

# PARTS & SERVICE NEWS

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**SUBJECT:** TRANSMISSION INCHING CLUTCH IMPROVEMENT PARTS (SPRING) ON GD825A-2

**PURPOSE:** To introduce a new valve part (spring) for improving durability of inching clutches by lowering hydraulic oil pressure.

**APPLICATION:** GD825A-2 Motor Graders, Serial Nos. 12099 thru 12116  
GD825A-2 (-50°C) Motor Graders, Serial Nos. 12099 thru 12116

**FAILURE CODE:** 15F0FA

**DESCRIPTION:**

1. Introduction

Durability of inching clutches (both R and R) can be improved by lowering the hydraulic oil pressure of the inching clutches. This Service News introduces a valve part (spring) for the purpose.

2. List of parts

Part No.	Part Name	Q'ty	Remarks
235-15-26181 [23901-15-496] (235-15-26190)	Spring (Spring)	1 [1] (1)	For prototypes
(235-15-26180)	(Spring)	(1)	
(235-15-25181)	(Spacer)	(1)	} Discontinued
(103-15-35270)	(Shim)	(4)	

### 3. Detail of Improvement

#### (1) Background

The inching work is mainly for finishing road surfaces and is generally completed in about 10 seconds. In this case, durability of the inching clutch is not related with any problem.

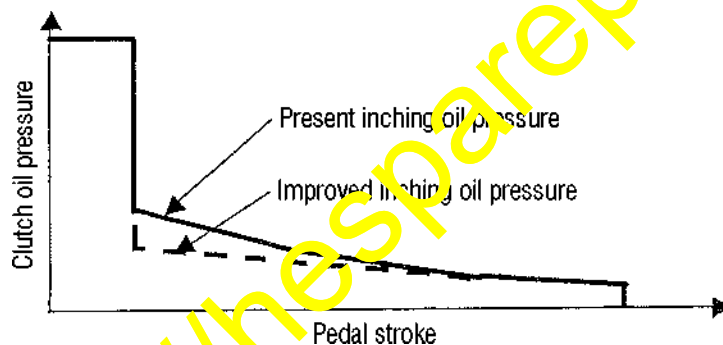
When the inching pedal is used, an operator may use it for a long time (more than 1 minute) unconsciously. In case stopping on a slope, for example, the operator may not set the gear to the neutral position and use the inching pedal instead. For this abnormal operation, decals are stuck to draw attention, and lamps blink and the buzzer alarms when the transmission controller is inched for hours. When the operator is concentrated in operation, however, the alarm may not work effectively due to sounds from the radio or in the environment.

It has been also informed that the machine is not used for finishing road surface like middle size motor grader in mine and is mainly used for maintenance of dump truck traveling road and for dozing work.

#### (2) Coexistence of Inching Performance and High Durability

In view of the above background, it will be introduced how to improve the durability of the inching clutch without influence on the traditional inching performance.

#### (3) Concrete Explanation



The inching oil pressure (the upper limit value in the pressure adjustment range for inching) can be lowered as shown above by replacing the spring inside the inching valve (installed on the top of the transmission). Therefore, even if the operator inches it for a long time by mistake, the clutch heat building up will decrease and the durability of the inching clutch is improved.

When the inching oil pressure is lowered, some operators may feel conflicting phenomena like

