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監督						
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協会・本部						
協会・支部						
船営本部	営業部					
	業務部					
	ｱﾌﾀｰ					
資材部	管理					
	購買					
品保部	造船					
	艦艇					
	鉄構・機					
艤装部	工事					
	船装1					
	船装2					
	機装					
	塗装					
修繕部	工事					
	船体					
	機関					
造兵部	電装					
	電気					
	造兵					
造船設計部	SD					
	SN					
	SC					
	SF1					
	SF2					
	SM1					
	SM2					
	SE					
	SS					
生産技術部						
本船		1				
船主		2				
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合計		4				

OASIS RIVER

S~~761~~/762

Main Diesel Generator Engine Operation Manual & Parts List

(FINISHED PLAN)

CLASS : ABS (ACCU)	SCALE : —

SASEBO HEAVY INDUSTRIES CO., LTD.

SASEBO HEAVY INDUSTRIES CO.,LTD. SHIP DESIGN DEPT. 佐世保重工業株式会社 造船設計部

SASEBO SHIPYARD
SASEBO JAPAN
FEB. 0 6. 2009
SHIP DESIGN DEPT.

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WORK NO.	1000761/1000762
DRAWING NO.	---

DK-20

INSTRUCTION MANUAL
(OPERATION)

DAIHATSU

● Replacement Parts

・Hazards and nonconformities of imitation parts

<Use of imitation parts causes accidents.>

1. Recent engines have compact bodies and high power, and are designed to prevent fuel deterioration and to reduce NOx discharge. Even if imitation parts are similar in shape to the genuine parts, the use of imitation parts will degrade the engine performance because of their fragile materials and low machining accuracy. Since the service life of such parts is short, the engine
2. If imitation parts are used for the engines designed in accordance with MARPOL VI, the certificate (EIAPP) may lose its validity, and operation of the engine may be inhibited.
3. If you use imitation parts, you will not be supplied with parts improved in quality and performance.
4. If imitation parts are used, it may be difficult to make insurance claims for the engine when any accident occurs.
5. We take no responsibility for the engine in which imitation parts are used.

Daihatsu Diesel supplies reliable engines. Use genuine parts to operate your engine safely.

DAIHATSU DIESEL MFG.CO.,LTD. http://www.dhtd.co.jp

Head Office	1-30, Oyodo Naka 1-chome, Kita-ku, Osaka, 531-0076 Japan TEL : 81-6-6454-2346 FAX : 81-6-6454-2680
Tokyo Office	2-10, 2-chome, Nihonbashi-Honcho, Chuo-ku, Tokyo, 103-0023 Japan TEL : 81-3-3279-0827 FAX : 81-3-3245-0359
Jakarta Office	16th Floor, Wisma Antara Bldg., Jl. Medan Merdeka, Selatan No.17, Jakarta-Pusat, Indonesia TEL : 62-21-384-8411 FAX : 62-21-384-8412
Taiwan Office	No.14 Tai-Tang RD, Lin-Hai Industrial Zone, Kaohsiung, 812 Taiwan (c/o Marine Technical Industries Co., Ltd.) TEL : 886-7-803-1082 FAX : 886-7-801-9179
Daihatsu Diesel (Europe) Ltd.	5th Floor, Devon House, 58-60 St. Katharine's Way, London E1W 1LB, U.K. TEL : 44-20-7977-0280 Fax : 44-20-7702-4325
Daihatsu Diesel (AMERICA), Inc.	180 Adams Avenue, Hauppauge, NY 11788, U.S.A. TEL : 1-631-434-8787/8/9 FAX : 1-631-434-8759
Daihatsu Diesel (ASIA PACIFIC) Pte.Ltd.	128 Pioneer Road, Singapore 639586 TEL : 65-6270-7235 FAX : 65-6270-6236
Manila Office	Unit 1010 Herrera Tower Herrera Corner Valero Sts., Salcedo Village, Makati City 1226 Philippines TEL : 63-2-753-3211 63-2-817-1279/1285 FAX : 63-2-845-0691
Daihatsu Diesel (SHANGHAI) Co.,Ltd.	Room A, Floor 9, Huamin Empire Plaza, No. 726 Yanan RD (w), Shanghai, China TEL : 86-21-6225-7876/7 FAX : 86-21-6225-9299

DK-20 INSTRUCTION MANUAL (OPERATION)

◎ As for the disassembly, maintenance, assembly, and the parts to be replaced, refer to the separately provided INSTRUCTION MANUAL (MAINTENANCE) and PARTS LIST.

◎ Keep this Instruction Manual and the related documents (drawings, materials, etc.) in the specified place so that the persons engaged in operation of the engine can refer to them whenever necessary, and in case that the supervisor of the engine is changed, be minded that these documents, along with the duties, shall be transferred to the successor without a fall.

CONTENTS

CONTENTS

0. Introduction

1) Only skilled operators who have carefully read and fully understood the instruction manual should operate, inspect and service this machine.
Operation, inspection or servicing by persons inadequately familiar with the machine may result in personal injury, equipment damage or environmental hazard.

(2) No responsibility shall be assumed whatsoever for product damage or any associated fires, oil spills or other environmental hazards, personal injuries, property damage or economic losses caused by the use of non-genuine parts or operation, inspection or servicing that deviates from the instruction manual.

(3) We shall repair new parts or replace any flawed parts made or sold by us, however no compensation shall be provided for damage to any equipment not of our manufacture or cargo, or personnel, fire-fighting, towing or other expenses arising from the use of such flawed parts or fowled fuel, lubricant, cooling water or other medium.

(4) This instruction manual is subject to change without notice.

0-1. Before Running Daihatsu Diesel Engine

This instruction manual describes the proper operation procedure of the DK-20 engine, its daily maintenance and inspection procedure, and other necessary information on the engine.

To maintain the engine in good operating condition and ensure that it provides the specified performance, be sure to read through this manual and become sufficiently familiar with the proper procedures before operating the engine.

Do not use your engine for applications or under the conditions other than those it is designed for.

Be sure to observe the procedures described in this manual. Improper practices can cause damage to the engine or result in injuries or fatal accidents.

(1) ⚠ ⚠ Each piece of the information enclosed in the square box is an important safety precautions and provided as a warning or caution.

(2) The features and structure of your engine may be different from those provided in this manual depending on the specifications of the engine delivered. In this case, the engine specifications and final documents supplied separately have priority over this manual.

(3) For the details on the following machine or device, see their instruction manual supplied with this manual:

① Turbocharger ② Governor ③ Air motor
④ Control equipment ⑤ Other special devices

(4) Be sure to use the genuine parts of DAIHATSU DIESEL MFG. CO., LTD. or those specified in the parts list.

We will not guarantee the proper operation of the engine unless such parts are used.
For replacement of the parts or service on your engine, contact our Parts Sales Department, Service Department branch office, or the nearest DAIHATSU DIESEL MFG.Co.,Ltd provided on the cover page.

Be sure to provide us with the "type and number of your engine" when contacting us.

(5) To prevent environmental contamination, do not dispose of waste products, liquids, etc. thoughtlessly. Be sure to entrust the disposal of such waste products, liquids, etc. to the authoriqed waste disposal company.

0-2. Basic Information on Safety Operation

0-2.1 Safety Precautions

The diesel engine uses flammable oil. It has the high-speed rotational parts, the parts that become extremely hot, or the parts that are under high pressure fluid, during operation.
Improper handling of the engine can result in serious injury or fatal acciqents. Be sure to observe the safety precautions provided in this manual.

(1) Beware of Rotational Parts

⚠ **This engine has the high-speed rotational parts.**
Inadvertent contact of personnel or objects with such parts can cause that person to get caught in the engine, or cause the chips of objects to fly in all directions.

(a) Never attempt to touch the rotational parts such as the flywheel and couplings during operation. Also, be sure to place the protective cover in place before operation.
(b) Before starting operation, check that no personnel is around the engine. Warn any nearby personnel by signaling that the engine is about to start operation.

(2) Beware of Hot Parts

⚠ **The engine parts are very hot during and immediately after operation. Touching them with bare hands or skin can cause burns. Note that the exhaust manifold, turbocharger, indicator valve periphery, cylinder head, air cooler inlet, and heated heavy fuel oil pipes become extremely hot.**

(a) Never attempt to touch any part of the engine with bare hand or skin during or immediately after operation.
(b) Be sure to wear safety gloves or other protective gear for making measurements or inspection.
(c) Allow the engine to sufficiently cool down before performing inspection or maintenance work.

(3) Prevent Oil from Catching Fire

⚠ **Fuel oil or lubricating oil coming in contact with extremely hot parts of the machine may catch fire.**

(a) Be attentive to oil leakage during operation. If any leakage is found, immediately stop the engine and eliminate the leakage.
(b) Strictly observe the "Caution: Flammables" sign when adding fuel oil or lubricating oil.

If the engine is stopped due to failure or defect failure, be sure to eliminate the cause of defect and restore it to the normal operating condition before resuming the engine operation.

0-2.2 Safety Signs and Symbol Marks

This instruction manual and warning labels affixed to the engine carry one of the following safety signs and symbol marks:

(1) Safety Signs and "Signal words"

- ···**"Warning"** : Precaution related to safety of personnel (Potential hazard which could result in death or serious injury)
- ···**"Caution"** : Precaution related to safety of personnel (Potential hazard which may result in minor or moderate injury)
- ···**"Precautions for handling"** : Information on handling of the engine to prevent damage
- ···**"Prohibition"** : Prohibited practice that can affect the safety of personnel and the engine
- ···**"Obligatory acts"** : Recommended practice or instruction to be followed to ensure safety of personnel and the engine

(2) Symbol Marks

(a) Warning Signs

- ···General warning
- ···Flammable → Fire
- ···Explosive → Explosion or Bursting
- ···Poisonous → Poisoning
- ···Voltage → Electric Shock
- ···Hot → Burn
- ···Rotational/Moving Part → Getting Caught
- ···Edge → Cut
- ···High-Pressure Fluid Jet → Injury
- ···High Location → Fall

(b) Prohibition Signs

- ···Non-specific general prohibition
- ···No Smoking
- ···Caution: Fire strictly prohibited
- ···Do Not Touch

(c) Signs for Obligatory Acts

- ···Wear Eye Protection Gear (safety goggles, etc.)
- ···Wear Head Protection Gear (hard hat, etc.)
- ···Wear Ear (Noise) Protection Gear (ear plugs, etc.)
- ···Wear Hand Protection Gear (safety gloves, etc.)
- ···Wear Foot Protection Gear (safety shoes, etc.)

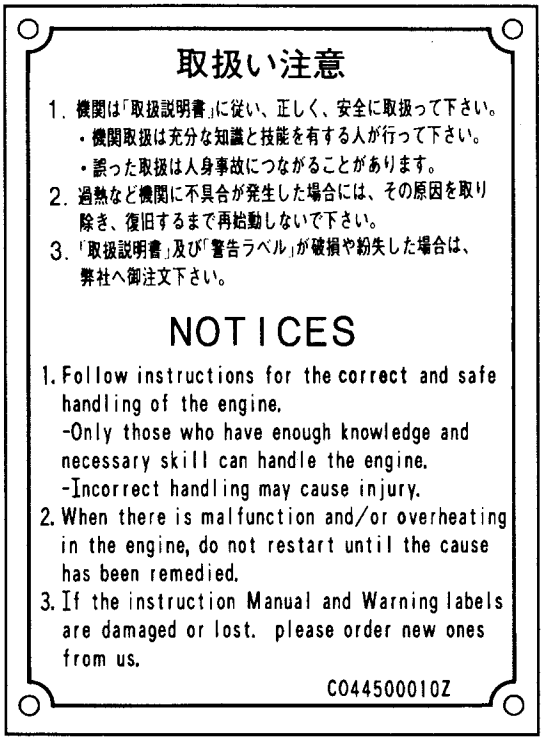
(d) Others

- ···See other pages in this manual or other documents.

0-2.3 Indication of Warning: Warning Labels

The warning labels shown below are used on the DAIHATSU DIESEL MFG.CO.,LTD

①



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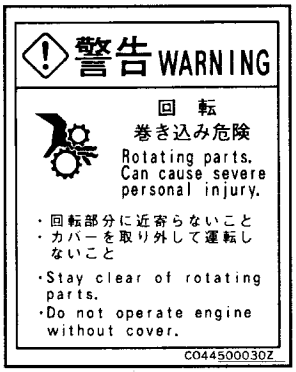

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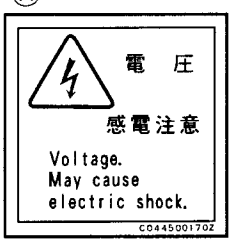
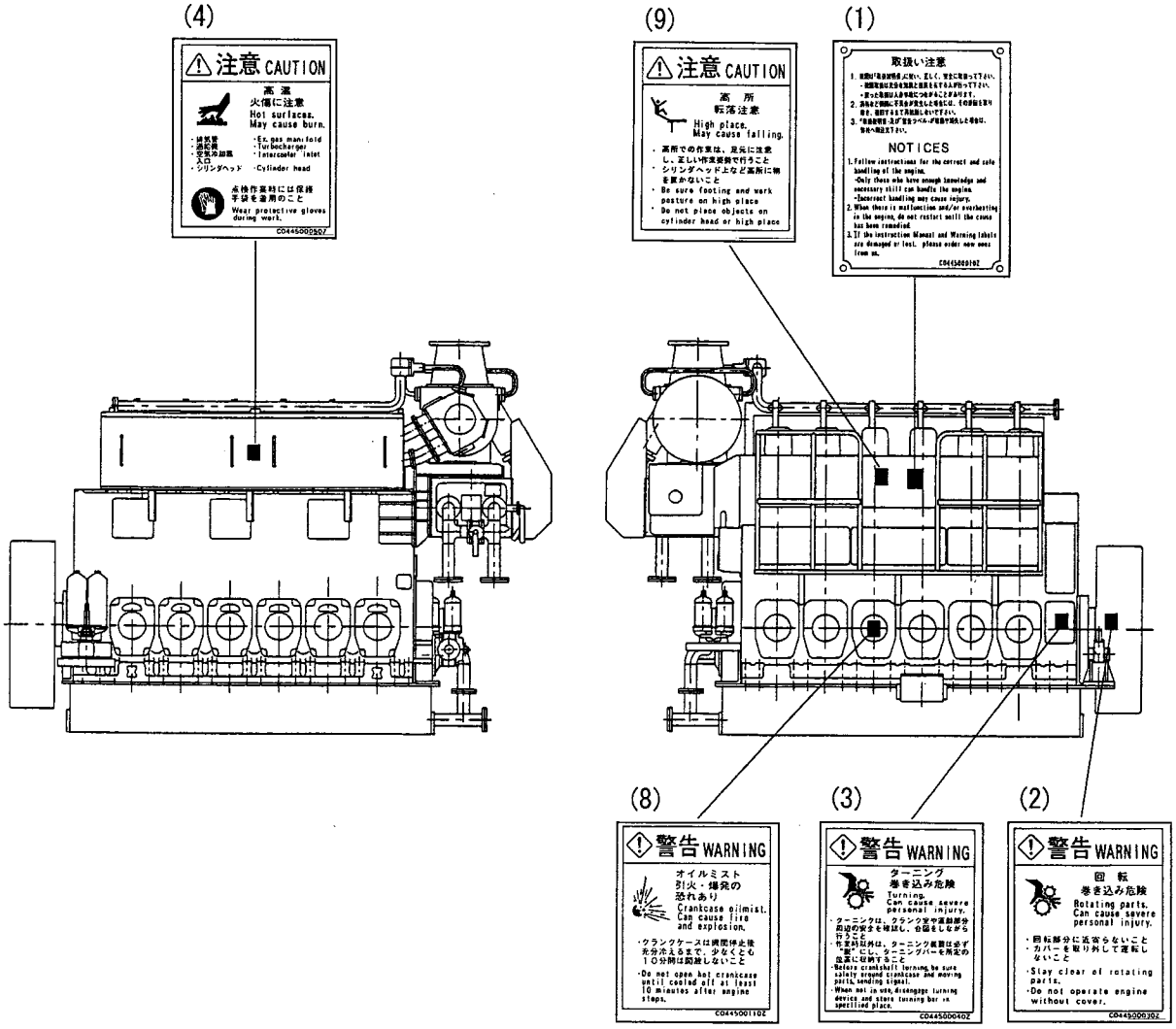
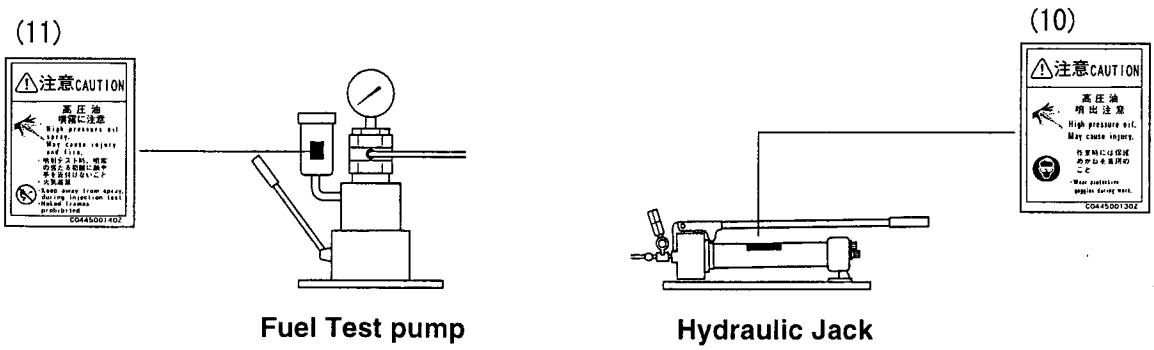


0-2.4 Indication of Warning: Warning Label Positions

For safty, the warning labels shown below are affixed to the engine. The numbers carried by labels correspond to those given on Item 2.3 of Chapter 0.
If a label is broken or falls, replace it with a new label, and make arrangement so that it may be visible clearly at any time.





Fuel Test pump

Hydraulic Jack

0-3 Engine Conforming to NOx Technical Code

0-3.1 Outline

(1) The marine diesel engines to which the 13th rule "Nitrogen Oxides (NOx)" in Supplement VI "Rules to Prevent Air Pollution by Ships" to MARPOL73/78 Treaty applies should conform to NOx Technical Code.

(2) The engines conforming to NOx Technical Code are authorized as an engine group or an engine family, and it is allowed to apply the engine parameter check method to them, when receiving the NOx discharge inspection on board.

The engine parameter check method is a method for verifying that the engine components and setting values conform to the requirements specified in the technical file, and does not require the measurement of NOx discharge. To the engines that are not conforming to the requirements of the technical file, the engine parameter check method cannot be applied. For such engines, the measurement of NOx discharge shall be required.

0-3.2 The parts to be Specified

The technical file states the engine components that can affect the NOx discharge specified in NOx Technical Code, and shows the identification marks stamped on them, and the user is required to maintain the technical file for each engine. When replacing any parts shown in the technical file, be sure to use our genuine parts stamped with the identification marks. In the case that any parts without the identification mark is used, it shall be regarded as nonconformance to the requirements of the technical file, and in such a case, inspection by the engine parameter check method cannot be applied.

The followings are the parts that have the identification marks specified in the technical file. When replacing any of these parts, be sure to check the identification marks. (📖: "Technical file")

<Parts with identification marks>

① Cylinder head
② Piston
③ Turbocharger
④ Air cooler
⑤ Fuel cam
⑥ Fuel injection pump
⑦ Fuel injection pump plunger
⑧ Fuel injection valve
⑨ Fuel injection valve nozzle

0-3.3 Engine settings

The engines conforming to NOx Technical Code are adjusted to conform to the specifications before shipment. After shipment, they should not be adjusted to such a manner that the setting values specified in the technical file may be deviated.

If any change is made in the manner that may deviate from the settings specified in the technical file, it shall be considered to be nonconformance to the requirements of the technical file, and the inspection by the engine parameter check method cannot be applied.

The followings are the items that have been set to conform to NOx Technical Code:

<Items set before shipment>

(1) Fuel injection timing
(2) Fuel injection valve opening pressure

0-4 General Information

0-4.1 Notation of Types Engine

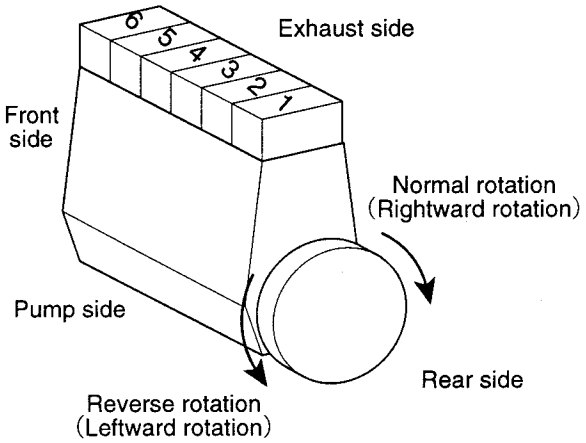
3, 5, 6, 8 DK (M) -20 (F) (L)

- Number of cylinders
- Name of series
- Marine propulsion engine
- Cylinder bore (cm)
- Front end drive
- Reverse rotation

0-4.2 Definition of Terms

Definitions of the terms used in this manual are as follows:

- Rear side of engine: Output end side (flywheel side)
- Front side of engine: Opposite side to the output end
- Exhaust side: Exhaust manifold side (on the right when seen from the output end)
- Pump side: Fuel injection pump side (on the left when seen from the output end)
- Normal rotation (rightward rotation):Clockwise rotation when seen from the output end
- Reverse rotation (leftward rotation): Counterclockwise rotation when seen from the output end
- Front end drive: Output from the engine front
- Cylinder and journal numbers……1, 2, 3, starting from the output end



Be careful with cylinder and journal numbers. Numbers are given in the reverse order for conventional engines.

0-4.3 Units

Basically, SI units are used on the engine and in this manual. Note that figures in { } are reference values given in the conventional uinits.

1-1 Engine Specifications

Model		3DK-20	5DK-20	6DK-20	8DK-20
Type		Vertical water-cooling direct injection type 4-cycle diesel engine			
Number of cylinders		3	5	6	8
Cylinders bore	mm	200			
Piston stroke	mm	300			
Engine speed	min^{-1}	※			
Output	kW	※			
	{PS}	※			
Ignition sequence	Constant speed	1-3-2	1-3-5-4-2	1-5-3-6-2-4	1-3-2-5-8-6-7-4
	Variable speed	—	—	1-2-4-6-5-3	1-3-2-5-8-6-7-4
Rotating direction		Clockwise when seen from the flywheel			
Turbocharging method		Turbocharged by exhaust gas turbine equipped with air cooler			
Starting method,Compressed air		Air motor		Direct (Starting valve)	
Cooling method	Jacket	Fresh water			
	Cooler	Fresh (or Sea) water			

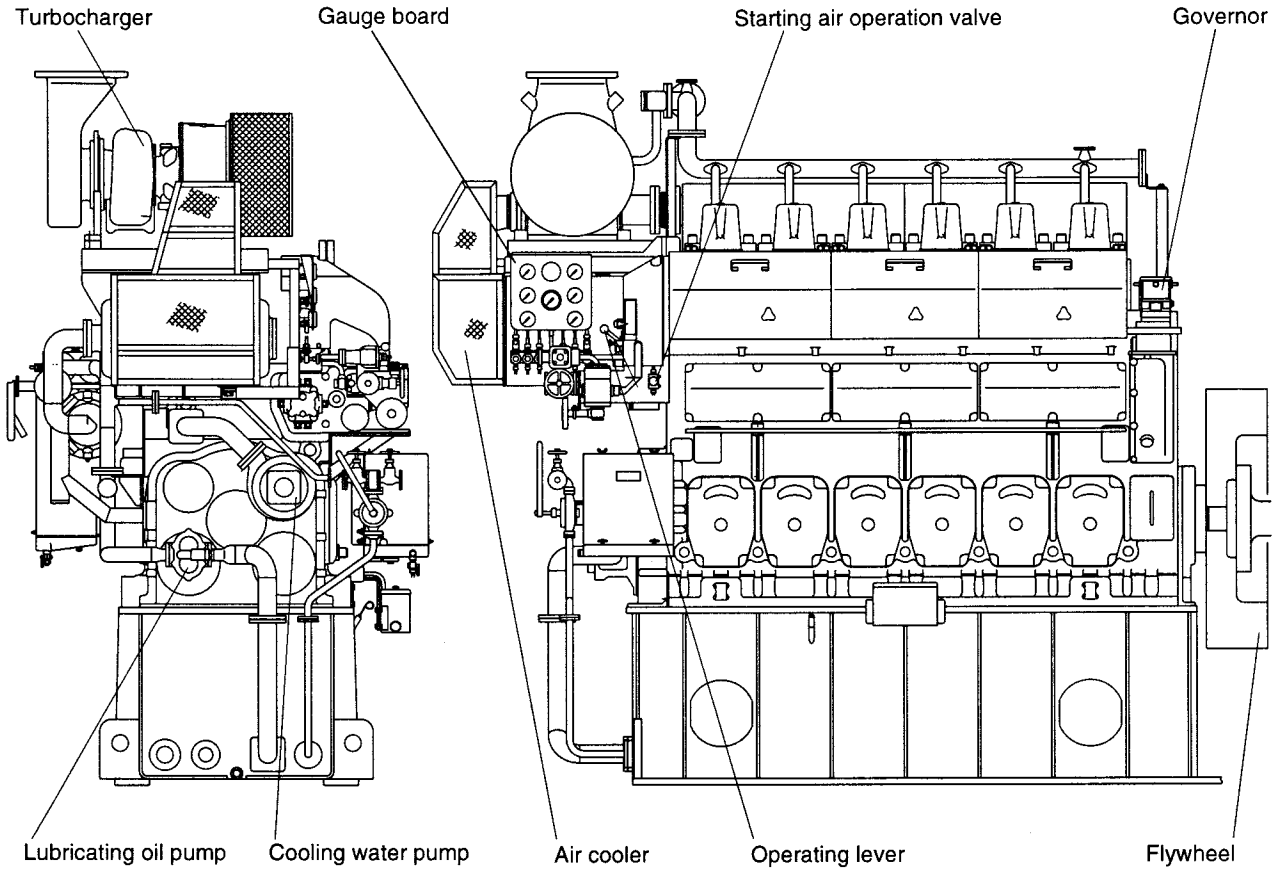
Note : (1) Both the ignition sequence and the rotation direction show the data in the case of normal rotation respectively.
(2) Since the engine speed and the output, which are marked with ※, differ depending upon each specifications, be minded to enter the data after referring to the "Engine Specifications" and "Test Run Record".

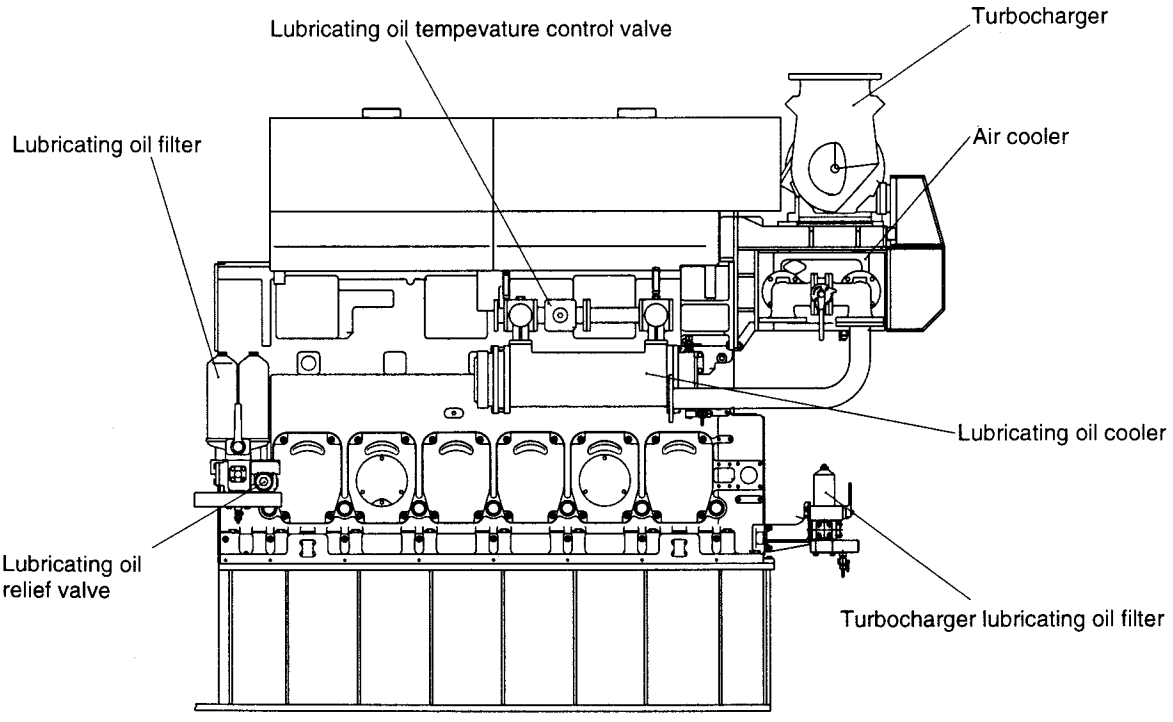
1-2 Auxiliary Equipment

Auxiliary / equipment	Type	Remarks
Turbocharger	Radial turbine type	
Air cooler	Multi-tubular type	
Governor	Hydraulic type	
Fuel injection pump	Bosch type	
Fuel oil valve	Bosch type	
Fuel oil feed pump	Gear type	
Fuel oil filter	Notch-wire wire, duplex type	
Lubricating oil pump	Gear type	
Lubricating oil cooler	Multi-tubular type	
Lubricating oil filter	Notch wire, duplex type	
Lubricating oil tank	Installed on the common base plate, or on a separate base plate	
Cooling water pump	Centrifugal type	
Fresh water cooler	Multi-tubular type	

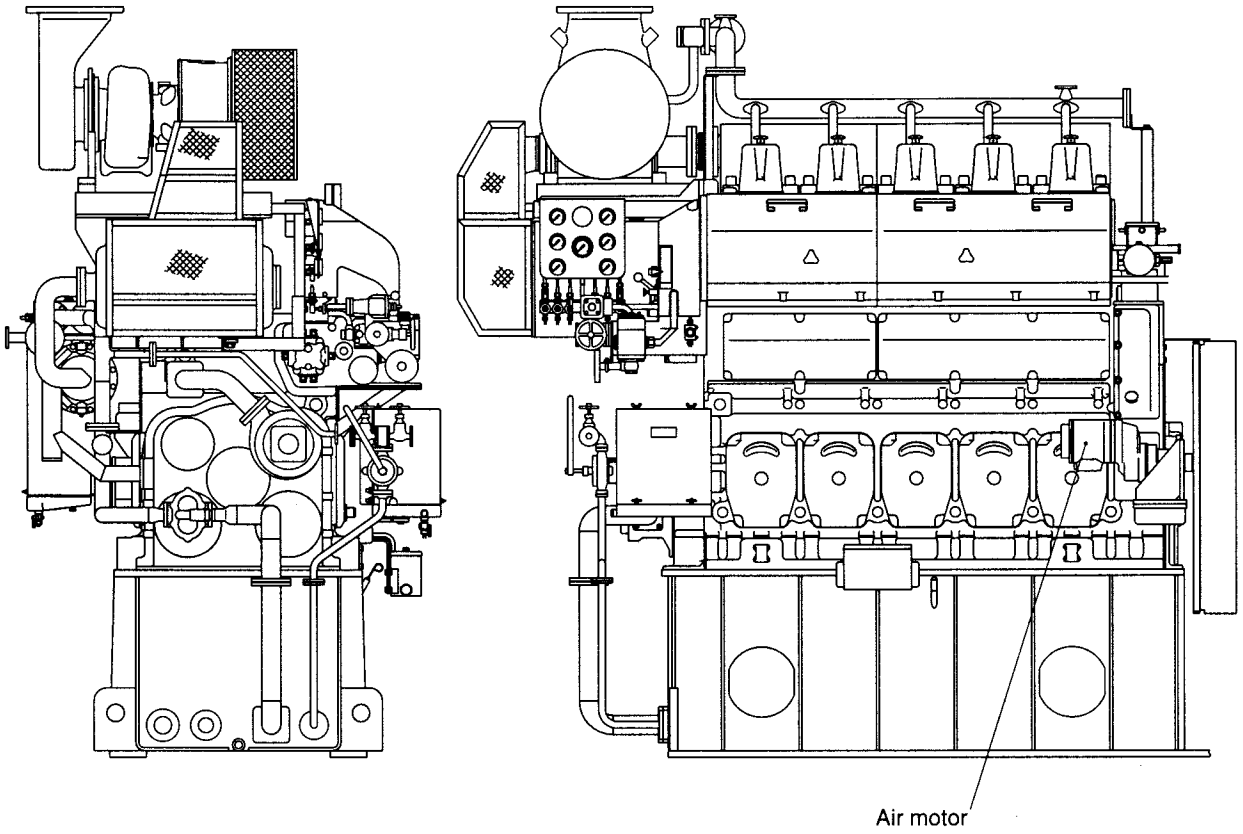
Note : The data given in the above table show those in the case of the standard specifications. Therefore, the data of your engine may differ from those shown in this table, and in such a case be minded to refer to the "Engine Specifications".

1-3 Engine Outline and Equipment Layout





1-3 Engine Outline and Equipment Layout



Memo

2-1 Engine

2-1.1 Engine Frame, Cylinder Liner, and Main Bearing

The frame is a monoblock structure made of cast iron, and the upper section of the frame forms a cooling jacket, together with the cylinder liner.
The main bearing is a suspension type, and mounted to the engine frame with 2 mounting bolts and 2 side bolts.
Intake air, lubricating oil, and each cooling water channel, and the timing gear case are incorporated in the engine frame.
A frame safety valve is provided to the cover on the engine frame side.

2-1.2 Crankshaft and Bearing

The crankshaft is made of a forged and monolithic structure, and the bearing part (the crank pin and journal) is quench-hardened.
The flywheel is installed at the rear end (output side) of the crankshaft, and the crank gear for driving the camshaft is installed at the front end of the camshaft, together with the auxiliary drive gear for driving various pumps.
The main bearing and crank pin bearing have a thin-walled, two-piece structure, and a thrust metal is attached to the front and rear end of the No.1 bearing located at the rear end.

2-1.3 Camshaft and Timing Gear

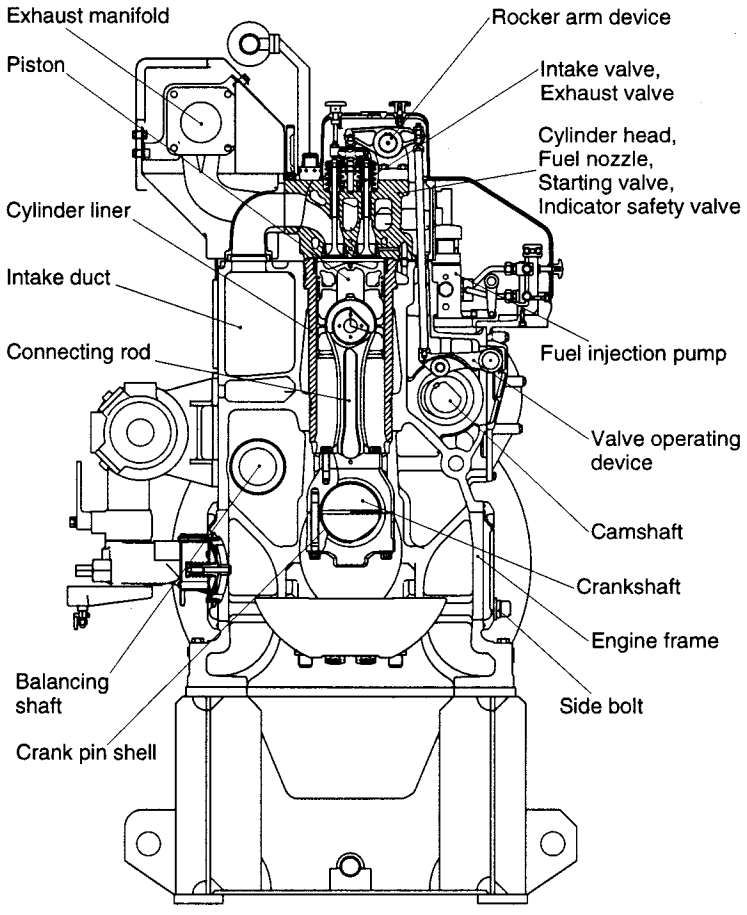
The camshaft is located on the left side of the engine (when seen from the output side).
The intake cam, exhaust cam, and fuel cam are fixed to the camshaft by shrink fitting.
The timing gear for driving the camshaft is installed on the rear side of the engine, and the cam gear is driven from the crank gear via the middle gear.
In 6.8DK engine, the drive coupling of the starting air rotary valve is installed on the rear side of the engine.
Note that in 3.5 DK engine, the starting air rotary valve is not installed since the engine is air motor starting type.

2-1.4 Balancing Shaft

In 3DK engine, the balancing shaft is installed for preventing vibration.
The balancing shaft is supported to the crankshaft with 4 thin-walled metal and 2 automatic core-adjusting bearing, and is driven by the auxiliary gear located on the front side of the engine.

2-1.5 Piston and Connecting Rod

The piston is of an assembly type made of special alloy steel with ductile cast iron, and is cooled down by the lubricating oil that is transferred from the connecting rod via piston rod.
The connecting rod is form-turned forged product with the large end, which is horizontally split into three parts, to allow overhaul of the piston without disassembling the bearing unit.



3DK-20

2-1.6 Cylinder Head

The cylinder head is of a highly rigid structure made of special cast iron, and is hydraulically secured to the piston with 4 bolts.
Four valve system is employed having 2 intake valves and 2 exhaust valves, and a water cooling valve seat, which is directly attached to the cylinder head, is installed for each exhaust valve.
The indicator valve and cylinder safety valve are installed on the upper face of the cylinder head, and the starting valve is located on the side of the head. Note that 3.5DK engine has no starting valve since it is motor starting type.

2-1.7 Fuel Injection Device

The fuel injection pump is a Bosch-type high pressure pump and a tappet-incorporated monolithic type. It is provided with a closed-type plunger barrel and isobaric valve, and plunger lubrication is employed.
Also, the high-pressure oil inlet coupling, which is a horizontal-insertion type, is connected to the fuel injection pump via high-pressure coupling made of forged steel.

2-1.8 Valve Operating Device

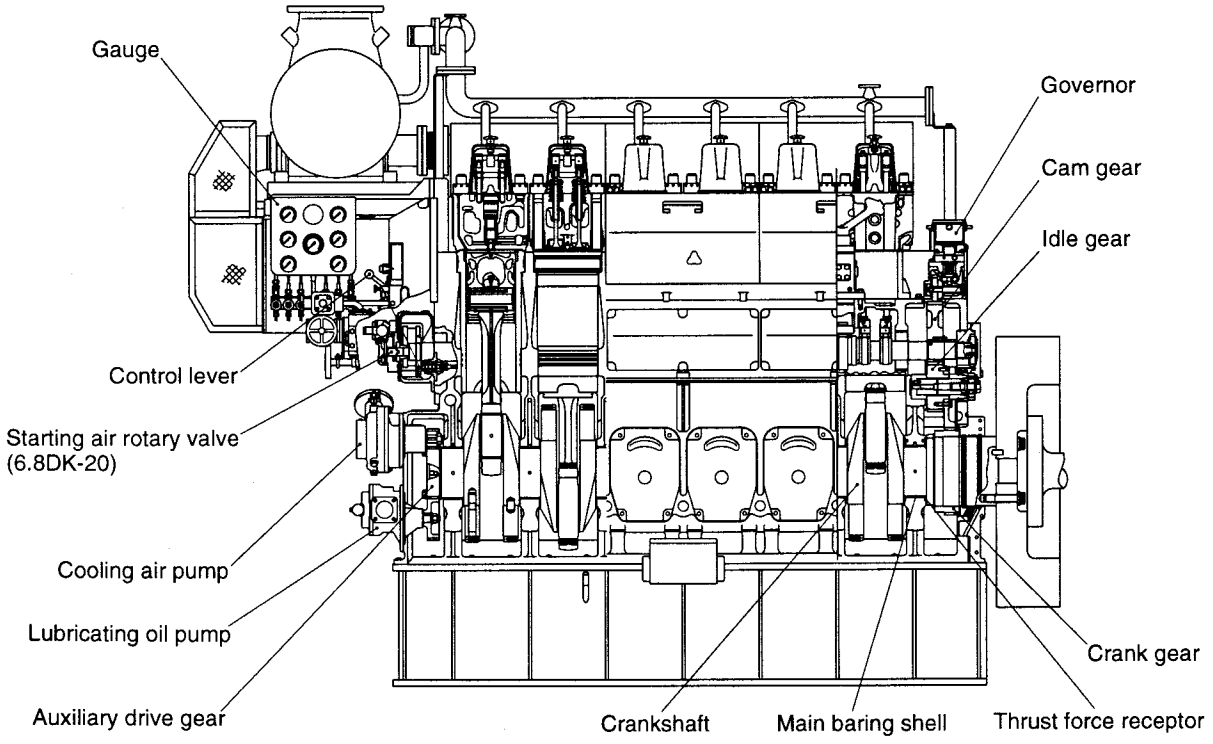
The intake and exhaust valves are driven by motion transferred from the camshaft via swing arm, push rod, and rocker arm.

2-1.9 Fuel Control Device

The governor is installed on the rear of the engine, and is driven by the cam gear.
The control lever is located near the gauge board on the front side of the engine, together with the starting valve.

2-1.10 Intake and Exhaust System

The turbocharger and air cooler are mounted on the front end of the engine.
The standard specification of the turbocharger is non-cooling and forced-feed lubrication, however the specifications may vary according to the engine type, output, and specification of each order.
(📖: "Instruction Manual of Turbocharger")
The exhaust manifold and air intake duct are installed on the same side of the engine, and the intake duct is incorporated in the engine frame.



2-2 Piping Systems

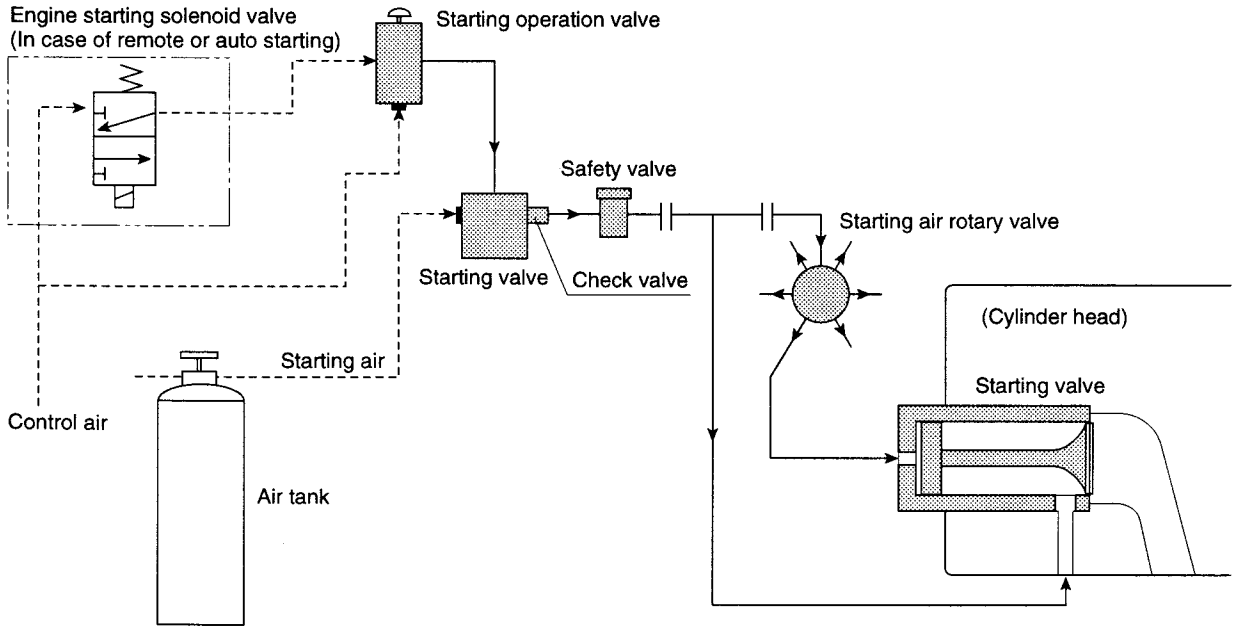
Piping systems and related equipment vary depending on the engine applications, type of fuel used, and specifications.
This section describes the typical piping systems of standard specifications. For more details, refer to the piping systems included in the final documents.

2-2.1 Starting Pneumatic System

Starting operation of the engine is by pneumatic system, and direct starting system is employed for 6.8DK, and air motor starting system is employed for 3.5DK.

(1) Direct Starting Type

Starting operation is made by means of the piloted ignition system using compressed air.
When the push button for the starting operation valve is pressed, control air flows to the starting air valve to open the main valve, and the compressed air reaches to the starting valve of each cylinder.
Meanwhile, the compressed air branched off from the main starting air pipe is sequentially supplied to each cylinder by the starting air rotary valve according to the ignition order, and opens the starting valve of each cylinder.
The compressed air sent through the main starting air pipe effects the piston, causing the engine to start its rotation.
The starting operation valve, starting air valve, and starting air rotary valve are installed on the front side of the engine, and starting air rotary valve is driven from the front end of the camshaft.
Note that a safety valve and a check valve is installed in the main air pipe for prevention of the reversed flow of combustion air.
In case that the engine is started remotely or automatically, the starting operation is made by means of the solenoid valve, allowing control air to reach the starting operation valve.
(📖: "Starting Method")



Starting Pneumatic System; Direct starting type

(2) Air Motor Starting Type

Starting operation of the engine is made by air motor system using compressed air.

In case of remote starting or automatic starting, if the stating push button of the engine control board or operation board (monitoring board) is pressed, the starter relief valve provided with pressure control function (monolithic type incorporated with relief valve) activates, and the decompressed air pushes out the pinion gear of the air motor.

When the pinion gear is engaged with the wheel gear attached to the flywheel, the main air circuit of the air motor opens.

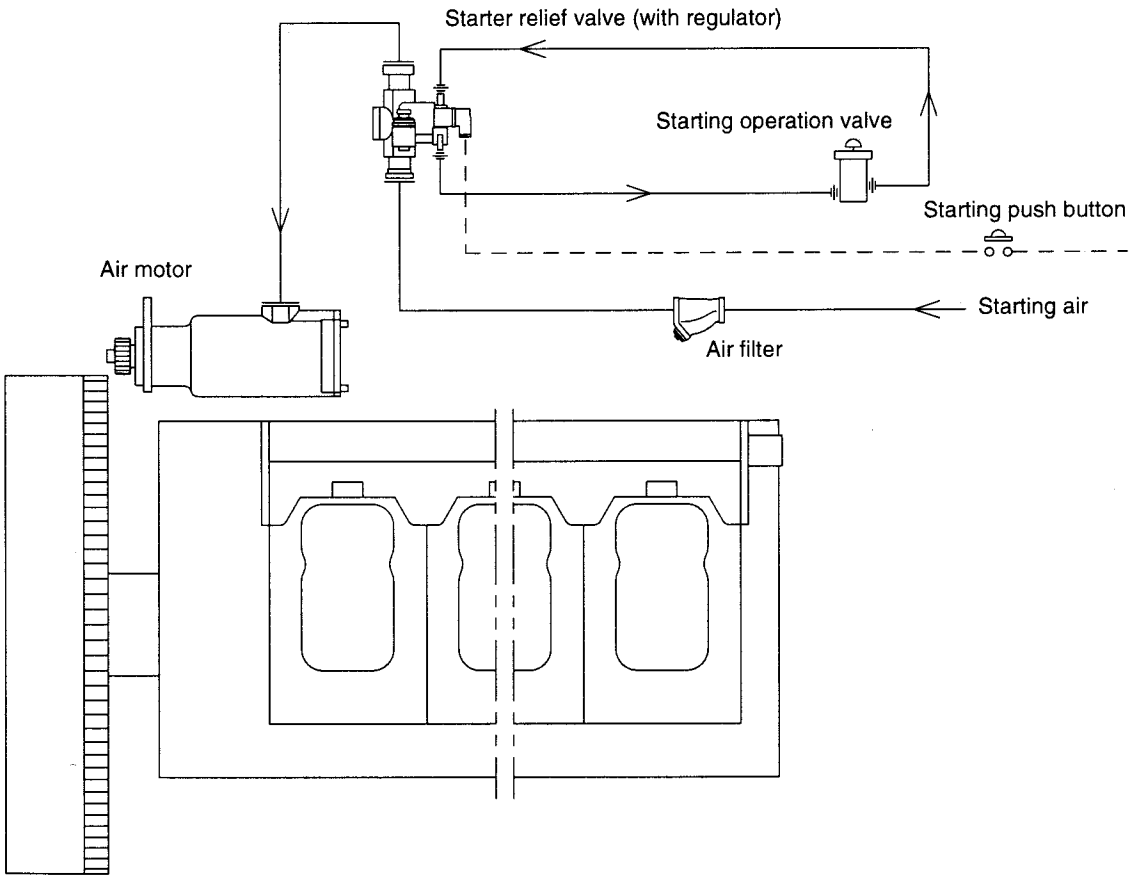
Consequently, the air motor is driven by the main air, and the engine starts its rotation.

In case of starting from the engine side (locally), if the starting operation valve is pressed, decompressed pilot air opens the main circuit of the starter relief valve, and decompressed air pushes out the pinion gear of air motor.

Note that a strainer is provided between the air tank and relief valve for protection of the air motor.

The relief valve and air motor are installed on the base plate of the engine.

(: "Starting Method")

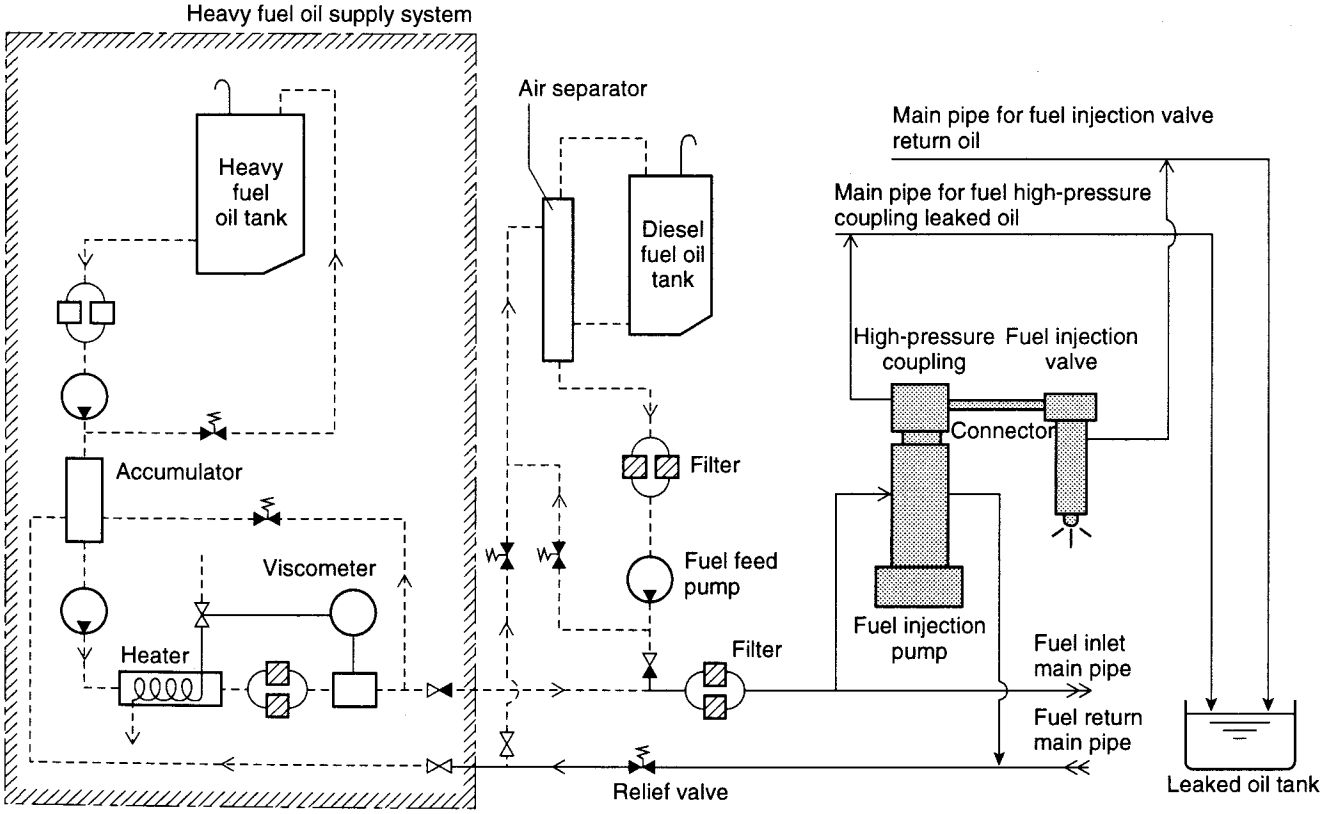


Starting Pneumatic System; Air motor starting type

2-2.2 Fuel Oil System

Fuel oil system vary depending on the grade of the oil used, and a typical example of the fuel oil system for heavy fuel oil is as shown below.
When heavy fuel oil is used, oil must be heated and kept at a constant temperature to maintain the oil viscosity suitable for injection.
Oil heated by the heater and pressurized by the fuel feed pump is transferred to the fuel injection pump via filter. Surplus of oil is returned to the inlet side of the oil feed pump via pressure regulating valve (relief valve), and is then circulated again.
The oil pipe is provided with various heat insulating arrangement such as steam trace or ragging, and is kept at a constant temperature.
The lubrication of the fuel injection pump is made by means of fuel oil circulation system, and the plunger is lubricated by means of forced-feed lubrication system using lubricating oil.
(📖 : "Lubricating Oil System")

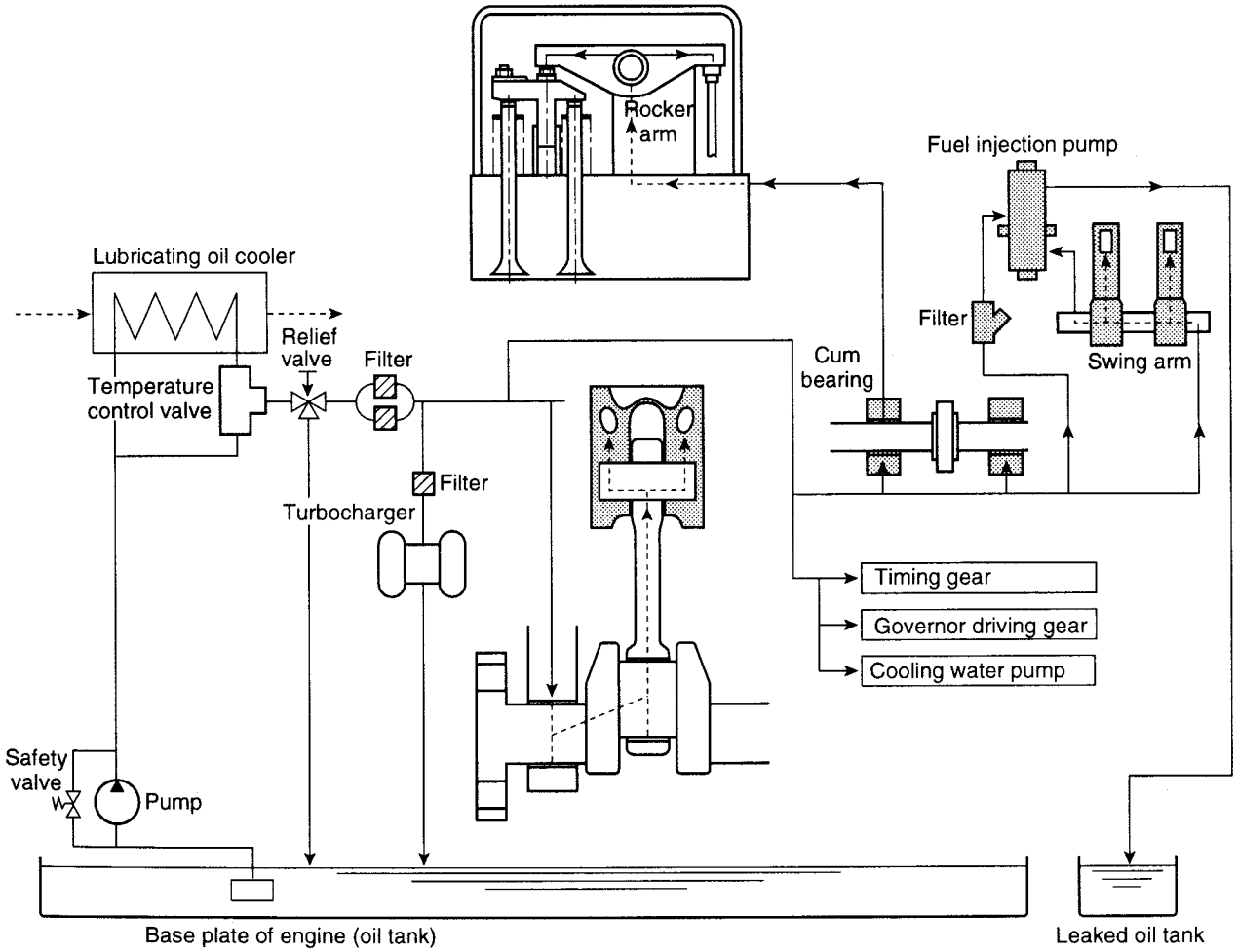
High pressure oil fed by the fuel injection pump is introduced into the fuel injection valve connector from the cylinder head side via high-pressure piping coupling.
In case of heavy fuel oil specification, nozzle cooling is provided to prevent the formation of carbon flower.
(📖 : 2-2.5 "Nozzle Cooling System")
When diesel fuel oil is used, heating or heating insulation of oil, and nozzle cooling is not required.



Fuer Oil System

2-2.3 Lubricating Oil System

The lubricating oil system is as shown below.
Lubricating oil transferred to the lubricating oil cooler from the lubricating oil pump is regulated to reach the specified temperature and pressure, by means of the automatic temperature control valve (hereinafter referred to as temperature control valve) and relief valve respectively, and the lubricating oil is transferred to the oil channel of the engine frame from the cooler via filter. Then, from this oil channel, the lubricating oil is supplied to the piston through the holes of the connecting rod via each main bearing metal and crank pin metal.
Lubricating oil is also supplied to the camshaft, valve-operating swing arm, fuel
injection pump, various gears, and around the locker arm.
The lubricating pump is of a gear type provided with a safety valve, and is installed on the front side of the engine, to be driven from the crankshaft.
The lubricating oil filter is a notch-wire duplex type, and blow-off cleaning during operation is possible with this filter.
Lubricating oil is supplied to the turbocharger and fuel injection pump via each special lubricating oil filter respectively.
Lubricating oil, that has circulated through and has lubricated each part, returns to the base plate of the engine (oil tank).



Lubricating Oil System

2-2.4 Cooling Water System

The cooling water system is divided into the jacket line (primary water) and the cooler line (secondary water), and normally the jacket line is used for fresh water, and the cooler line is used for sea water (in case of use for vessels) as the standard application.

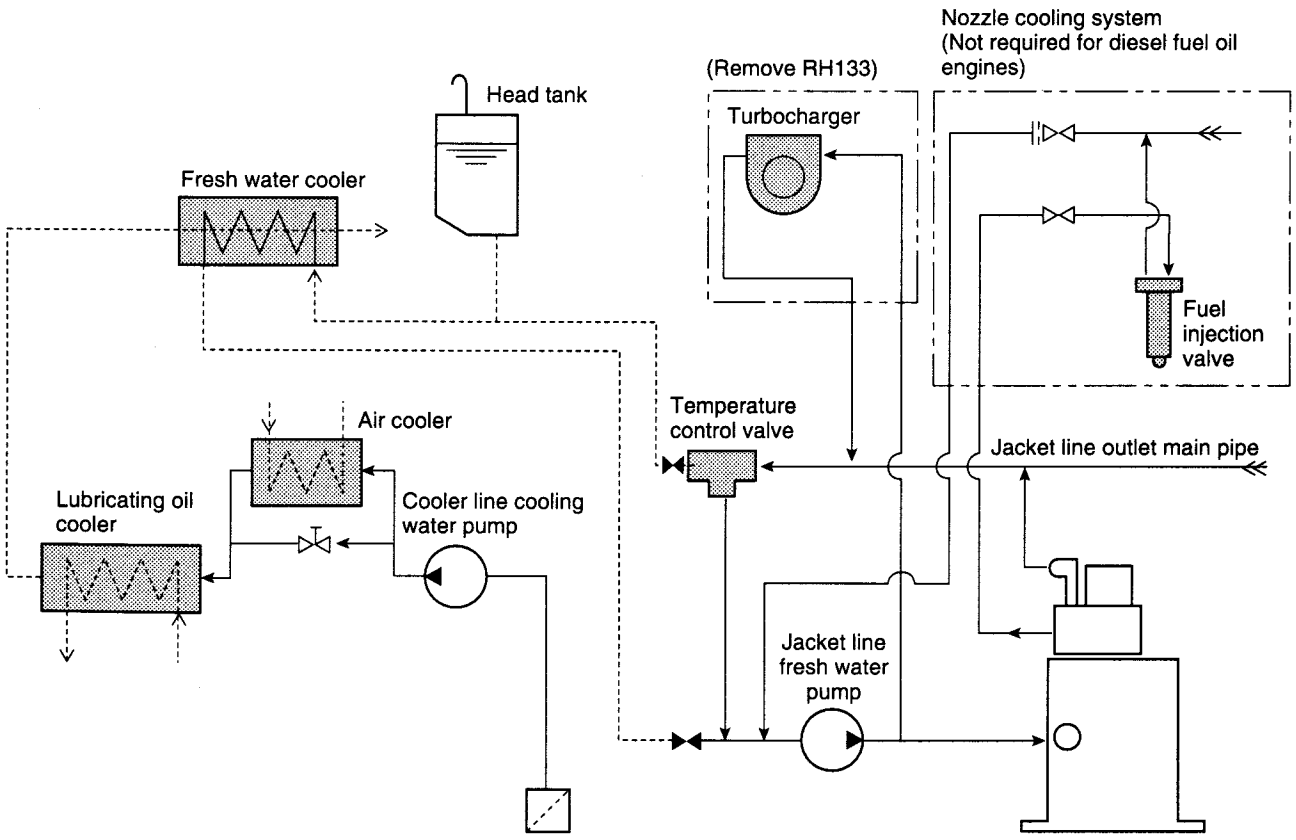
(1) Jacket Line

The jacket line circulates cooling water, and the water cooled by the fresh water cooler is forcibly fed into the cylinder jacket of the engine by the cooling water pump, so that the water cools various part of the engine and returns to the fresh water cooler through the outlet collective pipe.

A temperature control valve is provided between the inlet and outlet of the engine (or, fresh water cooler) to maintain the water temperature constant.

(2) Cooler Line

Cooling water in the cooler line is forcibly fed by a special pump exclusive for cooler line, which is separately installed, to the air cooler, lubricating oil cooler, and fresh water cooler, and is then discharged.



Cooling Water System

2-2.5 Nozzle Cooling System

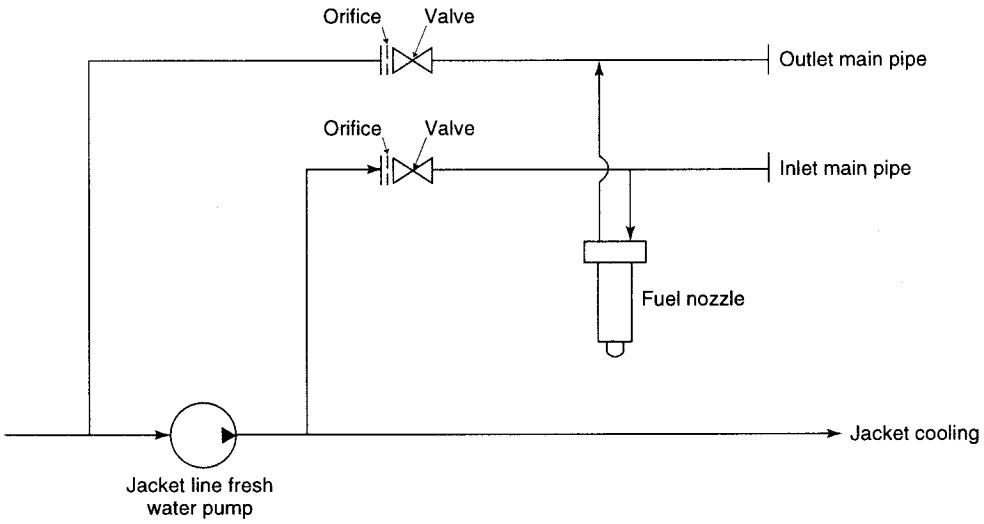
Nozzle cooling system is installed in the engine that uses heavy fuel oil.

In order to prevent the formation of the carbon flower that occur on the nozzle tip of the fuel injection valve when fuel oil temperature is intensely heated, cooling of the nozzle tip is required, and therefore the nozzle cooling using cooling water or diesel fuel oil is carried out.

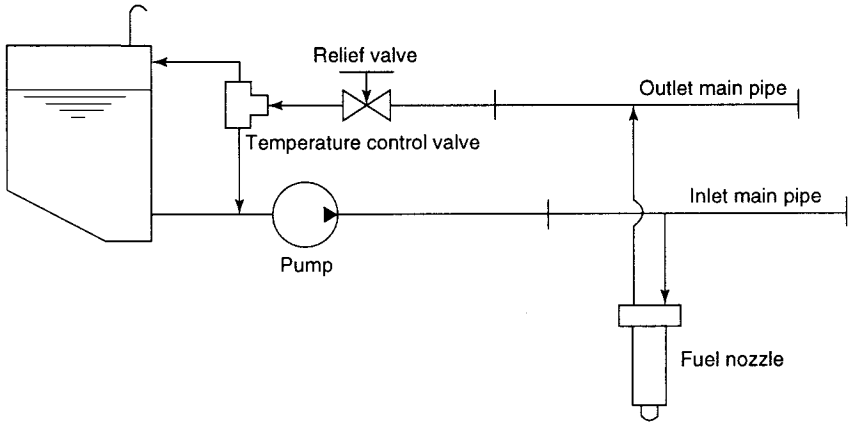
As the standard specification, cooling water is employed.

As the cooling water, part of the water used to cool the cylinder head is branched out and reaches the fuel injection valve through the inlet main pipe, so that it cools the nozzle tip and then returns to the outlet main pipe.

In case of the special specification using diesel fuel oil, the cooling system is of independently feeding system, and the nozzle cooling pump is installed on the front part of the engine. The oil reaches the fuel injection valve from the cooling pump through the inlet main pipe to cool the nozzle tip. After cooling, the oil returns to the outlet main pipe, and then returns to the diesel fuel tank through the relief valve and temperature control valve. This is the forced-feed circulation system.



Nozzle Cooling System Diagram (Fresh water cooling)



Nozzle Cooling System Diagram (Diesel fuel oil cooling)

2-3 Engine Operation Control and Protective Device

Control and protective devices such as the starting air valve and stoppage cylinder are activated by low-pressure control air.]
This section describes a system generally used for the power station that is remotely controlled for starting and stopping. The engine that is actually delivered may differ from the examples shown in this section depending on the specifications, and therefore refer to the final documents, which are separately provided, for the details.
As for the starting air system (high pressure), refer to the previous section 2-2.1.

2-3.1 Starting Control

(1) For Generator (Remote control)

a) In case of starting the engine by remote control, the control lever must always be set to "RUN" position. The handle switch (HS) will be turned "ON" at this state, and if the turning safety switch (TC) is also turned "ON", the engine will be on standby and ready for operation.

b) In case of directly starting the engine, the starting solenoid (88V) is powered, excited, and activated by a start command, so that control air flows into the starting air valve via starting operation valve, and the starting air reaches the starting valve as the main valve is opened.
Further, in case of air motor starting system, the solenoid valve of the starter relief valve is activated by a start command, and the decompressed air reaches the air motor to push the pinion gear.
When the pinion gear is engaged with the wheel gear, the main air circuit of the air motor will be opened.

c) Meanwhile, the same start command allows the fuel control solenoid (88L) to activate, causing control air to flow into fuel regulating cylinder, and allows the common rod to be held in position, so that the fuel injection amount is controlled not to be excessive at the time of starting.

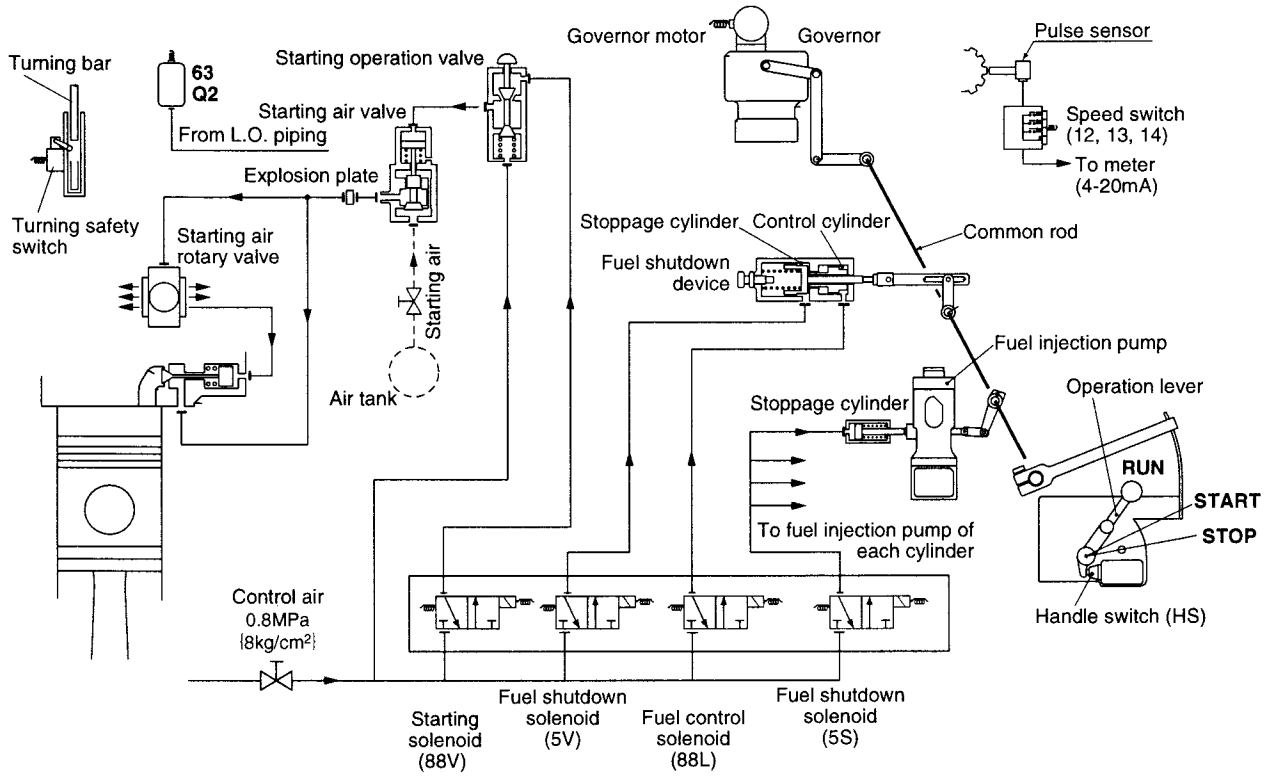
d) When the engine reaches the specified rotation speed, the low-speed relay (14) is activated, canceling the start command and resetting the protective circuit, so that the engine is set to operating state.

(2) Automatic Starting

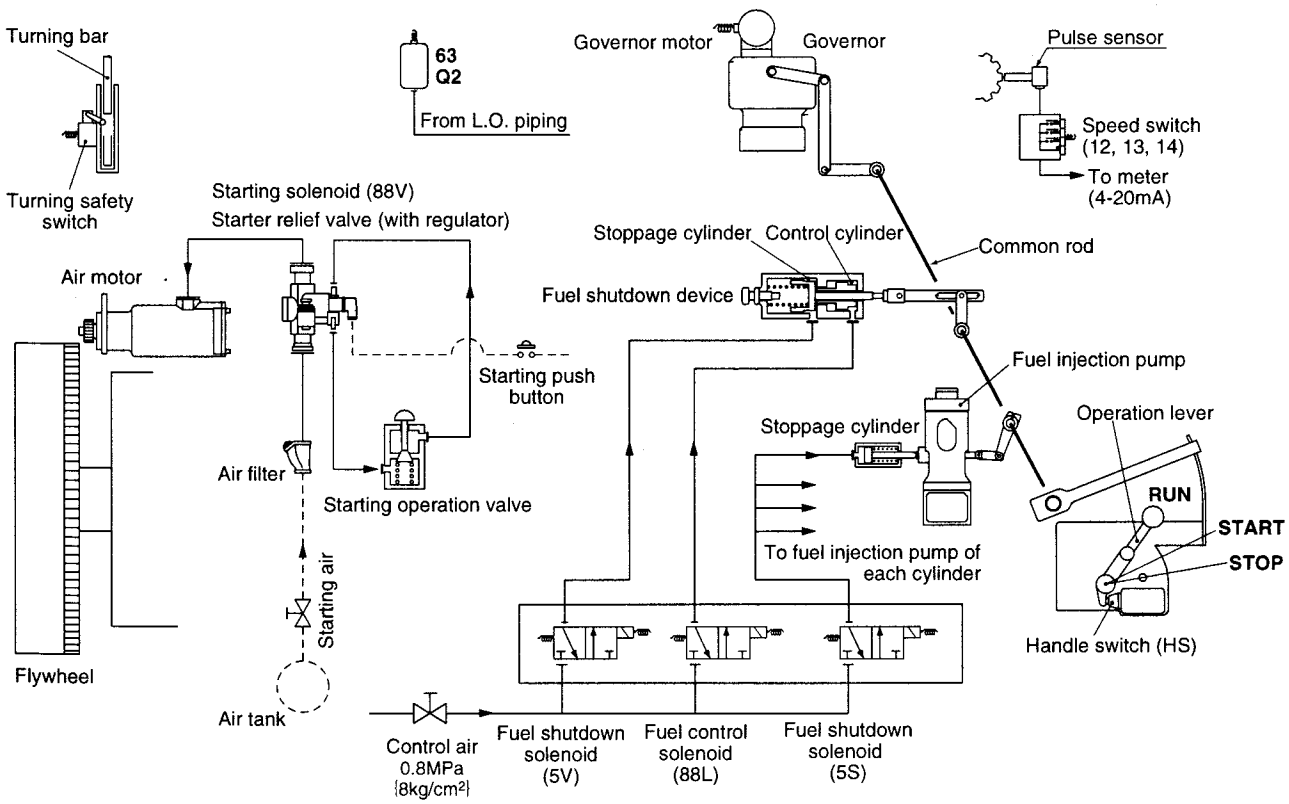
When the engine is started automatically, the engine solenoid is activated in response to the start command issued automatically in the specified sequence, so that the control air flows into the starting air valve and the engine starts its rotation.
Further, in case of air motor starting system, the solenoid valve of the starter relief valve is activated by a start command, and decompressed air flows into the air motor, so that the engine starts its rotation.

(3) Engine Side Starting (Local starting)

In case of starting the engine from the engine side (locally), the operation mode must be set to "LOCAL" position, and in case of direct starting system, if the push button of the starting operation valve is pressed, control air flows into the starting air valve, and starting air flows into the cylinder.
Further, in case of air motor starting system, if the push button of the starting operation valve is pressed, the main circuit of the starter relief valve is opened and the decompressed starting air flows into the air motor.



Starting and Stoppage System (Direct starting type)



Starting and Stoppage System (Air motor starting type)

(4) For marine propulsion engine

a) Engine Side Starting (Local starting)

i) In case of starting the engine from the engine side (locally), the changeover valve on the engine must be set to the local side, and the control lever must be changed to "START" position from "STOP" position. At this state, the handle switch (HS) will be turned to "ON", and the protective circuit will be released.

ii) When the push button of the starting operating valve is pressed, control air flows into the starting valve, and starting air (high pressure) flows into the starting valve as the main valve of the starting air valve is opened.

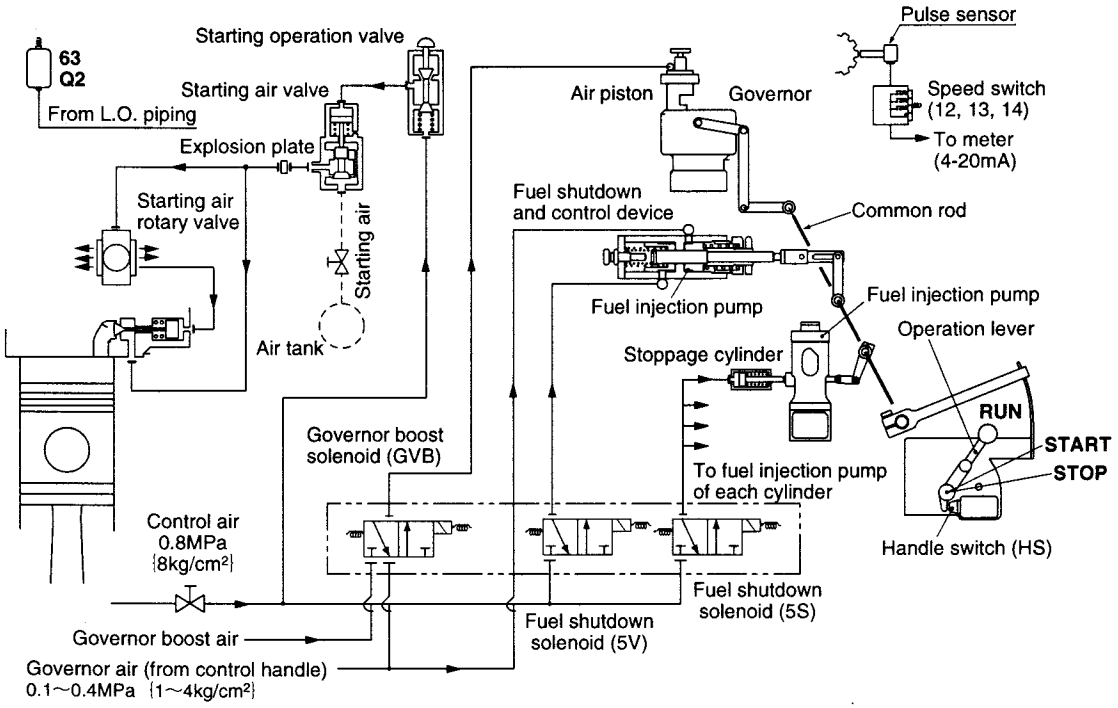
iii) When the engine reaches the specified rotation speed, the low-speed relay (14) is activated, so that the start command is canceled and the protective circuit is reset, allowing the engine to be at starting state.

iv) When the idle rotation speed becomes stable, turn the operating lever to "RUN" position from "START" position.

b) Remote Starting (Starting from the bridge)

i) When the engine is to be started remotely (starting from the bridge), set the control handle of the bridge to "NEUTRAL" position, and set the operating lever to "RUN" position. Then, the handle switch (HS) will be turned "ON", and the turning safety switch (TC) will also be turned to "ON", so that the engine is on standby position for starting.

ii) The starting solenoid (88V) is powered, excited, and activated by a start command, and control air flows into the starting valve via starting operation valve, so that the main valve is opened, and starting air flows into the starting valve.



Starting and Stoppage System (Marine propulsion engine side)

2-3.2 Stoppage Control

(1) For Generator

The fuel shutdown solenoid (5V) is activated by a stoppage command, causing control air to flow into the fuel shutdown device, so that the common rod is turned toward stoppage direction, and then the engine is stopped.

In case of stopping the engine from the engine side (locally), turn the operating lever to "STOP" position.

Note that the fuel control cylinder above described is the monolithic type assembled with the fuel shutdown device.

(2) For Marine propulsion engine

The fuel shutdown solenoid (5S) is activated by a stoppage command, causing control air to flow into the stoppage cylinder, so that the rack of the fuel injection pump is moved toward the stoppage direction, and then the engine is stopped.

2-3.3 Engine Protection System

(1) As for the errors that may be led to serious accidents or failures, alarm is issued and emergency stop is made.

Each abnormal operation data or value is detected by a switch or sensor, and the fuel shutdown solenoid is activated by an emergency stoppage command, so that the engine is immediately stopped.

(2) Depending the specifications, the dual safety system will be provided. In such a case, in addition to the normal engine stoppage, control air is flowed into the stoppage air cylinder attached to the fuel injection pump to stop the engine.

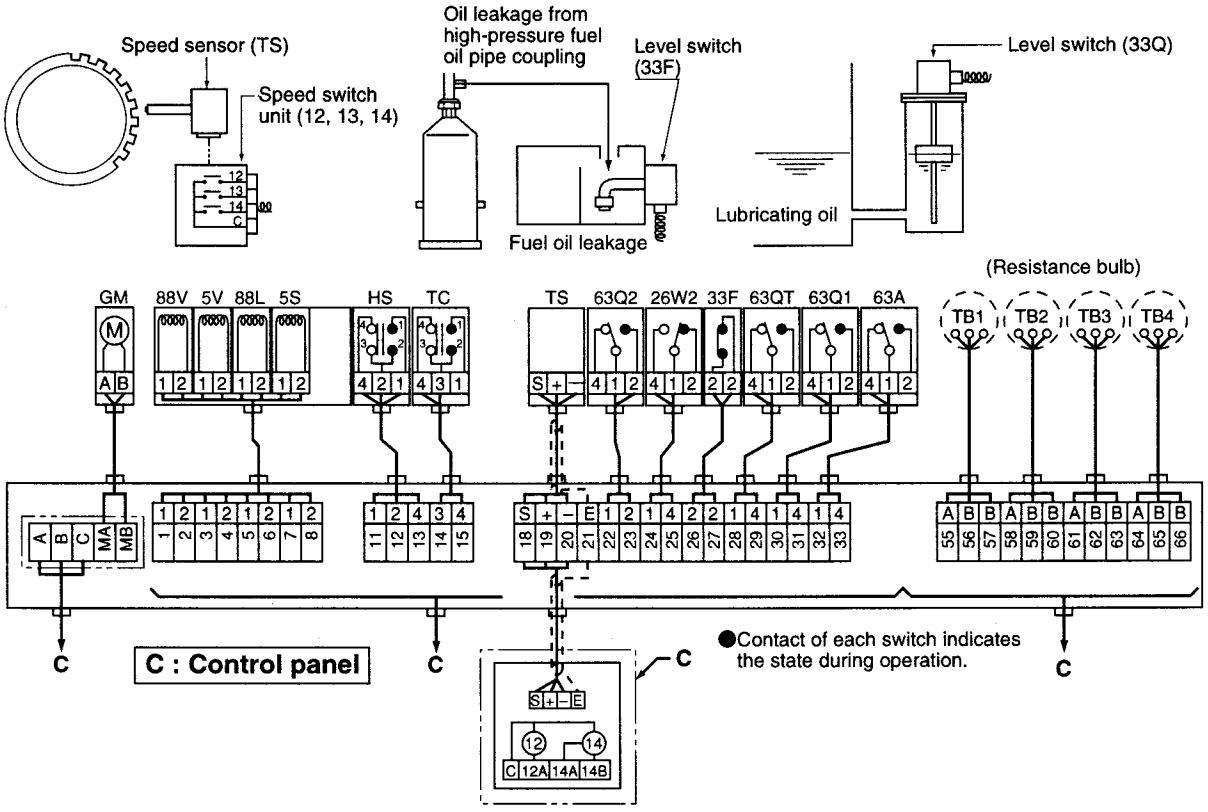
(3) When the forward clutch of the reduction gear is engaged, the governor boost solenoid is activated by movement of the control handle, causing the governor air boost to reach the governor, so that the reduction of the engine rotation speed is prevented.

Further, the engine rotation speed is controlled by governor air via governor, and at the same time the governor air reaches the FO control cylinder to control the rotation speed of the common rod, so that the excessive supply of fuel injection is restrained. (for the specifications of the marine propulsion engine)

Table 2.3-1 Alarm and Stoppage Items (Examples)

Detection item	Alarm	Shutdown	Location	Remarks
Overspeed			Cam gear	
Decrease of lubricating oil pressure	※63Q1	63Q2	Engine inlet	
Increase of fresh cooling water temperature	※TB4	26W2	Engine outlet	TB4:Combined use for issuing command
Decrease of turbocharger lubricating oil pressure	63QT		Turbocharger inlet	
Increase of exhaust temperature	※TB3		Engine inlet	Combined use for issuing command
Increase of exhaust temperature	※TB1		Turbocharger inlet (or, outlet)	Combined use for issuing command
Oil leakage from high-pressure fuel oil pipe coupling	※33F		Tank level of leaked or waste oil	
Decrease of lubricating oil level	※33Q		Engine lubricating oil tank	

※ Marked : Option



Engine Protection System (Example)

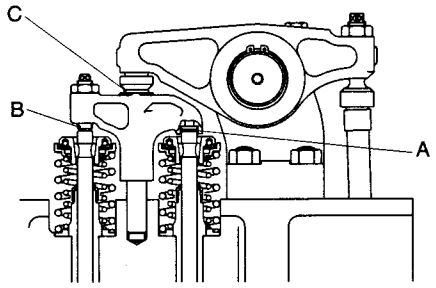
Memo

3-1 Operating Specifications

Item			Normal value	Alarm setting value (emergency stop value)	Reference
Pressure MPa (kgf/cm²)	Starting air	Air tank	1.5 ~ 3.0 {15 ~ 30}	1.5 {15}	
		Air motor	0.5 ~ 0.6 {5.0 ~ 6.0}		
	Control air	Air tank	0.7 ~ 0.9 {7.0 ~ 9.0}	0.6 {6.0}	
	Intake air	Intake air duct			Varies depending on the engine output
	Fuel oil	Engine inlet	0.5 ~ 0.6 {5.0 ~ 6.0}		
	Lubricating oil	Engine inlet (filter outlet)	0.4 ~0.5 {4.0 ~ 5.0}	0.25(0.20) {2.5 (2.0)}	
		Turbocharger inlet(filter outlet)			Varies depending on the turbocharger spec.
	Cooling water	Jacket line (jacket inlet)	0.25 ~ 0.35 {2.5 ~ 3.5}		Consider static and dynamic pressure due to tank head and pipe resistance
		Cooler line (cooler inlet)	0.1 ~ 0.2 {1 ~ 2}		
	Nozzle cooling oil (independent oil feed system)	Inlet main pipe port	0.1 ~ 0.3 {1 ~ 3}		
Temperature (°C)	Intake air	Intake air duct	45 ~ 55		
	Exhaust gas	Cylinder outlet		500	
		Turbocharger inlet		600	
		Turbocharger outlet		500	
	Lubricating oil	Engine inlet (cooler outlet)	50 ~ 60	65	
	Cooling water Jacket line (fresh water)	Engine inlet	65 ~ 70	85(90)	
		Engine outlet	70 ~ 75		
	Cooling water Cooler line	Engine inlet	~ 32		
	Nozzle cooling oil	Inlet main pipe port	50 ~ 60		Varies depending on the specifications

Note: (1) As for the alarm setting value and emergency stop value, each item of the pressure represents the lower limit value, and each item of the temperature represents the upper limit value.
(2) Manometer, thermometer, and alarm / emergency stop device will be provided depending on the individual specifications.
(3) The actual data found on each engine may differ from those shown in the abave table, and therfore refer to the Test Run Record (includes in the final documents) for the details.

3-2 Valve Setting Values

Item		Adjustment value (design value)		Remarks
Intake valve	Opening start angle (before top dead center)	8D	(50°)	 **(Valve end clearance adjusting procedure)** (1) Valve end clearance data represents the clearance available when the engine is cold. (2) Adjust valve end clearance "A" and "B" shown above such that it becomes equal to "0" first. Then, adjust valve end clearance "C" such that it becomes equal to the value given in this table.
		6D		
		5D	(30°)	
		3D	(50°)	
	Closing end angle (after bottom dead center)	(35°)		
	Valve end clearance "C"	**0.31mm**		
Exhaust valve	Opening start angle (before bottom dead center)	(55°)		
	Closing end angle (after top dead center)	(50°)		
	Valve end clearance "C"	**0.31mm**		
Starting air valve	Opening start angle (before top dead center)	(4°)		In case of direct starting system。
	Closing end angle (after top dead center)	(130°)		
Pumping start angle by fuel injection pump (before top dead center)				May vary depending on the engine output and specifications. Refer to the Test Run Record Table (included in the final documents).
Fuel oil injection valve opening pressure (adjustment value)		**29.4MPa {300kgf/cm²}**		
Maximum combustion pressure				May vary depending on the engine output and specifications. Refer to the Test Run Record Table (included in the final documents).
Cylinder safety valve opening pressure (adjustment value)		**19.1MPa {195kgf/cm²}**		

4-1. Precautions for Operating Engine

4-1.1 For Start

(1) Conduct preparations before start of the operation of engine, such as the inspection of oil, water, and air levels, as well as proper operation of the valves without fault, and be minded to start operation only after it has been confirmed that all the conditions are ready for the start of engine.

(2) It is extremely dangerous to start the operation of engine with the turning bar inserted in the flywheel. Be minded to remove the bar and store it in a specified place after turning is completed.

(3) Confirm that there are no working staff around the engine. When anyone is around the engine, be minded to send a signal and confirm safety before starting the operation of engine.

4-1.2 For Operation

(1) After the starting engine, inspect the following items, and confirm that the engine is in a good and removal operating for. In case that any defect is found, immediately stop the engine, so that the causes of the defect can be investigated and the measures for recovery can be taken.

- Any abnormal data of the engines, such as inadequate lubricating oil pressure, inadequate exhaust temperature, etc.
- Abnormal sound, excessive heating, etc.
- Any leakage from piping. (Particularly, leaks from oil piping will result in fire.)

Be minded never to attempt to resume the operation of engine, until the causes of the problem or defect are found and eliminated, and the engine is restored to normal operating conditions.

(2) Inadvertent contact of the body of working staff or objects with the rotary parts (e.g. flywheel and coupling) will result in dangerous accidents such as that the staff may be caught up or the chips of the objects caught may fly out in all directions. Therefore, be minded that both person or object may not touch the rotary parts.
Further, ensure that the protective covers of the rotary parts are always attached without fall.

(3) During the operation of engine, particularly the following parts are extremely hot, and therefore there is a danger of burn if touched with bare hands or skin. Be minded to wear safety gloves or protective gears whenever maintenance or inspection works are conducted.
After the completion of the work, restore the lagging, heat covers, combustible oil splash preventive means (FN tape) and protective covers that have been removed for maintenance and inspection.

- Exhaust pipe
- Turbocharger
- Air cooler inlet pipe
- Cylinder head
- Indicator valve
- Fuel injection pump and high-pressure coupling
- Fuel oil filter and fuel oil pipe (in case of heavy fuel oil)

4-1.3 Precautions for Stoppage

(1) Make sure that the engine is stopped after load is taken off the engine, except in the case of emergency.

(2) In case that the engine is stopped in emergency stop, be minded never attempt to resume the operation until the causes of the problems is found and eliminated, and the engine is restored.

(3) Do not open the crankcase for at lease 10 minutes after the engine is stopped and fully cooled down. Otherwise, there is a danger of explosion since the inflammable mist gas in the crankcase may catch fire.

(4) The engine immediately after it is stopped is still extremely hot like during the operation, and there is a danger of burn. Therefore, be minded to wear the protective gears whenever inspection or maintenance works is conducted without fail.

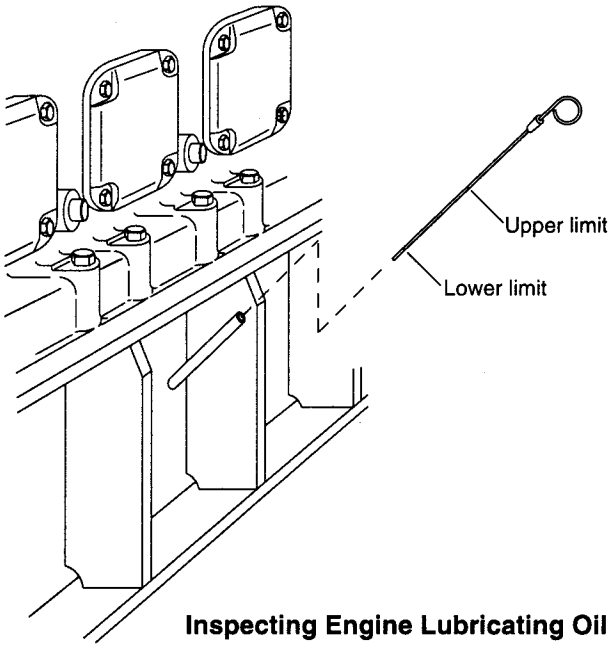
4-2 Preparation for Operation

It is essential to keep the engine in "Operable Conditions" whenever the engine is being operated. Therefore, be sure to perform pre-operation inspections before the starting of engine, and take proper corrective actions and countermeasure whenever any problem is found, to confirm that the engine is in normal conditions for operation, before starting the operation of engine.
If the engine is started without pre-operation inspections or preparations, it will cause not only the troubles when starting the engine but also result in a sudden stoppage or damaging accidents.

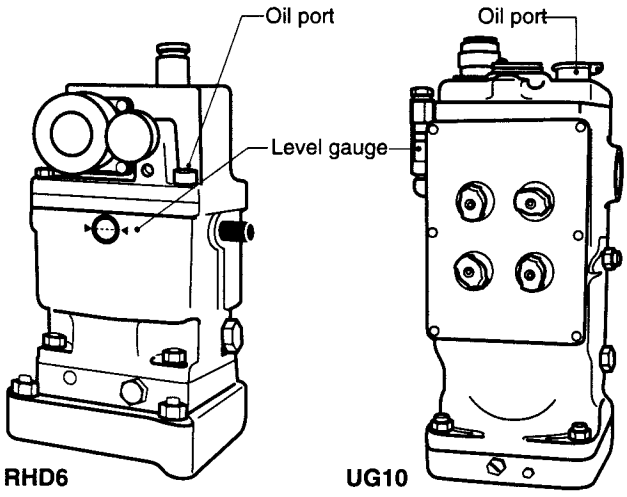
4-2.1 Preparation for Daily Operation

The number of the inspection items required before starting the operation varies depending on how long the engine has been out of operation.
- Daily starting: Short period of disuse (within one month)
- Initial starting after a long period of disuse, or after overhaul or maintenance.

The daily starting procedures is described in this section. As for the latter (initial starting), refer to the following section.
(: 4-2.2 "Preparation for Initial Starting")



Inspecting Engine Lubricating Oil



Inspecting GovernorLubricating Oil Level

(1) Inspection before Operation

a) Inspection and Feeding of Lubricating Oil

Check the oil level of the oil tank, and feed new oil to the upper limit level of the oil gauge.

Further, in case that the lubricating oil is found inadequate after examination, proceed with makeup or replace the entire amount of the lubricating oil.

(📖 : 6-2 "Lubricating Oil Characteristics and Control)

① Engine lubricating oil tank
(Base plate common to different engines)

Engine model No.	3DK	5DK	6DK	8DK
Lubricating oil level (L)	500	740	1100	1400

Note: The oil level shown above may vary depending on the specifications.

② Governor
Lubricating oil level RHD6 : 1.3L,
UG10 : 1.7L

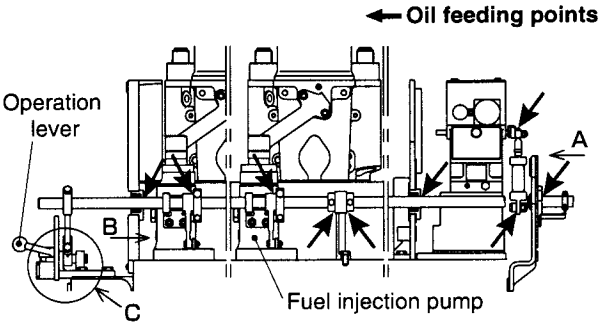
③ Generator (in case of self · · · lubricating type)
(📖 : Separately provided "Generator Instruction Manual")

④ Reduction gear (in case of marine propulsion engine)
(📖 : Separately provided "Reduction Gear Instruction Manual")

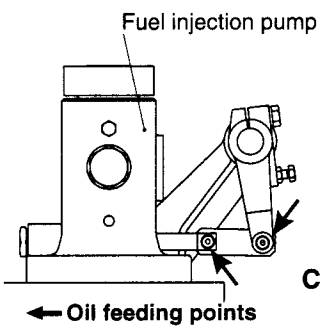
b) Inspection, lubrication, and Operation Check around the Fuel Regulation System

Manually lubricate the bearing and sliding parts of pins, after checking for any loose or missing levers, link pins, and bolts around the governor, common rod, stoppage system, and fuel injection pump rack.

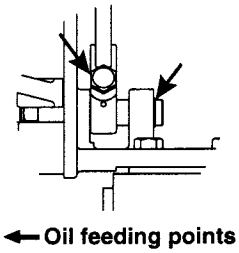
Set the operation lever to "STOP" position and confirm that the rack scale is "O", and then alternately move the lever to STOP" and "RUN" positions, to confirm that the common rod and pump rack moves smoothly.



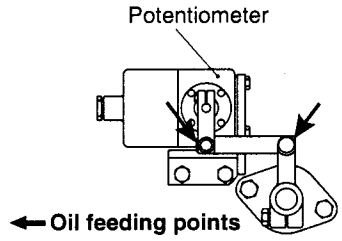
Manual oil feeding: Around common rod and fuel injection pump



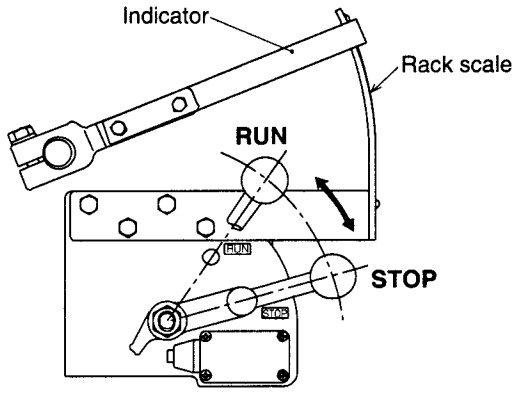
View B : Around fuel injection pump



C: Around operation lever



View A : Around potentiometer link

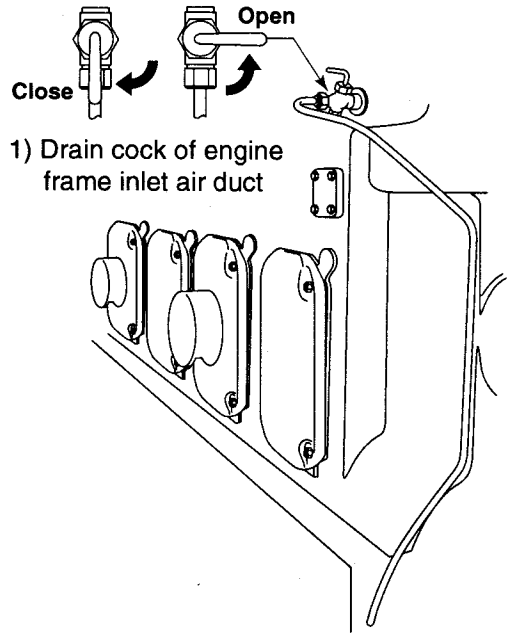


Operation lever

c) Draining of Condensed Water from Intake Air Inlet Duct

Open the drain cock of the intake air inlet duct, and drain the condensed water out.

1. Close 2. Open
1) Drain cock of engine frame inlet air duct



Engine Frame Inlet Air Duct

Always keep the drain cock of the engine frame inlet air duct open about 1/4, after draining the condensed water by fully opening the drain cock.
In case that the humidity is high and the temperature of the air cooler is low, a large amount of condensed water will accumulate, and may cause abnormal wear or tear on various parts by flowing into the cylinder.

d) Draining Condensed Water from, and Supply Air, to Air Tanks

In case of automatically supplying air, first drain the condensed water out of the starting air tank and starting air control tank, and then confirm that air pressures in these tanks is above the lower limit value.
In case of manually supplying air (including manual staring of the air compressor), supply air to the upper limit value.

Item		Upper limit	Lower limit
Starting air	Direct starting	2.9MPa {30kgf/cm²}	1.5MPa {15kgf/cm²}
	Air motor starting	2.9MPa {30kgf/cm²}	1.0MPa {10kgf/cm²}
Control air		0.9MPa {9kgf/cm²}	0.7MPa {7kgf/cm²}

e) Checking and Feeding of Fresh Cooling Water

Check the level of fresh cooling water, and if the level is at the lower limit, supply fresh water up to the upper limit, and at the same time add a proper amount of the additive.
Further, in case that each properties of water has reached the limit level, replace the entire amount of water.
(📖 : 6-3 "Cooling Water Characteristics and Control")

f) Draining of Fuel Oil and Supply of Oil

First drain fuel oil out of the fuel oil service tank, and then check the oil level and supply oil up to the upper limit of the level gauge.

g) Confirmation of the Clutch Being "Neutral" (in case of the clutch-mounted engine)

In case of the engines such as the marine propulsion engine, make sure that the clutch is in "Neutral" position.

h) Opening and Closing of valves

Repeat "Fully open" and "Fully close" operation of the valves on the piping system 2 to 3 times to confirm that the valves move smoothly, and then set the valves to RUN" position.

Some of the examples are shown as follows. Since the layout positions of the piping systems and valves differ depending on each engine, refer to the piping diagrams of the final documents for the details.

[Examples]

① Valves for fuel oil inlet pipe and return pipe: "Open"
② Valves for cooling water (jacket and cooler), inlet pipe, and outlet pipe: "Open"
③ Valves for starting air pipe: "Closed" ("Open" only when starting operation)
④ Valves for operation air pipe: "Open"
⑤ Valves for pipe coupling parts provided for emergency, priming, cleaning, etc.: "Closed"

△

If the screw-tightening valves are used on the state of half-open, the valve handle may be turned during operation and the opening degree may be changed, causing malfunctions.
Therefore, the valves should be fully turned toward either "Open" or "Close" position, and should be locked tightly.
In case that the valves must necessarily be left half open for the sake of flow adjustment, be sure to secure the valve handles with wire ring and the like, and fix them to prevent their loosening and turning.

(2) Standby Preparation (Engine on standby)
Before entering the operation of engine, conduct the following preparations:

a) Priming with Lubricating Oil
Start the motor-driven lubricating oil priming pump (or, reserve pump) 5 minutes before starting the operation of engine, and confirm that there is no oil leaks from various parts of the piping.

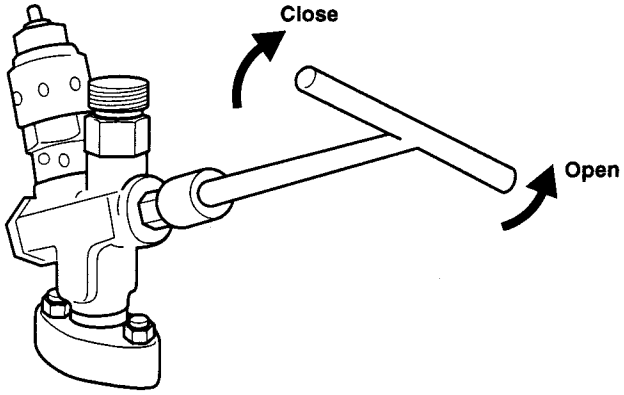
[Priming by Manual Pump]
When priming is conducted by manual pump, in stead of motor-driven pump, follow the following procedure:
i) Open the valve of the manual pump outlet.
ii) Operate the pump lever.
iii) Conduct priming for about 5 minutes, while confirming the swing of the indicator or the lubricating oil gauge.
iv) After the completion of priming, securely close the outlet valve.

b) Turning or Air Running
Conduct turning or air running to discharge the dusts or water drops that has collected in the cylinder while the engine is stopped.
Further, when the engine is started after the inspection of various parts of the engine, or after a long period of disuse of the engine, conduct turning before air running to confirm the safety.

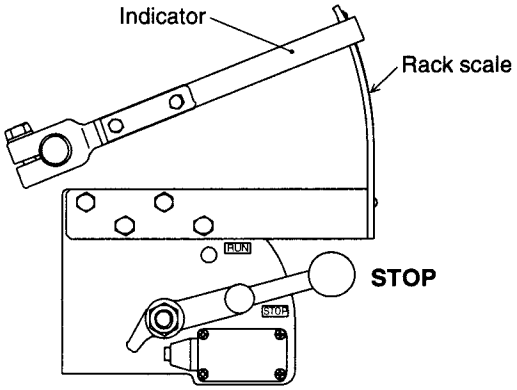
△ In case that a large amount of water or oil is accumulated in the cylinder due to the leakage from the cylinder head or fuel injection valve, there is a possibility of serious accidents such as bending damage of the connecting rod by water hammer.
When conducting turning or air running, if water or oil has gushed out of the indicator valve, immediately stop the starting of engine, so that the causes can be investigated and the countermeasure can be prepared and taken.

[Turning]

<Work Procedure>
i) Conduct priming with lubricating oil.
ii) Set the operating lever to "STOP" position. (Do not inject fuel oil.)
iii) Set the indicator valve to "Fully open" position.
iv) Conduct turning 1 to 2 times, and confirm that the engine rotates smoothly.



Indicator Valve



Operation Lever

[Air Running (abbreviated as Air Run.)]

<Work Procedure>

i) Conduct priming with lubricating oil.

ii) Set the operation lever to "STOP" position.

iii) "Fully open" the indicator valve.

iv) Open the starting air valve and the control air valve, and press the push button for the starting operation valve. Then, starting air flows into the stsrting air valve, and the engine start its rotation.

In case of air motor starting system, operate the solenoid of the starter relief valve. Then, pilot air flows into the air motor, and the engine starts its rotation.

v) Keep pressing the push button for 3 to 4 seconds. (for air run)

vi) Release the push button. Then, the starting air valve closes, and the engine stops its rotation.

In case of air motor starting system,stop the operationof the solenoid. Then, the air motor stops, and the engine stops its rotation.

⚠

If the engine starts its rotation during the inspection of the inside of the engine or rotary parts, it is extremely dangerous since the working staff may be caught up or the objects that has been caught up may fly out in all directions.

When conducting air run, strictly observe the following points.

1) Confirm that the turning device or turning bar is set "OFF".
2) Send a signal to coworkers and confirm safety before starting to press the push button of the starting operation valve.

⚠

Do not fully open the starting air valve during air run, keeping the opening at about 1/3, and carefully conduct air running at low speed.

If air run is conducted at high speed by fully opening the starting air valve, it will not only expend air uselessly, but also will result in serious accidents such as aggravation of the defects if any defect had been caused.

c) Heating of Fuel Oil (when heavy fuel oil is used.)

In case that heavy fuel oil is used, heating shall be made according to the following items:

i) Turn on the fuel oil heating device.

ii) Operate the motor-driven oil feed pump.

(📖 : 6-1 "Fuel Oil Characteristics and Control")

⚠

Heated heavy fuel oil is extremely hot (100℃ or more), may cause burn if you touch the piping or equipment on the fuel oil system. Therefore, in case of handling the equipment of fuel oil system that carriers heat oil, be sure to wear safety gloves and never touch them with bare hands.

d) Turning "ON" of Protective and Alarm Circuit

Turn "ON" the protective and alarm circuit on the monitor panel, and confirm that the warning lam is lit up.

e) Operation of Motor-Driven Pumps

In case that the engine is equipped with the motor-driven cooling water pump and fuel oil feed pump, start the pumps 5 minutes before the starting of engine, and confirm that there is no oil leaks from various parts of piping.

4-2.2 Preparation for Initial Starting after Long Period of Disuse

Since the engine is not ready for immediate starting of operation after a long period of disuse, and overhaul or maintenance, it is particularly necessary to thoroughly conduct the preparations for operation.

Before the preparation for daily operation, conduct the following preparation works (4-2.1).

(1) Inspection of Crankcase and Cylinder Liner, and Supply of Oil

a) Inspection of the Inside of Crankcase

Open the side cover of the engine frame, and check and ensure that tools, waste clothes, foreign matters such as desiccants are not left behind, and that there is no rusting on the cylinder liners, crankshaft, and so on.

b) Supplying Lubricating Oil to Cylinder Liner

After a long period of disuse, the various parts of engine are not covered with sufficient amount of lubricating oil. Particularly around the cylinder, lubricating oil cannot be supplied sufficiently with priming alone, and therefore supply lubricating oil on the following procedure:

i) Conduct turning to allow the pistons to move upward, and apply lubricating oil on the lower part of the cylinder liners by a spray device and the like.

ii) Sequentially conduct the above procedure to each cylinder.

(2) Inspection of Connections and Joints

Inspect again the external connections or joints to confirm that there is no connections that has been forgotten to be tightened, or loosened joints. If combustible oil splash preventive means (FN tape) has been removed from joints, newly treat the joints in the same manner after the completion of the work.

(3) Opening, Cleaning, and Cleansing of Filters

Dust or foreign objects, that had been collected into piping during transportation, and outfitting or installation, is accumulated in the filters of the engine inlet.

Open the following filters, and cleanse the inside and the elements of the filters:

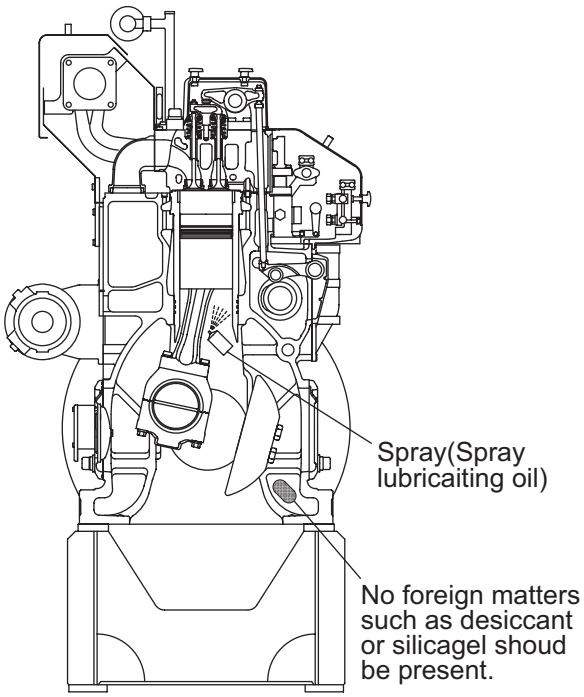
① Starting air filter and control air filter

② Fuel oil filter (including oil filters on the outside of the engine)

③ Lubricating oil filter (filters on the engine, for T/C)

④ Cooling water filter

（ : 5-4.3 "Cleaning Filters"）



Applying Procedure of Lubricating Oil

(4) Priming with Lubricating Oil and Exhausting Air

Conduct priming with lubricating oil and exhausting air on the following procedure:

a) Run the lubricating oil priming pump for 5 minutes. While the pump is operating, open the turning plug (on the cylinder head top surface) to perform turning two or three times, and check for leakage of fuel oil, lubricating oil and water from the turning plug.

b) At the same time, open the each cover and check the dripping-down conditions of lubricating oil from each part.

① Engine frame: Main bearing, crank pin, piston (cooling chamber), and piston pin

② Cam case: Cam bearing, swing arm, and tappet

③ Cylinder head: Rocker arm and valve retaining tee

c) Operate the priming pump, open the air vent valve for lubricating oil filter, and drain lubricating oil until air bubbles in the oil are completely vanished. Take care not to splash the oil.

d) Check that there is no oil leakage from various parts of the piping during priming.

(5) Priming with Fuel Oil and Exhausting Air

Conduct priming with fuel oil and exhausting air bubbles on the following procedure:

i)Operate the fuel oil feed pump (in case of the engine equipped with a motor-driven oil feed pump).

ii)Open the fuel oil inlet valve, after confirming that the operation lever is set to "STOP" position.

iii)Open the air vent valve of the fuel oil filter, and drain oil until air bubbles in oil are completely vanished.

iv)Open the air vent valve of the fuel injection pump, and drain oil until air bubbles in oil are completely vanished.

v)After completely removing air vent, securely tighten the deflator.

⚠

The heavy fuel oil is heated to a high temperature (100℃ or more).

Touching the splashing oil may scald your hands. If high-temperature parts are splashed with the oil, a fire may occur. Take care not to splash the oil when discharging air.

(6) Cleaning of Turbocharger Pre-Filter

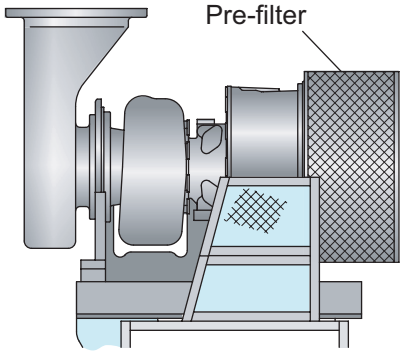
Dust or debris are collected in the pre-filter of the turbocharger during transportation, outfitting, and installation, causing the filter to be stained or damaged.

Therefore, clean it or replace it with a new one before starting the operation.

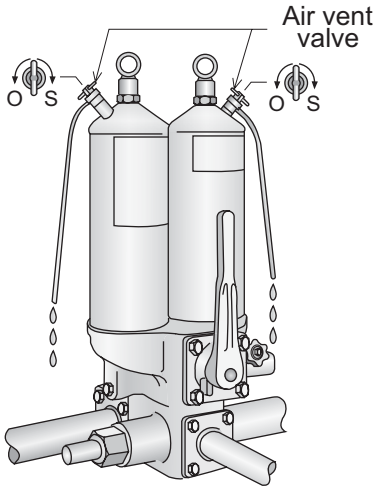
(7) Checking the covers are fitted

Check that the lagging for high-temperature parts (exhaust pipe, turbocharger, etc.), exhaust pipe cover and heat box cover that were removed for disassembly and servicing have been restored as they were.

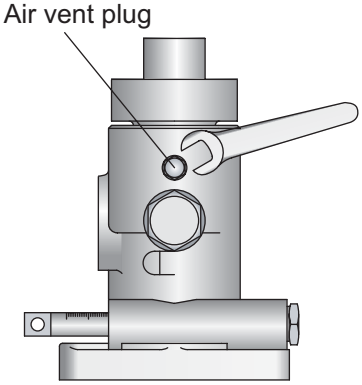
Check that the joints that were once disconnected are provided with combustible oil splash preventive means (NF tape).



Turbocharger



Exhaousting Air of Notch-Wire Filter



Exhausting Air of Fuel Injection Pump

4-3 Starting

Inadvertent contact of working staff or objects with the rotary parts is extremely dangerous since the person may be caught up or the object that has been caught up may fly out in all directions.
Therefore, strictly observe the following items when starting the operation.

- Confirm that the protective covers of rotary parts are mounted in normal state, and that the rotary parts are free of any obstacle.
- Confirm that the turning device or turning bar is set to "OFF".
- Send a signal to a coworker if there is any, and confirm safety before starting the operation of engine.

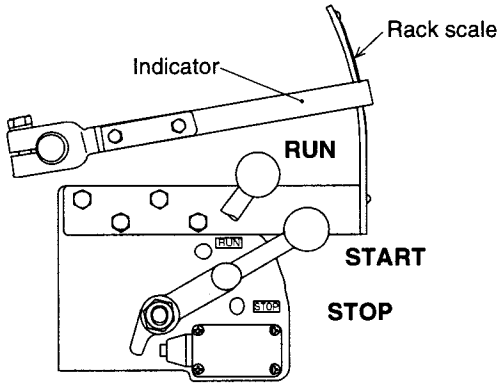
4-3.1 Starting Procedure

(1) Starting from Engine Side (Locally)

Starting procedure can be classified into the three types; engine side starting (local starting), remote starting, and automatic starting, and which of these should be employed depends on the specifications. However, local starting (starting from engine side) by manual operation should always be employed after a long period of disuse or after overhaul or maintenance.

<Work Procedure>

i) Open the starting valve and control air valve.
ii) Set the operation lever to "START" position.
iii) Press the push button for the starting operation valve.
iv) If the rotation speed of the engine has rapidly increased and starting has been established along with continuous ignition sounds, release the push button.
v) After confirming that the rotation speed of the engine has reached the specified speed, and each pressure has reached the specified value, set the operating lever to "RUN" position.
vi) Close the starting air valve.
(Leave the control air valve "Open" as it is.)



Operating Lever

(2) Remote Starting (Manual and Push Button Starting)

<Work Procedure>

i) Switch the starting mode to the remote mode (from monitor chamber) from local mode (from engine side).
ii) Set the operating lever to "RUN" position,
iii) Open the starting air valve and control air valve, after confirming that "READY" indicator lamp has lit up.
iv) Press the starting push button.
v) Confirm that "RUN" indicator lamp on the panel has lit up as the rotation speed of the engine has reached the specified rate, and each pressure has reached the specified value.
vi) Close the starting air valve.
(Leave the control air valve "OPEN" as it is.)

(3) Automatic Starting

In case of automatic starting, the engine starts automatically by the starting command based on preset starting conditions, such as the overload conditions of power shutdown or other engines (in case of plural engines), and therefore it is essential that the engine should always be kept in operable conditions
Engines should be kept in the following conditions at all times:
① Starting mode: "AUTO"
② Operation lever position: "RUN"
③ Starting air valve and control air valve: "OPEN"

(4) Corrective Measure In Case of Faulty Starting

In case that the engine has failed to start or has not started smoothly, take corrective measures by referring to a separately provided section.
(📖 : 7 "Trouble Shooting and Countermeasures")

> ⚠
> In case that the engine has repeatedly failed to start in an extremely cold weather while the engine is still in cold condition, the unburnt mist of fuel oil may remain in the exhaust manifold, having a possibility of catching fire or explosion being caused by high-temperature combustion gas.
> When starting failure has been repeated, conduct air running and exhaust the unburnt mist in the exhaust manifold, before restarting the engine.

4-3.2 Inspection and Check Items Immediately After Starting

Check the following items immediately after starting.
When any abnormal error has been found, immediately stop the engine and take proper measures.
(📖 : 7 "Trouble Shooting and Countermeasure")

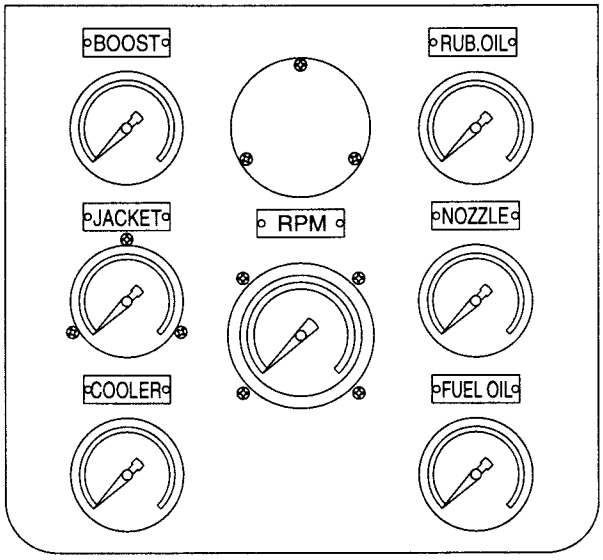
> △
> After conducting overhaul or maintenance of the sliding parts or rotary parts, be sure to once stop the engine and check that there is no error or failure by hand-touching.

(1) Engine Rotation Speed

Confirm that the engine rotation speed (the number of idle rotation speed, in case of the marine propulsion engine) has reached the specified rotation speed, and hunting (swinging of tachometer) is not occurred.

(2) Pressure Reading of Each Parts

Confirm that the indicator of pressure reading, for the manometer with blue mark, is within the blue mark, showing the pressure is within the specified value.



Gauge Board

(3) Abnormal Sound

Carefully listen to the sound of the following engine parts, and check if there is any abnormal sound or not:
① Cylinder head and surrounding parts (intake and exhaust valves)
② Crankcase
③ Crankcase and timing gear and auxiliary drive gear
④ Turbocharger

(4) Exhaust Temperature

Check the exhaust temperature of each cylinder, and confirm that all the cylinders are properly burnt (at 200°C or more).

(5) Gas Leakage from Starting Valve

If gas has leaked from the starting valve, the starting air main pipe becomes hot.
Check if the starting air main pipe is not heated or not by lightly touching the pipe.

(6) Leakage and Loosening of Each Part

Check if the bolts and nuts of installation part or connecting part are not loosened, and if oil, water, or gas is not leaked.

4-4. Operation

4-4.1 Running-in

Do not apply a load abruptly since the sliding parts of the engine are not yet sufficiently ready to work smoothly or freely when the engine is started for the first time after its installation or immediately after replacement of the parts such as the cylinder liners and the piston ring.

Conduct the running-in operation to ensure smooth and free working of the sliding parts according to the following procedure before getting into the steady mode of operation.

(1) Initial Running-in

Whether or not the pistons and the oil rings move smoothly and freely will substantially affect the engine performance, especially the combustion performance and consequently the consumption of lubricating oil. Further, it is assumed that they will be decided by the initial operation of a few hours.

The revolution of the engine should be gradually increased, then the engine should be stopped after it is driven for two or three minutes without a load and then conduct the following inspection that is to be effected after completion of the initial running-in when the engine is started for the first time after its installation or replacement of any of parts located in the periphery of the cylinder such as the cylinder liner, the piston, the piston ring. And especially the following items in the checking list for the initial running-in should be watched and checked during the engine operation in order to find out any symptom of a trouble as soon as possible or to prevent it from occurring.

<Inspection Items during the Initial Running-in>

① Abnormal sound.
② Partial heating.
③ Leakage from connection points and loosening of the bolts and nuts.
④ Exhaust temperature, irregular exhaust color : ····· Abnormal combustion.
⑤ Excessive consumption of lubricating oil : ····· Poor adaptability of liners and rings.

<Inspection after Completion of the Initial Running-in>

① Checking the condition of sliding portions of the cam and the roller, and the cam metal by tactile feeling of the finger.
② Checking the condition of the internal surface of the cylinder liner.
③ Checking the condition of the main shaft, the crankpin metal and the cylinder liner by tactile feeling of the finger.

(2) Operating Conditions during the Running-in

Be sure to operate the engine during the running-in period under the following conditions, gradually increasing the load referring to the figure 4.1 and paying special attention to the inspection items during the initial running-in indicated in the section A.

① Load: 80% or less.
② Fuel oil to be used: Diesel fuel oil.
Even for the engines of heavy fuel oil type, use diesel fuel oil during the running-in period.
③ Notwithstanding the prescription given by the item ② above, the lubricating oil specified for the engines of heavy fuel oil type may be used for such engines from the start of engine driving.
④ Running-in period is 20 to 30 hours.

At the time when the running-in operation is completed, conduct the following inspection works and confirm that there is not any abnormality before entering the normal and regular operation of engine.

①.Inspection of foreign matters and stains in the crankcase.
②.Visual inspection of the inner surface of the cylinder liner.
③.Inspection and cleaning of the element of each filter.
④.Remove the flushing filter attached to the element of the fuel oil filter.

△ Be minded never to perform the operation of engine using heavy fuel oil, while the flushing filter is attached.

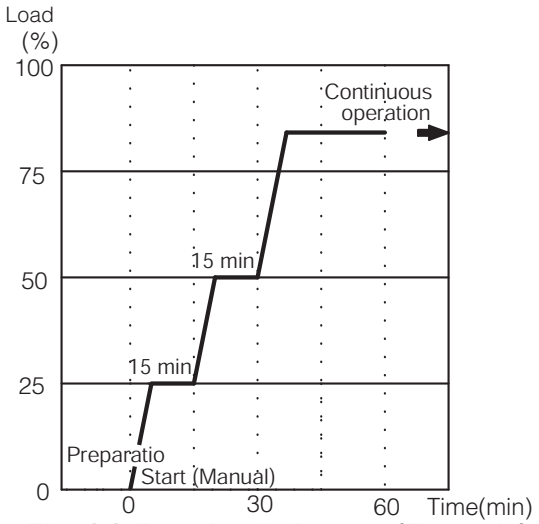


Fig. 4.1 Running-in Pattern (Example)

4-4.2 Warming-Up and Connecting Load to the Engine

In case that the engine is started while it is still in a cold state, first perform the warm-up operation, except for the case of emergency, and gradually connect the load after the engine has sufficiently been warmed up.

If the load is hastily connected while the various parts of the engine are still cold and not yet in the conditions for proper fuel combustion and lubrication, malfunctions such as faulty combustion, excessive wear of the sliding parts, and seizure may be caused.

(1) Warming-up Operation of Engine

a) Use diesel fuel oil for warming-up operation

Be sure to use diesel fuel oil for warming up the engine, even in case of the engine with heavy fuel oil specification.

b) No load (Idle operation in case of warming up the marine propulsion engine)

First operate under no load or light load, and connect the load after jacket cooling water and lubricating oil temperature has increased.

△

Be minded to perform no-load operation on for warming-up operation, and restrain the duration of no-load operation within 10 minutes.

Running the engine under no-load for long hours will result in malfunctions such as faulty combustion and collection of carbons in the combustion chamber.

B. Connecting Load to the Engine

The lower the engine temperature (temperatures of jacket cooling water and lubricating oil) is, the longer time it is needed to connect the load.

The standard load connecting time is shown in the figure below.

(📖 : Fig. 4.2 "Load Connection Pattern")

In case of the marine propulsion engine (direct connection by propeller), be minded to gradually increase the rotation speed, since the load will increase according to the rotation speed.

△

When increasing the rotation speed, be minded to quickly pass the dangerous running speed zone, under which torsional vibration causes damages (the ref mark zone), on the tachometer.

Running the engine within this zone for long hours may cause the breakage of the crankshaft.

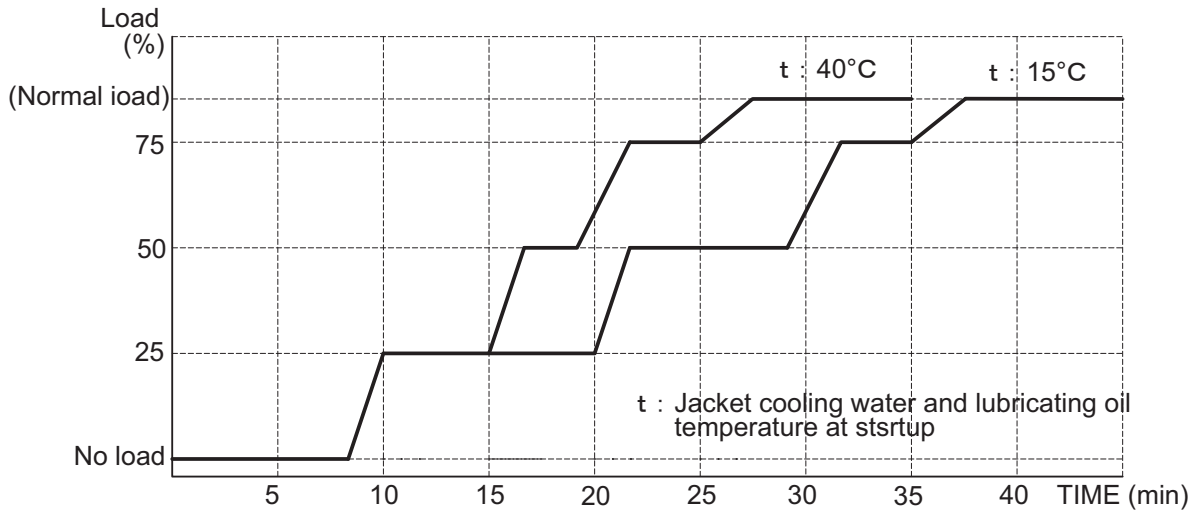


Fig. 4.2 Load Connection

4-4.3 Operation with Load (Normal Operation)

Inspect the running conditions of the engine and measure the operating performance data in regular intervals, during the continuous operation with load (including period of the running-in operation).

In case that any problem is found as the results of the inspection and measurement, take proper measures such as adjustment or repair of the defective parts. (Refer to a separately provided section.)

(📖 :5-3 "Measurement and Adjustment")

(📖 :7 "Troubleshooting and Countermeasures")

(1) Inspection of Operating Conditions

<Check Item>

① Abnormal sound and abnormal vibration

② Partial overheat

③ Leakage from connections and looseness of screws

④ Abnormal combustion pressure, exhaust temperature, and exhaust color

····· Abnormal combustion

⑤ Excessive consumption of lubricating oil

····· Damaged cylinder liner and ring

⚠

During the operation of engine, particularly the following parts become extremely hot, and touching these parts with bare hands or skin may cause burns.

Therefore, be minded to use the protective gears such as safety gloves when working on them.

- Exhaust pipe
- Turbocharger
- Air cooler inlet pipe
- Cylinder head
- Indicator valve
- Fuel oil system equipment and piping (in case of heavy fuel oil)

(2) Measuring Performance Data

a) Measure the operating performance data at least once every day, when the load variation is less and the load is stable.

b) Compare each of the measured data with the data obtained when the engine was newly introduced, and judge if there is any problem and check the degree of deterioration.

(📖 : "Test Run Record Table" in the final documents)

<Measurement Item>

① Room temperature

② Load (output)

③ Intake air temperature (turbocharger inlet)

④ Exhaust temperature (each cylinder)

⑤ Exhaust temperature (turbocharger inlet)

⑥ Intake air pressure (engine inlet)

⑦ Lubricating oil pressure (engine inlet)

⑧ High-temperature cooling water pressure (engine inlet)

⑨ Low-temperature cooling water pressure (engine inlet)

⑩ Fuel oil pressure (engine inlet)
... In case of heavy fuel oil specification

⑪ Inlet air temperature (engine inlet)

⑫ Lubricating temperature (engine inlet)

⑬ Cooling water temperature (engine inlet)

⑭ Fuel oil temperature (engine inlet)
... In case of heavy fuel oil specification

⑮ Fuel injection pump rack scale

(3) Regular Inspection and Maintenance

Conduct inspection and maintenance of the various parts of engine regularly.

(Refer to a separately provided section.)

(📖 : 5 "Inspection and Maintenance")

(4) Operation Records

After completion of the inspection and measurement, keep the records of the works performed on adjustments or repairs in the log book.

△

Operation records are very important documents when understanding the conditions of engine and tracing the history of the inspection or maintenance that has been performed.

Keep and store them carefully, and when the supervisor is changed, be sure to transfer the records to the successor without fall.

4-4.4 Operation Using Heavy Fuel Oil (in case of Heavy Fuel Oil Specification Engine)

Since heavy fuel oil is lower in its quality and higher in its viscosity as comperared with diesel fuel oil, it is required to carry out an appropriate operation control, such as operating the engine by changing to diesel fuel oil depending on the load conditions, in addition an appropriate control of the fuel oil and lubricating oil, when this type of oil is to be used.

Further, the starting and stopping the engine, when heavy oil is used, is only allowed on the engine of the heavy-fuel-oil starting-and stopping specification.

(📖 : 6.1 "Fuel Oil Characteristics and Control")

(📖 : 6.2 "Lubricating Oil Characteristics and Control")

(1) Operation with Diesel Fuel Oil

Be minded to use heavy fuel oil only under stable load conditions, and be sure to use diesel fuel oil in the following cases:

a) During Running-In Operation Period(150 hours)

① Immediately after installation

② After replacement of the sliding parts around cylinder (e.g. cylinder liner, piston, and piston ring)

(📖 : 4.4.1 "Running-In Operation")

b) During Starting or Warming-Up Operation

(📖 : 4.3 "Starting")

(📖 : 4.4.2 "Warming-Up Operation")

c) During idling or Low-Load Operation

When the engine is operated under low load, the compressed air temperature in the cylinder and fuel injection pressure of fuel oil is low, and therefore if the heavy fuel, of which combustion quality is lower than that of diesel fuel oil, is used, combustion will become unstable, resulting in undesirable conditions, such as worsening of the exhaust smoke, sticking of the ring, and so on. In case of the connection of the load that is below the lower limit described in the engine specification, be minded to use diesel fuel oil.

d) In Case Load Variation is Heavy

① When entering or leaving port

② When weather is rough and stormy

③ When cargo is being loaded or unloaded

e) Before Stopping Engine

(📖 : 4.6 "Stoppage")

(2) Switching Fuel Oil Types

Heavy fuel oil is normally heated up to 80 to 90℃ in the service tank, and 100℃ or more at the engine inlet, and the temperature difference is larger as compared with that of diesel fuel oil (non-heated), and therefore if fuel oil is suddenly switched between these oils, it may cause malfunctions such as sticking of the fuel injection pump, vapor lock, and so on.

a) Slowly switch from diesel fuel oil to heavy fuel oil, so that the rate of change in the fuel oil temperature at the engine inlet is between 5 and 10℃ per minute.

(📖 : Fig. 4.3 "Switching Pattern from Diesel Fuel Oil to Heavy Fuel Oil")

b) Maintain the viscosity (temperature) of heavy fuel oil at the engine inlet at the specified value

c) Do not raise the temperature of diesel fuel oil beyond the flashing point (60℃ is the standard point).

d) To prevent the generation of vapor, maintain the pressure of fuel oil at the specified value.

Further, remove the air bubbles in fuel oil in the various equipment of the fuel oil system (heater, filter, tank, etc.) from time to time, so that the accumulation of vapor can be prevented.

⚠

If high-temperature parts are splashed with the oil, a fire may occur. Take care not to splash the oil when discharging air.

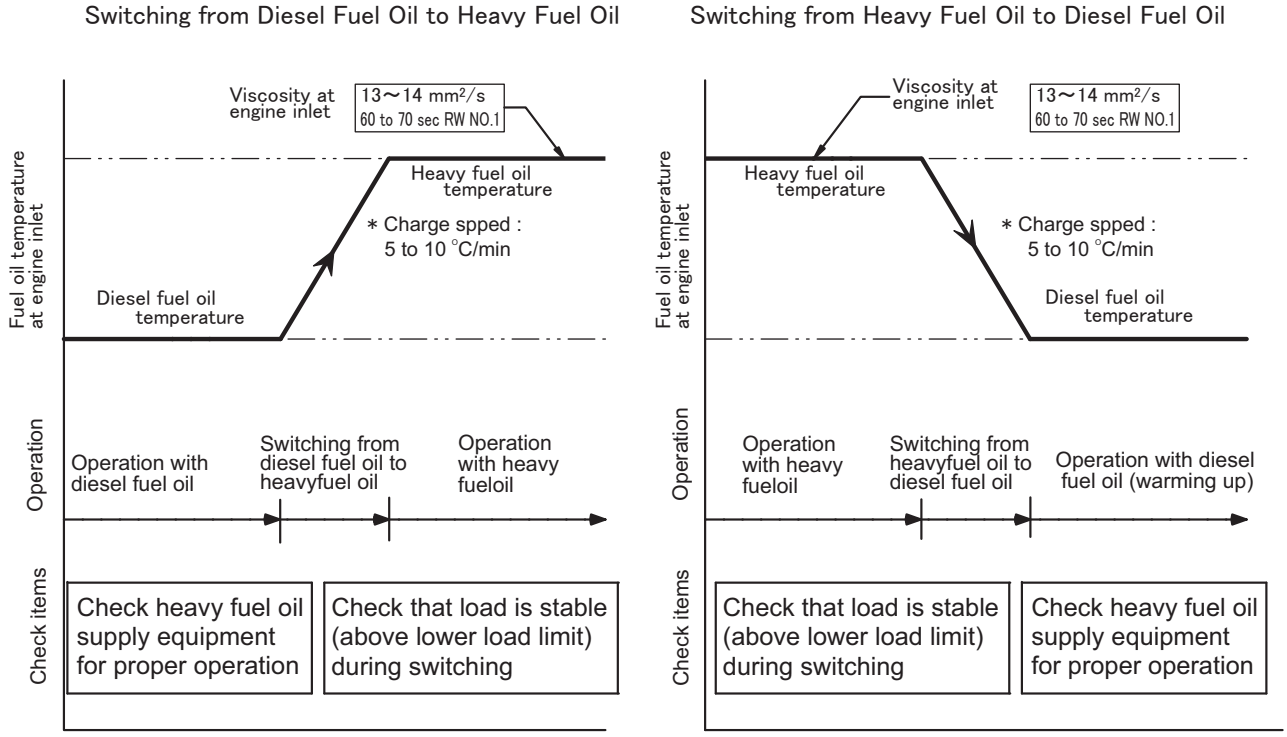
e) Confirm that the heat traces on piping and equipment is properly functioning.

⚠

The fuel oil is heated, and the filter and the piping are at high-temperatures. If touched with bare hands or skin, it may cause a burn. Therefore, be minded not to directly touch the exposed metallic parts such as the valves and cocks, and wear the protective gear such as safety gloves when working on them.

In case that emergency stop is made during the operation with heavy fuel oil, immediately switch the heavy fuel oil to diesel fuel oil, operate the separate pump, and perform flushing of the fuel oil system.

If the engine is cooled down with the heavy fuel oil left unchanged, the oil will be solidified and the operation will be prohibited.



Note : 1. Since the pretreatment of fuel oil differs depending on the use purpose of the engine, the opersting method suitsble to each system is necessary.
2. The diesel fuel oil tempersture when switching on heated condition shall be 60 °C or more.

Fig. 4–3 Switching Pattern from Diesel Fuel Oil to Heavy fuel Oil

4-4.5 Allowable Operating Range (In case of marine propulsion engine)

In case of the marine propulsion engine, the load channges in accordance with the marine characteristics, and according to the changes in the rotation speed.

The allowable operating range and recommended operating range within the marine characteristics are shown in the figure below.

When acutually operating, be mineded to select a proper rotation speed and engine torque (Pme, to be judged based on the reading on the rack scale), and keep operating within the recommended operating range as far possible, to prevent being overloade.

Note that the lower load limit is normally 30% when using heavy fuel oil, and if the load to be connected is lower than this limit value, use diesel fuel oil.

(📖 : Fig.4.4 "Allowable Operating Range")

As for the output characteristics of the engine to be actually operated, refer to "Test Run Record Table" included in the separately provided final documents.

(1) In case of Fixed Pitch Propeller (FPP)

The fixed pitched propeller is generally designed by including the sea margin, which has taken into consideration the fouled hull surface, in addition to the absorbed horsepower due to the marine characteristics.

In case that fouling of the hull surface has advanced, increasing the resistance, and has exceeded beyond the sea margin, the absorbed horsepower increases to such an extent that the excessive torque occurs even if the rotation speed is maintained constant. Therefore, always heed cautions to the rotation speed and the reading on the rack scale to prevent excessive torque.

Further, particularly be careful when the absorbed propeller hordepower suddenly increases, for example when in stormy weather and so on, since this will often cause the excessive torque to occur, eventually leading to surging of the turbocharger.

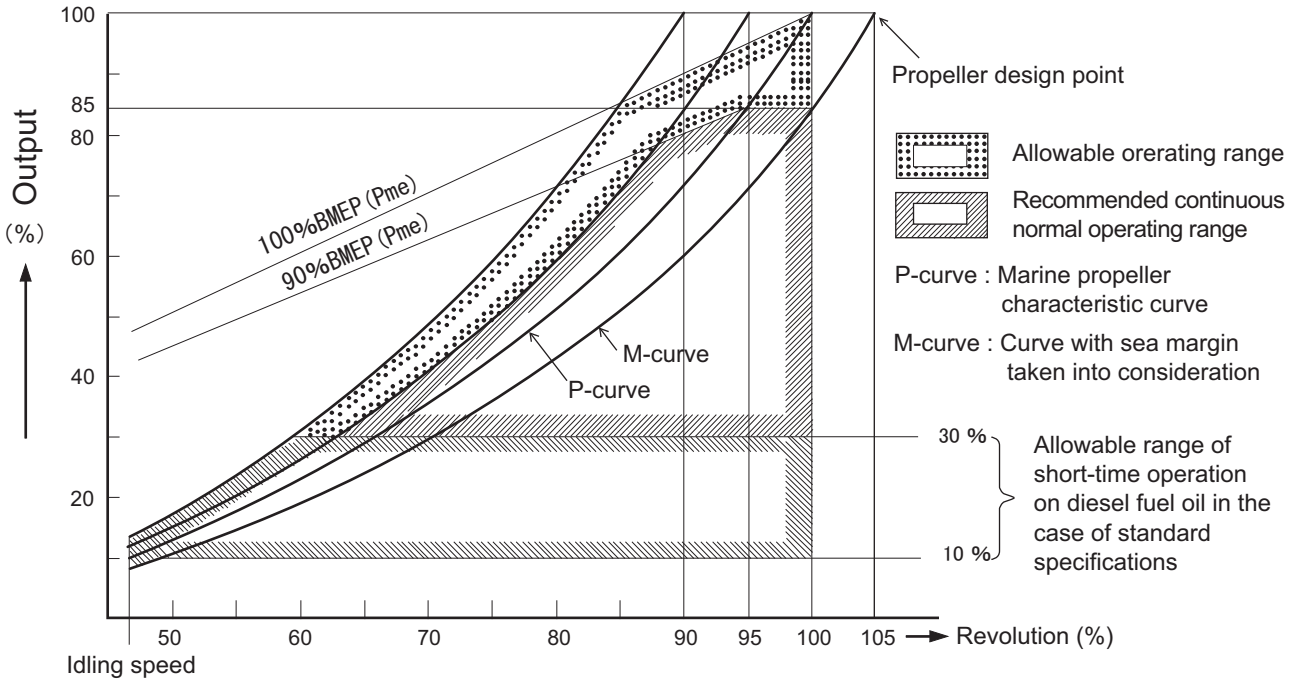


Fig. 4.4 Allowable Operating Range

(2) Incase of Changeable Pitch Propeller (CPP)

The changeable pitch propeller is capable of changing its propeller pitch (blade angle), while maintaining the engine rotational speed constant, and is thereby capable of changing the absorbed horsepower. Therefore, this propeller has a merit that the rotational speed and load can be changed according to the conditions of the other auxiliary machinery driven by the marine propulsion engine, and the hull resistance.

However, since the changeable pitch propeller tends to run under excessive torque to as much extent as it has alarger freedom of its operation, be minded to operate the engine properly preventing the excessive torque, by always grabbing the load conditions.

4-5. Special Operation

4-5.1 Low-Load Operation

Since running the engine with a low-load lower than a certain limit can lead to unfavorable combustion conditions such as the reduction of intake air pressure and blowing-back of exhaust air, if the engine is operated under such conditions for long hours, it may result in the various malfunctions such as fouling of the turbocharger and combustion chamber, faulty combustion and so on.

Therefore, be sure to minimize the low-load operation to a shorter period of time as much as possible, and in case that the engine must be inevitably run under a low-load for long hours, be sure to observe the following conditions:

(1) Low-Load Limit

The low-load limit varies depending on each specification. Confirm the low load limit described on the specification supplied with the engine.

(2) Use of Diesel Fuel Oil

In case of the heavy fuel oil specification, be sure to switch it to diesel fuel oil.

(3) Increase of Intake Air Temperature

To improve the combustion conditions, increase the intake air temperature and adjust to as a higher level as possible, within the following limit:

- Intake air : 75 °C or less
- Exhaust air temperature (cylinder outlet) : 450 °C or less

(: 5-3.2(2) "Measurement and Adjustment: Intake Air Temperature")

(4) Cleaning of Turbocharger

Properly increase the number of times of cleaning the turbocharger according to necessity.

> The turbocharger is at a high-temperature during operation and just after the engine is stopped. If you touch it with bare hands during cleaning, you may burn your hands. Wear safety gloves without fail.

(5) Intermittent High Load Operation

If the load is switched to the high load (60% or more) for about 30 minutes during low-oad operation, it will have an effect to restrain or reduce the fouling of the combustion chamber, as well as the intake and exaust air systems.

4-5.2 Operation with Air Cooler Cut-Off

In case that the defects such as breakage of the fine tube in the air cooler or water leakage from a caulked sections is found, and the repairing cannot be performed quickly, an emergency messure can be taken by cutting off the air cooler on the following procedure:

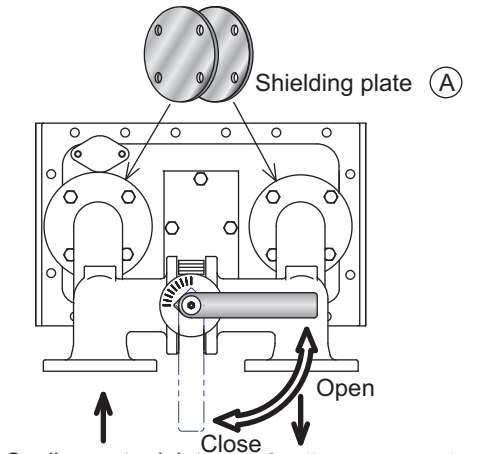
(1) Low-Load Limit

a) Stop water supply to the cooler cooling system, and draw out the water from the air pipe.

b) Insert a shielding plate A into the flange part of the air cooler cooling water inlet pipe and outlet pipe.

c) "Fully open" the bypass valve of the air cooler.

d) Operate the cooler cooling water pump, and confirm that no water is leaking from the flange packing area.



Air Cooler Bypass Valve

(2) Prerequisites for aaOperation

a) The fuel oil to be used is diesel fuel oil.

b) Restrain the output as low as possible, referring to the following values as the standard:

- Pme(average effective pressure): 0.8MPa {8 kgf/cm²}
- Exaust air temperature (cylinder outlet): 450 °C or less

4-5.3 Non-turbocharger Operation

In case of the marine propulsion engine, a non-turbocharger operation implement (turbocharger blind plate) is provided, so that operation in emergency can be made even ehwn the turbocharger may have been damaged. (The generator is optinal.)

The non-turbocharger operation procsdure is as the followings:

(1) Preparation for Operation

Install the non-turbocharger operation implement in accordance with the Turbocharger Instruction Manual.

> During operation or immediately after stopping the engine, the turbocharger is extremely hot, and if the turbocharger is touched with bare hands or skin, it may cause burns.
>
> Therefore, perform the disassembly work after the turbocharger is completely cooled down.
>
> If it must be removed before it cools down, wear safety gloves, and remove it taking care not to burn your hands.

(2) Prerequisites for Operation

a) The fuel oil to be used is diesel fuel oil.

b) Restrain the output as a lower level as possible, referring to the following values asthe standard:

- Pme(average effective pressure):
  0.44MPa {4.5 kgf/cm^2}
- Exaust air temperature (cylinder outlet):
  400 °C or less

4-5.4 Operation with Reduced Number of Cylinders

Adoption of the operation with the reduced number of cylinders impose such problems as the torsional vibration of the shaft system as well as the external vibration of the engine, and therefore this operation should be limited as a secondary measure to be used only in emergency.

In case of 3DK and 5Dk engines, the operation with the reduced number of cylnders is prohibited due to the axternal vibration of engine.

The operation with the reduced number of cylinders may be conducted in various cases such as the case of only reducing the fuel oil, or the case in which the operating parts are needed to be removed. Further, since the prohibited items for the operation vary depending on each case, be sure to inquire our company for the working procedures, cautionary items on the operation, ansd so on, obtain the necessary instructions, and strictly observe them, when the operation with the reduced number of cylinders is conducted.

<Preparation for Operation>

a) The fuel oil to be used is diesel fuel oil..

b) The output shall be as below:

$$\frac{\text{(No. of cylinders)-(No. of reduced cylinders)}}{\text{(Total number of cylinders)}} \times 70\%$$

However,the output may be reduced according to the turbochager sursing or exhaust air temperature in each case.

c) Exhaust temperature : 450℃ or less
(each cylinder outlet)

> Be attentive of the external vibration of engine and the gear sound, and if any abnormality is found, immediately stop the engine. If the engine is kept operating disregarding such abnormality, serious accidents may be caused.

4-6. Stoppage

4-6.1 Normal Stoppage

(1) Preparations for stoppage

a) In case that heavy fuel oil is used, switch the fuel oil to diesel fuel oil 30 minutes before stopping the engine.

b) Immediately before stopping the engine, start the operation of lubricating oil priming pump.

c) Confirm that the starting air pressure is at 2.0 MPa {20 kgf/cm^2} or more.

(The preparation for the next round of starting)

(2) Stoppage

a) Conduct the stop operation on the following procedures:

[In case of local operation]

Shift the operation lever to "STOP" position.

Then, fuel oil injection will be shut off by means of the common rod, and the engine will be stopped.

[In case of remote control]

i) Press the "STOP" push button on the control panel.

Then, the fuel oil injection solenoid valve will be activated to operate the fuel shutdown device, and the engine will be stopped.

ii) Shift the operation lever to "STOP" position.

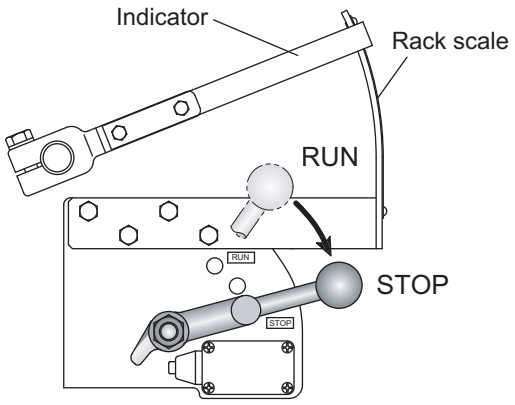
b) After stop operation, be attentive of any abnormal sound in the engine and turbocharger, and confirm that there is not any abnormal sound.

△

In case that the engine does not stop even when the stop operation is conducted, forcibly stop the engine on the following procedure:

1)Forcibly set the rack of the fuel injection pump to "0".

2)Fully close the valve of the fuel oil inlet main pipe.



Operating Lever

(3) After Stop

a) Operate both the lubricating oil priming pump and cooling fresh water pump for about 20 minutes, and cool down the engine and turbocharger.

△

The turbocharger continues to run at high speed even after the engine is stopped. Lubrication of the turbocharger provided with this engine is made using the system oil, and therefore if the supply of lubricating oil is stopped immediately after the engine is stopped, it may damage the bearing.

b) Fully open the indicator valve to conduct air running for 3 to 4 seconds and exhaust the combustion gas out of the combustion chamber.

c) Close the valves on all the systems.

4

4-6.2 Emergency Stop

(1) When Emergency Stop is Required.

Immediately stop the engine when any of the following abnormalities is found:

① Announcement of "Emergency" or "Alarm"
(∗ Activation of the protective device ---Automatic)

∗ • Overspeed

∗ • Decrease of lubricating oil pressure

∗ • Suspension of water supply/increase of cooling water temperature

• Increase of exhaust air temperature

• Other alarming (depending on each specification)

② Abnormal sound and abnormal vibration

③ Heating of the bearings or other moving parts, or generation of smokes, or abrupt increase of mist.

④ Loosening or falling-off of the governor, common rod rink, each lever around the fuel oil injection pump, link pin, or bolt.

⑤ Deterioration of fuel oil or lubricating oil, or damage of the cooling water pipe.

⑥ Abrupt increase or decrease of rotation speed.

⑦ Abrupt increase of lubricating oil temperature

⑧ Water supply disability due to suspension of cooling water supply

△ In case that the engine is overheated due to suspension of water supply, do not hastily supply cooling water.
If cooled down abruptly, each part of the engine may be deformed, resulting in malfunction or accidents.

⑨ Mixing of water into lubricating oil

⑩ Abrupt increase of exhaust air temperature

⑪ Abrupt decrease of the turbocharger rotation speed or intake air pressure

⑫ Generation of abnormal sound in the propeller or the stem shaft system

(In case of the marine propulsion engine.)

⑬ Breakage or loosening of the bolts of each section

(2) Measures after Emergency Stop

In case that the engine is stopped by activation of the protective device or stopped automatically, take the following measures:

a) In case that the engine is stopped by remote operation or stopped automatically, set the operating lever to "STOP" position after the engine is stopped.

b) In case that the operation had been made using heavy fuel oil, immediately switch the fuel oil to diesel fuel oil, operate the motor-driven oil feed pump, and conduct flushing of the fuel oil system (However, this procedure does not apply when the fuel oil pipe is broken.)
Further, conduct turning of the engine, and exhaust the heavy fuel oil remaining in the fuel injection pump or fuel valve.

△ In case that the engine is stopped during the operation using heavy fuel oil and the engine is cooled down without changing the fuel oil, heavy fuel oil in the equipment of the fuel oil system (e.g. pump, filter, etc.) and piping will not only solidify to prohibit restarting, but also incur substantial labor to clean and cleanse after the accident.

c) Disconnect the load off the engine, and return the operation lever, each valve, and the state of all other equipment to "STOP" position.

△ In case that the emergency stop is conducted, be minded not to restart the engine until the cause is determined, the countermeasures are taken, and recovery is completed.
In case that the engine is started without removing the cause of the abnormality, the malfunction may be aggravated and serious accidents may be caused.

Be minded not to open the crank case for at least 10 minutes after engine is stopped and is completely cooled down. If the crank case is opened immediately after the engine is stopped, flammable mist in the crank case may catch fire and explode.

Particularly be careful when a large amount of mist is generated due to overheat or seizing of the engine.

Be minded never to let flames or sparks approach the crankcase even after it is overhauled.

4-6.3 Long-Term Shutdown

In case that the operation of engine is suspended for a long term (one month or more), take the preservation measures (mainly, anti-rusting measure) on the following procedures:

(1) Shutdown within 3 Months

a) Fully open the indicator valve once every week, and conduct turning of the crankshaft several times while conducting priming with lubricating oil.
In this case, stop the crankshaft at a position different from that before turning. After turning, securely close the indicator valve.

b) In case that there is a risk of freezing in extremely cold season, be minded to remove cooling water from the engine.

(2) Shutdown over 3 Months ··· Measures for Long-Term Storage

In case that the operation of engine is suspended for 3 months or more, the following measures for long-term storage is required:

a) Remove cooling water from the engine.

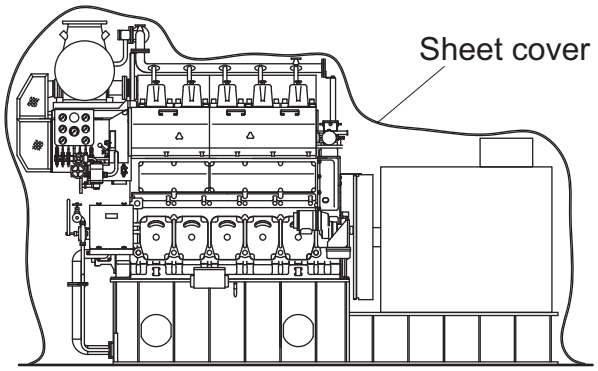
b) Add rust-preventive oil to lubricating oil, open the indicator valve, and conduct turning of the crankshaft several times while conducting priming with the lubricating oil.
After turning, securely close the indicator valve.

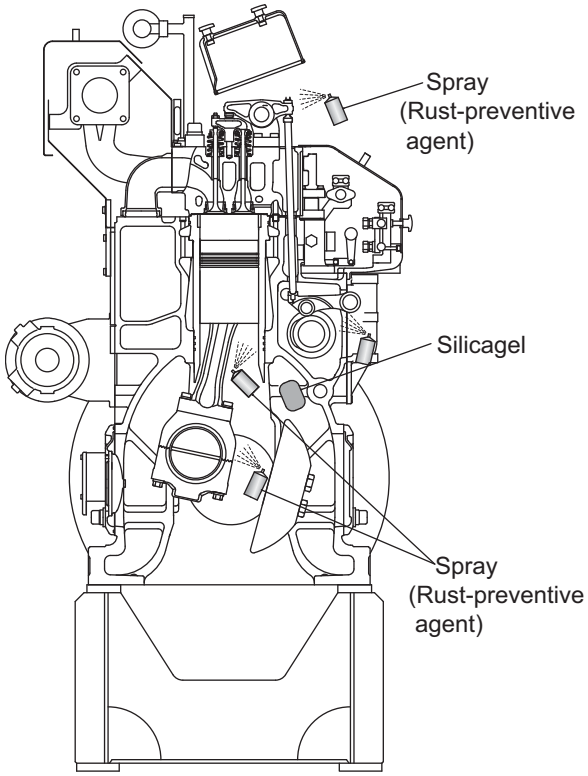
c) Open each cover of the engine frame, cam case, and the cylinder head, and spray rust-preventive oil to the internal parts.

d) Insert the moisture-proof agent such as silicagel into the crankcase, according to the ambient air conditions (e.g. weather and humidity) and according to necessity.

e) Place the cover on the outside air opening section of the exhaust air pipe and the mist pipe.

f) Cover the engine with a sheet, and carefully cover the electric equipment with particular attention to prevent collection of dust on them.





Measures for Long-Term Strage

4

5-1. Precautions for Inspection and Maintenance

When conducting the inspection and maintenance works of engine, be minded to read this manual carefully, understand the structure of the related parts and the work contents, carefully examine the working procedures, and prepare the consumable parts and tools in advance, before starting these works.

If the works are conducted without previous and sufficient examinations, it will not only lead to the expense of useless labors, but also result in failure or damage of the engine due to mistaken assembling, and further in personal accidents.Be sure to replace all the damaged parts, or the parts that have reached replacing limit, both of which have been so found after the results of inspections.

In case that replacing these parts are difficult on site, or the necessary parts are not readied, inform the Parts Sales Department, Service Department, Daihatsu Diesel Manufacturing Co., Ltd. or the nearest branch office or shop, and take proper actions.

5-1.1 Safety Precautions

(1) Do not open the crank case side cover for at least 10 minutes after the engine is stopped and is completely cooled down. While the engine is overheated, there is a danger that oil mist may catch fire and explode if new air is flowed into the crank case when it is opened.

(2) If the engine is rotated during disassembly or inspection works, it may impose serious dangers such as caught-up accidents and so on.
Be minded to start these works, after returning the operating lever to "STOP" position, securely closing the starting air valve, and confirming that the engine is not running.
When conducting the turning of engine, be minded to start it after confirming that nothing is in contact with the rotational parts, and no danger is imposed on coworkers by the rotation of engine, and after sending the signal to them.
Perform a proper preventive measures to prevent the crankshaft from freely turning.

(3) Be minded to wear the protective gears such as safety glove, helmet, safety shoes, safety goggles, according to the circumstances.
During the operation of engine and immediately after stopping the engine, the engine parts, particularly exhaust manifold, turbocharger, parts round the cylinder are extremely hot. Therefore, be sure to wear safety gloves, and proceed the works taking care not to incur burns.
The engine room floors and the surrounding areas are slippery due to oils stuck on them. Therefore, be minded to start the works after sufficiently wiping off the oils stuck on floors or shoe soles. Particularly when working on a high-rise places such as on the foot-step board, pay enough attentions to the periphery of your feet, so that falling-off accidents should not happen.

(4) When disassembling the piping systems, "Close" all the valves of the external connection parts, gradually warm up the air vent plug, and start the disassembly after removing residual pressure. Immediately after stopping engine, when disassembling the filters and connection parts of piping systems, you may burn on your skin on a injected high temperature oil or water of residual pressure. If high temperature parts are splashed with the fuel oil or the lubricating oil, a fire may occur. Take utmost care when disassembling them.

(5) When disassembling the spring-loaded devices such as the regulation valves, proceed the works paying careful attentions, since there is a risk that the springs may fly out and injury accidents may occur.

(6) Be minded to use wire rope and chain block when suspending the heavy-weight parts or equipment, and do not try to forcibly raise these parts or equipment by physical force. Further, be minded not to approach the areas immediately under the suspended parts or equipment.

(7) When handling the electric parts, be sure to cut off the power source.

(8) When handling the liquids, be minded to strictly observe the following items:

- Flammable liquids such as fuel oil and lubricating oil, the sources of fire, e.g.: The source of fires such as flames or sparks are strictly prohibited.
- Poisonous substances such as rust-preventive agent for fresh water, anti-freeze solution for fresh water, mercury (thermometer): Drinking is prohibited, and if any of these has stuck on hands or skin, immediately wash it off.
- Poisonous substance or substance which generate flammable gas, such as battery liquids: Drinking is prohibited, and if any of these has stuck on hands or skin, immediately wash it off, and the source of fires such as flames or sparks are strictly prohibited.
- For the sake of preventing environmental contamination, be minded to entrust the disposal and treatment of the waste oils and liquids to the authorized special waste disposing company.

5-1.2 Cautionary Items When Finishing Inspection and Maintenance

(1) Restore the lagging or heat-preventive covers, combustible oil splash preventive means (FN tape) and protective covers, that have been removed for inspection and maintenance, to each original position.

(2) After the completion of assembling, confirm that there is no abnormality in each part, by conducting the turning of engines and the priming with each corresponding oil.
After checking the parts during turning, close the reducing valve without fail.

(3) After the completion of working, return the turning equipment and turning bar, that have been used, to "OFF" position.

(4) Record the work contents of the inspection and maintenance that have been performed, and the replaced parts in the daily report respectively.

Inspection and Maintenance Item Table

5-2. Inspection and Maintenance Item Table

This table shows the inspection and maintenance work items (basically, those to be performed within 6 months). As for the work items concerning the regular overhaul and maintenance after the long-term operation, refer to the corresponding sections of "Maintenance" version, which is separately provided.
(○ : Normal, ▲ : Initial operation and 1st operation after overhaul, ● : Initial operation after installation, overhaul, and maintenance, ◎ : Replacement)

Parts to be inspected	Descriptions	Inspection before operation	Intervals (Hours) Daily	Weekly	Monthly 300-500	3 months 1000-1500	6 months 2000-3000	Ref.	Remarks
Engine appearance	Check loose parts and leaks.	○	○						
Piping system	Check loose parts and leaks.	○	○						
Cylinder head cover	Check internally. (Valve end clearance, rotator)				▲	○		5-4.1	
Cylinder head	Check and tightn head bolt.						▲		Including when overhauling
Fuel injection pump	Remove and check valve. Clean and adjust it.				▲	○		5-4.2	
Connecting rod	Check and tighten connecting rod bolt.						▲		Including when overhauling
Cylnder liner	Visually check internal surface.	●		▲	○				
Crankshaft	Measure and adjust deflection.					▲	○	5-4.5	
Camshaft	Check cam and roller.			▲	○				
Governor	Check and supply hydraulic oil.	○	○				◎	4-2.1	◎ Replace hydraulic oil.
Fuel control link	Check movement and supply oil.	○		○				4-2.1	
Turbocharger	Clean filter.	●		☆○				4-2.2	☆150-200 hr
	Clean blower.			☆○				5-4.4	☆150-200 hr
	Clean turbine.			☆○				5-4.5	☆150-200 hr
Starting rotary valve	Drain water.	●			○				
Starting air tank	Check pressure.	○	○					4-2.1	
	Drain water.	●			○			4-2.1	
Reducing valve	Check and adjust pressure.	●					○		
Relief valve	Open, check, and clean valve.						○		
Fuel injection pump	Lubricate pump rack.	●		○				4-2.1	
	Check reading on rack scale.				○			5-3.1	
Fuel oil filter	Drain water.	○	○						
	Clean by blowing-off.			○				5-4.3	
	Open, check, and clean filter.	●		▲	○			5-4.3	
Lubricating oil (for engine and turbocharger)	Drain water.	○	○						
	Clean by blowing-off.			○				5-4.3	
	Open, check, and clean filter.	●		▲	○			5-4.3	
Lubricating oil tank	Check oil level and supply oil.	○	○					4-2.1	
	Analyze and examine oil.	●			○			6-2	
Lubricating oil temperature control valvel	Open, check, and clean valve.						○	5-3.2	
Fresh water filter	Open, check, and clean filter.	●			○				
Fresh water tank	Open, check, and clean tank.	●		○					
	Check water quality.	●		○				6-3	
Protactive zinc	Check protector (zinc) and replace it when necessary.						○	5-4.6	For air cooler
	Check protector (zinc) and replace it when necessary.					○		5-4.6	For lub. oil cooler
gauge board	Check thermometer and pressure gauge.				○				
Controlling and protective device	Check and confirm movement.	●		○					

Note: This table shows the standard inspection intervals for inspection and maintenance to be conducted under normal operating conditions when heavy fuel oil is used. Determine the most adequate interval of inspection and maintenance, in accordance with the operating conditions and inspection results.

5-3 Measurement and Adjustment

5-3.1 Maximum Combustion Pressure and Exhaust Temperature

Maximum combustion pressure and exhaust temperature serve as the important indicators for knowing the engine combustion conditions and the changes according to the elapse of time.
Normally, the decrease of the engine performance can be indicated by the following items:

- Decrease of the maximum combustion pressure
- Increase of the exhaust temperature

Conduct the measurement with the interval of once a week or so, and record the results, so that the tendency of the change can be identified and the data can be used as the judgment materials when determining the interval of the adjustment.

(1) Maximum Combustion Pressure (hereinafter referred to as Pmax)

a) Pmax

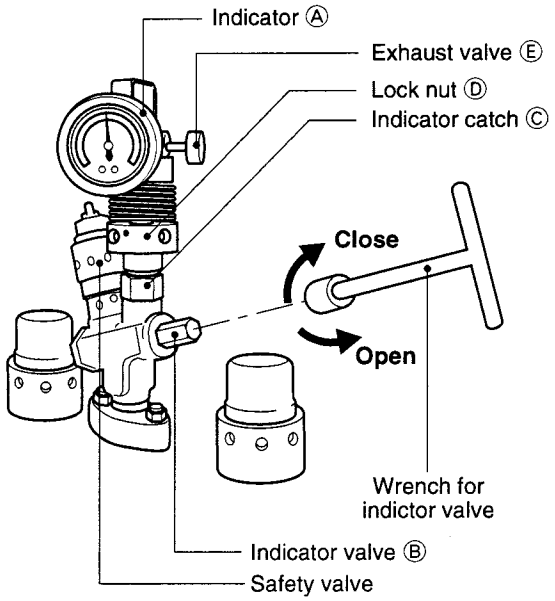
Pmax is determined by load, and varies depending on the factors such as the fuel oil viscosity, intake air pressure, and intake air temperature. Ordinarily, however, this adjustment is not necessary.

Pmax varies according to the initial fuel injection pumping angle, however, it is readily adjusted and set at an optimum value at the time of shipment from our factory.

The fuel cam is fixed to the camshaft by shrink fitting, and therefore, ordinarily, it cannot be adjusted.

Since the items mentioned in this section will be the items, to which the engine setting value specified in Nox technical code shall be applied, do not make any change that may deviate from the setting value.
(📖 : 0-3 "Engine Conforming to Nox Technical Code")

⚠ Since the indicator valve is extremely hot during the operation of engine, there is a danger of burns if it is touched by bare hands.
Therefore, be sure to wear safety gloves when handling the valve.



△ Be sure to "Fully open" or "Fully close" both the indicator valve and the exhaust valves of the indicator, whenever these valves are used.
If these valves are used on the "Half-open" state, high-temperature gas will flow into the threaded parts of the valve, and the screws may be seized.

b) Measuring Pmax

Perform the measurement of Pmax after the warming-up operation of engine has been completed and the load has become stable.

During measurement, the measured values may change due to such factors as the occurrence of the load fluctuation. In such a case, perform the measurement again to obtain a stable data.

(: "Test Run Record" included in the final documents)

<Measuring Procedure>

i) Open the indicator valve Ⓑ with a special wrench for indicator valve before installing the indicator Ⓐ, and close the indicator valve after lightly releasing it 1 or 2 times.

ii) Install the indicator to the indicator catch Ⓒ, and securely lock it by turning the lock nut Ⓓ.

iii) Close the exhaust valve Ⓔ of the indicator.

iv) Open the indicator valve.

v) Check the reading of the pressure on the indicator.

vi) Close the indicator.

vii) Open the exhaust valve of the indicator, and remove the indicator after indicating reading has become "0".

* Maximum value (when fully loaded): 15.7 MPa {160 kgf/cm²}
* Difference between cylinders: 0.6 MPa {6 kgf/cm²} or less

(2) Exhaust Temperature

The exhaust temperature at each cylinder outlet slightly varies from one cylinder to another depending on the factors such as the effect of other cylinders as well as the distance to the turbocharger inlet.

The exhaust temperature can be adjusted by increasing or increasing the reading on the fuel injection pump rack, however, the adjustment is ordinarily unnecessary as long as the difference between cylinders is within the following value.

* Difference between cylinders: 40°C or less

(3) Adjustment of Reading on Fuel Injection Pump Rack

In case that the exhaust temperature differs from those of other cylinders in excess of the range specified in the above (2), for example, when the fuel injection plunger or the fuel injection valve nozzle is replaced, adjust the fuel injection amount by increasing or decreasing the reading on the rack scale.

<Rack Adjusting Procedure>

The reading on the rack scale can be increased or decreased by adjusting screw Ⓐ of the fuel injection pump rack lever.

i) Loosen the lock nut Ⓑ.

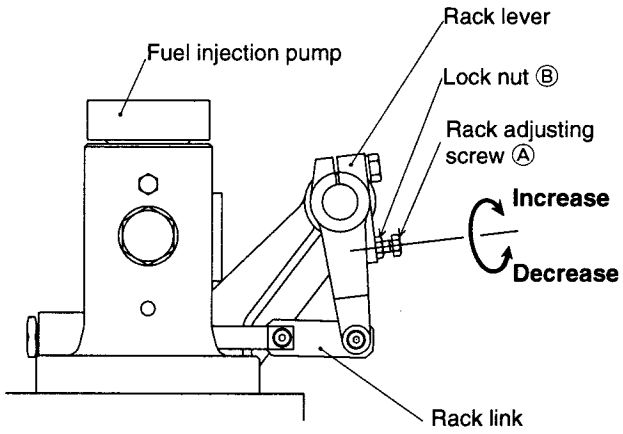
ii) Turn the adjusting screw A and change the reading on the rack scale.

- Clockwise turning "Increase" (Increase of exhaust air temperature)
- Counterclockwise turning "Decrease" (Decrease of exhaust air temperature)

iii) Confirm that the exhaust air temperature is within the specified value.

iv) Securely tighten the lock nut.

* Difference between cylinders: 1.5 mm or less



Adjusting Rack

5-3.2 Pressure and Temperature of Each Part

The pressure and temperature of lubricating oil, fuel oil, and cooling water, etc. are controlled by the relief valve, so that they should be proper values being within each specified value during the operation of engine, however, when actually operating the engine, the pressure and temperature of these fluids may not be within the specified and proper values.

In such a case, readjust the setting values of the valves, and perform the operation within the specified proper range.

(1) Intake Air Pressure

Since the intake air pressure changes in accordance with load, each pressure when the engine was new (or, after adjustment) becomes a reference value.

The more the turbocharger is fouled, the more the intake air will decrease, resulting in the deterioration of the engine performance (e.g. increase of the exhaust air temperature and increase of the fuel consumption rate), and therefore regularly conduct the blower cleaning and prevent the progress of fouling.

(📖 : 5-4.4 "Cleaning Turbocharger Blower")

△ The turbocharger is at a high-temperature during operation and just after the engine is stopped. If you touch it with bare hands during cleaning, you may burn your hands. Wear safety gloves without fail.

△ It is impossible to completely remove the fouls even when cleansed by blower cleaning, and to prevent the deterioration of engine performance by the elapse of time, however, if the cleaning is neglected, fouling will accelerate, resulting in worsening of the engine performance, and as the result it will be required to disassemble and clean the turbocharger much earlier than when the cleaning is periodically conducted.

(2) Intake Air Temperature

∗ Proper temperature: 45-55℃ (at full load)

Intake air, that is either higher or lower than the specified range, will affect the engine, and therefore be minded to adjust and keep the temperature to be within the specified proper range, as far as possible.

When the intake air temperature is too low, it causes abnormal or excessive wear of the cylinder liner, intake air valve, etc., since the water drops is formed by the dew condensation.
Further, if the intake air temperature is too high, it damages the parts around the combustion chamber such as the exhaust valve, since the exhaust air temperature will increase. (Exhaust air temperature varies in proportion to the intake air temperature, and also varies in the rate of approximately 2 times the change of the suction air temperature of the turbocharger.)

If the intake air temperature gets out of the proper range owing to a low room temperature, or when automatic adjustment of intake air temperature cannot be made for some reasons, operate the following procedure.

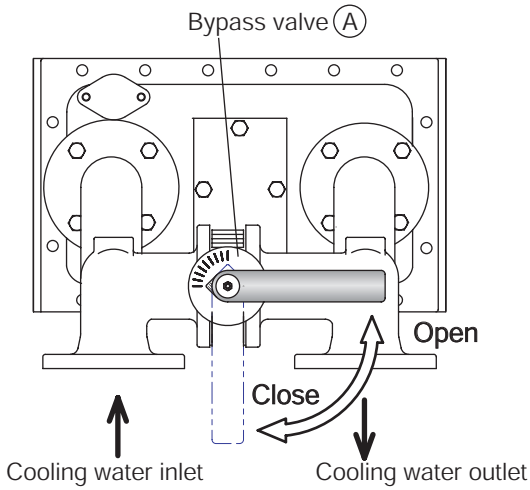
<Intake Air Adjusting Procedure>

The intake air adjustment can be made by changing the cooling water flow rate in the air cooler.

i) Operate the handle of the bypass valve Ⓐ, and change the opening angle of the valve.

- Open the bypass valve. (Handle facing sideways) Increase of tnmperature
- OpenClose the bypass valve (Handle facing downward) Decrease of tnmperature

ii) Be attentive to changes of the intake air temperature, and open the bypass valve so as to be within the proper range, and adjust the angle.



Air Cooler Bypass Valve

In case that the intake air does not fall within the proper range even when the bypass valve is fully opened and the entire amount of cooling water is flowed into the air cooler, it is required to disassemble and adjust the air cooler since the fouling of the air cooler can be considered.
(📖 : 12-3 "Air Cooler" in the Instruction Manual, "Maintenance Version")

(3) Lubricating Oil Pressure

* Proper range (Blue zone range of manometer): 0.4～0.5 MPa {4 - 5 kgf/cm²}

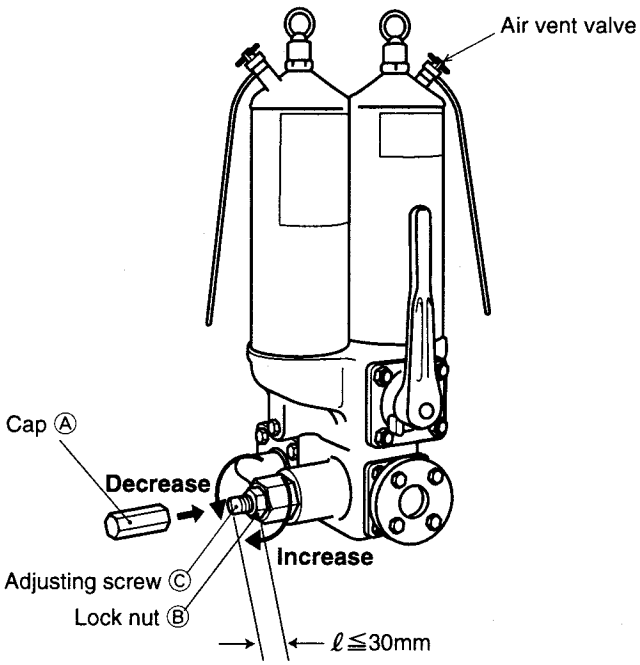
Lubricating oil pressure changes in accordance with the changes in the viscosity and temperature of lubricating oil.
When the engine is started in extremely cold weather, and the temperature of the lubricating oil is still low and the viscosity is high, the pressure reading may go up beyond the blue mark range, however, it does not impose any problem if the reading falls back within the blue mark range when the engine is warmed up.
In case that the pressure reading is beyond or under the blue mark range, adjust the pressure on the following procedure:

△ Lubricating oil pressure decreases when the filter is fouled. Be sure to perform the adjustment of pressure after the filter is cleaned well.
(📖 : 5-4.3 "Cleaning Filters")

<Lubricating Oil Pressure Adjusting Procedure>
When adjusting the lubricating oil pressure, use the adjusting screw on the lubricating oil relief valve.

i) Remove the screw cap Ⓐ of the relief valve, and loosen the lock nut Ⓑ.
ii) Turn the adjusting screw Ⓒ, and adjust the pressure.
- Clockwise turning (tightening) Increase of pressure
- Counterclockwise turning (loosening) Decrease of pressure

iii) Be attentive to changes of the pressure, and confirm that the pressure has entered within the blue mark range.
iv) Tighten the lock nut Ⓑ, and attach the cap Ⓐ.



△
1) Do not loosen the adjusting screw beyond the loosening limit (ℓ =30mm). The cap may not be installed back, if the screw is loosened excessively.
2) In case that the lubricating pressure dose not change even when the adjustment screw is turned, there is the possibilities of sticking of the relief valve, suction of air, pump failure, and so on, and therefore investigate the causes of the trouble.

Since the rate of the oil supply to the periphery of the rocker arm is set at the pressure of 0.1 MPa {1 kgf/cm²} or more by the relief valve located at the cylinder head inlet, the adjustment is not required.

(4) Lubricating Oil Temperature

* Proper range: 50~60°C (cooler outlet)

Lubricating oil temperature is controlled to remain within the proper range of temperature by the automatic temperature control valve installed at the lubricating oil cooler outlet.

a) Lubricating Oil Temperature Control Valve

The temperature control valve is an automatic bypass valve, that changes the flow rate of lubricating oil passing through the cooler, according to its temperature, and when the engine is started while it is still in cold state, this valve rapidly raises the lubricating oil by letting the oil bypass through the cooler, and when the engine is operated normally, this valve maintains the lubricating oil to be within the suitable range of the specified value.

In case that the lubricating oil does not fall within the proper range, for example, because the cooling water (secondary water) temperature is different from the design temperature, the temperature of lubricating oil can be adjusted by the adjusting screw of the temperature control valve. However, in case that the actual temperature is exceeding the correctable range and the adjustment is impossible, contact us for consultation on the problem.

b) Manual Adjustmen–Emergency Measures

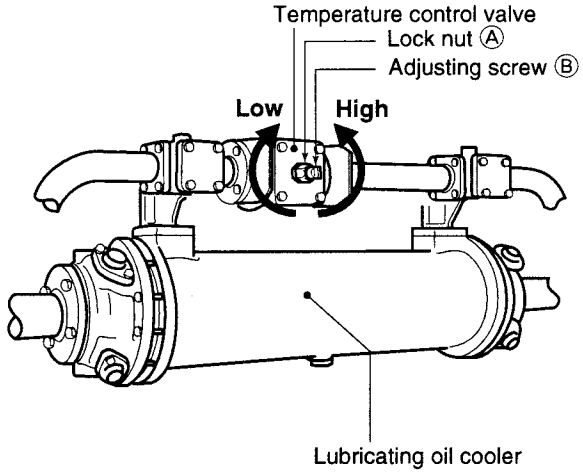
In case that the temperature control valve has become faulty and the temperature control has become impossible, the engine can continuously be operated by performing the emergency measures on the following procedure.

<Adjusting Procedure>

i) Loosen the lock nut Ⓐ, and screw the adjusting screw Ⓑ down to its bottom.
Totally close the passage of the cooler.

ii) Closely watch the changes of the oil temperature while returning the adjusting screw, and set the lock nut when the temperature has entered the following range:

* Use range: 30~60°C
Since the oil temperature changes according to the load, be minded to set the oil temperature at a rather lower level, so that it will not exceed the limit when heavily loaded.



(5) Cooling Water Pressure

* Proper range: 0.25~0.35MPa
{2.5 - 3.5 kgf/cm2}]

Jacket cooling water pressure substantially changes depending on the external conditions such as the cooling water expansion tank head, pipe resistance, and so on.

When cooling water pressure is too low, it will cause corrosion of the engine frame or cylinder liner, and therefore adjust the cooling water pressure at the engine outlet using the valve or orifice, so that the pressure should be proper during the operation of engine.

(6) Cooling Water Temperature

* Proper range: 70~75°C (engine outlet)

a) Warming-Up Operation

When jacket cooling water temperature is too low, it will cause faulty combustion or the corrosion or wear of the parts around the combustion chamber, and therefore be minded to start the operation of engine with load after raising the cooling water temperature by warming-up operation.
(📖: 4-4.2 "Warming-Up Operation")

b) Temperature Control

Cooling water temperature is controlled to remain within the proper range by the temperature control valve installed between the jacket cooling water inlet and outlet pipe (fresh water cooler inlet and outlet pipe).
This temperature valve is an automatic bypass valve that is functionally identical with the lubricating oil temperature control valve.
(📖: 5-3.2 (4) "Lubricating Oil Temperature")

(7) Fuel Oil Pressure

a) Engine using Heavy Fuel Oil

When using heavy fuel oil, the pressure of heavy fuel oil must be adjusted to be within the following range, so that generation of vapor due to heating-up of the fuel oil can be prevented:

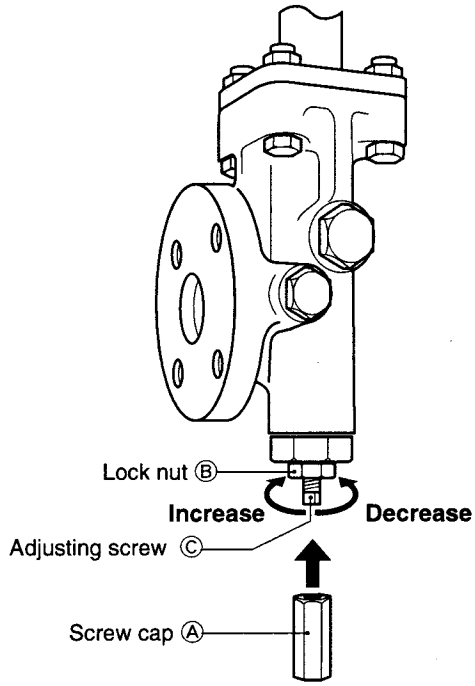
* Proper range: 0.5~0.6 MPa {5~6 kgf/cm²}

<Fuel Oil Pressure Adjusting Procedure>

Adjustment of fuel oil pressure can be made by the pressure adjusting screw of the fuel oil relief valve.

i) Remove the screw cap Ⓐ of the relief valve, and loosen the lock nut Ⓑ.
ii) Turn the adjusting screw Ⓒ, and adjust the pressure.
- Clockwise turning (tightening) Increase of pressure
- Counterclockwise turning (loosening) Decrease of pressure

iii) Closely watch the changes of the pressure, and confirm that the pressure reading is within the proper range.
iv) Tighten the lock nut Ⓑ, and attach the screw cap Ⓐ.



Fuel Oil Pressure Adjusting Procedure

When the engine with heavy fuel oil specification is operated by diesel fuel oil, the fuel oil pressure does not decrease since the fuel oil cannot be pressurized as in the heavy fuel oil supply line, however, the adjustment of the fuel oil pressure is not required if the pressure is within the following range.

* 0.2 MPa {2 kgf/cm²} or more

b) Engine using Diesel Fuel Oil

* Proper range: 0.2~0.3 MPa {2~3 kgf/cm²}

In case of diesel fuel oil specification, the pressure adjustment procedure is the same as in case of heavy fuel oil specification, since the same type of the fuel relief valve is used in both cases.

(8) Fuel Oil Temperature·····When Using Heavy Fuel Oil

Heavy fuel oil must be heated so as to make its viscosity suitable for injection, before the oil is supplied to the engine.

* Proper viscosity (engine inlet) dynamic viscosity: 14±1 cSt

Since the temperature appropriate for proper viscosity varies depending on the properties (viscosity) of heavy fuel oil, be minded to keep the proper viscosity referring to the following figure as a standard:
(📖: Fig.6-1.1 "Fuel Oil Temperature Curve")
In case that the viscontroller (automatic viscosity regulator) is installed to the engine, control the fuel oil viscosity in accordance with instruction manual, and be minded to carefully keep the manual.
(📖: 4-4.4 "Operation Using Heavy Fuel Oil")
(📖: 6-1 "Fuel Oil Characteristics and Control")

(9) Nozzle Cooling Oil Pressure and Temperature ·····When Using Heavy Fuel Oil

In case that nozzle cooling system is incorporated as an separate system as independently installed, and diesel fuel oil is used as the refrigerant carrier in stead of cooling water, it is required to control the pressure and temperature to be within a proper range of the value.

a) Nozzle cooling oil pressure ·····When Using Heavy Fuel Oil

* Proper range: 0.1~0.3 MPa {1~3 kgf/cm²}

In either case of DO or HO, be minded to feed nozzle cooling oil. Since nozzle cooling oil passes through the high-temperature parts, it may block the passage if the flow has become stagnant or stopped, and therefore be minded to secure the specified pressure for nozzle cooling oil..

Further, in case that nozzle cooling is conducted using fresh water, it is not required to regulate both the pressure and temperature, since jacket cooling water is used in such a case.

b) Nozzle Cooling Oil Temperature ·····When Using Heavy Fuel Oil

* Proper range: 50~60°C

Nozzle cooling oil temperature is regulated by the temperature control valve.
This temperature control valve is the same type as the one used for regulating lubricating oil. As for the regulating procedure, refer to the < Adjusting Procedure > of (4) Lubricating Oil Temperature.
In case that nozzle cooling oil temperature is too low, it will cause sulfated corrosion on the tip part of the fuel injection valve nozzle, and in case that the temperature is too high, it will cause generation of carbon flower on the nozzle.

5-4 Inspection and Maintenance

5-4.1 Inspecting Parts around Intake and Exhaust Valves, and Adjusting Valve End Clearance

(1) Replacing Consumables, Implements, and Measuring Instruments

a) Replacing Consumables (: "Parts List")
① Head cover rubber seal No.D10

b) Implements and Measuring Instruments
① General tools
(: "Implements List" in the final documents)

(2) Inspecting Parts around Intake and Exhaust Valves

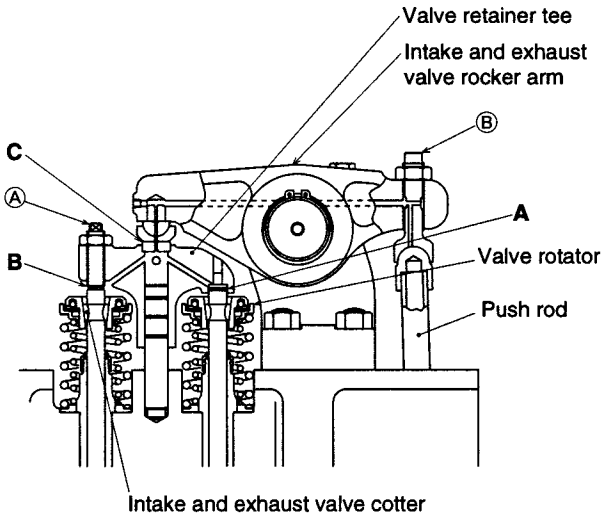
Both intake and exhaust valves are the parts that are exposed to the most severe conditions among all other parts of the engine. Therefore, be minded to periodically inspect these valves, and confirm that both valves operate normally.

a) Confirm that there is no abnormal operating sounds in both the intake and exhaust valves during the operation of engine.

b) Check the following points on these valves removing the cylinder head cover when the engine is stopped.
① Lubricating conditions of the rocker arm and push rods
② Lubricating and sludge collecting conditions of the intake and exhaust valve cotters, and valve rotators
③ Sludge collecting conditions around the valve spring
④ Rotating conditions of the valve rotators
⑤ Valve end clearance

(3) Adjusting Valve End Clearance

Since valve end clearance decreases due to the wear of the valve seat part, and therefore be minded to periodically inspect and adjust it.
When the valve end clearance is too small, it will cause improper setting of the valve on its seat during the operation of engine due to thermal expansion of the valve itself and push rod, resulting in burning of the seat.
Further, the valve system of this engine is 4-valve type, having 2 intake valves and 2 exhaust valves, and a single valve holder tee is provided to simultaneously push down both pairs of intake and exhaust valves, and therefore unless the valve end clearance of each pair of both intake and exhaust valves is equal, the valve pushing force will be unbalanced, resulting in abnormal wear or damage of the valve holder tee and the guide parts.



Valve End Clearance Adjusting Procedure

<Valve End Clearance Adjusting Procedure>

i) Place the cylinder in the explosion stroke, and close the intake and exhaust valves.

ii) Loosen the lock nuts of the adjusting screws Ⓐ and Ⓑ, and turn back the adjusting screw Ⓐ and Ⓑ.

iii) Closely fit the valve end "A", place the dial gauge against the valve holder tee, and tighten the adjusting screw Ⓐ until the scale pointer swings, so that it can be confirmed that the valve ends "A" and "B" are both closely fit at the same time.

iv)

Ⓐ

v) Insert a thickness gauge of the specified thickness into the clearance "C" on the top part of the valve holder tee, and adjust the clearance using the adjusting screw Ⓑ.

* Proper clearance: 0.31 mm
(for both intake and exhaust valves)

5-4.2 Inspecting and Maintenance of Fuel Injection Valve

Since the conditions of the fuel injection valve substantially affect the performance of engine operation, be minded to periodically inspect it and conduct the maintenance.

However, in case that remarkable changes have been found in the maximum combustion pressure, exhaust temperature, exhaust color, and so on, be minded to conduct immediate inspection and maintenance, regardless of the standard inspection and maintenance period.

Since the items mentioned in this section will be the parts to which NOx Technical Code shall be applied, when replaacing any of these parts, be sure to use the parts provided with the identification marks.
(:0-3 "Engine Conforming to NOx Technical Code")

(1) Replacing Consumables, Implements, and Measuring Instruments

a) Replacing Consumables (:"Parts List")

①	Circular gasket	No.507
②	Gasket	No.218
③	O-ring	No.12
④	O-ring	No.503
⑤	O-ring	No.504
⑥	O-ring	No.505

b) Implements and Measuring Instruments

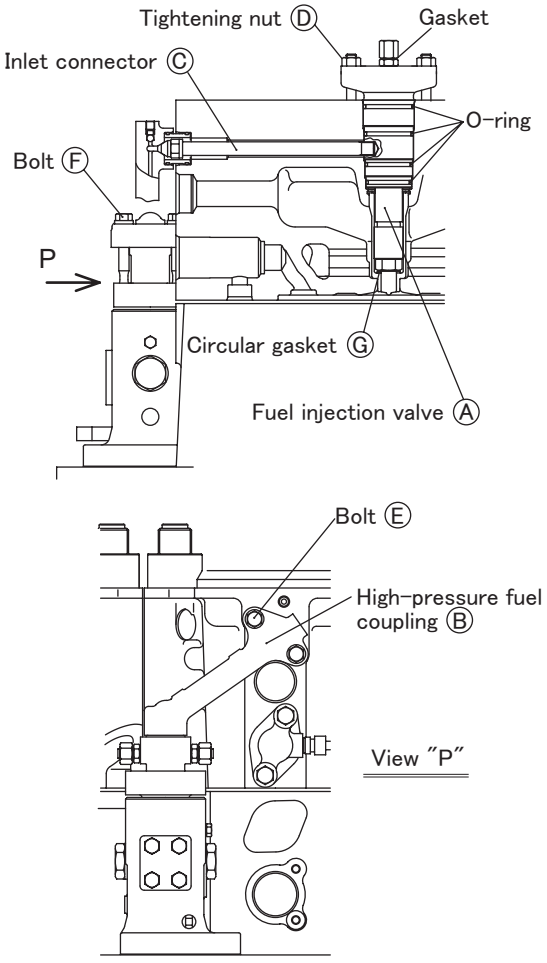
① General tools and measuring instruments (: Final Documents)
② Nozzle holder extracting implement
③ Fuel oil injection testing device
④ Nozzle cleaning implement

(2) Extracting Fuel Oil Injection Valve

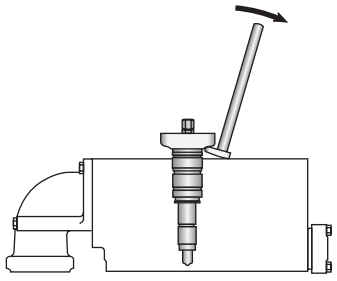
Extraction of the fuel oil injection valve can be conducted on the following procedure:

<Extracting Procedure>

i) Remove the cylinder head and heat box cover (upper side only).



Fuel Injection Device



Nozzle Holder Extracting Procedure

1)Be careful so that the circular packing Ⓖ may not be left behind in the cylinder head.
2)After removing the high-pressure fuel coupling and fuel injection valve, be minded to place the cover both on the coupling part of the fuel oil injection pump and on the insertion part of the cylinder head.

ii) Close the valve of the nozzle cooling water (or oil) pipe system. (In case of heavy fuel oil specifications.)

iii) Loosen the bolts Ⓔ and Ⓕ , and remove the high-pressure fuel coupling (block) Ⓑ .

iv) Remove the inlet connector Ⓒ .

v) Remove the tightening nut Ⓓ using a box wrench.

vi) Extract the fuel oil injection valve Ⓐ using a fuel oil injection extracting implement ②.

vii) Remove the circular gasket Ⓖ .

(3) Injection Test

Conduct a fuel injection test of the fuel injection valve, to check if the opening pressure and the spraying conditions of the fuel injection valve is in proper and normal state.

Conduct the fuel injection test using the fuel injection test device installed to the engine.

a) Inspecting Valve Opening Pressure

i) Install the fuel injection valve on the injection test device, after removing the carbon stuck on the tip of the injection valve, and cleaning the tip.

ii) Connect the test pump and the fuel injection valve using a high-pressure hose for testing.

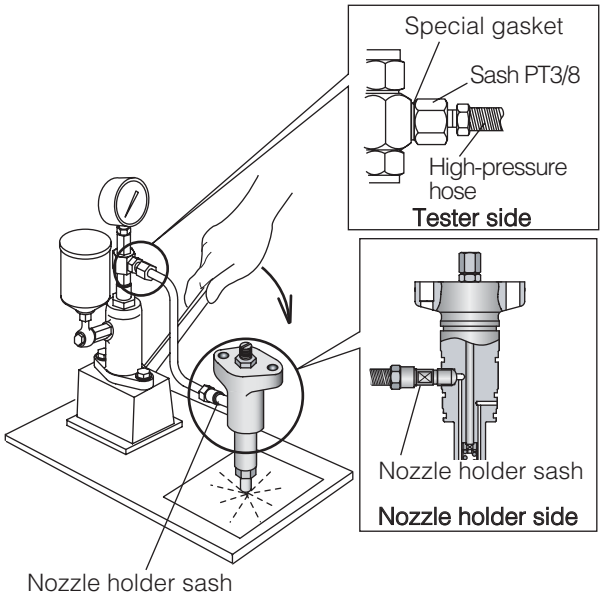
iii) Quickly operate the test pump lever several times, and drain the air until the valve starts injection of the fuel as the pressure indicating scale swings.

iv) Slowly turn the test pump lever (once every second, or so), check the pressure reading (the pressure, that has once increased gradually, suddenly starting to decrease due to opening of the valve).

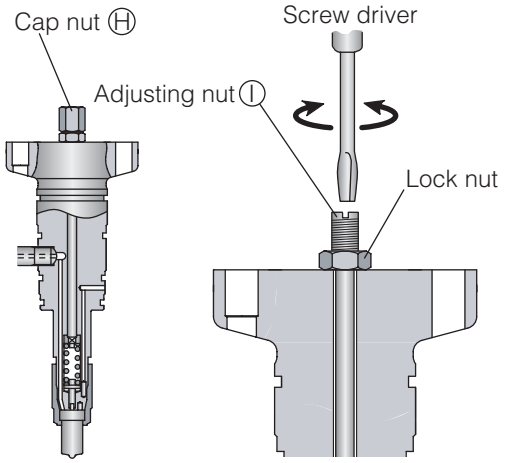
∗ Normal pressure: 27.4 - 29.4 MPa
{280-300 kgf/cm²}

b) Adjusting Valve Opening Pressure

When reassembling the fuel injection valve after conducting the maintenance work by extracting the valve out of the engine, and when the nozzle is replaced with a new one, adjust the valve pressure on the following procedure.



Injection Test Procedure



Pressure Adjusting Procedure

∗ Setting pressure : 29.4MPa {300 kgf/cm}
Be minded to set the pressure of the fuel injection valve at a rather higher level, taking into concideration the initial working adjustment, in case that a new injection valve is introduced.
-------30.4 MPa {310 kgf/cm²}

Since the items mentioned in this section will be the parts to which engine setting value specified in NOx Technical Code shall be confirmed, do not make any change that may deviate from the setting values.
(: 0-3 "Engine Conforming to NOx Technical Code")

<Valve Opening Pressure Adjustment Procedure>

i) Remove the cap nut Ⓗ.
ii) Loosen the lock nut Ⓙ for the adjusting screw ①,
iii) Adjust the pressure to the specified pressure, by turning the adjusting screw using a screwdriver, while conducting the injection of the fuel, as in the same procedure as in the case of the fuel injection test.
- Screwing-in of adjusting screw High
- Turning-back of adjusting screw Low

iv) Tighten the lock nut Ⓙ.

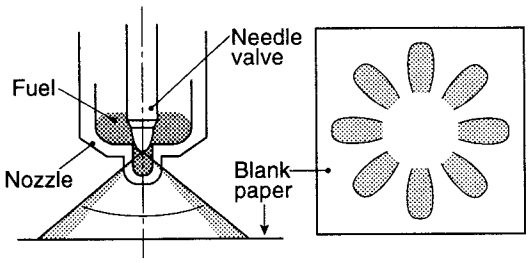
c) Inspecting Fuel Injection

Inspect the fuel injecting conditions on the following procedure:

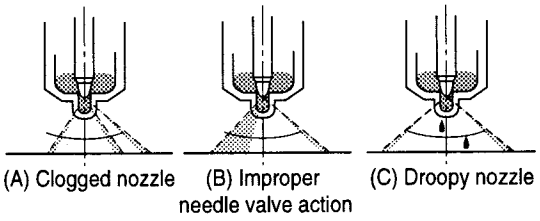
i) Quickly operate the test pump lever several times (2 to 3 times every minute, or so), and inspect the fuel injecting conditions.
(Let the fuel injected against a blank paper, so that the conditions can be better inspected.)
- Check if cutting-off injection is good or not. ·····Injection sound
- Check if the injection is made in clear spray, not being in spray of bar pattern injection, nor dripping down.

ii) Check if there is no dripping-down of fuel from the tip of the nozzle after the injection test.

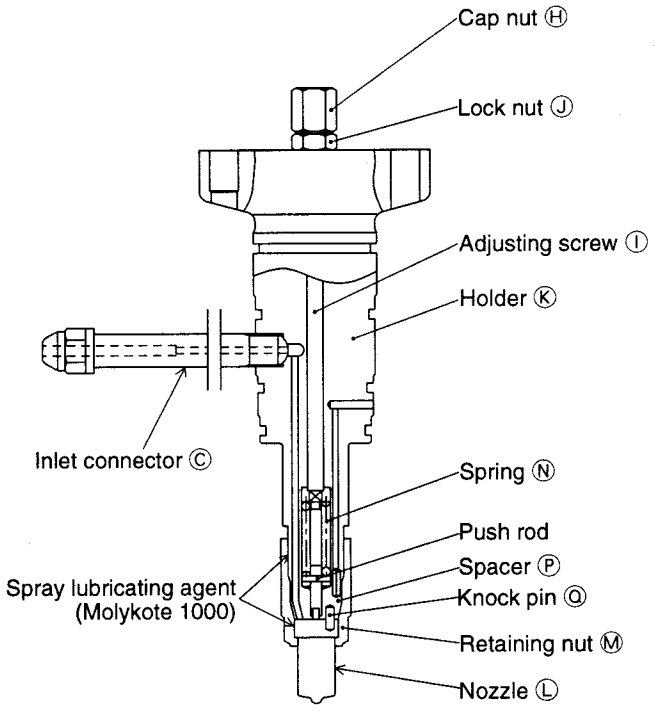
Be minded not to approach your face or hands near the fuel spray during testing.
If the high-pressure fuel has hit your face or hands, it will cause injuries.



Normal Injection



Abnormal Injection



Fuel Injection Valve (A)

(4) Disassembling and Inspecting Nozzle

In case that a remarkable decrease of the valve opening pressure, faulty injection of fuel oil, or dripping-down of fuel oil after injection is found as the results of the fuel injection test, conduct disassembling, cleaning, and inspection on the following procedure:

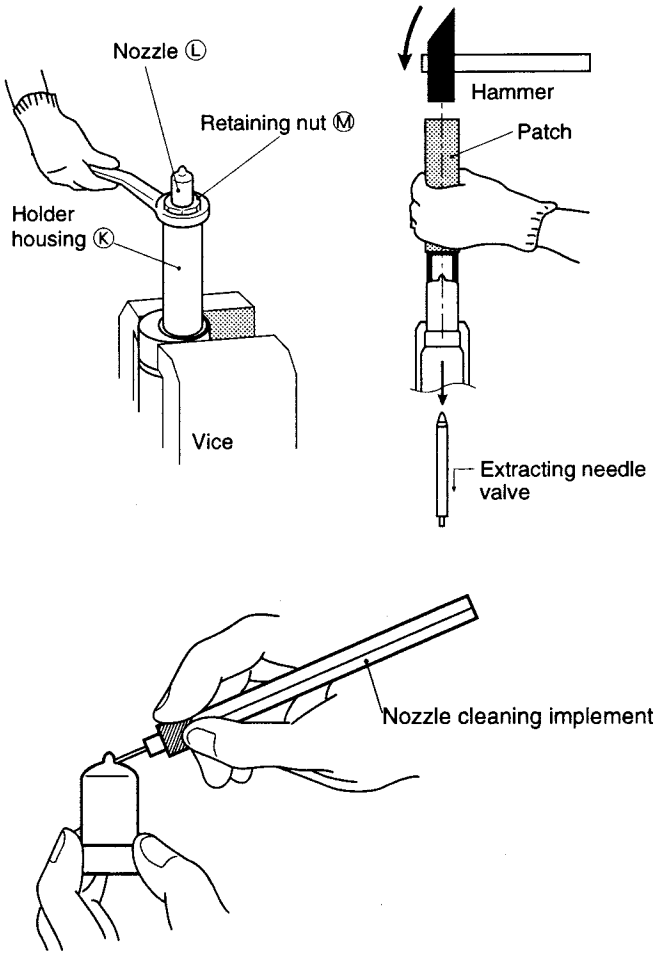
a) Disassembling the Nozzle

i) Remove the cap nut Ⓗ.
ii) Loosen the adjusting nut Ⓘ.
iii) Fix the holder housing Ⓚ in a vise, and loosen the retaining nut Ⓜ.
iv) Extract the needle valve out of the Nozzle Ⓛ.
v) Extract the nozzle out of the retaining nut, by striking with a hammer, placing a pipe-type patch on the nozzle, so as not to damage the nozzle hole.

△ If the retaining nut is turned while the adjusting nut is still tightened, it will damage the nozzle or nozzle holder parts.
In case that heavy fuel oil is used, the retaining nut and nozzle may be stuck together with carbon accumulated on them.
If the nut is loosened in this state, the nozzle will turn together with the nut, and may damage the nozzle, or the knock pin of spacer, and therefore first lubricate the nut with gas oil, and then carefully loosen the nut by striking the nozzle with a hammer, while placing a patch on the nozzle.

b) Inspecting Nozzle

i) Clean the nozzle nut and needle valve with gas oil.
ii) Clean the nozzle hole with a nozzle cleaning implement.
iii) Push in and push out with hand, and check the movement.
- Check if the movement is smooth or not.
- Check if the movement is too loose.



Nozzle Cleaning Procedure

△ Since the nozzle and needle valve is a pair functioning together, be minded not to replace either of them separately.
Do not try to reuse a faulty nozzle by wrapping, but be sure to replace it with a new one.

(5) Assembling Fuel Injection Valve

Assemble the fuel injection valve in the reverse order of the disassembling procedure.

i) Clean each of the disassembled parts with clean gas oil, and insert each of them back into the holder housing Ⓚ.

ii) Put the spacer Ⓟ and the knock pin Ⓠ of nozzle together, and install them into the holder housing.

iii) Apply the lubricating agent (Molykote 1000 U-paste) on the holder housing thread, the seat face of the retaining nut Ⓜ, and the outer periphery of the nozzle, and screw the retaining nut into the holder housing by hand.

iv) Loosen the adjusting nut Ⓘ.

v) Tighten the retaining nut with the specified torque.

* Specified torque: 196～226 N·m {20～23 kgf·m}

△ Be careful not to tighten the retaining nut with the toque over the specified value, since it may cause the sticking of the needle valve of the nozzle.

vi) Set the fuel injection valve on the injection test device, and adjust the valve opening pressure.
(📖: 5-4.2 (3) "Fuel Injection Test)

(6) Mounting Fuel Injection Valve

Mount the fuel injection valve to the cylinder head in the reverse order of the extracting procedures.

i) Apply heat-resistant agent on the O-rings, and attach them to the holder housing Ⓚ.

ii) Apply heat-resistant agent on the circular gasket, and attach it to the holder housing.

iii) Insert the fuel injection valve into the cylinder head guide hole, after confirming that the old gasket is not left behind in the guide hole.

iv) Attach the holder tightening nut Ⓓ, and evenly tighten with the specified torque.

* Specified torque: 59 N·m {6 kgf·m}

v) Screw in the inlet connector with hand, and tighten it with the specified torque.

* Specified torque: 88～98 N·m {9～10 kgf·m}

vi) Attach the high-pressure fuel coupling and O-rings on the cylinder head side and fuel injection pipe side, tighten the high-pressure fuel coupling tightening bolt Ⓔ and Ⓕ with the specified torque.

* Specified torque: 34～45 N·m {3.5～4.5 kgf·m}

5-4.3 Cleaning Filters

Fuel oil filters and lubricating oil filters have very important roles, i.e., removing foreign matters or sludge in oil and keeping the oil clean, and maintaining the normal operation of the various parts of engine. Therefore, it is important to periodically overhaul and clean, so that filtering capabilities can be maintained.

The notch-wire duplex type filter and centrifugal type lubricating oil bypass filter are used for fuel oil and lubricating oil, and which type should be used shall be decided depending on the specification of each engine.

(📖 : Separately provided "Engine Specification")

(1) Notch-Wire Duplex Type Filter

The notch-wire duplex type filter is normally used as both-side-parallel application.

Since both the fuel oil pressure and lubricating oil pressure decreases if the filter has been fouled, be minded to periodically conduct blow-off cleaning. In case that the oil pressure does not increase even after the blow-off cleaning has been conducted, overhaul the filter and then clean it.

a) Replacing Consumables

For lubricating oil 32XP (📖 : "Parts List")

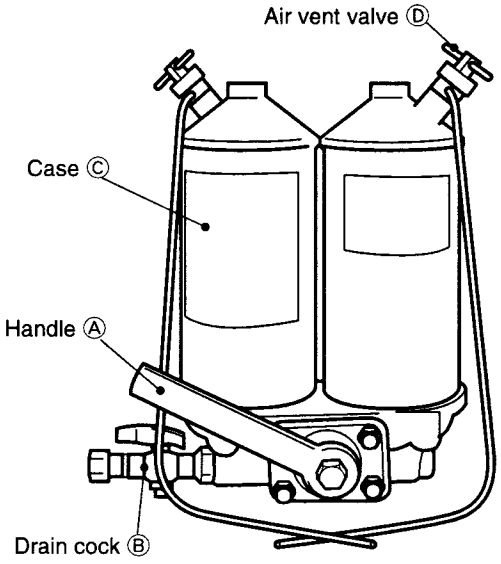
① Gasket No.157
② Gasket No.186
③ Element gasket No.281

For fuel oil 32PED (📖 : "Pars List")

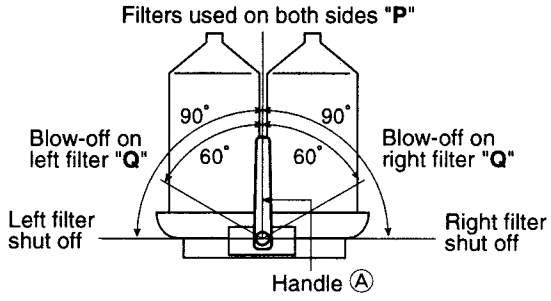
① O-ring No.106
② Gasket No.152
③ Gasket No.190
④ Gasket No.266

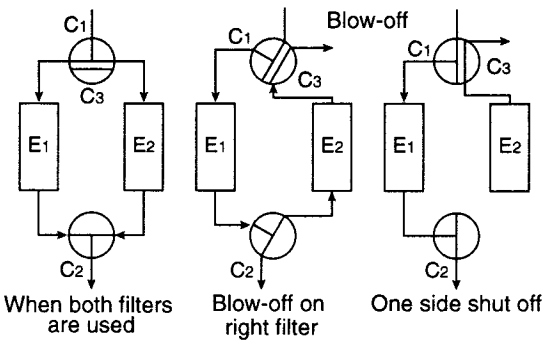
b) Blow-Off Cleaning

In case of blow-off cleaning, deposits can be removed by reversely flowing the fluid through the element on one side, and this type of cleaning has no cleaning effect when the element is substantially clogged, and therefore be minded to conduct the blow-off cleaning in an earlier state, while the fouled degree of filter is still light. (The cleaning should be conducted at least once a week.)



Notch-Wire Type Filter





E1 E2 ·····Right and left elements
C1 ·····Selector cock inlet hole
C2 ·····Selector cock outlet hole
C3 ·····Selector cock blow-off and draining hole
} Interlocke

<Blow-Off Cleaning Procedure>

i) Open the drain cock Ⓑ at the bottom part of filter. At this time, be careful so that waste oil may not scatter or overflow out of the drain cock.

ii) Turn the selector cock handle Ⓐ (usually, set to "Used on both sides" (P) position) to the "Blow-off" position (about 60℃), and quickly conduct the operation to return the handle to the previous position (within 0.5～1 sec.).

iii) Repeat this operation 2～3 times.

iv) Conduct the above same procedure on the other side.

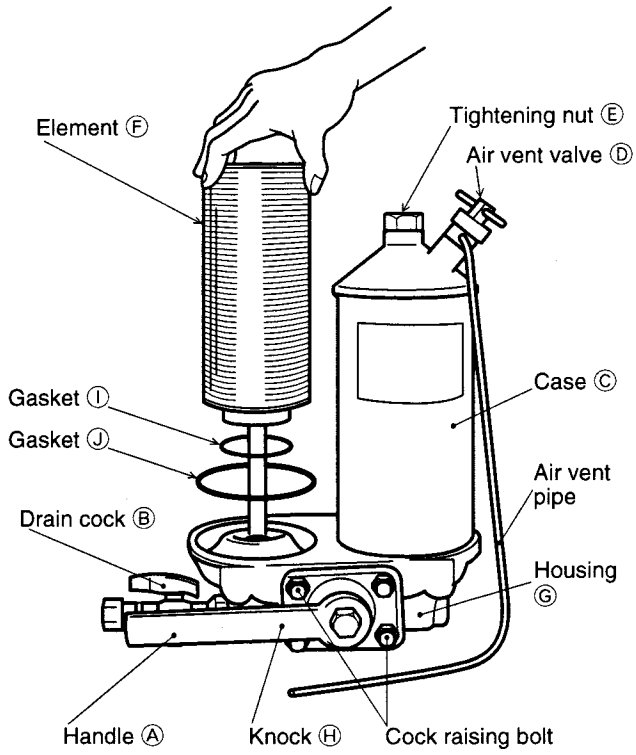
v) Close the drain cock.

△ Conduct the blow-off cleaning quickly. Further, do not place the lever on the middle position, but quickly move to the specified position (knock position). If too much time has been taken in blow-off cleaning and switching the lever positions, the pressure will decrease, and may activate the alarm or emergency stop.

c) Overhaul and Cleaning of Filters

Be minded to conduct the overhaul and cleaning of filters when the engine is stopped, as far as possible. In case that the overhaul and cleaning is performed during the operation of engine, first conduct the blowing-off cleaning on the opposite side, and then perform the overhaul and cleaning while the engine is in an idle operation or is under a low-load operation.

△ When using the heavy fuel oil, the fuel oil is heated up and consequently the filter and the piping are extremely hot. Therefore, when handling the filter, be sure to wear the safety gloves, and be cautious so that the high-temperature oil may not splash on the skin or clothes.



Filter Overhaul Procedure

<Overhaul and Cleaning>

i) Turn the selector handle Ⓐ to "Close" position (90°) on the side to be overhauled.
ii) Open the drain cock Ⓑ, loosen the air vent valve Ⓓ at the top of the Case Ⓒ, and discharge oil.
iii) Loosen the tightening nut Ⓔ, remove the case Ⓒ, and then take out the element Ⓕ.
iv) Clean the element with washing oil or gas oil, and conduct blow-off cleaning from inside.
v) Clean each of the parts overhauled, and clean the case gasket grooves of the filter housing Ⓖ.

<Assembly and Restoration>

i) Attach the gasket Ⓘ to the element Ⓕ, and attach the gasket Ⓙ to the filter housing Ⓓ.
ii) Put the spring Ⓚ on the element, and place the case Ⓒ on the top of the spring, and screw the nut Ⓔ into the case while holding the case with hand.
iii) Close the drain cock Ⓑ.
iv) Shift the handle Ⓐ to "Blow-off" position.
v) When the filter is overhauled and cleaned during the engine being stopped, conduct priming and fill the case with oil.
vi) Close the air vent valve Ⓓ, after the oil has been let overflow and air bubbles have completely vanished from the oil flowing out of air vent pipe.
vii) Return the handle to "Both sides used" (P) position.
viii) Check if there is any oil leakage from the gasket sections.

△ Confirm that the knock Ⓗ of the handle Ⓐ is engaged in its position.
If the knock is not properly engaged in the position, the handle will be overturned by vibration during the operation of engine, and may incur oil spill-out accidents.

△
1) Check conditions of the sludge collected on the element.
Particularly in case of the lubricating oil filter, if metallic particles are found, investigate the causes and take the countermeasures.
2) When the element is damaged, or when the element is excessively fouled and clogging cannot be removed even by cleaning, replace the element with a new one.
3) Since the gaskets and O-rings are easily be damaged, be very careful in handling these parts. Particularly, the heavy fuel oil filter tends to be deteriorated in high-temperature conditions, and therefore be minded to replace the filter every time the overhaul is conducted.

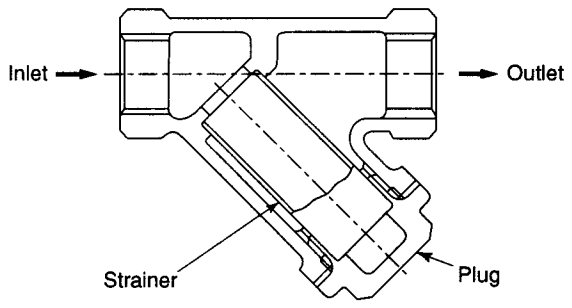
(2) Y-Type Filter

a) Overhaul and Cleaning

i) Remove the plug.
ii) Remove the strainer.
iii) Clean the strainer with washing oil or gas oil.

d) Mounting

When mounting the Y-type filter, be minded to mount it with the plug side facing downward, so that sludge may be accumulated in the strainer.



Disassembling Y-type Filter

5-4.4 Cleaning Turbocharger Blower

If the fouled degree of the turbocharger blower has progressed, the efficiency of the turbocharger will decrease and the operating performance of engine will be worsened. Particularly when heavy fuel oil is used, the turbocharger blower tends to be fouled in faster degree, and therefore be minded to conduct blow-off cleaning and restrain the progress of fouling.

(1) Interval of Cleaning

Clean the blower when intake air pressure has decreased 10% at the same load, or at least every 150 to 200 hours of operation.

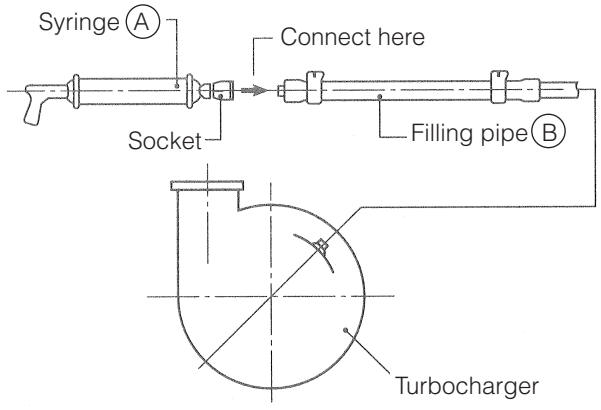
(2) Load during Cleaning

Make sure that the engine shall be operated under the load of 75% (In case of "MET", Intake air pressure is 0.03~0.07 MPa) or higher, and continue the loaded operation for 1 hour or more after cleaning.

(3) Cleaning Liquid

Be sure to use the specified cleaning liquid. In case that the specified cleaning liquid is not available, use fresh water. (Note that cleaning effect is inferior with fresh water.)

⚠ Be minded never to use gas oil or any other flammable liquid for cleaning, since these liquids will be the cause of fire.



Turbocharger Blower Cleaning Procedure

(4) Cleaning Method

Cleaning of the turbocharger blower can be made using the cleaning device that is supplied together with the engine.

i) Pour cleaning liquid into the blower syringe Ⓐ.

ii) Connect the syringe socket to the filling pipe Ⓑ that is connected the turbocharger inlet side.

iii) Fully open the drain cock of the air intake duct.

iv) Operate the syringe to inject cleaning liquid.

v) When 3 to 5 minutes has passed after the injection of cleaning liquid, inject fresh water of the same amount on the same procedure.

[Injection Amount and Injecting Time]

Type of turbocharger		Injection amount (L)	Injecting time (sec)
MET18SRC		0.25	20～40
RH	133	0.15	4～10
	143	0.2	
	163		
	183	0.3	
	203		
TPS	48	0.4	4～10
	52		

vi)) In case that there is no change in intake air pressure before and after the cleaning, repeat cleaning after 10 minutes.

◎ In case that intake air pressure does not change over when the cleaning is repeatedly conducted, conduct the overhaul and cleaning of the whole of turbocharger.

(📖 : Separately provided "Turbocharger Instruction Manual")

⚠ The turbocharger is at a high-temperature during operation and just after the engine is stopped. If you touch it with bare hands during cleaning, you may burn your hands. Wear safety gloves without fail.

5-4.5 Cleaning Turbocharger Turbine

⚠ The turbocharger is at a high-temperature during operation and just after the engine is stopped. If you touch it with bare hands during cleaning, you may burn your hands. Wear safety gloves without fail.

<Turbocharger type "RH" (water washing)>
(Applicable to heavy fuel oil engine)

Inject water through the water injection nozzle fitted on the exhaust pipe at the turbocharger inlet, and the combustion deposit on the turbine side can be removed by the mechanical effect of collosion of water drops and the dissolving effect.

Part of the water evaporates, and the remaining water is discharged through the drain hole in the gas outlet duct.

(1) Frequency of cleaning

Clean the turbine every 250 hours**.**

(2) Engine running conditions during cleaning

Clean the turbine after running the engine for about 20 minutes or more at a power at which a turbocharger inlet gas temperature of 300 to 350°C is obtained.

(3) Cleaning procedure

i) Connect the water injection tube ① connected to the exhaust pipe and the gauge board ② with a hose.

ii) Connect the water supply hose ④ to the gauge board ②.

iii) Open the stop valve ⑤ to feed water to the tube and hose to the nozzle ⑥. When the pressure gauge ⑦ stabilizes, close the stop valve.

iv) Open the drain cock ⑧.

v) Fully open the nozzle ⑥.

vi) Slowly open the stop valve ⑤, seeing the pressure gauge ⑦, until the water pressure becomes 0.05 to 0.08 MPa (0.5 to 0.8 kg/cm²).

vii) Feed water for about 5 to 7 minutes.

viii) If no drain is discharged from the drain cock ⑧ after water is fed for 5 minutes, close the nozzle ⑥ to discharge drain at a rate of about 0.1 l/min.

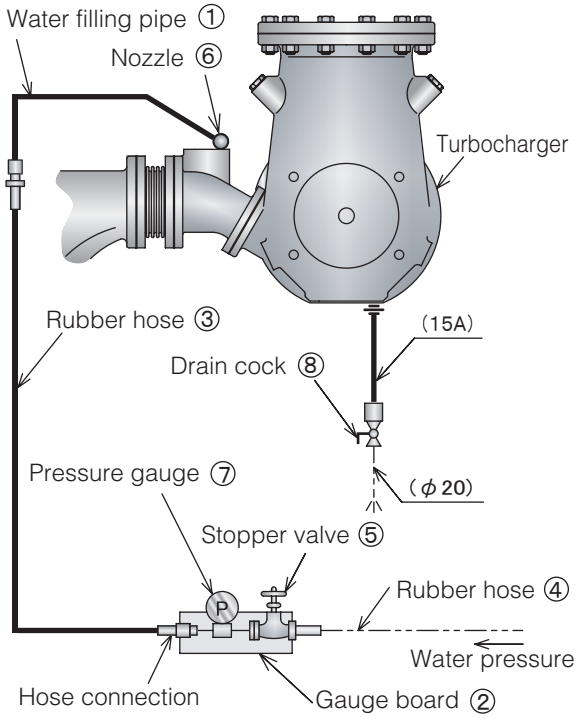
ix) After the completion of water cleaning, close the nozzle ⑥.

x) Make sure that no drain is discharged, and close the drain cock ⑧.

xi) After water cleaning, keep the engine running for about 5 to 10 minutes under the same load.

△
- Keep a close watch on the turbine during water injection. Take care that the injection rate is not too high or the drain pipe is not clogged with removed deposit.
- Even if drainage is not observed, do not feed water for 7 minutes or more.
- After the completion of cleaning, remove the connected hoses.

(📖 : Separately provided "Turbocharger Instruction Manual")



Water-Pouring Cleaning Procedure of Turbine

<Turbocharger type "TPS" (pouring water washing)>

As the pouring water washing method of the supercharger, fresh water is sprayed in front of the turbine from the pouring water nozzle on the supercharger. Thus, the extraneous matter is removed through the difference of the cooled turbine nozzle eith fresh water, turbine blade and the thermal expansion extraneous matter.

(1) Washing interval

Since the washing effect is reduced when the deposit layer becomes thick, apply the washing every approx. 200 hours.

(2) Load during washing

Apply the washing at such a load as the exhaust temperature of the turbocharger intlet is 400 to 450°C. Asthe exhaust temperature is lower, the washing effect decreases. As it is higher, the turbine nozzle or similar part may be damaged.

Take special care for the exhaust temperature.

(3) Fresh water for washing

As the fresh water for washing, use the fresh water which does not include any additives.

Never use any seawater.

(4) Washing method

i) Connect the hoses of the pressure gauge and the check-valve hose to the pipe connected to the exhaust pipe.

ii) Open the check valve, fill the water into the pipe and hose up to the nozzle, and close the check valve.

iii) Fully open the valve in the nozzle on the exhaust pipe.

iv) Observing the pressure gauge, slowly open the check valve to gain the water valve of 0.45 to 0.7 MPa (4.5 to 7.0 kgf/cm^2)

v) Continue pouring water 25 to 30 seconds.

vi) Apply the washing three times. Here, provide the interval shown in the table below after washing of one time.

vii) Close the valve, loosen the hose connection. Disassemble the manometer and the hose with valve.

viii) To dry the supercharger, run it applox. 10 minutes at the same load.

ix) If any variation is not observed on the performance values of the exhaust temperature, charge pressure, supercharger revolution speed and so on, repeat the procedure above after completion of the washing. If any variation is not observed after repetition of several times, it is necessary to open and clean it.

Supercharger type	Interval time (minutes)
TPS48	3
TPS52	3

(📖 : "Operating Manual for Supercharger")

< In case of Turbocharger Model "MET" (Cleaning solid matter) >

If staining of the turbocharger turbine side progresses, engine performance will be worsened due to decrease of the efficiency as in the case of the blower side. Particularly, it tends to be more stained in'case of heavy fuel oil specification, periodically clean the turbine side, and restrain the progress of staining.

When cleaning the solid matter in the turbine, charge vegetable solid particle in front of the turbine, and remove the adhered matters on the turbine nozzle or turbine rotor blade by the impact force produced by the vegetable solid particle accelerated by the exhaust gas.

(1) Interval of Cleaning

Conduct the cleaning with the interval of 200 to 250 hours in the initial stage, since the effect of cleaning will be lost if the layers of the accumulated matters have become thick.

As for the cleaning interval after the initial cleaning, properly increase or decrease depending on the factors such as the exhaust temperature, intake air pressure, and the degree of performance decrease of the turbocharger rotation speed.

(2) Load during Cleaning

Perform cleaning by making the load of engine to be 75 to 85% as the standard. Although it is possible to perform cleaning at a low load of around 50%, cleaning liquid may sometime be accumulated at the gas outlet casing, and therefore avoid the cleaning of such a low load as far as possible.

