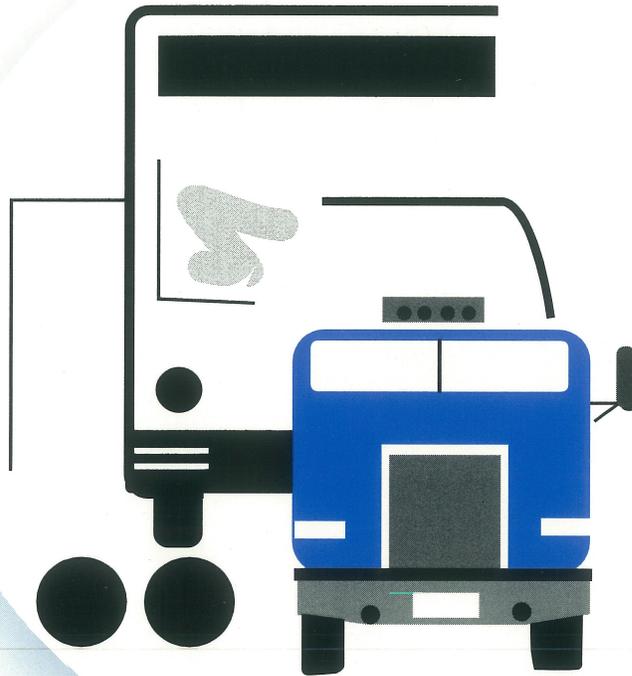


# Trucks, Buses & Trailers

# Trucks, Buses & Trailers

## 1999 INSPECTION HANDBOOK

Includes Recommended Procedures  
for the United States and Canada



*Published by the*  
American Association of Motor Vehicle Administrators

**CCMTA • CCATM**

*In Partnership with the*  
Canadian Council of Motor Transport Administrators

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# Introduction

The American Association of Motor Vehicle Administrators (AAMVA) in partnership with the Canadian Council of Motor Transport Administrators (CCMTA) is proud to offer this section of the new, expanded edition of the *Vehicle Inspection Handbook Set*, with recommended minimum inspection procedures and standards for all types of vehicles in the United States and Canada including:

- Motorcycles,
- Passenger Vehicles & Light Trucks,
- Salvage Vehicles,
- Trucks, Buses & Trailers, and
- Emissions.

Each handbook section contains information compiled from multiple sources and is based on actual working systems and programs in the United States and Canada.

*To order additional handbook sections, use the order form provided with this manual or contact AAMVA (703-522-4200). In Canada, contact CCMTA (613-736-1003).*

## How To Use This Handbook

Designed for use by government officials, fleet operators, inspection managers and others who want to update or enhance existing procedures or develop new inspection programs, this handbook provides practical, up-to-date inspection procedures, and minimum recommendations and rejection criteria for trucks, buses and trailers, with a special section on school buses. It also is intended to serve as a useful teaching tool for inspection training programs, and as a resource guide for maintenance programs.

Recommended procedures in this handbook apply to all trucks, truck tractors, semitrailers, trailers and combinations over 4,500 kg/

10,000 lbs. Gross Vehicle Weight Rating (GVWR), and to all buses designed, constructed and used for the transportation of passengers with a designated seating capacity of more than ten, including the driver.

Every effort has been made to provide specific inspection recommendations except where jurisdictions vary widely on what is acceptable or where there is a broad range of acceptable conditions depending on the type of vehicle. In those instances, recommendations in this handbook rely on and refer to recognized industry specifications and limits, directly or indirectly, through the use of terms such as “properly,” “adequate,” “inadequate,” “excessive,” “loose,” “perceptible,” etc.

Where appropriate, differences between Canadian and United States’ minimum recommendations or procedures are clearly noted in the text by a maple leaf icon for Canada and a stars and stripes icon for the United States.

One of the intended purposes of periodic motor vehicle inspection (PMVI) programs is to ensure, to the extent possible, that safety-related components still have some degree of service life. For this reason, rejection criteria for annual inspections will, in some cases, be more stringent than the criteria used for roadside enforcement.

Also, please note that some jurisdictions may have more stringent requirements than the ones set forth in this handbook.

## Hazardous Conditions

Mechanical conditions that are imminently hazardous are highlighted throughout the text as a hazardous condition. If a hazardous condition is identified, appropriate repairs should be made before the vehicle is driven again.

Although many of the hazardous conditions

noted in this handbook are similar to and complement the Commercial Vehicle Safety Alliance's (CVSA) Out-Of-Service criteria, they are not the same and have been written as recommendations for PMVI mechanics. In most cases, these mechanics have the power only to advise or to fail the vehicle based on its inspection. Mechanics may not prevent a vehicle from further operation.

On the other hand, CVSA's criteria are designed for use by certified roadside inspectors and are enforced in the United States and Canada. Vehicles that do not meet CVSA's criteria may be placed Out-Of-Service and may not be allowed to continue operation until they meet the criteria.

### **Based on Information from U.S. and Canadian Experts**

This handbook is based on CCMTA's manual, *Commercial Vehicle Inspections in Canada*, and the recommended annual inspection criteria are based on Canada's National Safety Code Standard 11, Part B. Vehicles conforming to this standard and bearing a valid inspection report and decal are recognized as being in compliance with the Federal Highway Administration requirements for periodic mandatory vehicle inspection.

All commercial trucks, truck tractors, semi-trailers, trailers and combinations thereof should be inspected to the inspection standards at least annually. All buses should be inspected to the inspection standards at least semiannually.

For convenient referencing, chapter numbers in this manual correspond with section numbers in the CCMTA manual. Otherwise, the text has been updated, edited and reformatted in the style of the other handbooks in the *Vehicle Inspection Handbook Set*. Spelling and style are based on AAMVA editorial style policies, which use United States spelling guidelines. For example, "semitrailer" and "center" are preferred in the United States, and "centre" and "semi-trailer" are preferred in Canada. Both are correct, but the AAMVA style is used in this handbook series to provide consistency.

Information in the handbook was revised and expanded by members of AAMVA's Handbook Working Group, which is part of AAMVA's Engineering and Vehicle Inspection Committee. The text also was reviewed and/or provided by representatives from CCMTA, CVSA, the Federal Highway Administration, the American Trucking Associations, the California Highway Patrol and the California Department of Education.

Please note that the recommendations presented in this handbook reflect the majority view of the AAMVA Handbook Working Group, but every recommendation is not necessarily endorsed by each reviewer.

### **Handbook Reflects Experience and Cooperation**

AAMVA has been involved in publishing vehicle inspection handbooks since the late 1980s, when AAMVA and the National Highway Traffic Safety Administration began working cooperatively to publish handbooks for passenger vehicles and trucks and buses with information provided primarily by the American Automobile Manufacturers Association.

In 1995, AAMVA published the first edition of the *Vehicle Inspection Handbook* for passenger vehicles. A year later, AAMVA's Engineering and Vehicle Inspection Committee began developing this expanded version of the handbook to provide inspection recommendations for all types of vehicles.

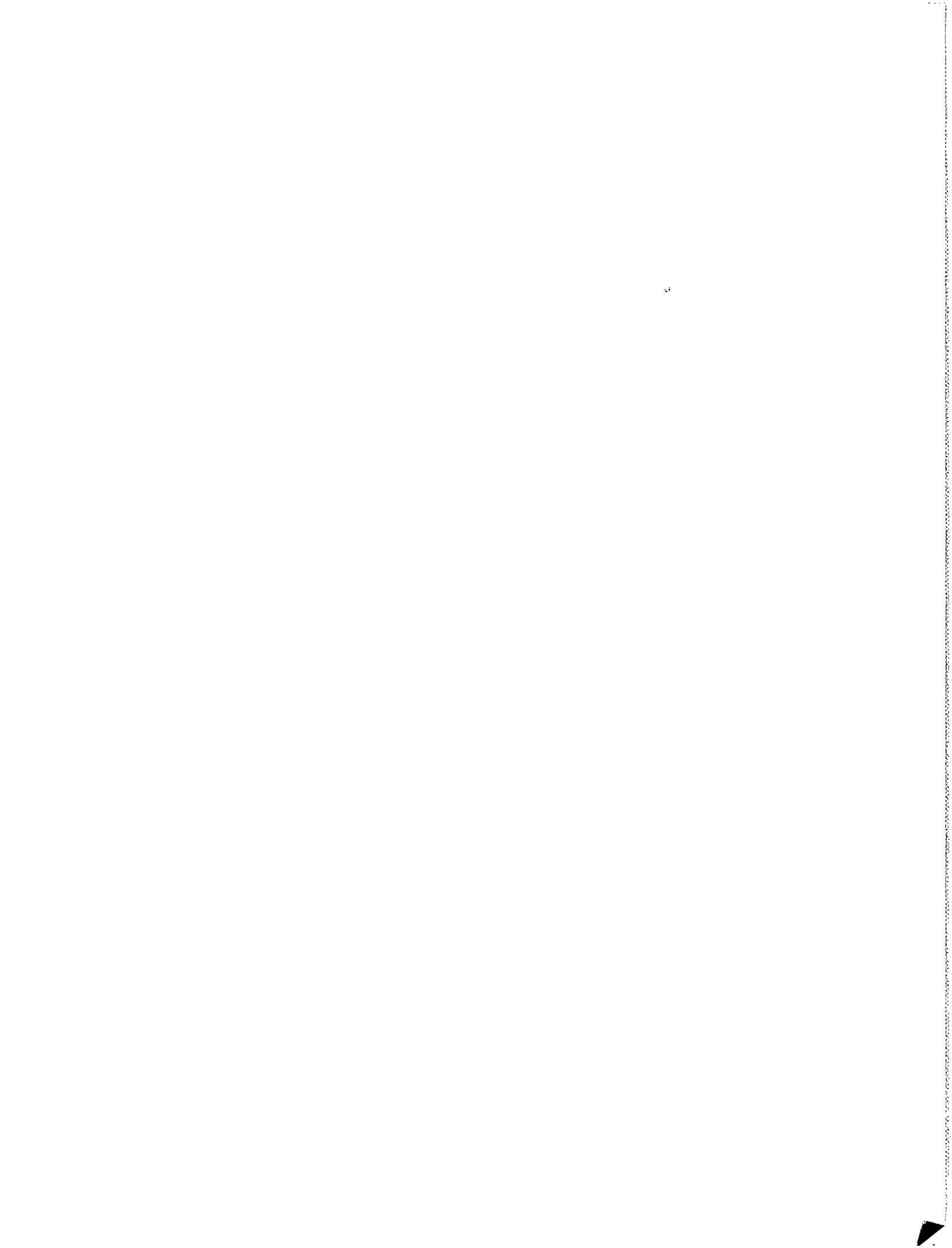
In 1997, CCMTA offered material from its manual, *Commercial Vehicle Inspections in Canada*, as the basis of the *Trucks, Buses & Trailers Inspection Handbook*, and AAMVA and CCMTA agreed to collaborate on the publication of the entire handbook set.

Because it includes recommendations for both the United States and Canada, the *Vehicle Inspection Handbook Set* is an important step toward the harmonization of standards throughout North America.

**Trucks, Buses & Trailers 1999 Inspection Handbook**

**PART I:**

**Truck & Truck Tractor  
Vehicle Safety  
Inspection Program**



# Contents

*(This handbook has been organized so that chapter numbers and topics correspond to section numbers and topics in the CCMTA Commercial Vehicle Inspections in Canada manual. In addition, for ease of referencing, topics are organized by the same chapter numbers in each part of this handbook for trucks, buses and trailers.)*

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# Power Train

## 1. Accelerator Pedal

### Procedure

**Step 1:** With the engine idling, manually depress the accelerator pedal and then release it.

**Step 2:** Visually inspect the pedal, mount, linkage and springs.

### Reject the vehicle if:

- The pedal is binding, and the engine will not return to an idle position.
- The mount is insecure or deteriorated by corrosion.
- The linkage is worn, insecure or retainers are inferior.
- The springs are missing, deteriorated or the improper type.

## 2. Fuel System

### A. GAS OR DIESEL SYSTEMS

#### Procedure

Inspect the cap(s), tank(s), tank mount(s), strap(s), fuel lines and pump.

#### Reject the vehicle if:

- Any cap is missing, does not prevent spillage, or is not the proper type.
- Any tank is leaking or cracked, has broken welds, or is not designed to store motor fuel.
- Any strap is cracked, missing or loose, or repaired with an inferior substitute. **Note:** An inferior substitute is something lacking the strength of the original strap or something that will itself damage the tank.

- Fuel lines are cracked, leaking or insecure.
- Internal braid is exposed at the first layer on a braided line.
- The pump leaks, is insecure or physically damaged.

---



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### HAZARDOUS CONDITION

- Any tank is insecure. **Note:** Tanks mounted with cushioning devices will have some movement.
  -  There is a leak at any point, auxiliary equipment included.
  - The fuel cap is missing.
- 
- 

### B. LIQUIFIED PETROLEUM GAS (LPG) FUEL SYSTEMS

#### Procedure

**Step 1:** Visually inspect the condition of the tank, the tank label and approval, working pressure, valve identification, mounting straps and mounting brackets.

#### Reject the vehicle if:

- The tank is leaking or cracked, or there are welds other than those used by the original equipment manufacturer.
- The tank is not labeled.
- The tank is not approved by recognized labeling organizations.
- The working pressure is less than 250 psig for external tanks. (Psig means pounds per square inch gauge.)
- The working pressure is less than 312.5 psig for enclosed tanks.
- The valves are not identified.
- The mounting straps are loose or missing.

- The mounting brackets are cracked or missing, or mounting bolts are loose and/or less than grade 5, 12.7 mm (1/2 inch).

**Step 2:** Visually inspect the remote 80 percent stop fill valve, remote fill line, fuel gauge, hydrostatic relief valve or Sherwood valve, and the liquid fill line.

**Reject the vehicle if:**

- The remote 80 percent stop fill valve is missing or not approved and so labeled.
- The remote fill line:
  - is less than 9.5 mm (3/8 inch) inside diameter.
  - is not type II or III, or a high pressure line.
  - has any quick coupler attached.
  - is frayed, cracked or damaged.
- The fuel gauge is missing or not working.
- The hydrostatic relief valve or Sherwood valve is not present between each pair of shut-off valves.
- The hydrostatic relief valve or Sherwood valve is not approved and is so labeled.
- The liquid fuel line:
  - is less than 9.5 mm (3/8 inch) inside diameter.
  - is not type II or III, or a high pressure line.
  - is not seamless steel line or approved copper sheathed line and is so marked.
  - has any quick coupler installed.
  - is frayed cracked or damaged.

---

**HAZARDOUS CONDITION**

- Any fuel leak is evident.
- 

**C. COMPRESSED NATURAL GAS (CNG) SYSTEMS**

 In the United States, on vehicles manufactured on or after March 26, 1995, check the fuel tank for compliance with FMVSS 304, S7.4.

**Reject the vehicle if:**

- The compliance label is missing.

### 3. Exhaust System

**Procedure**

**Step 1:** With the engine running, audibly and visually inspect the manifolds, mufflers, exhaust pipes, mounting hardware, heat shields (if applicable), and the exhaust turbo.

**Reject the vehicle if:**

-  Manifolds are cracked or leaking.
- The muffler(s) are leaking, missing or patched.
- The exhaust pipes are missing, leaking or perforated. **Note:** Minor leaking and soot tracks are normal at joints in diesel engine pipes.
- Mounting hardware is missing, loose or broken.
- Heat shields, if applicable, are insecure or missing.
- The exhaust turbo is leaking at the gaskets.

**Step 2:** Check the location of the system and the exhaust pipe termination point.

**Reject the vehicle if:**

- Any part of the exhaust system is closer than 50 mm (2 inches) from any part of the fuel or brake system or any combustible material and is not protected by shields.
-  This is subject to provincial legislation if the system is powered by LPG or CNG.
- The exhaust pipe does not expel exhaust fumes beyond the perimeter of the cab and sleeper.

---

**HAZARDOUS CONDITION**

- There is any exhaust leak within the perimeter of the cab or sleeper compartment.
-

## 4. Drive Shaft

### Procedure

**Step 1:** With the rear wheels chocked, release the spring brakes or emergency brake, and place the gear selector in “NEUTRAL.”

**Step 2:** Place a small bar between the yoke and the U-joint, and rock the shaft in both directions. Visually and manually inspect the U-joints, U-clamps attaching the U-joints to the yoke, bolts (if so equipped) and the center bearing.

### Reject the vehicle if:

- Any free play is evident.
- U-clamps are not present or nuts are loose, missing or stripped.
- Bolts are missing, loose or stripped.
-  The center bearing is loose.
- The center bearing is worn, or the rubber mount is deteriorated.

## 5. Clutch

### Procedure

Apply the parking brakes and start the engine. Depress the clutch pedal and attempt to shift the transmission into gear. Inspect the operation of the clutch and the clutch adjustment.

### Reject the vehicle if:

- The vehicle attempts to move when the clutch is in its fully depressed position.
- The free pedal clearance is in excess of 38 mm (1.5 inches) or exceeds the manufacturer’s specifications.

## 6. Engine Shut Down

### Procedure

Inspect the vehicle as equipped for manual shut down, electric solenoid, ignition switch (gas engine) or air solenoid.

### Reject the vehicle if:

- The engine will not shut down (manual or electric solenoid).
- The engine will not shut down when the ignition switch is turned off (gasoline).
- The air solenoid is leaking, or will not shut down the engine.

## 7. Neutral Safety Switch

### Procedure

Manually place selector lever in all gears and attempt to start the engine.

### Reject the vehicle if:

- The engine starts in any position other than “PARK” or “NEUTRAL.”

# Suspension

## 1. Suspension Attachments

**Procedure**

Visually inspect the U-bolts, center bolts, control arms and torque arms. This procedure also applies to overload spring attachments.

**Reject the vehicle if:**

- U-bolts are loose, broken, missing or welded.
- Center bolts are broken or missing.
- Control arms are bent or missing, or the rubber surrounding the bushing does not secure it.
- Control arms are welded and/or there are welds other than those used by the original equipment manufacturer.

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**HAZARDOUS CONDITION**

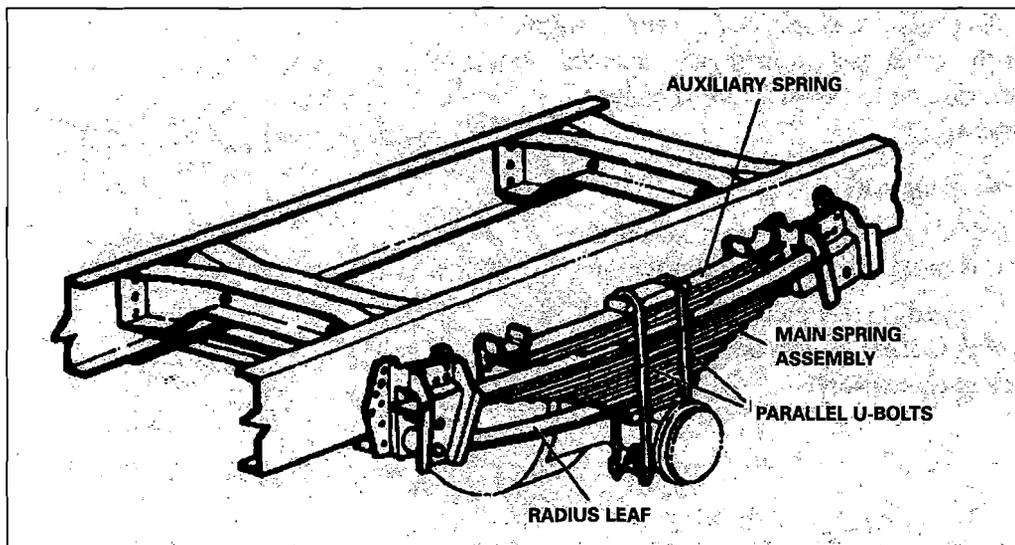
- Any component allows the axle to shift from its normal position.
  - Any attaching component is missing, loose, cracked or broken.
- 

## 2. Springs and Attachments

**Procedure**

**Step 1:** Partially jack up the vehicle on the frame to reduce the load on the springs, or jack up the vehicle between the spring and the frame when inspecting the steering and drive axle(s).

**Step 2:** Inspect the springs, shackles, hangers, bushings and/or pins, equalizers and bump pads.



Rear Suspension, Single Axle with Auxiliary Springs

**Reject the vehicle if:**

- Any spring leaf
  - is broken, missing or cracked.
  - sags so as to allow contact with the rebound rubber during normal operation.
  - sags so as to lower the vehicle more than 50 mm (2 inches) from one side to the other.
  - has shifted so as to be less than 12.7 mm (1/2 inch) from any rotating part.
- Shackle pins are loose, missing, excessively worn or cracked.
- Hangers are loose, cracked, broken, missing or worn more than 3.2 mm (1/8 inch). Wear plates permitted.
- Bushings and/or pins are loose, missing or the wear exceeds the following:
  - \*Shaft size 12.7 mm (.5 inch) to 24 mm (.98 inch)  
maximum clearance 2 mm (.08 inch)
  - \*Shaft size 25 mm (1 inch) to 45 mm (1.8 inch)  
maximum clearance 3.2 mm (.125 inch)
- Equalizers are cracked, broken or welded. Wear plates permitted.
- Bump pads are missing, split or badly deteriorated.

**HAZARDOUS CONDITION**

- The main leaf(s) or one-quarter of the leaves in one assembly are broken or missing.
- Any leaf has shifted in a manner so that it contacts any rotating part.
- Any attaching or tracking component is missing, loose, cracked or broken.

**3. Torsion Bar Suspension**

All other suspension components should be checked the same way as leaf type suspensions.

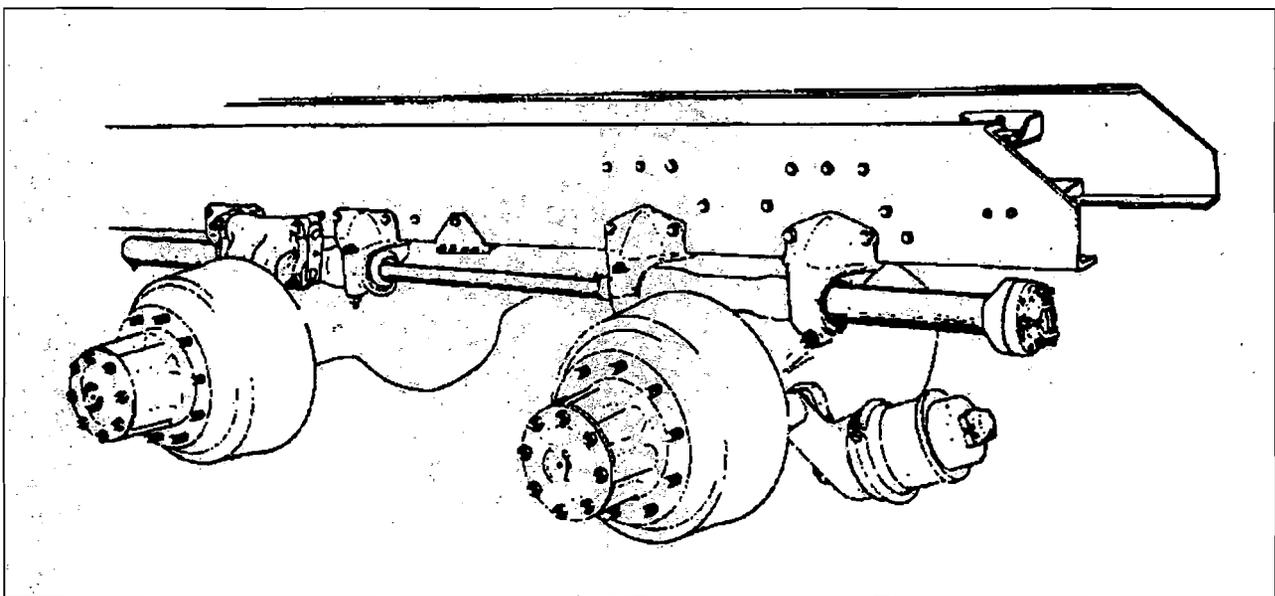
**Procedure**

**Step 1:** Place a bar between the frame and the torsion bar and pry down. Visually inspect the forward shackle bushings and pins.

**Reject the vehicle if:**

- Play exceeds 3.2 mm (1/8 inch).

**Step 2:** Place a bar between the frame and the torsion bar and pry down. Inspect the rear shackle bushings and pins.



**Torsion Bar Suspension**

**Reject the vehicle if:**

- Play exceeds 3.2 mm ( $1/8$  inch).

**Step 3:** Inspect the torsion bar and mounting brackets.

**Reject the vehicle if:**

- The torsion bar is broken, cracked, welded or sags so as to lower the vehicle more than 50 mm (2 inches) from the manufacturer's specified height.
- The mounting brackets are loose, cracked or welded.

**HAZARDOUS CONDITION**

- Any attaching component is missing, broken or loose.
- Any torsion bar is cracked or broken.
- Any attaching or tracking component is missing, loose, cracked or broken.

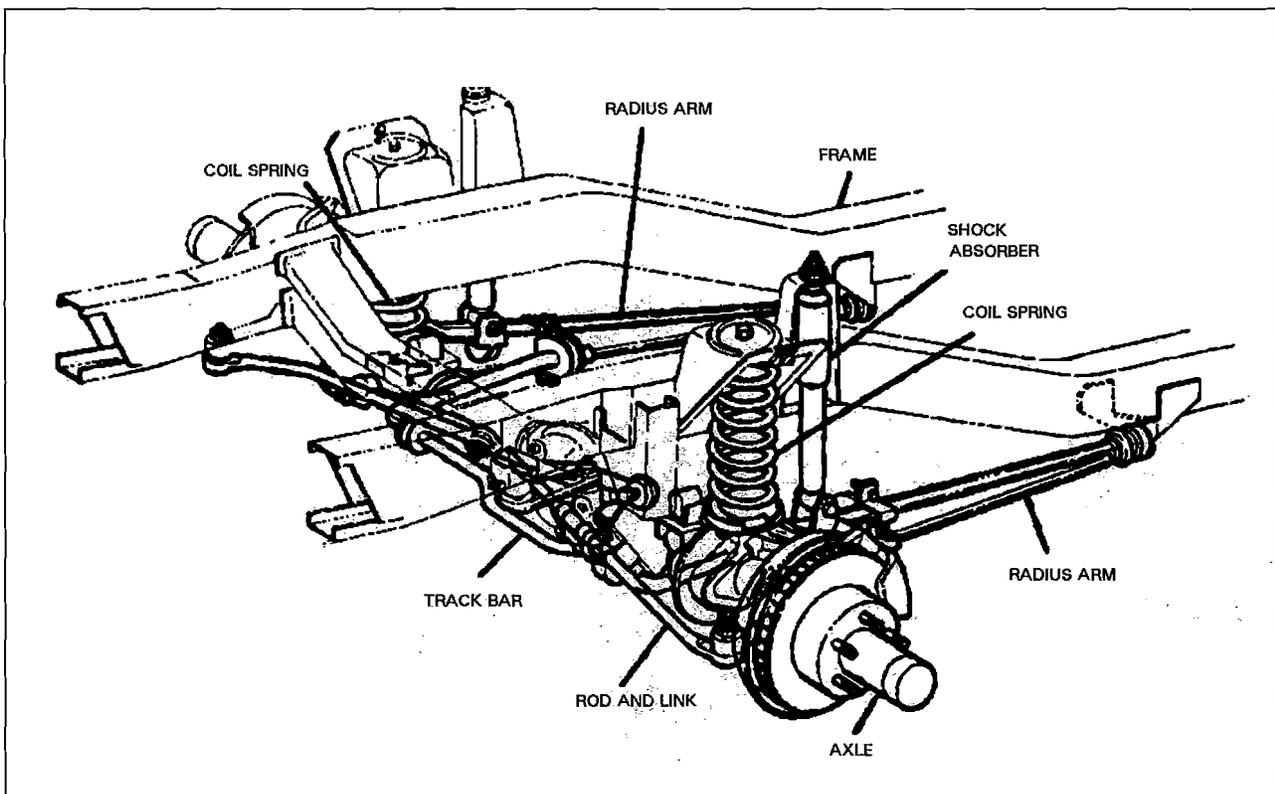
## 4. Coil Spring Suspension

**Procedure**

Visually inspect the spring, control arms, torque arms (rear), axial strut (if applicable), radius arm (if applicable), and the front and rear stabilizer bars.

**Reject the vehicle if:**

- The spring coil is broken or sags so as to lower the vehicle more than 50 mm (2 inches) from the manufacturer's specified height.
- The control arms are bent, cracked, welded, or the bushings are loose.
- The rear torque arms are missing, bent, cracked, welded, or the bushings are loose.
- The axial strut (if applicable) is missing, bent, cracked, welded, or the bushings are loose.
- The radius arm (if applicable) is missing, bent, cracked, welded, or the bushings are loose.



**Coil Spring Suspension**

- The front and rear stabilizer bars are missing, disconnected, broken, loose, welded, damaged or the bushing brackets and bolts are missing or loose.

## 5. Rubber Load Cushions

On suspensions using rubber load cushions in place of leaf type springs, all other hardware is to be checked in the same way as *Springs and Attachments (Chapter 2, Item 2)*.

### Procedure

Visually inspect attachments and rubber blocks.

### Reject the vehicle if:

- Attachments are cracked, broken or missing.
- Rubber blocks are missing or the rubber pad is split.
- Mounting bolts are loose.

### HAZARDOUS CONDITION

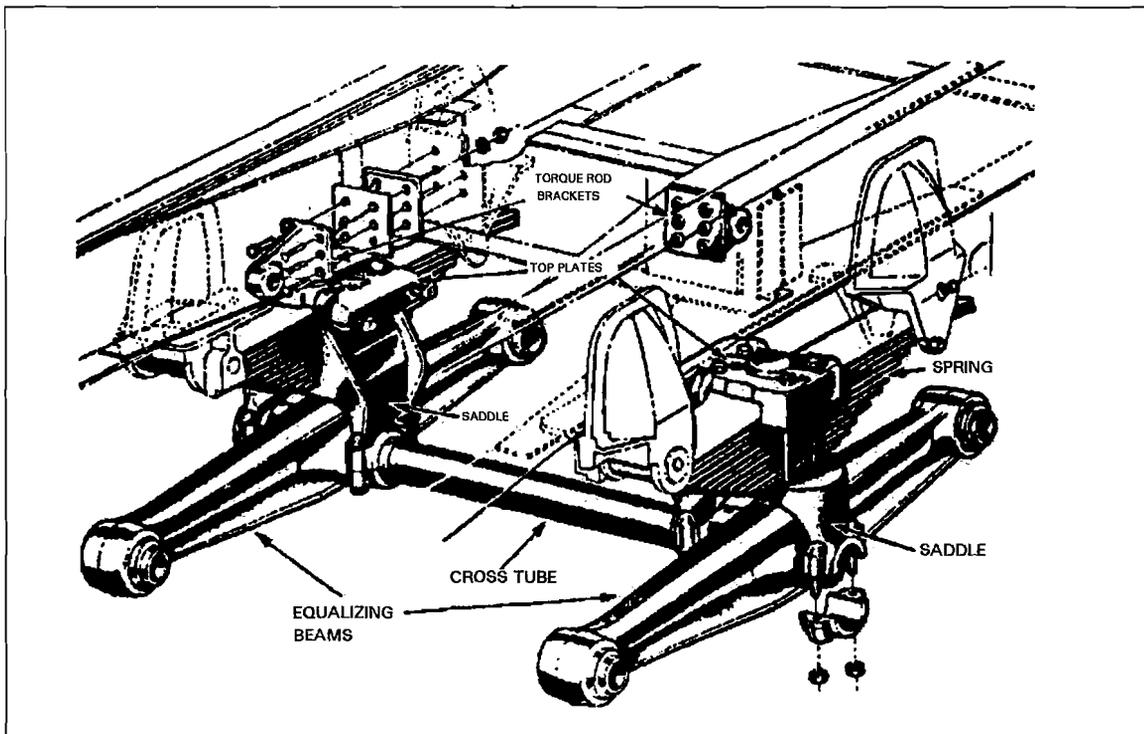
- Any rubber block is missing.
- Any component allows the axle to shift from its normal position.
- Any attaching or tracking component is missing, loose, cracked or broken.

## 6. Tandem Axle Walking Beam Suspension

### Procedure

**Step 1:** Visually inspect the rubber insert in the bushings, axle movement, springs, and cross tube bushing.

**Step 2:** Visually inspect the alignment by driving the vehicle and making a sharp turn. Observe if the tires contact any part of the frame or frame attachments.



Tandem Axle Walking Beam Suspension

**Reject the vehicle if:**

- Rubber is excessively dispersed from the bushing.
- Tires come into contact with any part of the frame or frame attachments when inspected on a flat surface.
- Any leaf is broken or has shifted so that it contacts any rotating part.
-  The cross tube bushing has more than 6.4 mm (1/4 inch) clearance.

**HAZARDOUS CONDITION**

- Tires contact any part of the frame or attachments.
- Any attaching or tracking component is missing, loose, cracked or broken.

## 7. Air Suspension

**Procedure**

With air in the suspension system and at a normal operating pressure, visually and audibly inspect the bushings, pivots, lines, air bags, air bag base, radius rods, horizontal suspension beam, pressure protection valve, suspension height and height-leveling valve.

**Note:** When checking air bags, for security, the vehicle must be jacked up on the frame.

**Reject the vehicle if:**

- Bushings are loose, deteriorated, worn or elongated.
- Pivots are loose or worn.
- Lines are cracked, crushed, leaking or disabled.
- Air bags are cut, bruised or there is evidence of air leakage.
- The vehicle body and chassis frame is unsupported on one or more axles or leans to one side.
- Air bags are mounted insecurely.
- An air bag is cracked to the braid.

- The air bag base is broken, loose, cracked or severely corroded.
- Radius rods are loose, bent or broken.
- Horizontal suspension beam holes are rusted through or severely corroded.
- Air goes to the suspension before the brake system tank pressure reaches 450 kpa (65 psi).
- One or more suspensions are noticeably down.
- The height-leveling valve is inoperable, or the vehicle is equipped with only one, and it is not mounted in the center of the frame or in an original equipment manufacturer's (OEM) location.

**HAZARDOUS CONDITION**

- Any component allows the axle to shift from its normal position.
- Any air bag has an air leak.
- Any attaching or tracking component is missing, loose, cracked or broken.

## 8. Air Suspended Lift Axles

All applicable mechanical components should be inspected as per the appropriate section of this manual.

**Procedure**

With air in the suspension and the system at normal operating pressure, operate the lift control. Audibly and visually inspect leaks, axle operation and one-way valves.

**Reject the vehicle if:**

- An air leak is evident when the axle is in either an up or down position.
- A retractable axle does not respond to the lift control switch.
- The air supply to the suspension is depleted, and one-way safety valves do not protect the main suspension system.

## 9. Self-steering Axles

### Procedure

Inspect the steering dampers, steering lock, air pressure regulator and pressure gauge.

### Reject the vehicle if:

- Steering dampers are missing, inoperable or leaking.
- The steering lock is missing or inoperable.
- Steering is not centered in the “zero” locked position.
- The vehicle is not equipped with a manual locking system independent of the remote locking system.
- The air pressure regulator is inoperable or the vehicle is not equipped with one.
- The pressure gauge is inoperable, inaccurate or the vehicle is not equipped with one.
- The pressure gauge is not labeled with the minimum design pressure required to comply with centering force requirements.

## 10. Shock Absorbers

Shock absorbers must be present on a vehicle if it is OEM equipped. **Note:** All air ride suspensions require shock absorbers.

### Procedure

Visually inspect the condition of the shock absorbers, mountings, bushings and attachments.

### Reject the vehicle if:

- Shock absorbers are damaged and/or defective.
- Mountings are broken or loose.
- Bushings are loose, missing or deteriorated.
- Attachments are loose, broken or missing.

---

---

### HAZARDOUS CONDITION

- Any shock absorber is missing, broken or not attached on air ride suspension system.
- 
-

# Hydraulic Brake Systems

Regardless of the number of axles, all vehicles fitted with original equipment brakes by the manufacturer must have those brakes in proper working order before the vehicle can pass inspection.

If the front axle brakes are fitted but are not operative, the front brakes must be returned to proper working order before the vehicle can pass inspection.

If the original manufacturer's front axle brake components have been removed, they must be replaced and the front brake system brought into proper working order.

Properly functioning brakes must be fitted on all two- and three-axle trucks and two-axle truck tractors before a vehicle can pass inspection.



In the United States, trucks and truck tractors with three or more axles require front brakes if manufactured after July 24, 1980.



In Canada, truck tractors manufactured without front brakes must be fitted with front brakes to OEM specifications for that axle by January 1, 1995, if the vehicle is converted for use as a straight truck (subject to provincial legislation).

Internal components of brake systems should be inspected as follows:

1. When evidence of defect(s) on internal brake components is disclosed during inspection of external or internal brake components, the affected brake drum(s) should be removed for further inspection and repair.
2. When no evidence of brake defect(s) exists, inspection of internal components should be performed as follows:

- a. Remove brake drums and inspect the internal brake components, measure and record the internal brake drum diameter, and measure and record the brake lining edge thickness at the center of the brake shoe; or
- b. If fitted with removable dust shields or no dust shields are in place; with the dust shields removed, inspect the internal brake components, measure and record the internal brake drum diameter, and measure and record the brake lining edge thickness at the center of the brake shoe.
- c. If fitted with non-removable dust shields or backing plates:
  - When the owner provides proof that wheel removal and inspection of internal brake components was conducted within the preceding 24 months, perform a visual inspection through the inspection holes;
  - When proof of wheel removal is not provided by the owner or no inspection holes are present, remove brake drum(s) and inspect the internal brake components, measure and record the internal brake drum diameter, and measure and record the brake lining edge thickness at the center of the brake shoe.

**Note:** Proof of brake drum removal and inspection of internal brake components should include the brake drum inside diameter and brake lining thickness measurements. The registered owner of the vehicle or a person designated by the owner is responsible for providing proof of inspection of the internal brake components.

## 1. Parking Brakes

### Procedure

**Step 1:** With the engine idling, apply the parking brakes. Place an automatic transmission into drive. For a manual transmission, shift into gear and partially engage the clutch.

**Step 2:** Visually inspect the function of the parking brakes, indicator lamp (if equipped), brake application, mechanism, cables (if equipped) and lining (if equipped).

### Reject the vehicle if:

- The parking brake fails to hold.
- The indicator lamp (if equipped) fails to illuminate.
- The parking brake fails to fully apply or release.
- The mechanism binds or is inoperable.
- Cables are frayed, broken or missing.
- Lining (if equipped) is less than 1.6 mm ( $1/16$  inch) above the shoe on an external clamping type.

---

### HAZARDOUS CONDITION

- The brake fails to hold the vehicle when the parking brake is actuated.
- 

## 2. Hydraulic System

### Procedure

Visually inspect the lines, hoses, master cylinder and cap.

### Reject the vehicle if:

- Lines and hoses are leaking, welded, cracked, chafed, flattened, insecurely mounted or have restricted sections.
- Repairs to lines and hoses have been made with anything other than steel tubing.
- Connections are anything other than double flared.

- The master cylinder is leaking, loose or the fluid level is below 12.7 mm ( $1/2$  inch) from the top.
- The cap is missing or loose, vent holes are plugged, or the gasket is missing or damaged.

---

### HAZARDOUS CONDITION

- Any brake hose or line seeps or swells under pressure.
  - Any brake hose is cracked to the second layer.
  - The master cylinder reservoir is less than one-quarter full.
- 

## 3. Dual Hydraulic Circuit

**Step 1:** Visually and manually inspect the warning indicator.

### Reject the vehicle if:

- The warning indicator lamp illuminates in the "ON" position, it fails to operate in a "START" position, or it operates continuously.

**Step 2:** With the engine running, press the brake pedal with a heavy foot force (about 55 kg/125 lbs. force) and inspect the pressure differential switch. Observe the warning lamp.

### Reject the vehicle if:

- The warning indicator lamp comes on.

---

### HAZARDOUS CONDITION

- The brake failure lamp illuminates continuously.
-

## 4. Hydraulic Brake Leakage and Pedal Reserve

### Procedure

If testing power brakes, do this procedure with the engine running. Apply a moderate foot force to the pedal and maintain for one minute. Do not pump or repeatedly apply the brake pedal. Using a measuring device, visually inspect for leakage and brake pedal travel.

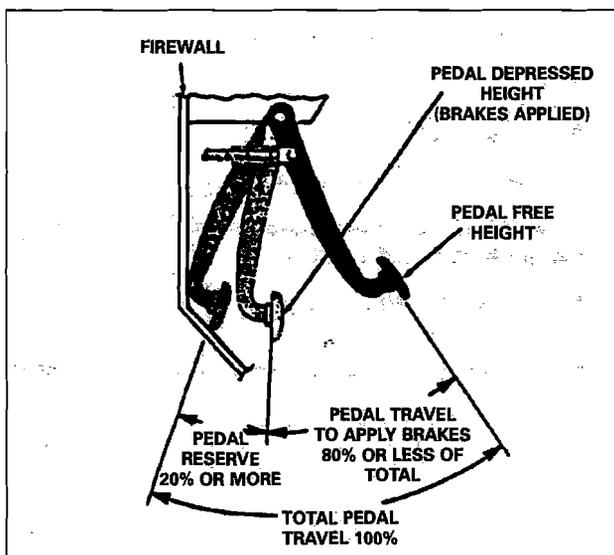
### Reject the vehicle if:

- The pedal moves in applied direction.
- Pedal travel from its free height to its depressed height is more than 65 percent of this total or does not meet manufacturer's specifications. (See illustration.)

---

### HAZARDOUS CONDITION

- Any fluid leakage is observed in the system.
  - The service brake pedal requires pumping to maintain the pedal reserve.
  - Pedal free play exceeds 80 percent.
- 



Brake Pedal Travel

## 5. Hydraulic System with Hydraulic Assist

### Procedure

**Step 1:** Inspect for leakage and test the pedal reserve following the same procedures and rejection criteria as above in *Chapter 3, Item 4*. Vehicles equipped with an electrically driven hydraulic pump that functions in the event of a power steering failure, can be checked by applying moderate pressure on the brake pedal. Visually and audibly inspect pedal travel, the warning indicator lamp (if applicable), pump reservoir, lines, hoses, belt and motor operation.

### Reject the vehicle if:

- No movement in the pedal is detected.
- The warning indicator lamp is inoperable when the power steering pump is stopped.
- The pump reservoir is below the indicated "ADD" mark.
- Lines and hoses are leaking.
- The belt is loose, cracked or excessively worn.
- The motor fails to operate when the engine is not running.

**Step 2:** With the ignition in the "OFF" position and the engine stopped, depress the brake pedal several times. Apply moderate foot pressure on the brake pedal and start the engine.

### Reject the vehicle if:

- No pedal movement is observed.

---

### HAZARDOUS CONDITION

- Power assist unit fails to operate.
  - The service brake pedal does not move toward the floorboard with the brakes applied when the engine is started.
-

## 6. Vacuum System

### Procedure

Visually and manually inspect the lines and hoses, and the condition of the system, clamps and tank(s).

### Reject the vehicle if:

- Lines and hoses are collapsed, broken, chafed, insecurely mounted, less than 38 mm (1.5 inch) from any part of the exhaust system.
- The system is leaking.
- Clamps are loose, missing or broken.
- Any tank is missing, loose, damaged or leaking.

---



---

### HAZARDOUS CONDITION

- Power assist unit fails to operate.
  - The check valve is missing or inoperative.
  - The service brake pedal does not move toward the floorboard with the brakes applied when the engine is started.
- 
- 

## 7. Vacuum Booster

### Procedure

With the engine off, press the brake pedal several times to eliminate vacuum. Apply light force on the brake pedal (12 kg/25 lbs.) and then start the engine. Visually inspect the vacuum booster operation and condition.

### Reject the vehicle if:

- Brake pedal movement cannot be detected.
- The vacuum booster is loose, damaged or the mounting is cracked.

---



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### HAZARDOUS CONDITION

- The power assist unit fails to operate.
  - The check valve is missing or inoperative.
  - The service brake pedal does not move toward the floorboard with the brakes applied when the engine is started.
- 
- 

## 8. Vacuum Reserve

### Procedure

Start the engine and build to full vacuum. Shut the engine off and make three full brake applications. Manually and visually inspect the pedal reserve and the buzzer or brake indicator lamp (if applicable).

### Reject the vehicle if:

- The pedal reserve is insufficient to assist three full applications.
- The brake indicator lamp or buzzer fails to operate when the system is reduced to 2 kpa (8 inches) of vacuum, or it operates continuously after one application.

## 9. Vacuum Pump

### Procedure

**Step 1:** If a vehicle is equipped with a vacuum pump, deplete all vacuum by pumping the brakes. If the system also uses engine vacuum, disconnect the source.

**Step 2:** Operate the engine at approximately 1,200 rpm. Visually inspect the reserve.

### Reject the vehicle if:

- The vacuum pump is unable to achieve and maintain 4.5 kpa (18 inches) of vacuum.

