SERVICE MANUAL

HYDRAULIC EXCAVATOR

ViO80-1A

ARTICULATED BOOM

YANMAR

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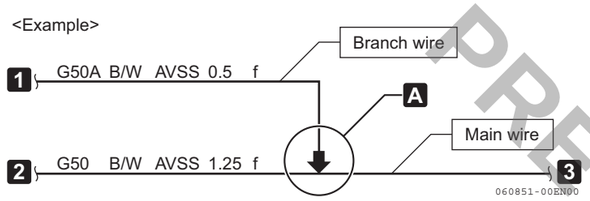
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2-9 Wiring Diagram

■ How to Read Wiring Diagrams

● Intersections and Wire Connections

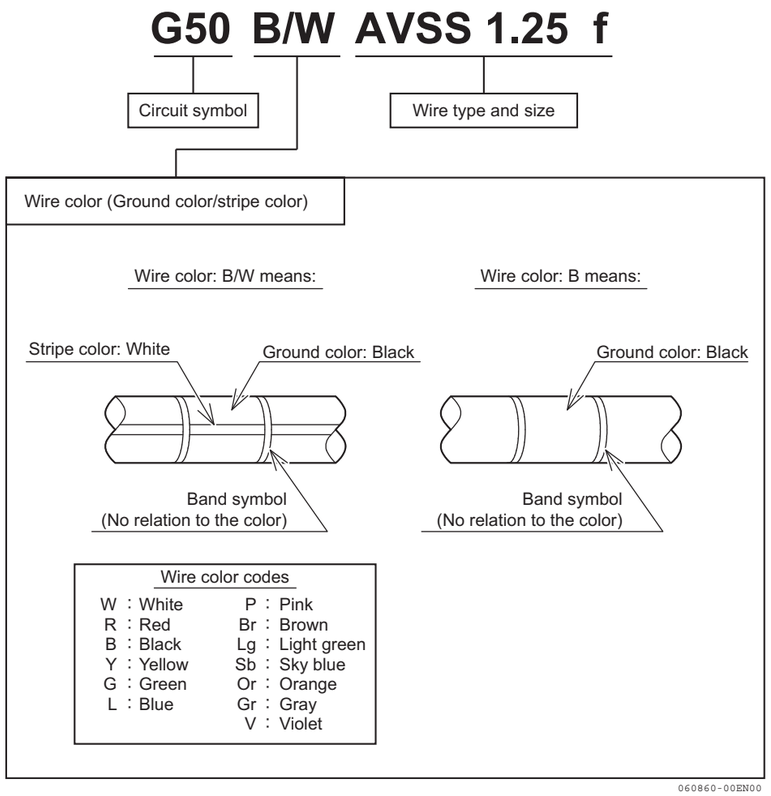


The point of arrow **A** on the main wire shown in the figure above represents an intersection of the branch wire and the main wire.
The direction of the arrow indicates which one is the branch wire (the arrowed line represents the branch wire) and also shows the division between the branch wire and the main wire.

In the example above, the wires are divided as follows.

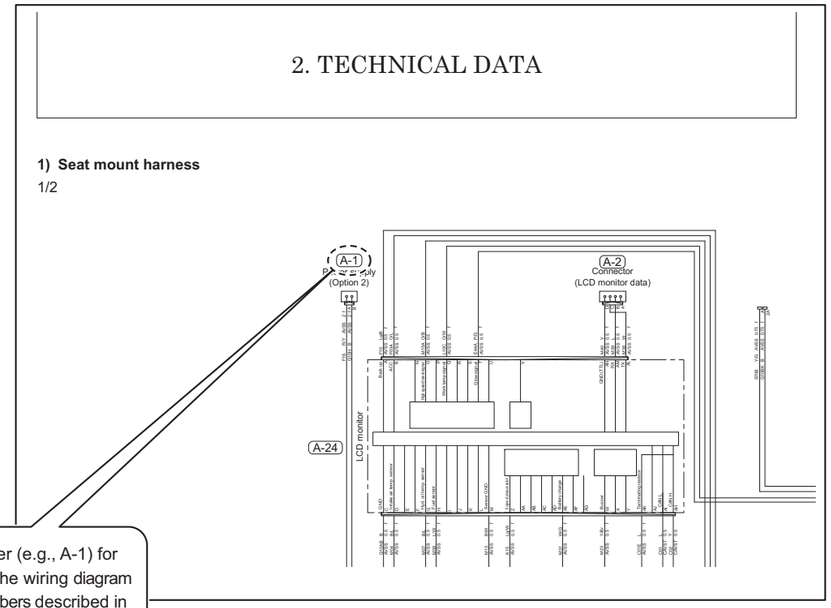
1 to the point of arrow **A** : Branch wire G50A B/W AVSS 0.5 f
2 to **3** : Main wire G50 B/W AVSS 1.25 f

