has detected conditions that indicate the engine is not operating correctly.

If the Check Engine Light turns on then the vehicle should be immediately removed from service to be inspected by a qualified technician.

The Check Engine Light should be on when the ignition switch is ON but the engine has not yet been started. If the light does not come on then the vehicle should be immediately removed from service to be inspected by a qualified technician.

#### **5) Park Brake Warning Light**

This light will be ON when ever the parking brake is set.

#### **6) Brake Warning Light**

This light monitors the differential pressure between the front and rear pots of the master cylinder. If this light is ON then there is a fault in one of the two systems and the vehicle should be immediately removed from service to have the brake system inspected.

#### **2) Switch for Optional Components**

#### **3) Instrument Panel**

#### **7) Headlight Switch**

The headlight switch is located on the left side of the instrument panel. Pull the switch out to turn the lights on. Push the switch in to turn the lights off.

#### **4) Low Fuel (LPG) Light**



## 8) Coolant Temperature

This gauge indicates the temperature of the engine coolant, not the coolant level. If the coolant is not at its proper level or mixture, the gauge indication will not be accurate.



The pointer moves from the left to the right side of the gauge as your engine coolant warms up.

Once the engine is warmed up, the typical normal coolant temperature range is 180 to 210 degrees (F).

Under normal driving conditions, the pointer should stay in the NORMAL range. It is acceptable for the pointer to fluctuate within the NORMAL band under normal driving conditions, and under certain driving conditions such as, heavy stop and go traffic, driving up hills in hot weather, or towing heavy loads for the pointer to indicate at the top of the NORMAL band.

If, under any circumstances, the pointer moves above the NORMAL range, the engine is overheating and continued operation may cause engine damage.

- The engine ECU will reduce power if the temperature exceeds 220 degrees.
- The engine ECU will shut the engine down if the temperature exceeds 230 degrees.

If your engine coolant overheats:

1. Pull off the road as soon as safely possible.
2. Turn off the engine.
3. Let the engine cool. **DO NOT REMOVE COOLANT SYSTEM FILL CAP UNTIL THE ENGINE IS COOL.**
4. Check the coolant level following the instructions on checking and adding coolant to your engine.
  - If the coolant continues to overheat, have the coolant system serviced.

## 9) Hour Meter

The hour meter records the number of hours the vehicle has been in operation.



## 10) Oil Pressure

This gauge indicates the engine oil pressure, not the oil level. However, if your engine's oil level is low, it could affect the oil pressure.



Typical normal oil pressure range when engine is hot is 6 to 18 PSI.

With the engine running, the pointer should move into the NORMAL range. If the pointer drops below the NORMAL range while the engine is running, you have lost oil pressure and continued operation will cause severe engine damage. If the pointer exceeds the NORMAL range then there may be obstructions in the engine lubrication system and continued operation will cause severe engine damage.

If the oil pressure is low, pull to the side of the road and immediately shut the engine off. Check and add oil as needed and restart the engine. If the oil pressure is still low, turn the engine off and have the vehicle towed to a repair facility.

If the oil pressure is high, pull to the side of the road and immediately shut the engine off and have the vehicle towed to your authorized Tiger Tractor repair facility.

## 11) Ignition Switch

Note: Rotary switch shown. Also available as a keyed switch.

The ignition switch has 3-positions: OFF, RUN, START.

Rotating the switch clockwise to the first position turns the ignition system ON.

Rotating the switch to the START position engages the engine starter motor. This is a momentary position and the switch will return the START position when it is released. Once the switch has been released from the START position, it must be turned to OFF before it can be turned back to the START position.



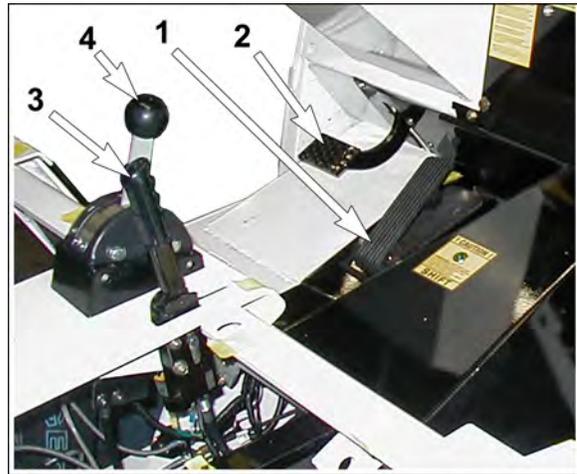


## **1) Throttle Pedal**

The throttle pedal is located on the floorboard and is intended to be operated by the driver's right foot. It controls the speed of the vehicle and operates similar to the throttle pedal in an automobile. Depress the pedal to increase speed and release the pedal to decrease speed.

## **2) Foot Brake Pedal**

The foot brake pedal, is located to the left of the throttle pedal and is intended to be operated with the driver's right foot only. It works similar to the brake in an automobile. Applying pressure to the brake pedal slows the vehicle according to the amount of pressure applied. Relieving pressure from the pedal releases the braking action.



## **3) Park Brake**

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

## **4) Transmission Shift Lever**

Selects the direction of travel and gear range. Detailed description of operation is in the Vehicle Operation section later in this chapter.

## **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.



## **Horn Switch**

The horn switch is located in the center of the steering wheel. To sound the horn, depress the center area of the steering wheel hub.

## **Seat Interlock Switch (optional)**

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

Whenever the driver leaves the vehicle, the driver should turn the start switch off, place the forward-off-reverse switch in the center "OFF" position, and set the park brake.



### **Directional Signals (Optional)**

The turn signal lever is located on the left side of the steering column. Push the lever forward to activate the right turn signal and pull the lever back to activate the left turn signal.



### **Hazard Light Switch (Optional)**

The hazard light switch is located on the left side of the steering column. The switch is a small tab. To activate the hazard lights, pull the tab out. To turn the hazard lights off, push forward or pull back the directional signal lever.



### **Speedometer**

Cyberdyne 3-3/8 Ultragege.

This is a high performance speedometer. Some of the functions do not apply to a low speed vehicle.

### **Displays:**

There are two displays on the gauge:

The upper display will show the vehicles current speed in miles per hour (MPH). This cannot be changed to KPH. One MPH = 1.609 KPH.

The lower display has the following functions:

- Odometer
- Trip Odometer
- High Speed Recall
- 0-60 Time Recall (does not apply)
- ¼ Mile Time Recall (does not apply)

Press and release the button on the speedometer to toggle through all of the available functions.



### **Function Descriptions:**

- Odometer: When selected, displays the total miles traveled.
- Trip Odometer: When selected, displays the miles traveled since last reset. It can display up to 999.9 miles. To reset the trip odometer, toggle the display until the trip odometer is displayed, then press and hold the button until it resets to 0
- High Speed Recall: When selected, "SP" will be displayed along with the highest speed attained since the vehicle was started.

The following functions are built in to the speedometer but do not apply to this vehicle:

- 0-60 Time Recall: When selected, "60" will be displayed along with how long it takes for the vehicle to accelerate to 60 MPH.
- ¼ Mile Time Recall: When selected, "25" will be displayed along the time it takes to travel ¼ mile.



## VEHICLE OPERATION

### 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-Gasoline/LPG Engine

For additional information, refer to the engine operator's manual included with your vehicle.

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

*NOTE: The vehicle may be equipped with a various start interlock switches. All interlock switches must be closed to allow the engine to start.*

1. Place the transmission shift lever in Park or Neutral.
2. Set the parking brake.
3. Depress the foot brake pedal.
4. Rotate the ignition switch to the start position and hold (see notes below) until the engine starts and then release the switch.

Starting Notes:

#### Starting when engine is cold:

- At temperatures 10°F (- 12°C) and below, If the engine does not start in 15-seconds on the first try, turn the ignition switch to OFF, wait approximately 10-seconds so you do not flood the engine or overheat the starter motor, then try again.
- At temperatures 10°F (- 12°C) and below, If the engine does not start in 5-seconds on the first try, turn the ignition switch to OFF, wait approximately 10-seconds so you do not flood the engine or overheat the starter motor, then try again.

#### Starting when engine is warm:

- Do not hold the ignition switch in the START position for more than 5-seconds at a time. If the engine does not start within 5-seconds on the first try, turn the ignition switch to the OFF position. Wait wait approximately 10-seconds so you do not flood the engine or overheat the starter motor, then try again.





## 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.

Depress the foot brake pedal.

Release the parking brake.

Move the transmission shift lever into the desired direction of travel and gear then depress the throttle pedal.

## The following applies only if the vehicle is equipped with the optional full range shifter:

The gear position 'D' (drive) should be used for most driving conditions. When in drive, the transmission will automatically select the correct gear depending on the speed of the vehicle and the load conditions.

**When to use 1st gear:** Use first gear while driving down steep grades. First gear will help limit vehicle speed and increase braking power.

**When to use 2nd gear:** Second gear is preferred when starting on a slippery road surface or for assisting in slowing while traveling down a moderate grade.

Always come to a complete stop before moving the shift lever to the Reverse or Park position.

For additional information, refer to the transmission operator's manual included with your vehicle.



## Parking

Before leaving the vehicle:

- After coming to a complete stop, move the shift lever to the Park position.
- Set the parking brake.
- Rotate the ignition switch to the "OFF" position.

In addition:

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

## Towing Loads:

- Do not exceed the DBP towing capacity of the tractor. See vehicle specifications and DBP definition.
- 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.

## Towing This Vehicle

### **⚠ WARNING**

This vehicle is equipped with a power assist braking system. The power assist system only functions when the engine is running. The effort required to activate the brakes will be significantly increased when the engine is off and will require a longer stopping distance.

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

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.



## Refueling

### **⚠ WARNING**

**The fuel system may be under pressure. If the fuel cap or fuel line is venting vapor or if you hear a hissing sound while disengaging the fuel cap or fuel line, wait until it stops before completely removing the cap or line. Otherwise, fuel may spray out and injure you or others.**

Refer to the engine operation manual for details regarding approved fuel types.

The following guidelines should be followed regardless of engine fuel type.

- Turn the engine off before refueling.
- No smoking or open flames.
- Only refuel in an area with adequate ventilation.
- If using LPG, turn LPG tank valve off before disconnecting the fuel line.

## 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.

## Draw Bar Pull (DBP), definition

DBP is a measure of pulling force required to move a load. The load may be a trailing load or a pushed load. It is normally expressed in pounds or Newtons.

The DBP of a tow tractor is the horizontal force exerted on a load at its coupler while towing or pushing a load. To measure the DBP, a scale would be connected in line with the tractor coupler and the load. The scale will directly read the DBP as the tractor tows the load.

## Tow tractor DBP specifications, definition:

**Normal DBP:** Highest DBP that can be sustained for a given duty cycle.

**Ultimate DBP:** Also referred to a Maximum DBP. Highest DBP achieved while traveling at a minimum speed of approximately 0.5 mph (0.8 kph) for a minimum of 30 seconds. This specification is used in calculations for getting a load moving.

## Notes:

Tow tractor DBP specifications are based on:

- Road surface consisting of level dry clean asphalt, brushed concrete or equivalent.
- Maximum battery weight installed per tow tractor battery specification.

Towing a load up any grade will significantly affect the DBP required.

Most paved roads and parking lots have a drainage grade to allow water to run off. When operating a tow tractor at or near its maximum capacity, this drainage grade will greatly affect DBP required to pull the load and may exceed the tractor specifications.



**PM CHECKLIST**

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

**Taylor-Dunn  
Preventative Maintenance Schedule for Tiger TC-30-60**

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

Interval (hours) <sup>1</sup>	Inspected <sup>2</sup>	Service Required	Service Complete	Item Description
Operator Daily Checklist				Parking brake for secure hold
				Tire inflation (pneumatic tires)
				Tire damage (tread and sidewall)
				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)
				Engine oil level
250 (Monthly)				Fluid leaks (in and around vehicle)
				Inspect/adjust front wheel bearings (after 1 <sup>st</sup> 24-hours, then every-250 hours)
				Inspect all steering linkages and hardware
				Inspect engine coolant level
				Clean radiator exterior
				Inspect/adjust front wheel bearings
500 (3-Months) Perform Monthly service + these items				Wash battery and clean battery terminals
				Inspect battery fluid level (except for maintenance free batteries)
				Adjust service and park brake systems
				Inspect power steering/hydraulic fluid level
				Inspect master cylinder fluid level
				Inspect transmission fluid level
				Lubricate the vehicle
1000 (6-Months) Perform 3-Month service + these items				Check all electrical interlocks for proper operation
				Inspect wheel bearings for play and noise
				Inspect and tighten all hardware (first 500 hours only, then 1000 hours and every 1000 hours)
				Inspect and tighten all hardware
				Clean and repack front wheel bearings, replace grease seals
				Tighten all electrical connections
2000 (Yearly)				Inspect all wiring for cracks, fraying or wear
				Inspect steering king pins for play
				Inspect all engine cooling and heater hoses
				Align front end
				Change rear axle oil
				Flush hydraulic brake system
				Inspect brake pad/shoe wear
				Test battery and alternator
				Inspect suspension bushings (spring, shock)
				Inspect suspension bumpers
				Rotate tires
				Inspect frame for damage

Notes (1) and (2), Refer to "Maintenance Guidelines for Severe Duty" in the vehicles service manual  
 This checklist covers the chassis only. Refer to the engine operators manual included with the vehicle for engine specific maintenance such as fluid/filter change intervals and wearable components.

# SAFETY RULES AND OPERATING INSTRUCTIONS

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## **Daily Visual inspection:**

- Tire condition and pressure.
- External frame damage (body).
- Proper operation of all external lights, internal lights, warning lights, warning alarms and/or horns.
- Proper operation of all instrument panel gauges and/or warning lights.
- Proper operation of trailer hitches.
- Inspect for leaking fluids or grease.
- Smooth and proper operation of all controls such as but not limited to:
  - Throttle pedal, Brake pedal, Steering, Parking brake, etc.
- Proper operation of all personnel restraint systems.
- Proper operation of all starter interlock switches.
- Proper operating of all door latches
- Engine oil level

## **⚠ CAUTION**

**New front wheel bearing adjustment must be inspected after the first 24 hours of operation. This includes new vehicle installations. Failure to inspect the bearings after the break in period may result in premature failure of the bearings.**

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

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

In addition, the entire 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.



# Chapter - 3

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# General Maintenance



## Maintenance Guidelines

### **⚠ WARNING**

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

### **⚠ WARNING**

Before starting any repairs:

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

### **⚠ CAUTION**

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

### **⚠ WARNING**

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

- Avoid fire hazards and have fire protection equipment present in the work area. Conduct vehicle performance checks in an authorized area where safe clearance exists.
- Before starting the vehicle, follow the recommended safety procedures in Section 2, "Safety Rules and Operational Information."
- Ventilate the work area properly.
- Regularly inspect and maintain in a safe working condition, brakes, steering mechanisms, speed and directional control mechanisms, warning devices, lights, governors, guards, and safety devices.
- Inspect and maintain battery limit switches, protective devices, electrical conductors, and connections in conformance with Taylor-Dunn's® recommended procedures.
- Keep the vehicle in clean condition to minimize fire hazards and facilitate detection of loose or defective parts.
- Do not use an open flame to check level or leakage of battery electrolyte.
- Do not use open pans of fuel or flammable fluids for cleaning parts.
- Only properly trained and authorized technicians should perform maintenance or repairs to this vehicle.

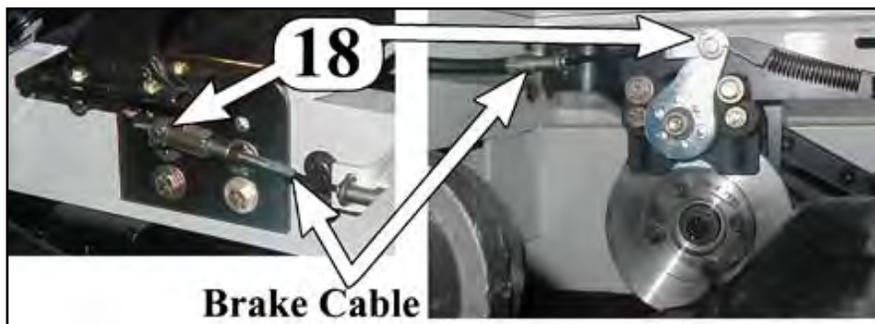
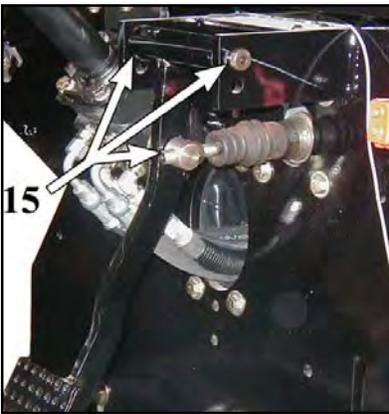
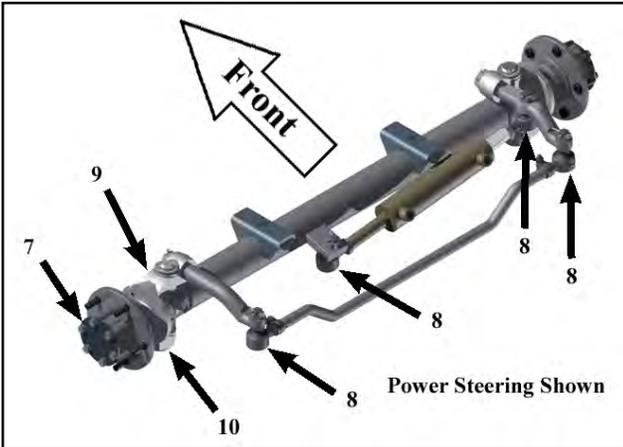
## Lubrication and Fluids Chart

Assembly	ID#	Component	QTY	Capacity	Lubricant
<b><u>Front Axle:</u></b>					
	9	King Pin, Upper	2	-	NLGI Grade 2 lithium multi-purpose grease
	10	King Pin, Lower	2	-	NLGI Grade 2 lithium multi-purpose grease
	8	Ball Joint	4	-	NLGI Grade 2 lithium multi-purpose grease
	7	Wheel Bearing	4	-	NLGI Grade 2 lithium high temp Bearing Grease
<b><u>Power Steering:</u></b>					
	5	Power Steering Pump	1	.5 - .75 g.	Meets or exceeds Ford ESW-M2C128-C
<b><u>Brake Fluid:</u></b>					
	4	Master Cylinder	1	-	DOT 3, Meets or exceeds SAE J1703
<b><u>Linkages:</u></b>					
	15	Brake pedal pivot	3	-	Multi-purpose spray lubricant
	17	Park brake handle	3	-	Multi-purpose spray lubricant
	18	Park brake cable	2	-	Multi-purpose spray lubricant
	16	Shift lever	3	-	Multi-purpose spray lubricant
<b><u>Drive Axle:</u></b>					
	-	Differential gear box (TA267/268)	1	4.5 q	80W-90 API GL5 Hypoid gear oil
	-	Primry reduction gear box (TA267)	1	1 q	80W-90 API GL5 Hypoid gear oil
	-	Planetary Hub (TA268)	2	2 q	80W-90 API GL5 Hypoid gear oil
<b><u>Engine Oil, GM PSI 3.0L:</u></b>					
	-	Above 0 degrees (F)	1	5 q	10W-30 Petroleum base, Synthetic oil NOT recommended
	-	Below 0 degrees (F)	1	5 q	5W-30 Petroleum base, Synthetic oil NOT recommended
	-	Oil level dipstick	1	-	
	-	Oil fill cap	1	-	
<b><u>Engine Oil, Cumins Diesel:</u></b>					
Refer to engine manual included with vehicle.					
<b><u>Engine Oil, Perkins Diesel:</u></b>					
Refer to engine manual included with vehicle.					
<b><u>Engine Coolant, GM PSI 3.0L:</u></b>					
	-	Coolant overflow tank	1	3 g	50/50 Dexcool coolant and water
<b><u>Engine Coolant, Cummins Diesel:</u></b>					
Refer to engine manual included with vehicle.					
<b><u>Engine Coolant, Perkins Diesel:</u></b>					
Refer to engine manual included with vehicle.					
<b><u>Automatic Transmission:</u></b>					
	-	C6 Transmission	1	~13 q	Meets or exceeds Ford ESW-M2C33-F
	-	Allison Transmission	1	~13 q	
	-	Drive shaft U-joints	2	-	NLGI Grade 2 lithium multi-purpose grease
	-	Fluid level dipstick	1	-	

"g" = gallon = 3.78 liters

"q" = quart = .946 liters

## Lubrication Diagram



# Chapter - 4

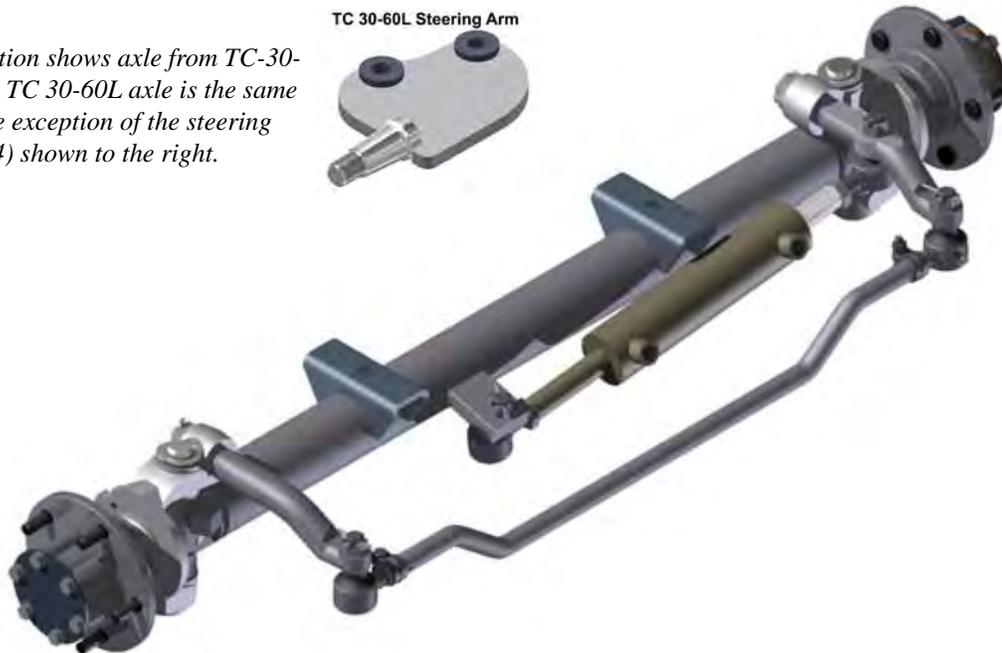
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*Illustration shows axle from TC-30-60. The TC 30-60L axle is the same with the exception of the steering arm (14) shown to the right.*



## INSPECT THE FRONT WHEEL BEARINGS AND KING PIN

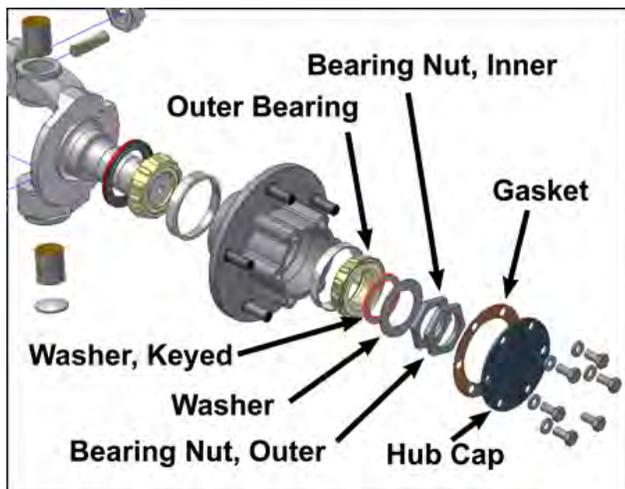
### ⚠ WARNING

1. Make sure the ignition switch is in the "OFF" position.
2. Place the transmission shift lever in the Park or Neutral position
3. Set the park brake.
4. Place blocks under the rear wheels 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.

5. Raise the front of the vehicle and support with jack stands.
6. 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 an indication of loose wheel bearings or king pin.
7. Spin the wheel and listen for any grinding noise. Any grinding noise may be an indication of worn or damaged wheel bearings.
8. Lower the vehicle.
9. Remove the blocks from behind the wheels and test drive the vehicle.



## ADJUST FRONT WHEEL BEARINGS (USED BEARINGS)

DO NOT use this procedure to set new wheel bearings. Refer to Adjust Front Wheel Bearing for new bearing adjustment procedure.

Setting the proper wheel bearing preload is the combination of tightening the two wheel bearing nuts.

Use tool #96-500-47 to adjust bearings.

### ⚠ WARNING

1. Make sure the ignition switch is in the "OFF" position.
2. Place the transmission shift lever in the Park or Neutral position
3. Set the park brake.
4. Place blocks under the rear wheels 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.

5. Raise the front of the vehicle and support with jack stands.
6. Remove the hub cap cover bolts, hub cap, and gasket.

*NOTE: A new gasket is required.*

7. Push on the inner brake pad to force the brake pistons into the brake caliper so that the brake pads are not contacting the rotor.
8. Remove the outer bearing nut and keyed washer.
9. While rotating the hub, tighten the inner bearing nut to 30 foot pounds (40 Newton meters).
10. Loosen the nut and then while rotating the hub hand tighten the inner nut until it is snug against the bearing.
11. Now, rotate the nut counterclockwise 30 to 45 degrees. The tool is marked with notches at 30 and 45 degrees.
12. Install the keyed washer and outer bearing nut then tighten the nut to torque listed in the Hardware Torque table at the end of this section.
13. Bend the keyed washer up against a flat on the outer nut.
14. Install the hub cap. Use a new gasket.
15. Lower the vehicle.
16. Remove the blocks from behind the wheels and test drive the vehicle.

## ADJUST FRONT WHEEL BEARINGS (NEW BEARINGS)

DO NOT use this procedure to set used wheel bearings. Refer to Adjust Front Wheel Bearing for used bearing adjustment procedure.

Setting the proper wheel bearing preload is the combination of tightening the two wheel bearing nuts.

Use tool #96-500-47 to adjust bearings.

### ⚠ WARNING

1. Make sure the ignition switch is in the "OFF" position.
2. Place the transmission shift lever in the Park or Neutral position
3. Set the park brake.
4. Place blocks under the rear wheels 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.

5. Raise the front of the vehicle and support with jack stands.
6. Remove the hub cap cover bolts, hub cap, and gasket.

*NOTE: A new gasket is required.*

7. Push on the inner brake pad to force the brake pistons into the brake caliper so that the brake pads are not contacting the rotor.
8. Remove the outer bearing nut and keyed washer.
9. While rotating the hub, tighten the inner bearing nut to 30 foot pounds (40 Newton meters).
10. Loosen the nut and then while rotating the hub tighten the inner bearing nut to 10 foot pounds (13 Newton meters).
11. Install the keyed washer and outer bearing nut then tighten the nut to torque listed in the Hardware Torque table at the end of this section.
12. Bend the keyed washer up against a flat on the outer nut.
13. Install the hub cap. Use a new gasket.
14. Lower the vehicle.
15. Remove the blocks from behind the wheels and test drive the vehicle.

### ⚠ CAUTION

New front wheel bearing adjustment must be inspected after the first 24 hours of operation. This includes new vehicle installations. Failure to inspect the bearings after the break in period may result in premature failure of the bearings.

## ALIGN FRONT WHEELS

Alignment of the front wheels consists of setting the Toe In only. Camber and Castor are fixed and cannot be adjusted.

The Toe In specification is 0 to +0.25 inch (6.3 mm)

### ⚠ WARNING

1. Make sure the ignition switch is in the "OFF" position.
2. Place the transmission shift lever in the Park or Neutral position
3. Set the park brake.
4. Place blocks under the rear wheels 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.

5. After the toe is set, make sure ball joint hardware is tightened per torque listed in the Hardware Torque table at the end of this section.
6. Lower the vehicle.
7. Remove the blocks from behind the wheels and test drive the vehicle.



## FRONT HUB, STEERING KNUCKLE, KING PIN

It is recommended that if a wearable component is replaced on one side of a vehicle, the same components should be replaced on the other side of the vehicle.

### Disassembly

#### **⚠ WARNING**

1. Make sure the ignition switch is in the "OFF" position.
2. Place the transmission shift lever in the Park or Neutral position
3. Set the park brake.
4. Place blocks under the rear wheels 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.

5. Raise the front of the vehicle and support with jack stands.
6. Remove the front wheels.
7. If equipped with front brakes, remove the brake caliper assembly. Refer to Brake section for instructions.
8. Remove the hub cap cover bolts (1), hub cap (3), and gasket (4). Note: The gasket will have to be replaced.
9. Remove the bearing adjuster nuts (7), washer (5), keyed washer (6), and the outer bearing (8).
10. Remove the hub assembly (9, 10, 11, 8, 12).
11. If required, remove the rotor (not shown) by pressing out the wheel studs.
12. If required, remove the seal (12) and inner bearing (8). Note: If the seal is removed, it must be replaced.
13. Remove the ball joint(s) from the steering arm (14). Note: The cotter pins (15) must be replaced.
14. Remove the steering arm nut (17) and remove the steering arm from the steering knuckle (13). Note: The cotter pin (19) must be replaced.

NOTE: The king pin cap (20c) is part of the king pin kit and is not available as a separate component. Do not remove the cap unless the king pins are to be replaced.

15. Drill a 3/16 inch hole in the center of the king pin cap (20c). Insert a #14 x 2 inch long sheet metal screw into the hole and screw in until the cap is removed.
16. Using a drift punch, tap out the tapered king pin retaining pin (20h).
17. Using a soft metal or wooden rod, insert the rod through the bottom of the steering knuckle and tap out the king pin (20i) then remove the steering knuckle from the axle.
18. Press the upper and lower king pin bushings (20g, 20b) out of the steering knuckle.

### Reassembly

1. Thoroughly clean and inspect all parts.
2. If the hub seal was removed it must be replaced.
3. Use a new hub cap gasket.
4. Pack the king pin thrust bearing and wheel bearings with grease before reassembly.
5. Always use new cotter pins.

#### **⚠ WARNING**

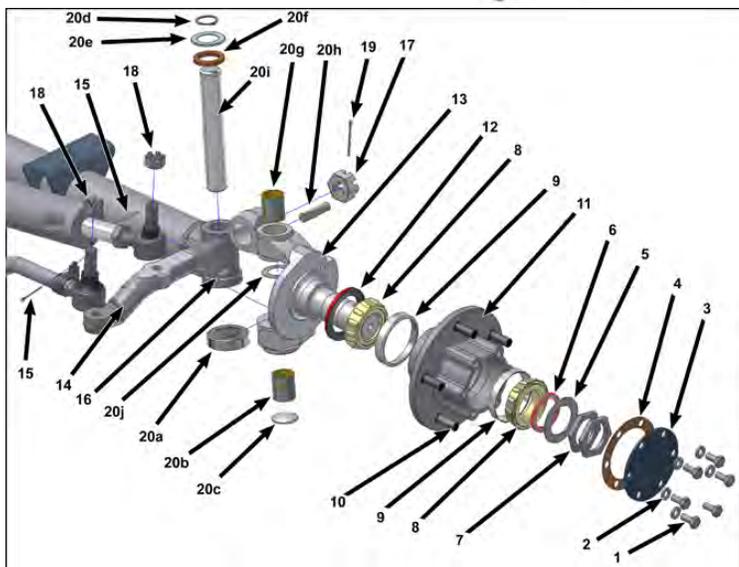
Failure to correctly broach or ream bronze bushings may result in steering difficulty and loss of control of the vehicle causing severe bodily injury and /or property damage.

6. If installing new king pin bushings, make sure the hole in the bushings lines up with the grease fittings in the steering knuckle. The new bushings must be reamed or broached to 1.1095 - 1.1105 inches (28.181 - 28.207 mm)
7. Reassemble in reverse order of disassembly.
8. Tighten the ball joint nuts per torque listed in the Hardware Torque table at the end of this section.
9. Tighten the steering arm nuts per torque listed in the Hardware Torque table at the end of this section.
10. Refer to Adjust Front Wheel Bearings for wheel bearing adjustment procedure.
11. Lubricate the king pin bushings after assembly is complete.

TC 30-60L Steering Arm



Illustration shows axle from TC-30-60. The TC 30-60L axle is the same with the exception of the steering arm (14) shown to the right.



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## REPLACE FRONT WHEEL BEARINGS

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It is recommended that if a wearable component is replaced on one side of a vehicle, the same components should be replaced on the other side of the vehicle.

This procedure assumes that the front hub has been removed from the vehicle. Refer to the front hub assembly removal instructions for details and warnings regarding the removal and installation procedure.

1. Thoroughly clean all grease from the inside of the hub.
2. Use a race puller or press to remove the inner and outer races.
3. Install new races.

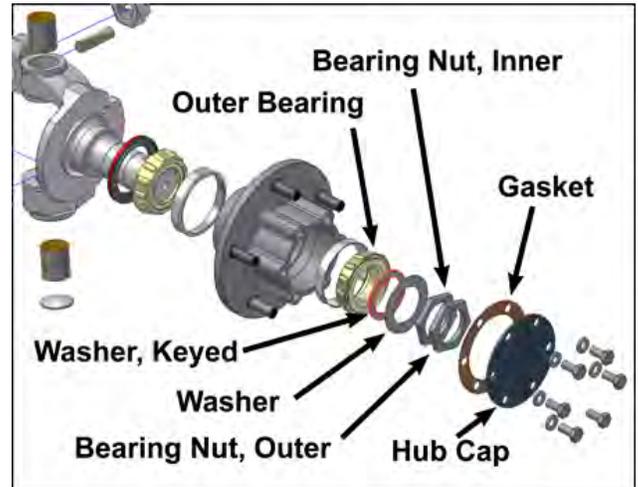
### **CAUTION**

**Make sure the inner and outer bearing races are pressed properly into the hub. Improperly pressed races will result in premature failure of the bearings.**

4. Pack inner bearing with appropriate grease and install in the hub along with a new grease seal.
5. Apply a thin film of grease to the seal lip.
6. Slide the hub/bearing assembly onto the spindle being careful not to damage the seal lip.
7. Pack outer bearing with appropriate grease and install in the hub.
8. Reassemble the hub to the steering knuckle using the inner bearing nut only at this time.
9. Refer to Adjust Front Wheel Bearings (New Bearings) for procedure to adjust the wheel bearings.

### **CAUTION**

**New front wheel bearing adjustment must be inspected after the first 24 hours of operation. This includes new vehicle installations. Failure to inspect the bearings after the break in period may result in premature failure of the bearings.**



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## REPLACE THE STEERING CYLINDER

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Refer to Steering Component Service section

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## REBUILD THE STEERING CYLINDER

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Refer to Steering Component Service section

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## REPLACE BALL JOINT

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Refer to Steering Component Service section



## ***HARDWARE TORQUE***

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

Description	Foot Pounds	Newton Meters
Outer Wheel Bearing Nut	50	67
Ball Joint Clamp	28-32	38-43
Ball Joint Nuts	45-55	61-74
Hub Cap Bolts	20	27.1
Steering Arm Nuts	Tighten to 160 Foot Pounds (217 N-M) and then to next slot to insert cotter pin	

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# Chapter - 5

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# Steering Component Service

## STEERING CONTROL VALVE, HYDROSTATIC STEERING

### ⚠ CAUTION

Hydraulic fluid and components must be kept clean. Thoroughly clean exterior of any hydraulic component before disconnecting hoses or fittings. Perform all maintenance and repairs in a clean environment. Do not use cloth or paper towels to clean components due to possible contamination with lint or other fiber. Failure to follow these guidelines will result in premature failure of hydraulic system components.

### Remove

### ⚠ WARNING

1. Make sure the ignition switch is in the "OFF" position.
2. Place the transmission shift lever in the Park or Neutral position
3. Set the park brake.
4. Place blocks under the rear wheels to prevent vehicle movement.

6. Remove the dash assembly.
7. Remove the steering wheel.
8. Disconnect the horn switch wires from the column.
9. Remove the hydraulic hoses from the steering valve body. Tie the hoses so that the ends of the hose remain above the level of the reservoir to prevent fluid from draining out.
10. Remove the four bolts holding the steering valve assembly to the tilt bracket.
11. Remove the valve assembly from the vehicle.

### Install

Install the valve in reverse order of removal.

Tighten mounting bolts to torque listed in the Hardware Torque table at the end of this section.

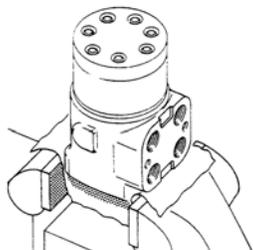
Reconnect the battery, remove the blocks from behind the wheels and test drive the vehicle.

The hydraulic system does not have to be bled. To expel any air in the system, power up the pump and turn the steering wheel fully in both directions.

### Disassemble

Refer to exploded illustration later in this procedure.

1. Remove the steering column assembly (32) from the Steering Valve.
2. Clamp the Steering Valve as shown in a vise. use protective material such as leather on the vise jaws. Do not over tighten the vise or the housing may be damaged.



3. Remove the cap screws and end cap (2).
4. Remove the seal (3) from the end cap.
5. Remove the Gerotor (4).
6. Remove the seal (3) from the Gerotor.
7. Remove the drive spacer (5).
8. Remove the drive (7).
9. Remove the spacer plate (6).
10. Remove the seal (3) from the housing.
11. Remove Steering Valve from the vice.
12. Remove the upper retaining ring (19).
13. Place the assembly on the bench with the ports facing up.
14. Rotate the spool and sleeve assembly (9) until the centering pin (10) is horizontal then push spool and sleeve assembly just far enough to free the gland bushing (18) from the housing and remove the bushing.
15. Remove the quad seal (17) from the seal gland bushing.
16. Carefully remove the dust seal (16) from the gland bushing.
17. Remove the two bearing races and the thrust bearing (13, 14) from the spool/sleeve assembly.
18. While slowly rotating the spool/sleeve assembly, carefully remove it through the back of the housing. It should come out easily without forcing.
19. Remove the pin (10) from the spool/sleeve assembly.
20. Push the spool out just far enough so that the springs (11) clear the slot in the sleeve and remove the springs.
21. While rotating the spool, Push it back through the sleeve to remove it.
22. Remove the seal (15) from the housing.
23. Thread a 10-24 machine screw into the check valve ball seat (23). Pull the screw with a pair of pliers to remove the seat.
24. Remove the two seals from the seat.
25. Remove the check ball and retainer (21,22).

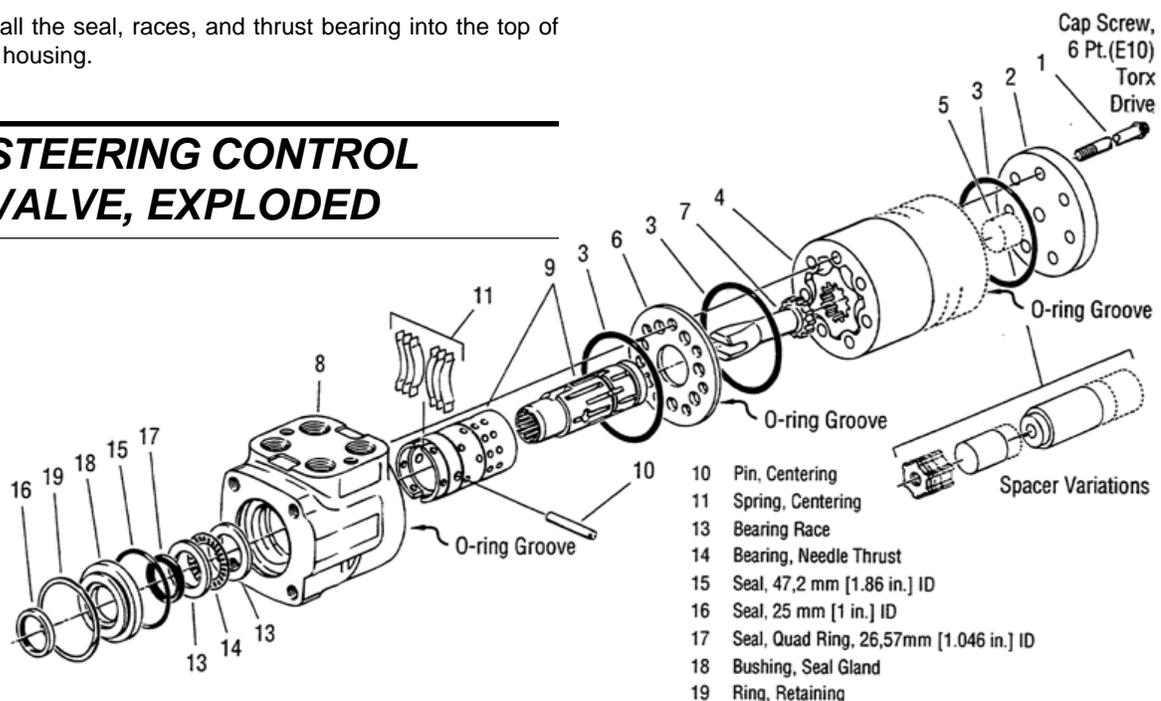
## Reassemble

Thoroughly clean all components and air dry. Read cleanliness caution at the beginning of this section.

Use new seals. Lightly lubricate all seals with petroleum jelly prior to assembly.

1. Install the check valve retainer (21). Make sure it is straight in the bore.
2. Install the check ball (22).
3. Install seals on the check ball seat (23).
4. Carefully install the lubricated check ball seat/seal assembly into the housing. Do not twist the seals. Push down to the shoulder of the hole.
5. Lubricate the spool with hydraulic fluid and assemble the spool and sleeve (9). Make sure that the spring slots are at the same end. The spool should freely rotate in the sleeve.
6. Position the springs (11) on the bench so that extended edge is down and arched center section is together.
7. Compress the extended end of the centering spring set and push into the spool.
8. Center the spring set in the parts so that they push down evenly and flush with the upper surface of the spool and sleeve.
9. Install the pin (10) into the spool/sleeve assembly. It should be flush at both ends.
10. Keeping the pin horizontal, install the spool/sleeve assembly through the bottom of the housing until it is flush with the bottom of the housing.
11. Install the seal, races, and thrust bearing into the top of the housing.
12. Install dust seal (16) into the seal gland bushing (18). Flat or smooth side must face down into the bushing.
13. Install the quad ring seal (17) into the gland bushing. Smooth the seal into place with your finger. Do not use any seal that freely falls into pocket of the bushing.
14. Install the seal gland bushing assembly over the spool end. Tap in place with a rubber hammer. Bushing should be flush against the bearing race.
15. Install the retaining ring (19). Make sure it is properly seated.
16. Clamp the Steering Valve as shown in a vise. Use protective material such as leather on the vise jaws. Do not over tighten the vise or the housing may be damaged.
17. The spool /sleeve assembly should be flush with the end.
18. Install seal (3) in housing.
19. Install spacer plate (6).
20. Rotate the spool/sleeve assembly until the pin is parallel with the port face and install the drive (7). Mark the end of the drive with a line that is parallel with the port face.
21. Install seal (3) on to the meter (4).
22. With the seal side of the meter facing the spacer plate, align the star valleys of the meter to the line on the drive. Do not allow the drive to rotate.
23. Install the drive spacers.
24. Install seal in meter or end cap and install the end cap. Cross tighten the bolts in two stages. First to 120 inch pounds (14 nm) then to final torque listed in the Hardware Torque table at the end of this section.

## STEERING CONTROL VALVE, EXPLODED



- |                               |                   |
|-------------------------------|-------------------|
| 1 Screw, Cap                  | 6 Plate, Spacer   |
| 2 Cap, End                    | 7 Drive           |
| 3 Seal, 73,5 mm [2.89 in.] ID | 8 Housing         |
| 4 Gerotor                     | 9 Sleeve, Control |
| 5 Spacer                      | Spool, Control    |

- |  |
|--|
| 10 Pin, Centering                          |
| 11 Spring, Centering                       |
| 13 Bearing Race                            |
| 14 Bearing, Needle Thrust                  |
| 15 Seal, 47,2 mm [1.86 in.] ID             |
| 16 Seal, 25 mm [1 in.] ID                  |
| 17 Seal, Quad Ring, 26,57mm [1.046 in.] ID |
| 18 Bushing, Seal Gland                     |
| 19 Ring, Retaining                         |



## TROUBLESHOOTING, HYDROSTATIC STEERING

The cause of most steering problems can be identified by the symptoms. The entire steering system must be analyzed by a qualified technician before any components are removed. Use the following chart to identify probable cause of steering problems.

Symptoms:	Possible Cause:	Repair Procedure:
Slow or difficult Steering. Loss of Power Assist.	Worn or faulty pump. Faulty flow divider.  Faulty relief valve. Faulty steering linkage. Overloaded steer axle.	Inspect power steering pump for proper operation. Flow divider is in the brake Hydro-Boost assembly. If the flow divider is not functioning correctly then replace the HydroBoost. Replace the relief valve. Inspect steering linkage and steering knuckles for binding.
Wandering: Vehicle Will Not Hold a Straight Line.	Air in system. Steering control unit worn. Faulty steering linkage. Faulty steering cylinder. Front end out of alignment.	Locate cause of air bleed and repair. Add oil to reservoir. Replace the control unit. Inspect steering linkages for loose fittings. Inspect the steering cylinder. Realign front end.
Drifting: Vehicle Pulls to the Left or Right.	Steering control unit worn. Faulty steering linkage. Front end out of alignment.	Replace the control unit. Inspect steering linkages for loose fittings. Realign front end.
Slipping: Slow Rotation of Steering Wheel Will Not Turn Vehicle.	Faulty steering control unit. Faulty steering cylinder.	Replace the control unit. Inspect the steering cylinder internal seals.
Intermittent Hard Steering or Steering Wheel Locks Up. After lock, Steering Wheel May Spin Free With No Steering Action.	Thermal shock	Thermal shock can occur if the system is operated for an extended period without turning the steering wheel. In this situation, there may be an large temperature differential between the fluid in the system and the fluid in the steering control unit. If the steering wheel is turned quickly, the steering may temporarily seize and could be followed with a free wheeling steering wheel. Thermal shock could damage the steering control unit.
Erratic Steering.	Air is system. Faulty steering cylinder. Damage due to thermal shock. Sticking flow control spool.	Locate cause of air bleed and repair. Add fluid to reservoir. Inspect and repair or replace cylinder. Replace control unit. Replace flow control valve.
Soft or Spongy Steering.	Air in system. Low fluid level	Locate cause of air bleed and repair. Add fluid to reservoir. Add fluid to reservoir.
Rotation of Steering Wheel Does Not Turn Vehicle. No Resistance in Steering.	Broken steering column No fluid in steering control unit.  Faulty steering control unit.	Inspect the steering column assembly. Start the steering pump. If this does not correct the problem then inspect the steering pump for proper operation. Replace the steering control unit.
Rotation of Steering Wheel does not Turn Vehicle. Slight resistance Felt When Steering.	Faulty steering cylinder.	Inspect the steering cylinder internal seals.
Excessive Free Play at Steering Wheel.	Loose steering wheel. Faulty steering column	Inspect the steering wheel nut. Inspect the steering column assembly for loose or worn components.
Excessive Free Play at Steered Wheels.	Faulty steering linkage. Leaking cylinder seals.	Inspect the steering linkages for loose components. Inspect the steering cylinder internal seals.
Binding or Poor Centering of Steering Wheel.	Faulty steering column. High back pressure in return line. Debris in the fluid.	Inspect steering column components. Inspect fluid return line for obstructions. Flush the system and clean the steering control unit.
Steering Unit Locks Up.	Debris in the fluid. Low pump pressure. Damage due to thermal shock. Worn or broken pin.	Flush the system and clean the steering control unit. Inspect the power steering pump for proper operation. Replace the steering control unit. Replace the steering control unit.
Steering Wheel Moves by Itself.	Parts assembled incorrectly. Improper timing in steering unit. Hydraulic hoses not connected properly.	Reassemble properly. Reassemble properly. Reconnect hoses properly.
Vehicle Steers in Wrong Direction.	Hydraulic hoses not connected properly.	Reconnect hoses properly.
Steering Wheel "Kicks Back" at Start of Steering.	Inlet check valve missing.	Install the check valve.
Instability / Hoses Jump.	Air in system.	Locate cause of air bleed and repair. Add fluid to reservoir.

## REPLACE THE STEERING CYLINDER, HYDROSTATIC STEERING

### Remove

#### **⚠ WARNING**

1. Make sure the ignition switch is in the "OFF" position.
2. Place the transmission shift lever in the Park or Neutral position
3. Set the park brake.
4. Place blocks under the rear wheels 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.

5. Disconnect the two hydraulic lines from the cylinder. Install plugs into the hoses to prevent hydraulic fluid from bleeding out.
6. Loosen the ball joint jam nuts.
7. Disconnect the ball joints from the steering arm and front axle. Note: The cotter pins must be replaced.
8. Remove the ball joints from the cylinder.

### Install

1. Install in reverse order of removal.
2. Always use new cotter pins.
3. Position the right wheel so that it is 90 degrees to the front axle beam.
4. Install the ball joints into the cylinder so that it can be installed without moving the wheels.
5. Tighten the ball joint nuts per torque listed in the Hardware Torque table at the end of this section.
6. Install new cotter pins.
7. Tighten the ball joint jam nuts per torque listed in the Hardware Torque table at the end of this section.
8. Realign the front wheels.
9. Connect both hydraulic lines to the cylinder.
10. Start the engine and rotate the steering wheel from full left to full right 3 or 4 times to bleed the steering system.

## REPLACE BALL JOINT

It is recommended that if a wearable component is replaced on one side of a vehicle, the same components should be replaced on the other side of the vehicle.

It is likely that the ball joint will be damaged when removed from the steering arm. It is recommended that the ball joint should be replaced if removed.

#### **⚠ WARNING**

1. Make sure the ignition switch is in the "OFF" position.
2. Place the transmission shift lever in the Park or Neutral position
3. Set the park brake.
4. Place blocks under the rear wheels 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.

5. Raise the front wheel off of the ground and support with jack stands.
6. Remove the front wheel.
7. Loosen the ball joint clamp or jam nut.
8. Remove the cotter pin and discard.
9. Remove the ball joint nut.
10. Using a pickle fork, remove the ball joint from the steering arm.
11. Install a new ball joint in reverse order of removal.
12. Tighten the ball joint nut per torque listed in the Hardware Torque table at the end of this section.
13. Install a new cotter pin.
14. Lubricate the ball joint with the appropriate grease.
15. Realign the front wheels. Refer to procedure "Align Front wheels."



## **WHEEL ALIGNMENT**

Refer to Front Axle section

## **HARDWARE TORQUE**

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

Description	Foot Pounds	Newton Meters
Steering wheel nut	35	47
Steering Valve Mounting Bolts	16.7	22
Steering Valve Cap Bolts (final) See instructions for 1st stage torque	19.6	27
Ball Joint Clamps	28-32	38-43
Ball Joint Jam Nuts	20-25	27-34
Ball joint Nuts	17-23	23-31

# Chapter - 6

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Due to the various engines available, engine service information is provided in separate supplementary manuals.

Manual Part Numbers by engine model:

## **PSI GM 3.0 gasoline/LPG**

Operation/Maintenance:	M7-001-31
Service:	M7-001-32
Diagmostics:	M7-001-33
Parts:	M7-001-34

*Note: The above manuals are included on the CD provided with your vehicle.*

Additional Manuals may be purchased through your local Taylor-Dunn® distributor. A service manual order form (D4-010-00) is available on the vehicle CD.



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### **⚠ WARNING**

Fuel, whether gasoline or LPG, is highly flammable. Use extreme care whenever servicing any component of the fuel system.

- Allow the engine to cool before starting work.
- Confirm all pressurized fuel lines have been depressurized before opening any fuel line connection.
- Work in a open air environment with adequate ventilation.
- Extinguish all open flames.
- No smoking.
- Disconnect the vehicle battery negative lead before starting work.
- Do not attempt to start the engine with any fuel system component disconnected.

# Fuel System



## **⚠ WARNING**

Fuel, whether gasoline, LPG or Diesel, is highly flammable. Use extreme care whenever servicing any component of the fuel system.

- Allow the engine to cool before starting work.
- Confirm all pressurized fuel lines have been depressurized before opening any fuel line connection.
- Work in a open air environment with adequate ventilation.
- Extinguish all open flames.
- No smoking.
- Disconnect the vehicle battery negative lead before starting work.
- Do not attempt to start the engine with any fuel system component disconnected.

## **FUEL SYSTEM, GASOLINE**

### **⚠ CAUTION**

Failure to change the fuel filters as recommended can result in premature failure of the fuel system components.

The fuel system consists of the fuel tank, fuel pump, pressure regulator and two fuel filters.

There is a coarse fuel filter in the fuel line from the tank to the pump. This removes large particles from the fuel that may clog the pump.

There is an additional fine particle filter installed after the fuel pump. This filter protects the engine and injectors from microscopic particles in the fuel.

## **FUEL SYSTEM, LPG**

### **⚠ CAUTION**

Failure to change the fuel filters as recommended can result in premature failure of the fuel system components.

The LPG fuel system consists of the pressurized liquid fuel tank, hoses, Filter, Valves.

Refer to the engine operators manual for components installed on the engine.

The LPG fuel filter is located on the seat deck by the fuel tank.

After replacing the LPG fuel tank, be sure that the tank is properly strapped in before putting the vehicle in service.

### **⚠ WARNING**

LPG fuel tanks not installed on the vehicle must be stored in accordance to local regulations.

Failure to properly store empty or full tanks can result explosion and/or fire.

## FUEL SYSTEM, CUMMINS B4.5 DIESEL

### CAUTION

Failure to change the fuel filters as recommended can result in premature failure of the fuel system components.

Refer to the engine operators manual for fuel system service information.

The fuel system consists of the fuel tank, primary fuel filter, fuel pump, fuel filter/separator.

The primary fuel filter is located to the rear of the engine.

The fuel filter/seperator is located on the left rear of the engine.



*Primary Fuel Filter*



*Fuel Filer/Seperator*

### WARNING

Fuel, whether gasoline, LPG, or Diesel, is highly flammable. Use extreme care whenever servicing any component of the fuel system.

- Allow the engine to cool before starting work.
- Confirm all pressurized fuel lines have been depressurized before opening any fuel line connection.
- Work in a open air environment with adequate ventilation.
- Extinguish all open flames.
- No smoking.
- Disconnect the vehicle battery negative lead before starting work.
- Do not attempt to start the engine with any fuel system component disconnected.

## FUEL SYSTEM, PERKINS 1104C DIESEL

### CAUTION

Failure to change the fuel filters as recommended can result in premature failure of the fuel system components.

