



Mercedes-Benz

# G Class

## Differential Locks



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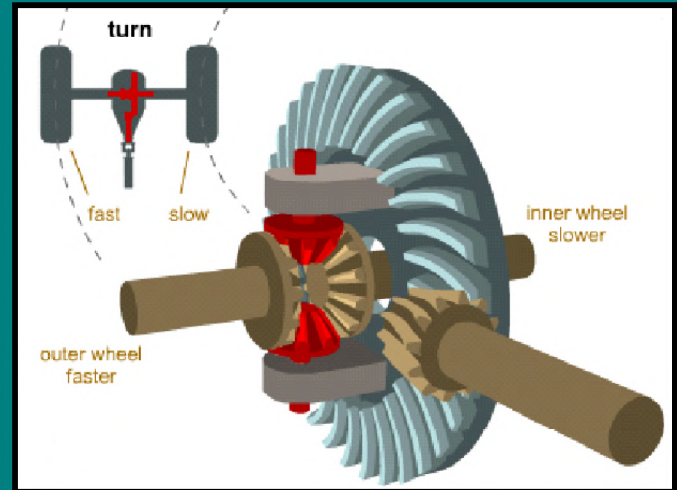
*Printed in U. S.A.*

# Why Use Differential Locks?

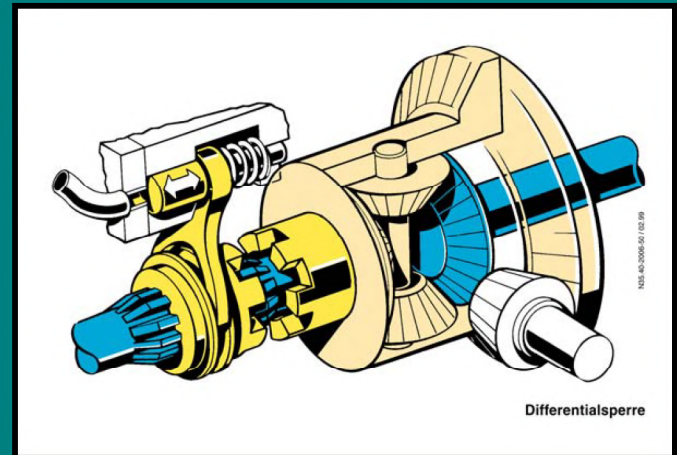
A differential allows the driven wheels to turn at different speeds when turning a corner (open differential).

In off-road conditions one or several wheels can lose traction. The differential allows the torque to go to the wheels that are easiest to turn.

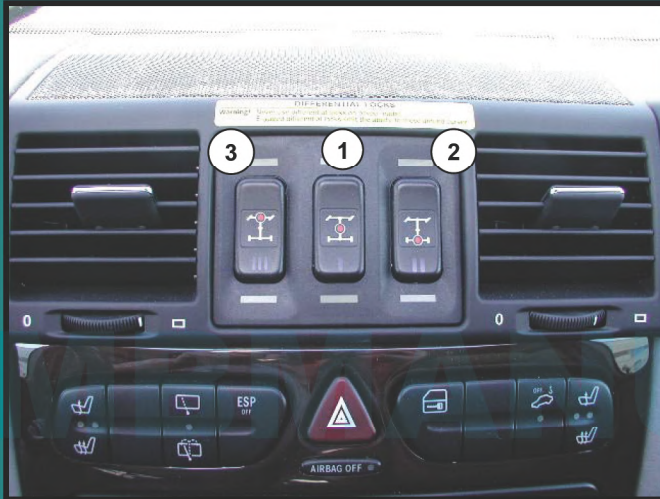
Result: spinning wheels !!



A differential lock secures one axle shaft to the rotating differential case. The differential “spider” gears can no longer allow a difference in speed, both axle shafts turn at the same speed.



# When To Use Differential Locks

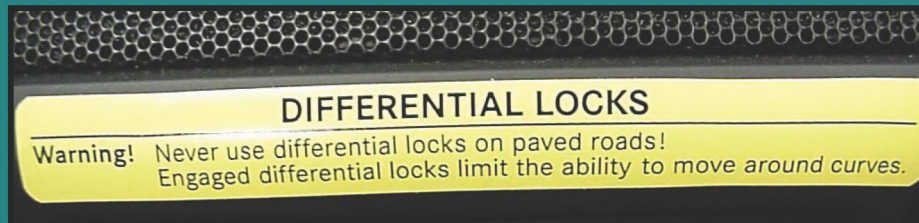


- 1 - Center lock switch
- 2 - Rear lock switch
- 3 - Front lock switch

Differential locks should be engaged for traction improvement while:

- Driving off-road
- Fording
- Driving on snowy, icy or muddy surfaces

Engaging differential locks while on paved roads can damage drivetrain components.



# Operation

- Fixed sequence (cannot be changed)
  - center, rear, front
- Lock request: Yellow indicator

MF Display: **“ESP NOT AVAILABLE”**

- Lock confirmation: Red indicator

MF Display: **“ESP NOT AVAILABLE”**

**“ABS NOT AVAILABLE”**

**“BAS NOT AVAILABLE”**

Note: 2002 MF warning display shown



# 2003 MF Display

Lock request



Lock engaged



Warning display changed for 2003 due to NHTSA mandate

# Differential Lock Switch Group (S76)

## Task:

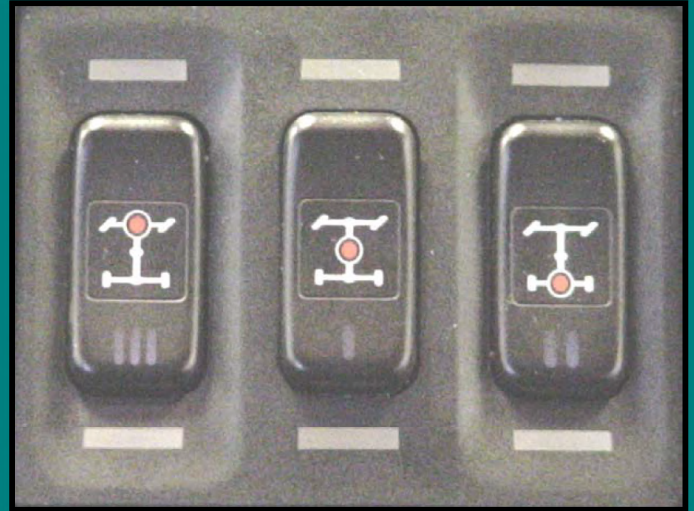
- Activates the individual differential lock
- Monitors differential lock engagement
- Ensures engagement sequence
- Indicates condition
  - off, request or engaged
- Time delay
  - ensures differential locks stay engaged for ~ 30 seconds when ignition switched off

