Diesel Engine Operation I.

PREPARATION FOR STARTING

Preparations for getting under way begin in the engine room an hour or more before leaving. The length of time required depends upon the size of the engine.

To ensure a quick starting the cylinders and heads of marine engines are *warmed* through by **circulating hot water.** As a preliminary step the **Watch Engineer** should *check* the **fuel, lubricating oil** and **cooling water** are *at working level* and the tanks properly *drained*. He will examine the **fuel** and **lube oil filters** *to see if* they are clean and make sure that all adequate valves are open.

Supply the right terms

Preparations for _____ under way begin in the engine room an hour or more before leaving. The length of time required depends upon the _____ of the engine.

To ensure a quick starting the cylinders and _____ of marine engines are *warmed* through by _____ **hot water.** As a preliminary step the **Watch Engineer** should *check* the **fuel,** _____ **oil** and _____ **water** are *at working level* and the tanks properly *drained*. He will examine the **fuel** and **lube oil** _____ *to see if* they are clean and make sure that all adequate _____ are open.

Complete the text below

- *Preparations for getting under way begin ….. …… ….. .*
- *The length of time required depends ….. …… ….. .*
- *To ensure a quick starting the cylinders and heads of marine engines ….. …… ….. through by ….. …… ….. .*
- *As a preliminary step the **Watch Engineer** should check that the **fuel, lubricating oil** and **cooling water** are ….. …… ….. and the tanks ….. …… …… .*
- *He will examine the **fuel** and **lube oil filters** to see if ….. …… ….. and make sure that all adequate valves are open.*

Now he can *start* the lubricating oil pump and circulating water pump *inspecting* all **visible returns** for adequate **flow**. If any **leak** is noticed it should be immediately *rectified*. After opening the **indicator cocks** the Engineer should *turn the engine through* at least **one complete revolution** by means of the **turning gear**. The purpose of this procedure is *to see that* everything is clear for **running** and to *force out* any water which may have collected in the cylinders. Then the **fuel oil system** *will be primed* as described in the builders' operating instructions. If an **auxiliary scavenge blower** is part of the installation, it should at this point be started.

Fill in the missing terms

- *Now he can start the _____ and circulating water pump inspecting all **visible returns** for adequate **flow**.*
- *If any _____ is noticed it should be immediately rectified.*
- *After opening the _____ the Engineer should turn the engine through at least **one complete revolution** by means of the _____.*
- *The purpose of this procedure is to see that everything is clear for _____ and to force out any water which may have collected in the _____.*
- *Then the _____ will be primed as described in the builders' operating instructions. If an _____ is part of the installation, it should at this point be started.*

Which of the three sentences below best describe the concept of 'priming' (to prime)

- *to fill (a pump) with its working fluid before starting, in order to improve the sealing of the pump elements and to expel air from it before starting*
- *to increase the quantity of fuel in the float chamber of (a carburettor) in order to facilitate the starting of an engine*
- *(of a steam engine or boiler) to operate with or produce steam mixed with large amounts of water*

Put the sentences in the right sequence:	
If any **leak** is noticed it should be immediately *rectified*.	
After opening the **indicator cocks** the Engineer should *turn the engine through* at least **one complete revolution** by means of the **turning gear**.	
The purpose of this procedure is *to see that* everything is clear for **running** and to *force out* any water which may have collected in the cylinders.	
Then the **fuel oil system** *will be primed* as described in the builders' operating instructions.	
Now he can *start* the lubricating oil pump and circulating water pump *inspecting* all **visible returns** for adequate **flow**.	

The final steps in preparations include *opening* the **main stop valve** in **starting air lines**, *shutting off* the **air drains** and starting the **manoeuvring air compressor** to *charge* the air reservoirs to the required pressures.

If conditions *external to the ship* are safe and permission given by the bridge the *engine should be* ***tried*** – ahead or astern – *on starting a*ir. Prior to that it is necessary to *disengage* the turning gear. On engines with **bridge control** the **control selector** must be *switched to the desired position*. The engine is now ready for manoeuvring and when ***STAND-BY is rung*** on **the telegraph** from the bridge, the Engineer will *close the indicator cocks*.

