

中远集团船员英语
适岗考试系列教材

轮机英语阅读

English Reading for Marine Engineering

主编 党 坤 丛 波

主审 孙玉清



大连海事大学出版社

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内 容 提 要

本书是根据中远集团船员英语适岗标准的要求而编写的系列教材之一,共分十个单元。主要内容包括:船用柴油机工作原理及其辅助系统;甲板机械中的起货机、锚机、系缆机;空调系统、船用泵及其系统、发电机及配电装置、分油机及油水分离器、有关应急设备及相关国际公约。课文及阅读材料视需要配有插图。每个单元分课文、生词及短文、课文注解、练习、阅读材料及注释和汉英常用专业词汇等。书后附有练习参考答案和二、三管轮适岗考试样卷。

本书主要为中远集团二、三管轮的适岗英语培训教材,也可供其他船员自学提高使用或专业技术人员参考。

编者

1999 年 7 月

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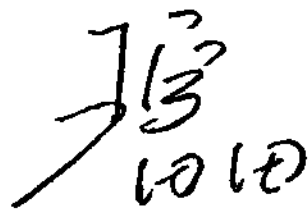
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序

看到船员英语适岗考试系列教材出版,我十分高兴。这标志着我们的船员英语培训工作又向前推进了一大步。

在日益激烈的国际市场竞争中,中远集团越来越清醒地认识到——英语作为一种国际间的交流工具,已经成为衡量企业和船员素质高低的重要标尺。航运业是一种国际性行业,远洋船员是一种国际性职业。中远作为特大跨国航运企业,若想进一步加快发展的步伐,就必须使船员学会驾御英语这门语言工具。集团于1995年提出对船员实施英语适岗考试制度,以适应国际海事组织STCW78/95公约和我国海事局九七规则对船员的要求。英语适岗考试正式实施的三年间,取得了良好的效果,对提高广大船员的英语水平发挥了重要作用,为建立企业的职业岗位资格证书制度提供了有益的借鉴。船员英语适岗考试系列教材的及时出版,正是适应了集团对英语培训新的发展需要,将会对船员英语适岗考试起到良好的推动作用。同时,这套教材具有较强的针对性、实用性,能够较好地提高船员学习英语的积极性。

为此,我向为该系列教材的出版付出辛勤劳动的教师及有关人员表示衷心的感谢!我们也期待着,该系列教材能够经受实践的检验,为全面提高中远船员英语水平发挥更重要的作用。



李 洁

前 言

为全面提高船员的英语水平,以适应 STCW78/95 公约和开拓外派劳务市场的需要,中远集团自 1996 年开始对全集团船员实施英语适岗考试。为配合船员英语适岗考试的顺利实施,成立了中远集团船员英语适岗考试系列教材编写委员会,组织系列教材的编写工作。

本系列教材根据《中远集团船员英语适岗标准》的规定,密切配合中远集团船员的实际工作,由青岛远洋船员学院、大连海运学校、广州海员学校、天津海员学校和上海远洋运输公司教育中心合作编写。系列教材共分十册:其中《水手英语》由广州海员学校编写,《机工英语》由天津海员学校编写,分别供参加航海与轮机 1~2 级适岗考试的船员使用;《航海英语阅读》、《航海英语口语》由青岛远洋船员学院和大连海运学校编写,供航海 3~4 级的船员使用;《轮机英语阅读》、《轮机英语口语》由青岛远洋船员学院和大连海运学校编写,供轮机 3~4 级的船员使用;《高级航海英语阅读》、《高级航海英语口语》和《高级轮机英语阅读》、《高级轮机英语口语》由青岛远洋船员学院和上海远洋运输公司培训中心编写,分别供参加航海和轮机 5~6 级适岗考试的船员使用。