● How to Read Wiring Symbols

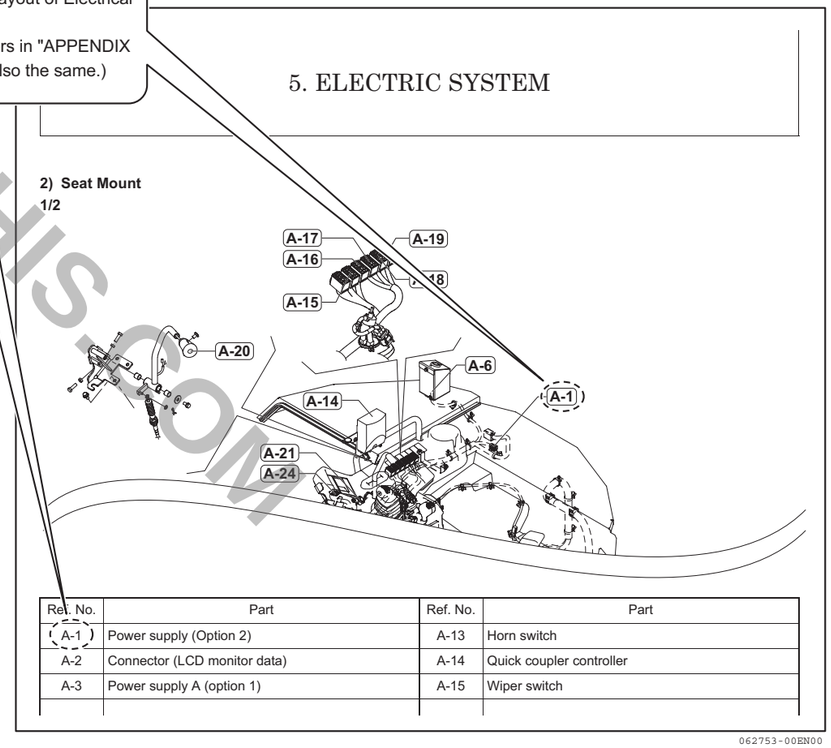


● Reference numbers

<Example>



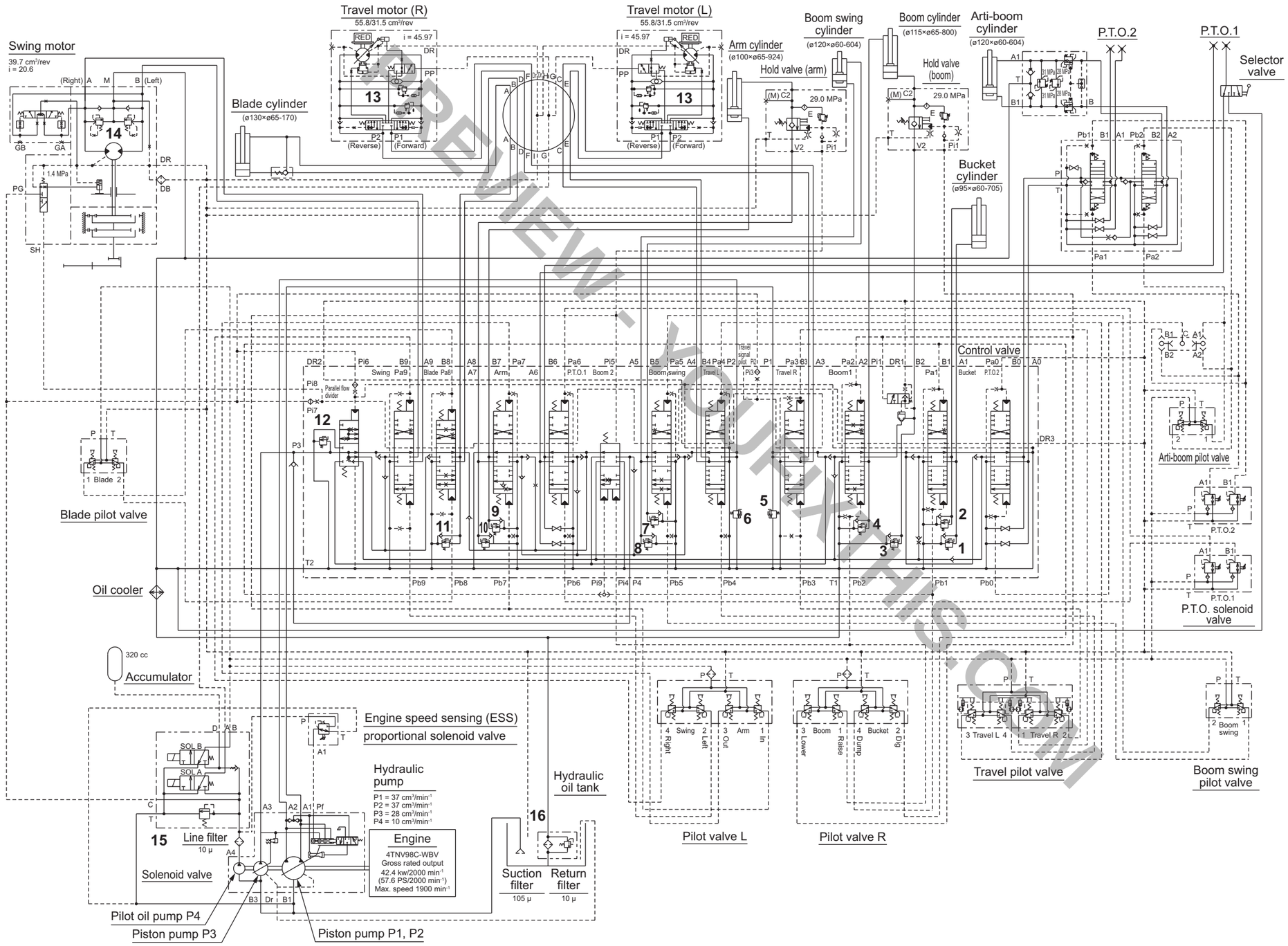
Each reference number (e.g., A-1) for electric equipment in the wiring diagram corresponds to the numbers described in Section "5-1-1 Parts Layout of Electrical Equipment".
(The reference numbers in "APPENDIX Wiring Diagram" are also the same.)



Ref. No.	Part	Ref. No.	Part
A-1	Power supply (Option 2)	A-13	Horn switch
A-2	Connector (LCD monitor data)	A-14	Quick coupler controller
A-3	Power supply A (option 1)	A-15	Wiper switch

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2-8 Hydraulic Circuit Schematic



Relief valve set pressure

No.	PSI	MPa
1	4134	28.5
2	4134	28.5
3	4279	29.5
4	4134	28.5
5	3698	25.5
6	3698	25.5
7	4134	28.5
8	4134	28.5
9	4134	28.5
10	4134	28.5
11	2176	15
12	3481	24
13	3698	25.5
14	3481	24
15	421	2.9
16	21	0.147

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2. TECHNICAL DATA

Item				Unit	VIO80-1A-2PB
Engine					
Main specifications					
	Lubricating method			-	Forced lubrication by trochoid pump
	Specific lubricating oil consumption			lbs./HP•h (g/kW•h)	0.00008 to 0.00037 (0.05 to 0.23)
	Compression pressure			PSI (MPa)	493 (3.4) at 250 rpm
Cylinder head					
	Intake valve	Open	bTDC	degrees	14
		Close	aBDC	degrees	46
	Exhaust valve	Open	bBDC	degrees	50
		Close	aTDC	degrees	14
	Intake valve clearance (Cold engine)			in. (mm)	0.0079 (0.2)
	Exhaust valve clearance (Cold engine)			in. (mm)	0.0079 (0.2)
	Intake valve seat angle			degrees	120
	Exhaust valve seat angle			degrees	90
Piston					
	First compression ring	Ring shape		-	Half keystone
		Ring quantity		pcs.	4
	Second compression ring	Ring shape		-	Rectangular
		Ring quantity		pcs.	4
	Oil-ring	Ring shape		-	Bevel V groove (with coil expander)
		Ring quantity		pcs.	4
Governor					
	Name			-	BOSCH ECU
	Type			-	EDC17CV54 type
Fuel feed system					
	Fuel filter			-	Filter paper with automatic air release device
	Fuel filter filtration area			sq.in. (sq.cm)	310 (2000)
	Oil/water separator			-	Float type
	Feed pump			-	Plunger type (+ electric type)
Lubrication system					
	Lubrication pump			-	Trochoid pump
	LO pressure regulating valve opening pressure			PSI (MPa)	42.1 to 56.6 (0.29 to 0.39)
	LO filter			-	Full flow filter
	LO filter filtration area			sq.in. (sq.cm)	180 (1160)
	Filter valve opening pressure			PSI (MPa)	11.4 to 17.1 (0.08 to 0.12)
	Operating pressure of alarm switch			PSI (MPa)	5.69 to 8.53 (0.04 to 0.06)
Cooling device					
	Cooling system			-	Water-cooling (Radiator)
	Fan belt size			-	A44
	Thermostat opening temperature			ºF (ºC)	159.8 (71)
	Thermostat full-open temperature			ºF (ºC)	179.6 (82)

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3-7 List of Tightening Torque

3-7-1 Machine

Applicable model			VIO80-1A-2PB		
Equipment			Thread size	Tightening torque ft•lbf (N•m)	Adhesive
	No	Tightening part			
Engine / Electrical equipment					
	1	Engine mount vibroisolating rubber	M16 × 130	195.3 to 224.2 (264.8 to 304)	Three Bond 1324
	2	Engine × Engine mount F (Radiator side)	M10 × 35 (11T)	61.4 (83.3)	Three Bond 1324
	3	Engine × Engine mount R (Flywheel side)	M12 × 30 (10.9)	79.7 to 94.4 (108 to 128)	Three Bond 1324
	4	Air cleaner	M8 × 20	14.5 to 16.7 (19.6 to 22.6)	-
	5	Air cleaner intake hose (Engine and Air cleaner side)	Hose clip 80	1.8 to 2.5 (2.5 to 3.4)	-
	6	Air cleaner intake hose (Air cleaner intake side)	Hose clip 90	0.9 to 1.1 (1.2 to 1.5)	-
	7	Cooling water hose	Hose clip 48	1.8 to 2.5 (2.5 to 3.4)	-
	8	Fuel gauge unit	M5×12 (Pan-head machine screw)	0.87 to 1.08 (1.18 to 1.47)	-
	9	Fuel tank × Bracket SWP × Clamp	M8 × 16	9.4 to 12.3 (12.8 to 16.7)	-
	10	Fuel drain valve	R3/8	14.5 to 21.7 (19.6 to 29.4)	Sealing tape Loctite 577
	11	Fuel tank holding band (Tank holding (upper) side)	Nut 10	1.8 to 2.1 (2.5 to 2.9)	-
	12	Fuel tank holding band (Lock nut (lower) side)	Nut 10	18.1 to 23.9 (24.5 to 32.4)	-
	13	Fuel tank bracket L × Frame	M10 × 30	32.5 to 43.4 (44.1 to 58.9)	Three Bond 1324
	14	Battery holding rod (Battery holding side)	Nut 8	2.2 (2.94)	-
	15	Battery holding rod (Lock nut side)	Nut 8	9.4 to 12.3 (12.8 to 16.7)	-
	16	LCD monitor × Panel	M5 × 20	1.88 to 2.43 (2.55 to 3.3)	-
	17	Air conditioner hose joint	M6 × 20	5.9 to 8.9 (8 to 12)	-
	18	Air conditioner hose × Receiver dryer	M6 × 25	5.9 to 8.9 (8 to 12)	-
	19	Air conditioner hose × Condenser (Condenser upper side)	M22 × 1.5 (Hose joint)	14.8 to 18.4 (20 to 25)	-
	20	Air conditioner hose × Condenser (Condenser lower side)	M16 × 1.5 (Hose joint)	8.9 to 11.1 (12 to 15)	-
	21	Air conditioner hose × Compressor	M8 × 25	14.8 to 18.4 (20 to 25)	-
	22	Safety switch (Cut-off lever)	Nut 18 (Fine thread)	21.7 to 25.3 (29.4 to 34.3)	-
	23	Engine control dial	Nut 9 (Fine thread)	1.08 or less (1.47 or less)	-
	24	Mount × Air conditioner bracket	Nut 8	9.37 to 12.3 (12.7 to 16.7)	-