Supply the missing verb

*Now he can _____ the lubricating oil pump and circulating water pump _____ all **visible returns** for adequate **flow**.*

*If any **leak** is _____ it should be immediately _____.*

*After _____ the **indicator cocks** the Engineer should _____ the engine through at least **one complete revolution** by means of the **turning gear**.*

*The purpose of this procedure is to _____ that everything is clear for **running** and to _____ out any water which may have _____ in the cylinders.*

*Then the **fuel oil system** will be _____ as described in the builders' operating instructions.*

*If an **auxiliary scavenge blower** is part of the installation, it should at this point be _____.*

Complete the text below

- The final steps in preparations include *opening* the **main stop valve** in **starting air lines**, ... and starting the **manoeuvring air compressor** to *charge* the air reservoirs to the required pressures.
- If conditions *external to the ship* are safe and permission given by the bridge the *engine* .....
- Prior to that it is necessary to .....
- On engines with **bridge control** the **control selector** must be .....
- The engine is now ..... and when ***STAND-BY is rung*** on **the telegraph** from the bridge, the Engineer will *close the indicator cocks*.

Complete the text below with missing chunks or words

- The final steps in preparations include *opening* …… in **starting air lines**, …… the **air drains** and …… the **manoeuvring air compressor** to *charge* the air reservoirs to the required ……
- If conditions *external to the ship* are safe and permission given by the bridge …… – ahead or astern – *on starting a*ir.
- …… it is necessary to *disengage* the ……
- On engines with **bridge control** the **control selector** must be *switched* ……
- The engine is now ready for manoeuvring and when …… on **the telegraph** from the bridge, the Engineer will *close the* ……

Questions and discussion

1. How are marine diesel engines started ?
2. How long do preparations for starting last ?
3. Why must an engine be heated up before starting ?
4. How is a marine diesel engine heated up ?
5. State what tanks need draining .
6. Why is the crankshaft turned one or two revolutions by auxiliary power before re-starting ?
7. When is the turning gear disconnected ?
8. What must be done before starting on engines fitted with bridge control ?
9. What is " priming " ? Why are the fuel, lube oil and cooling water systems primed before operation ?
10. Why do preparations include the starting of an auxiliary blower ?

I Give all the procedures prior to starting a main diesel engine in a form of instructions.

Use imperative of verbs omitting the articles, adjectives, unnecessary verbs, etc.

For example this sentence:

- The Engineer will examine the fuel and lube oil filters to see if they are clean.

  may be converted into the following instruction:

- Examine the fuel and lube oil filters if clean (or for cleanliness).
-

HOW TO MAKE DIESELS READY FOR RUNNING

Instruction list

- 1. _____
- 2. _____
- 3. _____
- 4. _____
- 5. _____
- 6. _____
- 7. _____
- 8. _____
- 9. _____
- 10. _____
- 11. _____
- 12. _____
- 13. _____
- 14. _____
- 15. _____
- 16. _____
- 17. _____
- 18. _____

- II Change the above instructions into ADVICE or RECOMMENDATION by using the auxiliary verb " Should " as in the following example:
-
- Fuel and lube oil filters should be examined if clean (or for cleanliness).

16 - DIESEL ENGINE OPERATION II.

STARTING THE ENGINE

- The starting and manoeuvring of the engines is accomplished by the operation of either a **handwheel**, or a **lever**, or a combination of levers (as in the following text), according to the *make of the engine*.
- Immediately the first order has been given by the **bridge telegraph direction handle**, which may be built into the **telegraph reply lever**, is moved from *stop to ahead or astern position*. The camshaft is thus positioned *relative to* the crankshaft to operate the various **cams** for fuel injection, valve operation, etc. the manoeuvring handle (known as the **starting lever**) is set to START.
- This will cause the **air pilot valve** to be lift ,admitting air – by the way of the automatic valve – to the **air distributor** and the **cylinder starting valves** in the correct sequence to *turn the engine* in the desired direction.

- Immediately the first order has been given by the **bridge telegraph direction handle**, which may be built into the **telegraph reply lever**, is moved from *stop to ahead or astern position*. The camshaft is thus positioned *relative to* the crankshaft to operate the various **cams** for fuel injection, valve operation, etc. the manoeuvring handle (known as the **starting lever**) is set to START.
- This will cause the **air pilot valve** to lift ,admitting air – by the way of the automatic valve – to the **air distributor** and the **cylinder starting valves** in the correct sequence to *turn the engine* in the desired direction.

