

PARTS & SERVICE NEWS

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SUBJECT: REPAIR PROCEDURE OF BALL STUD FOR STEERING CYLINDER ON GD555-3C, GD655-3C AND GD675-3C

PURPOSE: To introduce modification procedure to improve the ball stud for the steering cylinder on GD555-3C, GD655-3C and GD675-3C motor graders

<Machines shipped to the USA market only>

APPLICATION: GD555-3C Motor Graders, Serial Nos. 50001 thru 50029 (29 unit)
 GD655-3C Motor Graders, Serial Nos. 50001 thru 50037 (37 unit)
 50040 thru 50081 (42 unit)
 GD675-3C Motor Graders, Serial Nos. 50001 thru 50017 (17 unit)

FAILURE CODE: 4A1CMQ

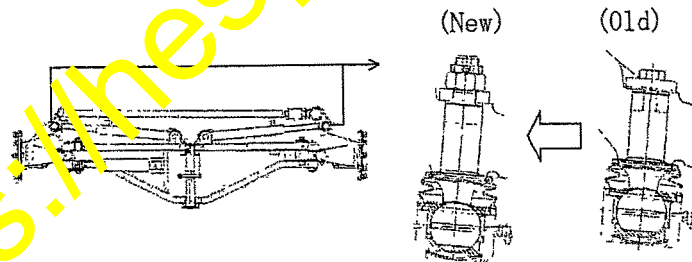
DESCRIPTION:

1. Introduction

It has become necessary to replace the ball stud for the steering cylinder on the GD555-3C, GD655-3C and GD675-3C motor graders with the improved parts in order to prevent occurrence of loosening and to make the inspection work easier.

Contents of the modification

1. Shaft end bolt → Nut and cotter pin
2. Fit tolerance: $\phi 40H7/m6 \rightarrow \phi 40H7/p6$



2. List of parts

Part No.	Part Name	Purpose of part	Q'ty	Remarks
23B-27-31500	Stud kit	Replacement	1	Including the 9 items of the component parts indicated below.
23B-27-31580 (*1: 23B-27-11564) (*2: 23B-27-31560)	Stud, ball (Stud, ball) (Stud, ball)		2 (2) (2)	*1: GD555-3C *2: GD655-3C, GD675-3C
23B-27-31550 (235-27-11240)	Washer (Washer)		2 (2)	
01592-32427 (01010-81635)	Nut (Bolt)		2 (2)	Component parts of the above kit
04050-15045	Pin		2	
23B-27-11360 (23B-27-11360)	Plug (Plug)	Replacement	2 (2)	Consumable parts
01010-81035	Bolt	Press fitting jigs	1	
01643-31032	Washer		1	
23D-27-11571	Plate		1	
23B-27-31550	Washer		1	

For individual application to the machines having been shipped to the U.S.A. market. Refer to the Service News AT03180 regarding the information on the component parts.

3. Inspection method for loosening of the ball stud for the front axle steering cylinder and replacement procedure

3-1. Inspection method for loosening of the ball stud bolt

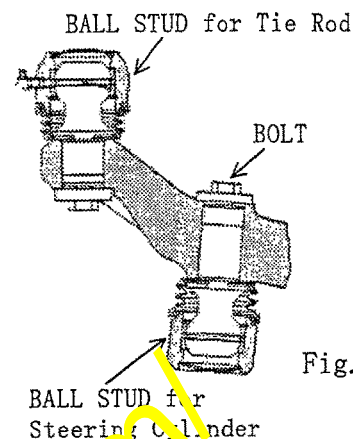
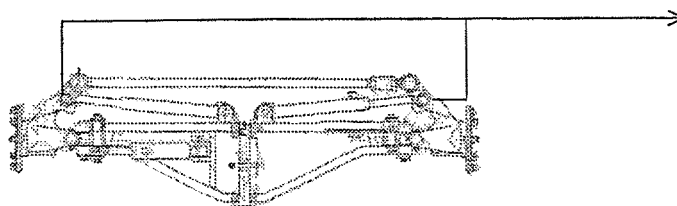


Fig. 1

(1) Preparations

- 1) Park the machine on a flat place, apply the parking brake and fix the front and rear frame by use of the articulated lock pin.
- 2) Direct the wheels in the straight traveling direction.
- 3) Lower the blade to touch the ground so that it may come in right angle to the machine.
- 4) Lower the blade to raise the front tires by about 10 cm.
- 5) Insert holding blocks under the front axle.
- 6) Contract the blade lift cylinder little by little for the front axle to sit on the blocks. (Refer to Fig. 2.)
 - Make the tires raised from the ground level by 2 to 3 cm.

