BEGINNING A NEW WORLD OF COMMUNICATIONS

Learning English and Computers/Electronics in the Real World

开始沟通新的世界

在真实的世界中学习英语、计算机和电子学

邓　隽　编著
Richard Shikles（美）审

电子科技大学出版社

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BEGINNING A NEW WORLD OF COMMUNICATIONS

· 内容简介 ·

本书基于修完大学英语教学大纲规定的内容之上，引导通信、计算机、电子工程专业学习者以英语语言为载体，熟悉并掌握必要的基本术语及相应的专业基础知识，通过对专业知识的学习，保持大学英语学习四年不断线，为读者在用英语理解并运用本专业知识方面打下扎实的语言基础。全书共分8个单元，第1~7单元分别介绍了电子学早期历史，电子学、计算机、个人软件、商务软件、通信及网络、因特网等专业知识概况；第8单元对以上领域的未来发展作了进一步的展望；并附有全书专业术语词汇表及释义。全书配有丰富的练习，再加上精心设计的多媒体课件，意在帮助读者提高在专业内用英语沟通（口语及笔头）的能力，引导他们进入一个全新高效的学习环境，从而与全球成功沟通。

本书既可作为通信、计算机、电子工程等专业学生进入专业英语学习前衔接大学英语学习的有效读物，亦可作为以上专业爱好者学习英语的自学教科书。

前　言

在这个快速变化的世界中，电子学渗透到社会各个领域，带来了通信、计算机、网络等技术领域的全方位变化。为了让当今这些热门领域的学生跟上这种变化的速度，成为世界公民的一分子，他们有必要了解这些领域的发展变化，深刻理解这些变化带来的内涵意义，运用、推广并创新上述领域的新技术。本书注重帮助学生打下学习通信、计算机、网络、电子学等领域技术语言或术语的坚实基础，从而提高他们在课堂中高效学习的能力，提高他们在这些技术领域里进行高效沟通的能力。

全书编排思路如下：阅读水平定位于大学低年级学生的阅读水平；英语为主要行文语言，少数重难点用中文释义。全书共分8个单元，涉及电子及计算机领域的历史，电子学、软件、通信与网络、因特网以及未来各学科领域发展预测等方面的常识。每个单元再分为A、B两个部分进行不同层面的学习，A部分重点在专业知识阅读方面；B部分重点在巩固已学术语及知识，使口、笔头表达等应用能力得以提高；最后列出了全书的术语词汇总表及详尽的英文释义，方便学习者及时查阅。

本书既可作为通信、计算机、电子学等领域学生进入专业英语学习前衔接大学英语学习的有效读物，亦可作为以上专业爱好者学习英语的自学教科书。

在本书编写过程中，电子科技大学中山学院外国语系辛声老师在全书中文释义、校对，特别是在制作多媒体课件方面做了大量工作；该院聘请的美籍教师Richard Shikles在全书选材、术语词汇总表生成，特别是语言审定把关方面功不可没。在此谨向他们一并表示衷心的感谢。

由于时间仓促，加之本人才疏学浅，本书在编写方面难免存在疏漏，殷切希望广大读者批评指正。

邓　隽

2007年春于广东·中山

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Introduction

In this rapidly changing world, electronics in its many forms and phases has changed the world forever. It includes the world of radio, television, satellites, computers, and a full range of communications devices. In order for today's students to keep up and be a part of this world, they need to learn the history, implication and application of all this technology in today's world. This book is intended to provide a solid starting point of learning all the language/terminology of today's technology, electronics, computers, the Internet, etc. Therefore, providing the student the ability to learn effectively in the classroom and communicate effectively in this technology world.