Intake air pressure when cleaning is performed is as shown in the following table, and therefore in case that the normal load value is higher than these, decrease the load.

[Intake air pressure and Exhaust Temperature]

Turbocharger model	Intake air pressure	Turbocharger inlet exhaust temperature
MET18SRC	0.1~0.15 MPa	510 °C or less

Cleaning Turbocharger Turbine

(3) Cleaning Liquid

Use the specified cleaning liquid as shown below.

- ○ Husk of walnut: Diameter of grain: 1.7 to 2.4 mm {Marine grid #10)
- ○ Grain (rice, wheat, etc): Diameter of grain: 1.7 to 2,4 mm
- ◎ Close the drain hole of the turbocharger gas outlet casing while cleaning.

(4) Cleaning Method

a) Procedure for one time cleaning

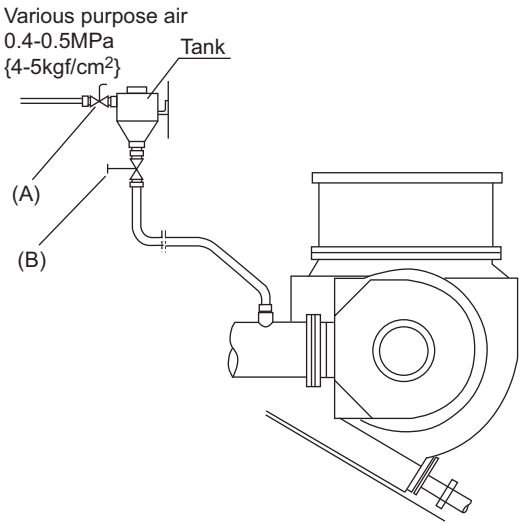
i) After opening the valve (B), open the valve (A) and cool the equipment by passing air for 0.5 to 1 minutes.

ii) Close the valve (A), and close the valve (B).

iii) Fill the specified use amount of vegetable solid cleaning agent into the tank, and securely tighten the cap of the tank.

iv) Open the valve (A) and (B) in this order, and charge the cleaning agent with air pressure.

v) Close the valve (B) and (A) in this order.



Turbine Rotor Blade Cleaning Procedure

b) Repeated cleaning

i) In case that a sudden change, such as surging, has occurred in the engine when charging the cleaning agent, try the cleaning by using a half of the specified use amount of solid cleaning agent for single time cleaning, and perform the cleaning after confirming that there is no more sudden change in the engine.

Afterwards, make this method as the standard.

ii) After finishing the cleaning, repeat the above the procedure of Item a), if no particular change is not found in the performance values such as the exhaust temperature, intake air pressure, and turbocharger rotation speed. In case that any change is not found even after the cleaning has been repeated, it is necessary to perform the overhaul and cleaning.

[Specified use amount of solid cleaning agent]

Turbocharger model	Specified use amount
MET18SCR	0.05 ~ 0.1 ℓ / 1

(📖 : "Instruction Nmanual of Turbocharger")

5-4.6 Measuring Crankshaft Deflection

△

If the crankshaft deflection exceeds its limit, the stress to be applied to the crankshaft will become excessive, and it will result in the breakage of crankshaft if the excess of deflection is too large.

Therefore, adjust the crankshaft deflection to a proper value when being installed, and periodically measure the deflection, so that it can be corrected whenever it is over the limit value.

(1) Replacing Consumables and Measuring Instruments

a) Replacing Consumables (📖 : "Parts List")

① O-ring (frame side cover) No.11

b) Implements and Measuring Instruments

① General tools

(📖 : "Implement List" in the final documents)

② Deflection gauge

③ Motor

(2) Conditions for Measuring Deflection

a) Deflection of the crankshaft varies according to the temperature. Be sure to measure it when the engine is in cold state.

b) Before measurement, push the contact piece of the deflection gauge with a finger, and confirm that both the contact piece and dial gauge return to the original positions correctly.

c) In case of the marine engine, since the deflection varies according to the loaded cargo conditions, be minded to record the conditions of loaded cargo, draft, temperature, and so on, at the same time.

(3) Measuring Deflection

<Measurement procedure>

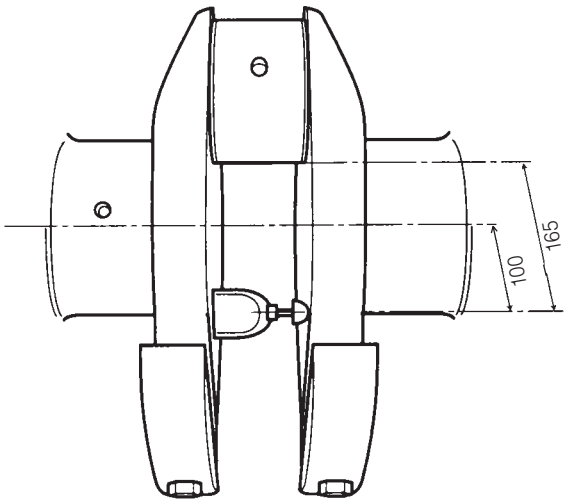
i) Open the turning plug, and perform turning the crankshaft.

ii) Place the crank pin at the point of 30° (position "B") past the bottom dead center.

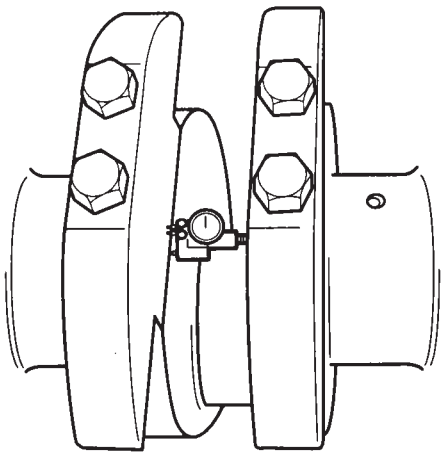
iii) Install the deflection gauge.
Installation position shall be approximately on the identical line with the outer diameter of the journal, and shall be on the intersecting point on the center line of the crank arm.

iv) Set the reading on the gauge scale to +20 at the position "B" in the Figure. (To make clear the positive and negative directions.)

v) Slowly conduct turning of the engine in the normal direction of rotation, and measure the reading on the scale when the crankshaft is at the angle of "B", "C", "D", "E", and "A" respectively, of which data shall be recorded.



Deflection Gauge Mounting Position



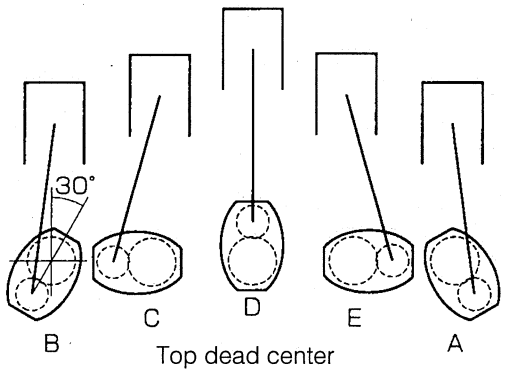
Measuring Crankshaft Deflection

(4) Calculating Deflection (d)

Calculate the deflection values as based on the measured values and in accordance with the following formula, and record the calculated values:

- Vertical (V) deflection: $dV = D - \frac{A+B}{2}$
- Horizontal (H) deflection: dH = C - E
- Positive/negative deflection: Open downward (+), closing downward (-)

A, B, C, D, and E represent the measured values respectively at each corresponding position shown in the figure on the right.



Deflection Measuring Position

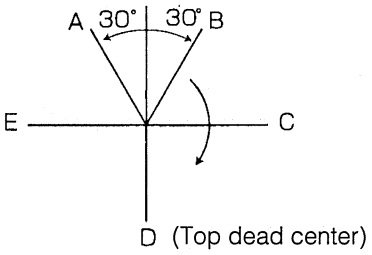
(5) Correction Limit for Deflection

a) The correction limit shall apply to whichever is larger of dV and dH as shown in the following table.

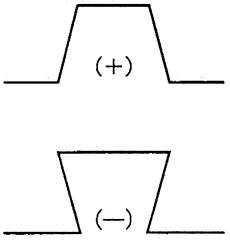
(Unit : mm)

	Adjusted value	Allowable limit	Direction
In case of direct connection : (One-side bearing generator)	0.03 or less	0.08	
	$\frac{1}{10,000}$ x stroke	$\frac{2.8}{10,000}$ x stroke	
In case of direct connection : (Both-side bearing generator)	0.03 or less	0.08	
	$\frac{1}{10,000}$ x stroke	$\frac{2.8}{10,000}$ x stroke	
In case of direct connection with flexible coupling:	0.09 or less	0.12	
	$\frac{3}{10,000}$ x stroke	$\frac{4}{10,000}$ x stroke	

Seen from flywheel side



Dial Gauge Reading



b) Deflection varies depending on the connection method (direct connection or flexible coupling) between the crankshaft and drive equipment, however, usually, the deflection becomes maximum at the crank throw that is closest to the flywheel.

Adjust the drive equipment using the adjusting shim or chock liner, so that the deflection falls within the limited values as shown in the above table.

△

The deflection of the crankshaft shall be represented by the value when the engine is cold, and since the values measured when the engine is warm sometimes differ significantly depending on the measurement conditions, be minded not to use the value measured when the engine is warm as standard.

<Reference>

Deflection in warm condition

In case of the directly connected generating engine, the deflection in the warm conditions generally tends to vary as compared to the values in the cold conditions.

This is because the temperature increase of the engine base is larger than the temperature increase of the generator to be directly connected, so that the crankshaft core relatively increases, the deflection varies towar ⌐¬ direction (downward closing), and thereby the difference manifests itself as the deflection difference between the cold and warm conditions.

Like this, in case of the directly connected generating engine, the deflection difference between the cold and warm conditions differs depending on the bearing dimensions and temperature difference of the engine and generator, so that the adjustment is impossible, and it will be the value unique to the generating device.

Consequently, in case of the generating engine, the adjustment is made with the target of the conditions near to + side upper limit ⌐¬(downward opening) of the specified value in the cold conditions.

The measured value of the deflection value in the warm conditions varies according to the temperature, and the different values tend to be obtained every time the measurement is conducted, however, based on the actual measurement results of our company, the value is approximately 3 to 4/10,000 x stroke and within the range of ⌐¬ (downward closing).

There is a possibility that the measurement results of the deflection in the warm conditions differ from the real value due to the reasons that the engine temperature may suddenly increase after the engine is stopped, and due to the effects of the thermal expansion owing to the temperature difference of the crankshaft. Be careful of this fact.

5-4.7 Inspecting and Replacing Protective Zinc

In case that sea water is used as the cooling water in the cooleig system, a protective zinc is provided in each cooler.

Conduct periodical inspection and replacement of the parts on the following procedure:

(1) Replacing Consumables, Implements and Measuring Instruments

a) Replacing Consumables

Lubricating cooler (📖 : "Parts List")

① Gasket No.12

② Protective zinc No.11

Air cooler (📖 : "Parts List")

③ Gasket No.2

③ Gasket No.4

④ Protective zinc No.1

④ Protective zinc No.3

b) Implements and Measuring Instruments

① General tools

(📖 : "Implements List" in the final documents)

(2) Locations of Protective Zinc and Inspection Interval

- Front and rear covers for lubricating cooler -------Every 3 months
- Front and rear covers for air cooler-----Every 6 months

△

Efficiency of the protective zinc substantially varies depending on the purity. Therfore, be minded to use the genuine parts supplied by Daihatsu Diesel Manufacturing. Co., Ltd.

(3) Inspection and Replacement

a) Inspection

i) Remove the mounting flange for protective zinc.

ii) Replace the protective zinc of which volume is reduced more than 50% (20% by dimension) as compared the original shape.

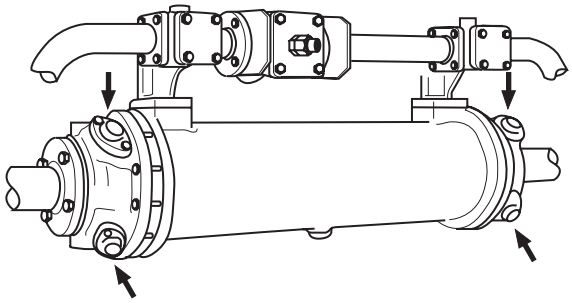
iii) On the contrary, in case that the protective zinc is rarely worn out, the following failures may be suspected:

- Faulty condition on the mounting surface
- purity failure of zinc

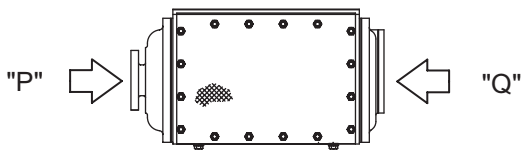
b) Replacement and mounting

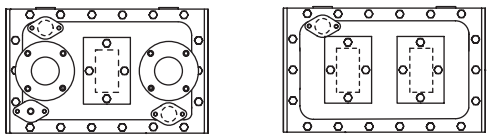
i) Remove the rust or scale from the mounting surfaces of the protective zinc and the mounted flange to expose the metallic surface, and securely mount the protective zinc to the flange in such a way that the both parts are closely in contact each other.

ii) In case that the protective zinc is reused, shave scale off the surface of the protective zinc and expose the zinc surface.



Location of Protective Zinc for Lubricating Oil Cooler





View "P" View "Q"

Location of Protective Zinc for Air Cooler

6-1 Fuel Oil Characteristics and Control

How well the fuel oil characteristics is controlled will greatly affect the smooth operation of engine, maintenance intervals, as well as the working life of various parts.
When supplying the fuel oil, it is required not only to confirm the characteristics referring to the characteristics analysis table, but also to conduct the control of the oil in accordance with each characteristics.
Particularly when using heavy fuel oil, conduct the preprocessing of fuel oil, the control of viscosity (temperature), and the control of lubricating oil without fail, so that troubles arising from fuel oil can be prevented.

6-1.1 Selecting Fuel Oil

The standard characteristics of the fuel oil applicable to this engine is as shown in a separate table.

Table 6-1.1 "Standard Fuel Oil Characteristics"

Commercially available fuel oils are considerably different in the characteristics, and even the same type of the fuel oil may show a greatly different characteristics depending on the location and period of supply.

Therefore, be minded to check the characteristics analysis values of the fuel oils after each delivery, and try to avoid using the fuel oil of which characteristics is excessively different from those shown in the standard characteristics table.

△

1) The engine specification varies depending on the types of the fuel oil to be used. Be minded to confirm the type of the fuel oil referring to the specification of engine, and do not use the oil of which grade is lower than that shown in the specification.

In case that the fuel oil of lower grade is used, troubles may be incurred on the operation of engine, due to the faulty combustion, troubles on the fuel oil system equipment, premature wearing of the parts, and so on.

2) Avoid using the fuel oil by mixing with the other oils whose production of origin is different. In case that fuel oil is mixed the oil with inferior affinity, a large amount of sludge may be generated, causing troubles on the operation of engine.

△

Bottoms oils resulting from operation by FCC method (catalytic cracking method) are often mixed in fuel oils recently.
The mixed oils, such as this, contain rigid alumina silica (catalyst particles), and will cause abnormal wear of the various parts of engine, particularly the parts of the fuel injection system.
Remove the solid particles by fully utilizing the existing fuel oil pretreatment equipment, and by intensifying the cleaning of fuel oil.
In case that the removal of the solid particles cannot sufficiently be made with the existing fuel oil pretreatment equipment, the reinforcement of the cleaning equipment will be required, and when such reinforcement is not possible, it may be required to change the current fuel oil to the oil of a better quality.

6-1.2 Fuel Oil Characteristics and Control

(1) Heavy Fuel Oil

Since heavy fuel oil contains more carbon residue and impurities, and is higher in its viscosity as compared to diesel fuel oil, heavy fuel oil cannot be used as the fuel oil for diesel engine, when it is in the state of bunker fuel oil.

Therefore, it will be a prerequisite to use heavy fuel oil that the oil must properly be preprocessed before being supplied to engine (including the removal of impurities by cleaning, and the assurance of proper viscosity by heating).

a) Cleaning Fuel Oil

Water, and solid contents such as vanadium, sodium, alumina, and silica, contained in heavy fuel oil accelerate the corrosion and wear of the various parts of fuel injection system and fuel combustion chamber system, substantially affecting and reducing the working life of these parts.

For the purpose of removing such impurities, the fuel oil preprocessing equipment, such as the centrifugal separator and precision filters, are installed.

Since these equipment will not exhibit the efficiencies unless each equipment is properly handled, be minded to operate each equipment in accordance with the corresponding instruction manual.

(📖 : Instruction Manual" for each equipment")

Since waste fuel or sludge will be the causes of environmental contamination or pollution, be sure to entrust the treatment of these to the authorized waste disposal company, not directly handling or disposing these matters on your own.

b) Heating Fuel Oil

Since the viscosity of heavy fuel oil is very high, it is required to heat the oil, so that a proper viscosity for fuel injection can be obtained.

Since the heating temperature varies depending on the viscosity of fuel oil, heat the oil and obtain the proper viscosity, by referring to the fuel oil viscosity temperature curve on a separate page as a standard.

In case that a viscosity controller (automatic viscosity regulator) is installed on the engine, control the fuel oil viscosity to its proper value according to the attached instruction manual.

(📖 : Fig. 6-1.1 "Fuel Oil Viscosity/Temperature Curve")

∗ Proper viscosity for fuel oil (engine inlet)
Kinematic viscosity: 14 ± 1.5 cSt.
If the temperature control of fuel oil is improper, and the fuel oil with high viscosity has been supplied to engine, it will not only incur faulty combustion, but also will result in the accidents such as the clogged or damaged fuel oil filter, and the breakage of fuel injection system parts.

(2) Diesel Fuel Oil

a) Water tends to extract and separate out of diesel fuel oil, and further diesel fuel oil tends to generate a large amount of sludge when mixed with the oil of different base oil.

Daily conduct the draining-off of the precipitation tank and setting tank, so that water or sludge does not flow into the engine.

To remove water or sludge, the centrifugal separator is an effective device.

b) Diesel fuel oil, that has been cut back by using the gas oil refined by FCC method, may incur faulty start or ignition, and this tendency is particularly obvious in case of low sulfur diesel oil for land vehicles, due to its low cetane number, if the environmental conditions, such as ambient temperature or water temperature, are unfavorable.

In such a case, special measures will be become necessary to improve starting capability and combustibility of engine, and in such occasions, contact our company for consultation.

(3) Gas Oil

Although gas oil does not contain few impurities, it may cause problems on ignition when the gas oil is refined by FCC method, just like the case with diesel fuel oil, and therefore be minded to pay particular attentions to the cetane number of gas oil.

Further, since gas oil is low in its viscosity and is inferior in its lubricity, it may cause abnormal wear on the sliding parts of fuel oil injection system, and therefore be minded to conduct the inspection of the fuel injection pump and fuel injection valve in the earlier stage than usual.

(4) Kerosene Oil

As a countermeasures to prevent air pollution, there may a case in which kerosene oil may be used.

Since kerosene oil is further lower in its cetane number and is lower in its viscosity than gas oil, it is required to carry out a special arrangement on the engine, and therefore contact our company for consultation before using the oil.

Table 6-1.1 Fuel Oil Standard Characteristics

Type of fuel oil		General call		Diesel fuel oil note 1)	Heavy fuel oil note 2)			
		JIS		(K2205 type 1)	(K2205 type 3)			
		ISO-F		(DMA)	RMA10	RME25	RMG35	RMH55
		CIMAC		—	A10	E25	G35	H55
Density (15 °C)		g/cm³	max	0.890	0.975	0.991	0.991	0.991
Viscosity	Kinematic viscosity 100/50 °C	cSt	max	3.0 - (50 °C)	10/40	25/180	35/380	55/700
	RW#1 100 °F	sec	max	30 - 50	300	1500	3500	7000
Flash point		°C	min	60	60	60	60	60
Pour point		°C	max	0	6	30	30	30
Carbon residue		wt %	max	0.2	10	15	18	22
Ash		wt %	max	0.01	0.1	0.10	0.15	0.20
Water		vol %	max	0.1	0.5	1.0	1.0	1.0
Sulfer		wt %	max	1.5	3.5	5.0	5.0	5.0
Vanadium		mg/mg	max	—	150	200	300	600
Sodium		mg/mg	max	—	50	50	50	50
Aluminum + silica		mg/mg	max	—	80	80	80	80
Cetane number note 3)		—	min	40	—	—	—	—
CCAI value note 4)		—	max	—	850	850	850	850

Notes : 1) Since there are a wide range of the standard values for diesel fuel characteristics, the recommended values are shown in the above table.
2) heavy fuel oil characteristics represent the values of "Residual marine fuel oil" proposed in CIMAC (1990).
3) Cetane number represent the calculated values based JIS K 2280-1996.
4) CCAI (Calculated Carbon Aromatic Index) value is calculated by the following formula, and indicates the reference value for starting capability.
CCAI value = 1000 D -141 Log Log (VK + C) - 81
D: Density g/cm³ (15 °C), VK: Viscosity cSt (50 °C), C: Constant (0.85 for heavy fuel oil)

Table 6-1.2 Standards for Clean Fuel Oil

Component		Standards
Water		0.2%v/v or less
Solid particles	Content	50 mg/kg or less
	Size	5 μm or less

△

Vanadium combines with sodium to yield a compound that acts as an oxidation catalyst, accelerating the corrosion due to sulfuric acid (vanadium attack).
Further, water accelerates the corrosion of fuel injection system parts. Particularly in case that sea water is mixed in water, it will further accelerate the corrosion due to sulfuric acid as above said, and therefore remove the impurities together with solid particles by the fuel oil cleaning equipment, to the best possible extent.

Fuel Oil Viscosity-Temperature Curve

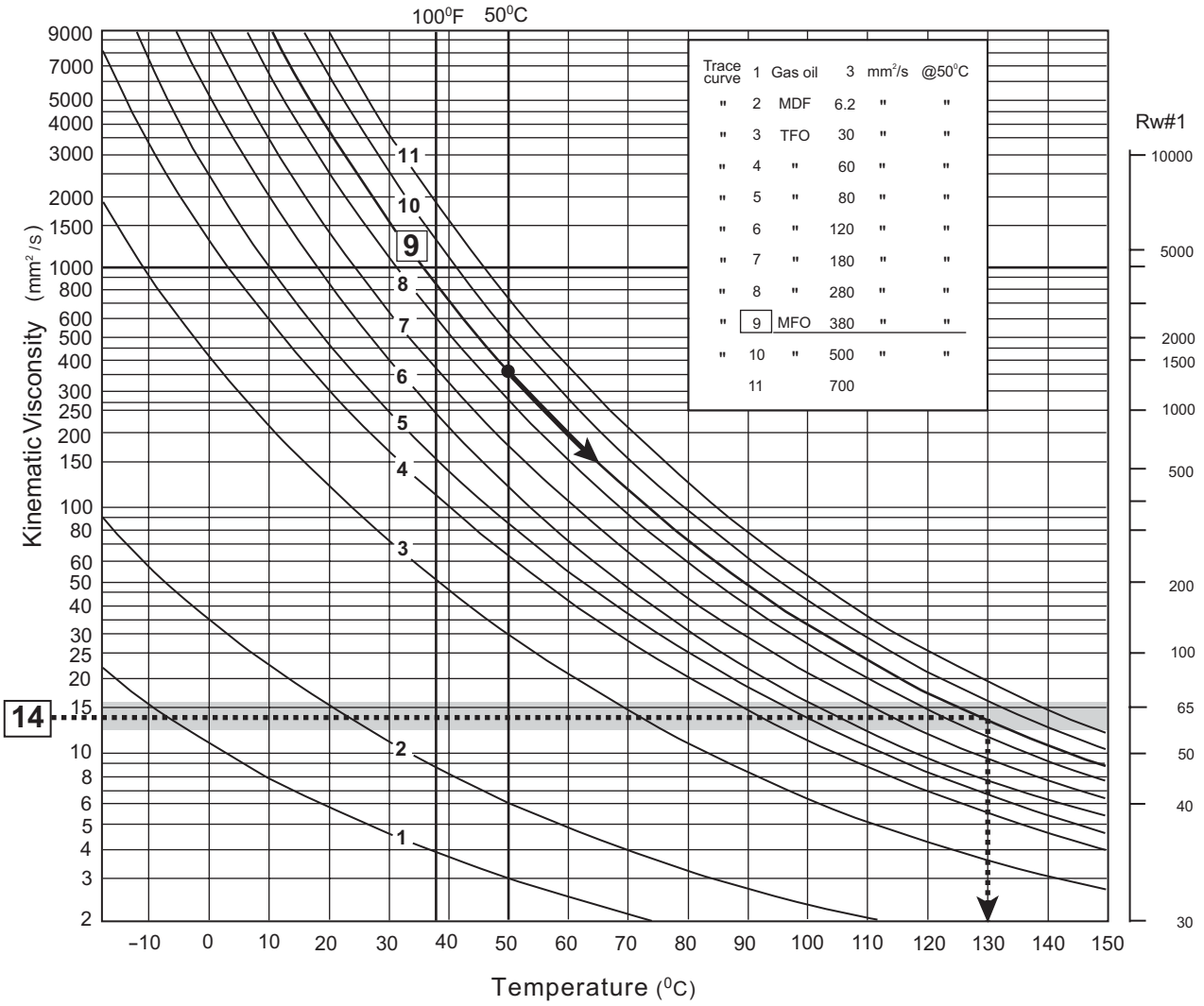


Fig. 6-1.1Fuel Oil Viscosity / Temperature Curve

Example) We find the temperature, under which heavy fuel oil of 380mm²/s can be heated, so as to obtain the proper viscosity of 14mm²/S at the engine inlet.

To find this temperature, tracing the curve No. 9 downward, and from the point that intersects kinematic viscosity 14mm²/S, goes down vertically to obtain 130℃.

Note: 1. The viscosity temperature characteristics of fuel oil may slightly differ depending on the original place of production or its refining process, and therefore confirm the viscosity with a viscometer, and determine the proper value when actually operating the engine.

2. Kinematic viscosity 1cSt = 1 mm²/S

6-2 Lubricating Oil Characteristics and Control

Lubricating oil only plays an extremely important roles for engine, not only lubricating the sliding parts but also cooling the various parts, ensuring air tightness, acting as a detergent-dispersant, or acting as a neutralizing acids.
For the purpose of maintaining the engine in proper conditions and assuring the smooth operation, it is indispensable to select suitable lubricating oil brands taking into consideration the use purpose of engine, the fuel oil to be used, the load to be connected, etc., and to conduct an appropriate control of the lubricating oil.

6-2.1 Selection of Lubricating Oil

(1) Engine system oil

As the system oil for engine, high-grade lubricating oil (CD of API service category, or higher) for diesel engine shall be used.
Select the lubricating oil of the suitable grade, according to the quality of the fuel oil to be used.
The recommended lubricating brands are shown in a separate table.

Table 6-2.1 "Recommended Lubricating Oil Brands"

Be minded to use the lubricating oil of the same brand, not mixing the lubricating oil with the oil of any other brand.
If the lubricating oil is mixed with the oil of different brand, the additives contained in the both oils react for each other, and this may result in the degradation of the lubricating oil.

(2) Lubricating Oils for Other Equipment

In case that separate lubricating system is employed apart from the engine lubricating system, as in the case of the governor, air motor, turbocharger, generator, deduction gear, etc., be minded to refer to the instruction manual of each equipment.

"Instruction Manual of each equipmen"

6-2.2 Control of Lubricating Oil

(1) Cleaning of Lubricating Oil

Since fine dust or combustion residue from the combustion chamber enter and mix in the lubricating oil, a centrifugal separator is installed to the engine, to eliminate such foreign matters, in addition to the filters attached to engine. Use such equipment in correct manner, referring to the instruction manual of each manufacturer.

Do not conduct cleaning by injecting water into lubricating oil.
Mixing water into lubricating oil will cause degradation of the lubricating oil, such as the emulsification of oil, the decrease of total base number, and the increase of insoluble substances.

(2) Control of Lubricating Oil Characteristics

Periodically conduct the sampling and analysis of lubricating oil (every 500 hours), and in case that the analyzed value of the lubricating oil characteristics has reached the control standard value, immediately consult the lubricating oil manufacturer, so that the replacement or makeup can be carried out.

Table 6-2.2 "Lubricating Oil Control Standards"

Selection of Lubricating Oil

a) Sampling Procedure

i) Collect samples from the air vent pipe of the filter during the operation of engine.
If the samples are collected from the drain cock, the analyzed value of the characteristics may show a different value due to the mixing of sludge or solid deposits.

ii) The minimum amount of sampling shall be 500 cm^3.

iii) Attach on the sampling receptacle with the label indicating the information as shown on the right.

b) Lubricating Oil Control Standards

The lubricating oil control standards are as shown in the Table 6-2.2 below.
Of all the lubricating oil control standards, the total base number and n-pentane insoluble are particularly important for the purpose of checking the degradation degree of lubricating oil.

Table 6-2.2
Lubricating Oil Control Standards (System oil)

Fuel oil Used		Diesel fuel oil	Heavy fuel oil
Total base number[1)]	mgKOH/g	3 or more	10 or more
Visconsity	cSt	+30% or less / -20% or more of new oil	
Flash point	°C	180°C or higher	
Water content	vol.%	0.3 or less	
n-pentane insoluble	wt.%	2.5 or less	

Note : 1) The total base number represents the values measured according to ASTM D664, JIS K2501 (hydrochloric acid method).
····· TBN (Total Base Number)
2) n-pentane insoluble represents the values measured according to ASTM D893B.
In case that the measured value has quickly increased, or has surpassed 1.5, measure the insolubles of toluene with the same method, and in case of n-pentane insolubles - toluene insolubles ≧ 0.5, replace the lubricating oil.

《Information to be Attached to Sample Receptacle》

① Name of your company and your name
② Model number of engine
③ Engine number
④ Date and location of sampling
⑤ The amount of time the engine is
⑥ operated
⑦ Lubricating oil brand
The total operation time and quantity of lubricating oil
⑧ Replenishment record (Date and quantity of replenishment)

1) Total Base Number (TBN)
Total base number represents the quantity of potassium hydroxide (KOH) that corresponds to the quantity of acid required to neutralize the base component contained in 1 g of lubricating oil, and is indicated by the unit of mgKOH/g.
Total base number indicates the lubricating oil capabilities to prevent the corrosion due to sulfuric acid generated from sulfur contained in fuel oil, and other acids, and further it indicates the capabilities of lubricating oil to clean and disperse the fouled sections in the engine.

2) Insoluble (= n-pentane soluble)
Insoluble is fouling substance that do not dissolve in oil, and the main component is soot which is a product of combustion, and calcium sulfate which is a neutralized product.
Since these substances do not dissolve even in n-pentane which is a solvent, n-pentane insoluble serves as an index to indicate the degradation and fouling degree of lubricating oil.

Table 6-2.1 Recommended Lubricating Oil Brands

Kind of F.O. / Name of Company	Gas oil or Diesel oil	Up to 200 Sec. R.W. No.1	Up to 1500 Sec. R.W. No.1	Up to 7000 Sec. R.W. No.1
	Class II (Supplying or Replacing oil)	Class III (Supplying or Replacing oil)	Class IV (Supplying or Replacing oil)	Class V (Supplying or Replacing oil)
BP	BP ENERGOL DL-MP30 CASTROL MLC30	BP ENERGOL IC-HF253 CASTROL TLX203	BP ENERGOL IC-HF303 CASTROL TLX303	BP ENERGOL IC-HF303 CASTROL TLX303
CHEVRON TEXACO	DELO 1000 Marine Oil SAE30 TARO XD SAE30	DELO 2000 Marine Oil SAE30 TARO DP SAE30	DELO 3000 Marine Oil SAE30 TARO DP SAE30	DELO 3000 Marine Oil SAE30
EXXON MOBIL	EXXMAR 12TP30 MOBILGARD 312	EXXMAR 30 TP30 MOBILGARD 330 MOBILGARD M330	EXXMAR 30TP30 MOBILGARD 330 MOBILGARD M330	EXXMAR 30TP30 EXXMAR 40TP30 MOBILGARD 330 MOBILGARD M330
GULF	GULF VERITAS DPO30	GULF VERITAS SERECT30	GULF VERITAS SERECT30	—
PETROBRAS	MARBRAX CCD310	MARBRAX CCD320	MARBRAX CCD330	MARBRAX CCD330
SHELL	GADINIA30	ARGINA S30	ARGINA T30	ARGINA T30
TOTAL FINA	RUBIA S SAE30 DISOLA M3015	RUBIA ST SAE30 HAM SAE30 AURELIA 3030	HAM SAE30 AURELIA 3030	HAM SAE30 AURELIA 3030

Note: 1) This table shows lubricating oils classified as SAE30. Be sure to use lubricating oils classified as SAE40 only when the minimum ambient temperature is 20°C
We recommend that multigrade oil (SAE10W-30 or 5W-30) be used in extremely cold locations (minimum ambient temperature: 5°C or less).

2) Be sure to consult with oil manufacturers before selecting the lubricating oil proper brand that best suits the fuel oil and operating conditions.

6-3 Cooling Water Characteristics and Control

Always use fresh water as cooling water in the cylinder jacket system and add corrosion prevention agent to cooling water to maintain cooling effect and prevent corrosion due to scale bonded on the piping surface.
Improper cooling water control can cause localized heating of the jacket line parts due to corrosion or scale, resulting in excessive wear on or damage to the jacket line parts.

6-3.1 Cooling Fresh Water (Raw Water)

As cooling fresh water (raw water), be minded to use the soft water that meets water quality standards shown in Table 6-3.1 below, or the water to which softening processing has been administered

6-3.2 Corrosion Prevention Agent

(1) As corrosion prevention agent, we recommend the agent which is nitrous acid type.
(2) Commercially available brands in Japan are shown in Table 6-3.2.
When using them, carefully read the manufacturer's instruction manual, and properly use the agent in accordance with the use standard as well as the control standard.

Table 6-3.1 Fresh Water (Ran Water) Quality Standards

Item	Standards	Effect (reference)	
		Corrosion	Scale
PH (25°C)	6.5 to 8.5 (neutral)	○	○
Total hardness ($CaCO_3$ PPM)	100mg/kg Max.		○
Chlorine ion (Concentration: Cl^{-1})	100mg/kg Max.	○	
M - alkalinity (PH4.8)	150mg/kg Max.		○
Sulfate ion (Concentration: SO_4^{-2})	100mg/kg Max.	○	
Total iron (Fe)	0.3mg/kg Max.	○	○
Silica (SiO_2)	50mg/kg Max.		○
Ammonium ion (Concentration: NH_4)	0.05mg/kg Max.	○	
Evaporation residue	400mg/kg Max.		○

Table 6-3.2 Brands of Commercially Available Corrosion Prevention Agents

Brand Name	Manufacturer	Constituent	Amount to added (ppm)
DEWT-NC	Drew Chemical Corp. (U.S.A.)	Nitrite	3,000 ~ 4,500
MAXIGARD			20,000 ~ 22,000
CWT DIESEL 102	VECOM B.V.	Nitrite	1,250 ~ 5,000

6-3.3 Control of Cooling Water

(1) As cooling water, be minded to use fresh water added with corrosion prevention agent, from the stage of very first beginning, without fail.

⚠

Corrosion prevention agent is poisonous and toxic substance. Therefore, be minded never to drink the cooling water that is added with corrosion prevention agent.
Further, regarding the handling of the cooling water added with corrosion prevention agent, be sure to wear the protective gears such as rubber gloves and masks, so that your hands or skin do not directly touch the cooling water.
If the corrosion prevention agent has accidentally touched your skin or entered your eyes or mouth, immediately wash them with fresh water sufficiently.

(2) Controlling Fresh Water with PH Value
Measure the PH value of cooling water once every week, using a PH value, and in case that the value has exceed the standard value specified by the manufacturer, discharge 10 to 20 % of the cooling water to add new water.

(3) Replace the entire amount of cooling water once every year or 2 years.

⚠

Be minded never to directly discharge the cooling water, which are added with corrosion agent, into sea or river, without adequate processing.
When disposing the cooling water, be sure to conduct the water examination, to ensure that the CDD concentration of cooling water is diluted to be within the specified value.

7. Troubleshooting and Countermeassures

Defect or failure of the engine is caused not only by faulty or improperly adjusted engine parts, but also by faulty equipment, improper operation and maintenance work, in addition to the couses attributable to fuel oil characteristics. More often than not, each engine problem is caused by two or more causes that are interrelated. Therefore, it is impossible to provide the descriptions of the countermeasure for every single defect or failure.
This chapter describes the defects and problems that are frequently found on engines, as well as the generally probable causes and countermeasures for such defects and problems. If your engine has a defect or failure that is not described in this section, or if you cannot discover the causes after inspection, contact our Service Department.

7-1. Precautions for Troubleshooting

(1) Take proper measures immediately when you find a defect or problem.
If any of the following defects and failures is found, stop the engine for inspection. Never attempt to restart the engine until you find the cause, take proper measures, and restore the engine to the normal operating conditions. Resuming operation without taking proper measures may rapidly aggravate the defect or failure, resulting in injuries or accidents.

① Activation of protective device: "Alarm", "Emergency Stop"
Overspeed, low lubricating oil pressure, high cooling water temperature, etc.
② Abnormal sounds (specially mechanical sounds), abnormal vibrations
③ Overheating of the engine
④ Abnormal increase of exhaust temperature or maximum explosion pressure, or abnormal decrease of exhaust temperature or maximum explosion pressure
⑤ Defective parts on or around the engine control (governor, control device), or protective device, 2nd loosened link, or detachment of link
⑥ Damage to piping or joint bolts (specially fuel and lubricating oil systems)

(2) Inspect, disassemble, and adjust the engine correctly according to the instruction manual. To prevent accidents, never neglect "Safety Precautions".

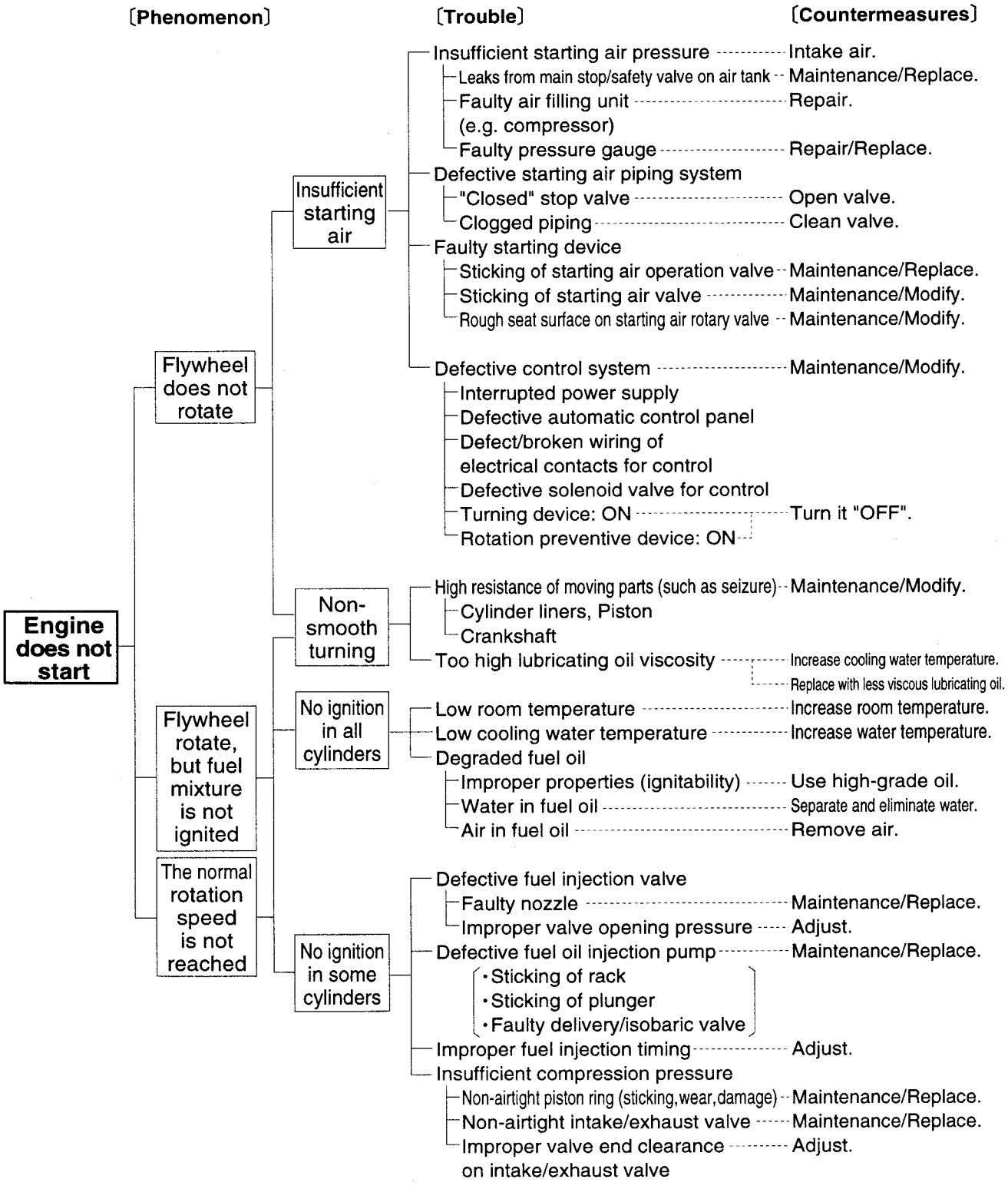
(3) Be sure to use the genuine parts of DAIHATSU DIESEL MFG. CO., LTD. or those specified in the parts list. We will not thereafter guarantee the proper operation of the engine unless such parts are used.
If you are out of the spare parts for servicing, immediately contact us for replenishment.

Instruments such as tachometers, thermometers, and pressure gauge may provide incorrect indication even if the engine is running normally.
Inspect the instruments on a daily basis to make sure their indication is correct. Replace any defective instrument. Always use correct indications as an index for determining the engine conditions.

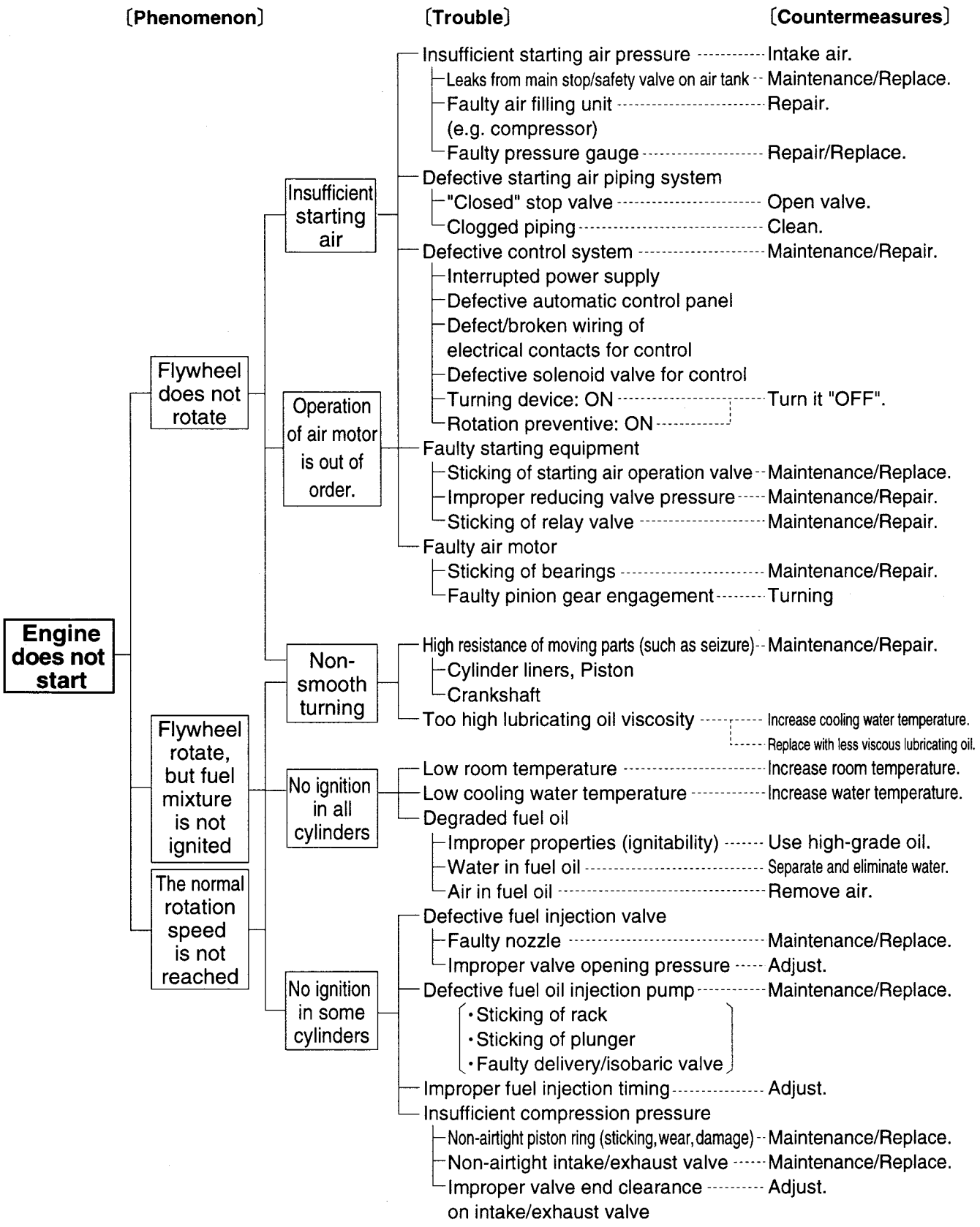
7-2 Troubleshooting and Countermeasures

7-2.1 When Starting Is Difficult

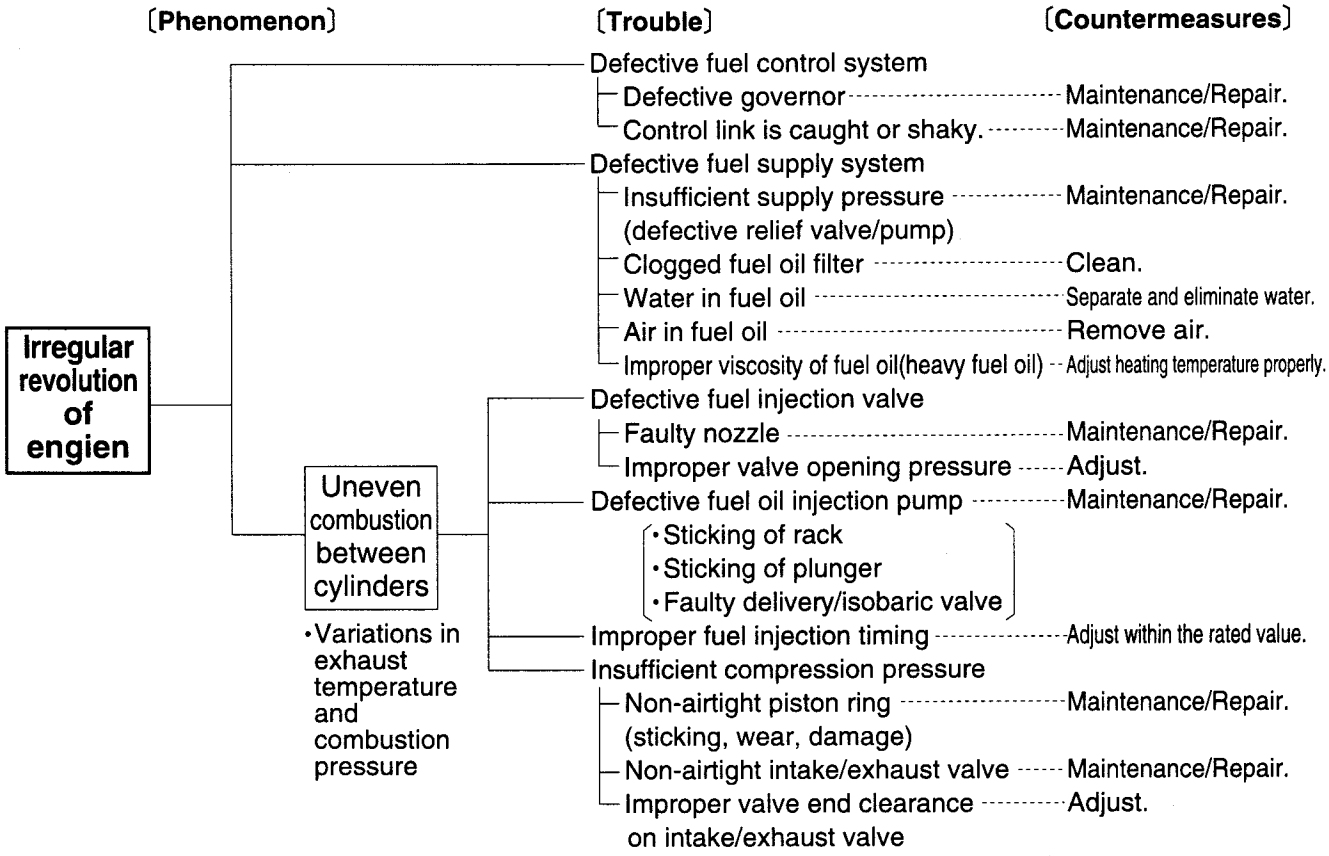
(1) Direct System



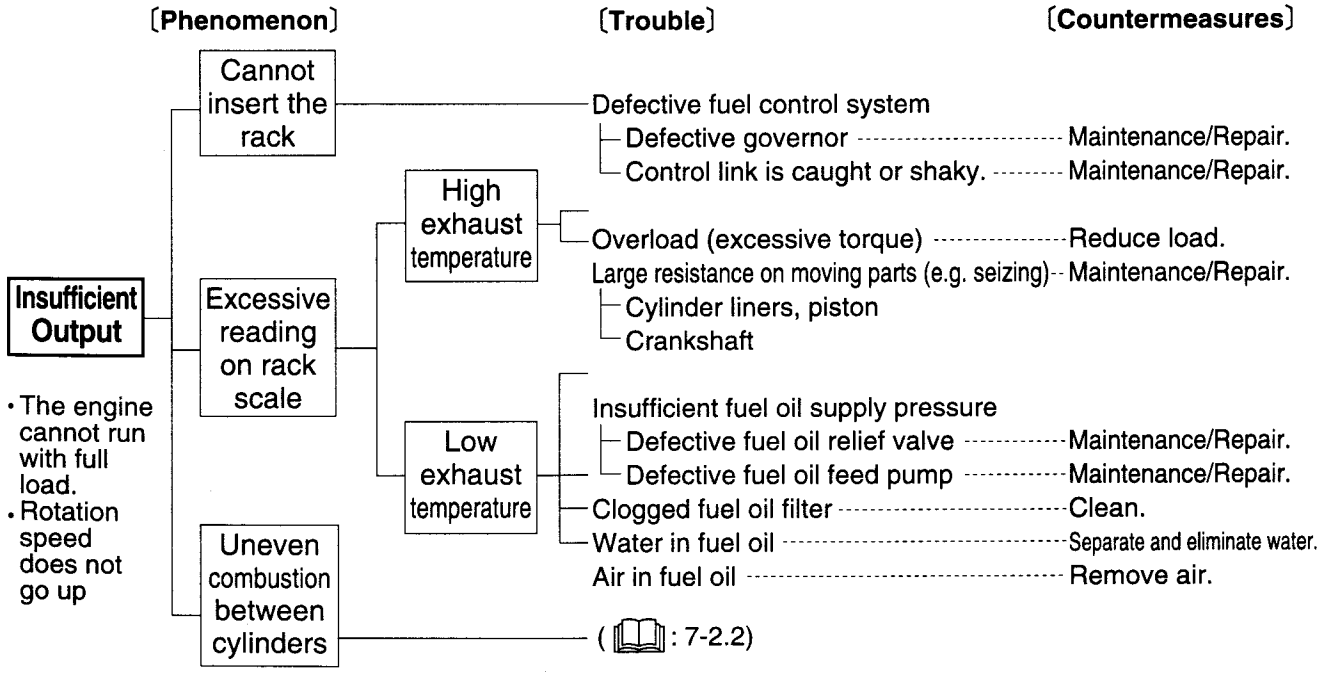
(2) Air Motor System



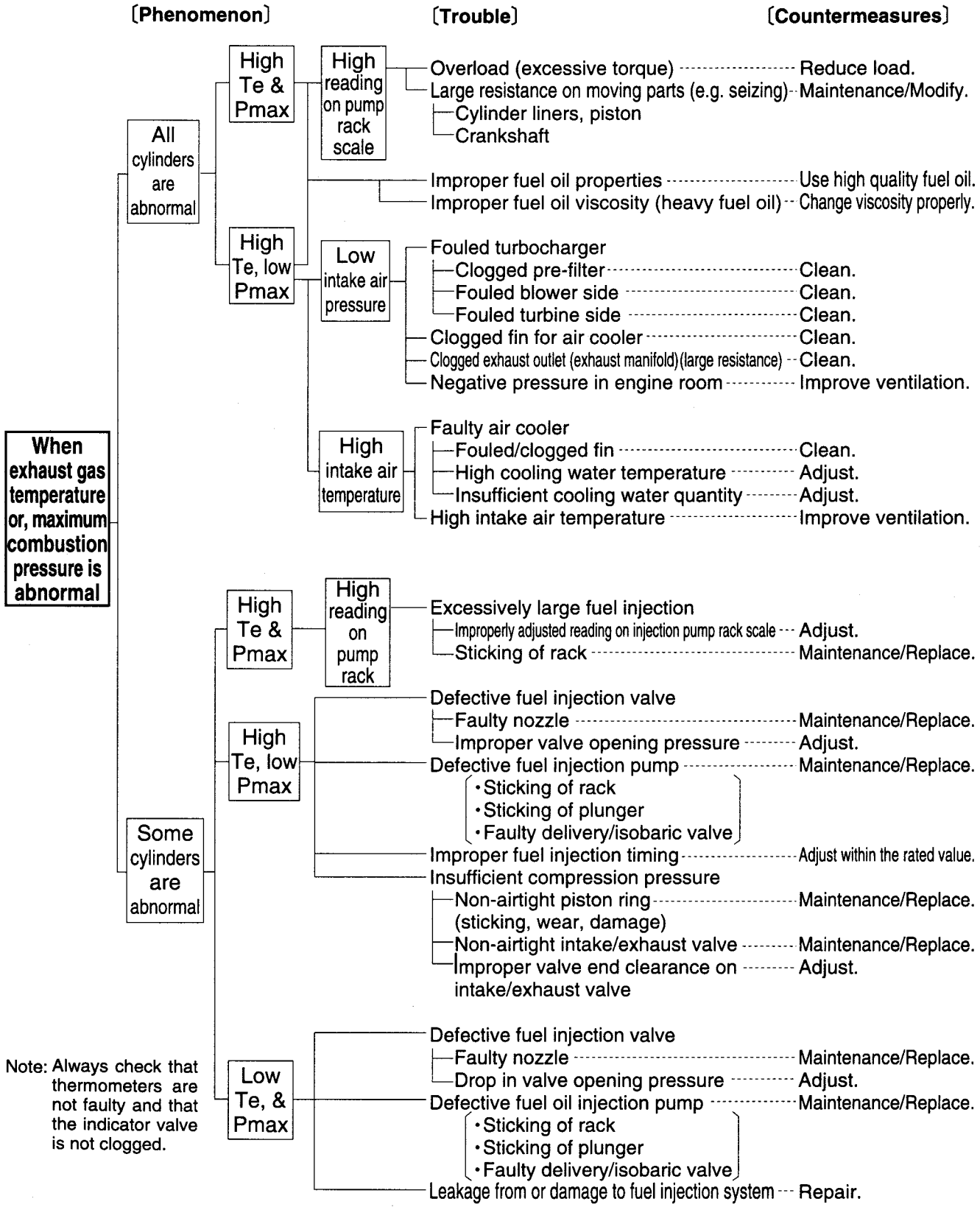
7-2.2 When Engine Revolution Is Not Smooth



7-2.3 Insufficient Output

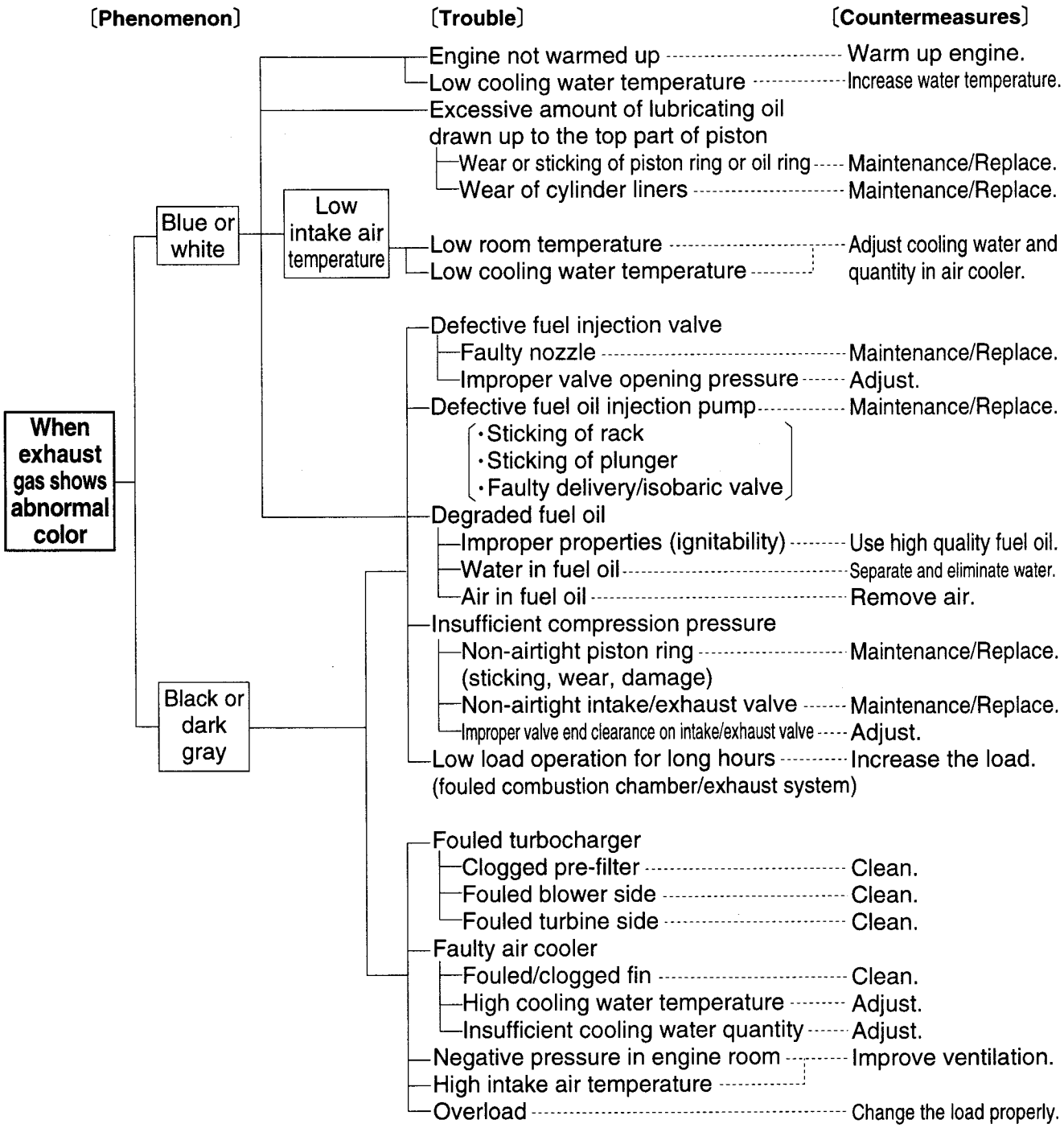


7-2.4 When Exhaust Gas Temperature (Te) or Maximum Combustion Pressure (Pmax) Is Abnormal

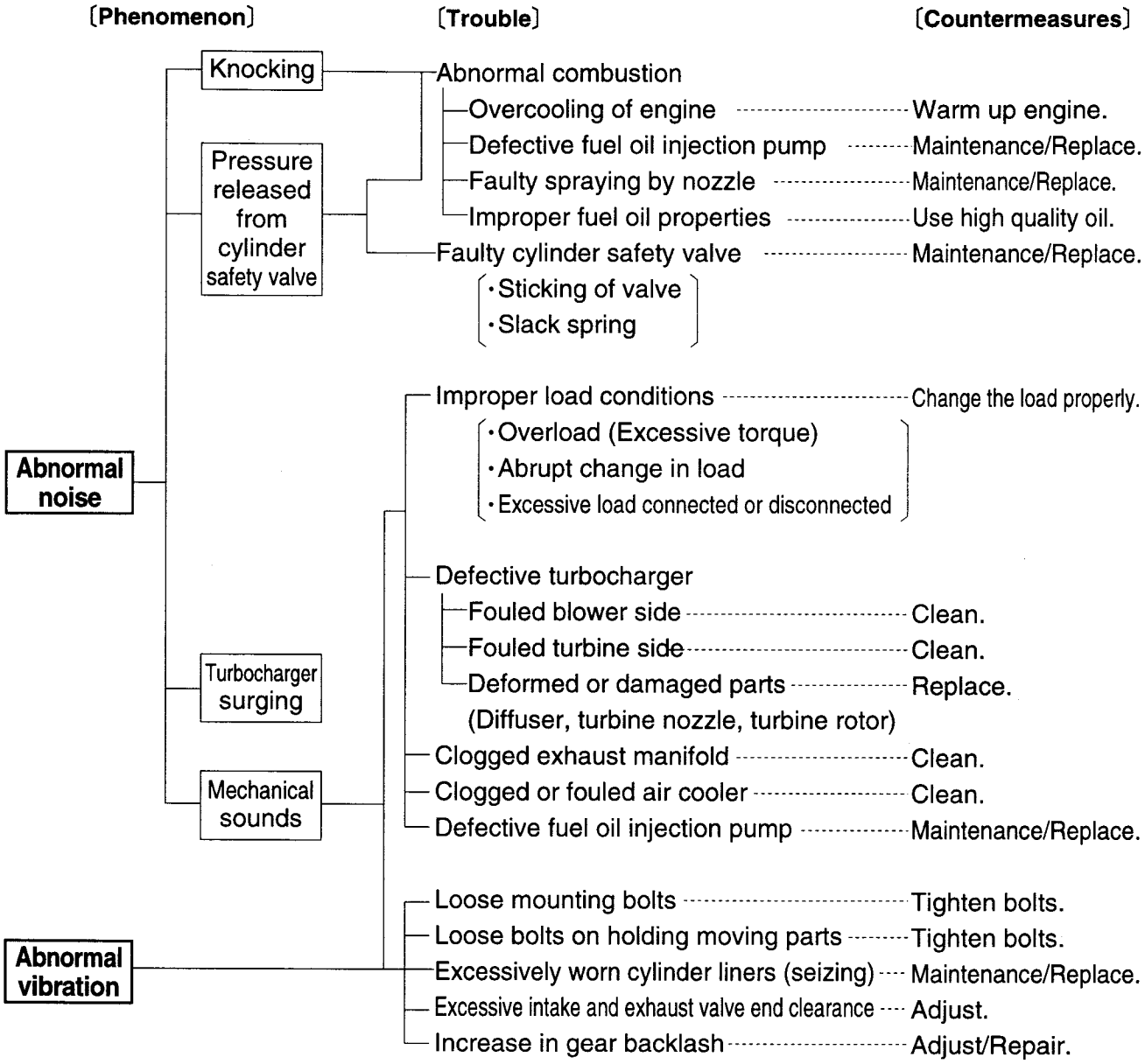


Note: Always check that thermometers are not faulty and that the indicator valve is not clogged.

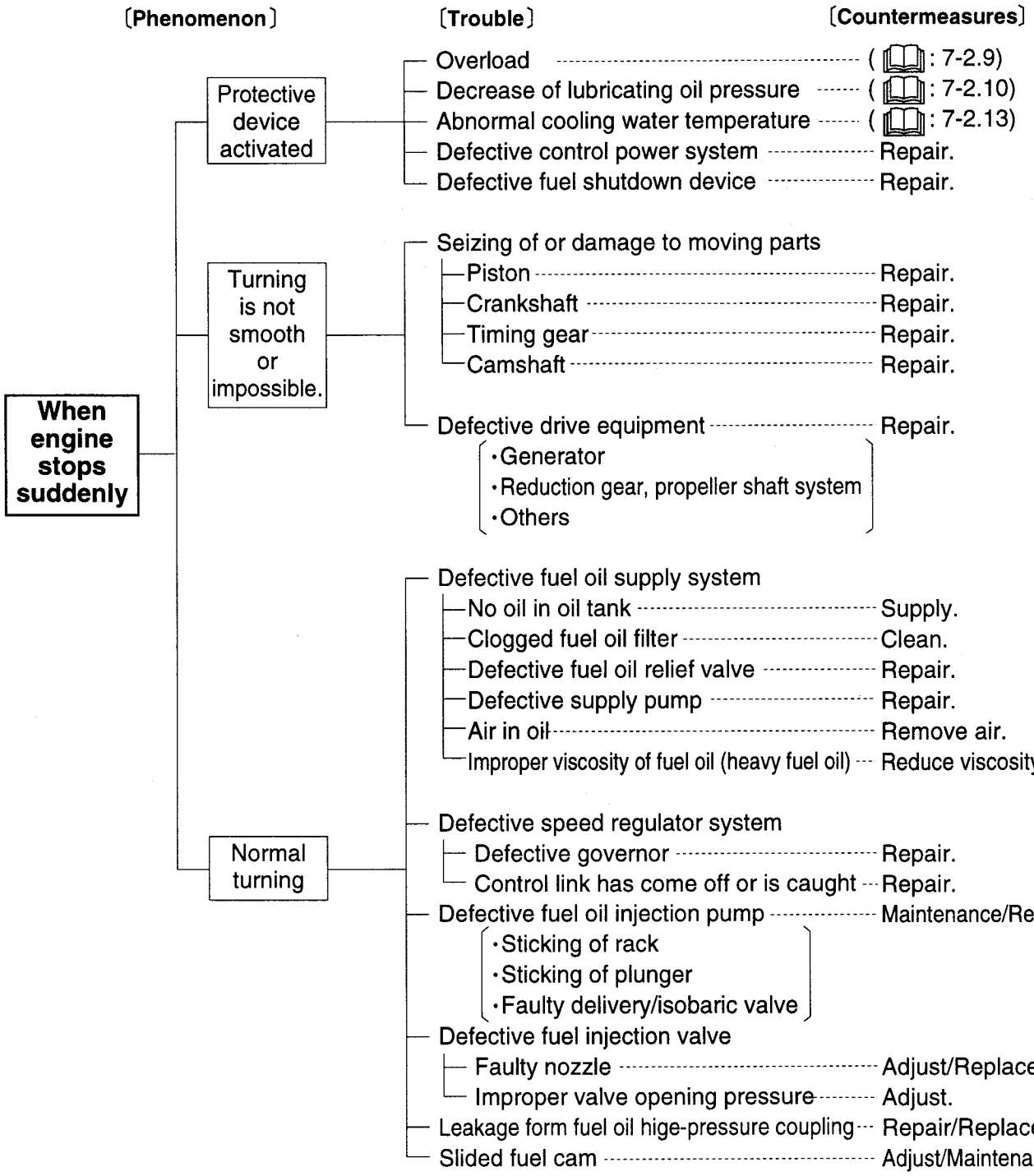
7-2.5 When Exhaust Gas Shows Abnormal Color



7-2.6 Abnormal Noise / Abnormal Vibration

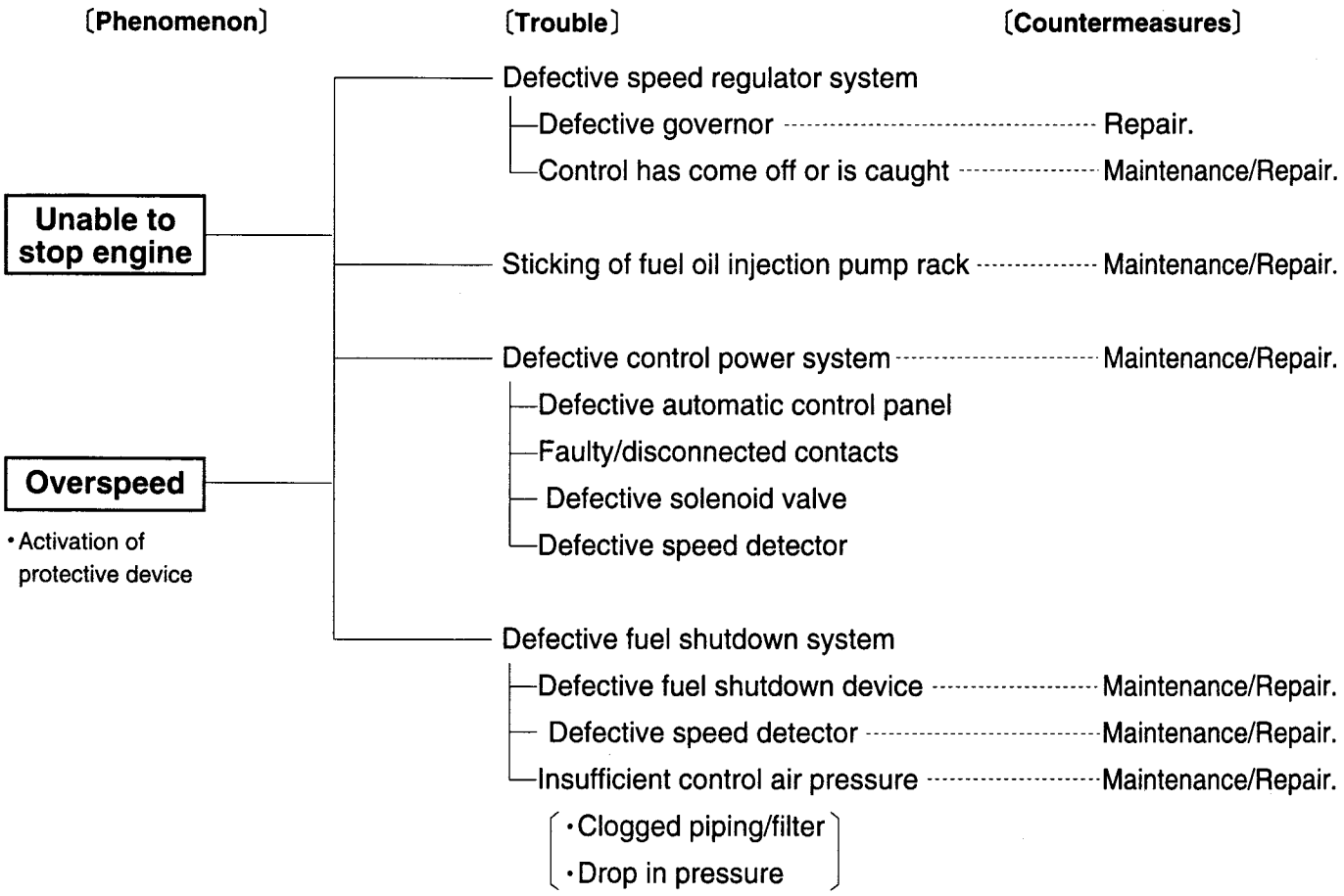


7-2.7 When Engine Stops Suddenly

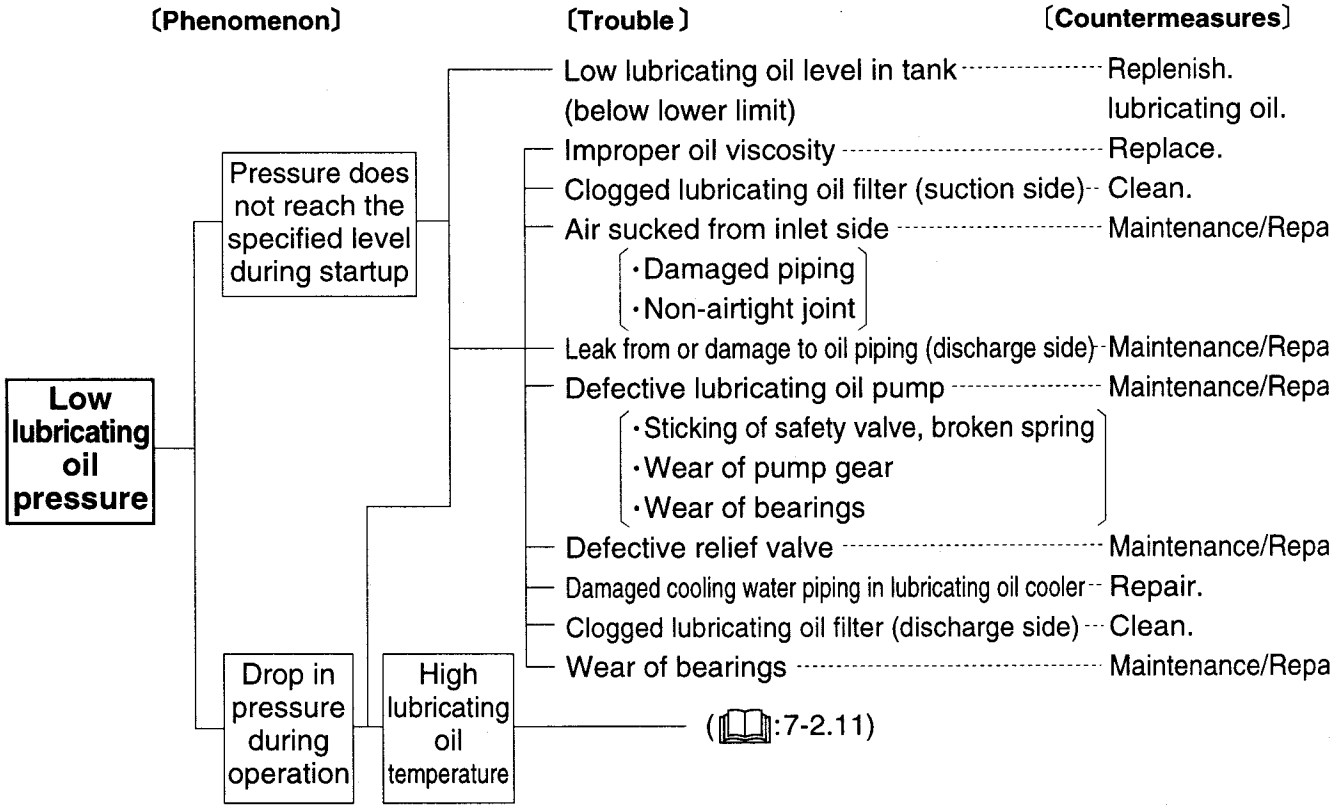


Unable to Stop Engine / Overspeed

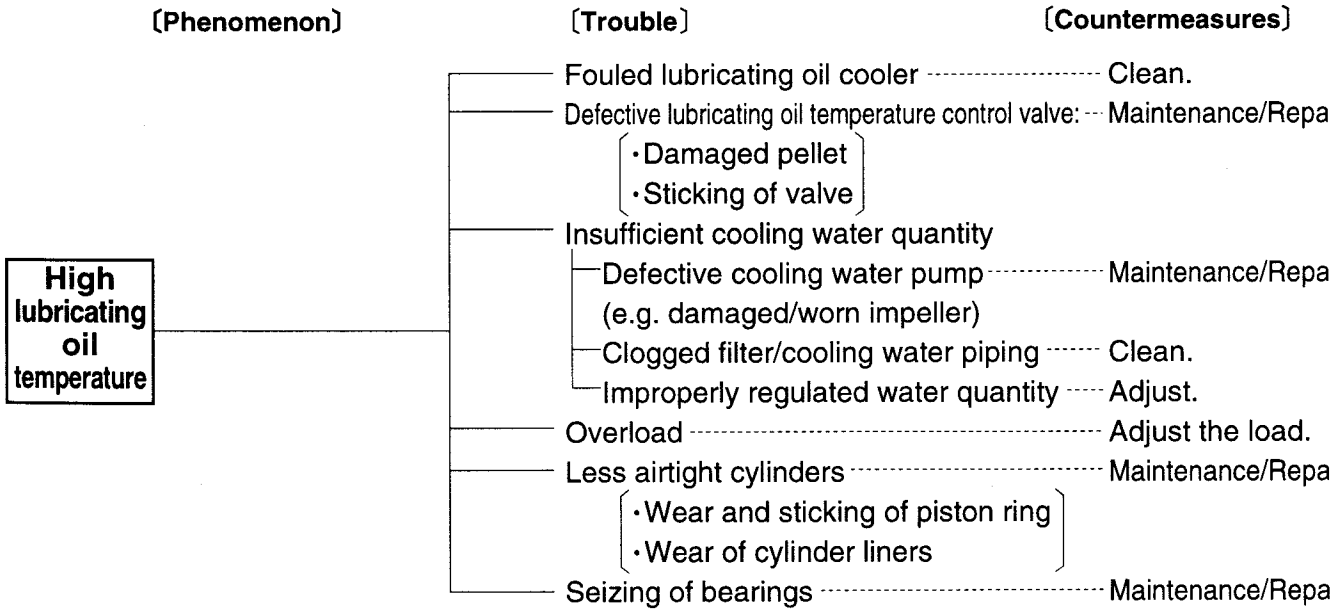
7-2.8 Unable to Stop Engine / 7-2.9 Overspeed



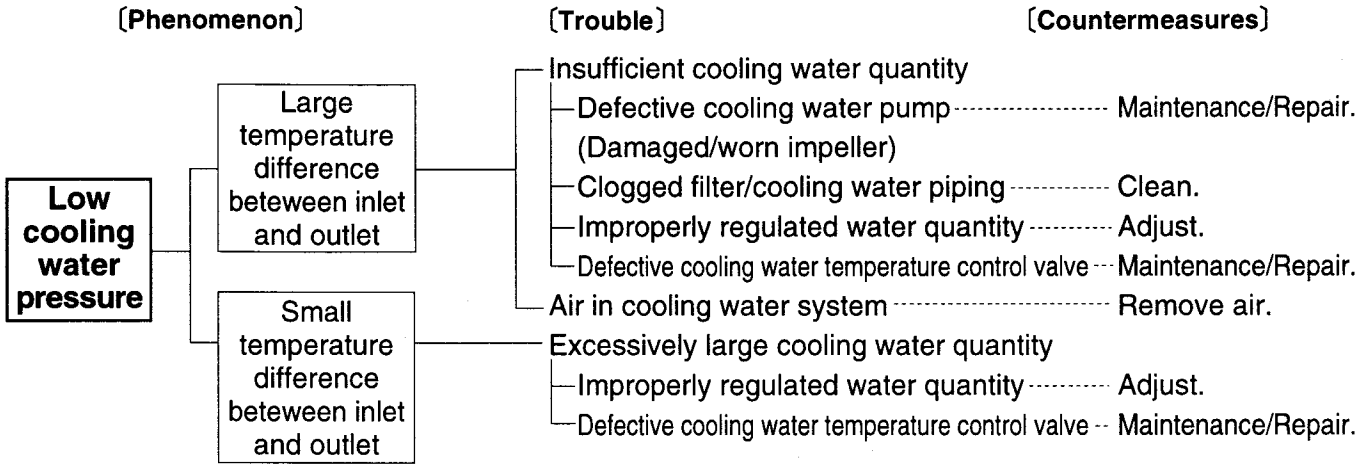
7-2.10 Low Lubricating Oil Pressure



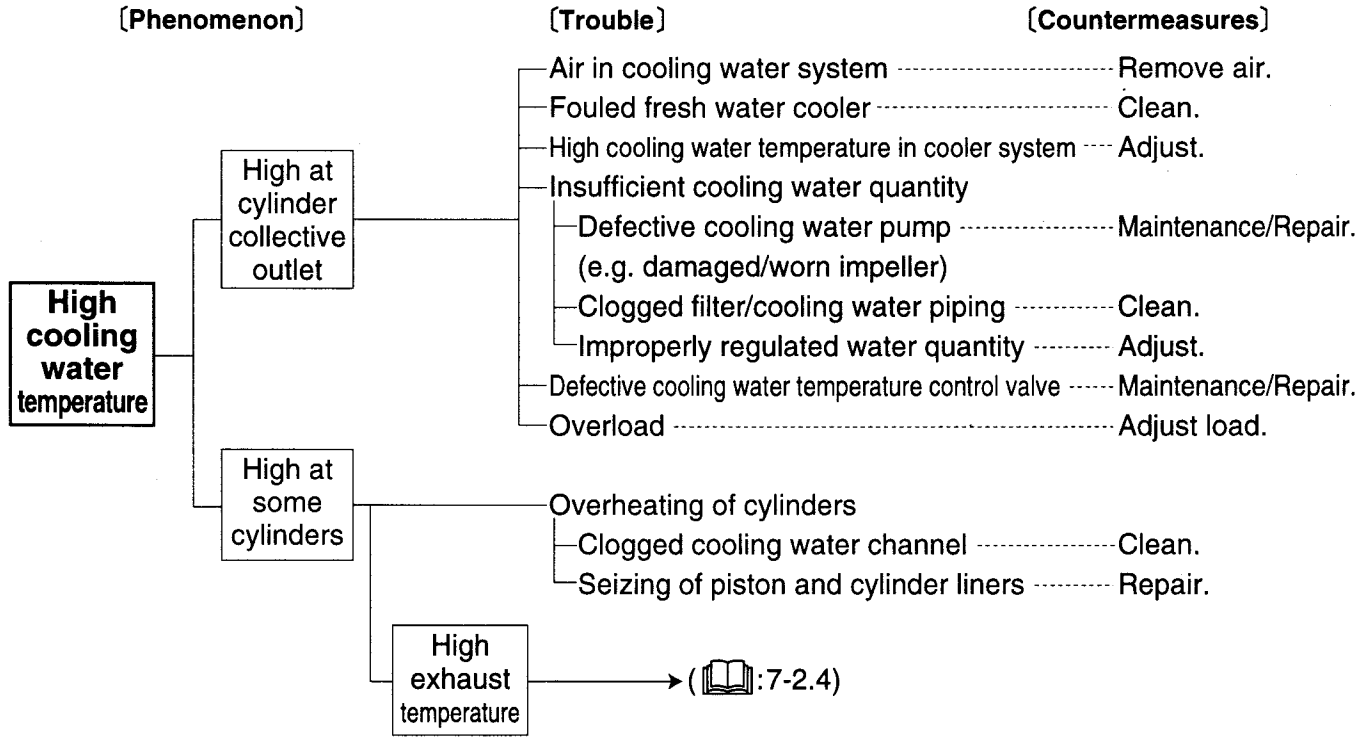
7-2.11 High Lubricating Oil Temperature



7-2.12 Low Cooling Water Pressure (Jacket Line)



7-2.13 High Cooling Water Temperature (Jacket Line)



Memo

DK-20

INSTRUCTION MANUAL
(MAINTENANCE)

DAIHATSU

● Replacement Parts

・Hazards and nonconformities of imitation parts

<Use of imitation parts causes accidents.>

1. Recent engines have compact bodies and high power, and are designed to prevent fuel deterioration and to reduce NOx discharge. Even if imitation parts are similar in shape to the genuine parts, the use of imitation parts will degrade the engine performance because of their fragile materials and low machining accuracy. Since the service life of such parts is short, the engine
2. If imitation parts are used for the engines designed in accordance with MARPOL VI, the certificate (EIAPP) may lose its validity, and operation of the engine may be inhibited.
3. If you use imitation parts, you will not be supplied with parts improved in quality and performance.
4. If imitation parts are used, it may be difficult to make insurance claims for the engine when any accident occurs.
5. We take no responsibility for the engine in which imitation parts are used.

Daihatsu Diesel supplies reliable engines. Use genuine parts to operate your engine safely.

DAIHATSU DIESEL MFG.CO.,LTD. http://www.dhtd.co.jp

Head Office	1-30, Oyodo Naka 1-chome, Kita-ku, Osaka, 531-0076 Japan TEL : 81-6-6454-2346 FAX : 81-6-6454-2680
Tokyo Office	2-10, 2-chome, Nihonbashi-Honcho, Chuo-ku, Tokyo, 103-0023 Japan TEL : 81-3-3279-0827 FAX : 81-3-3245-0359
Jakarta Office	16th Floor, Wisma Antara Bldg., Jl. Medan Merdeka, Selatan No.17, Jakarta-Pusat, Indonesia TEL : 62-21-384-8411 FAX : 62-21-384-8412
Taiwan Office	No.14 Tai-Tang RD, Lin-Hai Industrial Zone, Kaohsiung, 812 Taiwan (c/o Marine Technical Industries Co., Ltd.) TEL : 886-7-803-1082 FAX : 886-7-801-9179
Daihatsu Diesel (Europe) Ltd.	5th Floor, Devon House, 58-60 St. Katharine's Way, London E1W 1LB, U.K. TEL : 44-20-7977-0280 Fax : 44-20-7702-4325
Daihatsu Diesel (AMERICA), Inc.	180 Adams Avenue, Hauppauge, NY 11788, U.S.A. TEL : 1-631-434-8787/8/9 FAX : 1-631-434-8759
Daihatsu Diesel (ASIA PACIFIC) Pte.Ltd.	128 Pioneer Road, Singapore 639586 TEL : 65-6270-7235 FAX : 65-6270-6236
Manila Office	Unit 1010 Herrera Tower Herrera Corner Valero Sts., Salcedo Village, Makati City 1226 Philippines TEL : 63-2-753-3211 63-2-817-1279/1285 FAX : 63-2-845-0691
Daihatsu Diesel (SHANGHAI) Co.,Ltd.	Room A, Floor 9, Huamin Empire Plaza, No. 726 Yanan RD (w), Shanghai, China TEL : 86-21-6225-7876/7 FAX : 86-21-6225-9299

DK-20 INSTRUCTION MANUAL (MAINTENANCE)

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0. Introduction

(1) Only skilled operators who have carefully read and fully understood the instruction manual should operate, inspect and service this machine.
Operation, inspection or servicing by persons inadequately familiar with the machine may result in personal injury, equipment damage or environmental hazard.
(2) No responsibility shall be assumed whatsoever for product damage or any associated fires, oil spills or other environmental hazards, personal injuries, property damage or economic losses caused by the use of non-genuine parts or operation, inspection or servicing that deviates from the instruction manual.
(3) We shall repair new parts or replace any flawed parts made or sold by us, however no compensation shall be provided for damage to any equipment not of our manufacture or cargo, or personnel, fire-fighting, towing or other expenses arising from the use of such flawed parts or fowled fuel, lubricant, cooling water or other medium.
(4) This instruction manual is subject to change without notice.

0-1 Prior to Start of Engine Maintenance

Before the maintenance work is performed, please read this Manual sufficiently, fully understand the structure of the parts concerned, and understand well the contents of the work in advance, and fully understand the working procedure and then start the work.
Execution of the work without sufficient advance understanding will not only result in spending useless labors but also lead to the troubles and damages of the engine due to wrong assembly, and personal accidents as well.
Strictly avoid use of the engine for a purpose other than the original purpose of the use of engine, or on the conditions that are different from the specified conditions or handling against the descriptions given herein, since such operation will cause accidents or troubles.
Please be advised that the descriptions of this manual may be changed without notice.

(1) This manual bears the following safety signs.
These symbol marks indicate the important descriptions concerning safety. Be fully careful, and conduct the work with the motto of "Safety First".


…**"Warning"**= Precaution related to the safety of personnel (Potential hazard which could result in death or serious injury)


…**"Caution"**= Precaution related to the safety of personnel (Potential hazard which may result in minor or moderate injury)


…**"Notice"**= Information on handling of the engine to prevent damage


…**"Prohibition"**= Prohibited practice that can affect the safety of personnel and the engine


…**"Obligatory acts"**= Recommended practice or instruction to be followed to ensure safety of personnel and the engine

(2) If it is found as a result of disassembly or inspection that parts are damaged or end of their service life is reached, be sure to replace such parts.

(3) For replacement, be sure to use our genuine parts or those specified by us. If the parts used for replacement are other than our genuine parts or those specified by us, we shall not be held responsible for their quality.

(4) When it is difficult to take countermeasures or corrective actions at the site, or the required replacing parts are not prepared, please contact our Service Department, Parts Sales Department, branch office or service agent to take appropriate actions.
At that time, be sure to inform us or our agent of the engine type and the engine number.

(5) For handling of the following equipment, refer to the individual Instruction Manuals attached separately.

① Turbocharger ② Governor ③ Air motor
④ Control equipment ⑤ Ancillary equipment of special specifications

(6) Keep this Instruction Manual and the related documents (drawings, materials, etc.) in the specified place at all times for ready reference by the persons engaged in the operation and maintenance of engine at any time, and at the same time, when the engine supervisor is changed, the predecessor is requested to transfer his duties to the successor completely.

(7) To prevent public pollution, do not dispose of the replaced scrapped parts or waste liquid without permission but entrust the disposition to an authorized professional disposal company.

0-2 Precautions Pertaining to Maintenance

0-2.1 Safety Precautions

(1) After stop of the engine, do not open the crankcase side cover for at least 10 minutes, until the engine cools down sufficiently. If fresh air should flow into the engine, while the engine is not cooled down, explosion may occur igniting on the oil mist.

(2) Revolution of the engine during the disassembly or inspection work will cause great hazards such as injury resulting from entanglement.

- Before starting the disassembly or inspection work, put the control handle position back to the "STOP" position, securely close the valves on the starting-air system, extract starting air on the engine side, and confirm that the engine will not revolve.
- Be sure to turn OFF the control power.
- When turning the engine, be sure to check that the rotary section is free from contact with other sections, and that turning of the engine does not bring about hazards to the co-workers or persons in vicinity, and conduct turning with signs exchanged between the workers.
- When moving sections of the engine is disassembled or inspected, take the measures to prevent the crankshaft from idle turning.
- The turning bar should be removed from the flywheel except when the engine is turned.

(3) Before executing the work, wear protection gears such as gloves, hard hat, safety shoes, and safety goggles depending on the applicable situations.

- While the engine is operating, and just after the engine is stopped, particularly the exhaust pipe, turbocharger, cylinder heads and parts around them are hot. When servicing them, wear

(4) The engine room floor and the surroundings are slippery as a result of the deposit of oil. Wipe off oil on the floor and the shoe soles. When the work is intended at a high place such as on a step board, particularly be careful of your footing to prevent falling accidents.

(5) When disassembling each pipeline, set all the valves in the external connections to the "CLOSE" position, and gradually loosen the air vent plug to release the remaining pressure in advance. If each filter and the joint area of piping system are disassembled immediately after the engine is stopped, high-temperature oil or water may spout out under residual pressure, and may cause burn accidents.

Contact of the splashing hot oil with any high-temperature part may cause a fire. Take utmost care not to splash the oil.

(6) When the spring-incorporated valves or devices are disassembled, conduct the assembly work very carefully, since the spring may jump out to cause an injury to the worker.

(7) Do not lit heavy parts and equipment forcibly with physical strength. Use wire ropes and chain blocks to lit them. Also do not walk up to under lifted things.

Concerning the wire ropes used to lift the parts, select a normal one free from break or twist of the element wire, and of the specified dimensions conforming to the applicable weight.

(8) When inspecting and disassembling an electrical product, be sure to turn OFF the POWER switch, and put up a sign of "Under Construction".

(9) When handling a liquid, strictly observe the following instructions:

- Fuel oil, lubricating oil: Inflammable.....Naked flames are strictly prohibited.
- Fresh water corrosion inhibitor, fresh water anti-freeze, mercury (thermometer) = Poisonous .....Drinking is prohibited. Wash away, if deposited on the skin.
- Battery electrolyte = Poisonous.....Drinking is prohibited. Wash away, if deposited on the skin. Naked flames strictly prohibited.

◎ For the sake of preventing pollution, entrust a special waste ddisposal company with the task of disposing the used waste liauid and oil.

0-2.2 Precautions for Disassembly, Maintenance, and Assembly

(1) Prepare the replacing parts, tools and measuring instruments in advance. As for the tools, be minded to use those specified, and concerning the replacing parts, use our genuine parts or those specified by us.

(2) Gaskets, O-rings, split pins and wire ring wires must be replaced with the new parts after every disassembly. Prepare the new parts according to the extent of disassembly.

(3) Block the openings resulting from disassembly with tape or clean cloth to prevent infiltration of foreign matters.
After restoration, be sure to remove such tape or cloth.

(4) Place disassembled parts in neat order for prevention of the damage or loss, and for improvement of the assembly working efficiency.

(5) Be sure to assemble the parts provided with the assembling position marks or matchmarks, such as the cylinder numbers and the bearing numbers, to their original positions.
Further, when these parts are replaced, be sure to provide the new parts with the same marks as those provided on the old parts.

(6) Materials of the bolts and nuts used in high-temperature sections such as the exhaust manifold are heat-resistant. When reassembling the engine, therefore, be careful not to confuse them with ordinary bolt and nuts.

(7) Tighten each of the bolts and nuts uniformly with the specified torque (or specified oil pressure).
If it is necessary to apply an agent, such as a lubricant, to the bolts and nuts when tightening them, never use an aqent other than the specified ones.

(8) When parts are required to be measured during maintenance, perform the measurement correctly, and arrange the results of the measurement as the data for the reference on later days.

(9) After the completion of the work, restore the lagging of the exhaust pipe and the turbocharger, the exhaust pipe cover and the parts shielding heated parts, such as the heat box, if they have been removed for disassembly and servicing. Newly treat the disconnected joints with combustible oil splash preventive means (FN tape) after the completion of the work.

(10) Be minded to promptly replenish all the used spare parts.

0-2.3 Check Items after Disassembly, Maintenance, and Assembly

(1) Check that all the bolts and nuts are free from loosening, and that specified lock washers are inserted securely. Particularly be careful when checking the inside of the engine where visual inspection is impracticable during operation.

(2) Turn the engine and prime each fluid to check that there is no problems such as interference of the working area, and leakage or clogging of each area.

(3) After end of the work, check that the flywheel turning device and the turning bar used are in "disengaged" position

(4) Record the contents of the work executed and parts replaced in the Engine Diary.

0-3. Engine Conforming to NOx Technical Code

0-3.1 Outline

(1) The marine diesei engines, to which the 13th rule "Nitrogen Oxides (NOx)" in Supplement VI "Rules to Prevent Air Pollution by Ships" to MARPOL73/78 Treaty applies should, conform to NOx Technical Code.

(2) The engines conforming to NOx Technical Code are authorized as an engine group or an engine family and it is allowed to apply the engine parameter check method to them, when receiving the NOx discharge inspection on board.

The engine parameter check method is a method for verifying that the engine components and setting values conform to the requirements specified in the technical file, and does not require the measurement of NOx discharge. To the engines that are not conforming to the requirements of the technical file, the engine parameter check method cannot be applied. For such engines, the measurement of NOx discharge shall be required.

0-3.2 The parts to be Specified

The technical file states the engine components that can affect the NOx discharge specified in NOx Technical Code, and shows the identification marks stamped on them, and the user is required to maintain the technical file for each engine. When replacing any parts shown in the technical file, be sure to use our genuine parts stamped with the identification marks. In the case that any parts without the identification mark is used, it shall be regarded as nonconformance to the requirements of the technical file, and in such a case, inspection bv the enaine oarameter check method cannot be applied.

The followings are the parts that have the Identification marks specified in the technical file. When replacing any of these parts, be sure to check the identification marks. (:"Technical File")

<Parts with identification marks>

① Cylinder head	② Piston	③ Turbocharger
⑭ Air cooler	⑤ Fuel oil cam	⑥ Fuel oil injection pump
⑦ Fuel oil injection pump plunger	⑧ Fuel oil injection valve	⑨ Fuel oil injection valve nozzle

0-3.3 Engine Setting Value

The engines conforming to NOx Technical Code are adjusted to conform to the specifications before shipment. After shipment, they should not be adjusted to such a manner that the setting values specified in the technical file may be deviated.

If any change is made in the manner that may deviate from the settings specified in the technical file, it shall be considered to be nonconformance to the requirements of the technical file, and the inspection by the engine parameter check method cannot be applied.

The followings are the items that have been set to conform to NOx Technical Code:

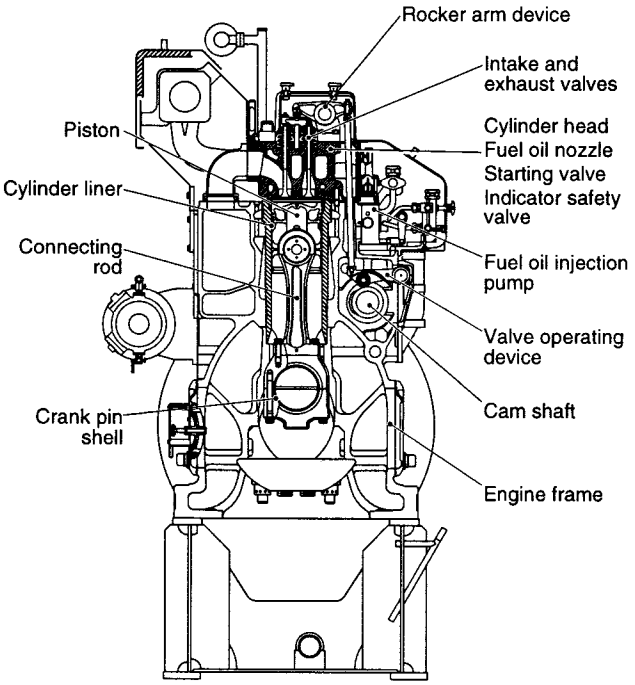
<Items set before shipment>

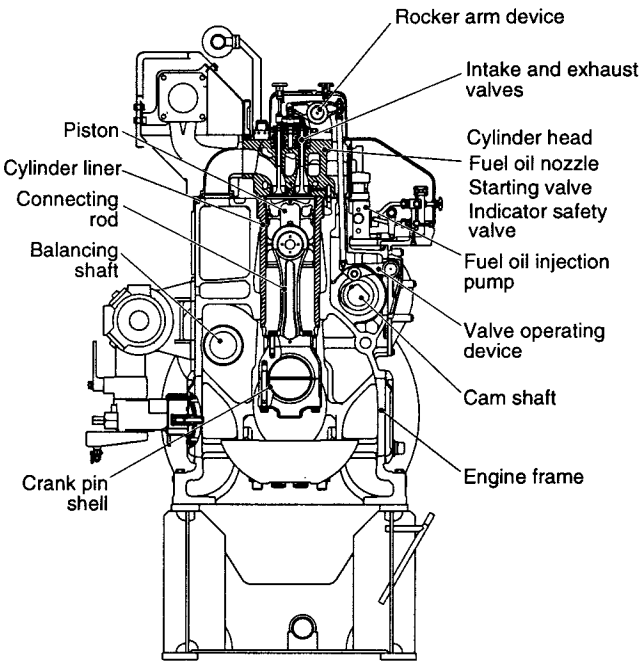
(1) Fuel oil injection timing

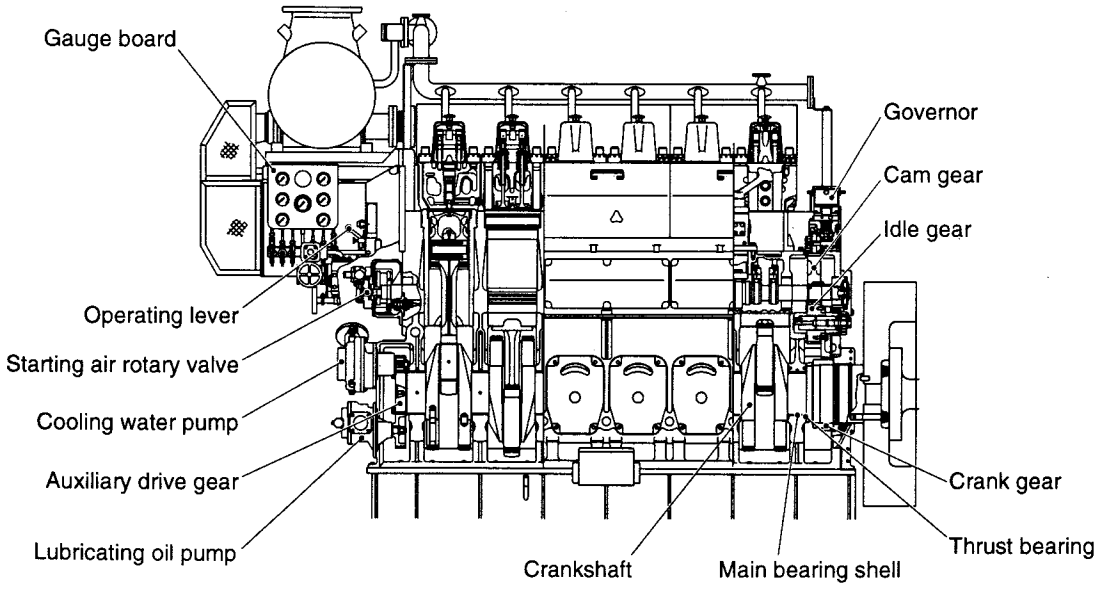
(2) Fuel oil injection valve opening pressure

1. Equipment Arrangement and Maintenance Schedule

1-1 Equipment Arrangement







Equipment Arrangement

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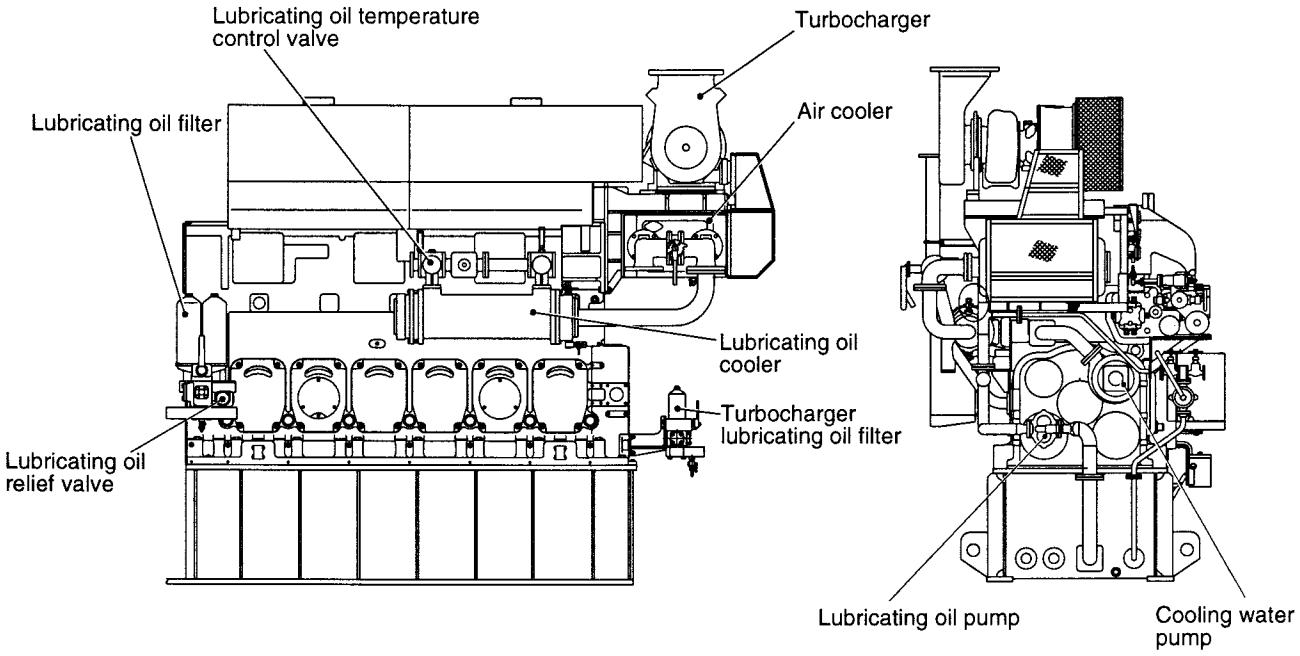
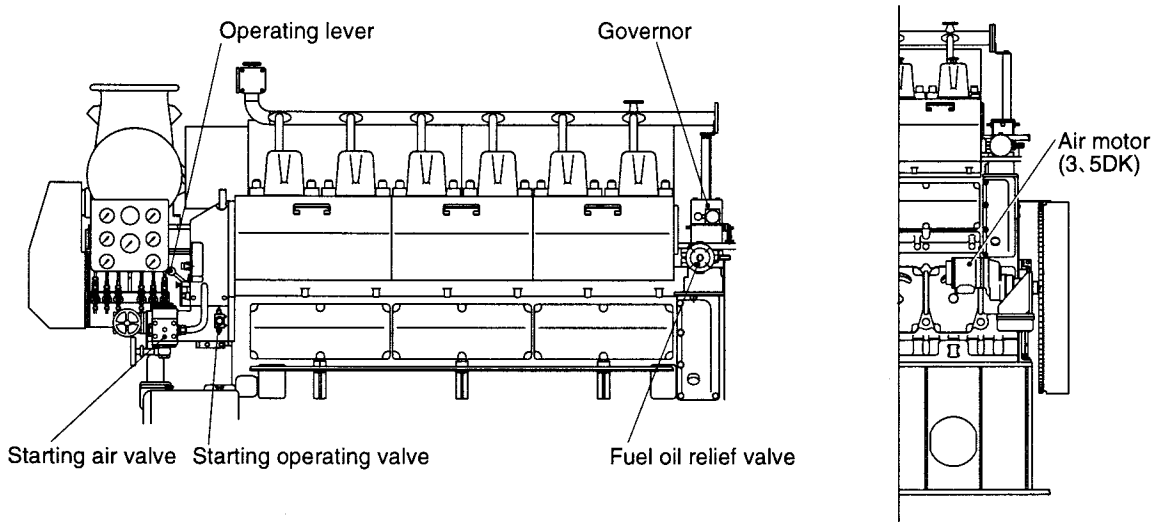




(Note) Equipment arrangement may be different according to specifications.

1-2 Maintenance Schedule Table

This table covers the periodic disassembly and maintenance items of the engine. For the items related with daily maintenance and inspection, refer to a separate volume.(📖 : "Operation")
(○ : Periodical inspection, ▲ : The 1st inspection after the initial operation, and after overhaul and maintenance, ◎ : Replacement.)

Overhaul and maintenance portion	Work contents	Work man-hour No. of workers x Hours	Overhaul and maintenance piriod(hr) 1000 ≀ 1500 3 mths	2000 ≀ 3000 6 mths	4000 ≀ 6000 1 yr.	8000 ≀ 12000 2 to 3 yr.	16000 ≀ 24000 4 to 5 yr.	Reference 📖	Remarks
Cylinder head	Checking and retightening cylinder head bolt	∗ 2 x 0.20		▲		○		3 - 1	
	Overhaul of cylinder head (top hole)	∗ 2 x 1.0				○		3 - 1	
	○ Cylinder head inspection and cleaning	∗ 1 x 1.5				○		3 -1	
	○ Intake and exhaust valve disassembly, inspection and facinf-up	∗ 1 x 2.0				○		3 - 2	
	○ Valve rotaitor disassembly and inspection	∗ 1 x 1.0		▲		○		3 - 2	
	○ Valve spring and cotter inspection	∗ 1 x 0.25		▲		○		3 - 2	
	○ Starting valve disassembly and inspection	∗ 1 x 1.0				○		3 - 3	
	○ Rocker arm disassembly and inspection	∗ 1 x 1.0				○		3 - 4	
	○ Indicator and safety valve disassembly and inspection	∗ 1 x 1.5				○		3 - 5	
	○ Exhaust valve seat and O-ring replacement	∗ 1 x 2.0					◎	3 - 1	
	○ Jacket opening for removal of scale	∗ 1 x 1.0				○		3 - 1	
Piston	Piston extraction (including connecting rod small end part)	∗ 2 x 1.0				○		4 - 3	
	○ Piston inspection,cleaning and measurement	∗ 1 x 0.5				○		4 - 4	
	○ Piston ring replacement	∗ 1 x 0.5				◎		4 - 4	
	○ Piston pin inspection and measurement	∗ 1 x 0.25				○		4 - 4	
	○ Piston pin bush inspection	∗ 1 x 0.25				○		4 - 4	
Protection ring	Extraction,inspection,cleaning and measurement	∗ 1 x 0.25				○		4-3/5-3	
Connecting rod	Connecting rod bolt inspection and retightening	∗ 2 x 1.0		▲	○			4 - 5	
	Crankpin bearing overhaul inspection, and bearing shell replacement	∗ 2 x 1.5				○	◎	4 - 4	
	○ Crankpin inspection and measurement	∗ 1 x 0.5				○		4-4/4-7	
	○ Connecting rod bolt inspection and replacement	∗ 2 x 1.0				○	◎	4 -5	
Cylinder liner	Cylinder liner inner surface inspection, and measurement	∗ 1 x 1.0				○		5 - 3	
	Cylinder liner extraction	∗ 2 x 2.0					○	5 - 4	
	○ Inspection on jacket side and replacement of O-ring	∗ 1 x 1.0					○/◎	5 - 5	
Main bearing	Main bearing bolt tightening check	∗ 2 x 0.5				○		6 - 3	
	Disassembly and inspection of main bearing,Replacement of bearing shell	∗ 2 x 2.0				○	◎	6 - 3	

Overhaul and maintenance portion	Work contents	Work man-hour No. of workers x Hours	Overhaul and maintenance piriod(hr) 1000 ≀ 1500 3 mths	2000 ≀ 3000 6 mths	4000 ≀ 6000 1 yr.	8000 ≀ 12000 2 to 3 yr.	16000 ≀ 24000 4 to 5 yr.	Reference	Remarks
Crankshaft	Deflection measurement	2 x 1.0	▲	○				Separate volume	"Operation" 5-4.5
	Balance weight bolt tightening check								
	○ Wiring inspection	1 x 0.5				○		7-1	
	○ Inspection by torque wrench	2 x 1.0					○	7-1	
Balancer shaft	Replacement of automatic core-adjusting bearing	2 x 1.5					◎	7-2	
Timing gear	Tightening bolt check and retightening	1 x 1.5				○		8-1	
	Gear tooth contact and backlash inspection	1 x 1.0				○		8-1	
	Idle gear overhaul and bush inspection and measurement	1 x 1.5				○		8-1	
Camshaft Camshaft bearing shell Camgear	Cam gear disassembly,inspection,and measurement	3 x 2.0				○		8-2	
	Camshaft bearing disassembly,inspection, and measurement	2 x 1.0				○		8-2	
	Cam gear disassembly and inspection	1 x 1.0				○		8-2	
Fuel injection pump	Injection timing check	＊2 x 1.0		▲	○			8-2	
	Injection pump disassembly and inspection	＊1 x 2.0			○/◎			9-4	
	○ Deflector inspection and replacement				○	◎		9-4	
	○ Plunger assembly and delivery valve replacement					◎		9-4	
	○ Spring and spring seat replacement						◎	9-4	
Fuel injection valve	Extraction inspection,cleaning and injection pressure adjustment	＊ 1 x 1.0	○					Separate volume	"Operation"
Fuel oil piping system	O-ring replacement	2 x 4.0			○	◎			
Valve operating device	Swing arm disassembly,roller and bush inspection	＊ 1 x 1.0			○			10	
☆Governor	Disassembly and inspection							Separate volume	Instruction manual
Governor driving device	Disassembly,inspection and cleaning	1 x 2.0				○		11	
☆Turbocharger	Disassembly,inspection and cleaning							Separate volume	Instruction manual
Air cooler	Disassembly,inspection cleaning and hydrostatic test	2 x 3.0			○			12-3	
Starting air valve	Disassembly,inspection and O-ring replacement	1 x 2.0				○/◎		13-2	
Starting air rotary valve	Disassembly and inspection	1 x 1.5				○		13-3	
☆Air motor	Disassembly,inspection and cleaning	2 x 3.0						Separate volume	Instruction manual
Fuel oil rerief valve	Disassembly and inspection	1 x 1.5				○		14-2	
Fuel oil feed pump	Disassembly and inspection,bearing inspection and replacement	1 x 2.0				○/◎		14-3	
Lubricating oil pump	Disassembly,inspection and cleaning	2 x 1.5				○		15-2	
	○ Bearing oil seal inspection and replacement					○/◎		15-2	
Lubricating oil cooler	Inspection,cleaning and hydrostatic test	2 x 3.0			○			15-3	
Lubricating oil rerief valve	Disassembly and inspection	1 x 1.5				○		15-4	
Lubricating oil temperature control valve	Disassembly,inspection,cleaning and pellet replacement	1 x 1.0				○	◎	15-5	
Cooling water pump	Disassembly,inspection and cleaning	2 x 2.0				○		16-2	
	○ Oil seal,mechanical seal replacement					◎		16-2	
	○ Bearing replacement					◎		16-2	

Equipment Arrangement and Maintenance Schedule

Maintenance Schedule Table

Overhaul and maintenance portion	Work contents	Work man-hour No. of workers x Hours	Overhaul and maintenance piriod(hr) 1000 ≀ 1500 3 mths	2000 ≀ 3000 6 mths	4000 ≀ 6000 1 yr.	8000 ≀ 12000 2 to 3 yr.	16000 ≀ 24000 4 to 5 yr.	Reference	Remarks
Cooling water temperature control valve	Disassembly,inspection,cleaning and element replacement	1 x 1.0				○	◎	16-3	
Fuel oil shut-down device	Disassembly,inspection,and O-Ring replacement	1 x 1.0				○/◎		17	
Gauges	Replacement of pressure gauge rubber hose and vibration insulating rubber	1 x 1.0					◎	18	
	Inspection of pressure gauge and tachometer (Calibration)		○				(○)	18	
	Replacement of F.O.pressure gauge ethylene glycol (in case of heavy fuel oil specifications)	1 x 0.5			◎			18	
Pressure damper of main fuel oil pipe	Accumlator assembly replacement (including the O-Ring)	1 x 0.5				◎			

Notes:

1). The above table shows the standard values of the man-hour as well as the overhaul and maintenance period under the conditions of general use of the heavy fuel oil.

In servicing an actual engine, initially set the work man-hour larger, and set the overhaul and maintenance interval smaller than those shown in the table.

Later reset the work man-hour as well as the overhaul and maintenance interval to the most appropriate values, according to the operating conditions, work environment, and the results of the overhaul.

2). The work man-hour is based on the standard values for the experienced workers who are also skilled in restoration.

Therefore, please plan to have extra times for those with in experience.

3). The mark " " given in the work-hour column indicates the man-hour per unit (one cylinder or one bearing).

When the number of the objects is "n" pieces, multiply the value by "n".

4). Have the work marked with "☆" executed by a professional technician of the manufacturer or maintenance company, of conduct the work under his guidance.

MEMO

2. General Maintenance Items

2-1 Preparation before Maintenance Work

Make the following preparation before starting the engine disassembly and maintenance work.

《Preparation before work》

(1) Set the control handle to the "STOP" position.
(2) Close the air tank main valve.
(3) Close the fuel oil outlet and inlet valves.
(4) Close the lubricating oil outlet and inlet valves.
(5) Close the cooling water outlet and inlet valves.
(6) Open the cooling water inlet pipe drain valve to discharge cooling water in the jacket.
(7) Turn OFF the POWER switch of engine control system .
(8) Open the indicator valve.

2-2 General Consumables and Materials/General Tools, Implements, and Measuring Instruments

General consumables, materials, tools, and measuring instruments to be prepared for the engine maintenance work are shown below. The consumables, tools, and measuring instruments specially required for specific works are shown in each individual section.

2-2.1 General Consumables and Materials

① Waste cloth
② Washing oil
③ Lubricating oil
④ Grease
⑤ Machine oil VG-10
⑥ Lubricating agent (MOLYKOTE 1000 spray-type)
⑦ High-temperature anti-seizure agent
⑧ Liquid packing
⑨ Silicon rubber
⑩ Compound medium size, fine size (for facing-up)
⑪ Lubricating penetrant
⑫ Dye testing penetrant (for color check)
⑬ Blue paint lead (for confirmation of contact)
⑭ Liquid nitrogen or dry ice (for cold-fitting)
⑮ Wire (for wire ring)
⑯ Wire brush
⑰ Sandpaper #80 or equivarent
⑱ Oil stone
⑲ Anti-corrosive paint (for liner repairing)
⑳ Repair agent (for liner repairing)
㉑ Lead wire (for measuring instruments for gear backlash, etc.)
㉒ Adhesive (LOCK-TIGHT 242,243,271)

2-2.2 General Tools, Implements, and Measuring Instruments

(1). General tools and implements

① General tools
ⓐ Sockets (17x12.7,19x12.7, 24x19, 27x19)
ⓑ Double-ended spanners (8×10, 11×13,17×19, 22×24, 27×30)
ⓒ Offset wrenches (17×19)
ⓓ Hex. rod spanners (4, 6, 10, 14)
ⓔ Box spanner (19×180, 65×130)
ⓕ Adapter (19X12.7)
ⓖ Monkey wrenches
ⓗ Pliers
ⓘ Snap ring pliers
ⓙ Screwdrivers (plus, minus)
ⓚ Hammers (iron, plastic)
② Torque wrenches (1000, 4200,14000)
③ Ratchet handles (12.7,19)
④ Extention bar (19X400, 12.7X150)
⑤ Pipe handle
⑥ Eye bolts (M10, M12, M16)
⑦ Chain block
⑧ Wire rope for suspension
⑨ Tap (M10×1.5)

(2). Measuring instruments

① Calipers
② Thickness gauge
③ Outside micrometer (mm) (0~25, 25~50,50~75, 75~100, 100~125, 150~175, 175~200)
④ Spherical micrometer (0~25 mm)
⑤ Cylinder gauge (mm) (10~18, 35~60, 50~100, 160~250)
⑥ Dial caliper gauge (3~9 mm)
⑦ Dial gauge
⑧ Magnet stand

2-3 Bolts and Nut Tightening Torque, Tightening Oil Pressure

	Name of bolts and nuts	Size	Bolt or nut width across flats (mm)	Tigjtening torque or oil pressure (N · m) { kgf · m }	Remarks
1	Cylinder head bolts	M39	Hydraulic tightening	※ Oil pressure 54MPa {550 kgf/cm^2}	Studding torque 245 {25} ☆
2	Crank pin bolt	M22	27	※ 196 { 20 }+40° (B-torque 392 {40})	☆
3	Connecting rod bolt	M20	27	※ 98 {10}+20° (B-torque 255{26})	☆
4	Side bolt	M39	Hydraulic tightening	※ Oil pressure 69MPa {700 kgf/cm^2}	To be returned by 1/4 to 1/2 turn after fully screwing on the studding side ☆
5	Main bearing tightening nut	M39	Hydraulic tightening	※ Oil pressure 78MPa {800 kgf/cm^2}	
6	Balance weight bolt	M30	50	980 {100}	☆
7	Flywheel bolt	M30	41	1270 {130}	☆
8	Generator fitting bolt	M30	41	1080 {110}	☆
9	Idle gear shaft bolt (1)	M30	41	196 { 20 }+40° (B-torque 588 {60})	☆
10	Idle gear shaft bolt (2)	M16	Hole 14	196 {20}	☆
11	Idle gear tightening bolt	M14	24	118 {12}	
12	Cam gear mounting Power-Rock	M10	Hole 8	80 {8.3}	◇
13	Camshaft bearing pin	G1/2	27	85 {8.7}	
14-1	Aux. machinery drive gear bolt	M20	27	373 {38}	☆
14-2	Aux. machinery drive gear cushion bolt	M12	19	69 {7}	☆
15	Fuel oil injection pump fitting nut	M16	24	90~110 {9~11}	Applied to black stud bolt ☆
16	Fuel oil injection pump delivery valve tightening bolt	M16	Hole 14	137~197 {14~16}	□
17	Fuel oil nozzle mounting nut	----	27	196~226 {20~23}	□
18	Nozzle holder mounting nut	M12	19	59 {6}	☆

Bolt and Nut Tightening Torque, Tightening Oil Pressure

	Name of bolts and nuts	Size	Bolt or nut width across flats (mm)	Tigjtening torque or oil pressure (N · m) { kgf · m }	Remarks
19	Nozzle holder inlet connector	M16	19	88~98 {9~10}	
20	F.O. High-pressure coupling mounting bolt	M12	17	34~44 {3.5~4.5}	
21	Governor drive shaft tightening nut	M16	22	59 {6}	RHD6 U-NUT
22	Swing arm mounting bolt	M16	24	59 {6}	☆
23	Starting valve cover mounting bolt	M12	17	59 {6}	
24	Indicator valve mounting nut	M12	19	59 {6}	☆
25	Divided cam shaft bolt and nut	M16	22	196 {20}	
26	C.W. pump impeller mounting nut	M18		147 {15}	
27	General bolts and nuts	M10	17	15 ~ 20 { 1.5 ~ 2 }	
		M12	19	29 ~ 39 { 3 ~ 4 }	
		M14	22	34 ~ 49 { 3.5 ~ 5 }	
		M16	24	49 ~ 69 { 5 ~ 7 }	
		M18	27	78 ~ 98 { 8 ~ 10 }	

Notes: 1) Main bolts and nuts should be tightened according to the above table without fail.
2) Bolts and nuts must be tightened uniformly in a diagonally and alternating sequence.
3) Be sure to check for loose cylinder head tightening nut and connecting rod bolts after a certain period of operation. (: 1-1.2 "Maintenance Schedule Table".)
4) Anti-seizure agent should be applied on the threaded parts and seat surfaces around the exhaust manifold which are subjected to high temperature for the prevention of seizure before tightening.
5) Retighten the bolts used for installation when stopping the engine, and be sure to check the crankshaft deflection after retightening.
6) Torque wrenches used for tightening should be inspected periodically.
7) The symbol marks used in this table signifies the following:
※ : The tightening hydraulic pressure and torque specified on the name plate attached on the engine shall have priority.
☆ : Apply the lubricating agent (MOLYKOTE 1000 spray type) to the contact surfaces and threaded areas of the bolt and nuts.
□ : Apply the lubricating agent (MOLYKOTE U-paste) to the contact surfaces and threaded areas of the bolt and nuts.
◇ : Apply lubricating oil to the threaded portions and contact surfaces.

⚠

If any agent other than the specified products is applied, the friction force of the threaded portions changes, and the bolts are tightened excessively or insufficiently. As the result of this, the bolts may be broken or loosened, thereby causing serious damage to the engine.

2-4 Hydraulic Jack

2-4.1 General Construction of Hydraulic Jack

The hydraulic jack (assy.) Ⓐ is consisted of a pair of a hydraulic cylinder and a hydraulic piston.
Operate the hydraulic pump Ⓑ connected with high-pressure hose Ⓒ to give the rated pulling power to the bolt by hydraulic pressure. And, in this condition, turn the nut to tighten or loosen it.
Tighten and remove the nuts of the following bolts using a hydraulic jack:

- Cylinder head bolt
- Main bearing bolt
- Side bolt

2-4.2 Removal of Nut

Remove the nut according to the following procedures:

(1) Clean the area around the circular nut carefully, and confirm that there is no dirt or foreign matters on the seat surfaces of the hydraulic jack stand Ⓔ, and place the hydraulic jack stand.

(2) Place the hydraulic jack assembly on the jack stand, and screw the hydraulic piston ⓐ into the bolt. Be minded to screw the hydraulic piston until it strikes the hydraulic cylinder ⓑ.

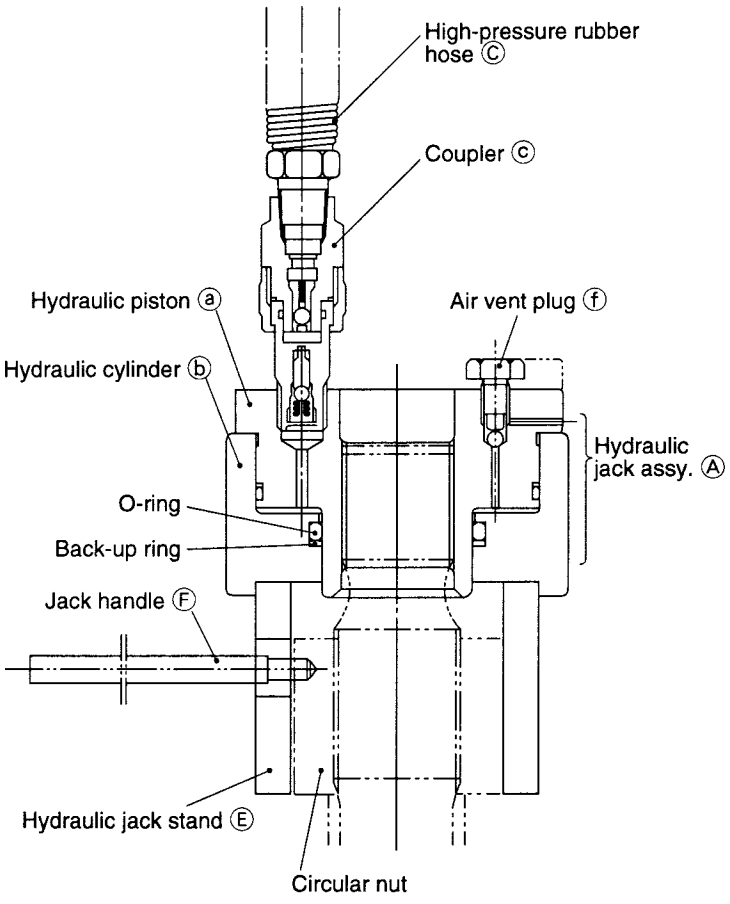
(3) After confirming that the hydraulic jack are closely attached to the jack stand, turn back the hydraulic jack by about 1/2 turn.

(4) Confirm that the valve of coupler ⓒ for connecting the high-pressure hose is not stuck, and then connect the hydraulic jack and terminal Ⓓ, and then connect the terminal and hydraulic pump using a high-pressure hose.

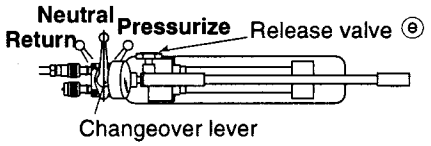
(5) Loosen the air vent plug ⓓ of the hydraulic pump, and release air in the oil tank into the atmosphere.

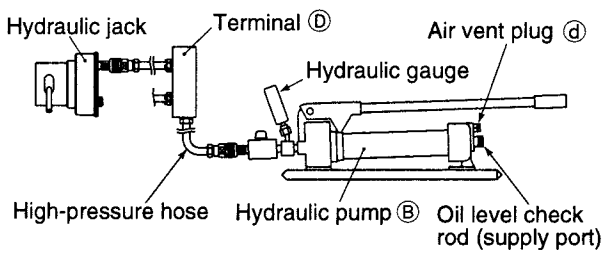
(6) Check the hydraulic pump oil level, and in case that the level is low, replenish the hydraulic oil.

Hydraulic oil : Machine Oil VG-10



Hydraulic Jack





Hydraulic Pump

(7) Tighten the release valve ⓔ of hydraulic pump.
(8) Loosen the air vent plug ⓕ of hydraulic jack , and operate the hydraulic pump lever to vent the air in the hydraulic cylinder. Tighten the air vent plug after confirming that the air is completely vented.
(9) Operate the hydraulic pump lever to increase the oil pressure up to the specified level.

> **Specified value·····To be specified in each work item.** (📖 : 2-3)

(10) Insert the jack handle Ⓕ into the hole of the circular nut through the oblong hole of the hydraulic jack stand, and loosen the circular nut by 5 to 6 holes.
(11) Slowly open the release valve of hydraulic pump, and gradually reduce the oil pressure down to "0" .
(12) Manually loosen and remove the hydraulic jack.
(13) Remove the hydraulic jack stand.
(14) Remove the circular nut.

> ⚠ When operating the hydraulic jack, oil is highly pressurized, and if oil is leaked and sprouted out, it is extremely dangerous. Therefore, be minded to wear the protective glass without fail.

2-4.3 Tightening of Nut

(1) Carefully clean around the bolt, and confirm that there is no foreign matters on the seat surface of the nut and jack stand. Then, manually screw the nut until it gets in contact with the bottom, and place the jack stand.
(2) Install the hydraulic jack, and connect to the hydraulic pump according to the same procedures as those for removal, and increase the oil pressure up to the specified level by operating the hydraulic pump lever.
(3) Insert the jack handle through the long hole of the jack stand, and tighten it until it gets in contact with the bottom.
(4) Strike the jack handle with a hammer, and confirm that it is securely tightened.
(5) Slowly open the hydraulic pump release valve, and gradually reduce the oil pressure down to "0" .
(6) Manually loosen the hydraulic, and remove it.
(7) Remove the hydraulic jack stand.
(8) In the case of a bolt equipped with the protection cap, fit it with the protection cap.

2-4.4 Maintenance of Hydraulic Jack

(1) Extract the piston from hydraulic cylinder by striking its lower area with a wooden hammer, and pull out the piston from the hydraulic cylinder.
(2) Remove the air vent plug.
(3) Wash all the parts using the washing oil, and check them for scratch.
(4) Apply the hydraulic oil to all the parts, and install the hydraulic piston to the cylinder.
(5) Replace the O-ring and the back-up ring with new ones.

> △ When installing the piston, be careful so that the O-ring and the back-up ring may not be fitted upside down. Wrong way of fitting will cause the O-ring to be damaged.

《Consumables for hydraulic jacks》
(📖 : "Parts List")

① Back-up ring (small)	9-1.1 No.18
② Back-up ring (large)	9-1.1 No.19
③ O-ring (small)	9-1.1 No.506
④ O-ring (large)	9-1.1 No.507

3. Cylinder Head and Valves

3-1 Cylinder Head

3-1.1 General Construction

The cylinder head made of the special cast iron of high strength and high thermal conductivity is designed to assume the structure of high rigidity, and hydraulically fastened to the engine frame rigidly with the four large-diameter bolts via metal gasket and cylinder liner.

The combustion surface is of the thick-walled structure provided with the forced cooling through the drilled holes.

The intake and exhaust valves consist of the 4-valve system of 2 piece each for intake and exhaust, with the valve seat cold-fitted to the cylinder head, and with the exhaust valve seat cooled by the cooling water.

The fuel oil injection valve, indicator valve and safety valve are mounted on the upper side of the cylinder head, and the starting valve (not provided in case of air-motor type) is mounted on the lateral side respectively.

The leaked oil from the fuel oil injection valve as well as the cooling water (or, cooling oil) of the fuel oil injection valve, when heavy fuel oil is used, are guided into the piping on the fuel oil injection pump side through the hole.

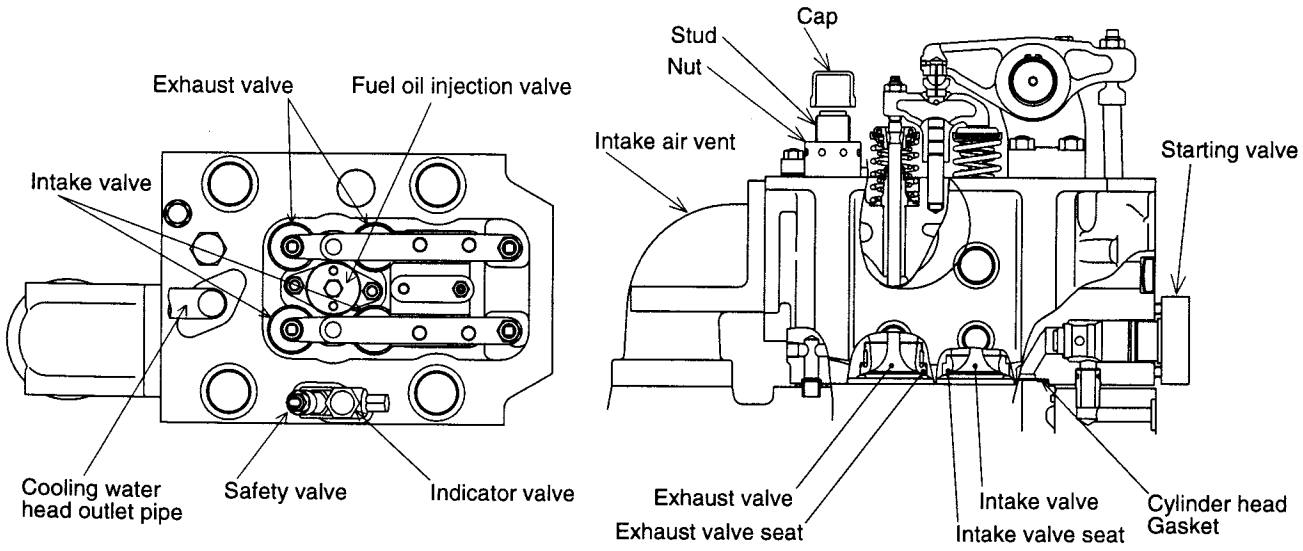
Cylinder head (independent) : 120 kg
Cylinder head assy. (with valves) : 130 kg

3-1.2 Replacing Consumables, Implements and Measuring Instruments

(1) Replacing Consumables

Replace the following parts with the new ones.
(: "Parts List")

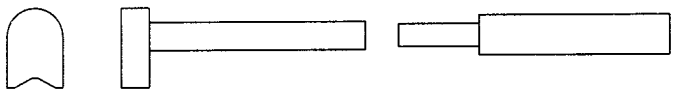
① Cylinder head gasket 3-15 No.A18
② O-ring (fuel oil injection valve guide) 3-15 No.A30
③ O-ring (Starting valve inlet) 3-15 No.A505
④ O-ring (exhaust valve seat) 3-15 No.A26, 27
⑤ CW connection pipe gasket 3-15 No.A56
⑥ Gasket (intake air vent) 3-15 No.B7
⑦ Intake air vent seal 3-15 No.B59
⑧ Gasket (exhaust manifold) 3-29.1 No.A27
⑨ Rubber seal (head cover) 3-21 No.A10
⑩ Push rod rubber seal 3-22 No.14
⑪ Gasket (1) 34×70 (CW head outlet pipe) 2-1.7



Cylinder Head and Valves

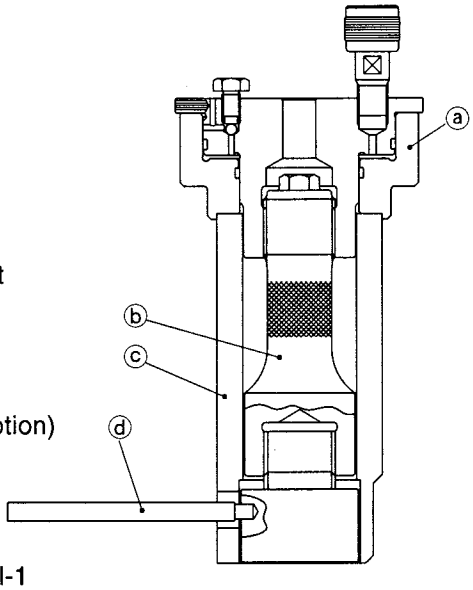
(2) Implements and Measuring Instruments

① General tools and measuring instruments (: 2-2)
② Nozzle holder extracting implement
③ Hydraulic jack
  ⓐ Jack cylinder ····· Head
  ⓑ Tension bolt ····· Head
  ⓒ Jack stand ····· Head
  ⓓ Jack handle
④ Hydraulic pump
  ⓐ Hydraulic pump
  ⓑ High-pressure hose (2 m x 6)
  ⓒ Terminal (4T)
  ⓑ Male coupler
⑤ Cylinder head suspending implement
  ⓐ Spring disassembling implement-2 (for common use)
  ⓑ Eye bolt M16
⑥ Valve guide extracting implement (option)
⑦ Water cooling valve seat extracting implement (option)
⑧ Water cooling valve seat fitting tool
  ⓐ Water cooling valve seat fitting tool-1
  ⓑ Water cooling valve seat fitting tool-2 (option)
⑨ Valve seat fitting implement (option)
  ⓐ Valve seat fitting implement-1
  ⓑ Valve seat fitting implement-2

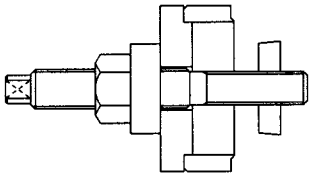


② Nozzle Holder Extracting Implement

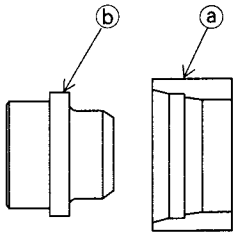
⑥ Valve Guide Extracting Implement



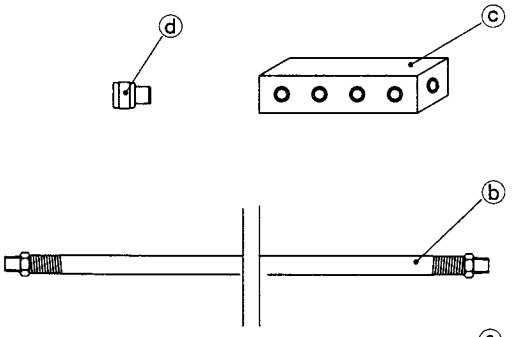
③ Hydraulic Jack



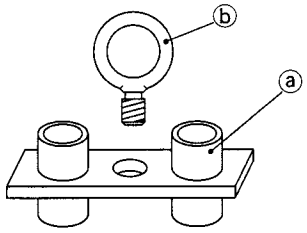
⑦ Water Cooling Valve Seat Extracting Implement



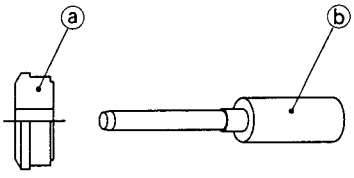
⑧ Water Cooling Valve Seat Fitting Tool



④ Hydraulic Pump



⑤ Cylinder Head Suspending Implement



⑨ Valve Seat Fitting Implement

3-1.3 Removal of Cylinder Head

Remove the cylinder head (top hole) on the following procedure:

(1) Remove all the covers.
① Exhaust manifold cover Ⓐ
② Heat box cover Ⓑ
③ Cylinder head cover Ⓒ

> ⚠ All the parts (the exhaust manifold and the area around the cylinder head, in particular) are hot immediately after stopping the engine, and a burn may be caused if the parts of such areas are touched with naked hand.
> Therefore, be minded to wear safety gloves during the work and be careful to prevent a burn.

(2) Remove all the piping around the cylinder head.
① Nozzle cooling outlet and inlet piping Ⓓ
② Starting valve pilot air pipe Ⓔ
③ Cooling water outlet pipe flange Ⓕ
④ F.O. leaked oil branch pipe Ⓖ

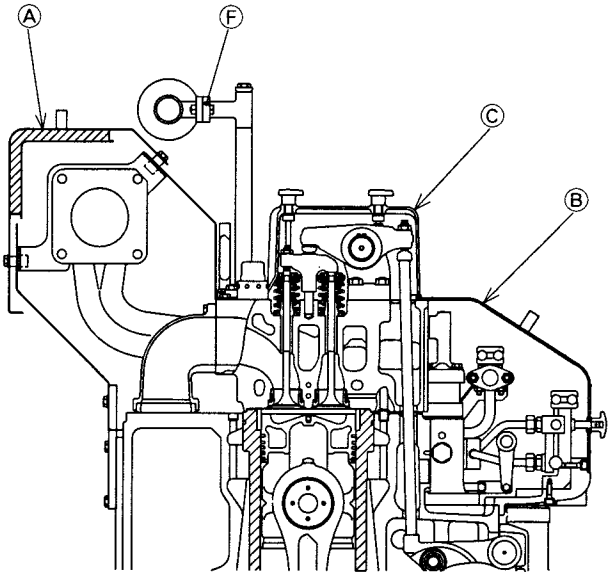
(3) Remove the F.O. high-pressure joint and inlet connector, and extract the fuel oil injection valve.
(📖: "Operation" 5-4.2 "Inspection and Maintenance of Fuel oil injection Valve")

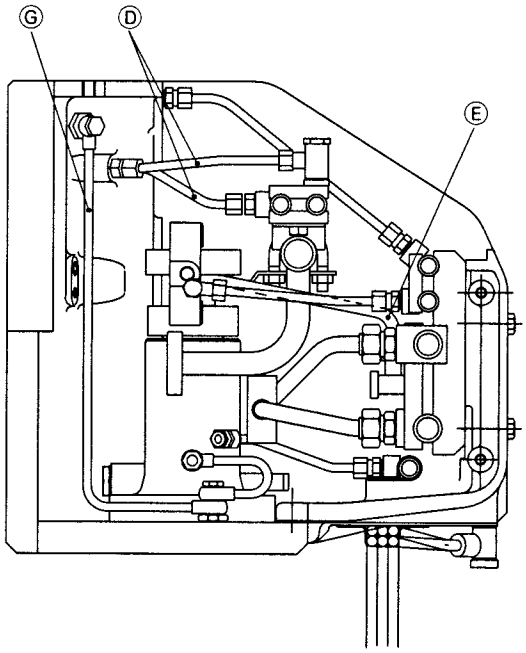
(4) Remove the exhaust manifold mounting bolt.

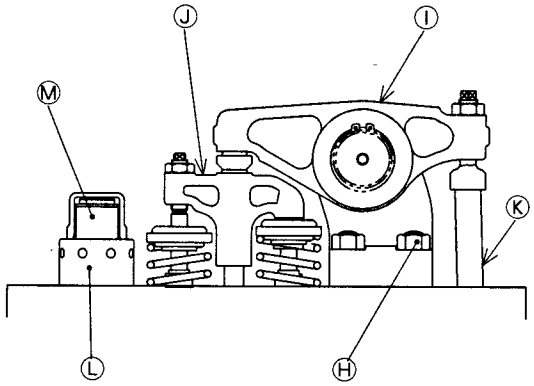
> △ The exhaust manifold mounting bolt is made of stainless steel. Be careful not to mix with other general bolts.

(5) Loosen the mounting nut Ⓗ, and take out rocker arm device Ⓘ.
(📖: 3-4 "Rocker Arm Device")

(6) Extract the valve retainer tee Ⓙ and push rod Ⓚ.







(7) Remove the cylinder head mounting nut Ⓛ using the hydraulic jack ③.
(📖: 2-4 "Hydraulic Jack")

a) Mount the tension bolt ③-ⓑ to the head bolt Ⓜ, and fully screw it until it gets in contact with the bottom.

b) Place the jack stand ③-ⓒ by adjusting its cut-out part, so as not to let it interfere with the adjoining cylinder nut.

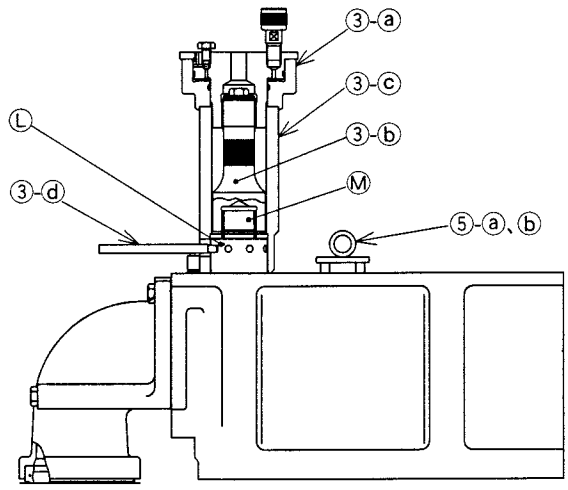
c) Mount the hydraulic jack ③-ⓐ to the tension bolt.

d) Mount the male coupler ④-ⓓ to the high-pressure hose ④-ⓑ, and then connect the hydraulic pump ④-a, terminal ④-ⓒ, and hydraulic jack ③ with a hydraulic hose.

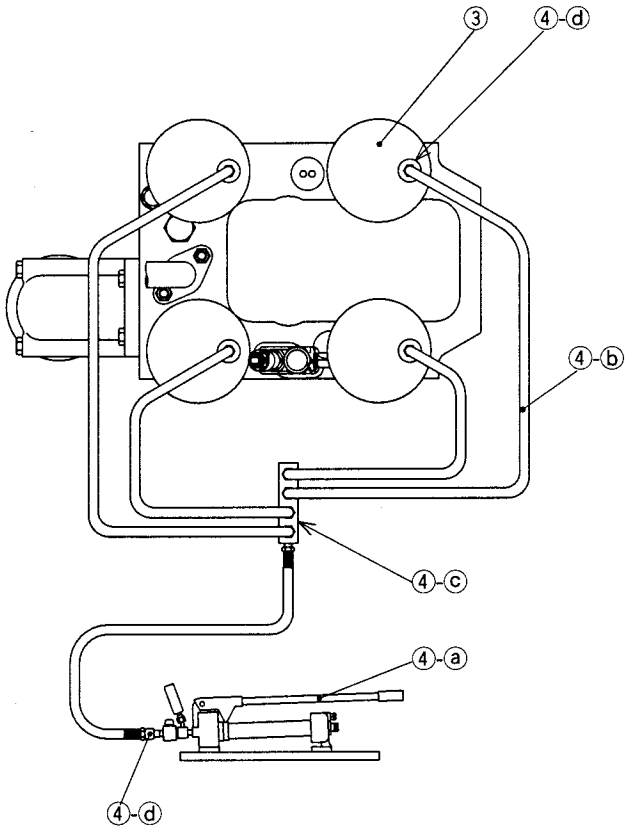
e) Increase the hydraulic oil pressure to the specified pressure by operating the hydraulic pump, and remove the cylinder head by loosening the nut using the handle ③-ⓓ.

Hydraulic pump specified oil pressure:
54 MPa {550 kgf/cm²}

f) Confirm the pressure to allow the nut to start turning, and check that the cylinder head bolt is tightened securely to be free from loosening.



Mounting of Hydraulic Jack



Connection of Hydraulic Hose

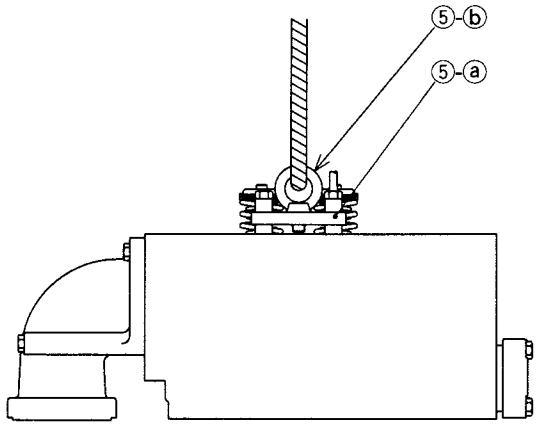
Removal of Cylinder Head

(8) Mount the cylinder head suspending implement ⑤-ⓐ and ⑤-ⓑ on the upper surface of the head, and suspend the cylinder head using a chain block and suspending wire rope.

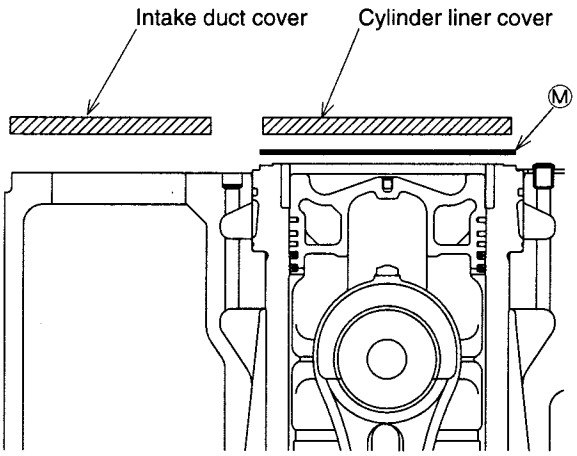
> ⚠ When suspending the cylinder head, be sure to use the specified suspending implement, and be minded to strictly observe the use standard of the wire rope.

> △ 1) When suspending the cylinder head, conduct the work slowly while confirming that the head is not caught on anything. Further, be careful so that the cooling water in the head may not enter the cylinder.
> 2) When lowering down the cylinder head, be careful not to scratch the lower surface of the cylinder head.

(9) Remove cylinder head gasket Ⓜ, and place a cover to prevent infiltration of foreign matters into the cylinder liner and the intake duct.



Suspension of Cylinder Head



Intake duct Cover and Cylinder Liner

3-1.4 Inspection and Maintenance of Cylinder Head (Body)

Since the items mentioned in this section will be the parts to which NOx Technical Code shall be applied, when replacing any of these parts, be sure to use the parts provided with the identification marks.
(📖 : 0-3 "Engine Conforming to NOx Technical Code")

(1) Before servicing the cylinder head (body), disconnect the following attachments. (For the disconnecting procedure, refer to the descriptions of the separate sections.)
① Intake and exhaust valves (📖 : 3-2)
② Starting valve (📖 : 3-3)
③ Indicator and safety valves (📖 : 3-5)
④ Intake air pipe vent
⑤ Cooling water head outlet pipe

(2) Observe and inspect the conditions of the carbons deposited on the combustion surface and intake and exhaust ports, in the state that the attachments are removed.

(3) Completely remove the carbons deposited on the combustion surface and intake and exhaust ports, carefully clean them, and check for the cracks by means of color check.
Particularly be minded to check the combustion surface most carefully, since the part is exposed to the high temperature and high pressure.

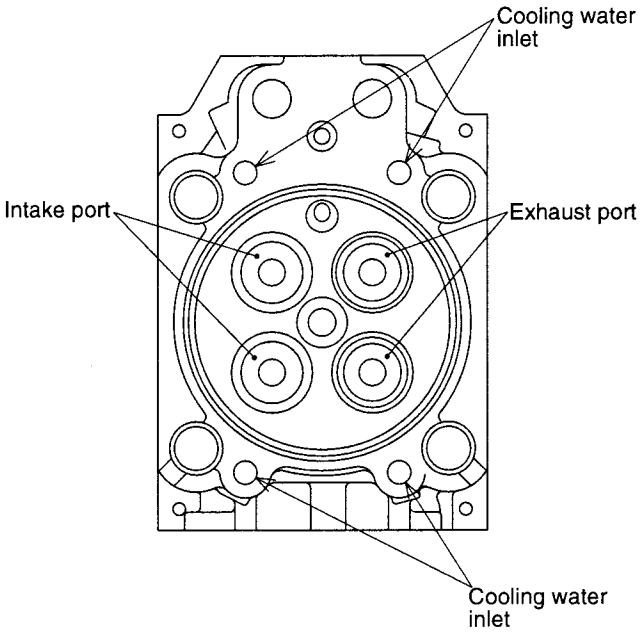
△ Do not use a gas burner to remove carbon. It may cause hardening of the O-ring due to high temperature and deterioration of the materials due to local heating.

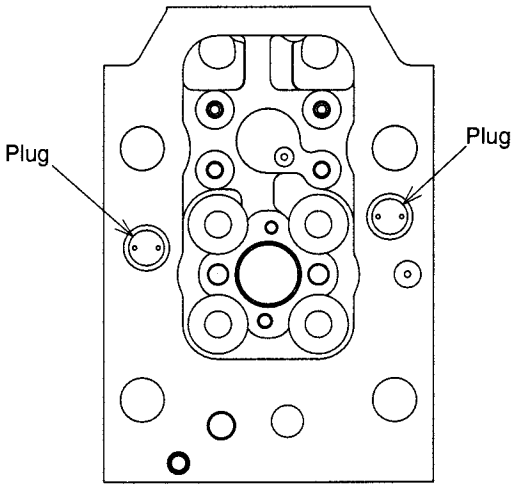
(4) Check if there is corrosion on the intake and exhaust ports.

(5) Check for the corrosion of the contact surfaces of the cooling water connecting pipe gasket and starting air connecting pipe O-ring, and also check for the leak of gases from the cylinder head gasket surface.

(6) Clean the contact surface of the cylinder head gasket.
If necessary, conduct the facing-up of the contact surface.

(7) Inspect the inside of the jacket through the cooling water outlet hole. If heavy scale deposits are found, remove the plug on the upper face, and clean the inside.
After cleaning, apply the adhesive (ROCK-TIGHT 271)on the plug, and then securely tighten it.





Cleaning and Inspection of Head

3-1.5 Intake and Exhaust Valve Guides

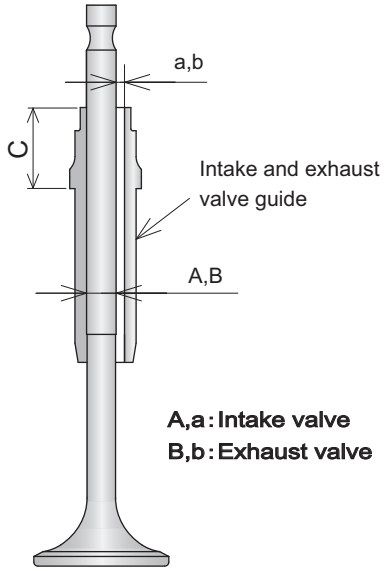
The dimension "C" of the intake valve guide differs from that of the exhaust valve guide.

Intake valve guide	C=42 mm
Exhaust valve guide	C=39.5 mm

(1) Measurement of Inner Diameter

Inspect the intake and exhaust valve guides for corrosion, measure the inner diameters with a cylinder gauge and record the data.
Calculate the clearance by joining the outer diameter measurement results of the intake and exhaust valve stem parts. (: 3-2.4)

Norn. Size (mm)	Standard Clearance (mm)	Replacing limit (mm)
A= ϕ 14	a=0.09~0.13	0.3
B= ϕ 14	b=0.09~0.13	0.3



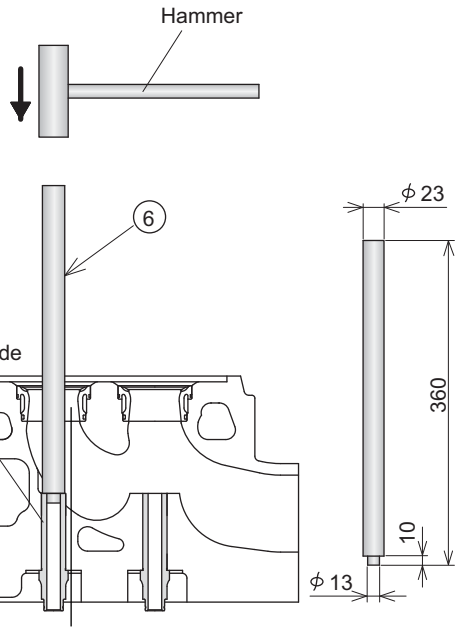
Clearance of Valve Guide

(2) Replacement of Valve Guides

When the clearance between the intake and exhaust valve stems and the intake and exhaust-valve guides is more than the specified replacing limit and the valve guides are found heavily worn, remove the intake and exhaust valve guides and replace them with the new ones according to thefollowing procedure:

a) Remove the valve guide.

Produce the valve guide extracting implement ⑥ (option), or produce the extracting implement as shown in the figure using a round bar, and strike out the valve guide with a hammer, by inserting such implement into the valve guide.



Extraction of Valve Guide

b) Fit the valve guides.

Fit the valve guides by means of cold-fitting using liquid nitrogen or dry ice.

< Cold-fitting procedure >

- In case of liquid nitrogen ·····Immerse the parts in the liquid, take out the parts when bubbles disappear, and fit it promptly.
- In case of dry ice ·····Immerse the parts and dry ice in alcohol, take out the parts after cooling for 20 to 30 minutes, and fit it promptly.

If the cooling liquid or cooled-down parts are touched by nakedl hand, frostbite may be caused. Therefore, be minded to wear cotton arctic gloves during execution of the works.

3-1.6 Intake and Exhaust Valve Seats

(1) Valve Seat Dimensional Measurement

Measure the dimensions of the valve seat part, and in case that it is worn out heavily exceeding the replacing limit, replace the exhaust valve with the new one.
(Replacing limit 📖 : 3-2.4 (4))

(2) Replacement of Valve Seat

a) Removal of valve seat

Remove the valve seats on the following procedure:

Perform the padding welding on the inner surface of the valve seat, and quench it with water. By doing this, the valve will contract and can easily be taken out.

> ⚠ When performing the padding welding, be careful not to damage the combustion surface or valve guide hole with the spatters. Further, when removing the valve seat, be careful not to damage the fitting part of the head.

b) Valve seat fitting

Cold-fit the valve seat using liquid nitrogen or dry ice. (The cold-fitting procedure is as same as the one for the valve guide. 📖 : 3-1.5)

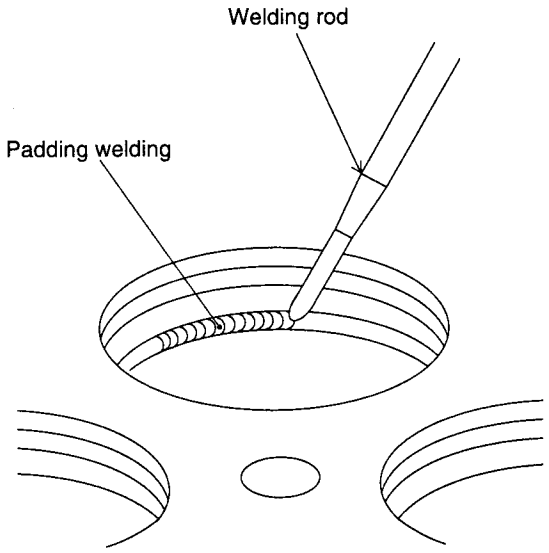
(3) Replacement of Water Cooling Exhaust Valve Seat

Replace the water cooling valve seat, in case that the valve seat part is used exceeding the correction limit, or every 16000 to 24000 hours (4 to 5 years).

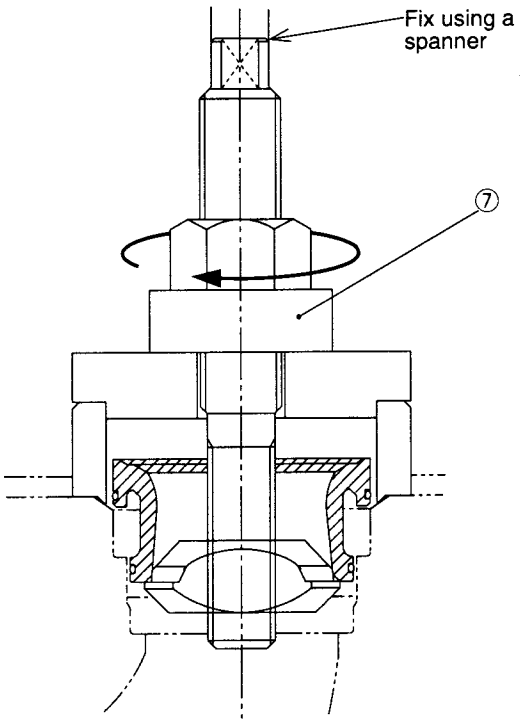
Be minded to replace the O-ring at the same time.

a) Removal of Valve Seat

Removal of the valve seat shall be made by padding welding as same as in the case of the intake valve seat, or shall be made by using the valve seat extracting implement ⑦ (option).



Removal of Intake Valve Seat

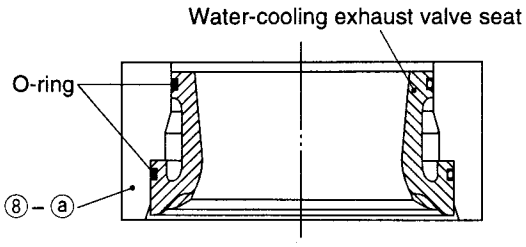


Removal of Exhaust Valve Seat

b) Valve seat fitting

As the O-ring is attached to the exhaust valve seat, fit the valve seat into the cylinder head using the water cooling valve seat tool, after cooling and hardening the valve seat with liquid nitrogen or dry ice on the state that the O-ring is installed on the valve seat.

(The cold-fitting procedure is as same as in the case of valve guide. : 3-1.5)



Exhaust Valve Seat Cooling Procedure

《Fitting procedure》

i) Apply grease to the O-ring at a normal temperature, and fit the exhaust valve seat.

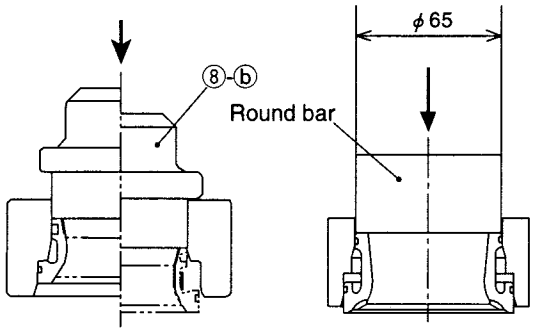
ii) Heat the water cooling valve seat fitting tool ⑧-ⓐ with boiled water of 70 to 80°C.

iii) Insert the valve seat into the water-cooling valve seat fitting tool ⑧-ⓐ.

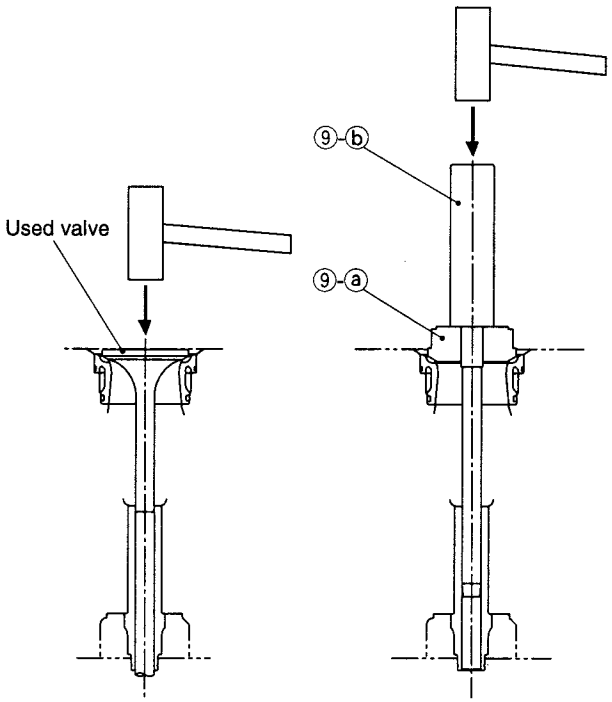
iv) Cool down the valve seat in the state that it is inserted in the valve seat fitting implement.

v) Take the valve seat out of the water-cooling valve seat fitting tool after cooling down it using a round bar or the water-cooling valve seat fitting tool ⑧-ⓑ, and insert the valve seat in the cylinder head promptly.

Be minded to securely strike down the valve seat using a used valve or the valve seat fitting implement ⑨-ⓐ and ⓑ (option).



Removal of Valve Seat from Tool



Fitting of Exhaust Valve Seat

3-1.7 Mounting of Cylinder Head

Mount the cylinder head according in the reversed order of the disassembling procedure as shown in the followings:

(1) Mount the intake and exhaust valve and starting valve in the cylinder head. (📖: 3-2.6, 3.5)

(2) Fit the intake air vent.

(3) Clean the cylinder head and cylinder liner head gasket contact surface, intake air seal contact surface, starting air inlet, push rod protection tube rubber seal fitting area.

(4) Fit the cylinder head gasket to the upper surface of liner.

△ Do not apply any anti-seizure agent or lubricant oil to the cylinder head gasket surface.

(5) Apply grease to individual O-ring and the intake air seal, and mount them in the specified positions.

(6) Mount the cylinder head suspending implement ⑤ on the upper surface of the head, and confirm that there is no foreign matters in the cylinder, and install the head.

(7) Temporarily attach the exhaust manifold mounting bolt, and attach the cylinder head tightening nut.

△ Be careful not to mistakenly attach the cylinder head tightening nut with the upper and lower surface upside-down.

(8) Install the hydraulic jack in the same procedure as that of disassembling, and tighten it with the specified hydraulic pressure.

Specified hydraulic pump pressure:
54 MPa {550 kgf/cm²}

(9) Attach the rubber cap.

(10) Mount the fuel oil injection valve. (📖: "Operation" 5-4.2)

(11) Insert the push rod.

(12) Mount the rocker arm device. (📖: 3-4.5)

(13) Mount the indicator valve and safety valves.

(14) Insert the fuel oil injection valve inlet connector, and tighten it with the specified torque.

Specified Torque:
88～98 N·m {9～10 kgf-m}

(15) Mount the fuel oil high-pressure coupling, and tighten it with the specified torque.

Specified Torque: 34～44 N·m
{3.5～4.5 kgf-m}

△ All the high-pressure joint of the fuel oil injection system are connected with the metal touch. Take enough care so that each joint may not be damaged, and so that any foreign matters may not be caught in them.

(16) Install the exhaust manifold and each of the piping around the cylinder head.

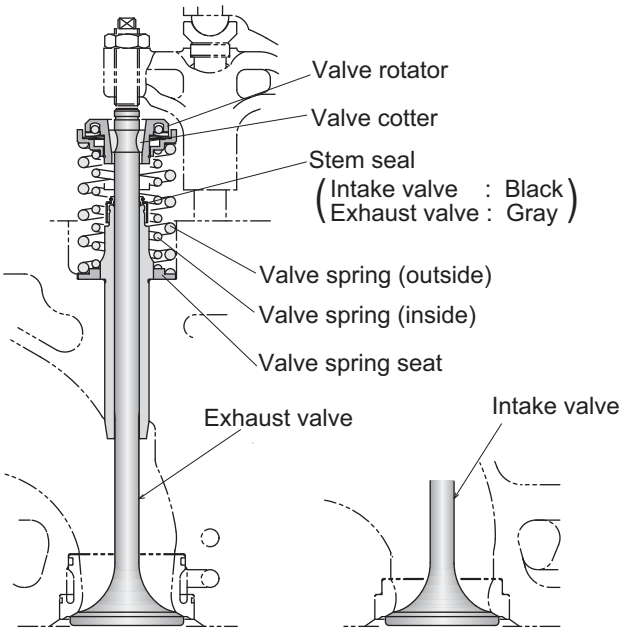
(17) Mount the cylinder head cover, heat box cover, and exhaust manifold cover.

3-2 Intake and Exhaust Valves

3-2.1 General Construction

The intake and exhaust valves consist of the 4-valve system with 2 piece each for intake and exhaust, having the valve rotators fitted to the upper areas.

Stem seal are fitted to the upper areas of the intake and exhaust valve guides, so as to appropriately control the volume of lubricating oil to be supplied to the stem.



Intake Valve and Exhaust Valve

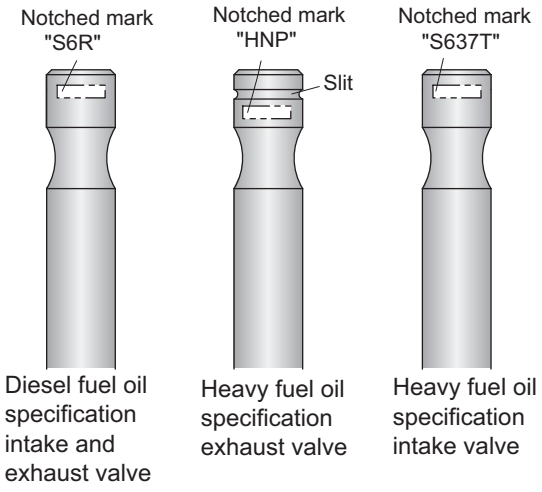
△

The intake valve and exhaust valve are identical and can be used in common for each other, in case of the diesel fuel oil specifications.

However, in case of the heavy fuel oil specifications, the intake valve and exhaust valve are same in the shape and dimensions,and different in the materials, and therefore they are discriminated by cutting a slit on the upper part of the exhaust valve.

When assembling them, be careful not to mistake them with each other.

Intake/exhaust valve (independent):
0.6 kg each



Discrimination Marks of Valves

△

The stem seal for the suction valve is black, and the stem seal for the exhaust valve is grey. In this way, the stem seals can be easily identified from their rubber colors.

In addition, the length of the suction valve guide differs from that of the exhaust valve guide.

Carefully assemble the valves.

3-2.2 Consumables, Implements, and Measuring Instruments

(1) Replacing Consumables

Replace the following parts with the new ones:

(📖: "Parts List")

① Valve stem seal (Intake valve) 3-15 No.A32

② Valve stem seal (Exhaust valve) 3-15 No.A103

(2) Implements and Measuring Instruments

① General tools and measuring instruments (📖: 2-2)

② Valve spring disassembling implement

ⓐ Valve spring disassembling implement-1

ⓑ Valve spring disassembling implement-2

ⓒ Special bolt

③ Valve facing-up implement

④ Valve facing-up spring

⑤ Valve seat cutter (option)

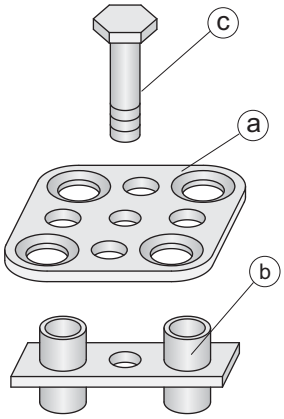
⑥ Valve seat grinding implement (option)

⑦ Stem seal striking implement

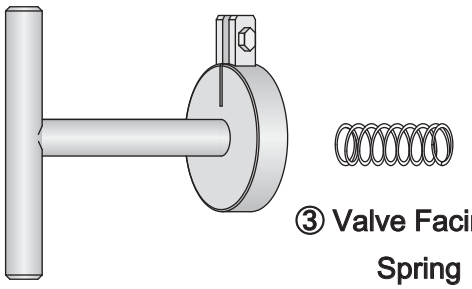
3-2.3 Disassembly of Intake and Exhaust Valves

When disassembling the intake and exhaust-valves, disassemble the four valves at the same-time using the valve disassembling implement, on the following procedure:

(1) In order to avoid wrong assembling, be minded to put the markings such as the discrimination-marks of intake and exhaust, as well as the cylinder numbers on the valve head, before starting the disassembling work.



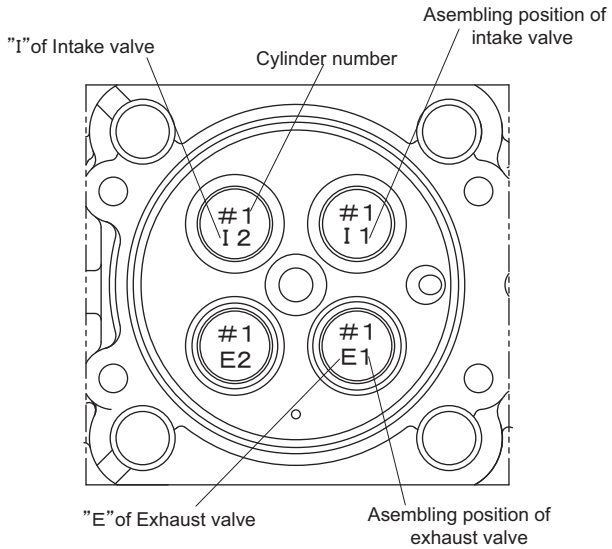
② Valve Spring Disassembling Implement



③ Valve Facing-Up Spring

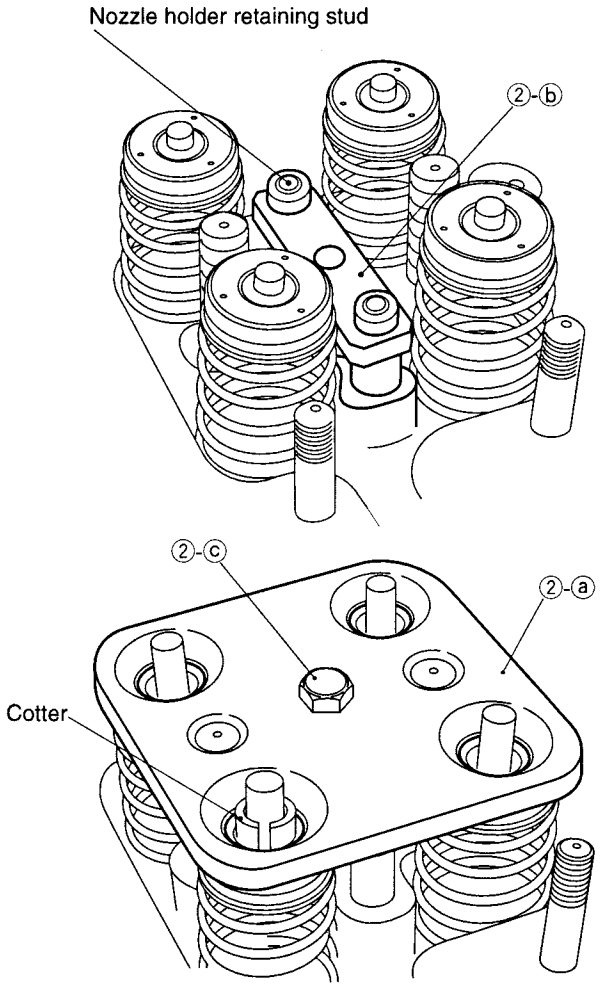
③ Valve Facing-Up Implement

⑦ Stem Seal Striking Implement



Marking Procedure of Intake and Exhaust Valves

(2) Mount the valve spring disassembling implement-2 ②-ⓑ using the nozzle holder retaining stud on the upper surface of the cylinder.
(3) Mount the valve spring disassembling implement-1 ②-ⓐ on the rotator body, and screw the special bolt ②-ⓒ into the valve spring disassembling implement-2.
(4) Turn the special bolt to retain the spring, and take out the cotter.
(5) Return the bolt, and take out the disassembling implement.
(6) Take out the valve rotator and spring.
(7) Pull out the intake and exhaust valves from the combustion chamber side.

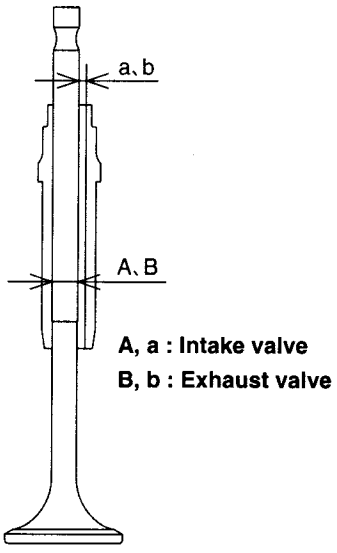


Disassembly of Intake and Exhaust Valves

3-2.4 Inspection and Maintenance of Intake and Exhaust Valves

(1) Clean the intake and exhaust valves with washing oil.
(2) Inspect on the following items:
① Corrosion of valve head area
② Corrosion or bending of valve stem area
③ Blow-out or pitching of valve seat area
④ Contact conditions of valve seat area and valve stem area
⑤ Crack or corrosion of valve spring
·····Conduct color check depending on the conditions.
(3) Measurement of Valve Stem
a) Measure the stem area of the intake and exhaust valves using outside micrometer, and record the data.
b) Calculate the clearance between the stem area and valve guide by combining the measurement results of the intake and exhaust valve guide inner diameters, and in case that the value is over the replacing limit, replace the valve stem of which wear is larger.
The wear amount of the valve stem can be calculated by comparing with the non-sliding area.

Nom. size (mm)	Standard clearance (mm)	Replacing limit (mm)
A= ϕ 14	a = 0.09~0.13	0.3
B= ϕ 14	b = 0.09~0.13	0.3



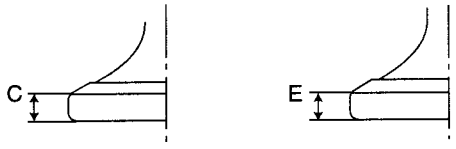
A, a : Intake valve
B, b : Exhaust valve

Measurement of Valve Stem

(4) Measurement of head thickness and valve seats of intake and exhaust valves

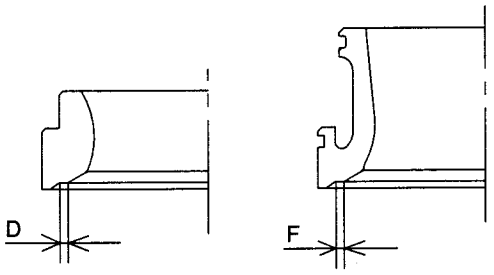
Measure the head thickness of the intake and exhaust valve seat areas, and the valve seat dimensions with calipers, and record the results. In case that the wear is over the replacing limit, replace it with a new one.

	Nom. size (mm)	Replacing limit (mm)
Intake valve seat area	C=5.0	3.5
Exhaust valve seat area	E=5.0	3.5
Intake valve seat	D=2.0	0.5
Exhaust valve seat	F=2.0	0.5



Intake valve **Exhaust valve**

Measurement of Valve Head Thickness



Intake valve seat **Exhaust valve seat**

Measurement of Valve Seat

When corrosion of the valve stem and wear of the intake valve seat is remarkable, a possible cause is low-temperature corrosion. For the prevention of such corrosion, strictly observe the followings.

1) Set the intake air temperature at a little higher level.
2) Exhaust combustion gas by means of air running when the engine is stopped.

(5) Facing-up of intake and exhaust valves

Facing-up of the intake and exhaust valves, the latter in particular, is one of the most troublesome works in the maintenance work.

The care and maintenance period largely depends on the load factor, the fuel oil used, and the operating conditions of the engine. Further, delay in the maintenance of the engine leads to the acceleration of the wear and tear of the valves. So, execute facing-up a little earlier according to the situations.

《**Facing-up procedure**》

a) Apply lubricating oil to the valve stem, mount the valve facing-up spring ④ on the valve stem, and insert the valve stem into the cylinder head valve guide.

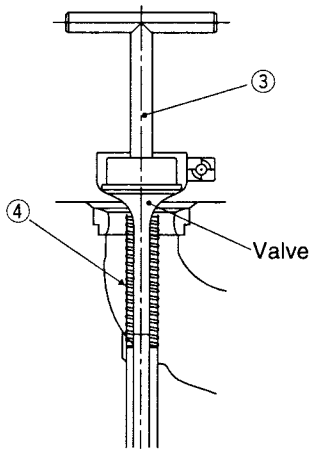
b) Mount the valve facing-up implement ③ to the valve.

c) Apply compound to the seat area, and carefully conduct the facing-up. Use the compound in the order of the medium grade and fine grade.

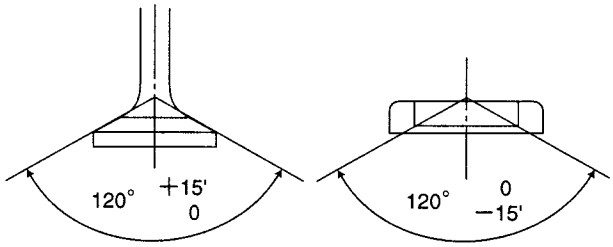
- Medium grade compound·····Conduct the facing- up as if to strike.
- Fine grade compound·····Conduct the finishing facing-up as if to press compound against the seat.
- Finally, wash the seat carefully, and conduct the oil facing-up.

d) Conduct the blue-lead check of the seat surface contact conditions after finishing the facing-up.

e) Measure the valve head thickness and the valve seat dimensions with calipers again, and cofirm that the measured values do not exceed the use limit.



Facing-Up of Intake and Exhaust Valves



Valve **Valve seat**

Correction of Intake Valve, Exhaust Valve, and Valve Seat

(6) Correction of valves

If the valve face scratch is deep and cannot be corrected with compound, conduct the correction (rough finishing) using a machine or grinding tool before conducting facing-up.

a) Machine the valve seat using the valve seat cutter (option).

b) Machine the angle of the valve seat to make the outside contact to be as shown in the figure.

△ If the valve rear face is ground, the valve strength will be reduced and cause cracking. Therefore, be minded never to grind the valve rear face.

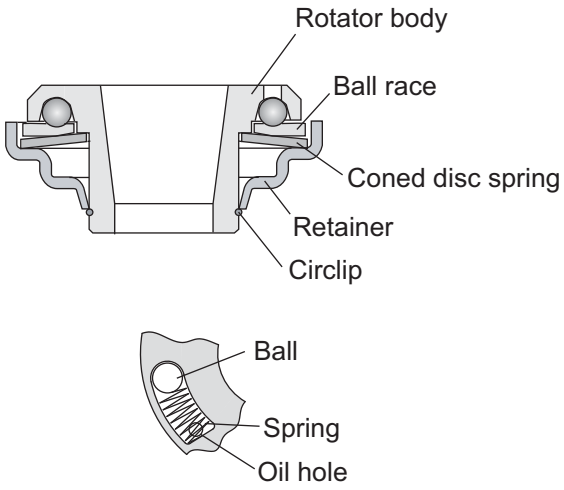
3-2.5 Inspection and Maintenance of Valve Rotator

Since imperfect rotation of the valve rotator largely affects the valve life adversely, be sure to conduct-the periodical inspection and maintenance.

Valve rotator rotational speed: min^{-1}
Standard value: 2~4
Replacing limit: 1/2 of initial rotational speed

(1) Disconnect the circlip and disassemble the rotator.
(2) Wash the individual parts using washing oil,and check the parts for the following defects:
① Wear, deformation, and corrosion of ball
② Break, corrosion, and fatigue of spring
③ Compression mark on ball race
④ Corrosion and fatigue of coned disc spring
⑤ Compression mark on rotator body groove
(3) Replace the defective parts.
(4) Assemble the valve rotator according in the reverse order of the disassembling procedure.

△ Assemble the spring in such a manner that it rests in the oil hole side of the groove of the rotator body.



Valve Rotator

3-2.6 Assembly of Intake and Exhaust Valves

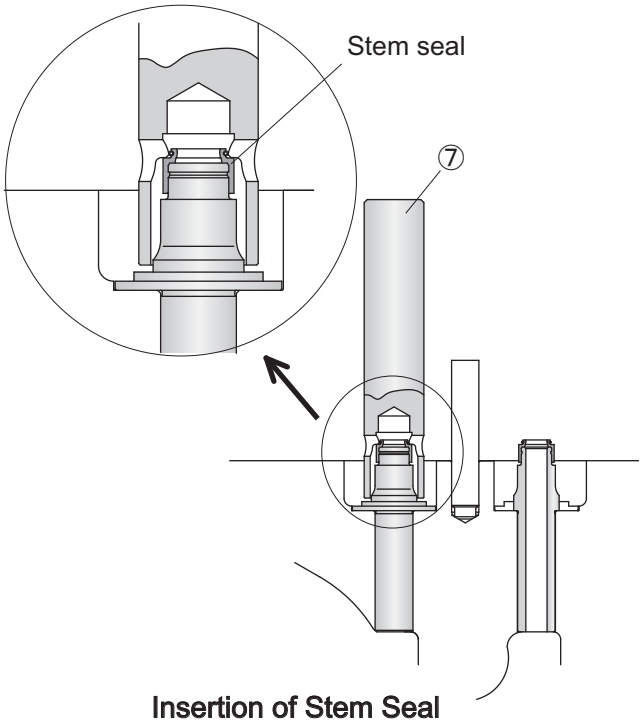
(1) Use the stem seal striking implement ⑦ to put the stem seal (Intake valve : black, Exhaust valve : gray) on the upper area of the valve guide, and apply grease to the Inner periphery.

(2) Insert the valve from the combustion surface side.

△

1) Before inserting the valve, be minded to confirm the identification mark of the valve head, and be sure to asemble the valve into the original position.
2) If the inner periphery of the stem steal is scratched or damage, it will affect the lubricating oil consumption and stain of the valve. Therefore, be minded to apply lubricating oil on the valve stem part, and then gradually insert it.

(3) Assemble the valves in the reverse order of the disassembling procedure, using the valve disassembling implement.



Insertion of Stem Seal

3-3 Starting Valve

3-3.1 General Construction

The starting valve is a pneumatic valve of pilot type, and the pilot air from the starting air rotary valve works on the starting valve piston, so that the valve opens to allow the flow of starting air into the cylinder.

The starting valve is installed on the F.O. injection pump side of the cylinder head, and it can be removed in the state of the assembly.

If leak has occurred from the seal of the starting valve seat area, the combustion gas flows back into the starting air main pipe side to cause sticking or damage of the starting air rotary valve, starting air valve, and so on, and therefore make it a rule to conduct the inspection and maintenance periodically.

In case of overheating of the starting air pipe during operation, the possible cause is gas leak from the starting valve, and therefore conduct the inspection of the parts.

Starting valve assy. : 1.1 kg

3-3.2 Replacing Consumables, Implements, and Measuring Instruments

(1) Replacing Consumables

Replace the following parts with new ones:
(📖 : "Parts List")

① Circular gasket	3-18 No.508, 509
② O-ring	3-18 No.506
③ Split pin	3-18 No.503

(2) Implements and Measuring Instruments

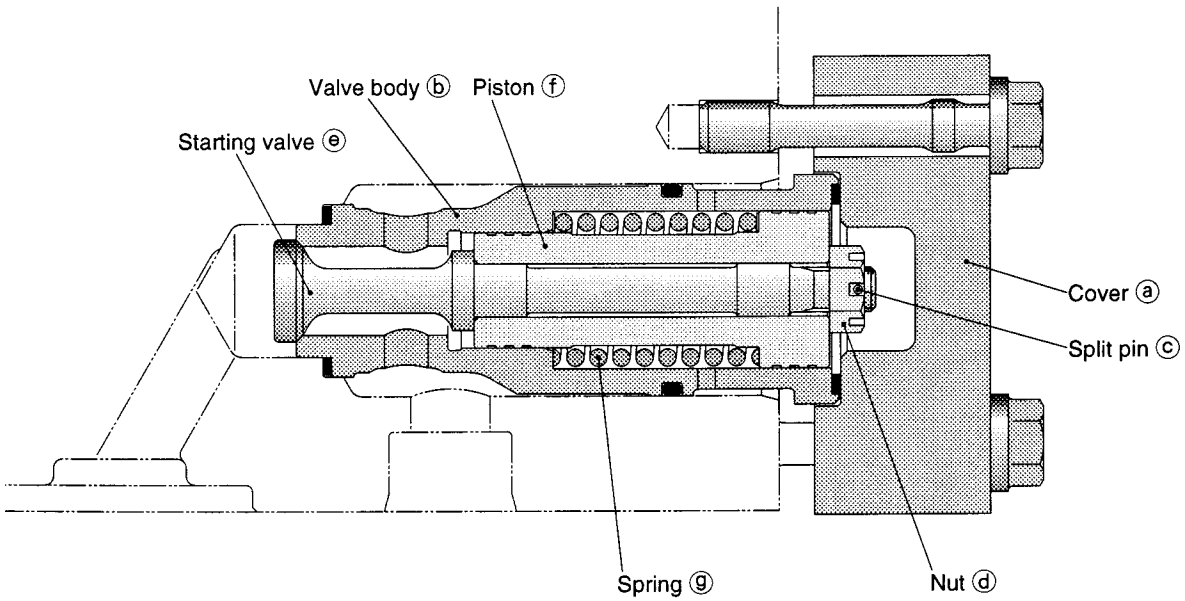
① General tools and measuring instruments
(📖 : 2-2)

3-3.3 Disassembly of Starting Valve

(1) Remove the starting valve cover ⓐ, and extract the starting valve assembly from the cylinder head.

(2) Extract the split pin ⓒ, nut ⓓ, and starting valve ⓔ.

(3) Remove the starting valve piston ⓕ and spring ⓖ.



Starting Valve

3-3.4 Inspection and Maintenance of Starting Valve

(1) Clean the individual parts using washing oil.
(2) Conduct the following inspections:
① Sticking of the starting valve and starting valve piston, and the leak of gas from the seat area
② Corrosion or scratch of the spring
(3) Apply compound to the seat areas of the starting valve and valve body ⓑ, assemble the starting valve and piston into the valve body, and conduct the facing-up.
(4) Apply blue lead to the starting valve seat area, and check the contact.

Contact range: 75% or more

3-3.5 Assembly of Starting Valve

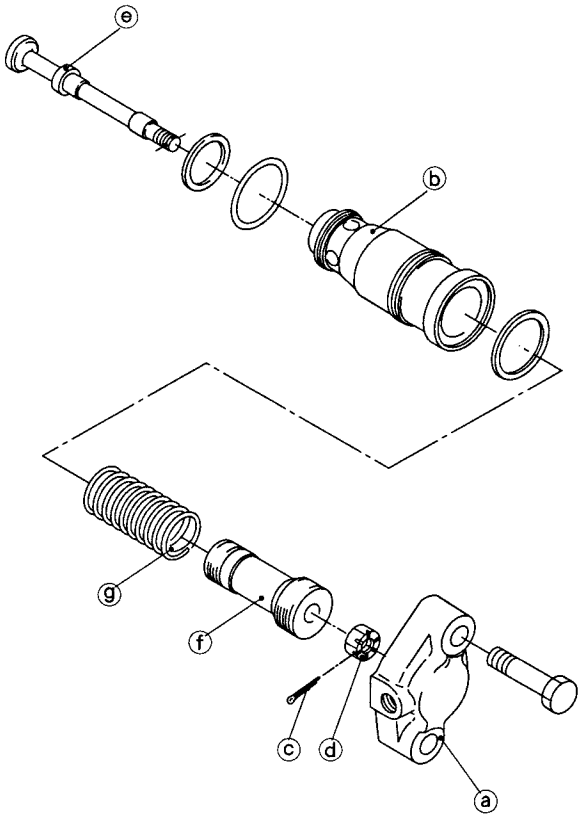
(1) Assemble the starting valve assembly on the following procedure:
a) Insert the starting valve into the starting valve body.
b) Insert the spring and starting valve piston, tighten the nut, and clamp it with the split pin.

△ Be careful since tightening of the starting valve nut with excessive torque will break the threads.
The split pin is made of stainless steel. Do not to mistake it with the one made of ordinary materials.

(2) Assemble the starting valve assembly into the cylinder head, and tighten with the bolt after attaching the cover.

Specified torque: 59 N-m {6 kgf · m}

△ Be minded to gradually tighten the bolt alternately, and evenly. Uneven tightening will cause the leaks of the starting air and gas.



Disassembly of Starting Valve

3-4 Rocker Arm Device

3-4.1 General Construction

The intake and exhaust valves are driven by the intake and exhaust cams that are shrunk-fit to the camshaft, via swing arm, push rod, rocker arm, and valve retainer tee.

Individual areas of the rocker arm are lubricated by the system oil fed from the piping on the fuel oil injection pump side of cylinder head, through the drilled holes inside the head.

For adjusting procedure of the valve end clearance, refer to the separate "Operation". (: "Operation" 5-4.1 "Adjusting Valve End Clearance")

Rocker arm assy. : 11.8 kg

3-4.2 Replacing Consumable,Implements,and Measuring Instlements

(1) Replacing Consumables

Replace the following parts with the new ones:

(: "Parts List")

① O-Ring 3-20 No.512

② Special ring 24 x 12.7

(2) Implementsand Measuring Instlements

① General tools and measuring instlements

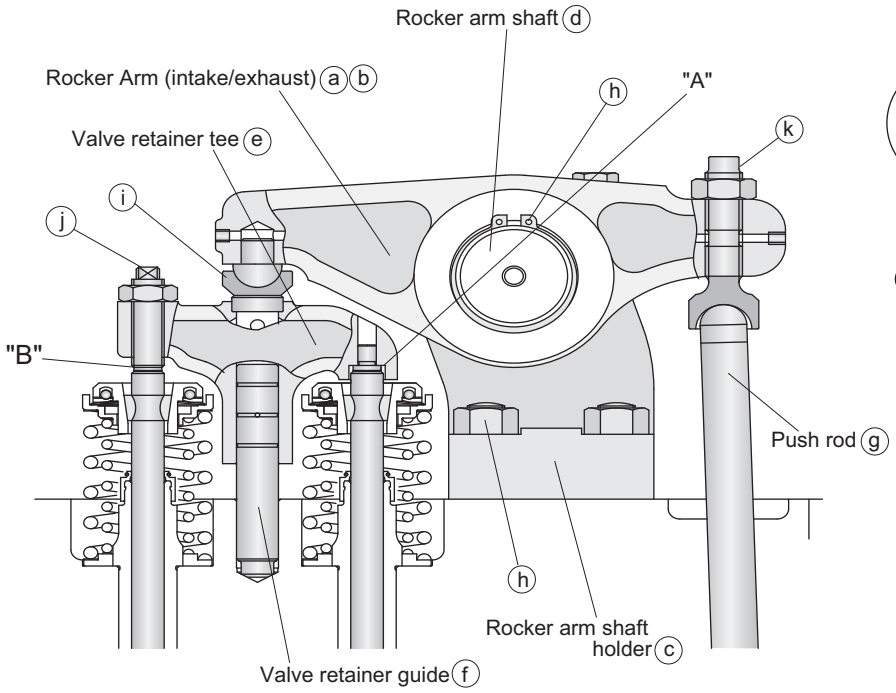
(: 2-2)

3-4.3 Disassembly of Rocker Arm Device

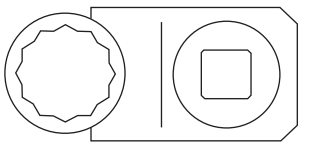
(1) Loosen the nut, and disconnect the rocker arm device assembly.

(2) Remove the valve retainer tee ⓔ.

(3) Remove the snap rings ⓗ at both ends of the rocker arm shaft ⓓ, and disconnect the rocker arm ⓐ and ⓑ of the intake and exhaust valves.



Rocker Arm Device



② Special ring 24X12.7

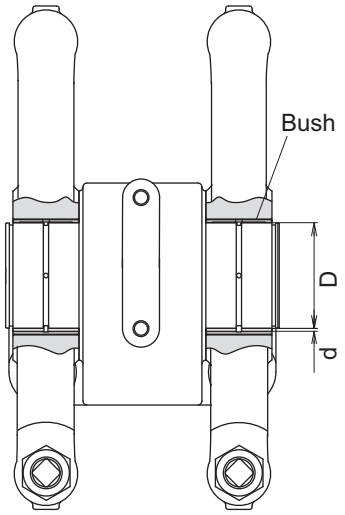
3-4.4 Inspection and Maintenance of Rocker Arm Device

(1) Clean the Individual parts using washing oil.

(2) Measure the rocker arm shaft diameter with an outside micrometer, and measure the rocker arm bush inner diameter with a cylinder gauge, to calculate the clearance.
If the clearance is over the replacing limit, replace the bush with a new one.

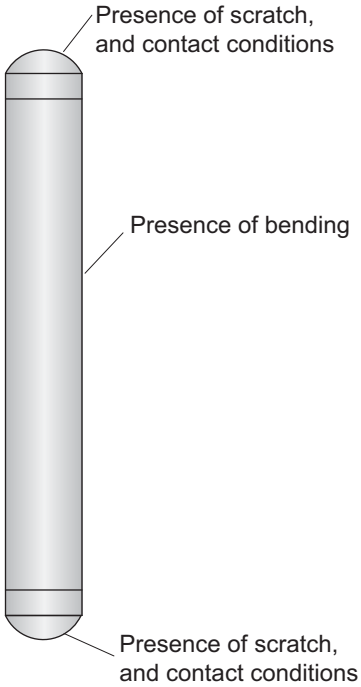
Nom. size (mm)	Standard clearance (mm)	Replacing limit (mm)
D= ϕ 50	d = 0.05-0.14	0.25

*** Bush press-fitting force :**
14.7~27.5 kN {1500~2800 kgf}



Clearance of Rocker Arm Shaft Bush

(3) Inspect the individual parts on the following points:
① Contact conditions of the valve retainer tee and valve retainer guide ⓕ
② Bend, scratch on the end surface, and abnormal contact of the push rod ⓖ
③ Scratch and abnormal contact on the contact areas "A" and "B" with the valve
④ Scratch, abnormal contact, and wear of the valve retainer tee ⓙ, rocker arm metal fitting cap ⓘ, and rocker arm screw ⓚ



Inspection of Push Rod

3-4.5 Assembly of Rocker Arm Device

(1) Assemble the rocker arm device assembly.
Pass the intake and exhaust rocker arm through the rocker arm shaft, and attach a snap ring.

(2) Insert the valve retainer tee into the valve retainer guide.

(3) Place the rocker arm shaft assy. on the cylinder head, apply the lubricating agent (MOLYKOTE 1000 spray) to the rocker arm shaft holder tightening nut and bolt, and tighten the nut with the specified torque. (use special ring ②)

Specified torque : 98N·m {10kgf·m}

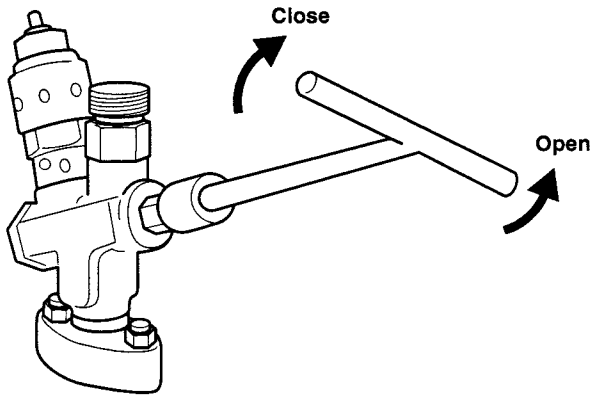
(4) After assembling, adjust the valve end clearance.
(📖: "Operation" 5-4.1(2) "Adjusting Rocker Arm Clearance")

3-5 Indicator and Safety Valves

3-5.1 General Construction

The indicator valve and the cylinder safety valve are incorporated in the same valve body.
The indicator valve screw is of "left hand screw", and the valve is opened and closed by the handle in the directions as shown in the figure.
For the pressure measuring procedure, refer to the separate manual of the "Operation".
(: "Operation" 5-3.1)

Indicator and safety valve assy. : 1.7kg



Opening and Closing of Indicator Valve

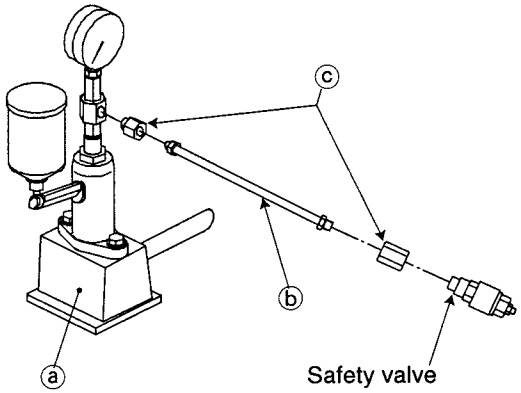
3-5.2 Replacing Consumables, Implements, and Measuring Instruments

(1) Replacing Consumables

Replace the following parts with new ones:
(: "Parts List")
① Circular gasket 3-19 No.A506, A507-1
No.A507-2
② Straight pin 3-19 No.A504

(2) Implements and Measuring Instruments

① General tools and measuring instruments
(: 2-2)
② Safety valve testing implements
ⓐ Hydraulic pump
ⓑ Safety valve test joint
ⓒ High-pressure hose



② Safety Valve Testing Implement

3-5.3 Disassembly of Indicator and Safety Valves

⚠ The indicator and safety valve are extremely hot during operation. If it may be touched with naked hands during operation or immediately after the stop, a burn may be caused. Conduct the maintenance work after the indicator and safety valves are cooled down sufficiently.

(1) Removal of Indicator and Safety Valve Assembly

Disconnect the flange mounting nut ⓐ, and remove the indicator and safety valve assembly from the cylinder head.

(2) Disassembly of Safety Valve

a) Remove the safety valve (independent assy.) ⓑ from the indicator valve body.

b) Loosen lock nut ⓒ and adjusting screw ⓓ. Respectively provide the lock nut, adjusting screw, and spring retainer ⓔ with the matchmarks for the sake of convenience when reassembling.

c) Loosen and disconnect the spring retainer.

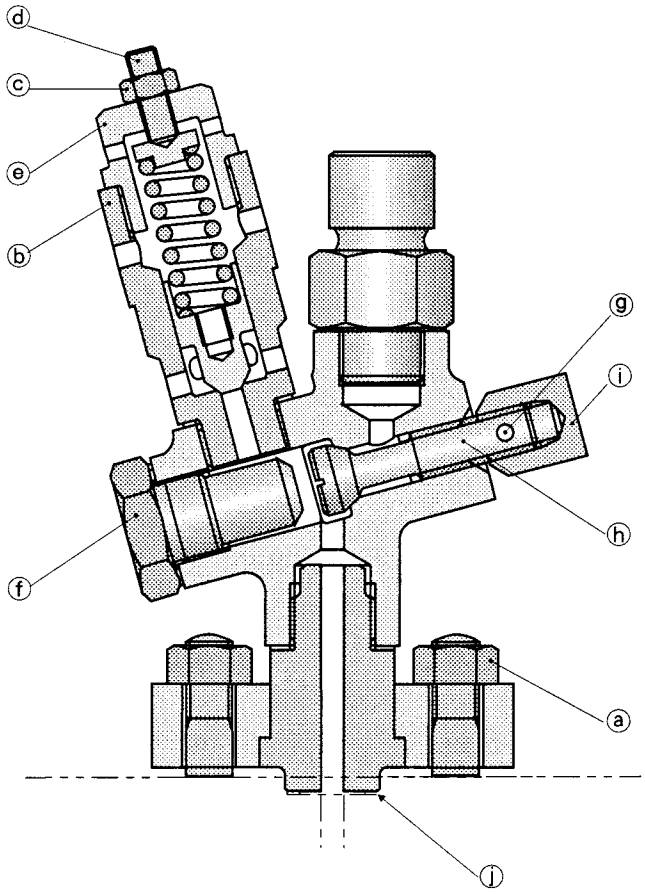
⚠ When the spring retainer is taken out while the spring is in compressed state, the spring will jump out causing a hazard.
Gradually loosen the spring retainer, and remove it after confirming that the spring compression is eliminated.

(3) Disassembly of Indicator Valve

a) Take out hex. Plug ⓕ.

b) Extract the straight pin ⓖ, and remove the indicator valve nut ⓘ from the indicator valve ⓗ.

c) Extract the indicator valve using a screwdriver.



Indicator and Safety Valves

△ The threaded part of the indicator valve ⓗ is of "left-handed screw", and the extracting direction is clockwise as viewed from the side of the hexagonal plug.

3-5.4 Inspection and Maintenance of Indicator and Safety Valves

(1) Wash all the disassembled parts using washing oil to eliminate stains such as carbon.

(2) Inspection and maintenance of safety valve

a) Check the safety valve outer periphery and seat for the marks of abnormal contact, scratch and sticking.

b) If scratch or sticking is found, correct the faulty areas with oil stone, and apply compound to the seat to perform the facing-up.

(3) Inspection and maintenance of indicator valve

a) Check the indicator valve seat for scratch or one-sided contact.

b) When scratch is found, correct it using an oil stone and apply compound to the seat to perform the facing-up.

(4) Check the spring for abnormal contact or scratch, and when scratch is found, replace the spring with a new one.

3-5.5 Assembly and Adjustment of Safety Valve

(1) Assembly of safety valve (independent assy.)

Insert the valve and the spring into the safety valve body after facing-up, and assemble the lock nut and the adjusting screw to them.

(2) Adjustment of Safety Valve

Adjust the valve opening pressure according to the following procedure:

a) Mount the safety valve test joint on the safety valve, and connect them to the hydraulic pump using a high-pressure pipe.

b) Screw the adjusting screw up to the matchmark position using a hex. rod spanner.

c) Operate the hydraulic pump lever to increase the pressure, and read the valve opening pressure.

d) Turn the adjusting screw, and adjust the valve opening pressure.

Setting pressure: 19.1 MPa {195 kgf/cm²}
When the spring is replaced with a new one, set the value about 10% higher than the above value by taking into consideration the initial fatigue.

e) Fix the adjusting screw by tightening the lock nut.

3-5.6 Assembly and Mounting of Indicator and Safety Valve

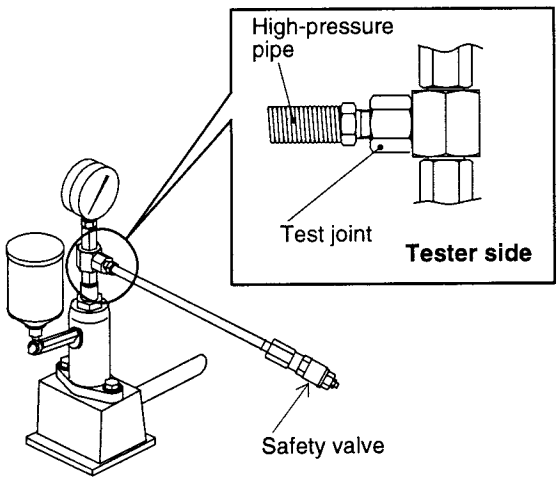
(1) Assemble the indicator and safety valve assembly in the reverse order of the disassembling procedure.
When assembling, replace the straight pins of indicator valve with new ones, and fix them to the indicator nut by caulking the three places on the both sides respectively.

(2) Blow air to the mounting surface of the cylinder head to clean there, and mount the indicator and safety valve assembly while placing the circular gasket Ⓙ between them.

(3) Apply the lubricating agent "MOLYKOTE 1000 spray type" to the threaded part of the mounting nut, and tighten the nut after adjusting the direction, so that the indicator valve will not protrude from the cylinder side surface.

Specified torque: 59 N.m {6.0 kgf.m}

△ Tighten the nuts alternately and uniformly. Uneven tightening causes the leaks of gases.



Safety Valve Testing Procedure

3-6 Nozzle Holder Guide

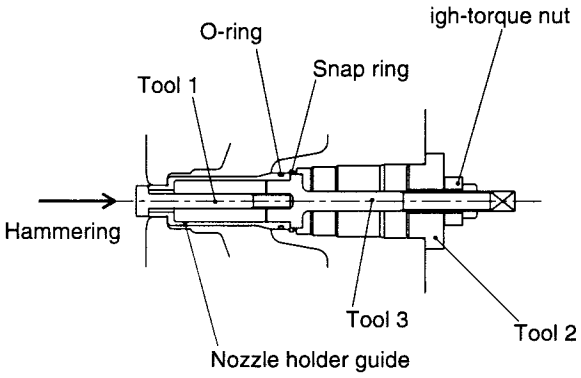
The O-ring of the nozzle holder guide should be replaced for every 16,000~24,000 hours (4~5 years).

The tools can be supplied as optional parts.
(📖: "Parts List")
① O-ring 3-13 No.A30

3-6.1 Extraction of the nozzle holder guide

<Extracting procedure>

(1) Remove the nozzle holder, and turn the cylinder head sideways. (Turn it to the state that the combustion surface can be seen.)
(2) Remove the snap ring.
(3) Install the tool 1~3 and high-torque nut as shown in the Figure.
(4) Tighten the high-torque nut, and extract the nozzle holder guide.
In case that the nozzle holder guide is difficult to be extracted, the tool 1 may be hammered with a wooden hammer from the combustion surface side.

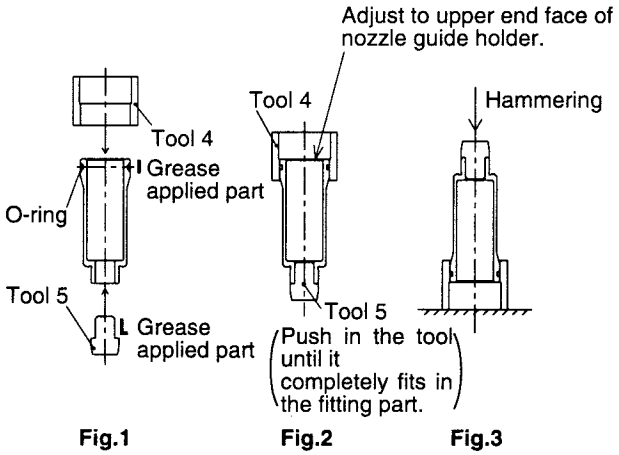


Nozzle holder guide extracting procedure

3-6.2 Cooling of the nozzle holder guide

<Cooling procedure>

(1) Install the O-ring to the nozzle holder guide.
Before installation, make sure that there is not any scratch nor tearing on the O-ring.
Be minded to install the O-ring so that it should not be scratched nor distorted.
(2) Apply grease to the entire circumference of the O-ring in the state of above Item 1.
(3) After warming the tool 4 with hot water (about 80°C) for 2~3 minutes, install it to the nozzle holder guide.
Be minded to carefully install it so that the O-ring should not be scratched.
Install the tool 5 to the nozzle holder guide, after applying grease to the entire circumference of the fitting part.
Installation should be done as shown in the Figure 2.



Nozzle holder guide cooling-down procedure

(4) Put the entire nozzle holder guide into liquid nitrogen just as in the state of Figure 2.
Cool it down until the air bubble, that generates when cooling down, completely disappears. (Required time: about 2 minutes)

(5) Install the nozzle holder as shown in Figure 3, and remove the tool 4 by hammering with a wooden hammer.
At this time, do not remove the tool 5.
Place a wood, cloth, or the like beneath the tool 4.

3-6.3 Fitting of the nozzle holder guide

<Fitting procedure>

(1) Wipe off dust, etc. on the seating face and fitting part of the cylinder head with a waste cloth or the like.

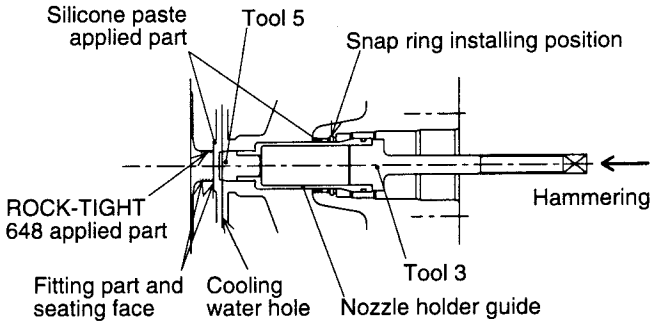
(2) Apply silicone paste to the specified places in circumferential manner. (It can be applied easily if a brush or the like is used.)
At this time, do not block the cooling water hole inside the cylinder head with silicone paste.

(3) Apply LOCK-TIGHT 648 to the fitting part of the cylinder head.
※Be minded to perform the work of the above Item 1～3 before cooling down the nozzle holder guide.

(4) Install the tool 3 to the nozzle holder guide in the state that the tool 5 is still attached, and fit in the cylinder head by hammering.
When fitting in, be sufficiently careful so that the nozzle holder guide should not be hammered in the state that it is tilted.
Further, continue hammering until the nozzle holder guide strikes the seating face.
Be careful because the fitting-in of the nozzle holder guide will be difficult unless this work is rapidly performed.

(5) Remove the tool 3 and 5.

(6) Install the snap ring to the specified place.



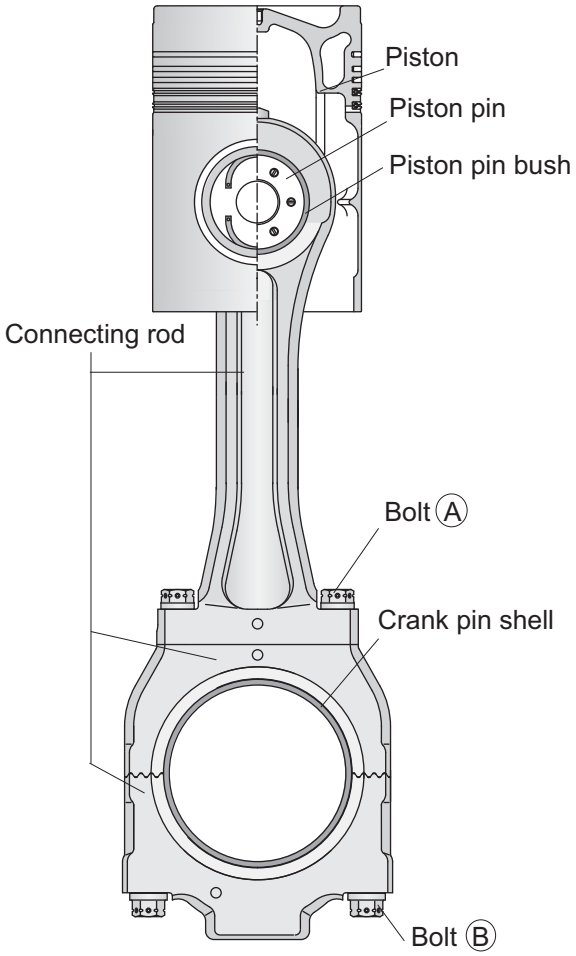
Nozzle holder guide fitting-in procedure

4. Piston and Connecting Rod

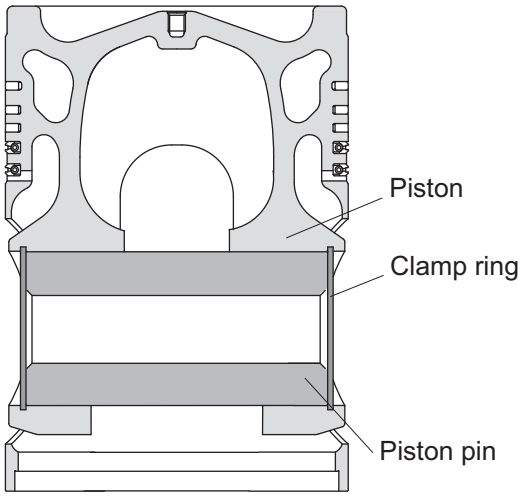
4-1 General Construction

The connecting rod is of carbon steel die forging with the large end part being horizontal 3-division type. This structure allows the extraction of the piston without disassembling the bearing part oi the crank pin shaft.
The large end divided surfaces (serrated) and trunk part divided surfaces are angularly fastened rigidly with 4 bolts Ⓑ and Ⓐ, respectively.
Crank pin shell is made of aluminum alloy of high wear resistance.
Piston pin is of full floating type, and held with the snap ring. Further, the piston pin push is stepped so as to allow a wide bearing area on the side, where explosive force works.
The piston is an assembly of the ductile integral cast iron product, and special coating is applied tc the outer periphery of the skirt.
The piston cooling lubricating oil reaches from the crankshaft to the cooling cavity in the piston, via piston pin, through the drilled holes in the connecting rod trunk part.
The piston rings consist of the 3 compression rings and 2 oil rings.
In the heavy fuel oil specifications, induction hardening is conducted to the top and second ring arooves to improve wear resistance.

Piston connecting rod assy.:	**73 kg**
Piston:	**18.6 kg**
Piston pin:	**6.8 kg**
Connecting rod assy.:	**46 kg**
Crank pin bolt:	**2 kg**



Piston and Connecting Rod



Piston and Piston Pin

4-2 Replacing Consumables, Implements, and Measuring Instruments

(1) Replacing Consumables

None

(2) Implements and Measuring Instruments

① General tools and measuring instruments

(: 2-2)

② Piston insertion frame

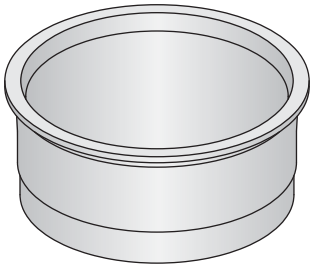
③ Protection ring extracting implement

④ Metal cap fitting and disengaging implement (option)

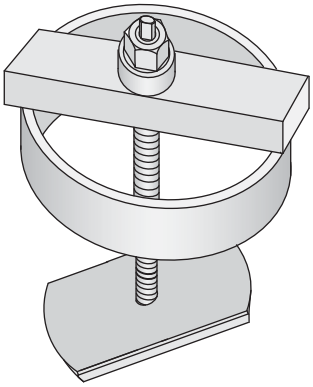
⑤ Cylinder liner position gauge

⑥ Cylinder bore gauge 200 - 225

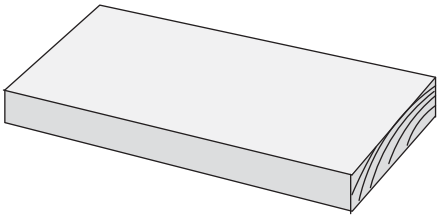
⑦ Piston suspending implement (option)



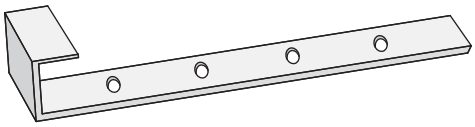
② Piton Insertion Frame



③ Protection Ring Extracting Implement

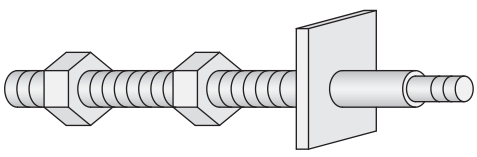


④ Metal Cap Fitting and Disengaging Implement



⑤ Cylinder Head Suspending Implement

⑥ Cylinder Bore Gauge



⑦ Piston Suspending Implement

4-3 Disassembly of Piston and Connecting Rod

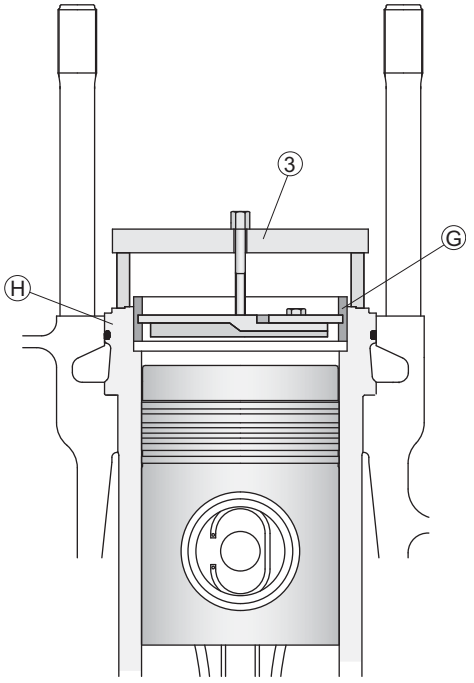
4-3.1 Extraction of Piston

Extract the piston after removing the cylinder head. (: 3-1.3 "Removal of Cylinder Head")
In the case of piston extraction only, it is not necessary to disassemble the large end part, and conduct the extraction work by separating the large end part from the small end trunk part.

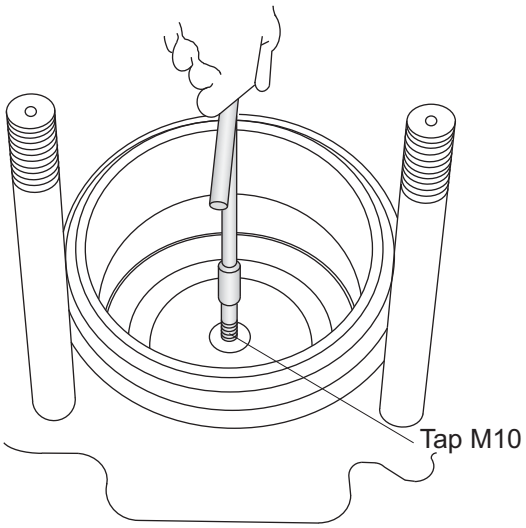
> If the crankshaft has turned when handling theparts located in the crank chamber when extracting the piston, it will cause serious accidents resulting form entanglement and it will be very dangerous.
> Therefore, be sure to conduct turning after exchanging the signs with coworkers, and donot fail to put the flywheel turning device in the"disengage" position, except when the engine is turned.

< Piston extraction procedure >

(1) Take off the cover on the engine frame side on the both sides of the cylinder to be overhauled, and place the piston to the position of about 50° before the top dead center.
(2) Place waste cloth on the piston upper surface to facilitate easy removal of carbon.
(3) Remove the carbons deposited on the upper areas of the protection ring Ⓖ and cylinder liner Ⓗ with sandpaper or the like.
(4) Extract the protection ring located in the upper area of the cylinder liner using the protection ring extracting implement ③ .
  a) Spray penetrating lubricant to the protection ring outer periphery before starting the work, to facilitate easy removal of the protection ring.
  b) When extracting the protection ring, gradually extract it while lightly striking the lower surface of the extracting implement with a plastic hammer.
(5) Remove the carbon deposited in the piston suspending threaded hole using a tap (M10X 1.5).
(6) Turn the crankshaft, and place the piston to be released in the position of 120° before the bottom dead center.



Extraction of Protection Ring

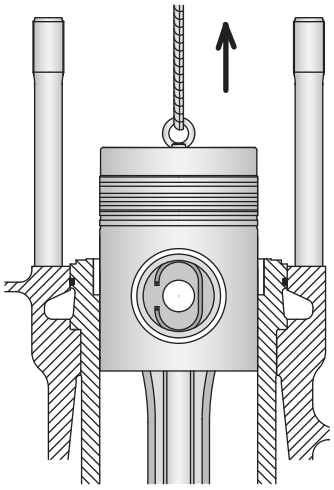


Removal of Carbon from the threaded Hole for Suspension

Extraction of Piston

If the big end of the connecting rod of the cylinder that has been disassembled turns during turning operation, it may get into contact with the frame and may be damaged.
Slowly turn the crankshaft, taking care that the big end does not turn.

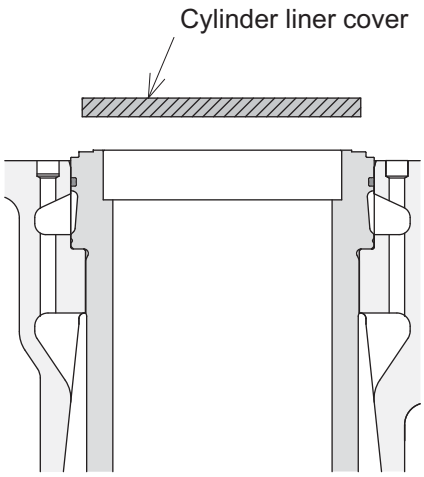
(7) Remove the rotation-stopping wire of the connecting rod joint bolt Ⓐ, and loosen the joint bolt to extract it.
(8) Mount the eye bolt M10 (for piston suspension) on the upper surface of the piston, suspend it with the wire rope and chain block, and then extract the piston.



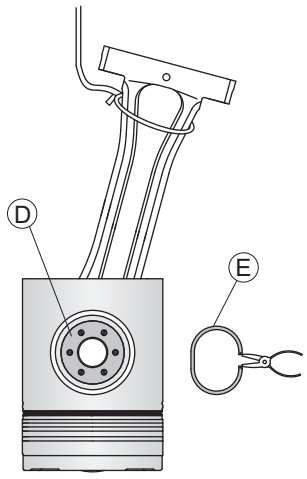
Extraction of Piston

Securely tighten the suspending eye bolt down to the seat surface. Unless securely tightened to the seat surface, it causes distortion or breakage of the metal fitting (eye bolt), and is very dangerous.

When suspending the piston, be careful so that the cylinder liner may not be damaged being struck by the connecting rod.



(9) Fit a cover on the cylinder liner after extracting the piston, so that no foreign matters may infiltrate in the engine.
(10) Place the piston in the specified place with its combustion surface facing downward.
(11) Lightly suspend the connecting rod, and remove the clamp ring Ⓔ on one side of the piston pin Ⓓ using a snap ring pliers.
(12) Extract the piston pin, and remove the piston from the connecting rod.
(13) Remove the piston ring and oil ring.



Extraction of Piston Pin

Since the periphery of each ring is edged sharply after a long-time operation of the engine, be sure to wear safety gloves and take care not to suffer injuries when disassembling the engine.

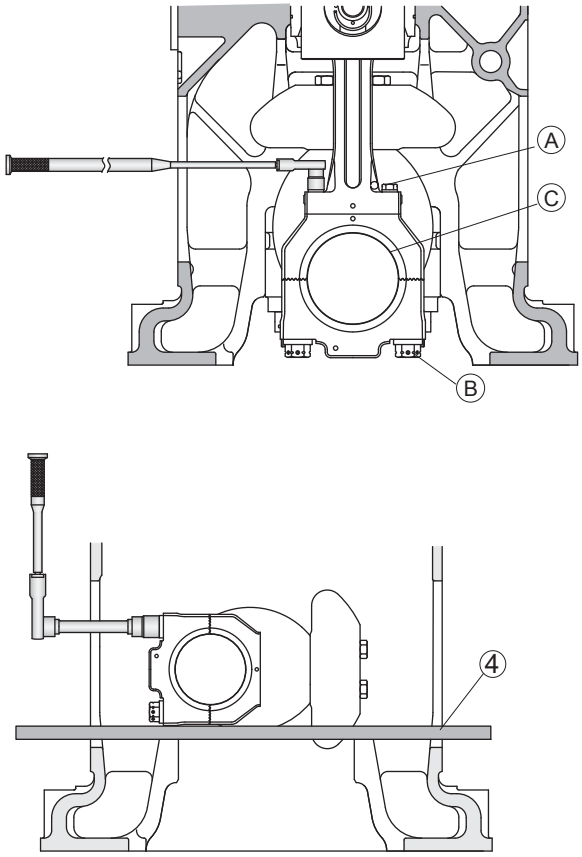
4-3.2 Disassembly of Connecting Rod Large End Part

Disassemble the connecting rod large end part-when the crank pin shell Ⓒ or crank pin bolt Ⓑ is inspected or replaced. When only extraction of the piston is intended, disassembly of the connecting rod large end part is not required.
When only inspection of the crank pin shell is intended, the connecting rod large end part can be disassembled with the piston being suspended,and without removing the cylinder head.