## Inputs:

- Differential lock confirmation switches
- 58d lighting

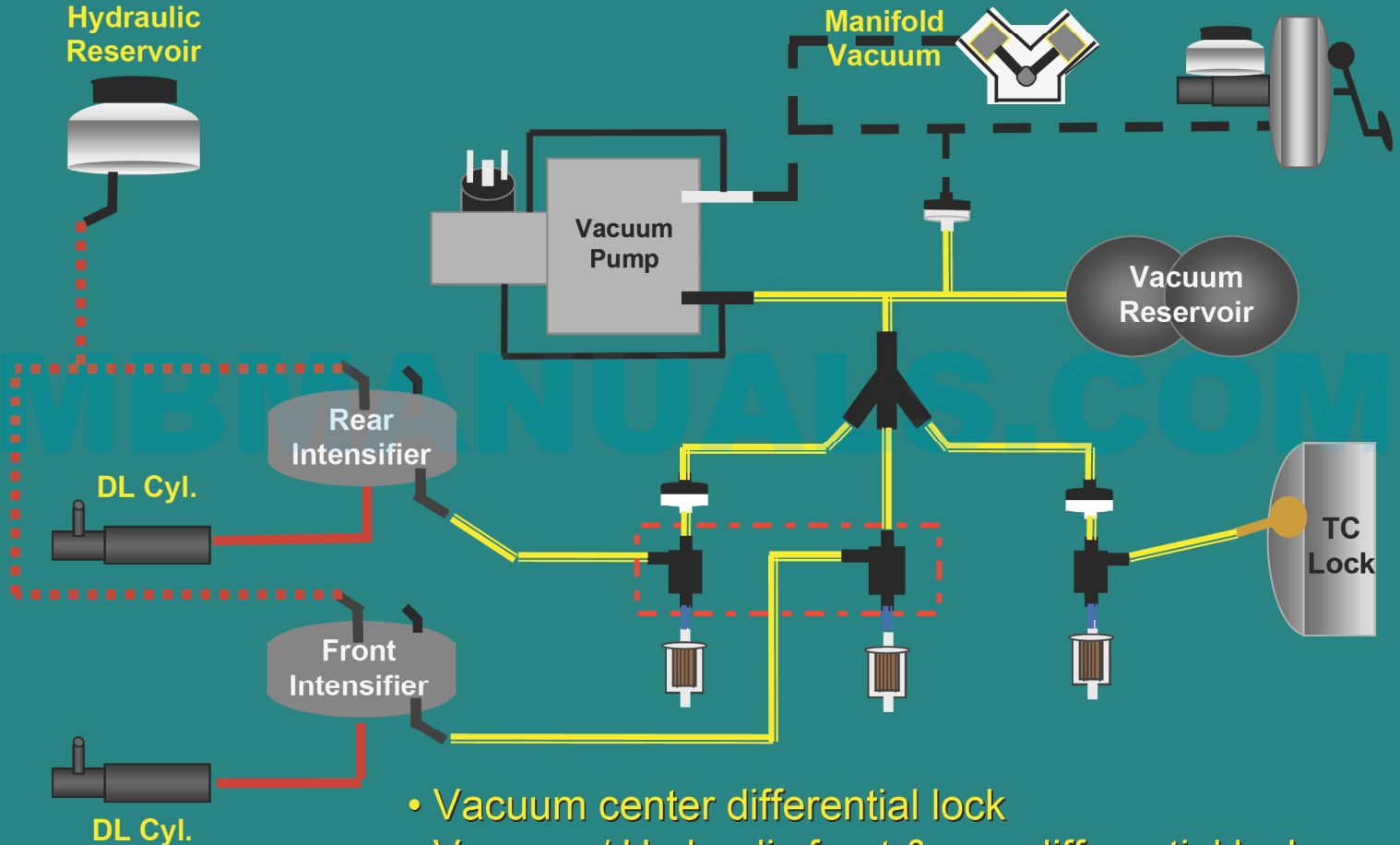
## Outputs:

- Differential lock relay
- Front & rear differential lock switchover valves
- ESP



- No self-diagnostics
- Guided test available in SDS / DAS

# Vacuum and Hydraulic Diagram



- Vacuum center differential lock
- Vacuum / Hydraulic front & rear differential lock
- Check valves on center & rear vacuum supply

# Vacuum Pump (M40)

Task: Supplement manifold vacuum for the differential lock system.

Differential lock request, pump runs:

- Key on, until vacuum reaches approx. 550 mbar
- Engine running, continuously

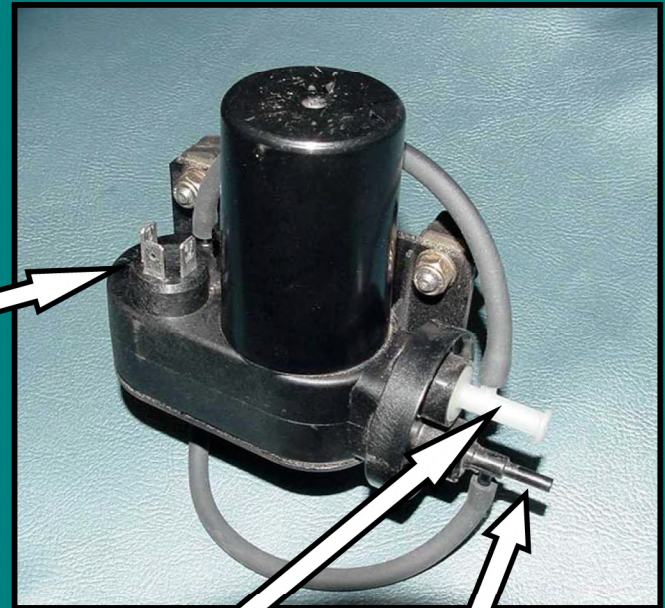
Pump motor connector +/-

Mechanical internal pressure sensor

Note: Front differential lock may disengage if vac leak / pump weak on heavy throttle application