航海专业英语的五册教材和轮机专业英语的五册教材根据各个岗级的岗位工作特点自成体系,又相互配合,形成整体,以适应船员参加英语适岗考试的笔试、听力和口试的考试要求。教材内容在选材与编写上紧紧围绕各级岗位的实际工作需要,同时考虑到国际海事组织 STCW78/95 公约和我国海事局船员适任考试和评估大纲对船员英语的要求以及远洋船舶在新技术上的发展和对船舶管理水平的要求。

中远集团船员英语适岗考试系列教材编写委员会

1999 年 7 月

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Unit One

Text

Engine Cycles

The term 'cycle' refers to one complete sequence of operations required to produce power in an engine. This cycle of operations is continuously repeated while the engine is running. For a diesel engine it consists of four operations within the cylinder:

1. Compression of a charge of air
2. Injection of fuel which then ignites^①
3. Expansion of the hot gases formed during combustion
4. Expulsion of the used gas to exhaust.

The cylinder is then recharged with air and the cycle is repeated.

Diesel engines can be designed to complete this cycle once during each revolution and this is termed the two-stroke cycle, or alternatively to take two engine revolutions to complete the four-stroke cycle^②. An engine can only operate on the cycle for which it was designed^③.

Engine stroke is measured as the full distance through which the piston moves between each end of its travel^④. It can be seen that it must move through two complete strokes (one up and one down) during each revolution of the engine.

Engine timing refers to the relative time or position of the crank, at which each operation during the cycle is commenced and is completed^⑤. It is measured as the angle through which the crank has been rotated from a datum position such as top or bottom center.

Two-stroke cycle Practically all large, slow-speed, direct drive marine diesel engines operate on the two-stroke cycle (Fig. 1.1)^⑥. As its name implies a two-stroke cycle takes place in two consecutive strokes of the engine piston, or one revolution of the crankshaft^⑦. Thus each operation in the cycle is repeated during every revolution of the engine. The two strokes of the cycle may be termed; *Compression stroke and Power or expansion stroke*. Operations take place in a fixed order and must occur when the piston reaches a corresponding position in its stroke^⑧. These positions are shown as volumes on an indicator diagram which relates them with pressure within the cylinder^⑨. It is convenient to express them in terms of angles of crank position measured from top dead center (TDC) or bottom dead center (BDC) and they may be shown as a circle on a timing diagram. (Numbers have been added for reference.)

Actual timing may differ between engines due to construction and design differences such as; ratio of connecting rod length/crank length, stroke/bore ratio, engine speed, engine rating,

etc.^⑧.

- 1-2 Completion of scavenge. Air is entering the cylinder, expelling exhaust gas and recharging it for the next combustion. Scavenge and exhaust are open^①.