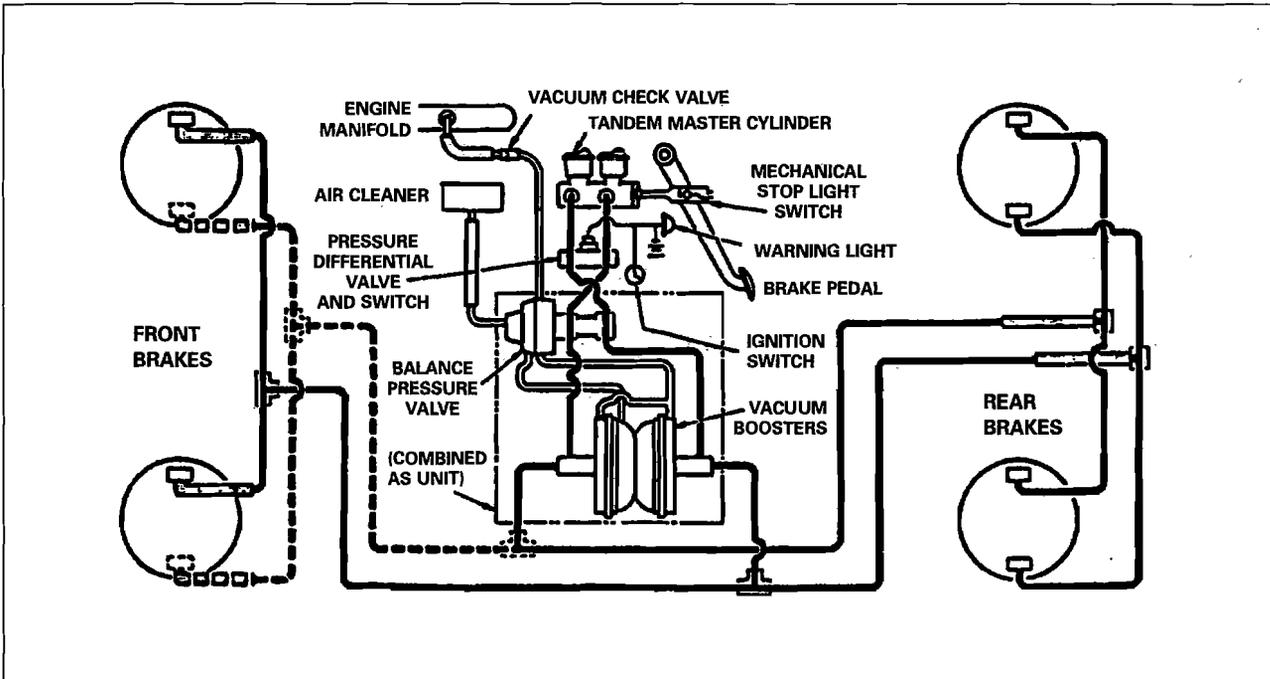
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### HAZARDOUS CONDITION

- The power assist unit fails to operate.
- 
-



Split Hydraulic Brake System Schematic for Medium-duty and Heavy-duty Vehicles

## 10. Front Drum Brakes

### Procedure

*Equipment needed:* Steel scale or Vernier caliper.

**Step 1:** Visually inspect and measure the bonded lining for wear and condition.

#### Reject the vehicle if:

- Bonded lining is worn to 1.6 mm ( $\frac{1}{16}$  inch) or less at the center or at any point other than the chamfered area of the shoe.
- Bonded lining is cracked, insecurely bonded to the shoe, contaminated or worn extremely unevenly.

**Step 2:** Visually inspect and measure the riveted lining for wear and condition.

#### Reject the vehicle if:

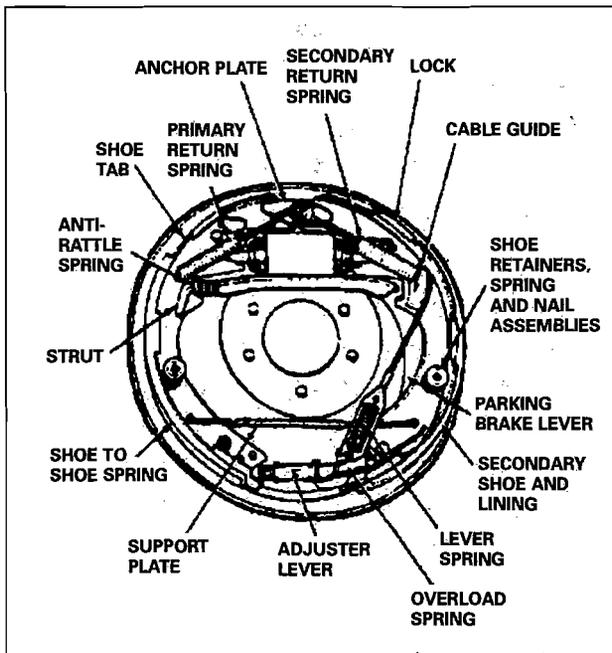
- Riveted lining is worn to 3.2 mm ( $\frac{1}{8}$  inch) or less at the center or at any point other than the chamfered area of the shoe.
- Riveted lining is broken, cracked, contaminated or worn extremely unevenly.

**Step 3:** Visually inspect the mechanical components including the self-adjusters, self-adjuster cables and linkage, anchor pins and springs, backing plate, and axle and spindles.

#### Reject the vehicle if:

- Self-adjusters are seized, excessively worn, inoperable, missing or the wrong thread for the wheel has been installed.
- Self-adjuster cables and linkage are missing, loose, broken, inoperable or the cables are frayed.
- Anchor pins and springs are missing, loose, broken, excessively worn or stretched.
- The backing plate is worn so as to restrict free movement of the shoes.
- The axle and spindles show evidence of cracking.

**Step 4:** Visually inspect the wheel cylinders for operation, condition and dust seals.



Typical Servo Drum Brake

**Reject the vehicle if:**

- Wheel cylinders are inoperable or seized.
- Wheel cylinders are leaking, damaged or mounted insecurely.
- Dust seals are damaged, missing or deteriorated.

**Step 5:** When wheels are removed, the brake drums must be inspected as per this section. Visually inspect for the condition of the brake drums.

**Reject the vehicle if:**

- Cracks extend to the open edge of the drum.
- Any external cracks are present.
- Any hot spots that cannot be removed by machining within drum limits are present in more than three locations.
-  Friction surface is uneven.

**Step 6:** Measure the inside diameter of the drum at two different locations approximately 90 degrees apart.

*Equipment needed:* A drum measuring gauge approved by the jurisdiction.

**Reject the vehicle if:**

- Drum has one or more grooves worn so that the measurement in the groove exceeds the wear limit.
- Drum is out of round more than 0.25 mm (.010 inch) on drums 280 mm (11 inches) in diameter and smaller.
- Drum is out of round more than 0.63 mm (.025 inch) on drums greater than 280 mm (11 inches) in diameter.
- Drum exceeds specifications as set out in *Chapter 3, Item 14.*

**Step 7:** Apply the brakes and try to rotate the wheel.

**Reject the vehicle if:**

- The wheel rotates.

---

**HAZARDOUS CONDITION**

---

- The brake drum is in a condition that would indicate that failure is imminent.
- 

## 11. Front Disc Brakes

**Procedure**

**Step 1:** Visually inspect and measure rotors, calipers and pads.

*Equipment needed:* Micrometer and dial indicator.

**Reject the vehicle if:**

- Rotors are broken or damaged, or cracks on the surface extend to the outer edges.
- Two grooves on the rotors are worn beyond the maximum 2.3 mm (0.09 inch).
- Lateral runout exceeds 0.128 mm (.005 inch) on discs 380 mm (15 inches) in diameter or less.

- Lateral runout exceeds 0.25 mm (0.010 inch) on discs greater than 380 mm (15 inches).
- Rotors exceed the wear limits in *Chapter 3, Item 14*.
- Calipers are leaking, the piston is seized or the caliper is seized.
- Pads are damaged, contaminated or worn to the following measurements:
  - Bonded Pads: 1.6 mm ( $1/16$  inch) or less at the thinnest point.
  - Riveted Linings: 3.2 mm ( $1/8$  inch) or less at the thinnest point.

**Step 2:** Apply the brakes and attempt to rotate the wheel assembly.

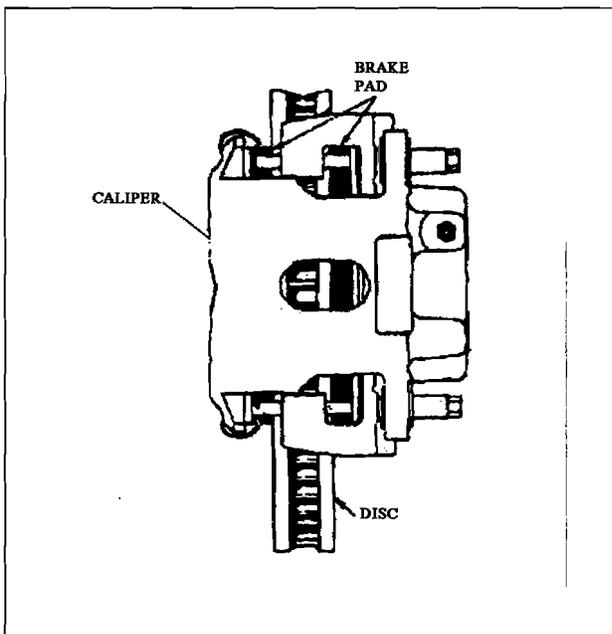
**Reject the vehicle if:**

- Wheels rotate.

---

**HAZARDOUS CONDITION**

- Any rotor is cracked to the hub or failure appears to be imminent.
- 



Typical Disc Brake

## 12. Rear Brakes

**Procedure**

**Step 1:** Visually inspect and measure the lining for wear and condition.

*Equipment needed:* Vernier caliper or a steel scale.

**Reject the vehicle if:**

- Bonded lining is worn to 1.6 mm ( $1/16$  inch) or less at the center or at any point other than the chamfered area of the shoe.
- The bonded lining is cracked, contaminated or insecurely bonded to the shoe.
- Riveted lining is worn to 3.2 mm ( $1/8$  inch) or less at the center or at any point other than the chamfered area of the shoe.
- Riveted lining is broken, cracked or contaminated.

**Step 2:** Visually inspect the mechanical components of the rear brakes, including the self-adjusters, self-adjuster cable and linkage, anchor pins and springs, backing plate and the parking brake cables and linkage.

**Reject the vehicle if:**

- Self-adjusters are seized, worn, inoperable, missing, or the wrong thread for the wheel is installed.
- The self-adjuster cable and linkage is missing, loose, broken, inoperable or the cables are frayed.
- Anchor pins and springs are missing, loose, broken, excessively worn or stretched.
- The backing plate is worn so as to restrict free movement of the shoes.
- The parking brake cables and linkage are missing, loose, broken, inoperable or the cables are frayed.

**Step 3:** Visually inspect the wheel cylinders.

**Reject the vehicle if:**

- Wheel cylinders are inoperable or seized.
- Wheel cylinders are leaking.
- Dust seals are damaged, missing or deteriorated.

**Step 4:** Visually inspect the brake drums for condition and wear. Measure the inside diameter of the drum at two locations approximately 90 degrees apart using an approved gauge. **Note:** When wheels are removed, the brake drums must be inspected as per this section.

**Reject the vehicle if:**

- Cracks extend to the open edge of the drum.
- Any external cracks are present.
- Hot spots that cannot be removed by machining within drum limits are present in more than three locations.
- The friction surface is uneven.
- The drum has more than two grooves worn so that the measurement in the grooves exceeds the wear limits as per *Chapter 3, Item 14*.
- The drum is out-of-round more than 0.25 mm (0.010 inch) on drums 280 mm (11 inches) and smaller.
- Out-of-round is more than 0.63 mm (0.025 inch) on drums greater than 280 mm (11 inches).
- The drum exceeds wear limits as set out in *Chapter 3, Item 14*.

---

**HAZARDOUS CONDITION**

- The brake drum is in a condition that indicates that failure is imminent.
- 

## 13. Anti-lock Brake Systems (ABS)

Trucks with hydraulic brakes manufactured after March 1, 1999, must be equipped with anti-lock brakes when they are operated in the United States.



**Procedure**

If a vehicle is equipped with an ABS brake system, visually and manually inspect the warning light.

**Reject the vehicle if:**

- The warning light fails to illuminate during the cycle or self-check, or a self-diagnostic error is indicated.

## 14. Machining and Wear Limits, Brake Drums and Rotors

### A. BRAKE DRUMS

No combination of machining and wear may exceed the manufacturer's stamped limit.

If the manufacturer's limit is not available, then no combination of wear and machining may exceed:

- 2.3 mm (0.090 inch) over original; drum diameter of 350 mm (14 inches) or less.
- 3.0 mm (0.120 inch) over original; drum diameter of greater than 350 mm (14 inches).

### B. BRAKE ROTORS

The original thickness may not be decreased by any combination of wear and machining below the manufacturer's minimum thickness.

# Air Brakes

## Internal Brake Inspections

Regardless of the number of axles, all vehicles fitted with original equipment brakes by the manufacturer must have those brakes in proper working order before the vehicle can pass inspection.

If the front axle brakes are fitted, but are not operative, the front brakes must be returned to proper working order before the vehicle can pass inspection.

If the original manufacturer's front axle brake components have been removed, they must be replaced and the front brake system brought into proper working order.

Properly functioning brakes must be fitted on all two- and three-axle trucks and two-axle truck tractors before a vehicle can pass inspection.



In the United States, trucks and truck tractors with three or more axles require front brakes if manufactured after July 24, 1980.



In Canada, truck-tractors manufactured without front brakes must be fitted with front brakes to OEM specifications for that axle by January 1, 1995, if the vehicle is converted for use as a straight truck (subject to provincial legislation).

Internal components of brake systems should be inspected as follows:

1. When evidence of defect(s) on internal brake components is disclosed during inspection of external or internal brake components, the affected brake drum(s) should be removed for further inspection and repair.
2. When no evidence of defect(s) exists, inspection of internal components should be performed as follows:

- a. Remove brake drums and inspect internal brake components, measure and record internal brake drum diameter, and measure and record brake lining edge thickness at the center of the brake shoe; or
- b. If fitted with removable dust shields or no dust shields are in place:
  - With dust shields removed, inspect internal brake components, measure and record internal brake drum diameter, and measure and record brake lining edge thickness at the center of the brake shoe; or
  - With dust shields removed, inspect the internal brake components, perform a camshaft rotation test and record the measurement obtained.
- c. If fitted with non-removable dust shields:
  - When the owner provides proof that wheel removal and inspection of internal brake components was conducted within the preceding 24 months, perform a camshaft rotation test and record the measurement.
  - When proof of wheel removal is not provided, remove brake drum(s) and inspect the internal brake components, measure and record the internal brake drum diameter, and measure and record the brake lining edge thickness at the center of the brake shoe.

**Note:** Proof of brake drum removal and inspection of internal brake components should include the brake drum inside diameter and brake lining thickness measurements. The registered owner of the vehicle or a person designated by the owner is responsible for providing proof of inspection of internal brake components.

## 1. Air Compressor

### Procedure

Manually and visually inspect the compressor, belts (if so equipped), compressor mount (if so equipped), air filter and pulley (if so equipped).

### Reject the vehicle if:

- The compressor is loose.
- Belts are deteriorated, frayed, loose (maximum deflection of 12.7 to 19 mm ( $1/2$  to  $3/4$  inch)).
- The compressor mount is loose, cracked or bolts are missing.
- The air filter is missing or contaminated so as to affect the airflow.
- The pulley is bent or damaged.

---

### HAZARDOUS CONDITION

- A belt or pulley is in such a condition that failure is imminent.
  - The compressor is mounted insecurely and has shifted from its normal position.
- 

## 2. Compressor Air-build Time

### Procedure

With the spring brakes released, and with the wheel chocked, reduce the pressure in the system until the pressure gauge indicator is less than 350 kpa (50 psi). Run the engine at 1200 rpm and record the time required to raise the air pressure from 350 to 600 kpa (50 to 90 psi) on the gauge. Inspect the air-build time.

### Reject the vehicle if:

- Air-build time exceeds three minutes.

## 3. Air Governor

### Procedure

**Step 1:** Continue running the engine and observe the gauge pressure when the governor cuts out.

### Reject the vehicle if:

- The gauge pressure is not between 805 and 945 kpa (115 to 135 psi).

**Step 2:** With the spring brakes released at maximum pressure and with the engine idling, make a rapid series of brake applications and observe the gauge pressure when the governor cuts in.

### Reject the vehicle if:

- The governor cut-in pressure is below 560 kpa (80 psi).

## 4. Low Air Pressure Warning System

### Procedure

Visually and audibly inspect the warning system (lamp, buzzer or wig-wag).

### Reject the vehicle if:

- The warning system fails to operate below 382 kpa (55 psi) or one-half governor cut-out pressure, whichever is less.
- The warning system is missing.

---

### HAZARDOUS CONDITION

- The warning system is missing or fails to operate below 382 kpa (55 psi).
- 

## 5. Air System Leakage

### Procedure

With a fully charged air system and with the spring brakes released, make a full service brake application. Shut down the engine and record the pressure drop in kpa (psi) per minute. Conduct the test for at least two minutes. Inspect for leakage.

**Reject the vehicle if:**

- The pressure drop exceeds 20 kpa (3 psi) per minute.
- The pressure drop exceeds 28 kpa (4 psi) per minute if connected to a trailer.

**HAZARDOUS CONDITION**

- Single vehicle: If the pressure drop exceeds 40 kpa (6 psi) per minute.
- Two vehicles: If the pressure drop exceeds 48 kpa (7 psi) per minute.
- Three vehicles: If the pressure drop exceeds 62 kpa (9 psi) per minute.
- Reservoir pressure between 560 and 600 kpa (80 and 90 psi) is not maintained with the service brakes applied and the engine at idle.

**6. Compressed Air Reserve**

This is a reserve air inspection only and must not be used as an indicator that brakes are properly adjusted.

**Procedure**

With a fully charged air system and spring brakes released, shut down the engine and make one full service brake application. Visually inspect the drop in reservoir pressure.

**Reject the vehicle if:**

- The reservoir pressure is lowered more than 130 kpa (18 psi). **Note:** If defective, recheck after brake adjustment.

**7. Air Reservoir and Check Valves**

With the air system fully charged and wheel chocks installed, open the drain valve on the primary (wet) tank or on a service tank. Check valve(s) should close and retain compressed air in the secondary (dry) tank(s), then open the secondary tank valve. Visually inspect the check valve(s).

**Reject the vehicle if:**

- Check valve(s) do not close.

**HAZARDOUS CONDITION**

- Check valve(s) are inoperable or missing.

**8. Quick-release Valves****Procedure**

With the spring brakes released, apply the service brake and then release it. Inspect the valve operation and mounting.

**Reject the vehicle if:**

- Air is not quickly exhausted through the exhaust port of the valve when the brakes are released.
- Mounting is insecure or the bracket is broken or loose.

**9. Relay Valves**

With the spring brakes released, apply the service brakes and observe the application of brake chambers served by the relay valve being tested. Then release the brakes. Inspect the operation and mounting of the valves.

**Reject the vehicle if:**

- Air is not quickly exhausted through the exhaust port of the valve when the brakes are released.
- The mounting is insecure or the bracket is broken or loose.

**10. Tractor-protection Valve and Push-pull Control Valve**

There are different systems designed for the operation of the tractor protection system. Check the system as the design allows. Inspect applicable units without trailers attached.

**Procedure**

Build up air pressure to approximately 690 kpa (100 psi). With the engine shut down, push in the trailer control valve and observe the air pressure escaping through the emergency glad hand. Also take note that there is no air pressure leakage through the service line glad hand.

When the gauge pressure has dropped to 138 kpa (20 psi) or greater, the push-pull control valve should actuate, closing the tractor-protection valve, and the pressure should be maintained at 138 kpa (20 psi) or greater in the power unit air system.

**Reject the vehicle if:**

- The tractor-protection control valve does not pop out or close at or above 138 kpa (20 psi), retaining 138 kpa (20 psi) or greater of air in the power unit system.
- Air leakage is still noticeable at the emergency glad hand after the control valve has operated.

## 11. Air Parking and Emergency Brake Application

Vehicles originally equipped with mechanically operated parking brakes are permitted.

**Procedure**

**Step 1:** Using the park spring brake control valve, release the air pressure from the spring brakes. Visually inspect the pushrod location.

**Reject the vehicle if:**

- Pushrods are in a fully extended position and the vehicle can be moved.
- The parking brake is not fully applied when the air pressure is exhausted.

**Step 2:** Recharge the system and release the spring brakes.

**Reject the vehicle if:**

- The spring brakes do not fully release.

**HAZARDOUS CONDITION**

- The parking system fails to hold the vehicle.

## 12. Air Brake Components

**Procedure**

Visually inspect glad hands, air lines, air line connectors, air tanks, air tank brackets and straps, drain cocks, splices and moisture ejectors (manual or automatic).

**Reject the vehicle if:**

- Glad hands are damaged, cracked, corroded, insecurely mounted or seals are damaged.
- Air lines are abraded to the first body ply cord, or they are insecure, flattened, cracked, broken, kinked or leaking.
- Air lines are within 50 mm (2 inches) of the exhaust and there is not a heat shield.
- Air lines do not meet OEM design standards.
- The braid is exposed at the first layer on a braided line.
- Air line connectors do not meet OEM design standards.
- Air tanks are missing, leaking, loose or damaged so as to cause possible failure.
- Air tank brackets and straps are cracked, broken, missing or an inferior substitute has been used.
- Drain cocks are missing, loose, leaking, inoperable or do not meet OEM design standards.
- Moisture ejectors (manual or automatic) are inoperable or not present on each tank.

**HAZARDOUS CONDITION**

- Failure of any air line appears imminent.
- Any line bulges under pressure.
- Any splice does not meet OEM design standards.

### 13. Brake Mechanical Components

#### Procedure

Visually inspect the brake chambers, mounting brackets, clevis pins, clevis yokes, pushrods, slack adjusters, slack adjuster nut self-locking sleeve, pushrod clevis pin hole setting, return springs, rollers, brake shoe, anchor pins and spiders.

#### Reject the vehicle if:

- Clevis pins are excessively worn, a cotter pin is missing or an inferior substitute, such as a nut and bolt, has been used.
- Clevis yokes are excessively worn, cracked, broken or bent.
- Pushrods are bent, broken or misaligned to slack adjuster.
- Pushrods do not form a 90 degree angle or as close as practical with the slack adjuster when the brakes are applied with approximately 620 kpa (90 psi). **Note:** The 90 degree angle is a suggested guideline only. Not all brakes achieve 90 degrees, therefore check with the manufacturer's specifications.
- Slack adjusters are bent, broken, excessively worn, seized or function improperly.
- Slack adjuster nut self-locking sleeve is seized or inoperable.
- Pushrod clevis pin hole setting is not the same hole on the same axle, and the dis-

tance from the center of the cam to the hole is not the same on the same axle.

- Return springs are missing, stretched or do not hold the lower roller to the cam.
- Rollers are missing, have flat spots or are the wrong size.
- Brake shoe and anchor pins are missing or worn so that the lining protrudes outside the edge of the brake drum.
- Spiders are bent, loose or bolts are missing.

---

#### HAZARDOUS CONDITION

- Any one brake fails to operate on a steering axle (if so equipped).
  -  Defective brakes on a unit are equal to or greater than 20 percent of all brakes on the unit. A defective brake is considered to be any brake that does not meet the standards as per *Chapter 3A* of this manual.
- 

### 14. Self-adjusting Slack Adjuster

 In the United States, vehicles with an external adjustment mechanism and exposed push rods manufactured after October 20, 1994, must be equipped with automatic brake adjustment and brake adjustment indicators.

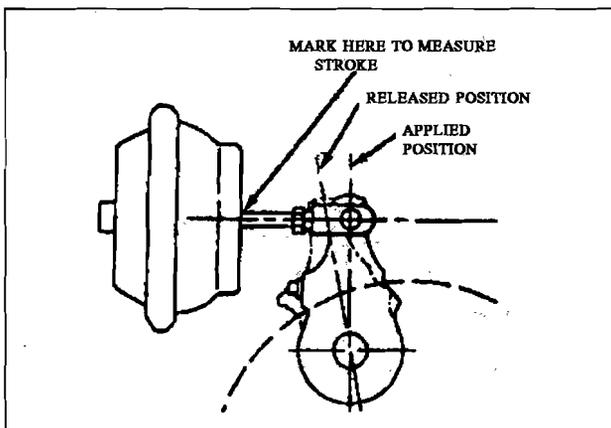
 In Canada, vehicles with an external adjustment mechanism and exposed pushrods manufactured after May 31, 1996, must be equipped with automatic brake adjustment and brake adjustment indicators.

#### Procedure

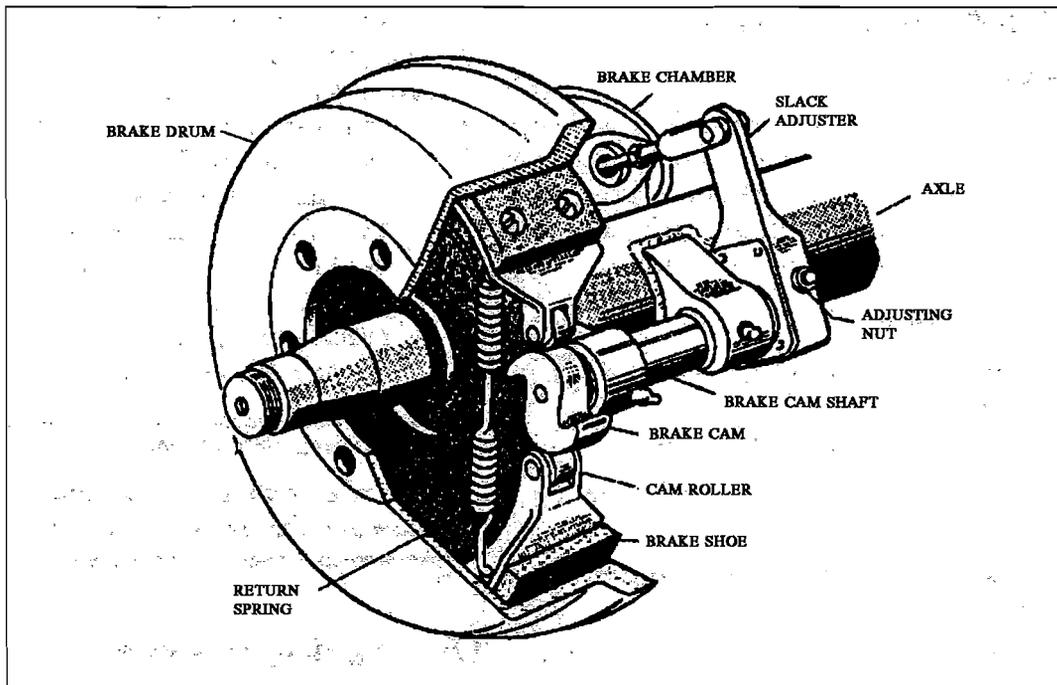
**Step 1:** Inspect for the presence of automatic brake adjustment and brake adjustment indicators, if so equipped.

#### Reject the vehicle if:

- Automatic brake adjusters and brake adjustment indicators are missing or inoperative.
- Indicators are not clearly visible.



Measuring the Brake Cam Adjustment



**S-cam Brake Components**

**Step 2:** If applicable, with the assistance of a second party, make a treadle valve application and note the pushrod travel. Inspect the adjustment.

**Reject the vehicle if:**

- The adjustment is not within the manufacturer's specifications.

## 15. Brake Camshafts

**Procedure**

With spring and service brakes released, manually check for movement between the camshaft and bushings, and inspect the bushings using a dial indicator.

*Equipment needed:* Dial indicator.

**Reject the vehicle if:**

- Bushings on the camshaft are worn more than 2.1 mm (0.085 inch).

## 16. Camshaft Travel

**Procedure**

**Step 1:** Back off the slack adjuster until movement is noticed in the brake chamber pushrod. The roller will now be in the bottom position of the S-cam. Brake S-cam bushings should be inspected at this time.

**Step 2:** Mark the slack adjuster in relation to the camshaft with chalk. Adjust the brakes to lock the wheel, and visually inspect travel.

**Note:** Ensure brakes are properly adjusted after the test.

**Reject the vehicle if:**

- The difference between the marks is more than 120 degrees or one-third of camshaft travel.
- It is overcammed.

---

**HAZARDOUS CONDITION**

- Cam travel exceeds 120 degrees.
  - Cam is inoperable.
  - Oversized rollers were used.
-

## 17. Rear Brake Linings

### Procedure

**Step 1:** Visually inspect the brake shoes and lining. If the shoes and lining cannot be seen, remove the lower portion of the dust cover. It may be necessary to back off the slack adjusters to accurately measure the brake lining.

### Reject the vehicle if:

- Brake shoes or lining are broken, cracked or contaminated (i.e., oil).
- Lining protrudes outside the drum.
- There is a parting of the lining from the shoe.
- Shims were used between the lining and the shoe.
- Brake lining is worn to 8 mm ( $5/16$  inch) or less at the center or at any point other than the chamfered area of the shoe.
- Wheel seals are leaking. **Note:** Seepage is not cause for rejection.

---

### HAZARDOUS CONDITION

- Any lining is worn below 6.3 mm ( $1/4$  inch).
- 

## 18. Brake Drums

When wheels are removed, the brake drums must be inspected as per this section.

### Procedure

Visually inspect the brake drums and measure the inside diameter of the drum at two different locations approximately 90 degrees apart, using an approved gauge.

### Reject the vehicle if:

- Cracks extend to the outer edge of the drum.
- Any external cracks are present.
- Hot spots that cannot be removed by machining within the drum limits are present in more than three locations.
-  The friction surface is uneven.

- A drum has one or more grooves worn so that the measurement in the groove exceeds the wear limit:
  - Out-of-round more than 0.25 mm (.010 inch) on drums 280 mm (11 inches) in diameter and smaller.
  - Out-of-round more than 0.63 mm (.025 inch) on drums greater than 280 mm (11 inches) diameter.
  - Exceeds the specifications as set out in *Chapter 3A, Item 24.*

---

### HAZARDOUS CONDITION

- A brake drum is in a condition that indicates that failure is imminent.
- 

## 19. Spring Brakes

### Procedure

Visually inspect the spring brakes.

### Reject the vehicle if:

- Spring brakes have been rendered inoperable by use of caging bolts or other mechanical means.
- Spring brakes cannot be released mechanically.

### WARNING! DANGER!

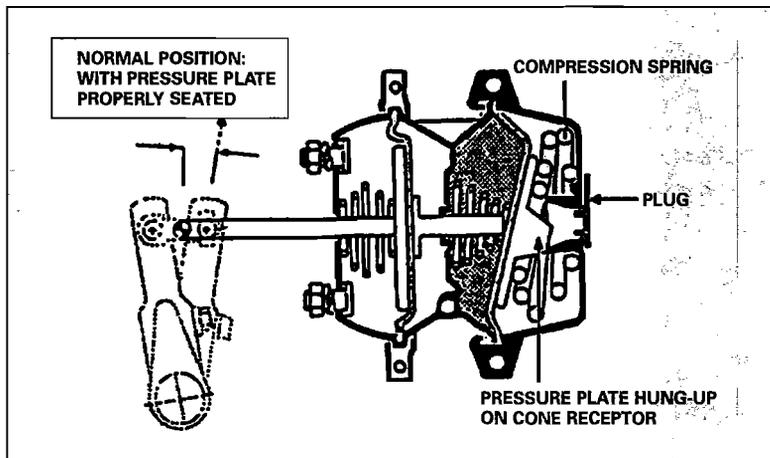
Do not attempt to dismantle the double diaphragm spring brake unit. Using a safety cage, remove the entire unit from the vehicle. Replace the unit with a new or rebuilt assembly.

## 20. Brake Adjustment

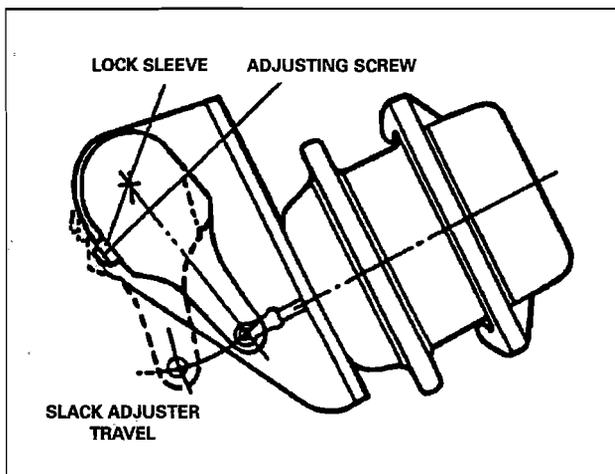
### A. S-CAM BRAKES

#### Procedure

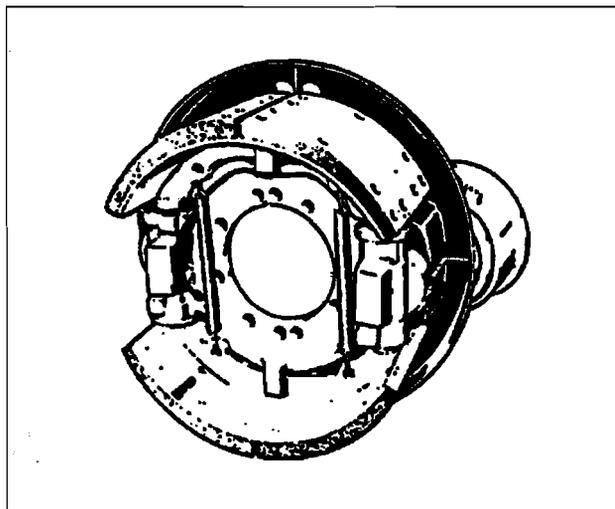
**Step 1:** Support the vehicle on safety stands or with the wheels on the ground and spring brakes released, apply the service brakes at approximately 620 kpa (90 psi) and visually inspect the angle between the pushrod and the slack adjuster.



Brake Dragging Condition with Brakes Not Applied



Slack Adjustment on Cam-type Air Brakes



Wedge-type Air Foundation Brake (Twinplex)

**Reject the vehicle if:**

- The angle between the pushrod and the slack adjuster is not 90 degrees or as close as practical. Note: The 90 degree angle is a suggested guideline only. Not all brakes achieve 90 degrees, therefore check with the manufacturer's specifications.
- Pushrod travel is not between 19 to 37.5 mm (3/4 to 1 1/2 inch) or manufacturer's specifications.
- Pushrod travel is not within 6.4 mm (1/4 inch) for chambers of the same type and size on the same axle.

**Step 2:** Try to rotate the wheel.

**Reject the vehicle if:**

- The wheel rotates.

**B. WEDGE BRAKES**

Visually and manually inspect the application of the wedge brakes and measure the distance the lining travels from full release to the fully applied position.

**Reject the vehicle if:**

- The wheel rotates.
- Travel exceeds 1.6 mm (1/16 inch).

**HAZARDOUS CONDITION**

- Adjustment exceeds the standards defined in this chapter.

## 21. Disc Brakes

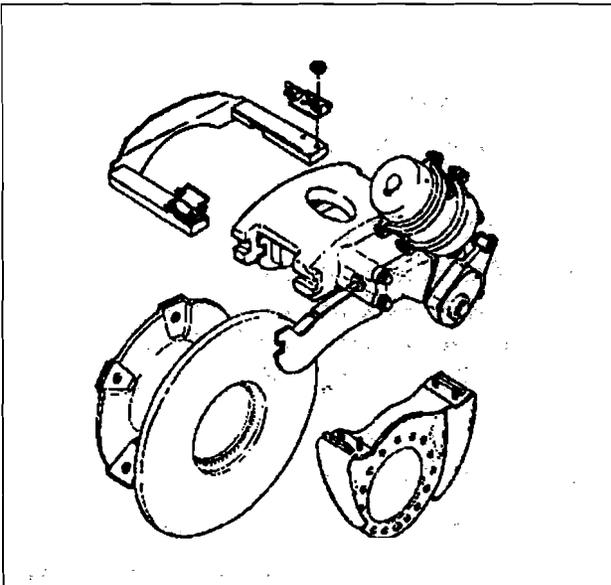
### Procedure

Visually inspect and measure the disc brake rotor, calipers, anchor plates, pads and wheel seals.

*Equipment needed:* Micrometer and dial indicator.

### Reject the vehicle if:

- Cracks on the surface extend to the outer edges of the rotor.
- The rotor is damaged or two or more grooves are worn beyond 2.25 mm (.090 inch).
- Calipers are seized or loose.
- Anchor plates are loose or bolts are missing.
- Pads are damaged, contaminated or worn
  - Riveted pad: 4.8 mm ( $\frac{3}{16}$  inch) or less thickness.
  - Bonded pad: 3.2 mm ( $\frac{1}{8}$  inch) or less thickness.
- Adjustment cannot be made to meet the manufacturer's specifications.



Air-actuated Disc Brake

- Wheel seals are leaking. Note: Seepage is not cause for rejection.

**Step 2:** Apply the brakes and try to rotate the wheel.

### Reject the vehicle if:

- The wheel rotates when the brakes are applied.

---

### HAZARDOUS CONDITION

- Any disc is cracked or does not meet the standards as defined in *Chapter 3A Item 24*.
- 

## 22. Front Brakes

### Procedure

**Step 1:** After adjustment, measure the pushrod, pushrod-to-slack adjuster angle and lining thickness.

### Reject the vehicle if:

- The angle between the pushrod and slack adjuster is not 90 degrees or as close as practical. Note: The 90 degree angle is a suggested guideline only. Not all brakes achieve 90 degrees, therefore check with the manufacturer's specifications.
- Pushrod travel is not between 19 to 31 mm ( $\frac{3}{4}$  to 1  $\frac{1}{4}$  inch) or within the manufacturer's specifications.
- Each side is not within 6.4 mm ( $\frac{1}{4}$  inch)

**Step 2:** Visually inspect and measure the brake diaphragm, slack adjuster and lining thickness.

### Reject the vehicle if:

- The brake diaphragm and slack adjuster are not the same type and size on each side of the axle.
- Lining thickness is less than 4.8 mm ( $\frac{3}{16}$  inch) above the shoe at the center or at any point other than the chamfered area.

**Step 3:** Apply the brakes and try to rotate the wheel. Inspect the wheel seals and limiting valve.

**Reject the vehicle if:**

- The wheel rotates.
- Wheel seals are leaking. **Note:** Seepage is not cause for rejection.
- Brakes fail to apply.

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**HAZARDOUS CONDITION**

- Braking action is not evident.
- 
- 

## 23. Anti-lock Brake Systems (ABS)



Tractors manufactured after March 1, 1997, and trucks manufactured after March 1, 1998, must be equipped with anti-lock brakes when they are operated in the United States.

**Procedure**

If a vehicle is equipped with an ABS brake system, visually and manually inspect the warning light.

**Reject the vehicle if:**

- The warning light fails to illuminate during the cycle or self-check, or a self-diagnostic error is indicated.

## 24. Machining and Wear Limits—Brake Drums and Rotors

### A. BRAKE DRUMS

No combination of machining and wear may exceed the manufacturer's stamped limit.

If the manufacturer's limit is not available, then no combination of wear and machining may exceed:

- 2.3 mm (0.090 inch) over the original drum diameter of 350 mm (14 inches) or less.
- 3.0 mm (.120 inch) over the original drum diameter of greater than 350 mm (14 inches).

### B. BRAKE ROTORS

Original thickness may not be decreased by any combination of wear or machining below the manufacturer's minimum thickness.

# Steering

## 1. Travel

### Procedure

Turn steering wheel through a full right and left turn. If the vehicle has manual steering, jack the vehicle up on its axle. Manually and visually inspect the steering wheel and its operation.

### Reject the vehicle if:

- The steering wheel has been modified or damaged.
- The steering wheel binds or jams during the cycle.
- The number of turns from the center to full left does not equal (plus or minus a half turn) the number of turns from the center to full right.
- Clearance is less than 25 mm (1 inch) between tire and frame, fender or other parts when the vehicle is on a level surface.
- Steering stops are missing.

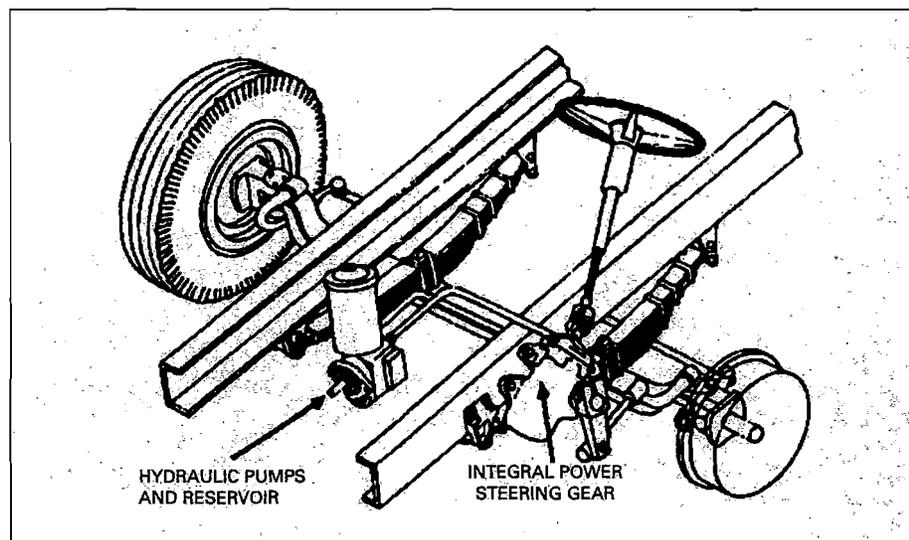
## 2. Steering Linkage

### Procedure

With the engine shut down, rock the steering wheel to the left and then to the right. Observe any movement in the steering components. If movement is observed, grasp the tie-rod and attempt to move it in the direction of the ball stud. Visually inspect the tie-rod, tie-rod ends, draglink and ends, pitman arm, transfer gear box (if so equipped), steering box, cotter pins, steering column, steering shaft universal joint, steering shaft yoke, slip joint or adjusting sleeve. **Note:** Under no circumstances should a pry bar be used.

### Reject the vehicle if:

- The tie-rod is bent or there is a welded repair.
- Tie-rod ends are bent, loose, injected, or there is a welded repair.
- Draglink and ends are loose, bent, injected or there is a welded repair.



Integral Power Steering System

- The pitman arm is loose or there is a welded repair.
- The transfer gearbox (if so equipped) is loose on the mounting or has excessive free play.
- The steering box is loose, insecurely mounted or bolts are missing or loose.
- Cotter pins are missing or an inferior substitute has been used.
- The steering column is loose or mounted insecurely.
- The steering shaft universal joint is loose or has a welded repair.
- The steering shaft yoke is loose, has a welded repair, the clamping bolt is loose, or there is a welded repair and/or weld in an area other than originally provided by the manufacturer.
- On the slip joint, free play between the splines exceeds 1.2 mm (.050 inch), or the horizontal play exceeds 6.4 mm ( $1/4$  inch).
- The adjusting sleeve is loose, bent, or the tightening bolt is in such a position that the steering can be jammed.

---

#### HAZARDOUS CONDITION

##### Steering column

- Any bolts are missing or any positioning parts allow movement from its normal position. Any universal joints have welded repairs, or the steering wheel is not secure.

##### Steering box

- Any mounting bolts are loose or missing, or any frame or mounting bracket is loose.

##### Pitman arm

- Pitman arm is loose on the steering gear output shaft spline, or it has a welded repair.

##### Ball and sockets

- Any linkage shows looseness in alignment with the shank or neck of the ball in excess of 3.2 mm ( $1/8$  inch). Nuts are loose on tie-rod ends, pitman draglink or steering, or there are any welded repairs on the above components.
- 

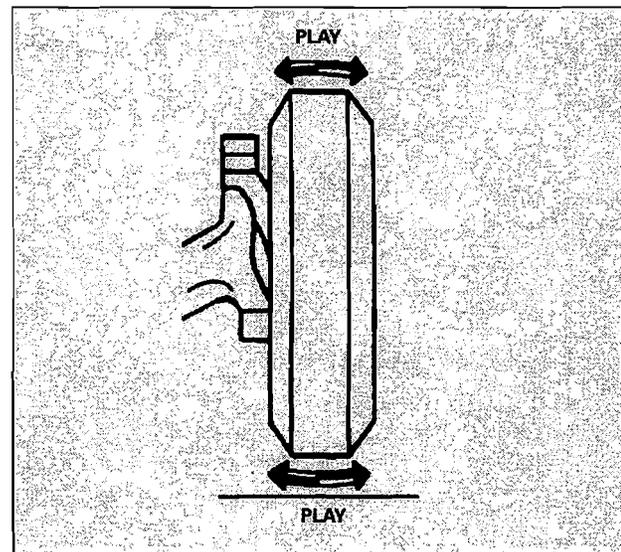
### 3. Front Wheel Bearings

#### Procedure

With the front end of the vehicle raised off the floor, attempt to move the wheel relative to the spindle by using a bar for leverage. Bearing maladjustment or wear is determined by the relative movement between the brake drum and the backing plate or dust cover. **Note:** Adhere to the manufacturer's specifications when adjusting the front wheel bearings.

