

**PARTS & SERVICE
NEWS**

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SUBJECT: UNIFICATION OF PARTS ON SA12V140 ENGINE**PURPOSE:** To introduce the design change of the parts of SA12V140 engine**APPLICATION:** SA12V140-1 Engines**DESCRIPTION:**

1. Introduction

Some parts of SA12V140 engines, which have been different from one application to another, were changed so that they can be used commonly and the serviceability of the engines will be improved.

Some parts of these engines were also changed for higher reliability, and they were introduced in SERVICE NEWS A950035.

List of machines mounted with improved engines in factory

Item	D475A-2	WA800-2	HD785-3 (With electronic governor)	HD785-3 (With mechanical governor)
1. Common gear train	11034 and up	11042 and up	11024 and up	11045 and up
2. Other improvements				
(1) Change of oil connector cover	11066 and up	11044 and up	11024 and up	11061 and up
(2) Common oil filter tube	11066 and up	11044 and up	11024 and up	11061 and up
(3) Change of oil pan	Shown separately	—	—	—
(4) Cast heater connector	11049 and up	11044 and up	11024 and up	11045 and up
(5) Change of engine water outlet connector	11066 and up	11044 and up	—	—
(6) Common oil filter	11066 and up	—	—	—
(7) Change of oil filler	11049 and up	11044 and up	Shown separately	Shown separately
(8) Change of fuel piping (filter)	11066 and up	11060 and up	—	—
(9) Change of fuel piping (pump)	11066 and up	11060 and up	11024 and up	—
(10) Common coupling cover	11049 and up	11044 and up	11024 and up	11045 and up
(11) Change of muffler water drain tube	11066 and up	11060 and up	—	—
(12) Change of heater relay mounting plate	—	Shown separately	Shown separately	Shown separately
(13) Change of returning point of by-pass filter oil	—	—	11024 and up	11024 and up

This SERVICE NEWS shall be applied to the shipped machine other than the above.

2. Contents of main improvements

- 1) Common gear train for electronically controlled injection pump (electronic governor) for KOMATSU KP21 and standard injection pump (mechanical governor)

When replacing the standard injection pump and mechanical governor manufactured by ZEXEL on HD785-3 with the injection pump KP21 and electronic governor manufactured by KOMATSU, the gear train must be replaced with the common one. Some parts other than the gear train also need to be replaced. For details, see SERVICE NEWS A950024.

When the injection pumps on the engines which are modified before shipped are changed, their gear trains do not need to be changed.

(KP21 is not set for D475A-2 and WA800-2.)

- 2) Other changes

Common outer parts are used for higher serviceability.

The current and common parts have the same functions. Since almost all the common parts are not interchangeable with the current ones, replace them as a set.

3. List of related parts

3.1 Common gear train

No.	Part No.	Part Name	Qty	Remarks
1	6215-21-3132 (6215-21-3111)	Cover, front (Cover, front)	1 (1)	Current parts may be reworked (See Fig. 2)
		[Standard specification (All SA12V140 engine, except ones with electronic governors on HD785-3)]		
3	6215-31-6160 (6215-31-6310)	Gear idler (Gear, idler)	1 (1)	See Fig. 2
4	6215-31-6100 (6215-31-6200)	Gear ass'y (Gear ass'y)	2 (2)	
5	☆ ☆	• Gear (• Gear)	— —	
6	☆ (6210-31-6131)	• Bushing (• Bushing)	— —	
7	6215-31-6120 (6215-31-6350)	Gear (Gear)	1 (1)	
8	01010-31040 (01010-30840)	Bolt (Bolt)	12 (12)	
9	6215-31-6130	Bearing	4	
10	6215-31-6470 (6215-31-6460)	Plate (Plate)	2 (2)	
11	6215-31-6430 (6215-31-6410)	Shaft (Shaft)	2 (2)	
12	01011-31210 (01011-31200)	Bolt (Bolt)	4 (4)	

No.	Part No.	Part Name	Q'ty	Remarks
13	6215-31-1140 (6215-31-1120)	Gear, crankshaft (Gear, crankshaft)	1 (1)	} New one can substitute for current one by reworking gear case, but current one cannot.
14	6215-71-3240 (6210-71-3220)	Gear, injection drive (Gear, injection drive)	2 (2)	
[HD785-3 with electronic governor]				
17	6215-31-6160 (6215-31-6320)	Gear, idler (Gear, idler)	1 (1)	See Fig. 5
18	6215-31-6100 (6215-31-6300)	Gear ass'y (Gear ass'y)	2 (2)	
19	☆ (☆)	• Gear (• Gear)	— —	
20	☆ (6210-31-6131)	• Bushing (• Bushing)	— —	
21	6215-31-6120 (6215-31-6360)	Gear (Gear)	1 (1)	
22	01010-31040 (01010-30840)	Bolt (Bolt)	12 (12)	
23	6215-31-6130	Bearing	4	
24	6215-31-6500 (6215-31-6400)	Gear ass'y (Gear ass'y)	1 (1)	
25	☆ (☆)	• Gear (• Gear)	— —	
26	6150-31-6150 (6150-31-6150)	• Bushing (• Bushing)	1 (1)	
27	6215-31-6420 (6215-31-6440)	Shaft (Shaft)	1 (1)	
28	6215-31-6460 (6215-31-6470)	Plate (Plate)	1 (1)	
29	01010-31280 (01010-31285)	Bolt (Bolt)	2 (2)	
30	6215-31-1140 (6215-31-1130)	Gear, crankshaft (Gear, crankshat)	1 (1)	See Fig. 6
31	6215-71-3240 (6215-71-3230)	Gear, injection drive (Gear, injection drive)	2 (2)	
32	6215-41-1130 (6215-41-1150)	Gear, camshaft (Gear, camshaft)	1 (1)	See Fig. 8
33	6210-41-1120 (6215-41-1140)	Gear (Gear)	1 (1)	
34	6215-81-4172 (6215-81-4120)	Shaft (Shaft)	1 (1)	See Fig. 9

No.	Part No.	Part Name	Q'ty	Remarks
35	6215-61-1500 (6215-61-1403)	Water pump ass'y (Water pump ass'y)	1 (1)	See Fig. 10
36	6215-61-1160 (6215-61-1170)	• Gear (• Gear)	1 (1)	
37		• Other component parts are the same		
38	6215-21-3400 (6215-21-3500)	Drive ass'y (Drive ass'y)	1 (1)	See Fig. 11
39	6215-21-3480 (6215-21-3470)	• Seal (• Seal)	1 (1)	Same as No.2 on next page
40	6215-21-3441 (6215-21-3460)	• Gear (• Gear)	1 (1)	
41		• Other component parts are the same		
42	6553-00-1111 (6553-00-1110)	Inj. pump ass'y (Inj. pump ass'y)	1 (1)	See Fig. 12, KPL1
43	6553-91-3140 (6553-91-3150)	• Fly wheel (• Fly wheel)	1 (1)	
44		• Other component parts are the same		
45	6553-00-1211 (6553-00-1210)	Inj. pump ass'y (Inj. pump ass'y)	1 (1)	
46	6553-91-3140 (6553-91-3150)	• Fly wheel (• Fly wheel)	1 (1)	
47		• Other component parts are the same		

3.2 Other changes

No.	Part No.	Part Name	Q'ty	Remarks
22	6215-51-5481 (6215-51-5480)	Cover (Cover)	1 (1)	New and current ones are interchangeable as set with each other.
23	6215-51-5490 (07000-33048)	Gasket (Gasket)	1 (1)	
24	6215-21-5112 (6215-21-5111)	Pan, oil (Pan, oil)	1 (1)	For D475A-2
25	6215-81-8111 (8215-81-8110)	Plate (Plate)	2 (2)	Two for WA800 and one for HD785
26	6215-21-1961 (6215-21-1960)	Connector (Connector)	1 (1)	For D475A-2
27	6215-61-6670 (6215-21-1980)	Cover (Cover)	1 (1)	New and current ones are interchangeable as set with each other.
28	6212-61-6661 (6110-91-1341)	Gasket (Gasket)	2 (2)	

