

PARTS & SERVICE NEWS

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SUBJECT: REPAIR PROCEDURE OF DEFECTIVE OPERATION OF ECMV ON HD465/605-7

PURPOSE: To introduce modification procedure to repair and to prevent occurrence of malfunctioning of the ECMV on HD465-7 and HD605-7 dump trucks

APPLICATION: HD465-7 Dump Trucks, Serial Nos. 7001 thru 7112
 HD605-7 Dump Trucks, Serial Nos. 7001 thru 7047, 7049
 (Transmission Serial Nos. Up to 100151)

FAILURE CODE: 15S0MC

DESCRIPTION:

1. Introduction

Malfunctioning of the ECMV may occur on the HD465-7 and HD605-7 dump trucks. Therefore, make the modification being introduced in this Service News to prevent occurrence of the above failure.

In the meantime, when implementing this modification, take the opportunity of changing the oil to carry out oil change and this modification simultaneously.

Determine if flushing is necessary or not and if replacement of the ECMV is necessary or not after checking the current status.

Malfunctioning phenomenon of the ECMV

- 1) It takes more time to shift the speed and, at the same time, speed shifting shock is considerably large.
- 2) ECMV related error codes will be issued.
 1380MW, 15?0MW, 15S?MA or 15S?LI (?) wildcard represents any valid character

2. List of parts

Part No.	Part Name	Purpose of part	Q'ty	Remarks
569-15-51000	Transmission	} Reworked	1	The last chance filter element only is different between the new and current assemblies.
569-15-55002 (569-15-55001)	Control valve ass'y (Control valve ass'y)		1 (1)	
569-15-51720 (714-23-11720)	Filter Ass'y (Filter ass'y)		1 (1)	
569-15-51503 (569-15-51502)	Oil tank ass'y (Oil tank ass'y)		1 (1)	
569-15-51730 (714-23-11730)	Element (Element)	} Replacement	1 (1)	Last chance filter element
569-15-51510 (14X-49-12310)	Magnet ass'y (Magnet ass'y)		3 (3)	Transmission strainer
569-16-81160 (424-16-11140)	Element (Element)		2 (2)	Line filter element
Consumable parts to replace when carrying out this replacement work.				
07000-02060	O-ring		1	Consumable parts to replace when carrying out the replacement work for the last chance filter
07000-72105	O-ring		3	Consumable parts to replace when carrying out the replacement work for the strainer
07000-12125	O-ring		2	} Consumable parts to replace when carrying out the replacement work for the line filter element
07000-12014	O-ring		2	

Part No.	Part Name	Purpose of part	Q'ty	Remarks
Parts necessary for flushing of the transmission ass'y				
561-15-55670	Element		2	Line filter element for the flushing
07000-12125	O-ring		2	Consumable parts to replace when changing the line filter element at the time of carrying out the flushing work
07000-12014	O-ring		2	
209-60-31130	Element		1	The rear brake cooling oil element for the flushing
07063-51210	Element		1	Standard element for the rear brake cooling oil filter
07000-F5180	O-ring		2	Consumable parts to replace when changing the line filter element at the time of carrying out the flushing work
In case malfunctioning of the ECMV is occurring already, replace the ECMV also.				
714-23-15501	ECMV ass'y		3	For the H., REV. and 1st clutch
569-15-56501	ECMV ass'y		1	For the lockup clutch
569-15-55200	ECMV ass'y		4	For the LOW, 4th, 3rd and 2nd clutch

