刘丽萍 毕心安 编著

航空通信技术英语教程

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前　言

随着我国民用航空事业及通信技术的飞速发展，引进的通信设备日趋增多，通信业务对外联系越来越紧密。为了满足航空通信与信息工程专业对英语的需求，提高民航通信技术人员专业英语水平，我们编写了这本《航空通信技术英语教程》。

本书所选文章着眼于通信领域的新技术及其在民航的应用，全书共22课，课文内容涉及数据通信、卫星通信、光纤通信、程控交换、移动通信及现代通信网络的原理及相关设备等方面，另外还包括新航行系统有关电信方面的内容，基本上覆盖了当代通信技术在民用航空应用的每一个领域。

全书内容取材于国内外有关书刊、国际民用航空公约附件十、通信设备生产厂家和公司的有关产品介绍及设备使用说明书等，题材广泛，文字流畅，词汇丰富，专业性强，易于阅读和理解。为了便于自学，在每篇课文之后附有生词、专业术语、简字简语、语法注释、课后练习及阅读材料等。书后还附有词汇表、术语表、简字简语表及练习答案。考虑到读者学习过公共英语，已具有一定的英语基础，所以本书的编写是以扩大航空通信技术英语的词汇量，熟悉专业术语，了解并掌握科技英语的表达特点和翻译技巧为宗旨。

本书由广州民航职业技术学院通信工程系刘丽萍、中国民用航空总局空中交通管理局通信处毕心安共同编写，其中第1—18课由刘丽萍编写，19—22课由毕心安编写，全书由刘丽萍统稿。中国民用航空学院马士忠副教授担任本书的主审，并为本书提出了许多宝贵的意见和建议，在此表示衷心的感谢。另外，本书在编写过程中还得到广州民航职业技术学院副院长蔡昌荣，通信系张建超、张力平、梁应禄以及民航中南空管局中心收信台丘伟平、方建国、崔志强、张水兴、刘志峰、沈中针等同志的大力帮助和支持，在此一并表示感谢。

希望本书能对提高读者航空通信技术英语的读写及翻译能力有所帮助。由于我们水平有限，书中难免有一些错误和不足之处，恳请读者批评指正。

编　者

2000年1月

CONTENTS

Lesson 1

Data Communications System

Data communications is most simply defined as the science of moving information from one place to another.① The type of information concerned with is data that has been encoded for use in a computer system. The data is either coming from a computer or being sent to a computer. So the data communications is the science of moving computer-encoded information from one place to another.

Computers "think" in terms of binary bits.② For the binary bits stored in a computer to represent something other than numbers, various computer codes have been developed. These codes each specify unique combinations of bits to represent each of the keys (similar to typewriter keys) and control characters (special characters that specify a unique function) on a computer. The most common computer codes include the following:

ASCII—American Standard Code For Information Interchange

EBCDIC—Extended Binary Coded Decimal Interchange Code

SBT—Six-Bit Transcode

BAUDOT—International Telegraph Alphabet No.2 (ITA-2)

For example, Each ASCII character consists of 8 bits (1 bit parity, 7 bits data). It is standardized to allow computers of different manufacturers to communicate. During transmission, the source translates the computer's internal binary code to ASCII code. The receiver translates the ASCII code to the destination.

At its simplest, a data communications system consists of some form of input or output unit, a communications link and a host processor. Most networks contain many more than these three basic ingredients,③ but it is worth remembering that they are all designed to facilitate, expedite or make more efficient the basic functions of inputting,

transmitting, processing and outputting data.

④One of the main hardware devices added to a large computer system for telecommunications is a communications controller or front-end processor (Figure 1-1), an interface between the computer and the telecommunications channels. In a large computer system, the processor sits in a large cabinet on the computer room floor. The front-end processor is similar to a secretary who serves as an interface to a busy executive. The secretary receives incoming mail, opens it and places it in the executive's desk. After the executive has worked on the material, the secretary retrieves it, places it in an envelope and mails it.

