新世纪电子信息课程系列规划教材

科技英语（电类）

KEJI YINGYU DIANLEI

主　编　鲍玉军　俞伟钧

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主　编　鲍玉军　俞伟钧
副主编　王贤君　徐红丽　彭　颖
　　江　来　魏　娜

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内 容 提 要

根据理工类本科生考研和掌握专业英语的需要，《科技英语》共分为两部分，第一部分为“精读”，共包含22个单元，涉及电力、机械、数控、电子技术、信号处理、现代通信、传感器、自动化等多学科知识，在每一个单元中的每篇课文后均安排了生词介绍、常见的语法知识和适量的课后习题。第二部分为“专业阅读材料”，安排了一些专业相关英文材料。

本书编写力求反映应用型本科的要求和理工类专业的教学特点，内容由浅入深，循序渐进，通俗易懂，基本概念和基本知识准确清晰，注重将英语和专业知识有机结合起来，并且特别注意以形象直观的形式来配合文字表述，重点突出。

本书可适应不同层次的读者选用，既可用作高等学校理工类本科教材，也适用于理工类学生考研参考、阅读。

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前　言

根据2003年1月教育部组织的全国高等学校教学研究中心在黑龙江工程学院召开的“21世纪中国高等学校应用型人才培养体系的创新与实践”课题审定会的有关精神，在原高等学校通用的科技英语的基础上，根据理工类应用型本科专业的特点，我们编写了科技英语的教材。《科技英语》共分为两部分，第一部分为“精读”，共包含22个单元，涉及电力、机械、数控、电子技术、信号处理、现代通信、传感器、自动化等多学科知识，在每一个单元中的每篇课文后均安排了生词介绍、常见的语法知识和适量的课后习题。第二部分为“专业阅读材料”，安排了一些专业相关英文材料。

为了让读者能全面的、系统的掌握科技英语的知识，达到教育部对应用型本科的要求，根据应用型本科的特点，本书在编写过程中，力求由浅入深，循序渐进，通俗易懂，基本概念和基本知识准确清晰，科技英语知识的说明简明扼要，注重将科技英语知识与实际应用有机结合起来。特别注意以形象直观的操作形式来配合文字表述，重点突出，以帮助读者掌握科技英语关键内容并全面理解本书内容。

本书由鲍玉军、俞伟钧任主编；王贤君、徐红丽、彭颖、江来、魏娜任副主编，其中Part Ⅰ部分的Unit One ~ Unit Three由江来编写、Unit Four ~ Unit Twelve由鲍玉军编写、Unit Thirteen ~ Unit Sixteen由魏娜编写，Unit Seventeen、Unit Eighteen由俞伟钧编写、Unit Nineteen由徐丽编写、Unit Twenty、Unit Twenty-One由王贤君编写、Twenty-Two由彭颖编写，Part Ⅱ部分全部由鲍玉军编写。本书由鲍玉军统稿，并由钱显毅主审。

为了方便教师教学和与作者交流，本书作者将向该教材的教学单位提供PPT及相关教学资料，联系方式：baoyj@czu.cn。

由于作者水平有限，书中难免有错误或不足之处，敬请广大读者批评指正。

编者

2008年8月

目　录

第一部分　精读

Unit 1

Text A

Voltage, Resistance and Current

Electricity is the main power used in industry. The engineering and technical personnel working in electronics have relations with voltage, resistance and current every day.

Voltage is the potential difference in an electric circuit[1]. The opposition given by a conductor or an insulator to the flow of electrons is called resistance.

There are two kinds of current: direct current (DC) and alternating current (AC). A direct current is a current flowing in a conductor always in one direction. An alternating current is a current periodically changing its direction of flow.

The electric current transmitted through electric power lines is alternating current. This is because AC is easy to control and more economical when we transmit it over long distances[2].

Measuring with an ammeter and a voltmeter, and multiplying the amperes by the volts[3], we can get the power expended in a circuit. This is the most commonly used method when we measure direct current. With[4] alternating current, being unable to find the power expended in terms of the product of the amperes and volts[5], we have to use an instrument called "wattmeter".

From Ohm's Law we know that the current in an electric circuit is equal to the voltage divided by the resistance[6]. In other words, we get the voltage when multiplying the current by the resistance.