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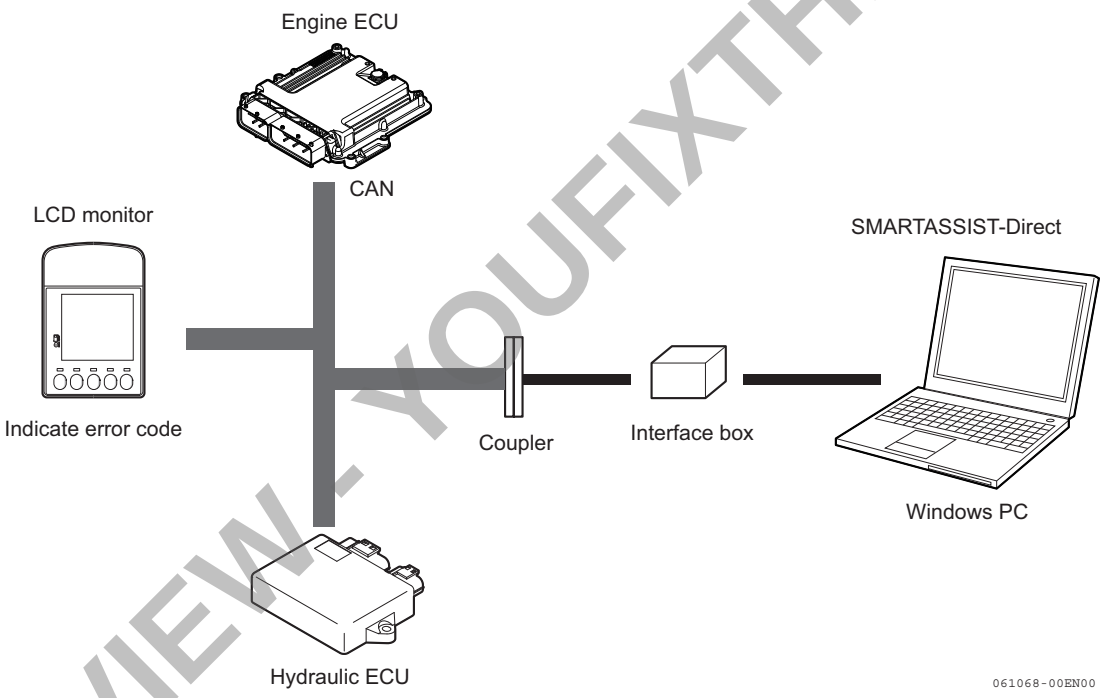
5-5 Error Code

The LCD monitor and the controllers including the engine ECU and hydraulic ECU are connected via CAN.
If the LCD monitor or any of the controllers detects an abnormality, an error code corresponding to the abnormality is displayed on the LCD monitor. For detailed description of error codes, refer to the error code list.

Connecting SMARTASSIST-Direct (SA-D), a controller failure diagnosis tool, to the controllers allows checking of detailed failure information and history for the engine ECU and hydraulic ECU as well as implementation of status monitoring and diagnostic tests.
For detailed information and operation of SA-D, refer to the SMARTASSIST-Direct operation manual and the engine troubleshooting manual.

Note:

Information on the LCD monitor cannot be checked by SA-D.



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Disassembly of Cylinder Head

Prepare a clean, flat working surface on a workbench large enough to accommodate the cylinder head assembly. Discard all gaskets, O-rings and seals. Use new gaskets, O-rings and seals on reassembly of the cylinder head.

1. Drain the coolant from the engine into a suitable container.

NOTICE

Identify all parts and their location using an appropriate method. It is important that all parts are returned to the same position during the reassembly process.

2. Disconnect the electrical wire from the glow plug, injector, intake throttle, EGR valve and sensors **(Figure 4-2-3, (1))**.

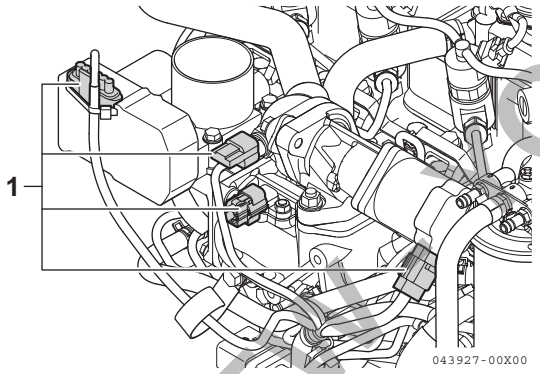


Figure 4-2-3

3. Disconnect the fuel pipes from the fuel filter, if the fuel filter is mounted on the intake manifold.
4. Remove the intake throttle, EGR valve and fuel filter on the intake manifold if required (discard the all gasket).
5. Remove the intake manifold bolts **(Figure 4-2-4, (1))**. Remove the intake manifold **(Figure 4-2-4, (2))**. Discard the intake manifold gasket **(Figure 4-2-4, (3))**.

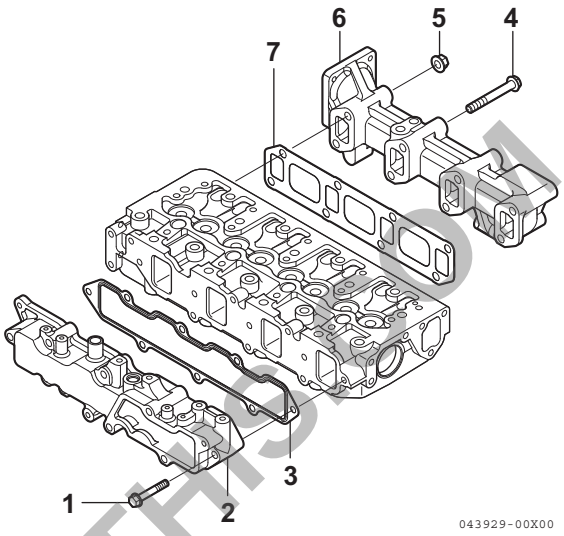


Figure 4-2-4

6. Disconnect the electrical wire from the diesel particulate filter if mounted.
7. Remove the diesel particulate filter from the engine (discard the all gasket).
8. Remove the exhaust manifold bolts **(Figure 4-2-4, (4))** and nuts **(Figure 4-2-4, (5))**. Remove the exhaust manifold **(Figure 4-2-4, (6))** and the exhaust manifold gasket **(Figure 4-2-4, (7))**.
9. Remove the coolant pump. *See Disassembly of Engine Coolant Pump on page 4-4-6.*
10. Remove the high-pressure lines and fuel injectors from the cylinder head. *See Removal of Injector on page 4-3-8.*

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2-7 Fuel, Lube Oil and Grease Recommended

Cooling fluid

Temperatures °C								Quantity prescribed (L)
-40	-20	0	20	40	60	80	100	
Long-life cooling fluid **YANMAR POWER COOLANT B-6**								8,6 Radiator 0,4 the expansion flask

Engine oil

Temperatures °C								Quantity prescribed (L)
-30	-20	-10	0	10	20	30	40	
5W30								11,2
10W30								
15W40								

Fuel

Temperatures °C							Quantity prescribed (L)
-20	-10	0	10	20	30	40	
No. 1-D / No. 2-D							115

Hydraulic oil

Temperatures °C							Quantity prescribed (L)
-20	-10	0	10	20	30	40	
VG46							60 in the tank
VG68							58 the rest

Gear oil

Temperatures °C							Quantity prescribed (L)
-20	-10	0	10	20	30	40	
75W90LS							1,1 by reducer
80W90LS							

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2-6 Periodic Inspection and Servicing

