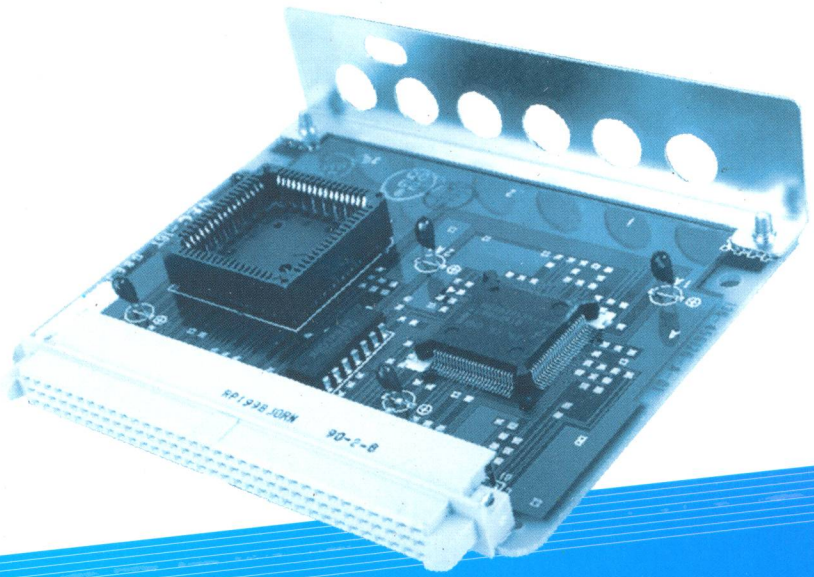
21世纪全国高职高专电子信息系列技能型规划教材



电子信息专业英语

主　编　高金玉

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内 容 简 介

本书为“21 世纪全国高职高专电子信息系列技能型规划教材”之一，以培养学生阅读和理解机电类专业英语的能力为目标，内容丰富，涵盖了电子技术、机电一体化技术、单片机技术、可编程控制器、电气控制技术、现代通信技术等方面的专业英语知识。每篇课文后都配有词汇、短语、注释、课后练习及参考译文，每个单元后配有专业英语的词法、语法及翻译技巧，以便读者学习。

本书旨在扩大学生的专业词汇量，提高学生英文专业文章的阅读能力，同时使学生获得更多机电类专业方面的新知识，并了解新的发展动态。

本书可作为高职高专院校机电类、电子信息类、自动化类专业的专业英语教学用书，也可供相应水平的读者与技术人员参考使用。

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前　言

通过学习专业英语，可以扩大专业词汇量，提高英文专业资料的阅读能力，同时获得更多机电类专业方面的新知识和新的发展动态。

本书为“21世纪全国高职高专电子信息系列技能型规划教材”之一。本书具有如下特点。

(1) 立足于高等职业教育，面向高职高专教育对象，以能力培养为本位，以训练为手段，旨在切实提高读者阅读和理解电子信息类专业英语的能力。每个单元模块目标明确，并将科技英语的词法、语法及阅读翻译技巧贯穿于专业英语的教学中，有针对性地加以训练，使学生掌握阅读技巧，提高阅读科技英语资料的能力。

(2) 在内容安排上，根据高职高专机电类专业所涉及的专业课程分为电子技术基础、自动化技术及应用、通信技术三大部分。本书共12个单元，每个单元3篇课文，前两篇为精读课文，第3篇为阅读材料。每个单元突出一个领域的技术与应用，是机电类专业通用的专业英语教材。

(3) 每篇课文后都提供了课后练习题，具有较强的针对性，有利于检验学生掌握课文的程度，便于教师更好地组织教学活动；每个单元中的阅读材料可作为学生自学内容，学生通过阅读，可以了解更多的专业知识。

(4) 选材新颖，许多内容选自英、美等国外文献原著；点面结合，注重各专业、学科间知识的相关性；选材不仅能体现专业性，还能体现趣味性；贴近实际，选取了大量的新知识和新的应用实例。

