
# OPERATORS MANUAL

**MARMON-HERRINGTON ALL-WHEEL DRIVE**
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RD07/04

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MARMON–HERRINGTON

ALL–WHEEL DRIVE

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1. **SHIFT PATTERN AS NOTED**
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   2nd Detent High Range (**ALL-WHEEL DRIVE**)
   3rd Detent Neutral Range (Power-Take-Off)
   4th Detent Low Range (**ALL WHEEL DRIVE**)

2. **HIGH RANGE** (1st Detent)
   The first detent of the control lever is High Range (1.00:1 Ratio). Vehicle to be operated for **ON-HIGHWAY** application, **REAR-WHEEL** drive only.

3. **HIGH RANGE** (2nd Detent)
   The second detent of the control lever is High Range (1:00:1 Ratio) and **ALL-WHEEL DRIVE**. Vehicle to be operated for **OFF-HIGHWAY** application.

4. **NEUTRAL RANGE** (3rd Detent)
   The third detent of the control lever is Neutral Range. With the lever in this position, the Rear and Front output drives are disengaged. Vehicle should be operated for **POWER-TAKE-OFF** application.
   **NOTE:** The **EMERGENCY BRAKE SYSTEM** should be **APPLIED**.

5. **LOW RANGE** (4th Detent)
   The fourth detent of the control lever is Low Range (2.05:1 Ratio), and **ALL-WHEEL DRIVE**. Vehicle to be used only for adverse conditions.

**CAUTION:**
**DO NOT** shift to any position until vehicle is **STOPPED**, otherwise gear damage is most probable. Using slight clutch drive movement will help in the shifting.

## TWIN GEAR SHIFT
## MR226 TRANSFER CASE

1. The shift system includes two (2) control levers; one for High-Neutral-Low and the other for Front Axle engage-disengagement, with linkage connections between control lever and transfer case shift rails.

2. **HIGH-NEUTRAL-LOW RANGE**

   **HIGH RANGE:**
   The first detent of the control lever is High Range (1.00:1 Ratio). Vehicle to be operated for **ON-HIGHWAY** application or **OFF-HIGHWAY** with the front axle **ENGAGED**.

   **NEUTRAL RANGE:**
   The second detent of the control lever is Neutral Range. With the lever in this position the **FRONT** and **REAR** (if Front Axle was engaged) output drives are disengaged. Vehicle should be operated for **POWER-TAKE-OFF** application. **NOTE:** The **EMERGENCY BRAKE SYSTEM** should be **APPLIED**.

   **LOW RANGE:**
   The third detent of the control lever is Low Range (1.98:1 Ratio). Vehicle to be used only with the **FRONT AXLE ENGAGED** for adverse conditions.

3. **FRONT AXLE ENGAGEMENT**
   The first detent of the control lever is disengagement, and the second detent is engagement of the Front Axle declutch located at the transfer case. The **ENGAGEMENT** is for **OFF-HIGHWAY** application.

**CAUTION:**
**DO NOT** shift to any position until vehicle is **STOPPED**, otherwise gear damage is most probable. Using slight clutch drive movement will help in the shifting.

## FRONT DRIVING AXLE ENGAGEMENT
## MR226 TRANSFER CASE

1. The **ENGAGEMENT** of the front driving axle is for **OFF-HIGHWAY** application. To engage the axle an air or vacuum control valve is utilized.

2. **AIR ENGAGEMENT**
   The shift system includes a manually operated air shifter valve, air cylinder, and linkage. In operation, the shifter valve supplies air to engage or disengage the cylinder and linkage located at the Front Axle declutch of the transfer case.

3. **VACUUM ENGAGEMENT**
   The shift system includes a manually operated vacuum rotary valve, vacuum chamber, and linkage. In operation, the valve supplies vacuum to engage or disengage the chamber and linkage located at the Front Axle declutch of the transfer case.

**CAUTION:**
**DO NOT** shift to any position until vehicle is **STOPPED**, otherwise gear damage is most probable. Using slight clutch drive movement will help in the shifting.

## MANUAL GEAR SHIFT
## MR226 HIGH-LOW TRANSFER CASE

1. **HIGH RANGE**
   The first detent of the control lever is High Range (1.00:1 Ratio). Vehicle to be operated for **ON-HIGHWAY** application or **OFF-HIGHWAY** with the Front Axle **ENGAGED**.

2. **NEUTRAL RANGE**
   The second detent of the control lever is Neutral Range. With the lever in this position the **FRONT** and **REAR** (if Front Axle was engaged) output drives are disengaged. Vehicle should be operated for **POWER-TAKE-OFF** application. **NOTE:** The **EMERGENCY BRAKE SYSTEM** should be **APPLIED**.

3. **LOW RANGE**
   The third detent of the control lever is Low Range (1.98:1 Ratio). Vehicle to be used only with the **FRONT AXLE ENGAGED** for adverse conditions.

**CAUTION:**
**DO NOT** shift to any position until vehicle is **STOPPED**, otherwise gear damage is most probable. Using slight clutch drive movement will help in the shifting.

## 3-POSITION AIR SHIFT
## MR-226 HIGH-LOW TRANSFER CASE

1. The shift system includes a manually operated air shifter valve, and a 3-position air cylinder.

2. **HIGH RANGE**
   With the air shifter valve in this position, the Transfer Case is in **HIGH RANGE** (**1.00:1 Ratio**). Vehicle to be operated for **ON-HIGHWAY** application or **OFF-HIGHWAY** with the **FRONT AXLE ENGAGED**.

3. **NEUTRAL RANGE**
   Shift the air valve to the middle position, and Transfer Case is in **NEUTRAL RANGE**. In this position, the **REAR** and **FRONT** (if Front Axle was engaged) are disengaged. Vehicle should be operated for **POWER-TAKE-OFF** application. **NOTE:** The **EMERGENCY BRAKE SYSTEM** should be **APPLIED**.

4. **LOW RANGE**
   Shift the air valve to this position and the Transfer Case is in **LOW RANGE** (**1.98:1 Ratio**). Vehicle to be used only with the **FRONT AXLE ENGAGED** for adverse conditions.

**CAUTION:**
**DO NOT** shift to any position until vehicle is **STOPPED**, otherwise gear damage is most probable. Using slight clutch drive movement will help in the shifting.

## FRONT DRIVING AXLE ENGAGEMENT
## SINGLE SPEED DROP BOX

1. The Transfer Case is geared in a 1 to 1 Ratio, with no reduction. The Front Axle disconnect is air operated with an internal electrical indicator switch.

2. The shift system includes a manually operated air shift valve and a red indicator lamp. In operation, the shift valve supplies air to engage the Front Axle disconnect at the Transfer Case. When the disconnect is engaged an internal electrical indicator switch will light the red indicator lamp.

**CAUTION:**
**DO NOT** shift to any position until vehicle is **STOPPED**, otherwise gear damage is most probable. Using slight clutch drive movement will help in the shifting.

## FRONT DRIVING AXLE ENGAGEMENT
## MVG750, MVG1200, MVG2000 TRANSFER CASE

1. The **ENGAGEMENT** of the front driving axle is for **OFF-HIGHWAY** application. To engage the axle, an air control valve is utilized.

2. **AIR ENGAGEMENT**

   The shift system includes a manually operated air shifter valve and an integral air cylinder within the transfer case. In operation, the shifter valve supplies air to engage or disengage the integral cylinder of the Front Axle Declutch in the transfer case.

**CAUTION:**
**DO NOT** shift to any position until vehicle is **STOPPED**, otherwise gear damage is most probable. Using slight clutch drive movement will help in the shifting.

## SAFE-T-SHIFT

**Operating description:**

As of December 2003, Marmon-Herrington has included a Safe-T-Shift interlock system as part of your all-wheel drive conversion. The system consists of a microprocessor or “black box” that takes vehicle speed-readings from a remote sensor. This speed information is used to manage available air supply to the front axle engage and hi-lo transfer case shift controls to prevent the operator from inadvertently engaging these functions while the vehicle is moving. Engagement while the vehicle is moving over 5 mph may cause damage to the drive-train components.

When the operator engages the front axle or shifts the transfer case between high or low, the Safe-T-Shift controller will not allow engagement until the vehicle is below a predetermined speed. With a manual transmission, the speed limit may require the operator to use the clutch to obtain the low speed. With an automatic transmission, the operator may need to shift to neutral to make the shift.

As this system uses one pre-set speed rather than a speed range, the shift may not occur until the vehicle starts to move from a complete stop.

Some vehicles are not equipped with the Safe-T-Shift system. Exclusions include Marmon-Herrington transfer cases fitted with an integral PTO, and any Rockwell transfer cases.

## 3-POSITION AIR SHIFT
## MVG750, MVG1200, MVG2000 HIGH-NEUTRAL-LOW TRANSFER CASE

1. The shift system includes a manually operated air shifter valve, and an integral 3-position air cylinder within the transfer case.

