

INSTALLATION MANUAL

REF NO. BA00010

DATE July 18, 2000

(C)

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SUBJECT: IMPROVEMENT OF FUEL EFFICIENCY

PURPOSE: To introduce how to improve fuel efficiency by decreasing running power

APPLICATION: HD785-3 Dump Trucks, S/N 2001 thru 2281, 2284 thru 2298
330M Dump Trucks, S/N Cf24366 and up

FAILURE CODE: A00099

DESCRIPTION:

Improvement will be made by:

- 1) Change of depth of transmission oil pan.
- 2) Change of engine revolutions when transmission is shifted.

The effect of improved fuel efficiency may depend on specific operating conditions. However, the fuel consumption per workload, may be improved by as much as 5% in some cases.

Referring to item 2) the maximum speed of a dump truck decreases by 5% in relation to the change of engine speed. Therefore, it is important to pay attention to actual jobsite applications where high speed running is required. The application of item 2) is limited optionally to engines with mechanical governor (for overseas).

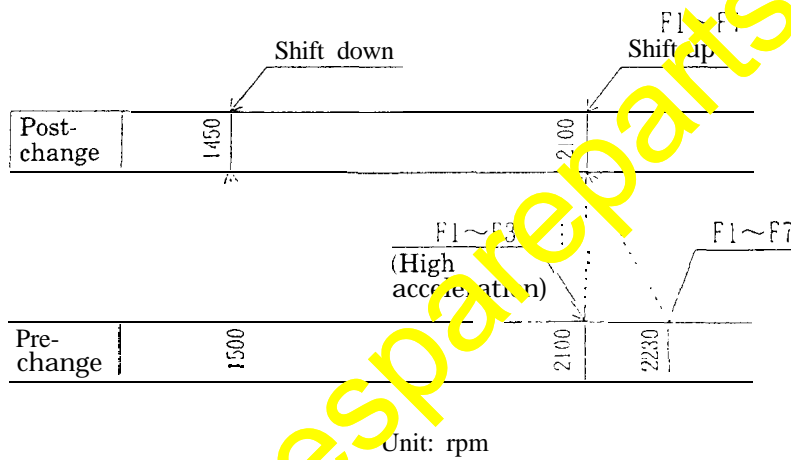
2. Outline of improvement

① Change of depth of transmission oil pan

The oil level of the transmission oil pan is lowered to decrease agitating resistance. Along with this change, transmission piping and transmission underguard must also be changed.

② Change of engine revolutions when transmission is shifted

The loss caused by revolution and engine fuel consumption have been improved in the area of revolutions when shifting up. With this change, the change of transmission shift controller, the additional installation of adapter harness and the adjustment of engine speed are required.



3. Newly-supplied parts list

①-1 Modification of T/M oil pan (For replacing parts)

No.	Part No.	Part Name	Q'ty	Remarks
1	561-15-51553 (561-15-51552)	Tank	1	T/M oil pan
2	561-15-51430	Gasket	1	Consumable
3	561-16-6A110 (561-16-61111)	Tube	1	
4	561-16-6A120 (561-16-61121)	Tube	1	
5	07000-22075	O-ring	2	Consumable
6	561-16-6A510 (561-16-61511)	Tube	1	
7	561-16-6A520 (561-16-61522)	Tube	1	
8	07000-22060	O-ring	1	Consumable
9	561-16-61542 (561-16-61541)	Bracket	1	
10	561-54-6F210 (561-54-66211)	Guard	1	

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①-2 Modification of T/M oil pan (For reworking)

No.	Part No.	Part Name	Q'ty	Remarks
1	585-99-2 1100	Spacer	1	Spacer for oil pan
2	561-15-51430	Gasket	2	Consumable
3	01010-51080 (01010-51030)	Bolt	26	
4	585-99-2 1120	Tube	1	
5	07000-22075	O-ring	1	Consumable
6	561-16-61590	Tube	1	Local fabrication allowed (See 11/15)
7	561-16-61542 (561-16-61541)	Bracket	1	
8	56 1-46-62590	Plate	2	Local fabrication allowed (See 12/15)
9	561-54-66290	Spacer	2	Local fabrication allowed (See 13/15)
10	01011-52045	Bolt	1	

② Parts related to T/M gear shift controller

No.	Part No.	Part Name	Q'ty	Remarks
1	7818-56-1003 (7818-56-1002)	Control box A	1	
2	561-44-65190	Wiring harness	1	
3	08034-20510	Band	1	

4. Repair procedure

4-1 Change of depth of T/M oil pan

The following two methods are applicable to this repair. Each procedure is explained as follows.

4-1-1 Repair by replacing parts

★ Provide parts as shown in ①-1 of Newly-supplied parts list for this modification.

- (1) Wash machine to remove dirt and coarse particles deposited on body. Especially, clean T/M, engine and its vicinity.
- (2) Drain oil from T/M oil pan drain plug.
- (3) Remove T/M under-guard (561-16-66211).