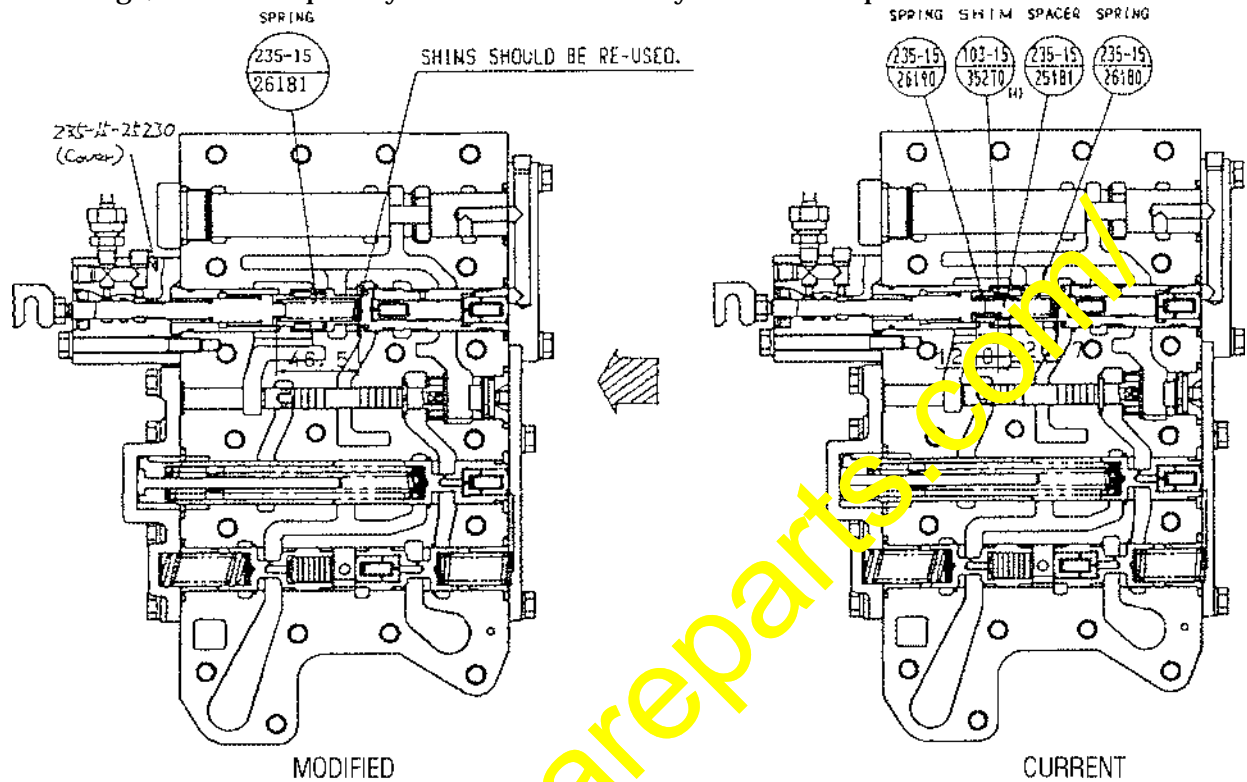
- ① When the inching pedal is used, fine travels become harder than before the improvement or
- ② When the inching pedal is used, the starting shock becomes larger than before the improvement.

This can be solved by returning the inching pedal more slowly than before. A report from the U.S.A. evaluated that the operation in a mine "did not cause any problem."

#### 4. Details of Modification

##### (1) Modification and Purpose

The heat building up at the time of sliding the clutch has been reduced with the inching pedal operation range remaining and by decreasing the pressure adjustment range, and consequently the clutch durability has been improved.



##### (2) List of Parts for Modification

Parts prepared			
Part No.	Description	Quantity per unit	Remarks
235-15-26181	Spring	1	Parts to be mounted, Free height 64, Total number of windings 21.6

Unnecessary parts after replacement			
Part No.	Description	Quantity per unit	Remarks
235-15-26190	Spring	1	To be removed, Free height 17.6
235-15-26180	Spring	1	To be removed, Free height 39.4
235-15-25181	Spacer	1	To be removed, Overall length 23.6
103-15-35270	Shim	About 4	All shims are removed.

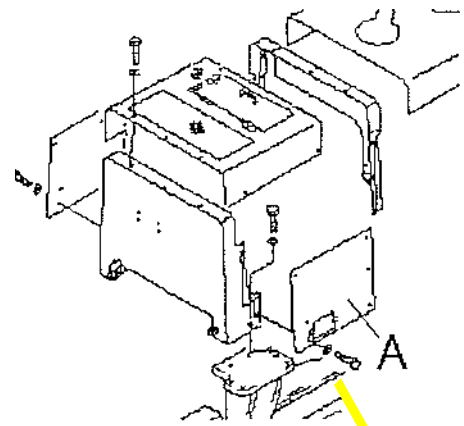
##### (3) Time required for modification (by one worker)

Removal of external cover	15 minutes
Removal of inching linkage	15 minutes
Cleaning around valve	10 minutes
Removal of parts around valve	30 minutes
Disassembling valve and replacing spring	30 minutes
Repair of valve and reassembly of parts	30 minutes
Repair of inching linkage	15 minutes
Re-setting of inching potentiometer	15 minutes
Setting of external cover	15 minutes
<b>Total</b>	<b>175 minutes = 3 hours approx.</b>

