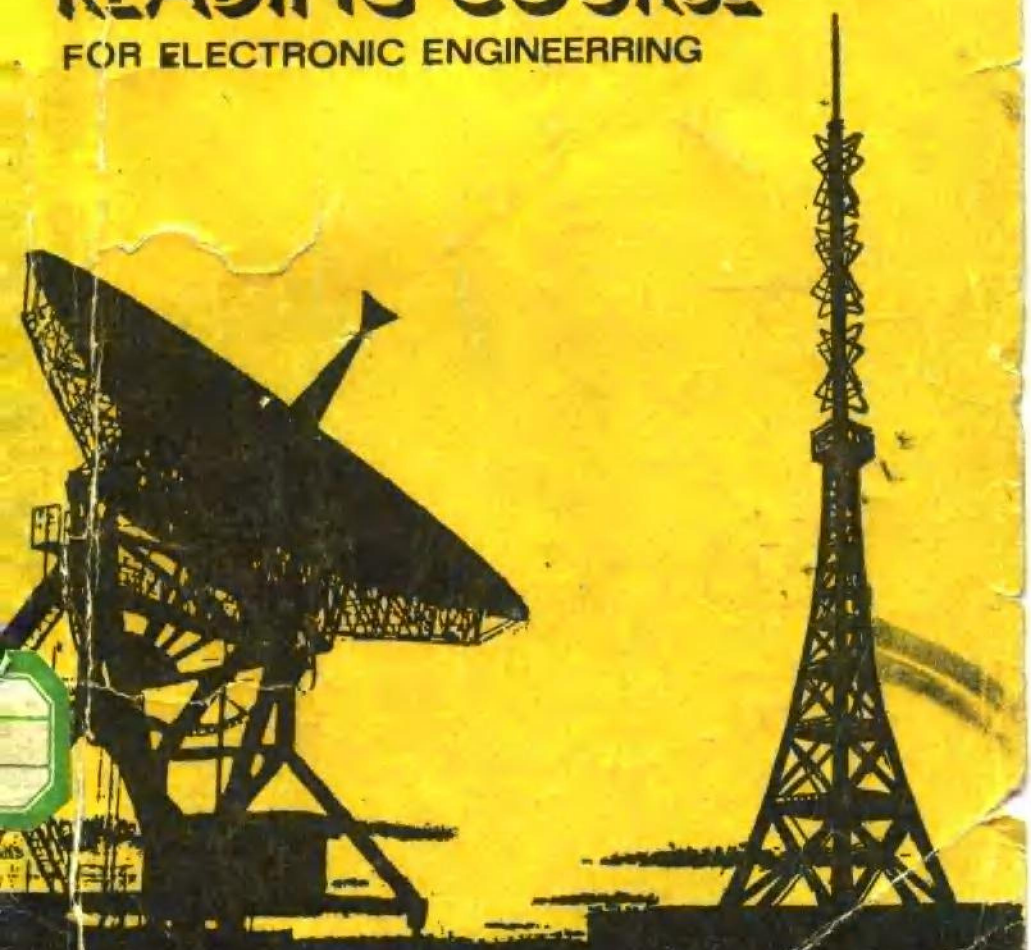
高等英语阅读教程

AN ADVANCED ENGLISH READING COURSE

FOR ELECTRONIC ENGINEERRING

孙洪仪 编



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电子类专业用

高等英语阅读教程

An Advenced English Reading Course for Electronic Engineering

孙洪仪 编

南京工学院出版社

内 容 提 要

本书是电子类专业高年级专业英语课教材。共分14个单元，每个单元均含有课文、注释、综合练习、阅读材料等四部分。内容新颖实用，涉及面广，有电路、器件、通讯、微波、电磁场、信号处理、数字图象（语言）处理、光纤、激光、微处理机、计算机、数据库、自动控制、人工智能、机器人学、生物电子学等。所选课文语言规范、体裁多样、利于教学；对课文中的难句均结合翻译技巧给出译文和讨论；综合练习的形式多样、内容丰富。练习的答案将与补充阅读材料另册出版。全部课文和阅读材料均由美籍英语教师录制成磁带另行发行。本书亦可供电子类专业领域中，科研人员自学专业英语，提高阅读专业文献水平之用。