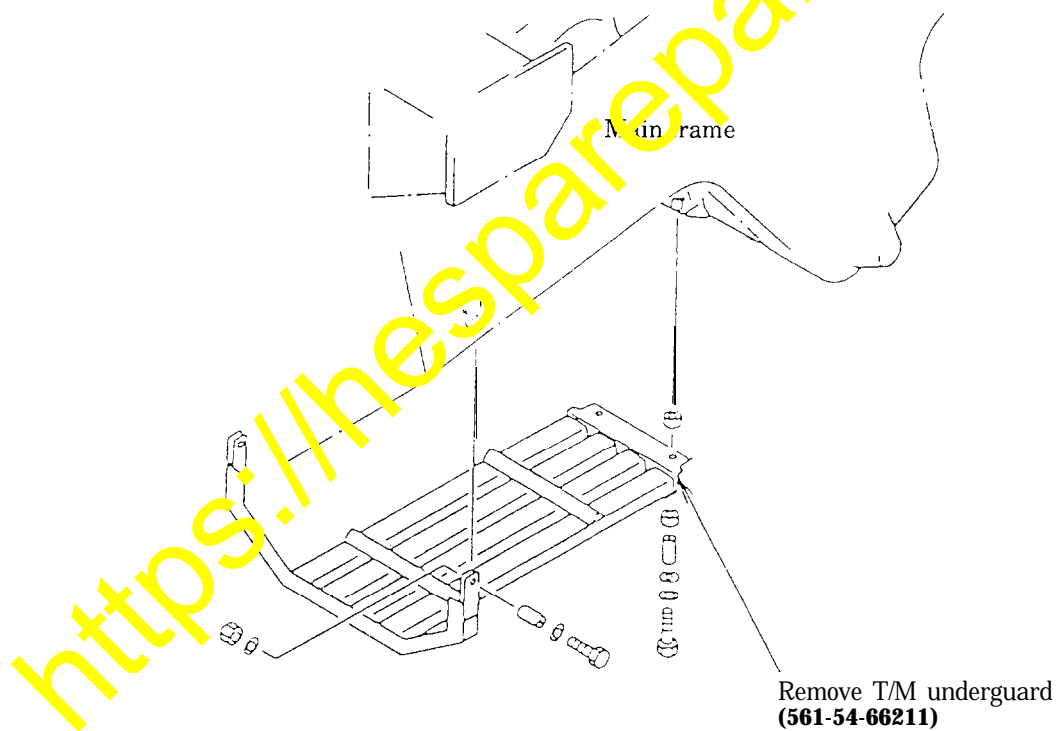
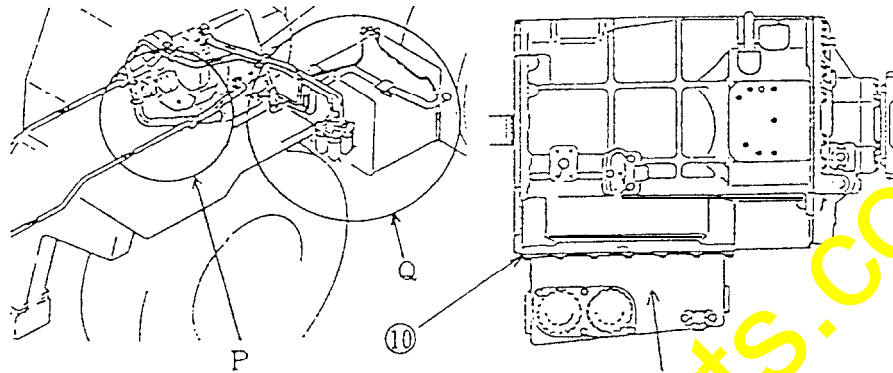


Fig. 1

- (4) Then, remove parts (①, ②, ③) of T/M oil pan intake line and oil filler port-related parts (⑤, ⑦, ⑫).
- ★ When removing filler port tube, remove clamps of brackets ④, ⑦ to remove oil filler port tube.



★ See Fig. 2 for changing related parts.