(5) 为便于提高学生阅读英文专业资料的能力，本书还系统介绍了专业英语的词法、语法特点与翻译技巧，对学生掌握和理解专业词汇会有很大的帮助。

本书由高金玉担任主编，王维利、王立亚担任副主编，于宏伟、韩学尧、姜明参与编写；由高金玉、王维利、于宏伟、姜明统稿。本书具体编写分工如下：韩学尧编写了第1～3单元；姜明编写了第4单元；王维利和王立亚编写了第5～8单元，并汇总、整理常用专业英语词汇和短语；于宏伟编写了第9～12单元；于宏伟、韩学尧整理编写了专业英语的词法、语法及翻译技巧。

本书在编写时参考了大量的文献资料及一些专业网站，在此对这些文献资料的作者深表谢意，并对各位参与编写工作的老师一并致以诚挚的谢意。

本书建议总课时为72学时，各章节建议课时分配见下表。

章　节	建议课时
Part Ⅰ　Electronics	24
Part Ⅱ　Automatic Control Technology	24
Part Ⅲ　Communications	24

由于编者水平有限，加之时间仓促，书中难免有不足、疏漏之外，敬请广大读者不吝赐教，以便对本书进行进一步修订与完善。

编　者

2010年8月

Contents

Part I
Electronics

Unit One Basic Knowledge of Electronics

【Learning Target】

In this Unit, our target is to train your reading comprehension. Try to grasp the main idea of these passages and learn the speciality vocabularies.

Passage A

Resistors, Capacitors and Inductors

Questions for passage discussion

What is a resistor? And what are the characteristics of a resistor?
What is a capacitor? And what is the capacitance? What can capacitors be applied to?
What can inductors be used to do?

Text

A resistor(Fig. 1.1) is a two-terminal electronic component that produces a voltage across its terminals that is proportional to the electric current through it in accordance with Ohm's Law: $V = IR$.

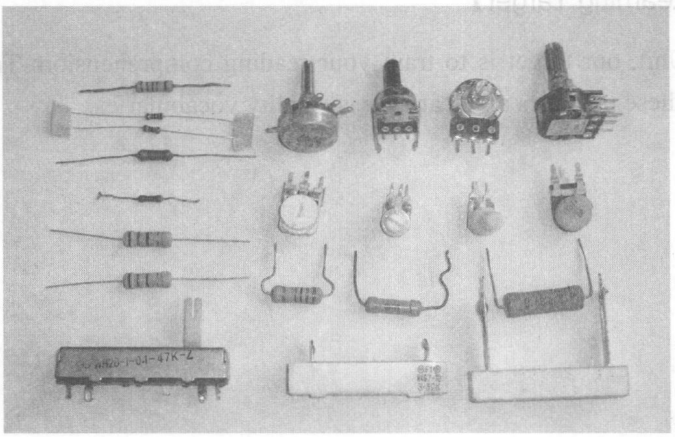

Fig. 1.1 Resistors

Resistors are elements of electrical networks and electronic circuits and are ubiquitous in most electronic equipment. Practical resistors can be made of various compounds and films, as well as resistance wire (wire made of a high-resistivity alloy, such as nickel/chrome). The primary characteristics of a resistor are the resistance, the tolerance, maximum working voltage and the power rating. Other characteristics include temperature coefficient, noise, inductance and critical resistance. The ohm (symbol: Ω) is a unit of electrical resistance. Commonly used in electrical and electronic usage are the kilohm and megohm.

Capacitors(Fig. 1.2) store electric charge. They are used with resistors in timing circuits because it takes time for a capacitor to fill with charge. They are used to smooth DC supplies by acting as a reservoir of charge. They are also used in filter circuits because capacitors easily pass AC (changing) signals but they block DC (constant) signals.