*Not available at time of printing.*



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  - Adding Coolant ..... 2
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- Fan Belts ..... 2
  - Inspect ..... 2
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- Hardware Torque ..... 3

# Cooling System

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## **COOLANT LEVEL**

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### **⚠ WARNING**

The coolant system is pressurized when the engine is running or hot.

- Do not remove the radiator cap while the engine is running.
- Do not remove the radiator cap until the engine is cool.

### **⚠ CAUTION**

Never add cold coolant to a hot engine. The sudden change in coolant temperature may damage the engine

### **Inspection**

It is not necessary to remove the radiator cap to inspect the coolant level or add coolant to the system. Coolant level can be inspected at the coolant recovery tank.

There are two level lines on the coolant recovery tank. The coolant level should be at the upper line when the engine is hot or the level should be at the lower line when the engine is cool.



### **Adding Coolant**

Refer to the Maintenance section Lubrication and Fluids Chart for the coolant specifications.

Coolant can be added to the coolant recovery tank at any time. Add coolant until the coolant level is at the line indicated by the current temperature of the engine.

It is not recommended to add coolant directly to the radiator unless a large quantity of coolant must be added.

If filling the radiator:

- 1) Add coolant until the level is at the top of the filler neck.
- 2) Replace the radiator cap.
- 3) Start the engine and allow it to warm up to the normal operating temperature.
- 4) Fill the coolant recovery tank to the upper level line.
- 5) Allow the engine to cool.
- 6) Repeat the procedure if the coolant recovery tank is empty after the engine has cooled down,

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## **RADIATOR AND HOSES**

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### **Inspection**

Inspect the exterior of the radiator for obstructions and damage to the cooling fins. The radiator fins can be cleaned using a soft brush and a low pressure stream of water through the rear of the radiator.

Inspect all radiator and heater hoses for indications of leaking, swelling, cracking or spongy feeling.

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## **FAN BELTS**

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### **Inspect**

Check the fan belt for signs of wear and cracking.

### **Adjust**

A loose belt will wear out prematurely and may result in improper operation of the power steering and cooling fan. A belt that is too tight will result in premature failure of the fan pulley bearings or power steering pump.

The fan belt tension is adjusted by moving the power steering pump. A cogged v-belt tension gauge is required to properly set the belt tension. Follow the instruction provided with your tension gauge to set the belt tension.



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***HARDWARE TORQUE***

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

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Description	Foot Pounds	Newton Meters
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# Transmission Service Ford C6



## **DIAGNOSIS AND TESTING**

Troubleshooting the automatic transmission is simplified by using the proven methods of diagnosis. One of the most important things to remember is that there is a definite procedure to follow. Do not try to short cut or take it for granted that someone else has done the critical checks or adjustments. The following procedures are recommended for checking and/or verifying that the various components are adjusted and operating properly. If an Automatic Transmission Tester is used, Rotunda model 014-00737 or equivalent, follow the manufacturers instructions.

## **GENERAL INFORMATION**

All automatic transmissions are equipped with high temperature resistant seals. This includes those seals used on the manual and kickdown levers, the O-rings and oil pan gasket. Under no conditions should older design seals be used on the transmissions, except the regular service replacement oil pan gasket, which is of special leak prevention design. This should still be used.

### Transmission Fluid Level Check

**CAUTION:** Vehicle should not be driven if fluid level is below the "DO NOT DRIVE" hole.

#### Transmission—Operating Temperature

The automatic transmission should be checked at an operating temperature of 66 degrees to 77 degrees C (150 degrees to 170 degrees F) (dipstick is hot to the touch). The operating temperature may be obtained by driving 24-32 km (15 to 20 miles) of city-type driving with the outside temperature above 10 degrees C (50 degrees F).

**CAUTION:** If vehicle has been operated for an extended period at high speed, or in city traffic in hot weather, or vehicle is being used to pull a trailer, to obtain an accurate reading, the fluid has to cool, usually about 30 minutes after engine has been turned off.

#### Transmission—Room Temperature

If the transmission is not at an operating temperature of 66 degrees to 77 degrees C (150 degrees to 170 degrees F) and it becomes necessary to check the fluid level (such as pre-delivery), the fluid may be checked at room temperature, 21 degrees to 35 degrees C (70 degrees to 95 degrees F) (dipstick cool to touch).

#### Dipstick Reading

Refer to Fig. 2.

The fluid level on the dipstick should be within the cross hatched area at operating temperature. The fluid level on the dipstick should read between the holes at room temperatures.

Check the fluid as follows:

**NOTE:** It may be necessary to remove the air inlet tube located directly in the way of access to the dipstick.

1. With the transmission in PARK, engine at idle rpm, foot brakes applied, and vehicle on level surface, move the transmission/selector lever through each range, allowing time in each range to engage transmission. Return to PARK, applying parking brake fully, and block the wheels. Do not turn off the engine during the fluid level check.
2. Clean all dirt from the transmission fluid dipstick cap before removing the dipstick from the filler tube.
3. Pull the dipstick out of the tube, wipe it clean, and push it all the way back into the tube. Be sure it is fully seated.

4. Pull the dipstick out of the filler tube again, and check the fluid level.

**IMPORTANT:** The fluid level indication on the dipstick will be different at operating temperature and room temperature. For the correct fluid level reading on the dipstick, follow the appropriate instructions stated previously.

Before adding fluid, be sure that the correct type will be used. If in doubt, check the Vehicle Certification Label affixed to the left front door lock face panel or door pillar for the Transmission/Transaxle Code. Also, the fluid is stamped on the dipstick.

**CAUTION:** Use of a fluid other than specified could result in transmission malfunction and/or failure.

If necessary, add enough fluid through the filler tube to raise the level to the correct position. Do not overfill the transmission, because it will result in foaming, loss of fluid through the vent, and possible transmission malfunction. If overfill occurs, excess must be removed.

5. Install the dipstick, making sure it is fully seated in the tube.

If the transmission fluid level is correctly established at 21 degrees to 35 degrees C (70 degrees to 95 degrees F), it will appear in the cross hatch area on the dipstick when the transmission reaches an operating temperature of 66 degrees to 77 degrees C (150 degrees to 170 degrees F). Do not overfill or underfill.

Overfill can cause the fluid to foam and spill out through the transmission vent resulting in a transmission malfunction.

Underfill can result in transmission loss of engagement or slipping. This condition is most evident in cold weather or when the vehicle is parked or being driven on a hill.

If the transmission fluid level is checked when the fluid is at room temperature, the dipstick could indicate that fluid should be added if the dipstick is misread. If fluid is added at this time, an overfill condition could result when the fluid reaches operating temperatures of 66 degrees to 77 degrees C (150 degrees to 170 degrees F) (dipstick hot to touch).

Refer to the specifications at the end of this Section for automatic transmission fluid requirements and capacities.

### Transmission Fluid Condition Check

1. Make the normal fluid check according to the above procedure.

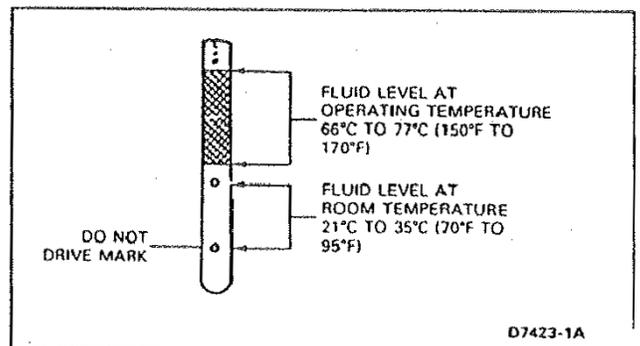


FIG. 2. Dipstick Reading— C6



2. Observe color and odor of the fluid. It should be dark reddish not brown or black. A burnt odor can sometimes indicate that there is an overheating condition or clutch disc or band failure.
3. Use an absorbent white facial tissue paper to wipe the dipstick. Examine the stain for evidence of solids (specks of any kind) and for antifreeze signs (gum or varnish on dipstick).

NOTE: Fluid used with the automatic transmission contains a detergent which retains in suspension particles generated during normal transmission use. This characteristic may result in a dark coloring of the fluid and does not by itself indicate malfunction or need for repair.

If specks are present in the oil or there is evidence of antifreeze, the transmission oil pan must be removed for further inspection. If fluid contamination or transmission failure is confirmed by further evidence of coolant or excessive solids in the oil pan, the transmission must be disassembled and completely cleaned and repaired. This includes cleaning the torque converter and transmission cooling system. It would be a waste of time to perform any further checks before cleaning and repairing the transmission.

During disassembly and assembly, all overhaul checks and adjustments of clearances and end play must be made.

### High or Low Fluid Level

A fluid level that is too high will cause the fluid to become aerated. Aerated fluid will cause low control pressure, and the aerated fluid may be forced out the vent.

A fluid level that is too low can affect the operation of the transmission. Low level may indicate fluid leaks that could cause transmission damage.

### Fluid Level High Before Starting Engine—OK During Normal Check

1. Check for correct operation of drainback valve in stator support.
2. Check pump bushing.
3. Replace or repair pump if required.

### Transmission Fluid Cooler Flow Check

The linkage, fluid level and control pressure must be within specifications before performing this flow check.

Remove the transmission dipstick from the filler tube. Place a funnel in the transmission filler tube. Raise the vehicle, remove the cooler return line from its fitting in the case. Attach a hose to the cooler return line and fasten the free end of the hose in the funnel installed in the filler tube.

Start the engine and set idle speed at 1000 rpm with the transmission in neutral.

Observe the fluid flow at the funnel. When the flow is "solid" (air bleeding has been completed), the flow should be liberal. If there is not a liberal flow at 1000 rpm in neutral, low pump capacity, main circuit system leakage, or cooler system restriction is indicated.

Check both metal cooler lines between the transmission and radiator for restrictions. Check for restrictions in the metal or rubber cooler lines to and from the auxiliary cooler, if the vehicle is so equipped. Visually check and physically feel all bends for kinks, especially rubber cooler lines, that would restrict flow and could result in transmission overheating or lack of lubrication.

To separate transmission trouble from cooler system trouble, observe the flow at the transmission case converter-out fitting.

### Transmission Fluid Leakage Checks

Check the speedometer cable connection at the transmission. Replace the rubber seal if necessary (if so equipped).

Leakage at the oil pan gasket often can be stopped by tightening the attaching bolts to the proper torque. If necessary, replace the gasket.

Check the fluid filler tube connection at the transmission case. If leakage is found, install a new O-ring. The filler tube brackets should align properly and be attached to the transmission or engine locations.

Check the fluid lines and fittings between the transmission and the cooler in the radiator tank for looseness, wear, or damage. If leakage is found, tighten the fitting, or replace the damaged parts (Fig. 3).

Check the engine coolant in the radiator. If transmission fluid is present in the coolant, the cooler in the radiator is probably leaking.

The cooler can be further checked for leaks by disconnecting the lines from the cooler fittings and applying 345-517 kPa (50-75 psi) air pressure to the fittings. Remove the radiator cap to relieve the pressure build up at the exterior of the oil cooler tank. If the cooler is leaking and/or will not hold pressure, the cooler must be replaced. Cooler replacement is described in the Cooling System Section of Group 27.

If leakage is found at either the downshift control lever shaft or the manual lever shaft, replace either or both seals.

Inspect the pipe plug on the left front side of the transmission case. If the plug shows leakage, tighten the plug to specifications. If leakage continues, replace the plug. On a C6 transmission, inspect the TV pressure plug on the right rear side of the case.

Transmission	Radiator		Transmission		Fluid Line Nut	
	ft-lbs	N-m	ft-lbs	N-m	ft-lbs	N-m
C6	8-12	11-16	18-23	24-31	12-18	17-24

CD3141-2D

FIG. 3 Cooler Line Fitting Torque Specifications

evident. If the plug shows leakage, coat the threads with Motorcraft Sealing Compound or equivalent and tighten the plug to specification as listed at the end of the appropriate transmission Section. If leakage continues, replace the plug.

When a converter drain plug leaks, remove the drain plug with a six-point wrench. Coat the threads with Motorcraft Sealing Compound or equivalent and install the plug. Tighten the drain plug to specification as listed at the end of this Section. **Fluid leakage from the converter housing may also be caused by engine oil leaking past the rear main bearing, or from oil galley plugs, or power steering oil leakage from steering system. Be sure to determine the exact cause of the leak before starting repair procedures.**

Oil-soluble aniline or fluorescent dyes premixed at the rate of 1/2 teaspoon of dye powder to 0.23 liter (1/2 pint) of transmission fluid have proved helpful in locating the source of fluid leakage. Such dyes may be used to determine whether an engine oil or transmission fluid leak is present, or if the fluid in the oil cooler leaks into the engine coolant system. A black light must be used with the fluorescent dye solution.

### Fluid Leakage in Converter Area

In diagnosing and correcting fluid leaks in the front pump and converter area, use the following procedures to locate the exact cause of the leakage. Leakage at the front of transmission, is evidenced by fluid around the converter housing, may have several sources. By careful observation, it is possible in many instances, to pinpoint the source of the leak before removing the transmission from the vehicle. The paths which the fluid takes to reach the bottom of the converter housing are shown in (Fig. 4).

1. Fluid leaking by the front pump seal lip will tend to move along the drive hub and onto the back of the impeller housing. Except in the case of a total seal failure, fluid leakage by the lip of the seal will be deposited on the inside of the converter housing only, near the outside diameter of the housing.
2. Fluid leakage by the outside diameter of the seal and front pump body will follow the same path which the leaks by the front pump seal follow.
3. Fluid that leaks by a front pump-to-case bolt will be deposited on the inside of the converter housing only. Fluid will not be deposited on the back of the converter.
4. Leakage by the front pump-to-case gasket may cause fluid to be deposited inside the converter housing, or it may seep down between the front of the case and converter housing.
5. Fluid leakage from the converter drain plugs or converter-to-flywheel stud weld will appear at the outside diameter of the converter on the back face of the flywheel, and in the converter housing only near the flywheel.

Engine oil leaks are sometimes improperly diagnosed as transmission front pump seal leaks. The following areas of possible leakage should also be checked to determine if engine oil leakage is causing the problem:

- a. Leakage at the rocker arm cover (valley cover) may allow oil to flow over the converter housing or seep down between the converter housing and cylinder block, causing oil to be present in or at the bottom of the converter housing.
- b. Oil galley plug leaks will allow oil to flow down the rear face of the block to the bottom of the converter housing.

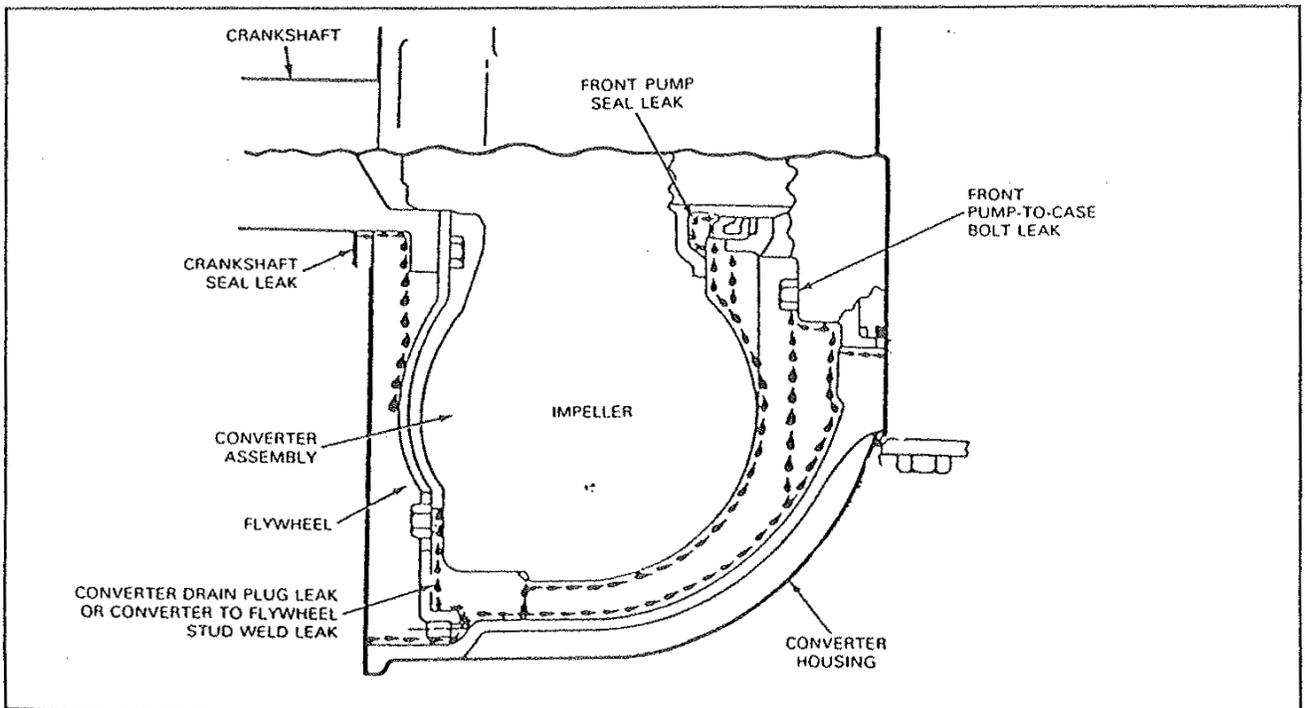


FIG. 4 Converter Leakage—Fluid Path



- c. Leakage by the crankshaft seal will work back to the flywheel, and then into the converter housing.

Fluid leakage from other areas, such as the power steering system forward of the transmission, could cause fluid to be present around the converter housing due to blow back or road draft. The following procedures should be used to determine the cause of the leakage before any repairs are made.

- a. Remove the transmission dipstick and note the color of the fluid. Original factory-fill fluid is dyed red, to aid in determining if leakage is from the engine or transmission. Unless a considerable amount of makeup fluid has been added or the fluid has been changed, the color should assist in pinpointing the leak. Since road draft may cause leaking power steering fluid to be present on the transmission, this leakage, if present, should be eliminated before checking the transmission for fluid leakage.
- b. Remove the converter housing cover. Clean off any fluid from the top and bottom of the converter housing, front of the transmission case, and rear face of the engine and engine oil pan. Clean the converter area by washing with a suitable non-flammable solvent, and blow dry with compressed air.
- c. Wash out the converter housing, the front of the flywheel, and the converter drain plugs. The converter housing may be washed out using cleaning solvent and a squirt-type oil can. Blow all washed areas dry with compressed air.
- d. Start and run the engine until the transmission reaches its normal operating temperature. Observe the back of the block and top of the converter housing for evidence of fluid leakage. Raise the vehicle on a hoist and run the engine at fast idle, then at engine idle, occasionally shifting to the drive and reverse ranges to increase pressure within the transmission. Observe the front of the flywheel, back of the block (in as far as possible), and inside the converter housing and front of the transmission case. Run the engine until fluid leakage is evident and the probable source of leakage can be determined.

### Converter Leakage Check

If welds on the torque converter indicate leakage, remove the converter and make the following check.

Assemble a Rotunda 021-00054 Torque Converter Leak Detector or an equivalent to the converter. Test the converter for leaks following the directions supplied with the detector kit.

### Control Pressure Test

#### C6

There are two methods of performing the control pressure test. One is to perform the test using the engine vacuum. The second method is to use a remote vacuum source such as the one provided in the distributor tester or a hand operated vacuum pump.

### Engine Vacuum Pressure

When the vacuum diaphragm unit is operating properly and the manual and downshift linkage is adjusted properly, all the transmission shifts (automatic and kickdown) should occur within the road speed limits listed in the Technical Service Bulletin—Special Specifications Issue.

If the shifts do not occur within limits, or the transmission slips during shift point, use the following procedure to determine whether the engine, transmission, linkage, vacuum diaphragm unit or valve body is causing the condition.

1. Attach a tachometer to the engine and a vacuum gauge, Rotunda Number 059-00008, or equivalent to the transmission vacuum line at the manifold vacuum port (Fig. 5).
2. Attach a pressure gauge to the control pressure outlet at the transmission (Fig. 6).

**CAUTION:** Pressure gauges affect the shift quality of the transmission. Care should be taken NOT to accelerate or decelerate rapidly. Possible transmission failure could result.

3. Firmly apply the parking brake and start the engine.
4. Adjust the engine idle speed to the specified rpm, using the carburetor idle adjustment screw. If the

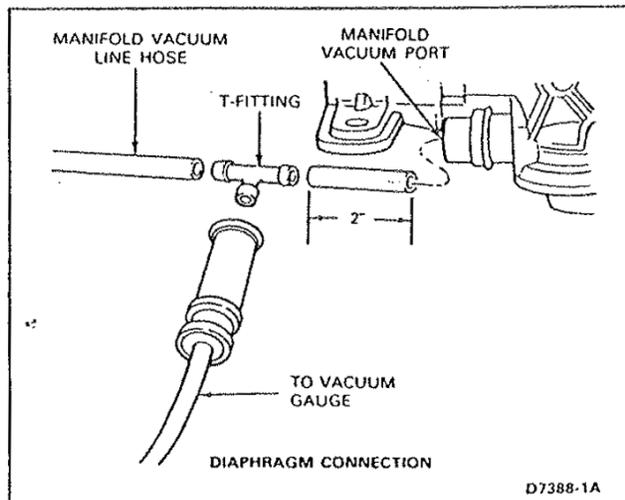


FIG. 5 Typical Vacuum Test Line Connections

\*May be purchased as a separate item.

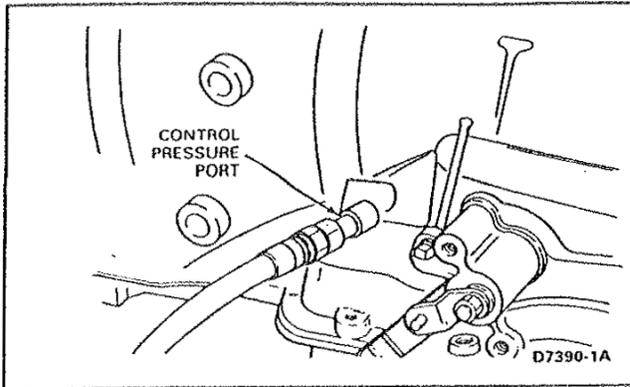


FIG. 6 Control Pressure Connecting Point—C6 Transmissions

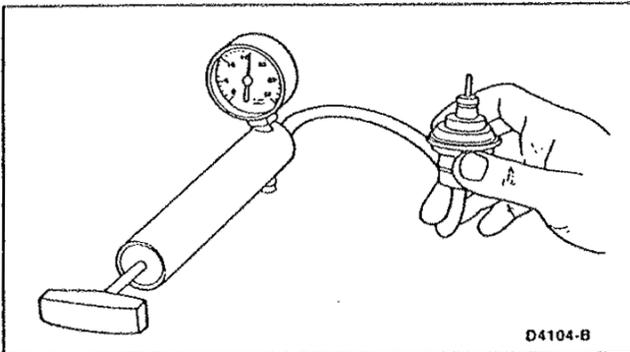


FIG. 7 Testing Transmission Vacuum Unit for Leakage

engine idle speed cannot be brought within limits, check the throttle linkage for a binding condition. If linkage is satisfactory, check for vacuum leaks in the transmission diaphragm unit (Fig. 7) and its connecting tubes and hoses. Check all other vacuum operated units (such as the power brake) for vacuum leaks. Refer to the appropriate brake Section in Group 12.

Refer to the two control pressure diagnostic guides in Fig. 8 to show what components are inoperative when the control pressure test is not within specifications. Do not proceed with the main diagnosis guide until you have made any repairs, as required, and the control pressure is within specifications as listed in the Technical Service Bulletin—Special Specifications Issue.

### Vacuum Pump Method

#### C6

Disconnect and temporarily plug the vacuum line at the vacuum diaphragm unit. Attach a vacuum pump to the vacuum diaphragm. Apply both the parking and service brakes. Start the engine and vacuum pump. Set the vacuum at 15 inches, read and record the control pressure in all selector positions. Run the engine up to 1000 rpm, and reduce the vacuum to 10 inches. Read and record the control pressure in D, 2 and 1. Keep the engine rpm at 1000 and reduce the vacuum to 1 inch. Read and record the control pressure in D, 1, 2 and R.

Refer to the two control pressure diagnostic guides in Fig. 8 to show what components are inoperative when the control pressure test is not within specifications. Do not proceed with the main diagnosis guide until you

have made any repairs, as required, and the control pressure is within specifications as listed in the Technical Service Bulletin—Special Specifications Issue.

### Vacuum Diaphragm Test—On Vehicle

#### C6

To check the vacuum diaphragm unit, start the vacuum pump and set the regulator knob so that the vacuum gauge reads 18 inches with the end of the vacuum hose blocked off. Then connect the vacuum hose to the diaphragm unit. If the gauge still reads 18 inches, the vacuum diaphragm unit is not leaking. If the reading does not remain at 18 inches, but drops, the vacuum diaphragm unit is leaking. Replace the vacuum diaphragm unit. Also, if automatic transmission fluid is present in the vacuum side of the diaphragm or in the vacuum hose, the diaphragm is leaking and must be replaced.

### Vacuum Diaphragm Test—Off Vehicle

#### C6

To check the vacuum unit for diaphragm leakage, remove the unit from the transmission. Use a distributor tester equipped with a vacuum pump or Rotund Vacuum Tester 021-00014 or equivalent (Fig. 7). Set the regulator knob until the vacuum gauge reads 18 inches with the end of the vacuum hose blocked off.

Connect the vacuum hose to the manifold vacuum port as shown in Fig. 7. If the gauge still reads 18 inches, the vacuum unit diaphragm is not leaking. A second leakage check can be made as the hose is removed from the transmission vacuum unit. Hold your finger over the end of the control rod. When the hose is removed, the internal spring of the vacuum unit should push the control rod outward. If the vacuum diaphragm needs replacing, install a new unit that has been released for service. Vacuum diaphragm assembly identification is given at end of this Section.

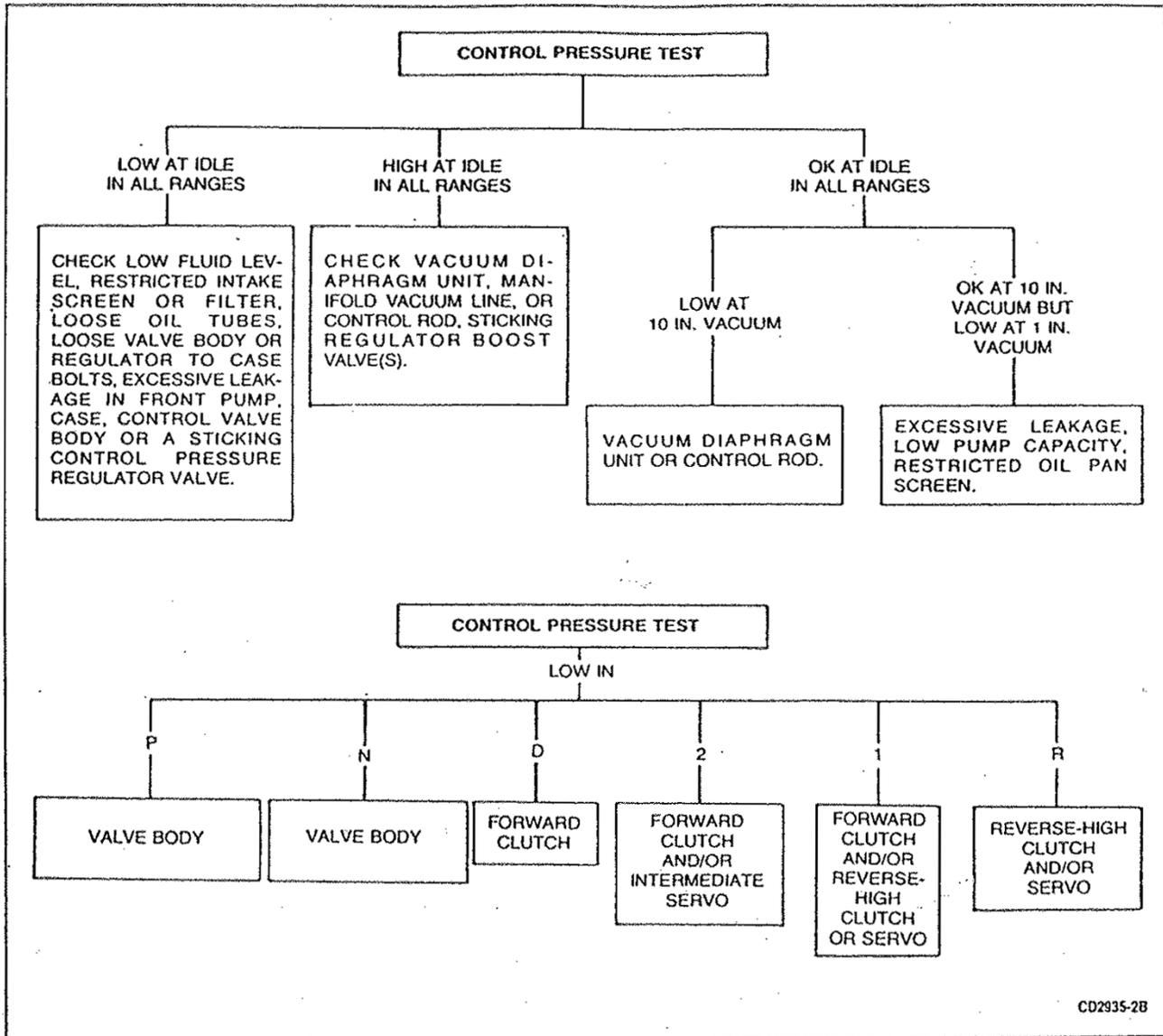


FIG. 8 Control Pressure Test Charts—C6

2. Connect a 300 psi gauge to the line pressure port on the case left side just above the control lever (Fig. 9). Have sufficient flexible hose to make the gauge accessible while operating the engine.
3. Connect a 0-100 psi pressure gauge to the TV port on the right side of the case (see Fig. 9). Have sufficient flexible Hose to make the gauge accessible while operating the engine.

**CAUTION:** Pressure gauges affect the shift quality of the transmission. Care should be taken NOT to accelerate or decelerate rapidly. Possible transmission failure could result.

NOTE: W.O.T. readings are to be made at full stall. However, be sure to run the engine at fast idle in neutral for cooling between test.

4. Run the engine until it is hot.

**CAUTION:** Idle pressure must be read with the throttle off the fast idle cam.

5. Apply the service and parking brakes firmly and shift through all the ranges. Record the line pressure and the throttle pressure and compare it with specifications.

After making the control pressure tests, analyze the results to relate to the conditions in Figs. 10, 11 and 12.

Keep in mind that clutch and servo leakage may or may not show up on the control pressure test. This is because (1) the pump has a high output volume and the leak may not be severe enough to cause a pressure drop; and (2) orifices between the pump and pressure chamber may maintain pressure at the source, even with a leak downstream. Pressure loss caused by a less-than-major leak is more likely to show up at idle than at W.O.T. where the pump is delivering full volume.

Conversely, if you are manipulating the T.V. linkage to simulate W.O.T., but actually testing at idle, the leak is more likely to cause a pressure loss in the W.O.T. position.

To further isolate leakage in a clutch or servo circuit, it is necessary to remove the oil pan and valve body, and to perform case air pressure tests.

## Governor Check

### C6

The governor can be checked at the same time as the Control Pressure Test is performed and in the same manner.

Raise the vehicle with an axle or frame hoist so that the rear wheels are clear of the floor. Disconnect and plug the vacuum line to the vacuum diaphragm unit. Connect the line from the distributor tester if available to the vacuum diaphragm unit. Vacuum pump can be used with an extended vacuum hose to operate from within the vehicle.

**CAUTION: Never exceed 96 km (60 mph) speedometer speed.**

Place the transmission in D (DRIVE), no load on the engine and apply 10 inches of vacuum to the vacuum diaphragm unit. Increase the speed slowly and watch the speedometer. Check the mph at which the control pressure cutback occurs. It should occur between 16-32 km (10-20 mph).

NOTE: After each test, move the selector to N (neutral) and run the engine at 1000 RPM to cool the transmission.

The governor is good if the cutback occurs within these specifications. If the cutback does not occur within specifications, check shift speeds to verify that it is the governor and not a stuck cutback valve, then repair or replace the governor.

## Shift Point Checks

### Road Test

#### C6

**This check will determine if the governor pressure and shift control valves are functioning properly.**

Check the minimum throttle upshifts in D (DRIVE). The transmission should start in first gear, shift to second, and then shift to third, within the shift points listed in Technical Service Bulletin—Special Specifications Issue.

With the transmission in third gear, depress the accelerator pedal through the detent (to the floor). The

transmission should shift from third to second or third to first, depending on the vehicle speed.

Check the closed throttle downshift from third to first by coasting down from about 48 km (30 mph) in third gear. The shift should occur within the limits listed in the Specifications.

When the selector lever is at 2 (SECOND), the transmission can operate only in second gear.

With the transmission in third gear and road speed over 80 km (50 mph) the transmission should shift to second gear when the selector lever is moved from 1 (DRIVE) to 2 (SECOND) or 1 (FIRST).

The transmission will downshift from second or third to first gear when this same manual shift is made below approximately 48 km (30 mph) with a C6 transmission.

Refer to the band application chart in Fig. 14 to aid in diagnosis of transmission conditions.

### In Shop

A shift test can be performed in the shop to check shift valve operation, governor circuits, shift delay pressures, throttle boost and downshift valve action.

Raise the vehicle with an axle or frame hoist so that the rear wheels are clear of the floor. Disconnect and plug the vacuum line to the vacuum diaphragm unit.

(C6). Connect the line from the distributor tester vacuum pump to the vacuum diaphragm unit.

**CAUTION: Never exceed 96 km (60 mph) speedometer speed.**

1. To check the shift valves and governor circuit, apply 18 inches of vacuum to the transmission vacuum diaphragm unit. Place the transmission in Drive and make a minimum throttle 1-2 and 2-3 shift. At the shift points you will see the speedometer needle make a momentary surge and feel the driveline bump. If the shift points are within specification, the 1-2 and 2-3 shift valves and governor are OK.

If the shift points are not within specifications, perform a Governor Check to isolate the problem.

NOTE: After each test, move the selector lever to Neutral, run the engine at 1000 rpm to cool the transmission.

2. To check the shift delay pressures and throttle boost, decrease the vacuum at the vacuum diaphragm to 0-2 inches. Make a 1-2 shift test. If the shift point raises to specification, the throttle boost and shift delay systems are functioning.
3. To check downshift valve action. Leave the vacuum to the vacuum diaphragm at 0-2 inches. Position the downshift linkage in the wide open throttle position (through the detent) and repeat the 1-2 shift test. The speed at the shift point should be higher.

Shift speed specifications can be found in the Technical Service Bulletin—Special Specifications Issue.

## Air Pressure Checks

### C6

A NO DRIVE condition can exist, even with correct transmission fluid pressure, because of inoperative clutches or bands. On automatic transmissions, an erratic shift can be caused by a stuck governor valve. The inoperative units can be located through a series of checks by substituting air pressure for fluid pressure to determine the location of the malfunction.

When the selector lever is at 2 (second) a NO DRIVE condition may be caused by an inoperative forward clutch. A NO DRIVE condition at D (drive) may be caused by an inoperative forward clutch or one-way clutch. When there is no drive in 1 (low) the difficulty could be caused by improper functioning of the forward clutch or simultaneous malfunction of the low-reverse band and the one-way clutch. Failure to drive in R (Reverse) could be caused by a malfunction of the reverse-high clutch or low-reverse band or clutch.

When you have a slip problem but don't know whether it is in the valve body or in the hydraulic system beyond the valve body, the air pressure tests can be very valuable.

To make the air pressure checks, loosen the oil pan bolts and lower one edge to drain the transmission fluid. Remove the oil pan and the control valve body assembly. The inoperative clutches or bands can be located by introducing air pressure into the various transmission case passages (Figs. 15 and 16).

#### Forward Clutch

Apply air pressure to the transmission case forward clutch passages (Figs. 15 and 16). A dull thud can be heard when the clutch piston is applied. If no noise is heard, place the finger tips on the input shell and again apply air pressure to the forward or front clutch passage. Movement of the piston can be felt as the clutch is applied.

#### Governor

Apply air pressure to the control pressure to governor passage (Figs. 15 and 16) and listen for a sharp clicking or whistling noise. The noise indicates governor valve movement.

#### Reverse-High Clutch

Apply air pressure to the reverse-high clutch (Figs. 15 and 16). A dull thud indicates that the reverse-high or rear clutch piston has moved to the applied position. If no noise is heard, place the finger tips on the clutch drum and again apply air pressure to detect movement of the piston.

#### Intermediate Servo

Hold the air nozzle in the front servo apply tube or the intermediate servo apply passages (Figs. 15 and 16).

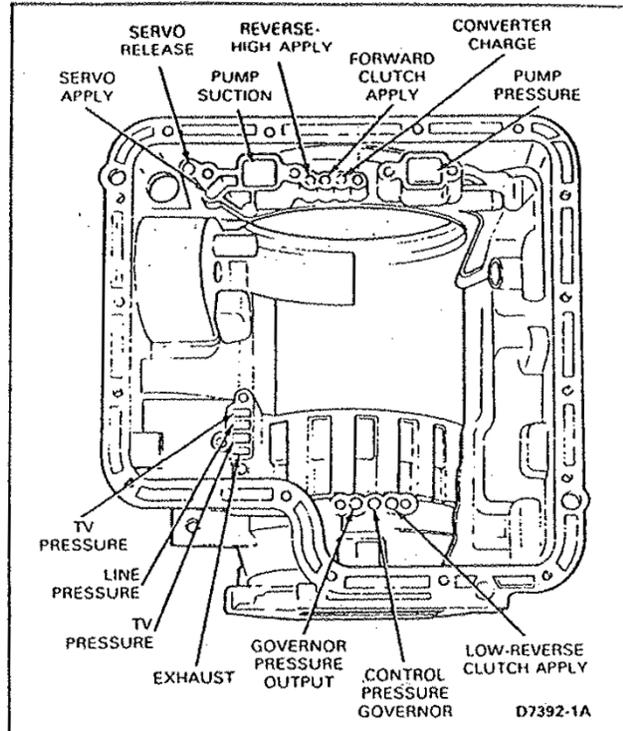


FIG. 15 Case Fluid Passage Hole Identification—C6 Automatic

Operation of the servo is indicated by a tightening of the front or intermediate band around the drum on C6 transmissions. Continue to apply air pressure to the servo apply tube or passage, and introduce air pressure into the front release tube or the intermediate servo release passage. The front or intermediate servo should release the band against the apply pressure.

#### Low-Reverse Clutch C6 Only

Apply air pressure to the low-reverse clutch apply passage (Fig. 15). A dull thud should be heard if the clutch is operating properly. If the passages are clear, remove the clutch assemblies, and clean and inspect the malfunctioning clutch to locate the trouble.



**Diagnosis Guides**

The diagnosis guides in this Section can be used as an aid when diagnosing automatic transmissions.

**DIAGNOSIS — AUTOMATIC TRANSMISSION**

CONDITION	POSSIBLE CAUSE	RESOLUTION
Slow initial engagement.	<ol style="list-style-type: none"> <li>1. Improper fluid level.</li> <li>2. Damaged or improperly adjusted linkage.</li> <li>3. Contaminated fluid.</li> <li>4. Improper clutch and band application, or low main control pressure.</li> </ol>	<ol style="list-style-type: none"> <li>1. Perform fluid level check.</li> <li>2. Service or adjust linkage.</li> <li>3. Perform fluid condition check.</li> <li>4. Perform control pressure test.</li> </ol>
Rough initial engagement in either forward or reverse. Rough initial engagement — AOD.	<ol style="list-style-type: none"> <li>1. Improper fluid level.</li> <li>2. High engine idle.</li> <li>3. Automatic choke on (warm temp.).</li> <li>4. Looseness in the driveshaft, U-joints or engine mounts.</li> <li>5. Improper clutch or band application, or oil control pressure.</li> <li>6. Sticking or dirty valve body.</li> </ol>	<ol style="list-style-type: none"> <li>1. Perform fluid level check.</li> <li>2. Adjust idle to specifications.</li> <li>3. Disengage choke.</li> <li>4. Service as required.</li> <li>5. Perform control pressure test.</li> <li>6. Clean, service or replace valve body.</li> </ol>
Harsh engagements — (warm engine).	<ol style="list-style-type: none"> <li>1. Improper fluid level.</li> <li>3. Engine curb idle too high.</li> <li>4. Valve body bolts — loose/too tight.</li> <li>5. Valve body dirty/sticking valves.</li> </ol>	<ol style="list-style-type: none"> <li>1. Perform fluid level check.</li> <li>3. Check engine curb idle.</li> <li>4. Tighten to specification.</li> <li>5. Determine source of contamination. Service as required.</li> </ol>
No/delayed forward engagement (reverse OK).	<ol style="list-style-type: none"> <li>1. improper fluid level.</li> <li>2. Manual linkage — misadjusted/damaged.</li> <li>3. Low main control pressure. (Leakage.) Forward clutch stator support seal rings leaking (#3, #4).</li> <li>4. Forward clutch assembly burnt/damaged/leaking check ball in cylinder/leaking piston seal rings.</li> <li>5. Valve body bolts — loose/too tight.</li> <li>6. Valve body dirty/sticking valves.</li> <li>7. Transmission filter plugged.</li> <li>8. Pump damaged/leaking.</li> </ol>	<ol style="list-style-type: none"> <li>1. Perform fluid level check.</li> <li>2. Check and adjust or service as required.</li> <li>3. Control pressure test, note results.</li> <li>4. Perform air pressure test.</li> <li>5. Tighten to specification.</li> <li>6. Determine source of contamination. Service as required.</li> <li>7. Replace filter.</li> <li>8. Visually inspect pump gears. Replace pump if necessary.</li> </ol>
No/delayed reverse engagement (forward OK).	<ol style="list-style-type: none"> <li>1. Improper fluid level.</li> <li>2. Manual linkage misadjusted/damaged.</li> <li>3. Low main control pressure in reverse. Reverse clutch stator support seal rings leaking (#1, #2), High reverse clutch OK.</li> </ol>	<ol style="list-style-type: none"> <li>1. Perform fluid level check.</li> <li>2. Check and adjust or service as required.</li> <li>3. Control pressure test.</li> </ol>



DIAGNOSIS — AUTOMATIC TRANSMISSION (Continued)

CONDITION	POSSIBLE CAUSE	RESOLUTION
No/delayed reverse engagement (forward OK) (continued).	<ol style="list-style-type: none"> <li>4. Reverse clutch assembly burnt/worn/leaking check ball in piston/leaking piston seal rings.</li> <li>5. Valve body bolts loose/too tight.</li> <li>6. Valve body dirty/sticking valves.</li> <li>7. Transmission filter plugged.</li> <li>8. Pump damaged.</li> </ol>	<ol style="list-style-type: none"> <li>4. Perform air pressure test.</li> <li>5. Tighten to specification.</li> <li>6. Determine source of contamination. Service as required.</li> <li>7. Replace filter.</li> <li>8. Visually inspect pump gears. Replace if necessary.</li> </ol>
No/delayed reverse engagement and/or no engine braking in manual low ①.	<ol style="list-style-type: none"> <li>1. Improper fluid level.</li> <li>3. Low reverse servo piston seal leaking.</li> <li>5. Planetary low one way clutch damaged.</li> </ol>	<ol style="list-style-type: none"> <li>1. Perform fluid level check.</li> <li>3. Check and replace piston seal.</li> <li>4. Perform air pressure test.</li> <li>5. Determine cause of condition. Service as required.</li> </ol>
No engine braking in manual second gear.	<ol style="list-style-type: none"> <li>1. Intermediate band out of adjustment.</li> <li>2. Improper band or clutch application, or oil pressure control system.</li> <li>3. Intermediate servo leaking.</li> <li>4. Intermediate one way clutch damaged.</li> <li>5. Polished or glazed band or drum.</li> </ol>	<ol style="list-style-type: none"> <li>1. Adjust intermediate band.</li> <li>2. Perform control pressure test.</li> <li>3. Perform air pressure test of intermediate servo for leakage. Service as required.</li> <li>4. Replace.</li> <li>5. Service or replace as required.</li> </ol>
Forward engagement slips/shutters/chatters.	<ol style="list-style-type: none"> <li>1. Improper fluid level.</li> <li>3. Manual linkage misadjusted/damaged.</li> <li>4. Low main control pressure.</li> <li>5. Valve body bolts — loose/too tight.</li> <li>6. Valve body dirty/sticking valves.</li> <li>7. Forward clutch piston ball check not seating/leaking.</li> <li>8. Forward clutch piston seals cut/worn.</li> <li>10. Low one way clutch (planetary) damaged.</li> </ol>	<ol style="list-style-type: none"> <li>1. Perform fluid level check.</li> <li>3. Check and adjust or service as required.</li> <li>4. Control pressure test.</li> <li>5. Tighten to specification.</li> <li>6. Determine source of contamination. Service as required.</li> <li>7. Replace forward clutch cylinder. Service transmission as required.</li> <li>8. Replace seals and service clutch as required.</li> <li>10. Determine cause of condition. Service as required.</li> </ol>
Reverse shudder/chatters/slips.	<ol style="list-style-type: none"> <li>1. Improper fluid level.</li> <li>2. Low main control pressure in reverse.</li> <li>3. Low — reverse servo/ leaking.</li> <li>4. Low (planetary) one-way clutch damaged.</li> <li>5. Reverse clutch drum bushing damaged.</li> <li>6. Reverse clutch stator support seal ring/ring grooves worn/damaged.</li> <li>7. Reverse clutch piston seals cut/worn.</li> <li>8. Reverse band out of adjustment or damaged.</li> <li>9. Looseness in the driveshaft, U-joints or engine mounts.</li> </ol>	<ol style="list-style-type: none"> <li>1. Perform fluid level check.</li> <li>2. Control pressure test.</li> <li>3. Air pressure test; visually inspect seal rings and piston bore.</li> <li>4. Determine cause of condition. Service as required.</li> <li>5. Determine cause of condition. Service as required.</li> <li>6. Determine cause of condition. Service as required.</li> <li>7. Determine cause of condition. Service as required.</li> <li>9. Service as required.</li> </ol>



DIAGNOSIS — AUTOMATIC TRANSMISSION

CONDITION	POSSIBLE CAUSE	RESOLUTION
No drive, slips or chatters in first gear in D. All other gears normal.	1. Damaged or worn planetary one-way clutch.	1. Service or replace one-way clutch.
No drive, slips or chatters in second gear.	1. Intermediate band out of adjustment (C6).  4. Improper band or clutch application, or control pressure. 5. Damaged or worn intermediate servo piston seals and/or internal leaks. 6. Dirty or sticking valve body. 7. Polished, glazed intermediate band or drum (C6).	1. Adjust intermediate band.  4. Perform control pressure test. 5. Perform air pressure test. 6. Clean, service or replace valve body. 7. Replace or service as required.
Starts up in 2nd or 3rd.	1. Improper band and/or clutch application, or oil pressure control system.  3. Damaged or worn governor. Sticking governor. 4. Valve body loose. 5. Dirty or sticking valve body. 6. Cross leaks between valve body and case mating surface.	1. Perform control pressure test.  3. Perform governor check. Replace or service governor, clean screen. 4. Tighten to specification. 5. Clean, service or replace valve body. 6. Service or replace valve body and/or case as required.
Shift points incorrect.	1. Improper fluid level. 2. Vacuum line damaged, clogged or leaks (C6).  6. Improper clutch or band application, or oil pressure control system. 7. Damaged or worn governor. 8. Vacuum diaphragm bent sticking or leaks, (C6). 9. Dirty or sticking valve body.	1. Perform fluid level check. 2. Perform vacuum supply test.  6. Perform shift test and control pressure test. 7. Service or replace governor — clean screen. 8. Replace. 9. Clean, service or replace valve body.
All upshifts harsh/delayed or no upshifts.	1. Improper fluid level.  3. Manual linkage — misadjusted/damaged. 4. Governor sticking. 5. Main control pressure too high. 6. Valve body bolts — loose/too tight. 7. Valve body dirty/sticking valves.	1. Perform fluid level check.  3. Check and adjust or service as required. 4. Perform governor test. Service as required. 5. Control pressure test. Service as required. 6. Tighten to specification. 7. Determine source of contamination. Service as required.
All upshifts harsh/delayed or no upshifts (continued).	8. Vacuum leak to diaphragm unit (C6).	8. Check vacuum lines to diaphragm unit. Service as necessary. Perform vacuum supply and diaphragm tests.



## REMOVAL AND INSTALLATION

### Vacuum Diaphragm C6

#### Removal and Installation

1. Disconnect the hose from the vacuum unit.
2. Remove the vacuum unit retaining bracket bolt and bracket (Fig. 28). **Do not pry or bend the bracket.** Pull the vacuum unit from the transmission case.
3. Remove the vacuum unit control rod from transmission case.
4. Install the vacuum unit control rod in transmission case.
5. Push the vacuum unit into the case and secure with the retaining bracket and bolt. Tighten the bolt to 17-21 N·m (12-16 ft-lbs) on C6 transmissions.
6. Install the vacuum unit hose to the diaphragm connector.

#### Transmission Fluid Drain and Refill

Normal maintenance and lubrication requirements do not necessitate periodic automatic transmission fluid changes.

If a major repair, such as a clutch band, bearing, etc., is required in the transmission, it will have to be removed for service. At this time the converter, transmission cooler and cooler lines must be thoroughly flushed to remove any dirt.

When used under continuous or severe conditions, the transmission and the torque converter should be drained and refilled with the specified fluid at intervals directed in the maintenance or owners manual.

Refer to the Truck Performance Specifications Book or the end of this Section for fluid requirements.

NOTE: Fluid level indicator should be used to determine actual fluid requirements. Check fluid level when the transmission is at normal operating temperature. Do not overfill.

Procedures for partial drain and refill, due to in-vehicle repair operation, are as follows:

### C6 Transmissions

1. Raise the vehicle on a hoist or jack stands.
2. Place a drain pan under the transmission.
3. Loosen the pan attaching bolts and drain the fluid from the transmission.
4. When fluid has drained to the level of the pan flange, remove the rest of the pan bolts working from the rear and both sides of the pan to allow it to drop and drain slowly.
5. When all fluid has drained from the transmission, remove and thoroughly clean the pan and the screen. Discard the pan gasket.
6. Place a new gasket on the pan, and install the pan on the transmission. Tighten the bolts to specifications.
7. Add 4.7 liters (5 quarts) shallow pan, or 5.6 liters (6 quarts) deep pan of fluid to the transmission through the filler tube.
8. Check the fluid level.

### Fluid Cooler Lines

When fluid leakage is found from the fluid cooler, a cooler must be replaced. Cooler replacement described in the Cooling System Section of Group 27.

When one or more of the fluid cooler steel tubes must be replaced, each replacement tube must be fabricated from the same size steel tubing as the original line.

Using the old tube as a guide, bend the new tube as required. Add the necessary fittings, and install the tube.

After the fittings have been tightened, add fluid as needed, and check for fluid leaks.

## CLEANING AND INSPECTION

### Transmission

It is important to completely clean all transmission components, including converter, cooler, cooler lines, main control valve body, governor, all clutches, and all check balls after any transmission servicing that generates contamination. These contaminants are a major cause for recurring transmission troubles and must be removed from the system before the transmission is put back into service. The cleaning of debris from the direct clutch piston, the forward clutch cylinder, and reverse clutch piston check balls are often omitted. This omission can lead to a repeat servicing of the transmission.

During overhaul inspect all hardware for evidence of overheating. Any overheating will be indicated by heat stained blue surfaces.

Clean the parts with suitable solvent and use moisture-free air to dry off all the parts and clean out oil passages.

The composition clutch plates, bands and synthetic seals should not be cleaned in a vapor degreaser or with any type of detergent solution. To clean these parts, wipe them off with a lint-free cloth. New clutch plates or bands should be soaked in transmission fluid specified for that transmission type for fifteen minutes before being assembled.

### Control Valve Body

1. Clean all parts thoroughly in clean solvent, and blow dry with moisture-free compressed air. **If the valve body-to-screen gasket is removed on a C6 Transmission, the gasket should not be cleaned in a degreaser, solvent or any type of detergent solution. To clean the gasket, wipe it off with a lint-free cloth.**
2. Inspect all valve and plug bores for scores. Check all fluid passages for obstructions. Inspect the check valve for free movement. Inspect all mating surfaces for burrs or distortion. Inspect all plugs and valves for burrs or scores. Use crocus cloth to polish valves and plugs. Avoid rounding the sharp edges of the valves and plugs with the cloth.
3. Inspect all springs for distortion. Check all valves and plugs for free movement in their respective bores. Valves and plugs, when dry, must fall from their own weight in their respective bores.
4. On a C6 transmission, inspect the separator plate screen for obstructions. The screen must be clean and free of foreign material. If contaminated, remove it from separator plate, clean in a suitable solvent, and thoroughly blow clean with compressed air.
5. Roll the manual valve on a flat surface to check for bent condition.

### Intermediate Servo

#### C6

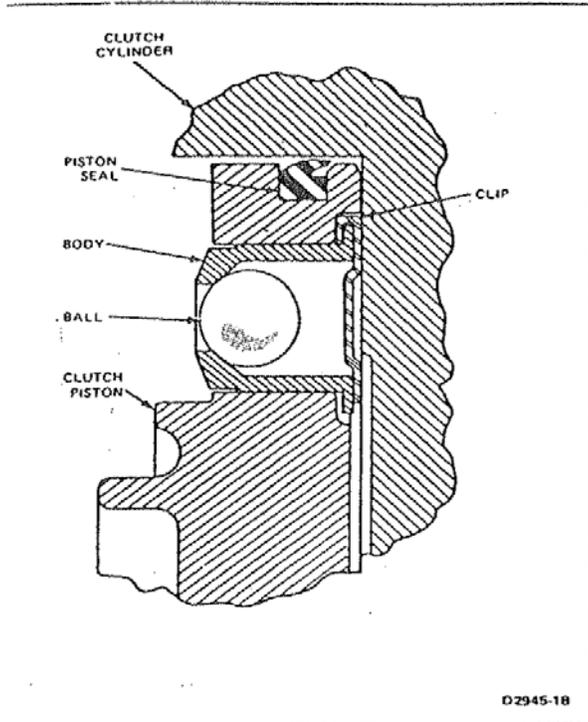
1. Inspect the servo bore for cracks and the servo piston for damage, and the piston bore and the servo piston stem for scores. Check fluid passages for obstructions. Replace damaged seals.
2. Check the servo spring and servo band strut(s) for distortion.
3. Inspect the cover seal and gasket cover sealing surface for damage.