The intention of this book is as follows:

1. —To be used as a text book for 2 school terms.
2. —Reading level will be targeted between High School and College age bracket.
3. —Have approximately 8 units of study.
4. —General subject areas will be:

   history, electronics, computers, software, communications, networks, internet, and the future.
5. —Each unit may be subdivided as section A & B for easier study.
6. —Each unit and/or sub-units will include:

   class reading/discussion, terminology, applications, demonstrations, script writing, exercises and exams.
7. —Each unit will generally provide material for 6-8 class periods (3-4 weeks).
8. —Each unit will have mini-exercises/testing to check progress of students learning.
9. —Conversation forms are used which amplifies practice speaking and thinking of students.

10. —Further exercises and examinations will be left to the in-class teacher.

11. —This book will have extensive Index of Terms.

Book Language:

This text book is written for the Chinese student with English as the primary language and important sections translated in Chinese where it is felt it was necessary.

Introduction:

This book is not easy to write and it will not be easy to study and teach. Writing technical subjects in simple language is not easy or practical. Who is the best teacher for such a class. Sometimes it seemed that a computer major teacher would be better suited to teach this text. Other times it seemed better for an English major teacher to teach this book. Either way, it will be necessary for the teacher to be schooled in and understand the technical information provided here as well as a good level of English. Further, the teacher will find it necessary to provide frequent explanation, assignments other then in the book, and examples of the subject material.

You will quickly see that the flow of the material in this book is consistent from unit to unit. All units have, 1) Reading, 2) Terminology, 3) Written Review, 4) Group Reading, 5) Conversation, 6) Script writing and 7) Paragraph Writing. Let me provide a more detail explanation of the intention and teaching intention in each of these sections.

1) Reading. This is likely the hardest section of each unit. Reading about technical material the student is not familiar with will be the most difficult area of study. But, this is only the first stop when the student is "introduced" to numerous new words and terms the student has not seen before. The reading material should be assigned in these ways. First, the student should be assigned to read and "review" the material during the week prior to class. Next, the material can be read in class in varied ways as you are comfortable with. Finally, a discussion of paragraph by paragraph and word by word with helpful discussion and definition provided by the teacher. This will provide learning without the student being put on the spot individually.

2) Terminology. This should be easy for the students to look up words in the reading and write the definitions of these words in the blanks provided. Most of these are exactly as they are found in the reading text. Therefore, it should be only practice and reinforcement of material already introduced to the student. This is intended to be practice and exercise, not an examination. If you wish to let the students work in pairs on this section, this might be a good idea.

3) Written Review. This is intended to be an extension of the section on Terminology. It only switches from providing the word for definition, to providing the definition and the students provides the word. Again this should be only for practice and reinforcement of material but from a different approach and intended to be practice and exercise, not an examination. Make sure students are given enough time to work through this section easily and NOT with the assistance of other students.

4) Group Reading. This is now the first time the students have grouped together and read out loud. Of course this will face opposition, but reading and practicing to "speak" the words will continue to reinforce memory and learning. One student is not reading the whole thing, but switching from student to student and paragraph to paragraph. This will be difficult for them and for the teacher. Do not make this to be labor, just allow each group to do as they can, with the teacher encouraging them a few times.

5) Conversation. This section is making simple conversation of the material studied. Again it is allowing the student to speak verbally what they have learned. It is this writer's opinion that unless you can "speak what's in the mind" there is no understanding. Speaking always makes what is in the mind solid.

6) Scripting. Now the student is moving from learning internally, speaking out loud and now starting to put the material in their "own words". Again do not make this to be labor, but observe how creative some of the students will be. Give the students time to write the conversation together. Allow plenty of time for the students to make presentations in class. This is a great practice and reinforcement of learning. Yes, it will take time, but the rewards will be great if the teacher allows relaxed "role playing".

7) Writing. This allows the student to give a unified expression of what they have learned in the unit. It also continues to give practice to writing complete thoughts and not just matching words and single word applications.

Suggestions for teaching:

Please allow me to make some suggestions for teaching this text to students. These suggestions are not provided in any order, it will be up to you to find which suggestions best fits your teaching style, material understanding, and perceptions of student needs.