Words and Phrases

1. engineering [ˌendʒi'niəriŋ] *n.* 工程
2. technical ['teknikəl] *adj.* 技术的，技术上的，技巧方面的
3. electronics [ilek'trɔniks] *n.* 电子学
4. relation [ri'leiʃən] *n.* 关系，联系
5. have relations with 与……打交道；与……有关系
6. potential difference 位差，势差
7. insulator ['insjuleitə] *n.* 绝缘体，绝热器
8. direct current (DC) 直流电

9. alternating current (AC) 交流电

10. periodically [ˌpiəri'ɔdikəli] *adv.* 周期性地

11. electric power lines 电力线,输电线

12. economical [ˌi:kə'nɔmikəl] *adj.* 节约的, 经济的

13. over long distance 越过很远的距离。over 作介词时可表示"越过;在……上方;与……相比;对于……;在……范围内"等词义,可根据具体情况选择其确切的含义。

14. ammeter ['æmitə] *n.* 安培表,电流表

15. voltmeter ['vəultmi:tə] *n.* 伏特表,电压表

16. expend [iks'pend] *vt.* 花费, 消耗, 支出

17. in terms of 根据,按照

18. wattmeter ['wɔtmi:tə] *n.* 电表,瓦特计,功率表

19. Ohm's Law 欧姆定律

Notes to the Text

[1] Voltage is the potential difference in an electric circuit. 电压为电路中的电位差。

[2] This is because AC is easy to control and more economical when we transmit it over long distances. 这是因为交流电在进行长距离的传输时不仅能很容易地得到控制,而且也很经济。

[3] 这是由"measuring"和"multiplying"引出的两个分词短语位于句子主语前作状语,表示条件。其中"by the volts"是修饰"multiplying"的,它在这后一个分词短语中作状语。

[4] 当"with"处于句子开头时,在科技英语中有多种含义,要根据具体的情况进行选择。这里表示"对于……来说"。

[5] "being unable to find the power expended in terms of the product of the amperes and volts"在此作原因状语。其中"expended"为单个过去分词作后置定语,修饰"the power","in terms of"是修饰"to find"的,而不是修饰"expended"的。

[6] "From Ohm's Law we know that the current in an electric circuit is equal to the voltage divided by the resistance." 从欧姆定律得知,电路中的电流等于电压除以电阻。其中"divided by the resistance"从语法角度来看是修饰"the voltage"的后置定语,但在翻译为中文时要按词序进行顺序翻译,即"除以电阻",而不能翻译为"被电阻除的(电压)"。

Text B

Kirchhoff's Current Law (KCL) and Kirchhoff's Voltage Law (KVL)

Kirchhoff's Current Law (KCL)

It is a consequence of the work of the German physicist (1824—1887) that enables us to analyze an interconnection of any number of elements (voltage sources, current sources, and resistors), as well as other electronic devices[1]. We will refer to any such interconnection as a circuit or a network.

For a given circuit, a connection of two or more elements shall be called a node. We now present the first of Kirchhoff's two laws, his current law (KCL), which is essentially the law of

conservation of electric charge[2]:

At any node of a circuit, at every instant of time, the sum of the currents into the node is equal to the sum of the currents out of node.

An alternative, but equivalent, form of KCL can be obtained by considering currents directed into a node to be positive in sense and currents directed out of a node to be negative in sense[3]. Under this circumstance, the alternative form of KCL can be stated as follows:

At any node of a circuit, the currents algebraically sum to zero.

Kirchhoff's Voltage Law (KVL)

We now present the second of Kirchhoff's laws, the voltage law. To do this, we must introduce the concept of a "loop". Starting at any node n in a circuit, we form a loop by traversing through elements and returning to the starting node n, and never encountering any other node more than once. Kirchhoff's voltage law (KVL) is:

In traversing any loop in any circuit, at every instant of time, the sum of the voltages having one polarity equals the sum of the voltages having the opposite polarity[4].

An alternative statement of KVL can be obtained by considering voltages across elements that are traversed from plus to minus to be positive in sense and voltages across elements that are traversed from minus to plus to be negative in sense (or vice versa). Under this circumstance, KVL has the following alternative form.

Around any loop in a circuit, the voltages algebraically sum to zero.

Words and Phrases

1. consequence [ˈkɔnsikwəns] *n.* 结果,[逻]推理,推论,因果关系
2. voltage sources 电压源
3. current sources 电流源
4. refer to 查阅,提到,谈到,打听
5. node [nəud] *n.* 节点
6. essentially [iˈsenʃəli] *adv.* 本质上,本来
7. conservation [ˌkɔnsə(:)ˈveiʃən] *n.* 保存,保持,守恒
8. electric charge 电荷
9. alternative [ɔ:lˈtə:nətiv] *n.* 二中择一,可供选择的办法、事物 *adj.* 选择性的,二中择一的
10. equivalent [iˈkwivələnt] *adj.* 相等的,相当的,同意义的 *n.* 等价物,相等物
11. loop [lu:p] *n.* 回路
12. traversing *vbl.* 穿越,通过
13. polarity [pəuˈlæriti] *n.* 极性
14. vice versa 反之亦然