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前　言

国家教育委员会所颁布的“高等学校理工科英语教学大纲”，将理工科大学的英语教学分为基础阶段和专业阅读阶段。专业英语课为必修课，总课时为120学时，总阅读量为250000词。本教程就是根据专业英语课的这些要求而编写的电子工程类专业用教材。

本教程共分十四个单元。每单元包括课文、课文注释、综合练习和阅读材料四个部分。

课文内容均选自国外新近出版的书刊。题材涉及到电子工程的许多重要方面，如电路、器件、电磁场、通讯、信号处理、微波技术、自动控制和计算机科学等。与此同时，特别注意了反映现代电子工程领域的新成就和发展方向，包括了诸如数字图象(语言)处理、计算机软件、微机开发系统、人工智能、机器人学、光纤通讯、激光和生物电子学等内容，文章的语言规范，体裁多样，适于教学；课文注释中就课文中的难句逐一进行了分析，并结合翻译技巧给出了参考译文；在综合练习中安排了大量的阅读理解、词义辨析、翻译实践及讨论题；阅读材料是为了配合课文内容，扩大阅读量而设计的。

通过本教材的教学，培养学生快速阅读、正确理解、流畅翻译专业文献的能力，从而使学生真正做到《大纲》所列“以英语为工具，获取专业信息”的要求。

为了达到“大纲”对阅读量的要求，本教程还配有补充阅读文选，它将与练习的答案另册出版，以供师生选用。所有的课文和阅读材料均由南京工学院美籍英语教授录制成磁带，与教材配合同时发行。

本教程曾在中国科技大学、南京工学院、上海科技大学、山东大学和郑州大学等高校多次使用，教学效果良好，受到师生的欢迎。上述学校在试用过程中对本教程提出过许多宝贵的意见和有益的建议，谨表感谢！

本书由中国科技大学科技外语教研室龚立副教授主审；由美籍英语教师李若丝(JoceleWild) 教授审阅书中的综合练习部分；由无线电系沈风麟教授、钱景仁教授、景中起副教授和吴健康副教授分别审阅了有关的专业内容部分。本书在修编出版过程中，还得到南京工学院王蕴仪教授、中国科技大学科技外语教研室周世雄副主任的热情帮助和指导，谨此一并致谢！

编　　者

1987年3月于中国科技大学

Contents

Unit 1

Text

Introduction to "Communication Systems"

The purpose of this book is to present an introductory treatment of communication systems. By "communication" we mean the conveying or transmission of information from one place and/or time to another. Admittedly, this definition is not very precise, but the subject of communication is very broad. It may, for example, mean anything from a telephone hookup to the use of good gestures, emphasis, and diction in a speech; from the amateur radio operator chatting about the weather to an American Indian sending a smoke signal. Note that the commonality in these examples is that there is information transmitted that is of importance to the recipient.

In this study of communications we shall restrict ourselves to the transmission of information over comparatively long distances. The use of electrical signals (in the broader sense, we may consider light to fall within this class because it is in the electromagnetic spectrum) has almost completely replaced all other forms of information transmission over long distances. This arises mainly because electrical signals are relatively easy to control (compared, for instance, to the fire for the smoke

signals) and travel with velocities at or near that of the speed of light. Certainly for long distances, then, a study of communications via electrical signals is appropriate.

What is information transmission? This subject turns out to be more complicated than it might first appear and will, in fact, form a basis for part of our study. From a strictly intuitive viewpoint, we can say that the transmission of information requires that signals vary with time. Consider, for example, a 9–V battery; once the voltage has been established, there is little further information available without changing the voltage. Connection of the battery to a variable resistor or transistor allows such a variation. However, simply the fact that the signal can vary with time is not sufficient! Consider a 120–V 60–Hz sinusoidal voltage; once the voltage has been established. there is little further information available without changing the amplitude or phase of the sinusoidal voltage, even though the voltage is changing at a 60–Hz rate.

We conclude not only that the transmission of information is related to signals changing with time but also that these changes must be made in an unpredictable way. Thus a necessary requirement is the use of a band of signal frequency content known as "bandwidth" (Chapter 3). These intuitive ideas will be enough to discuss the basic methods used in electrical communication systems. However, a more complete mathematical description of information transmission also demands some knowledge of probability (Chapter 8) and will be postponed until Chapter 9.

