

A Practical Course for Engineers Working on Board Ships



《轮机英语》

Marine Engineering English



江苏航运职业技术学院 轮机工程学院

Department of Marine Engineering, Jiangsu Shipping College,

主讲：薛海龙 (Allen)

Lesson 9

Starting System



Learning Objectives:

1. Grasp some useful words and expressions in the whole text.
2. After studying the lesson, he or she will have a better understanding of Starting System

part 1

New Words and Expressions





Lesson 9 Starting System

New Words and Expressions

reservoir

n. 容器(空气瓶), 蓄压器

compressor

n. 压缩机

drainage

n. 排放, 排泄, 排出物

facility

n. 设备

interlock

v. n. 联锁

prevent

v. 防止, 预防

automatic

n. a. 自动机械; 自动的

pilot

n. 引水员; a. 控制的, 先导的

lever

n. v. 杆, 杠杆, 控制杆; 抬起

engage

v. 啮合, 从事

deposit

v. n. 沉积物; 沉淀

explosion

n. 爆炸



Lesson 9 Starting System

New Words and Expressions

attempt

n. v. 企图; 试图

trap

n. 挡板, 收集器

burst

n. v. 突然破裂; 爆发, 冲破

isolate

v. 隔绝, 绝缘

fusible

a. 易熔的, 可熔的

plug

v. n. 堵, 塞; 插头, 插销

guard

n. v. 防护装置; 防护, 防卫

humidity

n. 湿气, 湿度

slight

a. 轻微的, 微小的, 弱的

by means of

利用, 用……方法

bursting cap

防爆帽

part 2

Text Analysis





Diesel engines are started by supplying **compressed air** into the cylinders in the **appropriate sequence** for the **required direction**.

压缩空气

适当的顺序
要求的方向

柴油机由压缩空气起动，按照要求的方向，
以适当的顺序，打入气缸



A supply of compressed air is stored in **air reservoirs** or bottles or receivers at pressures about 30 or 40 **bar** ready for **immediate use**.

空气瓶

压力单位
立即可用

压缩空气被储存在空气瓶里，
30-40公斤压力，随时可用。

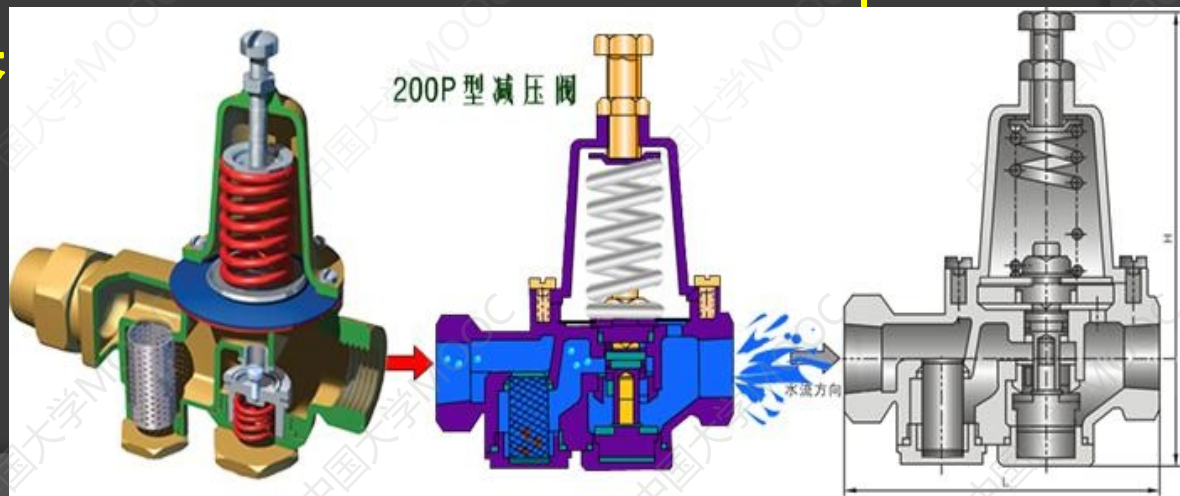




Some times compressed air pressure is dropped to a lower value by means of a **reducing valve** for other uses. The receivers are **charged** by compressors.