Notes to the Text

[1] It is a consequence of the work of the German physicist (1824—1887) that enables us

to analyze an interconnection of any number of elements (voltage sources, current sources, and resistors), as well as other electronic devices. 德国物理学家 Gustav Kirchhoff(1824—1887)得出了基尔霍夫定律,这使得我们可以用之来分析由任何电路元件(电压源,电流源和电阻)以及其他电子器件相互连接所构成的电路。"as well as"为副词,意思是"也,又",其扩充作用。

[2] We now present the first of Kirchhoff's two laws, his current law (KCL), which is essentially the law of conservation of electric charge. 句中的"which..."定语从句用来修饰 KCL。整个句子的意思为:现在我们展示基尔霍夫定律中的第一个定律,基尔霍夫电流定律,它是根据电荷守恒的定理给出的。

[3] An alternative, but equivalent, form of KCL can be obtained by considering currents directed into a node to be positive in sense and currents directed out of a node to be negative in sense. 如果考虑电流的方向,取流入节点为正,流出节点为负,则基尔霍夫电流定律也可以表述为另一形式。

[4] In traversing any loop in any circuit, at every instant of time, the sum of the voltages having one polarity equals the sum of the voltages having the opposite polarity. 沿着电路的任一闭合回路,在任一瞬间的正电压均等于负电压之和。

Grammar

动词不定式(一)

一、非限定动词概述

1. 非限定动词的含义

非限定动词(non-finite verb)是动词的非谓语形式。限定动词(finite verb)在句子中用作谓语,受主语的人称和数的限定,所以叫限定动词。而非限定动词则不能在句子中单独用作谓语,但是可以用作其他句子成分,所以这类动词不受主语的人称和数的限定,故称为非限定动词。

这里所说的限定动词和非限定动词并不是两种不同的动词,而是同一动词的两种不同的形式。

2. 非限定动词的种类

非限定动词主要有三种,即不定式、动名词和分词(包括现在分词和过去分词),其中动名词和现在分词形式相同。

3. 非限定动词的主要语法特征

非限定动词的主要语法特征在于它具有双重性质,即它既具有动词的性质,又具有非动词的性质。具体表现在下述几个方面:

(1) 有时态(仅有有限几种)和语态(主动和被动)的变化。

(2) 可带有自己的宾语、状语、补足语等,从而构成各自的一个整体,此时就分别称为动词不定式短语、分词短语和动名词短语。所以在分析非限定动词在句子中语法功能时,应把各自的短语作为一个整体来对待。

二、动词不定式(一)

不定式主要有两种形式,一是带 to 的不定式(to-infinitive),一是不带 to 的不定式(bare

infinitive)。后者主要由动词原形构成。

不定式有时式和语态的形式变化。举例如下：

	主动语态	被动语态
一般式	to write	to be written
进行式	to be writing	
完成式	to have written	to have been written

注：被动语态仅限于及物动词

其中在科技文献中最常用的是一般式的“主动语态”和“被动语态”两种形式。通常若与不定式发生关系的那个名词是不定式表示的动作的承受者时，则不定式一般要用被动形式，否则多用主动形式。这两种形式均是要求熟练掌握的。

需要注意的是，这里的“to”是动词不定式的标志，其本身没有任何意义，它和介词“to”的形式相同，但是意义和功能不同。不定式符号“to”置于动词之前，表示动词的不定式形式；而介词“to”置于名词或名词短语之前，构成介词短语。如：

In a radio receiver, some power is converted to sound waves. 在无线电接收机中，部分功率转换为了声波。

（因为“sound waves”为名词短语，所以句子中的“to”为介词。）

Insulators may be used between conductors in order to prevent the flow of electric current between them. 绝缘体可被用在导体之间以防止电流在它们之间流动。

（这里的“prevent”为动词，所以“to”为动词不定式的标志。）

不定式的一般式可以构成短语，相当于名词短语，在句子中可用作主语、表语、补语、宾语、定语、状语等6种句子成分。这里先介绍动词不定式作主语和状语的情况。

1. 作主语

（1）动词不定式作主语时表示的是一件事，故句子的谓语必定为单数第三人称形式。

To choose time is to save time. 选择时间等于节约时间。

（注意到是“is”，为单数形式。）

To construct such inductors（电感）requires many turns of wire and iron cores（铁芯）. 制作这样的电感需要许多线匝和铁芯。