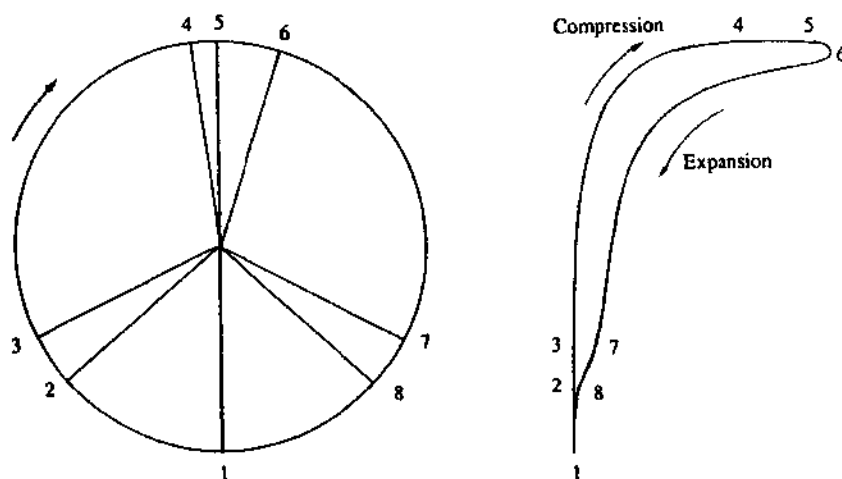


Fig. 1.1 Two-stroke cycle and timing diagrams

- 2-3 Post-scavenge. Scavenge ports have closed and some air within the cylinder may leak to exhaust. In some engines 2 and 3 are made to coincide to eliminate leakage of air.
- 3-4 Compression. Exhaust has now closed and the air trapped within the cylinder is compressed by the upstroke of the piston to raise its temperature sufficiently to ignite the fuel^②.
- 4-5-6 Fuel injection takes place and combustion occurs causing a rapid rise in pressure. The period for which this continues depends upon the fuel pump setting and power to be produced.
- 6-7 Expansion. Combustion completed, the hot gases expand forcing the piston downwards and converting the heat energy from combustion into work on the piston.
- 7-8 Exhaust blowdown^③. Exhaust has opened allowing gas to pass to exhaust manifold, and pressure drops rapidly in cylinder.
- 8-1 Scavenge. Scavenge ports have opened and air enters to expel the remaining exhaust gas.
- 1-etc. Scavenging then continues for the next cycle.

Position 1 represents bottom of stroke (BDC). Position 5 represents top of stroke (TDC).

Four-stroke cycle The majority of medium and high speed diesel engines for main or auxiliary drive operate on the four-stroke cycle, which takes place during four consecutive strokes, or two complete revolutions, of the engine^④. The four strokes may be termed: *Compression stroke*, *Power or expansion stroke*, *Exhaust stroke*, and *Aspirating or air induction stroke* (Fig. 1.2)^⑤. Numbering the operations in sequence on the timing diagram:

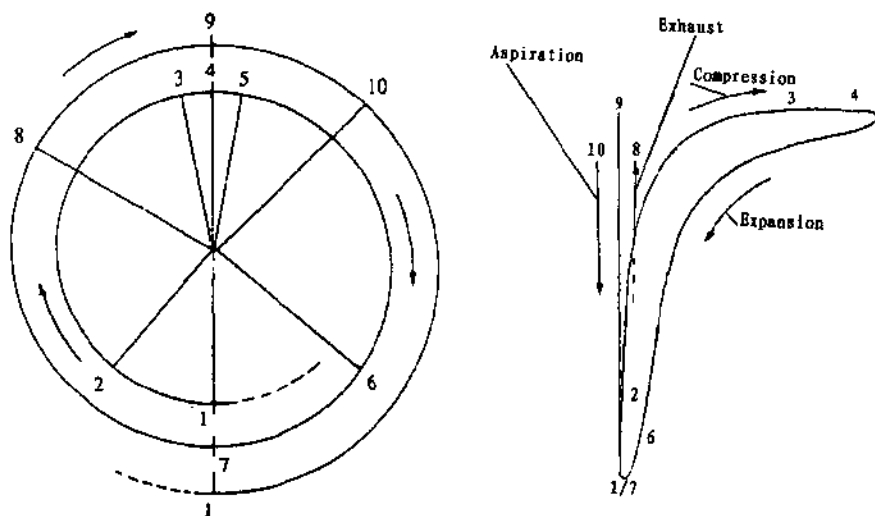


Fig. 1.2 Four-stroke cycle and timing diagrams

- 1-2 Completion of aspiration.
- 2-3 Compression. Air inlet valve has closed, air in cylinder is now compressed to raise its temperature for combustion of fuel.
- 3-4-5 Fuel injection. Combustion takes place with corresponding rise in pressure. Period controlled by fuel pump setting.
- 5-6 Expansion. Combustion completed, gas pressure does work on piston during downward stroke.
- 6-7-8 Exhaust. Exhaust valve opened, piston expels exhaust gas on upward stroke.
- 8-9-10 Overlap. Air inlet valve opened while exhaust remains open. The length of this is increased in supercharged or high speed engines[®].
- 10-1 Aspiration. Exhaust valve closed, piston draws air into cylinder during downward stroke.
- 1-etc. Aspiration continues for next cycle.

4 and 9 are TDC positions. 1 and 7 are BDC positions.