#### Reject the vehicle if:

- Movement measured at the circumference of the tire exceeds:
  - 3.2 mm ( $1/8$  inch) for vehicles 4,535 kg (10,000 lbs.) GVWR or less.
  - 4.8 mm ( $3/16$  inch) for vehicles over 4,535 kg (10,000 lbs.) GVWR.
-  Lubrication is insufficient. **Note:** On oil-lubricated bearings, wheels do not have to be removed.
- Roughness or noise is evident during wheel rotation.
- Races or rollers are chipped, burred, pitted or show evidence of overheating. Check only when wheels are removed.
- Bearing end play exceeds manufacturer's specifications.



Front Wheel Bearing Play

- Binding or roughness is detected while rotating bearing.
- Bearing adjustment locking device is missing, not engaged or nonfunctional.

## 4. Kingpin Play

### Procedure

*Equipment needed:* Tape measure or dial indicator.

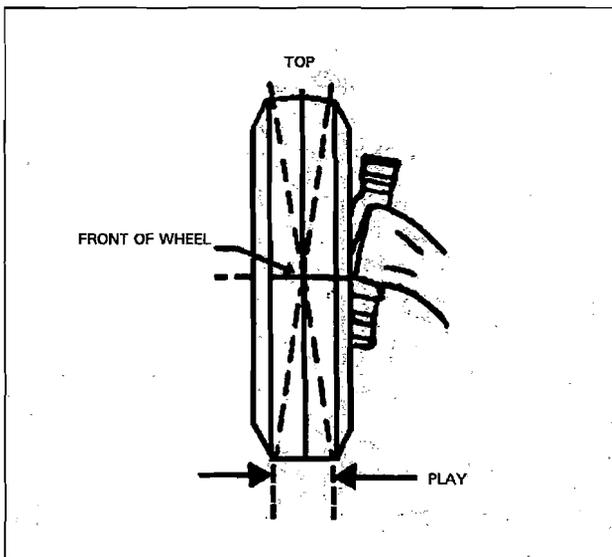
**Step 1:** Raise the vehicle so as to unload the kingpins. If equipped, apply the brakes to eliminate wheel bearing looseness.

**Step 2:** Grasp the tire and attempt to rock it in and out. Observe and measure movement at the extreme top or bottom of the tire.

**Step 3:** Place a bar under the tire and observe and measure vertical movement between the spindle support and axle.

### Reject the vehicle if:

- Horizontal movement exceeds:
  - 4.8 mm ( $3/16$  inch) for wheels 510 mm (20 inches) or larger.
  - 3.2 mm ( $1/8$  inch) for wheels under 510 mm (20 inches).
- Vertical movement exceeds 2.5 mm (0.100 inch) or the manufacturer's specifications.



Kingpin Play

**Note:** Tapered kingpins should not be tightened beyond the manufacturer's specifications.

## 5. Ball Joints (applicable buses)

### A. LOAD CARRYING BALL JOINTS

#### Procedure

Raise the vehicle to unload the ball joints. Using a gauge or measuring device, measure the horizontal and vertical movement. Observe the condition of the ball joints.

#### Reject the vehicle if:

- Horizontal movement exceeds the manufacturer's specifications.
- Vertical movement exceeds the manufacturer's specifications.
- Ball joints are injected or have any welded repair.

### B. PRE-LOADED BALL JOINTS, NON-LOAD CARRYING

#### Procedure

For ball joints preloaded by rubber springs under tension, measure the horizontal and vertical movement. Observe the condition of the ball joints.

#### Reject the vehicle if:

- Horizontal movement exceeds the manufacturer's specifications.
- Vertical movement exceeds the manufacturer's specifications.
- Ball joints are injected or have any welded repair.

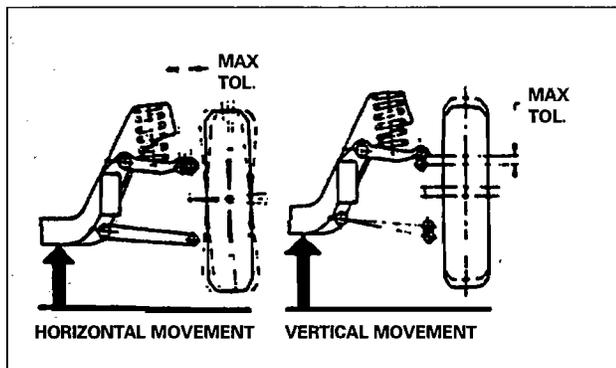
### C. BALL JOINT WEAR INDICATORS

#### Procedure

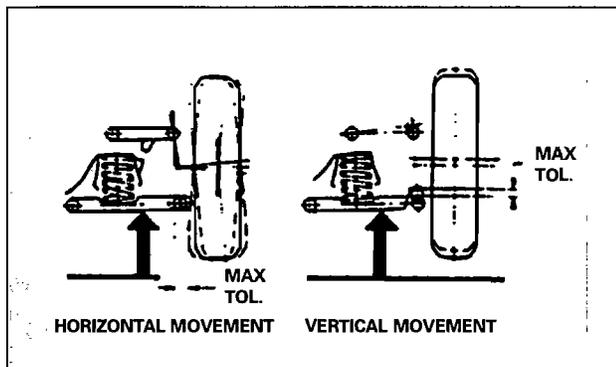
Inspect the ball joint wear indicators.

#### Reject the vehicle if:

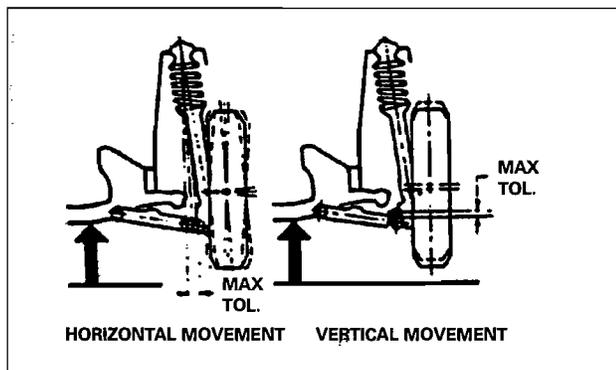
- The surface is flush with, or inside the cover surface.



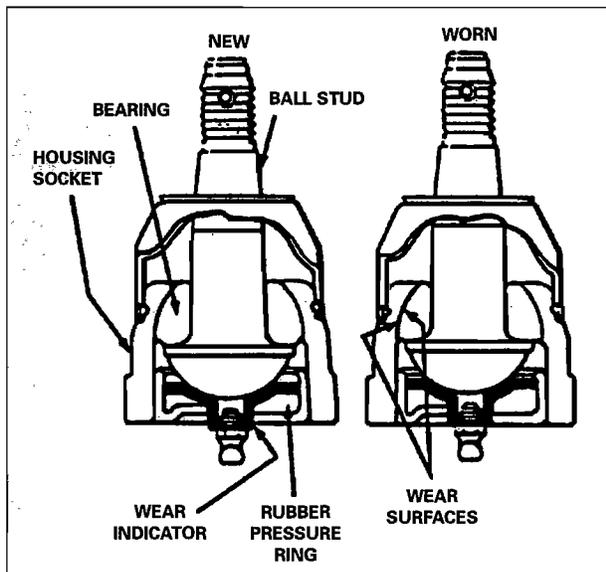
Spring on Upper Control Arm



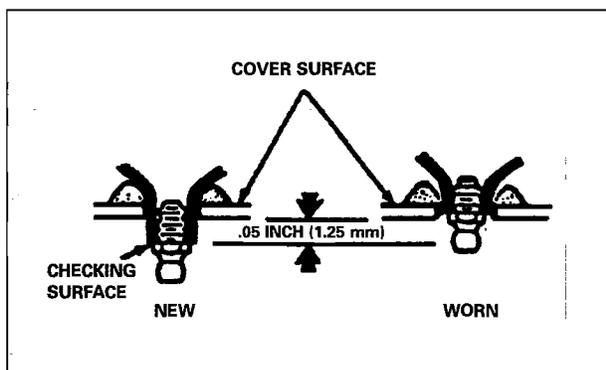
Spring or Torsion Bar on Lower Control Arm



MacPherson Strut - No Upper Ball Joint Raising Positions for Suspension Systems



Ball Joint Components



Ball Joint Wear Indicator

Wear is indicated by the protrusion of the 1/2 inch (12.5 mm) diameter boss, (exaggerated for illustration) into which the grease fitting is threaded. This round boss projects .05 inch (1.25 mm) beyond the surface of the ball joint cover on a new, unworn joint.

To inspect for wear, support vehicle by wheels so that the lower ball joints are in a loaded condition. Wipe the grease fitting and boss free of dirt and grease. Observe or scrape a scale, screw-driver or fingernail across the cover. If the grease fitting boss is flush or inside the cover surface reject vehicle.

## 6. Power Steering

### Procedure

Manually and visually inspect the power steering fluid level, belts, hoses, pump, cylinder (if so equipped), mounting brackets, assist and steering box.

### Reject the vehicle if:

- Fluid level is low.
- Belts are missing, loose, frayed or cracked.
- Hoses are cracked, leaking, rubbed by moving parts (seepage permitted).
- The pump is loose or leaking.
- The cylinder (if so equipped) is loose or leaking.
- Mounting brackets are cracked, loose or broken.
- No assist is evident.
- The steering box is loose or leaking (seepage permitted).

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### HAZARDOUS CONDITION

- No assist is evident.
- 
- 

## 7. Steering Wheel Test

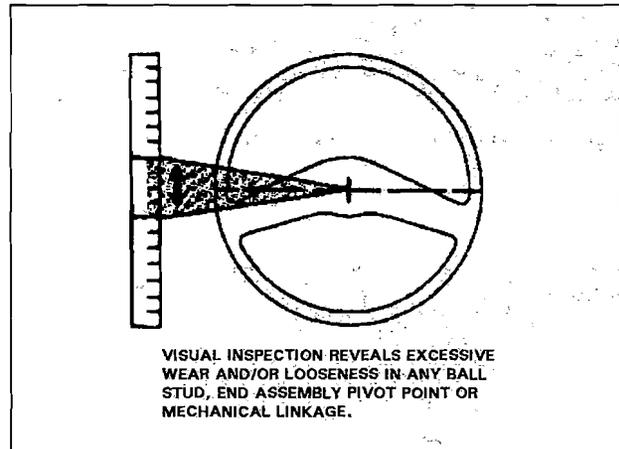
On vehicles equipped with power steering, the engine must be running and the fluid level, belt tension and condition must be adequate before testing.

### Procedure

With the front wheels in a straight-ahead position, turn the steering wheel until a turning motion can be observed at the front wheels. Mark the rim of the steering wheel. Then, using a pointer, turn the steering wheel in the opposite direction until motion can be observed at the front wheels. Measure the distance between the mark and the pointer.

### Reject the vehicle if:

- A total movement greater than that shown in the following table is encountered at the steering wheel rim before movement is observed at the front wheels.



Steering Lash

 In the United States, the steering wheel lash should be consistent with Section 393.209(b) of the Federal Motor Carrier Safety Regulations. The steering wheel lash must not exceed the following limit:

Steering Wheel Diameter	Manual Steering	Power Steering
406mm (16 inches) or less	51 mm (2 inches)	108 mm (4 1/2 inches)
457 mm (18 inches)	57 mm (2 1/16 inches)	121 mm (4 3/4 inches)
483 mm (19 inches)	60 mm (2 3/8 inches)	127 mm (5 inches)
508 mm (20 inches)	64 mm (2 1/2 inches)	133 mm (5 1/4 inches)
533 mm (21 inches)	67 mm (2 5/8 inches)	140 mm (5 1/2 inches)
559 mm (22 inches)	70 mm (2 3/4 inches)	146 mm (5 3/4 inches)

 In Canada, use the following measurements:

Steering Wheel Diameter	Manual Steering	Power Steering
500 mm (20 inches) & less	87 mm (3 1/2 inches)	75 mm (3 inches)
Over 500 mm (20 inches)	100 mm (4 inches)	87 mm (3 1/2 inches)

### HAZARDOUS CONDITION

 In the United States, the following steering wheel lash measurements indicate a hazardous condition:

Steering Wheel Diameter	Manual Steering	Power Steering
16 inches (41 mm)	4 1/2 inches (11.5 mm)	6 1/2 inches (17 mm)
18 inches (46 mm)	4 3/4 inches (12 mm)	7 1/8 inches (18 mm)
19 inches (48 mm)	5 inches (13 mm)	7 1/2 inches (19 mm)
20 inches (51 mm)	5 1/4 inches (13 mm)	7 7/8 inches (20 mm)
21 inches (53 mm)	5 1/2 inches (14 mm)	8 1/4 inches (21 mm)
22 inches (56 mm)	5 3/4 inches (15 mm)	8 5/8 inches (22 mm)

 In Canada, the following steering wheel lash measurements indicate a hazardous condition:

Steering Wheel Diameter	Manual Steering	Power Steering
500 mm (20 inches) or less	133 mm (5 1/4 inches)	87 mm (3 1/2 inches)
Over 500mm (20 inches)	196 mm (7 3/4 inches)	100 mm (4 inches)

## 8. Telescope or Tilt Steering

### Procedure

For applicable vehicles, grasp the steering column and try to move it horizontally and vertically on the mounts. Measure the play.

### Reject the vehicle if:

- Play exceeds 6.4 mm (0.250 inch)

**Note:** Mounting solid rather than repairing is permitted.

# Instruments & Auxiliary Equipment

## 1. Fire Extinguisher

### Procedure

Visually inspect for the presence of an approved fire extinguisher, appropriate type, mount, seal and charge.

### Reject the vehicle if:

- The fire extinguisher is missing.
-  In the United States, the rating is less than 10 B:C if the vehicle is transporting hazardous materials, or the rating is less than 5 B:C or two of 4 B:C minimum for all other power units.
-  In Canada, where required by provincial law, the rating is less than 5 B:C (replacement must be 1A5 B:C), or for vehicles hauling flammable products, the rating is less than 20 B:C or two of 10 B:C.
- The mount is insecure and not in a quick release holder within reach of the driver.
- The seal is broken on units not equipped with a gauge.
- The extinguisher is not Fire Marshall (FM), Underwriters Lab Canada (ULC) or Underwriters Lab (UL) approved and labeled.

## 2. Hazard Warning Kit

### Procedure

Visually inspect the container and reflectors, electric lanterns or flares.

### Reject the vehicle if:

- The container is missing.
- Reflectors, lanterns or flares are missing, or three are not present in the kit.

- Reflectors are not advanced warning triangles with stands that are at least 175 mm (7 inches) in height and each side is 430 to 500 mm (17 to 22 inches) long.
-  Hazardous warning kits for United States power units must include reflective triangles conforming to FMVSS 125, or at least six fuses or three liquid burning flares in conformance with UL No. 912, Highway Emergency Signals.

## 3. Clutch and Brake Pedal

### Procedure

Visually inspect the clutch (if applicable), brake pedal and anti-slip provisions.

### Reject the vehicle if:

- The pedal(s) are missing, loose or excessively worn.
- Anti-slip provisions are excessively worn or missing.

## 4. Horn

### Procedure

Inspect the horn activating device and audibility.

### Reject the vehicle if:

- The activating device is not readily accessible to the driver or does not function as intended.
- The horn is not clearly audible or does not operate.

## 5. Speedometer

### Procedure

Operate the vehicle and visually inspect the operation of the speedometer.

### Reject the vehicle if:

- The speedometer does not function.

## 6. Instruments

### Procedure

Visually inspect the operation of the air pressure gauge(s) and the vacuum gauge.

### Reject the vehicle if:

- The gauges do not operate or readings are inaccurate.

## 7. Chain or Headache Rack

### Procedure

If the vehicle is so equipped, visually inspect the chain or headache rack U-clamps, welds and condition.

### Reject the vehicle if:

- The U-clamps are loose, missing or broken.
- Welds are cracked at the base.
- The rack is mounted insecurely.

# Lamps

## 1. Lamps

All lamps mentioned below, except hazard lamps, should be inspected with the headlamps and all other auxiliary lamps on and with brakes applied.

**Reject the vehicle if:**

- Any lamp fails to illuminate and any lamp or reflector is missing, broken, cracked, insecurely mounted or does not meet CMVSS, FMVSS, DOT or SAE standards and is not so labeled or fails to meet the requirements set out in this section.

**Note:** A crack is allowed in a halogen lamp with a replaceable bulb.

**Procedure**

Visually inspect the headlamps, taillamps, stoplamps, turn signal lamps, hazard lamps, side marker lamps, clearance lamps, identification lamps, license plate lamp, and daytime running lamps (if so equipped).

**Reject the vehicle if:**

- Lamps do not meet the following criteria:
  - Headlamps:* The vehicle must be equipped with two or four headlamps facing front as far apart as practical. The headlamps must be white in color and clearly visible. They must be operable by the headlamp control and function on high and low beam.
  - Taillamps:* The vehicle must be equipped with two taillamps located at the rear facing the rear as far apart as practical. Taillamps must be red in color and clearly visible. The proper filament must light, and the lamps must operate by the headlamp control.
  - Stoplamps:* The vehicle must be equipped with two stoplamps facing the rear as far

apart as practical. The stoplamps must be red in color and clearly visible. The proper filament must illuminate and the lamps must be operable by the brake pedal.

*Turn Signal Lamps:* The vehicle must be equipped with four turn signal lamps. Two must face the front and two must face the rear as far apart as practical. The front turn signal lamps must be amber in color. The rear turn signal lamps may be amber or red. The lamps must be clearly visible, and the proper filament must light, flash and be operable by the turn signal control.

**Note:** Rear turn signal lamps are not required on power units if the front located lamps are of double-faced construction and visible to the rear.

*Hazard Lamps:* The vehicle must be equipped with four hazard lamps located as far apart as practical, with two facing the front and two facing the rear. The front lamps must be amber in color, and the rear lamps must be red or amber in color. Lamps must be clearly visible, and the proper filaments must light, flash simultaneously and operate by the hazard warning control.

*Side Marker Lamps:* The vehicle must be equipped with four side marker lamps. Two must be located on each side as close to the corners as practical. The front lamps must be amber in color, and the rear lamps must be red. The lamps must be clearly visible. **Notes:**

- One side marker lamp may serve as both a side marker and a clearance lamp, provided it can be seen from both the side and the rear.
- Vehicles over 9.1 m (30 feet) in length require amber intermediate lamps.

- Rear and intermediate side marker lamps are not required on power units.

*Clearance Lamps:* The vehicle must be equipped with four clearance lamps located as far apart as practical at the widest point of the cab. Two lamps, amber in color, should face the front as high as practical, and two lamps, red in color, should face the rear. All lamps must be clearly visible. **Notes:**

- Rear clearance lamps are not required on power units.
- Clearance lamps are not required on vehicles under 2.05 m (81 inches) in width.

*Identification Lamps:* The vehicle must be equipped with six identification lamps. Three lamps, amber in color, must face the front and three lamps, red in color, must face the rear. All lamps must be clearly visible and positioned as high and as near to the center of the vehicle as practical.

**Notes:**

- Rear identification lamps are not required on power units.
- Identification lamps are not required on vehicles under 2.05 m (81 inches) in width.

*License Plate Lamp:* The vehicle must be equipped with a license plate lamp located so that it emits a white light on the rear plate.



*Daytime Running Lamps:* Vehicles manufactured after December 1, 1989, must be equipped with daytime running lamps located on the front of the vehicle. Lamps must be white or yellow in color, and must operate continuously when the engine is operating and the master lighting switch is not in the "ON" position.

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### HAZARDOUS CONDITION

- There is not at least one headlamp that operates on low beam.
  - There is not at least one operative red lamp on the rear of the vehicle.
  - There is not at least one operative stop lamp on the rear of the vehicle.
  - The rear turn signal lamp on each side does not operate.
- 
- 

## 2. Reflex Reflectors

A lamp or cover that emits a reflection may be considered a reflector.

Reflector tape may be used in place of a reflector provided it covers an area 100 x 100 mm (4 x 4 inches) and is the same color as the reflector being replaced.

### Procedure

Inspect the clearance and side marker reflectors. **Notes:**

- One lens may serve as both a side marker and a clearance reflector provided it can be seen from both sides and end.
- Power units require only front side marker reflectors.

### Reject the vehicle if:

- The vehicle is not equipped with two clearance reflectors on the rear as far apart as practical, or the clearance reflectors are not red in color, or they are not clearly visible.
- The vehicle is not equipped with four side marker reflectors, with two located on each side as close to the corners as practical, or the front reflectors are not amber in color, or the rear reflectors are not red in color, or the reflectors are not clearly visible.
- The vehicle is over 9.1 m (30 feet) in length and is not equipped with an intermediate reflector.

### 3. Instrument Lamps

**Procedure**

Visually inspect the high beam indicator lamp, speedometer lamp(s), and the air pressure gauge lamp(s).

**Reject the vehicle if:**

- The high beam indicator lamp fails to illuminate when the high beam is selected.
- The speedometer lamp(s) fails to illuminate.
- The air pressure gauge lamp(s) fails to illuminate.

### 4. Headlamp Aiming

**Procedure**

Visually inspect the headlamp aim.

**Reject the vehicle if:**

- The aim is not within the manufacturer's specifications.

# Electrical System

## 1. Wiring

### Procedure

Visually inspect wiring for security, insulation and condition.

### Reject the vehicle if:

- Wiring is loose and contacts moving parts.
- The insulation is rubbed through or peeled.
- Wiring is cut, shorted or deteriorated.

## 2. Battery

### Procedure

Visually inspect the posts, mounts and hold-down.

### Reject the vehicle if:

- The battery is corroded excessively.
- The mounts are corroded, weakened or cracked.
- The holddown is missing or insecure.

## 3. Trailer Cord

### Procedure

Visually inspect the trailer cord insulation, connectors and ground circuit. **Note:** The trailer cord can be repaired if approved connectors are used.

## 4. Switches

### Procedure

Visually and manually inspect the operation of the switches.

### Reject the vehicle if:

- Any switch pertaining to safety items fails to operate.

# Body

## 1. Hood

### Procedure

Manually inspect the hood operation and visually inspect the hood or engine cover, latches, safety cables (if originally equipped), hinges and secondary latches (if applicable).

### Reject the vehicle if:

- The hood or engine cover is missing.
- Latches are broken, missing, seized, insecurely mounted or inoperable.
- Safety cables (if originally equipped) are broken, missing or insecurely attached.
- Hinges are cracked, broken, missing or excessively worn.
- Secondary latches (if applicable) are broken, missing or inoperable.

## 2. Tilt Cab

### Procedure

Visually inspect the tilt cab latch, secondary latch and hinges.

### Reject the vehicle if:

- The tilt cab latch is missing, broken, insecurely attached or inoperable.
- The secondary latch is missing, broken, insecurely attached or inoperable.
- Hinges are missing, broken, cracked, or worn so as to cause cab misalignment.

## 3. Air Suspended Cabs

### Procedure

With the air at normal operating pressure, visually and audibly inspect the air bags, lines, radius rods, pressure protection valve, suspension height, height-leveling valve and shock absorbers.

### Reject the vehicle if:

- Air bags are leaking, not inflated or bruised, the cab tilts to one side or bags are cracked to the braid.
- Lines are cracked, crushed, leaking or disabled.
- Radius rods are loose, bent or broken.
- Air goes to the system before the pressure reaches 450 kpa (65 psi).
- One or more suspensions is noticeably down.
- The height-leveling valve is inoperable, or the vehicle is equipped with only one valve that is not in the center of the cab or OEM location.
- Shock absorbers are missing, broken or leaking, or mounts are loose, or bushings are deteriorated.

## 4. Vehicle Body

### A. CAB

#### Procedure

**Step 1:** Visually inspect the cab floor, metal, molding and fenders.

#### Reject the vehicle if:

- Any holes are present in the cab floor other than by design.

- The floor is cracked, corroded through and/or is excessively weakened.
- Any torn metal protrudes so as to be hazardous to pedestrians and/or cyclists, or there are any sharp edges.
- Any molding is loose or protrudes so as to be hazardous to pedestrians and/or cyclists.
- Fenders are missing.

## B. VAN BODIES

### Procedure

Visually inspect the van body, sheet metal, doors, flooring, side rails and cross members. Also inspect for body and rivet corrosion.

### Reject the vehicle if:

- Any metal protrudes so as to be hazardous to other vehicles, pedestrians or cyclists.
- Any rivets are loose and/or working.
- Any door binds, locks insecurely, is mounted insecurely to the hinges, has hinges that are mounted insecurely, or is severely corroded in the hinge area.
- The flooring is unsafe in such a manner that a person or cargo could fall through.
- There are bulges indicating that corrosion is evident.
- There are stress cracks at the rail.
- Rivets are missing and/or dimpled.

---

### HAZARDOUS CONDITION

- Any component is loose so that it could become disconnected from the vehicle.
- 

## C. TANK BODIES

### Procedure

Visually inspect the tank body, hoses, auxiliary attachments and bumper.

### Reject the vehicle if:

- The tank is loose at the mounts.
- There is evidence of leaking.

- The tank is cracked or there are any cracked or broken welds.
- There is movement or severe corrosion between the tank and frame.
- Supports are cracked or broken.
- There are bulges or severe corrosion.
- Hoses and auxiliary attachments are loose or insecure.
- The bumper is missing, inoperable or broken.

---

### HAZARDOUS CONDITION

- Any component is loose so that it could become disconnected from the vehicle.
- 

## D. GRAIN BOXES

### Procedure

Visually inspect the grain box body and frame, interior and exterior. Also inspect for rivet corrosion.

### Reject the vehicle if:

- Sides are cracked, especially in the hopper area.
- Rivets at drop center front and back are loose or moving.
- The floor is cracked at either the front or back.
- Side supports (visually check inside) are missing or broken.
- There are bulges indicating that corrosion is evident, or there are stress cracks at the side rails.
- Rivets are missing and/or dimpled.
- The rivet area is swollen by corrosion.
- Hatches and dumps are not secure.

---

### HAZARDOUS CONDITION

- Any component is loose so as it could become disconnected from the vehicle.
-

**E. PRESSURE VESSELS****Procedure**

Visually inspect the pressure vessel including the tank and hoses.

**Reject the vehicle if:**

- The tank is loose on the mounts, there are visible or audible leaks or there are any broken welds.
- Hoses are loose or insecure.

**HAZARDOUS CONDITION**

- Any component is loose so as it could become disconnected from the vehicle.

**F. FLAT DECKS****Procedure**

Visually inspect the flat deck, sides (if originally equipped) and stake pockets.

**Reject the vehicle if:**

- The deck is loose on the mounts, or unsafe so as cargo or a person could fall through.
- Plywood in the structural members of the sides is broken, cracked or missing.
- Stake pockets (if originally equipped) are broken, missing or cracked.

**HAZARDOUS CONDITION**

- Any component is loose so as it could become disconnected from the vehicle.

**G. GRAVEL BOXES****Procedure**

Visually inspect the gravel box including the sides, hopper or end-dump door(s), side supports and hinges.

**Reject the vehicle if:**

- Sides are cracked, especially in the hopper area, or they are severely corroded.

- The hopper or end-dump door(s) is loose, insecure or will not close and latch properly.
- Any gaps are evident that would allow spillage of the load.
- Side supports are missing or there are broken welds.
- Hinges are missing, broken, cracked or pin locks are missing.

**HAZARDOUS CONDITION**

- Any component is loose so as it could become disconnected from the vehicle.

**H. OTHER BODY TYPES****Procedure**

Visually inspect other body types including the floor, doors, sides, fasteners, hoses and auxiliary equipment, if applicable.

**Reject the vehicle if:**

- The floor is unsafe in such a manner that a person or cargo could fall through.
- Doors lock insecurely, are mounted insecurely, or are severely corroded in the hinged area.
- Sides are cracked, corroded through or insecure.
- Fasteners are cracked, broken or insecurely mounted.
- Hoses are insecurely mounted.
- Auxiliary equipment is insecurely mounted.

**5. Frame Rails****Procedure**

Visually inspect the frame, engine mounts, frame and/or body fasteners, cross members, and cab mounts.

**Reject the vehicle if:**

- The frame is cracked, broken, bent or rusted to a depth as to weaken the frame.

**Note:** Repair by welding is permitted if it is reinforced.

- Engine mounts are missing, loose, cracked, broken, or bolts are loose and/or missing.
- Frame and/or body fasteners are missing, loose, or corroded so as to be ineffective.
- Cross members are loose, cracked, broken, missing or corroded through.
- Cab mounts are cracked, loose or missing bolts. (Replacement bolts must be at least grade 5).

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#### HAZARDOUS CONDITION

- Any frame member is broken, sagging or cracked so as to permit the body to contact any moving part, or collapse of the frame is imminent.
  - Any frame member or component fails to adequately support directional stability components.
  - There is a 38 mm (1 1/2 inch) or longer crack in the frame that is directed toward the bottom flange.
  - There is a 25 mm (1 inch) or longer crack in the bottom flange.
- 
- 

## 6. Load Securement Points

### Procedure

Visually inspect the load securement points and the securement equipment.

### Reject the vehicle if:

- Attachment points are cracked, elongated or broken.
- Securement equipment is inoperable.

## 7. Bumpers and Underride Protection Devices

### Procedure

Visually inspect the condition of the bumpers and underride protection devices.

### Reject the vehicle if:

- Bumpers or underride protection devices are loose or broken.
- A torn portion is protruding so as to be hazardous to pedestrians and/or cyclists.
-  For vehicles in the United States, the rear bumpers may be no more than 76 mm (30 inches) above ground clearance, and they may be placed no more than 61 mm (24 inches) forward of the rearmost extremity of the vehicle.

## 8. Doors

### Procedure

Inspect the operation of the doors and catches.

### Reject the vehicle if:

- A door binds, jams or closes insecurely.
- Catches are loose or worn.
- Hinges are cracked, missing, seized or loose so that the door will not close properly.

## 9. Cab Mount Handle and Step

### Procedure

Inspect for the presence and security of the cab mount handle and step (if so equipped).

### Reject the vehicle if:

- The cab mount handle is missing or the mount is corroded.
- The cab mount handle is not securely mounted on the driver's side.
- The cab mounted step or fuel tank step is missing or mounted insecurely.

## 10. Windshield

### Procedure

Visually inspect the windshield for cracks, chips, discoloration, tinting (other than by the glass manufacturer), type and condition.

### Reject the vehicle if:

- Any crack goes through both layers of glass.
- Any intersecting cracks are in the area swept by wipers.
- Any star or chips 12.7 mm (1/2 inch) or greater in diameter are in the area swept by wipers.
- Discoloration is greater than 10 percent of the total glass area.
- Tinting, other than the glass manufacturer's, is such that vision is obscured or limited.
- Tinting in excess of ANSI Z26 is lower than 75 mm (3 inches) from the top of the windshield.
- The windshield is other than laminated safety glass type AS-1, AS-10 or AS-14 and not so marked.
- The windshield is in a condition such that vision is obscured or limited.

## 11. Side Windows

### Procedure

Inspect the operation of the windows and observe obstructions, cracks, type of glass and tinting.

### Reject the vehicle if:

- A window will not open or close properly on the driver's side.
- Vision is restricted.
- A window is cracked so as to restrict vision.
- There are exposed sharp edges.
- A window is cracked through both layers of glass.

- A window is other than safety glass type AS-1, AS-2, AS-10 or AS-11, and not so marked.
- Aftermarket tinting is used forward of the driver's shoulder.

## 12. Sun Visor

### Procedure

Visually and manually inspect for the presence, condition and adjustment capabilities of the driver's sun visor.

### Reject the vehicle if:

- The driver's sun visor is missing.
- Any attaching parts are broken, bent or loose.
- The visor cannot be adjusted and/or maintained in a set position.

## 13. Rearview Mirrors

### Procedure

From the driver's position, visually inspect for the presence of left and right rearview mirrors, the view, mounts, condition of glass, area of each mirror and adjustment capabilities.

### Reject the vehicle if:

- Either the left or right rearview mirror is missing.
- Mirrors do not provide a clear view of the highway to the rear of the vehicle, or the view is obstructed.
- Mounts are insecure.
- The glass is cracked, pitted or clouded so as to obscure vision.
- The mirror surface area is less than approximately 37,800 mm sq. (54 sq. inches) including the area beneath a convex mirror mounted to its surface.
- Mirrors cannot be adjusted and/or maintained in a set position.

## 14. Seats and Safety Belts

### Procedure

Visually inspect the driver and passenger seat and safety belts.

### Reject the vehicle if:

- Any seat is loose, or the frame is broken.
- The seat adjusting mechanism does not operate or will not lock into position.
- Safety belts are not equipped as originally manufactured.
- Safety belts are missing, frayed or insecurely mounted, or webbing is torn.
- Lap belts are not attached to the seat and a secondary belt from the seat to the floor if equipped with an air ride seat.
- Retractors fail to retract and/or allow the belt to extend to the maximum length.

## 15. Windshield Wipers and Washers

### Procedure

Visually inspect both sides for the operation and condition of the windshield wipers and washers.

### Reject the vehicle if:

- The windshield wipers or washers fail to operate or park.
- Blades are torn, hardened, missing, or fail to wipe approximately 75 percent of the windshield or the area designed to be swept.
- Blades fail to contact the windshield properly.
- Arms and pivots are missing, bent, distorted or excessively worn.
- Washers (OEM installations only) fail to operate, clean an effective area, or are not aligned.

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### HAZARDOUS CONDITION

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- Any vehicle has an inoperative wiper, missing or damaged parts that render it ineffective on the driver's side.

## 16. Windshield Defroster

### Procedure

Turn on the defroster fan (auxiliary fans may be used). Manually inspect the fan operation and airflow.

### Reject the vehicle if:

- The fan fails to operate.
- There is no airflow.

## 17. Fenders or Mud Flaps

 In Canada, any power unit not equipped with mud flaps must have them available for installation when operating without a trailer.

### Reject the vehicle if:

- Fenders or mud flaps are loose, broken or insecurely mounted.
- They do not cover the full width of the tires.
- The lower end of the mudguard is more than 350 mm (14 inches) from the ground, measured when the vehicle is in an unloaded position.

# Tires & Wheels

## 1. Tread Depth

### Procedure

Using a tire tread depth gauge, measure the tread depth throughout a continuous circumferential band on the tread of all major grooves of the tire tread width. Inspect the front and rear tires. (Do not measure at wear bar.)

*Equipment needed:* Tire tread depth gauge.

### Reject the vehicle if:

- Front tires have less than 3.2 mm ( $\frac{4}{32}$  inch) of tread.
- Rear tires have less than 1.6 mm ( $\frac{2}{32}$  inch) of tread, or rear tires on any vehicle involved with the transportation of flammable and hazardous products has less than 3.2 mm ( $\frac{4}{32}$  inch) of tread.

---

### HAZARDOUS CONDITION

- Less than 1.6 mm ( $\frac{2}{32}$  inch) of tread on front tires and 0.8 mm ( $\frac{1}{32}$  inch) of tread on rear tires measured at any two adjacent major grooves at any location on the tire.
  - Less than 0.8 mm ( $\frac{1}{32}$  inch) of tread between any lugs on grip tires on the rear.
- 

## 2. Tread Section of Tires

Note: Retreaded tires are acceptable (pass inspection) on "self-steering axles."

### Definitions:

**Passive self-steering axle.** An axle on which the wheels turn left and right on one or more essentially vertical axes, but their turning is not controlled by means of the steering wheel in the operator's compartment.

**Active steering axle.** An axle on which the wheels turn left and right on one or more essentially vertical axes, and their turning is controlled by, and is in direct proportion to, the rotation of the steering wheel in the operator's compartment.

### Procedure

Visually inspect the front and rear tires for retreads, damage, condition, cupping, section repairs, regrooving and mismatching.

### Reject the vehicle if:

-  Retreads are not permitted on the front axles (active steering axles) of Canadian vehicles.
- A rear tire retread surface is peeled.
- Any tire has cuts greater than 25 mm (1 inch) in length below the tread depth or there are cuts in the cord.
- Any tread separation is evident or cords are exposed.
- Tread is no longer evident in the cupped areas.
- Any visible breaks, boots or blowout patches are evident in section repairs.
- A front tire has been regrooved and the tire is not marked "Regroovable."
- Different size tires are used on the same axle or dual tire diameters vary by more than 12.7 mm ( $\frac{1}{2}$  inch).

## 3. Sidewalls

Visually inspect sidewalls for bulges, cuts, matching tires, valve stems, markings and condition.

**Reject the vehicle if:**

- A sidewall has any bulges exceeding 9.5 mm ( $\frac{3}{8}$  inch) in height.
- A sidewall has any cuts that expose cords.
- A vehicle has mismatched tires on one axle such as radial and nonradial.
- Valve stems are cracked or damaged.
- Any tire is labeled "NOT FOR HIGHWAY USE."
- Sidewalls are broken or distorted, cords are exposed, there is ply separation or there is severe deterioration as a result of weather checking.

**HAZARDOUS CONDITION**

- Any sidewall is cut or damaged, thereby exposing the cord.
- Any tire is labeled "NOT FOR HIGHWAY USE."
-  Bias and radial tires are used on the same axle.
- There is a visible bump or bulge in the sidewall area indicating separation.

**4. Tire Pressure****Procedure**

With the use of a gauge, check the tire pressure.

**Reject the vehicle if:**

- Tire pressure is not within the range as marked on the sidewall.
- Pressure in dual tires is not within 10 percent of each other.

**Note:** Correct the tire pressure and pass the vehicle.

**HAZARDOUS CONDITION**

- Any tire is flat.

 **5. Hubs (General)****Procedure**

Visually inspect the condition of the hubs on Canadian vehicles.

**Reject the vehicle if:**

- A hub has been repaired by welding.
- A hub is damaged, cracked, bent, broken or distorted.
- Any stud hole is enlarged or damaged in a way that prevents proper fitting and retention of studs.

**6. Hub/Bearing Lubricant****Procedure**

Visually inspect the hub/bearing lubricant.

**Reject the vehicle if:**

- The lubricant level is below the required minimum.
-  The lubricant is contaminated.
- Lubricant is leaking from the hub, hub/wheel seal or hub cap.

**7. Wheel/Rim (General)****Procedure**

Visually inspect the condition of the wheel/rim.

**Reject the vehicle if:**

- The wheel/rim is damaged, broken, bent, cracked or distorted.
- The wheel/rim has been repaired by welding.
- The wheel/rim is damaged or discolored as a result of heating.
- The wheel/rim size does not match the tire size.
- The valve stem is damaged or is inaccessible, preventing gauging of tire pressure or inflation of tire.

## 8. Multi-piece Wheel/Rim

### Procedure

Visually inspect the condition of the wheel/rim.

### Reject the vehicle if:

- A component is damaged, bent, cracked or distorted.
- A component is improperly assembled or shifted out of position.
- A component is severely corroded or pitted.

## 9. Spoke Wheel/Demountable Rim System

### Procedure

Visually inspect the condition of the spoke wheel/de-mountable rim system. Rotate the wheel and check the run-out, and visually inspect the spacer bands.

### Reject the vehicle if:

- There is damage in the 28 degree mounting area resulting from rim slippage, wear, corrosion or pitting.
- There is evidence of rim slippage or incorrect positioning of the rim on the spokes.
- Lateral run-out exceeds 6 mm ( $\frac{1}{4}$  inch) at the sidewall of the tire.
- Rim clamps are missing, broken, cracked, welded, mismatched or twisting, or are worn out in the 28 degree mounting area.
- Any heel-less clamp is bottomed or has more than 10 mm ( $\frac{3}{8}$  inch) gap between the clamp and spoke.
- Any heel type clamp has more than 6 mm ( $\frac{1}{4}$  inch) gap between the clamp and spoke.
- A spacer is missing, cracked or distorted, or is not the correct size or type, or has been modified or repaired by welding.

## 10. Disc Wheel System

### Procedure

Visually inspect the condition of the disc wheel system.

### Reject the vehicle if:

- An incompatible wheel or component is used on the wheel system.
- A wheel is incorrectly installed.
- There is evidence of loose or ineffective fasteners.
- There is evidence of damage or deterioration, foreign material, excessive or uncured paint on the hub, drum or wheel mounting faces.

## 11. Wheel Fasteners (Nuts and Studs)

### Procedure

Visually inspect the condition, installation and secureness of the wheel fasteners.

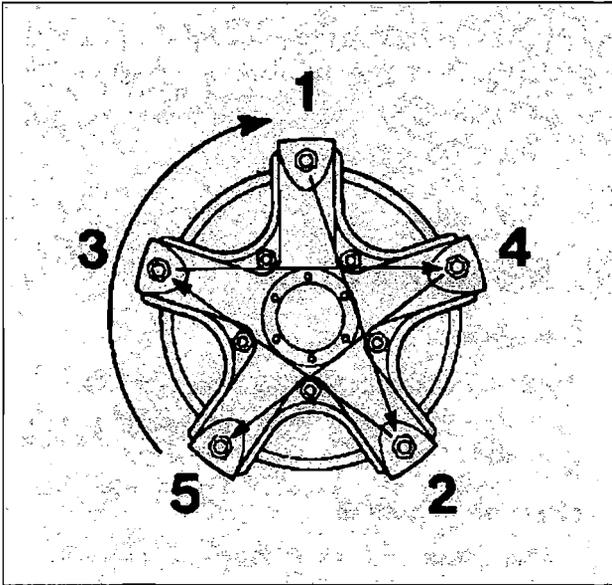
### Reject the vehicle if:

- Any fastener is missing, broken, bent or otherwise damaged.
- An incorrect fastener type, thread direction or style is used on the wheel system.
- A nut is not fully engaged with the stud.  
**Note:** It is not imperative that every thread in a nut be engaged by a thread on the stud, however, a sufficient number of threads should be engaged so that when the fastener is torqued, they will not strip out.
- Any fastener rotates before the lowest torque value specified by the manufacturer is applied.

---

### HAZARDOUS CONDITION

- Two or more wheel nuts or studs are loose, missing or broken on a disc wheel.
  - One or more wheel nuts or studs are loose, missing or broken on a spoke wheel.
-



Spoke Wheel Nut Tightening Sequence

## 12. Axle End Bearing

### Procedure

Inspect the bearing end play, rotate the bearings, and inspect the condition of the bearing adjustment locking device when it is visually accessible. (See also *Chapter 4, Section 3.*)

### Reject the vehicle if:

-  Bearing end play exceeds the manufacturer's specifications.
- Binding or roughness is detected while rotating the bearing.
- The bearing adjustment locking device is missing, not engaged or is nonfunctional.

# Couplers & Hitches

## 1. Trailer Hitch

### Procedure

Visually inspect the trailer hitch mounting, latch, condition, cast or forged hitch, safety attachments (applicable units) and pintle hook.

### Reject the vehicle if:

- The hitch is insecurely attached, or bolts are loose or missing.
-  Bolts are less than grade 8.
- The latch fails to close and latch, or there is excess play between the bolt and latch.
- Any part is missing, cracked, broken, bent, seized or excessively worn.
- A cast or forged hitch has been repaired by welding, or the wear exceeds 4.8 mm ( $3/16$  inch).
- Safety attachments (if applicable) are missing, cracked, broken or excessively worn.
- A pintle hook has been repaired by welding and/or is welded in an area other than by the original equipment manufacturer, or the wear exceeds 4.8mm ( $3/16$  inch).

---

### HAZARDOUS CONDITION

- Wear exceeds 9.5 mm ( $3/8$  inch) on the hitch.
- 

## 2. No-Slack Hitch

### Procedure

Apply air pressure to the no-slack hitch. Visually inspect the cushion, condition, wear and latch.

### Reject the vehicle if:

- The cushion does not move or is out of adjustment.
- Air leaks at the chamber or lines.
- Wear exceeds 4.8 mm ( $3/16$  inch).
- The latch does not latch securely or the latch-mounting pin is loose or broken.

## 3. Fifth Wheel Coupler

### Procedure

When checking the saddle bushings, place a bar between the frame and the fifth wheel and pry horizontally. Visually inspect the mounting, jaw and latch, jaw mount pins, the top plate, saddle bushings, saddles, stops, slider air release and slide, frame and fifth wheel subframe.

### Reject the vehicle if:

- The mounting is broken or cracked, or components are distorted.
- The mounting is insecure to the frame or bolts are missing or loose.
-  Bolts are less than grade 8.
- The jaw and latch are seized, cracked, broken or wear exceeds 6.4 mm ( $1/4$  inch).
- Jaw mount pins are loose and/or welded.
- The top plate is cracked, broken, damaged, distorted or welded, or there is no evidence

of lubrication grooves, or it is contaminated (i.e. sand, gravel), or it is not properly lubricated.

- Steel saddle bushing movement exceeds 9.5 mm ( $\frac{3}{8}$  inch).
- Rubber saddle bushing movement is excessive.
- Saddles are cracked or repaired by welds other than authorized by the manufacturer.
- Stops are missing.
- Slider is cracked, worn, does not lock, or play exceeds 6.4 mm ( $\frac{1}{4}$  inch).
- Air release and slide do not lock securely.
- Frame and fifth wheel subframe is severely corroded or rusted.