- This will cause the **air pilot valve** to be lift ,admitting air – by the way of the automatic valve – to the **air distributor** and the **cylinder starting valves** in the correct sequence to *turn the engine* in the desired direction.

Supply the terms relevant for engine starting

- The starting and manoeuvring of the engines is accomplished by the operation of either a **handwheel**, or a _____, or a combination of levers (as in the following text), according to the *make of the engine*.
- Immediately the first order has been given by the **bridge telegraph the** _____, which may be built into the **telegraph** _____, is moved from *stop to ahead or astern* _____.
- The camshaft is thus positioned _____ the crankshaft to operate the various _____ for fuel injection, valve operation, etc. the manoeuvring handle (known as the _____) is set to START.
- This will cause the _____**valve** to lift, admitting air – by the way of the automatic valve – to the _____and the **cylinder starting valves** in the correct sequence to _____*the engine* in the desired direction.

Supply the missing prepositions

- *The starting and manoeuvring _____the engines is accomplished _____ the operation of either a handwheel, or a lever, or a combination _____ levers (as in the following text), according _____ the make (design) of the engine.*
- *Immediately the first order has been given _____ the bridge telegraph the direction handle, which may be built _____ the telegraph reply lever, is moved _____ stop _____ ahead or astern position. The camshaft is thus positioned relative _____ the crankshaft to operate the various cams _____ fuel injection, valve operation, etc. the manoeuvring handle (known as the starting lever) is set _____ START. This will cause the air pilot valve to be lifting admitting air – _____the way of the automatic valve – to the air distributor and the cylinder starting valves _____ the correct sequence _____ turn the engine _____ the desired direction.*

Supply the phrases or chunks in the brackets where appropriate

- The starting and manoeuvring of the engines is accomplished by the operation of, or a lever, or a combination of levers (as in the following text), the make of the engine. (***either a handwheel, according to***)
- the first order has been given by the bridge telegraph the direction handle,, is moved from stop to ahead or astern position. (***immediately , which may be built into the telegraph reply lever***)
- The camshaft is thus positioned the crankshaft to operate the various cams for fuel injection, valve operation, etc. the manoeuvring handle is set to START. (***relative to , (known as the starting lever)***)
- This will cause the air pilot valve to be lifting, admitting air to the air distributor and the cylinder starting valves to turn the engine in the desired direction. ***(– by the way of the automatic valve – , in the correct sequence***)

- When the engine reaches its firing speed the manoeuvring handle is pushed over to FUEL, thereby shutting off compressed air and admitting fuel to the cylinders. When the engine is running on fuel the manoeuvring handle or a sepatate speed control lever or wheel is adjusted to bring the engine up to the desired running speed.
- At the time the FULL – AWAY is received the auxiliary scavenge air blower should be stopped, the starting air stop valve closed and all drains opened.

Supply the verb where appropiate

- When the engine its firing speed the manoeuvring handle is over to FUEL, thereby shutting off compressed air and fuel to the cylinders. (***reaches, pushed, admitting***)
- When the engine is on fuel the manoeuvring handle or a sepatate speed control lever or wheel is to bring the engine up to the desired running speed. (***running, adjusted***)
- At the time the FULL – AWAY is the auxiliary scavenge air blower should be, the starting air stop valve and all drains. (***received, stopped, closed, opened***)

- *When the engine reaches its firing speed the manoeuvring handle …… to FUEL, thereby shutting off compressed air and admitting ……*
- *When the engine is running on fuel the manoeuvring handle or a sepatate speed control lever or wheel …… to bring the engine up to the …… .*
- *At the time the FULL – AWAY is received the auxiliary scavenge air blower should be _____, the starting air stop valve _____ and all drains _____.*

16 - Diesel Engine Operation – III.

REVERSING THE ENGINE

- Reversal of the engine will be unnecessary if variable-pitch propellers or reversible gearboxes are used.
- If an order to reverse the engines is received from the bridge while the ship is manoeuvring in and out of the harbour the ship will usually be moving slowly and reversal can speedily be made without difficulty.
- If, however, the vessel is proceeding at full speed, only when speed is considerably reduced blast of compressed air will be applied for stopping and reversing the engine.

