



Trouble Shooting Steering Clutch on Builder Unit D155A-2 Komatsu

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Abstract. The Komatsu D155A-2 bulldozer is a sequence tractor designed for various earthmoving obligations, presenting components just like the blade, raise cylinder, cabin, gasoline tank, ripper, and more. It's far powered by an SA6D10E-2 engine and uses a crawler-type steering machine with a grasp for manipulate. To turn the unit, the snatch disengages, preventing energy transmission to one of the very last drives. The research targets to address guidance grasp troubles in the D155A-2 Bulldozer.

The take a look at makes a speciality of the proper issue of the steering snatch, which stories operational problems. The troubleshooting procedure consists of visual inspection, measurements, and disassembly. The diagnosed troubles are low oil pressure inside the steering grab and the presence of unidentified foreign fabric inside the right snatch component, causing a loss of engagement and decreased electricity. To clear up these problems, the foreign cloth is removed, and the guidance clutch body element is reinstalled and tested. The unit's steering capability returns to ordinary following those moves.

Keywords: *Bulldozer, trouble shooting, steering system.*

1. Introduction

Coal contained within the mining jurisdiction of Indonesia is a nonrenewable natural resource that is a gift from God Almighty that plays a vital role in many people's lives. In order to achieve prosperity and the well-being of the people in a just manner, its management must be governed by the state to provide real added value to the national economy.

Coal mining business activities, which are mining business activities other than geothermal, oil, and gas, as well as water and land, play a significant role in contributing to real economic growth and sustainable regional development.

As actors involved in coal processing, heavy equipment plays a vital role in the efficient operation of the mining process. Bulldozers play a significant role as heavy equipment in this regard. PT. United Tractors Tbk is the agent for "Komatsu." Bulldozers serve as a displacing medium and push soil or material, in addition to

their role in leveling the road surface on rocky or muddy terrain, so roads with flat surfaces are advantageous for the loading process from zero to 360 degrees.

This steering system is utilized by Bulldozers and Shovel dozers. The control utilizes a clutch consisting of a disc plate between the inner and outer drums. For this type of steering to function, the disc and plate must be disengaged for the unit to turn so that the transmission's rotation and power are not transmitted to one of the final drives. The clutch can be stretched (disengaged) using either hydraulic or mechanical force. In a disengaged state, the disc and plate are not connected (not meeting). In an engaged state, the disc and plate are connected. Under these conditions, the transmission transfers power to the final drive. The steering clutch cannot be disengaged due to a foreign object between the disc and the plate on its right; therefore, if the unit turns to the right, it requires much power, and the rotation process is lengthy. In response to this issue, the author researched by disassembling the suitable steering clutch component. The author chose the title "Trouble Shooting Steering Clutch on the Bulldozer D155A-2 Komatsu Unit" based on the preceding explanation.

2. Methodology

This observational study was conducted through interviews, library research, and observation at Mahakam Sumber Jaya (MSJ) from August to October 2016.

2.1 Method of Collecting Data

Data were collected during On the Job Training (OJT) at PT. United Tractors Site Separi. Direct observation in the field on the object intended to obtain data or what the author needs in the preparation of the final assignment.

The aim is to obtain the data the author needs in writing the final project and the Trouble Shooting Report (TSR), Emergency Trouble Report (ETR), and historical units. The collection of data is through library research in this research through Shop Manual D155A-2. Meanwhile, the interview process was carried out by directly interviewing mechanics and unit operators who experienced the problem.

In the process of data collection, there is a disassembly and assembly phase. One of the steering is disassembled by removing the steering clutch from the unit. After removing the steering clutch right from the unit, it is continued by removing the elements on the steering clutch right to determine what damage has occurred to the component. The toolbox set is used.

3. Finding and Analysis

This research is divided into three processes, including (1) examination and measurement; (2) demolition; and (3) repair and installation.

3.1 Examination and measurement

Before inspecting and disassembly, the mechanic interviews the customer to obtain additional valid information regarding the problem. The first step is to

inspect the unit's condition. Afterward, the mechanics examine the unit to determine what issues have occurred, and the results are consistent with customer reports. In addition, mechanics perform more straightforward tests that are believed to be potential problems, such as linkage steering and justifying the bolt rod brake (Fig 1).

After conducting inspections and checks on the unit, proceed with measuring the pressure oil steering. The gauge used for measuring the pressure is the pressure gauge group.

Table 1. Measurement Results.

Measurement	Results	Standard
Steering lever full stroke (2,5 Mpa)	-	-
CL = Clutch Left/LH	15 kg/ cm ²	15-17 kg/cm ²
CR = Clutch Right/RH	10 kg/ cm ²	15-17 kg/cm ²
BL = Brake Left/LH	18 kg/ cm ²	15-17 kg/cm ²
BR = Brake Right/BR	10 kg/ cm ²	15-17 kg/cm ²



Fig. 1. Adjustment Bolt Rod Brake.



