交通中等专业学校统编教材

汽车工程专业英语

(汽车运用工程专业用)

王静文　傅晓薇　主编
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人民交通出版社

内 容 提 要

本书的全部文章选自近年来国外正式出版的原著。文章语言规范、图文并茂，与当今世界汽车工业技术同步，可以使读者在学习专业英语的同时了解最新的汽车技术。

本书可作为汽车运用工程、汽车维修、汽车检测、筑路机械等专业有一定英语基础的高职及中专学生的教学用书，也可作为从事汽车筑路机械使用维修的工程技术人员及驾驶人员的自学和参考书。

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前　言

本书的全部文章选自近年来国外正式出版的原著。文章不仅语言规范、图文并茂，而且与当今世界汽车工业技术同步，从而可以使读者在学习专业英语的同时了解最新的汽车技术。

本书共分十个单元，每个单元设有课文、阅读材料 A 和阅读材料 B 三篇文章。为了便于自学，对每篇文章中出现的长句、难句作了语法结构分析，并有中文翻译；每篇课文后面还配有练习，以利检查和巩固所学内容；每个单元的后面还附有翻译技巧知识。

本书可作为汽车运用工程、汽车维修、汽车检测、筑路机械等专业有一定英语基础的高职班及中专班学员的教学用书，也可以作为从事汽车及筑路机械使用、维修的工程技术人员及驾驶人员的自学和参考书。

本书由呼和浩特交通学校高级讲师王静文、交通部电视中专高级讲师傅晓薇主编，呼和浩特交通学校高级讲师崔崇学主审。呼和浩特交通学校讲师张志国参加了部分内容的编写和全书的审校工作。

由于时间仓促和编者水平所限，书中难免会有诸多不妥之处。敬请使用本书的专家、同行及广大读者提出宝贵意见，以便再版时修改。

编　者

1998.10

CONTENTS

Unit 1

Text

Four-Stroke Engine Operation

A stroke is the movement of the piston from TDC(top dead center) to BDC(bottom dead center), or from BDC to TDC. There are four strokes in one four-stroke cycle of the engine: intake stroke, compression stroke, power stroke, and exhaust stroke.

● Intake Stroke. Gasoline is very explosive when one part is mixed with about 15 parts of air. The ideal mixture of about 14.7 to 1 is called stoichiometric. As the crankshaft turns, it pulls the rod and piston down creating a vacuum that draws in a mixture of air and fuel through the open intake valve(Fig.1-1a). About 10,000 gallons of air is drawn in for every 1 gallon of fuel. The air/fuel mixture is supplied by the carburetor or fuel injection system.

Fig.1-1 The mixture is drawn into the cylinder where it is compressed.

Almost all new vehicles have fuel injection systems. Computer controls used with these vehicles monitor the oxygen content in the vehicle's exhaust and then adjust the fuel supply to provide the correct amount of fuel and air for each intake stroke①.

● Compression Stroke. When the mixture of air and fuel is compressed into a smaller area, it becomes much more explosive. The compression stroke begins at BDC after the

intake stroke is completed. The intake valve closes and the piston moves up in the cylinder, compressing the air/fuel mixture ② (Fig. 1-1b). When the piston is at TDC, the mixture is compressed to about 1/8 the volume it occupied when the piston was at BDC. In this case, the compression ratio is said to be 8:1 (Fig. 1-2). If the mixture were compressed to 1/12 its original volume, the compression ratio would be 12:1.

● Power Stroke. As the piston approaches TDC on its compression stroke, the compressed air/fuel mixture becomes very explosive (Fig. 1-3). When the ignition system generates a spark at the spark plug, the fuel is ignited. The burning fuel mixture expands and forces the piston down to BDC (Fig. 1-4a). This action forces the crankshaft to turn; the turning crankshaft powers the car.

Fig. 1-2
Compression ratio is a comparison of the volume of the air space above the piston at BDC and at TDC.

Fig. 1-3
The air/fuel mixture heats up as it is compressed.

● Exhaust Stroke. As the piston nears BDC on the power stroke, another valve opens

Fig. 1-4
a) The mixture is burned, pushing the piston down. b) Then the exhaust is forced out as the piston comes up.

to allow the burned gases to escape. Because the exhaust gases are still expanding, they are forced out this open valve. As the crank continues to turn, the piston moves up in the cylinder, helping to force the remaining exhaust gases out through this open exhaust valve (Fig.1-4b). A few degrees after the piston passes TDC, the exhaust valve closes, and the entire four-stroke cycle repeats itself, beginning with the intake stroke.

