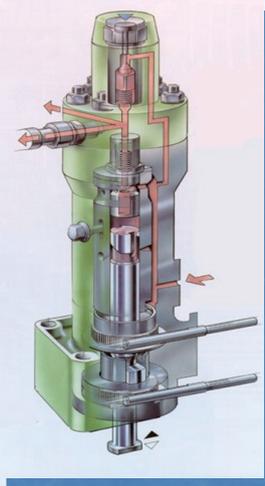


SPINDLE GIKEN's Repair Services

Fuel Pump for M/E and G/E



To supply accurate metered amount of fuel with sufficient pressure to open fuel injector in correct timing.

The most common problem is fuel oil fired. The governor controls the fuel pump delivery through a fuel rack, which is a combination of mechanical links. Sometimes the fuel pump gets stuck leading to lack of fuel supply in the concerned unit which results in either fluctuation in the engine RPM if running or slow down/not start the engine.



Fuel Pump Internal Parts

Puncture Valve
Suction Valve
Spill Valve

Delivery/Discharge Valve
Plunger and Barrel

Fuel Line Parts

Fuel Injector
High Pressure Pipe
Roller Guide
Indicator Valve

Recommend / black Smoke:

All the fuel pump must be well overhauled and set the timing before starting the main engine. If incorrect timing difficult to start engine, abnormal exhaust temperature reading, block smoke come out and irregular running of engine.



We recommend
***periodic
maintenance.***

Puncture Valve



It is fitted top cover of the pump and used to cut off the fuel injector.

It consists of a piston which communicates with the air control system of the engine. In "STOP" mode, compressed air causes the piston pin to be pressed downwards and 'punctures' the oil flow to the pump housing.

Suction Valve

Suction valve controls the flow of fuel into the pump and it also decides the beginning of fuel delivery.

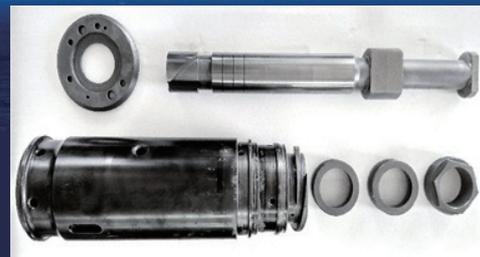
Spill Valve

Spill valve controls the end of injection of fuel.



Discharge/Delivery

The fuel is delivered to the cylinder through the discharge valve.



Plunger & Barrel

Barrel: It is a cylinder fixed in the pump's body to accommodate the plunger. It has a high surface finish.

Plunger: The plunger reciprocates with minute clearance (in microns) inside the barrel to push the fuel out of the pump.

Fuel has to be injected into the engine at a high pressure so that it atomizes correctly. As the plunger moves up the barrel, the pressure of the fuel in the barrel above the plunger rises very quickly.

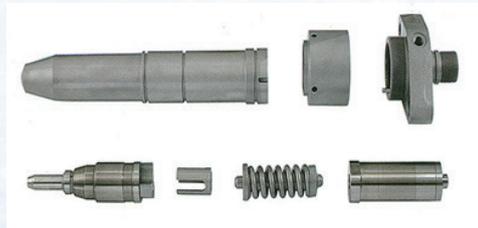
Recommend:

If the plunger and barrel clearance is not in the limit, it should need to be serviced.

- To check the barrel suction holes and the wear on the holes using both endoscopic and photographic examinations
- Grinding the barrel holes and renewal of the pump element with special anticorrosion coating as required.
- We then proceed with grinding and lapping of the barrel contact plane, lubrication hole cleaning using new generation multi-frequency ultrasonic equipment and reassembly at the required clearances

Fuel valve/Injector

The purpose of the fuel injection system is to deliver fuel into the engine cylinders, while precisely controlling the injection timing, fuel atomization, and other parameters. The faulty fuel injectors are an extremely violent or rough engine. If fuel is not properly provided to the engine cylinder, it will result in engine operation uneven or slowdown.



Recommend:

In this case Injector should be opened and overhauled for the below mentioned items;

Nozzle

Atomizer

Spindle Guide

Non-Return Valve

- The assembly and the disassembly must be done as per the instructions given by the engine manufacturer.
- The needle and the guide are always a pair and should not be interchanged with another one.
- Cleanliness is the most important factor in making fuel valves. A clean fuel valve lasts a longer time.
- To check nozzle seats using microscopic analysis.
- We then perform the grinding of the nozzle seat, replace the nozzle needle, calibrate the nozzle injection holes.
- Perform the necessary grinding and lapping of the contact plane.

Reassemble, test and calibrate on our specialized test benches to requested specifications.

Exhaust Valve (4-Stroke)

The 4 stroke have multiple inlet and exhaust valves fitted to the cylinder heads. On the medium speed engines this normally takes the form of two inlet and two exhaust valves per unit.

The area of the valve openings must be large enough to provide for an efficient gas exchange process.

If the area is too small then not enough air will be pushed/drawn into the cylinder during the induction stroke, and on the exhaust stroke the engine will be doing work pushing the exhaust gas out of the cylinder.

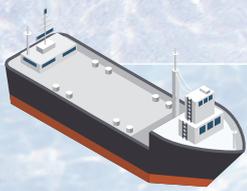


- **Exhaust valves** are subject to arduous conditions, and require regular overhaul.
- To aid this, exhaust valves are often fitted in separate cages. This allows the exhaust valve to be changed and overhauled without removing the cylinder head. The cages have water cooling passages connected to the cylinder head cooling water.
- The springs which ensure the valve closes will weaken with use and are liable to break.
- Exhaust gas can leak up the spindle, causing overheating and accelerating wear. The springs which ensure the valve closes will weaken with use and are liable to break.
- **Inlet/Suction Valves** are subject to much less arduous conditions and are not usually fitted in separate cages.



