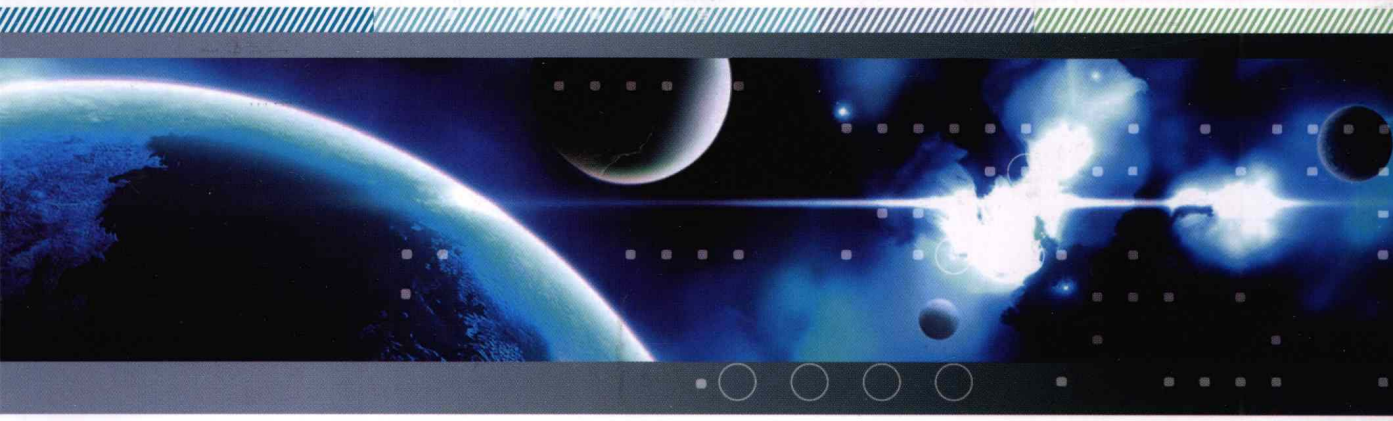
高等学校专业英语教材

通信工程专业实用英语

陶亚雄　主编
王永明　副主编
刘南平　主审



電子工業出版社
PUBLISHING HOUSE OF ELECTRONICS INDUSTRY
http://www.phei.com.cn

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北京 · BEIJING

内 容 简 介

相比普通大学英语，专业英语以培养学生的职业岗位综合能力为目标，根据相关行业的发展趋势和就业需求，有针对性地对学生进行职业技能培养。电子通信专业英语是每个电子、通信工程专业的必修课程，随着信息、通信技术的飞速发展，国外大量行业相关的先进技术和理论被引进、采用，相关教材的缺失日渐明显，面临着更新换代的迫切需求。

本书尽量结合实际通信系统原理与技术进行编写，既可作为本科、高职电子与通信类专业英语的教学用书，也可作为相关工程技术人员的参考用书。

图书在版编目（CIP）数据

通信工程专业实用英语 / 陶亚雄主编. —北京：电子工业出版社，2009.5
高等学校专业英语教材
ISBN 978-7-121-08630-4

Ⅰ. 通… Ⅱ. 陶… Ⅲ. 通信工程—英语—高等学校—教材 Ⅳ. H31

中国版本图书馆 CIP 数据核字（2009）第 055152 号

责任编辑：陈晓莉
印　　刷：北京市顺义兴华印刷厂
装　　订：三河市双峰印刷装订有限公司
出版发行：电子工业出版社
　　北京市海淀区万寿路 173 信箱　邮编　100036
开　　本：787×980　1/16　印张：26　字数：585　千字
印　　次：2009 年 5 月第 1 次印刷
印　　数：4 000 册　　定价：38.00 元

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前　言

电子、通信专业起源于欧美，随着信息、通信技术的飞速发展，引进了大量国外先进的行业相关标准、技术与设备，对通信从业者的专业英语阅读、理解能力要求越来越高，通信专业英语教学的重要性也日趋明显。