Complete the following

- Reversal of the engine will be unnecessary if v_____ p_____ propellers or reversible g_____ are used.
- If an order to r _____ the engines is received from the bridge while the ship is manoeuvring …… the harbour the ship will usually be moving slowly and r_____l can speedily be made without difficulty.
- If, however, the vessel is proceeding ……, only when speed is considerably reduced, blast of compressed air will be applied for s _____ and r _____ the engine.

- Where the **auxiliary scavenge air blower** is fitted it should be started and the **manoeuvring handle** brought to the stop position. This will *shut off* the supply and the engine will *slow down*. When it *comes to a stop* the direction handle *is positioned astern* and the manoeuvring handle is *pushed to starting position*, thereby applying compressed air to *turn the engine* in the astern direction.
- When *turning astern* (it is necessary to be absolutely sure that this is so before applying fuel), the manoeuvring handle is shifted *from* ***starting*** *to* ***fuel position*** to *admit fuel* for the engine to be able quickly to *reach astern speed*.

shut off, slow down, is pushed, to turn the engine , admit fuel, is fitted, reach astern speed, comes to a stop, turning astern

- *Where the auxiliary scavenge air blower _____ it should be started and the manoeuvring handle brought to the stop position.*
- *This will _____ the supply and the engine will _____.*
- *When it _____ the direction handle is positioned astern and the manoeuvring handle is pushed to starting position, thereby applying compressed air _____ in the astern direction.*
- *When _____ (it is necessary to be absolutely sure that this is so before applying fuel), the manoeuvring handle is shifted from starting to fuel position to _____ for the engine to be able quickly to _____.*

Complete the following

- *Where the auxiliary scavenge air blower is fitted it …… and the manoeuvring handle brought to ……*
- *This will shut off the supply and the engine ……*
- *When it ……, the direction handle is positioned astern and the manoeuvring handle is pushed to starting position, thereby …… to turn the engine in the astern direction.*
- *When turning astern (it is necessary to be absolutely sure that this is so before ……), the manoeuvring handle is shifted from starting …… to admit fuel for the engine to be able quickly to reach …… .*

I *Study the Fig.16.1. and give in the correct sequence the positions of the control levers for*

starting and running ahead, reversing and regulating speed.

II Refer to the previous exercise and state what occurs in the engine when the control levers

are moved to the various positions.

QUESTIONS AND DISCUSSION

1. *By what means may the starting and manoeuvring of engines be actuated ?*
2. *What final operations must be done as soon as the order FULL – AWAY is given ?*
3. *Why is the auxiliary blower stopped when the ship is under way at full speed ?*
4. *Are all marine engines made to run in the reverse direction ?*
5. *Explain what is meant by " firing speed " .*
6. *Can reversing of engine be readily performed when the ship is under-way at full speed ?*

III Find words and phrases in Lesson 16 which are opposite in meaning to the following:

1. Open _____
2. Cool the engine _____
3. Speed up _____
4. Dangerous _____
5. Reach harbour _____
6. In port _____
7. Run the engine ahead _____
8. Reach full speed _____

IV. Fill in the blanks in the following sentences with the appropriate terms from the previous exercise.

- *If any major repairs in the engine room are necessary the engineers are busier _____ than they are while the ship is _____.*
- *When starting from cold the engine must be _____ ; on the contrary running engines require _____ .*
- *When releasing starting air in the lines remember to _____ the air drains and to _____ the main stop valve.*
- *After the direction handle has been shifted to ahead position and the manoeuvring lever set to start the engine will _____ .*
- *During manoeuvre ships having fixed blade propellers must _____ .*
- *When the rate of supply is increased the engine _____ , when it is reduced the engine _____ .*
- *If fuel is applied at the maximum rate, the engine will _____, but soon after the fuel supply has been shut off it will _____ .*
- *A vessel begins her voyage the moment she _____ .*
- *This sort of repairs can't be done while we are at sea; we have to wait until the ship _____.*
- *Try the engine in port on starting air only whel situation external to the ship is quite _____ .*
-

Preparations for standby

1. Before a large diesel is started it must be warmed through by circulating hot water through the jackets, etc. This will enable the various engine parts to expand in relation to one another.

2. The various supply tanks, filters, valves and drains are all to be checked.

3. The lubricating oil pumps and circulating water pumps are started and all the visible returns should be observed.

4. All control equipment and alarms should be examined for correct operation.

5. The indicator cocks are opened, the turning gear engaged and the engine turned through several complete revolutions. In this way any water which may have collected in the cylinders will be forced out.