Many of these suggestions will need the assistance of the computer/electronics departments of the school. It will be necessary to talk with them at the beginning of the term about needing their teachers to visit class, hardware, software or other assistance.

1. —Use of "Show-and-Tell"– As technical material is discussed and taught, it will be helpful from time to time to actually bring the subject matter into class to see. This might include bringing the hardware into class so the students can see more carefully what it looks like and how it is used. This might include bringing software into class, and providing examples of its use on the classroom computer.

2. —Use of "Field Trips" – In some cases it might be impractical to bring some materials and hardware to class. Therefore, it would be good to schedule a "trip" to the computer departments labs and server sights and have a technician give some explanation and tour of the facility. Particularly with discussions of internet and networks as well as electronics.

3. —Use of student groups for class presentations – You can do group presentations during sections 4 and 5. You can also be creative and have group presentations during other areas, particularly the reading section. The Software unit is a good example. There are a number of topics and student groups could take topics and teach them to the class. Also they can bring examples of how they work on a computer or discuss how important they are in the work environment.

4. —You might find it helpful to merge 4) conversations and 5) scripting together, especially if time becomes a problem. Flow of the class and time constraints are, of course, up to the discretion of the teacher. Merging these areas should not be done except as needed.

5. —Use of examinations always has multiple purposes. They examine what the students know "for the teacher" but it also is another teaching tool. It could be helpful to give a unannounced "pop quiz". You can use a mixture of your questions or questions already in each unit for this pop quiz. It is my suggestion is that you allow the students to "use their books" as an open book quiz. Further, I suggest you give only 10 or 12 minutes for the quiz and keep marking off the minutes on the board. 10, 12, 15 questions should be the maximum and you will learn how many will fit nicely in 10 or 12 minutes. If the students have read, studied and participated in the class, they will readily find the answers. If not, they will spend time finding and trying to answer questions they have no ideas where to look.

目录

BEGINNING A NEW WORLD OF COMMUNICATIONS

Unit #1： Savvy of Electronics Early Years 知道，了解

Electricity 电 is a form of energy involving the flow of **electrons** 电子. All matter is made up of **atoms** 原子, and an atom has a center, called a **nucleus** 核子. The nucleus contains positively charged particles called **protons** 核质子 and uncharged particles called **neutrons** 中子. The nucleus of an atom is surrounded by negatively charged particles called **electrons**. The negative charge of an electron is equal to the positive charge of a proton, and the number of electrons in an atom is usually equal to the number of protons. When the balancing force between protons and electrons is upset by an outside force, an atom may gain or lose an electron. When electrons are "lost" from an atom, the free movement of these electrons constitutes an **electric current** 电流.

Electricity is a basic part of nature and it is one of our most widely used forms of energy. We get electricity, which is a secondary energy source, from the conversion of other sources of energy, like coal, natural gas, oil, nuclear power and other natural sources, which are called primary sources. Many cities and towns were built alongside waterfalls (a primary source of mechanical energy) that turned water wheels to perform work. Before electricity generation began slightly over 100 years ago, houses were lit with kerosene lamps, food was cooled in iceboxes, and rooms were warmed by wood-burning or coal-burning stoves. Beginning with Benjamin Franklin's experiment with a kite one stormy night in Philadelphia, the principles of electricity gradually became understood. In the mid-1800s, everyone's life changed with the invention of the electric **light bulb** 电灯泡. Prior to 1879, electricity had been used in **arc lights** 弧光灯 for outdoor lighting. The light bulb's invention used electricity to bring indoor lighting to our homes.