Fig. 2. Measurement steering full stroke.

They measure the pressure on the low-pressure right steering clutch with a pressure gauge when the engine is started at a high idle speed of 1500 engine revolutions per minute. The results of these measurements could be more satisfactory because they do not correspond to the standards outlined in the manual (Table 1). After measuring the steering oil pressure and determining unsatisfactory results, the steering right did not move with full force, and another measurement was taken (Figure 2).

The mechanics disassembled the steering clutch on the right to visually assess its condition based on the results of these measurements.

3.2 Disassembly

Disassembling the proper steering clutch assembly, namely draining the oil from the steering case, removing the fuel tank, removing the hoses, bolts and so on, then lifting the steering clutch assembly using a lifting device (Figure 3). Next, place the steering clutch assembly component on the particular stand provided, place a jack under the steering clutch assembly component to hold the springs, and disassemble and inspect each steering clutch assembly element (Figure 4).

The following process is removing and inspecting the disc and plate, then removing the outer drum and spring. After disassembling and inspecting the steering clutch assembly components, an unknown material was found between the disc and the plate (Figure 5).

The unknown material that was found is thought to be the cotter pin lock lining (the rivet) of the brake, which had been worn down so that it fell into the steering case and finally entered the steering clutch assembly component, which resulted in the steering clutch right not working. It can be disengaged and result in low power suitable steering clutch.



Fig. 3. Steering Clutch Assembly Removal.



Fig. 4. Clutch Assembly Disassemble.

Fig.5. Removing and inspecting the outer drum and spring until unknown material is found.

		<p>Disc and Plate Removal and Inspection Process</p>
		<p>Removing Process and Inspection of outer drum and spring</p>
		<p>Unknown materials discovery</p>

3.3 Repair and Installation

After finding the cause of the steering clutch right not being disengaged, the following process is to reinstall the steering clutch assembly components that have been disassembled. As for before the assembling process, cleaning and washing the component is first carried out and then installing the inner drum, piston and spring, then installing the clutch piston ring seal, then installing the clutch drum install, the disc and plate and aligning the gears. The following process is installing the outer drum, pressure plate and brake band (Figure 6).

As a result, after the steering clutch assembly component is installed and the

steering oil has been filled, after that, the mechanic tries to do a test run in the field, and the results obtained from the test run are excellent, that is, when the unit is turned to the right, the turning process is normal, or as usual, namely it no longer takes a long time to turn right or turn around.

4. Conclusion

Based on a customer report, the Komatsu D155A-2 Bulldozer unit experienced a problem with the steering clutch right being unable to be disengaged (low oil pressure). So that the unit is difficult to turn right or rotate; when this problem occurred, the customer's mechanic made adjustments to the bolt rod adjustment, but the result was still experiencing low steering power. Then the customer asks for help from the PT mechanic—United Tractors- to inspect and repair the Komatsu D155A-2 Bulldozer unit.

PT mechanic The first thing United Tractors did was to interview the customer to obtain more valid data about the trouble that occurred. From the data obtained from the customer, the customer said that this unit had never carried out a major repair program or standardized components during its operation. According to the shop manual, unit components are commonly known as a general overhaul. After that, the mechanic carried out a testing run on the unit to find out firsthand the trouble that occurred, and after that, it continued with a visual inspection of the unit. Then the mechanic checked the jousting linkage steering brake, and the results were still standard, and after checking the linkage on the steering, he continued to check and adjust the bolt rod adjustment brake. After inspection and jousting, the mechanic did another test run on the unit, and the results were still the same as the previous trouble. Then the mechanic will measure the proper steering oil pressure using a pressure gauge, namely the pressure gauge group. The inspection was carried out with the engine running high idle, which was 1500 rpm, and the results obtained from these measurements were that the pressure oil steering right obtained was incompatible with that in the shop manual. After the measurement, testing is carried out, and the results are still the same as before. To ensure mechanical damage and colleagues immediately disassembled the steering brake component. They immediately removed the component from the body, and due to the disassembly, a foreign object was found between the disc and the plate. Based on the data obtained from the results of disassembling the right steering clutch, it can be concluded that the foreign object makes the right steering clutch unable to be disengaged, causing low steering oil pressure. Finally, the unit has difficulty turning and turning right. To prevent this problem from happening again, conduct periodic servicing of these components and a general overhaul every 16,000 hours of the unit's work processes. If carrying out the adjusting process, adjust it to the operating standards used. Moreover, if this problem occurs again, it will harm the company materially and non-materially because the unit is experiencing a breakdown.



Fig. 6. Steering Clutch Repair and Installation Process

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