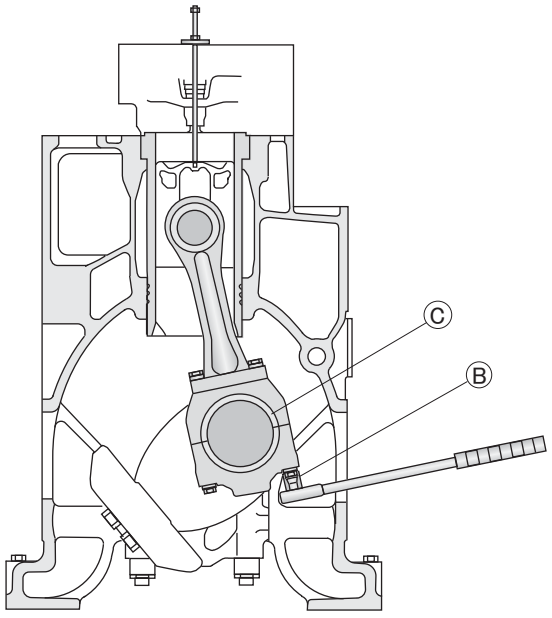
(1) Remove the connecting rod joint bolt Ⓐ, and suspend the piston and connecting rod small end side. (Piston extracted or piston suspended)
(2) Turn the crankshaft, and mount the metal cap fitting and disengaging implement ④, so that the large end part is facing sideways.
(3) Remove the rotation-stopping wire of the crank pin bolt Ⓑ, and disconnect the bolt using the socket and extension bar.
(4) Take the top and bottom of the large end part out of the right and left inspection windows respectively.
(5) Remove the crank pin shell Ⓒ from the large end part. Place wooden piece against the claw side of the bearing shell and strike it lightly. Then, the bearing shell can be removed easily.
(6) Mark the disassembled shells with the cylinder numbers and ID marks, so that the upper and lower shells can be distinguished from each other.

< Disassembly of the large end part by suspending the piston >

a) Turn the crankshaft, and place the crank pin of cylinder to be inspected in the position where the crank pin bolt can be disassembled.
b) Remove the fuel oil high-pressure joint and inlet connector, and extract the fuel oil injection valve.
c) Insert the piston suspending bolt into the mounting hole of the fuel oil injection valve, screw it into the threaded hole of the upper part of the piston, and then fix it.
d) Loosen the crank pin bolt, and remove the large end cap.
e) Turn the crankshaft, and remove the upper shell.



Disassembly of Connecting Rod Large End Part



Piston Suspending Procedure

4-4 Inspection and Maintenance of Piston and Connecting Rod

4-4.1 Inspection and Maintenance of Piston

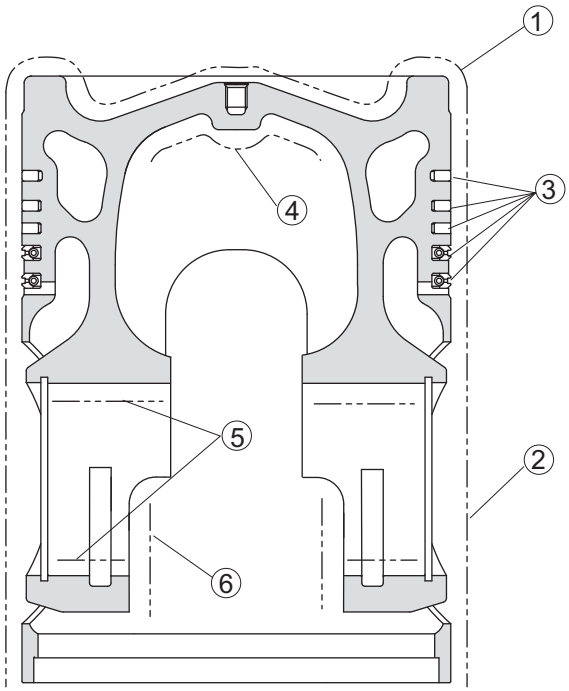
Since the items mentioned in this section will be the parts to which NOx Technical Code shall be applied, when replacing any of these parts, be sure to use the parts provided with the identification marks.
(:0-3 "Engine Conforming to NOx Technical Code.")

(1) Inspection of individual parts
Inspect the individual parts of the piston, and record the conditions.
① Conditions of the carbon deposited on the piston, and the lubricating conditions
② Scratch and abnormal contact of the sliding areas
③ Sticking of the piston ring, and conditions of chrome plating
④ Conditions of the carbon sludge deposited on the piston underside.
⑤ Abnormal contact of the piston pin and pin boss inner surface
⑥ Abnormal contact of the connecting rod small end of the piston pin boss

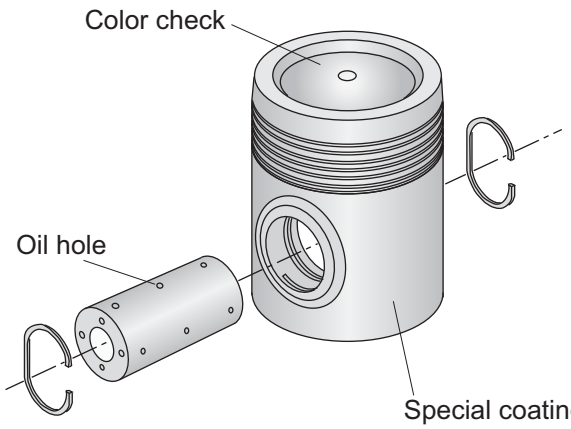
(2) Eliminate the carbon deposited on the upper part of the piston with a sandpaper of fine mesh.

Since special coating is applied to the piston skirt area, do not use sandpaper on the parts.

(3) Clean the piston and the piston ring using washing oil.
(4) Clean the piston combustion surface carefully, and perform thorough inspections for crack by means of color check.
(5) Blow air to the oil hole of piston pin, and clean the inside of the hole.



Inspection of Piston



Inspection and Maintenance of Piston Parts

(6) Measurement of dimensions

Measure the dimensions of individual parts, and record the results. Calculate the clearance based on the results of measurement, and replace the parts with the new ones, if the clearance is exceeding the replacing limit.

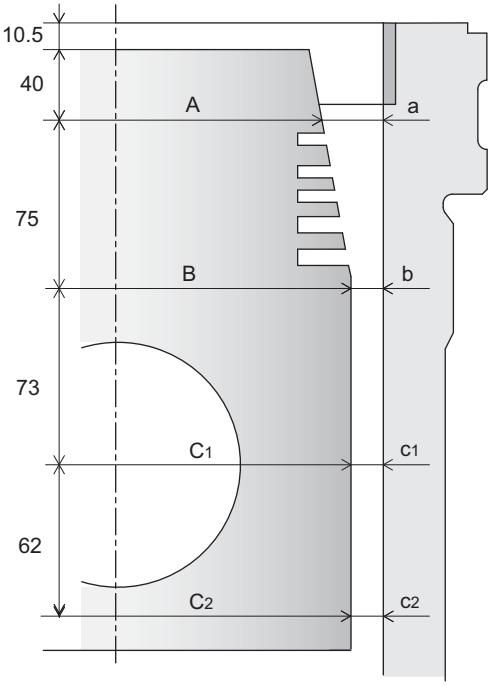
a) Piston outer diameter

Measure the four places of the piston outer diameter using an outer micrometer, and record the results.

Calculate the clearance based on the results of the measurement of the cylinder liner inner diameter.

(: 5-3 "Inspection of the Inside Surface of Cylinder Liner")

Norn, size (mm)	Standard clearance (mm)	Replacing limit (mm)
A=200	a =0.66~0.76	
B=200	b =0.12~0.21	
C_1=200	c_1 =0.10~0.19	0.4
C_2=200	c_2 =0.10~0.19	0.4

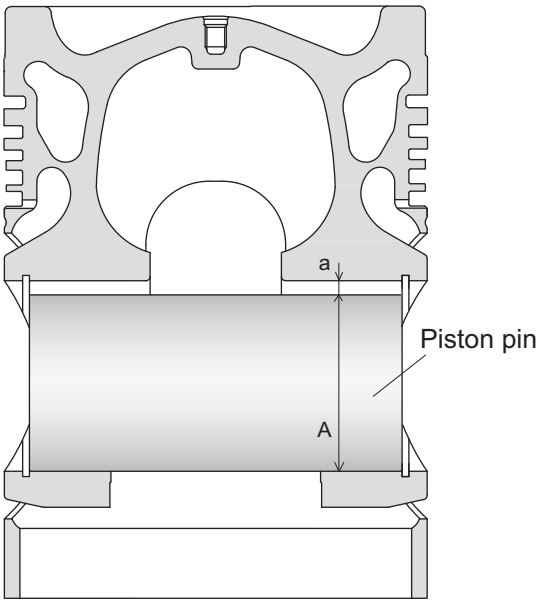


Clearance between Piston and Liner

b) Piston pin and piston pin boss

Measure the piston pin outer diameter and the piston pin boss inner diameter, and replace the one with larger wear.

Nom. size (mm)	Standard clearance (mm)	Replacing limit (mm)
A= ϕ 90	a=0.04~0.08	0.15



Clearance between Piston Pin and Pin Boss

4-4.2 Inspection and Maintenance of Ring

(1) Eliminate the carbon deposited on the piston rings and oil rings, and wash the rings using washing oil.

(2) Since hard-chrome plating is applied to the sliding surfaces of the rings, in case that the ring surface is exposed due to wear of the plated layers, or the defects such as crack are found, replace the ring with a new one, even when it is still within the specified replacing period.

(3) Measure the end clearance of ring.
Measurement of the end clearance using a new cylinder liner is advisable.

Standard clearance (mm)	Replacing limit (mm)
C_1 = 1.50~1.70	2.5
C_2 = 0.90~1.10	1.5
C_3 = 0.75~0.95	1.5
C_4 = 1.05~1.25	2.0
C_5 = 1.05~1.25	2.0

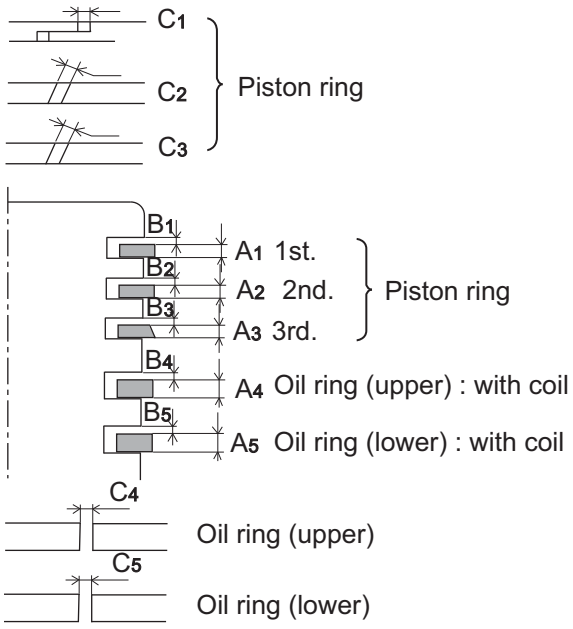
(4) Measure the width of the piston ring and oil ring, and also measure the piston ring groove width, and if the clearance is over the replacing limit, replace the ring with a new one.

Norn, size (mm)	Standard clearance (mm)	Replacing limit (mm)
A_1 = 5	B_1= 0.13~0.17	0.3
A_2 = 5	B_2 = 0.09~0.13	0.3
A_3 = 5	B_3 = 0.08~0.12	0.3
A_4 = 7	B_4 = 0.04~0.08	0.2
A_5 = 7	B_5 = 0.04~0.08	0.2

◎ When wear of the piston ring groove width is so excessive, as to require replacement with an oversize ring, consult our Service Department.

Each ring periphery is edged sharply after a long-time run of the engine. Therefore, when disassembling the engine, be sure to wear safety gloves to prevent injuries.

Even when the wear of the ring is within the permissible value, replace it with a new one at every periodical inspection with the interval of 8000~12000 hours (2~3 years).



Piston Ring and Oil Ring

4-4.3 Inspection and Maintenance of Connecting Rod

(1) Inspect the connecting rod on the following points, record the results, and repair or replace whenever a defect is found.

① Contact conditions of the small end part piston pin bush Ⓓ and loosening or positional deviation of the bush fitting area

② Scratch and fretting on the joint surface of the trunk part and large end part

③ Dent or peel of the threaded areas and seat surfaces of the connecting rod joint bolt and crank pin bolt

④ Conditions of the serrated area Wear and fretting

(2) Clean the serrated area, and inspect the area for scratch by means of color check.

(3) Blow air to the oil hole and nozzle Ⓔ that is running through the trunk part, and clean the parts.

(4) Measure the piston pin bush inner diameter, calculate the clearance by combining it with the results of measurement of the piston pin outer diameter, and replace the piston bush with a new one, in case that the wear is exceeding the replacing limit.

Norn, size (mm)	Standard clearance (mm)	Replacing limit (mm)
A= ϕ 90	a=0.09~0.16	0.3

< Bush replacing method >

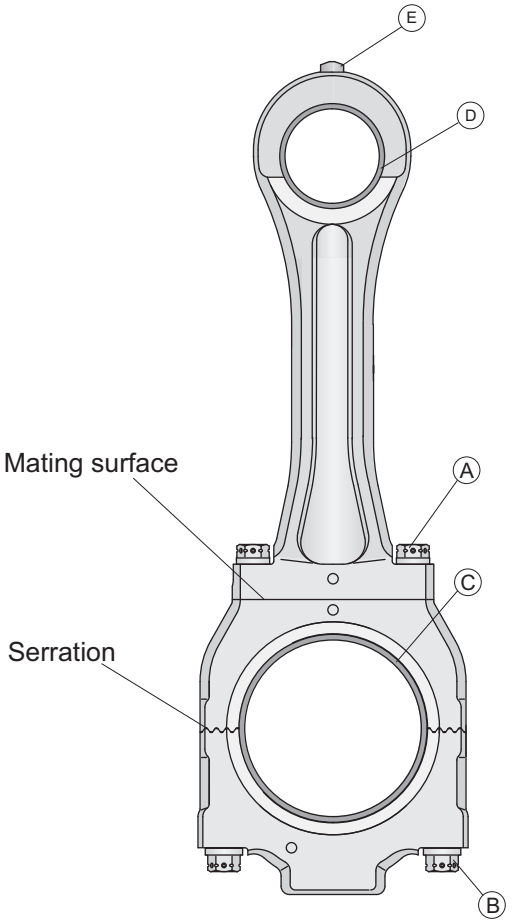
a) Take out the bush by striking with a press or hammer.

b) Insert a new bush by pressing or cold-fitting after confirming the oil hole position of the bush.

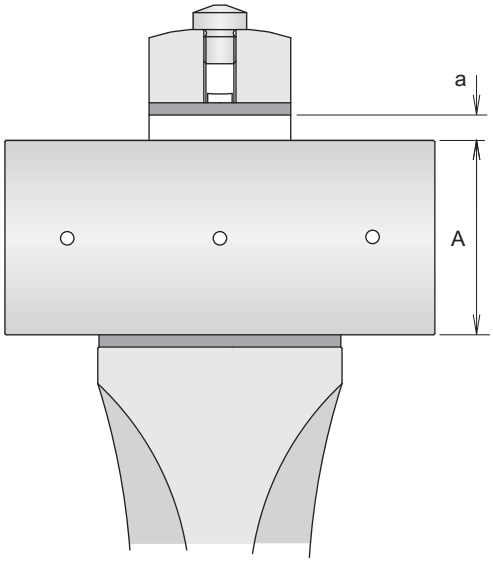
< In case of pressing >
Press-fitting force of bush : 8.8~44.1 kN
{900~4500 kgf}

< In case of cold-fitting >
Immerse the bush in liquid nitrogen, and take out the bush when bubbles disappear (in 5 to 10 minutes), and then insert it.

(5) Confirm the tightening torque and matchmarks of the connecting joint bolt and crank pin bolt.



Inspection and Maintenance of Connecting Rod



Piston Pin Bush Clearance

- Connecting joint bolt and crank pin may produce deviation in the relative position of the bolt and body due to becoming accustomed after a long period of operation, and therefore in such a case, be minded to renew the match-mark on the bolt side.

(📖: 4"4-5 ""A" Mark Notching Procedure")

(6) Measure and record the inner diameter of the large end housing in the state that the connecting rod is independently assembled (the state that the large end part and trunk part are assembled without the shells, and the connecting /□\% joint bolt and crank pin bolt are tightened with the specified value), and inspect if there is any distortion of the shape.

(📖: 4-5 "Assembly of Piston and Connecting Rod")

4-4.4 Inspection and Maintenance of Crank Pin Shell

(1) Inspect if there is no fretting on the crank pin shell rear surface and the joint surface, and also inspect the inner surface for the seizure mark, peel, cavitation, or any imbedded foreign matters. When such defects are of light degree,repair the crank pin shell using an oil stone.

△ The shell is the thin-wall finished metal, and is provided with appropriate interference (crush) and tension so as to closely fit to the housing surface. Therefore, do not correct the rear surface and joint surfaces with a file or scraper.

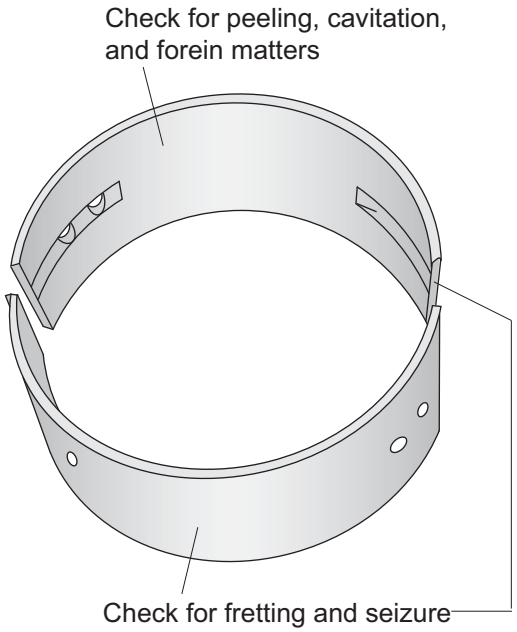
(2) Wash the shell, and measure the thickness of the shell using a spherical micrometer, and record the results.

(3) Calculate the clearance from the measurement results of the inner diameter of the large end housing, thickness of the shell, and diameter of the crank pin. If the result is over the replacing limit, replace the shell with a new one.

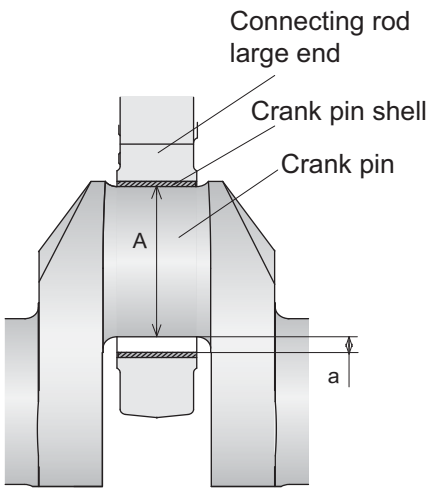
Norn, size (mm)	Standard clearance (mm)	Replacing limit (mm)
A= ϕ 170	a=0.10~0.19	0.3

△ **1)** Be sure to replace the shell as one set of a pair of the upper shell and the lower one.

2) When the shell is used for a long time, it shows reduction of the tension and hardening of its surface, resulting in crack or peel of the shell, even if the wear is; within the allowance value.Therefore, be minded to replace the shell every 16,000 to 24,000 hr (4 to 5 years).



Inspection of Crank Pin Shell



Crank Pin Shell Clearance

Replacement of connecting Rod Bolt

4-4.5 Replacement of Connecting Rod Bolt

Be minded to replace the crank pin bolt and connecting rod joint bolt every 16,000 to 24,000 hrs (4 to 5 years), even when the appearance problem is not found.

< Bolt replacing procedure >

(1) Use the red lead or blue paint lead to check the contact of the bolt head seat surface, and correct the seat surface of the connecting rod, in case that there is any fault or problem.

(2) Stamp the identification number of the engine to be replaced, the cylinder number, and the bolt number on the head part of a new bolt.

(3) Apply the lubricating agent (MOLYKOTE 1000 spray type) on the threaded part and seat surface of the bolt, and repeat loosening and tightening 2 to 3 times using a torque wrench, with B-mark equivalent torque, so as to make the parts to be accustomed.

< B-mark equivalent torque >

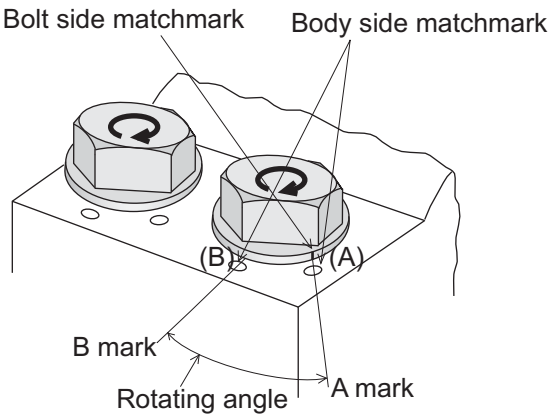
- **Connecting rod joint bolt: 255N·m {26kgf·m}**
- **Crank pin bolt: 392N·m {40 kgf·m}**

(4) Notch the A-mark on the following procedure:

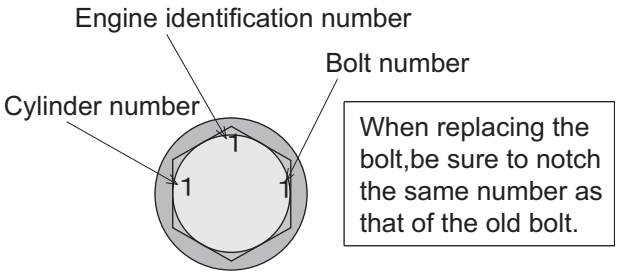
a) Apply the lubricating agent on the threaded area and seat surface of the bolt.

△

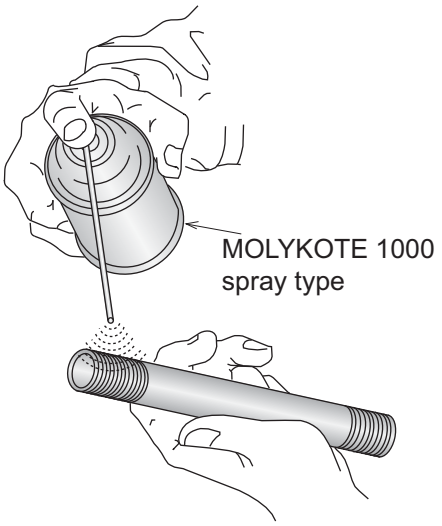
1) Use of the lubricating agents of different brands causes difference in the bolt axial tension. Therefore, be sure to use the lubricating agent "MOLYKOTE 1000 spray type" (genuine parts).
2) MOLYKOTE brings about changes in the frictional force after drying. Therefore, quickly tighten the bolts after spraying before it dries.



Angular Tightening Matchmark



Bolt Identification Mark

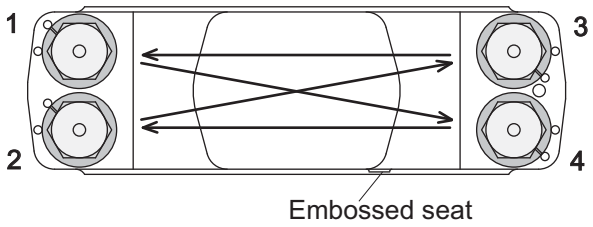


Application of Lubricating Agent

b) Tighten the bolt using a torque wrench with A-torque in the following order:

A-torque

- **Connecting rod joint bolt: 98 N·m {10kgf·m}**
- **Crank pin bolt: 196 N·m {20kgf·m}**
- **Tightening order: 1-4-2-3-1**



Bolt Tightening Order

c) Notch the "A" mark on the bolt.

When renew the notching of "A" mark, be minded to clearly notch the new "A" mark after erasing the old mark, so that the new mark may not be mistaken with the old mark when reassembling.

4-5 Assembly of Piston and Connecting Rod

4-5.1 Assembly of Connecting Rod Large End Part

(1) Clean all the parts using washing oil and blow air to the threaded holes before assembly.
(2) Cleanly wipe off the dirt and oil accumulated on the inside surface of the large end part housing and the rear surface of the shell.

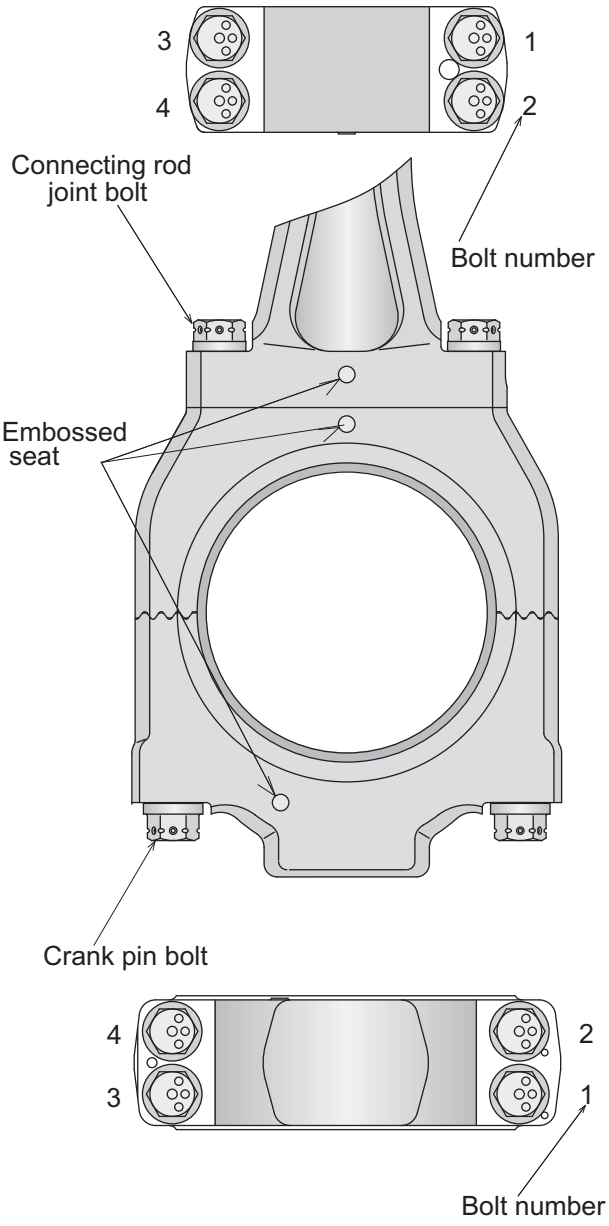
> Do not apply lubricating oil or grease to the rear surface of the shell. Inclusion of oil will cause the reduction of adhesion

(3) Adjust the position of the shell claw to the groove of the large end part housing, and mount it so that the shell may be positioned at the center of the large end part housing.
(4) Strike the shell at its center with hand to fit the shell tightly to the housing.
(5) Cleanly wipe the crank pin area, and apply lubricating oil to the inner surface of the shell.
(6) Assemble the large end shell cap using the shell cap fitting and disengaging implement from both sides in the same procedure of the disassembling, with enough care so as not to scratch the crank pin.

> Be sure to install the connecting rod large end part after matching the cylinder number, so that the embossed seat may be in the position directed toward the front side of the enqine.

(7) Apply the lubricating agent (MOLYKOTE 1000 spray type) on the threaded area and seat surface of the crank pin bolt, and screw the bolt down to the bottom surface.

> Since the bolt number is notched on the bolt,be minded to mount the bolt in the original position without fail, not mistaking the assembling position.

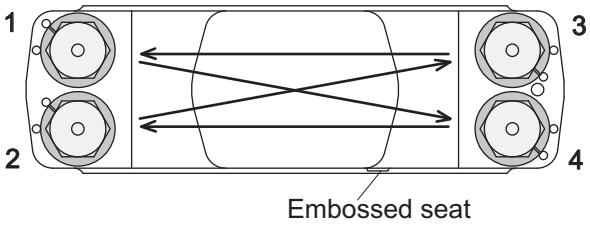


Assembly of Connecting Rod Large End Part

(8) Angularly tighten the crank pin bolt on the following procedure, using the socket, extension bar, and torque wrench:

a) Evenly tighten the bolt with A-torque, according to the tightening order as shown in the figure on the right.

b) Confirm that the A mark of the bolt and the A mark of the seat surface is matched



Bolt Tightening Order

In case that A marks are not matched, renew the marking on the procedure of 4-4.5.

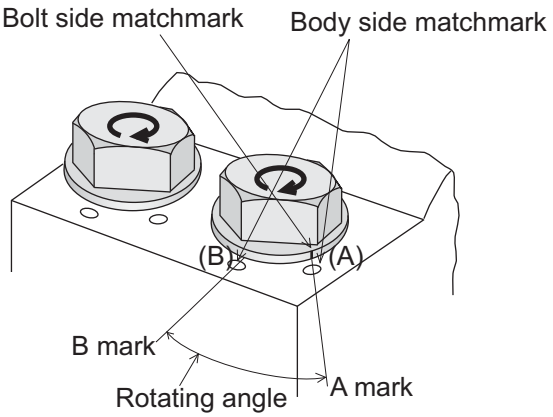
c) Angularly tighten the bolt down to the B mark in the order of 1-4-2-3-1.

- **A-torque: 196N·m {20kgf·m}**
- **Augular tightening (B mark): +40°**
  (B mark equivalent torque) : 392N·m{40kgf·m}

If the tightening of bolt is insufficient, it will not only damage the bearing shell and large end part serration, but also incur serious accidents such as the breakage of bolt, and therefore be minded to securely tighten the bolt.

(9) Confirm that the matchmark of the bolt is tightened down to the B mark position of the large end part, and then conduct the rotation stoppage.

(10) Manually turn the large end part, and confirm that it rotates lightly.



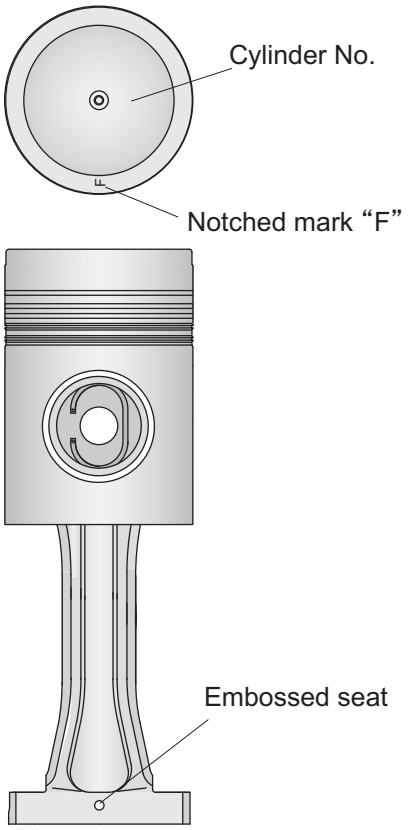
Matchmark Matching Procedure

4-5.2 Assembly of Piston and Connecting Rod

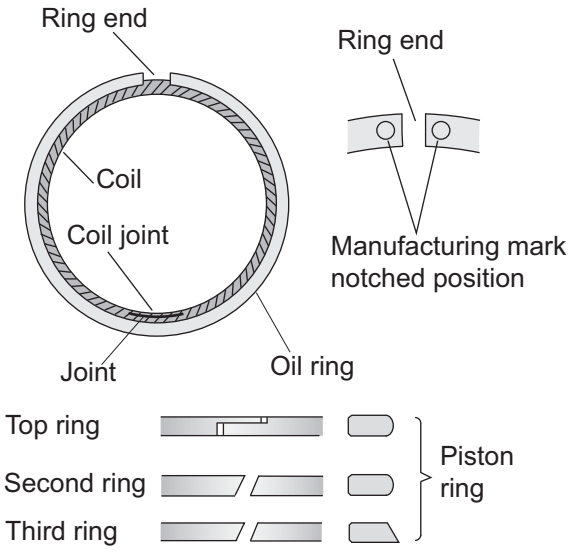
(1) Wash all the parts and blow air to them before assembling the piston.
(2) Assemble the piston and the connecting rod.
a) Insert the connecting rod small end into the piston, placing the combustion surface of the piston facing downward, while matching the embossed seat of the connecting rod lower part and "F" mark of the piston combustion surface.

△ Confirm that the discrimination numbers of the large end part and the small end part are identical.

b) Apply lubricating oil to the piston pin outer periphery and piston pin boss inside area,lightly suspend the connecting rod, and then insert the piston pin.
c) Fit the piston pin stopper ring into the groove using a snap ring pliers.
(3) Fit the piston insertion frame into the cylinder liner upper part.
(4) Turn the crankshaft to place the crank pin at the bottom dead center position.
(5) Mount the suspension metal fitting (eye bolt) on the piston upper part, and suspend the piston and the connecting rod part.
(6) Assemble the piston ring.
Assemble the piston ring in the position as shown in the figure, with the manufacturing mark facing upward (toward the combustion chamber side) so as to ensure the correct assembling position.
(7) Assemble the oil ring.
a) Entangle the coil into the piston oil ring groove, and insert the coil joint.
b) Assembly the oil ring so that the coil joint comes on the opposite side of the ring joint
(8) Deviate the positions of each ring by 90□‹, so that the piston ring and oil ring joint may not be on a straight line.
(9) Sufficiently apply lubricating oil to the piston, piston ring, oil ring, piston insertion frame, and cvlinder liner.

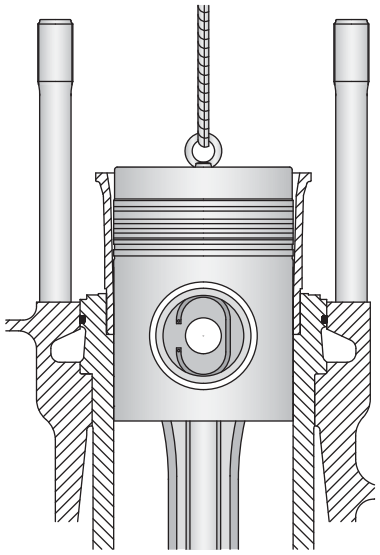


Assembly of Piston and Connecting Rod



(10) Check the cylinder number, insert the piston into the cylinder liner, so that "FM mark on the piston top surface and the embossed seat of the connecting rod face toward the engine front side, and then align the knock of the large end part and trunk part after slowly lowering the piston.

When assembling the piston to the cylinder liner, it is advisable to lightly strike the piston-periphery with a plastic hammer, since it facilitates easy lowering of the piston.
In case that the piston is fitted too tightly, do not dare to forcibly lower the piston, but once suspend the piston and then try to insert the piston again.



Insertion of Piston

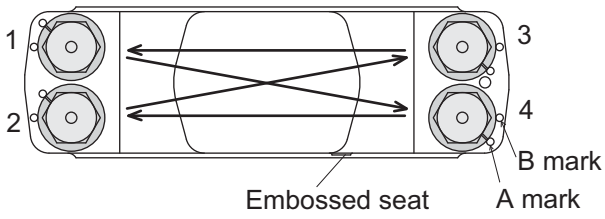
(11) Apply the lubricating agent (MOLYKOTE 1000 spray type) on the threaded area and seat surface of the connecting rod, and assemble the rod into the position of the discrimination number.

(12) Augularly tighten the connecting rod joint bolt on the following procedure:

< Bolt tightening procedure >

a) Evenly tighten the bolt with the A-torque according to the tightening order as shown in the figure on the right.

b) Confirm that A mark of the bolt and A mark of the seat surface are matched.



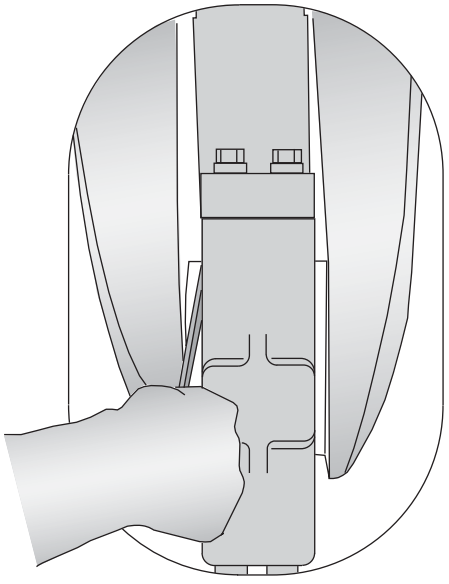
Bolt Tightening Order

In case that A marks are not matched, renew the marking according to the procedure of 4-4.5

c) Angularly tighten the bolt down to B mark in the order of 1-4-2-3-1.

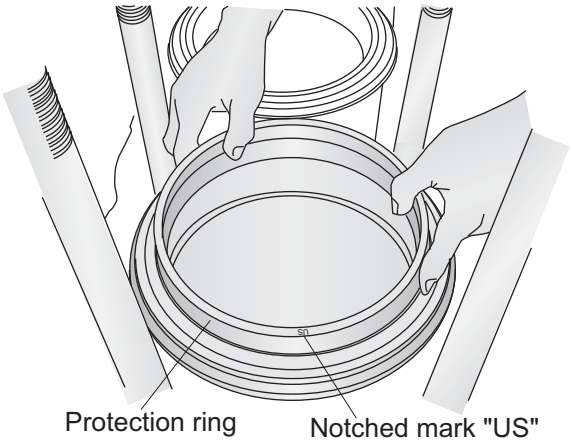
- **A-torque: 98N·m {10kgf·m}**
- **Angular tightening (B mark) : +20°**
  (B mark equivalent torque) : 255N·m{26kgf·m}

(13) Confirm that side motion is seen in the connecting rod large end part, and conduct the rotation stoppage by wiring if there is no abnormality.



Confirmation of Side Motion

(14) Manually insert the protection ring into the cylinder liner, making the notched mark "US" side facing upward, and taking care not to tilt the ring.



Insertion of Protection Ring

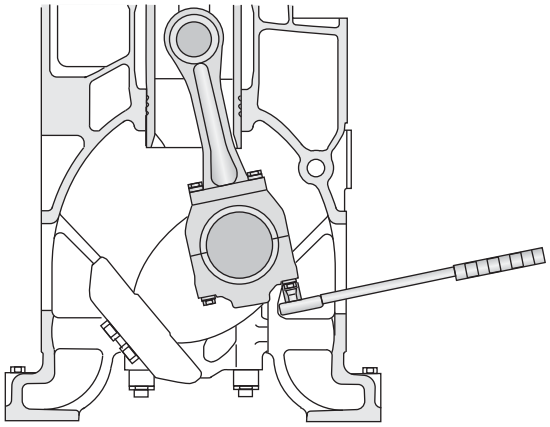
When the piston and the connecting rod are disassembled, be sure to conduct a test run of the engine after restoration, to sufficiently check that they are free from problems through touching and the like. Then, enter into the normal operation.

4-5.3 Confirmation and Retightening of Connecting Rod Bolt Tightening Force

Confirm the tightening conditions of the crank pin-bolt and connecting rod joint bolt taking into consideration the initial running-in, and check and retighten these bolts within 3,000 hr after the initial operation or the replacement of the bolts. Afterwards also, be minded to periodically check-the tightening force within every 6,000 hours.

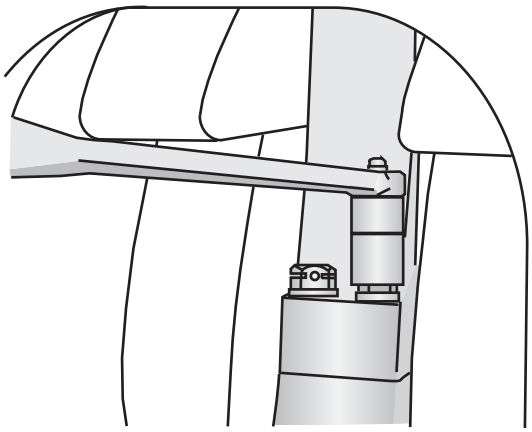
< Tightening confirmation and retightening procedure >

(1) Turn the crankshaft to place the crank pin of the cylinder, which is to be inspected, in the position where the crank pin rod or connecting rod joint bolt can be inspected.
(2) Remove the rotation stopper wire ring.
(3) Tighten the bolt after setting the torque wrench to the B mark equivalent torque. If the bolt does not turn, the tightening force is normal.
(4) In case that the bolt is turned, once loosen the bolt, and conduct the angular tightening after renewing the A mark again.
(: 4-4.5 "A" Mark Notching Procedure")



Tightening Confirmation of Crank Pin Bolt

B mark equivalent torque
- **Crank pin bolt: 392 N·m {40kgf·m}**
- **Connecting rod joint bolt: 255 N·m {26kgf·m}**



Tightening Confirmation of Connecting Rod Joint Bolt

Memo

5. Engine Frame and Cylinder Liner

5-1 General Construction

The engine frame is of a suspension shell structure made of cast steel, and has sufficient rigidity against the explosion pressure.
The main bearing part is hydraulically fastened securely with the main bearing bolts and side bolts of large diameters.

The air-intake passage, cooling water assage,and lubricating oil passage are incorporated in the engine frame to minimize external piping.
The cylinder liner upper area is provided with the thin-wall liner protection ring, for the sake of preventing the accumulation of carbon sludge.
The engine frame and the cylinder liner are tightly-sealed with O-rings at both the top and bottom part.

Cylinder liner: 67 kg

5-2 Replacing Consumables, Implements, and Measuring Instruments

(1) Replacing Consumables

(📖: "Parts List")

① O-ring 3-12 No.9, 501

(2) Implements and Measuring instruments

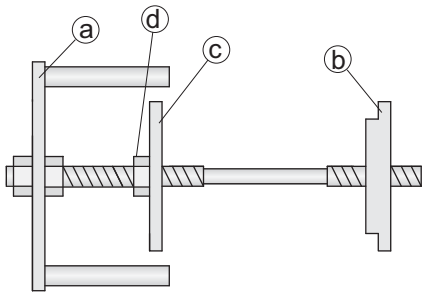
① General tools and measuring instruments (📖:2-2)

② Cylinder liner fitting and disengaging implement

ⓐ Fitting and disengaging implement-1
ⓑ Fitting and disengaging implement-2
ⓒ Fitting and disengaging implement-3
ⓓ Nut

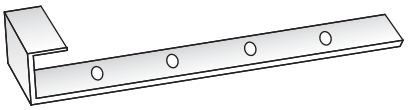
③ Cylinder bore gauge (200 - 225 mm)

④ Cylinder line position gauge



② Cylinder Liner Fitting and Disengaging Implement

③ Cylinder Liner Bore Gauge



④ Cylinder Liner Position Gauge

5-3 Inspection and Maintenance of Cylinder Liner Inner Surface

Conduct the inspection and maintenance of the-cylinder liner (hereafter to be referred as liner) inner surface in the state that the cylinder liner is assembled in the engine frame, after overhauling the cylinder head and piston.

(: 3-1.3 "Removal of Cylinder Head")

(: 4-3.1 "Extraction of Piston")

(1) Visual Inspection

a) Observe the conditions of the carbon deposited on the cylinder liner inner surface.

b) Remove the carbon, and check the inner surface for scratch, scuffing, blow-by mark, and corrosion.

(2) Measure the cylinder liner inner diameter.

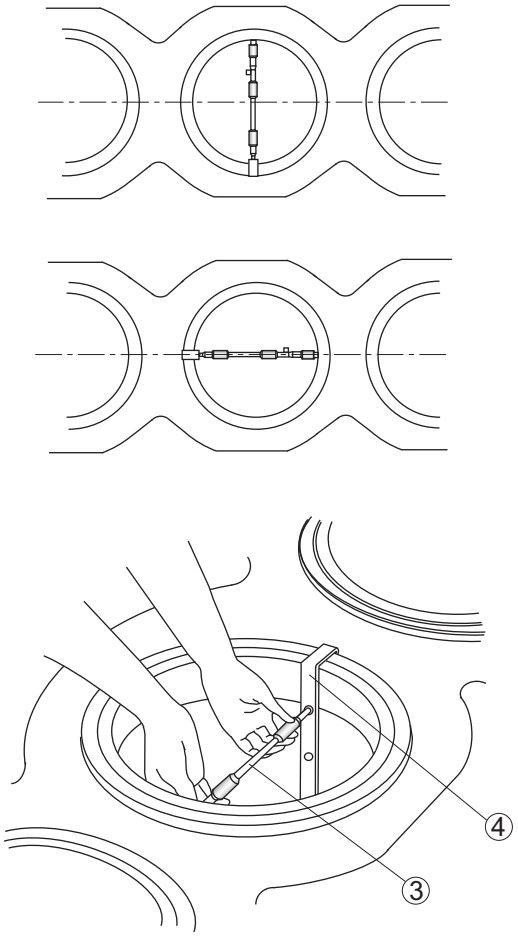
Mount the liner position gauge ④ in the state that the cylinder liner is assembled in the engine frame, measure the inner diameter with the cylinder bore gauge ③, and record the results.

Nom.size (mm)	Replacing limit (mm)	Correction limit (mm)
D= ϕ 200	1.0	Uneven wear: 0.3

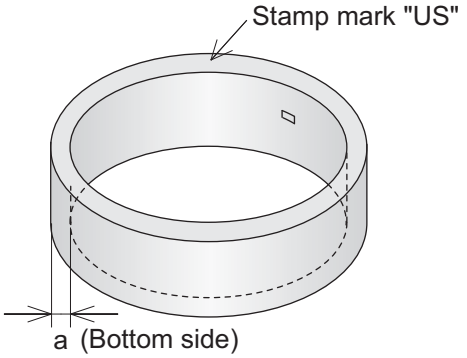
(3) Measure the protection ring thickness with a spherical micrometer, and record the results.

Nom. size (mm)	Replacing limit (mm)
a=8.7	−0.25

△ Wear of the cylinder liner and protection ring inner diameters depends on the quality of the fuel oil used, control of lubricating oil, and cooling water temperature. Progress of wear causes problems such as blow-by and increase in the consumption of lubricating oil, and therefore when the parts reach or come close to the use limit, be minded to replace them in an earlier stage.



Measurement of Cylinder Liner Inner Diameter



Measurement of Protection Ring Thickness

△ Protect ring thickness of "upper side" and "bottom side" is deferent.
Please note to measure the protect ring thickness at bottom side.
There is a stamped mark at the upper side as "US".

(4) Dressing (de-glazing) of cylinder liner
When the piston ring is replaced, or the cylinder liner inner surface is in the mirror surface condition, dress the inner surface.
Conduct the dressing with sandpaper or by honing.

a) Polish the surface with sandpaper (#80) in the circumferential direction, so that the surface may be marked with the sandpaper mesh.

b) In the case of dressing by honing, correct the uneven wear, and conduct honing, so that the surface may be 5 to 10 μ Rz at the cross-hatch angle of 40°.

c) After the end of honing, measure the inner diameter, and confirm that the inner diameter is within the replacing limit.

5-4 Extraction of Cylinder Liner

Extract the cylinder liner after removing the cylinder head and piston.
(📖: 3-1.3 "Removal of Cylinder Head")
(📖: 4-3.1 "Extraction of Piston")

(1) Before extracting the cylinder liner, confirm that water in the cylinder jacket is drained completely.

(2) Receive dirt, foreign matters, water droplets, etc. on a vinyl sheet or the like, so that they may not drop on the oil pan.

(3) Extract the cylinder liner in the following procedure:

a) Insert the liner fitting and disengaging implement ②-ⓐ into the cylinder, making the head bolt as the guide.

b) Mount the implement-2 ②-ⓑ to the implement- 1, and screw the implement until it hits againsi the liner lower end surface.

c) Turn the nut ②-ⓔ, and pull up the liner until the O-ring of the liner lower part is completely extracted out of the engine frame.

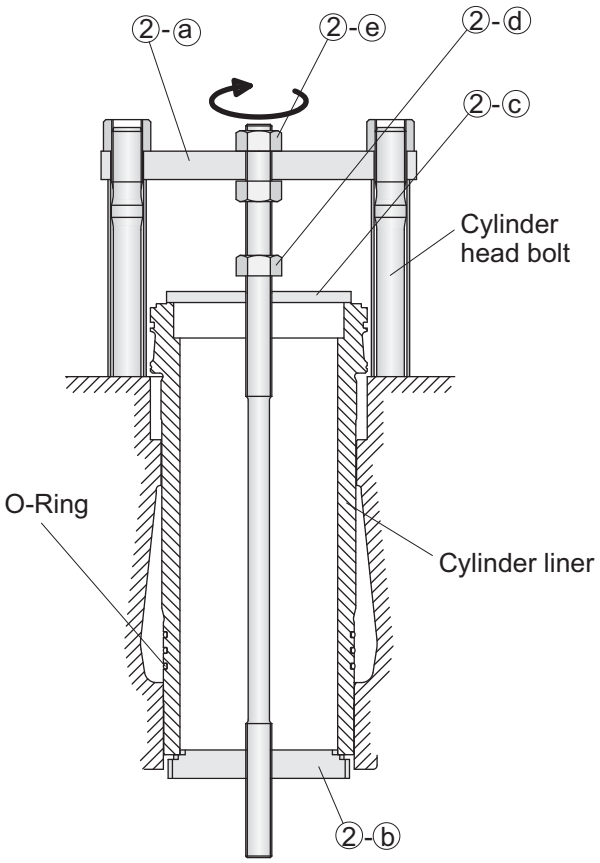
d) Tighten the nut ②-ⓓ, and completely fix the cylinder liner using the implement-2 ②-ⓑ and the implement-3 ②-ⓒ.

e) Pass the wire rope around the liner fitting ano disengaging implement-1 ②-ⓐ, and suspend it.

f) Remove the liner fitting and disengaging implement.

(4) Remove the O-ring

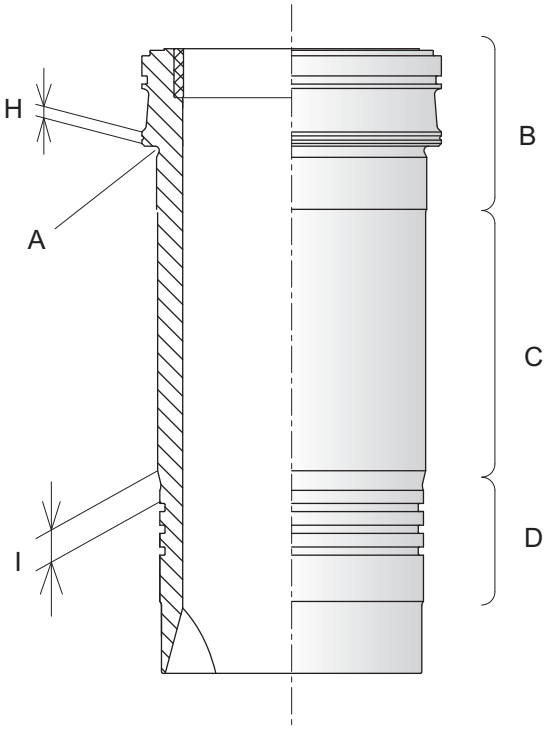
> It is possible to conduct honing processing in the state that the cylinder liner is assembled in the engine frame by using a special honing machine.
> As for the details, consult the Service Department of Daihatsu Diesel Manufacturing Co., Ltd.



Extraction of Cylinder Liner

5-5 Inspection and Maintenance of Cylinder Liner Outer Periphery and Engine Frame Jacket

(1) Remove the scale or silicone rubber accumulated on the liner outer periphery using a wire brush or the like.
(2) Subject flange fillet "A" to the color check, and inspect if there is any crack.
(3) Inspect the cylinder liner outer periphery "C" and engine frame jacket "U" for cavitation or corrosion. If the degree of the defect is minor, repair the faulty part using a repairing agent.
(4) Inspect the fitting areas "B" and "D", and the inserting area "E" and "G" of the engine frame for corrosion and fretting.

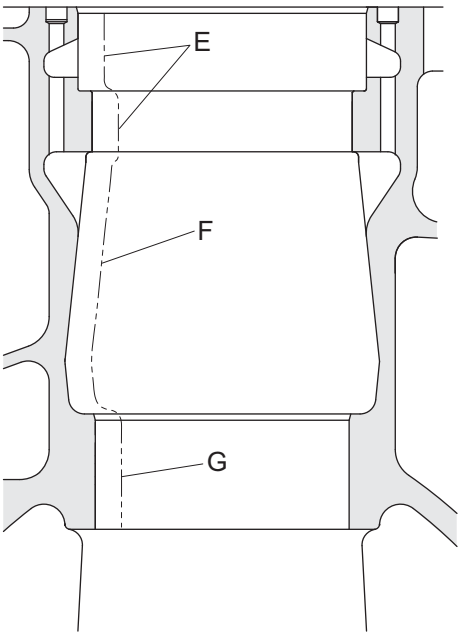


Inspection of Liner Outer Periphery

△
In case of the corrosion or cavitation is found, the following possible reasons can be considered:
1) Cooling water rust preventive agent is not effectively working.
2) Cooling water pressure is low.
3) Cooling water is mixed with air.
Conduct appropriate cooling water control in strict conformance with the Control Standard. (📖:"Operation" 6-3 "Control of Cooling Water")

(5) If the anti-corrosion coating film of the cylinder liner outer periphery and the engine frame jacket is peeled off, conduct touchup painting.

△
Pale gray-brownish deposit is a film of the rust preventive agent that has been used. Therefore, do not remove it.



Inspection of Engine Frame Jacket

Mounting of Cylinder Liner

5-6 Mounting of Cylinder Liner

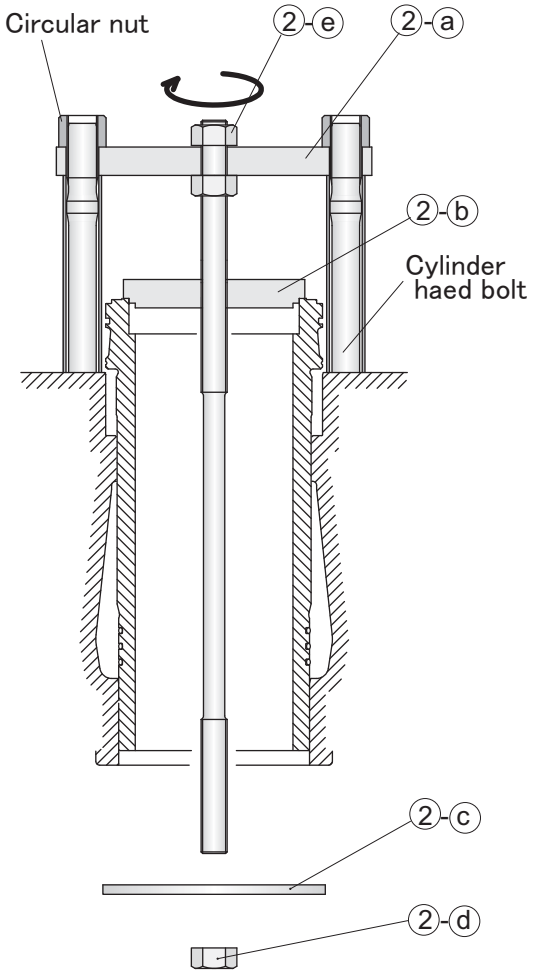
Mount the cylinder liner in the reverse order of thedismounting procedure:

(1) Clean the cylinder liner inner and outer surfaces, and O-ring grooves.
(2) Fit O-rings to the cylinder liner.
(3) Apply silicone rubber on the flange part outer periphery "H" of the liner upper part, and also apply it on the O-ring part upper side "I" of the liner lower part.

△

1) Do not apply silicone rubber to the O-ring.
2) After silicone rubber is applied, assemble the cylinder liner at a little earlier timing hefnre it dries.

(4) Mount the liner in the following procedure:
a) Mount the liner fitting and disengaging implement to the liner.Tighten the nut ②-ⓓ, and fix the liner using the implement-2 ②-ⓑ and the implement-3 ②-ⓒ.
b) Pass the wire rope around the liner fitting and disengaging implement-1 ②-ⓐ, suspend it by a chain block, and insert it into the engine frame.
Matching the punch mark of the liner and the notched line of the engine frame (between the 2 lines), and slowing lower the liner, taking care so as not to cut the O-ring. Swing the liner, and lower it down until it does not lower any more with its own weight.
c) Fix the implement-1 ②-ⓐ with the circular nut for head bolt.
d) Remove the nut ②-ⓓ and the implement-3 ②-ⓒ.
e) Turn the nut ②-ⓔ anticlockwise direction, and tighten it until the line is completely attached to the engine frame.
f) Remove the liner fitting and disengaging implement ②-ⓐ and ②-ⓑ.



Mounting of Cylinder Liner

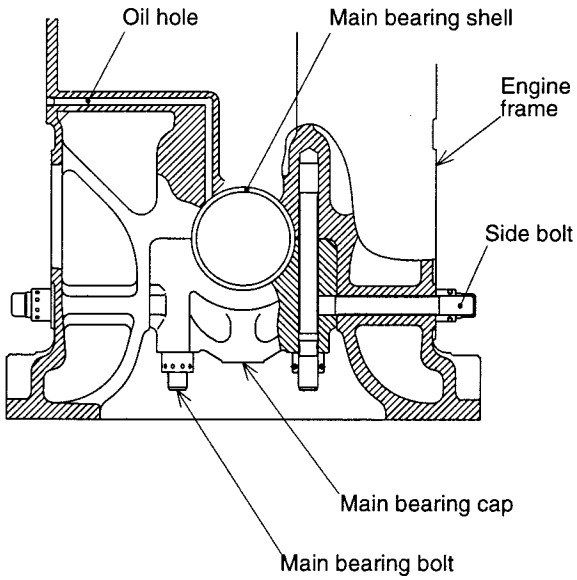
Memo

6. Main Bearing and Thrust Bearing

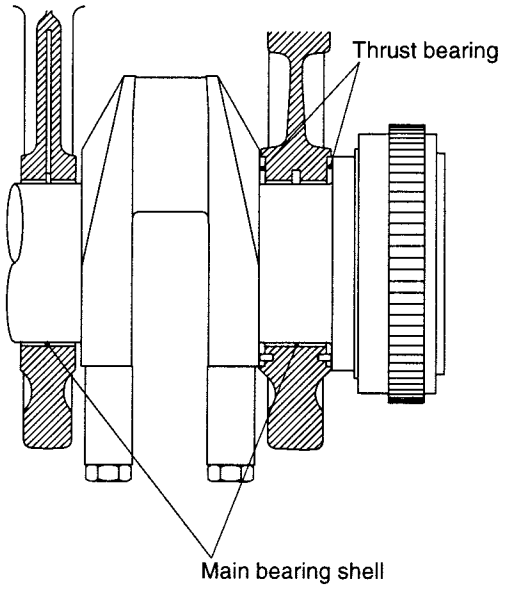
6-1 General Construction

The main bearings are of a suspension bearing shell structure with the main bearing cap hydraulically fastened rigidly by the main bearing bolt and the side bolts.
The main bearing shells are made of aluminum alloy of high wear resistance, and the top and bottom bearing shell are positioned by means of the claw.
The main bearing lubricating oil will be supplied through the drilled holes of the engine frame from the upper bearing shell.
The thrust bearings are made of aluminum alloy as same as in the case of the main bearing, mounted at the top and bottom on the both sides of the 1st wall located on the engine rear side, and forcibly lubricated through the drilled holes of the engine frame.

Main bearing cap : 33 kg



Main Bearing



Thrust Bearing

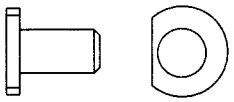
6-2 Replacing Consumables, Implements, and Measuring Instruments

(1) Replacing Consumables

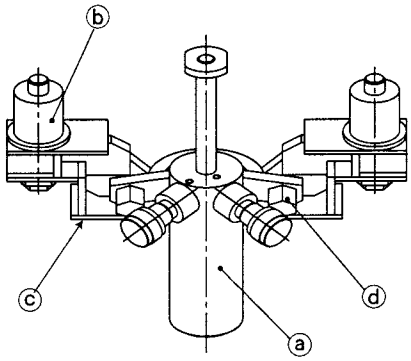
None

(2) Implements and Measuring Instruments

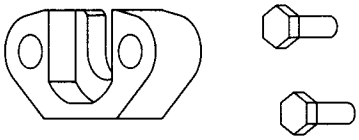
① General tools and measuring instruments
(: 2-2)
② Main bearing top shell extracting implement
③ Hydraulic ram assy.
ⓐ Hydraulic ram
ⓑ Shell cap implement-1
ⓒ Shell cap implement-2
ⓓ Bolt
④ Hydraulic ram receptor metal fitting
⑤ Hydraulic jack and hydraulic pump for main bearing
ⓐ Hydraulic jack
ⓑ Jack stand
ⓒ Jack handle
ⓓ Hydraulic pump
ⓔ High-pressure hose
ⓕ Terminal (4T)
ⓖ Male coupler



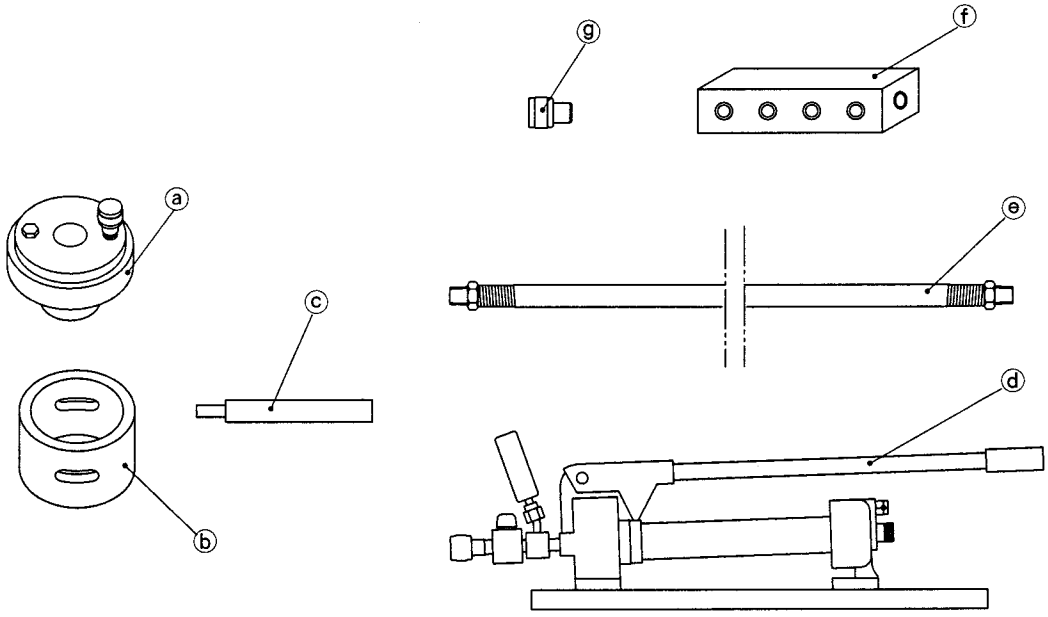
② Main Bearing Top Shell Extracting Implement



③ Hydraulic Ram assy.



④ Hydraulic Ram Receptor Metal Fitting



⑤ Hydraulic Jack and Hydraulic Pump

6-3 Main Bearing Shell

For disassembly and inspection of the main bearing shell, the bearing shell can be extracted only by lowering the main bearing shell cap without removing it completely.

6-3.1 Disassembly of Main Bearing Shell

(1) Remove the covers of the both sides on the engine frame side of the cylinders at the front and rear of the main bearing to be disassembled, and set the crank pin on the working side to be horizontal on the opposite side.

(2) Disconnect the side bolt tightening nut using the hydraulic jack.
(📖 : 2-4 "Hydraulic Jack Operating Method")

a) Mount the jack stand ⑤-ⓑ and hydraulic jack ⑤-ⓐ on the side bolts on the both sides, and connect it to the hydraulic pump ⑤-ⓓ using a high-pressure hose ⑤-ⓔ.

b) Operate the hydraulic pump lever to increase the oil pressure to the specified level, and loosen the nut using the jack handle ⑤-ⓒ.

Specified oil pressure: 69 MPa {700 kgf/cm²}

c) Confirm the oil pressure to cause the nut to turn, and check the side bolts for loosening.

d) Remove the hydraulic jack and jack stand.

e) Disconnect the side bolt tightening nut.

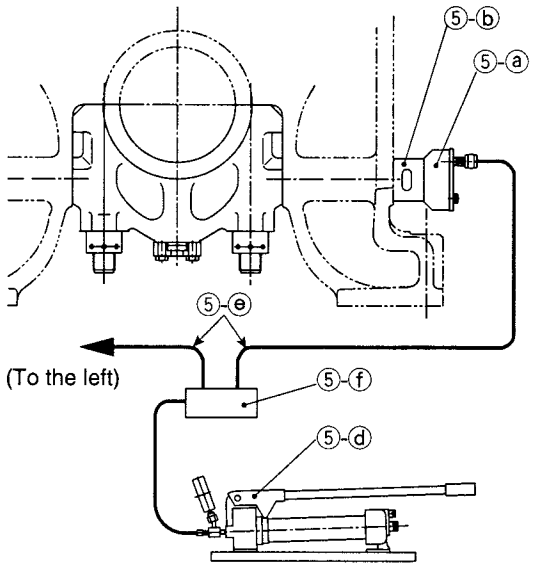
(3) Remove the main bearing cap tightening nut using the hydraulic jack.
(📖 : 2-4 "Hydraulic Jack Operating Method")

a) Mount the jack stand ⑤-ⓑ and hydraulic jack ⑤-ⓐ, and connect them to the hydraulic pump ⑤-ⓓ using the high-pressure hose ⑤-ⓔ.

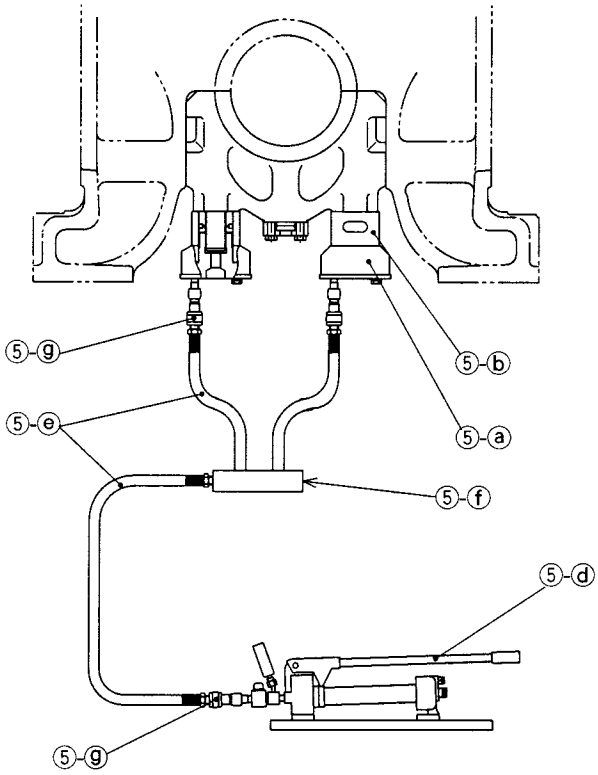
b) Operate the hydraulic pump to increase the oil pressure to the specified level, and use the jack handle ⑤-ⓒ to loosen the nut.

Specified oil pressure : 78 MPa {800 kgf/cm²}

c) Check the oil pressure for the nut to begin to turn, and inspect that the main bearing bolts are tightened securely to be free from loosening.



Removal of Side Bolt Nut



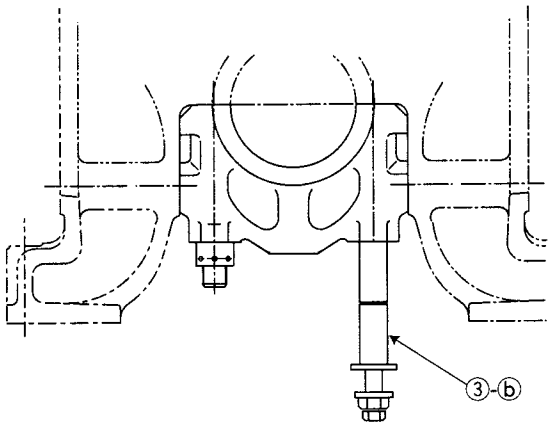
Removal of Main Bearing Cap Tightening Nut

d) Remove the hydraulic jack and jack stand.

e) Remove the main bearing cap tightening nut on one side.

f) Mount the shell cap implement-1 ③-ⓑ on the end of the main bearing bolt, of which main bearing cap tightening nut is removed.

△ To prevent spontaneous fall of the shell cap, immediately mount the shell cap implement-1 after removing the main bearing cap tightening nut on one side.



(4) Dismount the main bearing cap in the following procedure:

a) Mount the hydraulic ram receptor metal fitting ④ to the main bearing cap.

b) Mount the metal cap implement-1 ③-ⓑ to the main bearing bolt, and fix the metal cap implement-2 ③-ⓒ with the nut Ⓝ.

c) After fitting the rod end of the hydraulic ram ③-ⓐ into the hydraulic ram receptor metal fitting of the main bearing cap, mount them to the metal cap implement-2 with the mounting bolt ③-ⓓ.

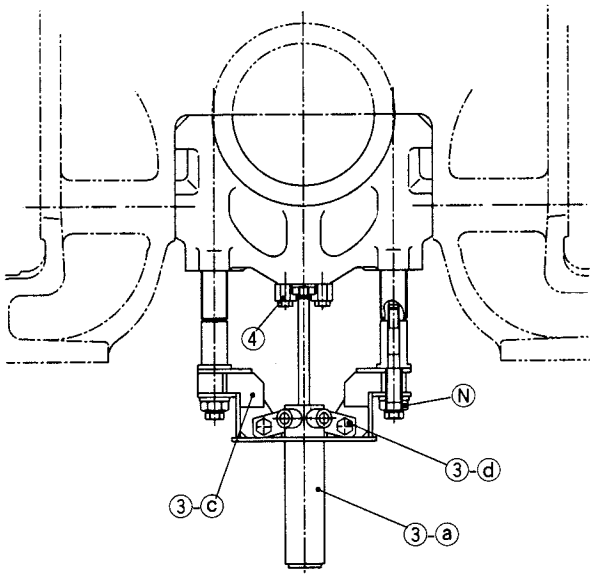
d) Connect the oil feed port "U" of the hydraulic ram and the port "A" of the hydraulic pump changeover valve with the high-pressure hose ⑤-ⓔ.

Likewise, connect the oil feed port "D" of the hydraulic ram and the port "B" of the hydraulic pump changeover valve with the high-pressure hose.

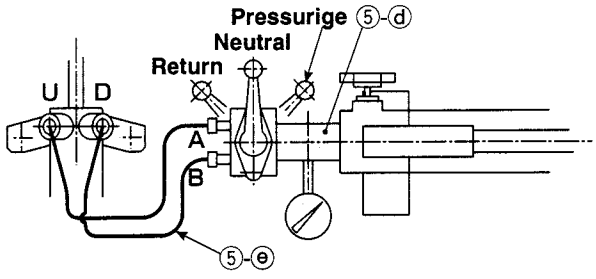
e) Operate the hydraulic pump ⑤-ⓓ and pressurize.

△ Be minded not to increase the hydraulic oil pressure over the value of 19.6 MPa {200 kgf/cm²}

f) Switch the changeover valve to "Return", and slowly lower the main bearing cap.



Mounting of Hydraulic Ram



Connection of Hydraulic Ram

Disassembly of Main Bearing Shell

- If the changeover valve is switched to "Return", the hydraulic oil flows from "B" to "D" and the main bearing cap lowers, and if the changeover valve is switched to "Pressurize", the oil flows from "A" to "U" and the main bearing cap rises.
- In the neutral position, the hydraulic oil does not flow.
- In case that the main bearing cap dose not lower, if the side bolts on both sides are loosened, it will facilitate to lower the cap.

(5) Disconnect the main bearing bottom shell from the cap.

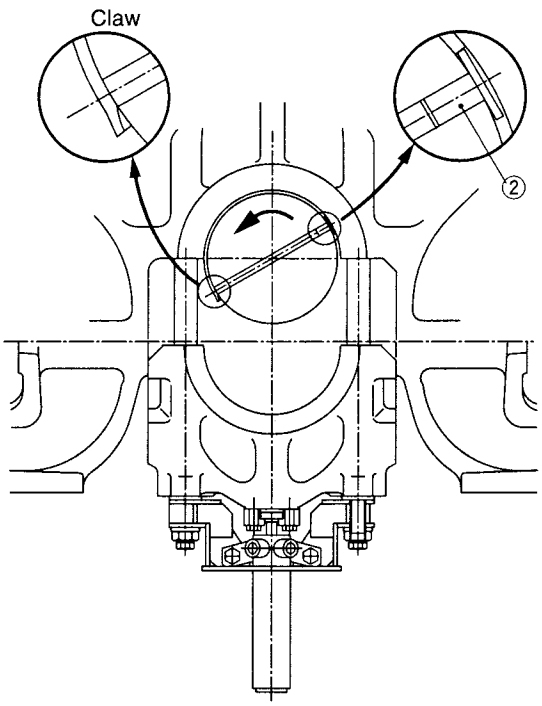
(6) Disconnect the main bearing top shell in the following procedure:

a) Insert the main bearing top shell extracting implement áA into the crankshaft oil hole.

△ Be careful so that the main bearing shell extracting implement may not come off the oil hole. Application of grease to the insertion side of the extracting implement will make it difficult for the implement to come off.

b) Press the main bearing shell extracting implement against the end face of the main bearing top shell, turn the crankshaft anticlockwise as viewed from the engine front side, and then extract the top shell.

△ Be careful not to turn the crankshaft in a wrong direction. The positioning claw is provided on the main bearing shell, and it will be damaged if the crankshaft is turned in a wrong direction.



Extraction of Main Bearing Shell (Viewed from the engine front side)

6-3.2 Inspection and Maintenance of Main Bearing Shell

(1) Inspect if there is fretting on the rear surface and the joint surface of the main bearing shell, and also check if there are seizure mark, peel, cavitation, or imbedded foreign matters in the inner surface. When the degree of the fault is minor, correct the surface using an oil stone.

△

The main bearing shell is a thin-wall finished metal, and provided with appropriate interference (crush) and tension, so as to make it tightly fit to the housing surface. Therefore, do not repair the rear surface and joint surfaces with a file or scraper.

△

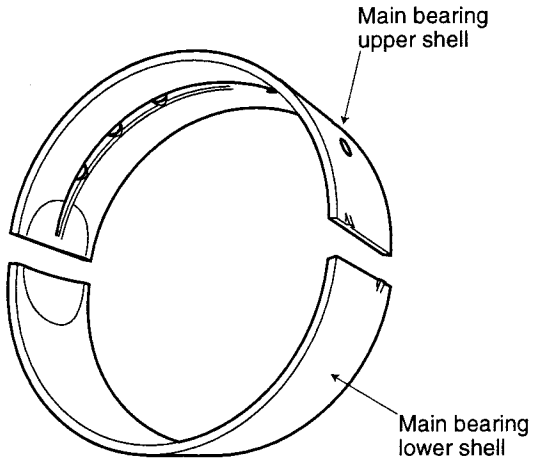
1) Long-time use of the shells brings about the reduction of tension and hardening of the shell surfaces to cause crack and peel of the shells, even if the wear is below the allowable value. Therefore, be minded to replace the shells every 16,000 to 24,000 hours (4 to 5 years).
2) Be sure to simultaneously replace the top and bottom shells as one pair set.

(2) Check the seat surface of the tightening nut and the seat surface of the cap side, and if there is any roughness on them, correct the part.

(3) If the tightening nut of the disassembled main bearing bolt is found to be loosened, retighten the other main bearing bolts as well.

(4) Inspect the main bearing cap joint surface and the contact surface of the fitting area, to check if there is any fault such as fretting.

(5) Inspect the crankshaft surface for scratch, and also check the contact and wear conditions.



Main Bearing Shell

6-3.3 Assembly of Main Bearing Shell

(1) Visually check and also check with naked hand that the crankshaft journal part is free from the deposit of foreign matters and scratch.

(2) Clean the shell inner surface and rear surface with washing oil, then carefully wipe off the oil.

(3) Assemble the top shell to the engine frame in the following procedure:

a) Check the positions of the top shell claw and the helical groove in the engine frame, and push in the top shell from the side not equipped with the claw by hand as deeply as possible.

b) Insert the main top shell extracting implement into the crankshaft oil hole according to the same procedure as that for disassembly.

c) Turn the crankshaft counterclockwise as viewed from the engine front side, and push the top shell into the engine frame, until the top shell end face fits the main bearing cap joint surface of the engine frame.

△ Conduct turning with enough care, so that the main bearing top shell extracting implement may not be dislocated from the shell end face.

d) Confirm that the top shell is inserted in the regular position.

e) Turn the crankshaft anticlockwise as viewed from the engine front side, and remove the main bearing top shell extracting implement.

(4) Assemble the bottom shell to the main bearing cap in the following procedure:

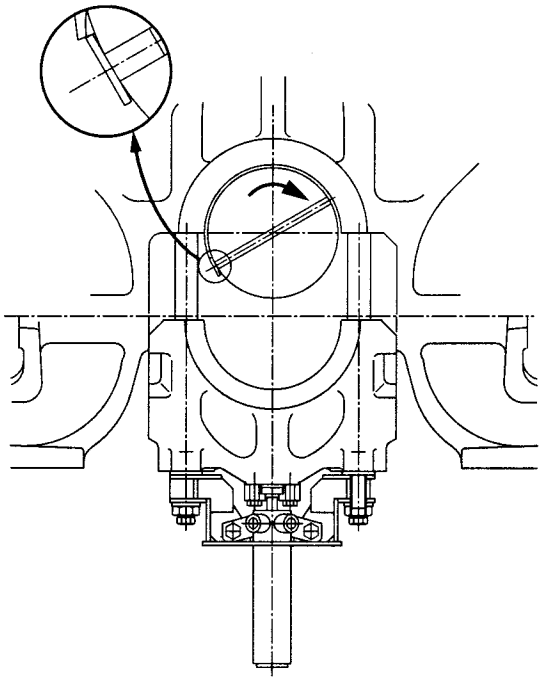
a) Visually recheck and also recheck with naked hand that the crankshaft journal and the main bearing cap inner surface are free from the deposit of foreign matters and scratch.

b) Confirm the positions of the bottom shell, the end face of the main bearing cap, and the claw. And then, mount the bottom shell to the main bearing cap.

c) Confirm that the shell is completely mounted.

d) Sufficiently apply lubricating oil to the bottom shell inner surface with naked hand.

△ Be minded not to apply lubricating oil to the back surface of the shell. If the oil is applied, the adhesion performance decreases.



Assembly of Main Bearing Shell

(5) Assemble the main bearing cap in the reverse order of the extracting procedure.

a) Match the main bearing cap side face with the engine frame side face, switch the changeover valve to "Pressurize" (main bearing cap raising direction), and slowly push up the main bearing cap until it strikes the joint surface of the upper area engine frame.

b) Spray the lubricating agent (MOLYKOTE 1000 spray type) to the threaded area on the studding side of the side bolt, and manually screw the bolt into the threaded hole of the main bearing cap.
Turn it back by 1/4 to 1/2 turn after the bolt is screwed down to the bottom.

c) Screw the side bolt tightening nut until it is completely settled to the bottom.

d) Remove the hydraulic ram assembly and hydraulic ram receptor metal fitting, and manually screw the tightening nut into the main bearing bolt.

△ To prevent the spontaneous falling-off of the main bearing cap, remove the hydraulic ram after screwing the side bolt.

e) Install the hydraulic jack, and conduct the hydraulic tightening of the bolts.
The tightening shall be made on the 2 bolts at the same time.

Specified oil pressure: 78 MPa {800 kgf/cm²}

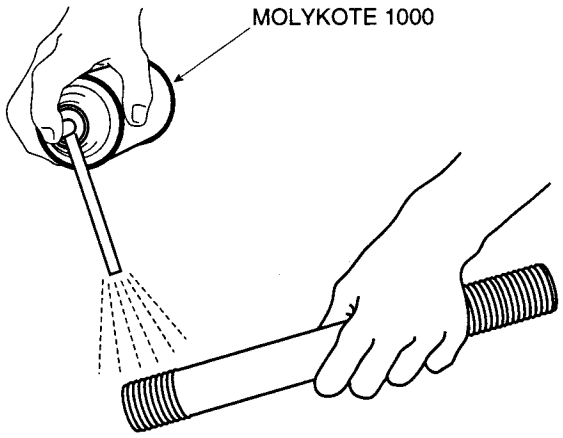
f) After tightening the bolt with the specified pressure, once return the oil pressure back to "0", then increase the oil pressure up to the specified value again to check for the tightening conditions.

(6) Mount the hydraulic jack on the side bolts, and tighten the bolts hydraulically.

Specified oil pressure: 69 MPa {700 kgf/cm²}

a) Tighten the two side bolts of the same main bearing at the same time.

b) After tightening the bolts with the specified pressure, once return the oil pressure back to "0", then increase the oil pressure up to the specified value again to check for the tightening conditions.



Application of Lubricating Agent

6-4 Thrust Bearing

The thrust bearings are mounted on the front and rear surfaces of No.1 main bearing (flywheel side). Dismount the thrust bearings at the time of disassembling the main bearing.

6-4.1 Dismounting of Thrust Bearing

(1) Measure the side clearance of the crankshaft according to the following procedure before dismounting the thrust bearing:

a) Use the bar to shift the crankshaft toward the either side, front or back, and place the dial gauge against the crankshaft.

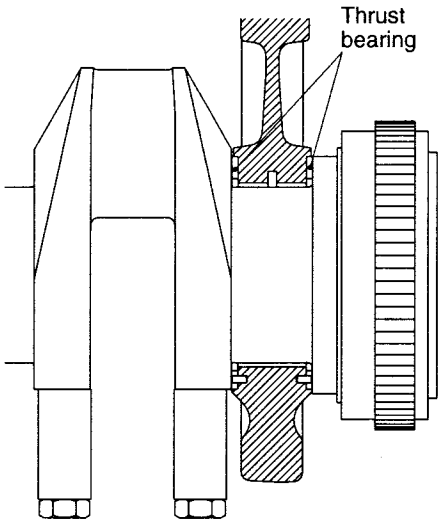
b) Fully shift the crankshaft toward the opposite side, and read the value.

△ When hooking the bar on the crankshaft, hook it on the crank web, and do not hook the bar on the balance weight.

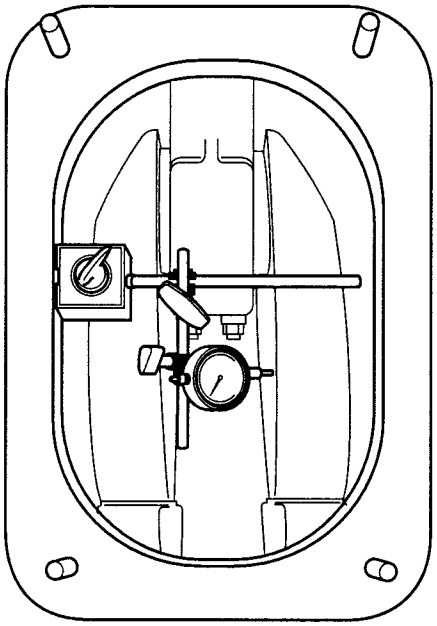
(2) The bottom side thrust bearing is mounted on No.1 main bearing cap with knock pins (1 piece each on both sides). Therefore, it can be disconnected at the same time when the main bearing bottom shell is extracted.

(3) The top side thrust bearing can easily be extracted when the end face is pushed with hand.

△ The thrust bearings are designed to form a pair with the top and bottom shells. Therefore, be careful not to mistake the front thrust bearing for the rear thrust bearing. Discriminate them by marking or the like.



Thrust Bearing



Measurement of Side Clearance

6-4.2 Maintenance of Thrust Bearing

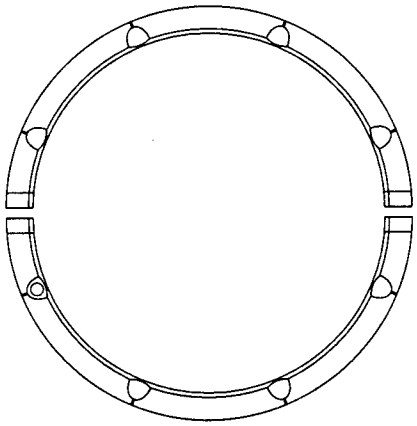
(1) Check the thrust bearing for seizure mark and imbedded foreign matters. If the defect is of minor degree, repair the defect using an oil stone.

(2) Measure the thrust bearing thickness using an outside micrometer, and record the results.

(3) When the thrust bearing wear is heavy, and the clearance with the crankshaft is exceeding the replacing limit, replace the thrust bearing with a new one.

Be sure to replace the thrust bearing as one set of a pair of the top and bottom shells.

Nom. size (mm)	Standard clearance (mm)	Replacing limit (mm)
D=92	d=0.13~0.30	0.6



Thrust Bearing

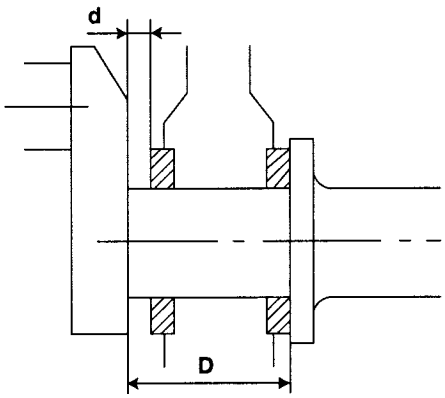
6-4.3 Assembly of Thrust Bearing

(1) Carefully clean the thrust bearings and apply lubricating oil to the bearing surfaces.

(2) Insert the top side thrust bearing.

(3) Mount the bottom side thrust bearing to the main bearing cap, and assemble them together as an assembled parts.

(4) Measure the side clearance.



Side Clearance

7. Crankshaft and Balancer Shaft

7-1 Crankshaft

7-1.1 General Construction

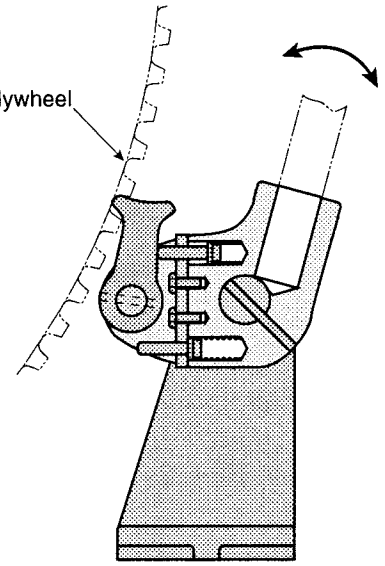
The crankshaft is a high-strength carbon steel RR forged product of one-piece construction, and provided with sufficient rigidity and strength.
The thrust bearing is processed by induction hardening to increase abrasion resistance.
Two pieces of the balance weight are fitted to each cylinder, and they are securely tightened with two pieces of the bolts respectively.
The crank gear is shrink-fitted to the rear side of the crankshaft to drive the camshaft, and further the auxiliary drive gear is bolted on the front end to drive the lubricating oil pump and cooling water pump.
Lubricating oil supplied to the main bearing through the holes of the engine frame reaches the crank pin metal through the drilled holes in the crankshaft, and further flows to the piston pin and piston through the drilled holes in the connecting rod.
The crankshaft is manually turned by the turning device on the flywheel side.

Crankshaft assy.: 3DK : 740 kg
5DK : 1059 kg
6DK : 1287 kg
8DK : 1684 kg

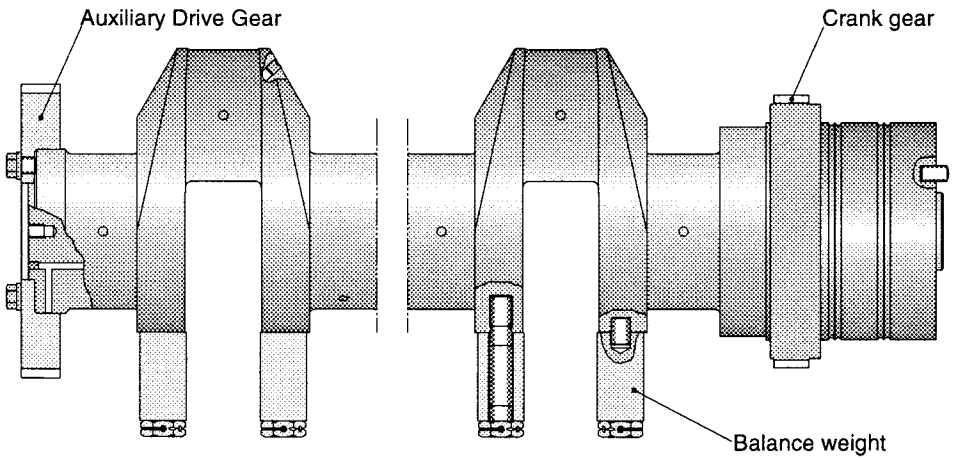
7-1.2 Replacing Consumables, Implements, and Measuring Instruments

(1) Replacing Consumables
None

(2) Implements and Measuring Instruments
① General tools and measuring instruments
(📖 : 2-2)



Turning Device



Crankshaft

7-1.3 Inspection and Maintenance of Crankshaft

In ordinary maintenance, the crankshaft is not disassembled, but inspected and adjusted in the state that it is assembled.
When it becomes necessary to overhaul the crankshaft because of the particular reasons such as seizure of the bearing or abnormal wear of the shaft, consult our Service Department.

1. Inspection of Crank Pin

Inspect the crank pin when the connecting rod large end part is disassembled.
(📖: 4-3.2 "Disassembly of Connecting Rod Large End Part")

(1) Check the bearing for scratch and contact conditions.
If scratch is found, correct it using an oil stone, and conduct the color check carefully.
(2) Measure the shaft diameter, and record the results.
(📖: 4-4.4 "Inspection and Maintenance of Crank Pin Shell")
(3) Subject the fillet to color check.
In case that the problems such as the ones as described above are found, carefully conduct the color check with particular attentions.

2. Inspection of Crank Journal

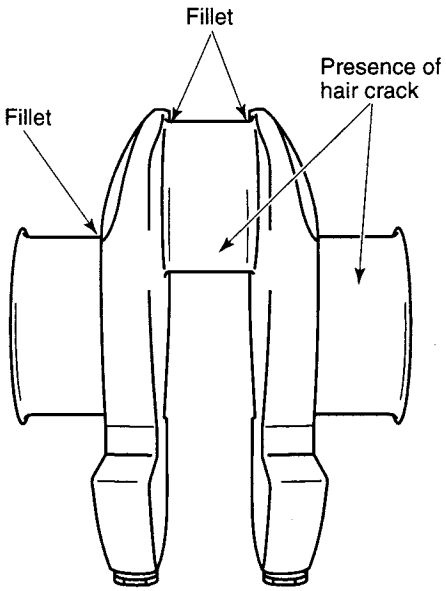
Inspect the crank journal when the main bearing shell is disassembled.
(1) Check the bearing for scratch and contact conditions.
(2) Subject the fillet to color check.
In case that the problems such as the ones as described above are found, carefully conduct the color check with particular attentions.

When disassembly of the crankshaft is required as a result of inspection, consult our Service Department.

△

In case that the following situations has happened and if the operation is continued disregarding any one of them, it may result in serious damages or accidents:
① In case that the engine is operated for a long time in the dangerous rotation number range due to torsional vibration
② In case that the engine is operated exceeding the allowable value of the crankshaft deflection
③ In case that the clearance between the crankshaft and shell is excessive, or the crankshaft is unevenly worn out
④ In case that the shell is burnt (In case of minor degree)

7



Inspection of Crankshaft

7-1.4 Inspection of Balance Weight Bolt Tightening Force

(1) Inspection of every 4,000 to 6,000 hours (every year).

Inspect the rotation-stopper wire ring conditions, and confirm that the balance weight bolt is not loosened.

(2) Inspection of every 16,000 to 24,000 hours (4 to 5 years)

Inspect the balance weight bolt tightening conditions in the following procedure:

a) Remove the rotation-stopper wire ring.

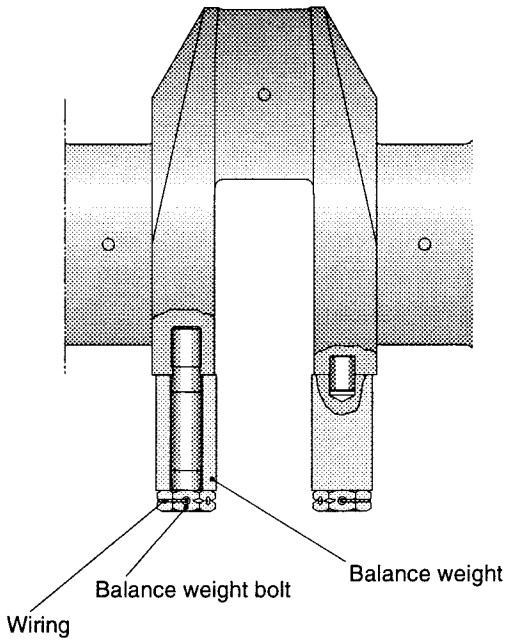
b) Set the torque wrench to the specified torque, and confirm the tightening force.

When the bolt does not turn, it is sufficiently tightened, and then conduct the rotation stoppage with the wiring.

c) In case that the bolt is turned, remove the bolt, apply the lubricating agent (MOLYKOTE 1000 spray type), and once again tighten the bolt with the specified torque.

d) After tightening, conduct the rotation stoppage with wiring.

Specified torque: 980 N·m {100 kgf·m}



Balance Weight Bolt

7.15 Measurement of Crankshaft Deflection

△

1) Measure the crankshaft deflection when the engine is cold.
2) When the engine is continuously operated in the state that the crankshaft deflection is over the limit value, the added stress of the crankshaft will become excessive, and will lead to the breakage of the crankshaft in the worst case.
Therefore, adjust the deflection to a proper value at the time of installation, and periodically measure the crankshaft deflection every 2,000 to 3,000 hours (every 6 months) after the start of operation of the engine, and correct the situation in case that the deflection is over the limit value.

◎Crankshaft deflection measuring procedure:
(📖: "Operation" 5-4.5 "Measurement of Crankshaft Deflection")

7.2 Balancer Shaft

7-2.1 General Construction

In 3DK engine, the balancer shaft is provided for the purpose of controlling vibration.
The balancer weight is provided on the front side and rear side of the balancer shaft, and is supported in the crank case with 4 thin-wall shells and 2 automatic core adjusting bearing, and is driven by the auxiliary drive gear located on the front side of the engine.

Balancer shaft assy. : 131 kg

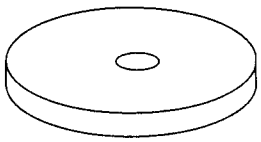
7-2.2 Replacing Consumables, Implements, Measuring Instruments

(1) Replacing Consumables

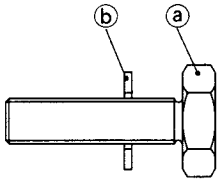
Replace the following parts with the new ones:
(📖: "Parts List")
① Automatic core-adjusting bearing 3-8 No.5
② O-ring 3-8 No.507
③ Gasket 3-8 No.16
④ Gasket 3-8 No.17

(2) Implements and Measuring Instruments

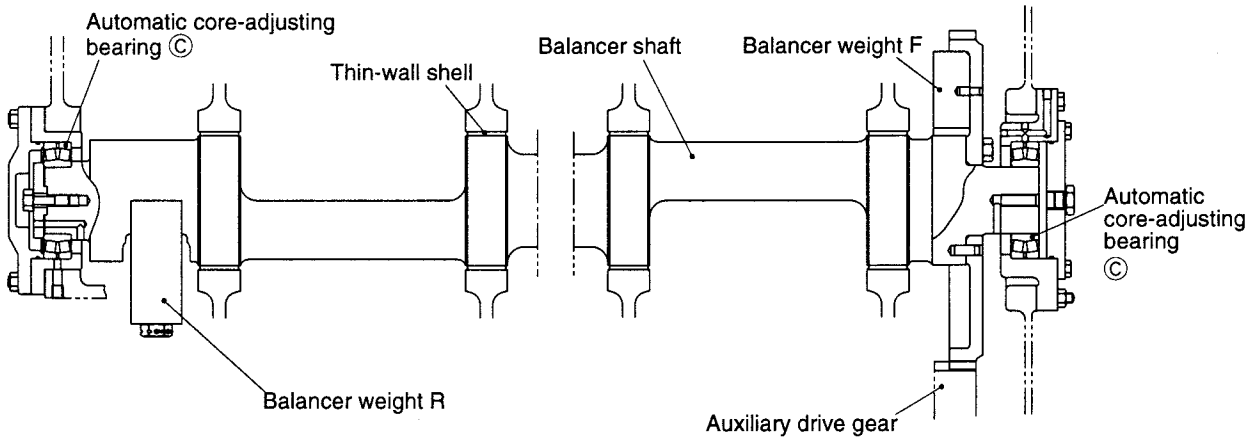
① General tools and measuring instruments
(📖: 2-2)
② Bearing retainer
③ Jack bolt
ⓐ Jack bolt
ⓑ Plate washer



② **Bearing Retainer**



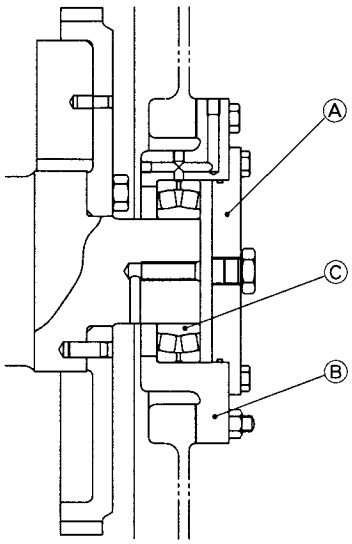
③ **Jack Bolt**



Balancer Shaft Assembly

7-2.3 Inspection and Maintenance of Balancer Shaft

In ordinary inspections, balancer shaft is not disassembled, however replace the automatic core-adjusting bearings on the both sides at every 16,000 to 24,000 hours (4 to 5 years) with the new ones.



《Replacing procedure of automatic core-adjusting bearing》

1. Removal of bearing

(1) Remove the bearing housing cover-F Ⓐ on the front side.

(2) Disconnect the mounting bolt of the bearing housing-F Ⓑ, mount the jack bolt (M12) to the shaft housing-F and evenly tighten it, and then remove the bearing Ⓒ and bearing housing-F.

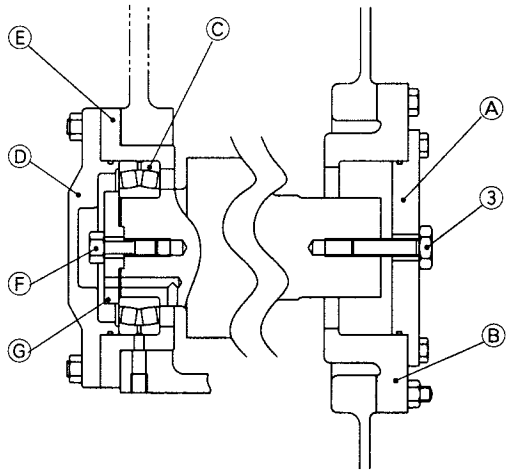
(3) Remove the bearing Ⓒ from the bearing housing-F.

(4) Attach the bearing housing-F and bearing housing cover-F again, and fix the balancer shaft with the jack bolt (M14) ③.

(5) Remove the bearing housing cover-R Ⓓ on the rear side, and remove the bearing stopper Ⓖ by loosening the bolt Ⓕ.

(6) Mount the jack bolt (M12) on the bearing housing-R Ⓔ and evenly tighten it, and then remove the bearing Ⓒ and bearing housing-R.

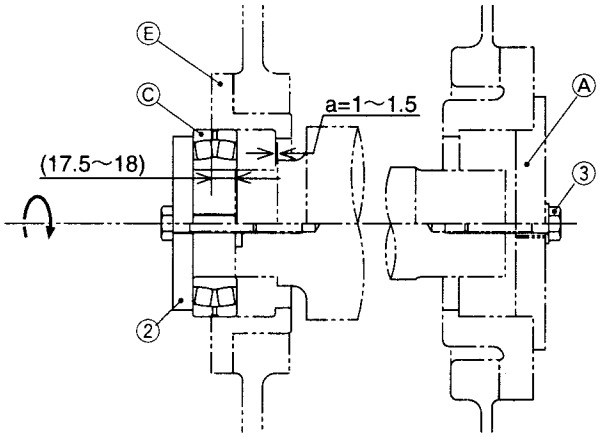
(7) Remove the bearing Ⓒ from the bearing housing-R.



2. Assembling of Bearing

(1) Adjust the jack bolt ③ of the bearing housing cover-F Ⓐ and, and fix it at the place where "a" on the rear side of the balancer shaft is 1 to 1.5 mm.
(At this moment, the distance between the faces of the bearing housing-R Ⓔ and balancer shaft is 17.5 to 18 mm.)

(2) Put the bearing Ⓒ into the bearing housing-R Ⓔ, and tighten the jack bolt ③ until the bearing hits the shoulder of the bearing housing-R, while placing the bearing retainer ② on it.



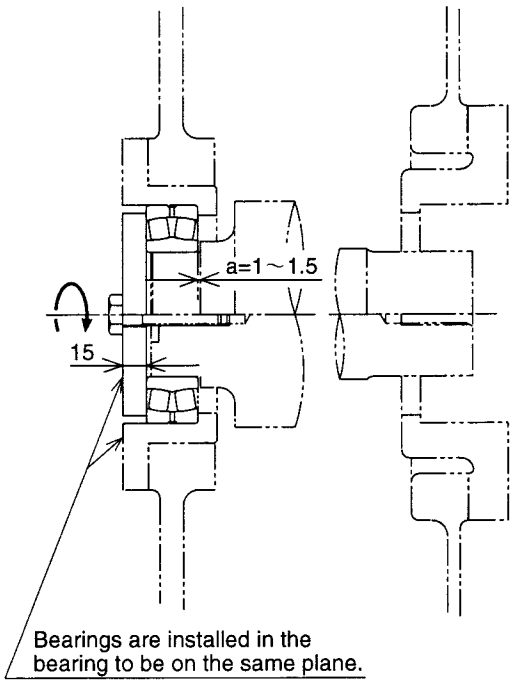
(3) Remove the jack bolt ③ and bearing housing-F Ⓐ on the front side, and tighten the jack bolt ③ on the rear side until it does not turn any more, to change the clearance "a" to 0.

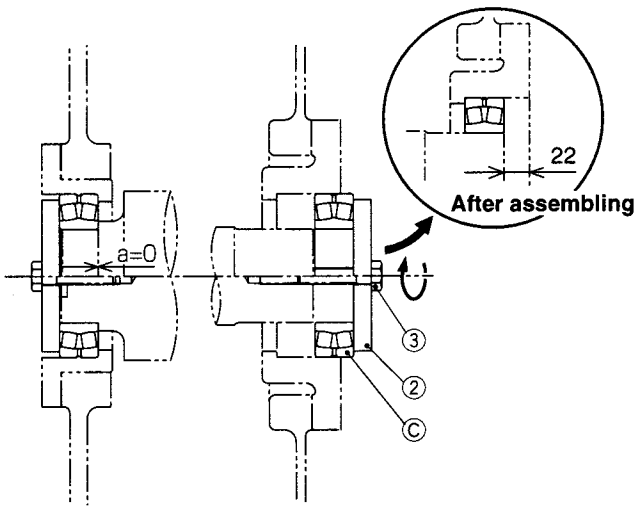
(4) Screw the bearing Ⓒ on the front side into the balancer shaft using the bearing retainer ② and jack bolt ③, on the state that the bearing is attached with the bearing retainer ② on the rear side and jack bolt ③.

(5) When the jack bolt on the front side does not turn any more, remove the jack bolt and bearing retainer on the front side and rear side.

(6) Mount the bearing stopper Ⓖ on the rear side to the balancer shaft using the bolt Ⓕ, and attach the bearing housing cover-R Ⓓ.

(7) Attach the bearing housing cover-F Ⓐ of the front side.





8. Timing Gear and Camshaft

8-1 Timing Gear

8-1.1 General Construction

The timing gear is arranged on the engine front side, and the camshaft is driven by the cam gear Ⓓ, from the crank gear Ⓐ located on the crankshaft rear side, via the idle gear-1 Ⓑ and idle gear-2 Ⓒ.

All the gears are helical gears made of high-strength alloy steel, and the cam gear tooth surfaces are carburized and hardened.

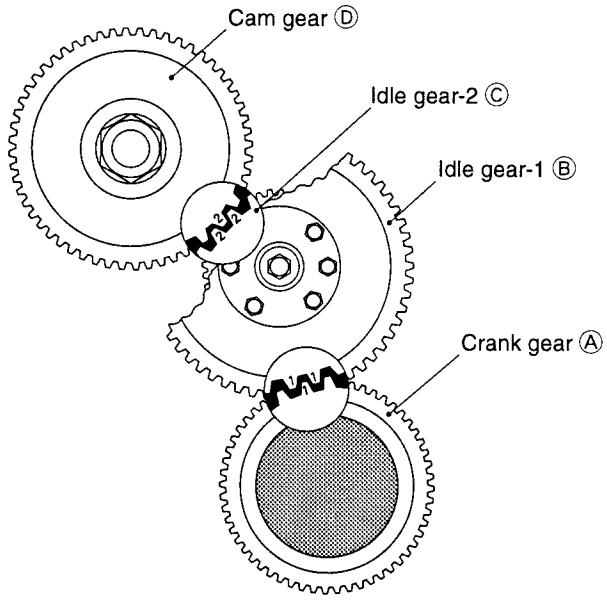
The cam gear is fixed to the camshaft by means of the shaft fastening elemental parts (POWER-LOCK) Ⓔ, which makes use of the wedge effect.

Lubricating oil is supplied to the idle gear bush Ⓕ through the drilled holes of the idle gear shaft bolt Ⓖ and idle gear shaft Ⓗ.

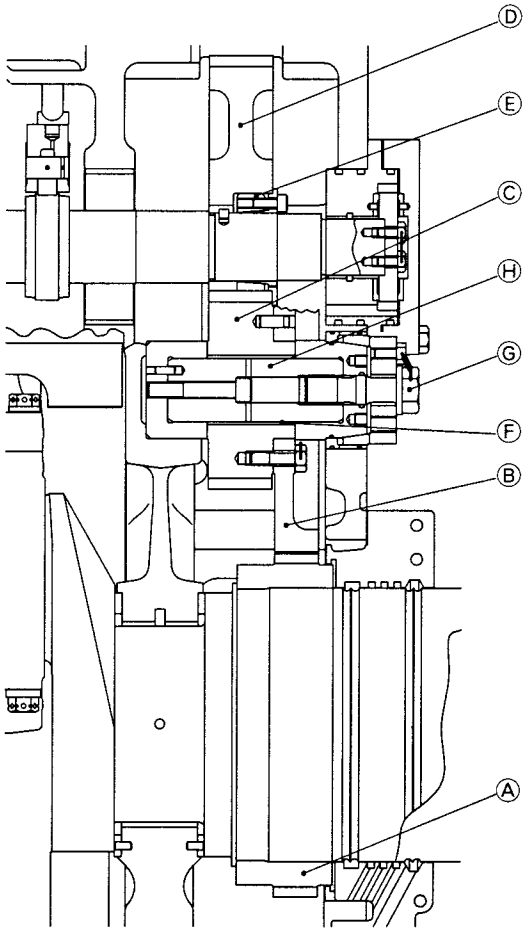
The gear tooth is lubricated through the oil feed nozzle.

Cam gear	**: 39 kg**
Idle gear assy.	**: 44 kg**

High technology is needed to disassemble, assemble, and adjust the area around the timing gear and camshaft.
When the maintenance of such high technology is needed as the results of the inspection, please contact our Service Department or agency, and perform suck works under the experienced engineers' guidance.



Engagement of Timing Gears



Timing Gears

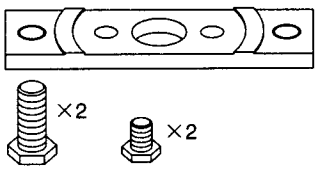
8-1.2 Replacing Consumables, Implements and Measuring Instruments

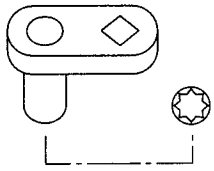
(1) Replacing Consumables

Replace the following Consumables with the new ones:

(📖 : "Parts List")

① O-ring 3-6 No.502, 503, 504





② **Idle Gear Shaft Implement** ③ **Spanner 41 x 25.4**

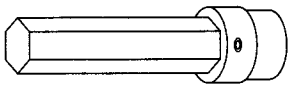
(2) Implements and Measuring Instruments

① General implements and measuring instruments (📖 : 2-2)

② Idle gear shaft implement (option)

③ Spanner 41×25.4 (option)

④ Hex. wrench 14×12.7 (option)



④ **Hex. Wrench 14×12.7**

8-1.3 Disassembly of Idle Gear

When disassembling the idle gear, the cam gear is needed to be extracted beforehand so that the idle gear can be dismounted from the cam gear cover side.

(📖 : 8-2.3 "Disassembly of Camshaft")

(1) Remove the flywheel cover.

(2) Remove the governor and governor driving device.

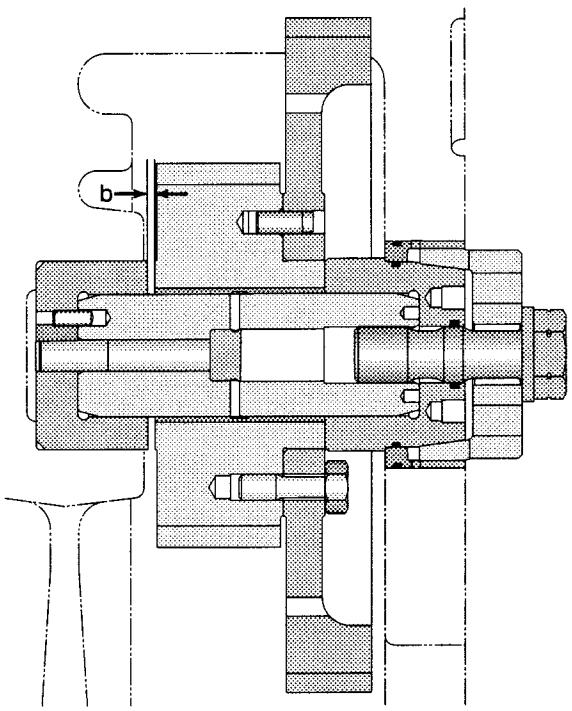
(📖 : 11-3 "Disassembly of Governor Driving Device")

(3) Remove the mist pipe on the rear side.

(4) Conduct the following measurement before disassembling the idle gear:

a) Measure the thrust clearance on the axis direction of the idle gear, and record the data.

Standard clearance (mm)	Replacing limit (mm)
b = 0.3 ~ 0.7	0.9



Idle Gear Thrust Clearance

Timing Gear: Disassembly of Idle Gear

b) Measure the backlash between the timing gears, and record the data.

i) Bend a lead wire of 0.5 mm diameter along the tooth profile, and adhere it using grease.

ii) Slowly turn the engine, and stop the turning at the point where the lead wire is caught.

iii) Next, turn the engine in the reverse direction, and pick up the lead wire to this side.

iv) Measure the thinnest part of the thickness of the lead wire that is collapsed. (A and B as shown in the figure)

v) Conduct the measurement in the 4 places per 90° on the large gear wheel, and take its average value.

Backlash	Standard value (mm)	Replacing limit (mm)
A+B	b= 0.2 ~ 0.3	0.5

(5) Remove the cam gear.
(: 8-2.3 "Disassembly of Cam Gear")

(6) Install the eyebolt to the idle gear-1 Ⓑ, and support the idle gear-1 by passing the suspending wire around the eyebolt from the mist exhaust port of the engine frame

(7) Remove the oil feed plug of the idle gear shaft bolt Ⓖ, and remove the idle gear shaft bolt using the spanner 41 x 25.4 ③.

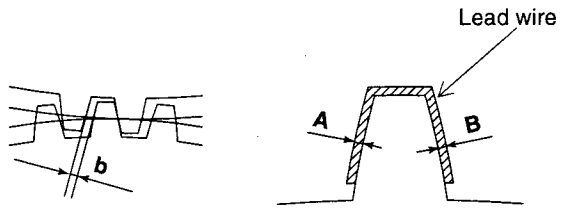
(8) Screw the bolt of the idle gear shaft implement ② into the idle gear shaft support-3 Ⓘ, and remove the idle gear shaft support-3.

(9) Mount the idle gear shaft implement on the idle gear shaft support-2 Ⓙ.
Screw the bolt into the idle gear shaft support implement, and extract the idle gear shaft support-2 and idle gear shaft support-4 Ⓚ at the same time.

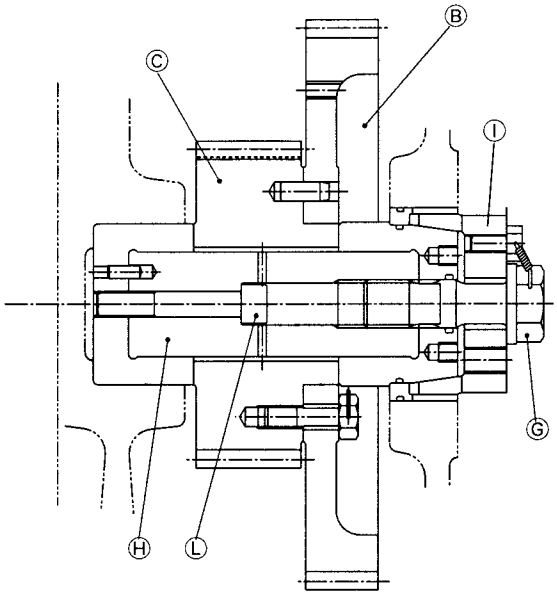
(10) Remove the bolt Ⓛ with the hole in the idle gear shaft using the hexagonal wrench ④.

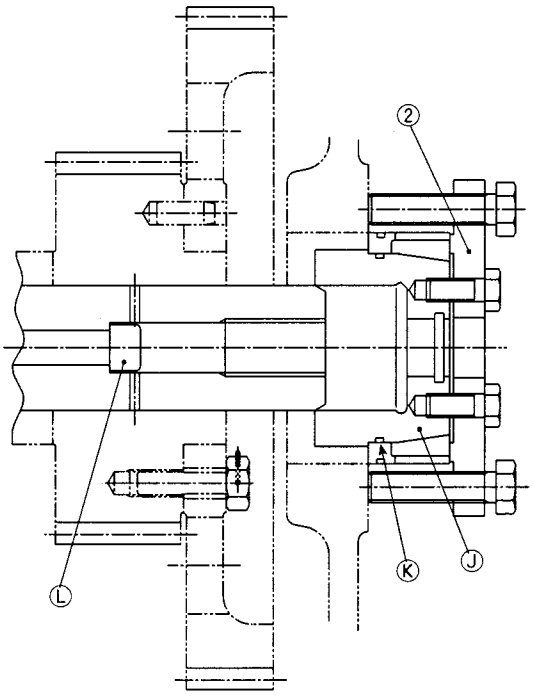
(11) Screw the idle gear shaft bolt into the idle gear shaft, and extract the idle gear shaft.

(12) Take out the idle gear from the cam gear cover side of the engine side face, by slowly loosening the wire.



Backlash b (= A + B)





Idle Gear Disassembling Procedure

8-1.4 Inspection and Maintenance of Timing Gear

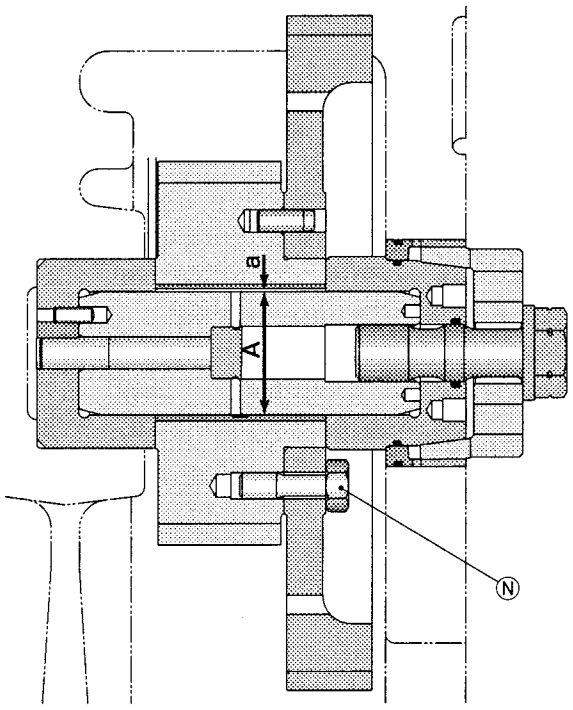
(1) Wash all the gears and parts using washing oil.
(2) Clean the idle gear shaft oil hole by blowing air.
(3) Check the idle gear-1, -2, and cam gear tooth surface for contact, pitching, and scratch.
(4) Turn the crankshaft, and check the crank gear as well, in the same manner as above.
(5) Inspect the tightening conditions of the tightening bolt Ⓝ of the idle gear-1 and idle gear-2.
Inspect the bolt tightening conditions under the specified torque, and in case that the bolt is loosened, remove the bolt, clean it, and then tighten it again with the specified torque.
In case that the thread of the bolt is damaged, replace the bolt with a new one.

Specified torque : 118 N·m {12 kgf·m}

(6) Check the idle gear bush and shaft for the contact and wear conditions.
(7) Measure the outer diameter of the bush contact area of the idle gear shaft using an outside micrometer.
(8) Measure the inner diameter of the idle gear bush using a cylinder gauge.
(9) Calculate the clearance from the results of the measurement of the idle gear shaft and idle gear bush, and when the clearance is over the replacing limit, replace the idle gear bush with a new one.

Nom. size (mm)	Standard clearance (mm)	Replacing limit (mm)
A= ϕ 65	a=0.0~0.15	0.25

△ When it is presumed that the clearance will be over the replacing limit before the next periodic maintenance, replace the bush, even if the clearance is presently within the limit.



Idle Gear Bush Clearance

8-1.5 Assembly of Idle Gear

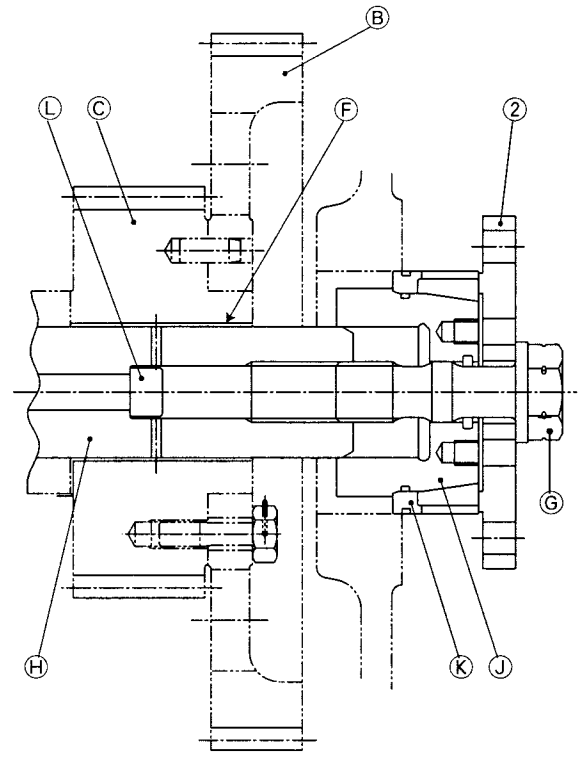
Assemble the idle gear according in the reverse order of the disassembling procedure.

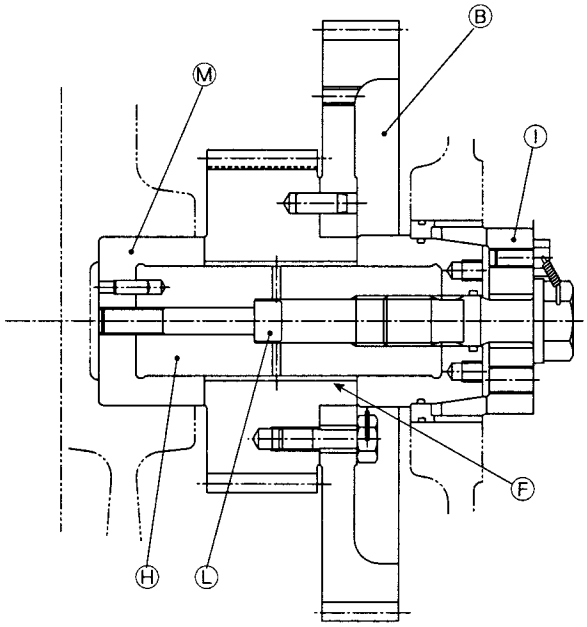
(1) Suspend the idle gear assembly with a wire, and move it to the specified place.
(2) Turn the crank shaft, and place the No.1 cylinder to the position of the intake top dead center.
(3) Apply grease to the idle gear bush Ⓕ, and match the matchmarks of the idle gear-1 Ⓑ and crank gear.
(4) Apply lubricating oil to the idle gear shaft Ⓗ, insert it into the idle gear and idle gear shaft support-1 Ⓜ, and then match the knock pin positions.
(5) Apply lubricating agent (MOLYKOTE 1000 spray type) to the thread area and seat surface of the bolt Ⓛ with the hole, and tighten it with the specified torque using a hexagonal wrench.

Specified torque: 196 N·m {20 kgf·m}

(6) Assemble the idle gear shaft support-2 Ⓙ and idle gear shaft support-4 Ⓚ.
Mount the idle gear shaft implement ② and idle gear shaft support-2, -4 to the idle gear shaft bolt Ⓖ.
Tighten the idle gear shaft bolt until the idle gear shaft support-2 becomes tightly in contact with the idle gear shaft.
(7) Remove the idle gear shaft bolt and idle gear shaft implement.
(8) Apply the lubricating agent (MLYKOTE 1000 spray type) to the threaded area and seat surface of the idle gear shaft bolt, mount the idle gear shaft support-3 Ⓘ, and angularly tighten it with the specified torque using the spanner 41×25.4 ③.

A-torque: 196 N·m {20 kgf·m}
Angular tightening (B mark): 40°
B mark equivalent torque:
588 N·m {60 kgf·m}





Idle Gear Assembling Procedure

△

《Cautionary items when assembling the timing gears》

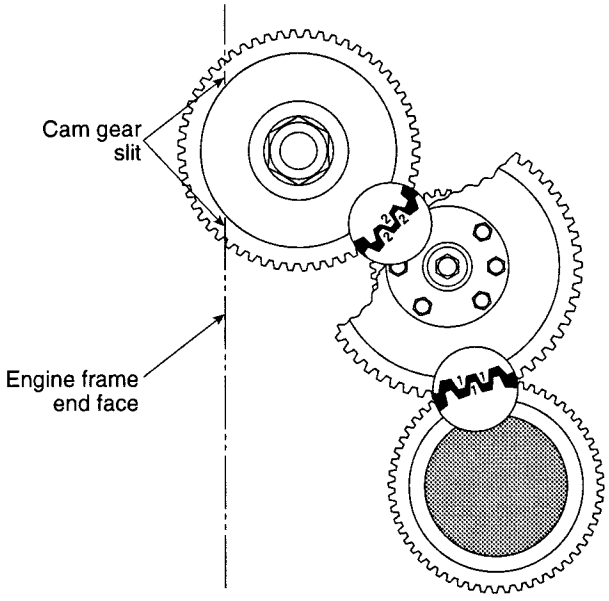
a) The engagement matchmarks of the timing gears are notched on the side of each gear. Be sure to check the engagement matchmarks when assembling the gears without fail.

b) When the matchmarks of the crank gear and idle gear are engaged, also have the matchmarks of the cam gear and idle gear engaged at the same time.

c) If the slit on the flywheel side of the cam gear is aligned with the engine end face, while matching the engagement matchmarks on the crank gear side, the matchmarks of the cam gear and idle gear will be engaged.

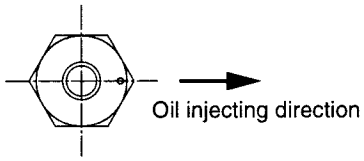
d) Since it is required to determine the oil injecting direction of the idle gear oil feed nozzle, be careful of the mounting direction of the nozzle.

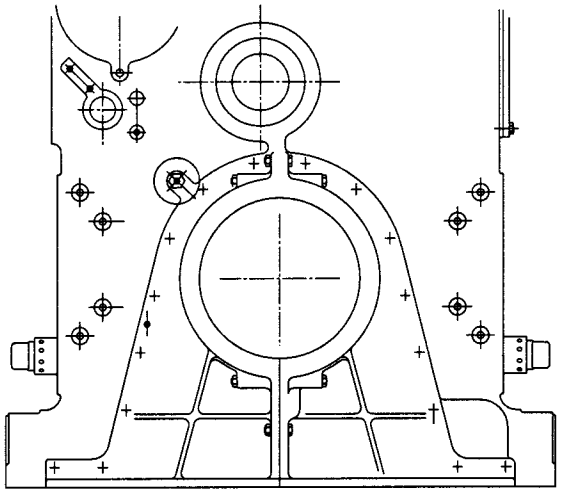
The punch mark direction of the nozzle hexagonal head is the oil injecting direction. Be minded to conduct the shim adjustment so that the punch mark faces toward the horizontal direction of the engine inner side.



This figure shows the engagement of timing gears when No.1 cylinder is on the position of the intake top dead center.

Matchmarks of Timing Gears





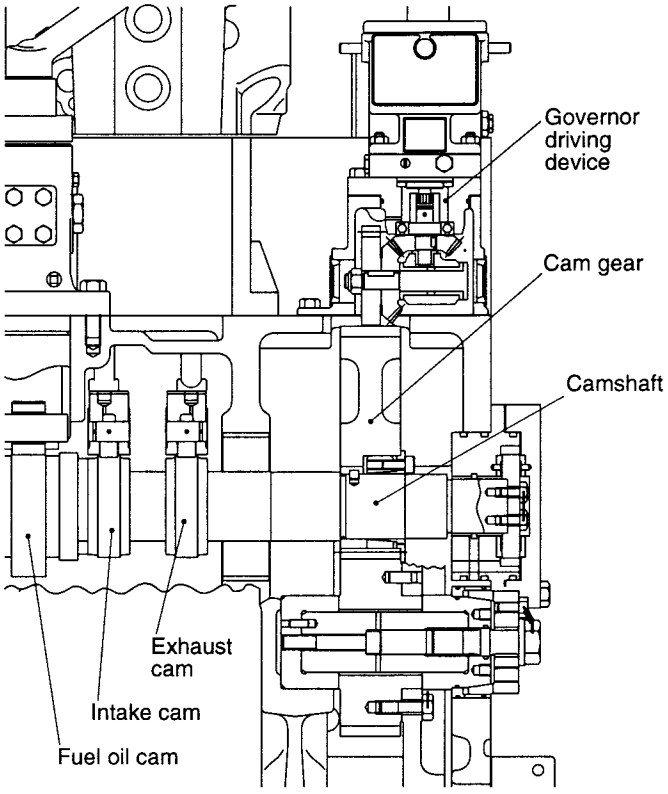
Mounting Direction of Oil Feed Nozzle

8-2 Camshaft

8-2.1 General Construction

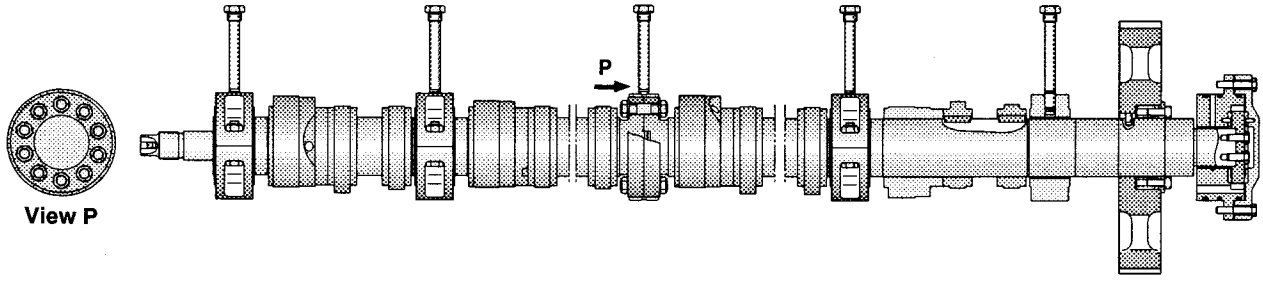
The camshaft is of one-piece construction made of carbon steel, and is driven by the cam gear located on the rear end part.
The governor driving device is provided to the cam gear upper part, and is directly driven from the cam gear.
The starting air rotary valve is driven from the camshaft front end via the Oldham's coupling.
The intake and exhaust cams are fixed to the camshaft by shrink fitting, and these cams are positioned by the key.
The fuel cam is also fixed to the camshaft by shrink fitting as in the same manner as the case of the intake and exhaust cams.
The surface of each cam is carburized.
The cam bearings are provided at the front and rear of the cam gear, and the cam bearings are also provided at the front side of the fuel oil injection pump of each cylinder.
The bearing housing between each cylinders is divided into 2 parts, i.e. the upper and lower sections, and the cam bearing pin combines the oil feed passage.
(📖 : 8-1 "Timing Gear")
(📖 : 11 "Governor Driving Device")
(📖 : 13-3 "Starting Air Rotary Valve")

Camshaft assy. (excluding cam gear) :
3DK : 96 kg
5DK : 140 kg
6DK: 160 kg
8DK: 210 kg



Camshaft Rear End

◎Camshaft divided into 2 sections (optional specification)
The camshaft divided into 2 sections is divided at the center of the camshaft in relation to the disassembly space, and the connecting flange is tightened with 10 sets of the bolts and nuts.
The outer periphery of the flange is the bearing part, and the bearing shell is press-fitted into the engine frame.



Camshaft Divided Into 2 Sections (Option)

8-2.2 Replacing Consumables, Implements, and Measuring Instruments

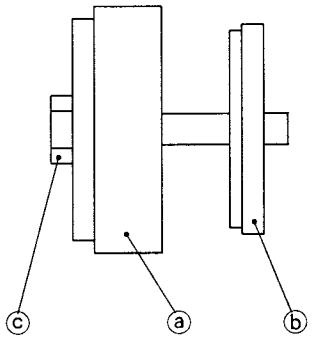
(1) Replacing Consumables

Replace the following parts with the new ones.
(: "Parts List")

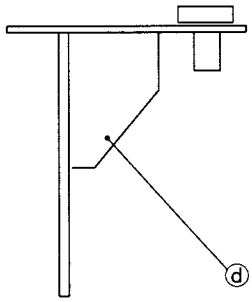
① O-ring 3-8.7 No.B509
② O-ring 3-8.1 - 8.6 No.B511
③ Circular gasket 3-8.1 - 8.6 No.B510

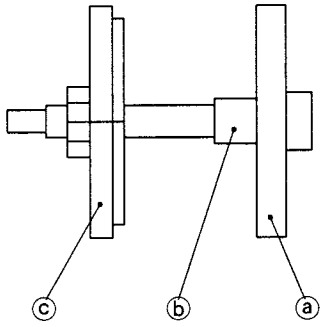
(2) Implements and Measuring Instruments

① General implements and measuring instruments (: 2-2)
② Camshaft shell extracting implement
·····For the camshaft divided into 2 sections (Option)
ⓐ Shell extracting implement-1
ⓑ Shell extracting implement-2
ⓒ Bolt
③ Camshaft shell assembling implement
·····For the camshaft divided into 2 sections (Option)
ⓐ Shell assembling implement-1
ⓑ Shell assembling implement-2
ⓒ Shell assembling implement-3
ⓓ Shell assembling implement-4
④ Fuel oil cam adjusting implement (option)
ⓐ Hydraulic pump (Use the one for hydraulic jack.)
ⓑ High-pressure hose (Use the one for hydraulic jack.)
ⓒ Coupler
ⓓ Fuel oil cam adjusting handle



② Camshaft Shell Extracting Implement





③ Camshaft Shell Assembling Implement

8-2.3 Disassembly of Camshaft

Disassemble the camshaft in the following procedure:

(1) Remove the governor, governor driving device, starting air rotary valve and its related parts, and piping.
(📖 : 11-3 "Governor Driving Device")
(📖 : 13-3 "Starting Air Rotary Valve")

(2) Remove the gear case on the front side of the camshaft, cam gear cover on the side of the camshaft, and cam chamber cover.

(3) Take out the cylinder head cover, and remove the rocker arm device and push rod.
(📖 : 3-4 "Rocker Arm Device")

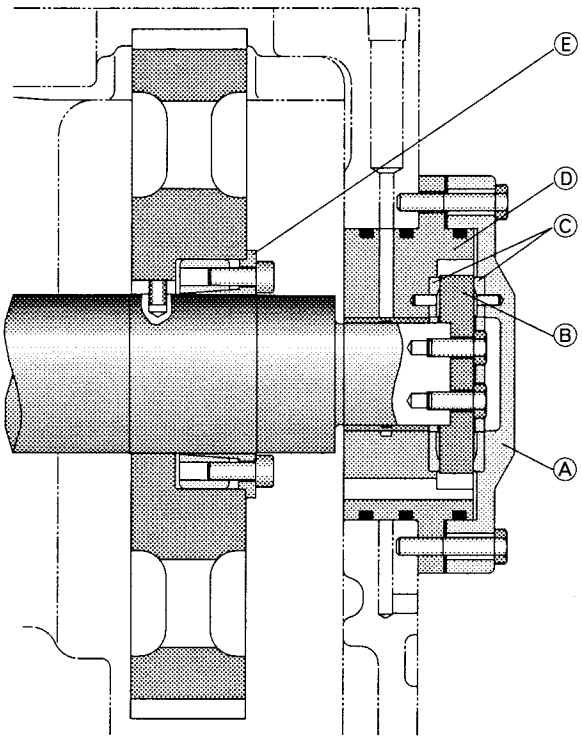
(4) Remove the fuel oil injection pump and valve driving device.
(📖 : 9 "Fuel Oil Injection Pump")
(📖 : 10 "Valve Driving Device")

(5) Before removing the thrust bearing, measure the thrust clearance of the camshaft.
Placing a dial gauge against the top end of the camshaft, and measure the clearance by moving the camshaft back and forth.

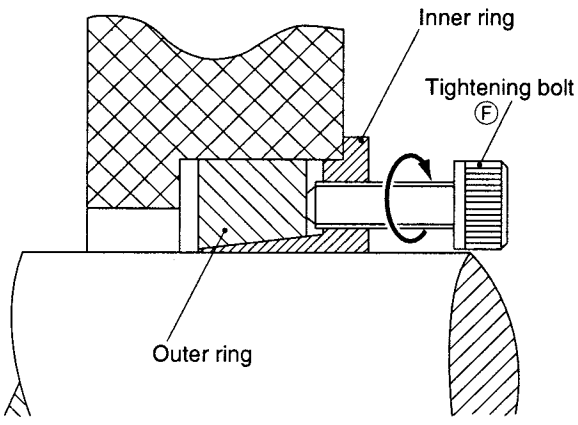
Standard clearance(mm)	Replacing limit(mm)
b = 0.15	0.45

(6) Remove the thrust bearing located on the rear side of the camshaft in the following procedure:
a) Loosen the bolt, and take out the bearing cover Ⓐ.
b) Loosen the thrust bearing mounting bolt, and remove the thrust bearing Ⓑ and thrust shell Ⓒ.
c) Remove the bearing body Ⓓ.
Remove the bearing cover, thrust bearing, and bearing body using the jack bolt.

(7) Remove the POWER-LOCK Ⓔ mounted on the cam gear in the following procedure:
a) Confirm that the rotational torque or thrust load is not applied on the boss and shaft.
b) Gradually loosen the POWER-LOCK tightening bolt Ⓕ by dividing into several steps.
c) Remove the POWER-LOCK by screwing and tightening the tightening bolt Ⓕ into the dismounting threaded hole.



Thrust Bearing



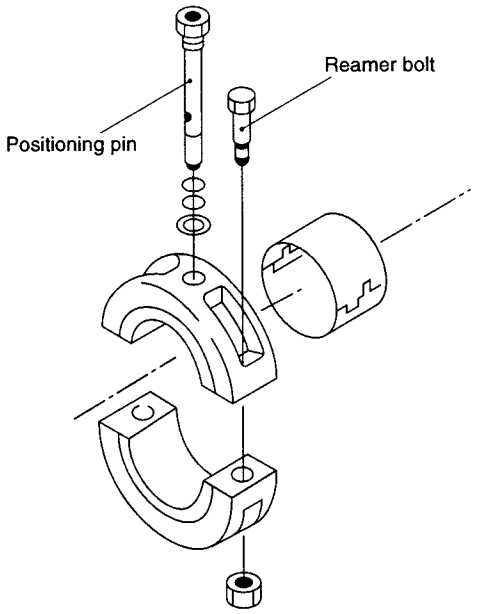
Removal of POWER-LOCK

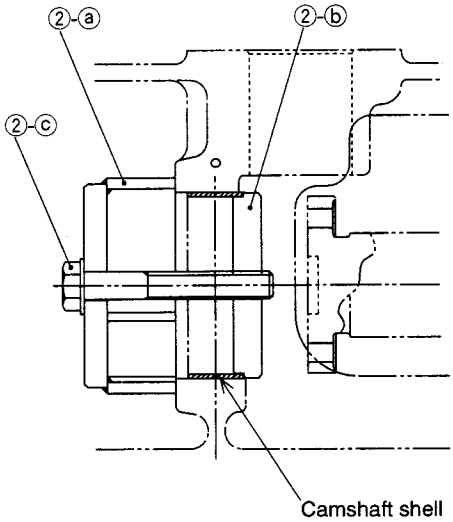
(8) Remove the camshaft positioning pin of the camshaft upper part shelf.
(9) Move the camshaft to the front of the engine to as much extent as that the disassembling of the camshaft is possible.
(10) Divide the cam bearing, and remove it from the camshaft.
The cam bearing is divided into 2 parts of the upper and lower sections, and can be disassembled if the reamer bolt is removed.
(11) Move the camshaft to the front of the engine, and take out the cam gear from the side of the cam gear chamber.
(12) Extract the camshaft toward the front.

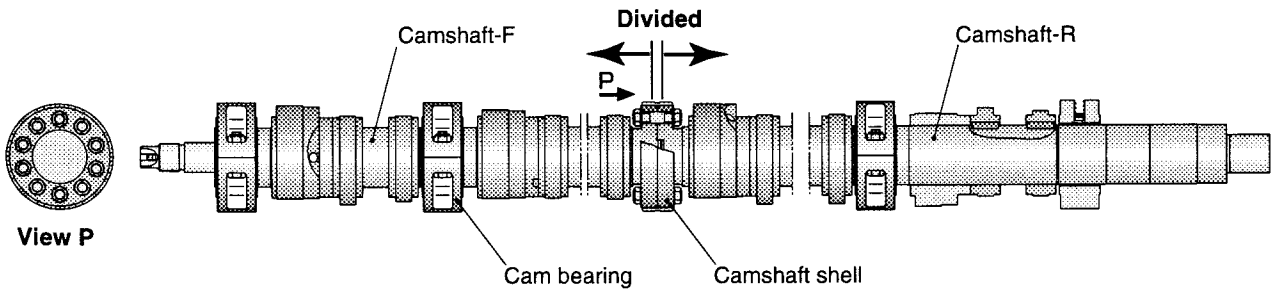
> When disassembling the camshaft, be careful not to damage the cam and camshaft.

◎Disassembly of the camshaft divided into 2 sections

(1) After finishing the works of the above Item (1) to (8), loosen the nut of the divided parts at the center of the camshaft, and remove the tightening bolt.
(2) Move the camshaft-F to the front of the engine to as much extent as that the cam bearing can be disassembled.
(3) Disassemble the cam bearing, and take out it from the camshaft.
(4) Extract the camshaft-F toward the front.
(5) Move the camshaft-R toward the rear, and mount the camshaft shell extracting implement.
(6) Push in the extracting implement bolt, and extract the camshaft shell.
(7) Move the camshaft-R to the front of the engine to as much extent as that the cam bearing can be disassembled.
(8) Disassemble the cam bearing, and remove it from the camshaft.
(9) Extract the camshaft-R toward the front.







Camshaft Divided Into 2 Sections

8-2.4 Inspection and Maintenance of Camshaft

Since the items mentioned in this section are the parts to which NOx Technical Code shall be applied, when replacing any of these parts, be sure to use the parts provided with the identification marks.
(📖: 0-3 "Engine Conforming to NOx Technical Code.")

(1) Inspect if there is any pitching or peel on each cam surface.

△ When the pitching, peeling, or wearing on the cam surface is excessive, it is necessary to replace the cam with a new one.
When the damage is of light degree, the cam service life can be extended to some degree by conducting the surface treatment. Therefore, consult our Service Department.

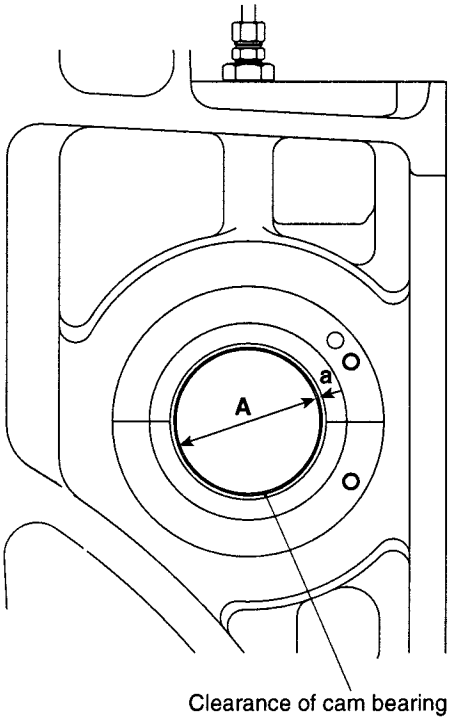
(2) Inspect if the cam is not slid.
(3) Check the camshaft shell for the wearing, scratch, or peeling conditions.
(4) Measure the clearance between the camshaft and the bearing.
a) Measure the outer diameter of each bearing of the camshaft using an outside micrometer.
b) Assemble the cam bearing incorporating the shell, and
measure the inner diameter of the bearing using a cylinder gauge.
c) Calculate the clearance from the results of the measurement, and in case that the clearance is over the replacing limit, replace the bearing shell with a new one.

Nom. size (mm)	Standard clearance (mm)	Replacing limit (mm)
A= ϕ 90	a=0.04~0.12	0.2

(5) Inspect the wearing, scratch, or peeling conditions of the thrust shell.
(6) Maintenance of POWER-LOCK
a) Disassemble the POWER-LOCK by extracting the bolt, and clean all the parts.
b) Thinly apply lubricating oil on all the parts.

△ Do not use the oil which contains silicone type or molybdenum type lubricating agent. Use of such an oil decreases the friction coefficient and allows easier sliding.

c) Assemble the camshaft so that the blanked tap hole of the inner ring and the phase of the outer ring slit part do not match.



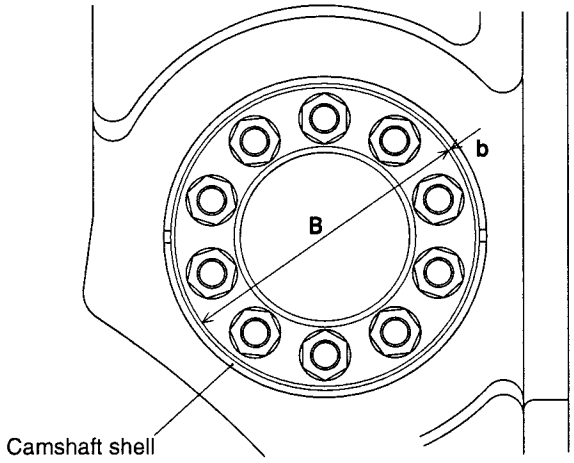
Clearance of Cam Bearing

◎Inspection and maintenance of the camshaft divided into 2 sections

As for the bearings of the divided sections, also inspect for the wearing, scratch, and peeling conditions of the bearing shell, as same manner as in the case of the other bearings.

Measure the bearing clearance, and in case that the clearance is over the replacing limit, replace the bearing shell with a new one.

Nom. size (mm)	Standard clearance (mm)	Replacing limit (mm)
A= ϕ 155	a=0.07~0.19	0.3



8-2.5 Assembly of Camshaft

Assemble the camshaft in the reverse order of the disassembling procedure.

(1) Clean the boss inner surface of the cam gear and the surface of the camshaft, and thinly apply lubricating oil on them.

(2) Insert the camshaft into the position to as much extent as that the cam bearing can be installed.

Insert the cam gear and POWER-LOCK into the camshaft.

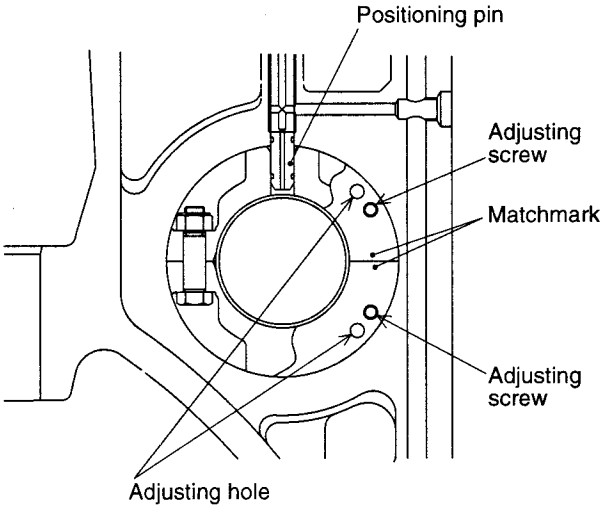
(3) Confirm the matchmarks of the top and bottom cam bearings, assemble the shell into the housing, and tighten the nut by passing the reamer bolt.

(4) Move the camshaft and cam bearing to the position where the cam bearing positioning pin holes can be matched.

(5) Attach the circular gasket and O-ring to the cam bearing positioning pin, and then fit and install the pin into the cam bearing pin hole.

To fit the pin into the bearing pin hole, move the cam bearing toward the circumferential direction, and toward the front and rear directions, utilizing the adjusting threaded hole or the hole of the cam bearing side face.

(6) Install the thrust bearing.



(7) Adjust the thrust bearing clearance.
Place the dial gauge against the tip of the camshaft, move the camshaft back and forth, and then adjust using the shim so that the clearance becomes 0.15 mm.

(8) Fix the cam gear to the camshaft using POWER-LOCK. Install the cam gear so that the clearance between the cam gear and idle gear-1 Ⓑ becomes 3 mm.

(9) Tighten the POWER-LOCK in the following procedure:

《POWER-LOCK tightening procedure》

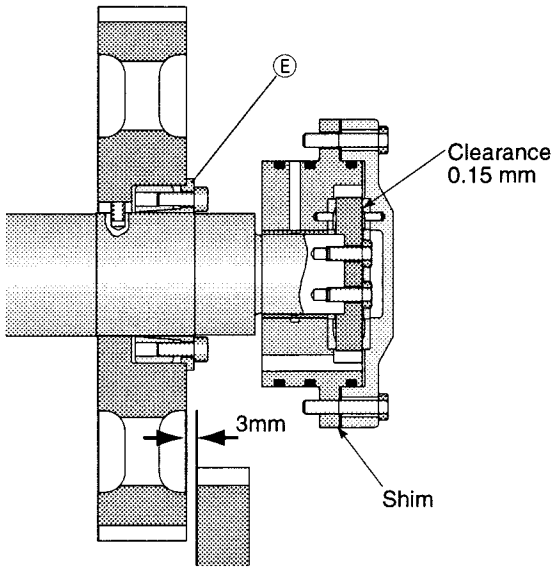
a) Lightly push the POWER-LOCK to the specified position by hand, in the state that the POWER-LOCK tightening bolt is lightly tightened.

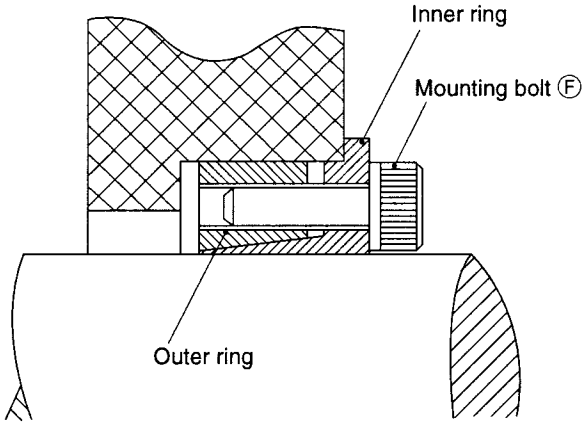
b) After inserting the POWER-LOCK to the specified position, tighten the tightening bolts of 4 places diagonally with about 1/4 torque. Next, tighten the other tightening bolts in the same manner.

c) Setting the tightening torque to about 1/2 of the specified torque, sequentially tighten the bolts diagonally in the same manner as in Item b).

d) Sequentially tighten all the tightening bolts with the specified torque diagonally. Repeat this procedure a few times, and confirm the tightening conditions.

Specified torque: 80 MPa {8.3 kgf·m}





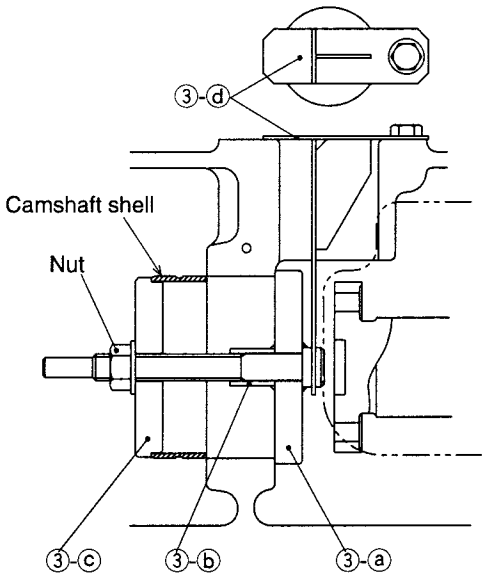
Mounting of POWER-LOCK

◎Assembly of the camshaft divided into 2 sections

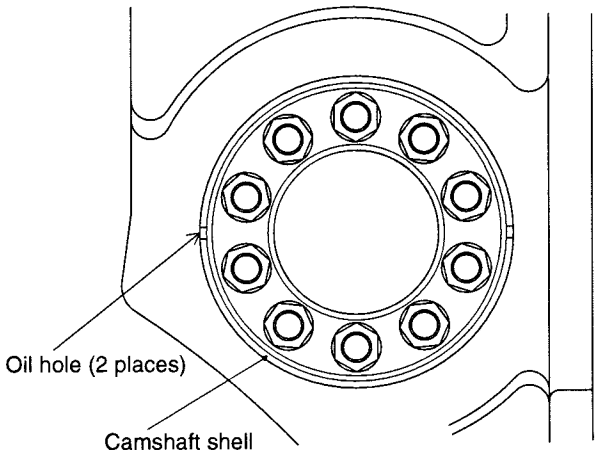
(1) Insert the camshaft-R to the position where the cam bearing can be installed. Previously insert the cam gear and POWER-LOCK into the camshaft.

(2) Install the cam bearing.

(3) Move the camshaft-R and cam bearing to the position where the camshaft shell fitting implement can be mounted.



(4) Mount the camshaft shell and camshaft shell fitting implement, and press-fit the camshaft shell by tightening the implement nuts.
Install the camshaft shell, so that the oil hole is in horizontal position.



△ When press-fitting the shell, be careful so that the shell may not be distorted or damaged.

(5) Insert the camshaft-F to the position where the cam bearing can be installed, and then install the cam bearing.

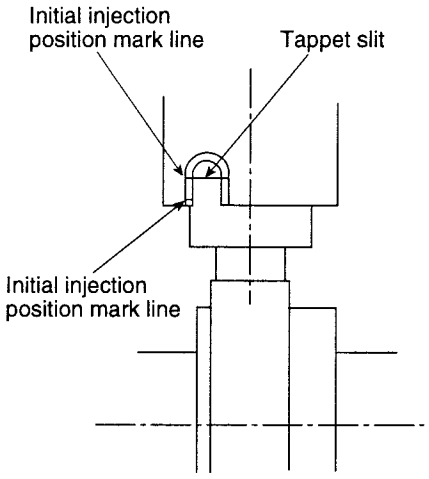
(6) Insert the camshaft-F and camshaft-R into the camshaft shell part, attach the bolts, and then tighten them with the nuts.
Attach the 2 reamer bolts diagonally, and sequentially tighten the nuts diagonally.

(7) Afterwards, assemble the camshaft in the same procedure as that of the one-piece construction camshaft.

8-2.6 Inspection of Fuel Oil Cam Timing

Since the items mentioned in this section are the parts to which engine value specified in NOx Technical Code shall be confirmed, do not make any change that may deviate from the setting values.
(: 0-3 "Engine Conforming to NOx Technical Code.")

Read the initial injection angle when the initial injection line of the fuel oil injection pump and the fuel oil injection pump tappet line is aligned, from the scale on the flywheel.



Initial Injection Position

8-2.7 Adjustment of Fuel Oil Cam Timing (When Replacing Cam)

Since the items mentioned in this section are the parts to which engine value specified in NOx Technical Code shall be confirmed, do not make any change that may deviate from the setting values.

(: 0-3 "Engine Conforming to NOx Technical Code")

In case that the cam or camshaft is replaced, perform the adjustment in the following procedure:

(1) Attach the coupler and coupler connector to the fuel oil cam, and then connect the high-pressure hose.

(2) Apply the hydraulic pressure of more than 34.3MPa {350 kgf/cm²} using a hydraulic pump.

△ The maximum oil pressure is 68.6 MPa {700 kgf/cm²}

(3) Adjust the fuel oil cam using the special handle in the state that the hydraulic pressure is applied.

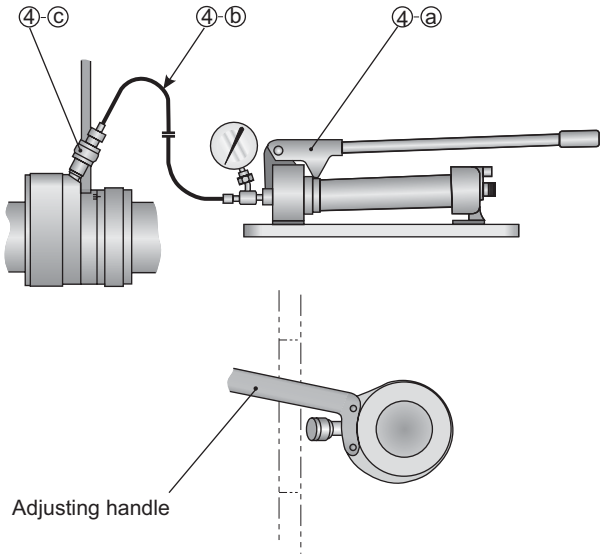
a) Adjust the fuel oil cam slit referring to the slit on the intake cam side as the standard.

b) Read the initial injection angle when the initial injection line of the fuel oil injection pump and the fuel oil injection pump tappet line is aligned, from the scale on the flywheel.

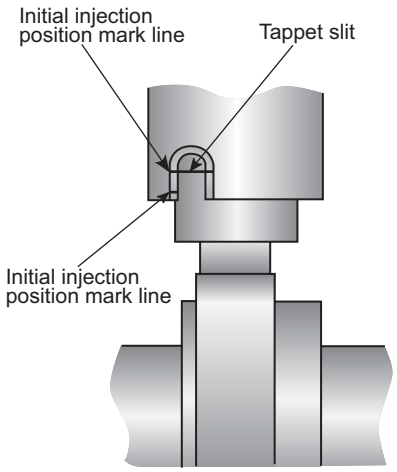
c) Adjust the fuel oil cam again, so that the angle becomes the initial injection angle that is specified on the adjustment plate on the inspection window of the engine frame.

△ When restarting the operation, measure the maximum combustion pressure, and readjust the initial injection timing of the fuel oil cam, so that the deviation among the cylinders is within 0.3 MPa {3 kgf/cm²} at the time of full loading.

However, be minded that the maximum combustion pressure at the time of full loading do not exceed 15.8 MPa {160 kgf/cm²}.



Adjustment of Fuel Oil Cam



Initial Injection Position

《Relationship between the initial injection angle of the fuel oil cam and the maximum combustion pressure (Pmax)》

The maximum combustion pressure can be varied by turning the fuel oil cam, and by changing the initial injection angle, as the followings:

(The rotating direction of the camshaft is as same as the rotating direction of the engine.)

- ○ Turn the camshaft toward the rotating direction. (Advance the injection timing.)
  ·····Pmax will be increased.
- ○ Turn the camshaft toward the anti-rotating direction. (Delay the injection timing.)
  ·····Pmax will be decreased.

Variation standard of Pmax (when fully loaded)
If the initial injection is changed by 1° of the crank angle, Pmax will be changed by 0.3～0.5 MPa {3～5 kgf/cm²}.

9. F.O. Injection Device

9-1 General Construction

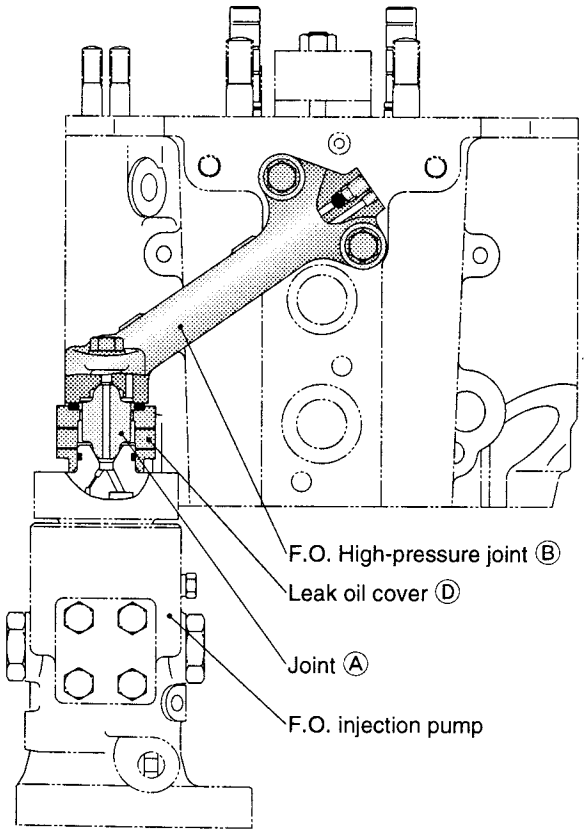
The F.O. injection pump is a Bosch type, tappet-incorporated high-pressure single cylinder pump, and the plunger is lubricated with lubricating oil. In case of heavy fuel oil specification, the pump rack is assembled with the stop air cylinder.

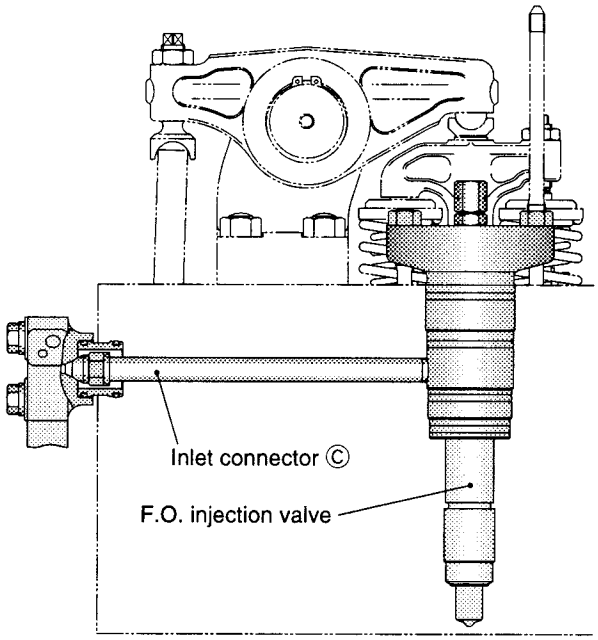
High-pressure fuel oil is introduced from the pump outlet into the F.O. injection valve inlet connector Ⓒ, through the drilled holes of the forged steel high-pressure coupling Ⓑ, via the joint Ⓐ with the spherical surfaces on the both ends.

In case that high-pressure oil has leaked from the connecting part ranging from the F.O. injection pump to the F.O. injection valve, such oil will be recovered through the piping into the leak oil tank from the leak oil cover Ⓓ attached on the upper part of the fuel oil injection pump, and the level switch will detect the abnormality.

(: "Operation" 5-4.2 "Inspection and Maintenance of F.O. Injection Valve")

F.O. injection pump assy. : 16.8 kg





Fuel Oil Injection Device

9-2 Replacing Consumables, Implements, and Measuring Instruments

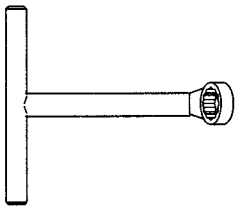
(1) Replacing Consumables

Replace the following parts with the new ones:
(📖: "Parts List")

① O-ring	2-23.2 No.216, 230, 236, 285
② Back-up ring	3-23.2 No.235
③ Gasket	3-23.2 No.261, 280
④ O-ring (for high-pressure coupling)	3-24.1.1 No.505
	3-24.1.2 No.12, 506

(2) Implements and Measuring Instruments

① General tools and measuring instruments (📖: 2-2)
② F.O. pump spanner 24



② F.O. Pump Spanner 24

9-3 Disassembly of F.O. Injection Pump

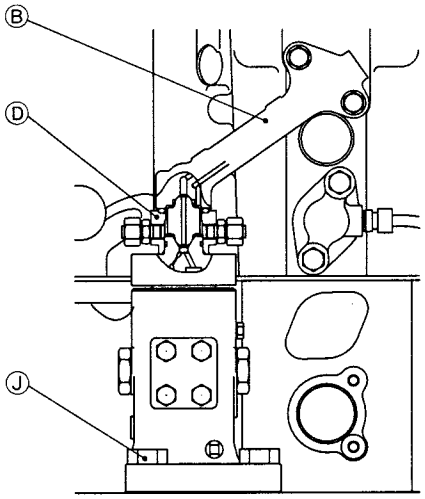
(1) Turn the engine to place the roller of the F.O. injection pump on the base circle of the fuel oil cam.

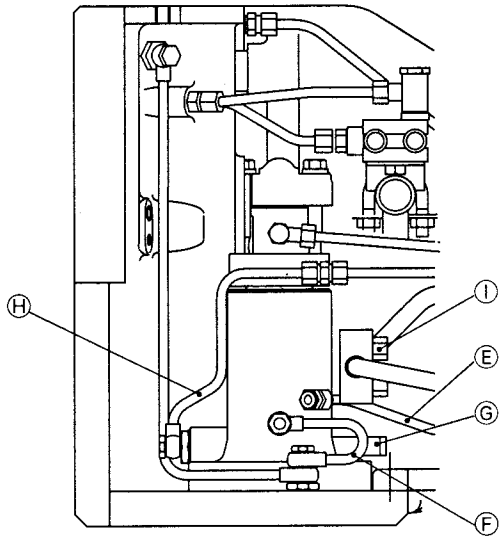
(2) Remove the F.O. high-pressure joint Ⓑ, plunger oil supply piping Ⓔ, drain pipe Ⓕ, leak oil cover Ⓓ, and rack pin Ⓖ.
Disconnect the stop air piping (heavy fuel oil specification) Ⓗ of each cylinder.

(3) Remove the mounting bolt Ⓘ of the F.O. injection pump inlet block.

(4) Disconnect the pump mounting nut Ⓙ using the F.O. pump spanner 24 ②.

(5) Pass a wire around the F.O. injection pump, suspend it, and dismount it from the engine.





△ The injection timing of the F.O. injection pump is readily adjusted for each cylinder. When disassembling the pump, be minded to discriminate the pumps according to the following procedure, so that each of the F.O. injection pumps may not be assembled into a wrong cylinder:

1) Describe the engine number and cylinder number on the pump body.
2) Attach the tag as one set to the shim (for adjusting the base circle) of the mounting surface, and describe the engine number and cylinder number on it.

9-4 F.O. Injection Pump

9-4.1 Disassembly of F.O. Injection Pump

The F.O. injection pump is a precision parts in particular.
Even fine foreign matters will cause sticking or breakage of the plunger and the delivery valve. Therefore, when disassembling or assembling the pump, take every possible care to prevent the infiltration of foreign matters.

(1) Mount the F.O. injection pump on a vice, so that the tappet ⓓ is on the upper side.
(2) Remove the fall-stop pin ⓔ by means of the bolt (M6×20), while pushing the tappet, and using a gear puller and the like.

Be careful so that the tappet roller may not jump out due to the spring force.

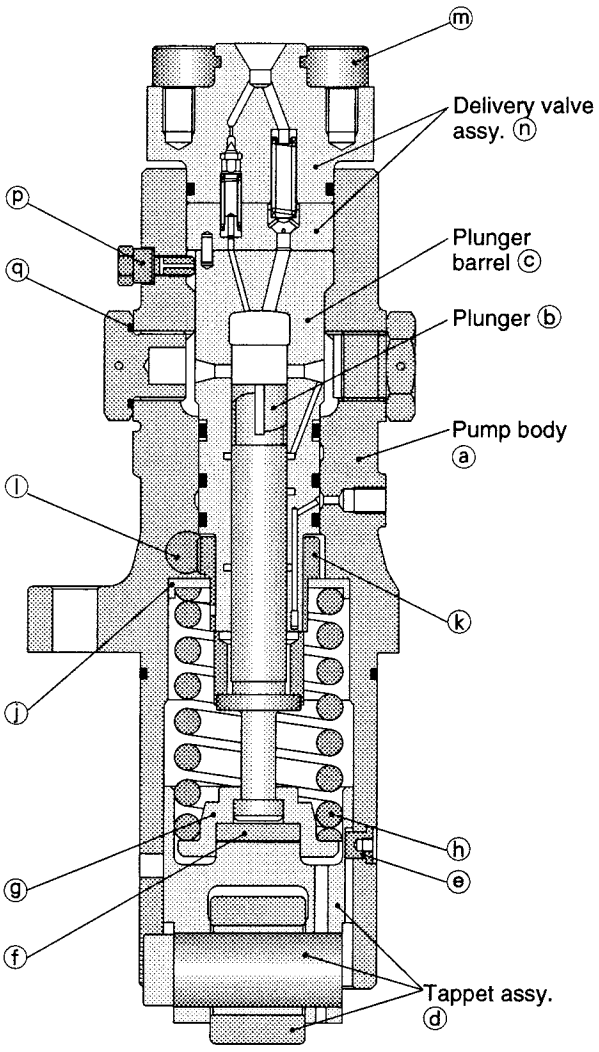
(3) Take out the tappet assembly, plate ⓕ, spring seat-lower ⓖ, spring ⓗ, plunger ⓑ, spring seat-upper ⓙ, in this sequence.
(4) Take out the control sleeve ⓚ and control rack ⓛ.
(5) Remove the F.O. injection pump from the vice, turn over the pump upside-down, and mount it on the vice again.
(6) Disconnect the mounting bolt ⓜ, and remove the delivery valve assembly ⓝ.

Do not disassemble the delivery valve. Instead, be minded to replace it as an assembly.

(7) Remove the positioning screw ⓟ.
(8) Turn over the pump again, and extract the plunger barrel ⓒ from the body while receiving it on the hand.
If extraction is difficult due to too tight fitting, place a wooden piece against the barrel from the opposite side, and strike the wooden piece with a hammer to extract it.

(9) Remove the deflector ⓠ.

1) Be minded to handle the plunger and barrel as one pair. The clearance of the both parts are matched, and if wrong combination is made, the parts cannot be used.
2) Be sure to sort the disassembled parts per each pump, so that they do not mix with the parts of the other cylinders.



F.O. Injection Pump

9-4.2 Inspection and Maintenance of F.O. Injection Pump

Since the items mentioned in this section are the parts to which NOx Technical Code shall be applied, when replacing any of these parts, be sure to use the parts provided with the identification marks.
(📖: 0-3 "Engine Conforming to NOx Technical Code")

(1) Wash all the disassembled parts with clean washing oil, and blow air on them.

(2) Check the plunger, barrel, and deflector for the corrosion caused by cavitation.
In case that the degree of corrosion is heavy, replace the parts with the new ones.

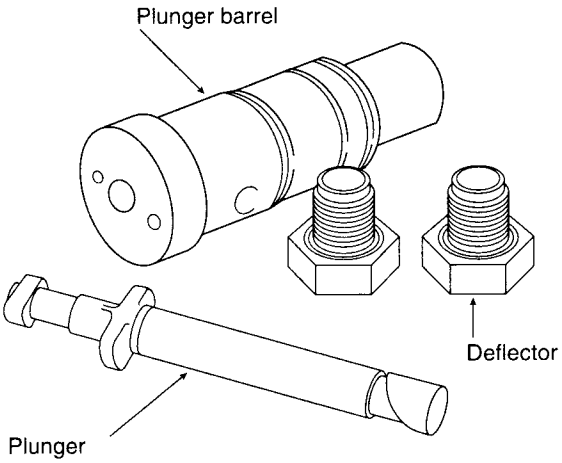
△ Replace the plunger assembly, the delivery valve assembly, and the spring every 16,000 to 24,000 hr (4 to 5 years) with the new ones, even in case that there is no particular problems.

(3) Measure the inner and outer diameters of the tappet, and calculate the tappet clearance.

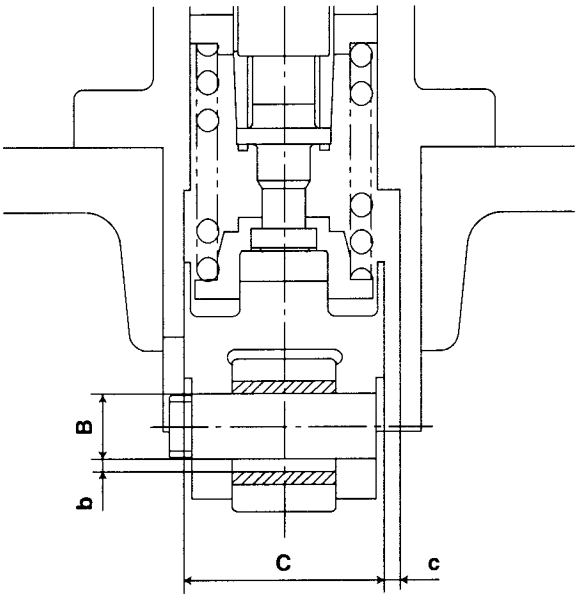
Nom. size (mm)	Standard clearance (mm)	Replacing limit (mm)
C = ϕ 72	a = 0.03 ~ 0.08	0.25

(4) Placing a dial gauge against the tappet roller surface, and measure the bearing clearance by moving the roller up and down.

Nom. size (mm)	Standard clearance (mm)	Replacing limit (mm)
B = ϕ 28	c = 0.05 ~ 0.08	0.20



Plunger, Barrel, and Deflector



Tappet Diameter Clearance and Roller Bearing Clearanc

9-4.3 Assembly of F.O. Injection Pump

When assembling the F.O. injection pump, do not wear gloves but handle the pump with naked hands, so as to prevent the deposit of foreign matters or dust on the pump.

Assemble the F.O. injection pump in the following procedure:

(1) Mount the pump body ⓐ on a vice with the delivery valve side facing upward.

(2) Apply grease to the O-ring and the back-up ring, both of which are newly replaced, and fit them to the barrel ⓒ.

(3) Match the barrel positioning bolt hole and the barrel hole of the pump body for each other, and insert the barrel into the pump body.

(4) Mount the barrel positioning bolt ⓟ.

(5) Assemble the delivery valve assembly ⓝ into the pump body with its knock pin position matched with the pin hole position.

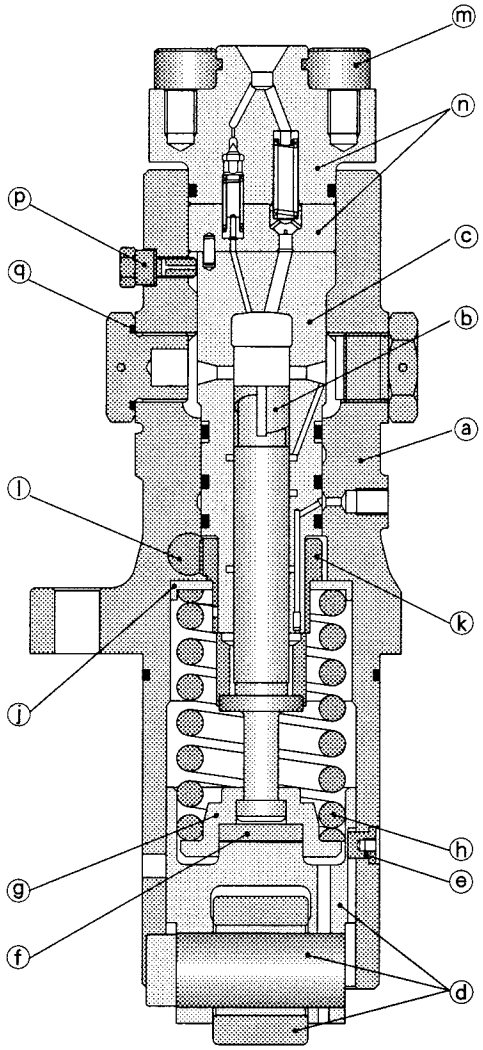
(6) Apply the lubricating agent (MOLYKOTE U-paste) to the threaded area and seat surface of the bolt ⓜ, and tighten the bolts with the specified torque diagonally and uniformly.

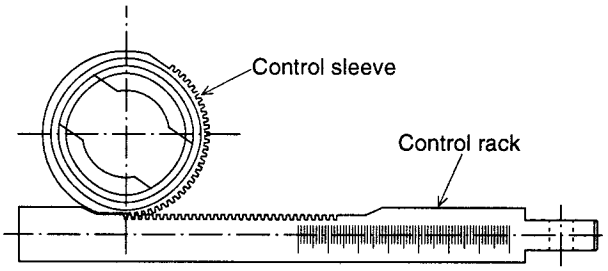
Specified torque:
137 ~ 157 N·m {14 ~ 16 kgf·m}

(7) Remove the pump body from the vice, and turn over the body to mount it on the vice again.

(8) Apply grease to the gear tooth surface of the control rack ⓛ and the inner surface of the control sleeve ⓚ, and assemble them while matching the control rack teeth with the control sleeve end teeth (rack 0-mm direction).

Be careful since the engine cannot be operated properly, if the rack is not normally and correctly engaged with the sleeve.





Assembly of Control Rack and Control Sleeve (Position of Rack 0) (Viewed from Pump Tappet Roller Side)

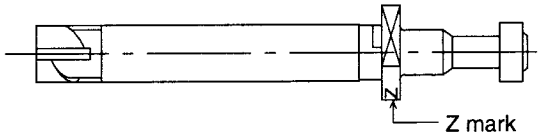
(9) Assemble the spring seat-upper ⓙ, plunger ⓑ, spring ⓗ, spring seat-lower ⓖ, plate ⓕ, and tappet assembly ⓓ in this sequence.
Assemble the plunger so that the "Z" mark on the lower part faces toward the opposite side of the rack.

(10) Mount the fall-stop pin ⓔ while pushing the tappet using a gear puller and the like.

> When assembling, be careful not to scratch the tappet or roller.

(11) Mount the deflector ⓠ.

(12) After finishing the assembly, confirm that the rack moves smoothly, and the "0" point position is matched.



Plunger Matchmark

9-5 Mounting of Fuel Injection Pump

(1) Check if the fuel oil cam is placed on the position of the base circle.

(2) Install the fuel injection pump on the engine, and tighten the nut to the specified torque.

Specified torque:	90 ~ 110 N·m {9.2 ~ 11.2 kgf·m}

(3) Confirm the assembling height of the F.O. injection pump.

a) When the tappet roller is on the base circle of the fuel oil cam, confirm that the tappet slit is matched with the base line slit.

b) In case that the adjustment of the assembling height is necessary, adjust it by the shim.

Shim thickness (: "Parts List")	
0.5 mm (Standard)	3-23.1 No. 11
0.1 mm	3-23.1 No. 12
1.0 mm	3-23.1 No. 13

(4) Apply grease to the O-ring, fit it on leak oil cover, and assemble them into the F.O. injection pump.

(5) Install the F.O. injection high-pressure coupling, and tighten the bolts with the specified torque.

Specified torque:	34 ~ 44 N·m {3.5 ~ 4.5 kgf·m}

(6) Mount the rack pin, and adjust the rack amount uniformly.

(: "Operation" 5-3.1 "Adjustment of the F.O. Injection Pump Rack Amount")

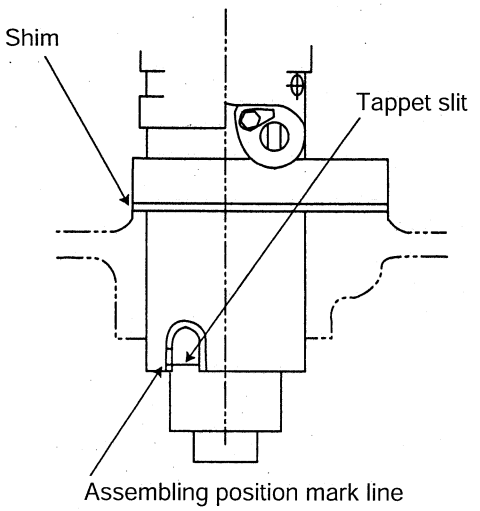
(7) Mount all the piping.

(8) Check the fuel oil injection timing.

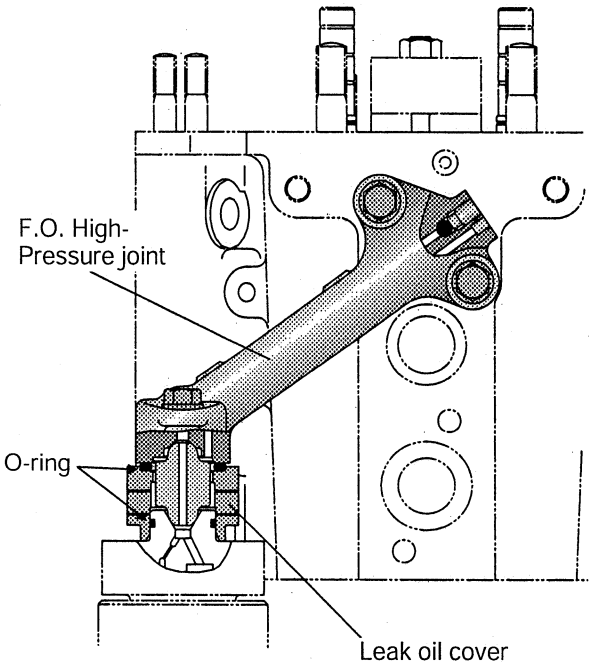
(: 8-2.6 "Inspection and Adjustment of the Fuel Oil Cam Timing")

(9) After finishing the adjustment, pass the fuel oil, and loosen the air vent screw to vent air.

(: "Operation" 4-2.2(5) "Fuel Oil Priming and Air Vent")



Mounting Heght of F.O. Injection Pump



Mounting of F.O. Injection High-Pressure Coupling

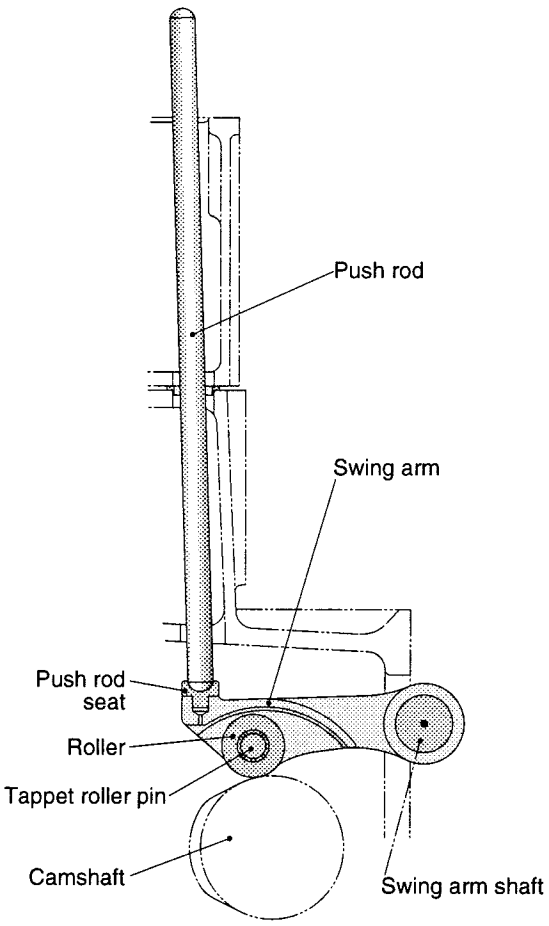
Memo

10. Valve Operating Device

10-1 General Construction

The valve operating device is of a swing-arm type, equipped with the roller follower, and the valve operating devices for exclusive use of intake and exhaust are separately provided respectively.
The intake and exhaust cam lift is transmitted to the intake and exhaust valves from the roller, through the push rod, rocker arm, and valve retainer tee, via swing arm pivot (push rod seat).
A bearing is press-fitted into the roller, and it turns around the tappet roller pin which is press-fitted into the swing arm.
The swing arm support and roller bearing lubricating oil are supplied from the drilled holes of the engine frame, through the bolt which fixes the swing arm shaft, and via the shaft and the drilled holes inside the arm.
A ring knock is press-fitted into the shaft, so as to ensure the parallelism between the roller and cam contact surfaces.

Swing arm assy. : 11 kg



Valve Operating Device

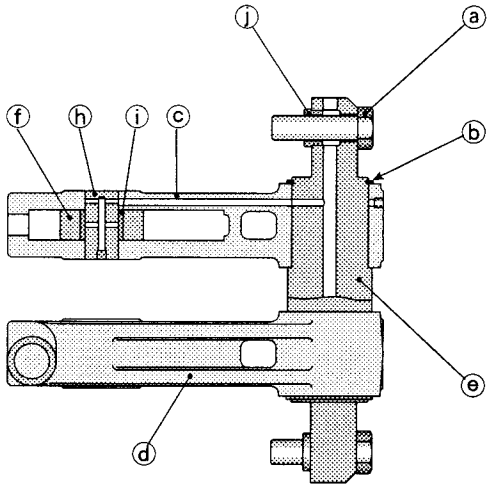
10.2 Replacing Consumables, Implements, and Measuring instruments

(1) Replacing Consumables
None

(2) Implements and Measuring Instruments
① General tools and measuring instruments
(📖 : 2-2)

10.3 Disassembly of Valve Operating Device

(1) Disconnect the cylinder head cover, and remove the rocker arm device and the push rod.
(2) Remove the cover on the camshaft side.
(3) Disconnect the bolt ⓐ, and remove the swing arm assembly.
Mark the engine number and the cylinder number with magic ink or the like, before removing the swing arm assembly.
(4) Disconnect the snap ring ⓑ, and remove the swing arm ⓒ and ⓓ from the swing arm shaft ⓔ.



Swing Arm Assy.

10-4 Inspection and Maintenance of Valve Operating Device

(1) Clean all the parts using washing oil.

> Lubricating holes are provided in each of the individual parts, and therefore be careful so that no dust or foreign matters will be infiltrated.

(2) Inspect if there is any scratch or abnormal dent on the swing arm shaft and the swing arm sliding surface.

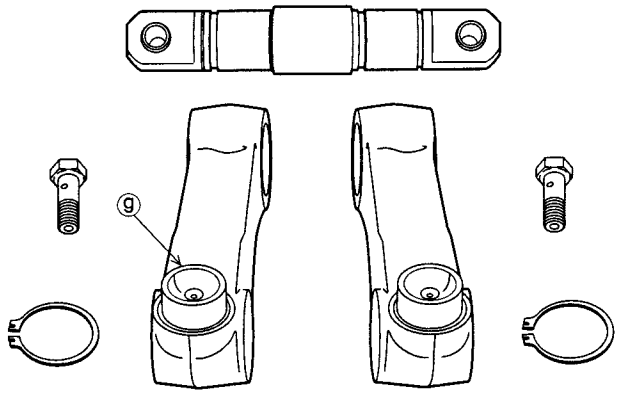
(3) Inspect if there is any scratch or abnormal dent on the outer periphery of the tappet roller ⓕ.

(4) Inspect if there is any scratch or abnormal dent on the contact surface of the push rod seat ⓖ.

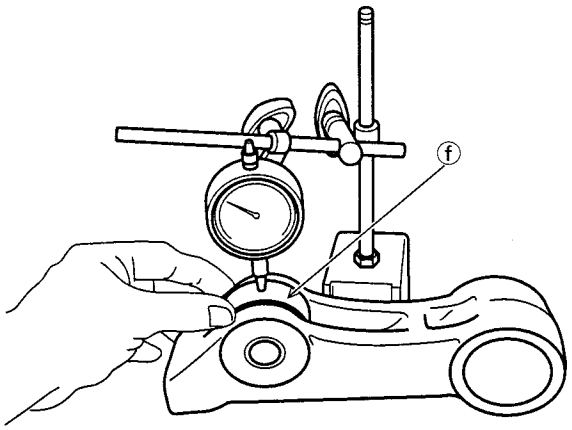
(5) Measure the clearance between the roller pin ⓗ and tappet roller bush ⓘ, placing a dial gauge against the upper face of the tappet roller, and moving the tappet roller up and down.

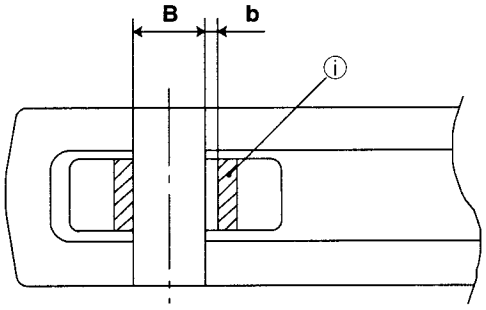
Nom. size (mm)	Standard clearance (mm)	Replacing limit (mm)
B = ϕ 22	b = 0.07~0.13	0.2

> When the clearance become wider, the valve end clearance becomes larger, and the valve opening and closing timing changes, resulting in the deterioration of the engine performance.
> In case that the measurement result of the clearance is over the replacing limit, replace the swing arm (with the roller) with a new one.



Inspection of Swing Arm Shaft and Swing Arm

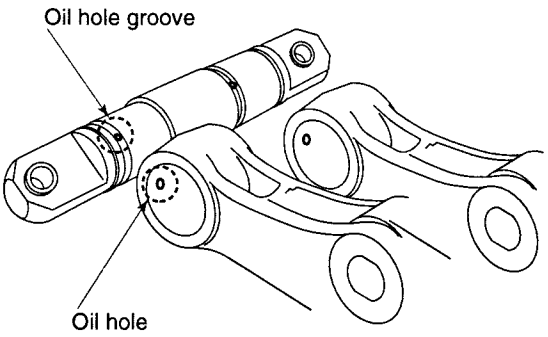




Clearance Measurement of Tappet Roller Bush

10.5 Assembly of Valve Operating Device

(1) Mount the arm on the arm shaft, matching the oil hole of swing arm and the oil hole groove of swing arm shaft.



Swing Arm Oil Hole

Be careful not to mistake when handling the swing arms each other, since there are two types of swing arm, one for intake and one for exhaust. The one with the carved stamp "R" is for exhaust (flywheel side), and the one with the notched mark "L" is for intake (front side).
Further, before assembling, be minded to confirm the cylinder number, so as to prevent mistaking it with the parts of the other cylinder.

(2) Fix a snap ring.

(3) Match the ring knock Ⓙ position, then mount the swing arm assembly on the engine frame.

(4) Tighten the bolt with the specified torque, after applying lubricating agent (MOLYKOTE 1000) on the threaded area of bolt and seat surface.

Specified torque : 59 N·m {6 kgf·m}

11. Governor Driving Device

11-1 General Construction

The governor is of a hydraulic type that controls the rack amount of the F.O. injection pump and the F.O. injection rate, in accordance with the load and the revolving speed of the engine via common rod.
The governor driving device is located on the rear-side of the engine, and composed of the helical-gear engaged with the cam gear and a pair of the-bevel gear, and drives the governor via spline coupling.
The governor gear case and the mounting surface-of the engine frame are sealed with liquid sealant, and the adjustment of the bevel gear backlash is made by the adjusting shims on the mounting surface of the governor.

In this engine, the following 2 types of governor is applied.
As for the handling of the governor body, refer to a separately provided document.
(📖: "Governor Instruction Manual")

< RHD6·····Standard >

Governor: 8kg
Governor driving device assy.: 21 kg

< UG10·····Option >

Governor: 20 kg
Governor driving device assy.: 22 kg

11-2 Replacing Consumables, Implements, and Measuring Instruments

(1) Replacing Consumables

Replace the following parts with the new ones.

< For RHD6 governor >
(📖: "Parts List".)

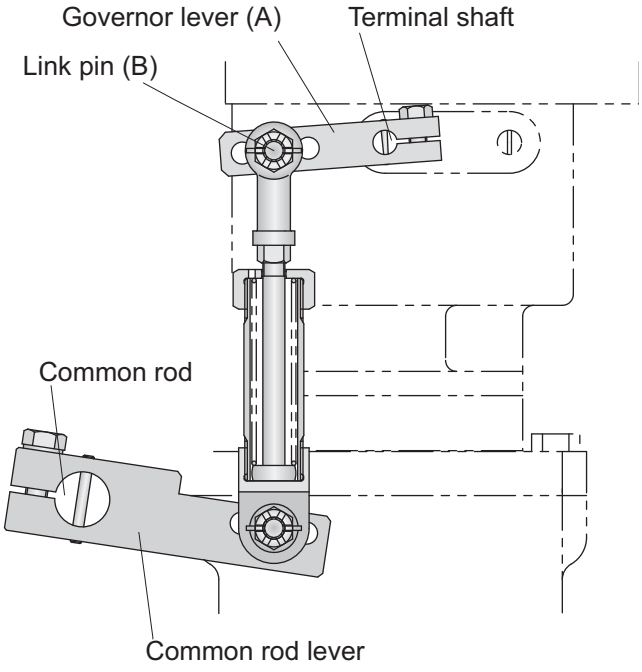
① O-ring	3-25.1 (6,8DK)	No. 521, 522
	3-22.1 (3,5DK)	No. 521, 522
② Cover	3-25.1 (6,8DK)	No. 48
	3-22.1 (3,5DK)	No. 48
③ Bearing	3-25.1 (6,8DK)	No. 512
	3-22.1 (3,5DK)	No. 512
④ Split pin	3-25.1 (6,8DK)	No. 532,539
	3-22.1 (3,5DK)	No. 532,539

< For UG10 governor >
(📖: "Parts List".)

① O-ring	3-25.2 (6,8DK)	No. 23
	3-22.2 (3,5DK)	No. 23
② Bearing	3-25.2 (6,8DK)	No. 513,514
	3-22.2 (3,5DK)	No. 513,514
③ Split pin	3-25.2 (6,8DK)	No. 532,539
	3-22.2 (3,5DK)	No. 532,539

(2) Implements and Measuring Instruments

General tools and measuring instruments
(📖: 2-2.)



Governor Link

11.3 Disassembly of Governor Driving Device

The construction of governor driving device is basically same regardless of the types of governor, and therefore the explanation is made regarding Type RHD6 in this section.

(1) Remove the governor lever(A) and link pin (B)

(2) Remove the oil feed piping of the driving device.

(3) Remove the governor mounting nut (C), and remove the governor.

(4) Remove the governor gear case mounting bolt (D), and remove the governor driving device assembly.

(5) Measure the backlash between the governor gear (b) and governor driving gear (c).

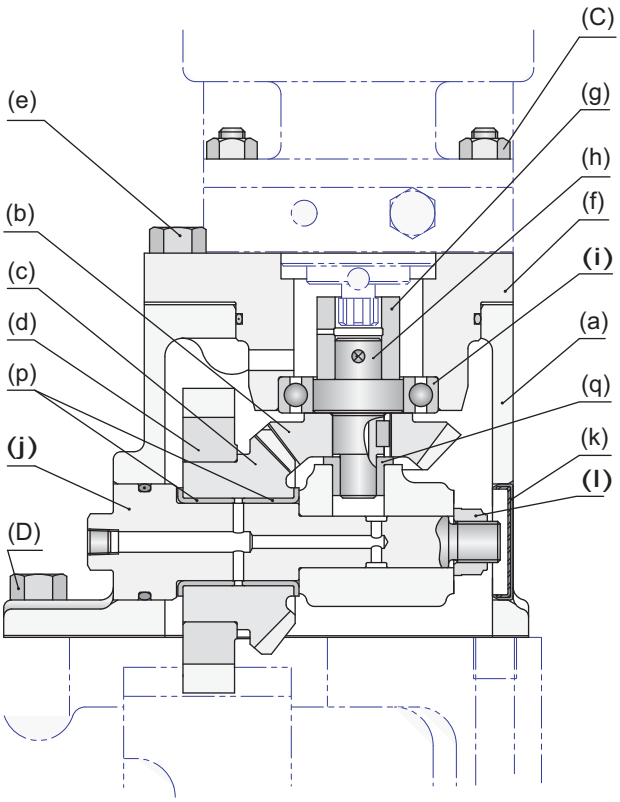
	Standard clearance (mm)	Replacing limmit (mm
Backlash	0.3~0.5	0.8

(6) Take out the bolt (e) and remove the governor base (f).
As the spline coupling (g), governor driving shaft-2 (h), bearing (i), and governor gear (b) are all mounted on the governor base, these parts can be pulled out at the same time.

(7) Remove the cover (k) of the governor driving shalft-1 (j).

(8) Fit a spanner to the hexagonal area at the end of governor driving shaft-1, and then remove the nut (l). After that, remove governor driving shaft- 1.
During this removal work, support the governor driving gear so that the gear cannot fall.

(9) Remove the governor drive gear (c) and (d).



Governor Driving Device

11-4 Inspection and Maintenance of Governor Driving Device

(1) Clean all the disassembled parts with washing oil.

(2) Inspect each gear surface for abnormal wear and scratch.

(3) Inspect the governor shaft-1 (j), -2 (h) and flange bush (p), (q) for abnormal dent or scratch.

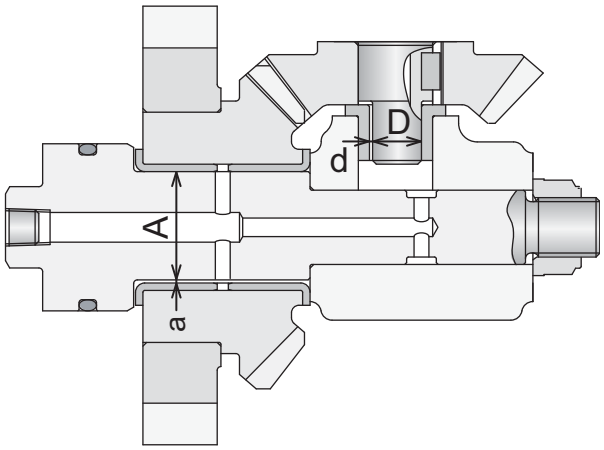
(4) Calculate the clearance by measuring the governor driving shaft outer diameter and flange bush inner diameter, and in case that the clearance is over the replacing limit, replace the flange bush with a new one.

< Governor driving shaft-1 >

Norn, size (mm)	Standard clearance (mm)	Replacing limit (mm)
A = ϕ 30	a = 0.02~0.13	0.15

< Governor driving shaft-2 >

Nom. size (mm)	Standard clearance (mm)	Replacing limit (mm)
D= ϕ 14	d = 0.02~0.08	0.10



Clearance of Flange Bush

11-5 Assembly of Governor Driving Device

(1) Assemble the governor driving device in the reverse order of the disassembling procedure.
- **a)** Replace the O-ring and bearing with the new ones, and apply grease to them before assembling.
- **b)** Replace the cover (k) with a new one. Apply seal bond (silicone type) and insert it into the hole, and evenly strike it placing a patch, so that the outer periphery should be adhered tightly.

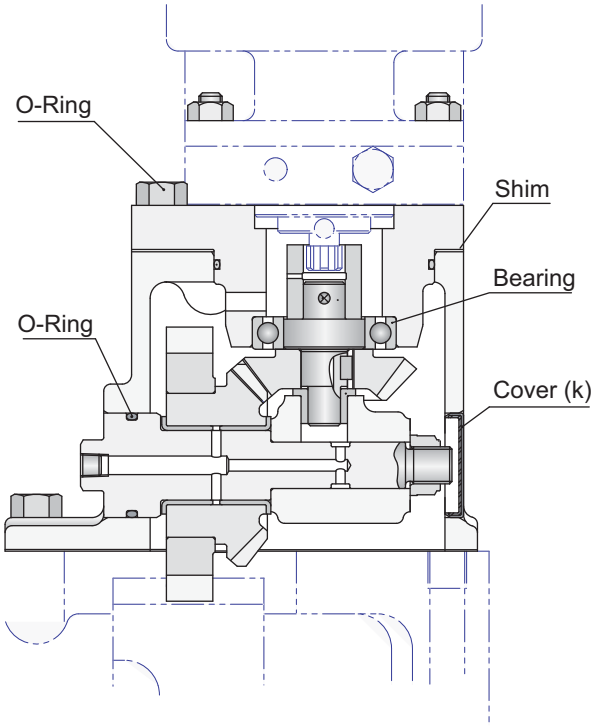
(2) After assembling, check the followings:
- **a)** The governor drive gear and governor rotate smoothly.
- **b)** Confirm that backlash is normal, and in case that it is not within the specified value, adjust it by inserting the shim between the governor base and governor gear case.

< For RHD6 Governor > (📖: "Parts List")

Shim thickness : 0.1 mm 3-25.1 No.54
0.8 mm 3-25.1 No.55
1.0 mm 3-25.1 No.53

< For UG10 Governor > (📖: "Parts List")

Shim thickness : 0.2 mm 3-25.2 No.57
0.5 mm 3-25.2 No.58
1.0 mm 3-25.2 No.59



Assembly of Governor Driving Device

Memo

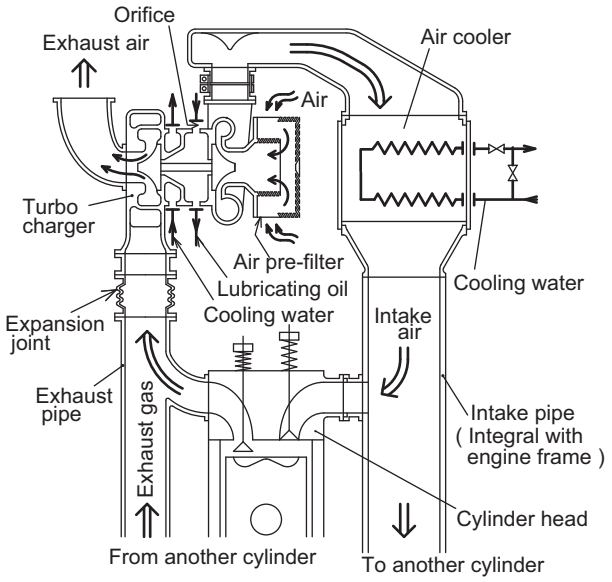
12 Intake and Exhaust Device

12-1 General of Intake and Exhaust System

The high-temperature and high-pressure exhaust gases shall be emitted from the cylinder are effectively introduced into the turbocharger through the exhaust manifold, and a part of the exhaust energies will be recovered as intake pressure.

The high-temperature air compressed by the turbocharger will be cooled down while passing through the air cooler, and will be introduced to the intake duct of the engine frame.

The turbocharger and the air cooler is located onthe front part of the engine as standard, however they can be located on the rear part of the engine according to the specifications.



Intake and Exhaust Device

12-2 Turbocharger

Since the items mentioned in this section are the parts to which NOx Technical Code shall be applied, when replacing any of these parts, be sure to use the parts provide with the identification marks.

(📖: 0-3 "Engine Conforming to NOx Technical Code")

Lubricating oil that lubricates the bearing and-cooling water that cools the bearing base are supplied to the turbocharger.

The lubricating oil is supplied to the turbocharger through a special filter, being branched from the engine system oil. Further, an orifice is installed at the inlet of the turbocharger, so as to maintain the lubricating oil pressure at the appropriate level.

As for the operation, disassembly, and maintenance of the turbocharger, refer to a separately provided instruction manual.

Turbocharger (except the exhaust duct)		
RH123, RH133	:	37 kg
RH143, RH163	:	115 kg
RH183.RH203	:	214 kg
TPS48	:	129 kg
TPS52	:	187 kg
MET18SRC	:	180 kg

⚠

The turbocharger is very hot just after the engine is stopped. Wait until it sufficiently cools down before dismantling it for inspection and maintenance.If it must be dismantled before it cools down, wear safety gloves, and take care not to burn your hands.

12.3 Air Cooler

12.3.1 General Construction

The air cooler is of a fin-tube multi-tubular type with box shape, and is installed to the bracket.
The cooling water inlet and outlet ducts of the air cooler are equipped with a butterfly valve to adjust the intake air temperature to an appropriate value.

Model No. of air cooler
DK25, DH31 : 150 kg
DHB31 : 234 kg
DK30, DH29, DH39, DH48 : 240 kg
DH52, DH73 : 310 kg
DH95 : 300 kg

12-3.2 Replacing Consumables, Implements, and Measuring Instruments

(1) Replacing Consumables

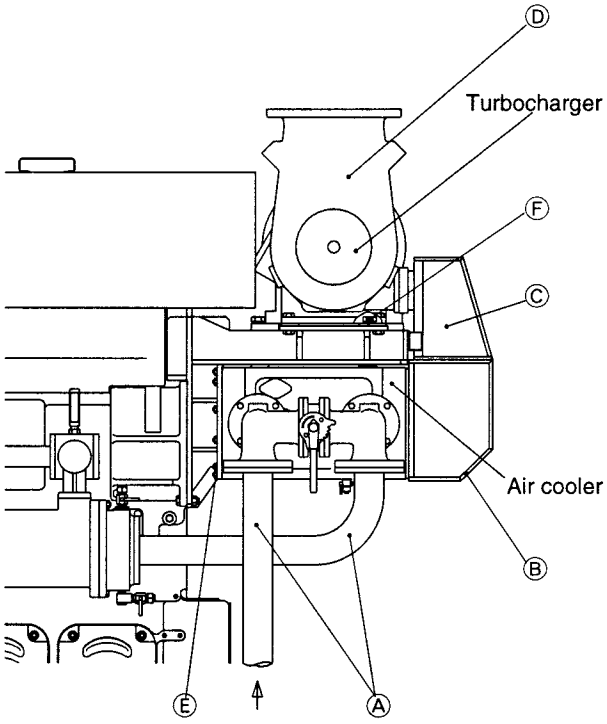
Since the replacing consumbales, such as O-ring, packing, and gasket, vary depending on the model number of the air cooler, refer to a separately provide parts list.
(📖 : "Parts List")

(2) Implements and Measuring Instruments

① General implements and measuring instruments
(📖 : 2-2)

12-3.3 Dismounting of Air Cooler

(1) Remove the cooling water inlet and outlet duct Ⓐ.
(2) Remove the air cooler cover Ⓑ and air cooler inlet duct Ⓒ.
(3) Disconnect the exhaust outlet duct Ⓓ, and the turbocharger.
(4) Remove the air cooler mounting bolt Ⓔ and Ⓕ, passing a wire rope around the air cooler and suspending it with a chain block.
(5) Disconnect the air cooler.



Dismounting of Air Cooler

112.3.4 Inspection and Maintenance of Air Cooler

Since the items mentioned in this section are the parts, to which Nox Technical Code shall be applied, when replacing any of these parts, be sure to use the parts provided with the identification marks.
(: "Engine Conforming to NOx Technical Code")

(1) Remove the water chamber covers on the both sides, and eliminate the scales deposited on them.

In case that coating of the inside surfaces is peeled off, repair the part or conduct the coating again.

(2) Clean the inside of the cooling tube using a nylon brush.

After brushing, wash it with clean and fresh water.

(3) Eliminate the stains on the air side by blowing air on them.

In case the degree of stain is heavy, disconnect the water chamber, and remove the stain by immersing the plate-fin tube assembly in sulphamic acid.

After eliminating the stain, wash with clean and fresh water, and sufficiently dry the assembly promptly.

△
To be minded to use the sulphamic acid cleaning agent.
In oder to secure stable engine performance, air cooler should be checked and cleaned according tothe maintenance/cleaning schedule (4000～6000 hr).

(4) Inspect the protective zinc, and replace it with a new one. (In case that the equipment is provided with the protective zinc.)

(:: 5-4.6 "Daily Inspection and Maintenance of Protective Zinc")

12.3.5 Mounting of of Air Cooler

Assemly the air cooler in the reverse order of the disassembling procedure.

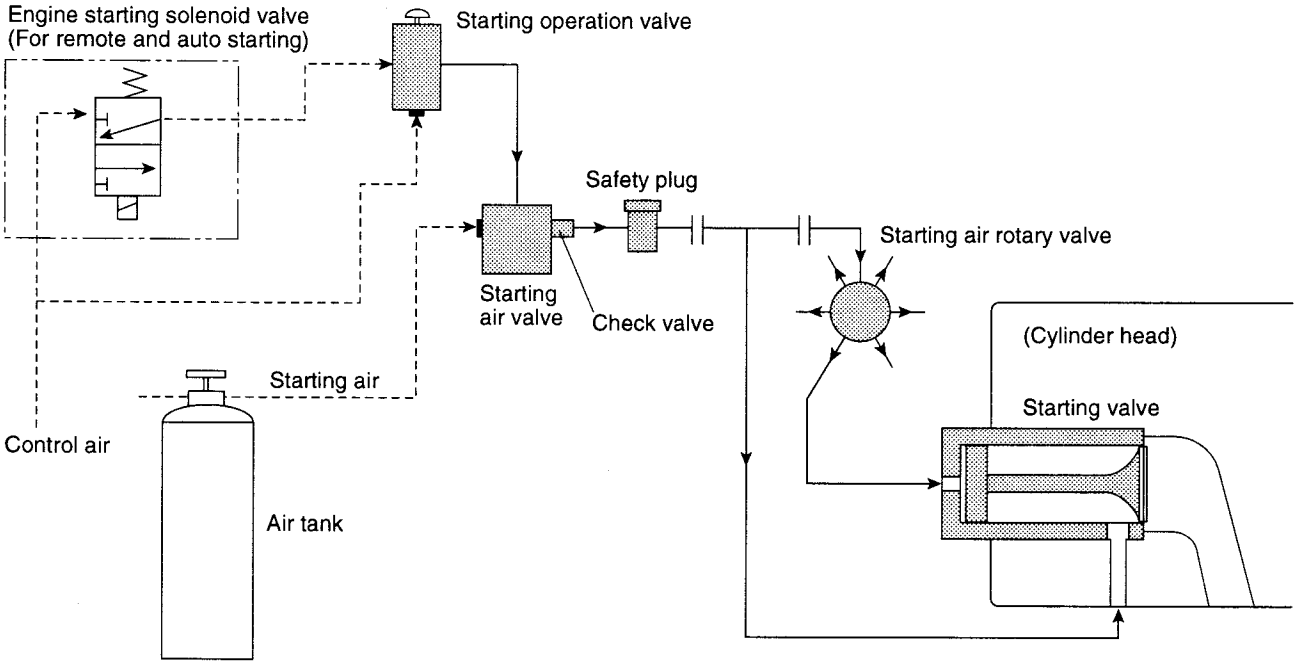
Memo

13. Starting Air System

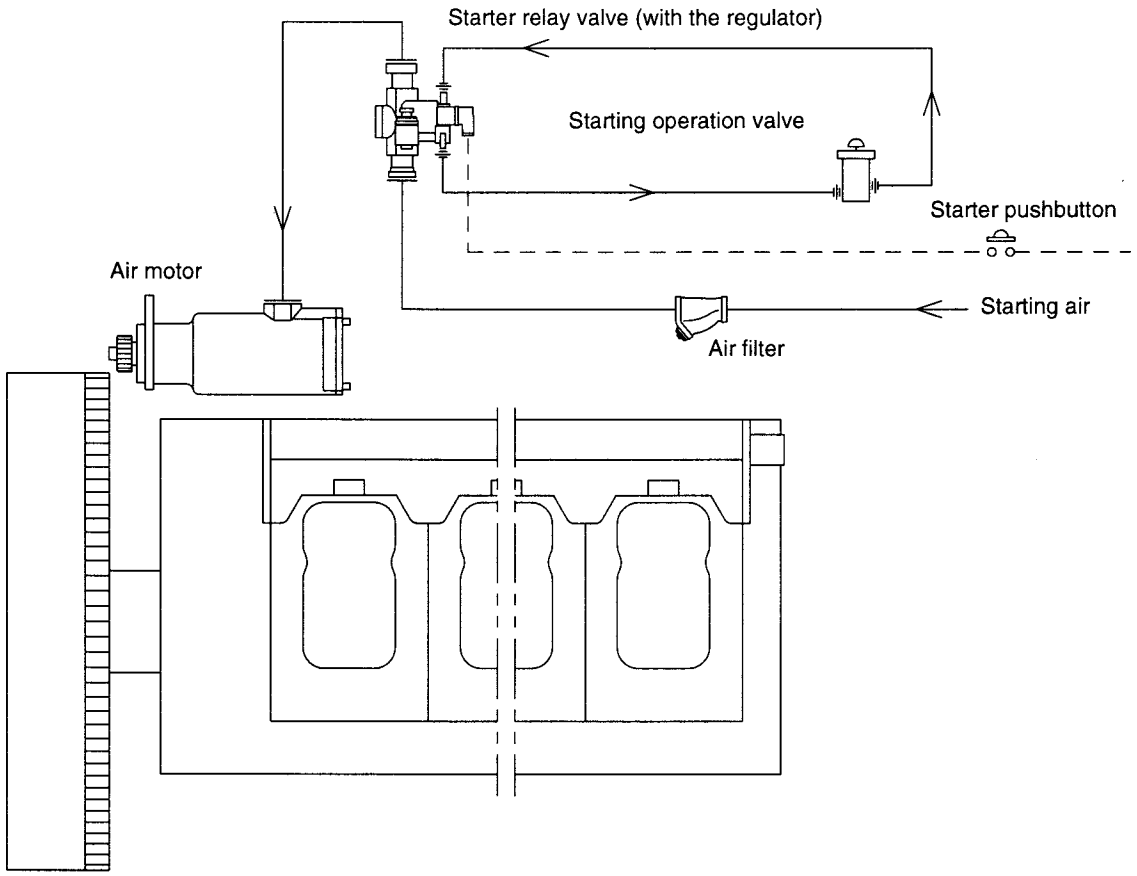
13.1 Outline of Starting Air System

The air starting type is employed to DK-20 engines, the direct starting type by the starting valve is employed to 6.8DK engines, and the air motor starting type is employed to 3.5DK engines.
(📖: "Operation" 2-2.1 "Starting Air System")
The high-pressure air of 2.5 to 2.9 MPa {25 to 30 kgf/cm²} is used as the starting air, and the low-pressure air of 0.8 MPa {8 kgf/cm²} is used as the controlling air.
The major components of direct starting air type are the starting air valve, starting air rotary valve, and starting operation valve.

The major components of air system of the air motor starting type are the starter, relay valve (with the regulator), and starting operation valve.
Among these equipment, regarding the starter, relay valve, and starting operation valve, the overhaul and repair is virtually impossble. Therefore, be minded to activation is faulty.
As for the air motor, refer to the separately provided "Instruction Manual".
(📖: "Instruction Manual of Air Motor")



Starting Air System (Direct Starting Type)



Starting Air System (Air Motor Starting Type)

13-2 Starting Air Valve

13-2.1 General Construction

The starting air valve is the valve that controls the supply of the high-pressure air for starting when the engine is being started, and is activated by the controlling low-pressure air which is sent from either the starting operation valve or the starting solenoid valve.

Starting valve assy. : 12 kg

13-2.2 Replacing Consumables, Implements, and Measuring Instruments

(1) Replacing Consumbales

Replace the following parts with the new ones.
(📖 : "Parts List")

① Valve	4-1.1.1	No.B6
② Split pin	4-1.1.1	No.B10, B25
③ O-ring	4-1.1.1	No.B502, B503, B504, No.B505, B506, B507 No.B508, B509
④ Circular gasket	4-1.1	No.C516, C517

(2) Implements and Measuring Instruments

① General implements and measuring instruments
(📖 : 2-2)

13-2.3 Disassembly of starting valve

(1) Disconnect the piping of the starting air outlet and inlet and the piping of the control air inlet, and remove the starting air valve assembly from the bracket.

(2) Disassemble the starting air valve according to the following procedure:

a) Disconnect the mounting bolt, and remove the upper cover ⓐ and lower cover ⓑ.

b) Take out the split pin of the valve stem and the nut ⓓ, and remove the piston ⓔ and the spring ⓕ.

⚠ When disassembling, carefully perform the work so that the spring will not fly out, because the spring is compressed by the piston.

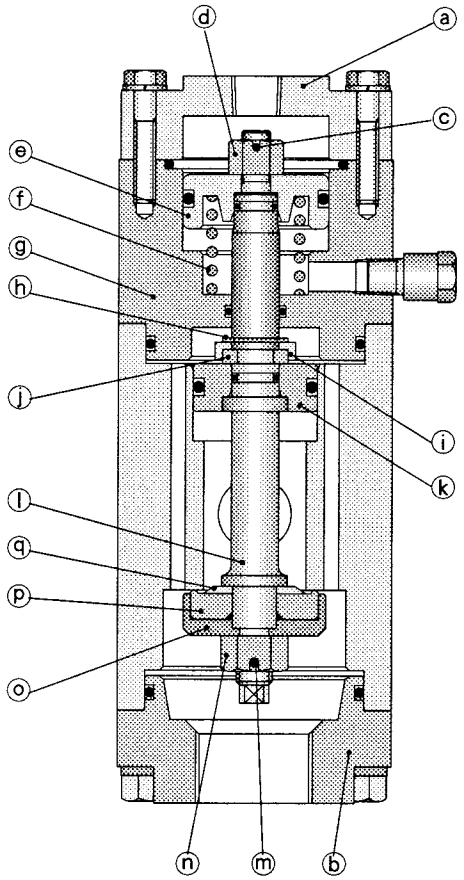
c) Remove the bolt and disconnect the cylinder ⓖ.

d) Take out the stopper ring ⓗ, and remove the key receptor ⓘ and the key ⓙ.

e) Disconnect the piston ⓚ, and extract the valve stem ⓛ.

f) Take out the split pin ⓜ and the nut ⓝ, and remove the valve receptor ⓞ, the valve ⓟ, and the valve retainer ⓠ from the valve stem.

g) Remove the union screw ⓡ, and take out the spring ⓢ and the check valve ⓣ.



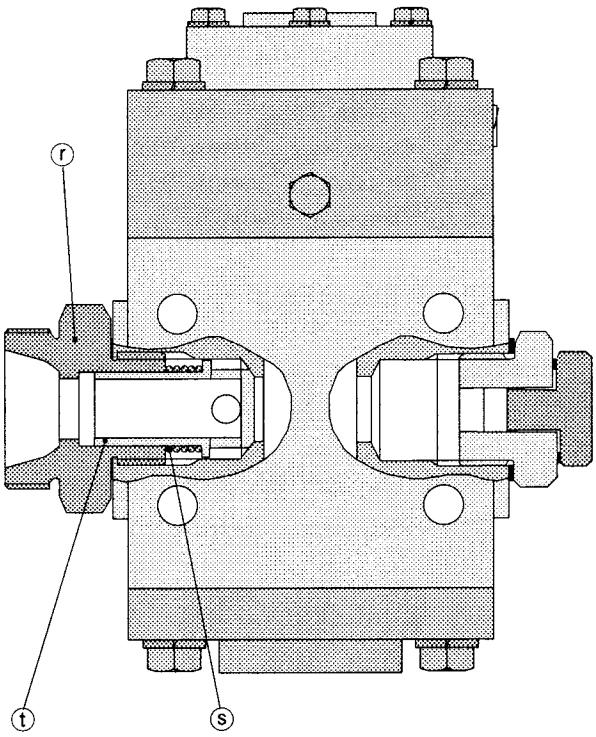
Starting Air Valve

13-2.4 Inspection and Maintenance of Starting Air Valve

(1) When rust is found, carefully remove it using a fine sandpaper.

> For the sake of rust-prevention, be minded to perform the draining of the equipment and the piping without fail, at the time of daily maintenance.

(2) Wash all the disassembled parts with clean washing oil, and blow air on them.
(3) Inspect if there is any abnormal dent or scratch on the piston ⓔ and ⓚ.
(4) Inspect if there is any scratch on the seat surface of the valve Ⓟ.
(5) Inspect if there is any abnormal dent or scratch on the check valve ⓣ and the seat surface.
(6) Inspect if there is any scratch on the spring ⓕ and ⓢ.



Check Valve

13-2.5 Assembly of Starting Air Valve

(1) Before assembling, thinly apply silicone grease on the valve, the O-ring, and the sliding part of the seat surface.
(2) Assemble the staring air valve assembly in the reverse order of the disassembling procedure.
(3) Mount the starting air valve assembly to the bracket, and install the piping.

> Sufficiently flush the piping before installation, so that dust and drain are completely removed. Further, be minded that sealant or the like will not be deposited during the work.

13.3 Starting Air Rotary Valve

13-3.1 General Construction

The starting air rotary valve is the valve that distribute pilot air, which is used to actuate the starting valve, to each cylinder according to the explosion sequence, and this valve is driven from the front end of the camshaft via rotary valve coupling (Oldham's coupling).

Starting air rotary valve assy. : 8.4 kg

13-3.2 Replacing Consumables, Implements, Measuring instruments

(1) Replacing Consumables

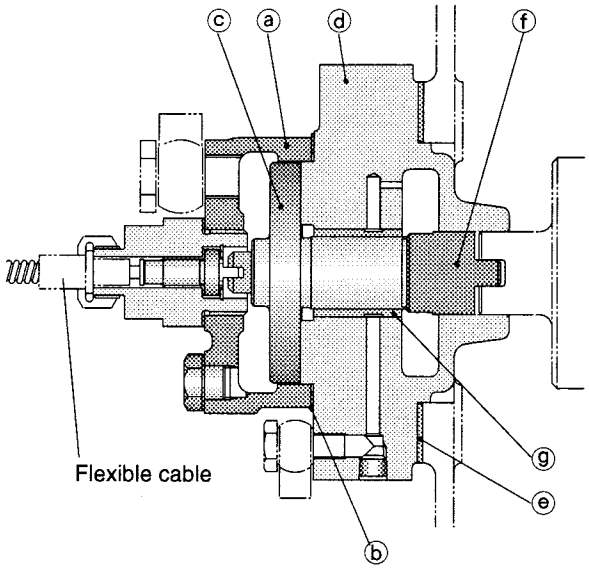
Replace the following parts with the new ones.
(📖: "Parts List")
① Rotary valve cover gasket 4-1.2 No.A14
② Circular gasket 4-1.2 No. A505, A515

(2) Implements and Measuring Instruments

① General implements and measuring instruments
(📖: 2-2)

13-3.3 Disassembly of Starting Air Rotary Valve

(1) Disconnect each piping of the starting air inlet and the starting air outlet.
(2) Disassemble the starting air rotary valve on the following procedure:
a) Remove the mounting bolts, and disconnect the rotary valve cover ⓐ and the circular gasket ⓑ.
b) Extract the starting air rotary valve ⓒ.
c) Disconnect the mounting bolts of the rotary valve seat ⓓ, and remove the rotary valve seat and the gasket ⓔ.
d) Remove the rotary valve coupling ⓕ.



Starting Air Rotary Valve

13-3.4 Inspection and Maintenance of Starting Air Rotary Valve

(1) Wash all the disassembled parts with clean washing oil, and blow air on them.

(2) Inspect the scratch and wearing conditions of the rotary valve bush ⓖ.
Measure the shaft diameter and the bush inner diameter of the rotary valve, and calculate the clearance.

Nom. size (mm)	Standard clearance (mm)	Replacing limit (mm)
A = ϕ 28	a = 0.02~0.10	0.20

△ When wear of the bush becomes heavy, lubricating oil will infiltrate into the starting air pipe, making the starting difficult. In such a case, replace the bush with a new one.

(3) Inspect if there is any fin or foreign matters caught on the seat areas of the starting air rotary valve and the rotary valve.
In case that inclusion scratch is extended over the holes of each cylinder, perform the facing-up after grinding and correcting the seat surface.
Further, in case that fin is found, remove it using a file or scraper.

(4) Inspect if the engagement area of the starting air rotary valve ⓒ and rotary valve coupling ⓕ, and the engagement area of the rotary valve coupling and camshaft are not worn out, respectively.

△ If the wearing degree of the engagement area is heavy, the opening and closing timing of the starting valve will be delayed, making the starting difficult.
In such a case, replace the starting air rotary valve or rotary valve coupling with a new one.

13-3.5 Assembly of Starting Air Rotary Valve

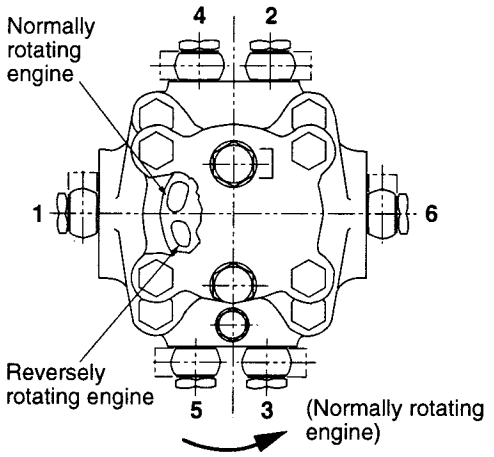
Assemble the starting air rotary valve in the reverse order of the disassembling procedure.

(1) Wash the starting air rotary valve and rotary valve seat, and apply the lubricating oil to the seat surface and shaft area.

(2) When inserting the starting air rotary valve into the rotary valve seat, conduct the insertion work by adjusting the air hole of the starting air valve to the rotary valve seat hole of the cylinder number, which is on the explosion process.
When the holes do not match, insert the starting air rotary valve by turning it 180(.

△ Be careful not to disassemble the rotary valve in a wrong way, since it will inhibit the engine to start.

(3) Install the piping and flexible cable.



Rotating direction of rotary valve

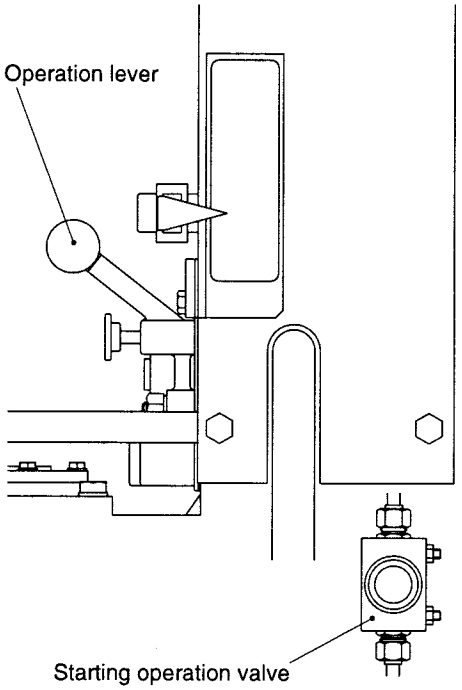
The above figure shows the positional relationship of the starting air valve when the No.1 engine is on the top dead center position of explosion.

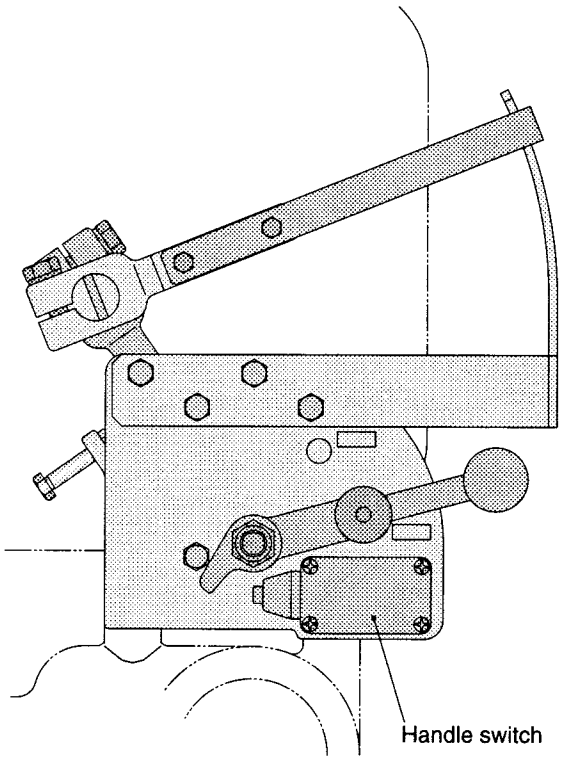
Rotary Air Valve Assembling Procedure

13-4 Starting Operation Valve and Handle Switch

The starting operation valve is an air valve for the purpose of starting from the machine side, and the starting air valve will be actuated by manually operating the pushbutton, so that the low-pressure air is supplied to the starting air valve.
The handle switch is a limit switch, which is actuated interlocking with the control lever, and when the control lever is set to the drive position, the switch is turned ON and a protective circuit is formed.