Leakage of gases past the rings during the power stroke is called blow-by③ (Fig.1-5). Blow-by causes pressure in the crankcase.

Fig. 1-5

Leakage of gases past the ring is know n as blow-by.

New Words

1.stroke[str uk] n.冲程,行程
2.m ovem ent[m u vm nt] n.运动,移动
3.piston[pist n] n.活塞
4.intake[in-teik] n.进气,吸气
5.com pression[k m pre n] n.压缩、压紧
6.exhaust[i z st] n.,vt.排口,排气
7.explosive[iksplousiv] a.,n.爆炸的,炸药
8.m ixture[m ikst] n.混合物
9. stoichiom etric[st iki m etrik] a.理想配比的,化学论量的
stoichiom etric air-fuel ratio 理论空燃比
10.crankshaft[kr k ft] n.曲轴
11.rod[r d] n.杆,连杆
connectin rod 连杆
12.vacuum [v kju m] n.真空
13.draw [dr] v.拉,拖,牵引,(发动机)回火
14.valve[v lv] n.气门,阀门

15.gallon[l n] n.加仑
16.carburetor[k bjuret] n.化油器,汽化器
17.injection[in d ek n] n.喷射,注入,注射,注射液
18.system [sist m] n.系统
19.vehicle[viikl] n.车辆,汽车
20.m onitor[m nit] n.v.监视器,检查,监视
21.cylinder[silind] n.气缸
22.ratio[rei iou] n.比,比率
23.approach[prout] vt.接近
24.ignition[i ni n] n.点火
25.generate[d en reit] v.产生,发生,引起
26.spark[sp k] n.,vi.,vt.火花,电花,发火花,发动
27.plug[pl] n.,v.塞子,火花塞,插上插头
28.ignite[i nait] v.点火
29.expand[iksp nd] v.膨胀,扩张,展开
30.escape[iskeip] vi.,vt.逃脱
31.rem ain[rim ein] vi.剩下,留下,保持,仍是
32.degree[di ri] n.度,程度,等级
33.leakage[likid] n.泄漏
34.ring[ri] n.,v.活塞环,环形物,环绕
35.crankcase[kr kkeis] n.曲轴箱
36.occupy[kju pai] 占有,占据,使…从事
37.engine[end in] n.发动机
38.content[k ntent] n.内容,容量
39.original[rid n l] a.最初的,原始的
40.volum e[v ljum] n.体积,容积,音量,卷,册
41.entire[in tai] a.全部的,完全的;n.全体
42.cycle[saikl] n.周期;循环

Phrases and Expressions

1.four-stroke engine 四冲程发动机
2.top dead center(TDC) 上止点
3.bottom dead center(BDC) 下止点
4.draw in 吸入,使加入,收网
5.m ove up 向上移动,上升
6.in this case 假若这样,这时
7.begin w ith 从…开始
8.blow -by (缝隙)漏气,从…中出,窜气
9.heat-up 发热,变热

Notes

①Computer controls used with these vehicles monitor the oxygen content in the vehicle's exhaust and then adjust the fuel supply to provide the correct amount of fuel and air for each intake stroke.

为了对每一进气行程提供正确的燃油空气量,用于这些汽车上的计算机控制(组件)监测汽车排气中的氧含量,然后调节燃油的供给。

1)used with these vehicles 是分词短语作后置定语。

2)and 并列连词,连接两个谓语 monitor 和 adjust。

3)to provide…不定式短语作目的状语。

②The intake valve closes and the piston moves up in the cylinder, compressing the air/fuel mixture.

进气门关闭,活塞在气缸内上移而压缩空气燃油混合物。

compressing the air/fuel mixture 分词短语作结果状语,通常用逗号与句子隔开。

③Leakage of gases past the rings during the power stroke is called blow-by.

在作功行程中通过活塞环气体的泄漏称为漏气。

1)past the rings 过去分词短语作后置定语

2)during the power stroke 分词短语做时间状语

Glossary of Technical Terms

1. stroke: in an automobile engine, the distance moved by the piston.

2. valve: A device used to open and close a port to let intake and exhaust gases in and out of the engine.

3. carburetor: A device for automatically mining fuel in the proper proportion with air to produce a combustible gas.

4. compression ratio: A measure of how much the air has been compressed in a cylinder of an engine from BDC to TDC. Compression ratio will usually be from 8-1 to 25-1.

5. ignition: In internal-combustion gasoline engines, the process of igniting the air/fuel mixture in the combustion chamber by an electrical spark from a spark plug.