*Differential locks engage ~400mbar*

*Differential locks disengage ~200mbar*



engine

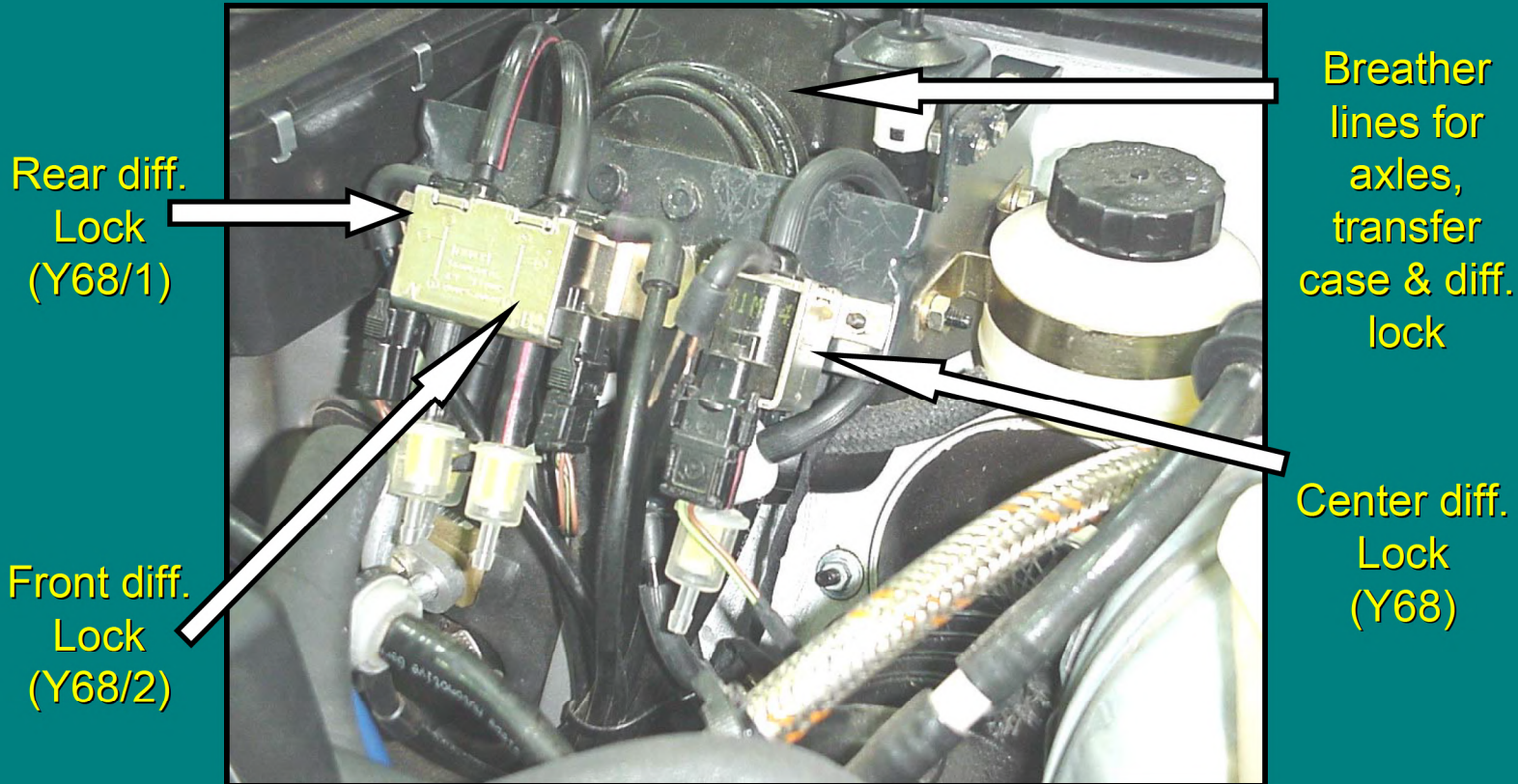
vac reservoir &  
switchover valves

# Vacuum Reservoir



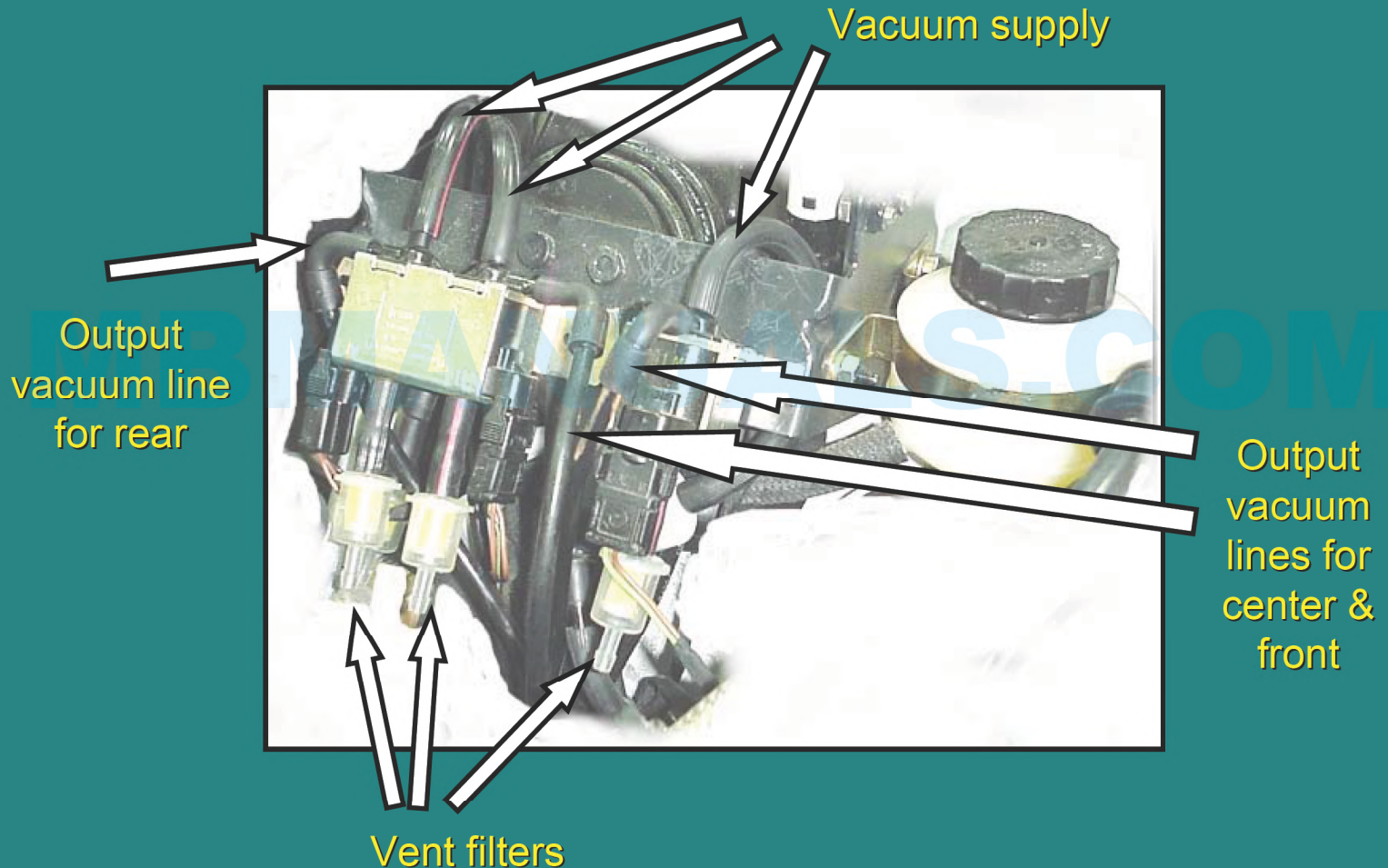
Location: left inner fender well

# Differential Lock Switchover Valves



Location: mounted on the firewall right of the brake booster

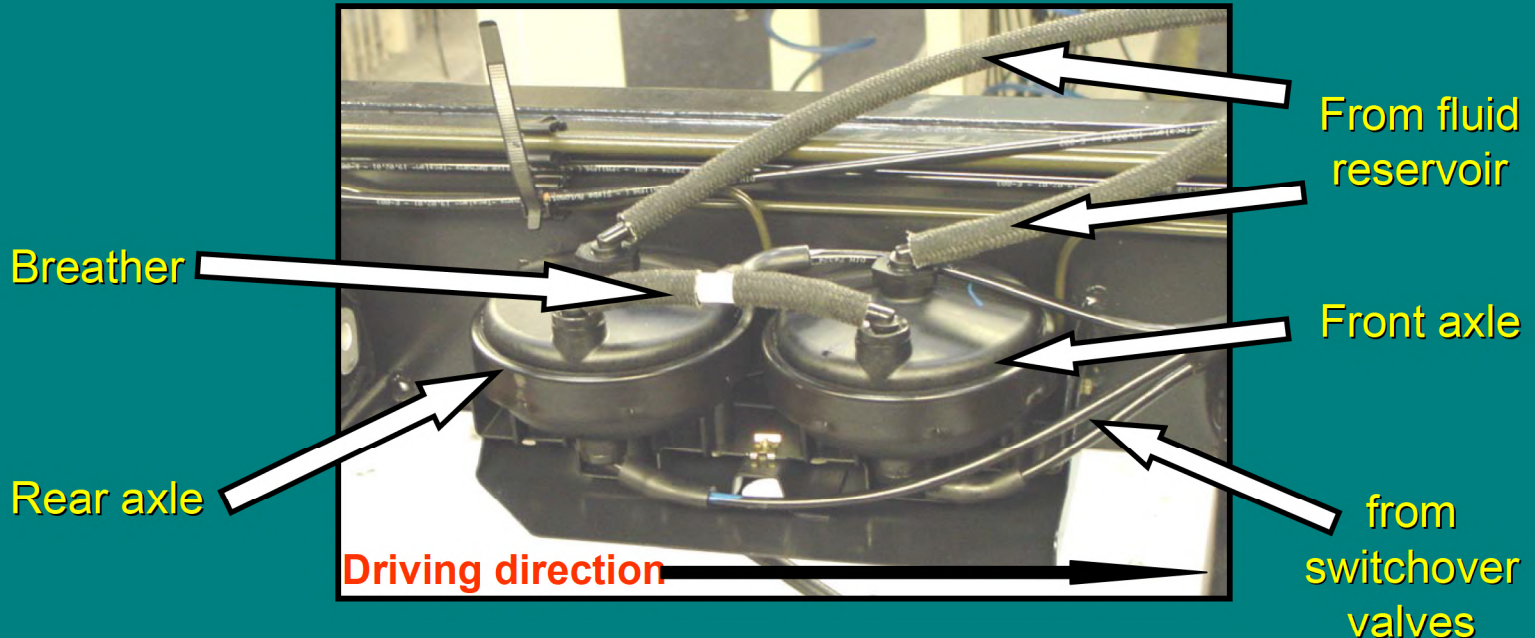
# Differential Lock Switchover Valves



# Pressure Intensifier Units

Task:

- Convert vacuum to hydraulic
- Provide hydraulic pressure

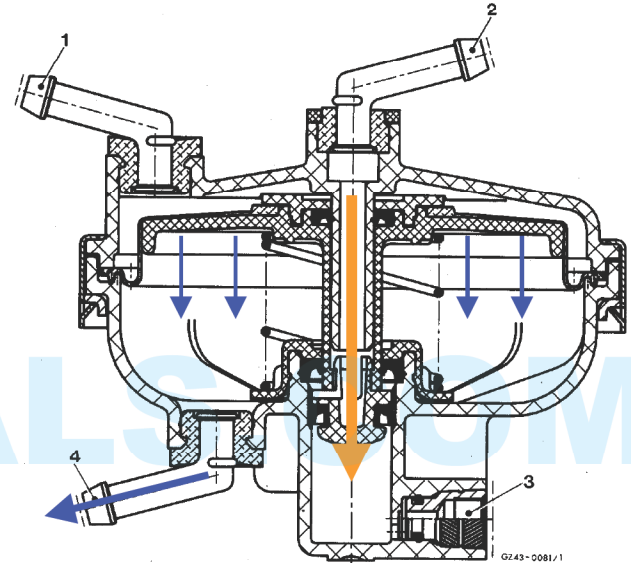


Location: inside of left frame rail

# Pressure Intensifier Unit

## Function:

- Vacuum is applied to a large area diaphragm
- Diaphragm and hydraulic piston are pulled in a downward direction
- Downward movement of the piston creates hydraulic pressure of approximately 15 bar
- When vacuum is removed the spring force will return the diaphragm and hydraulic piston to its rest position

