A NAVISTAR COMPANY

International® Hydraulic Clutch System

Study Guide
TMT-131101

INTERNATIONAL®

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Introduction

International® has introduced a new hydraulic clutch system to replace the traditional mechanical clutch linkage. This system is standard on the 2010 ProStar® and LoneStar®, and optional on the TranStar® and WorkStar®.

An additional option, available when the truck is equipped with the hydraulic clutch system, is an air assist system that reduces pedal effort when depressing the clutch.

This program covers the components, operation, and bleed procedures of both the hydraulic linkage and the optional air assist system.

Upon completion of this program you will be able to:

- Identify components of both the hydraulic and air assist clutch systems
- Identify the operation of the air assist system.
- Identify the hydraulic linkage operation
- And, Identify the proper steps of both hydraulic clutch and air assist repairs

Objectives

Upon completion you will be able to:

- **Identify hydraulic clutch system design**
- **Identify components on the hydraulic clutch system**
- **Identify the proper steps of hydraulic clutch repairs**

NOTES

System Components and Operation

Module I

Hydraulic Components and System Operation

The hydraulic clutch system consists of a hydraulic reservoir, master cylinder, hydraulic hose, slave cylinder, and clutch pedal.

When the clutch pedal is depressed, fluid from the master cylinder forces the slave cylinder to move the clutch release fork.

"Fluid from the master cylinder forces the slave cylinder to move the clutch release fork."

Upon release of the clutch pedal the fluid is returned to the reservoir.

Master Cylinder

The master cylinder is located on the left side of the bulkhead and fed DOT 3 or DOT 4 brake fluid through a low pressure hose from the remotely mounted reservoir on the bulkhead.

The master cylinder and slave cylinder are then connected through a hydraulic hose.

Reservoir

The reservoir includes a visual “MIN” and “MAX” fluid level indicator. The reservoir cap is vented to allow trapped air to escape.

Slave Cylinder

“The slave cylinder is mounted to the transmission.”

The slave cylinder is mounted to the transmission. When the clutch pedal is depressed, fluid is directed from the master cylinder to the slave cylinder. This causes a piston in the slave cylinder to move a pushrod out against the release fork. Since the release bearing is connected to the fork, the force is transmitted to the pressure spring of the clutch, and the clutch is disengaged.

Air Assist components and System operation

The optional air assist system uses the components of the hydraulic linkage system, with the exception of the slave cylinder. The servo cylinder replaces the slave.

“The Servo is a slave cylinder with a pneumatic booster built in.”

The Servo is a slave cylinder with a pneumatic booster built in. When the pedal is depressed, fluid pressure begins to move the slave piston. This movement activates the booster and

vehicle air pressure then assists the operator in depressing the clutch. When the operator releases the clutch pedal, retraction of the slave piston deactivates the booster and the air is exhausted.

If the system loses air pressure the operator will still be able to depress the clutch, but there will be an increase in pedal effort.

“If the system loses air pressure the operator will still be able to depress the clutch.”

NOTES

Bleeding Procedures Module 2

Hydraulic Fluid Flushing and Bleeding

The DOT 3 or DOT 4 fluid should be replaced every two years. The fluid can be flushed, bled, or changed using the following procedure.

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"The DOT 3 or DOT 4 fuild should be replaced every two years."

Prepare the pressure bleeding equipment according to the manufacturer's instructions. Make sure the equipment contains only Dot 3 or Dot 4 brake fluid.

Remove the reservoir cap and install the adapter provided with the bleeder tool. Route the hose attached to the adapter to a collection container with a volume of at least one quart.

Connect the fluid supply hose from the pressure bleeder to the bleeder valve.

Pressurize the bleeder system to 15 psi or 103 kPa.

Now open the on/off valve on the power bleeder.

Then open the bleeder valve approximately one-half turn. This will allow fluid under pressure to enter the slave or servo cylinder.

NOTE

Do not fully open the bleed valve screw or air may enter the system.

When new fluid exits the adapter hose, first close the bleed screw and then the pressure valve on the bleeder equipment.

Slowly pump the clutch pedal several times to help remove air from the system.

Open the equipment pressure valve and the bleeder valve again. Closely watch the fluid for air bubbles as it exits the adapter hose.

Repeat both the bleed process and pedal pumping, in the correct order, until no air bubbles are present in the fluid stream from the reservoir.

"Tighten the bleed screw to 7lb-ft or 10 N-m."

When finished, tighten the bleed screw to 7lb-ft or 10 N-m and close the pressure bleeder valve.

Disconnect the adapter and hose from the reservoir. Remove the bleeder supply hose from the bleed valve. Be sure to re-install the bleeder valve cover.

Fluid Level

Finally, check the fluid level in the reservoir.

If the fluid level is below the “MIN” line, fill the reservoir with DOT 3 or DOT 4 brake fluid until the level reaches the “MAX” line, and then reinstall the cap.

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Conclusion

This concludes the Hydraulic Clutch System training program. Thank you for your participation.

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