专业英语以大学英语为基础，但在词汇、语法、句法及文风上带有浓厚的专业特色。目前国内本科通信专业英语教材在选题上普遍倾向计算机（网络）通信方向，侧重于介绍通信网络的结构、类型、组成原理和协议等；加之通信技术的发展日新月异，教材内容与实际通信专业基础理论和行业热点、资讯联系松泛，不利于学以致用。

本教材编写围绕电子、通信专业的实际应用技术和最新行业资讯展开，为保证内容切合行业实际，主要从“基本通信概念+主流通信技术+常见通信服务”三个部分着手，阐述了现代通信相关的理论和技术。

① 首先，从现代通信的几项主要分支系统技术入手，介绍通信的基本概念和术语，包括：通信系统的组成、频段划分、通信信号分类、线性调制系统、非线性调制系统、编码技术、多址接入技术、带限信道的信号传输、扩频调制技术等；

② 其次，在此基础上，介绍目前的主流通信系统和技术，如移动通信 GSM 系统、CDMA 系统、3G 通信、光纤通信、程控交换技术、分组交换技术、VoIP 技术等；

③ 再次，介绍目前常见电子通信行业的相关业务概念、原理和术语，包括：语音服务、增值服务、数据服务、多媒体服务、短消息业务、通用个人电信号码等。

其中，第 1～7 单元首先介绍现代通信的基本概念和技术，如通信系统的组成、通信频段划分、线性/非线性调制理论，编码技术、多址接入技术、带限信道的信号传输、扩频调制技术等；第 8～15 单元主要介绍了目前主流通信系统及其核心技术，包括移动通信 GSM 系统、CDMA 系统、3G 通信、光纤通信、程控交换技术、分组交换技术、VoIP 技术等；第 16～18 单元则主要介绍目前通信行业的相关基本概念、术语和电信业务的概念，如增值服务、短消息业务、通用个人电信号码等。

针对学生理论基础水平的参差不齐，教材的每一单元都附有 1～5 篇英文阅读材料及其中文译文，这些阅读材料全部取自国内外各大通信网站的相关行业资讯和技术说明，并配有大量的插图，浅显易懂。一方面便于教师根据学生的具体情况有选择地组织教学，另一方面也为学有余力的学生自行拓展学习提供了引导和便利。

此外，本书每一单元还附有大量形式多样的课后练习题（附参考答案），主要针对该单元课程教学的重点进行复习和强化，旨在帮助读者进一步加深对相关内容的理解掌握，巩

固教学效果。

本教材参考学时为 100 学时（2 学期），是通信、电子类教学用书，同时也可作为计算机通信、网络类专业相关工程技术人员的参考用书。

本书由上海师范大学天华学院电子与信息工程系陶亚雄教授主编，王永明副主编，天津师范大学刘南平教授主审，上海师范大学天华学院电子与信息工程系徐振、徐会彬、刘伟、朱国权、赵兰老师参与了其中部分单元的编写工作。

该书在编写过程中得到了各位参编老师及所在上海师范大学天华学院相关领导的大力支持和帮助，在此表示衷心的感谢；同时也对提供文献参考资料的专家、学者表示深深的谢意。

由于水平有限，且编写时间仓促，书中疏漏甚至错误在所难免，欢迎各位读者批评指正。

编　者

2009 年 1 月

目　录

PART Ⅰ　Basic Communication Concepts

PART II Major Communication Technologies

PART Ⅰ Basic Communication Concepts

Unit 1 Brief Introduction of Modern Communication

1.1 Text

1.1.1 Communication

Modern communication means a technology using light wave and electromagnetic wave to transmit or exchange information from one place to another rapidly and accurately, so it's also called ***telecommunication*** technique.

Along with the unceasing development and fusion of communication technique, computer technique and control technology, performance of communication systems have enormously expanded, such as visible text, electronic mail-box, video telephone and conference, etc., accompanied with the communicating content extension from simplex voice and text signals to multimedia information including sound, text, data, picture and so on. Not only efficient information transmission, but also information collecting, processing, storage and displaying are carried out by modern communication network.

Classification of modern communication systems is different along with the different classifying manners.