### Governor

1. Inspect the governor valves and bores for scores. Minor scores may be removed from the valves with crocus cloth. Replace the governor if the valves or body is deeply scored.
3. Check for free movement of the valves in the bores. The valves should slide freely of their own weight in the bores when dry. Inspect fluid passages in the valve body and counterweight for obstructions. **All fluid passages must be clean.**
4. Inspect the mating surfaces of the governor body and governor distributor (C6) for burrs and distortion. Mating surfaces must be smooth and flat.
5. Check the mating surface of the governor valve and the counterweight on Automatic Overdrive transmission for burrs or scratches.

### Front Pump

1. Inspect the mating surfaces of the pump body and case for burrs.
2. Inspect the drive and driven gear bearing surface for scores and check gear teeth for burrs.
3. Inspect the front pump seal for cuts or nicks, and the pump bushing for scoring.
4. Check the fluid passages for obstructions.
5. If any parts are found damaged or worn, replace the pump as a unit. Minor burrs and scores may be removed with crocus cloth.
6. On a C6 and AOD transmission, check the large seal ring groove of the pump body for damage. Check the gasket mating surface of the pump body for damage.



3. 29 Clutch Piston Check Ball

2. Check the fluid passage in the clutch cylinder for obstructions. Clean out all fluid passages. Inspect the clutch piston for scores and replace if necessary. Inspect the piston check ball for freedom of movement and proper seating (Fig. 29).
3. Check the clutch release spring (C6 only) for distortion and cracks. Replace the spring if distorted or cracked.
4. Inspect the composition clutch plates, steel clutch plates, and clutch pressure plate for worn or scored bearing surfaces. Replace all parts that are deeply scored.
5. Check the clutch hub thrust surfaces for scores and the clutch hub splines for wear.
6. Check the splines on the stator support for wear. Inspect the bushing in the stator support for scores. Check the input shaft (C6) for damaged or worn splines. Replace shaft if the splines are excessively worn.

### Direct Clutch Piston Check Ball Leakage Procedure

Direct clutch piston check ball—Inspect the piston check ball for freedom of movement. Improper seating of check ball will cause leakage. Leakage can be detected by turning the piston upside down (flat side of piston facing you) allowing the check ball to seat in the piston. Pour a small quantity of solvent over the check ball. If solvent drips past the check ball, replace the piston.

### Low—Reverse Clutch—C6

1. Inspect the clutch cylinder piston bore and clutch plate serrations for scores or burrs. Minor scores or burrs may be removed with crocus cloth. Replace the case if it is badly scored or damaged.
2. Check the fluid passage in the case for obstructions (Fig. 16). Clean out all fluid passages. Inspect the clutch piston for scores and replace if necessary.
3. Check the piston return springs for distortion. Check the piston return spring retainer for flatness.
4. Inspect the composition clutch plates, steel clutch plates and clutch pressure plate for worn or scored bearing surfaces. Replace all parts that are deeply scored.
5. Check the clutch hub splines.

### Planetary One-Way Clutch

1. Inspect the intermediate outer and inner races for scores or damaged surface areas where rollers contact the races.

### Reverse-High Clutch—C6—Reverse Clutch—

- Inspect the drum band surface, the bushing, and thrust surfaces for scores. Minor scores may be removed with crocus cloth. **Badly scored parts must be replaced.**
- Inspect the clutch piston bore and the piston inner and outer bearing surfaces for scores. Check the air bleed ball valve in the clutch piston for free movement. Check the orifice to make sure it is not plugged.
- Check the fluid passages for obstructions. All fluid passages must be clean and free of obstructions.
- Inspect the clutch plates for wear, scoring, and fit on the clutch hub serrations. Replace all plates that are badly scored, worn, or do not fit freely in the hub serrations.
- Inspect the clutch pressure plate for scores on the clutch plate bearing surface. Check the clutch release spring(s) for distortion.
- The clutch piston has a check ball similar to Fig. 29. Inspect the check ball for freedom of movement and proper seating.

### Forward Clutch

- Inspect the clutch cylinder thrust surfaces, piston bore, and clutch plate serrations for scores or burrs. Minor scores or burrs may be removed with crocus cloth. Replace the clutch cylinder if it is badly scored or damaged.

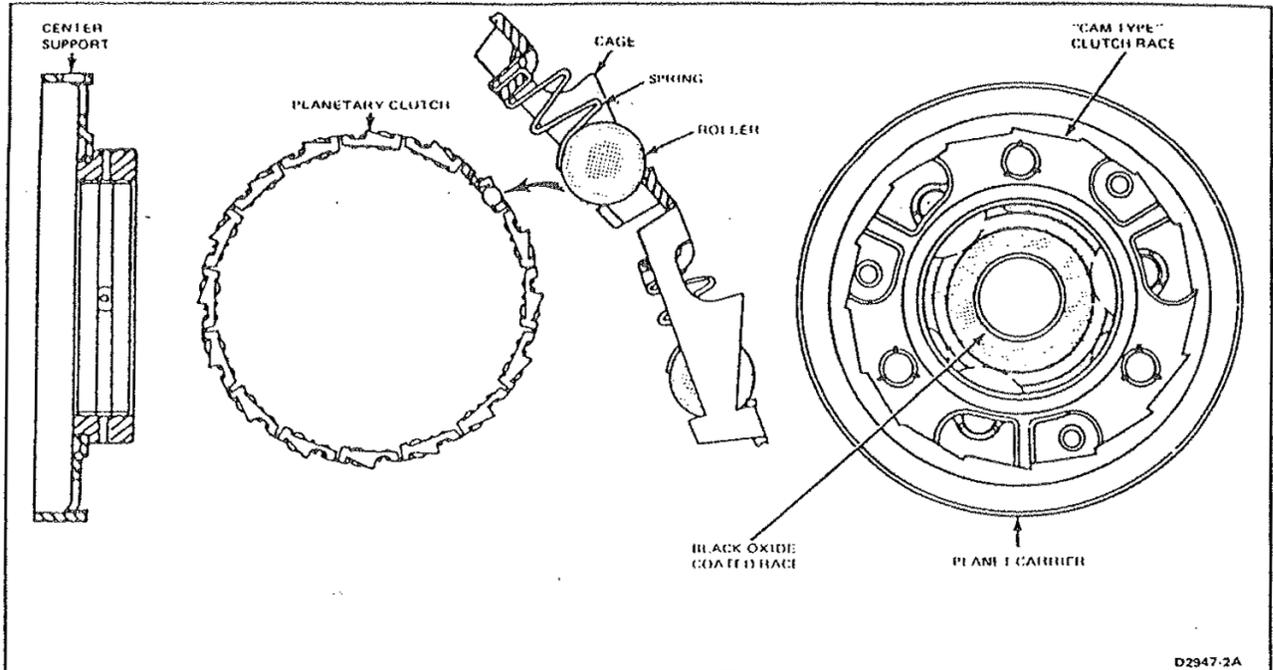


FIG. 30 Roller Type Planetary Clutch, Carrier and Center Support-

### Converter and Fluid Cooler

When internal wear or damage has occurred in the transmission, metal particles, clutch plate material, or band material may have been carried into the converter and oil cooler. These contaminants are a major cause of recurring transmission troubles and **MUST** be removed from the system before the transmission is put back into service.

Whenever a transmission has been disassembled to replace worn or damaged parts or because the valve body sticks from foreign material, the converter and oil cooler **MUST** be cleaned by using the Rotunda torque Converter Cleaner (model 014-00028) or equivalent. Under **NO** circumstances should an attempt be made to clean converters by hand agitation with solvent.

### Converter End Play and One Way Clutch Check

The Tools T76L-7902-C and T77L-7902-R shown in Fig. 31 are used to check the converter one-way clutch.

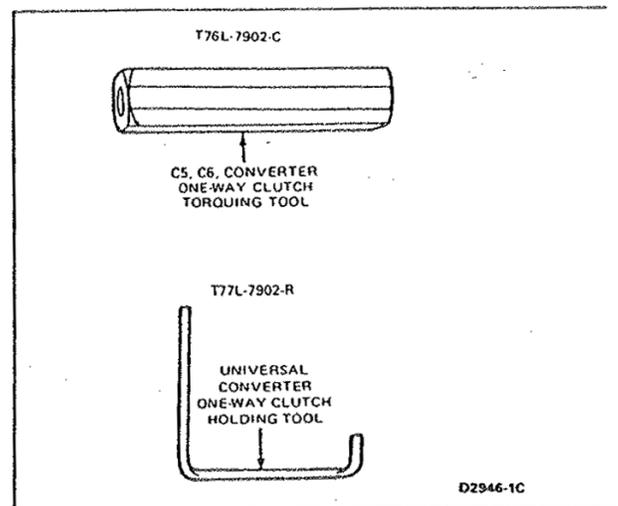


FIG. 31 Converter One Way Clutch Check Tools

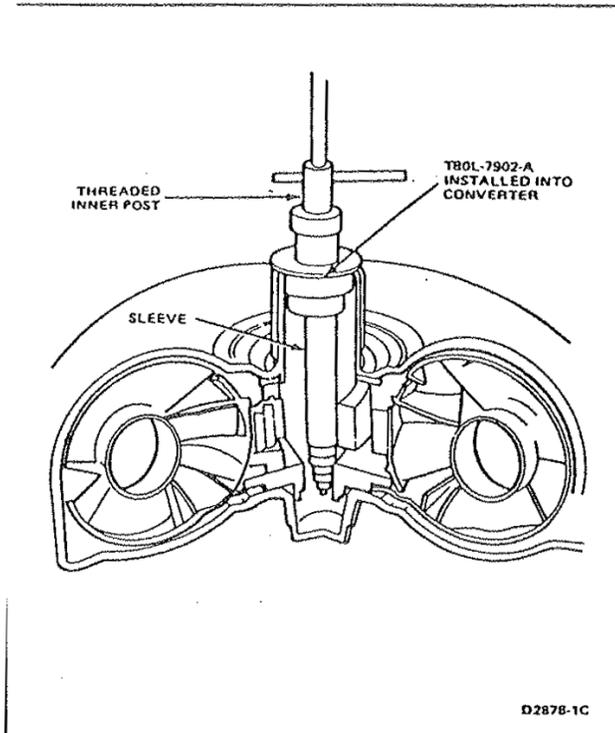


FIG. 32 End Play Checking Tool Installed

### End Play Check

1. Insert Tool T80L-7902-A into the converter pump drive hub until it bottoms (Fig. 32).
2. Expand the sleeve in the turbine spline by tightening the threaded inner post, (Fig. 32), until the tool is securely locked into the spline.
3. Attach a dial indicator (with bracketry) TOOL-4201-C to the tool (Fig. 33). Position the indicator button on the converter pump drive hub, and set the dial face at 0 (zero).
4. Lift the tool upward as far as it will go and note the indicator reading. The indicator reading is the total end play which the turbine and stator share. Replace the converter unit if the total end play exceeds the limits. End play specifications are listed at the end in the specifications section of this Section.
5. Loosen the threaded inner post to free the tool, and then remove the tool from the converter.

### Converter One-Way Clutch Check

1. Insert the one way clutch holding Tool T77L-7902-R (Fig. 34), in one of the grooves in the stator thrust washer.
2. Insert the one way clutch torquing Tool, (T77L-7902-B) in the converter pump drive hub so as to engage the one way clutch inner race, (Fig. 34).

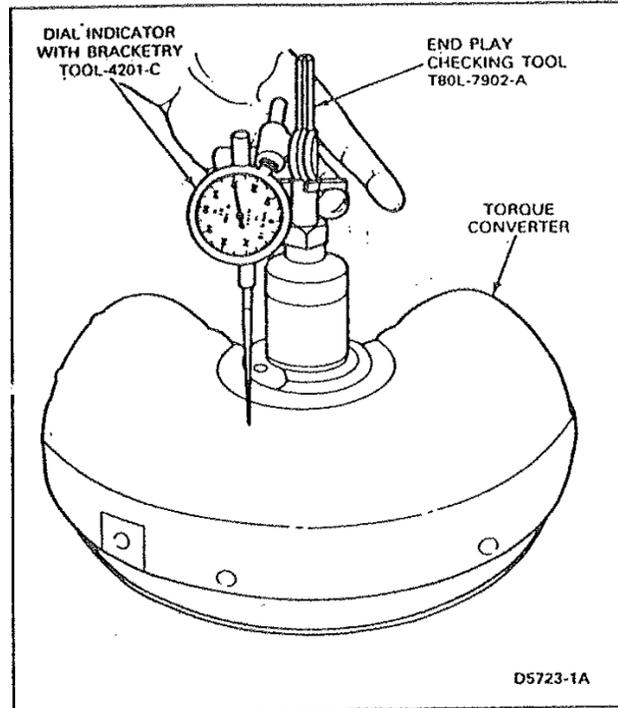


FIG. 33 Checking Stator and Turbine End Play

3. Attach a torque wrench to the one way clutch holding tool held stationary, turn the torque wrench counterclockwise. The converter one way clutch should lockup and hold a 14 N·m (10 ft-lbs) force. The converter one way clutch should rotate freely in a clockwise direction. Try the clutch for lockup and hold in at least five different locations around the converter.
4. If the clutch fails to lock up and hold at 14 N·m (10 ft-lbs) torque, replace the converter unit.

### Stator to Impeller Interference Check

1. Position the front pump assembly on a bench with the spline end of the stator shaft pointing up (Fig. 36).
2. Mount a converter on the pump with the splines on the one-way clutch inner race engaging the mating splines of the stator support. The converter hub will then engage the pump drive gear.
3. Hold the pump stationary and try to rotate the converter counterclockwise. The converter should rotate freely without any signs of interference or scraping within the converter assembly.
4. If there is an indication of scraping, the trailing edges of the stator blades may be interfering with the leading edges of the impeller blades. In such cases, replace the converter.

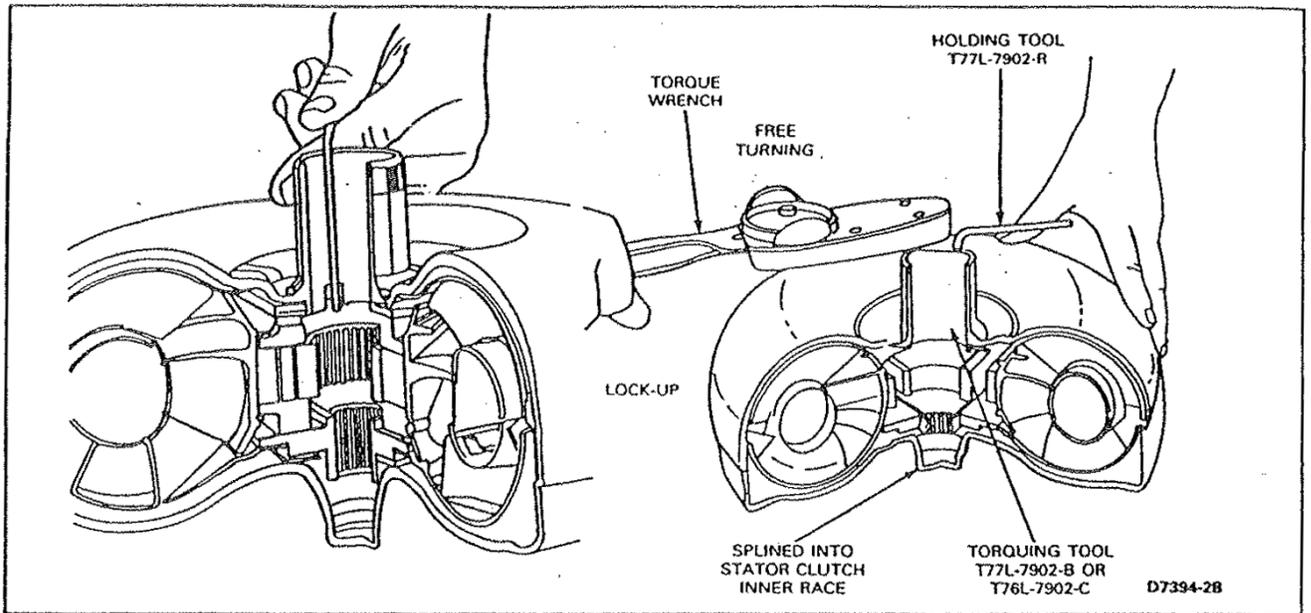


FIG. 34 Checking Converter One-Way Clutch

### Stator to Turbine Interference Check—C6

1. Position the converter on the bench front side down.
2. Install a front pump assembly to engage the mating splines of the stator support and stator, and pump drive gear lugs.
3. Install the input shaft, engaging the splines with the turbine hub (Fig. 37).
4. Hold the pump stationary and attempt to rotate the turbine with the input shaft. The turbine should rotate freely in both directions without any signs of interference or scraping noise.
5. If interference exists, the stator front thrust washer may be worn, allowing the stator to hit the turbine. In such cases, the converter must be replaced.

Check the converter crankshaft pilot for nicks or damaged surfaces that could cause interference when installing the converter into the crankshaft. Check the converter front pump drive hub for nicks or sharp edges that would damage the pump seal

### Pinion Carriers

#### C6

Individual parts of the planet carriers are not serviceable.

1. Check the pins and shafts in the planet assemblies for loose fit and/or complete disengagement. Use a new planet assembly if either condition exists. Before installing a planet assembly, the shaft retaining pins should be checked for adequate staking. If necessary, restake the pins before installation. When restaking, the retaining pins must not be driven into the carrier any further than 1.01mm (0.040 inch) below the surface of the carrier.
2. Inspect the pinion gears for damaged or excessively worn teeth.
3. Check for free rotation of the pinion gears.

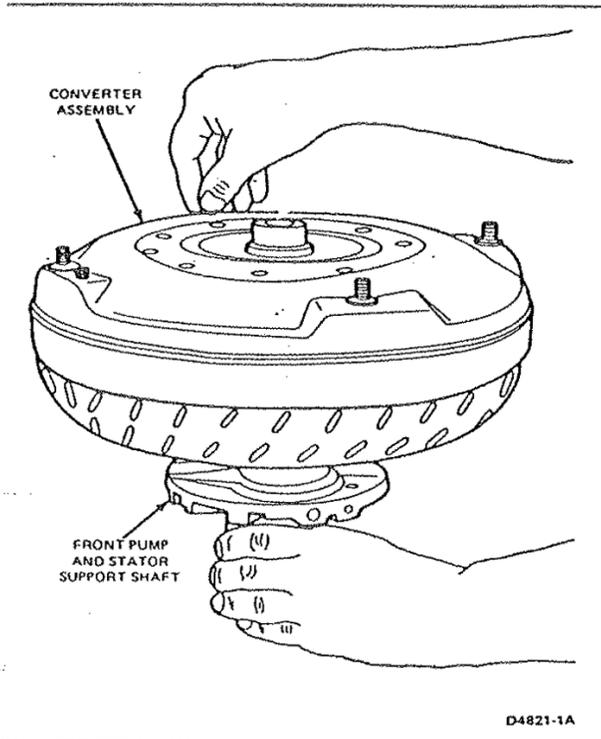


FIG. 36 Stator to Impeller Interference Check

### Stator Support

#### C6.

1. Inspect the stator support splines for burrs and wear.
2. Check the oil ring grooves in the stator support for nicks, burrs or damaged edges.
3. Check the front and rear bushings of the stator support for wear or scoring.

#### Case

Inspect the case for cracks and stripped threads. Inspect the gasket surfaces and mating surfaces for burrs. Check the vent for obstructions, and check all fluid passages for obstructions and leakage (Figs. 15, 16 and 17).

Inspect the case bushing for scores. Check all parking linkage parts for wear or damage.

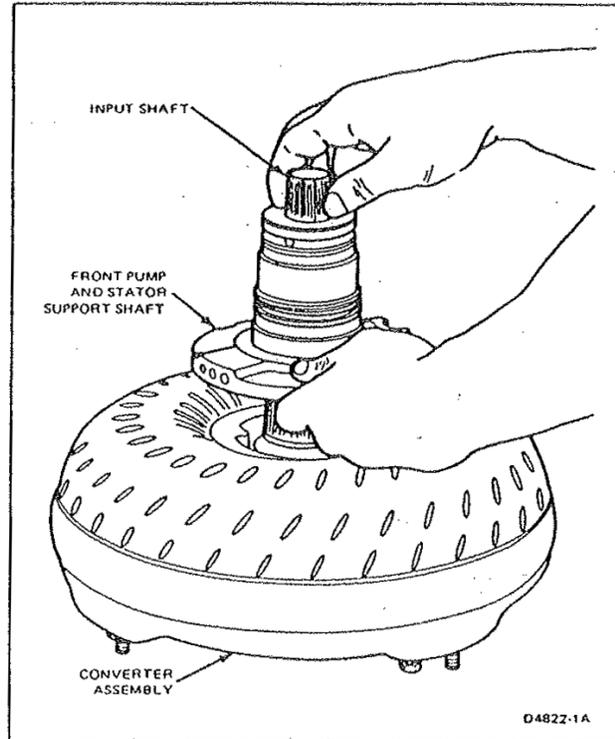


FIG. 37 Stator to Turbine Interference Check—C6

If a transmission case thread is damaged, service kits may be purchased from local jobbers. To repair a damaged thread, the following procedures should be carefully followed.

1. Drill out the damaged threads using the same drill size as the thread outside diameter. For example, use a 5/16 inch drill for a 5/16-18 thread.
2. Select the proper special tap and tap the drilled hole. The tap is marked for the size of the thread being repaired. Thus, the special tap marked 5/16-18 will not cut the same thread as a standard 5/16-18 tap. The tap cuts a thread large enough to accommodate the insert, and after the insert is installed, the original thread size (5/16-18) is restored.
3. Select the proper coil inserting tool. These tools are marked with the thread size being repaired. Place the insert on the tool and adjust the sleeve to the length of the insert being used. Press the insert against the face of the tapped hole. Turn the tool clockwise and wind the insert into the hole until the insert is 1/2 turn below the face.
4. Working through the insert, bend the insert tang straight up and down until it breaks off at the notch.
5. Improperly installed inserts can be removed with the extractor tool. Place the extractor tool in the insert with the blade resting against the top coil 1/4 to 1/2 turn away from the end of the coil. Tap the tool sharply with a hammer until the blade cuts into the insert. Exert downward pressure on the tool and turn counterclockwise until the insert is removed.



**SPECIFICATIONS**

**VACUUM DIAPHRAGM ASSEMBLY SPECIFICATION**

Transmission Type	Diaphragm Type	Diaphragm Part No.	Identification	Throttle Valve Rod #		
				Part No. (7A380)	Length	Identification
C6	HAD	D7AP-7A337-AA	Part No. Stamped	C4AP-A	1.677-1.667	No Color
	SAD	D70P-7A377-BA	1 Green Stripe	D1AF-BA	1.727-1.717	Purple Daub
	SAD	D4TP-7A377-BA	1 Black Stripe	D3AF-DA	1.611-1.601	Yellow Daub
	SAD	D5AP-7A377-AA	1 Purple Stripe	D3AP-EA	1.644-1.634	Blue Daub
				D3AP-FA	1.660-1.650	Green Daub
				D3AP-GA	1.710-1.700	White Daub
				D8AP-AA	1.694-1.684	Brown Daub

# Selective fit rods  
 SAD — Single Area Diaphragm  
 S-SAD — Super Single Area Diaphragm  
 HAD — High Altitude Diaphragm

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**AUTOMATIC TRANSMISSION REFILL CAPACITY — C5, C6 AND AOD AUTOMATIC TRANSMISSION**

Transmission Type	Engine	Approximate Refill Capacity①		
		U.S. Quarts	Imperial Quarts	Liters
C6②	4.9L (300 CID) I-6	11-3/4	9.4	11.2

① Approximate dry capacity, includes cooler and lines. Fluid level indicator should be used to determine actual fluid requirements and fluid specifications. Check level at normal operating temperature. DO NOT OVERFILL.

**TORQUE-CONVERTER END-PLAY**

Transmission Model	Converter End-Play			
	New or Rebuilt Converter		Used Converter	
	mm	Inch	mm	Inch
C6	0.533 Max.	0.021 Max.	1.01 Max.	0.040 Max.



## SPECIAL SERVICE TOOLS

Tool Number	Description
Tool-4201-C	Dial Indicator with Bracketry
Tool-7000-DD	Rubber Tip For Air Nozzle
Tool-7000-DE	Air Nozzle Assembly
T82L-7006-A	Air Pressure Check Plate
T82P-7006-C	Cap Screws for Air Pressure Check Plate
T76L-7902-C	Converter Clutch Torquing Tool
T77L-7902-R	Converter Clutch Holding Tool
T77L-7902-B	Converter Clutch Torquing Tool
T80L-7902-A	Torque Converter End Play Checking Tool
T83L-7902-A	Converter Checking Tool Kit
T83L-7902-A1	Torque Adapter Turning Tool
T83L-7902-A2	Pilot Guide
T83L-7902-A3	Holding Fixture
T80L-77030-B	Servo Piston Remover

## ROTUNDA EQUIPMENT

Model	Description
014-00028	Torque Converter Cleaner
021-00054	Torque Converter Leak Tester
014-00737	Automatic Transmission Tester
021-00014	Vacuum Tester
059-00008	Vacuum and Pressure Tester

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# Chapter - 9b

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The C6 transmission is a three speed unit Capable of providing automatic upshifts and downshifts through the three forward gear ratios. The transmission Is also capable of providing manual selection of first and second gears.

Fig. 1 shows the location of the converter, front pump, clutches, gear train and most of the Internal parts used in the C6 transmission. The identification tag (Fig. 2), is attached to the intermediate servo lower front cover bolt. The first line On the tag shows the transmission model prefix and suffix. A number appearing after the suffix indicates that the internal parts in the transmission have been changed after initial production start-up. For example, a PGD-BN model transmission that has been changed internally would read PGD-BN1. Both transmissions are basically the same, but some service parts in the PGN-BN transmission are slightly different than the PGD-BN1 transmission. **Therefore, it is important that the codes on the transmission identification tag be checked when ordering parts or making inquiries about the transmission.**

The hydraulic control system schematic is shown in Fig. 3. The converter housing and the fixed splines which engage the splined outside diameter of the low-reverse clutch steel plates, are both cast integrally into the case.

Only one (intermediate) band is used in the C6 transmission. This along with the forward clutch is used to obtain intermediate gear.

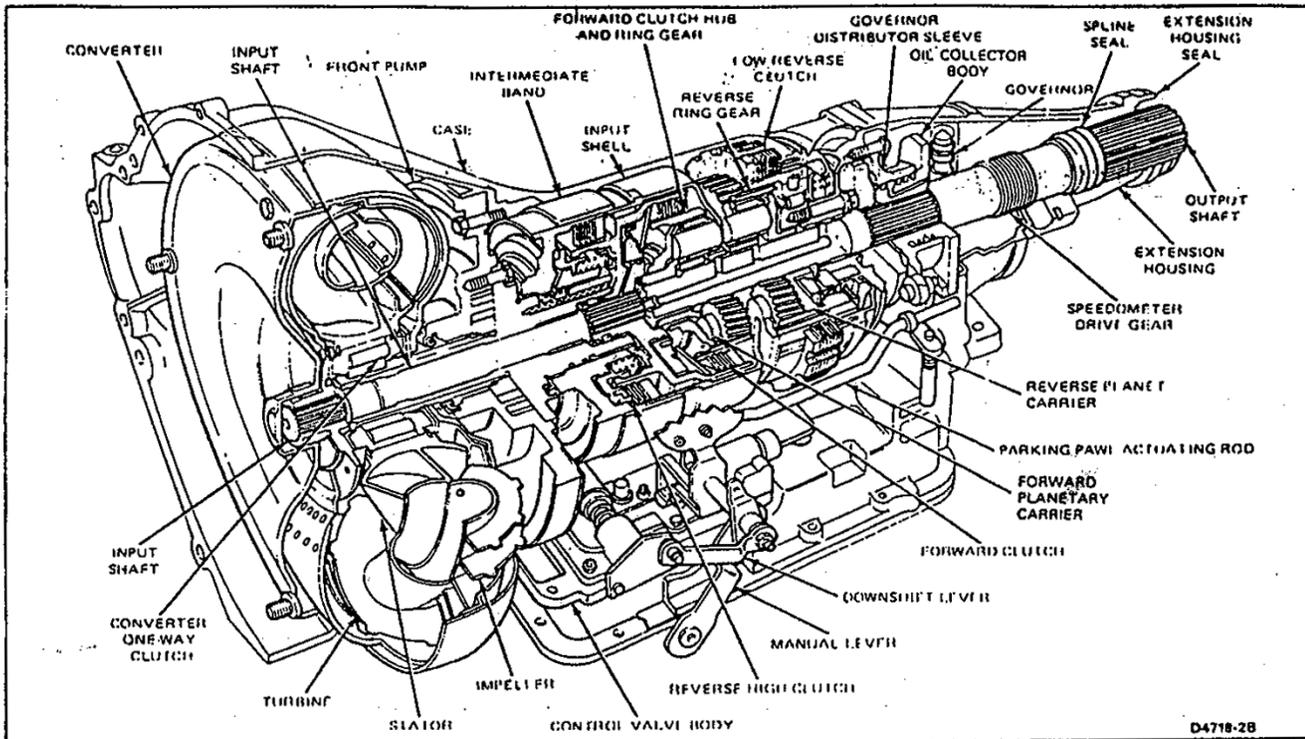


FIG. 1 C6 Automatic Transmission—Sectional

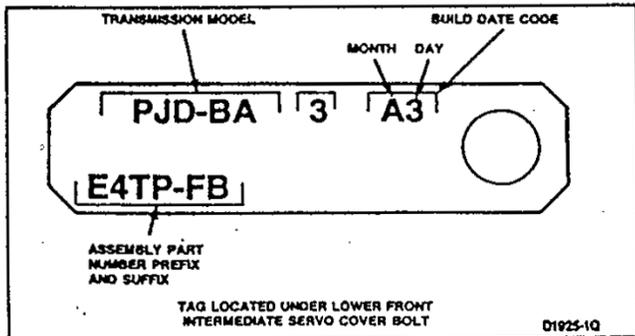


FIG. 2 Identification Tag

## DIAGNOSIS AND TESTING

Refer to Section 2 General Automatic Transmission Service.

## ADJUSTMENTS

The only adjustment on the transmission are the intermediate band

### Intermediate Band Adjustment

1. Raise the vehicle on a hoist or jack stands.
2. Clean all the dirt from the band adjusting screw. Remove and discard locknut.
3. Install a new locknut and tighten the adjusting screw to 14 N·m (10 ft-lbs) torque (Fig. 5).
4. Back off the adjusting screw exactly 1-1/2 turns.
5. Hold the adjusting screw from turning and tighten the locknut to 48-61 N·m (35-40 ft-lbs).
6. Lower the vehicle.

To prevent damage to the transmission and to assure proper band adjustment, it is essential that the tools and procedures described here are used whenever the band is adjusted.

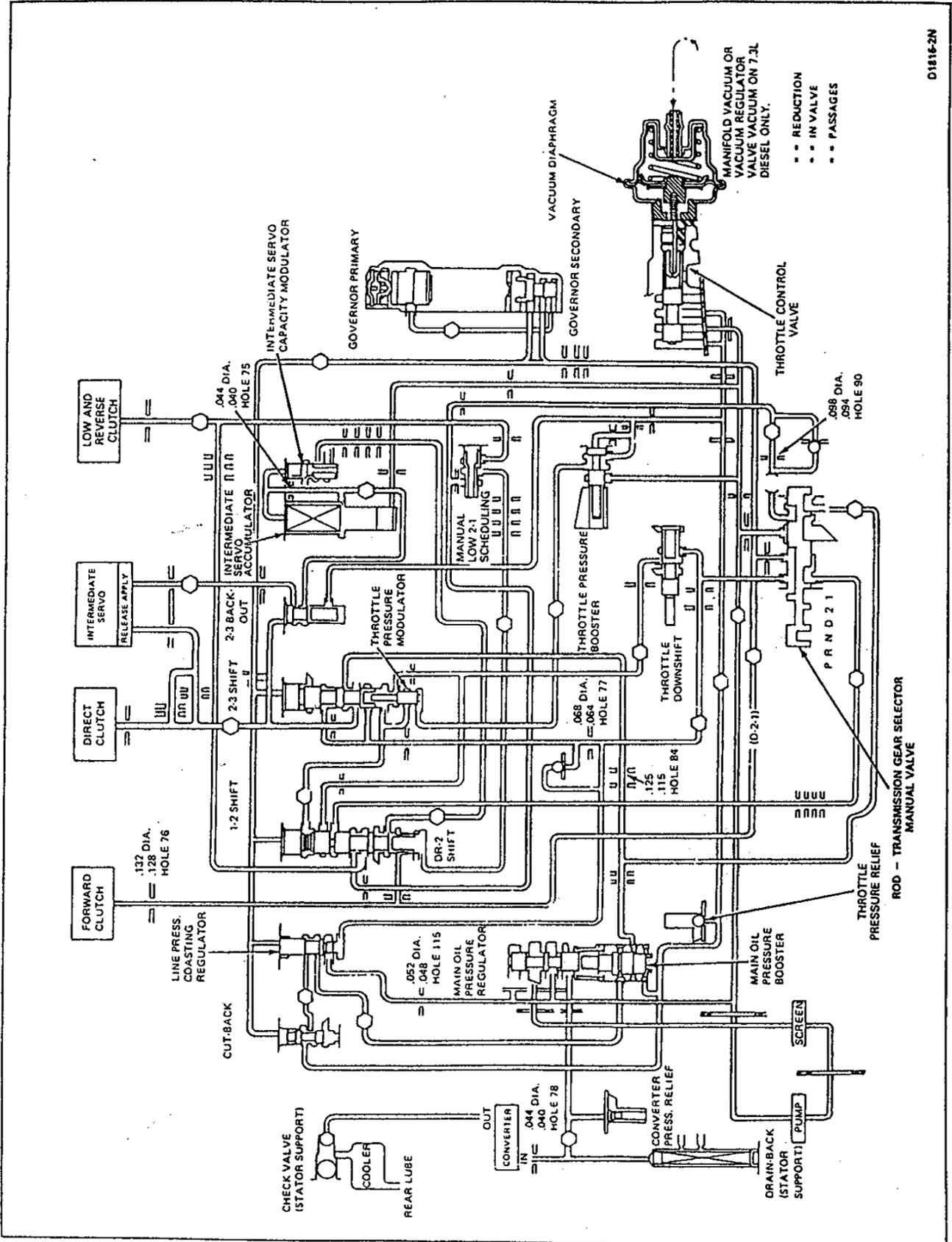


FIG. 3 Hydraulic Control System—C6 Transmission

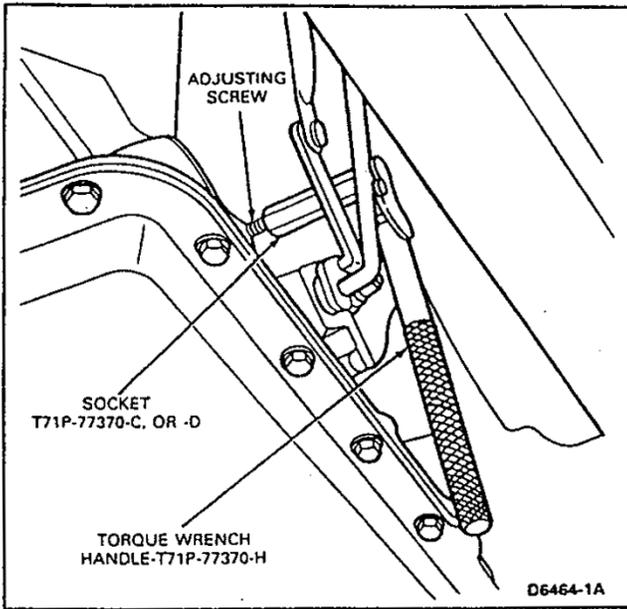


FIG. 5 Adjusting Intermediate Band

### Control Valve Body

Refer to Fig. 17.

#### Removal

1. Raise the vehicle on a hoist or jack stands.
2. Place a drain pan under the transmission and loosen the bolts holding the transmission pan to drain the fluid from the transmission.
3. Remove the transmission pan attaching bolts from both sides and the rear to allow the fluid to drain further. Finally, remove the remainder of the attaching bolts. Remove the pan and gasket. Remove and discard the nylon shipping plug from the pan. This plug is used to retain transmission fluid within the transmission during shipment and should be discarded when the oil pan is removed.
4. Remove the valve body attaching bolts and remove the valve body from the case.

#### Installation

1. Position the valve body to the case making sure that the selector and downshift levers are engaged. Install and tighten the attaching bolts to 11-14 N·m (95-125 in.-lbs).
2. Clean the transmission pan and gasket surfaces thoroughly.
3. Using a new pan gasket, install attaching bolts securing the pan to the transmission case. Tighten the attaching bolts to 10.5-17 N·m (8-12 ft-lbs).
4. Lower the vehicle and fill the transmission to the correct level with the specified fluid.

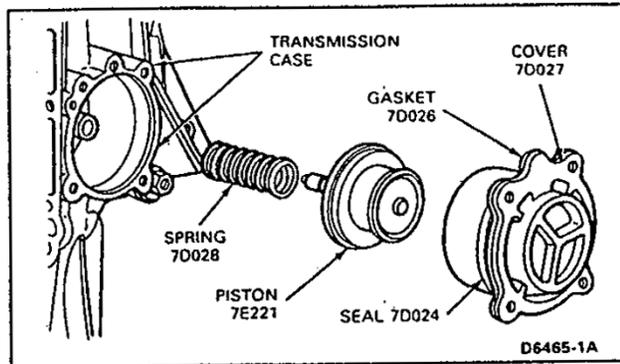


FIG. 10 Intermediate Servo Disassembled—Typical

### Intermediate Servo

(Refer to Fig. 10).

#### Removal

1. Raise the vehicle on a hoist or stands.
2. Remove the bolts that secure the engine rear support to the transmission extension rear support and insulator assembly to the crossmember.
3. Remove the two crossmember-to-frame attaching bolts, and the bolts attaching the gussets to the crossmember if so equipped.
4. Raise the transmission high enough to remove the weight from the crossmember and remove the crossmember.
5. Disconnect the muffler inlet pipe from the exhaust manifolds and allow the pipe to hang.
6. Place a drain pan under the servo. Remove the bolts that attach the servo cover to the transmission case.
7. Remove the cover, piston, spring and gasket from the case, screwing the band adjusting screw inward as the piston is removed. This places enough tension on the band to keep the struts properly engaged in the band end notches while the piston is removed.
8. Apply air pressure to the port in the servo cover to remove the piston and rod.
9. Replace the complete piston and rod assembly if the piston or piston sealing lips are damaged, (Fig. 10).
10. Remove the seal from the cover.

#### Installation

1. Dip the new seal in transmission fluid.
2. Install a new seal on the cover.
3. Coat new gasket with petroleum jelly, and position on the servo cover.
4. Dip the piston in transmission fluid and install it in the cover.

**Governor**

**Removal**

1. Remove the extension housing as outlined in this Section.
2. Remove the four governor body-to-oil-collector attaching bolts (Fig. 15).
3. Remove the governor from the collector body flange.
4. Refer to the Disassembly and Assembly Section of this Section for Governor repair operations.

**Installation**

1. Secure the governor (Fig. 15) to the oil collector flange with the attaching bolts. Tighten the bolts to 10.5-13.5 N·m (90-120 in.-lbs).
2. Re-install the extension housing as outlined in this Section.

**DISASSEMBLY AND ASSEMBLY**

**Transmission**

Refer to Fig. 38.

Before removing any of the subassemblies, thoroughly clean the outside of the transmission to prevent dirt from entering the mechanical parts.

During the repair of the subassemblies, certain general instructions which apply to all units of the transmission must be followed. Following these instructions will avoid unnecessary repetition.

Handle all transmission parts carefully to avoid nicking or burring the bearing or mating surfaces. Lubricate all internal parts of the transmission with clean automatic transmission fluid before assembly.

Do not use any other lubricants except on gaskets and thrust washers. These may be coated with petroleum jelly to facilitate assembly. Always use new gaskets and seals when assembling a transmission. Refer to Section 17-01, General Automatic

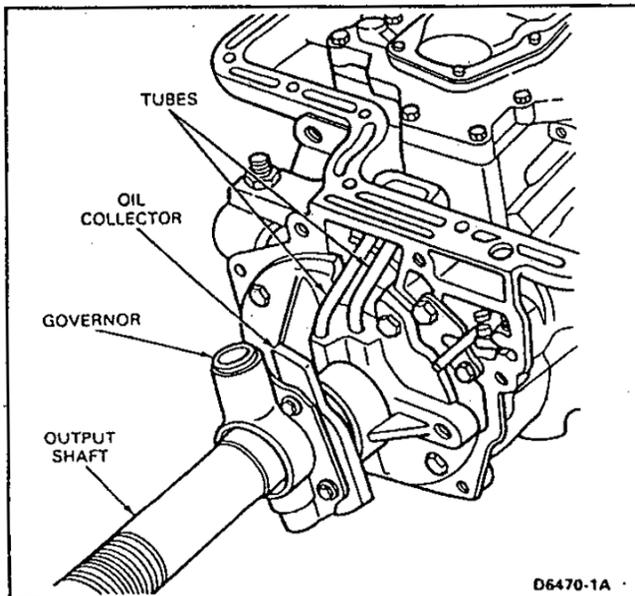


FIG. 15 Governor Installed

**Transmission Service for Cleaning and Inspection Procedures.**

Tighten all bolts and screws to the recommended torque as outlined in specifications at end of this Section.

**Disassembly**

1. Remove the converter, and mount the transmission in holding fixture Rotunda Model 014-00106 or equivalent, (Fig. 16).

NOTE: If equipped, remove and discard the nylon shipping plug from the pan. This plug is used to retain transmission fluid within the transmission during shipping. It should be discarded when the oil pan is removed.

2. Remove the 17 fluid pan attaching bolts. Remove the pan and gasket.
3. Remove the eight valve body attaching bolts. Lift the valve body (Fig. 17) from the transmission case.

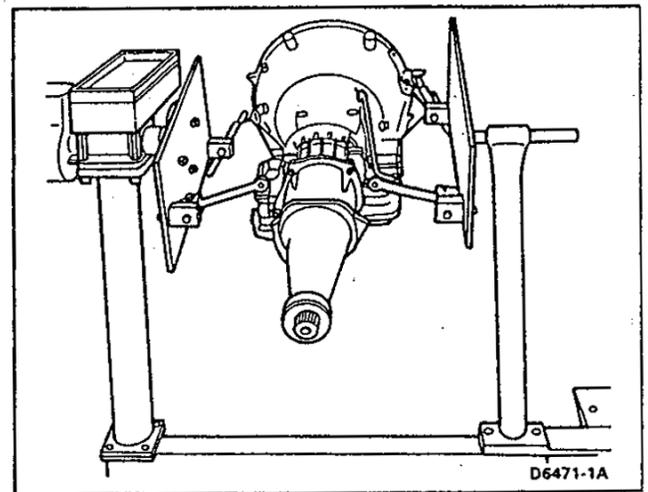


FIG. 16 Transmission Mounted in Holding Fixture

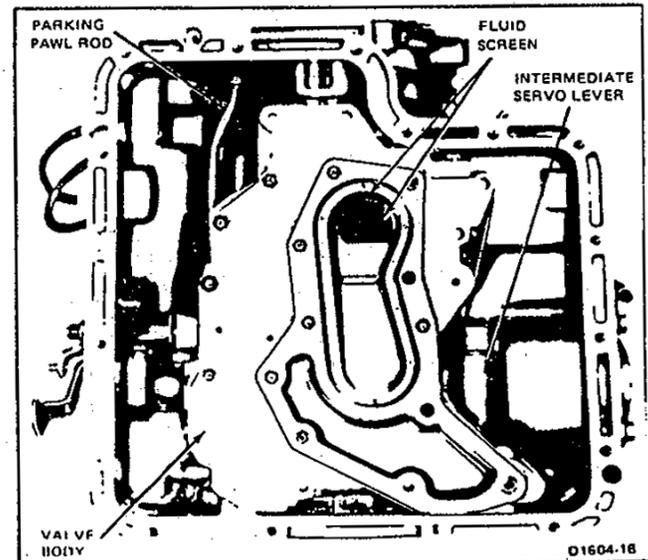


FIG. 17 Transmission With Pan Removed

4. Attach a dial indicator TOOL-4201-C or equivalent to the front pump as shown in Fig. 18. Install Extension Housing Seal Replacer T61L-7657-B in the extension housing to center the output shaft.
5. Pry the gear train to the rear of the case and at the same time, press the input shaft inward until it bottoms, (Fig. 18). Set the dial indicator to read zero.
6. Pry the gear train forward, (Fig. 18), and note the amount of gear train end play on the dial indicator. Record the end play to facilitate assembling the transmission. Remove the dial indicator from the pump and the tool from the extension housing.

7. Remove the vacuum diaphragm, valve rod and the throttle valve from the bore in the rear of the case. Slip the input shaft out of the front pump.
8. Remove the front pump attaching bolts. Pry the gear train forward as shown in Fig. 19 to remove the pump.
9. Loosen the band adjustment screw and remove the two struts.
10. Rotate the band 90 degrees counterclockwise to align the ends with the slot in the case (Fig. 20). Slide the band off the reverse-high clutch drum.
11. Remove the forward part of the gear train as an assembly as shown in Fig. 21.
12. Remove the bolts that attach the servo cover to the transmission case.
13. Remove the cover, piston, spring and gasket from the case.

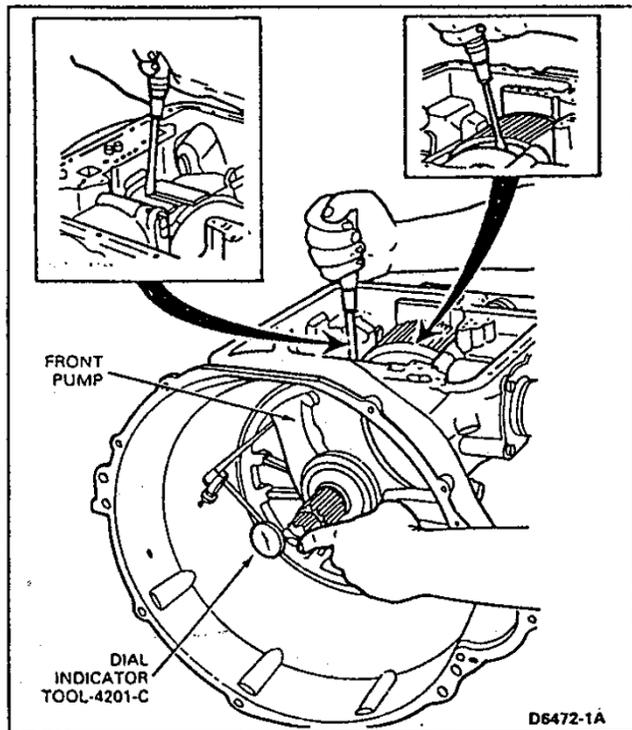


FIG. 18 Checking Gear Train End Play

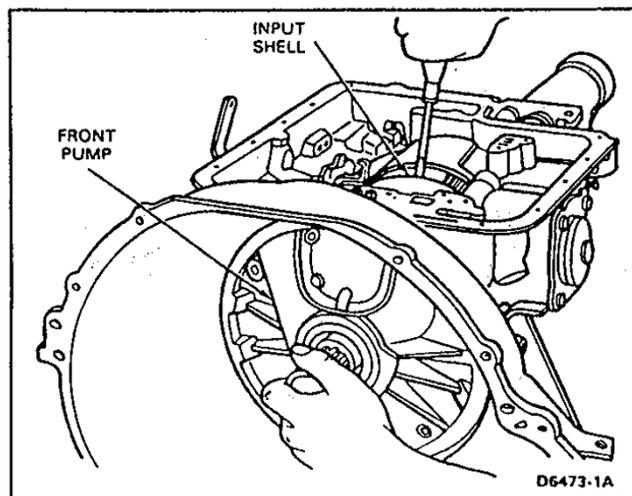


FIG. 19 Removing Front Pump

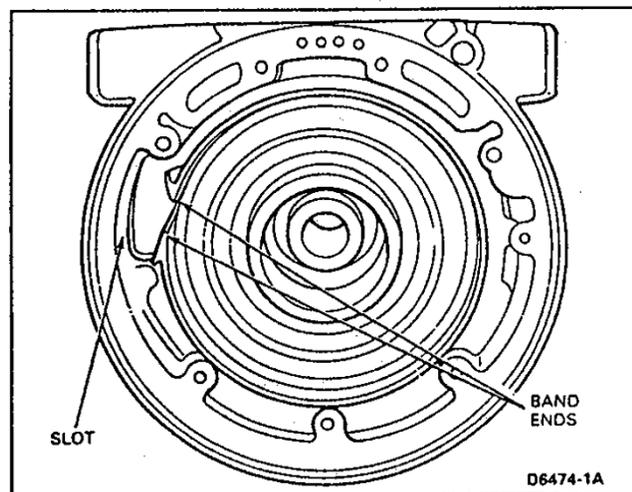


FIG. 20 Removing or Installing Band

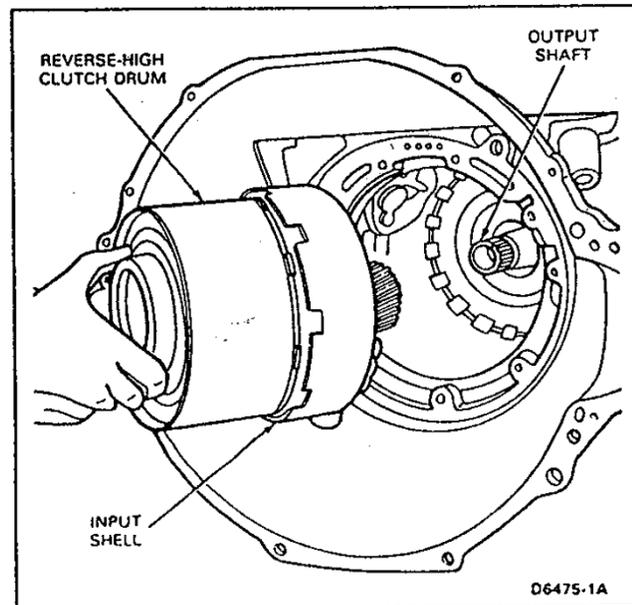


FIG. 21 Removing or Installing Forward Part of Gear Train

14. Remove the large snap ring that secures the reverse planet carrier in the low-reverse clutch hub. Lift the thrust washers and planet carrier from the drum.
15. Remove the snap ring, (Fig. 22), that secures the reverse ring gear and hub on the output shaft. Slide the ring gear and hub off the shaft. Remove the thrust washer.
16. Rotate the low-reverse clutch hub in a clockwise direction and at the same time, withdraw it from the case.
17. Remove the reverse clutch snap ring from the case, then remove the clutch discs, plates and pressure plate from the case.
18. Remove the extension housing attaching bolts from the case. Remove the extension housing and gasket.
19. Slide the output shaft (with governor and oil collector) assembly from the transmission case.
20. Remove the distributor sleeve attaching bolts and remove the sleeve, parking pawl gear and the thrust washer.

If the thrust washer is staked in place, use a sharp chisel and cut off the metal from behind the thrust washer. Be sure to clean the rear of the case with air pressure or a suitable solvent to remove any metal particles.

21. Remove the one-way clutch inner race attaching bolts from the rear of the case. Remove the inner race and reverse clutch spring retainer assembly from inside of the case.
22. Remove the low-reverse clutch piston from the case using TOOL-7000-DE or equivalent as shown in Fig. 23.

**Assembly**

1. Place the transmission case in a holding fixture.
2. Tap the low-reverse piston into place in the case with a clean rubber hammer.
3. Install the low-reverse clutch spring retainer assembly and retainer assembly in the clutch piston.

4. Hold the one-way clutch inner race in position and install the attaching bolts. Tighten bolts to 25-33 N·m (18-25 ft-lbs).
5. Place the transmission case on the bench with the front end facing downward.
6. Position the parking gear thrust washer and the gear or the case (Fig. 31). **Do not re-stake the thrust washer.**
7. Position the collector and tubes in place on the rear of the case. Install the attaching bolts and tighten to 17-21 N·m (12-16 ft-lbs).
8. Install the output shaft, and governor as an assembly.
9. Place a new gasket on the rear of the transmission case. Position the extension housing on the case and install the attaching bolts. Tighten the attaching bolts to 34-47 N·m (25-35 ft-lbs).
10. Place the transmission case in the holding fixture.
11. Coat new gasket with petroleum jelly and position on the servo cover.
12. Position the servo spring on the piston rod.
13. Insert the servo piston rod in the case. Install the servo cover with the attaching bolts, making sure that the identification tag is in place. Tighten the attaching bolts to 19-27 N·m (14-20 ft-lbs).
14. Align the low-reverse clutch hub and one-way clutch with the inner race at the rear of the case. Rotate the low-reverse clutch hub clockwise while applying pressure to seat it on the inner race.
15. Install the low-reverse clutch plates, starting with the wave plate next to the piston and following with steel and friction plates alternately. Retain them with petroleum jelly. If new composition plates are being used, soak them in clean transmission fluid, Motorcraft MERCON® Multi-Purpose Automatic Transmission Fluid XT-2QDX or DDX (ESP-M2C166-H), or equivalent for fifteen minutes before installation. Install the pressure plate and the snap ring. Test the operation of the low-reverse clutch by applying air pressure at the clutch pressure apply hole in the case.