No.	Part No.	Part Name	Q'ty	Remarks
29	01010-51025 (01010-31025)	Bolt (Bolt)	4 (4)	New and current ones are interchangeable as set with each other.
30	6215-61-8910	Cover	1	
31	6215-21-1961 (6215-21-1960)	Connector (Connector)	1 (1)	For WA800-2
32	6215-61-6670 (6215-21-1980)	Cover (Cover)	2 (2)	New and current ones are interchangeable as set with each other.
33	6212-61-6661 (6110-91-1341)	Gasket (Gasket)	2 (2)	
34	01010-51025 (01010-31025)	Bolt (Bolt)	4 (4)	New and current ones are interchangeable as set with each other.
35	6215-21-1961 (6215-21-1960)	Connector (Connector)	1 (1)	
36	6215-61-6670 (07042-30415)	Cover (Cover)	1 (1)	New and current ones are interchangeable as set with each other.
37	6212-61-6661	Gasket	1	
38	01010-51025	Bolt	4	New and current ones are interchangeable as set with each other.
39	6215-51-5771 (6215-51-5770)	Tube (Tube)	1 (1)	
40	6215-51-5781 (6215-51-5780)	Tube (Tube)	1 (1)	New and current ones are interchangeable as set with each other.
41	6215-51-5771 (6215-51-5370)	Tube (Tube)	1 (1)	
42	6215-51-5781 (6215-51-5370)	Tube (Tube)	1 (1)	New and current ones are interchangeable as set with each other.
43	6215-51-6401 (6215-51-6800)	Oil filter ass'y (Oil filter ass'y)	1 (1)	
44	— 6215-51-5840	•Spacer (•Spacer)	1 (1)	New and current ones are interchangeable as set with each other.
45	— (6215-51-5760)	•Spacer (•Spacer)	1 (1)	
46	01010-51045 (01010-51055)	•Bolt (•Bolt)	4 (4)	New and current ones are interchangeable as set with each other.
47	01010-51030 (01010-51050)	•Bolt (•Bolt)	4 (4)	
48	6215-21-7152 (6215-21-7151)	Tube (Tube)	1 (1)	
49	6215-21-7270 (6215-21-7170)	Plate (Plate)	1 (1)	
50	01011-51060 (01011-51090)	Bolt (Bolt)	1 (1)	

No.	Part No.	Part Name	Q'ty	Remarks	
51	01010-51016 (01010-51020)	Bolt (Bolt)	1 (1)		
52	01010-51020 (01010-31025)	Bolt (Bolt)	2 (2)		
53	— (6215-21-5560)	Bracket (Bracket)	— (1)		
54	— (6643-21-6550)	Spacer (Spacer)	— (1)		New and current ones are interchangeable as set with each other.
55	— (01640-21016)	Wahser (Washer)	— (2)		
56	— (01580-11008)	Nut (Nut)	— (1)		
57	6215-21-7163 (6215-21-7162)	Bracket (Bracket)	1 (1)		
58	6215-21-7122 (6215-21-7121)	Tube (Tube)	1 (1)		For HD 785-3
59	6215-21-7260	Plate	1	New and current ones are interchangeable as set with each other.	
60	— (01010-31045)	Bolt (Bolt)	— (2)		
61	— (6134-12-5120)	Spacer (Spacer)	— (2)		
62	6215-21-7113 (6215-21-7112)	Tube (Tube)	1 (1)		For WA800-2
63	02720-11616 (6215-51-5890)	Plug (Plug)	1 (1)		For HD785-3
64	175-79-82560 (07236-10210)	Elbow (Elbow)	1 (1)		
65	— (07002-5142)	O-ring (O-ring)	— (1)		
66	— (01043-70211)	Plug (Plug)	— (1)		
67	6215-11-6141 (6215-11-6140)	Tube (Tube)	2 (2)	For D475A-2	
68	01011-51030 (01011-31020)	Bolt (Bolt)	8 (8)	New and current ones are interchangeable as set with each other.	
69	6215-11-6180 (427-03-12430)	Tube (Tube)	1 (1)		New and current ones are interchangeable as set with each other.
70	01011-51030 (01011-31020)	Bolt (Bolt)	4 (4)	For WA800-2	
71	6215-11-6190 (427-03-12440)	Tube (Tube)	1 (1)		

No.	Part No.	Part Name	Q'ty	Remarks
72	01011-51030 (01011-31020)	Bolt (Bolt)	4 (4)	New and current ones are interchangeable as set with each other.
73	6215-11-5831 (6215-11-5830)	Bracket (Bracket)	1 (1)	
74	6215-71-7511 (6215-71-7510)	Connector (Connector)	1 (1)	New and current ones are interchangeable as set with each other.
75	01010-51025 (01011-31025)	Bolt (Bolt)	2 (2)	
76	6215-71-7591 (6215-71-7590)	Tube (Tube)	1 (1)	For D475A-2 WA800-2
77	6215-71-7581 (6215-71-7580)	Tube (Tube)	1 (1)	
78	6215-71-7552 (6215-71-7551)	Tube (Tube)	1 (1)	
79	6215-71-7542 (6215-71-7541)	Tube (Tube)	1 (1)	
80	— (6215-71-7810)	Tube (Tube)	— (1)	
81	— (6215-71-7560)	Tube (Tube)	— (1)	
82	6215-71-2852 (6215-71-7521)	Bracket (Bracket)	1 (1)	
83	01010-51020	Bolt	1	
84	01010-50820	Bolt	2	
85	6215-71-6270	Clamp	1	
86	6215-71-6280	Clamp	1	
110	— (6154-11-5120)	Spacer (Spacer)	— (1)	
111	— (01010-31070)	Bolt (Bolt)	— (1)	
112	206-01-44320 (6150-81-6940)	Spacer (Spacer)	2 (2)	
113	01010-51075 (01010-31080)	Bolt (Bolt)	2 (2)	
87	6215-71-7640 (6215-71-7530)	Connector (Connector)	1 (1)	For HD785-3
88	01435-01020 (01010-31095)	Bolt (Bolt)	2 (2)	New one can substitute for current one by reworking gear case, but current one cannot.
89	— (07005-02012)	Gasket (Gasket)	— (2)	

No.	Part No.	Part Name	Q'ty	Remarks
90	— (600-211-7113)	Plug (Plug)	— (2)	New one can substitute for current one by reworking gear case, but current one cannot.
91	6215-71-7212 (6215-71-7211)	Hose (Hose)	1 (1)	
92	6215-71-7531 (6215-71-7530)	Connector (Connector)	1 (1)	New one can substitute for current one by reworking gear case, but current one cannot.
93	01435-01020 (01010-31095)	Bolt (Bolt)	2 (2)	
94	6215-71-7351 (6215-71-7350)	Bracket (Bracket)	1 (1)	For WA800-2
95	6215-71-7351 (6215-71-7360)	Plate (Plate)	1 (1)	
96	— (01010-31055)	Bolt (Bolt)	— (2)	For D475A-2
97	6215-71-7181 (6215-71-7180)	Plate (Plate)	1 (1)	
98	6215-71-7531 (6215-71-7530)	Connector (Connector)	1 (1)	New and current ones are interchangeable as set with each other.
99	01435-01020 (01010-31095)	Bolt (Bolt)	2 (2)	
100	6215-71-7311 (6215-71-7310)	Tube (Tube)	1 (1)	For HD785-3
101	6215-71-7321 (6215-71-7320)	Tube (Tube)	1 (1)	
102	6215-71-2634 (6215-71-2731)	Cover (Cover)	1 (1)	New and current ones are interchangeable as set with each other.
103	6215-71-2743 (6215-71-2742)	Cover (Cover)	1 (1)	
104	6215-71-2352 (6215-71-2850)	Connector (Connector)	1 (1)	For WA800-2, D475A-2
105	200-01-44320 (0150-81-6940)	Spacer (Spacer)	2 (2)	
106	01010-31075 (01010-31090)	Bolt (Bolt)	2 (2)	New and current ones are interchangeable as set with each other.
107	6215-71-2634 (6215-71-2633)	Cover (Cover)	1 (1)	
108	6215-71-2643 (6215-71-2641)	Cover (Cover)	1 (1)	For WA800-2, D475A-2
114	01594-01008 (6215-11-5740)	Nut (Nut)	4 (4)	

No.	Part No.	Part Name	Q'ty	Remarks
115	6215-11-5652 (6215-11-5651)	Bracket (Bracket)	1 (1)	For D475A-2 New and current ones are interchangeable as set with each other.
116	6215-11-5230 (6215-11-5840)	Tube (Tube)	1 (1)	
117	6215-11-5240 (6215-11-5840)	Tube (Tube)	1 (1)	
118	6215-11-5682 (6215-11-5850)	Tube (Tube)	1 (1)	
119	6215-11-5690 (6215-11-5930)	Tube (Tube)	1 (1)	
120	— (6215-11-5940)	Adapter (Adapter)	— (1)	For WA800-2
121	— (01010-51060)	Bolt (Bolt)	— (2)	
122	6215-11-5652 (6215-11-5651)	Bracket (Bracket)	1 (1)	
123	6215-11-5662 (6215-11-5661)	Tube (Tube)	1 (1)	New and current ones are interchangeable as set with each other.
124	6215-11-5671 (6215-11-5661)	Tube (Tube)	1 (1)	For No. 75 Bolt
125	01640-21016	Washer	2	

4. Details of change

4-1 Common gear train (Improved parts list: P2-P4)

Standard specification — Helical gear } Unified to wider
 Specification of HD758-3 A — Spur gear } helical gear

- The current and new gears in this Service News are not interchangeable with each other.
- When installing the common wider helical gear, replace or rework (Fig. 1) the front cover.
- After modification, check the backlash and end play (Fig. 13).