减压阀
填充

有时候，通过减压阀来降低压缩空气压力，用于其他用途





The design of starting air systems, including the **number and capacity** of compressors and receivers, the provision of features **and drainage facilities** are the subject of stringent requirements by **Classification Societies**.①

数量和容量

放残设施

船级社

本句的主语是the design of starting air systems, the subject of stringent requirements是表语, by Classification Societies是介词短语作定语修饰requirements

全句译为: 空气系统的设计包括空气瓶和空压机的数量及容量, 辅助及放残设备的配置受到船级社严格的制约。



Up to 12 starts are possible with the **stored quantity** of compressed air. The starting air system usually has **interlocks** to prevent starting if any thing is not in order.

储存数量

互锁

储存的数量要能够起动12次，互锁机构能够防止起动。。。



The compressed air is supplied by a **large bore** pipe to a **remote operating non-return or automatic valve** and then to the cylinder air starting valves.

大孔径

遥控操作
止回阀

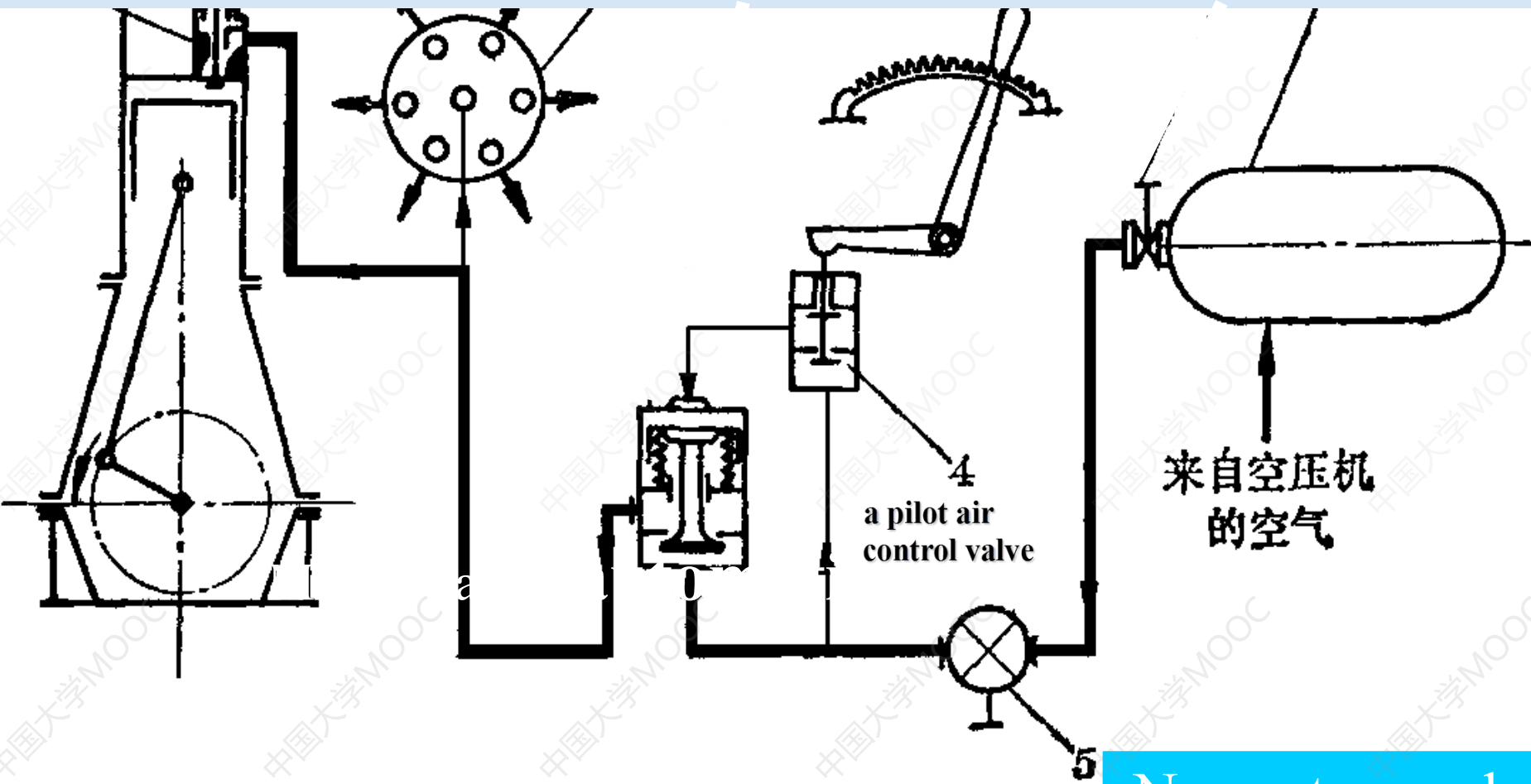
压缩空气由大孔径的管子送到遥控操作的止回阀，或自动阀；然后再到气缸起动阀。

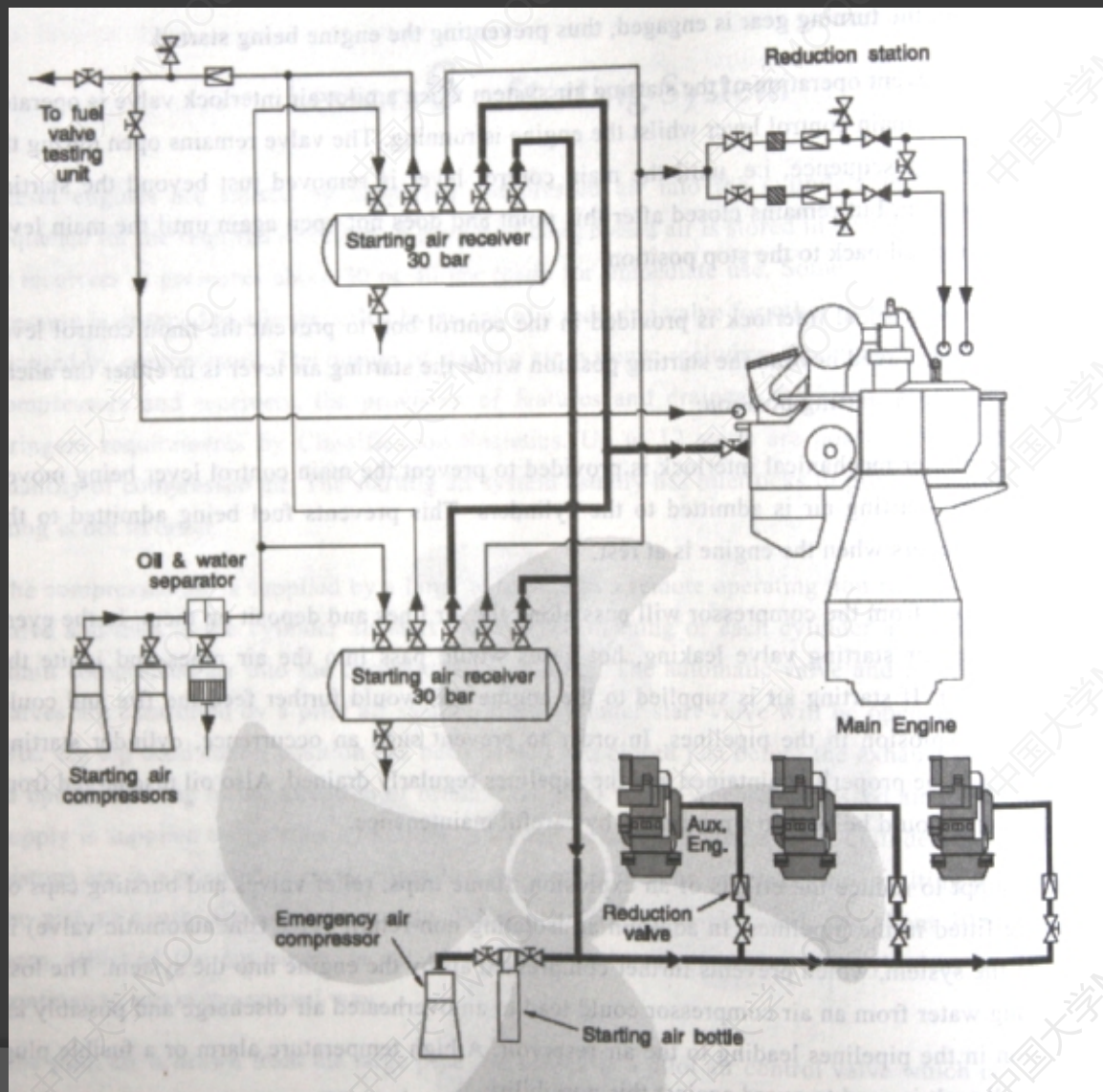
Cylinder air
start valve

Air distributor

Air start
lever

Air bottle







The opening of each cylinder air start valve will admit compressed air into the **corresponding cylinder**. The automatic valve and the cylinder start valves are controlled by a **pilot air system**.

