ELECTRICAL AND ELECTRONIC ENGINEERING

电气和电子工程

大学英语专业阅读精选系列教材

FOCUS READING SERIES

上海外语教育出版社

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Focus Reading Series
大学英语专业阅读精选系列教材

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前　　言

大学英语教学大纲规定大学本科(包括理工科和文理科)的英语教学分为基础阶段和专业阅读阶段。专业阅读阶段的任务是:指导学生阅读有关专业的英语书刊和文选,使其进一步提高阅读英语科技资料的能力,并能以英语为工具,获取专业所需要的信息。从实践中我们感到基础阶段学生所接触的语言材料在文体和词汇方面与专业阅读阶段有着较大的差别,而且一般说来学生第五学期刚开始接触专业基础课,他们还缺乏专业知识,直接进行专业阅读尚有一定困难。另外学生在基础阶段学习中所掌握的读、听、写、说四种技能在专业阅读阶段还需得到进一步巩固和提高。

Focus Reading Series 是为解决大学英语从基础阶段过渡到专业阅读阶段的衔接问题而编写的一套系列教材。本系列教材按专业大类分成六个分册:Mechanical Engineering, Electrical and Electronic Engineering, Chemistry and Chemical Engineering, Computer Engineering, Materials Science 和 Power Engineering。教师可按学生所学专业选用对口的分册。在编写过程中编者力求打破同类教材的老框框,使学生通过大量专业基础方面有关材料的阅读不仅能学到英语,而且还能学到一定的专业基础知识,熟悉和了解专业题材文章的特色并掌握一定量的专业词汇,从而为他们顺利进入专业阅读阶段学习打下良好的基础。本系列教材练习形式力求新颖多样,学生可以通过各种练习在语言运用上得到锻炼,使他们在大学英语基础阶段所掌握的读、听、写、说技能得到进一步的巩固和提高,并进而提高交际能力。本系列教材在编写过程中还着重强调了专业文章的特色及与之有关的功能意念和语言技能训练。

全套教材由机械工业部大学英语协作组责成华东工业大学、湖南大学、吉林工业大学和沈阳工业大学,并特邀上海大学合作编写。华东工业大学程月芳副教授担任总主编,卢思源教授担任总主审。教材编写的全过程得到了机械工业部教育司的领导和上海外语教育出版社编辑同志的大力支持和帮助。

编　者

1992 年 3 月

本书使用说明

本书为 Electrical and Electronic Engineering 分册，供电子电气及有关专业的大学本科学生用作专业阅读阶段之前的过渡性教材。一般在第五学期使用，约需 34 学时。

本书由 15 个单元组成，各单元均按专业内容划分，既考虑到专业知识的连贯性又照顾到英语学习的循序渐进。每个单元由 Reading and Comprehension，Reading and Practice 和 Reading and Translation 三个部分组成。Reading and Comprehension 部分有一篇阅读文章，其后是检查学生对文章理解的练习，旨在训练提高学生对科技体裁文章的阅读技能。文章后面附有生词表，将大学英语 1～4 级中未出现过的词汇或虽已出现过但在专业方面有特殊词义的词汇列入表内，生词后注有汉语或英语解释并注有国际音标，生词表中出现的词汇在文章内该词用斜体标出，便于学生预习时查找。Reading and Practice 部分也有一篇文章，其内容基本与 Reading and Comprehension 部分一致，也附有生词表，但文字较浅近易懂。要求学生在理解文章内容的基础上做好练习。该部分练习由 Use of English 和 Guided Writing 两个部分组成，是为训练学生运用语言的能力而设计的。Use of English 可以是 Use of Language 也可以是 Information Transfer，旨在为学生提供运用语言的实践机会。教师在引导学生做这一练习时应注意语言的流畅和准确性并重，并要尽力鼓励学生将已有的语言知识较流利地运用到实践中去。Guided Writing 旨在指导并训练学生的书面表达能力，练习的设计从连句成段开始，最后到指导学生写出简单的实验报告以及某一零部件或图表的定义、分类和描述。在这一练习的教学过程中教师可向学生推荐一些简单的实验报告格式，也可让学生对某些实物进行定义、分类和描述。Reading and Translation 部分有单句、段落或短文，要求学生进行英译汉练习。在做这部分练习时教师可作一些翻译指导，并要求学生不仅注意单句的译法，还要注意前后文意思对译文的影响，该部分选材以有利于指导翻译教学为主，但在内容上力求不脱离本分册的专业范围。