6. The fuel oil system is checked and circulated with hot oil.

7. Auxiliary scavenge blowers, if manually operated, should be started.

8. The turning gear is removed and if possible the engine should be turned over on air before closing the indicator cocks.

9. The engine is now available for standby.

The length of time involved in these preparations will depend upon the size of the engine.

Correct the sequence of the steps in the preparations for standby

1. *Before a large diesel is started it must be warmed through by circulating hot water through the jackets, etc. This will enable the various engine parts to expand in relation to one another.*

   Auxiliary scavenge blowers, if manually operated, should be started.

   The engine is now available for standby.

   The lubricating oil pumps and circulating water pumps are started and all the visible returns should be observed.

   All control equipment and alarms should be examined for correct operation.

   The indicator cocks are opened, the turning gear engaged and the engine turned through several complete revolutions. In this way any water which may have collected in the cylinders will be forced out.

   The various supply tanks, filters, valves and drains are all to be checked.

   The fuel oil system is checked and circulated with hot oil.

   The turning gear is removed and if possible the engine should be turned over on air before closing the indicator cocks.

Engine starting

1. The direction handle is positioned ahead or astern. This handle may be built into the telegraph reply lever. The camshaft is thus positioned relative to the crankshaft to operate the various cams for fuel injection, valve operation, etc.

2. The manoeuvring handle is moved to 'start'. This will admit compressed air into the cylinders in the correct sequence to turn the engine in the desired direction. A separate air start button may be used.

3. When the engine reaches its firing speed the manoeuvring handle is moved to the running position. Fuel is admitted and the combustion process will accelerate the engine and starting air admission will cease.

Engine starting

1. The _____ is positioned ahead or astern. The camshaft is thus positioned relative to the crankshaft to operate the various cams for fuel injection, valve operation, etc.

2. The manoeuvring handle is moved _____. This will admit compressed air into the cylinders in the correct sequence to turn the engine in the desired direction. A separate air _____ may be used.

3. When the engine reaches its firing speed the manoeuvring handle is moved to _____. Fuel is _____ and the combustion process will _____ the engine and starting air admission will _____. (CEASE, ADMIT, ACCELERATE)

Engine reversing

When running at manoeuvring speeds:

1. Where manually operated auxiliary blowers are Fitted they should be started.

2. The fuel supply is shut off and the engine will quickly slow down,

3. The direction handle is positioned astern.

4. Compressed air is admitted to the engine to turn it in the astern direction.

5. When turning astern under the action of compressed air, fuel will be admitted. The combustion process will take over and air admission cease.

Engine reversing – put the steps in the right sequence

When running at manoeuvring speeds:

1. Where manually operated auxiliary blowers are fitted they should be started.

When turning astern under the action of compressed air, fuel will be admitted. The combustion process will take over and air admission cease.

Compressed air is admitted to the engine to turn it in the astern direction.

The fuel supply is shut off and the engine will quickly slow down,

The direction handle is positioned astern.

When running at full speed:

1. The auxiliary blowers, where manually operated, should be started.

2. Fuel is shut off from the engine.

3. Blasts of compressed air may be used to slow the engine down.

4. When the engine is stopped the direction handle is positioned astern.

5. Compressed air is admitted to turn the engine astern and fuel is admitted to accelerate the engine. The compressed air supply will then cease.

Control and safety devices for marine diesel engine - function of governors

Supply the missing verbs - When running at full speed:

1. The auxiliary blowers, where manually operated, should be _____ .

2. Fuel is _____ from the engine.

3. Blasts of compressed air may _____ to slow the engine down.

4. When the engine is stopped the direction handle _____ astern.

5. Compressed air _____ to turn the engine astern and fuel is admitted to _____ the engine. The compressed air supply will then _____ .