（2）在有些情况下，可以在句子主语的位置上放一个“形式主语”it，而把真正的句子主语（即动词不定式短语）放在句子的最后。这里的“it”无任何含义，在翻译时不予译出。

It is necessary *to apply theory to practice*. 将理论应用于实践是非常必要的。

（3）动词不定式作主语时可用形式主语 it 的句型主要有下述两种：

It + 连系动词 + 表语 + 主语（不定式短语）

It + 谓语（主要是 take）+ 宾语 + 主语（不定式短语）

It *is* now possible to convert sunlight directly into electricity. 现在能够把太阳能直接转换为电。

It *is not* an easy job to operate this machine. 操作这台机器可不是件容易的事情。

It *will take* us a lot of time to solve this equation. 这个方程的求解将要花费我们很多

时间。

It *requires* a strong field to magnetize these materials. 需要很强的磁场方能使这些物质磁化。

2. 作状语

通常在科技文献中,动词不定式作状语主要有下述几种情况。

(1) 不定式作状语,用于表示目的,通常译为"为了,要"。

In those days, *to make a call*, you had to wind a handle at the side of your telephone. 那时,为了打一个电话,你得摇动你电话机旁的手柄。

To send radio waves, it is necessary to generate high frequency oscillations. 为了发射无线电波,就必须产生高频振荡。

(2) 不定式在句尾,表示目的(译为"来"、"以便于")或者结果(译为"从而"、"以至于")。

Most elements are combined with others *to form compounds*. 大多数元素相互化合从而形成了各种化合物。(表示"结果")

Electricity can be used *to run machines*. 电可以用来启动机器。(表示"目的")

(3) 构成一些固定词组或搭配,如"in order to"、"so as to"等,这种形式的不定式比较常见,需要读者在平时记忆一些常用的词组。

In order to become familiar with such a system, it is necessary first to know about amplifiers and oscillators. 为了熟悉这种系统,必须先要了解放大器和振荡器。

If a current flows in a wire, an electric field *is able to* produce a magnetic field. 如果电流在导线中流动,则电厂能够产生磁场。

Exercises

1. 判别下述句子中的"to"是介词还是动词不定式的标志。

(1) The sun is very important to us.

(2) The longer the wire, the greater the resistance to the electrons.

(3) The resistance of a given section of an electric circuit is equal to the ratio of its voltage to the current through this section of the circuit.

(4) Edison decided to use carbon because it does not melt.

2. 标出下面句中的不定式或者不定式短语,说明其在句子中的语法作用,并将句子翻译为中文。

(1) We shall build more power stations to meet to the needs of industry.

(2) To understand the concept of a limit, we first consider the continuity of a function.

(3) It is important to keep in mind the directional character of momentum.

(4) Is it necessary to keep the brushes in water?

(5) He left college to be an engineer in the big company.

(6) We'll hold a meeting in order to explain the program.

(7) The manufacturer of integrated circuits has become so advanced as to incorporate thousands of active components in volumes of a fraction of an inch.

(8) The fastest molecules have enough energy to escape through the liquid surface despite the attractive forces of the other molecules.

(9) Whenever a force acts so as to produce motion in a body, the force acts during a displacement of the body.

3. 将下列短语翻译为英文。

前向压降	断路器	电力系统
模拟电子技术	数字电子技术	逻辑图
无功补偿	无功(功率)	功率因数
直流-交流变换器		

4. 将下列短语翻译为中文。

(1) falling edge

(2) shunt capacitor

(3) schematic diagram

(4) reactive power compensation

(5) power factor Absorber Circuit

(6) Asynchronous Modulation

(7) Conduction Angle

(8) Current Reversible Chopper

(9) relative stability

(10) abundance sensitivity

(11) piezoelectric effect

(12) output impedance

5. 翻译下列句子。

(1) A hardware debugging tool that allows you to view the voltage on one or more electrical lines. For example, you might use an oscilloscope to determine if a particular interrupt is currently asserted.

(2) A piece of silicon containing a general-purpose CPU. The most common examples are Intel's 80X86 and Motorola's 680X0 families.

(3) The electronic technology will provide a sound educational foundation to enable graduates to follow a career in electrical engineering.

(4) A table or diagram containing the name and address range of each peripheral addressable by the processor within the I/O space. I/O maps are a helpful aid in getting to know the target.

6. 阅读下列短文并翻译。

(1) The sinusoid is an extremely important and ubiquitous function. To begin with the shape of ordinary household voltage is sinusoidal, consumer radio transmissions are either amplitude modulation (AM), in which the amplitude of a sinusoid is changed or modulated according some information signal, or frequency modulation (FM), in which the frequency of a sinusoid is modulated.