Communication over long distances usually requires that

some alterations or other operations be performed on the electrical signal conveying the information in preparation for transmission. Upon reception, known inverse operations are performed to retrieve the information.

In the process of transmission, the signals bearing the information are contaminated by noise. Noise is generated by numerous natural and man–made events and introduces errors in the information transmission. From an engineering point of view, the communication problem consists in designing those portions of the transmission over which one can exercise some control. A criterion for doing this is to keep the information transmission as error–free as possible.

With these desired objectives in mind, we shall consider different communication systems and their basic principles of operation. The emphasis will be on the methods and not on the particular circuits or devices currently employed.

A diagram of the basic units comprising a communication system is shown in Fig 1.1. Not every communication system makes use of all indicated operations, but each always involves a transmission medium of some kind. The encoder chooses the best form for the signal in order to optimize its detection at the output. The decoder performs the inverse operation to make the best decision, based on the availabe signals, that a given message was indeed sent. The design of the encoder and decoder must rely on a detailed mathematical description of information transmission. While the subject of coding often carries with it an air of secrecy, a more important motive in many modern coding systems is the improved efficiency in conveying informa-

tion.

The modulator produces a varying signal at its output which is proportional in some way to the signal appearing across its input terminals. For example, a sinusoidal modulator may vary the amplitude, frequency, or phase of a sinusoidal signal in direct proportion to the voltage input. The roles of the encoder and the modulator are similar in that both prepare the signal for more efficient transmission. However, the process of coding is designed to optimize the error–free detection that a given message is being sent, whereas the process of modulation is designed to impress the information signal onto the waveform to be transmitted. The demodulator performs the inverse operation of the modulator to recover the signal in its original form. The combination of a modulator–demodulator is often referred to as a "modem" in data transmission.

The transmission medium is the crucial link in the system. Without it, there would be no communication problem. The transmission medium may include the ionosphere, the troposphere,free space, or simply a transmission line. In any case, attenuation and distortion, as well as noise signals generated in the media and the transmitting and receiving equipment, are introduced. For our purposes, noise signals are any electrical signals (voltages or currents) which interfere with the error–free reception of the message–bearing signal.

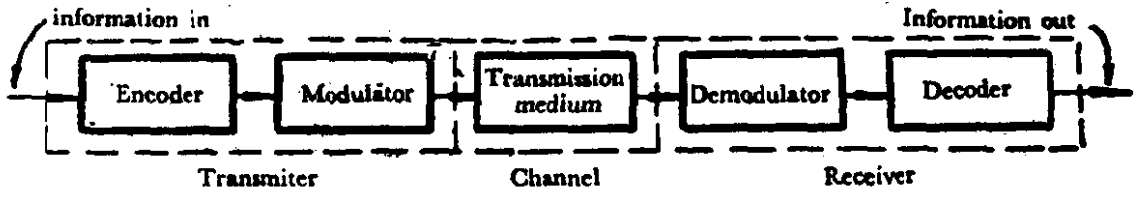

Fig 1.1 A communication system

The purpose of the main part of this book is to introduce and develop the above topics in a systematic manner and is based on the methods of signal analysis which are discussed briefly in Chapters 2 and 3.

Summary

In a system's approach, an input signal and the resulting response are used to characterize the behavior of a given system. For our purposes a signal is defined to be a single–valued function of time. This function may be complex–valued for mathematical convenience but our observations practice are real–valued.

Signals may be classified into basic categories by their finite energy or power. Other useful categories include those of periodic or aperiodic signals and random or deterministic signals.

Mathematically, a system is a rule for mapping inputs into outputs. If the system is linear, superposition applies. If the system response is not dependent on absolute values of time, but only on time differences, the system is time-invariant.

Communication is the transmission of information from one point to another. This transmission requires the ability to vary signals with time in a manner which is unpredictable to the receiver.

Noise is composed of those signals, both natural and man–made, which interfere with the transmission of information. Our interest in communication systems centers around the design of systems for the most error–free transmission of informa-

tion within constraints of the propagation of signal power, the effects of noise, and economic limitations.