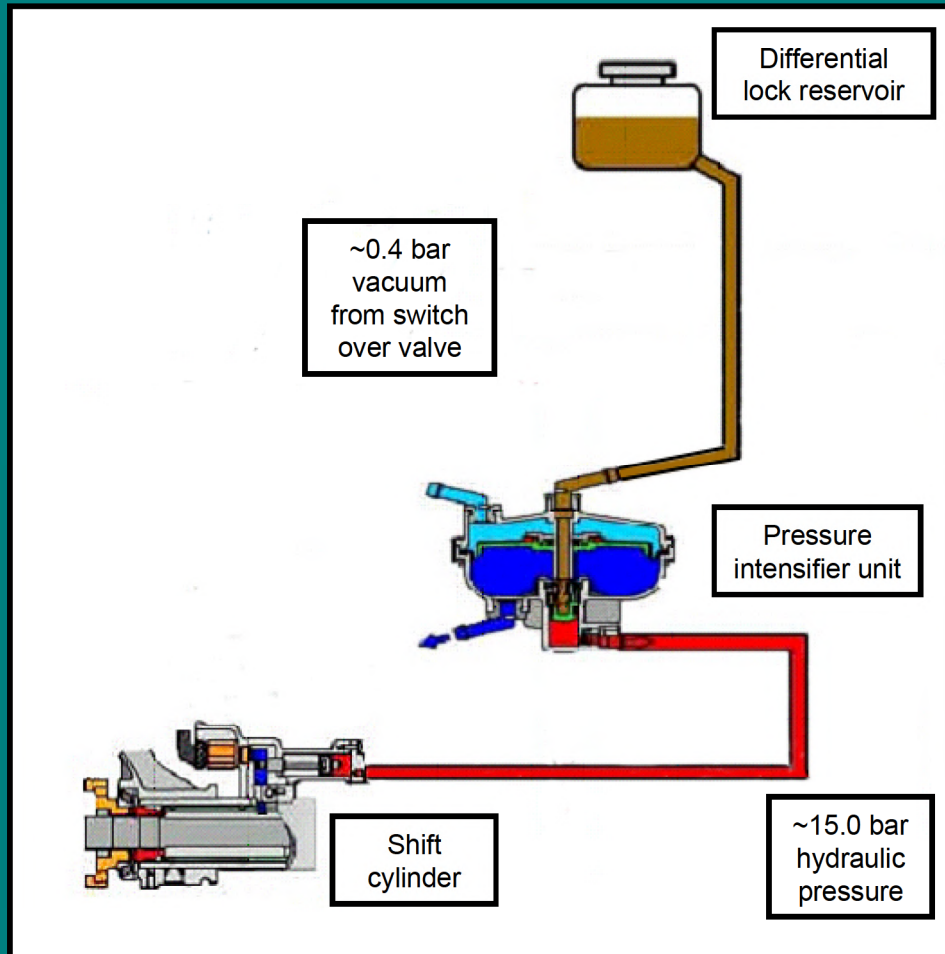


## Pressure Intensifier

(pneumatic system-hydraulic system)

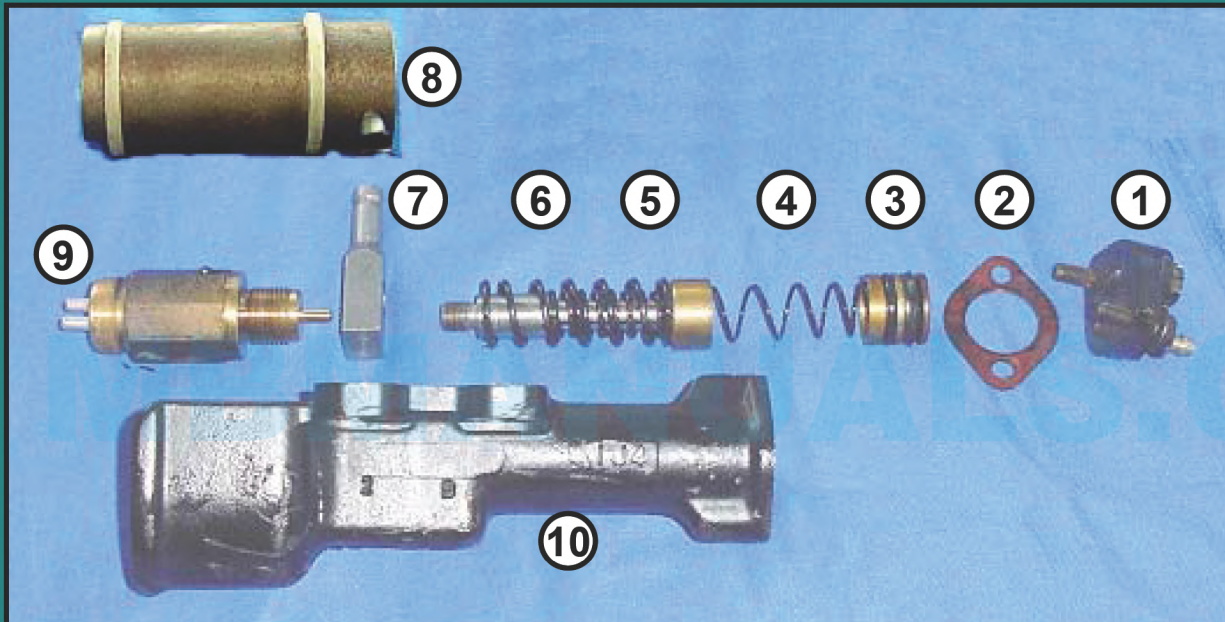
1. vent
2. hydraulic reservoir
3. Shift cylinder
4. vacuum