- **Operating Troubles - Main Engine Does Not Start/Fire When Starting Lever Is Pulled**

- **Operating trouble shooting -Main engine does not fire when started .**
- As a Marine Engine we should know the reasons why the engine is not abLe to fire when starting lever is pulled in the control pannel. In Marine Diesel Engine there are various factors affect the starting of the engine it includes all the system which are inter-connected if any one fails the control will not start the engine .Before starting the engine the engine jcw temperature and pressure should be correct and lube oil temperature and pessure should be in the desired value then only the hydraulic interlocking control lever will be released for starting

Possible causes for main engine not fired are as follows

- 1.If the Turning gear is engaged .It blocking valve prevents pilot air flowing to the pilot valve on the control stand .So Dis-engage the Turning gear before starting .
- 2.The shut off valve on the starting air cointains cracks or starting air pipe are closed .
- 3.The Automatic Starting air stop valve does not works on account of having been closed by hand ,either being jammed or its internal out let ducts being obstructed .
- 4.The Actuating valve for the Automatic starting air stop valve is jammed or opens only partially.
- 5.The NON RETURN VALVE in starting air pipe is struck and does not open.
- 6.Starting air pressure is too low , the Engine only oscillating .Flame baffle is obstructed.
- 7.The starting air control slide valves are either struck or the control air is not able to force them down on to the starting cam vent opening may be obstructed.
- 8.The starting valve do not open .
- 9.A working

- 9.A working piston or any other running gear component prevents starting of the engine by reason of being seized or defective.
- 10.One or more starting control air pipes or control oil pipes are incorrectly connected or obstructed .
- 11.If the blocking device of the starting lever has been uncoupled by hand ,the engine can only be started if the reversing servomotor is closed to its end position .

- **Operational Faults During Starting and Running**

1.The engine oscillates when being started or does not gain speed:

- During the starting of the engine the engine is turned on air and during this operation the engine oscillates and it does not gain the speed to be started in the fuel.
- So as the result the engine fails to start.

Possible causes for this are:

- 1.Individual cylinder receives only an insufficient amount of starting air, or none at all.
- 2.The starting air pressure is too low in general and cannot over come the compression counter-pressure .this happens more frequently with engines having only a few cylinders.
- 3.One or more starting air control slide valve is struck.
- 5.One or more starting valves are struck or defective.
- 4.Obstructed staring air pipes (flame baffles).If the is any obstruction it has to be removed first.
-

Read more:
http://www.brighthub.com/engineering/marine/articles/60601.aspx#ixzz1cS0QGIxp

2.Scavenge air pressure charging receiver drops with the load indicator remaining in the same position:

- At the time of running the scavenge air pressure drops and this causes the improper combustion. This is indicated in the scavenge air pressure indicator and immediate action has to be taken to bring back the scavenge pressure to normal condition

Possible causes for less scavenge air pressure are:

- 1.Turbocharger is either fouled or defective.
- 2.Loss of exhaust gases before turbine due to leakage in the exhaust pipe line from the Main Engine.
- 3.Intake filters of turbocharger are fouled. Protective grating before turbocharger is fouled.
- 4.Air loss on account of leakage (leaking stuffing box).
- 5.Increase in exhaust gas back-pressure after turbine.

3.Engine speed falls with load indicator remaining in the same position:

Possible causes are :

- 1.A component of the running gear is hot. Stop the engine immediately.
- 2.The hydrodynamic resistance of the ship's hull is increasing.
- 3.The propeller is absorbing greater power.
- 4.The propeller shaft friction in the stern tube is excessive.
- 5.A fuel pump or fuel pipe is defective.
- 6.The priming plug on a fuel injector valve is either loose or leaking.
- 7.The holes of fuel valve nozzle are obstructed.
- 8.Defective scavenge air valves.
- 9.Defective or fouled turbocharger or air cooler (inadequate air supply).Protective grating before turbocharger may be fouled.
- 10.Fouled scavenge or exhaust ports.
- 11.Poor combustion

SLOW-TURNING THE ENGINE (Cont...)

1. WITH SPECIAL-SLOW TURNING DEVICE
2. WITH TURNING GEAR
   - 2.1 Open the indicator valves
   - 2.2 Lift the locking plate of the main starting valve to the service position.
   - 2.3 Give reversing order.
   - 2.4 Turn the engine with the reversing gear.
   - 2.5 Close the indicator valves.
   - 2.6 Disengage the turning gear.

FUEL OIL SYSTEM

- START:
    1. Fuel oil supply pump.
    2. Circulating pump.