本书阅读总量约为 30,000 词，每一阅读文章（不包括翻译部分）篇幅一般为 1,000 词左右。总生词量为 400～500 个左右，并按字母顺序列于书后。在讲课中教师应着重阅读理解、翻译和语言实践的指导及交际能力的培养。学生宜在课前做好预习工作。本书的阅读和练习量较大，教师可根据学生的实际情况安排教学内容，对教材进行有选择的使用。

本书由华东工业大学颜国伟担任主编，叶彦文任副主编。颜国伟、叶彦文和张敏波编写。戴炜华教授和燕存正教授负责审核。

由于编者水平有限，教材中不妥之处望广大读者提出宝贵意见。

编　者

1992 年 3 月

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Unit One

I. Reading and Comprehension

INTRODUCTION TO ELECTRICAL ENGINEERING

The electrical and electronics industry has continued to mature to the point where almost every person, household, or industry in the world has been influenced by its *accomplishments*. Most obvious is the widespread acceptance of the computer at every level of our lives. Its speed, size, and cost make it *readily* available and effective in business and personal ventures. Electronics has provided radio, television, VCRs, and so on, as entertainment products in almost every household. *Integrated circuits* are now a part of most modern electronic systems and continue to provide smaller, more *sophisticated* end products. The engineer of the early 1950s would be in awe of the amount of *circuitry* that can be contained in a single integrated circuit, and today's engineer will probably be *astounded* by the technological progress that will take place by the year 2000.

Electronic systems will undoubtedly become a standard part of an increasing number of products since they offer a number of benefits that are cost-effective. Automotive functions previously performed by mechanical *components* are being replaced by electronic *equivalent* units, *phonograph* records using mechanical *pickup transducers* are being replaced by electronic *compact disk* units, mechanical typewriters are being replaced by electronic units and computer word-processing units, to name just a few examples of the *transition* to more IC electronic technology.

The growth of the electronic industry is due partly to the low-cost, very small size, relatively complete electronic systems referred to as very-large-scale integrated (VLSI) circuits. It is impressive to consider that within the typical small calculator there is essentially one small IC *package* occupying less than one-fifth of the inside volume, and within this VLSI package is an even smaller *chip* on which the total circuitry exists. A VLSI component contains hundreds of thousands of individual electronic components arranged in the various functional parts of the unit. These include storage stages, counter circuitry, memory circuits, arithmetic circuits, and so on.

The single-chip VLSI is the heart of the electronic watch, replacing the long established *analog* movement watches. As the electronic manufacturing technology has matured, the functions in a single hand-worn unit have increased. In addition to keeping count of the time, the additional circuit complexity has made possible an alarm function, *stopwatch* functions, calculator operation, storage of telephone numbers, and storage of messages, to name the more *prevalent*. Electronic devices are now made using CMOS circuitry which use very little power, permitting units such as watch circuits to operate for years on a single small battery.

Electronic products have been developed for engineering applications as well as for special commercial products. The availability of small, low-cost electronic components now makes it practical to include electronic systems in many new areas of application, including measuring instruments, and in the mechanical, chemical, civil, and *biomedical* engineering fields, among others. In each of these areas electronic circuitry—both *linear* and *digital* ICs—has been added to provide more automatic operation, digital display, and more central control, and to add additional features not presently available. For example, digital thermometers now provide faster, more easily visible display in a small, compact, portable instrument. Similarly, *instrumentation*, *oscilloscopes*, and measurement equipment now include digital display and control circuitry to provide automatic scale selection and digital read-out.

Probably the greatest advances in the VLSI area have been made in *microprocessors* and in digital memory units. The complexity of microprocessor circuits has increased from handling 4 *bits* at a time to 8 bits, 16 bits, and now 32 bits at a time. Memory capacity has also increased, so that the same-size IC that once held 16 *kilobits* now holds at least 1 *megabit*. This tremendous increase in packaging density has greatly extended the types of problems that can be handled by these small devices. For example, the increased storage capacity has enabled small units to provide voice output.