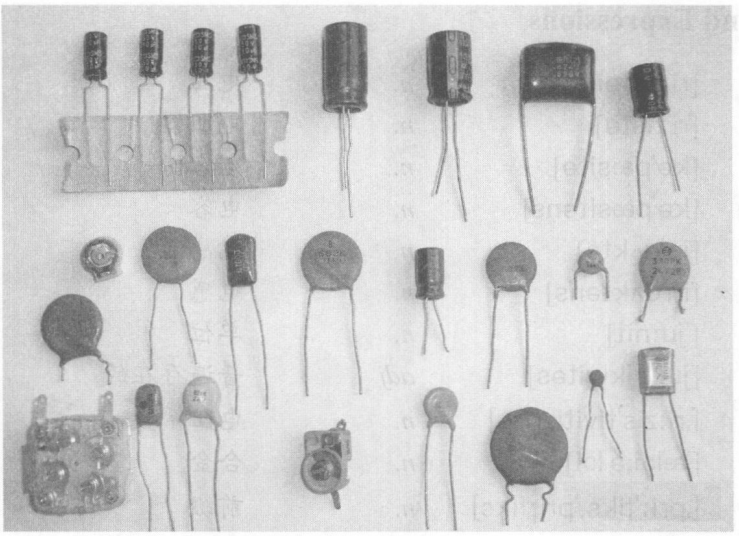

Fig. 1.2 Capacitors

Capacitance is a measure of a capacitor's ability to store charge. A larger capacitance means that more charge can be stored. Capacitance is measured in farads, symbol F. However 1F is very large, so prefixes are used to show the smaller values. Three prefixes are used, μ (micro), n (nano) and p (pico).

An inductor (Fig. 1.3) is formed by winding wire around a suitable mold to form a coil. Its electrical property is called inductance and the unit for it is the henry, symbol H. 1H is very large so mH(milli-henry) and μH(micro-henry) are used, 1000μH = 1mH and 1000mH = 1H. Iron and ferrite cores increase the inductance. Inductors are mainly used in tuned circuits and to block high frequency AC signals. They pass DC easily, but block AC signals, this is the opposite of capacitors. Inductors are rarely found in simple projects, but one exception is the tuning coil of a radio receiver. This is an inductor which you may have to make yourself by neatly winding enamelled copper wire around a ferrite rod.

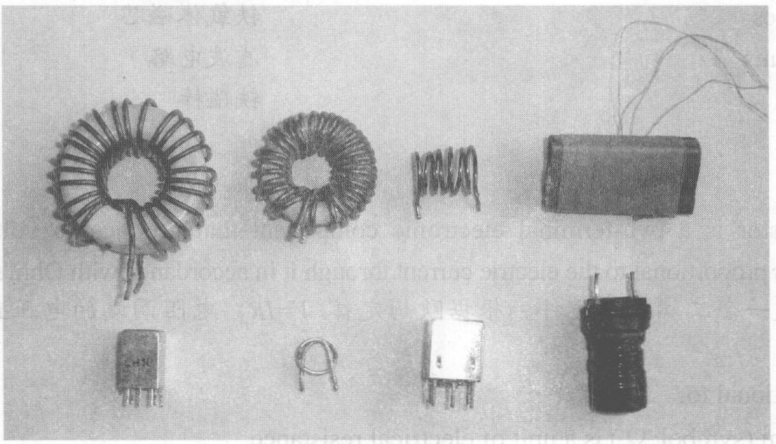

Fig. 1.3 Inductors

New Words and Expressions

resistance	[ri'zistəns]	*n.*	电阻
resistor	[ri'zistə]	*n.*	电阻器
capacitor	[kə'pæsitə]	*n.*	电容器
capacitance	[kə'pæsitəns]	*n.*	电容
inductor	[in'dʌktə]	*n.*	电感器
inductance	[in'dʌktəns]	*n.*	电感
unit	['ju:nit]	*n.*	单位
ubiquitous	[ju:'bikwitəs]	*adj*	普遍存在的
resistivity	[ˌri:zis'tiviti, ri:z-]	*n.*	电阻系数
alloy	['ælɔi,ə'lɔi]	*n.*	合金
prefix	[ˌpri:'fiks,'pri:fiks]	*n.*	前缀
voltage	['vəultidʒ]	*n.*	电压
constant	['kɔnstənt]	*n.*	常数，常量
AC			交流
DC			直流
charge	[tʃɑ:dʒ]	*n.*	电荷
mold	[məuld]	*n.*	模子，模型
coil	[kɔil]	*n.*	线圈
frequency	['frikwənsɪ]	*n.*	频率
Ohm's Law			欧姆定律
electronic circuits			电子电路
timing circuits			定时电路
critical resistance			临界电阻
power rating			额定功率
enamelled copper wire			漆包线
ferrite cores			铁氧体磁芯
filter circuits			滤波电路
ferrite rod			铁磁棒

Notes

1. A resistor is a two-terminal electronic component that produces a voltage across its terminals that is proportional to the electric current through it in accordance with Ohm's Law: $V = IR$.