5. Modification Procedures

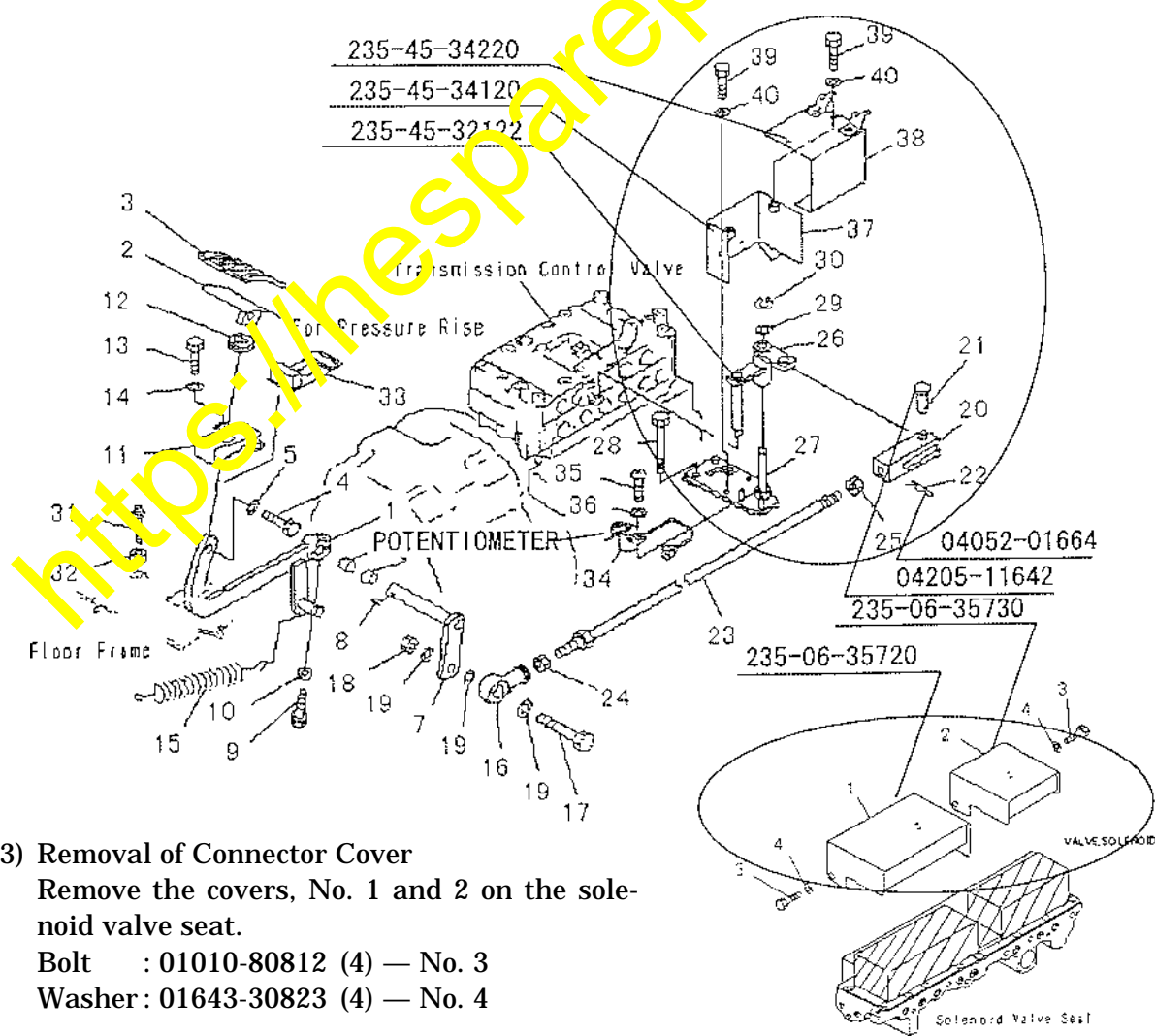
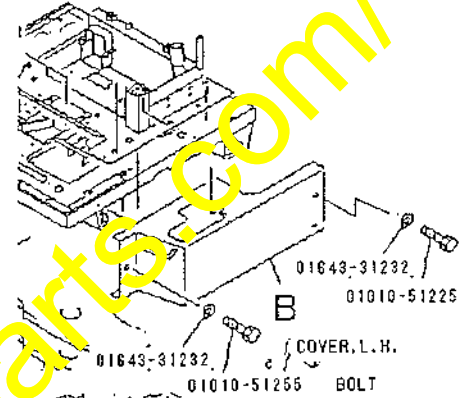
(1) Removal of External Cover

- 1) Remove A.
  - Bolt : 01010-81225 (6)
  - Washer: 232-43-58360(6)
- 2) Remove B.
  - Bolt : 01010-81255 (1)
  - 01010-81225 (2)
  - Washer: 232-43-58360(3)