2. **HIGH RANGE**

   With the air shifter valve in this position, the Transfer Case is in **HIGH RANGE** (1.00:1 Ratio). Vehicle to be operated for **ON-HIGHWAY** application or **OFF-HIGHWAY** with the **FRONT AXLE ENGAGED.**

3. **NEUTRAL RANGE**

   Shift the air valve to the middle position, and the Transfer Case is in **NEUTRAL RANGE**. In this position, the **REAR** and **FRONT** (if Front Axle was engaged) are disengaged. Vehicle should be operated for **POWER-TAKE-OFF** application (see page A7 for operation. Note: **NOT FULL TORQUE**). **NOTE**: The **EMERGENCY BRAKE SYSTEM** should be **APPLIED**.

4. **LOW RANGE**

   Shift the air valve to this position, and the Transfer Case is in **LOW RANGE (1.91:1 Ratio)**. Vehicle to be used only with the **FRONT AXLE ENGAGED** for adverse conditions.

**CAUTION:**
**DO NOT** shift to any position until vehicle is **STOPPED**, otherwise gear damage is most probable. Using slight clutch drive movement will help in the shifting.

## OPERATION OF MVG750PD, MVG1200PD, MVG2000PD TRANSFER CASE

1. This transfer case features a **PROPORTIONING DIFFERENTIAL** between the **FRONT** and **REAR** ouputs. This allows for the front drive axle to **ALWAYS** be **ENGAGED** and **DRIVING**, with 30% of the driving torque going to the front and 70% going to the rear. This is the normal configuration for both **ON** and **OFF** road.

2. For extremely severe conditions, where tires start to slip, the case is equipped with a differential lock-up. This disables the differential and effectively creates a solid shaft between the front and rear outputs.

3. This differential lock-up is manually activated by the air valve in the cab. The red indicator light will come on.

**NOTE**: The differential lock-up should be used **ONLY** under severe conditions, and disengaged as soon as traction is restored.

This transfer case also has the **HIGH-LOW** range shift, and a provision for a **NEUTRAL** (for a PTO).

## EATON 4x4, 6x6 SYSTEM

1. The Power Divider is geared in a 1 to 1 Ratio, with no reduction. The Front Axle is engaged by an air shift valve in the cab.

2. The shift system includes a manually operated air shift valve and a red indicator lamp. In operation the shift valve supplies air to engage the Front Axle at the Power Divider in the Rear Axle.

**CAUTION:**
**DO NOT** shift to any position until vehicle is **STOPPED**, otherwise gear damage is most probable. Using slight clutch drive movement will help in the shifting.

# OPTIONAL
# POWER-TAKE-OFF
# MR223, MR226, MVG750, MVG1200, MVG2000 TRANSFER CASES

## DESCRIPTION AND OPERATION

A Power-Take-Off assembly is installed on the rear end of the input shaft of the Transfer Case. The Power-Take-Off is a single speed unit and its output shaft rotates at the same speed as the output shaft of the main transmission. The vehicle operator is at liberty to use any forward or reverse speed position of the main transmission to obtain satisfactory direction or speed of Power-Take-Off operation.

When the vehicle is to be stationary and the Power-Take-Off utilized, the Transfer Case must be in the neutral position. The **EMERGENCY BRAKE SYSTEM** should be **APPLIED**.

If it is required to move the vehicle and utilize the Power-Take-Off at the same time, the Transfer Case may be shifted to either high or low ranges, as to application of vehicle.

**CAUTION:**
**DO NOT** shift to any position until vehicle is **STOPPED**, otherwise gear damage is most probable. Using slight clutch drive movement will help in the shifting.

**NOTE**:
When mounting equipment to be driven by this Power-Take-Off, it must be connected by a double universal joint type shaft to minimize thrust pressure and shock to the Power-Take-Off, and Transfer Case as well as the mounted equipment.

The Power-Take-Off is shifted by cable or air control. Cable is push-pull type and air control is with an air valve switch mounted in the cab of the vehicle.

## OPTIONAL
## TWO-SPEED REAR AXLE INTERLOCK SYSTEM

1. The **MARMON-HERRINGTON** Two-Speed-Rear-Axle Interlock is designed to allow for the convenience of this rear axle type on highway, and yet allow for the necessity of **ALL-WHEEL DRIVE** off-road. Briefly, the system allows for normal shifting of the two-speed rear in the normal fashion if the Front Drive Axle is not driving, since only one of the rear axle's ratios can be matched ratio. In addition, if the Front Axle is engaged when the rear is shifted to the unmatched ratio, the front will automatically disengage. The Front Axle engagement is controlled by an electrical toggle switch in the cab, which is connected to an air or vacuum solenoid, which also senses which of the electrical wires running to the rear axle has current in it, that is, which ratio the rear is in. This solenoid controls the air cylinder or vacuum chamber for the Front Axle engagement shift at the Transfer Case.

2. **THE ENGAGEMENT OF THE FRONT DRIVING AXLE**
   A. The two-speed rear control valve on the main transmission shift lever must be shifted to the **CORRECT MATCHED RATIO** of the **FRONT** vs **REAR AXLE**.
   B. Switch the Front Axle toggle switch control to the engage position. A red indicator lamp should be lit when the Front Axle is engaged.

3. **THE DISENGAGEMENT OF THE FRONT DRIVING AXLE**
   Switch the front axle toggle switch control to the disengage position. The red indicator lamp should go off when the Front Axle is disengaged.

   **NOTE**: When **NOT** using the Front Drive Axle, always switch the toggle control to the disengage position. **DO NOT USE** the two-speed rear control valve for this procedure.

4. With the toggle switch control in the Front Axle disengaged position, the vehicle, by using the two-speed rear axle control, can be shifted from Hi-Low ranges.

5. If the vehicle is in the **DIFFERENT REAR AXLE** vs **FRONT AXLE RATIO**, the Front Axle cannot be engaged until the two-speed control is shifted to the correct ratio. This is a protection so that the Front and Rear Axle ratios are the same, otherwise, gear train damage would result.

6. The vehicle's two-speed rear axle control (located on the main transmission shift lever) can be shifted from High-Low range, **ONLY** with the Front Axle in the disengaged position.

## OPTIONAL
## FREE WHEEL HUBS

1. Installed on the Front Driving Axle is a set of Free Wheel Hubs, mounted to the wheel-axle drive shafts. The hubs **MUST BE** completely **ENGAGED** when the Front Axle is **ENGAGED**. **BOTH HUBS MUST BE ENGAGED** or **DISENGAGED** or damage to the axle drive train is most probable.

2. The hub is engaged by rotating the handle clockwise in accordance with its markings. On some axle models, a rubber cover will have to be removed to manipulate the hubs, reinstall these rubber covers for the protection of the axle wheel parts. If trouble is encountered in twisting the control plate, place your hand on top of the front tire and slightly rock back and forth as you twist the control plate.

3. When vehicle is in rear drive only, and the hubs are disengaged, there can be a reduced Front Axle gear train wear and whine. Since less gear train is in operation, fuel savings and decreased tire wear may result.

**NOTE**: Free wheel hubs are not available with the MVG1200 or MVG2000 transfer cases or MT14/17, MT22/23 axles.

## OPTIONAL
## DRIVER CONTROLLED DIFFERENTIAL LOCK
## (LIMITED SLIP)
## MT14, MT17, MT22, MT23 AXLES

1. The Front Axle Differential Lock is engaged when additional traction is required for **OFF-HIGHWAY** application.

2. The system includes a manually operated air shifter valve, an air chamber with an internal indicator switch on the Front Axle and a clutch pack type disconnect. In operation, the shifter valve supplies air to the air chamber which via a push rod engages the clutch pack.

**CAUTION**:
**DO NOT** shift the differential at speeds greater than 10 MPH.

**NOTE**: Even though the clutch pack design allows for “wind-up” relief, it is recommended that the differential be locked only in extremely poor traction situations.

# SERVICE INFORMATION



MARMON–HERRINGTON

ALL–WHEEL DRIVE

# INTRODUCTION

The efficiency and life of mechanical equipment is as dependent on proper lubrication as on proper engineering design. The importance of proper lubrication is increased because of greater gear tooth and bearing pressures and higher speeds in present day vehicles. For this reason we are vitally interested in promoting widespread usage of the best possible lubricants for our products.

It is advisable to consider the reputation of the refiner or vendor when selecting a lubricant. He is responsible for the quality and correct application of his product. A high quality lubricant incorrectly applied may greatly reduce the maximum service built into our product. Past experience has proven that a large portion of service problems can be traced to an improper lubricant or to an incorrect lubricant application.

Our purpose in compiling these specifications is to provide a guide to aid in the selection of a lubricant which will render the most satisfactory service.

# LUBRICATION

## A. LUBRICATION OF THE FRONT AXLE DIFFERENTIAL CARRIER

With new axles, the original drive axle lubricant should be drained at 1,000 miles (1,600 km) but no later than 3,000 miles (4,800 km). Change every 10,000 miles (16,000 km) or annually. Drain the lubricant initially used in the assembly while the assembly is still warm. Axles **SHOULD NOT** be flushed with any solvent such as kerosene. All new axles should be checked for correct oil level before being placed into service.