6. stoichiometric: In automotive terminology it refers to an air/fuel ratio in which all combustible materials are used with no deficiencies or excesses; 14.7 parts air to 1 part fuel, by weight, at sea level.

Exercises

I. True or false questions:

1. The stoichiometric in the text means the ideal mixture of the air and fuel, which is about 14.7 to1.

2. When it is compressed, the mixture of air and fuel will be at a high pressure and temperature.

3. As the piston moves up to TDC on its compression stroke, the compressed air/fuel mixture becomes very explosive and forces the piston moves down in the cylinder.

4. A few degrees before the piston approaches TDC, the intake valve opens and the engine begins with the intake stroke.

5. The remaining exhaust gases is forced out of the cylinder, because the exhaust gases are still expanding.

II. Study Questions:

1. What does TDC mean?

2. What is the movement of the piston from TDC to BDC called?

3. During which of the four strokes are the valves closed?

4. What is the ratio called that compares the volume of the air space above the piston at TDC and BDC?

III. Translate the following sentences into Chinese:

1. If the mixture were compressed to 1/12 its original volume, the compression ratio would be 12: 1.

2. When the ignition system generates a spark at the spark plug, the compressed mixture of air and fuel is ignited.

3. This arrangement allows the piston to return to the top of the cylinder, making continuous rotary motion of the crankshaft possible.

Reading Material A

Engine Control System Operating Modes

Every computer control system has two operating modes. The computer can ignore sensor input under certain operating conditions, or it can make one of several different possible decisions based on the input of other sensors. For example, the computer can ignore an exhaust gas recirculation (EGR) sensor if a temperature sensor tells it that the engine is cold.

Since a computer has this ability to be selective, engineers program a control system for two basic operating modes: open-loop and closed-loop, Fig. 1-6. The most common application of these modes applies to fuel-metering feedback control, although there are other open- and closed-loop functions①. In addition to these two basic modes, a practical fuel control system must handle other operating modes as operating conditions change. Control logic that is programmed into the microprocessor determines the operating mode according to the existing engine condition.

Fig. 1-6
Typical open-and closed-loop control.

Open-loop Control

When a vehicle is first started, the control system is in open loop. The sensors provide information to the computer. The computer reads these signals and orders the output actuators to operate in a specific manner. The actuators obey the orders they receive without providing and feedback to the computer. This unidirectional operating sequence is shown by the solid lines in Fig. 1-6.

When you turn on the windshield wipers, you are exercising open-loop control over the wiper system. The wiper blades will move across the windshield at a given rate of speed, regardless of whether the rain falling on the windshield is a light drizzle or heavy downpour. Wiper speed does not change until you readjust the wiper control. The wiper system does not receive an error feedback signal telling it that it is operating too slowly to clean the heavy downpour from the windshield. It relies on an outside force (the driver) for adjustment.

For an engine computer to determine whether the air-fuel mixture is correct, it requires a feedback signal from the exhaust gas oxygen (EGO) sensor. If the computer ignores this signal, it relies on signals from other sensors to make its decision. In this case, suppose the engine coolant sensor tells the computer that the engine is cold. The throttle position sensor also signals that engine speed is increasing. Based on this information, the computer tells the fuel control actuator to enrich the mixture. It does this under certain specified conditions:

- During a cold start or hot restart
- Under low vacuum conditions
- At wide-open throttle or under full load, regardless of engine speed
- During idle or deceleration conditions (some systems).

Closed-loop Control

In closed-loop control, the computer responds to feedback signals provided by sensors

and actuators. These feedback signals tell the computer whether the output is too little, too much, or just right. In other words, the feedback singnals regulate the output control. This cycle is summarized by the dotted line in Fig.1-6.

In our fuel metering example above, the computer will respond to the EGO sensor signal in closed-loop operation. If the sensor measures a low oxygen content, which indicates a rich mixture, it signals this fact to the computer. The computer then directs the fuel control actuator to lean the mixture. If the actuator leans the mixture to much, the EGO sensor will inform the computer, which then directs the fuel control actuator to again enrich the mixture. This is an on-going process that occurs many times per second.

In essence, a computer operating in closed loop is constantly "returning" the engine while it is running in order to compensate for changes in various operating factors, such as temperature, speed, load, altitude, among others.