Supply ○ Check/Adjust ◇ Clean □ Oil and grease ■ Replace ● Oil sample ♦

Check & Service items			Daily	Every 50h	Every 100h	Every 250h	Every 500h *	Every 1000h *	Every 2000h **
General	Missing or broken parts		◇						
	Tightening of nuts and bolts		◇						
	Engine condition, exhaust and inlet hoses		◇						
	Machine overall		□						
	Operation manual			◇(1)			◇	◇	◇
Greasing	Greasing points		◇/■						
	Swing gear and crown			■	■	■	■	■	■
	Bearing rollers and bearings, idler wheels		◇			■(2)	■	■	■
Engine	Diesel filter			●(1)			●	●	●
	Water separator	Drain	◇						
		Bowl (if equipped)					□	□	□
	Oil		◇/○	♦(1)			●	●	●
	Oil filter			●(1)			●	●	●
	Cooling fluid & leakage		◇/○						●
	Radiator fins		◇/□						
	Belt			◇					●
	Fuel hose, coolant hose								◇/●
	Performance of engine control and engine speed			◇(1)			◇	◇	◇
	Governor lever and accelerator device			◇(1)			◇	◇	◇
	Air cleaner	External air cleaner element	□(3)			●(3)	●	●	●
		Safety cartridge element (if equipped)					●	●	●
	Intake and exhaust valves								◇
	Injectors and injection pressure								◇/□
	Crankcase breather system								◇
	Engine silent-bloc & bracket			◇					
Exhaust	EGR valve							◇/□	◇/□
	Diesel Particulate Filter							◇/□	◇/□
Travel	Oil for travel gears			●(1)	◇(2)	◇/●(2)	◇/●	◇/●	◇/●
	Tracks, rubber tracks & pads		◇						
	Track tension		◇						
	Play of travel lever			◇(1)			◇	◇	◇
	Performance of travel			◇(1)			◇	◇	◇
Swing motor	Oil for swing gears			●(1)			●	●	●
Hydraulic	Oil		◇	♦(1)			♦/●(4)	●	●
	Aspiration filter			□(1)		●(4)	□	□	□
	Hydraulic oil return filter			●(1)		●(4)	●	●	●
	Other filter					●(4)	●	●	●
	Accumulator			◇(1)			◇	◇	◇
	Pump pressure			◇(1)			◇	◇	◇
	Play of control lever			◇(1)			◇	◇	◇
	Low pressure			◇(1)			◇	◇	◇
	Blade control			◇(1)			◇	◇	◇
	Boom swing			◇(1)			◇	◇	◇
	Boom			◇(1)			◇	◇	◇
	Articulated boom			◇(1)			◇	◇	◇
	Arm			◇(1)			◇	◇	◇
	Bucket			◇(1)			◇	◇	◇
	Options			◇(1)			◇	◇	◇
Electric	Time counter		◇	◇			◇	◇	◇
	Wire breakage, short circuits, loosened terminals		◇	◇			◇	◇	◇
	LCD monitor		◇	◇			◇	◇	◇
	Battery			◇(1)			◇	◇	◇
Cabin	Cab filters					●(3)	●	●	●
	Air conditioning						◇	◇	◇
Final	Sign inspection card and return to YANMAR			◇ (1)		◇ (2) (3) (4)	◇	◇	◇

* or annualy first time occurs

** or two years

(1) First time 50-80h visit

(2) If machine does lot of digging line during one day (fiber, drop pipe, drainage…).

(3) If machine is used at dusty worksites.

(4) If a hydraulic hammer is used.

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2. TECHNICAL DATA

2. Technical Data

2-1 Specifications

Item				Unit	VIO80-1A-2PB
Main specifications of machine					
Dimensions					
Overall length (Transportation position)				in. (mm)	266.5 (6770)
Cabin	Overall height		Transportation position	in. (mm)	105.5 (2680)
			Traveling position	in. (mm)	105.5 (2680)
	Overall width		Full machine width	in. (mm)	89.4 (2270)
Canopy	Overall height		Transportation position	in. (mm)	-
			Traveling position	in. (mm)	-
	Overall width		Full machine width	in. (mm)	-
Tumbler center distance (steel / rubber)				in. (mm)	89.6 (2277) / 90.1 (2288)
Track gauge				in. (mm)	73.6 (1870)
Minimum ground clearance				in. (mm)	15.4 (390)
Traveling performance					
Travel speed	Steel crawler		Low speed (Forward/Reverse)	MPH (km/hr)	1.4 (2.3)
			High speed (Forward/Reverse)	MPH (km/hr)	2.6 (4.1)
	Rubber crawler		Low speed (Forward/Reverse)	MPH (km/hr)	1.6 (2.5)
			High speed (Forward/Reverse)	MPH (km/hr)	2.8 (4.5)
Permissible water depth limit				in. (mm)	19.7 (500)
Work performance					
Bucket	Width (Standard) *including side cutter			in. (mm)	29.53 (750)
	[Standard. JIS heaped capacity]			cu.ft. (cu.m)	9.89 (0.28)
	Number of teeth / Installation method			pcs.	4 / rubber pin lock type
Maximum digging depth	With blade raised			in. (mm)	163.8 (4160)
	With blade on the ground			in. (mm)	174.0 (4420)
Maximum depth of vertically digging				in. (mm)	148.4 (3770)
Maximum dumping height				in. (mm)	224.8 (5710)
Minimum front swing radius (with boom in front)			Cabin	in. (mm)	112.6 (2860)
			Canopy	in. (mm)	-
Minimum front swing radius (at boom swing)			Cabin	in. (mm)	97.6 (2480)
			Canopy	in. (mm)	-
Rear end swing radius				in. (mm)	49.8 (1265)
Boom swing angle	Cabin		Left	degrees	57
			Right	degrees	60
	Canopy		Left	degrees	-
			Right	degrees	-
Maximum digging force			Bucket	lbs. (k•N)	14286 (63.5)
			Arm	lbs. (k•N)	9171 (40.8)
Maximum tractive force			steel	lbs. (k•N)	14320 (63.7)
			rubber	lbs. (k•N)	14230 (63.3)
Maximum swing inclination angle (with standard bucket)				degrees	15.3

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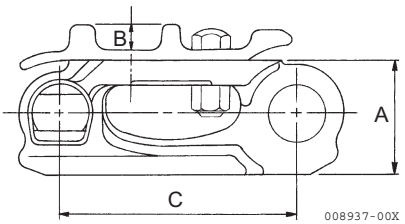
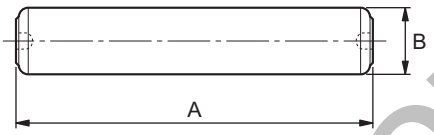
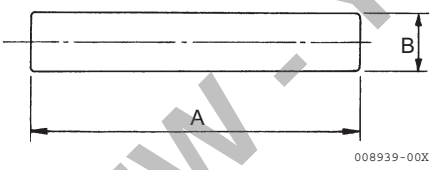
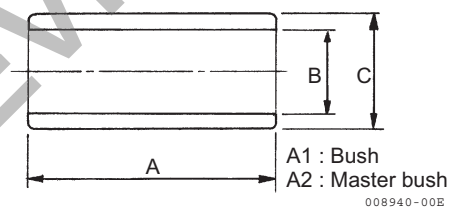
3. SERVICING STANDARDS

Applicable model				4TNV98C-WBV	
Item			Unit	Standard	Allowable limit
Cam shaft and timing gear train					
Cam shaft	End play		in. (mm)	0.0020 to 0.0079 (0.05 to 0.20)	0.0118 (0.030)
	Bend (1/2 the dial gauge reading)		in. (mm)	0 to 0.0008 (0 to 0.02)	0.0020 (0.05)
	Cam lobe height		in. (mm)	1.6707 to 1.6758 (42.435 to 42.565)	1.6608 (42.185)
	Gear end	Bush inside diameter	in. (mm)	1.9681 to 1.9707 (49.990 to 50.055)	1.9736 (50.130)
		Cam shaft outside diameter	in. (mm)	1.9655 to 1.9665 (49.925 to 49.950)	1.9642 (49.890)
		Oil clearance	in. (mm)	0.0016 to 0.0051 (0.040 to 0.130)	0.0094 (0.240)
	Intermedi-ate	Bore inside diameter	in. (mm)	1.9685 to 1.9695 (50.000 to 50.025)	1.9724 (50.100)
		Cam shaft outside diameter	in. (mm)	1.9650 to 1.9659 (49.910 to 49.935)	1.9636 (49.875)
		Oil clearance	in. (mm)	0.0026 to 0.0045 (0.065 to 0.115)	0.0089 (0.225)
	Flywheel end	Bore inside diameter	in. (mm)	1.9685 to 1.9695 (50.000 to 50.025)	1.9724 (50.100)
		Cam shaft outside diameter	in. (mm)	1.9655 to 1.9665 (49.925 to 49.950)	1.9642 (49.890)
		Oil clearance	in. (mm)	0.0020 to 0.0039 (0.50 to 0.100)	0.0083 (0.210)
Idler gear shaft	Idler gear A	Shaft outside diameter	in. (mm)	1.8091 to 1.8100 (45.950 to 45.975)	1.8071 (45.900)
		Bush inside diameter	in. (mm)	1.8110 to 1.8120 (46.000 to 46.025)	1.8140 (46.075)
		Oil clearance	in. (mm)	0.0010 to 0.0030 (0.025 to 0.075)	0.0068 (0.175)
	Idler gear B	Shaft outside diameter	in. (mm)	1.8091 to 1.8100 (45.950 to 45.975)	1.8071 (45.900)
		Bush inside diameter	in. (mm)	1.8110 to 1.8120 (46.000 to 46.025)	1.8140 (46.075)
		Oil clearance	in. (mm)	0.0010 to 0.0030 (0.025 to 0.075)	0.0068 (0.175)
	Timing gear backlash	Crank gear, cam gear, idler gear, fuel injection pump drive gear and P.T.O. gear	in. (mm)	0.0031 to 0.0055 (0.08 to 0.14)	0.0063 (0.16)

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3-3-2 Steel Crawler Specifications

[Unit : in. (mm)]

Applicable model		VIO80-1A-2PB		
Part		Measuring position	Standard	Wear limit
Steel crawler specifications				
(1) Crawler link (Triple grouser)  ***Note :*** *For the link pitch, measure 5 links at three places and obtain the average value.*		A	2.91 (74)	2.76 (70)
		B	0.79 (20)	0.47 (12)
		C	6.06 (154)	6.18 (157)
(2) Master pin  		A	5.16 (131)	-
		B	Ø0.94 (Ø24.00)	Ø0.87 (Ø22)
(3) Pin  		A	5.16 (131)	-
		B	Ø0.95 (Ø24.075)	Ø0.87 (Ø22)
(4) Bush & master bush  	A	A1	3.18 (80.8)	-
		A2	2.93 (74.5)	-
	B		Ø0.97 (Ø24.6)	Ø1.02 (Ø26)
	C		Ø1.62 (Ø41.26)	Ø1.47 (Ø37.3)

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9. Remove fuel supply pump if necessary. *See Removal of Supply Pump on page 4-3-10 if necessary.*
10. Remove the starter motor. *See Removal of Starter Motor on page 4-6-5.*

Disassembly of Camshaft and Timing Components

Discard all gaskets, O-rings and seals. Use new gaskets, O-rings and seals on reassembly of the camshaft and timing components.