① Change of engine with standard specifications (All SA12V140 engines, except ones with electronic governors on HD785-3)

(1) Change of idler gear (Fig. 2)

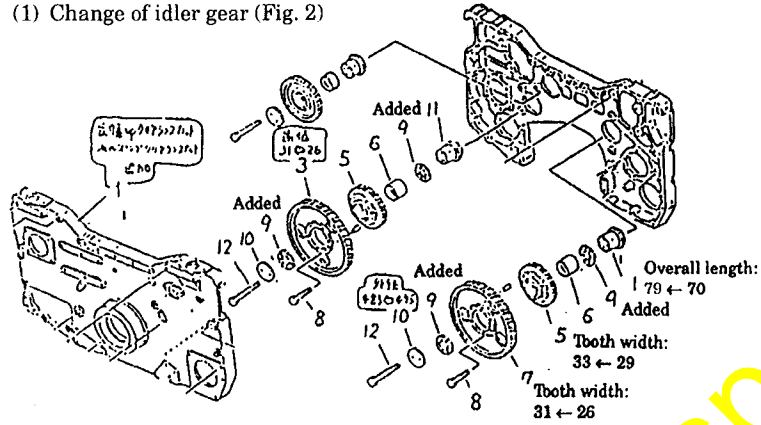


Fig. 2

(3) Change of injection pump drive gear (Fig. 4)

(2) Change of crank gear (Fig. 3)

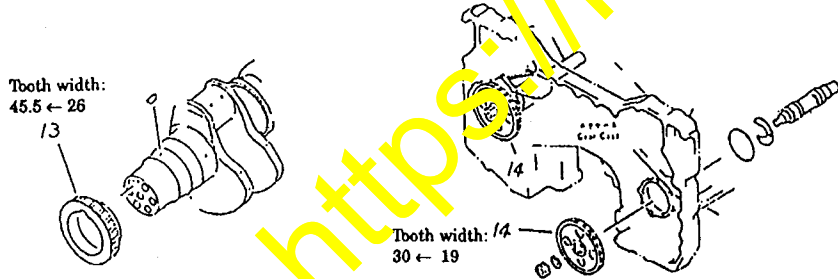
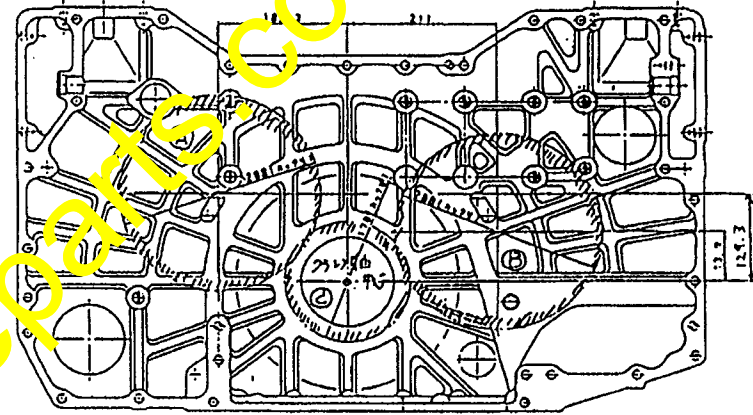


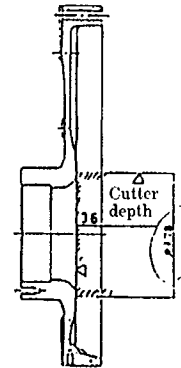
Fig. 3

Fig. 4

[Rework drawing for front cover] (For replacement with common gear)
 When reusing front cover 6215-31-3111, make a clearance as shown below since the crank gear and large idler gear (R/B, L/B) will interfere with the front side.
 (When using new one, prepare 6215-31-3112.)

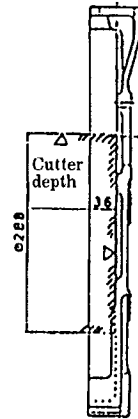


Back side of cover



Rework on part ③

Clearance between gear and cover must be 2.5 - 3.5.



Rework Part ①
 Part ②

Fig. 1

- ② Change of installation specifications of electronic governor for HD785-3
 • The new gear train is the same as one on the engine with the standard specifications

(1) Change of main idler gear (Fig. 5)

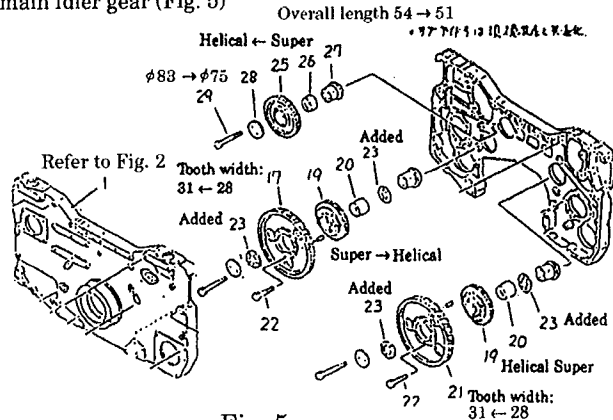


Fig. 5

(2) Change of crank gear (Fig. 6)

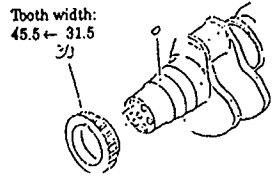


Fig. 6

(3) Change of injection pump drive gear (Fig. 7)



Fig. 7

(4) Change of cam gear (Fig. 8)

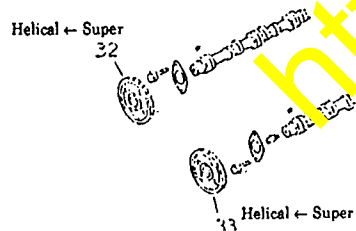


Fig. 8

(5) Change of air compressor gear (Fig. 9)

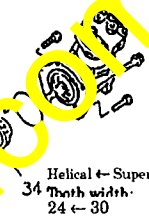


Fig. 9

(6) Change of water pump gear (Fig. 10)

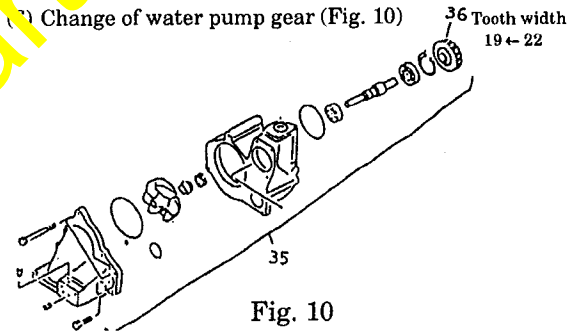


Fig. 10

(7) Change of alternator driver gear (Fig. 11)

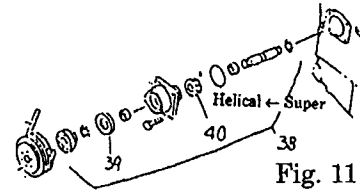


Fig. 11

(8) Change of injection pump (Fig. 12)

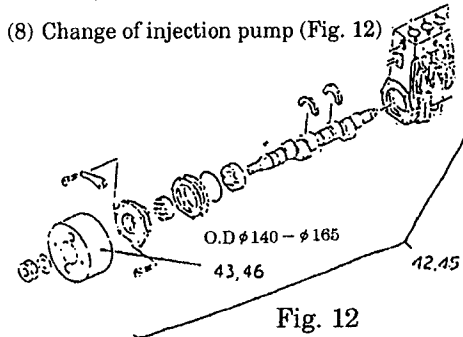
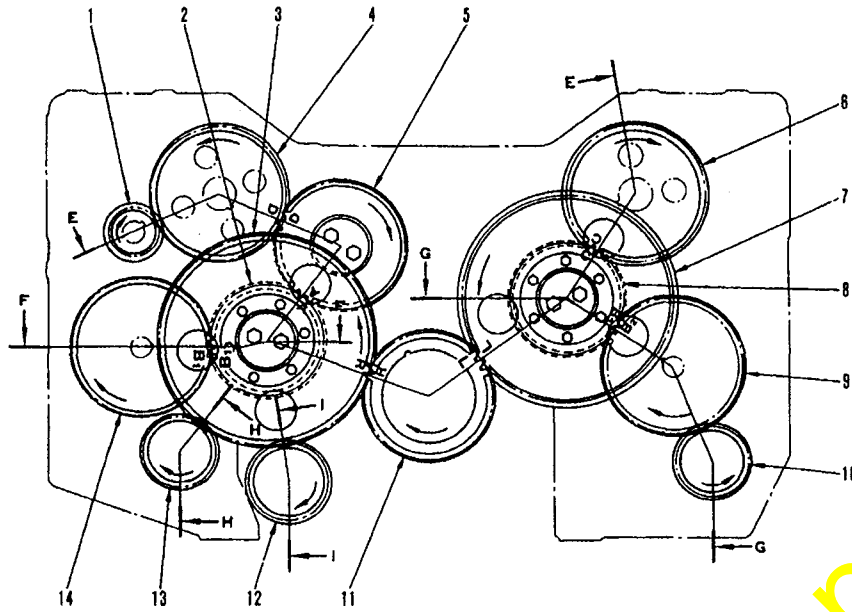