Fill axle housings to bottom of level hole (in carrier and/or housing) with specified lubricant with the vehicle on level ground.

The most satisfactory results will be obtained only when the lubricant is of the correct viscosity API GL-5 or MILL2105B. For general use, use SAE 85-140 EP Multi-Viscosity gear lube. Higher or lower viscosity may be required for extremely hot or cold weather.

## B. FRONT DRIVE STEERING AXLE WHEEL ENDS, UNIVERSAL JOINTS, BEARINGS, BUSHINGS AND KNUCKLE PINS

The frequency of lubricant changes depends upon individual operating conditions, speed and loads. Change whenever seals are replaced or when brakes are relined or at 10,000 miles (16,000 km) or annually.

Use a high grade Lithium chassis lubricant that conforms to NLGI-2EP requirements.

1. Check for looseness
2. Apply grease
3. Observe lube purging
4. If the above is not successful, remove cup or joint and check old grease. If rusty, gritty or burned, replace.

**NOTE:** Axle shaft cardan joints are not serviceable.

**IMPORTANT:** At rebuild time, before installing wheel bearings onto spindle, coat bearing journals with a film of grease to deter fretting corrosion. Apply 1/16” on spindle hub and knead into the bearings. Apply by hand, repack every 10,000 miles (16,000 km) or annually.

## C. BRAKE LUBRICATION

A high temperature waterproof grease in a Number 1 NLGI Grade is recommended for lubricating the brake actuating system. It should be a smooth textured corrosion resistant grease free of filters and abrasives. It should maintain a satisfactory softness under normal parking and storage temperatures so the brakes can be applied and released. Vehicles operating in extremely cold weather (below -40°) require a grease conforming to MIL-G-25013C.

**WEDGE BRAKES AND CHAMBERS (ON-HIGHWAY AND OFF-HIGHWAY)**

On-Highway — Change whenever seals are replaced or when brakes are relined.

Off-Highway — Change grease every 12 months (maximum), whenever seals are replaced and when brakes are relined. However, the change interval may be shorter than 12 months depending on the severity of service operation. This can be determined by initially scheduling an inspection of internal parts and lubricant every 2 months until the first 12 month period is up. At each inspection look for contaminated or hardened grease or for the lack of grease.

**CAM BRAKES (ON-HIGHWAY AND OFF-HIGHWAY)**

On-Highway — Every 10,000 miles (16,000 km) or every 6 months for all components depending on severity of service.

Off-Highway — For all components, change grease every 4 months (maximum), whenever seals are replaced and when brakes are relined. However, the change interval may be shorter than 4 months depending on the severity of service operation. This can be determined by initially scheduling an inspection of internal parts. At each inspection look for contaminated or hardened grease or for the lack of grease.

**D. LUBRICATION OF TIE-ROD AND DRAG LINK**

Use the same type of grease as for the wheel bearings.

**E. LUBRICATION OF DRIVELINES**

Off-Highway — The change interval will differ greatly and be determined largely on the type of vehicle or machinery being used, type of operation and severity of service. The lubricant change interval could be, for example, one (1) day maximum or three (3) months maximum. This can be determined by initially scheduling daily or weekly inspections of universal joint, shaft, and slip yoke parts. Check seals, bearings, splines, etc., and check condition of grease in the assemblies by purging with new grease. Look for contaminated or hardened grease or for the lack of grease. Also, check to make sure grease purges from all four (4) bearing and seal positions of the cross.

**LUBRICATION PROCEDURES FOR UNIVERSAL JOINTS (DRIVE SHAFTS ONLY)**

1. Check for looseness.
2. Apply grease.
3. Observe lube purging from all seals until new grease comes out.
4. If grease does not purge, manipulate the “U” joint until purging occurs.
5. If the above is not successful, remove cup or joint and check old grease. If rusty, gritty or burnt, replace the complete universal joint.

**LUBRICATION PROCEDURES FOR SLIP YOKES AND SPLINES**

1. Check for looseness or sideplay.
2. Apply grease until purging takes place at air hole in end of slip yoke.

**NOTE:** Axle shaft cardan joints are not serviceable.

**F. LUBRICATION OF TRANSFER CASE**

Use the same type and viscosity of gear lube as used in the differential carrier. Fill to the bottom of the fill-hole. **DO NOT OVERFILL** as this may cause the case to run hot, or cause lubricant to be pumped out of the vent.

Transfer Case may be mounted at various approved angles by the vehicle manufacturer and normally should be filled to the bottom of the tapped hole. Capacities will vary depending upon the angle of mounting.

Lubricant should be drained at 1,000 miles (1,600 km) but no later than 3,000 miles (4,800 km). Change every 10,000 miles (16,000 km) or annually. Drain the lubricant initially used in the assembly while the assembly is still warm. Transfer Cases **SHOULD NOT** be flushed with any solvent such as kerosene.

**G. MAGNETIC DRAIN PLUGS**

Any drive axle or transfer case while it is working, generates wear particles at a fairly steady rate. These wear particles are very fine but hard. If these hard wear particles are allowed to circulate in the lubricant, the anti-friction bearings will wear at a faster rate than they would if the hard wear particles were removed as they are generated.

Magnetic drain plugs perform the vital function of trapping these small metallic particles that circulate in the lubricant, through the gears and bearings, causing rapid wear and premature failure. The magnet must be strong enough to firmly hold the particles under service conditions.

**REFERENCE ONLY:**

**A.** Never add lubricant to axle or transfer case unless it is the same make and grade as that which is already in the axle or transfer case. If the same lubricant is not available, drain and refill.

**B. CHECKING LEVEL**
Remove filler hole plug. Lubricant should be level with bottom of tapped filler hole.

**C. AIR VENTS**
Check every 2,000 miles (3,200 km) — Clean in solvent.

## SCHEDULED MAINTENANCE SERVICES

| COMPONENT | (CODE) |
|---|---|
| Front Axle Differential Carrier | (1) (2) (4) (6) |
| Steering Axle Wheel Ends | (2) (5) (6) |
| Brake Lubrication | (2) (6) |
| Tie Rod Lubrication | (3) (6) |
| Drag Link Lubrication | (3) (6) |
| Drivelines Lubrication | (2) (3) (6) |
| Transfer Case Lubrication | (1) (2) (4) (6) |
| Wheel Bearing Lubrication | (5) (6) |

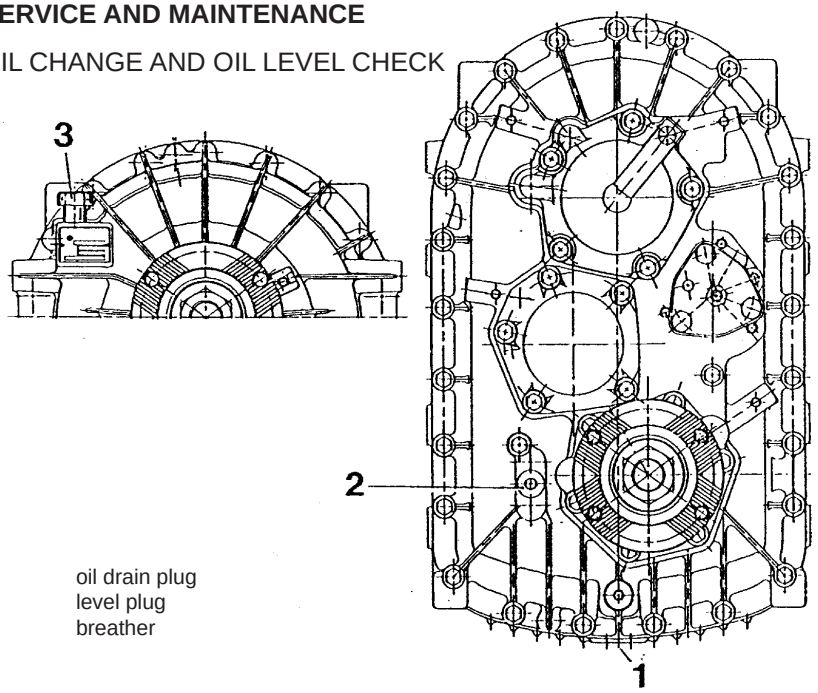
**(CODE)**

**1.** Change after first 1,000 miles (1,600 km)
**2.** Check each 1,000 miles (1,600 km)
**3.** Lubricant every 2,000 miles (3,200 km)
**4.** Drain and refill every 10,000 miles (16,000 km)
**5.** Repack every 10,000 miles (16,000 km)
**6.** More frequent intervals may be required under adverse operating conditions.