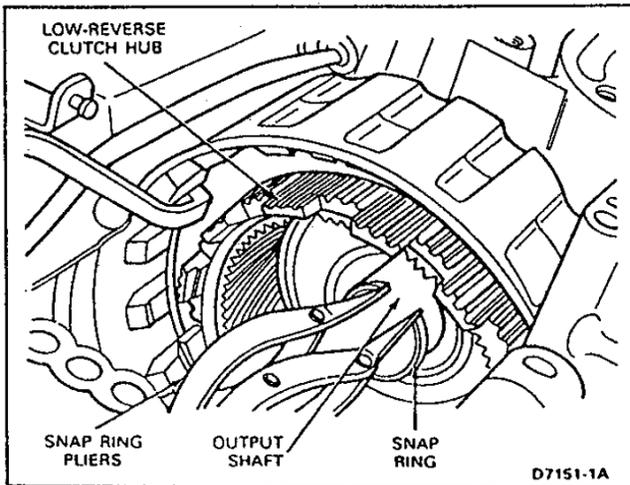


FIG. 22 Removing or Installing Reverse Ring Gear Hub, Snap Ring

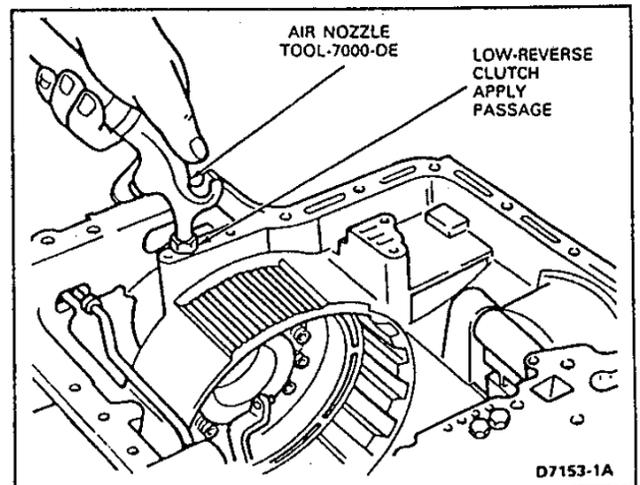


FIG. 23 Removing Low-Reverse Clutch Piston



16. Install the reverse planet ring gear thrust washer and the ring gear and hub assembly. Insert the snap ring in the groove on the output shaft.
17. Assemble the front and rear thrust washers onto the reverse planet assembly; retain with petroleum jelly. Insert the assembly into the ring gear and install the snap ring.
18. Set the reverse-high clutch assembly on the bench, with the front end facing down. Install the thrust washer on the rear end of the reverse-high clutch assembly. Retain the thrust washer with petroleum jelly and insert the splined end of forward clutch into the open end of the reverse-high clutch with splines engaging the direct clutch friction plates (Fig. 38).
19. Install the thrust washers and retain them with petroleum jelly, on the front end of the forward planet-ring gear and hub. Insert the ring gear into the forward clutch.
20. Install the thrust washer on the front end of the forward planet assembly. Retain the washer with petroleum jelly and insert the assembly into the ring gear. Install the input shell and sun gear assembly.
21. Install the reverse-high clutch assembly, forward clutch assembly, forward planet assembly and drive input shell, and sun gear as an assembly into the transmission case.
22. Insert the intermediate band into the case around the reverse-high clutch drum. Install the struts and tighten the band adjusting screw sufficiently to retain the band.
23. Place a selective thickness bronze thrust washer on the rear shoulder of the stator support and retain it with petroleum jelly. If the end play was not within specification when checked prior to disassembly, replace the washer with one of proper thickness. Refer to specifications at the end of this Section for selective thrust washer thicknesses.

Using two 5/16-inch bolts three inches long, make two alignment studs. Cut the heads from the bolts and grind a taper on the cut end. Temporarily install the two studs opposite each other in the mounting holes of the case. Slide a new gasket onto the studs. Position pump on case, being careful not to damage the large seal on the outside diameter of the pump housing, (removing the aligning studs).

Install six of the seven mounting bolts and tighten to 22-40 N·m (16-30 ft-lbs).
24. Adjust the intermediate band as detailed under Adjustments and install the input shaft with the long splined end inserted into the forward clutch assembly.
25. Install Tool 4201-C or equivalent at the seventh pump mounting bolt (Fig. 18) and check the transmission end play as in steps 4, 5 and 6 of Disassembly. (See specifications at the end of this Section.) Remove the tool.

Install the seventh pump mounting bolt and tighten to 22-40 N·m (16-30 ft-lbs).
26. Install the main control valve body on the case, making sure that the levers engage the valves properly and tighten the attaching bolts to 11-14

N·m (95-125 in.-lbs). Install the primary throttle valve, rod, and the vacuum diaphragm in the case. Tighten the diaphragm attaching bolt to 17-21 N·m (12-16 ft-lbs).

27. Install a new pan gasket and the pan. Tighten the bolts to 10.5-17 N·m (8-12 ft-lbs).
28. Install the converter assembly.
29. Install the transmission in the vehicle as detailed under Removal and Installation.

## Control Valve Body

### Disassembly

The valve body-to-screen gasket should not be cleaned in a degreaser solvent or any type of detergent solution when disassembling the main control. To clean the gasket, wipe it off with a lint-free cloth.

1. Remove the nine screws that attach the screen to the lower valve body (Fig. 24) and remove screen and gasket (Fig. 25).
2. Remove the five upper-to-lower valve body and hold-down plate attaching screws. Remove the seven attaching screws from the underside of the lower valve body (Fig. 24).
3. Separate the bodies and remove the separator plate and gasket. **Be careful not to lose the check valves and springs.** Remove and clean the separator plate screen if necessary (Fig. 25).
4. Remove the manual valve retaining pin from the upper valve body (Fig. 26).
5. Slide the manual valve (Fig. 26) out of the valve body.
6. Cover the downshift valve bore with a finger, then working from the underside of the body remove the downshift valve retainer. Remove the spring and downshift valve (Fig. 26).
7. Apply hand pressure on the pressure boost valve sleeve end and remove the sleeve retaining clip from the under side of the body. Slowly release hand pressure and remove the sleeve and the pressure boost valve. Remove the two springs, the spring and the main regulator valve from the bore.
8. Apply pressure on the throttle boost valve retaining plate and remove the two attaching screws. Slowly release the pressure and remove plate, throttle pressure boost valve and spring, and the manual low 2-1 scheduling valve and spring from the body (Fig. 26).
9. Apply pressure on the remaining valve retaining plate and remove the eight attaching screws.
10. Hold the valve body so that the plate is facing upward. Slowly release the pressure and remove the plate.
11. Remove the spring and the intermediate servo modulator valve (Fig. 26) from the valve body.
12. Remove the intermediate servo accumulator valve and springs.
13. Remove the 2-3 back-out valve and spring.
14. Remove the 2-3 shift valve, spring and the throttle modulator valve and spring.
15. Remove the 1-2 shift valve, DR-2 shift valve and the spring from the valve body.

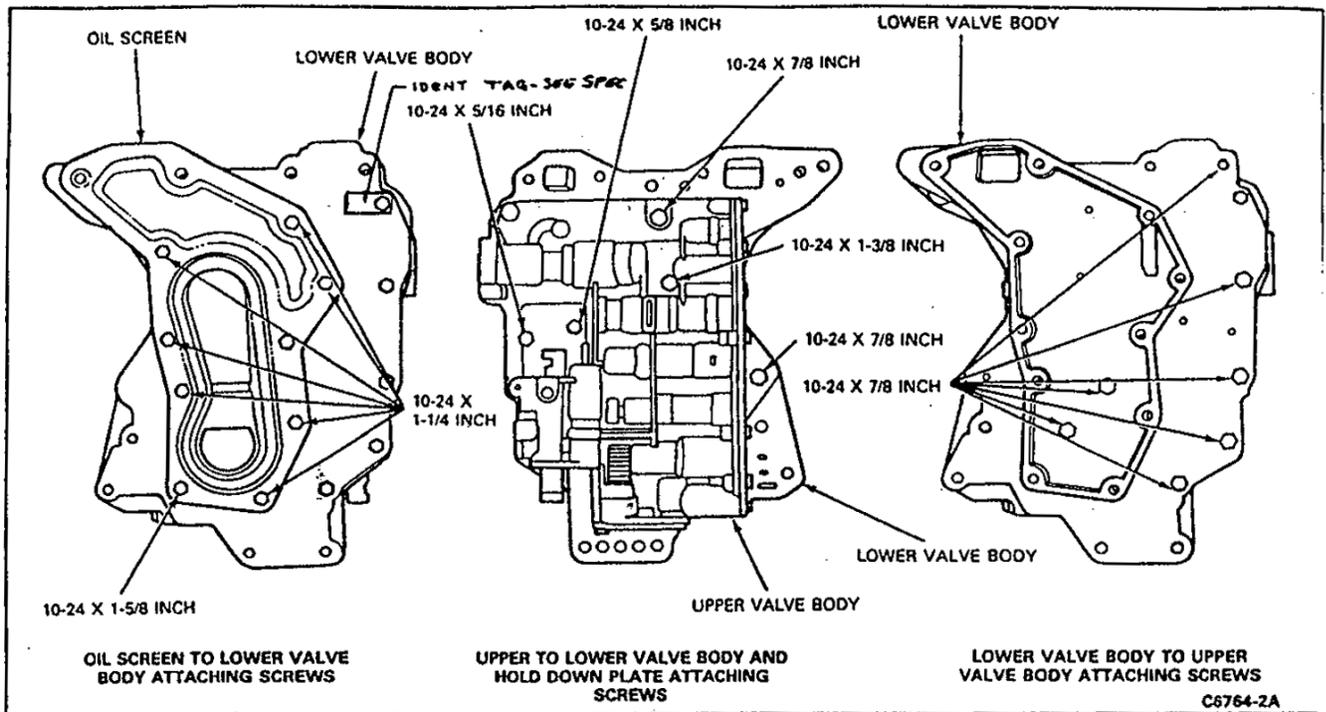


FIG. 24 Control Valve Body and Screen Attaching Screws

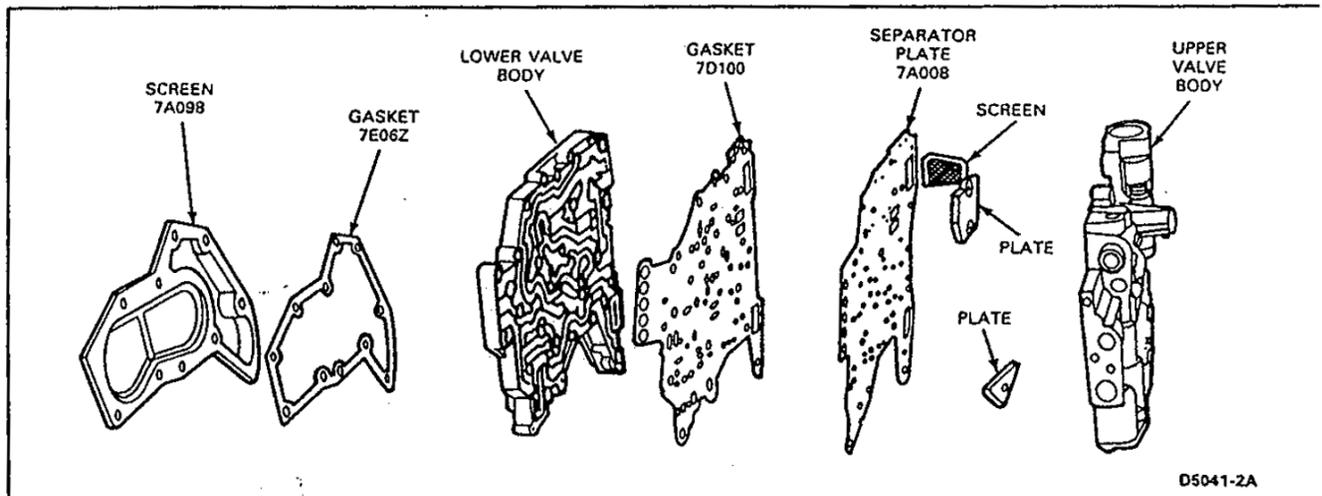
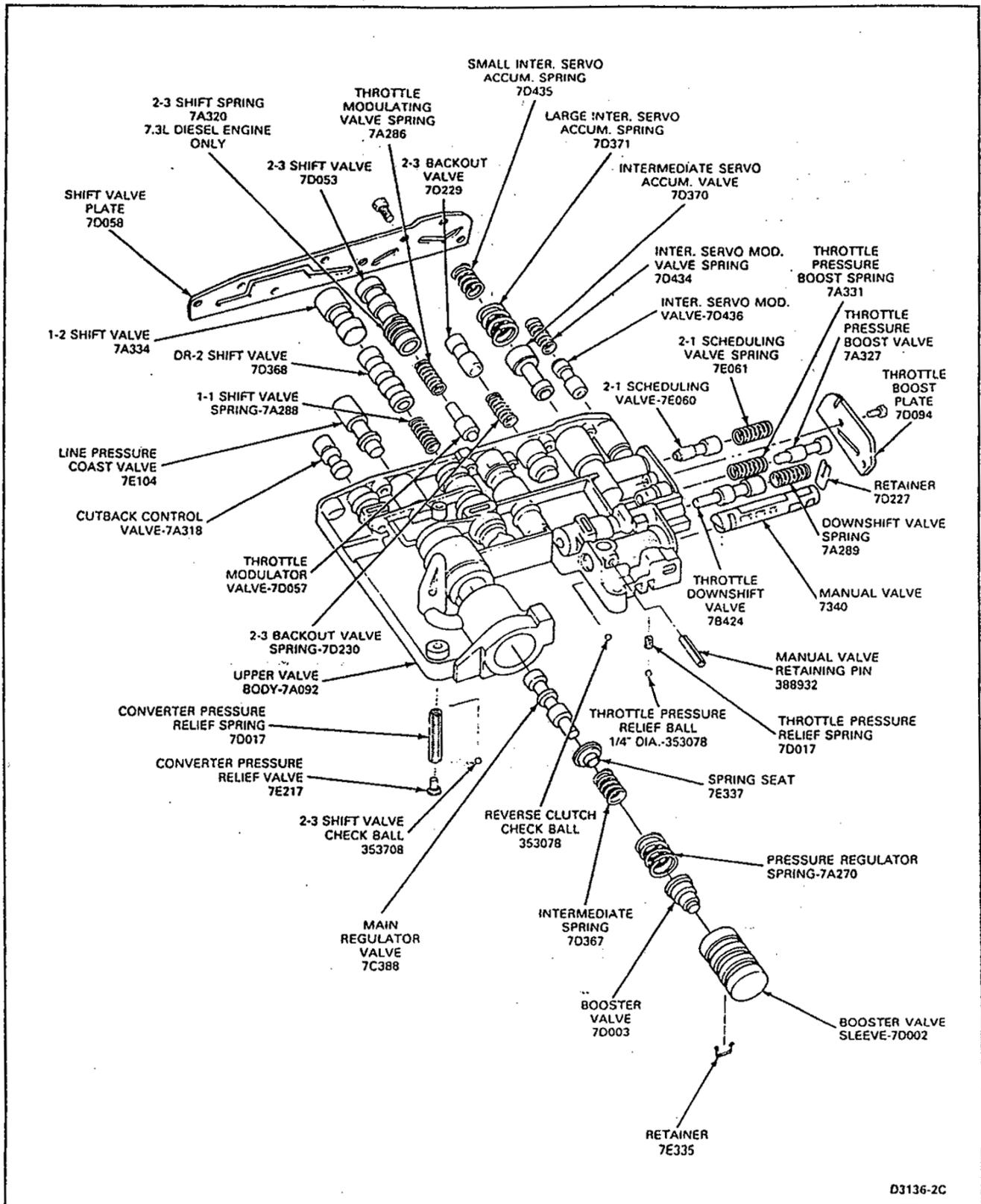


FIG. 25 Upper and Lower Valve Bodies Disassembled

16. Remove the line pressure coasting regulator valve, (Fig. 26) from the body.
17. Remove the cutback control valve to complete the disassembly of the control valve.

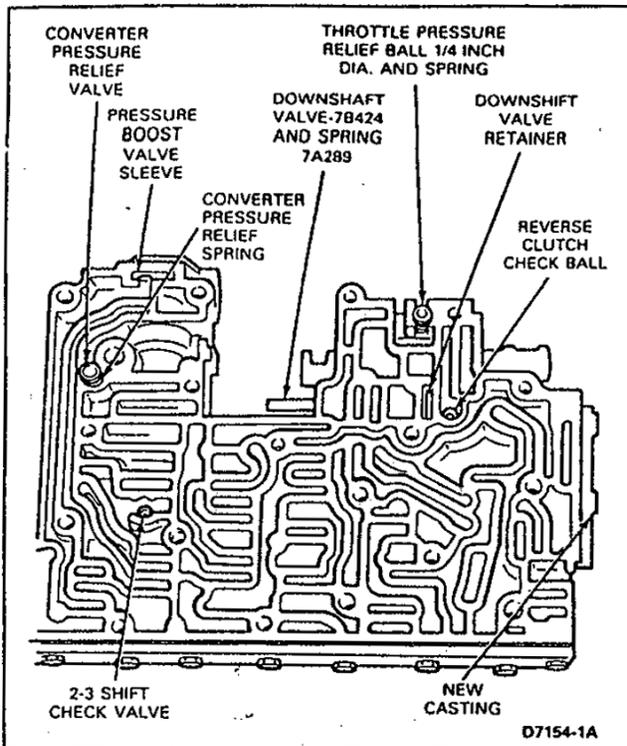
#### Assembly

1. Place the downshift valve and spring in the valve body. Compress the spring and install the retainer from the underside of the body (Fig. 27).
2. Place the valve body on a clean surface with the passage side facing up. Place the converter relief valve spring in its bore (Fig. 27). Coat the converter pressure relief valve with petroleum jelly and place it on top of the spring. Place the 2-3 shift valve check ball in its cavity. Place the throttle pressure relief valve spring in its bore (Fig. 27). Coat the throttle pressure relief valve check ball with petroleum jelly and place it on top of the spring. Place the reverse clutch check ball in its cavity.
3. Install the separator screen in the separator plate it was previously removed. **Be sure the screen tabs are flush with the separator plate surface.** Carefully position the separator plate and neogasket on the lower valve body. Place the two hold-down plates on the separator plate and install the attaching screws finger tight.
4. Place the lower body and plate assembly on top of the upper valve body (Fig. 24) and install the attaching screws finger tight.



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FIG. 26 Upper Valve Body Disassembled



**FIG. 27** Downshift Valve and Spring, Converter Pressure Relief Valve, Throttle Pressure Relief Valve Check Ball, and 2-3 Shift Check Valve Locations

5. Install the oil screen screws loosely, without the screen, to properly align the upper and lower valve bodies, gasket and separator plate.
6. Tighten the two bolts that are covered by the screen to 5.0-6.2 N·m (40-55 in.-lbs).
7. Remove the oil screen attaching screws and place the gasket and oil screen in position on the lower valve body. Re-install the screen attaching screws (Fig. 24).
8. Tighten all the valve body and screen attaching screws to 5.0-6.2 N·m (40-55 in.-lbs).
9. Place the cutback control valve (Fig. 26) and the line pressure coasting regulator valve in the valve body.
10. Place the one spring, DR-2 shift valve and the 1-2 shift valve in the body.
11. Place the throttle modulator valve and spring and the 2-3 shift valve (and spring on 7.3L Diesel) in the valve body.
12. Place the spring and the 2-3 backout valve in the valve body.
13. Place the two springs and the intermediate servo accumulator valve in the valve body.
14. Place the intermediate servo modulator valve and spring in the body.
15. Carefully place the valve retaining plate on the body and secure it with the eight attaching screws. Tighten the two hex washer head screws to 2.5-5.0 N·m (20-45 in.-lbs). Tighten the remaining six screws to 2.5-4.5 N·m (20-40 in.-lbs).

16. Place the throttle pressure boost valve and spring in the valve body. Place the manual low 2-1 scheduling valve and spring in the valve body and install the retaining plate. Tighten the attaching screws to 2.5-5.0 N·m (20-45 in.-lbs).
17. Place the spring seat on the stem of the main regulator valve so that the retainer flange is next to the valve shoulder. Place the main regulator valve, spring seat, two springs, pressure boost valve and sleeve in the bore. Apply hand pressure on the end of the pressure boost valve sleeve and install the spring clip retainer in the groove on the under side of the body so that the clip is inserted into the end groove in the sleeve. Be sure that the pressure boost valve sleeve is free in its bore.
18. Place the manual valve in the valve body and install the retaining pin in the body.

### Intermediate Servo

(Refer to Fig. 10).

### Disassembly

1. Apply air pressure to the port in the servo cover to remove the piston and rod.
2. Replace the complete piston and rod assembly if the piston or piston sealing lips are unserviceable or damaged.
3. Remove the seal and gasket from the cover.

### Assembly

1. Dip the new seals in transmission fluid.
2. Install new seal and gasket on the cover.
3. Dip the piston in transmission fluid, Motorcraft MERCON® Multi-Purpose Automatic Transmission Fluid XT-2-QDX or DDX (ESP-M2C166-H), or equivalent and install it in the cover.

### Governor

#### Disassembly

1. Remove the governor body attaching bolts and remove the governor.
2. Remove and discard the snap ring that secures the governor oil collector body on the output shaft (Fig. 28) and slide the governor off the front of the shaft.
3. Remove the seal rings from the oil collector body.

#### Assembly

1. Carefully install new seal rings on the oil collector body.
2. Working from the front end of the output shaft, slide the governor oil collector body into place on the shaft. Install a new snap ring to secure it. Make sure that the snap ring is seated in the groove.
3. Position the governor assembly on the oil collector body (Fig. 28) and secure with the attaching screws. Tighten screws to 10.5-13.5 N·m (90-120 in.-lbs).

### Downshift and Manual Linkage

#### Disassembly

1. Remove the nut and lockwasher that secures the outer downshift lever to the transmission and remove the lever.

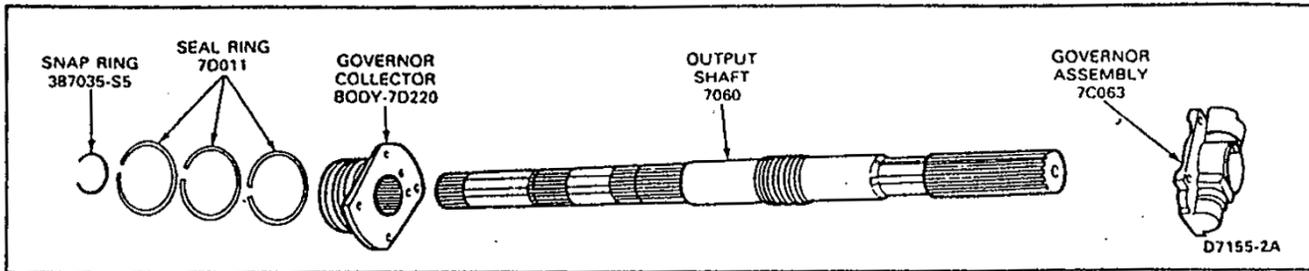


FIG. 28 Output Shaft Disassembled

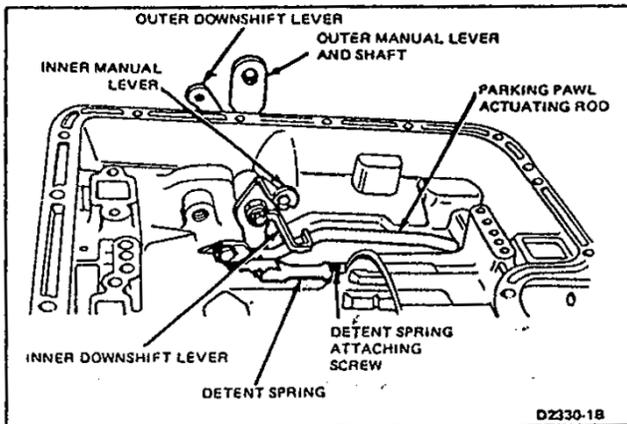


FIG. 29 Downshift and Manual Linkage

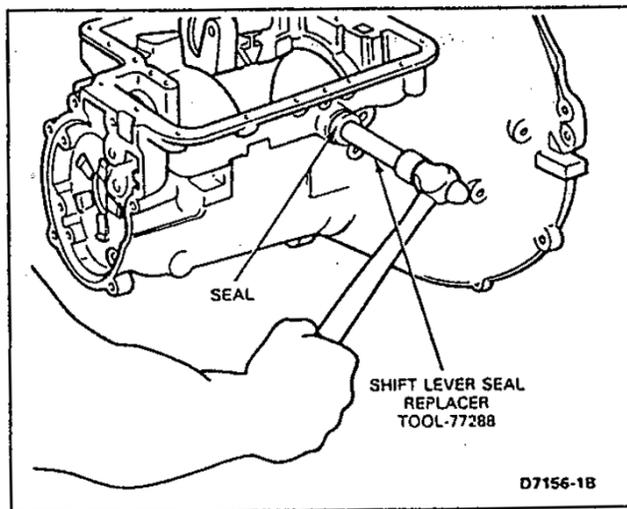


FIG. 30 Installing Manual Lever Seal

2. Slide the inner downshift lever assembly out from the inside of the case (Fig. 29). Remove the seal from the recess in the manual lever shaft.
4. Remove the C-ring securing the parking pawl actuating rod to the manual lever. Remove the rod from the case.
5. Remove the nut securing the inner manual lever to the shaft. Remove the inner lever from the shaft. Slide the outer lever and shaft from the case.

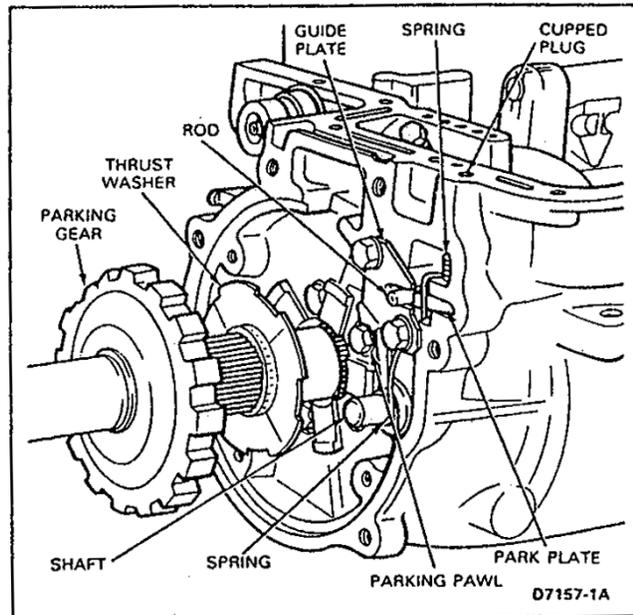


FIG. 31 Parking Pawl Mechanism

6. Remove the seal from the case with Tools T59L-100-B, Slide Hammer and T58L-101-B, Puller Attachment, or equivalents.

**Assembly**

1. Dip the new seal in transmission fluid Motorcraft MERCON® Multi-Purpose Automatic Transmission Fluid XT-2-QDX or DDX (ESP-M2C166-H), or equivalent and install it in the case using TOOL-77288 or equivalent as shown in Fig. 30.
2. Slide the outer manual lever and shaft in the transmission case.
3. Position the inner lever on the shaft, making sure the leaf spring roller is positioned in the inner manual lever detent. Install the attaching nut. Tighten the nut to 41-54 N·m (30-40 ft-lbs). Install the parking pawl actuating rod and secure it to the inner manual lever with a C-ring.

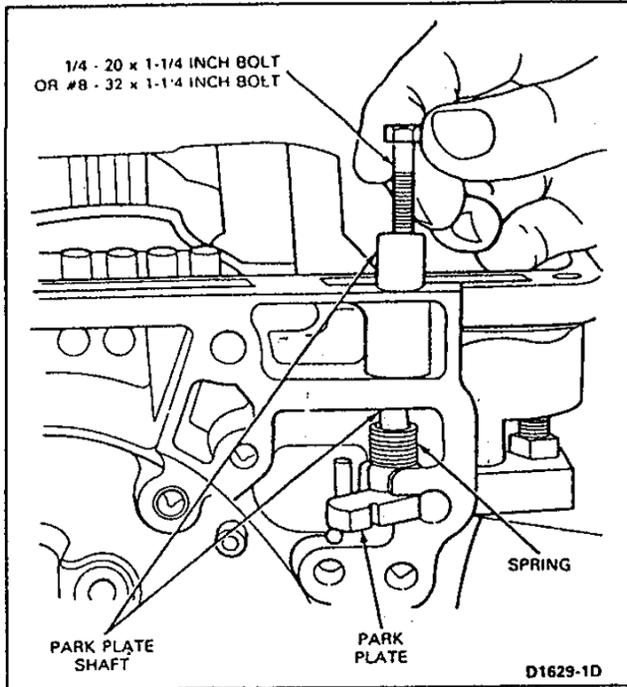


FIG. 32 Removing Park Plate

6. Install a new downshift lever seal in the recess of the outer lever shaft. Slide the downshift lever and shaft into position.
7. Place the outer downshift lever on the shaft and secure it with a lockwasher and nut. Tighten nut to 17-21 N·m (12-16 ft-lbs).

### Parking Pawl Linkage

#### Disassembly

1. Remove the bolts securing the parking pawl guide plate to the case (Fig. 31). Remove the plate.
2. Remove the spring, parking pawl and shaft from the case.
3. Working from the pan mounting surface, drill a 1/8 inch diameter hole through the center of the cupped plug. Pull the plug from the case with a wire hook.
4. Unhook the end of the spring from the park plate slot to relieve the tension.
5. Thread a 1/4-20 inch or 8-32 x 1-1/4 inch screw (Fig. 32) into the park plate shaft. Pull the shaft from the case with the screw. Remove the spring and park plate.

#### Assembly

1. Position the spring and park plate in the case and install the shaft. Place the end of the spring into the slot of the park plate.
2. Install a new cupped plug to retain the shaft.
3. Install the parking pawl shaft in the case. Slip the parking pawl and spring into place on the shaft.
4. Position the guide plate on the case, making sure that the actuating rod is seated in the slot of the plate. Secure the plate with two bolts and lockwashers. Tighten bolts to 17-21 N·m (12-16 ft-lbs).

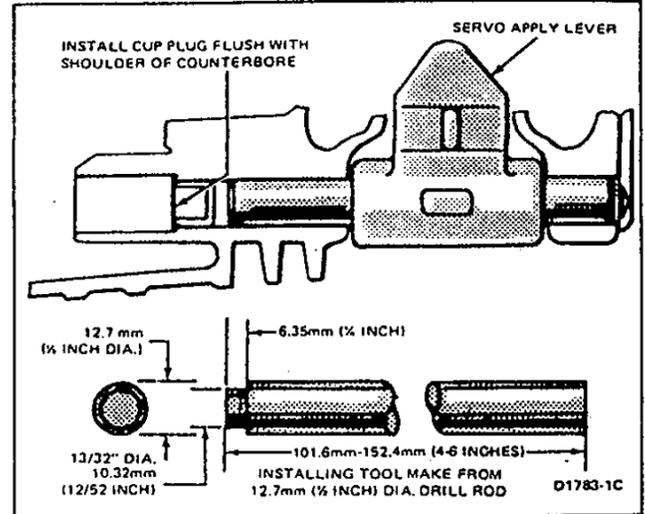


FIG. 33 Servo Apply Lever Installation

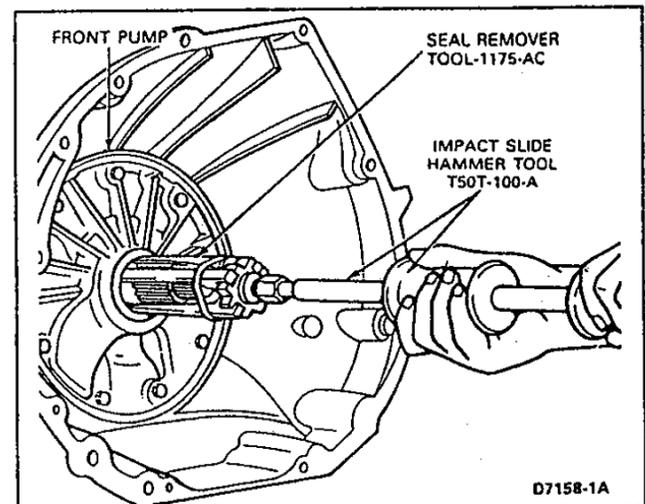


FIG. 34 Removing Front Pump Seal

### Servo Apply Lever

#### Disassembly

1. Working from inside of the transmission case, carefully drive on the servo apply lever shaft to remove the cup plug. The shaft (Fig. 33) can be withdrawn from the case by hand.

#### Assembly

1. Hold the servo apply lever in position and install the new shaft.
2. Using the fabricated tool shown in Fig. 33, drive the cup plug into position in the case. Be sure the plug is flush with the shoulder of the counterbore. The cup plug may be coated with Threadlock and Sealer, EOAZ-19554-AA (ESE-M4G204-A) or equivalent, before installation.

### Front Pump

The front seal can be replaced after the pump has been installed on the transmission using T50T-100-A and TOOL-1175-AC or equivalent for removal, and

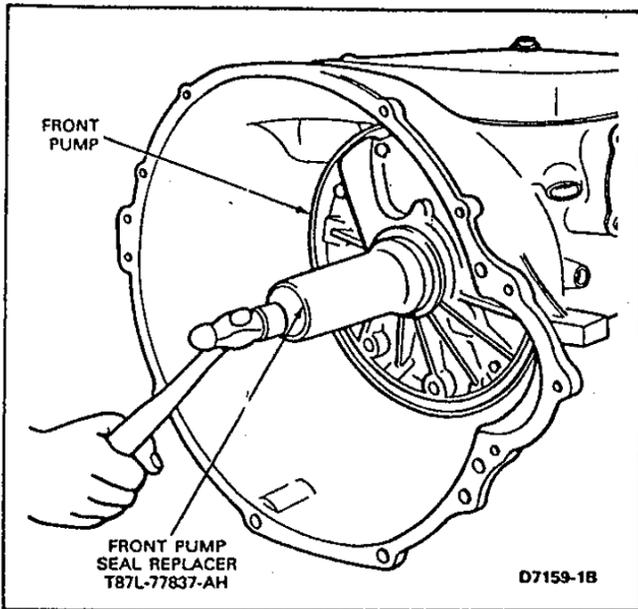


FIG. 35 Installing Front-Pump Seal

T87L-77837-AH or equivalent for installation (Figs. 34 and 35).

**Disassembly**

1. Remove the two seal rings and the selective thrust washer (Fig. 36).
2. Remove the large square-cut seal from the outside diameter of the pump housing.
3. Remove the five bolts that secure the stator support to the pump housing. Lift the support from the housing.
4. Remove the drive and the driven gear from the housing.
5. If the pump housing bushing is worn or damaged, replace it using the handle and Tool T66L-7003-C2 or equivalent shown in Fig. 37.

Place the new bushing in position, making sure the half moon slot in the bushing is on top and in line with the oil lube hole near the seal bore. Press

the bushing in 1.52-2.03mm (0.060-0.080 inch) below the front face of the bushing bore. Use Tool T66L-7003-C2 or equivalent and handle to seat the bushing properly. After assembly, the half moon slot must be in past the lube hole to provide proper lubrication.

**Assembly**

1. Install the drive and driven gears in the pump housing. Each gear has either an identification mark or chamfered teeth on one face. The identification mark or the chamfered surface on each gear must be installed toward the front of the pump housing.
2. Position the stator support in the pump housing and install the five attaching bolts. Tighten bolts to 17-21 N·m (12-16 ft-lbs).
3. Carefully install two new seal rings on the stator support. Make sure that the ends of the rings are engaged to lock them in place. Install a new square-cut seal on the outside diameter of the pump housing.
4. Install the selective thrust washer. Make sure that the correct thickness selective washer is being used to obtain the specified end play. Refer to Specifications at end of this Section.
5. Place the pump on the converter, making sure that the drive gear engages the converter hub. Rotate the pump to make sure that the gears rotate freely.

**Reverse-High Clutch**

**Disassembly**

1. Separate the drive train as shown in Fig. 38. Remove the pressure plate snap ring as shown in Fig. 39.
2. Remove the pressure plate and the drive and driven (internal and external spline) clutch plates (Fig. 40).
3. Install Clutch Spring Compressor, Tool T65L-77515-A (Fig. 41) on the reverse-high clutch drum. Make sure that the legs clear the snap ring enough to remove it. Remove the snap ring and remove the tool.

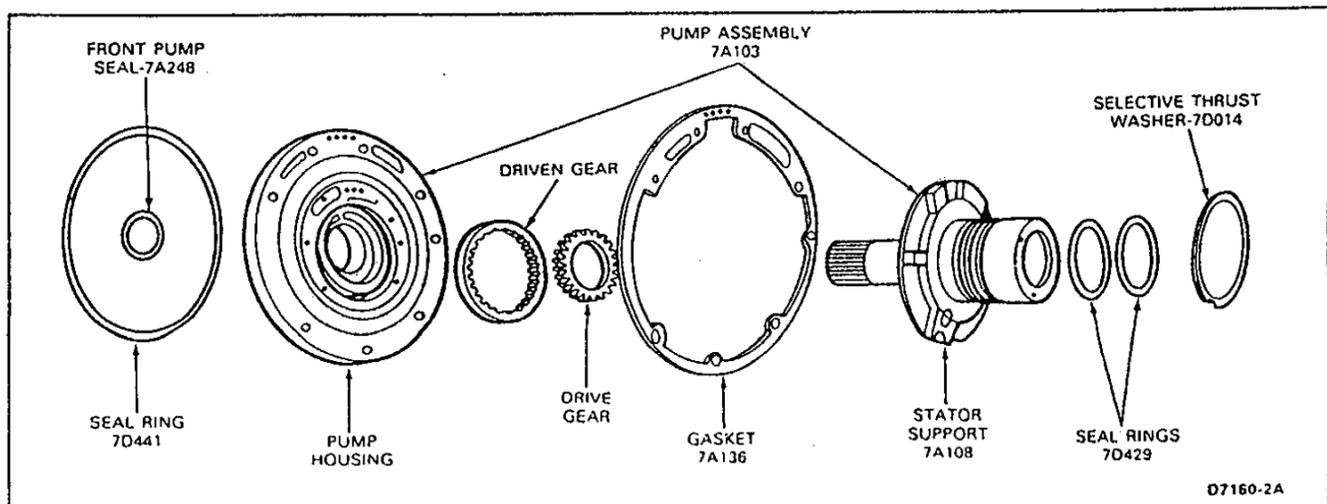
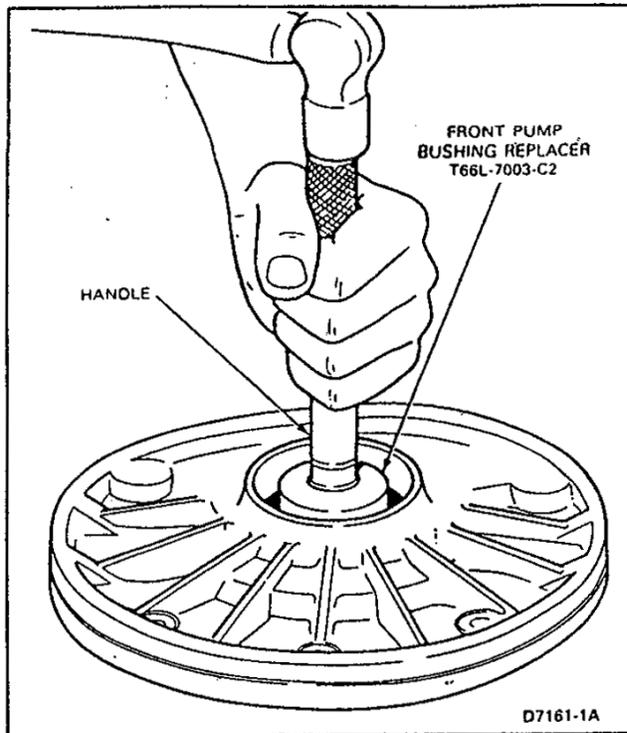


FIG. 36 Front Pump Disassembled



**FIG. 37 Replacing Front Pump Housing Bushing**

4. Remove the spring retainer and the piston return springs.
5. Apply air pressure to the piston apply hole in the clutch hub using TOOL-7000-DE or equivalent (Fig. 42) and remove the piston.
6. Remove the piston outer seal from the piston and the inner seal from the clutch drum (Fig. 40).
7. Remove the front and rear bushings from the clutch drum if they are worn or damaged. To remove the front bushing, use a cape chisel and cut along the bushing seam until the chisel breaks through the bushing wall. Pry the loose ends of the bushing up with an awl and remove the bushing. To remove the rear bushing, use Tool T69L-7D044-B or equivalent shown in Fig. 43, and press the bushing from the drum.

#### Assembly

1. If the clutch drum bushings were removed, position the drum in a press and press new bushings into the drum with the Tool T69L-7D044-B or equivalent shown in Figs. 43 and 44.
2. Dip the new seals in transmission fluid and install one on the drum and one on the piston.
3. Install the piston in the clutch drum.
4. Position the piston return springs in the piston sockets (Fig. 45). Place the spring retainer on the springs.
5. Install Clutch Spring Compressor, Tool T65L-77515-A (Fig. 41) and compress the springs. Make certain that the spring retainer is centered while compressing the springs. Install the snap ring. Before releasing the pressure on the tool, make certain that the snap ring is positioned

inside of the four snap ring guides on the spring retainer.

6. Clutch plate usage varies with each model, refer to the specifications at end of this Section for the number of plates required. Dip the clutch plates in clean transmission fluid. Install the clutch plates alternately starting with a steel drive (internal) plate (Fig. 40). When new composition clutch plates are used, soak the plates in automatic transmission fluid, Motorcraft MERCON® Multi-Purpose Automatic Transmission Fluid XT-2-QDX or DDX (ESP-M2C166-H) or equivalent, for 15 minutes before they are assembled.
7. After all clutch plates have been installed, position the pressure plate in the clutch drum. Install the pressure plate (selective) snap ring.
8. With a feeler gauge, check the clearance between the pressure plate and snap ring (Fig. 46).
9. The pressure plate should be held downward as the clearance is checked. The clearance should be 0.558-0.914mm (0.022-0.036 inch). If the clearance is not within specifications, selective thickness snap rings are available in the following thicknesses: 1.42-1.52mm (0.056-0.060 inch), 1.65-1.75mm (0.065-0.069 inch), 1.87-1.98mm (0.074-0.078 inch), 2.10-2.20mm (0.083-0.087 inch), 2.33-2.43mm (0.092-0.096 inch), 2.79-2.89mm (0.110-0.114 inch) and 3.25-3.35mm (0.128-0.132 inch). Install the correct size snap ring and re-check the clearance.

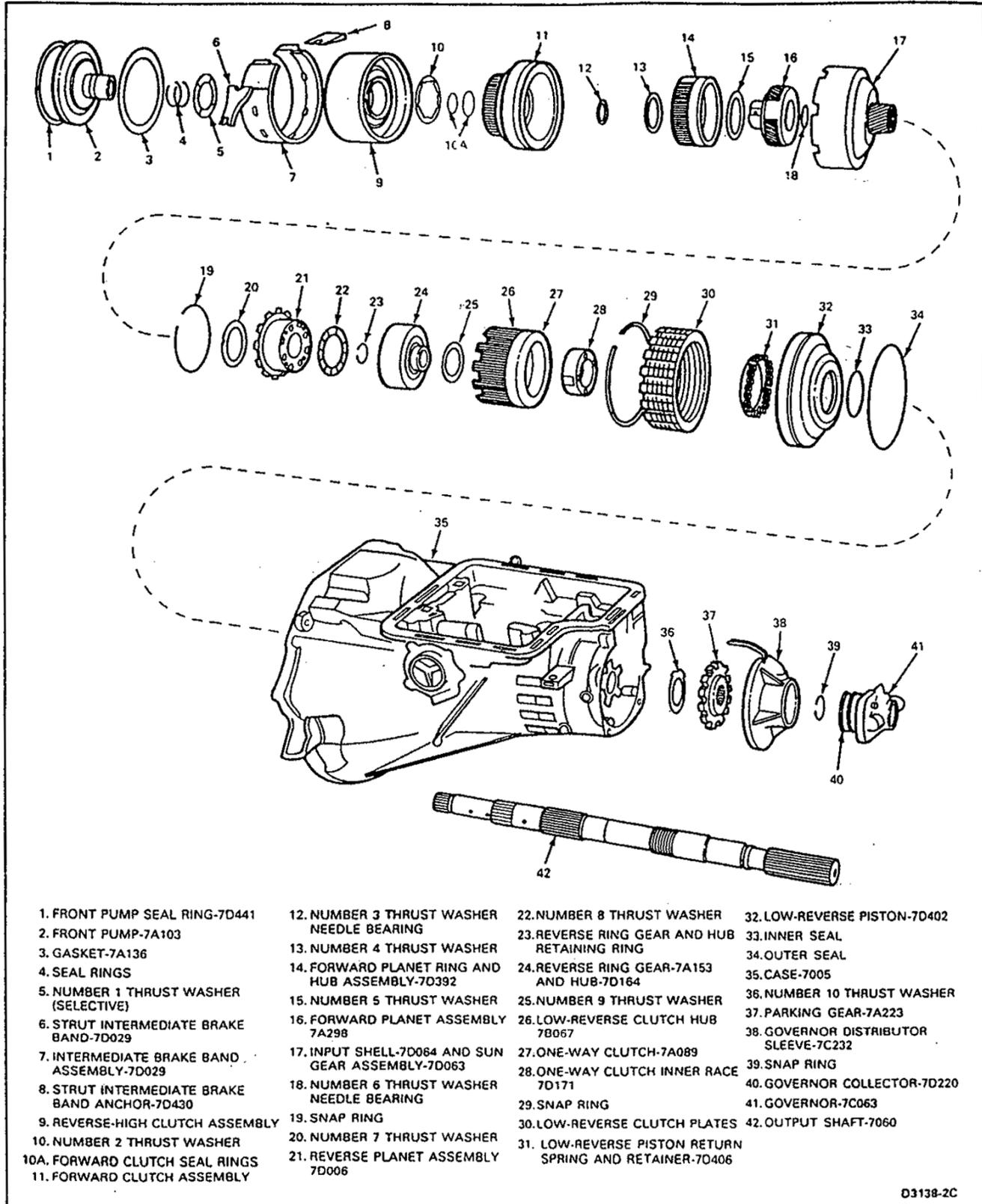
#### Forward Clutch

##### Disassembly

1. Remove the clutch pressure plate snap ring (Fig. 47).
2. Remove the rear pressure plate, the drive and driven plates, wave plate, and the forward pressure plate from the clutch hub (Fig. 48).
3. Remove the snap ring (Fig. 49) that secures the disc spring in the clutch cylinder. Remove the disc spring and steel ring using Tool T65L-77515-A.
4. Apply air pressure to the clutch cylinder using TOOL-7000-DE or equivalent (Fig. 50) to remove the piston.
5. Remove the seal from the piston and the seal from the clutch hub (Fig. 48).

##### Assembly

1. Dip two new seals in transmission fluid, Motorcraft MERCON® Multi-Purpose Automatic Transmission Fluid XT-2-QDX or DDX (ESP-M2C166-H) or equivalent. Install the smaller seal on the clutch hub and the lip seal on the clutch piston.
2. Install the clutch piston and lip seal with Lip Seal Protector, T77L-77548-A, (Fig. 51).
3. Position the installation tool into the forward clutch cylinder, so that the bore of the tool is aligned with the piston bore in the cylinder. Press the piston into the cylinder until it bottoms in the bore. Remove the installation tool.
4. Make sure that the steel pressure ring is in the groove on the piston. Position the disc spring in the cylinder with the dished face downward. Install the spring as shown in Fig. 49 so that the



D3138-2C

FIG. 38 Drive Train Disassembled—Typical

- |  |  |  |  |
|--|--|--|--|
| 1. FRONT PUMP SEAL RING-7D441                    | 12. NUMBER 3 THRUST WASHER<br>NEEDLE BEARING         | 22. NUMBER 8 THRUST WASHER                                 | 32. LOW-REVERSE PISTON-7D402             |
| 2. FRONT PUMP-7A103                              | 13. NUMBER 4 THRUST WASHER                           | 23. REVERSE RING GEAR AND HUB<br>RETAINING RING            | 33. INNER SEAL                           |
| 3. GASKET-7A136                                  | 14. FORWARD PLANET RING AND<br>HUB ASSEMBLY-7D392    | 24. REVERSE RING GEAR-7A153<br>AND HUB-7D164               | 34. OUTER SEAL                           |
| 4. SEAL RINGS                                    | 15. NUMBER 5 THRUST WASHER                           | 25. NUMBER 9 THRUST WASHER                                 | 35. CASE-7005                            |
| 5. NUMBER 1 THRUST WASHER<br>(SELECTIVE)         | 16. FORWARD PLANET ASSEMBLY<br>7A298                 | 26. LOW-REVERSE CLUTCH HUB<br>7B067                        | 36. NUMBER 10 THRUST WASHER              |
| 6. STRUT INTERMEDIATE BRAKE<br>BAND-7D029        | 17. INPUT SHELL-7D064 AND SUN<br>GEAR ASSEMBLY-7D063 | 27. ONE-WAY CLUTCH-7A089                                   | 37. PARKING GEAR-7A223                   |
| 7. INTERMEDIATE BRAKE BAND<br>ASSEMBLY-7D029     | 18. NUMBER 6 THRUST WASHER<br>NEEDLE BEARING         | 28. ONE-WAY CLUTCH INNER RACE<br>7D171                     | 38. GOVERNOR DISTRIBUTOR<br>SLEEVE-7C232 |
| 8. STRUT INTERMEDIATE BRAKE<br>BAND ANCHOR-7D430 | 19. SNAP RING  | 29. SNAP RING  | 39. SNAP RING                            |
| 9. REVERSE-HIGH CLUTCH ASSEMBLY                  | 20. NUMBER 7 THRUST WASHER                           | 30. LOW-REVERSE CLUTCH PLATES                              | 40. GOVERNOR COLLECTOR-7D220             |
| 10. NUMBER 2 THRUST WASHER                       | 21. REVERSE PLANET ASSEMBLY<br>7D066                 | 31. LOW-REVERSE PISTON RETURN<br>SPRING AND RETAINER-7D406 | 41. GOVERNOR-7C063                       |
| 10A. FORWARD CLUTCH SEAL RINGS                   |  |  | 42. OUTPUT SHAFT-7060                    |
| 11. FORWARD CLUTCH ASSEMBLY                      |  |  |  |

pressure ring and spring are in contact. Secure the disc with the retaining snap ring.

5. Install the forward pressure plate with the flat side up and the beveled side downward. Dip the clutch plates in clean transmission fluid (Specification Motorcraft MERCON® Multi-Purpose Automatic Transmission Fluid XT-2-QDX or DDX (ESP-M2C166-H) or equivalent). Next, install the wave plate, then a steel plate and a composition driven plate. Install the remaining plates in this sequence (Fig. 48).

Refer to the Specification at end of this Section for the number of plates required. The last plate installed will be the rear pressure plate. Install the snap ring and make certain that it seats fully in the groove.

6. With a feeler gauge, check the clearance between the snap ring and the pressure plate (Fig. 52). Downward pressure on the plate should be maintained when making this check. Clearance should be 0.533-1.168mm (0.021-0.046 inch).

7. If the clearance is not within specifications, selective snap rings are available in the following thicknesses: 1.42-1.52mm (0.056-0.060 inch), 1.65-1.75mm (0.065-0.069 inch), 1.87-1.98mm (0.074-0.078 inch), 2.10-2.20mm (0.083-0.087 inch), 2.33-2.43mm (0.092-0.096 inch), 2.79-2.89mm (0.110-0.114 inch) and 3.25-3.35mm (0.128-0.132 inch). Insert the correct size snap ring and recheck the clearance.

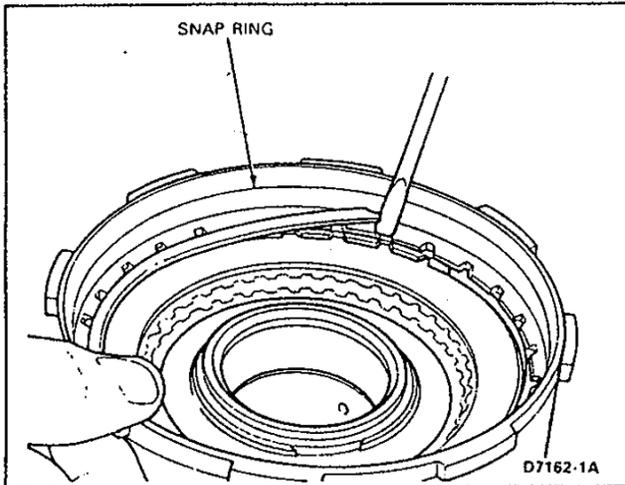


FIG. 39 Removing or Installing Reverse-High Clutch Pressure Plate Snap Ring

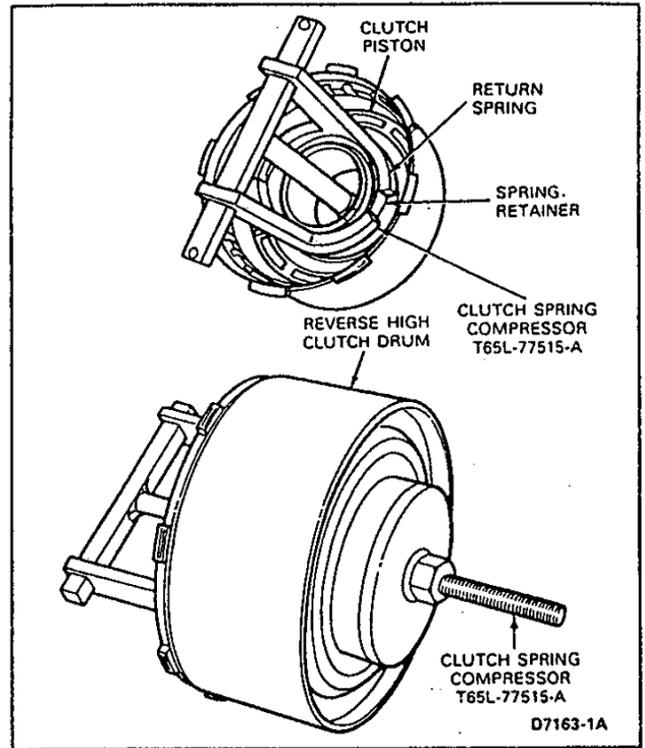


FIG. 41 Removing or Installing Reverse-High Clutch Piston Snap Ring

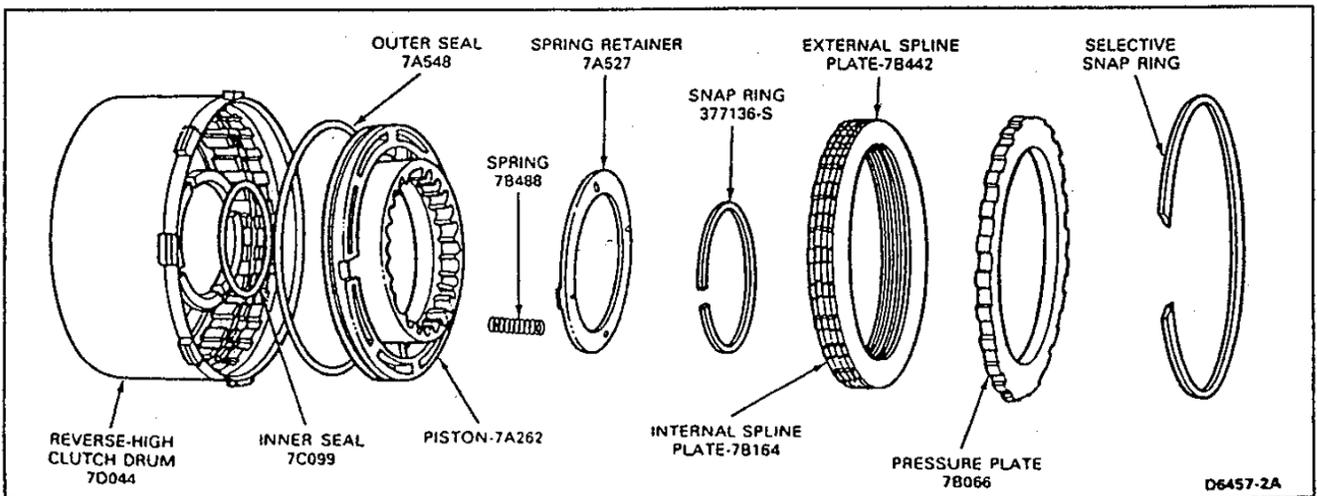


FIG. 40 Reverse-High Clutch Disassembled

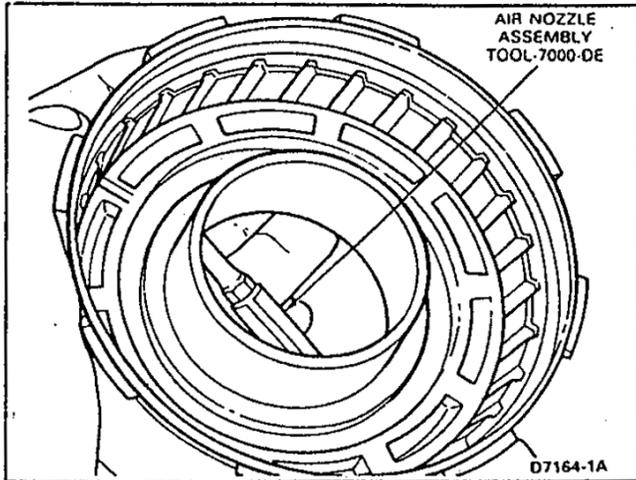


FIG. 42 Removing Reverse-High Clutch Piston

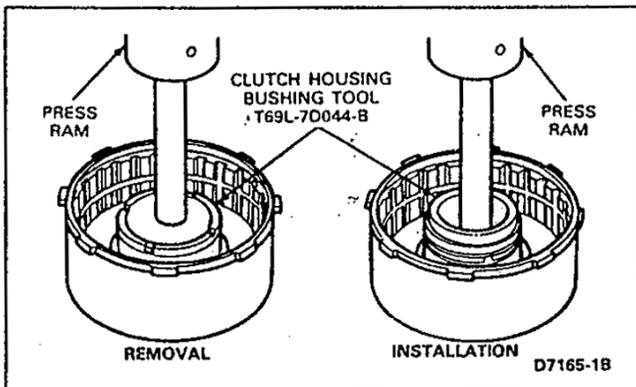


FIG. 43 Replacing Reverse-High Clutch Rear Bushing

### Input Shell and Sun Gear

#### Disassembly

1. Remove the rear snap ring from the sun gear as shown in Fig. 53.
2. Remove the thrust washer wear plate from the input shell and sun gear (Fig. 54).
3. Working from inside the input shell remove the sun gear. Remove the snap ring from the gear.