对应的气缸
导向空气
控制空气

气缸起动阀打开，空气进入对应的气缸；
自动阀和气缸起动阀由控制空气系统控制。



Each cylinder start valve will be opened immediately after the **top dead centre** position has been passed and closed just before the **exhaust ports** are due to open according to the direction of rotation required.②

上止点

排气口

本句中opened和closed是并列的谓语，immediately是副词修饰opened，be due to表示定于某时做某事，在本句中译为排气口按所需运转方向开启

全句译为：每个气缸起动阀在（活塞）经过上止点后立即开启，在排气口按所需运转方向适当开启前关闭。



Thus, when compressed air from the main supply is supplied to the starting system of an engine at least it enters those cylinders in which the pistons are in a position **corresponding** to some part of the **power stroke**, the resulting pressure on the pistons causes the engine to **rotate**.③

对应

做功冲程

旋转

这样，在压缩空气经主管路进入柴油的起动系统时，至少进入活塞处于对应做功冲程某一位置的某些缸中，结果，施加于活塞上的压力迫使柴油机转动。

本句中from the main supply是介词短语修饰compressed air, in which 引导定语从句补充说明cylinders



When a sufficiently high speed, say about 20 **rpm**, has been achieved, the air supply is cut off and fuel is **injected** causing the cylinders to fire and continue to run in the normal way.④

转每分钟

喷射

本句中say about 20 r. p. m是插入语，causing是现在分词作结果状语
全句译为：当达到足够高转速，如20 rpm时，起动空气切断，燃油喷入，使气缸发火并以正常方式连续运转。



The **pilot air** is drawn from the large pipe and passes to a pilot air control valve which is operated by the engine **air start lever**.

导向空气
控制空气

起动手柄

控制空气来自于大孔径管，并通向控制空气控制阀，
该阀由空气起动手柄控制。



When the air start lever is operated, a supply of pilot air enables the pilot air control valve to open either **manually** or with **a pneumatic cylinder** when a bridge control system is fitted. Pilot air for the appropriate direction of operation is also supplied to an **air distributor**..

手动的

气动缸

空气分配器

控制空气的开启。。。。



This device is usually driven by the engine camshaft and supplies pilot air to the **control cylinders of the cylinder air start valves**. The pilot air is then supplied in the appropriate sequence for the direction of operation required.

空气分配器

气缸起动阀的控制缸（大气缸vs小控制气缸）





The cylinder air start valves are held closed **by springs** when not in use and opened by the pilot air enabling the compressed air direct from the receivers to enter the engine cylinder.

弹簧

气缸空气起动阀由弹簧关闭，由导向空气开启。。。。



As soon as the engine **fires** the air starting lever is brought back. The pilot air control valve returns to the off position, **venting** the pilot air lines and the remote air starting valve and allowing it to close.