## LUBRICATION GUIDE:
## TRANSFER CASE MODELS: MVG750, MVG1200, MVG2000

**SERVICE AND MAINTENANCE**

OIL CHANGE AND OIL LEVEL CHECK




1 oil drain plug
2 level plug
3 breather

**MVG750**

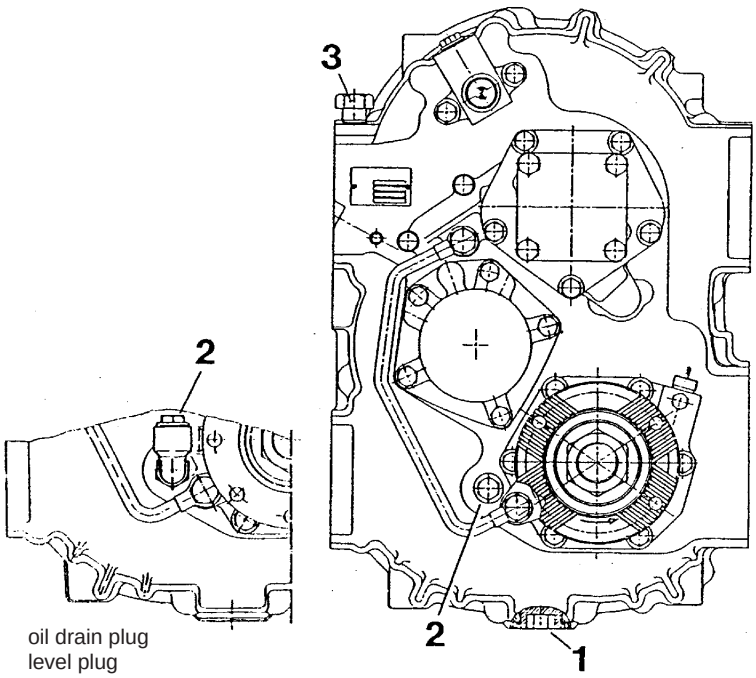
OIL CHANGE (recommended in warm condition)
- drain gear oil at drain plug (1)
- clean magnet of drain plug
- mount drain plug with new seal
- fill new gear oil at filling bore/level bore (2) until it flows over
- mount level plug (2) with new seal
- unscrew breather (3), clean it and mount it again

OIL LEVEL CHECK
- open oil filling/level plug (2)
- oil level must reach edge of level bore, if necessary top up
- mount level plug with new seal

without longitudinal differential
approx. 6,4 l
13.5 pts.

with longitudinal differential
approx. 5,5 l
11.6 pts.

**ATTENTION:** Assure correct oil level. Low level causes lack of lubrication and reduces durability. Too high level causes excessive splashing and leads to overheating of transfer case.




1 oil drain plug
2 level plug
3 breather

**MVG1200**

OIL CHANGE (recommended in warm condition)
- drain gear oil at drain plug (1)
- clean magnet of drain plug
- mount drain plug with new seal
- fill new gear oil at filling bore/level bore (2) until it flows over
- mount level plug (2) with new seal
- unscrew breather (3), clean it and mount it again

OIL LEVEL CHECK
- open oil filling/level plug (2)
- oil level must reach edge of level bore, if necessary top up
- mount level plug with new seal

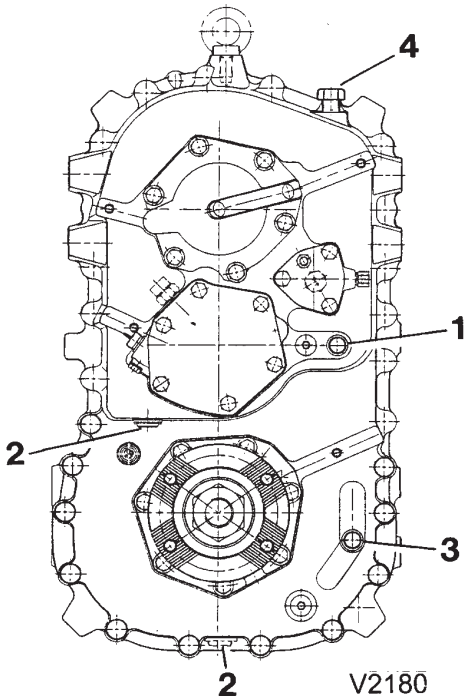
without longitudinal differential
approx. 4,6 l
9.7 pts.

with longitudinal differential
approx. 3,5 l
7.8 pts.

**ATTENTION:** Assure correct oil level. Low level causes lack of lubrication and reduces durability.
Too high level causes excessive splashing and leads to overheating of transfer case.

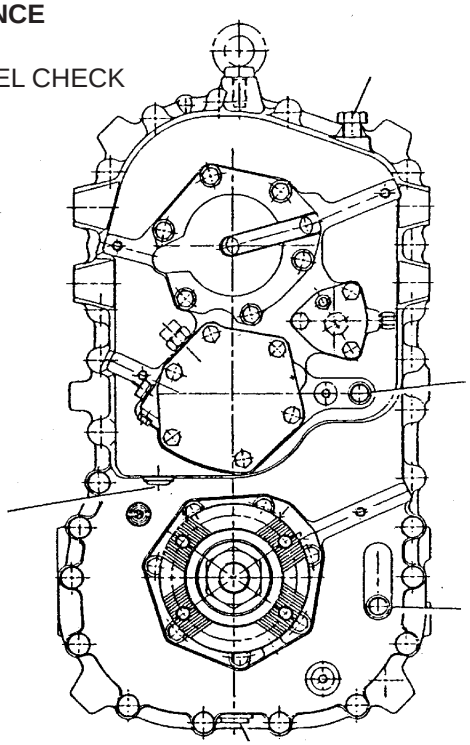
**MVG1600**

1 Oil filling plug
2 Oil drain plug
3 Oil level plug
4 Breather




Drain oil by unscrewing both oil drain plugs (2)
Install oil drain plugs (2) with new seals
Fill oil through oil filling bore (1) until it starts to overflow at oil level bore (3)
After setting of correct oil quantity Install oil level plug (3) with new seal
Clean and install breather (4)

OIL CHANGE AND OIL LEVEL CHECK



1 oil filling plug
2 oil drain plug
3 level plug
4 breather

## MVG2000 (Long Drop)

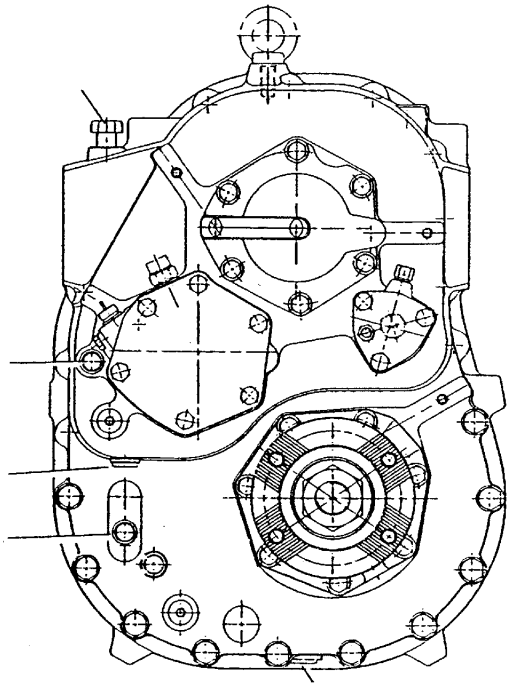
OIL CHANGE (recommended in warm condition)
- drain gear oil at drain plug (2)
- clean magnet of drain plug
- mount drain plug with new seal
- fill new gear oil at filling bore/level bore (1) until it flows over (3)
- mount level plug (3) with new seal
- unscrew breather (4), clean it and mount it again

OIL LEVEL CHECK
- open oil filling/level plug (3)
- oil level must reach edge of level bore, if necessary top up
- mount level plug with new seal

without longitudinal differential
approx. 7,1 l
15 pts.

with longitudinal differential
approx. 6,5 l
13.74 pts.

**ATTENTION:** Assure correct oil level. Low level causes lack of lubrication and reduces durability.
Too high level causes excessive splashing and leads to overheating of transfer case.



1 oil filling plug
2 oil drain plug
3 level plug
4 breather

## MVG2000 (Short Drop)

OIL CHANGE (recommended in warm condition)
- drain gear oil at drain plug (1)
- clean magnet of drain plug
- mount drain plug with new seal
- fill new gear oil at filling bore/level bore (2) until it flows over
- mount level plug (2) with new seal
- unscrew breather (3), clean it and mount it again

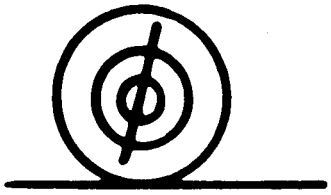
OIL LEVEL CHECK
- open oil filling/level plug (2)
- oil level must reach edge of level bore, if necessary top up
- mount level plug with new seal

without longitudinal differential
approx. 9,0 l
19 pts.

with longitudinal differential
approx. 8,4 l
17.75 pts.