From *Electricity and Electronics, a Survey*, ed., Dale R, Patrick, Stephen W, Fardo, Prencice Hall, USA, 1990.

New Words

accomplishment /ə'kɔmpliʃmənt/ *n.*	成果；成就
readily /'redili/ *adv.*	容易地；乐意地
integrate /'intigreit/ *v.*	使…结合
circuit /'səːkit/ *n.*	电路
sophisticated /sə'fistikeitid/ *a.*	复杂的；尖端的
circuitry /'səːkitri/ *n.*	电路(总称)
astound /əs'taund/ *v.*	使…大吃一惊
component /kəm'pəunənt/ *n.*	元件；部件
equivalent /i'kwivələnt/ *n.*	相等的；相同的
phonograph /'fəunəgrɑːf/ *n.*	唱机
pickup /'pikʌp/ *n.*	拾音；拾波

transduser /trænz'dju:sə/ *n.* 传感器；换能器
compact /kəm'pækt/ *a.* 紧凑的，密集的
disc /disk/ *n.* 唱片
transition /træn'siʒən/ *n.* 过渡
package /'pækidʒ/ *n.* 集成块
chip /tʃip/ *n.* 芯片
analog /'ænəlɔg/ *n.* 模拟
stopwatch /'stɔpwɔtʃ/ *n.* 秒表
prevalent /'prevələnt/ *a.* 普遍的；流行的
biomedical /baiəu'medikəl/ *a.* 生物医学的
linear /'liniə/ *a.* 线性的
digital /'didʒitəl/ *a.* 数字的
instrumentation /ˌinstrumen'teiʃn/ *n.* 仪表检测；仪表测量
oscilloscope /'ɔsiləskəup/ *n.* 示波器
microprocessor /'maikrə'prəusesə/ *n.* 微处理器
bit /bit/ *n.* 位
kilobit /'kiləubit/ *n.* 千位
megabit /'megəbit/ *n.* 百万位

Reading Comprehension

Choose the best answer for each of the following.

1. Which of the following is the reason that makes the computer possible to be used in personal affairs and business?
   a. The computer works at a fast speed.
   b. The computer has become small.
   c. The computer costs little money.
   d. All of the above.
2. Future accomplishments in the electrical and electronics industry may take aback ______.
   a. today's products
   b. today's engineers
   c. early engineers
   d. sophisticated electronic systems
3. From the second paragraph, we can see that the electronic units will undoubtedly ______.
   a. increase mechanical products
   b. become a standard in making products
   c. turn out to be a standard component of more and more products

d. be substituted by mechanical units

4. Different functional components of a small calculator such as storage stage, counter circuitry, memory circuits and so on may exist ______.
   a. on a tiny chip
   b. on different chips
   c. in the separate packages
   d. in the total circuitry
5. The verbal phrase "referred to as" in the first sentence of the third paragraph can be replaced by ______.
   a. preferred
   b. labeled
   c. reflected
   d. refreshed
6. Besides keeping count of time, the other functions of a watch consist in ______.
   a. a small battery
   b. its new mechanical renovation
   c. its additional complicated circuits
   d. advanced mechanical devices
7. One of the areas has not been mentioned in the passage to use electronic systems. It is ______.
   a. the mechanical field
   b. the biomedical field
   c. the educational field
   d. the chemical field
8. The great increase in packaging density has enabled the small devices to ______.
   a. handle 8 bits
   b. hold 16 kilobits
   c. solve finite problems
   d. possess voice output

II. Reading and Practice

ELECTRICAL AND ELECTRONIC ENGINEERING IN THE FUTURE

So much of the development of science and technology depends on the variables of economic, political, and social developments that precise predictions about future trends in the field of electrical and electronic engineering cannot be made. But it is possible to *discern* certain technological trends which can reasonably be expected to occur.

A major scientific advance such as the development of a comprehensive theory and knowledge of elementary particles, the basic components of all matter and energy, could *profoundly* change the way we live tomorrow. A theory based on knowledge of such strange objects as *pulsars*, stars that emit radio waves in uniform pulses, and *quasars*, strong radio sources and unexplained sources of enormous energy, could alter life in ways we cannot yet forecast.

