面向21世纪高等学校精品规划教材
电子信息类

Specialized English on Electronics and Communication Technology

电子与通信专业英语

主 编 王 琳 夏 怡

北京理工大学出版社
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内容简介

本书由电子技术基础篇，仪器仪表的使用篇，通信篇和计算机与网络篇四部分组成，共计23个单元。电子技术基础篇主要包括电路理论的基本概念，电路的组成元件及符号，二极管，晶体管，放大器，运放，集成电路，逻辑电路等；仪器仪表的使用篇主要包括安培表，电压表，欧姆表，万用表，示波器，信号发生器等仪器仪表的使用；通信篇主要包括通信的基本知识，光纤通信，移动通信，宽带通信和异步传输模式等；计算机与网络篇主要包括计算机的配置和硬件，操作系统，网络，因特网，计算机安全等。本书所有原文均精心挑选自国外相关专业的网站和教材，具有专业性和实用性强，难度适宜等特点，有助于培养学生阅读电子和通信类英文资料的能力。为了便于学生自学，所有课文都附有译文。

本书可作为电子信息工程专业和通信工程专业等相关专业的教材，也可供高等职业学校相关专业高年级学生使用和相关专业英语爱好者学习参考。

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出版说明

电子信息技术的发展水平是衡量一个国家现代化水平和综合国力的重要标志，是我国今后20年高科技发展的重点。目前，随着我国电子信息技术及理论研究的快速发展，电子信息技术的各个领域急需大量的应用型工程技术人才。他们既掌握着比较丰富的基础理论知识，又具有比较强的动手能力和一定的专业实践经验，能够在实际工作中比较好地分析问题、解决问题；有较高的综合素质，能够在基层一线对自己所从事的工作和工程实际问题进行研究、探索，能够组织工程项目的实施。

近年来新建本科院校大都以应用型为办学定位，形成了一批占全国本科高校总数近30%的、与传统本科院校不同的应用型本科院校。教材是教学的主要依据，也是教学改革的重要组成部分。教学改革的种种设想和试验，大多要通过教材建设来具体体现；教材建设反过来又推动和促进教学改革。面对高等教育对象的扩展、教学模式的变革、教材内容需求的变化，为了更好地适应当前我国高等教育这种发展的需要，满足我国高校对电子信息类应用型人才培养的各种要求，北京理工大学出版社组织知名专家、学者，以培养应用型人才为主题进行深入的研讨，确立了电子信息类应用型本科教材的出版规划。

本套教材在规划过程中体现了如下一些基本原则和特点：

（1）定位明确。针对应用型本科“理论基础扎实，专业知识面广，实践能力强，综合素质高，并有较强的科技运用、推广、转换能力”的特点，在选择教材内容和确立编写体系时注意体现素质教育、创新能力与实践能力的培养，为学生知识、能力、素质协调发展创造条件。

（2）注重培养学生职业能力。电子信息类专业学生要能紧跟电子信息产业的迅

速发展，要有较强的适应工作的能力，具备使用先进应用软件的能力，在此套教材中强调培养学生利用诸如 protel、maxplusII、multisim、matlab 等工具软件进行电路设计和仿真调试的能力。

（3）体系完整。此套教材包括了电子信息工程和通信工程的专业基础课和部分专业选修课。

（4）保证质量。本套教材大多是在已经在学生中用过几轮并且经实际验证比较优秀的课程讲义的基础上形成的。在教材出版后我们将选择并安排一部分比较好的优秀教材修订再版，逐步形成精品教材。

（5）提供教学软件包。可在北京理工大学出版社网站 www. bitpress. com. cn 下载。

本套教材可作为应用型本科院校电子信息工程、通信工程等专业的课程教学用书，也可以作为电子信息技术的技能培训用书。

前　言

随着新技术革命的发展及经济全球化的到来，社会对专业人才的外语能力要求越来越高。理工科的学生除了应具有一定的听说读写能力外，还应掌握一定的本专业的基本词汇，具有基本的阅读本专业外文资料和进行专业交流的能力。为了更好地培养学生的专业外语能力，针对电子信息工程专业和通信工程专业的培养目标，我们编写了这本《电子与通信专业英语》。