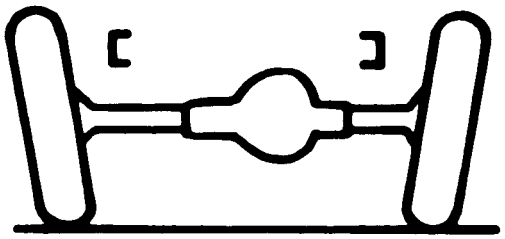
**ATTENTION:** Assure correct oil level. Low level causes lack of lubrication and reduces durability.
Too high level causes excessive splashing and leads to overheating of transfer case.

## CASTER



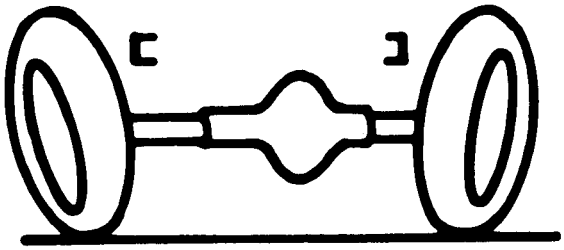
**CASTER**: Backward tilt of king pin at top. To cause front wheels to run straight normally to straighten up after turn and to give trailing action to wheels.

## CAMBER



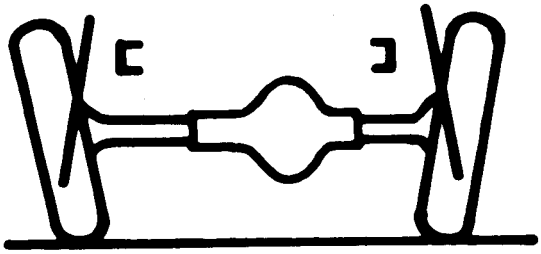
**CAMBER**: Outward tilt of front wheels at top. To bring road contact point of wheel more nearly under center of load. Important tire saving adjustment.

## TOE IN



**TOE-IN**: Drawing together of front wheels at front at hub height. To prevent excessive tire wear.

## KING PIN INCLINATION



**KING PIN INCLINATION**: Inward tilt of king pin at top to compensate for shearing action on king pin which would result if wheels were left vertical and had no camber and no king pin inclination.

**DRAG LINK & TIE ROD NOMENCLATURE**:
The term **DRAG LINK** is the component that connects the Front Axle steering arm to the steering gear box.

The term **TIE ROD** is the component that connects the left and right Front Axle wheels.

# ADJUSTMENTS

**A. CASTER**

A change in axle caster could indicate front axle housing distortion, which might be caused by a minor accident, or a permanent set in the front springs.

This is read by a protractor mounted on the pinion U-joint. Consult the respective axle specifications to determine the actual caster reading.

**TO CORRECT**:
If front springs are badly distorted, it is advisable to install new leaves or complete new springs.

It may only be necessary to install tapered shims between the front axle spring pads and springs. The position of the thick part of the shim will be determined by the direction in which the axle must be tilted in order to bring the caster angle to the correct specification.

**B. CAMBER**

Front wheel camber is controlled by the axle housings, and cannot be changed.

**TO CORRECT**:
Call the Factory. The application of heat will destroy the heat treatment and make the housing susceptible to distortion.

**C. TOE-IN**

Front wheel toe-in is controlled by the length of the tie rod.

For smooth operation and ease of steering at highway speeds, the axle has been adjusted such that the wheel mounting surfaces at the front are slightly closer together than on the rear side. This difference should measure 1/8" $\pm$ 1/6".

**TO CORRECT**:
The length of the tie rod is adjusted by rotating the threaded end (ends) through a complete turn.

Turning the tie-rod one way will slightly increase the toe-in, while rotating it the other way will slightly decrease it with each turn.

In the event the tie rod becomes bent, it should be replaced, as it will again bend easily even though straightened to its original form.

**D. TIE ROD ENDS**

Tie rod yoke pins should be adjusted to eliminate lost motion. Tie rod pins and bushings, or ball sockets, should be replaced if worn.

**E. STEERING GEAR**

The steering gear should be adjusted to eliminate excessive looseness. The standard original steering gear is used, therefore, the original service operation applies.

**F. U-BOLT AND STUD NUTS**

Front spring U-bolt nuts should be securely tightened. If the front axle continues to shift on the springs, it is an indication that the spring center bolts are sheared and they should be replaced.

**G. WHEELS AND TIRES**

Check wheels and tires for runout and balance.

See that tires are inflated to recommended pressure, in order to provide the **SAME TIRE ROLLING RADIUS, FRONT AND REAR**.

**H. WHEEL BEARINGS**

In order to ensure top performance and long bearing life, the tapered-roller bearings must be properly preloaded upon assembly anytime the outer end assembly is disassembled. Proper adjustment is obtained by tightening the inner bearing nut, with the bearings in position, until the hub will no longer turn. Then back off the nut approximately 1/8 revolution, install retainer and outer nut, and lock in position. The hub should now turn freely yet no perceivable end-play will exist. Consult the specific axle maintenance manual for a more detailed procedure.

**I. GENERAL INFORMATION**

(1) Lubrication — Lubricate the front axle assembly in accordance with the Lubrication Chart of this manual. **DO NOT OVER LUBRICATE**. If the differential, universal joints, or hub bearings are over-lubricated, the lubricant will be pressurized past the oil seals and vents and may do damage by destroying the seal as well as entering the brakes.

(2) **LOOSE ADJUSTMENTS** — As soon as a looseness is noted in the hub bearings pivot pins, or other adjustable points, attention should be given to these items. Normal wear is slight but develops more rapidly as looseness occurs. If a unit is operated for a long length of time with a prevailing perceptible looseness, it will impose a pounding action on the parts involved. This may result in severe damage or destruction of parts and cause the necessity of replacement. This service repair can be avoided by preventive maintenance in eliminating the looseness as it develops, by performing the necessary adjustments.

## TROUBLE SHOOTING

| PROBLEM | POSSIBLE CAUSE |
|---|---|
| Transfer case or axle running “Hot” | Improper lubrication |
| Excessive driveline or gear noise | Driveline imbalance<br>Improper lubrication<br>Loose or worn parts |
| Steering instability (shimmy) | Wheels and/or tires out of balance<br>Over or under inflated tires<br>Worn or loose parts<br>Improper lubrication<br>Overload |
| Excessive or uneven tire wear | Wheels and/or tires out of balance<br>Improper alignment<br>Over or under inflated tires. |

## LUBRICATION GUIDE:
## FRONT DRIVING STEER AXLES: MODELS: MT10/11, MT14/17, MT22/23

| MODEL | MT10/11 AXLE | MT14/17 AXLE | MT22/23 AXLE |
|---|---|---|---|
| WHEEL ENDS | | 2.0 pints | 2.0 pints |
| DIFFERENTIAL | 17.0 pints | 17.0 pints | 17.0 pints |

**NOTE:** All capacities approximate

**MT14, MT17, MT22, MT23**

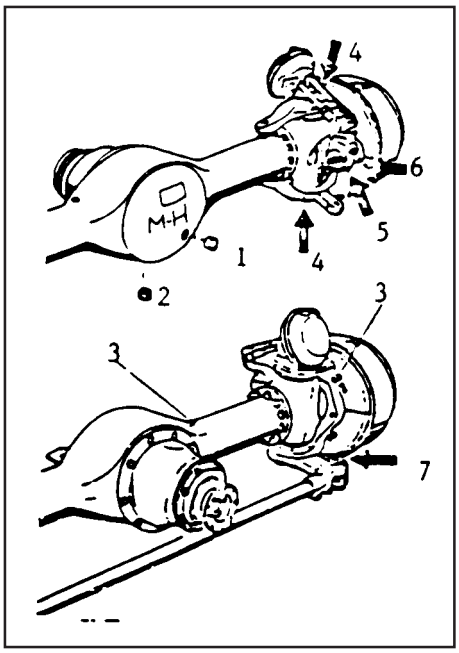



fig. 1

**LUBRICATION POINTS:** (fig. 1) (fig. 2)

1 — oil level check & filter bore screw plug

2 — oil drain bore screw plug

3 — vent valve

4 — steering swivel bearings (bottom-top)

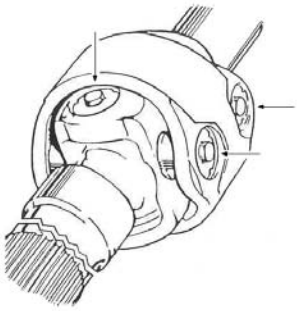
5 — slack adjuster

6 — brake camshaft bearings

7 — tie-rod ball joints

### CARDAN-JOINT SERVICE

The Cardan-Joint caps are fitted with plugged threaded ports that are used for disassembly/assembly. While these ports will accept a standard zerk fitting, we recommend that only a needle attachments be used to flow lube into these joints. Adding lube under pressure may result in the failure of the cup seal.