New Words and Expressions

cycle ['saɪkl]n.

循环

refer to

涉及; 指的是

sequence ['si:kwəns]n.

顺序; 次第

diesel ['di:zəl]n.

柴油机; 发动机

consist of

由……组成

cylinder ['sɪlɪndə]n.

气缸

compression [kəm'preʃən]n.

压缩

injection [ɪn'dʒekʃən]n.

喷射; 注入

| | |
|-----------------------------------|-------------|
| ignite [ɪɡ'naɪt]v. | 点燃;使发火 |
| expansion [ɪks'pænfən]n. | 膨胀 |
| combustion [ˌkɒmɪ'bʌstʃən]n. | 燃烧 |
| expulsion [ɪks'pʌljən]n. | 逐出;排出 |
| exhaust [ɪɡ'zɔːst]n. v. | 排气;排气管;废气 |
| design [dɪ'zain]n. | 设计;型式 |
| revolution [ˌrevə'lʊːʃən]n. | 旋转;周转 |
| stroke [ˈstroʊk]n. | 行程;冲程 |
| alternatively [ɔː'tə:nətɪvli]adv. | 二者选其一 |
| measure ['meʒə]v. | 度量 |
| distance ['dɪstəns]n. | 距离 |
| piston ['pɪstən]n. | 活塞 |
| relative ['relətɪv]a. | 相对的 |
| crank [kræŋk]n. | 曲柄 |
| commence [kə'məns]v. | 开始 |
| datum ['deɪtəm]n. | 基准面;基准点 |
| rotate [rou'teɪt]v. | 旋转 |
| practically ['præktɪkəli]adv. | 实际地;实用地 |
| marine {mə'ri:n}a. | 海的;海运的 |
| take place | 发生 |
| imply [ɪm'plai]v. | 暗示;含有……意思的 |
| consecutive [kən'sekjʊtɪv]a. | 连续不断的 |
| crankshaft ['kræŋkʃɑːft]n. | 曲轴 |
| compression stroke | 压缩行程 |
| expansion stroke | 膨胀行程 |
| occur [ə'kɜː]v. | 发生;出现 |
| corresponding [ˌkɒrɪs'pɒndɪŋ]a. | 相应的;相当的 |
| volume ['vɒljəm]n. | 本积;容量 |
| indicator ['ɪndɪkeɪtə]n. | 示功器 |
| diagram ['daɪəgræm]n. | 图;图形 |
| indicator diagram | 示功图 |
| convenient [kən'vi:nɪənt]a. | 合适的;方便的 |
| in terms of | 就……而论;用……单位 |
| top dead center (TDC) | 上止点 |
| bottom dead center (BDC) | 下止点 |
| timing diagram | 定时图 |
| reference ['refrəns]n. | 资料;参考 |
| actual ['æktʃʊəl]a. | 确实的;实际的 |
| due to | 因为;由于 |

| | |
|----------------------------------|--------------|
| ratio ['reɪʃiəʊ]n. | 比; 比率 |
| length [lengθ]n. | 长度 |
| bore [bɔː]n. | 缸径; 缸孔 |
| scavenge ['skævɪndʒ]n. /v. | 扫气; 换气 |
| expel [ɪks'pel]v. | 驱除 |
| leak [li:k]v. | 泄漏 |
| coincide [kəʊɪn'saɪd]v. | 巧合; 同时发生 |
| eliminate [ɪ'lɪmɪneɪt]v. | 去除; 剔除 |
| leakage ['li:kɪdʒ]n. | 漏泄 |
| trap [træp]v. | 把……封闭在里面 |
| sufficiently [sə'fɪʃəntli]adv. | 足够地; 充分地 |
| depend upon | 依赖于……; 决定于…… |
| downward ['daʊnwəd]adv. | 向下 |
| convert [kən'veɪt]v. | 转化; 转换; 转变 |
| manifold ['mænɪfəʊld]n. | 总管 |
| rapidly ['ræpɪdli]adv. | 迅速地 |
| majority [mə'dʒɔːrɪti]n. | 多数; 大半 |
| medium ['miːdɪəm]a. | 中速的 |
| auxiliary [ɔːg'zɪliəri]a. | 辅助的 |
| aspiration [,æspi'reɪʃən]n. | 吸气 |
| overlap [ˌoʊvə'læp]n. | 重叠 |
| increase [ɪn'krɪ:s]v. | 增加, 增多 |
| supercharger ['sju:pə:tʃɑːdʒə]n. | 增压器 |
| draw [drɔː]v. | 抽吸 |