△ Do not disassemble the starting operation valve and handle switch. In case that malfunction is occurred, be minded to replace it as an assembly.





Memo

General of Fuel Oil System

14. Fuel Oil System

14-1 General of Fuel Oil System

The engine is designed on the assumption that the driving shall be performed using heavy fuel oil.

In case of heavy fuel oil, appropriate pretreatment of the fuel oil before feeding at the entrance of the engine is particularly important, and the quality of the fuel oil will give a remarkable influence on the various equipment such as the fuel oil injection pump.

Since not only the individual systems but also the facility and equipment will also differ depending on the grade of the oil to be used, be minded to perform appropriate maintenance, inspection, and adjustment according to the instruction manuals of each facility and equipment.

The major component parts attached to the engine are the fuel oil filter, fuel oil relief valve, fuel oil feed valve, and so on.

As for the inspection and maintenance of the following equipment, refer to the other sections in this manual or separately supplied documents.

(: "Operation" 2-2.2 "Fuel Oil System")

- **Fuel oil filter**

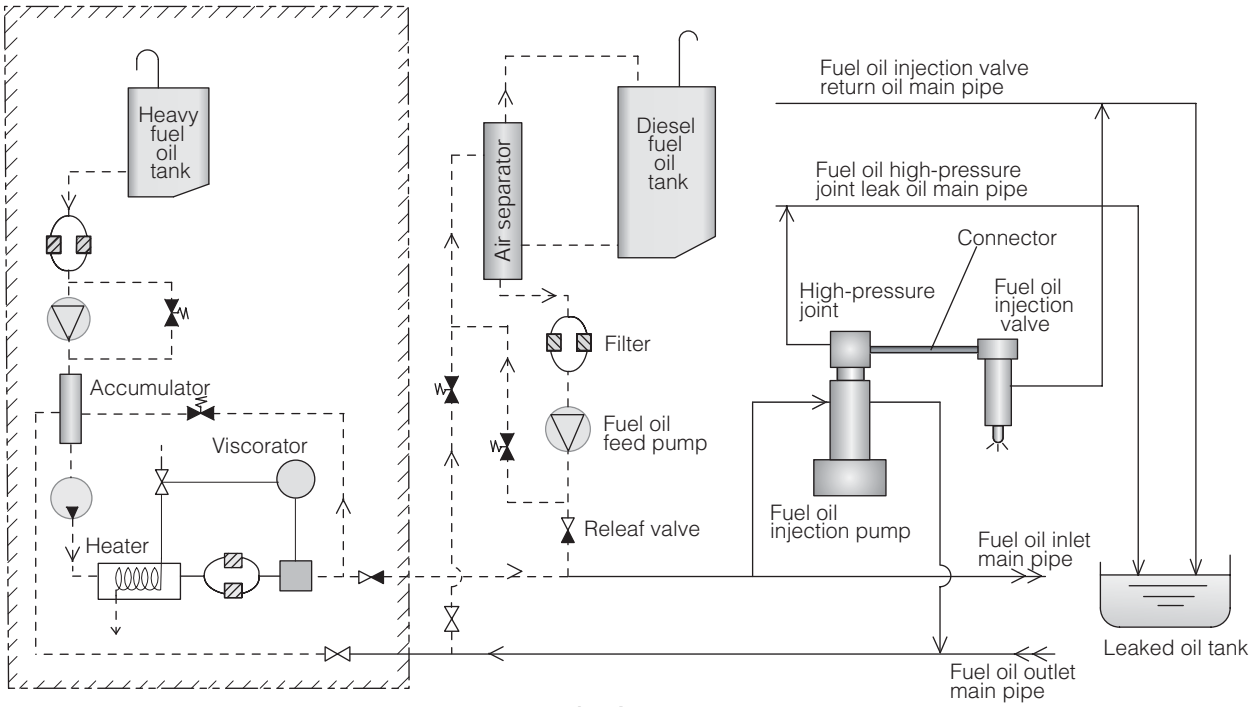
(: "Operation" 5-4.3 "Cleaning Filters")

- **Facilities and equipment for pretreatment**

(: Separately supplied "Instruction Manual")

<Cautions in disassembling, maintaining and reassembling the fuel oil system>

1) The parts such as the fuel oil injection pump and fuel oil injection valve, which are used in the fuel injection system, are all precision parts, and therefore if any dust or foreign matter is mixed in the oil, it will result in the faults such as seizure.In case that the equipment of the fuel oil system is disassembled, regardless of whether it is the one attached to the engine or the one to be separately installed, be particularly careful so that any dust or foreign matters will not infiltrate into the inside of the equipment or piping.
2) In case that the fuel oil system is overhauled, be sure to perform air bleeding after restoration.
When discharging air, take care not to splash the oil.



Fuel Oil System

14-2 Fuel Oil Pressure Regulating Valve

14-2.1 General of structure

The fuel oil relief valve is installed on the read end of the fuel oil main pipe, and the valve operates to maintain the pressure at the inlet of the fuel oil injection pump within the appropriate range.

Excessive oil will be returned to the supply system through the relief valve.

The fuel oil pressure depends on the source pressure of the supply system, and it also varies depending on the viscosity of the oil.In case of heavy fuel oil, adjustment is readily made so that the pressure stays at an appropriate viscosity and to be within the blue mark range on the pressure gauge. Therefore, when the pressure is deviated from the specified range during operation, be minded to first check if the viscosity of the fuel oil is appropriate or not before starting to disassemble and inspect the fuel oil relief valve.

When heavy fuel oil is used, the oil is heated to a high temperature (100℃ or more). If the oil is splashed on the skin, it may be scald. Take care not to splash the oil when disassembling.

14-2.2 Replacement Consumables, Implements, and Measuring Instruments

(1) Replacement Consumables

Replace the following parts with the new ones.

(📖 : "Parts List")

1) Circular gasket 4-2.5 No.507, 508, 509

(2) Implements and Measuring instruments

1) General implements and measuring Instruments (📖 : 2-2)

14-2.3 Disassembly of Fuel Oil Relief Valve

(1) Take out the connected piping, and remove the relief valve assembly.

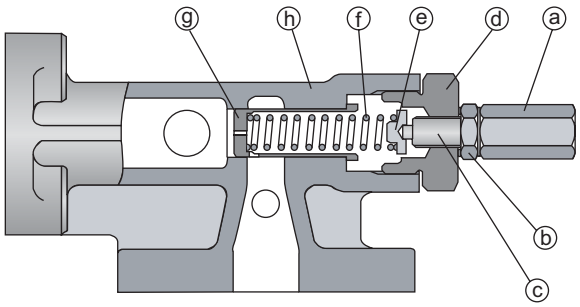
(2) Disassemble the relief valve according to the following procedure:

a) Disconnect the cap nut ⓐ , loosen the lock nut ⓑ, and completely turn back the adjusting screw ⓒ.

Before loosening the adjusting screw, either put a mark on the tightening position of the adjusting screw or keep the record of the dimension, so that the original position can be identified when assembling.

b) Loosen and remove the spring retainer ⓓ.

c) Remove the spring seat ⓔ, spring ⓕ, and relief valve ⓖ from the relief valve body ⓗ.



Fuel Oil Relieve Valve

14-2.4 Inspection and Maintenance of Fuel Oil Relief Valve

(1) Wash all the disassembled parts with clean washing oil, and remove the sludge

(2) Inspect if there is any abnormal dent or scratch on the relief valve, or also check if the valve is not stuck.

(3) Inspect if there is any abnormal dent or scratch on the spring

14-2.5 Reassembly of fuel oil pressure regulating valve

Perform the assembly of the relief valve in the reverse order of the disassembling procedure.

(1) Set the adjusting screw to the position of the marking.

(2) After assembling, drive the engine and check if the pressure is within the blue mark range, and in case that the pressure is out of the range, adjust the pressure with the adjusting screw.

14.3 Fuel Oil Feed Pump

.

14-3.1 General Construction

The fuel oil feed pump is installed on the front side of the engine, and it is driven from the auxiliary gear case via the pump driving device.

The pump is a trochoid type, and the safety valve is incorporated in installed in the upper part cover.

Fuel oil feed pump assy.: 24 kg

14-3.2 Replacing Consumables, Implements, and Measuring Instruments

(1) Replacing Consumables

Replace the following parts with the new ones: (📖 : "Parts List")

<Fuel oil feed pump>

(TYPE A)

1) O-ring	4-2.1.1 No.205, 206
2) Gasket	4-2.1.1 No.235, 236,297,298
3) Mechanical seal	4-2.1.1 No.238
4) Bearing	4-2.1.1 No.232, 233

(TYPE B)

1) O-ring	4-2.1.2 No.200-5, 200-6
2) Gasket	4-2.1.2 No.200-7
3) Bearing	4-2.1.2 No.200-1,200-2
4) Oil seal	4-2.1.2 No.200-3,200-4

<Fuel oil feed pump driving device>

(TYPE A)

1) Flange gasket	4-2.2.1 No.20
2) Plain washer	4-2.2.1 No.507
3) Washer with tooth	4-2.2.1 No.508, 509,510
4) Split pin	4-2.2.1 No.511
5) Oil seal	4-2.2.1 No.519
6) Bearing	4-2.2.1 No.518

(TYPE B)

1) Flange gasket	4-2.2.2 No.7
2) Plain washer	4-2.2.2 No.503
3) Washer with tooth	4-2.2.2 No.505, 506
4) Split pin	4-2.2.2 No.507
5) Oil seal	4-2.2.2 No.513
6) Bearing	4-2.2.2 No.511,512

(2) Implements and Measuring Instruments

1) General tools and measuring instruments

(📖 : 2-2)

14-3.3 Dismounting of Fuel Oil Feed Pump

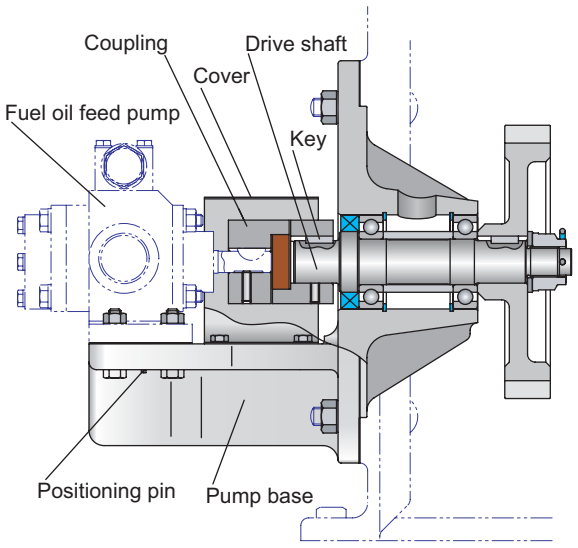
(1) Disconnect the inlet and outlet piping of the fuel oil feed pump.

(2) Take out the coupling cover.

(3) Remove the bolts, and disconnect the fuel oil feed pump from the pump base while carefully watching the positioning pin.

(4) Loosen the clamping screw of the coupling, and remove the coupling.

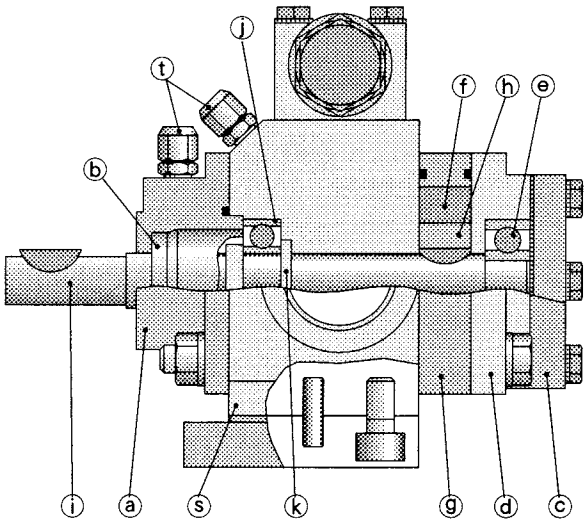
(5) Take out the coupling key.



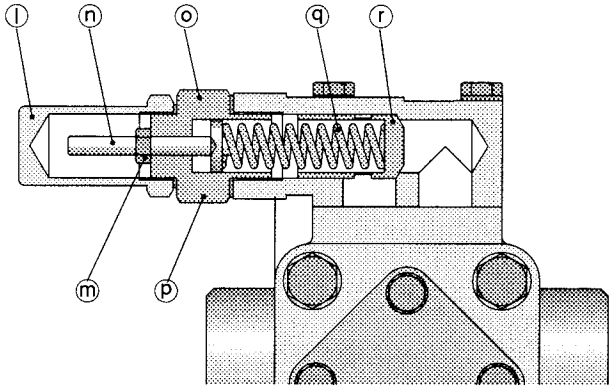
Dismounting of Fuel Oil Feed Pump

14-3.4 Disassembly of Fuel Oil Feed Pump

(1) Before disassembling the fuel oil feed pump, be minded to mark the matchmarks on the pump body, the cover, and so on.
(2) Remove the piping of the ring joint ⓣ.
(3) Remove the bolt and nut, and take out the seal cover ⓐ.
(4) Take out the mechanical seal ⓑ from the seal cover.
(5) Remove the bolt, and take out the bearing cover ⓒ.
(6) Remove the bolt, and take out the side cover ⓓ and bearing ⓔ.
(7) Take out the rotary part of the mechanical seal.
(8) Take out the outer rotor ⓕ and rotor housing ⓖ.
(9) Pull out the inner rotor ⓗ and shaft ⓘ.
Carefully handle the parts so as not to bend the shaft.
(10) Take out the bearing ⓙ and collar ⓚ.
(11) Remove the safety valve cap ⓛ, loosen the lock nut ⓜ, and then loosen the adjusting screw ⓝ.
Before loosening the adjusting screw, be minded either to mark the tightening position of the adjusting screw, or to record the dimensions.
(12) Take out the connector ⓞ, and remove the spring retainer ⓟ, spring ⓠ, and safety valve ⓡ.



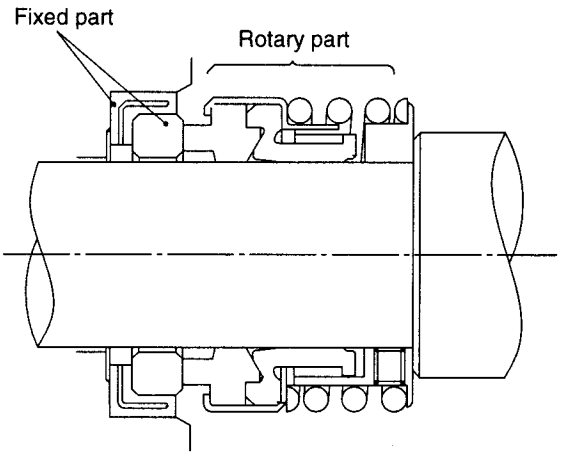
Fuel Oil Feed Pump



Fuel Oil Feed Pump Safety Valve

14-3.5 Inspection and Maintenance of Fuel Oil Feed Pump

(1) Clean all the disassembled parts with fresh washing oil, and blow air on them for drying.
(2) Inspect the wearing conditions of the inner rotor and outer rotor tooth surfaces, cavitation, pitching, and so on.
(3) Inspect the scratch and wearing conditions of the outer periphery of outer rotor.
(4) Rotate the bearing, and check if it rotates smoothly or if there is not any abnormal sound.
(5) Inspect if there is any abnormal dent on the safety valve and safety valve spring, and also if there is not any sticking.

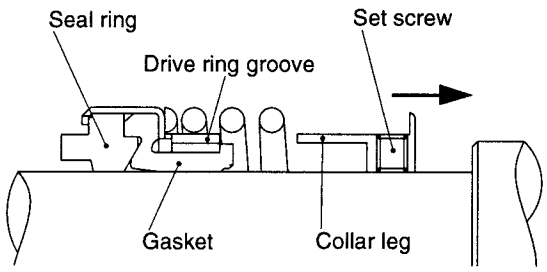


Mechanical Seal

Even in case that no particular fault is found in the bearing, be minded to replace it with a new one at the time of the periodical inspection, which shall be performed every 12,000 to 16,000 hours (4 years).

14-3.6 Assembly of Fuel Oil Feed Pump

(1) Attach the inner rotor ⓗ to the shaft ⓘ, and install them into the casing ⓢ.
(2) Install the collar ⓚ and bearing ⓙ to the shaft.
(3) Insert the pipe knock into the casing, attach the rotor housing ⓖ, and then mount the outer rotor ⓕ.
(4) Insert the mechanical seal rotary part into the shaft.
a) Apply lubricating oil to the inner surface of the gasket and shaft.
b) Mount the collar, and fix the shaft by tightening the set screw.
When inserting the collar leg into the drive ring groove, be minded to slowly and carefully insert it, so that the gasket will not be peeled off.
(5) Attach the side cover ⓓ with short bolt, insert the bearing ⓔ, and then install the bearing cover
(6) Insert the fixed part of the mechanical seal into the seal cover ⓐ.
(7) Attach the seal cover to the main body.
Temporarily tighten 2 short bolts and 2 long bolts, and then securely tighten all the bolts after confirming that it can be rotated lightly by hand.
(8) Install the safety valve.
(9) Install the piping of ring joint, and attach the drive key.
(10) Install the coupling, and mount the fuel oil feed pump on the pump base.
(11) Attach the pump inlet and outlet piping.



Insertion of Mechanical Seal Rotary Part

14-4 Fuel Oil Feed Pump Driving Device

14-4.1 Disassembly of Fuel Oil Feed Pump Driving Device

(1) Before starting to disassemble the driving device, take out the center cover of the auxiliary drive gear case, and measure the backlash of the pump drive gear.

	Standard value (mm)	Replacing limit (mm)
Backlash	0.3~0.5	0.8

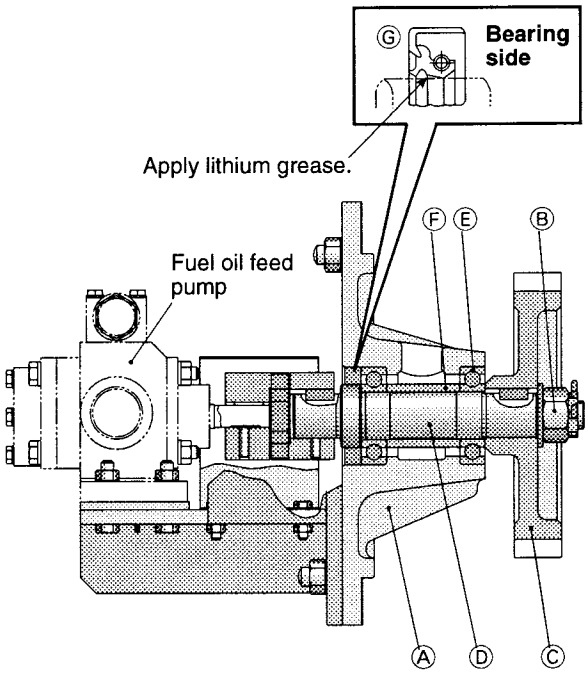
(2) Disconnect the fuel oil feed pump.
(: 14-3.3 "Dismounting of Fuel Oil Feed Pump")

(3) Disconnect the mounting nut, and remove the pump drive bearing Ⓐ.

(4) Remove the nut Ⓑ, and pull out the pump drive gear Ⓒ form the drive shaft Ⓓ.
Then, take out the key.

(5) Pull out the drive shaft from the pump drive bearing, and take out the bearing Ⓔ and distance piece Ⓕ.

(6) Remove the oil seal Ⓖ.



Fuel Oil Feed Pump Driving Device

14-4.2 Maintenance and Assembly of Fuel Oil Feed Pump Driving Device

(1) Inspect if there is any wear or pitching on the tooth surface of the pump drive gear,

(2) Inspect if there is any distortion or crack in the coupling rubber.

(3) Rotate the bearing, and inspect if it rotates smoothly or if there is any abnormal sound.

(4) Assemble the driving device in the reverse order of the disassembling procedure.

△ If the oil seal is installed upside-down, oil will leak.
Therefore, be careful not to mistake the assembling direction.

15. Lubricating Oil System

15-1 Outline of Lubricating Oil System

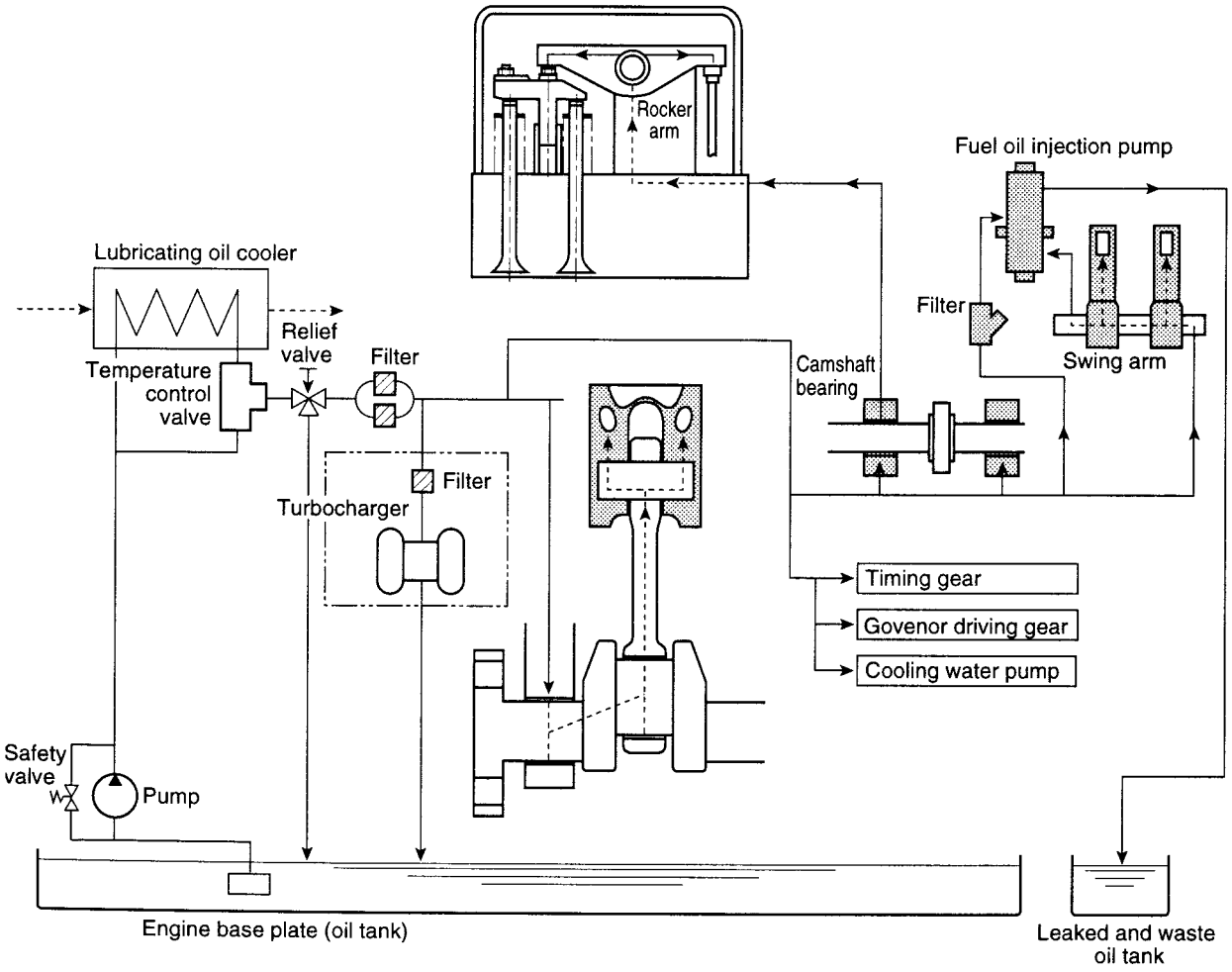
The lubricating oil is installed on the front end of the engine, and driven by the auxiliary drive gear attached to the crankshaft.
The lubricating oil cooler is installed on the engine, and equipped with a temperature control valve as an assembly.
The lubricating oil filter is also installed on the engine, and the lubricating oil relief valve is installed on the installation base of the engine.
As the filters for the turbocharger and fuel injection pump, the special filters of a higher precision are installed.
(📖: "Operation" 2-2.3 "Lubricating Oil System")
(📖: "Operation" 5-4.3 "Cleaning Filters")

15-2 Lubricating Oil Pump

15-2.1 General Construction

The lubricating oil is of a gear type, and all the 5 pieces of the bearings used in the pump are needle bearings. Further, a safety valve is incorporated into the pump cover.

Lubricating oil pump assy. : 33 kg



Lubricating Oil System

15-2.2 Replacing Consumables,Implements, and Measuring Instruments

(1) Replacing Consumables

Replace the following parts with the new ones.
(📖: "Parts List")

①	Needle bearing	4-3.1.1 No.42
②	Oil seal	4-3.1.1 No.526
③	Split pin	4-3.1.1 No.510
④	Pump body gasket	4-3.2 No.10

(2) Implements and Measuring Instruments

① General implements and measuring instruments
(📖:2-2.)

15-2.3 Disassembly of Lubricating Oil Pump

(1) Before removing the lubricating oil pump, take-out the center cover of the auxiliary gear case,and measure the backlash of the pump drive gear.

	Standard value (mm)	Replacing limit (mm)
Backlash	0.3~0.5	0.8

(2) Remove the inlet and outlet piping.

(3) Remove the mounting nut, and take out the lubricating oil pump assembly.

(4) Assemble the lubricating oil pump on the following procedure:

a) Before disassembling, be minded to mark the-matchmarks on the mating surfaces of the pump body, cover, and so on.

b) Remove the split pin ⓐ and castle nut ⓑ, andtake out the gear ⓒ and key ⓓ.

c) Remove the bolt of the pump body cover ⓔ ,and take out the pump body cover.

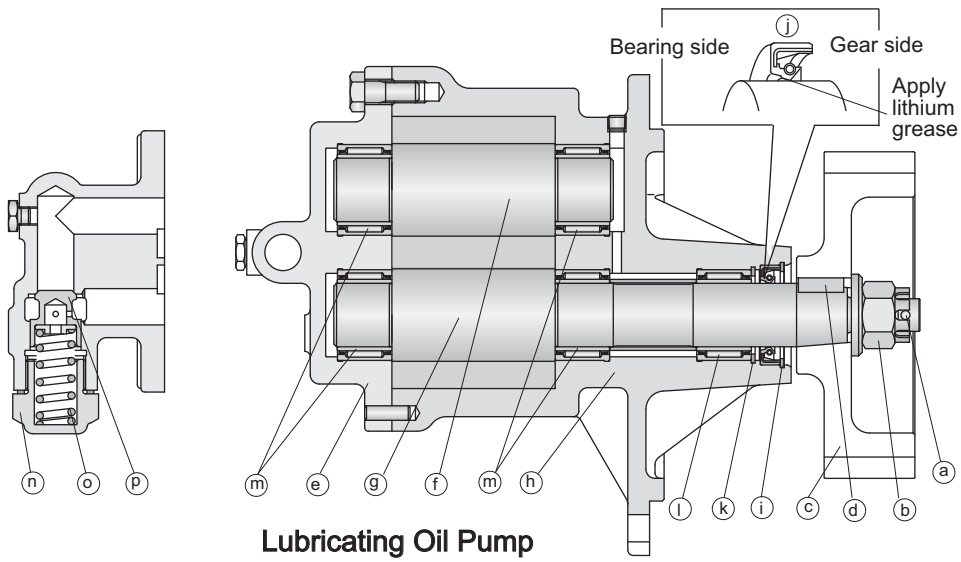
d) Pull out the pump gear ⓕ and ⓖ from the pump body ⓗ.

e) Remove the snap ring ⓘ, and pull out the oil seal ⓙ.

f) Remove the snap ring ⓚ, and pull out the bearing ⓛ.

g) Pull out the bearing ⓜ from the pump body and pump body cover.

h) Remove the safety valve retainer ⓝ, and pull out the safety valve spring ⓞ and safety valve.ⓟ.



Lubricating Oil Pump

15-2.4 Inspection and Maintenance of Lubricating Oil Pump

(1) Wash all the disassembled parts with clean-washing oil.
(2) Inspect the wearing conditions of the toothsurface of each gear, and presence of pitting.
Also inspect the peeling conditions of the outer-periphery and side face, and the presence of seizure.
(3) Inspect if there is any abnormal wear on the oil seal sliding surface of the pump gear shaft.
(4) Inspect if there is any abnormal dent or scratch on the pump body, and the inner surface of the pump body cover.
(5) Inspect the wearing conditions of the toothsurface of the drive gear ⓒ, and the presence of pitting.
(6) Inspect if there is any scratch or trace of sticking on the safety valve. In case that thescratch degree is light, correct it with oil stone.

15-2.5 Assembly of Lubricating Oil Pump

(1) Assemble the lubricating oil pump in the reverse order of the disassembling procedure.

(2) To fit the driving gear (c), apply the lubrication oil to the crown nut, and then tighten the nut with the specified torque.
If the groove of the crown nut is not aligned with the hole of the cotter pin, further tighten the nut.

Specified torque: 245 N·m (25 kgf·m)

△

< Cautions when assembling >
1) Replace the needle bearing and oil seal with the new ones.
2) Use liquid sealant for the mating surface of the pump body cover and pump body.
3) Be minded to assemble the pump body cover after confirming the matchmarks that have been made when disassembling, so that oil release hole is situated on the delivery side without fail.

(3) Install the lubricating oil pump.
In case that the pump drive gear is replaced confirm the backlash.
(4) Connect the inlet and outlet piping.

15-3 Lubricating Oil Cooler

15-3.1 General Construction

The lubricating oil cooler is installed on the engine body, and the temperature control valve is attached to the lubricating oil outlet.
The cooling pipe is multi-tubular type, and there are the tube plates on both sides, and the tube plate on one side is fixed type, and the tube plate on the other side is outer-periphery-slide type, which absorbs thermal expansion of the tube, and is sealed with O-ring.
In case that the cooling water is sea water, protective zinc is attached to the side covers on the both sides.
(📖: "Operation" 5-4.6 "Inspection and Replacement of Protective Zinc")

Lubricating oil cooler
6.4 m² : 123 kg
8 m² : 136 kg
12 m² : 170 kg

15-3.2 Replacing Consumables, Implements, and Measuring Instruments

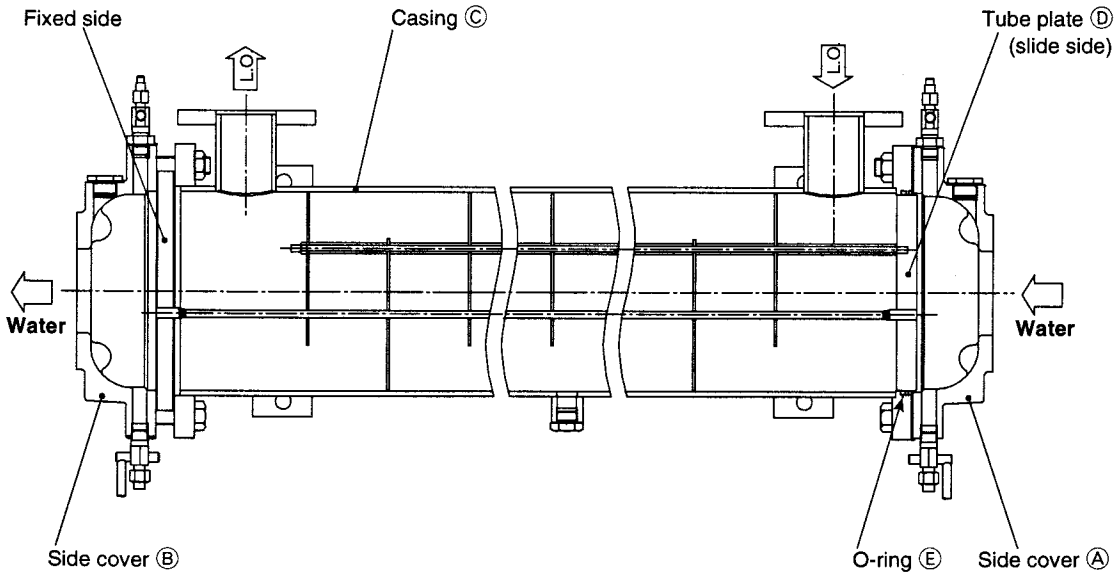
(1) Replacing Consumables
Replace the following parts with the new ones.
(📖: "Parts List")
① Gasket 4-3.3.1 No.525, 526
② O-ring 4-3.3.1 No.521
③ Protective zinc mounting gasket 4-3.3.1 No.61

(2) Implements and Measuring Instruments
① General tools and measuring instruments
(📖: 2-2)

15-3.3 Inspection and Maintenance of Lubricating Oil Cooler

If sludge is accumulated on the cooling pipe surface of the lubricating cooler, the cooling performance will drastically be decreased. Therefore, be minded to conduct the maintenance according to the maintenance interval specified in the overhaul and maintenance list.

(1) Removal of lubricating oil cooler
a) Remove the connecting piping of the cooling water and lubricating oil.
b) Pass a wire rope around the lubricating oil cooler assembly, and dismount the cooling water assembly by removing the mounting bolt, while suspending it with a chain block.



Lubricating Oil Cooler

(2) Cleaning of lubricating Oil Side

Clean the lubricating oil side of the lubricating oil cooler by means of chemical cleaning, pulling out the cooling pipe assembly.

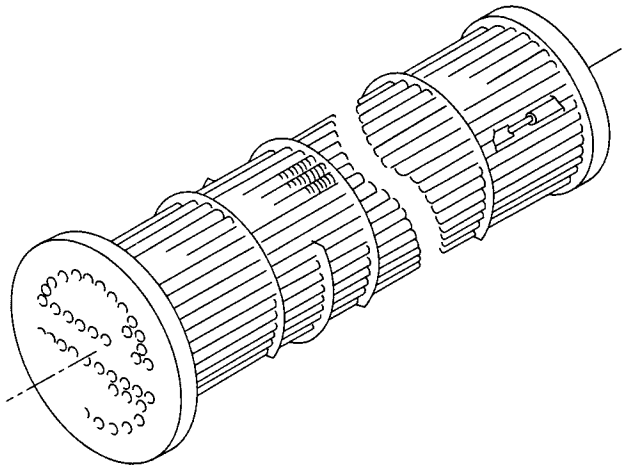
a) Remove the bolt and nut, and take out the cover Ⓐ and Ⓑ on the both sides.

b) Pull out the cooling pipe assembly by pushing it from the slide side (cover Ⓐ side) to the fixed side (cover Ⓑ side).

c) Clean the cooling pipe assembly by immersing it into cleaning liquid.

△

1) As for the details on the brand of the cleaning agent, the mixing ratio, heating, postcleaning treatment, and so on, refer to the instruction manual of the manufacturer of each cleaning agent.
2) Be minded not to add the heat of 150°C or more to the cooler.



Cooling Pipe Assembly

(3) Cleaning of cooling water side

Remove sludge accumulated on the cooling pipe inner surface using a cleaning brush for small tube, in the state that the covers on the both sides are removed.

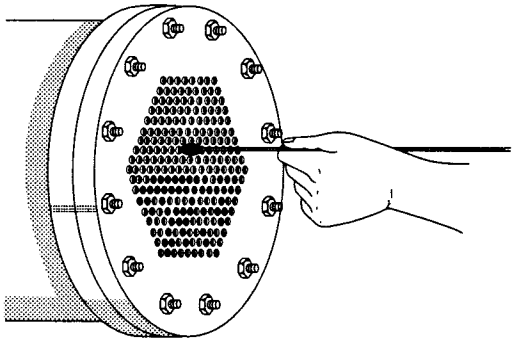
(4) Inspection and maintenance

a) Inspect if there is any crack or corrosion on the inner surface of the cooling pipe.

b) In case that crack or corrosion is found, replace the cooling pipe with a new one.

◎As for the replacing method, consult the Service Department of Daihatsu Diesel Manufacturing Co., Ltd.

c) Replace the O-ring Ⓔ of the tube plate Ⓓ outer periphery, and insert it into the casing Ⓒ.



Cleaning of Cooling Pipe

15-3.4 Assembly of Lubricating Oil Cooler

(1) Attach the covers on the both sides.

(2) Conduct the water pressure test in the state of the cooler assembly, and confirm that there is not leakage from any section of the parts.

(3) Install the cooler assembly on the engine, and connect the piping.

《Water pressure test》
Water side : 0.6MPa {6 kgf/cm²}
Lubricating oil side : 1.0MPa {10 kgf/cm²}

15-4 Lubricating Oil Relief Valve

15-4.1 General Construction

The lubricating oil relief valve is incorporated into the lower part block of the lubricating filter.
Surplus lubricating oil will be returned into the oil pan or into the oil tank on the engine base plate.
The adjustment of lubricating oil pressure can be made by by turning the adjusting screw ⓐ, and by changing the spring force of the relief valve,.

15-4.2 Replacing Consumables, Implements, and Measuring Instruments

(1) Replacing Consumables

Replace the following parts with the new ones.
(📖 : "Parts List")
① Circular gasket 4-3.5.1 No.532, 533

(2) Implements and Measuring Instruments

① General implements and measuring instruments
(📖: 2-2)

15-4.3 Disassembly of Lubricating Oil Relief Valve

(1) Remove the cap ⓑ, loosen the lock nut ⓒ, and fully turn back the adjusting screw ⓐ.
Before loosening the adjusting screw, either mark the tightening position of the adjusting screw, or record the dimensions, so that the previous adjusting position can be identified when assembling.

(2) Take out the spring case ⓓ.

> ⚠ Since the spring of the spring case is compressed, be minded to slowly and carefully loosen it.

(3) Take out the spring seat ⓔ, spring ⓕ and ⓖ, and relief valve ⓗ from the lubricating oil relief valve body ⓘ.

15-4.4 Inspection and Maintenance of Lubricating Oil Relief Valve

(1) Clean all the disassembled parts with fresh washing water, and remove sludge.

(2) Inspect if there is any abnormal dent or scratch on the relief valve, or if the relief valve is not stuck.
If the degree of the damage is minor, correct it with oil stone, and confirm that the valve can be moved smoothly.

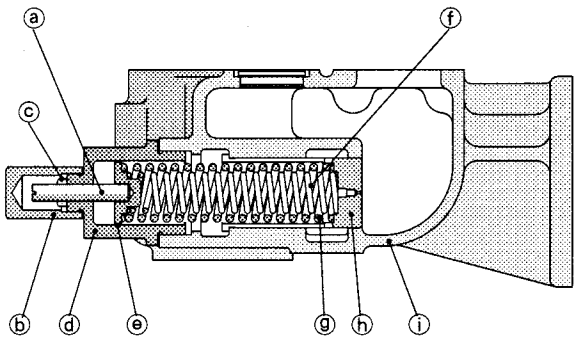
(3) Inspect if there is any abnormal dent or scratch on the spring.

15-4.5 Assembly of Lubricating Oil Relief Valve

Assemble the relief valve in the reverse order of the disassembling procedure.

(1) Set the adjusting screw to the marking position.

(2) After assembling, operate the engine and check if the pressure is within the blue mark range, and in case that the pressure indication is out of the range, adjust it with the adjusting screw.



Lubricating Oil Relief Valve

15-5 Lubricating Oil Temperature Control Valve:

15-5.1 General Construction

The lubricating oil temperature control valve is a kind of the mixing type with 3-direction valves, and the common port "A", high-temperature port "B", and low-temperature port "C" are provided. The valve ⓕ is opened or closed by the activation of the spindle ⓔ, which moves out and moves in by expansion or contraction force of the wax of the wax pellet ⓓ located in the common port "A".

《Explanation of activation》

The figure shows the case that the lubricating oil temperature of the port "A", which is connected to the engine inlet, is low, and indicates the state that the port "C" is fully closed and the port "B" is fully opened.

When the lubricating oil temperature is increased, the wax in the wax pellet will expand to extend the spindle, so that the valve ⓕ is pushed down to open the port "C", and the lubricating oil temperature in the port "A" can be controlled to be of the specified value.

In case that the lubricating oil temperature of the engine inlet has abnormally increased due to failure of the pellet, and so on, the temperature can be decreased by manually screwing the adjusting screw ⓖ, as an emergency measure, to push down the valve ⓕ and open the port "C".

(📖: "Operation" 5-3.2 "Manual Adjustment of Lubricating Oil Temperature")

Lubricating oil temperature control valve (DTV50) : 13 kg

15-5.2 Replacing Consumables, Implements, and Measuring Instruments

(1) Replacing Consumables

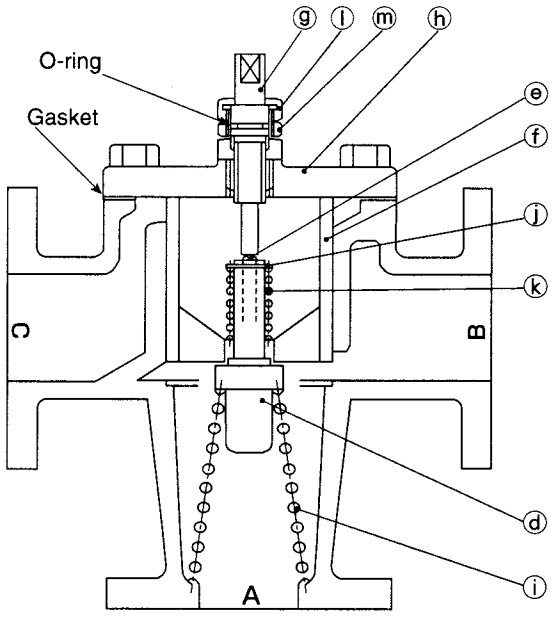
Replace the following parts with the new ones.

① Gasket S4104100680
② O-ring Z560101124
③ Pellet (1) S10400

Note: The controlling temperature of pellet will vary depending on the specifications. Therefore, clearly indicate the controlling temperature of the name plate when issuing orders.

(2) Implements and Measuring Instruments

① General implements and measuring instruments (📖: 2-2)



Lubricating Oil Temperature Control Valve

15-5.3 Disassembly of Lubricating Oil Temperature Control Valve

(1) Take out each connection piping, and dismount the temperature control valve.

(2) Disassemble the temperature control valve on the following procedure:

a) Remove the bolt, and take out the cover ⓗ.

> ⚠ Since the spring ⓘ is compressed, be minded to slowly and carefully loosen the bolt, so that the spring may not fly out.

b) Dismount the valve ⓕ.
As the pellet ⓓ is attached to the valve, pull out the valve and pellet at the same time.

c) Pull out the spring ⓘ.

d) Remove the E-ring ⓙ, and take out the spring ⓚ.

e) Take out the pellet from the valve.

f) Remove the cap nut ⓛ and lock nut ⓜ, and pull out the adjusting screw ⓖ.

15-5.4 Inspection and Maintenance of Lubricating Oil Temperature Control Valve

(1) Clean all the disassembled parts with washing oil, and remove the scales.

(2) Inspect if there is any scratch on the outer periphery and end surface of the valve, and confirm that the valve moves smoothly.
In case that the degree of scratch is minor, correct it with oil stone.

(3) Inspect if there is any abnormal dent or scratch on each spring.

15-5.5 Assembly of Lubricating Oil Temperature Control Valve

Assemble the control valve in the reverse order of the disassembling procedure.

> △
> 1) Apply grease on the sliding part of the valve.
> 2) Replace the pellet every 2 years, taking into consideration the deterioration of the rubber diaphragm in the inside.

16. Cooling Water System

16.1 Outline of Cooling Water System

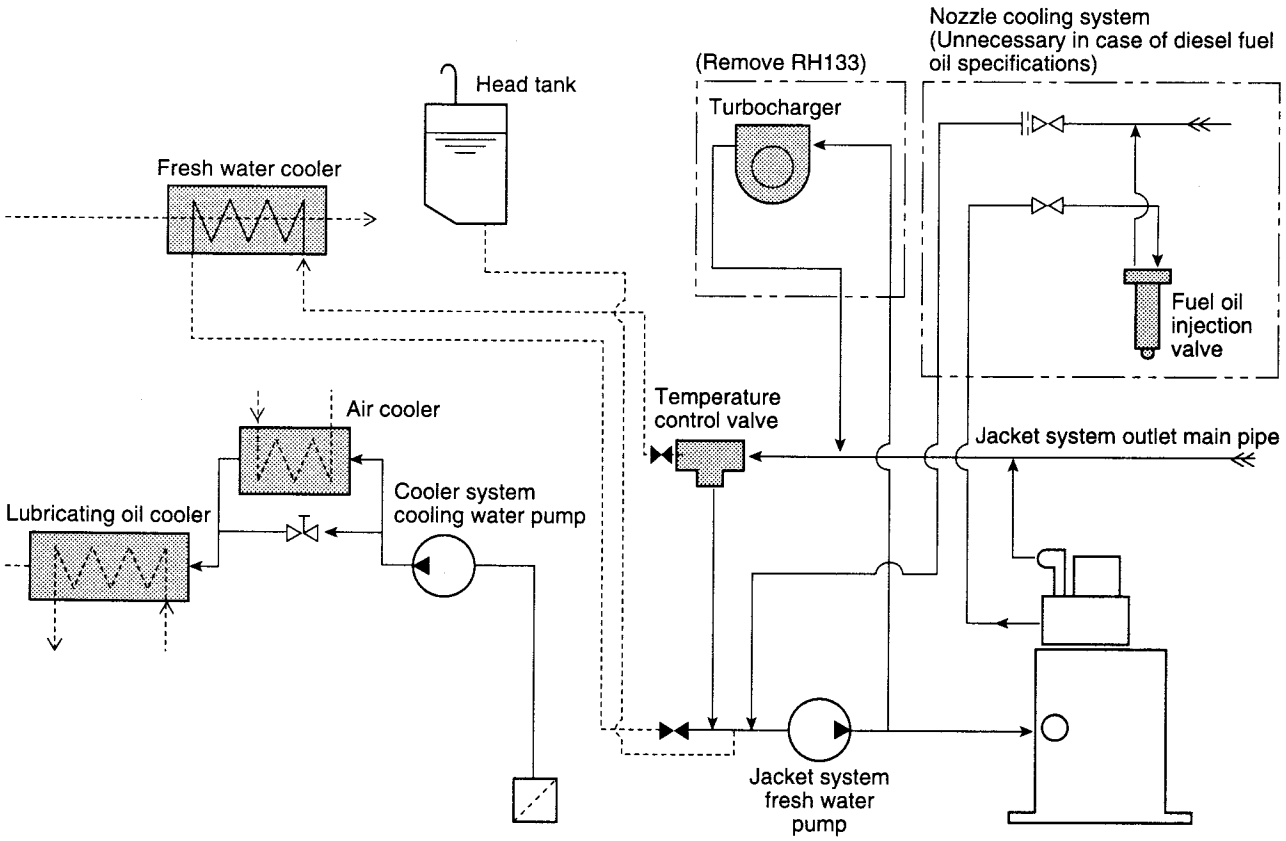
The cooling water system is divided into a jacket system for cooling the engine, and a cooler system for cooling the air cooler and lubricating oil cooler.
As the standard specifications, the jacket system cooling water pump is attached on the engine, and the cooler system cooling water pump is separately installed.
The engine outlet of the jacket system cooling water is equipped with a temperature control valve.
In case of heavy fuel oil specifications, the fuel oil injection valve is water-cooled, and cooling water is supplied as branched from the jacket system.
(: "Operation" 2.2.4 "Cooling Water System")

16.2 Cooling Water Pump

16.2.1 General Construction

The cooling water pump of the jacket system is a volute type, and the pump is installed on the front of the engine, and is driven by the auxiliary drive gear located on the front end of the crankshaft.

Cooling water pump : 39 kg



Cooling Water System

16.2.2 Replacing Consumables,Implements and Measuring Instruments

(1) Replacing Consumables

Replace the following parts with the new ones.
(📖: "Parts List")

①	O-ring	4-4.1 No.522
②	Circular gasket	4-4.1 No.529
③	Gasket	4-4.2 No.10
④	Oil seal	4-4.1 No.520
⑤	Mechanical seal	4-4.1 No.49
⑥	Bearing	4-4.1 No.57

(2) Implements and Measuring Instruments

① General implements and measuring instruments
(📖: 2-2.2)

16.2.3 Disassembly of Cooling Water Pump

(1) Before dismounting the cooling water pump,remove the cover of the center of the auxiliary gear case, and measure the backlash of the pump drive gear.

	Standard (mm)	Replacement limit (mm)
Backlash	0.3~0.5	0.8

(2) Disconnect the piping of the pump inlet and outlet.
(3) Remove the tightening nut, and dismount the cooling water pump assembly.
(4) Disassemble the cooling water pump in thefollowing procedure:
Before disassembling, put matchmarks on the joint surfaces of the pump body, cover, and so on.

< Cooling water pump disassembling procedure >

a) Remove the mounting nut, and take out the pump body ⓐ.

b) Remove the impeller mounting nut ⓑ, remove the impeller ⓒ and take out the key ⓓ.

△ The screw of the impeller mounting nut ⓑ for normal rotation engine is threaded as "left-handed" screw. Therefore, be careful of the direction when loosening or tightening the nut and screw.

c) Remove the rotary part of the mechanical seal ⓔ.

d) Remove the seal holder ⓕ, and take out the-fixed part of the mechanical seal.

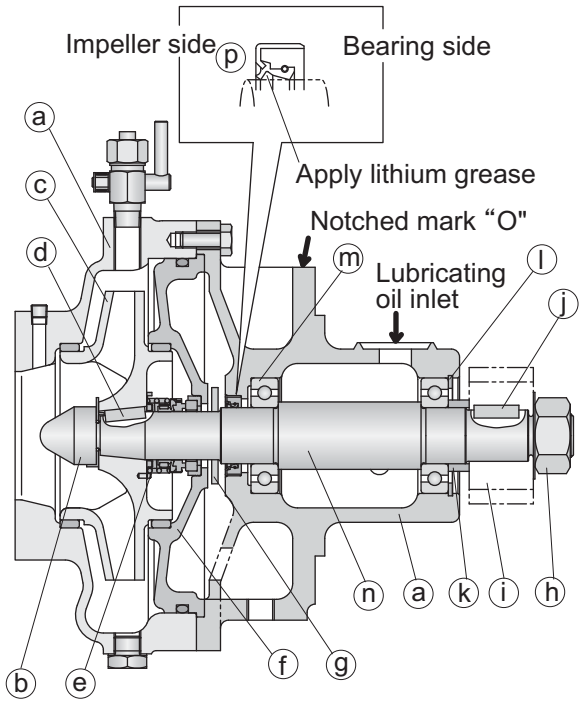
e) Remove the water-cutting ring ⓖ.

f) Remove the cooling water pump gear tightening nut ⓗ, remove the cooling water pump gear ⓘ, and then take out the key ⓙ.

g) Pull out the collar ⓚ, and take out the snap ring ⓛ.

h) Extract the pump shaft ⓝ out of the bearing case ⓞ, together with the ball bearing ⓜ.

i) Take out the oil seal ⓟ from the bearing case



Cooling Water Pump

16.2.4 Inspection and Maintenance of Cooling Water Pump

(1) Wash all the disassembled parts with washing oil, and remove the scales.

(2) Measure the clearance "a" between the impeller and the mouth ring.
Measure the outer diameter of the mouth ring inserting part of the impeller and the inner diameter of the mouth ring, and calculate the clearance.

Mouth ring clearance	
Standard value(mm)	Replacement limit(mm)
a = 0.50~0.56	1.0

△ In case that the clearance is over the replacement limit, replace the parts, of which wearing degree is larger.
Excessive wear may degrade the pump efficiency.

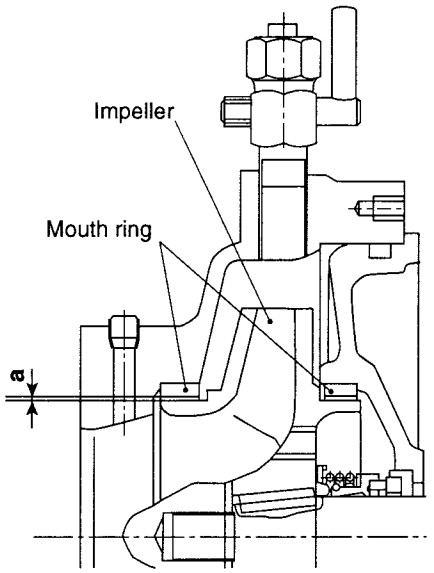
(3) Check if there is any corrosion or cavitation on the impeller.

(4) Check if there is any corrosion or cavitation on the casing, or the reduction in thickness of the casing due to these defects.

(5) Check the wearing conditions of the cooling water pump gear tooth flank and the presence of pitching.

(6) Rotate the bearing, and check if it rotates smoothly, does not make abnormal noise, or is not worn out.

△ Replace the bearing at the time of the periodical inspection of every 8,000 to 12,000 hrs. (every 2 to 3 years) with a new one, even when there is no particular abnormality on it.



Clearance between Impeller and Mouth Ring

16.2.5 Assembly of Cooling Water Pump

(1) Assemble the cooling water pump assembly in the reverse order of the disassembling procedure.

△ To tighten the impeller nut (b) and the pump gear nut (h), apply the lubrication oil to the nuts, and then tighten the nuts with the specified torque.

△ When tightening the pump gear nut (h), fix the gear and then tighten the nut so that the load (reaction) cannot be applied to the impeller.

Specified torque:

Impeller nut:	**147 N·m (15 kgf·m)**
Pump gear nut:	**333 N·m (34 kgf·m)**

△

< Cautions when assembling the cooling water pump >

1) Be minded to perform the assembling in such a manner that the lubricating oil inlet of the bearing case faces straight upward (the notched mark "O" facing straight upward), when the pump is mounted on the engine.
2) Replace the oil seal, mechanical seal, packing, folded washer, O-ring, etc. with new ones.
3) Be careful not to assemble the oil seal in the wrong direction.
4) Mark the direction of the washer claw on the impeller (refer to Fig. 1).
5) Tighten the impeller nut with the specified torque using a torque wrench.

When tightening the impeller nut, check that the folded washer does not turn together with the nut.

6) Before fitting the pump body, turn the impeller with your hand, and check that the impeller can rotate smoothly and there is a play (0.1 to 0.7 mm) in the axial direction.
Also check that deflection is 0.05 mm or less on the outer surface of the impeller (refer to Fig. 2).

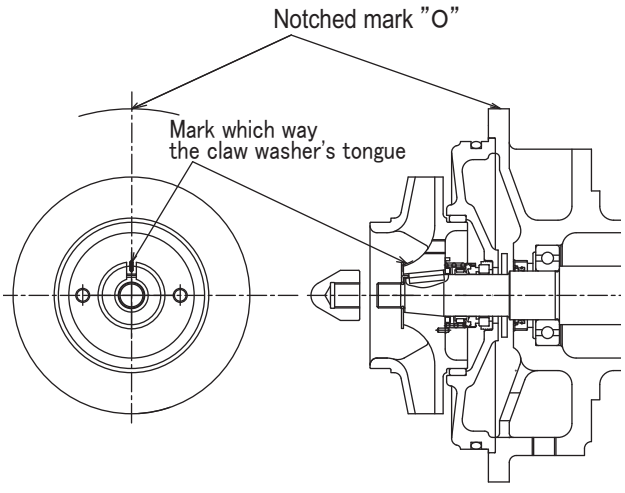


Fig. 1

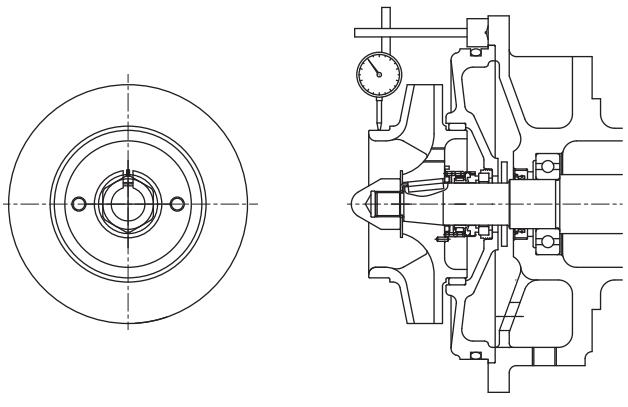
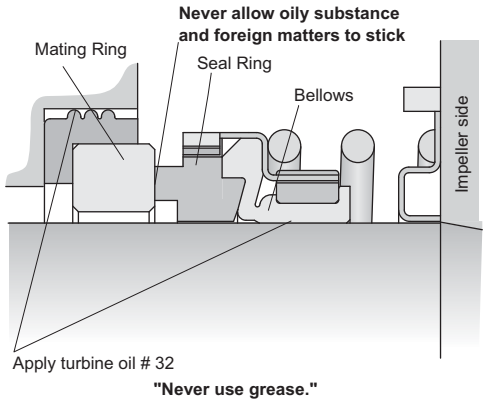


Fig. 2

Assembly of Cooling Water Pump

<Caution in handling mechanical seal>

1) Do not use any greases.
2) Do not apply any oils to the sliding surface. If oil or foreign material is on the sliding surface, wipe it off the sliding surface using clean cloth moistened with alcohol or acetone.
3) Apply a thin coat of turbine oil #32, or equivalent oil, to the inner surface of the mechanical seal and the shaft, and then fit the mechanical seal.
4) Leave the mechanical seal as it is for 30 minutes or more.



Installation of the Mechanical Seal

(2) Mount the cooling water pump.
In case that the cooling water pump gear is replaced, check the backlash.

(3) Connect the cooling water inlet and outlet piping.

If the flange surfaces cannot be fitted tightly due to the distortion of piping, correct the distortion of the piping before connecting. If the distorted piping is forcibly connected, the pump bearing may be damaged.

16-3 Cooling Water Temperature Control Valve

16-3.1 General Construction

The cooling water temperature control valve is a kind of the mixing type with 3-direction valves as in the case of the lubricating oil temperature control valve. Consequently, the basic structure, function, activation, and handling method is approximately identical with those of the lubricating oil temperature control valve.
(📖: "Lubricating Oil Temperature Control Valve")

Cooling water temperature control valve (DTV-65): 20 kg

16-3.2 Replacing Consumables,Implements, and Measuring Instruments

(1) Replacing Consumables

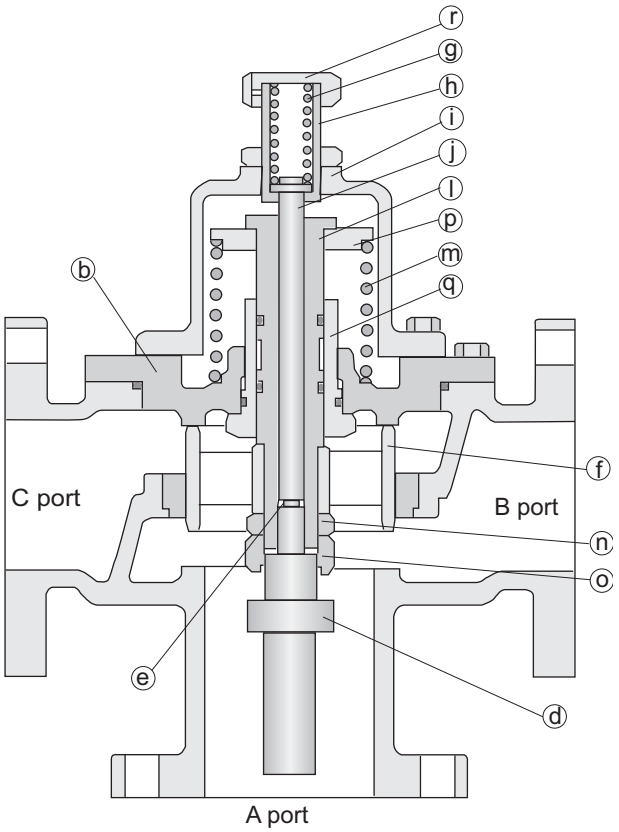
Replace the following parts with the new ones:

① Y-ring S104100650
② O-ring Z560102124ZZ
③ O-ring Z560103635ZZ
④ O-ring Z565001300ZZ
⑤ Pellet S10400

Note: The controlling temperature of pellet may differ depending on the specification. Therefore, be minded to clearly Indicate the-controlling temperature of the name plate when issuing orders.

(2) Implements and Measuring Instruments

① General implements and measuring instruments (📖: 2-2)



Cooling Water Temperature Control Valve

16-3.3 Disassembly of Cooling Water Temperature Control Valve

(1) Disconnect the connection piping, and remove the temperature control vaive assembly.

(2) Disassemble the cooling water temperature-control valve in the following procedure:

< Disassembling procedure >

a) Remove the mounting bolt, and take out the-cover ⓒ.
Since the adjusting screw ⓗ and the rod ⓙ are attached to the cover ⓒ, remove them altogether.

b) Remove the mounting bolt, and take out the-cover ⓑ.
Since the valve ⓕ, shaft ⓙ, pellet ⓓ, and main spring ⓜ are attached to the cover, remove them altogether.

c) Take out the pellet.

d) Remove the lock nut ⓝ and ⓞ, take out the-valve from the shaft.

> Since the main spring is compressed, be minded to carefully and slowly loosen the nut, so that the spring may not fly out.

e) Take out the shaft, spring seat ⓟ, and main-spring.

f) Pull out the shaft bush ⓠ from the cover.
Take out the cap ⓡ, and pull out cushion spring ⓖ and rod ⓙ from the adjusting screw ⓗ.

16-3.4 Inspection and Maintenance of Cooling Water Temperature Control Valve

(1) Clean all the disassembled parts with washing oil, and remove the scales.

(2) Inspect if there is not any scratch on the outer periphery and end surface of the valve, and con-firm that the valve moves smoothly.
If the degree of scratch is minor, correct it with oil stone.

(3) Inspect if there is not any abnormal dent or scratch on the cushion spring.

(4) Insert the shaft into the shaft bush, and inspect if it moves smoothly.

16-3.5 Assembly of Cooling Water Temperature Control Valve

Assemble the temperature control valve in the reverse order of disassembling procedure.

> Be minded to replace the pellet every 2 years, taking into consideration the degradation of the rubber diaphragm in the inside.

MEMO

17-2 Fuel Oil Shutdown Device (G1 Type)

17-2.1 General construction

As the fuel oil shutdown device, there are two types, i.e., G1 Type for the constant-speed engine (such as a generator engine) and J2 Type for the variable-speed engine (such as a marine propulsion engine), and which engine should be used depends on the purpose of its use and specifications.

The fuel oil shutdown device (G1 Type) is provided with a stop cylinder to shut down the fuel oil, and a fuel control cylinder to control excessive fuel oil injection that are arranged in tandem, and this shutdown device shifts the fuel injection pump rack to either "Stop" position or "Control" position via common rod, by affecting the control air to each piston.

Fuel oil shutdown device (G1 type) : 5.5 kg

17-2.2 Replacing Consumables, Implements, and Measuring Instruments

(1) Replacing Consumables

Replace the following parts with the new ones.
(📖 : "Parts List")
<G1 type> O-ring
4-7.1.1 No.505, 506, 507, 508, 509

(2) Implements and Measuring Instruments

① General implements and measuring instruments
(📖 : 2-2)

17-2.3 Disassembly of Fuel Oil Shutdown Device (G1 Type)

(1) Before disassembling, put a mark (matchmark) to the adjusting place, or keep the record of the dimensions.

(2) Take out the link pin Ⓒ, and remove the fork end Ⓑ.

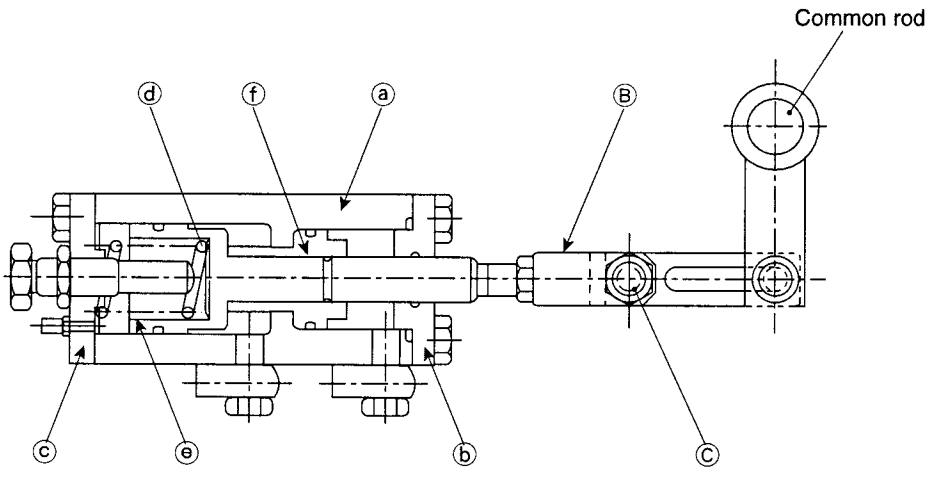
(3) Remove the fuel oil shutdown device assembly Ⓐ from the engine.

(4) Disassemble the fuel oil shutdown device assembly in the following procedure:

a) Remove the bolts, and take out the cover-1ⓑ and the cover-2 ⓒ.

b) Extract the main spring ⓓ and shutdown piston ⓔ out of the cylinder ⓐ.

c) Extract the control piston ⓕ from the opposite side.



Fuel Oil Shutdown Device (G1 Type)

17-2.4 Inspection, Maintenance, and Assembly of Fuel Oil Shutdown Device (G1 Type)

(1) Wash all the disassembled parts with clean washing oil, and blow air on them.

(2) Inspect if there is any abnormal dent or scratch on the shutdown piston and control piston.

(3) Inspect if there is any abnormal dent or scratch on the cylinder inner surface.

(4) Inspect if there is any scratch on the main spring.

(5) Inspect if there is any rusting on each parts, which is caused by drain.

(6) Assemble the fuel oil shutdown device assembly in the reverse order of the disassembling procedure.

△
1) Replace all the O-rings with the new ones.
2) When assembling, thinly apply grease to the sliding surfaces of the O-ring, piston, and so on.

(7) After assembling, confirm that every part of the device operates smoothly.

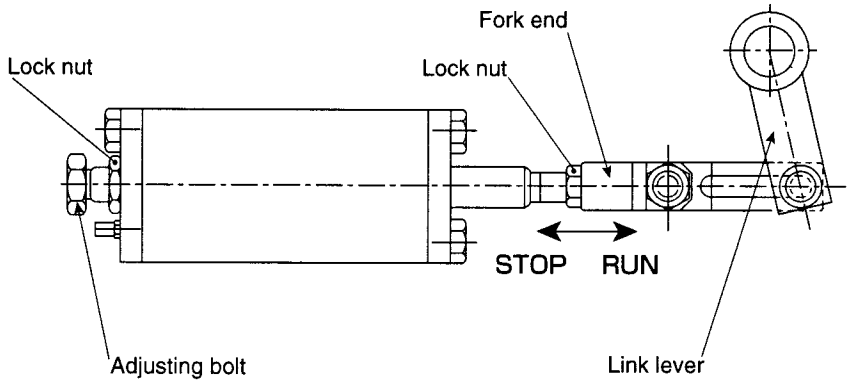
17-2.5 Mounting and Adjustment of Fuel Oil Shutdown Device (G1 Type)

(1) Mount the fuel oil shutdown device assembly to the engine, and attach the fork end and link lever.
At this time, be minded to temporarily adjust the adjusting bolt ⑨ by matching it to the matchmark.

(2) Turn the operation lever to "Drive" position, and supply control air to the control cylinder of the fuel oil shutdown device. And, adjust the screw-in position of the fork end, so that the rack scale indicates the specified position, and fix the link lever.

(3) Next, supply air to the shutdown cylinder, and adjust the screw-in position of the adjusting bolt, so that the rack is at "0" position.
If the screw-in direction is clockwise, the shutdown stroke will be decreased.

(4) When the adjustment of the control stroke and the shutdown stroke is completed after repeating the above steps (2) and (3), fix the fork end and adjusting bolt with the lock nuts.



Mounting and Adjustment of Fuel Oil Shutdown Device (G1 Type)

17.3 Fuel Oil Shutdown Device (J2 Type)

17.3.1 General construction

The fuel oil shutdown device (J2 type) is employed in the air-system type variable-speed engine, and as in the case of G1 type, the shutdown device is composed of a stop cylinder which shuts down the fuel, and a control cylinder which controls excessive fuel injection.
The limit value of the control cylinder is variable, and it shall be varied by the air pressure for operation, and according to the load.

Fuel oil shutdown device (J2 type) : 9.5 kg

17.3.2 Replacing Consumables, Implements, and Measuring Instruments

(1) Replacing Consumables

Replace the following parts with the new ones.
(: "Parts List")

① Mini-Y gasket	4-7.1.2	No.40, 41
② GLY gasket	4-7.1.2	No.44
③ O-ring	4-7.1.2	No.37
④ SER scraper	4-7.1.2	No.47

(2) Implements and Measuring Instruments

① General implements and measuring instruments (: 2-2)

17.3.3 Disassembly, Maintenance, and Assembly of Fuel Oil Shutdown Device (J2 Type)

The assembly, maintenance, and assembly of the fuel shutdown device (J2 type) shall be conducted according to the procedure of G1 type.
(: 17-2 "Fuel Oil Shutdown Device (G1 Type)")

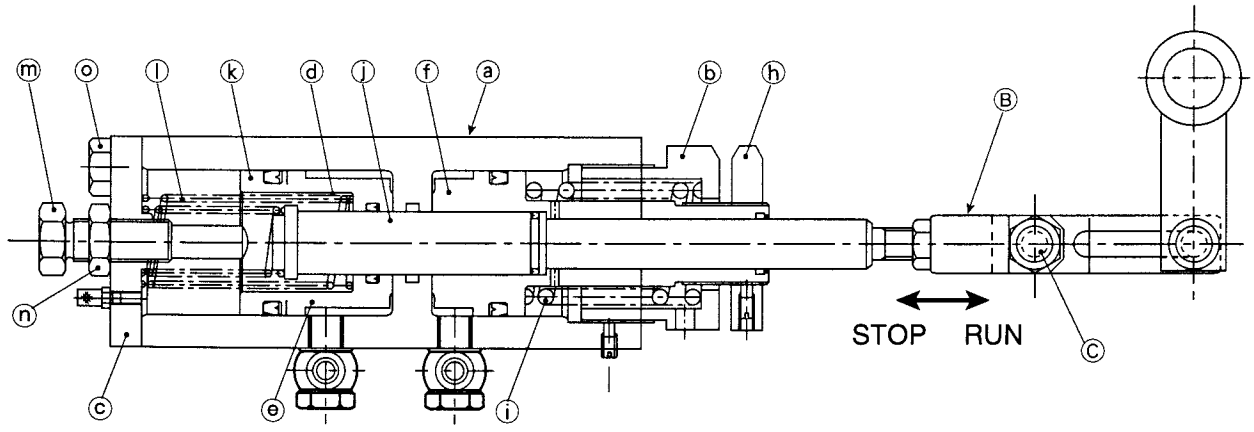
17-3.4 Mounting and Adjustment of Fuel Oil Shutdown Device (J2 Type)

The adjustment of the fuel oil shutdown device (J2 type) shall be conducted by correlating it with the pressure of operating air.

(1) Mount the fuel oil shutdown device to the engine, and attach the fork end and link lever by temporarily adjusting them.

(2) Set the operating lever of the engine to "Drive" position, push the rack indicator needle to the increase direction, adjust the screw-in position of the fork end, so that the rack amount in the state that the link pin is struck against the long-hole part of the link should be the rack amount +2-3 mm (Point A in the figure) of the starting time, and then fix the link lever.

(3) Supply the operating air equivalent to the total load rack amount (0.4MPa in the figure) to the rack control piston.
In the meantime, confirm that the link pin is not struck against the long-hole part of the link.



Fuel Oil Shutdown Device (J2 Type)

(4) Next, push the rack indicator needle to the increase direction, and adjust the screw-in position of the spring seat, so that the rack amount in the state that the link pin is struck against the long-hole part of the link should be the rack amount +1~2 mm (Point B in the figure) of the full-loading time.
If the screw-in direction is clockwise, the limit rack amount will be decreased.

(5) In case that the rack stopper is set in the full-loaded position, confirm the rack amount to be limited by the clearance between the link long-hole part and link pin.

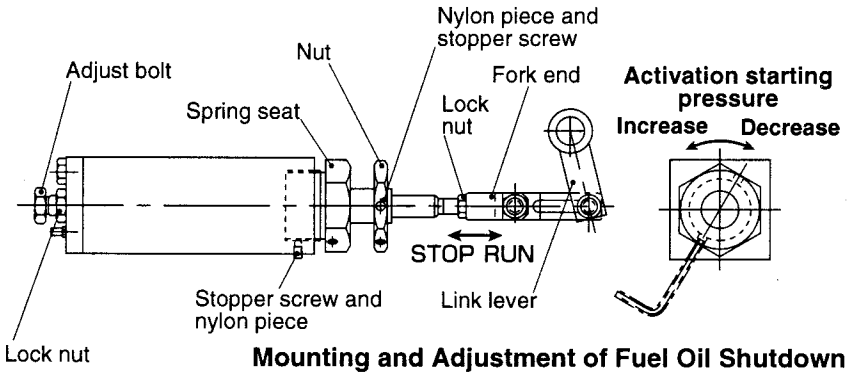
(6) After the operating air is decompressed to 0.1MPa or lower, gradually supply the operating air to the control piston again, and confirm that activation starting point (Point C in the figure) is within the range of 0.1~0.2MPa.

(7) Next, supply the control air to the shutdown piston, and adjust the screw-in position of the adjusting bolt, so that the rack position is "O".
If the screw-in direction is clockwise, the shutdown stroke will be decreased.

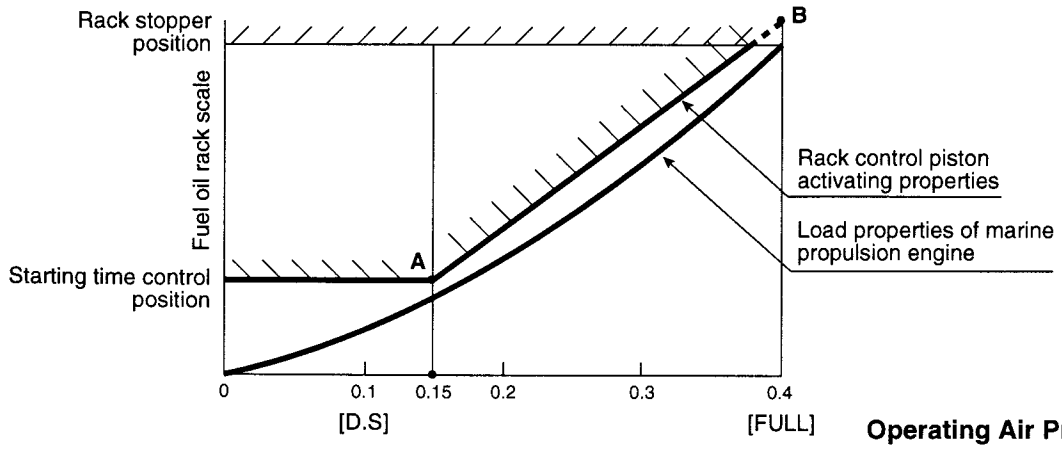
(8) When the adjustment of the rack control stroke and shutdown stroke is completed by repeating the procedure of the above Item (3) to (7), fix the fork end and adjust bolt with the lock nut.

△

1) Although hysteresis may be seen between the increase time and decrease time of operating air pressure, there is no functional problems at all.
2) The adjustment of activating properties of the rack control piston shall be conducted only in the direction of increasing the operating air pressure, so that the errors due to hysteresis can be minimized.
3) Since the spring seat is locked not to rotate by the stopper screw and nylon piece, adjustment shall be conducted after loosening the stopper screw, and be sure to lock it again after finishing the adjustment.



Mounting and Adjustment of Fuel Oil Shutdown Device (J2 Type)



18 Gauge Board

18-1 Gauge Board

18-1.1 General Construction

The gauge board is equipped with a tachometer and each pressure gauge (for lubricating oil, fuel oil, intake air, cooling water, etc.), and is supported by cushion rubber.

The tachometer is driven from the front end of the camshaft via flexible cable, and each pressure gauge is connected from the source valve at the end of piping with flexible hose

18-1.2 Replacing Consumables, Implements, Measuring Instruments

(1) Replacing Consumables

Replace the following parts with the new ones.

(📖 : "Parts List")

① Flexible hose 4-6.1 No. A20, A21, A24

② Cushion rubber 4-6.1 No. A15

(2) Implements and Measuring Instruments

(📖 : 2-2)

18-1.3 Disassembly and Maintenance of Gauge Board

Perform the disassembly and maintenance of the gauge board at the time of the periodic inspection (every 16,000 to 24,000 hr: every 4 to 5 years), according to the following procedure:

(1) Disassembly of Gauge Board

a) Remove the flexible cable of tachometer from the take-out port.

b) Close the source valve of the pressure gauge, and disconnect the flexible hose.

c) Remove the mounting bolt of cushion rubber to the bracket, and disconnect the entire gauge board.

(2) Inspection and Maintenance of Gauge Board

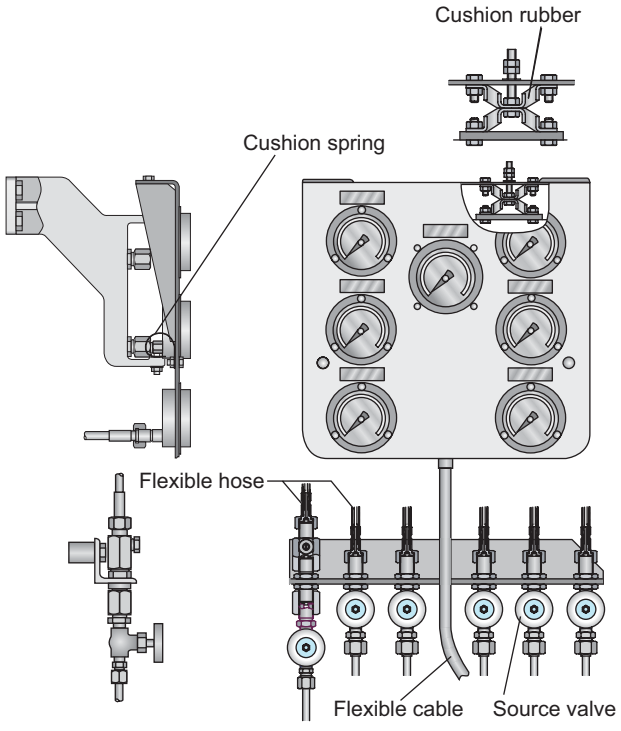
a) Check the accuracy of each gauge, comparing with the equipment for calibration purpose or new equipment. In case that any fault is found, replace it with a good gauge.

b) Replace the flexible hose with a new one.

c) Replace the cushion rubber with a new one.

△

1) It is difficult to repair the defective gauges on site. Therefore, replace them with the new ones, or inquire the specialized maker for the repair.
2) Heavily deteriorated hoses may break. If the hoses for fuel oil and lubricating oil break and high-temperature parts are splashed with the oil, a fire may occur. Replace such hoses without fail.
3) If the elasticity of the cushion rubber is lost, the vibration of the gauge will increase and the indication fault of the gauge will be advanced.

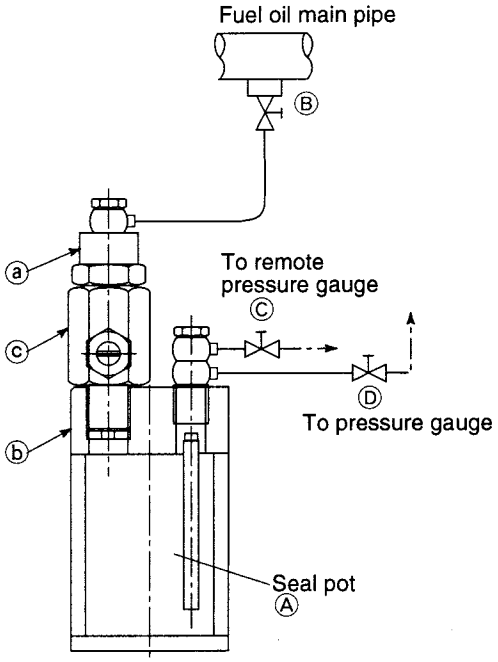


Gauge Board

18-2 Seal Pot (Heavy fuel oil specification)

In case of heavy fuel oil, a seal pot is provided in the middle of the fuel oil pressure gauge piping, and filled with ethylene glycol to replace the pressure, so that the pressure gauge can be prevented from malfunction due to the sticking of fuel oil in the cold condition.

Ethylene glycol will be contaminated and deteriorated being mixed with fuel oil as time passes, and therefore be minded to periodically replace ethylene glycol with new one.



Seal Pot

《Replacing procedure of ethylene glycol》

(1) Close the valve Ⓑ, Ⓒ, and Ⓓ at the seal pot inlet and outlet, and remove the seal pot Ⓐ.

(2) Disconnect the inlet side joint ⓒ of siphon tank ⓑ, and discharge the fuel oil and ethylene glycol of the inside.

(3) Wash the inside of the tank.

(4) Fill ethylene glycol until it starts to spill out of the upper part hole, and then install the joint.

(5) Install the piping to the seal pot.

> ⚠
>
> Although ethylene glycol is less toxic to skin and membrane, it is still dangerous if it was taken into human body. Therefore, be minded to take enough care in the handling, and promptly wash it away when it is deposited on hand or skin.

1) It is difficult to repair the defective gauges on site. Therefore, replace them with the new ones, or inquire the specialized maker for the repair.
2) Heavily deteriorated hoses may break. If the hoses for fuel oil and lubricating oil break and high-temperature parts are splashed with the oil, a fire may occur. Replace such hoses without fail.
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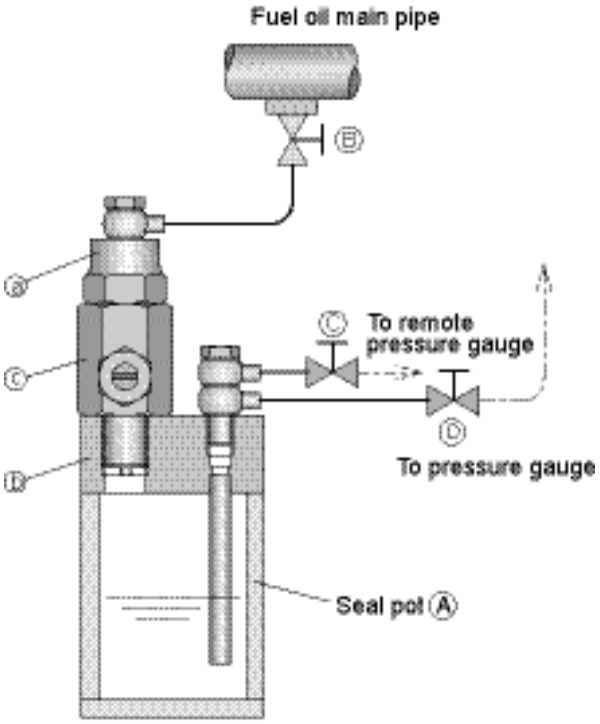

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パーツリスト
PARTS LIST

6·8DK-20

低質燃料油
HEAVY FUEL OIL

DAIHATSU

● 交換部品について

・ イミテーション部品の危険性・不適合性
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1. 近年の機関は小型高出力化し、燃料粗悪化、低NOxに対応するものとなっており、イミテーション部品を使用されますと、形状が類似していても材料が脆弱、加工精度が低い等により、機関性能が悪化します。又、部品寿命が短くメンテ期間が短くなります。
2. MARPOL VI の対象機関は、イミテーション部品を使用されますと、証書（EIAPP）が失効となり、運行停止となる場合があります。
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● Replacement Parts

・Hazards and nonconformities of imitation parts

<Use of imitation parts causes accidents.>

1. Recent engines have compact bodies and high power, and are designed to prevent fuel deterioration and to reduce NOx discharge. Even if imitation parts are similar in shape to the genuine parts, the use of imitation parts will degrade the engine performance because of their fragile materials and low machining accuracy. Since the service life of such parts is short, the engine
2. If imitation parts are used for the engines designed in accordance with MARPOL VI, the certificate (EIAPP) may lose its validity, and operation of the engine may be inhibited.
3. If you use imitation parts, you will not be supplied with parts improved in quality and performance.
4. If imitation parts are used, it may be difficult to make insurance claims for the engine when any accident occurs.
5. We take no responsibility for the engine in which imitation parts are used.

Daihatsu Diesel supplies reliable engines. Use genuine parts to operate your engine safely.

DAIHATSU DIESEL MFG.CO.,LTD.

http://www.dhtd.co.jp

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Daihatsu Diesel (AMERICA), Inc.	180 Adams Avenue, Hauppauge, NY 11788, U.S.A. TEL : 1-631-434-8787/8/9 FAX : 1-631-434-8759
Daihatsu Diesel (ASIA PACIFIC) Pte.Ltd.	128 Pioneer Road, Singapore 639586 TEL : 65-6270-7235 FAX : 65-6270-6236
Manila Office	Unit 1010 Herrera Tower Herrera Corner Valero Sts., Salcedo Village, Makati City 1226 Philippines TEL : 63-2-753-3211 63-2-817-1279/1285 FAX : 63-2-845-0691
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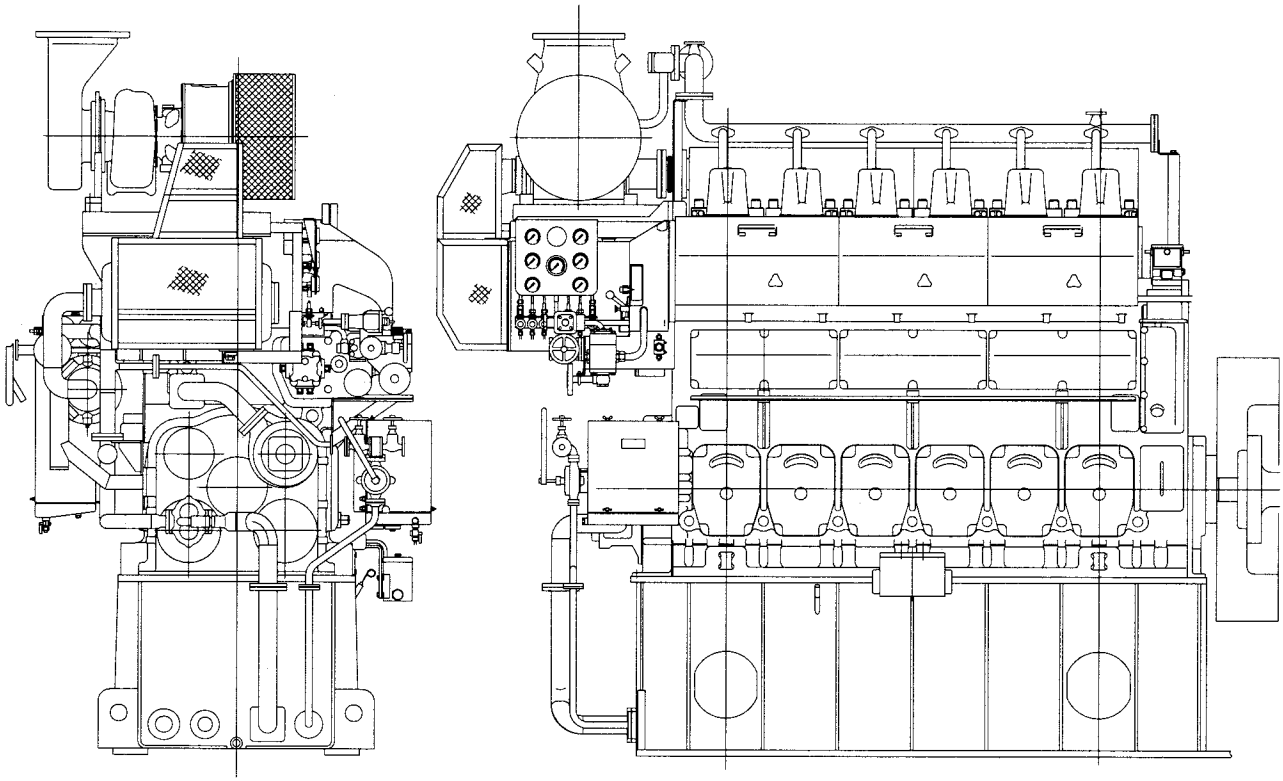
機関外形図
ENGINE OUTLINE



NOx テクニカルコード適合機関
ENGINE CONFORMING TO NOx TECHNICAL CODE

1-1. NOx テクニカルコード適合機関

1-1.1 概　要

(1) MARPOL73/78条約の付属書 VI「船舶からの大気汚染防止のための規則」の第13規則「窒素酸化物（NOx)」が適用される舶用ディーゼルエンジンは、NOx テクニカルコードに適合する必要があります。

(2) NOx テクニカルコード適合機関は、エンジングループまたはエンジンファミリーとして認定をうけており、船上での NOx 排出量確認検査は、エンジンパラメータチェック法を適用することができます。

エンジンパラメータチェック法とは、エンジン構成部品、設定値がテクニカルファイル記載事項を満足していることを検証する方法であり、NOx 排出量計測を行う必要はありません。テクニカルファイル記載事項を満足していない場合は、エンジンパラメータチェック法を適用することができず、NOx 排出量計測が必要となります。

1-1.2 規定対象部品

テクニカルファイルには、NOx テクニカルコードに規定された NOx 排出量に影響をおよぼすエンジン構成部品とその部品の識別刻印が記載されており、エンジンごとにテクニカルファイルの保管が義務付けられています。テクニカルファイルに記載の部品を交換するときは、**必ず識別刻印のある弊社純正部品をご使用ください。**万一、識別刻印のない部品が使用されている場合は、テクニカルファイル記載事項の不適合となり、エンジンパラメータチェック法による検査は適用できません。

1-1. Engine Conforming to NOx Technical Code

1-1.1 Outline

(1) The marine diesel engines to which the 13th rule "Nitrogen Oxides (NOx)" in Supplement VI "Rules to Prevent Air Pollution by Ships" to MARPOL73/78 Treaty applies should conform to NOx Technical Code.

(2) The engines conforming to NOx Technical Code are authorized as an engine group or an engine family, and it is allowed to apply the engine parameter check method to them, when receiving the NOx discharge inspection on board.

The engine parameter check method is a method for verifying that the engine components and setting values conform to the requirements specified in the technical file, and does not require the measurement of NOx discharge. To the engines that are not conforming to the requirements of the technical file, the engine parameter check method cannot be applied. For such engines, the measurement of NOx discharge shall be required.

1-1.2 The parts to be Specified

The technical file states the engine components that can affect the NOx discharge specified in NOx Technical Code, and shows the identification marks stamped on them, and the user is required to maintain the technical file for each engine. When replacing any parts shown in the technical file, be sure to use our genuine parts stamped with the identification marks. In the case that any parts without the identification mark is used, it shall be regarded as nonconformance to the requirements of the technical file, and in such a case, inspection by the engine parameter check method cannot be applied.

NOx テクニカルコード適合機関
ENGINE CONFORMING TO NOx TECHNICAL CODE

テクニカルファイルに記載されている識別刻印のある部品は以下の通りです。部品交換時には識別刻印を確認の上、ご使用ください。(📖:「テクニカルファイル」)

《識別刻印付部品》

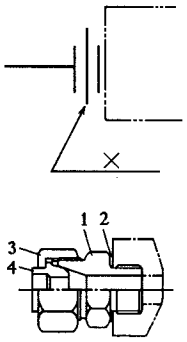
① シリンダヘッド
② ピストン
③ 過給機
④ 空気冷却器
⑤ 燃料カム
⑥ 燃料噴射ポンプ
⑦ 燃料噴射ポンププランジャ
⑧ 燃料噴射弁
⑨ 燃料噴射弁ノズル

The followings are the parts that have the identification marks specified in the technical file. When replacing any of these parts, be sure to check the identification marks. (📖 : "Technical file")

<Parts with identification marks>

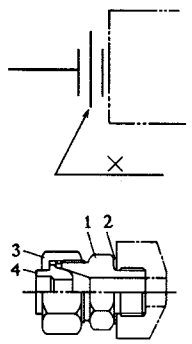
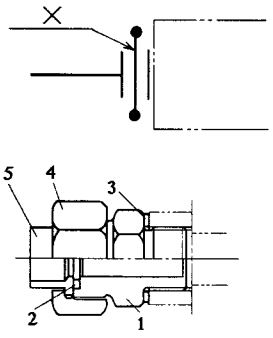
① Cylinder head
② Piston
③ Turbocharger
④ Air cooler
⑤ Fuel cam
⑥ Fuel injection pump
⑦ Fuel injection pump plunger
⑧ Fuel injection valve
⑨ Fuel injection valve nozzle

配管部品の図式記号および部品名称,部品番号
GRAPHICAL SYMBOL, PART NAME AND PART NUMBER OF PIPING PART

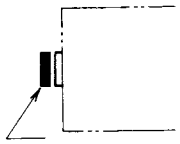


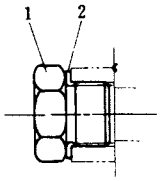
図式記号 Graphical symbol	サイズ Size	No.	部品番号 Parts number	部品名称	Name of parts
	8×¼		X550008020ZZ	ユニオンセッシュASSY. 8×¼	Union assy. 8×¼
		1	X550208000ZZ	ユニオンネジ 8	Union screw 8
		2	Z565001300ZZ	マルパッキン 13	Gasket 13
		3	X550308000ZZ	ユニオンナット 8	Union nut 8
		4	Z550108000ZZ	ユニオンツバ 8	UNion nipple 8
	10×⅜		X550010030ZZ	ユニオンセッシュASSY. 10×⅜	Union assy. 10×⅜
		1	X550210000ZZ	ユニオンネジ 10	Union screw 10
		2	Z565001700ZZ	マルパッキン 17	Gasket 17
		3	X550310000ZZ	ユニオンナット 10	Union nut 10
		4	Z550110000ZZ	ユニオンツバ 10	UNion nipple 10
	12×½		X550012040ZZ	ユニオンセッシュASSY. 12×½	Union assy. 12×½
		1	X550212000ZZ	ユニオンネジ 12	Union screw 12
		2	Z565002100ZZ	マルパッキン 21	Gasket 21
		3	X550312000ZZ	ユニオンナット 12	Union nut 12
		4	Z550112000ZZ	ユニオンツバ 12	UNion nipple 12
	15×½		X550015040ZZ	ユニオンセッシュASSY. 15×½	Union assy. 15×½
		1	X550215000ZZ	ユニオンネジ 15	Union screw 15
		2	Z565002100ZZ	マルパッキン 21	Gasket 21
		3	X550315000ZZ	ユニオンナット 15	Union nut 15
		4	Z550115000ZZ	ユニオンツバ 15	UNion nipple 15
	18×½		X550018040ZZ	ユニオンセッシュASSY. 18×½	Union assy. 18×½
		1	X550220000ZZ	ユニオンネジ 20	Union screw 20
		2	Z565002100ZZ	マルパッキン 21	Gasket 21
		3	X550318000ZZ	ユニオンナット 18	Union nut 18
		4	Z550118000ZZ	ユニオンツバ 18	UNion nipple 18
	20×½		X550020040ZZ	ユニオンセッシュASSY. 20×½	Union assy. 20×½
		1	X550220000ZZ	ユニオンネジ 20	Union screw 20
		2	Z565002100ZZ	マルパッキン 21	Gasket 21
		3	X550318000ZZ	ユニオンナット 18	Union nut 18
		4	Z550120000ZZ	ユニオンツバ 20	UNion nipple 20
	20×¾		X550020060ZZ	ユニオンセッシュASSY. 20×¾	Union assy. 20×¾
		1	X550222000ZZ	ユニオンネジ 22	Union screw 22
		2	Z565002700ZZ	マルパッキン 27	Gasket 27
		3	X550318000ZZ	ユニオンナット 18	Union nut 18
		4	Z55012000ZZZ	ユニオンツバ 20	UNion nipple 20
	22×¾		X550022060ZZ	ユニオンセッシュASSY. 22×¾	Union assy. 22×¾
		1	X5502250002ZZ	ユニオンネジ 25	Union screw 25
		2	Z565002700ZZ	マルパッキン 27	Gasket 27
		3	X550322000ZZ	ユニオンナット 22	Union nut 22
		4	Z55012300ZZZ	ユニオンツバ 23	UNion nipple 23

配管部品の図式記号および部品名称,部品番号
GRAPHICAL SYMBOL, PART NAME AND PART NUMBER OF PIPING PART

図式記号 Graphical symbol	サイズ Size	No.	部品番号 Parts number	部品名称	Name of parts
	35×1¼		X550035120ZZ	ユニオンセッシュASSY. 35×1¼	Union assy. 35×1¼
		1	X550235000ZZ	ユニオンネジ 35	Union screw 35
		2	Z565004200ZZ	マルパッキン 42	Gasket 42
		3	X550335000ZZ	ユニオンナット 35	Union nut 35
		4	Z550135000ZZ	ユニオンツバ 35	Union nipple 35
	28×1	1	X550230000ZZ	ユニオンネジ 30	Union screw 30
		2	X665034000CC	マルパッキン 34	Gasket 34
		3	Z550325000ZZ	ユニオンナット 25	Union nut 25
		4	X550128000ZZ	ユニオンツバ 28	Union nipple 28
	15×¼		X550015040ZZ	フラットユニオンASSY. 15×¼	Flat union assy. 15×¼
		1	X551215000ZZ	フラットネジ 15	Flat union screw 15
		2	Z560101524ZZ	Oリング P15	O ring P15
		3	Z565002100ZZ	マルパッキン 21	Gasket 21
		4	X551315000ZZ	フラットナット 15	Flat union nut 15
		5	X551115000ZZ	フラットツバ 15	Flat union nipple 15
	18×½		X551018040ZZ	フラットユニオンASSY. 18×½	Flat union assy. 18×½
		1	X551220000ZZ	フラットネジ 20	Flat union screw 20
		2	Z560102024ZZ	Oリング P20	O ring P20
		3	Z565002100ZZ	マルパッキン 21	Gasket 21
		4	X551318000ZZ	フラットナット 18	Flat union nut 18
		5	X551118000ZZ	フラットツバ 18	Flat union nipple 18
	20×¾		X551020060ZZ	フラットユニオンASSY. 20×¾	Flat union assy. 20×¾
		1	X551222000ZZ	フラットネジ 22	Flat union screw 22
		2	Z560102024ZZ	Oリング P20	O ring P20
		3	Z565002700ZZ	マルパッキン 27	Gasket 27
		4	X551318000ZZ	フラットナット 18	Flat union nut 18
		5	X551120000ZZ	フラットツバ 20	Flat union nipple 20
	22×¾		X551022060ZZ	フラットユニオンASSY. 22×¾	Flat union assy. 22×¾
		1	X551225000ZZ	フラットネジ 25	Flat union screw 25
		2	Z560102635ZZ	Oリング P26	O ring P26
		3	Z565002700ZZ	マルパッキン 27	Gasket 27
		4	X551325000ZZ	フラットナット 25	Flat union nut 25
		5	X551122000ZZ	フラットツバ 22	Flat union nipple 22
	28×1		X551028100ZZ	フラットユニオンASSY. 28×1	Flat union assy. 28×1
		1	X551228000ZZ	フラットネジ 28	Flat union screw 28
		2	Z560102635ZZ	Oリング P26	O ring P26
		3	Z565003400ZZ	マルパッキン 34	Gasket 34
		4	X551325000ZZ	フラットナット 25	Flat union nut 25
		5	X551128000ZZ	フラットツバ 28	Flat union nipple 28

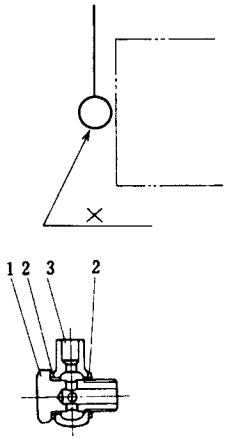
配管部品の図式記号および部品名称,部品番号
GRAPHICAL SYMBOL, PART NAME AND PART NUMBER OF PIPING PART





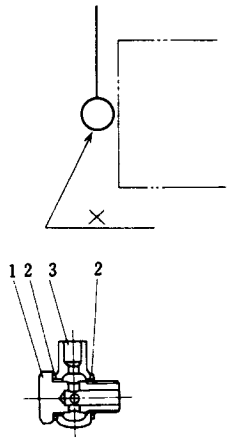
図式記号 Graphical symbol	サイズ Size	No.	部品番号 Parts number	部品名称	Name of parts
	1/8	1	X570001000ZZ	ロッカクプラグ 1/8	Hex. plug 1/8
		2	Z565001000ZZ	マルパッキン 10	Gasket 10
	1/4	1	X570002000ZZ	ロッカクプラグ 1/4	Hex. plug 1/4
		2	Z565001300ZZ	マルパッキン 13	Gasket 13
	3/8	1	X570003000ZZ	ロッカクプラグ 3/8	Hex. plug 3/8
		2	Z565001700ZZ	マルパッキン 17	Gasket 17
	1/2	1	X570004000ZZ	ロッカクプラグ 1/2	Hex. plug 1/2
		2	Z565002100ZZ	マルパッキン 21	Gasket 21
	3/4	1	X570006000ZZ	ロッカクプラグ 3/4	Hex. plug 3/4
		2	Z565002700ZZ	マルパッキン 27	Gasket 27
	1"	1	X570010000ZZ	ロッカクプラグ 1	Hex. plug 1
		2	Z565003400BZ	マルパッキン 34	Gasket 34

配管部品の図式記号および部品名称,部品番号
GRAPHICAL SYMBOL, PART NAME AND PART NUMBER OF PIPING PART



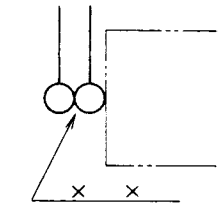
図式記号 Graphical symbol	サイズ Size	No.	部品番号 Parts number	部品名称	Name of parts
	6×1/8		X546106010ZZ	ツギワ ASSY. 6×1/8	Banjo assy. 6×1/8
		1	X545201000ZZ	ツギボルト 1/8	Banjo plug 1/8
		2	Z665010000ZZ	マルパッキン 10	Gasket 10
		3	Z645106010ZZ	ツギワ 6×1/8	Banjo 6×1/8
	6×1/4		X546106020ZZ	ツギワ ASSY. 6×1/4	Banjo assy. 6×1/4
		1	X545202000ZZ	ツギボルト 1/4	Banjo plug 1/4
		2	Z665001300ZZ	マルパッキン 13	Gasket 13
		3	Z545106020ZZ	ツギワ 6×1/4	Banjo 6×1/4
	8×1/8		X546108010ZZ	ツギワ ASSY. 8×1/8	Banjo assy. 8×1/8
		1	X545201000ZZ	ツギボルト 1/8	Banjo plug 1/8
		2	Z665010000ZZ	マルパッキン 10	Gasket 10
		3	Z545108010ZZ	ツギワ 8×1/8	Banjo 8×1/8
	8×1/4		X546108020ZZ	ツギワ ASSY. 8×1/4	Banjo assy. 8×1/4
		1	X545202000ZZ	ツギボルト 1/4	Banjo plug 1/4
		2	Z665001300ZZ	マルパッキン 13	Gasket 13
		3	Z545108020ZZ	ツギワ 8×1/4	Banjo 8×1/4
	10×1/4		X546110020ZZ	ツギワ ASSY. 10×1/4	Banjo assy. 10×1/4
		1	X545202000ZZ	ツギボルト 1/4	Banjo plug 1/4
		2	Z665001300ZZ	マルパッキン 13	Gasket 13
		3	Z545110020ZZ	ツギワ 10×1/	Banjo 10×1/4
	10×3/8		X546110030ZZ	ツギワ ASSY. 10×3/8	Banjo assy. 10×3/8
		1	X545203000ZZ	ツギボルト 3/8	Banjo plug 3/8
		2	Z665001700ZZ	マルパッキン 17	Gasket 17
		3	Z545110030ZZ	ツギワ 10×3/8	Banjo 10×3/8
	12×1/4		X546112020ZZ	ツギワ ASSY. 12×1/4	Banjo assy. 12×1/
		1	X545202000ZZ	ツギボルト 1/4	Banjo plug 1/4
		2	Z665001300ZZ	マルパッキン 13	Gasket 13
		3	Z545112020ZZ	ツギワ 12×1/4	Banjo 12×1/4
	12×3/8		X546112030ZZ	ツギワ ASSY. 12×3/8	Banjo assy. 12×3/8
		1	X545203000ZZ	ツギボルト 3/8	Banjo plug 3/8
		2	Z665001700ZZ	マルパッキン 17	Gasket 17
		3	Z545112030ZZ	ツギワ 12×3/8	Banjo 12×3/
	15×3/8		X546115030ZZ	ツギワ ASSY. 15×3/8	Banjo assy. 15×3/8
		1	X545203000ZZ	ツギボルト 3/8	Banjo plug 3/8
		2	Z665001700ZZ	マルパッキン 17	Gasket 17
		3	Z545115030ZZ	ツギワ 15×3/8	Banjo 15×3/8
	15×1/2		X546115040ZZ	ツギワ ASSY. 15×1/2	Banjo assy. 15×1/2
		1	X545204000ZZ	ツギボルト 1/2	Banjo plug 1/2
		2	Z665002100ZZ	マルパッキン 21	Gasket 21
		3	Z645115000ZZ	ツギワ 15×1/2	Banjo 15×1/2

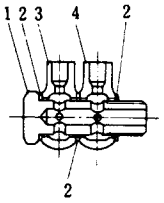
配管部品の図式記号および部品名称,部品番号
GRAPHICAL SYMBOL, PART NAME AND PART NUMBER OF PIPING PART



図式記号 Graphical symbol	サイズ Size	No.	部品番号 Parts number	部品名称	Name of parts
	18×½		X546118040ZZ	ツギワ ASSY. 18×½	Banjo assy. 18×½
		1	X545204000ZZ	ツギボルト ½	Banjo plug ½
		2	Z565002100ZZ	マルパッキン 21	Gasket 21
		3	Z545118040ZZ	ツギワ 18×½	Banjo 18×½
	20×½		X546120040ZZ	ツギワ ASSY. 20×½	Banjo assy. 20×½
		1	X545204000ZZ	ツギボルト ½	Banjo plug ½
		2	Z565002100ZZ	マルパッキン 21	Gasket 21
		3	Z545120040ZZ	ツギワ 20×½	Banjo 20×½
	20×1	1	X545210000ZZ	ツギボルト 1	Banjo plug 1
		2	X665034000ZZ	マルパッキン 34	Gasket 34
		3	Z545120100ZZ	ツギワ 20×1	Banjo 20×1
	22×½		X546122040ZZ	ツギワ ASSY. 22×½	Banjo assy. 22×½
		1	X545204000ZZ	ツギボルト ½	Banjo plug ½
		2	Z565002100ZZ	マルパッキン 21	Gasket 21
		3	Z545122040ZZ	ツギワ 22×½	Banjo 22×½
	28×1		X546128100ZZ	ツギワ ASSY. 28×1	Banjo assy. 28×1
		1	X545210000ZZ	ツギボルト 1	Banjo plug 1
		2	Z665034000ZZ	マルパッキン 34	Gasket 34
		3	Z545128100ZZ	ツギワ 28×1	Banjo 28×1
	15×M18	1	X649218031ZZ	トクシュツギボルト M18×31	Special banjo plug M18×31
		2	X665018000ZZ	マルパッキン 18	Gasket 18
		3	Z649115180ZZ	ツギワ 15×M18	Banjo 15×M18
	M24	1	X645220000ZZ	ツギボルト 20	Banjo plug 20
		2	X665024000ZZ	マルパッキン 24	Gasket 24
		3	Z645120000ZZ	ツギワ 20	Banjo 20
	20×M18	1	X649218036ZZ	トクシュツギボルト M18×36	Special banjo plug M18×36
		2	X665018000ZZ	マルパッキン 18	Gasket 18
		3	Z649120180ZZ	ツギワ 20×M18	Banjo 20×M18

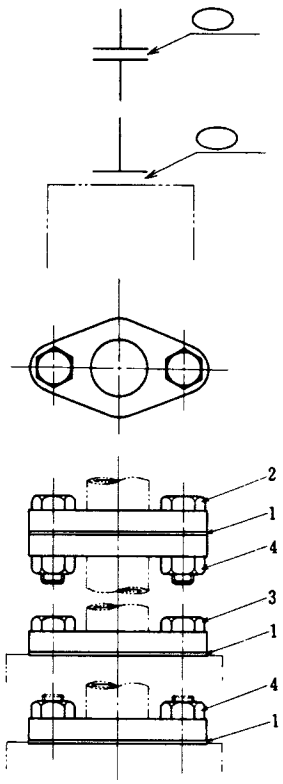
配管部品の図式記号および部品名称,部品番号
GRAPHICAL SYMBOL, PART NAME AND PART NUMBER OF PIPING PART





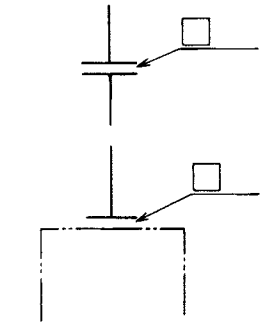
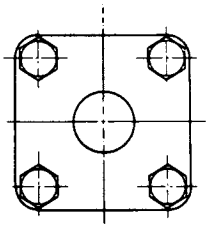
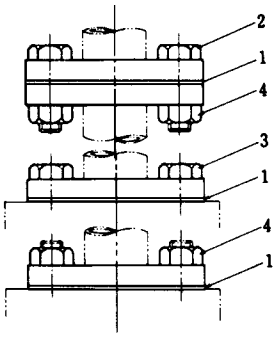
図式記号 Graphical symbol	サイズ Size	No.	部品番号 Parts number	部品名称	Name of parts
	8×8×⅛		X546210808ZZ	カサネツギワ ASSY. ⅛×8×8	Double banjo assy. ⅛×8×8
		1	X545401000ZZ	カサネツギボルト ⅛	Double banjo plug ⅛
		2	Z565010000ZZ	マルパッキン 10	Gasket 10
		3,4	Z545108010ZZ	ツギワ 8×⅛	Banjo 8×⅛
	8×8×¼		X546220808ZZ	カサネツギワ ASSY. ¼×8×8	Double banjo assy. ¼×8×8
		1	X545402000ZZ	カサネツギボルト ¼	Double banjo plug ¼
		2	Z565001300ZZ	マルパッキン 13	Gasket 13
		3,4	Z545108020ZZ	ツギワ 8×¼	Banjo 8×¼
	8×10×¼		X546220810ZZ	カサネツギワ ASSY. ¼×8×10	Double banjo assy. ¼×8×10
		1	X545402000ZZ	カサネツギボルト ¼	Double banjo plug ¼
		2	Z565001300ZZ	マルパッキン 13	Gasket 13
		3	Z545108020ZZ	ツギワ 8×¼	Banjo 8×¼
		4	Z545110020ZZ	ツギワ 10×¼	Banjo 10×¼
	10×10×¼		X546221010ZZ	カサネツギワ ASSY. ¼×10×10	Double banjo assy. ¼×10×10
		1	X545402000ZZ	カサネツギボルト ¼	Double banjo plug ¼
		2	Z565001300ZZ	マルパッキン 13	Gasket 13
		3,4	Z545110020ZZ	ツギワ 10×¼	Banjo 10×¼
	18×22×½		X546241822ZZ	カサネツギワ ASSY. ½×18×22	Double banjo assy. ½×18×22
		1	X545404065ZZ	カサネツギボルト ½×65	Double banjo plug ½×65
		2	Z565002100ZZ	マルパッキン 21	Gasket 21
		3	Z545118040ZZ	ツギワ 18×½	Banjo 18×½
		4	Z545122040ZZ	ツギワ 22×½	Banjo 22×½
	20×22×½		X546242022ZZ	カサネツギワ ASSY. ½×20×22	Double banjo assy. ½×20×22
		1	X545404065ZZ	カサネツギボルト ½×65	Double banjo plug ½×65
		2	Z565002100ZZ	マルパッキン 21	Gasket 21
		3	Z545120040ZZ	ツギワ 20×½	Banjo 20×½
		4	Z545122040ZZ	ツギワ 22×½	Banjo 22×½

配管部品の図式記号および部品名称,部品番号
GRAPHICAL SYMBOL, PART NAME AND PART NUMBER OF PIPING PART

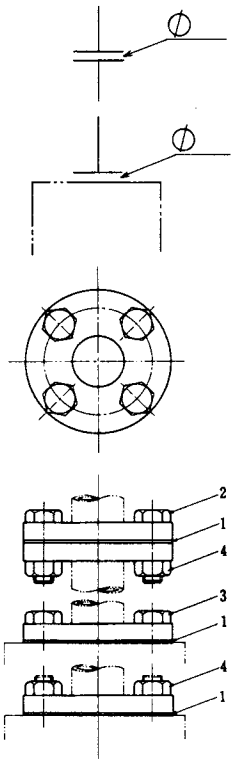


図式記号 Graphical symbol	サイズ Size	No.	部品番号 Parts number	部品名称	Name of parts
	⬭ 55	1	Z501101800AZ	JIS パッキン (1) 18	JIS gasket (1) 18
		2	X200010032ZZ	ボルト M10×1.5×32	Bolt M10×1.5×32
		3	X200010020ZZ	ボルト M10×1.5×20	Bolt M10×1.5×20
		4	X220010000ZZ	ナット M10×1.5	Nut M10×1.5
	⬭ 58	1	Z541102058AZ	パッキン (1) 20×58	Gasket (1) 20×58
		2	X200010032ZZ	ボルト M10×1.5×32	Bolt M10×1.5×32
		3	X200010020ZZ	ボルト M10×1.5×20	Bolt M10×1.5×20
		4	X220010000ZZ	ナット M10×1.5	Nut M10×1.5
	⬭ 60	1	Z541103560AZ	パッキン (1) 35×60	Gasket (1) 35×60
		2	X200010040ZZ	ボルト M10×1.5×40	Bolt M10×1.5×40
		3	X200010025ZZ	ボルト M10×1.5×25	Bolt M10×1.5×25
		4	X220010000ZZ	ナット M10×1.5	Nut M10×1.5
	⬭ 62	1	Z541103562AZ	パッキン (1) 35×62	Gasket (1) 35×62
		2	X200010035ZZ	ボルト M10×1.5×35	Bolt M10×1.5×35
		3	X200010022ZZ	ボルト M10×1.5×22	Bolt M10×1.5×22
		4	X220010000ZZ	ナット M10×1.5	Nut M10×1.5
	⬭ 70	1	Z541103470AZ	パッキン (1) 34×70	Gasket (1) 34×70
		2	X200012045ZZ	ボルト M12×1.75×45	Bolt M12×1.75×45
		3	X200012028ZZ	ボルト M12×1.75×28	Bolt M12×1.75×28
		4	X220012000ZZ	ナット M12×1.75	Nut M12×1.75
	⬭ 80	1	Z541105080AZ	パッキン (1) 50×80	Gasket (1) 50×80
		2	X200012045ZZ	ボルト M12×1.75×45	Bolt M12×1.75×45
		3	X200012028ZZ	ボルト M12×1.75×28	Bolt M12×1.75×28
		4	X220012000ZZ	ナット M12×1.75	Nut M12×1.75
	⬭ 92	1	Z541106092AZ	パッキン (1) 60×92	Gasket (1) 60×92
		2	X200012045ZZ	ボルト M12×1.75×45	Bolt M12×1.75×45
		3	X200012028ZZ	ボルト M12×1.75×28	Bolt M12×1.75×28
		4	X220012000ZZ	ナット M12×1.75	Nut M12×1.75
	⬭30×60	1	Z541103060AZ	パッキン (1) 30×60	Gasket (1) 30×60
		2	X200010035ZZ	ボルト M10×1.5×35	Bolt M10×1.5×35
		3	X200010022ZZ	ボルト M10×1.5×22	Bolt M10×1.5×22
		4	X220010000ZZ	ナット M10×1.5	Nut M10×1.5
	⬭28×58	1	Z541102858AZ	パッキン (1) 28×58	Gasket (1) 28×58
		2	X200010032ZZ	ボルト M10×1.5×32	Bolt M10×1.5×32
		3	X200010020ZZ	ボルト M10×1.5×20	Bolt M10×1.5×20
		4	X220010000ZZ	ナット M10×1.5	Nut M10×1.5
	⬭ 75	1	Z541104275ZZ	パッキン (1) 42×75	Gasket (1) 42×75
		2	X200010040ZZ	ボルト M10×1.5×40	Bolt M10×1.5×40
		3	X200010025ZZ	ボルト M10×1.5×25	Bolt M10×1.5×25
		4	X220010000ZZ	ナット M10×1.5	Nut M10×1.5

配管部品の図式記号および部品名称,部品番号
GRAPHICAL SYMBOL, PART NAME AND PART NUMBER OF PIPING PART

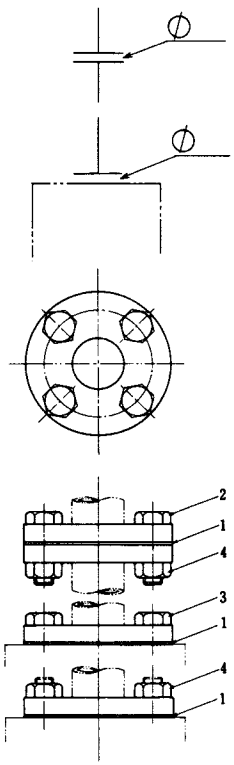
図式記号 Graphical symbol	サイズ Size	No.	部品番号 Parts number	部品名称	Name of parts
	□ 44	1	Z541203044AZ	パッキン (2) 30×44	Gasket (2) 30×44
		2	X200010040ZZ	ボルト M10×1.5×40	Bolt M10×1.5×40
		3	X200010025ZZ	ボルト M10×1.5×25	Bolt M10×1.5×25
		4	X220010000ZZ	ナット M10×1.5	Nut M10×1.5
	□ 54	1	Z541204054AZ	パッキン (2) 40×54	Gasket (2) 40×54
		2	X200012045ZZ	ボルト M12×1.75×45	Bolt M12×1.75×45
		3	X200012028ZZ	ボルト M12×1.75×28	Bolt M12×1.75×28
		4	X220012000ZZ	ナット M12×1.75	Nut M12×1.75
	□ 60	1	Z541204560AZ	パッキン (2) 45×60	Gasket (2) 45×60
		2	X200012040ZZ	ボルト M12×1.75×40	Bolt M12×1.75×40
		3	X200012028ZZ	ボルト M12×1.75×28	Bolt M12×1.75×28
		4	X220012000ZZ	ナット M12×1.75	Nut M12×1.75
	□ 65	1	Z541206065AZ	パッキン (2) 60×65	Gasket (2) 60×65
		2	X200012045ZZ	ボルト M12×17.5×45	Bolt M12×1.75×45
		3	X200012028ZZ	ボルト M12×1.75×28	Bolt M12×1.75×28
		4	X220012000ZZ	ナット M12×1.75	Nut M12×1.75
	□ 85	1	Z541207585AZ	パッキン (2) 75×85	Gasket (2) 75×85
		2	X200012055ZZ	ボルト M12×1.75×55	Bolt M12×1.75×55
		3	X200012035ZZ	ボルト M12×1.75×35	Bolt M12×1.75×35
		4	X220012000ZZ	ナット M12×1.75	Nut M12×1.75
	□ 96	1	Z541209096AZ	パッキン (2) 90×96	Gasket (2) 90×96
		2	X200012055ZZ	ボルト M12×1.75×55	Bolt M12×1.75×55
		3	X200012035ZZ	ボルト M12×1.75×35	Bolt M12×1.75×35
		4	X220012000ZZ	ナット M12×1.75	Nut M12×1.75
	□ 92 (JIS)	1	Z501208000AZ	JIS パッキン (2) 80	JIS Gasket (2) 80
		2	X200012055ZZ	ボルト M12×1.75×55	Bolt M12×1.75×55
		3	X200012035ZZ	ボルト M12×1.75×35	Bolt M12×1.75×35
		4	X220012000ZZ	ナット M12×1.75	Nut M12×1.75
	□ 105 (JIS)	1	Z501206000AZ	JIS パッキン (2) 60	JIS Gasket (2) 60
		2	X200012055ZZ	ボルト M12×1.75×55	Bolt M12×1.75×55
		3	X200012035ZZ	ボルト M12×1.75×35	Bolt M12×1.75×35
		4	X220012000ZZ	ナット M12×1.75	Nut M12×1.75
	□ 60 (JIS)	1	Z501206000AZ	JIS パッキン (2) 60	JIS Gasket (2) 60
		2	X200012040ZZ	ボルト M12×1.75×40	Bolt M12×1.75×40
		3	X200012028ZZ	ボルト M12×1.75×28	Bolt M12×1.75×28
		4	X220012000ZZ	ナット M12×1.75	Nut M12×1.75
	□ 77 (JIS)	1	Z501208000AZ	JIS パッキン (2) 80	JIS Gasket (2) 80
		2	X200012040ZZ	ボルト M12×1.75×40	Bolt M12×1.75×40
		3	X200012028ZZ	ボルト M12×1.75×28	Bolt M12×1.75×28
		4	X220012000ZZ	ナット M12×1.75	Nut M12×1.75

配管部品の図式記号および部品名称,部品番号
GRAPHICAL SYMBOL, PART NAME AND PART NUMBER OF PIPING PART

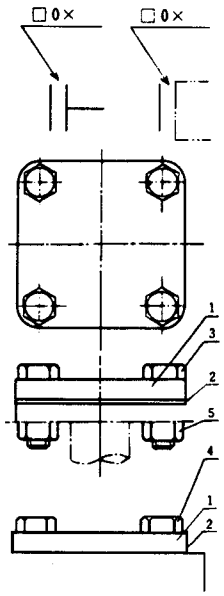
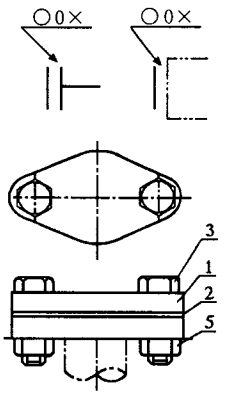
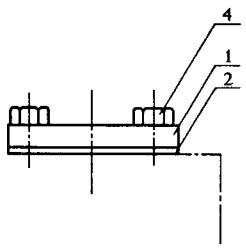


図式記号 Graphical symbol	サイズ Size	No.	部品番号 Parts number	部品名称	Name of parts
	φ 60	1	Z501302200AZ	JIS パッキン (3) 22	JIS Gasket (3) 22
		2	X200010032ZZ	ボルト M10×1.5×32	Bolt M10×1.5×32
		3	X200010020ZZ	ボルト M10×1.5×20	Bolt M10×1.5×20
		4	X220010000ZZ	ナット M10×1.5	Nut M10×1.5
	φ 65	1	Z501302800AZ	JIS パッキン (3) 28	JIS Gasket (3) 28
		2	X200010032ZZ	ボルト M10×1.5×32	Bolt M10×1.5×32
		3	X200010020ZZ	ボルト M10×1.5×20	Bolt M10×1.5×20
		4	X220010000ZZ	ナット M10×1.5	Nut M10×1.5
	φ 75	1	Z501303500AZ	JIS パッキン (3) 35	JIS Gasket (3) 35
		2	X200010032ZZ	ボルト M10×1.5×32	Bolt M10×1.5×32
		3	X200010020ZZ	ボルト M10×1.5×20	Bolt M10×1.5×20
		4	X220010000ZZ	ナット M10×1.5	Nut M10×1.5
	φ 90	1	Z501304300AZ	JIS パッキン (3) 43	JIS Gasket (3) 43
		2	X200012038ZZ	ボルト M12×1.75×38	Bolt M12×1.75×38
		3	X200012025ZZ	ボルト M12×1.75×25	Bolt M12×1.75×25
		4	X220012000ZZ	ナット M12×1.75	Nut M12×1.75
	φ 95	1	Z501305000AZ	JIS パッキン (3) 50	JIS Gasket (3) 50
		2	X200012038ZZ	ボルト M12×1.75×38	Bolt M12×1.75×38
		3	X200012025ZZ	ボルト M12×1.75×25	Bolt M12×1.75×25
		4	X220012000ZZ	ナット M12×1.75	Nut M12×1.75
	φ 105	1	Z501306000AZ	JIS パッキン (3) 60	JIS Gasket (3) 60
		2	X200012042ZZ	ボルト M12×1.75×42	Bolt M12×1.75×42
		3	X200012028ZZ	ボルト M12×1.75×28	Bolt M12×1.75×28
		4	X220012000ZZ	ナット M12×1.75	Nut M12×1.75
	φ 130	1	Z501308000AZ	JIS パッキン (3) 80	JIS Gasket (3) 80
		2	X200012042ZZ	ボルト M12×1.75×42	Bolt M12×1.75×42
		3	X200012028ZZ	ボルト M12×1.75×28	Bolt M12×1.75×28
		4	X220012000ZZ	ナット M12×1.75	Nut M12×1.75
	φ 145	1	Z501309000AZ	JIS パッキン (3) 90	JIS Gasket (3) 90
		2	X200016045ZZ	ボルト M16×2.0×45	Bolt M16×2.0×45
		3	X200016030ZZ	ボルト M16×2.0×30	Bolt M16×2.0×30
		4	X220016000ZZ	ナット M16×2.0	Nut M16×2.0
	φ 165	1	Z501311500AZ	JIS パッキン (3) 115	JIS Gasket (3) 115
		2	X200016050ZZ	ボルト M16×2.0×50	Bolt M16×2.0×50
		3	X200016035ZZ	ボルト M16×2.0×35	Bolt M16×2.0×35
		4	X220016000ZZ	ナット M16×2.0	Nut M16×2.0

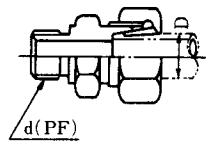
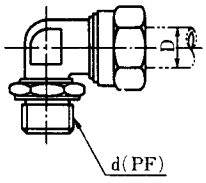
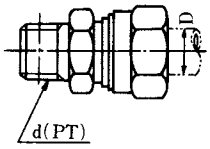
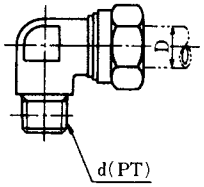
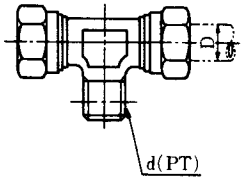
配管部品の図式記号および部品名称,部品番号
GRAPHICAL SYMBOL, PART NAME AND PART NUMBER OF PIPING PART

図式記号 Graphical symbol	サイズ Size	No.	部品番号 Parts number	部品名称	Name of parts
	φ 90 (10K)	1	Z506303500AZ	10K パッキン 35	10K Gasket 35
		2	X200016042ZZ	ボルト M16×2.0×42	Bolt M12×2.0×42
		3	X200016032ZZ	ボルト M16×2.0×32	Bolt M12×2.0×32
		4	X220016000ZZ	ナット M16×2.0	Nut M16×2.0
	φ 77 (10K)	1	Z506302500AZ	10K パッキン 25	10K Gasket 25
		2	X200012042ZZ	ボルト M12×1.75×42	Bolt M12×1.75×42
		3	X200012028ZZ	ボルト M12×1.75×28	Bolt M12×1.75×28
		4	X220012000ZZ	ナット M12×1.75	Nut M12×1.75

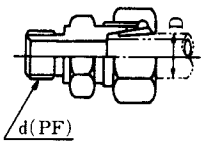
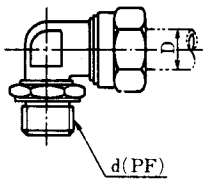
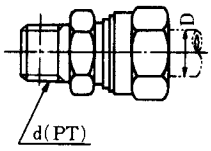
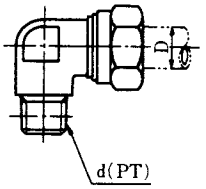
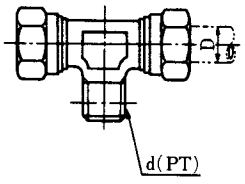
配管部品の図式記号および部品名称,部品番号
GRAPHICAL SYMBOL, PART NAME AND PART NUMBER OF PIPING PART

図式記号 Graphical symbol	サイズ Size	No.	部品番号 Parts number	部品名称	Name of parts
	□0×44	1	Z540200044ZZ	フランジ (2) 0×44	Flange (2) 0×44
		2	Z541203044AZ	パッキン (2) 30×44	Gasket (2) 30×44
		3	X200010040ZZ	ボルト M10×1.5×40	Bolt M10×1.5×40
		4			
		5	X220010000ZZ	ナット M10×1.5	Nut M10×1.5
	□0×54	1	Z540200054ZZ	フランジ (2) 0×54	Flange (2) 0×54
		2	Z541203054AZ	パッキン (2) 30×54	Gasket (2) 30×54
		3	X200012040ZZ	ボルト M12×1.75×40	Bolt M12×1.75×40
		4			
		5	X220012000ZZ	ナット M12×1.75	Nut M12×1.75
	□0×65	1	Z540200065ZZ	フランジ (1) 0×65	Flange (1) 0×65
		2	Z541206065AZ	パッキン (1) 60×65	Gasket (1) 60×65
		3	X200012045ZZ	ボルト M12×1.75×45	Bolt M12×1.75×45
		4			
		5	X220012000ZZ	ナット M12×1.75	Nut M12×1.75
	□0×150	1	Z540200015ZZ	フランジ (2) 0×150	Flange (2) 0×150
		2	Z541213150AZ	パッキン (2) 130×150	Gasket (2) 130×150
		3			
		4	X200022045ZZ	ボルト M22×2.5×45	Bolt M22×2.5×45
		5			
	◯0×58	1	Z540100058ZZ	フランジ (1) 0×58	Flange (1) 0×58
		2	Z541102058AZ	パッキン (1) 20×58	Gasket (1) 20×58
		3	X200010030ZZ	ボルト M10×1.5×30	Bolt M10×1.5×30
		4			
		5	X220010000ZZ	ナット M10×1.5	Nut M10×1.5
	◯0×60	1	Z540100060ZZ	フランジ (1) 0×60	Flange (1) 0×60
		2	Z541103060AZ	パッキン (1) 30×60	Gasket (1) 30×60
		3			
		4	X200010022ZZ	ボルト M10×1.5×22	Bolt M10×1.5×22
		5			
					

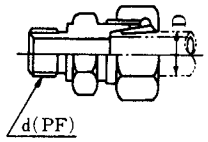
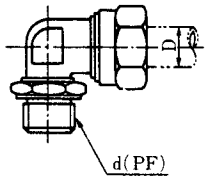
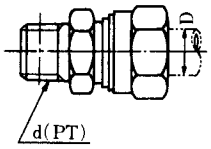
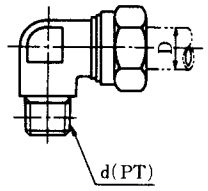
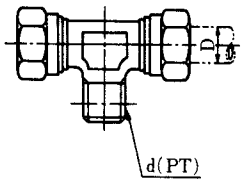
配管部品の図式記号および部品名称,部品番号
GRAPHICAL SYMBOL, PART NAME AND PART NUMBER OF PIPING PART

図式記号 Graphical symbol	サイズ Size	部品番号 Parts number	部品名称	Name of parts
クイコミユニオン (1) Biting union (1) 	6×⅛	X588106010ZZ	クイコミユニオン (1) 6×⅛	Biting union (1) 6×⅛
		X588206010ZZ	〃 (2) 6×⅛	〃 (2) 6×⅛
		X588306010ZZ	〃 (3) 6×⅛	〃 (3) 6×⅛
		X588406010ZZ	〃 (4) 6×⅛	〃 (4) 6×⅛
		X588506010ZZ	〃 (5) 6×⅛	〃 (5) 6×⅛
	6×¼	X588106020ZZ	クイコミユニオン (1) 6×¼	Biting union (1) 6×¼
		X588206020ZZ	〃 (2) 6×¼	〃 (2) 6×¼
		X588306020ZZ	〃 (3) 6×¼	〃 (3) 6×¼
		X588406020ZZ	〃 (4) 6×¼	〃 (4) 6×¼
		X588506020ZZ	〃 (5) 6×¼	〃 (5) 6×¼
クイコミユニオン (2) Biting union (2) 	8×⅛	X588108010ZZ	クイコミユニオン (1) 8×⅛	Biting union (1) 8×⅛
		X588208010ZZ	〃 (2) 8×⅛	〃 (2) 8×⅛
		X588308010ZZ	〃 (3) 8×⅛	〃 (3) 8×⅛
		X588408010ZZ	〃 (4) 8×⅛	〃 (4) 8×⅛
		X588508010ZZ	〃 (5) 8×⅛	〃 (5) 8×⅛
	8×¼	X588108020ZZ	クイコミユニオン (1) 8×¼	Biting union (1) 8×¼
		X588208020ZZ	〃 (2) 8×¼	〃 (2) 8×¼
		X588308020ZZ	〃 (3) 8×¼	〃 (3) 8×¼
		X588408020ZZ	〃 (4) 8×¼	〃 (4) 8×¼
		X588508020ZZ	〃 (5) 8×¼	〃 (5) 8×¼
クイコミユニオン (3) Biting union (3) 	10×⅛	X588110010ZZ	クイコミユニオン (1) 10×⅛	Biting union (1) 10×⅛
		X588210010ZZ	〃 (2) 10×⅛	〃 (2) 10×⅛
		X588310010ZZ	〃 (3) 10×⅛	〃 (3) 10×⅛
		X588410010ZZ	〃 (4) 10×⅛	〃 (4) 10×⅛
		X588510010ZZ	〃 (5) 10×⅛	〃 (5) 10×⅛
クイコミユニオン (4) Biting union (4) 	10×¼	X588110020ZZ	クイコミユニオン (1) 10×¼	Biting union (1) 10×¼
		X588210020ZZ	〃 (2) 10×¼	〃 (2) 10×¼
		X588310020ZZ	〃 (3) 10×¼	〃 (3) 10×¼
		X588410020ZZ	〃 (4) 10×¼	〃 (4) 10×¼
		X588510020ZZ	〃 (5) 10×¼	〃 (5) 10×¼
クイコミユニオン (5) Biting union (5) 	10×⅜	X588110030ZZ	クイコミユニオン (1) 10×⅜	Biting union (1) 10×⅜
		X588210030ZZ	〃 (2) 10×⅜	〃 (2) 10×⅜
		X588310030ZZ	〃 (3) 10×⅜	〃 (3) 10×⅜
		X588410030ZZ	〃 (4) 10×⅜	〃 (4) 10×⅜
		X588510030ZZ	〃 (5) 10×⅜	〃 (5) 10×⅜
	11×⅛	X588111010ZZ	クイコミユニオン (1) 11×⅛	Biting union (1) 10×⅛
		X588211010ZZ	〃 (2) 11×⅛	〃 (2) 10×⅛
		X588311010ZZ	〃 (3) 11×⅛	〃 (3) 10×⅛
		X588411010ZZ	〃 (4) 11×⅛	〃 (4) 10×⅛
		X588511010ZZ	〃 (5) 11×⅛	〃 (5) 10×⅛

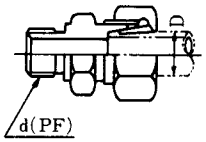
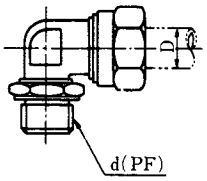
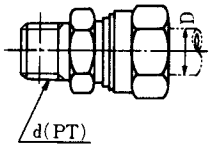
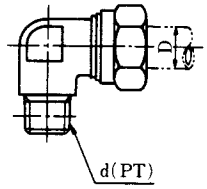
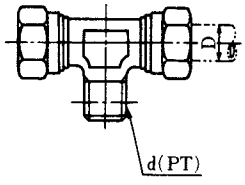
配管部品の図式記号および部品名称,部品番号
GRAPHICAL SYMBOL, PART NAME AND PART NUMBER OF PIPING PART

図式記号 Graphical symbol	サイズ Size	部品番号 Parts number	部品名称	Name of parts
クイコミユニオン (1) Biting union (1) 	11×3/8	Z588111030ZZ	クイコミユニオン (1) 11×3/8	Biting union (1) 11×3/8
		X588211030ZZ	〃 (2) 11×3/8	〃 (2) 11×3/8
		X588311030ZZ	〃 (3) 11×3/8	〃 (3) 11×3/8
		X588411030ZZ	〃 (4) 11×3/8	〃 (4) 11×3/8
		X588511030ZZ	〃 (5) 11×3/8	〃 (5) 11×3/8
	12×1/4	Z588112020ZZ	クイコミユニオン (1) 12×1/4	Biting union (1) 12×1/4
		X588212020ZZ	〃 (2) 12×1/4	〃 (2) 12×1/4
		X588312020ZZ	〃 (3) 12×1/4	〃 (3) 12×1/4
		X588412020ZZ	〃 (4) 12×1/4	〃 (4) 12×1/4
		X588512020ZZ	〃 (5) 12×1/4	〃 (5) 12×1/4
クイコミユニオン (2) Biting union (2) 	12×3/8	Z588112030ZZ	クイコミユニオン (1) 12×3/8	Biting union (1) 12×3/8
		X588212030ZZ	〃 (2) 12×3/8	〃 (2) 12×3/8
		X588312030ZZ	〃 (3) 12×3/8	〃 (3) 12×3/8
		X588412030ZZ	〃 (4) 12×3/8	〃 (4) 12×3/8
		X588512030ZZ	〃 (5) 12×3/8	〃 (5) 12×3/8
	14×1/4	Z588114020ZZ	クイコミユニオン (1) 14×1/4	Biting union (1) 14×1/4
		X588214020ZZ	〃 (2) 14×1/4	〃 (2) 14×1/4
		X588314020ZZ	〃 (3) 14×1/4	〃 (3) 14×1/4
		X588414020ZZ	〃 (4) 14×1/4	〃 (4) 14×1/4
		X588514020ZZ	〃 (5) 14×1/4	〃 (5) 14×1/4
クイコミユニオン (3) Biting union (3) 	14×3/8	Z588114030ZZ	クイコミユニオン (1) 14×3/8	Biting union (1) 14×3/8
		X588214030ZZ	〃 (2) 14×3/8	〃 (2) 14×3/8
		X588314030ZZ	〃 (3) 14×3/8	〃 (3) 14×3/8
		X588414030ZZ	〃 (4) 14×3/8	〃 (4) 14×3/8
		X588514030ZZ	〃 (5) 14×3/8	〃 (5) 14×3/8
	14×1/2	Z588114040ZZ	クイコミユニオン (1) 14×1/2	Biting union (1) 14×1/2
		X588214040ZZ	〃 (2) 14×1/2	〃 (2) 14×1/2
		X588314040ZZ	〃 (3) 14×1/2	〃 (3) 14×1/2
		X588414040ZZ	〃 (4) 14×1/2	〃 (4) 14×1/2
		X588514040ZZ	〃 (5) 14×1/2	〃 (5) 14×1/2
クイコミユニオン (4) Biting union (4) 	15×3/8	Z588115030ZZ	クイコミユニオン (1) 15×3/8	Biting union (1) 15×3/8
		X588215030ZZ	〃 (2) 15×3/8	〃 (2) 15×3/8
		X588315030ZZ	〃 (3) 15×3/8	〃 (3) 15×3/8
		X588415030ZZ	〃 (4) 15×3/8	〃 (4) 15×3/8
		X588515030ZZ	〃 (5) 15×3/8	〃 (5) 15×3/8
クイコミユニオン (5) Biting union (5) 	15×1/2	Z588115040ZZ	クイコミユニオン (1) 15×1/2	Biting union (1) 15×1/2
		X588215040ZZ	〃 (2) 15×1/2	〃 (2) 15×1/2
		X588315040ZZ	〃 (3) 15×1/2	〃 (3) 15×1/2
		X588415040ZZ	〃 (4) 15×1/2	〃 (4) 15×1/2
		X588515040ZZ	〃 (5) 15×1/2	〃 (5) 15×1/2

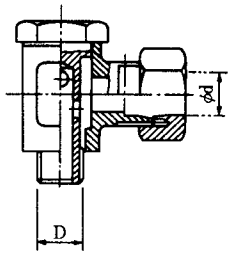
配管部品の図式記号および部品名称,部品番号
GRAPHICAL SYMBOL, PART NAME AND PART NUMBER OF PIPING PART

図式記号 Graphical symbol	サイズ Size	部品番号 Parts number	部品名称	Name of parts
クイコミユニオン (1) Biting union (1) 	16×½	X588116040ZZ	クイコミユニオン (1) 16×½	Biting union (1) 16×½
		X588216040ZZ	〃 (2) 16×½	〃 (2) 16×½
		X588316040ZZ	〃 (3) 16×½	〃 (3) 16×½
		X588416040ZZ	〃 (4) 16×½	〃 (4) 16×½
		X588516040ZZ	〃 (5) 16×½	〃 (5) 16×½
	18×⅜	X588118030ZZ	クイコミユニオン (1) 18×⅜	Biting union (1) 18×⅜
		X588218030ZZ	〃 (2) 18×⅜	〃 (2) 18×⅜
		X588318030ZZ	〃 (3) 18×⅜	〃 (3) 18×⅜
		X588418030ZZ	〃 (4) 18×⅜	〃 (4) 18×⅜
		X588518030ZZ	〃 (5) 18×⅜	〃 (5) 18×⅜
クイコミユニオン (2) Biting union (2) 	18×½	X588118040ZZ	クイコミユニオン (1) 18×½	Biting union (1) 18×½
		X588218040ZZ	〃 (2) 18×½	〃 (2) 18×½
		X588318040ZZ	〃 (3) 18×½	〃 (3) 18×½
		X588418040ZZ	〃 (4) 18×½	〃 (4) 18×½
		X588518040ZZ	〃 (5) 18×½	〃 (5) 18×½
	20×¾	X588120060ZZ	クイコミユニオン (1) 20×¾	Biting union (1) 20×¾
		X588220060ZZ	〃 (2) 20×¾	〃 (2) 20×¾
		X588320060ZZ	〃 (3) 20×¾	〃 (3) 20×¾
		X588420060ZZ	〃 (4) 20×¾	〃 (4) 20×¾
		X588520060ZZ	〃 (5) 20×¾	〃 (5) 20×¾
クイコミユニオン (3) Biting union (3) 	22×½	X588122040ZZ	クイコミユニオン (1) 22×½	Biting union (1) 22×½
		X588222040ZZ	〃 (2) 22×½	〃 (2) 22×½
		X588322040ZZ	〃 (3) 22×½	〃 (3) 22×½
		X588422040ZZ	〃 (4) 22×½	〃 (4) 22×½
		X588522040ZZ	〃 (5) 22×½	〃 (5) 22×½
	22×¾	X588122060ZZ	クイコミユニオン (1) 22×¾	Biting union (1) 22×¾
		X588222060ZZ	〃 (2) 22×¾	〃 (2) 22×¾
		X588322060ZZ	〃 (3) 22×¾	〃 (3) 22×¾
		X588422060ZZ	〃 (4) 22×¾	〃 (4) 22×¾
		X588522060ZZ	〃 (5) 22×¾	〃 (5) 22×¾
クイコミユニオン (4) Biting union (4) 	25×¾	X588125060ZZ	クイコミユニオン (1) 25×¾	Biting union (1) 25×¾
		X588225060ZZ	〃 (2) 25×¾	〃 (2) 25×¾
		X588325060ZZ	〃 (3) 25×¾	〃 (3) 25×¾
		X588425060ZZ	〃 (4) 25×¾	〃 (4) 25×¾
		X588525060ZZ	〃 (5) 25×¾	〃 (5) 25×¾
クイコミユニオン (5) Biting union (5) 	28×¾	X588128060ZZ	クイコミユニオン (1) 28×¾	Biting union (1) 28×¾
		X588228060ZZ	〃 (2) 28×¾	〃 (2) 28×¾
		X588328060ZZ	〃 (3) 28×¾	〃 (3) 28×¾
		X588428060ZZ	〃 (4) 28×¾	〃 (4) 28×¾
		X588528060ZZ	〃 (5) 28×¾	〃 (5) 28×¾

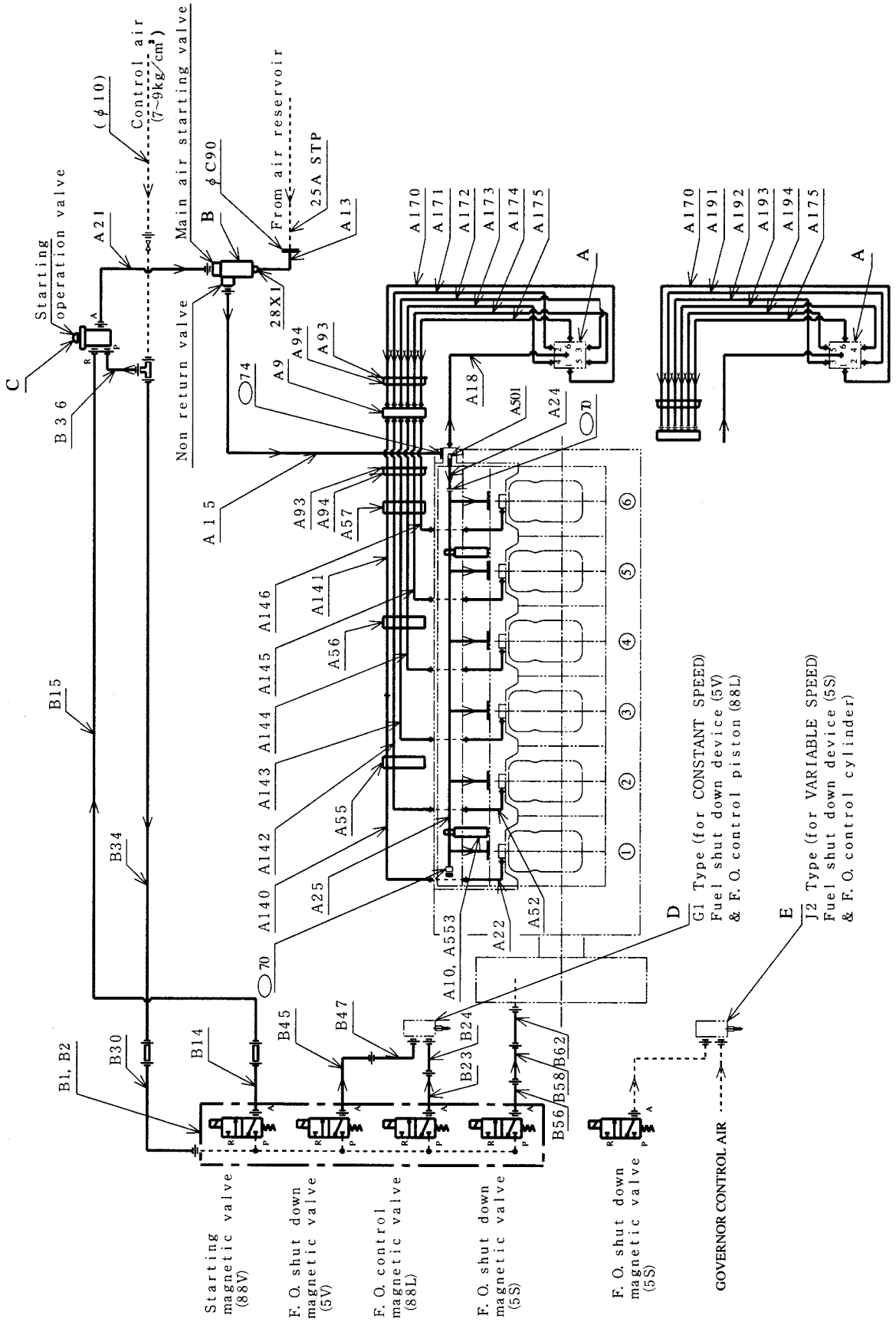
配管部品の図式記号および部品名称,部品番号
GRAPHICAL SYMBOL, PART NAME AND PART NUMBER OF PIPING PART

図式記号 Graphical symbol	サイズ Size	部品番号 Parts number	部品名称	Name of parts
クイコミユニオン (1) Biting union (1) 	28×1	Z588128100ZZ	クイコミユニオン (1) 28×1	Biting union (1) 28×1
		X588228100ZZ	〃 (2) 28×1	〃 (2) 28×1
		X588328100ZZ	〃 (3) 28×1	〃 (3) 28×1
		X588428100ZZ	〃 (4) 28×1	〃 (4) 28×1
		X588528100ZZ	〃 (5) 28×1	〃 (5) 28×1
	30×1	Z588130100ZZ	クイコミユニオン (1) 30×1	Biting union (1) 30×1
		X588230100ZZ	〃 (2) 30×1	〃 (2) 30×1
		X588330100ZZ	〃 (3) 30×1	〃 (3) 30×1
		X588430100ZZ	〃 (4) 30×1	〃 (4) 30×1
		X588530100ZZ	〃 (5) 30×1	〃 (5) 30×1
クイコミユニオン (2) Biting union (2) 	34×1	Z588134100ZZ	クイコミユニオン (1) 34×1	Biting union (1) 34×1
		X588234100ZZ	〃 (2) 34×1	〃 (2) 34×1
		X588334100ZZ	〃 (3) 34×1	〃 (3) 34×1
		X588434100ZZ	〃 (4) 34×1	〃 (4) 34×1
		X588534100ZZ	〃 (5) 34×1	〃 (5) 34×1
	34×1¼	Z588134120ZZ	クイコミユニオン (1) 34×1¼	Biting union (1) 34×1¼
		X588234120ZZ	〃 (2) 34×1¼	〃 (2) 34×1¼
		X588334120ZZ	〃 (3) 34×1¼	〃 (3) 34×1¼
		X588434120ZZ	〃 (4) 34×1¼	〃 (4) 34×1¼
		X588534120ZZ	〃 (5) 34×1¼	〃 (5) 34×1¼
クイコミユニオン (3) Biting union (3) 	35×1¼	Z588135120ZZ	クイコミユニオン (1) 35×1¼	Biting union (1) 35×1¼
		X588235120ZZ	〃 (2) 35×1¼	〃 (2) 35×1¼
		X588335120ZZ	〃 (3) 35×1¼	〃 (3) 35×1¼
		X588435120ZZ	〃 (4) 35×1¼	〃 (4) 35×1¼
		X588535120ZZ	〃 (5) 35×1¼	〃 (5) 35×1¼
	38×1¼	Z588138120ZZ	クイコミユニオン (1) 38×1¼	Biting union (1) 38×1¼
		X588238120ZZ	〃 (2) 38×1¼	〃 (2) 38×1¼
		X588338120ZZ	〃 (3) 38×1¼	〃 (3) 38×1¼
		X588438120ZZ	〃 (4) 38×1¼	〃 (4) 38×1¼
		X588538120ZZ	〃 (5) 38×1¼	〃 (5) 38×1¼
クイコミユニオン (4) Biting union (4) 	40×1¼	Z588140120ZZ	クイコミユニオン (1) 40×1¼	Biting union (1) 40×1¼
		X588240120ZZ	〃 (2) 40×1¼	〃 (2) 40×1¼
		X588340120ZZ	〃 (3) 40×1¼	〃 (3) 40×1¼
		X588440120ZZ	〃 (4) 40×1¼	〃 (4) 40×1¼
		X588540120ZZ	〃 (5) 40×1¼	〃 (5) 40×1¼
	42×1¼	Z588142120ZZ	クイコミユニオン (1) 42×1¼	Biting union (1) 42×1¼
		X588242120ZZ	〃 (2) 42×1¼	〃 (2) 42×1¼
		X588342120ZZ	〃 (3) 42×1¼	〃 (3) 42×1¼
		X588442120ZZ	〃 (4) 42×1¼	〃 (4) 42×1¼
		X588542120ZZ	〃 (5) 42×1¼	〃 (5) 42×1¼
クイコミユニオン (5) Biting union (5) 	42×1½	Z588142140ZZ	クイコミユニオン (1) 42×1½	Biting union (1) 42×1½
		X588242140ZZ	〃 (2) 42×1½	〃 (2) 42×1½
		X588342140ZZ	〃 (3) 42×1½	〃 (3) 42×1½
		X588442140ZZ	〃 (4) 42×1½	〃 (4) 42×1½
		X588542140ZZ	〃 (5) 42×1½	〃 (5) 42×1½

配管部品の図式記号および部品名称,部品番号
GRAPHICAL SYMBOL, PART NAME AND PART NUMBER OF PIPING PART

図式記号 Graphical symbol	サイズ Size	部品番号 Parts number	部品名称	Name of parts
クイコミユニオン (9) Biting union (9) 	6×⅛	X588906010ZZ	クイコミユニオン (9) 6×⅛	Biting union (9) 6×⅛
	8×⅛	X588908010ZZ	クイコミユニオン (9) 8×⅛	Biting union (9) 8×⅛
	8×¼	X588908020ZZ	クイコミユニオン (9) 8×¼	Biting union (9) 8×¼
	10×¼	X588910020ZZ	クイコミユニオン (9) 10×¼	Biting union (9) 10×¼
	10×⅜	X588910030ZZ	クイコミユニオン (9) 10×⅜	Biting union (9) 10×⅜
	12×¼	X588912020ZZ	クイコミユニオン (9) 12×¼	Biting union (9) 12×¼
	12×⅜	X588912030ZZ	クイコミユニオン (9) 12×⅜	Biting union (9) 12×⅜
	15×⅜	X588915030ZZ	クイコミユニオン (9) 15×⅜	Biting union (9) 15×⅜
	15×½	X588915040ZZ	クイコミユニオン (9) 15×½	Biting union (9) 15×½
	8×¼	X588908020JJ	クイコミユニオン (9) 8×¼	Biting union (9) 8×¼

起動空気配管 – 6DK
STARTING AIR PIPING – 6DK



起動空気配管 – 6DK
STARTING AIR PIPING – 6DK

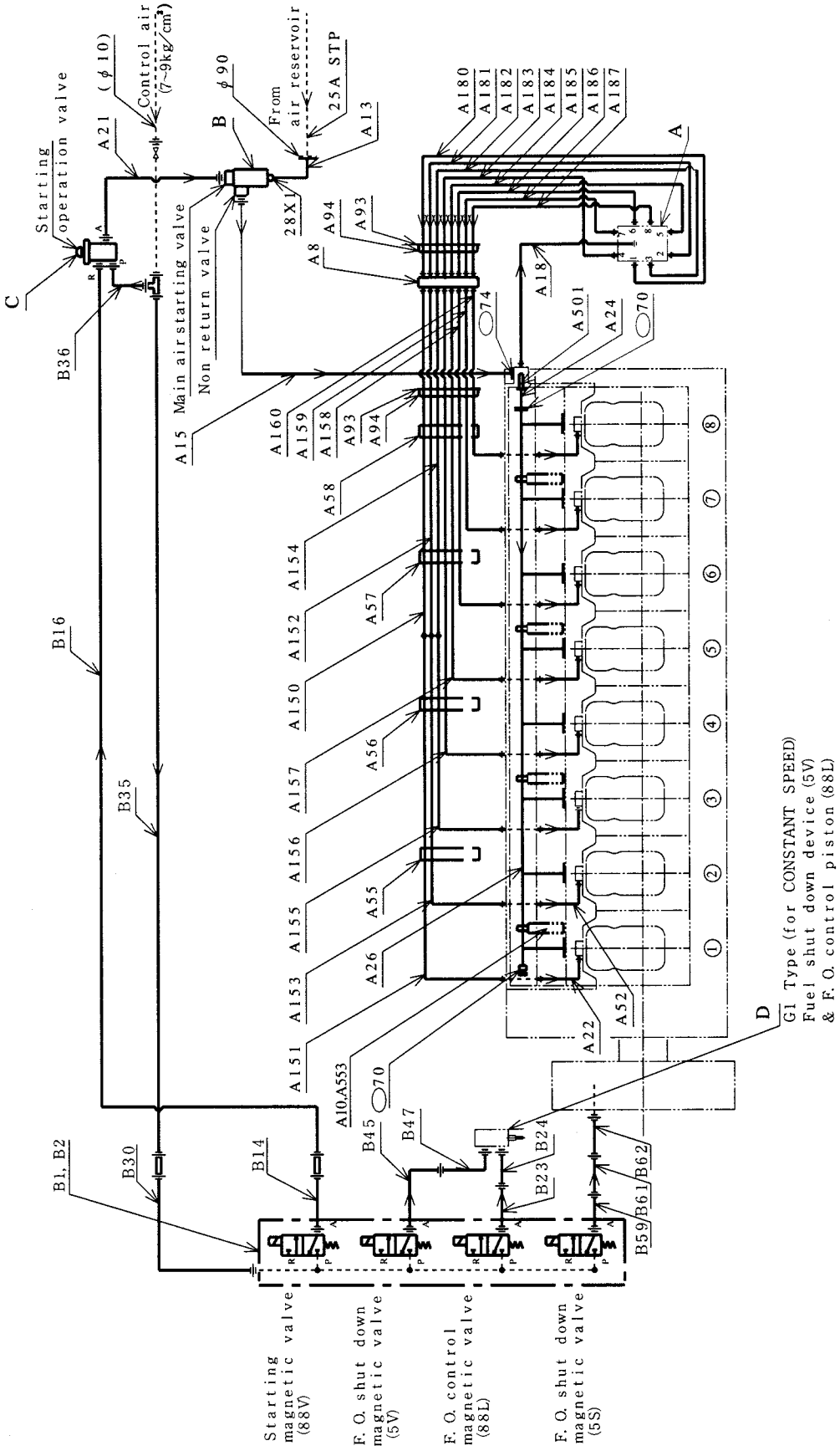
①……定速型 CONSTANT SPEED TYPE　②……変速型 VARIABLE SPEED TYPE

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity ①	②
A	Ref. 4-1.2	キドウカイテンベン	STARTING ROTARY VALVE	1	1
B	Ref. 4-1.1	シドウベン	MAIN AIR STARTING VALVE	1	1
C	Ref. 4-1.1	シドウソウサベン	STARTING OPERATION VALVE	1	1
D	Ref. 4-7.1.1	G1 ガタ F.O. シャダンソウチ	FUEL SHUTDOWN DEVICE, G1 TYPE	1	
E	Ref. 4-7.1.2	J2 ガタ F.O. シャダンソウチ	FUEL SHUTDOWN DEVICE, J2 TYPE		1
A9	E208550090	パイロツトチユウケイセツシユ-6DK	CONNECTOR, S.A. PILOT-6DK	1	1
A10	E208550100	SA シユカンササエ	SUPPORT, S.A. MAIN PIPE	2	2
A13	E208550130	SA カン, シドウベンイリグチ	S.A. PIPE, STARTING VALVE INLET	1	1
A15	E208550150	SA カン, シドウベンデグチ	S.A. PIPE, STARTING VALVE OUTLET	1	1
A18	E208550180	SA カン, カイテンベンイリグチ	S.A. PIPE, ROTARY VALVE INLET	1	1
A21	E208550210	SA カン, ソウサベンデグチ	S.A. PIPE, OP. VALVE OUTLET	1	1
A22	E208550220	SA カン, キドウベンイリグチ (1)	S.A. PIPE, S.A. VALVE INLET (1)	1	1
A24	E208550240	SA カン, シユカンイリグチ	S.A. PIPE, MAINPIPE INLET	1	1
A25	E208550250	SA シユカン-6DK	S.A. MAIN PIPE-6DK	1	1
A52	E208550520	SA カン, キドウベンイリグチ (2)	S.A. PIPE, S/A VALVE INLET (2)	5	5
A55	E269900042	SA パイロツトカンオサエ (2)	CLAMP, S.A. PILOT PIPE (2)	1	1
A56	E269900043	SA パイロツトカンオサエ (3)	CLAMP, S.A. PILOT PIPE (3)	1	1
A57	E269900044	SA パイロツトカンオサエ (4)	CLAMP, S.A. PILOT PIPE (4)	1	1
A93	E229900380	オサエイタ	CLAMP	2	2
A94	E229900370	U ボルト	U BOLT	2	2
A140	E208551400	SA カン, パイロツト (6DK) 1-1	S.A. PIPE, PILOT (6DK) 1-1	1	1
A141	E208551410	SA カン, パイロツト (6DK) 1-2	S.A. PIPE, PILOT (6DK) 1-2	1	1
A142	E208551420	SA カン, パイロツト (6DK) 2	S.A. PIPE, PILOT (6DK) 2	1	1
A143	E208551430	SA カン, パイロツト (6DK) 3	S.A. PIPE, PILOT (6DK) 3	1	1
A144	E208551440	SA カン, パイロツト (6DK) 4	S.A. PIPE, PILOT (6DK) 4	1	1
A145	E208551450	SA カン, パイロツト (6DK) 5	S.A. PIPE, PILOT (6DK) 5	1	1
A146	E208551460	SA カン, パイロツト (6DK) 6	S.A. PIPE, PILOT (6DK) 6	1	1
A170	E208551700	SA カン, R/V デグチ (6D-1)	S.A. PIPE, R/V OUTLET (6D-1)	1	1
A171	E208551710	SA カン, R/V デグチ (6D-2)	S.A. PIPE, R/V OUTLET (6D-2)	1	
A172	E208551720	SA カン, R/V デグチ (6D-3)	S.A. PIPE, R/V OUTLET (6D-3)	1	
A173	E208551730	SA カン, R/V デグチ (6D-4)	S.A. PIPE, R/V OUTLET (6D-4)	1	
A174	E208551740	SA カン, R/V デグチ (6D-5)	S.A. PIPE, R/V OUTLET (6D-5)	1	
A175	E208551750	SA カン, R/V デグチ (6D-6)	S.A. PIPE, R/V OUTLET (6D-6)	1	1
A191	E208551910	SA カン, R/V デグチ (6D-M2)	S.A. PIPE, R/V OUTLET (6D-M2)		1
A192	E208551920	SA カン, R/V デグチ (6D-M3)	S.A. PIPE, R/V OUTLET (6D-M3)		1
A193	E208551930	SA カン, R/V デグチ (6D-M4)	S.A. PIPE, R/V OUTLET (6D-M4)		1
A194	E208551940	SA カン, R/V デグチ (6D-M5)	S.A. PIPE, R/V OUTLET (6D-M5)		1
A501	Z560103135ZZ	O リング	O-RING	1	1
A553	Z260102500ZZ	U ボルト	U-BOLT	2	2

起動空気配管 – 6DK
STARTING AIR PIPING – 6DK

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
B1	E215550010	デンジベントリツケイタ	MAGNETIC VALVE BOARD	1
B2	E215550020	デンジベンバコ	MAGNETIC VALVE BOX	1
B14	E215550140	SA カン, ソウサベンイリグチ 5	S.A. PIPE, OP. VALVE INLET 5	1
B15	E215550150	SA カン, ソウサベンイリグチ 6	S.A. PIPE, OP. VALVE INLET 6	1
B23	E215550230	SA カン, FO コントロールピストン 4	S.A. PIPE, F.O. CONTROL PISTON 4	1
B24	E215550240	SA カン, FO コントロールピストン 5	S.A. PIPE, F.O. CONTROL PISTON 5	1
B30	E215550300	SA カン, コントロールエア 1	S.A. PIPE, CONTROL AIR 1	1
B34	E215550340	SA カン, コントロールエア 5	S.A. PIPE, CONTROL AIR 5	1
B36	E215550360	SA カン, コントロールエア 7	S.A. PIPE, CONTROL AIR 7	1
B45	E215550450	SA カン, シヤダンソウチ 6	S.A. PIPE, F.O. SHUTDOWN DEVICE 6	1
B47	E215550470	SA カン, シヤダンソウチ 8	S.A. PIPE, F.O. SHUTDOWN DEVICE 8	1
B56	E215550560	SA カン, FO カツト 7	S.A. PIPE, F.O. CUT 7	1
B58	E215550580	SA カン, FO カツト 9	S.A. PIPE, F.O. CUT 9	1
B62	E215550620	SA カン, FO カツト 13	S.A. PIPE, F.O. CUT 13	1

起動空気配管 – 8DK
STARTING AIR PIPING – 8DK



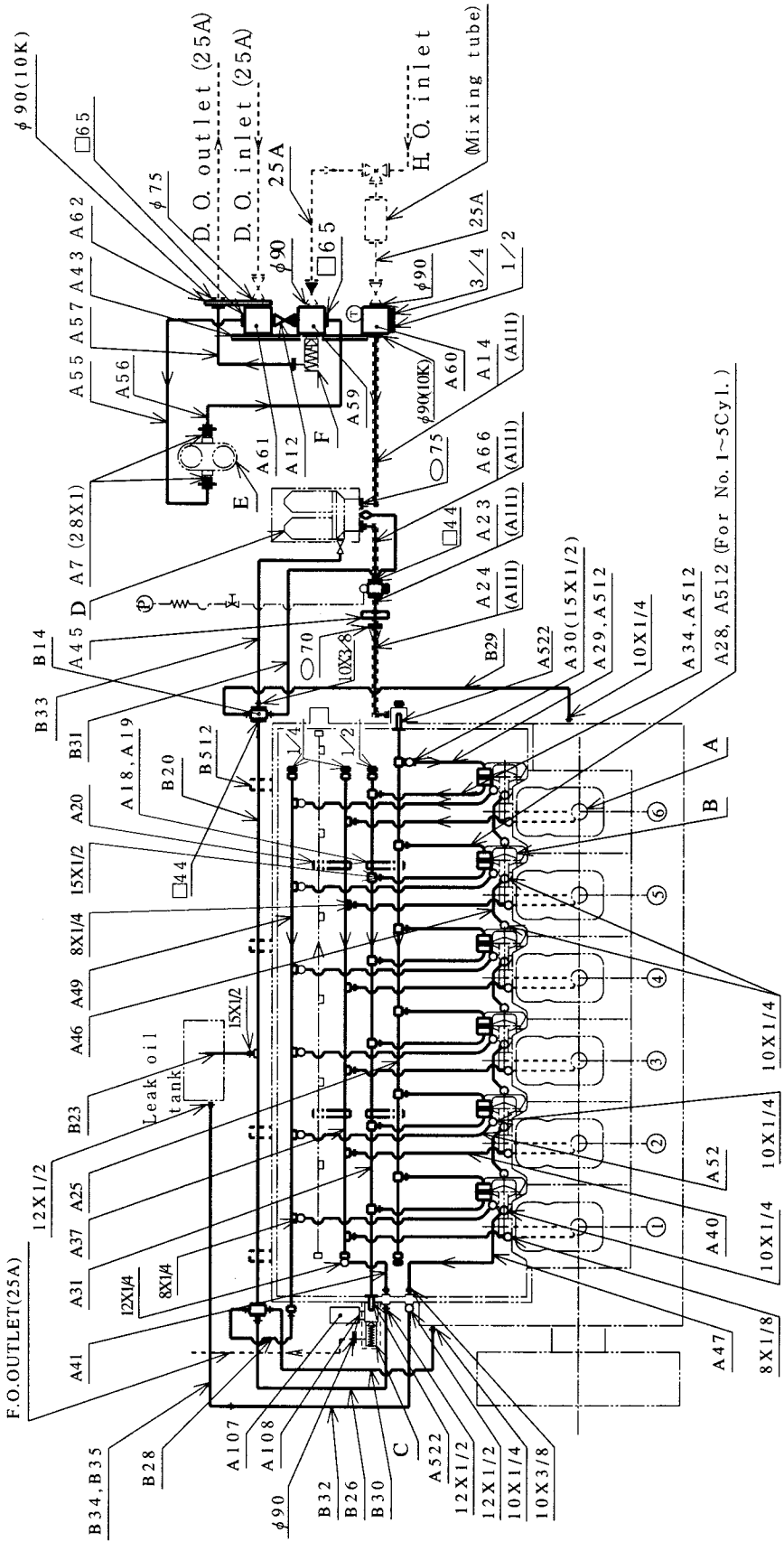
起動空気配管 – 8DK
STARTING AIR PIPING – 8DK

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
A	Ref. 4-1.2	キドウカイテンベン	STARTING ROTARY VALVE	1
B	Ref. 4-1.1	シドウベン	MAIN AIR STARTING VALVE	1
C	Ref. 4-1.1	シドウソウサベン	STARTING OPERATION VALVE	1
D	Ref. 4-7.1.1	G1 ガタ F.O. シャダンソウチ	FUEL SHUTDOWN DEVICE, G1 TYPE	1
A8	E208550080	パイロツトチユウケイセツシユ-8DK	CONNECTOR, S.A. PILOT-8DK	1
A10	E208550100	SA シユカンササエ	SUPPORT, S.A. MAIN PIPE	4
A13	E208550130	SA カン, シドウベンイリグチ	S.A. PIPE, STARTING VALVE INLET	1
A15	E208550150	SA カン, シドウベンデグチ	S.A. PIPE, STARTING VALVE OUTLET	1
A18	E208550180	SA カン, カイテンベンイリグチ	S.A. PIPE, ROTARY VALVE INLET	1
A21	E208550210	SA カン, ソウサベンデグチ	S.A. PIPE, O.P. VALVE OUTLET	1
A22	E208550220	SA カン, キドウベンイリグチ (1)	S.A. PIPE, S/A VALVE INLET(1)	1
A24	E208550240	SA カン, シユカンイリグチ	S.A. PIPE, MAINPIPE INLET	1
A26	E208550260	SA シユカン-8DK	S.A. MAIN PIPE-8DK	1
A52	E208550520	SA カン, キドウベンイリグチ (2)	S.A. PIPE, S/A VALVE INLET(2)	7
A55	E269900042	SA パイロツトカンオサエ (2)	CLAMP, S.A. PILOT PIPE (2)	1
A56	E269900043	SA パイロツトカンオサエ (3)	CLAMP, S.A. PILOT PIPE (3)	1
A57	E269900044	SA パイロツトカンオサエ (4)	CLAMP, S.A. PILOT PIPE (4)	1
A58	E269900045	SA パイロツトカンオサエ (5)	CLAMP, S.A. PILOT PIPE (5)	1
A93	E229900380	オサエイタ	CLAMP	2
A94	E229900370	U ボルト	U-BOLT	2
A150	E208551500	SA カン, パイロツト (8DK) 1-1	S.A. PIPE, PILOT (8DK) 1-1	1
A151	E208551510	SA カン, パイロツト (8DK) 1-2	S.A. PIPE, PILOT (8DK) 1-2	1
A152	E208551520	SA カン, パイロツト (8DK) 2-1	S.A. PIPE, PILOT (8DK) 2-1	1
A153	E208551530	SA カン, パイロツト (8DK) 2-2	S.A. PIPE, PILOT (8DK) 2-2	1
A154	E208551540	SA カン, パイロツト (8DK) 3-1	S.A. PIPE, PILOT (8DK) 3-1	1
A155	E208551550	SA カン, パイロツト (8DK) 3-2	S.A. PIPE, PILOT (8DK) 3-2	1
A156	E208551560	SA カン, パイロツト (8DK) 4	S.A. PIPE, PILOT (8DK) 4	1
A157	E208551570	SA カン, パイロツト (8DK) 5	S.A. PIPE, PILOT (8DK) 5	1
A158	E208551580	SA カン, パイロツト (8DK) 6	S.A. PIPE, PILOT (8DK) 6	1
A159	E208551590	SA カン, パイロツト (8DK) 7	S.A. PIPE, PILOT (8DK) 7	1
A160	E208551600	SA カン, パイロツト (8DK) 8	S.A. PIPE, PILOT (8DK) 8	1
A180	E208551800	SA カン, R/V デグチ (8D-1)	S.A. PIPE, R/V OUTLET (8D-1)	1
A181	E208551810	SA カン, R/V デグチ (8D-2)	S.A. PIPE, R/V OUTLET (8D-2)	1
A182	E208551820	SA カン, R/V デグチ (8D-3)	S.A. PIPE, R/V OUTLET (8D-3)	1
A183	E208551830	SA カン, R/V デグチ (8D-4)	S.A. PIPE, R/V OUTLET (8D-4)	1
A184	E208551840	SA カン, R/V デグチ (8D-5)	S.A. PIPE, R/V OUTLET (8D-5)	1
A185	E208551850	SA カン, R/V デグチ (8D-6)	S.A. PIPE, R/V OUTLET (8D-6)	1
A186	E208551860	SA カン, R/V デグチ (8D-7)	S.A. PIPE, R/V OUTLET (8D-7)	1
A187	E208551870	SA カン, R/V デグチ (8D-8)	S.A. PIPE, R/V OUTLET (8D-8)	1
A501	Z560103135Z	O リング	O-RING	1
A553	Z260102500Z	U ボルト	U-BOLT	4

起動空気配管 – 8DK
STARTING AIR PIPING – 8DK

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
B1	E215550010	デンジベントリツケイタ	MAGNETIC VALVE BOARD	1
B2	E215550020	デンジベンバコ	MAGNETIC VALVE BOX	1
B14	E215550140	SA カン, ソウサベンイリグチ 5	S.A. PIPE, O.P. VALVE INLET 5	1
B16	E215550160	SA カン, ソウサベンイリグチ 7	S.A. PIPE, O.P. VALVE INLET 7	1
B23	E215550230	SA カン, FO コントロールピストン 4	S.A. PIPE, F.O. CONTROL PISTON 4	1
B24	E215550240	SA カン, FO コントロールピストン 5	S.A. PIPE, F.O. CONTROL PISTON 5	1
B30	E215550300	SA カン, コントロールエア 1	S.A. PIPE, CONTROL AIR 1	1
B35	E215550350	SA カン, コントロールエア 6	S.A. PIPE, CONTROL AIR 6	1
B36	E215550360	SA カン, コントロールエア 7	S.A. PIPE, CONTROL AIR 7	1
B45	E215550450	SA カン, シヤダンソウチ 6	S.A. PIPE, F.O. SHUTDOWN DEVICE 6	1
B47	E215550470	SA カン, シヤダンソウチ 8	S.A. PIPE, F.O. SHUTDOWN DEVICE 8	1
B59	E215550590	SA カン, FO カツト 10	S.A. PIPE, F.O. CUT 10	1
B61	E215550610	SA カン, FO カツト 12	S.A. PIPE, F.O. CUT 12	1
B62	E215550620	SA カン, FO カツト 13	S.A. PIPE, F.O. CUT 13	1

燃料配管 – 6DK
FUEL OIL PIPING – 6DK



DAIHATSU

燃料配管 – 6DK
FUEL OIL PIPING – 6DK

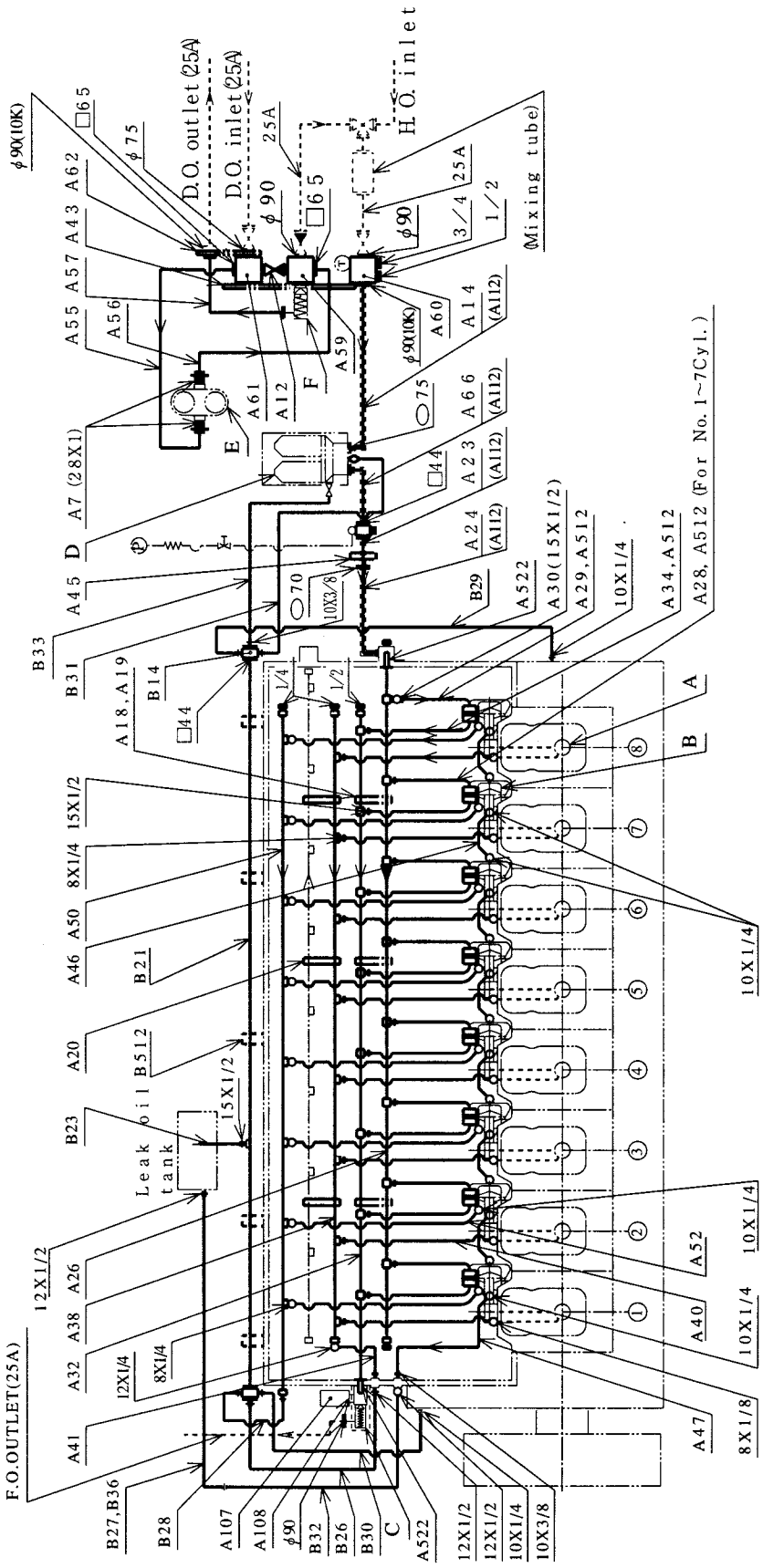
番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
A	Ref. 3-24.2	ノズルホルダ	NOZZLE HOLDER	6
B	Ref. 3-23.2	F.O. フンシャポンプ	F.O. INJECTION PUMP	6
C	Ref. 4-2.5	F.O. チョウアツベン	F.O. RELIEF VALVE	1
D	Ref. 4-2.3	F.O. ロキ	F.O. FILTER	1
E	Ref. 4-2.1	F.O. ポンプ	F.O. PUMP	1
F		オイルチョウアツベン	OIL RELIEF VALVE	1
A7	C034000220	シールワッシャ	SEAL WASHER	2
A12	Y013160204	ギャクシタマガタベン	CHECK GROVE VALVE	1
A14	E208650140	FO カン, ロキイリグチ	F.O. PIPE, FILTER INLET	1
A18	E208650180	FO カンササエ-1	SUPPORT-1, F.O. PIPE	2
A19	E208650190	カンオサエ	PIPE SUPPORTER	2
A20	E208650200	カンオサエ	PIPE SUPPORTER	6
A23	E208650230	FO カン, ロキデグチ-C-2	F.O. PIPE, FILTER OUTLET-C-2	1
A24	E208650240	FO カン, シユカンイリグチ-C	F.O. PIPE, MAIN PIPE INLET-C	1
A25	E208650250	FO イリグチシユカン-6DK	F.O. INLET MAIN PIPE-6DK	1
A28	E208650280	FO エダカン (イリグチ-1)	F.O. BRANCH PIPE (INLET-1)	5
A29	E208650290	FO エダカン (イリグチ-2)	F.O. BRANCH PIPE (INLET-2)	1
A30	E208650300	シールワッシャ	SEAL WASHER	2
A31	E208650310	FO デグチシユカン-6DK	F.O. OUTLET MAIN PIPE-6DK	1
A34	E208650340	FO エダカン (デグチ)	F.O. BRANCH PIPE (OUTLET)	6
A37	E208650370	FO NH リークオイルシユカン-6D	F.O. NH LEAK OIL MAIN PIPE-6D	1
A40	E208650400	FO エダカン-NH (ロウユ)	F.O. BRANCH PIPE-NH (LEAK OIL)	6
A41	E208650410	FO カン, NH リークシユカンデグチ	F.O. PIPE, NH LEAK MAIN PIPE OUTLET	1
A43	E208650430	FO イリグチカンブラケット-C	BRACKET-C, F.O. INLET PIPE	1
A45	E208650450	フレドメ, FO ロキデグチカン-C	SUPPORTER, F.O. FILTER OUTLET-C	1
A46	E208650460	FO エダカン-FS (ロウユ-1)	F.O. BRANCH PIPE-FS (LEAK OIL-1)	5
A47	E208650470	FO エダカン-FS (ロウユ-2)	F.O. BRANCH PIPE-FS (LEAK OIL-2)	1
A49	E208650490	リークメインパイプ (FOIP)-6D	F.O. LEAK MAIN PIPE (F.O.I.P)-6DK	1
A52	E208650520	FO エダカン-FOIP (ロウユ)	F.O. BRANCH PIPE-F.O.I.P (LEAK OIL)	6
A55	E208650550	FO カン, ホンプイリグチ-C	F.O. PIPE, F.O. PUMP INLET-C	1
A56	E208650560	FO カン, ホンプデグチ-C	F.O. PIPE, F.O. PUMP OUTLET-C	1
A57	E208650570	FO カン, チヨウアツベンデグチ	F.O. PIPE, RELIEF VALVE	1
A59	E208650590	ブロツク FO-3	BLOCK, F.O.-3	1
A60	E208650600	ブロツク FO-4	BLOCK, F.O.-4	1
A61	E208650610	ブロツク FO-1	BLOCK, F.O.-1	1
A62	E228650860	トクシユフランジ	SPECIAL FLANGE	1
A66	E208650660	FO カン, ロキデグチ-C-1	F.O. PIPE, FILTER OUTLET-C-1	1
A107	E268180020	アキユムレータ	ACCUMULATOR	1
A108	E268180060	O リング	O RING	1
A111	E208651110	ラギング, FO ライン-6DK-C	LAGGING, F.O. LINE-6DK-C	1
A512	Z560101824DZ	O リング	O-RING	12
A522	Z560103135DZ	O リング	O-RING	2

燃料配管 – 6DK
FUEL OIL PIPING – 6DK

漏油タンクレベルスイッチ　①……付　②……無
LEVEL SWITCH, LEAK OIL TANK　With　Without

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity ①	②
B14	A245012010	キユウユセツシユ (1)	BLOCK, L.O. PIPE	2	2
B20	E209450200	FO リークモドシシユカン (6D)	F.O. LEAK RETURN MAIN PIPE (6D)	1	1
B23	E209450230	FO リークモドシカン	F.O. LEAK RETARN PIPE	1	1
B26	E209450260	FO カン, ノズルリーク	F.O. PIPE, NOZZLE LEAK	1	1
B28	E209450280	FO カン, プランジヤリーク	F.O. PIPE, PLUNGER LEAK	1	1
B29	E209450290	FO カン, カコウ (マエ)	F.O. PIPE, FRAM (FRONT)	1	1
B30	E209450300	FO カン, カコウ (ウシロ)	F.O. PIPE, FRAM (REAR)	1	1
B31	E209450310	FO カン, ロキリーク	F.O. PIPE, FILTER LEAK	1	1
B32	E209450320	FO カン, コウアツカンリーク	F.O. PIPE, INJECTION PIPE LEAK	1	1
B33	E209450330	FO カン, ロキブローオフ	F.O. PIPE, FILTER BROW OFF	1	1
B34	E209450340	FO カン, コウアツカンリーク (6D) 1	F.O. INJECTION PIPE LEAK (6D) 1	1	
B35	E209450350	FO カン, コウアツカンリーク (6D) 2	F.O. INJECTION PIPE LEAK (6D) 2		1
B512	Z585128000ZJ	カンバンド	PIPE SUPPORTER	4	4

燃料配管 – 8DK
FUEL OIL PIPING – 8DK



燃料配管 – 8DK
FUEL OIL PIPING – 8DK

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
A	Ref. 3-24.2	ノズルホルダ	NOZZLE HOLDER	8
B	Ref. 3-23.2	F.O. フンシャポンプ	F.O. INJECTION PUMP	8
C	Ref. 4-2.5	F.O. チョウアツベン	F.O. RELIEF VALVE	1
D	Ref. 4-2.3	F.O. ロキ	F.O. FILTER	1
E	Ref. 4-2.1	F.O. ポンプ	F.O. PUMP	1
F		オイルチョウアツベン	OIL RELIEF VALVE	1
A7	C034000220	シールワッシャ	SEAL WASHER	2
A12	Y013160204	ギャクシタマガタベン	CHECK GROVE VALVE	1
A14	E208650140	FO カン, ロキイリグチ	F.O. PIPE, FILTER INLET	1
A18	E208650180	FO カンササエ-1	SUPPORT-1, F.O. PIPE	3
A19	E208650190	カンオサエ	PIPE SUPPORTER	3
A20	E208650200	カンオサエ	PIPE SUPPORTER	8
A23	E208650230	FO カン, ロキデグチ-C-2	F.O. PIPE, FILTER OUTLET-C-2	1
A24	E208650240	FO カン, シユカンイリグチ-C	F.O. PIPE, MAIN PIPE INLET-C	1
A26	E208650260	FO イリグチシユカン−8DK	F.O. INLET MAIN PIPE-8DK	1
A28	E208650280	FO エダカン (イリグチ-1)	F.O. BRANCH PIPE (INLET-1)	7
A29	E208650290	FO エダカン (イリグチ-2)	F.O. BRANCH PIPE (INLET-2)	1
A30	E208650300	シールワッシャ	SEAL WASHER	2
A32	E208650320	FO デグチシユカン-8DK	F.O. OUTLET MAIN PIPE-8DK	1
A34	E208650340	FO エダカン (デグチ)	F.O. BRANCH PIPE (OUTLET)	8
A38	E208650380	FO NH リークオイルシユカン-8D	F.O. NH LEAK OIL MAIN PIPE-8D	1
A40	E208650400	FO エダカン-NH (ロウユ)	F.O. BRANCH PIPE-NH (LEAK OIL)	8
A41	E208650410	FO カン, NH リークシユカンデグチ	F.O. PIPE, NH LEAK MAIN PIPE OUTLE	1
A43	E208650430	FO イリグチカンブラケツト-C	BRACKET-C, F.O. INLET PIPE	1
A45	E208650450	フレドメ, FO ロキデグチカン-C	SUPPORTER, F.O. FILTER OUTLET-C	1
A46	E208650460	FO エダカン-FS (ロウユ-1)	F.O. BRANCH PIPE-FS (LEAK OIL-1)	7
A47	E208650470	FO エダカン-FS (ロウユ-2)	F.O. BRANCH PIPE-FS (LEAK OIL-2)	1
A50	E208650500	リークメインパイプ (FOIP) −8D	F.O. LEAK MAIN PIPE (F.O.I.P.)-8DK	1
A52	E208650520	FO エダカン-FOIP (ロウユ)	F.O. BRANCH PIPE-F.O.I.P (LEAK OIL)	8
A55	E208650550	FO カン, ホンプイリグチ-C	F.O. PIPE, F.O. PUMP INLET-C	1
A56	E208650560	FO カン, ホンプデグチ-C	F.O. PIPE, F.O. PUMP OUTLET-C	1
A57	E208650570	FO カン, チヨウアツベンデグチ	F.O. PIPE, RELIEF VALVE	1
A59	E208650590	ブロツク FO-3	BLOCK, F.O.-3	1
A60	E208650600	ブロツク FO-4	BLOCK, F.O.-4	1
A61	E208650610	ブロツク FO-1	BLOCK, F.O.-1	1
A62	E228650860	トクシユフランジ	SPECIAL FLANGE	1
A66	E208650660	FO カン, ロキデグチ-C-1	F.O. PIPE,FILTER OUTLET-C-1	1
A107	E268180020	アキユムレータ	ACCUMULATOR	1
A108	E268180060	O リング	O RING	1
A112	E208651120	ラギング, FO ライン-8DK-C	LAGGING, F.O. LINE-8DK-C	1
A512	Z560101824DZ	O リング	O-RING	16
A522	Z560103135DZ	O リング	O-RING	2

燃料配管 – 8DK
FUEL OIL PIPING – 8DK

漏油タンクレベルスイッチ　①……付　②……無
LEVEL SWITCH, LEAK OIL TANK　With　Without

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity ①	②
B14	A245012010	キユウユセツシユ (1)	BLOCK, L.O. PIPE	2	2
B21	E209450210	FO リークモドシシユカン (8D)	F.O. LEAK RETURN MAIN PIPE (8D)	1	1
B23	E209450230	FO リークモドシカン	F.O. LEAK RETARN PIPE	1	1
B26	E209450260	FO カン, ノズルリーク	F.O. PIPE, NOZZLE LEAK	1	1
B27	E209450270	FO カン, コウアツカンリーク (8D) 1	F.O. INJECTION PIPE LEAK (8D) 1		1
B28	E209450280	FO カン, プランジヤリーク	F.O. PIPE, PLUNGER LEAK	1	1
B29	E209450290	FO カン, カコウ (マエ)	F.O. PIPE, FRAM (FRONT)	1	1
B30	E209450300	FO カン, カコウ (ウシロ)	F.O. PIPE, FRAM (REAR)	1	1
B31	E209450310	FO カン, ロキリーク	F.O. PIPE, FILTER LEAK	1	1
B32	E209450320	FO カン, コウアツカンリーク	F.O. PIPE, INJECTION PIPE LEAK	1	1
B33	E209450330	FO カン, ロキブローオフ	F.O. PIPE, FILTER BROW OFF	1	1
B36	E209450360	FO カン, コウアツカンリーク (8D) 2	F.O. INJECTION PIPE LEAK (8D) 2	1	
B512	Z585128000ZJ	カンバンド	PIPE SUPPORTER	5	5

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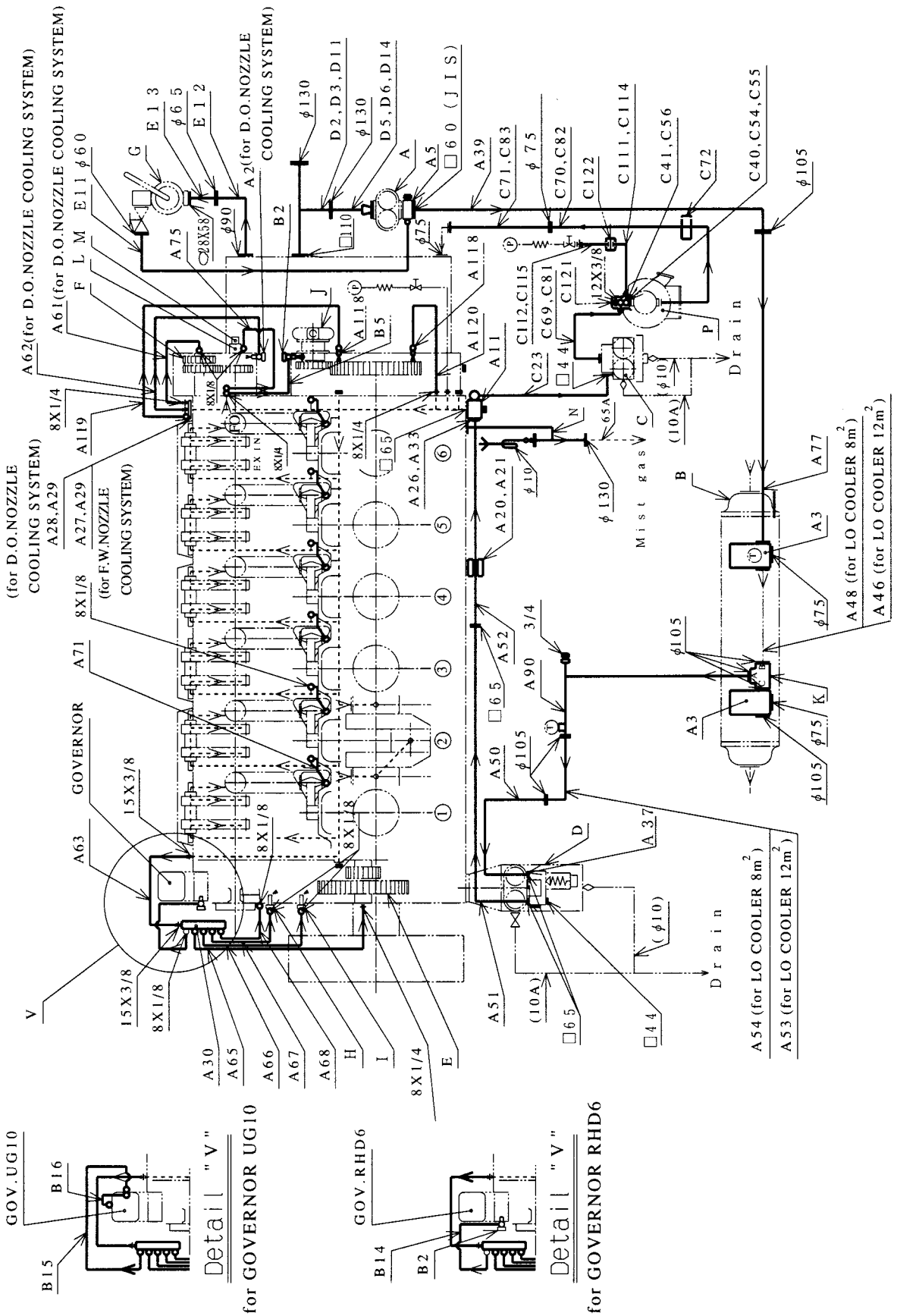
潤滑油配管(前端過給)－6DK
LUBRICATING OIL PIPING (FRONT T/C) – 6DK



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潤滑油配管(前端過給)－6DK
LUBRICATING OIL PIPING (FRONT T/C) – 6DK

潤滑油冷却器容量 CAPACITY of L.O. COOLER ①……8m² ②……12m²

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity ①	②	
A	Ref. 4-3.1	L.O. ポンプ	L.O. PUMP	1	1	
B	Ref. 4-3.3	L.O. クーラ	L.O. COOLER	1	1	
C	Ref. 4-3.6	T/C L.O. ロキ	T/C L.O. FILTER	1	1	
D	Ref. 4-3.4	L.O. ロキ	L.O. FILTER	1	1	
E	Ref. 3-6	アイドルギヤ	IDLE GEAR	1	1	
F	Ref. 3-7	オイルポンプアイドルギヤ	IDLE GEAR, OIL PUMP	1	1	
G		ウイングポンプ 3/4FC	WING PUMP 3/4FC	1	1	
H	Ref. 3-2.1	L.O. ノズル	L.O. NOZZLE	1	1	
I	Ref. 3-2.3	L.O. ノズル (2)	L.O. NOZZLE (2)	1	1	
J	Ref. 4-4.1	C.W. ポンプ	C.W. PUMP	1	1	
K		オンチョウベン	THERMOSTAT VALVE	1	1	
L	Ref. 4-1.2	キドウカイテンベン	S.A. ROTARY VALVE	1	1	
M	Ref. 4-1.2	カイテンケイクドウソウチ	TACHOMETER DRIVING DEVICE	1	1	
N		ミストヌキハイカン	MIST PIPE	1	1	
P	Ref. Sparate manual	ターボチャージャ	TURBOCHARGER	1	1	
A2	E208750020	ツギボルト	BANJO PLUG	1	1	※2
A3	E208750030	LO クーラセツシユ	BLOCK, L.O. COOLER	2	2	
A5	E208750050	ブロツク	BLOCK	1	1	
A11	E208750110	LO キユウユセツシユ (3)	L.O. BLOCK (3)	1	1	
A20	E208750200	カンバンド-3, カコウイリグチカン	PIPE CLIP-3, FRAME INLET PIPE	1	1	
A21	E208750210	カンバンド-4, カコウイリグチカン	PIPE CLIP-4, FRAME INLET PIPE	2	2	
A26	E208750260	フランジ (トク)	SPECIAL FLANGE	1	1	
A27	E208750270	LO シユカンメクラフランジ-8D	BRANK FLANGE, L.O. MAIN PIPE-8D	1	1	※1
A28	E208750280	LO シユカンメクラフランジ	BRANK FLANGE, L.O. MAIN PIPE	1	1	※2
A29	E208750290	LO シユカンメクラフランジガスケツト	GASKET, L.O. MAIN PIPE FLANGE	1	1	
A30	E208750300	LO チユウケイブロツク	L.O. CONNECTING BLOCK	1	1	
A33	E228700230	パツキン (トク)	SPECIAL PACKING	1	1	
A37	E268700111	トクシユボルト	SPECIAL BOLT	4	4	
A39	E208750390	LO カン, LOP デグチ-6D	L.O. PIPE, PUMP OUTLET-6D	1	1	
A46	E208750460	LO カン, バイパス－ (2)	L.O. PIPE, BY-PASS-(2)		1	
A48	E208750480	LO カン, バイパス－ (1)	L.O. PIPE, BY-PASS-(1)	1		
A50	E208750500	LO カン, ロキイリグチ-6D	L.O. PIPE, FILTER INLET-6D	1	1	
A51	E208750510	LO カン, ロキデグチ-6D	L.O. PIPE, FILTER OUTLET-6D	1	1	
A52	E208750520	LO カン, フレームイリグチ	L.O. PIPE, FRAME INLET	1	1	
A53	E208750530	LO カン, クーラデグチ (1)	L.O. PIPE, COOLER OUTLET (1)		1	
A54	E208750540	LO カン, クーラデグチ (2)	L.O. PIPE, COOLER OUTLET (2)	1		
A61	E208750610	LO カン, ポンプアイドルギヤ	L.O. PIPE, PUMP IDLE GEAR	1	1	※2
A62	E208750620	LO カン, ポンプギヤ	L.O. PIPE, PUMP GEAR	1	1	※2
A63	E208750630	LO カン, チユウケイブロツク	L.O. PIPE, CONNECTING BLOCK	1	1	
A65	E208750650	LO カン, アイドルギヤジク	L.O. PIPE, IDLE GEAR SHAFT	1	1	

注記 Remarks

※1……清水によるノズル冷却仕様　F.W. Nozzle cooling system
※2……A重油によるノズル冷却仕様　D.O. Nozzle cooling system

CHAPTER 2

ITEM 4.1 | 6·8DK-20

潤滑油配管(前端過給)－6DK
LUBRICATING OIL PIPING (FRONT T/C) – 6DK

潤滑油冷却器容量 CAPACITY of L.O. COOLER ①……8m² ②……12m²

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量Quantity ①	②
A66	E208750660	LO カン, タイミングギヤ (1)	L.O. PIPE, TIMING GEAR (1)	1	1
A67	E208750670	LO カン, タイミングギヤ (2)	L.O. PIPE, TIMING GEAR (2)	1	1
A68	E208750680	LO カン, カムジクウケ	L.O. PIPE, CAM SHAFT BEARING	1	1
A71	E208750710	LO カン, ヘツドイリグチ	L.O. PIPE, CYL. HEAD INLET	6	6
A75	E208750750	LO カン, カイテンベン-8D	L.O. PIPE, S.A. ROTARY VALVE-8D	1	1
A77	E208750770	LO カン, クーライリグチ-FT	L.O. PIPE, COOLER INLET-FT	1	1
A90	E208750900	LO カン, オンチヨウベンデグチ FT	L.O. PIPE, THERMO. VALVE OUTLET FT	1	1
A118	E208751180	ギヤチユウユノズル	NOZZLE, OILLING GEAR	2	2
A119	E208751190	LO カン, CW ポンプクドウギヤ	L.O. PIPE, C.W. PUMP DRIVING GEAR	1	1
A120	E208751200	LO カン, LO ポンプクドウギヤ	L.O. PIPE, L.O. PUMP DRIVING GEAR	1	1

調速機形式 GOVERNOR TYPE ①……UG10 ②……RHD6

				数量Quantity ①	②
B2	E208750020	ツギボルト	BANJO PLUG	1	2
B5	E208950050	LO カン, CW ポンプ	L.O. PIPE, C.W. PUMP	1	1
B14	E208950140	LO カン, ガバナ	L.O. PIPE, GOVERNOR		1
B15	E208950150	LO カン, ガバナ (UG8)	L.O. PIPE, GOVERNOR (UG8)	1	
B16	E208950160	LO カン, ガバナ (UG8)-2	L.O. PIPE, GOVERNOR (UG8)-2	1	

過給機形式 TURBOCHARGER TYPE ①……RH143,RH163 ②……RH183

				数量Quantity ①	②
C23	E209650230	LO カン, ロキイリグチ (NR15)	L.O. PIPE, FILTER INLET (NR15)	1	1
C40	E209650400	フランジ, LO イリグチ	FLANGE, L.O. INLET		1
C41	E209650410	ツギワ	BANJO		1
C54	E209650540	トクシュパッキン	SPECIAL GASKET	1	
C55	E209650550	LO イリグチフランジ	FLANGE, L.O. INLET	1	
C56	E209650560	ツギワ	BANJO	1	
C69	E209650690	LO カン, T/C イリグチ RH163-1	L.O. PIPE, T/C INLET RH163-1	1	
C70	E209650700	LO カン, T/C デグチ RH163-1	L.O. PIPE, T/C OUTLET RH163-1	1	
C71	E209650710	LO カン, T/C デグチ RH163-2	L.O. PIPE, T/C OUTLET RH163-2	1	
C72	E209650720	LO カンササエ, T/C デグチ	L.O. PIPE SUPPORT, T/C OUTLET	1	
C81	E209650810	LO カン, T/C イリグチ-8	L.O. PIPE, T/C INLET-8		1
C82	E209650820	LO カン, T/C デグチ-8	L.O. PIPE, T/C OUTLET-8		1
C83	E209650830	LO カン, T/C デグチ-9	L.O. PIPE, T/C OUTLET-9		1
C111	E209651110	アツリヨクケイカン, RH163-FT1	GAUGE PIPE, RH163-FT1	1	
C112	E209651120	アツリヨクケイカン, RH163-FT2	GAUGE PIPE, RH163-FT2	1	
C114	E209651140	アツリヨクケイカン, RH183-FT1	GAUGE PIPE, RH183-FT1		1
C115	E209651150	アツリヨクケイカン, RH183-FT2	GAUGE PIPE, RH183-FT2		1
C121	E209651210	T/C, LO ハイカンラギング (1)	LAGGING (1), T/C, L.O. PIPE	1	1
C122	E209651220	T/C, LO ハイカンラギング (2)	LAGGING (2), T/C, L.O. PIPE	1	1

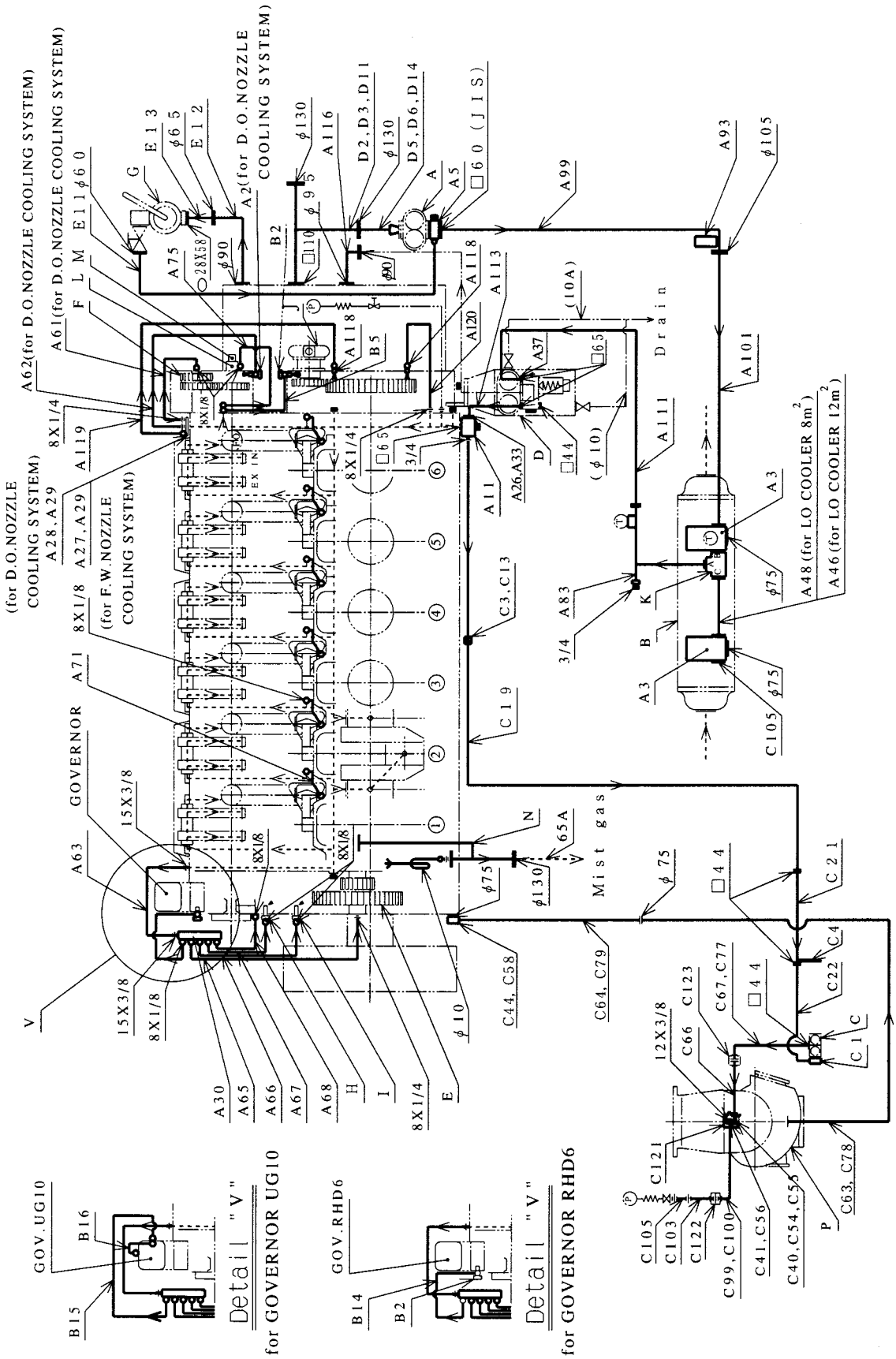
潤滑油配管(前端過給)－6DK
LUBRICATING OIL PIPING (FRONT T/C) – 6DK

①定速……正転 CONSTANT SPEED TYPE ……NORMAL ROTATION
②変速……正転 VARIABLE SPEED TYPE ……NORMAL ROTATION
②変速……逆転 VARIABLE SPEED TYPE ……REVERSE ROTATION

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity ①	②	③
D2	E209150020	LO カン, LOP サクションー1	L.O. PIPE, L.O.P. SUCTION-1		1	
D3	E209150030	LO カン, LOP サクションー1 (L)	L.O. PIPE, L.O.P. SUCTION-1 (L)			1
D5	E209150050	LO カン, LOP サクションー2	L.O. PIPE, L.O.P. SUCTION-2		1	
D6	E209150060	LO カン, LOP サクションー2 (L)	L.O. PIPE, L.O.P. SUCTION-2 (L)			1
D11	E209150110	LO カン, LOP サクションー1 (6DG)	L.O. PIPE, L.O.P. SUCTION-1 (6DG)	1		
D14	E209150140	LO カン, LOP サクションー2 (6DG)	L.O. PIPE, L.O.P. SUCTION-2 (6DG)	1		

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
E11	A584100110	LO カン, PR. Pデグチ	L.O. PIPE, PRIMING PUMP OUTLET	1
E12	A584100120	LO カン, PR. Pイリグチ-1-RT	L.O. PIPE, PRIMING PUMP INLET-1-RT	1
E13	A584100130	LO カン, PR. Pイリグチ-2-RT	L.O. PIPE, PRIMING PUMP INLET-2-RT	1

潤滑油配管 (後端過給) – 6DK
LUBRICATING OIL PIPING (REAR T/C) – 6DK



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潤滑油配管 (後端過給) – 6DK
LUBRICATING OIL PIPING (REAR T/C) – 6DK

潤滑油冷却器容量 CAPACITY of L.O. COOLER ①……8m² ②……12m²

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity ①	②	
A	Ref. 4-3.1	L.O. ポンプ	L.O. PUMP	1	1	
B	Ref. 4-3.3	L.O. クーラ	L.O. COOLER	1	1	
C	Ref. 4-3.6	T/C L.O. ロキ	T/C L.O. FILTER	1	1	
D	Ref. 4-3.4	L.O. ロキ	L.O. FILTER	1	1	
E	Ref. 3-6	アイドルギヤ	IDLE GEAR	1	1	
F	Ref. 3-7	オイルポンプアイドルギヤ	IDLE GEAR, OIL PUMP	1	1	
G		ウイングポンプ 3/4FC	WING PUMP 3/4FC	1	1	
H	Ref. 3-2.1	L.O. ノズル	L.O. NOZZLE	1	1	
I	Ref. 3-2.3	L.O. ノズル (2)	L.O. NOZZLE (2)	1	1	
J	Ref. 4-4.1	C.W. ポンプ	C.W. PUMP	1	1	
K		オンチョウベン	THERMOSTAT VALVE	1	1	
L	Ref. 4-1.2	キドウカイテンベン	S.A. ROTARY VALVE	1	1	
M	Ref. 4-1.2	カイテンケイクドウソウチ	TACHOMETER DRIVING DEVICE	1	1	
N		ミストヌキハイカン	MIST PIPE	1	1	
P	Ref. Sparate manual	ターボチャージャ	TURBOCHARGER	1	1	
A2	E208750020	ツギボルト	BANJO PLUG	1	1	※2
A3	E208750030	LO クーラセツシユ	BLOCK, L.O. COOLER	2	2	
A5	E208750050	ブロツク	BLOCK	1	1	
A11	E208750110	LO キユウユセツシユ (3)	L.O. BLOCK (3)	1	1	
A26	E208750260	フランジ (トク)	SPECIAL FLANGE	1	1	
A27	E208750270	LO シユカンメクラフランジ-8D	BRANK FLANGE, L.O. MAIN PIPE-8D	1	1	※1
A28	E208750280	LO シユカンメクラフランジ	BRANK FLANGE, L.O. MAIN PIPE	1	1	※2
A29	E208750290	LO シユカンメクラフランジガスケツト	GASKET, L.O. MAIN PIPE FLANGE	1	1	
A30	E208750300	LO チユウケイブロツク	L.O. CONNECTING BLOCK	1	1	
A33	E228700230	パツキン (トク)	SPECIAL PACKING	1	1	
A37	E268700111	トクシユボルト	SPECIAL BOLT	4	4	
A46	E208750460	LO カン, バイパス– (2)	L.O. PIPE, BY-PASS-(2)		1	
A48	E208750480	LO カン, バイパス– (1)	L.O. PIPE, BY-PASS-(1)	1		
A61	E208750610	LO カン, ポンプアイドルギヤ	L.O. PIPE, PUMP IDLE GEAR	1	1	※2
A62	E208750620	LO カン, ポンプギヤ	L.O. PIPE, PUMP GEAR	1	1	※2
A63	E208750630	LO カン, チユウケイブロツク	L.O. PIPE, CONNECTING BLOCK	1	1	
A65	E208750650	LO カン, アイドルギヤジク	L.O. PIPE, IDLE GEAR SHAFT	1	1	
A66	E208750660	LO カン, タイミングギヤ (1)	L.O. PIPE, TIMING GEAR (1)	1	1	
A67	E208750670	LO カン, タイミングギヤ (2)	L.O. PIPE, TIMING GEAR (2)	1	1	
A68	E208750680	LO カン, カムジクウケ	L.O. PIPE, CAM SHAFT BEARING	1	1	
A71	E208750710	LO カン, ヘツドイリグチ	L.O. PIPE, CYL. HEAD INLET	6	6	
A75	E208750750	LO カン, カイテンベン-8D	L.O. PIPE, S.A. ROTARY VALVE-8D	1	1	
A83	E208750830	LO カン, オンチヨウベンデグチ- RT	L.O. PIPE, THERMO. VALVE OUTLET-RT	1	1	
A93	E208750930	カンササエ-1, LOP デグチ-RT	PIPE SUPPOTER-1, L.O.P. OUT PIPE-RT	1	1	
A99	E208750990	LO カン, LOP デグチ-1-RT	PIPE, L.O.P. OUTLET-1-RT	1	1	

注記 Remarks

※1……清水によるノズル冷却仕様　F.W. Nozzle cooling system
※2……A重油によるノズル冷却仕様　D.O. Nozzle cooling system

CHAPTER 2

ITEM 4.2 | 6·8DK-20

潤滑油配管 (後端過給) – 6DK
LUBRICATING OIL PIPING (REAR T/C) – 6DK

潤滑油冷却器容量 ①……8m² ②……12m²
CAPACITY of L.O. COOLER

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量Quantity ①	②
A101	E208751010	LO カン, クーライリグチ-RT	L.O. PIPE, COOLER INLET-RT	1	1
A111	E208751110	LO カン, ロキイリグチ (RT)	L.O. PIPE, FILTER INLET (RT)	1	1
A113	E208751130	LO カン, フレームイリグチ-RT	L.O. PIPE, FRAME INLET-RT	1	1
A116	E208751160	LO カン, チョウアツベンリーク-2RT	L.O. PIPE, RELIEF V. RETURN-2-RT	1	1
A118	E208751180	ギヤチユウユノズル	NOZZLE, OILLING GEAR	2	2
A119	E208751190	LO カン, CW ポンプクドウギヤ	L.O. PIPE, C.W. PUMP DRIVING GEAR	1	1
A120	E208751200	LO カン, LOポンプクドウギヤ	L.O. PIPE, L.O. PUMP DRIVING GEAR	1	1

調速機形式 ①……UG10 ②……RHD6
GOVERNOR TYPE

				数量Quantity ①	②
B2	E208750020	ツギボルト	BANJO PLUG	1	2
B5	E208950050	LO カン, C.W. ポンプ	L.O. PIPE, C.W. PUMP	1	1
B14	E208950140	LO カン, ガバナ	L.O. PIPE, GOVERNOR		1
B15	E208950150	LO カン, ガバナ (UG8)	L.O. PIPE, GOVERNOR (UG8)	1	
B16	E208950160	LO カン, ガバナ (UG8)-2	L.O. PIPE, GOVERNOR (UG8)-2	1	

過給機形式 ①……RH143,RH163 ②……RH183
TURBOCHARGER TYPE

				数量Quantity ①	②
C1	A245073210	キユウユセツシユ (3)	BLOCK, OIL JOINT (3)	1	1
C3	E209650030	カンバンド-2, T/C ロキイリグチ	PIPE CLIP-2, T/C FILTER INLET	1	1
C4	E209650040	LO カンブラケツト-TC	L.O. PIPE BRACKET-T/C	1	1
C13	E208750200	カンバンド-3, カコウイリグチカン	PIPE CLIP-3, FRAME INLET PIPE	1	1
C19	E209650190	LO カン, ロキイリグチ-1 (RT) 5D	L.O. PIPE, FILTER INLET-1 (RT) 5D	1	1
C21	E209650210	LO カン, ロキイリグチ-2 (RT)	L.O. PIPE, FILTER INLET-2 (RT)	1	1
C22	E209650220	LO カン, ロキイリグチ-3 (RT)	L.O. PIPE, FILTER INLET-3 (RT)	1	1
C40	E209650400	フランジ, L.O. イリグチ	L.O. INLET FLANGE		1
C41	E209650410	ツギワ	BANJO		1
C44	E209650440	フランジブロック	FLANGE BLOCK		1
C54	E209650540	トクシュパッキン	SPECIAL GASKET	1	
C55	E209650550	LO イリグチフランジ	L.O. INLET FLANGE	1	
C56	E209650560	ツギワ	BANJO	1	
C58	E209650580	フランジブロツク	FLANGE BLOCK	1	
C63	E209650630	LO カン, T/C デグチ-6	L.O. PIPE, T/C OUTLET-6		1
C64	E209650640	LO カン, T/C デグチ-7	L.O. PIPE, T/C OUTLET-7		1
C66	E209650660	LO カン, T/C イリグチ-6	L.O. PIPE, T/C INLET-6		1
C67	E209650670	LO カン, T/C イリグチ-7	L.O. PIPE, T/C INLET-7		1
C77	E209650770	LO カン, T/C イリグチ RH163-2	L.O. PIPE, T/C INLET RH163-2	1	
C78	E209650780	LO カン, T/C デグチ RH163-3	L.O. PIPE, T/C OUTLET RH163-3	1	
C79	E209650790	LO カン, T/C デグチ RH163-4	L.O. PIPE, T/C OUTLET RH163-4	1	
C99	E209650990	アツリヨクケイカン, RH163-RT	GAUGE PIPE, RH163-RT	1	
C100	E209651000	アツリヨクケイカン, RH183-RT	GAUGE PIPE, RH183-RT		1
C103	E209651030	アツリヨクケイカン, T/C-RT-6D	GAUGE PIPE, T/C-RT-6D	1	1
C105	E209651050	アツリヨクケイカン, T/C-RT	GAUGE PIPE, T/C-RT	1	1

潤滑油配管 (後端過給)－6DK
LUBRICATING OIL PIPING (REAR T/C) – 6DK

過給機形式 TURBOCHARGER TYPE ①……RH143,RH163 ②……RH183

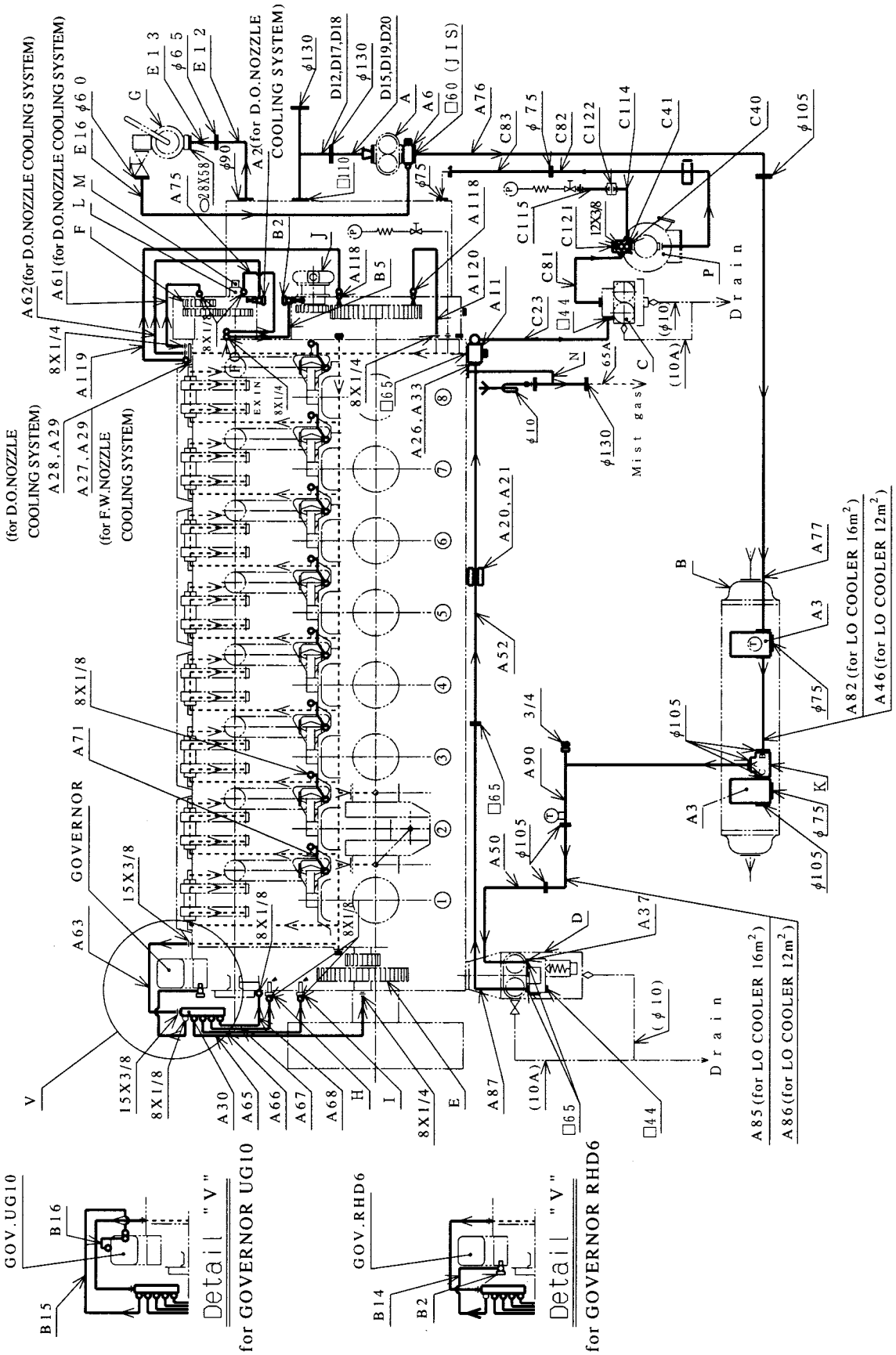
番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity ①	②
C121	E209651210	T/C, LO ハイカンラギング (1)	LAGGING (1), T/C, L.O. PIPE	1	1
C122	E209651220	T/C, LO ハイカンラギング (2)	LAGGING (2), T/C, L.O. PIPE	1	1
C123	E209651230	T/C, LO ハイカンラギング (3)	LAGGING (3), T/C, L.O. PIPE		1

①定速……正転 CONSTANT SPEED TYPE ……NORMAL ROTATION
②変速……正転 VARIABLE SPEED TYPE ……NORMAL ROTATION
②変速……逆転 VARIABLE SPEED TYPE ……REVERSE ROTATION

				数量 Quantity ①	②	③
D2	E209150020	LO カン, LOP サクシヨン-1	L.O. PIPE, L.O.P. SUCTION-1		1	
D3	E209150030	LO カン, LOP サクシヨン-1 (L)	L.O. PIPE, L.O.P. SUCTION-1 (L)			1
D5	E209150050	LO カン, LOP サクシヨン-2	L.O. PIPE, L.O.P. SUCTION-2		1	
D6	E209150060	LO カン, LOP サクシヨン-2 (L)	L.O. PIPE, L.O.P. SUCTION-2 (L)			1
D11	E209150110	LO カン, LOP サクシヨン-1 (6DG)	L.O. PIPE, L.O.P. SUCTION-1 (6DG)	1		
D14	E209150140	LO カン, LOP サクシヨン-2 (6DG)	L.O. PIPE, L.O.P. SUCTION-2 (6DG)	1		

				数量 Quantity
E11	A584100110	LO カン, PR. Pデグチ	L.O. PIPE, PRIMING PUMP OUTLET	1
E12	A584100120	LO カン, PR. Pイリグチ-1-RT	L.O. PIPE, PRIMING PUMP INLET-1-RT	1
E13	A584100130	LO カン, PR. Pイリグチ-2-RT	L.O. PIPE, PRIMING PUMP INLET-2-RT	1

潤滑油配管 (前端過給) – 8DK
LUBRICATING OIL PIPING (FRONT T/C) – 8DK



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潤滑油配管 (前端過給) – 8DK
LUBRICATING OIL PIPING (FRONT T/C) – 8DK