电阻器是一个二端电子元件。根据欧姆定律 $V=IR$，电阻两端的电压正比于通过它的电流。

be proportional to: 正比于……

2. The ohm (symbol: Ω) is a unit of electrical resistance.

电阻的单位是欧姆。unit，单位

3. They are also used in filter circuits because capacitors easily pass AC (changing) signals but they block DC (constant) signals.

AC (changing) signals 交流信号; DC (constant) signals 直流信号

4. An inductor is formed by winding wire around a suitable mold to form a coil.

be formed by : 由……组成(形成)

Exercises

I. Try to match the following columns.

1. two-terminal component	电子电路
2. Ohm's Law	额定功率
3. electronic circuits	二端元件
4. power rating	欧姆定律
5. critical resistance	滤波电路
6. electric charge	漆包线
7. enamelled copper wire	电荷
8. filter circuits	临界电阻

II. Fill in the blanks in each of the following sentences.

1. _____is proportional to the electric current through the resistor.

2. Practical resistors can be made of various compounds and _____, as well as _____.

3. Capacitance is a measure of a capacitor's ability to store _____.

4. An inductor is formed by winding wire around a suitable _____ to form a _____.

5. Inductors are mainly used in _____ and to block high frequency AC signals.

Passage B

Direct and Alternating Current

Questions for passage discussion

What is direct circuit? What is alternating circuit?

How can we convert alternating current into direct current?

And how can we convert direct current into alternating current?

What can alternating circuit be used to do and what is the advantage of it?

Text

Circuits consisting of just one battery and one load resistance are very simple to analyze, but they are not often found in practical applications. Usually, we find circuits where more than two components are connected together. And there are two basic ways in which to connect more than two circuit components: series and parallel. Series circuit is a circuit in which two or more pieces of apparatus are connected end to end or in tandem where the current is not divided at any point. Parallel circuit, a closed circuit in which the current divides into two or more paths before recombining to complete the circuit, is the opposite of series circuit.

And we know that if two resistors were connected in series, to get the total resistance of two resistors, R1 and R2, you add them together. On the other hand, to find total resistance of two in parallel circuits, you have to add the reciprocals of the resistances and take the reciprocal of the result. Capacitors and inductors in series circuits or in parallel circuits have the similar characters.

It's one of the main classification methods about circuits in electronics. Not by connecting methods of components in circuit , it is well known that electric circuit is usually divided into two classes: direct circuit and alternating circuit, by the signal or current flowing through direct current, abbreviation, DC, is a current that always flows in the same direction (i.e., the polarity never reverses). The current might be constant, as from a battery or a regulated power supply; it might be pulsating, as from an unfiltered rectifier. And these systems are usually called direct current circuit. The first utility systems installed by Edison used DC technology. Not long after Edison installed his direct current system, others realized that the use of an alternating current system had advantages over the DC.

Every time we turn on a television set, a radio, or any of other electrical appliances, we are calling on alternating currents to provide the power to operate them. But, what is the alternating current? Different from direct current moving through a conductor or circuit in one direction only, alternating current, abbreviation, AC, is a current that periodically reverses its direction of flow. As Fig. 1.4 showing, in one cycle, an alternation starts at zero, rises to a maximum positive level at 90 degrees, returns to zero at 180 degrees, rises to a maximum negative level at 270 degrees, and again returns to zero at 360 degrees. The number of such cycles completed per second is termed the AC frequency. In the United States and many other areas of the world, the frequency is 60 hertz or cycles per second. And in our country the current used for the transmission of electrical energy and the operation of common machines has a frequency of 50 hertz.

AC is widely used for the operation of the vast majority of circuits, which can be transmitted over long distances, even without using connecting wires between source and receiver, provided the change rate of current is fast enough, transformed to various voltages and easily to larger or smaller values using a device known as a transformer, but DC cannot. However, in many circuit applications such as general purpose lighting and heating, either AC or DC can be used. We can convert DC to AC by using a DC-AC converter, a circuit that converts a DC input voltage into an AC output voltage, with or without step-up or step-down, and AC to DC by rectification circuit formed by the diode, resistor and capacitor.