(2) Removal of Inching Linkage and Connector Cover

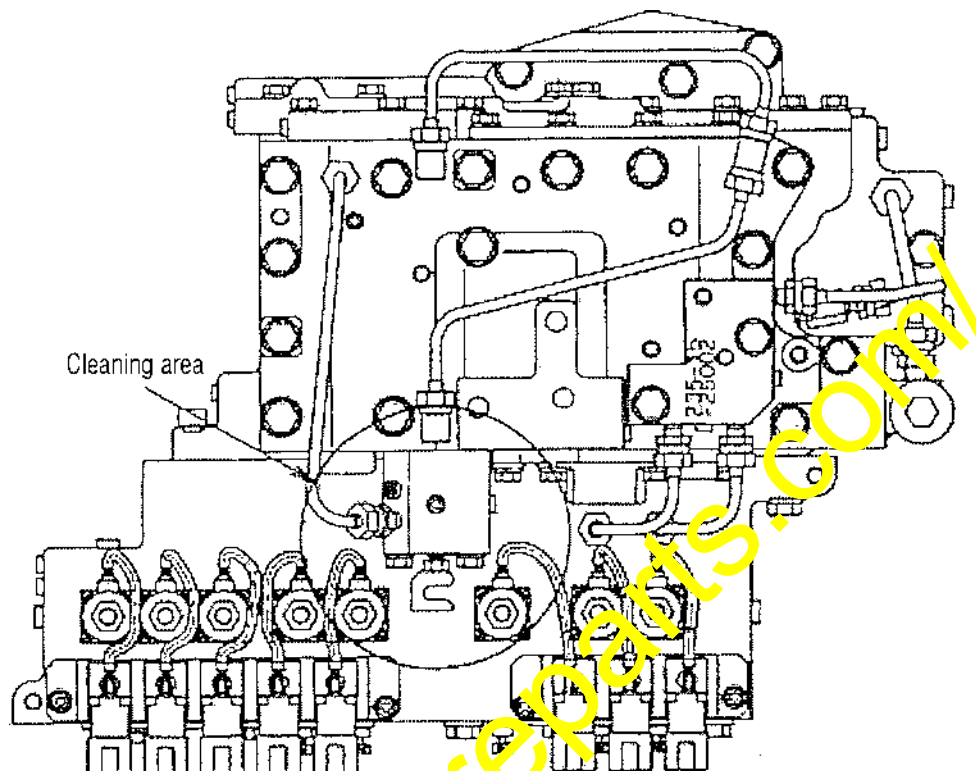
- 1) Remove the covers, No. 37 and 38.
  - Bolt : 01010-80812 (4)
  - Washer: 01643-30823 (4)
- 2) Remove No. 22, Snap Pin (04052-01664) and pull out No. 21, Pin (04205-11642). Then, remove No. 30, Snap ring (04064-01610) and remove No. 26, Bracket.
  - Washer: 01643-31032 (1) — No. 29



- 3) Removal of Connector Cover
  - Remove the covers, No. 1 and 2 on the solenoid valve seat.
  - Bolt : 01010-80812 (4) — No. 3
  - Washer: 01643-30823 (4) — No. 4

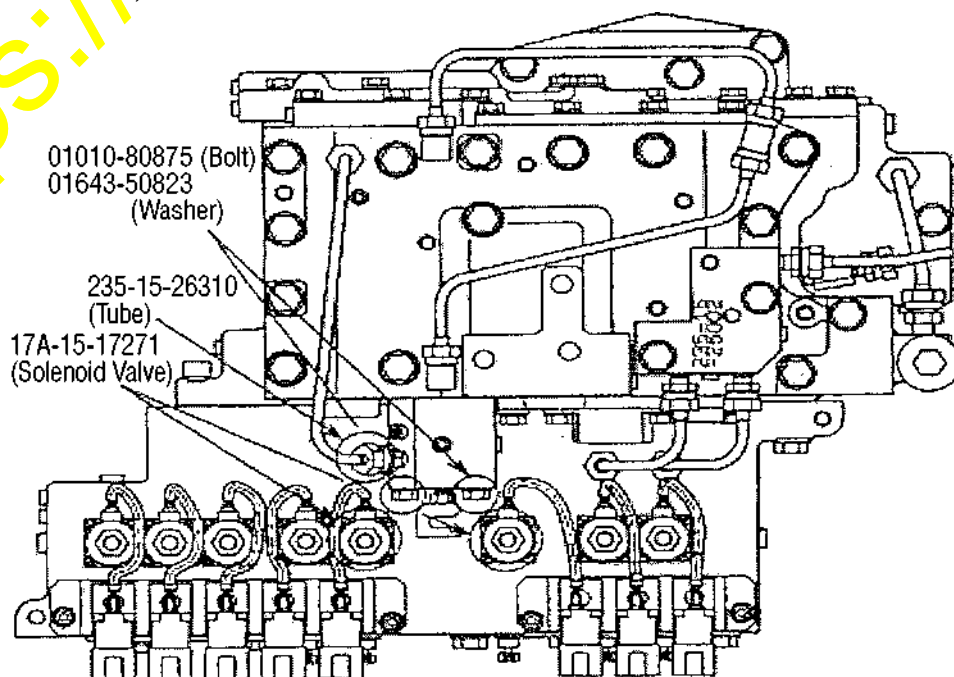
### (3) Cleaning of Parts around Valve

As the parts in the area in the circle are removed, remove dust, stain and paint waste completely so that no dust will enter inside at the time of removing.