#### Assembly

1. Install the forward snap ring on the forward end (short end) of the sun gear (Fig. 54). Working from inside the input shell, slide the sun gear and snap ring into place making sure that the longer end is at the rear (Fig. 54).
2. Place the thrust washer wear plate on the sun gear and install the rear snap ring.

### Output Shaft Hub and Ring Gear

#### Disassembly

1. Remove the hub snap ring (Fig. 55) from the ring gear.
2. Lift the hub from the ring gear.

#### Assembly

1. Position the hub in the ring gear.

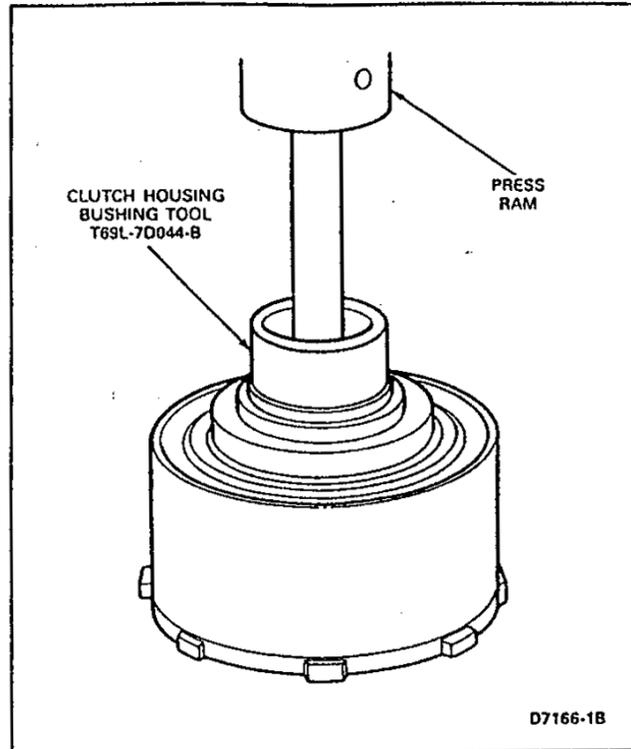


FIG. 44 Installing Reverse-High Clutch Front Bushing

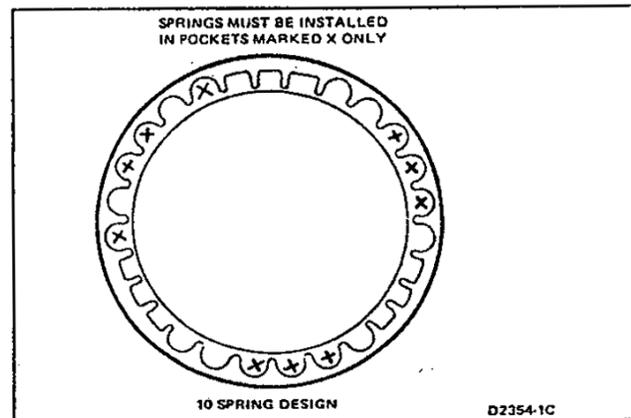


FIG. 45 Reverse-High Clutch Piston Return Spring Locations

2. Secure the hub with the snap ring. Make certain that the snap ring is fully engaged with the groove.

### One-Way Clutch

#### Disassembly

1. Remove the snap ring and bushing from the rear of the low-reverse clutch hub (Fig. 56).
2. Remove the rollers from the spring assembly and lift the spring assembly from the hub.
3. Remove the remaining snap ring from the hub.

#### Assembly

1. Install a snap ring in the forward snap ring groove of the low-reverse clutch hub.

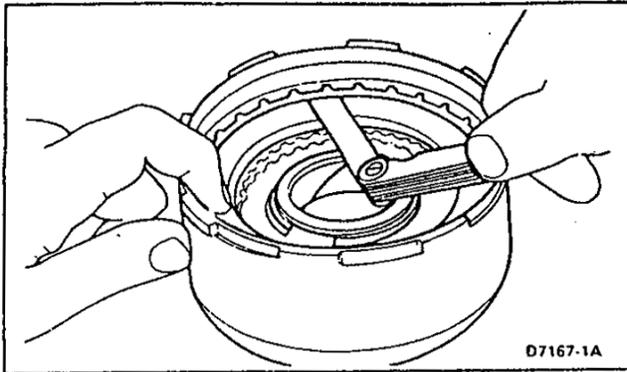


FIG. 46 Checking Reverse-High Clutch Snap Ring Clearance:

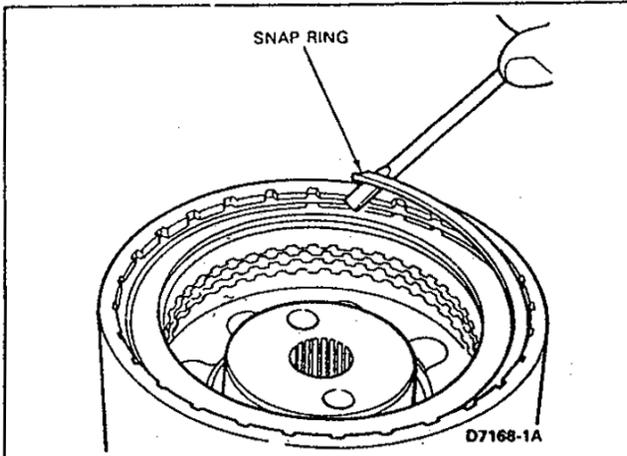


FIG. 47 Removing Forward Clutch Pressure Plate Snap Ring

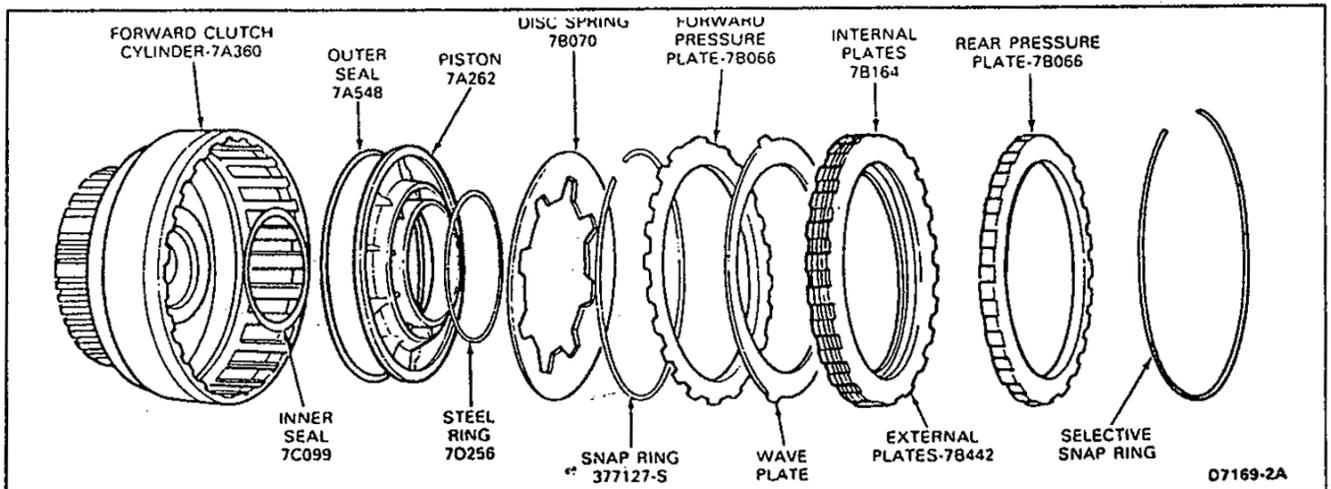


FIG. 48 Forward Clutch Disassembled

- Place the low-reverse clutch hub on the bench with the forward end down (Fig. 57).
- Install the one-way clutch spring assembly on top of the snap ring.
- Install a roller into each of the spring assembly compartments (Fig. 56).
- Install the bushing on top of the spring assembly.
- Install the remaining snap ring at the rear of the low-reverse clutch hub to secure the assembly (Fig. 56).

### Low-Reverse Clutch Piston

#### Disassembly

- Remove the inner and the outer seal from the low-reverse clutch piston (Fig. 38).

#### Assembly

- Dip the two new seals in clean transmission fluid, Motorcraft MERCON® Multi-purpose Automatic Transmission Fluid XT-2-QDX or DDX (ESP-M2C166-H) or equivalent.
- Install the seals on the piston.

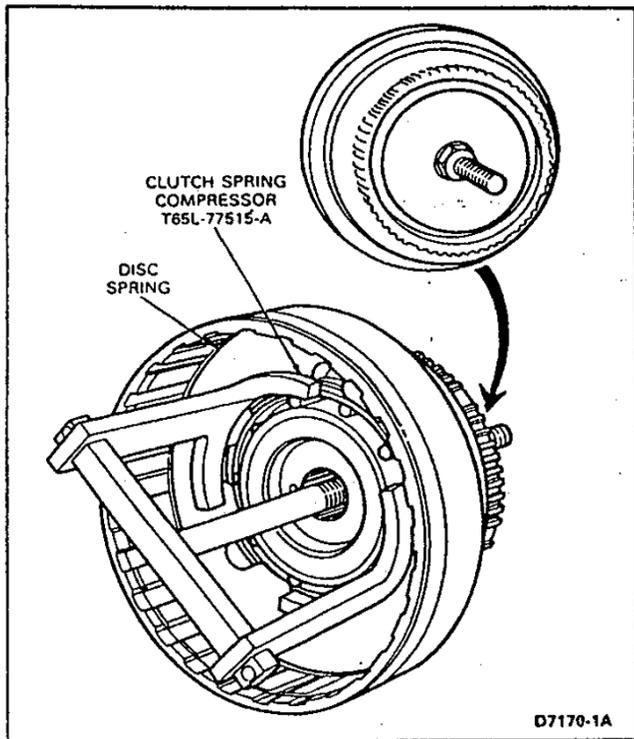


FIG. 49 Removing or Installing Disc Spring

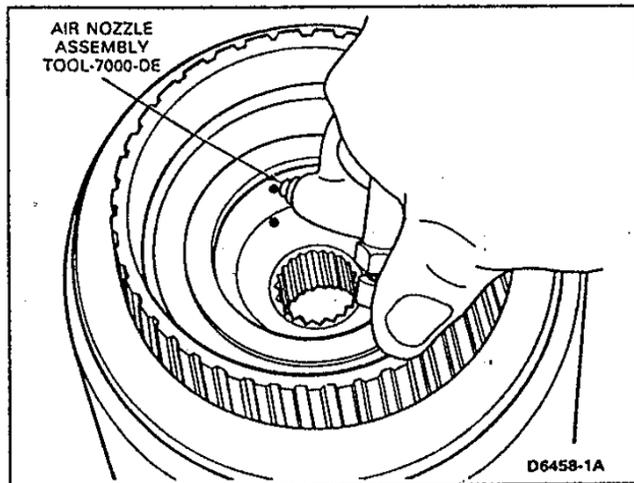


FIG. 50 Removing Forward Clutch Piston

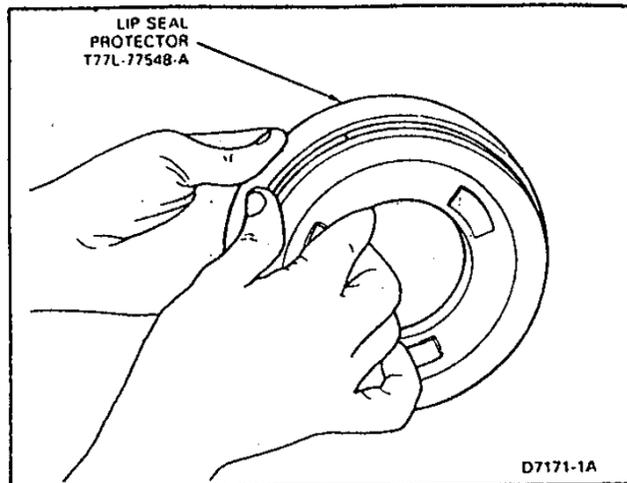


FIG. 51 Installing Forward Clutch Piston and Lip Seal

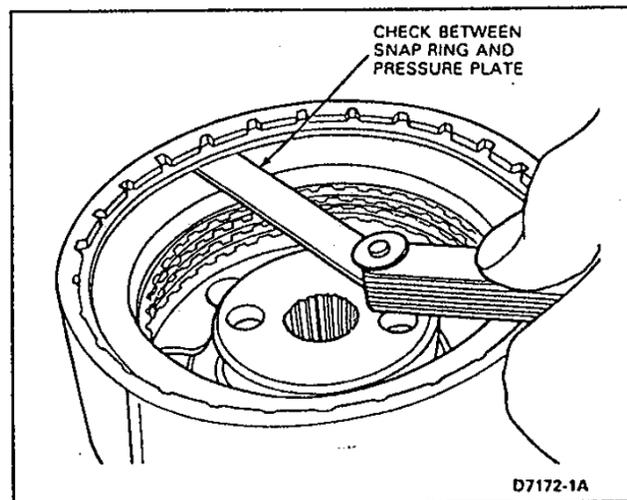


FIG. 52 Checking Forward Clutch Clearance

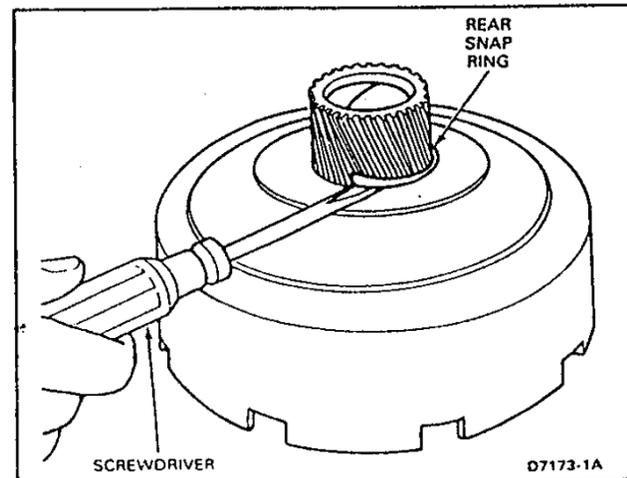


FIG. 53 Removing Sun Gear Snap Ring

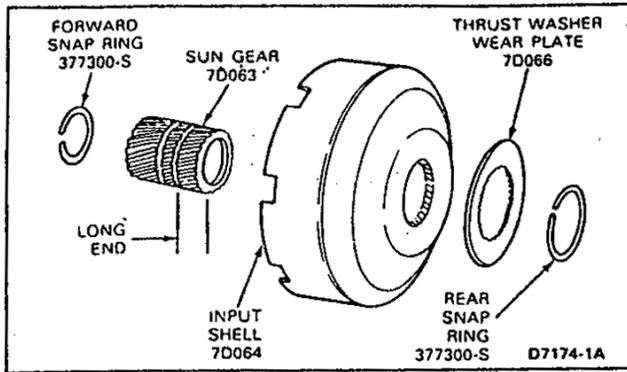


FIG. 54 Input Shell and Sun Gear Disassembled

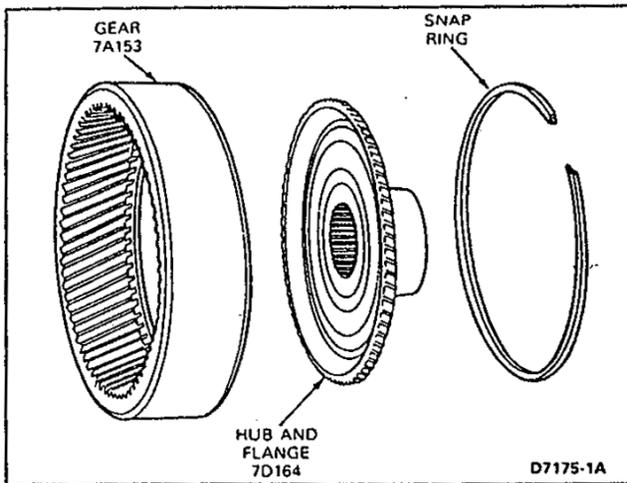


FIG. 55 Output Shaft Hub and Ring Gear

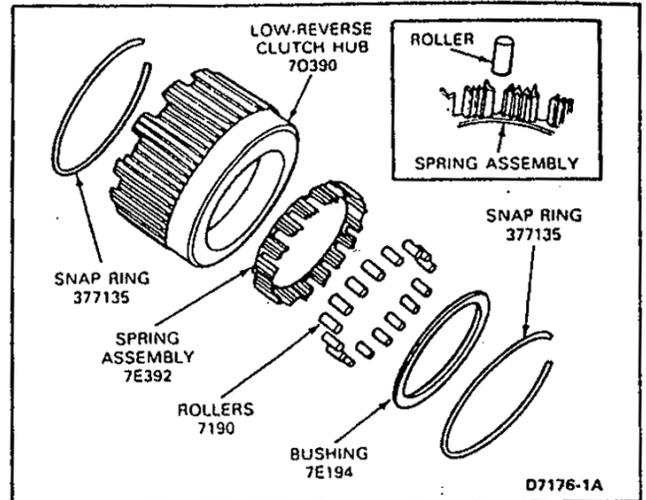


FIG. 56 One-Way Clutch Disassembled

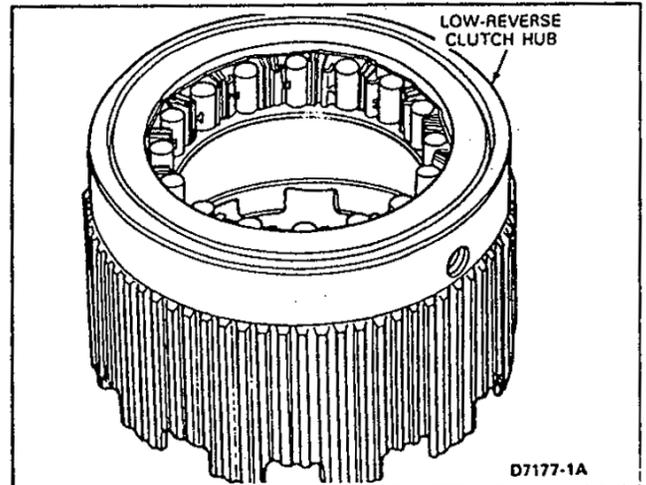


FIG. 57 One-Way Clutch Installed

**SPECIFICATIONS**
**C6 — TRANSMISSION REFILL CAPACITY**

Vehicle	U.S. Quarts	Capacity Imperial Quarts	Liters
	11-3/4	9.4	11.2
	13-1/2	10.8	12.7

**SELECTIVE THRUST WASHERS (FRONT PUMP SUPPORT)**

Identification Color	Thickness	
	MM	Inch
Blue	1.42-1.52	0.056-0.060
Natural (White)	1.85-1.95	0.073-0.077
Red	2.23-2.33	0.088-0.092

**TRANSMISSION CLUTCH PLATE USAGE**

Transmission Model	Steel	Friction	Clearance	
			MM	Inch
<b>Forward Clutch</b>				
PGD, PJD	4①	4	0.533-1.168	0.021-0.046
<b>High Clutch</b>				
PGD, PJD	3	3	0.558-0.914	0.022-0.036
<b>Reverse Clutch</b>				
PJD	5②	5	—	—
PGD	4②	4	—	—

① Plus a waved plate (7E457) next to inner pressure plate.

② Plus a waved plate next to the piston.

**CLUTCH SNAP RINGS**

Part Number	Thickness		Forward	High
	MM	Inch		
377434	1.52-1.42	0.060-0.056	X	X
377126	1.75-1.62	0.069-0.064		X
377127	1.98-1.87	0.078-0.074	X	X
377128	2.20-2.10	0.087-0.083		X
377444	2.43-2.33	0.096-0.092	X	X
386841	2.89-2.79	0.114-0.110	X	
386842	3.35-3.25	0.132-0.128	X	

**CHECKS AND ADJUSTMENTS**

Operation	Specification
Transmission End Play	0.203-1.117 mm. (0.008-0.044 inch) (Selective Thrust Washers Available)
Torque Converter End Play	New or rebuilt 0.533 mm. (0.021 inch) max. Used 1.016 mm. (0.040 inch) max. ①
Intermediate Band Adjustment	Remove and discard locknut. Install new locknut. Adjust screw to 14 N·m (10 ft-lbs) torque, then back off 1-1/2 turns. Hold screw and tighten locknut to 54 N·m (40 ft-lbs)
Forward Clutch Pressure Plate-to-Snap Ring Clearance	0.533-1.168 mm. (0.021-0.046 inch)

Operation	Specification
Selection Snap-Ring Thickness	1.42-1.52 mm. (0.056-0.060 inch) 1.62-1.75 mm. (0.064-0.069 inch) 1.87-1.98 mm. (0.074-0.078 inch) 2.10-2.20 mm. (0.083-0.087 inch) 2.33-2.43 mm. (0.092-0.096 inch) 2.79-2.89 mm. (0.110-0.114) 3.25-3.35 mm. (0.128-0.132 inch)
Reverse-High Clutch Pressure Plate-to-Snap Ring Clearance	0.558-0.914 mm. (0.022-0.036 inch)
Selective Snap Ring Thickness	1.42-1.52 mm. (0.056-0.060 inch) 1.62-1.75 mm. (0.064-0.069 inch) 1.87-1.98 mm. (0.074-0.078 inch) 2.10-2.20 mm. (0.083-0.087 inch) 2.33-2.43 mm. (0.092-0.097 inch)

① To check end play, exert force on checking tool to compress turbine to cover thrust washer wear plate. Set indicator at zero.

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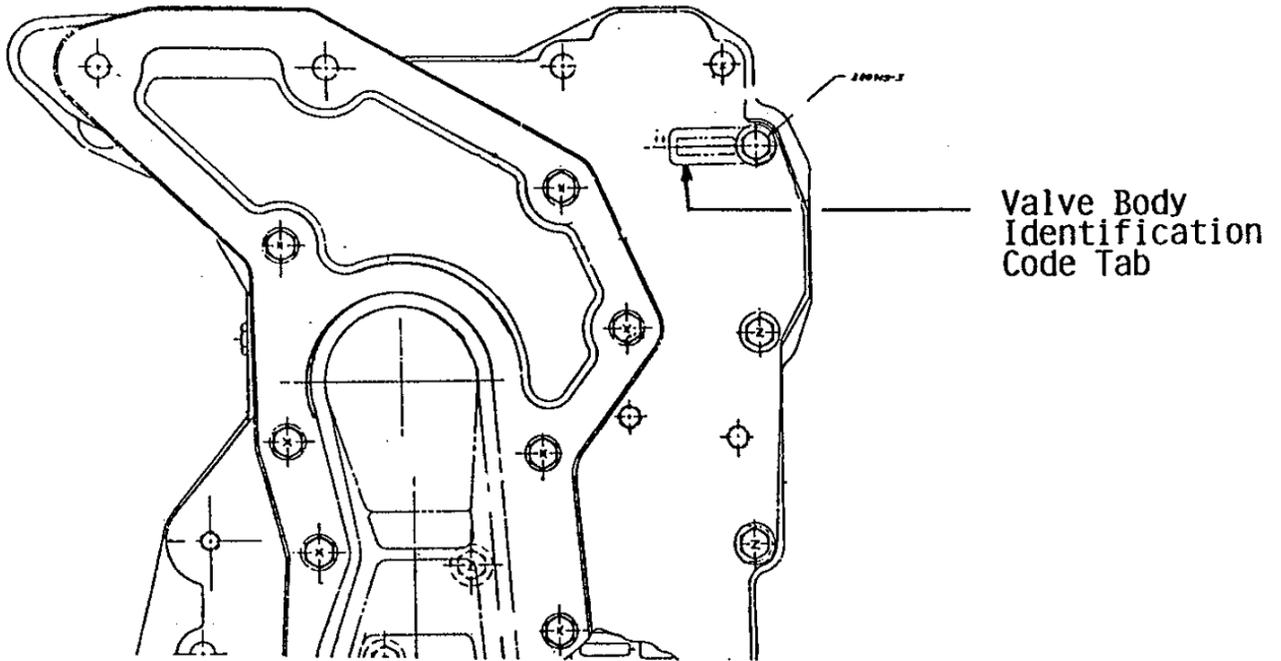


Figure 58 - Valve Body Identification

Valve Body Identification Codes

2 Speed

MD MP  
 ME MS  
 MG MT  
 MF MU  
 MH MV  
 MJ MW  
 MK MX  
 ML MY  
 MM

3 Speed

LN LZ  
 LM MA  
 LP MB  
 LT MC  
 LU M3  
 LY



# Chapter - 10

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*OMSI Drive Axle*



*TA-268*



*TA-267*

# Drive Axle Service

## CHECK OIL LEVEL

### TA-268

#### **⚠ WARNING**

1. Make sure the ignition switch is in the "OFF" position.
2. Place the transmission shift lever in the Park or Neutral position
3. Set the park brake.
4. Place blocks under the front wheels 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.

5. Park the vehicle on a level surface.
6. Remove the oil level plug (A) on the axle housing.
7. The oil level should be very close to the bottom of the level plug hole.
8. Reinstall the plug.
9. Rotate the wheel hub so that the fill/level/drain plug is positioned as shown in the illustration.
10. Remove the plug.
11. The oil level should be very close to the bottom of the plug hole.
12. Reinstall the plug.



*Planetary Hub*

### TA-267

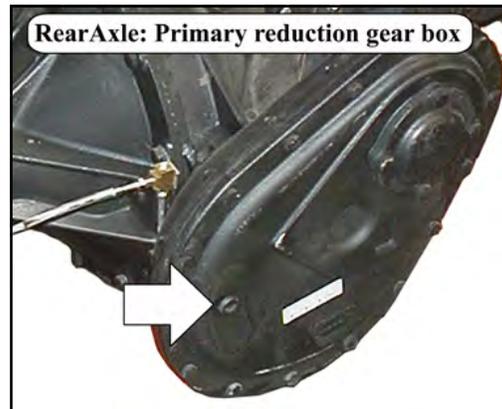
#### **⚠ WARNING**

1. Make sure the ignition switch is in the "OFF" position.
2. Place the transmission shift lever in the Park or Neutral position
3. Set the park brake.
4. Place blocks under the front wheels 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.

5. Park the vehicle on a level surface.
6. Remove the oil level plugs on the primary and secondary reduction gear boxes.
7. The oil level should be very close to the bottom of the level plug hole.
8. Reinstall the plugs.



*Level Plug, Primary Case*



*Level Plug, Secondary Case*



## Omsi Axle

### ⚠ WARNING

1. Make sure the ignition switch is in the "OFF" position.
2. Place the transmission shift lever in the Park or Neutral position
3. Set the park brake.
4. Place blocks under the front wheels to prevent vehicle movement.

### ⚠ WARNING

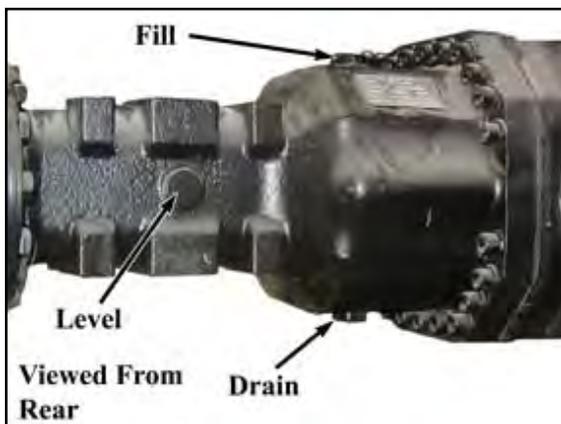
Always use a lifting strap, hoist, and jack stands, of adequate capacity to lift and support the vehicle. Failure to use lifting and support devices of rated load capacity may result in severe bodily injury.

There are three individual sections in the drive axle that require oil: Left planetary hub, right planetary hub, and center section. Refer to the Lubrication section for type and quantity of oil.

5. Park the vehicle on a level surface.
6. Remove one of the oil level plugs on an axle housing.
7. The oil level should be very close to the bottom of the level plug hole. If the level is low, add through the fill plug as required.
8. Reinstall the plug.
9. Rotate the wheel hub (right or left) until the fill/level/drain plug is horizontal to the ground.
10. Remove the plug.
11. The oil level should be very close to the bottom of the plug. If the level is low, add through the plug as required.
12. Repeat for the opposite side hub.
13. Reinstall plugs.



*Wheel Hub Plug  
Shown in 'level' position*



*Axle Housing Plugs*

## CHANGE OIL

### TA-268

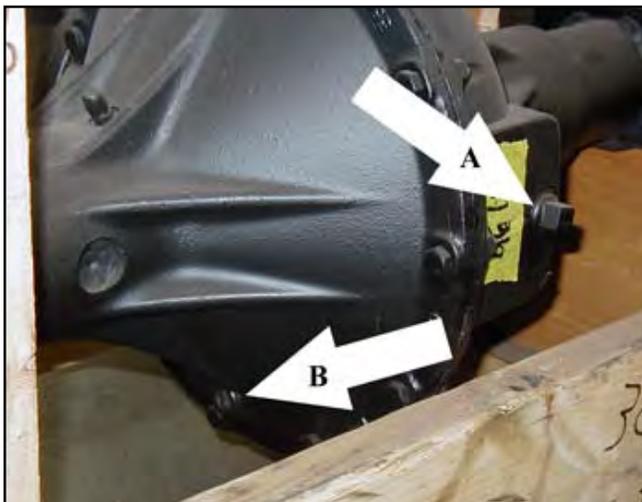
#### **⚠ WARNING**

1. Make sure the ignition switch is in the "OFF" position.
2. Place the transmission shift lever in the Park or Neutral position
3. Set the park brake.
4. Place blocks under the rear wheels 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.

5. Rotate the wheel hubs so that the fill/level/drain plugs are at the bottom of the hub.
6. Place an oil drain pan underneath the drive axle and both wheel hubs.
7. Remove the drain plug axle housing (B) and the plugs on each wheel hub.
8. Remove the fill plug from the axle housing (A).
9. Allow all oil to drain from the gear boxes.
10. Install the drain plug on the axle housing (B).
11. Rotate both wheel hubs so that the fill/level/drain plugs are at the "level" position as shown in the illustration
12. Fill the gear cases with oil up to the bottom of the level plug holes. Refer to Lubrication section for oil specification.
13. Install the level plugs.



*Axle Housing*

### TA-267

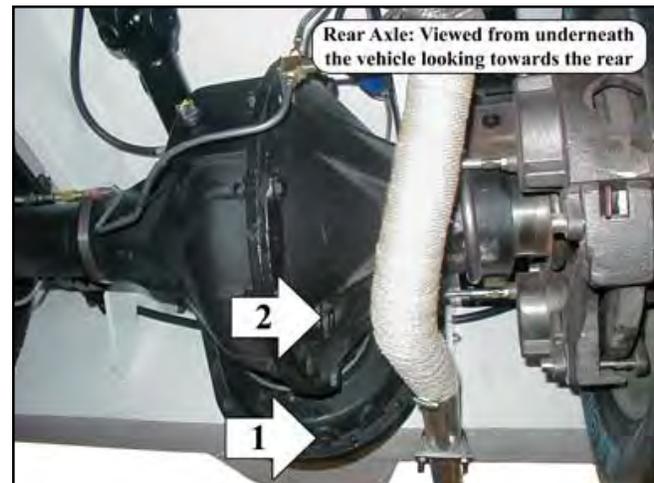
#### **⚠ WARNING**

1. Make sure the ignition switch is in the "OFF" position.
2. Place the transmission shift lever in the Park or Neutral position
3. Set the park brake.
4. Place blocks under the front wheels 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.

5. Place an oil drain pan underneath the drive axle.
6. Remove the drain plugs on the primary (1) and secondary (2) reduction gear boxes.
7. Remove the level plugs on the primary and secondary reduction gear boxes.
8. Allow all oil to drain from the gear boxes and install the drain plugs.
9. Fill both gear cases with oil up to the bottom of the level plug holes. Refer to Lubrication section for oil specification.
10. Install the level plugs.



*Drain Plugs*



## Omsi Axle

### ⚠ WARNING

1. Make sure the ignition switch is in the "OFF" position.
2. Place the transmission shift lever in the Park or Neutral position
3. Set the park brake.
4. Place blocks under the front wheels to prevent vehicle movement.

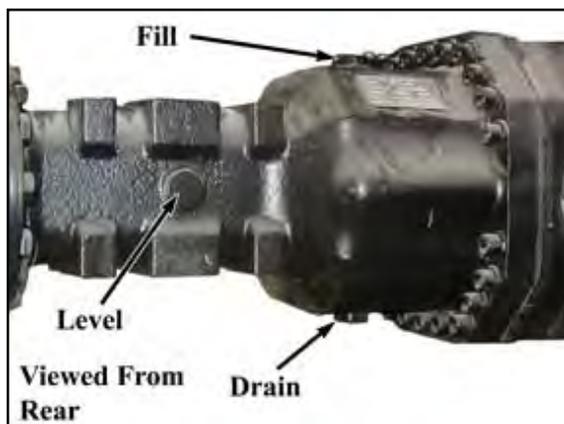
### ⚠ WARNING

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.

5. Raise the rear wheels off of the ground and support with jack stands.
6. Remove the rear wheels.
7. Place an oil drain pan underneath the drive axle and both wheel hubs.
8. Rotate the wheel hubs so that the fill/level/drain plugs are at the bottom.
9. Remove the drain plugs on the left and right rear axle housings and both wheel hubs.
10. Allow all oil to drain from the gear boxes and reinstall the drain plugs on the axle housings.
11. Rotate both hubs so that the fill/level/drain plug is horizontal to the ground.
12. Remove one of the oil level plugs on an axle housing.
13. Fill all three cases with oil up to the bottom of the level plug holes. Refer to Lubrication section for oil specification.
14. Install the level plugs.



*Wheel Hub Plug  
Shown in 'level' position*



*Axle Housing Plugs*



## ***DRIVE AXLE SERVICE***

---

The information on the following pages was provided by the axle manufacturer.

This section covers two drive axle configurations:

- TA268 - Primary reduction is ring and pinion gears with planetary gear hubs for secondary reduction. Equipped with drum brakes.
- TA267 - Primary reduction is a nose reduction gear box with ring and pinion gear secondary reduction. Equipped with disc brakes.



*TA268 Drive Axle*



*TA267 Drive Axle*



*OMSI Drive Axle*

Service information for the OMSI drive axle is in manual M7-001-41 and can be found on the CD included with your vehicle.

Additional Manuals may be purchased through your local Taylor-Dunn® distributor. A service manual order form is available on the vehicle CD.

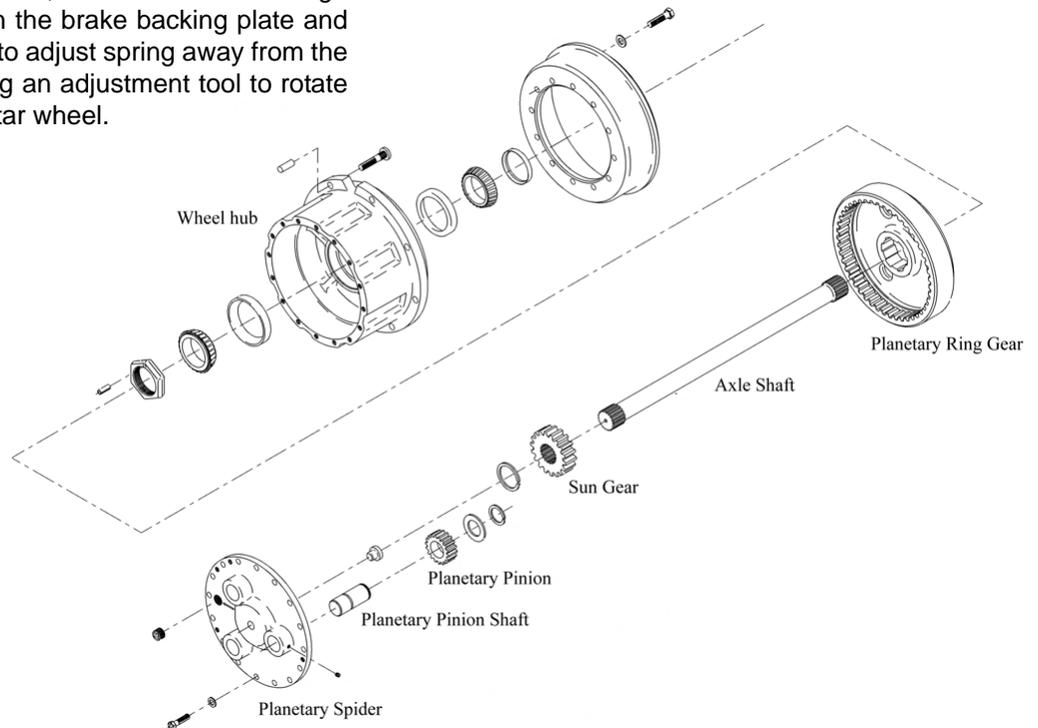
## DISASSEMBLY

Perform the following prior to disassembly.

1. Remove axle from vehicle if required.
2. Clean exterior axle surfaces. Steam clean or pressure washer the complete axle assembly after plugging all breathers and vents. Do not direct full pressure at any seals. (input shall, wheel hubs or brakes)
3. Drain oil from nose box, axle housing and wheelends.

### Wheelend, Planetary - TA268 Drive Axle

1. Match mark the planetary spider and wheel hub prior to disassembly to assure correct alignment during reassembly.
2. Remove 16 planetary spider to wheel hub cap screws and washers.
3. Install three puller screws in tapped holes of planetary spider. Remove planetary spider assembly.
4. Remove snap ring and thrust washer from the ends of the three planetary pinion shafts. Remove the planetary pinions.
5. Remove the planetary pinion shaft setscrews from the three pinion shafts. Press each pinion shaft in the direction of the spider mounting flange to remove.
6. Remove axle shaft retaining snap ring from the axle shaft. Remove planetary sun gear and axle shaft.
7. Support the wheel hub assembly, remove planetary ring gear and wheel bearing adjusting nut.
8. Remove the outer wheel bearing cone. Remove the wheel hub and drum assembly. It may be necessary to manually retract the brake shoes to remove the hub and drum. If required, insert a stiff wire through the adjustment slot in the brake backing plate and push the stamped auto adjust spring away from the star wheel while using an adjustment tool to rotate the adjustment bolt star wheel.
9. For wheel hub disassembly, remove the wheel hub seal, inner bearing cone, inner bearing cup and outer bearing cup.
10. If servicing the DSH brakes, unscrew the capscrew from the auto adjuster pivot.
11. Disconnect the short link and long link from the auto adjuster pivot. Remove the two links.
12. Remove the green return spring and black return spring from their anchor pins.
13. Grasp the leading brake shoe assembly while removing the shoe retaining clip. Lift and rotate the clip until it is disconnected.
14. Remove the leading shoe, adjusting lever and adjusting bolt.
15. Grasp the trailing brake shoe assembly while removing the two retaining clips. Lift and rotate the clips until disconnected.
16. If complete wheel cylinder service is required, disconnect the hydraulic lines from the cylinder, remove the wheel cylinder mounting capscrews and wheel cylinder.



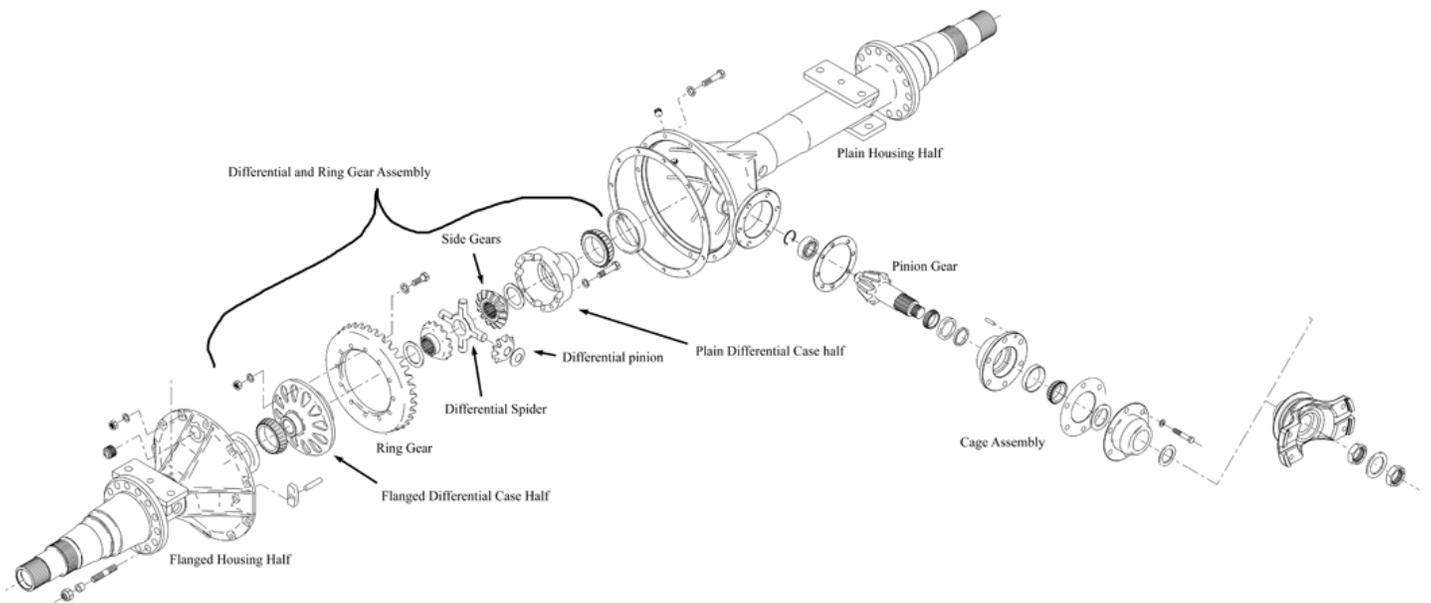
## Main Housing Disassembly

Both axle ends, brakes, and nose reduction (if equipped) must be removed before proceeding with this section.

1. With nose box, wheel ends, axle shafts and brakes removed; insert a long bar or tube 1 to 1-1/2 inch diameter thru the axle differential section and both axle housings. This will prevent dropping of the differential and bevel ring gear assembly when the case halves are split.
2. Remove the eleven capscrews, washers and locknuts securing the two axle housing halves. Remove the plain housing half.
3. Remove differential and bevel ring gear assembly. If bearing replacement is required, use a suitable bearing puller to remove the housing half tapered bearing cups from the housing halves.
4. Match mark the plain differential case half and flanged differential case half to aid alignment at reassembly.
5. Remove the eight differential case capscrews and washers. Separate the plain differential case half from the flanged differential case half.
6. Remove the two differential side gears, two side gear

thrust washers, four differential pinions, four pinion thrust washers and the differential spider.

7. If replacement of the bevel ring gear is required, remove the twelve capscrews, washers and locknuts securing the bevel ring gear to the flanged differential case half. Press the bevel ring gear off of the flanged differential case half using a suitable press.
8. Remove the bevel pinion and cage assembly and pinion cage gasket from the remaining housing half.
9. For bevel pinion gear or bearing replacement, place the bevel pinion and cage assembly in a suitable press and press the bevel pinion from the pinion cage assembly. The outer bearing cone and pinion bearing selective spacer will be pressed free along with the pinion cage assembly.
10. Remove the bevel pinion inner roller bearing snap ring. Press the bevel pinion inner roller bearing and inner tapered bearing cone free from the bevel pinion utilizing a suitable press.
11. Press tapered bearing cups free from the pinion cage utilizing a suitable press.



## **Nose Reduction Box Disassembly - TA267**

1. Loosen input shaft nut, remove washer and input flange from then input shaft.
2. Remove input shaft bearing cap screws, lock washers and bearing cap.
3. Remove snap ring from OD of input shaft outboard bearing.
4. Remove the fifteen reduction box cover to case capscrews, lock washers and nuts. Remove cover.
5. Remove input shaft with outboard bearing and inboard bearing. If bearing replacement is required, remove the outboard bearing snap ring and press both bearings off of the input shaft
8. Straighten the lock tabs on driven gear nut lock. Remove outer nut, lock and inner nut.
9. Remove driven gear using a gear puller and the 1/2-13 puller holes located in gear web section.
10. Remove driven gear thrust washer.
11. Remove the six reduction box case to axle locknuts and washers.
12. Remove reduction box case.

## ***PREPARE PARTS FOR ASSEMBLY***

### **Cleaning**

- Parts with Rough Finishes — Clean parts with a cleaning solvent and brush or hot tank the parts in a weak alkaline solution. Wash hot tanked parts with water to remove the alkaline solution.
- Parts with Machined or Ground Surfaces — Clean parts with a cleaning solvent and brush. Remove remaining gasket material using a gasket scraper, taking care to not damage the machined surfaces. Do not clean ground or polished parts with water, steam, alkaline solution, or place in a hot tank.

### **Drying**

- Dry all parts after washing using clean rags or paper towels.
- Corrosion Prevention — Apply a light oil film to all parts to be reused and reassembled.

### **Inspection**

**It is very important to inspect all parts carefully before the axle is reassembled. Replace all damaged parts.**

- All Seals/Gaskets — Replace only, do not reuse.
- All Bearings — Inspect all bearings, cups and cones for pitting or damage. Replace as required.
- All Castings — Inspect for damage or cracking. Replace as required. Do not weld.
- Drop/Reduction Gear set — Inspect both gears for pitting or damage. Replace as required.
- Bevel Gear Set — Inspect pinion and ring gear for pitting or damage. Replace only as a matched set.
- Differential Assembly — Inspect differential case thrust washers and thrust washer surfaces for wear or damage. Replace differential case and thrust washers as matched sets only. Inspect differential spider and pinion gears for wear or damage. Replace only in matched sets. Inspect differential side gears for wear or damage. Replace only in matched sets.
- Planetary Wheelend — Inspect all gearing for pitting or damage. Replace as required.
- Axle Shafts — Inspect both axle shafts for spline wear and evidence of torsional cracking. Mount shafts between centers and check for a maximum of 0.010 inch shaft runout. Replace if wear, cracks or excessive runout observed.



## **ASSEMBLY**

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### **Bevel Pinion and Cage Assembly**

1. Press inner roller bearing firmly against bevel pinion shoulder and install inner roller bearing snap ring.
2. Press inner tapered bearing cone firmly against bevel pinion shoulder.
3. Press tapered bearing cups firmly against the pinion cage shoulders.
4. Lubricate bearing cups and cones with a light machine oil.
5. Insert bevel pinion with inner tapered bearing cone in pinion cage.
6. If assembling a TA268; skip to step #9.
7. If assembling a TA267; position selective spacer over bevel pinion stem. Press outer tapered bearing cone firmly against the selective spacer. Rotate pinion bearing cage several revolutions to assure good bearing cone to cup contact.
8. While the bevel pinion and cage are still positioned in a hydraulic press, apply a 25,000 pound axial load to the bearings. Wrap a string around the 4.23 inch outer diameter of the pinion cage. Apply a pound scale to the string and observe the reading required to rotate the bearing cage. A reading of 2.5 to 7 pounds is required. If the reading is above 7 pounds, disassemble bevel pinion and cage and replace the selective spacer with a thicker selective spacer. If the reading is below 2.5 pounds, disassemble bevel pinion and cage and replace the selective spacer with a thinner spacer. Repeat this procedure until proper scale load is obtained. (If alternate selective thickness spacers are not available, grind stock from the existing spacer to increase preload or cut an additional shim from shim stock and add to the existing spacer to reduce preload). This completes the bevel pinion cage assembly, skip to next section.
9. If assembling a TA268; install outer bearing cone, bevel pinion thrust washer and bevel pinion inner nut. Tighten the nut to 350 foot pounds. Using an inch pound torque wrench, check bevel pinion bearing rolling torque. Tighten or loosen the nut to achieve 5-15 inch pound rolling torque. Once rolling torque is correct, install bevel pinion nut lock and bevel pinion outer nut. Tighten outer nut to 350 foot pounds and bend lock tabs of nut lock to secure both inner and outer nuts.

### **Differential and Bevel Ring Gear Assembly**

1. Press the bevel ring gear firmly against shoulder of flanged differential case half. Install the twelve capscrews, washers and locknuts securing the bevel ring gear to the flanged differential case half. Tighten the locknuts to 60-75 foot pounds.
2. Lubricate the differential pinion gears, pinion thrust washers, side gears, side gear thrust washers, spider, flanged differential case half and plain differential case half using gear lubricant.
3. Assemble differential components into the flanged differential case half. Install plain differential case half, aligning with mark on flanged differential case half. Install 4 differential case capscrews and washers equally spaced. Loosely tighten the cap screws and check for free rotation of the differential gearing. If rotation OK, install remaining capscrews and washers and tighten all capscrews to 85-115 foot pounds.
4. If differential tapered bearing cones are to be replaced, press new bearings squarely against differential case halves, seating fully.

### **Main Housing and Differential and Bevel Ring Gear Assembly**

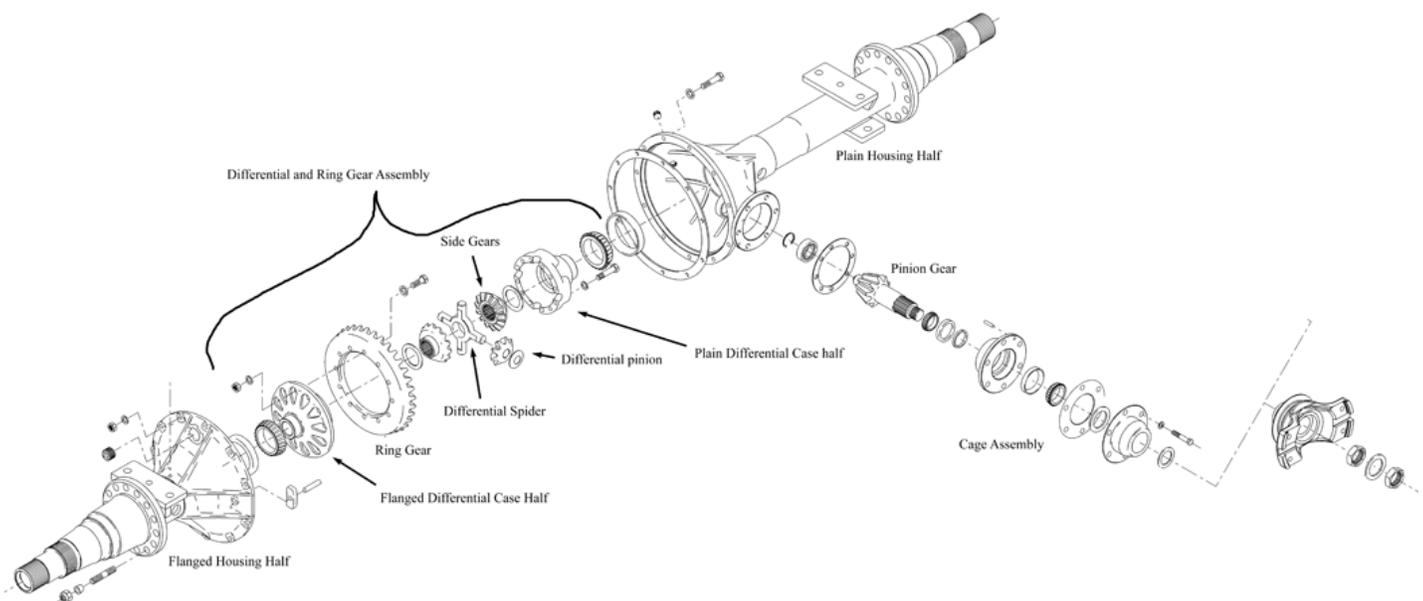
1. If the main housing half tapered bearing cups were removed from the housing halves, press new tapered bearing cups squarely into their bores, seating fully against the housing shoulders.
2. Lubricate the tapered bearing cups and cones and insert differential and bevel ring gear assembly into the pinion mount housing half(#). Install new housing half gasket on housing half flange after applying sealant to both faces of the gasket.
3. Install plain housing half aligning with mating holes in the pinion mount housing half. Install the eleven capscrews, lock washers and nuts. Torque to 65-85 foot pounds.
4. Check for free rotation of differential and bevel ring gear. If binding observed, disassemble housing halves, remove differential and ring gear and make certain that both differential tapered bearing cones and cups are fully seated against their respective shoulders.