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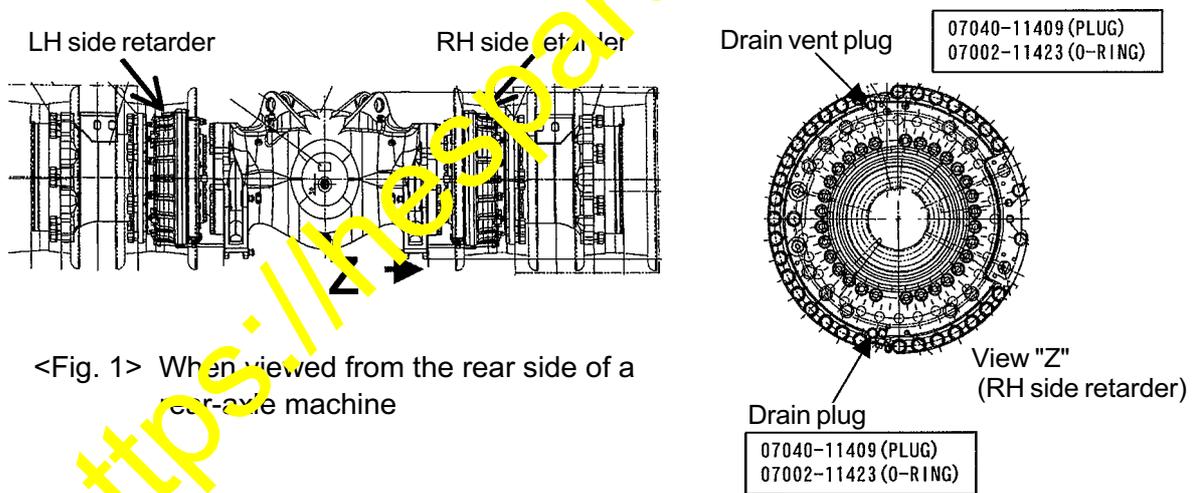
3. Details of the improvement

By the following improvements, the cleanliness factor of the oil can be improved, thus preventing occurrence of malfunctioning of the valve by mixture of foreign substance.

- 1) Adding magnets to the transmission strainer, improve the capturing factor for iron kind foreign substance. (Refer to Section 4-2.)
- 2) Adding magnets to the last chance filter element for the transmission control valve ass'y, improve the capturing factor for iron kind foreign substance. (Refer to Section 4-3.)
- 3) Changing the mesh of the filter medium to a finer mesh, improve the filtration performance. (Refer to Section 4-6.)

4. Installation procedure

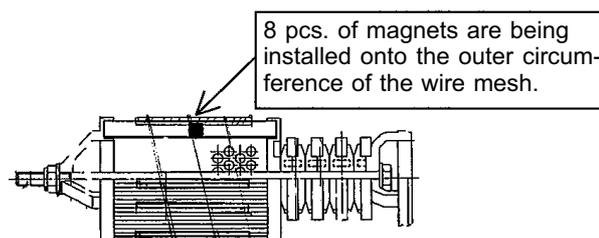
- 1) Draining the transmission oil and removing the filter (Draining oil quantity will be 190 ℓ including the retarder cooling oil.)
 - ① Drain the transmission oil from the drain cock of the transmission oil pan.
 - ② Since the transmission oil is being used commonly as the retarder cooling oil, when changing the transmission oil, drain oil from the LH side and RH side retarders also to prevent existence of residue oil when changing the transmission oil. Regarding the position of the drain plug on the retarder case, refer to <Fig. 1>.
 - ③ Remove the transmission oil filter [424-16-11143] (2 pcs.) and the rear brake cooling oil filter element [07063-51210] (1 pc.).
 - ④ Remove the side cover for the transmission oil pan and remove the transmission oil strainers [14X-49-12310] (3 pcs.)



<Fig. 1> When viewed from the rear side of a rear-axle machine

2) Installing the improved strainers

Install the improved strainers [569-15-51510 [58903-15-895]] (3 pcs.) to the transmission oil pan.