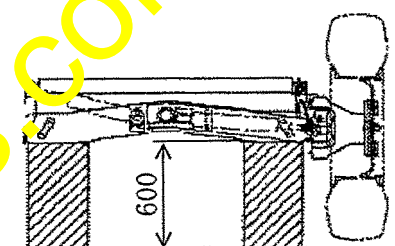


Fig. 2

(2) Inspections

Inspection method for loosening of the ball stud section is as follows.

- ① Shake the tire by hands to make visual inspection if the ball stud section is not loosened. (Refer to Fig. 3.)
- ② In case loosening of the ball stud section is not checked visually, measure the bolt tightening torque using a torque wrench to check if the bolt is not loosened.
 - If the bolt tightening torque is less than 245 Nm {25 kgm}, the bolt is being loosened.

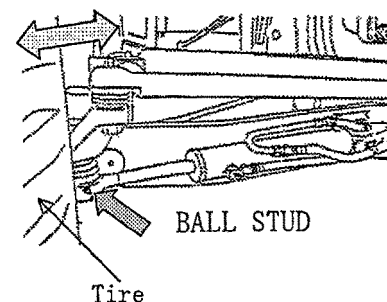


Fig. 3

3-2. Inspection method for fatigue of the housing hole

In case the ball stud is being loosened, there is a possibility of occurrence of fatigue of the housing side hole. Therefore, measure the hole diameter. (Refer to Fig. 4.)

- Measuring point: The dimension marked ☆ in the drawing shown on the RH side (Measuring instrument: Micrometer)
- Hole diameter: 40.025 mm or more → Replace the housing.
- Hole diameter: Less than 40.025 mm → Reuse the housing.

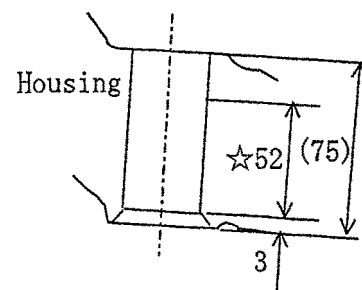


Fig. 4

Part No. of Housing

Table 1

Model	Housing, L.H.	Housing, R.H.
GD555-3C	23A-27-31140	23A-27-31150
GD655-3C, GD675A-3C	23B-27-31140	23B-27-31150

3-3. Disassembly and assembly of the ball stud

(1) Removal of the ball stud

Remove the current type parts No. 1 thru 8 (excluding No. 4) shown in Fig. 5.

(2) Installation of the ball stud

Install the parts No. 1 thru 8 to the steering cylinder.

Regarding the installation procedure and precautions, refer to the drawing shown below (Fig. 5) and Section 3-3. (3).

Parts List

Table 2

No.	Part No.		Parts name	Q'ty/set			Remark
	New	Old		GD555-3C	GD655-3C	GD675-3C	
1	23B-27-31580	23B-27-11564	Stud, ball	2	—	—	GD555-3C
		23B-27-31560		—	2	2	GD655-3C, GD675-3C
2	01592-32427	—	Nut	2	2	2	
	—	01010-81635	Bolt	2	2	2	
3	23B-27-31550	235-27-11240	Washer	2	2	2	
4	04050-15045	—	Pin	2	2	2	
5	23B-27-31570	23B-27-31570	Snap ring	2	2	2	Reuse
6	23B-27-31840	23B-27-31840	Boot	2	2	2	Reuse
7	23B-27-11800	23B-27-11800	Bushing ass'y	2	2	2	Reuse
8	23B-27-11360	23B-27-11360	Plug	2	2	2	Change to new parts