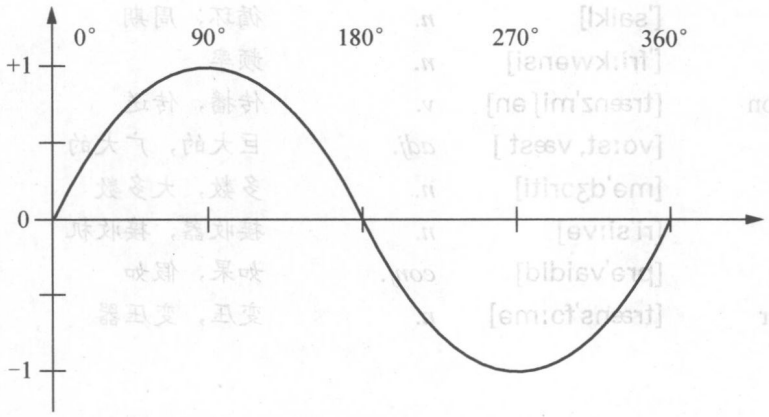

Fig. 1.4 Alternating current

New Words and Expressions

battery	['bætəri]	*n.*	电源
application	[ˌæpli'keiʃən]	*n.*	应用
component	[kəm'pəunənt]	*n.*	器件，元件
series	['siəriz]	*n.*	串联
parallel	['pærəlel]	*n.*	并联
apparatus	[ˌæpə'reitəs]	*n.*	器件，仪器
tandem	['tændəm]	*adv.*	串联式，双人的
divide	[di'vaid]	*v.*	分离，隔开
recombine	[ri:kəm'bain]	*vt.*	合并，汇合
opposite	['ɔpəzit]	*adj.*	相反，不同
reciprocal	[ri'siprəkəl]	*n.*	倒数
classification	[ˌklæsifi'keiʃən]	*n.*	分类，类别
direct	[di'rekt]	*adj.*	直流，直接
alternating current	['kʌrənt]	*n.*	交流，交变 电流
abbreviation	[əˌbri:vi'eiʃən]	*n.*	缩写，简写
polarity	[pəu'læriti]	*n.*	极性
reverse	[ri'və:s]	*v.*	反转，倒相
constant	['kɔnstənt]	*n.*	恒定，不变，常量
regulate	['regjuleit]	*v.*	控制，调节
pulsate	['pʌlseit]	*v.*	波动的，脉动的
unfilter	[ʌn'filtə]	*adj.*	未滤波的
rectifier	['rektifaiə]	*n.*	整流，整流器
utility	[ju(:)"tiliti]	*n.*	应用程序，功用
periodically	[ˌpiərɪ'ɔdikəli]	*adv.*	周期性地

cycle	['saikl]	*n.*	循环，周期
frequency	['fri:kwənsi]	*n.*	频率
transmission	[trænz'miʃən]	*v.*	传播，传送
vast	[vɑ:st, væst]	*adj.*	巨大的，广大的
majority	[mə'dʒɔriti]	*n.*	多数，大多数
receiver	[ri'si:və]	*n.*	接收器，接收机
provided	[prə'vaidid]	*conj.*	如果，假如
transformer	[træns'fɔ:mə]	*n.*	变压，变压器

Notes

1. Series circuit is a circuit in which two or more pieces of apparatus are connected end to end or in tandem where the current is not divided at any point.

end to end: 首尾相连

2. On the other hand, to find total resistance of two in parallel circuits, you add the reciprocals of the resistances and take the reciprocal of the result.

on the other hand: 另一方面

the reciprocal of …: ……的倒数

3. Not by connecting methods of components in circuit, it is well known that electric circuit is usually divided into two classes: direct circuit and alternating circuit, by the signal or current flowing through.

it is well known that: 众所周知

be divided into ... : 被分成……

4. Direct current, abbreviation, DC, is a current that always flows in the same direction (i.e., the polarity never reverses).

in the same direction: 相同的方向

5. Not long after Edison installed his direct current system, others realized that the use of an alternating current system had advantages over the DC.

not long after … : 在……后不久

have an advantage over … : 比……有优势

Exercises

I. Try to match the following columns.

1. step-up	负载
2. step-down	直流电路
3. DC-AC converter	交流电路
4. regulated power	整流电路
5. load resistance	直流-交流转换器
6. series circuit	降压
7. parallel circuit	稳压电源

8. direct circuit 升压
9. alternating circuit 并联电路
10. rectification circuit 串联电路

Ⅱ. Translate the following sentences into Chinese.