本书由电子技术基础篇，仪器仪表的使用篇，通信篇和计算机与网络篇四部分组成，共计23个单元。电子技术基础篇主要包括电路理论的基本概念，电路的组成元件及符号，二极管，晶体管，放大器，运放，集成电路，逻辑电路等；仪器仪表的使用篇主要包括安培表，电压表，欧姆表，万用表，示波器，信号发生器等仪器仪表的使用；通信篇主要包括通信的基本知识，光纤通信，移动通信，宽带通信和异步传输模式等；计算机与网络篇主要包括计算机的配置和硬件，操作系统，网络，因特网，计算机安全等。本书所有原文均精心挑选自国外相关专业的网站和教材，具有专业性和实用性强，难度适宜等特点，有助于培养学生阅读电子和通信类英文资料的能力。为了便于学生自学，所有课文都附有译文。

本书可作为电子信息工程专业和通信工程专业等相关专业的教材，也可供高等职业学校相关专业高年级学生使用和相关专业英语爱好者学习参考。

本书由王琳、夏怡主编。其中王琳编写第二部分章和第三章，夏怡编写第一部分章和第四章，全书的统稿由王琳、夏怡共同完成。由于编者水平有限，加上时间仓促，书中难免存有疏漏之处，敬请读者批评指正。

编　者

目 录

Chapter 1 Electronic Technology Fundamentals

Text 1 Basic Concepts of Circuit Theory

Voltage and Current

Voltage and current are vital to understanding electronics, but they are quite hard to grasp because we can't see them directly.

Voltage attempts to make a current flow, and current will flow if the circuit is complete. Voltage is sometimes described as the 'push' or 'force' of the electricity, it isn't really a force but this may help you to imagine what is happening. It is possible to have voltage without current, but current cannot flow without voltage.

Voltage, *V*

- Voltage is a measure of the energy carried by the charge. Strictly: voltage is the "energy per unit charge".
- The proper name for voltage is potential difference or p. d. for short, but this term is rarely used in electronics.
- Voltage is supplied by the battery (or power supply).
- Voltage is used up in components, but not in wires.
- Voltage is across a component.
- Voltage is measured in volts, V.
- Voltage is measured with a voltmeter, connected in parallel.
- The symbol *V* is used for voltage in equations.

Voltage At a Point and 0 V (Zero Volts)

Voltage is a difference between two points, but in electronics we often refer to voltage at a point meaning the voltage difference between that point and a reference point of 0 V (zero volts)[1].

Zero volts could be any point in the circuit, but to be consistent it is normally the negative terminal of the battery or power supply. You will often see circuit diagrams labelled with 0 V as a reminder.

You may find it helpful to think of voltage like height in geography. The reference point of zero height is the mean (average) sea level and all heights are measured from that point. The zero volts in an electronic circuit is like the mean sea level in geography.

Current, *I*

- Current is the rate of flow of charge.
- Current is not used up, what flows into a component must flow out.
- Current is through a component.
- Current is measured in amps (amperes), A. A (1 amp) is quite a large current for electronics, so mA (milliamps) are often used. m (milli) means "thousandth": 1 mA = 0.001 A, or 1 000 mA = 1 A.
- Current is measured with an ammeter, connected in series.
- To connect in series you must break the circuit and put the ammeter across the gap.
- The symbol *I* is used for current in equations[2].

Series and Parallel Connections

There are two ways of connecting components:

In series (Fig. 1.1). Each component has the same current. The battery voltage is divided between the two lamps. Each lamp will have half the battery voltage if the lamps are identical.

In parallel (Fig. 1.2). Each component has the same voltage. Both lamps have the full battery voltage across them. The battery current is divided between the two lamps.