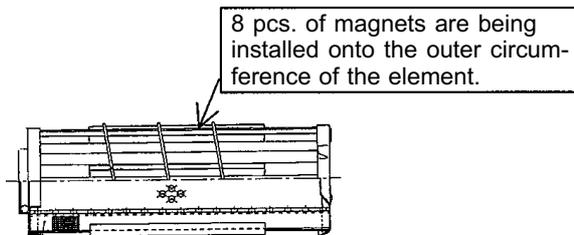


<Fig. 2> Improved strainer

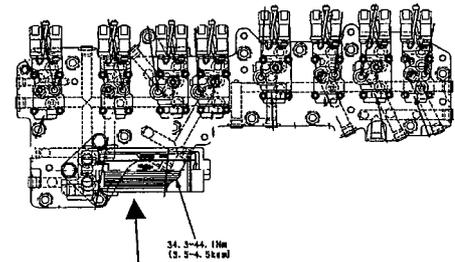
3) Installing the improved last chance filter element

After removing the current last chance filter element [714-23-11730] (1 pc.) from the transmission control valve ass'y, install the improved last chance filter element [569-15-51730 [58903-15-896]] (1 pc.).

Tighten the filter case at a tightening torque of 34.3 - 44.1 Nm (3.5 - 4.5 kgm).



<Fig. 4> Improved last chance filter



<Fig. 3> When the control valve ass'y is viewed from the upper side

4) Carrying out the flushing work (Refer to the Service News No. A900170C regarding the flushing procedure.)

- ① Install the flushing element [561-15-55670] (2 pcs.) to the transmission oil filter case and install the flushing element [289-60-31130] (1 pc.) to the rear brake cooling oil filter case.

(Before installing these flushing elements, check the parts numbers in order not to mix the flushing element and standard element.)

- ② Refill new oil into the transmission oil pan.

(1) Referring to the Operation and Maintenance Manual, refill the specified quantity of oil. (Changing oil quantity will be 190 ℓ.)

(2) Adjust the oil level operating the engine at a Lo-Idling revolution.

- ③ After starting the engine, continue Lo-Idling revolution for about 20 minutes not changing the speed shift lever position.

(At this time, raise the revolution rate to around 1,500 rpm once in a while. In case the engine water temperature gauge is not making a green range indication owing to the influence of the atmospheric temperature, etc., continue the warming up operation furthermore.)

- ④ After that, let the vehicle travel for about 20 minutes. At this time, let the vehicle travel at all the speed stages (F1 thru F7 and R1) and by use of the retarder. (The above traveling for about 20 minutes can be substituted by actual operation of the vehicle for upto 24 hours. However, even in this case, be sure to carry out the procedure as per the above Section 4)-③ before starting the operation.)

- ⑤ Then, after finishing the aforementioned travel of the vehicle, continue Lo-Idling revolution of the engine for about 20 minutes. (In the same procedure as per the above Section 4)-③.)

(Conduct this Lo-Idling revolution of the engine when the traveling for about 20 minutes has been substituted by actual operation of the vehicle as per the above Section 4)-④.)

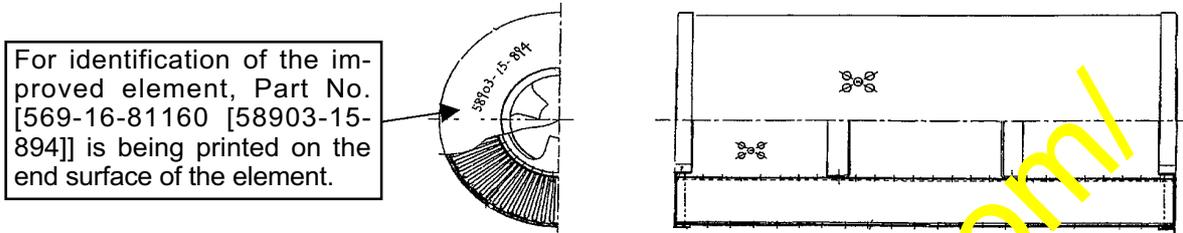
5) Removing the flushing elements

Remove the flushing elements.

(If the flushing element is used for long, early stage clogging will occur and be sure to change the flushing element to the standard element.)

6) Installing the improved elements to the transmission oil filter

Install the improved elements [569-16-81160 [58903-15-894]] (2 pcs.) to the transmission oil filter.



7) Installing the standard element to the rear brake cooling oil filter

Install the standard element [07063-51210] (1 pc.) to the rear brake cooling oil filter

8) Adjusting the oil level

Adjust the oil level once again.