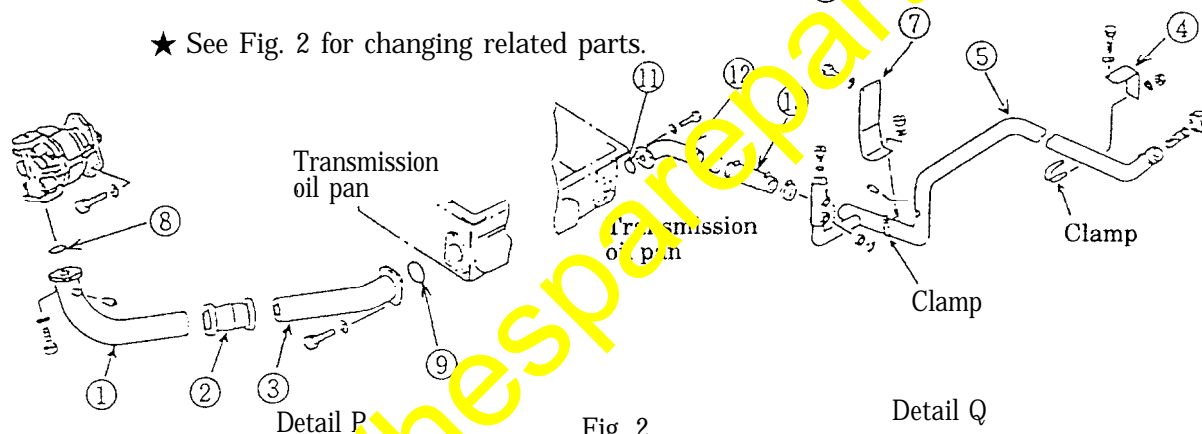


Fig. 2

		P/N after improvement
①	561-16-61121 Tube	→ 561-16-6A120
②	07332-02400 Coupling	→ 07332-02400 (Use installed part)
③	561-16-61111 Tube	→ 561-16-6A110
④	561-16-61551 Bracket	→ 561-16-61551 (Use installed part)
⑤	561-16-61522 Tube	→ 561-16-6A520
⑥	561-15-51552 Oil pan	→ 561-15-51553
⑦	561-16-61541 Bracket	→ 561-16-61542
⑧	07000-22075 O-ring	→ 07000-22075 (Consumable)
⑨	07000-22075 O-ring	→ 07000-22075 (Consumable)
⑩	561-15-51430 Gasket	→ 561-15-51430 (Consumable)
⑪	07000-22060 O-ring	→ 07000-22060 (Consumable)
⑫	561-16-61511 Tube	→ 561-16-6A510
⑬	07260-25822 Hose	→ 07260-25822 (Use installed part)

- (5) Remove oil pan ⑥ from case.
 - ★ Remove attached gasket on oil pan mounting face of T/M case before cleaning.
- (6) Install improved oil pan ⑥, gasket ⑩ to T/M case.
 - ★ Apply LG-1 on both sides of gasket.
 - ★ Bolt tightening torque shall be 34 – 74 Nm (3.5 – 7.5 kgm).
- (7) Install intake line tube.
 - a. Install tube ③ with O-ring ⑨ to oil pan ⑥.
 - ★ Tightening torque of mounting bolt 07372-21240 shall be 54 – 122 Nm (5.5 – 12.5 kgm).
 - b. Install coupling ② to tube ③.
 - c. Install tube ① to coupling ② and then to T/M pump together with O-ring ⑧.
 - ★ Tightening torque of mounting bolt 07372-21240 shall be 54 – 122 Nm (5.5 – 12.5 kgm).
- (8) Install oil filler port tube.
 - a. Install tube ⑫ with O-ring ⑪ to oil pan ⑥.
 - b. Install hose ⑬ to tube ⑫.
 - c. Replace tube clamping bracket ⑦ with new one (561-16-61542).
 - d. Install oil filler port tube ⑤ to hose ⑬ and secure to brackets ⑦, ④.
- (9) Replace T/M underguard (561-54-6211) with new T/M underguard (561-54-6F210).
 - ★ After installing T/M underguard to front of body, secure rear mounting bolts.
 - ★ Bolt tightening torque shall be 491 – 607 Nm (50 – 62 kgm).
- (10) Inspect T/M oil level according to the following procedure.

Oil level checking procedure

Check oil level through lower level gauge G2 at low engine idling (Transmission gear at neutral). Check the oil level after warm-up running since the oil level fluctuates with oil temperature. (Standard checking temperature is approx. 50°C.)

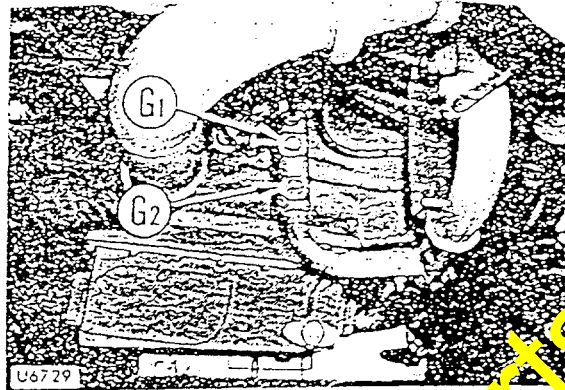


Fig. 3

Table 1 Oil level checking method

Gauge	Checking method	Criteria
G1	<ul style="list-style-type: none"> Use as standard when changing oil before starting engine. Perform checking at more than 8 hours after stopping engine. 	<p>Oil level must be visible within this range</p> <p>Oil level must be within G1.</p>
G2	<ul style="list-style-type: none"> Check for oil level with low idling (Transmission gear at neutral) after warm-up running. Oil temperature at checking shall be approx. 50°C as standard and ensure that oil level is within gauge G2. ★ When oil temperature is high during or immediately after operation, oil level may exceed gauge at low idling. 	<p>Oil level must be visible within this range</p> <p>Oil level must be within G2.</p>

★ Check oil level and refill engine oil, if insufficient (See Operation and Maintenance Manual for oil to be used.)