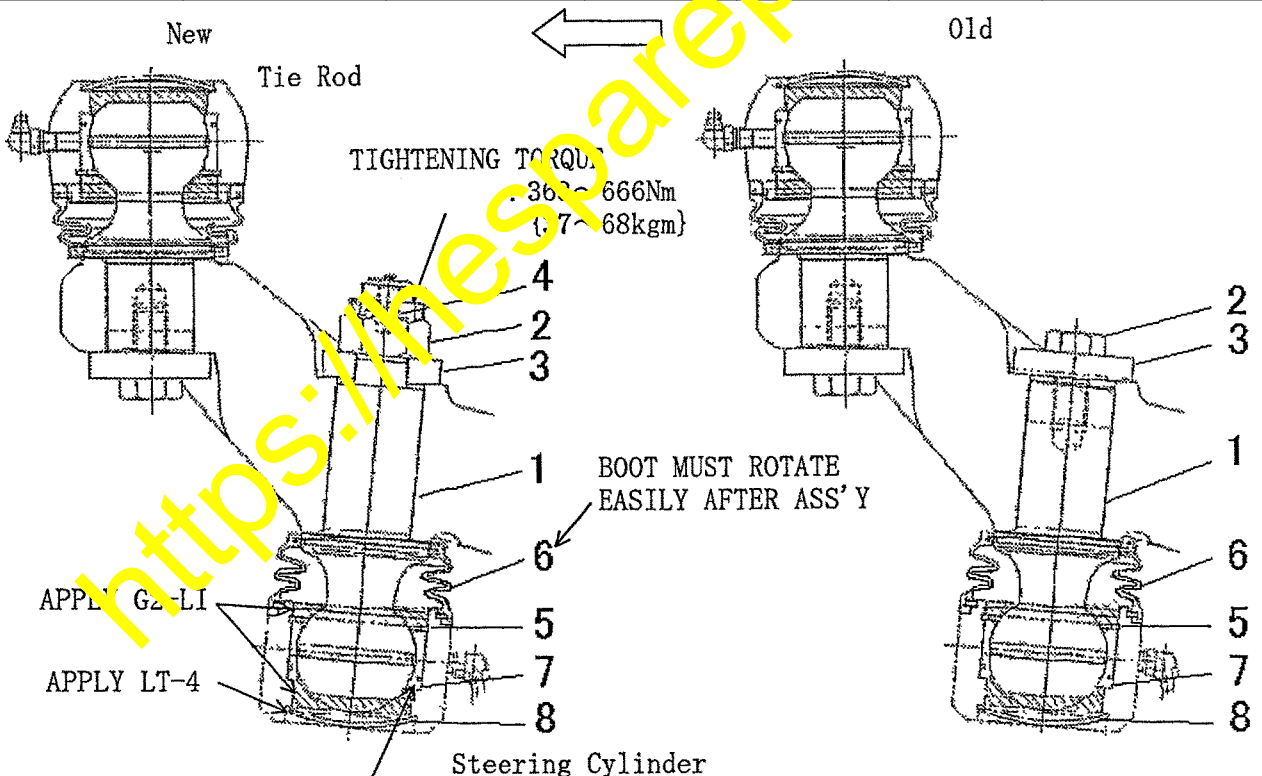
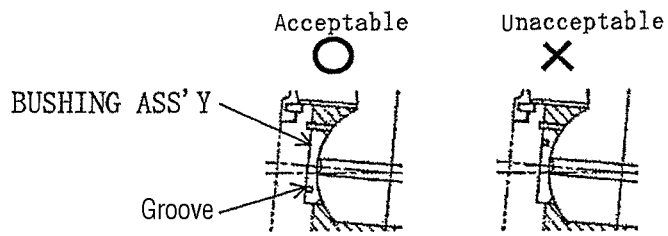


Fig. 5



(3) Installation procedure and precautions

1) Precautions before starting press-fitting (hitting) of the ball stud

Precaution ①: Do not apply lubricant like grease between the ball stud and the housing.

Precaution ②: Match the direction of the width across flat section of the flange of the stud to the right angle direction to the tire (in parallel to the tie-rod). (Refer to Fig. 6.)

Installing direction of the width across flat

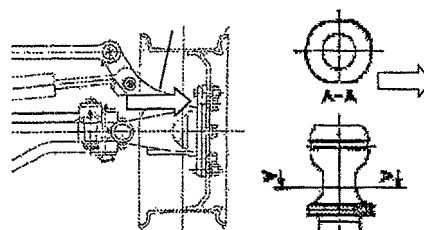


Fig. 6

2) Press-fitting (hitting) of the ball stud

- Hit the ball stud until the tip end of the ball stud comes out to the upper surface of the housing by use of a hammer. (Refer to Fig. 7 and 8-1.)

Precaution ③: When hitting the ball stud by the hammer, using the hitting jig in order not to hit the cylinder head section by an error.

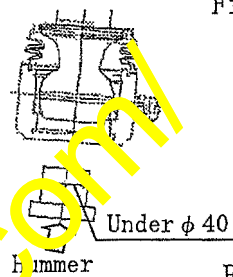


Fig. 7

- Install the pulling up bolt, etc. (Refer to Fig. 8-2.)
- Tighten the bolt by 7 turns to pull up the ball stud. (Refer to Fig. 8-3.)
- Add the washer. (Refer to Fig. 8-4.)
- Tighten the bolt by 7 turns to pull up the ball stud. (Refer to Fig. 8-5.)
- Remove the bolt and install the nut and washer to pull up the ball stud. (Refer to Fig. 8-6 and 8-7.)