(2) By an electric circuit or network we mean a collection of electrical devices (for example, voltage and current sources, resistors, inductors, capacitors, transformers, amplifiers, and transistors) that are interconnected in some manner. The various uses of such circuits, though important, is not the major concern of this text. Instead, our prime interest will be with the process of determining the behavior of a given circuit — which is referred to as analysis.

Reading Material:

Superheterodyne Receiver

The purpose of a receiver is to select a desired group of frequencies form one transmitter, get rid of all unwanted signals and noise, and then demodulate the signal to obtain the modulating information. The better the receiver does its job, the closer the demodulated signal will resemble the original signal from the transmitter. Regardless of the type of demodulation required, the main functions performed by a receiver are filtering and amplifying. The superheterodyne receiver is the logical choice for the job.

Since it is easier to design narrow-band, steep-skirt filters and obtain high gains at lower frequencies, the "superhet" receiver is an efficient design. All incoming signals are mixed with the output of a local oscillator and the difference frequency is selected and amplified by the intermediate frequency amplifiers. The big benefit is that these amplifiers remain at a fixed frequency and only the RF amplifier and local oscillator need be tunable. Fig. 1. is a block diagram of a typical superheterodyne receiver. One further benefit is the fact that the gain is concentrated at two or sometimes three different frequencies. This reduces the gain required at any one frequency and leads to more stable amplifiers. When over 120dB of RF gain is involved, every little bit helps.

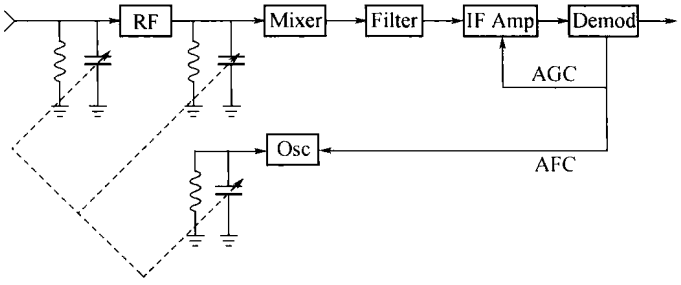

Fig. 1-1 Block diagram of a superheterodyne receiver

The function of each item in Fig. 1-1 can be explained as follows:

1. RF amplifier

It should have just enough gain, usually about 10 dB, to establish the overall noise figure of the receiver. The tuned circuits at the input and output need only be selective enough to reject image signals and other spurious signals that could intermodulate and appear at the intermediate frequency. Some AGC may be needed to prevent overloading on strong signals. The RF amplifier

may also be called on to suppress any tendency for the local oscillator to radiate out to the antenna and interfere with other listeners.

2. Mixer and local oscillator

The mixer has two inputs, one from the RF amplifier and one from the local oscillator. The nonlinearities of the mixer will create numerous intermodulation products, and one of these, the sum or difference frequency, will occur at the IF frequency. Usually, there will be a second frequency, the image, that can also mix with the oscillator frequency and produce an output at the IF. Depending on the type of mixer used, conversion gains from − 10 dB to + 30 dB are common. The local oscillator must be tunable, yet have a low drift rate and relatively low sideband noise, since this could increase the noise level of the receiver.

3. IF filters and amplifiers

This section establishes the overall bandwidth and adjacent channel selectivity of the receiver. The bulk of the receiver's gain will be concentrated here and some type of automatic gain control will be included to adjust for variations in received signal strength. The IF is usually at a lower frequency than the RF, but, in some special cases, the IF may be higher to reduce spurious intermodulation and image problems.

4. Demodulators

For each type of modulation used (i. e., AM, FM, SSB, PM), a number of different circuits exist. Some will have gain, others a loss. Some will require a reference input (i. e., SSB and phase modulation), others won't. The demodulation may also be required to produce outputs to AGC or AFC circuits. The recovered audio level (or video, etc.) will determine the amount of gain required in the following audio or video amplifiers.

1. superheterodyne [ˈsjuːpəˈhetərədain] *adj.* 超外差的
2. intermediate frequency amplifier 中频放大器
3. RF(Radio Frequency) 无线电频率
4. AGC(Automatic Gain Control) 自动增益控制
5. numerous [ˈnjuːmərəs] *adj.* 众多的,许多的
6. intermodulation products 互调分量
7. adjacent [əˈdʒeisənt] *adj.* 邻近的,接近的
8. reference input 基准输入
9. demodulation [ˈdiːˌmɔdjuːˈleiʃən] *n.* 解调,检波
10. AFC(Automatic Frequency Control) 自动频率控制