Drain oil to appropriate oil level if it is higher (Drain oil gradually to avoid over-draining).

- ★ The oil temperature reaches approx. 50°C when the indicator of oil temperature gauge of torque converter on dashboard panel is within green range.

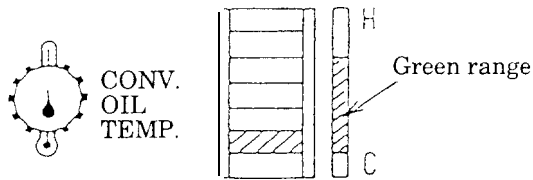


Fig. 4

For a truck equipped with electronic display panel, the oil temperature is approx. 50°C when the indicator is in the 2nd segment from the bottom (Green range).

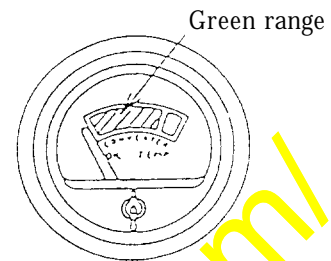


Fig. 5

For a truck equipped with cluster gauge, the oil temperature is approx. 50°C when the indicator is within green range.

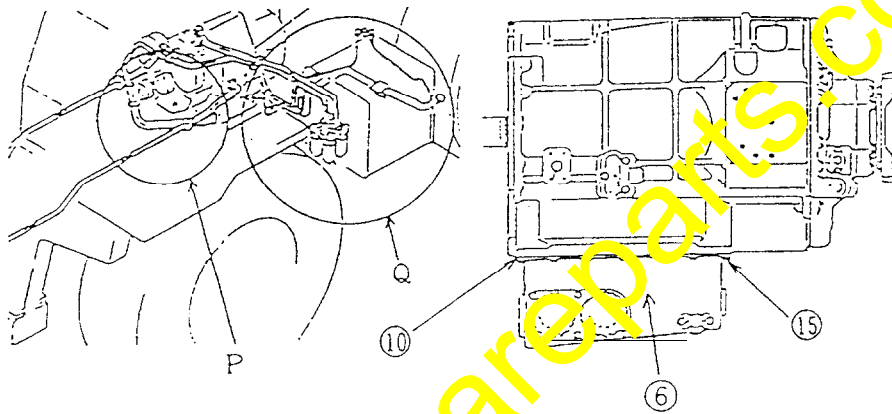
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4-1-2 Repair by reworking parts

★ Provide parts as shown in ①-2 of Newly-supplied parts list for this modification.

- (1) Wash machine to remove dirt and coarse particles deposited on body. Especially, clean T/M, engine and its vicinity.
- (2) Drain oil from T/M oil pan drain plug.
- (3) Remove T/M under-guard. (See Fig. 1)
- (4) Then, remove parts (①, ②, ③) of T/M oil pan intake line and oil filler port-related parts (⑤, ⑦, ⑫).

★ When removing oil filler port tube, remove clamps of brackets ④, ⑦ to remove oil filler port tube.



★ See Fig. 6 for changing related parts.