Fig. 12

[Layout of gears and standard backlash]

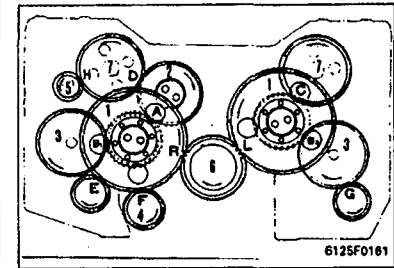


- | | |
|--|---|
| 1. Accessory drive gear (No. of teeth: 18) | 10. Air compressor drive gear (No. of teeth: 24) |
| 2. R-Sub-idler gear (No. of teeth: 40) | 11. Crankshaft gear (No. of teeth: 45) |
| 3. R-Idler gear (large) (No. of teeth: 75) | 12. Oil pump drive gear (No. of teeth: 27) |
| 4. R-Camshaft gear (No. of teeth: 48) | 13. Water pump drive gear (No. of teeth: 25) |
| 5. Idler gear (small) (No. of teeth: 45) | 14. R-Fuel injection pump drive gear (No. of teeth: 48) |
| 6. L-Camshaft gear (No. of teeth: 48) | 15. Front camshaft gear (No. of teeth: 48) |
| 7. L-Idler gear (large) (No. of teeth: 75) | |
| 8. L-Sub-idler gear (small) (No. of teeth: 20) | |
| 9. L-Fuel injection pump drive gear (No. of teeth: 48) | |
- R, L, A, B₁, B₂, C, D: Match marks for timing gears

Fig. 13

Position	Judgement position	Standard	
		mm	in
A · A	Right idler gear (small) and right sub-idler gear	0.130 - 0.390	0.0052 - 0.0153
B ₁ · B ₁	Right sub-idler gear and right injection pump gear	0.051 - 0.469	0.0021 - 0.0184
B ₂ · B ₂	Left sub-idler gear and left injection pump gear	0.051 - 0.469	0.0021 - 0.0184
C · C	Left sub-idler gear and left cam gear	0.129 - 0.391	0.0051 - 0.0153
D · D	Right idler gear (small) and right cam gear	0.130 - 0.391	0.0051 - 0.0153
E · E	Right idler gear (large) and water pump drive gear	0.052 - 0.481	0.0021 - 0.0189
F · F	Right idler gear (large) and oil pump gear	0.137 - 0.421	0.0054 - 0.0165
G · G	Left injection pump gear and compressor gear	0.106 - 0.381	0.0042 - 0.015
H · H	Right cam gear and accessory drive gear	0.085 - 0.492	0.0034 - 0.0193
L · L	Crankshaft gear and left idler gear (large)	0.141 - 0.425	0.0056 - 0.0167
L · L	Crankshaft gear and right idler gear (large)	0.141 - 0.425	0.0056 - 0.0167

- Measure the backlash and end play of each gear with a dial gauge.
- 1) Standard value for backlash of each gear



2) Standard value for end play of each gear

Position	Part Name	Standard	
		mm	in
1	Idler gear (large)	0.09 - 0.26	0.0035 - 0.010
2	Idler gear (small)	0.07 - 0.18	0.0027 - 0.0070
3	Injection pump drive gear	0.07 - 0.20	0.0028 - 0.0078
4	Oil pump drive gear	0.03 - 0.088	0.0012 - 0.0034
5	Accessory drive gear	0.1 - 0.4	0.004 - 0.0157
6	Crankshaft gear	0.14 - 0.32	0.0056 - 0.0125
7	Camshaft gear	0.10 - 0.25	0.004 - 0.098

Standard size	Clearance between main idler gear bushing and shaft (R and L bank)	Tolerance		Standard clearance
		Shaft	Bushing	
56 [2.205]		-0.016 [-0.0006] -0.029 [-0.0011]	+0.034 [+0.0013] +0.009 [0.0003]	0.025 - 0.063 (0.0009 - 0.0024)
56 [2.205]		-0.016 [-0.0006] -0.029 [-0.0011]	+0.055 [+0.0021] 0 [0]	0.016 - 0.084 (0.0006 - 0.0032)

4.2 Change of other parts (Changed parts list: P4 - P9)

- ① Replacement of oil connector cover seal with gasket (Fig. 32)

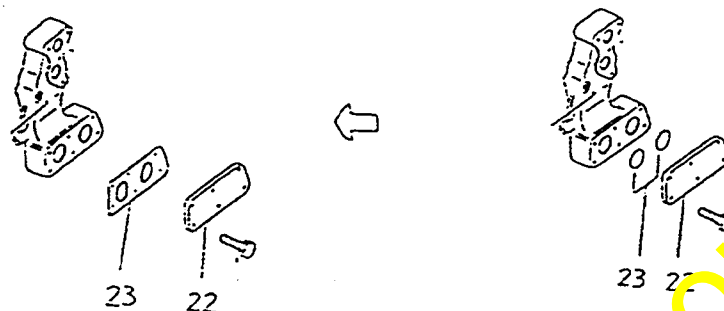


Fig. 32

- ② Common oil filter tube (Fig. 33)

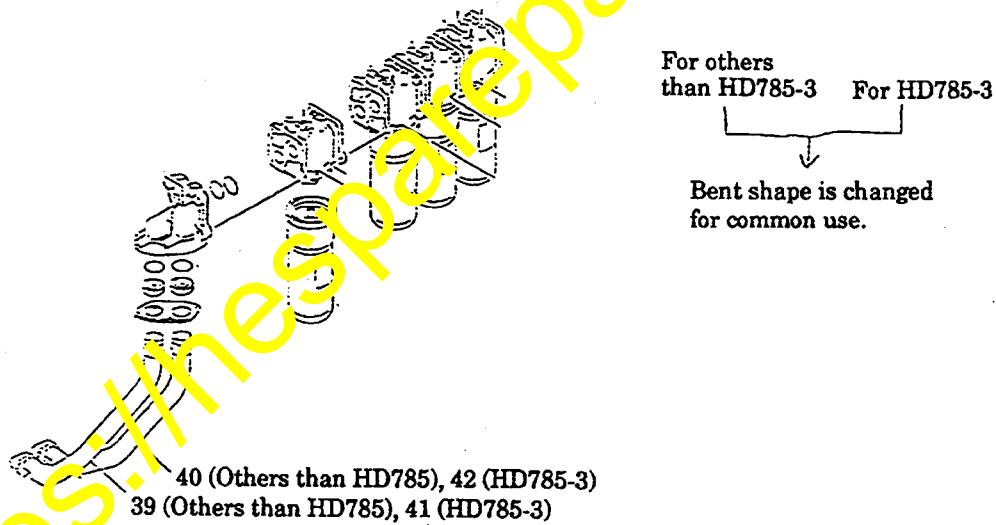


Fig. 33

③ Elimination of oil pan baffle plate on D475A-2 (Fig. 34)

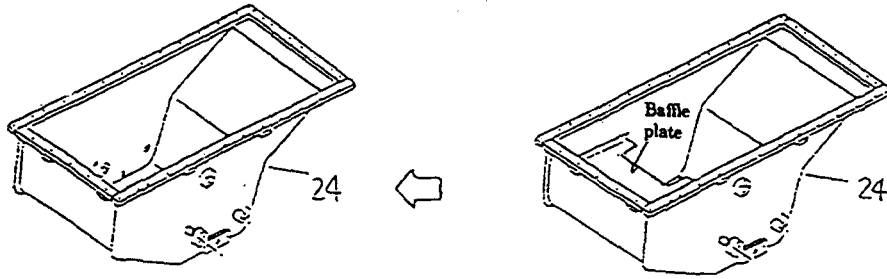


Fig. 34

④ Cast heater connector on D475A-2 (Fig. 35)