潤滑油冷却器容量 CAPACITY of L.O. COOLER ①……12m² ②……16m²

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity ①	②	
A	Ref. 4-3.1	L.O. ポンプ	L.O. PUMP	1	1	
B	Ref. 4-3.3	L.O. クーラ	L.O. COOLER	1	1	
C	Ref. 4-3.6	T/C L.O. ロキ	T/C L.O. FILTER	1	1	
D	Ref. 4-3.4	L.O. ロキ	L.O. FILTER	1	1	
E	Ref. 3-6	アイドルギヤ	IDLE GEAR	1	1	
F	Ref. 3-7	オイルポンプアイドルギヤ	IDLE GEAR, OIL PUMP	1	1	
G		ウイングポンプ 3/4FC	WING PUMP 3/4FC	1	1	
H	Ref. 3-2.1	L.O. ノズル	L.O. NOZZLE	1	1	
I	Ref. 3-2.3	L.O. ノズル (2)	L.O. NOZZLE (2)	1	1	
J	Ref. 4-4.1	C.W. ポンプ	C.W. PUMP	1	1	
K		オンチョウベン	THERMOSTAT VALVE	1	1	
L	Ref. 4-1.2	キドウカイテンベン	S.A. ROTARY VALVE	1	1	
M	Ref. 4-1.2	カイテンケイクドウソウチ	TACHOMETER DRIVING DEVICE	1	1	
N		ミストヌキハイカン	MIST PIPE	1	1	
P	Ref. Sparate manual	ターボチャージャ	TURBOCHARGER	1	1	
A2	E208750020	ツギボルト	BANJO PLUG	1	1	※2
A3	E208750030	LO クーラセツシユ	BLOCK, L.O. COOLER	2	2	
A6	E208750060	ブロツク	BLOCK	1	1	
A11	E208750110	LO キユウユセツシユ (3)	L.O. BLOCK (3)	1	1	
A20	E208750200	カンバンド-3, カコウイリグチカン	PIPE CLIP-3, FRAME INLET PIPE	1	1	
A21	E208750210	カンバンド-4, カコウイリグチカン	PIPE CLIP-4, FRAME INLET PIPE	2	2	
A26	E208750260	フランジ (トク)	SPECIAL FLANGE	1	1	
A27	E208750270	LO シユカンメクラフランジ-8D	BRANK FLANGE, L.O. MAIN PIPE-8D	1	1	※1
A28	E208750280	LO シユカンメクラフランジ	BRANK FLANGE, L.O. MAIN PIPE	1	1	※2
A29	E208750290	LO シユカンメクラフランジガスケツト	GASKET, L.O. MAIN PIPE FLANGE	1	1	
A30	E208750300	LO チユウケイブロツク	L.O. CONNECTING BLOCK	1	1	
A33	E228700230	パツキン (トク)	SPECIAL PACKING	1	1	
A37	E268700111	トクシユボルト	SPECIAL BOLT	4	4	
A46	E208750460	LO カン, バイパス– (2)	L.O. PIPE, BY-PASS-(2)	1		
A50	E208750500	LO カン, ロキイリグチ-6D	L.O. PIPE, FILTER INLET-6D	1	1	
A52	E208750520	LO カン, フレームイリグチ	L.O. PIPE, FRAME INLET	1	1	
A61	E208750610	LO カン, ポンプアイドルギヤ	L.O. PIPE, PUMP IDLE GEAR	1	1	※2
A62	E208750620	LO カン, ポンプギヤ	L.O. PIPE, PUMP GEAR	1	1	※2
A63	E208750630	LO カン, チユウケイブロツク	L.O. PIPE, CONNECTING BLOCK	1	1	
A65	E208750650	LO カン, アイドルギヤジク	L.O. PIPE, IDLE GEAR SHAFT	1	1	
A66	E208750660	LO カン, タイミングギヤ (1)	L.O. PIPE, TIMING GEAR (1)	1	1	
A67	E208750670	LO カン, タイミングギヤ (2)	L.O. PIPE, TIMING GEAR (2)	1	1	
A68	E208750680	LO カン, カムジクウケ	L.O. PIPE, CAM SHAFT BEARING	1	1	
A71	E208750710	LO カン, ヘツドイリグチ	L.O. PIPE, CYL. HEAD INLET	8	8	
A75	E208750750	LO カン, カイテンベン-8D	L.O. PIPE, S.A. ROTARY VALVE-8D	1	1	

注記 Remarks

※1……清水によるノズル冷却仕様　F.W. Nozzle cooling system
※2……A重油によるノズル冷却仕様　D.O. Nozzle cooling system

潤滑油配管 (前端過給) – 8DK
LUBRICATING OIL PIPING (FRONT T/C) – 8DK

潤滑油冷却器容量 ①……12m² ②……16m²
CAPACITY of L.O. COOLER

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量Quantity ①	②
A76	E208750760	LO カン, ポンプデグチ-8D	L.O. PIPE, PUMP OUTLET-8D	1	1
A77	E208750770	LO カン, クーライリグチ-FT	L.O. PIPE, COOLER INLET-FT	1	1
A82	E208750820	LO カン, バイパス-(3)	L.O. PIPE, BY-PASS-(3)		1
A85	E208750850	LO カン, クーラデグチ-(3)	L.O. PIPE, COOLER OUTLETL (3)		1
A86	E208750860	LO カン, クーラデグチ-(1) 8D	L.O. PIPE, COOLER OUTLETL (1) 8D	1	
A87	E208750870	LO カン, ロキデグチ- 8D	L.O. PIPE, FILTER OUTLET-8D	1	1
A90	E208750900	LO カン, オンチョウベンデグチ-FT	L.O. PIPE, THERMO. VALVE OUTLET-FT	1	1
A118	E208751180	ギヤチユウユノズル	NOZZLE, OILLING GEAR	2	2
A119	E208751190	LO カン, CW ポンプクドウギヤ	L.O. PIPE, C.W. PUMP DRIVING GEAR	1	1
A120	E208751200	LO カン, LO ポンプクドウギヤ	L.O. PIPE, L.O. PUMP DRIVING GEAR	1	1

調速機形式 ①……UG10 ②……RHD6
GOVERNOR TYPE

				数量Quantity ①	②
B2	E208750020	ツギボルト	BANJO PLUG	1	2
B5	E208950050	LO カン, CW ポンプ	L.O. PIPE, C.W. PUMP	1	1
B14	E208950140	LO カン, ガバナ	L.O. PIPE, GOVERNOR		1
B15	E208950150	LO カン, ガバナ (UG8)	L.O. PIPE, GOVERNOR (UG8)	1	
B16	E208950160	LO カン, ガバナ (UG8)-2	L.O. PIPE, GOVERNOR (UG8)-2	1	

				数量 Quantity
C23	E209650230	LO カン, ロキイリグチ (NR15)	L.O. PIPE, FILTER INLET (NR15)	1
C40	E209650400	フランジ, LO イリグチ	FLANGE, L.O. INLET	1
C41	E209650410	ツギワ	BANJO	1
C81	E209650810	LO カン, T/C イリグチ-8	L.O. PIPE, T/C INLET-8	1
C82	E209650820	LO カン, T/C デグチ-8	L.O. PIPE, T/C OUTLET-8	1
C83	E209650830	LO カン, T/C デグチ-9	L.O. PIPE, T/C OUTLET-9	1
C114	E209651140	アツリヨクケイカン, RH183-FT1	GAUGE PIPE, RH183-FT1	1
C115	E209651150	アツリヨクケイカン, RH183-FT2	GAUGE PIPE, RH183-FT2	1
C121	E209651210	T/C, LO ハイカンラギング (1)	LAGGING (1), T/C, L.O. PIPE	1
C122	E209651220	T/C, LO ハイカンラギング (2)	LAGGING (2), T/C, L.O. PIPE	1

①定速……正転
CONSTANT SPEED TYPE
……NORMAL ROTATION

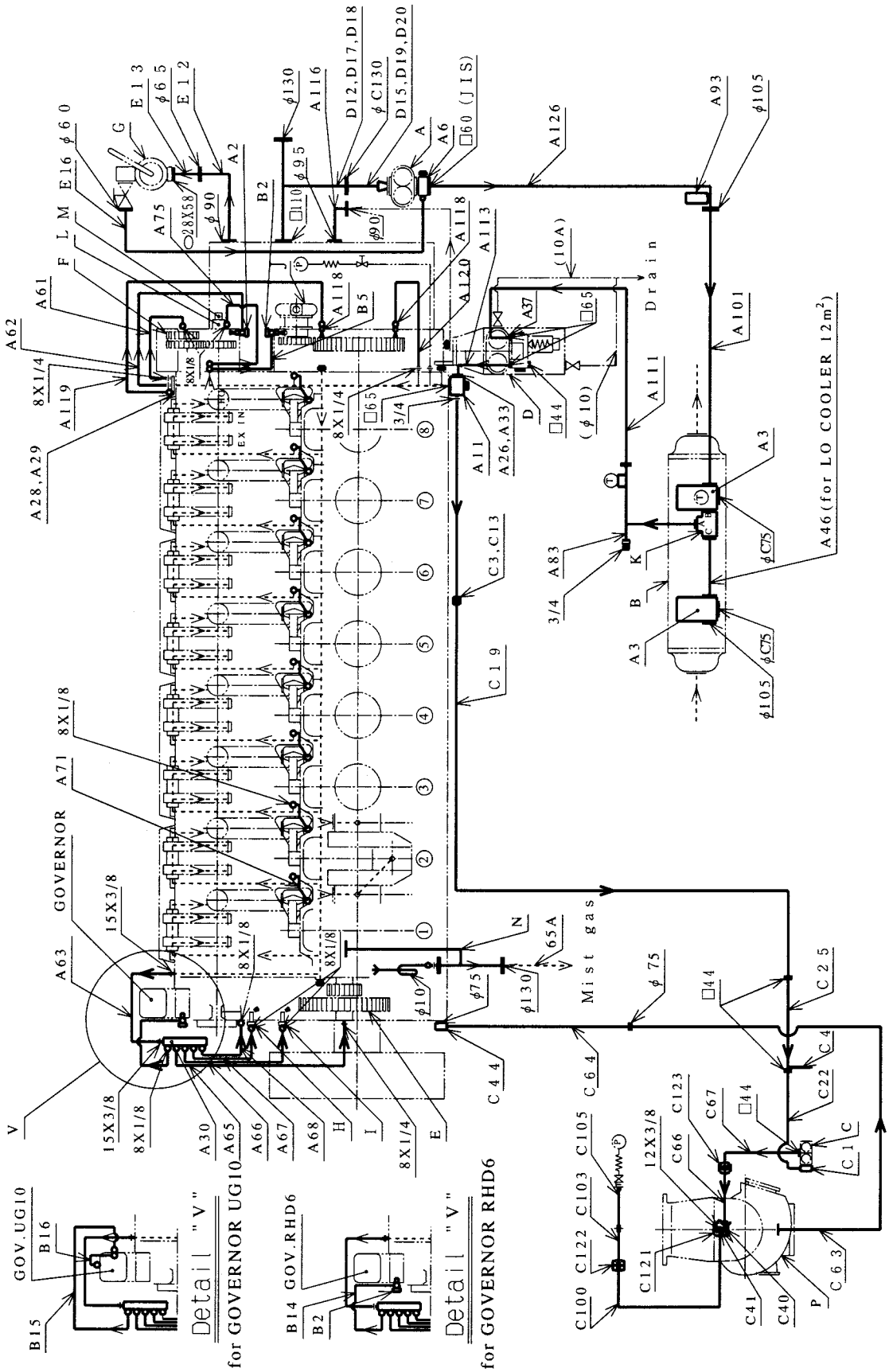
②変速……正転
VARIABLE SPEED TYPE
……NORMAL ROTATION

②変速……逆転
VARIABLE SPEED TYPE
……REVERSE ROTATION

				数量Quantity ①	②	③
D12	E209150120	LO カン, LOP サクシヨン-1 (8DG)	L.O. PIPE, L.O.P. SUCTION-1 (8DG)	1		
D15	E209150150	LO カン, LOP サクシヨン-2 (8DG)	L.O. PIPE, L.O.P. SUCTION-2 (8DG)	1		
D17	E209150170	LO カン, LOP サクシヨン-3	L.O. PIPE, L.O.P. SUCTION-3		1	
D18	E209150180	LO カン, LOP サクシヨン-3 (L)	L.O. PIPE, L.O.P. SUCTION-3 (L)			1
D19	E209150190	LO カン, LOP サクシヨン-4	L.O. PIPE, L.O.P. SUCTION-4		1	
D20	E209150200	LO カン, LOP サクシヨン-4 (L)	L.O. PIPE, L.O.P. SUCTION-4 (L)			1

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
E12	A584100120	LO カン, PR. Pイリグチ-1-RT	L.O. PIPE, PRIMING PUMP INLET-1-RT	1
E13	A584100130	LO カン, PR. Pイリグチ-2-RT	L.O. PIPE, PRIMING PUMP INLET-2-RT	1
E16	A584100160	LO カン, PR. Pデグチ-8D	L.O. PIPE, PRIMING PUMP OUTLET-8D	1

潤滑油配管 (後端過給) – 8DK
LUBRICATING OIL PIPING (REAR T/C) – 8DK



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潤滑油配管 (後端過給) – 8DK
LUBRICATING OIL PIPING (REAR T/C) – 8DK

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
A	Ref. 4-3.1	L.O. ポンプ	L.O. PUMP	1
B	Ref. 4-3.3	L.O. クーラ	L.O. COOLER	1
C	Ref. 4-3.6	T/C L.O. ロキ	T/C L.O. FILTER	1
D	Ref. 4-3.4	L.O. ロキ	L.O. FILTER	1
E	Ref. 3-6	アイドルギヤ	IDLE GEAR	1
F	Ref. 3-7	オイルポンプアイドルギヤ	IDLE GEAR, OIL PUMP	1
G		ウイングポンプ 3/4FC	WING PUMP 3/4FC	1
H	Ref. 3-2.1	L.O. ノズル	L.O. NOZZLE	1
I	Ref. 3-2.3	L.O. ノズル (2)	L.O. NOZZLE (2)	1
J	Ref. 4-4.1	C.W. ポンプ	C.W. PUMP	1
K		オンチョウベン	THERMOSTAT VALVE	1
L	Ref. 4-1.2	キドウカイテンベン	S.A. ROTARY VALVE	1
M	Ref. 4-1.2	カイテンケイクドウソウチ	TACHOMETER DRIVING DEVICE	1
N		ミストヌキハイカン	MIST PIPE	1
P	Ref. Sparate manual	ターボチャージャ	TURBOCHARGER	1
A2	E208750020	ツギボルト	BANJO PLUG	1
A3	E208750030	L.O. クーラセツシユ	BLOCK, L.O. COOLER	2
A6	E208750060	ブロツク	BLOCK	1
A11	E208750110	L.O. キユウユセツシユ (3)	L.O. BLOCK (3)	1
A26	E208750260	フランジ (トク)	SPECIAL FLANGE	1
A28	E208750280	L.O. シユカンメクラフランジ	BRANK FLANGE, L.O. MAIN PIPE	1
A29	E208750290	L.O. シユカンメクラフランジガスケツト	GASKET, L.O. MAIN PIPE FLANGE	1
A30	E208750300	L.O. チユウケイブロツク	L.O. CONNECTING BLOCK	1
A33	E228700230	パツキン (トク)	SPECIAL PACKING	1
A37	E268700111	トクシユボルト	SPECIAL BOLT	4
A46	E208750460	L.O. カン, バイパス-(2)	L.O. PIPE, BY-PASS-(2)	1
A61	E208750610	L.O. カン, ポンプアイドルギヤ	L.O. PIPE, PUMP IDLE GEAR	1
A62	E208750620	L.O. カン, ポンプギヤ	L.O. PIPE, PUMP GEAR	1
A63	E208750630	L.O. カン, チユウケイブロツク	L.O. PIPE, CONNECTING BLOCK	1
A65	E208750650	L.O. カン, アイドルギヤジク	L.O. PIPE, IDLE GEAR SHAFT	1
A66	E208750660	L.O. カン, タイミングギヤ (1)	L.O. PIPE, TIMING GEAR (1)	1
A67	E208750670	L.O. カン, タイミングギヤ (2)	L.O. PIPE, TIMING GEAR (2)	1
A68	E208750680	L.O. カン, カムジクウケ	L.O. PIPE, CAM SHAFT BEARING	1
A71	E208750710	L.O. カン, ヘツドイリグチ	L.O. PIPE, CYL. HEAD INLET	8
A75	E208750750	L.O. カン, カイテンベン-8D	L.O. PIPE, S.A. ROTARY VALVE-8D	1
A83	E208750830	L.O. カン, オンチヨウベンデグチ- RT	L.O. PIPE, THERMO. VALVE OUTLET-RT	1
A93	E208750930	カンササエ-1, LOP デグチ-RT	PIPE SUPPOTER-1, L.O.P. OUT PIPE-RT	1
A101	E208751010	L.O. カン, クーライリグチ-RT	L.O. PIPE, COOLER INLET-RT	1
A111	E208751110	L.O. カン, ロキイリグチ (RT)	L.O. PIPE, FILTER INLET (RT)	1
A113	E208751130	L.O. カン, フレームイリグチ-RT	L.O. PIPE, FRAME INLET-RT	1
A116	E208751160	L.O. カン, チョウアツベンリーク-2-RT	L.O. PIPE, RELIEF V. RETURN-2-RT	1
A118	E208751180	ギヤチユウユノズル	NOZZLE, OILLING GEAR	2
A119	E208751190	L.O. カン, CW ポンプクドウギヤ	L.O. PIPE, C.W. PUMP DRIVING GEAR	1
A120	E208751200	L.O. カン, LO ポンプクドウギヤ	L.O. PIPE, L.O. PUMP DRIVING GEAR	1
A126	E208751260	L.O. カン, LOP デグチ-8RT	L.O. PIPE, L.O. PUMP OUTLET-8RT	1

潤滑油配管 (後端過給) – 8DK
LUBRICATING OIL PIPING (REAR T/C) – 8DK

調速機形式 GOVERNOR TYPE ①……UG10 ②……RHD6

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity ①	②
B2	E208750020	ツギボルト	BANJO PLUG	1	2
B5	E208950050	LO カン, C.W. ポンプ	L.O. PIPE, C.W. PUMP	1	1
B14	E208950140	LO カン, ガバナ	L.O. PIPE, GOVERNOR		1
B15	E208950150	LO カン, ガバナ (UG8)	L.O. PIPE, GOVERNOR (UG8)	1	
B16	E208950160	LO カン, ガバナ (UG8)-2	L.O. PIPE, GOVERNOR (UG8)-2	1	

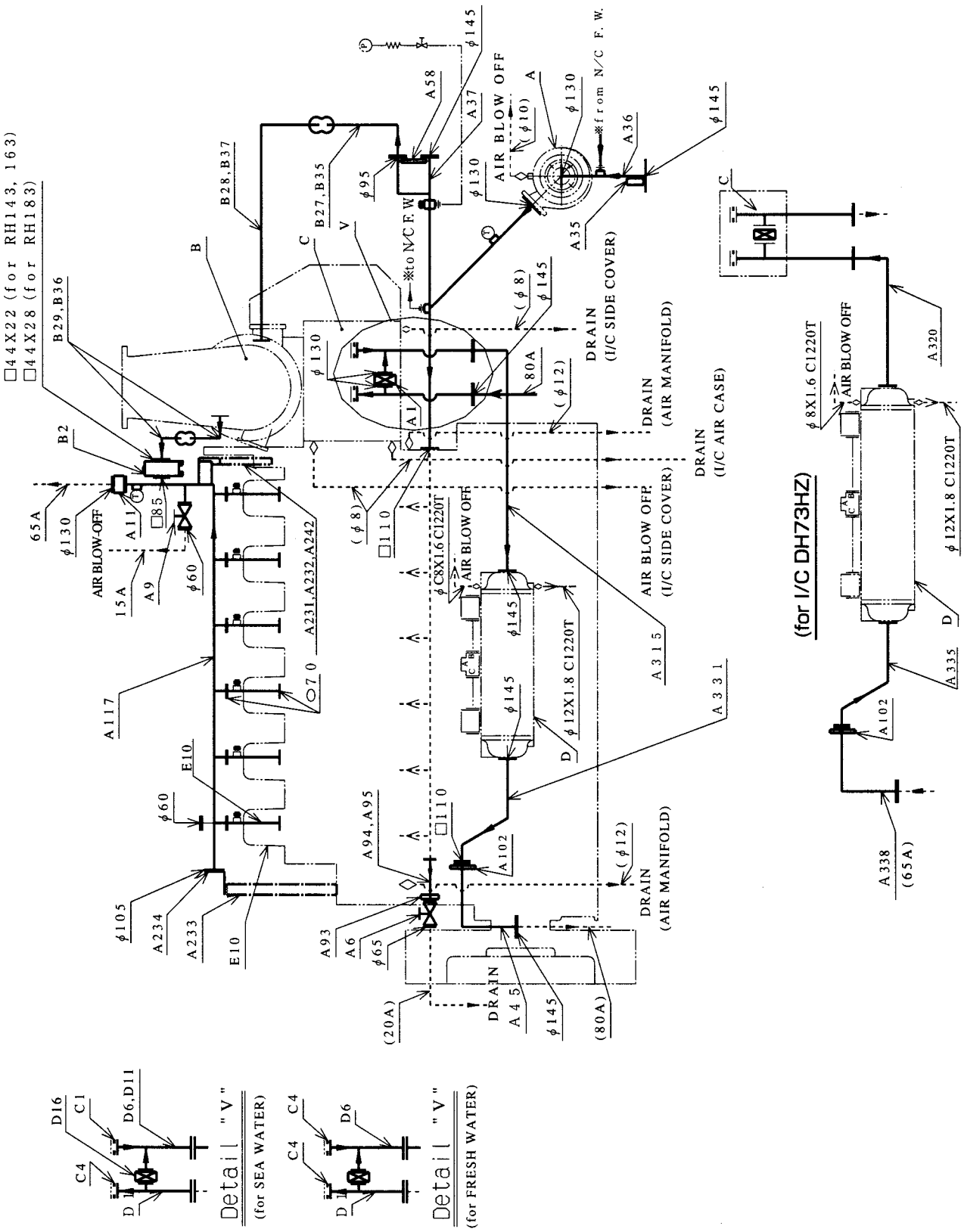
				数量 Quantity
C1	A245073210	キユウセユツシユ (3)	BLOCK, OIL JOINT (3)	1
C3	E209650030	カンバンド-2, T/C ロキイリグチ	PIPE CLIP-2, T/C FILTER INLET	1
C4	E209650040	LO カンブラケツト-TC	L.O. PIPE BRACKET-T/C	1
C13	E208750200	カンバンド-3, カコウイリグチカン	PIPE CLIP-3, FRAME INLET PIPE	1
C19	E209650190	LO カン, ロキイリグチ-1 (RT) 5D	L.O. PIPE, FILTER INLET-1 (RT) 5D	1
C22	E209650220	LO カン, ロキイリグチ-3 (RT)	L.O. PIPE, FILTER INLET-3 (RT)	1
C25	E209650250	LO カン, ロキイリグチ-(8RT)	L.O. PIPE, FILTER INLET-(8RT)	1
C40	E209650400	フランジ, L.O. イリグチ	L.O. INLET FLANGE	1
C41	E209650410	ツギワ	BANJO	1
C44	E209650440	フランジブロック	FLANGE BLOCK	1
C63	E209650630	LO カン, T/C デグチ-6	L.O. PIPE, T/C OUTLET-6	1
C64	E209650640	LO カン, T/C デグチ-7	L.O. PIPE, T/C OUTLET-7	1
C66	E209650660	LO カン, T/C イリグチ-6	L.O. PIPE, T/C INLET-6	1
C67	E209650667	LO カン, T/C イリグチ-7	L.O. PIPE, T/C INLET-7	1
C100	E209651000	アツリヨクケイカン, RH183-RT	GAUGE PIPE, RH183-RT	1
C103	E209651030	アツリヨクケイカン, T/C-RT-6D	GAUGE PIPE, T/C-RT-6D	1
C105	E209651050	アツリヨクケイカン, T/C-RT	GAUGE PIPE, T/C-RT	1
C121	E209651210	T/C, LO ハイカンラギング (1)	LAGGING (1), T/C, L.O. PIPE	1
C122	E209651220	T/C, LO ハイカンラギング (2)	LAGGING (2), T/C, L.O. PIPE	1
C123	E209651230	T/C, LO ハイカンラギング (3)	LAGGING (3), T/C, L.O. PIPE	1

①定速……正転 CONSTANT SPEED TYPE ……NORMAL ROTATION
②変速……正転 VARIABLE SPEED TYPE ……NORMAL ROTATION
②変速……逆転 VARIABLE SPEED TYPE ……REVERSE ROTATION

				数量 Quantity ①	②	③
D12	E209150120	LO カン, LOP サクシヨン-1 (8DG)	L.O. PIPE, L.O.P. SUCTION-1 (8DG)	1		
D15	E209150150	LO カン, LOP サクシヨン-2 (8DG)	L.O. PIPE, L.O.P. SUCTION-2 (8DG)	1		
D17	E209150170	LO カン, LOP サクシヨン-3	L.O. PIPE, L.O.P. SUCTION-3		1	
D18	E209150180	LO カン, LOP サクシヨン-3 (L)	L.O. PIPE, L.O.P. SUCTION-3 (L)			1
D19	E209150190	LO カン, LOP サクシヨン-4	L.O. PIPE, L.O.P. SUCTION-4		1	
D20	E209150200	LO カン, LOP サクシヨン-4 (L)	L.O. PIPE, L.O.P. SUCTION-4 (L)			1

				数量 Quantity
E12	A584100120	LO カン, PRP イリグチ-1-RT	L.O. PIPE, PRIMING PUMP INLET-1-RT	1
E13	A584100130	LO カン, PRP イリグチ-2-RT	L.O. PIPE, PRIMING PUMP INLET-2-RT	1
E16	A584100160	LO カン, PRP デグチ-8D	L.O. PIPE, PRIMING PUMP OUTLET-8D	1

冷却水配管(前端過給)－6DK
COOLING WATER PIPING (FRONT T/C)－6DK



冷却水配管(前端過給)－6DK
COOLING WATER PIPING (FRONT T/C)－6DK

過給機形式 TURBOCHAGER TYPE ①……RH143,RH163 ②……RH183

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity ①	②	
A	Ref. 4-4.1	C.W. ポンプ	C.W. PUMP	1	1	
B	Ref. Separate manual	ターボチャージャ	TURBOCHARGER	1	1	
C	Ref. 3-32	インタークーラ	INTER COOLER	1	1	
D	Ref. 4-3.3	L.O. クーラ	L.O. COOLER	1	1	
A1	C062000190	バタフライベン	BUTTERFLY VALVE	1	1	
A6	Y011110204	タマガタベン	FLANGED GLOBE VALVE	1	1	
A9	Y011110154	タマガタベン	FLANGED GLOBE VALVE	1	1	
A11	E208851150	ブロツク-2, CW カン	BLOCK (2), C.W. PIPE	1	1	
A35	E208851210	ササエ, CW ポンプイリグチカン	SUPPORT, C.W. PUMP INLET PIPE	1	1	
A36	E208851010	CW カン, ポンプイリグチ	C.W. PIPE, C.W. PUMP INLET	1	1	
A37	E208851020	CW カン, フレームイリグチ-FT	C.W. PIPE, FRAME INLET-FT	1	1	
A45	※ E20885	CW カン, LO/C デグチ FT	C.W. PIPE, L.O./C OUTLET FT	1	1	
A58	E208851220	ササエ, CW フレームイリグチカン-FT	SUPPORT, C.W. PIPE FRAME INLET-FT	1	1	
A93	E208851230	ササエ, CW ドレンシユカン-FT	SUPPORT, C.W. DRAIN PIPE-FT	1	1	
A94	E208851040	CW カン, シユカンドレン	C.W. PIPE, MAIN PIPE DRAIN	1	1	
A95	E189150120	トクシユフランジ (2)	SPECIAL FLANGE (2)	1	1	
A102	E208850810	CW カンササエ, LO/Cデグチ-FT	C.W. PIPE SUPPORT, L.O./C OUTLET-FT	1	1	
A117	E209051170	CW デグチシユカン 6DK-FT	C.W. OUTLET MAIN PIPE, 6DK-FT	1	1	
A231	E209052310	ササエ 1, デグチシユカン-6D-FT	SUPPORT1, C.W. OUTLET PIPE-6D-FT	1		
A232	E209052320	ササエ 2, デグチシユカン-6D-FT	SUPPORT2, C.W. OUTLET PIPE-6D-FT	1	1	
A233	E209052330	ササエ 3, デグチシユカン-6D-FT	SUPPORT3, C.W. OUTLET PIPE-6D-FT	1	1	
A234	E209052340	ササエ, CW デグチシユカン-6D	SUPPORT, C.W. OUTLET PIPE-6D	1	1	
A242	E209052420	ササエ 1, デグチシユカン-6D-FT	SUPPORT1, C.W. OUTLET PIPE-6D-FT		1	
A315	※ E20905	CW カン, I/Cデグチ-FT	C.W. PIPE, I/C OUTLET-FT	1	1	
A320	E209053200	CW カン 4-PK, I/C イリグチ-FT	C.W. PIPE 4-PK, I/C INLET-FT		1	※1
A331	※ E20905	CW カン, LO/Cデグチ-FT	C.W. PIPE, L.O./C OUTLET-FT	1	1	
A335	E209053350	CW カン 4-PK, LO/C デグチ-FT	C.W. PIPE 4-PK, L.O./C OUTLET-FT		1	※1
A338	E208850380	CW カン 5-PK, LO/C デグチ-FT	C.W. PIPE 5-PK, L.O./C OUTLET-FT		1	※1
B2	A245012010	キユウユセツシユ (1)	BLOCK, L.O. PIPE	1	1	
B27	E209750270	CW カン, T/C イリグチ RH163FT1	C.W. PIPE, T/C INLET RH163 FT1	1		
B28	E209750280	CW カン, T/C イリグチ RH163FT2	C.W. PIPE, T/C INLET RH163 FT2	1		
B29	E209750290	CW カン, T/C デグチ RH163-1	C.W. PIPE, T/C OUTLET RH163-1	1		
B35	E209750350	CW カン, T/C イリグチ RH183FT1	C.W. PIPE, T/C INLET RH183 FT1		1	
B36	E209750360	CW カン, T/C デグチ RH183FT	C.W. PIPE, T/C OUTLET RH183 FT		1	
B37	E209750370	CW カン, T/C イリグチ RH183FT2	C.W. PIPE, T/C INLET RH183FT2		1	

①……海水 SEA WATER ②……清水 FRESH WATER

				数量 Quantity ①	②
C1	C015200010	オリフイス	ORIFICE	1	
C4	C015200040	オリフイス	ORIFICE	1	2

冷却水配管(前端過給)－6DK
COOLING WATER PIPING (FRONT T/C)－6DK

空気冷却器形式 INTER COOLER TYPE ①……DH29,DH39,DH39HZ,DH48HZ ②……DH52,DH73HZ

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量Quantity ①	②
D1	※E21895	CW カン-1, I/C デイリグチ	C.W. PIPE-1, I/C INLET AND OUTLET	1	1
D6	※E21895	CW カン-2, I/C デイリグチ	C.W. PIPE-2, I/C INLET AND OUTLET		1
D11	※E21895	CW カン-3, I/C デイリグチ	C.W. PIPE-3, I/C INLET AND OUTLET	1	
D16	E218950160	ナガナット	LONG NUT	4	4

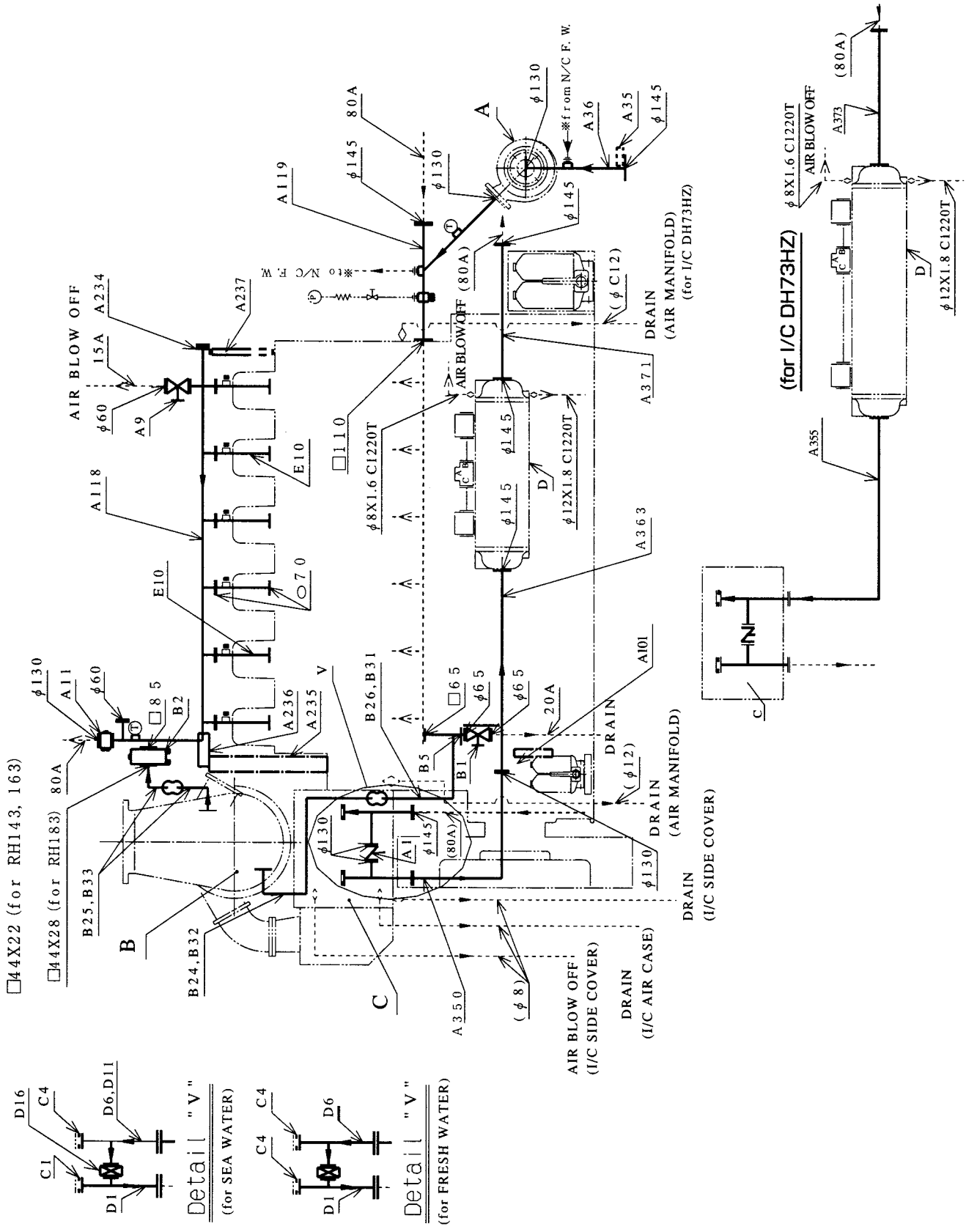
				数量 Quantity
E10	E206150100	CW カン, ヘッドデグチ (RH3)	C.W. PIPE, CYLINDER HEAD OUTLET (RH3)	1

注記 Remarks

※印部品は仕様により異なる.
Parts (Signal ※) depend on specification.

※1印部品は空気冷却器形式のDH73HZ仕様です.
Parts (Signal ※1) is used for INTER COOLER type DH73HZ.

冷却水配管 (後端過給) – 6DK
COOLING WATER PIPING (REAR T/C) – 6DK



冷却水配管 (後端過給)－6DK
COOLING WATER PIPING (REAR T/C)－6DK

過給機形式 TURBOCHAGER TYPE ①……RH143,RH163 ②……RH183

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量Quantity ①	②	
A	Ref. 4-4.1	C.W. ポンプ	C.W. PUMP	1	1	
B	Ref. Separate manual	ターボチャージャ	TURBOCHARGER	1	1	
C	Ref. 3-32	インタークーラ	INTER COOLER	1	1	
D	Ref. 4-3.3	L.O. クーラ	L.O. COOLER	1	1	
A1	C062000190	バタフライベン	BUTTERFLY VALVE	1	1	
A9	Y011110154	タマガタベン	FLANGED GLOBE VALVE	1	1	
A11	E208851150	ブロツク-2, CW カン	BLOCK (2), C.W. PIPE	1	1	
A35	E208851210	ササエ, CW ポンプイリグチカン	SUPPORT, C.W. PUMP INLET PIPE	1	1	
A36	E208851010	CW カン, ポンプイリグチ	C.W. PIPE, PUMP INLET	1	1	
A101	E208850820	CW カンササエ, LO/C イリグチ-RT	C.W. PIPE SUPPORT, L.O./C INLET-RT	1	1	
A118	E209051180	CW デグチシユカン, 6DK-RT	C.W. OUTLET MAIN PIPE, 6DK-RT	1	1	
A119	E208851030	CW カン, フレームイリグチ-RT	C.W. PIPE, FRAM INLET-RT	1	1	
A234	E209052340	ササエ, CW デグチシユカン-6D	SUPPORT, C.W. OUTLET PIPE-6D	1	1	
A235	E209052350	ササエ, CW デグチシユカン-6D-RT	SUPPORT, C.W. OUTLET PIPE-6D-RT	1	1	
A236	E209052360	ササエ-2, デグチシユカン-6D-RT	SUPPORT 2, C.W. OUTLET PIPE-6D-RT	1	1	
A237	E209052370	ササエ-3, デグチシユカン-6D-RT	SUPPORT 3, C.W. OUTLET PIPE-6D-RT	1	1	
A350	※E20905	CW カン, I/C デグチ-RT	C.W. PIPE, I/C OUTLET-RT	1	1	
A355	E209053550	CW カン 4-PK, I/C イリグチ-RT	C.W. PIPE 4-PK, I/C INLET-RT		1	※1
A363	※E20905	CW カン, LO/C イリグチ-RT	C.W. PIPE, L.O./C INLET-RT	1	1	
A371	※E20905	CW カン, LO/C デグチ-RT	C.W. PIPE, L.O./C OUTLET-RT	1	1	
A373	E208850730	CW カン-PK, LO/C デグチ-RT	C.W. PIPE-PK, L.O./C OUTLET-RT		1	※1
B1	Y011110204	タマガタベン	FLANGED GLOBE VALVE	1	1	
B2	A245012010	キユウユセツシユ (1)	BLOCK, L.O. PIPE	1	1	
B5	E209750050	ササエ, シユカンドレンデグチ-RT	SUPPORT, MAIN PIPE DRAIN OUTLET-RT	1	1	
B24	E209750240	CW カン, T/C イリグチ-2-RT	C.W. PIPE, T/C INLET-2-RT		1	
B25	E209750250	CW カン, T/C デグチ-2-RT	C.W. PIPE, T/C OUTLET-2-RT		1	
B26	E209750260	CW カン, T/C イリグチ-3-RT	C.W. PIPE, T/C INLET-3-RT		1	
B31	E209750310	CW カン, T/C イリグチ R163-2	C.W. PIPE, T/C INLET RH163-2	1		
B32	E209750320	CW カン, T/C イリグチ R163-3	C.W. PIPE, T/C INLET RH163-3	1		
B33	E209750330	CW カン, T/C デグチ RH163-2	C.W. PIPE, T/C OUTLET RH163-2	1		

①……海水 SEA WATER ②……清水 FRESH WATER

				数量Quantity ①	②
C1	C015200010	オリフイス	ORIFICE	1	
C4	C015200040	オリフイス	ORIFICE	1	2

CHAPTER 2
ITEM 5.2 6·8DK-20

冷却水配管 (後端過給)－6DK
COOLING WATER PIPING (REAR T/C)－6DK

空気冷却器形式 INTER COOLER TYPE ①……DH29,DH39,DH39HZ,DH48HZ ②……DH52,DH73HZ

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity ①	②
D1	※E21895	CW カン-1, I/C デイリグチ	C.W. PIPE-1, I/C INLET AND OUTLET	1	1
D6	※E21895	CW カン-2, I/C デイリグチ	C.W. PIPE-2, I/C INLET AND OUTLET		1
D11	※E21895	CW カン-3, I/C デイリグチ	C.W. PIPE-3, I/C INLET AND OUTLET	1	
D16	E218950160	ナガナット	LONG NUT	4	4

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
E10	E206150100	CW カン, ヘッドデグチ (RH3)	C.W. PIPE, CYLINDER HEAD OUTLET (RH3)	1

注記 Remarks

※印部品は仕様により異なる.
Parts (Signal ※) depend on specification.

※1印部品は空気冷却器形式のDH73HZ仕様です.
Parts (Signal ※1) is used for INTER COOLER type DH73HZ.

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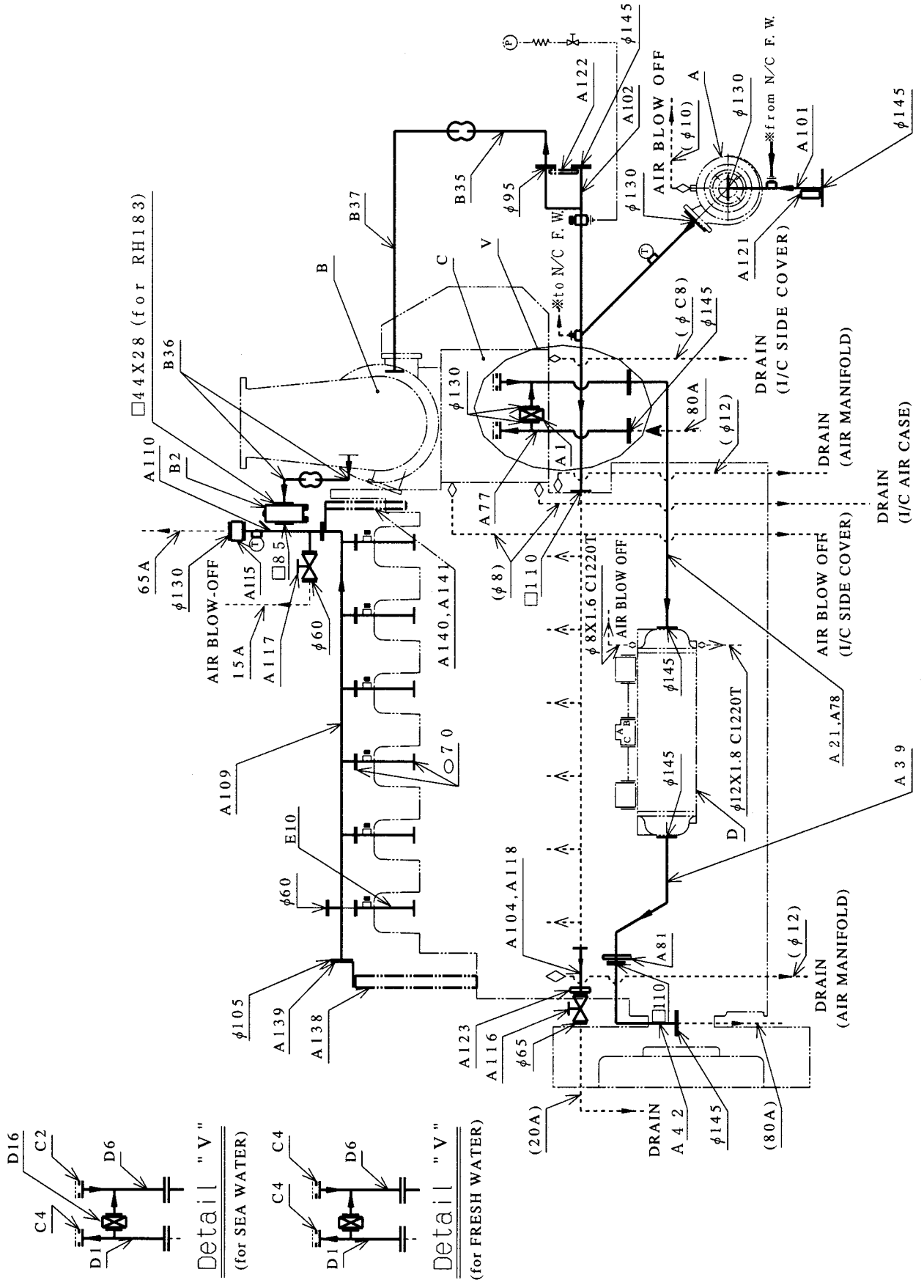
冷却水配管 (前端過給)－8DK
COOLING WATER PIPING (FRONT T/C)－8DK



冷却水配管 (前端過給)－8DK
COOLING WATER PIPING (FRONT T/C)－8DK

空気冷却器形式 ①……DH52,DH73,DH73HZ ②……DH95HZ
INTER COOLER TYPE

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量Quantity ①	②
A	Ref. 4-4.1	C.W. ポンプ	C.W. PUMP	1	1
B	Ref. Separate manual	ターボチャージャ	TURBOCHARGER	1	1
C	Ref. 3-32	インタークーラ	INTER COOLER	1	1
D	Ref. 4-3.3	L.O. クーラ	L.O. COOLER	1	1
A1	C062000190	バタフライベン	BUTTERFLY VALVE	1	1
A21	※E20885	CW カン 5, I/C デグチ-FT	C.W. PIPE 5, I/C OUTLET-FT	1	
A39	※E20885	CW カン, LO/C デグチ-FT	C.W. PIPE, L.O. COOLER OUTLET-FT	1	1
A42	※E20885	CW カン 8, LO/C デグチ-FT	C.W. PIPE 8, L.O. COOLER OUTLET-FT	1	1
A77	E208850770	CW カン-PK, I/C イリグチ-DH95	C.W. PIPE-PK, I/C INLET-DH95		1
A78	E208850780	CW カン-PK, I/C デグチ-DH95	C.W. PIPE-PK, I/C OUTLET-DH95		1
A81	E208850810	CW カンササエ, LO/C デグチ-FT	SUPPORT, C.W. PIPE L.O./C OUTLET-FT	1	1
A101	E208851010	CW カン, ポンプイリグチ	C.W. PIPE, C.W. PUMP INLET	1	1
A102	E208851020	CW カン, フレームイリグチ-FT	C.W. PIPE, FRAME INLET-FT	1	1
A104	E208851040	CW カン, シュカンドレン	C.W. PIPE, MAIN PIPE DRAIN	1	1
A109	E208851090	CW デグチシュカン 1, 8DK	C.W. OUTLET MAIN PIPE 1, 8DK	1	1
A110	E208851100	CW デグチシュカン 2, 8DK	C.W. OUTLET MAIN PIPE 2, 8DK	1	1
A115	E208851150	ブロック-2, CW カン	BLOCK-2, C.W. PIPE	1	1
A116	Y011110204	タマガタベン	FLANGED GLOBE VALVE	1	1
A117	Y011110154	タマガタベン	FLANGED GLOBE VALVE	1	1
A118	E189150120	トクシュフランジ	SPECIAL FLANGE	1	1
A121	E208851210	ササエ, CW ポンプイリグチカン	SUPPORT, C.W. PUMP INLET PIPE	1	1
A122	E208851220	ササエ, CW フレームイリグチカン-FT	SUPPORT, C.W. FRAME INLET PIPE-FT	1	1
A123	E208851230	ササエ, CW ドレンシュカン-FT	SUPPORT, C.W. DRAIN PIPE-FT	1	1
A138	E208851380	ササエ1, CW デグチシュカン-8D	SUPPORT 1, C.W. OUTLET PIPE-8D	1	1
A139	E208851390	ササエ2, CW デグチシュカン-8D	SUPPORT 2, C.W. OUTLET PIPE-8D	1	1
A140	E208851400	ササエ3, CW デグチシュカン-8D	SUPPORT 3, C.W. OUTLET PIPE-8D	1	
A141	E208851410	ササエ4, CW デグチシュカン-8D	SUPPORT 4, C.W. OUTLET PIPE-8D		1

				数量 Quantity
B2	A245012010	キユウユセツシユ (1)	BLOCK, L.O. PIPE	1
B35	E209750350	CW カン, T/C イリグチ-RH183FT1	C.W. PIPE, T/C INLET-RH183FT1	1
B36	E209750360	CW カン, T/C デグチ-RH183FT	C.W. PIPE, T/C OUTLET-RH183FT	1
B37	E209750370	CW カン, T/C イリグチ-RH183FT2	C.W. PIPE, T/C INLET-RH183FT2	1

①……海水 SEA WATER ②……清水 FRESH WATER

				数量Quantity ①	②
C2	C015200020	オリフイス	ORIFICE	1	
C4	C015200040	オリフイス	ORIFICE	1	2

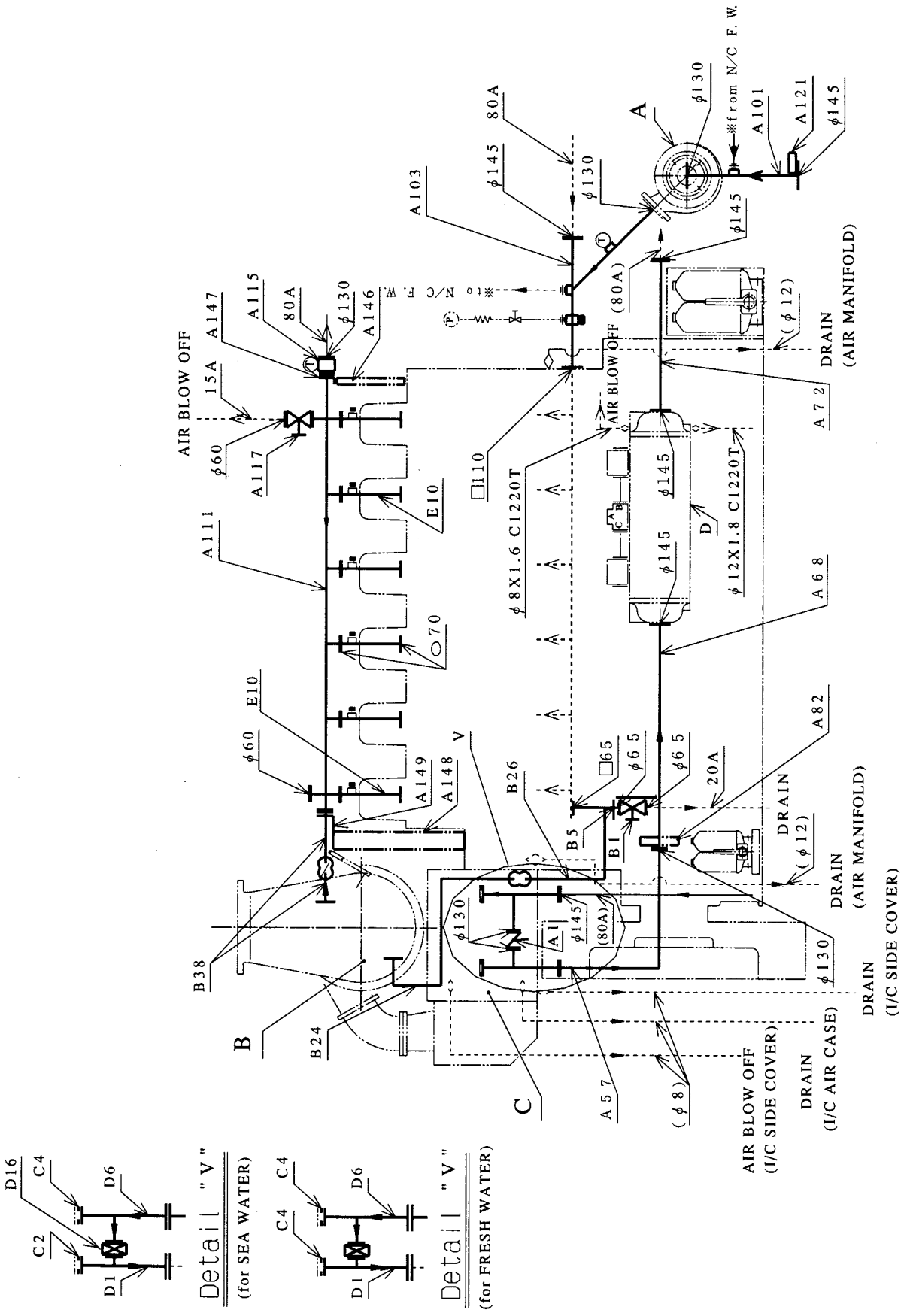
冷却水配管 (前端過給)－8DK
COOLING WATER PIPING (FRONT T/C)－8DK

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
D1	※E21895	CW カン-1, I/C デイリグチ	C.W. PIPE-1, I/C INLET AND OUTLET	1
D6	※E21895	CW カン-2, I/C デイリグチ	C.W. PIPE-2, I/C INLET AND OUTLET	1
D16	E218950160	ナガナット	LONG NUT	4
E10	E206150100	CW カン, ヘッドデグチ (RH3)	C.W. PIPE, CYLINDER HEAD OUTLET (RH3)	1

注記
Remarks

※印部品は仕様により異なる.
Parts (Signal ※) depend on specification.

冷却水配管 (後端過給) - 8DK
COOLING WATER PIPING (REAR T/C) - 8DK



冷却水配管 (後端過給) - 8DK
COOLING WATER PIPING (REAR T/C) - 8DK

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
A	Ref. 4-4.1	C.W. ポンプ	C.W. PUMP	1
B	Ref. Separate manual	ターボチャージャ	TURBOCHARGER	1
C	Ref. 3-32	インタークーラ	INTER COOLER	1
D	Ref. 4-3.3	L.O. クーラ	L.O. COOLER	1
A1	C062000190	バタフライベン	BUTTERFLY VALVE	1
A57	E208850570	CW カン 3-PL, I/C デグチ-RT	C.W. PIPE 3-PL, I/C OUTLET-RT	1
A68	E208850680	CW カン-PL, LO/C イリグチ	C.W. PIPE-PL, L.O. COOLER INLET	1
A72	E208850720	CW カン-PL, LO/C デグチ-RT	C.W. PIPE-PL, L.O. COOLER OUTLET-RT	1
A82	E208850820	CW カンササエ, LO/C イリグチ-RT	SUPPORT, C.W. PIPE L.O./C INLET-RT	1
A101	E208851010	CW カン, ポンプイリグチ	C.W. PIPE, C.W. PUMP INLET	1
A103	E208851030	CW カン, フレームイリグチ-RT	C.W. PIPE, FRAME INLET-RT	1
A111	E208851110	CW デグチシュカン, 8DK-RT	C.W. OUTLET MAIN PIPE, 8DK-RT	1
A115	E208851150	ブロック-2, CW カン	BLOCK-2, C.W. PIPE	1
A117	Y011110154	タマガタベン	FLANGED GLOBE VALVE	1
A121	E208851210	ササエ, CW ポンプイリグチカン	SUPPORT, C.W. PUMP INLET PIPE	1
A146	E208851460	ササエ1, CW デグチシュカン-8RT	SUPPORT 1, C.W. OUTLET PIPE-8RT	1
A147	E208851470	ササエ2, CW デグチシュカン-8RT	SUPPORT 2, C.W. OUTLET PIPE-8RT	1
A148	E208851480	ササエ3, CW デグチシュカン-8D-RT	SUPPORT 3, C.W. OUTLET PIPE-8D-RT	1
A149	E208851490	ササエ4, CW デグチシュカン-8D-RT	SUPPORT 4, C.W. OUTLET PIPE-8D-RT	1
B1	Y011110204	タマガタベン	FLANGED GLOBE VALVE	1
B5	E209750050	ササエ, シュカンドレンデグチ-RT	SUPPORT, MAIN PIPE DRAIN OUTLET-RT	1
B24	E209750240	CW カン, T/C イリグチ-2-RT	C.W. PIPE, T/C INLET-2-RT	1
B26	E209750260	CW カン, T/C イリグチ-3-RT	C.W. PIPE, T/C INLET-3-RT	1
B38	E209750380	CW カン, T/C デグチ-RH183RT	C.W. PIPE, T/C OUTLET-RH183RT	1

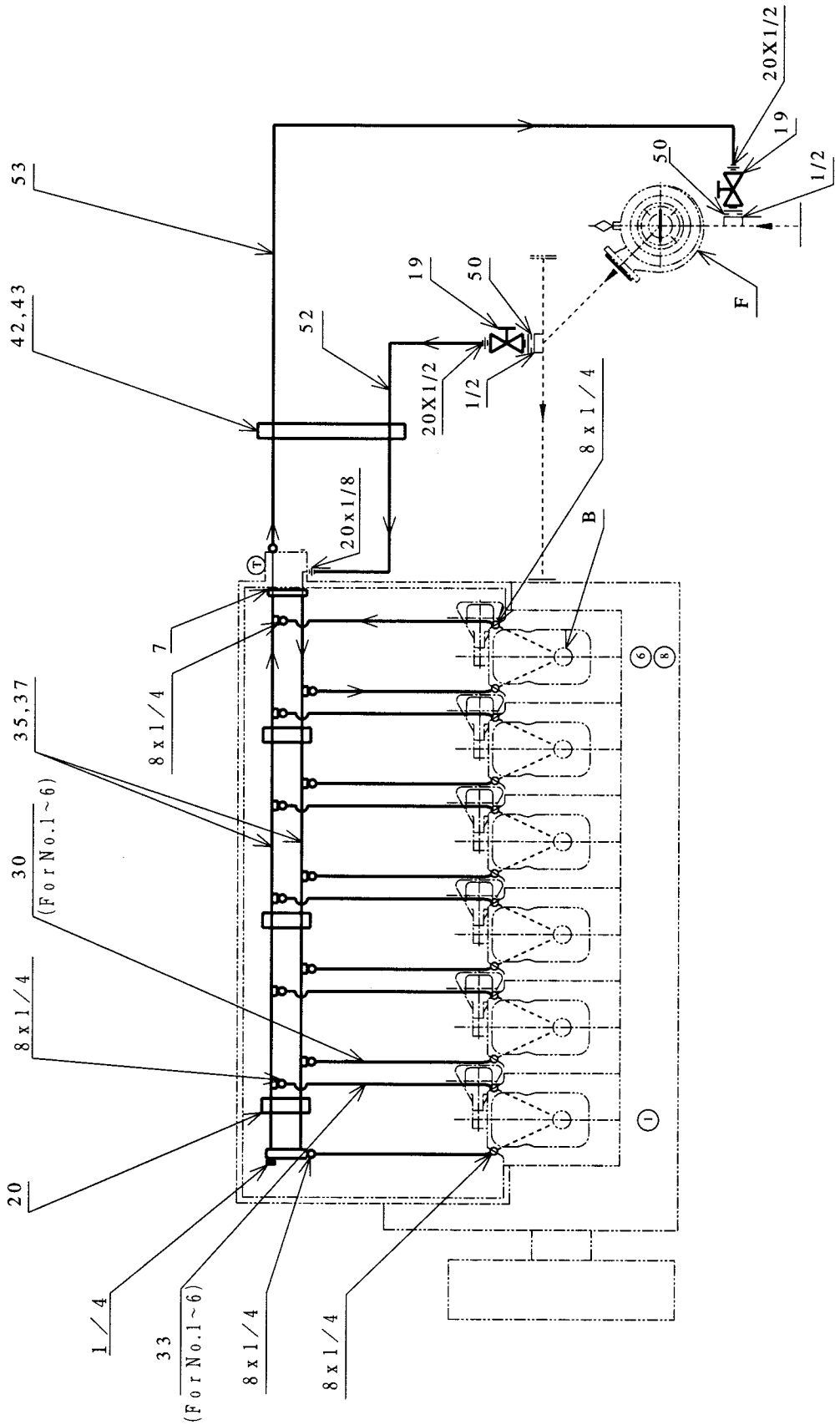
				①……海水 SEA WATER	②……清水 FRESH WATER
				数量 Quantity ①	②
C2	C015200020	オリフイス	ORIFICE	1	
C4	C015200040	オリフイス	ORIFICE	1	2

				数量 Quantity
D1	※E21895	CW カン-1, I/C デイリグチ	C.W. PIPE-1, I/C INLET AND OUTLET	1
D6	※E21895	CW カン-2, I/C デイリグチ	C.W. PIPE-2, I/C INLET AND OUTLET	1
D16	E218950160	ナガナット	LONG NUT	4
E10	E206150100	CW カン, ヘッドデグチ (RH3)	C.W. PIPE, CYLINDER HEAD OUTLET (RH3)	1

注記
Remarks

※印部品は仕様により異なる.
Parts (Signal ※) depend on specification.

ノズル冷却水配管
NOZZLE COOLING WATER PIPING



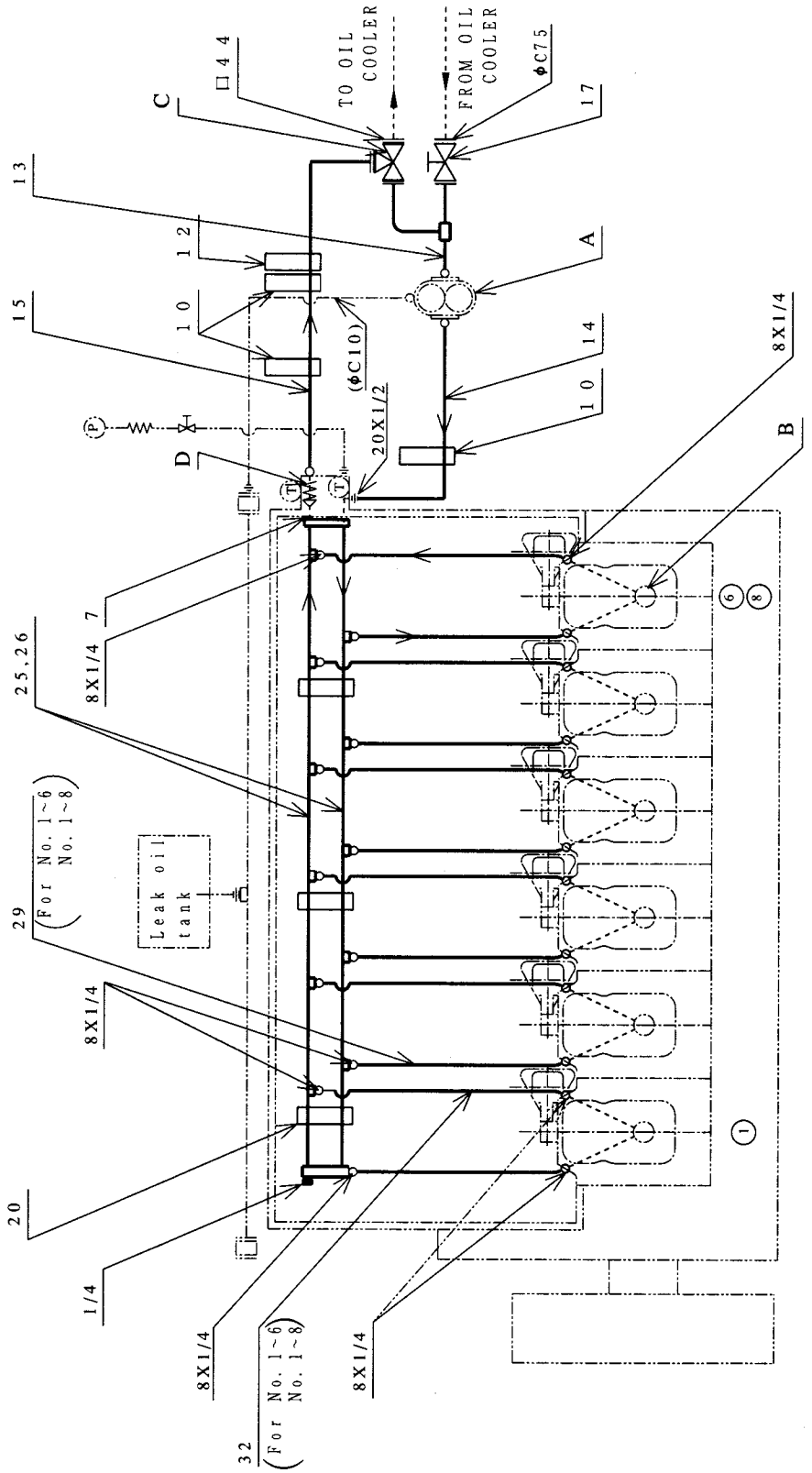
DAIHATSU

ノズル冷却水配管
NOZZLE COOLING WATER PIPING

①……6DK ②……8DK

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity ①	②
B	Ref. 3-24.2	ノズルホルダ	NOZZLE HOLDER	6	8
F	Ref. 4-4.1	C.W. ポンプ	C.W. PUMP	1	1
7	E209550070	ガスケツト	GASKET	1	1
19	Y021310154	ネジコミタマガタベン	SCREWED GLOBE VALVE	2	2
20	E208650200	カンオサエ	PIPE SUPPORTER	6	8
30	E209550300	レイキヤクスイエダカン (IN)	COOLING WATER BRANCH PIPE (IN)	6	8
33	E209550330	レイキヤクスイエダカン (OUT)	COOLING WATER BRANCH PIPE (OUT)	6	8
35	E209550350	N/C FW シユカン-6DK	N/C F.W. MAIN PIPE-6DK	1	
37	E209550370	N/C FW シユカン-8DK	N/C F.W. MAIN PIPE-8DK		1
42	E229950420	ブラケツト	BRACKET	1	1
43	E229950430	U ボルト	U-BOLT	1	1
50	E209550500	ユニオンセツシユ	UNION JOINT	2	2
52	E209550520	N/C FW イリグチカン	N/C F.W. INLET PIPE	1	1
53	E209550530	N/C FW デグチカン	N/C F.W. OUTLET PIPE	1	1

ノズル冷却油配管
NOZZLE COOLING OIL PIPING



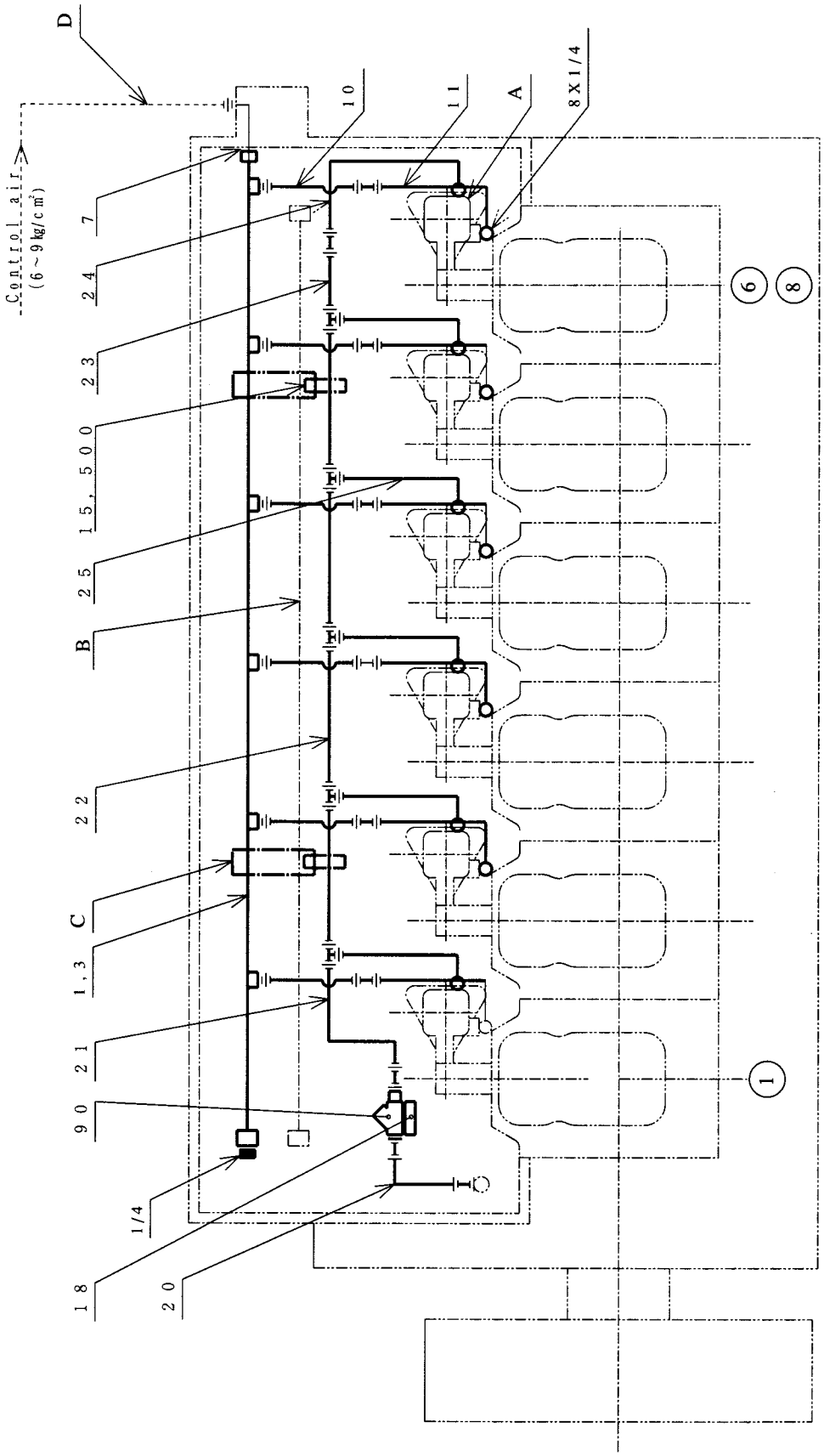
DAIHATSU

ノズル冷却油配管
NOZZLE COOLING OIL PIPING

①……6DK ②……8DK

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity ①	②
A	Ref. 4-5.1	オイルポンプ	OIL PUMP	1	1
B	Ref. 3-24.2	ノズルホルダ	NOZZLE HOLDER	6	8
C		オンチョウベン	THERMOSTAT VALVE	1	1
D	Ref. 4-5.3	オイルチョウアツベン	OIL RELIEF VALVE	1	1
7	E209550070	ガスケツト	GASKET	1	1
10	E229950090	カンオサエ	PIPE SUPPORTER	3	3
12	E229950100	カンオサエ	PIPE SUPPORTER	1	1
13	E209550130	N/C ポンプイリグチカン (R-1)	N/C PIPE,PUMP INLET (R-1)	1	1
14	E209550140	N/C カン, シユカンイリグチ	N/C PIPE,MAIN PIPE INLET	1	1
15	E209550150	N/C カン, シユカンデグチ	N/C PIPE,MAIN PIPE OUTLET	1	1
17	Y011110254	タマガタベン	FLANGED GLOBE VALVE	1	1
20	E208650200	カンオサエ	PIPE SUPPORTER	6	8
25	E209550250	N/C デイリグチシユカン-6DK	N/C. IN. OUTLET MAIN PIPE-6DK	1	
26	E209550260	N/C デイリグチシユカン-8DK	N/C. IN. OUTLET MAIN PIPE-8DK		1
29	E209550290	レイキヤクユエダカン (IN)	COOLING OIL BRANCH PIPE (IN)	6	8
32	E209550320	レイキヤクユエダカン (OUT)	COOLING OIL BRANCH PIPE (OUT)	6	8

燃料噴射ポンプ配管
FUEL OIL INJECTION PUMP PIPING



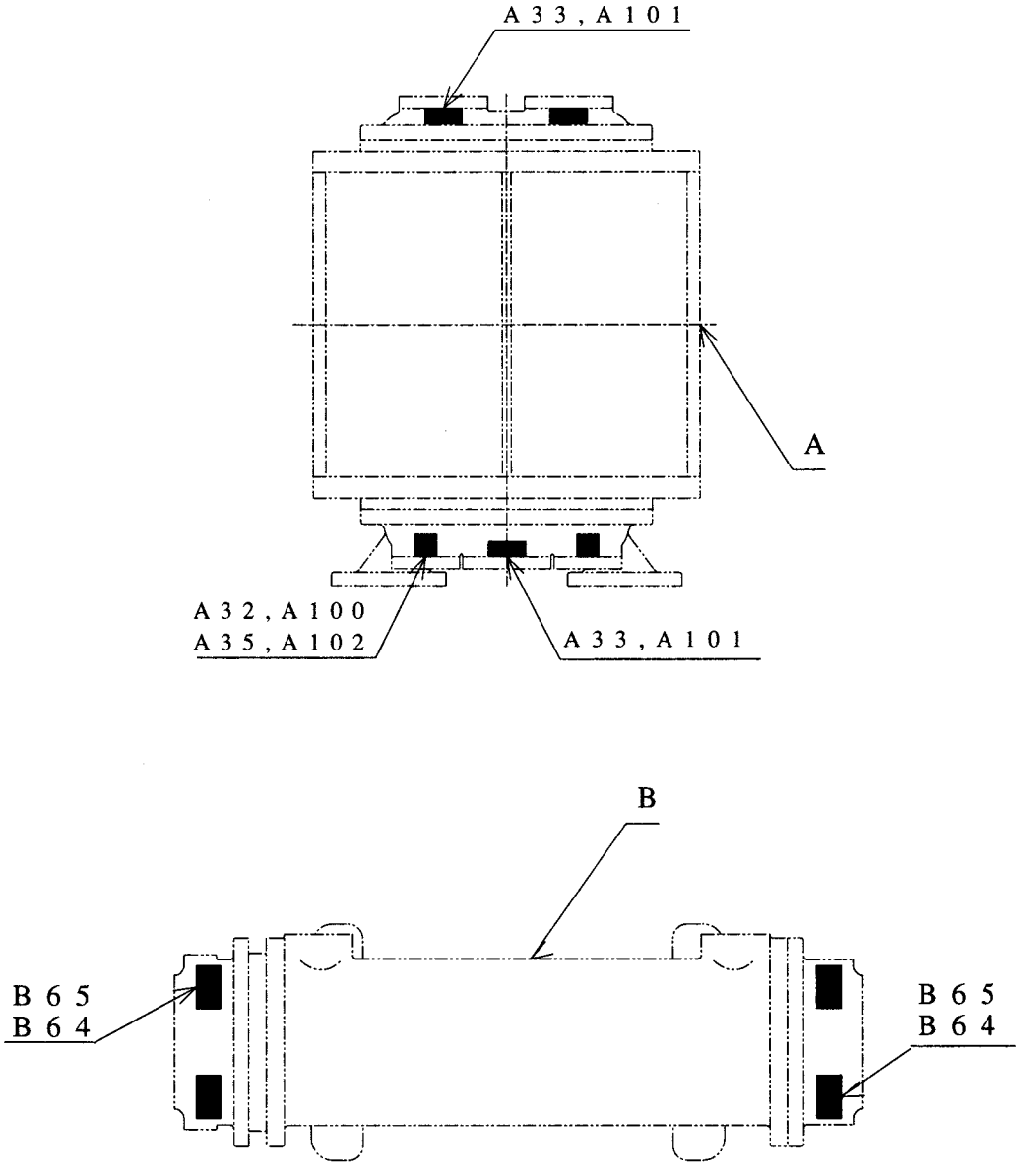
DAIHATSU

燃料噴射ポンプ配管
FUEL OIL INJECTION PUMP PIPING

①……6DK ②……8DK

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity ①	②
A	Ref. 3-23.2	F.O. ポンプ	F.O. INJECTION PUMP	6	8
B	Ref. 2-3 No.37(6DK), No.38(8DK)	F.O. NH リークオイルシュカン	F.O. NH LEAK OIL MAIN PIPE	1	1
C	Ref. 2-3 No.20	カンオサエ	PIPE SUPPORTER	6	8
D-1	Ref. 2-2.1 No.B56, B58, B62	デンジベンハイカン	MAG. VALVE PIPING	1Set	
D-2	Ref. 2-2.2 No.B59, B61, B62	デンジベンハイカン	MAG. VALVE PIPING		1Set
1	E209250010	SA シユカン, FO カツト-6D	S.A. MAIN PIPE, F.O. SHUTDOWN-6D	1	
3	E209250030	SA シユカン, FO カツト-8D	S.A. MAIN PIPE, F.O. SHUTDOWN-8D		1
7	E209250070	ガスケツト	GASKET	1	1
10	E209250100	SA カン, FO ポンプイリグチ-1	S.A. PIPE, F.O. PUMP INLET-1	6	8
11	E209250110	SA カン, FO ポンプイリグチ-2	S.A. PIPE, F.O. PUMP INLET-2	6	8
15	E209250150	カンササエ, FO ポンプ	PIPE SUPPORTER, F.O. PUMP	2	3
18	E209250180	ブラケツト-1, ストレーナ	BLACKET-1,STRAINER	1	1
20	E209250200	LO カン-1, FO ポンプ	L.O. PIPE-1, F.O. PUMP	1	1
21	E209250210	LO カン-2, FO ポンプ	L.O. PIPE-2, F.O. PUMP	1	1
22	E209250220	LO カン-3, FO ポンプ	L.O. PIPE-3, F.O. PUMP	4	6
23	E209250230	LO カン-4, FO ポンプ	L.O. PIPE-4, F.O. PUMP	1	1
24	E209250240	LO カン-5, FO ポンプ	L.O. PIPE-5, F.O. PUMP	1	1
25	E209250250	LO カン-6, FO ポンプ	L.O. PIPE-6, F.O. PUMP	5	7
90	E288770900	Y-フイルタ	Y-FILTER	1	1
500	Z585508002ZZ	カンバンド	PIPE SUPPORTER	3	3

保護亜鉛配置図
ARRANGEMENT OF PROTECTIVE ZINC



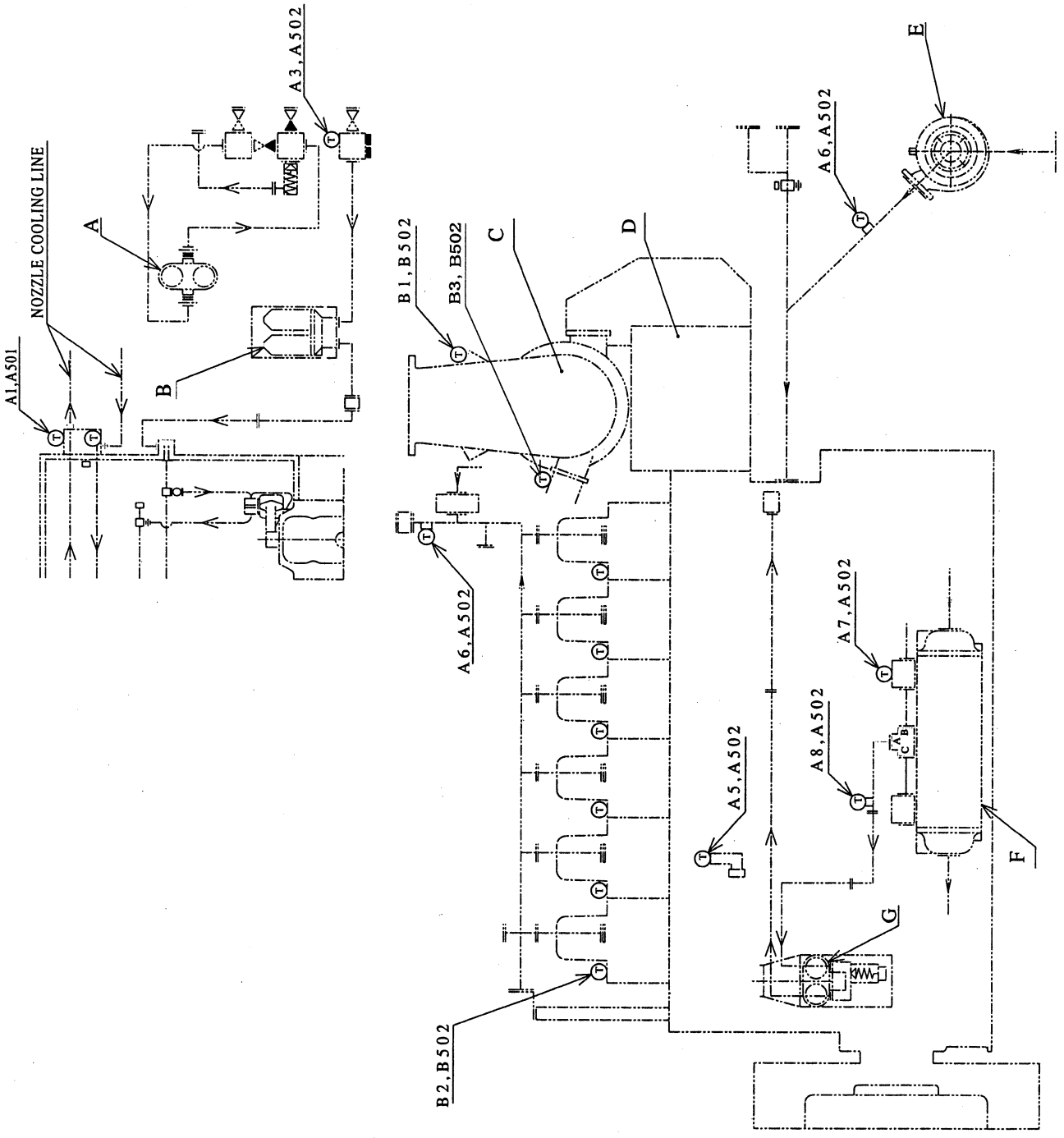
保護亜鉛配置図
ARRANGEMENT OF PROTECTIVE ZINC

空気冷却器形式 ①……DH29,DH39 ②……DH52,DH73
INTER COOLER TYPE

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity ①	②
A	Ref. 3-32	インタークーラ	INTER COOLER	1	1
B	Ref. 4-3.3	L.O. クーラ	L.O. COOLER	1	1
A32	C048420320	ボウショクアエン (B)	ZINC PROTECTOR (B)	2	
A33	C048420330	ボウショクアエン (A)	ZINC PROTECTOR (A)	3	3
A34	C048420340	ボウショクアエン (B)	ZINC PROTECTOR (B)		2
A100	C048471000	パッキン (5)	GASKET (5)	2	
A101	C048471010	パッキン (4)	GASKET (4)	3	3
A102	C048471020	パッキン (5)	GASKET (5)		2

				数量 Quantity
B64	C037400320	ホゴアエントリツケフランジパッキン	PACKING, ZINC PROTECTOR	4
B65	C045170020	ホゴアエン	PROTECTOR ZINC	4

温度計配置図
ARRANGEMENT OF THERMOMETER



温度計配置図
ARRANGEMENT OF THERMOMETER

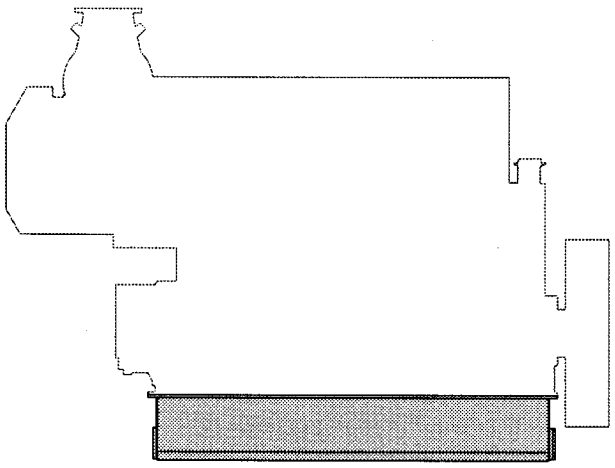
6·8DK-20 | CHAPTER 2 | ITEM 9

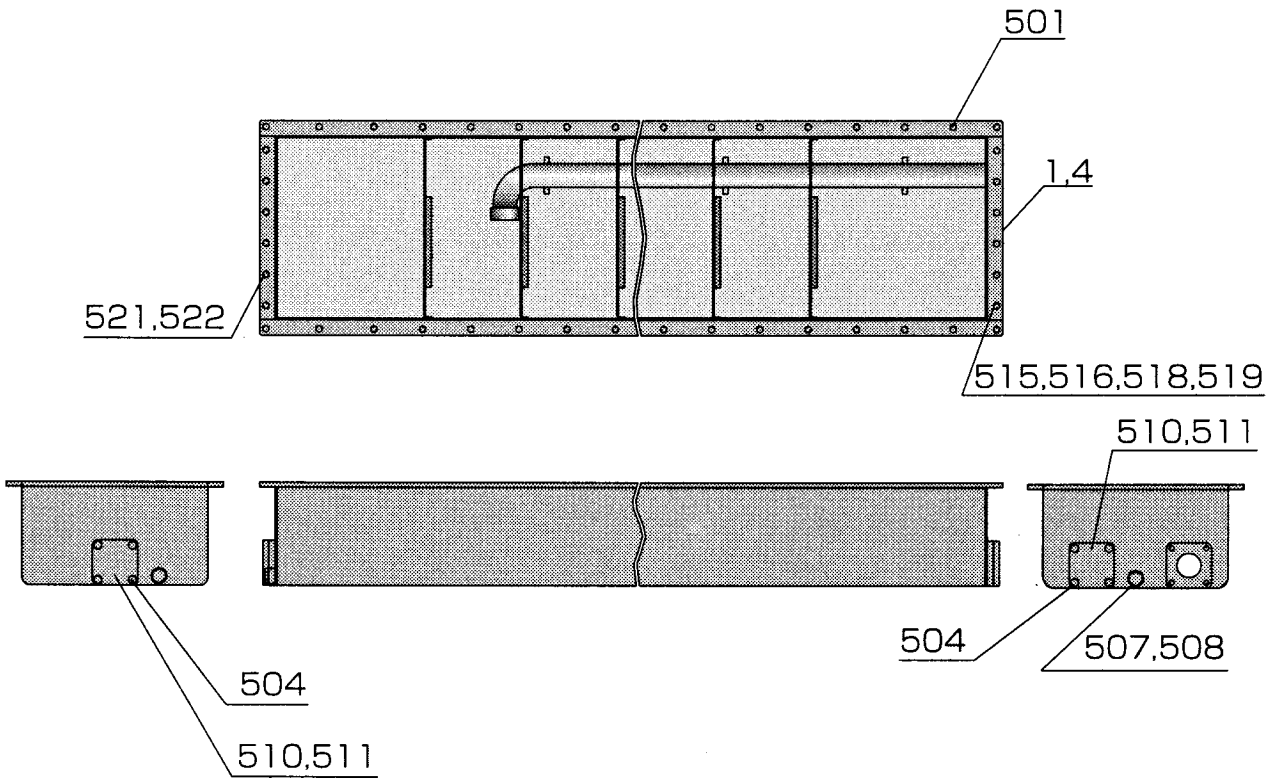
番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity	
A	**Ref. 4-2**	**FO送油ポンプ**	**F.O. FEED PUMP**	**1**	**1**
B	**Ref. 4-2.3**	**FOロキ**	**F.O. FILTER**	**1**	**1**
C	**Ref.Separate manual**	**ターボチャージャー**	**TURBOCHARGER**	**1**	**1**
D	**Ref. 3-29**	**インタークーラー**	**INTER COOLER**	**1**	**1**
E	**Ref. 4-4.1**	**CWポンプ**	**C.W. PUMP**	**1**	**1**
F	**Ref. 4-3.3**	**LO クーラ**	**L.O. COOLER**	**1**	**1**
G	**Ref. 4-3.4**	**LOロキ**	**L.O. FILTER**	**1**	**1**
A1	Y231003140	オンドケイ 100Cx3／8P	THERMOMETER 100Cx3/8P	2	2
A3	Y232014150	オンドケイ 200Cx1／2P-100	THERMOMETER 200Cx1/2P-100	1	1
A5	Y241004000	オンドケイ 100Cx1／2-L	THERMOMETER 100Cx1/2L	1	1
A6	Y231004000	オンドケイ 100Cx1／2P	THERMOMETER 100Cx1/2P	2	2
A7	Y231004000	オンドケイ 100Cx1／2P	THERMOMETER 100Cx1/2P	1	1
A8	Y231004000	オンドケイ 100Cx1／2P	THERMOMETER 100Cx1/2P	1	1
A501	Z565001700ZZ	マルパッキン	GASKET	2	2
A502	Z565002100ZZ	マルパッキン	GASKET	6	6
B1	Y235204180	オンドケイ P520x4x180x95	THERMOMETER P520x4x180x95	1	1
B2	Y235204240	オンドケイ P520x4x240x95	THERMOMETER P520x4x240x95	6	8
B3	Y236204180	オンドケイ P620x4x180x95	THERMOMETER P620x4x180x95	※	※
	Y266204210	オンドケイ P620x4x210x125	THERMOMETER P620x4x210x125	※	※
	Y236204240	オンドケイ P620x4x240x95	THERMOMETER P620x4x240x95	※	※
B502	Z565002100ZZ	マルパッキン	GASKET	7	9

注記
Remarks

※印部品は機関仕様による
Parts(Signal※)depends on engine spec.

油受け（湿式）
OIL PAN (WET SUMP)



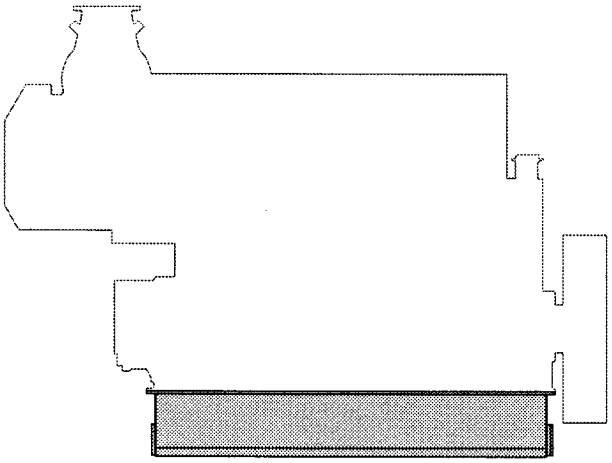


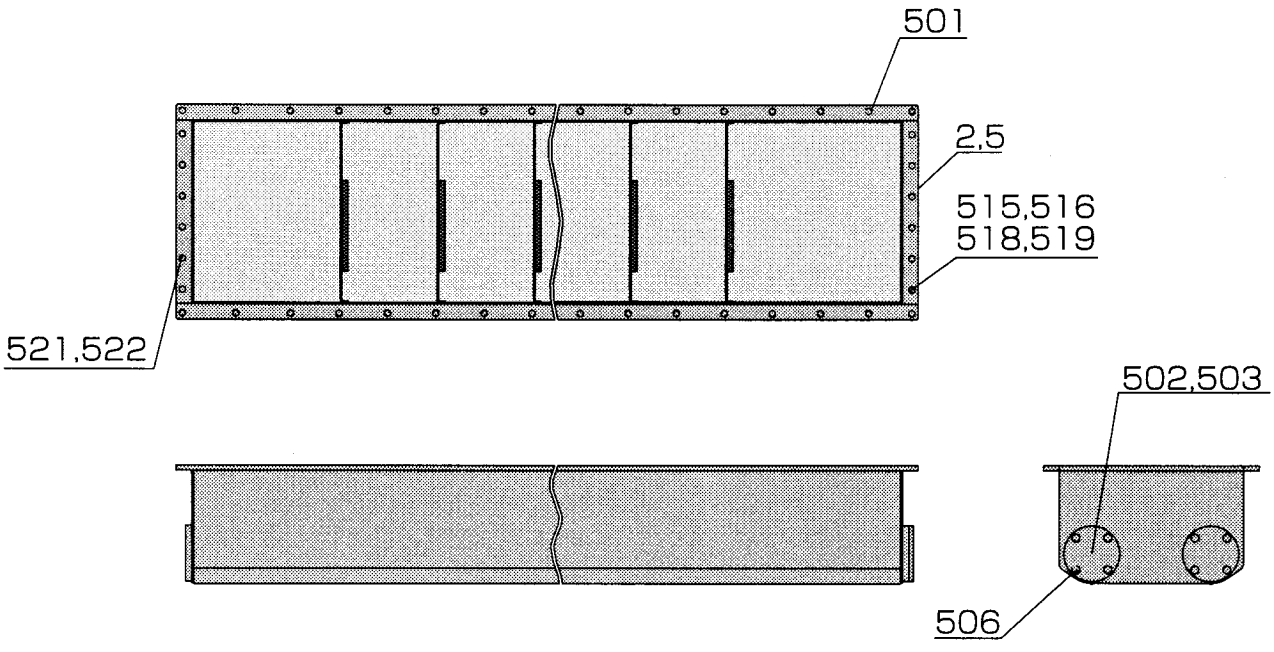
油受け（湿式）
OIL PAN (WET SUMP)

①……6DK ②……8DK

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity ①	②
1	E200150010	オイルパン-6D-シツシキ	OIL PAN-6D-WET SUMP	1	
4	E200150040	オイルパン-8D-シツシキ	OIL PAN-8D-WET SUMP		1
501	X200012028ZZ	ボルト	BOLT	28	36
504	X200016050ZZ	ボルト	BOLT	8	10
507	X570010000ZZ	ロッカクプラグ	HEX. PLUG	2	2
508	Z565003400ZZ	マルパッキン	GASKET	2	2
510	Z5402000011ZZ	フランジ	FLANG	2	2
511	Z541209110AZ	パッキン	GASKET	2	2
515	X200012050ZZ	ボルト	BOLT	8	
516	X220012000ZZ	ナット	NUT	8	
518	X200012045ZZ	ボルト	BOLT		8
519	X220012000ZZ	ナット	NUT		8
521	X200012045ZZ	ボルト	BOLT	8	8
522	X220012000ZZ	ナット	NUT	8	8

油受け（乾式）
OIL PAN (DRY SUMP)



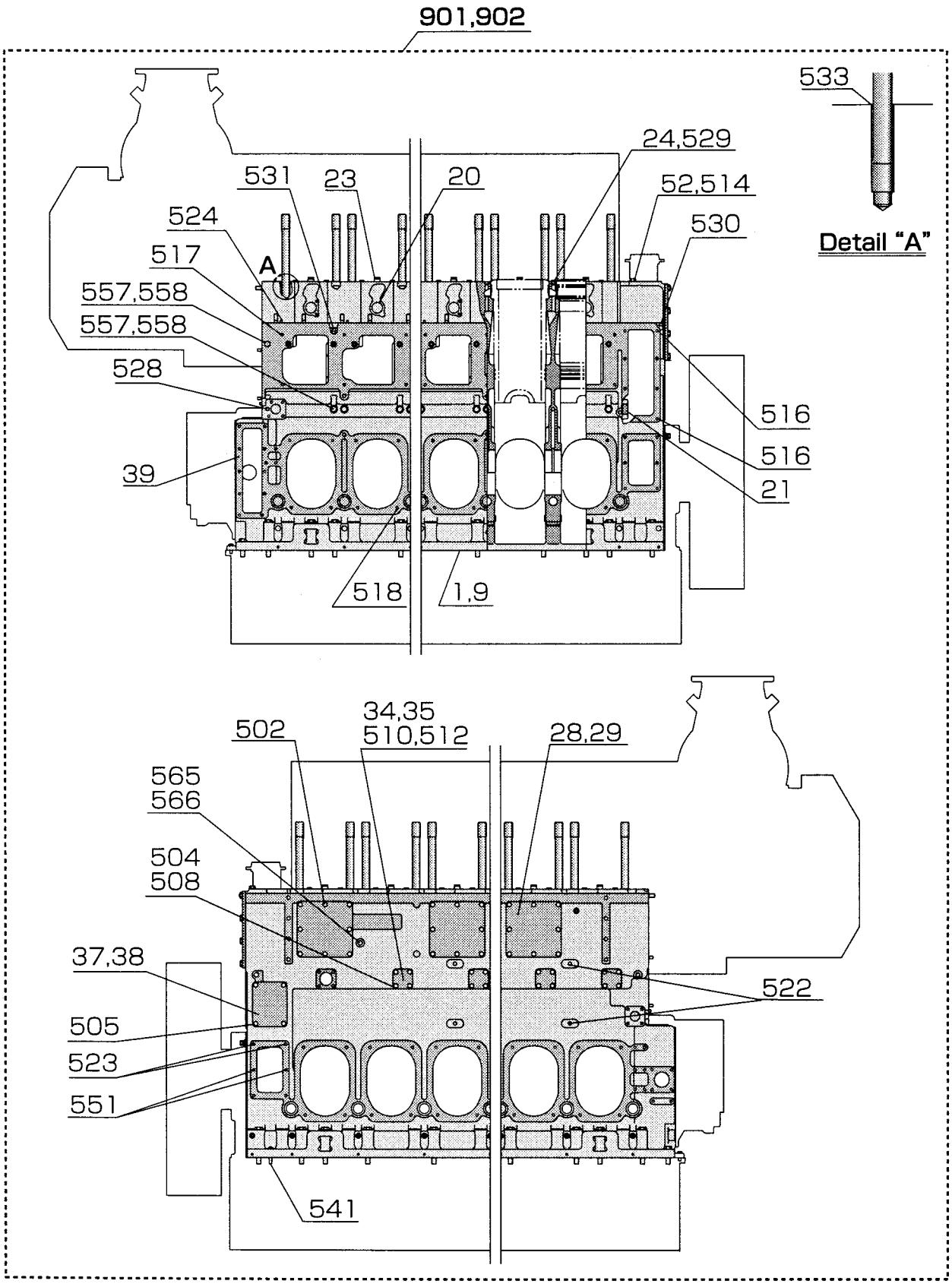


油受け（乾式）
OIL PAN (DRY SUMP)

①……6DK ②……8DK

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity ①	②
2	E200150020	オイルパン-6D-カンシキ	OIL PAN-6D-DRY SUMP	1	
5	E200150050	オイルパン-8D-カンシキ	OIL PAN-8D-DRY SUMP		1
501	X200012028ZZ	ボルト	BOLT	28	36
502	Z509090000ZZ	JIS フランジトク	JIS SPECIAL FLANGE	2	2
503	Z501309000AZ	JIS パッキン	JIS GASKET	2	2
506	X200016032ZZ	ボルト	BOLT	8	8
515	X200012050ZZ	ボルト	BOLT	8	
516	X220012000ZZ	ナット	NUT	8	
518	X200012045ZZ	ボルト	BOLT		8
519	X220012000ZZ	ナット	NUT		8
521	X200012045ZZ	ボルト	BOLT	8	8
522	X220012000ZZ	ナット	NUT		8

架構（側面）– 定速型
ENGINE FRAME (SIDE VIEW) - CONSTANT SPEED TYPE

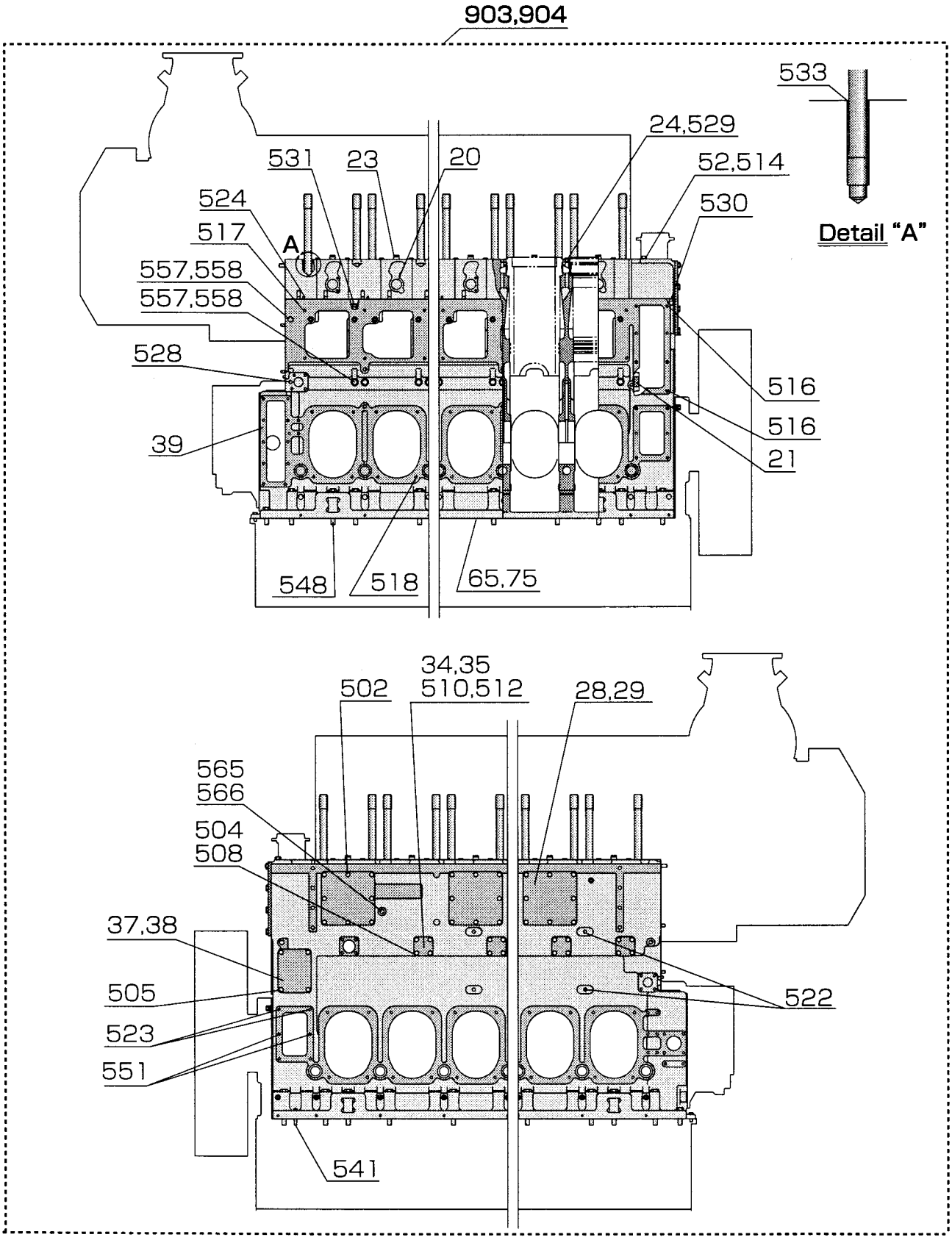


架構（側面）- 定速型
ENGINE FRAME (SIDE VIEW) - CONSTANT SPEED TYPE

①……6DK ②……8DK

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity ①	②
901		カコウ ASSY.-6D, BTツキ-定速	ENGINE FRAME ASSY.-6D, W/BOLT-C	1	
902		カコウ ASSY.-8D, BTツキ-定速	ENGINE FRAME ASSY.-8D, W/BOLT-C		1
1	E200250010	カコウ-6D	ENGINE FRAME-6D	1	
9	E200250090	カコウ-8D	ENGINE FRAME-8D		1
20	E200250200	ワンガタプラグ	BOWL TYPE PLUG	6	8
21	E200250210	トクシユプラグ	SPECIAL PLUG	1	1
23	E200250230	SA レンラクカン	S.A. CONNECTOR	6	8
24	E200250240	CW レンラクカン	C.W. CONNECTOR	24	32
28	E200250280	キユウキカンフタ-1	COVER-1, INTAKE MANIFOLD	3	4
29	E200250290	キユウキカンフタガスケツト-1	GASKET-1, INTAKE MANIFOLD LID	3	4
34	E200250340	スイシツフタ	COVER, C.W. MANIFOLD		1
35	E200250350	スイシツフタガスケット	GASKET, C.W. MANIFOLD LID		1
37	E200250370	ギヤケースフタ	GEAR CASE LID	1	1
38	E200250380	ギヤケースフタガスケツト	GASKET,GEAR CASE LID	1	1
39	E200250390	ホキギヤケースソクフタガスケツト	GASKET,AUX.GEAR CASE SIDE COVER	1	1
52	E200250520	LOノズル	L.O. NOZZLE	1	1
502	X200012030ZZ	ボルト	BOLT	24	32
504	X200012025ZZ	ボルト	BOLT		6
505	X200012025ZZ	ボルト	BOLT	4	4
508	X200012035ZZ	ボルト	BOLT	20	24
510	Z540200065ZZ	フランジ	FLANGE	5	6
512	Z541206065AZ	パツキン	GASKET	5	6
514	Z565001700ZZ	マルパツキン	GASKET	2	2
516	X210012050ZZ	スタツド	STUD	2	2
517	X210012054ZZ	スタツド	STUD	18	22
518	X210012048ZZ	スタツド	STUD	48	64
522	X210016054ZZ	スタツド	STUD	4	4
523	X210012046ZZ	スタツド	STUD	2	2
524	Z336008025ZZ	ダンツキピン	STEPPED PIN	6	8
528	Z571503000ZZ	テーパプラグ	TAPER PLUG	2	2
529	Z571503000ZZ	テーパプラグ	TAPER PLUG	24	32
530	Z571504000ZZ	テーパプラグ	TAPER PLUG	1	1
531	Z571503000ZZ	テーパプラグ	TAPER PLUG	7	9
533	Z560203531ZZ	O リング	O-RING	24	32
541	X341216070ZZ	ノツクボルトASSY	KNOCK BOLT ASSY.	2	2
551	X210012070ZZ	スタツド	STUD	2	2
557	X570003000ZZ	ロツカクプラグ	HEX.PLUG	11	15
558	Z565001700ZZ	マルパツキン	GASKET	11	15
565	X570006000ZZ	ロツカクプラグ	HEX.PLUG	1	1
566	Z565002700ZZ	マルパツキン	GASKET	1	1

架構（側面）– 変速型（主機）
ENGINE FRAME (SIDE VIEW) - VARIABLE SPEED TYPE (FOR PROPULSION)

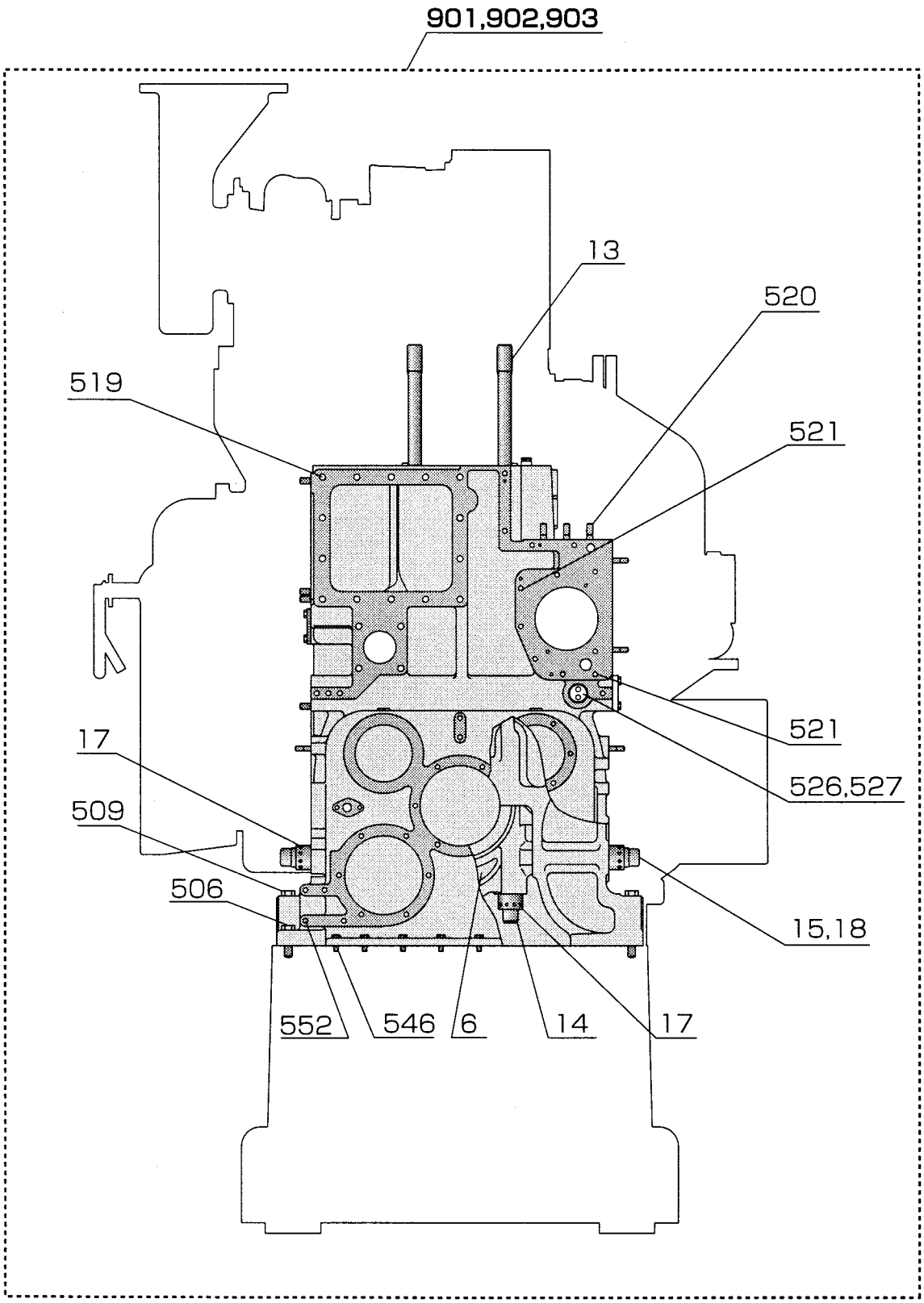


架構（側面）– 変速型（主機）
ENGINE FRAME (SIDE VIEW) - VARIABLE SPEED TYPE (FOR PROPULSION)

①……6DK ②……8DK

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity ①	②
903		カコウ ASSY.-6D, BTツキ-変速	ENGINE FRAME ASSY.-6D, W/BOLT-V	1	
904		カコウ ASSY.-8D, BTツキ-変速	ENGINE FRAME ASSY.-8D, W/BOLT-V		1
20	E200250200	ワンガタプラグ	BOWL TYPE PLUG	6	8
21	E200250210	トクシユプラグ	SPECIAL PLUG	1	1
23	E200250230	SA レンラクカン	S.A. CONNECTOR	6	8
24	E200250240	CW レンラクカン	C.W. CONNECTOR	24	32
28	E200250280	キユウキカンフタ	COVER, INTAKE MANIFOLD	3	4
29	E200250290	キユウキカンフタガスケツト	GASKET, INTAKE MANIFOLD LID	3	4
34	E200250340	スイシツフタ	COVER, C.W. MANIFOLD		1
35	E200250350	スイシツフタガスケット	GASKET, C.W. MANIFOLD LID		1
37	E200250370	ギヤケースフタ	GEAR CASE LID	1	1
38	E200250380	ギヤケースフタガスケツト	GASKET, GEAR CASE LID	1	1
39	E200250390	ホキギヤケースソクフタガスケツト	GASKET, AUX. GEARCASE SIDE COVER	1	1
52	E200250520	LO ノズル	L.O. NOZZLE	1	1
65	E200250650	カコウ-6DM	ENGINE FRAME-6DM	1	
75	E200250750	カコウ-8DM	ENGINE FRAME-8DM		1
502	X200012030ZZ	ボルト	BOLT	24	32
504	X200012025ZZ	ボルト	BOLT		6
505	X200012025ZZ	ボルト	BOLT	4	4
508	X200012035ZZ	ボルト	BOLT	20	24
510	Z540200065ZZ	フランジ	FLANGE	5	6
512	Z541206065AZ	パツキン	GASKET	5	6
514	Z565001700ZZ	マルパツキン	GASKET	2	2
516	X210012050ZZ	スタツド	STUD	2	2
517	X210012054ZZ	スタツド	STUD	18	22
518	X210012048ZZ	スタツド	STUD	48	64
522	X210016054ZZ	スタツド	STUD	4	4
523	X210012046ZZ	スタツド	STUD	2	2
524	Z336008025ZZ	ダンツキピン	STEPPED PIN	6	8
528	Z571503000ZZ	テーパプラグ	TAPER PLUG	2	2
529	Z571503000ZZ	テーパプラグ	TAPER PLUG	24	32
530	Z571504000ZZ	テーパプラグ	TAPER PLUG	1	1
531	Z571503000ZZ	テーパプラグ	TAPER PLUG	7	9
533	Z560203531ZZ	O リング	O RING	24	32
541	X341216070ZZ	ノツクボルト ASSY	KNOCK BOLT ASSY.	2	2
548	X213020160ZZ	オシボルト	JACK BOLT	4	6
551	X210012070ZZ	スタツド	STUD	2	2
557	X570003000ZZ	ロツカクプラグ	HEX.PLUG	11	15
558	Z565001700ZZ	マルパツキン	GASKET	11	15
565	X570006000ZZ	ロツカクプラグ	HEX.PLUG	1	1
566	Z565002700ZZ	マルパツキン	GASKET	1	1

架構（前面）– 補機歯車室（一体型）
ENGINE FRAME (FRONT VIEW) - AUX. MACHINERY GEAR CASE (ONE-BLOCK TYPE)



架構（前面）– 補機歯車室（一体型）
ENGINE FRAME (FRONT VIEW) - AUX. MACHINERY GEAR CASE (ONE-BLOCK TYPE)

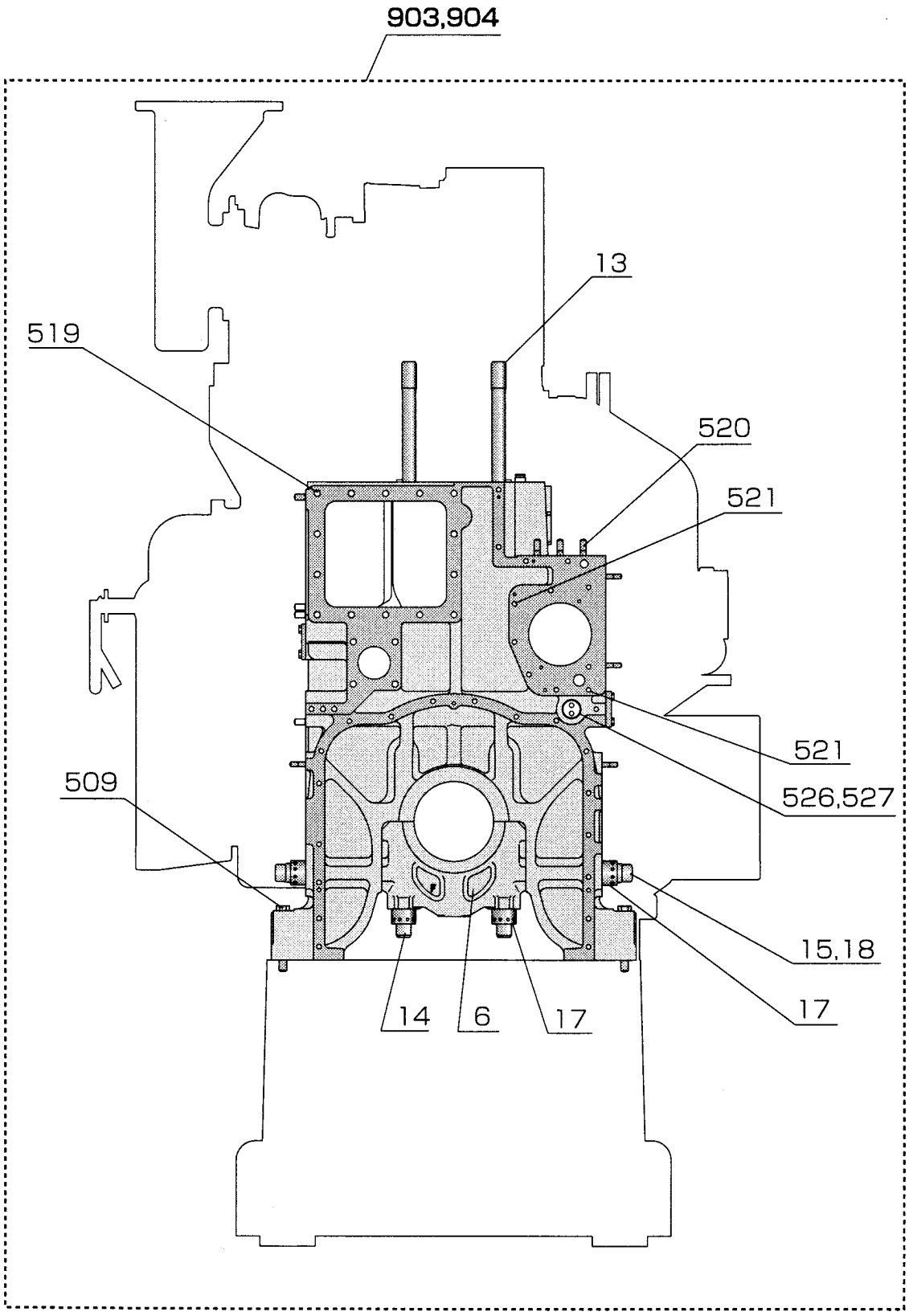
①……6DK ②……8DK

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity ①	②
901		カコウ ASSY.-6D, BTツキ-定速	ENGINE FRAME ASSY.-6D, W/BOLT-C	1	
902		カコウ ASSY.-8D, BTツキ-定速	ENGINE FRAME ASSY.-8D, W/BOLT-C		1
903		カコウ ASSY.-6D, BTツキ-変速	ENGINE FRAME ASSY.-6D, W/BOLT-V	1	
6	E200250060	シユジクウケ	MAIN METAL CAP	6	8 ※
13	E200250130	ヘツドボルト	HEAD BOLT	24	32
14	E200250140	シユジクウケボルト	MAIN BEARING BOLT	14	18
15	E200250150	サイドボルト	SIDE BOLT	14	18
17	E200250170	マルナツト	CIRCULAR NUT	28	36
18	E200250180	キヤツプ	CAP	14	18
506	X205020070ZZ	HT ボルト	HT BOLT	2	2
509	X205020160ZZ	HT ボルト	HT BOLT	16	20
519	X210016054ZZ	スタツド	STUD	4	4
520	X210016066ZZ	スタツド	STUD	18	24
521	X210012043ZZ	スタツド	STUD	2	2
526	Z665048000ZZ	マルパツキン	GASKET	1	1
527	X572348000ZZ	トクシユプラグ	SPECIAL PLIG	1	1
546	X200012035ZZ	ボルト	BOLT	8	8
552	X210012050ZZ	スタツド	STUD	4	4

注記
Remarks

※印部品の単体販売は不可
Parts (Signal ※) cannot be purchased by itself.

架構（前面）– 補機歯車室（分割型）
ENGINE FRAME (FRONT VIEW) - AUX. MACHINERY GEAR CASE (BUILT-UP TYPE)



架構（前面）– 補機歯車室（分割型）
ENGINE FRAME (FRONT VIEW) - AUX. MACHINERY GEAR CASE (BUILT-UP TYPE)

6·8DK-20

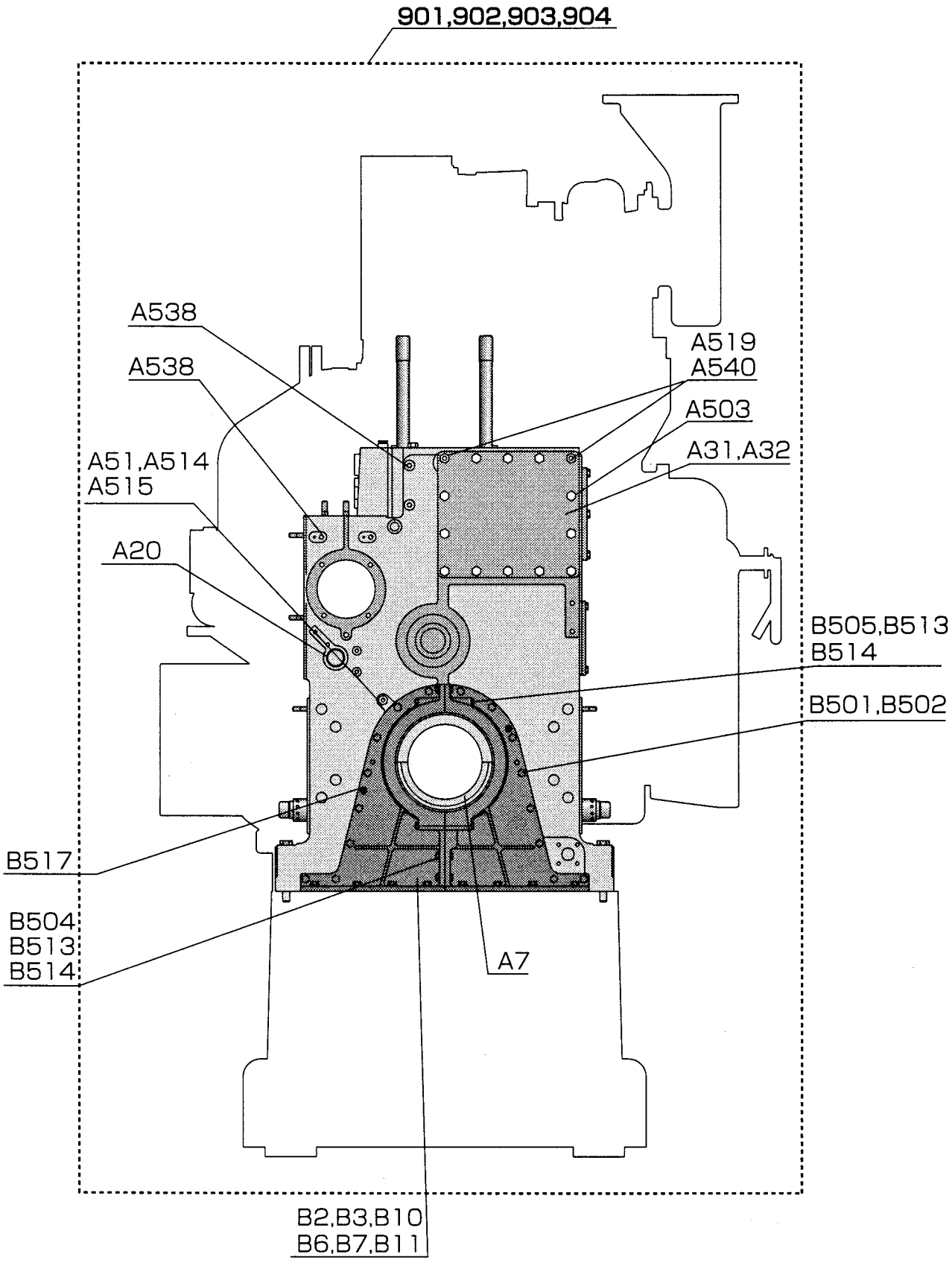
①……6DK ②……8DK

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity ①	②
903		カコウ ASSY.-6D, BTツキ-変速	ENGINE FRAME ASSY.-6D, W/BOLT-V	1	
904		カコウ ASSY.-8D, BTツキ-変速	ENGINE FRAME ASSY.-8D, W/BOLT-V		1
6	E200250060	シユジクウケ	MAIN METAL CAP	6	8 ※
13	E200250130	ヘツドボルト	HEAD BOLT	24	32
14	E200250140	シユジクウケボルト	MAIN BEARING BOLT	14	18
15	E200250150	サイドボルト	SIDE BOLT	14	18
17	E200250170	マルナツト	CIRCULAR NUT	28	36
18	E200250180	キヤツプ	CAP	14	18
509	X205020160ZZ	HT ボルト	HT BOLT	16	20
519	X210016054ZZ	スタツド	STUD	4	4
520	X210016066ZZ	スタツド	STUD	18	24
521	X210012043ZZ	スタツド	STUD	2	2
526	Z665048000ZZ	マルパツキン	GASKET	1	1
527	X572348000ZZ	トクシユプラグ	SPECIAL PLIG	1	1

注記
Remarks

※印部品の単体販売は不可
Parts (Signal ※) cannot be purchased by itself.

架構（後面）
ENGINE FRAME (REAR VIEW)



架構（後面）
ENGINE FRAME (REAR VIEW)

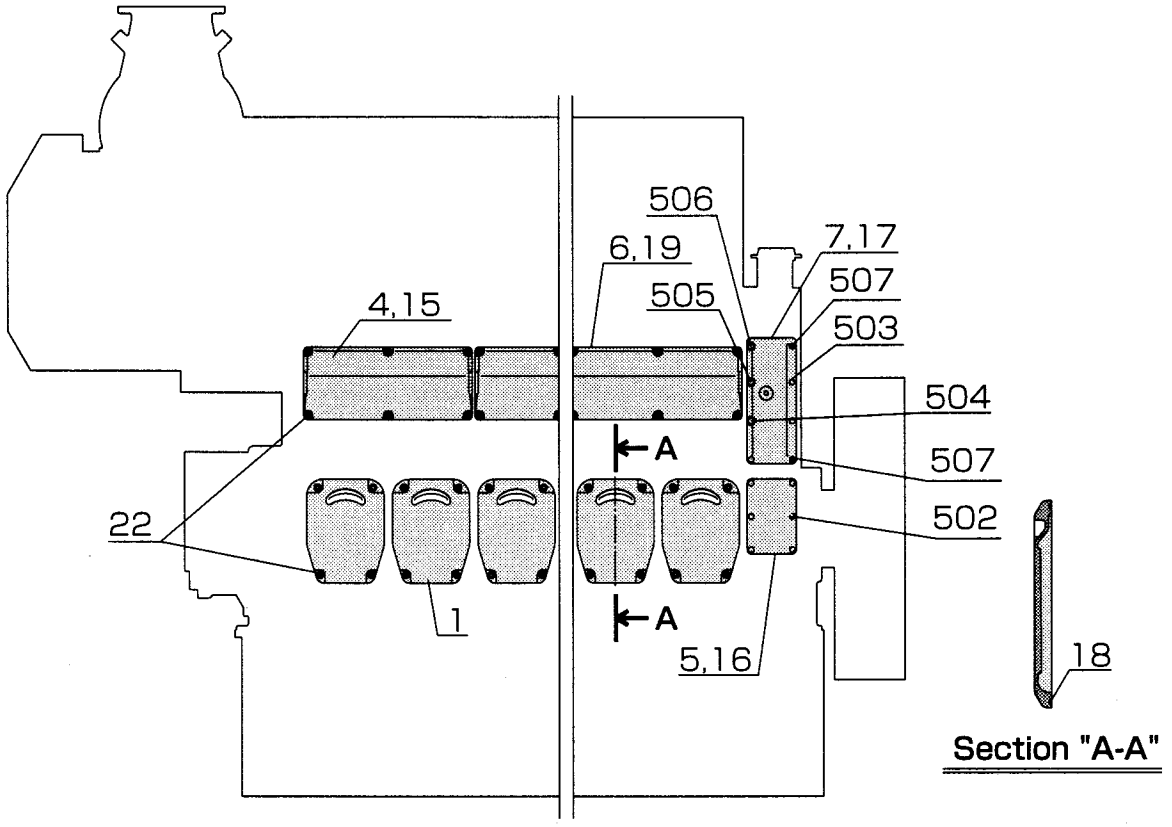
オイルパン OIL PAN ①……無 WITHOUT ②……有 WITH

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity ①	②
901		カコウ ASSY.-6D, BTツキ-定速	ENGINE FRAME ASSY.-6D, W/BOLT-C	1	
902		カコウ ASSY.-8D, BTツキ-定速	ENGINE FRAME ASSY.-8D, W/BOLT-C	1	
903		カコウ ASSY.-6D, BTツキ-変速	ENGINE FRAME ASSY.-6D, W/BOLT-V		1
904		カコウ ASSY.-8D, BTツキ-変速	ENGINE FRAME ASSY.-8D, W/BOLT-V		1
A7	E200250070	シユジクウケ（キジユン）	MAIN METAL CAP(REAR)	1	1 ※
A20	E200250200	ワンガタプラグ	BOWL TYPE PLUG	1	1
A31	E200250310	キユウキカンフタ-2	LID-2, INTAKE MANIFOLD	1	1
A32	E200250320	キユウキカンフタガスケツト-2	GASKET-2, INTAKE MANIFOLD LID	1	1
A51	E200250510	LO ノズル	L.O. NOZZLE	1	1
A503	X200016035ZZ	ボルト	BOLT	12	12
A514	Z56500170OZZ	マルパツキン	GASKET	2	2
A515	X230303000ZZ	トクシユナツト	SPECIAL NUT	1	1
A519	X210016054ZZ	スタツド	STUD	4	4
A538	X210012046ZZ	スタツド	STUD	2	2
A540	X220016000ZZ	ナツト	NUT	2	2
B2	E203050011	ウシロフタ-1	COVER-1, REAR SIDE	1	※
B3	E203050012	ウシロフタ-2	COVER-2, REAR SIDE	1	※
B6	E203050051	ウシロフタ-S-1	COVER-S-1, REAR SIDE		1 ※
B7	E203050052	ウシロフタ-S-2	COVER-S-2, REAR SIDE		1 ※
B10	E203050100	ウシロフタパツキン	GASKET, REAR SIDE COVER	1	
B11	E203050110	ウシロフタパッキン-S	GASKET, COVER-S, REAR SIDE		1
B501	X200012030ZZ	ボルト	BOLT	24	22
B502	Z300012000ZZ	ヒラザガネ	FLAT WASHER	24	22
B504	X200010040ZZ	ボルト	BOLT	3	3
B505	X200010160ZZ	ボルト	BOLT	2	2
B513	X220010000ZZ	ナツト	NUT	5	5
B514	Z300010000ZZ	ヒラザガネ	FLAT WASHER	5	5
B517	X34101003OZZ	ノツクボルト ASSY	KNOCK BOLT ASSY.	2	2

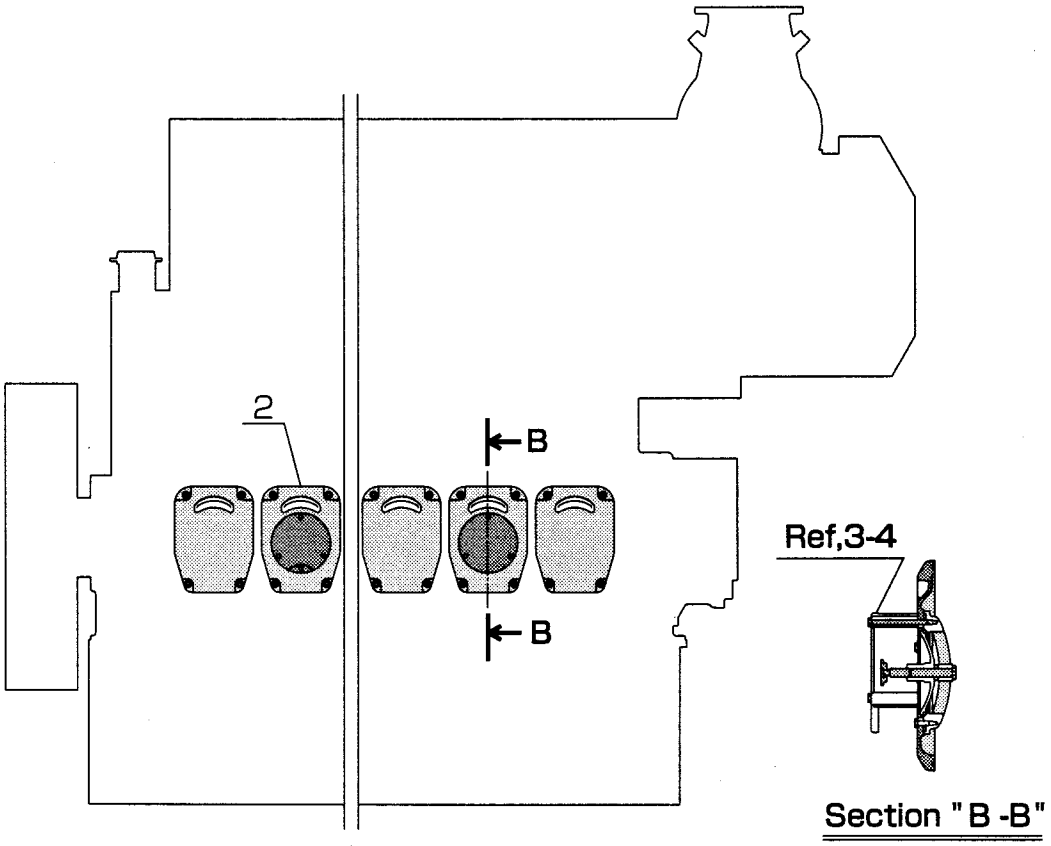
注記 Remarks

※印部品の単体販売は不可
Parts (Signal ※) cannot be purchased by itself.

架構側蓋
ENGINE SIDE COVER



Section "A-A"



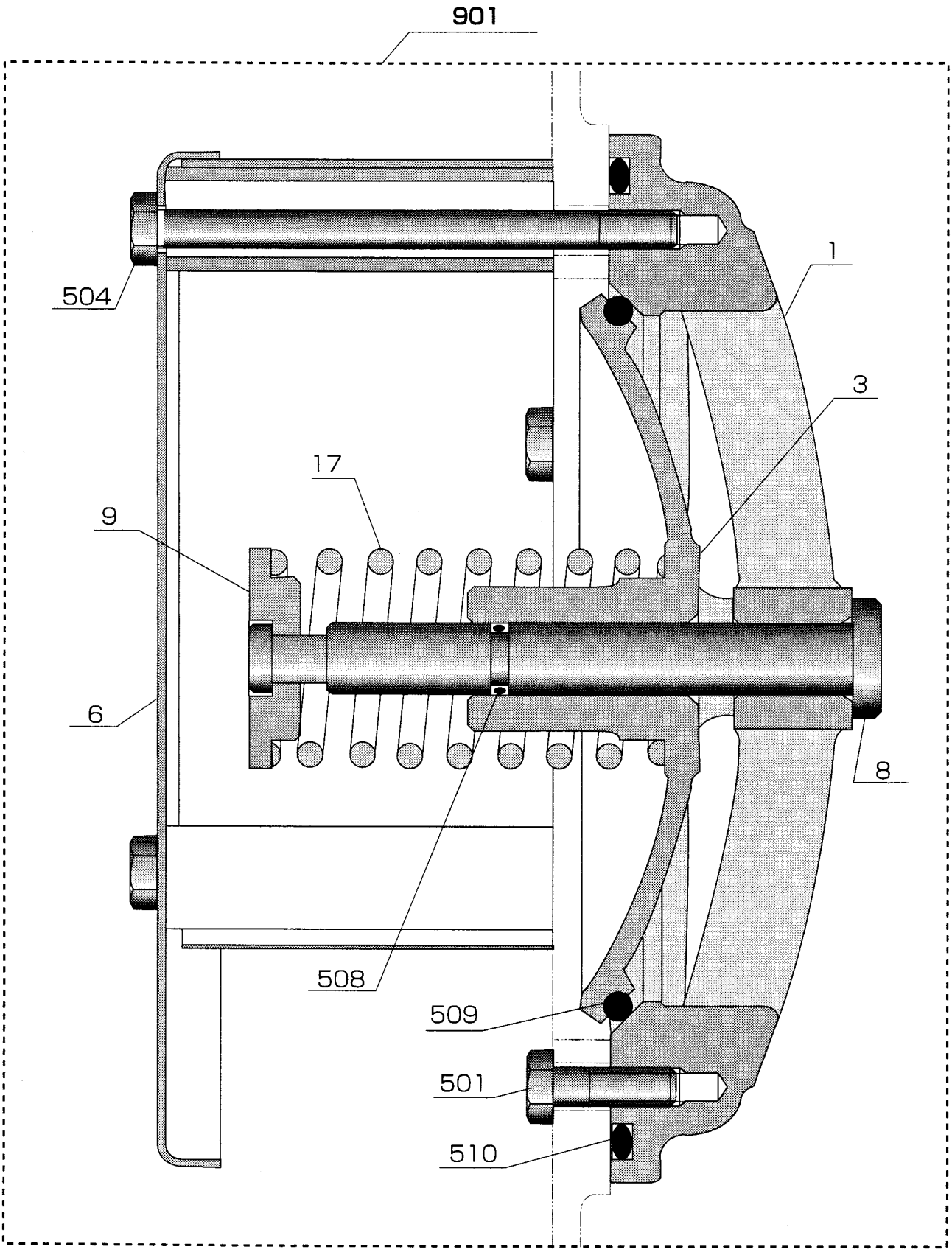
Section "B -B"

架構側蓋
ENGINE SIDE COVER

①……6DK ②……8DK

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity ①	②
1	E200350010	カコウソクフタ (1)	SIDE COVER (1)	10	14
2	E200350020	カコウソクフタ (2)	SIDE COVER (2)	2	2
4	E200350040	カコウソクフタ (4)	SIDE COVER (4)	3	1
5	E200350050	カコウソクフタ (5)	SIDE COVER (5)	1	1
6	E200350060	カコウソクフタ (7)	SIDE COVER (7)		2
7	E200350070	カムギヤカバー	CAM GEAR COVER	1	1
15	E200350150	カコウソクフタガスケツト (4)	GASKET, SIDE COVER (4)	3	1
16	E200350160	カコウソクフタガスケツト (5)	GASKET, SIDE COVER (5)	1	1
17	E200350170	カムギヤカバーガスケツト	GASKET,CAM GEAR COVER	1	1
18	E200350180	O リング	O-RING	12	16
19	E200350190	カコウソクフタガスケツト (7)	GASKET, SIDE COVER (7)		2
22	E200350220	ザツキナツト	FLANGE NUT	66	88
502	X200012020ZZ	ボルト	BOLT	6	6
503	X200012030ZZ	ボルト	BOLT	3	3
504	X200012112ZZ	ボルト	BOLT	1	1
505	X200012120ZZ	ボルト	BOLT	1	1
506	X200012070ZZ	ボルト	BOLT	1	1
507	X220012000ZZ	ナット	NUT	2	2

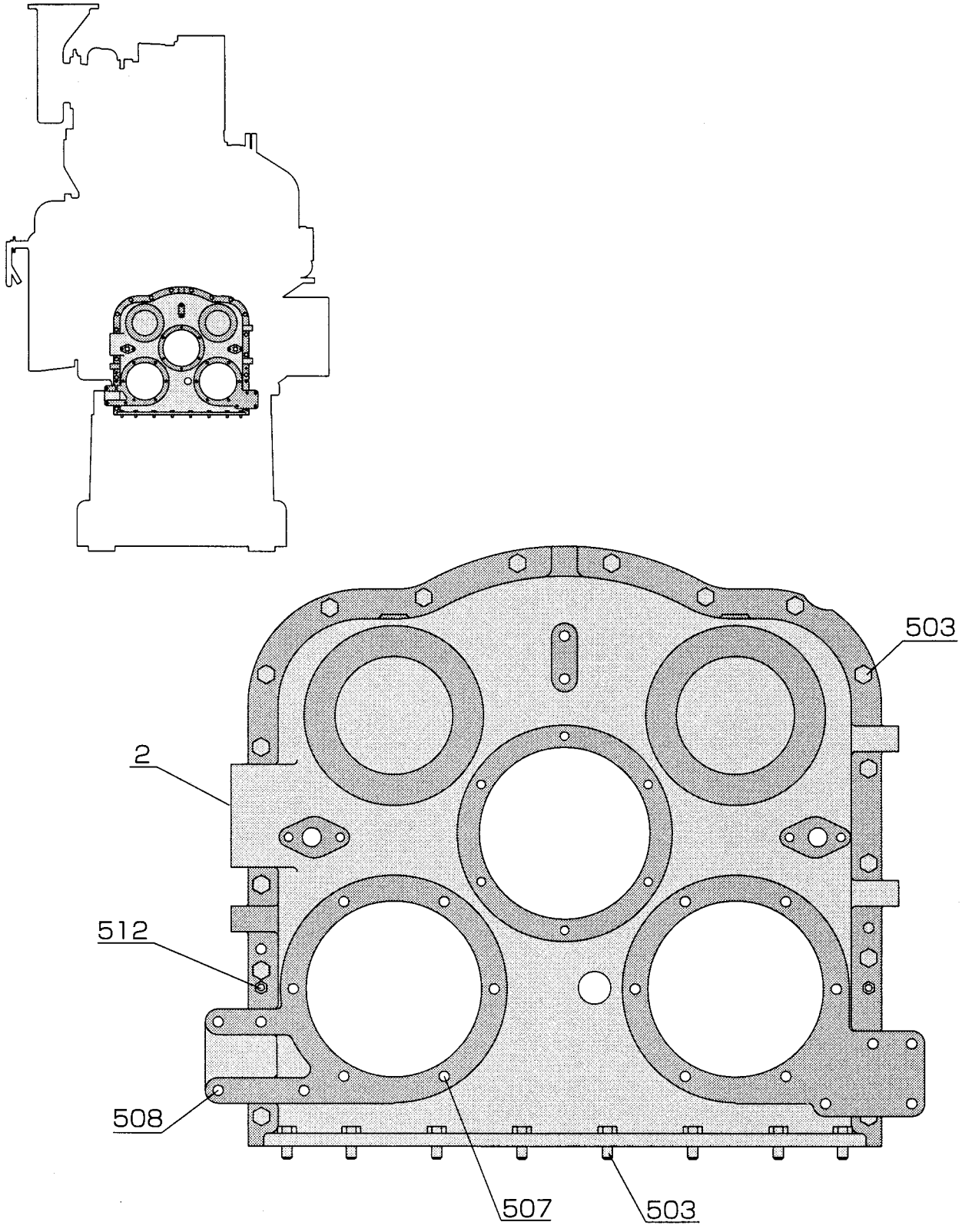
架構安全弁
ENGINE FRAME SAFETY VALVE



架構安全弁
ENGINE FRAME SAFETY VALVE

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
901	C031590010	カコウアンゼンベン ASSY.	ENGINE FRAME SAFETY VALVE ASSY.	1
1	C031510010	アンゼンベンシート	SEAT, SAFETY VALVE	1
3	C031510030	アンゼンベン	SAFETY VALVE	1
6	C031570060	アンゼンベンフタ	COVER, SAFETY VALVE	1
8	C031540080	アンゼンベンジク	SAFETY VALVE SHAFT	1
9	C031540090	アンゼンベンバネウケ	RETAINER, SAFETY VALVE	1
17	C031570171	バネ	SPRING	1
501	X200008020ZZ	ボルト	BOLT	3
504	X200008100ZZ	ボルト	BOLT	3
508	Z560101124ZZ	O リング	O-RING	1
509	Z560114057ZZ	O リング	O-RING	1
510	Z560219557ZZ	O リング	O-RING	1

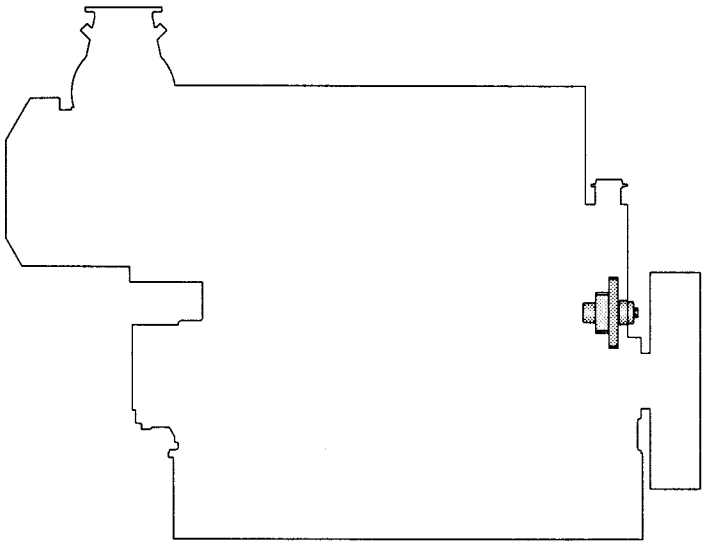
補機歯車室 (架構 - 分割型)
AUX. MACHINERY GEAR CASE (ENGINE FRAME - BUILT-UP TYPE)

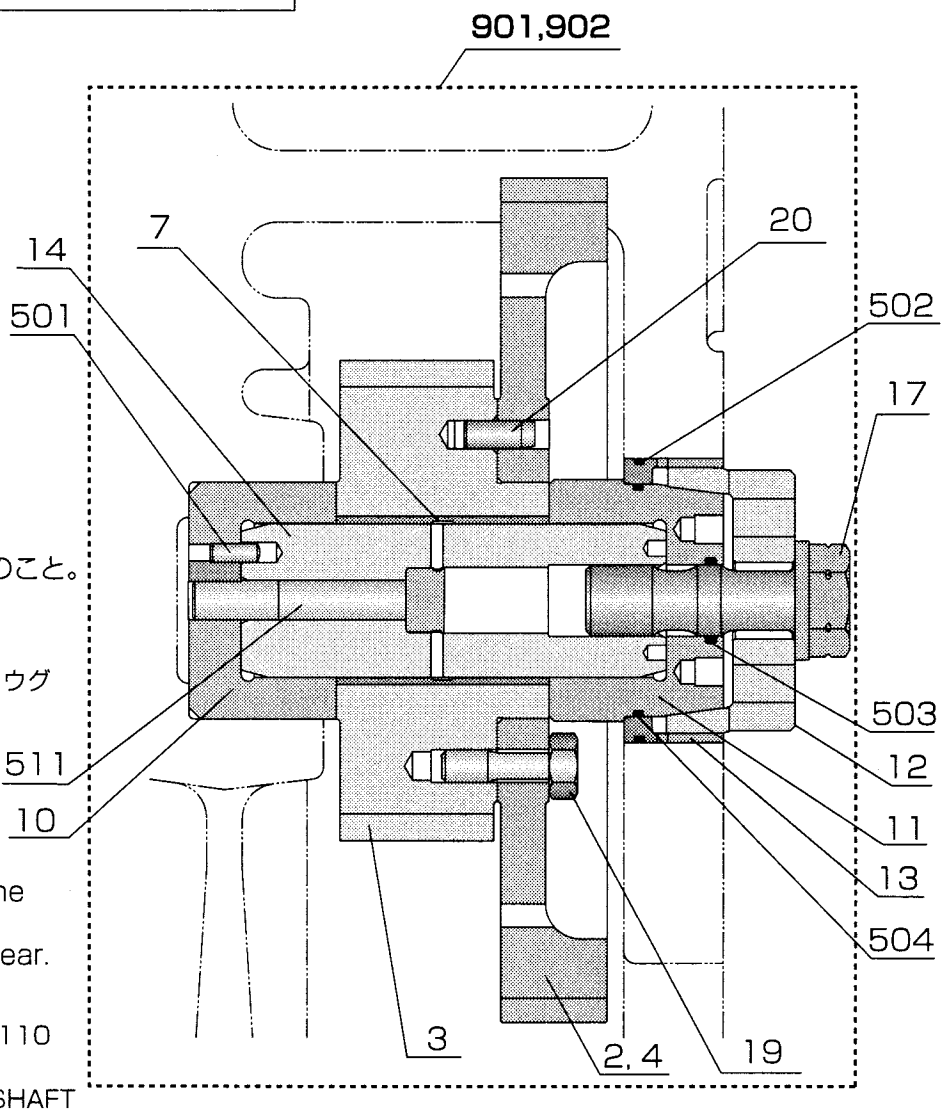


補機歯車室 (架構 - 分割型)
AUX. MACHINERY GEAR CASE
(ENGINE FRAME - BUILT-UP TYPE)

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
2	E203150020	ホキギヤケース	AUX. MACHINERY GEAR CASE	1
503	X200012030ZZ	ボルト	BOLT	26
507	X210012043ZZ	スタツド	STUD	12
508	X210012050ZZ	スタツド	STUD	4
512	X341010030ZZ	ノツクボルト ASSY	KNOCK BOLT ASSY.	2

アイドルギヤ
IDLE GEAR





[注記]
分解時下記工具を別途手配のこと。

オプション工具
部品番号：E219959110
部品名称：アイドルギヤジクヨウグ

[Remark]
Make arrangement for the following a tool when decompose of the idle gear.

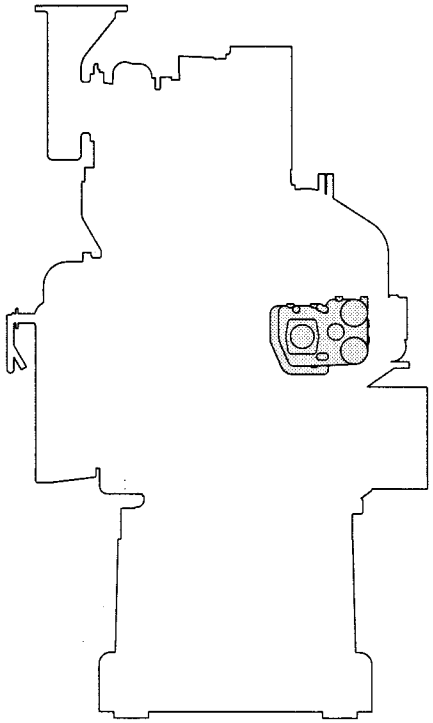
Optional tool
Parts number ：E219959110
Name of Parts :
REMOVER, IDLE GEAR SHAFT

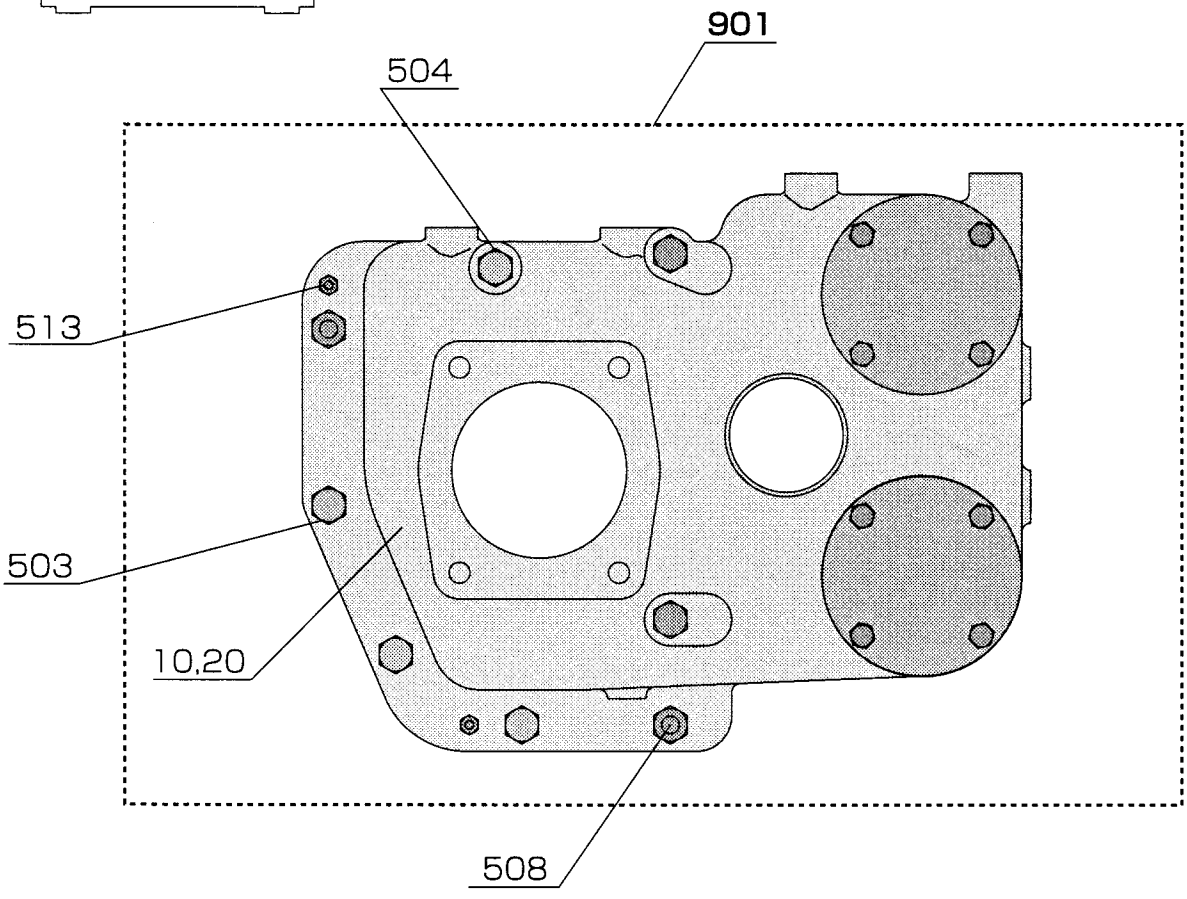
アイドルギヤ
IDLE GEAR

①……6DK ②……8DK

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity ①	②
901		アイドルギヤ ASSY.-6D	IDLE GEAR ASSY.-6D	1	
902		アイドルギヤ ASSY.-8D	IDLE GEAR ASSY.-8D		1
2	E203550020	アイドルギヤ (1)	IDLE GEAR (1)		1
3	E203550030	アイドルギヤ (2)	IDLE GEAR (2)	1	1
4	E203550040	アイドルギヤ (1)-TF	IDLE GEAR (1)-TF	1	
7	E203550070	アイドルギヤブシユ	BUSH,IDLE GEAR	1	1
10	E203550100	アイドルギヤジクササエ (1)	SUPPORTER (1), IDLE GEAR SHAFT	1	1
11	E203550110	アイドルギヤジクササエ (2)	SUPPORTER (2), IDLE GEAR SHAFT	1	1
12	E203550120	アイドルギヤジクササエ (3)	SUPPORTER (3), IDLE GEAR SHAFT	1	1
13	E203550130	アイドルギヤジクササエ (4)	SUPPORTER (4), IDLE GEAR SHAFT	1	1
14	E203550140	アイドルギヤジク	IDLE GEAR SHAFT	1	1
17	E203550170	アイドルギヤジクボルト	BOLT, IDLE GEAR SHAFT	1	1
19	E203550190	アイドルギヤボルト	BOLT, IDLE GEAR	8	8
20	E223500120	アイドルギヤノツク	KNOCK PIN, IDLE GEAR	1	1
501	Z336008020ZZ	ダンツキピン	STEPPED PIN	1	1
502	Z560211531ZZ	O リング	O-RING	1	1
503	Z560103035ZZ	O リング	O-RING	1	1
504	Z560209031ZZ	O リング	O-RING	1	1
511	Z2120160902Z	アナツキボルト	HEX. SOCKET BOLT	1	1

オイルポンプ歯車室（清水によるノズル冷却仕様）
OIL PUMP GEAR CASE (F.W. NOZZLE COOLENG SYSTEM)

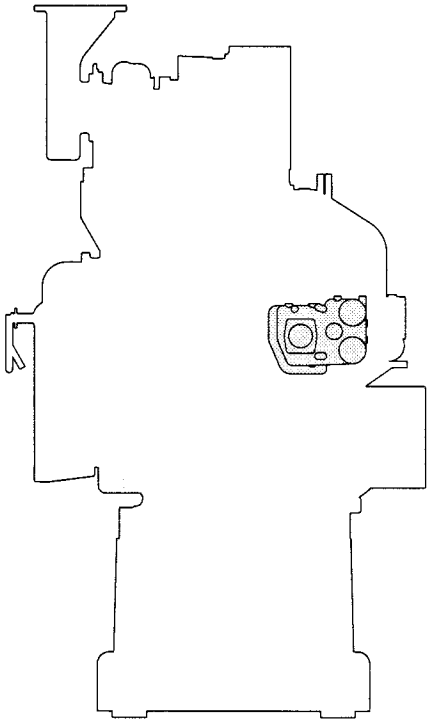


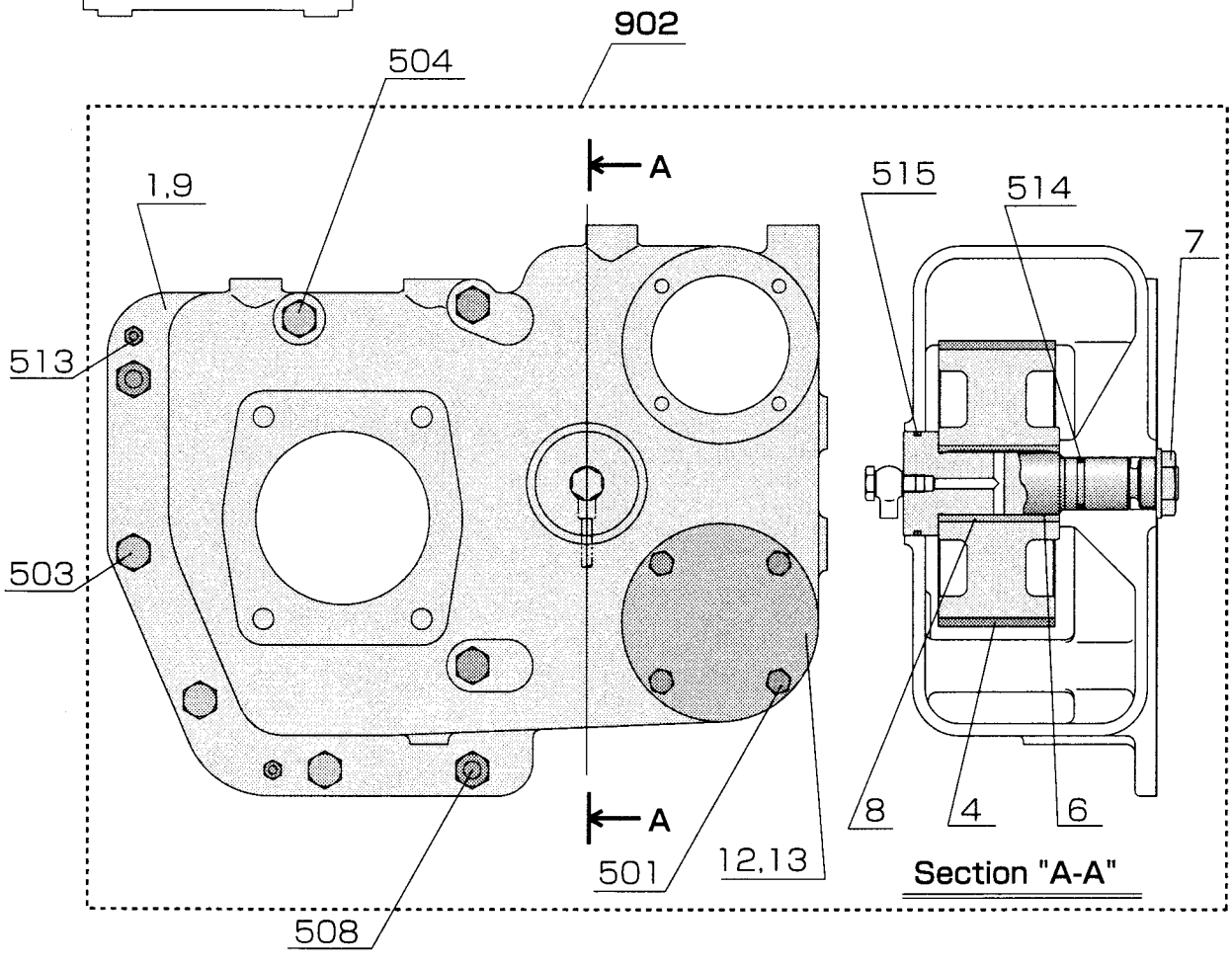


オイルポンプ歯車室（清水によるノズル冷却仕様）
OIL PUMP GEAR CASE
(F.W. NOZZLE COOLENG SYSTEM)

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
901		オイルポンプギヤケース ASSY.-CW	OIL PUMP GEAR CASE ASSY.-C.W.	1
10	E203250100	オイルポンプギヤケースガスケツト	GASKET, OIL PUMP GEAR CASE	1
20	E203250200	オイルポンプギヤケース	OIL PUMP GEAR CASE	1
503	X200012025ZZ	ボルト	BOLT	3
504	X200012160ZZ	ボルト	BOLT	3
508	X220012000ZZ	ナツト	NUT	2
513	X341008025ZZ	ノツクボルト ASSY	KNOCK BOLT ASSY.	2

オイルポンプ歯車室(A重油によるノズル冷却仕様)
OIL PUMP GEAR CASE (D.O. NOZZLE COOLENG SYSTEM)



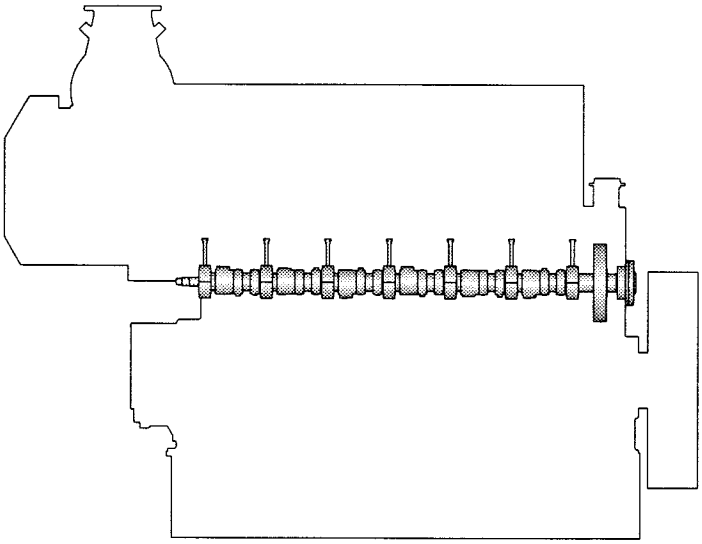


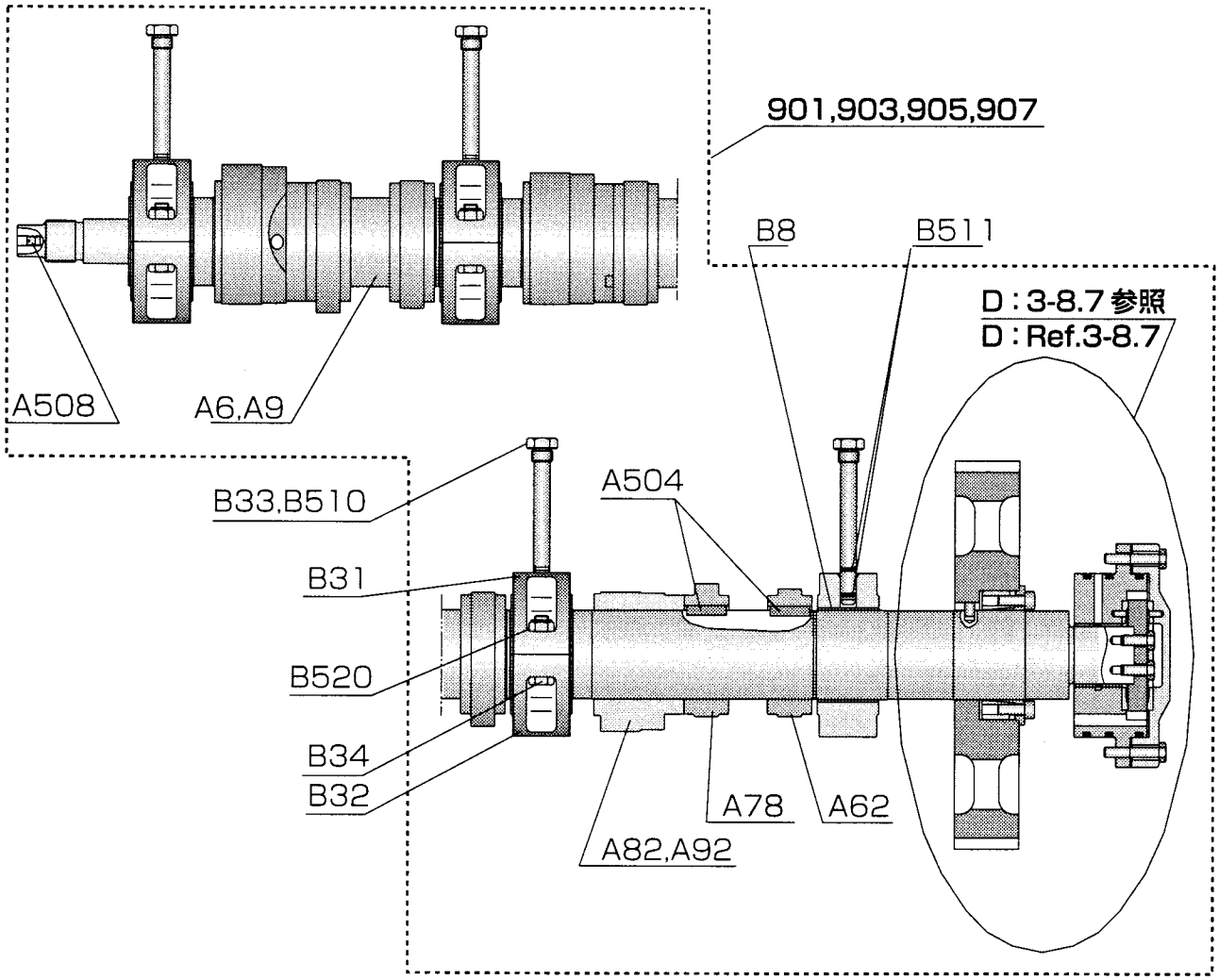
DAIHATSU

オイルポンプ歯車室(A重油によるノズル冷却仕様)
OIL PUMP GEAR CASE
(D.O. NOZZLE COOLENG SYSTEM)

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
902		オイルポンプギヤケース ASSY.-D.O.	OIL PUMP GEAR CASE ASSY.-D.O.	1
1	E203250010	オイルポンプギヤケース	OIL PUMP GEAR CASE	1
4	E223200040	ポンプクドウアイドルギヤ	IDLE GEAR, OIL PUMP	1
6	E223200060	ポンプアイドルギヤジク	PUMP IDLE GEAR SHAFT	1
7	E223200070	ポンプアイドルギヤジクナット	NUT, PUMP IDLE GEAR SHAFT	1
8	E223200080	ポンプアイドルギヤブッシュ	BUSH, PUMP IDLE GEAR	1
9	E203250090	オイルポンプギヤケースパツキン	GASKET, OIL PUMP GEAR CASE	1
12	E203250120	メクライタ	BLANK FLANGE	2
13	C263400060	フランジパツキン	GASKET	2
501	X200008014ZZ	ボルト	BOLT	8
503	X200012025ZZ	ボルト	BOLT	3
504	X200012160ZZ	ボルト	BOLT	3
508	X220012000ZZ	ナツト	NUT	2
513	X341008025ZZ	ノツクボルト ASSY	KNOCK BOLT ASSY.	2
514	Z560202531ZZ	O リング	O-RING	1
515	Z560205531ZZ	O リング	O-RING	1

カム軸（一体型 - 6DK）- 定速型
CAMSHAFT (ONE-BLOCK TYPE - 6DK) - CONSTANT SPEED TYPE





DAIHATSU

カム軸（一体型 - 6DK）- 定速型
CAMSHAFT (ONE-BLOCK TYPE - 6DK) - CONSTANT SPEED TYPE

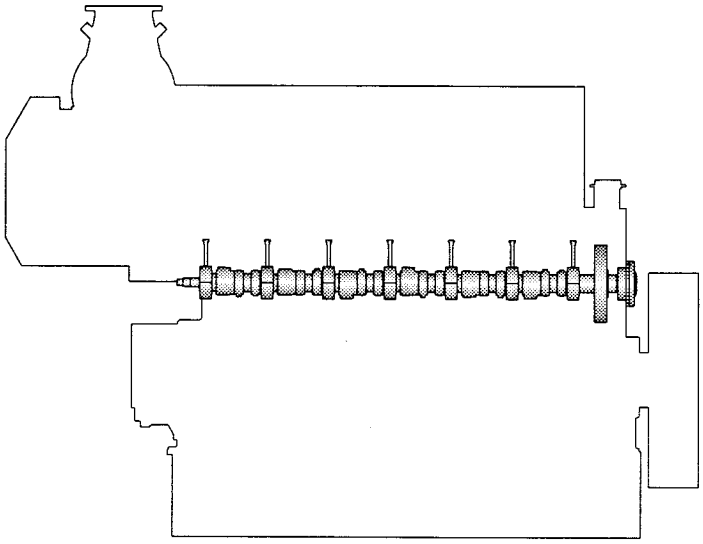
①……720～750rpm　②……900rpm

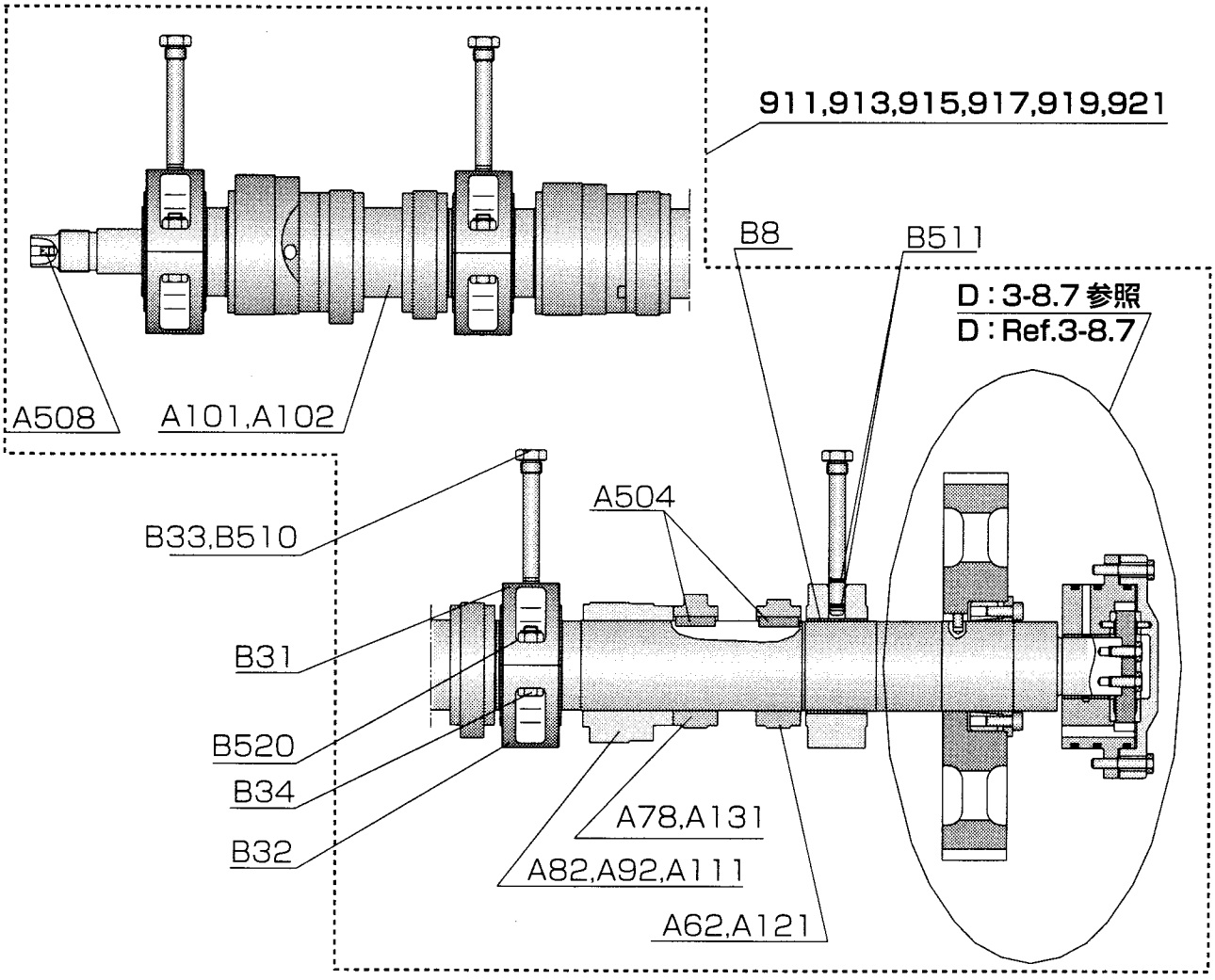
番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity ①	②	
901		カムジク ASSY.-6D-1	CAMSHAFT ASSY.-6D-1	1		※1
903		カムジク ASSY.-6D-3	CAMSHAFT ASSY.-6D-3		1	※1
905		カムジク ASSY.-6D-5	CAMSHAFT ASSY.-6D-5	1		※2
907		カムジク ASSY.-6D-7	CAMSHAFT ASSY.-6D-7		1	※2
A6	E201150060	カムジク - 6D (R)-D.O.	CAMSHAFT - 6D (R)-D.O.	1	1	※1
A9	E201150090	カムジク - 6D (R)-C.W.	CAMSHAFT - 6D (R)-C.W.	1	1	※2
A62-1	E201050611	ハイキカム (90.1)-285	EXHAUST CAM (90.1)-285	2	2	
A62-2	E201050612	ハイキカム (90.2)-285	EXHAUST CAM (90.2)-285	2	2	
A62-3	E201050613	ハイキカム (90.3)-285	EXHAUST CAM (90.3)-285	2	2	
A78-1	E201050771	キユウキカム (90.1)-265	INTAKE CAM (90.1)-265	2	2	
A78-2	E201050772	キユウキカム (90.2)-265	INTAKE CAM (90.2)-265	2	2	
A78-3	E201050773	キユウキカム (90.3)-265	INTAKE CAM (90.3)-265	2	2	
A82-1	E201050851	FO カム - 1 (90.1)	F.O. CAM-1 (90.1)		2	
A82-2	E201050852	FO カム - 1 (90.2)	F.O. CAM-1 (90.2)		2	
A82-3	E201050853	FO カム - 1 (90.3)	F.O. CAM-1 (90.3)		2	
A92-1	E201050911	FO カム - 2 (90.1)	F.O. CAM-2 (90.1)	2		
A92-2	E201050912	FO カム - 2 (90.2)	F.O. CAM-2 (90.2)	2		
A92-3	E201050913	FO カム - 2 (90.3)	F.O. CAM-2 (90.3)	2		
A504	Z400015040ZZ	キー	KEY	12	12	
A508	X251210010ZZ	トメネジ	SET SCREW	1	1	※1
B8	E201250080	カムジクウケ	CAM SHAFT BEARING SHELL	7	7	
B31	E201250310	カムジクウケ（ウエ）	BEARING, CAM SHAFT (UPPER)	7	7	
B32	E201250320	カムジクウケ（シタ）	BEARING, CAM SHAFT (LOWER)	7	7	
B33	E201250330	ピン，カムジクウケ -1	PIN,CAM SHAFT BEARING-1	7	7	
B34	E261210080	リーマボルト	REAMER BOLT	14	14	
B510	Z565002100ZZ	マルパツキン	GASKET	7	7	
B511	Z560112524ZZ	O リング	O-RING	14	14	
B520	X227014000ZZ	Uナツト	U-NUT	14	14	

注記
Remarks

※1……A重油によるノズル冷却仕様　D.O. Nozzle cooling system
※2……清水によるノズル冷却仕様　F.W. Nozzle cooling system

カム軸（一体型 - 6DK）- 変速型（主機）
CAMSHAFT (ONE-BLOCK TYPE - 6DK) - VARIABLE SPEED TYPE (FOR PROPULSION)





DAIHATSU

カム軸（一体型 - 6DK）- 変速型（主機）
CAMSHAFT (ONE-BLOCK TYPE - 6DK) - VARIABLE SPEED TYPE (FOR PROPULSION)

① 720～750rpm…正転 NORMAL ROTATION　② 900rpm…正転 NORMAL ROTATION　③ 900rpm…逆転 REVERSE ROTATION

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity ①	②	③	
911		カムジク ASSY.-6D-11	CAMSHAFT ASSY.-6D-11	1			※1
913		カムジク ASSY.-6D-13	CAMSHAFT ASSY.-6D-13		1		※1
915		カムジク ASSY.-6D-15	CAMSHAFT ASSY.-6D-15			1	※1
917		カムジク ASSY.-6D-17	CAMSHAFT ASSY.-6D-17	1			※2
919		カムジク ASSY.-6D-19	CAMSHAFT ASSY.-6D-19		1		※2
921		カムジク ASSY.-6D-21	CAMSHAFT ASSY.-6D-21			1	※2
A62-1	E201050611	ハイキカム (90.1)-285	EXHAUST CAM (90.1)-285	2	2		
A62-2	E201050612	ハイキカム (90.2)-285	EXHAUST CAM (90.2)-285	2	2		
A62-3	E201050613	ハイキカム (90.3)-285	EXHAUST CAM (90.3)-285	2	2		
A78-1	E201050771	キユウキカム (90.1)-265	INTAKE CAM (90.1)-265	2	2		
A78-2	E201050772	キユウキカム (90.2)-265	INTAKE CAM (90.2)-265	2	2		
A78-3	E201050773	キユウキカム (90.3)-265	INTAKE CAM (90.3)-265	2	2		
A82-1	E201050851	FO カム -1 (90.1)	F.O. CAM-1 (90.1)		2		
A82-2	E201050852	FO. カム -1 (90.2)	F.O. CAM-1 (90.2)		2		
A82-3	E201050853	FO カム -1 (90.3)	F.O. CAM-1 (90.3)		2		
A92-1	E201050911	FO カム -2 (90.1)	F.O. CAM-2 (90.1)	2			
A92-2	E201050912	FO カム -2 (90.2)	F.O. CAM-2 (90.2)	2			
A92-3	E201050913	FO カム -2 (90.3)	F.O. CAM-2 (90.3)	2			
A101	E201151010	カムジク - 6DM-(R)-DO	CAMSHAFT - 6DM(R)-D.O.	1	1	1	※1
A102	E201151020	カムジク - 6DM-(R)-CW	CAMSHAFT - 6DM(R)-C.W.	1	1	1	※2
A111-1	E201051101	FO カム -3 (90.1)	F.O. CAM-3 (90.1)			2	
A111-2	E201051102	FO カム -3 (90.2)	F.O. CAM-3 (90.2)			2	
A111-3	E201051103	FO カム -3 (90.3)	F.O. CAM-3 (90.3)			2	
A121-1	E201051201	ハイキカム (90.1)-285L	EXHAUST CAM (90.1)-285L			2	
A121-2	E201051202	ハイキカム (90.2)-285L	EXHAUST CAM (90.2)-285L			2	
A121-3	E201051203	ハイキカム (90.3)-285L	EXHAUST CAM (90.3)-285L			2	
A131-1	E201051301	キュウキカム (90.1)-265L	INTAKE CAM (90.1)-265L			2	
A131-2	E201051302	キュウキカム (90.2)-265L	INTAKE CAM (90.2)-265L			2	
A131-3	E201051303	キュウキカム (90.3)-265L	INTAKE CAM (90.3)-265L			2	
A504	Z400015040ZZ	キー	KEY	12	12	12	
A508	X251210010ZZ	トメネジ	SET SCREW	1	1	1	※1

注記 Remarks

※1……A重油によるノズル冷却仕様　D.O. Nozzle cooling system
※2……清水によるノズル冷却仕様　F.W. Nozzle cooling system

カム軸（一体型 - 6DK）- 変速型（主機）
CAMSHAFT (ONE-BLOCK TYPE - 6DK) - VARIABLE SPEED TYPE (FOR PROPULSION)

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
B8	E201250080	カムジクウケ	ECAM SHAFT BEARING SHELL	7
B31	E201250310	カムジクウケ（ウエ）	BEARING, CAM SHAFT (UPPER)	7
B32	E201250320	カムジクウケ（シタ）	BEARING, CAM SHAFT (LOWER)	7
B33	E201250330	ピン，カムジクウケ -1	PIN, CAM SHAFT BEARING-1	7
B34	E261210080	リーマボルト	REAMER BOLT	14
B510	Z565002100ZZ	マルパツキン	GASKET	7
B511	Z560112524ZZ	O リング	O-RING	14
B520	X227014000ZZ	Uナツト	U-NUT	14

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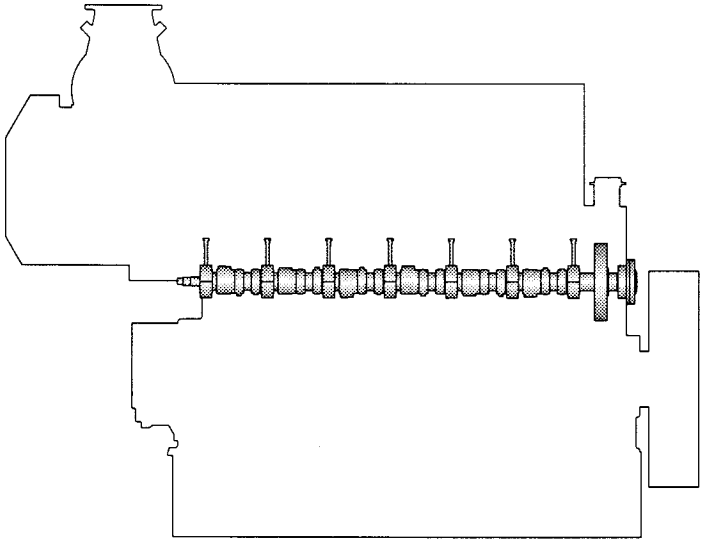
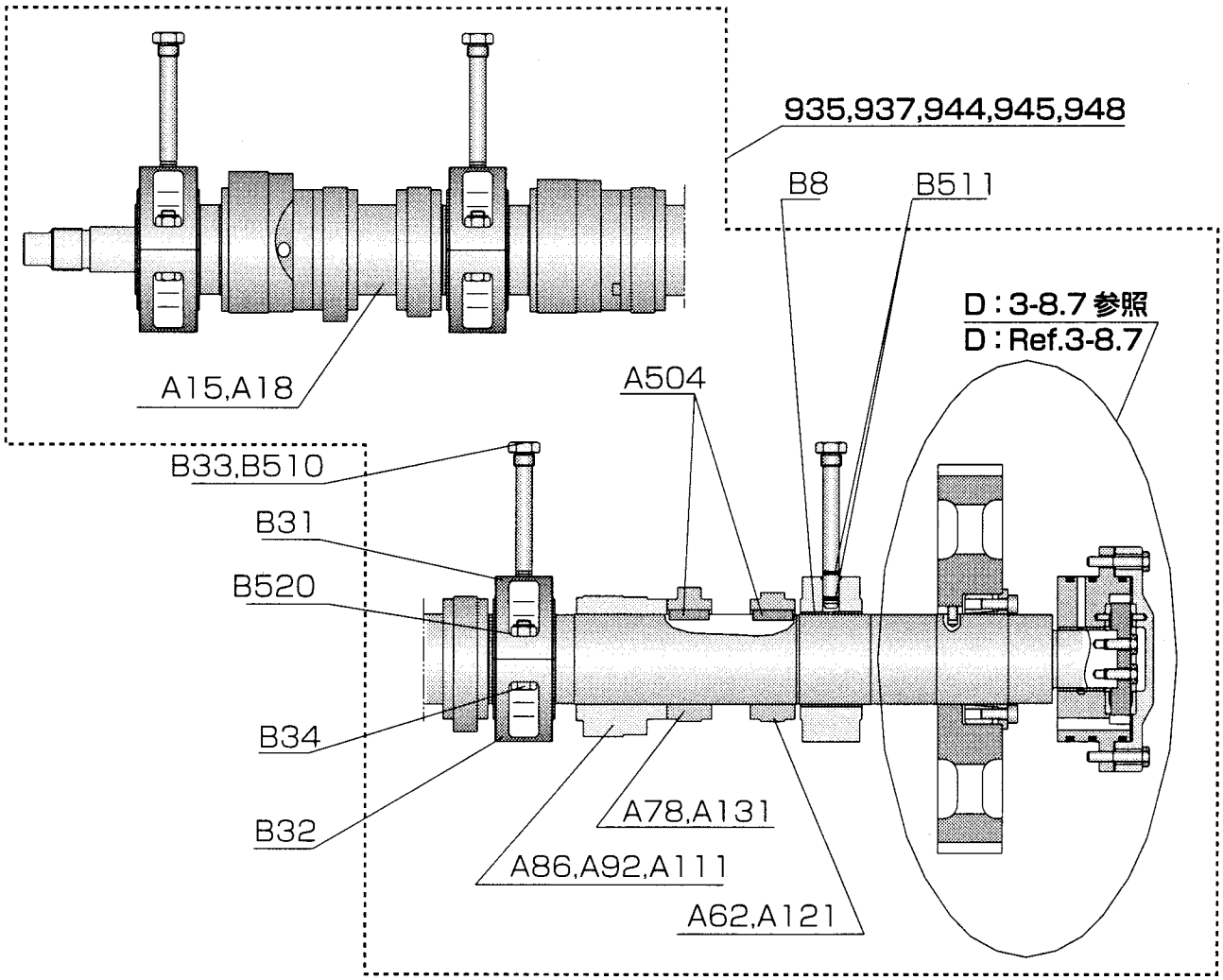
カム軸（一体型 - 8DK)
CAMSHAFT (ONE-BLOCK TYPE - 8DK)





カム軸（一体型 - 8DK)
CAMSHAFT (ONE-BLOCK TYPE - 8DK)

① 720～750rpm…正転 NORMAL ROTATION　② 900rpm…正転 NORMAL ROTATION　③ 900rpm…逆転 REVERSE ROTATION

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity ①	②	③	
935		カムジク ASSY.-8D-5	CAMSHAFT ASSY.-8D-5	1			※2
937		カムジク ASSY.-8D-7	CAMSHAFT ASSY.-8D-7		1		※2
944		カムジク ASSY.-8D-14	CAMSHAFT ASSY.-8D-14	1			※1
945		カムジク ASSY.-8D-15	CAMSHAFT ASSY.-8D-15		1		※1
948		カムジク ASSY.-8D-18	CAMSHAFT ASSY.-8D-18			1	※2
A15	E201050150	カムジク - 8D (R)-CW	CAMSHAFT - 8D (R)-C.W.	1	1	1	※2
A18	E201050180	カムジク - 8D (R)-DO	CAMSHAFT - 8D (R)-D.O.	1	1		※1
A62-1	E201050611	ハイキカム (90.1)-285	EXHAUST CAM (90.1)-285	2	2		
A62-2	E201050612	ハイキカム (90.2)-285	EXHAUST CAM (90.2)-285	2	2		
A62-3	E201050613	ハイキカム (90.3)-285	EXHAUST CAM (90.3)-285	2	2		
A62-4	E201050614	ハイキカム (90.4)-285	EXHAUST CAM (90.4)-285	2	2		
A78-1	E201050771	キユウキカム (90.1)-265	INTAKE CAM (90.1)-265	2	2		
A78-2	E201050772	キユウキカム (90.2)-265	INTAKE CAM (90.2)-265	2	2		
A78-3	E201050773	キユウキカム (90.3)-265	INTAKE CAM (90.3)-265	2	2		
A78-4	E201050774	キユウキカム (90.4)-265	INTAKE CAM (90.4)-265	2	2		
A86-1	E201050851	FO.カム -1 (90.1)	F.O. CAM-1 (90.1)		2		
A86-2	E201050852	FO カム -1 (90.2)	F.O. CAM-1 (90.2)		2		
A86-3	E201050853	FO カム -1 (90.3)	F.O. CAM-1 (90.3)		2		
A86-4	E201050854	FO カム -1 (90.4)	F.O. CAM-1 (90.4)		2		
A92-1	E201050911	FO カム -2 (90.1)	F.O. CAM-2 (90.1)	2			
A92-2	E201050912	FO カム -2 (90.2)	F.O. CAM-2 (90.2)	2			
A92-3	E201050913	FO カム -2 (90.3)	F.O. CAM-2 (90.3)	2			
A92-4	E201050914	FO カム -2 (90.4)	F.O. CAM-2 (90.4)	2			
A111-1	E201051101	FO カム -3 (90.1)	F.O. CAM-3 (90.1)			2	
A111-2	E201051102	FO カム -3 (90.2)	F.O. CAM-3 (90.2)			2	
A111-3	E201051103	FO カム -3 (90.3)	F.O. CAM-3 (90.3)			2	
A111-4	E201051104	FO カム -3 (90.4)	F.O. CAM-3 (90.4)			2	
A121-1	E201051201	ハイキカム (90.1)-285L	EXHAUST CAM (90.1)-285L			2	
A121-2	E201051202	ハイキカム (90.2)-285L	EXHAUST CAM (90.2)-285L			2	
A121-3	E201051203	ハイキカム (90.3)-285L	EXHAUST CAM (90.3)-285L			2	
A121-4	E201051204	ハイキカム (90.4)-285L	EXHAUST CAM (90.4)-285L			2	
A131-1	E201051301	キユウキカム (90.1)-265L	INTAKE CAM (90.1)-265L			2	
A131-2	E201051302	キユウキカム (90.2)-265L	INTAKE CAM (90.2)-265L			2	
A131-3	E201051303	キユウキカム (90.3)-265L	INTAKE CAM (90.3)-265L			2	
A131-4	E201051304	キユウキカム (90.4)-265L	INTAKE CAM (90.4)-265L			2	
A504	Z400015040ZZ	キー	KEY	16	16	16	

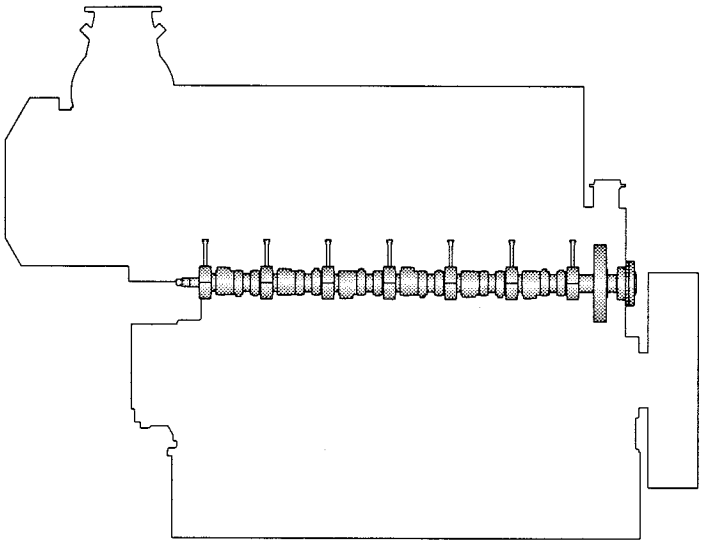
注記 Remarks

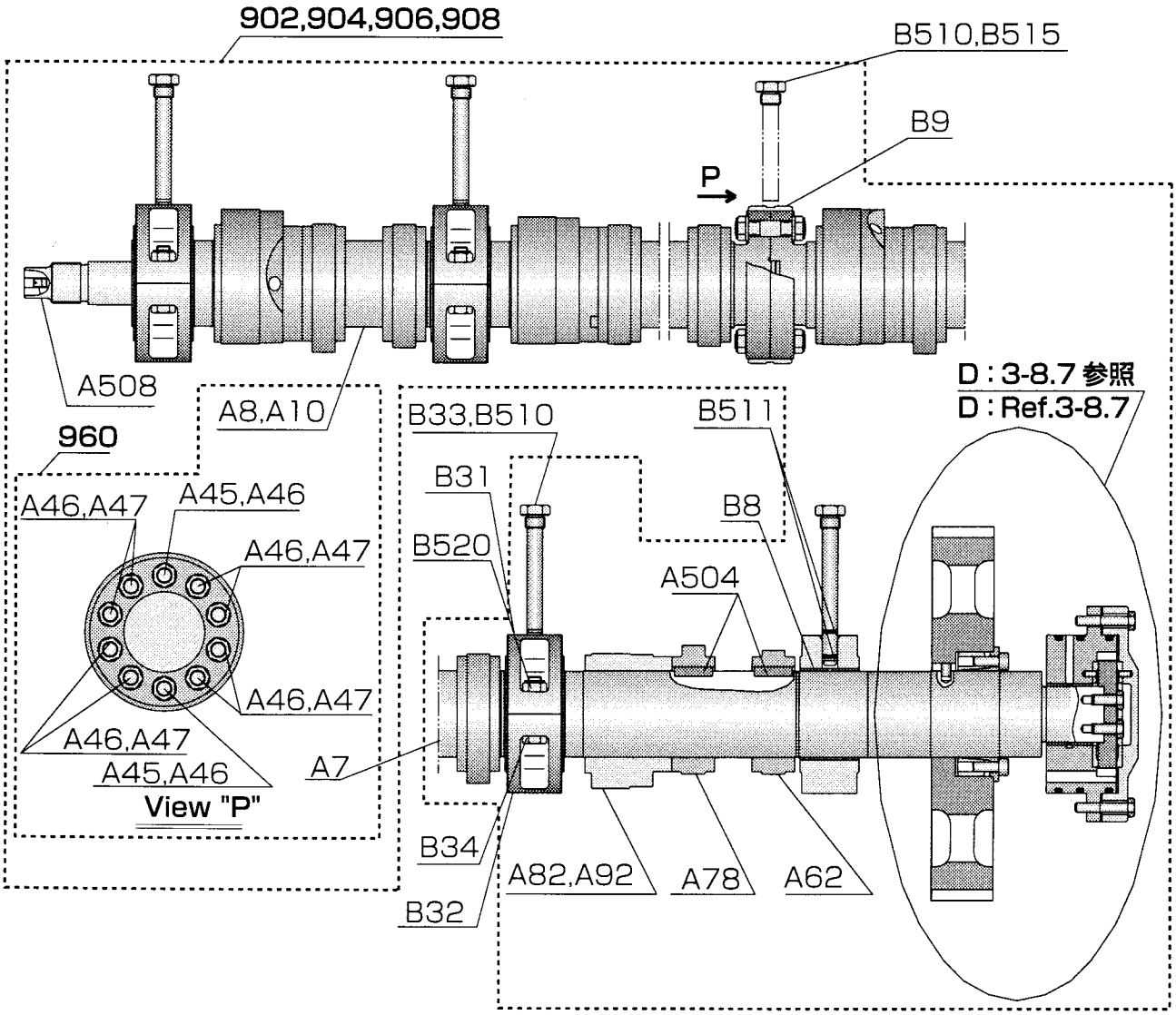
※1……A重油によるノズル冷却仕様　D.O. Nozzle cooling system
※2……清水によるノズル冷却仕様　F.W. Nozzle cooling system

カム軸（一体型 - 8DK)
CAMSHAFT (ONE-BLOCK TYPE - 8DK)

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
B8	E201250080	カムジクウケ	CAM SHAFT BEARING SHELL	9
B31	E201250310	カムジクウケ（ウエ）	BEARING, CAM SHAFT (UPPER)	9
B32	E201250320	カムジクウケ（シタ）	BEARING, CAM SHAFT (LOWER)	9
B33	E201250330	ピン，カムジクウケ -1	PIN, CAM SHAFT BEARING-1	9
B34	E261210080	リーマボルト	REAMER BOLT	18
B510	Z565002100ZZ	マルパツキン	GASKET	9
B511	Z560112524ZZ	O リング	O-RING	18
B520	X227014000ZZ	Uナツト	U-NUT	18

カム軸（分割型 - 6DK）- 定速型
CAMSHAFT (BUILT-UP TYPE - 6DK) - CONSTANT SPEED TYPE





カム軸（分割型 - 6DK）- 定速型
CAMSHAFT (BUILT-UP TYPE - 6DK) - CONSTANT SPEED TYPE

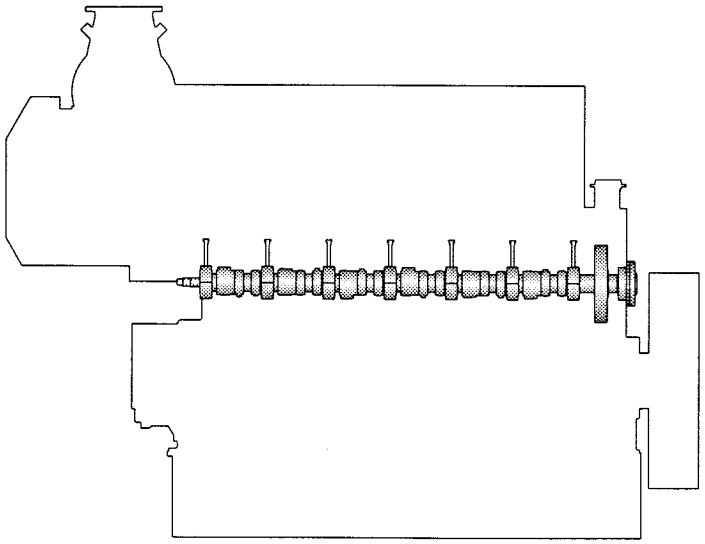
①……720～750rpm ②……900rpm

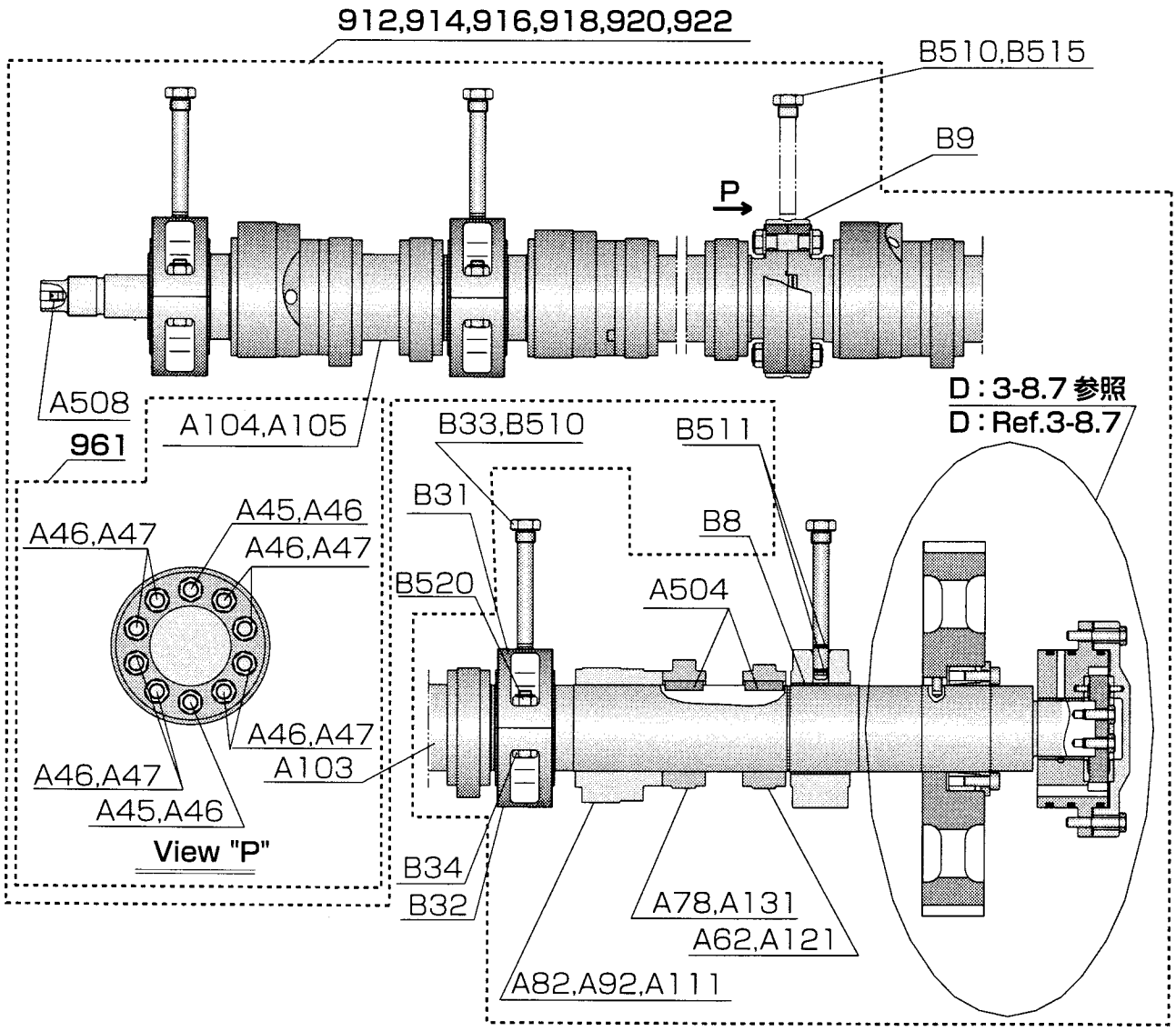
番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity ①	②	
902		カムジク ASSY.-6D-2	CAMSHAFT ASSY.-6D-2	1		※1
904		カムジク ASSY.-6D-4	CAMSHAFT ASSY.-6D-4		1	※1
906		カムジク ASSY.-6D-6	CAMSHAFT ASSY.-6D-6	1		※2
908		カムジク ASSY.-6D-8	CAMSHAFT ASSY.-6D-8		1	※2
960		カムジク (サブ) ASSY.-6D-C	CAMSHAFT SUB.-ASSY.-6D-C	1	1	
A7	E201150070	カムジク - 6DK-R(R)	CAMSHAFT - 6DK-R(R)	1	1	
A8	E201150080	カムジク - 6D (B-U) F-DO	CAMSHAFT - 6D(B-U) F-D.O.	1	1	※1
A10	E201150100	カムジク - 6D (B-U) F-CW	CAMSHAFT - 6D(B-U) F-C.W.	1	1	※2
A45	E201150450	カムジクボルト-2	CAMSHAFT BOLT-2	2	2	
A46	E201150460	Uナット	U-NUT	20	20	
A47	E201150470	カムジクボルト -1	CAMSHAFT BOLT-1	8	8	
A62-1	E201050611	ハイキカム (90.1)-285	EXHAUST CAM (90.1)-285	2	2	
A62-2	E201050612	ハイキカム (90.2)-285	EXHAUST CAM (90.2)-285	2	2	
A62-3	E201050613	ハイキカム (90.3)-285	EXHAUST CAM (90.3)-285	2	2	
A78-1	E201050771	キユウキカム (90.1)-265	INTAKE CAM (90.1)-265	2	2	
A78-2	E201050772	キユウキカム (90.2)-265	INTAKE CAM (90.2)-265	2	2	
A78-3	E201050773	キユウキカム (90.3)-265	INTAKE CAM (90.3)-265	2	2	
A82-1	E201050851	FO カム -1 (90.1)	F.O. CAM-1 (90.1)		2	
A82-2	E201050852	FO カム -1 (90.2)	F.O. CAM-1 (90.2)		2	
A82-3	E201050853	FO カム -1 (90.3)	F.O. CAM-1 (90.3)		2	
A92-1	E201050911	FO カム -2 (90.1)	F.O. CAM-2 (90.1)	2		
A92-2	E201050912	FO カム -2 (90.2)	F.O. CAM-2 (90.2)	2		
A92-3	E201050913	FO カム -2 (90.3)	F.O. CAM-2 (90.3)	2		
A504	Z400015040ZZ	キー	KEY	12	12	
A508	X251210010ZZ	トメネジ	SET SCREW	1	1	※1
B8	E201250080	カムジクウケ	CAM SHAFT BEARING SHELL	6	6	
B9	E200250600	バランスシャフトブッシュ	BUSH, BALANCE SHAFT	1	1	
B31	E201250310	カムジクウケ（ウエ）	BEARING, CAM SHAFT (UPPER)	6	6	
B32	E201250320	カムジクウケ（シタ）	BEARING, CAM SHAFT (LOWER)	6	6	
B33	E201250330	ピン，カムジクウケ-1	PIN, CAM SHAFT BEARING-1	6	6	
B34	E261210080	リーマボルト	REAMER BOLT	12	12	
B510	Z565002100ZZ	マルパツキン	GASKET	7	7	
B511	Z560112524ZZ	O リング	O-RING	12	12	
B515	X550010040ZZ	セッシュザ	JOINT SEAT	1	1	
B520	X227014000ZZ	Uナツト	U-NUT	12	12	

注記
Remarks

※1……A重油によるノズル冷却仕様　D.O. Nozzle cooling system
※2……清水によるノズル冷却仕様　F.W. Nozzle cooling system

カム軸（分割型 - 6DK）- 変速型（主機）
CAMSHAFT (BUILT-UP TYPE - 6DK) - VARIABLE SPEED TYPE (FOR PROPULSION)





カム軸（分割型 - 6DK）- 変速型（主機）
CAMSHAFT (BUILT-UP TYPE - 6DK) - VARIABLE SPEED TYPE (FOR PROPULSION)

① 720～750rpm…正転 NORMAL ROTATION　② 900rpm…正転 NORMAL ROTATION　③ 900rpm…逆転 REVERSE ROTATION

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity ①	②	③	
912		カムジク ASSY.-6D-12	CAMSHAFT ASSY.-6D-12	1			※1
914		カムジク ASSY.-6D-14	CAMSHAFT ASSY.-6D-14		1		※1
916		カムジク ASSY.-6D-16	CAMSHAFT ASSY.-6D-16			1	※1
918		カムジク ASSY.-6D-18	CAMSHAFT ASSY.-6D-18	1			※2
920		カムジク ASSY.-6D-20	CAMSHAFT ASSY.-6D-20		1		※2
922		カムジク ASSY.-6D-22	CAMSHAFT ASSY.-6D-22			1	※2
961		カムジク (サブ) ASSY.-6D-V	CAMSHAFT SUB.-ASSY.-6D-V		1	1	
A45	E201150450	カムジクボルト-2	CAMSHAFT BOLT-2	2	2	2	
A46	E201150460	Uナット	U-NUT	20	20	20	
A47	E201150470	カムジクボルト-1	CAMSHAFT BOLT-1	8	8	8	
A62-1	E201050611	ハイキカム (90.1)-285	EXHAUST CAM (90.1)-285	2	2		
A62-2	E201050612	ハイキカム (90.2)-285	EXHAUST CAM (90.2)	2	2		
A62-3	E201050613	ハイキカム (90.3)-285	EXHAUST CAM (90.3)-285	2	2		
A78-1	E201050771	キユウキカム (90.1)-265	INTAKE CAM (90.1)-265	2	2		
A78-2	E201050772	キユウキカム (90.2)-265	INTAKE CAM (90.2)-265	2	2		
A78-3	E201050773	キユウキカム (90.3)-265	INTAKE CAM (90.3)-265	2	2		
A82-1	E201050851	FO カム-1 (90.1)	F.O. CAM-1 (90.1)		2		
A82-2	E201050852	FO カム-1 (90.2)	F.O. CAM-1 (90.2)		2		
A82-3	E201050853	FO カム-1 (90.3)	F.O. CAM-1 (90.3)		2		
A92-1	E201050911	FO カム-2 (90.1)	F.O. CAM-2 (90.1)	2			
A92-2	E201050912	FO カム-2 (90.2)	F.O. CAM-2 (90.2)	2			
A92-3	E201050913	FO カム-2 (90.3)	F.O. CAM-2 (90.3)	2			
A103	E201151030	カムジク- 6DKM-R(R)	CAMSHAFT - 6DKM-R(R)	1	1	1	
A104	E201151040	カムジク- 6DM(B-U)F-DO	CAMSHAFT - 6DM(B-U)F-D.O.	1	1	1	※1
A105	E201151050	カムジク- 6DM(B-U)F-CW	CAMSHAFT - 6DM(B-U)F-C.W.	1	1	1	※2
A111-1	E201051101	FO カム-3 (90.1)	F.O. CAM-3 (90.1)			2	
A111-2	E201051102	FO カム-3 (90.2)	F.O. CAM-3 (90.2)			2	
A111-3	E201051103	FO カム-3 (90.3)	F.O. CAM-3 (90.3)			2	
A121-1	E201051201	ハイキカム (90.1)-285L	EXHAUST CAM (90.1)-285L			2	
A121-2	E201051202	ハイキカム (90.2)-285L	EXHAUST CAM (90.2)-285L			2	
A121-3	E201051203	ハイキカム (90.3)-285L	EXHAUST CAM (90.3)-285L			2	
A131-1	E201051301	キユウキカム (90.1)-265L	INTAKE CAM (90.1)-265L			2	
A131-2	E201051302	キユウキカム (90.2)-265L	INTAKE CAM (90.2)-265L			2	
A131-3	E201051303	キユウキカム (90.3)-265L	INTAKE CAM (90.3)-265L			2	
A504	Z400015040ZZ	キー	KEY	12	12	12	
A508	X251210010ZZ	トメネジ	SET SCREW	1	1	1	※1

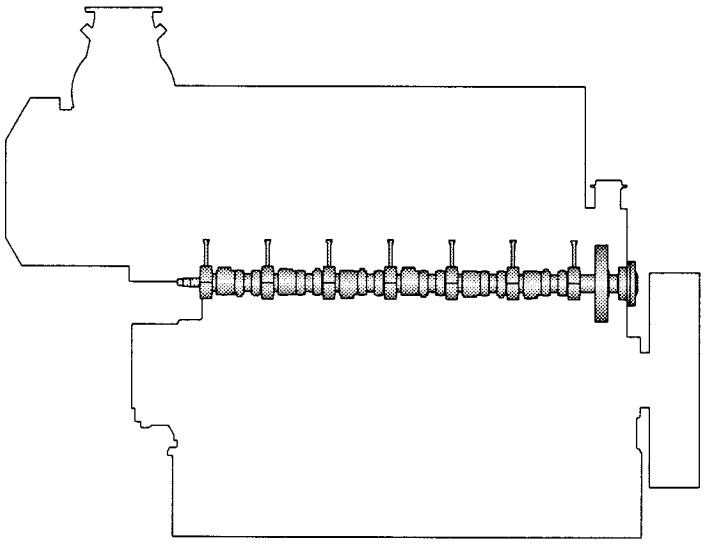
注記 Remarks

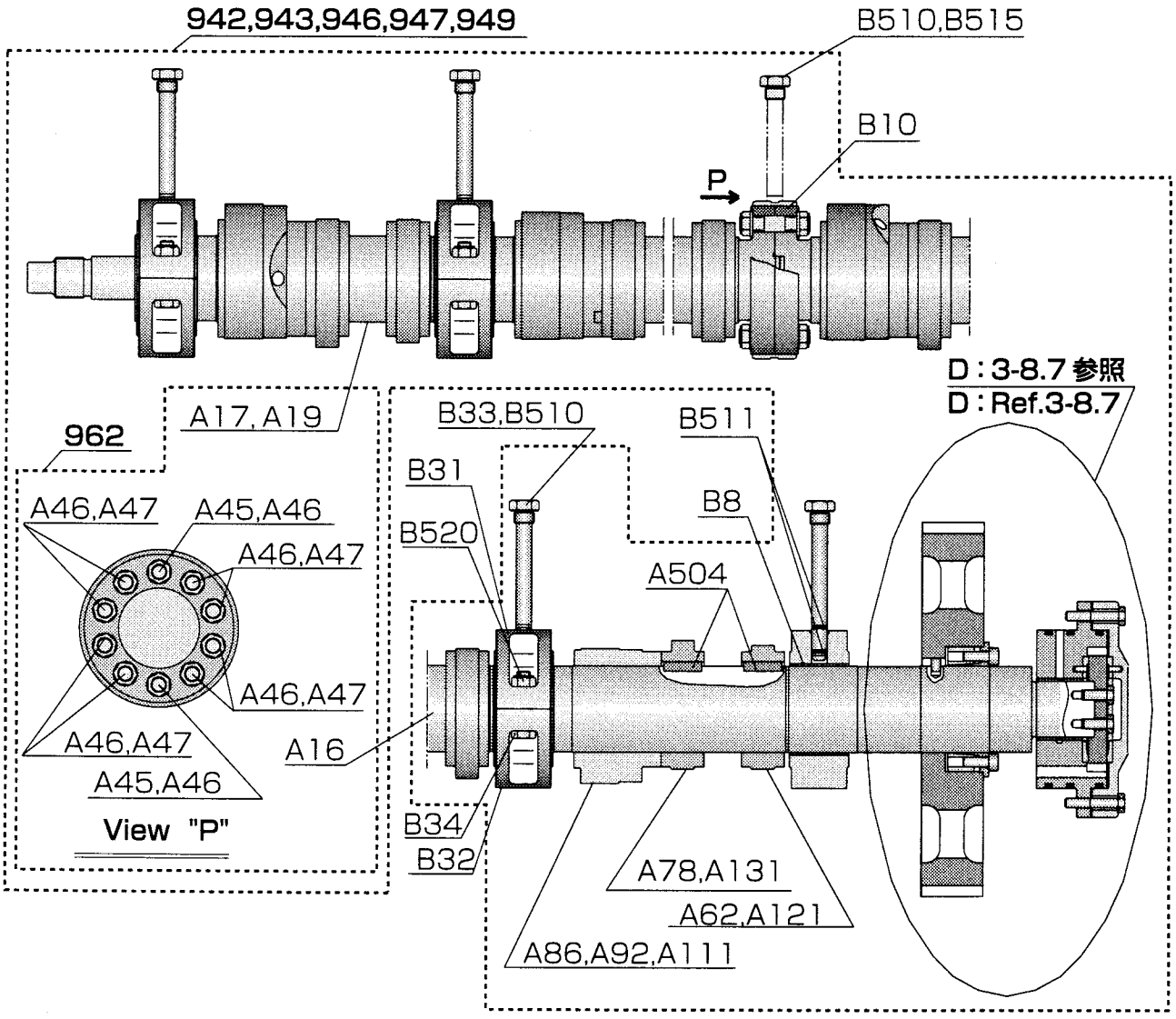
※1……A重油によるノズル冷却仕様　D.O. Nozzle cooling system
※2……清水によるノズル冷却仕様　F.W. Nozzle cooling system

カム軸（分割型 - 6DK）- 変速型（主機）
CAMSHAFT (BUILT-UP TYPE - 6DK) - VARIABLE SPEED TYPE (FOR PROPULSION)

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
B8	E201250080	カムジクウケ	CAM SHAFT BEARING SHELL	6
B9	E200250600	バランスシャフトブッシュ	BUSH, BALANCE SHAFT	1
B31	E201250310	カムジクウケ（ウエ）	BEARING, CAM SHAFT (UPPER)	6
B32	E201250320	カムジクウケ（シタ）	BEARING, CAM SHAFT (LOWER)	6
B33	E201250330	ピン，カムジクウケ-1	PIN, CAM SHAFT BEARING-1	6
B34	E261210080	リーマボルト	REAMER BOLT	12
B510	Z565002100ZZ	マルパツキン	GASKET	7
B511	Z560112524ZZ	O リング	O-RING	12
B515	X550010400ZZ	セッシュザ	JOINT SEAT	1
B520	X227014000ZZ	Uナツト	U-NUT	12

カム軸（分割型 - 8DK)
CAMSHAFT (BUILT-UP TYPE - 8DK)





カム軸（分割型 - 8DK)
CAMSHAFT (BUILT-UP TYPE - 8DK)

① 720～750rpm…正転 NORMAL ROTATION　② 900rpm…正転 NORMAL ROTATION　③ 900rpm…逆転 REVERSE ROTATION

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity ①	②	③	
942		**カムジク ASSY.-8D-12**	**CAMSHAFT ASSY.-8D-12**	1			※2
943		**カムジク ASSY.-8D-13**	**CAMSHAFT ASSY.-8D-13**		1		※2
946		**カムジク ASSY.-8D-16**	**CAMSHAFT ASSY.-8D-16**	1			※1
947		**カムジク ASSY.-8D-17**	**CAMSHAFT ASSY.-8D-17**		1		※1
949		**カムジク ASSY.-8D-19**	**CAMSHAFT ASSY.-8D-19**			1	※2
962		**カムジク (サブ) ASSY.-8D**	**CAMSHAFT SUB.-ASSY.-8D**	1	1	1	
A16	E201050160	カムジク - 8D(B-U)-R	CAMSHAFT - 8D(B-U)-R	1	1	1	
A17	E201050170	カムジク - 8D(B-U)-F-CW	CAMSHAFT - 8D(B-U)-F-C.W.	1	1	1	※2
A19	E201050190	カムジク - 8D(B-U)-F-DO	CAMSHAFT - 8D(B-U)-F-D.O.	1	1		※1
A45	E201150450	カムジクボルト-2	CAMSHAFT BOLT-2	2	2	2	
A46	E201150460	Uナット	U-NUT	20	20	20	
A47	E201150470	カムジクボルト-1	CAMSHAFT BOLT-1	8	8	8	
A62-1	E201050611	ハイキカム (90.1)-285	EXHAUST CAM (90.1)-285	2	2		
A62-2	E201050612	ハイキカム (90.2)-285	EXHAUST CAM (90.2)-285	2	2		
A62-3	E201050613	ハイキカム (90.3)-285	EXHAUST CAM (90.3)-285	2	2		
A62-4	E201050614	ハイキカム (90.4)-285	EXHAUST CAM (90.4)-285	2	2		
A78-1	E201050771	キユウキカム (90.1)-265	INTAKE CAM (90.1)-265	2	2		
A78-2	E201050772	キユウキカム (90.2)-265	INTAKE CAM (90.2)-265	2	2		
A78-3	E201050773	キユウキカム (90.3)-265	INTAKE CAM (90.3)-265	2	2		
A78-4	E201050774	キユウキカム (90.4)-265	INTAKE CAM (90.4)-265	2	2		
A86-1	E201050851	FO カム-1 (90.1)	F.O. CAM-1 (90.1)		2		
A86-2	E201050852	FO カム-1 (90.2)	F.O. CAM-1 (90.2)		2		
A86-3	E201050853	FO カム-1 (90.3)	F.O. CAM-1 (90.3)		2		
A86-4	E201050854	FO カム-1 (90.4)	F.O. CAM-1 (90.4)		2		
A92-1	E201050911	FO カム-2 (90.1)	F.O. CAM-2 (90.1)	2			
A92-2	E201050912	FO カム-2 (90.2)	F.O. CAM-2 (90.2)	2			
A92-3	E201050913	FO カム-2 (90.3)	F.O. CAM-2 (90.3)	2			
A92-4	E201050914	FO カム-2 (90.4)	F.O. CAM-2 (90.4)	2			
A111-1	E201051101	FO カム-3 (90.1)	F.O. CAM-3 (90.1)			2	
A111-2	E201051102	FO カム-3 (90.2)	F.O. CAM-3 (90.2)			2	
A111-3	E201051103	FO カム-3 (90.3)	F.O. CAM-3 (90.3)			2	
A111-4	E201051104	FO カム-3 (90.4)	F.O. CAM-3 (90.4)			2	
A121-1	E201051201	ハイキカム (90.1)-285L	EXHAUST CAM (90.1)-285L			2	
A121-2	E201051202	ハイキカム (90.2)-285L	EXHAUST CAM (90.2)-285L			2	
A121-3	E201051203	ハイキカム (90.3)-285L	EXHAUST CAM (90.3)-285L			2	
A121-4	E201051204	ハイキカム (90.4)-285L	EXHAUST CAM (90.4)-285L			2	
A131-1	E201051301	キユウキカム (90.1)-265L	INTAKE CAM (90.1)-265L			2	
A131-2	E201051302	キユウキカム (90.2)-265L	INTAKE CAM (90.2)-265L			2	
A131-3	E201051303	キユウキカム (90.3)-265L	INTAKE CAM (90.3)-265L			2	
A131-4	E201051304	キユウキカム (90.4)-265L	INTAKE CAM (90.4)-265L			2	
A504	Z400015040ZZ	キ	KEY	16	16	16	

CHAPTER 3
ITEM 8.6 6·8DK-20

カム軸（分割型 - 8DK)
CAMSHAFT (BUILT-UP TYPE - 8DK)

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
B8	E201250080	カムジクウケ	CAM SHAFT BEARING SHELL	8
B10	E201250100	ブッシュ, カムジクウケ, ブンカツ	BUSH, CAMSHAFT SHELL, BUILD UP	1
B31	E201250310	カムジクウケ（ウエ）	BEARING, CAM SHAFT (UPPER)	8
B32	E201250320	カムジクウケ（シタ）	BEARING, CAM SHAFT (LOWER)	8
B33	E201250330	ピン, カムジクウケ-1	PIN, CAM SHAFT BEARING-1	8
B34	E261210080	リーマボルト	REAMER BOLT	16
B510	Z565002100ZZ	マルパツキン	GASKET	9
B511	Z560112524ZZ	O リング	O-RING	16
B515	X550010400ZZ	セッシュザ	JOINT SEAT	1
B520	X227014000ZZ	Uナツト	U-NUT	16

注記 Remarks

※1……A重油によるノズル冷却仕様　D.O. Nozzle cooling system
※2……清水によるノズル冷却仕様　F.W. Nozzle cooling system

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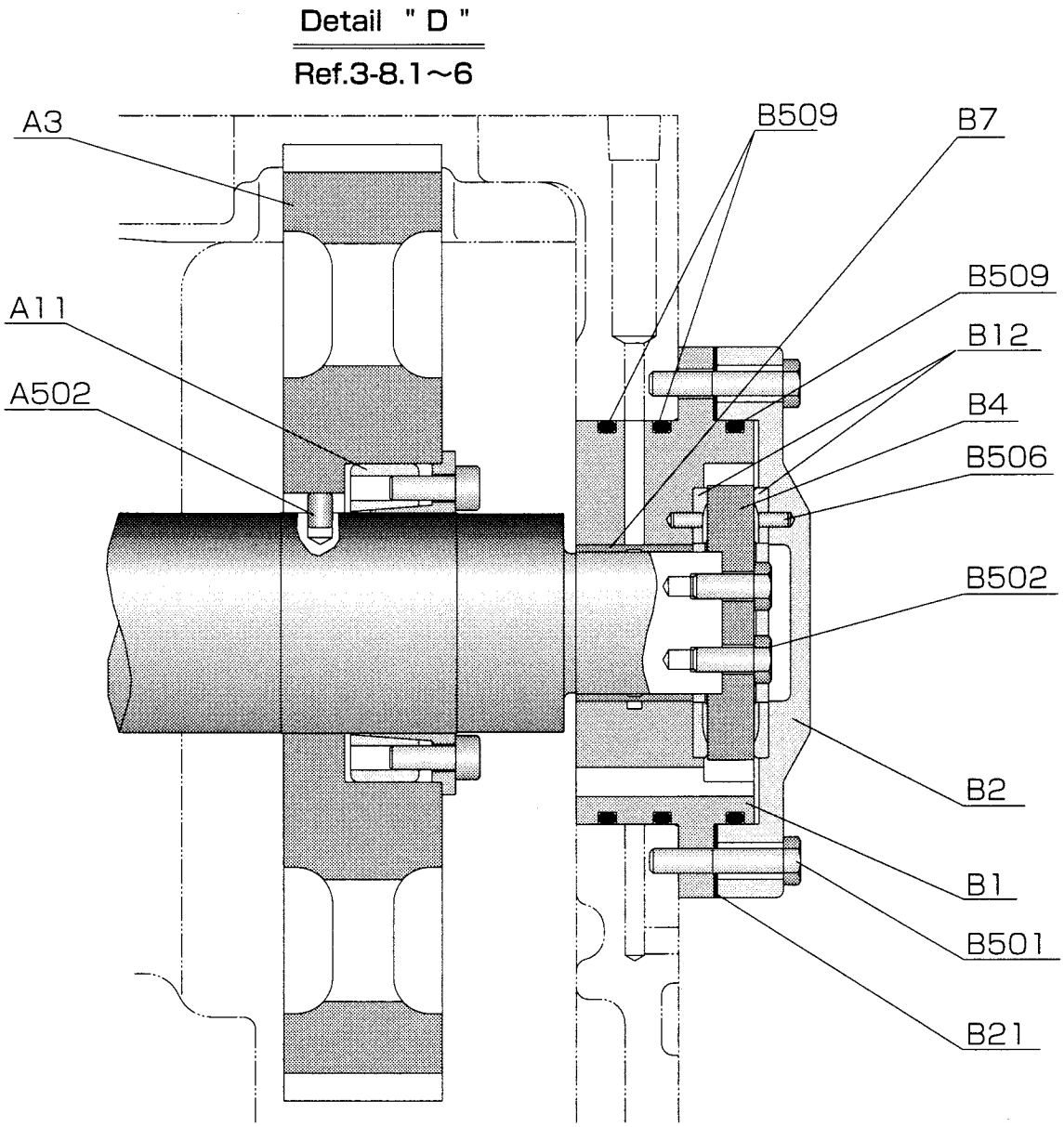
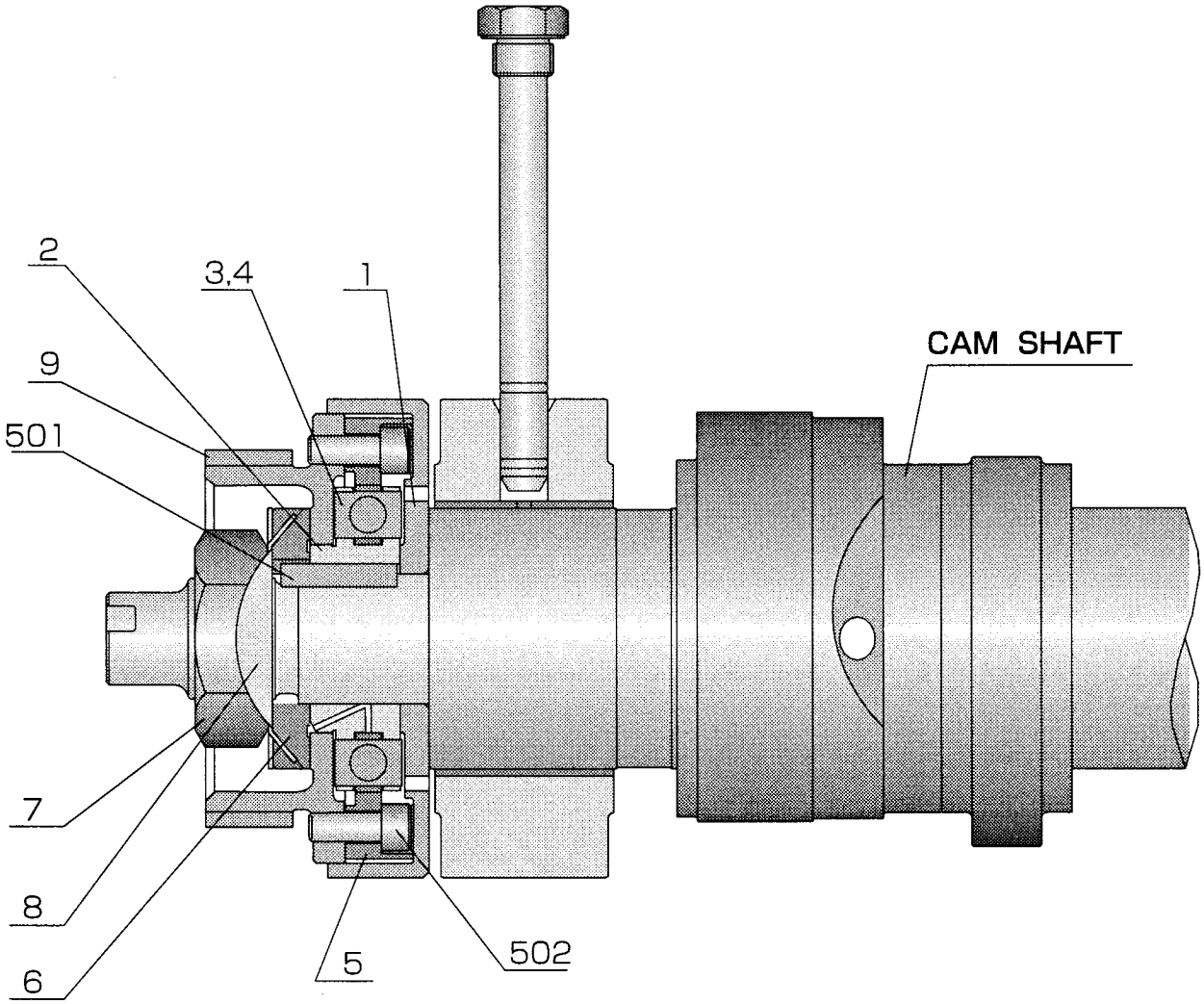
カム軸後端部詳細
DETAIL OF CAMSHAFT REAR END