## Main Housing and Pinion Cage Assembly

1. If assembling a TA267; skip to step #5.
2. If assembling a TA268; apply a light film of sealing compound to both sides of the pinion cage gasket. Install the gasket and pinion cage assembly in main housing half bore.
3. Press bevel pinion oil seal to bottom of bore in bevel pinion oil seal cover. Apply a 1/8 inch diameter bead of silicone gasket compound to the pinion cage/seal cover mounting surface. Install the cover and seal on the pinion cage.
4. Install six pinion cage capscrews and washers. Tighten capscrews to 130-165 foot pounds. This completes the main housing and pinion cage assembly, skip to next section.
5. If assembling a TA267; apply silicone sealant sealing compound to both sides of the pinion cage gasket. Install the gasket and pinion cage assembly in main housing half bore.

## Nose Reduction Box Assembly - TA267

1. Press input shaft oil seal to bottom of bore in reduction box case.
2. Apply a light film of sealing compound to both sides of the pinion cage gasket. Install gasket on pinion cage.
3. Mount reduction box case onto pinion cage. Install six locknuts and washers. Tighten locknuts to 110-145 foot pounds.
4. Install the driven gear thrust washer and driven gear.
5. Install driven gear inner nut and torque to 350 foot pounds. Install driven gear nut lock and outer driven gear nut. Torque outer nut to 350 foot pounds and bend tabs of nut lock over inner and outer nut.
6. Press new input shaft bearings and onto input shaft. Remove the snap ring from OD of the outboard input shaft bearing. Install the outboard input shaft bearing to input shaft snap ring. Install the input shaft and bearings into bore of the reduction box case.
7. Apply silicone sealant to mounting face of reduction box case. Install reduction box cover, two reduction box dowels, fifteen reduction box cap screws, fifteen lock washers, and fifteen nuts. Torque nuts to 40-55 foot pounds.
8. Install the outboard input shaft bearing OD snap ring. Apply silicone sealant to mating face of input shaft bearing cap and install cap on reduction box cover. Install four cap capscrews and lockwashers. Torque to 35-50 foot pounds.
9. Install input flange, washer, and nut on the input shaft. Torque nut to 200-275 foot pounds.





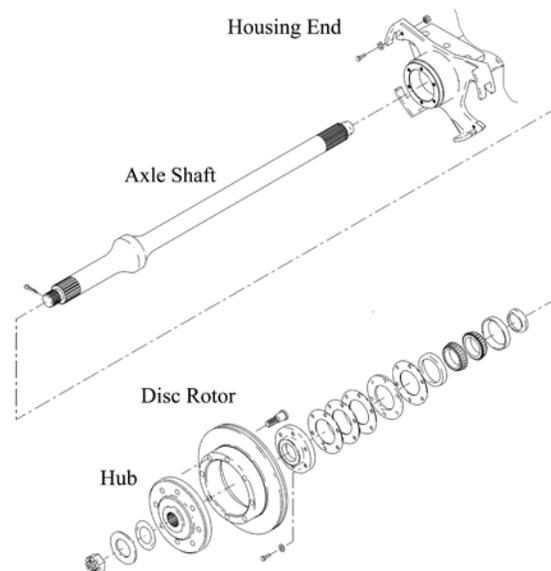
### **Planetary Wheelend**

1. Before starting brake reassembly, apply a small quantity of EP-2 grease to the following brake components:
  - Adjustment bolt assembly
  - Contact points of levers and shoes that ride against each other
  - Push rod ends of the wheel cylinder
  - Anchor pins with mating holes and tighten capscrews to 12-16 foot pounds.
2. If equipped, install parking brake lever on the trailing shoe and the parking link on the leading shoe.
3. Install the two anchor pins in the backing plate holes.
4. Position the trailing shoe with the wheel cylinder push rod and anchor pin. Install anchor pin retainer clip by positioning it on the pin and rotating it until it sets flat on the shoe.
5. If equipped, install the parking brake cable thru the backing plate and engage the parking brake lever.
6. Install the stamped auto adjusting spring on the leading shoe.
7. Assemble a star wheel adjustment bolt and shoe spring to the trailing shoe and leading shoe and as the leading shoe is positioned with the wheel cylinder push rod and anchor pin. Install anchor pin retaining clip.
8. Install the green return spring onto the leading shoe for the right hand brake and trailing shoe for the left hand brake. Install the black return spring onto the trailing shoe for the right hand brake and leading shoe for the left hand brake.
9. Install the short auto adjustment wire to connect the adjuster pivot to the pin near the brake shoe anchor. Install the long auto adjust wire to connect the adjuster pivot to the stamped auto adjust spring. Tighten adjuster pivot bolt.
10. Rotate the star wheel on the adjustment bolt to verify easy rotation with a 'click' in one direction and restricted rotation in the other direction.
11. If tapered bearing cups were removed from the wheel hub press new inner cup and outer cup to the bottom of their bores. Lubricate and install inner bearing cone. Press wheel hub oil seal into bore flush with wheel hub casting.
12. Lubricate spindle seal journal and wheel hub seal lip. Install wheel hub and drum onto the spindle. Lubricate outer bearing cone and install on spindle. Take care to not let the hub and drop before the outer bearing cone is positioned on the spindle.
13. Thread the wheel bearing adjustment nut onto the spindle. Tighten nut to 400 foot pounds. Rotate the wheel hub while rapping the hub several times with a 10 pound dead blow mallet, Retighten the nut to 400 foot pounds, rotate the hub and rap the hub again. Retighten, rotate and rap again. Loosen the nut 1/4 of a turn and then retighten to 100 foot pounds for final adjustment.
14. Install the planetary ring gear. Note that the pin from the wheel bearing adjustment nut must engage the mating hole on the back side of the planetary ring gear. Index the planetary ring gear to mate with the pin.
15. Install axle shaft, sun gear and sun gear retaining ring.
16. If the planetary spider was disassembled, install the three planetary pinion shafts from the inside face of the planetary spider. Press the uncoated end of each shaft into the respective spider bore until the standout of each shaft is 1.775 to 1.770 inches from the machined spider face to far end of the pinion shaft.
17. If a new planetary pinion shaft was installed, carefully drill a 5/16 inch diameter hole, 1/4 inch deep into the planetary pinion shaft by drilling through the 3/8-16 hole in the planetary spider.
18. Clear all chips from the drilled holes and install planetary pinion shaft setscrews in, the three tapped holes. Tighten the setscrews to 30-35 foot pounds.
19. Apply lubricant to the bores of planetary pinion gears. Install the gears the planetary pinion shafts. Install the planetary pinion thrust washers and snap rings.
20. Apply a 1/8 inch bead of silicone sealant to the mounting face of the planetary spider. The bead should be continuous end encircle each of the 16 mounting holes. Install the planetary spider assembly into the wheel hub. Install the sixteen cap screws and washers. Torque the capscrews to 85-115 foot pounds.
21. Reattach the brake lines to the wheel cylinders and bleed the brake system.
22. Adjust brakes by inserting an adjusting tool through the forward slot in the brake backing plates and engaging the star wheel of the adjuster. Move the tool handle downward to expand the shoes until a resistance to hub/drum rotation is felt. Adjust in the opposite direction until the hub/drum just rotates freely.



### Standard Wheelend

1. If inner bearing cup was removed from carrier and tube assembly, press new bearing cup to bottom of bore in carrier and tube assembly.
2. If tapered bearing cones were removed from the axle shafts, press new tapered bearing cones onto shafts making certain that the shaft collar is in place and that the bearing cones are seated against the collar. Install the axle shafts into the carrier and tube assembly.
3. Assemble axle shaft retainer spacer to end of carrier and tube assembly using three equally spaced cap screws (do not assemble the retainer spacer shims that were removed during disassembly). Lightly tighten the three capscrews until zero axial bearing clearance is obtained. Using a feeler gage, measure the gap between retainer spacer and end of carrier and tube assembly. This measurement will be used to select the correct shim pack using any combination of 0.010 inch shims, 0.005 inch shims, or 0.003 inch shim .
4. If a new axle shaft seal is required, press flush with outer surface of the oil seal retainer.
5. Remove the retainer spacer and three cap screws. Apply sealant to all faces of the shims and assemble to carrier and tube assembly along with the retainer spacer.
6. Apply sealant to both faces of retainer gasket and position gasket in the retainer bore. Assemble the seal retainer to carrier and tube assembly and install 6 cap screws and lock washers Tighten capscrews to 35-50 foot pounds.
7. If brake disc was removed from brake disc hub reinstall disc to hub and press eight wheel studs to secure the disc to hub.
8. Install O-ring into the internal groove in the brake disc hub. Lubricate the O-ring and the seal journal of the brake disc hub. Install hub assembly onto the axle shaft.
9. Install hub retaining washer and retaining nut Torque nut to 350 foot pounds and install cotter pin.
10. If service of the brake calipers was not required, go to step 15. If the brake calipers were removed only for pad replacement go to 13.
11. Start caliper reassembly by dipping a new piston seal in brake fluid. Assemble the seal into the groove in the caliper housing bore.
12. Assemble the piston boot to the piston. Install the piston in the caliper housing bore, pushing it to the bottom of the bore. Seat the piston boot in caliper housing boot bore.
13. Prior to pad reassembly, verify that the slide pin inboard and outboard bushings arc in place in the caliper housing. Lubricate the bushings and inboard sleeve with lithium grease. Install the inboard sleeve.
14. Install the shoe retainer spring clip to the inboard shoe and lining. Insert the shoe and lining into the caliper with the spring clip positioned in the bore of the piston. Install the outboard shoe and lining
15. Position the caliper assembly over the brake rotor and in the slot of the brake reaction plate. Apply lithium grease to the body of the brake slide pins and Loctite 242 to the threaded area of the slide pins. Install the slide pins and tighten to 35 foot pounds.
16. Reconnect brake lines to calipers and depress the vehicle brake pedal several times to seat the brake pads. Bleed the brake system and refill the master cylinder.
17. To prevent rattling of the outboard shoe, use a 12 inch Channel lock type plier to clinch the ears of the outboard shoe and lining to the caliper housing.



# Chapter - 11

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# Brake Service

### ⚠ CAUTION

Hydraulic fluid and components must be kept clean. Thoroughly clean exterior of any hydraulic component before disconnecting hoses or fittings. Perform all maintenance and repairs in a clean environment. Do not use cloth or paper towels to clean components due to possible contamination with lint or other fiber. Failure to follow these guidelines will result in premature failure of hydraulic system components.

### ⚠ 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 for recommended handling precautions.

### ⚠ WARNING

- Only use DOT 3 brake fluid from a new sealed container.
- DOT 3 brake fluid is corrosive and will damage paint finishes.
- Dispose of brake fluid in accordance with local state and federal regulations.
- Read and follow all warnings on the brake fluid container.



## FRONT BRAKE

### Service Limits:

Brake pad Thickness: 1/16 inches (1.58 mm).

Rotor Thickness: 0.20 inches (5 mm).

Rotor runout: 0.005 inches (0.127 mm).

### ⚠ WARNING

1. Make sure the ignition switch is in the "OFF" position, then remove the key.
2. Place the shift lever in the "park" or "neutral" position.
3. Set the park brake.
4. Place blocks under the rear wheels 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.

### Inspection

5. Raise the front of the vehicle and support with jack stands.
6. Remove the front wheels.
7. Measure the distance between the rotor and the brake pad backing plate (all 4 pads, both ends of each pad). If any one of the four brake pads are equal to or less than the service limit then all four pads should be replaced.
8. Measure the rotor thickness in three places. If the rotor thickness is less than the service limit then the rotor must be replaced.
9. Measure the rotor runout. If the runout exceeds the service limit, then the rotor must be resurfaced. After resurfacing the rotor, measure the rotor thickness. If the rotor thickness is less than the service limit, then the rotor must be replaced.
10. Lower the vehicle.
11. Remove the blocks from behind the wheels and test drive the vehicle.

### ⚠ 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.

### Replace Pads

### ⚠ WARNING

1. Make sure the ignition switch is in the "OFF" position, then remove the key.
2. Place the shift lever in the "park" or "neutral" position.
3. Set the park brake.
4. Place blocks under the rear wheels to prevent vehicle movement.

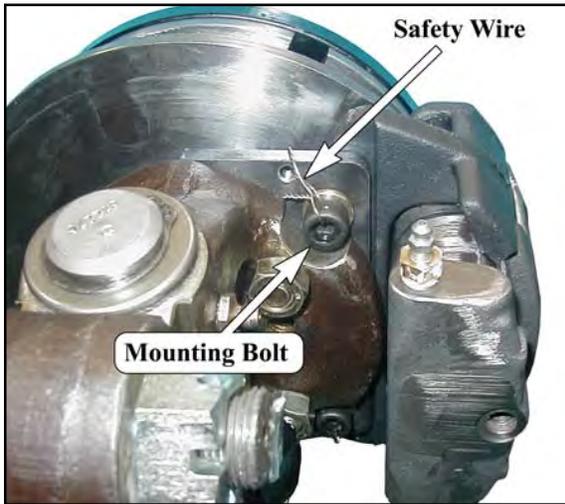
### ⚠ WARNING

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.

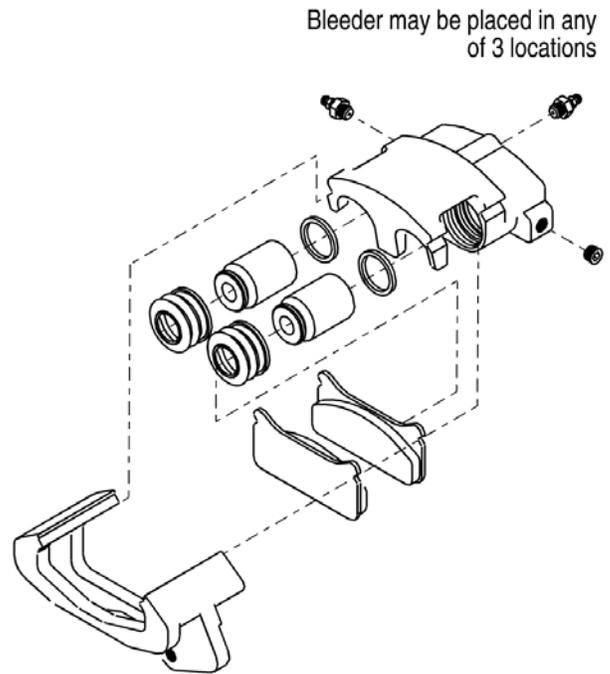
6. Raise the front of the vehicle and support with jack stands.
7. Remove the wheels. Refer to procedure in "Tires and Wheels" section.
8. Thoroughly clean the exterior of the brake caliper assemblies.
9. Remove the safety wire from the two caliper retaining bolts and discard.
10. Remove the two caliper bolts.
11. Slide the brake housing off of the mounting bracket and remove the brake pads.
12. Thoroughly clean the sliding surfaces of the bracket and housing.
13. Apply an anti-seize lubricant to the machined "V" groove in the brake bracket. Be careful not to apply too much lubricant.
14. Assemble the housing and new pads to the bracket and confirm that the housing slides freely with no binding.
15. Remove and resurface the rotor to remove all grooves or run out. Refer to the front axle section for information on removing the hub.
16. Measure the thickness of the rotor. If the thickness of the rotor is less than the service limit then the rotor must be replaced. Refer to the front axle section for information on removing/installing the brake rotor.
17. Reinstall the rotor and brake assembly. Tighten the brake mounting bolts per torque listed in the Hardware Torque table at the end of this section.
18. Bleed the brake system.
19. Lower the vehicle.
20. Remove the blocks from behind the wheels and test drive the vehicle.

### Rebuild Caliper

There are no internally serviceable components in the front brake calipers. If there is a problem with the caliper then it must be replaced as an assembly.



*Front Brake  
Assembly*



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## **REAR BRAKE - AXLE OMSI**

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Brake service information is provided by the brake manufacturer. The manufacturer's manual can be found on the CD provided with the vehicle.

The manual number is: M7-001-41



## REAR BRAKE - AXLE TA267

### Service Limits:

Brake pad Thickness: 1/16" (1.6 mm)

Rotor Thickness: 0.826" (21 mm)

Rotor runout: 0.005 inches (0.127 mm).

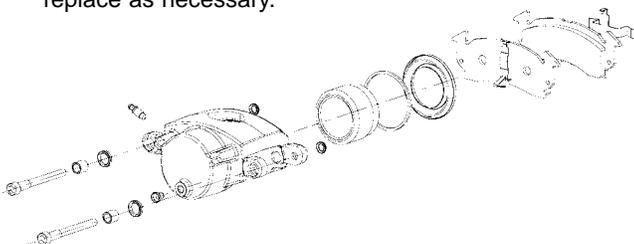
It is recommended that if a wearable component is replaced on one side of a vehicle, the same components should be replaced on the other side of the vehicle.

### Brake Disassembly:

#### **⚠ WARNING**

1. Make sure the ignition switch is in the "OFF" position, then remove the key.
2. Place the shift lever in the "park" or "neutral" position.
3. Set the park brake.
4. Place blocks under the front wheels to prevent vehicle movement.

1. Remove pad pins.
2. Remove caliper from mounting fixture.
3. Discard worn stator pads.
4. Remove boot and piston from the housing at the same time. Do so by holding the brake against a table surface with the piston facing down and slowly applying air pressure to the inlet port. Once the piston is out of the housing, tilt the piston to one side and pry the boot out of the housing. Discard these pieces only if you are rebuilding.
5. Remove the square-ring from the cylinder of the housing.
6. Inspect housing bore. It must be clean and rust free. If rust is present, use emery or crocus cloth to remove. The square-ring seals against the piston surface. So small scratches and cavities in the bore wall will not affect sealing performances. However, since the bore guides the piston movement, any cylinder wall imperfection, which causes the piston to catch or wedge in the bore must be taken care of. If the piston cannot be properly guided in the bore, replace the brake
7. Clean all ports and mounting surfaces. Wash housing in a solvent to remove any dirt, loose rust, and any petroleum products.
8. Inspect bushing in slide mount for signs of wear. Replace as necessary
9. Inspect all other parts for unusual wear or rust. Clean or replace as necessary.



### Inspection

The brake pads must be removed from the caliper for inspection. Refer to the Brake Disassembly procedure to remove the pads from the caliper.

Measure the thickness of the brake linings. If the brake lining is equal to or less than the service limit then the linings should be replaced.

Measure the rotor in a minimum of 3 places around the rotor. If any measurement is less than the service limit, then the rotor must be replaced.

Mount a dial indicator and measure the rotor runout on the inside and outside surfaces. If the runout exceeds the service limit, then the rotor must be machined. After machining, confirm that the rotor thickness is not less than the service limit.

### Brake Assembly

Important: there may be more parts in a service kit than your brake requires. Check the parts list carefully for the exact quantity.

*Note: All parts must be thoroughly cleaned prior to assembly.*

1. Insert rubber rings and sleeves.
2. Lubricate sleeves with a high temperature grease before assembly.
3. Lubricate the cylinder of the housing, square-ring, the boot, and piston with brake fluid before reassembly.
4. Install the square-ring in the groove in the cylinder bore furthest from the opening.
5. Install a boot onto the piston. The small opening of the boot is to be seated in the groove on the front side of the piston. Pull the boot over the full length of the piston and extend the boot beyond the end of the piston about 1/4 inch. Start the boot lip into the cylinder groove. Use a vice or shop press to slowly move the piston into the cylinder until the piston bottoms out. Verify that the boot has properly seated in the cylinder bore groove

### Installation

1. Slide the brake over the rotor with one pad on each side of rotor.
2. Align mounting sleeve holes in caliper with mounting holes in mounting bracket.
3. Insert pad pins and torque to 30-40 ft. Lbs.
4. Attach brake line using M10 x 1.5 banjo port.
5. Bleed the brake system.

## REAR BRAKE - AXLE TA268

The following information was obtained from the manufacturer manual. The complete manual can be downloaded from the manufacturer web site:

[http://www.axletech.com/service\\_manuals/pdf/standard/MM4H.pdf](http://www.axletech.com/service_manuals/pdf/standard/MM4H.pdf)

### Description

#### **⚠ 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 for recommended handling precautions.

DSH Brake (Duo Servo Hydraulic)

The DSH brake is a 12.50 x 2.50 (317.5 mm x 63.5 mm) hydraulic actuated brake. The duo servo design permits the leading shoe to transfer all of its force through the adjusting bolt to the trailing shoe. This increases the braking action, because the force from both shoes is transmitted into the anchor of the trailing shoe. The brake has automatic adjustment and can be supplied with an optional cable operated lever for parking brake linkage.

### Disassemble DSH Brake

#### **⚠ WARNING**

To prevent serious eye injury, always wear safe eye protection when you perform vehicle maintenance or service.

#### **⚠ WARNING**

Block the wheels to prevent the vehicle from moving. Support the vehicle with safety stands. Do not work under a vehicle supported only by jacks. Jacks can slip and fall over. Serious personal injury can result.

1. Make sure the vehicle is on a level surface.
2. Place blocks under the wheels not being serviced to keep the vehicle from moving.
3. Raise the vehicle so that the wheels to be serviced are off the ground. Support the vehicle with safety stands.
4. Remove the wheels and brake drums from the axle. If necessary, manually retract the brake shoes through the forward adjustment slot so that the brake drums will clear the linings. Insert a stiff wire or pick through the adjustment slot to push the automatic adjustment stamped spring away from the star wheel while using an adjusting tool to rotate the adjustment bolt star wheel.
5. Remove the fastener that attaches the automatic adjusting wires and the pivot to the leading shoe.



6. Remove the two brake shoe return springs from the anchor pins.
7. Support the leading shoe with one hand and remove the shoe hold-down spring clip. Lift and rotate the spring clip until it is released from the retainer pin.
8. Remove the shoe spring and the adjustment bolt at the bottom of the brake.
9. Support the trailing shoe with one hand and remove the two shoe hold-down spring clips. Lift and rotate each spring clip until it is released from the retainer pin.
10. If the brake has a parking brake lever, disassemble the link from the leading shoe by removing the spring clip. To disassemble the parking lever from the trailing shoe, remove its spring clip.
11. Remove the anchor pins from holes.
12. If complete disassembly is necessary, disconnect the hydraulic line and remove the wheel cylinder capscrews and the wheel cylinder.
13. Clean and inspect all parts.

### Assemble DSH Brake

#### **⚠ CAUTION**

Do not permit grease to contact the brake drum or linings. Grease on the linings can cause poor brake performance. Contaminated linings MUST be replaced

1. Before assembly, apply a thin layer of Mentor specification 0-616 brake lubricant such as Texaco Thermatex EP-2 grease or equivalent to the following parts:
  - a. Adjustment bolt assemblies.
  - b. All edges of brake levers and shoes that slide against each other.
  - c. Push rod ends of the wheel cylinder.
  - d. Anchor pins, anchor pin holes and anchor pin slots.
2. Install the wheel cylinder to the backing plate. Tighten the wheel cylinder capscrews to 15-20 lb. ft. (20-27 Nm).
3. If used, install the parking brake lever on the trailing shoe and the parking brake link on the leading shoe.
4. Install the two anchor pins in the holes in the backing plate.
5. Put the trailing shoe in position into the anchor pin slot and engage it with the wheel cylinder push rod.



# Maintenance, Service, and Repair

6. To install the two shoe retainer clips, engage the clip on to the retainer pin and rotate the clip down until it sets flat on the shoe.
7. If used, install the parking cable through the backing plate and engage the cable in the parking brake lever. Install a cable retainer bracket (not supplied by Mentor) where the cable enters through the backing plate.
8. Install the stamped automatic adjustment spring on the leading shoe.
9. Assemble a star wheel adjustment bolt and shoe spring on both shoes while you put the leading shoe in position into the anchor pin slot and engage it with the wheel cylinder push rod.
10. If used, install the parking link to engage with the parking lever slide pin.
11. Hold the shoe in its correct position and install the shoe hold-down spring clip on to the retainer pin.
12. Install the green shoe return spring on to the leading shoe for right hand brake and onto trailing shoe for left hand brake.
13. Install the short automatic adjustment wire to connect the pivot to the pin near the anchor location. Install the long automatic adjustment wire to connect the pivot to the stamped automatic adjustment spring.
14. Install the automatic adjustment pivot and spacer to the leading shoe on its shoulder bolt fastener. Be careful that the pivot is not pinched under the edge of the shoulder.

15. Rotate the star wheel on the adjustment bolt to see that it can easily rotate with a "click" in one direction and cannot easily rotate in the other direction.
16. Connect the hydraulic line and install the brake drum and wheel.
17. Bleed the hydraulic system after all brakes are assembled.

## Adjust DSH Brake

1. Adjust the DSH brake through the forward adjustment slot (toward the front of the vehicle) at the bottom of the backing plate.
2. Insert an adjusting tool through the forward slot of the backing plate to engage the star wheel on the adjustment bolt. To move the shoes closer to the brake drum, move the tool handle down. The adjusting tool pivots against the backing plate slot and rotates the star wheel in the direction opposite to the handle movement.
3. Adjust the linings until a light resistance can be felt when the brake drum is rotated. Then adjust in the other direction until the brake drum can just rotate freely.
4. If the brake has a parking brake lever, adjust the parking cable until a light resistance can be felt when the brake drum is rotated. Then adjust the cable in the opposite direction until the brake drum can rotate freely. Apply and release the parking brake to see that it operates correctly.

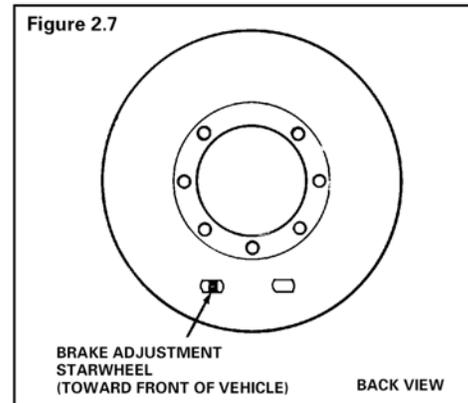
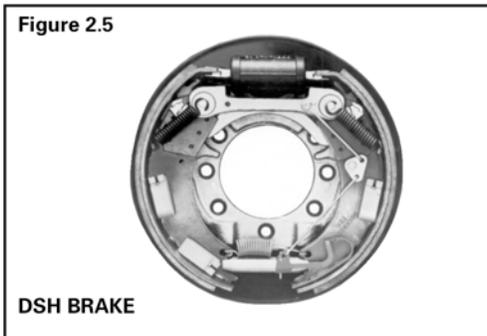
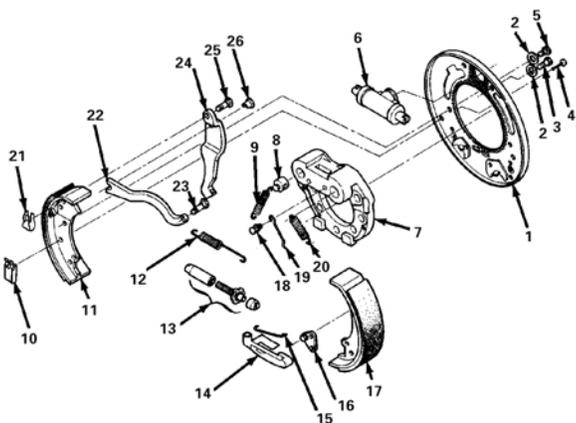


Figure 2.6



ITEM	DESCRIPTION
1	Backing Plate
2	Lock Washer
3	Capscrew
4	Hold Down Retainer Pin
5	Capscrew
6	Wheel Cylinder Assy.
7	Spider
8	Anchor Pin
9	Shoe Return Spring (Black)
10	Shoe Hold Down Clip
11	Shoe Lining Assy. (Trailing)
12	Shoe Spring
13	Adjuster Bolt Assy.
14	Automatic Adjuster Stamped Spring
15	Automatic Adjuster Wire (Long)
16	Automatic Adjuster Pivot
17	Shoe and Lining Assy. (Leading)
18	Adjuster Wire Pin
19	Automatic Adjuster Wire (Short)
20	Shoe Return Spring (Green)
21	Parking Lever Spring Clip
22	Link
23	Pivot Pin - Link
24	Parking Lever
25	Pivot Pin - Parking Lever
26	Slide Pin - Link

NOTE: Some duplicate parts are not shown.

## MASTER CYLINDER

There are no serviceable components in the hydroboost or master cylinder. If there is a fault in the hydroboost or master cylinder then the entire assembly must be replaced.

## BLEED BRAKE SYSTEM

### WARNING

- Only use DOT 3 brake fluid from a new sealed container.
- DOT 3 brake fluid is corrosive and will damage paint finishes.
- Dispose of brake fluid in accordance with local state and federal regulations.
- Read and follow all warnings on the brake fluid container.

### WARNING

1. Make sure the ignition switch is in the "OFF" position, then remove the key.
2. Place the shift lever in the "park" or "neutral" position.
3. Set the park brake.
4. Place blocks under the front or rear wheels 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.

*NOTE: Start this procedure at the wheel furthest from the master cylinder, then work toward the wheel closest to the master cylinder. The rear bleeder valves can be accessed through the center rear inspection cover.*

5. Thoroughly clean the area around the master cylinder cap and remove the cap.
6. Add brake fluid from a new sealed container to the master cylinder. Fill to 1/4" from the top of the master cylinder chamber.
7. The master cylinder fluid level will drop as the brakes are bled. Periodically check and fill the master cylinder during this procedure. Do not allow the fluid level in the master cylinder to drop too low as this will allow air into the brake lines.
8. Attach a clear hose to the bleeder valve on the brake cylinder that is to be bled. Route the hose into a clear container for waste brake fluid.

9. Pump the brake pedal a few times and then press and hold light pressure to the brake pedal.
10. Open the brake bleeder valve.
11. Depress the foot pedal to the floor and then close the bleeder valve. Do not release pressure on the brake pedal until the bleeder valve is closed.
12. Slowly release the foot pedal, allowing it to return to its released position.

*NOTE: Check and fill the master cylinder frequently during the bleeding process. Do not allow the fluid level in the master cylinder to drop low enough to allow air to enter the brake lines. If air enters the brake lines during the bleeding process, then you will have to start again from the beginning.*

13. Repeat the above steps until you are sure that all of the air is expelled from the brake line. Any air bubbles that can be seen in the clear hose attached to the bleeder is an indication that there is still air in the brake lines.

14. Repeat this process with each of the other wheels.

*NOTE: When finished, top off the master cylinder with fluid. See Check Master Cylinder Fluid for information on filling the master cylinder.*

15. Remove the blocks from behind the wheels and test drive the vehicle.

## **ADJUST PARKING BRAKE (DRIVE SHAFT BRAKE DRUM)**

### **⚠ WARNING**

1. Make sure the ignition switch is in the "OFF" position, then remove the key.
2. Place the shift lever in the "park" or "neutral" position.
3. Set the park brake.
4. Place blocks under the front or rear wheels to prevent vehicle movement.

### **Primary Adjustment**

5. Release the park brake.
6. Rotate the knob on the end of the park brake handle 7. until the parking brake holds firm when applied.
8. Release the park brake and test drive the vehicle.

### **Secondary Adjustment**

### **⚠ WARNING**

1. Make sure the ignition switch is in the "OFF" position, then remove the key.
2. Place the shift lever in the "park" or "neutral" position.
3. Set the park brake.
4. Place blocks under the front or rear wheels to prevent vehicle movement.

5. Release the park brake.
6. Turn the primary adjustment until the park brake is as loose as possible.
7. Adjust the bellcrank link so that the bellcrank upper arm is 5 degrees past vertical pointing to the rear of the vehicle.
8. Adjust the brake cable to remove any remaining freeplay in the linkage.
9. Adjust the primary adjustment until the parking brake holds firm when applied.
10. Release the park brake and test drive the vehicle.

### **Inspection**

### **Service Limits**

Brake Shoe Lining Thickness: 1/16 inch (1.6 mm).

Drum Inside Diameter: 9.030 inches 229.36 mm).

Drum Runout: 0.010 inches (0.254 mm).

- 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.
- 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**

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 for recommended handling precautions.





## **ADJUST PARKING BRAKE (DRIVE SHAFT DISC BRAKE)**

### **Primary**

The primary adjustment for the parking brake is the knob on the end of the parking brake handle.

#### **⚠ WARNING**

1. Make sure the ignition switch is in the "OFF" position, then remove the key.
2. Place the shift lever in the "park" or "neutral" position.
3. Set the park brake.
4. Place blocks under the front wheels to prevent vehicle movement.

5. Release the park brake and rotate the knob on the end of the park brake handle until the parking brake holds firm when applied.
6. If the knob is fully tightened and the brake does not hold, go to the Secondary adjustment procedure.

### **Secondary**

Perform the Primary adjustment procedure first before performing this procedure.

#### **⚠ WARNING**

1. Make sure the ignition switch is in the "OFF" position, then remove the key.
2. Place the shift lever in the "park" or "neutral" position.
3. Set the park brake.
4. Place blocks under the front wheels to prevent vehicle movement.

5. Fully loosen the adjustment knob on the end of the park brake handle.
6. Loosen the jam nut on the clevis below the park brake handle.
7. Tighten the brake cable to remove most slack in the brake system and then tighten the jam nut.
8. Perform the Primary adjustment procedure.

### **Inspection**

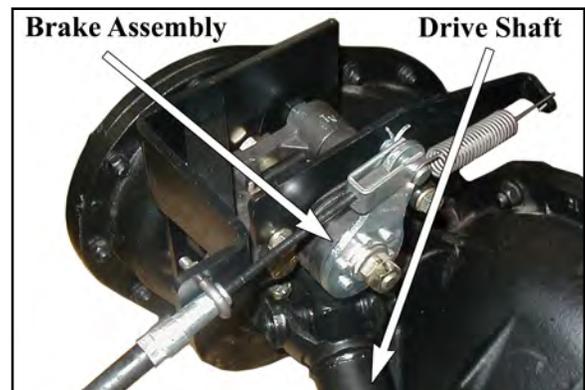
### **Service Limits**

Brake pad Thickness: 0.090 inches (2.29 mm).

Rotor Thickness: 0.400 inches (10.2 mm).

Rotor runout: 0.010 inches 0.127 mm).

- Measure the thickness of the brake linings. If the brake lining is equal to or less than the service limit then the linings should be replaced.
- Measure the rotor in a minimum of 3 places around the rotor. If any measurement is less than the service limit, then the rotor must be replaced.
- Mount a dial indicator and measure the rotor runout on the inside and outside surfaces. If the runout exceeds the service limit, then the rotor must be machined. After machining, confirm that the rotor thickness is not less than the service limit.





## Maintenance, Service, and Repair

The following information was provided by the brake manufacturer. Refer to the illustration on the following pages for item numbers.

### Mounting Procedure

- 1 Insert Mounting Bolts through Sleeves (9) and thread Brake Mounting Locking Nuts as far as possible on Mounting Bolts. This is not required if brake assembly comes with the sleeve/bolt sub-assy (9). Position the brake over disc and align with mounting holes in mounting bracket.
- 2 Thread mounting bolts into mounting bracket, adjusting bolts until a .020" - .060" gap exists between the Sleeves (9) and the Locking Nuts. Tighten the Locking Nuts to 75 to 85 lb-ft of torque against the bracket.
- 3 Refer to Adjustment Procedure to set clearance of installed brake assembly.

### Adjustment Procedure

- 1 Loosen two Adjustment Nuts (12 & 13) (one full nut and one jam nut except when using a 0.50 inch thick disc which requires two jam nuts).
- 2 Tighten inner Nut (12) until firm contact is made with the disc by the linings. Torque to 100 lbs in. Make certain Lever (1) is in proper operating position for application.
- 3 Back off inner Nut (12) 4 to 5 flats and check that disc is free to move.
- 4 Tighten outer Nut (13) against inner Nut (12) to lock Adjustment Bolt (2) in place. Torque to 45 to 55 lb-ft.

### Ball and Cam Replacement

- 1 Remove both Adjustment Nuts (12 & 13), Thrust, Stainless Steel and Hardened Washers (11, 17 & 16), Lever (1), and Boot (3) from Adjustment Bolt (2).
- 2 Remove outer Cam (4) and Ball/Retainer Assembly (8) from Adjustment Bolt (2).
- 3 Use a screwdriver, or similar tool, to gently pry inner Cam (4) protrusions on back of cam, loose from Torque Plate (5), and remove from Adjusting Bolt (2). Remove Seal (15) from Adjusting Bolt (2).
- 4 Install the new Seal (15) on the Adjusting Bolt (2), inserting through inner Cam (4) until Seal (15) bottoms out on Torque plate (5).

**NOTE:** *PRIOR TO THE INSTALLATION OF THE CAMS (4), IT IS RECOMMENDED THAT "ALPHA 2000" GREASE (ANTI-SEIZE & LUBRICATING COMPOUND) MANUFACTURED BY CHEMTOOL, BE APPLIED TO RAMP AREAS OF THE CAMS.*

- 5 Install new inner Cam (4) on Adjusting Bolt (2), taking care to orient protrusions into holes in Torque Plate (5).

- 6 Install Ball/Retainer Assembly (8) onto Adjusting Bolt (2), orienting balls into pockets of inner Cam (4). Install outer Cam (4) onto Adjusting Bolt (2), orienting pockets onto Balls of Ball/Retainer Assembly (8). Install Boot (3) over cam assembly.
- 7 Install Lever (1), using protrusions on back of outer Cam (4) and holes in Lever (1) to orient lever to proper operating position.
- 8 Install remaining washers and nuts (11, 17, 16, 12 & 13) and follow adjustment procedure in Section 4.

**NOTE:** *MAKE SURE TO ORIENT COATED FACE OF THRUST WASHER (11) TOWARD STAINLESS STEEL WASHER (17).*

### Lining Replacement

- 1 Replace both linings when either has worn to .090in. remaining.
- 2 Loosen two Adjustment Nuts (12 & 13) enough to slide each Torque Plate (5 & 7) away from disc far enough to provide clearance to remove old carrier & lining assemblies (6) and install new ones. (It may be necessary to remove one or both Nuts.)
- 3 Collapse Lining Retraction Spring (10) and remove from brake Head Assembly.
- 4 Slide Torque Plates (5 & 7) away from disc, move Carrier & Lining Assemblies (6) out of pockets, and remove from the Brake Head Assembly from the side.

**NOTE:** *PRIOR TO THE INSTALLATION OF THE NEW LININGS, IT IS RECOMMENDED THAT A COATING OF "ALPHA 2000" GREASE (ANTI-SEIZE & LUBRICATING COMPOUND) MANUFACTURED BY CHEMTOOL, BE APPLIED TO THE INTERFACE OF THE SLEEVE (9) AND THE TORQUE PLATES (5) & (7). AFTER GREASE HAS BEEN APPLIED, SLIDE TORQUE PLATES BACK AND FORTH ON SLEEVE AS FAR AS POSSIBLE TO INSURE THAT THE GREASE HAS BEEN INTRODUCED INTO THE BORES OF THE TORQUE PLATES.*

- 5 Install new Carrier & Lining Assemblies (6) in each Torque Plate (5 & 7).
- 6 Install Lining Retention Spring (10) into Brake Head Assembly. Be sure spring's "feet" are positioned properly in holes in both Lining Carrier Assemblies (6).
- 7 Adjust brake per Adjustment Procedure on this page.

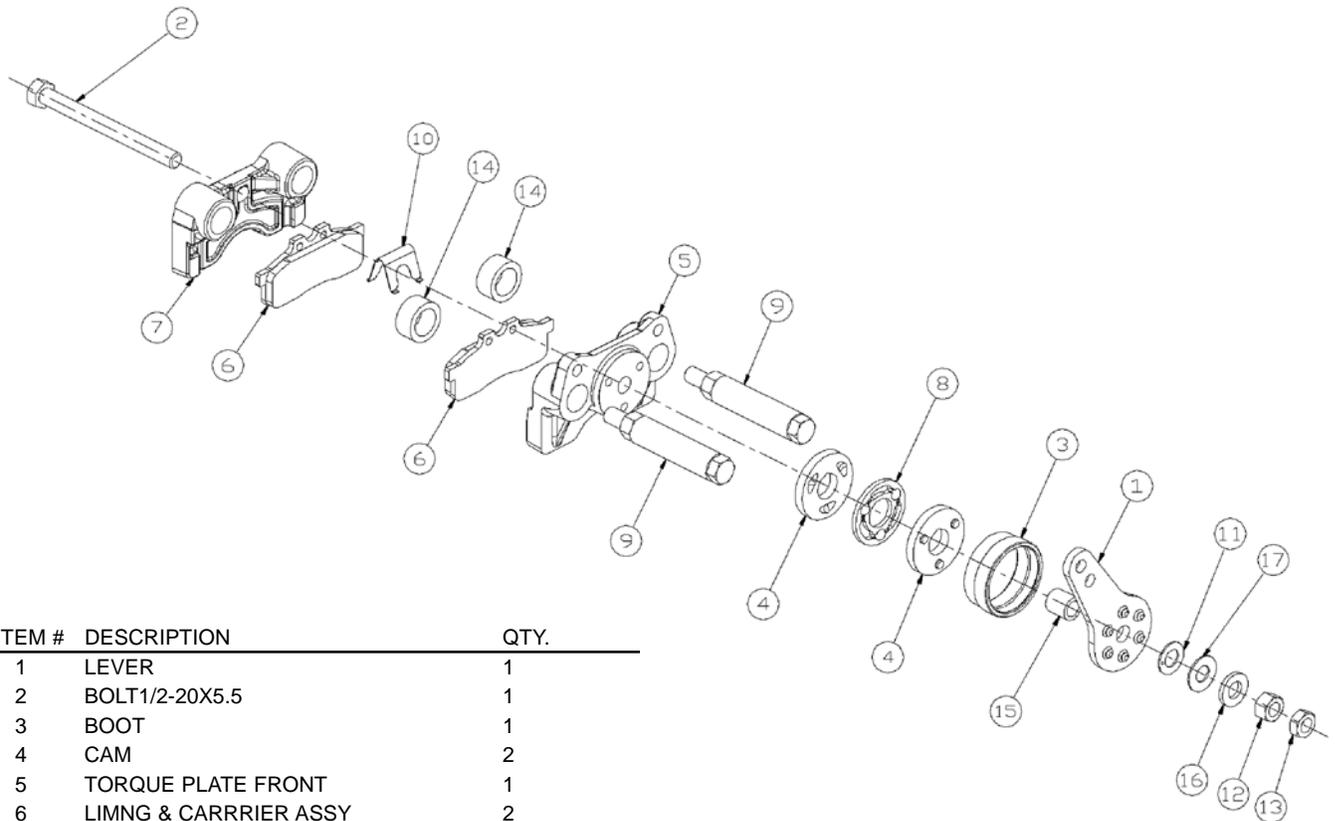


## Sleeve Seal Replacement

- 1 Loosen the two locking nuts on the mounting bolts and remove the sleeve/bolt subassembly (9) from the brake. Remove sleeve seals (14).
- 2 Insert new sleeve seals (14) between the Torque Plates (5 & 7) and align with the sleeve bores.

**NOTE: PRIOR TO THE INSTALLATION OF THE MOUNTING BOLT & SLEEVE ASSEMBLY, IT IS RECOMMENDED THAT "ALPHA 2000" GREASE (ANTI-SEIZE & LUBRICATING COMPOUND) MANUFACTURED BY CHEMTOOL, BE APPLIED TO THE SLEEVES AND THE BORES OF THE TORQUE PLATES.**

- 3 Insert Sleeve/Bolt sub-assembly (9) through the front torque plate (5), sleeve seal (14), and back torque plate (7).
- 4 Mount brake per paragraph 3.2 and adjust per Adjustment Procedure on the preceding page.



ITEM #	DESCRIPTION	QTY.
1	LEVER	1
2	BOLT 1/2-20X5.5	1
3	BOOT	1
4	CAM	2
5	TORQUE PLATE FRONT	1
6	LIMNG & CARRRIER ASSY	2
7	TORQUE PLATE REAR	1
8	BALL/RETAINER SUB ASSY	1
9	SLEEVE OR SLEEVE/BOLT SUB ASSY	2
10	SPRING FLAT	1
11	GARLOCK THRUST BEARING	1
12	1/2-20HEXNUT	1
13	1/2-20JAIVINUT	1
14	SEAL SLEEVE	2
15	IDSEAL	1
16	WASHER HARDENED	1
17	WASHER	1



## ***HARDWARE TORQUE***

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

Description	Foot Pounds	Newton Meters
Brake Mounting Bolts	40	54

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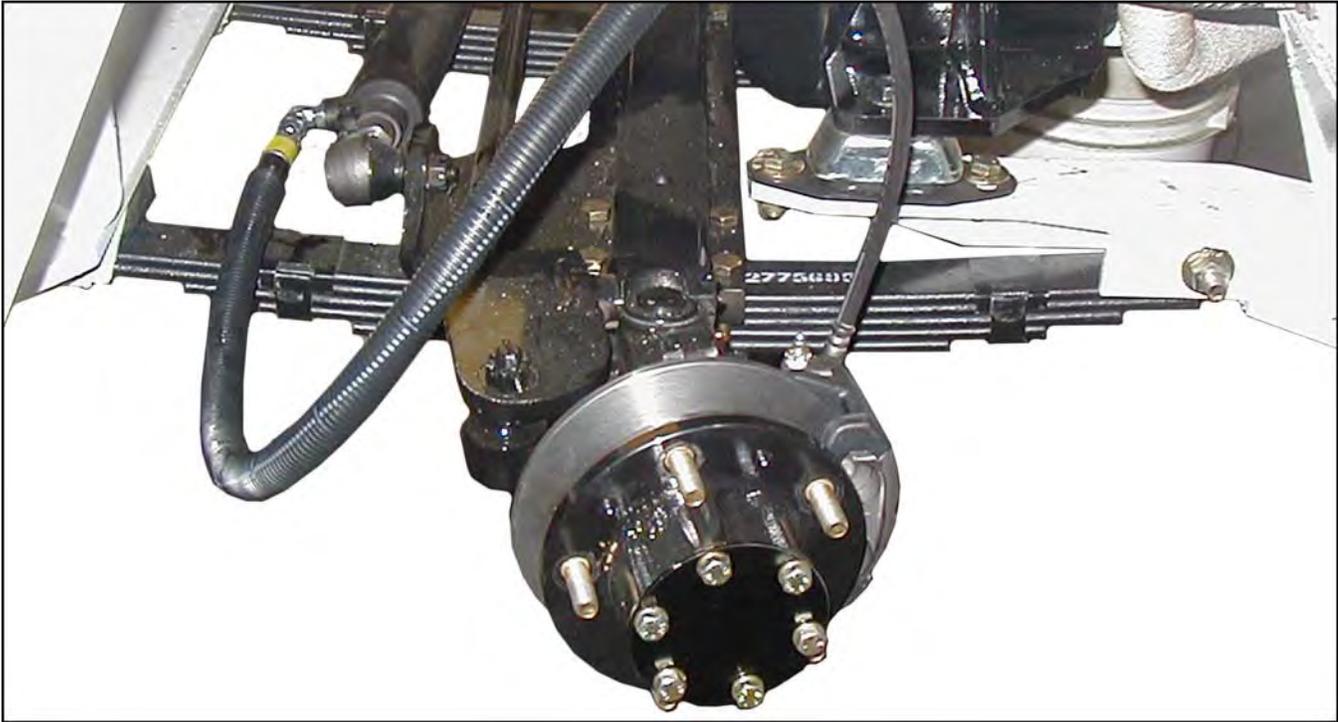
Front Suspension .....	2
Rear Suspension .....	2
Hardware Torque .....	3

# Suspension

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## ***FRONT SUSPENSION***

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## ***REAR SUSPENSION***

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Rear suspension is a solid mount to the frame.





## **HARDWARE TORQUE**

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

Description	Foot Pounds	Newton Meters
Front Spring, Front Eye	100	

*\*\* - Tighten until the spring hangers or mounting brackets are solid against the spring eye and then loosen the nut 1/4 turn. The spring hangers should be able to swing free with no lateral movement of the spring.*





# Chapter - 13

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Tire Inspection ..... 2  
Tire/Wheel Assembly ..... 3  
    Remove/Install ..... 3  
Hardware Torque ..... 3

# Tires and Wheels

## TIRE INFLATION

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 below is an example of the side wall information on a tire.

Tire pressures must be checked when the tire is cold.



## TIRE INSPECTION

### ⚠ WARNING

1. Make sure the start 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 battery connector from the vehicle.
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.
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.



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

## TIRE/WHEEL ASSEMBLY

### Remove/Install

#### **⚠ WARNING**

1. Make sure the start 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 battery connector from the vehicle.

#### **⚠ 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 wheel to be replaced off of the ground and support with jack stands.
7. Remove the wheel nuts and remove the wheel.
8. Install in reverse order.
9. Cross tighten the wheel nuts in two stages as follows:
  - 1st stage to approximately 20 foot pounds (27 newton meters).
  - 2nd stage to torque listed in the Hardware Torque table at the end of this section.
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.

#### **⚠ WARNING**

Improper assembly or disassembly of a split rim wheel can result in tire explosion causing severe injury. Refer tire/wheel repair to a qualified tire supplier.

## HARDWARE TORQUE

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

Description	Foot Pounds	Newton Meters
Wheel Nut, Front	90-110	122-149
Wheel Nut, Rear	110-120	149-162



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### **⚠ WARNING**

- Explosive mixtures of Hydrogen gas are present within battery cells at all times. Do not work with or charge battery in an area where open flames (including gas furnace or water heater pilots), sparks, cigarettes, or any other sources of combustion are present. Always provide ample ventilation in rooms where batteries are being charged. Failure to do so may result in severe bodily injury and/or property damage.
- A battery is a live electrical source. It cannot be disconnected or neutralized. Do not drop any tool or conductive object onto the battery. A conductive object that comes in contact with the battery terminals will initiate a short circuit of the battery. This could cause the battery to explode resulting in severe bodily injury and/or property damage.
- Battery electrolyte is poisonous and dangerous. It contains sulfuric acid. Avoid contact with skin eyes or clothing. Wear rubber gloves and safety glasses while servicing batteries. **DO NOT INGEST!** This may result in severe bodily injury.

# Battery Service

## CLEANING

### **⚠ WARNING**

- Explosive mixtures of Hydrogen gas are present within battery cells at all times. Do not work with or charge battery in an area where open flames (including gas furnace or water heater pilots), sparks, cigarettes, or any other sources of combustion are present. Always provide ample ventilation in rooms where batteries are being charged. Failure to do so may result in severe bodily injury and/or property damage.
- A battery is a live electrical source. It cannot be disconnected or neutralized. Do not drop any tool or conductive object onto the battery. A conductive object that comes in contact with the battery terminals will initiate a short circuit of the battery. This could cause the battery to explode resulting in severe bodily injury and/or property damage.
- Battery electrolyte is poisonous and dangerous. It contains sulfuric acid. Avoid contact with skin eyes or clothing. Wear rubber gloves and safety glasses while servicing batteries. **DO NOT INGEST!** This may result in severe bodily injury.

### **⚠ 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 start 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 both battery leads from the battery.
6. Dry dirt can be readily blown off with low-pressure air or brushed off.
  7. Wetness or wet dirt on the battery indicates battery acid. Using a nonmetallic brush with flexible bristles, wash the battery off with a strong solution of baking soda and hot water (1 lb. of soda to a gallon of water). Continue until all fizzing stops, which indicates that the acid has been neutralized. Then rinse thoroughly with clear water. **DO NOT** get any of the solution into the battery cells.
  8. Using a battery terminal cleaning brush along with the same solution used in the previous step, clean the inside of each battery connector and each battery post.
  9. Reconnect the battery, remove the blocks from the wheels and test drive.



*Typical battery terminal brush available from local automotive parts stores*

## TESTING

### ⚠ WARNING

- Explosive mixtures of Hydrogen gas are present within battery cells at all times. Do not work with or charge battery in an area where open flames (including gas furnace or water heater pilots), sparks, cigarettes, or any other sources of combustion are present. Always provide ample ventilation in rooms where batteries are being charged. Failure to do so may result in severe bodily injury and/or property damage.
- A battery is a live electrical source. It cannot be disconnected or neutralized. Do not drop any tool or conductive object onto the battery. A conductive object that comes in contact with the battery terminals will initiate a short circuit of the battery. This could cause the battery to explode resulting in severe bodily injury and/or property damage.
- Battery electrolyte is poisonous and dangerous. It contains sulfuric acid. Avoid contact with skin eyes or clothing. Wear rubber gloves and safety glasses while servicing batteries. DO NOT INGEST! This may result in severe bodily injury.

### ⚠ CAUTION

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

### Specific Gravity

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

This test should only be performed on non-maintenance free batteries. The caps on maintenance free batteries should never be removed. Removing a cap on a maintenance free battery will destroy the seals in the battery and result in premature battery failure.

The specific gravity of a cell is an indication of the actual state of charge of the cell. A fully charged cell should have a reading of 1275 to 1300 (see the illustration to the right). A discharged cell will read 1100. Ideally, all cells in a battery will have the same reading. Any cells in a battery that vary by more than 25-points may be an indication of a bad cell.

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

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

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

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 25-points, then the battery should be replaced.



*Typical  
Hydrometer  
Float*

## WATERING

### ⚠ WARNING

- Explosive mixtures of Hydrogen gas are present within battery cells at all times. Do not work with or charge battery in an area where open flames (including gas furnace or water heater pilots), sparks, cigarettes, or any other sources of combustion are present. Always provide ample ventilation in rooms where batteries are being charged. Failure to do so may result in severe bodily injury and/or property damage.
- A battery is a live electrical source. It cannot be disconnected or neutralized. Do not drop any tool or conductive object onto the battery. A conductive object that comes in contact with the battery terminals will initiate a short circuit of the battery. This could cause the battery to explode resulting in severe bodily injury and/or property damage.
- Battery electrolyte is poisonous and dangerous. It contains sulfuric acid. Avoid contact with skin eyes or clothing. Wear rubber gloves and safety glasses while servicing batteries. **DO NOT INGEST!** This may result in severe bodily injury.

### ⚠ CAUTION

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



Battery Filler

### ⚠ WARNING

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

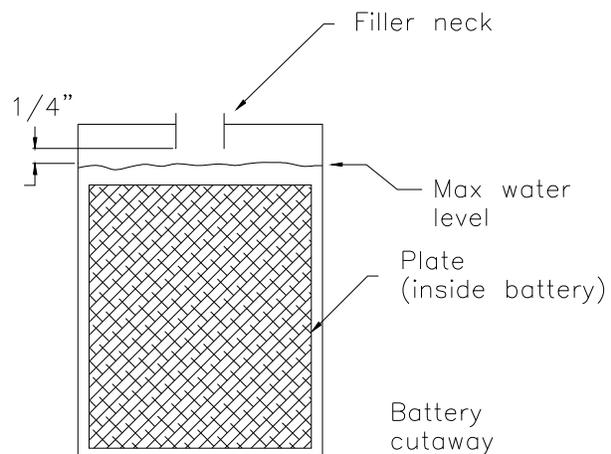
### ⚠ WARNING

1. Make sure the ignitions switch is in the "OFF" position, then remove the key.
2. Place shift lever in "park" or "neutral" position.
3. Set the park brake.
4. Place blocks under the front wheels to prevent vehicle movement.