1. Circuits consisting of just one battery and one load resistance are very simple to analyze, but they are not often found in practical applications.

2. And there are two basic ways in which to connect more than two circuit components: series and parallel.

3. On the other hand, to find total resistance of two in parallel circuits, you add the reciprocals of the resistances and take the reciprocal of the result.

4. Not by connecting methods of components in circuit, it is well known that electric circuit is usually divided into two classes: direct circuit and alternating circuit, by the signal or current flowing through.

5. Direct current, abbreviation, DC, is a current that always flows in the same direction (i.e., the polarity never reverses).

6. AC is widely used for the operation of the vast majority of circuits., which can be transmitted over long distances, even without using connecting wires between source and receiver , provided the change rate of current is fast enough, transformed to various voltages and easily to larger or smaller values using a device known as a transformer, but DC cannot.

Reading

Integrated Circuits

Questions for passage discussion

What is the integrated circuit? Which components can be included in a integrated circuit?
Which systems can IC be applied to?
What benefits using the IC can bring?

Text

In 1958, an extremely important device was invented independently by Jack Kilby, working at Texas Instruments, and by Noyce and Moore at Fairchild Semiconductor: the integrated circuit (IC, see Fig. 1.5), which combines BJTs, MOSFETs, resistors, and capacitors, as well as their interconnections, into a functional circuit on a single chip.

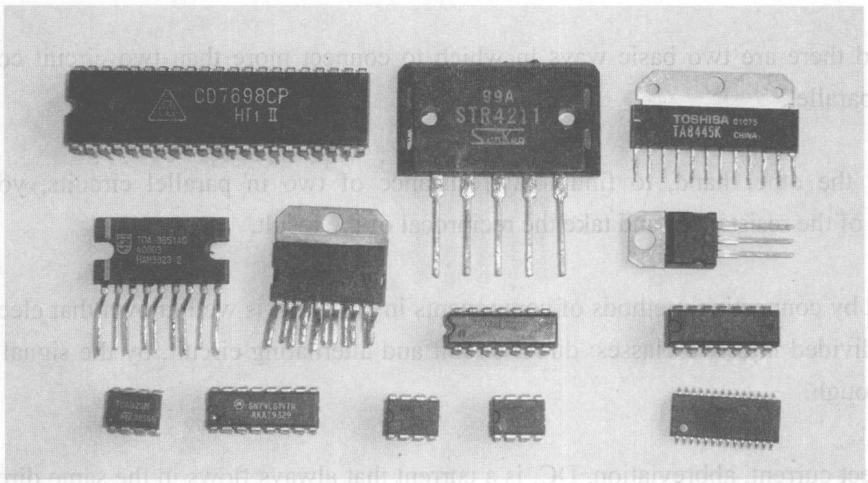

Fig. 1.5 Integrated circuits

Integrated circuits are usually called ICs or chips. They are complex circuits which are combination of a few interconnected circuit elements such as transistors, diodes, capacitors and resistors produced in a single manufacturing process on one and the same bearing structure, called the substrate, and intended to perform a definite function involved in converting information.

In the early 1960s, ICs contained perhaps 100 devices, and the smallest features were about 25 micrometers (μm). Realizing that the cost of complex electronic systems could be reduced dramatically by the use of more complex ICs, process engineers have worked diligently to increase the practical dimensions of chips and to reduce the sizes of the devices. Today's most advanced ICs contain in excess of 10 million devices and have features as small as 0.25 μm (A human hair is about 25 μm in diameter). The trend toward smaller devices is expected to continue. In addition to the increased number of devices, the reduction in the size of features results in higher performance (i.e., faster) digital circuits. Thus, we can anticipate even greater advances in the field of electronics.