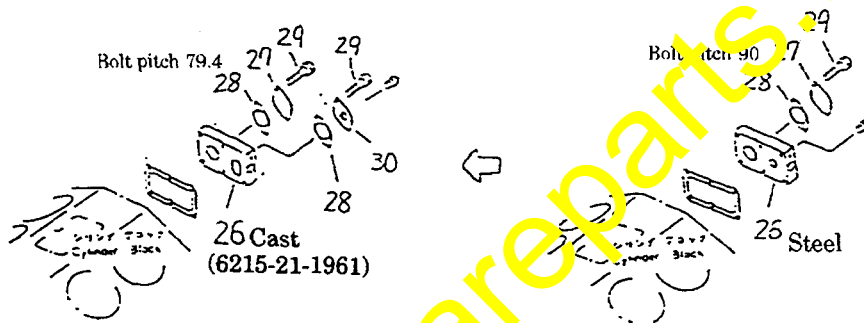


Fig. 35

⑤ Change of engine water outlet connector on D475A-2 (Fig. 36)

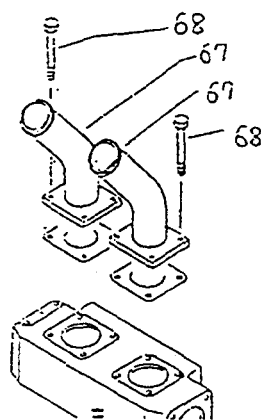


Fig. 36

⑥ Change of oil filter and oil filler on D475A-2 (Fig. 37)

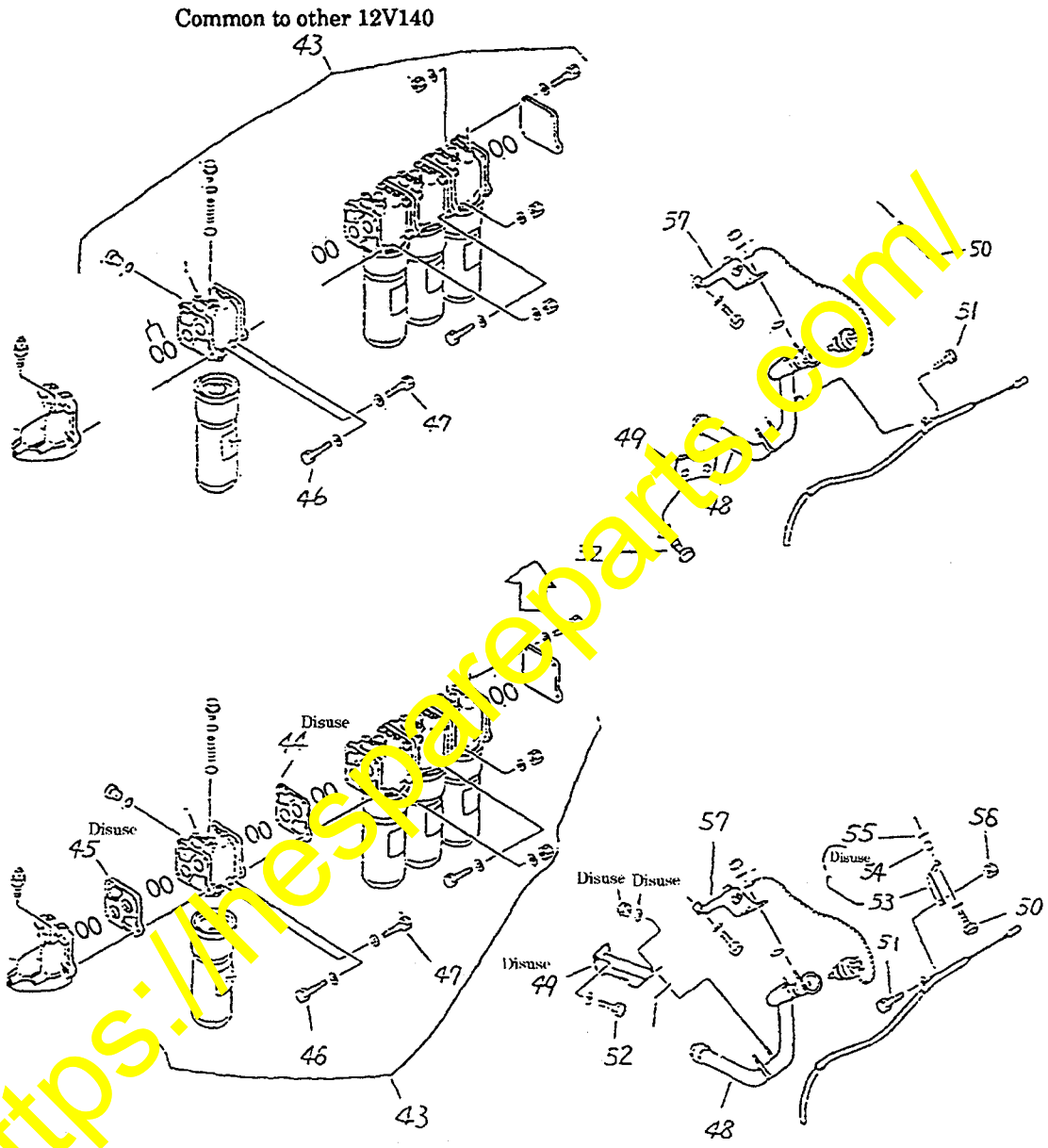


Fig. 37

⑦ Common fuel piping on D475A-2 (Fig. 38, Fig. 39)

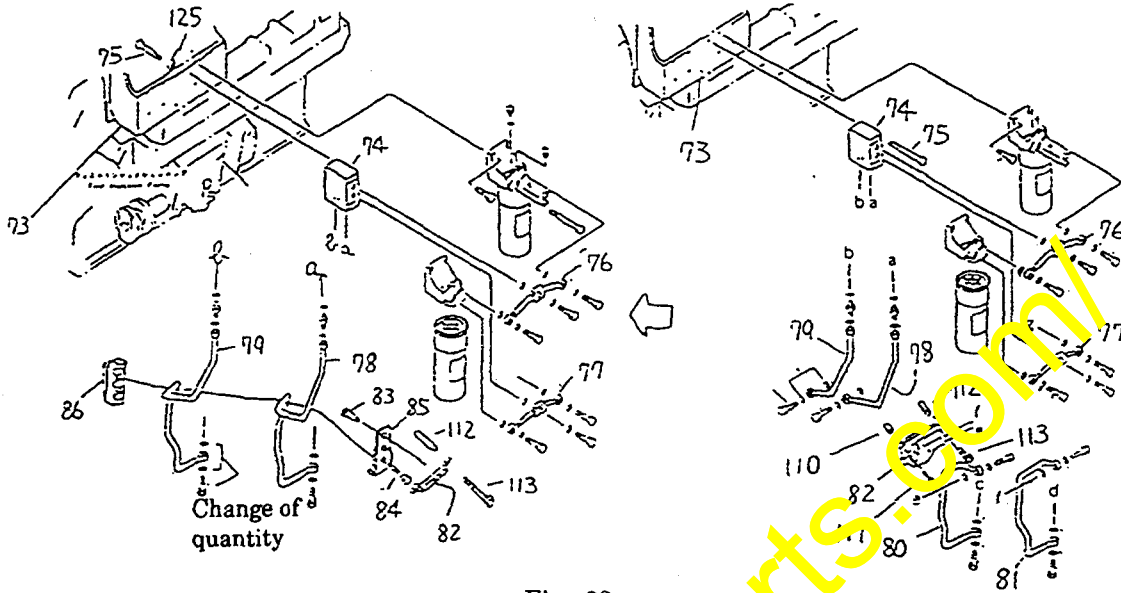


Fig. 38
(This drawing is the same as Fig. 4.)