■ Removal of timing gear case cover

1. Remove the bolt and washer retaining the crankshaft pulley.

NOTICE

Use care not to damage the threads in the end of the crankshaft when removing the crankshaft pulley.

2. Remove the crankshaft pulley using a gear puller.
3. Remove the bolts that retain the gear case cover to the cylinder block and oil pan.
4. Remove the gear case cover **(Figure 4-2-42, (1))**.

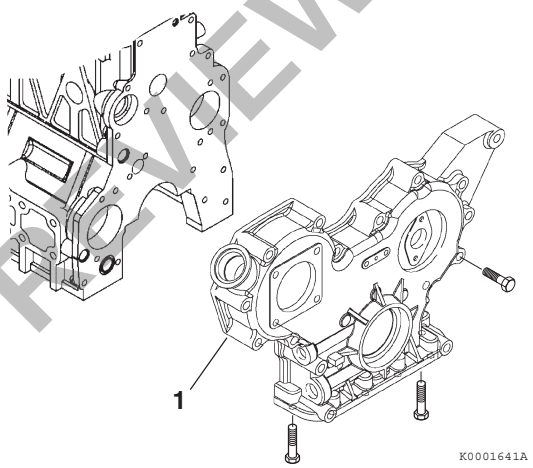


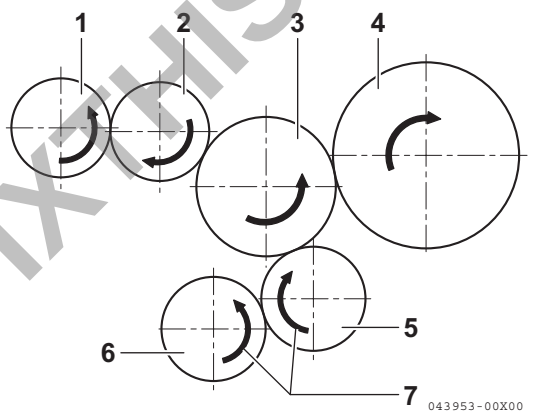
Figure 4-2-42

■ Checking timing gear backlash

Prior to removing the timing gears, measure the gear backlash and determine the gear wear.

Check the backlash between each pair of mating gears **(Figure 4-2-43)**. If not within specification, replace both mating gears. *See "3-2 Engine Service Standard" section for the service limit.*

Note: Do not allow the gear being checked to move axially as excess end play could cause a false reading.



1 – Supply pump gear
2 – Idler gear (B)
3 – Idler gear (A)
4 – Camshaft gear
5 – Crankshaft gear
6 – Lubricating oil pump gear
7 – Direction of rotation

Figure 4-2-43

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Disassembly of Oil Pump

NOTICE

If the oil pump must be replaced, replace it as an assembly only. Do not replace individual components.

Remove the engine cooling fan guard (if equipped), engine cooling fan **(Figure 4-5-4, (3))**, spacer **(Figure 4-5-4, (2))**, engine coolant pump V-pulley **(Figure 4-5-4, (1))** and V-belt.

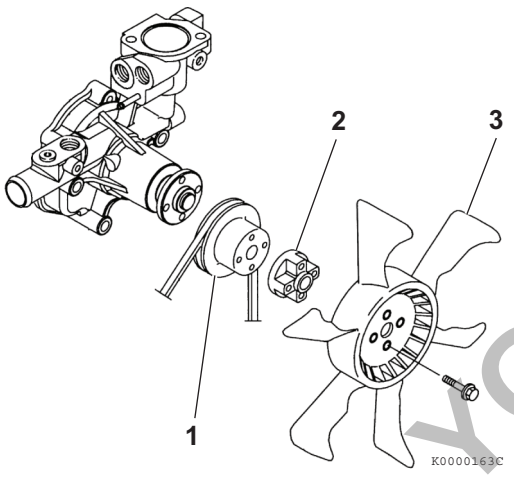


Figure 4-5-4

1. Remove the crankshaft pulley and the gear case cover. *See Removal of timing gear case cover on page 4-2-26.*
2. Remove the oil pump assembly bolts. Remove the oil pump assembly **(Figure 4-5-5, (1))** from the gear case housing **(Figure 4-5-5, (2))**.

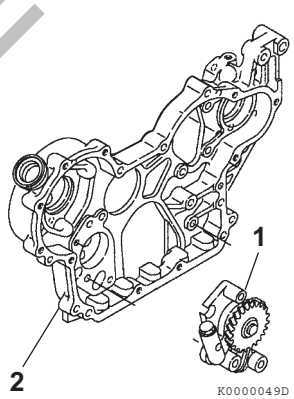


Figure 4-5-5

Cleaning and Inspection

Wash the oil pump, oil pressure regulator and oil pump cavity. Inspect for wear or damage. Replace as necessary.

NOTICE

If any oil pump component clearance exceeds its limit, the oil pump must be replaced as an assembly.

■ Check outer rotor outside clearance

Determine the outside clearance of the outer rotor. Insert a feeler gauge between the outer rotor **(Figure 4-5-6, (1))** and gear case oil pump cavity **(Figure 4-5-6, (2))**.

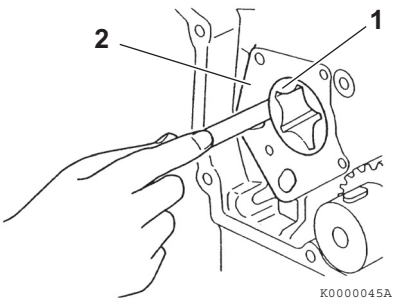


Figure 4-5-6

Record the measurement(s) and see "3-2 Engine Service Standard" section for the service limit.