カム軸後端部詳細
DETAIL OF CAMSHAFT REAR END

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
A3	E201150030	カムギヤ	CAM GEAR	1
A11	E201150110	パワーロツク	POWER LOCK	1
A502	Z335010014ZZ	ヘイコウピン	STRAIGHT PIN	1
B1	E201250010	ジクウケタイ	BEARING CASING	1
B2	E201250020	ジクウケフタ	CAP	1
B4	E201250040	スラストウケ	PRESSURE PLATE	1
B7	E201250070	カムジクメタル (1)	CAM SHAFT BEARING SHELL (1)	1
B12	E201250120	カムジクスラストメタル	THRUST METAL, CAM SHAFT	2
B21-1	E201250201	シム (1)	SHIM (1)	2
B21-2	E201250202	シム (2)	SHIM (2)	1
B21-4	E201250204	シム (4)	SHIM (4)	1
B21-5	E201250205	シム (5)	SHIM (5)	1
B501	X200012055ZZ	ボルト	BOLT	4
B502	X205010025ZZ	HT ボルト	HT BOLT	2
B506	Z335506012ZZ	ヘイコウピン	STRAIGHT PIN	2
B509	Z560215557ZZ	O リング	O-RING	3

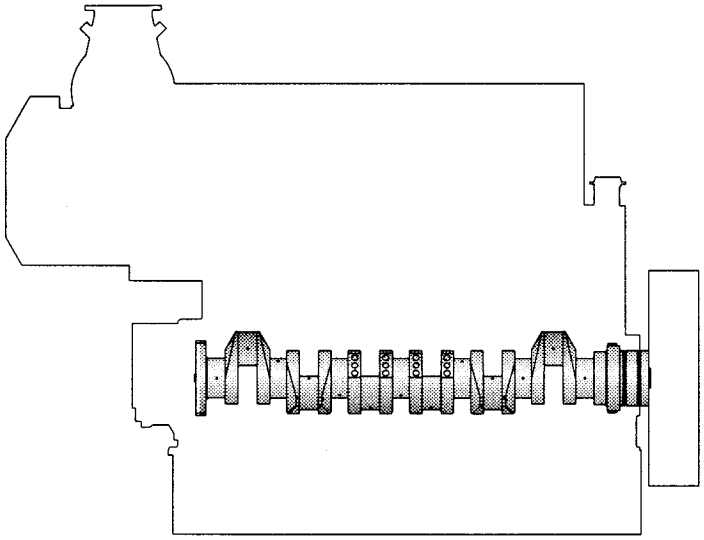
ノズル冷却油ポンプ駆動装置
NOZZLE COOLING OIL PUMP DRIVING DEVICE

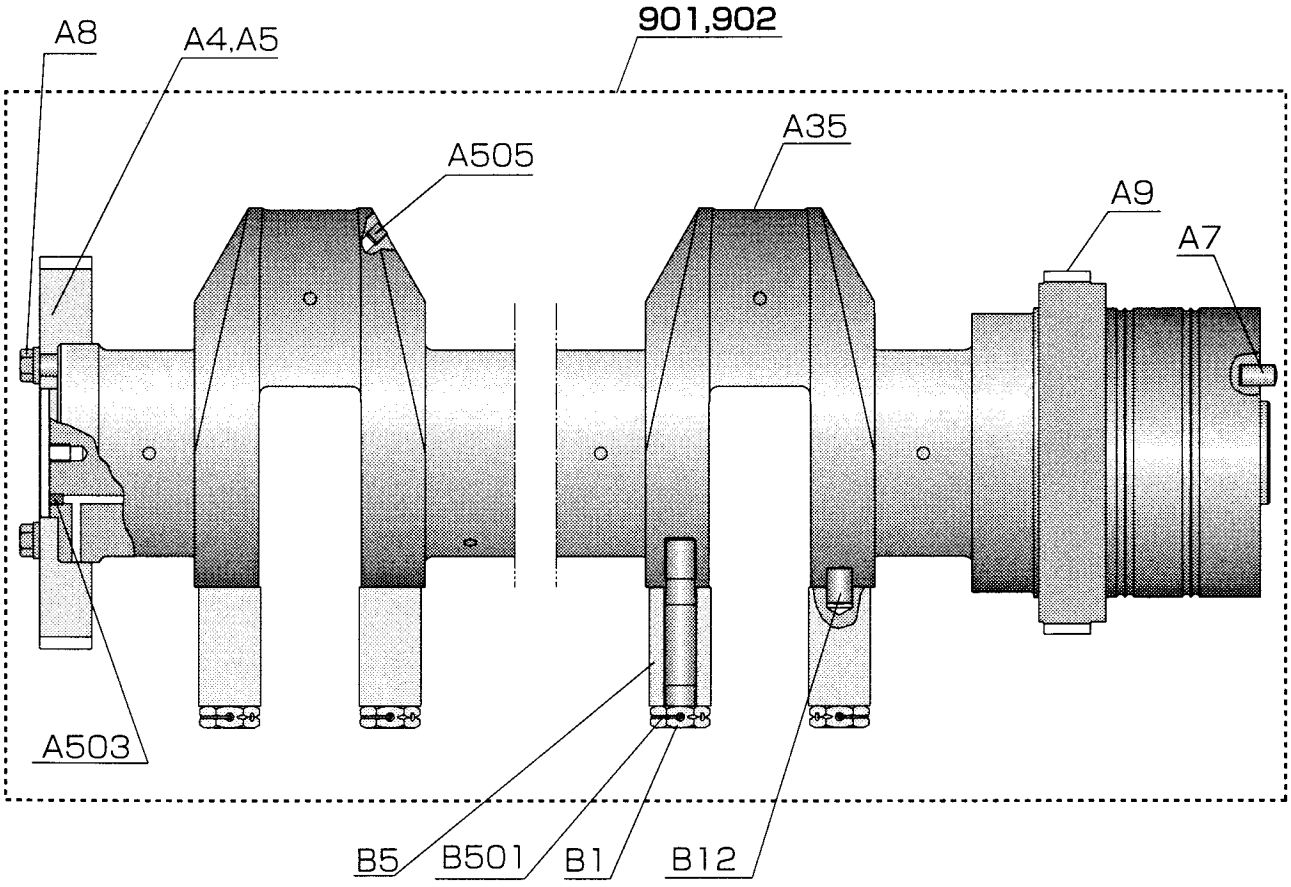


ノズル冷却油ポンプ駆動装置
NOZZLE COOLING OIL PUMP DRIVING DEVICE

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
1	E203750010	クドウギヤソクイタ	SIDE PLATE	1
2	C263700160	クドウギヤボス	DRIVING GEAR BOSS	1
3	C263700100	クツシヨンバネシート	SEAT, CUSHION SPRING	8
4	E263710221	バネ	SPRING	4
5	E203750050	クツシヨンバネウケ	HOLDER,CUSHION SPRING	4
6	E223700120	ガバナクドウギアオサエ	RETAINER, GOVERNOR GEAR	1
7	E223700100	ガバナクドウギヤナツト	NUT, DRIVING GEAR	1
8	E223700150	トクシユツメツキザガネ	SPECIAL CLAW WASHER	1
9	E203750090	ポンプクドウギヤ	GEAR, PUMP DRIVING	1
501	Z400012040ZZ	キー	KEY	1
502	Z212010025ZZ	アナツキボルト	HEX. SOKCET BOLT	8

クランク軸 & バランスウエイト - 6DK
CRANKSHAFT & BALANCE WEIGHT - 6DK



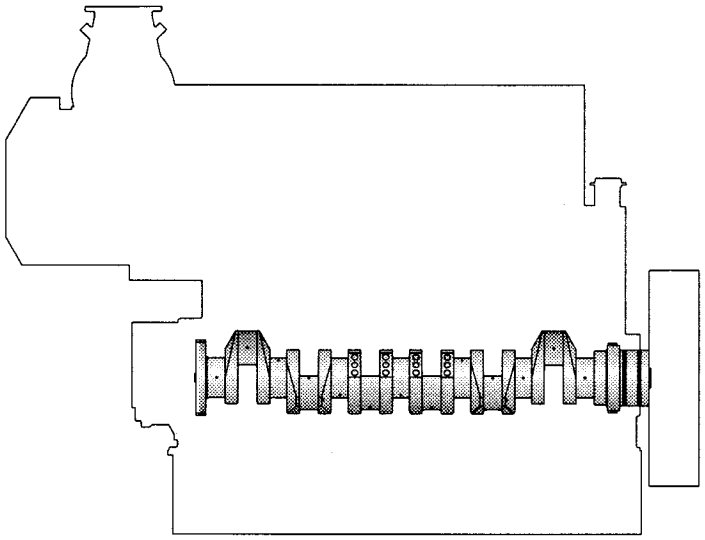


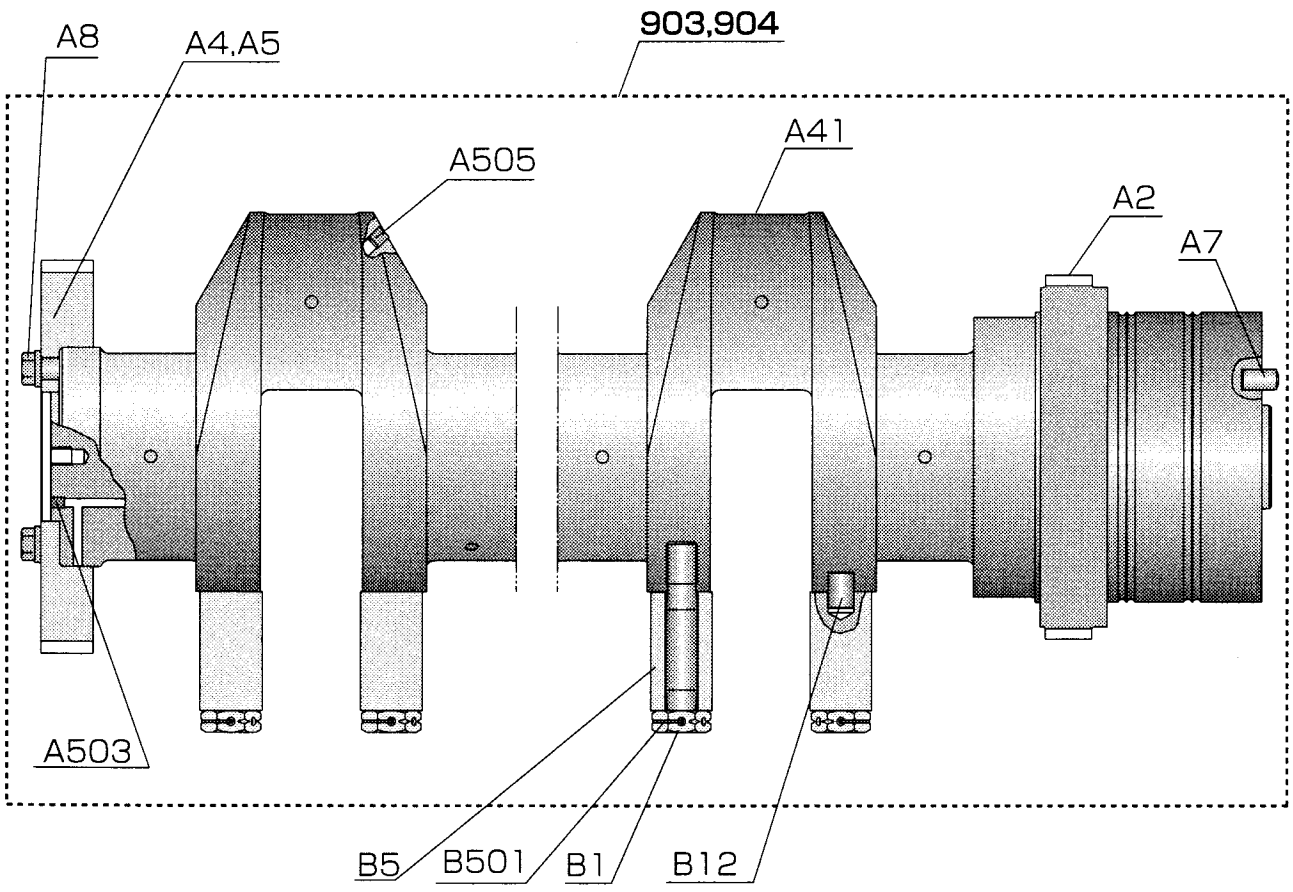
クランク軸 & バランスウエイト - 6DK
CRANKSHAFT & BALANCE WEIGHT - 6DK

①……720～750rpm ②……900rpm

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity ①	②
901		クランクジク ASSY.-6D-1	CRANKSHAFT ASSY.-6D-1	1	
902		クランクジク ASSY.-6D-2	CRANKSHAFT ASSY.-6D-2		1
A4	E200650040	ホキクドウギヤ (Z74)	AUX. MACHINERY DRIVING GEAR (Z74)	1	
A5	E200650050	ホキクドウギヤ (Z71)	AUX. MACHINERY DRIVING GEAR (Z71)		1
A7	E160680070	ダンツキピン	PIN	1	1
A8	E200650080	ホキクドウギヤトリツケボルト	BOLT, AUX.MACHINERY GEAR	4	4
A9	E200650090	クランクギヤ-TF	CRANK GEAR-TF	1	1
A35	E200650341	クランクジク (6DK)	CRANKSHAFT (6DK)	1	1
A503	X251210012ZZ	トメネジ	SET SCREW	1	1
A505	X251514016ZZ	トメネジ	SET SCREW	6	6
B1	E200850010	バランスウエイトボルト	BALANCE WEIGHT BOLT	24	24
B5	E20085	バランスウエイト（仕様により異なる）	BALANCE WEIGHT (Depend on sppc.)	12	12
B12	E280870120	ダンツキピン	PIN	12	12
B501	Z321023400ZZ	ハリガネ	WIRE	12	12

クランク軸 & バランスウエイト - 8DK
CRANKSHAFT & BALANCE WEIGHT - 8DK



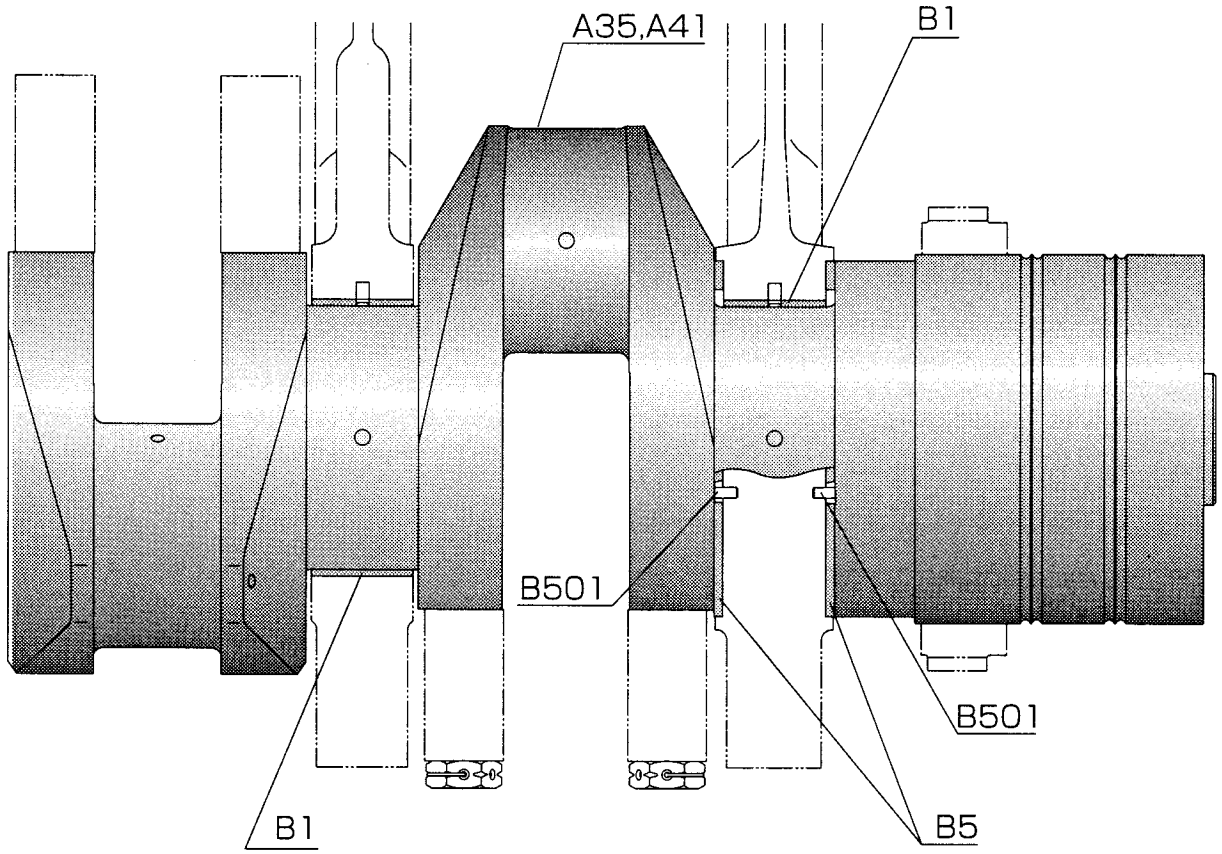


クランク軸 & バランスウエイト - 8DK
CRANKSHAFT & BALANCE WEIGHT - 8DK

①……720～750rpm ②……900rpm

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity ①	②
903		クランクジク ASSY.-8D-1	CRANKSHAFT ASSY.-8D-1	1	
904		クランクジク ASSY.-8D-2	CRANKSHAFT ASSY.-8D-2		1
A2	E200650020	クランクギヤ	CRANK GEAR	1	1
A4	E200650400	ホキクドウギヤ (Z74)	AUX. MACHINERY DRIVING GEAR (Z74)	1	
A5	E200650050	ホキクドウギヤ (Z71)	AUX. MACHINERY DRIVING GEAR (Z71)		1
A7	E160680070	ダンツキピン	PIN	4	4
A8	E200650080	ホキクドウギヤトリツケボルト	BOLT, AUX.MACHINERY GEAR	1	1
A41	E200650401	クランクジク (8DK)	CRANKSHAFT (8DK)	1	1
A503	X2512100122ZZ	トメネジ	SET SCREW	1	1
A505	X251514016ZZ	トメネジ	SET SCREW	8	8
B1	E200850010	バランスウエイトボルト	BALANCE WEIGHT BOLT	32	32
B5	E20085	バランスウエイト（仕様により異なる）	BALANCE WEIGHT (Depend on sppc.)	16	16
B12	E280870120	ダンツキピン	PIN	16	16
B501	Z321023400ZZ	ハリガネ	WIRE	16	16

クランク軸 & 主軸受
CRANKSHAFT & MAIN BEARING

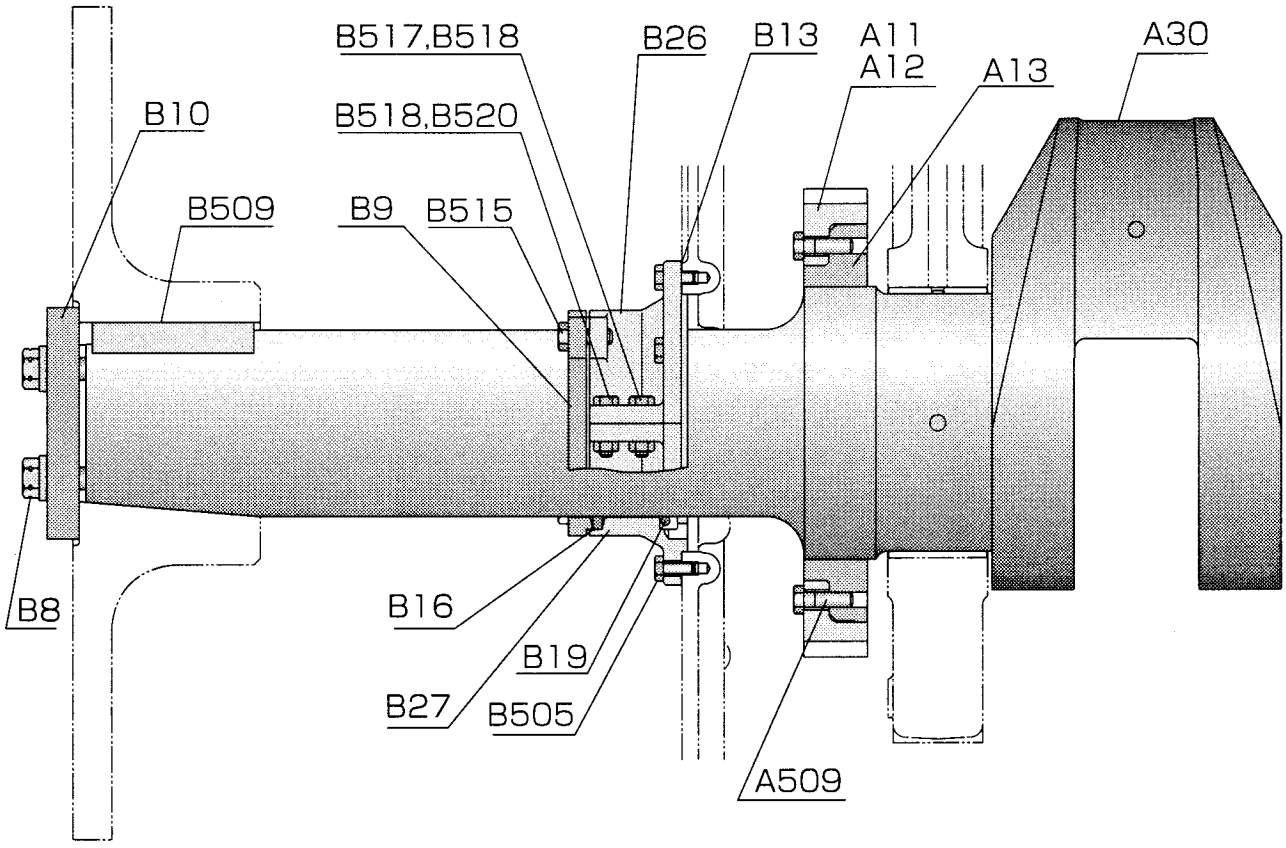


クランク軸 & 主軸受
CRANKSHAFT & MAIN BEARING

①……6DK ②……8DK

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity ①	②
A35	E200650341	クランクジク (6DK)	CRANKSHAFT (6DK)	1	
A41	E200650401	クランクジク (8DK)	CRANKSHAFT (8DK)		1
B1	E200750010	メインメタル	MAIN BEARING SHELL	7	9
B5	E200750050	スラストメタル	THRUST BEARING	2	2
B501	Z335008016ZZ	ヘイコウピン	STRAIGHT PIN	2	2

前端駆動装置 (前端軸一体型) - 6DK
FRONT DRIVING DEVICE (FRONT DRIVING SHAFT - ONE-BLOCK TYPE) - 6DK

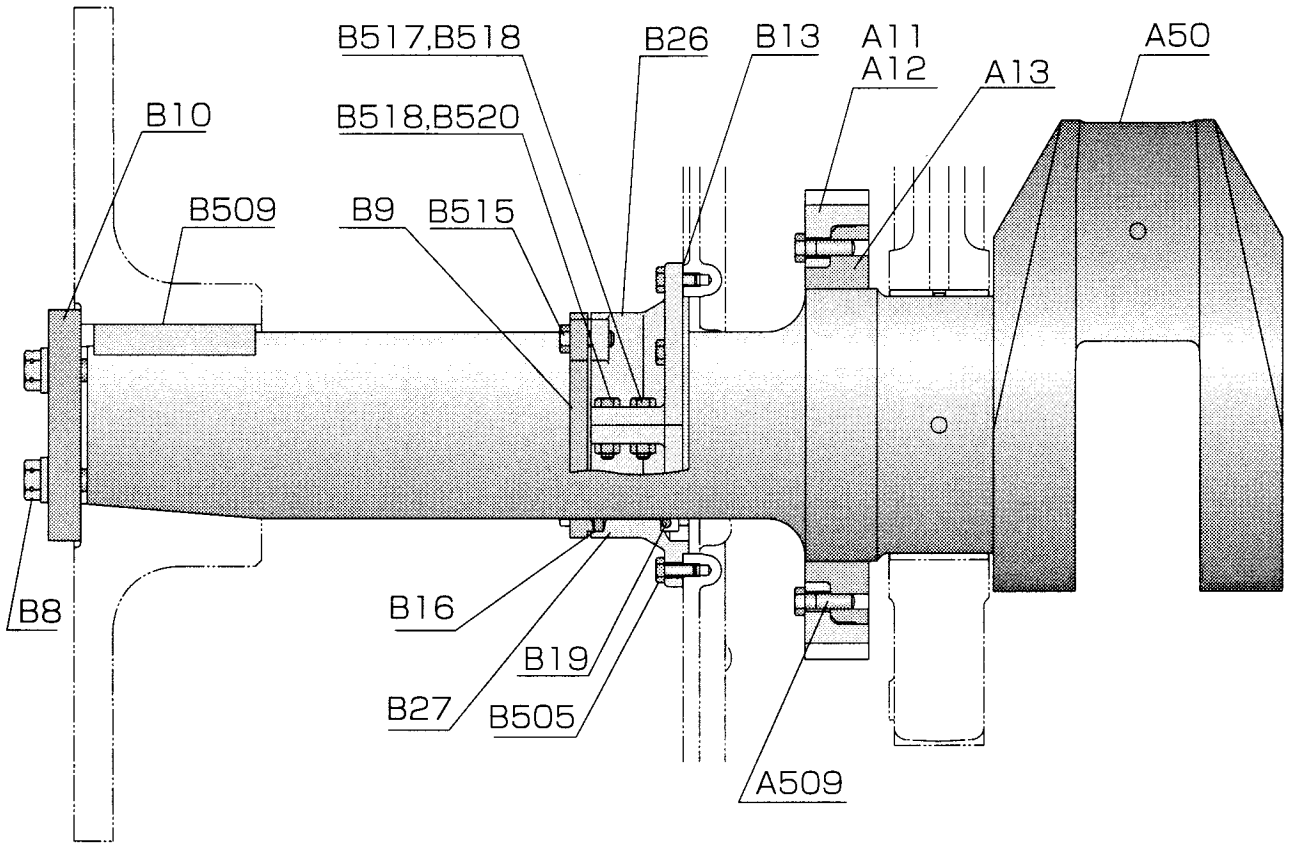


前端駆動装置 (前端軸一体型) - 6DK
FRONT DRIVING DEVICE (FRONT DRIVING SHAFT - ONE-BLOCK TYPE) - 6DK

①……720~750rpm ②……900rpm

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity ①	②
A11	E200650110	ホキクドウギヤ - F (Z74)	AUX. MACHINERY DRIVING GEAR-F (Z74)	1	
A12	E200650120	ホキクドウギヤ - F (Z71)	AUX. MACHINERY DRIVING GEAR-F (Z71)		1
A13	E200650130	ホキクドウギヤカップリング	COUPLING, AUX. MACHINERY DRIVING GEAR	1	1
A30	E200650341	クランクジク 6DK-FD-イッタイ	CRANKSHAFT 6DK-FD-ONE BLOCK	1	1
A509	X205012040ZZ	HT ボルト	HT BOLT	6	6
B8	E207450080	カップリングオサエイタボルト	BOLT, COUPLING SEAT PLATE	4	4
B9	E207450090	パツキンオサエ	PACKING HOLDER	1	1
B10	E207450100	カツプリングオサエイタ	COUPLING SEAT PLATE	1	1
B13	E207450130	パツキン	GASKET	1	1
B16	E227400330	グランドパツキン	GRAND-PACKING	1	1
B19	G001701892	マルベルト	O-BELT	1	1
B26	E207450251	ゼンタンクドウクランクジクフタ-1	COVER-1, FRONT DRIVING CRANKSHAFT	1	1
B27	E207450252	ゼンタンクドウクランクジクフタ-2	COVER-2, FRONT DRIVING CRANKSHAFT	1	1
B505	X200010025ZZ	ボルト	BOLT	6	6
B509	Z400038125ZZ	キー	KEY	1	1
B515	X200012030ZZ	ボルト	BOLT	4	4
B517	X200010040ZZ	ボルト	BOLT	2	2
B518	X220010000ZZ	ナツト	NUT	4	4
B520	X345012025ZZ	リーマボルト	REAMER BOLT	2	2

前端駆動装置 (前端軸一体型) - 8DK
FRONT DRIVING DEVICE (FRONT DRIVING SHAFT - ONE-BLOCK TYPE) - 8DK

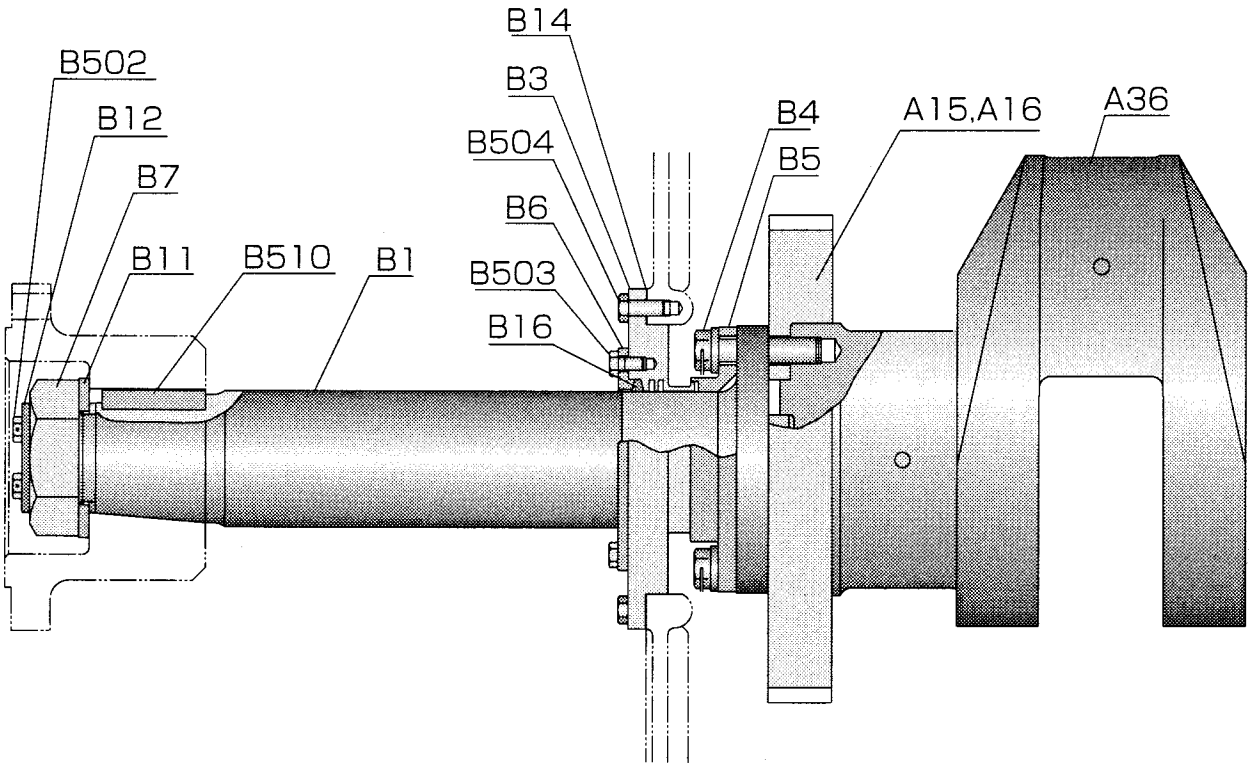


前端駆動装置 (前端軸一体型) - 8DK
FRONT DRIVING DEVICE (FRONT DRIVING SHAFT - ONE-BLOCK TYPE) - 8DK

①……720~750rpm ②……900rpm

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity ①	②
A11	E200650110	ホキクドウギヤ - F (Z74)	AUX. MACHINERY DRIVING GEAR-F (Z74)	1	
A12	E200650120	ホキクドウギヤ - F (Z71)	AUX. MACHINERY DRIVING GEAR-F (Z71)		1
A13	E200650130	ホキクドウギヤカップリング	COUPLING, AUX. MACHINERY DRIVING GEAR	1	1
A50	E200650500	クランクジク 8DK-FD-イッタイ	CRANKSHAFT 8DK-FD-ONE BLOCK	1	1
A509	X205012040ZZ	HT ボルト	HT BOLT	6	6
B8	E207450080	カップリングオサエイタボルト	BOLT, COUPLING SEAT PLATE	4	4
B9	E207450090	パツキンオサエ	PACKING HOLDER	1	1
B10	E207450100	カツプリングオサエイタ	COUPLING SEAT PLATE	1	1
B13	E207450130	パツキン	GASKET	1	1
B16	E227400330	グランドパツキン	GRAND-PACKING	1	1
B19	G001701892	マルベルト	O-BELT	1	1
B26	E207450251	ゼンタンクドウクランクジクフタ-1	COVER-1, FRONT DRIVING CRANKSHAFT	1	1
B27	E207450252	ゼンタンクドウクランクジクフタ-2	COVER-2, FRONT DRIVING CRANKSHAFT	1	1
B505	X200010025ZZ	ボルト	BOLT	6	6
B509	Z400038125ZZ	キー	KEY	1	1
B515	X200012030ZZ	ボルト	BOLT	4	4
B517	X200010040ZZ	ボルト	BOLT	2	2
B518	X220010000ZZ	ナツト	NUT	4	4
B520	X345012025ZZ	リーマボルト	REAMER BOLT	2	2

前端駆動装置（前端軸分割型）- 6DK
FRONT DRIVING DEVICE
(FRONT DRIVING SHAFT - BUILT-UP TYPE) - 6DK

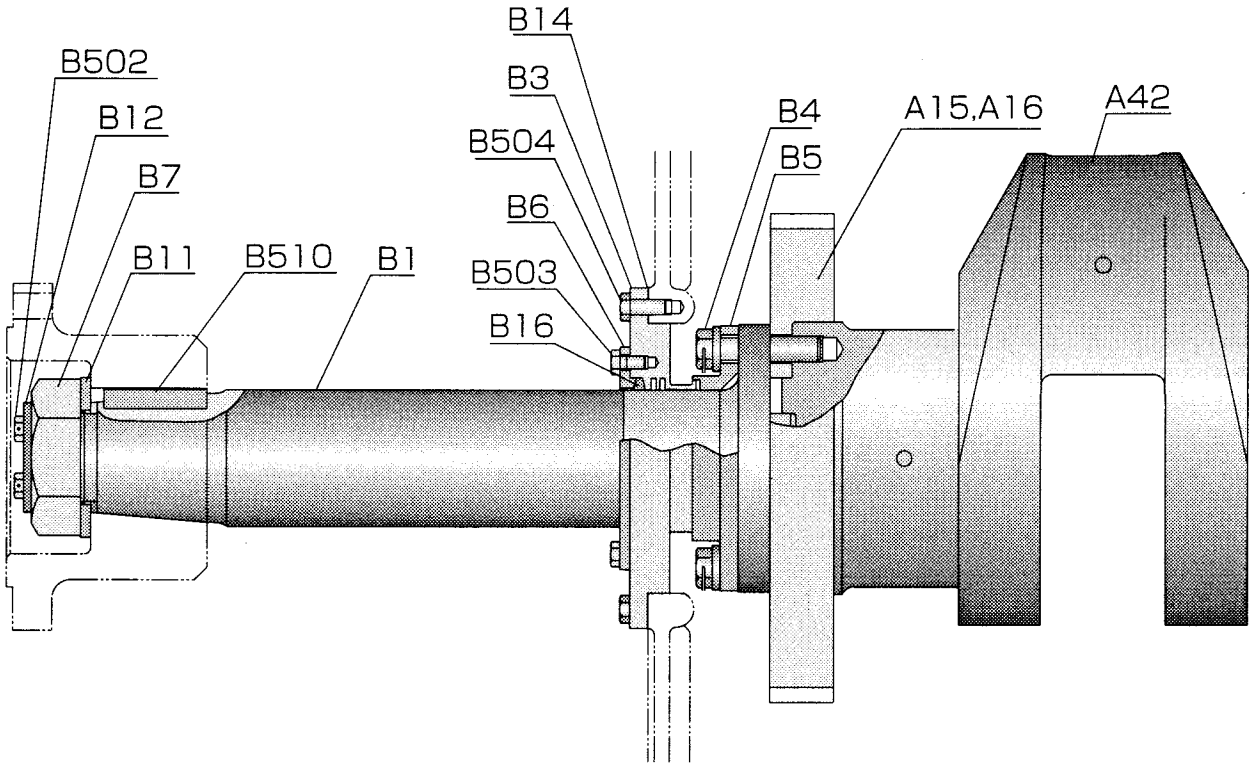


前端駆動装置（前端軸分割型）- 6DK
FRONT DRIVING DEVICE (FRONT DRIVING SHAFT - BUILT-UP TYPE) - 6DK

①……720～750rpm ②……900rpm

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity ①	②
A15	E200650150	ホキクドウギヤ -F (Z74)	AUX. MACHINERY DRIVING GEAR -F(Z74)	1	
A16	E200650160	ホキクドウギヤ -F (Z71)	AUX. MACHINERY DRIVING GEAR -F(Z71)		1
A36	E200650342	クランクジク (6DK-F)	CRANKSHAFT (6DK-F)	1	1
B1	E207450010	クドウジク	FRONT, DRIVING SHAFT	1	1
B3	E207450030	クランクジクマエフタ	COVER, FRONT DRIVING SHAFT	1	1
B4	E207450040	ゼンタンクドウジクボルト	BOLT, FRONT DRIVE	12	12
B5	E207450050	シールリング	SEAL RING	1	1
B6	E207450060	パツキンオサエ	PACKING HOLDER	1	1
B7	E187410042	ナツト	NUT	1	1
B11	E207450110	ザガネ	FLAT WASHER	1	1
B12	E207450120	ナットオサエ	PLATE	1	1
B14	E203150130	ガスケット	GASKET	1	1
B16	E227400330	グランドパツキン	GRAND-PACKING	1	1
B502	X200010022ZZ	ボルト	BOLT	2	2
B503	X200010020ZZ	ボルト	BOLT	4	4
B504	X200012028ZZ	ボルト	BOLT	6	6
B510	Z400024080ZZ	キー	KEY	1	1

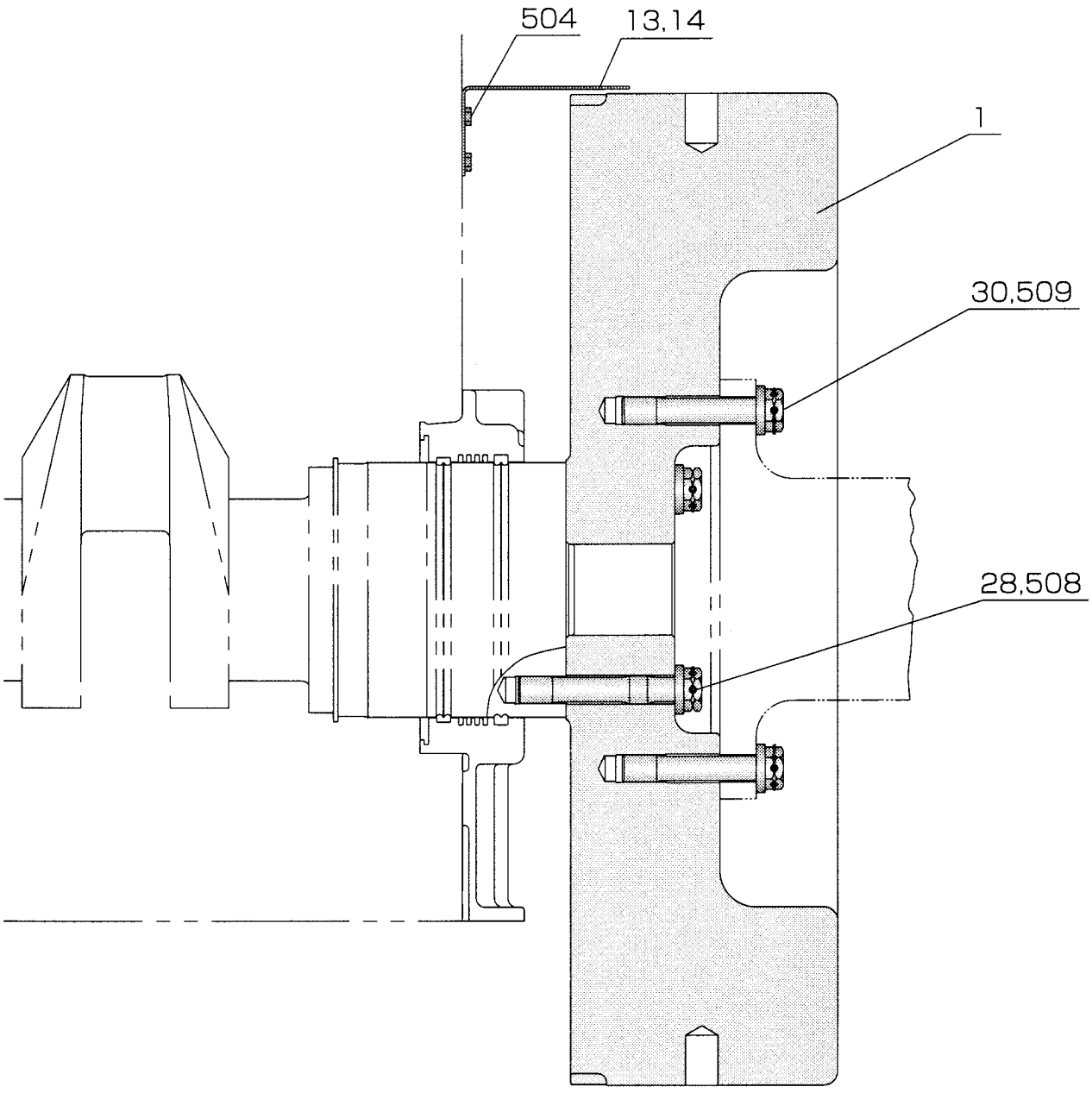
前端駆動装置（前端軸分割型）- 8DK
FRONT DRIVING DEVICE
(FRONT DRIVING SHAFT - BUILT-UP TYPE) - 8DK



①……720～750rpm　②……900rpm

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity ①	②
A15	E200650150	ホキクドウギヤ -F (Z74)	AUX. MACHINERY DRIVING GEAR -F(Z74)	1	
A16	E200650160	ホキクドウギヤ -F (Z71)	AUX. MACHINERY DRIVING GEAR -F(Z71)		1
A42	E200650402	クランクジク (8DK-F)	CRANKSHAFT (8DK-F)	1	1
B1	E207450010	クドウジク	FRONT, DRIVING SHAFT	1	1
B3	E207450030	クランクジクマエフタ	COVER, FRONT DRIVING SHAFT	1	1
B4	E207450040	ゼンタンクドウジクボルト	BOLT, FRONT DRIVE	12	12
B5	E207450050	シールリング	SEAL RING	1	1
B6	E207450090	パツキンオサエ	PACKING HOLDER	1	1
B7	E187410042	ナツト	NUT	1	1
B11	E207450110	ザガネ	FLAT WASHER	1	1
B12	E207450120	ナットオサエ	PLATE	1	1
B14	E203150130	ガスケット	GASKET	1	1
B16	E227400330	グランドパツキン	GRAND-PACKING	1	1
B502	X200010022ZZ	ボルト	BOLT	2	2
B503	X200010020ZZ	ボルト	BOLT	4	4
B504	X200012028ZZ	ボルト	BOLT	6	6
B510	Z40002408OZZ	キー	KEY	1	1

フライホイール
FLYWHEEL

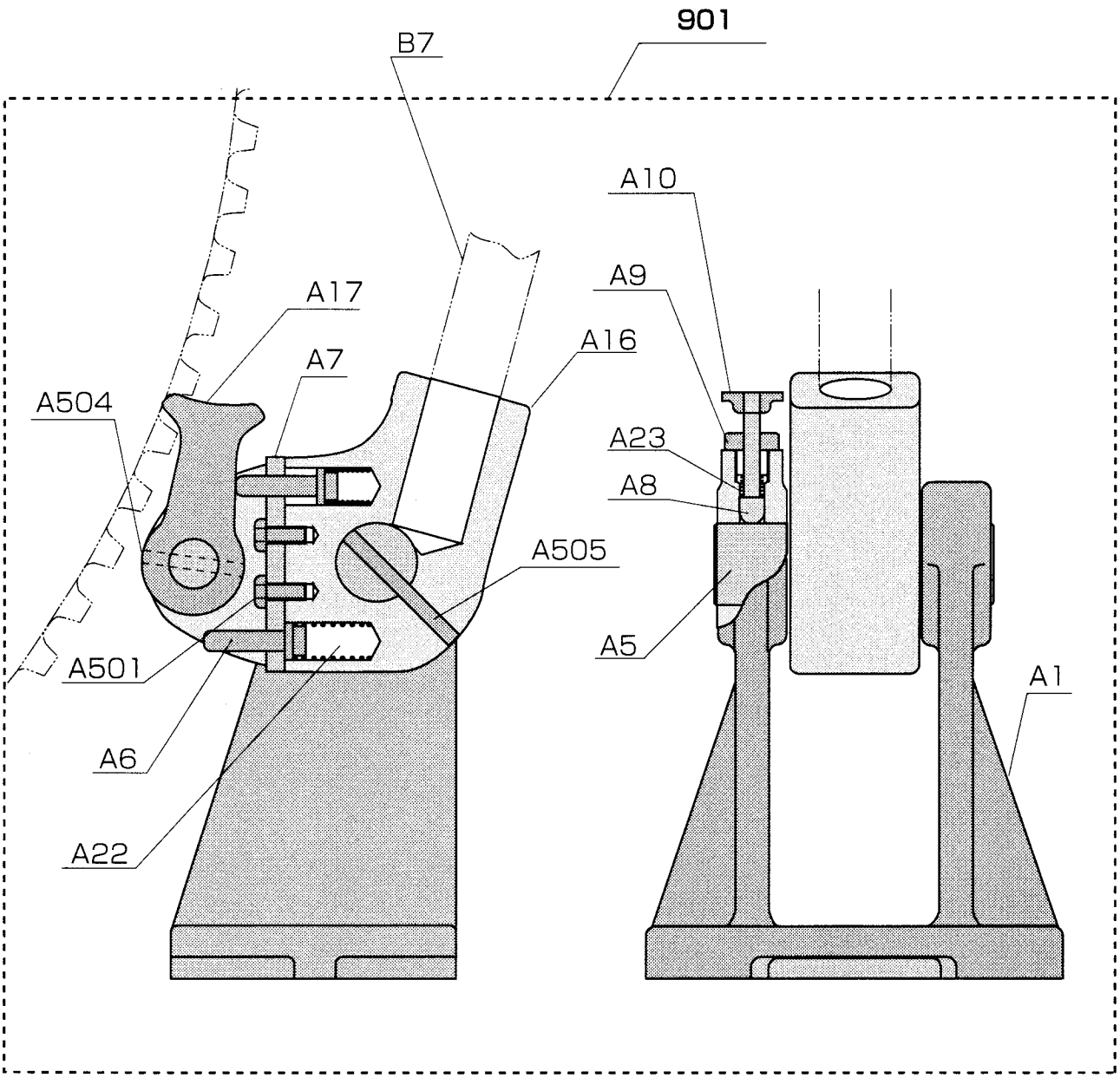


フライホイール
FLYWHEEL

①……720~750rpm ②……900rpm

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity ①	②
1	E20095	フライホイール（仕様により異なる）	FLYWHEEL (Depend on spec.)	1	1
13	E200950130	フライホイールシシン-1	FLYWHEEL POINTER-1	1	
14	E200950140	フライホイールシシン-2	FLYWHEEL POINTER-2		1
28	E200950280	フライホイールボルト	FLYWHEEL BOLT	12	12
30	E200950300	ハツデンキトリツケボルト	GEN. FITTING BOLT	8	8
504	X200010016ZZ	ボルト	BOLT	2	2
508	Z321020350ZZ	ハリガネ	WIRE	1	1
509	Z321020350ZZ	ハリガネ	WIRE	1	1

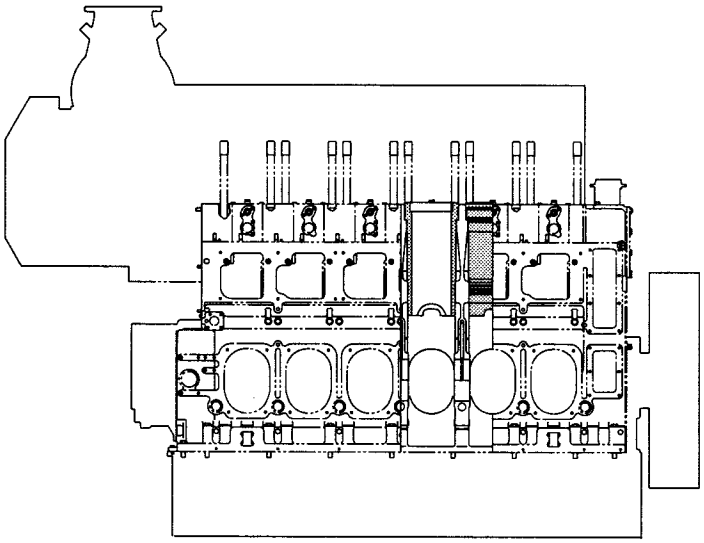
ターニング装置
FLYWHEEL TURNING DEVICE

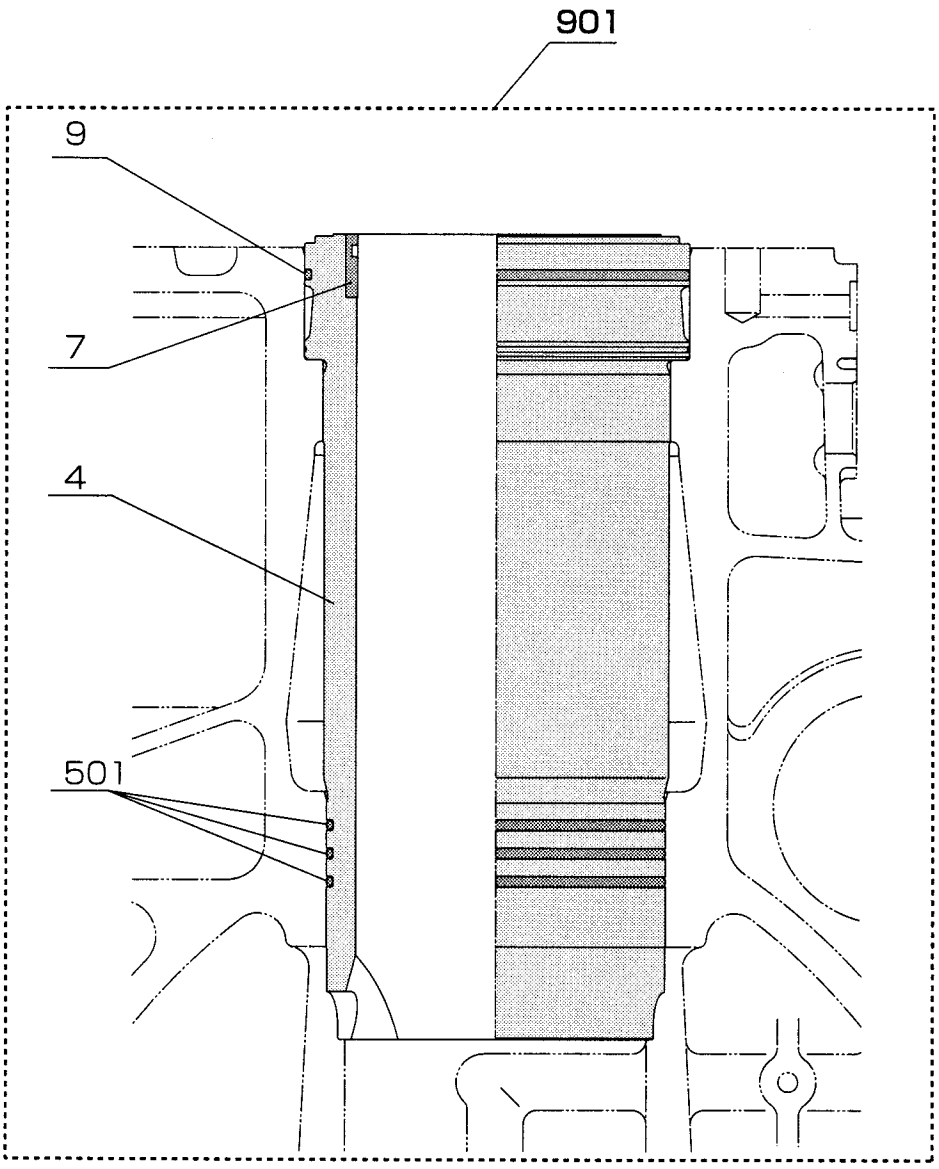


ターニング装置
FLYWHEEL TURNING DEVICE

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
901	C001390010	ターニングソウチ ASSY.-1	FLYWHEEL TURNING DEVICE ASSY.-1	1
A1	C001310010	テコダイ	FULCRUM	1
A4	C001340010	フォークレバージク	FORK LEVER SHAFT	1
A5	C001340020	ツメツキテコジク	CLAW LEVER SHAFT	1
A6	C001340030	オシボウ	PUSH ROD	2
A7	C001340040	オシボウガイド	GUIDE PLATE, PUSH ROD	1
A8	C001340050	ストッパ	STOPPER	1
A9	C001340060	ストッパガイド	GUIDE STOPPER	1
A10	C001340070	ノブ	KNOB	1
A16	C001370010	フォークレバ	FORK LEVER	1
A17	C001370020	ツメツキテコ	CLAW LEVER	1
A22	C001379801	バネ	SPRING	2
A23	C001379802	バネ	SPRING	1
A501	X200008018ZZ	ボルト	BOLT	2
A504	Z330006050ZZ	テーパピン	TAPER PIN	1
A505	Z330008080ZZ	テーパピン	TAPER PIN	1
B7	C001470070	ターニングバー	TURNING BAR	1

シリンダライナ
CYLINDER LINER



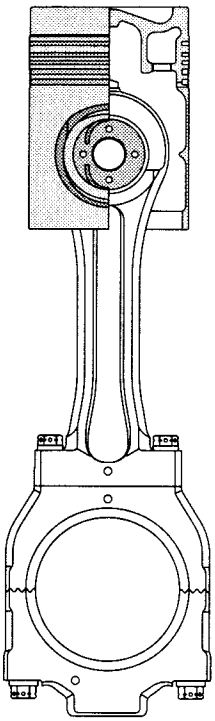


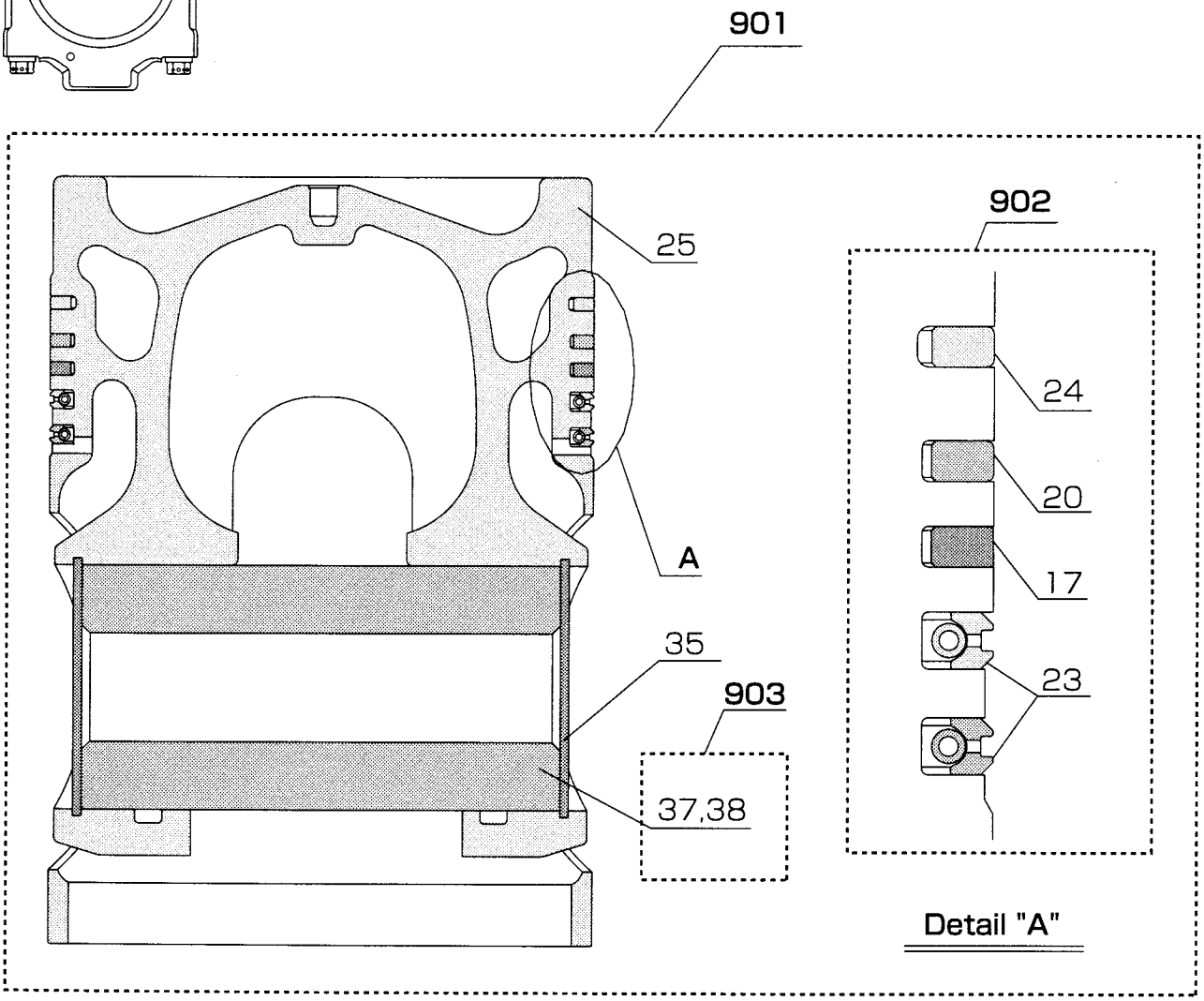
シリンダライナ
CYLINDER LINER

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
901		シリンダライナ ASSY.	CYLINDER LINER ASSY.	1
4	E205050040	シリンダライナ	CYLINDER LINER	1
7	E205050070	プロテクトリング	PROTECT RING	1
9	E205050090	O リング	O-RING	1
501	Z560223057ZZ	O リング	O-RING	3 (/CYL.)

)

ピストン
PISTON





DAIHATSU

ピストン
PISTON

6·8DK-20

CHAPTER 3

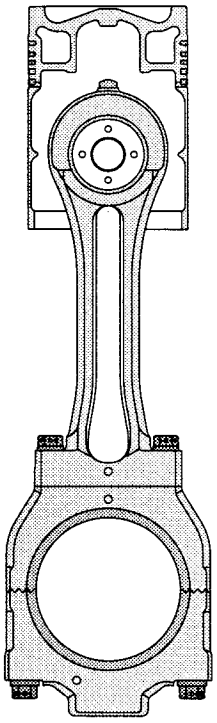
ITEM 13

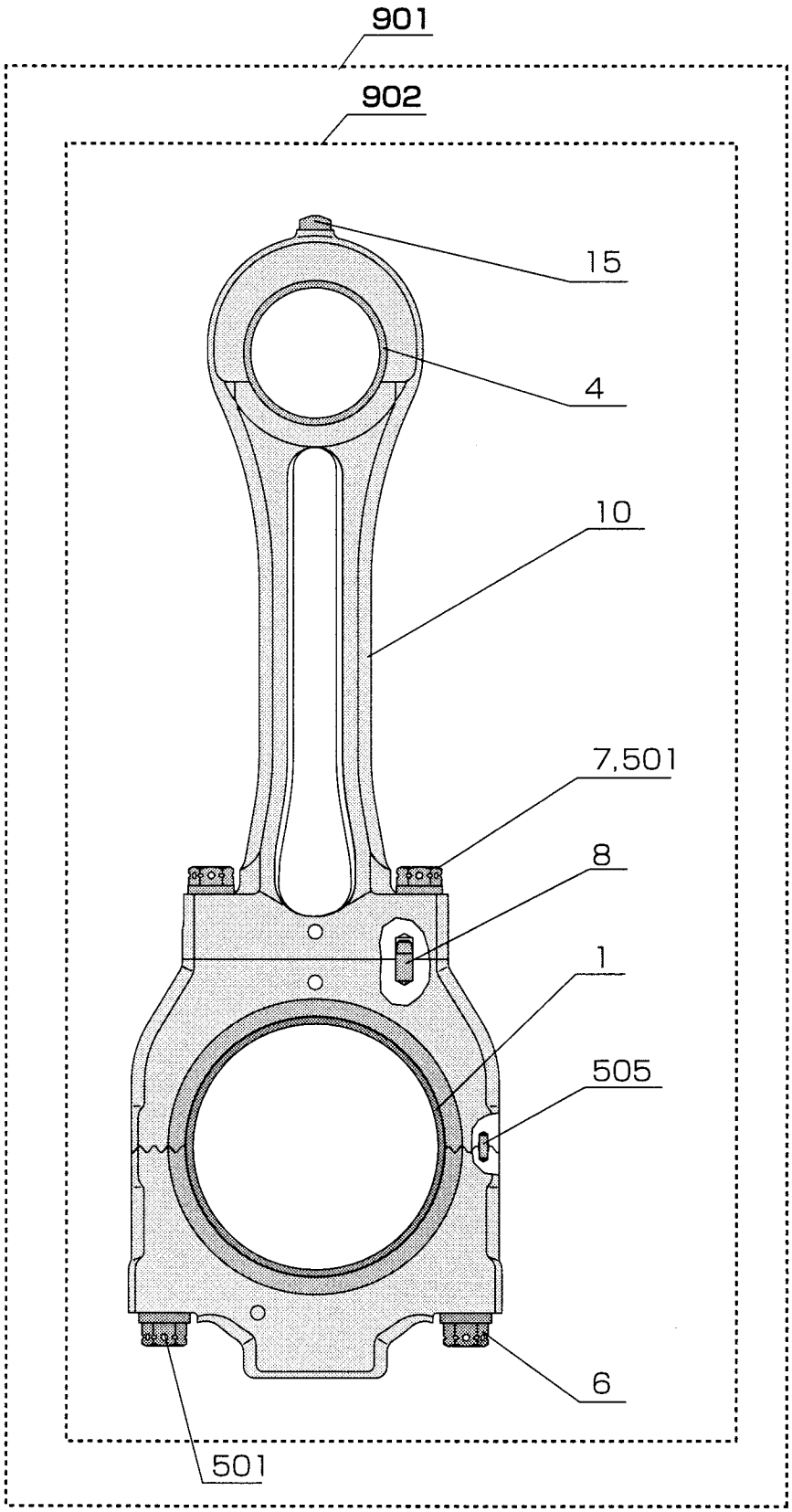
番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
901		ピストン ASSY.	PISTON ASSY.	1
902		ピストンリング ASSY.	PISTON RING ASSY.	1
903		ピストンピン ASSY.	PISTON PIN ASSY.	1
17	E205150170	ピストンリング (3)	PISTON RING (3)	1
20	E205150200	ピストンリング (2)	PISTON RING (2)	1
23	E205150230	オイルリング	OIL RING	2
24	E205150240	ピストンリング (1)	PISTON RING (1)	1
25	E205150250	ピストン-6	PISTON-6	1
35	E205150350	C ガタトメワ	SNAP RING, C-TYPE	2
37	E205150370	ピストンピン	PISTON PIN	1 ※
38	M140600100	ケーニツクエキスパンダ	PLUG	4 ※ (/CYL.)

注記
Remarks

※印部品の単体販売は不可
Parts (Signal ※) cannot be purchased by itself.

連接棒
CONNECTING ROD





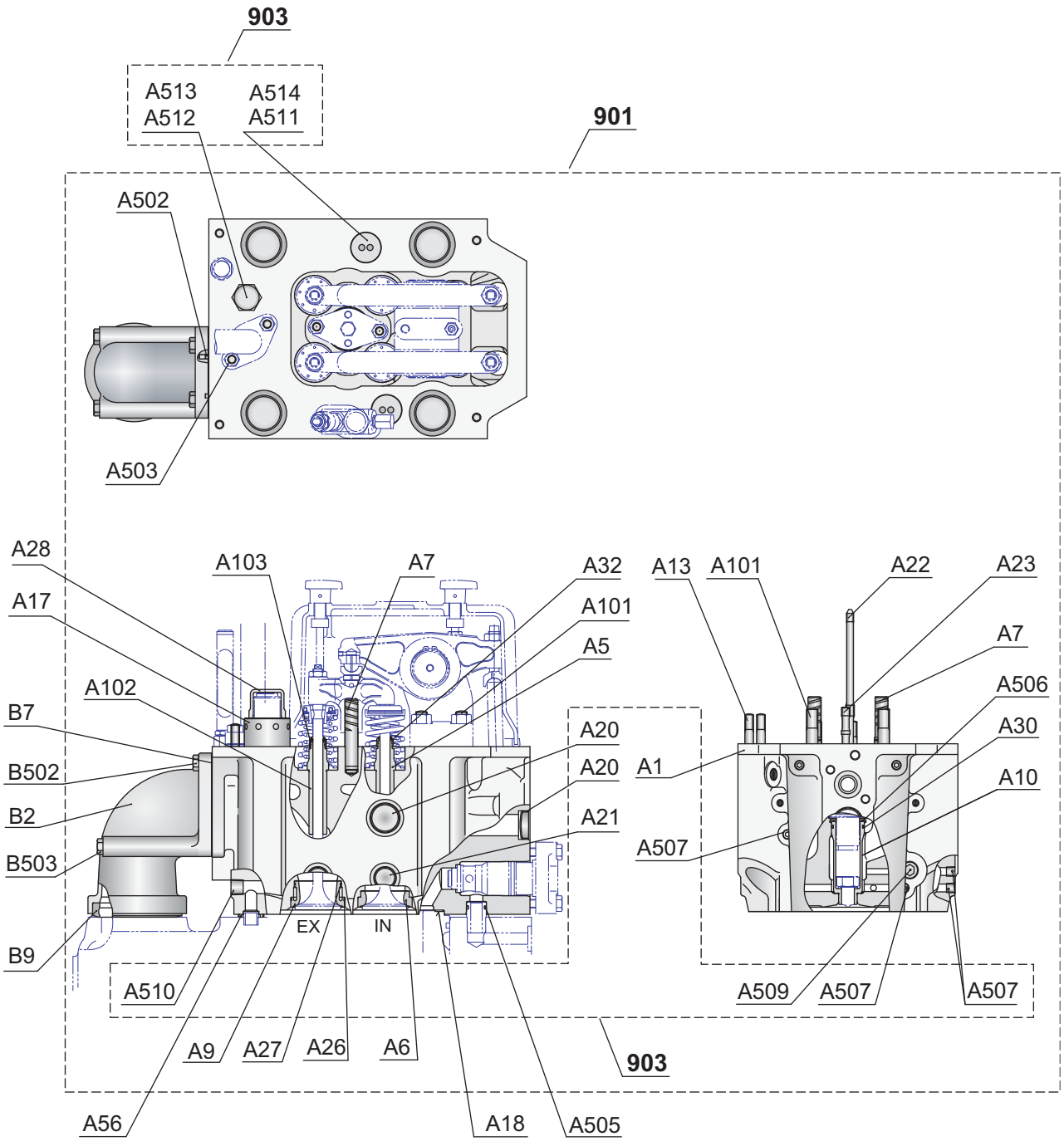
連接棒
CONNECTING ROD

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
901		レンセツボウ ASSY.	CONNECTING ROD ASSY.	1
902		レンセツボウ (タンタイ) ASSY.	CONNECTING ROD SUB-ASSY.	1
1	E205250010	クランクピンメタル	CRANKPIN BEARING SHELL	1
4	E205250040	ピストンピンブシユ	PISTON PIN BUSH	1
6	E205250060	クランクピンボルト	CRANKPIN BOLT	4
7	E205250070	レンセツボウツナギボルト	ROD CONNECTING BOLT	4
8	E205250080	トクシユヘイコウピン	SPECIAL STRAIGHT PIN	2
10	E205250100	レンセツボウ	CONNECTING ROD	1 ※
15	E205250150	ノズル	NOZZLE	1
501	Z321018020DZ	ハリガネ	WIRE	4
505	Z335006016ZZ	ヘイコウピン	STRAIGHT PIN	1
				(/CYL.)

注記
Remarks

※印部品の単体販売は不可
Parts (Signal ※) cannot be purchased by itself.

シリンダヘッド(燃料弁:冷却ノズル)
CYLINDER HEAD (NOZZLE : COOLING TYPE)



番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity	
901		シリンダヘッドASSY（ベンナシ）－C	**CYLINDER HEAD ASSY. W/OUT VALVE-C**	**1**	
902		シリンダヘッドASSY（ベンツキ）－C	**CYLINDER HEAD ASSY. WITH VALVE-C**	**1**	
903		シリンダヘッド（サブ）ASSY－C	**CYLINDER HEAD SUB-ASSY. -C**	**1**	
A1	E205650010D	シリンダヘッドーC	CYLINDER HEAD-C	1	*
A5	E205650050A	ベンガイド	VALVE GUIDE	2	
A6	E205650060Z	キュウキベンザ	SEAT; INTAKE VALVE	2	
A7	E205650070A	ベンオサエガイド	GUIDE; VALVE YOKE	2	
A9	E205650090B	ハイキベンザ（メテコ）	SEAT; EXHAUST VALVE (METCO)	2	
A10	E205650100A	ノズルホルダガイド	GUIDE; NOZZLE HOLDER	1	
A13	AE02056021A	スタッド	STUD	2	
A17	AE02008003A	マルナット	CIRCULAR NUT	4	
A18	E205650180Z	シリンダヘッドパッキン	GASKET; CYLINDER HEAD	1	
A20	H150103400Z	ワンガタプラグ	BOWL TYPE PLUG	4	
A21	E205650210Z	ワンガタプラグ	BOWL TYPE PLUG	6	
A22	E205650220Z	ボルト（1），ノズルホルダ	BOLT (1) ; NOZZLE HOLDER	1	
A23	E205650230Z	ボルト（2），ノズルホルダ	BOLT (2) ; NOZZLE HOLDER	1	
A26	E205650260Z	Oリング	O-RING	2	
A27	E205650270A	Oリング	O-RING	2	
A28	E205650280Z	キヤップ	CAP	4	
A30	E205650300Z	Oリング	O-RING	1	
A32	E205650320A	バルブステムシール	VALVE STEM SEAL	2	
A56	E205650560Z	CWレンラクカンパツキン	GASKET; C.W. CONNECTOR	4	
A101	AE01056036A	スタッド	STUD	4	
A102	E205655010Z	ベンガイド2	VALVE GUIDE 2	2	
A103	U205605010Z	バルブステムシール1	VALVE STEM SEAL 1	2	
A502	Z335606014ZZ	ヘイコウピン	STRAIGHT PIN	2	
A503	X210012050ZZ	スタッド	STUD	2	
A505	Z560102235ZZ	Oリング	O-RING	1	
A506	Z412004800ZZ	スナップリングアナ	SNAP RING	1	
A507	Z571502000ZZ	テーパプラグ	TAPER PLUG	9	
A509	Z571506000ZZ	テーパプラグ	TAPER PLUG	1	
A510	Z571504000ZZ	テーパプラグ	TAPER PLUG	1	
A511	X572310000DZ	トクシュプラグ	SPECIAL PLUG	2	
A512	X570006000DZ	ロッカクプラグ	HEX. PLUG	1	
A513	Z565002700ZZ	マルパッキン	GASKET	1	
A514	Z565003400ZZ	マルパッキン	GASKET	2 (/CYL)	

注記
Remarks

(1) ＊印部品の単体販売は不可。
Parts (Signal *) cannot be purchased by itself.

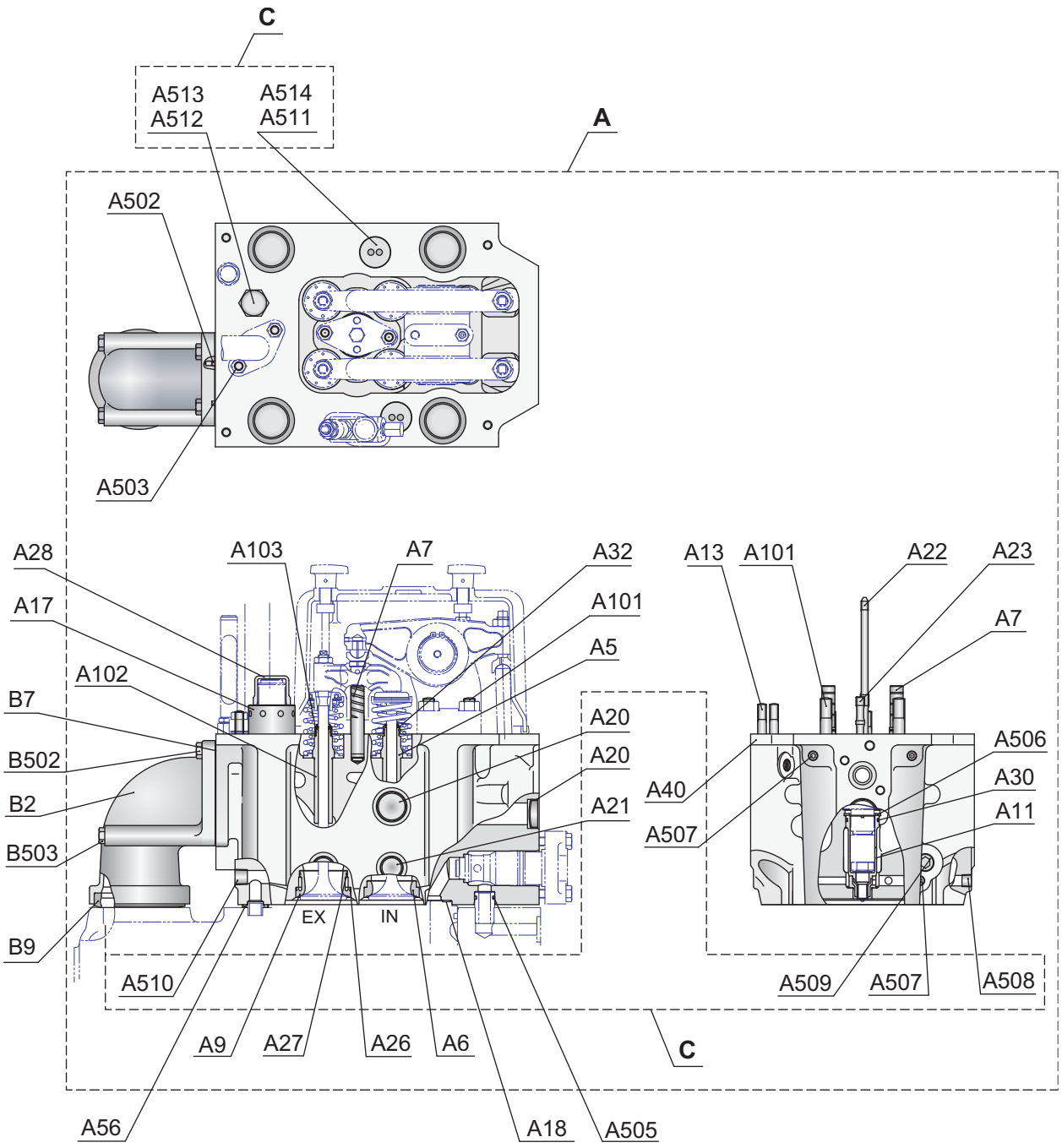
(2) NO. 902シリンダヘッドASSY（ベンツキ）には、吸・排気弁、起動弁、指圧器安全弁を含む：3－16，3－17，3－18，3－19を参照ください。
CYLINDER HEAD ASSY. (WITH VALVE) INCLUDE IN. & EX. VALVES and INDICATOR & SAFETY VALVE : Ref. 3-16,3-17,3-18,3-19.

シリンダヘッド(燃料弁:冷却ノズル)
CYLINDER HEAD (NOZZLE : COOLING TYPE)

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
B2	E202050020	キュウキカンベンド	BEND; INTAKE MANIFOLD	1
B7	E202050070	キュウキカンベンドガスケット	GASKET; INTAKE MANIFOLD BEND	1
B9	E202050090	キュウキベンドシール	SEAL; INTAKE MANIFOLD BEND	1
B502	X200012032ZZ	ボルト	BOLT	2
B503	X200012165ZZ	ボルト	BOLT	2

(/CYL)

シリンダヘッド(燃料弁:無冷却ノズル)
CYLINDER HEAD (NOZZLE : NON-COOLING TYPE)



DAIHATSU

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
A		シリンダヘッドASSY（ベンナシ）	**CYLINDER HEAD ASSY. W/OUT VALVE**	**1**
B		シリンダヘッドASSY（ベンツキ）	**CYLINDER HEAD ASSY. WITH VALVE**	**1**
C		シリンダヘッド（サブ）ASSY	**CYLINDER HEAD SUB-ASSY.**	**1**
A5	E205650050A	ベンガイド	VALVE GUIDE	2
A6	E205650060Z	キュウキベンザ	SEAT; INTAKE VALVE	2
A7	E205650070A	ベンオサエガイド	GUIDE; VALVE YOKE	2
A9	E205650090B	ハイキベンザ（メテコ）	SEAT; EXHAUST VALVE (METCO)	2
A11	E205650110A	ノズルホルダガイドーC	GUIDE; NOZZLE HOLDER-C	1
A13	AE02056021A	スタッド	STUD	2
A17	AE02008003A	マルナット	CIRCULAR NUT	4
A18	E205650180Z	シリンダヘッドパッキン	GASKET; CYLINDER HEAD	1
A20	H150103400Z	ワンガタプラグ	BOWL TYPE PLUG	4
A21	E205650210Z	ワンガタプラグ	BOWL TYPE PLUG	6
A22	E205650220Z	ボルト（1），ノズルホルダ	BOLT (1) ; NOZZLE HOLDER	1
A23	E205650230Z	ボルト（2），ノズルホルダ	BOLT (2) ; NOZZLE HOLDER	1
A26	E205650260Z	Oリング	O-RING	2
A27	E205650270A	Oリング	O-RING	2
A28	E205650280Z	キヤップ	CAP	4
A30	E205650300Z	Oリング	O-RING	1
A32	E205650320A	バルブステムシール	VALVE STEM SEAL	2
A40	E205650400Z	シリンダヘッド	CYLINDER HEAD	1
A56	E205650560Z	CWレンラクカンパツキン	GASKET; C.W. CONNECTOR	4
A101	AE01056036A	スタッド	STUD	4
A102	E205655010Z	ベンガイド2	VALVE GUIDE 2	2
A103	U205605010Z	バルブステムシール1	VALVE STEM SEAL 1	2
A502	Z335606014ZZ	ヘイコウピン	STRAIGHT PIN	2
A503	X210012050ZZ	スタッド	STUD	2
A505	Z560102235ZZ	Oリング	O-RING	1
A506	Z412004800ZZ	スナップリングアナ	SNAP RING	1
A507	Z571502000ZZ	テーパプラグ	TAPER PLUG	5
A508	Z571503000ZZ	テーパプラグ	TAPER PLUG	1
A509	Z571506000ZZ	テーパプラグ	TAPER PLUG	1
A510	Z571504000ZZ	テーパプラグ	TAPER PLUG	1
A511	X572310000DZ	トクシュプラグ	SPECIAL PLUG	2
A512	X570006000DZ	ロッカクプラグ	HEX. PLUG	1
A513	Z565002700ZZ	マルパッキン	GASKET	1
A514	Z565003400ZZ	マルパッキン	GASKET	2 (/CYL)

注記
Remarks

(1) ＊印部品の単体販売は不可。
Parts (Signal *) cannot be purchased by itself.

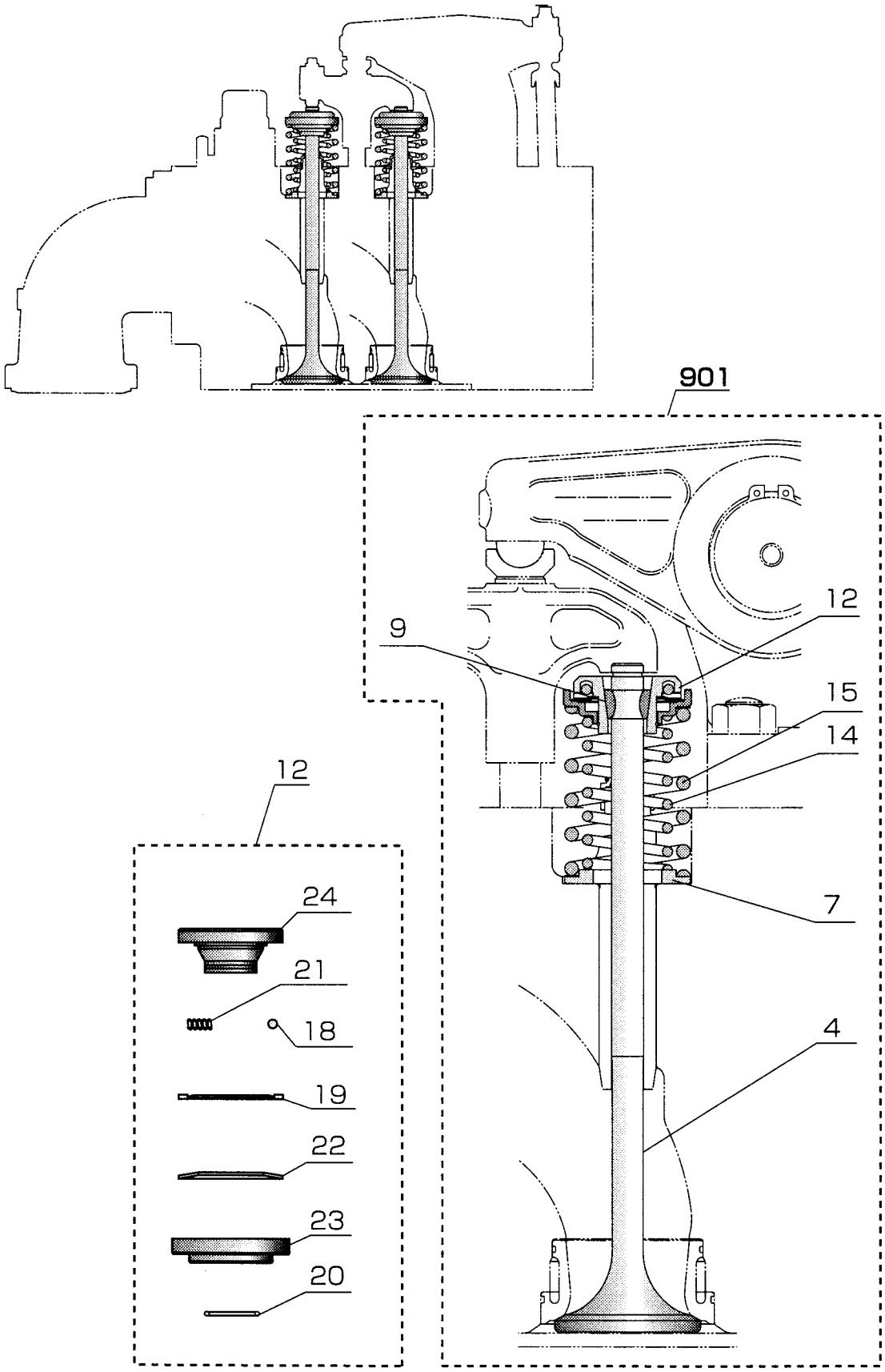
(2) NO. BシリンダヘッドASSY（ベンツキ）には、吸・排気弁、起動弁、指圧器安全弁を含む：3－16，3－17，3－18，3－19を参照ください。
CYLINDER HEAD ASSY. (WITH VALVE) INCLUDE IN. & EX. VALVES and INDICATOR & SAFETY VALVE : Ref. 3-16,3-17,3-18,3-19.

シリンダヘッド(燃料弁:無冷却ノズル)
CYLINDER HEAD (NOZZLE : NON-COOLING TYPE)

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
B2	E202050020	キュウキカンベンド	BEND; INTAKE MANIFOLD	1
B7	E202050070	キュウキカンベンドガスケット	GASKET; INTAKE MANIFOLD BEND	1
B9	E202050090	キュウキベンドシール	SEAL; INTAKE MANIFOLD BEND	1
B502	X200012032ZZ	ボルト	BOLT	2
B503	X200012165ZZ	ボルト	BOLT	2

(/CYL)

排気弁
EXHAUST VALVE



DAIHATSU

排気弁
EXHAUST VALVE

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CHAPTER 3

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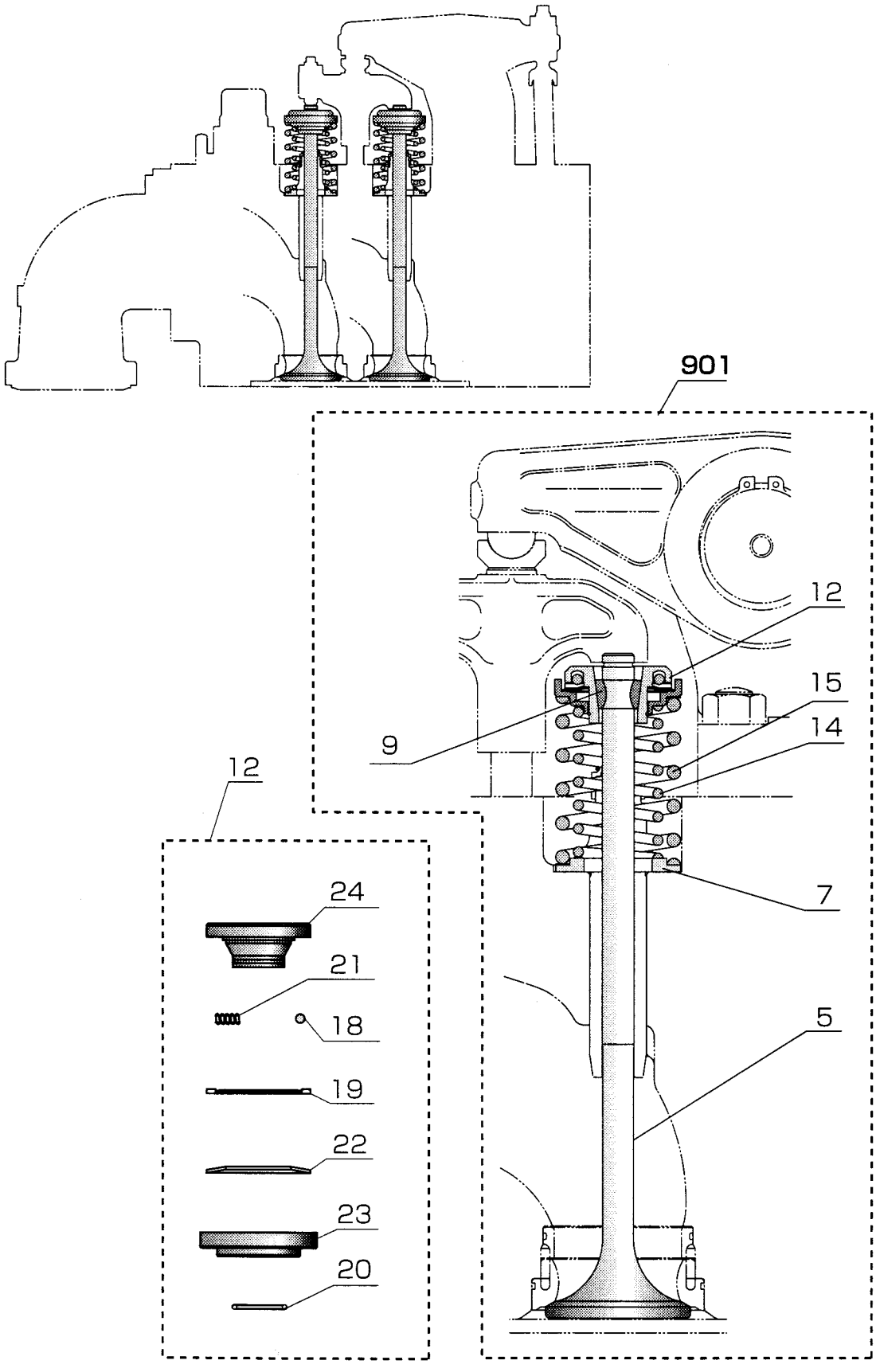
番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
901		ハイキベン ASSY.-1	EXHAUST VALVE ASSY.-1	2
4	E205850040	ハイキベン-1	EXHAUST VALVE-1	2
7	E205750070	ベンバネシート	SEAT, VALVE SPRING	2
9	E205750090	コツタ	VALVE COTTER	2
12	E205750120	バルブローテーター	VALVE ROTATOR	2
14	E205750140	ベンバネ（ウチ）	VALVE SPRING (INNER)	2
15	E205750150	ベンバネ（ソト）	VALVE SPRING (OUTER)	2 (/CYL.)
18	E205750180	コウキユウ	STEEL BALL	6
19	E205750190	ボールレース	BALL RACE	1
20	E205750200	トメワ	CIRCLIP	1
21	E205750210	コイルバネ	COIL SPRING	6
22	E205750220	サラバネ	COEND DISK SPRING	1
23	E205750230	リテーナ	RETAINER	1
24	E205750240	ホンタイ	BODY	1 ※

注記
Remarks

※印部品の単体販売は不可
Parts (Signal ※) cannot be purchased by itself.

給気弁
INTAKE VALVE



DAIHATSU

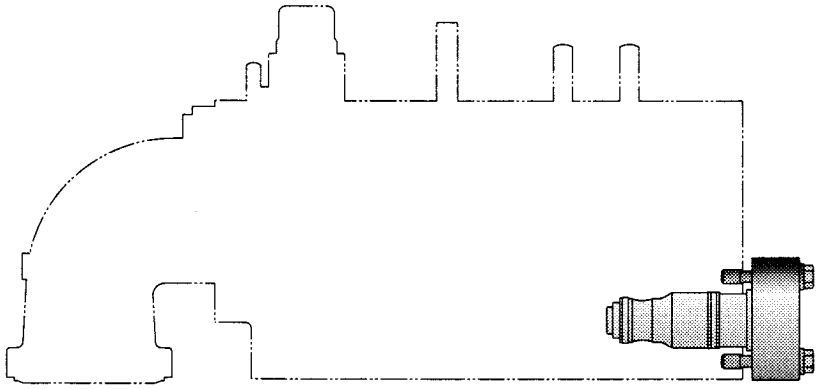
給気弁
INTAKE VALVE

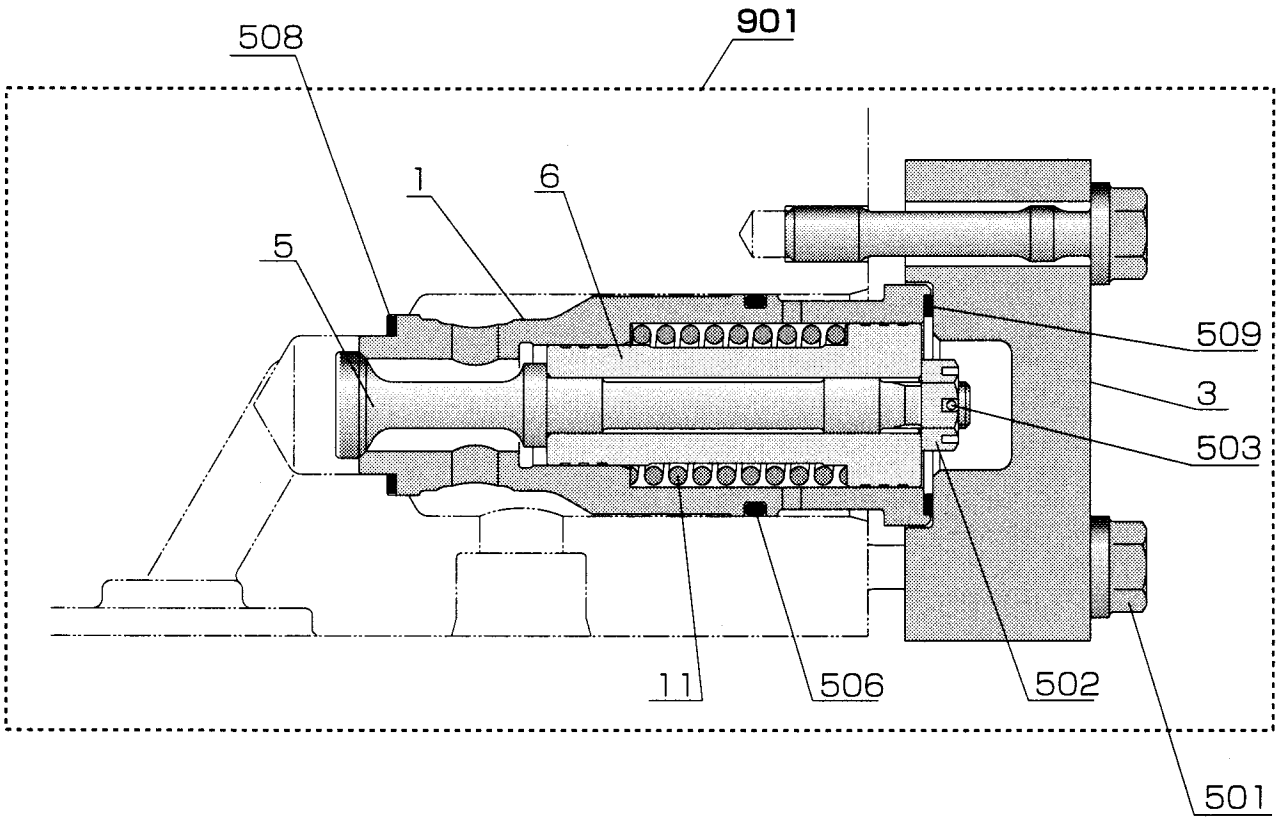
番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
901		キュウキベン ASSY.-1	INTEAKE VALVE ASSY.-1	2
5	E205750050	ベン-2	VALVE-2	2
7	E205750070	ベンバネシート	SEAT, VALVE SPRING	2
9	E205750090	コツタ	VALVE COTTER	2
12	E205750120	バルブローテーター	VALVE ROTATOR	2
14	E205750140	ベンバネ（ウチ）	VALVE SPRING (INNER)	2
15	E205750150	ベンバネ（ソト）	VALVE SPRING (OUTER)	2 (/CYL.)
18	E205750180	コウキユウ	STEEL BALL	6
19	E205750190	ボールレース	BALL RACE	1
20	E205750200	トメワ	CIRCLIP	1
21	E205750210	コイルバネ	COIL SPRING	6
22	E205750220	サラバネ	COEND DISK SPRING	1
23	E205750230	リテーナ	RETAINER	1
24	E205750240	ホンタイ	BODY	1 ※

注記
Remarks

※印部品の単体販売は不可
Parts (Signal ※) cannot be purchased by itself.

起動弁
STARTING VALVE





起動弁
STARTING VALVE

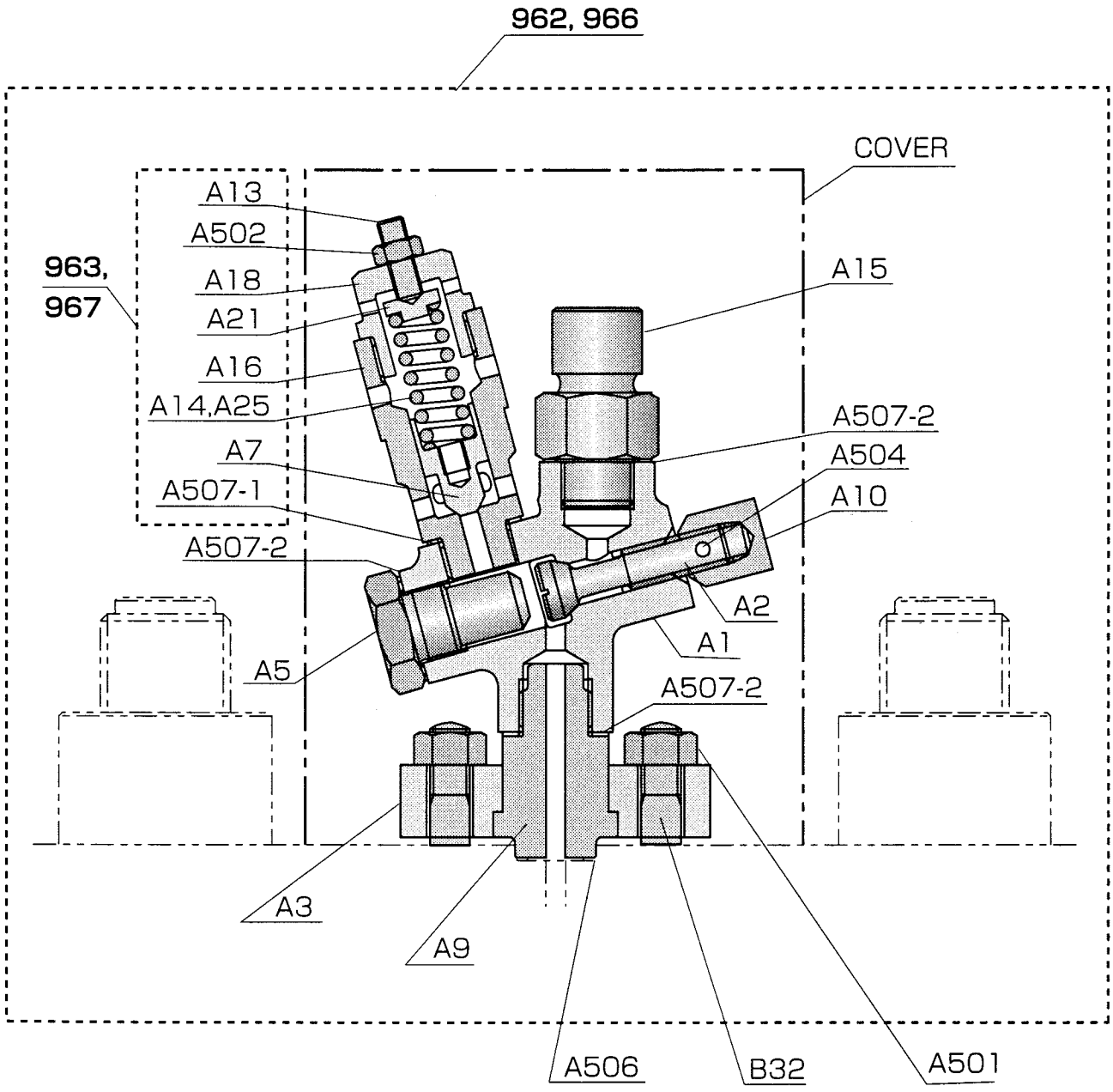
6·8DK-20

CHAPTER 3

ITEM 18

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
901		キドウベン ASSY.	STARTING VALVE ASSY.	1
1	E206050010	キドウベンタイ	BODY, STARTING VALVE	1
3	E206050030	キドウベンフタ	COVER, STARTING VALVE	1
5	E206050050	キドウベン	STARTING VALVE	1
6	E206050060	キドウベンピストン	PISTON, STARTING VALVE	1
11	E206050110	バネ	SPRING	1
501	X205012065ZZ	HT ボルト	HT BOLT	2
502	X225710000JZ	キクナツト	CASTLE NUT	1
503	Z320002025JZ	ワリピン	SPLIT PIN	1
506	Z560104235ZZ	O リング	O-RING	1
508	Z665030000CD	マルパツキン	GASKET	1
509	Z665038000ZZ	マルパツキン	GASKET	1 (/CYL.)

指圧器，安全弁
INDICATOR & SAFETY VALVE

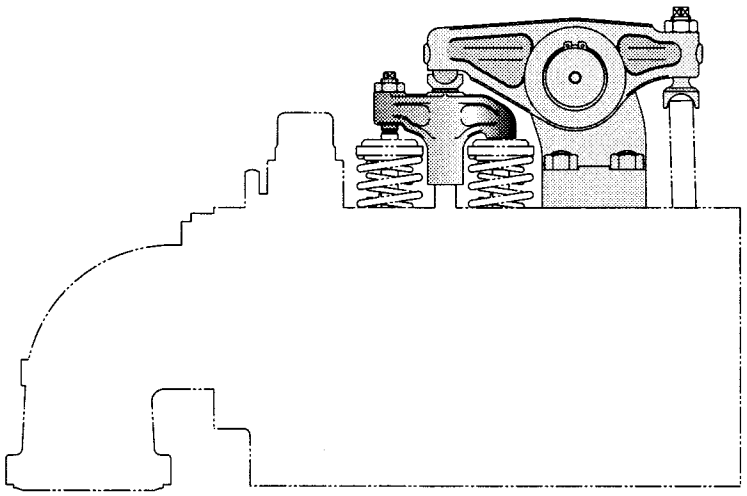


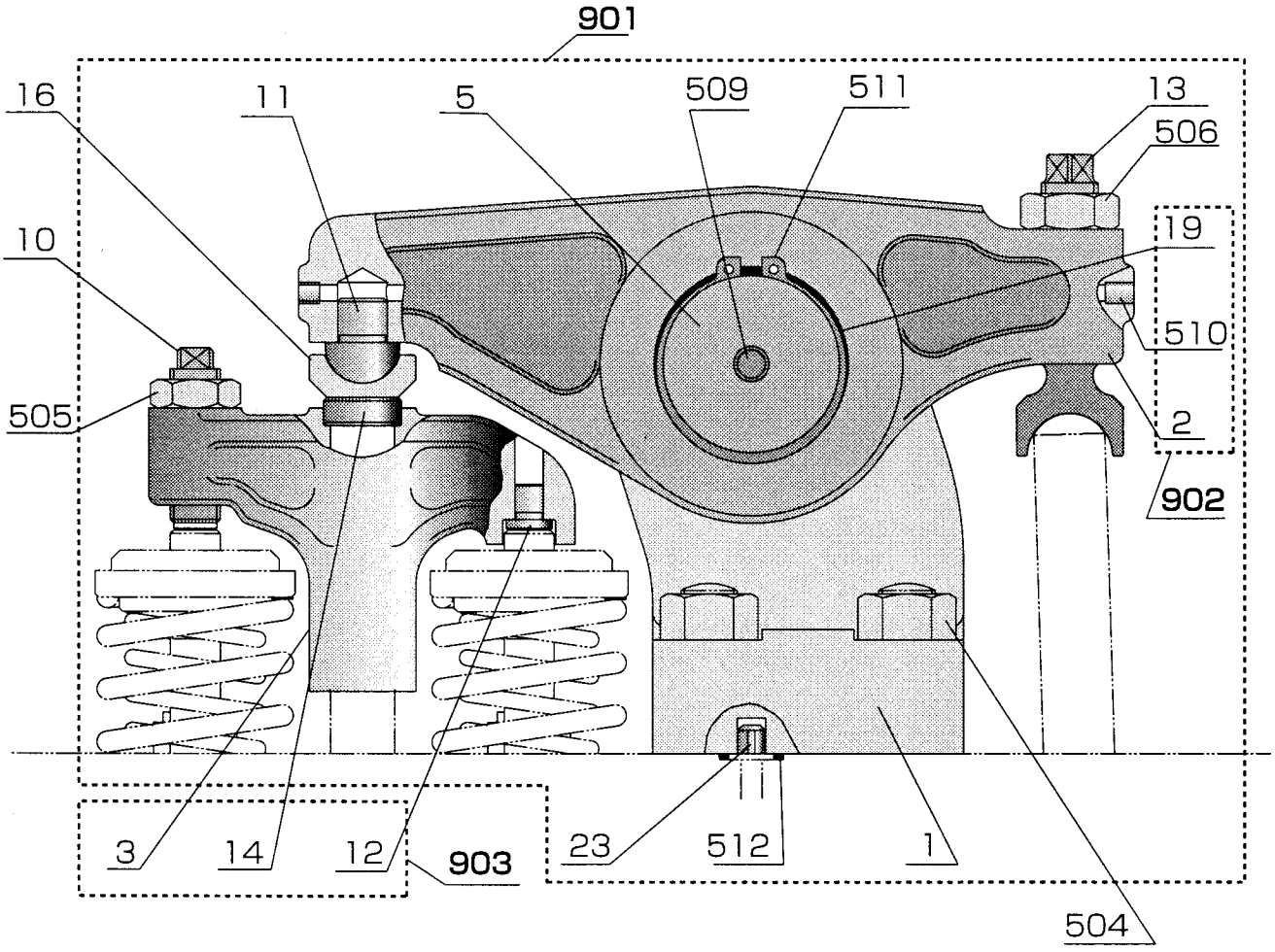
(1)····ｶﾊﾞｰ無し WITHOUT COVER　　(2)····ｶﾊﾞｰ付 WITH COVER

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity (1)	(2)
962	**NN00002004**	シアツキアンゼンベン(2) **ASSY.**	**INDICATOR & SAFETY VALVE (2) ASSY.**	**1**	
963	**NN00002025**	アンゼンベン**ASSY.**	**SAFETY VALVE ASSY.**	**1**	
966	**E206959660**	シアツキアンゼンベン(2C) **ASSY.**	**INDICATOR & SAFETY VALVE (2C) ASSY.**		**1**
967	**E206959670**	シアツキアンゼンベン(C)	**INDICATOR & SAFETY VALVE (C)**		**1**
A1	NN00002001	シアツキベンタイ	BODY:INDICATOR VALVE	1	1
A2	NN00002002	シアツキベン	INDICATOR VALVE	1	1
A3	NN00002003	フランジ:シアツキアンゼンベン	FLANGE:INDICATOR SAFETY VALVE	1	1
A5	NN00002005	ロツカクプラグ	HEX.PLUG	1	1
A7	NN00002006	アンゼンベン	SAFETY VALVE	1	1
A9	NN00002007	ジク, シアツキアンゼンベン	SHAFT:INDICATOR SAFETY VALVE	1	1
A10	NN00002008	ナツト, シアツキベン	NUT:INDICATOR VALVE	1	1
A13	NN00002011	トメネジ	SET SCREW	1	1
A14	NN00002012	バネ	SPRING	1	
A15	NN00002013	セツシユ, シアツキ	JOINT NDICATOR	1	1
A16	NN00002014	タイ, アンゼンベン	BODY SAFETY VALVE	1	1
A18	NN00002015	オサエ, アンゼンベンバネ	CLAMP SAFETY VALVE SPRING	1	1
A21	NN00002016	シート, バネ	SEAT SPRING	1	1
A25	NN00002029	バネ	SPRING		1
A501	X220012000ZZ	ナツト	NUT	2	2
A502	X220308000ZZ	ナツト	NUT	1	1
A504	Z335004020ZZ	ヘイコウピン	STRAIGHT PIN	1	1
A506	Z565001700ZZ	マルパツキン	GASKET	1	1
A507-1	Z565002300ZZ	マルパツキン	GASKET	1	1
A507-2	Z565002300ZZ	マルパツキン	GASKET	3	3
B32	E205650130	スタッド	STUD	2	2

(/CYL.)

動弁装置
VALVE OPERATING DEVICE





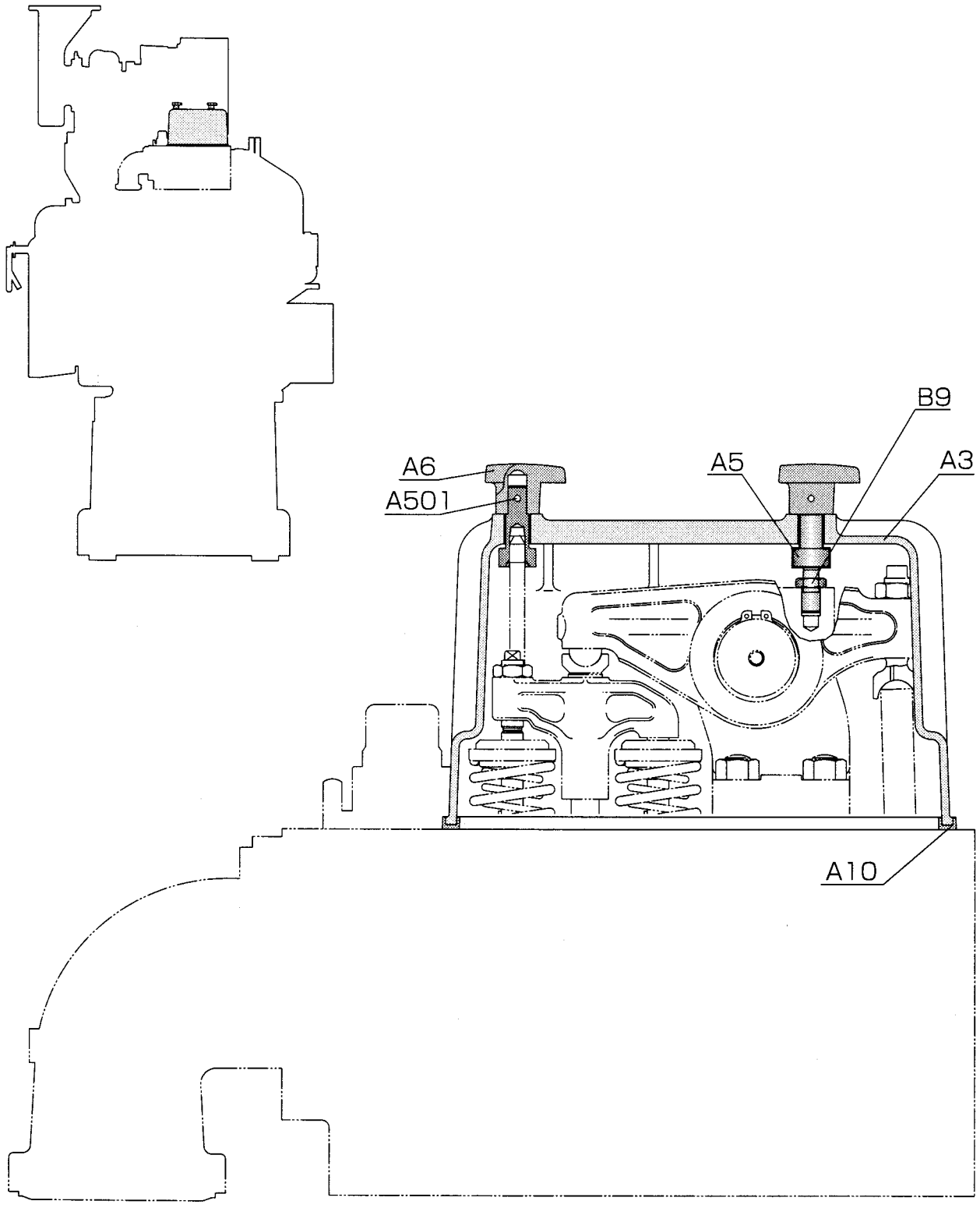
動弁装置
VALVE OPERATING DEVICE

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity	
901		ベンワン ASSY.	ROCKER ARM ASSY.	1	
902		キュウハイキベンワン（ブッシュツキ）	IN. & EX. VALVE ROCKE ARM (WITH BUSH)	2	
903		ベンオサエティ（シートツキ）	T, VALVE YOKE (WITH SEAT)	2	
1	E205950010	ベンワンジクホルダ	HOLDER, ROCKER ARM	1	
2	E205950020	キユウハイキベンワン	IN. & EX. VALVE ROCKER ARM	2	※
3	E205950030	ベンオサエテイー	T, VALVE YOKE	2	※
5	E205950050	ベンワンジク	SHAFT, ROCKER ARM	1	
10	E205950100	ベンオサエネジ	ADJUSTING SCREW, VALVE YOKE	2	
11	E205950110	ベンワンカナグ	METAL PIECE ROCKER ARM	2	
12	E205950120	テイーウチコミカナグ	SEAT, VALVE YOKE	2	
13	E205950130	ベンワンネジ	SCREW, ROCKER ARM	2	
14	E205950140	ベンオサエシート (1)	SEAT (1), VALVE YOKE	2	
16	E205950160	ベンワンカナグキヤツプ	CAP, ROCKER ARM METAL PIECE	2	
19	E205950190	ベンワンブシユ	BUSH, ROCKER ARM	2	
23	E205950230	ＬＯチヨウセイネジ	L.O. ADJUSTING SCREW	1	
504	X220016000ZZ	ナツト	NUT	4	
505	X220814000ZZ	ナツト	NUT	2	
506	X220316000ZZ	ナツト	NUT	2	
509	X251210012ZZ	トメネジ	SET SCREW	2	
510	X251206006ZZ	トメネジ	SET SCREW	4	
511	Z411005000ZZ	スナツプリング（ジク）	SNAP RING (SHAFT)	2	
512	Z560101424ZZ	Ｏリング	O-RING	1	
				(/CYL.)	

注記
Remarks

※印部品の単体販売は不可，サブ ASSY. での注文を承わります．
901ベンワン ASSY. は，3-21，B9，ヘッドカバーボルトを含む．
Parts (Signal ※) cannot be purchased by itself. Please order sub assy.
ROCKER ARM ASSY. include No.B9, BOLT, HEAD COVER in 3-21.

シリンダヘッドカバー
CYLINDER HEAD COVER



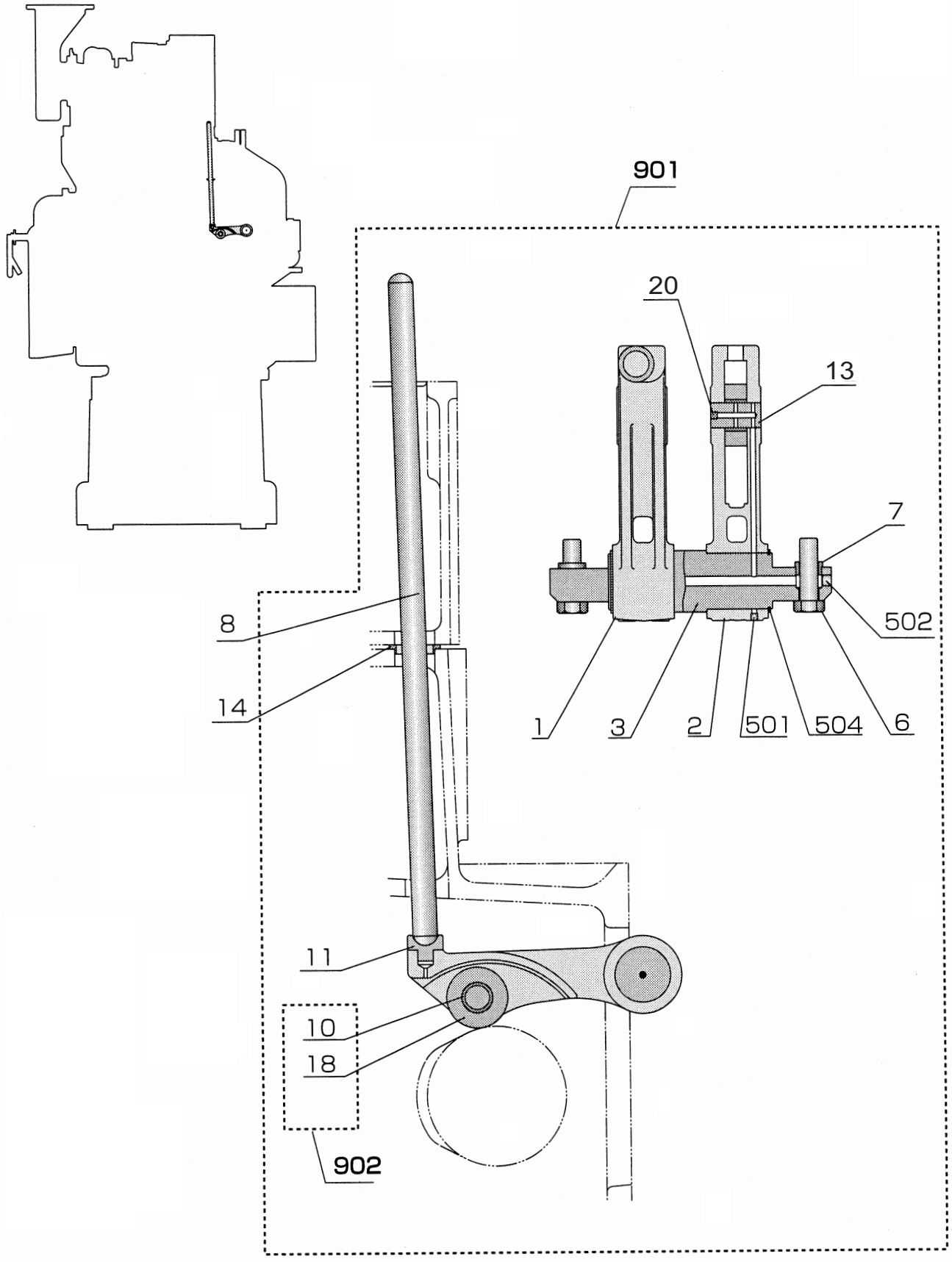
シリンダヘッドカバー
CYLINDER HEAD COVER

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
A3	E206350030	シリンダヘツドカバ (2)	COVER (2), CYLINDER HEAD	1
A5	E206350050	ハンドルジク	SHAFT, HEAD COVER KNOB	2
A6	E266300050	ヘツドカバトツテ	KNOB, CYLINDER HEAD COVER	2
A10	E206350100	ヘツドカバゴムシール	RUBBER SEAL, HEAD COVER	1
A501	Z415004024ZZ	スプリングピン	SPRING PIN	2
B9	E205950090	ヘッドカバボルト	BOLT, HEAD COVER	1 ※ (/CYL.)

注記
Remarks

※印部品は 3-20, 901, ベンワン ASSY. に含まれる.
Parts (Signal ※) is includid in ROCKER ARM ASSY. : Ref. 3-20.

吸・排気タペット
INTAKE & EXHAUST TAPPET



吸・排気タペット
INTAKE & EXHAUST TAPPET

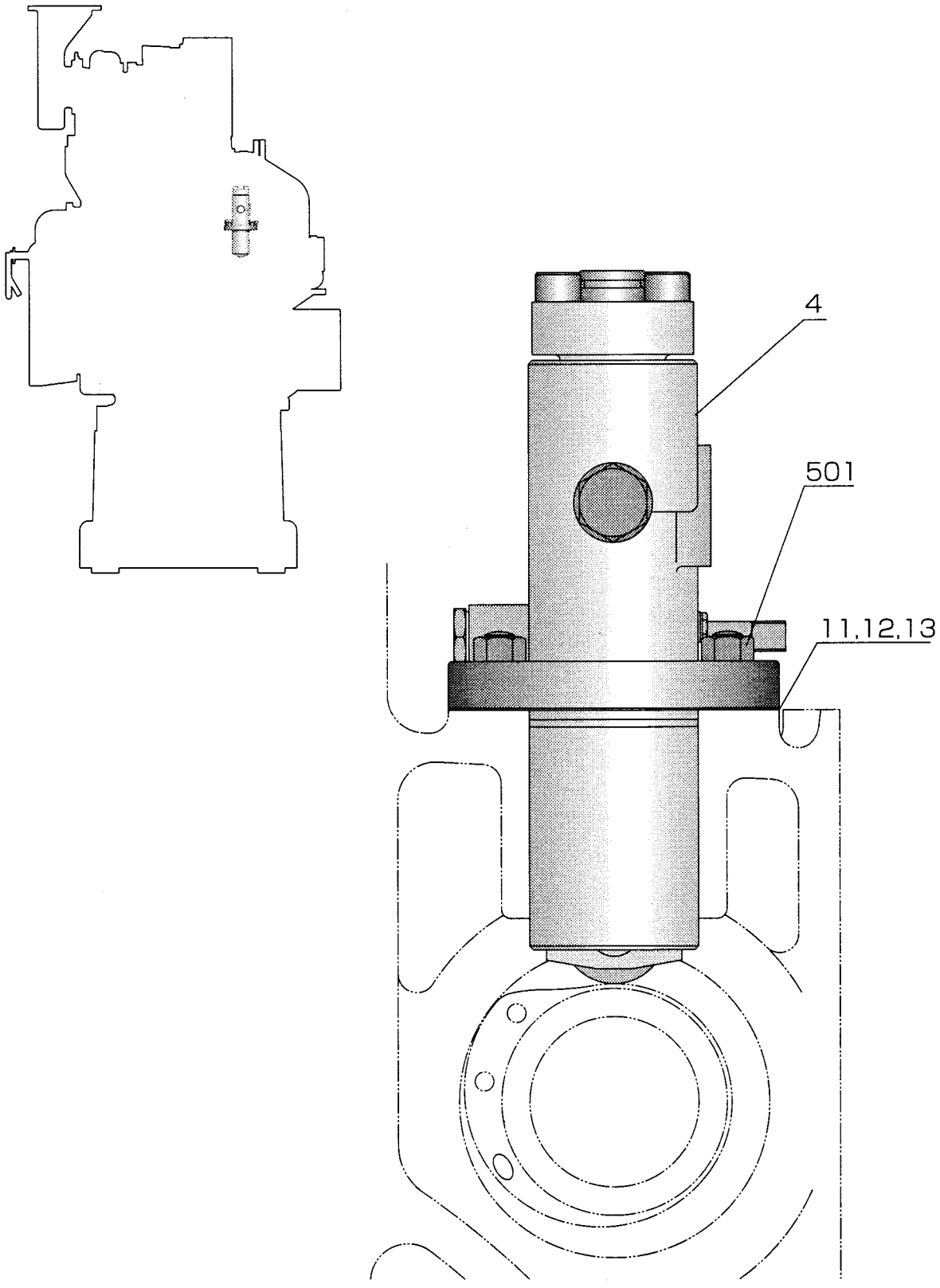
番号 Number	パーツコード Parts Code	部品名称	Name of Parts	数量 Quartity
901		**IN. EX. タペットASSY.**	**IN. EX. TAPPET ASSY.**	**1**
902		**ローラ ASSY.**	**ROLLER ASSY.**	**2**
1	E206650010	スウイングアーム(L)	SWING ARM(L)	1
2	E206650020	スウイングアーム(R)	SWING ARM(R)	1
3	E206650030	スウイングタペツトジク	SHAFT, SWING TAPPET	1
6	E206650060	ボルト, スウイングタペツトジク	BOLT, SWING TAPPET SHAFT	2
7	AE01066002	リングノツク	RING KNOCK	2
8	E206650080	プシユロツド	PUSH ROD	2
10	AE01066006	ブツシユ:タペツトローラ	BUSH:TAPPET ROLLER	2
11	E206650110	プシユロツドシート	SEAT, PUSH ROD	2
13	E206650130	ピン, タペツトローラ	PIN, TAPPET ROLLER	2
14	E206650140	ゴムシール, プツシユロツド	RUBBER SEAL, PUSH ROD	2
18	AE01066005	タペツトローラ	TAPPET ROLLER	2
20	AE01066017	ケーニツクエキスパンダ	KOENIC EXPANDER	2
501	X251206006ZZ	トメネジ	SET SCREW	2
502	Z571501000ZZ	テーパプラグ	TAPER PLUG	2
504	Z411005000ZZ	スナツプリング(ジク)	SNAP RING(SHAFT)	2

(/Cyl.)

注記
Remarks

＃印部品の単体販売は不可
Parts(Signal＃)cannot be purchased by itself.

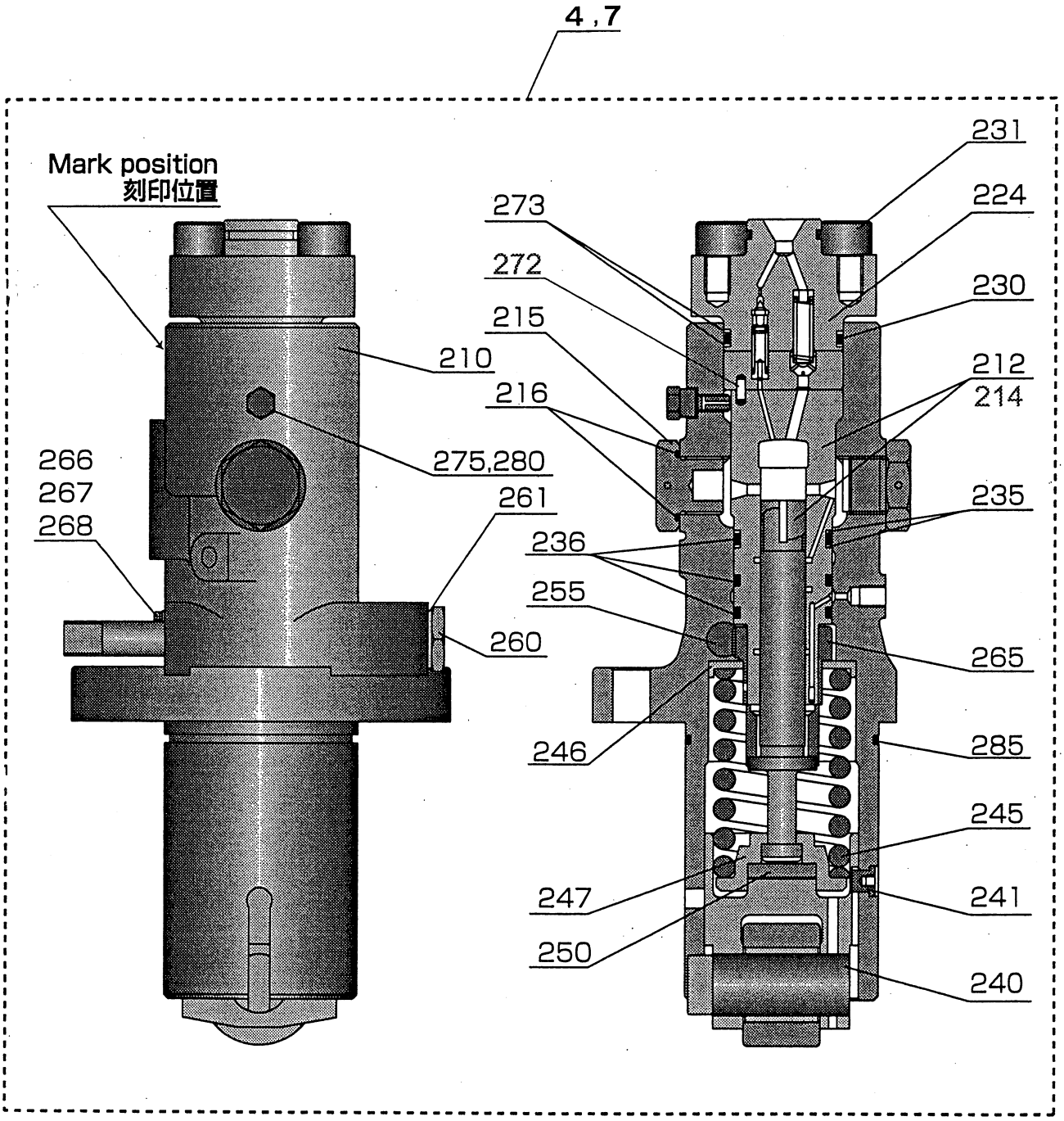
燃料噴射ポンプ取付
FUEL OIL INJECTION PUMP FITTING



燃料噴射ポンプ取付
FUEL OIL INJECTION PUMP FITTING

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
4	E206450040	FO ポンプ	F.O. PUMP	1
11	E206450110	シム 0.6, FO ポンプ	SHIM 0.6, F.O. PUMP	1
12	E206450102	シム 0.1, FO ポンプ	SHIM 0.1, F.O. PUMP	2
13	E206450103	シム 1.0, FO ポンプ	SHIM 1.0, F.O. PUMP	1
501	X220016000ZZ	ナット	NUT	3 (/CYL.)

燃料噴射ポンプ
FUEL OIL INJECTION PUMP



注）仕様により変更する場合があるため、刻印をご確認の上、部品要求してください。
Note) Different parts are used depending on the specifications.
Check the identification mark before ordering parts.

Example of Mark

(L42D) D NP-PFR1WS210A03N5
(L42D,N) D NP-PFR1WS210A03N8

燃料噴射ポンプ
FUEL OIL INJECTION PUMP

(1) プランジャ: DWS13 PLUNGER:DWS13
(2) プランジャ: DWS21 PLUNGER:DWS21

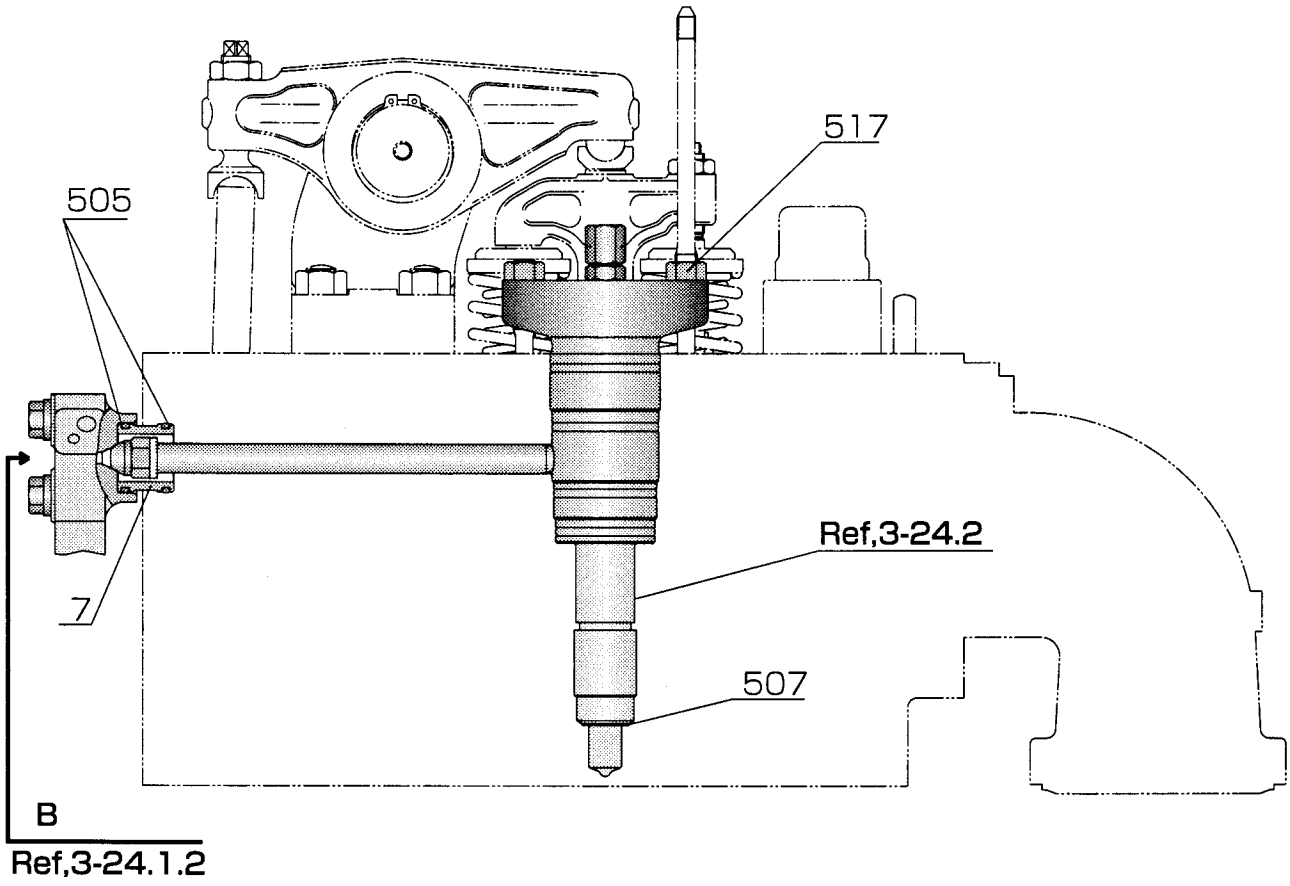
番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity (1)	(2)
4	**E206450040**	FOポンプ, C21TG−L42D	**FO PUMP,C21TG-L42D**	1	
7	**E206450070**	FOポンプ, C21TG−L42D, N	**FO PUMP,C21TG-L42D,N**		1
210	E206452100	ハウジング ポンプ	HOUSING;PUMP	※ 1	1
212	E206452120	プランジヤASSY, 21	PLUNGER ASSY,21	1	
214	E206452140	プランジヤASSY, 21,N	PLUNGER ASSY,21N		1
215	AE01064007	デフレクタ	DEFLECTOR	2	2
216	E206452160	O リング	O RING	2	2
224	E206452240	デリベリバルブ ASSY.	D.V. ASSY	1	1
230	E206452300	O リング	O RING	1	1
231	E206452310	ボルト	BOLT	4	4
235	AE01064012	バツクアツプリング	BACK UP RING	2	2
236	E206452360	O リング	O RING	3	3
240	E206452400	タペツト	TAPPET	1	1
241	AE01064015	ピン	PIN	1	1
245	AE01064017	スプリングプランジヤ	SPRING PLUNGER	1	1
246	AE01064018	スプリングシート	SPRING SEAT	1	1
247	E206452470	スプリングシート	SPRING SEAT	1	1
250	E206452500	プレート	PLATE	1	1
255	E206452550	コントロールラツク	CONTROL RACK	1	1
260	E206452600	プラグ	PLUG	1	1
261	E206452610	ガスケツト	GASKET	1	1
265	E206452650	コントロールスリーブ	CONTROL SLEEVE	1	1
266	AE01064023	ポインタ	POINTER	1	1
267	AE01064024	シム	SHIM	1	1
268	AE01064025	ボルト	BOLT	1	1
272	E206452720	スプリングピン	SPRING PIN	1	1
273	E206452730	バツクアツプリング	BACK UP RING	2	2
275	E206452750	セツトスクリユ	SET SCREW	1	1
280	E206452800	ガスケツト	GASKET	1	1
285	AE01064028	Oリング	O-RING	1	1

(/ CYL)

注記
Remarks

※印部品の単体販売は不可
Parts(Signal※)cannot be purchased by itself.

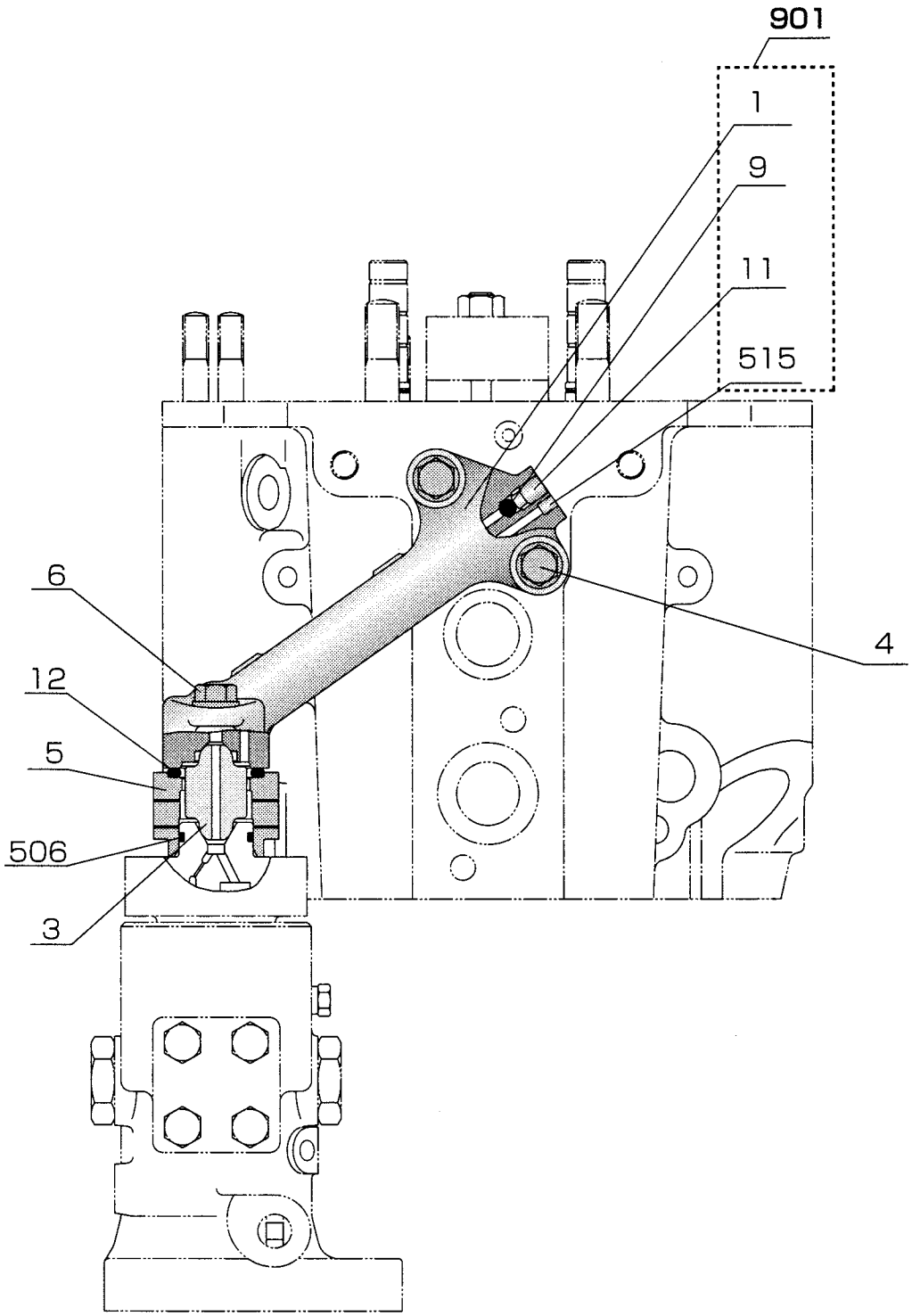
燃料高圧ブロック
FUEL OIL INJECTION BLOCK



燃料高圧ブロック
FUEL OIL INJECTION BLOCK

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
7	E206250070	コネクタ	CONNECTOR	1
505	Z560103235DZ	O リング	O-RING	2
507	Z56500192OZZ	マルパツキン	GASKET	1
517	X220012000ZZ	ナツト	NUT	2

燃料高圧ブロック
FUEL OIL INJECTION BLOCK



View "B"

Ref,3-24.1.1

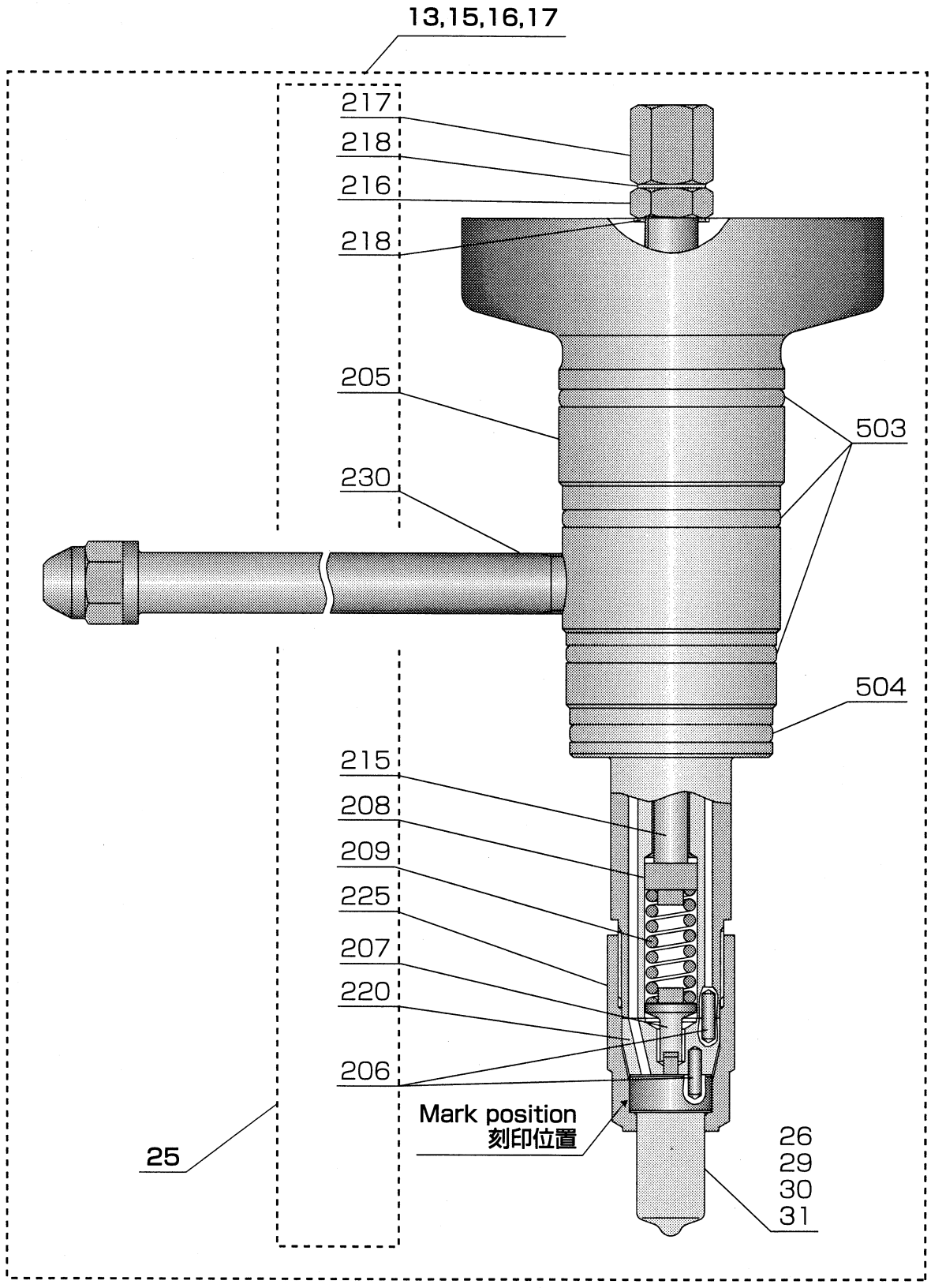
燃料高圧ブロック
FUEL OIL INJECTION BLOCK

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
901		F.O. コウアツカン ASSY.	F.O. INJECTION BLOCK ASSY.	1
1	E206250010	FO コウアツカン	BLOCK, F.O. INJECTION	1 ※
3	E206250030	コウアツカンジヨイント	JOINT, INJECTION PIPE	1
4	E206250040	ボルト	BOLT	2
5	E206250050	ロウユカバ	COVER, LEAK OIL	1
6	E206250060	ボルト	BOLT	2
9	E266270270	ボール	BALL	1
11	E206250110	プラグ	PLUG	1
12	E206250120	O リング	O-RING	1
506	Z560203031DZ	O リング	O-RING	1
515	X251206006ZZ	トメネジ	SET SCREW	1

注記
Remarks

※印部品の単体販売は不可, No.901, F.O. コウアツカン ASSY. の注文を承ります.
Parts (Signal ※) cannot be purchased by itself. Please order F.O. INJECTION BLOLK ASSY. (No.901).

燃料噴射装置(冷却ノズル)
F.O. INJECTION DEVICE (COOLING NOZZLE)



注) 仕様により変更する場合があるため、刻印をご確認の上、部品要求してください。
Note) Different parts are used depending on the specifications.
Check the identification mark before ordering parts.

Example of Mark
D NP-DLF140TE2610N6

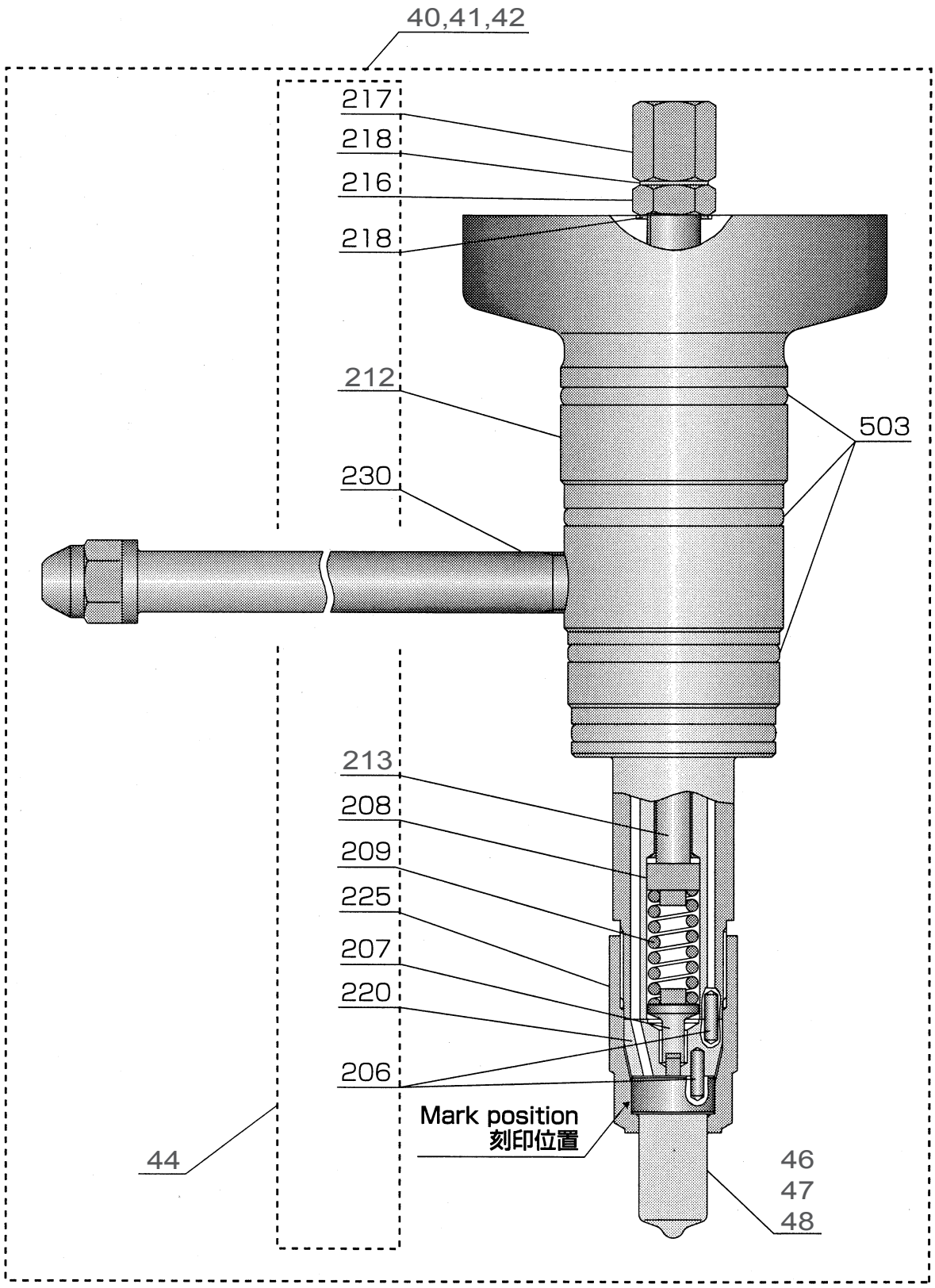
燃料噴射弁……穴径　①……0.26×10　②……0.28×10　③……0.30×10　④……0.32×10
F.O. Nozzle……Hole dia

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity ①	②	③	④
13	E206250130	ノズルホルダ-DLF3210 ASSY.	NOZZLE HOLDER-DLF3210 ASSY.				1
15	E206250150	ノズルホルダ-DLF2610 ASSY.	NOZZLE HOLDER-DLF2610 ASSY.	1			
16	E206250160	ノズルホルダ-DLF2810 ASSY.	NOZZLE HOLDER-DLF2810 ASSY.		1		
17	E206250170	ノズルホルダ-DLF3010 ASSY.	NOZZLE HOLDER-DLF3010 ASSY.			1	
25	E206250250	ノズルホルダ	NOZZLE HOLDER	1	1	1	1
26	E206250260	ノズル-DLF140TE2610	NOZZLE DLF140TE2610	1			
29	E206250290	ノズル-DLF140TE2810	NOZZLE DLF140TE2810		1		
30	E206250300	ノズル-DLF140TE3010	NOZZLE DLF140TE3010			1	
31	E206250310	ノズル-DLF140TE3210	NOZZLE DLF140TE3210				1
205	E206252050	ノズルホルダーボデー	NOZZLE HOLD BODY	1	1	1	1 ※
206	AE01062021	ピン，ノズルダウエル	PIN, NOZZLE DOWEL	4	4	4	4
207	AE01062011	プツシユロツド	PUSH ROD	1	1	1	1
208	AE01062022	スプリングシート	SPRING SEAT	1	1	1	1
209	AE01062023	ノズルスプリング	NOZZLE SPRING	1	1	1	1
215	E206252150	アジヤステイングスクリユ	ADJUSTING SCREW	1	1	1	1
216	AE01062015	ナツト	NUT	1	1	1	1
217	AE01062025	キヤツプナツト	CUP NUT	1	1	1	1
218	AE01062016	ガスケツト	GASKET	2	2	2	2
220	AE01062017	スペーサ	SPACER	1	1	1	1
225	AE01062026	リテイニングナツト	RETAINING NUT	1	1	1	1
230	E206252300	インレツトコネクタ	INLET CONNECTOR	1	1	1	1
503	Z560105035DZ	Oリング	O-RING	3	3	3	3
504	Z560104835DZ	Oリング	O-RING	1	1	1	1
							(/CYL.)

注記 Remarks

※印部品の単体販売は不可
Parts (Signal ※) cannot be purchased by itself.

燃料噴射装置(無冷却ノズル)
F.O. INJECTION DEVICE(NON-COOLING NOZZLE)



注) 仕様により変更する場合があるため、刻印をご確認の上、部品要求してください。
Note) Different parts are used depending on the specifications.
Check the identification mark before ordering parts.

Example of Mark
D NP-DLL140TE2810N1

DAIHATSU

燃料噴射装置(無冷却ノズル)
F.O. INJECTION DEVICE(NON-COOLING NOZZLE)

6･8DK-20

燃料噴射弁 F.O.Nozzle　穴径 Hole Dia　(1)0.28X10　(2)0.30X10　(3)0.32X10

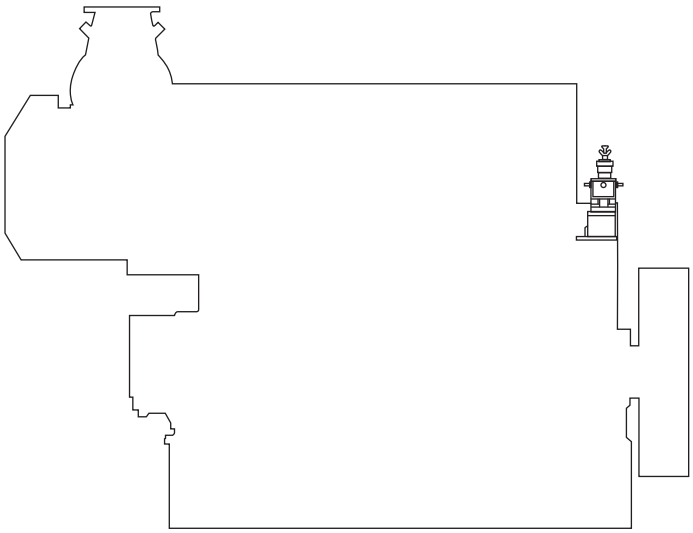
番号 Number	パーツコード Parts Code	部品名称	Name of Parts	数量 Quantity (1)	(2)	(3)
40	**E206250400**	**ノズルホルダ-DLL2810 ASSY.**	**NOZZLE HOLDER-DLL2810 ASSY.**	**1**		
41	**E206250410**	**ノズルホルダ-DLL3010 ASSY.**	**NOZZLE HOLDER-DLL3010 ASSY.**		**1**	
42	**E206250420**	**ノズルホルダ-DLL3210 ASSY.**	**NOZZLE HOLDER-DLL3210 ASSY.**			**1**
44	E206250440	ノズルホルダ、DLL	NOZZLE HOLDER,DLL	1	1	1
46	E206250460	ノズル-DLL140TE2810	NOZZLE-DLL140TE2810	1		
47	E206250470	ノズル-DLL140TE3010	NOZZLE-DLL140TE3010		1	
48	E206250480	ノズル-DLL140TE3210	NOZZLE-DLL140TE3210			1
206	AE01062021	ピン、ノズルダウエル	PIN NOZZLE DOWEL	4	4	4
207	AE01062011	プッシュロッド	PUSH ROD	1	1	1
208	AE01062022	スプリングシート	SPRING SEAT	1	1	1
209	AE01062023	ノズルスプリング	SPRING,NOZZLE	1	1	1
212	E206252120	ノズルホルダボデー、DLL	BODY,N.H.,DLL	1※	1※	1※
213	E206252130	アジャスチングスクリュ, DLL	ADJUSUTING SCREW,DLL	1	1	1
216	AE01062015	ナット	NUT	1	1	1
217	AE01062025	キャップナット	DAPNAT	1	1	1
218	AE01062016	ガスケット	GASKET	2	2	2
220	AE01062017	スペーサ	SPACER	1	1	1
225	AE01062026	リテイニングナット	RETAINING NUT	1	1	1
230	E206252300	インレットコネクタ	INLET CONNECTOR	1	1	1
503	Z560105035DZ	O リング	O-RING	3	3	3

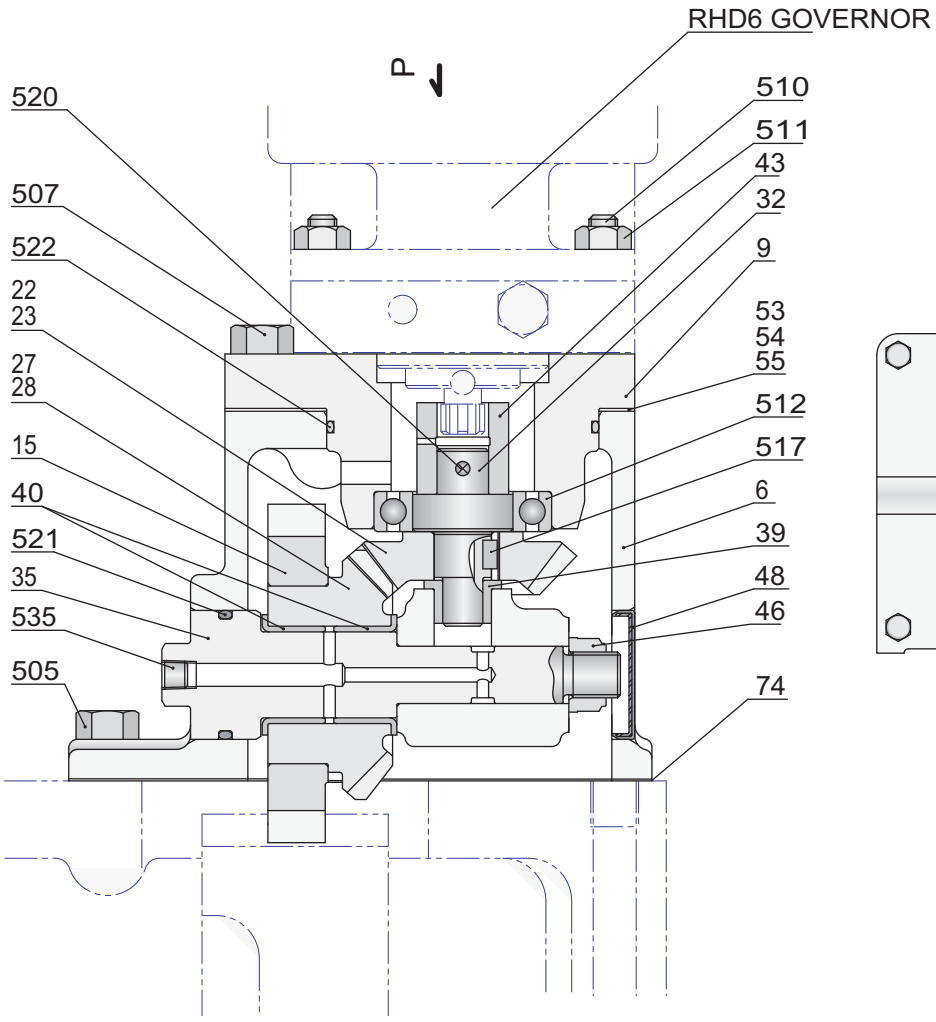
(/CYL.)

注記
Remarks

※印部品の単体販売は不可
Parts(Signa※) cannot be purchased by itself.

ガバナ駆動装置(RHD6)
GOVERNOR DRIVING DEVICE (RHD6)





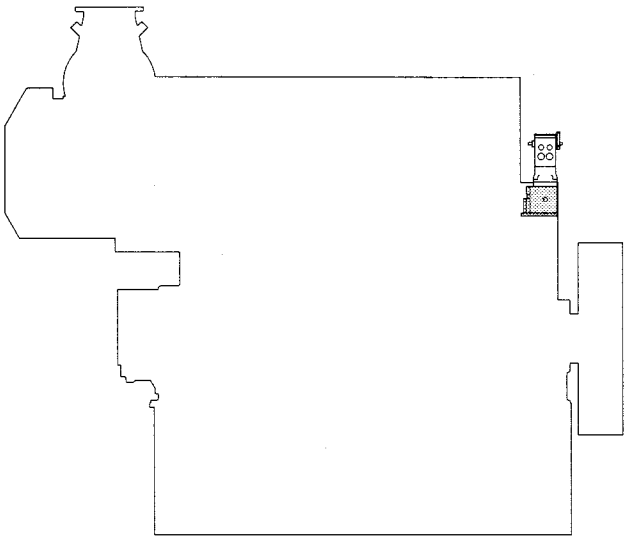
ガバナ駆動装置(RHD6)
GOVERNOR DRIVING DEVICE (RHD6)

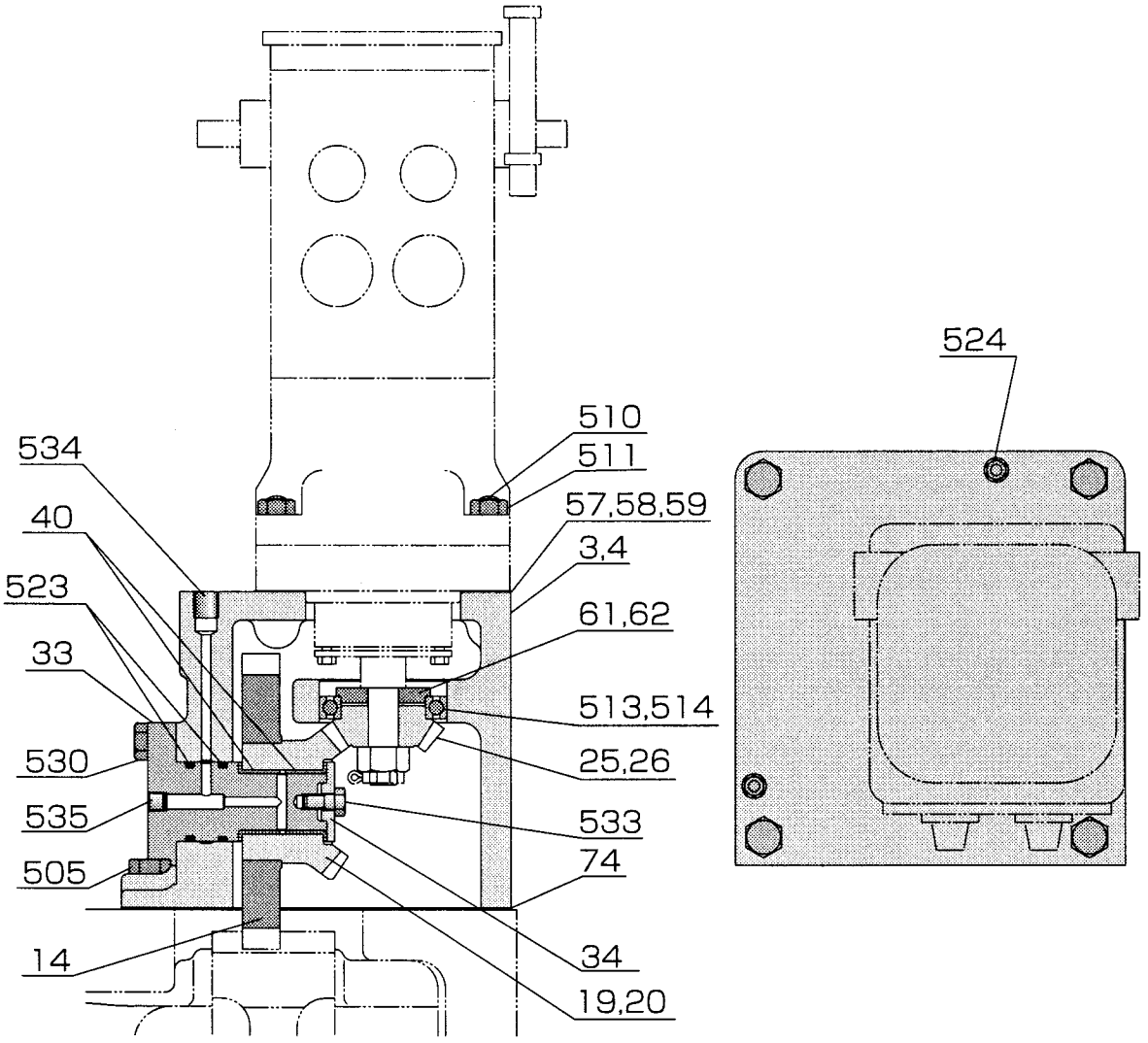
6·8DK-20

(1)····720~750 rpm (2)····900 rpm

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity (1)	(2)
6	E204550060B	ガバナギヤケース(RHD)	GOVERNOR GEAR CASE (RHD)	1	1
9	E204550090A	ガバナダイ(RHD)	MOUNT; GOVERNOR (RHD)	1	1
15	E204550150A	ガバナクドウギヤ(Z21)	GOVERNOR DRIVING GEAR (Z21)	1	1
22	E204550220A	ガバナギヤ(Z21)	GOVERNOR GEAR (Z21)	1	
23	E204550230A	ガバナギヤ(Z25)	GOVERNOR GEAR (Z25)		1
27	E204550270A	ガバナクドウギヤ(Z29)	GOVERNOR DRIVING GEAR (Z29)	1	
28	E204550280A	ガバナクドウギヤ(Z29)	GOVERNOR DRIVING GEAR (Z29)		1
32	E204550320Z	ガバナクドウジク−2(RHD)	GOVERNOR DRIVING SHAFT-2 (RHD)	1	1
35	E204550350Z	ガバナクドウジク−3(RHD)	GOVERNOR DRIVING SHAFT-3 (RHD)	1	1
39	E204550390Z	フランジブシュ	FLANGE BUSH	1	1
40	E204550400Z	フランジブシュ	FLANGE BUSH	2	2
43	E204550430Z	スプラインカップリング(RHD)	COUPLING; DRIVING SHAFT	1	1
46	E201150460Z	Uナット	U-NUT	1	1
48	E204550480Z	メクラフタ(RCA)	CAP (RCA)	1	1
53	E204550530Z	シム(RHD)	SHIM (RHD)	1	1
54	E204550540Z	シム(RHD)	SHIM (RHD)	1	1
55	E204550550Z	シム(RHD)	SHIM (RHD)	1	1
74	E204550731Z	ガバナギヤケースシム	SHIM; GOVERNOR GEAR CASE	1	1
507	X200012030ZZ	ボルト	BOLT	4	4
510	X210010067ZZ	スタッド	STUD	4	4
511	X220010000ZZ	ナット	NUT	4	4
512	Z451160070ZZ	ベアリング	BEARING	1	1
517	Z400005010ZZ	キー	KEY	1	1
520	Z330005032ZZ	テーパピン	TAPER PIN	1	1
521	Z560103935ZZ	Oリング	O-RING	1	1
522	Z560209031ZZ	Oリング	O-RING	1	1
524	Z415006026ZZ	スプリングピン	SPRING PIN	2	2
535	Z571501000ZZ	テーパプラグ	TAPER PLUG	1	1

ガバナ駆動装置 (UG 10)
GOVERNOR DRIVING DEVICE (UG 10)



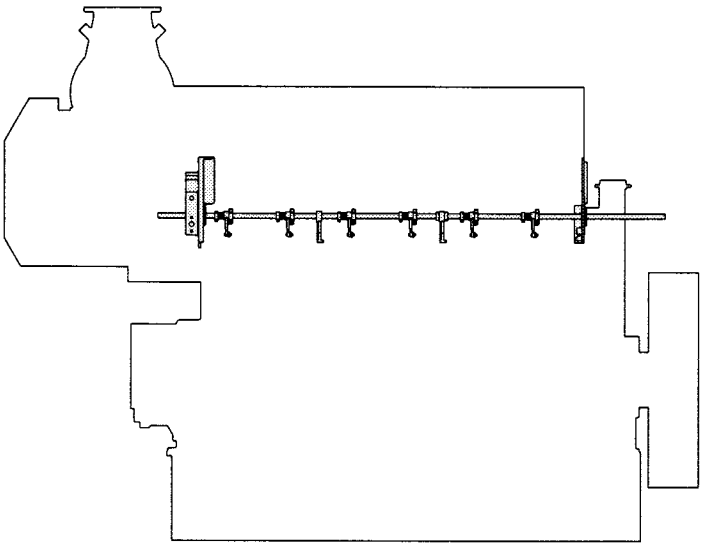


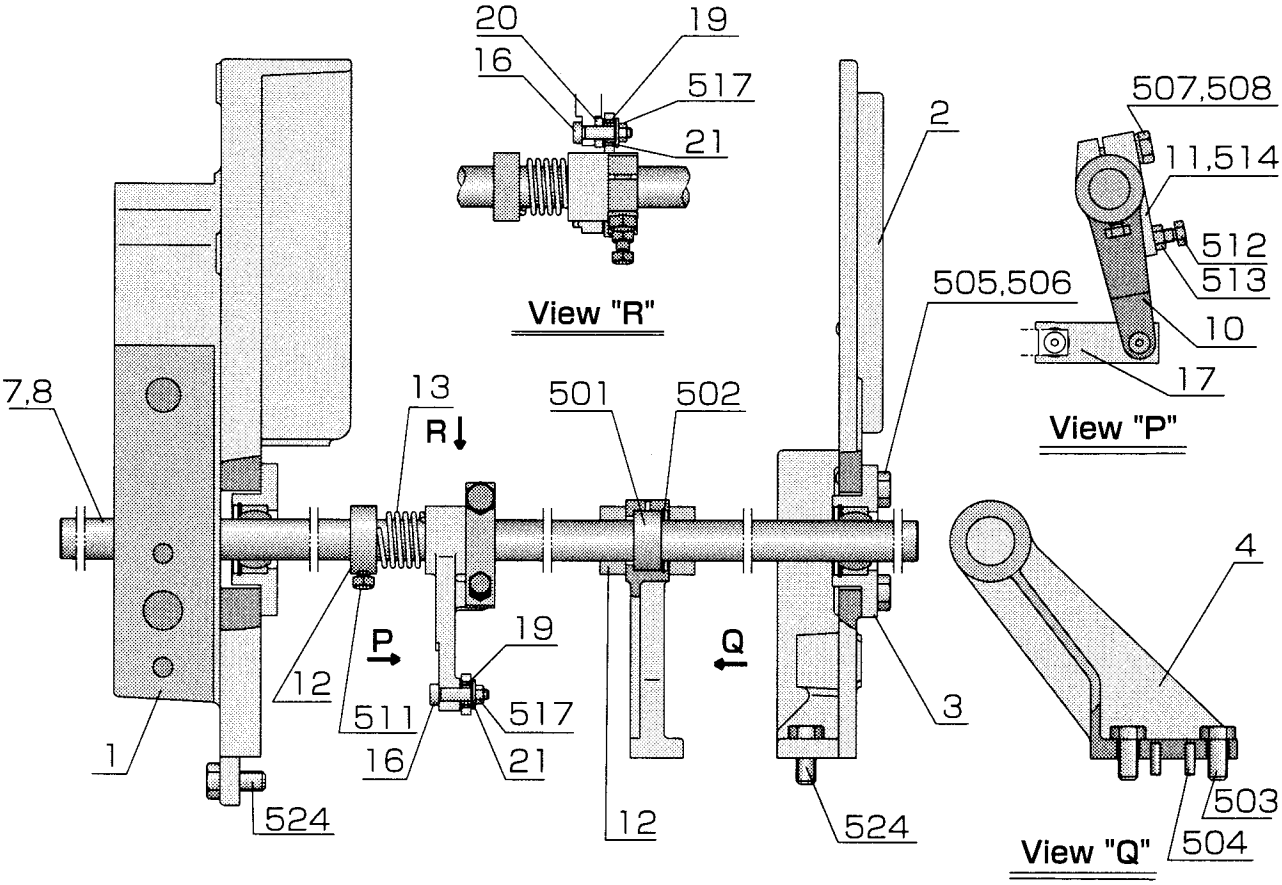
ガバナ駆動装置 (UG 10)
GOVERNOR DRIVING DEVICE (UG 10)

①……720～750rpm ②……900rpm

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity ①	②
3	E204550021	ガバナギヤケース-1 (UG8)	GOVERNOR GEAR CASE-1 (UG8)	1	
4	E204550022	ガバナギヤケース-2 (UG8)	GOVERNOR GEAR CASE-2 (UG8)		1
14	E204550140	ガバナクドウギヤ-UG8 (Z29)	GOVERNOR DRIVING GEAR-UG8 (Z29)	1	1
19	E204550190	ガバナクドウギヤ-4 (Z27)	GOVERNOR DRIVING GEAR-4 (Z27)	1	
20	E204550200	ガバナクドウギヤ-5 (Z24)	GOVERNOR DRIVING GEAR-5 (Z24)		1
25	E204550250	ガバナギヤ (Z20)	GOVERNOR GEAR (Z20)	1	
26	E204550260	ガバナギヤ (Z24)	GOVERNOR GEAR (Z24)		1
33	E204550330	ガバナクドウジク (UG8)	GOVERNOR DRIVING SHAFT (UG8)	1	1
34	E204550340	ガバナクドウジクオサエ	RETAINER, GOV. DRIVING SHAFT	1	1
40	E204550400	フランジブツシユ	FLANGE BUSH	2	2
57	E204550561	シム (UG8)	SHIM (UG8)	1	1
58	E204550562	シム (UG8)	SHIM (UG8)	1	1
59	E204550563	シム (UG8)	SHIM (UG8)	1	1
61	E204550610	デイスタンス-1	DISTANCE-1	1	
62	E204550620	デイスタンス-2	DISTANCE-2		1
74-1	E204550731	ガバナギヤケースシム	SHIM, GOVERNOR GEAR CASE	1	1
74-2	E204550733	ガバナギヤケースシム	SHIM, GOVERNOR GEAR CASE	1	1
505	X200012030ZZ	ボルト	BOLT	4	4
510	X210010067ZZ	スタツド	STUD	4	4
511	X220010000ZZ	ナツト	NUT	4	4
513	Z451169090ZZ	ベアリング	BEARING	1	
514	Z451169110ZZ	ベアリング	BEARING		1
523	Z560103635ZZ	O リング	O-RING	2	2
524	X341108030ZZ	ノツクボルトT ASSY. (1)	KNOCK BOLT ASSY. (1)	2	2
530	X205010025ZZ	HT ボルト	HT BOLT	4	4
533	X200008016ZZ	ボルト	BOLT	1	1
534	Z571501000ZZ	テーパプラグ	TAPER PLUG	1	1
535	Z571501000ZZ	テーパプラグ	TAPER PLUG	1	1

コモンロッド
CONTROL ROD



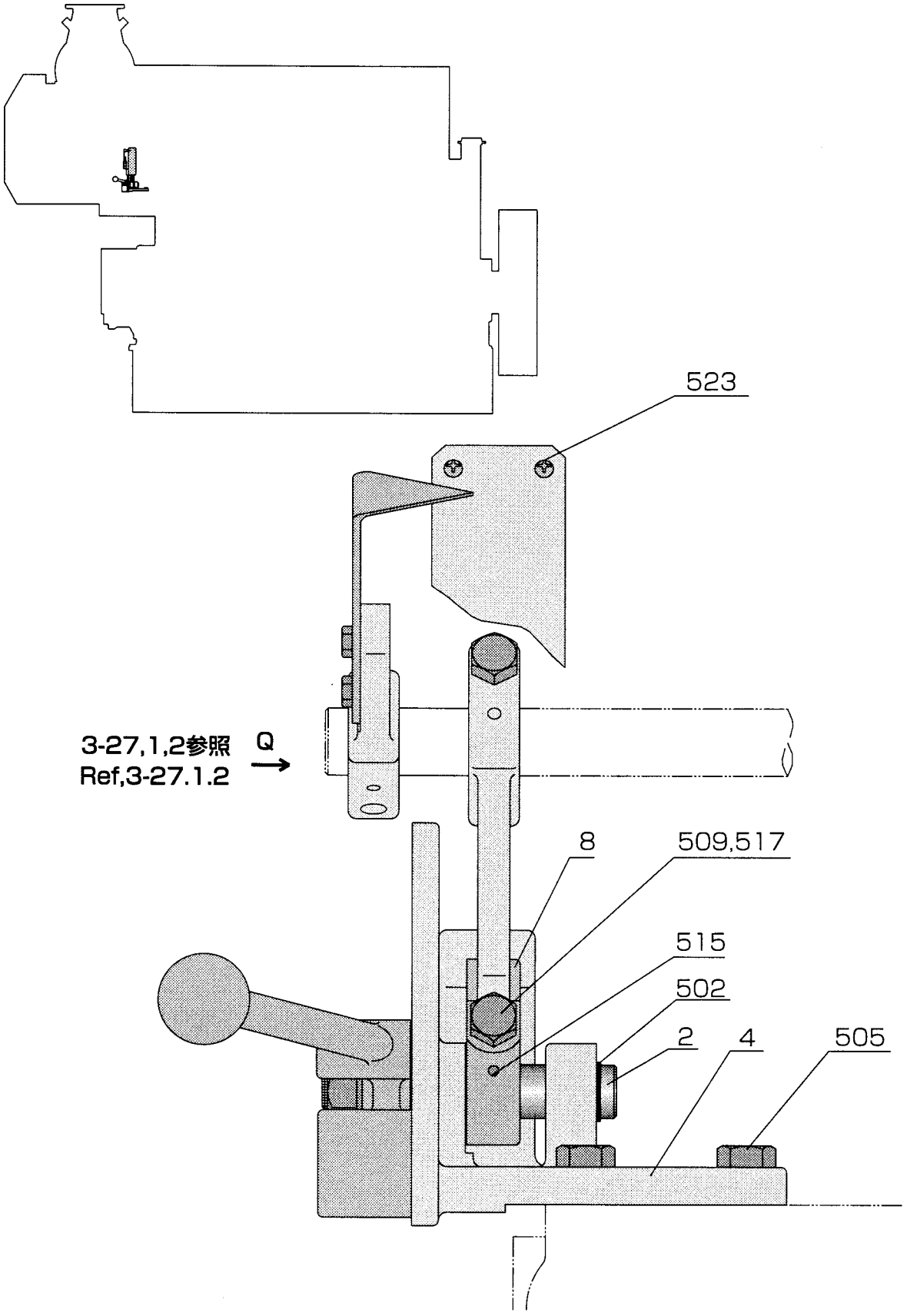


コモンロッド
CONTROL ROD

①……6DK ②……8DK

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity ①	②
1	E201650010	ヒートボツクスカバー（マエ）	HEATBOX COVER (FRONT)	1	1
2	E201650020	ヒートボツクスカバー（ウシロ）	HEATBOX COVER (REAR)	1	1
3	E201650030	コモンロツドジクウケ (2)	CONTROL ROD BEARING (2)	2	2
4	E201650040	コモンロツドジクウケ	CONTROL ROD STAND	2	3
7	E201650070	コモンロツド-6DK	CONTROL ROD-6DK	1	
8	E201650080	コモンロツド-8DK	CONTROL ROD-8DK		1
10	E201650100	ラツクレバー	RACK LEVER	6	8
11	E201650110	ラツクレバクラツチ	RACK LEVER CLUTCH	6	8
12	E201650120	ネジリバネホルダ	HOLDER, RETURN SPRING	6	8
13	E201650130	ネジリバネ	RETURN SPLING, RACK LEVER	6	8
16	E201650160	ラツクリンクピン	RACK LINK PIN	12	16
17	E201650170	ラツクリンク	RACK LINK	6	8
19	E201650190	スフエリカルプレインベアリング	SPHERICAL PLAIN BEARING	12	16
20	E201650200	リンクピンデイスタンス	LINK PIN DISTANCE	6	8
21	E201650210	トクシユヒラザガネ	SPECIAL FLAT WASHER	12	16
501	Z458249040ZZ	ベアリング	BEARING	2	3
502	Z412003700ZZ	スナツプリング（アナ）	SNAP RING (HOLE)	2	3
503	X200012025ZZ	ボルト	BOLT	4	6
504	Z335006018ZZ	ヘイコウピン	STRAIGHT PIN	4	6
505	X200014030ZZ	ボルト	BOLT	4	4
506	Z315014000ZZ	ハツキザガネ	TOOTHED LOCK WASHER	4	4
507	Z212010035ZZ	アナツキボルト	HEX. SOCKET BOLT	6	8
508	Z315010000ZZ	ハツキザガネ	TOOTHED LOCK WASHER	6	8
511	X250108016ZZ	ロツカクトメネジ	HEX. SET SCREW	6	8
512	X250108030ZZ	ロツカクトメネジ	HEX. SET SCREW	6	8
513	X220308000ZZ	ナツト	NUT	6	8
514	Z415005040ZZ	スプリングピン	SPRING PIN	6	8
517	X227006000ZZ	Uナツト	U-NUT	12	16
524	X200012028ZZ	ボルト	BOLT	7	7

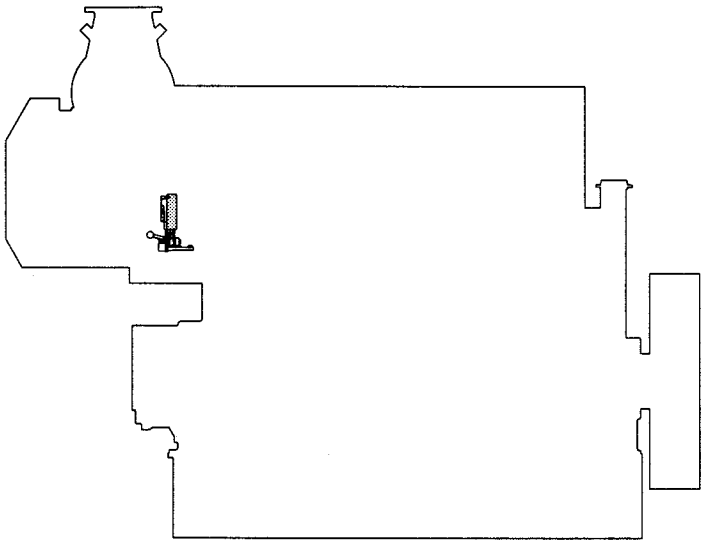
操縦ハンドル
CONTROL HANDLE

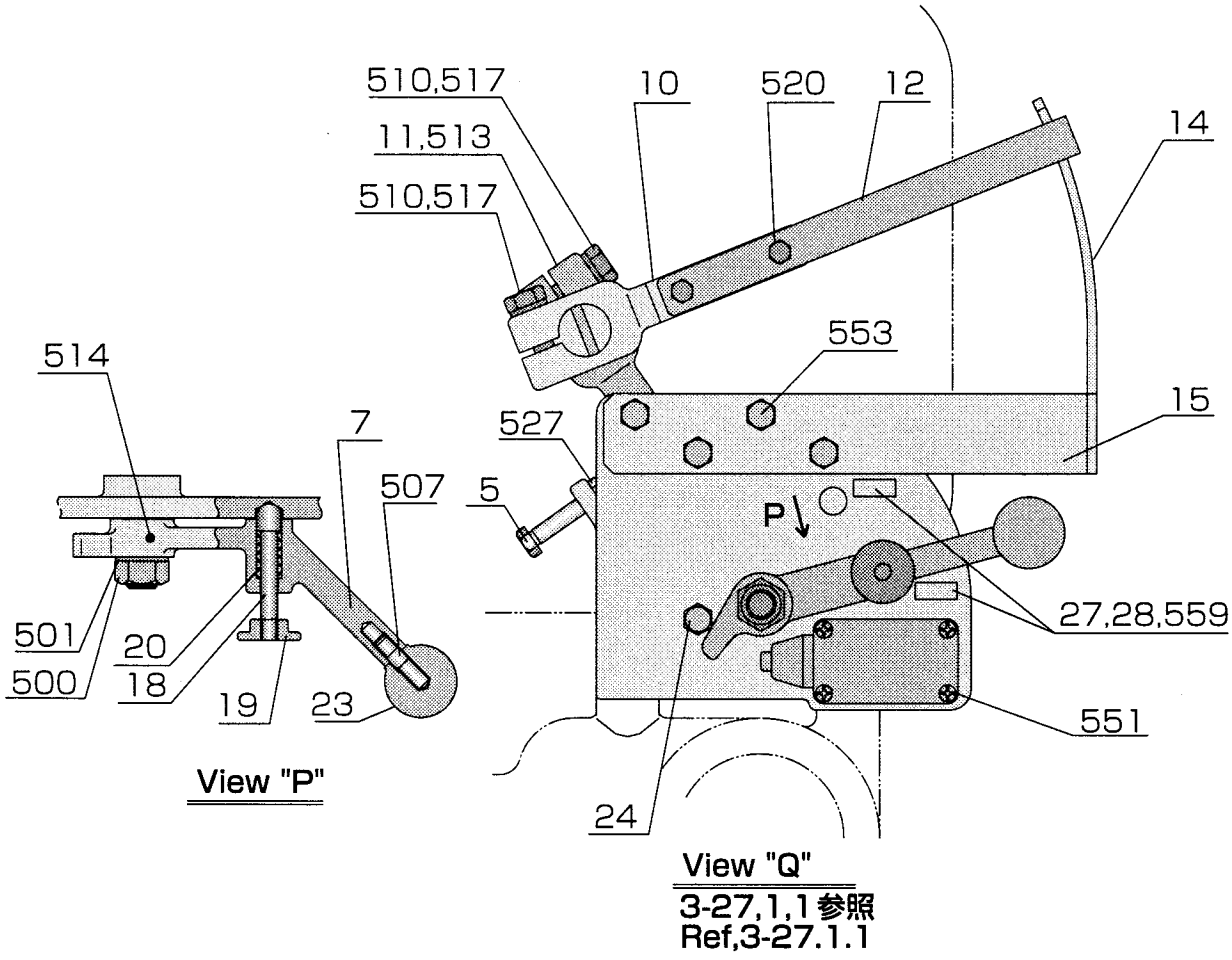


操縦ハンドル
CONTROL HANDLE

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
2	E204650020	テイシレバージク	SHAFT, STOP LEVER	1
4	E204650040	テイシレバージクホルダー	HOLDER, STOP LEVER SHAFT	1
8	E204650080	テイシレバー	STOP LEVER	1
502	Z411002000ZZ	スナップリング（ジク）	SNAP RING (SHAFT)	1
505	X200012030ZZ	ボルト	BOLT	4
509	X200010030ZZ	ボルト	BOLT	1
515	Z4150050350ZZ	スプリングピン	SPRING PIN	1
517	Z3150100000ZZ	ハツキザガネ	TOOTHED LOCK WASHER	1
523	X245204006ZZ	+ナベコネジ	+ PAN MACHINE SCREW	4

操縦ハンドル
CONTROL HANDLE



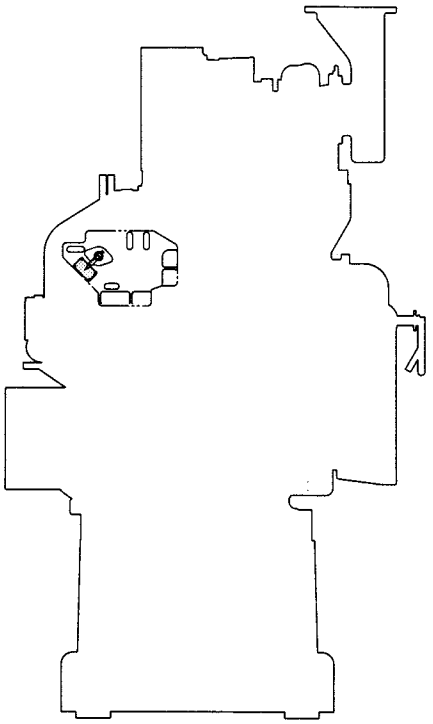


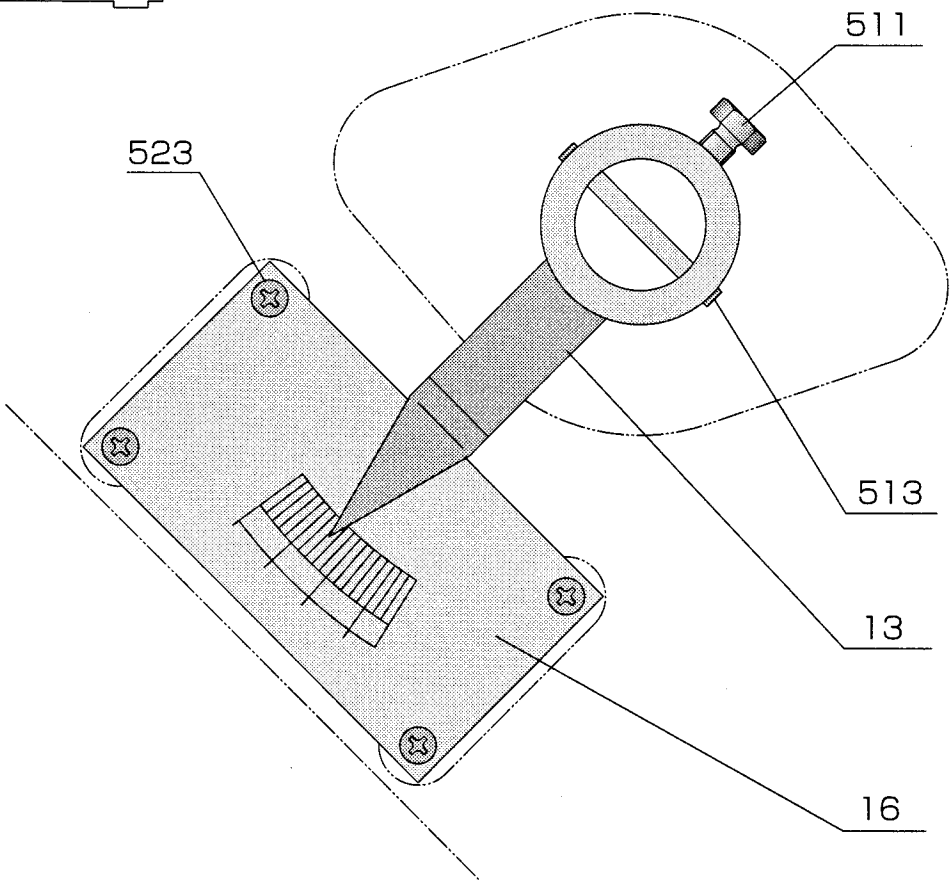
操縦ハンドル
CONTROL HANDLE

①……定速型 Constant speed type　②……変速型 Variable speed type

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity ①	②
5	C272000040	ラツクストツパボルト	BOLT, RACK STOPPER	1	1
7	E204650070	ソウサレバー	CONTROL LEVER	1	1
10	E204650100	シシンレバー	LOAD POINT LEVER		1
11	E204650110	コモンロツドレバー	CONTROL LOD LEVER	1	1
12	E204650120	シシン	LOAD POINTER		1
14	E204650140	フカケイメモリバン	LOAD SCALE PLATE		1
15	E204650150	フカケイメモリバンブラケツト	BRACKET, LOAD SCALE PLATE		1
18	C001340050	ストツパ	STOPPER	1	1
19	C001340070	ノブ	KNOB	1	1
20	E204650200	バネ	SPRING	1	1
23	P164600310	ハンドルグリツプ	HANDLE GRIP	1	1
24	E228400320	ハンドルストツパ	HANDLE STOPPER	1	1
27	A506470331	ガバナハンドルメイバン (1)	NAME PLATE (1), GOVERNOR LEVER	1	1
28	A506470333	ガバナハンドルメイバン (3)	NAME PLATE (3), GOVERNOR LEVER	1	1
500	X220014000ZZ	ナツト	NUT	1	1
501	Z315014000ZZ	ハツキザガネ	TOOTHED LOCK WASHER	1	1
507	X210008031ZZ	スタツド	STUD	1	1
510	X200010035ZZ	ボルト	BOLT	2	2
513	Z415005040ZZ	スプリングピン	SPRING PIN	1	1
514	Z415004030ZZ	スプリングピン	SPRING PIN	1	1
517	Z315010000ZZ	ハツキザガネ	TOOTHED LOCK WASHER	2	2
520	X200006010ZZ	ボルト	BOLT		2
527	X220308000ZZ	ナツト	NUT	1	1
551	X245204035ZZ	+ナベコネジ	+ PAN MACHINE SCREW	4	4
553	X200108014ZZ	ボルト	BOLT		4
559	Z352020500ZZ	リベツト	RIVET	4	4

負 荷 計 - 定速型
LOAD GAUGE - CONSTANT SPEED TYPE

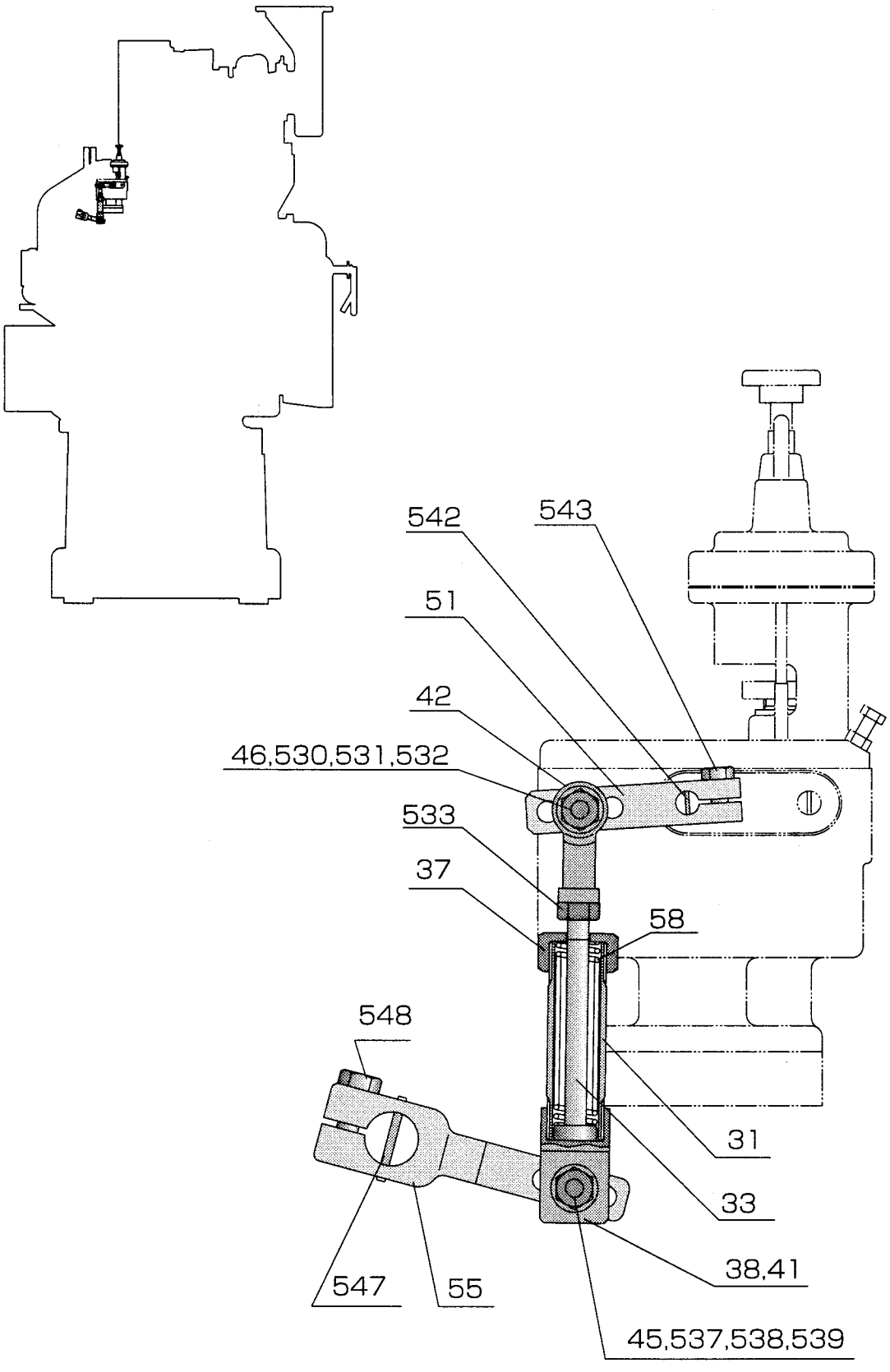




負 荷 計 - 定速型
LOAD GAUGE - CONSTANT SPEED TYPE

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
13	E204650130	シシンレバー	LOAD POINT LEVER	1
16	E204650160	フカケイメモリンバン	LOAD SCALE PLATE	1
511	X250106012ZZ	ロッカクトメネジ	HEX. SET SCREW	1
513	Z415005040ZZ	スプリングピン	SPRING PIN	1
523	X245204006ZZ	+ナベコネジ	+ PAN MACHINE SCREW	4

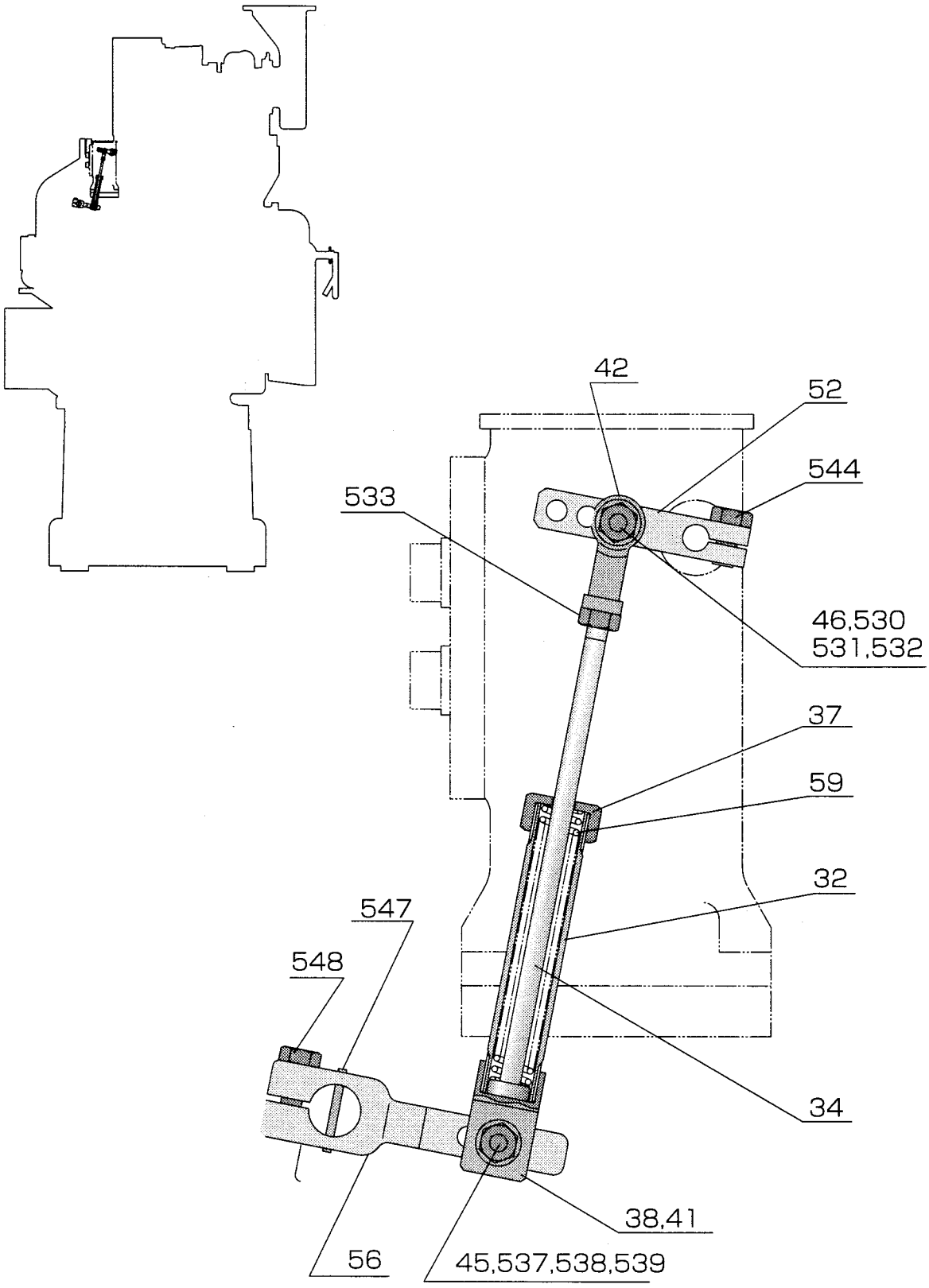
ガバナリンク (RHD 6)
GOVERNOR LINK (RHD 6)



ガバナリンク (RHD 6)
GOVERNOR LINK (RHD 6)

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
31	E204650310	レンケツカン (RHD)	CONNECTION ROD (RHD)	1
33	E204650330	レンケツカンジク (RHD)	SHAFT, CONNECTION ROD (RHD)	1
37	E204650370	ナット	NUT	1
38	E204650380	レンケツカンナット	NUT, CONNECTION ROD	1
41	E204650410	スフエリカルプレインベアリング	SPHERICAL PLAIN BEARING	1
42	E204650420	ロツドエンド	ROD END	1
45	E204650450	リンクピン	LINK PIN	1
46	E204650460	リンクピン	LINK PIN	1
51	E204650510	ガバナレバ-RHD	GOVERNOR LEVER-RHD	1
55	E204650550	コモンロツドレバ-RHD	CONTROL ROD LEVER-RHD	1
58	E204650580	バネ	SPRING	1
530	Z300010000ZZ	ヒラザガネ	FLAT WASHER	1
531	X225110000ZZ	キクナツト	CASTLE NUT	1
532	Z320002030ZZ	ワリピン	SPLIT PIN	1
533	X220310000ZZ	ナツト	NUT	1
537	Z300010000ZZ	ヒラザガネ	FLAT WASHER	1
538	X225110000ZZ	キクナツト	CASTLE NUT	1
539	Z320002030ZZ	ワリピン	SPLIT PIN	1
542	Z330003020ZZ	テーパピン	TAPER PIN	1
543	X200008020ZZ	ボルト	BOLT	1
547	Z415005040ZZ	スプリングピン	SPRING PIN	1
548	X200010032ZZ	ボルト	BOLT	1

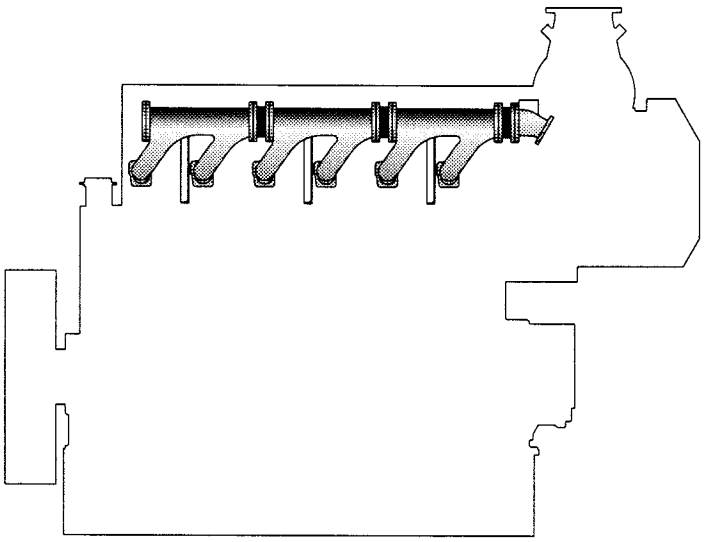
ガバナリンク (UG 10)
GOVERNOR LINK (UG 10)

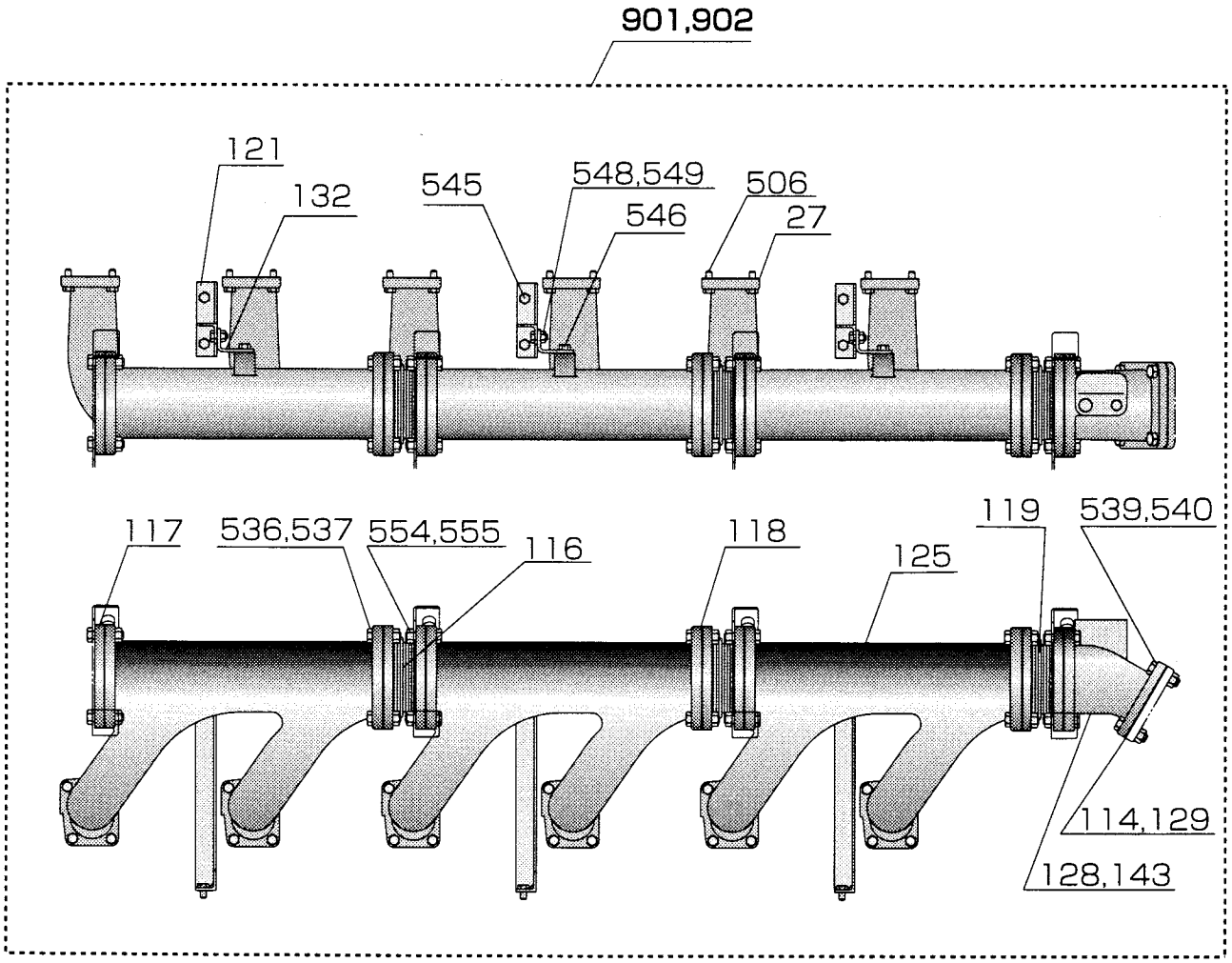


ガバナリンク (UG 10)
GOVERNOR LINK (UG 10)

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
32	E204650320	レンケツカン (UG8)	CONNECTION ROD (UG8)	1
34	E204650340	レンケツカンジク (UG8)	SHAFT, CONNECTION ROD (UG8)	1
37	E204650370	ナット	NUT	1
38	E204650380	レンケツカンナット	NUT, CONNECTION ROD	1
41	E204650410	スフエリカルプレインベアリング	SPHERICAL PLAIN BEARING	1
42	E204650420	ロツドエンド	ROD END	1
45	E204650450	リンクピン	LINK PIN	1
46	E204650460	リンクピン	LINK PIN	1
52	E204650520	ガバナレバ-UG8	GOVERNOR LEVER-UG8	1
56	E204650560	コモンロツドレバ-UG8	CONTROL ROD LEVER-UG8	1
59	E204650590	バネ	SPRING	1
530	Z300010000ZZ	ヒラザガネ	FLAT WASHER	1
531	X225110000ZZ	キクナツト	CASTLE NUT	1
532	Z320002030ZZ	ワリピン	SPLIT PIN	1
533	X220310000ZZ	ナツト	NUT	1
537	Z300010000ZZ	ヒラザガネ	FLAT WASHER	1
538	X225110000ZZ	キクナツト	CASTLE NUT	1
539	Z320002030ZZ	ワリピン	SPLIT PIN	1
544	X200010020ZZ	ボルト	BOLT	1
547	Z415005040ZZ	スプリングピン	SPRING PIN	1
548	X200010032ZZ	ボルト	BOLT	1

排気管 (前端過給) - 6DK
EXHAUST MANIFOLD (FRONT T/C) - 6DK



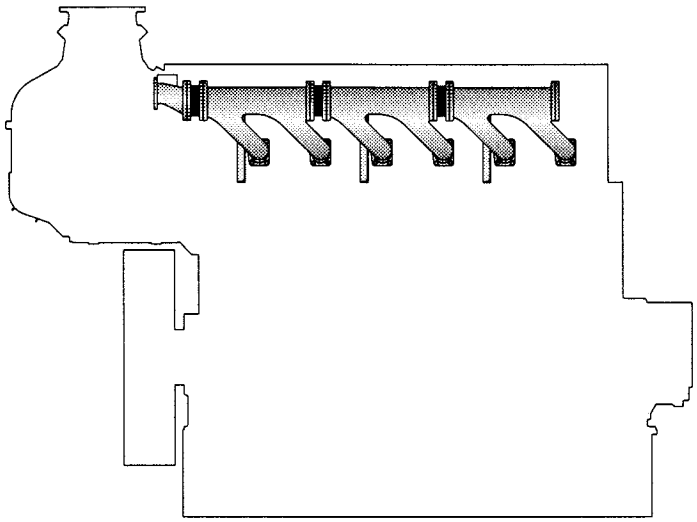


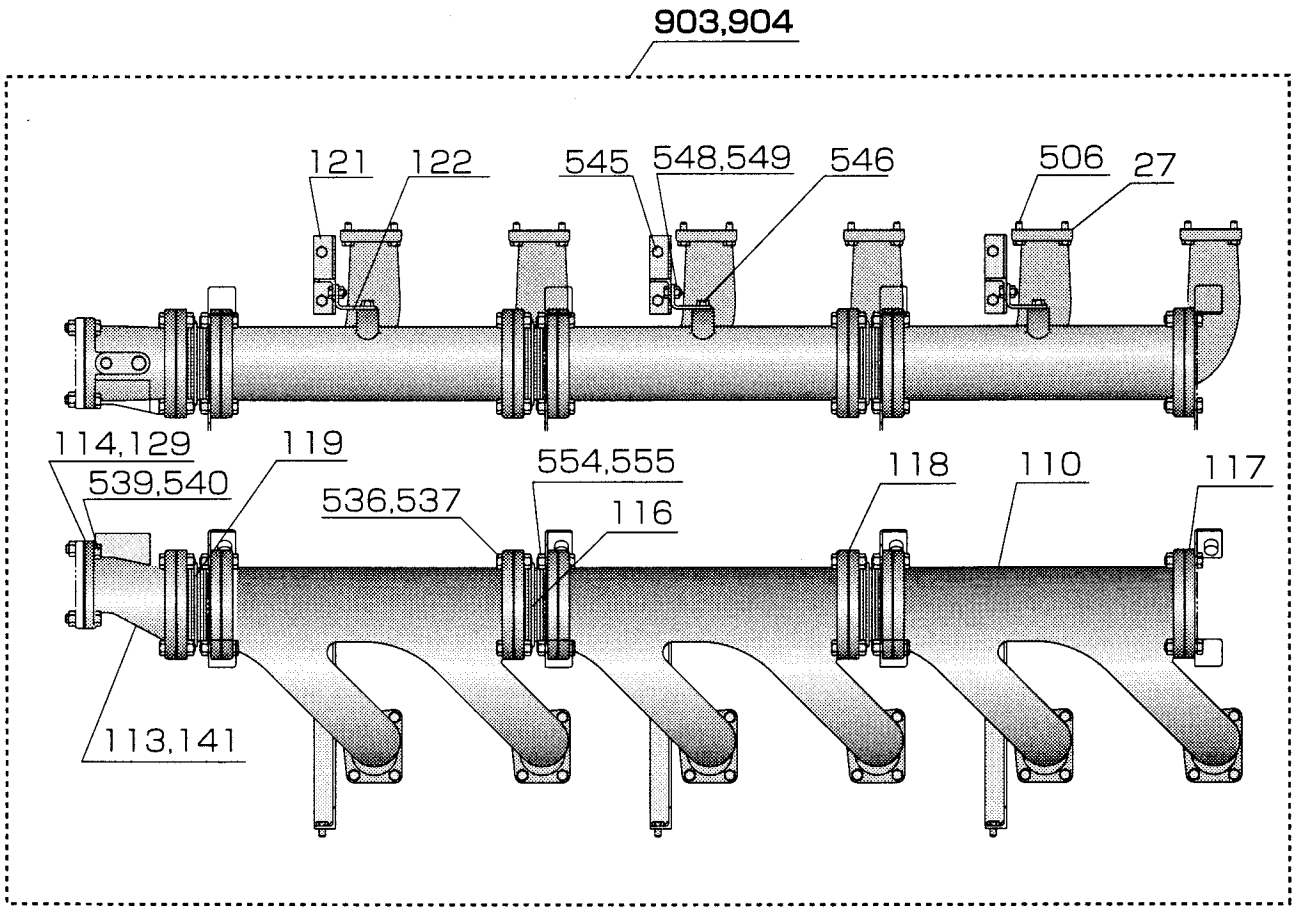
排気管 (前端過給) - 6DK
EXHAUST MANIFOLD (FRONT T/C) - 6DK

過給機形式 TURBOCHARGER TYPE ①……RH143, RH163 ②……RH183

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity ①	②
901		ハイキカン ASSY.-6D-1	EXHAUST MANIFOLD ASSY.-6D-1	1	
902		ハイキカン ASSY.-6D-2	EXHAUST MANIFOLD ASSY.-6D-2		1
27	E202150270	ハイキカンガスケツト	GASKET, EXHAUST MANIFOLD	6	6
114	E202151140	T/C パツキン, DSP (RH183)	GASKET, T/C INLET DSP (RH183)		1
116	E202151160	ベローズ	BELLOWS	2	2
117	E202151170	ハイキカンメクラフランジ (DSP)	EYE FLANGE, EX. MANIFOLD (DSP)	1	1
118	E202151180	ハイキカンパツキン (DSP)	GASKET, EX. MANIFOLD (DSP)	7	7
119	E202151190	ベローズ-2L-5C 120×80	BELLOWS-2L-5C 120×80	1	1
121	E202151210	ハイキカンササエ-1, (DSP)-RT	SUPPORT-1, EX. MANIFOLD (DSP)-RT	3	3
125	E202151250	ハイキカン-FT	EX. MANIFOLD-FT	3	3
128	E202151280	T/C イリグチカン, RH163-FT	T/C INLET PIPE, RH163-FT	1	
129	E202151290	T/C イリグチパッキン (RH163)	GASKET, T/C INLET (RH163)	1	
132	E202151320	ハイキカンササエ-2, (DSP)-FT	SUPPORT-2, EX. MANIFOLD (DSP)-FT	3	3
143	E202151430	T/C イリグチカン, RH183-FT	T/C INLET PIPE, RH183-FT		1
506	X205012035ZZ	HT ボルト	HT BOLT	24	24
536	X205016055ZZ	HT ボルト	HT BOLT	12	12
537	X220016000DZ	ナツト	NUT	12	12
539	X205016055ZZ	HT ボルト	HT BOLT	4	4
540	X220016000DZ	ナツト	NUT	4	4
545	X200012020ZZ	ボルト	BOLT	6	6
546	X205012020ZZ	HT ボルト	HT BOLT	6	6
548	X200012025ZZ	ボルト	BOLT	6	6
549	X220012000ZZ	ナツト	NUT	6	6
554	X205016060ZZ	HT ボルト	HT BOLT	16	16
555	X220016000DZ	ナツト	NUT	16	16

排気管 (後端過給) - 6DK
EXHAUST MANIFOLD (REAR T/C) - 6DK



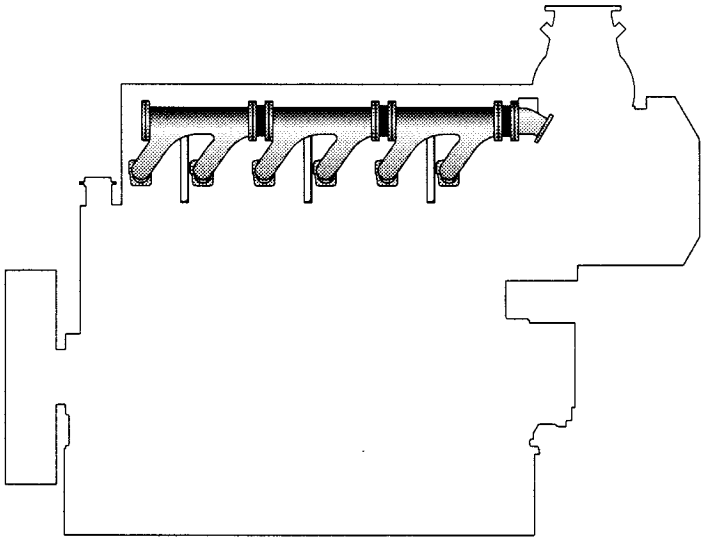


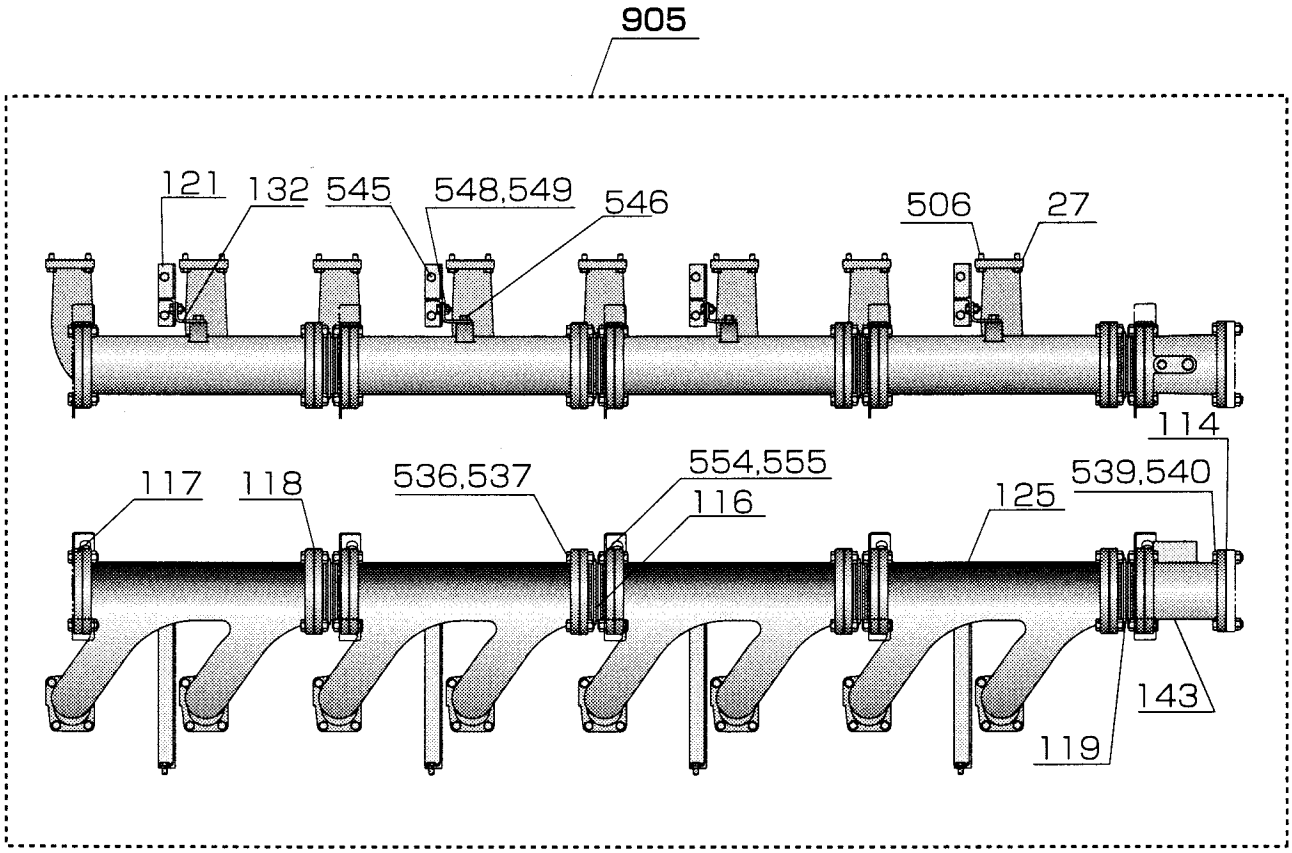
排気管 (後端過給) - 6DK
EXHAUST MANIFOLD (REAR T/C) - 6DK

過給機形式 TURBOCHARGER TYPE ①……RH143, RH163 ②……RH183

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity ①	②
903		ハイキカン ASSY.-6D-3	EXHAUST MANIFOLD ASSY.-6D-3	1	
904		ハイキカン ASSY.-6D-4	EXHAUST MANIFOLD ASSY.-6D-4		1
27	E202150270	ハイキカンガスケツト	GASKET, EXHAUST MANIFOLD	6	6
110	E202151100	ハイキカン-RT	EX. MANIFOLD-RT	3	3
113	E202151130	T/C イリグチカン, RH183-RT	T/C INLET PIPE, RH183-RT		1
114	E202151140	T/C パッキン, DSP (RH183)	GASCKET, T/C INLET DSP (RH183)		1
116	E202151160	ベローズ	BELLOWS	2	2
117	E202151170	ハイキカンメクラフランジ (DSP)	EYE FLANGE, EX. MANIFOLD (DSP)	1	1
118	E202151180	ハイキカンパツキン (DSP)	GASKET, EX. MANIFOLD (DSP)	7	7
119	E202151190	ベローズ-2L-5C 120×80	BELLOWS-2L-5C 120×80	1	1
121	E202151210	ハイキカンササエ-1, (DSP)-RT	SUPPORT-1, EX. MANIFOLD (DSP)-RT	3	3
122	E202151220	ハイキカンササエ-2, (DSP)-RT	SUPPORT-2, EX. MANIFOLD (DSP)-RT	3	3
129	E202151290	T/C イリグチパツキン (RH163)	GASCKET, T/C INLET (RH163)	1	
141	E202151410	T/C イリグチカン, RH163-RT	T/C INLET PIPE, RH163-RT	1	
506	X205012035ZZ	HT ボルト	HT BOLT	24	24
536	X205016055ZZ	HT ボルト	HT BOLT	12	12
537	X220016000DZ	ナツト	NUT	12	12
539	X205016055ZZ	HT ボルト	HT BOLT	4	4
540	X220016000DZ	ナツト	NUT	4	4
545	X200012020ZZ	ボルト	BOLT	6	6
546	X205012020ZZ	HT ボルト	HT BOLT	6	6
548	X200012025ZZ	ボルト	BOLT	6	6
549	X220012000ZZ	ナツト	NUT	6	6
554	X205016060ZZ	HT ボルト	HT BOLT	16	16
555	X220016000DZ	ナツト	NUT	16	16