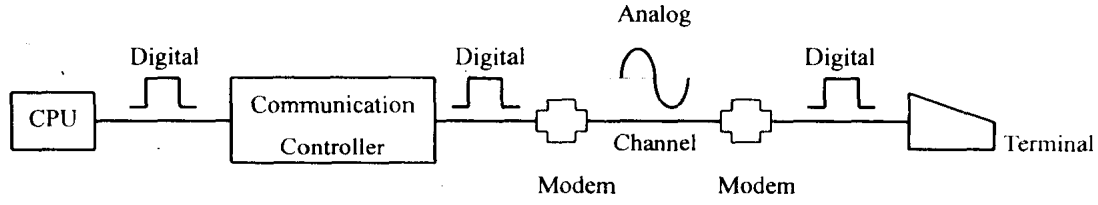

Figure 1-1 Data Communications System

The communications controller receives incoming data communications from a remote terminal and performs certain work on the incoming traffic before sending it on to the computer for processing. After the computer has done the actual data processing, the work is sent back to the controller where it is prepared for transmission back to the remote terminal.

The controller or front-end processor is a buffer device between the high-speed computer and the relatively slow telecommunications channel. The controller can analyze incoming data traffic for errors, perform code conversions, speed conversions, etc. Data communications from the computer can be arranged in the proper format for transmission to the distant terminal. The communications controller can consist primarily of hardware components, but most controllers also contain software. The term "front-end processor" is often used to describe controllers which contain software.

The communications controller interfaces the telecommunications channel through a hardware device called a modem, if the telecommunication channel is analog. It converts digital computer pulse into analog information that can be sent over voice telephone lines. A telecommunications channel has a modem at both ends of the channel. The modem at the terminal end converts analog information back into digital form. If the channel is digital (PCM), the communications controller will interface the channel through DSU. It coverts data information generated by the terminal or computer into digital information that can be sent over digital lines.

The telecommunications channel is the connecting link between the computer and the remote terminals. This channel is usually a telephone line, but it can also be anything that is capable of transmitting electrical signals. Microwave systems, satellites, lasers, and fiber optics are all being used more and more as communications channels for data communications systems.

⑤At the distant end of the telecommunications channel is the terminal that communicates with the computer. The terminal is the interface between people and the computer. It can be a teleprinter, video display, printer and/or a personal computer.

The physical path from the computer to the terminal is similar to a highway. Rules of the road are needed for traffic-data communications-to flow smoothly. Standards and protocols set the speed limit on the highway, assign right of way, deal with mistakes, etc. Without them there could be no real data flow over the highway.

In a data communications system, the direction of information flow can be classified to three types:

- Simplex mode
- Half-duplex mode
- Full-duplex mode

In a simplex mode of transmission, data can flow in only one direction (Figure 1-2). In a half-duplex mode of transmission, data can flow alternately in two directions, but not in one at a time (Figure 1-3). In a full-duplex mode of transmission , data can flow simultaneously in both directions (Figure 1-4).

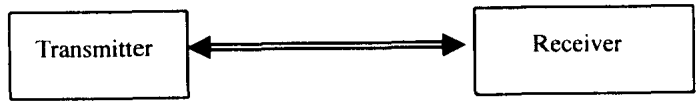

Figure 1-2 Simplex Interface

Figure 1-3 Half-Duplex Interface

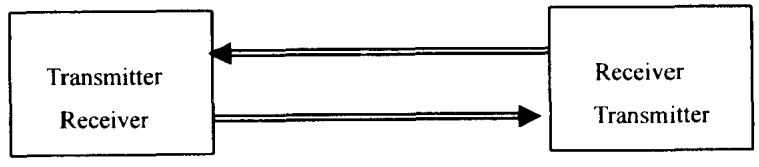

Figure 1-4 Full-Duplex Interface

Most data communications systems require that the receiver acknowledge receipt of data to the transmitter. For this reason, the simplex mode of transmission is generally not used in data communications. The half-duplex mode allows the receiver to send an acknowledgment message, but the transmitter has to stop transmitting so the receiver can acknowledge.

The full-duplex mode provides for faster transmission because the receiver can acknowledge receipt of data even while the transmitter continues sending additional data.