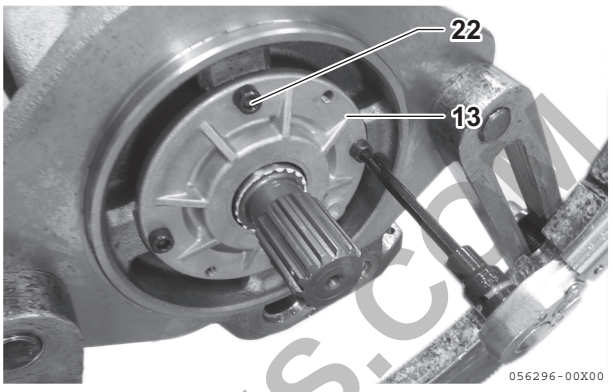
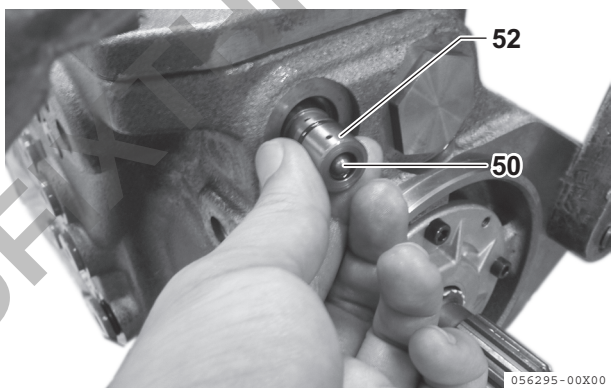
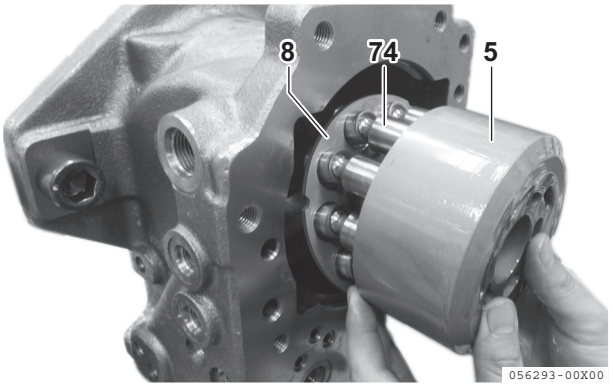
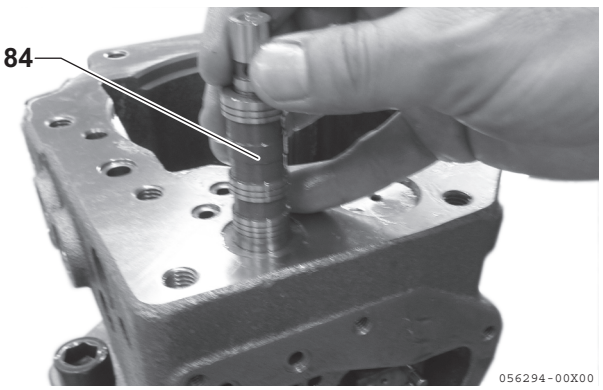
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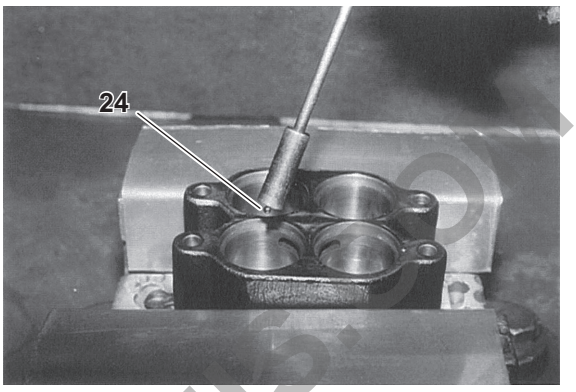
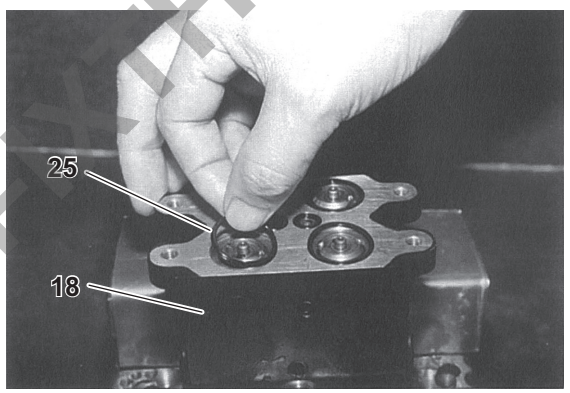
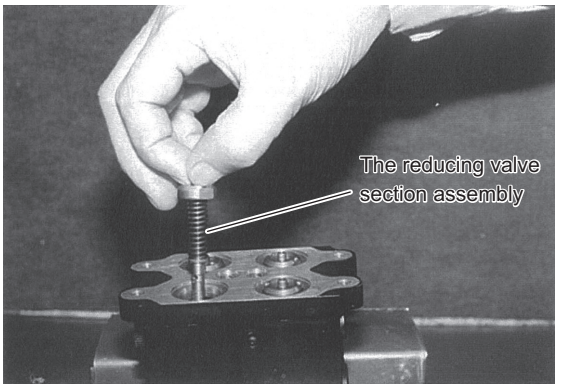
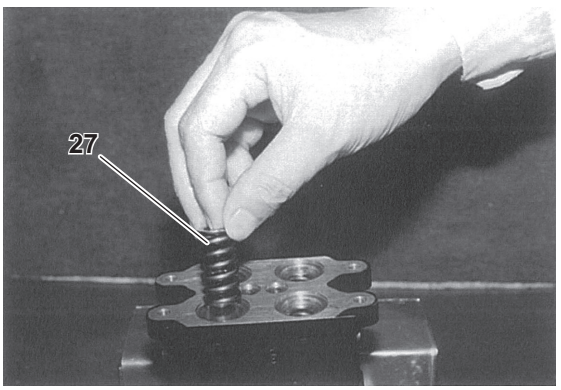
Error code	Classification	Error description	Detection condition	Causes	Corrective measures
00 003250.04	Warning	DPF intermediate temperature sensor malfunction: Low voltage	The sensor voltage is lower than 0.2 V when the engine is not cranking.	1. Improper connector engagement, 2. Faulty wire harness (Sensor signal wire short to ground), 3. DPF intermediate temperature sensor failure (Improper sensor output due to short to ground on a wire inside the DPF intermediate temperature sensor), 4. Engine ECU internal circuit failure	Check the connector, wire harness, DPF intermediate temperature sensor and engine ECU. Turn the starter switch to the "OFF" position and then to the "ON" position to check if the error code is displayed again.
00 003251.00	Warning	DPF differential pressure sensor: Abnormally high differential pressure	After the engine starts, the DPF differential pressure remains at 50 kPa or higher for a specific period of time (15 seconds).	1. Improper connector engagement, 2. Faulty wire harness, 3. DPF differential pressure sensor failure, 4. Engine ECU internal circuit failure	Check the connector, wire harness, DPF differential pressure sensor and engine ECU. Turn the starter switch to the "OFF" position and then to the "ON" position to check if the error code is displayed again.
00 003251.03	Warning	DPF differential pressure sensor malfunction: High voltage	The sensor voltage is higher than 4.8 V when the engine is not cranking.	1. Improper connector engagement, 2. Faulty wire harness, 3. DPF differential pressure sensor failure, 4. Engine ECU internal circuit failure	Check the connector, wire harness, DPF differential pressure sensor and engine ECU. Turn the starter switch to the "OFF" position and then to the "ON" position to check if the error code is displayed again.
00 003251.04	Warning	DPF differential pressure sensor malfunction: Low voltage	The sensor voltage is lower than 0.2 V when the engine is not cranking.	1. Improper connector engagement, 2. Faulty wire harness, 3. DPF differential pressure sensor failure, 4. Engine ECU internal circuit failure	Check the connector, wire harness, DPF differential pressure sensor and engine ECU. Turn the starter switch to the "OFF" position and then to the "ON" position to check if the error code is displayed again.
00 003251.13	Warning	DPF differential pressure sensor malfunction: Abnormal learning value	The final offset value for the DPF differential pressure is lower than the threshold value or higher than the threshold value.	1. Improper connector engagement, 2. Faulty wire harness, 3. EGR pressure sensor failure, 4. Engine ECU internal circuit failure	Check the connector, wire harness, DPF differential pressure sensor and engine ECU. Turn the starter switch to the "OFF" position and then to the "ON" position to check if the error code is displayed again.
00 003609.03	Warning	DPF high pressure-side sensor malfunction: High voltage	The sensor voltage is higher than 4.8 V when the engine is not cranking.	1. Improper connector engagement, 2. Faulty wire harness, 3. DPF high pressure-side sensor failure, 4. Engine ECU internal circuit failure	Check the connector, wire harness, DPF high pressure-side sensor and engine ECU. Turn the starter switch to the "OFF" position and then to the "ON" position to check if the error code is displayed again.
00 003609.04	Warning	DPF high pressure-side sensor malfunction: Low voltage	The sensor voltage is lower than 0.2 V when the engine is not cranking.	1. Improper connector engagement, 2. Faulty wire harness, 3. DPF high pressure-side sensor failure, 4. Engine ECU internal circuit failure	Check the connector, wire harness, DPF high pressure side sensor and engine ECU. Turn the starter switch to the "OFF" position and then to the "ON" position to check if the error code is displayed again.
00 003719.00	Warning	DPF backup mode	The engine ECU has been switched into the backup mode and the DPF is not under recovery regeneration.	1. Engine ECU left in the stationary regeneration standby emergency mode for a specific period of time, 2. Engine ECU internal circuit failure, 3. DOC deterioration due to external factors such as sulfur poisoning (Increase in activation temperature), 4. Combustion gas blow-by (Catalytic damage, piping damage in the passage to DOC), 5. Defective injector (Decrease in injection quantity, incorrect injection timing)	Connect the SMARTASSIST-Direct (SA-D) and perform a DPF recovery regeneration. Check the injector, engine ECU, DOC and piping. Turn the starter switch to the "OFF" position and then to the "ON" position to check if the error code is displayed again.
00 003719.07	Warning	DPF recovery regeneration prohibition	When the recovery regeneration is started, the amount of PM accumulated in the DPF (according to Method C) remains larger than the threshold value for a specific period of time or the total amount of time the amount of PM accumulated in the DPF (according to Method P) is larger than the threshold value exceeds a specified value.	PM is overaccumulated and the recovery regeneration cannot be performed.	Check the soot filter. Turn the starter switch to the "OFF" position and then to the "ON" position to check if the error code is displayed again.
00 003719.09	Warning	DPF recovery regeneration failure	The engine ECU determines that the recovery regeneration has failed.	1. DPF intermediate temperature sensor system failure, 2. DOC deterioration or DOC breakage due to external factors such as sulfur poisoning, 3. Defective injector (Decrease in injection quantity, incorrect injection timing)	Check the DPF intermediate temperature sensor system, injector and DOC. Turn the starter switch to the "OFF" position and then to the "ON" position to check if the error code is displayed again.
00 003719.16	Caution	Stationary DPF regeneration standby (Stationary regeneration request)	The engine ECU is switched into the stationary regeneration mode due to factors other than external switch and CAN commands when the DPF is not under stationary regeneration.	1. Inadequate regeneration capability due to low operating load, 2. Reset regeneration with regeneration prohibition switch on continued for a specific period of time, 3. Engine ECU internal circuit failure, 4. DOC deterioration due to external factors such as sulfur poisoning (Increase in activation temperature), 5. Combustion gas blow-by (Catalytic damage, piping damage in the passage to DOC), 6. Defective injector (Decrease in injection quantity, incorrect injection timing)	Perform a stationary (manual) DPF regeneration. Check the injector, engine ECU, DOC and piping. Turn the starter switch to the "OFF" position and then to the "ON" position to check if the error code is displayed again.
00 003720.00	Warning	DPF ash cleaning request 2	The ash deposit density is 60 g/L or more.	1. Engine ECU internal circuit failure, 2. Increase in actual differential pressure of the soot filter (Ash accumulation)	Replace or clean the soot filter. Check the DPF and engine ECU. Turn the starter switch to the "OFF" position and then to the "ON" position to check if the error code is displayed again.
00 003720.16	Caution	DPF ash cleaning request 1	The ash deposit density is greater than or equal to 50 g/L and less than 60 g/L.	1. Engine ECU internal circuit failure, 2. Increase in actual differential pressure of the soot filter (Ash accumulation)	Replace or clean the soot filter. Check the DPF and engine ECU. Turn the starter switch to the "OFF" position and then to the "ON" position to check if the error code is displayed again.
00 004257.12	Caution	Injector drive IC failure	An injector drive IC failure is detected by the engine ECU.	-	-