# Hydraulic Circuit



axle circuit illustrated

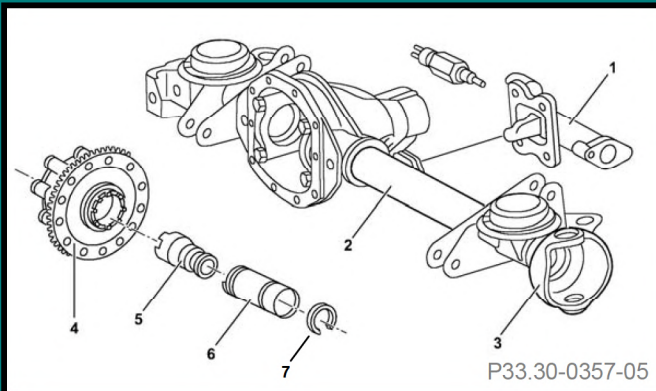
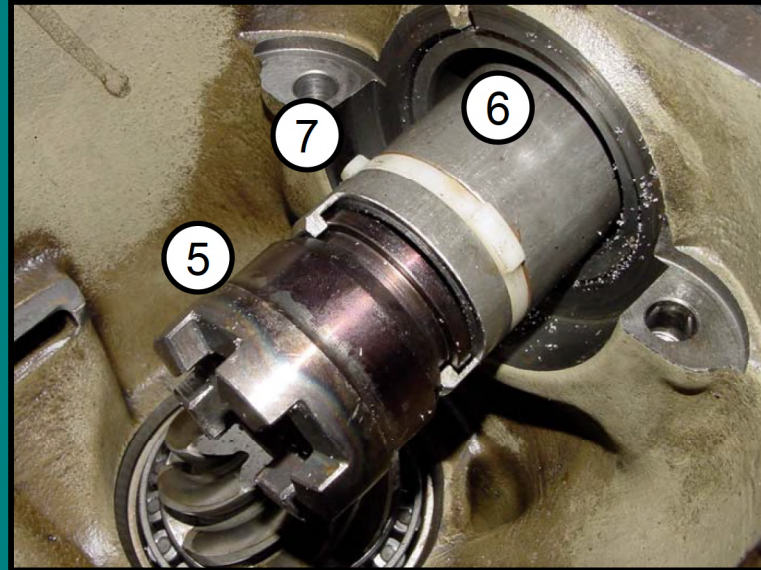
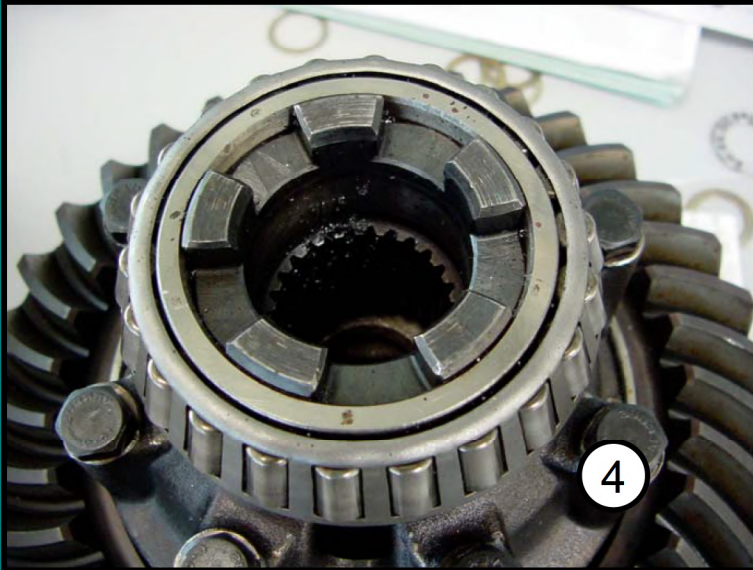
# Axle Shift Cylinder



- 1 End cover with bleeder nipple
- 2 Gasket
- 3 Shift piston
- 4 Spring
- 5 Shaft
- 6 Compression spring
- 7 Lever
- 8 Shift sleeve
- 9 Confirmation switch
- 10 Shift cylinder

- Hydraulic force moves the shift piston
- Piston movement causes mechanical movement of the shaft and lever
- Switch S76/8,9 confirms lever at end stop (engaged)