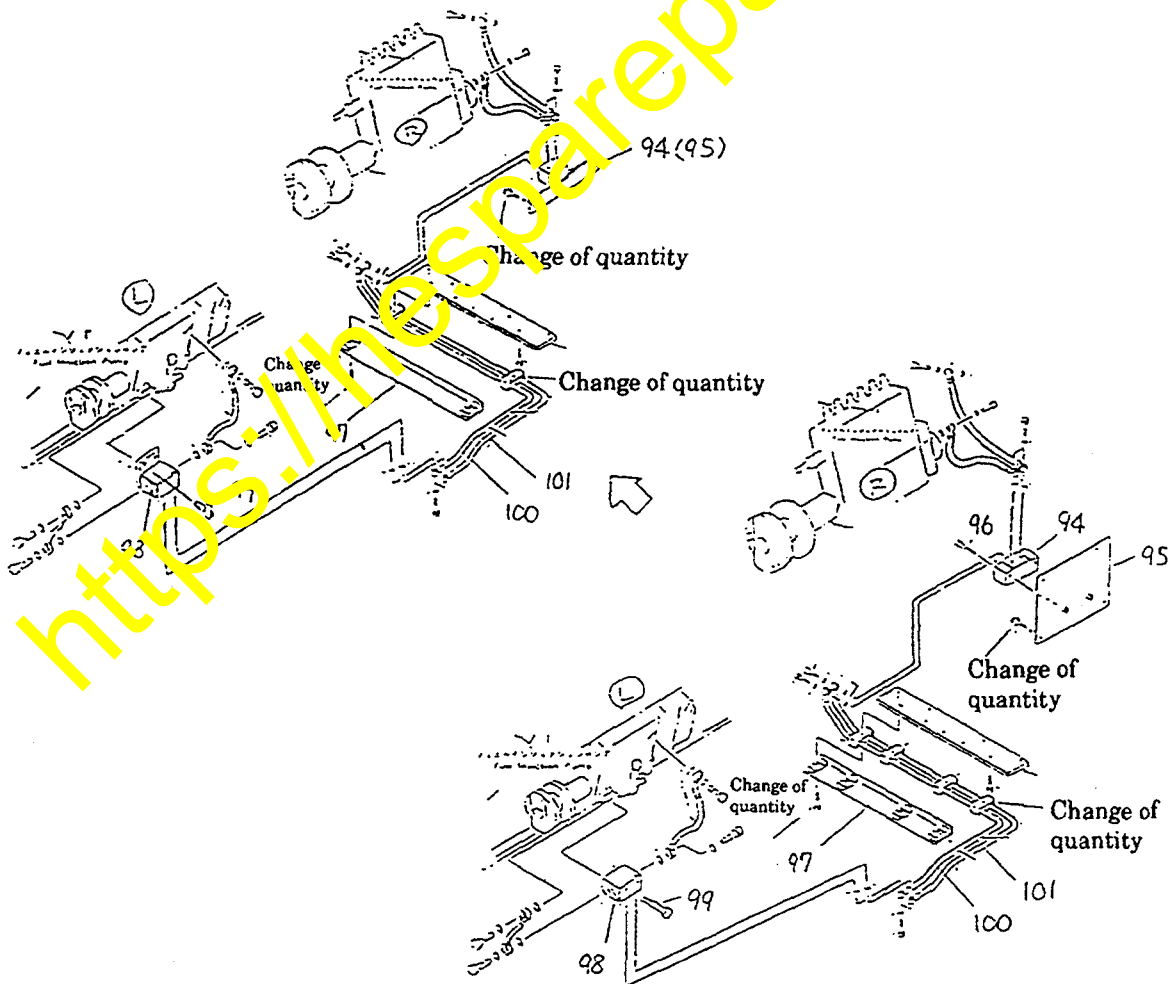


Fig. 39

⑧ Common injection pump coupling cover on D475A-2 (Fig. 40)

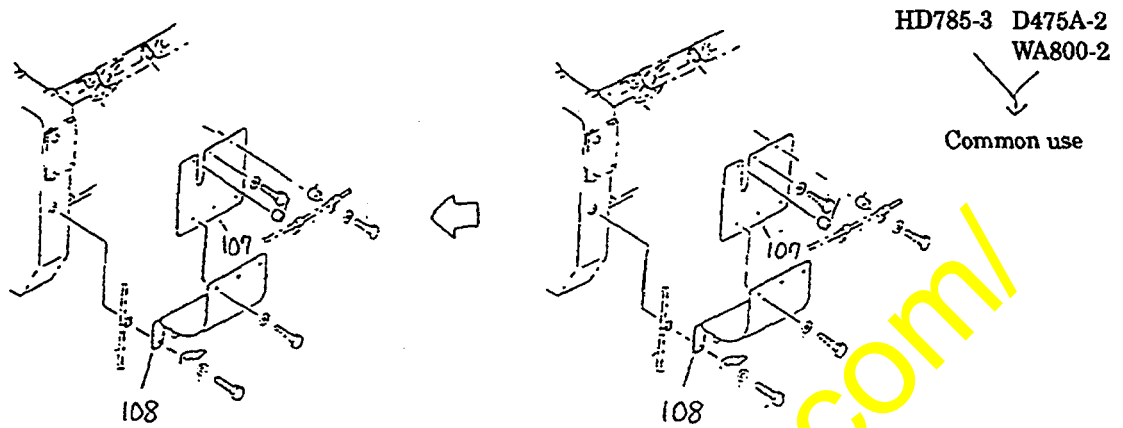


Fig. 40
(This drawing is the same as Fig. 48.)

⑨ Common muffler water drain tube on D475A-2 (Fig. 41)

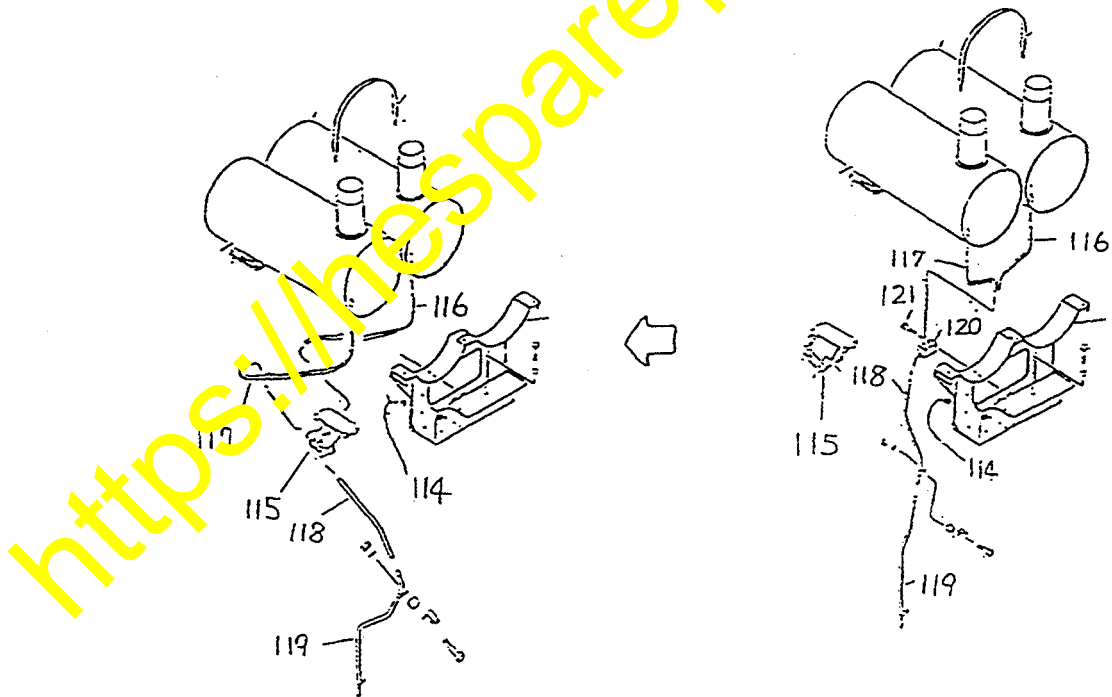


Fig. 41

- ⑩ Cast heater connector on WA800-2 (Fig. 42)

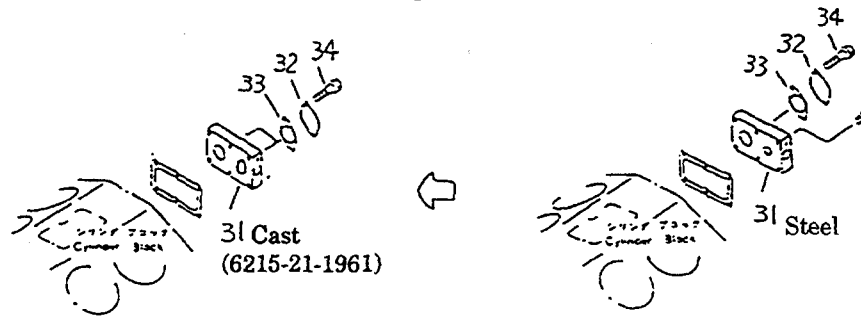


Fig. 42

- ⑪ Change of oil filler on WA800-2 (Fig. 43)

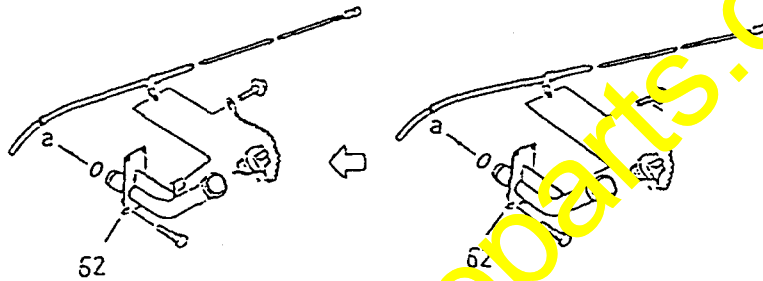


Fig. 43

- ⑫ Change of thickness of heater relay mounting plate on WA800-2 (Fig. 44)