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**HAZARDOUS CONDITION**

- Adjustable fifth wheel has one-fourth or more of the locking pins missing.
  - There is any observable movement between the fifth wheel mounting and the frame.
  - There is more than 9.5 mm ( $\frac{3}{8}$  inch) play lengthwise of the track of an adjustable fifth wheel.
  - Any adjustable fifth wheel locking mechanism does not remain in the locked position.
  - There is any crack, break or damage in the stress or loading area of the coupling device.
- 
- 

## 4. Permanently Attached Equipment

### Procedure

Visually and manually inspect the secureness of permanently attached equipment.

### Reject the vehicle if:

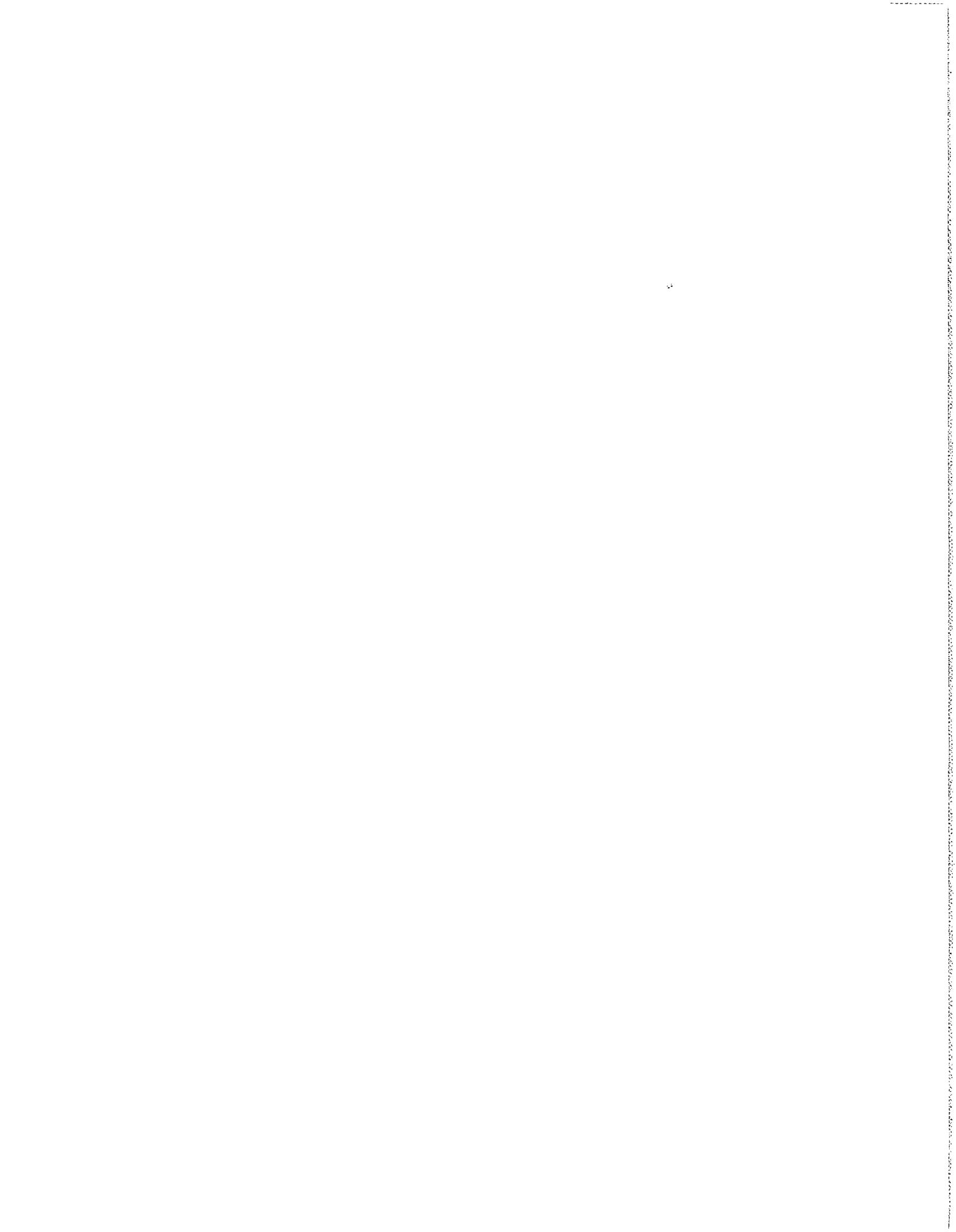
- Permanently attached equipment is insecure or loose.



**Trucks, Buses & Trailers 1999 Inspection Handbook**

**PART II:**

**Trailer & Semitrailer  
Vehicle Safety  
Inspection Program**



# Contents

*(This handbook has been organized so that chapter numbers and topics correspond to section numbers and topics in the CCMTA Commercial Vehicle Inspections in Canada manual. In addition, topics are organized by the same chapter numbers in each part of this handbook for trucks, buses and trailers. If a chapter number is missing, it's because that topic was not relevant to that section of the handbook. For example, Chapter 1 is about the power train, so it is not relevant to this section and is not included.)*

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# Suspension

## 1. Suspension Attachments

### Procedure

Visually inspect the U-bolts, center bolts, control arms and torque arms.

### Reject the vehicle if:

- U-bolts are loose, broken, missing or welded.
- Center bolts are broken or missing.
- Control arms are bent, missing, or the bushing is excessively worn, or the rubber is dispersed excessively.
- Control arms are welded and/or welded in an area other than an area used by the original equipment manufacturer.
- Torque arms are bent, missing, welded and/or welded in an area other than specified by the original equipment manufacturer.

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### HAZARDOUS CONDITION

- Any component allows the axle to shift from its normal position.
  - Any attaching component is missing, loose, cracked or broken.
- 
- 

## 2. Springs and Attachments

### Procedure

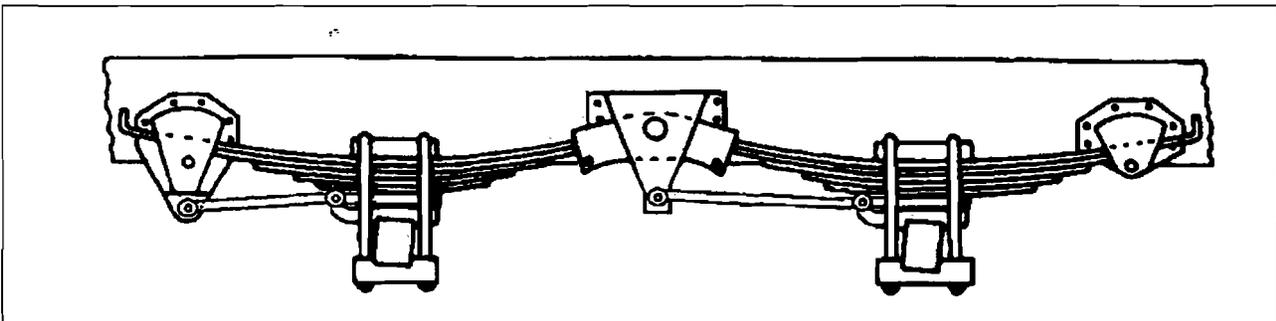
With the vehicle partially jacked up on the frame so as to reduce the load on the springs, and with the use of a pry bar, using the frame as a pivot, attempt to pry the spring attachments and check for movement. Inspect the springs, shackles, hangers, bushings and/or pins, equalizers and attachments.

### Reject the vehicle if:

- A spring leaf(s) is broken, missing or cracked, or it is shifted or sagged so as to contact any rotating part, or a composite leaf has cracks regardless of their length that are visible on either side and the top or bottom of the spring.
- A pin is loose in the shackle, missing, cracked or excessively worn.
- Hangers are loose, broken, missing or worn more than 3.2 mm ( $\frac{1}{8}$  inch). Wear plates are permitted.
- Bushings and/or pins are loose, missing or wear exceeds:

\*Shaft size 12.7 mm (.50 inch) to 24 mm (.98 inch)  
maximum clearance 2.0 mm (.080 inch)

\*Shaft size 25 mm (1 inch) to 45 mm (1.8 inch)  
maximum clearance 3.2 mm (.125 inch)



Typical Four Spring Suspension

- Equalizers are cracked, broken or welded. Wear plates are permitted.
- Attachments are cracked, broken or missing.

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**HAZARDOUS CONDITION**

- A main leaf or one-fourth of the leaves in one assembly are broken or missing.
  - Any leaf is shifted in such a manner as to contact any rotating part.
  - Any attaching or tracking component is missing, loose, cracked or broken.
  - A composite leaf has a side-to-side crack extending beyond three-fourths of the length of the spring.
  - A composite leaf has a top-to-bottom crack extending beyond three-fourths of the length of the spring.
- 
- 

### 3. Rubber Load Cushions

**Procedure**

Visually inspect attachments and rubber blocks. **Note:** On suspensions using rubber load cushions in place of leaf type springs, all other hardware is to be checked in the same way as springs and attachments.

**Reject the vehicle if:**

- Attachments are cracked, broken or missing.
- Rubber blocks are missing, the rubber pad is split, or mounting bolts are loose.

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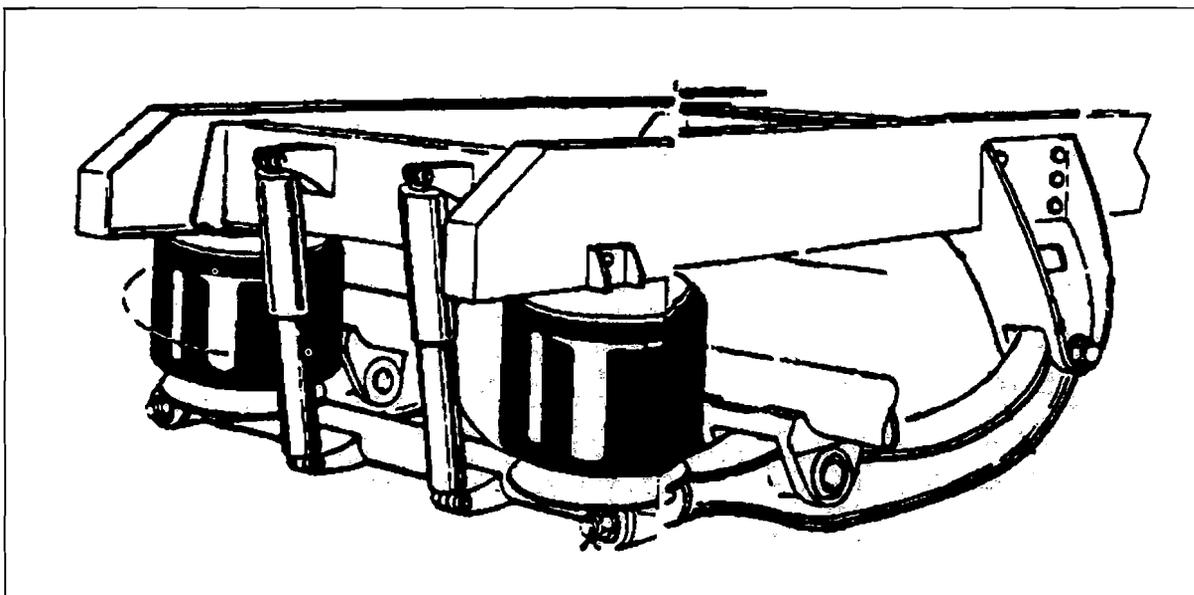
**HAZARDOUS CONDITION**

- Any rubber block is missing.
  - Any component allows the axle to shift from its normal position.
  - Any attaching or tracking component is missing, loose, cracked or broken.
- 
- 

### 4. Air Suspension

**Procedure**

With air in the suspension system and at normal operating pressure, visually and audibly inspect the bushings, pivots, lines, air bags, air bag base, radius rods, horizontal suspension beam, pressure protection valve, suspension height and height-leveling valve. **Note:** When checking the air bag for security, the vehicle must be jacked up on frame.



**Air Suspension**

**Reject the vehicle if:**

- Bushings are loose, deteriorated, excessively worn or elongated.
- Pivots are loose or excessively worn.
- Lines are cracked, crushed or disabled.
- Air bags are cut, bruised, leaking or loose.
- The vehicle body and chassis frame are unsupported on one or more axles or leans to one side.
- Air bags are mounted insecurely, or the bag is cracked to the braid.
- The air bag base is broken, loose, cracked or severely corroded.
- Radius rods are loose, bent or broken.
- The horizontal suspension beam has holes rusted through or is severely corroded.
- Air goes to the suspension before the brake system tank pressure reaches 450 kpa (65 psi).
- One or more suspensions are noticeably down.
- The vehicle is equipped with only one height-leveling valve and it is not mounted in the center of the frame or OEM location.

**HAZARDOUS CONDITION**

- Any component allows the axle to shift from its normal position.
- There is an air leak at any air bag.
- Any attaching or tracking component is missing, loose, cracked or broken.

## 5. Air Suspended Lift Axles

All applicable mechanical components are to be inspected as per the appropriate section of this manual.

**Procedure**

With air in the suspension and steering system (if applicable) at normal operating pressure, operate the lift control. Audibly and visually inspect leaks, axle operation and one-way valves.

**Reject the vehicle if:**

- Any air leak is evident when the axle is in either an up or down position.
- A retractable axle does not respond to the lift control switch on valve.
- The air supply is depleted to the tag suspension, and safety one-way valves do not protect the main suspension system.



## 6. Self-steering Axles

**Procedure**

In Canada, if applicable, inspect the steering dampers, steering lock, air pressure regulator and pressure gauge.

**Reject the vehicle if:**

- Steering dampers (if applicable) are missing, inoperable or leaking.
- The steering lock (if applicable) is missing or inoperable.
- The steering is not centered in the “zero” locked position.
- The vehicle is not equipped with a manual locking system independent of the remote locking system.
- The vehicle is not equipped with an air pressure regulator (if applicable), or the air pressure regulator is inoperable.
- The vehicle is not equipped with a pressure gauge (if applicable), or it is inaccurate or inoperable.

- The pressure gauge is not equipped with a label indicating the minimum design pressure required to comply with centering force requirements.

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**HAZARDOUS CONDITION**

-  The steering lock control or regulator is mounted in the cab of the towing vehicle.
- 
- 

## 7. Shock Absorbers

Shock absorbers must be present on the vehicle if it is OEM equipped. All vehicles equipped with air ride suspensions require shock absorbers.

**Procedure**

Visually inspect the condition, mountings, bushings and attachments of the shock absorbers.

**Reject the vehicle if:**

- Shock absorbers are damaged and/or defective.
- Mountings are broken or loose.
- Bushings are loose, missing or deteriorated.
- Attachments are loose, broken or missing.

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**HAZARDOUS CONDITION**

- Any shock absorber is missing, broken or not attached on an air ride suspension.
- 
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# Hydraulic & Electric Brakes

## Internal Brake Inspection Hydraulic and Electric Brakes

Regardless of the number of axles, all vehicles fitted with original equipment brakes by the manufacturer must have those brakes in proper working order before the vehicle can pass inspection.

Internal components of brake systems should be inspected as follows:

1. When evidence of defect(s) on internal brake components is disclosed during inspection of external or internal brake components, the affected brake drum(s) should be removed for further inspection and repair; and
2. When no evidence of brake defect(s) exists, inspection of internal components should be performed as follows:
  - a. Remove brake drums and inspect the internal brake components, measure and record the internal brake drum diameter, and measure and record the brake lining edge thickness at the center of the brake shoe; or
  - b. If fitted with removable dust shields or no dust shields are in place; with dust shields removed, inspect the internal brake components, measure and record the internal brake drum diameter, and

measure and record the brake lining edge thickness at the center of the brake shoe.

- c. If fitted with non-removable dust shields/backing plates:
  - When the owner provides proof that wheel removal and inspection of internal brake components was conducted within the preceding 24 months, perform a visual inspection through the inspection holes.
  - When proof of wheel removal is not provided by the owner or no inspection holes are present, remove brake drum(s) and inspect the internal brake components, measure and record the internal brake drum diameter, and measure and record the brake lining edge thickness at the center of the brake shoe.

**Note:** Proof of brake drum removal and inspection of internal brake components should include brake drum inside diameter and brake lining thickness measurements. The registered owner of the vehicle or a person designated by the owner is responsible for providing proof of inspection of internal brake components.

## 1. Hydraulic System

### Procedure

Inspect lines and hoses, master cylinder, cap and breakaway (if so equipped).

### Reject the vehicle if:

- Lines and hoses are leaking, welded, cracked, chafed, flattened, insecurely mounted, or have restricted sections.
- Lines have been repaired with anything other than steel tubing.
- Connections are other than double flared.
- The master cylinder is leaking, loose or the fluid level is lower than 12.7 mm (1/2 inch) from the top.
- The cap is missing, loose, vent holes are plugged, or gasket is missing or damaged.
- The breakaway (if so equipped) is inoperable.

---

### HAZARDOUS CONDITION

- Any brake hose or line seeps or swells under pressure.
  - Any brake hose is cracked to the second layer.
  - The master cylinder reservoir is less than one-quarter full.
- 

## 2. Vacuum System

### Procedure

Visually and manually inspect the lines and hoses, condition of the system, clamps and tank(s).

### Reject the vehicle if:

- Lines and hoses are collapsed, broken, chafed or insecurely mounted.
- The system is leaking.
- Clamps are loose, missing or broken.
- Tank(s) are missing, loose, damaged or leaking.

## 3. Vacuum Reserve

### Procedure

Start the engine, build to a full vacuum, shut the engine off, and make three full brake applications. Manually and visually inspect the reserve.

### Reject the vehicle if:

- The reserve is insufficient to assist three full applications.

## 4. Hydraulic Drum Brakes

If drums and shoes cannot be seen, drums must be removed.

### Procedure

**Step 1:** Visually and with the use of a steel scale or a Vernier caliper inspect and measure the bonded or riveted lining.

*Equipment needed:* Steel scale or Vernier caliper.

### Reject the vehicle if:

- Bonded lining is worn to 1.6 mm (1/16 inch) or less at the center or at any point other than the chamfered area of the shoe.
- Bonded lining is broken, cracked, contaminated or insecurely bonded to the shoe.
- Riveted lining is worn to 3.2 mm (1/8 inch) or less at the center or at any point other than the chamfered area of the shoe.
- Riveted lining is broken, cracked or contaminated.

**Step 2:** Visually inspect the mechanical components, including the self-adjusters, self-adjuster cables and linkage, anchor pins and springs.

**Reject the vehicle if:**

- Self-adjusters are seized, extensively worn, inoperable, missing or the wrong thread for the wheel is installed.
- Self-adjuster cables and linkage are missing, loose, broken or inoperable.
- Anchor pins and springs are missing, loose, broken, excessively worn or stretched.
- The backing plate is worn so as to restrict free movement of the shoes.

**Step 3:** Visually inspect the condition and operation of the wheel cylinders and dust seals.

**Reject the vehicle if:**

- Wheel cylinders are inoperable or seized.
- Wheel cylinders are leaking, damaged or mounted insecurely.
- Dust seals are damaged, missing or deteriorated.

**Step 4:** Inspect the brake drums and measure the inside diameter of the drum at two locations approximately 90 degrees apart using an approved gauge. **Note:** When wheels are removed, this item must be inspected as per this section.

**Reject the vehicle if:**

- Cracks extend to the open edge of the drums.
- Any external cracks are present.
- Hot spots that cannot be removed by machining within the drum limits are present in more than three locations.
-  The friction surface is uneven.

- The drum has more than two grooves worn so that the measurement in the grooves exceeds the wear limits as per *Chapter 3A, Item 15*.
- Out-of-round is more than 0.25 mm (0.010 inch) on drums 280 mm (11 inches) and smaller.
- Out-of round is more than 0.634 mm (0.025 inch) on drums greater than 280 mm (11 inches).
- The drum exceeds wear limits.

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**HAZARDOUS CONDITION**

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- Any brake drum is in a condition that indicates failure is imminent.

## 5. Disc Brakes

**Procedure**

**Step 1:** Visually and with the use of a micrometer and dial indicator inspect the rotors, calipers and pads.

**Reject the vehicle if:**

- The rotor is broken or cracks on the surface of rotors extend to the outer edges, or the rotors are damaged.
- Two grooves are worn beyond the maximum 2.3 mm (0.090 inch).
-  Lateral runout exceeds 0.128 mm (.005 inch) on discs 380 mm (15 inches) in diameter or less.
-  Lateral runout exceeds 0.25 mm (0.010 inch) on discs greater than 380 mm (15 inches).
- Calipers are leaking or a piston or caliper is seized.
- Pads are damaged or contaminated.
- Bonded pads are worn to 1.6 mm ( $\frac{1}{16}$  inch) or less at the thinnest point.
- Riveted pads are worn to 3.2 mm ( $\frac{1}{8}$  inch) at the thinnest point.

**Step 2:** Apply the brakes and attempt to rotate the wheel assembly.

**Reject the vehicle if:**

- The wheel rotates when brakes are applied.

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**HAZARDOUS CONDITION**

- Any rotor is cracked to the hub or failure appears imminent.
  - Bonded or riveted linings are contaminated.
- 
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## 6. Electric Brakes



In Canada, removal of drum is required.

**Procedure**

**Step 1:** Visually inspect and measure the thickness of the bonded or riveted lining with a steel scale or Vernier caliper.

*Equipment needed:* Steel scale or Vernier caliper.

**Reject the vehicle if:**

- Bonded lining is worn to 1.6 mm ( $1/16$  inch) or less at the center or at any point other than the chamfered area of the shoe.
- Bonded or riveted lining is broken, cracked, contaminated or worn extremely unevenly.
- Riveted lining is worn to 3.2 mm ( $1/8$  inch) or less at the center or at any point other than the chamfered area of the shoe.

**Step 2:** Inspect the mechanical components including the self-adjusters, self-adjuster cables, anchor pins and springs, and backing plate.

**Reject the vehicle if:**

- Self-adjusters are seized, excessively worn, inoperable, missing, or the wrong thread for the wheel is installed.
- Self-adjuster cables are missing, loose, broken or inoperable.
- Anchor pins and springs are missing, loose, broken or excessively worn.
- The backing plate is worn so as to restrict free movement of the shoes.

**Step 3:** Visually inspect the operation and condition of the wheel magnets and actuators.

**Reject the vehicle if:**

- Wheel magnets and actuators are inoperable or seized.
- Wheel magnets and actuators are loose, damaged or missing.

**Step 4:** Visually inspect the condition of the brake drums and measure the inside diameter of the drum at two locations approximately 90 degrees apart using an approved gauge.

**Reject the vehicle if:**

- Cracks extend to the open edge of the drums or any external cracks are present.
- Hot spots that cannot be removed by machining within the drum limits are present in more than three locations.
-  The friction surface is uneven.
- The drum has more than two grooves worn so that the measurement in the grooves exceeds wear limits as per *Chapter 3A, Item 15*.
- Out-of-round is more than 0.25 mm (0.010 inch) on drums 280 mm (11 inches) and smaller.

- Out-of round is more than 0.634 mm (0.025 inch) on drums greater than 280 mm (11 inches).
- The drum exceeds wear limits.

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**HAZARDOUS CONDITION**

- A brake drum is in a condition that indicates failure is imminent.

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**Step 5:** Visually inspect the condition and security of the wiring.

**Reject the vehicle if:**

- Wiring is shorted, cracked, peeled or spliced with other than an approved connector.
- Wiring is not secured every 1.8 m (6 feet).

**Step 6:** Visually inspect the condition of the breakaway system (if so equipped).

**Reject the vehicle if:**

- The breakaway system (if so equipped) is inoperable.

# Air Brakes

## Internal Drum Brake Inspections

Regardless of the number of axles, all vehicles fitted with original equipment brakes by the manufacturer must have those brakes in proper working order before the vehicle can pass inspection.

Internal brake components of brake systems should be inspected as follows:

1. When evidence of defect(s) on internal brake components is disclosed during inspection of external or internal brake components, the affected brake drum(s) should be removed for further inspection and repair.
2. When no evidence of brake defect(s) exists, inspection of internal components should be performed as follows:
  - a. Remove brake drums and inspect internal brake components, measure and record internal brake drum diameter, and measure and record brake lining edge thickness at the center of the brake shoe; or
  - b. If fitted with removable dust shields or no dust shields are in place:
    - With dust shields removed, inspect internal brake components, measure and record internal brake drum diameter, and measure and record brake lining edge thickness at the center of the brake shoe; or
    - With dust shields removed, inspect internal brake components, perform a camshaft rotation test and record the measurement obtained.
  - c. If fitted with non-removable dust shields:

- When the owner provides proof that wheel removal and inspection of internal brake components was conducted within the preceding 24 months, perform a camshaft rotation test and record the measurement.
- When proof of wheel removal is not provided, remove brake drum(s) and inspect the internal brake components, measure and record the internal brake diameter, and measure and record the brake lining edge thickness at center of the brake shoe.

**Note:** Proof of brake drum removal and inspection of internal brake components should include brake drum inside diameter and brake lining thickness measurements. The registered owner of the vehicle or a person designated by the owner is responsible for providing proof of inspection of internal brake components.

## 1. Glad Hands and Air Brake Lines

### Procedure

With the air system charged, visually inspect the glad hands, air lines, air line connectors, air tanks, air tank brackets and straps, drain cocks, and splices.

### Reject the vehicle if:

- Glad hands are damaged, cracked or corroded, or seals are damaged or insecurely mounted.
- Air lines are abraded, insecure, flattened, cracked, broken, kinked, or leaking.
- Air line connectors do not meet OEM design standards.

- Air tanks are missing, leaking, loose or damaged so as to cause possible failure, or welds are other than factory welds.
- Air tank brackets and straps are cracked, broken, missing, severely corroded or an inferior substitute has been used.
- Drain cocks are missing, loose, leaking, inoperable, or do not meet OEM design standards.
- Splices do not meet OEM design standards.

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**HAZARDOUS CONDITION**

- Failure of any air line appears imminent.
  - Any line bulges under pressure.
  - Any splice does not meet OEM design standards.
- 
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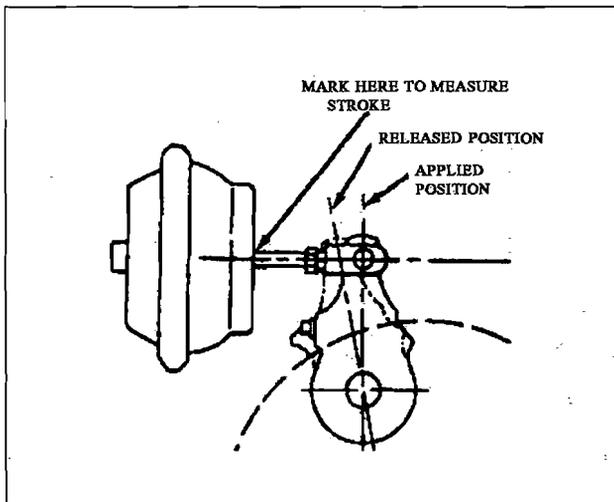
## 2. Brake Mechanical Components

### Procedure

**Step 1:** Visually inspect the brake chambers.

#### Reject the vehicle if:

- Brake chambers are damaged, mounted insecurely, leaking or corroded.



**Measuring the Brake Cam Adjustment**

- Drain holes are not pointing in a downward position and/or they are plugged.
- Brake chambers are not the same type and size on any given axle.

**Step 2:** Visually inspect the mounting brackets, clevis pins and clevis yokes.

#### Reject the vehicle if:

- Mounting brackets are loose, cracked, deformed, broken, or missing.
- Clevis pins are excessively worn, the cotter pin or retaining device is missing, or an inferior substitute, such as a nut and bolt, has been used.
- Clevis yokes are worn, cracked, broken, bent, or the locknut is backed-off.

**Step 3:** Visually inspect the pushrods.

#### Reject the vehicle if:

- A pushrod is bent, broken or misaligned to the slack adjuster.
- A pushrod does not form a 90 degree angle or as close as practical to the slack adjuster when the brakes are applied with approximately 620 kpa (90 psi). Note: The 90 degree angle is a suggested guideline only. Not all brakes achieve 90 degrees, therefore check with the manufacturer's specifications.

**Step 4:** Visually inspect the slack adjuster and the slack adjuster nut self-locking sleeve.

#### Reject the vehicle if:

- The slack adjuster is bent, broken, excessively worn, seized, or functions improperly.
- The slack adjuster nut self-locking sleeve is seized, cracked or inoperable.

**Step 5:** Inspect the pushrod clevis pin hole setting.

#### Reject the vehicle if:

- It is not the same hole on both sides of the axle.
- The distance from the center of the cam to the hole is not the same on the same axle.

**Step 6:** Inspect the rollers and return springs.

**Reject the vehicle if:**

- Rollers are missing, have flat spots or are the wrong size.
- Return springs are missing, stretched or broken.
- A return spring does not hold the lower roller to the cam.

**Step 7:** Inspect the brake shoe and anchor pins.

**Reject the vehicle if:**

-  The brake shoe and anchor pins are missing or the wear allows the lining to protrude outside the edge of the brake drum.

**Step 8:** Inspect the spiders.

**Reject the vehicle if:**

- Spiders are bent, loose or bolts are missing.

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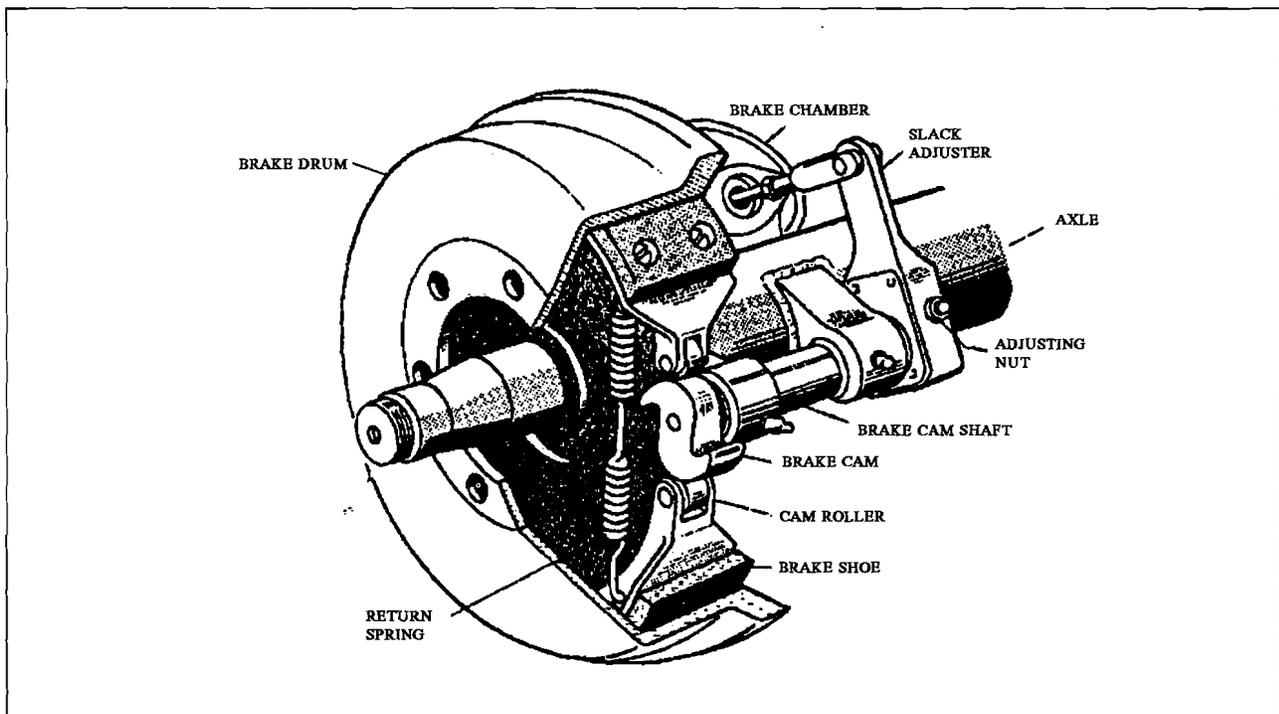
**HAZARDOUS CONDITION**

- With spring brakes released and service brake applied, any air leak at the brake chambers is evident that exceeds the allowable drop.
  - Any one brake fails to operate on a steering axle (if equipped).
  -  Defective brakes on the unit are equal to or greater than 20 percent of all brakes on the unit. A defective brake is considered as any brake that does not meet the standards as per *Chapter 3A* of this manual.
- 
- 

### 3. Quick-release Valves

**Procedure**

With spring brakes released, apply the service brake and then release. Inspect the operation and mounting.



**S-cam Brake Components**

**Reject the vehicle if:**

- Air is not exhausted through the exhaust port of the valve when the brakes are released.
- The mounting is insecure, has a broken bracket, or is loose.

## 4. Relay Valves

**Procedure**

With spring brakes released, apply the service brakes and observe the application of the brake chambers served by the relay valve being tested, then release the brakes. Inspect the operation and mounting.

**Reject the vehicle if:**

- Air is not quickly exhausted through the exhaust port of the valve when the brakes are released.
- The mounting is insecure, has a broken bracket, or is loose.

## 5. Self-adjusting Slack Adjuster



In the United States, vehicles with an external adjustment mechanism and exposed push rods manufactured after October 20, 1994, must be equipped with automatic brake adjustment and brake adjustment indicators.



In Canada, vehicles with an external adjustment mechanism and exposed push rods manufactured after May 31, 1996, must be equipped with automatic brake adjustment and brake adjustment indicators.

**Procedure**

**Step 1:** Inspect for the presence of automatic brake adjustment and brake adjustment indicators, if so equipped.

**Reject the vehicle if:**

- Automatic brake adjusters and brake adjustment indicators are missing or inoperative.
- Indicators are not clearly visible.

**Step 2:** If applicable, with the assistance of a second party, make a treadle valve application and note the pushrod travel. Inspect the adjustment.

**Reject the vehicle if:**

- The pushrod stroke is not within the manufacturer's specifications.

## 6. Brake Camshaft

**Procedure**

With the spring and service brakes released, manually check for movement between the camshaft and bushings. Visually, and with the use of a dial indicator, inspect the condition of the brake camshaft.

**Reject the vehicle if:**

- Bushings on the camshaft are worn more than 2.1 mm (0.085 inches).

## 7. Camshaft Travel

**Procedure**

Back off the slack adjuster until movement is noticed in the brake chamber pushrod. The roller will now be in the bottom position of the S-cam. Brake S-cam bushings should be inspected at this time. Mark the slack adjuster in relation to the camshaft with chalk. Adjust the brakes to lock the wheel. (Ensure the brakes are properly adjusted after the test.) Visually inspect the camshaft travel.

**Reject the vehicle if:**

- The difference between the marks is more than 120 degrees or one-third of the camshaft travel.
- The camshaft is overcammed.

**HAZARDOUS CONDITION**

- Cam travel exceeds 120 degrees.
- The cam is inoperable.
- An oversized roller is used.

## 8. Air Reservoirs and Check Valves

**Procedure**

**Step 1:** With the air system fully charged and wheel chocks installed, open the drain valve on the primary (wet) tank or on a service reservoir. Check valve(s) should close and retain compressed air on the secondary (dry) tank(s) or on the other service reservoir(s).

**Step 2:** Open the secondary valve. Visually inspect the check valves.

**Reject the vehicle if:**

- Check valves do not close.

## 9. Brake Linings

**Procedure**

**Step 1:** Visually inspect the brake shoes and linings. If shoes and linings cannot be seen, remove the lower portion of the dust cover. Inspect the condition of the brake shoes and linings. **Note:** If there is evidence of contamination, the wheel must be pulled to verify that brake function will not be impaired. If more than 20 percent of the surface of each shoe's surface area is contaminated, the shoe must be replaced.

**Reject the vehicle if:**

- The lining or shoe is broken or cracked.
- There is evidence of contamination, such as oil on the brake shoe or lining.
- The lining protrudes outside the drum (other than those that protrude by design).

- The lining appears to be parted from the shoe.
- Shims are used between the lining and the shoe.

**Step 2:** Inspect and measure the brake shoes and linings for wear. It may be necessary to back off the slack adjusters to make an accurate measurement.

**Reject the vehicle if:**

- Brake lining thickness is worn to 8mm ( $5/16$  inch) or less at the center or at any point other than the chamfered area of the shoe.

**Step 3:** Inspect the wheel seals.

**Reject the vehicle if:**

- The wheel seals are leaking. (Seepage is not cause for rejection.)

**HAZARDOUS CONDITION**

- Any lining is worn below 8 mm ( $5/16$  inch).

## 10. Brake Drums

When wheels are removed, brake drums must be inspected as per this section.

**Procedure**

**Step 1:** Visually inspect the condition of the brake drum.

**Reject the vehicle if:**

- Cracks extend to the open edge of the drums.
- Any external cracks are present.
- Hot spots that cannot be removed by machining within drum limits are present in more than three locations.
-  Friction surface is uneven.
- The brake drum exceeds specifications as per *Chapter 3A, Item 15*.

**Step 2:** Using an approved gauge, measure the inside diameter of the brake drum at two locations approximately 90 degrees apart.

**Reject the vehicle if:**

- The drum has more than two grooves worn so that measurement in the grooves exceeds the wear limits as per *Section 3A, Item 15*.
- Out-of-round is more than 0.25 mm (0.010 inch) on drums 280 mm (11 inches) and smaller.
- Out-of-round is more than 0.63 mm (0.025 inch) on drums greater than 280 mm (11 inches).
- The drum exceeds the wear limits as per *Chapter 3A, Item 15*.

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**HAZARDOUS CONDITION**

- A brake drum is in a condition that indicates failure is imminent.
- 

## 11. Spring Brakes

**Procedure**

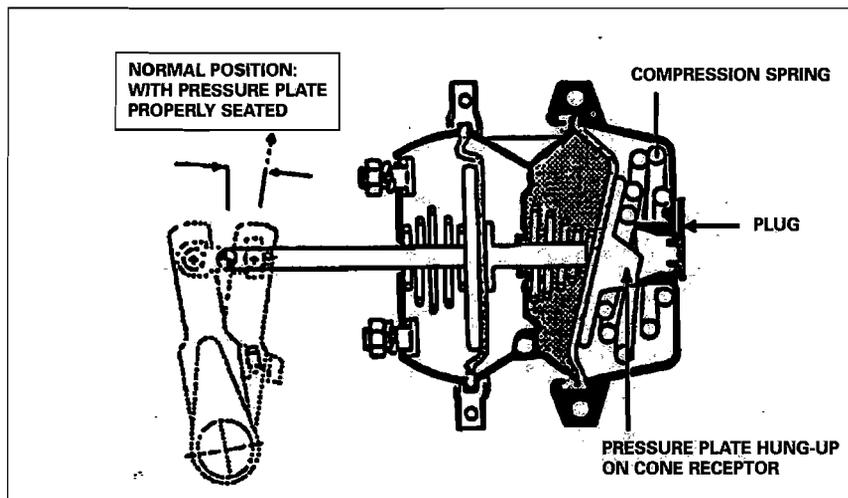
Visually inspect the operation of the spring brakes.

**Reject the vehicle if:**

- Spring brakes have been rendered inoperable by the use of caging bolts or other mechanical means.
- Spring brakes cannot be released mechanically.

**WARNING! DANGER!**

Do not attempt to dismantle the double diaphragm spring brake unit. Using a safety cage, remove the entire unit from the vehicle. Replace the unit with a new or rebuilt assembly.



**Brake Dragging Condition with Brakes Not Applied**

## 12. Brake Adjustment

After inspection of the brake items is complete, visually and manually inspect the brake adjustment.

### A. S-CAM BRAKES

#### Procedure

**Step 1:** Support the vehicle on safety stands or with the wheels on the ground and spring brakes released.

**Step 2:** Apply the brakes with approximately 620 kpa (90 psi). Visually inspect the angle between the pushrod and slack adjuster, and measure the pushrod travel.

#### Reject the vehicle if:

- The angle between the pushrod and the slack adjuster is not 90 degrees or as close as practical. **Note:** The 90 degree angle is a suggested guideline only. Not all brakes achieve 90 degrees, therefore check with the manufacturer's specifications.
- Pushrod travel is not between 19 to 37.5 mm ( $3/4$  to  $1\frac{1}{2}$  inches) or manufacturer's specifications, or pushrod travel is not

within 6.4 mm ( $1/4$  inch) of travel for chambers of the same type and size on the same axle.

**Step 3:** Try to rotate the wheel.

#### Reject the vehicle if:

- The wheel rotates.

### B. WEDGE BRAKES

#### Procedure

**Step 1:** Apply the brakes and try to rotate the wheel.

#### Reject the vehicle if:

- The wheel rotates.

**Step 2:** Measure the distance the lining travels from a fully released to a fully applied position.

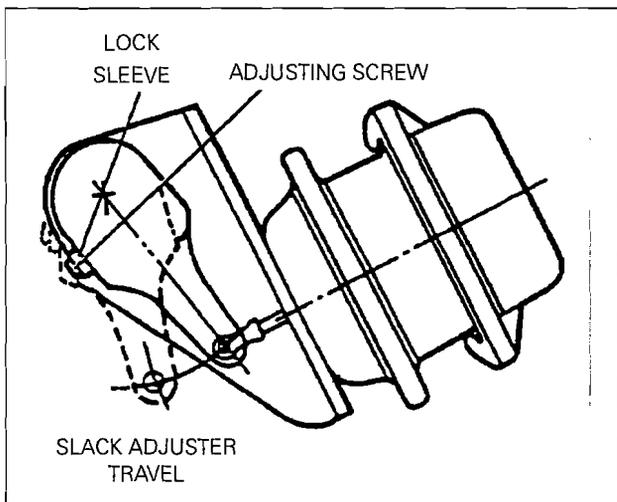
#### Reject the vehicle if:

- Travel exceeds 1.6 mm ( $1/16$  inch).

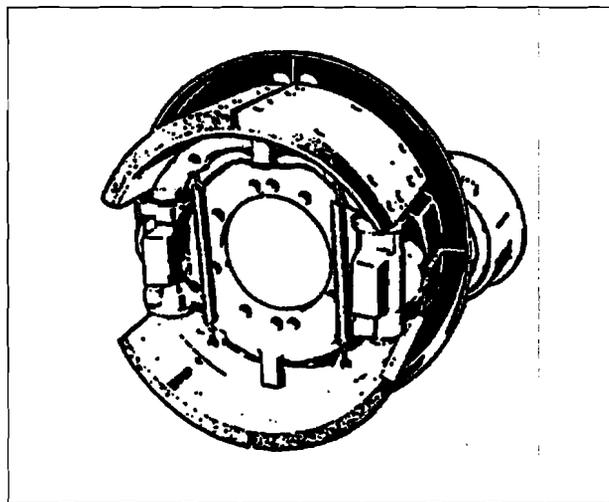
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#### HAZARDOUS CONDITION

- Adjustment exceeds standards as per this section.
- 



Slack Adjustment on Cam-type Air Brakes



Wedge-type Air Foundation Brake (Twinplex)

## 13. Disc Brakes (if equipped)

### Procedure

**Step 1:** Using a micrometer and dial indicator, visually inspect the disc brake rotors.

*Equipment needed:* Micrometer and dial indicator.

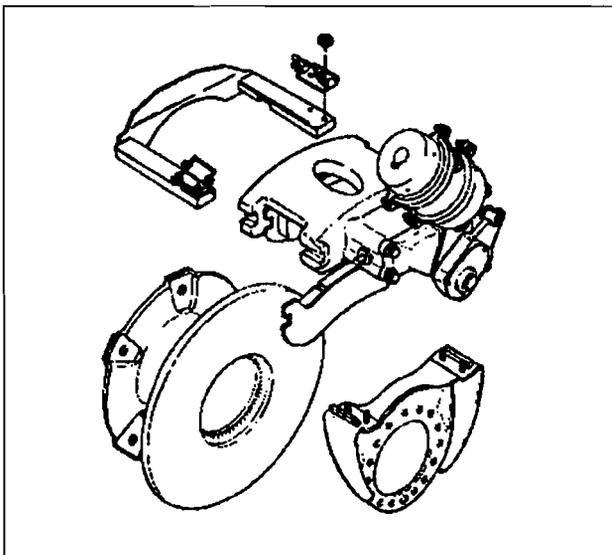
### Reject the vehicle if:

- Any crack on the surface of the disc brake rotors extends to the outer edges, or the rotor is damaged.
- Two or more grooves are worn beyond 2.25 mm (.090 inch).
-  Lateral runout exceeds 0.38 mm (0.015 inch).
- Wear exceeds specifications as per *Chapter 3A, Item 15*, or as stamped on the rotor.

**Step 2:** Inspect the calipers and anchor plates.

### Reject the vehicle if:

- Calipers are seized or loose.
- Anchor plates are loose or bolts are missing.



**Air Actuated Disc Brake**

**Step 3:** Inspect and measure the pads.

### Reject the vehicle if:

- Pads are damaged or contaminated.
- Riveted pads are worn to 4.8 mm ( $\frac{3}{16}$  inch) or less thickness.
- Bonded pads are worn to 3.2 mm ( $\frac{1}{8}$  inch) or less thickness.

**Step 4:** Inspect the adjustment.

### Reject the vehicle if:

- The adjustment does not meet the manufacturer's specifications.

**Step 5:** Apply the brakes, and try to rotate the wheel.

### Reject the vehicle if:

- The wheel rotates.