Notes

1. Injection of fuel which then ignites.

喷油及燃烧。

句中 which 引导定语从句修饰 fuel, which 代 fuel.

ignite [ɪg'naɪt] vi. catch fire; begin to burn 着火, 燃烧

then adv. 那时; 那一刻, 在定语从句中作时间状语。

2. Diesel engines can be...the four-stroke cycle.

柴油机可设计成每转完成一次工作循环, 称为二冲程机; 或另一种形式, 每两转完成一次工作循环, 称为四冲程机。

不定式短语“to complete...”及“to take...”作同一主语“Diesel Engines”的补语。全句由四个分句组成, 后两个分句为省略句, 补足后为“or alternatively diesel engines can be designed to take two engine revolutions to complete this cycle once and this is termed the four stroke cycle”。

term v. call; name; designate 把……叫做; 把……称为。本文第一句中 term 为名词, 意为术语。

3. An engine...it was designed.

发动机只能按其设计的循环方式工作。

该句为单从句复合句, “for which it was designed” 是定语从句, 修饰 the cycle。which, 代词, 代“an engine”。it, 代词, 代“the cycle”。

4. Engine stroke is measured...of its travel.

柴油机行程指其活塞行程端点间的距离。

“as the full distance” 是作主语补语, “through which...its travel” 为定语从句, 修饰 the full distance.

5. Engine timing refers to...and is completed.

柴油机定时, 是指其曲柄所处的相对时刻或位置, 在该时刻或位置, 其工作循环的每种动作开始或结束。

“at which...” 是非限制性定语从句, 修饰 “the relative time or position”, 但被定语 “of the crank” 分隔, 构成了定语隔位, 详见附录 I。

6. Practically all large...on the two stroke cycle (Fig. 1.1).

事实上, 所有大型、低速直接传动的柴油机均按二冲程循环工作(图 1.1)。

drive n. 传动

7. As its name implies a two-stroke cycle...of the crankshaft.

正如其名字所暗示的那样, 二冲程包括两个连续的活塞行程, 即曲轴旋转一周。

“As its name implies” 为插入语。“take place” 为短语动词, 其后的介词词组作状语。

8. Operations take place...in its stroke.

四种工作过程按固定顺序进行, 且必须在活塞到达其行程某一相应位置时开始。

该句为并列句, 由并列连词 and 连接一个简单句和一个复合句而成。when 引导的时间状语从句作第二个复合句谓语 “must occur” 的状语。

9. These positions are shown...within the cylinder.

这些位置以容积的形式在示功图上示出, 示功图还示出了与这些位置相关的缸内压力。

“as volumes on an indicator diagram” 为系表结构的方式状语, which 引导限制性定语从句, 修饰 “indicator diagram”, which 在从句中作主语, them 指 “these positions”。

relate [ri'leit] vt. have relation with; have reference with 显示出……; 与……的关系。

10. Actual timing may...engine rating, etc.

柴油机的实际定时, 会因结构和设计差别, 如连杆长度与曲轴柄长度比, 冲程缸径比, 转速及额定功率不同而有所不同。

“due to” 短语介词与 “construction and design differences” 构成的介词短语作状语。

“such as; ...” 为 “construction and design differences” 的同位语。

11. Scavenge and exhaust are open.

扫气口及排气口(同时)打开。

12. Exhaust has now closed...to ignite the fuel

排气口关闭,空气被困于缸中由上行活塞压缩,以将其温度提高到足以使燃料着火。

该句为并列句,“trapped within the cylinder”过去分词短语作 air 的后置定语,to raise its temperature 为目的状语,sufficiently to ignite the fuel 为上述不定式结构中宾语“its temperature”的补语。