Electrical and electronic scientists and engineers are engaged in examining and developing these areas. They are not restricted in their exploration to our present knowledge of space or time. With an instrument known as an electron *accelerator*, they *probe* the mysteries of the atomic *nucleus*, and with the radio telescope they study signals from remote regions of outer space. With computers they can store information *indefinitely* and with electronic circuits they can get information in a thousand-billionth of a second.

A major success such as the *harnessing* of *thermonuclear* energy produced through nuclear *fusion* would *radically* affect the development of all branches of engineering. The world would move from a state of energy scarcity to an era of *inexhaustible* energy resources. Given the proper economic and political circumstances, this would cause tremendous growth in science and technology.

However, if this major breakthrough does not occur, the enormous need for new energy resources will continue to grow. With the ever-increasing use of *fossil* fuels, the effort of much of the technological community is already directed toward the discovery of new sources of non-fossil fuels. Solar, *geothermal* (relating to the heat of the earth's *interior*,) tidal, and wind sources of energy are gradually becoming more economically possible. A technological breakthrough in any one of these fields would provide research work for tens of thousands of electrical engineers. New and improved types of cells, batteries, generators, *converters*, power plants, and *transmission* lines would have to be designed, tested, *evaluated*, and built in order to properly use the new source of energy.

In any case, the future of electrical and electronic engineering does not depend solely on the development of new scientific theories or the discovery of new energy sources. These engineers will be engaged in *diverse* technological pursuits such as the following.

Electrical and electronic engineers will be intimately involved in the development of the completely automated industrial factory. It will become possible, with the aid of electronic computers, to produce goods by teams of machines that transfer materials from one to another. In such a factory a product could be manufactured, tested, labeled, packaged, and shipped without being touched by human hands or directed by human intellect.

In the field of transportation, electrical engineers are currently engaged in developing the electric automobile, train, bus, and ship. They are designing new *inertial* guidance systems which would guide rockets and *interplanetary* spaceships by using devices which detect changes in speed and direction and make necessary adjustments automatically.

Fueling aircraft and spacecraft by laser beam is another possibility that will transform future travel. As light energy can be converted into other forms of energy, so could the laser beam be converted to aircraft fuel. Such a breakthrough would greatly reduce the weight of aircraft and thereby increase the probability of *hypersonic* travel—travel at speeds five or more times greater than the speed of sound. Planes could travel at 4,000 to 5,000 miles an hour and at *altitudes* of 150,000 feet.

Society will become more and more computerized, and the electronic engineer will be called upon to design and build ever-smaller computers capable of doing more varied and more complicated tasks. At some time in the future, fully automatic automobiles and homes will be built and directed by computers. Computers that "think," that learn from errors and never make the same mistake twice, that are able to repair themselves and reproduce themselves, may be the reality of tomorrow.

Cybernetics, the science of automatic controls, could eventually produce a race of robots—machines in human shapes that perform human tasks with what parallels human intelligence. Only human *sensitivity*, emotion, and *sexuality* will be missing. The necessary scientific knowledge for building these labor-replacing devices is available to engineers today: computer technology, *microcircuit* technology, control theory, and information theory—a mathematical analysis of the efficiency with which conputers, *telecommunication* channels, and other information-processing systems are employed. The electronic engineer need only translate today's knowledge into tomorrow's machinery.

The exciting field of biomedical engineering offers enormous possibilities. More and more electronic instruments to extend, repair, and improve upon physical life are currently being developed. Lasers are already used to join living *tissues* such as *detached* eye *retinas*; their uses in surgery too *intricate* and delicate for the knife will become *commonplace*. Computers will be developed to *diagnose* and treat disease. Electronic engineers will devise more usable and varied organs and organ *replacements*. There is, theoretically, no limit to the uses of electronics in medicine.

Not only will the new developments make use of the electronic engineer; he or she will develop new electronic products for people to buy. Telephones with picture screens on which the connected parties can see each other and three-*dimensional* television which would completely envelope the viewer could become ordinary household items.

Research and development, or R and D—investigation and experimentation by scientists, engineers, and technicians is not confined to sciences such as physics or radio *astronomy*. Countless engineers will continue to design and improve upon existing *vacuum* tubes, switches, and *electromechanical* devices. Improvements will be made in *anten-*

nae, arrangments of wires and rods which fan out to receive *electromagnetic* waves; *filters*, which block out selected waves or current; transducers, which convert one form of energy to another; and *relays*, which electrically cause switches in a circuit to open and close. These are the basic components of the electronics industry and a vital *segment* of the industries that maintain our economy.