排気管 (前端過給) - 8DK
EXHAUST MANIFOLD (FRONT T/C) - 8DK

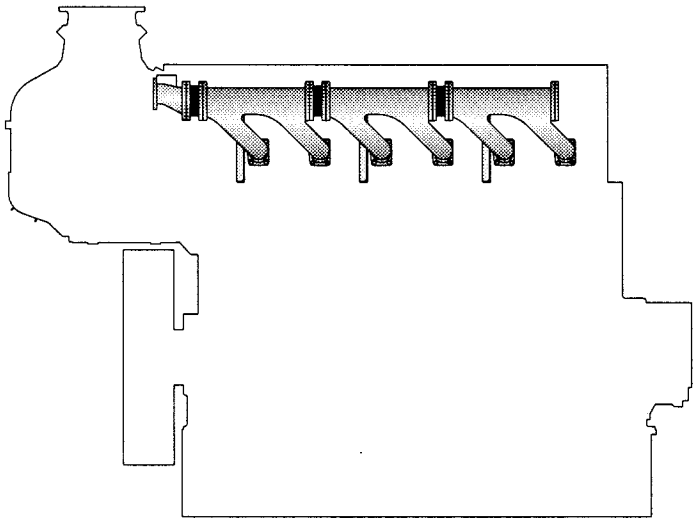


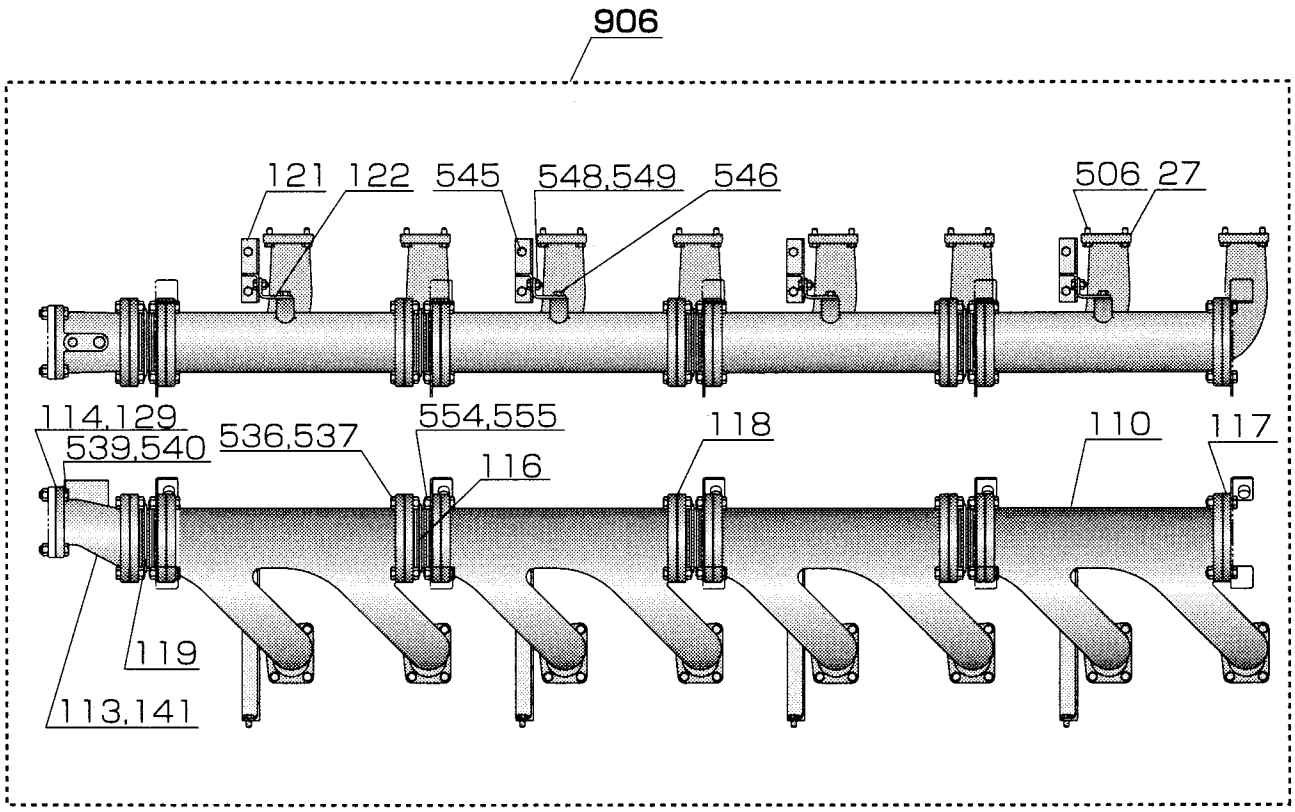


排気管 (前端過給) - 8DK
EXHAUST MANIFOLD (FRONT T/C) - 8DK

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
905		ハイキカン ASSY.-8D-1	EXHAUST MANIFOLD ASSY.-8D-1	1
27	E202150270	ハイキカンガスケツト	GASKET, EXHAUST MANIFOLD	8
114	E202151140	T/C パツキン, DSP (RH183)	GASKET, T/C INLET DSP (RH183)	1
116	E202151160	ベローズ	BELLOWS	3
117	E202151170	ハイキカンメクラフランジ (DSP)	EYE FLANGE, EX. MANIFOLD (DSP)	1
118	E202151180	ハイキカンパツキン (DSP)	GASKET, EX. MANIFOLD (DSP)	9
119	E202151190	ベローズ-2L-5C 120×80	BELLOWS-2L-5C 120×80	1
121	E202151210	ハイキカンササエ-1, (DSP)-RT	SUPPORT-1, EX. MANIFOLD (DSP)-RT	4
125	E202151250	ハイキカン-FT	EX. MANIFOLD-FT	4
132	E202151320	ハイキカンササエ-2, (DSP)-FT	SUPPORT-2, EX. MANIFOLD (DSP)-FT	4
143	E202151430	T/C イリグチカン, RH183-FT	T/C INLET PIPE, RH183-FT	1
506	X205012035ZZ	HT ボルト	HT BOLT	32
536	X205016055ZZ	HT ボルト	HT BOLT	16
537	X220016000DZ	ナツト	NUT	16
539	X205016055ZZ	HT ボルト	HT BOLT	4
540	X220016000DZ	ナツト	NUT	4
545	X200012020ZZ	ボルト	BOLT	8
546	X205012020ZZ	HT ボルト	HT BOLT	8
548	X200012025ZZ	ボルト	BOLT	8
549	X220012000ZZ	ナツト	NUT	8
554	X205016060ZZ	HT ボルト	HT BOLT	20
555	X220016000DZ	ナツト	NUT	20

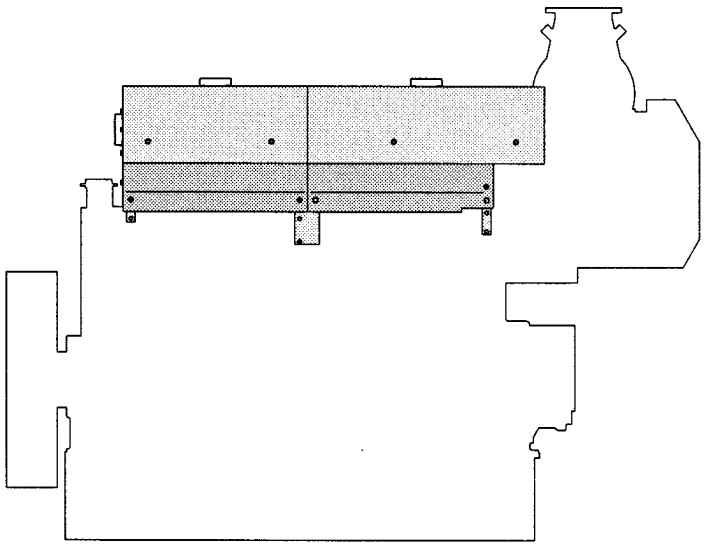
排気管 (後端過給) - 8DK
EXHAUST MANIFOLD (REAR T/C) - 8DK

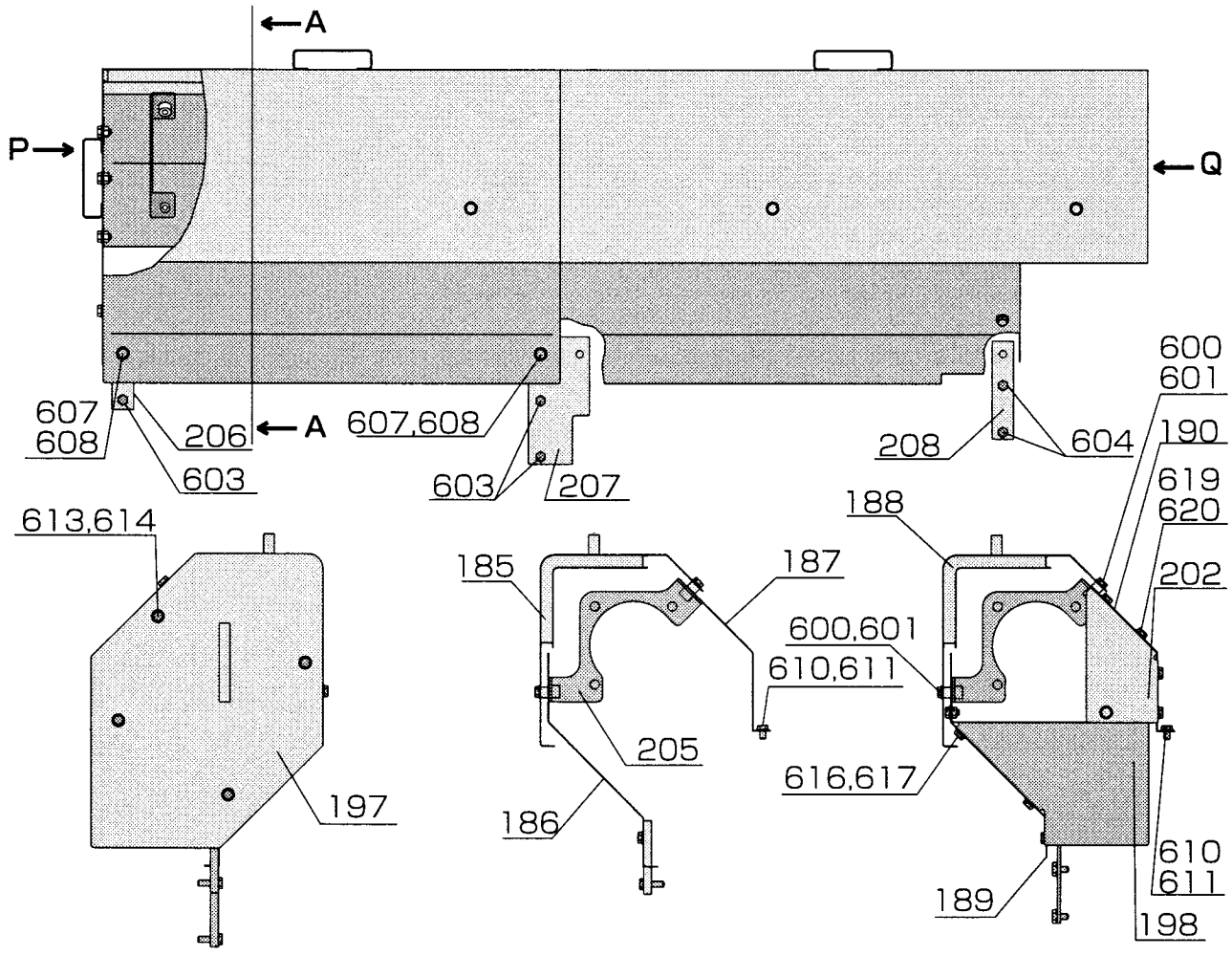




番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
906		ハイキカン ASSY.-8D-2	EXHAUST MANIFOLD ASSY.-8D-2	1
27	E202150270	ハイキカンガスケツト	GASKET, EXHAUST MANIFOLD	8
110	E202151100	ハイキカン-RT	EX. MANIFOLD-RT	4
113	E202151130	T/C イリグチカン, RH183-RT	T/C INLET PIPE, RH183-RT	1
114	E202151140	T/C パッキン, DSP (RH183)	GASKET, T/C INLET-DSP (RH183)	1
116	E202151160	ベローズ	BELLOWS	3
117	E202151170	ハイキカンメクラフランジ (DSP)	EYE FLANGE, EX. MANIFOLD (DSP)	1
118	E202151180	ハイキカンパツキン (DSP)	GASKET, EX. MANIFOLD(DSP)	9
119	E202151190	ベローズ-2L-5C 120×80	BELLOWS-2L-5C 120×80	1
121	E202151210	ハイキカンササエ-1, (DSP)-RT	SUPPORT-1, EX. MANIFOLD (DSP)-RT	4
122	E202151220	ハイキカンササエ-2, (DSP)-RT	SUPPORT-2, EX. MANIFOLD (DSP)-RT	4
506	X205012035ZZ	HT ボルト	HT BOLT	32
536	X205016055ZZ	HT ボルト	HT BOLT	16
537	X220016000DZ	ナツト	NUT	16
539	X205016055ZZ	HT ボルト	HT BOLT	4
540	X220016000DZ	ナツト	NUT	4
545	X200012020ZZ	ボルト	BOLT	8
546	X205012020ZZ	HT ボルト	HT BOLT	8
548	X200012025ZZ	ボルト	BOLT	8
549	X220012000ZZ	ナツト	NUT	8
554	X205016060ZZ	HT ボルト	HT BOLT	20
555	X220016000DZ	ナツト	NUT	20

排気管カバー(前端過給) - 6DK
EXHAUST MANIFOLD COVER (FRONT T/C) - 6DK

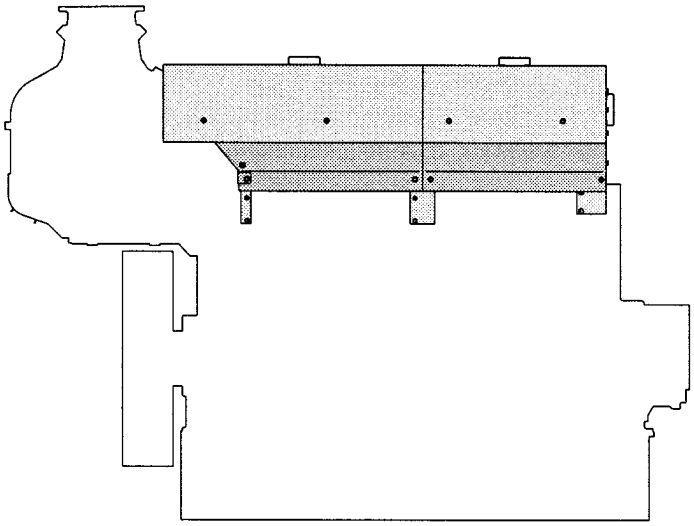


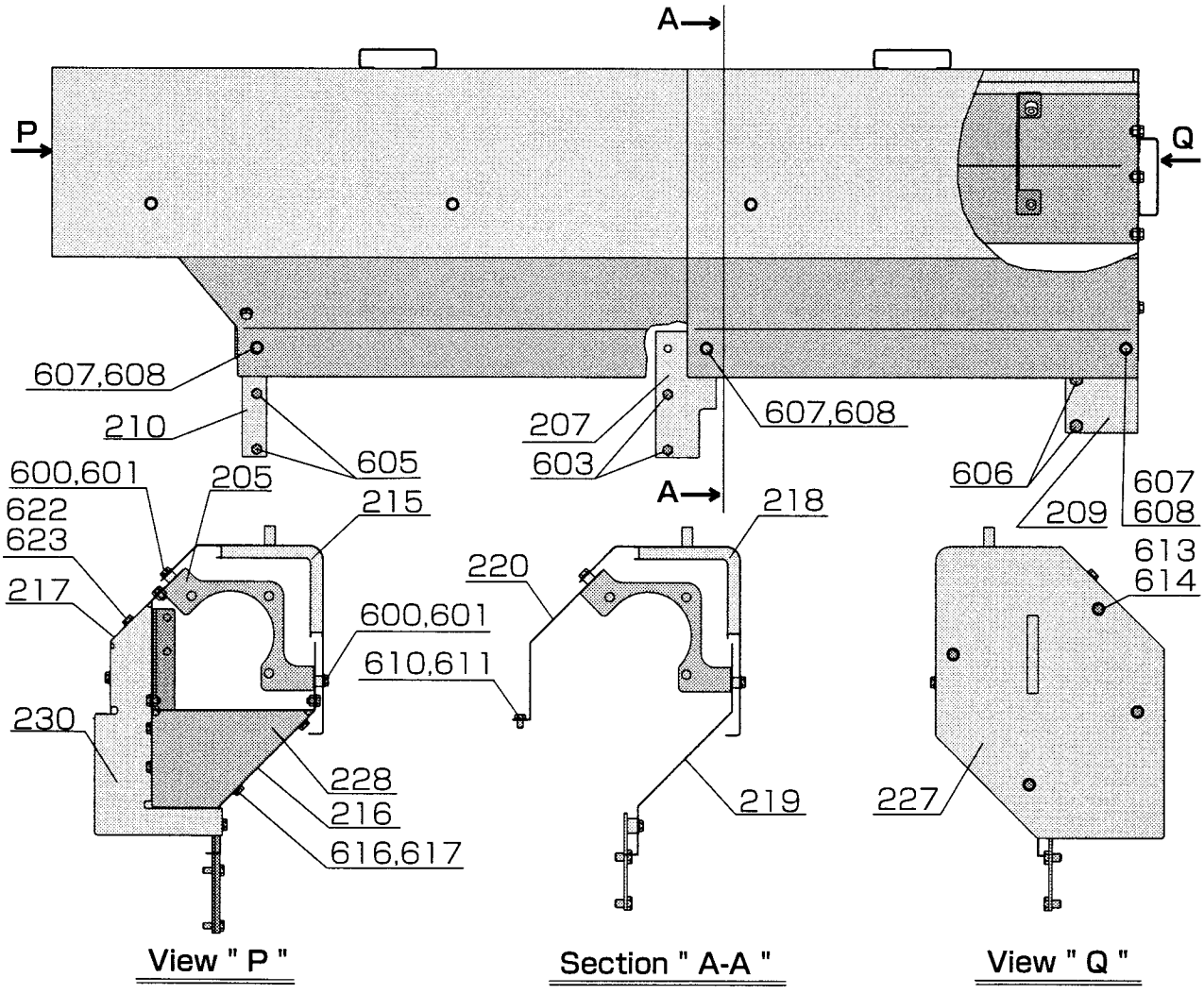


排気管カバー(前端過給) - 6DK
EXHAUST MANIFOLD COVER (FRONT T/C) - 6DK

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
185	E202251850	ハイキカンカバ-1, DSP-FT	EX. MANI. COVER-1, DSP-FT	1
186	E202251860	ハイキカンカバ-2, DSP-FT	EX. MANI. COVER-2, DSP-FT	1
187	E202251870	ハイキカンカバ-3, DSP-FT	EX. MANI. COVER-3, DSP-FT	1
188	E202251880	ハイキカンカバ-4, DSP-FT	EX. MANI. COVER-4, DSP-FT	1
189	E202251890	ハイキカンカバ-5, DSP-FT	EX. MANI. COVER-5, DSP-FT	1
190	E202251900	ハイキカンカバ-6, DSP-FT	EX. MANI. COVER-6, DSP-FT	1
197	E202251970	ハイキカンカバ-13, DSP-FT	EX. MANI. COVER-13, DSP-FT	1
198	E202251980	ハイキカンカバ-14, DSP-FT	EX. MANI. COVER-14, DSP-FT	1
202	E202252020	ハイキカンカバ-18, DSP-FT	EX. MANI. COVER-18, DSP-FT	1
205	E202252050	ハイキカンカバーササエ-1, DSP	BRACKET, EX. MANI. COVER-1, DSP	4
206	E202252060	ハイキカンカバーササエ-2, DSP	BRACKET, EX. MANI. COVER-2, DSP	1
207	E202252070	ハイキカンカバーササエ-3, DSP	BRACKET, EX. MANI. COVER-3, DSP	1
208	E202252080	ハイキカンカバーササエ-4, DSP	BRACKET, EX. MANI. COVER-4, DSP	1
600	X200012045ZZ	ボルト	BOLT	8
601	Z300012000ZZ	ヒラザガネ	FLAT WASHER	8
603	X200012042ZZ	ボルト	BOLT	3
604	X200012022ZZ	ボルト	BOLT	2
607	X200012022ZZ	ボルト	BOLT	4
608	Z300012000ZZ	ヒラザガネ	FLAT WASHER	4
610	X200012020ZZ	ボルト	BOLT	4
611	Z300012000ZZ	ヒラザガネ	FLAT WASHER	4
613	X200012020ZZ	ボルト	BOLT	4
614	Z300012000ZZ	ヒラザガネ	FLAT WASHER	4
616	X200012020ZZ	ボルト	BOLT	6
617	Z300012000ZZ	ヒラザガネ	FLAT WASHER	6
619	X200012020ZZ	ボルト	BOLT	4
620	Z300012000ZZ	ヒラザガネ	FLAT WASHER	4

排気管カバー(後端過給) - 6DK
EXHAUST MANIFOLD COVER (REAR T/C) - 6DK

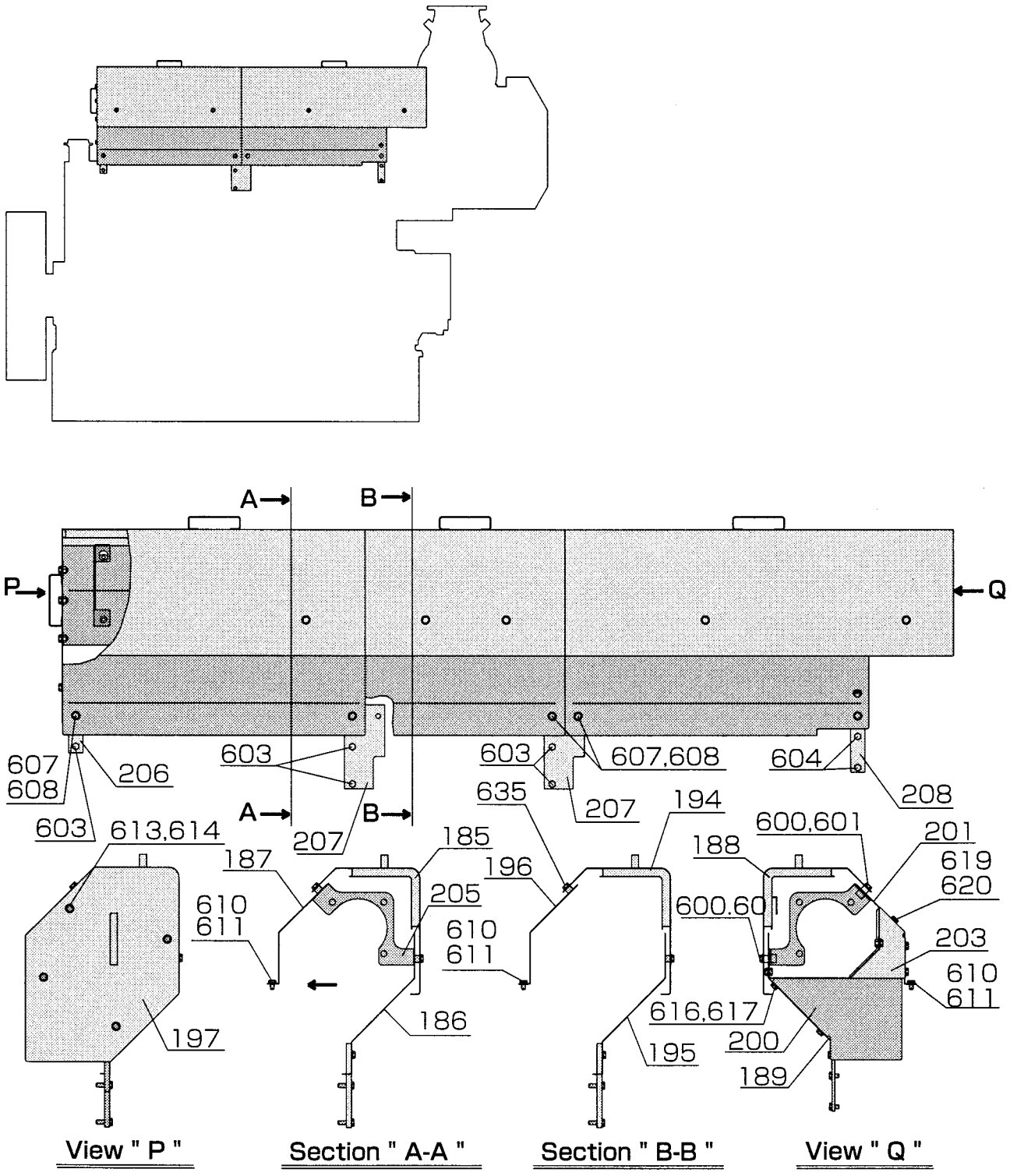




排気管カバー(後端過給) - 6DK
EXHAUST MANIFOLD COVER (REAR T/C) - 6DK

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
205	E202252050	ハイキカンカバーササエ-1, DSP	BRACKET, EX. MANI. COVER-1, DSP	4
207	E202252070	ハイキカンカバーササエ-3, DSP	BRACKET, EX. MANI. COVER-3, DSP	1
209	E202252090	ハイキカンカバーササエ-5, DSP	BRACKET, EX. MANI. COVER-5, DSP	1
210	E202252100	ハイキカンカバーササエ-6, DSP	BRACKET, EX. MANI. COVER-6, DSP	1
215	E202252150	ハイキカンカバ-1, DSP-FT	EX. MANI. COVER-1, DSP-FT	1
216	E202252160	ハイキカンカバ-2, DSP-RT	EX. MANI. COVER-2, DSP-RT	1
217	E202252170	ハイキカンカバ-3, DSP-RT	EX. MANI. COVER-3, DSP-RT	1
218	E202252180	ハイキカンカバ-4, DSP-RT	EX. MANI. COVER-4, DSP-RT	1
219	E202252190	ハイキカンカバ-5, DSP-RT	EX. MANI. COVER-5, DSP-RT	1
220	E202252200	ハイキカンカバ-6, DSP-RT	EX. MANI. COVER-6, DSP-RT	1
227	E202252270	ハイキカンカバ-13, DSP-RT	EX. MANI. COVER-13, DSP-RT	1
228	E202252280	ハイキカンカバ-14, DSP-RT	EX. MANI. COVER-14, DSP-RT	1
230	E202252300	ハイキカンカバ-16, DSP-RT	EX. MANI. COVER-16, DSP-RT	1
600	X200012045ZZ	ボルト	BOLT	8
601	Z300012000ZZ	ヒラザガネ	FLAT WASHER	8
603	X200012042ZZ	ボルト	BOLT	2
605	X200012035ZZ	ボルト	BOLT	2
606	X200016025ZZ	ボルト	BOLT	2
607	X200012022ZZ	ボルト	BOLT	4
608	Z300012000ZZ	ヒラザガネ	FLAT WASHER	4
610	X200012020ZZ	ボルト	BOLT	4
611	Z300012000ZZ	ヒラザガネ	FLAT WASHER	4
613	X200012020ZZ	ボルト	BOLT	4
614	Z300012000ZZ	ヒラザガネ	FLAT WASHER	4
616	X200012020ZZ	ボルト	BOLT	3
617	Z300012000ZZ	ヒラザガネ	FLAT WASHER	3
622	X200012020ZZ	ボルト	BOLT	5
623	Z300012000ZZ	ヒラザガネ	FLAT WASHER	5

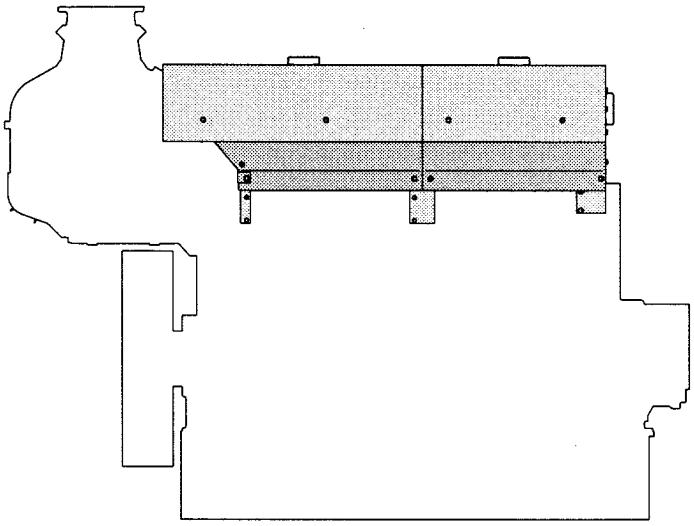
排気管カバー (前端過給) - 8DK
EXHAUST MANIFOLD COVER (FRONT T/C) - 8DK

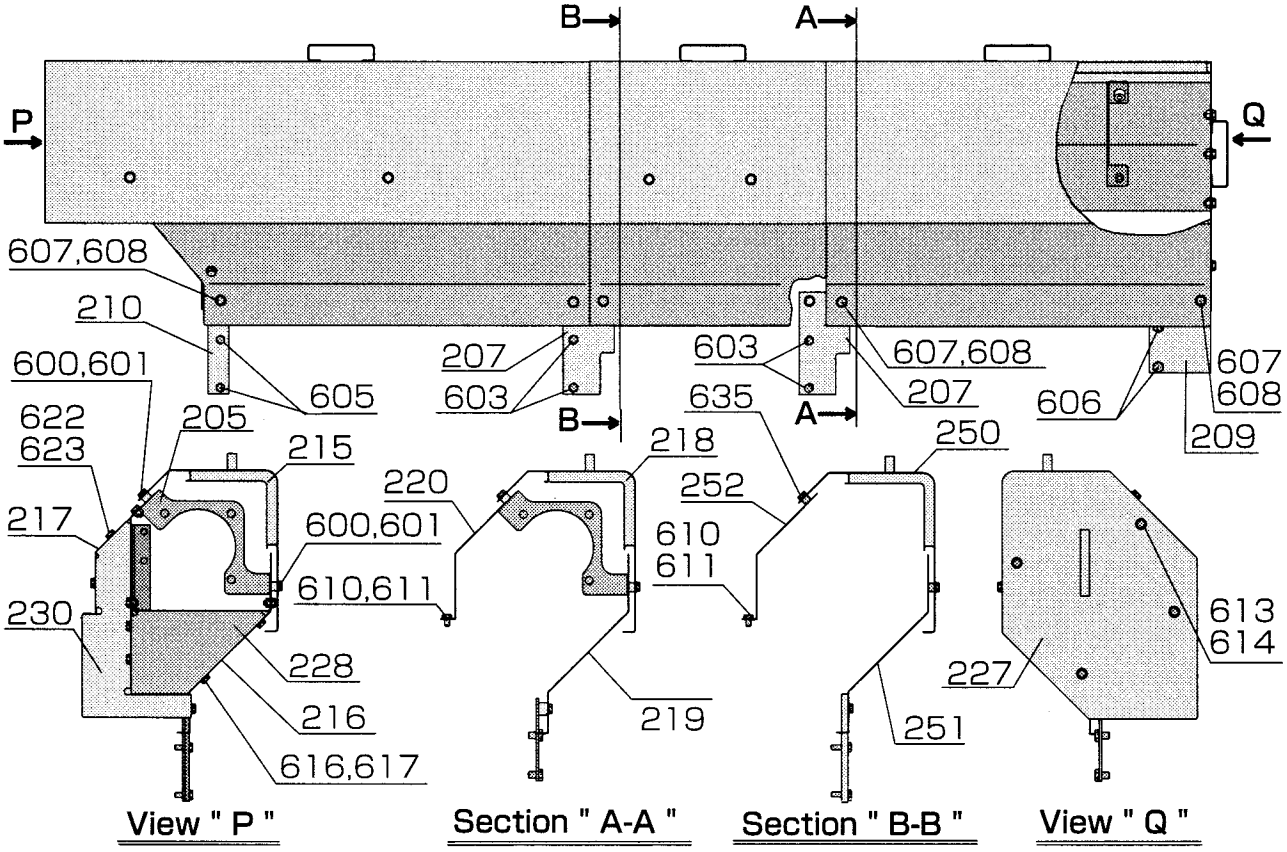


排気管カバー (前端過給) - 8DK
EXHAUST MANIFOLD COVER (FRONT T/C) - 8DK

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
185	E202251850	ハイキカンカバ-1, DSP-FT	EX. MANI. COVER-1, DSP-FT	1
186	E202251860	ハイキカンカバ-2, DSP-FT	EX. MANI. COVER-2, DSP-FT	1
187	E202251870	ハイキカンカバ-3, DSP-FT	EX. MANI. COVER-3, DSP-FT	1
188	E202251880	ハイキカンカバ-4, DSP-FT	EX. MANI. COVER-4, DSP-FT	1
189	E202251890	ハイキカンカバ-5, DSP-FT	EX. MANI. COVER-5, DSP-FT	1
194	E202251940	ハイキカンカバ-10, DSP-FT	EX. MANI. COVER-10, DSP-FT	1
195	E202251950	ハイキカンカバ-11, DSP-FT	EX. MANI. COVER-11, DSP-FT	1
196	E202251960	ハイキカンカバ-12, DSP-FT	EX. MANI. COVER-12, DSP-FT	1
197	E202252070	ハイキカンカバ-13, DSP-FT	EX. MANI. COVER-13, DSP-FT	1
200	E202252000	ハイキカンカバ-16, DSP-FT	EX. MANI. COVER-16, DSP-FT	1
201	E202252010	ハイキカンカバ-17, DSP-FT	EX. MANI. COVER-17, DSP-FT	1
203	E202252030	ハイキカンカバ-19, DSP-FT	EX. MANI. COVER-19, DSP-FT	1
205	E202252050	ハイキカンカバーササエ-1, DSP	BRACKET, EX. MANI. COVER-1, DSP	5
206	E202252060	ハイキカンカバーササエ-2, DSP	BRACKET, EX. MANI. COVER-2, DSP	1
207	E202252070	ハイキカンカバーササエ-3, DSP	BRACKET, EX. MANI. COVER-3, DSP	2
208	E202252080	ハイキカンカバーササエ-4, DSP	BRACKET, EX. MANI. COVER-4, DSP	1
600	X200012045ZZ	ボルト	BOLT	10
601	Z300012000ZZ	ヒラザガネ	FLAT WASHER	10
603	X200012042ZZ	ボルト	BOLT	5
604	X200012022ZZ	ボルト	BOLT	2
607	X200012022ZZ	ボルト	BOLT	6
608	Z300012000ZZ	ヒラザガネ	FLAT WASHER	6
610	X200012020ZZ	ボルト	BOLT	6
611	Z300012000ZZ	ヒラザガネ	FLAT WASHER	6
613	X200012020ZZ	ボルト	BOLT	4
614	Z300012000ZZ	ヒラザガネ	FLAT WASHER	4
616	X200012020ZZ	ボルト	BOLT	6
617	Z300012000ZZ	ヒラザガネ	FLAT WASHER	6
619	X200012020ZZ	ボルト	BOLT	3
620	Z300012000ZZ	ヒラザガネ	FLAT WASHER	3
635	X200012016ZZ	ボルト	BOLT	2

排気管カバー (後端過給) - 8DK
EXHAUST MANIFOLD COVER (REAR T/C)- 8DK

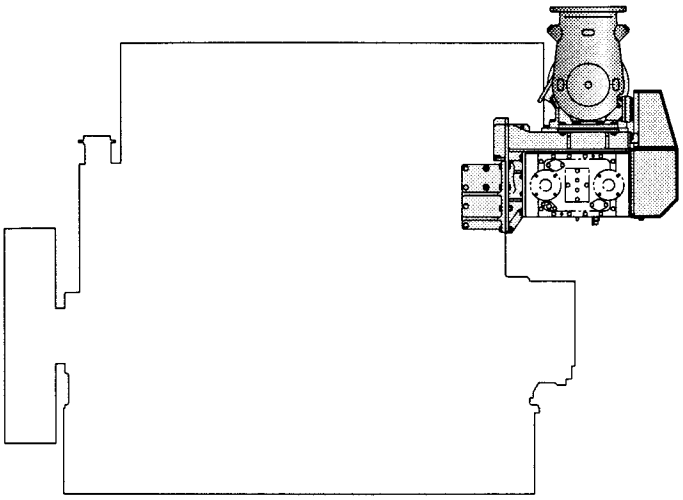


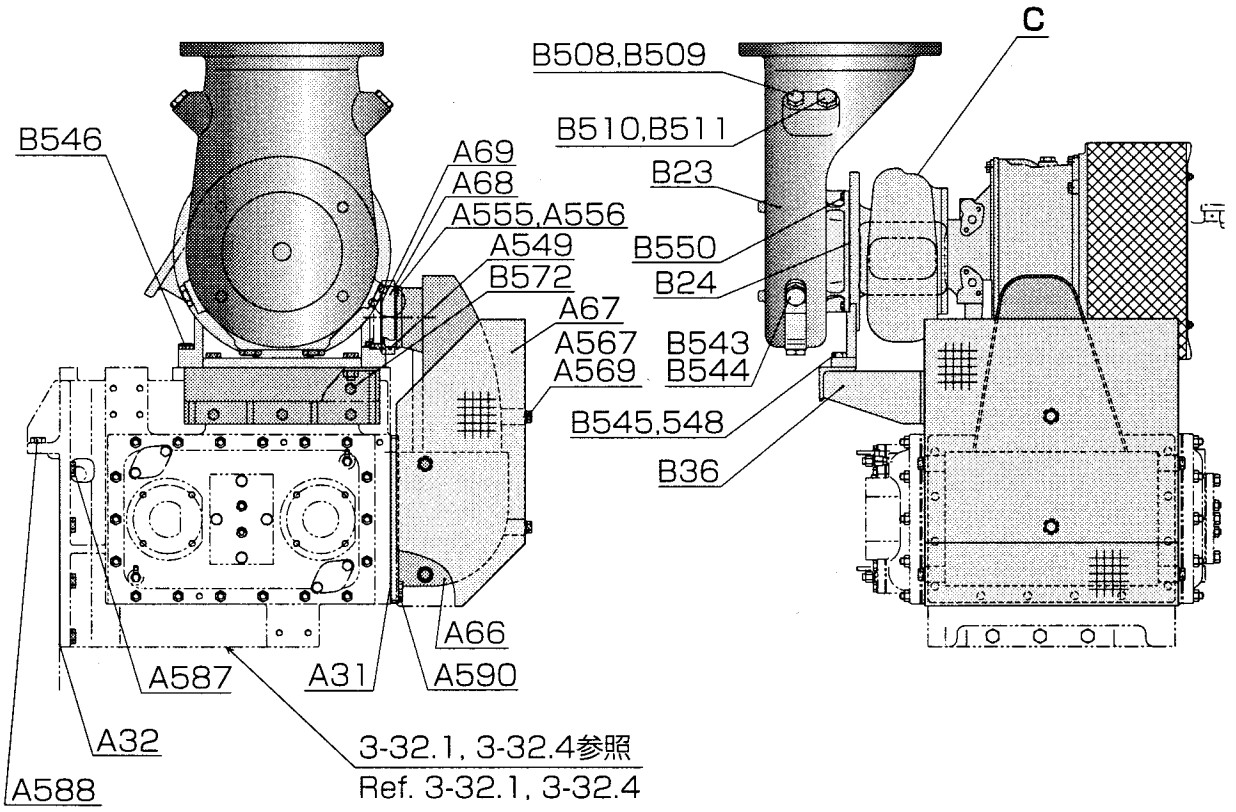


排気管カバー (後端過給) - 8DK
EXHAUST MANIFOLD COVER (REAR T/C)- 8DK

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
205	E202252050	ハイキカンカバーササエ-1, DSP	BRACKET, EX. MANI. COVER-1,DSP	5
207	E202252070	ハイキカンカバーササエ-3, DSP	BRACKET, EX. MANI. COVER-3,DSP	2
209	E202252090	ハイキカンカバーササエ-5, DSP	BRACKET, EX. MANI. COVER-5,DSP	1
210	E202252100	ハイキカンカバーササエ-6, DSP	BRACKET, EX. MANI. COVER-6,DSP	1
215	E202252150	ハイキカンカバ-1, DSP-RT	EX. MANI. COVER-1, DSP-RT	1
216	E202252160	ハイキカンカバ-2, DSP-RT	EX. MANI. COVER-2, DSP-RT	1
217	E202252170	ハイキカンカバ-3, DSP-RT	EX. MANI. COVER-3, DSP-RT	1
218	E202252180	ハイキカンカバ-4, DSP-RT	EX. MANI. COVER-4, DSP-RT	1
219	E202252190	ハイキカンカバ-5, DSP-RT	EX. MANI. COVER-5, DSP-RT	1
220	E202252200	ハイキカンカバ-6, DSP-RT	EX. MANI. COVER-6, DSP-RT	1
227	E202252270	ハイキカンカバ-13, DSP-RT	EX. MANI. COVER-13, DSP-RT	1
228	E202252280	ハイキカンカバ-14, DSP-RT	EX. MANI. COVER-14, DSP-RT	1
230	E202252300	ハイキカンカバ-16, DSP-RT	EX. MANI. COVER-16, DSP-RT	1
250	E202252500	ハイキカンカバ-18, DSP-RT	EX. MANI. COVER-18, DSP-RT	1
251	E202252510	ハイキカンカバ-19, DSP-RT	EX. MANI. COVER-19, DSP-RT	1
252	E202252520	ハイキカンカバ-20, DSP-RT	EX. MANI. COVER-20, DSP-RT	1
600	X200012045ZZ	ボルト	BOLT	10
601	Z300012000ZZ	ヒラザガネ	FLAT WASHER	10
603	X200012042ZZ	ボルト	BOLT	5
605	X200012035ZZ	ボルト	BOLT	2
606	X200016025ZZ	ボルト	BOLT	2
607	X200012022ZZ	ボルト	BOLT	6
608	Z300012000ZZ	ヒラザガネ	FLAT WASHER	6
610	X200012020ZZ	ボルト	BOLT	6
611	Z300012000ZZ	ヒラザガネ	FLAT WASHER	6
613	X200012020ZZ	ボルト	BOLT	4
614	Z300012000ZZ	ヒラザガネ	FLAT WASHER	4
616	X200012020ZZ	ボルト	BOLT	6
617	Z300012000ZZ	ヒラザガネ	FLAT WASHER	6
622	X200012020ZZ	ボルト	BOLT	5
623	Z300012000ZZ	ヒラザガネ	FLAT WASHER	5
635	X200012016ZZ	ボルト	BOLT	2

過給機, 空気冷却器取付(前端過給)-6DK
TURBOCHARGER & INTERCOOLER FITTING (FRONT T/C)-6DK





過給機, 空気冷却器取付(前端過給)-6DK
TURBOCHARGER & INTERCOOLER FITTING (FRONT T/C)-6DK

RH143, RH163

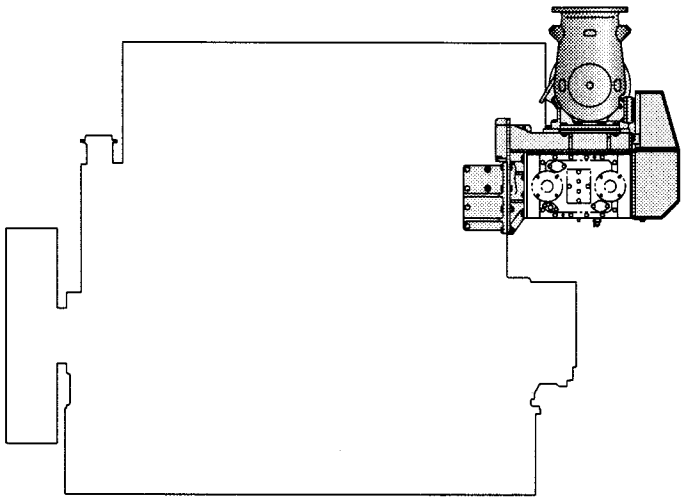
番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
A31	E202650310	I/C ガスケット (DK30)	I/C GASKET (DK-30)	1
A32	E200250320	キユウキカンフタガスケツト-2	GASKET-2, INTAKE MANIFOLD LID	1
A66	E202650660	I/C イリグチカン RH163-DSP	I/C INLET DUCT, RH163-DSP	1
A67	E202650670	I/C カバー RH163-DSP-FT	I/C COVER, RH163-DSP-FT	1
A68	E202650680	ブロワデグチフランジ RH163	FLANGE, BLOWWER OUTLET, RH163	1
A69	E202650690	ブロワデグチパッキン RH163	GASKET, BLOWWER OUTLET, RH163	1
A549	Z560111257DZ	O リング	O-RING	1
A555	X200010055ZZ	ボルト	BOLT	4
A556	X220010000ZZ	ナツト	NUT	4
A567	X200012016ZZ	ボルト	BOLT	6
A569	Z300012000ZZ	ヒラザガネ	FLAT WASHER	6
A588	X200016040ZZ	ボルト	BOLT	18
A590	X200012028ZZ	ボルト	BOLT	16
B23	E202350230	ハイキデグチカン (RH163)	GAS OUTLET DOCT (RH163)	1
B24	E202350240	ハイキデグチパッキン (RH163)	GASKET, GAS OUTLET DOCT (RH163)	1
B36	E202350360	ブラケット RH143-163	BRACKET, RH143-163	1
B510	X570006000DZ	ロツカクプラグ	HEX. PLUG	2
B511	Z565002700ZZ	マルパツキン	GASKET	2
B543	X570006000ZZ	ロツカクプラグ	HEX. PLUG	4
B544	Z565002700ZZ	マルパツキン	GASKET	4
B545	X200016030ZZ	ボルト	BOLT	2
B546	X200012050ZZ	ボルト	BOLT	2
B548	X220016000ZZ	ナツト	NUT	2
B550	X220008000DZ	ナツト	NUT	12
B572	X200012028ZZ	ボルト	BOLT	6
C	E20245	**ターボチャージャ**（仕様により異なる）	**TURBOCHARGER** (Depend on spec.)	1

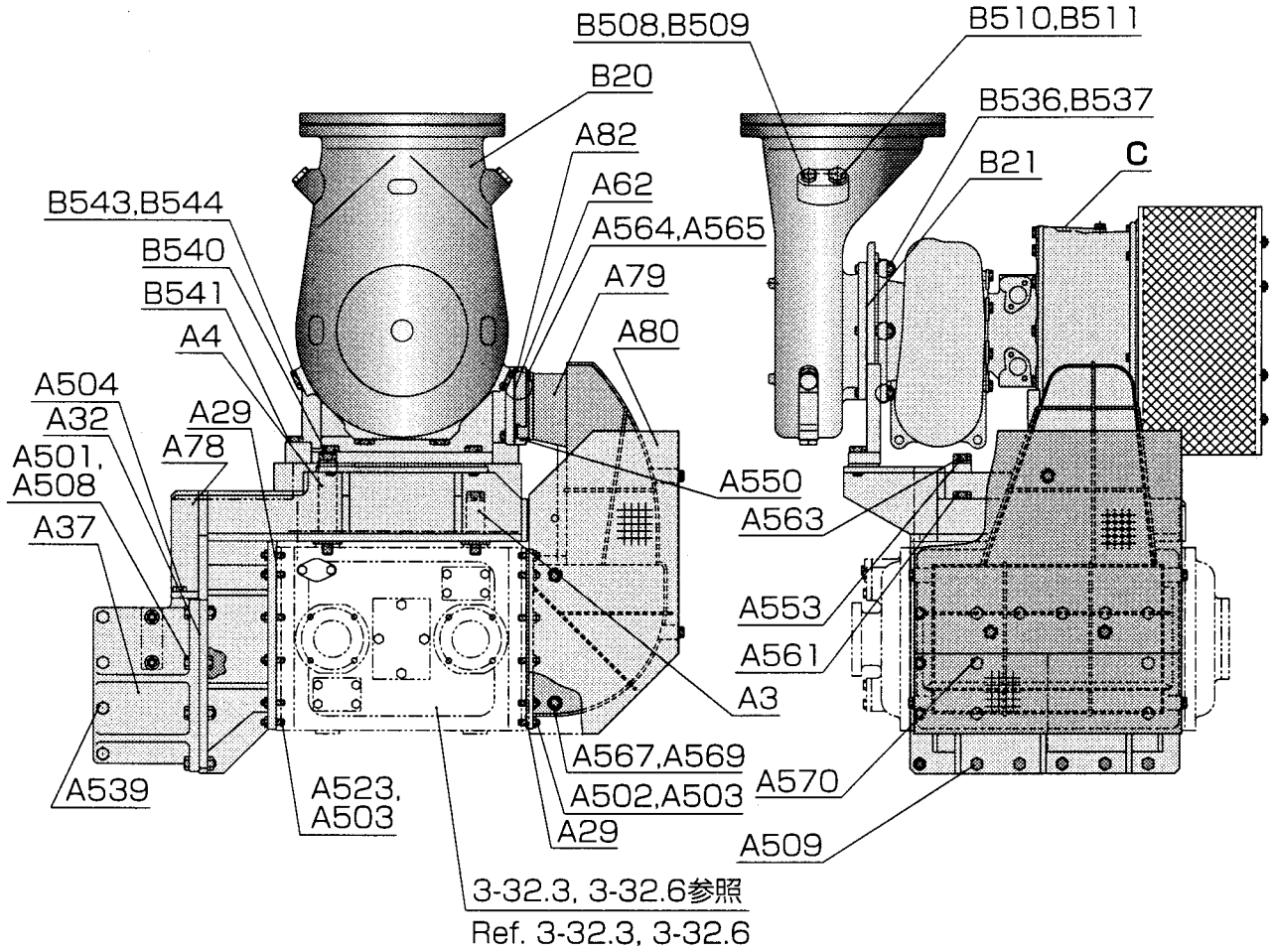
過給機，空気冷却器取付 (前端過給) - 6DK
TURBOCHARGER & INTERCOOLER FITTING (FRONT T/C) - 6DK

①……RH143, RH163 ②……RH183

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity ①	②
B20	E202350200	ハイキデグチカン (RH183)	GAS OUTLET DUCT (RH183)		1
B21	E202350210	ハイキデグチパツキン (RH183)	GASKET, GAS OUTLET DUCT (RH183)		1
B23	E202350230	ハイキデグチカン (RH163)	GAS OUTLET DUCT (RH163)	1	
B24	E202350240	ハイキデグチパツキン (RH163)	GASKET, GAS OUTLET DUCT (RH163)	1	
B508	X570004000DZ	ロツカクプラグ	HEX. PLUG	2	2
B509	Z56500210OZZ	マルパツキン	GASKET	2	2
B510	X570006000DZ	ロツカクプラグ	HEX. PLUG	2	2
B511	Z56500270OZZ	マルパツキン	GASKET	2	2
B536	X210016085DZ	スタツド	STUD		4
B537	X220016000DZ	ナツト	NUT		4
B540	X200020050ZZ	ボルト	BOLT		2
B541	X200020070ZZ	ボルト	BOLT		2
B543	X570006000ZZ	ロツカクプラグ	HEX. PLUG	4	4
B544	Z56500270OZZ	マルパツキン	GASKET	4	4
B546	X200012050ZZ	ボルト	BOLT	2	
B547	X200016055ZZ	ボルト	BOLT	2	
B548	X220016000ZZ	ナツト	NUT	2	
B550	X220008000DZ	ナツト	NUT	12	
C	E20245	ターボチャージャ (仕様により異なる)	TURBOCHARGER (Depend on spec.)	1	1

過給機，空気冷却器取付 (前端過給) - 6DK
TURBOCHARGER & INTERCOOLER FITTING (FRONT T/C) - 6DK





RH183

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
A3	E202650030	デイスタンス	DISTANCE	3
A4	E202650040	デイスタンス	DISTANCE	1
A29	E202650290	I/C ガスケット (44&55)	I/C GASKET (44&55)	2
A32	E200250320	キユウキカンフタガスケツト-2	GASKET-2, INTAKE MANIFOLD LID	1
A37	E202650370	I/C ブラケツト-2 (FT)	I/C BRACKET-2 (FT)	1
A62	E202650620	ブロワデグチパツキン RH183	GASKET, BLOWER OUTLET RH183	1
A78	E202650780	I/C ブラケツト, RH183-FT	I/C BRACKET, RH183-FT	1
A79	E202650790	I/C イリグチカン, RH183-FT	I/C INLET DUCT, RH183-FT	1
A80	E202650800	I/C カバー, RH183-FT	I/C COVER, RH183-FT	1
A82	E202650820	ブロワデグチフランジ-RH203	FLANGE, BLOWER OUTLET-RH203	1
A501	X200016055ZZ	ボルト	BOLT	4
A502	X210012046ZZ	スタツド	STUD	20
A503	X220012000ZZ	ナツト	NUT	20
A504	X200016030ZZ	ボルト	BOLT	4
A508	X220016000ZZ	ナツト	NUT	4
A509	X200016035ZZ	ボルト	BOLT	5
A523	X210012050ZZ	スタツド	STUD	20
A539	X200016040ZZ	ボルト	BOLT	4
A550	Z560113557DZ	O リング	O-RING	1
A553	Z310022000ZZ	バネザガネ	SPRING WASHER	4
A561	X200022120ZZ	ボルト	BOLT	3
A563	X200022200ZZ	ボルト	BOLT	1
A564	X200012055ZZ	ボルト	BOLT	4
A565	X220012000ZZ	ナツト	NUT	4
A567	X200012016ZZ	ボルト	BOLT	2
A568	X200012020ZZ	ボルト	BOLT	2
A569	Z300012000ZZ	ヒラザガネ	FLAT WASHER	4
A570	X200016035DZ	ボルト	BOLT	9
B20	E202350200	ハイキデグチカン (RH183)	GAS OUTLET DUCT (RH183)	1
B21	E202350210	ハイキデグチパツキン (RH183)	GASKET, GAS OUTLET DUCT (RH183)	1
B508	X570004000DZ	ロツカクプラグ	HEX. PLUG	2
B509	Z565002100ZZ	マルパツキン	GASKET	2
B510	X570006000DZ	ロツカクプラグ	HEX. PLUG	2
B511	Z565002700ZZ	マルパツキン	GASKET	2
B536	X210016085DZ	スタツド	STUD	4
B537	X220016000DZ	ナツト	NUT	4
B540	X200020050ZZ	ボルト	BOLT	2
B541	X200020070ZZ	ボルト	BOLT	2
B543	X570006000ZZ	ロツカクプラグ	HEX. PLUG	4
B544	Z565002700ZZ	マルパツキン	GASKET	4
C	E20245	ターボチャージャ (仕様により異なる)	TURBOCHARGER (Depend on spec.)	1

過給機，空気冷却器取付 (後端過給) - 6DK
TURBOCHARGER & INTERCOOLER FITTING (REAR T/C) - 6DK

①……RH143, RH163 ②……RH183

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity ①	②
B509	Z565002100ZZ	マルパツキン	GASKET	2	2
B510	X570006000DZ	ロツカクプラグ	HEX. PLUG	2	2
B511	Z565002700ZZ	マルパツキン	GASKET	2	2
B536	X210016085DZ	スタツド	STUD		4
B537	X220016000DZ	ナツト	NUT		4
B540	X200020050ZZ	ボルト	BOLT		2
B541	X200020070ZZ	ボルト	BOLT		2
B543	X570006000ZZ	ロツカクプラグ	HEX. PLUG	4	4
B544	Z565002700ZZ	マルパツキン	GASKET	4	4
B546	X200012050ZZ	ボルト	BOLT	2	
B549	X200016035ZZ	ボルト	BOLT	2	
B550	X220008000DZ	ナツト	NUT	12	
C	E20245	ターボチャージャ (仕様により異なる)	TURBOCHARGER (Depend on spec.)	1	1

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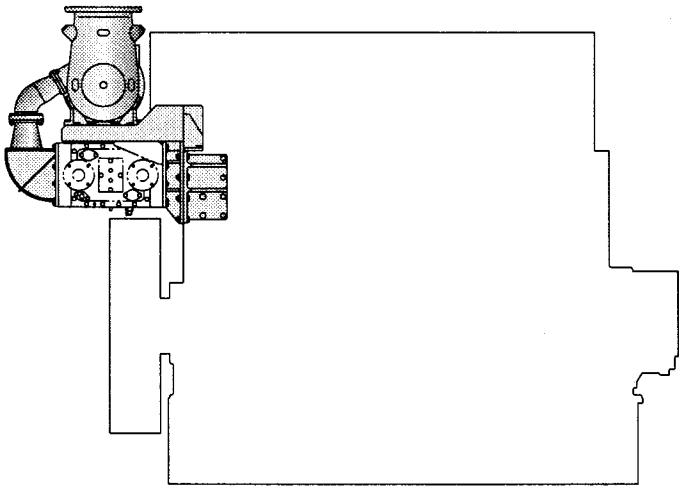
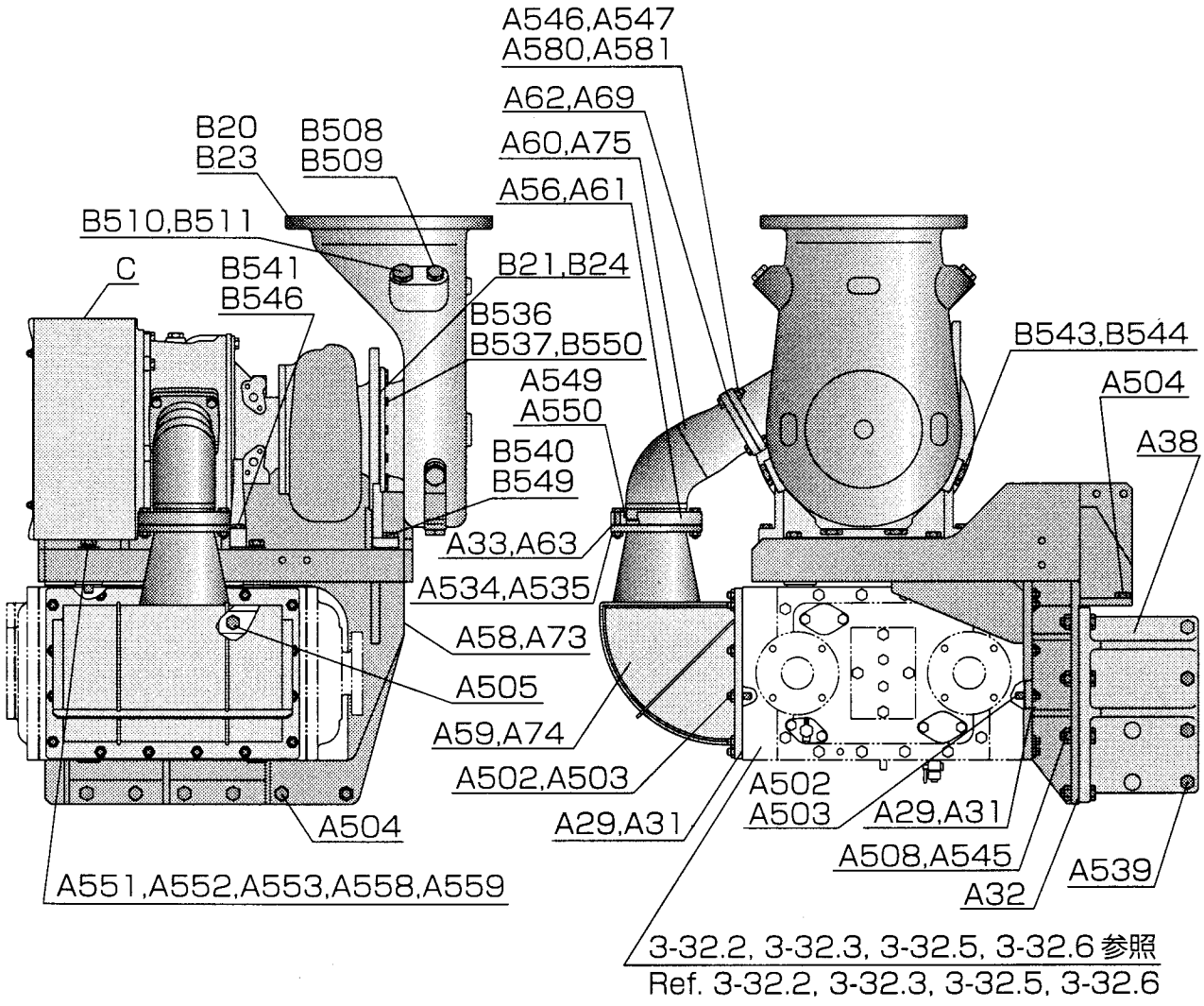
過給機，空気冷却器取付 (後端過給) - 6DK
TURBOCHARGER & INTERCOOLER FITTING (REAR T/C) - 6DK





過給機，空気冷却器取付 (後端過給) - 6DK
TURBOCHARGER & INTERCOOLER FITTING (REAR T/C) - 6DK

①……RH143, RH163 ②……RH183

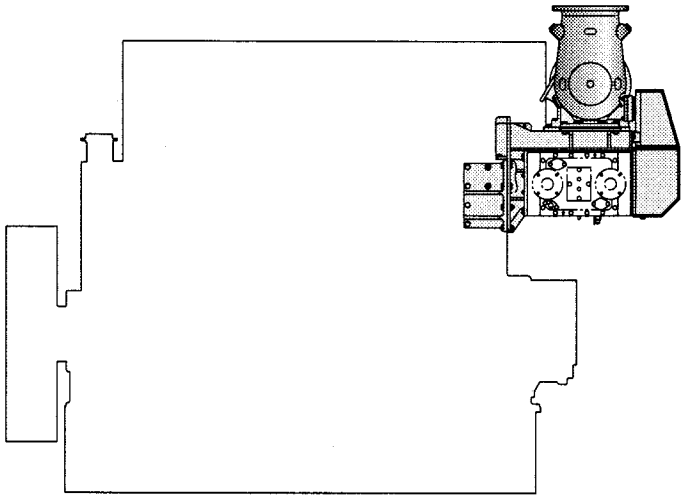
番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity ①	②
A29	E202650290	I/Cガスケット (44&55)	I/C GASKET (44&55)		2
A31	E202650310	I/C ガスケツト (DK30)	I/C GASKET (DK30)	2	
A32	E200250320	キユウキカンフタガスケツト-2	GASKET-2, INTAKE MANIFOLD LID	1	1
A33	E202650330	ブロワデグチパツキン-VTR161	GASKET, BLOWER OUTLET-VTR161	1	
A38	E202650380	I/C ブラケツト-2 (RT)	I/C BRACKET-2 (RT)	1	1
A56	E202650560	ブロワデグチフランジ-VTR160	FLANGE, BLOWER OUTLET-VTR160	1	
A58	E202650580	I/C ブラケット-RH183 (RT) DSP	I/C BRACKET-RH183 (RT) DSP		1
A59	E202650590	I/C イリグチカン-RH183-DSP	I/C INLET DUCT-RH183-DSP		1
A60	E202650600	ブロワデグチカン-RH183-DSP	BLOWER, OUTLET PIPE-RH183-DSP		1
A61	E202650610	ブロワデグチフランジ-RH183	FLANGE, BLOWER OUTLET-RH183		1
A62	E202650620	ブロワデグチパッキン-RH183	GASKET, BLOWER OUTLET-RH183		1
A63	E202650630	I/C イリグチカンパッキン-RH183	I/C INLET DUCT-RH183		1
A69	E202650690	ブロワデグチパツキン-RH163	GASKET,BLOWER OUTLET-RH163	1	
A73	E202650730	I/C ブラケツト-RH163-RT	I/C BRACKET-RH163-RT	1	
A74	E202650740	I/C イリグチカン-RH163-RT	I/C INLET DUCT-RH163-RT	1	
A75	E202650750	ブロワデグチカン-RH163-RT	BLOWER OUTLET PIPE, RH163-RT	1	
A502	X210012046ZZ	スタツド	STUD	32	40
A503	X220012000ZZ	ナツト	NUT	32	40
A504	X200016030ZZ	ボルト	BOLT	12	4
A505	X200016030DZ	ボルト	BOLT	6	9
A508	X220016000ZZ	ナツト	NUT	4	9
A534	X200010050ZZ	ボルト	BOLT	4	6
A535	X220010000ZZ	ナツト	NUT	4	6
A539	X200016040ZZ	ボルト	BOLT	4	4
A545	X200016055ZZ	ボルト	BOLT	4	4
A546	X200012045ZZ	ボルト	BOLT		4
A547	X220012000ZZ	ナット	NUT		4
A549	Z560111257DZ	O リング	O-RING	1	
A550	Z560113557DZ	O リング	O-RING		1
A551	X200022160ZZ	ボルト	BOLT		1
A552	X200022105ZZ	ボルト	BOLT		3
A553	Z310022000ZZ	バネザガネ	SPRING WASHER		4
A558	X200016090ZZ	ボルト	BOLT	4	
A559	Z310016000ZZ	バネザガネ	SPRING WASHER	4	
A580	X200010045ZZ	ボルト	BOLT	4	
A581	X220010000ZZ	ナット	NUT	4	
B20	E202350200	ハイキデグチカン (RH183)	GAS OUTLET DUCT (RH183)		1
B21	E202350210	ハイキデグチパツキン (RH183)	GASKET, GAS OUTLET DUCT (RH183)		1
B23	E202350230	ハイキデグチカン (RH163)	GAS OUTLET DUCT (RH163)	1	
B24	E202350240	ハイキデグチパツキン (RH163)	GASKET, GAS OUTLET DUCT (RH163)	1	
B508	X570004000DZ	ロツカクプラグ	HEX. PLUG	2	2

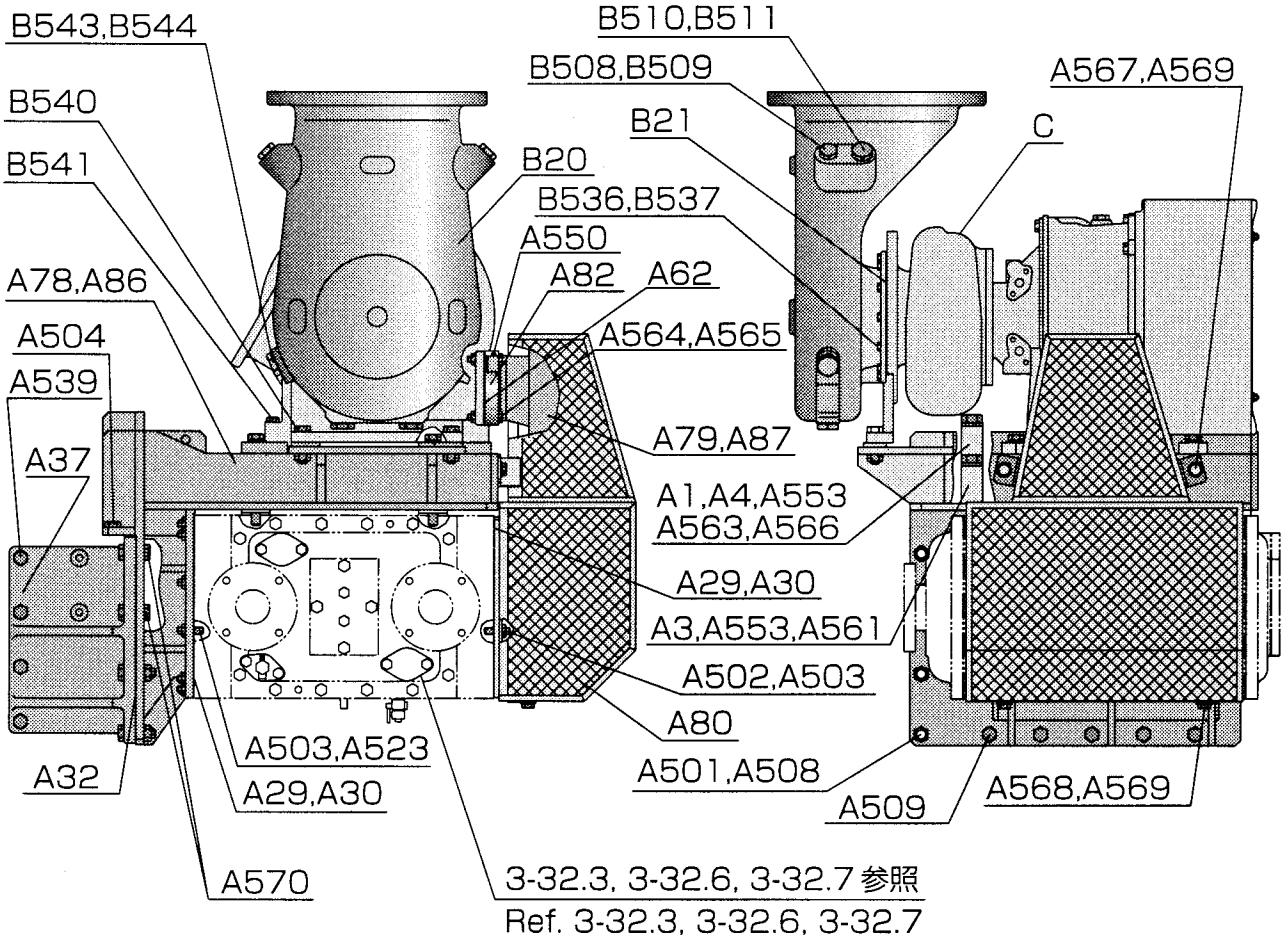
過給機，空気冷却器取付 (後端過給) - 6DK
TURBOCHARGER & INTERCOOLER FITTING (REAR T/C) - 6DK

①……RH143, RH163 ②……RH183

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity ①	②
B509	Z565002100ZZ	マルパツキン	GASKET	2	2
B510	X570006000DZ	ロツカクプラグ	HEX. PLUG	2	2
B511	Z565002700ZZ	マルパツキン	GASKET	2	2
B536	X210016085DZ	スタツド	STUD		4
B537	X220016000DZ	ナツト	NUT		4
B540	X200020050ZZ	ボルト	BOLT		2
B541	X200020070ZZ	ボルト	BOLT		2
B543	X570006000ZZ	ロツカクプラグ	HEX. PLUG	4	4
B544	Z565002700ZZ	マルパツキン	GASKET	4	4
B546	X200012050ZZ	ボルト	BOLT	2	
B549	X200016035ZZ	ボルト	BOLT	2	
B550	X220008000DZ	ナツト	NUT	12	
C	E20245	ターボチャージャ (仕様により異なる)	TURBOCHARGER (Depend on spec.)	1	1

過給機，空気冷却器取付 (前端過給) - 8DK
TURBOCHARGER & INTERCOOLER FITTING (FRONT T/C) - 8DK





過給機，空気冷却器取付 (前端過給) - 8DK
TURBOCHARGER & INTERCOOLER FITTING (FRONT T/C) - 8DK

①……I/C : DH52, DH73 ②……I/C : DH95

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity ①	②
A1	E202650010	ディスタンス	DISTANCE		1
A3	E202650030	デイスタンス	DISTANCE	3	3
A4	E202650040	デイスタンス	DISTANCE	1	
A29	E202650290	I/C ガスケット (44&55)	I/C GASKET (44&55)	2	
A30	E202650300	I/C ガスケット (57)	I/C GASKET (57)		2
A32	E200250320	キユウキカンフタ, ガスケツト-2	GASKET-2, INTAKE MANIFOLD LID	1	1
A37	E202650370	I/C ブラケツト-2 (FT)	I/C BRACKET-2 (FT)	1	1
A62	E202650620	ブロワデグチパツキン, RH183-DSP	GASKET, BLOWER OUTLET RH183-DSP	1	1
A78	E202650780	I/C ブラケツト, RH183-FT	I/C BRACKET, RH183-FT	1	
A79	E202650790	I/C イリグチカン, RH183-FT	I/C INLET DUCT, RH183-FT	1	
A80	E202650800	I/C カバー, RH183-FT	I/C COVER, RH183-FT	1	
A82	E202650820	ブロワデグチフランジ, RH203	FLANGE, BLOWWER OUTLET-RH203	1	1
A86	E202650860	I/C ブラケツト, RH203-FT	I/C BRACKET, RH203-FT		1
A87	E202650870	I/C イリグチカン, RH203-FT	I/C INLET DUCT, RH203-FT		1
A501	X200016055ZZ	ボルト	BOLT	4	4
A502	X210012046ZZ	スタツド	STUD	20	20
A503	X220012000ZZ	ナツト	NUT	40	40
A504	X200016030ZZ	ボルト	BOLT	4	4
A508	X220016000ZZ	ナツト	NUT	4	4
A509	X200016035ZZ	ボルト	BOLT	5	5
A523	X210012050ZZ	スタツド	STUD	20	20
A539	X200016040ZZ	ボルト	BOLT	4	4
A550	Z560113557DZ	O リング	O-RING	1	1
A553	Z310022000ZZ	バネザガネ	SPRING WASHER	4	4
A561	X200022120ZZ	ボルト	BOLT	3	3
A563	X200022200ZZ	ボルト	BOLT	1	
A564	X200012055ZZ	ボルト	BOLT	4	4
A565	X220012000ZZ	ナツト	NUT	4	4
A566	X200022170ZZ	ボルト	BOLT		1
A567	X200012016ZZ	ボルト	BOLT	2	2
A568	X200012020ZZ	ボルト	BOLT	2	2
A569	Z300012000ZZ	ヒラザガネ	FLAT WASHER	4	4
A570	X200016035DZ	ボルト	BOLT	9	9
B20	E202350200	ハイキデグチカン (RH183)	GAS OUTLET DUCT (RH183)	1	1
B21	E202350210	ハイキデグチパツキン (RH183)	GASKET, GAS OUTLET DUCT (RH183)	1	1
B508	X570004000DZ	ロツカクプラグ	HEX.PLUG	2	2
B509	Z565002100ZZ	マルパツキン	GASKET	2	2
B510	X570006000DZ	ロツカクプラグ	HEX. PLUG	2	2
B511	Z565002700ZZ	マルパツキン	GASKET	2	2
B536	X210016085DZ	スタツド	STUD	4	4
B537	X220016000DZ	ナツト	NUT	4	4

過給機，空気冷却器取付 (前端過給) - 8DK
TURBOCHARGER & INTERCOOLER FITTING (FRONT T/C) - 8DK

①……I/C : DH52, DH73 ②……I/C : DH95

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity ①	②
B540	X200020050ZZ	ボルト	BOLT	2	2
B541	X200020070ZZ	ボルト	BOLT	2	2
B543	X570006000ZZ	ロツカクプラグ	HEX. PLUG	4	4
B544	Z565002700ZZ	マルパツキン	GASKET	4	4
C	E20245	ターボチャージャ (仕様により異なる)	TURBOCHARGER (Depend on spec.)	1	1

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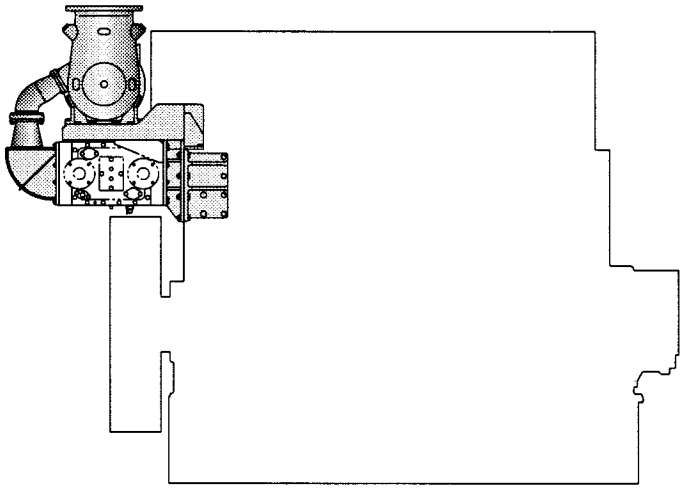
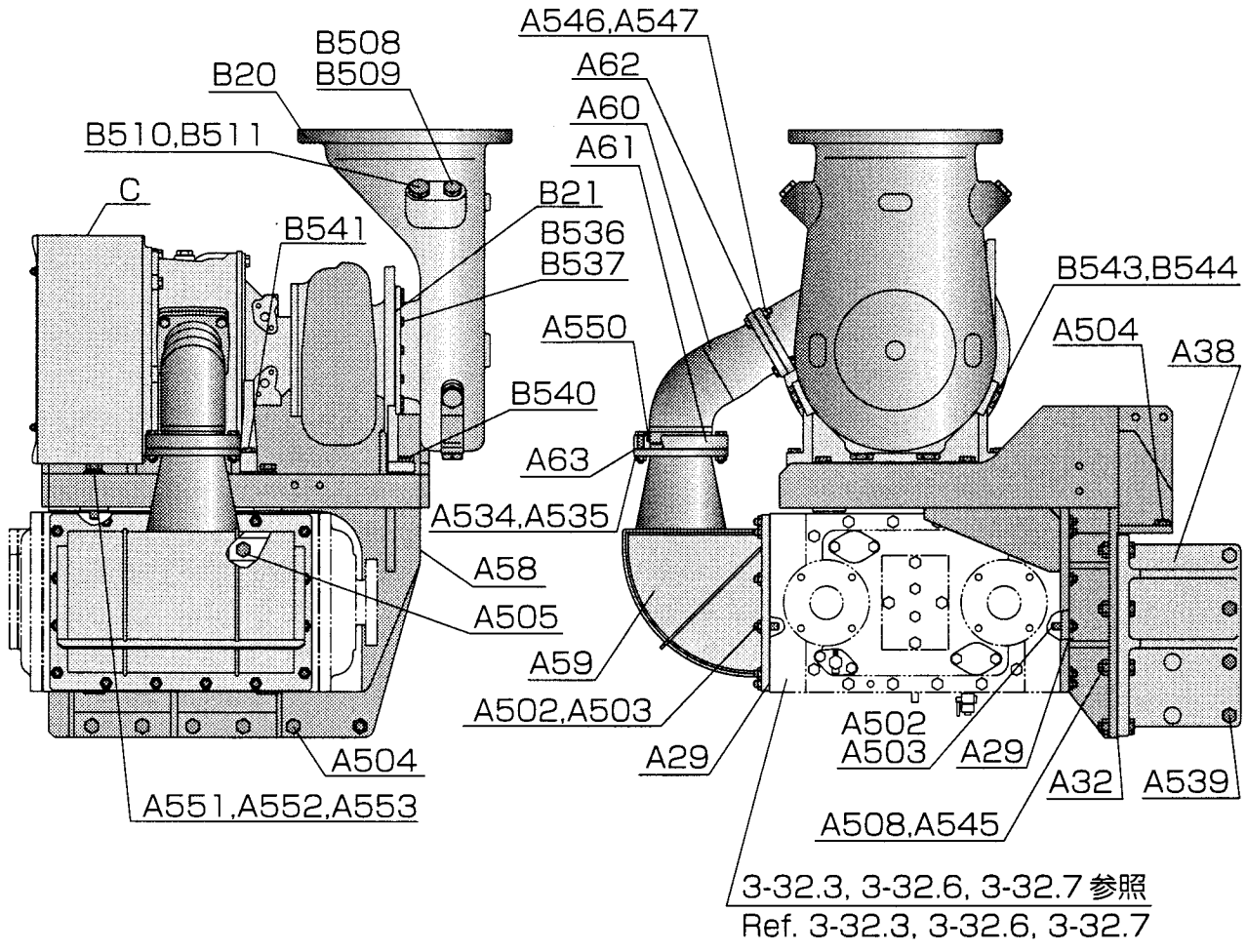
過給機，空気冷却器取付 (後端過給) - 8DK
TURBOCHARGER & INTERCOOLER FITTING (REAR T/C) - 8DK

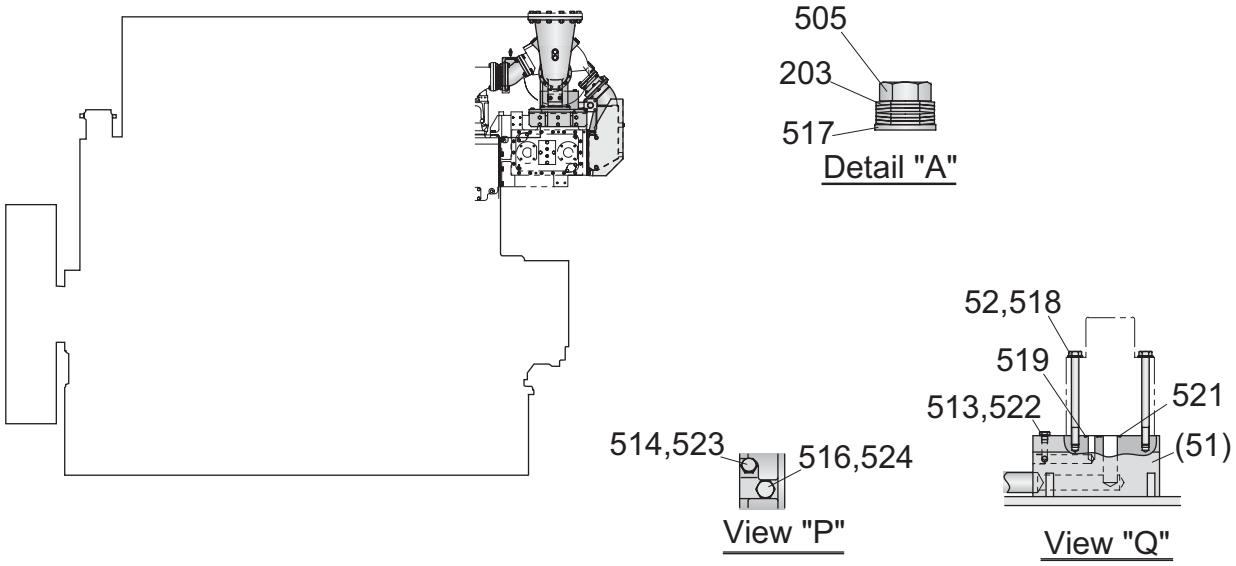


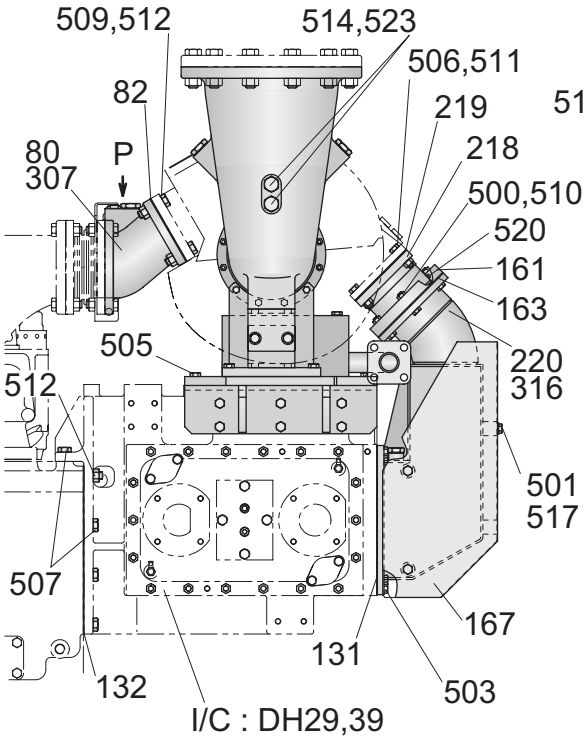


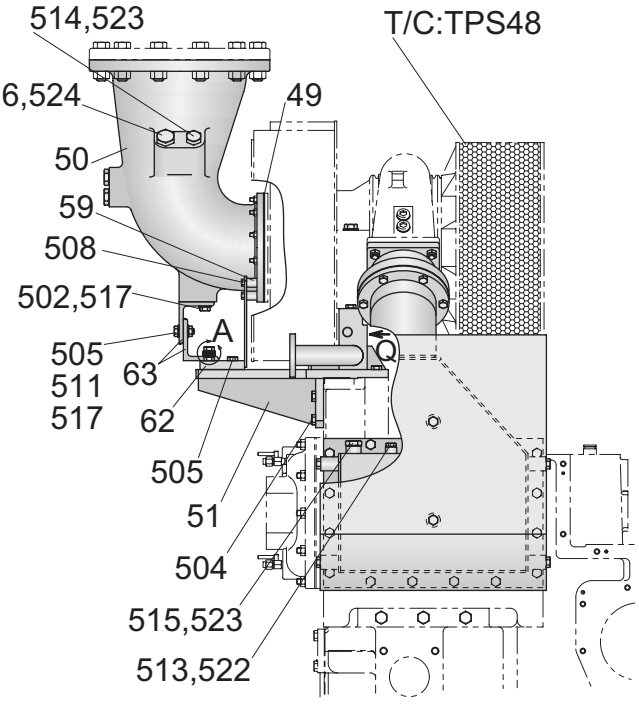
過給機，空気冷却器取付 (後端過給) - 8DK
TURBOCHARGER & INTERCOOLER FITTING (REAR T/C) - 8DK

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
A29	E202650290	I/C ガスケット (44 & 55)	I/C GASKET (44 & 55)	2
A32	E200250320	キユウキカンフタガスケツト-2	GASKET-2, INTAKE MANIFOLD LID	1
A38	E202650380	I/C ブラケツト-2 (RT)	I/C BRACKET-2 (RT)	1
A58	E202650580	I/C ブラケット, RH183(RT)DSP	I/C BRACKET, RH183(RT)DSP	1
A59	E202650590	I/C イリグチカン, RH183-DSP	I/C INLET DUCT, RH183-DSP	1
A60	E202650600	ブロワデグチカン, RH183-DSP	BLOWER OUTLET PIPE, RH183-DSP	1
A61	E202650610	ブロワデグチフランジ-RH183	FLANGE, BLOWER OUTLET-RH183	1
A62	E202650620	ブロワデグチパッキン-RH183	GASKET, BLOWER OUTLET-RH183	1
A63	E202650630	I/C イリグチカンパッキン-RH183	GASKET, I/C INLET DUCT-RH183	1
A502	X210012046ZZ	スタツド	STUD	40
A503	X220012000ZZ	ナツト	NUT	40
A504	X200016030ZZ	ボルト	BOLT	4
A505	X200016030DZ	ボルト	BOLT	9
A508	X220016000ZZ	ナツト	NUT	9
A534	X200010050ZZ	ボルト	BOLT	6
A535	X220010000ZZ	ナツト	NUT	6
A539	X200016040ZZ	ボルト	BOLT	4
A545	X200016055ZZ	ボルト	BOLT	4
A546	X200012045ZZ	ボルト	BOLT	4
A547	X220012000ZZ	ナット	NUT	4
A550	Z560113557DZ	O リング	O-RING	1
A551	X200022160ZZ	ボルト	BOLT	1
A552	X200022105ZZ	ボルト	BOLT	3
A553	Z310022000ZZ	バネザガネ	SPRING WASHER	4
B20	E202350200	ハイキデグチカン (RH183)	GAS OUTLET DUCT (RH183)	1
B21	E202350210	ハイキデグチパツキン (RH183)	GASKET, GAS OUTLET DUCT (RH183)	1
B508	X570004000DZ	ロツカクプラグ	HEX.PLUG	2
B509	Z565002100ZZ	マルパツキン	GASKET	2
B510	X570006000DZ	ロツカクプラグ	HEX.PLUG	2
B511	Z565002700ZZ	マルパツキン	GASKET	2
B536	X210016085DZ	スタッド	STUD	4
B537	X220016000DZ	ナット	NUT	4
B540	X200020050ZZ	ボルト	BOLT	2
B541	X200020070ZZ	ボルト	BOLT	2
B543	X570006000ZZ	ロツカクプラグ	HEX.PLUG	4
B544	Z565002700ZZ	マルパツキン	GASKET	4
C	E20245	**ターボチャージャ** (仕様により異なる)	**TURBOCHARGER** (Depend on spec.)	1

過給機(前端過給:TPS48),空気冷却器取付-6DK
TURBOCHARGER (FRONT T/C :TPS48) & INTERCOOLER FITTING-6DK





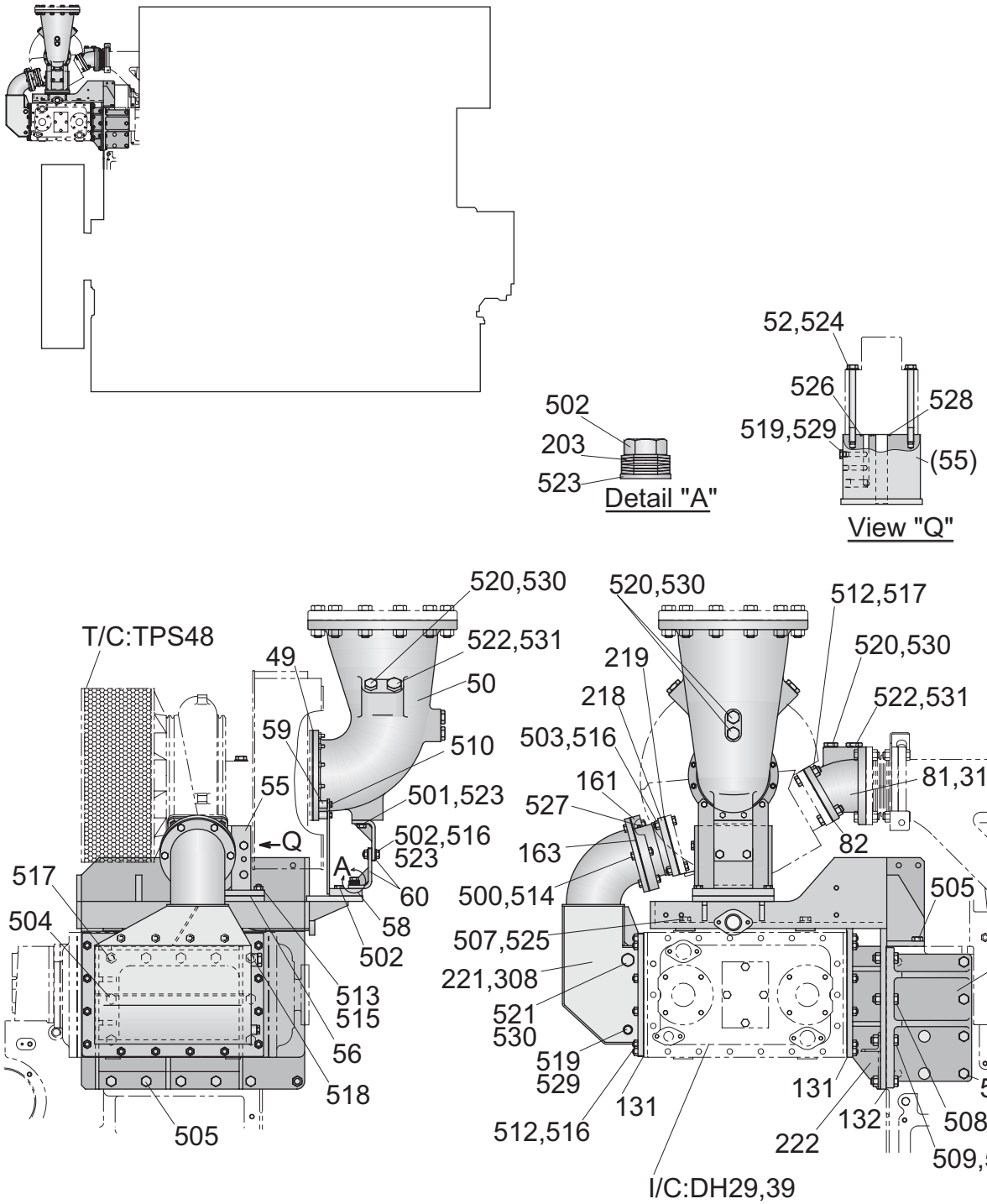


番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
49	E202350490	ガスケット : T/C	GASKET : T/C	1
50	E202350500	ダクト : T/C デグチ TPS48	DUCT : T/C OUTLET TPS48	1
51	E202350510	T/C ブラケット TPS48	BRACKET : T/C TPS48	1
52	E202350520	ボルト	BOLT	2
59	E202350590	ディスタンス デグチ TPS48	DISTANCE:.OUTLET DUCT TPS48	4
62	E202350620	ブラケット :TPS48-FT	BRACKET : TPS48-FT	1
63	E202350630	デグチカンブラケット :TPS48-FT	BRACKET : OUTLET DUCT TPS48-FT	2
80	E202152520	ダクト :T/C イリグチ TPS48-F	DUCT : T/C INLET TPS48-F	1
82	E202152490	ガスケット T/C	GASKET : T/C	1
131	E202650310	ガスケット : I/C : DK30	GASKET : I/C : DK30	1
132	E200250320	キュウキカンフタガスケット-2	GASKET-2 : INTAKE DUCT	1
161	E202650610	ブロワデグチフランジ-RH183	FLANGE : BLOWER OUTLET RH183	1
163	E202650630	ガスケット : I/C イリグチカン RH183	GASKET : I/C INTAKE DUCT RH183	1
167	E202650670	カバー : I/C : RH163-DSP-FT	COVER : I/C : RH163-DSP-FT	1
203	E202651030	サラバネ	CONED DISC SPRING	12
218	E202651180	ブロワデグチカン TPS48	PIPE : BLOWER OUTLET TPS48	1
219	E202651190	ガスケット : ブロワデグ TPS48	GASKET : BLOWER OUTLET TPS48	1
220	E202651200	I/C イリグチカンTPS48	DUCT : I/C INLET TPS48	1
307	E202363070	ラギング : T/C IN : TPS48-F	LAGGING : T/C INLET : TPS48-F	1
316	E202363160	ラギング : T/C OUT : TPS48	LAGGING : T/C OUTLET : TPS48	1
500	X200010055ZZ	ボルト	BOLT	6
501	X200012016ZZ	ボルト	BOLT	6
502	X200012025DZ	ボルト	BOLT	2
503	X200012028ZZ	ボルト	BOLT	16
504	X200012030ZZ	ボルト	BOLT	6
505	X200012035ZZ	ボルト	BOLT	10
506	X200012050ZZ	ボルト	BOLT	4
507	X200016040ZZ	ボルト	BOLT	16
508	X205008060ZZ	HTボルト	HT BOLT	4
509	X205016060ZZ	HTボルト	HT BOLT	4
510	X220010000ZZ	ナット	NUT	6
511	X220012000ZZ	ナット	NUT	6
512	X220016000DZ	ナット	NUT	6
513	X570002000ZZ	ロッカクプラグ	HEX.PLUG	2
514	X570004000DZ	ロッカクプラグ	HEX.PLUG	5

過給機(前端過給:TPS48),空気冷却器取付-6DK
TURBOCHARGER (FRONT T/C :TPS48) & INTERCOOLER FITTING-6DK

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
515	X570004000ZZ	ロッカクプラグ	HEX.PLUG	1
516	X570006000DZ	ロッカクプラグ	HEX.PLUG	3
517	Z300012000ZZ	ヒラザガネ	FLAT WASHER	14
518	Z300016000ZZ	ヒラザガネ	FLAT WASHER	2
519	Z560102435DZ	Oリング	O-RING	1
520	Z560113557DZ	Oリング	O-RING	1
521	Z560204031DZ	Oリング	O-RING	1
522	Z565001300ZZ	マルパツキン	GASKET	2
523	Z565002100ZZ	マルパツキン	GASKET	6
524	Z565002700ZZ	マルパツキン	GASKET	3
C	**E20245**	タ-ボチャ-ジャ(仕様により異なる)	**TURBOCHARGER**(DEPEND ON SPEC.)	**1**

過給機(後端過給:TPS48),空気冷却器取付-6DK
TURBOCHARGER (REAR T/C :TPS48) & INTERCOOLER FITTING-6DK

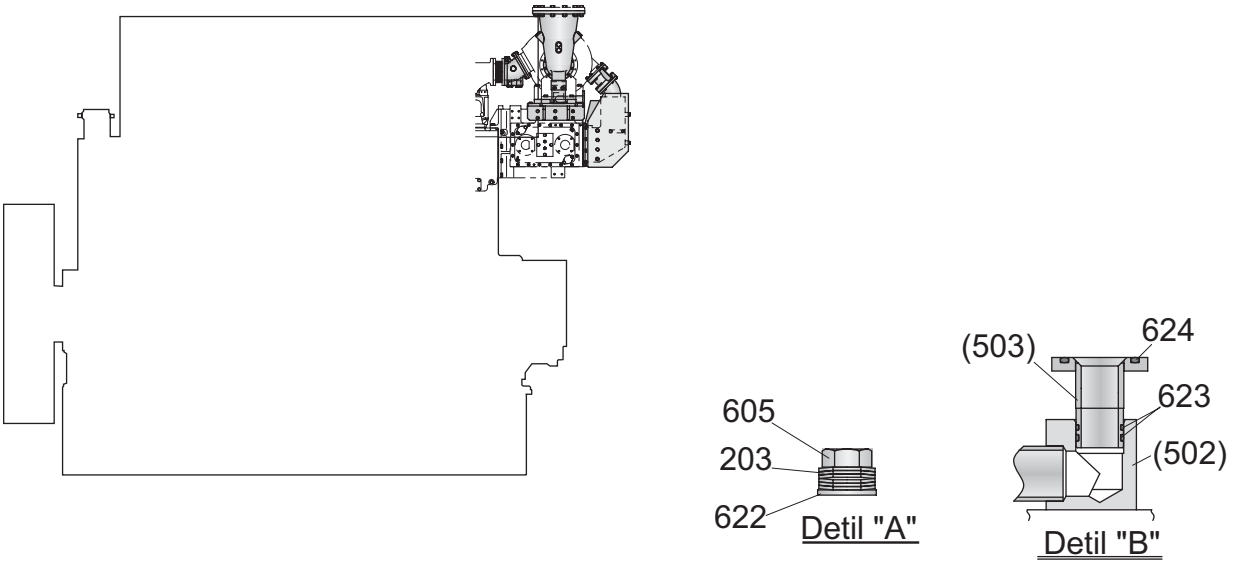


番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
49	E202350490	ガスケット T/C	GASKET : T/C	1
50	E202350500	ダクト T/C デグチ TPS48	DUCT : T/C OUTLET TPS48	1
52	E202350520	ボルト	BOLT	2
55	E202350550	ダイ T/C TPS48-RT	MOUNT : T/C TPS48-RT	1
56	E202350560	パッキン T/C ダイ TPS48-RT	GASKET : T/C MOUNT : TPS48-RT	1
58	E202350580	T/C ブラケット : TPS48-RT	T/C BRACKET : TPS48-RT	1
59	E202350590	ディスタンス : ハイキデグチ	DISTANCE:EX.GAS OUTLET DUCT	4
60	E202350600	ブラケット : ハイキデグチ	BRACKET : EX.GAS OUTLET DUCT	2
81	E202152510	ダクト :T/C イリグチ TPS48-RT	DUCT : T/C INLET TPS48-RT	1
82	E202152490	ガスケット T/C	GASKET : T/C	1
131	E202650310	ガスケット : I/C : DK30	GASKET : I/C : DK30	2
132	E200250320	I/C キュウキカンフタガスケット-2	GASKET-2 : I/C INTAKE DUCT	1
138	E202650380	I/C ブラッケト-2(RT)	I/C BRACKET-2(RT)	1
161	E202650610	ブロワデグチフランジ-RH183	FLANGE : BLOWER OUTLET RH183	1
163	E202650630	ガスケット : I/C イリグチカン RH183	GASKET : I/C INTAKE DUCT RH183	1
203	E202651030	サラバネ	CONED DISC SPRING	12
218	E202651180	ブロワデグチカン TPS48	PIPE : BLOWER OUTLET TPS48	1
219	E202651190	ガスケット : ブロワデグ TPS48	GASKET : BLOWER OUTLET TPS48	1
221	E202651210	ダクト ; I/C イリグチTPS48R	DUCT : I/C INLET TPS48R	1
222	E202651220	ブラケット,: I/C TPS48-R	BRACKET : I/C TPS48-R	1
308	E202363080	ラギング : T/C IN : TPS48-R	LAGGING : T/C INLET : TPS48-R	1
316	E202363160	ラギング : T/C OUT : TPS48	LAGGING : T/C OUTLET : TPS48	1
500	X200010055ZZ	ボルト	BOLT	6
501	X200012025DZ	ボルト	BOLT	2
502	X200012035ZZ	ボルト	BOLT	8
503	X200012050ZZ	ボルト	BOLT	4
504	X200016030DZ	ボルト	BOLT	5
505	X200016030ZZ	ボルト	BOLT	11
506	X200016040ZZ	ボルト	BOLT	4
507	X200016045ZZ	ボルト	BOLT	4
508	X200016055ZZ	ボルト	BOLT	2
509	X200016060ZZ	ボルト	BOLT	2

過給機(後端過給:TPS48),空気冷却器取付-6DK
TURBOCHARGER (REAR T/C :TPS48) & INTERCOOLER FITTING-6DK

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
510	X205008060ZZ	HTボルト	HT BOLT	4
511	X205016060ZZ	HTボルト	HT BOLT	4
512	X210012046ZZ	スタッド	STUD	32
513	X210012048DZ	スタッド	STUD	6
514	X220010000ZZ	ナット	NUT	6
515	X220012000DZ	ナット	NUT	6
516	X220012000ZZ	ナット	NUT	38
517	X220016000DZ	ナット	NUT	5
518	X220016000ZZ	ナット	NUT	5
519	X570002000ZZ	ロッカクプラグ	HEX.PLUG	2
520	X570004000DZ	ロッカクプラグ	HEX.PLUG	5
521	X570004000ZZ	ロッカクプラグ	HEX.PLUG	1
522	X570006000DZ	ロッカクプラグ	HEX.PLUG	3
523	Z300012000ZZ	ヒラザガネ	FLAT WASHER	8
524	Z300016000ZZ	ヒラザガネ	FLAT WASHER	2
525	Z310016000ZZ	バネザガネ	SPRING WASHER	4
526	Z560102435DZ	Oリング	O-RING	1
527	Z560113557DZ	Oリング	O-RING	1
528	Z560204031DZ	Oリング	O-RING	1
529	Z565001300ZZ	マルパツキン	GASKET	2
530	Z565002100ZZ	マルパツキン	GASKET	6
531	Z565002700ZZ	マルパツキン	GASKET	3
C	**E20245**	タ-ボチャ-ジャ(仕様により異なる)	**TURBO CHARGER**(Depend on spec.)	1

過給機(前端過給:MET18SRC),空気冷却器取付-6DK
TURBOCHARGER (FRONT T/C:MET18SRC) & INTERCOOLER FITTING-6DK

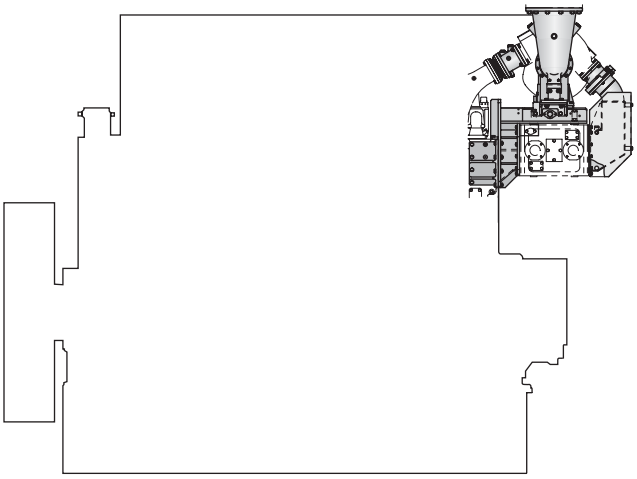


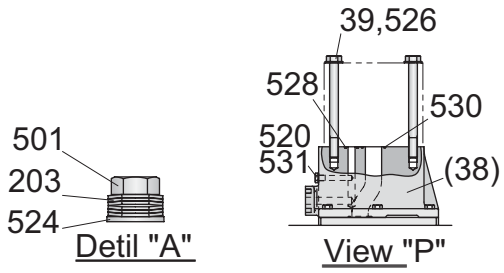
番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
68	E202350680	ブラケット、デグチカン、52-ウエ	BRACKET,OUTLET PIPE-52-UP	1
131	E202650310	ガスケット : I/C : DK30	GASKET : I/C : DK30	1
132	E200250320	I/C キュウキカンフタガスケット-2	GASKET-2 : I/C INTAKE DUCT	1
203	E202651030	サラバネ	CONED DISC SPRING	12
501	E202365010	ダクト:T/C イリグチMET18-F/T-1E	DUCT : T/C INLET MET18-F/T-1E	1
502	E202365020	ブラケット:T/C MET18-F/T-1E	BRACKET : T/C MET18-F/T-1E	1
503	E202365030	LOカン:T/C ドレン-1:MET18	L.O.PIPE : T/C DRAIN-1 MET18	1
504	E202365040	ダクト:I/C イリグチMET18-RT-1E	DUCT : I/C INLET MET18-R/T-1E	1
505	E202365050	パイプ:I/C イリグチ:MET18	PIPE : I/C INLET MET18	1
506	E202365060	フランジ:I/C イリグチ:MET18	FIANGE : I/C INLET MET18	2
507	E202365070	ガスケット:T/C イリグチ:MET18	GASKET : T/C INLET MET18	1
508	E202365080	ガスケット:ブロワデグチ:MET18	GASKET : BLOWER OUTLET MET18	2
509	E202365090	ブラケット:ハイキデグチカン:MET18	BRACKET : EX.GAS OUTLET MET18	1
510	E202365100	カバー:I/C : MET18	COVER : I/C MET18	1
511	E202365110	ダクト:T/Cデグチ : MET18	DUCT : T/C OUTLET MET18	1
512	E202365120	ガスケット:T/Cデグチ:MET18	GASKET : T/C OUTLET MET18	1
513	E202365130	ラギング : T/C IN : MET18-FT	LAGGING : T/C INLET : MET18-FT	1
514	E202365140	ラギング : T/C OUT : MET18-FT	LAGGING : T/C OUTLET : MET-FT	1
600	X200010050ZZ	ボルト	BOLT	6
601	X200010055ZZ	ボルト	BOLT	6
602	X200012016ZZ	ボルト	BOLT	6
603	X200012025ZZ	ボルト	BOLT	2
604	X200012028ZZ	ボルト	BOLT	22
605	X200012035ZZ	ボルト	BOLT	3
606	X200016035ZZ	ボルト	BOLT	2
607	X200016040ZZ	ボルト	BOLT	16
608	X200016120ZZ	ボルト	BOLT	2
609	X205010040ZZ	HTボルト	HT BOLT	8
610	X205012025ZZ	HTボルト	HT BOLT	2
611	X205012035ZZ	HTボルト	HT BOLT	2
612	X220010000ZZ	ナット	NUT	14
613	X220012000ZZ	ナット	NUT	2
614	X220016000ZZ	ナット	NUT	2

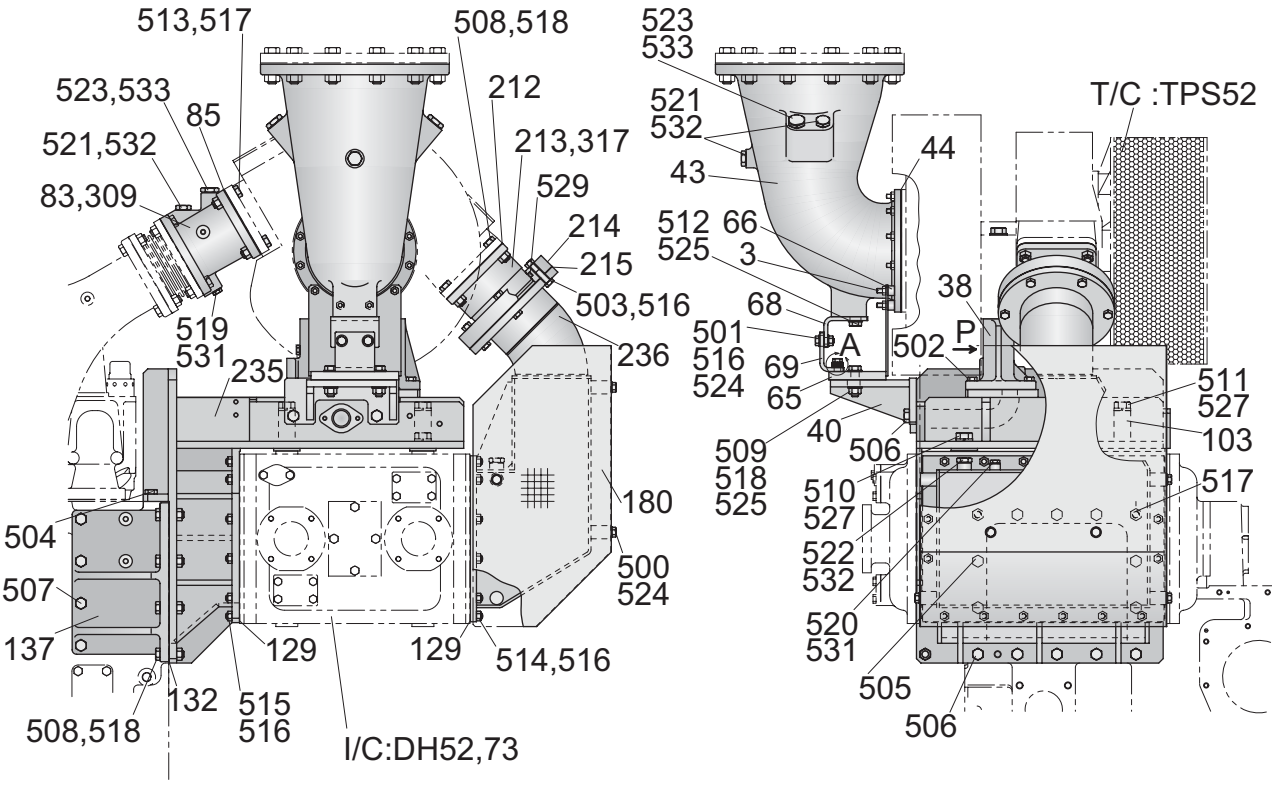
過給機(前端過給:MET18SRC),空気冷却器取付-6DK
TURBOCHARGER (FRONT T/C:MET18SRC) & INTERCOOLER FITTING-6DK

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
615	X570002000ZZ	ロッカクプラグ	HEX.PLUG	1
616	X570004000DZ	ロッカクプラグ	HEX.PLUG	4
617	X570004000ZZ	ロッカクプラグ	HEX.PLUG	1
618	X570006000DZ	ロッカクプラグ	HEX.PLUG	2
619	X570010000DZ	ロッカクプラグ	HEX.PLUG	1
620	Z212010030ZZ	アナツギボルト	HEX.SOCET BOUTPLUG	12
621	Z212012045ZZ	アナツギボルト	HEX.SOCET BOUTPLUG	1
622	Z300012000ZZ	ヒラザガネ	FLAT WASHER	14
623	Z560103635DZ	Oリング	O-RING	2
624	Z560106057ZZ	Oリング	O-RING	1
625	Z560111057DZ	Oリング	O-RING	2
626	Z565001300ZZ	マルパツキン	GASKET	1
627	Z565002100ZZ	マルパツキン	GASKET	5
628	Z565002700ZZ	マルパツキン	GASKET	2
629	Z565003400ZZ	マルパツキン	GASKET	1
C	**E20245**	タ-ボチャ-ジャ(仕様により異なる)	**TURBOCHARGER**(Depend on spec.)	**1**

過給機(前端過給:TPS52),空気冷却器取付
TURBOCHARGER (FRONT T/C :TPS52) & INTERCOOLER FITTING





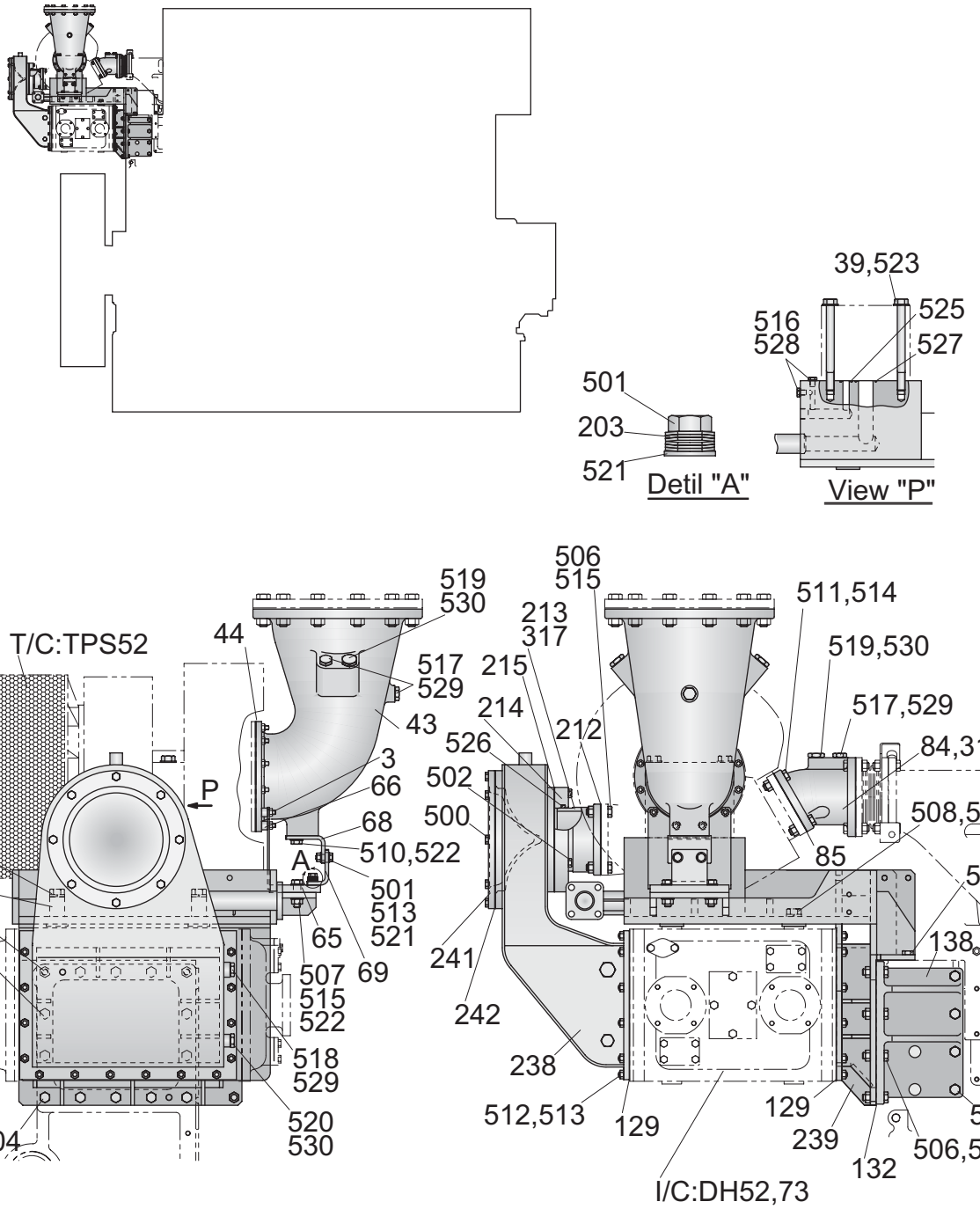


番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
3	E202350030	スタッド	STUD	4
38	E202380450	T/C ダイ	T/C MOUNT : TPS52	1
39	E202380490	ボルト	BOLT	2
40	E202350400	ブラッケト、T/Cデグチカン	BRACKET : T/C OUTLET DUCT	1
43	E262380440	ダクト、T/Cデグチ:TPS52	DUCT : T/C OUTLET TPS52	1
44	E262380510	ガスケット :T/Cデグチ	GASKET : T/C OUTLETT	1
65	E202350650	デグチカンブラケット :TPS52-FT	BRACKET : OUTLET DUCT TPS52-FT	1
66	E202350660	デスタンス :デグチ TPS52	DISTANCE : OUTLET DUCT TPS52	4
68	E202350680	ブラケット :デグチカン 52-ウエ	BRACKET : OUTLET DUCT 52-UPPER	1
69	E202350690	ブラケット :デグチカン 52-シタ	BRACKET : OUTLET DUCT 52-UNDER	1
83	E202151400	T/C イリグチカン TPS52D-FT	DUCT : T/C INLET TPS52D-FT	1
85	E262180290	ガスケット T/C	GASKET : T/C	1
103	E202650030	デスタンス	DISTANCE	3
129	E202650290	ガスケット : I/C : DK44 and 55	GASKET : I/C :DK44 and 55	2
132	E200250320	I/C キュウキカンフタガスケット-2	GASKET-2 : I/C INTAKE DUCT	1
137	E200250370	I/C ブラケット-2(FT)	BRACKET-2(FT) : I/C	1
180	E202650800	カバー : I/C : RH183-FT	COVER : I/C : RH183-FT	1
203	E202651030	サラバネ	CONED DISC SPRING	12
212	E262380500	ガスケット T/Cブロワデグ	GASKET : T/C.BLOWER OUTLET	1
213	E262380460	ダクト、I/C イリグチ TPS52	DUCT : I/C INLET TPS52	1
214	E282670610	フランジ、I/C イリグチカン-91S	FLANGE : I/C INLET DUCT-91S	1
215	E262380140	フランジパッキン	GASKET : FLANGE I/C INLET DUCT	1
235	E202651350	ブラケット,I/C ,TPS-DH73	BRACKET : I/C,TPS-DH73	1
236	E202651360	I/C イリグチカン DH73-TPS	DUCT : I/C INLET DH-TPS	1
309	E202363090	ラギング : T/C IN : TPS52-F	LAGGING : T/C INLET : TPS52-F	1
317	E202363170	ラギング : T/C OUT : TPS52	LAGGING : T/C OUTLET : TPS52	1
500	X200012016ZZ	ボルト	BOLT	7
501	X200012035ZZ	ボルト	BOLT	4
502	X200012040ZZ	ボルト	BOLT	6
503	X200012065ZZ	ボルト	BOLT	6
504	X200016030ZZ	ボルト	BOLT	4

過給機(前端過給:TPS52),空気冷却器取付
TURBOCHARGER (FRONT T/C :TPS52) & INTERCOOLER FITTING

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
505	X200016035DZ	ボルト	BOLT	7
506	X200016035ZZ	ボルト	BOLT	7
507	X200016040ZZ	ボルト	BOLT	4
508	X200016055ZZ	ボルト	BOLT	8
509	X200016060ZZ	ボルト	BOLT	2
510	X200022050ZZ	ボルト	BOLT	1
511	X200022120ZZ	ボルト	BOLT	3
512	X205016035ZZ	HTボルト	HT BOLT	2
513	X205016060ZZ	HTボルト	HT BOLT	4
514	X210012046ZZ	スタッド	STUD	20
515	X210012050ZZ	スタッド	STUD	20
516	X220012000ZZ	ナット	NUT	48
517	X220016000DZ	ナット	NUT	6
518	X220016000ZZ	ナット	NUT	10
519	X570002000DZ	ロッカクプラグ	HEX.PLUG	1
520	X570002000ZZ	ロッカクプラグ	HEX.PLUG	2
521	X570004000DZ	ロッカクプラグ	HEX.PLUG	4
522	X570004000ZZ	ロッカクプラグ	HEX.PLUG	1
523	X570006000DZ	ロッカクプラグ	HEX.PLUG	3
524	Z300012000ZZ	ヒラザガネ	FLAT WASHER	13
525	Z300016000ZZ	ヒラザガネ	FLAT WASHER	6
526	Z300020000ZZ	ヒラザガネ	FLAT WASHER	2
527	Z310022000ZZ	バネザガネ	SPRING WASHER	4
528	Z560102635DZ	Oリング	O-RING	1
529	Z560116084DZ	Oリング	O-RING	1
530	Z560205031DZ	Oリング	O-RING	2
531	Z565001300ZZ	マルパツキン	GASKET	3
532	Z565002100ZZ	マルパツキン	GASKET	5
533	Z565002700ZZ	マルパツキン	GASKET	3
C	**E20245**	タ-ボチャ-ジャ(仕様により異なる)	**TURBOCHARGER**(DEPEND ON SPEC.)	**1**

過給機(後端過給:TPS52),空気冷却器取付
TURBOCHARGER (REAR T/C :TPS52) & INTERCOOLER FITTING

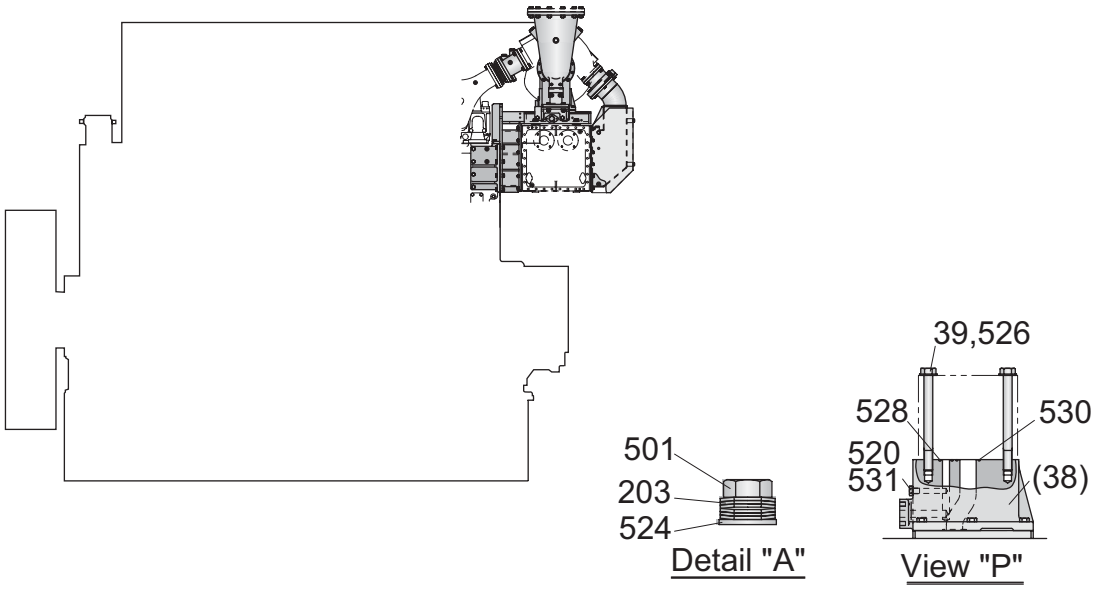


番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
3	E202350030	スタッド	STUD	4
39	E202380490	ボルト	BOLT	2
43	E262380440	ダクト、T/Cデグチ:TPS52	DUCT : T/C OUTLET TPS52	1
44	E262380510	ガスケット :T/Cデグチ	GASKET : T/C OUTLETT	1
65	E202350650	デグチカンブラケット :TPS52-FT	BRACKET : OUTLET DUCT TPS52-FT	1
66	E202350660	デスタンス :デグチ TPS52	DISTANCE : OUTLET DUCT TPS52	4
68	E202350680	ブラケット :デグチカン 52-ウエ	BRACKET : OUTLET DUCT 52-UPPER	1
69	E202350690	ブラケット :デグチカン 52-シタ	BRACKET : OUTLET DUCT 52-UNDER	1
84	E202150080	T/C イリグチカン TPS52-RT	DUCT : T/C INLET TPS52-RT	1
85	E262180290	ガスケット T/C	GASKET : T/C	1
102	E202650020	デスタンス	DISTANCE	3
129	E202650290	ガスケット : I/C : DK44 and 55	GASKET : I/C :DK44 and 55	2
132	E200250320	I/C キュウキカンフタガスケット-2	GASKET-2 : I/C INTAKE DUCT	1
138	E202650380	I/C ブラケット-2(RT)	BRACKET-2(RT) : I/C	1
203	E202651030	サラバネ	CONED DISC SPRING	12
212	E262380500	ガスケット T/Cブロワデグ	GASKET : T/C.BLOWER OUTLET	1
213	E262380460	ダクト、I/C イリグチ TPS52	DUCT : I/C INLET TPS52	1
214	E282670610	フランジ、I/C イリグチカン-91S	FLANGE : I/C INLET DUCT-91S	1
215	E262380140	フランジパッキン	GASKET : FLANG I/C INLET DUCT	1
238	E202651380	ダクト : I/C イリグチ TPS52	DUCT : I/C INLET TPS52	1
239	E202651390	ブラケット : I/C TPS-DH73R	BRACKET : I/C TPS-DH73R	1
241	E202670130	I/C イリグチカンガイド	GUIDE : I/C INLET DUCT	1
242	E202670230	ガスケット	GASKET : I/C INLET DUCT	1
310	E202363100	ラギング : T/C IN : TPS52-R	LAGGING : T/C INLET : TPS52-F	1
317	E202363170	ラギング : T/C OUT : TPS52	LAGGING : T/C OUTLET : TPS52	1
500	X200012030ZZ	ボルト	BOLT	8
501	X200012035ZZ	ボルト	BOLT	4
502	X200012050ZZ	ボルト	BOLT	6
503	X200016030DZ	ボルト	BOLT	7
504	X200016030ZZ	ボルト	BOLT	9
505	X200016040ZZ	ボルト	BOLT	4
506	X200016055ZZ	ボルト	BOLT	8
507	X200016060ZZ	ボルト	BOLT	2
508	X200022055ZZ	ボルト	BOLT	1
509	X200022105ZZ	ボルト	BOLT	3

過給機(後端過給:TPS52),空気冷却器取付
TURBOCHARGER (REAR T/C :TPS52) & INTERCOOLER FITTING

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
510	X205016035ZZ	HTボルト	HT BOLT	2
511	X205016060ZZ	HTボルト	HT BOLT	4
512	X210012046ZZ	スタッド	STUD	40
513	X220012000ZZ	ナット	NUT	42
514	X220016000DZ	ナット	NUT	6
515	X220016000ZZ	ナット	NUT	10
516	X570002000ZZ	ロッカクプラグ	HEX.PLUG	2
517	X570004000DZ	ロッカクプラグ	HEX.PLUG	4
518	X570004000ZZ	ロッカクプラグ	HEX.PLUG	1
519	X570006000DZ	ロッカクプラグ	HEX.PLUG	3
520	X570006000ZZ	ロッカクプラグ	HEX.PLUG	1
521	Z300012000ZZ	ヒラザガネ	FLAT WASHER	6
522	Z300016000ZZ	ヒラザガネ	FLAT WASHER	6
523	Z300020000ZZ	ヒラザガネ	FLAT WASHER	2
524	Z310022000ZZ	バネザガネ	SPRING WASHER	4
525	Z560102635DZ	Oリング	O-RING	1
526	Z560116084DZ	Oリング	O-RING	1
527	Z560205031DZ	Oリング	O-RING	1
528	Z565001300ZZ	マルパツキン	GASKET	2
529	Z565002100ZZ	マルパツキン	GASKET	5
530	Z565002700ZZ	マルパツキン	GASKET	4
C	**E20245**	タ-ボチャ-ジャ(仕様により異なる)	**TURBOCHARGER**(DEPEND ON SPEC.)	**1**

過給機(前端過給:TPS52),空気冷却器取付(DH95)-8DK
TURBOCHARGER (FRONT T/C :TPS52) & INTERCOOLER(DH95) FITTING-8DK

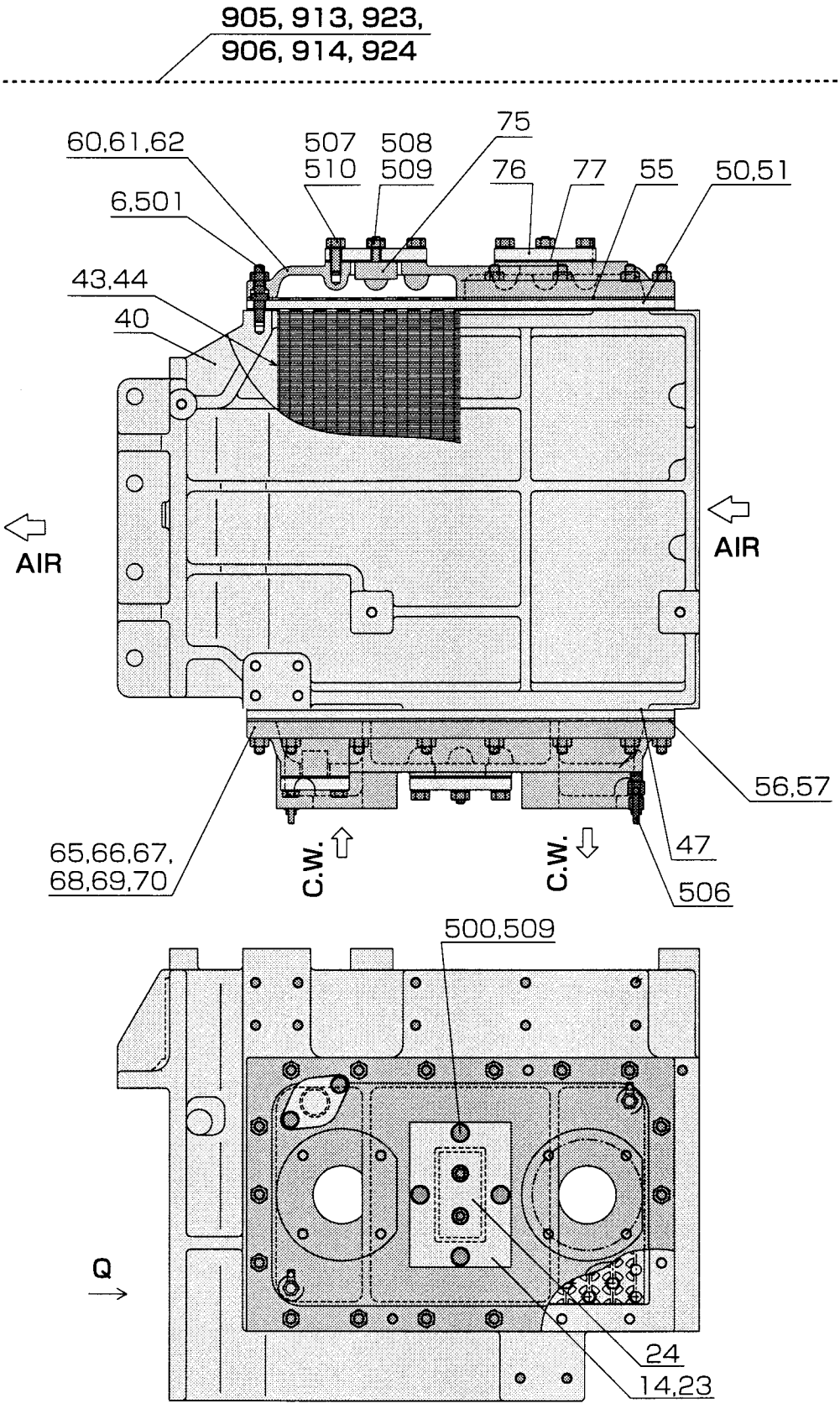


番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
3	E202350030	スタッド	STUD	4
38	E202380450	T/C ダイ	T/C MOUNT : TPS52	1
39	E202380490	ボルト	BOLT	2
40	E202350400	ブラッケト、T/Cデグチカン	BRACKET : T/C OUTLET DUCT	1
43	E262380440	ダクト、T/Cデグチ:TPS52	DUCT : T/C OUTLET TPS52	1
44	E262380510	ガスケット :T/Cデグチ	GASKET : T/C OUTLETT	1
65	E202350650	デグチカンブラケット :TPS52-FT	BRACKET : OUTLET DUCT TPS52-FT	1
66	E202350660	デスタンス :デグチ TPS52	DISTANCE : OUTLET DUCT TPS52	4
68	E202350680	ブラケット :デグチカン 52-ウエ	BRACKET : OUTLET DUCT 52-UPPER	1
69	E202350690	ブラケット :デグチカン 52-シタ	BRACKET : OUTLET DUCT 52-UNDER	1
83	E202151400	T/C イリグチカン TPS52D-FT	DUCT : T/C INLET TPS52D-FT	1
85	E262180290	ガスケット T/C	GASKET : T/C	1
130	E202650300	ガスケット : I/C : DD57	GASKET : I/C :DD57	2
132	E200250320	I/C キュウキカンフタガスケット-2	GASKET-2 : I/C INTAKE DUCT	1
137	E200250370	I/C ブラケット-2(FT)	BRACKET-2(FT) : I/C	1
180	E202650800	カバー : I/C : RH183-FT	COVER : I/C : RH183-FT	1
203	E202651030	サラバネ	CONED DISC SPRING	12
210	E202651100	ブラケット、I/C,TPS52D	BRACKET,I/C,TPS52D	1
211	E202651110	I/C イリグチカン, DH95-TPS	DUCT : I/C INLET DH95-TPS	1
212	E262380500	ガスケット T/Cブロワデグ	GASKET : T/C.BLOWER OUTLET	1
213	E262380460	ダクト、I/C イリグチ TPS52	DUCT : I/C INLET TPS52	1
214	E282670610	フランジ、I/C イリグチカン-91S	FLANG : I/C INLET DUCT-91S	1
215	E262380140	フランジパッキン	GASKET : FLANG I/C INLET DUCT	1
309	E202363090	ラギング : T/C IN : TPS52-F	LAGGING : T/C INLET : TPS52-F	1
317	E202363170	ラギング : T/C OUT : TPS52	LAGGING : T/C OUTLET : TPS52	1
500	X200012016ZZ	ボルト	BOLT	7
501	X200012035ZZ	ボルト	BOLT	4
502	X200012040ZZ	ボルト	BOLT	6
503	X200012065ZZ	ボルト	BOLT	6
504	X200016030ZZ	ボルト	BOLT	4
505	X200016035DZ	ボルト	BOLT	7
506	X200016035ZZ	ボルト	BOLT	7
507	X200016040ZZ	ボルト	BOLT	4
508	X200016055ZZ	ボルト	BOLT	8
509	X200016060ZZ	ボルト	BOLT	2

過給機(前端過給:TPS52),空気冷却器取付(DH95)-8DK
TURBOCHARGER (FRONT T/C :TPS52) & INTERCOOLER(DH95) FITTING-8DK

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
510	X200022045ZZ	ボルト	BOLT	4
512	X205016035ZZ	HTボルト	HT BOLT	2
513	X205016060ZZ	HTボルト	HT BOLT	4
514	X210012046ZZ	スタッド	STUD	24
515	X210012050ZZ	スタッド	STUD	24
516	X220012000ZZ	ナット	NUT	56
517	X220016000DZ	ナット	NUT	6
518	X220016000ZZ	ナット	NUT	10
519	X570002000DZ	ロッカクプラグ	HEX.PLUG	1
520	X570002000ZZ	ロッカクプラグ	HEX.PLUG	2
521	X570004000DZ	ロッカクプラグ	HEX.PLUG	4
522	X570004000ZZ	ロッカクプラグ	HEX.PLUG	1
523	X570006000DZ	ロッカクプラグ	HEX.PLUG	3
524	Z300012000ZZ	ヒラザガネ	FLAT WASHER	13
525	Z300016000ZZ	ヒラザガネ	FLAT WASHER	6
526	Z300020000ZZ	ヒラザガネ	FLAT WASHER	2
527	Z310022000ZZ	バネザガネ	SPRING WASHER	4
528	Z560102635DZ	Oリング	O-RING	1
529	Z560116084DZ	Oリング	O-RING	1
530	Z560205031DZ	Oリング	O-RING	2
531	Z565001300ZZ	マルパツキン	GASKET	3
532	Z565002100ZZ	マルパツキン	GASKET	5
533	Z565002700ZZ	マルパツキン	GASKET	3
C	**E20245**	タ-ボチャ-ジャ(仕様により異なる)	**TURBOCHARGER**(DEPEND ON SPEC.)	**1**

空気冷却器 (DH29, DH39) - 海水
INTERCOOLER (DH29, DH39) - SEA WATER



空気冷却器 (DH29, DH39) - 海水
INTERCOOLER (DH29, DH39) - SEA WATER

①…タールエポキシコーティング Tar epoxy coating　②…ネオプレンコーティング Neoprene coating　③…ネオプレンライニング Neoprene lining

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity DH29 ①	DH29 ②	DH29 ③	DH39 ①	DH39 ②	DH39 ③
905	E202859050	インタークーラ DH29-TC	INTER COOLER, DH29-TC	1					
906	E202859060	インタークーラ DH39-TC	INTER COOLER, DH39-TC				1		
913	E202859130	インタークーラ DH29-NC	INTER COOLER, DH29-NC		1				
914	E202859140	インタークーラ DH39-NC	INTER COOLER, DH39-NC					1	
923	E202859230	インタークーラ DH29-NL	INTER COOLER, DH29-NL			1			
924	E202859240	インタークーラ DH39-NL	INTER COOLER, DH39-NL						1
6	C048440370	スタッドボルト	STUD BOLT	36	36	36	36	36	36
14	C048471000	パッキン (5)	GASKET (5)	2	2	2	2	2	2
23	C048470720	ボウショクアエンヘッド (B)	HEAD, ZINC PROTECTOR (B)	2	2	2	2	2	2
24	C048420320	ボウショクアエン (B)	ZINC PROTECTOR (B)	2	2	2	2	2	2
40	E202850400	I/C ケーシング DH29, 39	I/C FRAME DH29, 39	1	1	1	1	1	1
43	C050770430	フィンチューブ (DH29-27)	FIN TUBE (DH29-27)	1	1	1			
44	C050770440	フィンチューブ (DH39-30)	FIN TUBE (DH39-30)				1	1	1
47	C048470790	パッキン (1)	GASKET (1)	2	2	2	2	2	2
50	E202850500	チューブプレート DH29	TUBE PLATE OH29	2	2	2			
51	E202850520	チューブプレート	TUBE PLATE				2	2	2
55	C048470870	パッキン (2)	GASKET (2)	1	1	1	1	1	1
56	E202850560	パッキン DH29	GASKET DH29	1	1	1			
57	E202850540	パッキン (2)	GASKET (2)				1	1	1
60	C048410040	サイドカバー (A) DK30-TC	SIDE COVER (A) DK30-TC	1			1		
61	C048411690	サイドカバー (A) DK30-NC	SIDE COVER (A) DK30-NC		1			1	
62	C048411710	サイドカバー (A) DK30-NL	SIDE COVER (A) DK30-NL			1			1
65	E202850650	サイドカバー (B) DH29-TC	SIDE COVER (B) DH29-TC	1					
66	E202850660	サイドカバー (B) DH29-NC	SIDE COVER (B) DH29-NC		1				
67	E202850670	サイドカバー (B) DH29-NL	SIDE COVER (B) DH29-NL			1			
68	E202850680	サイドカバー (B) DH39-TC	SIDE COVER (B) DH39-TC				1		
69	E202850690	サイドカバー (B) DH39-NC	SIDE COVER (B) DH39-NC					1	
70	E202850700	サイドカバー (B) DH39-NL	SIDE COVER (B) DK39-NL						1
75	C048420330	ボウショクアエン (A)	ZINC PROTECTOR (A)	3	3	3	3	3	3
76	C048470730	ボウショクアエンヘッド (A)	HEAD, ZINC PROTECTOR (A)	3	3	3	3	3	3
77	C048471010	パッキン (4)	GASKET (4)	3	3	3	3	3	3
500	X200010025ZZ	ボルト	BOLT	4	4	4	4	4	4
501	X227012000ZZ	Uナット	U-NUT	36	36	36	36	36	36
506	Z580202000ZZ	ドレンコック (2)	DRAIN COCK (2)	2	2	2	2	2	2
507	X200010030ZZ	ボルト	BOLT	12	12	12	12	12	12
508	X220010000ZZ	ナット	NUT	6	6	6	6	6	6
509	Z310010000ZZ	バネザガネ	SPRING WASHER	10	10	10	10	10	10
510	Z310012000ZZ	バネザガネ	SPRING WASHER	12	12	12	12	12	12
511	Z571502000JZ	テーパプラグ (5)	TAPER PULG	1	1	1	1	1	1

CHAPTER 3

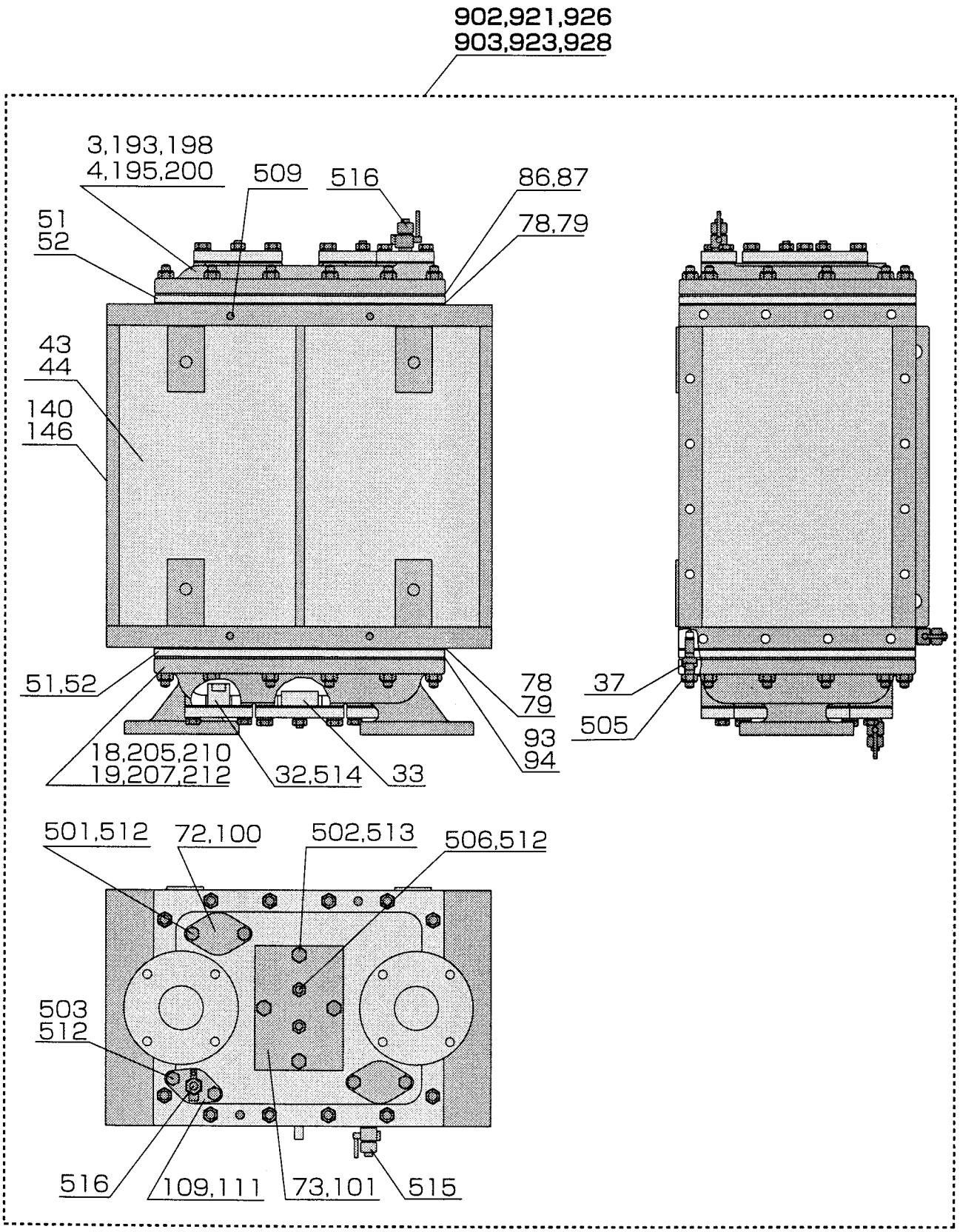
ITEM 32.1 | 6·8DK-20

空気冷却器 (DH29, DH39) - 海水
INTERCOOLER (DH29, DH39) - SEA WATER

①…タールエポキシコーティング Tar epoxy coating　②…ネオプレンコーティング Neoprene coating　③…ネオプレンライニング Neoprene lining

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity DH29 ①	DH29 ②	DH29 ③	DH39 ①	DH39 ②	DH39 ③
509	Z571501000DZ	テーパプラグ	TAPER PLUG	7	7	7	7	7	7
512	Z310010000ZZ	バネザガネ	SPRING WASHER	14	14	14	14	14	14
513	Z310012000ZZ	バネザガネ	SPRING WASHER	12	12	12	12	12	12
514	Z310008000ZZ	バネザガネ	SPRING WASHER	2	2	2	2	2	2
515	Z580201000ZZ	ドレンコツク	DRAIN COCK	1	1	1	1	1	1
516	Z580202000ZZ	ドレンコツク	DRAIN COCK	2	2	2	2	2	2

空気冷却器 (DH29, DH39) - 海水
INTERCOOLER (DH29, DH39) - SEA WATER



空気冷却器 (DH29, DH39) - 海水
INTERCOOLER (DH29, DH39) - SEA WATER

①…タールエポキシコーティング Tar epoxy coating　②…ネオプレンコーティング Neoprene coating　③…ネオプレンライニング Neoprene lining

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity DH29 ①	DH29 ②	DH29 ③	DH39 ①	DH39 ②	DH39 ③
902	C050790020	インタクーラ (DH29-27)	INTER COOLER (DH29-27)	1					
903	C050790030	インタクーラ (DH39-30)	INTER COOLER (DH39-30)				1		
921	C050790210	インタクーラ (DH29-27)-NC	INTER COOLER (DH29-27)-NC		1				
923	C050790230	インタクーラ (DH39-30)-NC	INTER COOLER (DH39-30)-NC					1	
926	C050790260	インタクーラ (DH29-27)-NL	INTER COOLER (DH29-27)-NL			1			
928	C050790280	インタクーラ (DH39-30)-NL	INTER COOLER (DH39-30)-NL						1
3	C048410030	サイドカバー (A) DK27-TC	SIDE COVER (A) DK27-TC	1					
4	C048410040	サイドカバー (A) DK30-TC	SIDE COVER (A) DK30-TC				1		
18	C048410180	サイドカバー (B) DK27-TC	SIDE COVER (B) DK27-TC	1					
19	C048410190	サイドカバー (B) DK30-TC	SIDE COVER (B) DK30-TC				1		
32	C048420320	ボウシヨクアエン (B)	ZINC PROTECTOR (B)	2	2	2	2	2	2
33	C048420330	ボウシヨクアエン (A)	ZINC PROTECTOR (A)	3	3	3	3	3	3
37	C048440370	スタツドボルト	STUD BOLT	36	36	36	36	36	36
43	C050770430	フインチユーブ (DH29-27)	FIN TUBE (DH29-27)	1	1	1			
44	C050770440	フインチューブ (DH39-30)	FIN TUBE (DH39-30)				1	1	1
51	C048470510	チユーブプレート	TUBE PLATE	2	2	2			
52	C048470520	チユーブプレート	TUBE PLATE				2	2	2
72	C048470720	ボウシヨクアエンヘツド (B)	HEAD (B), ZINC PROTECTOR	2	2	2	2	2	2
73	C048470730	ボウシヨクアエンヘツド (A)	HEAD (A), ZINC PROTECTOR	3	3	3	3	3	3
78	C048470780	パツキン (1)	GASKET (1)	2	2	2			
79	C048470790	パツキン (1)	GASKET (1)				2	2	2
86	C048470860	パツキン (2)	GASKET (2)	1	1	1			
87	C048470870	パツキン (2)	GASKET (2)				1	1	1
93	C048470930	パツキン (3)	GASKET (3)	1	1	1			
94	C048470940	パツキン (3)	GASKET (3)				1	1	1
100	C048471000	パツキン (5)	GASKET (5)	2	2	2	2	2	2
101	C048471010	パツキン (4)	GASKET (4)	3	3	3	3	3	3
109	C048471090	パツキン (8)	GASKET (8)	2	2	2	1	1	1
111	C048471110	ダエンフランジ (1)	OVAL FLANGE (1)	2	2	2	1	1	1
140	C050771400	ケーシング	FRAME	1	1	1			
146	C050771460	ケーシング	FRAME				1	1	1
193	C050711930	サイドカバー (A) DK27-NC	SIDE COVER (A) DK27-NC		1				
195	C048411690	サイドカバー (A) DK30-NC	SIDE COVER (A) DK30-NC					1	
198	C050711980	サイドカバー (A) DK27-NL	SIDE COVER (A) DK27-NL			1			
200	C048411710	サイドカバー (A) DK30-NL	SIDE COVER (A) DK30-NL						1
205	C050712050	サイドカバー (B) DK27-NC	SIDE COVER (B) DK27-NC		1				
207	C048411760	サイドカバー (B) DK30-NC	SIDE COVER (B) DK30-NC					1	
210	C050712100	サイドカバー (B) DK27-NL	SIDE COVER (B) DK27-NL			1			
212	C048411780	サイドカバー (B) DK30-NL	SIDE COVER (B) DK30-NL						1
501	X200010025ZZ	ボルト	BOLT	4	4	4	4	4	4
502	X200012030ZZ	ボルト	BOLT	12	12	12	12	12	12
503	X200010025ZZ	ボルト	BOLT	4	4	4	2	2	2
505	X227012000ZZ	Uナツト	U-NUT	36	36	36	36	36	36
506	X220010000ZZ	ナツト	NUT	6	6	6	6	6	6

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ITEM 32.2 | 6·8DK-20

空気冷却器 (DH29, DH39) - 海水
INTERCOOLER (DH29, DH39) - SEA WATER

①…タールエポキシコーティング Tar epoxy coating　②…ネオプレンコーティング Neoprene coating　③…ネオプレンライニング Neoprene lining

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity DH29 ①	DH29 ②	DH29 ③	DH39 ①	DH39 ②	DH39 ③
509	Z571501000DZ	テーパプラグ	TAPER PLUG	7	7	7	7	7	7
512	Z310010000ZZ	バネザガネ	SPRING WASHER	14	14	14	14	14	14
513	Z310012000ZZ	バネザガネ	SPRING WASHER	12	12	12	12	12	12
514	Z310008000ZZ	バネザガネ	SPRING WASHER	2	2	2	2	2	2
515	Z580201000ZZ	ドレンコツク	DRAIN COCK	1	1	1	1	1	1
516	Z580202000ZZ	ドレンコツク	DRAIN COCK	2	2	2	2	2	2

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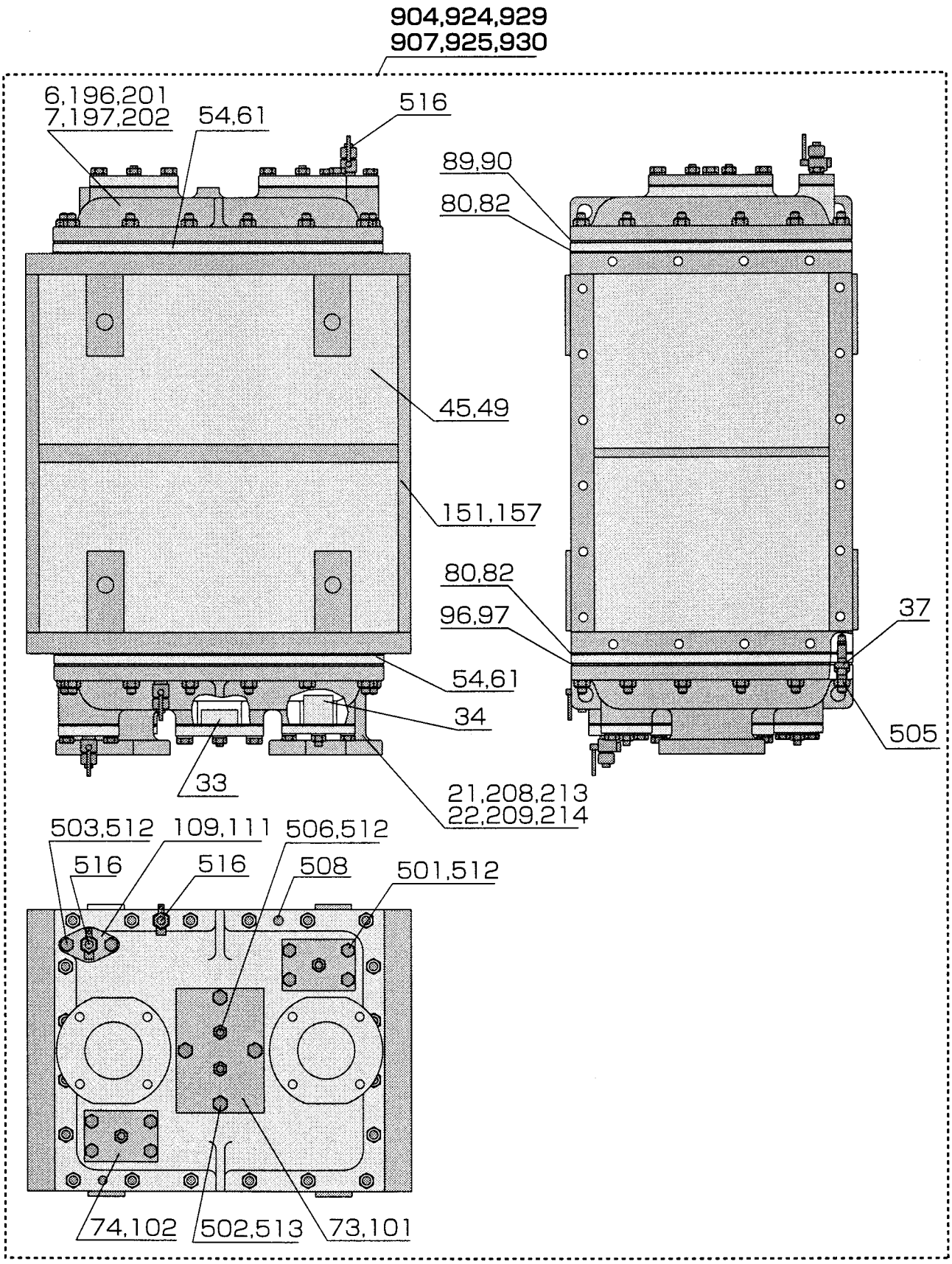
空気冷却器 (DH52, DH73) - 海水
INTERCOOLER (DH52, DH73) - SEA WATER



空気冷却器 (DH52, DH73) - 海水
INTERCOOLER (DH52, DH73) - SEA WATER

①…タールエポキシコーティング Tar epoxy coating ②…ネオプレンコーティング Neoprene coating ③…ネオプレンライニング Neoprene lining

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity DH52 ①	DH52 ②	DH52 ③	DH73 ①	DH73 ②	DH73 ③
904	C050790040	インタクーラ (DH52-44)	INTER COOLER (DH52-44)	1					
907	C050790070	インタクーラ (DH73-55)	INTER COOLER (DH52-44)				1		
924	C050790240	インタクーラ (DH52-44)-NC	INTER COOLER (DH52-44)-NC		1				
925	C050790250	インタクーラ (DH73-55)-NC	INTER COOLER (DH52-44)-NC					1	
929	C050790290	インタクーラ (DH52-44)-NL	INTER COOLER (DH52-44)-NL			1			
930	C050790300	インタクーラ (DH73-55)-NL	INTER COOLER (DH52-44)-NL						1
6	C048410060	サイドカバー (A) DK44-TC	SIDE COVER (A) DK44-TC	1					
7	C048410070	サイドカバー (A) DK55-TC	SIDE COVER (A) DK55-TC				1		
21	C048410210	サイドカバー (B) DK44-TC	SIDE COVER (B) DK44-TC	1					
22	C048410220	サイドカバー (B) DK55-TC	SIDE COVER (B) DK55-TC				1		
33	C048420330	ボウシヨクアエン (A)	ZINC PROTECTOR (A)	3	3	3	3	3	3
34	C048420340	ボウシヨクアエン (B)	ZINC PROTECTOR (B)	2	2	2	2	2	2
37	C048440370	スタッドボルト	STUD BOLT	40	40	40	44	44	44
45	C050770450	フインチューブ (DH52-44)	FIN TUBE (DH52-44)	1	1	1			
49	C050770490	フインチューブ (DH73-55)	FIN TUBE (DH73-55)				1	1	1
54	C048470540	チューブプレート	TUBE PLATE				2	2	2
61	C048470610	チューブプレート	TUBE PLATE	2	2	2			
73	C048470730	ボウシヨクアエンヘッド (A)	HEAD (A), ZINC PROTECTOR	3	3	3	3	3	3
74	C048470740	ボウシヨクアエンヘッド (B)	HEAD (B), ZINC PROTECTOR	2	2	2	2	2	2
80	C048470800	パッキン (1)	GASKET (1)	2	2	2			
82	C048470820	パッキン (1)	GASKET (1)				2	2	2
89	C048470890	パッキン (2)	GASKET (2)	1	1	1			
90	C048470900	パッキン (2)	GASKET (2)				1	1	1
96	C048470960	パッキン (3)	GASKET (3)	1	1	1			
97	C048470970	パッキン (3)	GASKET (3)				1	1	1
101	C048471010	パッキン (4)	GASKET (4)	3	3	3	3	3	3
102	C048471020	パッキン (5)	GASKET (5)	2	2	2	2	2	2
109	C048471090	パッキン (8)	GASKET (8)	2	2	2	2	2	2
111	C048471110	ダエンフランジ (1)	OVAL FLANGE (1)	2	2	2	2	2	2
151	C048471510	ケーシング	FRAME	1	1	1			
157	C048471570	ケーシング	FRAME				1	1	1
196	C050711960	サイドカバー (A) DK44-NC	SIDE COVER (A) DK44-NC		1				
197	C050711970	サイドカバー (A) DK55-NC	SIDE COVER (A) DK55-NC					1	
201	C050712010	サイドカバー (A) DK44-NL	SIDE COVER (A) DK44-NL			1			
202	C050712020	サイドカバー (A) DK55-NL	SIDE COVER (A) DK55-NL						1
208	C050712080	サイドカバー (B) DK44-NC	SIDE COVER (B) DK44-NC		1				
209	C050712090	サイドカバー (B) DK55-NC	SIDE COVER (B) DK55-NC					1	
213	C050712130	サイドカバー (B) DK44-NL	SIDE COVER (B) DK44-NL			1			
214	C050712140	サイドカバー (B) DK55-NL	SIDE COVER (B) DK55-NL						1

CHAPTER 3

ITEM 32.3 | 6·8DK-20

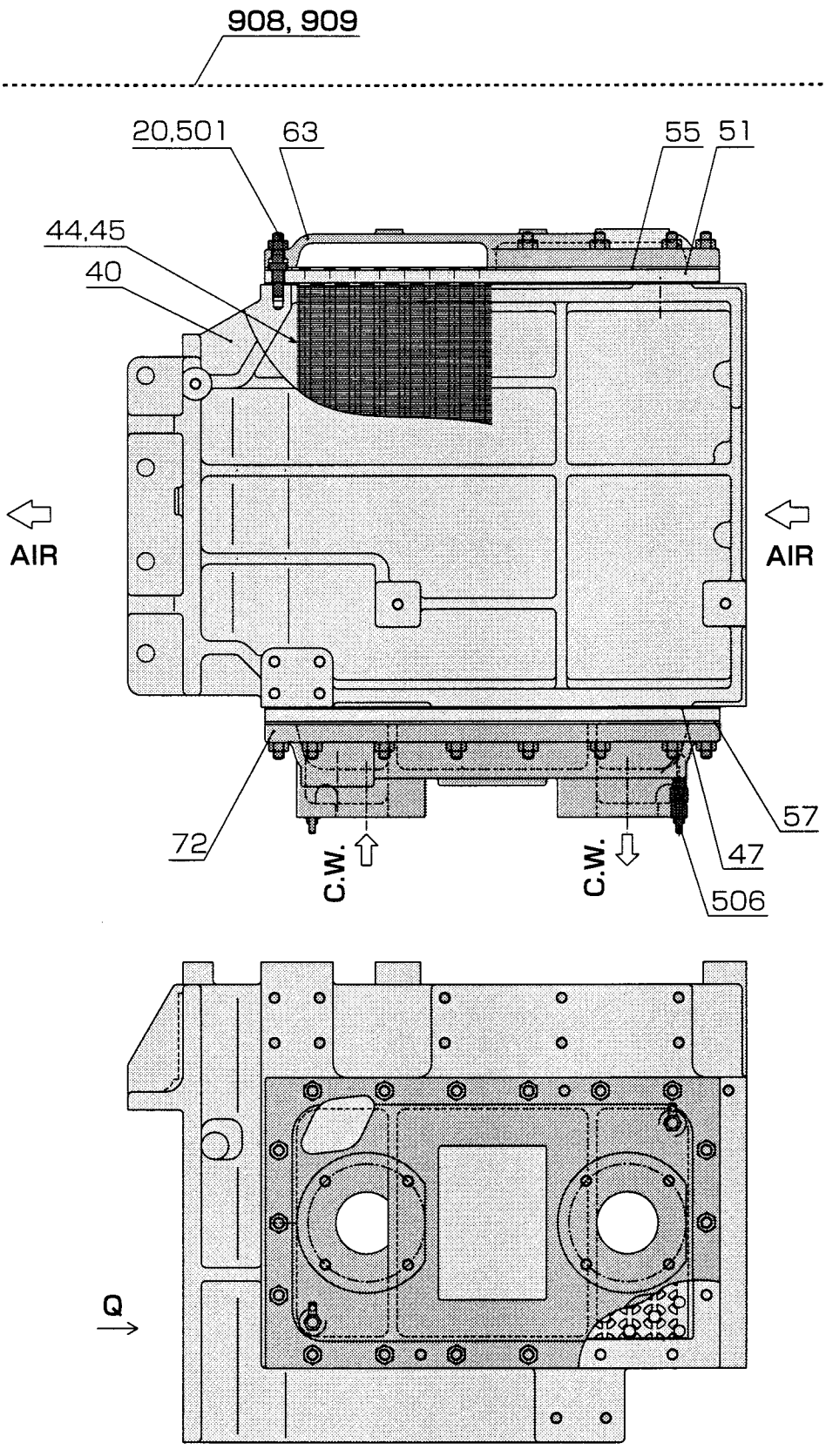
空気冷却器 (DH52, DH73) - 海水
INTERCOOLER (DH52, DH73) - SEA WATER

①…タールエポキシコーティング Tar epoxy coating　②…ネオプレンコーティング Neoprene coating　③…ネオプレンライニング Neoprene lining

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity DH52 ①	DH52 ②	DH52 ③	DH73 ①	DH73 ②	DH73 ③
501	X200010025ZZ	ボルト	BOLT	8	8	8	8	8	8
502	X200012030ZZ	ボルト	BOLT	12	12	12	12	12	12
503	X200010025ZZ	ボルト	BOLT	4	4	4	4	4	4
505	X227012000ZZ	Uナット	U-NUT	44	44	44	44	44	44
506	X220010000ZZ	ナット	NUT	8	8	8	8	8	8
508	Z571102000JZ	テーパプラグ	TAPER PLUG	1	1	1	1	1	1
512	Z310010000ZZ	バネザガネ	SPRING WASHER	20	20	20	20	20	20
513	Z310012000ZZ	バネザガネ	SPRING WASHER	12	12	12	12	12	12
516	Z580202000ZZ	ドレンコツク	DRAIN COCK	3	3	3	3	3	3

)

空気冷却器 (DH39HZ, DH48HZ) - 清水
INTERCOOLER (DH39HZ, DH48HZ) - FRESH WATER

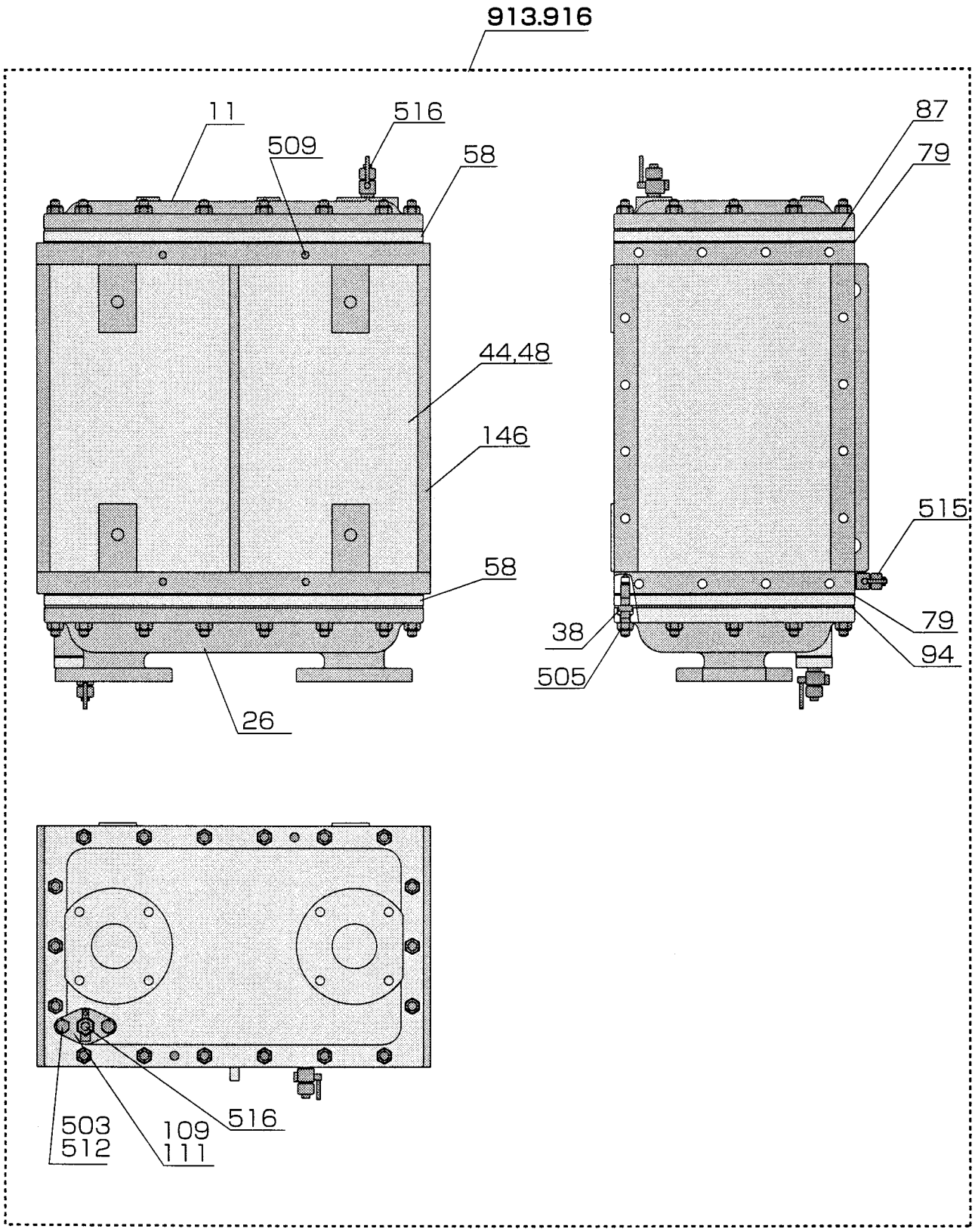


空気冷却器 (DH39HZ, DH48HZ) - 清水
INTERCOOLER (DH39HZ, DH48HZ) - FRESH WATER

①……DH39HZ ②……DH48HZ

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity ①	②
908	E202859080	インタークーラ DH39HZ-TC	INTER COOLER, DH39HZ-TC	1	
909	E202859090	インタークーラ DH48HZ-TC	INTER COOLER, DH48HZ-TC		1
20	C047900610	スタッドボルト	STUD BOLT	36	36
40	E202850400	I/C ケーシング DH29, 39	I/C FRAME DH29, 39	1	1
44	C050770440	フィンチューブ (DH39-30)	FIN TUBE (DH39-30)	1	
45	C050770480	フィンチューブ (DH48-30)	FIN TUBE (DH48-30)		1
47	C048470790	パッキン (1)	GASKET (1)	2	2
53	C048470058	チューブプレート	TUBE PLATE	2	2
55	C048470870	パッキン (2)	GASKET (2)	1	1
57	C048470940	パッキン (3)	GASKET (3)	1	1
63	C048410110	サイドカバー (A)	SIDE COVER (A)	1	1
72	E202850720	サイドカバー (B) DK39HZ-TC	SIDE COVER (B) DK39HZ-TC	1	1
501	X227012000ZZ	Uナット	U-NUT	36	36
506	X580202000ZZ	ドレンコック (2)	DRAIN COCK (2)	2	2
511	Z571502000JZ	テーパプラグ	TAPER PULG	1	1

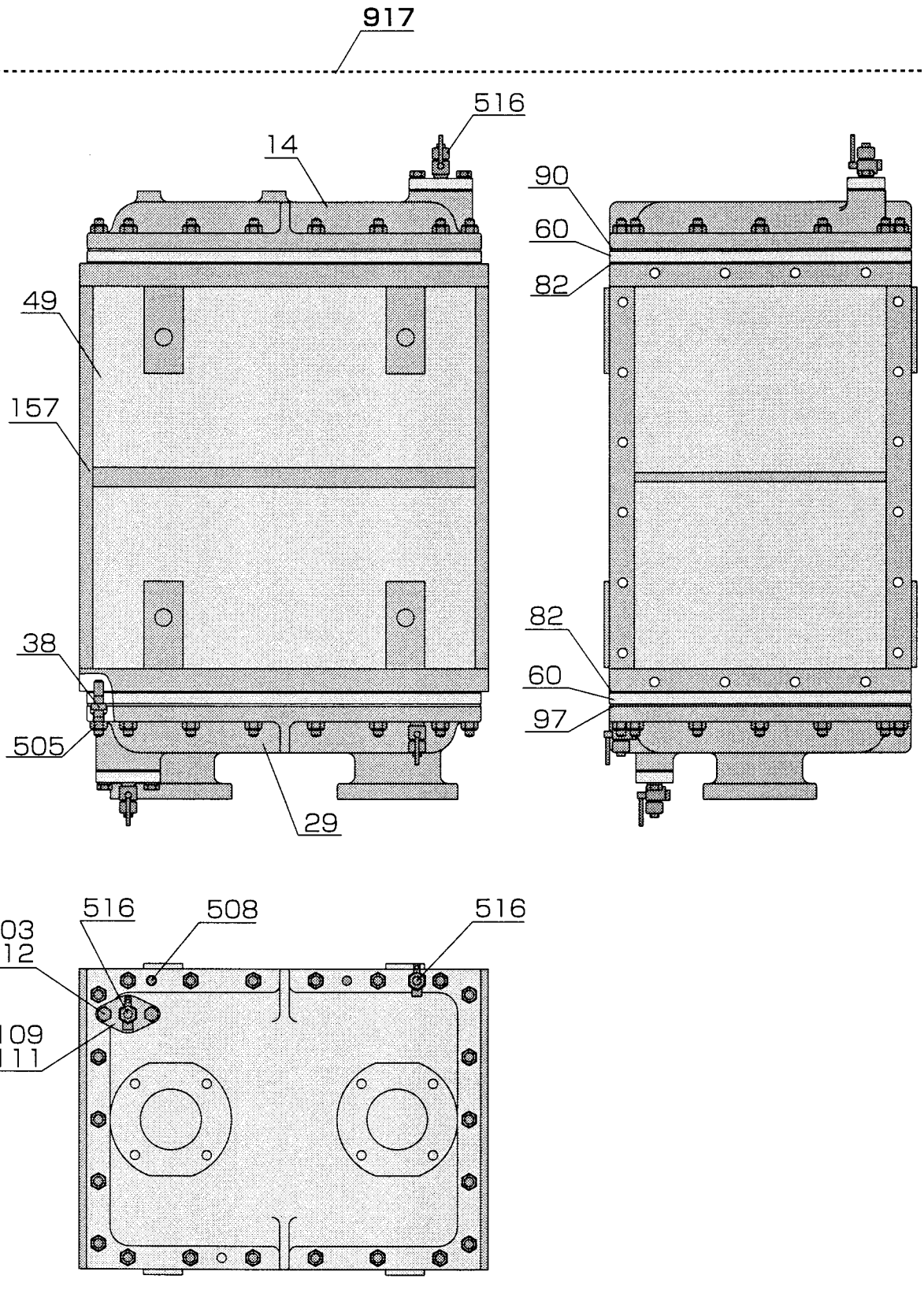
空気冷却器 (DH39HZ, DH48HZ) - 清水
INTERCOOLER (DH39HZ, DH48HZ) - FRESH WATER



①……DH39HZ ②……DH48HZ

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity ①	②
913	C050790130	インタクーラ (DH39HZ-30)	INTER COOLER (DH39HZ-30)	1	
916	C050790160	インタクーラ (DH48HZ-30)	INTER COOLER (DH48HZ-30)		1
11	C048410110	サイドカバー (A)	SIDE COVER (A)	1	1
26	C048410260	サイドカバー (B)	SIDE COVER (B)	1	1
38	C047900610	スタッドボルト	STUD BOLT	36	36
44	C050770440	フインチューブ (DH39-30)	FIN TUBE (DH39-30)	1	
48	C050770480	フインチューブ (DH48-30)	FIN TUBE (DH48-30)		1
58	C048470580	チューブプレート	TUBE PLATE	2	2
79	C048470790	パッキン (1)	GASKET (1)	2	2
87	C048470870	パッキン (2)	GASKET (2)	1	1
94	C048470940	パッキン (3)	GASKET (3)	1	1
109	C048471090	パッキン (8)	GASKET (8)	1	1
111	C048471110	ダエンフランジ (1)	OVAL FLANGE (1)	1	1
146	C050771460	ケーシング	FRAME	1	1
503	X200010025ZZ	ボルト	BOLT	2	2
505	X227012000ZZ	Uナット	U-NUT	36	36
509	Z571501000DZ	テーパプラグ	TAPER PLUG	7	7
512	Z310010000ZZ	バネザガネ	SPRING WASHER	2	2
515	Z580201000ZZ	ドレンコツク	DRAIN COCK	1	1
516	Z580202000ZZ	ドレンコツク	DRAIN COCK	2	2

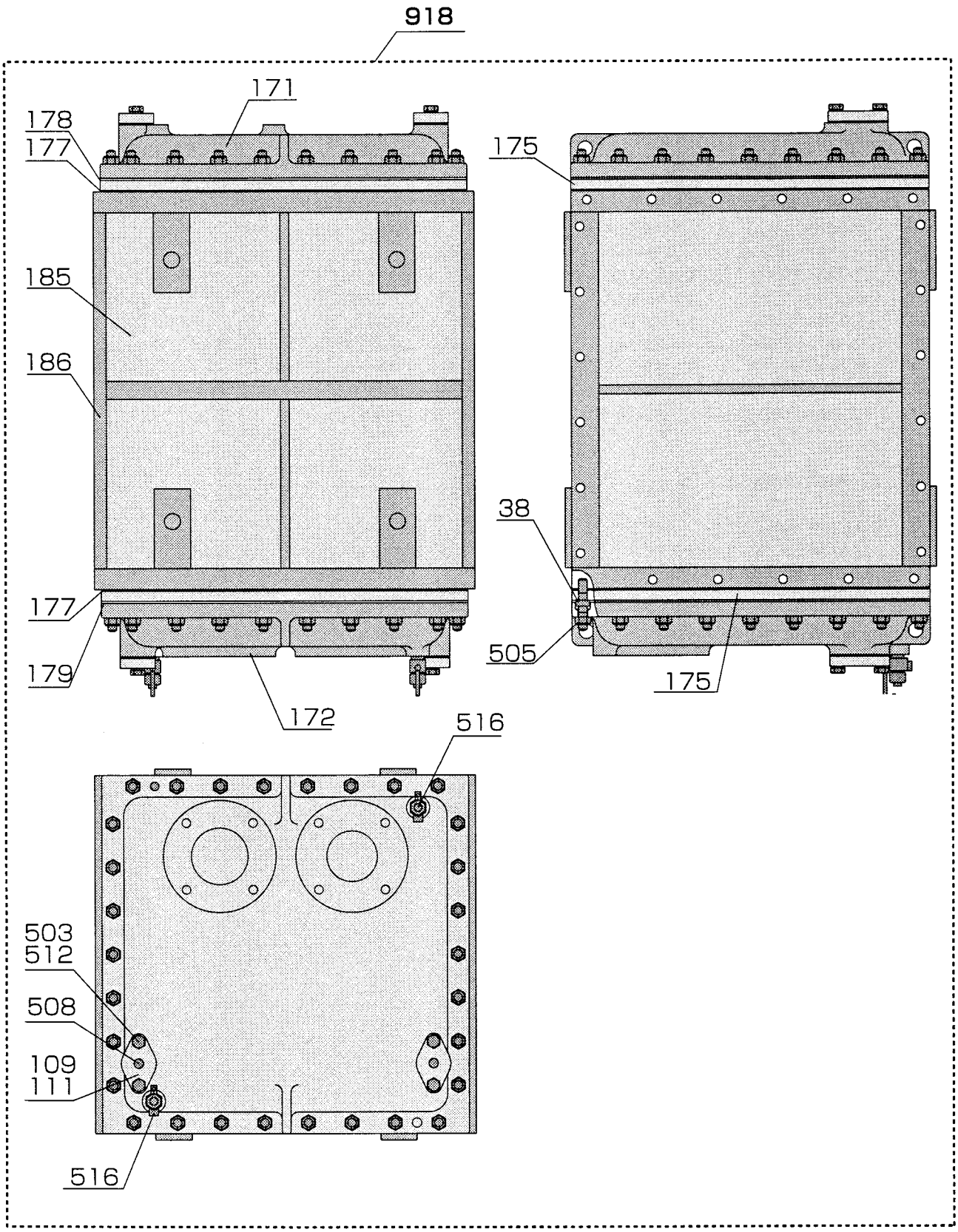
空気冷却器 (DH73HZ) - 清水
INTERCOOLER (DH73HZ) - FRESH WATER



空気冷却器 (DH73HZ) - 清水
INTERCOOLER (DH73HZ) - FRESH WATER

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
917	C050790170	インタクーラ (DH73HZ-55)	INTER COOLER (DH73HZ-55)	1
14	C048410140	サイドカバー (A)	SIDE COVER (A)	1
29	C048410290	サイドカバー (B)	SIDE COVER (B)	1
38	C047900610	スタッドボルト	STUD BOLT	44
49	C050770490	フインチユーブ (DH73-55)	FIN TUBE (DH73-55)	1
60	C048470600	チユーブプレート	TUBE PLATE	2
82	C048470820	パツキン (1)	GASKET (1)	2
90	C048470900	パツキン (2)	GASKET (2)	1
97	C048470970	パツキン (3)	GASKET (3)	1
109	C048471090	パツキン (8)	GASKET (8)	2
111	C048471110	ダエンフランジ (1)	OVAL FLANGE (1)	2
157	C048471570	ケーシング	FRAME	1
503	X200010025ZZ	ボルト	BOLT	4
505	X227012000ZZ	Uナツト	U-NUT	44
508	Z571102000JZ	テーパプラグ	TAPER PLUG	1
512	Z310010000ZZ	バネザガネ	SPRING WASHER	20
516	Z580202000ZZ	ドレンコツク	DRAIN COCK	3

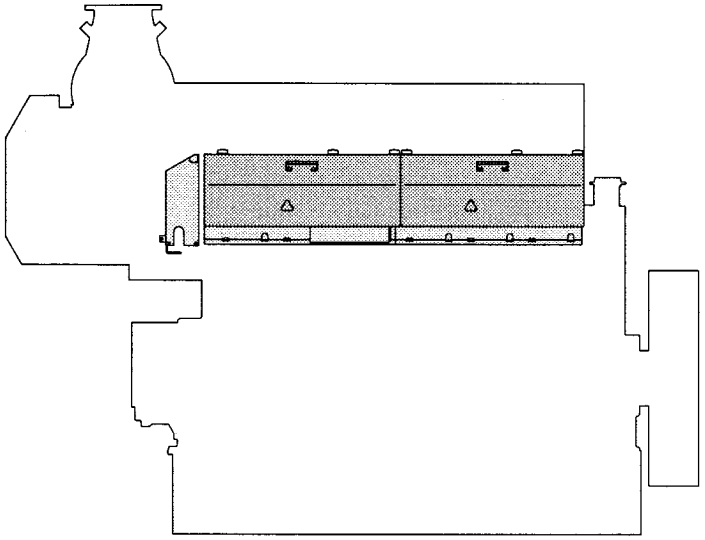
空気冷却器 (DH95HZ) - 清水
INTERCOOLER (DH95HZ) - FRESH WATER

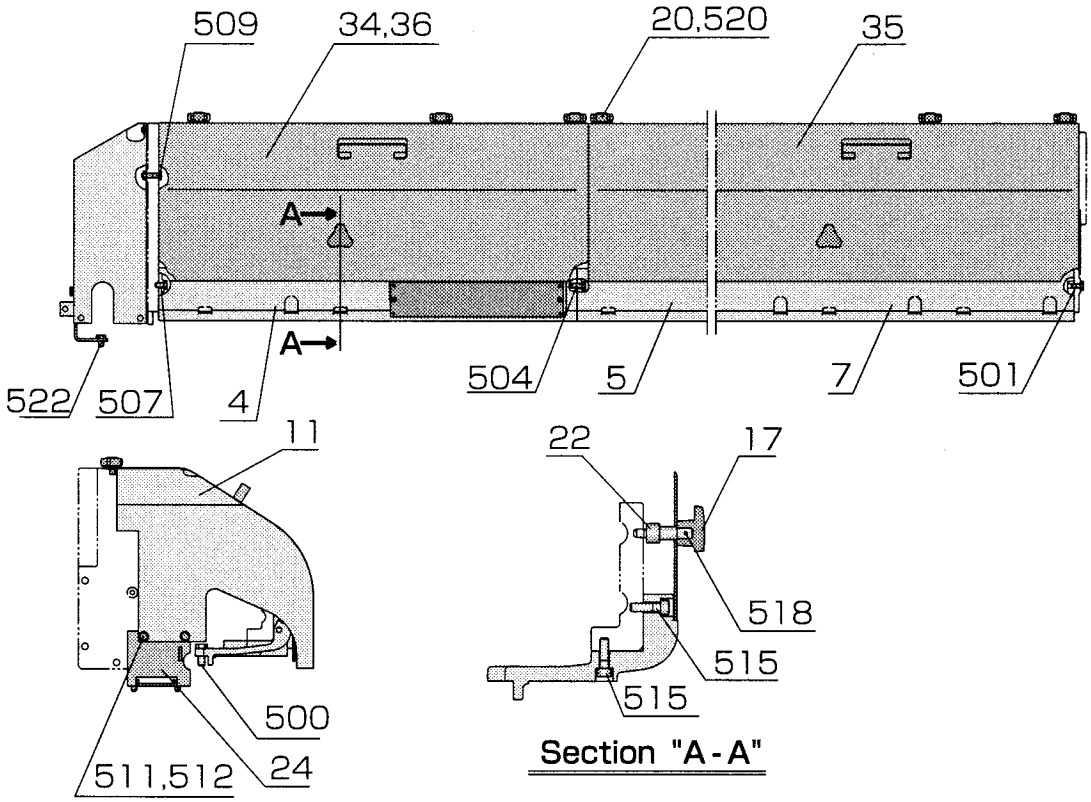


空気冷却器 (DH95HZ) - 清水
INTERCOOLER (DH95HZ) - FRESH WATER

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
918	C050790180	インタクーラ (DH95HZ-57)	INTER COOLER (DH95HZ-57)	1
38	C047900610	スタッドボルト	STUD BOLT	60
109	C048471090	パッキン (8)	GASKET (8)	4
111	C048471110	ダエンフランジ (1)	OVAL FLANGE (1)	4
171	C049910010	サイドカバー (A)	SIDE COVER (A)	1
172	C049910020	サイドカバー (B)	SIDE COVER (B)	1
175	C049970050	チューブプレート	TUBE PLATE	2
177	C049970090	フレームパッキン-DD57	GASKET-DD57, FRAME	2
178	C049970100	パッキン (2)	GASKET (2)	1
179	C049970110	パッキン (3)	GASKET (3)	1
185	C050771850	フインチューブ (DH95-57)	FIN TUBE (DH95-57)	1
186	C049970210	ケーシング-DD57	FRAME-DD57	1
503	X200010025ZZ	ボルト	BOLT	8
505	X227012000ZZ	U ナット	U-NUT	60
508	Z571102000JZ	テーパプラグ	TAPER PLUG	4
512	Z310010000ZZ	バネザガネ	SPRING WASHER	8
516	Z580202000ZZ	ドレンコツク	DRAIN COCK	2

CHAPTER 3		燃料噴射ポンプサイドカバー
ITEM 33	6·8DK-20	FUEL OIL INJECTION PUMP SIDE COVER





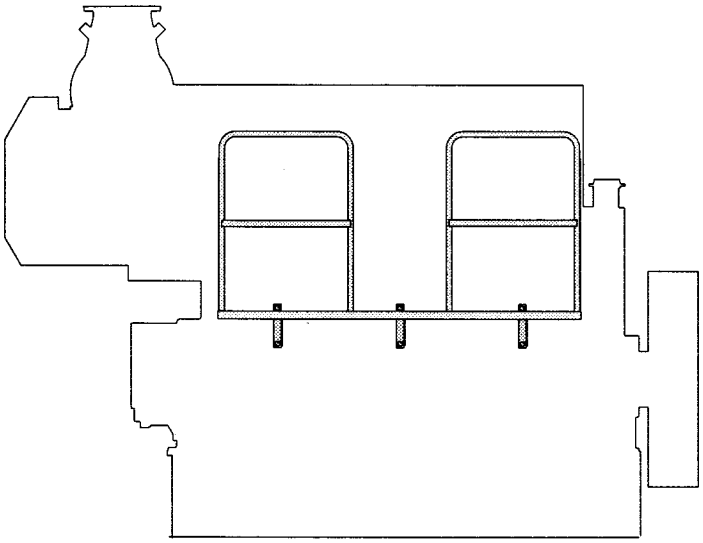
Section "A-A"

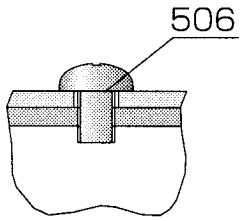
燃料噴射ポンプサイドカバー
FUEL OIL INJECTION PUMP SIDE COVER

①……6DK ②……8DK

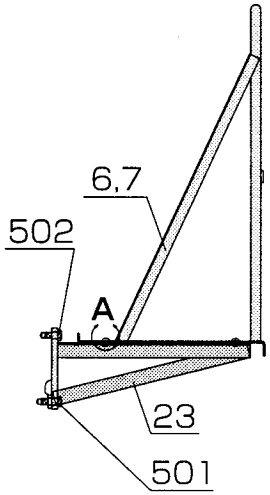
番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量Quantity ①	②
4	E207250040	ヒートボツクスカバー (シタ) -2	HEAT BOX COVER (LOWER) -2	1	1
5	E207250050	ヒートボツクスカバー (シタ) -3	HEAT BOX COVER (LOWER) -3		1
7	E207250070	ヒートボツクスカバー (シタ) -5	HEAT BOX COVER (LOWER) -1	1	1
11	E207250110	ヒートボツクスマエカバー	FRONT COVER,HEAT BOX	1	1
17	E266300050	ヘツドカバトツテ	KNOB, CYLINDER HEAD COVER	2	3
20	E207250200	ノブ	PLASTIC CROSS KNOB	6	8
22	E207250220	ハンドルジクーS, ヒートボツクス	SHAFT KNOBU,HEAT BOX	2	3
24	E207250240	ヒートボツクスマエカバササエ	SUPPORT, HEAT BOX FRONT COVER	1	1
34	E207250340	ヒートボツクスカバー (ウエ) -1	HEAT BOX COVER (UPPER) -1		1
35	E207250350	ヒートボツクスカバー (ウエ) -2	HEAT BOX COVER (UPPER) -2	1	2
36	E207250360	ヒートボツクスカバー (ウエ) -3	HEAT BOX COVER (UPPER) -3	1	
500	X200012030ZZ	ボルト	BOLT	12	16
501	X200010020ZZ	ボルト	BOLT	1	1
504	X200010025ZZ	ボルト	BOLT	1	2
507	X200010020ZZ	ボルト	BOLT	1	1
509	X200010040ZZ	ボルト	BOLT	3	3
511	X200010012ZZ	ボルト	BOLT	2	2
512	Z300010000ZZ	ヒラザガネ	FLAT WASHER	2	2
515	Z212010035ZZ	アナツキボルト	HEX.SOCKET BOLT	4	6
518	Z415004024ZZ	スプリングピン	SPRING PIN	2	3
520	X200012020ZZ	ボルト	BOLT	6	8
522	X200012018ZZ	ボルト	BOLT	2	2

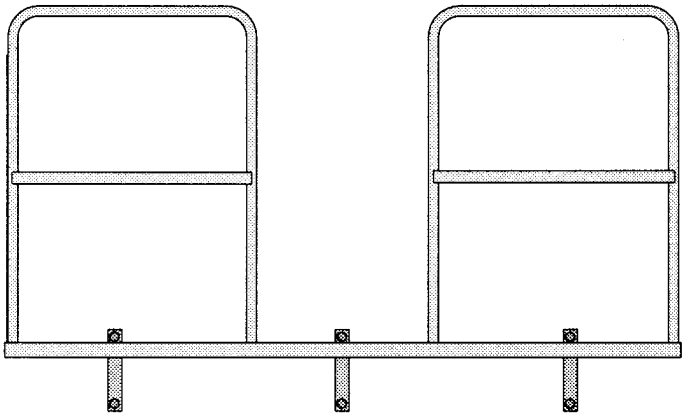
踏　板
STEP BOARD





Detail "A"





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STEP BOARD

6·8DK-20

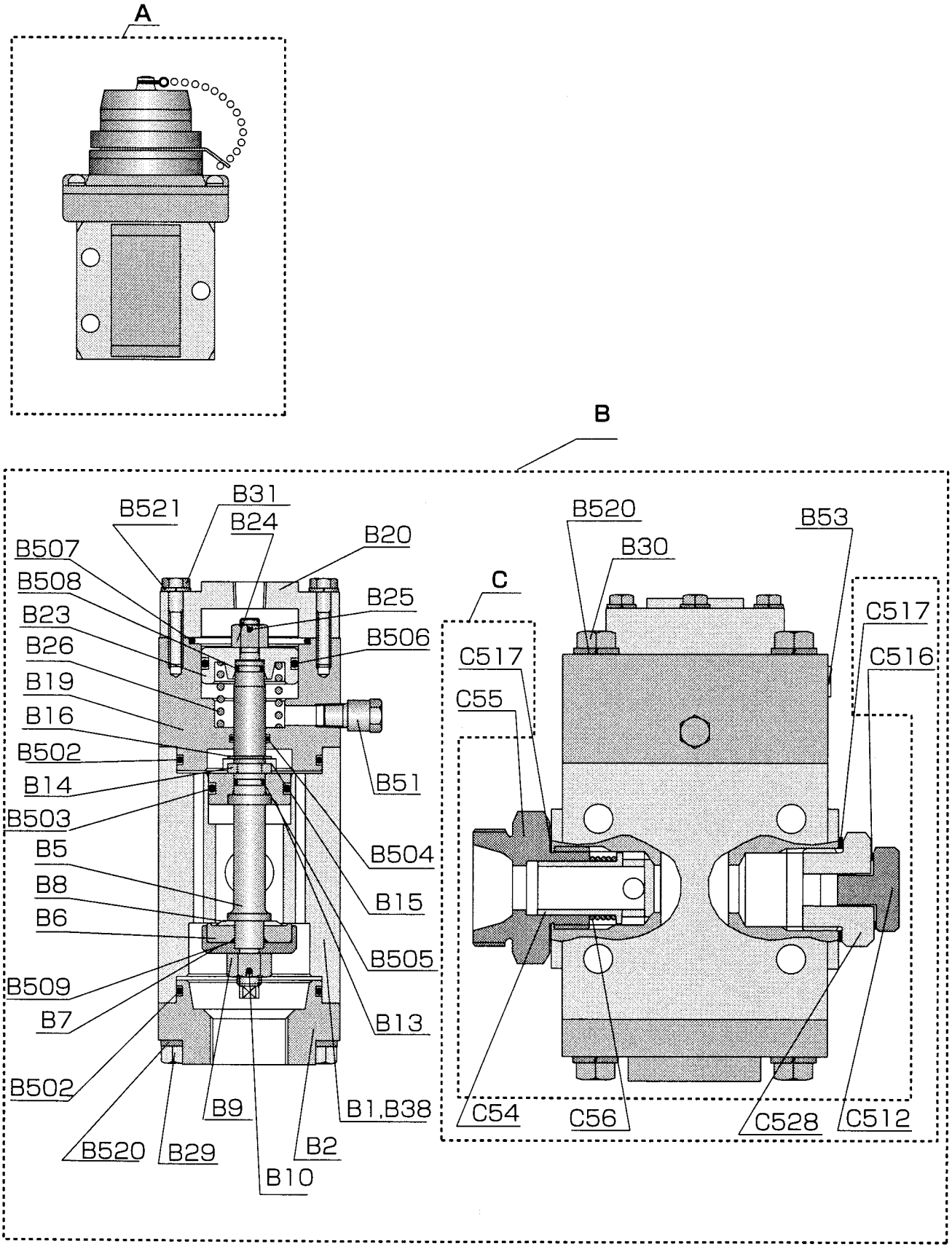
CHAPTER 3

ITEM 34

①……6DK　②……8DK

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity ①	②
6	E207050060	フミイタ	STEP BOARD	1	
7	E207050070	フミイタ-8D	STEP BOARD-8D		1
23	E207050230	フミイタウケ-3D	BRACKET, STEP BOARD-3D	3	4
501	X200016040ZZ	ボルト	BOLT	3	4
502	X200016030ZZ	ボルト	BOLT	3	4
506	X245110016ZZ	＋マルコネジ	+ FLAT MACHINE SCREW	6	8

始動弁, 操作弁
STARTING AIR VALVE & STARTING AIR OPERATION VALVE



始動弁, 操作弁
STARTING AIR VALVE & STARTING AIR OPERATION VALVE

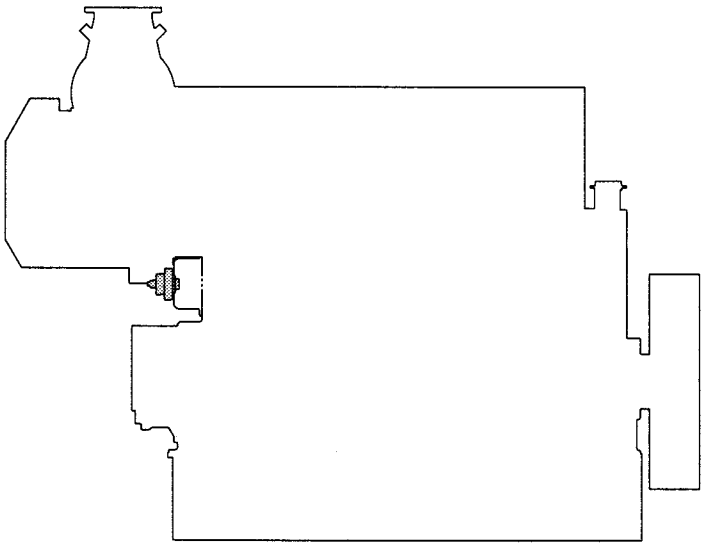
番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
A	S108509010	シドウソウサベン	STARTING OPERATION VALVE	1
B	S108609010	シドウベン 25A	MAIN AIR STARTING VALVE 25A	1
C	S109609010	シドウベンフゾクキキ 25A	ACCESORIES, S.A. VALVE 25A	1
B1	S108600010	ホンタイ	S.A. VALVE BODY	1
B2	S108600020	シタフタ	COVER-1	1
B5	S108600050	ベンボウ	VALVE SHAFT	1
B6	S108600060	バルブ	VALVE	1
B7	S108600070	バルブウケ	SEAT, VALVE	1
B8	S108600080	バルブオサエ	COVER, VALVE	1
B9	S108600090	ミゾツキナツト	HEXAGON SLOTTED & CASTLE NUT	1
B10	S108600100	ワリピン	SPLIT PIN	1
B13	S108600130	ピストン-A	PISTON-A	1
B14	S108600140	キー	KEY	1
B15	S108600150	キーウケ	RETAINER, KEY	1
B16	S108600160	トメワ	STOP RING	1
B19	S108600190	シリンダー	CYLINDER	1
B20	S108600200	ウエフタ	COVER-2	1
B23	S108600230	ピストン-B	PISTON-B	1
B24	S108600240	ミゾツキナツト	HEXAGON SLOTTED & CASTLE NUT	1
B25	S108600250	ワリピン	SPLIT PIN	1
B26	S108600260	バネ	SPRING	1
B29	S108600290	ボルト	BOLT	4
B30	S108600300	ボルト	BOLT	4
B31	S108600310	ボルト	BOLT	4
B38	A226570290	ジドウシドウベン　メイバン	LABEL,MAIN AIR STARTING VALVE	1
B51	S108600510	フイルター	FILTER	1
B53	S108600530	シドウベン, スイアツテストメイバン	W.T.P. LABEL, S.A.VALVE	1
B502	Z560205531ZZ	O リング	O-RING	2
B503	Z560102435ZZ	O リング	O-RING	1
B504	Z560101324ZZ	O リング	O-RING	1
B505	Z560101019ZZ	O リング	O-RING	1
B506	Z560103435ZZ	O リング	O-RING	1
B507	Z560204531ZZ	O リング	O-RING	1
B508	Z560100919ZZ	O リング	O-RING	1
B509	Z560001218ZZ	O リング	O-RING	1
B520	Z310010000ZZ	バネザガネ	SPRING WASHER	8
B521	Z310006000ZZ	バネザガネ	SPRING WASHER	4
C54	S109600540	チエツクバルブ	CHECK VALVE	1
C55	S109600550	ユニオンネジ	UNION SCREW	1
C56	S109600560	バネ	SPRING	1
C512	X570004000ZZ	ロツカクプラグ	HEX.PLUG	1

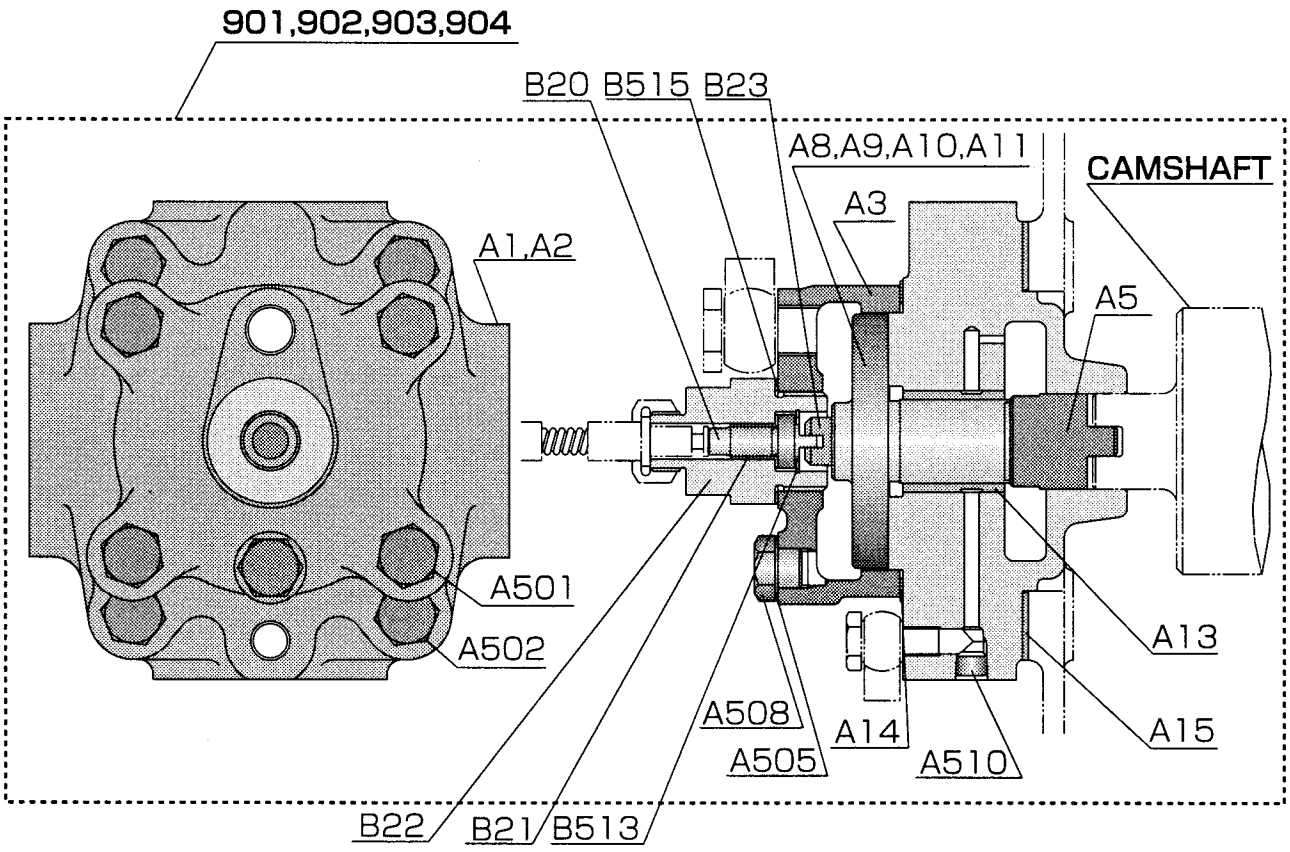
CHAPTER 4
ITEM 1.1 6·8DK-20

始動弁, 操作弁
STARTING AIR VALVE & STARTING AIR OPERATION VALVE

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
C516	Z565002100ZZ	マルパツキン	GASKET	1
C517	Z565003400ZZ	マルパツキン	GASKET	2
C528	X555004100ZZ	セツシユザ	JOINT SEAT	1

起動回転弁，回転計駆動装置
STARTING AIR ROTARY VALVE & TACHOMETER DRIVING DEVICE



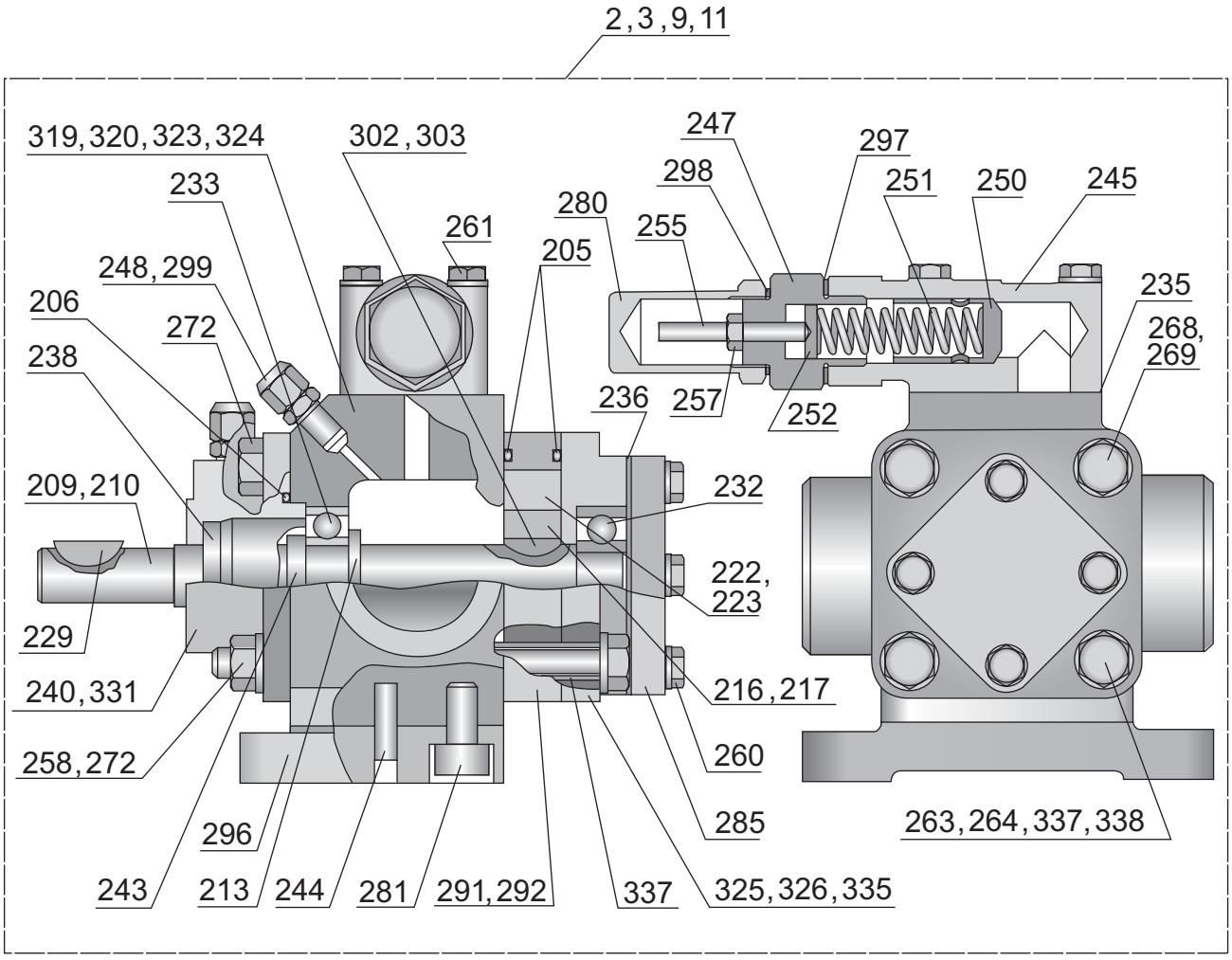


起動回転弁，回転計駆動装置
STARTING AIR ROTARY VALVE & TACHOMETER DRIVING DEVICE

①……正転 NORMAL ROTATION　②……逆転 REVERSE ROTATION

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity 6DK ①	6DK ②	8DK ①	8DK ②
901		キドウカイテンベン ASSY. 6D-R	S.A. ROTARY VALVE ASSY. 6D-R	1			
902		キドウカイテンベン ASSY. 6D-L	S.A. ROTARY VALVE ASSY. 6D-L		1		
903		キドウカイテンベン ASSY. 8D-R	S.A. ROTARY VALVE ASSY. 8D-R			1	
904		キドウカイテンベン ASSY. 8D-L	S.A. ROTARY VALVE ASSY. 8D-L				1
A1	E201350010	カイテンベンシート	ROTARY VALVE SEAT			1	1
A2	E221350020	カイテンベンシート (FCD)	ROTARY VALVE SEAT (FCD)	1	1		
A3	E201350030	カイテンベンフタ	COVER, ROTARY VALVE	1	1	1	1
A5	E221300050	カイテンベンツギテ	COUPLING, ROTARY VALVE	1	1	1	1
A8	E201350080	キドウカイテンベン (1)	ROTARY VALVE (1)			1	
A9	E201350090	キドウカイテンベン (2)	ROTARY VALVE (2)				1
A10	E201350100	キドウカイテンベン (1)-6D	ROTARY VALVE (1)-6D	1			
A11	E221350110	キドウカイテンベン (2)-6D	ROTARY VALVE (2)-6D		1		
A13	E201350130	カイテンベンブツシユ	BUSH, ROTARY VALVE	1	1	1	1
A14	E441300140	カイテンベンフタパツキン	GASKET, ROTARY VALVE COVER	1	1	1	1
A15	E221300150	カムジクウケ（ウシロ）パツキン	GASKET, CAMSHAFT BEARING (REAR)	1	1	1	1
A501	X200012050ZZ	ボルト	BOLT	4	4	4	4
A502	X200012060ZZ	ボルト	BOLT	4	4	4	4
A505	Z565001300ZZ	マルパツキン	GASKET	1	1	1	1
A508	X570002000ZZ	ロツカクプラグ	HEX. PLUG	1	1	1	1
A510	Z571501000ZZ	テーパプラグ	TAPER PLUG	1	1	1	1
B20	E204250200	カイテンケイツギテ	COUPLING,TACHOMETER	1	1	1	1
B21	E204250210	フランジブツシユ	FLANGE BUSH	1	1	1	1
B22	E204250220	ユニオンネジ	UNION SCREW	1	1	1	1
B23	E170900090	ツギテ	COUPLING	1	1	1	1
B513	Z412002000ZZ	スナツプリング（アナ）	SNAP RING (HOLE)	1	1	1	1
B515	Z565003400ZZ	マルパツキン	GASKET	1	1	1	1

燃料送油ポンプ（TYPE A）
FUEL OIL FEED PUMP (TYPE A)



燃料送油ポンプ（TYPE A）
FUEL OIL FEED PUMP (TYPE A)

6·8DK-20

(1)····正転用 NORMAL ROTATION　(2)····逆転用 REVERSE ROTATIO

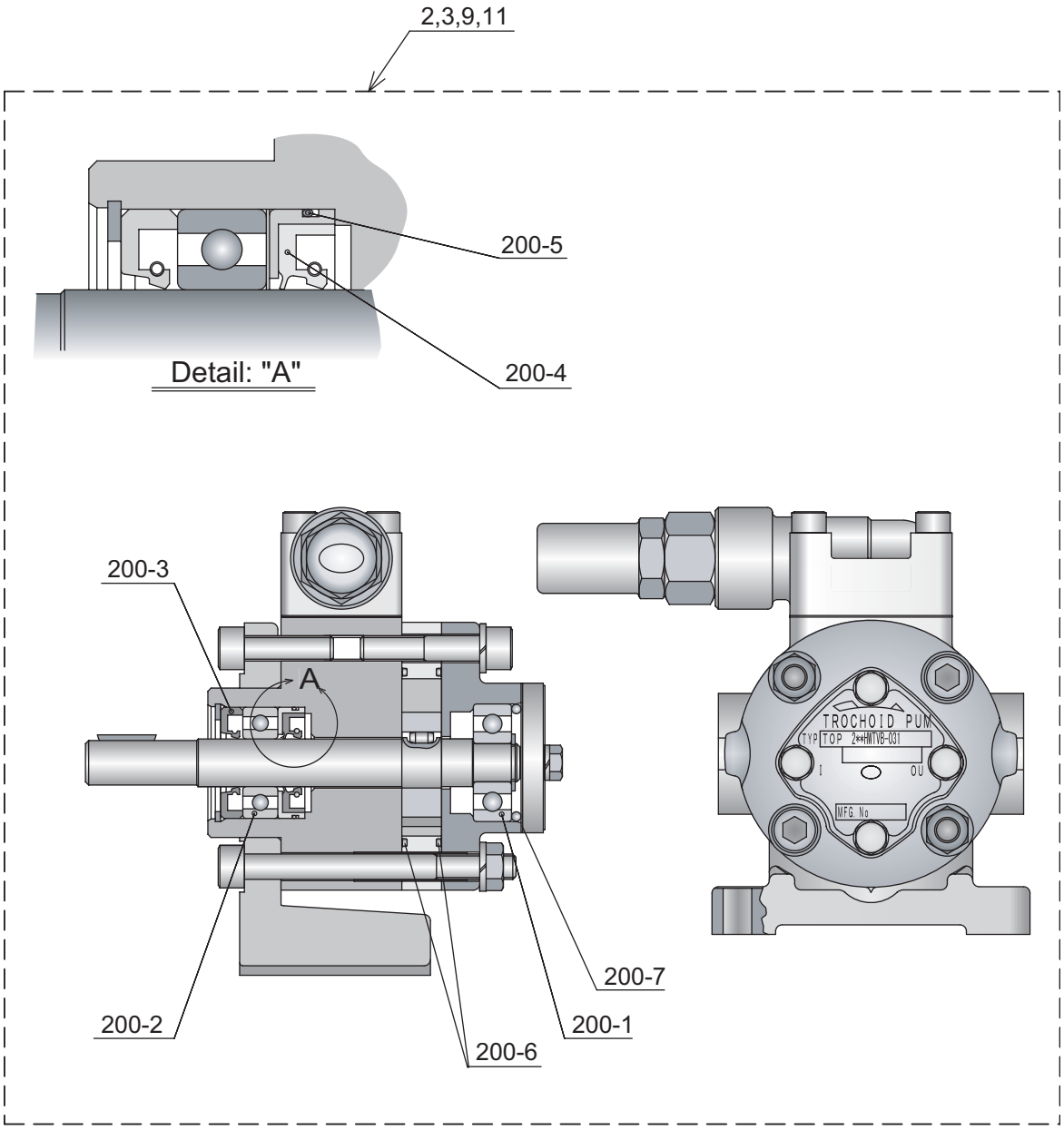
番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量Quantity 6DK (1)	6DK (2)	8DK (1)	8DK (2)
2	**C034900020**	**オイルポンプTLGK-2-6D2**	**OIL PUMP TLGK-2-6D2**	**1**			
3	**C034900030**	**オイルポンプTLGK-2-8D2**	**OIL PUMP TLGK-2-8D2**			**1**	
9	**C034900090**	**オイルポンプTLGK-2-6D2R**	**OIL PUMP TLGK-2-6D2R**		**1**		
11	**C034900110**	**オイルポンプTLGK-2-8D2R**	**OIL PUMP TLGK-2-8D2R**				**1**
205	C034902050	Oリング	O-RING	2	2	2	2
206	C034902060	Oリング一	O-RING	1	1	1	1
209	C034902090	ポンプジク	SHAFT	1	1		
209	C034902100	ポンプジク	SHAFT			1	1
213	C034902130	シャフトカラー	SHAFT COLLAR	1	1	1	1
216	C034902160	インナロータ	INNER ROTOR	1	1		
217	C034902170	インナロータ	INNER ROTOR			1	1
222	C034902220	アウタロータ	OUTER ROTOR	1	1		
223	C034902230	アウタロータ	OUTER ROTOR			1	1
229	C034902290	カップリングキー	COUPRIN KEY	1	1	1	1
232	C034902320	ベアリング	BALL BEWRING	1			
233	C034902330	ベアリング	BALL BEARING	1			
235	C034902350	パッキン	JOINT PACKING	1			
236	C034902360	パッキン	JOINT PACKING	1			
238	C034902380	メカニカルシール	MECHANICAL SEAL	1			
240	C034902400	シールカバー	SEAL COVER		1		1
243	C034902430	カラー	COLLAR	1	1	1	1
244	C034902440	ノックピン	KNOCK PIN	2	2	2	2
245	C034902450	バルブボックス	VALVE BOX	1	1	1	1
247	C034902370	コネクタ	CONNECTER	1			
248	C034902480	パイプ	PIPE		1		
250	C034902500	アンゼンベン	SAFETY VALVE	1	1	1	1
251	C034902510	バルブスプリング	VALVE SPRING	1	1	1	1
252	C034902520	バネオサエ	SPRING CARRIER	1	1	1	1
255	C034902550	チョウセイネジ	ADJUST SCREW	1	1	1	1
257	C034902570	ロックナット	LOCK NUT	1	1	1	1
258	C034902580	ナット	HEXAGON NUT	2	2	2	2
260	C034902600	ボルト	HEXAGON BOLT	4	4	4	4
261	C034902610	ボルト	HEXAGON BOLT	4	4	4	4
263	C034902630	ボルト	HEXAGON BOLT	2	2		
264	C034902640	ボルト	HEXAGON BOLT			2	2
268	C034902680	ボルト	HEXAGON BOLT	2	2		
269	C034902690	ボルト	HEXAGON BOLT			2	2
272	C034902720	ボルト	HEXAGON BOLT	2			
280	C034902800	キャップ	CAP	1			

燃料送油ポンプ（TYPE A）
FUEL OIL FEED PUMP (TYPE A)

(1)····正転用 NORMAL ROTATION　**(2)**····逆転用 REVERSE ROTATIO

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量Quantity 6DK (1)	6DK (2)	8DK (1)	8DK (2)
281	C034902810	アナツキボルト	SOCKET HEAD CAP SCREW	4	4	4	4
285	C034902850	ベアリングカバ	BEARING COVER	1	1	1	1
291	C034902910	ロータハウジング	ROTOR HOUSING	1	1		
292	C034902920	ロータハウジング	ROTOR HOUSING			1	1
296	C034902960	ブラケット	BRACKET	1	1	1	1
297	C034902970	パッキン	PACKING	1	1	1	1
298	C034902980	パッキン	PACKING	1	1	1	1
299	C034902990	リングジョイント	RING JOINT	2	2	2	2
302	C034903020	ロータキー	ROTOR KEY	1	1		
303	C034903030	ロータキー	ROTOR KEY			1	1
319	C034903190	ケーシング	CASING	1			
320	C034903200	ケーシング	CASING			1	
323	C034903230	ケーシング	CASING		1		
324	C034903240	ケーシング	CASING				1
325	C034903250	サイドカバ	SIDE COVER	1			
326	C034903260	サイドカバ	SIDE COVER			1	1
331	C034903310	シールカバ	SEAL COVER	1		1	
335	C034903350	サイドカバ	SIDE COVER		1		
337	C034903370	パイプノック	PIPE NOCK	2	2		
338	C034903380	パイプノック	PIPE NOCK			2	2

燃料送油ポンプ (TYPE B)
FUEL OIL FEED PUMP (TYPE B)

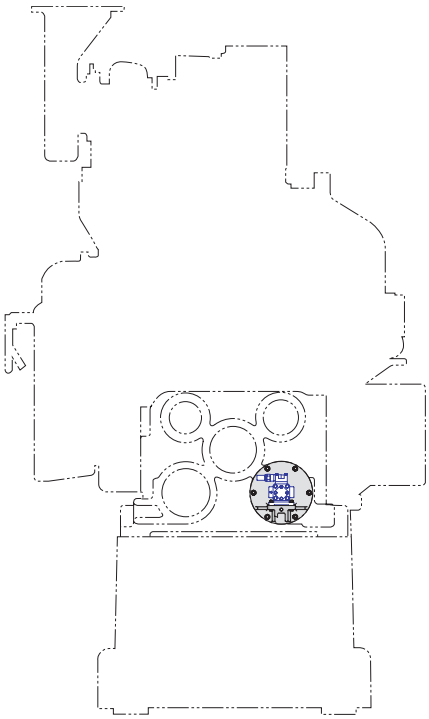


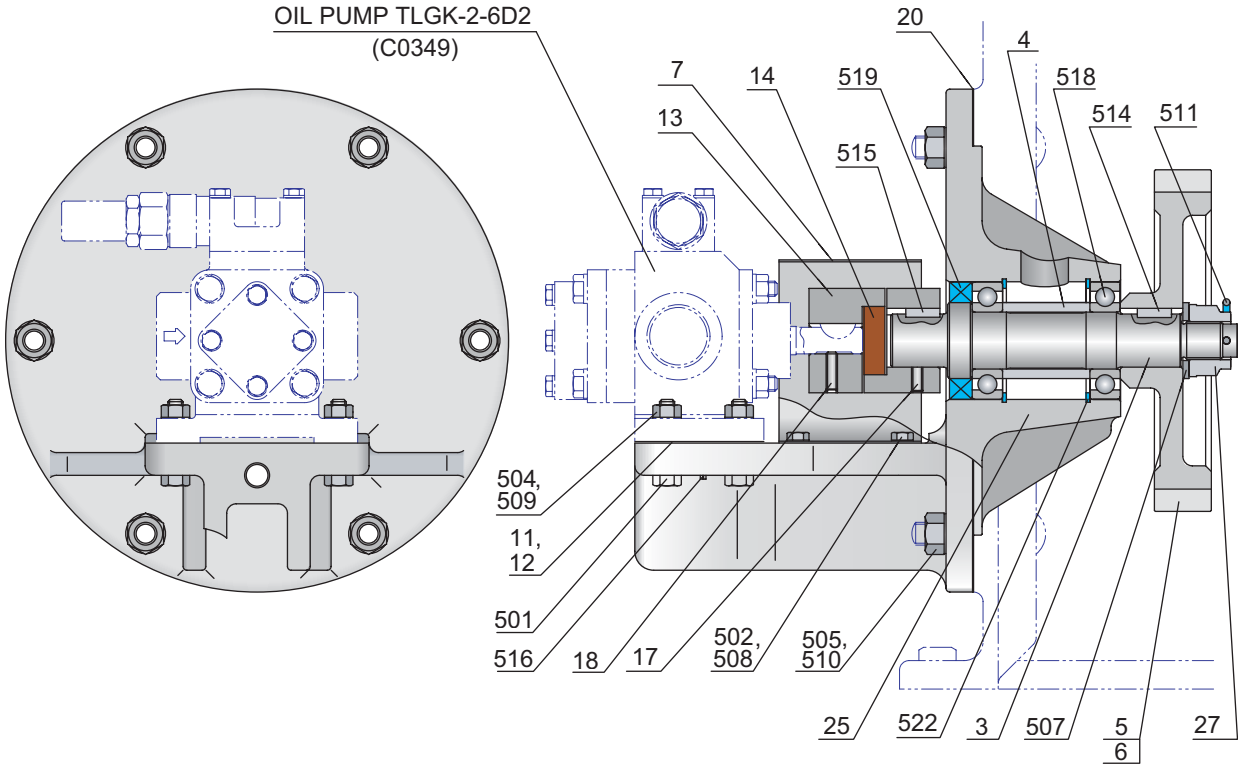
(1)‥‥正転用 NORMAL ROTATION　**(2)**‥‥逆転用 REVERSE ROTATIO

番号 Number	パーツコード Parts Code	部品名称	Name of Parts	数量Quantity 6DK (1)	6DK (2)	8DK (1)	8DK (2)
2	**C034400020**	オイルポンプ, 206HWT031	**OIL PUMP,** 206HWT031	**1**			
3	**C034400030**	オイルポンプ, 208HWT031	**OIL PUMP,** 208HWT031			**1**	
9	**C034400090**	オイルポンプ, 206HWTR031	**OIL PUMP,** 206HWTR031		**1**		
11	**C034400110**	オイルポンプ, 208HWTR031	**OIL PUMP,** 208HWTR031				**1**
200	C034402000	シールキット, HWTVB	SEALKIT, HWTVB	1Set	1Set	1Set	1Set
（内訳）							
200-1		ボールベアリング	BALL BEARING	(1)*	(1)*	(1)*	(1)*
200-2		ボールベアリング	BALL BEARING	(1)*	(1)*	(1)*	(1)*
200-3		オイルシール	OIL SEAL	(1)*	(1)*	(1)*	(1)*
200-4		オイルシール	OIL SEAL	(1)*	(1)*	(1)*	(1)*
200-5		O リング	O-RING	(1)*	(1)*	(1)*	(1)*
200-6		O リング	O-RING	(2)*	(2)*	(2)*	(2)*
200-7		トップカバーパッキン	TOP COVER GASKET	(2)*	(2)*	(2)*	(2)*

REMARKS; PARTS(SIGNAL*) CANNOT BE PURCHASED BY ITSELF.
*印部品の単品販売は不可。

燃料送油ポンプ駆動装置 (TYPE A)
FUEL OIL PUMP DRIVING DEVICE (TYPE A)





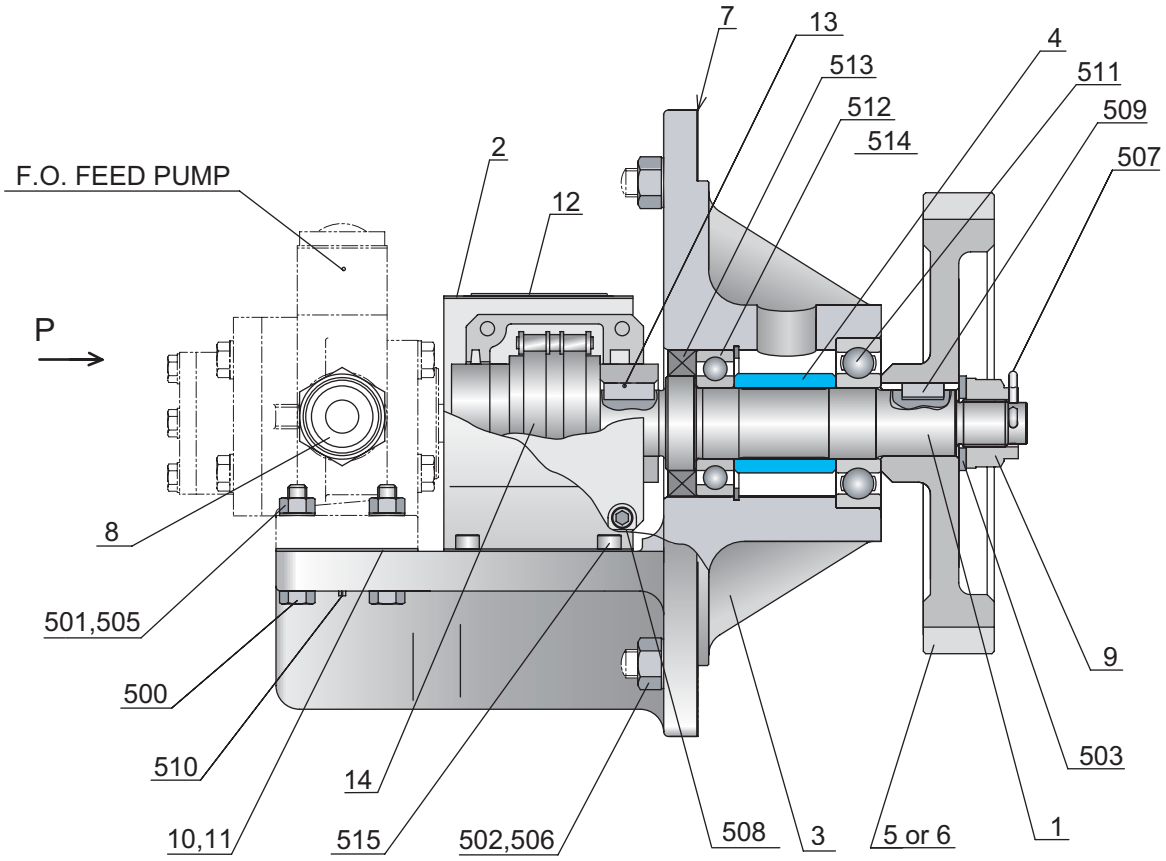
燃料送油ポンプ駆動装置 (TYPE A)
FUEL OIL PUMP DRIVING DEVICE (TYPE A)