**MT10, MT11**

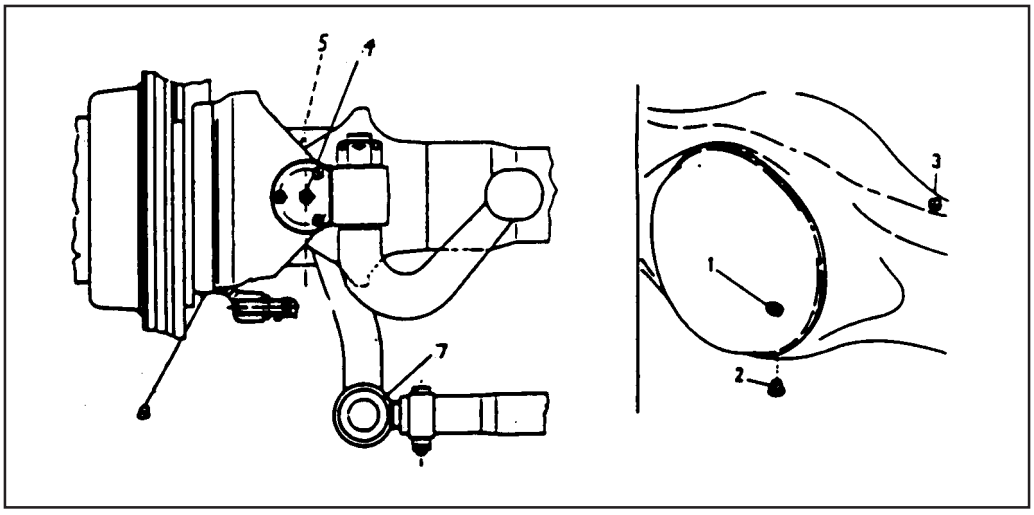
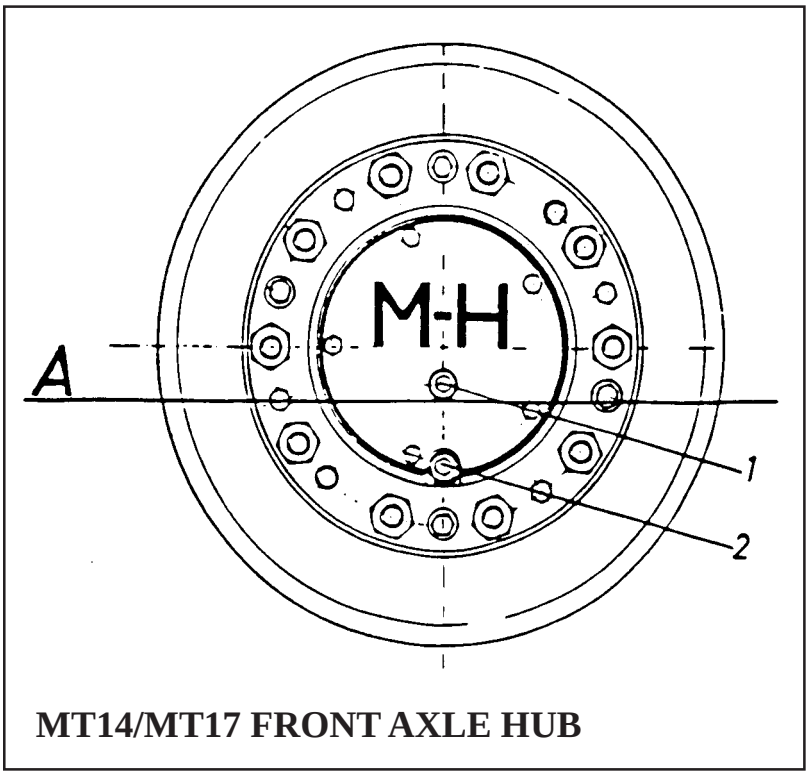



fig. 2

## OIL LEVEL OF WHEEL HUBS: MT14, MT17, MT22, MT23

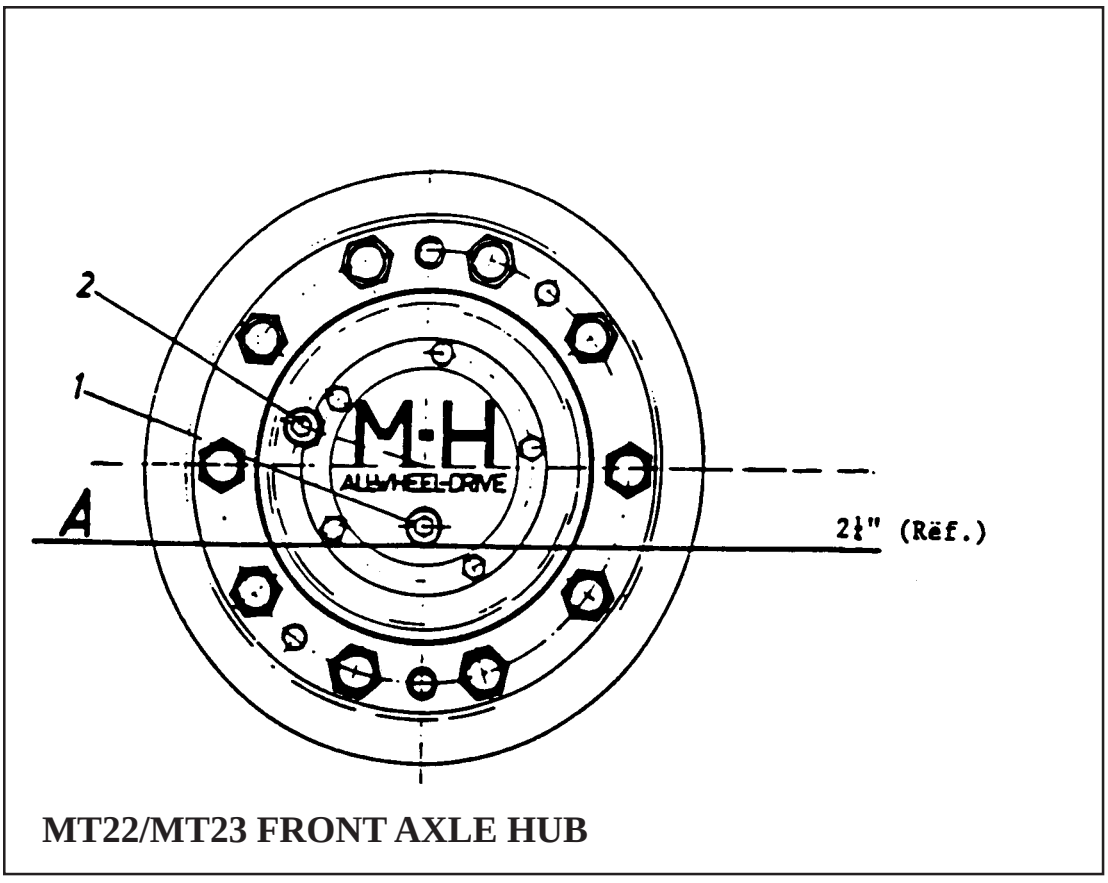



**MT14/MT17 FRONT AXLE HUB**

1 — Plug for **OIL FILLING** and inspection hole

2 — Plug for **DRAIN** hole

A — Line of **OIL LEVEL**



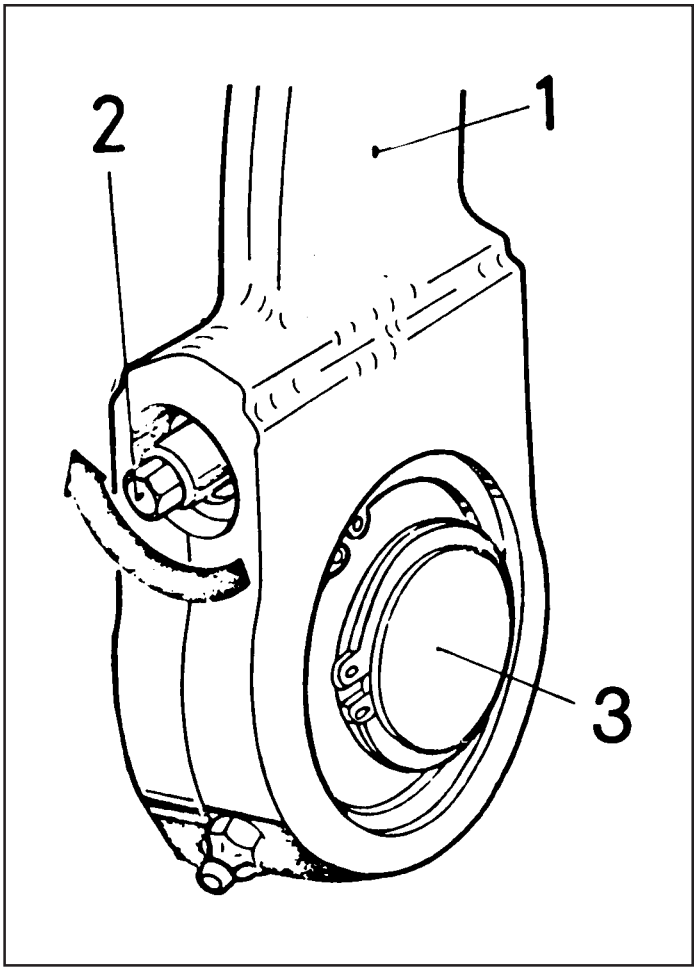

**MT22/MT23 FRONT AXLE HUB**

## BRAKE LEVER ADJUSTING: MT11, MT14, MT17, MT22, MT23 MODEL AXLES

1 — brake lever

2 — worm shaft

3 — cam shaft




**MANUAL SLACK ADJUSTERS:**

Readjustment of the front brake is performed by turning off the worm gears of the adjustable brake lever.