CHECKING THE FUEL REGULATING GEAR

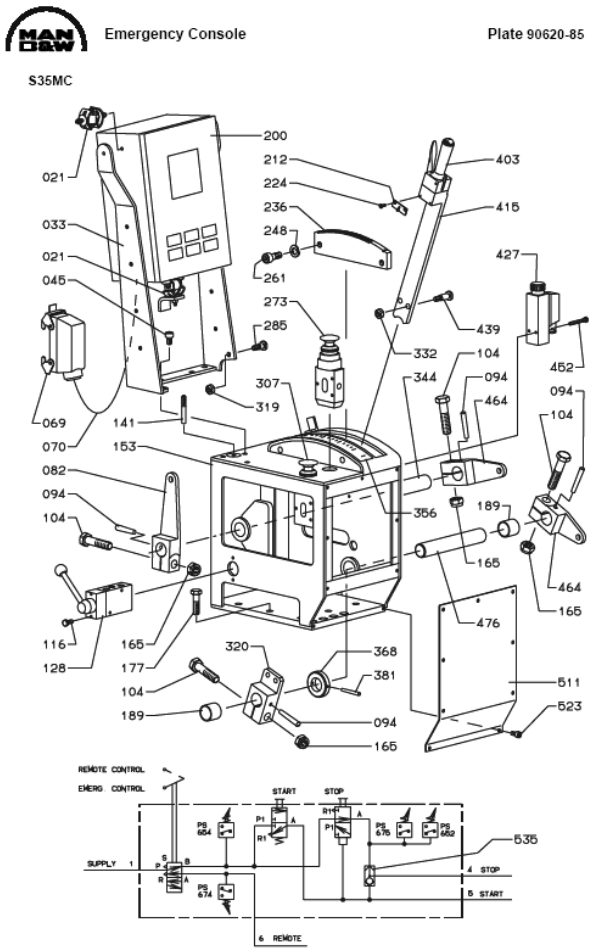
- Close the shut off valve of the starting air distributor to prevent the engine from turning.
- Switch over to control console (engine side).
- Increase fuel pump index by regulating handwheel.
- Switch back to NORMAL control.
- Open the shut off valve of the starting air distributor.

MISCELLANEOUS

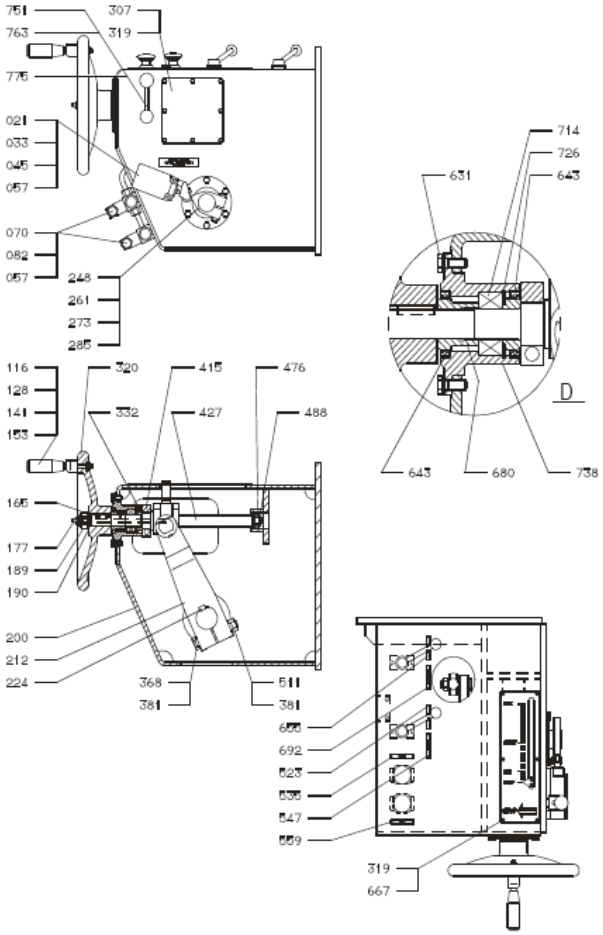
- Lubricate the bearings and rod connections.
- Switch on the electrical equipment in the control console.
- Set switch for auxiliary blowers in AUTO position.

START THE ENGINE

EMERGENCY CONSOLE



ENGINE SIDE CONTROL CONSOLE



EXERCISES

I. Study the Fig.16.1. and give in the correct sequence the positions of the control levers for :

- starting and running ahead,
- reversing and
- regulating speed.