Notes

1. By "communication" we mean the conveying or transmission of information from one place and / or time to another.

通讯的意思是指信息由某一地点传至另一地点，或者从某一时刻延至另一时刻；亦可指两者兼有之。

By "B" we mean "A" 这种句型可译为："B" 的意思是指"A"，或"A" 称为"B" 。有时可用其被动形式："A" is meant by "B"；或其倒装形式(以示强调)：By "B" is meant "A", e.g. By technology is meant the knowledge and use of the techniques and devices by which man explorts his environment to meet his needs.技术就是人类藉以探索周围环境，满足自身需要的技能和设备的知识及运用。

"and/or" 连接的前后两种事物既可同时存在，又可单独存在。为了符合汉语的表达习惯，本句中先译出"单独存在的情况"，再用"两者兼有之"表达"同时存在的情况"。

2. It may, for example, mean anything from a telephone hookup to the use of good gestures, emphasis, and diction in a speech; from the amateur radio operator chatting about the weather to an American Indian sending a smoke signal.

例如，从电话联络到人们在说话中恰当地运用手势，语调和辞令；从业余无线电操作者闲谈天气到美洲印第安人发送烟火信号等，其中无不包含通讯这个概念。

翻译时应注意联系专业背景，要体现出"通讯"所包含的动态过程。例如，不要把动态性的"电话联络" 译成静止性的 "电话试验

电路”；或者将“业余无线电操作者闲谈天气”，译成“闲谈天气的无线电操作者”等。

3. This subject turns out to be more complicated than it might first appear and will, in fact, form a basis for part of our study.

原来，这个科目要比初看上去复杂一些，事实上，它将成为我们部分研究课题的基础。

“turns out to be”意为“结果(是)，原来(是)，证明(是)”；“than”引导一省略形式的比较状句从句；“and”连接“turns out to be”和“will form”两个并列的谓语。

4. The decoder performs the inverse operation to make the best decision, based on the available signals, that a given message was indeed sent.

解码器完成相反的操作，它根据提供的信号作出最佳判决，来判断给定的消息确已发出。

“based on...”为条件状语；“that”引导一同位语从句，对“decision”作解释，注意，这一从句的谓语为一般过去时，用以说明发射消息是在解调之前。

5. However, the process of coding is designed to optimize the error-free detection that a given message is being sent, whereas the process of modulation is designed to impress the information signal onto the waveform to be transmitted.

可是，编码过程是为了发送给定消息，并使无误差检测最佳化，而调制过程则是将消息加到被发送的(信号)波形上去。

“to optimize...”和“that”引导的从句均为目的状语。译文中两者的语序与原文中颠倒，是为了表明信息的发送是在检测之前这一事实。

“whereas”连接两个并列的分句，语气上含有转折之意，可

译为“而”，又如：“Modesty helps one go forward, whereas conceit makes one lag behind.”谦虚使人进步，（而）骄傲使人落后。

Comprehension

I. Read each statement and decide whether it is true or false. Write 'T' after the true statements and 'F' after the false statements based on the text.

1. Communication deals with the transmission of information over comparatively long distances. ( )
2. The electrical signal conveying information should be processed properly before transmitting. ( )
3. The requirement of signals for information transmission is that signals vary with time randomly. ( )
4. Electrical signals transmit information because of their high travel speed. ( )
5. Whether the signals are contaminated by noise in the process of the transmission of information does not depend on the performance of communication system. ( )
6. In communication systems, the norm for designing the system is to prevent noise from affecting the information. ( )
7. The encoder is used to perform some alteration on the signal for more efficient transmission. ( )
8. The function of the decoder and the demodulator is less important than that of the encoder and modulator in a communication system. ( )
9. The objective for using a modulator in a communication

system is consistent with that for using an encoder for more efficient transmission. ( )

10. Whether signals are periodic or not depends on their energy. ( )

II. Interpretation of words or phrases: Circle the letter next to the best answer or one nearest in meaning to the words jtaljcized based on the text.

1. The purpose of this book is to present an introductory *treatment* of communication systems.
   (A) exposition
   (B) cure
   (C) approach
2. In this study of communications we shall *restrict* ourselves to the transmission of information over comparatively long distances.
   (A) ask for
   (B) limit
   (C) handle
3. The use of electrical signals (in the broader sense, we may consider light *to fall within* this class because it is in the electromagnetic spectrum) has alomst completely replaced all other forms of information transmission over long distances.
   (A) to pass into
   (B) to come within the scope of
   (C) to belong to
4. This *arises* mainly because electrical signals are relatively easy to control (compared, for instance, to the fire for the