1. Simplex & Half-duplex & Full-duplex Communication

According to the information direction transmitted in channel, modern communication systems can be divided into the ***simplex communication*** systems, ***half-duplex communication*** systems, and ***full-duplex communication*** systems。

In simplex communication systems such as radio and television broadcasting, signals can only flow in one direction. In half-duplex communication systems, signals can flow in both directions, but only one direction at a time (not simultaneously). Typically, once a party begins to receive a signal, it must wait for the transmitter to stop transmitting, before replying. Full-duplex systems are employed in many communication networks, in which signals can flow in both directions.

2. Serial & Parallel Communication

According to the number of information communicating approaches, modern communication

systems can be divided into the ***serial communication*** systems and the ***parallel communication*** systems.

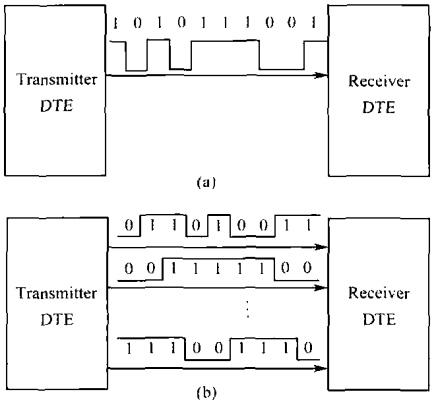

Figure 1-1 Serial communication and Parallel communication

Serial transmission is the process of sending data one bit at one time, sequentially, over a communication channel, as shown in Figure 1-1(a). Parallel transmission is mainly employed in real-time communication and data communication between computer and its peripherals, in which several data bits are packed together and transmitted simultaneously as shown in Figure 1-1(b).

3. Synchronous & Asynchronous Communication

According to the control methods of information transmitted in channels, modern communication systems can be divided into the ***synchronous communication*** systems and the ***asynchronous communication*** systems.

In asynchronous communication system, every symbol is transmitted independently at variable data rate, only one symbol at one time. A start bit (e.g. logic level 1) serves to represent the start of a new symbol, and a stop bit (e.g. logic level 0) serves to the represent the end of a symbol. Usually, the start bit length takes one bit while the stop bit length required by the system can be 1, 1.5 or 2 bits as shown in Figure 1-2. Since the transmission of every symbol usually requires 2~3 additional bits, asynchronous transmission usually lacks efficiency.

In synchronous communication system, information is transmitted in forms of data block. Each block has a preamble bit and postamble bit respectively for symbolizing the start and end of block. Apparently, synchronous communication system is more efficient than asynchronous communication system, and is more adaptive for high speed data transferring .

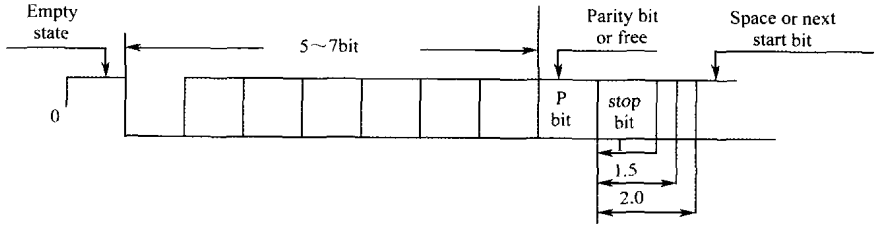

Figure 1-2 Asynchronous communication

4. Point-to-point & one-to-multi-points & multi-to-multi-points Communication

According to the line connecting modes and signal interacting ways between signal source

and destination, modern communication systems can be divided into ***point-to-point communication*** systems, ***one-to-multi-points communication systems*** and ***multi-to-multi-points communication*** systems.

In point-to-point communication system shown in Figure 1-3(a), the connection between the terminals, such as terminal A and B, was generally implemented through a dedicated line. In point-to-multipoint communication system shown in Figure 1-3(b), connection between every terminals (such as terminal A, B,⋯, *N*, et al.) is accomplished via a transferring equipment. In multipoint-to-multipoint communication system, data is transmitted flexibly between several terminals through a switching device, with the direct or stored-and-transferred method.