**Step 6:** Inspect the wheel seals.

### Reject the vehicle if:

- Wheel seals are leaking. (Seepage is not cause for rejection.)

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### HAZARDOUS CONDITION

- Any disc that is cracked or does not meet the standards as per *Chapter 3A, Item 15*.
- 

## 14. Air System Leakage

### Procedure

**Step 1:** With the trailer system charged, audibly inspect for air leaks.

### Reject the vehicle if:

- An audible leak is evident in the lines, tanks, valves, and/or chambers.

**Step 2:** Apply the trailer hand control valve, if equipped. If the tractor does not have a hand control valve, use the foot valve and two people to conduct the inspection.

**Reject the vehicle if:**

- An air leak is evident in the lines, valves, or chambers with the brakes applied.
- The trailer is attached to a power unit and leakage exceeds 28 kpa (4 psi) in one minute.
- The trailer is attached to an air line with gauge and leakage exceeds 20 kpa (3 psi) in one minute.

**Step 3:** Manually disconnect the trailer supply glad hand.

**Reject the vehicle if:**

- Brakes do not apply upon opening the supply line.

**HAZARDOUS CONDITION**

- Air system leakage with spring brakes released and service brakes applied exceeds the allowable limit.
- Trailer attached to a power unit exceeds 48 kpa (7psi) per minute.
- Trailer attached to an air line exceeds 40 kpa (6psi) per minute.
- Brakes do not apply.

## 15. Machining and Wear Limits, Brake Drums and Rotors

**A. BRAKE DRUMS**

- No combination of machining and wear may exceed the manufacturer's stamped limit.
- If the manufacturer's limit is not available, then no combination of wear and machining may exceed:
  - 2.3 mm (0.090 inch) over original drum diameter of 350 mm (14 inches) or less,
  - 3.0 mm (.120 inch) over original drum diameter of greater than 350 mm (14 inches).

**B. BRAKE ROTORS**

- Original thickness may not be decreased by any combination of wear and machining below the manufacturer's minimum thickness.

## 16. Anti-lock Brake Systems (ABS)

 Trailers with air brakes manufactured after March 1, 1998, must be equipped with anti-lock brakes when they are operated in the United States.

**Procedure**

If a vehicle is equipped with an ABS brake system, visually and manually inspect the warning light.

**Reject the vehicle if:**

- The warning light fails to illuminate during the cycle or self check, or a self-diagnostic error is indicated.

# Lamps

## 1. Lamps

### Procedure

Visually inspect all lamps mentioned below, except hazard lamps, with all other auxiliary lamps on and with brakes applied.

### Reject the vehicle if:

- Any lamp fails to illuminate and any lamp or reflector is missing, broken, cracked, insecurely mounted or does not meet CMVSS, FMVSS, DOT or SAE standards and is not so labeled or fails to meet the following criteria and requirements set out in this chapter.

**Note:** Sealed lamps are required on petroleum tanks.

*Taillamps:* Must be equipped with two red lamps, located at the rear as far apart as practical. Lamps must be clearly visible, and the proper filament must light.

*Stoplamps:* Must be equipped with two red lamps, located at the rear as far apart as practical. Lamps must be clearly visible and the proper filament must light.

*Turn Signal Lamps:* Must be equipped with two amber or red turn signal lamps, located on the rear as far apart as practical. Lamps must be clearly visible and the proper filaments must light.

*Hazard Lamps:* If originally equipped, must have two amber or red hazard lamps, facing rear and located as far apart as practical. Must be clearly visible; the proper filament must light; and the lamps must flash simultaneously. May be on the same circuit as the signal lamps.

*Side Marker Lamps:* Must be equipped with four lamps, located two on each side as close to the corners and as high as practical. The front lamps should be amber, the rear lamps red. Lamps must be clearly visible. **Note:** One may serve as both a side marker lamp and a clearance lamp provided it can be seen from both side and front or both side and rear. An intermediate amber lamp is required if the vehicle is over 9.1 m (30 feet) in length.

*Clearance Lamps:* Must be equipped with four lamps, located as far apart as practical. Two facing forward must be amber. Two facing the rear must be red. Lamps must be clearly visible. **Note:** Clearance lamps are not required on vehicles less than 2.05 m (81 inches) wide.

*Identification Lamps:* Must be equipped with three red lamps, located at the rear as high and as near center as practical. Lamps must be clearly visible. **Note:** U.S. Federal Motor Vehicle Safety Standard interpretations allow clearance and identification lamps to be low mounted if it is not possible to satisfactorily mount them up high.

*License Plate Lamp:* Must be located so as to emit a white light on the plate.

### Notes:

- A pole or cable reel trailer does not require side marker lamps or clearance lamps.
- Converter dollies need to have only one stoplamp and one taillamp.

**HAZARDOUS CONDITION**

- Less than one red lamp on the rearmost part of the vehicle visible from 152 m (500 feet).
- Less than one operational stop lamp on the rearmost part of the vehicle.
- Not at least one operative signal lamp on each side of the rearmost part of the vehicle.

**2. Reflex Reflectors**

A lamp or cover that emits a reflection may be considered a reflector.

 Reflective tape may be used in place of a reflector provided it covers an area 100 mm x 100 mm (4 inches x 4 inches) and is the same color as the reflector that is being replaced.

**A. CLEARANCE REFLECTORS****Procedure**

Inspect the clearance reflectors. **Note:** This does not apply to converter dollies.

**Reject the vehicle if:**

- The vehicle is not equipped with four clearance reflectors, two amber ones at the front and two red ones at the rear.
- Clearance reflectors are not as far apart as practical, are not located at the floor line of the trailer, or are not clearly visible.

**B. SIDE MARKER REFLECTORS**

One lens may serve as both side marker and clearance reflectors provided it can be seen from both sides and rear.

Amber intermediate side marker reflectors are required if the vehicle is over 9.1 m (30 feet) in length.



On United States trailers, reflective tape may be used for side markers provided it meets the requirements of FMVSS 108 S5.1.1.4.

**Note:** A converter dolly and a pole or cable reel trailer do not require side marker reflectors.

**Procedure**

Inspect the side marker reflectors.

**Reject the vehicle if:**

- The vehicle is not equipped with four side marker reflectors, located two on each side as close to the corners as practical at the floor line.
- The front side marker reflectors are not amber or the rear reflectors are not red.
- The reflectors are not clearly visible.

**3. Conspicuity Requirements**

Trailers and trailer combinations manufactured after the dates listed below must comply with color and marking placement requirements of CMVSS 108 (Canadian trailers) or FVMSS 108 (United States trailers).



FVMSS 108 standards apply to all trailers manufactured after December 1, 1993.

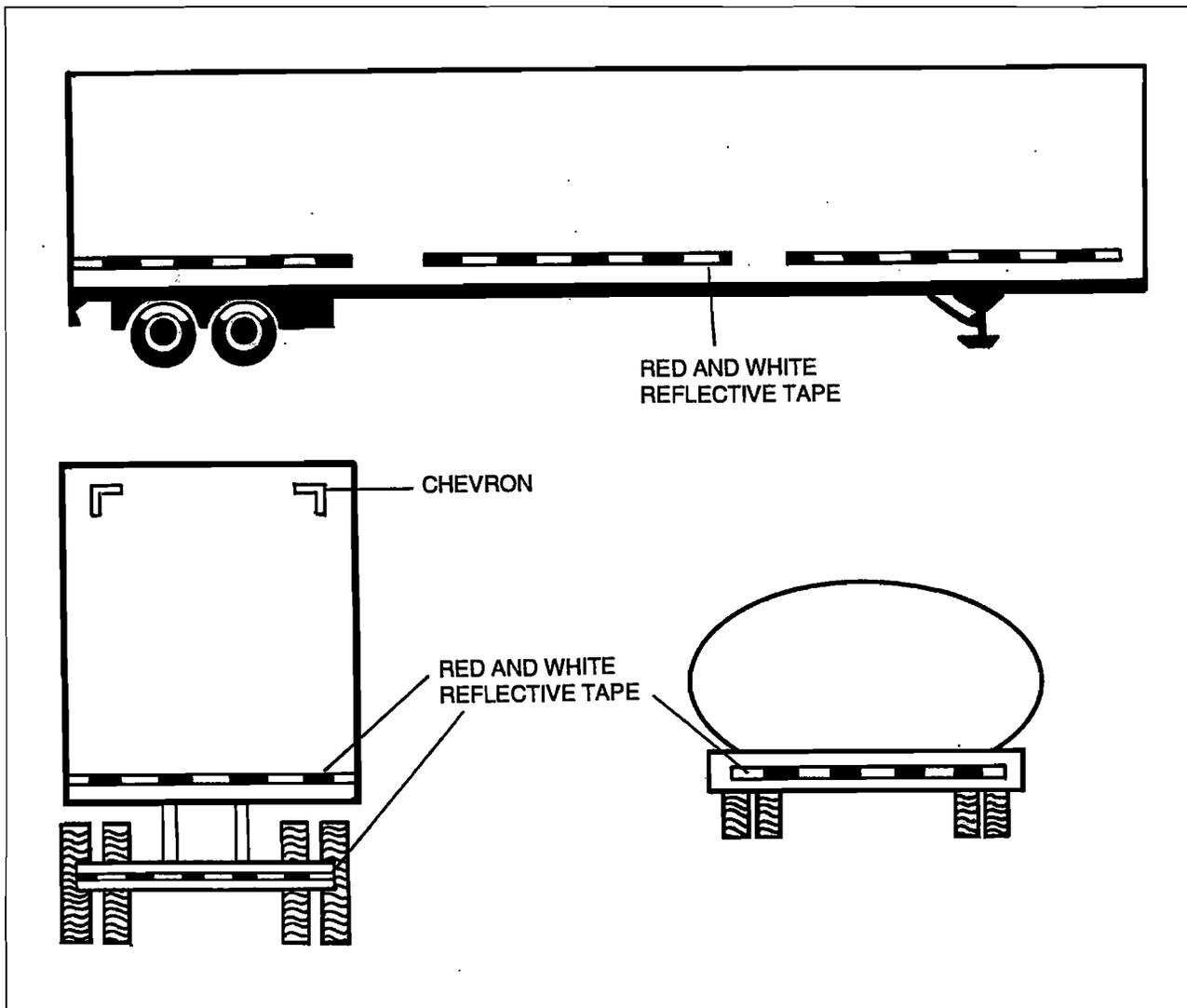


CMVSS 108 standards apply to all trailers manufactured after January 24, 1997. In addition, effective January 1, 2000, the standards apply to all trailers operating in Canada built after December 1, 1993. Effective January 1, 2002, the standards apply to all trailers built before December 1, 1993.

**Note:** These standards apply to trailers with 2032 mm (80 inches) or more overall width and with a GVWR greater than 4536 kg (10,000 lbs.).

**Procedure:**

Visually inspect for the location and size of reflective markings.



### Typical Conspicuity Treatments

#### Reject the vehicle if:

- Markings are not located 1.2 m (4 feet) above the road surface or as close as practical.
- Less than one-half the trailer length has material installed on it.
-  Colors are not red and white or other colors compliant with CMVSS 108.
-  Any one color makes up more than two-thirds of the striping. This standard applies to all United States trailers manufactured after December 1, 1993.
-  There is a color other than alternating red and white reflective tape at least 5 cm (2 inches) wide along the sides and rear of the trailer. This standard applies to all United States trailers manufactured after December 1, 1993.
- The vehicle is equipped with a bumper and striping is not installed on it.
- Van body trailers are not equipped with right angle chevrons at least 30 cm (12 inches) on the rear top corners of the trailer.

# Body

## 1. Body

### A. VAN TYPE TRAILERS

#### Procedure

**Step 1:** Visually inspect the sheet metal.

#### Reject the vehicle if:

- Any metal protrudes in such a manner as to be hazardous to other vehicles, pedestrians or cyclists.
-  Rivets are loose and/or working.

**Step 2:** Visually inspect the doors.

#### Reject the vehicle if:

- Doors are binding or lock insecurely.
- Doors are mounted insecurely to hinges.
- Doors are severely corroded in the hinge area.

**Step 3:** Visually inspect the flooring.

#### Reject the vehicle if:

- Flooring is unsafe in such a manner that a person or cargo could fall through.

**Step 4:** Visually inspect the upper and lower rails, cross members, body and rivet corrosion.

#### Reject the vehicle if:

- Bulges indicating corrosion are evident, or there are stress cracks at the rail.
- Rivets are missing and/or dimpled.

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#### HAZARDOUS CONDITION

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- Any component is loose so as it could become disconnected from the vehicle.

### B. TANKERS

#### Procedure

**Step 1:** Visually inspect the tank.

#### Reject the vehicle if:

- The tank is loose at the mounts.
- There is evidence of leaking or cracks.
- There are any cracked or broken welds.
- There is movement or severe corrosion between the tank and frame.
- Supports are cracked or broken.
- There are bulges or excessive corrosion.

**Step 2:** Inspect the hoses, auxiliary attachments and bumpers.

#### Reject the vehicle if:

- Hoses and auxiliary attachments are loose or insecure.
- Bumpers are missing, inoperable or broken.

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#### HAZARDOUS CONDITION

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- Any component is loose so as it could become disconnected from the vehicle.

### C. LOW BOY TRAILERS

#### Procedure

Inspect the tie downs, loading ramp (if equipped), equipment rails or pads (floor if equipped), and side rails (if equipped).

**Reject the vehicle if:**

- Tie downs are missing, broken or cracked.
- Loading ramp hinges are broken or insecurely mounted.
- Equipment rails or pads (floor if equipped) are loose or insecure.
- Side rails (if equipped) are loose, insecure or have improper repairs.

**HAZARDOUS CONDITION**

- Any component is loose so as it could become disconnected from the vehicle.

**D. TIMBER/POLE TRAILERS****Procedure**

Visually inspect the bunks and bunk posts.

**Reject the vehicle if:**

- Bunks are missing, broken or cracked.
- Bunk posts are missing, broken, cracked or bent excessively.

**HAZARDOUS CONDITION**

- Any component is loose so as it could become disconnected from the vehicle.

**E. PRESSURE VEHICLES****Procedure**

Visually inspect the tank and hoses.

**Reject the vehicle if:**

- The tank is loose on the mounts, there are visible or audible leaks, or there are any broken welds.
- Hoses are loose or insecure.

**HAZARDOUS CONDITION**

- Any component is loose so as it could become disconnected from the vehicle.

**F. FLAT DECKS****Procedure**

Visually inspect the deck, sides (if equipped) and stake pockets.

**Reject the vehicle if:**

- The deck is loose on the mounts.
- The deck is unsafe so as cargo or a person could fall through.
- Plywood in structural members on the sides (if equipped) is broken or missing.
- Stake pockets (if originally equipped) are broken, missing or cracked.

**HAZARDOUS CONDITION**

- Any component is loose so as it could become disconnected from the vehicle.

**G. CATTLELINER****Procedure**

**Step 1:** Visually inspect the sides.

**Reject the vehicle if:**

- The sides are cracked.
- Rivets at drop center front and back are loose and/or working.

**Step 2:** Visually inspect the floor at drop center.

**Reject the vehicle if:**

- The floor is cracked at either front or back.

**Step 3:** Visually inspect the side supports. Check the inside.

**Reject the vehicle if:**

- Side supports are missing or broken.

**Step 4:** Visually inspect the body, frame and rivet corrosion.

**Reject the vehicle if:**

- Bulges indicating corrosion are evident, or there are stress cracks at the rails.
- Rivets are missing and/or dimpled.

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**HAZARDOUS CONDITION**


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- Any component is loose so as it could become disconnected from the vehicle.
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**H. GRAIN TRAILERS****Procedure**

**Step 1:** Visually inspect the sides.

**Reject the vehicle if:**

- Sides are cracked, especially in the hopper area.
- Rivets at drop center front and back are loose or moving.

**Step 2:** Visually inspect the floor. Check at drop center.

**Reject the vehicle if:**

- The floor is cracked at either front or back

**Step 3:** Visually inspect the side supports. Check inside.

**Reject the vehicle if:**

- Side supports are missing or broken.

**Step 4:** Visually inspect the body, frame and rivet corrosion.

**Reject the vehicle if:**

- Bulges indicating corrosion are evident, or there are stress cracks at the side rails.
- Rivets are missing and/or dimpled.
- The rivet area is swollen by corrosion.

**Step 5:** Inspect the hatches and dumps.

**Reject the vehicle if:**

- The hatches and dumps are not secure.

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**HAZARDOUS CONDITION**


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- Any component is loose so as it could become disconnected from the vehicle.
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**I. GRAVEL TRAILERS****Procedure**

**Step 1:** Visually inspect the sides.

**Reject the vehicle if:**

- Sides are cracked, especially in the hopper area.
- Sides are excessively corroded.

**Step 2:** Inspect the hopper or end-dump door(s).

**Reject the vehicle if:**

- Door(s) is loose, insecure or will not close and latch properly.
- Any gaps are evident that would allow spillage of the load.

**Step 3:** Inspect the side supports.

**Reject the vehicle if:**

- Side supports are missing, or there are broken welds.

**Step 4:** Inspect the fifth wheel plate mount bushings.

**Reject the vehicle if:**

- Bushings are loose, or the bushing rubber is excessively dispersed.
- The bushing supports are cracked or broken.

**Step 5:** Inspect the hinges.

**Reject the vehicle if:**

- Hinges are missing, broken or cracked.

**J. OTHER BODY TYPES (APPLICABLE ITEMS)****Procedure**

Inspect the floor, door(s), sides, fasteners, hoses, and auxiliary equipment.

**Reject the vehicle if:**

- The floor is unsafe in such a manner so as a person or cargo could fall through.
- Doors lock insecurely.
- Doors are mounted insecurely or are severely corroded in the hinge area.

- Sides are cracked, corroded through or insecure.
- Fasteners are cracked, broken or insecurely mounted.
- Hoses are insecurely mounted.
- Auxiliary equipment is insecurely mounted.

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**HAZARDOUS CONDITION**

- Any component is loose so as it could become disconnected from the vehicle.
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## 2. Mud Flaps or Fenders

### Procedure

**Step 1:** Visually inspect the condition and width of the mud flaps or fenders.

### Reject the vehicle if:

- Flaps or fenders are not secure.
-  The vehicle is not equipped with mud flaps or fenders.
-  The mud flaps or fenders are not the full width of the tires.

 **Step 2:** Measure the height from the ground to the lower edge of the mud flaps or fenders.

### Reject the vehicle if:

-  The lower end of the mud flaps or fenders is more than 350 mm (14 inches) from the ground, measured when the vehicle is in an unloaded position.

## 3. Landing Gear (if applicable)

### Procedure

Manually and visually inspect the operation, condition, mechanism and landing pads of the landing gear.

### Reject the vehicle if:

- The landing gear is inoperable, binds or is seized.
- The landing gear is bent, cracked, broken, or insecurely mounted.
- The mechanism fails to hold position.
- Landing pads are loose, broken or missing.

## 4. Frame and Cross Members

### Procedure

Visually inspect the frame, cross members, body mounts and rivets, and bolts.

### Reject the vehicle if:

- The frame is cracked, broken, bent, or rusted to a depth as to substantially weaken the frame. Repair by welding permitted if reinforced.
- Cross members are loose, broken, missing, or cracked. Repair by welding permitted.
- Body mounts and rivets are missing, bolts are missing, or rivets are deteriorated or missing.
- Bolts are loose, missing or less than grade 5.

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**HAZARDOUS CONDITION**

- Any frame member is broken, sagging or cracked so as to permit the body to contact any moving part, or collapse of the frame is imminent.
  - Any frame member or component fails to adequately support directional stability.
  - There is a 38 mm (1½ inch) or longer crack in the frame that is directed toward the bottom flange.
  - There is a 25 mm (1 inch) or longer crack in the bottom flange.
- 
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## 5. Sliding Bogie (if applicable)

### Procedure

Visually inspect the rails, locking device and stops.

### Reject the vehicle if:

- Rails are cracked or broken.
- The locking device is missing or inoperable.
- Stops are missing or cracked.

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### HAZARDOUS CONDITION

- Any frame member is broken, sagging or cracked so as to permit the body to contact any moving part, or collapse of the frame is imminent.
  - Any frame member or component fails to adequately support directional stability.
  - There is a 38 mm (1½ inch) or longer crack in the frame that is directed toward the bottom flange.
  - There is a 25 mm (1 inch) or longer crack in the bottom flange.
  - One-fourth or more of the locking pins on the adjustable axle assembly are missing or not engaged.
- 

## 6. Corrosion Information

Corrosion affects all trailers but is more predominant in older units. It is usually found where steel and aluminum are in contact with each other. Corrosion is worse in areas around the upper coupler plate or behind the coupling plates.

To inspect for corrosion, visually check for bubbling, inside rivet heads missing, or rail cracks. If corrosion is evident by visual inspection, tap the rivets lightly with a hammer.

For a small area, if the corrosion is not serious, replace the rivets. Replace cadmium plated bolts that show indication of severe corrosion or electrolysis. If an area is badly corroded, replace or section members, panels, rivets, and bolts.

## 7. Rear Impact Guards



In the United States, trailers manufactured on or after January 26, 1997, require impact guards or impact protection in compliance with FMVSS 223 and FMVSS 224.



Canadian trailer and trailer combinations must comply with these standards if built after January 1, 1995. These criteria apply to trailers over 14.65 m (48 feet) or the rear trailer of combinations exceeding 23m (75.4 feet).

### Procedure

**Note:** The following procedures apply to trailers built after the dates noted above.

**Step 1:** Visually and manually inspect the location of the rear impact guards.

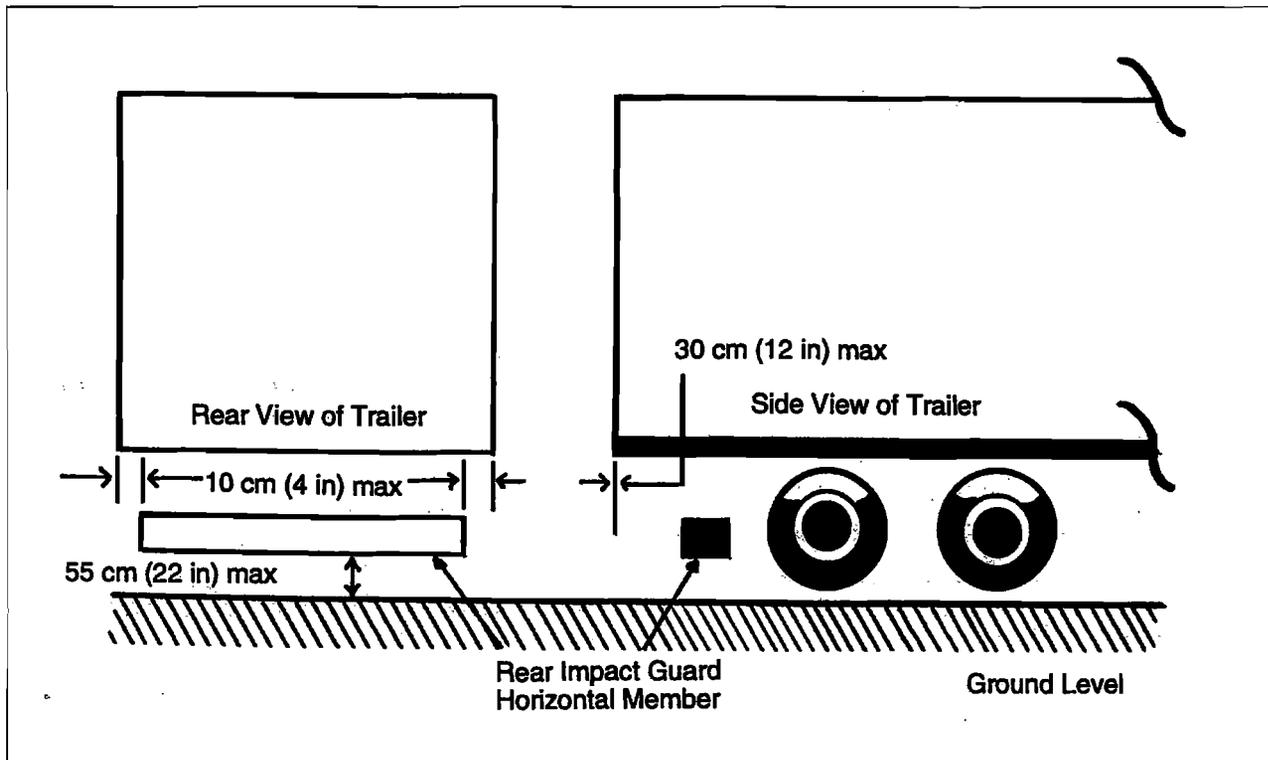
### Reject the vehicle if:

- Rear impact guards are not installed on trailers where the bottom of the rear structure is higher than 55 cm (22 inches) above the ground.
- The height between the rear guard and ground exceeds 55 cm (22 inches).
- The distance from the outside of the trailer to the outside of the bumper exceeds 10 cm (4 inches). Check the left and right sides.
- Guards are not equipped on trailers when the rearmost tire is more than 30 cm (12 inches) forward of the rear of the trailer.

**Step 2:** Visually and manually inspect the condition of the rear impact guards.

### Reject the vehicle if:

- Guards are missing, bent, or welds are broken or cracked.



Rear Impact Guard

# Tires & Wheels

## 1. Tread Depth

### Procedure

With the use of a tread depth gauge, measure tread depth throughout a continuous circumferential band on the tread of at least all major grooves of the tire tread width. Do not measure at the wear bar.

*Equipment needed:* Tread depth gauge.

### Reject the vehicle if:

- Tread depth is less than 1.6 mm ( $2/32$  inch) of tread.
- Any tanker trailer involved with the transportation of flammable and hazardous products has less than 3.2 mm ( $4/32$  inch) of tread.

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### HAZARDOUS CONDITION

- Less than 0.8 mm ( $1/32$  inch) of tread.
  - Less than 0.8 mm ( $1/32$  inch) of tread between any lugs on grip tires.
- 

## 2. Tread Section of Tires

### Procedure

Visually inspect tires for retreads on passive and active steering axles, damage, condition, cupping, section repairs, regrooving and mismatching. **Note:** Retreaded tires are acceptable (pass) on "self-steering axles."

### Definitions

- **Passive self-steering axle.** An axle on which the wheels turn left and right on one or more essentially vertical axes, but their turning is not controlled by means of the steering wheel in the operator's compartment.

**Active steering axle.** An axle on which the wheels turn left and right on one or more essentially vertical axes, and their turning is controlled by, and in direct proportion to, the rotation of the steering wheel in the operator's compartment.

### Reject the vehicle if:

- Retreaded surface is peeled.
-  Retreads are present on active steering axles.
- A tire has cuts greater than 25 mm (1 inch) in length below the tread depth, or cuts into the cord.
- Any tread separation is evident or cords are exposed.
- Tread is no longer evident in a cupped area.
- Tire has any visible breaks, boots or blowout patches.
- Tire is regrooved and is not marked "REGROOVABLE."
- A different size tire is used on one axle or one dual that exceeds 12.7 mm ( $1/2$  inch) diameter in size of the matching dual.

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### HAZARDOUS CONDITION

- Any part of the breaker strip or casing ply is showing in the tread area.
  - A visible bump or bulge in the tread area indicating separation.
  - A tire is regrooved and is not marked "REGROOVABLE."
-

### 3. Sidewalls

#### Procedure

Visually inspect sidewalls for bulges, cuts, matching tires, valve stems, marking and condition.

#### Reject the vehicle if:

- A sidewall has any bulges exceeding 9.5 mm ( $\frac{3}{8}$  inch) in height.
- A sidewall has any cuts that expose cords.
- A vehicle has mismatching tires on one axle such as radial and non-radial.
- Valve stems are cracked or damaged.
- Any tire is labeled “NOT FOR HIGHWAY USE.”
- Tires are broken or distorted, cords are exposed, or there is ply separation.
- There is severe deterioration as a result of weather checking.

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#### HAZARDOUS CONDITION

- A sidewall is cut or damaged exposing the cord.
  - Any tire is labeled “NOT FOR HIGHWAY USE.”
  -  Bias and radial tires are used on the same axle.
  - There is a visible bump or bulge in the sidewall area indicating separation.
- 

Note: Retreaded tires are acceptable on passive self-steering axles.

### 4. Tire Pressure

#### Procedure

Check the tire pressure with a gauge.

#### Reject the vehicle if:

- Pressure in tires on the same axle is not within 10 percent of each other.
- Pressure is not within the range as marked on the sidewall.

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#### HAZARDOUS CONDITION

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- Any tire is flat.
- 

### 5. Hubs (General)

#### Procedure

Visually inspect the condition of the hubs.

#### Reject the vehicle if:

- A hub has been repaired by welding.
- A hub is damaged, cracked, bent, broken or distorted.
- Any stud hole is enlarged or damaged in a way that prevents proper fitting and retention of studs.

### 6. Hub/Bearing Lubricant

#### Procedure

Visually inspect the hub/bearing lubricant.

#### Reject the vehicle if:

- The lubricant level is below the required minimum.
- Lubricant is contaminated.
- Lubricant is leaking from the hub, hub/wheel seal or hubcap.

### 7. Wheel/Rim (General)

#### Procedure

Visually inspect the condition of the wheel/rim.

#### Reject the vehicle if:

- The wheel/rim is damaged, broken, bent, cracked or distorted.
- The wheel/rim has been repaired by welding.
- The wheel/rim is damaged or discolored as a result of heating.

- The wheel/rim size does not match the tire size.
- A valve stem is damaged or is inaccessible, preventing gauging of tire pressure or inflation of the tire.

## 8. Multi-piece Wheel/Rim

### Procedure

Visually inspect the condition of the wheel/rim.

### Reject the vehicle if:

- A component is damaged, bent, cracked or distorted.
- A component is improperly assembled or shifted out of position.
- A component is severely corroded or pitted.
- There is less than 3 mm (0.120 inches) between butt ends of the lock ring.
- There is evidence of damage caused by heating.
- Any component has been repaired by welding.
- There is any mismatched wheel/rim component.

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### HAZARDOUS CONDITION

- A lock ring is bent, broken, cracked, sprung, mismatched or improperly seated.
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## 9. Spoke Wheel/Demountable Rim System

### Procedure

**Step 1:** Visually inspect the condition of the spoke wheel/demountable rim system.

### Reject the vehicle if:

- There is damage in the 28 degree mounting area resulting from rim slippage, wear, corrosion or pitting.
- There is evidence of rim slippage or incorrect positioning of the rim on spokes.

**Step 2:** Rotate the wheel and check run-out.

### Reject the vehicle if:

- Lateral run-out exceeds 6 mm ( $\frac{1}{4}$  inch) at the sidewall of the tire.
- Rim clamps are missing, broken, cracked, welded, mismatched, twisting, or worn out in the 28 degree mounting area.
- Any heel-less clamp is bottomed or has more than 10 mm ( $\frac{3}{8}$  inch) gap between clamp and spoke.
- Any heel type clamp has more than 6 mm ( $\frac{1}{4}$  inch) gap between clamp and spoke.

**Step 3:** Visually inspect the spacer bands.

### Reject the vehicle if:

- Any spacer is missing, cracked, distorted, the incorrect size or type, or has been modified or repaired by welding.

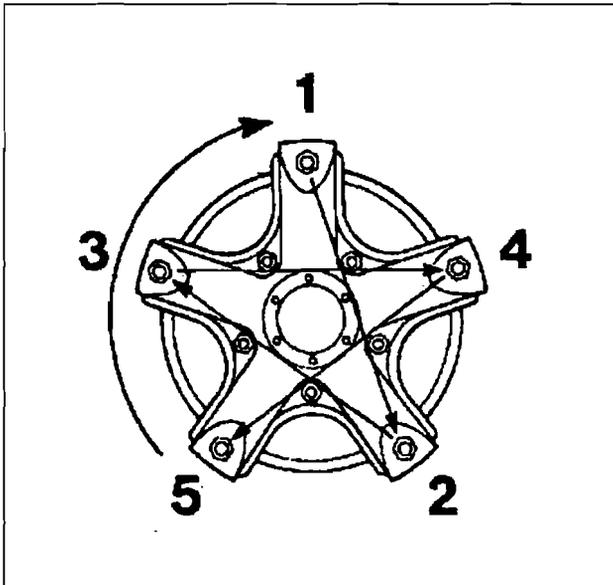
## 10. Disc Wheel System

### Procedure

Visually inspect the condition of the disc wheel system.

### Reject the vehicle if:

- An incompatible wheel or component is used on the wheel system.
- A wheel is incorrectly installed.



**Spoke Wheel Nut Tightening Sequence**

- There is evidence of damage or deterioration, foreign material, excessive or uncured paint on the hub, drum or wheel mounting faces.

## 11. Wheel Fasteners (Nuts and Studs)

### Procedure

Visually inspect the condition and installation of the wheel fasteners, and test for security.

### Reject the vehicle if:

- Any fastener is missing, broken, bent or otherwise damaged.
- Any incorrect fastener type, thread direction or style is used on the wheel system.
- Any nut is not fully engaged with the stud.  
Note: It is not imperative that every thread in a nut be engaged by a thread on the stud; however, a sufficient number of threads should be engaged so that when the fastener is torqued, they will not strip out.

- Any fastener rotates before the lowest torque value specified by the manufacturer is applied.

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### HAZARDOUS CONDITION

- Two or more wheel nuts or studs are loose, missing or broken on a disc wheel.
  - One or more wheel nuts or studs are loose, missing or broken on a spoke wheel.
- 
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## 12. Axle End Bearing

### Procedure

Inspect the bearing end play, rotate the bearings, and when visually accessible, inspect the condition of the bearing adjustment locking device.

### Reject the vehicle if:

-  The bearing end play exceeds the manufacturer's specifications.
- Binding or roughness is detected while rotating the bearing.
- The bearing adjustment locking device is missing, not engaged or is nonfunctional.

# Couplers & Hitches

## 1. Upper Fifth Wheel

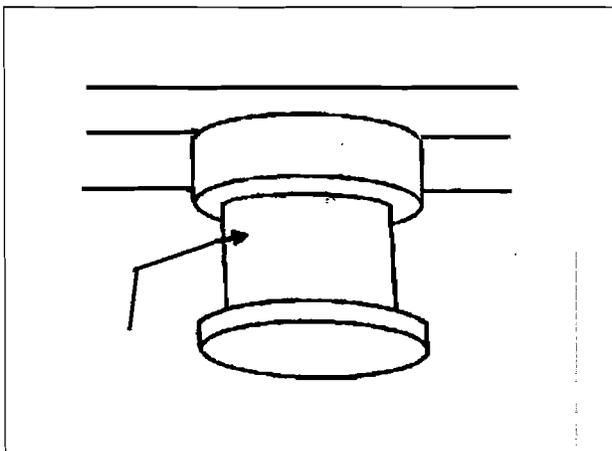
### Procedure

**Step 1:** Visually, and with the use of a Vernier caliper or an approved gauge, inspect the kingpin and the upper fifth wheel plate.

*Equipment needed:* Vernier caliper or approved gauge.

### Reject the vehicle if:

- The kingpin is loose, broken, deformed, cracked, has 3.2 mm (1/8 inch) damaged wear or more, or is field welded, unless the kingpin has been remanufactured using a process certified by a professional engineer. **Note:** The kingpin must be permanently marked and dated to identify the remanufacturer.
- The upper fifth wheel plate is cracked, loose, warped or worn so as an area less than 75 percent is in contact with the lower fifth wheel.
- The fifth wheel's attaching members are rusted so as the fifth wheel plate may become detached.



Kingpin

**Step 2:** Visually inspect the upper fifth wheel mounting to the body.

### Reject the vehicle if:

- Bolts or rivets are loose or missing.
- Bulges indicating corrosion are evident.
- Rivets are dimpled by corrosion.
- The rivet area is swollen by corrosion.
- Any weld is cracked and/or broken.

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### HAZARDOUS CONDITION

- Any relative movement between the upper fifth wheel and mounting components.
  - Any crack, break or damaged part in the stress or load-bearing areas of a coupling device.
- 

## 2. Trailer Hitch

### Procedure

Visually inspect the mounting, latch, pintle hook, eye or lunette (trailer drawbar), welds, and general condition of the trailer hitch.

### Reject the vehicle if:

- The mounting is insecurely attached.
- Mounting bolts are loose or missing.
-  Mounting bolts are less than grade 8.
- The latch fails to close and latch, or there is excess play between the bolt and latch.
- Any part is missing, cracked, broken, bent, seized or excessively worn.
- A cast or forged hitch has been repaired by welding and/or is welded in an area other than by the original equipment manufacturer.

- On a cast or forged hitch, wear exceeds 4.8 mm ( $\frac{3}{16}$  inch).
- The pintle hook has been repaired by field welding.
- Pintle hook wear exceeds 4.8 mm ( $\frac{3}{16}$  inch).
- The eye or lunette (trailer drawbar) is deformed or cracked, wear exceeds 4.8 mm ( $\frac{3}{16}$  inch), or it has been repaired by welding.

### 3. No-Slack Hitch

#### Procedure

Apply air pressure to the no-slack hitch. Visually inspect the cushion, condition, wear and latch.

#### Reject the vehicle if:

- The cushion does not move, is missing, or is out of adjustment.
- Air leaks at the chamber or lines.
- Wear exceeds 4.8 mm ( $\frac{3}{16}$  inch).
- It does not latch securely, or the latch mounting pin is loose or broken.

### 4. Secondary Attachments

#### Procedure

Visually inspect (if applicable) safety chains, cables and attachments, cable clamps, hooks and safety catches.

#### Reject the vehicle if:

- Safety chains, cables and attachments are missing, broken, insecurely fastened, the wrong length, an inadequate size or under-rated strength, or have cracked links, worn cables or an improper hookup.
- There is an insufficient quantity of cable clamps, or they are incorrectly installed or loose.
- Hooks are cracked, missing or parts are broken.

- Safety catches operate ineffectively or are missing.

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#### HAZARDOUS CONDITION

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- Any component is damaged or worn to the degree that it is no longer effective.

## 5. Converter Dolly Frame and Fifth Wheel Structure

#### Procedure

**Step 1:** Visually inspect the fifth wheel mounting bolts, jaw and latch, jaw mount pins, and top plate.

#### Reject the vehicle if:

- Fifth wheel mounting bolts are broken, cracked or have distorted components.
- Fifth wheel mounting bolts are insecure to the frame, loose or missing.
-  Fifth wheel mounting bolts are less than a grade 8.
- The jaw and latch are seized, cracked, broken or wear exceeds 6.4 mm ( $\frac{1}{4}$  inch).
- Jaw mount pins are loose and/or welded.
- The top plate is cracked, broken, damaged, welded or distorted, contaminated (i.e. sand and gravel), has no evidence of lubrication grooves or is not properly lubricated.

**Step 2:** Visually inspect the saddle bushings and saddles.

**Note:** When checking saddle bushings, place a bar between the frame and fifth wheel and pry horizontally.

#### Reject the vehicle if:

- Steel bushing movement exceeds 9.5 mm ( $\frac{3}{8}$  inch).
- Rubber bushing movement is excessive.
- Saddles are cracked, repaired by welding other than authorized by the manufacturer.

**Step 3:** Visually inspect the stops, slider and air release slide.

**Reject the vehicle if:**

- Stops are missing.
- The slider is cracked, worn or does not lock.
- Slider play exceeds 6.4 mm ( $1/4$  inch) movement.
- The air release slide is not securely locked.

**Step 4:** Visually inspect the frame, fifth wheel subframe and the eye or lunette.

**Reject the vehicle if:**

- The frame and the fifth wheel subframe are severely corroded or rusted.
- The eye or lunette is deformed, cracked, wear exceeds 4.8 mm ( $3/16$  inch), or it has been repaired or built-up by welding.

**Step 5:** Visually inspect the drawbar, sliding drawbar and ball bearing type turntable.

**Reject the vehicle if:**

- The drawbar is deformed or cracked, or has broken welds or worn bushings.

- Sliding drawbar pins are missing or worn greater than 3.2 mm ( $1/8$  inch).
- On a ball bearing type turntable the vertical lift exceeds 6.4 mm ( $1/4$  inch), the bolts are loose or missing, or welds are cracked.

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**HAZARDOUS CONDITION**

- The adjustable fifth wheel or tow-bar is missing one-fourth or more of the locking pins.
- Any observable movement exceeding 6.4 mm ( $1/4$  inch) between the fifth wheel mounting and the frame.
- More than 9.5 mm ( $3/8$  inch) play lengthwise of the track of an adjustable fifth wheel.
- Any adjustable fifth wheel locking mechanism does not remain in the locked position.
- Any crack, break or damage in the stress or loading area of the coupling device.

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**Note:** Inspect suspension and brakes as *Chapter 2 and 3* indicate. Inspect tires as per *Chapter 9*.

**Trucks, Buses & Trailers 1999 Inspection Handbook**

**PART III:**

**Bus & School Bus  
Vehicle Safety  
Inspection Program**



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*(This handbook has been organized so that chapter numbers and topics correspond to section numbers and topics in the CCMTA Commercial Vehicle Inspections in Canada manual. In addition, for ease of referencing, topics are organized by the same chapter numbers in each part of this handbook for trucks, buses and trailers.)*

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# Power Train

## 1. Accelerator Pedal

### Procedure

With the engine idling, manually depress the accelerator pedal and then release it. Visually inspect the pedal, mount, linkage, springs, and air cylinder and lines, if so equipped.

### Reject the vehicle if:

- The pedal is binding or the engine will not return to an idle position.
- The mount is insecure or deteriorated by corrosion.
- Linkage is worn, insecure or retainers are inferior.
- Springs are missing, deteriorated or an improper type.
- Any air leak is evident.

## 2. Fuel System



On United States vehicles, no part of the fuel system of a bus manufactured on or after January 1, 1973, can be located within or above the passenger compartment.

### A. GAS OR DIESEL

#### Procedure

Visually inspect the cap(s), filler tube, tank(s), tank mount(s), strap(s), fuel lines, pump and tank guard, if so equipped.

#### Reject the vehicle if:

- Any cap is missing, does not prevent spillage or is not a proper type.
- The filler tube is leaking or insecure.
- Any tank is leaking, cracked, has broken welds, or is not designed for storage of motor fuel.

- Any tank mount is cracked or loose, or has missing or loose bolts.
- Any strap is cracked, missing, loose, or repaired with an inferior substitute. **Note:** An inferior substitute is something lacking the strength of the original strap or something that will itself damage the tank.
- Fuel lines are cracked, leaking, insecure, or clamps or mount clips are missing.
- Internal braid is exposed at the first layer on a braided line.
- The pump is leaking, insecure or physically damaged.
- The tank guard, if so equipped, is missing or loose.

---

### HAZARDOUS CONDITION

- There is a leak at any point including auxiliary equipment.
  - A fuel cap is missing.
  - Any tank is insecure. (Tanks mounted with cushioning devices will have some movement.)
- 

### B. LIQUIFIED PETROLEUM GAS (LPG) FUEL SYSTEM

#### Procedure

**Step 1:** Visually inspect the tank condition, label, approval, working pressure, valve identification, mounting straps, and mounting brackets.

#### Reject the vehicle if:

- The tank is leaking, cracked or there is welding other than by the original equipment manufacturer.

- The tank is not labeled.
- The tank is not approved by recognized labeling bodies.
- Working pressure is less than 250 psig (pounds per square inch gauge) for external tanks or less than 312.5 psig for enclosed tanks.
- Valves are not identified.
- Mounting straps are cracked, loose or missing.
- Mounting brackets are cracked or missing, or mounting bolts are loose and/or less than grade 5, 12.7 mm (1/2 inch).

**Step 2:** Inspect the remote 80 percent stop fill valve and the remote fill line.

**Reject the vehicle if:**

- The remote 80 percent stop fill valve is missing or not approved and so labeled.
- The remote fill line is less than 9.5 mm (3/8 inch) inside diameter, is not type II or III hose or high pressure line, or is not seamless steel line or approved copper sheathed and stamped line.
- The remote fill line has any quick coupler installed.
- The remote fill line is frayed, cracked or damaged.

**Step 3:** Inspect the fuel gauge and hydrostatic relief valve or Sherwood valve.

**Reject the vehicle if:**

- The fuel gauge is missing or not working.
- The hydrostatic relief valve or Sherwood valve is not present between each pair of shut-off valves or is not approved and so labeled.

**Step 4:** Inspect the liquid fuel line.

**Reject the vehicle if:**

- The liquid fuel line is less than 9.5 mm (3/8 inch) inside diameter, is not type II or III hose or high pressure line, or is not seamless steel line or approved copper sheathed and stamped line.

- The liquid fuel line has any quick coupler installed.
- The liquid fuel line is frayed, cracked or damaged.

---



---

**HAZARDOUS CONDITION**

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- Any fuel leak is evident.

### 3. Exhaust System

**Procedure**

With the engine running, audibly and visually inspect the manifolds, mufflers, exhaust pipes, mounting hardware, heat shields (applicable vehicles), tailpipes, resonators (applicable units), location of exhaust system components and the exhaust turbo.