An **electric generator** 发电机, Long ago, a machine that generated electricity was named "dynamo", (today's preferred term is "generator".) is a device for converting **mechanical energy** 机械能 into **electrical energy** 电能. Process is based on the relationship between magnetism and electricity. When a wire or any other electrically conductive material moves across a magnetic field, an **electric current** 电流 occurs in the wire. The large generators used by the electric utility industry have a stationary conductor. A magnet attached to the end of a rotating shaft is positioned inside a stationary conducting ring that is wrapped with a long, continuous piece of wire. When the magnet rotates, it induces a small electric current in each section of wire as it passes. Each section of wire constitutes a small, separate electric conductor. All the small currents of individual sections add up to one current of considerable size. This current is what is used for electric power.

An **electric utility** 电业 **power station** 发电站 uses either a turbine, engine, water wheel, or other similar machine to drive an electric generator or a device that converts mechanical or chemical energy to electricity. Steam turbines, internal-combustion engines, gas combustion turbines, water turbines, and wind turbines are the most common methods to generate electricity.

Electronics 电子学 is a branch of physics that deals with the emission, behavior, and effect of electrons and with electronic devices. The history of electronics began to evolve separately from the history of electricity late in the 19th century. The English physicist J.J. Thomson identified the electron and the American physicist Robert A. Millikan measured its electric charge in 1909. Following you will find a time line of inventions and inventors by categories. Notice how many people were involved in the progress of electronics over so many years.

The following categories we will now study are:

1. **Cathode Rays** – 阴极射线 - A stream of electrons emitted by the cathode in electrical discharge tubes. One of the electrons that is emitted in a stream from a **cathode- ray tube** 阴极射线管.

2. **Wireless Telegraphy** – 无线电报- telegraphy that uses transmission by radio rather than by wire. The use of radio to send telegraphic messages (usually by Morse code).

3. **Vacuum Tubes** – 真空管 - An electron tube from which all or most of the gas has been removed, permitting electrons to move with low interaction with any remaining gas molecules.

4. **Radio** – 无线电接收装置/广播设备 - The wireless transmission through space of electromagnetic waves in the approximate frequency range from 10 kilohertz to 300,000 megahertz. Communication of audible signals encoded in electromagnetic waves. Transmission of programs for the public by radio broadcast.

5. **Television** – 电视,电视机- The transmission of visual images of moving and stationary objects, generally with accompanying sound, as electromagnetic waves and the re-conversion of received waves into visual images.

6. **Radar** – 雷达 - A method of detecting distant objects and determining their position, velocity, or other characteristics by analysis of very high frequency radio waves reflected from their surfaces.

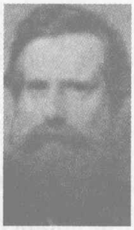
7. **Electrons and Waves** – 电子波形 - disturbance traveling through a medium by which energy is transferred from one particle of the medium to another without causing any permanent displacement of the medium itself.

8. **Transistors** – 晶体管 - small electronic device containing a semiconductor and having at least three electrical contacts, used in a circuit as an amplifier, detector, or switch.

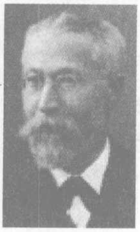
Ⅰ. Cathode Rays & the Discovery of the Electron

Although many of the pioneers of 19th century physics, including Faraday, were convinced on the basis of chemistry and the phenomena observed in electrolysis that electric current 电流 consisted of the flow of particles of charge, the nature of these charges was not understood. Even the basic question of whether the charge of the particles 微粒的电荷 was **positive** 正 or **negative** 负 remained undetermined. The answers to these questions, and to the basic structure of matter, were resolved by experiments that began with the study of electric discharges in evacuated tubes. Along the way a series of discoveries were made which led to the technological revolution of the 20th century.