*NOTE: The battery should be fully charged before performing this procedure.*

This procedure should only be performed on non-maintenance free batteries. The caps on maintenance free batteries should never be removed. Removing a cap on a maintenance free battery will destroy the seals in the battery and result in premature battery failure.

5. Clean the battery. Refer to **Cleaning** section for information on cleaning the battery.
6. 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.
7. Reconnect the battery, remove the blocks from the wheels and test drive.





## **STORING**

### **Storage**

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

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

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

If storing for more than one month, the battery should be charged per the table below.

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 ignitions switch is in the "OFF" position, then remove the key.
  2. Place shift lever in "park" or "neutral" position.
  3. Set the park brake.
  4. Place blocks under the front wheels to prevent vehicle movement.
5. Thoroughly clean the battery and battery compartment. Refer to **Cleaning** in this section for information regarding cleaning the battery.
  6. Check the electrolyte level and charge the battery. Refer to **Watering** in this section for information regarding checking the electrolyte level.
  7. Test the battery. Refer to **Testing** section for information on testing the battery.
  8. The battery is now ready to be put back into service.

## **REMOVE/INSTALL**

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### **⚠ WARNING**

- Explosive mixtures of Hydrogen gas are present within battery cells at all times. Do not work with or charge battery in an area where open flames (including gas furnace or water heater pilots), sparks, cigarettes, or any other sources of combustion are present. Always provide ample ventilation in rooms where batteries are being charged. Failure to do so may result in severe bodily injury and/or property damage.
- A battery is a live electrical source. It cannot be disconnected or neutralized. Do not drop any tool or conductive object onto the battery. A conductive object that comes in contact with the battery terminals will initiate a short circuit of the battery. This could cause the battery to explode resulting in severe bodily injury and/or property damage.
- Battery electrolyte is poisonous and dangerous. It contains sulfuric acid. Avoid contact with skin eyes or clothing. Wear rubber gloves and safety glasses while servicing batteries. **DO NOT INGEST!** This may result in severe bodily injury.

### **⚠ WARNING**

1. Make sure the ignitions switch is in the "OFF" position, then remove the key.
2. Place shift lever in "park" or "neutral" position.
3. Set the park brake.
4. Place blocks under the front wheels to prevent vehicle movement.

### **⚠ WARNING**

Always remove the negative cable from the battery first (negative ground systems) and connect the negative cable last.

5. Remove the negative cable from the battery .
6. Remove the positive cable from the battery.
7. Remove all battery hold downs and remove the battery from the vehicle.
8. Inspect the battery compartment for corrosion. If there is significant corrosion, then the battery compartment should be compartment cleaned and painted.
9. Install the battery
10. Connect the positive battery cable and torque the battery terminal hardware per torque listed in the Hardware Torque table at the end of this section.
11. Connect the negative battery cable and torque the battery terminal hardware per torque listed in the Hardware Torque table at the end of this section.



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## ***HARDWARE TORQUE***

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

Note: Depending on options ordered with the vehicle, the battery may have either a post or stud terminal.

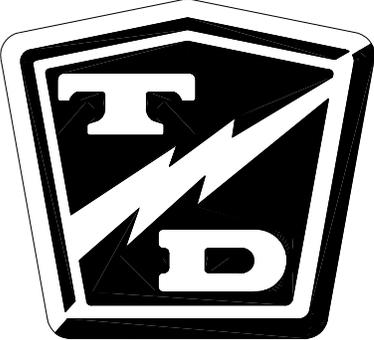
Description	Inch Pounds	Newton Meters
Battery Terminal (clamp type)	48-60	5.4-6.7
Battery Terminal (stud type)	120-130	13.5-14.5



# Chapter - 15

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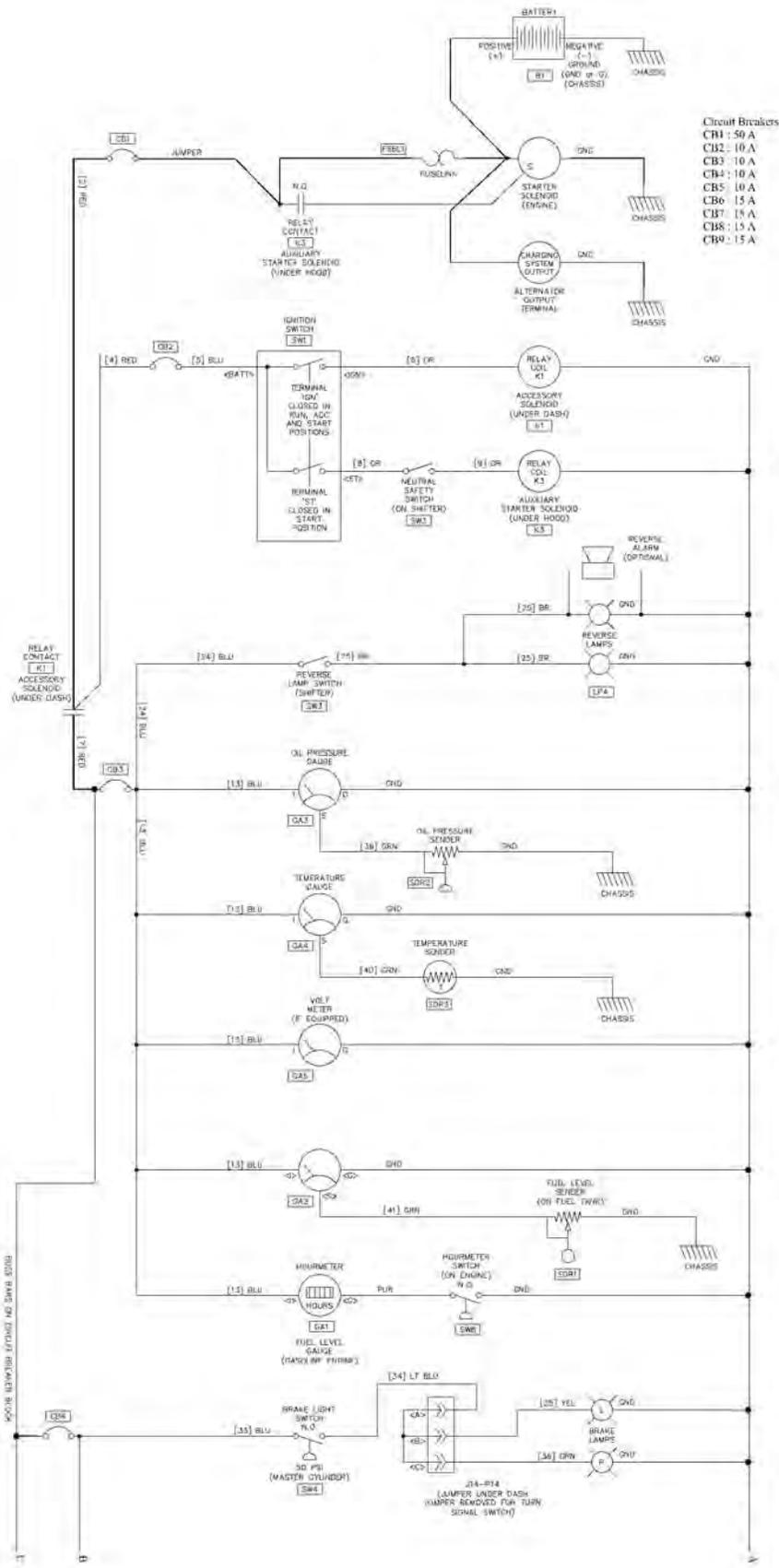
Wire Diagram, Chassie (P1) ..... 2  
Wire Diagram, Chassie (P2) ..... 3  
Hydraulic Diagram ..... 4



# Wire & Hydraulics Diagrams

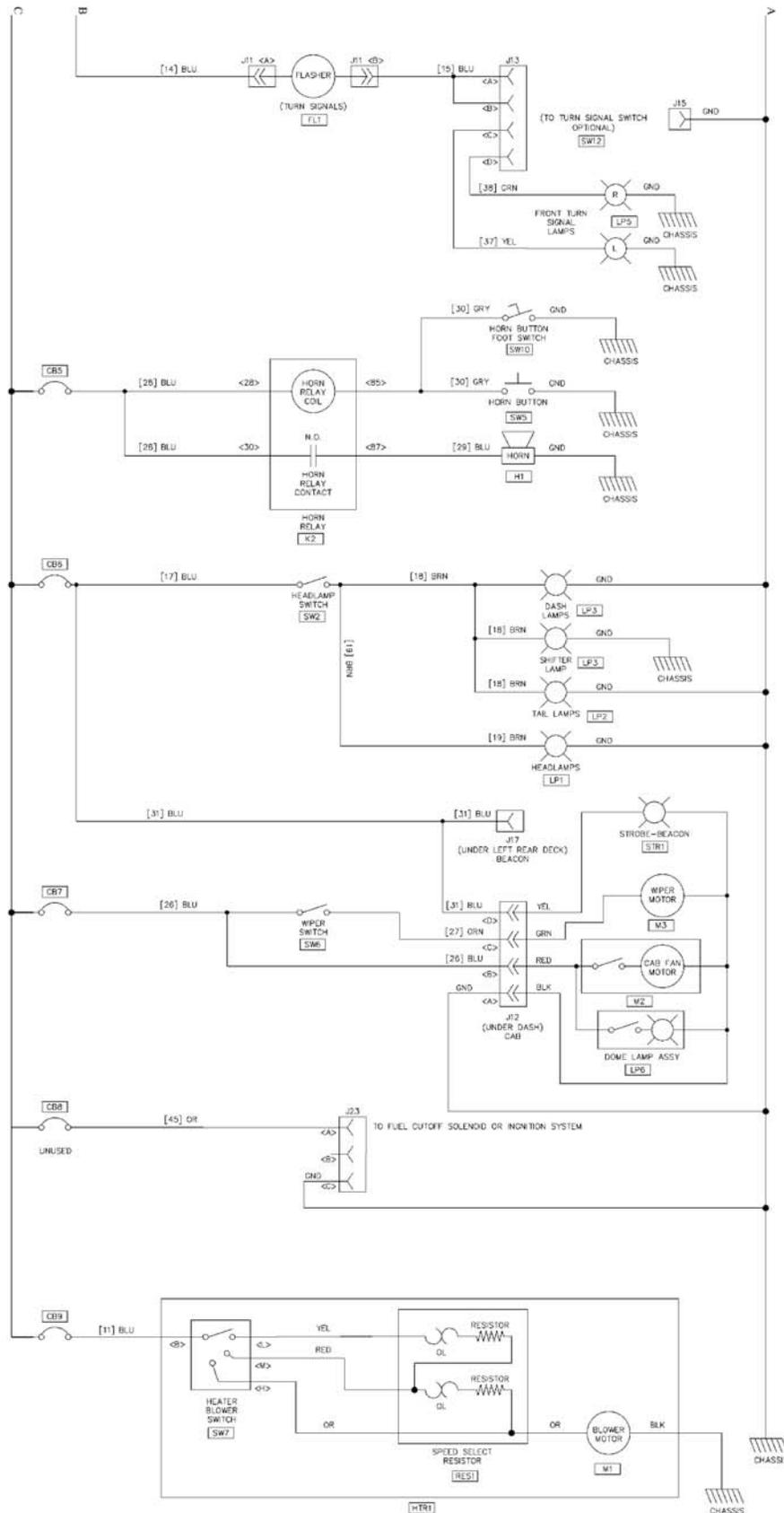
# WIRE DIAGRAM, CHASSIS (P1)

Note: A full size diagram is available on the CD provided with the vehicle. The diagram # is SCH-00036.



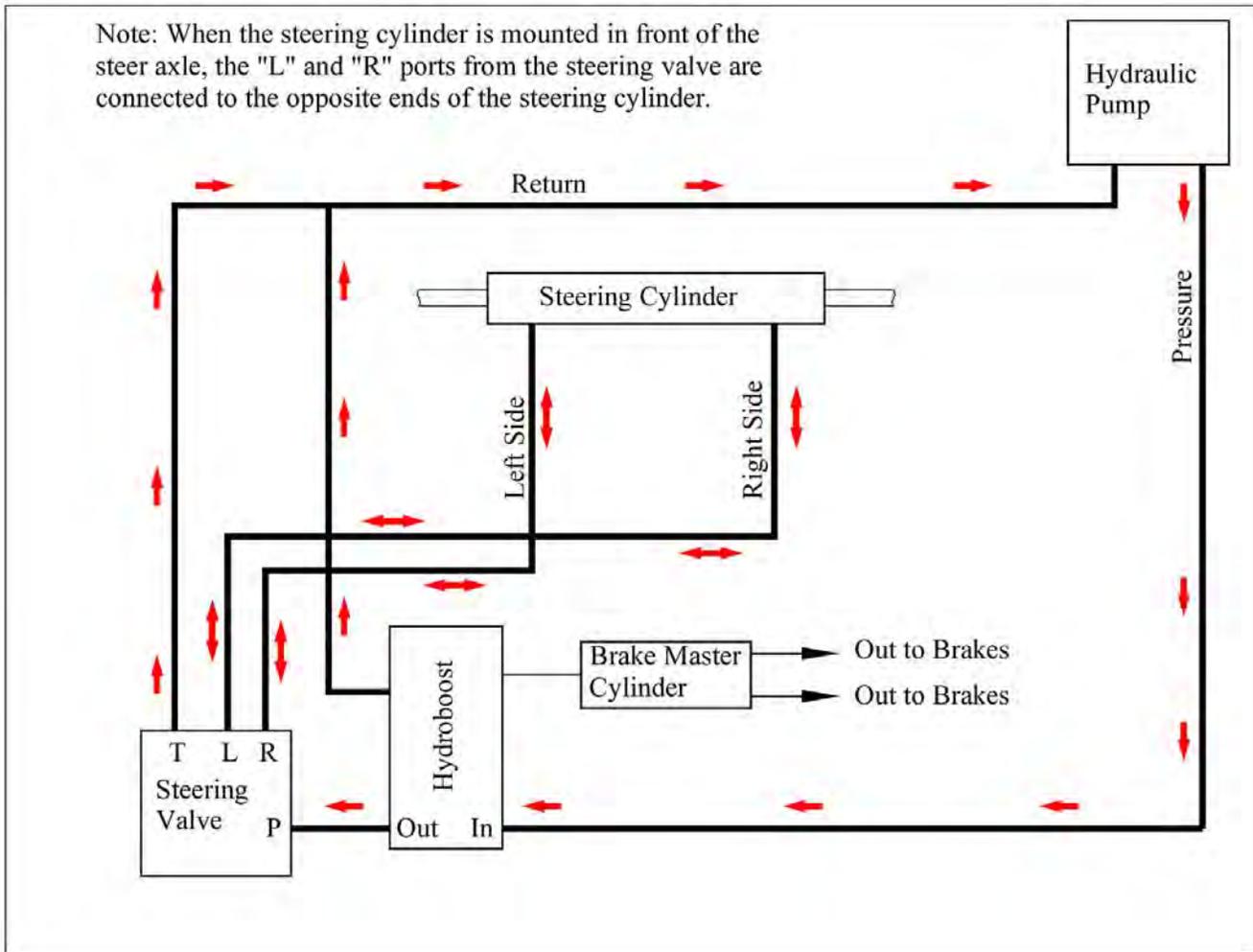
# WIRE DIAGRAM, CHASSIE (P2)

Note: A fill size diagram is available on the CD provided with the vehicle. The diagram # is SCH-00036.



# HYDRAULIC DIAGRAM

Note: When the steering cylinder is mounted in front of the steer axle, the "L" and "R" ports from the steering valve are connected to the opposite ends of the steering cylinder.



# Chapter - 4

## Illustrated Parts

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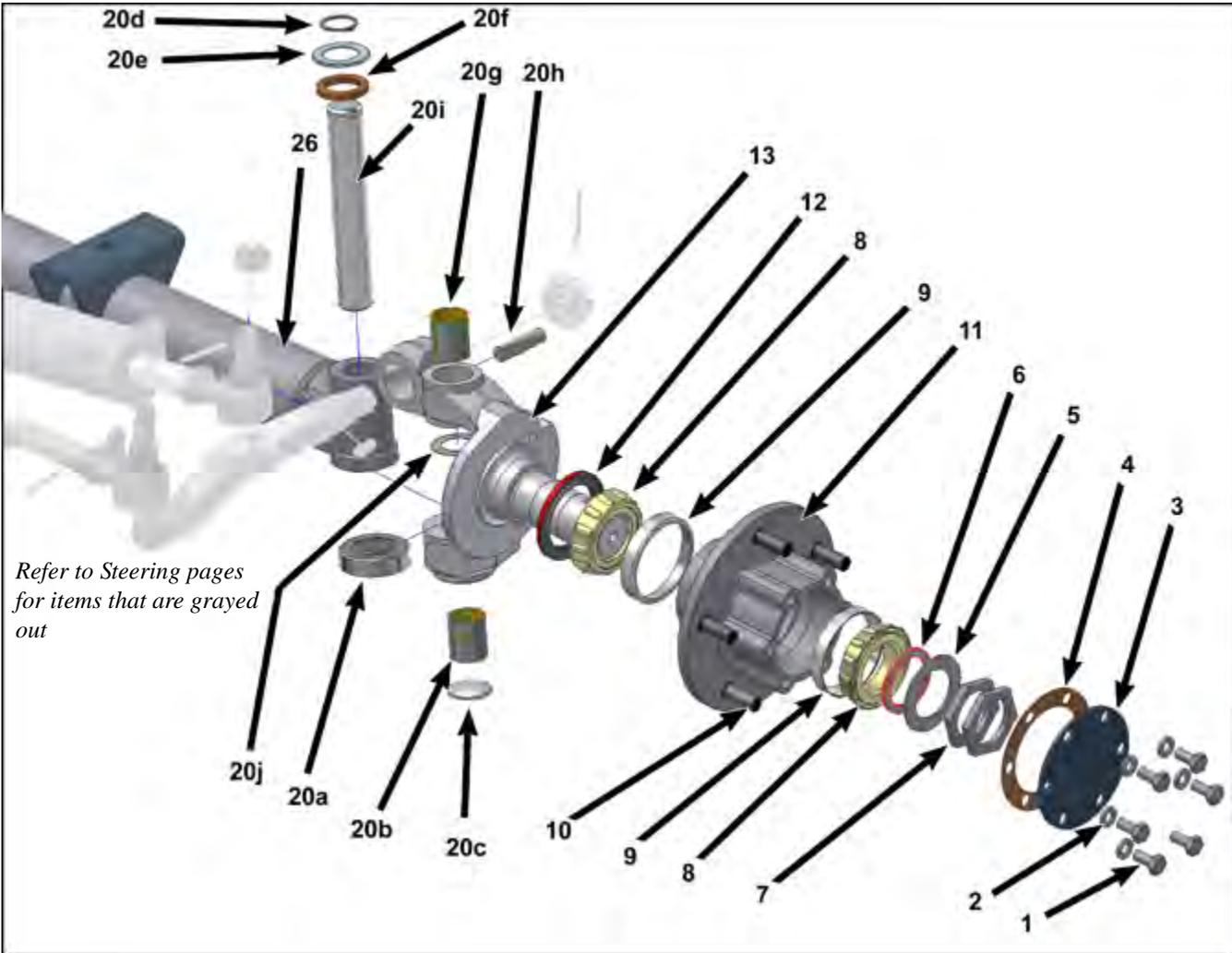
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# Axle Assembly, Front



*Illustration shows axle from TC-30-60. The TC 30-60L axle is the same with the exception of the steering arms shown below*

**TC 30-60L Steering Arm**

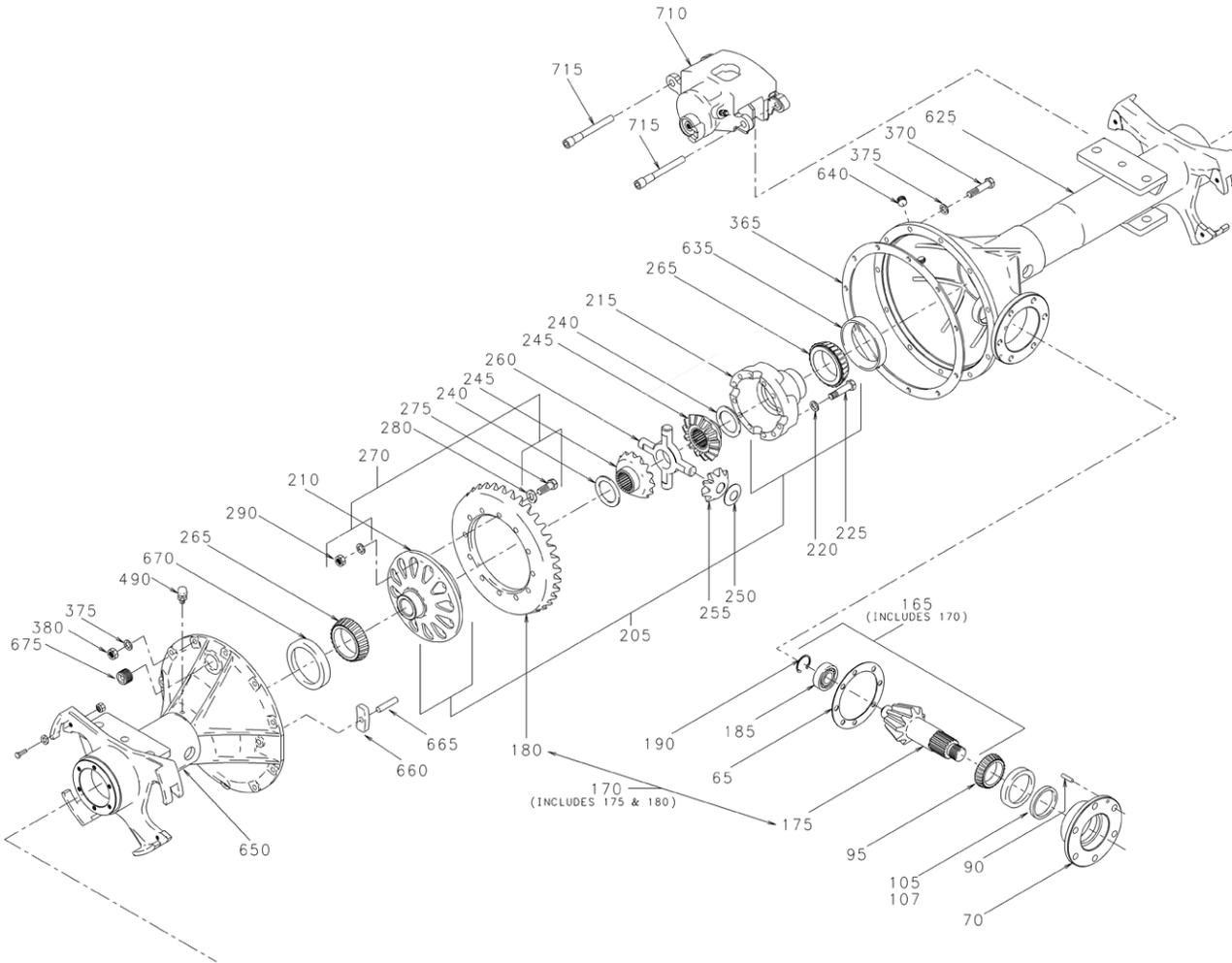




<b>Axle Assembly, Front</b>			
Item No.	Part No.	Description	Qty
1	88-401-45	Bolt	12
2	88-401-96	Washer	12
3	500845	Hub Cap	2
4	500844	Gasket	2
5	500841	Washer	2
6	500843	Washer	2
7	500842	Nut	4
8	500849	Bearing	4
9	500850	Race	4
10	500898	Wheel Stud	10
11	500846	Hub	2
12	500851	Seal	2
13	504917	Knuckle, Right	1
	504916	Knuckle, Left	1
20	500857	Kit, King Pin (left and right)	1
26	15-900-01	Axle Beam	1
-	500571	Grease Fitting, King Pin Bushing	4
-	A10621	Shim, King Pin	-



# Axle Assembly, Rear Secondary Gears



## Axle Assembly, Rear Secondary Gears

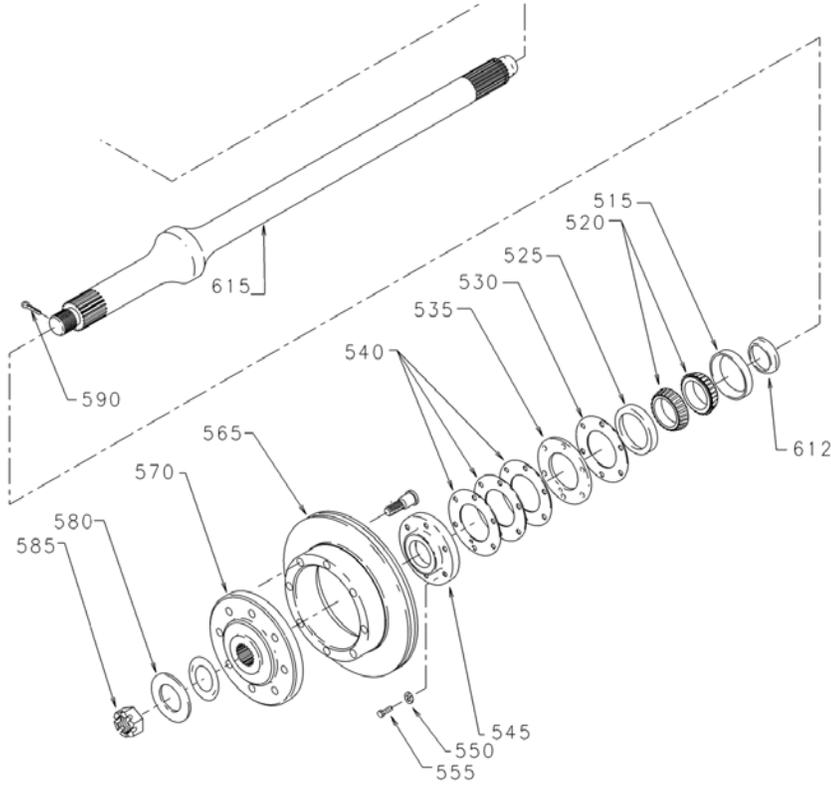
Item No.	Part No.	Description	Qty
	505452	Complete Axle Assembly	1
65	A10641	Gasket	1
70	A11451	Bearing cage assembly	1
90	A11432	Roll pin	1
95	A10182	Inner cone bearing	1
105	A11472	Shim pac	0
165	A11484	Pinion gear assembly	1
170	A11485	Ring and Pinion gear	1
180	A11487	Pinion gear	1
185	A11488	Bearing	1
190	A11489	Lock ring	1
205	A11452	Differential housing assembly	1
210	A11490	Differential flange	1
215	A11491	Differential housing	1
220	A10163	Washer	8
225	A10162	Cap screw	8
240	TIG-2001-119	Thrust washer	2

**Axle Assembly, Rear Secondary Gears (cont'd)**

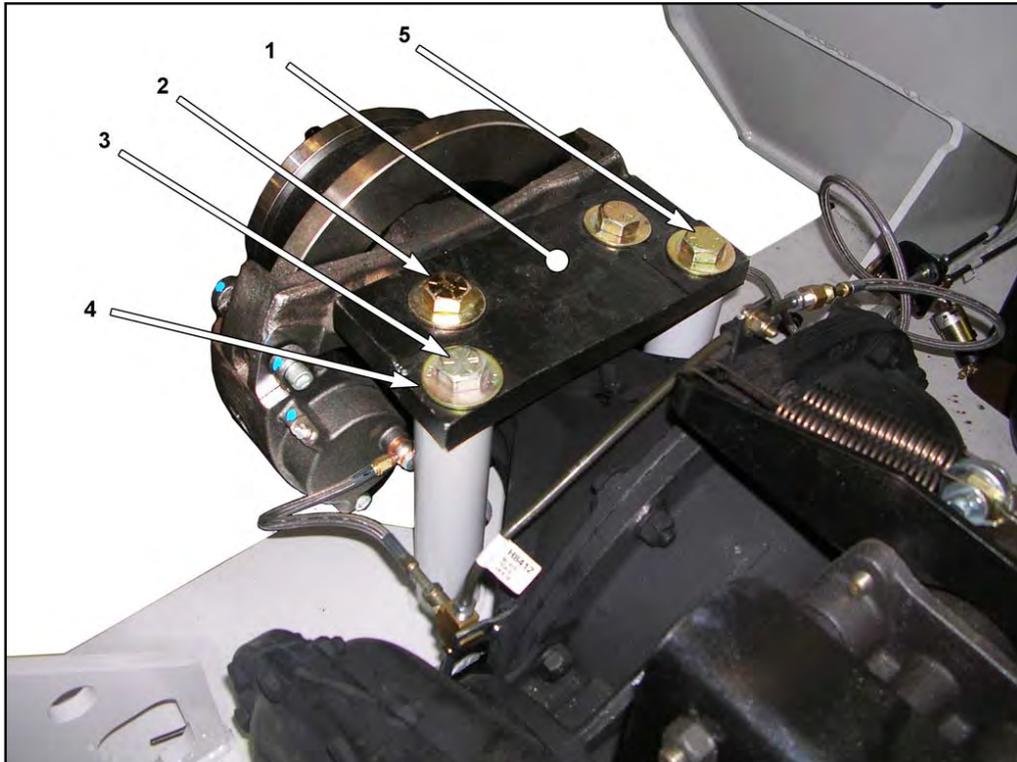
Item No.	Part No.	Description	Qty
245	TIG-2001-121	Axle gear	2
250	TIG-2001-127	Thurst washer	4
255	A10164	Differential gear	4
260	TIG-2001-123	Differential spider	1
265	A10167	Bearing	2
270	TIG-2001-291	Hardware kit	1
275	A11427	Cap screw	12
280	A10174	Washer	12
290	A10384	Nut	12
365	TIG-2001-157	Gasket	1
370	A11468	Cap screw	11
375	A10174	Washer	11
380	A10384	Nut	11
490	A10178	Breather	1
625	A11495	Housing	1
635	A10166	Bearing Race	1
640	A10179	Plug	1
650	A11496	Housing	1
660	A10193	Thrust block	1
665	TIG-2001-263	Pin	1
670	A10166	Bearing race	1
675	A11429	Plug, magnetic	1
710	See rear brakes	Brake assembly	4
715	A11498	Pin, sliding	8



## Axle Assembly, Rear Axles



## Axle Assembly, Mount to Frame



**Axle Assembly, Rear Axles**

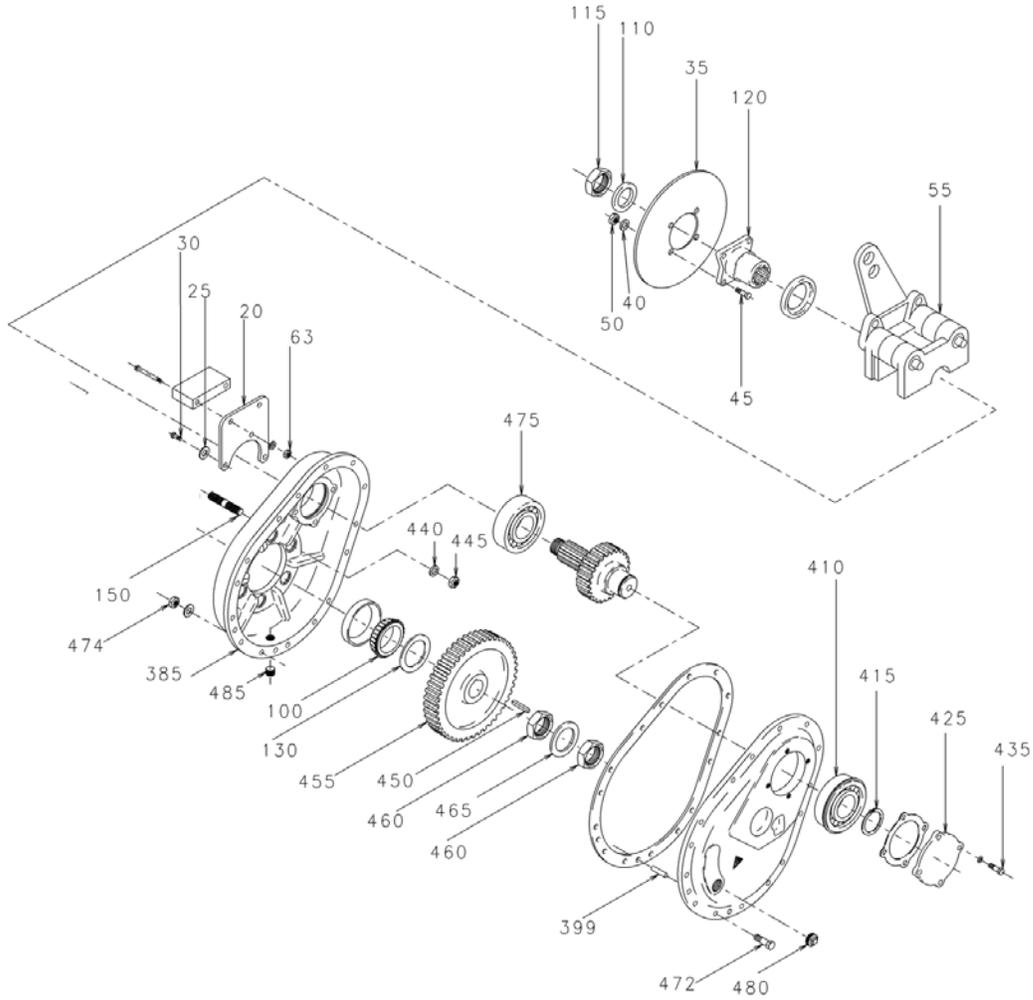
Item No.	Part No.	Description	Qty
515	A11418	Bearing race	1
520	TIG-2001-169	Bearing	2
525	A11418	Bearing race	1
530	TIG-2001-175	Gasket	1
535	A11425	Spacer	1
540	A11434	Shim, 0.003	5
	A11436	Shim, 0.005 (package of 10)	4
	A11437	Shim, 0.010 (package of 5)	3
545	A11454	Seal	1
550	401602	Washer	6
555	A11469	Cap screw	6
565	404217NS	Brake rotor	2
570	A11492	Hub	2
580	TIG-2001-187	Washer	2
585	TIG-2001-189	Nut	2
590	A11462	Cotter	2
612	A11493	Collar	1
615	A11494	Shaft assembly	1

**Axle Assembly, Mount to Frame**

Item No.	Part No.	Description	Qty
1	504182	Mounting Plate, Right Side	1
	504183	Mounting Plate, Left Side	
2	88-403-36	Bolt, Axle mount	4
	88-403-70	Nut	4
3	88-403-46	Bolt, Frame Mount, Rear	2
	88-403-70	Nut	2
4	88-403-80	Washer	16
5	88-403-45	Bolt, Frame Mount, Front	2
	88-403-70	Nut	2



# Axle Assembly, Rear Primary Gears



## Axle Assembly, Rear Primary Gears

Item No.	Part No.	Description	Qty
20	A11479	Brake adaptor	1
25	A11424	Washer	3
30	A11471	Cap screw	3
35	A11480	Brake disc	1
40	A10165	Washer	4
45	A11467	Cap screw	4
50	A11481	Nut	4
55	A11482	Brake assembly	1
63	A11483	Lock nut	2
100	A10182	Bearing	1
110	TIG-2001-231	Washer	1
115	A11421	Nut	1
120	TIG-2001-233	Flange	1
130	34475	Washer	1
150	A11450	Stud	6
385	A10642	Gear case assembly	1

**Axle Assembly, Rear Primary Gears (cont'd)**

Item No.	Part No.	Description	Qty
399	TIG-2001-263	Dowel	
410	A11423	Bearing	
415	A11430	Snap ring	1
425	A11445	Bearing cap	1
435	A11471	Cap screw	6
440	TIG-2001-217	Washer	6
445	401577	Nut	6
450	A11428	Key	2
455	TIG-2001-323	Gear	1
460	A10189	Nut	2
465	A10190	Locking washer	1
472	A11467	Cap screw	15
474	A11465	Nut	15
475	A11422	Bearing	1
480	A11466	Plug	1

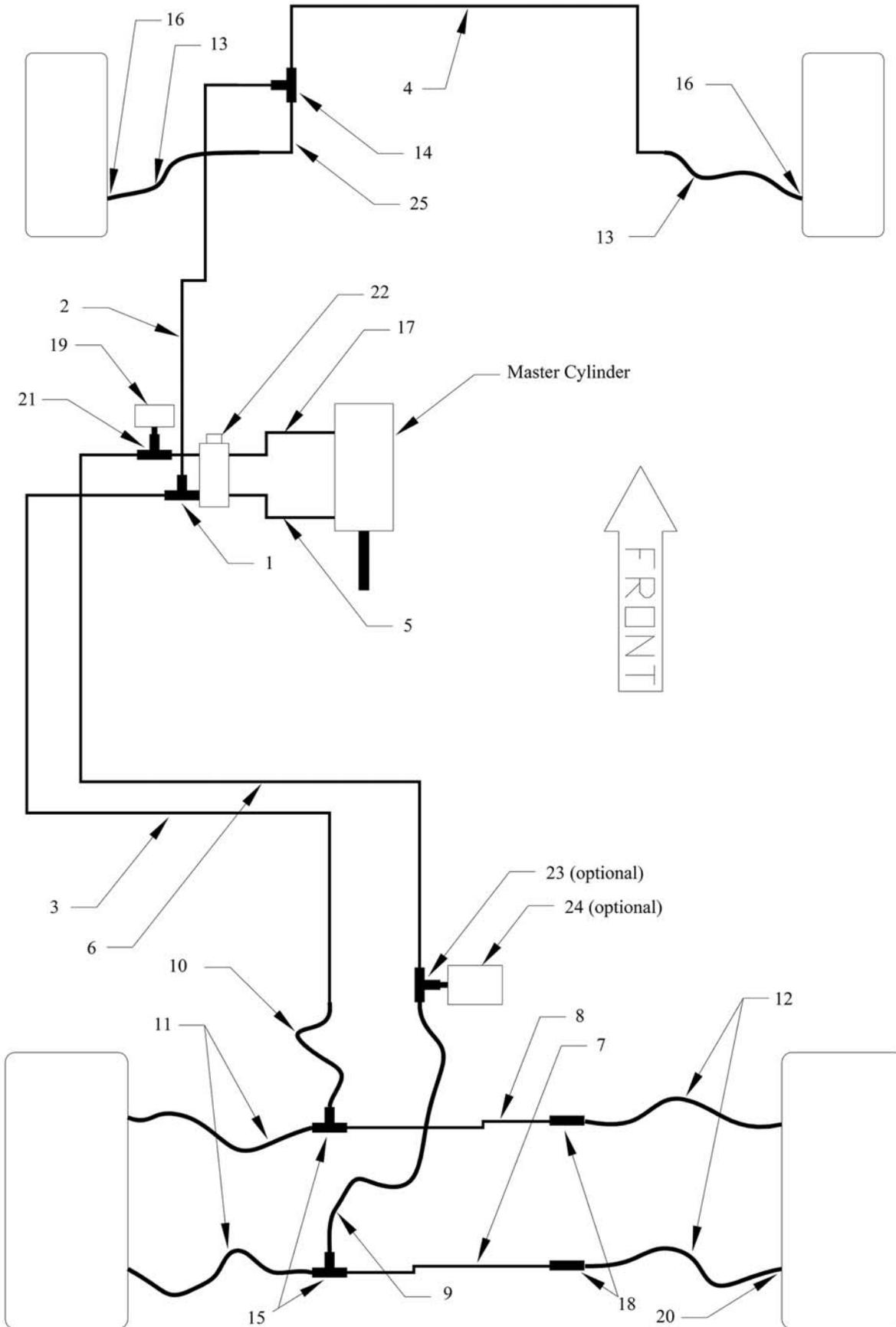
**Brake Pedal Linkage**

*Illustration Not Available*

Item No.	Part No.	Description	Qty
	504273	Brake Pedal (includes bushings)	1
	503191	Bushing	2
	500185	Bolt	1
	88-401-80	Nut	1
	88-401-95	Washer	2
	4-2384994	Pedal Return Spring	1
	505502	Hydroboost Assembly	1



# Brakes, Brake Lines



### Brake Lines

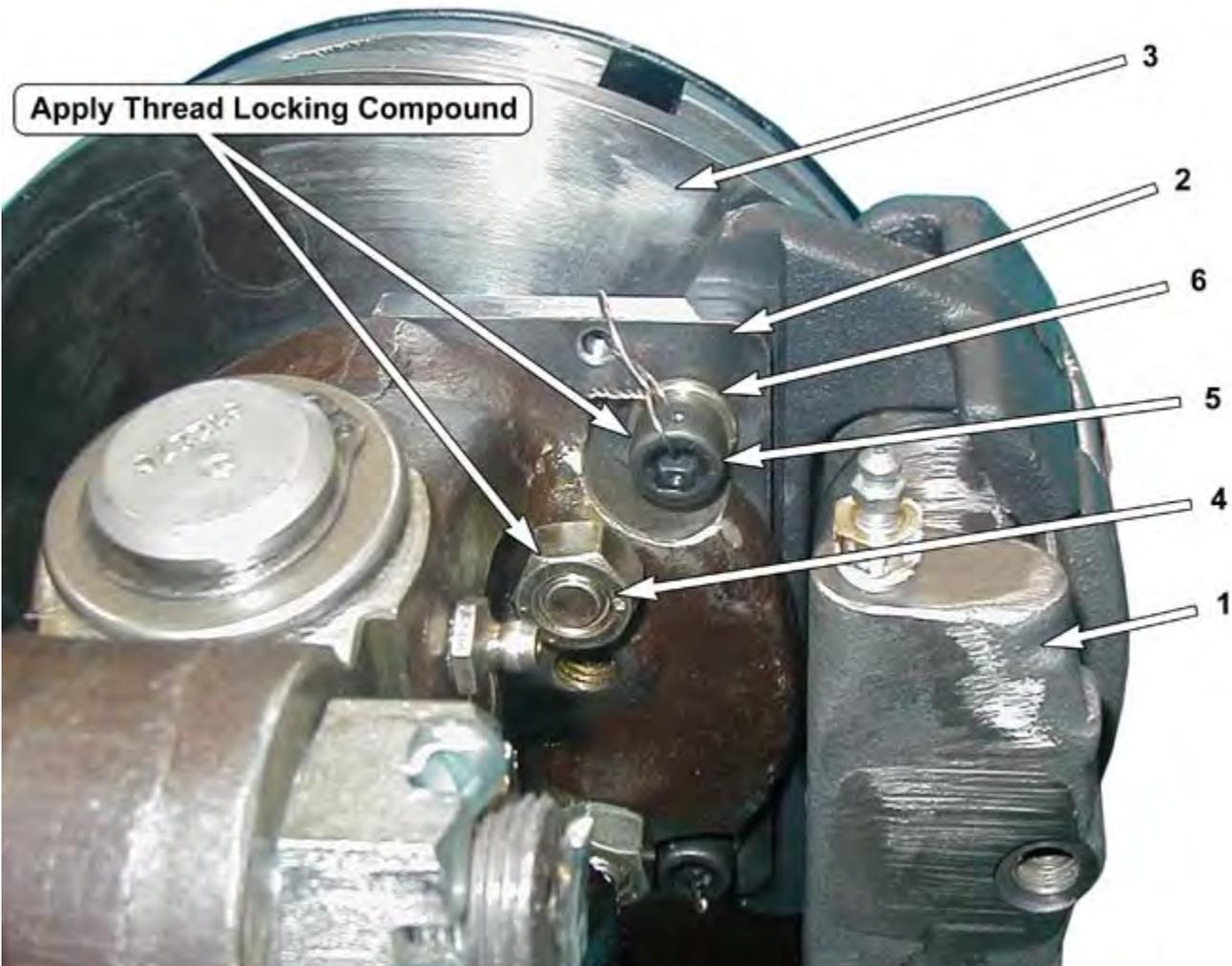
Item No.	Part No.	Description	Qty
1	501040-11	Brake Fitting, T	1
2	4-2793298	Brake Line	1
3	99-607-67	Brake Line	1
4	4-2810145	Brake Line	1
5	K2T-700-28	Brake Line	1
6	99-607-68	Brake Line	1
7	500146	Brake Line	1
8	500145	Brake Line	1
9	504592	Brake Hose	1
10	504592	Brake Hose	1
11	504590	Brake Hose	2
12	504590	Brake Hose	2
13	4-2809510	Brake Hose, Front	2
14	502013	Brake Fitting, T	1
15	98-515-92	Brake Fitting, T, w / Mounting bracket	2
16	99-575-10	Brake Fitting	2
17	K2T-700-27	Brake Line	1
18	500159	Brake Fitting, Coupler	2
19	500552	Brake Light Switch, Hydraulic	1
20	99-580-35	Fitting, Banjo Adaptor	4
	99-573-00	Washer, Copper Gasket	8
	99-580-31	Bolt, Hydraulic Fitting	4
21	501040-11	Brake Fitting, Brake light Switch	1
22	4-2382033	Brake Warning Switch	1
23	See Transmission	T-Fitting (optional)	1
24	See Transmission	Solenoid, Shift Interlock (optional)	1
25	4-2793669	Brake Line	1
Not Shown	500243	Hose Clamp, Rear Axle Brake Lines	1
	504867	Frame Mount, Rear Brake Hoses	1



# Brakes, Front Axle

## Front Brakes

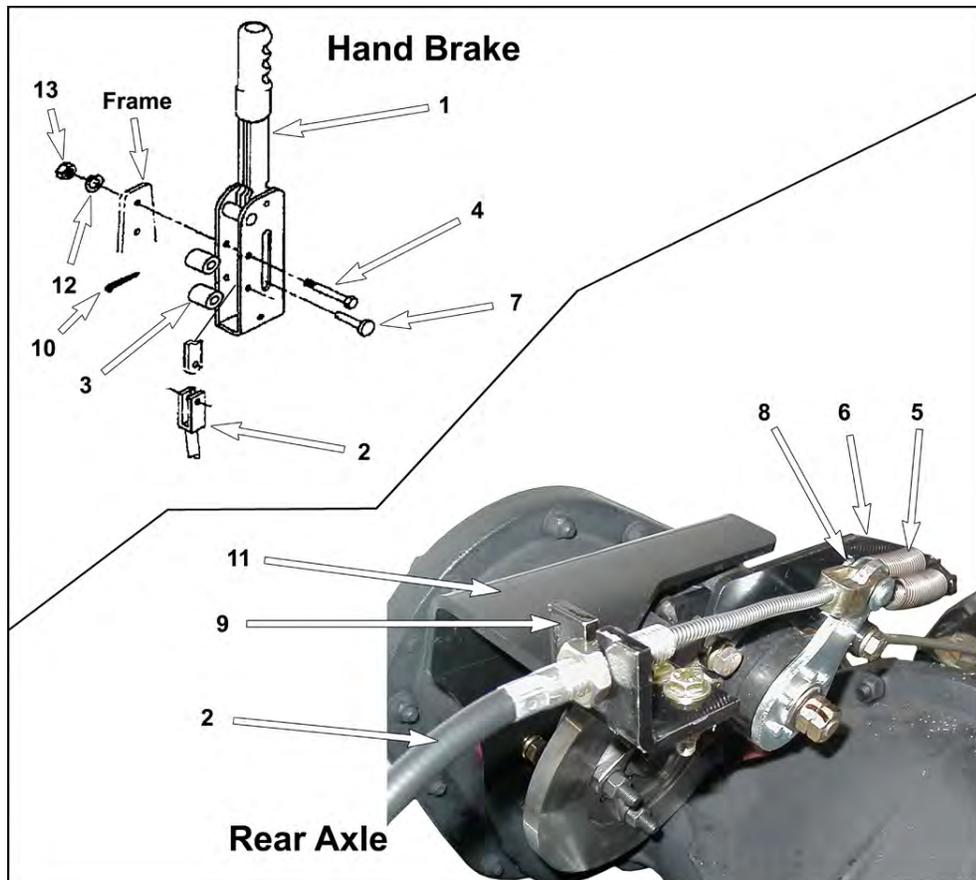
Item No.	Part No.	Description	Qty
1	500673	Caliper Assembly, Left	1
	500673	Caliper Assembly, Right	1
2	500375	Mounting Bracket	2
3	500374	Rotor	2
4	88-402-07	Bolt, 7/16 Grade 8	4
	88-402-28	Nut, Reversible Lock	4
5	88-401-77	Bolt, Caliper Mounting	4
6	88-401-96	Washer, Split Lock, Caliper Mounting	4
-	903641	Piston	4
-	41-348-62	Kit, Brake Pad, Includes 4 pads and safety wire	-
-	505879	Safety Wire (for #5)	Per Ft.