SIP (Swirl Injection Principle) Valve

- SIP may be controlled by ECL (Electronically Controlled Lubricating) system
⇒ Reduction of running cost by lower cylinder oil consumption.
- The principle of using the scavenging air inside the cylinder to distribute a spray of the lube oil as a thin and even oil film onto the cylinder wall. Thereby, an optimum distribution of the lube oil is obtained at a minimum lube oil consumption.
- For each piston stroke of the engine, a small quantity of lube oil is sprayed out of the SIP Valve.



Recommend:

The function of the SIP Valve should be checked at appropriate intervals, e.g. when renovating a cylinder or after operation hours.

We recommend that the spray, the closing pressure and the quantity of leak oil are checked at appropriate intervals, for example every two years.

In addition, we recommend that the distance between the cylinders and the tip of the needle is measured to ensure that wear on the cylinders does not lead to an exposure of the tip of the valve, which may then be damaged by the piston rings

High Pressure Pipe

It helps to deliver the fuel from the high pressure pump to the combustion engine without any loss of pressure, without any hindrance to the flow and without impairing the functions of the fuel injection components.

FO leaks from the high-pressure pipe are dangerous because of a risk of fire in the engine room. To prevent FO leaks, the below actions should be followed:

- ▶ Close Inspection: Clean & inspect by penetrating check. Chemical flush.
- ▶ Proper recondition: If any damage on the seat surface is observed, the relevant seat surface is to be lab by the special tool for all joints.
- ▶ Proper Tightening: Pipe should be tightened to the proper torque in accordance with the manufacturer' s instructions and test upto 1000 bars to check any leakage.



Indicator Valve

Indicator Valves are used to measure and monitor the cylinder pressure/power of diesel engine performance while the engine is running.

It indicates 4 types, such as Power card, Draw card, Compression diagram and light spring diagram. With help of those 4 diagrams, we can determine the following:

- i. The compression pressure inside the cylinder
- ii. peak pressure generated inside the cylinder
- iii. The actual power generated
- iv. Faulty combustion chamber parts (worn out piston, liner, rings, etc.) of the particular unit
- v. Faulty injection parts and wrong fuel timing
- vi. Exhausting and scavenging process

It is therefore very important to read these diagrams correctly as they provide several details about the cylinder working pressures and load.



Roller Guide

In the main engine with a camshaft, lubrication system feeds to camshaft roller guides and bearings, which actuates the exhaust valves and fuel pump.



G/E Governor



The main role of the governor is not to increase or decrease the speed which can be done via fuel control system but once the speed of the engine has been set, the job of the governor is to maintain that speed despite the variations in load.

Governor automatically adjusting the engine fuel pump settings to meet the desired load at the set speed.



Recommend:

If found stuck and speed variations at running time, we should proceed to repairing.

Need to maintain proper periodic maintenance to extending the service life of these costly components.

Alpha Lubricator (Electrical & Mechanical)

Lubrication of cylinders between liners and rings is one of the crucial factors that affects the efficient operation of diesel engines.



Lubricating oil for a marine engine achieves two objectives; it must cool and lubricate.

The main reason for cylinder lubrication system is to reduce the operational costs of the engine. Moreover, the most expensive lubricating oil is generally used for the engine's combustion chamber as cylinder lube oil.

Recommend:

For the operational cost to a marine engine, besides fuel oil, cylinder oil also takes a big share. To carry out periodic overhauling can reduce the cost.

Regular maintenance to reduce in cylinder oil feed rate.

Periodic maintenance BCU and MCU



M/E Main Air Starting Line / Main Air Starting Valve

Marine Engines are started using high pressure compressed air (pressure is 30 bar). The air is admitted into the cylinder and continued until the exhaust valve opens.

The main cause of starting airline explosion is the leaking starting air valve or jamming at open position of the valve. Initially, the oil which is discharged from the air compressor to starting airline system.



Recommend:

Periodic inspection/maintenance of air starting system pipelines is to be carried out to ensure that no build-up of oil is occurring.

Highly flammable cleaning fluids must never be used in any part of the starting air system. Any residue of liquid or vapors could result in an explosion.

Pneumatic Actuator

A pneumatic actuator is a device that is capable of converting energy from a pressurized air into motion (rotating the spindle and open the ball valve).

The actuator must withstand the temperature range and other specific maker condition. Failure of an actuator the ball valve not to open and air not flow to cylinder.

Recommend:

Carry out periodic maintenance.



M/E Air Distributor

Air distributor is responsible for maintaining the air supply which opens the starting air valve in the engine cylinders. Since it's a mechanical part, it is disposed to malfunctioning, especially getting stuck. The main engine will not start if air distributor does not supply air to open the starting air valves as no air will be present in the cylinder to commence fuel combustion.



Recommend:

If found stuck and maintain air variations at running time, we should proceed to repairing.



M/E Remote Control System

Pneumatic Maneuvering System

Governor Control Unit

- o ADU (Actuator Drive Unit)
- o Electric Governor

Bridge Maneuvering System (Control and Safety System)

- o Control System
- o Safety System
- o Telegraph Logger



Pneumatic and remote control system consists of overhauling of essential pneumatic valves/cylinders involved in main engine control (start, stop, reversing ahead and astern, speed setting telegraph, from bridge, ECR and Emergency stand).

Recommend:

Maker recommend overhauling of pneumatic components every 2.5 years.

It is also recommended to check the functioning of the system regularly; air bottles should be drained every day, filters cleaned regularly, automatic water traps emptied, compressors must be maintained in order to minimize the content of the oil and water in the system.

Perform periodic maintenance to extending the service life of costly components.

Our technical team of experts is happy to work/technical assistance at any time to find the right solution for a perfect result.