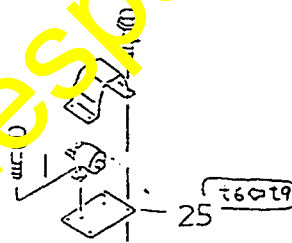


Fig. 44

- ⑬ Change of engine water outlet connector on WA800A-2 (Fig. 45)

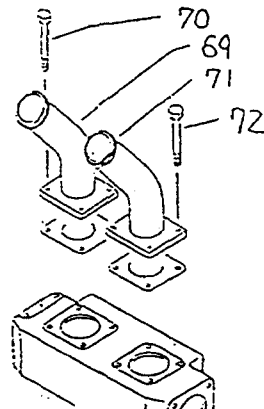


Fig. 45

⑭ Common fuel piping on W800A-2 (Fig. 46, Fig. 47)

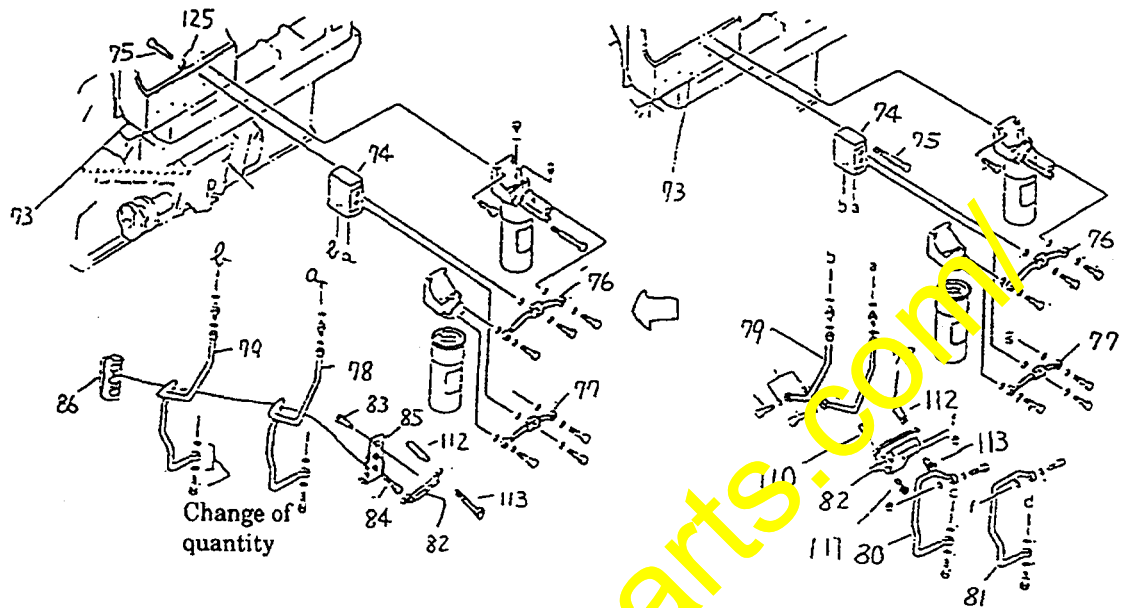


Fig 46
(This drawing is the same as Fig. 38)

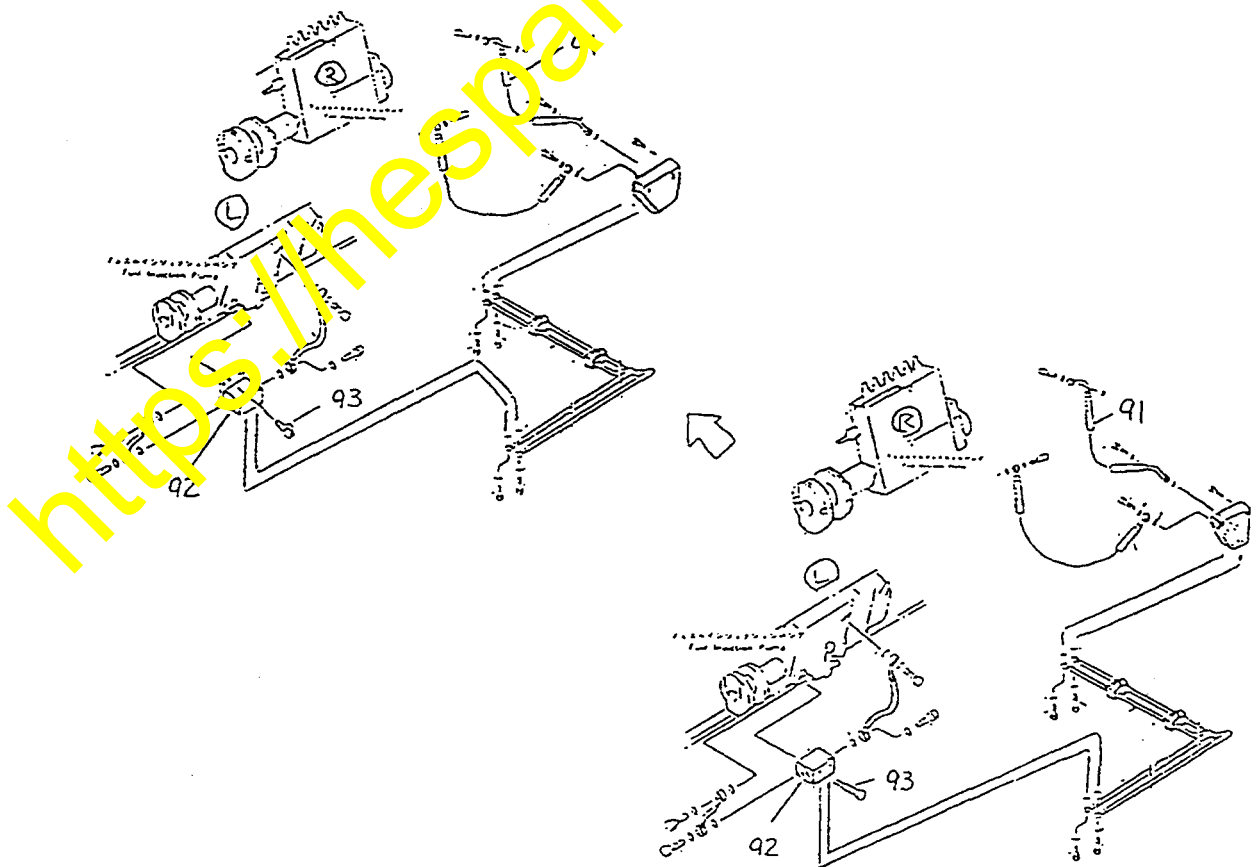


Fig. 47

⑮ Common injection pump coupling cover on WA800-2 (Fig. 48)

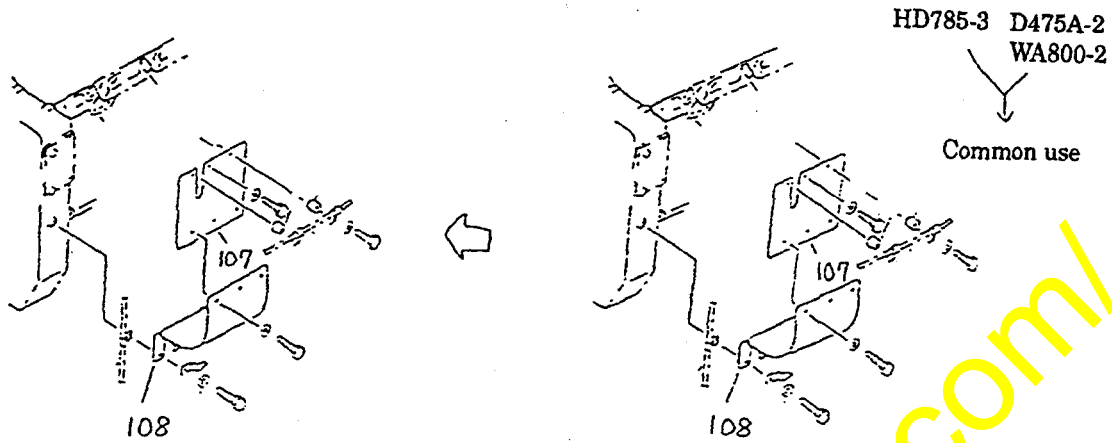


Fig. 48
(This drawing is the same as Fig. 40)

⑯ Common muffler water drain tube on WA800-2 (Fig. 49)