R-adjust the oil level after finishing the warming up. In the meantime, operate the engine at a Lo-Idling revolution while measuring the oil level.

5. Replacing the ECMV

(Although malfunctioning (speed shifting shock is considerably large and the error code will be issued) will usually be improved after the procedures as per the above Section 3 and Section 4 have been carried out, if the malfunctioning still continues, internal defect of the ECMV unit may be the cause.)

1) In case malfunctioning of the ECMV is occurring, replace the ECMV to a new unit.

2) When the ECMV is replaced, be sure to conduct tuning of the ECMV.

Since there are print errors in the ECMV tuning method being described in the Shop Manual (preparations are being made to issue the revised edition), conduct tuning of the ECMV referring to the attached procedure manual (Being indicated on pages 7 thru 14).

12. Adjustment function (TUNING)

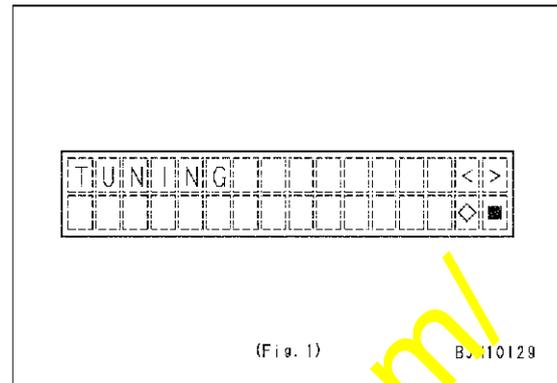
Through the transmission controller, the machine monitor can carry out the the adjustment function to correct the difference in operating feeling to a constant level caused by the the individual differences in the ECMV. It can also carry out the self-adjusting learning function so that a constant gearshifting feeling is maintained in accordance with the wear of the transmission clutch.

When the following operations related to the power train have been carried out, perform the adjustments.

- When the transmission has been overhauled or replaced
- When the transmission valve has been replaced
- When the transmission controller has been replaced
- When an abnormality has occurred in the power train speed sensor and it has been repaired (for details, see the failure code in the chart on the right)
- When an abnormality has occurred in the transmission oil temperature sensor and it has been repaired (for details, see the failure code in the chart on the right)
- When the transmission oil filter has become clogged and it has been repaired (for details, see the failure code in the chart on the right)

For the adjustment operation, operate the machine monitor and machine itself, and carry out the following items in order (Fig. 2).

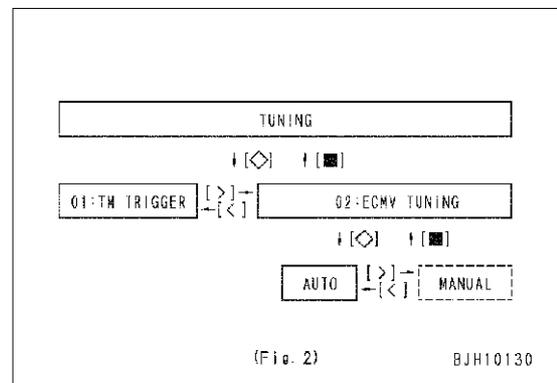
- ★ () indicates the menu to use for the adjustment operation.
- (1) Adjusting individual difference of valve (02: ECMV TUNING AUTO)
- (2) Resetting gearshifting feeling stabilized learning data (01: TM TRIGGER)
- (3) Gearshifting feeling stabilized initial learning (monitoring function)
- ★ The MANUAL menu of [02: ECMV TUNING] is a special function for the factory and is not used for service.