II. Go back to the previous exercise and state what occurs in the engine when the control levers are moved to the various positions.

QUESTIONS AND DISCUSSION

1. By what means may the starting and manoeuvring of engines be actuated ?
2. What final operations must be done as soon as the order FULL – AWAY is given ?
3. Why is the auxiliary blower stopped when the ship is under way at full speed ?
4. Are all marine engines made to run in the reverse direction ?
5. Explain what is meant by " firing speed " .
6. Can reversing of engine be readily performed when the ship is under-way at full speed ?

III Find words and phrases in Lesson 16 which are opposite in meaning to the following:

- Open _____
- Cool the engine _____
- Speed up _____
- Dangerous _____
- Reach harbour _____
- In port _____
- Run the engine ahead _____
- Reach full speed _____

IV Fill in the blanks in the following sentences with the appropriate terms from the previous exercise.

1. If any major repairs in the engine room are necessary the engineers are busier _____ than they are while the ship is _____.
2. When starting from cold the engine must be _____ ; on the contrary running engines require _____ .
3. When releasing starting air in the lines remember to _____ the air drains and to _____ the main stop valve.
4. After the direction handle has been shifted to ahead position and the manoeuvring lever set to start the engine will _____ .
5. During manoeuvre ships having fixed blade propellers must _____

6. When the rate of supply is increased the engine _____ , when it is reduced the engine _____ .

7. If fuel is applied at the maximum rate, the engine will _____, but soon after the fuel supply has been shut off it will _____ .

8. A vessel begins her voyage the moment she _____ .

10. This sort of repairs can't be done while we are at sea; we have to wait until the ship _____.

11. Try the engine in port on starting air only whel situation external to the ship is quite _____ .

Grammatical structure:

PAST PARTICIPLE

IT + BE + ---------- + THAT

ADJECTIVE

<u>It must be noted that</u> a change of pressure 1 or 2 per cent is usually an early indication that something is wrong.

<u>It is necessary that</u> the fuel oil is supplied in a perfectly clean condition.

Examples:

1. It must be noted that a change of pressure 1 or 2 per cent is usually an early indication that something is wrong.
2. It must be borne in mind that a large diesel is warmed through by circulating hot water through the jackets.
3. It should be seen that there is no air-locks in the outlet pipes.
4. It should also be ascertained that the amount of fuel oil in the service tank is ample for the duration of the watch.

Instead of the Past Participle we can use an ***Adjective***:

It is clear that the reversing procedure should be accomplished according to the instructions.

Further examples

- To ensure that the studs are not subject to excessive fatigue loads it is essential that they are tightened evenly.
- It is necessary that the fuel oil is supplied in a perfectly clean condition.
- In adition to the speed regulation governor it is usual that an overspeed trip is provided.
- It is clear that the reversing procedure should be accomplished according to the instructions.

THAT clause can be replaced by the *infinitive*:

- (5a) … it is essential **to tighten** them (i.e. studs) evenly.
- (7a) … it is usual **to provide** an overspeed trip.
- (9a) … It is desirable **to accomplish** the reversing procedure according to the instructions.

Or:

for + object + to infinitive:

It is necessary for the fuel oil to be supplied in a perfectly clean condition.

EXERCISES

I Rearrange these sentences into

IT + BE + PAST PART./ADJECTIVE + THAT

construction using the word in the brackets.

- Ex. ***The filter element is dirty***. (likely)
- ***It is likely that the filter element is dirty.***

1. The surfaces of the pistons should be treated carefully when overhauling the engine. (important)
2. Before stopping the engine the load should be gradually reduced. (recommend)
3. The starting air will be supplied only when the engine rotates at reduced revolutions. (obvious)
4. The manoeuvring lever on the engine was in the “ stop “ position. (make sure)
5. A Manual override is provided if the governor fails. (usual)

II Replace the THAT- clauses introduced by adjectives from the previous exercise with the construction

FOR + OBJECT + TO INFINITIVE

Ex. ***It is likely that the filter element is dirty.***

It is likely for the filter element to be dirty.

1. The clearance must be set in accordance with the temperature of the engine. (note)
2. The cooling water is heated and circulated through before starting the engine. (necessary)
3. We nearly ran out of fuel. We had a bunkering vessel ordered via our agent. (arrange)
4. The ring gap should never close completely. (essential)