These exciting possibilities indicate a bright future for electrical and electronic engineers. They will play a central role in *formulating*, shaping, and bringing into being the immediate and distant future.

From *Language of Electrical and Electronic Engineering in English*, ed., Engene J, Hall, Regents Publishing Company USA, 1977.

New Words

discern /di'sə:n/ *v.*	看到;辨出
profoundly /prə'faundli/ *adv.*	极度地;极大地
pulsar /'pʌlsɑ:/ *n.*	脉冲星
quasar /'kweizɑ:/ *n.*	类星体
accelerator /æk'seləreitə/ *n.*	加速器
probe /prəub/ *v.*	探索
nucleus /'nju:kliəs/ *n.*	(原子)核
indefinitely /in'definitli/ *adv.*	无限期地
harness /'hɑ:nis/ *v.*	利用
thermonuclear /ˌθə:məu'nju:kliə/ *n.*	热核
fusion /'fju:ʒən/ *n.*	聚变
radically /'rædikəli/ *adv.*	极大地
inexhaustible /ˌinig'zɔ:stəbl/ *a.*	无穷无尽的
fossil /'fɔsl/ *n.*	矿物的
geothermal /ˌdʒiəu'θə:məl/ *a.*	地热的
interior /in'tiəriə/ *n.*	内部
converter /kən'və:tə/ *n.*	换流器
transmission /trænz'miʃən/ *n.*	传输
evaluate /i'væljueit/ *v.*	评价
diverse /dai'və:s/ *a.*	多种多样的
inertial /i'nə:ʃəl/ *a.*	惯性的
interplanetary /ˌintəp'lænitəri/ *a.*	星际间的
hypersonic /'haipə'sɔnik/ *a.*	特超音速的
altitude /'æltitju:d/ *n.*	高度
cybernetics /ˌsaibə'netiks/ *n.*	控制论
sensitivity /ˌsensi'tiviti/	敏感性

sexuality /ˌseksjuˈæliti/ *n.* 性机能
microcircuit /ˈmaikrəuˈsəːkit/ *n.* 微型电路
telecommunication
/ˈteli-kəˌmjuːniˈkeiʃən/ *n.* 电信
tissue /ˈtisjuː/ *n.* 组织
detached /diˈtætʃt/ *a.* 分离的
retina /ˈretinə/ *n.* 视网膜
intricate /ˈintrikit/ *a.* 复杂的
commonplace /ˈkɔmənpleis/ *a.* 平凡的
diagnose /ˈdaiəgnəuz/ *v.* 诊断
replacement /ripˈleismənt/ *n.* 替代(物)
dimensional /ˌdiˈmenʃənl/ *a.* 面的;维的
astronomy /əsˈtrɔnəmi/ *n.* 天文学
vacuum /ˈvækjum/ *a.* 真空的
electromechanical
/iˈlektrəumiˈkænikəl/ *a.* 电机的
antenna /ænˈtenə/*n.* 天线
antennae /ænˈteniː/ (复数)天线
electromagnetic
/iˈlektrəumægˈnetik/ *a.* 电磁的
filter /ˈfiltə/ *n.* ;*v.* 滤波器;滤去
relay /ˈriːlei/ *n.* 继电器
segment /ˈsegmənt/ *n.* 部分;部门
formulate /ˈfɔːmjuleit/ *v.* 阐述

1. **Use of Language**

Exercise A

Complete the following paragraph selected from the reading passage with right words.

Cybernetics, the science of automatic controls, could __(1)__ produce a race of robots—machines in __(2)__ shapes that perform human tasks with what __(3)__ human intelligence. Only human sensitivity, emotion, and __(4)__ will be missing. The necessary scientific knowledge __(5)__ building these labor-replacing devices is available __(6)__ engineers today; computer technology, microcircuit technology, control __(7)__, and information theory—a mathematical analysis of __(8)__ efficiency with which computers, telecommunication channels, and __(9)__ information processing systems are employed. The electronic __(10)__ need only translate today's knowledge into tomorrow's __(11)__.