(Fig. 1)

BJH10129

Failure code	Component name
DLF1KA	Transmission input shaft speed sensor
DLF1LC	
DLF2KA	Transmission intermediate shaft speed sensor
DLF2LC	
DLT3KA	Transmission output shaft R speed sensor
DLT3LC	
DGF1KA	Transmission valve oil temperature sensor
5B0NA	Transmission oil filter

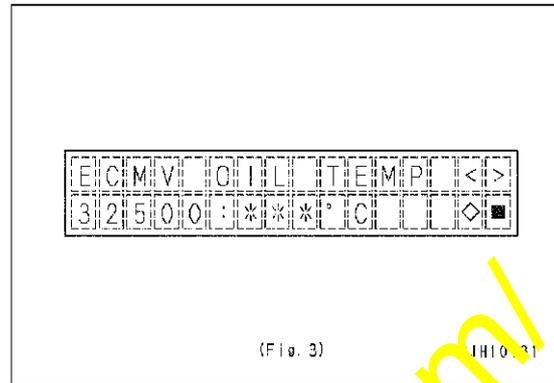


(Fig. 2)

BJH10130

Preparatory work:**Adjusting ECMV oil temperature**

- ★ It is necessary to carry out the adjustment operation at the specified oil temperature, so check that there is no abnormality on the machine and adjust the ECMV oil temperature as follows.
- 1) Start the engine.
 - 2) Display [ECMV oil temperature] with the machine data monitoring function. (Fig. 1).
 - TRANSMISSION No. 48
 - 3) Raise ECMV oil temperature to 70 – 80°C by raising engine speed.
 - 4) Keep engine speed in low idling for 3 minutes. Before carrying out adjustment, be sure to check that ECMV oil temperature is kept within 70 – 80°C.



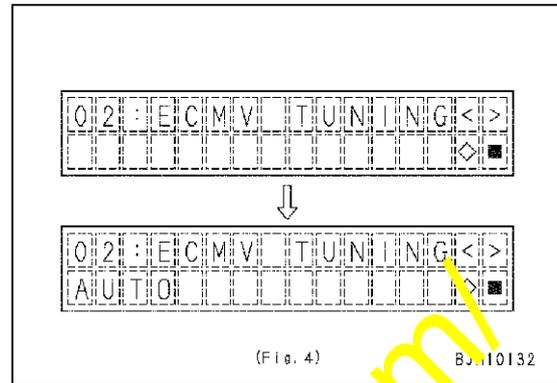
TESTING AND ADJUSTING

SPECIAL FUNCTIONS OF MACHINE MONITOR

Adjustment operation (1): Adjusting individual difference of valve

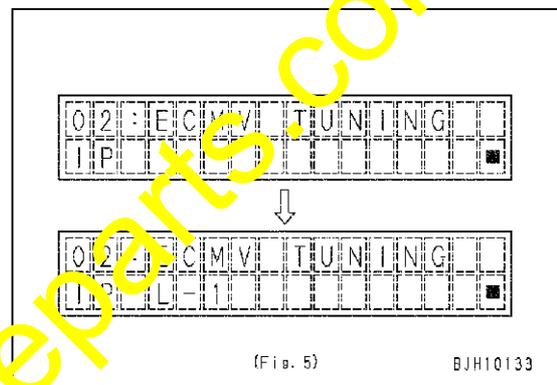
- ★ See Preparatory work and check that the ECMV oil temperature is at the specified temperature.
- ★ The adjustment operation is carried out automatically four times for the Lo, Hi, R, 1st, 2nd, 3rd and 4th valves.

- 1) Set the machine to the following conditions.
 - Parking brake switch: PARKING
 - AISS LOW switch: LOW
 - Gearshift lever: N position
 - Engine: Low idling
 - Accelerator pedal: OFF (released)
- 2) Operate the machine monitor and display the adjustment menu screen (Fig. 4).
 - Adjustment menu: 02: ECMV TUNING AUTO



(Fig. 4) BJH10132

- 3) Check the condition of the machine again, press the [◇] button, and start the adjustment operation (Fig. 5).
 - [◇] button: Runs adjustment menu
- ★ The adjustment is carried out consecutively four times for the applicable clutches and displays a screen like the one shown on the right.
- ★ For each adjustment operation, the result is displayed as normal or abnormal, so take action according to the display (Fig. 6).