By means of a wrench, turn the worm shaft until the brakes prevent wheel rotation. Now back off the worm shaft until only a slight drag is felt turning the wheel by hand. The shoe clearance can be checked by means of a feeler gauge through an opening in the brake cover plates.

# AUTOMATIC SLACK ADJUSTER

**ITEMS:**

1 — Adjusting plate

2 — Setscrew (hex. dist. 13)

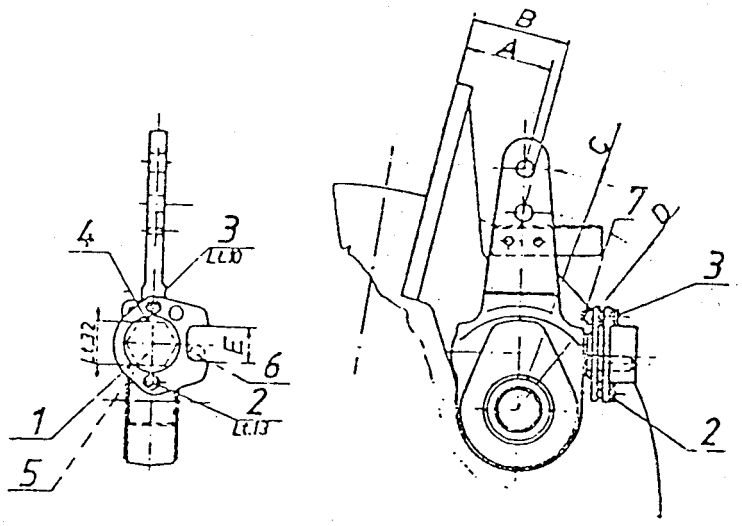
3 — Setscrew (hex. dist. 10)

4 — Plastic protection cap

5 — Hex. adjusting ring (hex. dist. 32)

6 — Stop pin

7 — Plastic thread protector




The slack adjuster requires no maintenance, since it is automatically readjusted according to the brake lining wear.

In case of replacing the brake linings or after repairing the axle perform adjustment of the shoe clearance and automatic slack adjuster as follows:

**ADJUSTMENT DATA:**

A = Distance between the chamber holder plane and the brake lever bore.

B = Distance between the chamber holder plane and the brake lever bore.

C = Brake lever installation radius.

D = Brake lever installation radius.

a. Adjusting position of the brake lever and the shoe clearance:

— Remove setscrews (2,3).

— Take care of the plastic thread protector (7).

— Remove the adjusting plate (1) and the plastic protection cap (4).

By turning the hex adjusting ring (5) to proper direction, adjust the specified distance between the seating surface and the brake lever bore. (Start adjustment from a distance higher than specified. If required, also adjust the push rod clevis.)

— After the above operation adjust the shoe clearance to 0.3 — 0.6 mm.

# WARRANTY & SERVICE

## REPLACEMENT PARTS

When ordering replacement parts for **MARMON-HERRINGTON ALL-WHEEL DRIVE** conversions, the following information should be given:

1. **FACTORY ORDER NUMBER** (found on I.D. Plate on driver's door panel or small plate affixed to axle housing). This will be a six (6) digit number. (See illustrations this page.)

2. Component for which parts are required, i.e. front drive axle or transfer case.

3. Model of axle and/or transfer, i.e. MR-90, MR-226.

4. Give quantity and part number required.
   **NOTE:** Drivelines, shift linkage, etc., are not illustrated, but can be found on the computer printout of Bill of Material, which is also included in the Service Manual.

5. Give complete billing and shipping address.

## WARRANTY CLAIM PROCEDURE

When ordering parts which you feel might be covered under warranty, advise the following information:

1. **FACTORY ORDER NUMBER** (found on I.D. Plate on driver's door panel or small plate affixed to axle housing). This will be a six (6) digit number. (See illustrations this page.)

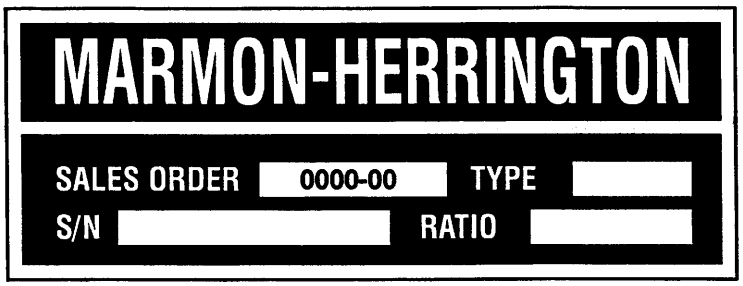
2. Date unit was put into operation.

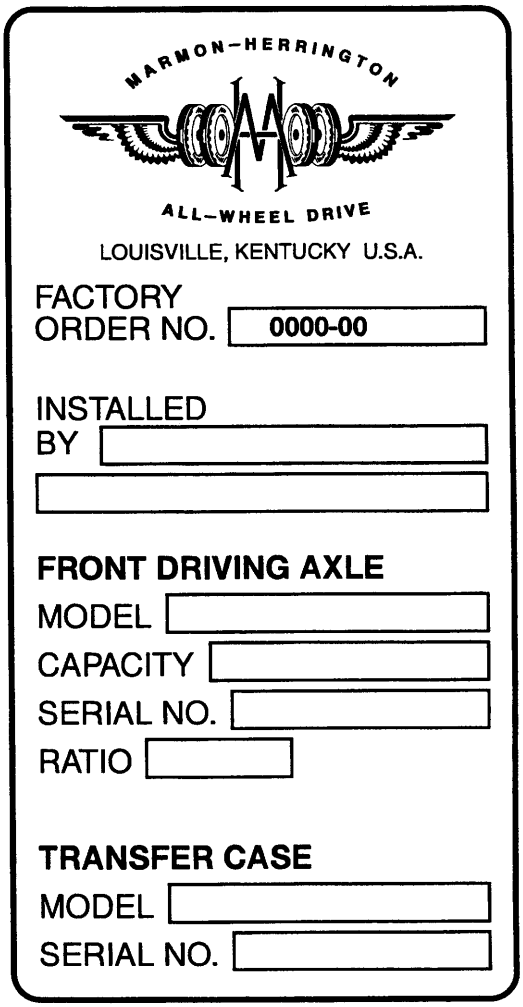
3. Mileage of unit at time of failure.

4. Nature of failure.

Upon receipt of the above, you will be advised as to how to proceed with the claim.

**The information necessary for replacement parts and/or warranty claim procedures will be found on either plate design.**



# MARMON-HERRINGTON WARRANTY

This is to certify that we, Marmon-Herrington Company, Louisville, Kentucky, warrant each new chassis remanufactured, or assembly or part furnished for the remanufacture of a truck chassis against defects in material and workmanship under normal use and service. Marmon-Herrington's obligation under this warranty is limited to replacement of, at our factory, any part or parts thereof which shall, within one (1) year after delivery of such vehicle to the final user, but not later than eighteen (18) months after installation of the all-wheel drive conversion kit, or prior to the time when such vehicle has been operated twelve thousand (12,000) miles, whichever first occurs, be returned to us with transportation charges prepaid, and which our examination shall disclose to our satisfaction to have been thus defective.

Service parts are manufactured to the same standards as production installed parts. However, since the installation thereof, as well as the age and condition of the receiving vehicle are beyond the control of Marmon-Herrington, Service Parts are warranted for a period of ninety (90) days or five thousand (5,000) miles whichever first occurs. All other regular warranty conditions apply.

On vehicles operating OVERSEAS, the determination of defects will be made at Marmon-Herrington Company, Louisville, Kentucky, from complete information supplied in writing by overseas distributors or recognized acting distributors. Complete information is defined to mean: vehicle serial number, user's name, date of delivery, mileage at time of breakage, date of breakage, type of service, nature of break or fault, distributor's recommendation (for our guidance only), and any other pertinent information. After determination of our obligation, any parts to be replaced will be shipped to distributor or acting distributor in accordance with his instructions.

This warranty is in lieu of all other warranties expressed or implied and of all other obligations or liabilities incurred by Marmon-Herrington. Marmon-Herrington neither assumes nor authorizes any other person to assume any other liability in connection with this sale, including but not limited to indirect or consequential damages.