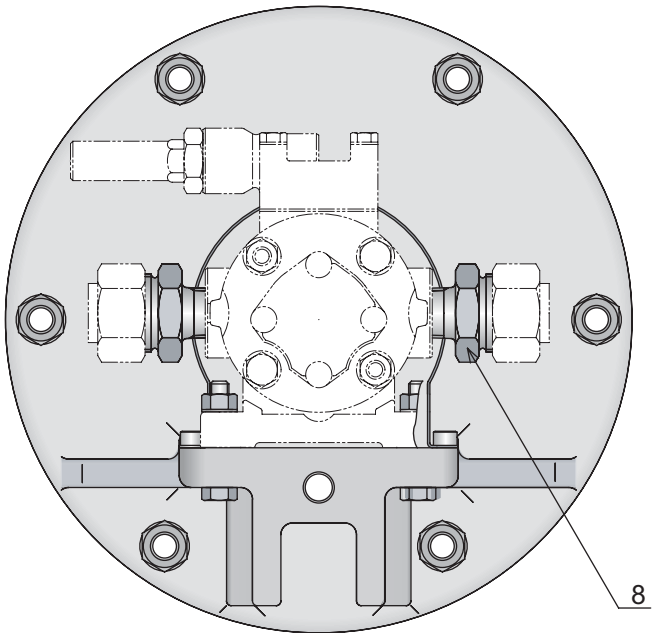
6·8DK-20

(1)····720,750 rpm **(2)**····900rpm

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量Quantity (1)	(2)
3	E211350030	クドウジク, FOソウユポンプ	DRIVING SHAFT, F.O. FEED PUMP	1	1
4	E211350040	ディスタンスピース	DISTANCE.PIECE	1	1
5	E211350050	FOポンプクドウギヤ Z＝34	F.O. PUMP DRIVING GEAR Z=34	1	
6	E211350060	FOポンプクドウギヤ Z＝37	F.O. PUMP DRIVING GEAR Z=37		1
7	E204200070	カップリングカバー	COVER COUPLING	1	1
11	E204200091	シム 0.1	SHIM 0.1	4	4
12	E204200092	シム 0.2	SHIM 0.2	4	4
13	E231350130	カップリング	COUPLING	1	1
14	E231350140	カップリングゴム	COUPLING RUBBER	1	1
17	E204200170	アナツキトメネジ	HEX. SOCKET SET SCREW	1	1
18	E204200180	アナツキトメネジ	HEX. SOCKET SET SCREW	1	1
20	E203150130	ガスケット	GASKET	1	1
25	E211350250	ブラケット, FOソウユポンプ	BRACKET, F.O. FEED PUMP	1	1
27	E211350270	ザツキキクナット、M20x1.5	CASTLE NUT WITH SEAT, M20x1.5	1	1
501	X200008040ZZ	ボルト	BOLT	4	4
502	X200006008ZZ	ナット	BOLT	4	4
504	X220008000ZZ	ナット	NUT	4	4
505	X220012000ZZ	ナット	NUT	6	6
507	Z300020000ZZ	ヒラザガネ	FLAT WASHER	1	1
508	Z315006000ZZ	ハツキザガネ	TOOTHED LOCK WASHER	4	4
509	Z315008000ZZ	ハツキザガネ	TOOTHED LOCK WASHER	4	4
510	Z315012000ZZ	ハツキザガネ	TOOTHED LOCK WASHER	6	6
511	Z320004040ZZ	ワリピン	SPLIT PIN	1	1
514	Z400007018ZZ	キー	KEY	1	1
515	Z400007018ZZ	キー	KEY	1	1
516	Z415004030ZZ	スプリングピン	SPRING PIN	2	2
518	Z451162060ZZ	ベアリング	BEARING	2	2
519	Z461406212SC	オイルシール	OIL SEAL	1	1
522	Z412006200ZZ	スナップリング	SNAP RING	2	2

燃料送油ポンプ駆動装置(TYPE B)
FUEL OIL PUMP DRIVING DEVISE (TYPE B)



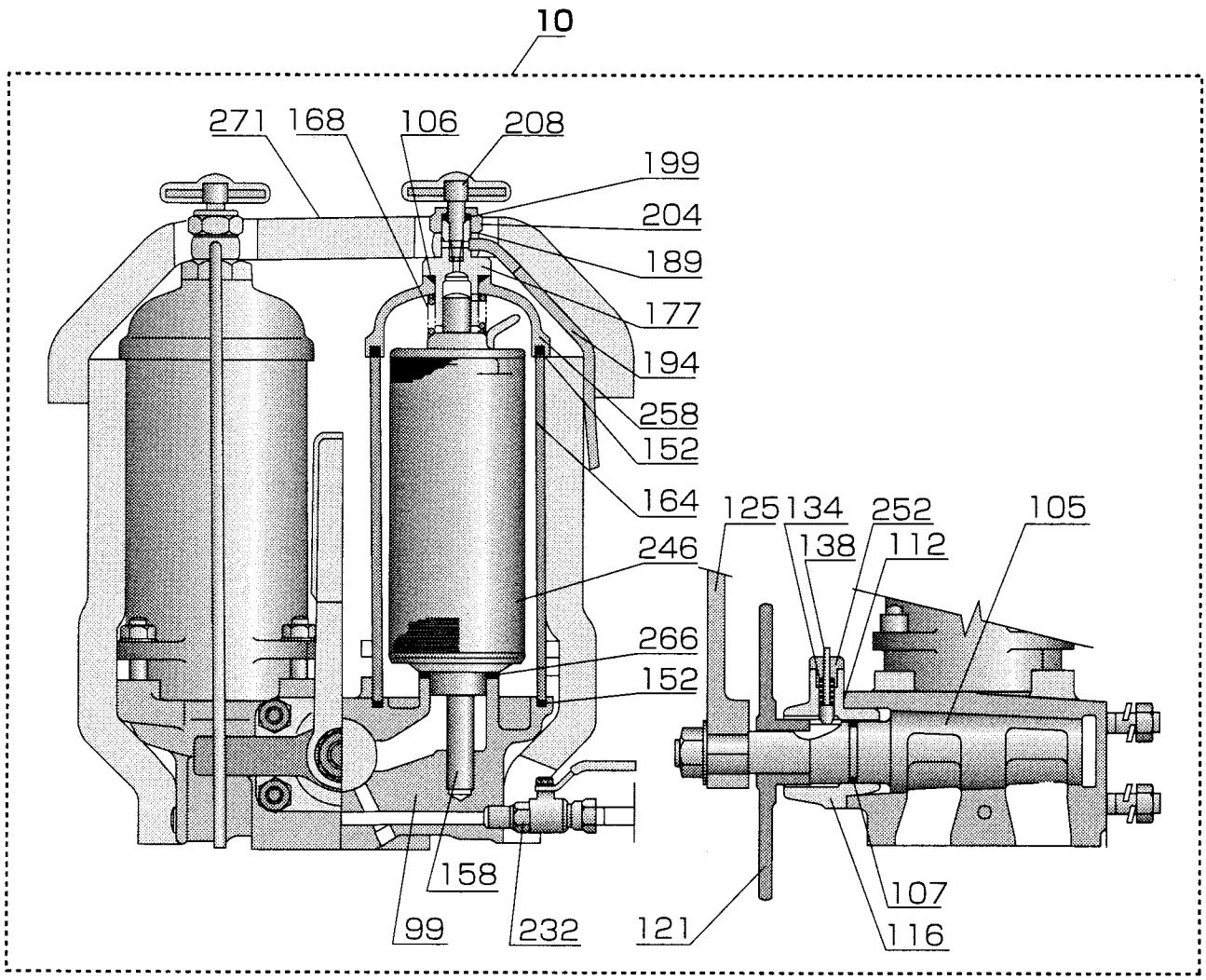


View:"P"

(1)····720,750 rpm **(2)**····900rpm

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity (1)	(2)
1	A596800010	クドウジク, FOソウユポンプ	DRIVING SHAFT, F.O. FEED PUMP	1	1
2	A596800020	カバー, チェーンカップリング	COVER, COUPLING, F.O. FEED PUMP	1	1
3	A596800030	ブラケット, FOソウユポンプ	BRACKET, F.O. FEED PUMP	1	1
4	E211350020	ディスタンス, クドウジク,FOP	DISTANCE, DRIVING SHAFT, F.O. FEED PUMP	1	1
5	E211350050	FOポンプクドウギヤ Z＝34	F.O. PUMP DRIVING GEAR Z=34	1	
6	E211350060	FOポンプクドウギヤ Z＝37	F.O. PUMP DRIVING GEAR Z=37		1
7	E203150130	ガスケット	GASKET	1	1
8	E211350220	ユニオンネジ, FOソウユポンプ	UNION SCREW, F.O. FEED PUMP	2	2
9	E211350270	ザツキキクナット	CASTLE NUT WITH SEAT	1	1
10	E211350291	シム	SHIM	4	4
11	E211350292	シム	SHIM	4	4
12	A596800120	メイバン, カップリングカバー	NAME PLATE, COUPLING COVER	1	1
13	A596800130	キー	SUNK KEY	1	1
14	A596800060	ローラーチェーンカップリング	ROLLER CHAIN COUPLING	1	1
500	X200008045Z	ボルト	BOLT	4	4
501	X220008000Z	ナット	NUT	4	4
502	X220012000Z	ナット	NUT	6	6
503	Z300020000Z	ヒラザガネ	FLAT WASHER	1	1
504	Z315006000Z	ハツキザガネ	TOOTHED LOCK WASHER	4	4
505	Z315008000Z	ハツキザガネ	TOOTHED LOCK WASHER	4	4
506	Z315012000Z	ハツキザガネ	TOOTHED LOCK WASHER	6	6
507	Z320004040Z	ワリピン	SPLIT PIN	1	1
508	Z310006000Z	バネザガネ	SPRING WASHER,M6	4	4
509	Z400007018Z	キー	KEY	1	1
510	Z415004030Z	スプリングピン	SPRING PIN	2	2
511	Z451163060Z	ベアリング	BEARING	1	1
512	Z451162060Z	ベアリング	BEARING	1	1
513	Z461406212S	オイルシール	OIL SEAL	1	1
514	Z412006200Z	スナップリング	SNAP RING	1	1
515	Z212006010Z	アナツキボルト	HEX. SOCKET BOLT	4	4

燃料ロキ
FUEL OIL FILTER



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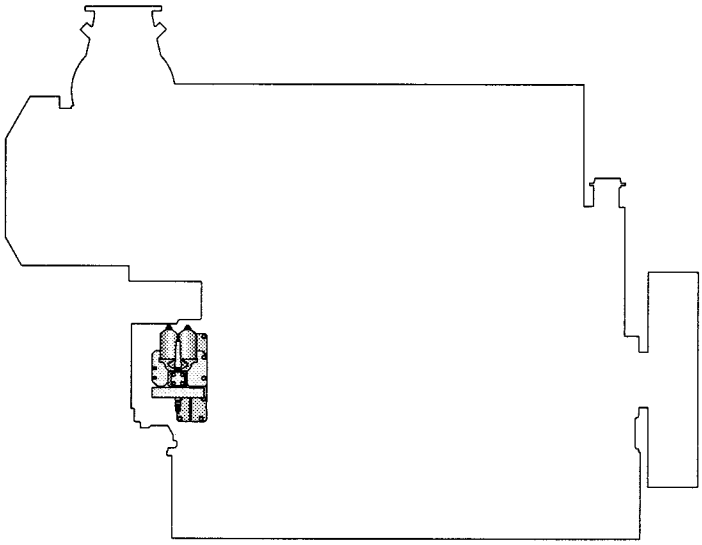
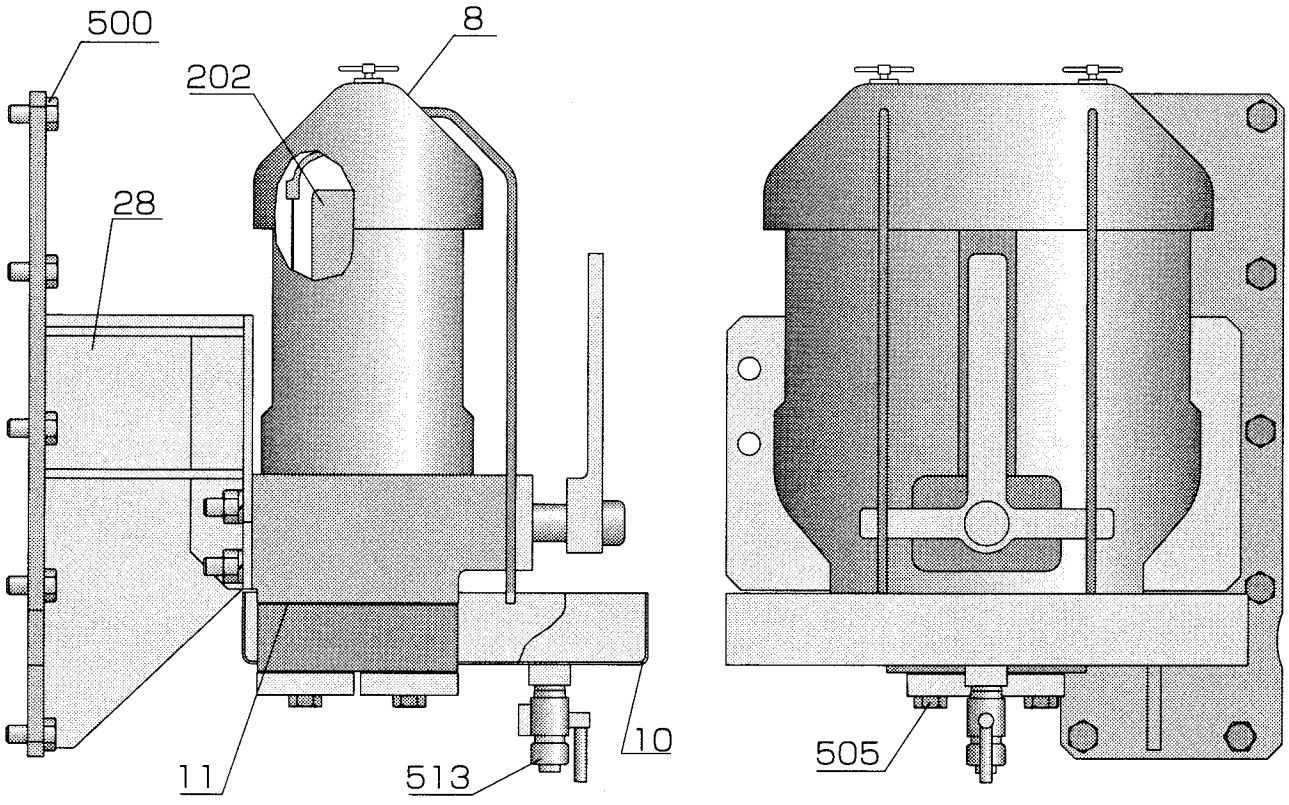
燃料ロキ
FUEL OIL FILTER

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
10	C060800010	ロキ	FILTER	1
99	C060800990	ロキホンタイ	FILTER BODY	1
105	Y529000018	キリカエコック	COCK	1
106	Y529000037	O リング	O-RING	2
107	Y529000038	O リング	O-RING	1
112	Y529000041	パッキン（オサエフタ）	PACKING, COCK COVER	1
116	Y529000046	オサエフタ	COCK COVER	1
121	Y529000052	チョウセイハンドル	HANDLE	1
125	Y529000060	ハンドル	HANDLE	1
134	Y529000071	バネ（トメセン）	SPRING (NOTCH BAR)	1
138	Y529000081	トメセン	NOTCH BAR	1
152	Y529000113	パッキン（ロキケース）	PACKING (CASING)	4
158	Y529000129	ジク	SHAFT	2
164	Y529000146	ケース	CASING	2
168	Y529000149	バネ（ロキケース）	SPRING (CASING)	2
177	Y529000167	シメツケナット	CAP NUT	2
189	C060801890	パッキン（カンセツシュ）	PACKING (CONNECTOR)	4
194	Y529000194	カンセツシュ	CONNECTOR	2
199	Y529000199	パッキン（フクロナット）	PACKING (SLEEVE NUT)	2
204	Y529000207	フクロナット	SLEEVE NUT	2
208	Y529000213	クウキヌキセン	AIR PLUG	2
232	Y529000247	バルブ	VALVE	1
246	Y529000301	エレメント ASSY-200ME	ELEMENT ASSY. (200ME)	2
252	Y529000313	プラグ	PLUG	1
258	Y529000324	ウワブタ	COVER	2
266	Y529000338	パッキン	GASKET	2
271	Y529000347	ラツキング	LAGGING	1

燃料ロキ取付（カバー無）
FUEL OIL FILTER FITTING (WITHOUT COVER)

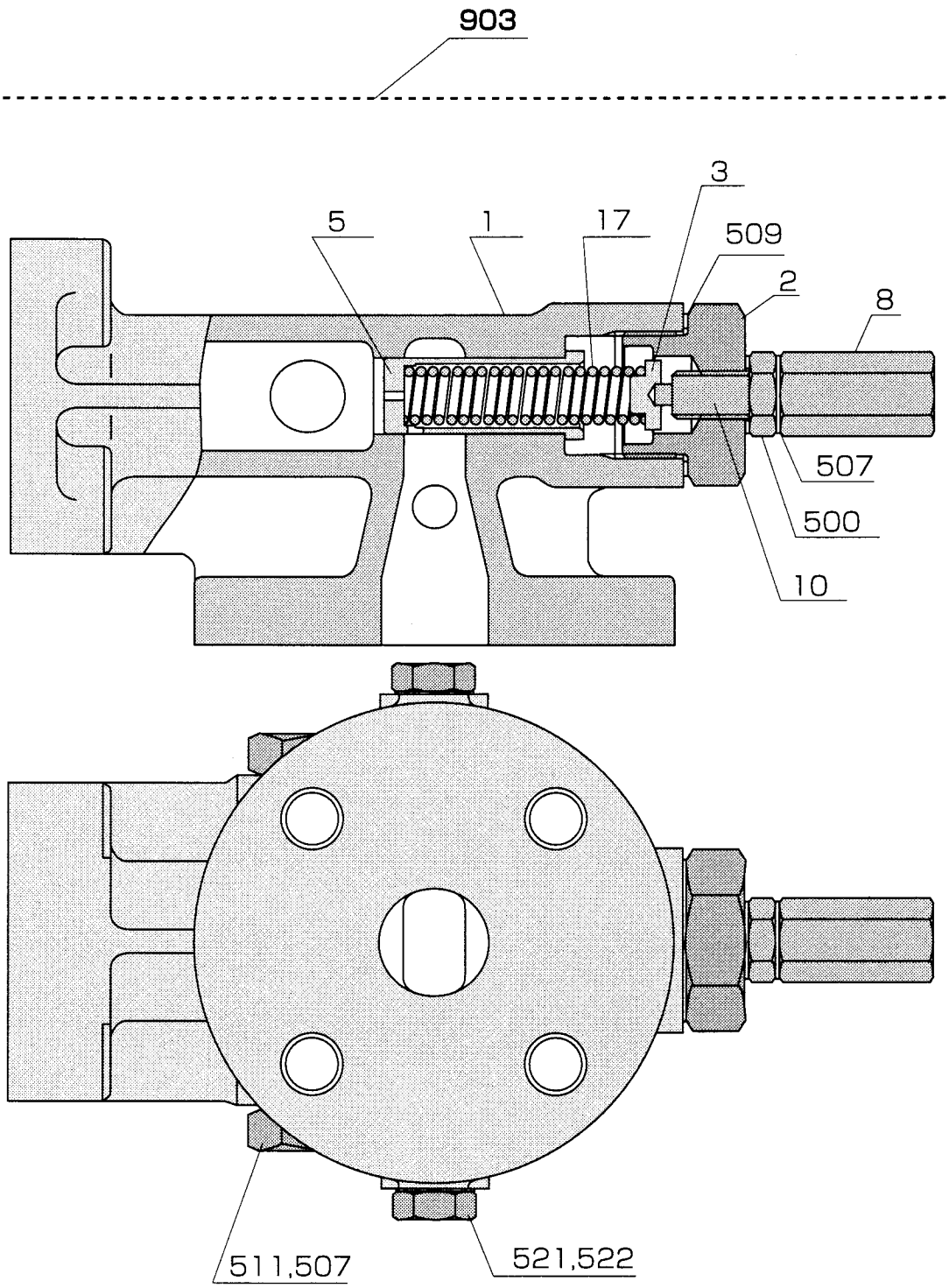




燃料ロキ取付（カバー無）
FUEL OIL FILTER FITTING (WITHOUT COVER)

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
8	C060800010	ロキ	FILTER	1
10	E214350100	ウケザラ, FO ロキ (C3500)	SAUCER, F.O. FILTER (C3500)	1
11	E214350110	パツキン, FO ロキ (C3500)	GASCKET, F.O. FILTER (C3500)	1
28	E214350280	FO ロキブラケツト (C3500)	BRACKET, F.O. FILTER (C3500)	1
202	Y529000301	エレメント ASSY (200ME)	ELEMENT ASSY. (200ME)	2
500	X200012025ZZ	ボルト	BOLT	10
505	X200012075ZZ	ボルト	BOLT	4
513	Z580203000ZZ	ドレンコツク	DRAIN COCK	1

燃料調圧弁
FUEL OIL RELIEF VALVE



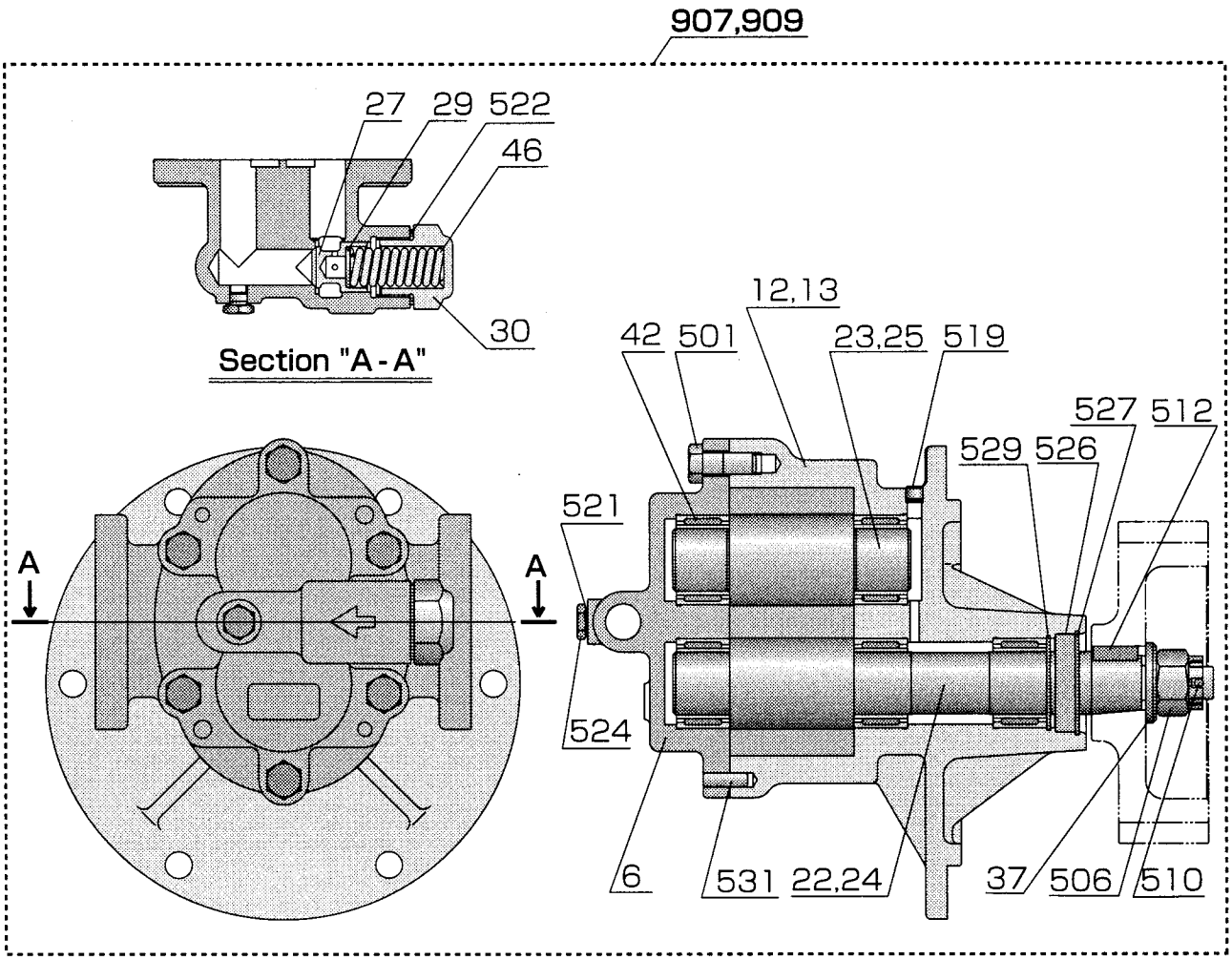
注記：2-3「燃料配管」を参照下さい。
Remarks：Ref. 2-3「FUEL OIL PIPING」

燃料調圧弁
FUEL OIL RELIEF VALVE

調 圧 ①1.0~2.0kg/cm² (仕様書参照)
Relief press. 0.10~0.20MPa (Refer to specification)

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量Quantity ①
903	C034509030	F. O. チョウアツベン ASSY. (S - 3)	F. O. RELIEF VALVE ASSY. (S - 3)	1
1	C034500010	チョウアツベンタイ - 1	BODY - 1, OIL RELIEF VALVE	1
2	C034500020	バネオサエ	CAP, VALVE SPRING	1
3	C034000030	バネシート	SPRING SEAT	1
5	C034040010	チョウアツベン	RELIEF VALVE	1
8	C034500080	フクロナット	CAP NUT	1
10	C034500100	チョウセイネジ	ADJUSTING SCREW	1
17	C034079802	バネ (1.6)	SPRING (1.6)	1
500	X220312000ZZ	ナット	NUT	1
507	Z565001300CC	マルパッキン	GASKET	4
509	Z565003400CC	マルパッキン	GASKET	1
511	X570002000ZZ	ロッカクプラグ	HEX. PLUG	2
521	X570006000ZZ	ロッカクプラグ	HEX. PLUG	2
522	Z565002700CC	マルパッキン	GASKET	2

潤滑油ポンプ - 定速型
LUBRICATING OIL PUMP - CONSTANT SPEED TYPE

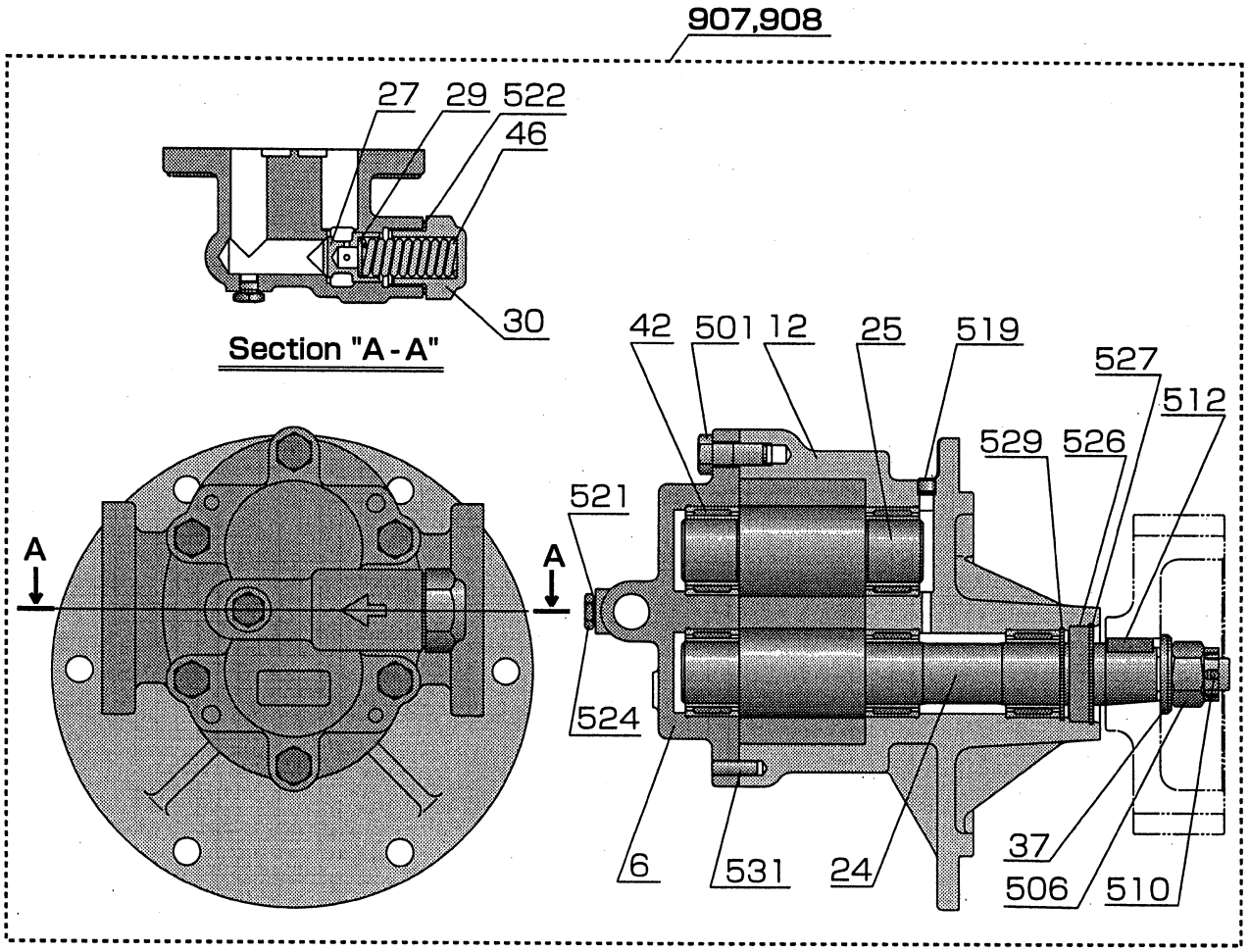


潤滑油ポンプ - 定速型
LUBRICATING OIL PUMP - CONSTANT SPEED TYPE

①……6DK ②……8DK

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity ①	②
907	C034790070	L.O. ポンプ ASSY. V184R	L.O. PUMP ASSY. V184R		1
909	C034790090	L.O. ポンプ ASSY. V143R	L.O. PUMP ASSY. V143R	1	
6	C034700060	ポンプタイフタ (V184)	L.O. PUMP COVER (V184)	1	1
12	C034700120	ポンプタイ (V184)	L.O. PUMP BODY (V184)		1
13	C034700130	ポンプタイ (V143)	L.O. PUMP BODY (V143)	1	
22	C034700220	ポンプモトギヤ (V143)	L.O. PUMP DRIVING GEAR (V143)	1	
23	C034700230	ポンプウケギヤ (V143)	L.O. PUMP DRIVEN GEAR (V143)	1	
24	C034700240	ポンプモトギヤ (V184)	L.O. PUMP DRIVING GEAR (V184)		1
25	C034700250	ポンプウケギヤ (V184)	L.O. PUMP DRIVEN GEAR (V184)		1
27	C036340240	アンゼンベン	SAFETY VALVE	1	1
29	C036340260	アンゼンベンバネウケ	RETAINER, SAFETY VALVE SPRING	1	1
30	G003100370	アンゼンベンバネオサエ	CAP, SAFETY VALVE SPRING	1	1
37	G003100390	ヒラザガネ	FLAT WASHER	1	1
42	E170500470	ベアリング	BEARING	5	5
46	C034700460	バネ	SPRING	1	1
501	X200012030ZZ	ボルト	BOLT	6	6
506	X225122000ZZ	キクナツト	CASTLE NUT	1	1
510	Z320005040ZZ	ワリピン	SPLIT PIN	1	1
512	Z400010025ZZ	キー	KEY	1	1
519	Z571501000ZZ	テーパプラグ	TAPER PLUG	1	1
521	Z665010000ZZ	マルパツキン	GASKET	1	1
522	Z665034000ZZ	マルパツキン	GASKET	1	1
524	X670010000ZZ	ロツカクプラグ	HEX. PLUG	1	1
526	Z461355511SC	オイルシール	OIL SEAL	1	1
527	Z412005500ZZ	スナツプリング	SNAP RING	1	1
529	Z412005000ZZ	スナツプリング	SNAP RING	1	1
531	Z335008025ZZ	ヘイコウピン	STRAIGHT PIN	2	2

潤滑油ポンプ-変速型(主機)-6DK
LUBLICATING OIL PUMP - VARIABLE SPEED TYPE (FOR PROPULSION)-6DK

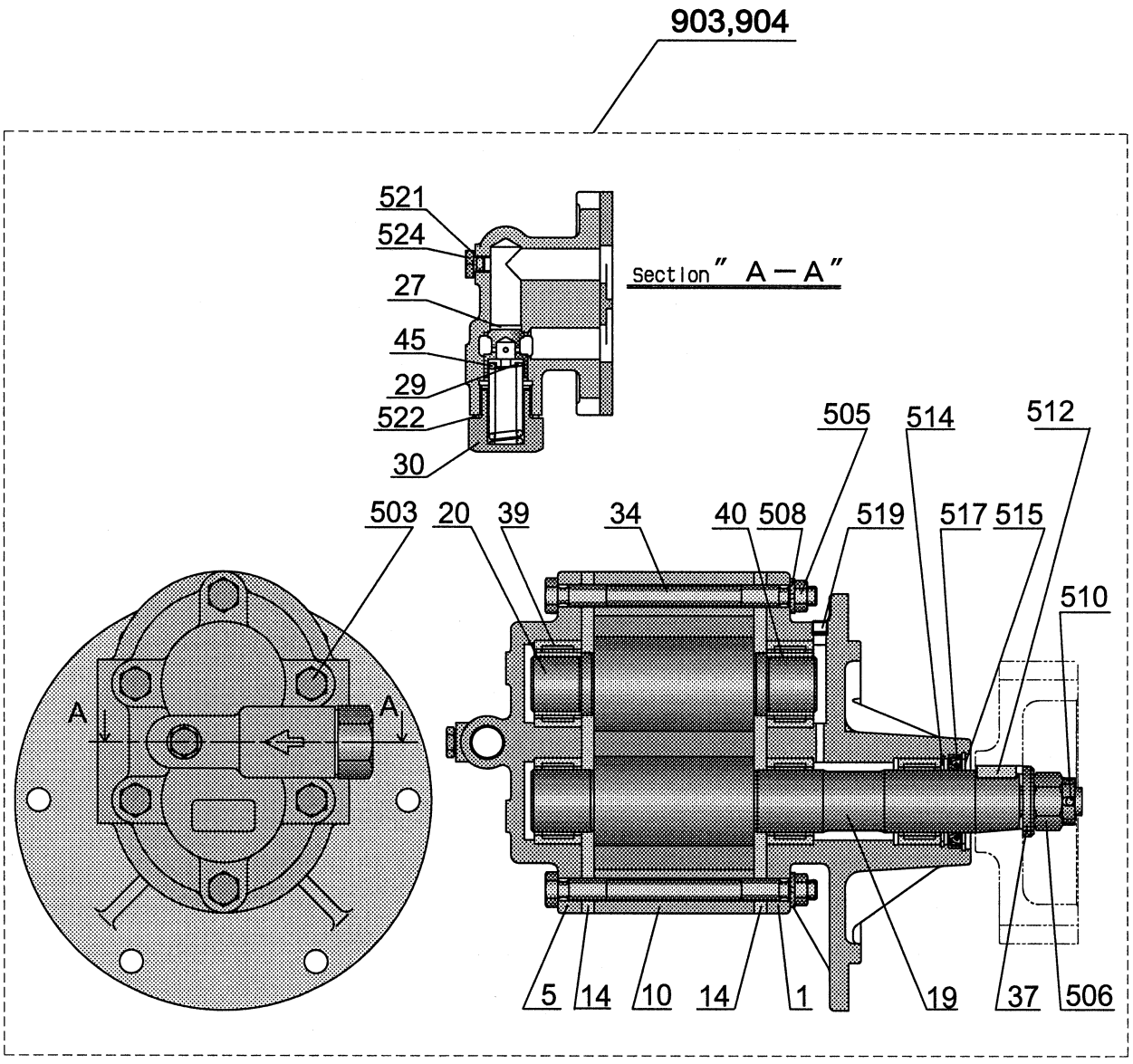


潤滑油ポンプ-変速型(主機)-6DK
LUBLICATING OIL PUMP - VARIABLE SPEED TYPE (FOR PROPULSION)-6DK

①……正転 NORMAL ROTATION　②……逆転 REVERSE ROTATION

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity ①	②
907	C034790070	L.O. ポンプ ASSY. V184R	L.O. PUMP ASSY. V184R	1	
908	C034790080	L.O. ポンプ ASSY. V184L	L.O. PUMP ASSY. V184L		1
6	C034700060	ポンプタイフタ (V184)	L.O. PUMP COVER (V184)	1	1
12	C034700120	ポンプタイ (V184)	L.O. PUMP BODY(V184)	1	1
24	C034700240	ポンプモトギヤ (V184)	L.O. PUMP DRIVING GEAR (V184)	1	1
25	C034700250	ポンプウケギヤ (V184)	L.O. PUMP DRIVEN GEAR (V184)	1	1
27	C036340240	アンゼンベン	SAFETY VALVE	1	1
29	C036340260	アンゼンベンバネウケ	RETAINER, SAFETY VALVE SPRING	1	1
30	G003100370	アンゼンベンバネオサエ	CAP, SAFETY VALVE SPRING	1	1
37	G003100390	ヒラザガネ	FLAT WASHER	1	1
42	E170500470	ベアリング	BEARING	5	5
46	AE01106010	バネ	SPRING	1	1
501	X200012030ZZ	ボルト	BOLT	6	6
506	X225122000ZZ	キクナツト	CASTLE NUT	1	1
510	Z320005040ZZ	ワリピン	SPLIT PIN	1	1
512	Z400010025ZZ	キー	KEY	1	1
519	Z571501000ZZ	テーパプラグ	TAPER PLUG	1	1
521	Z665010000ZZ	マルパツキン	GASKET	1	1
522	Z665034000ZZ	マルパツキン	GASKET	1	1
524	X670010000ZZ	ロツカクプラグ	HEX.-PLUG	1	1
526	Z461355511SC	オイルシール	OIL SEAL	1	1
527	Z412005500ZZ	スナツプリング	SNAP RING	1	1
529	Z412005000ZZ	スナツプリング	SNAP RING	1	1
531	Z335008025ZZ	ヘイコウピ	STRAIGHT PIN	2	2

潤滑油ポンプ-変速型(主機)-8DK
LUBLICATING OIL PUMP - VARIABLE SPEED TYPE (FOR PROPULSION)-8DK

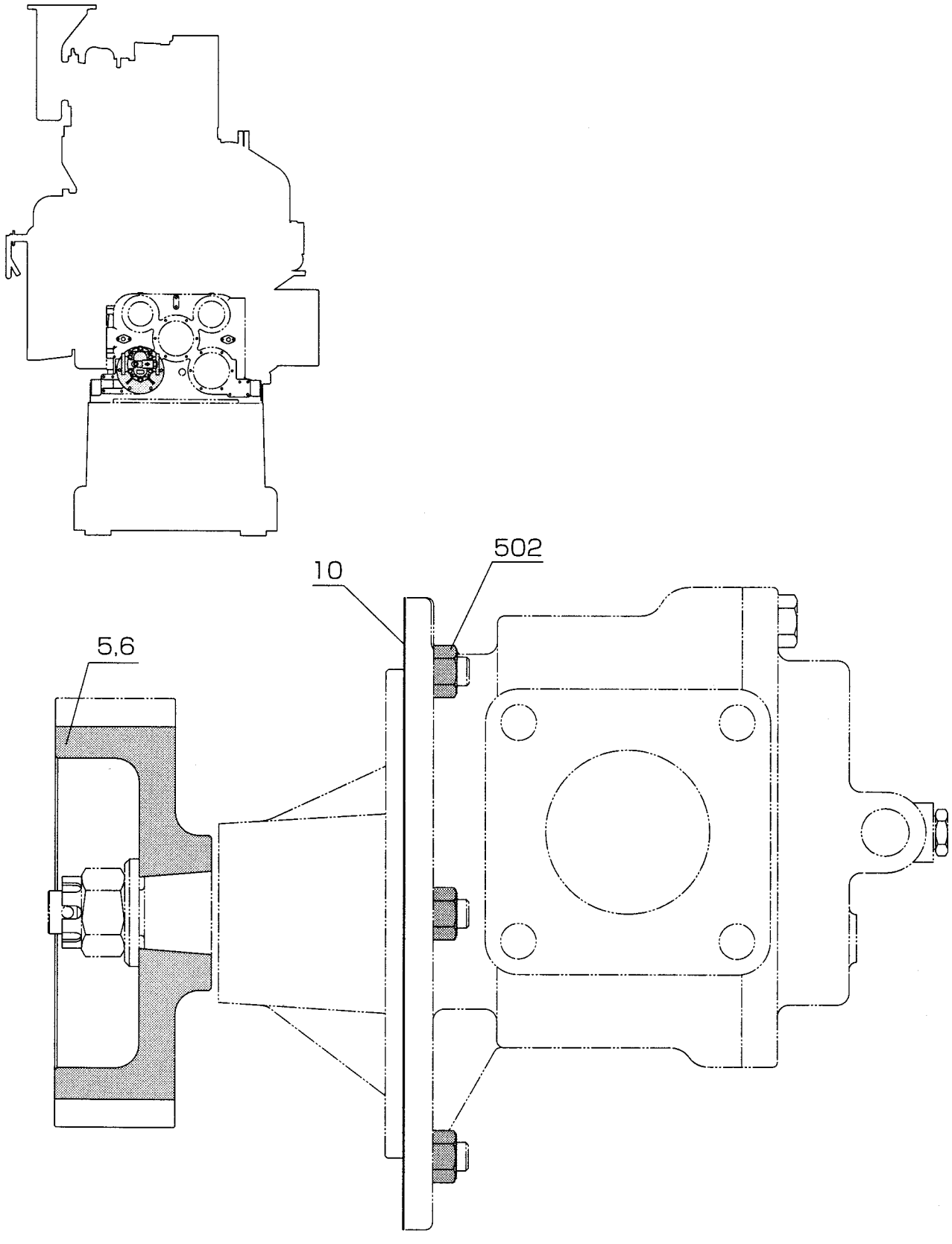


潤滑油ポンプ-変速型(主機)-8DK
LUBLICATING OIL PUMP - VARIABLE SPEED TYPE (FOR PROPULSION)-8DK

(1) 正転 NORMAL ROTATION　逆転 REVERSE ROTATION

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity (1)	(2)
903	**C034790030**	LOポンプASSY V232R	**L.O. PUMP ASSY. V232R**	**1**	
904	**C034790040**	LOポンプASSY V232L	**L.O. PUMP ASSY. V232L**		**1**
1	C034700010	ポンプジクウケ	L.O. PUMP BEARING RETAINER	1	1
5	G003100050	フタ, ポンプタイ V120D	COVER,PUMP BODY V120D	1	1
10	C034700100	タイ, ポンプ V232	BODY,PUMP V232	1	1
14	G003100190	イタ, シキリ	PLATE,PARTITION	2	2
19	C034700190	ポンプモトギヤ(V232)	PUMP DRIVING GEAR (V232)	1	1
20	C034700200	ポンプウケギヤ(V232)	PUMP DRIVEN GEAR(V232)	1	1
27	C036340240	アンゼンベン	SAFETY VALVE	1	1
29	C036340260	アンゼンベンバネウケ	RETAINER,SAFETY VALVE SPRING	1	1
30	G003100370	アンゼンベンバネオサエ	CAP,SAFETY VALVE SPRING	1	1
34	C034700340	リーマボルト	REAMER BOLT	2	2
37	G003100390	ヒラザガネ	FLAT WASHER	1	1
39	H616503040	ニードルベアリング	NEEDLE BEARING	5	5
40	G003100550	インナーレース	INNER RING	2	
45	G003100503	バネ	SPRING	1	1
503	X205012150ZZ	HTボルト	HT BOLT	4	4
505	X220012000ZZ	ナット	NUT	2	2
506	X225122000ZZ	キクナット	CASTLE NUT	1	1
508	Z310012000ZZ	バネザガネ	SPRING WASHER	2	2
510	Z320005040ZZ	ワリピン	SPLIT PIN	1	1
512	Z400010025ZZ	キー	KEY	1	1
514	Z412005600ZZ	スナップリング	SNAP RING	1	1
515	Z412006000ZZ	スナップリング	SNAP RING	1	1
517	Z461406008SB	オイルシール	OIL SEAL	1	1
519	Z571501000ZZ	テーパプラグ	TAPER PLUG	1	1
521	Z665010000ZZ	マルパッキン	GASKET	1	1
522	Z665034000ZZ	マルパッキン	GASKET	1	1
524	X670010000ZZ	ロッカクプラグ	HEX. PLUG	1	1

潤滑油ポンプ取付
LUBRICATING OIL PUMP FITTING

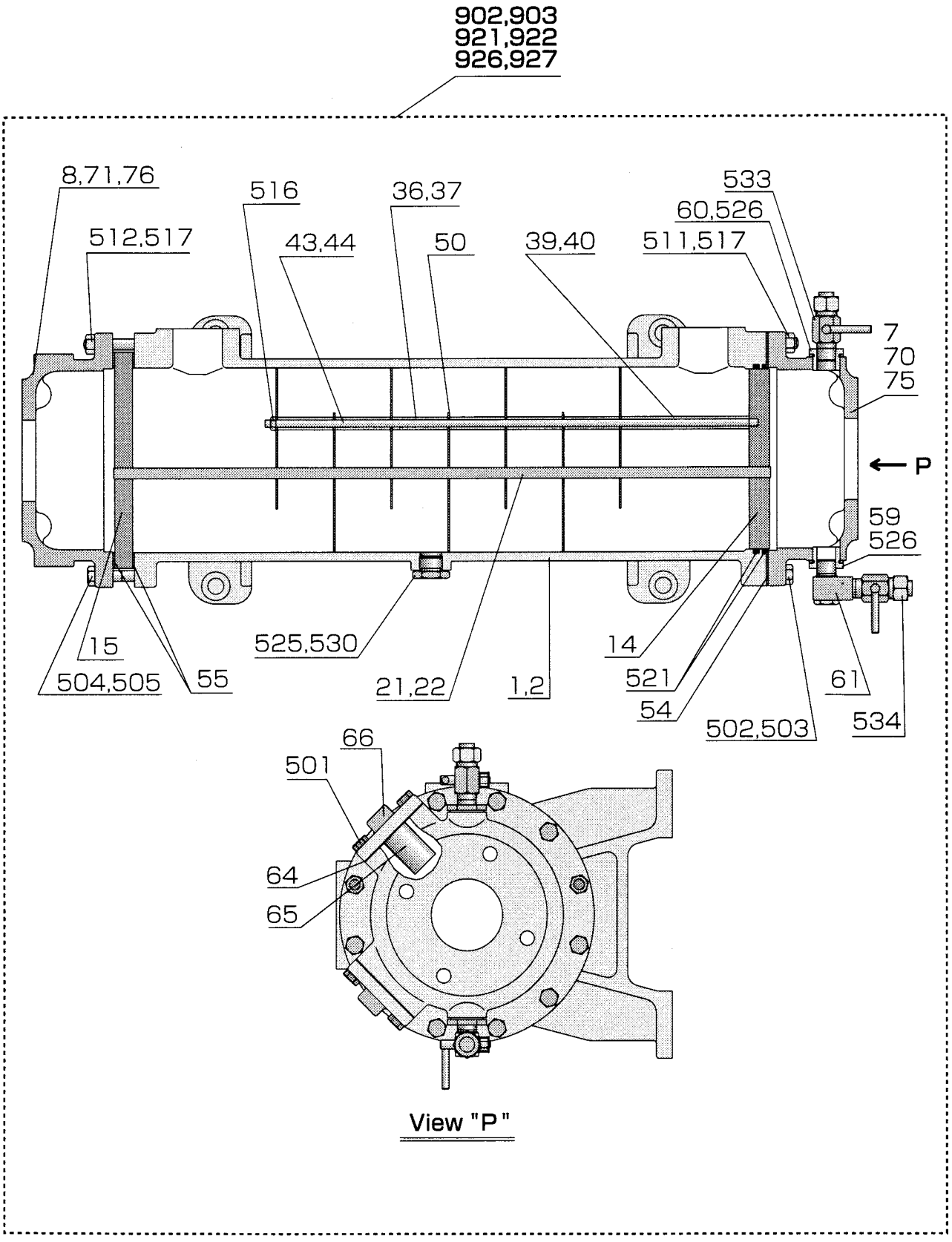


潤滑油ポンプ取付
LUBRICATING OIL PUMP FITTING

①……720～750rpm　②……900rpm

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity ①	②
5	E210550050	LO ポンプギヤ (Z34)	L.O. PUMP GEAR (Z34)	1	
6	E210550060	LO ポンプギヤ (Z37)	L.O. PUMP GEAR (Z37)		1
10	E203150130	ガスケット	GASKET	1	1
502	X220012000ZZ	ナット	NUT	6	6

潤滑油冷却器（海水）- 6DK
LUBRICATING OIL COOLER (SEA WATER) - 6DK



潤滑油冷却器（海水）- 6DK
LUBRICATING OIL COOLER (SEA WATER) - 6DK

①…タールエポキシコーティング Tar epoxy coating　②…ネオプレンコーティング Neoprene coating　③…ネオプレンライニング Neoprene lining

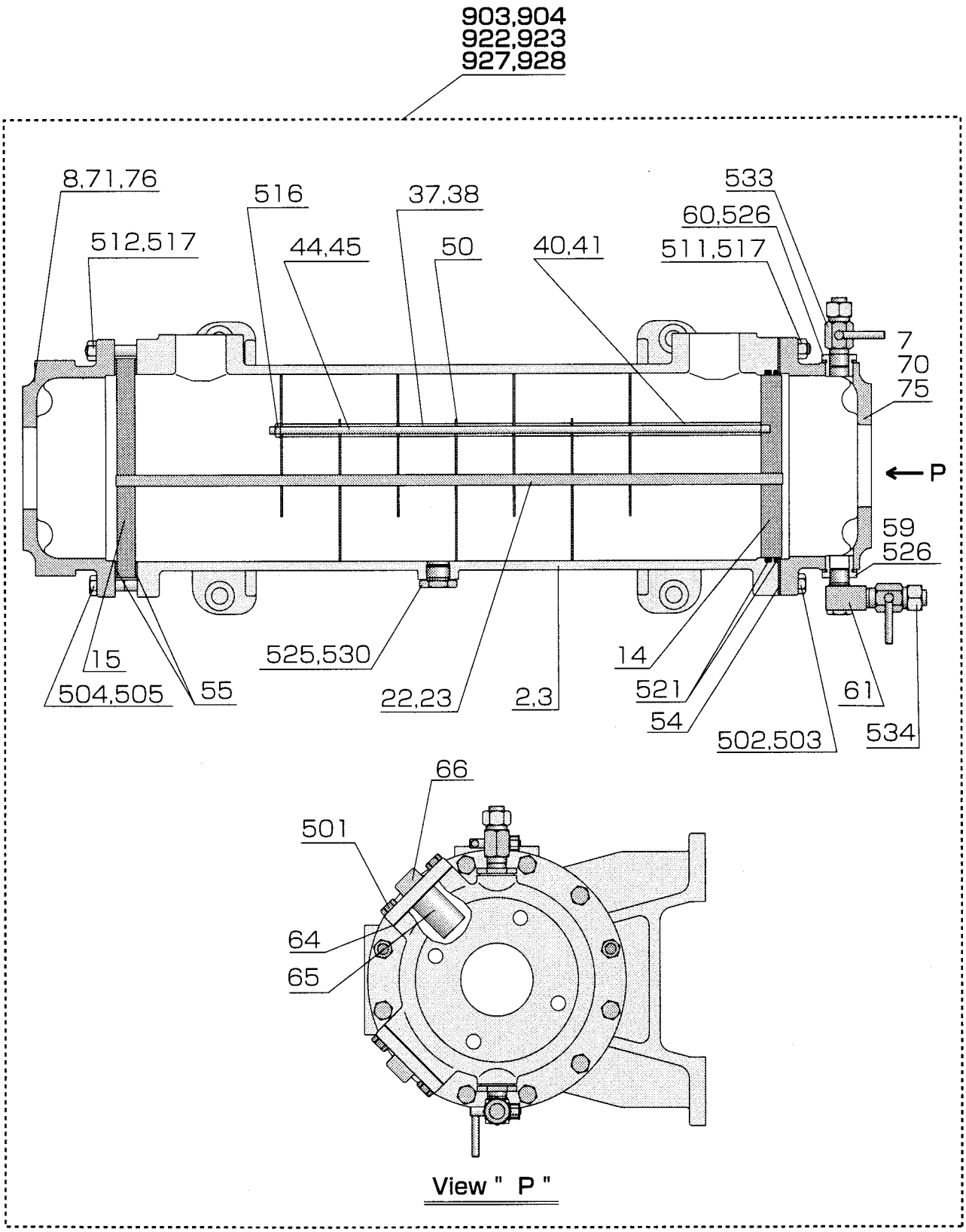
番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity 8 m² ①	8 m² ②	8 m² ③	12 m² ①	12 m² ②	12 m² ③
902	C041090020	オイルクーラ (F-8)	OIL COOLER (F-8)	1					
903	C041090030	オイルクーラ (F-12)	OIL COOLER (F-12)				1		
921	C041090210	オイルクーラ (F-8)-NC	OIL COOLER (F-8)-NC		1				
922	C041090220	オイルクーラ (F-12)-NC	OIL COOLER (F-12)-NC					1	
926	C041090260	オイルクーラ (F-8)-NL	OIL COOLER (F-8)-NL			1			
927	C041090270	オイルクーラ (F-12)-NL	OIL COOLER (F-12)-NL						1
1	C041010010	ケーシング (1)	SHELL (1)	1	1	1			
2	C041010020	ケーシング (2)	SHELL (2)				1	1	1
7	C041010070	サイドカバー (1)	SIDE COVER (1)	1			1		
8	C041010080	サイドカバー (2)	SIDE COVER (2)	1			1		
14	C041070140	チユーブプレート (3)	TUBE PLATE (3)	1	1	1	1	1	1
15	C041070150	チユーブプレート (4)	TUBE PLATE (4)	1	1	1	1	1	1
21	C041070201	ローフインチユーブ (1)	LOW FIN TUBE (1)	118	118	118			
22	C041070202	ローフインチユーブ (2)	LOW FIN TUBE (2)				118	118	118
36	C041070360	スペーサ-1 (F-8)	SPACER-1 (F-8)	24	24	24			
37	C041070370	スペーサ-1 (F-12)	SPACER-1 (F-12)				48	48	48
39	C041070390	スペーサ-2 (F-8)	SPACER-2 (F-8)	4	4	4			
40	C041070400	スペーサ-2 (F-12)	SPACER-2 (F-12)				4	4	4
43	C041070430	タイロツド (2)	STAY BOLT (2)	4	4	4			
44	C041070440	タイロツド (3)	STAY BOLT (3)				4	4	4
50	C041070500	ジヤマイタ	BUFFLE PLATE	7	7	7	13	13	13
54	C041070540	ガスケツト (1)	GASKET (1), TUBE PLATE	1	1	1	1	1	1
55	C041070550	ガスケツト (2)	GASKET (2), TUBE PLATE	2	2	2	2	2	2
59	C036840020	セツシユザ	JOINT SEAT	1	1	1	1	1	1
60	C036840040	セツシユザ	JOINT SEAT	1	1	1	1	1	1
61	C041070610	センカイエルボ	ROTATING ELBOW	1	1	1	1	1	1
64	C037400320	ホゴアエントリツケフランジパツキン	PACKING, ZINC PROTECTOR	4	4	4	4	4	4
65	C045170020	ホゴアエン	PROTECTIVE ZINC	4	4	4	4	4	4
66	C037110240	ホゴアエンフランジ	FLANGE, PROTECTIVE ZINC	4	4	4	4	4	4
70	C041010700	サイドカバー (1) -NC	SIDE COVER (1)-NC		1			1	
71	C041010710	サイドカバー (2) -NC	SIDE COVER (2)-NC		1			1	
75	C041010750	サイドカバー (1) -NL	SIDE COVER (1)-NL			1			1
76	C041010760	サイドカバー (2) -NL	SIDE COVER (2)-NL			1			1
501	X200010025ZZ	ボルト	BOLT	8	8	8	8	8	8
502	X200012035ZZ	ボルト	BOLT	8	8	8	8	8	8
503	X200012045ZZ	ボルト	BOLT	2	2	2	2	2	2
504	X200012060ZZ	ボルト	BOLT	8	8	8	8	8	8
505	X200012065ZZ	ボルト	BOLT	2	2	2	2	2	2
511	X210012054ZZ	スタツド	STUD	2	2	2	2	2	2
512	X210012074ZZ	スタツド	STUD	2	2	2	2	2	2
516	X220008000ZZ	ナツト	NUT	4	4	4	4	4	4
517	X220012000ZZ	ナツト	NUT	4	4	4	4	4	4

潤滑油冷却器（海水）- 6DK
LUBRICATING OIL COOLER (SEA WATER) - 6DK

①…タールエポキシコーティング Tar epoxy coating　②…ネオプレンコーティング Neoprene coating　③…ネオプレンライニング Neoprene lining

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity 8 m² ①	8 m² ②	8 m² ③	12 m² ①	12 m² ②	12 m² ③
521	Z560220057ZZ	O リング	O-RING	2	2	2	2	2	2
525	Z565002700ZZ	マルパツキン	GASKET	1	1	1	1	1	1
526	Z665030000ZZ	マルパツキン	GASKET	2	2	2	2	2	2
530	X570006000ZZ	ロツカクプラグ	HEX.PLUG	1	1	1	1	1	1
533	Z580102000ZZ	ドレンコツク	DRAIN COCK	1	1	1	1	1	1
534	Z580104000ZZ	ドレンコツク	DRAIN COCK	1	1	1	1	1	1

潤滑油冷却器（海水）- 8DK
LUBRICATING OIL COOLER (SEA WATER) - 8DK



潤滑油冷却器（海水）- 8DK
LUBRICATING OIL COOLER (SEA WATER) - 8DK

①…タールエポキシコーティング Tar epoxy coating　②…ネオプレンコーティング Neoprene coating　③…ネオプレンライニング Neoprene lining

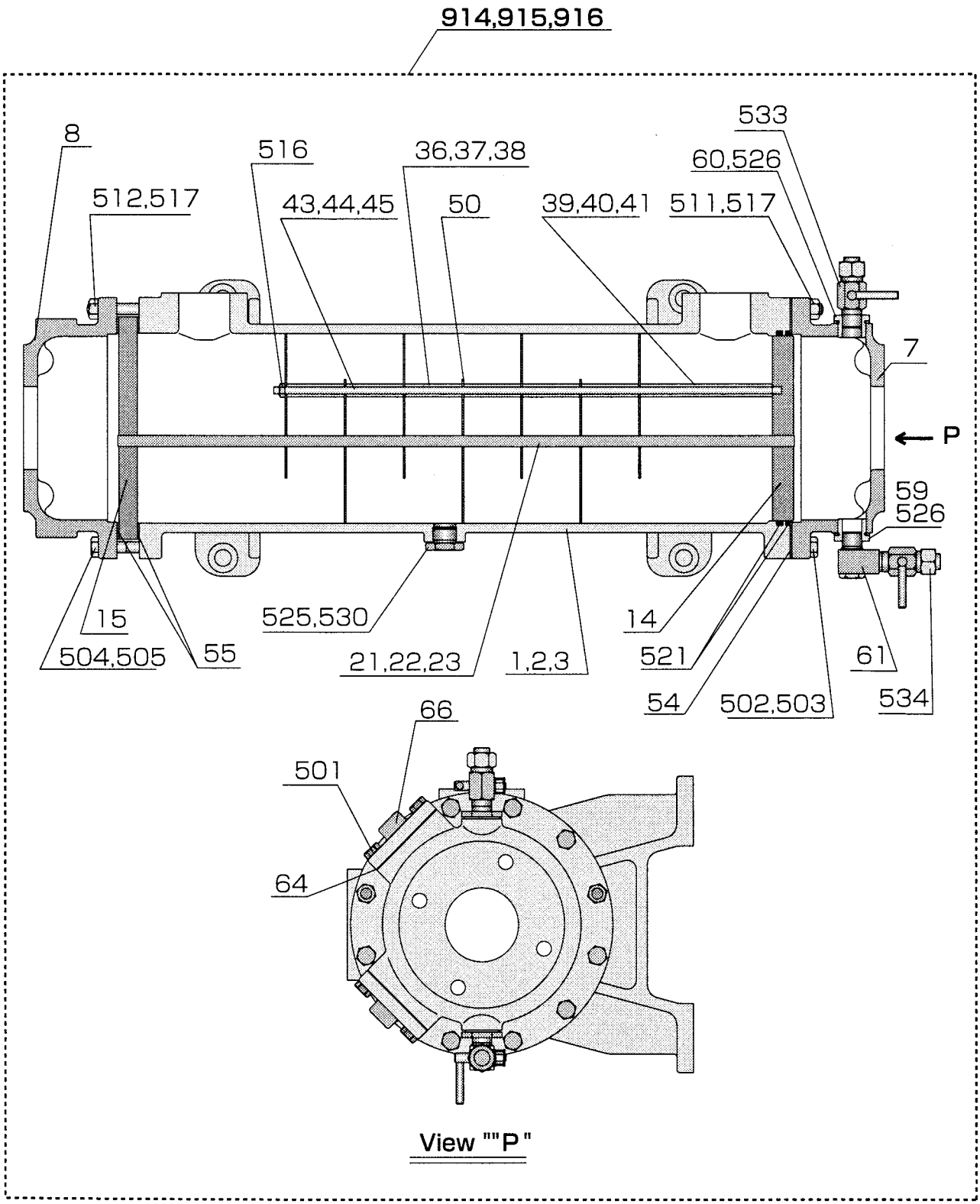
番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity 12 m² ①	12 m² ②	12 m² ③	16 m² ①	16 m² ②	16 m² ③
903	C041090030	オイルクーラ (F-12)	OIL COOLER (F-12)	1					
904	C041090040	オイルクーラ (F-16)	OIL COOLER (F-16)				1		
922	C041090220	オイルクーラ (F-12)-NC	OIL COOLER (F-12)-NC		1				
923	C041090230	オイルクーラ (F-16)-NC	OIL COOLER (F-16)-NC					1	
927	C041090270	オイルクーラ (F-12)-NL	OIL COOLER (F-12)-NL			1			
928	C041090280	オイルクーラ (F-16)-NL	OIL COOLER (F-16)-NL						1
2	C041010020	ケーシング (2)	SHELL (2)	1	1	1			
3	C041010030	ケーシング (3)	SHELL (3)				1		
7	C041010070	サイドカバー (1)	SIDE COVER (1)	1			1		
8	C041010080	サイドカバー (2)	SIDE COVER (2)	1			1		
14	C041070140	チユーブプレート (3)	TUBE PLATE (3)	1	1	1	1	1	1
15	C041070150	チユーブプレート (4)	TUBE PLATE (4)	1	1	1	1	1	1
22	C041070202	ローフインチユーブ (2)	LOW FIN TUBE (2)	118	118	118			
23	C041070203	ローフインチユーブ (3)	LOW FIN TUBE (3)				118	118	118
37	C041070370	スペーサ-1 (F-12)	SPACER-1 (F-12)	48	48	48			
38	C041070380	スペーサ-1 (F-16)	SPACER-1 (F-16)				40	40	40
40	C041070400	スペーサ-2 (F-12)	SPACER-2 (F-12)	4	4	4			
41	C041070410	スペーサ-2 (F-16)	SPACER-2 (F-16)				4	4	4
44	C041070440	タイロツド (3)	STAY BOLT (3)	4	4	4			
45	C041070450	タイロツド (4)	STAY BOLT (4)				4	4	4
50	C041070500	ジヤマイタ	BUFFLE PLATE	13	13	13	11	11	11
54	C041070540	ガスケツト (1)	GASKET (1), TUBE PLATE	1	1	1	1	1	1
55	C041070550	ガスケツト (2)	GASKET (2), TUBE PLATE	2	2	2	2	2	2
59	C036840020	セツシユザ	JOINT SEAT	1	1	1	1	1	1
60	C036840040	セツシユザ	JOINT SEAT	1	1	1	1	1	1
61	C041070610	センカイエルボ	ROTATING ELBOW	1	1	1	1	1	1
64	C037400320	ホゴアエントリツケフランジパツキン	PACKING, ZINC PROTECTOR	4	4	4	4	4	4
65	C045170020	ホゴアエン	PROTECTIVE ZINC	4	4	4	4	4	4
66	C037110240	ホゴアエンフランジ	FLANGE, PROTECTIVE ZINC	4	4	4	4	4	4
70	C041010700	サイドカバー (1)-NC	SIDE COVER (1)-NC		1			1	
71	C041010710	サイドカバー (2)-NC	SIDE COVER (2)-NC		1			1	
75	C041010750	サイドカバー (1)-NL	SIDE COVER (1)-NL			1			1
76	C041010760	サイドカバー (2)-NL	SIDE COVER (2)-NL			1			1
501	X200010025ZZ	ボルト	BOLT	8	8	8	8	8	8
502	X200012035ZZ	ボルト	BOLT	8	8	8	8	8	8
503	X200012045ZZ	ボルト	BOLT	2	2	2	2	2	2
504	X200012060ZZ	ボルト	BOLT	8	8	8	8	8	8
505	X200012065ZZ	ボルト	BOLT	2	2	2	2	2	2
511	X210012054ZZ	スタツド	STUD	2	2	2	2	2	2
512	X210012074ZZ	スタツド	STUD	2	2	2	2	2	2
516	X220008000ZZ	ナツト	NUT	4	4	4	4	4	4
517	X220012000ZZ	ナツト	NUT	4	4	4	4	4	4

潤滑油冷却器（海水）- 8DK
LUBRICATING OIL COOLER (SEA WATER) - 8DK

①…タールエポキシコーティング Tar epoxy coating　②…ネオプレンコーティング Neoprene coating　③…ネオプレンライニング Neoprene lining

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity 12 m² ①	12 m² ②	12 m² ③	16 m² ①	16 m² ②	16 m² ③
521	Z560220057ZZ	O リング	O-RING	2	2	2	2	2	2
525	Z565002700ZZ	マルパツキン	GASKET	1	1	1	1	1	1
526	Z665030000ZZ	マルパツキン	GASKET	2	2	2	2	2	2
530	X570006000ZZ	ロツカクプラグ	HEX.PLUG	1	1	1	1	1	1
533	Z580102000ZZ	ドレンコツク	DRAIN COCK	1	1	1	1	1	1
534	Z580104000ZZ	ドレンコツク	DRAIN COCK	1	1	1	1	1	1

潤滑油冷却器（清水）
LUBRICATING OIL COOLER (FRESH WATER)



潤滑油冷却器（清水）
LUBRICATING OIL COOLER (FRESH WATER)

潤滑油冷却器容量
CAPACITY of L.O. COOLER ①……8m² ②……12m² ③……16m²

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity ①	②	③
914	**C041090140**	**オイルクーラ (F-8) F.W.**	**OIL COOLER (F-8) F.W.**	**1**		
915	**C041090150**	**オイルクーラ (F-12) F.W.**	**OIL COOLER (F-12) F.W.**		**1**	
916	**C041090160**	**オイルクーラ (F-16) F.W.**	**OIL COOLER (F-16) F.W.**			**1**
1	C041010010	ケーシング (1)	SHELL (1)	1		
2	C041010020	ケーシング (2)	SHELL (2)		1	
3	C041010030	ケーシング (3)	SHELL (3)			1
7	C041010070	サイドカバー (1)	SIDE COVER (1)	1	1	1
8	C041010080	サイドカバー (2)	SIDE COVER (2)	1	1	1
14	C041070140	チユーブプレート (3)	TUBE PLATE (3)	1	1	1
15	C041070150	チユーブプレート (4)	TUBE PLATE (4)	1	1	1
21	C041070201	ローフインチユーブ (1)	LOW FIN TUBE (1)	118		
22	C041070202	ローフインチユーブ (2)	LOW FIN TUBE (2)		118	
23	C041070203	ローフインチユーブ (3)	LOW FIN TUBE (3)			118
36	C041070360	スペーサ-1 (F-8)	SPACER-1 (F-8)	24		
37	C041070370	スペーサ-1 (F-12)	SPACER-1 (F-12)		48	
38	C041070380	スペーサ-1 (F-16)	SPACER-1 (F-16)			40
39	C041070390	スペーサ-2 (F-8)	SPACER-2 (F-8)	4		
40	C041070400	スペーサ-2 (F-12)	SPACER-2 (F-12)		4	
41	C041070410	スペーサ-2 (F-16)	SPACER-2 (F-16)			4
43	C041070430	タイロツド (2)	STAY BOLT (2)	4		
44	C041070440	タイロツド (3)	STAY BOLT (3)		4	
45	C041070450	タイロツド (4)	STAY BOLT (4)			4
50	C041070500	ジヤマイタ	BUFFLE PLATE	7	13	11
54	C041070540	ガスケツト (1)	GASKET (1), TUBE PLATE	1	1	1
55	C041070550	ガスケツト (2)	GASKET (2), TUBE PLATE	2	2	2
59	C036840020	セツシユザ	JOINT SEAT	1	1	1
60	C036840040	セツシユザ	JOINT SEAT	1	1	1
61	C041070610	センカイエルボ	ROTATING ELBOW	1	1	1
64	C037400320	ホゴアエントリツケフランジパツキン	PACKING, ZINC PROTECTOR	4	4	4
66	C037110240	ホゴアエンフランジ	FLANGE, PROTECTIVE ZINC	4	4	4
501	X200010025ZZ	ボルト	BOLT	8	8	8
502	X200012035ZZ	ボルト	BOLT	8	8	8
503	X200012045ZZ	ボルト	BOLT	2	2	2
504	X200012060ZZ	ボルト	BOLT	8	8	8
505	X200012065ZZ	ボルト	BOLT	2	2	2
511	X210012054ZZ	スタツド	STUD	2	2	2
512	X210012074ZZ	スタツド	STUD	2	2	2
516	X220008000ZZ	ナツト	NUT	4	4	4
517	X220012000ZZ	ナツト	NUT	4	4	4
521	Z560220057ZZ	O リング	O-RING	2	2	2
525	Z565002700ZZ	マルパツキン	GASKET	1	1	1

CHAPTER 4

ITEM 3.3.3

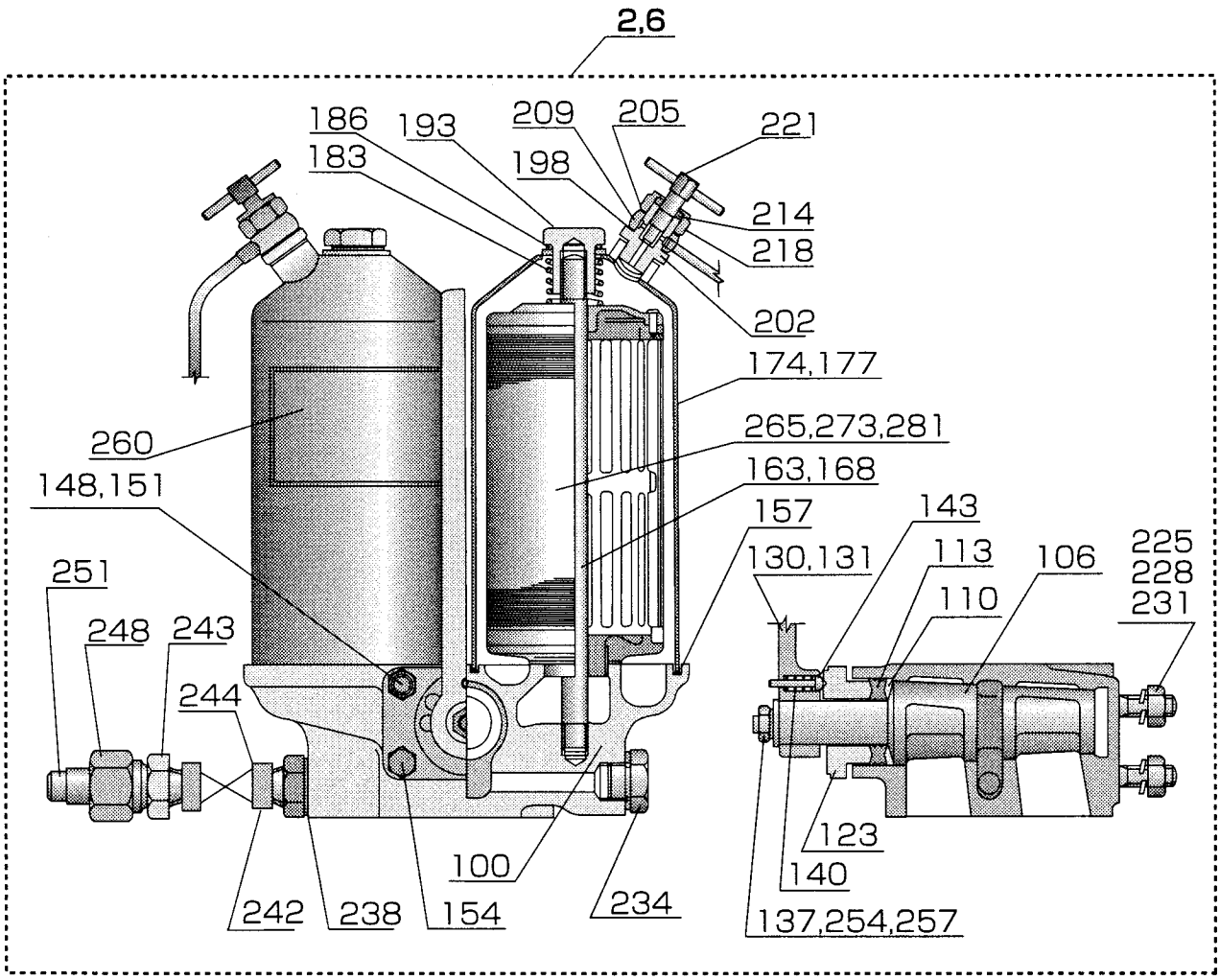
6·8DK-20

潤滑油冷却器（清水）
LUBRICATING OIL COOLER (FRESH WATER)

潤滑油冷却器容量
CAPACITY of L.O. COOLER ①……8m² ②……12m² ③……16m²

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity ①	②	②
526	Z665030000ZZ	マルパツキン	GASKET	2	2	2
530	X570006000ZZ	ロツカクプラグ	HEX.PLUG	1	1	1
533	Z580102000ZZ	ドレンコツク	DRAIN COCK	1	1	1
534	Z580104000ZZ	ドレンコツク	DRAIN COCK	1	1	1

潤滑油ロキ
LUBRICATING OIL FILTER



潤滑油ロキ
LUBRICATING OIL FILTER

①……6DK ②……8DK

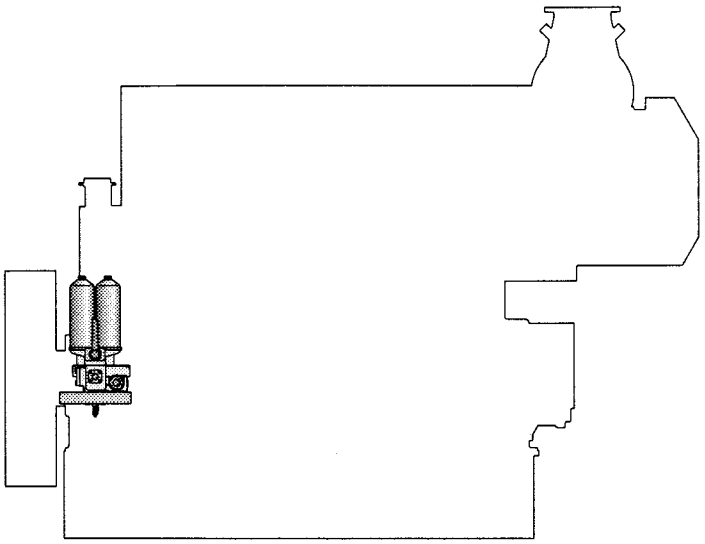
番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity ①	②
2	C060600011	ロキ	FILTER	1	
6	C060600015	ロキ	FILTER		1
100	Y529000003	ロキホンタイ	FILTER BODY	1	1
106	Y529000013	キリカエコック	COCK	1	1
110	Y529000023	パッキンシート	PACKING SEAT	1	1
113	Y529000032	パッキン（コック）	PACKING (COCK)	1	1
123	Y529000045	オサエフタ	COCK COVER	1	1
130	Y529000055	ハンドル	HANDLE	1	
131	Y529000056	ハンドル	HANDLE		1
137	Y529000064	ナット（ハンドル）	NUT (HANDLE)	1	1
140	Y529000071	バネ（トメセン）	SPRING (NOTCH BAR)	1	1
143	Y529000078	トメセン	NOTCH BAR	1	1
148	Y529000085	スタッド（フタ）	STUD (COVER)	2	2
151	Y529000092	ナット（フタ）	NUT (COVER)	2	2
154	Y529000098	ボルト（フタ）	BOLT (COVER)	2	2
157	Y529000107	パッキン（ロキケース）	PACKING (CASING)	2	2
163	Y529000118	ジク	SHAFT	2	
168	Y529000127	ジク	SHAFT		2
174	Y529000137	ケース	CASING	2	
177	Y529000140	ケース	CASING		2
183	Y529000149	バネ（ロキケース）	SPRING (CASING)	2	2
186	Y529000155	パッキン（シメツケナット）	PACKING (CAP NUT)	2	2
193	Y529000163	シメツケナット	CAP NUT	2	2
198	Y529000178	パッキン（ベンザ）	PACKING (VALVE SEAT)	2	2
202	Y529000184	ベンザ	VALVE SEAT	2	2
205	Y529000189	パッキン（カンセツシュ）	PACKING (CONNECTOR)	4	4
209	Y529000194	カンセツシュ	CONNECTOR	2	2
214	Y529000200	パッキン（フクロナット）	PACKING (SLEEVE NUT)	2	2
218	Y529000207	フクロナット	SLEEVE NUT	2	2
221	Y529000211	クウキヌキセン	AIR PLUG	2	2
225	Y529000217	スタッド（ロキトリツケ）	STUD	4	4
228	Y529000224	バネザガネ（ロキトリツケ）	SPRING WASHER	4	4
231	Y529000229	ナット（ロキトリツケ）	NUT	4	4
234	Y529000234	プラグ（ドレン）	PLUG	1	1
238	Y529000239	パッキン	PACKING	2	2
242	Y529000244	ニップル	NIPPLE	1	1
243	Y529000258	クイコミセッシュ	CONNECTER	1	1
244	Y529000249	バルブ	VALVE	1	1
248	Y529000251	スリーブナット	SLEEVE NUT	1	1
251	Y529000256	スリーブ	SLEEVE	1	1
254	Y529000261	ザガネ（ハンドル）	WASHER (HANDLE)	1	1
257	Y529000268	バネザガネ（ハンドル）	SPRING WASHER (HANDLE)	1	1

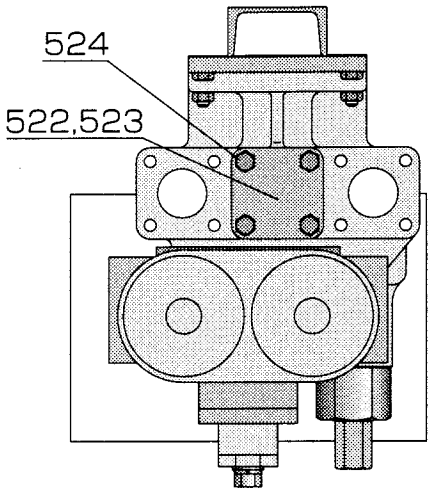
潤滑油ロキ
LUBRICATING OIL FILTER

①……6DK ②……8DK

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity ①	②
260	Y529000273	チュウイメイバン	NAME PLATE	1	1
265	Y529000287	エレメント ASSY-200ME	ELEMENT ASSY. (200ME)	2	
273	Y529000299	エレメント ASSY-200ME	ELEMENT ASSY. (200ME)		2
281	Y529000308	エレメントパッキン	PACKING	2	2

潤滑油調圧弁 & ロキ取付 (前端過給) - カバー無
LUBRICATING OIL RELIEF VALVE & FILTER FITTING (FRONT T/C) WITHOUT COVER





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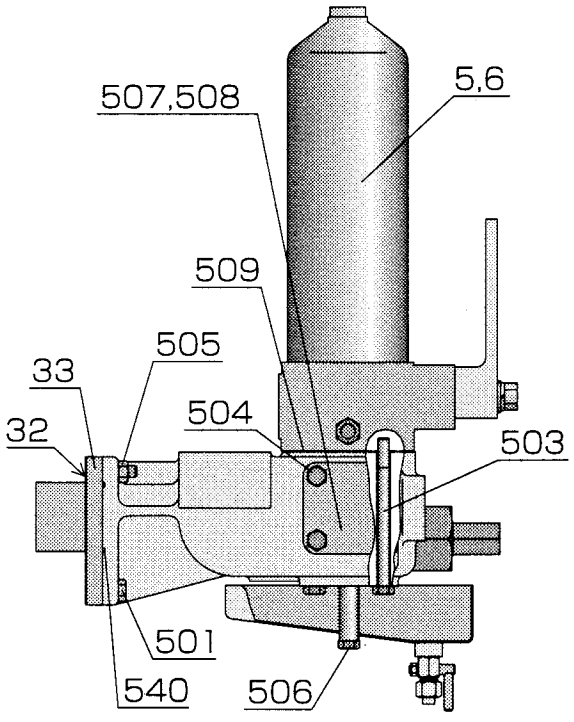
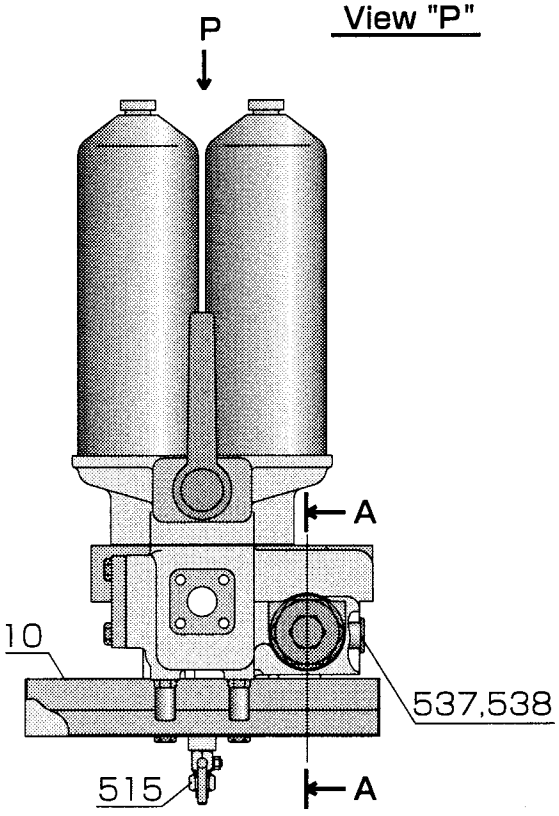
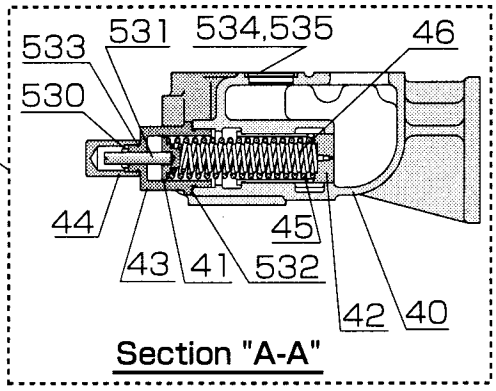






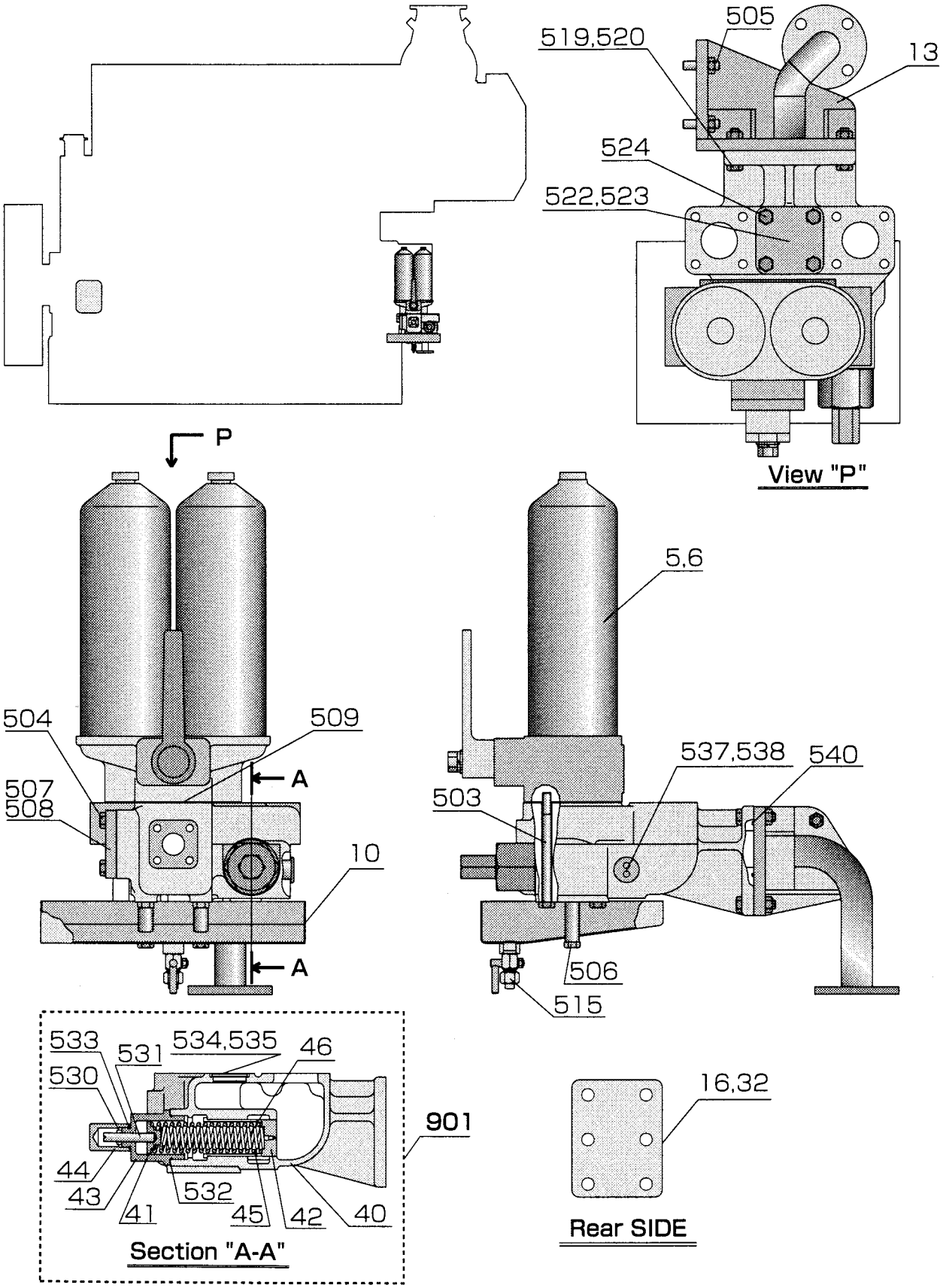
Section "A-A"

潤滑油調圧弁 & ロキ取付 (前端過給) - カバー無
LUBRICATING OIL RELIEF VALVE & FILTER FITTING (FRONT T/C) WITHOUT COVER

①……6DK ②……8DK

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity ①	②
901		チヨウアツベン ASSY.	L.O. RELIEF VALVE ASSY.	1	1
5	C060600011	ロキ	FILTER	1	
6	C060600015	ロキ	FILTER		1
10	E214150100	ウケザラ, LO ロキ	SAUCER, L.O. FILTER	1	1
32	E214150320	ガスケット LO ロキブラケツト	GASKET, L.O. FILTER BRACKET	1	1
33	E214150330	LO ロキブラケツト	BRACKET, L.O. FILTER	1	1
40	E214150400	チヨウアツベンタイ	BODY, RELIEF VALVE	1	1
41	C037540050	バネウケ	RETAINER, VALVE SPRING	1	1
42	C037540060	ベン	VALVE	1	1
43	C037540070	バネケース	VALVE SPRING CASE	1	1
44	C037540080	キヤツプ	CAP	1	1
45	C037570151	バネ	SPRING	1	1
46	C037570201	バネ	SPRING	1	1
501	X205012050ZZ	ＨＴボルト	HT BOLT	2	2
503	X200012150ZZ	ボルト	BOLT	4	4
504	X200012030ZZ	ボルト	BOLT	4	4
505	X220012000ZZ	ナツト	NUT	2	2
506	X200012065ZZ	ボルト	BOLT	2	2
507	Z540200065ZZ	フランジ	FLANGE	1	1
508	Z541206065ZZ	パツキン	GASKET	1	1
509	Z541104275ZZ	パツキン	GASKET	1	1
515	Z580203000ZZ	ドレンコツク	DRAIN COCK	1	1
522	Z540200065ZZ	フランジ	FLANGE	1	1
523	Z541206065ZZ	パツキン	GASKET	1	1
524	X200012030ZZ	ボルト	BOLT	4	4
530	X222312000ZZ	コガタナツト	NUT	1	1
531	X251512070ZZ	トメネジ	SET SCREW	1	1
532	Z565006100ZZ	マルパツキン	GASKET	1	1
533	Z565002700ZZ	マルパツキン	GASKET	1	1
534	X572242000ZZ	トクシユプラグ	SPECIAL PLUG	1	1
535	Z565004200ZZ	マルパツキン	GASKET	1	1
537	X570006000ZZ	ロツカクプラグ	HEX.PLUG	1	1
538	Z565002700ZZ	マルパツキン	GASKET	1	1
540	Z560207031ZZ	O リング	O-RING	1	1

潤滑油調圧弁 & ロキ取付 (後端過給) - カバー無
LUBRICATING OIL RELIEF VALVE & FILTER FITTING (REAR T/C) WITHOUT COVER

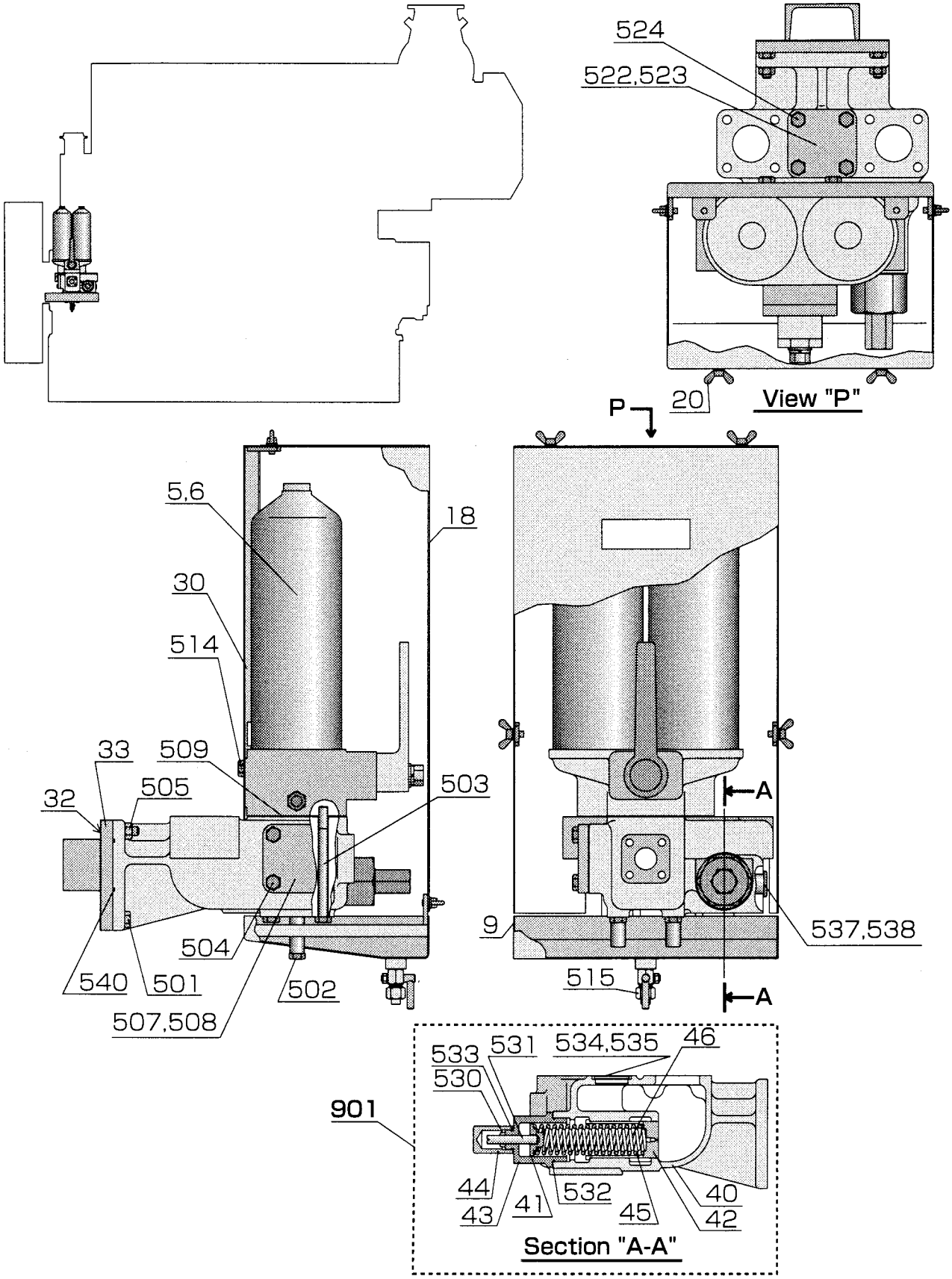


潤滑油調圧弁 & ロキ取付 (後端過給) - カバー無
LUBRICATING OIL RELIEF VALVE & FILTER FITTING (REAR T/C) WITHOUT COVER

①……6DK ②……8DK

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity ①	②
901		チヨウアツベン ASSY.	L.O. RELIEF VALVE ASSY.	1	1
5	C060600011	ロキ	FILTER	1	
6	C060600015	ロキ	FILTER		1
10	E214150100	ウケザラ, LO ロキ	SAUCER, L.O. FILTER	1	1
13	E214150130	LOロキブラケツト (RT)	BRACKET, L.O. FILTER (RT)	1	1
16	E200350050	カコウソクフタ (5)	SIDE COVER (5)	1	1
32	E214150320	ガスケット LO ロキブラケット	GASKET, L.O. FILTER BRACKET	1	1
40	E214150400	チヨウアツベンタイ	BODY, RELIEF VALVE	1	1
41	C037540050	バネウケ	RETAINER, VALVE SPRING	1	1
42	C037540060	ベン	VALVE	1	1
43	C037540070	バネケース	VALVE SPRING CASE	1	1
44	C037540080	キヤツプ	CAP	1	1
45	C037570151	バネ	SPRING	1	1
46	C037570201	バネ	SPRING	1	1
503	X200012150ZZ	ボルト	BOLT	4	4
504	X200012030ZZ	ボルト	BOLT	4	4
505	X220012000ZZ	ナツト	NUT	4	4
506	X200012065ZZ	ボルト	BOLT	2	2
507	Z540200065ZZ	フランジ	FLANGE	1	1
508	Z541206065ZZ	パツキン	GASKET	1	1
509	Z541104275ZZ	パツキン	GASKET	1	1
515	Z580203000ZZ	ドレンコツク	DRAIN COCK	1	1
519	X205012050ZZ	HTボルト	HT BOLT	4	4
520	X220012000ZZ	ナツト	NUT	4	4
522	Z540200065ZZ	フランジ	FLANGE	1	1
523	Z541206065ZZ	パツキン	GASKET	1	1
524	X200012030ZZ	ボルト	BOLT	4	4
530	X222312000ZZ	コガタナツト	NUT	1	1
531	X251512070ZZ	トメネジ	SET SCREW	1	1
532	Z565006100ZZ	マルパツキン	GASKET	1	1
533	Z565002700ZZ	マルパツキン	GASKET	1	1
534	X572242000ZZ	トクシユプラグ	SPECIAL PLUG	1	1
535	Z565004200ZZ	マルパツキン	GASKET	1	1
537	X570006000ZZ	ロツカクプラグ	HEX. PLUG	1	1
538	Z565002700ZZ	マルパツキン	GASKET	1	1
540	Z560207031ZZ	O リング	O-RING	1	1

潤滑油調圧弁 & ロキ取付 (前端過給) - カバー付
LUBRICATING OIL RELIEF VALVE & FILTER FITTING (FRONT T/C) WITH COVER

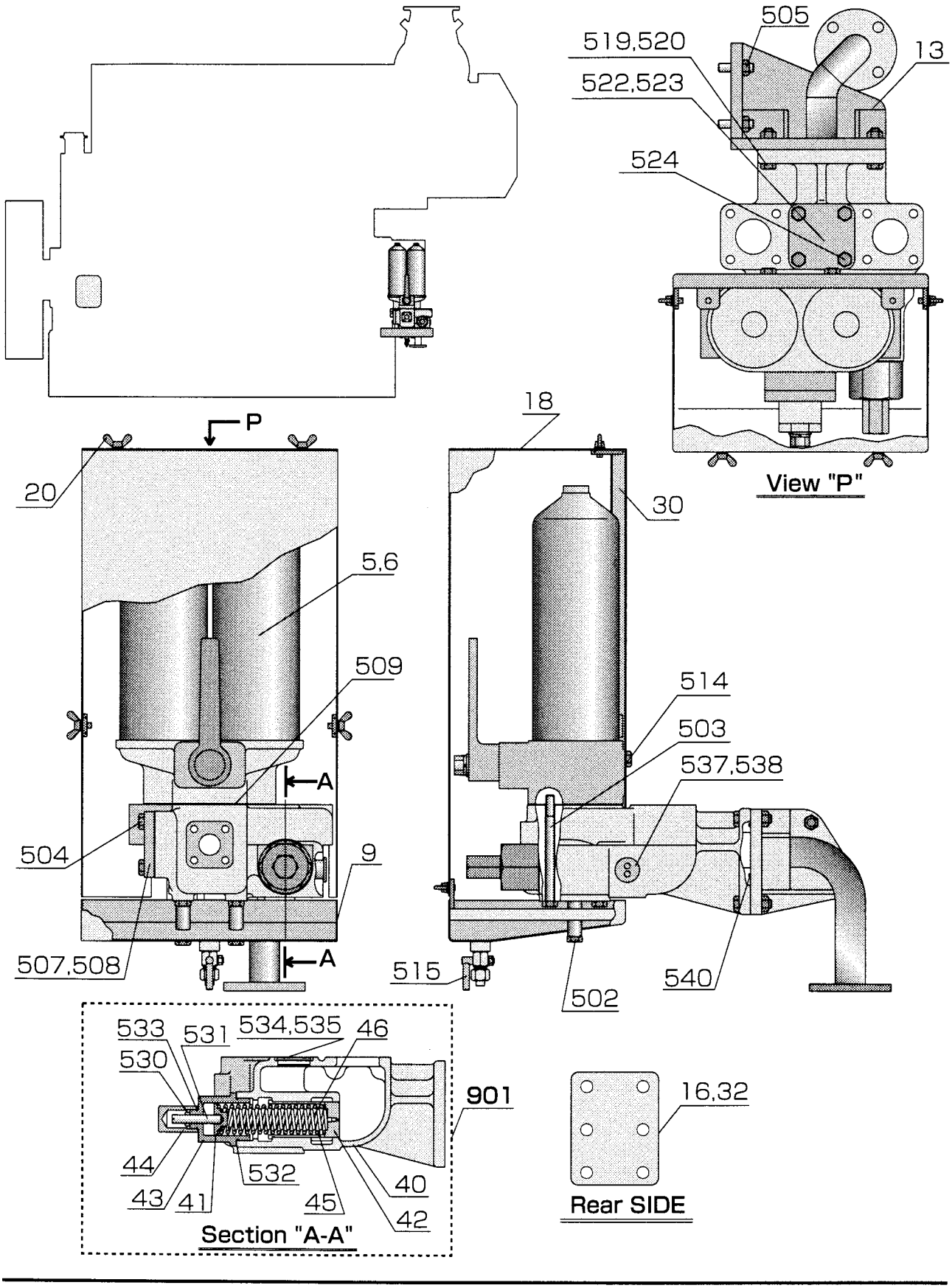


潤滑油調圧弁 & ロキ取付 (前端過給) - カバー付
LUBRICATING OIL RELIEF VALVE & FILTER FITTING (FRONT T/C) WITH COVER

①……6DK ②……8DK

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity ①	②
901		チヨウアツベン ASSY.	L.O. RELIEF VALVE ASSY.	1	1
5	C060600011	ロキ	FILTER	1	
6	C060600015	ロキ	FILTER		1
9	E214150090	ウケザラ, LO ロキ	SAUCER, L.O. FILTER	1	1
18	E214150180	カバー1, LO ロキ	COVER-1, L.O. FILTER	1	1
20	E214350200	チョウボルト	WING BOLT	6	6
30	E214150180	カバー2, LO ロキ	COVER-2, L.O. FILTER	1	1
32	E214150320	ガスケット LO ロキブラケット	GASKET, L.O. FILTER BRACKET	1	1
33	E214150330	LO ロキブラケット	BRACKET, L.O. FILTER	1	1
40	E214150400	チヨウアツベンタイ	BODY, RELIEF VALVE	1	1
41	C037540050	バネウケ	RETAINER, VALVE SPRING	1	1
42	C037540060	ベン	VALVE	1	1
43	C037540070	バネケース	VALVE SPRING CASE	1	1
44	C037540080	キヤツプ	CAP	1	1
45	C037570151	バネ	SPRING	1	1
46	C037570201	バネ	SPRING	1	1
501	X205012050ZZ	HTボルト	HT BOLT	2	2
502	X200012060ZZ	ボルト	BOLT	2	2
503	X200012150ZZ	ボルト	BOLT	4	4
504	X200012030ZZ	ボルト	BOLT	4	4
505	X220012000ZZ	ナツト	NUT	2	2
507	Z540200065ZZ	フランジ	FLANGE	1	1
508	Z541206065ZZ	パツキン	GASKET	1	1
509	Z541104275ZZ	パツキン	GASKET	1	1
514	X200012016ZZ	ボルト	BOLT	2	2
515	Z580203000ZZ	ドレンコツク	DRAIN COCK	1	1
522	Z540200065ZZ	フランジ	FLANGE	1	1
523	Z541206065ZZ	パツキン	GASKET	1	1
524	X200012030ZZ	ボルト	BOLT	4	4
530	X222312000ZZ	コガタナツト	NUT	1	1
531	X251512070ZZ	トメネジ	SET SCREW	1	1
532	Z565006100ZZ	マルパツキン	GASKET	1	1
533	Z565002700ZZ	マルパツキン	GASKET	1	1
534	X572242000ZZ	トクシユプラグ	SPECIAL PLUG	1	1
535	Z565004200ZZ	マルパツキン	GASKET	1	1
537	X570006000ZZ	ロツカクプラグ	HEX.PLUG	1	1
538	Z565002700ZZ	マルパツキン	GASKET	1	1
540	Z560207031ZZ	O リング	O-RING	1	1

潤滑油調圧弁 & ロキ取付 (後端過給) - カバー付
LUBRICATING OIL RELIEF VALVE & FILTER FITTING (REAR T/C) WITH COVER

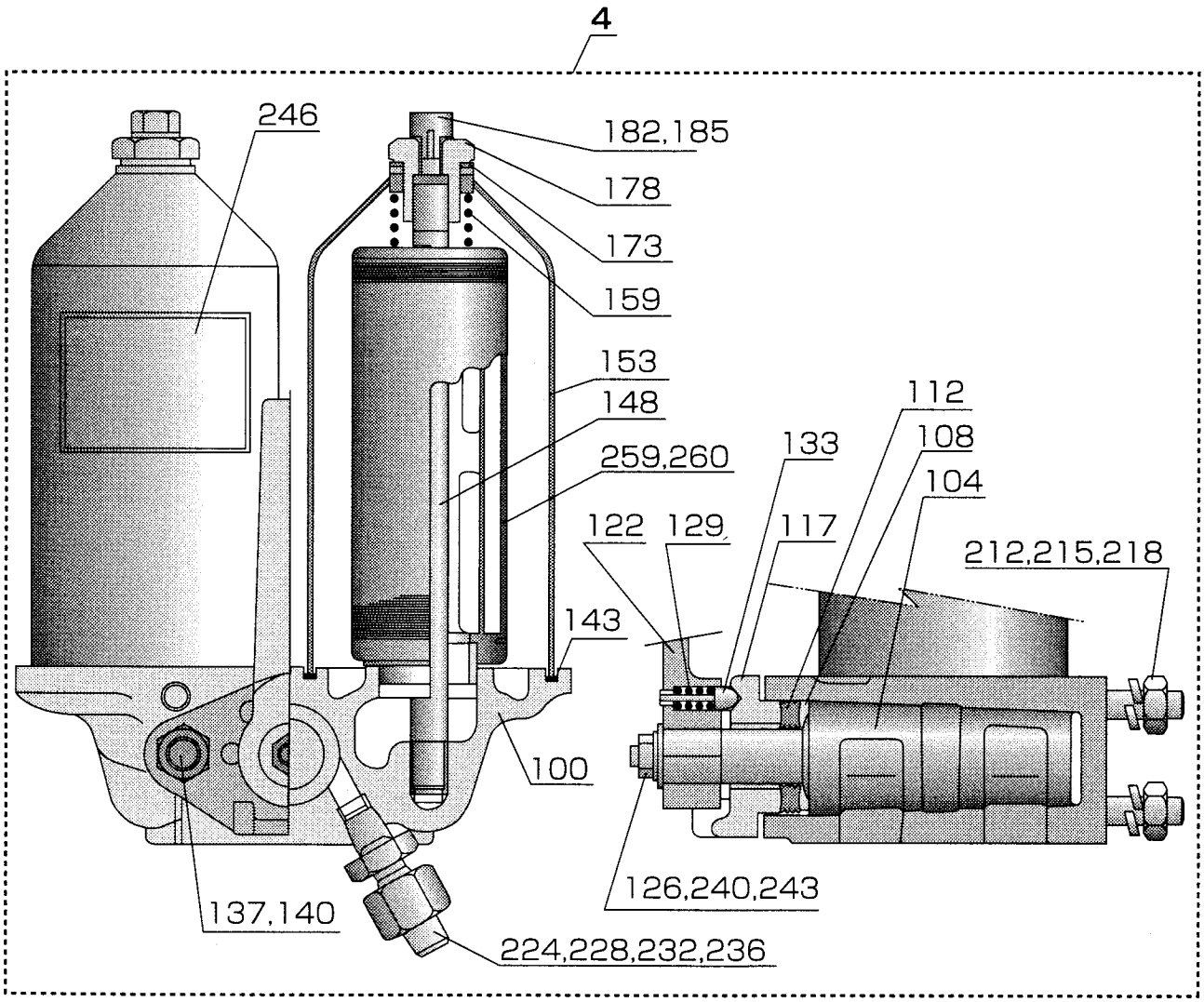


潤滑油調圧弁 & ロキ取付 (後端過給) - カバー付
LUBRICATING OIL RELIEF VALVE & FILTER FITTING (REAR T/C) WITH COVER

①……6DK ②……8DK

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity ①	②
901		チヨウアツベン ASSY.	L.O. RELIEF VALVE ASSY.	1	1
5	C060600011	ロキ	FILTER	1	
6	C060600015	ロキ	FILTER		1
9	E214150090	ウケザラ, LO ロキ	SAUCER, L.O. FILTER	1	1
13	E214150130	LO ロキブラケツト (RT)	BRACKET, L.O. FILTER (RT)	1	1
16	E200350050	カコウソクフタ (5)	SIDE COVER (5)	1	1
18	E214150180	カバー1, LO ロキ	COVER-1, L.O. FILTER	1	1
20	E214350200	チョウボルト	WING BOLT	6	6
30	E214150300	カバー2, LO ロキ	COVER-2, L.O. FILTER	1	1
32	E214150320	ガスケット LO ロキブラケツト	GASKET, L.O. FILTER BRACKET	1	1
40	E214150400	チヨウアツベンタイ	BODY, RELIEF VALVE	1	1
41	C037540050	バネウケ	RETAINER, VALVE SPRING	1	1
42	C037540060	ベン	VALVE	1	1
43	C037540070	バネケース	VALVE SPRING CASE	1	1
44	C037540080	キヤツプ	CAP	1	1
45	C037570151	バネ	SPRING	1	1
46	C037570201	バネ	SPRING	1	1
502	X200012060ZZ	ボルト	BOLT	2	2
503	X200012150ZZ	ボルト	BOLT	4	4
504	X200012030ZZ	ボルト	BOLT	4	4
505	X220012000ZZ	ナツト	NUT	4	4
507	Z540200065ZZ	フランジ	FLANGE	1	1
508	Z541206065ZZ	パツキン	GASKET	1	1
509	Z541104275ZZ	パツキン	GASKET	1	1
514	X200012016ZZ	ボルト	BOLT	2	2
515	Z580203000ZZ	ドレンコツク	DRAIN COCK	1	1
519	X205012050ZZ	HTボルト	HT BOLT	4	4
520	X220012000ZZ	ナツト	NUT	4	4
522	Z540200065ZZ	フランジ	FLANGE	1	1
523	Z541206065ZZ	パツキン	GASKET	1	1
524	X200012030ZZ	ボルト	BOLT	4	4
530	X222312000ZZ	コガタナツト	NUT	1	1
531	X251512070ZZ	トメネジ	SET SCREW	1	1
532	Z565006100ZZ	マルパツキン	GASKET	1	1
533	Z565002700ZZ	マルパツキン	GASKET	1	1
534	X572242000ZZ	トクシユプラグ	SPECIAL PLUG	1	1
535	Z565004200ZZ	マルパツキン	GASKET	1	1
537	X570006000ZZ	ロツカクプラグ	HEX. PLUG	1	1
538	Z565002700ZZ	マルパツキン	GASKET	1	1
540	Z560207031ZZ	O リング	O-RING	1	1

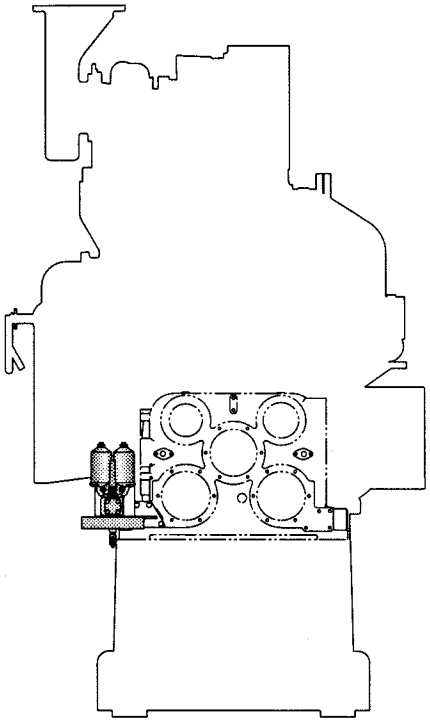
過給機潤滑油ロキ
TURBOCHAGER LUBRICATING OIL FILTER

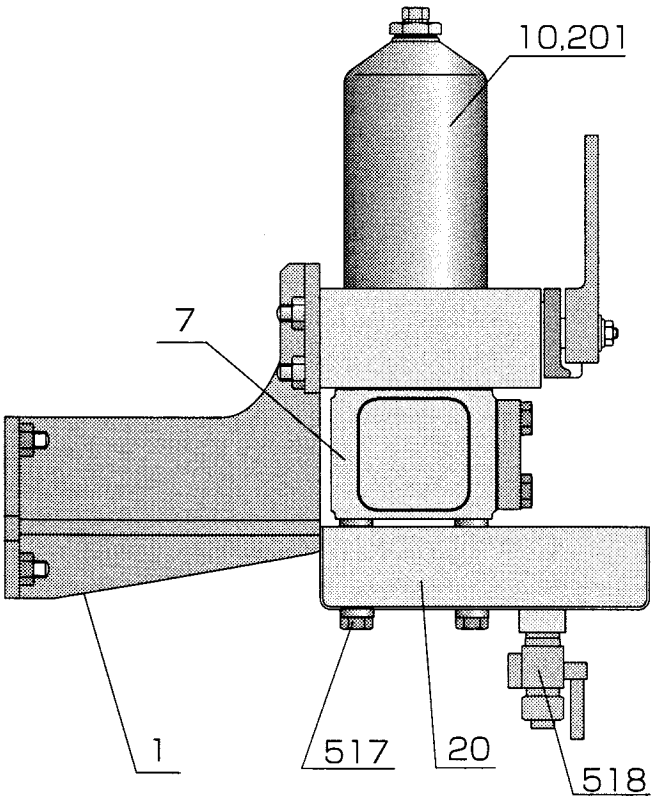


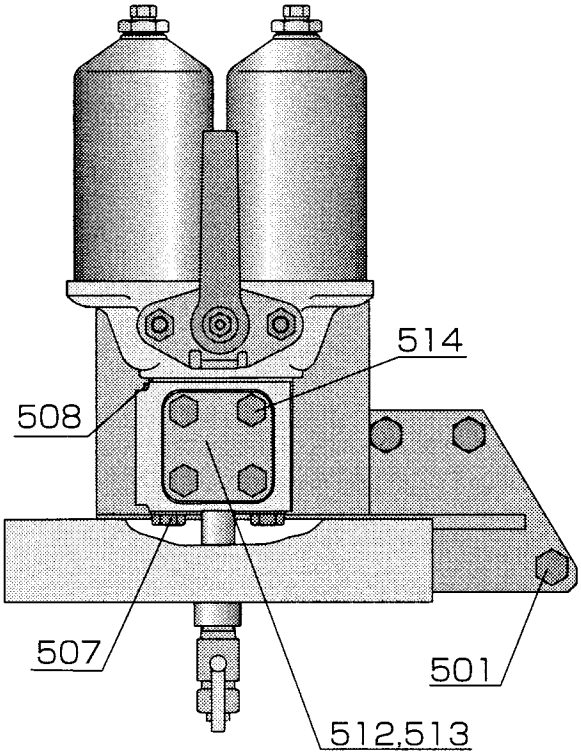
過給機潤滑油ロキ
TURBOCHAGER LUBRICATING OIL FILTER

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
4	C060500013	ロキ	FILTER	1
100	C060501000	ロキホンタイ	FILTER BODY	1
104	Y529000011	キリカエコック	COCK	1
108	Y529000021	パッキンシート	PACKING SEAT	1
112	Y529000029	パッキン（コック）	PACKING (COCK)	1
117	Y529000042	オサエフタ	COCK COVER	1
122	Y529000053	ハンドル	HANDLE	1
126	Y529000063	ナット（ハンドル）	NUT (HANDLE)	1
129	Y529000070	バネ（トメセン）	SPRING (NOTCH BAR)	1
133	Y529000077	トメセン	NOTCH BAR	1
137	Y529000084	スタッド（フタ）	STUD (COVER)	2
140	Y529000092	ナット（フタ）	NUT (COVER)	2
143	Y529000104	パッキン（ロキケース）	PACKING (CASING)	2
148	Y529000114	ジク	SHAFT	2
153	Y529000133	ケース	CASING	2
159	Y529000148	バネ（ロキケース）	SPRING (CASING)	2
173	Y529000154	パッキン（シメツケナット）	PACKING (CAP NUT)	2
178	Y529000162	シメツケナット	CAP NUT	2
182	Y529000170	パッキン（エヤーヌキ）	PACKING (AIR PLUG)	2
185	Y529000174	エヤーヌキ	AIR PLUG	2
212	Y529000216	スタッド（ロキトリツケ）	STUD	4
215	Y529000223	バネザガネ（ロキトリツケ）	SPRING WASHER	4
218	Y529000228	ナット（ロキトリツケ）	NUT	1
224	Y529000237	パッキン	PACKING	2
228	Y529000241	ニップル	NIPPLE	1
232	Y529000250	スリーブナット	SLEEVE NUT	1
236	Y529000255	スリーブ	SLEEVE	1
240	Y529000260	ザガネ（ハンドル）	WASHER (HANDLE)	1
243	Y529000267	バネザガネ（ハンドル）	SPRING WASHER (HANDLE)	1
246	Y529000272	チュウイメイバン	NAME PLATE	1
259	C060502590	エレメント ASSY-280ME	ELEMENT ASSY. (280ME)	2
260	Y529000306	エレメントパッキン	PACKING	2

過給機潤滑油ロキ取付 (前端過給) - カバー無
TURBOCHAGER LUBRICATING OIL FILTER FITTING (FRONT T/C) - WITHOUT COVER



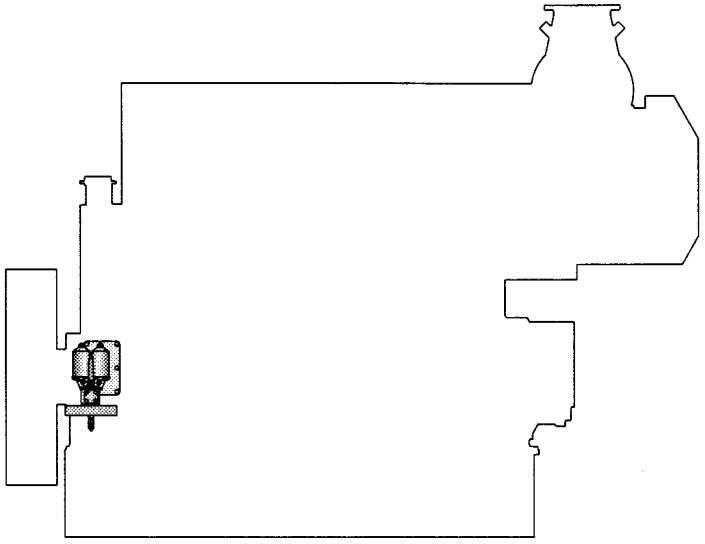


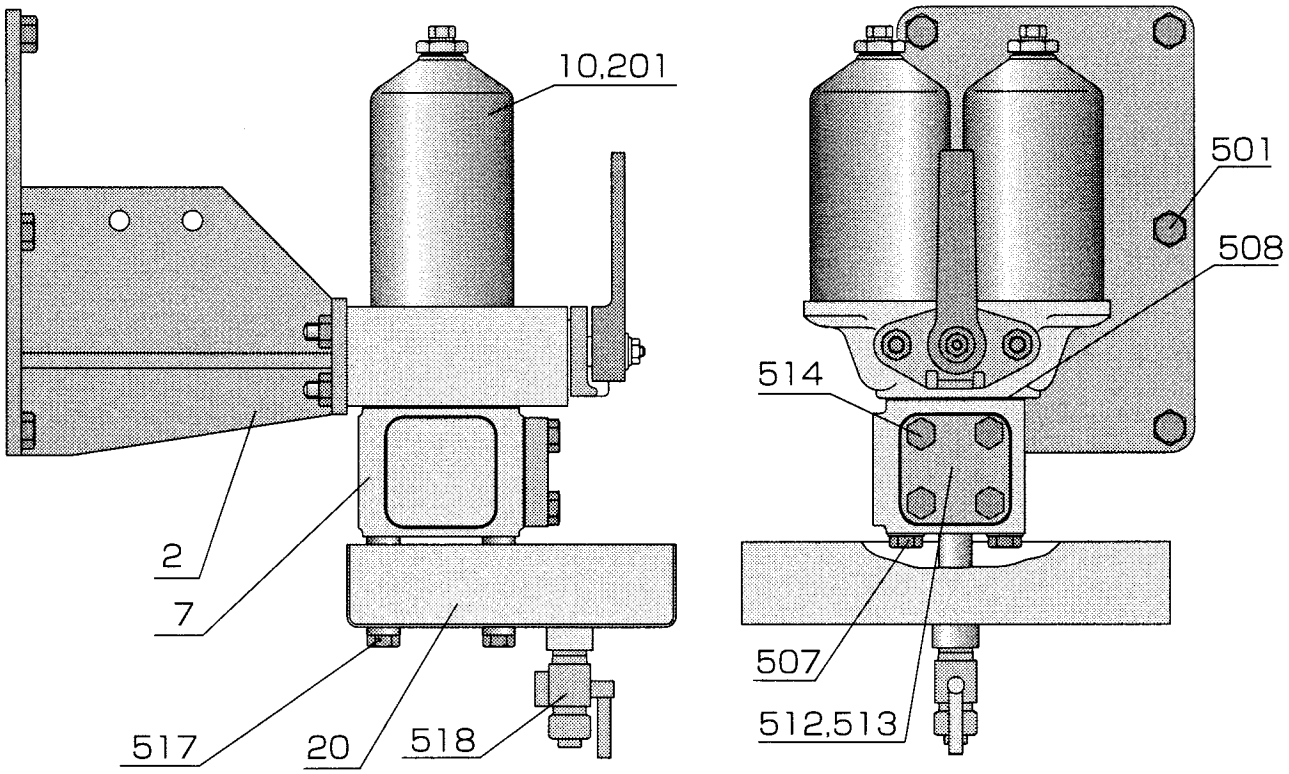


過給機潤滑油ロキ取付 (前端過給) - カバー無
TURBOCHAGER LUBRICATING OIL FILTER FITTING (FRONT T/C) - WITHOUT COVER

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
1	E214950010	LO ロキ-NRブラケット-1	BRACKET-1, L.O. FILTER	1
7	A245012270	ロキセツシユ	PIPING BLOCK	1
10	C060500013	ロキ	FILTER	1
20	E294970070	ウケザラ, LO ロキ	SAUCER, L.O. FILTER	1
201	C060502590	エレメント ASSY-280ME	ELEMENT ASSY.-280ME	2
501	X200012022ZZ	ボルト	BOLT	4
507	X200010090ZZ	ボルト	BOLT	4
508	Z541103060AZ	パツキン	GASKET	2
512	Z540200044ZZ	フランジ	FLANGE	1
513	Z541203044AZ	パツキン	GASKET	1
514	X200010028ZZ	ボルト	BOLT	4
517	X200010070ZZ	ボルト	BOLT	2
518	Z580203000ZZ	ドレンコツク	DRAIN COCK	1

過給機潤滑油ロキ取付 (後端過給) - カバー無
TURBOCHAGER LUBRICATING OIL FILTER FITTING (REAR T/C) - WITHOUT COVER

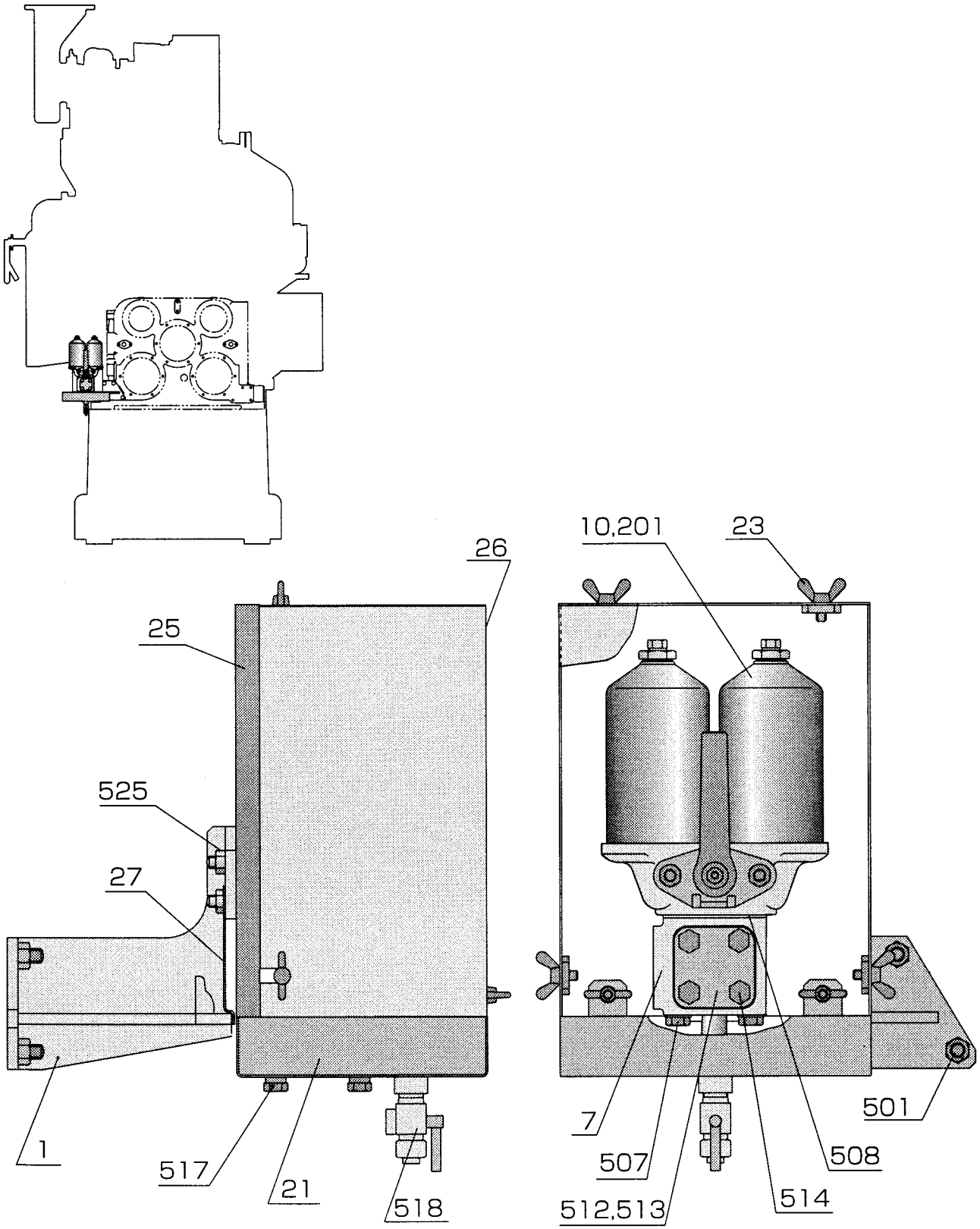




過給機潤滑油ロキ取付 (後端過給) - カバー無
TURBOCHAGER LUBRICATING OIL FILTER FITTING (REAR T/C) - WITHOUT COVER

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量y Quantity
2	E214950020	LO ロキブラケツト-TC (RT)	BRACKET, T/C L.O. FILTER (RT)	1
7	A245012270	ロキセツシユ	PIPING BLOCK	1
10	C060500013	ロキ	FILTER	1
20	E294970070	ウケザラ, LO ロキ	SAUCER, L.O. FILTER	1
201	C060502590	エレメント ASSY-280ME	ELEMENT ASSY.-280ME	2
501	X200012022ZZ	ボルト	BOLT	6
507	X200010090ZZ	ボルト	BOLT	4
508	Z541103060AZ	パツキン	GASKET	2
512	Z540200044ZZ	フランジ	FLANGE	1
513	Z541203044AZ	パツキン	GASKET	1
514	X200010028ZZ	ボルト	BOLT	4
517	X200010070ZZ	ボルト	BOLT	2
518	Z580203000ZZ	ドレンコツク	DRAIN COCK	1

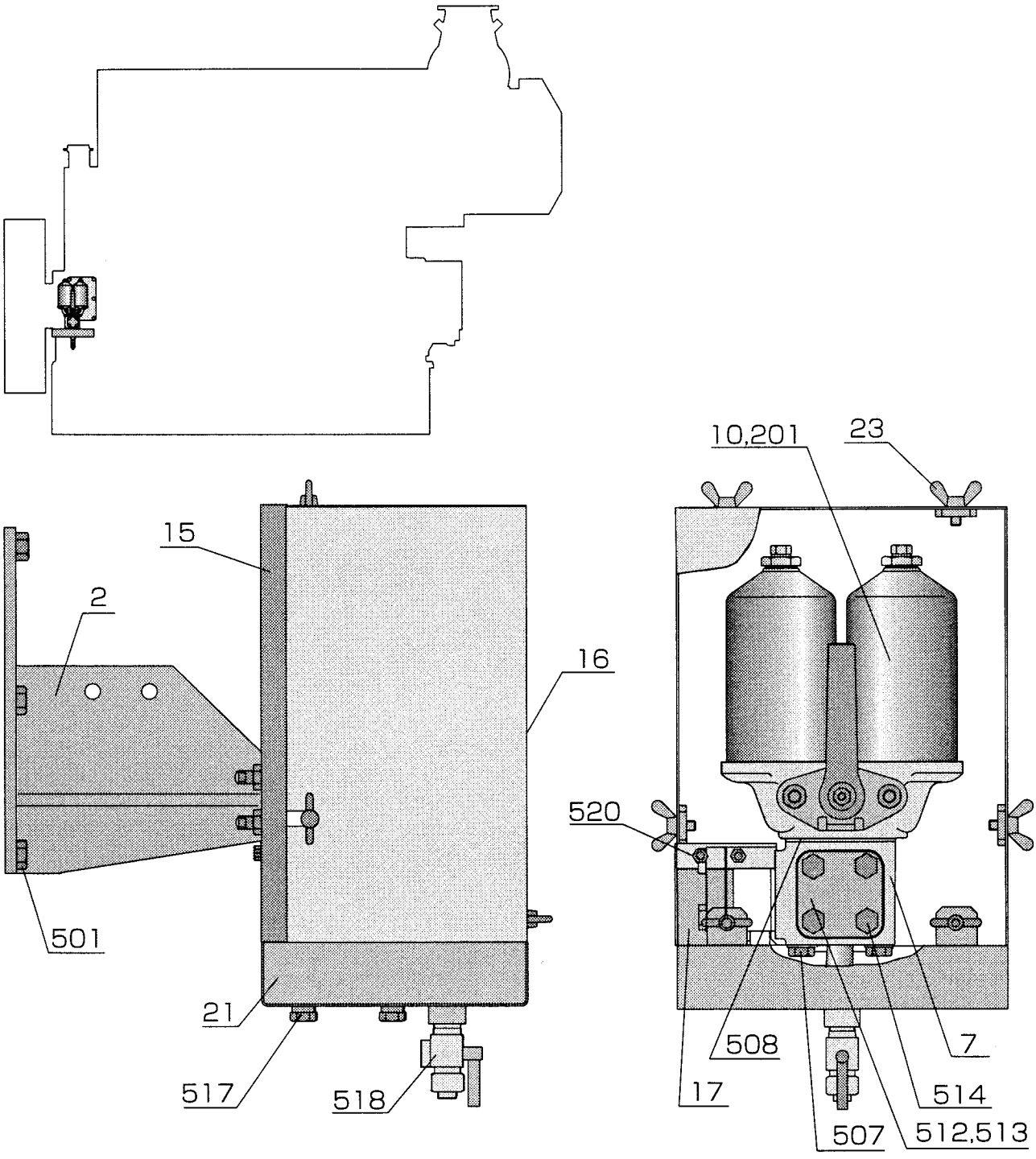
過給機潤滑油ロキ取付 (前端過給) - カバー付
TURBOCHAGER LUBRICATING OIL FILTER FITTING (FRONT T/C) - WITH COVER



過給機潤滑油ロキ取付 (前端過給) - カバー付
TURBOCHAGER LUBRICATING OIL FILTER FITTING (FRONT T/C) - WITH COVER

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
1	E214950010	LO ロキ-NRブラケット-1	BRACKET-1, L.O. FILTER	1
7	A245012270	ロキセツシユ	PIPING BLOCK	1
10	C060500013	ロキ	FILTER	1
21	E214950210	ウケザラ, LO ロキ	SAUCER, L.O. FILTER	1
23	E214350200	チョウボルト	WING BOLT	6
25	E214950250	カバー1, T/C LO ロキ-FT	COVER-1, T/C L.O. FILTER-FT	1
26	E214950260	カバー2, T/C LO ロキ-FT	COVER-2, T/C L.O. FILTER-FT	1
27	E214950270	カバー3, T/C LO ロキ-FT	COVER-3, T/C L.O. FILTER-FT	1
201	C060502590	エレメント ASSY-280ME	ELEMENT ASSY.-280ME	2
501	X200012022ZZ	ボルト	BOLT	4
507	X200010090ZZ	ボルト	BOLT	4
508	Z541103060AZ	パツキン	GASKET	2
512	Z540200044ZZ	フランジ	FLANGE	1
513	Z541203044AZ	パツキン	GASKET	1
514	X200010028ZZ	ボルト	BOLT	4
517	X200010070ZZ	ボルト	BOLT	2
518	Z580203000ZZ	ドレンコツク	DRAIN COCK	1
525	X210010050ZZ	スタッド	STUD	4

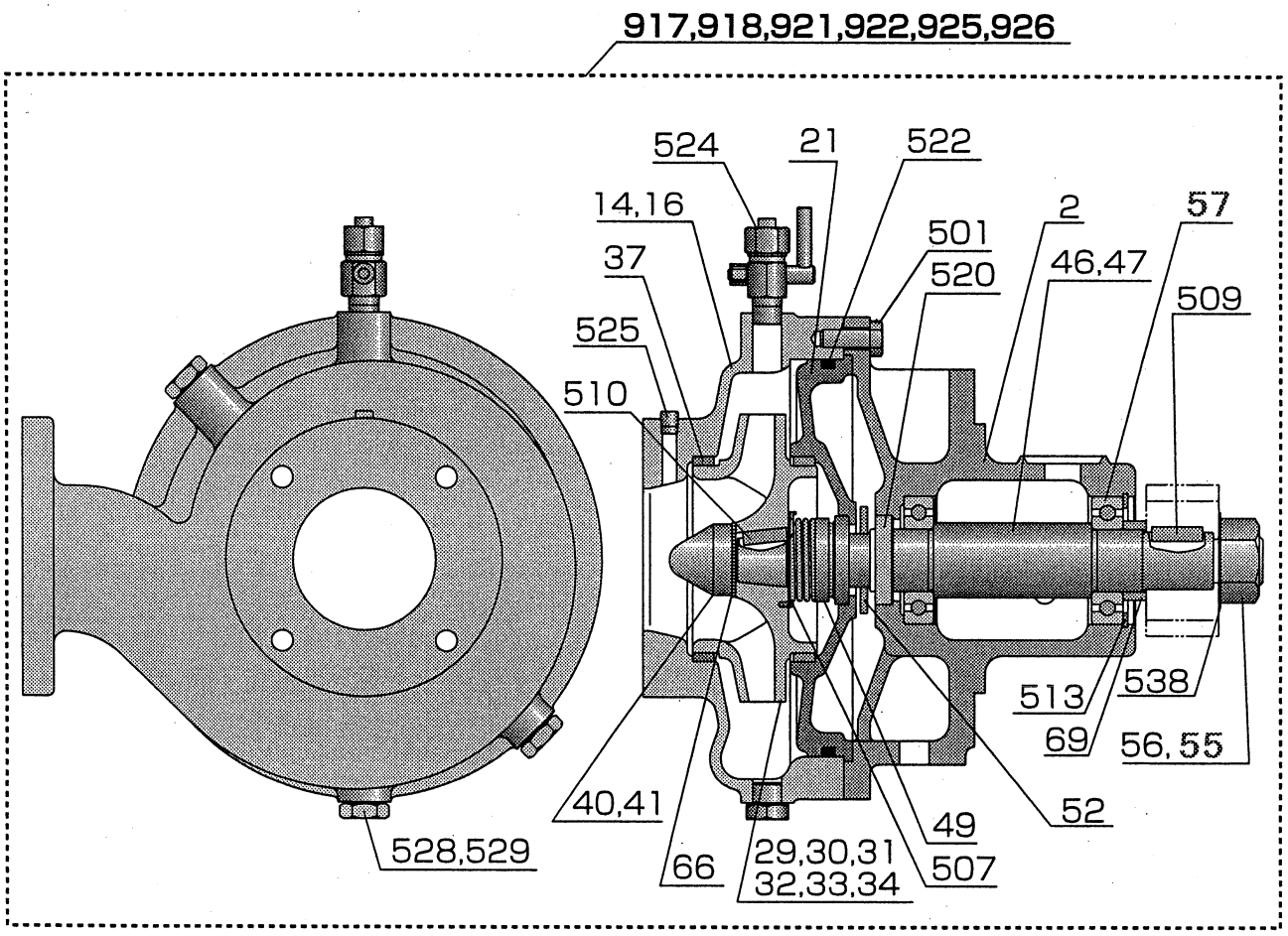
過給機潤滑油ロキ取付 (後端過給) - カバー付
TURBOCHAGER LUBRICATING OIL FILTER FITTING (REAR T/C) - WITH COVER



過給機潤滑油ロキ取付 (後端過給) - カバー付
TURBOCHAGER LUBRICATING OIL FILTER FITTING (REAR T/C) - WITH COVER

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
2	E214950020	LO ロキブラケツト-TC (RT)	BRACKET, T/C L.O. FILTER (RT)	1
7	A245012270	ロキセツシユ	PIPING BLOCK	1
10	C060500013	ロキ	FILTER	1
15	E214950150	カバー1, T/C LO ロキ-RT	COVER-1, T/C L.O. FILTER-RT	1
16	E214950160	カバー2, T/C LO ロキ-RT	COVER-2, T/C L.O. FILTER-RT	1
17	E214950170	カバー3, T/C LO ロキ-RT	COVER-3, T/C L.O. FILTER-RT	1
21	E214950210	ウケザラ, LO ロキ	SAUCER, L.O. FILTER	1
23	E214350200	チョウボルト	WING BOLT	6
201	C060502590	エレメント ASSY-280ME	ELEMENT ASSY.-280ME	2
501	X200012022ZZ	ボルト	BOLT	6
507	X200010090ZZ	ボルト	BOLT	4
508	Z541103060AZ	パツキン	GASKET	2
512	Z540200044ZZ	フランジ	FLANGE	1
513	Z541203044AZ	パツキン	GASKET	1
514	X200010028ZZ	ボルト	BOLT	4
517	X200010070ZZ	ボルト	BOLT	2
518	Z580203000ZZ	ドレンコツク	DRAIN COCK	1
520	X200006010ZZ	ボルト	BOLT	2

冷却水ポンプ-70A
COOLING WATER PUMP- 70A



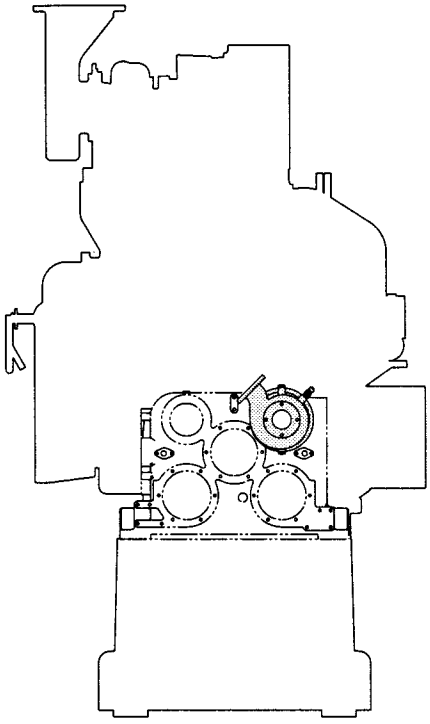
冷却水ポンプ-70A
COOLING WATER PUMP -70A

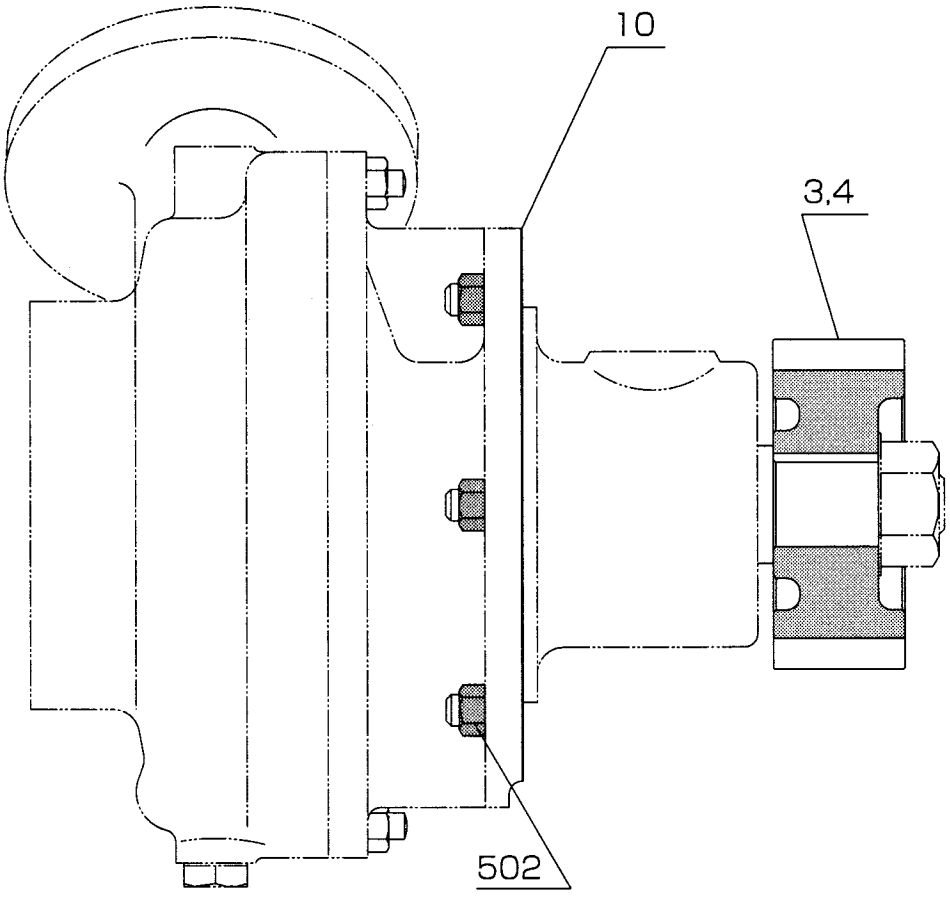
6·8DK-20 | CHAPTER 4 | ITEM 4.1

(1)(3)(5)正転 NORMAL ROTATION (2)(4)(6)逆転 REVERSE ROTATION
(1)(2) 羽根車径160 IMPELLER DIA 160 (3)(4) 羽根車径170 IMPELLER DIA 170 (5)(6) 羽根車径180 IMPELLER DIA 180

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity (1)	(2)	(3)	(4)	(5)	(6)
917	**C038809170**	CWポンプF70AR180	**C.W.PUMP ASSY.F70AR180**					1	
918	**C038809180**	CWポンプF70AL180	**C.W.PUMP ASSY.F70AL180**						1
921	**C038809210**	CWポンプF70AR170	**C.W.PUMP ASSY.F70AR170**			1			
922	**C038809220**	CWポンプF70AL170	**C.W.PUMP ASSY.F70AL170**				1		
925	**C038809250**	CWポンプF70AR160	**C.W.PUMP ASSY.F70AR160**	1					
926	**C038809260**	CWポンプF70AL160	**C.W.PUMP ASSY.F70AL160**		1				
2	C038800020	ジクウケケース	BEARING CASE	1	1	1	1	1	1
14	C038800131	ポンプタイ(2)70A-R-FC	PUMP BODY (2)70A-R-FC	1		1		1	
16	C038800151	ポンプタイ(2)70A-L-FC	PUMP BODY (2)70A-L-FC		1		1		1
21	C038800201	シールホルダーFC	MECHANICAL SEAL HOLDER-FC	1	1	1	1	1	1
29	C038800290	ハネグルマ(R)-180	IMPELLER(R)-180					1	
30	C038800300	ハネグルマ(L)-180	IMPELLER(L)-180						1
31	C038800310	ハネグルマ(R)-160	IMPELLER(R)-160	1					
32	C038800320	ハネグルマ(L)-160	IMPELLER(L)-160		1				
33	C038800330	ハネグルマ(R)-170	IMPELLER(R)-170			1			
34	C038800340	ハネグルマ(L)-170	IMPELLER(L)-170				1		
37	C038420180	マウスリング	MOUTH RING	2	2	2	2	2	2
40	C038800400	ハネグルマ ナットR	NUT(R),INPELLER	1		1		1	
41	C038800410	ハネグルマ ナットL	NUT(L),INPELLER		1		1		1
46	C038800460	ポンプジクR	PUMP SHAFT-R	1		1		1	
47	C038800470	ポンプジクL	PUMP SHAFT-L		1		1		1
49	AE01102010	メカニカルシール	MECHANICAL SEAL	1	1	1	1	1	1
52	C038800520	ミズキリリング	CUT RING	1	1	1	1	1	1
55	C038800550	ナット	NUT	1		1		1	
56	C038800560	ナット(L)	NUT (L)		1		1		1
57	C038500570	ベアリング	BEARING	2	2	2	2	2	2
66	C038800660	トクシユツメツキザガネ	SPECIAL CLAW WASHER	1	1	1	1	1	1
69	C038800690	カラー	COLOR	1	1	1	1	1	1
501	X200010025ZZ	ボルト	BOLT	8	8	8	8	8	8
507	Z335603008JZ	ヘイコウピン	STRAIGHT PIN	1	1	1	1	1	1
509	Z400010028ZZ	キー	KEY	1	1	1	1	1	1
510	Z400007025DZ	キー	KEY	1	1	1	1	1	1
513	Z412007200ZZ	スナップリング	SNAP RING	1	1	1	1	1	1
520	Z461355008TC	オイルシール	OIL SEAL	1	1	1	1	1	1
522	Z560221057ZZ	O リング	O RING	1	1	1	1	1	1
524	Z580203000ZZ	ドレンコツク	DRAIN COCK	1	1	1	1	1	1
525	Z571501000JZ	テーパプラグ	TAPER PLUG	1	1	1	1	1	1
528	X570003000JZ	ロツカクプラグ	HEX.PLUG	3	3	3	3	3	3
529	Z565001700ZZ	マルパツキン	GASKET	3	3	3	3	3	3
538	Z319128054ZZ	ツメツキザガネ	CLAW WASHER	1	1	1	1	1	1

冷却水ポンプ取付
COOLING WATER PUMP FITTING



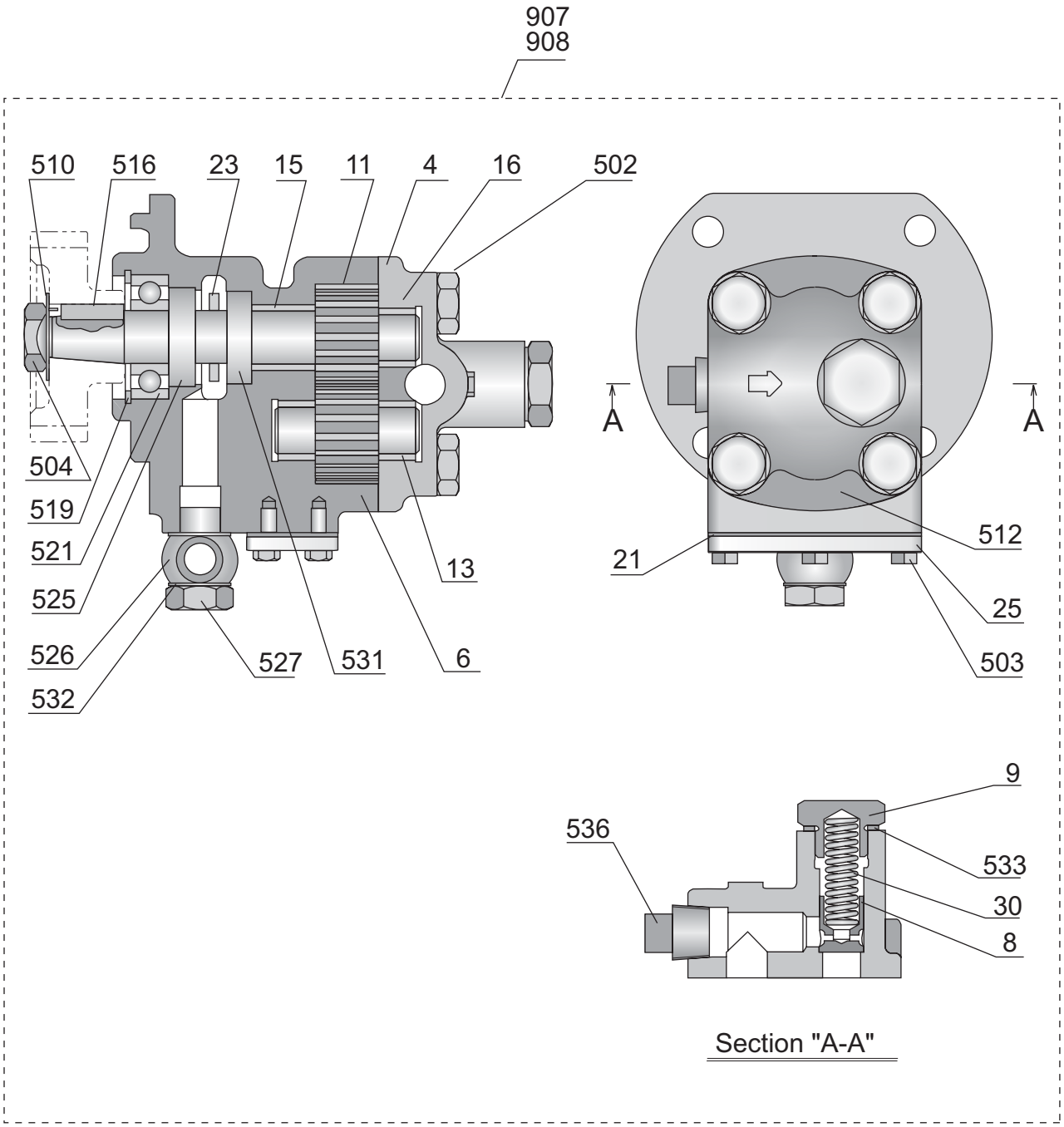


冷却水ポンプ取付
COOLING WATER PUMP FITTING

①……720~750rpm ②……900rpm

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity ①	②
3	E210150030	CW ポンプギヤ (Z23)	C.W. PUMP GEAR (Z23)	1	
4	E210150040	CW ポンプギヤ (Z26)	C.W. PUMP GEAR (Z26)		1
10	E203150100	ガスケツト	GASKET	1	1
502	X220012000ZZ	ナツト	NUT	6	6

ノズル冷却油ポンプ
NOZZLE COOLING OIL PUMP



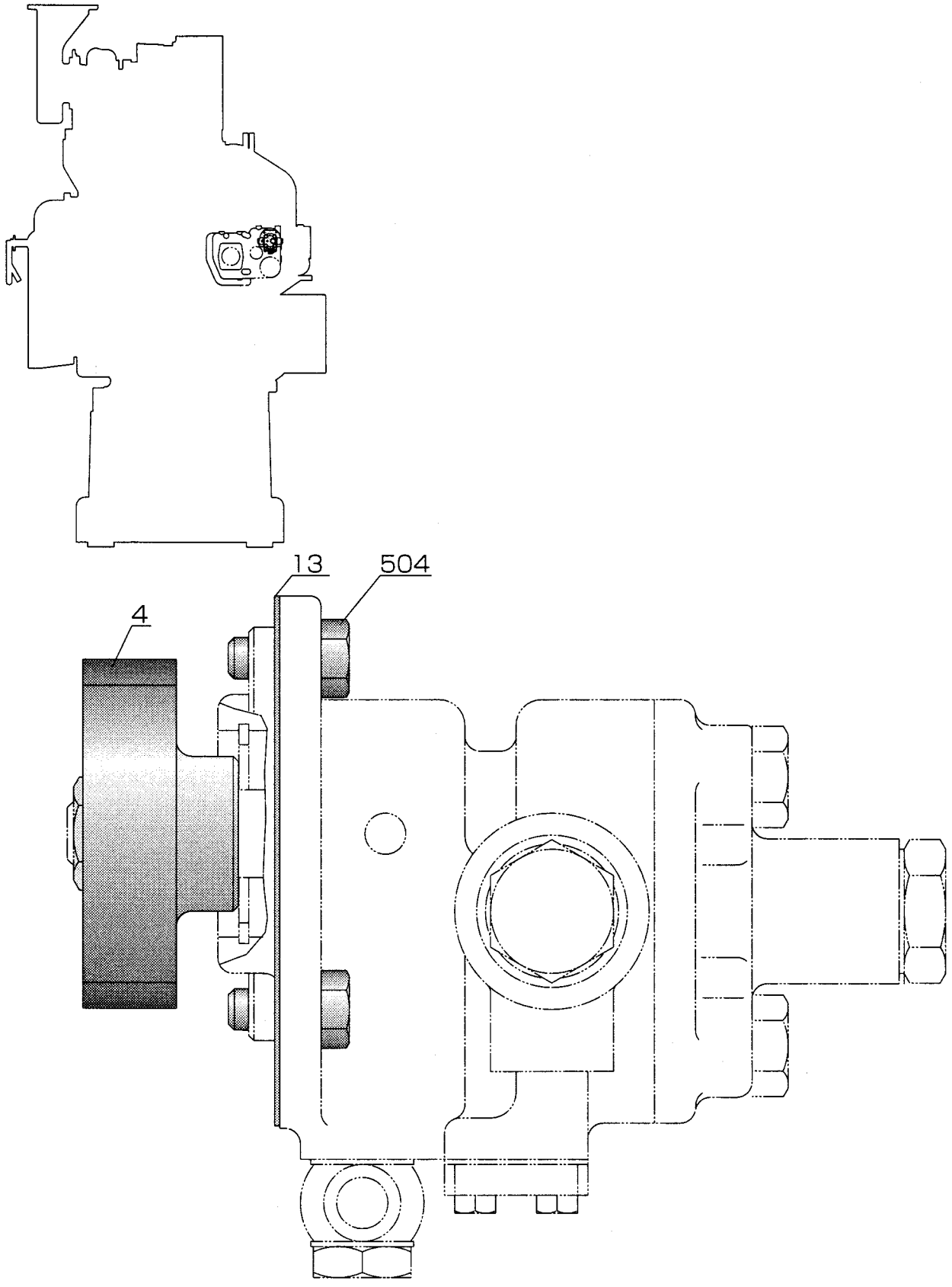
ノズル冷却油ポンプ
NOZZLE COOLING OIL PUMP

6·8DK-20

(1)····正転 NORMAL ROTATION (2)····逆転 REVERSE ROTATION

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity (1)	(2)
907	**C03319070**	オイルポンプASSY.(R)	**OIL PUMP ASSY.** (R)	**1**	
908	**C03319080**	オイルポンプASSY.(L)	**OIL PUMP ASSY.** (L)		**1**
4	C033110040	ホンタイフタ	COVER, PUMP BODY	1	1
6	C033110060	ホンプタイ	PUMP BODY	1	1
8	C033140070	ベン	RELIEF VALVE	1	1
9	C033140080	アンゼンベンバネオサエ	CAP, SAFTY VALVE SPRING	1	1
11	C033140090	ポンプモトギヤジク	PUMP DRIVING GEAR SHAFT	1	1
13	C033140110	ポンプウケギヤジク	PUMP DRIVEN GEAR SHAFT	1	1
15	C033170130	ポンプブッシュ(2)	PUMP BUSH (2)	1	1
16	C033170140	ポンプブッシュ(1)	PUMP BUSH (1)	3	3
21	C033170190	チェックバルブタイパッキン	GASKET, CHECK VALVE BODY	1	1
23	C033170220	オイルキリリング(2)	OIL CUT RING (2)	1	1
25	C033370200	メクライタ	BLANK PLATE	1	1
30	C033179800	バネ	SPRING	1	1
502	X200010032ZZ	ボルト	BOLT	4	4
503	X200005012ZZ	ボルト	BOLT	6	6
504	X220312000ZZ	ナット	NUT	1	1
510	Z319113028ZZ	ツメツキザガネ	CLAW WASHER	1	1
512	Z335004016ZZ	ヘイコウピン	STRAIGHT PIN	2	2
516	Z400005020ZZ	キー	KEY	1	1
519	Z412004000ZZ	スナップリング	SNAP RING	1	1
521	Z451162030ZZ	ベアリング	BEARING	1	1
525	Z461173208SB	オイルシール	OIL SEAL	1	1
526	Z545110020ZZ	ツギワ	BANJO	1	1
527	Z545202000ZZ	ツギボルト	BANJO PLUG	1	1
531	Z461173008TB	オイルシール	OILO SEAL	1	1
532	Z565001300BZ	マルパッキン	GASKET	2	2
533	Z565001700BZ	マルパッキン	GASKET	1	1
536	Z571103000ZZ	テーパプラグ	TAPER PLUG	1	1

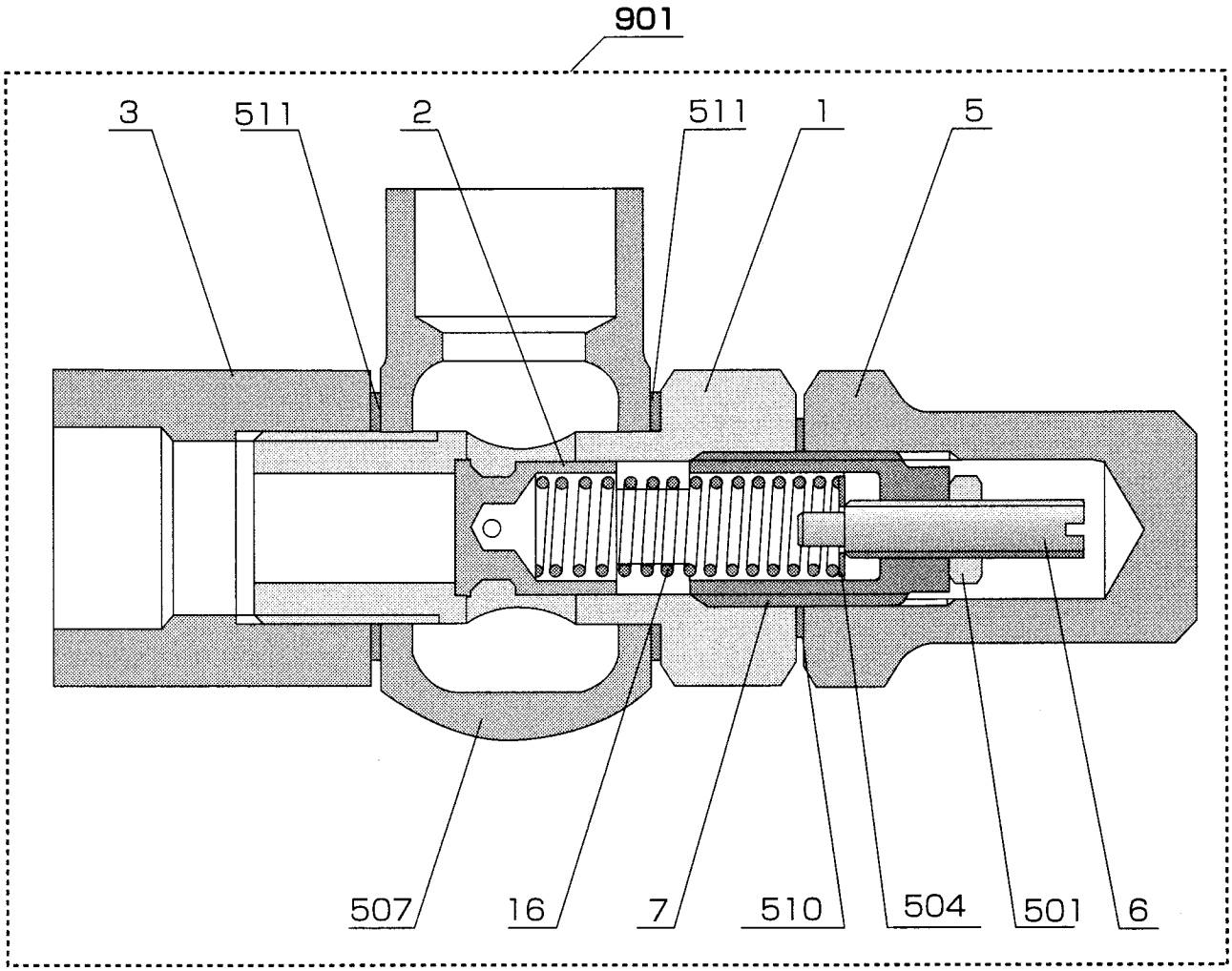
ノズル冷却油ポンプ取付
NOZZLE COOLING OIL PUMP FITTING



ノズル冷却油ポンプ取付
NOZZLE COOLING OIL PUMP FITTING

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
4	E230700040	オイルポンプギヤ	GEAR,OIL PUMP	1
13	C270700100	ポンプタイパツキン	GASKET,PUMP BODY	1
504	X200008018ZZ	ボルト	BOLT	4

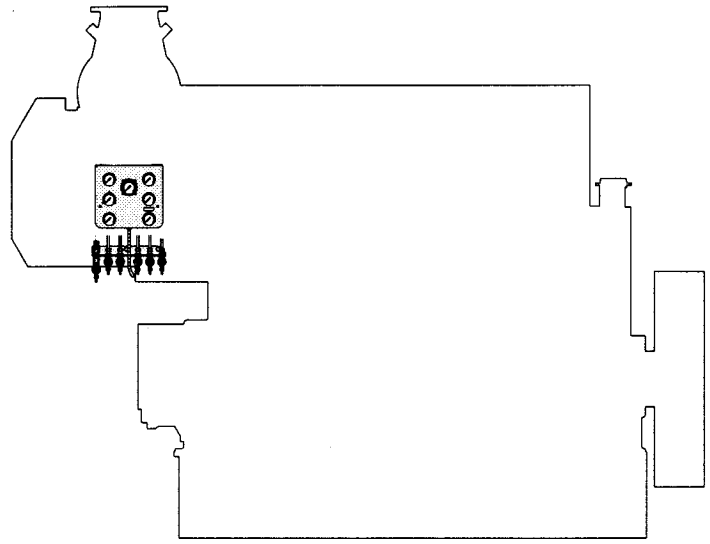
ノズル冷却油調圧弁
NOZZLE COOLING OIL RELIEF VALVE

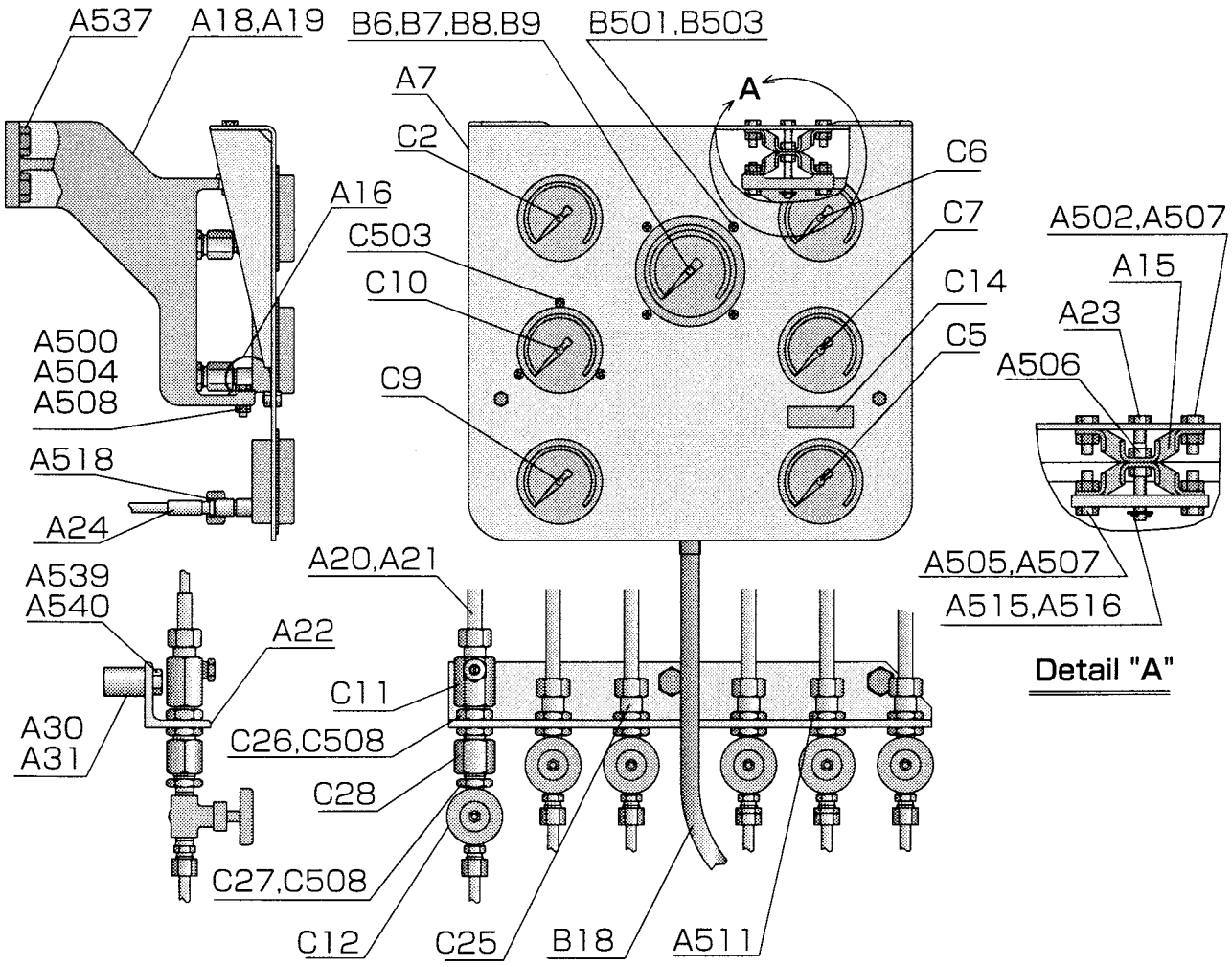


ノズル冷却油調圧弁
NOZZLE COOLING OIL RELIEF VALVE

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
901	C033990010	オイルチヨウアツベン ASSY-1	OIL RELIEF VALVE ASSY. 1	1
1	C033940010	チヨウアツベンタイ	RELIEF VALVE BODY	1
2	C033140070	ベン	RELIEF VALVE	1
3	C033940030	トクシユヨウセツザ	SPECIAL WELDING SEAT	1
5	C033940050	フクロナツト	CAP NUT	1
6	C033940060	チヨウセイネジ	ADJUSTING SCREW	1
7	C033940070	バネケース	SPRING CASE	1
16	C033970151	バネ	SPRING	1
501	X220306000ZZ	ナツト	NUT	1
504	Z300004000ZZ	ヒラザガネ	FLAT WASHER	1
507	Z545122040ZZ	ツギワ	BANJO	1
510	Z565001700BZ	マルパツキン	GASKET	1
511	Z565002100BZ	マルパツキン	GASKET	2

計器板（前端過給）
GAUGE BOARD (FRONT T/C)





計器板（前端過給）
GAUGE BOARD (FRONT T/C)

①……RH143, RH163　②……RH183, RH203

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity ①	②
A7	E213050070	ケイキバン-6	GAUGE BOARD-6	1	1
A15	C047070240	ボウシンゴム (1)	CUSHION RUBBER (1)	4	4
A16	C047070250	ケイキバントクシユバネ	SPECIAL SPRING, GAUGE BOARD	2	2
A18	E213050180	ケイキバンブラケツト-L	BRACKET-L, GAUGE BOARD	1	1
A19	E213050190	ケイキバンブラケツト-R	BRACKET-R, GAUGE BOARD	1	1
A20	C012400011	ホース	HOSE	2	2
A21	C012400012	ホース	HOSE	2	2
A22	E213050220	ゲージバルブササエ	SUPPORT, GAUGE VALVE	1	1
A23	E213050230	ケイキバンボルト	BOLT, GAUGE BOARD	2	2
A24	C012400013	ホース	HOSE	2	2
A30	E213050300	デイスタンス	DISTANCE	2	
A31	E213050310	デイスタンス	DISTANCE		2
A500	X200006010ZZ	ボルト	BOLT	2	2
A502	X200006016ZZ	ボルト	BOLT	4	4
A504	X200010020ZZ	ボルト	BOLT	2	2
A505	X200006020ZZ	ボルト	BOLT	4	4
A506	X220006000ZZ	ナツト	NUT	4	4
A507	X220006000ZZ	ナツト	NUT	8	8
A508	X220006000ZZ	ナツト	NUT	4	4
A511	X230303000ZZ	トクシユナツト	SPECIAL NUT	6	6
A515	Z300006000ZZ	ヒラザガネ	FLAT WASHER	2	2
A516	Z320001615ZZ	ワリピン	SPLIT PIN	2	2
A518	Z665006000ZZ	マルパツキン	GASKET	12	12
A537	X200012025ZZ	ボルト	BOLT	4	4
A539	X200012070ZZ	ボルト	BOLT	2	
A540	X200012050ZZ	ボルト	BOLT		2

①…正転 NORMAL ROTATION　②…逆転 REVERSE ROTATION

				数量 Quantity 720~750rpm ①	②	900rpm ①	②
6	C061500851	カイテンケイ 70 (2) 2:1 R1000	TACHOMETER 70 (2) 2:1 R1000	1			
B7	C061500921	カイテンケイ 70 (2) 2:1 R1500	TACHOMETER 70 (2) 2:1 R1500			1	
B8	C061500852	カイテンケイ 70 (2) 2:1 L1000	TACHOMETER 70 (2) 2:1 L1000		1		
B9	C061500922	カイテンケイ 70 (2) 2:1 L1500	TACHOMETER 70 (2) 2:1 L1500				1
B18	C061501933	フレキケーブル	FLEX. CABLE	1	1	1	1
B501	X220004000ZZ	ナツト	NUT	4	4	4	4
B503	X245204014ZZ	+ナベコネジ	+ PAN MACHINE SCREW	4	4	4	4

CHAPTER 4

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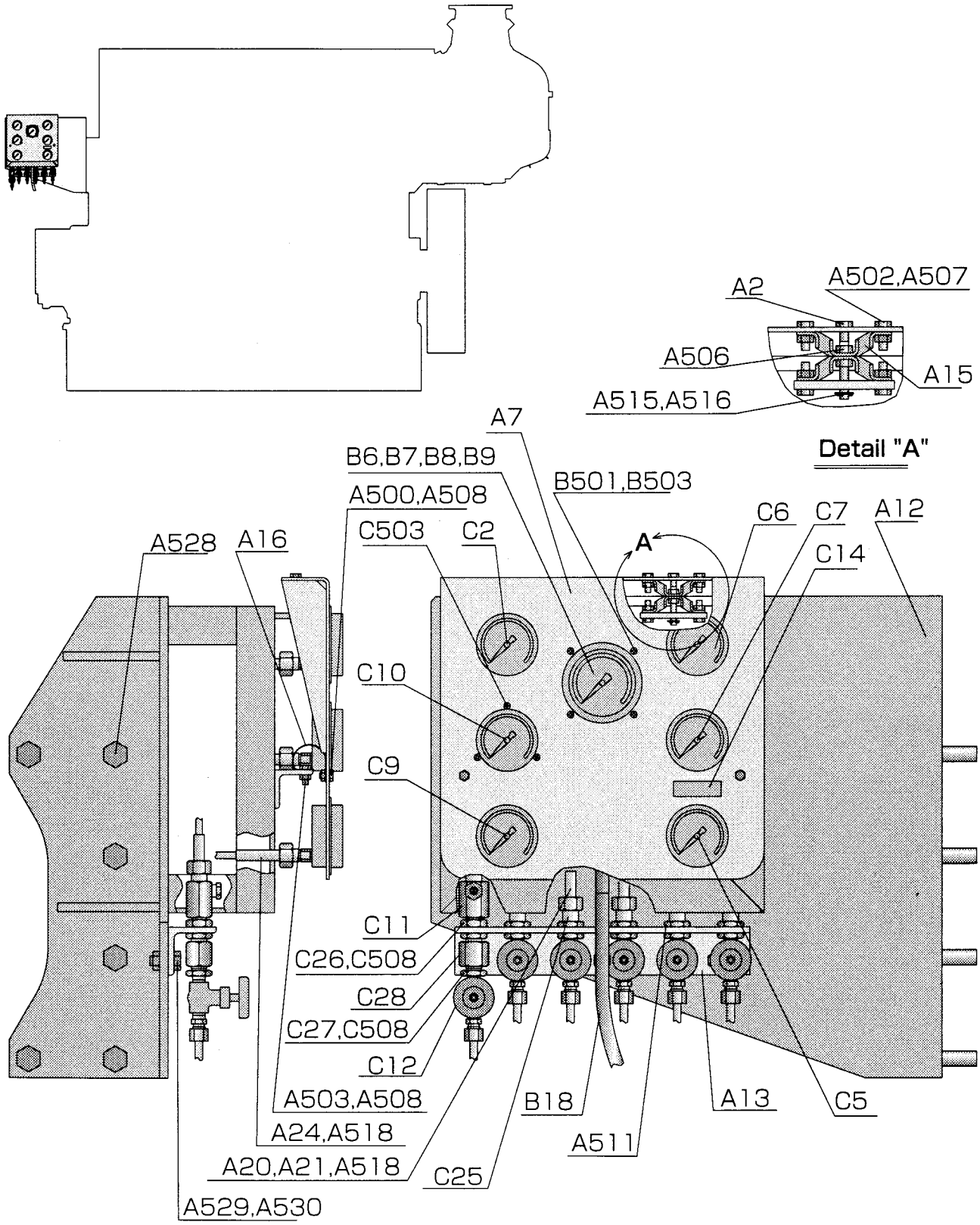
計器板（前端過給）
GAUGE BOARD (FRONT T/C)

①……清水によるノズル冷却 F.W. NOZZLE COOLING　②……A重油によるノズル冷却 D.O. NOZZLE COOLING

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量Quantity ①	②
C2	Y703093000	60 ゲージ D1/4U3-00	60 PRESS. GAUGE, D1/4U3-00	1	1
C5	Y703096000	60 ゲージ D1/4U6-00	60 PRESS. GAUGE, D1/4U6-00		1
C6	Y703001040	60 ゲージ D1/4U10-40	60 PRESS. GAUGE, D1/4U10-40	1	1
C7	Y703001050	60 ゲージ D1/4U10-50	60 PRESS. GAUGE, D1/4U10-50	1	1
C9	Y703001023	60 ゲージ D1/4U10-23	60 PRESS. GAUGE, D1/4U10-23	1	1
C10	Y703096024	60 ゲージ D1/4U6-24	60 PRESS. GAUGE, D1/4U6-24	1	1
C11	Y142030300	ダンプナー	DAMPNER	1	1
C12	Y012350085	ニードルバルブ	NEEDLE VALVE	5	6
C14	A506471750	ケイキメイバン-ST1	NAME PLATE-ST1		1
C25	E213650250	セツシユ	JOINT	4	5
C26	E273000030	コツクセツシユ	COCK CONNECTOR	1	1
C27	E273650280	セツシユ	JOINT	1	1
C28	E233650210	フクロナツト	CAP NUT	1	1
				15	18
C503	X245204008ZZ	+ナベコネジ	+ PAN MACHINE SCREW	2	2
C508	Z665006000ZZ	マルパツキン	GASKET		

DAIHATSU

計器板（後端過給）
GAUGE BOARD (REAR T/C)



DAIHATSU

計器板（後端過給）
GAUGE BOARD (REAR T/C)

6·8DK-20

CHAPTER 4

ITEM 6.2

①…正転 NORMAL ROTATION　②…逆転 REVERSE ROTATION

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity 720～750rpm ①	720～750rpm ②	900rpm ①	900rpm ②
A2	C047040030	ケイキバンボルト	BOLT, GAUGE BOARD	2	2	2	2
A7	E213050070	ケイキバン-6	GAUGE BOARD-6	1	1	1	1
A12	E213050120	ケイキバンブラケツト	BRACKET, GAUGE BOARD	1	1	1	1
A13	E213050130	ゲージバルブササエ	SUPPORT, GAUGE VALVE	1	1	1	1
A15	C047070240	ボウシンゴム (1)	CUSHION RUBBER (1)	4	4	4	4
A16	C047070250	ケイキバントクシユバネ	SPECIAL SPRING, GAUGE BOARD	2	2	2	2
A20	C012400011	ホース	HOSE	2	2	2	2
A21	C012400012	ホース	HOSE	2	2	2	2
A24	C012400013	ホース	HOSE	2	2	2	2
A500	X200006010ZZ	ボルト	BOLT	2	2	2	2
A502	X200006016ZZ	ボルト	BOLT	8	8	8	8
A503	X200006016ZZ	ボルト	BOLT	2	2	2	2
A506	X220006000ZZ	ナツト	NUT	4	4	4	4
A507	X220006000ZZ	ナツト	NUT	8	8	8	8
A508	X220006000ZZ	ナツト	NUT	4	4	4	4
A511	X230303000ZZ	トクシユナツト	SPECIAL NUT	6	6	6	6
A515	Z300006000ZZ	ヒラザガネ	FLAT WASHER	2	2	2	2
A516	Z320001615ZZ	ワリピン	SPLIT PIN	2	2	2	2
A518	Z665006000ZZ	マルパツキン	GASKET	12	12	12	12
A528	X200016045ZZ	ボルト	BOLT	6	6	6	6
A529	X200010025ZZ	ボルト	BOLT	2	2	2	2
A530	X220010000ZZ	ナツト	NUT	2	2	2	2
B6	C061500851	カイテンケイ 70 (2) 2:1 R1000	TACHOMETER 70 (2) 2:1 R1000	1			
B7	C061500921	カイテンケイ 70 (2) 2:1 R1500	TACHOMETER 70 (2) 2:1 R1500			1	
B8	C061500852	カイテンケイ 70 (2) 2:1 L1000	TACHOMETER 70 (2) 2:1 L1000		1		
B9	C061500922	カイテンケイ 70 (2) 2:1 L1500	TACHOMETER 70 (2) 2:1 L1500				1
B18	C061501933	フレキケーブル	FLEX. CABLE	1	1	1	1
B501	X220004000ZZ	ナツト	NUT	4	4	4	4
B503	X245204014ZZ	+ナベコネジ	+ PAN MACHINE SCREW	4	4	4	4

①……清水によるノズル冷却 F.W. NOZZLE COOLING　②……A重油によるノズル冷却 D.O. NOZZLE COOLING

				数量Quantity ①	②
C2	Y703093000	60 ゲージ D1/4U3-00	0 PRESS. GAUGE D1/4U3-00	1	1
C5	Y703096000	60 ゲージ D1/4U6-00	60 PRESS. GAUGE D1/4U6-00		1
C6	Y703001040	60 ゲージ D1/4U10-40	60 PRESS. GAUGE, D1/4U10-40	1	1
C7	Y703001050	60 ゲージ D1/4U10-50	60 PRESS. GAUGE, D1/4U10-50	1	1
C9	Y703001023	60 ゲージ D1/4U10-23	60 PRESS. GAUGE, D1/4U10-23	1	1
C10	Y703096024	60 ゲージ D1/4U6-24	60 PRESS. GAUGE, D1/4U6-24	1	1
C11	Y142030300	ダンプナー	DAMPNER	1	1
C12	Y012350085	ニードルバルブ	NEEDLE VALVE	5	6

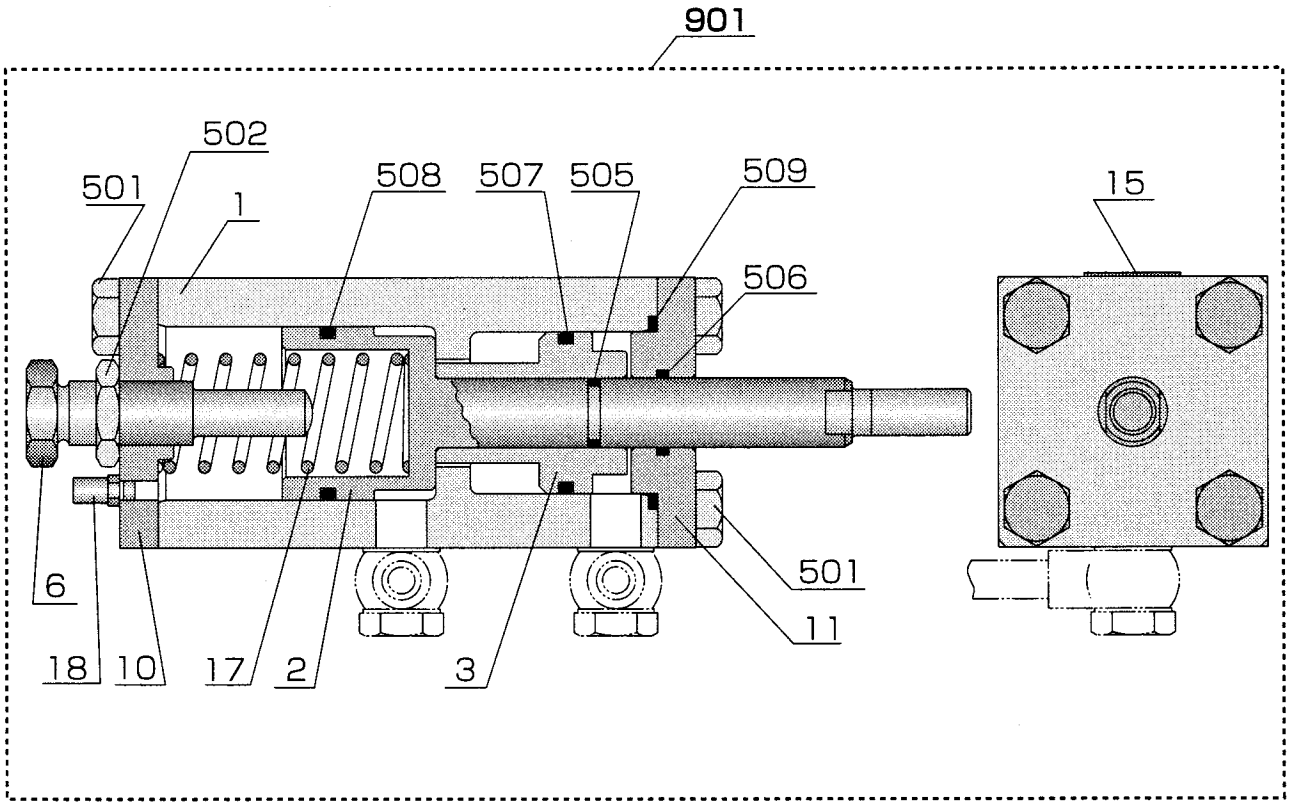
CHAPTER 4
ITEM 6.2 6·8DK-20

計器板（後端過給）
GAUGE BOARD (REAR T/C)

①……清水によるノズル冷却 F.W. NOZZLE COOLING　②……A重油によるノズル冷却 D.O. NOZZLE COOLING

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量Quantity ①	②
C14	YA506471750	ケイキメイバン-ST1	NAME PLATE-ST1		1
C25	E213650250	セツシユ	JOINT	4	5
C26	E273000030	コツクセツシユ	COCK CONNECTOR	1	1
C27	E273650280	セツシユ	JOINT	1	1
C28	E233650210	フクロナツト	CAP NUT	1	1
C503	X245204008ZZ	+ナベコネジ	+ PAN MACHINE SCREW	15	18
C508	Z665006000ZZ	マルパツキン	GASKET	2	2

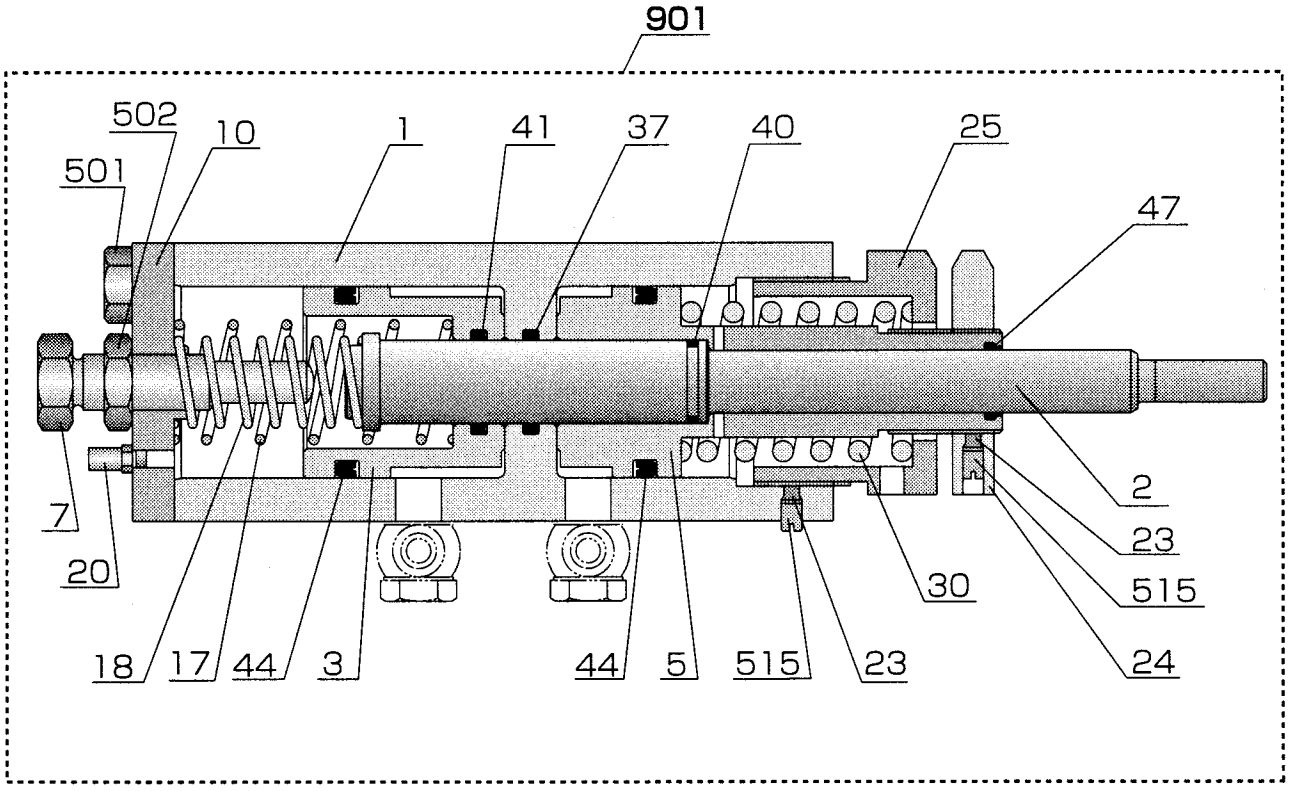
燃料遮断装置・抑制装置 - 定速型
FUEL SHUTDOWN & CONTROL PISTON - CONSTANT SPEED TYPE



燃料遮断装置・抑制装置 - 定速型
FUEL SHUTDOWN & CONTROL PISTON - CONSTANT SPEED TYPE

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
901	S107809010	G1ガタF.O.シャダンソウチ	FUEL SHUTDOWN DEVICE G1	1
1	S107800010	シリンダー	CYLINDER	1
2	S107800020	シャダンピストン	SHUTDOWN PISTON	1
3	S107800030	ヨクセイピストン	CONTROL PISTON	1
6	S107900060	チョウセイボルト	ADJUST BOLT	1
10	S107800100	フタ-1	COVER-1	1
11	S107800110	フタ-2	COVER-2	1
15	A226570160	FO シャダンソウチ-メイバン	LABEL, FUEL SHUTDOWN DEVICE	1
17	S107800170	シュバネ	MAIN SPRING	1
18	S107900180	エアーフイルター	AIR FILTER	1
501	X200010020ZZ	ボルト	BOLT	8
502	X230303000ZZ	トクシュナツト	SPECIAL NUT	1
505	Z560101424ZZ	O リング	O-RING	1
506	Z560101824ZZ	O リング	O-RING	1
507	Z560103635ZZ	O リング	O-RING	1
508	Z560103935ZZ	O リング	O-RING	1
509	Z560204531ZZ	O リング	O-RING	1

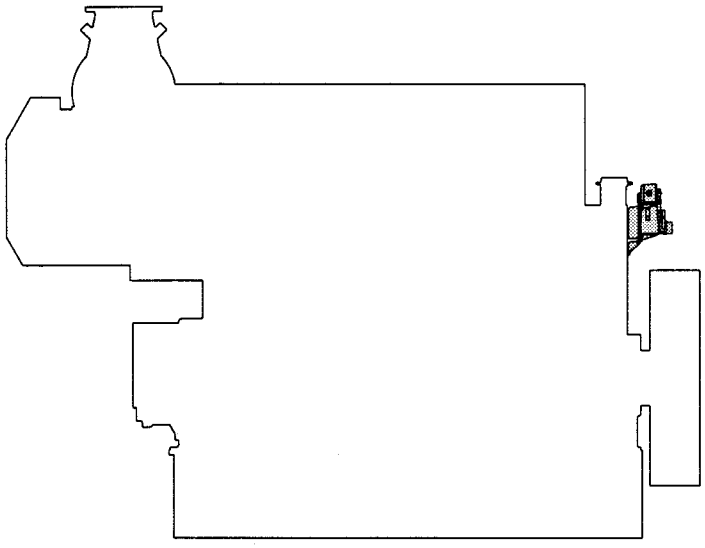
燃料遮断装置・抑制装置 - 変速型（主機）
FUEL SHUTDOWN & CONTROL PISTON - VARIABLE SPEED TYPE (FOR PROPULSION)

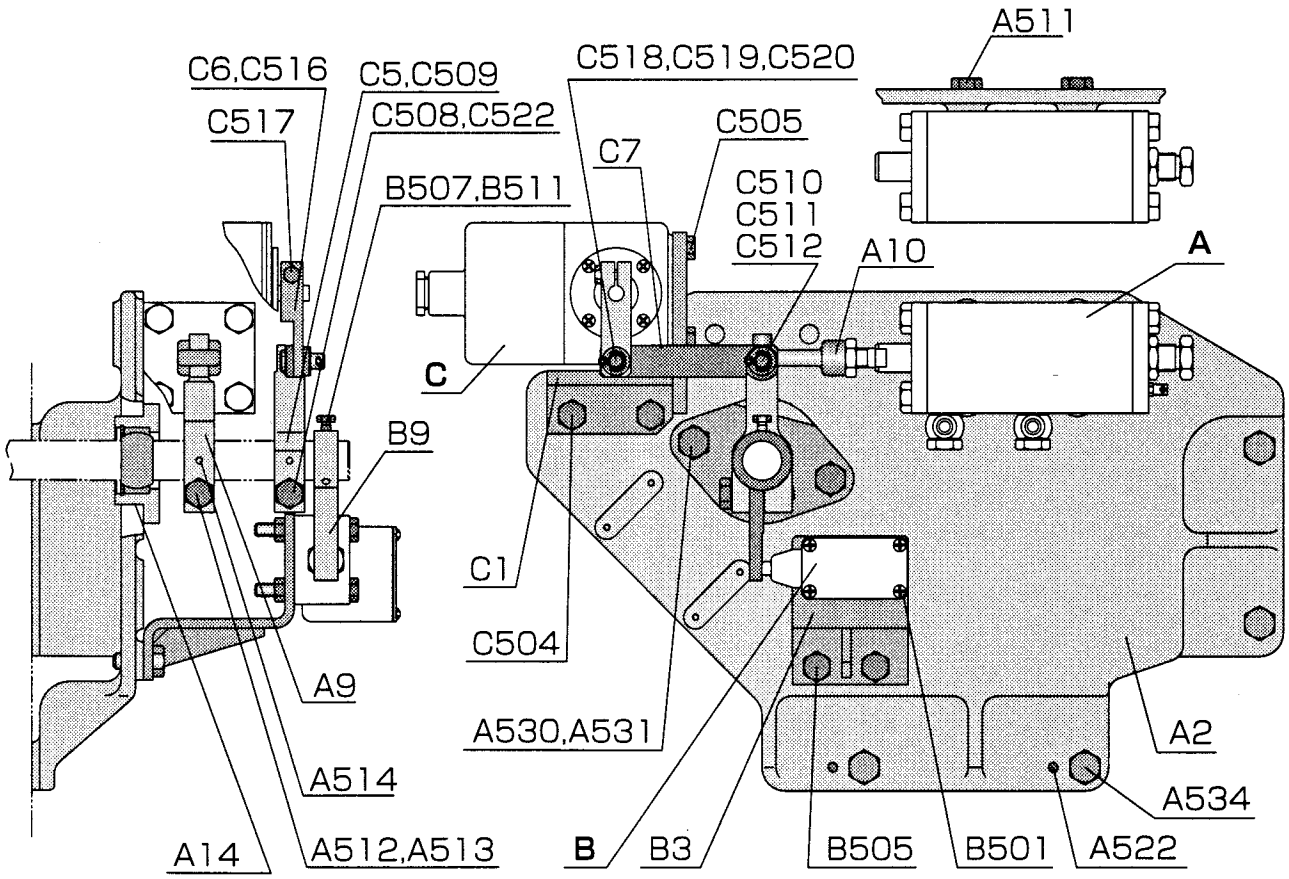


燃料遮断装置・抑制装置 - 変速型（主機）
FUEL SHUTDOWN & CONTROL PISTON - VARIABLE SPEED TYPE (FOR PROPULSION)

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
901	S109809010	J2ガタF.O.シャダンソウチ-1	FUEL SHUTDOWN DEVICE J2 TYPE-1	1
1	S109800010	シリンダ	CYLINDER	1
2	S109800020	シャフト	SHAFT	1
3	S109800030	シャダンピストン	SHUTDOWN PISTON	1
5	S109800050	ヨクセイピストン	CONTROL PISTON	1
7	S108100070	チョウセイボルト	ADJUST BOLT	1
10	S108100100	フタ-1	COVER-1	1
17	S109800170	シュバネ A	MAIN SPRING-A	1
18	S109800180	シュバネ B	MAIN SPRING-B	1
20	S107900180	エアーフイルター	AIR FILTER	1
23	S105000420	ナイロンピース	NYLON PIECE	2
24	S109800240	ナット	NUT	1
25	S109800250	バネウケ	SEAT, SPRING	1
30	S109800300	バネ (1)	SPRING (1)	1
37	S109800370	テフロン O リング	TEFLON O-RING	1
40	S109800400	ミニY パッキン	MINI Y-PACKING	1
41	S109800410	ミニY パッキン	MINI Y-PACKING	1
44	S105700240	GLY パッキン	GLY PACKING	2
47	S109800470	SER スクレーパ	SER SCRAPER	1
501	X200012020ZZ	ボルト	BOLT	4
502	X220316000ZZ	ナット	NUT	1
515	X251206008ZZ	トメネジ	SET SCREW	2

燃料遮断装置・抑制装置取付 - 定速型
FUEL SHUTDOWN & CONTROL PISTON FITTING - CONSTANT SPEED TYPE

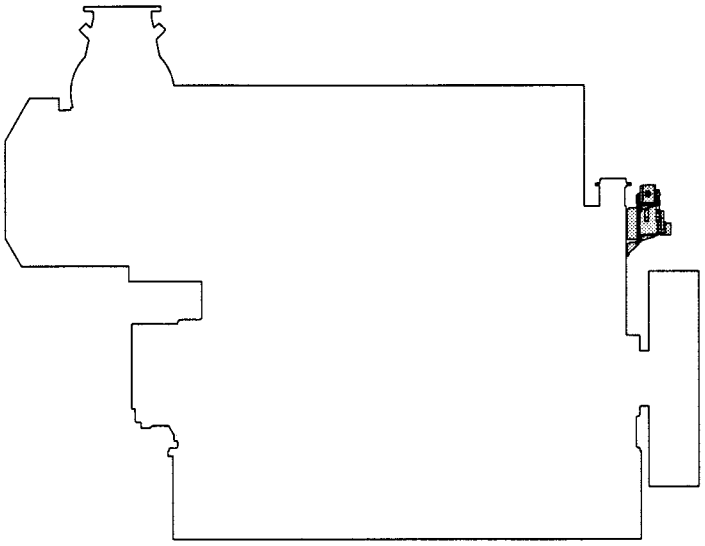


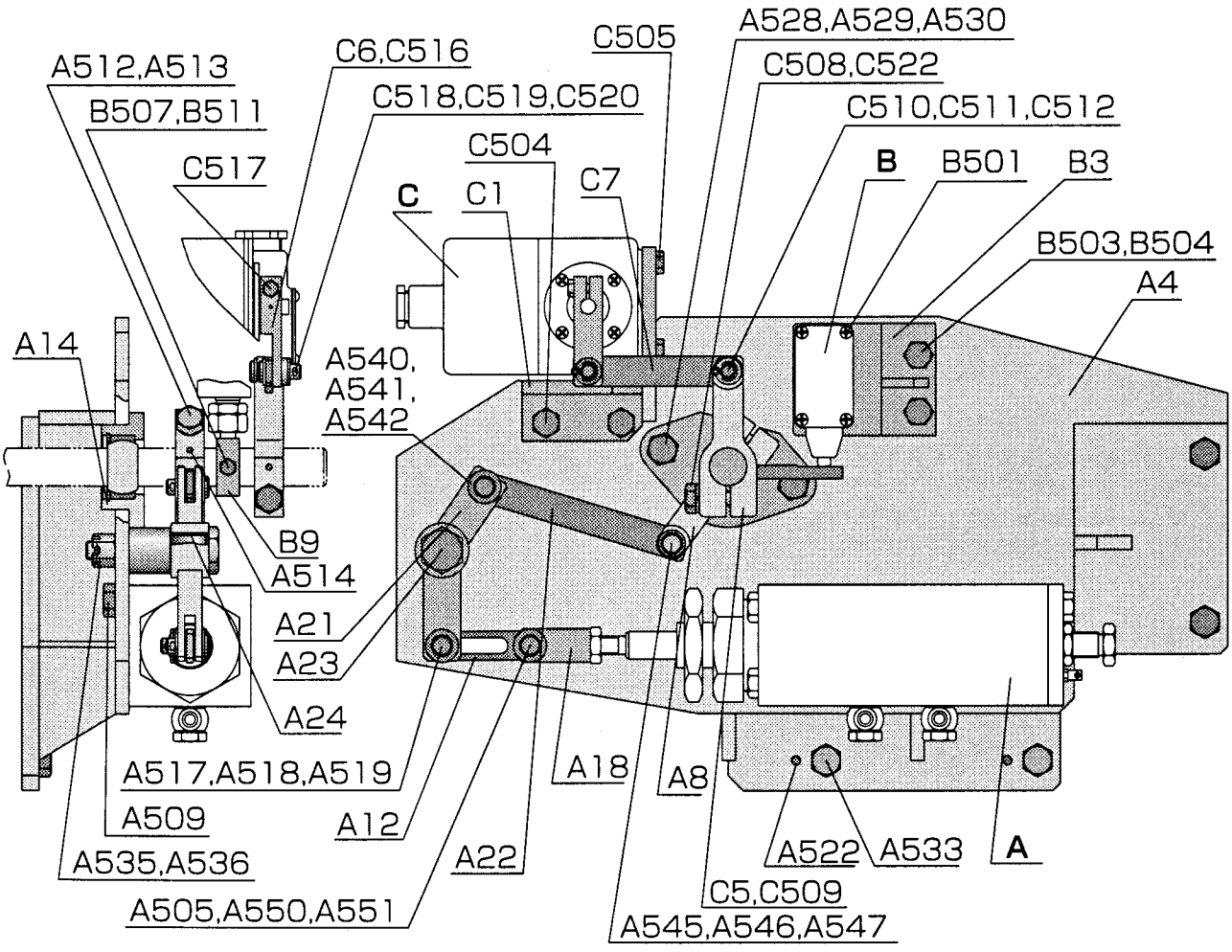


燃料遮断装置・抑制装置取付 - 定速型
FUEL SHUTDOWN & CONTROL PISTON FITTING - CONSTANT SPEED TYPE

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
A	S107809010	G1ガタ F.O. シャダンソウチ	F.O. SHUTDOWN DEVICE G1 TYPE	1
B	A333790010	カフカスイッチ	OVER LOAD INDICATOR	1
C	L510009010	ポテンショメータ	POTENTIOMETER	1
A2	E216050020	テイシソウチブラケツト-Gガタ	BRACKET,F.O. SHUTDOWN DEVICE-G	1
A9	E216050090	FO シヤダンレバー, Gガタ	LEVER, F.O. SHUTDOWN-G	1
A10	E216050100	FO シヤダンリンク-Gガタ	LINK, F.O. SHUT DOWN DEVICE	1
A14	E201650030	ジクウケ (2), コモンロツド	BEARING (2), COMMON ROD	1
A511	X200010045ZZ	ボルト	BOLT	4
A512	X200010040ZZ	ボルト	BOLT	1
A513	Z315010000ZZ	ハツキザガネ	TOOTHED LOCK WASHER	1
A514	Z415005040ZZ	スプリングピン	SPRING PIN	1
A522	Z415006020ZZ	スプリングピン	SPRING PIN	2
A530	Z315014000ZZ	ハツキザガネ	TOOTHED LOCK WASHER	2
A531	X200014030ZZ	ボルト	BOLT	2
A534	X200012028ZZ	ボルト	BOLT	4
B3	E216450030	カフカケンシツキブラケット	BLACKET, OVER LOAD DETECTOR	1
B9	E296400090	レバー	LEVER	1
B501	X245204035ZZ	+ナベコネジ	+ PAN MACHIUE SCREW	4
B505	X200010025ZZ	ボルト	BOLT	2
B507	X250106012ZZ	ロッカクトメネジ	HEX. SET SCREW	1
B511	Z415005040ZZ	スプリングピン	SPRING PIN	1
C1	E215150010	ポテンショメータブラケット (G1)	BRACKET (G1), POTENTIOMETER	1
C5	E216050080	F.O. シャダンレバー	LEVER, F.O. SHUTDOWN	1
C6	E295150060	ポテンショメータレバー (2)	LEVER (2), POTENTIOMETER	1
C7	E215150070	リンク	LINK	1
C504	X200010025ZZ	ボルト	BOLT	2
C505	X200008018ZZ	ボルト	BOLT	4
C508	X200010032ZZ	ボルト	BOLT	1
C509	Z415005040ZZ	スプリングピン	SPRING PIN	1
C510	Z300110000ZZ	ヒラザガネ	FLAT WASHER	2
C511	Z425110025ZZ	リンクピン	LINK PIN	1
C512	Z320002025ZZ	ワリピン	SPLIT PIN	1
C516	Z415003020ZZ	スプリングピン	SPRING PIN	1
C517	X200006018ZZ	ボルト	BOLT	1
C518	Z300110000ZZ	ヒラザガネ	FLAT WASHER	2
C519	Z425110025ZZ	リンクピン	LINK PIN	1
C520	Z320002025ZZ	ワリピン	SPLIT PIN	1
C522	Z310010000ZZ	バネザガネ	SPRING PIN	1

燃料遮断装置・抑制装置取付 - 変速型（主機）
FUEL SHUTDOWN & CONTROL PISTON FITTING -VARIABLE SPEED TYPE (FOR PROPULSION)



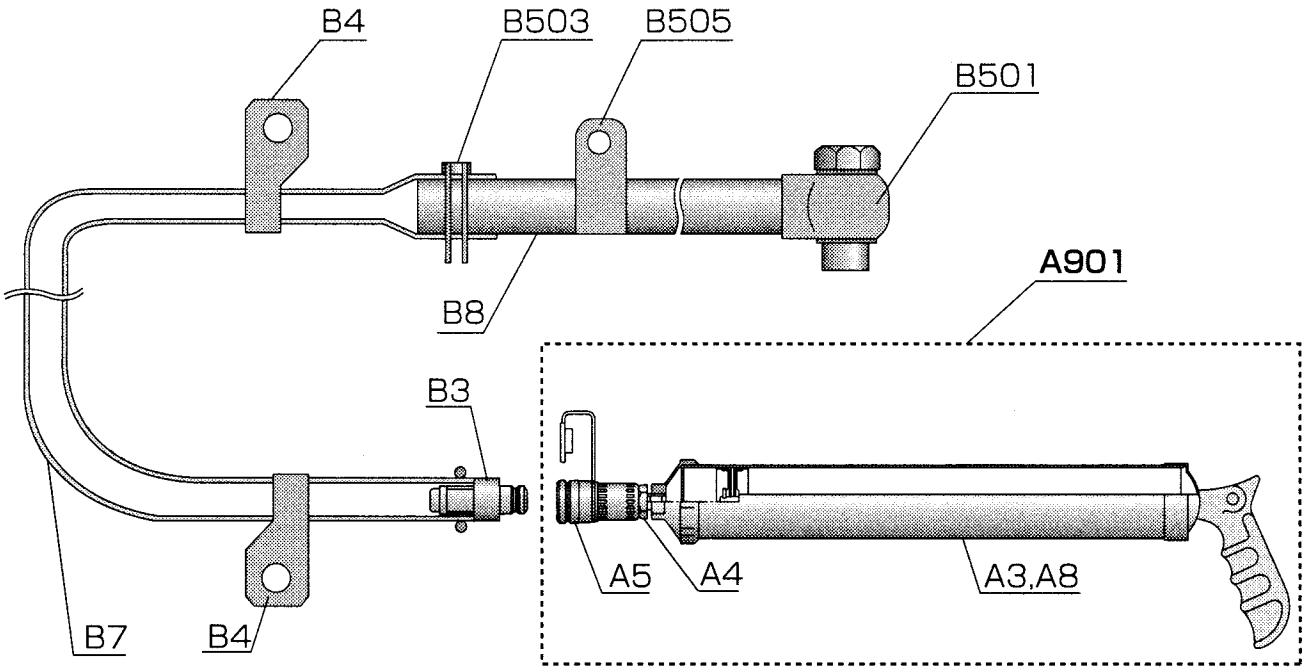


番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
A	S109809010	J2ガタ F.O. シャダンソウチ	F.O. SHUTDOWN DEVICE J2 TYPE	1
B	A333790010	カフカスイッチ	OVER LOAD INDICATOR	1
C	L510009010	ポテンショメータ	POTENTIOMETER	1
A4	E216050040	テイシソウチブラケツト-Jガタ	BRACKET, F.O. SHUT DOWN DEVICE J	1
A8	E216050080	FO シヤダンレバー	LEVER, F.O. SHUTDOWN	1
A12	E216050120	FO シヤダンリンク	LINK, F.O. SHUT DOWN DEVICE	1
A14	E201650030	ジクウケ (2), コモンロツド	BEARING (2), COMMON ROD	1
A18	E216050180	ホークエンド	FORK END	1
A21	E216050210	チユウカンレバー	IDLE LEVER	1
A22	E216050220	リンク	LINK	1
A23	E216050230	チユウカンレバジク	IDLE LEVER SHAFT	1
A24	E241600080	オイレスタフメツト	BUSH,OILES TMB	1
A505	Z425110030ZZ	リンクピン	LINK PIN	1
A509	X200012035ZZ	ボルト	BOLT	4
A512	X200010040ZZ	ボルト	BOLT	1
A513	Z315010000ZZ	ハツキザガネ	TOOTHED LOCK WASHER	1
A514	Z415005040ZZ	スプリングピン	SPRING PIN	1
A517	Z425110025ZZ	リンクピン	LINK PIN	1
A518	Z300010000ZZ	ヒラザガネ	FLAT WASHER	2
A519	Z320003020ZZ	ワリピン	SPLIT PIN	1
A522	Z415006020ZZ	スプリングピン	SPRING PIN	2
A528	X200014040ZZ	ボルト	BOLT	2
A529	X220014000ZZ	ナツト	NUT	2
A530	Z315014000ZZ	ハツキザガネ	TOOTHED LOCK WASHER	2
A533	X200012025ZZ	ボルト	BOLT	4
A535	X225112000ZZ	キクナツト	CASTLE NUT	1
A536	Z320003030ZZ	ワリピン	SPRIT PIN	1
A540	Z425110025ZZ	リンクピン	LINK PIN	1
A541	Z300010000ZZ	ヒラザガネ	FLAT WASHER	2
A542	Z320003020ZZ	ワリピン	SPLIT PIN	1
A545	Z425110025ZZ	リンクピン	LINK PIN(	1
A546	Z300110000ZZ	ヒラザガネ	FLAT WASHER	2
A547	Z320003020ZZ	ワリピン	SPLIT PIN	1
A550	Z300010000ZZ	ヒラザガネ	FLAT WASHER	1
A551	Z320003020ZZ	ワリピン	SPLIT PIN	1
B3	E216450030	カフカケンシツキブラケット	BLACKET, OVER LOAD DETECTOR	1
B9	E296400090	レバー	LEVER	1
B501	X245204035ZZ	+ナベコネジ	+PAN MACHIUE SCREW	4
B503	X200010030ZZ	ボルト	BOLT	2
B504	X220010000ZZ	ナット	NUT	2

燃料遮断装置・抑制装置取付 - 変速型（主機）
FUEL SHUTDOWN & CONTROL PISTON FITTING -VARIABLE SPEED TYPE (FOR PROPULSION)

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
B507	X250106012ZZ	ロッカクトメネジ	HEX. SET SCREW	1
B511	Z415005040ZZ	スプリングピン	SPRING PIN	1
C1	E215150010	ポテンショメータブラケット (G1)	BRACKET (G1), POTENTIOMETER	1
C5	E216050080	F.O. シャダンレバー	LEVER, F.O. SHUTDOWN	1
C6	E295150060	ポテンショメータレバー (2)	LEVER (2), POTENTIOMETER	1
C7	E215150070	リンク	LINK	1
C504	X200010025ZZ	ボルト	BOLT	2
C505	X200008018ZZ	ボルト	BOLT	4
C508	X200010032ZZ	ボルト	BOLT	1
C509	Z415005040ZZ	スプリングピン	SPRING PIN	1
C510	Z300110000ZZ	ヒラザガネ	FLAT WASHER	2
C511	Z425110025ZZ	リンクピン	LINK PIN	1
C512	Z320002025ZZ	ワリピン	SPLIT PIN	1
C516	Z415003020ZZ	スプリングピン	SPRING PIN	1
C517	X200006018ZZ	ボルト	BOLT	1
C518	Z300010000ZZ	ヒラザガネ	FLAT WASHER	2
C519	Z425110025ZZ	リンクピン	LINK PIN	1
C520	Z320002025ZZ	ワリピン	SPLIT PIN	1
C522	Z310010000ZZ	バネザガネ	SPRING PIN	1

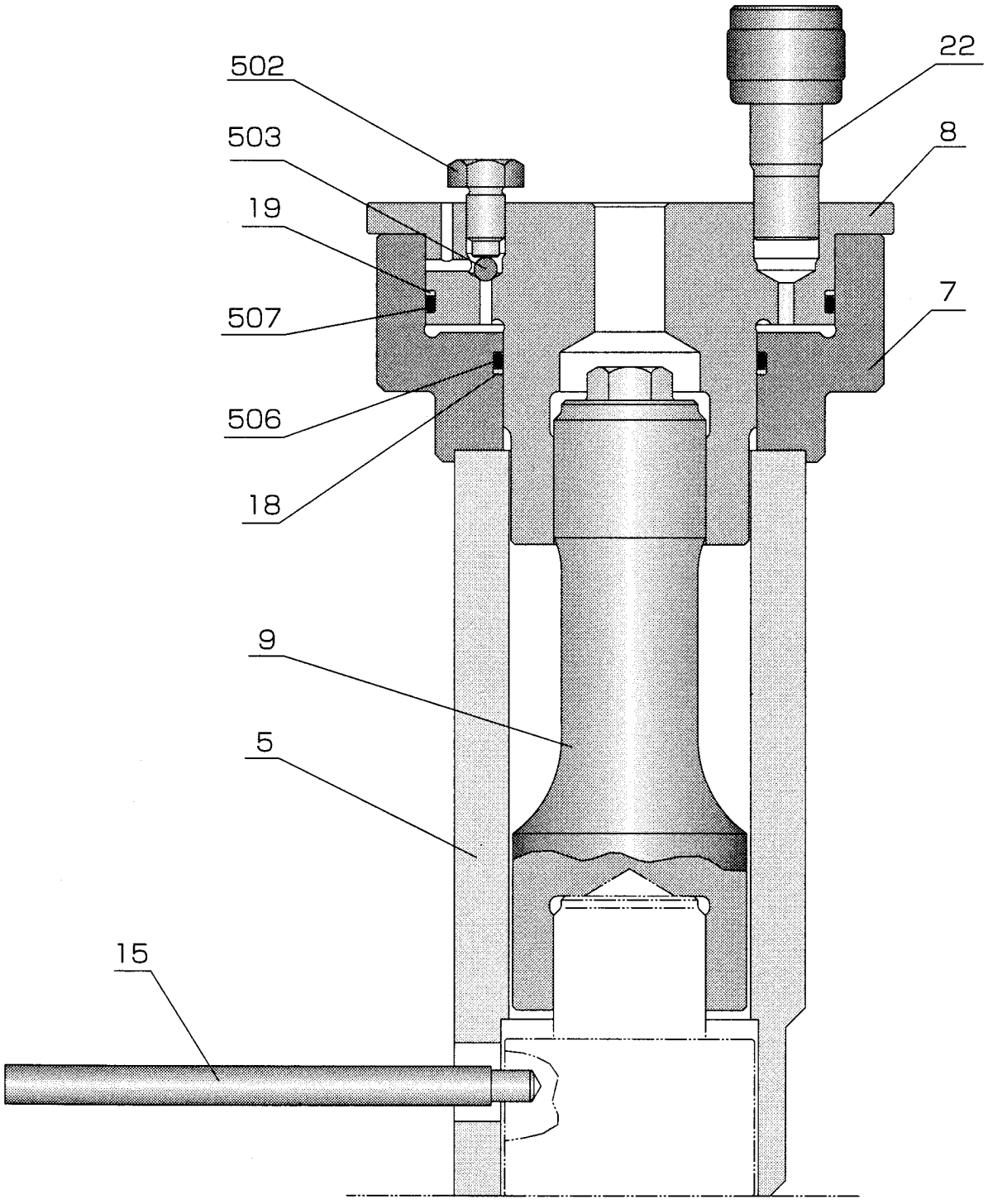
ブロワー洗浄装置
BLOWER CLEANING PARTS



ブロワー洗浄装置
BLOWER CLEANING PARTS

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
A901	C044090010	ブロワシリンジ ASSY.	BLOWER SYRINGE ASSY.	1
A3	C044070030	シリンジ	SYRINGE	1
A4	C044070040	ホースニップル	HOSE NIPPLE	1
A5	C044070050	ソケット	SOCKET	1
A8	A506470150	ブロワーシリンジメイバン	NAME PLATE, BLOWER SYRINGE	1
B3	C044170030	プラグ	PLUG	1
B4	C044170040	クランプ	CLUMP	2
B7	C044170070	ビニールホース	VINYL HOSE	1
B8	C044170080	パイプ	PIPE	1
B501	X546110030JZ	ツギワ ASSY	BANJO ASSY.	1
B503	Z584001500ZZ	ホースバンド	HOSE BAND	1
B505	Z585110003ZZ	カンバンド	PIPE SUPPORTER	1

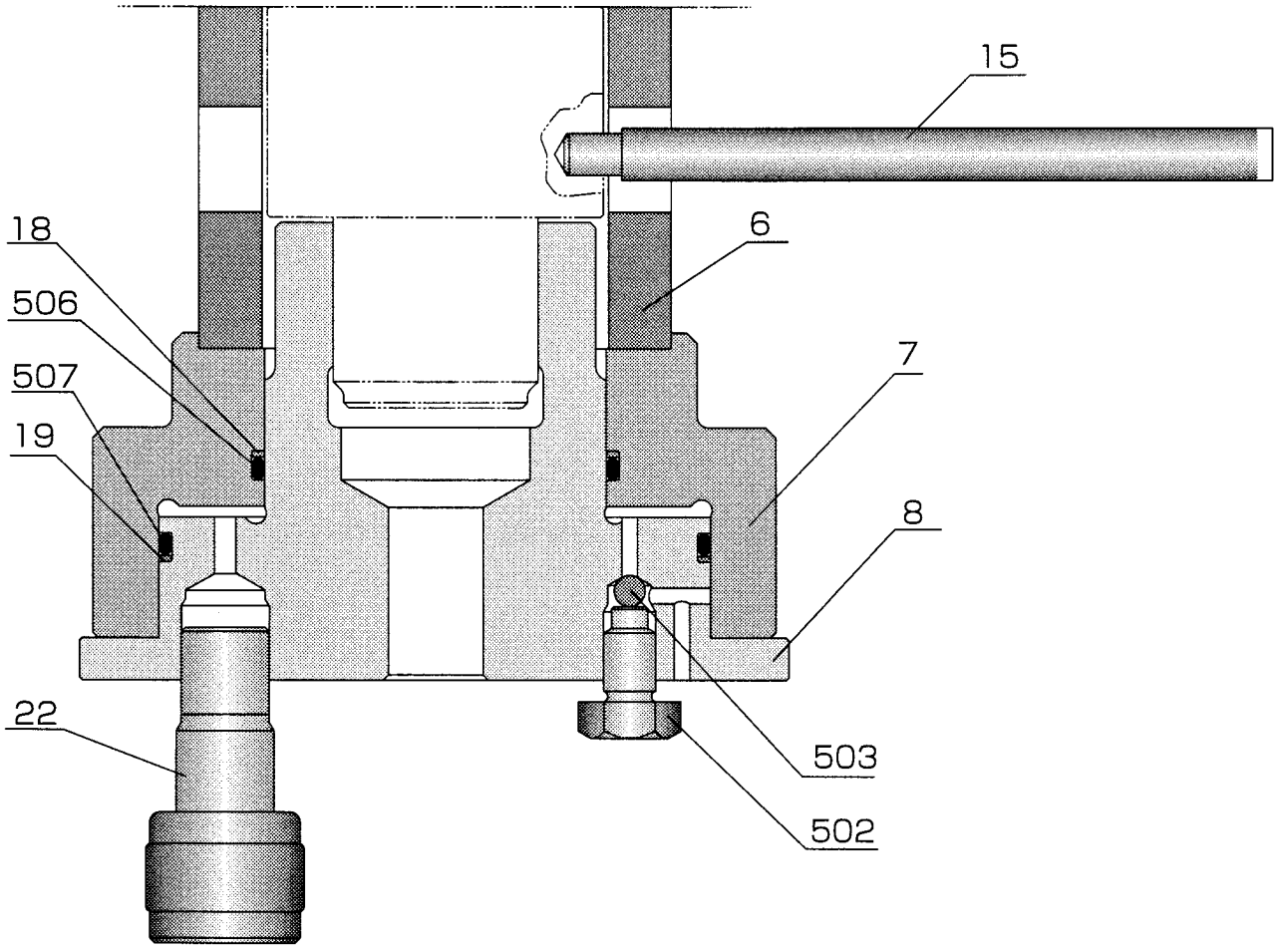
油圧ジャッキ（シリンダヘッド）
OIL PRESS JACK (CYLINDER HEAD)



油圧ジャッキ（シリンダヘッド）
OIL PRESS JACK (CYLINDER HEAD)

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
5	E219550050	ジャッキスタンド-ヘッド	JACK STAND-HEAD	1
7	E219550070	ジャッキシリンダ	JACK CYLINDER	1
8	E219550080	ジャッキピストン	JACK PISTON	1
9	E219550090	ヒッパリボルト	TENSION BOLT	1
15	E339500140	ジャッキハンドル	JACK HANDLE	1
18	E219550180	バックアップリング	BACK-UP RING	1
19	E219550190	バックアップリング	BACK-UP RING	1
22	E339600090	メスカペラ	SOCKET COUPLING	1
502	X250110018ZZ	ロッカクトメネジ	HEX. SET SCREW	1
503	Z445002000ZZ	ボール	BALL	1
506	Z560206531ZZ	O リング	O-RING	1
507	Z560210031ZZ	O リング	O-RING	1

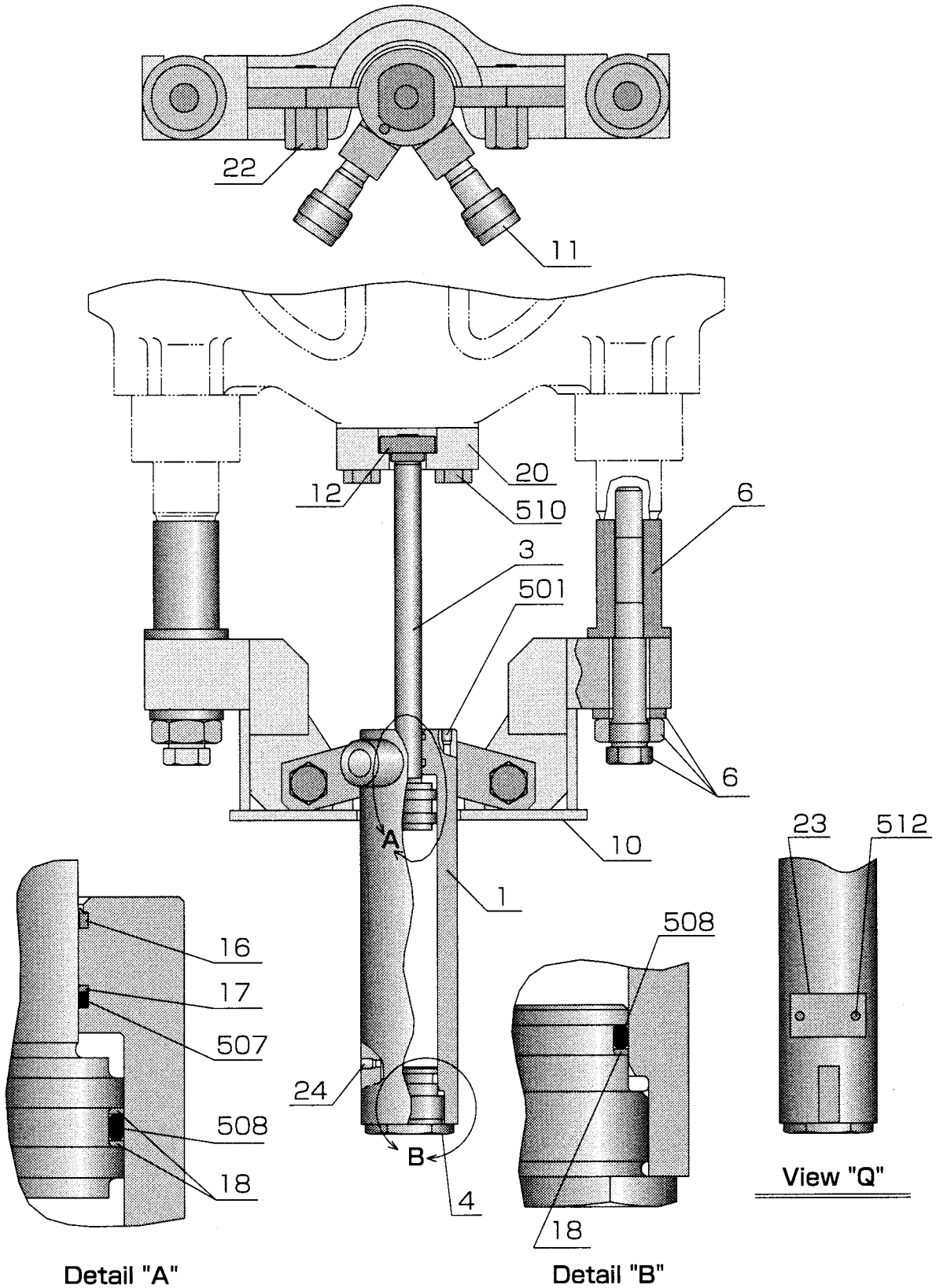
油圧ジャッキ（メタルキャップ）
OIL PRESS JACK (METAL CAP)



油圧ジャッキ（メタルキャップ）
OIL PRESS JACK (METAL CAP)

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
6	E219550060	ジャッキスタンド-キャップ	JACK STAND-CAP	1
7	E219550070	ジャッキシリンダ	JACK CYLINDER	1
8	E219550080	ジャッキピストン	JACK PISTON	1
15	E339500140	ジャッキハンドル	JACK HANDLE	1
18	E219550180	バックアップリング	BACK-UP RING	1
19	E219550190	バックアップリング	BACK-UP RING	1
22	E339600090	メスカペラ	SOCKET COUPLING	1
502	X250110018ZZ	ロッカクトメネジ	HEX. SET SCREW	1
503	Z445002000ZZ	ボール	BALL	1
506	Z560206531ZZ	O リング	O-RING	1
507	Z560210031ZZ	O リング	O-RING	1

油圧ラム
OIL PRESS. RAM



油圧ラム
OIL PRESS. RAM

番号 Number	部品番号 Parts number	部品名称	Name of Parts	数量 Quantity
1	E219450010	シリンダ, ユアツラム	CYLINDER, OIL PRESS. RAMSPECIAL	1
3	E219450030	ピストン, ユアツラム	PISTON, OIL PRESS. RAM	1
4	E219450040	プラグ, シリンダ	PLUG, CYLINDER	1
6	E219450060	メタルキャップヨウグ (1)	PULL PIECE (1)	2
10	E219450100	メタルキャップヨウグ (2)	PULL PIECE (2)	1
11	E339600090	メスカプラ	SOCKET COUPLING	2
12	E219450120	メタルキャップヨウグ (3)	PULL PIECE (3)	1
16	E219450160	ダストシール	DUST SEAL	1
17	E219450170	バックアップリング	BACK-UP RING	1
18	E219450180	バックアップリング	BACK-UP RING	3
20	E219450200	ユアツラムウケカナグ	PULL PIECE, OIL PRESS. RAM	1
22	E219450220	トクシュボルト	SPECIAL BOLT	2
23	E219450230	ユアツラムメイバン	NAME PLATE, OIL PRESS RAM	1
24	E219450240	テーパプラグ	TAPER PLUG	4
507	Z560101624ZZ	O リング	O-RING	1
508	Z560102835ZZ	O リング	O-RING	2
510	X200012035ZZ	ボルト	BOLT	2
512	Z352020500ZZ	リベット	RIVET	2