New Words

encode [in'kəud] *v*. 编码
binary ['bainəri] *a*. 二进制的
typewriter ['taipˌraitə] *n*. 打字机
decimal ['desiməl] *a*. 十进制的
transcode ['træskəud] *n*. 译码
telegraph ['teligrɑ:f] *n*. 电传机，电报
ingredient [in'gri:djənt] *n*. 组成部分，要素
expedite ['ekspidait] *v*. 加速
telecommunication ['telikəˌmju(:)ni'keiʃən] *n*. 电信
interface ['intəfeis] *n*. 接口，相互作用
channel ['tʃænl] *n*. 信道，线路
cabinet [kæbinit] *n*. 机箱，机柜
retrieve [ri'tri:v] *v*. 检索，取回，收回
executive [ig'zekjutiv] *n*. 执行官，经理
analog [ə'nælədʒi] *n*. 模拟，类似
modem ['mədəm] *n*. 调制解调器，数传机
buffer ['bʌfə] *n*. 缓冲器
conversion [kən'və:ʃən] *n*. 变换，转换，变频
microwave ['maikrəweiv] *n*. 微波
laser ['leizə] *n*. 激光
teleprinter ['teliˌprintə] *n*. 电传(打字)机
protocol ['prəutəkɔl] *n*. . 协议，规约
duplex ['dju:pleks] *a*. 双工的，双向的
tremendous [tri'mendəs] *a*. 极大的，非常的

Phrases and Expressions

telephone line	电话线路
microwave systems	微波系统
parity bit	校验比特（位）
host processor	主处理机
a simplex mode	单工方式
input unit	输入设备
communications controller	通信控制器
front-end processor	前置处理机
video display	视频显示器
code conversion	码型转换
fiber optics	光纤

Abbreviations

HW	Hardware	硬件
COM	Communication	通信
PCM	Pulse Code Modulation	脉冲编码调制
TEL	Telephone	电话
CH	Channel	信道
HDX	Half-Duplex	半双工
FDX	Full-Duplex	全双工
ITA	International Telegraph Alphabet	国际电码表
DSU	Digital Service Unit	数字业务单元
SBT	Six-bit Transcode	六比特（位）译码
PC	Personal Computer	个人计算机
DCS	Data Communications System	数据通信系统
EBCDIC	Extended Binary Coded Decimal Interchange Code	扩充的二进制码的十进制交换码
ASCII	American Standard Code for Information Interchange	美国信息交换标准码

Notes to the Text

①that 引导的定语从句，先行词是 data，that 在从句中作主语，译为：有关的信息类型

是数据，它在计算机系统中被编码利用。

②For the binary bits stored in a computer to represent something other that numbers 为独立主格结构，作原因状语。该句可译为：存储在计算机中的二进制数表示的不仅仅是数字，因而各种各样的计算机编码被开发出来。

③it is worth …that 意为"值得…的是"，it 是形式主语，真正的主语是 that 从句，worth 后接动名词。句中的代词 they 代替前面提到的"输入输出设备，通信链路和主机等等"数据通信系统的组成部分。译为：但是应该记住，它们都是为方便、加速和上述输入、传输、处理及输出数据的基本功能，或使它们的效率更高而设计的。

④该句的主语是"One of the main hardware devices"，added…是过去分词短语作定语修饰主语，an interface 是 a communications controller or front-end processor 的同位语。译为：为通信而加入大型计算机系统的主要硬件设备之一是通信控制器和前置处理器，是计算机和电信信道间的接口。

⑤这是个倒装句，正常语序为：The terminal that communications with the computer is at the end of the telecommunications channel. 倒装的原因是 terminal 有一个较长的定语从句，放在句末头轻脚重。译为：在电信信道的远端是与计算机通信的终端。

EXERCISES

Ⅰ. Text comprehension.

1. Data Communications is the science of _____.
   a. moving numbers from one place to another
   b. exchanging information between computers
   c. exchanging numbers between different users
2. Computers "think" in terms of _____.
   a. decimal bits
   b. binary bits
   c. hexadecimal bits
3. A fundamental communications system consists of _____.
   a. an input or output unit, a communications link and a host processor
   b. more than these three basic ingredients
   c. less than these three basic ingredients
4. A communications controller or front-end processor is _____.
   a. an interface between the computer and the telecommunications channels
   b. an interface between the computers
   c. an link between the channels
5. A modem is _____.

a. an interface between the computer and the telecommunications channels

b. the communications controller

c. an interface between the communications controller and the telecommunications channel

6. In full-duplex communications system, the data _____.

a. can flow in two directions alternately

b. can flow in two directions at the same time

c. can flow in only one direction

Ⅱ. Write out the English equivalent of the following words or expressions.