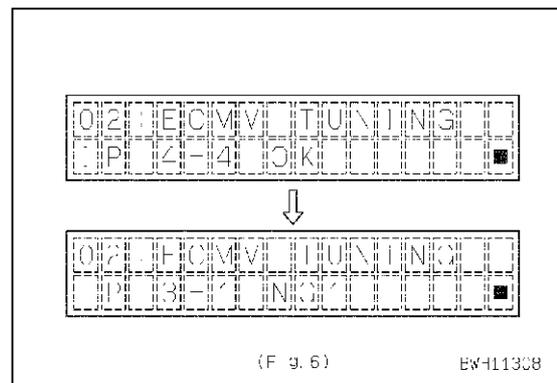
(Fig. 5) BJH10133

- If [4-4 OK] is displayed: The adjustment operation has been completed correctly.

(When the starting switch is turned OFF, the adjusted value is recorded in the controller.)

- If [NG 1] (Outside compensation condition) is displayed: Adjust the ECMV oil temperature correctly, check the set conditions of the machine again, then repeat from Step 1).
- If [NG 2] (No fill) is displayed: Carry out troubleshooting for failure codes [15S□]MA [DDT□]A, and if it is found to be normal, repeat from Step 1).
- If [NG 3] (Compensation value over) is displayed: Carry out troubleshooting for failure code [15S□]L, and if it is found to be normal, repeat from Step 1).

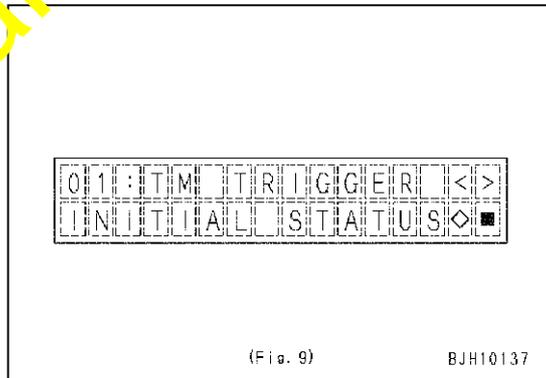
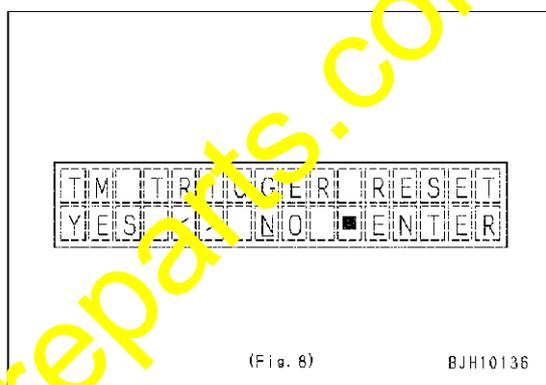
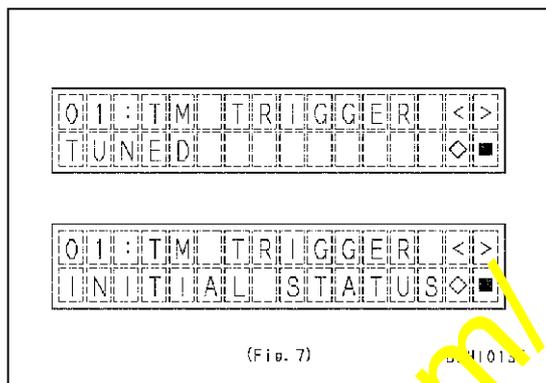
No.	Valve	1st time	2nd time	3rd time	4th time
1	Lo	IP L-1	IP L-2	IP L-3	IP L-4
2	Hi	IP H-1	IP H-2	IP H-3	IP H-4
3	R	IP R-1	IP R-2	IP R-3	IP R-4
4	1st	IP 1-1	IP 1-2	IP 1-3	IP 1-4
5	2nd	IP 2-1	IP 2-2	IP 2-3	IP 2-4
6	3rd	IP 3-1	IP 3-2	IP 3-3	IP 3-4
7	4th	IP 4-1	IP 4-2	IP 4-3	IP 4-4



(Fig. 6) EW411338

Adjustment operation (2): Resetting gearshifting feeling stabilized learning data