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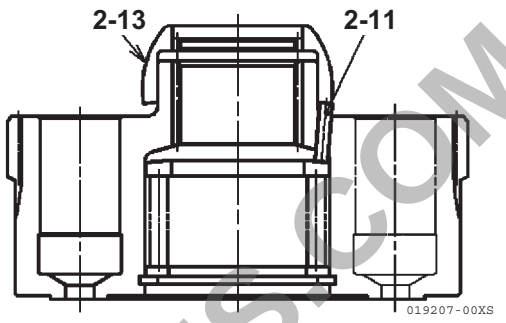
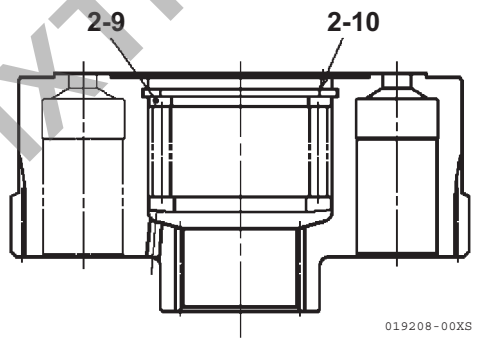
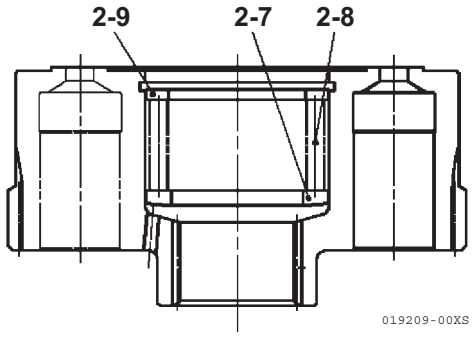
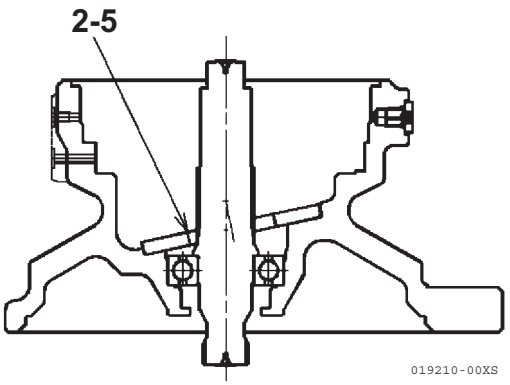
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Procedure	
(3) Install the seal cover (F) **13** onto the pump casing (F) **14** and tighten the hexagon socket head bolts **22**. ***Notes:*** • *Be sure to properly install the oil seal **67** onto the seal cover (F) in advance.* • *When installing the seal cover (F) onto the pump casing (F), be careful not to damage the oil seal, or oil leaks may be caused after reassembly.*	
(4) Install the compensator piston **37**, the piston case **38**, the Pf piston case **52** and the Pf piston **50** into the pump casing (F) and then install the ROH plug **24**. ***Note:*** *When installing the Pf piston case, apply grease thinly to the O-ring on the outside of the Pf piston case or take any other measures to prevent the O-ring from breakage.*	
(5) Assemble the cylinder block **5**, the piston assemblies **74**, the set plate **8**, the spherical bush **9** and the cylinder springs **10**. Install them to the drive shaft (F) **1** aligning the phases of the spline teeth of the spherical bush and cylinder block. Also install the spool assembly **84**. ***Notes:*** *Be careful not to damage the sliding surfaces of the cylinder block, spherical bush, shoes, swash plate, etc.* *Be sure to install the spool assembly **84** with its hole for the pin **48** facing up.*	 

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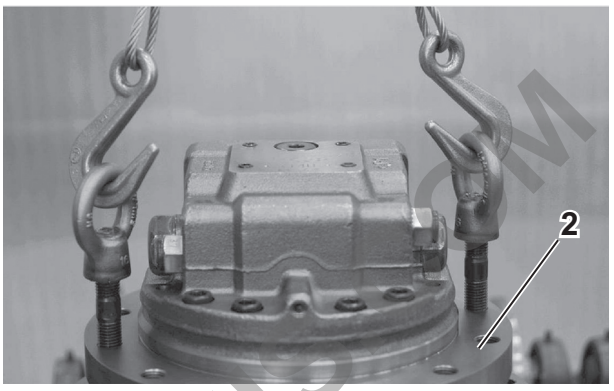
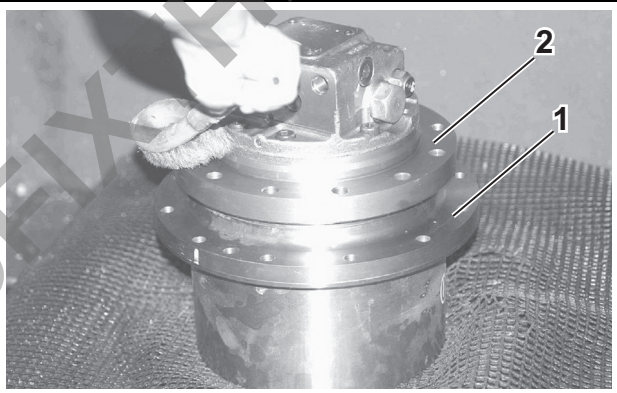
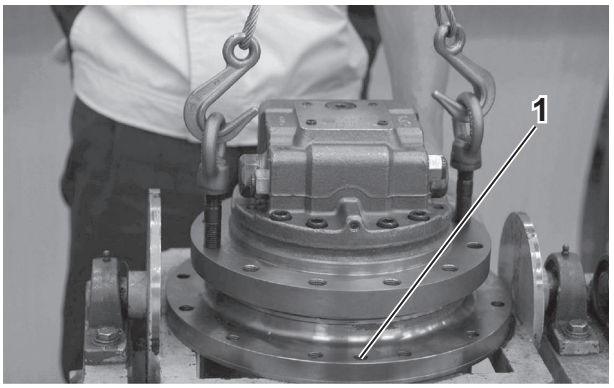
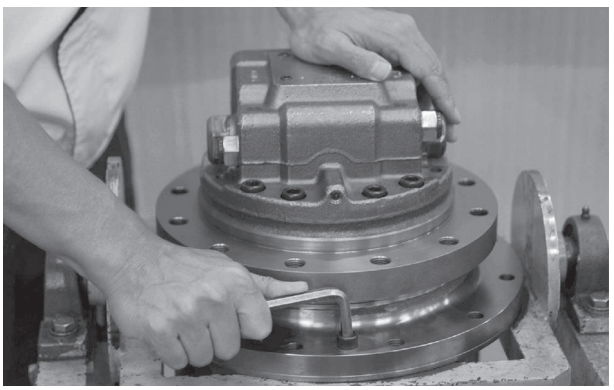
Procedure	
(14) Remove the steel ball **24** using a device, such as a magnet. ***Note:*** *Take care not to lose the steel ball.*	
(15) Fixing the lower casing assembly in a vice, remove the O-rings (**25** and **29** from the casing **18**).	
(16) Remove the reducing valve section assembly and the return spring **27** from the casing **18**. ***Note:*** *Note down the positional relationship with the casing hole.*	 

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Procedure	
(11) Remove the pin **2-11** and the retainer holder **2-13**.	
(12) While pushing the washer **2-9**, remove the snap ring **2-10**. ***Note :*** *Do not disassemble when it is not needed.* *Rotary parts should be changed as cylinder block assembly.*	
(13) Remove the collar **2-7**, the spring **2-8** and the washer **2-9**. ***Note :*** *Do not disassemble when it is not needed.* *Rotary parts should be changed as cylinder block assembly.*	
(14) Remove the thrust plate **2-5**.	