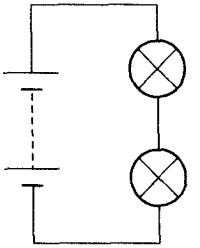

Fig. 1.1 In Series

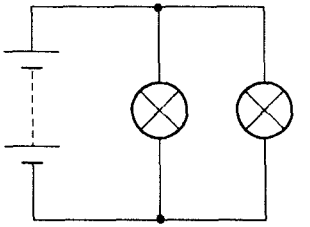

Fig. 1.2 In Parallel

Most circuits contain a mixture of series and parallel connections.

The terms series circuit and parallel circuit are sometimes used, but only the simplest of circuits are entirely one type or the other. It is better to refer to specific components and say they are connected in series or connected in parallel.

Analogue and Digital Systems

Analogue systems process analogue signals which can take any value within a range, for example the output from an LDR (light sensor) or a microphone.

All electronic circuits suffer from 'noise' which is unwanted signal mixed in with the desired signal, for example an audio amplifier may pick up some mains 'hum' [3]. Noise can be difficult to eliminate from analogue signals because it may be hard to distinguish from the desired signal.

Digital Systems

Digital systems process digital signals which can take only a limited number of values (discrete steps), usually just two values are used: the positive supply voltage (+ *V*s) and zero volts (0 V).

Digital systems contain devices such as logic gates, flip-flops, shift registers and counters. A computer is an example of a digital system.

Logic Signals

Most digital systems use the simplest possible type of signal which has just two values. This type of signal is called a logic signal because the two values (or states) can be called true and false. Normally the positive supply voltage + *V*s represents true and 0 V represents false. Other labels for the true and false states are shown in Table 1.1.

Table 1.1 Logic states

Logic states	
True	False
1	0
High	Low
+ *V*s	0 V
On	Off

Noise is relatively easy to eliminate from digital signals because it is easy to distinguish from the desired signal which can only have particular values. For example: if the signal is meant to be +5 V (true) or 0 V (false), noise of up to 2.5 V can be eliminated by treating all voltages greater than 2.5 V as true and all voltages less than 2.5 V as false.

Technical Words and Expressions

vital	[ˈvaitl]	*adj.*	极为重要的；关系重大的
electronics	[ilekˈtrɔniks]	*n.*	电子学
electricity	[ilekˈtrisiti]	*n.*	电流，电，电学
measure	[ˈmeʒə]	*n.*	测量
charge	[tʃɑːdʒ]	*n.*	负荷，电荷
potential difference			电位差，电势差
across	[əˈkrɔs]	*adv. &prep.*	跨越［接］
volts	[vəult，vɔlt]	*n.*	伏特（电压单位）
voltmeter	[ˈvəultˌmiːtə(r)]	*n.*	电压表，伏特计
parallel	[ˈpærəlel]	*n.*	并联
symbol	[ˈsimbəl]	*n.*	符号，记号，象征
negative terminal			负端，负极接线柱［端子］
amps (ampere)，A	[ˈæmpɛə]	*n.*	安培
ammeter	[ˈæmitə]	*n.*	安培计，电流表
series	[ˈsiəriːz]	*n.*	串联
analogue system			模拟系统
digital system			数字系统
LDR (light sensor)			光敏感元件
microphone	[ˈmaikrəfəun]	*n.*	扩音器，麦克风
noise	[nɔiz]	*n.*	干扰噪声
audio amplifier			音频放大器
frequency	[ˈfriːkwənsi]	*n.*	频率，周率，发生次数
eliminate	[iˈlimineit]	*v.*	排除，消除
distinguish	[disˈtiŋgwiʃ]	*v.*	区别，辨别
discrete step			离散阶跃
logic gate			逻辑门
flip-flop	[ˈflipflɔp]	*n.*	触发器，双稳态多谐振荡器
shift register			移位寄存器
counter	[ˈkauntə]	*n.*	计数器

Notes

1. Voltage is a difference between two points, but in electronics we often refer to voltage at a point meaning the voltage difference between that point and a reference point of 0 V (zero volts).