1. 计算机系统　　2. 数据通信系统

3. 微波通信系统　　4. 光纤通信

5. 卫星通信系统　　6. 模拟通信

Ⅲ. Explain the following special terms in English.

1. data communications

2. communications controller

3. telecommunication channel

4. a full-duplex channel

Ⅳ. Choose the best answer.

1. expedite

a. scale up　　b. inflate　　c. rectify　　d. speed up

2. ingredients

a. components　　b. parts　　c. devices　　d. equipment

3. information

a. news　　b. data　　c. digital　　d. report

4. channel

a. way　　b. highway　　c. road　　d. path

Ⅴ. Translate the following sentences into English.

1. 通信控制器或前置处理机是计算机和通信信道之间的一个接口。

2. 微波通信和卫星通信作为通信媒介越来越多地用于数据通信系统中。

3. ASCII 码的一个字符由一比特的校验位，七比特的数据位构成。

4. No.2 码广泛用于电报网中。

5. 通信信道是计算机和远程终端之间的连接链路。

READING MATERIAL

The Principle of the PCM

Pulse-code modulation is one way of converting an analog message to a binary sequence so that digital transmission methods can be used to convey it to its destination.

PCM is dependent on three separate operations: sampling, quantizing and coding.

The devices performing the digitizing process are called channel banks or primary multiplexers. They have two basic functions: (1) converting analog signals to digital signals (and vice versa at the other end); and (2) combining (multiplexing) the digital signals into a single time division multiplexed (TDM) data stream (and demultiplexing them at the other end).

①Analog-to-digital conversion is based on Nyquist sampling theory (Figure 1-5), which states that if a signal is sampled instantaneously at regular intervals and at a rate at least twice the highest frequency in the channel, the samples will contain sufficient

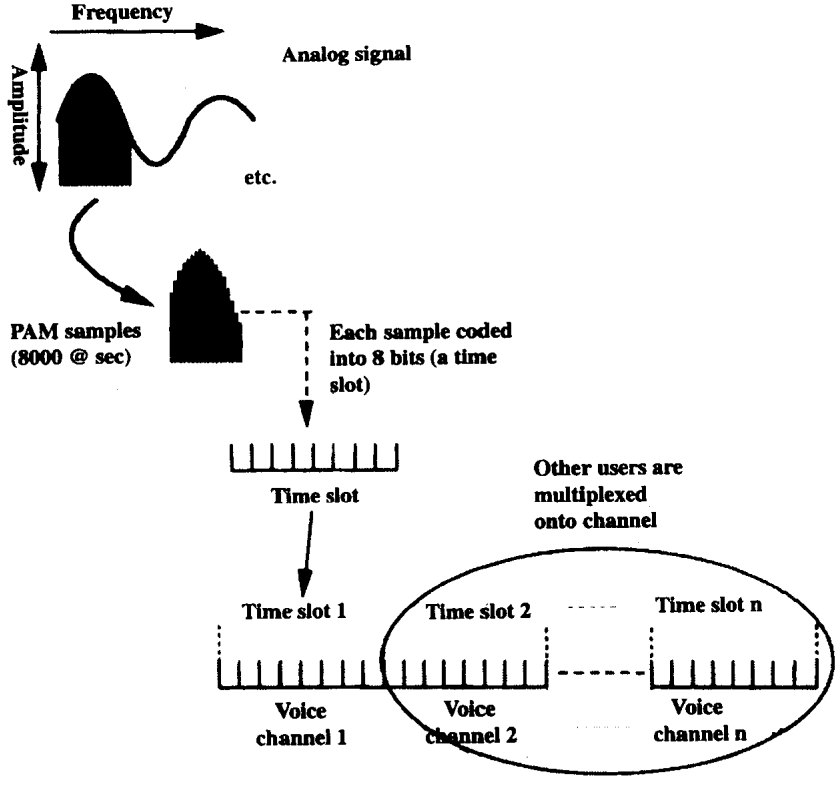

Figure 1-5 Analog-to-digital conversion

information to allow an accurate reconstruction of the signal.