- 1) Operate the machine monitor and display the initial menu screen (Fig. 7).
 - Initial menu: 01: TM TRIGGER
 - ★ The present initial status is displayed on the bottom line of the screen.
 - Initializing completed: INITIAL STATUS
 - Initializing not performed: TUNED
 - ★ With the transmission adjustment, the learning data is initialized from the following operation, regardless of the present initial status.
- 2) With the menu selected, press the [◊] button and display the initial screen of the sub menu (Fig. 7).
 - [◊] button: Runs initialize menu
- 3) Operate the buttons according to the screen display (Fig. 8).
 - [←] button: Select YES
 - [→] button: Select NO
 - [■] button: Run
 - ★ After carrying out initializing, check that INITIAL STATUS is displayed on the bottom line of the screen.



TESTING AND ADJUSTING

SPECIAL FUNCTIONS OF MACHINE MONITOR

Adjustment work (3): Initial learning of stabilization of gear shifting feel

- ★ Referring to PREPARATION WORK, check that the ECMV oil is at the specified temperature.

⚠ Perform the adjustment work in a place wide sufficiently for travel, taking care of the safety around the machine.

- ★ When performing the adjustment work by driving the vehicle actually, perform it on finished flat ground, as long as possible.

1) Display R CLUTCH FILL STATE with the machine monitoring function (Fig. 10).

- No. 38 of **TRANSMISSION**
FILL R: Fill state of R clutch

2) Run the engine at low idling and hold the gearshift lever in the N position for 10 seconds, and then operate the gearshift lever in the following order.

- ★ Operation of gearshift lever: N → R → N

3) Check the fill state with the monitoring display.

- ★ If "0" is displayed, go the next step.

- ★ If "1" is displayed, repeat step 2) until "0" is displayed.

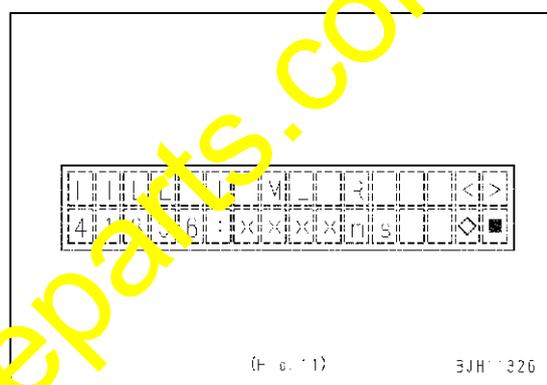
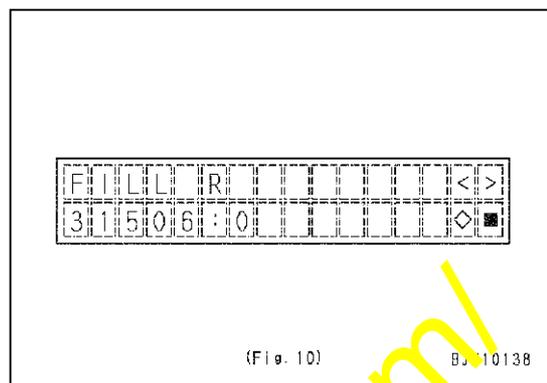
- ★ After step 2) is repeated 3 times, if "0" is still not displayed, display R CLUTCH FILL TIME with the machine monitoring function.

(1) If the fill time is 250 msec or shorter, go to 4).

(2) If the fill time is 900 msec or longer, return to 1) and repeat step 2) until the fill state of the R clutch becomes "0".

- No. 31 of **TRANSMISSION**
• **FILL TIME R:** Fill time of R clutch (Fig. 11)

- ★ If the above condition is still not satisfied after the steps are repeated 5 times, the ECMV may be defective. In this case, replace the ECMV.



TESTING AND ADJUSTING

SPECIAL FUNCTIONS OF MACHINE MONITOR

- 7) Set the gearshift lever in the 3 position. Run the engine at full throttle and shift up the gear to **F3**.
- 8) Stop the machine and display HI CLUTCH FILL STATE with the machine monitoring function and check the fill state (Fig. 16).