New Words

1. ignore[i n] vt.不理、忽略、不问
2. sensor[sens] n.传感器
3. recirculation[ris kju lei n] n.再循环,回流
4. selective [silektiv] a.选择的;精选的
5. loop[lu p] n.圈,环,回路。vt.把…连成回路
6. feedback[fidb k] n.反馈;回传,反应
7. function[f k n] n.,v.作用,功能;起作用
8. handle[h ndl] n.,vt.摇柄,把手;处理,管理
9. logic[l d ik] n.逻辑,逻辑学
10. microprocessor[maikr prouses] n.微处理器
11. exist [i zist] v.存在,有,生存
12. chart [t t] n.图表
13. typical [tipik l] a.典型的,标准的
14. actuator [ktjueit] n.调节器,传动装置,螺线管,激励器
15. specific [spisifik] a.特殊的,专门的,具体的
16. manner [m n] n.方法、样式;态度;种类
17. obey [bei] vt.服从;遵守
18. unidirectional [junidirek nl] a.单向性的
19. sequence [sikw ns] n.连续;顺序;程序
20. solid [s lid] a.实心的;固体的
21. windshield [wind ild] n.挡风玻璃
22. wiper [waip] n.,v.刮水器,雨刷
23. blade [bleid] n.刀口;刀身;叶片
24. drizzle [drizl] vi.,n.细雨,毛毛雨
25. downpour [daunp] n.倾盆大雨

26.error [er]　n.错误;误差
27.coolant [ku l nt]　n.冷却剂
28.throttle [　r tl]　n.节气门
29.enrich [in rit]　vt.加浓、浓缩
30.variable [v　ri bl]　n.,a.变量;可变的
31.lean [lin]　a.,vt.贫乏的,使贫乏
32.sum m arize[s　m　raiz]　v.概括,总结
33.dot [d　t]　n.,v.小点;打点
34.com pensate[k　m penseit]　vt.补偿,赔偿
35.altitude [　ltitju d]　n.海拔高度
36.indicate [indikeit]　vt.指示,表示,表明,暗示

Phrases and Expressions

1.open-loop　开路
　open-loop control　开路控制,无反馈控制
2.closed-loop　闭路
　closed-loop control　反馈控制
3.fuel-m etering　燃料调节
4.in addition to　除…之外,又
5.regardless of　不管,不顾
6.rely on　依靠
7.exhaust gas recirculation (EGR)　废气回流,废气再循环装置
8.exhaust gas oxygen (EGO)　排气氧含量
9.w ide-open throttle　油门全开,节气门全开
10.full load　满载,全负荷
11.in essence　本质上
12.com pensate for　补偿,抵偿
13.am ong others　其中

Notes

①The m ost com m on application of these m odes applies to fuel-m etering feedback control,although there are other open and closed-loop functions.

although　引导的是让步状语从句,作“虽然”解。

全句可译为:虽然此种模式还有其他的开、闭路控制功能,但最常见的是用于燃料调节反馈控制。

Glossary of Technical Terms

1. actuator: A device which translates the computer output voltage signal into mechanical energy.

2. closed-loop: An operational mode in which the computer reads and responds to feedback signals from its sensors, adjusting system operation accordingly.

3. open-loop: An operational mode in which the computer adjusts a system to function according to pre-determined instructions and does not always respond to feedback signals from its sensors.

4. sensor: A device which provides input data in the form of voltage signals to a computer.

5. microprocessor: A processor contained on an integrated circuit, processor (central processing unit) that makes the arithmetic and logic decisions in a microcomputer.

Reading Material B

Introduction to Electronic Engine Controls

Electronic engine controls appeared on the automotive scene with some 1977 models. The early control systems regulated only a single function, either ignition timing or fuel metering. However, they were rapidly expanded to incorporate control over both systems, as well as numerous other engine functions.

The basic parts of the first electronically controlled fuel management systems were a feedback carburetor, and electronic control module or microprocessor, an exhaust gas oxygen (EGO) sensor mounted in the exhaust manifold, and a catalytic converter.

Two types of fuel control actuators are used with carburetors:

- A solenoid or stepper motor mounted on or in the carburetor to directly control the fuel-metering rods or air bleeds, or both.
- A remote mounted, solenoid-actuated vacuum valve to regulate carburetor vacuum diaphragms that control the fuel-metering rods and air bleeds.

The fuel management microprocessor constantly monitors the oxygen content of the exhaust gas through signals received from the EGO sensor. The microprocessor sends a pulsed voltage signal to the control device, varying the ratio of on-time or off-time according to the signals received from the EGO sensor. As the percentage of on-time is increased or decreased, the mixture is leaned or richened.