点火

放气

点火成功后，空气切断，并且把管路里的空气放掉



A number of **interlocks** are provided in connection with the air starting system to **safeguard** the engine and **personnel**. These are:

互锁
保护
人员

起动系统内设置了很多互锁机构。。。



1. The **turning gear** interlock valve which is arranged to shut off the starting air pilot line when the turning gear **is engaged**, thus preventing the engine being started.

盘车机

啮合

盘车机互锁机构，盘车机未脱开时，是启动不了的



2. To prevent operation of the starting air system when a **pilot air interlock valve** is operated by the main control lever whilst the engine is running.

互锁阀

当发动机运转的时候，要防止起动杆被意外动作。。。



3. A **mechanical interlock** is provided in the control box to prevent the **main control lever** being moved beyond the starting position while the starting air lever is in either the **ahead or astern** starting position.

机械互锁

主控制杆

正车或倒车

当在起动期间，无论是正车起动还是倒车起动，主控制杆（油门）不能动作（要锁住）



4. Another mechanical interlock is provided to prevent the main control lever being moved until starting air is admitted to the cylinders. This prevents fuel being admitted to the cylinders when the **engine is at rest.**

机器停用
期间

了解即可



Lubricating oil from the compressor will pass along the air lines and **deposit** on them. In the event of a cylinder air starting valve **leaking**, hot gases would pass into the air pipes and **ignite** the lubricating oil.

沉淀

泄露

点燃

压缩机的滑油难免进入管道，如果气缸起动阀漏气，那热的燃气就会进入管道，点燃管道里的滑油



If starting air is supplied to the engine this would further feed the fire and could lead to an **explosion in the pipelines**. In order to prevent such an occurrence, cylinder starting valves should be properly **maintained** and the pipelines regularly **drained**

管路爆炸

保养
泄放

如果恰好起动空气进入，那会进一步加剧火灾并可能引起管路爆炸。

因此气缸阀需要良好保养，且管路需定期放残。



. Also oil discharged from compressors should be kept to a **minimum**, by careful maintenance.

最小

同时，应控制压缩机的排油

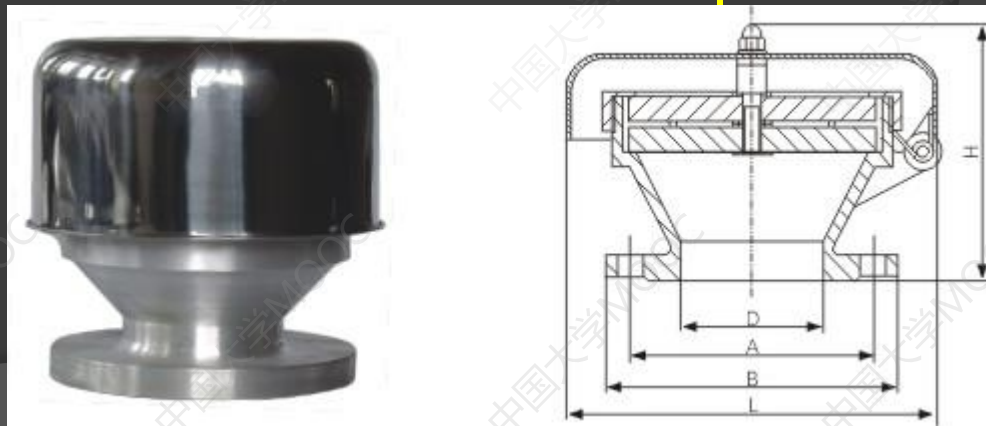


In an attempt to reduce the effects of an explosion, **flame traps**, relief valves and **bursting caps** or discs are fitted in the pipelines.

挡火板

防爆帽

管路上安装防火板
或防爆帽。。。





In addition an **isolating** non-return valve (the automatic valve) is fitted to the system, which prevents further compressed air by the engine into the system.

隔离

此外，管路上安装隔离作用的止回阀。。。。



The loss of cooling water from an air compressor could lead to an **overheated air discharge** and possibly an explosion in the pipelines leading to the **air reservoir**. A high **temperature alarm** or a **fusible plug** which will melt is used to guard against this possibility.