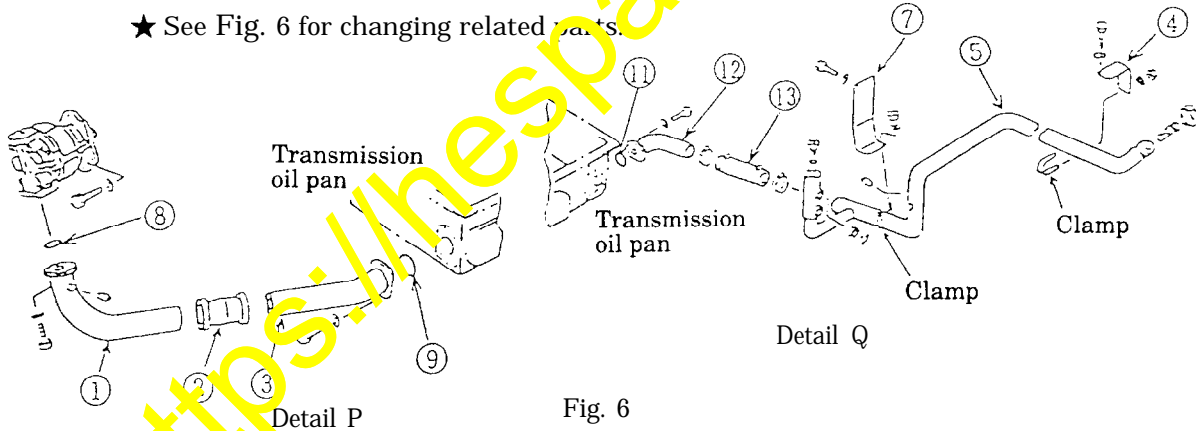


Fig. 6

	P/N after improvement		P/N after improvement
① 561-16-61121 Tube	→ 585-99-21120 (Newly supplied part)	⑨ 07000-22075 O-ring	→ 07000-22075 (Consumable)
② 07332-02400 Coupling	→ (Use installed part)	⑩ 561-15-51430 Gasket	→ 561-15-51430 (Consumable & Newly supplied part)
③ 561-16-61111 Tube	→ (Use installed part)	⑪ 07000-22060 O-ring	→ 07000-22060 (Consumable)
④ 561-16-61551 Bracket	→ (Use installed part)	⑫ 561-16-61511 Tube	→ (Use installed part)
⑤ 561-16-61522 Tube	→ Rework 561-16-61522	⑬ 07260-25822 Hose	→ (Use installed part)
⑥ 561-15-51552 Oil pan	→ (Use installed part)	⑭	Spacer → 585-99-21110 (Newly supplied part)
⑦ 561-16-61541 Bracket	→ 561-16-61542 (Newly supplied part)	⑮ 01010-51030 Bolt	→ 01010-51080 (Newly supplied part)
⑧ 07000-22075 O-ring	→ 07000-22075 (Consumable)		

- (5) Remove oil pan ⑥ from case.
 ★ Remove attached gasket on oil pan mounting face of T/M case before cleaning.
 Clean oil pan inside to remove dust, particulates.
- (6) Install T/M oil pan ⑥, spacer ⑭, gasket ⑩ to T/M case. (See Fig. 7)
 ★ Apply LG-1 to both sides of gasket.
 ★ Bolt tightening torque shall be 34 – 74 Nm (3.5 – 7.5 kgm).

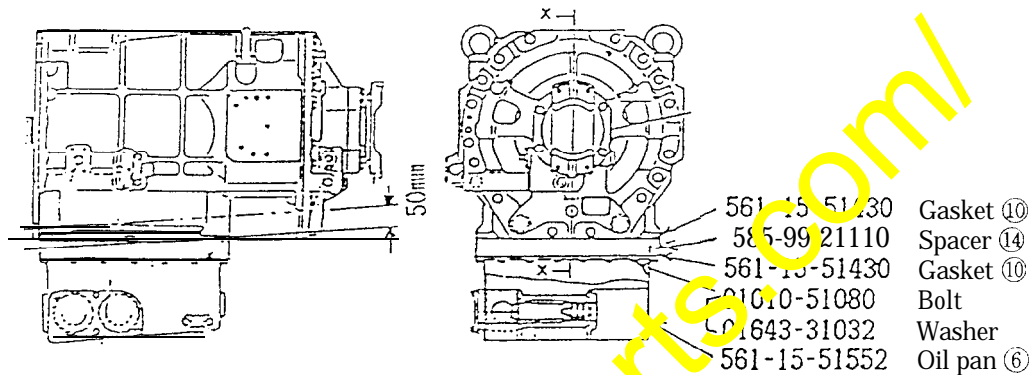


Fig. 7

- (7) Install intake line tube. (See Fig. 6)
 a. Install tube ③ with O-ring ⑨ to oil pan ⑥.
 ★ Tightening torque of mounting bolt 07372-21240 shall be 54 – 122 Nm (5.5 – 12.5 kgm).
 b. Install coupling ② to tube ③.
 c. Install tube ① to coupling ② and then to T/M pump together with O-ring ⑧.
 ★ Tightening torque of mounting bolt 07372-21240 shall be 54 – 122 Nm (5.5 – 12.5 kgm).
- (8) Install oil filler port tube. (See Fig. 6)
 a. Rework oil filler port tube ⑤. (See Fig. 8)