**Reject the vehicle if:**

- Manifolds are cracked or leaking.
- Mufflers are leaking, missing or patched.
- Exhaust pipes are leaking, missing or perforated. **Note:** Minor leaking and soot tracks are normal at joints in diesel engine pipes.
- Mounting hardware is missing, loose or broken.
- Heat shields (applicable vehicles) are insecure or missing.
- Tailpipes are leaking, missing, patched or have holes other than those made by the manufacturer.
- Tailpipes do not expel exhaust fumes beyond the perimeter of the body of the vehicle.
-  On United States gasoline powered vehicles, reject the vehicle if the tailpipe end is more than 150 mm (6 inches) forward of the rearmost part of the bus. On vehicles that are not gasoline powered, reject if the tailpipe is more than 375 mm (15 inches) forward of the rearmost part of the bus, or if the tailpipe is not placed to the rear of all doors or windows designed to be opened except windows that are solely emergency exits.

- Resonators (applicable units) are leaking or patched.
- Any part of the exhaust system is closer than 50 mm (2 inches) to any part of the fuel or brake system or any combustible material and is not protected by shields.
-  This is subject to provincial legislation if the system is powered by LPG or CNG.
- Any exhaust pipe passes through the occupant compartment. (Use of an upstack dilution system is not cause for rejection.)
- The exhaust turbo is leaking at the gaskets.

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#### HAZARDOUS CONDITION

- Any exhaust leak within the perimeter of the body of the vehicle.
- 
- 

## 4. Belts and Guards

### Procedure

Visually and manually inspect all belts for condition, adjustment and guards.

### Reject the vehicle if:

- Belts are missing, broken, frayed or excessively cracked. ( $\frac{1}{2}$  to  $\frac{3}{4}$  inch).
- Guards are bent, loose or missing.

## 5. Drive Shaft (applicable vehicles)

### Procedure

With rear wheels chocked, spring brakes or emergency brakes released and gear selector in "NEUTRAL," place a small bar between the yoke and U-joint and rock the shaft in both directions. Visually and manually inspect the U-joints, U-clamps attaching the U-joints to the yoke, center bearing, slip-joint, and guards, if originally equipped. **Note:** Vehicles over 3.8 mm (150 inch) wheel base with the engine mounted at the front or equipped with a two-piece shaft require drive shaft guards.

### Reject the vehicle if:

- Free play is uneven in the U-joints.
- U-clamps are not present or the nuts are missing or stripped.
- The center bearing is loose, worn or the rubber mount is deteriorated.
- The slip-joint is worn to 1.6 mm (0.062 inches) rotationally on the spline.
- Guards are missing, loose, cracked or mounted in such a manner as not to prevent the drive shaft from falling to the ground.
- Guards are not present for each shaft on the vehicle, if originally equipped.

## 6. Clutch

### Procedure

Apply parking brakes. Start engine, depress the clutch pedal and attempt to shift the transmission into gear. Inspect the operation and adjustment.

### Reject the vehicle if:

- The vehicle attempts to move when the clutch is in its fully depressed position.
- Free pedal clearance is in excess of 38 mm (1.5 inches) or manufacturer's specification.

## 7. Engine Shutdown

### Procedure

Inspect, as equipped, the manual shutdown, electric solenoid, ignition switch (gas engine) and air solenoid.

### Reject the vehicle if:

- The manual shutdown does not shut down the engine.
- The electric solenoid does not shut down the engine.

- The engine will not shut down when the ignition switch is turned off.
- The air solenoid is leaking or the engine will not shut down.

## 8. Neutral Safety Switch and Shift Pattern

### Procedure

Apply the parking brakes and turn the ignition switch to the start position. Manually place the selector lever in all gears. Inspect the operation and shift pattern.

### Reject the vehicle if:

- The engine starts in any position other than “P” or “N.”
- The shift pattern is not in the driver’s view.

# Suspension

## 1. Suspension Attachments

### Procedure

Visually inspect the U-bolts, center bolts, control arms and torque arms.

### Reject the vehicle if:

- U-bolts are loose, missing, broken or welded.
- Center bolts are broken or missing.
- Control arms are bent or missing, or the rubber surrounding the bushing does not secure it.
- Control arms are welded and/or welded in an area other than by the original equipment manufacturer.
- Torque arms are bent, missing or welded and/or welded in an area other than by the original equipment manufacturer.

### HAZARDOUS CONDITION

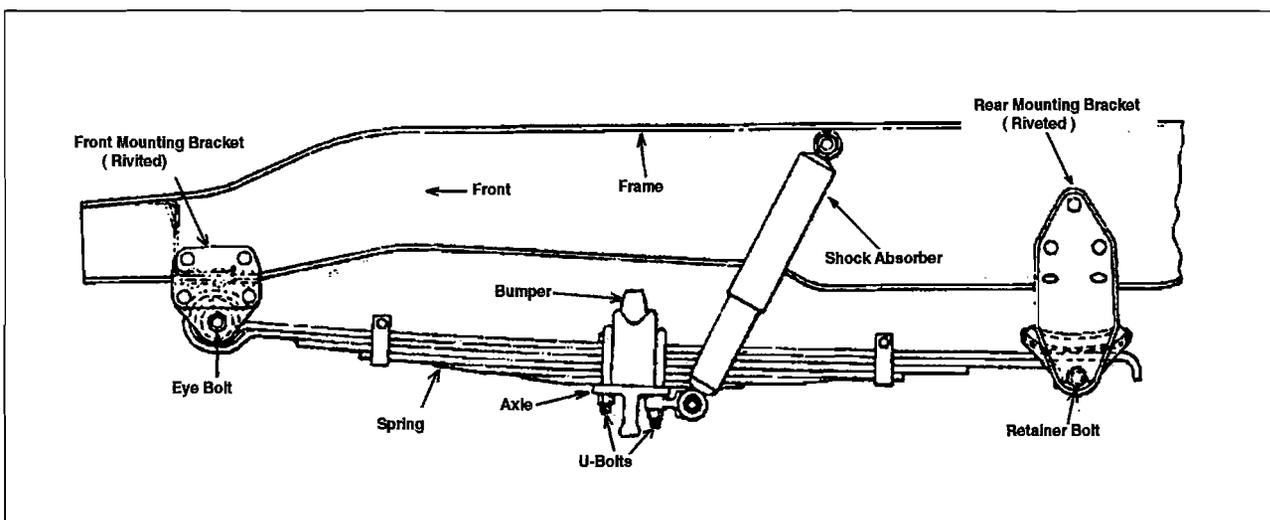
- Any component allows the axle to shift from its normal position.
- Any attaching component is missing, loose, cracked or broken.

## 2. Springs and Attachments

### Procedure

**Step 1:** With the use of a pry bar (where applicable) and using the frame as a pivot on light vehicles, attempt to pry spring attachments and check for movement. **Note:** The vehicle must be partially jacked up on the frame so as to reduce the load on the springs or jacked between the springs and frame when inspecting the steering and drive axle(s) on heavy vehicles.

**Step 2:** Inspect the springs, shackles, hangers, bushings and/or pins, stabilizer bar (front), and bump pads.



**Leaf Spring Suspension**

**Reject the vehicle if:**

- Any leaf is broken, missing or cracked.
- Any leaf is sagged so as to allow contact to be made with the rebound rubber in normal operation or sagged so as to lower the vehicle more than 50 mm (2 inches) from one side to the other.
- Shifted so as to be less than 12.7 mm ( $\frac{1}{2}$  inch) from any rotating part.
- Shackle pins are loose, missing, excessively worn or cracked.
- Any hanger is loose, cracked, broken, missing or worn more than 3.2 mm ( $\frac{1}{8}$  inch). Wear plates permitted.
- Bushings and/or pins are loose or missing, or wear exceeds the following:

\*Shaft size 12.7 mm (.5 inch) to 24 mm (.98 inch)  
maximum clearance 2 mm (.08 inch)

\*Shaft size 25 mm (1 inch) to 45 mm (1.8 inch)  
maximum clearance 3.2 mm (.125 inch)

- The front stabilizer bar is missing, cracked, broken, welded, disconnected, damaged, or loose.
- The front stabilizer bar bushings are worn excessively or the bushing brackets and bolts are loose.
- Bump pads are missing, split or badly deteriorated.

**HAZARDOUS CONDITION**

- Any main leaf or one-quarter of the leaves in one assembly are broken or missing.
- Any leaf is shifted in a manner as to contact any rotating part.
- Any attaching or tracking component is missing, loose, cracked or broken.

**3. Coil Spring Suspension****Procedure**

Visually inspect the spring, control arms, torque arms (rear), axial strut (applicable units), radius arm (applicable units), and the front and rear stabilizer bar.

**Reject the vehicle if:**

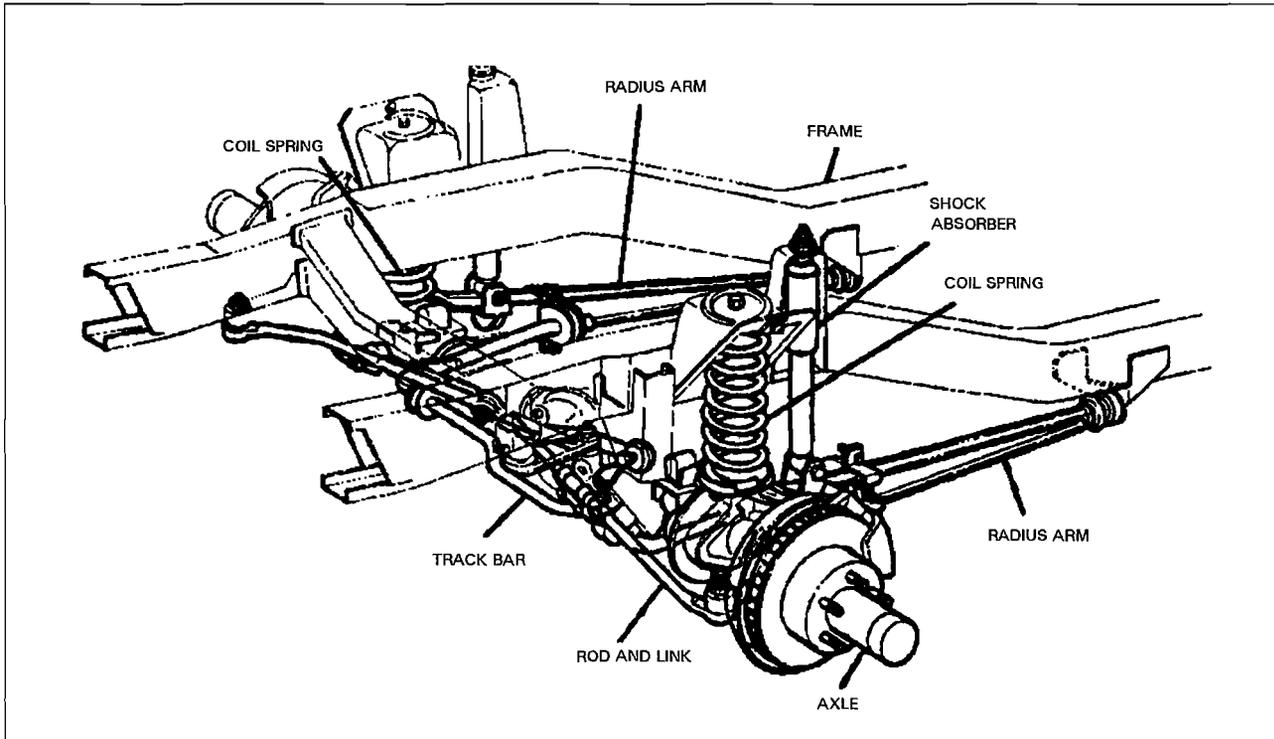
- The spring coil is broken or sagged so as to lower the vehicle more than 50 mm (2 inches) from the manufacturer's specified height.
- Control arms are bent, cracked, welded or bushings are loose.
- Rear torque arms are missing, bent, cracked, welded or the bushings are loose.
- The axial strut (applicable units) is missing, bent, cracked, welded or the bushings are loose.
- The radius arm (applicable units) is missing, bent, cracked, welded or the bushings are loose.
- The front and rear stabilizer bar is missing, disconnected, broken, loose, welded, damaged, or the bushing brackets and bolts are missing or loose.

**4. Torsion Bar Suspension****Procedure**

Inspect the torsion bar, mounting brackets, control arms, rear torque arms (applicable units), stabilizer bar(s) (applicable units), and the axial strut (applicable units).

**Reject the vehicle if:**

- The torsion bar is broken, cracked, welded or sagged so as to lower the vehicle more than 50 mm (2 inches) from the manufacturer's specified height.
- Mounting brackets are loose, cracked or welded.
- Control arms are bent, cracked, welded or the bushings are loose.



### Coil Spring Suspension

- Rear torque arms (applicable units) are missing, bent, cracked, welded or the bushings are loose.
- Stabilizer bar(s) (applicable units) is missing, disconnected, broken, loose, welded, damaged or the bushing brackets and bolts are missing or loose.
- The axial strut (applicable units) is missing, bent, cracked, welded or the bushings are excessively loose.

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#### HAZARDOUS CONDITION

- Any attaching component is missing, broken or loose.
  - Any torsion bar is cracked or broken.
  - Any attaching or tracking component is missing, loose, cracked or broken.
- 

## 5. More-ride Suspension

### Procedure

Visually inspect the attachment to frame and axle, clearance between frame and U-bolts, U-bolts, rubber banding [check with a 75 mm (3 inch) measuring device], and the cross member at suspension. **Note:** All bolts should be torqued to the manufacturer's specifications.

### Reject the vehicle if:

- Bolts are loose or missing at the attachment to the frame.
- The attachment to the axle is loose or damaged.
- Clearance between the frame and U-bolts is insufficient.
- U-bolts are not torqued to 225 ft.lbs. (306 Newton-meters) plus or minus 10 percent.
- Separation of rubber banding is in excess of 19 mm (<sup>3</sup>/<sub>4</sub> inches) in depth from the steel plate.

- The cross member at the suspension is broken or loose.

**Note:** All bolts should be torqued to the manufacturer's specifications.

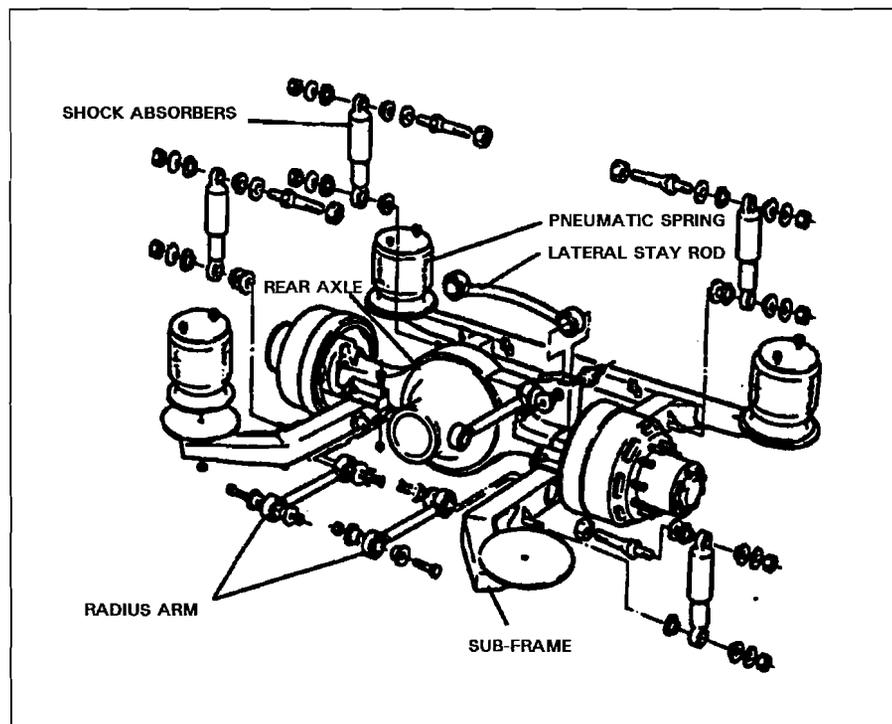
## 6. Air Suspension

### Procedure

With air in the suspension system and at normal operating pressure, visually and audibly inspect the bushings, pivots, lines, air bags, air bag base, radius rods, horizontal beam, pressure protection valve, suspension height, and height-leveling valve. **Note:** When checking the air bags for security, the vehicle must be jacked up on the frame.

### Reject the vehicle if:

- Bushings are loose, deteriorated, worn or elongated.
- Pivots are loose or worn.
- Lines are cracked, crushed, leaking or disabled.
- Air bags are cut, bruised or air leakage is evident.
- The vehicle body and chassis frame are unsupported on one or more axles or leans to one side.
- Air bags are mounted insecurely or cracked to the braid.
- Radius rods are loose, bent or broken.
- Horizontal suspension beam holes are rusted through or severely corroded.
- Air goes to the suspension before the brake system tank pressure reaches 450 kpa (65 psi).
- One or more suspensions are noticeably down.
- The height-leveling valve is inoperable, or the vehicle is equipped with only one valve and it is not mounted in the center of the frame or in the original equipment manufacturer's location.



Rear Suspension Assembly—Drive Axle

**HAZARDOUS CONDITION**

- Any component allows the axle to shift from its normal position.
- There is an air leak at any air bag.
- Any attaching or tracking component is missing, loose, cracked or broken.

## 7. Air Suspended Non-driving Axle

**Procedure**

With air in the suspension system at normal operating pressure, operate the lift control. Audibly and visually inspect for leaks, axle response and one-way valves.

**Reject the vehicle if:**

- Any air leak is evident when the axle is in the up or down position.
- A retractable axle does not respond to the lift control switch.
- Air supply is depleted to tag suspension, and safety one-way valves do not protect the main suspension system.

## 8. Shock Absorbers

Shock absorbers must be present on the vehicle if it was so equipped by the original equipment manufacturer. (All air ride suspensions require shock absorbers.)

**Procedure**

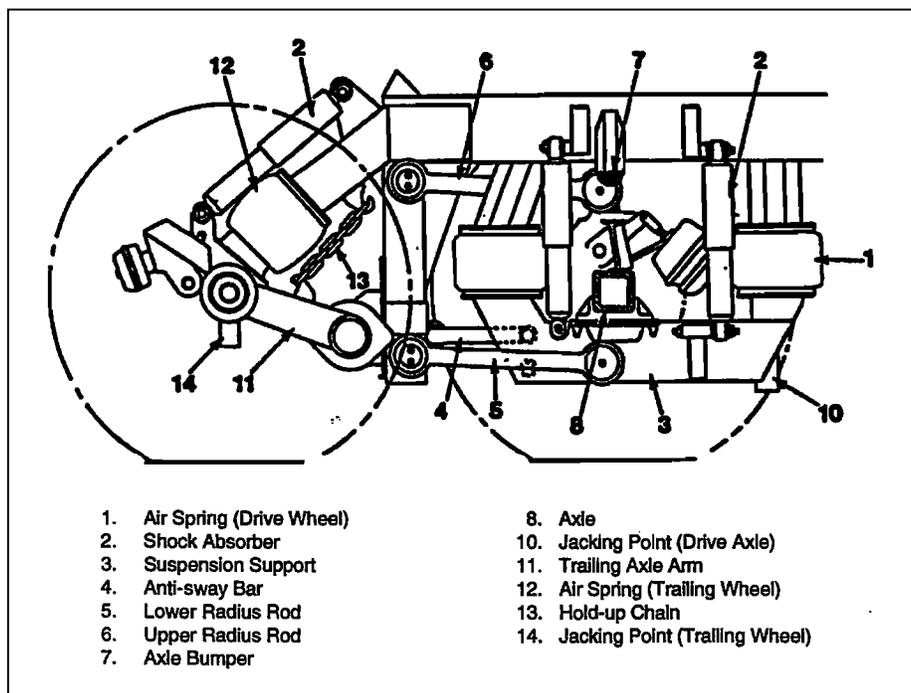
Visually inspect the shock absorbers' condition, mountings, bushings and attachments.

**Reject the vehicle if:**

- Shock absorbers are damaged and/or defective.
- Mountings are broken or loose.
- Bushings are loose, missing or deteriorated.
- Attachments are loose, broken or missing.

**HAZARDOUS CONDITION**

- Any shock absorber is missing, broken or not attached on air ride suspension.



Rear Suspension Assembly Drive Axle/Tag Axle

# Hydraulic Brake Systems

## Internal Brake Inspection

Regardless of the number of axles, all vehicles fitted with original equipment brakes by the manufacturer must have those brakes in proper working order before the vehicle can pass inspection.

If the front axle brakes are fitted but are not operative, the front brakes must be returned to proper working order before the vehicle can pass inspection.

If the original manufacturer's front axle brake components have been removed, they must be replaced and the front brake system brought into proper working order.

Internal components of brake systems should be inspected as follows:

1. When evidence of defect(s) on internal brake components is disclosed during inspection of external or internal brake components, the affected brake drum(s) should be removed for further inspection and repair.
2. When no evidence of brake defect(s) exists, inspection of internal components should be performed as follows:
  - a. Remove brake drums and inspect the internal brake components, measure and record the internal brake drum diameter, and measure and record the brake lining edge thickness at the center of the brake shoe; or
  - b. If fitted with removable dust shields or no dust shields are in place: with the dust shields removed, inspect the internal brake components, measure and record the internal brake drum diameter, and measure and record the brake lining edge thickness at the center of the brake shoe.

- c. If fitted with non-removable dust shields or backing plates:
  - When the owner provides proof that wheel removal and inspection of internal brake components was conducted within the preceding 24 months, perform a visual inspection through the inspection holes.
  - When proof of wheel removal is not provided by the owner or no inspection holes are present, remove brake drum(s) and inspect the internal brake components, measure and record the internal brake drum diameter, and measure and record the brake lining edge thickness at the center of the brake shoe.

**Note:** Proof of brake drum removal and inspection of internal brake components should include the brake drum inside diameter and brake lining thickness measurements. The registered owner of the vehicle or a person designated by the owner is responsible for providing proof of inspection of the internal brake components.

## 1. Parking Brakes

### Procedure

**Step 1:** With the engine idling, apply the parking brakes. Place an automatic transmission into drive. For a manual transmission, shift into gear and partially engage the clutch.

**Step 2:** Visually inspect the function of the parking brakes, indicator lamp (if equipped), brake application, mechanism, cable (if equipped) and lining (if equipped).

### Reject the vehicle if:

- Parking brakes fail to hold.
- The indicator lamp (if equipped) fails to illuminate.

- Brakes fail to fully apply or release.
- The parking brake mechanism binds or is inoperable.
- The cable (if equipped) is frayed, broken or missing.
- The lining (if equipped) is less than 1.6 mm ( $\frac{1}{16}$  inch) above the shoe on external clamping type.

---



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**HAZARDOUS CONDITION**

- Upon actuation of the parking brake, the brake fails to hold the vehicle.
- 
- 

## 2. Hydraulic System

**Procedure**

Visually inspect the lines, hoses, master cylinder and cap.

**Reject the vehicle if:**

- Lines and hoses are leaking, welded, cracked, chafed, flattened, insecurely mounted or have restricted sections.
- Lines and hoses have any repairs other than steel tubing.
- Connections are other than double flared.
- The master cylinder is leaking, loose or the fluid level is below 12.7 mm ( $\frac{1}{2}$  inch) from the top.
- The cap is missing or loose, vent holes are plugged, or the gasket is missing or damaged.

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**HAZARDOUS CONDITION**

- Any brake hose or line seeps or swells under pressure.
  - Any brake hose is cracked to the second layer.
  - The master cylinder reservoir is less than one-quarter full.
- 
- 

## 3. Dual Hydraulic Circuit

**Procedure**

Visually and manually inspect the warning indicator lamp and the pressure differential switch.

**Reject the vehicle if:**

- The warning indicator lamp illuminates in the "ON" position, it fails to operate in the "START" position, or the lamp operates continuously.
- The warning indicator lamp comes on with the engine running and the brake pedal depressed with a heavy foot force (about 55 kg [125 lbs.] force).

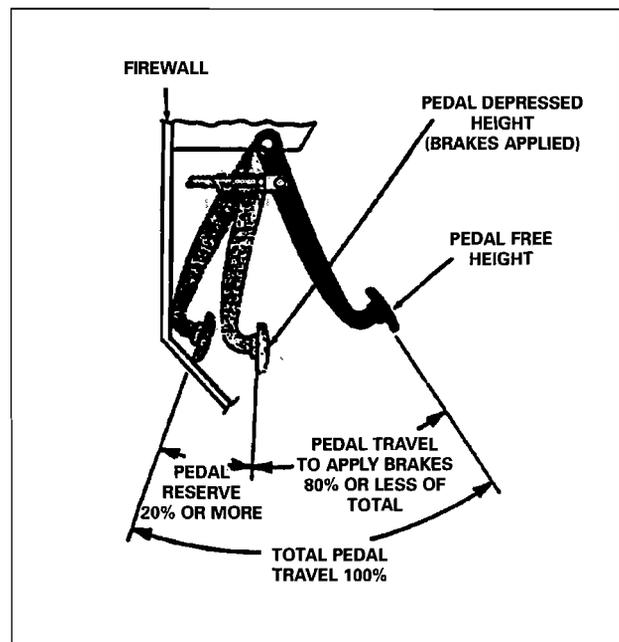
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**HAZARDOUS CONDITION**

- The brake failure lamp illuminates continuously.
- 
- 



**Brake Pedal Travel**

## 4. Hydraulic Brake Leakage and Pedal Reserve

### Procedure

With the engine running (if equipped with power brakes) and without pumping or repeated brake pedal applications, apply a moderate foot force to the pedal and maintain it for 80 seconds. With the use of a measuring device, visually inspect for leakage and brake pedal travel.

### Reject the vehicle if:

- The pedal moves in the applied direction.
- The pedal travel from its free height to its depressed height is more than 65 percent of this total or does not meet manufacturer's specifications.

---

### HAZARDOUS CONDITION

- Any fluid leakage is observed in the system.
  - The service brake pedal requires pumping to maintain the pedal reserve.
  - The pedal free play exceeds 80 percent.
- 

## 5. Hydraulic System with Hydraulic Assist

### Procedure

**Step 1:** Inspect for leakage and pedal reserve as described above in *Chapter 3, Item 4*. Vehicles equipped with an electrically driven hydraulic pump that functions in the event of a power steering failure can be checked by applying moderate pressure on the brake pedal. Visually and audibly inspect pedal travel, the warning indicator lamp (if applicable), the pump reservoir, lines and hoses, belt and the motor operation.

### Reject the vehicle if:

- No movement in the pedal is detected.
- The warning indicator lamp (if applicable) is inoperable when the power steering pump is stopped.
- Fluid in the pump reservoir is below the indicated "ADD" mark.
- Lines and hoses are leaking.
- The belt is loose, cracked or excessively worn.
- The motor fails to operate when the engine is not running.

**Step 2:** Stop the engine and with the ignition in the "OFF" position, depress the brake pedal several times, apply moderate foot pressure on the brake pedal and start the engine.

### Reject the vehicle if:

- No pedal movement is observed.

---

### HAZARDOUS CONDITION

- The power assist unit fails to operate.
  - The service brake pedal does not move toward the floorboard with the brakes applied when the engine is started.
- 

## 6. Vacuum System

### Procedure

Visually and manually inspect the vacuum system lines and hoses, condition, clamps and tank(s).

### Reject the vehicle if:

- Lines and hoses are collapsed, broken, chafed, insecurely mounted, less than 38 mm (1 1/2 inches) from any part of the exhaust system.
- The system is leaking.
- Clamps are loose, missing or broken.
- Any tank is missing, loose, damaged or leaking.

**HAZARDOUS CONDITION**

- The power assist unit fails to operate.
- A check valve is missing or inoperative.
- The service brake pedal does not move toward the floorboard with the brakes applied when the engine is started.

**7. Vacuum Booster****Procedure**

With the engine off, depress the brake pedal several times to eliminate vacuum, apply a light foot force of 12 kg (25 lbs.) on the brake pedal and then start the engine. Visually inspect the operation and condition of the vacuum booster.

**Reject the vehicle if:**

- Movement in the brake pedal is not detected.
- The vacuum booster is loose, damaged or the mounting is cracked.

**HAZARDOUS CONDITION**

- The power assist unit fails to operate.
- A check valve is missing or inoperative.
- The service brake pedal does not move toward the floorboard with the brakes applied when the engine is started.

**8. Vacuum Reserve****Procedure**

Start engine, build to full vacuum, shut engine off, and make one full brake application. Manually and visually inspect the reserve and the buzzer or brake lamp indicator (applicable vehicles).

**Reject the vehicle if:**

- The reserve is insufficient to assist three full applications.
- The buzzer or brake lamp indicator fails to operate when the system is reduced to 2 kpa (8 inches) of vacuum.
- The buzzer or brake indicator lamp activates continuously after one application.

**9. Vacuum Pump (if equipped)****Procedure**

**Step 1:** Pump the brakes to deplete all vacuum. If the system also uses engine vacuum, disconnect the source.

**Step 2:** Operate the engine at approximately 1,200 rpm and visually inspect the reserve.

**Reject the vehicle if:**

- The vacuum pump is unable to achieve and maintain 4.5 kpa (18 inches) of vacuum.

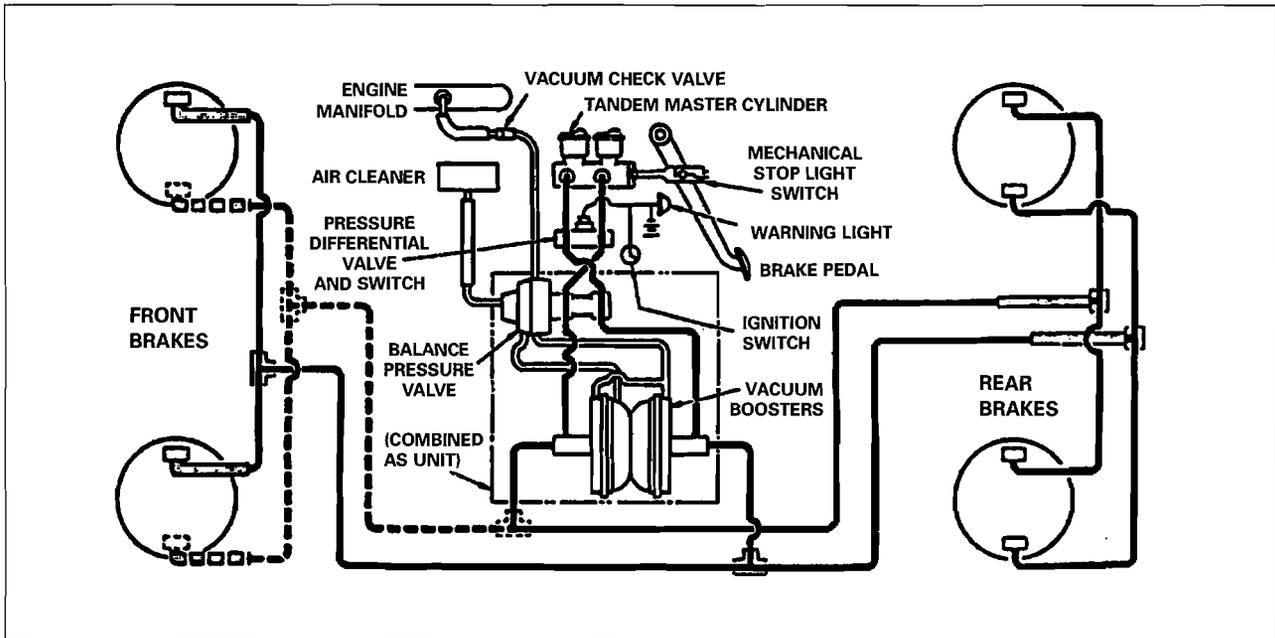
**10. Front Drum Brakes****Procedure**

*Equipment needed:* Vernier caliper or steel scale.

**Step 1:** Visually and with the use of a steel scale or Vernier caliper inspect the wear and condition of the lining.

**Reject the vehicle if:**

- Bonded lining is worn to 1.6 mm ( $1/16$  inch) or less at the center or at any point other than the chamfered area of the shoe.
- Bonded lining is broken, cracked, insecurely bonded to the shoe, contaminated or shows extremely uneven wear.
- Riveted lining is worn to 3.2 mm ( $1/8$  inch) or less at the center or at any point other than the chamfered area of the shoe.



Split Hydraulic Brake System Schematic for Medium-duty and Heavy-duty Vehicles

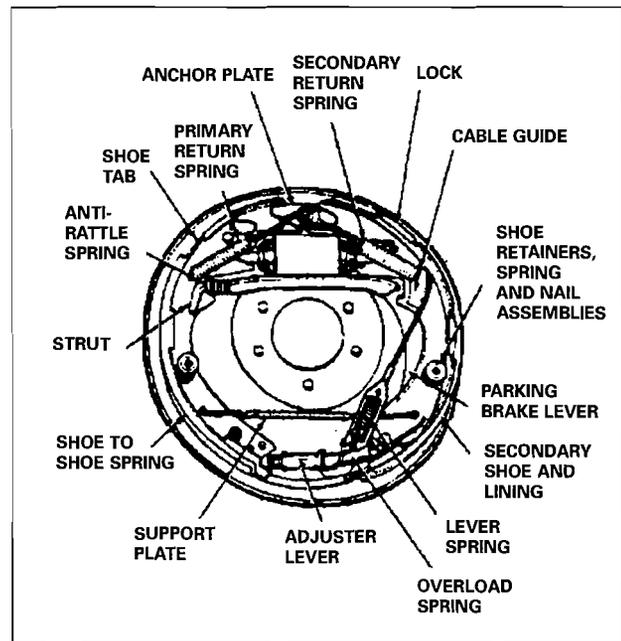
- Riveted lining is broken, cracked, contaminated or shows extremely uneven wear.

**Step 2:** Visually inspect mechanical components including self-adjusters, self-adjuster cables and linkage, anchor pins and springs, backing plate, and the axle and spindle.

**Reject the vehicle if:**

- Self-adjusters are seized, excessively worn, inoperable, missing, or the wrong thread for the wheel has been installed.
- Self-adjuster cables and linkage are missing, loose, broken, inoperable, or cables are frayed.
- Anchor pins and springs are missing, loose, broken, excessively worn or stretched.
- The backing plate is worn so as to restrict free movement of shoes.
- Evidence of cracking is present in the axle and spindle.

**Step 3:** Visually inspect the operation, condition and dust seals of the wheel cylinders.



Typical Servo Drum Brake

**Reject the vehicle if:**

- Wheel cylinders are inoperable or seized.
- Wheel cylinders are leaking, damaged or mounted insecurely.
- Dust seals are damaged, missing or deteriorated.

**Step 4:** Visually inspect the condition of the brake drums. When the wheels are removed, brake drums must be inspected as per this section.

**Reject the vehicle if:**

- Cracks extend to the open edge of the drum.
- Any external cracks are present.
- Hot spots that cannot be removed by machining within drum limits are present in more than three locations.
- The friction surface is uneven.

**Step 5:** Using an approved gauge, measure the inside diameter of the drum at two different locations approximately 90 degrees apart.

**Reject the vehicle if:**

- One or more grooves have worn into the drum so that the measurement in the groove exceeds the wear limit.
- Out-of-round is more than 0.25 mm (.010 inches) on drums 280 mm (11 inches) in diameter and smaller.
- Out-of-round is more than 0.63 mm (.025 inches) on drums greater than 280 mm (11 inches) in diameter.
- Wear exceeds specifications as set out in *Chapter 3, Item 13*.

**Step 6:** Apply the brakes and try to rotate the wheel.

**Reject the vehicle if:**

- The wheel rotates.

**HAZARDOUS CONDITION**

- Any brake drum is in a condition that would indicate that failure is imminent.

## 11. Front Disc Brakes

**Procedure**

**Step 1:** Visually and with the use of a micrometer and dial indicator inspect the rotors, calipers, and pads.

**Reject the vehicle if:**

- Rotors are broken or damaged, or cracks on the surface extend to the outer edges.
- Two grooves are worn beyond a maximum of 2.3 mm (0.09 inches).
- Lateral runout exceeds 0.128 mm (.005 inches) on discs 380 mm (15 inches) in diameter or less.
- Lateral runout exceeds 0.25 mm (0.01 inches) on discs greater than 380 mm (15 inches).
- Condition of rotors exceeds wear limits in *Chapter 3, Item 13*.
- Calipers are leaking or the piston or caliper is seized.
- Pads are damaged or contaminated.
- Pads are worn to 1.6 mm ( $1/16$  inch) or less at the thinnest point on bonded pads.
- Pads are worn to 3.2 mm ( $1/8$  inch) or less at the thinnest point on riveted pads.

**Step 2:** Apply the brakes and attempt to rotate the wheel assembly.

**Reject the vehicle if:**

- Wheels rotate.

**HAZARDOUS CONDITION**

- Any rotor is cracked to the hub or failure appears imminent.

## 12. Rear Brakes

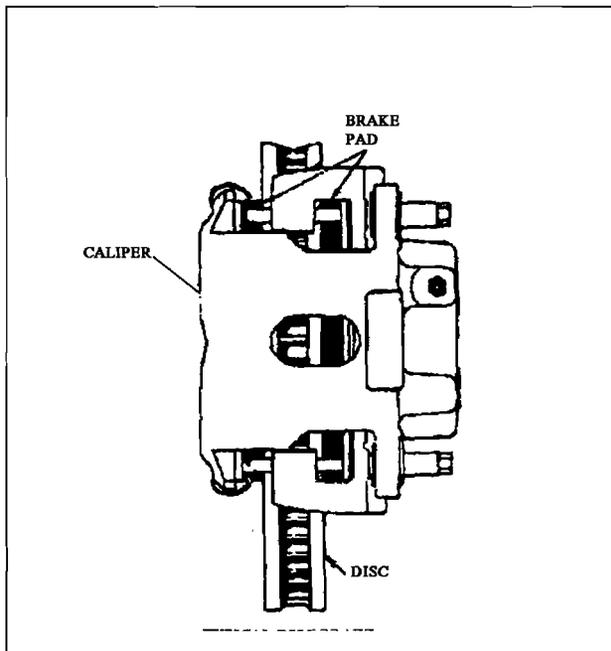
### Procedure

**Step 1:** Visually inspect the condition and wear of the rear brake linings.

#### Reject the vehicle if:

- Bonded lining is worn to 1.6 mm ( $1/16$  inch) or less at the center or at any point other than the chamfered area of the shoe.
- Bonded lining is broken, cracked, contaminated or insecurely bonded to the shoe.
- Riveted lining is worn to 3.2 mm ( $1/8$  inch) or less at the center or at any point other than the chamfered area of the shoe.
- Riveted lining is broken, cracked or contaminated.

**Step 2:** Inspect the mechanical components including the self-adjusters, self-adjuster cable and linkage, anchor pins and springs, backing plate, parking brake cables and linkage.



Typical Disc Brake

#### Reject the vehicle if:

- Self-adjusters are seized, worn, inoperable, missing or the wrong thread for the wheel is installed.
- The self-adjuster cable and linkage are missing, loose, broken, inoperable or cables are frayed.
- Anchor pins and springs are missing, loose, broken, excessively worn or stretched.
- The backing plate is worn so as to restrict free movement of shoes.
- Parking brake cables and linkage are missing, loose, broken, inoperable or cables are frayed.

**Step 3:** Through the inspection holes (if equipped), or through adjuster holes, visually inspect the operation and condition of the wheel cylinders and dust seals.

#### Reject the vehicle if:

- Wheel cylinders are inoperable or seized.
- Wheel cylinders are leaking.
- Dust seals are damaged, missing or deteriorated.

**Step 4:** Visually inspect the condition of the brake drums. When wheels are removed, brake drums must be inspected as per this section.

#### Reject the vehicle if:

- Cracks extend to the open edge of the drum.
- Any external cracks are present.
- Hot spots are present in more than three locations that cannot be removed by machining within drum limits.
- The friction surface is uneven.

**Step 5:** Using an approved gauge, measure the inside diameter of the drum at two locations approximately 90 degrees apart.

**Reject the vehicle if:**

- A drum has more than two grooves worn so that measurement in the grooves exceeds wear limits as per *Chapter 3, Item 13*.
- Out-of-round is more than 0.25 mm (0.010 inches) on drums 280 mm (11 inches) and smaller.
- Out-of-round is more than 0.63 mm (0.025 inches) on drums greater than 280 mm (11 inches).
- The drum exceeds specifications as set out in *Chapter 3, Item 13*.

**HAZARDOUS CONDITION**

- A brake drum is in a condition that indicates failure is imminent.

### 13. Machining and Wear Limits, Brake Drums and Rotors

**A. BRAKE DRUMS**

1. No combination of machining and wear may exceed the manufacturer's stamped limit.
2. If the manufacturer's limit is not available, then no combination of wear and machining may exceed:
  - 2.3 mm (0.09 inches) over the original; drum diameter of 350 mm (14 inches) or less.
  - 3.0 mm (0.12 inches) over the original; drum diameter greater than 350 mm (14 inches).

**B. BRAKE ROTORS**

1. Original thickness may not be decreased by any combination of wear and machining below the manufacturer's minimum thickness.

### 14. Anti-lock Brake Systems (ABS)

Buses with hydraulic brakes manufactured after March 1, 1999, must be equipped with anti-lock brakes when they are operated in the United States.

**Procedure**

If a vehicle is equipped with an ABS brake system, visually and manually inspect the warning light.

**Reject the vehicle if:**

- The warning light fails to illuminate during the cycle or self check, or a self-diagnostic error is indicated.

# Air Brakes

## Internal Brake Inspections

Regardless of the number of axles, all vehicles fitted with original equipment brakes by the manufacturer must have those brakes in proper working order before the vehicle can pass inspection.

If the front axle brakes are fitted but are not operative, the front brakes must be returned to proper working order before the vehicle can pass inspection.

If the original manufacturer's front axle brake components have been removed, they must be replaced and the front brake system brought into proper working order.

Internal components of brake systems should be inspected as follows:

1. When evidence of defect(s) on internal brake components is disclosed during inspection of external or internal brake components, the affected brake drum(s) should be removed for further inspection and repair.
2. When no evidence of brake defect(s) exists, inspection of internal components should be performed as follows:
  - a. Remove brake drums and inspect the internal brake components, measure and record the internal brake drum diameter, and measure and record the brake lining edge thickness at the center of the brake shoe; or
  - b. If fitted with removable dust shields or no dust shields are in place:
    - With dust shields removed, inspect internal brake components, measure and record the internal brake drum diameter, and measure and record brake lining edge thickness at the center of the brake shoe; or

- With dust shields removed, inspect internal brake components, perform a camshaft rotation test and record the measurement.

c. If fitted with non-removable dust shields:

- When the owner provides proof that wheel removal and inspection of internal brake components was conducted within the preceding 24 months, perform a camshaft rotation test and record the measurement.
- When proof of wheel removal is not provided, remove brake drum(s) and inspect the internal brake components, measure and record the internal brake drum diameter, and measure and record the brake lining edge thickness at the center of the brake shoe.

**Note:** Proof of brake drum removal and inspection of internal brake components should include the brake drum inside diameter and brake lining thickness measurements. The registered owner of the vehicle or a person designated by the owner is responsible for providing proof of inspection of the internal brake components.

## 1. Air Compressor

### Procedure

Manually and visually inspect the compressor, belts (if equipped), compressor mount (if equipped), air filter (applicable units) and the pulley.

### Reject the vehicle if:

- The compressor is loose.
- Belts (if equipped) are deteriorated, frayed, loose [maximum deflection 12.7 to 19 mm ( $1/2$  to  $3/4$  inch)].

- The compressor mount (if equipped) is loose, cracked or bolts are missing.
- The air filter (applicable units) is missing or contaminated so as to affect the airflow.
- The pulley is bent or damaged.

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**HAZARDOUS CONDITION**

- A belt or pulley is in such a condition that failure is imminent.
  - The compressor is mounted insecurely, resulting in it shifting from its normal position.
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- 

## 2. Compressor Air-build Time

**Procedure**

With the spring brakes released and wheels chocked, reduce pressure in the system until the pressure gauge indicator is less than 350 kpa (50 psi). Run the engine at 1,200 rpm and record the time required to raise the air pressure from 350 to 600 kpa (50 to 90 psi) on the gauge. Inspect the air-build time.

**Reject the vehicle if:**

- Air-build time exceeds three minutes.

## 3. Air Governor

**Procedure**

**Step 1:** Visually inspect the governor cutout.

**Reject the vehicle if:**

- The governor cutout is not between 805-945 kpa (115 to 135 psi).

**Step 2:** Visually inspect the governor cut-in. With spring brakes released at maximum pressure and with the engine idling, make a rapid series of brake applications and observe the gauge pressure when the governor cuts in.

**Reject the vehicle if:**

- The governor cut-in pressure is below 560 kpa (80 psi).

## 4. Low Air Pressure Warning Systems

**Procedure**

Visually and audibly inspect the low air pressure warning system. This may be a lamp, buzzer or wig-wag.

**Reject the vehicle if:**

- The warning system is missing.
- The warning system fails to operate below 382 kpa (55 psi) or one-half governor cut-out pressure, whichever is less.