译文为：电压是指两点间的一个电势差，但在电子学中我们经常提到的某一点上的电压其实是指这点和零电压参考点之间的电势差。

这是由 but 连接的并联句；but 后的分句是一个定语从句构成的，meaning... 是现在分词做定语，修饰 voltage at a point 的。

2. The symbol *I* is used for current in equations.

译文为：公式中电流是用符号 *I* 来表示的.

谓语为被动时，经常可译成主动句，把主语译成宾语构成无主语的动宾结构。

3. All electronic circuits suffer from 'noise' which is unwanted signal mixed in with the desired signal

译文为：所有的电子电路都会受到“噪声”的干扰，噪声是混合在所需信号中的无用的信号。

Which 引导定语从句，修饰“noise”；mixed ... 过去分词做定语，修饰 unwanted signal。

Exercises

I. Mark the following statements with T (true) or F (false) according to the text.

1. It is possible to have voltage without current, but current cannot flow without voltage. ( )
2. Current is used up in components, but not in wires. ( )
3. In parallel each component has the same current. ( )
4. Noise can be easy to eliminate from analogue signals. ( )
5. Most digital systems use the simplest possible type of signal which has just two values. ( )

II. Complete the following sentences.

1. We say voltage _____ a component, current _____ a component.

2. The proper name for voltage is _____ or _____ for short.
3. Current is measured in _____ and is measured with an _____.
4. Most circuits contain a mixture of _____ and _____ connections.
5. Normally the positive supply voltage + Vs represents _____ and 0 V represents _____.

Reading 1 AC, DC and Electrical Signals

AC means Alternating Current and DC means Direct Current. AC and DC are also used when referring to voltages and electrical signals which are not currents! For example: a 12 V AC power supply has an alternating voltage (which will make an alternating current flow). An electrical signal is a voltage or current which conveys information, usually it means a voltage. The term can be used for any voltage or current in a circuit.

Alternating Current (AC)

Alternating Current (AC) flows one way, then the other way, continually reversing direction. An AC voltage is continually changing between positive (+) and negative (−).

The rate of changing direction is called the frequency of the AC and it is measured in hertz (Hz) which is the number of forwards-backwards cycles per second.

Direct Current (DC)

Direct Current (DC) always flows in the same direction, but it may increase and decrease. A DC voltage is always positive (or always negative), but it may increase and decrease. Electronic circuits normally require a steady DC supply which is constant at one value or a smooth DC supply which has a small variation called ripple.

Properties of Electrical Signals

An electrical signal is a voltage or current which conveys information, usually it means a voltage. The term can be used for any voltage or current in a circuit.

The voltage-time graph (Fig. 1.3) shows various properties of an electrical signal. In addition to the properties labelled on the graph, there is frequency which is the number of cycles per second.

The diagram shows a sine wave but these properties apply to any signal with a constant

shape.

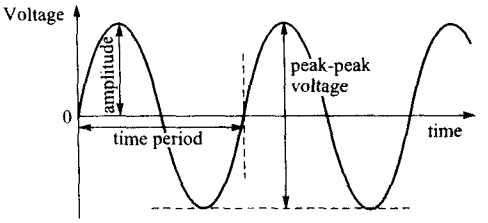

Fig. 1.3 A Sine Wave

- Amplitude is the maximum voltage reached by the signal.
- Peak voltage is another name for amplitude.
- Peak-peak voltage is twice the peak voltage (amplitude). When reading an oscilloscope trace it is usual to measure peak-peak voltage.
- Time period is the time taken for the signal to complete one cycle.
- Frequency is the number of cycles per second.
  It is measured in hertz (Hz), but frequencies tend to be high so kilohertz (kHz) and megahertz (MHz) are often used. 1 kHz = 1 000 Hz and 1 MHz = 1 000 000 Hz.
- frequency $= \frac{1}{\text{time period}}$ and time period $= \frac{1}{\text{frequency}}$.