William Crookes (1832-1919), heir at an early age to a large fortune, carried out his investigations in a private laboratory. His studies of electrical discharges 放电 in gases, which followed the development of the cathode ray tube 阴极射线管 by Pluecker and Hittorf, and his observations of cathode rays and the dark space at the cathode led to the discovery of x-rays and of the electron. Crookes also invented the radiometer, whose eventual explication verified the kinetic theory of gases. Curiously, Crookes was a believer in the occult and in the 1870's claimed to have verified the authenticity of psychic phenomena. Later he became involved in the Theosophical Movement and there are references to his having exorcised demons. In 1897 Crookes was knighted by Queen Victoria (who is also reputed to have had an interest in the occult) and in 1909 was elected president of the Royal Society.



Karl Ferdinand Braun (1850-1918) was director of the Physical Institute and a professor of Physics at the University of Strasbourg when he demonstrated the first cathode ray tube oscillograph, guiding a



narrow stream of electrons to a fluorescent screen 荧光屏 and presaging the modern television screen. Although little remembered today, Braun made several important contributions. He discovered that rectification occurs at a crystal/metal junction, leading to the introduction of crystal receivers. In 1899, he introduced (sparkless) inductive coupling to antennas and the first directive beam antenna. He received the Nobel Prize in 1909 along with Guglielmo Marconi. Braun was in New York to testify in a patent suit when the United States entered World War I; he was interned as an enemy alien and died before the war ended.

Wilhelm Conrad Roentgen (1845 -1923) was 44 years old, head of the Physical Institute and recently retired Rector (President) of the University of Wurzburg when, in November, 1895, he discovered that some unknown radiation 未知辐射 coming from a crookes tube could cause crystals to fluoresce 晶体产生荧光, pass through solid objects, and affect photographic plates. Working alone, sometimes sleeping in his laboratory, and maintaining great secrecy, he completed his research and eight weeks later announced his discovery. The scientific and medical implications of his work were immediately recognized and reported world-wide following its publication on New Year's Day in 1896. Within a few weeks some hospitals began to use x-rays. Roentgen became one of the most renowned scientists in the world. He received many honors, including the first Nobel prize in Physics and an offer refused to be raised to the nobility.

Joseph John Thomson (1856-1940), the son of a Manchester bookseller, entered college at fourteen and at twenty-eight was elected a fellow of the Royal Society and appointed to the Chair of Physics at the Cavendish Laboratory. His great discovery occurred in 1897 during the course of his investigations of cathode rays. Thomson provided convincing evidence that the rays consisted of charged particles; he measured the ratio of charge to mass and was able to estimate that the

mass was equal to about 1/1800 of the mass of a hydrogen atom 氢原子. His discovery of the electron 电子 won the Nobel Prize in 1906 and he was knighted two years later. Thomson was described by Rutherford as having "a most radiating smile, when he is scoring off anyone."

Robert A. Millikan (1868 -1953) began his career as a classics major

at Oberlin College, but agreed to teach Physics in order to earn more money. When he was offered a fellowship in Physics at Columbia he accepted, but again only because it was the best offer he could get financially. His academic career at the University of Chicago was at first devoted to teaching and administration and he did not begin to do research seriously until he was almost forty. Then, in 1906 he began to devise a series of improvements to the Thomson experiment that led to the oil-drop apparatus in which the charge of the electron was measured conclusively. His results were published in 1910 and the last resistance to the atomic theory of matter was dispelled. In 1914 he published the results of the research for which he was awarded the Nobel Prize - the direct determination of Plank's constant using the photoelectric effect 光电效应- verifying the 1905 Einstein theory of the photoelectric effect and the quantum nature of light.

Ⅱ. Wireless Telegraphy

Maxwell's 1865 publication of a theory which unified electrodynamics, magneto-dynamics, and optics had seemingly little impact in Britain where it was not widely accepted. Surprisingly, during the remaining fourteen years of his life, Maxwell, who was a skillful experimentalist, did not attempt to verify the existence of the electromagnetic waves 电磁波 that his theory predicted. However, the leading German scientist of the period, von Helmholtz, believed the Maxwell theory and he set his pupil Hertz on the track of producing and detecting electromagnetic radiation, opening the path to wireless communication.