- No. 36 of **TRANSMISSION**

FILL H: Fill state of Hi clutch

- ★ If "0" is displayed, correction is completed.
- ★ If "1" is displayed, repeat steps 7) and 8) until "0" is displayed.
- ★ After steps 7) and 8) are repeated 3 times, if "0" is still not displayed as the fill state of the Hi clutch, display HI CLUTCH FILL TIME with the machine monitoring function.

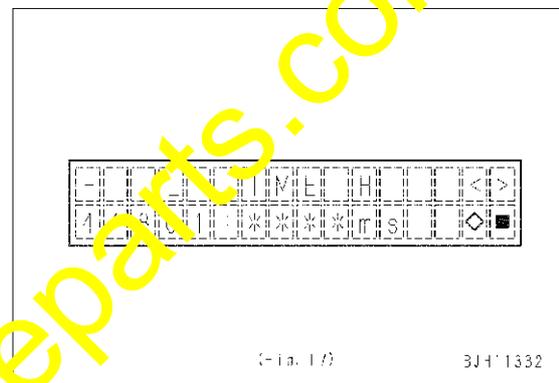
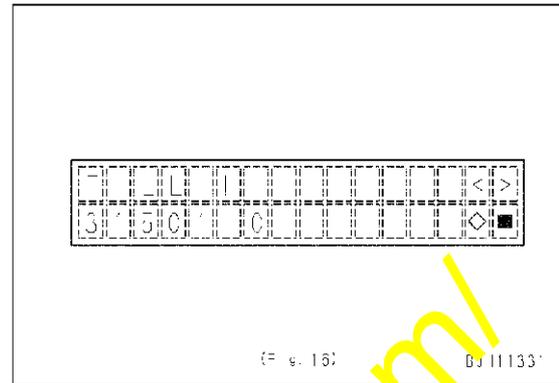
(1) If the fill time is 200 msec or shorter, go to 9).

(2) If the fill time is 550 msec or longer, return to 7) and repeat steps 7) and 8) until the fill state of the Hi clutch becomes "0".

- No. 29 of **TRANSMISSION**

FILL TIME H: Fill time of Hi clutch (Fig. 17)

- ★ If the above condition is still not satisfied after the steps are repeated 5 times, the ECMV may be defective. In this case, replace the ECMV.



TESTING AND ADJUSTING

SPECIAL FUNCTIONS OF MACHINE MONITOR

- 9) Display LO CLUTCH FILL STATE with the machine monitoring function and check the fill state (Fig. 18).
- No. 37 of **TRANSMISSION**
FILL L: Fill state of Lo clutch
- 10) Set the gearshift lever in the 4 position. Run the engine at full throttle and shift up the gear to **F3**.
- ★ Take care not to shift up the gear to **F4**. If the gear has been shifted to **F4**, repeat the step from starting.
- 11) Drive the machine in **F3** for 5 seconds, and then shift up the gear to **F4** with the engine at full throttle.
- 12) While the machine is traveling in **F4**, press control switch [◇] to keep displaying the machine monitoring function.
- 13) Stop the machine and display LO CLUTCH FILL STATE and 3RD CLUTCH FILL STATE with the machine monitoring function and check the fill states (Fig. 19).
- ★ Judge the fill state of the Lo clutch by the value displayed and held during travel at **F4**. Once holding is reset, the value is updated.
 - No. 41 of **TRANSMISSION**
FILL 3: Fill state of 3rd clutch
 - ★ If "0" is displayed, correction is completed.
 - ★ If "1" is displayed, repeat steps 9) – 13) until "0" is displayed for both clutches.
 - ★ After steps 9) – 13) are repeated 6 times, if "0" is still not displayed, the ECMV may be defective. In this case, replace the ECMV.
 - ★ The display keeping function of the machine monitoring function is reset automatically when any switch is operated.
 - ★ If the starting switch is turned OFF or control switch [■] is pressed 3 times, the machine monitoring function screen disappears and the ordinary screen appears.