With fuel injection systems, the microprocessor exercises ratio control by switching one or more fuel injectors on and off. The switching rate is determined by engine speed. The microprocessor varies the length of time the injectors remain open to establish the air fuel ratio. As the microprocessor receives data from its sensor inputs, it lengthens or shortens

the pulse width(on-time) according to engine operating and load conditions.

New Words

1.introduction[intr d k n] n.介绍;引进
2.electronic [ilek tr nik] a.电子的
3.appear [pi] v.出现,露出
4.autom otive [t m outiv] a.自动的,机动的;汽车的
5.scene [sin] n.景色,情景,实现,现场
6.m odel [m dl] n.,a.,v.模型,式样;模型的;仿造
7.regulate [re juleit] v.调速,调节,控制,规定
8.rapidly [r pidli] ad.迅速地,快地
9.incorporate [in k p reit] v.结合,合并,编入
10.num erous [nju m r s] a.许多的,众多的
11.electronically [ilek tr nik li] ad.电子学上
12.m anagem ent [m nid m nt] n.管理,管理处
13.m odule [m dju l] n.模件;(微型)组件
14.m ount [m aunt] vt.装配,安装
15.m anifold [m nifould] a.;n.多样的;(进排气)歧管
16.catalytic [k t litik] a.催化的
17.converter [k n v t] n.变换器
18.solenoid [soulin id] n.螺线管;筒形线圈
19.stepper [step] n.分档器,分节器
20.bleed [blid] v.流出,放出
21.rem ote [rim out] a.遥控的,远距离的
22.diaphragm [dai fr m] n.隔板,膜片,振动膜
23.constantly [k nst ntli] ad.不断地
24.pulse [p ls] n.,v.脉冲,波动
25.voltage[voultid] n.电压,电位差
26.vary [v ri] v.变化,变换
27.percentage [p sentid] n.比例,百分数,部分
28.injector [in d ekt] n.喷油器,喷嘴
29.establish [ist bli] vt.建立,确立

Phrases and Expressions

1.stepper m otor 步进马达
2.fuel-m etering rod 燃油计量测杆
3.air bleed (缓慢的)排气;放气孔
4.solenoid-actuated 电磁线圈动作的

5.vacuum valve　真空阀
6.vacuum diaphram　真空膜片
7.on-time　接通时间
　off-time　断开时间

翻译的基本知识

一、翻译的任务

就英译汉的笔译而言,翻译就是用汉语准确、完整、通畅地把英文原作重新表达出来。翻译本身是一种语言活动,它不能随译者之心表达自己的思想,而应把原作中所表达的内容忠实、完美地用汉语译出,使读者在阅读译文时,就像阅读原文一样,领会其思想和内容。

二、翻译的标准

翻译标准是衡量译文质量的尺度。翻译标准可概括为"忠实、通顺"四个字。忠实是指忠实于原作的内容。译者必须把原作的内容完整而准确地表达出来,不得有任何篡改、遗漏或任意增删的现象。通顺是指译文语言必须通顺易懂,符合规范。没有文理不通、结构混乱、逻辑不清的现象。要做到忠实、通顺,译者首先必须对原作有透彻的理解,然后把所理解的内容用汉语确切、流畅地表达出来。

三、翻译的过程

翻译的过程可概括为理解和表达两个阶段。

(一)理解阶段

对原文作透彻的理解是进行翻译的基础和关键。译者必须理解原文的词汇含义、句法结构、惯用法、技术术语以及原文的逻辑关系,从而把握原文的精神实质。

(二)表达阶段

表达就是译者把从原文所理解的内容用合乎规范的现代汉语重新复述出来。翻译的好坏取决于对原文的理解程度和对汉语的掌握程度。

对于初学翻译者来说,可参照下列步骤进行:

1.浏览全文,查阅生词

拿到文章后应首先对全文进行浏览。浏览时应注意文章的标题、小标题及各段的主题词等,并给于足够的重视。同时标出生词及短语,利用字典准确地查出其词性、词意。如果属于专业词汇则应查阅有关的专业技术词典,并注意短语及固定搭配。

2.分析原文结构,找到主题词,理解全文

翻译时切记不要一开始就抓住一两个词或一两句话不放,而应在浏览和生词理解的基础上对原文的结构进行分析,找到文章的主题词和各段落的主题句,化解长句、难句,进而达到理解全文的目的。

3.翻译与表达

翻译是一种再创作,是在理解原文的基础上用汉语准确、完整、通顺地表达原文的过程。具体翻译时,应逐段进行,切不可逐词、逐句翻译。认真阅读完一段后,对全段有了准确、完整的理