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**HAZARDOUS CONDITION**

- The low air pressure warning system is missing or fails to operate below 382 kpa (55 psi).
- 
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## 5. Air System Leakage

**Procedure**

With a fully charged air system and the spring brakes released, make a full service brake application. Shut down the engine and record the air pressure drop in kpa (psi) per minute. Conduct the test for at least two minutes. Visually inspect for leakage.

**Reject the vehicle if:**

- Leakage exceeds 20 kpa (3 psi) per minute.

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**HAZARDOUS CONDITION**

- Leakage exceeds 40 kpa (6 psi) per minute.
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## 6. Compressed Air Reserve

This is a reserve air inspection only and must not be used as an indicator that brakes are properly adjusted.

**Procedure**

With fully charged air system and spring brakes released, stop the engine and make one full service brake application. Visually inspect the drop in reservoir pressure.

**Reject the vehicle if:**

- The drop in reservoir pressure is more than 130 kpa (18 psi). **Note:** If defective, recheck after brake adjustment.

## 7. Air Reservoirs and Check Valves

**Procedure**

With the air system fully charged and wheel chocks installed, open the drain valve on the primary (wet) tank or on a service tank. Check valve(s) should close and retain compressed air in secondary (dry) tank or tanks, then open the secondary tank valve. Visually inspect the check valve(s).

**Reject the vehicle if:**

- Check valve(s) do not close.

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**HAZARDOUS CONDITION**

- Check valve(s) is inoperable or missing.
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## 8. Quick-release Valves

**Procedure**

With spring brakes released, apply the service brake and then release. Inspect the operation and mounting of the quick-release valves.

**Reject the vehicle if:**

- Air is not quickly exhausted through the exhaust port of the valve when brakes are released.
- Mounting is insecure or the bracket is broken or loose.

## 9. Relay Valves

**Procedure**

With spring brakes released, apply the service brakes and observe the application of the brake chambers served by the relay valve being tested, then release the brakes. Inspect the relay valve operation and mounting.

**Reject the vehicle if:**

- Air is not quickly exhausted through the exhaust port of the valve when the brakes are released.
- Mounting is insecure or the bracket is broken or loose.

## 10. Air Parking System

**Procedure**

**Step 1:** Using park spring brake control valve, release air pressure from the spring brakes. Visually inspect the pushrod location.

**Reject the vehicle if:**

- The pushrods are in a fully extended position and the vehicle can be moved.
- Parking brakes do not start to apply when the reservoir pressure is reduced to 280 kpa (40 psi).
- Full application has not occurred when the air pressure is exhausted.

**Step 2:** Recharge the system and release the spring brakes.

**Reject vehicle if:**

- Brakes do not fully release.

**Step 3:** Inspect the air parking system operation. There are different systems designed for automatic or manual operation of spring brakes in an emergency. Check the operation of the system as the design allows. **Note:** Check automatic application of brakes when the air tanks are being drained.

**Reject the vehicle if:**

- The emergency release tank does not contain a supply of air under pressure when the total service system is depleted.
- The parking brakes do not release when the control valve is held in the release position.

**HAZARDOUS CONDITION**

- The parking system fails to hold the vehicle.

## 11. Air Brake Components

**Procedure**

Visually inspect the air lines, air line connectors, air tanks, air tank brackets and straps, drain cocks, splices and moisture ejectors (manual or automatic).

**Reject the vehicle if:**

- Air lines are abraded to the first body cord, or they are insecure, flattened, cracked, broken, kinked or leaking.
- Air lines are within 50 mm (2 inches) of exhaust and no heat shield.
- Air lines do not meet the original equipment manufacturer's design standards.
- Braided lines braid is exposed at the first layer.
- Air line connectors do not meet the OEM design standards.
- Air tanks are missing, leaking, loose, damaged as to cause possible failure or have welding other than factory welds.
- Air tank brackets and straps are cracked, broken, missing or an inferior substitute has been used.
- Drain cocks are missing, loose, leaking, and inoperable or do not meet the OEM design standards.
- Splices do not meet the OEM design standards.

- Moisture ejectors (manual or automatic) are inoperable or not present on each tank.

**HAZARDOUS CONDITION**

- Failure of any airline appears imminent.
- Any line bulges under pressure.
- Any splice does not meet the OEM design standards.

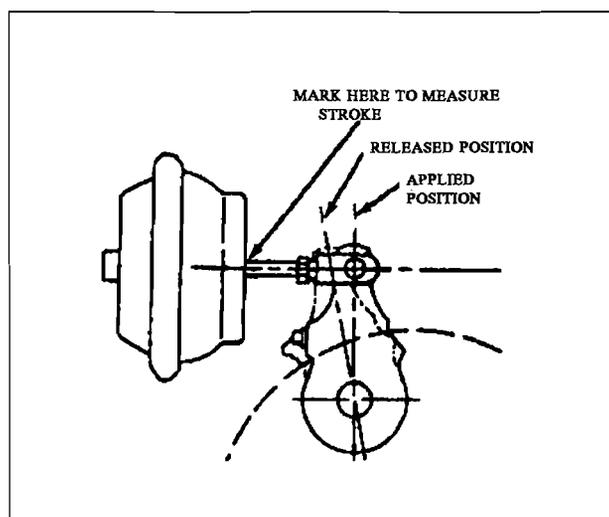
## 12. Brake Mechanical Components

**Procedure**

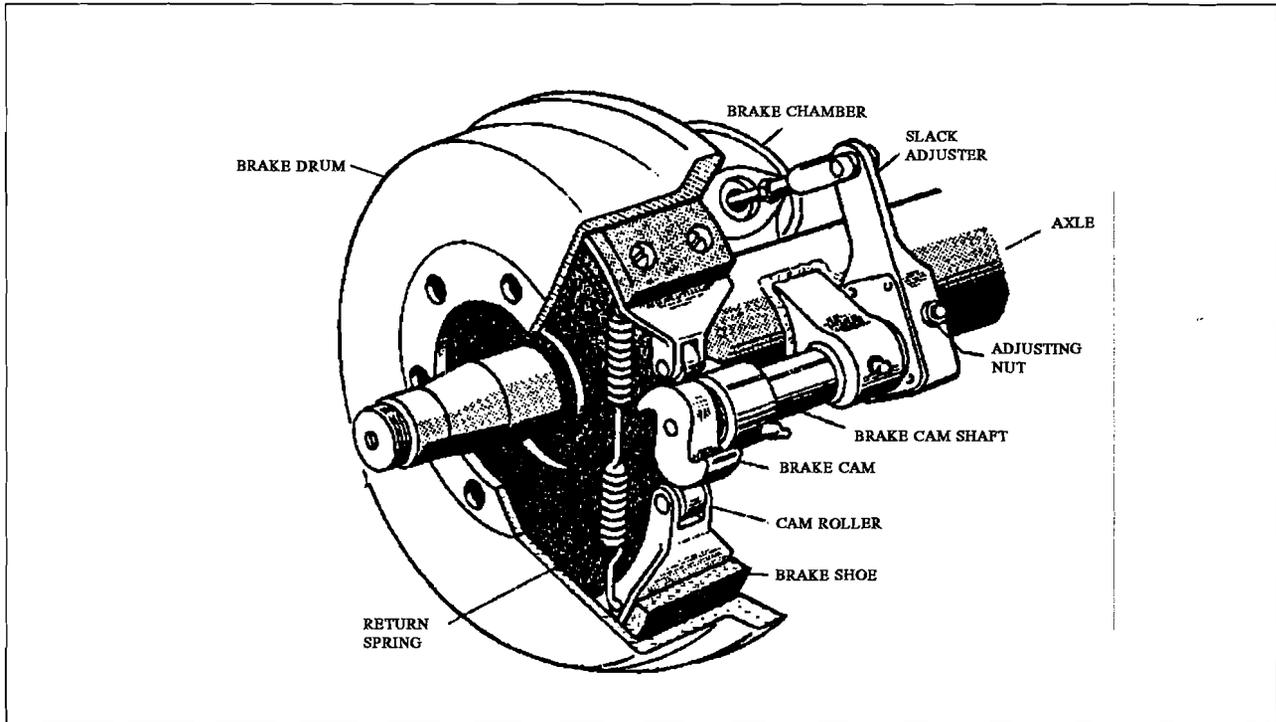
**Step 1:** Visually inspect the brake chambers.

**Reject the vehicle if:**

- Brake chambers are damaged, mounted insecurely, leaking or corroded.
- At least one drain hole is not pointing in a downward direction and/or plugged.
- There is a mismatched chamber size on the same axle.
- Brake chambers are not the same type and size on any given axle.



**Measuring the Brake Cam Adjustment**



### S-cam Brake Components

**Step 2:** Visually inspect the mounting brackets, clevis pins, clevis yokes, pushrods, slack adjusters, slack adjuster nut self-locking sleeve, pushrod clevis pin hole setting, return spring and rollers.

**Reject the vehicle if:**

- Mounting brackets are loose, cracked, deformed, broken or missing.
- Clevis pins are excessively worn, the cotter pin is missing, or an inferior substitute, such as a nut and bolt, has been used.
- Pushrods are bent, broken or misaligned to the slack adjuster.
- Pushrods do not form a 90 degree angle, or as close as practical, with the slack adjuster when the brakes are applied with approximately 620 kpa (90 psi) force.

**Note:** The 90 degree angle is a suggested guideline only. Not all brakes achieve 90 degrees, therefore check with the manufacturer's specifications.

- Slack adjusters are bent, broken, excessively worn, seized, or function improperly.
- A slack adjuster nut self-locking sleeve is seized or inoperable.
- The pushrod clevis pinhole setting is not the same hole on the same axle.
- The distance from the center of the cam to the pushrod clevis pinhole is not the same on the same axle.
- The return spring is missing, stretched or does not hold the lower roller to the cam.
- Rollers are missing, have flat spots, or are the wrong size.

**Step 3:** Visually inspect the brake shoe, anchor pins and spiders.

**Reject the vehicle if:**

- The brake shoe and anchor pins are missing or wear allows the lining to protrude outside the edge of the brake drum.
- Spiders are bent, loose or bolts are missing.

**HAZARDOUS CONDITION**

- Defective brakes on the unit are equal to or greater than 20 percent of all brakes on the unit. A defective brake is considered as any brake that does not meet the standards as per *Chapter 3A* of this manual.
- With spring brakes released and service brake applied, any air leak at the brake chambers is evident that exceeds the allowable drop.
- Any one brake fails to operate on a steering axle.

### 13. Self-adjusting Slack Adjuster (if applicable)

 In the United States, vehicles with an external adjustment mechanism and exposed push rods manufactured after October 20, 1994, must be equipped with automatic brake adjustment and brake adjustment indicators.

 In Canada, vehicles with an external adjustment mechanism and exposed push rods manufactured after May 31, 1996, must be equipped with automatic brake adjustment and brake adjustment indicators.

**Procedure**

**Step 1:** Inspect for the presence of automatic brake adjustment and brake adjustment indicators, if so equipped.

**Reject the vehicle if:**

- Automatic brake adjusters and brake adjustment indicators are missing or inoperative.
- Indicators are not clearly visible.

**Step 2:** With the assistance of a second party, make a treadle valve application and note the pushrod travel. Inspect the adjustment.

**Reject the vehicle if:**

- Adjustment is not within the manufacturer's specifications.

### 14. Brake Camshafts

**Procedure**

With the spring and service brakes released, manually check for movement between the camshaft and bushings. Visually and with the use of a dial indicator, inspect the condition of the camshaft and bushings.

**Reject the vehicle if:**

- Bushings on the camshaft are worn more than 2.1 mm (0.085 inches).

### 15. Camshaft Travel

**Procedure**

Back off the slack adjuster until movement is noticed in the brake chamber pushrod. The roller will now be in the bottom position of the S-cam. Brake S-cam bushings should be inspected at this time. Mark the slack adjuster in relation to the camshaft with chalk. Adjust the brakes to lock the wheel, and visually inspect travel. **Note:** Ensure that brakes are properly adjusted after the test.

**Reject the vehicle if:**

- The difference between the marks is more than 120 degrees or one-third of camshaft travel.
- Overcammed.

**HAZARDOUS CONDITION**

- Cam travel exceeds 120 degrees.
- Cam is inoperable.
- Oversized rollers are used.

## 16. Rear Brake Linings

### Procedure

**Step 1:** Visually inspect brake shoes and linings. If shoes and linings cannot be seen, remove the lower portion of the dust cover. Inspect the condition, wear and wheel seals. **Note:** Evidence of contamination requires the pulling of the wheel for verification that brake function will not be impaired. If more than 20 percent of the surface is contaminated, it must be replaced.

### Reject the vehicle if:

- Shoes and linings are broken, cracked or contaminated (i.e., oil).
- The lining protrudes outside of the drum.
- There is a parting of lining from the shoe.
- Shims are used between the lining and the shoe.
- Brake lining thickness is worn to 8 mm ( $\frac{5}{16}$  inch) or less at the center or at any point other than the chamfered area of the shoe. **Note:** It may be necessary to back off slack adjusters to make an accurate measurement.
- Wheel seals are leaking. **Note:** Seepage is not cause for rejection.

### HAZARDOUS CONDITION

- Any lining is worn below 8 mm ( $\frac{5}{16}$  inch).

## 17. Brake Drums

When wheels are removed, this item must be inspected as per this chapter.

### Procedure

**Step 1:** Visually inspect the condition of the brake drum.

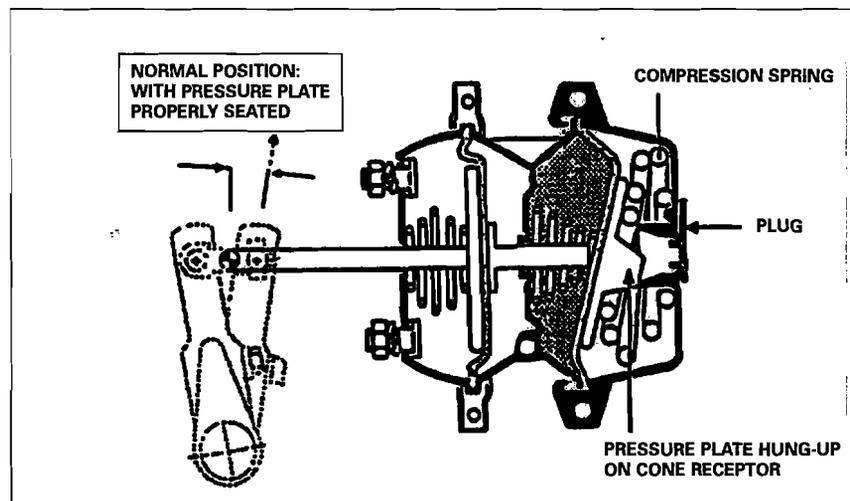
### Reject the vehicle if:

- Cracks extend to the open edge of the drum.
- Any external cracks are present.

**Step 2:** Using an approved gauge, measure the inside diameter of the drum at two different locations approximately 90 degrees apart.

### Reject the vehicle if:

- One or more grooves have worn so that measurement in the groove exceeds the wear limit.
- Out-of-round is more than 0.25 mm (.01 inches) on drums 280 mm (11 inches) in diameter and smaller.



Brake Dragging Condition with Brakes Not Applied

- Wear exceeds specifications as set out in *Chapter 3A, Item 23*.

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**HAZARDOUS CONDITION**


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- A brake drum is in a condition that would indicate failure is imminent.
- 

## 18. Spring Brakes

### Procedure

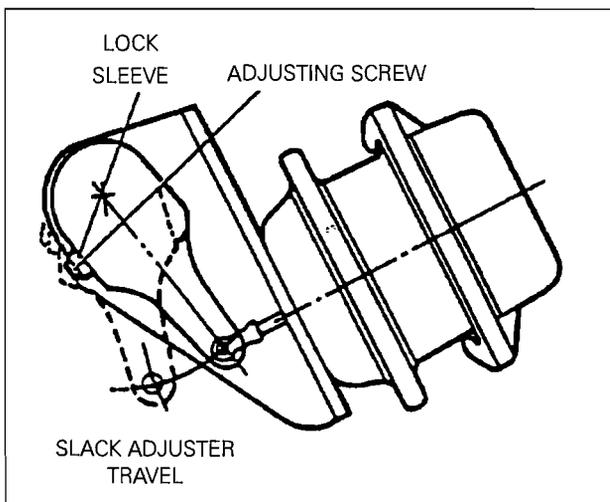
Visually inspect the operation of the spring brakes.

### Reject the vehicle if:

- Spring brakes have been rendered inoperable by use of caging bolts or other mechanical means.
- Spring brakes cannot be released mechanically.

### WARNING! DANGER!

Do not attempt to dismantle the double diaphragm spring brake unit. Utilizing a safety cage, remove the entire unit from the vehicle. Replace the unit with a new or rebuilt assembly.



Slack Adjustment on Cam-type Air Brakes

## 19. Brake Adjustment

After inspection of the brake items is complete, visually and manually inspect the brake adjustment.

### A. S-CAM BRAKES

#### Procedure

**Step 1:** Support the vehicle on safety stands or with the wheels on the ground and spring brakes released, apply the service brakes at approximately 620 kpa (90 psi). Visually check the angle between the pushrod and slack adjuster and measure pushrod travel.

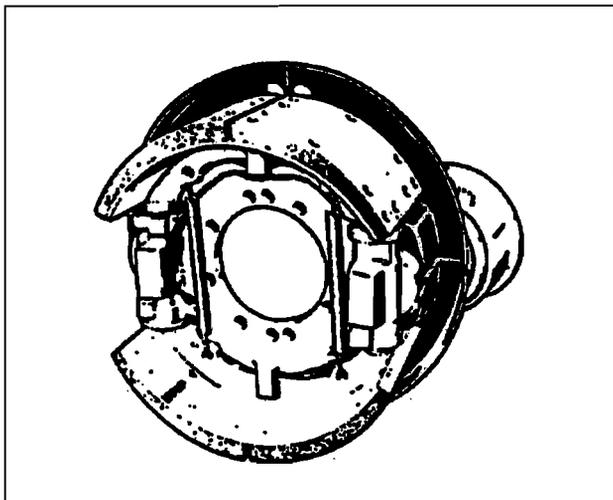
#### Reject the vehicle if:

- The angle between the pushrod and the slack adjuster is not 90 degrees or as close as practical. **Note:** The 90 degree angle is a suggested guideline only. Not all brakes achieve 90 degrees, therefore check with the manufacturer's specifications.
- Pushrod travel is not between 19 to 37.5 mm ( $\frac{3}{4}$  to  $1\frac{1}{2}$  inches).
- Pushrod travel is not within 6.4 mm ( $\frac{1}{4}$  inch) for chambers of the same type and size on the same axle.

**Step 2:** Try to rotate the wheel.

#### Reject the vehicle if:

- The wheel rotates.



Wedge-type Air Foundation Brake (Twinplex)

**B. WEDGE BRAKES****Procedure**

Visually and manually inspect the application and measure the distance the lining travels from fully released to fully applied position.

**Reject the vehicle if:**

- The wheel rotates.
- Travel exceeds 1.6 mm ( $1/16$  inch).

**HAZARDOUS CONDITION**

- Adjustment exceeds standards as per this section.

**C. INTERLOCK SYSTEM**

Some transit type vehicles equipped with air brakes may have a system whereby service brakes are automatically applied any time the exit door is opened.

**Procedure**

Test the interlock systems by attempting to move the bus with the exit doors open. Test the interlock override system (if equipped).

**Reject the vehicle if:**

- The vehicle moves when the exit door is open and the treadle valve is not applied.
- The interlock override does not release the brake when the exit door is open.

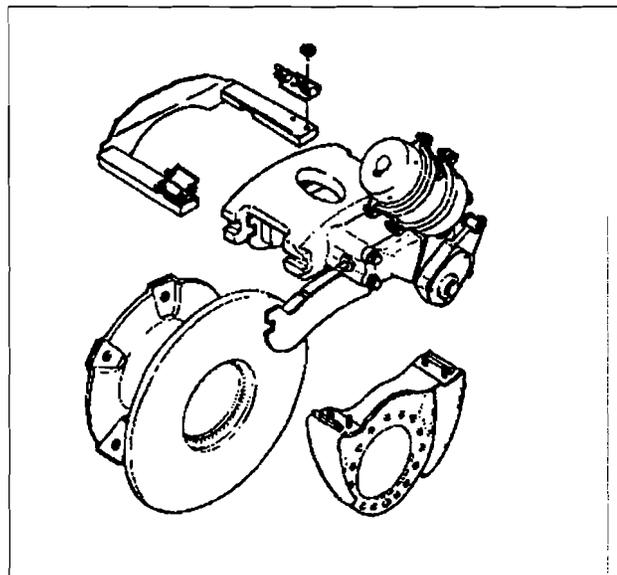
**20. Disc Brakes****Procedure**

Visually and with the use of a micrometer and dial indicator, inspect the disc brake rotor, calipers, anchor plates, pads, adjustment, application and wheel seals.

*Equipment needed:* Micrometer and dial indicator.

**Reject the vehicle if:**

- Cracks on the surface of the disc brake rotor extend to the outer edges.
- The disc brake rotor is damaged or two or more grooves are worn beyond 2.25 mm (.09 inches).
- Lateral runout exceeds 0.39 mm (0.015 inches).
- Wear exceeds specifications as set out in *Chapter 3A, Item 23*, or as stamped on the rotor.
- Calipers are seized or loose.
- Anchor plates are loose or bolts are missing.
- Pads are damaged or contaminated.
- Riveted pads are worn to 4.8 mm ( $3/16$  inch) or less thickness.
- Bonded pads are worn to 3.2 mm ( $1/8$  inch) or less thickness.
- Adjustment cannot meet the manufacturer's specifications.
- The wheel rotates when brakes are applied.
- Wheel seals are leaking. **Note:** Seepage is not cause for rejection.



**Air-actuated Disc Brake**

**HAZARDOUS CONDITION**

- Any disc that is cracked or does not meet the standards as per *Chapter 3A, Item 23*.

**21. Front Brakes****Procedure**

**Step 1:** Apply the service brakes at approximately 620 kpa (90 psi). Visually inspect the angle between the pushrod and the slack adjuster, pushrod travel, the brake diaphragm and slack adjuster, and lining thickness.

**Reject the vehicle if:**

- The angle between the pushrod and the slack adjuster is not 90 degrees or as close as practical and it is not between 19 mm to 31 mm ( $3/4$  to  $1\ 1/4$  inches) or the manufacturer's specifications. **Note:** The 90 degree angle is a suggested guideline only. Not all brakes achieve 90 degrees, therefore check with the manufacturer's specifications.
- Pushrod travel on each side is not within 6.4 mm ( $1/4$  inch).
- The brake diaphragm and slack adjuster are not the same type and size on each side of the axle.
- Lining thickness is less than 4.8 mm ( $3/16$  inch) above the shoe at the center or at any point other than the chamfered area.

**Step 2:** Apply the brakes and try to rotate the wheel. Inspect the wheel seals.

**Reject the vehicle if:**

- The wheel rotates.
- Wheel seals are leaking. **Note:** Seepage is not cause for rejection.

**HAZARDOUS CONDITION**

- Braking action is not evident.

**22. Anti-lock Brake Systems (ABS)**

Buses with air brakes manufactured after March 1, 1998, must be equipped with anti-lock brakes when they are operated in the United States.

**Procedure**

If equipped with ABS, visually and manually inspect the warning light.

**Reject the vehicle if:**

- The warning light fails to illuminate during the cycle or self-check, or self-diagnostic error is indicated.

**23. Machining and Wear Limits, Brake Drums and Rotors****A. BRAKE DRUMS**

1. No combination of machining and wear may exceed the manufacturer's stamped limit.
2. If the manufacturer's limit is not available, then no combination of wear and machining may exceed:
  - a. 2.3 mm (0.09 inches) over the original drum diameter of 350 mm (14 inches) or less.
  - b. 3.0 mm (0.12 inches) over the original drum diameter greater than 350 mm (14 inches).

**B. BRAKE ROTORS**

1. Original thickness may not be decreased by any combination of wear and machining below the manufacturer's minimum thickness.

# Steering

## 1. Travel

### Procedure

Turn the steering wheel through a full right and left turn. If the vehicle has manual steering, jack the vehicle up on its axle. Manually and visually inspect the steering wheel, steering operation, clearance and steering stops.

### Reject the vehicle if:

- The steering wheel is modified or damaged.
- There is any binding during the cycle.
- Steering jams during the cycle.
- The number of turns from center to full left does not equal, plus or minus one-half turn, the number of turns from center to full right.
- Clearance is less than 25 mm (1 inch) between the tire and the frame, fender or other parts when the vehicle is on a level surface.
- Steering stops are missing.

## 2. Steering Linkage

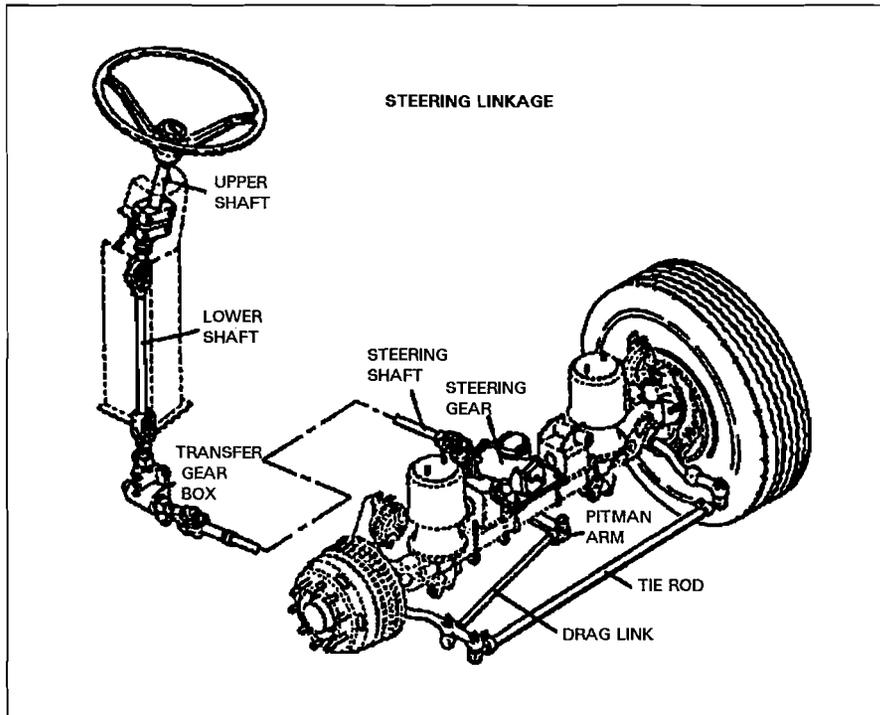
### Procedure

With the engine shut down, rock the steering wheel left and then right. Observe movement in the steering components. If no movement is observed, grasp the tie-rod and attempt to move it in the direction of the ball stud.

**Note:** Under no circumstances should a pry bar be used. Visually inspect the tie-rod, tie-rod ends, draglink and ends, pitman arm, transfer gear box (if equipped), steering box, cotter pins, steering column, steering shaft universal joint, steering shaft yoke, slip joint and adjusting sleeve.

### Reject the vehicle if:

- The tie-rod is bent or has a welded repair.
- Looseness is evident in the tie-rod ends.
- Tie-rod ends are bent, have been repaired by welding or have been injected.
- Looseness is evident in draglink and ends.
- Draglink and ends are bent, have been repaired by welding or have been injected.
- The pitman arm is loose or has been repaired by welding.
- The transfer gearbox (if equipped) is loose on the mounting or has excessive play.
- The steering box is loose, insecurely mounted or bolts are missing or loose.
- Cotter pins are missing or an inferior substitute has been used.
- The steering column is loose or mounted insecurely.
- The “pot” joint or “rag” joint is badly misaligned or deteriorated.
- A steering column clamp, bolt, nut or locking roll pin is loose or missing.
- The steering shaft universal joint is loose or has been repaired by welding.
- The steering shaft yoke is loose, has been repaired by welding, or the clamping bolt is loose.
- The steering shaft yoke is welded in an area other than by the original equipment manufacturer.
- Free play between the splines in the slip joint exceeds 1.2 mm (.05 inches), or horizontal play exceeds 6.4 mm ( $\frac{1}{4}$  inch).
- The adjusting sleeve is loose, bent, or the tightening bolt is in a position so as steering can be jammed.



Steering Linkage

**HAZARDOUS CONDITION****Steering Column**

- Any bolts are loose or missing or any positioning parts allow movement from its normal position.
- Any universal joints have been repaired by welding.
- The steering wheel is not secure.

**Steering Box**

- Any mounting bolts are loose or missing.
- Any frame or mounting bracket is loose.

**Pitman Arm**

- The pitman arm is loose on the steering gear output shaft spline or has a welded repair.

**Ball and Sockets**

- Any linkage shows looseness in alignment with the shank or neck of the ball in excess of 3.2 mm ( $\frac{1}{8}$  inch).
- Nuts are loose on tie-rod ends, pitman arm, drag link or the steering arm.

**3. Front Wheel Bearings****Procedure**

With the front end of the vehicle raised off the floor, attempt to move the wheel relative to the spindle by using a bar for leverage. Bearing maladjustment or wear is determined by the relative movement between the brake drum and the backing plate or dust cover. Inspect movement, lubrication, wheel rotation and damage.

**Reject the vehicle if:**

- Movement measured at the circumference of the tire exceeds
  - 3.2 mm ( $\frac{1}{8}$  inch) for vehicles 4,535 kg (10,000 lbs.) GVWR or less.
  - 4.8 mm ( $\frac{3}{16}$  inch) for vehicles over 4,535 kg (10,000 lbs.) GVWR.
- Lubrication is insufficient.

- Races or rollers are chipped, burred, pitted or show evidence of overheating. Check only when wheels are removed.
- Bearing end play exceeds manufacturer's specifications.
- Noise binding or roughness is detected while rotating bearing.
- Bearing adjustment locking device is missing, not engaged or nonfunctional.

**Reject the vehicle if:**

- Horizontal movement is in excess of:
  - 4.8 mm ( $\frac{3}{16}$  inch) for wheels 510 mm (20 inches) or larger.
  - 3.2 mm ( $\frac{1}{8}$  inch) for wheels less than 510 mm (20 inches).
- Vertical movement is in excess of 2.5 mm ( $\frac{1}{100}$  inches) or the manufacturer's specifications.

## 4. Kingpin Play

**Procedure**

Raise the vehicle so as to unload kingpins (brakes should be applied to eliminate wheel bearing looseness). With a fixed device placed at the wheel and tape measure, or with a dial indicator, measure movement. Using a bar for leverage, attempt to rock the wheel in and out. Visually inspect horizontal and vertical movement.

*Equipment needed:* Tape measure or dial indicator.

## 5. Ball Joints (applicable buses)

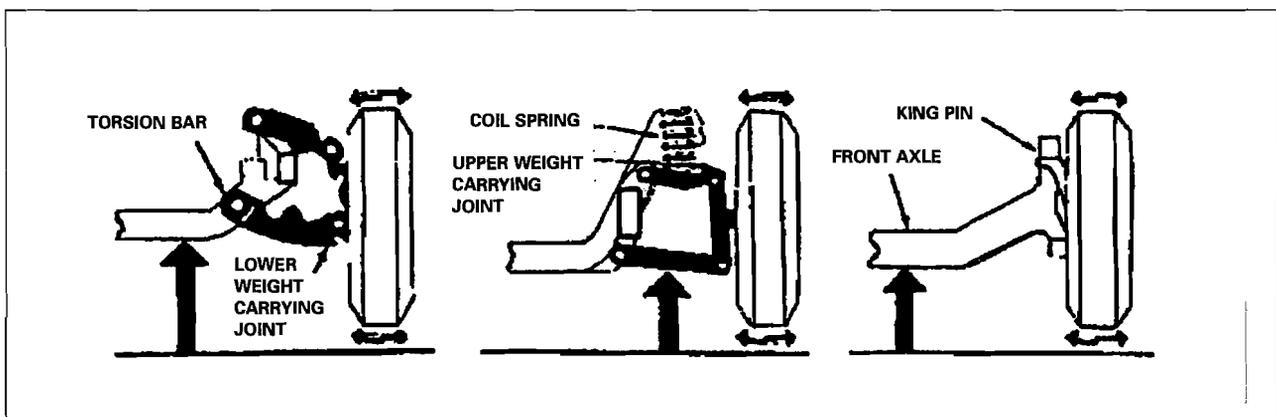
### A. LOAD CARRYING BALL JOINTS

**Procedure**

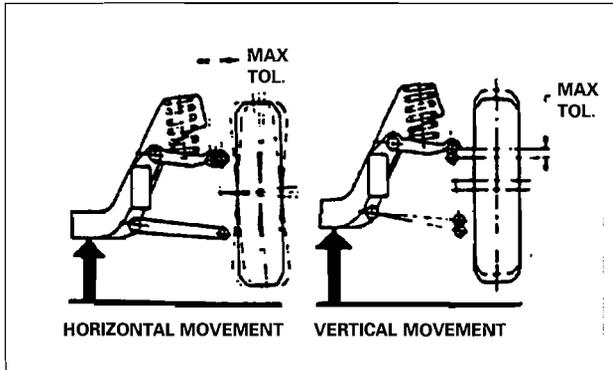
Raise vehicle so as to unload the ball joints. Visually and with the use of a gauge or measuring device measure the horizontal and vertical movement and the condition of the ball joints.

**Reject the vehicle if:**

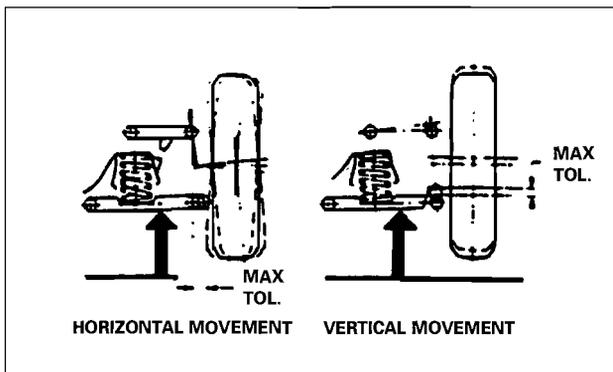
- Horizontal movement exceeds the manufacturer's specifications.
- Vertical movement exceeds the manufacturer's specifications.
- Ball joints are injected or have been repaired by welding.



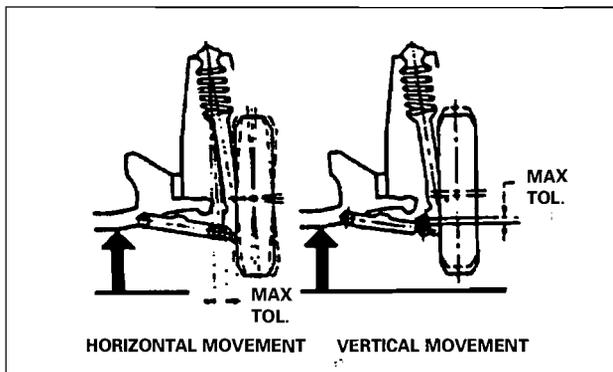
**Proper Lifting for Wheel Bearing, Steering Linkage Looseness and Kingpin Play Checks**



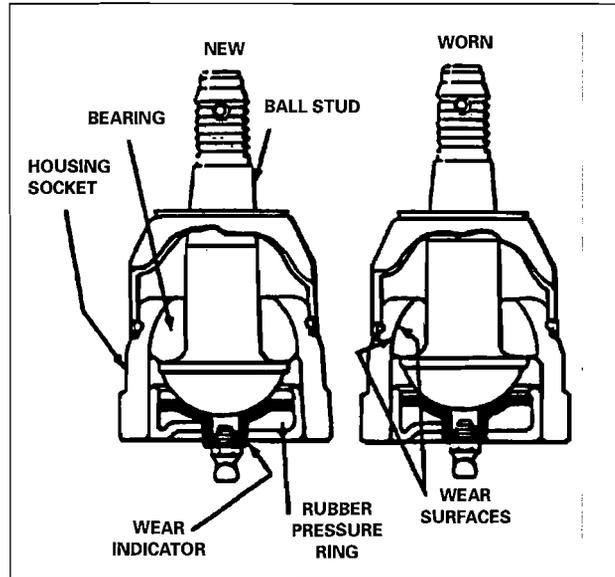
Spring on Upper Control Arm



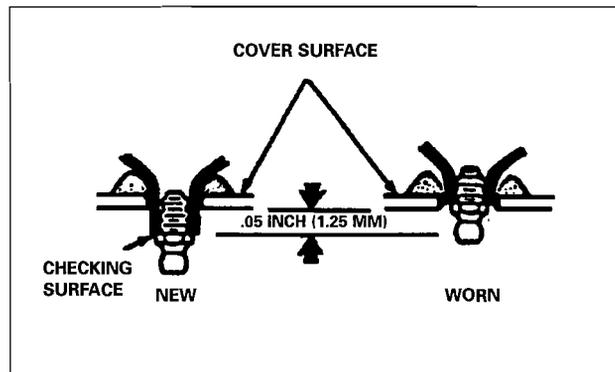
Spring or Torsion Bar on Lower Control Arm



MacPherson Strut—No Upper Ball Joint Raising Positions for Suspension Systems



Ball Joint Components



Ball Joint Wear Indicator

Wear is indicated by the protrusion of the 1/2 inch (12.5 mm) diameter boss, (exaggerated for illustration) into which the grease fitting is threaded. This round boss projects .05 inch (1.25 mm) beyond the surface of the ball joint cover on a new, unworn joint.

To inspect for wear, support vehicle by wheels so that the lower ball joints are in a loaded condition. Wipe the grease fitting and boss free of dirt and grease. Observe or scrape a scale, screw-driver or fingernail across the cover. If the grease fitting boss is flush or inside the cover surface reject vehicle.

### B. PRE-LOADED BALL JOINTS, NON-LOAD CARRYING

These ball joints are pre-loaded by rubber or springs under tension.

#### Procedure

Using the same methods above, measure the horizontal and vertical movement and condition of the ball joints.

#### Reject the vehicle if:

- Horizontal measurement exceeds the manufacturer's specifications.
- Vertical measurement exceeds the manufacturer's specifications.
- Ball joints are injected or have been repaired by welding.

### C. BALL JOINT WEAR INDICATORS

#### Procedure

Inspect with ball joints loaded.

#### Reject the vehicle if:

- The surface is flush with or inside the cover surface. See illustration.

## 6. Power Steering

#### Procedure

Manually and visually inspect the fluid level, belts, hoses, pump, cylinders (if equipped), mounting brackets, assist, steering box, and hose location.

#### Reject the vehicle if:

- Fluid level is low.
- Belts are missing, loose, frayed or cracked.
- Hoses are cracked, leaking or rubbed through by moving parts. Seepage is permitted.
- The pump is loose or leaking.
- Cylinders (if equipped) are loose or leaking.
- Mounting brackets are cracked, loose or broken.

- No assist is evident.
- The steering box is loose or leaking. Seepage is permitted.
- The hose location is within 25 mm (1 inch) of the exhaust system.

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#### HAZARDOUS CONDITION

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- No assist is evident.

## 7. Steering Wheel Test

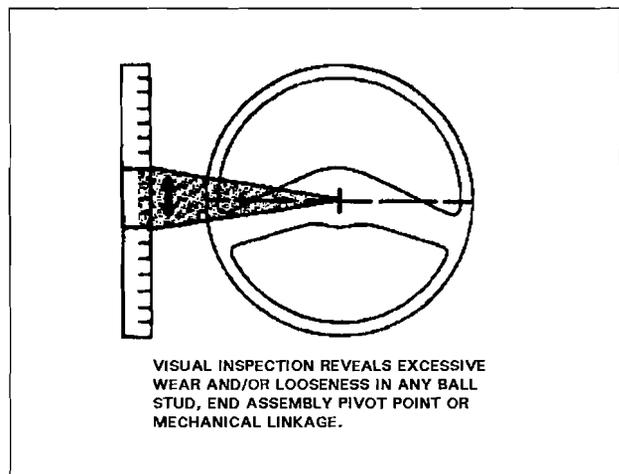
On vehicles equipped with power steering, the engine must be running and the fluid level, belt tension and condition must be adequate before testing.

#### Procedure

With the front wheels in a straight-ahead position, turn the steering wheel until a turning motion can be observed at the front wheels. Mark the rim of the steering wheel. Then, using a pointer, turn the steering wheel in the opposite direction until motion can be observed at the front wheels. Measure the distance between the mark and the pointer.

#### Reject the vehicle if:

- A total movement greater than that shown in the following table is encountered at the steering wheel rim before movement is observed at the front wheels.



Steering Lash

 In the United States, the steering wheel lash should be consistent with Section 393.209(b) of the Federal Motor Carrier Safety Regulations. The steering wheel lash must not exceed the following limit:

Steering Wheel Diameter	Manual Steering	Power Steering
406mm (16 inches) or less	51mm (2 inches)	108 mm (4 1/2 inches)
457 mm (18 inches)	57 mm (2 1/4 inches)	121 mm (4 3/4 inches)
483 mm (19 inches)	60 mm (2 3/8 inches)	127 mm (5 inches)
508 mm (20 inches)	64 mm (2 1/2 inches)	133 mm (5 1/4 inches)
533 mm (21 inches)	67 mm (2 5/8 inches)	140 mm (5 1/2 inches)
559 mm (22 inches)	70 mm (2 3/4 inches)	146 mm (5 3/4 inches)

 In Canada, use the following measurements:

Steering Wheel Diameter	Manual Steering	Power Steering
500 mm (20 inches) & less	87 mm (3 1/2 inches)	75 mm (3 inches)
Over 500 mm (20 inches)	100 mm (4 inches)	87 mm (3 1/2 inches)

### HAZARDOUS CONDITION

 In the United States, the following steering wheel lash measurements indicate a hazardous condition:

Steering Wheel Diameter	Manual Steering	Power Steering
16 inches (41 mm)	4 1/2 inches (11.5 mm)	6 3/4 inches (17 mm)
18 inches (46 mm)	4 3/4 inches (12 mm)	7 1/8 inches (18 mm)
19 inches (48 mm)	5 inches (13 mm)	7 1/2 inches (19 mm)
20 inches (51 mm)	5 1/4 inches (13 mm)	7 7/8 inches (20 mm)
21 inches (53 mm)	5 1/2 inches (14 mm)	8 1/4 inches (21 mm)
22 inches (56 mm)	5 3/4 inches (15 mm)	8 5/8 inches (22 mm)

 In Canada, the following steering wheel lash measurements indicate a hazardous condition:

Steering Wheel Diameter	Manual Steering	Power Steering
500 mm (20 inches) & less	133 mm (5 1/4 inches)	87 mm (3 1/2 inches)
Over 500 mm (20 inches)	100 mm (7 3/4 inches)	100 mm (4 inches)

# Instruments & Auxiliary Equipment

## 1. Fire Extinguisher

### Procedure

Visually inspect for the presence of a fire extinguisher, its accessibility, type, mount, seal (if not equipped with a gauge), charge, approval and labeling, gauge (by tapping), powder and nozzle.

### Reject the vehicle if:

- The fire extinguisher is missing or badly damaged.
- Accessibility is obstructed.
- The rating is less than 2A10 B:C, or does not meet jurisdictional requirements.
- The mount is insecure, or the extinguisher is not in a quick release holder in view of the driver.
- The seal (if not equipped with a gauge) is broken or not in place.
- The charge reading is less than the minimum.
- It is not Fire Marshall (FM), Underwriters Lab (UL) or Underwriters Lab Canada (ULC) approved and labeled, or it has no nameplate or instructions.
- The gauge moves to recharge or down.
- The powder cannot be felt shifting.
- The nozzle is deteriorated, clogged or corroded through.

## 2. Hazard Warning Kit

### Procedure

Visually inspect the hazard warning kit container, reflectors and type of reflectors.

### Reject the vehicle if:

- The container is missing or not secure.
- Reflectors are missing, or the kit does not contain three reflectors.
- The kit does not have advanced warning triangles with stands that are at least 175 mm (7 inches) in height and each side is 430 to 500 mm (17 to 22 inches) long, and reflectors or electric lanterns.

## 3. Clutch and Brake Pedal

### Procedure

Visually inspect the clutch (if applicable) and brake pedal for condition and anti-slip provisions.

### Reject the vehicle if:

- A pedal is missing, loose or excessively worn.
- Anti-slip provisions are excessively worn or missing.

## 4. Horn

### Procedure

Inspect the horn activating device and audibility.

### Reject the vehicle if:

- The horn activating device is not readily accessible to the driver, the button position is not identified, or the device does not function as intended.
- The horn is not clearly audible or does not operate.

## 5. Speedometer

### Procedure

By operating the vehicle, visually inspect the speedometer operation.

### Reject the vehicle if:

- It fails to operate.

## 6. Odometer

### Procedure

By operating the vehicle, visually inspect the odometer operation.

### Reject the vehicle if:

- It fails to operate.

## 7. Instruments

### Procedure

By operating the engine, visually inspect instruments (if equipped) including the water temperature gauge, oil pressure gauge, ammeter, fuel gauge, vacuum gauge, and air pressure gauge. **Note:** Indicators may be substituted for gauges.

### Reject the vehicle if:

- Any of the instruments listed above do not operate.