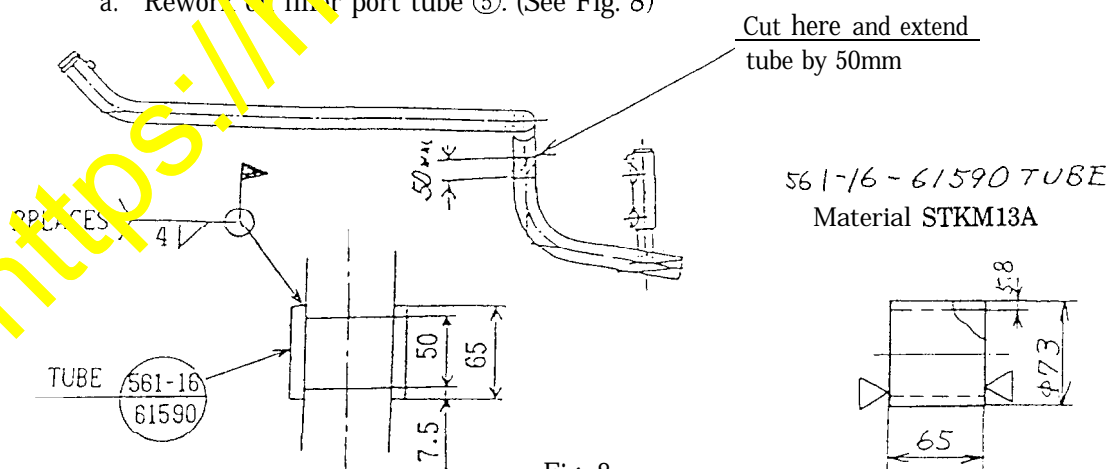


Fig. 8

- ★ After reworking tube, clean inside to remove scale and dust.
- b. Replace mounting bracket ⑦ of oil filler port tube with new bracket (561-16-61542).
 c. Install reworked tube ⑤ to hose ⑬ and secure to brackets ⑦, ④.

(9) Rework T/M underguard mounting plate installed on main frame.

- a. Gas-cut T/M underguard mounting plates of T/M mounting brackets (561-46-62511, 561-46-62521) at the illustrated position below.

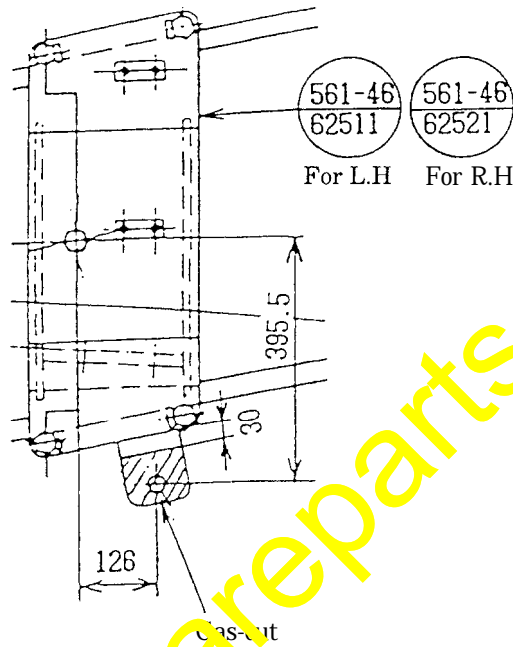


Fig. 9

- b. Weld plate ⑮ (561-46-62590) to gas-cut position.

561-46-62590 PLATE

Material S340P
Plate t16

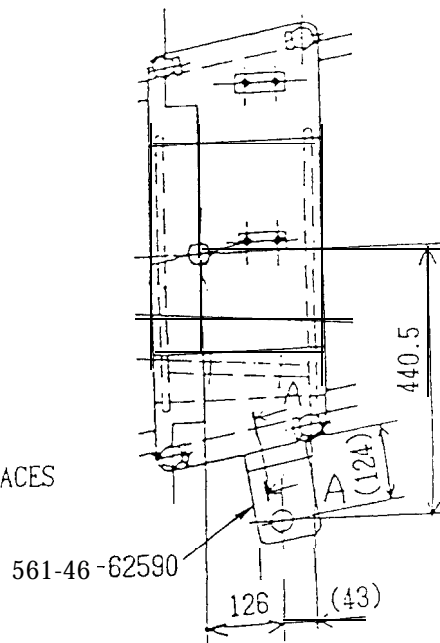
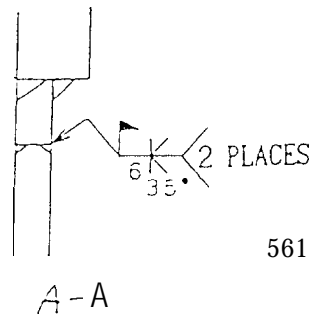
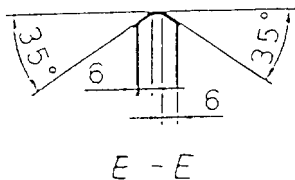
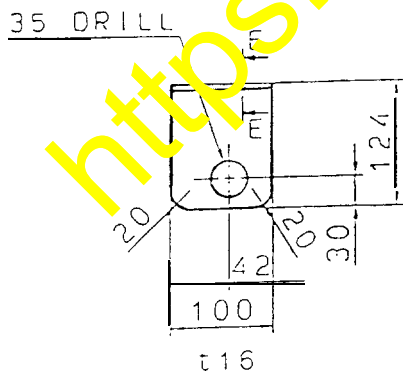


Fig. 10

(10) Install T/M underguard

- a. After installing T/M underguard to front of body, additionally install spacer ⑩ (561-54-66290) to the rear and secure rear bolts.

★ Bolt tightening torque shall be 491 – 607 Nm {50 – 62 kgm}.