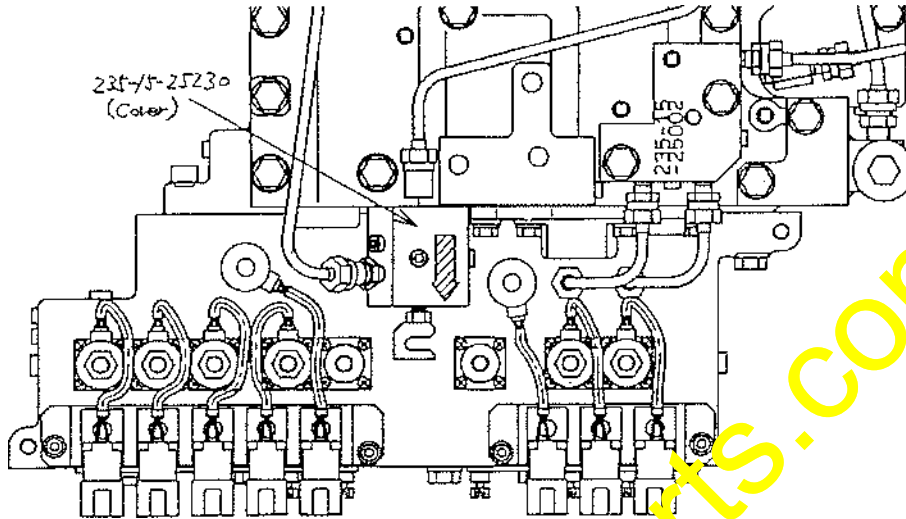
### (4) Removal of Parts around Valve

At first, loosen the indicated parts of the tube (235-15-26310) to separate it from the cover. Then, loosen the head nuts at the indicated 2 places of the solenoid valve (17A-15-17271) and remove the coil frame to make free space. At the time, it is not necessary to remove the solenoid base. At the end, remove the bolt (01010-80875) and the washer (01643-50823).