## 8. Indicator Lamps

### Procedure

Visually inspect the brake warning indicator, high beam indicator, turn signal indicator, and hazard indicator lamp.

### Reject the vehicle if:

- Any of the indicators fail to operate.
- The proper turn signal indicator does not illuminate for the switch selected.

## 9. Auxiliary Equipment

### Procedure

Visually inspect for the presence and security of auxiliary equipment (if equipped) such as an ax, chains, tools, shovels, spare tire, etc.

### Reject the vehicle if:

- Auxiliary equipment is not attached securely.

## 10. First Aid Kit

Visually inspect the first aid kit if required by the base jurisdiction.

### A. PILLOW TYPE

#### Procedure

Visually inspect the presence, seal and mount of the first aid kit. Check the contents only if the first aid seal is broken.

#### Reject the vehicle if:

- The kit is missing.
- The seal is broken or missing.
- The mount is not secure or not in view of the driver.
- The contents are not equipped as per the manufacturer's specifications. **Note:** Check the contents only if the first aid seal is broken.

**B. CSA TYPE**

**Procedure**

Visually inspect the presence, seal and mount of the first aid kit. Check the contents only if the first aid seal is broken.

**Reject the vehicle if:**

- The first aid kit is missing.
- The seal is broken or missing.
- The mount is an improper holder or it is not in view of the driver.
- The contents are not equipped as follows:

Triangle bandage .....	.2
Bandage compress 100 mm (4 inches) .....	.1
Gauze compress .9 x .9 m (36 x 36 inches) .....	.1
Bandages 50 mm x 5.5 m (2 inches x 6 yards) ...	.2
Telfa pads .....	.4
Safety bands 25 mm (1 inch) wide .....	.12
Tube gauze with applicator 4.5 m (5 yards) .....	.1
Safety pins 50 mm (2 inches) .....	.12
Scissors (small) .....	.1

**Note:** Do not inspect the contents unless the seal is broken.

# Lamps

## 1. Lamps

All lamps mentioned below, except hazard lamps, should be inspected with the headlamps and all other auxiliary lamps on and with brakes applied.

**Reject the vehicle if:**

- Any lamp fails to illuminate and any lamp or reflector is missing, broken, cracked, insecurely mounted or does not meet CMVSS, FMVSS, DOT or SAE standards and is not so labeled or fails to meet the requirements set out in this section.

**Note:** A crack is allowed in a halogen lamp with a replaceable bulb.

**Procedure**

Visually inspect the headlamps, taillamps, stoplamps, turn signal lamps, hazard lamps, side marker lamps, clearance lamps, identification lamps, license plate lamp, and daytime running lamps (if so equipped).

**Reject the vehicle if:**

- Lamps do not meet the following criteria:  
*Headlamps:* The bus must be equipped with two or four headlamps on the front of the bus as far apart as practical, white in color and clearly visible. Headlamps must be operated by the headlamp control, and they must operate on high and low beam.

*Taillamps:* The bus must be equipped with two taillamps, located at the rear of the bus as far apart as practical, red in color and clearly visible. The proper filament must light, and the taillamps must be operated by the headlamp control.

*Stoplamps:* The bus must be equipped with two stoplamps facing the rear, located as far apart as possible, red in color and clearly visible. The proper filament must light and they must be operated by brake application.

*Turn Signal Lamps:* The bus must be equipped with four turn signal lamps, two facing front and two facing the rear, located as far apart as practical and clearly visible. The front turn signal lamps should be amber in color, and the rear turn signal lamps should be amber or red. The proper filament should light, and the lamps should operate by the turn signal control.

*Hazard Lamps:* The bus must be equipped with four hazard lamps, two facing front and two facing the rear as far apart as practical and clearly visible. Turn signal lamps may serve as hazard lamps. The front lamps should be amber and the rear lamps should be amber or red. The proper filament should light and the lamps should flash simultaneously and operate by the hazard warning control. **Note:** Hazard lamps are required if originally equipped on the vehicle.

*Side Marker Lamps:* The bus must be equipped with four side marker lamps, located two on each side as close to the corners as practical and clearly visible. One lamp may serve as both side marker and clearance lamp provided that it can be seen from both the side and the rear. The front side marker lamps must be amber and the rear lamps must be red. Side marker lamps must be mounted at least 300 mm (15 inches) above the ground. If the bus is over 9.1 m (30 feet) in length, it must be equipped with an intermediate amber lamp on each side.

*Clearance Lamps:* The bus must be equipped with four clearance lamps, located at the widest part of the vehicle as far apart as practical and clearly visible. The front lamps must be amber and the rear lamps must be red. **Note:** Clearance lamps are not required on vehicles under 2.06 m (81 inches) in width.

*Identification Lamps:* The bus must be equipped with six identification lamps, three on the front and three on the rear, as high and near center as practical and clearly visible. The front lamps should be amber and the rear lamps should be red. **Note:** Identification lamps are not required on public service and commercial vehicles under 2.06 m (81 inches) in width and transit buses registered Class PC.

*Back-up Lamps:* The bus must be equipped with one or two back-up lamps located on the rear and clearly visible. The lamps must operate when the engine is running and the transmission is in reverse. **Note:** Back-up lamps are not required on vehicles manufactured before 1972.

*License Plate Lamp:* The bus must be equipped with one license plate lamp located on the rear so as to emit light on the rear plate. The lamp must be white, clearly visible and operated by the headlamp control.

*Step Well Lamp:* The bus must be equipped with one step well lamp that is white in color.

*Interior Lamps:* The bus must be equipped with a sufficient number of interior lamps to illuminate the interior, and they must be white in color.



*Daytime Running Lights:* All

Canadian vehicles manufactured after December 1, 1989, must be equipped with daytime running lights on the front of the vehicle, white or yellow in color. Daytime running lights must operate continuously when the engine is operating and the master lighting switch is not in the "ON" position.

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**HAZARDOUS CONDITION**

- There is not at least one headlamp that operates on low beam.
  - There is not at least one operative red lamp on the rear of the vehicle.
  - There is not at least one operative stop lamp on the rear of the vehicle.
  - The rear turn signal lamp on each side does not operate.
-

## 2. Reflex Reflectors

### Procedure

Visually inspect the clearance and side marker reflectors. A lamp or cover that emits a reflection may be considered a reflector. One lens may serve as both side marker and clearance reflector provided it can be seen from both sides and rear.

### Reject the vehicle if:

- It is not equipped with four clearance reflectors, located two facing front and two facing rear as far apart as practical and clearly visible. The front reflectors should be amber, and the rear reflectors should be red.
- It is not equipped with four side marker reflectors, located two on each side as close to the corners as practical and clearly visible. The front reflectors should be amber and the rear reflector should be red.
- It is over 9.1 m (30 feet) in length, and it is not equipped with an intermediate amber reflector on each side.

## 3. Instrument Lamps

### Procedure

Visually inspect the operation of the instrument lamps.

### Reject the vehicle if:

- Any one bulb fails to illuminate.

## 4. Headlamp Aiming Mechanical Aimer

### Procedure

Visually inspect the aim of the headlamps.

### Reject the vehicle if:

- A headlamp is not aimed within the manufacturer's specifications.

# Electrical System

## 1. Wiring

### Procedure

Visually inspect the security, insulation and condition of the wiring.

### Reject the vehicle if:

- Wiring is loose so as to contact moving parts.
- Wiring is not secured a minimum of every 1.8 m (6 feet).
- The insulation is rubbed through or peeled.
- Wiring is cut, shorted or deteriorated.

## 2. Battery

### Procedure

Visually inspect the battery posts, mounts and holddown.

### Reject the vehicle if:

- Posts are corroded excessively.
- Mounts are corroded, weakened or cracked.
- The holddown is missing or insecure.

## 3. Switches

### Procedure

Visually and manually inspect the operation of the switches.

### Reject the vehicle if:

- Any switch pertaining to safety items fails to operate.

# Body

## 1. Hood or Rear Mounted Engine Compartment Door

### Procedure

Manually inspect the hood operation and visually inspect the hood or engine cover, latches, supports, safety cables (if originally equipped), hinges, and secondary latches.

### Reject the vehicle if:

- The hood or engine cover is missing.
- Latches are broken, missing, seized, insecurely mounted or inoperable.
- Support rods are missing, broken or bent.
- The hinge mount area of the body is severely corroded.
- Safety cables (if originally equipped) are broken, missing or insecurely attached.
- Hinges are cracked, missing, broken or excessively worn.
- Secondary latches (if applicable) are broken, missing or inoperable.

## 2. Body

### Procedure

Visually inspect the body for torn metal and for the condition of the molding, side panels and fenders.

### Reject the vehicle if:

- Torn metal protrudes so as to be hazardous to passengers, pedestrians or cyclists.
- Molding is loose or protrudes so as to be hazardous to passengers, pedestrians or cyclists.

- Side panels are perforated, any rivets are missing or loose, or corrosion is so bad as to weaken the panel.
- Fenders (if equipped) are missing.

## 3. Frame Rails and Mounts

### Procedure

Visually inspect the frame, body mounts, cross members, engine mounts, bulkheads, frame and/or fasteners, and load-carrying panels.

### Reject the vehicle if:

- The frame is cracked, broken, bent, or rusted to a depth so as to weaken the frame.
- Body mounts are cracked, loose, missing bolts, or the body-to-frame insulation strip is missing.
- Cross members are loose, cracked, broken, missing or corroded through.
- Engine mounts are missing, loose, bolts are missing and/or loose, or the insulator is broken or badly deteriorated.
- Bulkheads are cracked, broken or severely corroded.
- The frame and/or fasteners have nuts, bolts or rivets loose and/or missing.
- Load-carrying panels are badly corroded so as to weaken the structure.

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### HAZARDOUS CONDITION

- Any frame member is broken, sagging or cracked so as to permit the body to contact any moving part, or collapse of the frame is imminent.
-

## 4. Front and Rear Bumpers

### Procedure

Visually inspect the condition, design and mounts of the front and rear bumpers.

### Reject the vehicle if:

- Bumpers are loose, missing or broken.
- Any torn portion protrudes so as to be hazardous to pedestrians and/or cyclists.
- The bumper design is other than the design provided by the original vehicle or body manufacturer.
- Mounts are loose, missing or broken.

## 5. Step Well (Entrance and Exit Steps)

### Procedure

Visually inspect the condition of the step well and anti-slip material.

### Reject the vehicle if:

- The step well is unsafe due to corrosion or it is cluttered or blocked.
- Risers are loose.
- Anti-slip material is missing or loose.

## 6. Floor

### Procedure

Visually inspect the condition of the floor and the floor covering.

### Reject the vehicle if:

- The floor is buckled or it is rusted or rotted sufficiently to cause a hazard or allow exhaust gases to enter the occupant compartment.
- The floor covering is cracked, curled, worn so as not to be waterproof at the seams, or it presents a tripping hazard.

## 7. Service Door and Exit Doors

### Procedure

Manually and visually inspect the remote control door, door edge material and sensitive edge. **Note:** All buses require a remote control door. Vans are not required to have a remote control opening.

### Reject the vehicle if:

- Binding is evident, jamming occurs or the remote control door malfunctions.
- It is not equipped with a remote control door.
- The override device on a power-operated door does not operate or the control is not accessible to the driver.
- The door edge material is missing, loose or torn.
- The strip seal along the bottom edge of the door is missing or torn.
- The door edge material is other than a flexible type.
- The sensitive edge does not operate.

## 8. Emergency Door or Exit

### Procedure

Visually and manually inspect the emergency door or exit passage, aisle, release mechanism (inside and outside if equipped by the manufacturer), warning device (if applicable), alternate exits such as push-out windows (if equipped), and width of the emergency exit.

### Reject the vehicle if:

- The passage is blocked or restricted.
- The aisle is less than 305 mm (12 inches) wide.
- The aisle is less than 812 mm (32 inches) wide on handicapped buses.

- The release mechanism fails to function from both inside and outside, has an improper latch, or latches insecurely when closed.
- The warning device fails to function.  
**Note:** Vans not equipped at the factory are not required to have a warning device.
- Two methods of escape are not present; one of which is to be on the left side or the rear of the vehicle.
- Alternate exits are not marked, or the exit is not at least 0.26 m<sup>2</sup> (396 square inches) in area.
- The width of the emergency exit is not at least 812 mm (32 inches) wide.
- The doors or exits are not as prescribed by the jurisdiction for the bus type and size inspected.

## 9. Windshield

### Procedure

Visually inspect the windshield for cracks, chips, discoloration, tinting other than the manufacturer's, type and condition.

### Reject the vehicle if:

- There are any intersecting cracks in the area swept by wipers.
- Stars or chips are 12.7 mm (1/2 inch) or greater in diameter in the area swept by windshield wipers.
- Discoloration is greater than 10 percent of the total glass area.
- Tinting (other than manufacturer's) obscures or limits vision, aftermarket tinting.
- Tinting in excess of ANSI Z26 is lower than 75 mm (3 inches) from the top of the windshield.
- The windshield is other than laminated safety glass type AS-1, AS-10 or AS-14 and so marked.
- Vision is obscured or limited by the condition of the windshield.

## 10. Windshield Wipers and Washers

### Procedure

Visually inspect the operation of the windshield wipers and washers, and the condition of the blades, arms and pivots.

### Reject the vehicle if:

- The windshield wipers fail to operate or park.
- Blades are torn, hardened or missing.
- Blades fail to wipe approximately 75 percent of the windshield.
- Blades fail to contact the windshield properly.
- The length of the blade is different than the original.
- Arms and pivots are missing, bent, distorted or excessively worn.
- Washers fail to operate, fail to clean effective area, or are not aligned.

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### HAZARDOUS CONDITION

- Any vehicle has an inoperative wiper, or missing or damaged parts that render it ineffective on the driver's side.
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## 11. Side Windows

### Procedure

Visually and manually inspect the operation of the side windows, push-out operation and window type, condition and tinting.

### Reject the vehicle if:

- The emergency and driver's window cannot be opened or closed readily.
- A side window will not open with the catch released.
- Side windows are a type other than safety glass AS-1, AS-2, AS-3, AS-10 and AS-11.
- Side windows are broken, have exposed sharp edges or exposed edges are not banded.

- Aftermarket tinting is used forward of the driver's shoulder.
- A rearview mirror cannot be adjusted or maintained in a set position.

## 12. Interior Rearview Mirror

### Procedure

Visually inspect for the presence, condition and adjustment of the interior rearview mirror.

### Reject the vehicle if:

- The rearview mirror is missing.
- The rearview mirror is cracked, broken or obscured.
- The rearview mirror will not maintain adjustment.

## 13. Exterior Rearview Mirrors

### Procedure

Visually inspect for the presence of left and right mirrors, and inspect the view, mounts, glass condition, mirror size, location and adjustment.

### Reject the vehicle if:

- Either the left or right rearview mirror is missing.
- The mirror does not provide a clear view of the highway to the rear or the view is obstructed.
- Mirror mounts are insecure, loose or protrude excessively.
- The glass is cracked, pitted or clouded so as to obscure vision.
- The size of the mirror is less than 0.03 m<sup>2</sup> (50 square inches) on vehicles over 2.06 m (81 inches) in width.
- The size of the mirror is less than 16,000 mm<sup>2</sup> (24 square inches) on vehicles 2.06 m (81 inches) or less in width.
- The location of a rearview mirror creates a blind spot.

## 14. Sun Visors

### Procedure

Visually and manually inspect for the presence of a driver's visor, the size of the visor, the condition of the attaching parts and its adjustment.

### Reject the vehicle if:

- The driver's visor is missing.
- The visor is less than 125 by 300 mm (5 by 12 inches).
- Attaching parts are broken, bent or loose.
- The visor cannot be adjusted or maintained in a set position.

## 15. Windshield Defroster

### Procedure

Turn on the defroster fan (auxiliary fans may be used). Manually inspect the fan operation and airflow.

### Reject the vehicle if:

- The fan fails to operate.
- There is no airflow.

## 16. Interior Heaters

### Procedure

Visually and manually inspect the interior heater fan operation, the condition of the heater and the airflow.

### Reject the vehicle if:

- The fan fails to operate.
- The interior heater is damaged.
- The interior heater does not produce heat, or there is an insufficient volume of air.

## 17. Driver's Seat and Safety Belt

### Procedure

Visually inspect the driver's seat, safety belt and retractors.

### Reject the vehicle if:

- The driver's seat is loose, the frame is broken, springs are exposed or broken, or the cover material is removed.
- The driver's seat adjusting mechanism does not operate or will not lock in position.
- The safety belt is not present for the driver as originally manufactured.
- The safety belt has torn webbing, is insecurely mounted or the buckle is inoperable.
- Retractors fail to retract and/or allow the safety belt to extend to its maximum length, or they are inoperable or damaged.

## 18. Passenger Seats

**Note:** In all van-type buses and in truck-type chassis buses manufactured after the 1978 model year, seats must be attached through the floor pan with two bolts per leg, using bolts of at least 6.4 mm ( $1/4$  inch) in diameter. Extreme rear seats and any other seats that are located so as to make the threaded end of the bolt inaccessible, should be securely attached through the floor pan with two steel self-tapping screws per leg of at least 8 mm ( $5/16$  inch) in diameter on the front two legs. Rear legs should be bolted.

### Procedure

Visually inspect the frame, seat cushions, seat backs and safety belts (if originally equipped).

### Reject the vehicle if:

- A seat frame is loose or broken.
- A seat frame does not face the front or rear (city buses are exempt).

- The seat covering material is torn so that the seat base or springs are exposed or torn more than 76 mm (3 inches).
- Seat cushions are not secured to the seat frame.
- Seat backs are missing or loose.
- Energy absorbing material on seat backs is missing in an area exceeding 1,600 mm<sup>2</sup> (3 square inches) and more than 6.4 mm ( $1/4$  inch) deep.
- Safety belts (if originally equipped) are not present, have torn webbing, are insecurely mounted or the buckle is inoperable.

## 19. Interior

### Procedure

Visually inspect the stanchions, guard rails, grab handles and interior damage.

### Reject the vehicle if:

- Stanchions are loose or support bolts are missing (equipped vehicles only and registered as public service).
- Guard rails are loose or support bolts are missing (equipped vehicles only and registered as public service).
- Grab handles (if equipped) are missing or loose.
- Any interior metal is torn and/or corroded so as to create a hazard.

## 20. Mud Flaps

### Procedure

Visually inspect the condition of the mud flaps, their width and their height from the ground. **Note:** All vehicles must be equipped with mud flaps or the body overhang must meet or exceed the requirements below.

### Reject the vehicle if:

- It is not equipped with mud flaps, or the mud flaps are loose or broken.

- Mud flaps are not the full width of the tires.
- The lower end of the mudguard is more than 350 mm (14 inches) from the ground, measured when the vehicle is in an unloaded position.

## 21. Auxiliary Compartments

### Procedure

Visually and manually inspect the access doors, baggage doors, express area in the passenger compartment, and the overhead shelf (if equipped).

### Reject the vehicle if:

- Access doors, such as for air conditioning, spare tires, etc., will not open or close, the latch will not hold or the hinges are damaged.
- Baggage doors will not open or close, the latch will not hold or the hinges are damaged.
- Counter-balance cables on baggage doors are frayed.
- The overhead shelf (if equipped) is insecurely mounted, retaining components are missing, broken or mounted insecurely, or energy absorbing material on the shelves is missing.

## 22. Passenger Vehicles for Physically Disabled

### Procedure

Visually and manually inspect the ramp, power lift, wheel chair holddowns and safety belts.

### Reject the vehicle if:

- The ramp (if equipped) is insecurely attached or fasteners are missing, broken or inoperable.
- The power lift (if equipped) is inoperable or insecurely attached.
- The power lift controls are inoperable or the lift does not respond to the controls.
- Wheel chair holddowns are inoperable, pins are worn or cables are broken or frayed.
- Safety belts are missing for each seat position or buckles are inoperable or frayed.

# Tires & Wheels

## 1. Tread Depth

### Procedure

With the use of a tire tread depth gauge, measure the tread depth throughout a continuous circumferential band on the tread of all major grooves of the tire tread width. Inspect the front and rear tires. **Note:** Do not measure at the wear bar.

*Equipment needed:* Tire tread depth gauge.

### Reject the vehicle if:

- Front tires have less than 3.2 mm ( $\frac{4}{32}$  inch) of tread.
- Front city mileage tires (transit bus) have less than 1.6 mm ( $\frac{2}{32}$  inch) of tread.
- Rear tires have less than 1.6 mm ( $\frac{2}{32}$  inch) of tread.
- The tread pattern or regroove is worn smooth on rear city mileage tires (transit bus).

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### HAZARDOUS CONDITION

- Less than 1.6 mm ( $\frac{2}{32}$  inch) of tread is on the front tires and 0.8 mm ( $\frac{1}{32}$  inch) of tread is on rear tires measured at any two adjacent major grooves at any location on the tire.
  - Less than 0.8 mm ( $\frac{1}{32}$  inch) of tread is between any lugs on grip tires on the rear.
- 

## 2. Tread Section of Tire

### A. FRONT TIRES

#### Procedure

Visually inspect the front tires for retreads on active steering axles, damage, condition, cupping, section repairs, regrooving and mismatching.

**Note:** Retreaded tires are acceptable (pass) on self-steering axles.

#### Definitions

*Passive self-steering axle.* An axle on which the wheels turn left and right on one or more essentially vertical axes but their turning is not controlled by means of the steering wheel in the operator's compartment.

*Active steering axle.* An axle on which the wheels turn left and right on one or more essentially vertical axes and their turning is controlled by, and in direct proportion to, the rotation of the steering wheel in the operator's compartment.

#### Reject the vehicle if:

- A front tire has been retreaded.
- A tire has cuts greater than 25 mm (1 inch) in length below the tread depth or cuts into the cord.
- Any tread separation is evident or cords are exposed.
- A tire has been siped below tread depth.
- Any chunking is greater than 25 mm (1 inch).
- Tread is no longer evident in a cupped area.

- Any visible breaks, boots or blowout patches are evident in section repairs.
- A tire is regrooved and is not marked “REGROOVABLE.”
- A different size tire is on one axle.

## B. REAR DUAL TIRES

### Procedure

Visually inspect rear dual tires for retreads, damage, condition, cupping, section repairs, regrooving, and mismatching.

### Reject the vehicle if:

- Retreaded surface has peeled.
- A tire has cuts greater than 25 mm (1 inch) in length below the tread depth or cuts into the cord.
- Any tread separation is evident or cords are exposed.
- A tire has been siped below tread depth.
- Tread is no longer evident in a cupped area.
- Any visible breaks, boots or blowout patches are evident in section repairs.
- A tire is regrooved and is not marked “REGROOVABLE.”
- A tire is regrooved to less than 2.3 mm ( $\frac{3}{32}$  inch) above the cord.
- Different size tires are used on the same axle or dual tire diameters vary by more than 12.7 mm ( $\frac{1}{2}$  inch).

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### HAZARDOUS CONDITION

- Any part of a breaker strip or casing ply is showing in the tire area.
  - There is a visible bump or bulge in the tread area indicating separation.
  - A tire is regrooved and not marked “REGROOVABLE.”
- 

## 3. Sidewalls

### Procedure

Visually inspect sidewalls for bulges, cuts, matching tires, valve stems, marking and condition.

### Reject the vehicle if:

- A sidewall has any bulges exceeding 9.5 mm ( $\frac{3}{8}$  inch) in height.
- There are any cuts that expose cords.
- There are any mismatching tires on any one axle such as radial and non-radial.
- Valve stems are cracked or damaged.
- Any tire is labeled “NOT FOR HIGHWAY USE.”
- Any tire has any cuts longer than 25 mm (1 inch) into the cord layer.
- The sidewall is broken or distorted, cords are exposed or there is ply separation.
- There is severe deterioration as a result of weather checking.

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### HAZARDOUS CONDITION

- A sidewall is cut or damaged thereby exposing the cord.
  - Any tire is labeled “NOT FOR HIGHWAY USE.”
  - Bias and radial tires are on the same axle.
  - There is a visible bump or bulge in the sidewall area indicating separation.
-

## 4. Tire Pressure

### Procedure

With the use of a tire gauge, check the tire pressure.

### Reject the vehicle if:

- Pressure is not within the range marked on the sidewall.
- Pressure in dual tires is not within 10 percent of each other.

**Note:** Correct the tire pressure and pass the vehicle.

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### HAZARDOUS CONDITION

- Any tire is flat.
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## 5. Hubs (General)

### Procedure

Visually inspect the condition of the hubs.

### Reject the vehicle if:

- A hub has been repaired by welding.
- A hub is damaged, cracked, bent, broken or distorted.
- Any stud hole is enlarged or damaged in a way that prevents proper fitting and retention of studs.

## 6. Hub/Bearing Lubricant

### Procedure

Visually inspect the hub/bearing lubricant.

### Reject the vehicle if:

- The lubricant level is below the required minimum.
-  The lubricant is contaminated.
- Lubricant is leaking from the hub, hub/wheel seal or hub cap.

## 7. Wheel/Rim (General)

### Procedure

Visually inspect the condition of the wheel/rim.

### Reject the vehicle if:

- The wheel/rim is damaged, broken, bent, cracked or distorted.
- The wheel/rim has been repaired by welding.
- The wheel/rim is damaged or discolored as a result of heating.
- The wheel/rim size does not match the tire size.
- The valve stem is damaged or inaccessible, preventing the gauging of tire pressure or inflation of the tire.

## 8. Multi-piece Wheel/Rim

### Procedure

Visually inspect the condition of the multi-piece wheel/rim.

### Reject the vehicle if:

- A component is damaged, bent, cracked or distorted.
- A component is improperly assembled or shifted out of position.
- A component is severely corroded or pitted.
- There is less than 3 mm (0.12 inches) between the butt ends of the lock ring.
- There is evidence of damage caused by heating.
- Any component has been repaired by welding.
- There is a mismatched wheel/rim component.

**HAZARDOUS CONDITION**

- Lock ring is bent, broken, cracked, sprung, mismatched or improperly seated.

## 9. Spoke Wheel/Demountable Rim System

**Procedure**

**Step 1:** Visually inspect the condition of the spoke wheel/demountable rim system.

**Reject the vehicle if:**

- There is damage in the 28 degree mounting area resulting from slippage, wear, corrosion or pitting.
- There is evidence of rim slippage or incorrect positioning of the rim on the spokes.

**Step 2:** Rotate the wheel and check the run-out.

**Reject the vehicle if:**

- Lateral run-out exceeds 6 mm ( $\frac{1}{4}$  inch) at the sidewall of the tire.
- Rim clamps are missing, broken, cracked, welded, mismatched or twisting, or worn out in the 28 degree mounting area.
- Any heel-less clamp is bottomed or has more than 10 mm ( $\frac{3}{8}$  inch) gap between the clamp and spoke.
- Any heel type clamp has more than 6 mm ( $\frac{1}{4}$  inch) gap between the clamp and spoke.

**Step 3:** Visually inspect the spacer bands.

**Reject the vehicle if:**

- A spacer is missing, cracked, distorted, the incorrect size or type, or has been modified or repaired by welding.

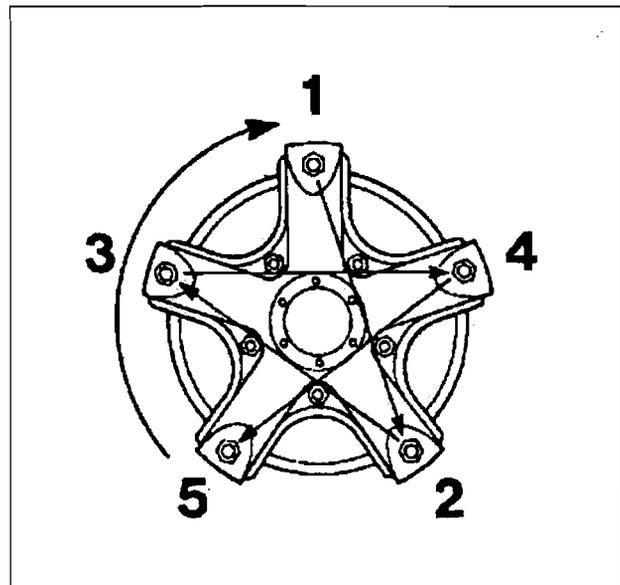
## 10. Disc Wheel System

**Procedure**

Visually inspect the condition of the disc wheel system.

**Reject the vehicle if:**

- An incompatible wheel or component is used on the wheel system.
- A wheel is incorrectly installed.
- There is evidence of loose or ineffective fasteners.
- There is evidence of:
  - Damage or deterioration.
  - Foreign material.
  - Excessive or uncured paint on the hub, drum or wheel mounting faces.



**Spoke Wheel Nut Tightening Sequence**

## 11. Wheel Fasteners (Nuts and Studs)

### Procedure

**Step 1:** Visually inspect the condition and installation of the wheel fasteners.

### Reject the vehicle if:

- Any fastener is missing, broken, bent or otherwise damaged.
- An incorrect fastener type, thread direction or style is used on the wheel system.
- Any nut is not fully engaged with the stud.  
**Note:** It is not imperative that every thread in a nut be engaged by a thread on the stud; however, a sufficient number of threads should be engaged so that when the fastener is torqued, they will not strip out.

**Step 2:** Test the fastener security.

### Reject the vehicle if:

- Any fastener rotates before the lowest torque value specified by the manufacturer is applied.

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### HAZARDOUS CONDITION

- Two or more wheel nuts or studs are loose, missing or broken on a disc wheel.
  - One or more wheel nuts or studs are loose, missing or broken on a spoke wheel.
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## 12. Axle End Bearing

### Procedure

**Step 1:** Inspect the bearing end play and rotate the bearings. See also *Chapter 4, Item 3*.

### Reject the vehicle if:

- Bearing end play exceeds the manufacturer's specifications.
- Noise binding or roughness is detected while rotating the bearing.

**Step 2:** When visually accessible, inspect the condition of the bearing adjustment locking device.

### Reject the vehicle if:

- The bearing adjustment locking device is missing, not engaged or non-functional.

# School Bus Appendix

*School bus inspection criteria consist of all applicable bus section items and this appendix.*

## 1. School Bus Power Train

### A. EXHAUST SYSTEM

#### Procedure

Visually inspect the exhaust pipe termination.

#### Reject the vehicle if:

- The exhaust pipe does not expel exhaust fumes beyond the perimeter of the body of the vehicle.
- The exhaust pipe does not terminate at or within 101.6 mm (4 inches) of the outside perimeter of the body or rear bumper.
- The exhaust pipe terminates on the left side.
- The exhaust pipe terminates on the right hand side more than 101.6 mm (4 inches) ahead of the rear wheel well.

### B. STARTER

#### Procedure

Start the vehicle three times and audibly inspect the starter operation and drive.

#### Reject the vehicle if:

- The engine fails to start three times in succession.
- The starter drive fails to engage or disengage.

### C. ALTERNATOR

#### Procedure

With the use of a volt and ammeter, visually check the alternator output and belt.

*Equipment needed:* Volt and ammeter.

#### Reject the vehicle if:

- The output shows an insufficient charge rate for the type of alternator installed on the bus. The charge rate for a regular bus should be 80 amp(min), and 68 amp(min) for a van.
- The alternator belt is loose, frayed or cracked.

## 2. Suspension

### A. SUSPENSION ATTACHMENTS

#### Procedure

Visually inspect the torsion bars.

#### Reject the vehicle if:

- Torsion bars are broken or loose.

### B. REAR WHEEL BEARINGS

#### Procedure

**Step 1:** On full-floating axles, elevate the rear axle so the tires are clear of the floor. Check the wheel bearing play by pushing the tire and drum assembly in toward the center of the axle housing as far as possible and then by pulling out as far as possible.

#### Reject the vehicle if:

- The endplay exceeds 3.17 mm ( $1/8$  inch) or the vehicle manufacturer's specifications.

**Step 2:** Inspect the rear wheel bearing adjustment.

**Reject the vehicle if:**

- The adjustment is improper.

### 3. Brakes

#### A. VEHICLES EQUIPPED WITH VACUUM POWER BRAKES

**Procedure**

With the engine off and the vacuum exhausted, apply moderate foot force to the pedal and then start the engine. Inspect the travel.

**Reject the vehicle if:**

- No movement in the pedal is detected.

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#### HAZARDOUS CONDITION

- The service brake pedal does not move toward the floorboard with the brakes applied when the engine is started.
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#### B. PROPORTIONING VALVE

**Procedure**

**Step 1:** If the school bus is equipped with a proportioning valve, determine if the rear brakes are working by lifting the vehicle so that all wheels are clear of the ground.

**Step 2:** Apply just sufficient pressure to the brake pedal to lock the front wheels against rotation by hand effort. The rear wheels should also lock.

**Step 3:** Place a lifting device under the rear axle. **Note:** Do not place it under the body as the valve on the body on some vehicles is connected to the axle by a link that causes the valves to shut off pressure to the rear brakes whenever the vehicle body lifts away from the rear axle.

**Reject the vehicle if:**

- The rear wheels fail to lock.

### 4. Lamps

#### A. ALTERNATING FLASHING RED/AMBER STOP LAMPS: 4 AND/OR 8 LAMP

**Procedure**

Visually inspect the operation of the alternating flashing red/amber stop lamps. Check their color, size, type and switch operation.

**Reject the vehicle if:**

- Lamps do not operate or do not alternate.
- Lamps are not red and amber in color.
- Lamps are not a minimum of 17 mm (5 inches) in diameter.
- Lamps are not sealed beam type lamps.
- The manual switch is inoperable.

#### B. STOP ARM

**Procedure**

Activate the flashing red stop lamps. Open the door and check the operation of the stop arm. Visually inspect the stop arm and lamps.

**Reject the vehicle if:**

- The stop arm fails to operate.
- Lamps fail to operate or flash alternately.

### 5. Body

#### A. PAINT

**Procedure**

**Step 1:** Visually inspect the body paint.

**Reject the vehicle if:**

-  It is not school bus yellow.
-  It is not painted yellow in accordance with the CSA School Bus Standard D250 "National school bus chrome."
- Any area of paint is missing in excess of 0.125 mm<sup>2</sup> (200 square inches).

**Step 2:** Visually inspect the front and rear bumpers, lettering, body trim and wheels.

**Reject the vehicle if:**

- Front and rear bumpers, lettering, body trim and wheels are not gloss black in color.



**Step 3:** Visually inspect the hood and sheet metal surfaces in the driver's view.

**Reject the vehicle if:**

-  They are not lusterless black. Note: In Canada, buses manufactured prior to the 1976 model year and all van buses manufactured prior to the 1979 model year do not require a black hood.

## B. SIGNS

### Procedure

**Step 1:** Visually inspect the “School Bus” sign.

**Reject the vehicle if:**

- It is not displayed on the front and rear.
- It is not black in color on a yellow background.
- It is not as high as practical on a vertical plane.
- The letters are not a minimum of 203.4 mm (8 inches) high and 32 mm (1.25 inch) in width.

**Step 2:** Visually inspect the “Do Not Pass When Red Lamps Flashing” or similarly prescribed sign.

**Reject the vehicle if:**

- The sign is not displayed.
- It is not located below the “School Bus” sign on the rear.
- It does not have a white or yellow background as prescribed.
- Letters are not a minimum of 76.2 mm (3 inches) high, and not black.
- It is not legible.

**Step 3:** Visually inspect the “Emergency Door” sign.

**Reject the vehicle if:**

- It is not inscribed on the upper part of the door.
- It is not inscribed on both the inside and outside in black or red letters a minimum of 50.8 mm (2 inches) high.

**Step 4:** Visually inspect the “This School Bus Stops At All Railroad Crossings” sign.

**Reject the vehicle if:**

- The sign is missing.
- It is not visible when approaching the rear of the bus.
- Letters are not 50.8 mm (2 inches) high.

**Step 5:** Visually inspect the side reflective material where prescribed.



In Canada, these requirements apply to buses manufactured after January 1998.

**Reject the vehicle if:**

- Tape is not yellow.
- Side reflective material is not a minimum of 25.4 mm (1 inches) wide.
- It is not below the windows and as high as practical.
- It is not the full length of the bus excluding the door and stop arm.

## C. SCHOOL BUS CONVERTED TO BUS

### Procedure

Visually inspect school buses converted to buses for compliance with the following:

#### Paint

The bus must be painted on the front and rear in such a manner as not to be confused with a school bus.

#### Signs

All signs associated with school bus operation must be removed from the vehicle.

**Lamps**

All flashing red and amber lamps (alternating lamps) must be removed.

**Reject the vehicle if:**

- It does not comply with all of the above requirements.

**D. FLOOR PAN****Procedure**

Inspect the floor pan.

**Reject the vehicle if:**

- The floor pan is not covered by at least 12.7 mm ( $\frac{1}{2}$  inch) plywood.
- The floor pan is other than smooth under the seats and ribbed in the aisle.

**E. SERVICE DOOR AND EXIT DOOR****Procedure**

Visually inspect the service door and exit door window.

**Reject the vehicle if:**

- Glass is missing from any panels.
- The window is not double paned or equipped with a means of keeping the glass clear.

**F. EMERGENCY DOOR OR EXIT****Procedure**

Visually inspect the emergency door or exit passage and roof hatch.

**Reject the vehicle if:**

- The passage is less than 304.8 mm (12 inches) in width from the floor to the ceiling.
- The vertical opening is less than 1219.2 mm (48 inches) measured from the floor.
- The interior/exterior latch is not operable from both sides.

- The emergency door warning device lock is not operable.
- The roof hatch is missing on buses manufactured after January 1998.

**G. SIDE WINDOWS****Procedure**

Visually inspect the condition of the side windows.

**Reject the vehicle if:**

- The first two windows on the right side and the first window on the left side are not double paned.

**H. EXTERIOR REARVIEW MIRRORS****Procedure**

**Step 1:** Visually inspect the location and type of side mirrors.

**Reject the vehicle if:**

- The location creates blind spots.
- A type of mirror other than below-eye-level type of mirror is used.

**Step 2:** Visually inspect hemispherical convex mirrors for location, diameter, vision, mounting, condition and adjustment.

**Reject the vehicle if:**

- The mirror is not at the right front corner.
- The diameter is less than 208.2 mm (8 inches).
- A seated driver cannot see a 0.6 m (2 feet) high object within 2 m (6.5 feet) of the front and right side of the bus.
- The mounting is loose or insecure.
- The mirror is cracked, broken or obscured.
- The mirror will not maintain adjustment.

## I. PASSENGER SEATS

### Procedure

Visually inspect the passenger seat cushions, backs and spacing.

### Reject the vehicle if:

- Seat cushions are not secured to the frame with a minimum of two clamps located at the front of the seat and positioned around the frame tubing and attached to the seat with a minimum of one self-tapping screw per clamp or equivalent.
- Seat backs are less than 508 mm (20 inches) in height from the seat cushion to the top of the seat.
- Spacing between the seats is not 635 to 711 mm (25 to 28 inches) from center to center.

## J. INTERIOR

### Procedure

Visually inspect the retainer barrier. All school buses should be equipped with retainer barriers placed forward of each front passenger seat.

### Reject the vehicle if:

- The retainer barrier is missing or not placed forward of any front seat.
- The retainer barrier is not as wide as the seat cushion, not the same height as the top of the seat backs and does not extend downward to within 304.8 mm (12 inches) of the floor.

## K. RUB RAILS

### Procedure

Visually inspect the presence, security and location of rub rails.

**Note:** All school buses require rub rails. In the case of a large bus, rub rails should be installed as per the original manufacturer. In a van-type vehicle, rub rails should be at least 101.6 mm (4 inches) wide, located at seat cushion height and on the left side in front of the driver to the rear corner. They should also be on the right side from the rear doorpost to the rear corner. Rub rails should be securely attached to the body, doorposts and corner posts.

### Reject the vehicle if:

- Rub rails are missing.
- Rub rails are loose or any rivet is missing.
- One is not approximately at seat cushion height.

## L. ROAD TEST

### Procedure

Start the vehicle and test drive it.

- Operate all electrical controls.
- Conduct turning maneuvers in both directions.
- Listen for noises abnormal to the operation of the vehicle.
- Conduct static operational tests on all gauges.
- Drive at highway speed.
- Test the braking.

### Reject the vehicle if:

- Any abnormal conditions are evident such as vibrations, poor balancing or pulling to one side.

## About the Publishers

### **American Association of Motor Vehicle Administrators**

Founded in 1933, AAMVA is a nonprofit, educational organization representing state and provincial motor vehicle and law enforcement agencies throughout the United States and Canada.

AAMVA's programs encourage uniformity and reciprocity among the states and provinces, and promote liaison activities with other levels of government and the private sector. AAMVA also stresses highway safety through its involvement in numerous national coalitions, and its program and research activities provide guidelines for more effective public service.

Association members include all United States and Canadian jurisdictions plus American Samoa, Guam, Puerto Rico and the Virgin Islands. AAMVA associate members include organizations, associations and business enterprises with interests compatible with AAMVA and its program objectives.

### **Canadian Council of Motor Transport Administrators**

Established by the provincial, territorial and federal governments, CCMTA is a nonprofit organization that promotes understanding and cooperation in all matters concerning the administration, regulation and control of motor vehicle transportation and safety in Canada.

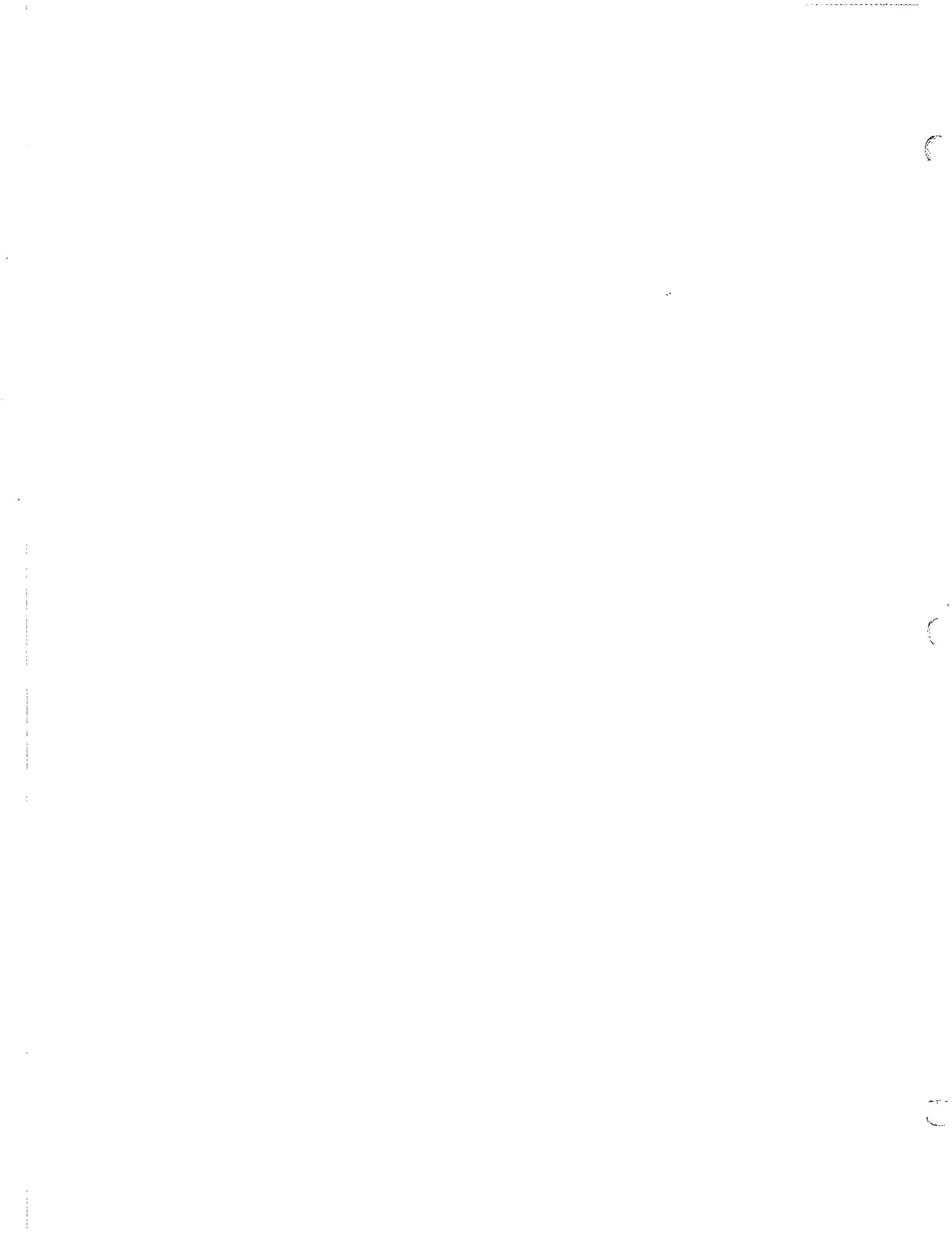
CCMTA reports to the Council of Ministers Responsible for Transportation and Highway Safety and is responsible for motor vehicle registration, driver licensing, road safety programs, motor carrier regulatory issues, compliance activities for commercial vehicles and drivers, and other transportation projects and agreements.

Members include senior representatives from all of the provincial and territorial governments, as well as representatives from the federal government. Private industry organizations and other government agencies in Canada and the United States participate as associate members.











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