561-54-66290 SPACER

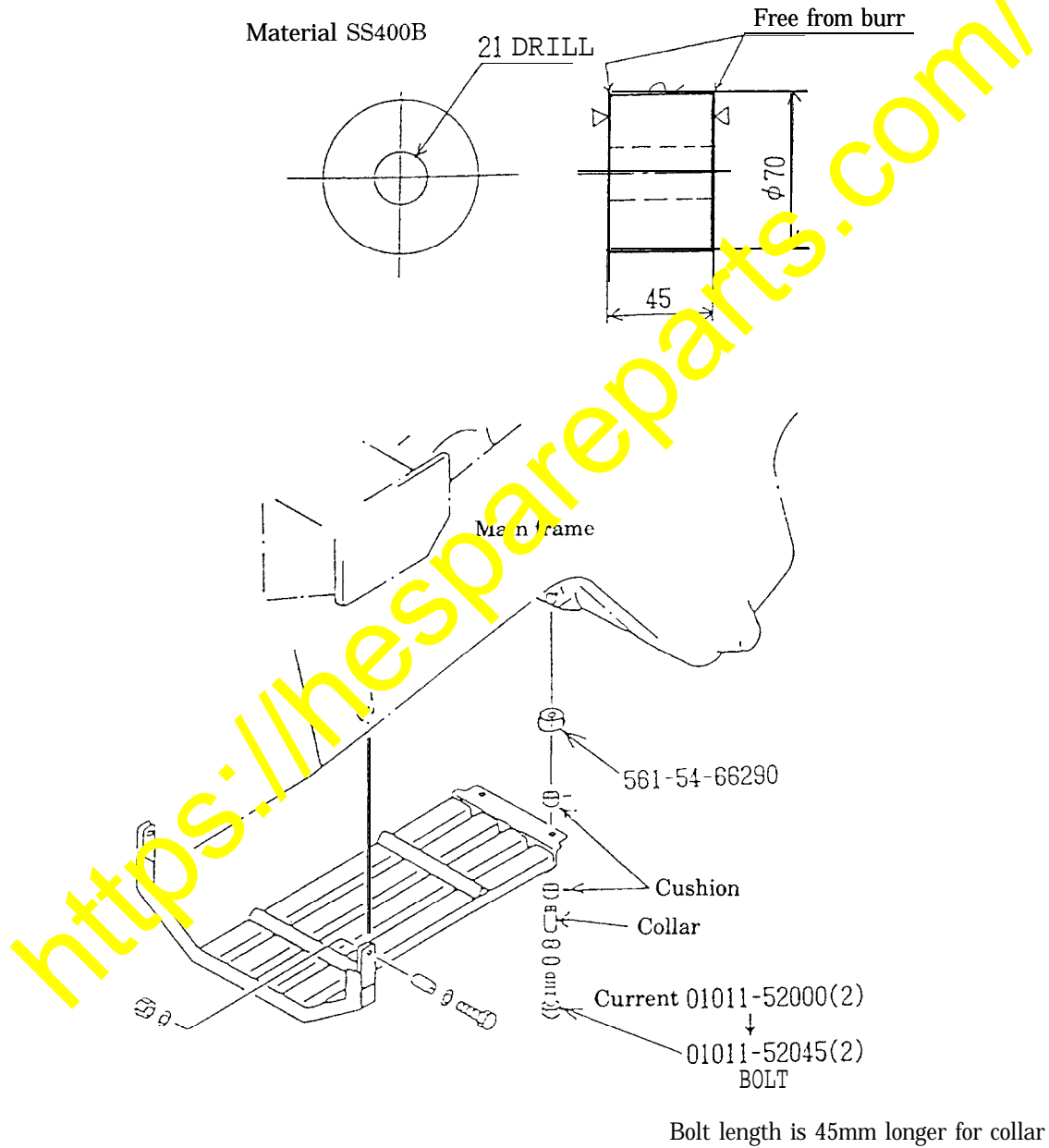


Fig. 11

(11) Inspect T/M oil level. (See p.8/15, 9/15)

4-2 Change of engine revolutions when transmission is shifted

4-2-1 Adjustment of engine high idling (For mechanical governor spec.)

- (1) Set engine tachometer to perform warm-up running.
- (2) Cut wire fore high idle stopper ③ of fuel injection pump and loosen nut ①.
- (3) Insert screwdriver into screw tip ② and tighten it to decrease E/G high idling speed.
 - ★ Approx. 1/8 turn (45°) required
 - ★ Target adjustment is as follows:

	Current	After adjustment
High idling	2450 ± 50 rpm	2300 ± 25rpm

- (4) When rpm reaches within spec. limitation, lock nut ① and seal with wire ③.