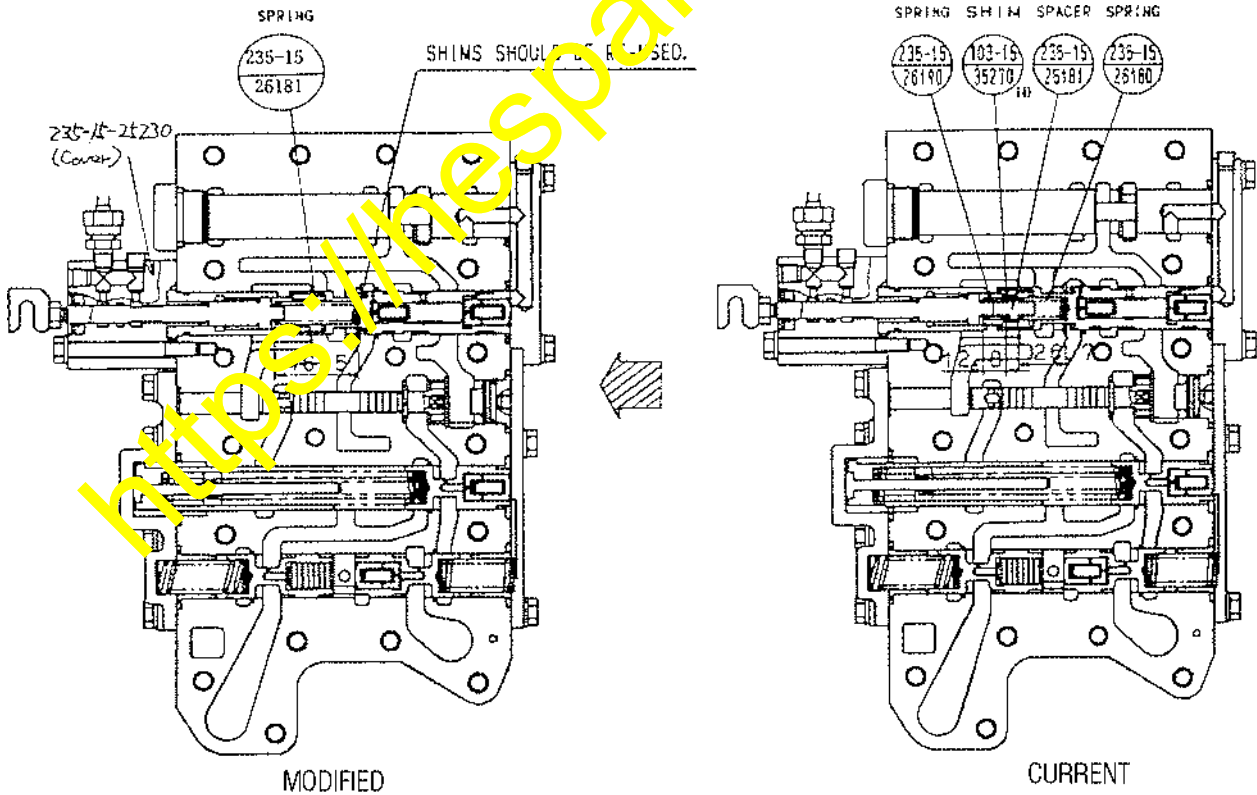


(5) Disassembly of Valve and Replacement of Spring

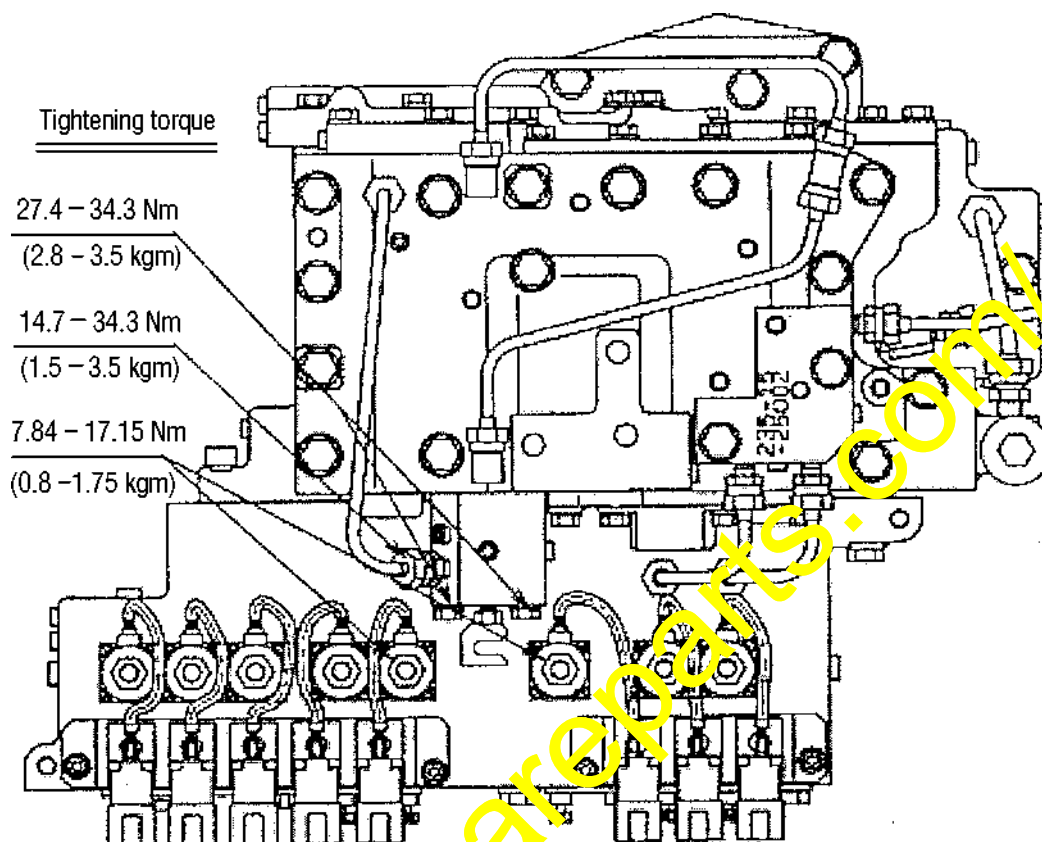
Pull out the cover (235-15-25230) in the arrow direction. It can be pulled out together with the inching spool.



The inside is as shown in the figure below. Assemble the spring and other parts correctly.



- (6) **Reassembly of Valve and Parts around**  
Assemble these parts by reversing the procedure mentioned in (4). Tightening torques are as shown in the figure below.



- (7) **Installing Connector Cover**  
Assemble it by reversing the procedure mentioned in (2)-3). The tightening torques are as follows:
- (8) **Reassembly of Inching Linkage**  
Assemble it by reversing the procedure mentioned in (2)-2). The tightening torques are as follows:  
Adjust the inching controller according to the procedures mentioned on the next page.
- (9) **Re-setting of Inching Potentiometer**  
Re-set it according to the detailed procedure mentioned on page 9.
- (10) **Installation of External Cover**  
Assemble it by reversing the procedure mentioned in (2)-1). The tightening torques are as follows.

Bolt	Tightening torque
01010-808**	14.7 – 34 Nm (1.5 – 3.5 kgm)
01010-810**	34 – 74 Nm (3.5 – 7.5 kgm)
01010-812**	54 – 123 Nm (5.5 – 12.5 kgm)

(11) Adjust the inching control according to the following procedure:

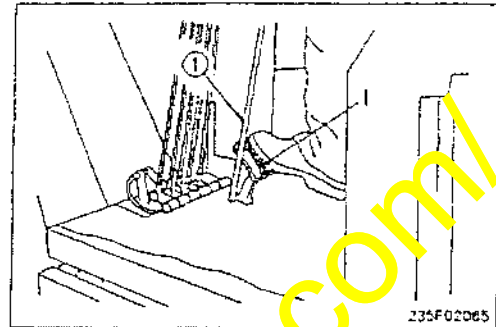
## TESTING AND ADJUSTING

## INCHING PEDAL TRAVEL AND OPERATING FORCE

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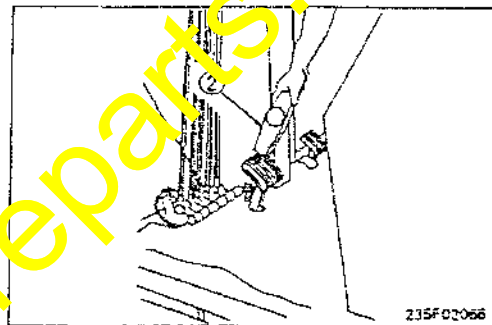
## INCHING PEDAL TRAVEL CHECK

Use convex rule ① to measure the length of the movement from up to down from beginning to the end of depressing inching pedal (1).



## INCHING PEDAL OPERATING FORCE CHECK

Use push-pull scale ② to measure the maximum value in the travel to just before the inching pedal travel end.



## CHECKING HEIGHT OF INCHING PEDAL

Using a steel tape, measure height H of the center of pedal mounting bolt (1) from the floor.

## ADJUSTING HEIGHT OF INCHING PEDAL

1. Adjust the installed length using rod (3) and yoke (2) at the pedal end so that installed height H of the center of pedal mounting bolt (1) from the floor is  $265 \pm 3$  mm. When doing this, remove pin (5) connecting the yoke and lever (4), then turn the yoke to adjust the length.

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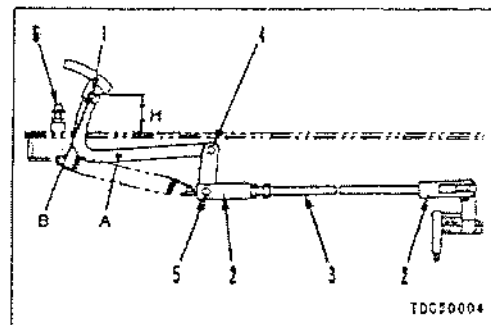
★ Check that portion A of the pedal does not interfere with the floor.

2. Depress the pedal to the end of its travel, and adjust stopper bolt (6) at this position. Then screw in the stopper bolt a further one turn and lock it in position.

★ Check that portion B of the pedal does not interfere with the floor.

3. After the completion of adjustment, start the engine and run it at full throttle. Depress the pedal and check that the machine does not move when the gear shift lever is put into F1.

4. Depress the service brake pedal and inching pedal, and put the gear shift lever into F8. From this position, release the inching quickly, and check that the engine stalls within 3 seconds. (Check with the engine running at full throttle.)



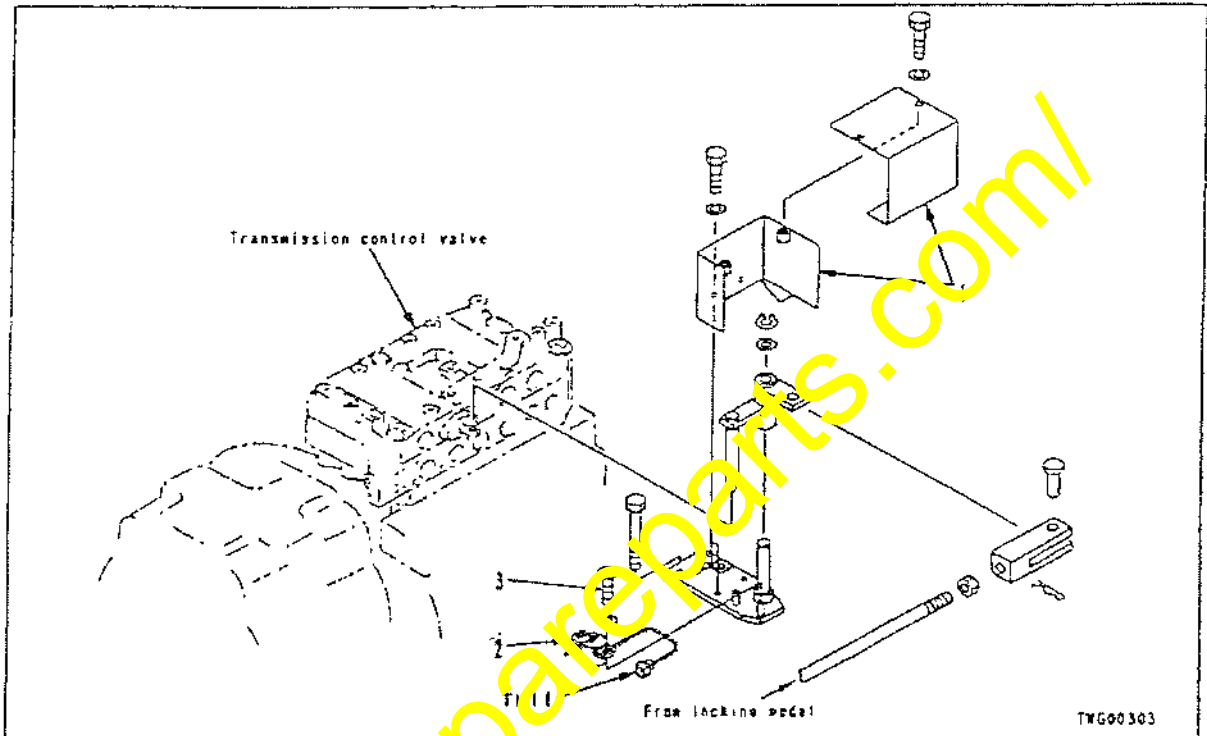


(12) Re-set the inching potentiometer according to the following procedure:

TESTING AND ADJUSTING

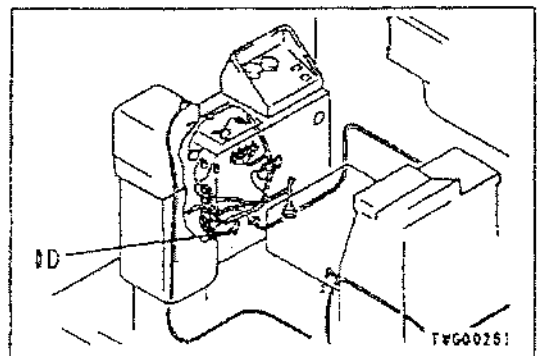
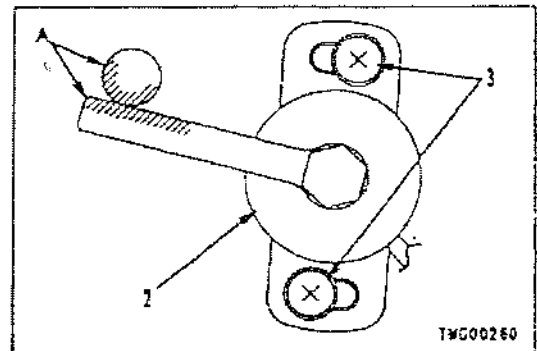
ADJUSTING INCHING POTENTIOMETER

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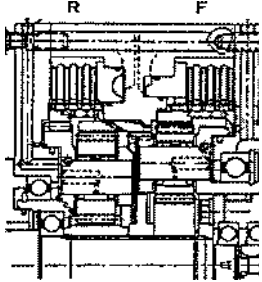
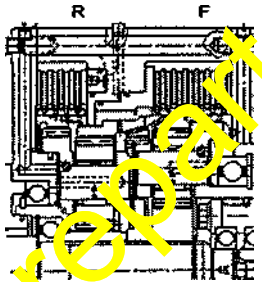
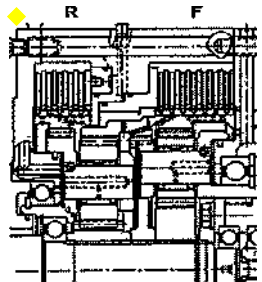


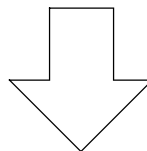
• Adjust the output voltage of the inching potentiometer by adjusting the mounting angle of potentiometer (2).

1. Remove cover (1).
2. Insert a T-adaptor into connector TM11.
3. Turn the starting switch ON and adjust the voltage between terminals ② and ① of TM11.
  - Adjust with the inching pedal not pressed.
  - Voltage:  $0.53 \pm 0.08$  V
  - The voltage can be changed by loosening screw (3) and changing the mounting angle of potentiometer (2).
4. Turn the starting switch OFF and remove the T-adaptor.
  - Connect connector TM11 to its original position.
5. Reset the controller (0 drift).
  - 1) Turn the starting switch ON.
  - 2) Ground the 0D terminal inside the right console box to the chassis.



6. High Durability Inching Clutches in the past

Improvement history		Original	Improvement 1	Improvement 2
Service News No.		-----	BT00046	BT00046
Serial No.		#11001 - 12098	#12099 - 12116	#12117 -
T/M ass'y No.		235-15-21010, 21011 (Standard specification)	235-15-21012, 21013 (Standard specification)	235-15-21014 (Standard specification)
		-----	235-15-21020 (Extreme cold area specification)	235-15-21021 (Extreme cold area specification)
Purpose		-----	Improvement of F clutch durability	Improvement of R clutch durability
Number of clutch disks (Material)	F	4 (Sintered)	7 (Paper)	7 (Paper)
	R	4 (Sintered)	4 (Paper)	5 (Sintered)
Transmission pump capacity		63 cc/rev	80 cc/rev	80 cc/rev
Inching clutch structure				
Reduction of inching clutch hydraulic oil pressure		-----	Has not been incorporated.	Has already incorporated.



The hydraulic oil pressures of the F and R inching clutches can be reduced by changing the valve spring, and the clutch durability can also be improved.