排气过热

空气瓶

高温警报

易熔塞

如果压缩机缺少冷却水，则排气会过热，可能导致管路爆炸。

。 。 。





Through a pressure reduction station, compressed air at 7 bar is supplied as control air for the engine **manoeuvring** system, and as safety air for the **emergency system**.

操纵系统
应急系统

经过减压阀，7公斤的控制空气可用于发动机的操纵。



An **emergency air compressor** and a starting air bottle are installed for **redundant** emergency start of the auxiliary engines.

应急空压机

额外的，
冗余的

应急空压机和空气瓶，作为备用，可用于起动辅机。

part 3

Exercise & Examination



1. Vessels having main engines arranged for **air starting** are to be provide with at least ____.
- A. one automatic drain serving both containers
 - B. two **air starting containers** of approximately equal size
 - C. one control air container and one starting air container
 - D. one additional means of starting the main engine

空气启动

启动空气瓶

B

主机用空气起动的船舶,需至少具备两个尺寸大致相近的启动空气瓶



2. In heavy marine engine the practice is to drive the engine on _____ which has previously been stored in **starting air reservoirs.**

- A. electric motor
- B. hydraulic motor
- C. compressed air
- D. turning gear

C

起动空气瓶

对于大型船舶柴油机,通常的做法是采用存放在压缩空气瓶内的压缩空气来起动的。



3. The air reservoirs must have _____ fitted to prevent rupture in the event of fire.

A. high pressure alarm

B. fire alarm

C. extinguishers

D. fusible plugs

D

空气瓶必须安装易熔塞,以防发生火灾时破裂。



4. Diesel engine air start system **check valves** are opened by_____.

- A. an air start cam
- B. cylinder compression pressure
- C. starting air pressure
- D. valve springs

C

单向阀

柴油机空气起动系统止回阀是由起动空气压力打开的。



5. In the starting system, the **automatic valve** is controlled by_____, and the cylinder start valves are controlled by_____.

A. pilot air; **pilot air**

B. handle; solenoid

C. handle, pilot air coming through the distributor

D. solenoid; pilot air coming through the distributor

自动阀

控制空气

A

在起动空气系统内,自动阀(主起动阀)是由控制空气控制的,气缸起动阀也是由控制空气控制的。



6. When starting an engine, the compressed air enters the cylinder when the **corresponding piston** is in position of its _____.

- A. suction stroke
- B. compression stroke
- C. power stroke
- D. exhaust stroke

对应的活塞

C

起动柴油机时,只有相应的活塞处于做功冲程的时候,压缩空气才进入气缸。



Lesson 9 Starting System | Exercise

7. Which of the listed devices would be **installed** at a control system air **pressure reducing station**?

- A. Moisture separator
- B. Vacuum breaker
- C. Lubricator
- D. Non-return valve

安装

减压台

A

控制空气系统的减压装置中安装有水分分离器。



9. Low pressure air is usually taken through _____ or pressure **regulators** to a low pressure reservoir supplying a ring main through driers.

- A. globe valves
- B. butterfly valves
- C. gate valves
- D. **reducing valves**

调节器

减压阀

D

低压空气通常来自于减压阀或压力调节器,然后贮存在低压空气瓶。



10. The total starting air capacity required for **reversible** main engines is to be sufficient for at least ____.

- A. six consecutive starts
- B. eight consecutive starts
- C. ten consecutive starts
- D. twelve consecutive starts

D

可逆转
可以反向起动

对于可换向式的主机,空气瓶的容量应能保证连续起动12次。



11. What **preventative maintenance** should be done frequently to diesel engine starting air receivers?

- A. Drain the accumulated moisture
- B. Test the relief valves
- C. Watch the temperature to prevent fluctuations in pressure
- D. Clean the interior to remove oil and foreign matter

A

预防性保养

对于柴油机起动空气瓶,日常的预防性保养是放残。



12. Diesel engine air start valve **timing** is controlled by_____.

- A. engine operating speed
- B. an air manifold
- C. a hydraulic distributor
- D. individual cams and valve gear

D

定时

柴油机起动空气阀的定时是由独立的凸轮和气阀机构控制的。