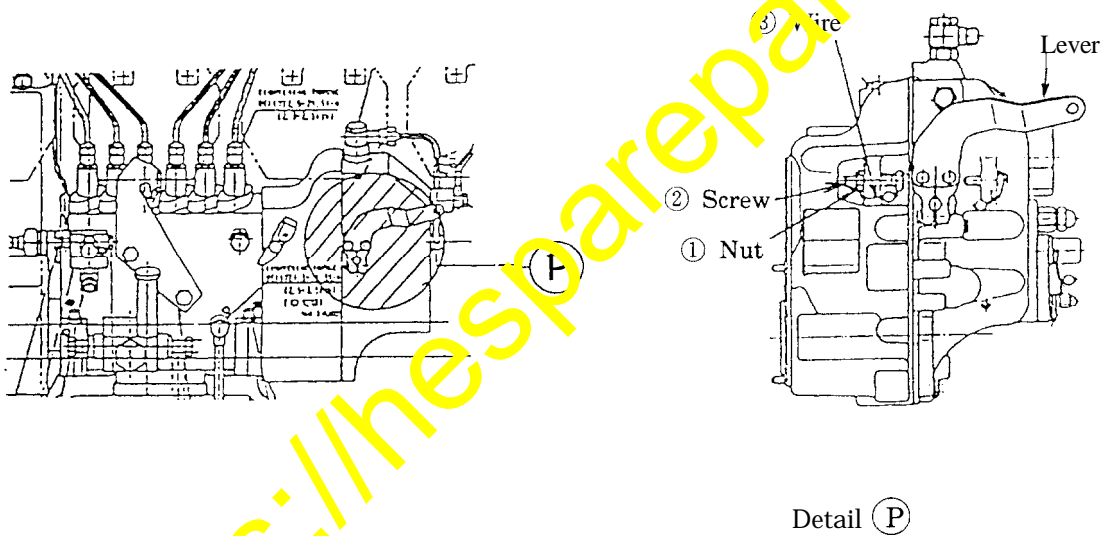


Fig. 12

4-2-2 Change of T/M controller

- (1) Replace T/M shift controller with controller to match improvement of fuel efficiency.
 ★ Controller P/N is as follows:

Current Improved item
 7818-56-1002 → 7818-56-1003

- (2) Additionally install adapter harness (561-44-65190) between connector SC1 of T/M shift controller and connector SC1 of wire harness inside cab.

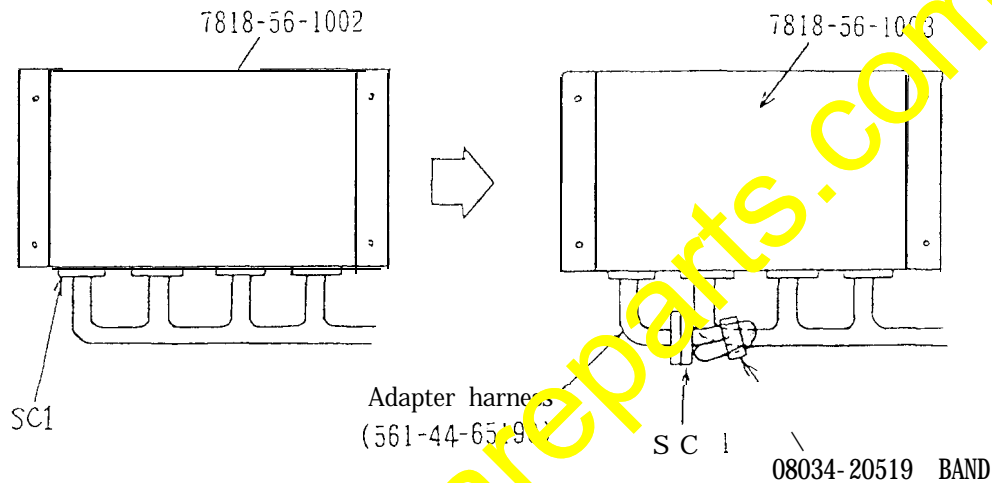
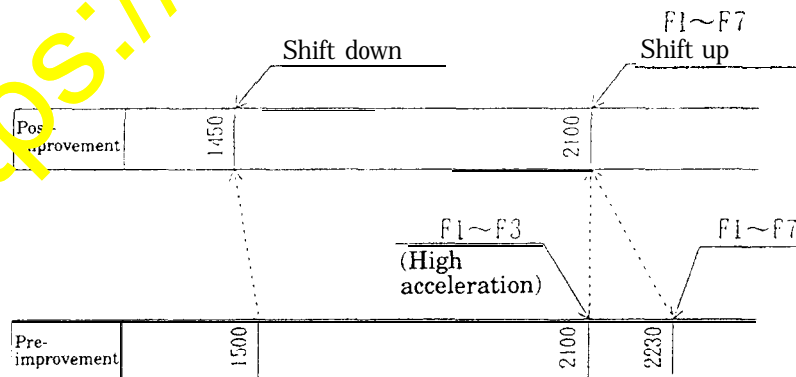


Fig. 13

- ★ After installing adapter harness, secure excess T/M controller harness with band (08034-20519) as shown in Fig. 13.

- (3) After the above modification, perform running test to verify that T/M shift schedule is changed as follows.



Unit: rpm

Fig. 14