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3) Disassembly procedure

Procedure	
1. Washing the motor (1) Fasten the eye bolts to the spindle **2**. ***Note:*** *Fasten the two eyebolts in the screw holes for mounting the spindle so that they are positioned symmetrically.*	
(2) Hook the wire in the eyebolts, hoist the motor with a crane and carry to the washing tank. (3) Wash each part of the motor with a brush. ***Note:*** *Earth and sand get in the clearance between the hub **1** and spindle **2** (floating seal mounting section). Be sure to wash this part with special care.*	
2. Motor installation (1) Put the motor on a workbench. ***Note:*** *While matching the screw holes of the hub **1** and screw holes of the workbench, carefully place the travel motor in the mounting holes of the workbench.*	
(2) Mount the motor on the workbench so that the two hexagon socket head cap screws are positioned symmetrically. ***CAUTION:*** *Tighten the hexagon socket head cap screws securely. Failure to do so could result in injury caused by the motor falling when it is turned upside down.*	

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6-11-2 Disassembly

CAUTION: The following precautions must be taken at the time of disassembly.

Be sure to stop the engine after ensuring that the actuator is not muffled with pressure. When you disassemble the valve with the muffled pressure in the actuator, the high-pressure oil may spout out or the parts may come out.

1. Clean around the parts to be disassembled and prevent foreign material from entering the valve at the time of disassembly.
2. When you store the disassembled parts, attach tags that make clear how the parts need to be reassembled.
3. Replace the seals (O-rings) with new ones.

CAUTION:

The shutoff valve is, in principle, replaced as part of the assembly. Do not disassemble it unless there is an abnormality. Mark the assembly position of each part for reassembly.

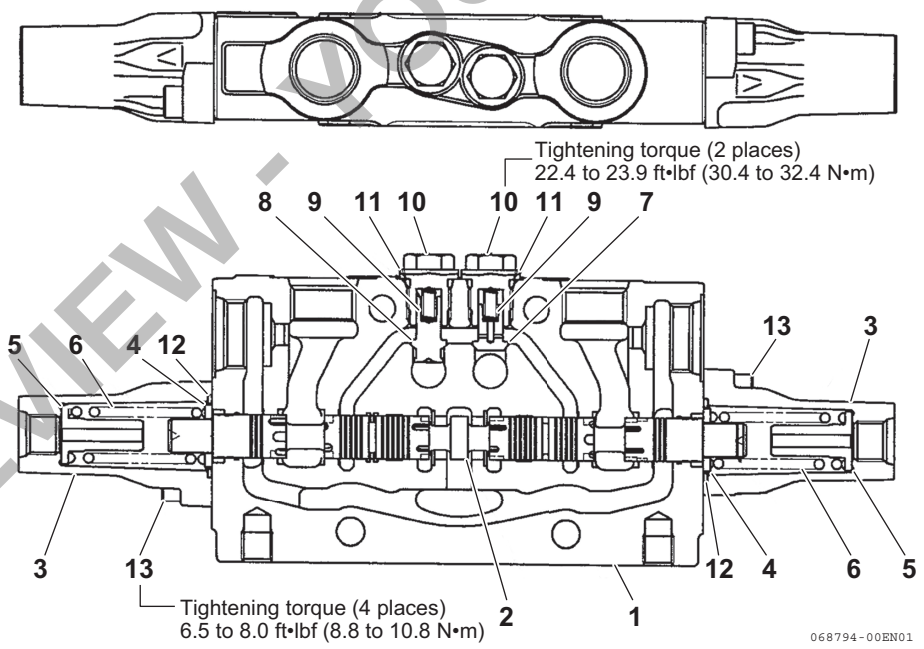
1. Disassembly of accessories

Remove the shutoff valve assembly **5**.

2. Disassembly of valve section

1) Disassembly of articulate boom cylinder section

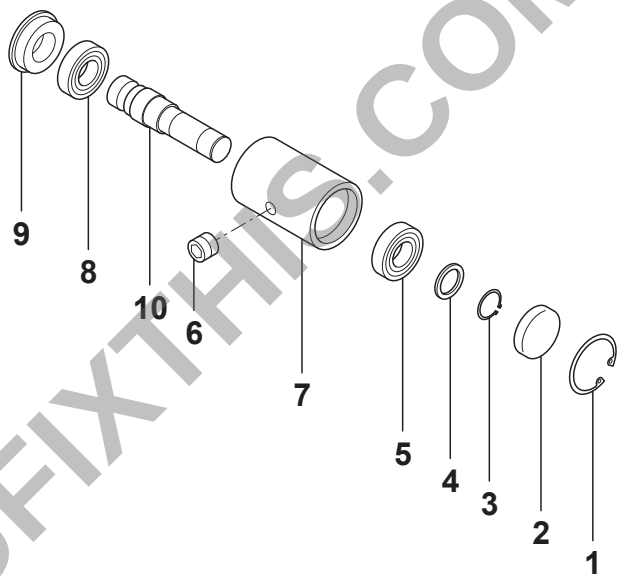
Loosen the socket head bolt (hexagon size 5 mm) **13** to remove the cap **3**. Then, remove the spring seat **4**, spring **6**, spring seat **5**, and O-ring **12**. After that, pull out the spool **2** from the valve housing **1**.



CAUTION:

Be sure to pull out the spool directly to avoid damage and scratches. If damaged or scratched, the spool may damage the spool bore of the body when you pull it out or it may be difficult to insert it during reassembly; even inserted, it may cause malfunction. Mark the assembly position for each spool. If mis-assembled, the cylinder may malfunction which is very dangerous (the same applies to the other sections).

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Procedure	
(2) Remove snap ring C **1** and cap **2**. (3) Remove snap ring C **3** and washer **4**. Then, pull out shaft **10** with a press. (4) Remove seal **9** and bearings **5** and **8**. (5) Remove plug R (PT) 1/8 **6**.	

3) Reassembly

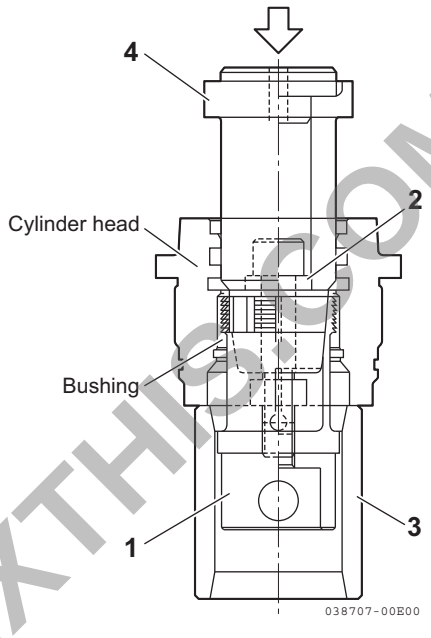
Reassemble the carrier roller in the reverse order of the disassembly procedure.

Notes:

- *Replace the cap and the seal with new ones.*
- *Supply inside of the roller with ALBANIA EP-2 or its equivalent.*

Plug R (PT) 1/8	
Adhesive	Apply Loctite 242 or its equivalent
Quantity of grease	0.11 Qts. (0.1 L)

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Procedure	
(17) Tighten the bolt until wedge **2** is fully inserted into chuck **1**. (18) Put the cylinder head on block **3** and set retainer assembly **4** into the cylinder head, and then, press retainer assembly **4** until the bushing is removed from the cylinder head. (19) Remove the bushing from chuck **1** using a lever and wrench.	

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