# Axle Locking Elements



1. Shift cylinder

2. Axle tube

3. Joint housing

4. Center drive

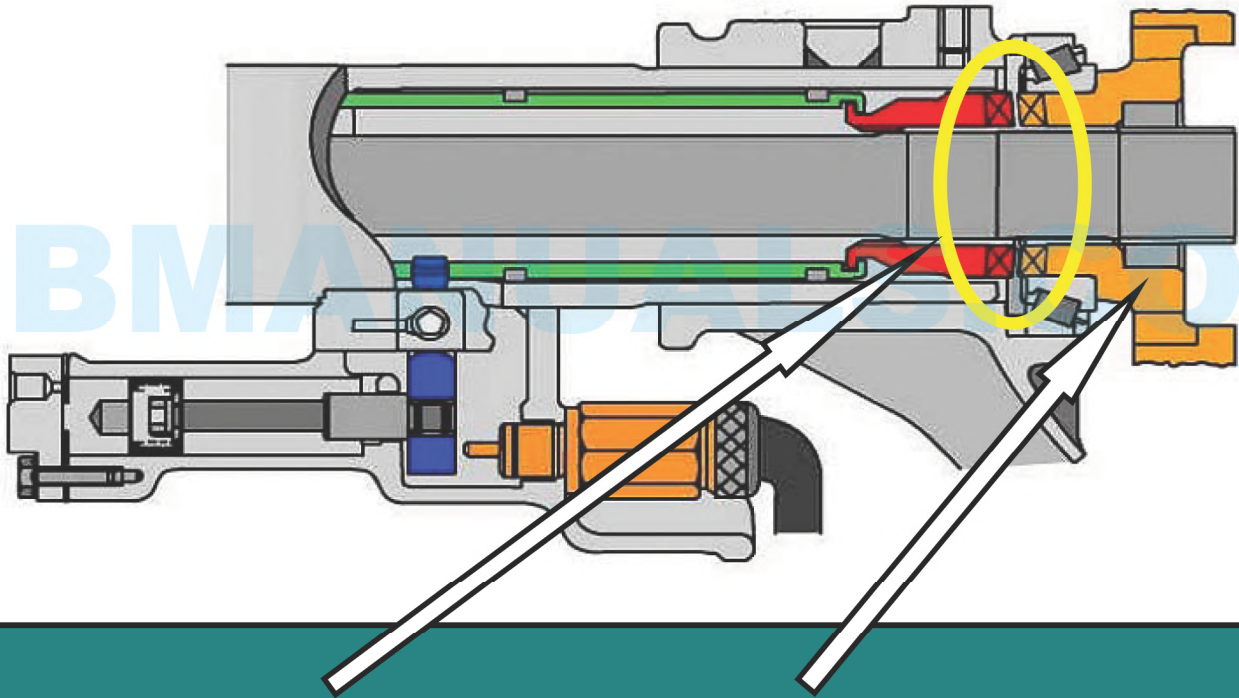
5. Shift sleeve

6. Shift tube

7. Polyamide ring

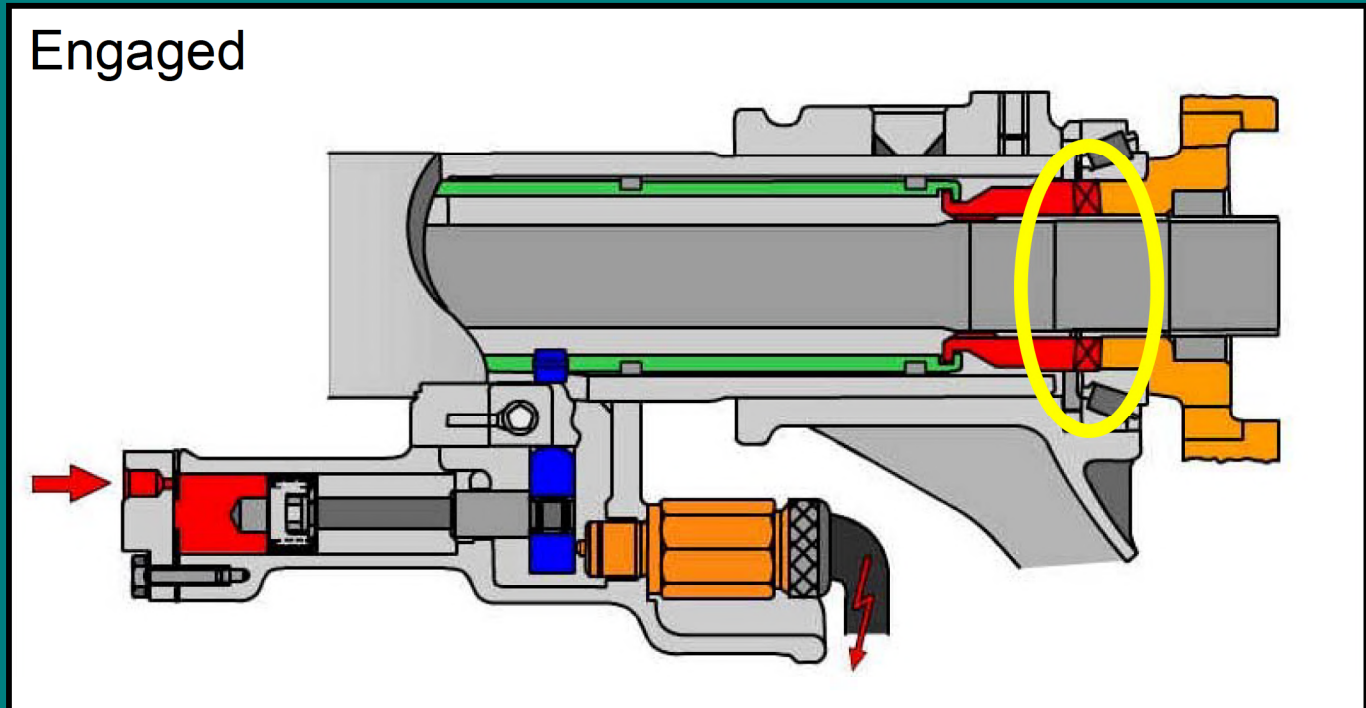
# Axle Differential Lock

Disengaged



Shift sleeve not engaged with center drive

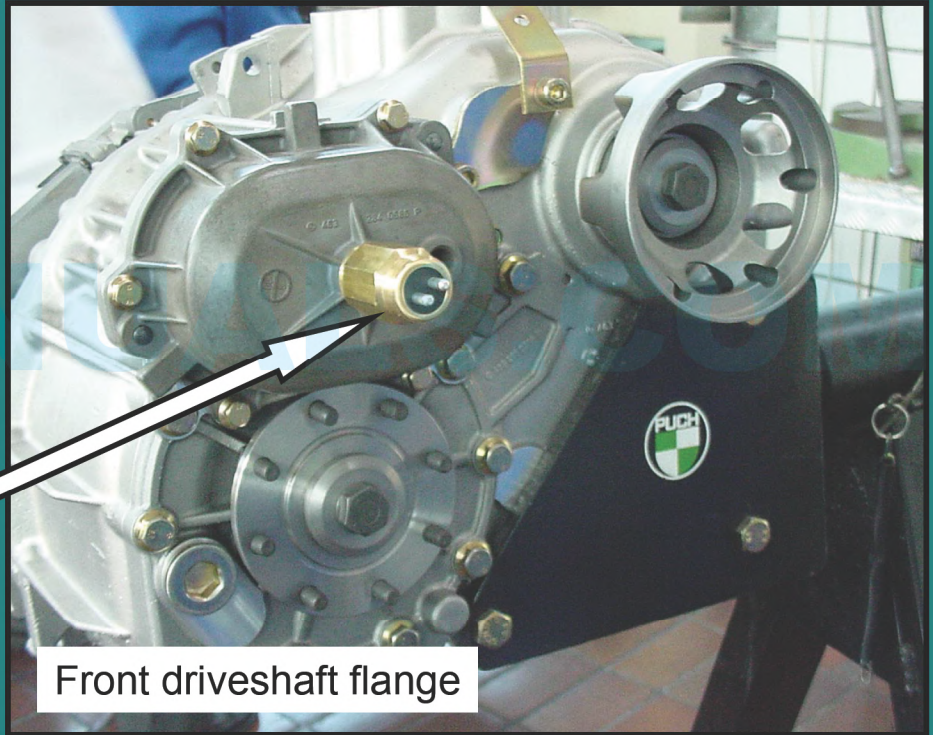
# Axle Differential Lock



- Adjust shift cylinder position when lock engaged
- Shift lever can be bent if engaged while wheel slipping
- If shift lever bent or incorrectly adjusted the switch will not be operated

# Transfer Case Differential Lock

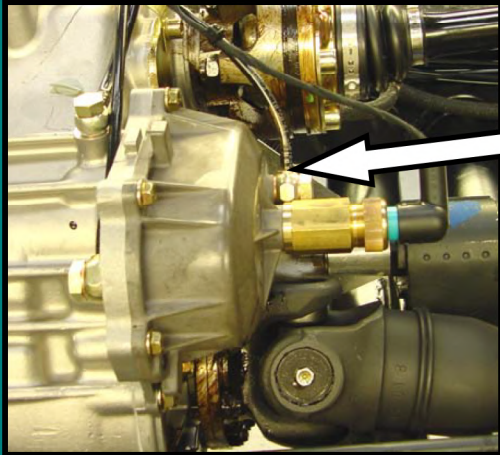
- Operated by vacuum only  
(No hydraulic circuit)
- Locks front & rear  
driveshafts together
- Locking confirmed by S76/7