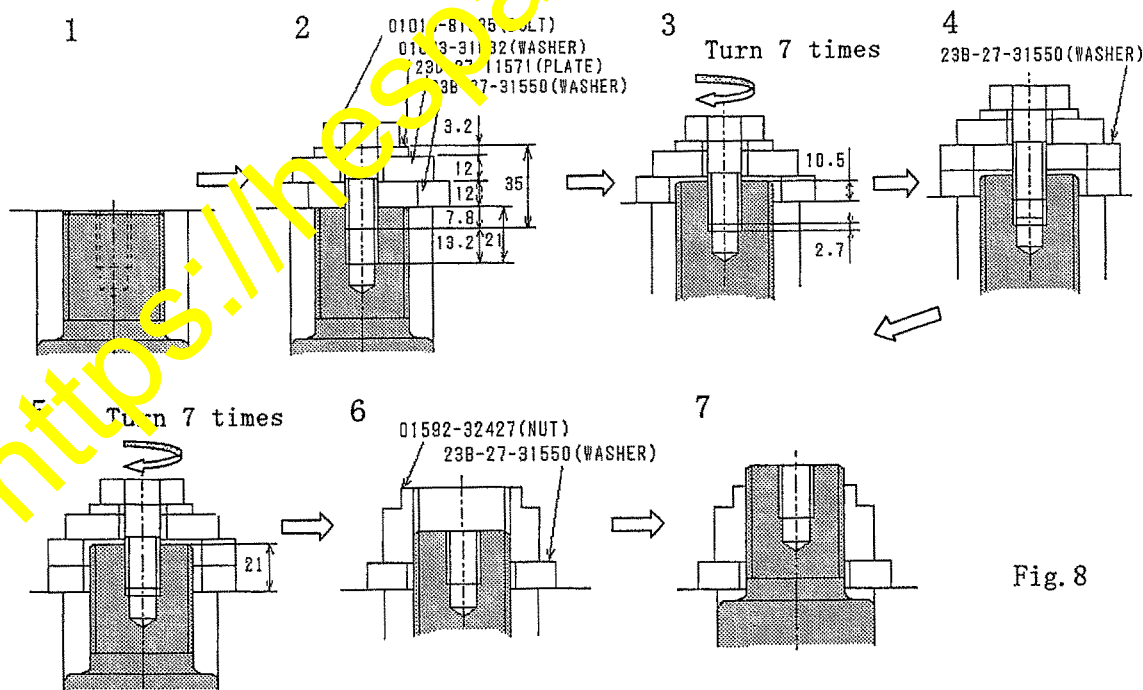


Fig. 8

- 3) Checking the existence of clearance between the flange section of the ball stud and the housing

Precaution ④: There should not be a clearance between the flange of the ball stud and the housing. (Refer to Fig. 9.)

- 4) Tightening of the nut and installation of the pin

After tightening the nut at the specified tightening torque, install the cotter pin.

Precaution ⑤: The final tightening torque for the nut should be 363 Nm {37 kgm} or more and for matching of the cotter pin hole, tighten within the range of 363 – 666 Nm {37 – 68 kgm}.

Precaution ⑥: When matching the cotter pin hole, match it with the nut rotated to tightening direction. Do not match the cotter pin hole with the nut rotated to loosening direction.

- 5) Restoration

Apply G2-LI (grease) to the hatched section range indicated in the drawing shown RH side. Install the plug (23B-27-11360).

- 6) Confirmation of the installation

Bring down the front axle from the block and turn the steering wheel several times to make sure that there is no problem found.

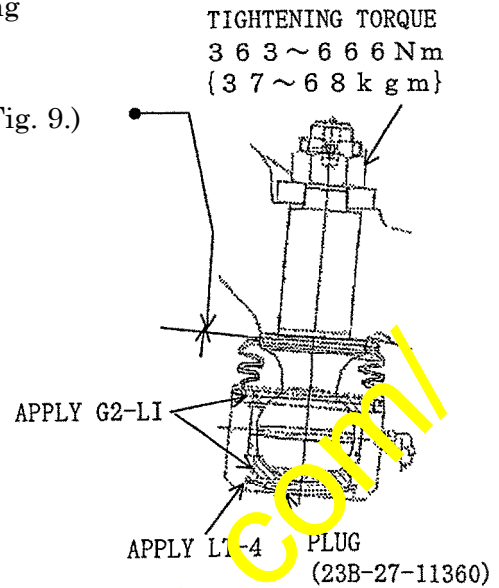


Fig. 9