The manufacturing techniques used for ICs can be divided into two main types: film technique and monolithic technique. And ICs can be classified by function into two: circuits to be applied in digital systems and those to be applied in linear systems. The digital ICs are employed mostly in computers, electronic counters, frequency synthesizers and digital instruments. And the analog or linear ICs operate over a continuous range, and include such devices as operational amplifiers.

These advances will result from teamwork by physical electronics scientists, process engineers, circuit designers, and systems designers. Although this book primarily considers circuit design, it provides useful background information for all engineers in the electronics industry.

The invention of IC is a great revolution in the electronic industry. Sharp size, weight reductions are possible with these techniques; and more importantly, high reliability, excellent functional performance, low cost and low power dissipation can be achieved. ICs are widely used in the electronic industry.

Exercises

Ⅰ. Answer the following questions.

1. When did the integrated circuits be invented?

2. How many methods did manufacturing techniques use for ICs?

Ⅱ. Translate the following sentences into Chinese.

1. In the early 1960s, ICs contained perhaps 100 devices, and the smallest features were about 25 micrometers (μm).

2. In addition to the increased number of devices, the reduction in the size of features results in higher performance (i.e., faster) digital circuits.

3. The manufacturing techniques used for ICs can be divided into two main types: film technique and monolithic technique.

4. ICs can be classified by function into two: circuits to be applied in digital systems and those to be applied in linear systems.

Translating Skills

专业英语的语法特点

专业英语作为一种揭示客观外部世界的本质和规律的信息传递工具，具有准确、简明扼要和客观正式等特点。科技文章文体的特点是：语言简练、结构严谨、逻辑性强、原理概念清楚、重点突出、段落章节分明。具体而言，专业英语在用词、语法结构及表达方式上有其自身的特点，下面分别予以介绍。

1. 词汇

(1) 大量使用专业词汇和半专业词汇，例如，calculus(微积分学)、bandwidth(带宽)、flip-flop(触发器)等是专业词汇，而 series、work 等是半专业词汇，在不同的学科领域含义有所不同，例如 series 可翻译成“级数”(数学)，也可翻译成“串联”(电学)。

(2) 大量使用词缀和词根，例如，外语教学与研究出版社出版的《英汉双解信息技术词典》中以 tele-构成的单词有 30 个。

(3) 较多使用缩略词，常见的如 PCM(Pulse-Coded Modulation，脉冲编码调制)、CDMA(Code Division Multiple Access，码分多址)、DSP(Digital Signal Processing，数字信号处理)等。

(4) 词性变换多，例如 sound 一词作名词时，常译为“声音、语音”，作动词时，常译为“听起来”，作形容词时，以“合理的，健全的”较为多见。

2. 词法

(1) 常用一般现在时态，陈述真理或客观规律。

【例 1】 Vector and matrix techniques provide the framework for much of the developments in modem engineering.

矢量和矩阵方法为现代工程学的发展提供了框架。

(2) 广泛使用被动语态，强调所论述的客观事物。

【例 2】 Chapters 7 and 8 are devoted to the calculus of functions of one variable and, recognizing again the mixed background knowledge in mathematics of the students, the basic ideas and techniques of differentiation and integration are reviewed in Chapter 7.

第 7 章和第 8 章讨论单变量函数的微积分，考虑到学生数学基础参差不齐，第 7 章复习微分与积分的基本概念与方法。

(3) 普遍使用名词词组及名词化结构，强调客观存在的事实而非某一行为，故常使用表示动作或状态的抽象名词。

【例 3】 Television is the transmission and reception of images of moving objects by radio waves.

电视通过无线电波发射和接收移动物体的图像。

(4) 使用非限定动词，使句子简明。

【例 4】 The calculus, aided by analytic geometry, proved to be astonishingly powerful and capable of attacking hosts of problems that had been baffling and quite unassailable in earlier days.

微积分辅以解析几何是一个非常强大的工具，能够解决许多困扰人们已久甚至以前认为无法解决的问题。

3. 句法

(1) 较常使用“无生命主语+及物动词+宾语(+宾语补足语)”句型。

【例 5】 Chapter 6 provides a basic introduction to the ideas of sequences, series and limits.

第 6 章介绍序列、级数及极限等基本概念。

(2) 常用 it 作形式主语或形式宾语。