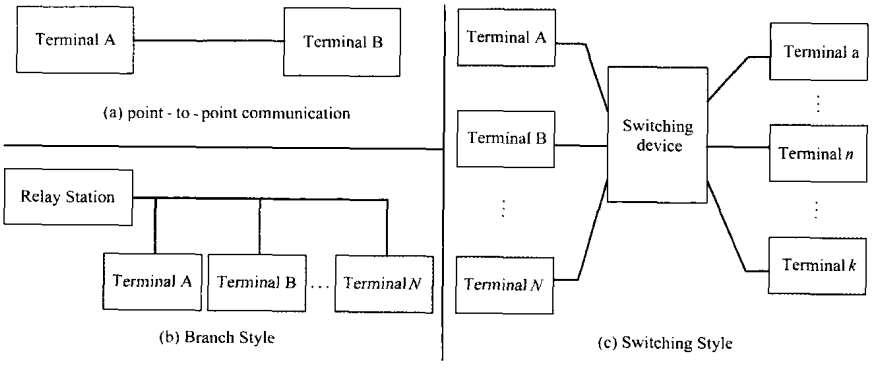

Figure 1-3 piont-to-piont & one-to-multi-points & multi-to-multi-points communication

1.1.2 History of Modern Communication

Communication comes up along with the history of humanity since people have to transmit information and exchange their views each other. Since electricity was invented by Volta, people had begun to try to communicate making use of electricity. The development of modern communication can be illustrated by those milestone events listed in the following Form 1-1.

Form 1-1 Memorabilia of modern communication

Age	Event	Significance
1837	Morse invented the line telegraphy	Beginning of a new era that electricity being used by people for long-distance information transmission
1876	A.G.Bell invented telephone	Transmitting voice signals by using current intensity directly
1864, 1887	Maxwell predicted the existence of electromagnetic radiation in 1864, and Hertz demonstrated it in 1887	Providing modern wireless communication with theory basis
Early 20th century	Amplitude modulation (AM) appeared	Changing communication signal from simplex audio signal to hybrid signal of voice, music, picture signals

续表

Age	Event	Significance
1936	Frequency modulation (FM) appeared	Improved communicating quality by overcoming the bug that AM signal is prone to interference, and impelled the development of mobile communication
1928 1937 1950	***Nyquist's Theorem*** was introduced in; A.H.Reeves invited pulse code modulation (PCM) communication technique; A.G.Bell turned out the PCM equipment successfully	Development of communication from analog to digital transmission; Analog signal being digitally transmitted via PCM technique, and improving the ability of communication system to anti-jamming
1940s- 1950s	Shannon Formula, ***Non-distortion Coding Principle***, ***Error-correction Coding*** Principle , Signal and Noise Theory, Modulation Principle, Signal Detection Theory appeared	Providing communication validity and reliability with theory basis, promoting communication technology to be mature and progressive
1960	The first satellite for communication launched successfully	Breaking the new path for international communication, bringing on the rapid development of space communication
1960s	***Cable television***, ***laser communication***, radar, computer network and digital communication technology appeared	***Photoelectricity processing technology*** **and** ***radio astronomy*** getting great development
1970s	***large-scale-integrated circuit*** (***LSI***), Private (Automatic) Branch exchange, microprocessor developed rapidly	Commercial ***satellite communication***, optical fiber communication getting rapid development
1980s	***Very-large-scale-integrated circuit*** (***VLSI***), Integrated Services Digital Network (ISDN) appeared	Promoted mobile communication, and optical fiber communications into application

Technical words and phrases

communication [kəmju:ni'keiʃən] *n.* 通信；联络
electromagnetic [i'lektrəumæg'netik] *adj.* 电磁的；电磁学的
telecommunication ['teli-kəmju(:)ni'keiʃən] *n.* 电信，无线电通信；电信学
unceasing [ʌn'si:siŋ] *adj.* 不停的，持续的
visible ['vizəbl] *adj.* 看得见的；明显的，显而易见的
video ['vidiəu] *adj.* 视频的；录像的
telephone ['telifəun] *n.* 电话；电话机
channel ['tʃænl] *n.* 信道，频道
simplex ['simpleks] *adj.* 单纯的，单一的
simplex communication 单工通信
half-duplex *n.* [计]半双工
half-duplex communication 半双工通信