The first stage in converting an analogue waveform to a binary sequence using pulse-code modulation is to sample it and produce a pulse-amplitude modulated signal. The accepted sampling rate in the industry is 8,000 samples per second.② Based on Nyquist sampling theory, this rate allows the accurate reproduction of a 4kHz channel, which is used as the bandwidth for a voice-grade channel. The 8,000 samples are more than sufficient to capture the signals in a telephone line if certain techniques are used.

With pulse amplitude modulation (PAM), the pulse carrier amplitude is varied with the value of the analog waveform. The pulse are fixed with respect to duration and position. PAM is classified as a modulation technique because each instantaneous sample of the wave is used to modulate the amplitude of the sampling pulse.

The process involved in the conversion of a PAM waveform to PCM is quantization.③ The point of quantization is to convert the amplitude values of the PAM waveform which can assume any value within the amplitude range of the message waveform to a finite set of values. Quantization may be defined as the reduction of a continuum of values to a finite set of values. The difference caused by quantization is referred to as quantization error. The quantizer outputs are actually coded to their two-digit (0 and 1) binary coding is to replace the analog signal by a series of pulses—The whole process is therefore called pulse code modulation (PCM).

It should be noticed that the 8kHz sampling rate results in a sample pulse train of signals with a 125 microseconds (μs) time period between the pulse. Each pulse occupies 5.2μs of this time period. Consequently, it is possible to interleave sampled pulses from other signals within the 125μs period. The most common approach in American utilizes 24 interleaved channels, which effectively fills the 125μs time period. The samples are then multiplexed using TDM and put into a digital TDM. TDM provides an efficient and economical means of combining multiple signals for transmission on a common facility.

New Words and Phrases

decoder [di:'kəudə] *n*.	译码器
stage [steidʒ] *n*.	步骤，程序
waveform ['weivfɔ:m] *n*.	波形
sample ['sɑ:mpl] *v*.	抽样，取样
quantize ['kɔntaiz] *v*.	量化，分层
quantization [kɔnti'zeiʃən] *n*.	量化，分层
amplitude ['æmplitju:d] *n*.	幅度，振幅

multiplexer ['mʌltipleksə] *n*.	多路复用器
interleave [ˌintə(:)'li:v] *n*.	交织，隔行
assume [ə'sju:m] *v*.	担任，采用
bandwidth ['bændwidθ] *n*.	(频) 带宽 (度)
finite ['fainait] *a*.	有限的
continuum [kən'tinjuəm] *n*.	连续
capture ['kæptʃə] *v*.	捕获，引起 (注意)，赢得
vice versa ['vaisi'və:sə]	(拉) 反过来 (也是这样)
carrier ['kæriə] *n*.	载波，介质，载荷者，通信公司
analog-to-digital conversion	模数转换
Nyquist Sampling Theory	奈奎斯特抽样定理
data stream	数据流
analog signals	模拟信号
digital signals	数字信号
be defined as…	被定义为…
be referred to as…	称…
PAM Pulse Amplitude Modulation	脉幅调制
MUX Multiplexer	多路复用器
TDM Time-Division Multiplexing	时分复用

Notes

①关系代词 which 引导的非限制性定语从句，which 在从句中作主语。在定语从句中有一个 that 引导的宾语从句，作动词 states 的宾语；在宾语从句中有一个 if 引导的条件状语从句。该句译为：模糊转换的基础是奈奎斯特准则，该准则表明如果以规定的间隔和速率，即至少是信道最高频率的两倍的速率对某一信号进行瞬时抽样，那么这些样值点将包括有效的信息可以准确地再生这个信号。

②"based on…theory" 过去分词短语，作状语，相当于表示原因的状语从句，即 "As this rate is based on …"。在句中有一个关系代词 which 引导的非限制性定语从句，which 在从句中作主语。该句译为：根据奈奎斯特准则，这个速率可以准确地再生 4kHz 的信道，这个带宽用作话音信道的带宽。

③该句中心句子为：The point of quantization is to convert the amplitude values of the PAM waveform to a finite set of values。句中有一个关系代词 which 引导的定语从句，先行词为 waveform。该句译为：量化就是将 PAM 波形的幅值变换成有限的分层值，PAM 波形的幅值可以是整个信息波形幅值范围内的任何值。