Technical Words and Expressions

AC (alternating current)		交流电
DC (direct current)		直流电
convey	*vt.*	传送
amplitude	*n.*	振幅
oscilloscope	*n.*	示波器
kilohertz	*n.*	千赫
megahertz	*n.*	(MHz) 兆赫

Comprehension

1. AC and DC are also used when referring to _____.

A. voltages, electrical signals and currents

B. currents and voltages

C. currents and electrical signals

D. voltages and electrical signals

2. Which of the following is right? _____.

A. Alternating Current flows one way, then the other way, continually reversing direction

B. An AC voltage is continually changing between positive (+) and negative (-)

C. The rate of changing direction is called the frequency of the AC

D. All

3. DC _____.

A. means Direct Current

B. means Alternating Current

C. always flows in the same direction and can't increase and decrease

D. voltage is always positive, but it may increase and decrease

4. Which of the following descriptions of electrical signal properties is not right?

A. Amplitude is the maximum voltage reached by the signal.

B. Peak voltage is another name for amplitude.

C. Peak-peak voltage is twice the peak voltage (amplitude).

D. Frequency is the number of cycles per second.

5. Frequency _____.

A. is the number of cycles per minute

B. is measured in second

C. tend to be high so kilohertz (kHz) and megahertz (MHz) are often used

D. is equal to time period

Text 2 Circuit Components and Their Symbols

Circuit symbols are used in circuit diagrams which show how a circuit is connected together. The actual layout of the components is usually quite different from the circuit diagram. To build a circuit you need a different diagram showing the layout of the parts on printed circuit board.

Wires and Connections

Wire: To pass current very easily from one part of a circuit to another. (Fig. 1.4 (a))

Wires joined: A 'blob' should be drawn where wires are connected (joined), but it is

sometimes omitted[1]. Wires connected at 'crossroads' should be staggered slightly to form two T-junctions, as shown in Fig. 1.4 (b).

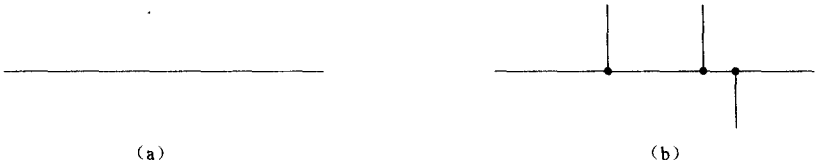

Fig. 1.4 Wire
(a) Wire ; (b) Wires Joined

Power Supplies (Fig. 1.5)

Cell: Supplies electrical energy. The larger terminal (on the left) is positive (+). A single cell is often called a battery, but strictly a battery is two or more cells joined together.

Battery: Supplies electrical energy. A battery is more than one cell. The larger terminal (on the left) is positive (+).

DC supply: Supplies electrical energy. DC = Direct Current, always flowing in one direction.

AC supply: Supplies electrical energy. AC = Alternating Current, continually changing direction.

Fuse: A safety device which will 'blow' (melt) if the current flowing through it exceeds a specified value.

Transformer: Two coils of wire linked by an iron core. Transformers are used to step up (increase) and step down (decrease) AC voltages. Energy is transferred between the coils by the magnetic field in the core. There is no electrical connection between the coils.

Earth (Ground): A connection to earth. For many electronic circuits this is the 0 V (zero volts) of the power supply, but for mains electricity and some radio circuits it really means the earth. It is also known as ground.

Output Devices

Lamp: A transducer which converts electrical energy to light. Fig. 1.6 (a) symbol is used for a lamp which is an indicator, for example a warning light on a car dashboard.

Heater: A transducer which converts electrical energy to heat.

Motor: A transducer which converts electrical energy to kinetic energy (motion).

Inductor: A coil of wire which creates a magnetic field when current passes through it. It