Front driveshaft flange

Location: front of transfer case

# Differential Lock



Vacuum line

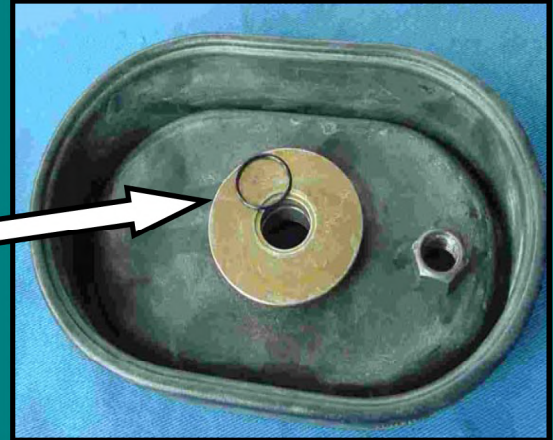
Shift Cylinder Housing



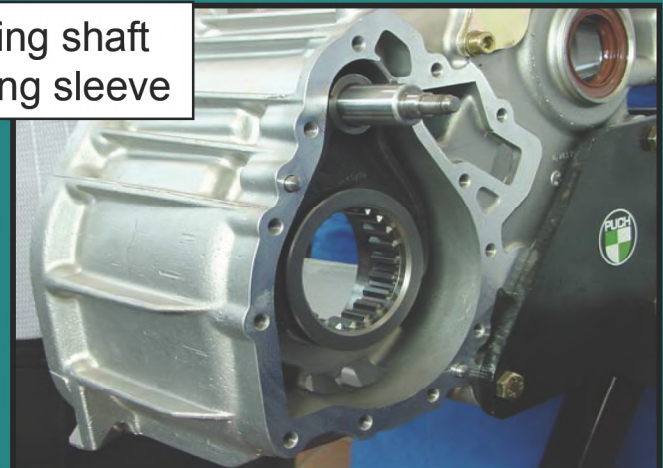
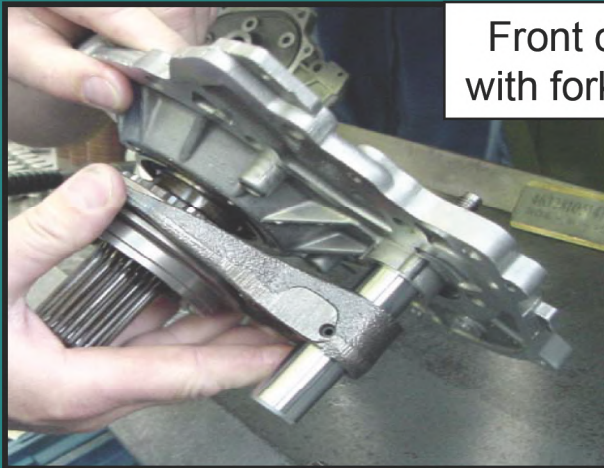
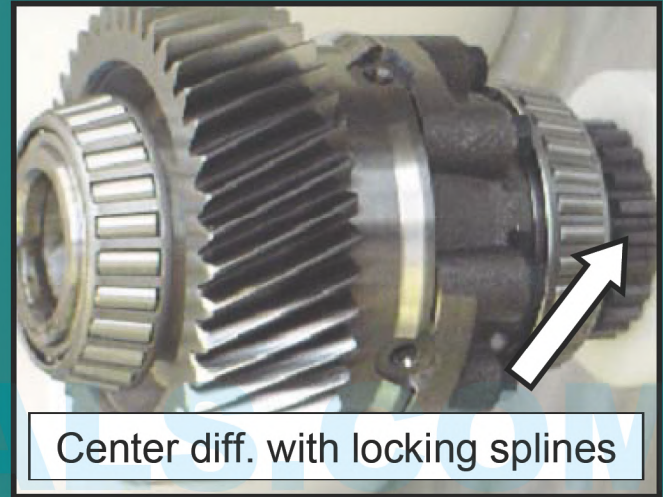
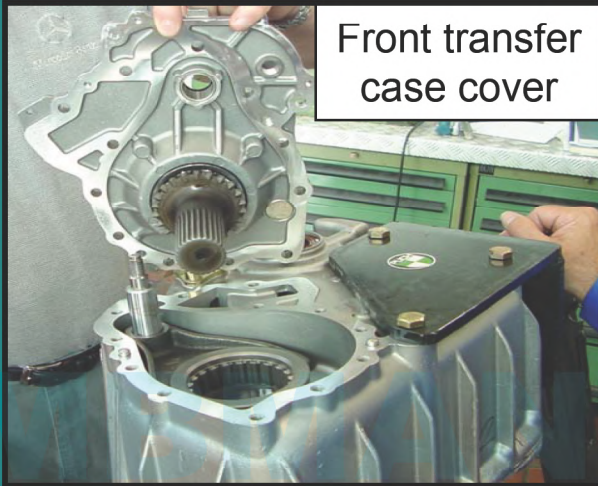
Diaphragm



O-ring



# Differential Lock



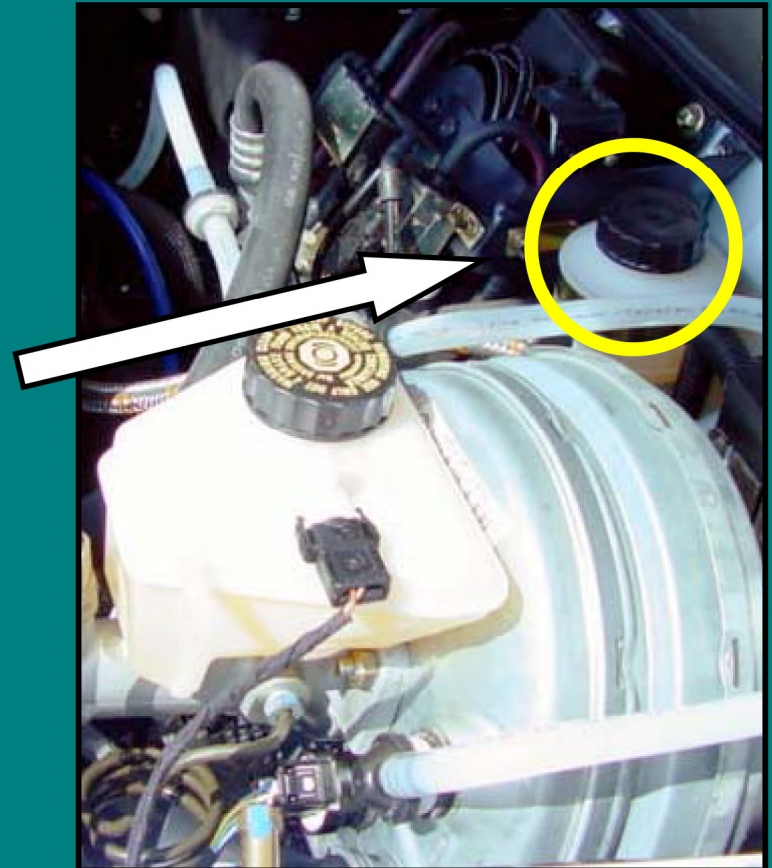
# Maintenance

Every A & B service:

- Check & correct fluid level
- DOT 4 Plus brake fluid
- Engage differential locks for short distance

Preventative maintenance every 3 - 5 years:

- Replace fluid



# Maintenance

The WIS job number for bleeding the front and rear differential locks is AR33.40-P-0701GG.