## Brakes, Parking Brake

Item No.	Part No.	Description	Qty
1	4-3798240	Handle, Park Brake	1
	4-2756080	Switch, Park Brake Warning	1
2	4-2774246	Cable, Park brake	1
3	4-1300065	Spacer	2
4	88-401-46	Bolt, Bracket to Frame	2
5	500864	Spring, Return	2
6	41-386-03	Mount, Return Spring	1
	Included w/handle	Clevis Pin, Handle	1
7	88-527-11	Cotter Pin	1
	96-772-00	Clevis Pin, Caliper	1
8	500563	Cotter Pin	2
	K9N-700-99	Bracket, Cable	1
9	88-527-11	Cotter pin	1
11	41-386-00	Bracket, Rear Cable Mounting	1
	88-402-75	Nut, Mounting	2
12	88-108-61	Washer	2
	88-109-81	Nut	2
-	501273	Caliper Assembly	1
-	245437	Kit, Brake Pads	
-	501272	Brake Rotor	1





## Brakes, Rear Axle

*Illustration Not Available*

<b>Brakes, Rear Axle</b>			
Item No.	Part No.	Description	Qty
	504350	Caliper Assembly	4
	41-490-43	Kit, Brake Pad Replacement Includes pads for all 4 calipers	1

## Decals

*Illustration Not Available*

Item No.	Part No.	Description	Qty
-	500235-W	Unleaded Fuel, White Text	1
-	504938	Check Engine	1
-	500233	Operation	1
-	501040-7	Shift Inhibitor	1
-	500235	Unleaded Fuel, Black Text	1
-	4-2376150	Fan Warning	1
-	500236	Diesel Fuel Only	1
-	500662	Headlights	1
-	201324-6	Parking Brake	1
-	4-2775281	Warning	1

## Electrical, Miscellaneous

*Illustration Not Available*

Item No.	Part No.	Description	Qty
	500364	Boot, Positive Starter Terminal or Battery	1
	504933	BATTERY/GROUP 24M	1
	500098	Battery Hold Down Bar	1
	502556A	Boot, Positive	1
	50-243-16	Rod, Hold Down	2
	4-2360829	Ground Cable, Engine to Chassis	1
	500560	HOUR METER SWITCH	1
	500586	Horn	1
	500558-A	Horn relay	1
	201040	Horn Switch, Steering Wheel	1
	500781	CIRCUIT BREAKER \ 10A	4
	500782	CIRCUIT BREAKER \ 50A	1
	502533	Boot, 50A Circuit Breaker	1
	500787	CIRCUIT BREAKER \ 15A	2
	500788	Mount, Circuit breaker	2
	500789	Buss Bar, 4-holes	1
	500790	Buss Bar, 3-holes	1
	500791	Buss Bar, 2-holes	1
	502496	Accessory Relay	1
	500532	Sender, Oil Pressure, GM	1
	500548	Sender, Temperature, GM	1
	500194-6	ALARM (REVERSE)	1
	500759-0250	WIRE LOOM NYLON 1/4	Per Foot
	500759-0350	WIRE LOOM \ 3/8" \ NYLON	Per Foot
	500759-0500	WIRE LOOM \ 1/2" \ NYLON	Per Foot
	500759-0750	LOOM, NYLON 3/4"	Per Foot
	500283-1	CLAMP CBL 1/4 X 1/2 INSUL(#4)	-
	500283-11	CLMP, CABLE, 1/2 X 1/2 (#8)	-
	500283-2	CLAMP CBL 3/8 X 1/2 INSUL	-
	500283-3	CLAMP CBL 3/4 X 1/2 INSUL	-
	500283-12	CLAMP CBL 3/4 X 3/4 INSUL	-
	500283-7-A	CLAMP CBL 2 X 1/2 INSUL	-
	500283-8	CLAMP CBL 1-1/8 X 1/2 INSUL	-

## Electrical, Harnesses/Wiring

Item No.	Part No.	Description	Qty
	500350-18	HARNESS, ENGINE SENSORS	1
	500350C	WIRING HARNESS \ MAIN \ 2001+	1
	4-2793322	Battery Cable, Positive	1
	501389	Battery Cable, Negative	1
	501040-5B	HARNESS, SHIFT INHIBITOR (optional)	0 or 1



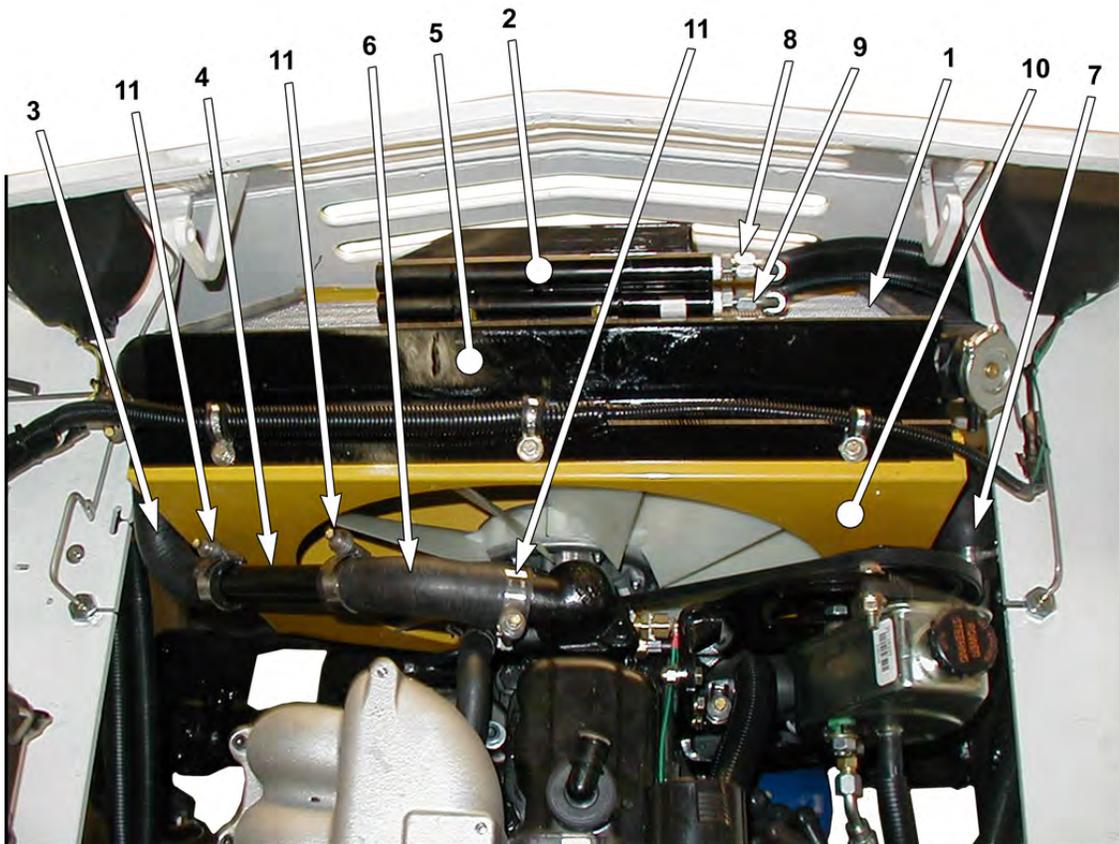
## Engine, GM

*Illustration Not Available*

Item No.	Part No.	Description	Qty
-	*	Engine Assembly, Gasoline	1
-	-	Refer to manufacturers appendix for engine assembly components	
-	67-000-99	Engine Assembly, LPG	1
-	-	Refer to manufacturers appendix for engine assembly components	
-	66-611-23	MOUNTING BRACKET, R, GM ENGINE	1
-	66-611-22	MOUNTING BRACKET, L, GM ENGINE	1
-	4-2778901	MOUNT-ENGINE (65 DURO)	2
-	88-407-40	M16X2 X 40MM 10.9 FLGHCS	2
-	66-900-07	Mount, Steering Pump, Lower	1
-	66-900-20	Mount, Steering Pump, Upper	1
-	66-900-06	Mount, Steering Pump, Rear	1
-	66-900-08	Belt, Steering Pump	1
-	66-900-09	PULLEY, WATER PUMP, 2 GROOVES	1

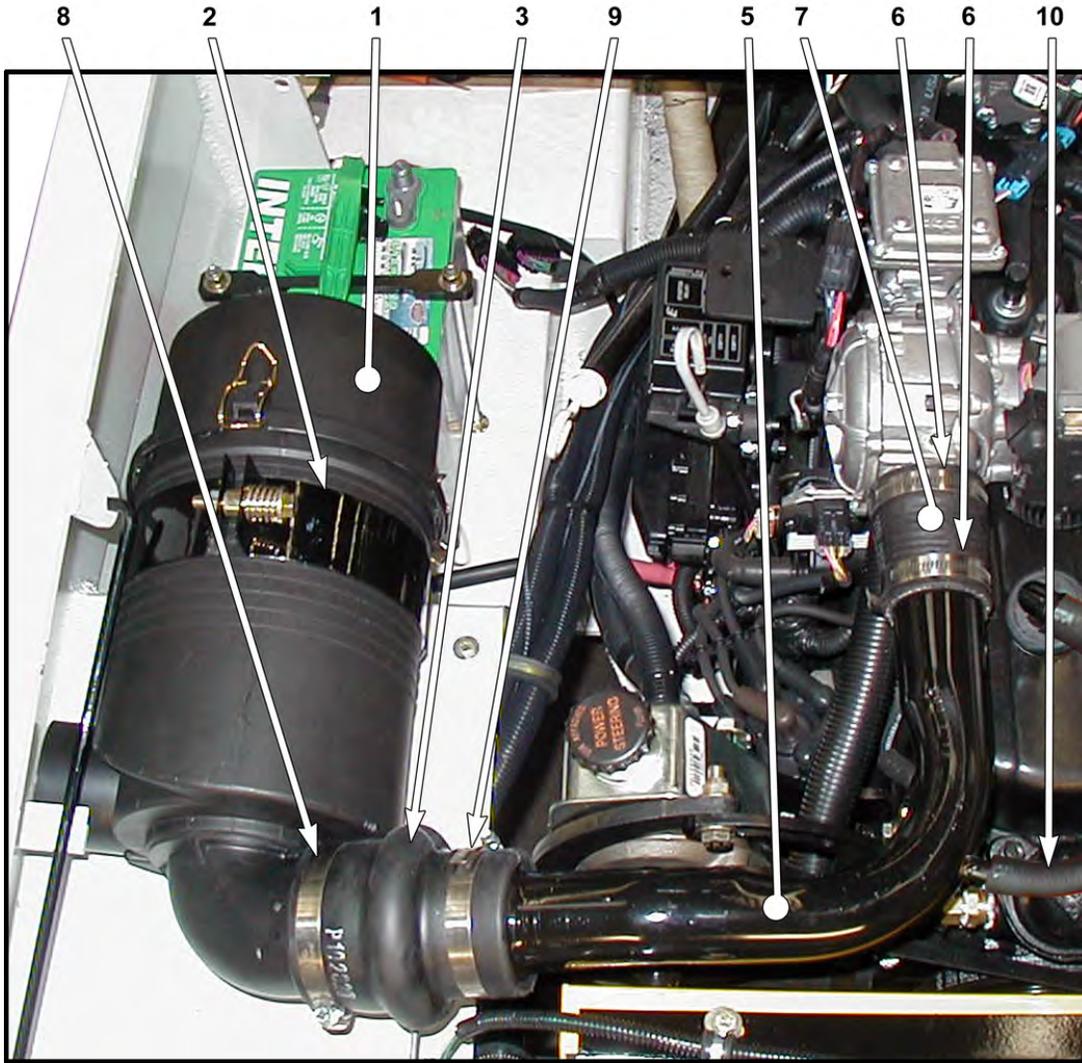
## Engine, Cooling System, Gasoline / LPG

Item No.	Part No.	Description	Qty
1	66-000-43	Radiator	1
	500262	Cap, Radiator	1
2	4-2804020	Cooler, Transmission Fluid	1
3	K2T-700-19	Hose, Radiator Upper1	1
4	66-000-28	Tube, Upper	1
5	507075	Hold Down Clamp, Radiator	1
6	K2T-700-23	Hose, Radiator Upper2	1
7	506334	Hose, Radiator Lower (radiator)	1
	K2T-700-17	Hose, Radiator Lower (engine)	1
	66-000-27	Tube, Coupler	1
	506344	Clamp, Lower	2
	506338	Clamp, Upper	2
8	99-531-01	Hose, Transmission Cooler	1
9	99-531-00	Hose, Transmission Cooler	1
10	507059	Fan Shroud / Radiator Mount	
11	506338	Clamp, Hose	4
	500130	Tank, Coolant Recovery	1
	-	Includes Tank, Wire bracket, Hoses, clamps	
	88-401-01	Bolt, bracket mounting	2
	88-401-95	Washer	4
	88-401-87	Nut	2
	88-401-01	Bolt, Recovery Tank Bracket	2
	88-401-40	Washer, Recovery Tank Bracket	4
	88-401-30	Nut, Recovery Tank Bracket	2





## Engine, Air Cleaner (LPG)

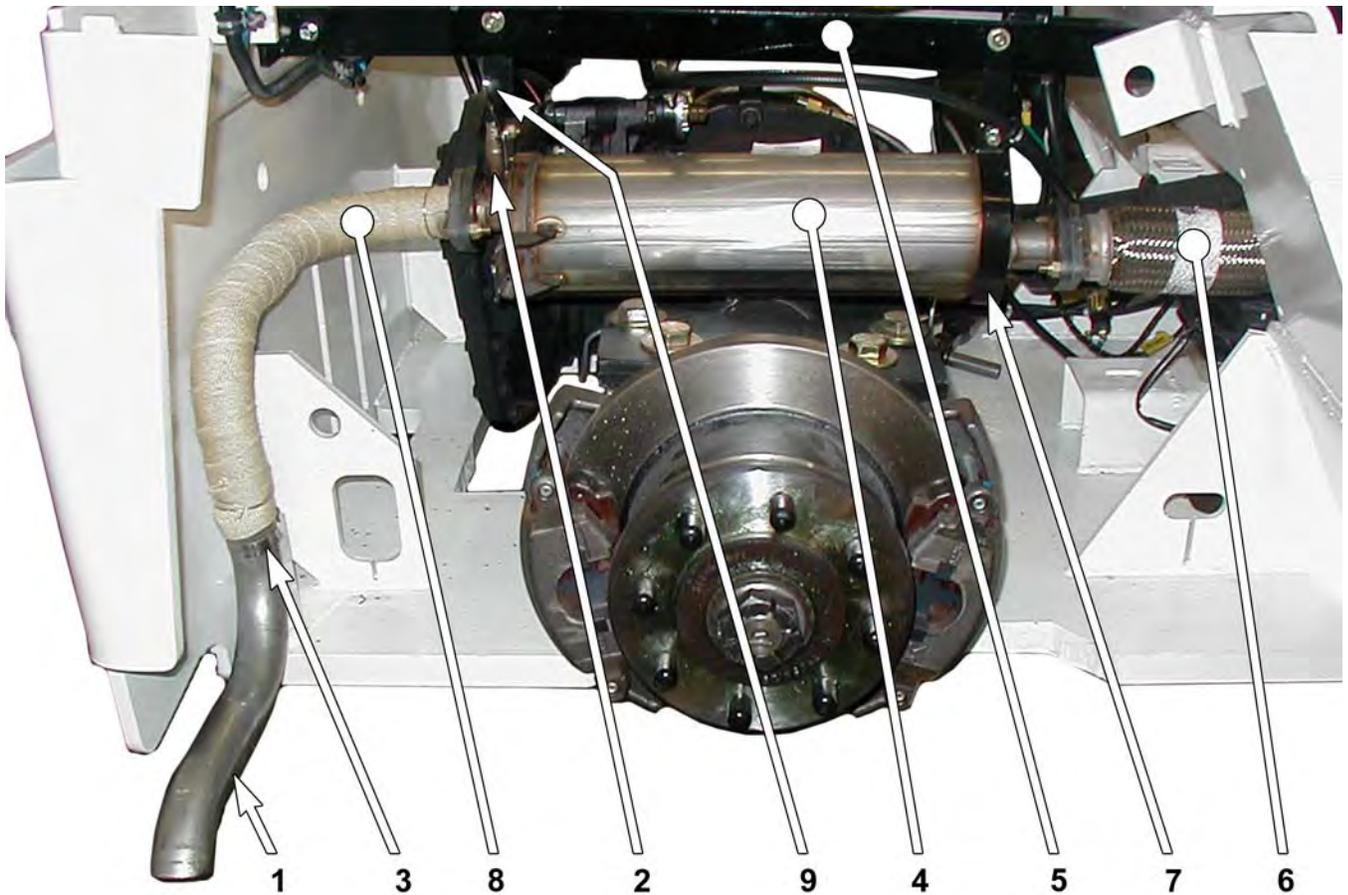


Item No.	Part No.	Description	Qty
1	500805-7-A	Air Filter Assembly	1
	67-500-01	Filter element	1
2	500805-7-B	Mounting Bracket, Clamp	1
	88-401-02	Bolt	2
	88-401-40	Washer	4
	88-401-31	Nut	2
3	504275	Flex Coupler	1
4	-	-	-
5	K2T-600-01	Tube Intake	1
6	502522	Clamp	2
7	505844	Hose, Coupler	1
8	502131	Clamp, Hose	1
9	502131	Clamp	1
10	98-540-14	Hose, Crankcase Vent	per foot



## Exhaust, Gasoline, LPG

Item No.	Part No.	Description	Qty
1	507079	TAIL PIPE 30/60 L 3.0 GM PSI	1
2	67-500-24	Sensor, Oxygen	1
3	502522	Clamp, Tail Pipe	1
4	67-500-19	Muffler / Catalytic Converter	1
5	66-045-16	BRACKET, MUFFLER HANGING	1
6	507077	HEAD PIPE 30/60 L 3.0 L GM PSI	1
7	01-900-33	MUFFLER, HANGER (clamp)	1
8	98-080-08	Wrapl Heat Insulation	Per roll
9	01-300-42	Hanger, Muffler (rear)	1
-	K2T-700-22	Mount, Exhaust/shifter cable	1
-	505735	CLAMP, MUFFLER, 1 3/4"	2





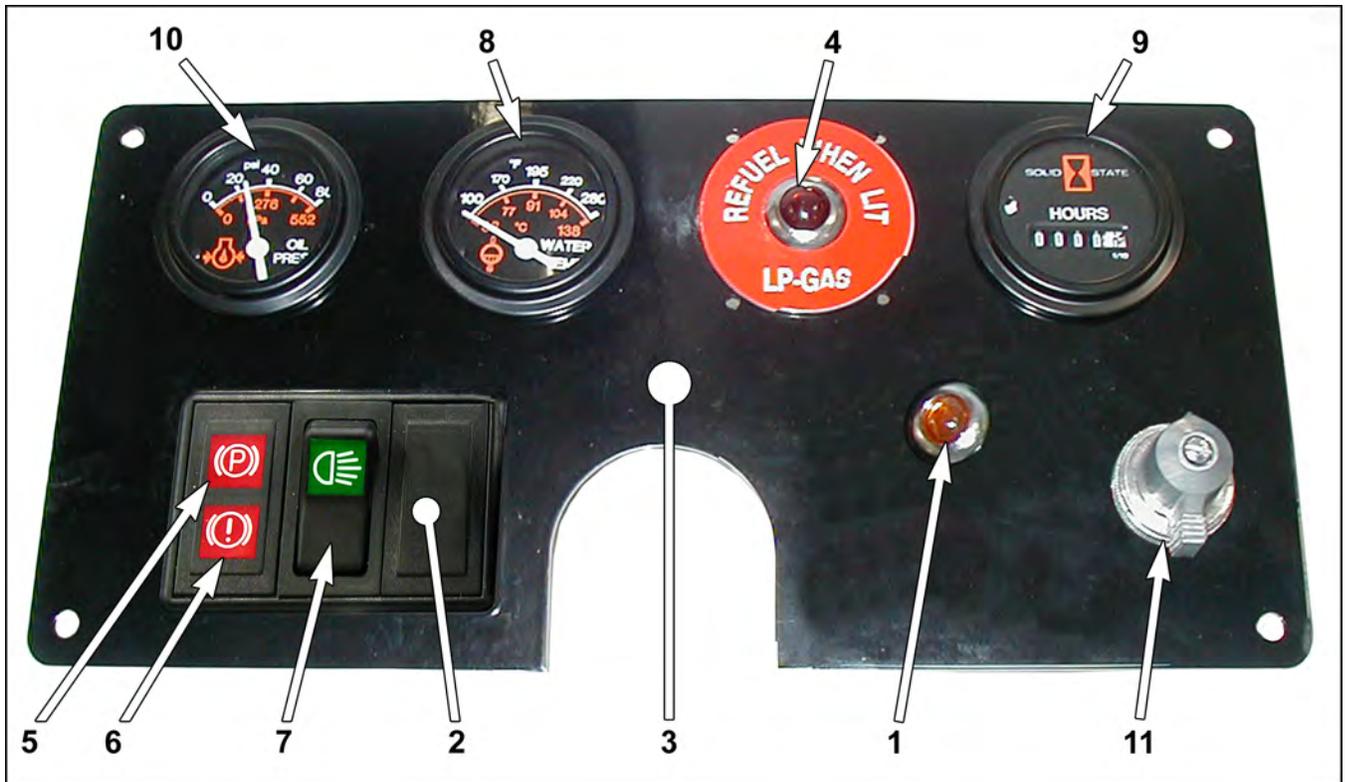
## Frame and Body

Item No.	Part No.	Description	Qty
-	*	Frame, standard	
	00-900-00	Hood	1
	4-2775620	Hinge Pin, removable (hood and seat frame)	4
	96880	Latch, Hood	2
	94001	Prop Rod, Hood	1
	500051	Clip, Prop Rod	1
	K2T-700-25	Spacer, Prop Rod Clip	1
	38374	Socket, Prop Rod	1
	K2T-700-21	Strap, Hood Limit	1
	K2T-700-18	Mount, Limit Strap	1
	4-2806424	Firewall, Upper	1
	00-900-09	Firewall, Lower	1
	00-900-08	Cover, Brake Pedal	1
	K2T-700-26	Splash Guard	1
	00-900-01	Transmission Cover	1
	500539	Bracket, Shifter Mounting	1
	90-160-70	Seat, Adjustable (optional)	1
	500204	Seat Belt (optional)	1
	88-401-80	Locknut	2
	88-401-95	Flat washer	2
	88-402-69	Shoulder Screw	2
	4-2810192	WLDMNT SEAT DECK	1
	94396	WRAPPER ASSY - SEAT DECK 90 DE	1
	4-2792860	FLAP-SEAT DECK WRAPPER	1

## Fuel System, LPG

Item No.	Part No.	Description	Qty
-	502073	Filter	1
-	502025	VALVE LPG RLF 400 PSI 1/4 NPT	1
-	502024-28	HOSE, LPG TANK	1
-	2-30900122	LPG TANK 33-1/2	1
-	500225	CLAMPS\LPG TANK MOUNTING	2
-	503894	LOW LPG INDICATOR (dash mounted)	1
-	66-611-26	Mounting Bracket, Vaporizer	1
-	500679	CONNECTOR LP TANK	1

## Instrument Panel



Item No.	Part No.	Description	Qty
1	See Lights	Light, Check Engine	1
2	4-3738254	Hole Cover	1
3	4-2773874	Panel	1
4	503894	Gauge, Fuel (low LPG)	1
-	4-2773837	Warning Light Assembly	1
5	4-2773841	Lens, Park Brake Lamp	1
6	4-2773868	Lens, Brake Warning Lamp	1
7	4-2774697	Switch, Headlight	1
	4-2773838	Lens	1
8	500545	Gauge, Coolant Temperature	1
9	500537	Gauge, Hour Meter	1
10	500116	Gauge, Oil Pressure	1
11	500128	Switch, Ignition (keyless)	0 or 1
	500128K	Switch, Ignition (keyed)	0 or 1
-	4-2774690	Bezel, Switch (left side 3 position)	1

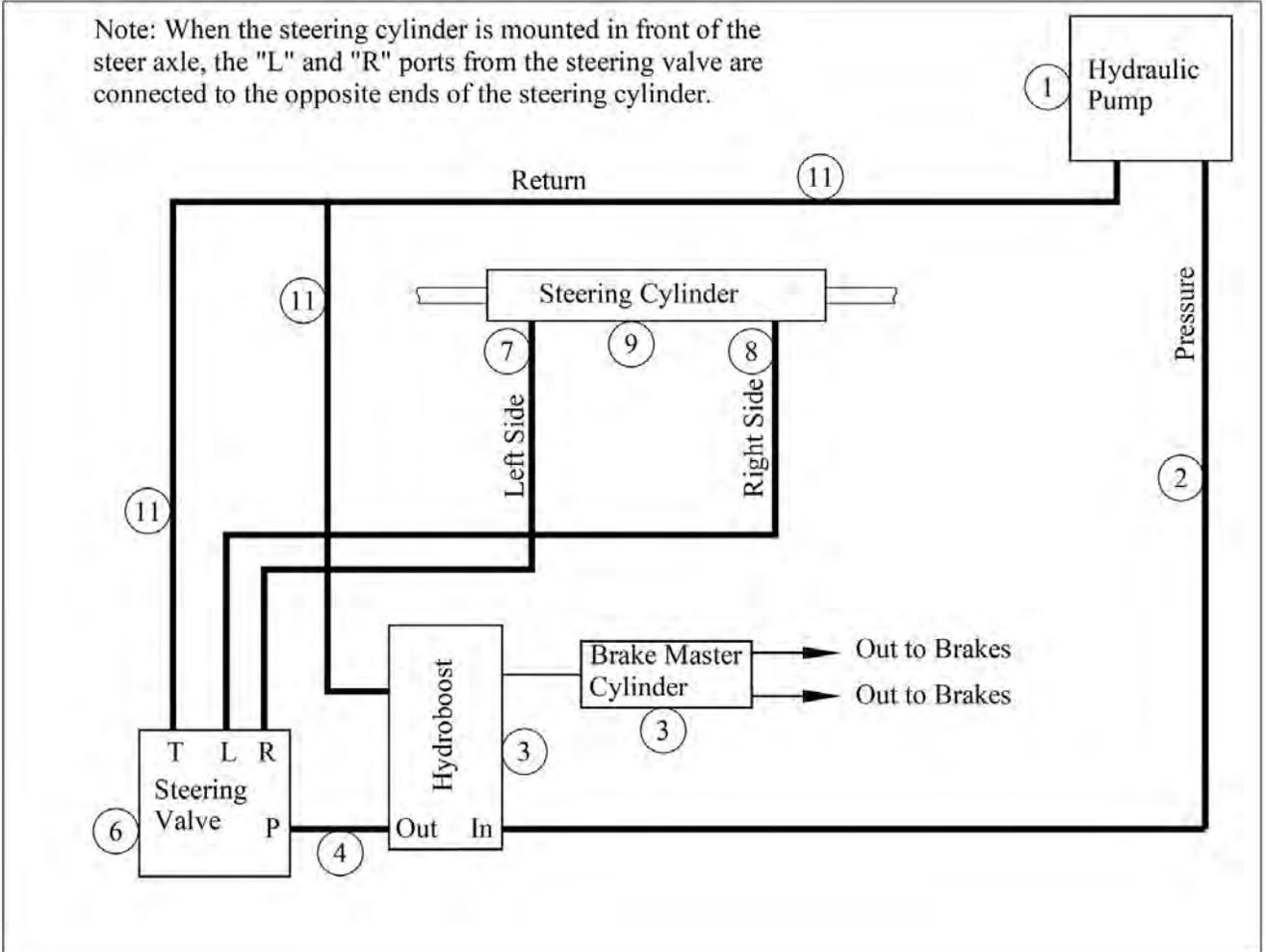


## Lights

Item No.	Part No.	Description	Qty
1	4-2793002	Headlight	2
2	3-515-9540-002	Taillight Assembly, Left	2
	3-515-9540-001	Taillight Assembly, Right	1
	72-082-01	Bulb, Reverse Light	1
	72-082-02	Bulb, Tail/Brake light	1
	A10897	Lens, Tail.Brake	1
	A10896	Lens, Reverse	1
3	504420	Reflector, Front Round	2
4	502142	Reflector, Side, Red	2
5	502143	Reflector, Side, Amber	2
6	72-018-23	MIL Light	1
7	502321	Bulb, Shift Light	1
-	502321	Bulb, Fuel Gauge	1
-	500650	LAMP\FNT.TURN SIGNAL/YELLOW (optional)	2
	504945	504945	1
	500636	FLASHER	1

# Steering, Hydrostatic, Hydraulics

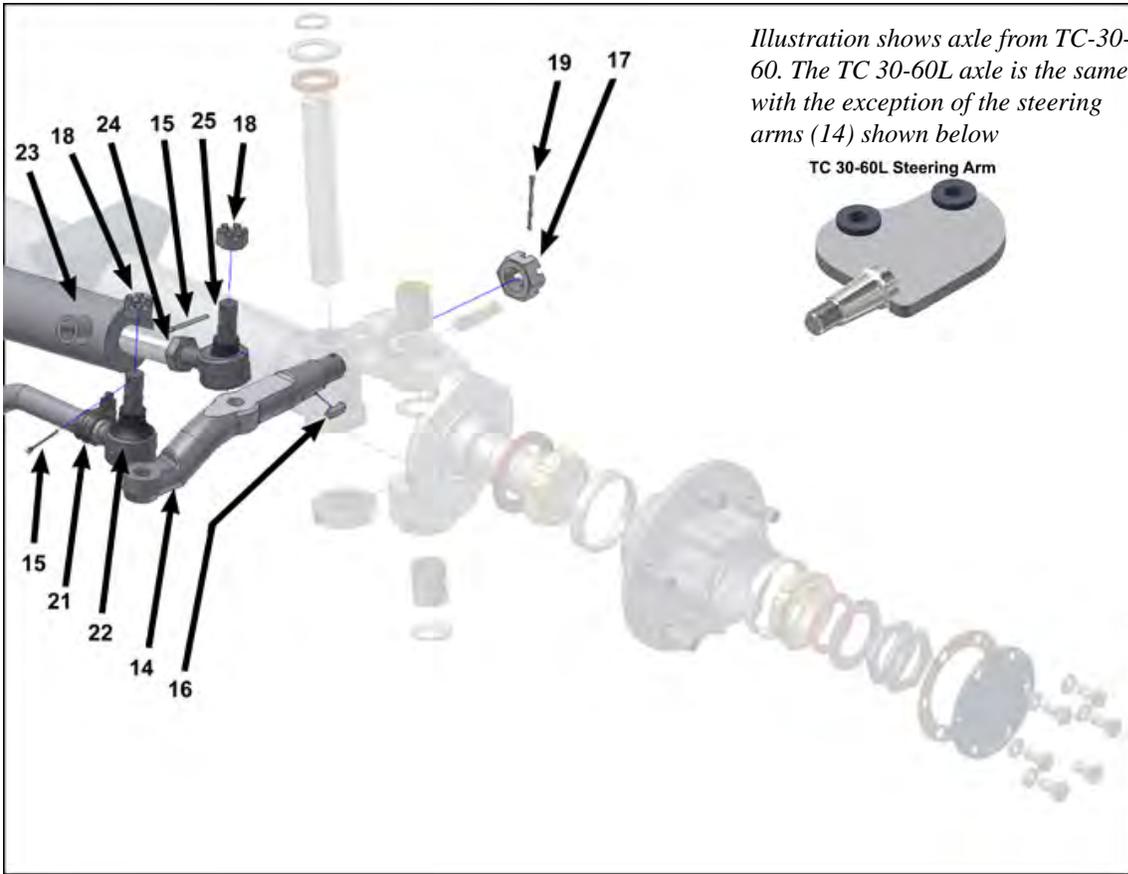
Note: When the steering cylinder is mounted in front of the steer axle, the "L" and "R" ports from the steering valve are connected to the opposite ends of the steering cylinder.



Item No.	Part No.	Description	Qty
1	4-2771715	Hydraulic Pump	1
	500895	Pulley	1
2	K2T-700-15	Hose, Pressure to Brake Hydroboost	1
	504777	Fitting, Pump outlet	1
3	See Brake Pedal	Brake Hydroboost	1
4	K2T-700-29	Hose, Pressure to Steering Valve	1
5	-	-	-
6	72710	Steering Control Valve	1
	504116	Adaptor, O-RING TO 3/8 JIC	2
	504106	Adapte, 90 STR THD O-RING 3/8 1/2	2
7	99-531-98	Hose, Steering Valve "L" port	1
8	99-531-99	Hose, Steering Valve "R" port	1
9	See mechanical parts	Steering Cylinder	1
10	-	-	-
11	K2T-700-16	Hose, Return Line Assembly	1
-	201037	Steering Column	1



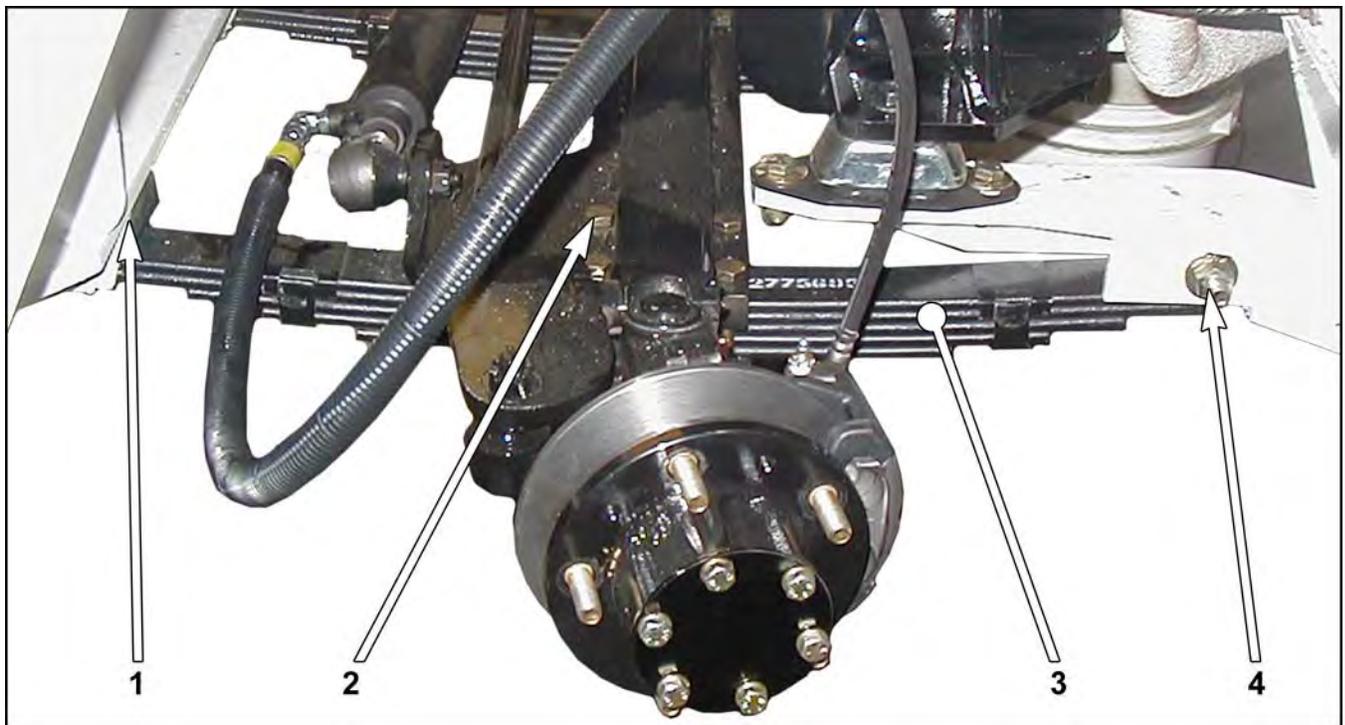
# Steering, Hydrostatic, Mechanical



## Steering Hydrostatic

Item No.	Part No.	Description	Qty
14	14-900-00	Steering Arm, Right	1
	14-900-01	Steering Arm, Left	1
15	500563	Cotter Pin	4
16	500838	Key	2
17	500837	Nut, Castle	2
18	-	Nut, Castle, included w ball joint	4
19	88-527-16	Cotter Pin	2
20	-	-	-
21	86-510-00	Clamp, Ball Joint	2
22	500855	Ball Joint, Left Thread	1
	500854	Ball Joint, Right Thread	1
23	4-2800687	Steering Cylinder	1
24	201032	Jam Nut	2
25	45946	ROD END, SOCKET, FEMALE	1
-	500854	Ball Joint, Right Thread, Steering Cylinder	1
-	18-054-20	Tie Rod	1
-	201039	Steering Wheel	1
	201283	Nut	1
-	88-128-13	Bolt, Steering Stop	2
-	500840	Nut, Steering Stop Bolt	2

## Suspension, Front



Item No.	Part No.	Description	Qty
1	4-2773135	Pad, Spring Slider	2
2	88-402-52	Bolt	8
	88-402-80	Nut	8
3	4-2775695	Leaf Spring	2
	CL-991017	Spring Eye Bushing	2
4	88-404-94	Bolt	4
	88-403-10	Washer	8
	88-403-05	Nut	4



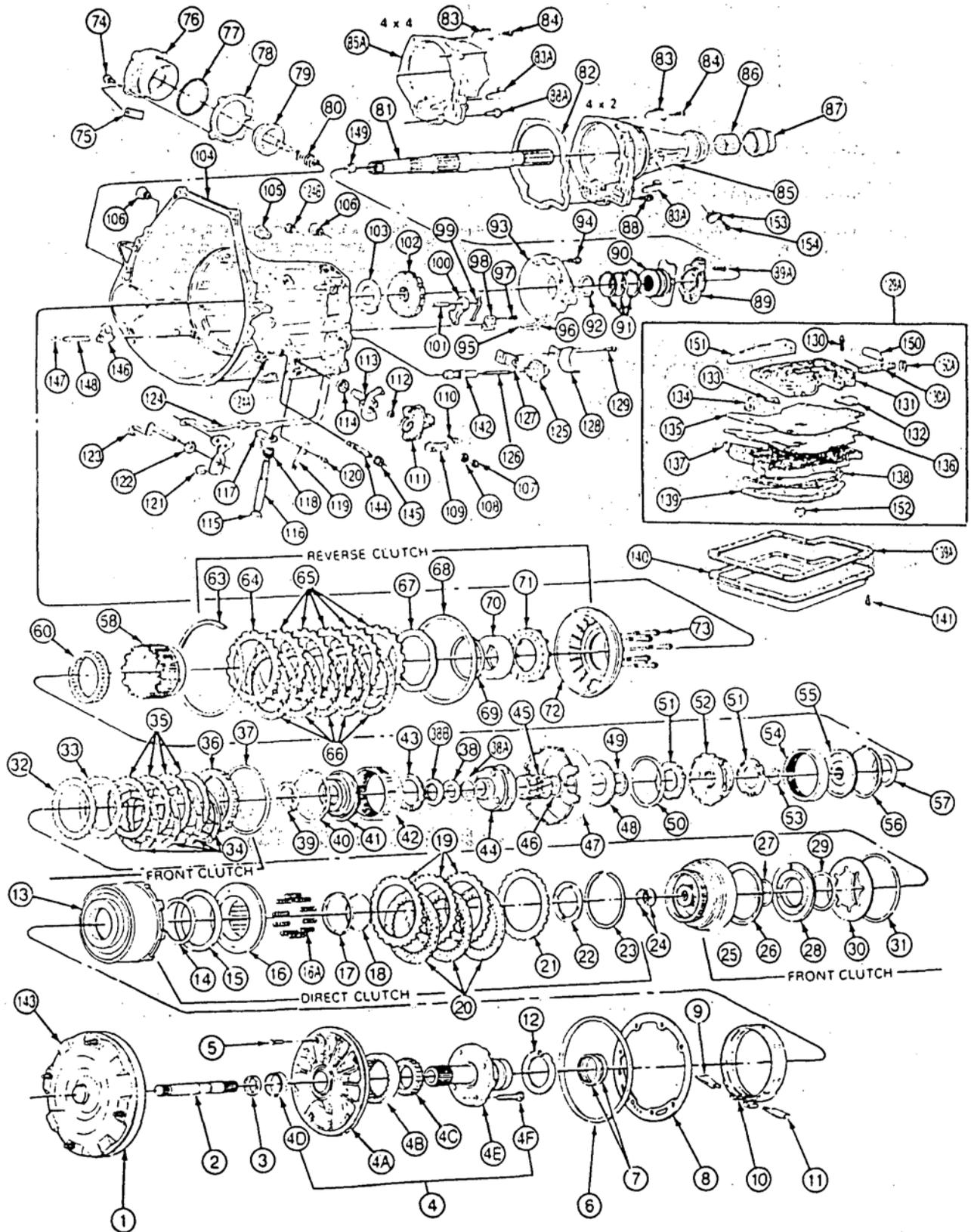
## Transmission Assembly / Drive Shaft

Item No.	Part No.	Description	Qty
	K2T-400-00	Transmission Assembly	1
-	502323	Dipstick	1
-	502324	DIPSTICK TUBE FORD C6	1
-	See Engine Cooling	Cooler, Transmission Fluid	1
-	See Engine Cooling	Hose Assembly, Transmission Cooler	2
-	503052	Shifter Assembly	1
-	4-2801560	Shift Cable	1
-	96-852-00	Rod End	1
-	504093	Switch, Reverse/Neutral	1
-	81-200-08	Drive shaft	1
-	86-553-10	U-Joint, Front	1
-	86-553-11	U-Joint, Rear	1
-	500810	FLEX PLATE	1
-	500811	RING/FLEX PLATE/USE W/500810	1
-	502427	BOLT/SPECIAL FLEXPLATE C6	6
-	4-2778901	Mount, Transmission	1
-	*	Spacer	1
-	501040	Kit, Shift Inhibitor (optional)	1
-	-	Kit includes: the following components	
-	500656	Relay	1
-	501040-10	Set Screw	1
-	501040-11	Fitting, Pressure Switch	1
-	501040-15	Circuit Breaker	1
-	501040-16	Decal, Push to Reset	1
-	501040-1-B	Pin, Shift Inhibitor	1
-	501040-2	Bracket, Shift Inhibitor	1
-	501040-3	Solenoid	1
-	501040-6A	Lamp	1
-	501040-8	SPRING PIN, 3/32 X 1 SS	1
-	501040-9	Spring	1
-	501332	LAMP\RED PILOT	1
-	502321	BULB, LIGHT #53	1
-	A12300	Pressure Switch	1



# Transmission Components (p1)

C6 Automatic Transmission, Exploded View



D10056-C

\* Not available at time of printing



## Transmission Components (p2)

Item	Part Number	Description
1	7902	Torque Converter
2	7017	Input Shaft
3	—	Front Oil Pump Seal (Part of 7A 103)
4	7A 103	Front Oil Pump Assembly
4A	—	Front Oil Pump Body (Part of 7A 103)
4B	—	Pump Driven Gear (Part of 7A 103)
4C	—	Pump Drive Gear (Part of 7A 103)
4D	—	Front Oil Pump Bushing (Part of 7A 103)
4E	—	Front Pump Support (Part of 7A 103)
4F	20346-S8	Hex Head Bolt (Part of 7A 103)
5	58619-S2	Bolt
6	7A248	Front Oil Pump Seal — Large
7	7D025	Intermediate Brake Drum Seal (2 Req'd)
8	7A 136	Oil Pump Gasket
9	7D029	Intermediate Brake Band Strut
10	7D034	Intermediate Band
11	7D430	Intermediate Band Anchor Strut
12	7D014	Thrust Washer — No. 1
13	7D044	Intermediate Brake Drum
14	7E056	Direct Clutch Piston Oil Seal — Inner
15	7A548	Direct Drive Clutch Piston Oil Seal — Outer
16	7A262	Direct Clutch Piston
16A	7B488	Direct Clutch Piston Spring — (10 Req'd)
17	7A527	Clutch Piston Spring Retainer
18	377 136-S	Direct Drive Clutch Piston Spring Retainer Ring
19	7B442	Direct Clutch External Spline Plate — (Steel)
20	7B 164	Direct Clutch Internal Spline Plate — (Friction)
21	7B066	Direct Drive Clutch Pressure Plate
22	7C096	Intermediate Brake Drum Thrust Washer — No. 2
23	377 126-128-S 377437 377444-S	Retaining Ring
24	7D019	Forward Clutch Cylinder Seal (2 Req'd)
25	7A360	Forward Clutch Cylinder Assembly
26	7A548	Forward Clutch Piston Oil Seal — Outer
27	7A548	Forward Clutch Piston Oil Seal — Inner

(Continued)

Item	Part Number	Description
28	7A262	Forward Clutch Piston
29	7D256	Forward Clutch Piston Spring Ring
30	7B070	Forward Clutch Piston Disc Spring
31	377 127-S	Retaining Ring
32	7B066	Forward Clutch Pressure Plate — Front
33	7E085	Forward Clutch Pressure Spring
34	7B 164	Forward Clutch Internal Spline Plate — (Friction)
35	7B442	Forward Clutch External Spline Plate — (Steel)
36	7B066	Forward Clutch Pressure Plate — Rear
37	377 127-S 377437-S 377444-S 386841-2-S	Retaining Ring
38	7D234	Forward Clutch Hub Thrust Bearing Assembly — No. 3 and No. 6 (2 Req'd)
38A	7D235	Forward Clutch Hub Thrust Race
38B	7D236	Forward Clutch Hub Thrust Race
39	7D090	Forward Clutch Hub Thrust Washer — No. 4
40	377 132-S	Retaining Ring
41	7B067	Forward Ring Gear Hub
42	7D392	Forward Ring Gear
43	7A 166	Planet Carrier Thrust Washer — No. 5
44	7A398	Forward Planet
45	7D063	Sun Gear Assembly
46	377300-S	Front Retainer
47	7D064	Input Shell
48	7D066	Input Shell Thrust Washer
49	377300-S	Rear Retainer
50	377 155-S	Retaining Ring
51	7D423	Reverse Planet Carrier Thrust Washer — No. 7 and No. 8
52	7D006	Reverse Planet
53	387031-S5	Retaining Ring
54	7A 153	Ring Gear
55	7D 164	Output Shaft Hub
56	377 132-S	Retaining Ring
57	7D422	Output Shaft Hub Thrust Bearing — No. 9
58	7B067	Reverse Clutch Hub
60	7A089	Overrunning Clutch
63	385044-S	Retaining Ring
64	7B066	Reverse Clutch Pressure Plate
65	7B442	Reverse Clutch External Spline Plate — (Steel)
66	7B 164	Reverse Clutch Internal Spline Plate — (Friction)

(Continued)

## Transmission Components (p3)

Item	Part Number	Description
67	7E085	Reverse Clutch Pressure Spring
68	7D403	Reverse Clutch Piston Outer Seal
69	7D404	Reverse Clutch Piston Inner Seal
70	—	Overrunning Clutch Race — Inner (Part of 7D164)
71	7D406	Reverse Clutch Retainer and Spring Assembly
72	7D402	Reverse Clutch Piston
73	7D167	Overrunning Clutch to Case Bolt (5 Req'd)
74	57633-S2	Bolt, (4 Required)
75	—	Transmission Model Identification Tag (Not Serviced)
76	7D027	Intermediate Band Servo Cover
77	7D024	Intermediate Band Servo Cover Piston Seal — Large
78	7D026	Intermediate Band Servo Cover Gasket
79	7D021	Intermediate Band Servo Piston and Rod Assembly
80	7D028	Intermediate Band Servo Piston Spring
81	7060	Output Shaft
82	7086	Extension Housing Gasket
83	7G496	Vacuum Tube Retainer (2 Req'd — 4x2)
83A	7G496	Vacuum Tube Retainer (2 Req'd — 4x4)
84	380209-S	Bolt, 4 Req'd
85	7A039	Extension Housing — (4x2)
85A	7A039	Extension Housing — (4x4)
86	7A034	Extension Housing Bushing
87	7052	Extension Housing Oil Seal
88	380207-S2	Bolt (2 Req'd — 4x2 Only)
88A	58642-S2	Bolt (2 Req'd — 4x4 Only)
89	7C063	Governor Body Assembly
89A	34805-S8	Bolt, 4 Req'd
90	7D220	Governor Body Oil Collector Body
91	7D011	Governor Housing Seal Ring (3 Req'd — 2 Teflon, 1 Cast Iron)
92	387035-S5	Retaining Ring
93	7C232	Oil Distributor Sleeve
94	20386-S8	Bolt, 4 Req'd
95	7D000	Oil Distributor Tube — Inlet
96	7D000	Oil Distributor Tube — Outlet
97	379058-S	Screw and Washer Assembly
98	7D419	Park Rod Guide Plate (Serviced in Kits Only)
99	7D070	Parking Pawl Return Spring
100	7A441	Parking Brake Pawl
101	7D071	Parking Pawl Shaft

(Continued)

Item	Part Number	Description
102	7A233	Output Shaft Park Gear
103	7B368	Output Shaft Thrust Washer — No. 10
104	7005	Case
105	7034	Vent
106	7D273	Oil Tube Connector (2 Required)
107	33798-S8	Nut — 5/16
108	34806-S7	Hex Lock Washer
109	7A394	Downshift Control Outer Lever
110	55651-S2	Screw and Washer Assembly
111	7A247	Park / Neutral Position Switch
112	386078-S	Throttle Control Outer Lever Seal
113	7A256	Manual Control Lever
114	7B498	Manual Control Lever Oil Seal
115	6572	Parking Plate Shaft Plug
116	7D418	Parking Plate Shaft
117	7D414	Parking Rod Support Plate
118	7D417	Parking Plate Torsion Spring
119	7A261	Manual Valve Detent Lever Spring
120	56501-S2	Hex Flg Bolt, 1/4-20 x .50
121	7A115	Manual Valve Detent Lever — Inner (Serviced in Kits Only)
122	380525-S	Hex Lock Nut, 9/16-18
123	7D261	Downshift Detent Lever — Inner
124	7D411	Parking Pawl Actuating Rod (Serviced in Kits Only)
124A	87650-S	Pipe Plug — 1/8-27 Dryseal Tapered Thread (Used in Case for Measuring Pump Pressure)
124B	87650-S	Pipe Plug — 1/8-27 Dryseal (Used in Case for Measuring Throttle Valve Pressure)
125	7A377	Throttle Valve Control Diaphragm Assembly
126	7A380	Throttle Control Valve Rod
127	7F006	Vacuum Diaphragm Clip
128	7F013	Vacuum Diaphragm Heat Shield
129	56119-S	Hex Flg Head Bolt, 5/16-18 x .82 — (7F013, 7F006 and 7A377 to 7005)
129A	7A100	Main Control Assembly
130	7D075	Inner Downshift Lever Stop (Part of 7A100)
130A	7326	Gear Selector Valve Rod
131	7A092	Upper Control Valve Body (Part of 7A100)
132	7C056	Main Control Valve Body Reinforcement Plate (Part of 7A100)

(Continued)



## Transmission Components (p4)

Item	Part Number	Description
133	7D259	Main Control Valve Body Separator Plate Reinforcement (Part of 7A 100)
134	7E387	Main Control Pump Inlet Screen
135	7A008	Valve Body Separating Plate (Part of 7A 100)
136	7D100	Valve Body Separating Plate Gasket
137	7A101	Lower Control Valve Body (Part of 7A 100)
138	7E062	Oil Pan Screen Gasket
139	7A098	Oil Screen
139A	7A191	Oil Pan Gasket
140	7A194	Transmission Oil Pan — (Shallow — 4x2) — (Deep — 4x4)
141	378782-S	Bolt
142	7D080	Primary Throttle Valve
143	87650-S	Converter Drain Plug, 1/8-27, Dryseal Tapered Thread

(Continued)

Item	Part Number	Description
144	7A178	Adjusting Screw (Reverse Band)
145	375185-S100	Nut
146	7330	Intermediate Servo Band Lever
147	7E206	Intermediate Band Servo Lever Shaft Retainer
148	7D433	Intermediate Band Adjusting Lever Shaft
149	378259	Cup Plug
150	7D094	Throttle Pressure Booster Valve Plate (Not Serviced Separately)
150A	7D227	Throttle Pressure Valve Secondary Spacer
151	7D058	Shift Valve Plate (Not Serviced Separately)
152	7A102	Lower Main Control Valve Body Suction Tube
153	7H183	Extension Housing Plug (Used to Plug Speedometer Gear Hole)
154	57621-S2	Screw and Washer Assembly, 1/4-20 x .62



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## Wheels and Tires

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Item No.	Part No.	Description	Qty
	503343	Wheel Assembly, Front, 650 x 10	2
	500164	Tire, 6.50 x 10, includes tube	
	500972	Wheel, 10 x 5.5	
	502758	Wheel Assembly, Rear	2
	500257	Tire, LT225-75R16 LR-D (tubeless)	
	500684	Wheel, 16 x 6	
	500218	Valve Stem	

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## Contents

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# Appendixes

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## **APPENDIX A: SUGGESTED TORQUE LIMITS FOR STANDARD HARDWARE**

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### **HARDWARE IDENTIFICATION**

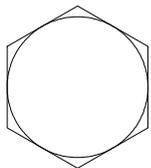
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#### **Standard Head Markings**

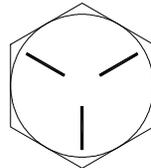
*NOTE: Torque value used should be for lowest grade of hardware used. If a grade 2 nut is used on a grade 8 bolt, use grade 2 torque value.*

*NOTE: Toque values specified are for clean dry threads.*

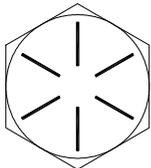
#### **Hex Bolts**



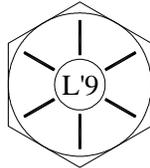
*S.A.E. Grade 2*



*S.A.E. Grade 5*

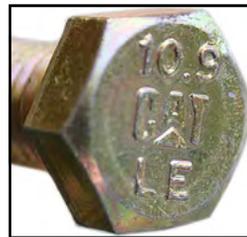


*S.A.E. Grade 8*



*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)*





## Generic Torque Values

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

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

Imperial (inch), Foot Pounds						Imperial (inch), Newton Meters					
Dia.	Pitch	Grade, SAE				Dia.	Pitch	Grade, SAE			
		2	5	8	L9			2	5	8	L9
#4	40	*	*	*	*	#4	40	*	*	*	*
#6	32	*	*	*	*	#6	32	*	*	*	*
#8	32	*	*	*	*	#8	32	*	*	*	*
#10	32	*	*	*	*	#10	32	*	*	*	*
#12	32	*	*	*	*	#12	32	*	*	*	*
1/4	20	5.5	8.5	12.5	11	1/4	20	7.4	11.5	16.9	14.9
	28	6.5	10.5				28	8.8	14.2		
5/16	18	12.0	17.5	24.5	22	5/16	18	16.2	23.7	33.2	29.8
	24	12.5	19.0	*	*		24	16.9	25.8	*	*
3/8	16	20	30	43	40	3/8	16	27.1	41	58	54
	24	22.5	33	50	45		24	30.5	45	68	61
7/16	14	27	50	70	65	7/16	14	37	68	95	88
	20	36	55	77	70		20	49	75	104	95
1/2	13	49	75	106	95	1/2	13	66	102	144	129
	20	55	85	120	110		20	75	115	163	149
9/16	12	70	109	153	140	9/16	12	95	148	614	190
	18	78	121	171	160		18	106	164	232	217
5/8	11	97	150	212	195	5/8	11	132	203	287	264
	18	110	170	240	225		18	149	230	325	305
3/4	10	172	275	376	350	3/4	10	233	373	510	475
	16	192	297	420	390		16	260	403	569	529
7/8	9	278	429	593	565	7/8	9	377	582	804	766
	14	306	473	818	625		14	415	641	1109	847
1	8	416	644	909	850	1	8	564	873	1232	1152
	14	466	721	1018	930		14	632	978	1380	1261
1-1/8	7	590	794	1287	1700	1-1/8	7	800	1076	1744	2304
	12	662	891	1444	1850		12	897	1208	2364	2508
1-1/4	7	832	1120	1817	2950	1-1/4	7	1128	1518	2463	4000
	12	922	1241	2012	3330		12	1250	1682	2727	4514

### Conversion Formulas:

Foot Pounds = Newton Meters x 0.737562149

Newton meters = Foot Pounds x 1.355817948

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

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

Metric, Newton Meters						Metric, Foot Pounds					
Dia.	Pitch	Grade, N-m				Dia.	Pitch	Grade, N-m			
		4.6	8.8	10.9	12.9			4.6	8.8	10.9	12.9
3	0.50	0.51	*	*	*	3	0.50	0.38	*	*	*
4	0.70	0.95	3.1	*	*	4	0.70	0.7	2.3	*	*
5	0.80	2.28	6.1	*	*	5	0.80	1.7	4.5	*	*
6	1.00	3.92	10.4	15.5	*	6	1.00	2.9	7.7	11.4	*
8	1.00	*	27.0	*	*	8	1.00	*	19.9	*	*
	1.25	9.48	25.0	37.0	*		1.25	7	18.4	27.3	*
10	1.00	*	57.0	*	*	10	1.00	*	42	*	*
	1.25	*	54.0	*	*		1.25	*	40	*	*
	1.50	19.1	51.0	75.0	*		1.50	14.1	38	55	*
12	1.25	*	96.0	*	*	12	1.25	*	71	*	*
	1.50	*	92.0	*	*		1.50	*	68	*	*
	1.75	32.6	87.0	160	*		1.75	24	64	118	*
14	1.50	*	150	*	*	14	1.50	*	111	*	*
	2.00	51.9	140	205	*		2.00	38	103	151	*
16	1.50	*	*	*	*	16	1.50	*	*	*	*
	2.00	79.9	215	310	*		2.00	60	158	229	*
18	1.50	*	*	*	*	18	1.50	*	*	*	*
	2.00	*	*	*	*		2.00	*	*	*	*
	2.50	110	300	*	*		2.50	81	221	*	*
20	1.50	*	*	*	*	20	1.50	*	*	*	*
	2.00	*	*	*	*		2.00	*	*	*	*
	2.50	156	430	*	*		2.50	115	317	*	*
22	1.50	*	*	*	*	22	1.50	*	*	*	*
	2.00	*	*	*	*		2.00	*	*	*	*
	2.50	211	580	*	*		2.50	156	428	*	*
24	2.00	*	*	*	*	24	2.00	*	*	*	*
	3.00	270	740	*	*		3.00	199	524	*	*
27	3.00	*	*	*	*	27	3.00	*	*	*	*
	3.00	398	*	*	*		3.00	293	*	*	*
30	2.00	*	*	*	*	30	2.00	*	*	*	*
	3.50	540	*	*	*		3.50	398	*	*	*

\*Not available at time of printing



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

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### **⚠ WARNING**

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

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

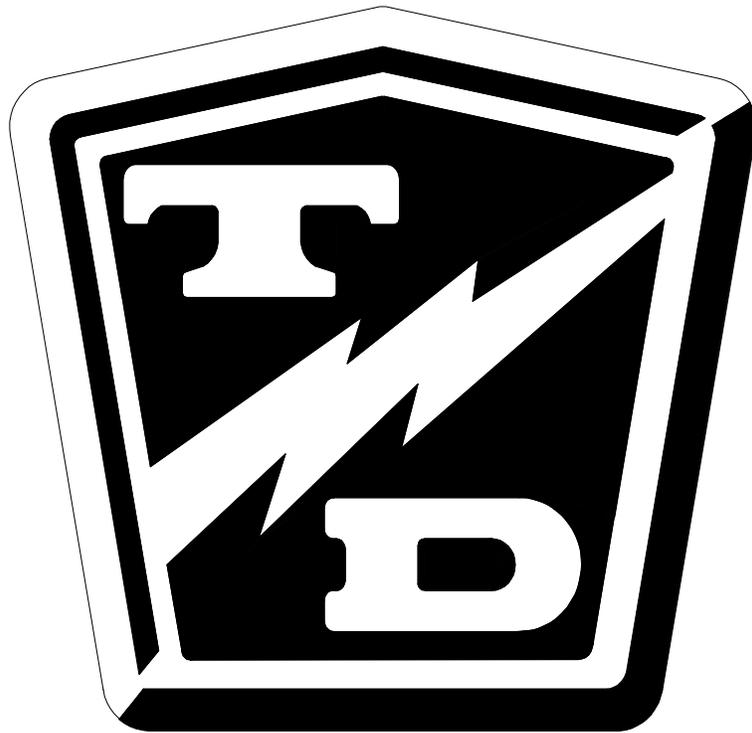
Do not grind, sand, break, or chisel the brake pads/shoes, as this will cause unnecessary dust, possibly releasing asbestos fibers in the air.

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

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

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





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