13. Exhaust blowdown 废气排放

14. The majority of medium...of the engine.

大多数用作主机或驱动辅助负载的中高速柴油机按四冲程循环工作,即四个连续的活塞行程,曲轴转动两周。

“for main or auxiliary drive”介词短语为“diesel engines”的后置定语。which 引导的非限制性定语从句是对“the four-stroke cycle”的修饰。

15. The four strokes may be termed...air induction stroke(Fig. 1. 2).

这四个冲程可以被称作:压缩行程,做功(或膨胀)行程,排气行程,进气(或空气吸入)行程(图 1. 2)。

16. Overlap, Air inlet valve...or high speed engines.

气阀(开启)重叠。在排气阀开启的同时,进气阀开启,气阀重叠量在增压及高速机中较大。

Exercises

I. Answer the questions based on the text.

1. What does the term “cycle”refer to?
2. What are the four operations for a diesel engine?
3. How does the two-stroke cycle differ from the four-stroke one?
4. How can engine stroke be measured?
5. What engines operate on the two-stroke cycle?
6. What do the two strokes refer to?
7. What does BDC stand for?
8. Please describe the four-stroke cycle.

II. Put the following phrases into Chinese.

- | | |
|-----------------------------|-----------------------------|
| 1. to refer to | 2. during the combustion |
| 3. relative time | 4. slow-speed diesel engine |
| 5. a corresponding position | 6. to take place |
| 7. to raise temperature | 8. four consecutive strokes |
| 9. to draw air in | 10. exhaust valve |

III. Put the following phrases into English.

- | | |
|----------|-----------|
| 1. 由……组成 | 2. 例如 |
| 3. 压缩冲程 | 4. 以一定的顺序 |
| 5. 燃油泵 | 6. 由于 |

7. 取决于
8. 转换成
9. 残留的废气
10. 上止点

IV. Complete the sentences.

1. A diesel engine is _____ (一种将热能转换成机械能的机器)。
2. In the two-stroke engine, each revolution of the crankshaft makes one power or working stroke, _____ (但四冲程机需要两转来完成)。
3. Each type of engine has its application on board ship, _____ (低速柴油机以二冲程工作循环来工作)。
4. The two strokes of the cycle may _____ (由压缩冲程和膨胀冲程组成)。
5. When the air is compressed, _____ (温度升高,以点燃喷进气缸里的燃油)。
6. Please stop the engine _____ (由于漏油)。

V. Choices.

1. () The operation between two fuel injections is called _____.
A. a working process B. a working cycle
C. two strokes D. two actions
2. () A charge of fresh air is drawn or pumped into the engine cylinder and then _____ by the moving piston to very high pressure.
A. pressed B. suppressed C. squeezed D. compressed
3. () The ports are located at _____ height that they are just exposed by the upper edge of the piston.
A. a such B. such a C. a so D. so a
4. () Top dead center is sometimes referred to as _____.
A. inlet dead center B. outlet dead center
C. inner dead center D. outer dead center
5. () Heat energy is a source of power by which the diesel engine _____.
A. be able to operate B. can be operated
C. will be operation D. may be operation
6. () The temperature of the compressed air is _____ the spray of the injected fuel.
A. enough high to ignite B. too high to ignite
C. very high to ignite D. high enough to ignite
7. () The fresh air enters as the inlet port is opened by the downward movement of _____.
A. the cylinder B. the piston C. the crankshaft D. the cam
8. () The _____ chamber is enclosed between the cylinder head and the piston crown.
A. lubrication B. injection C. cooling D. combustion
9. () It will take about four running days _____ the repair work.
A. complete B. completed C. to complete D. completing
10. () Please show me how _____ the machine.