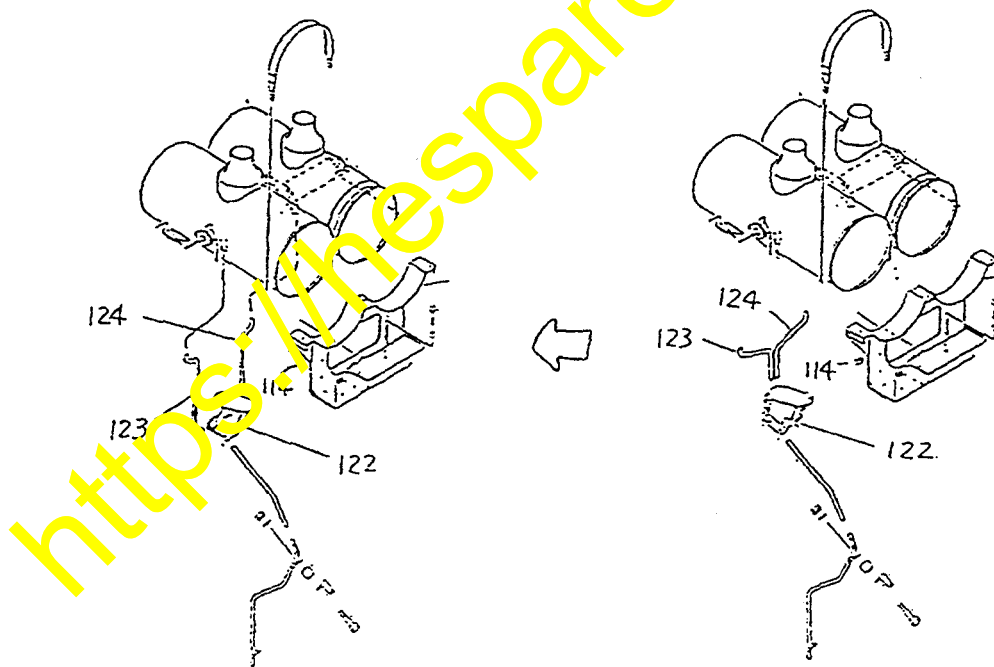


Fig. 49

- ⑰ Cast heater connector on HD785-3 (Fig. 50)

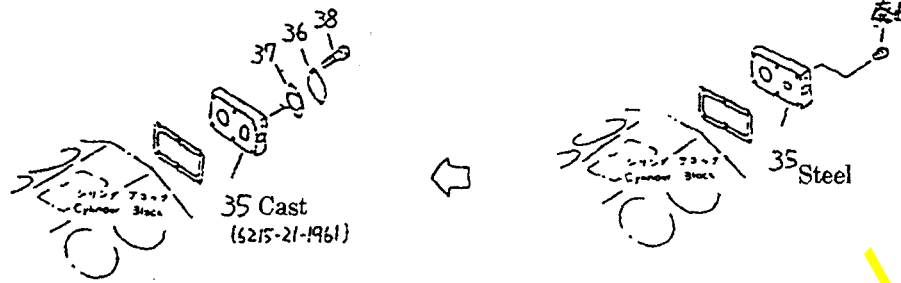


Fig. 50

- ⑱ Change of oil filler on HD785-3 (Fig. 51)

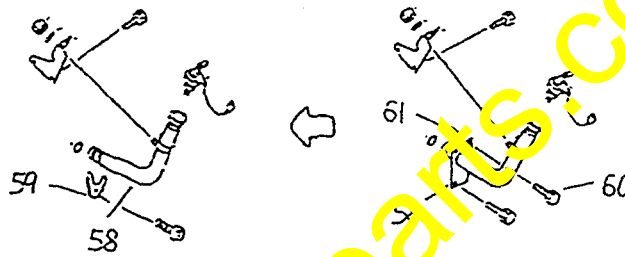


Fig. 51

- ⑲ Common returning point of by-pass filter oil on HD785-3 (Fig. 52)

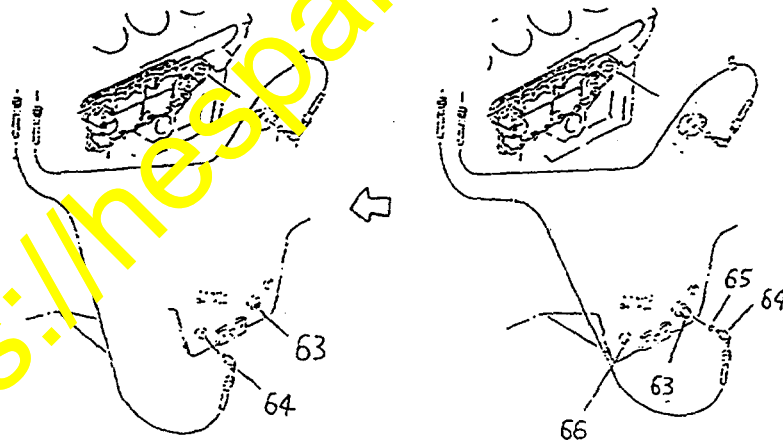


Fig. 52

- ⑳ Change of thickness of heater relay mounting plate on HD785-3 (Fig. 53)

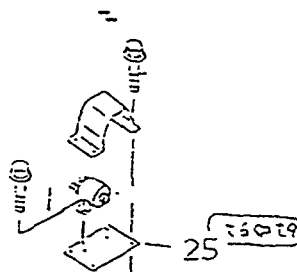


Fig. 53

② Common fuel piping connector on HD785-3 with mechanical governor (Fig. 54)

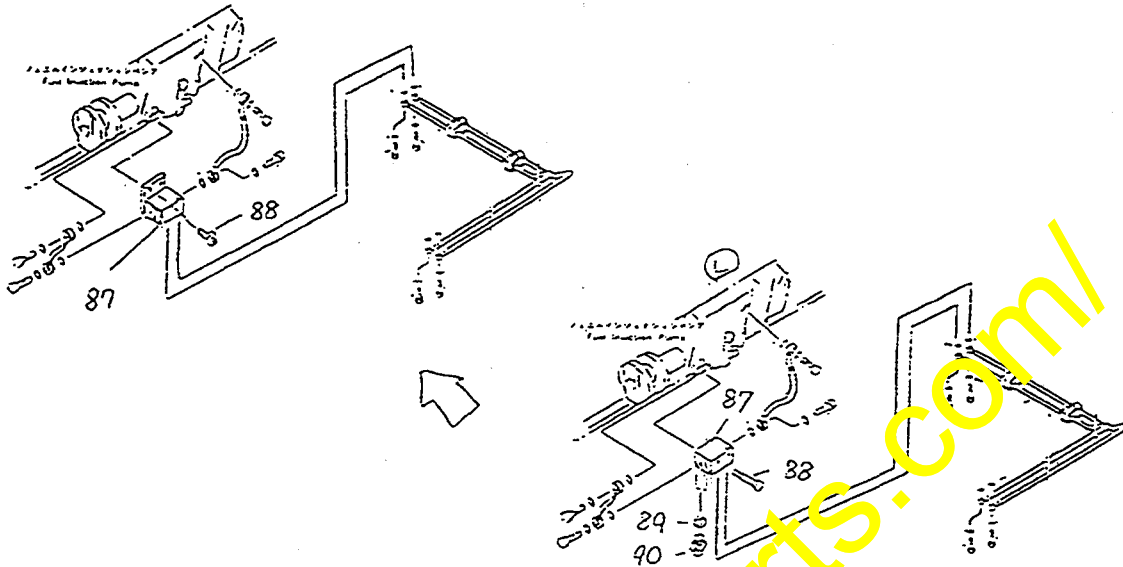


Fig. 54

② Common injection pump coupling cover on HD 85 (Fig. 55)

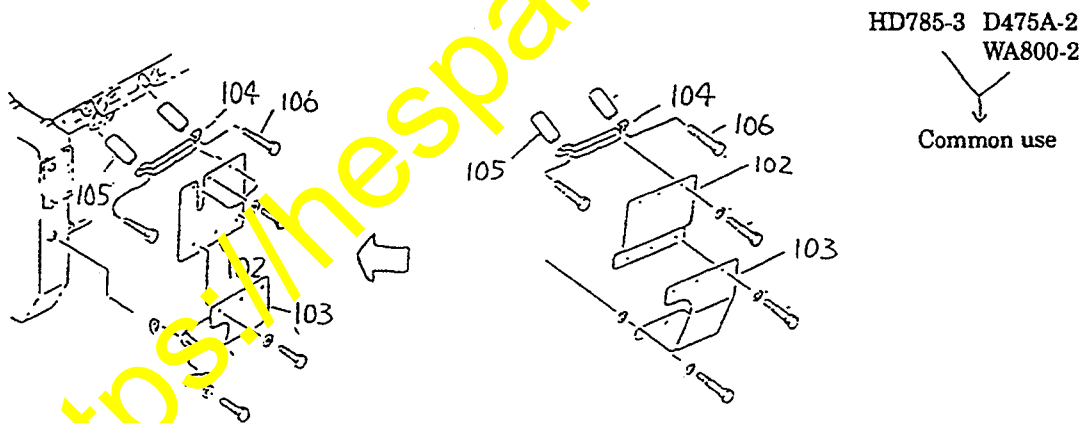


Fig. 55