This warranty shall not apply to any vehicle which shall have been repaired or altered in any way so as in our judgment, to affect its stability or reliability, nor which has been subject to misuse, negligence, or accident, nor which shall have been operated at a speed exceeding the factory rated speed or loaded beyond the factory rated load capacity or operated in violation of Marmon-Herrington's instructions.

Marmon-Herrington makes no warranty whatever on components of the original manufacturer's chassis not related to the modification work. Also, no warranty is made on tires, rims, ignitions, or other parts usually warranted separately by their respective manufacturers.

The manufacturers reserve the right to make changes in design, and changes or improvements upon their product, without notice, and without incurring any obligation to install such changes or improvements upon their products theretofore manufactured.

This warranty shall become effective only when the Warranty Certificate has been returned to Marmon- Herrington and validated by same.

# WARRANTY REPAIR AND CLAIM PROCEDURE

**Initial Failure Reporting**

1. Operator must call Marmon-Herrington Customer Service prior to performing any repairs and receive a Work Authorization Number to be eligible for reimbursement. The work authorization number does not guarantee payment but is an acknowledgement that the vehicle is within the warranty period in terms of date and mileage, and that a claim has been activated. **It will be the responsibility of the operator to ensure that their repair facility is aware of and complies with the guidelines of this policy.**
2. To expedite the authorization process, you will need the Sales Order Number or "S" number found on the front of this certificate. You will also need the Vehicle Identification Number or the last six digits of the "VIN", the date the vehicle was placed in service, and the current mileage. Please note the following:
   - This Warranty Registration should have been submitted at the time of delivery. If our records do not include a warranty registration, you must complete one before any authorization for repair can be issued. We will make them available by mail or fax upon request.
3. Marmon-Herrington will pre-approve .5 hours diagnosis/inspection time prior to your call for repair authorization. If the diagnosis/inspection complaint does not reveal a warrantable failure, or result in a warrantable repair, the customer will be responsible for all charges including diagnosis/inspection time.
4. The Operators Manual contains information covering proper equipment use and maintenance schedules. Operators must adhere to these guidelines to be eligible for reimbursement, and service records must be provided upon request.

**Pre-Repair Requirements**

1. Authorization for repairs will require a written estimate/repair order of costs after determination that a warrantable condition is found to exist.
2. Estimates must contain the following information:
   - A list of all parts necessary for specific job and if applicable, all parts that will be invoiced back to Marmon-Herrington.
   - The cost of disassembly, inspection and diagnosis of any portion of the vehicle to determine extent of repairs needed.
   - Current labor costs, reflecting both hourly rate and number of hours to effect repairs must be listed.
   - Miscellaneous charges such as "shop supplies" must be defined. Actual dollar amounts must be listed, as percentages will not be accepted.
   - Sublet repairs must also be defined and included in the estimate at their actual dollar amount.
   - NOTE: If it becomes necessary to exceed the original estimate in terms of parts or labor, the repair facility must call Marmon-Herrington Customer Service for additional authorization.
3. Only the use of Marmon-Herrington supplied parts will constitute reimbursement unless prior approval has been obtained.

**Parts Ordering**

1. While Marmon-Herrington operates a full service Parts Department, replacement parts needed to effect Warranty repairs must be acquired through Customer Service to be eligible for reimbursement.

**Post Repair requirements.**

1. The final invoice or work order must include the following:
   - Customer's name, address, and phone number.
   - The Vehicle Identification number.
   - The Sales Order Number or "S" number, which the customer can provide or can be located on the ID tag, fixed to the transfer case or axle.
   - The Axle or Transfer Case Model and Serial Number, also located on the ID tag.
   - Mileage IN / Mileage Out.
   - The Cause and Correction of the repair including detailed description of repairs and parts replaced.
   - The date the repair order was open and the date the repairs were completed.
   - The Work Authorization Number obtained from Customer Service.

**Notes to Repair Facilities**

1. Miscellaneous charges such as "shop supplies" must be listed as separate line items and shown on the final invoice as stated in "Pre-Repair Requirements". Invoices for sublet repairs must be made available upon request.
2. All repairs must comply with any or all state and DOT requirements.
3. Downtime of vehicle and incurred costs associated due to the delay of parts shipments or any other condition beyond our control is not reimbursable and should not be listed on the invoice.
4. All failed parts that are required to be returned to Marmon-Herrington must be received before payment will be made. The Return Authorization will be sent with the replacement parts when shipped from Marmon-Herrington.
5. All Claims must be submitted within 60 days of completion of repairs to be eligible for reimbursement.

For Work Authorization call: 800.227.0727 ext. 282
To Submit Claims by Fax: 502.253.0317
Submit Claims by Mail to: Marmon-Herrington Company
Customer Service Department
13001 Magisterial Drive
Louisville, KY 40223

# NOTES

# NOTES

# Marmon-Herrington *Literature Order Form*

Literature available on line at **www.Marmon-Herrington.com**

| Sales Literature – No Charge | Part | Quantity |
|---|---|---|
| MVG 750 Transfer Case | TCSL001 | |
| MVG 1200 Transfer Case | TCSL002 | |
| MVG 2000 Transfer Case | TCSL003 | |
| MT 8 Axle | AXSL001 | |
| MT 10 Axle | AXSL002 | |
| MT 11 Axle | AXSL003 | |
| MT 14 Axle | AXSL004 | |
| MT 17 Axle | AXSL005 | |
| MT 22 Axle | AXSL006 | |
| MT 23 Axle | AXSL007 | |
| Driver Controlled Locking Differential | AXSL008 | |
| 4 Page Brochure | PRBR001 | |
| **Total Sales Literature** | | |

| Parts Manuals: | Part | Price | Quantity | Extended Cost: |
|---|---|---|---|---|
| MVG 750 Transfer Case | TCPM001 | 6.00 | | |
| MVG 1200 Transfer Case | TCPM002 | 6.00 | | |
| MVG 1600SD Transfer Case | TCPM004 | 6.00 | | |
| MVG 1600LD Transfer Case | TCPM005 | 6.00 | | |
| MVG 1600PLD Transfer Case | TCPM006 | 6.00 | | |
| MVG 2000LD Transfer Case | TCPM003 | 6.00 | | |
| MT 8 Axle | AXPM001 | 6.00 | | |
| MT 10 Axle | AXPM002 | 6.00 | | |
| MT 11 Axle | AXPM003 | 6.00 | | |
| MT 14 Axle | AXPM004 | 6.00 | | |
| MT 17 Axle | AXPM005 | 6.00 | | |
| MT 22 Axle | AXPM006 | 6.00 | | |
| MT 23 Axle | AXPM007 | 6.00 | | |
| R/RF 22 Axle | AXPM008 | 6.00 | | |
| CT-8 Axle | AXPM009 | 6.00 | | |
| MTL Carrier | MTLM009 | 6.00 | | |
| **Repair Manuals:** | | | | |
| MVG 750 Transfer Case | TCRM001 | 10.00 | | |
| MVG 1200 Transfer Case | TCRM002 | 10.00 | | |
| MVG 1600 Transfer Case | TCRM004 | 10.00 | | |
| MDB 1610 Drop Box | DBM002 | 10.00 | | |
| MDB 500 Drop Box | DBM003 | 10.00 | | |
| MVG 2000 Transfer Case | TCRM003 | 10.00 | | |
| MT10/MT11 Axles | ARM001 | 10.00 | | |
| MT14/MT17 Axles | ARM002 | 10.00 | | |
| MT22/MT23 Axles | ARM003 | 10.00 | | |
| R/RF 22 Axle | ARM004 | 10.00 | | |
| CT-8 Axle | ARM005 | 10.00 | | |
| **Operators Manuals:** | | | | |
| Transfer Cases | OMTC-1 | 10.00 | | |
| General | OMG-2 | 10.00 | | |

## *Method of Payment*

**[ ] Check Enclosed**

**[ ] Purchase Order/P.O. #**_____
*(only w/current M-H Account)*

**[ ] Mastercard/VISA –**
**Card #**_____

**Exp. Date**_____

**Authorized Card User's Signature:**

_____

Credit Card Orders Or Current Customers' Purchase Orders May Be Faxed — **502/253-0317**

| | | |
|---|---|---|
| **Sub Total:** | | |
| **Total Quantity Sales Literature:** | | *No Charge* |
| **KY Sales Tax:** | | |
| **Standard Shipping:** | | *No Charge* |
| **TOTAL Due:** | | |

## *Ship Order to the following address*

**Company:** _____

**Name:** _____

**Address:** _____

**City/State:** _____ **Zip Code:** _____

**Country:** _____ **Postal Code:** _____

**Telephone Number:** _____ **Fax Number:** _____

**PLEASE MAKE COPIES OF THIS LITERATURE ORDER FORM AS NEEDED**


13001 Magisterial Drive • Louisville, KY 40223
(502) 253-0277 • (800) 227-0727 • Fax (502) 253-0317
E-mail: info@marmon-herrington.com