TELECOMMUNICATIONS

Developing Reading Skills in English

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Introduction

This book, which is one of a series, is intended for students and trainees in telecommunications whose mother tongue is other than English but who require an adequate reading performance in technical English as a tool for advancing their studies or training.

The texts

The field of telecommunications, currently undergoing a revolutionary expansion in technology and significance, is not as yet a curriculum subject in the usual sense, but rather a conglomeration of topics from physics and electrotechnology. These texts have been selected to represent a cross-section of the major themes, together with their associated lexical and stylistic characteristics; a comprehensive survey of the field would be beyond the scope of a single volume. The texts are authentic, chosen from the British and American corpus to illustrate a broad range of styles in telecommunications writing, including journalistic presentation for the non-specialist, general textbooks, teaching material from current schemes, reference works and advanced technical manuals. It is not the intention to analyse or attempt to fully explain or define the technical concepts underlying the language use—in these matters we defer to the other party in the ESP partnership, the technical specialist. Instead we are concerned with the way an argument is presented and developed in a telecommunications text, and the set of items which defines each topic.

The purpose of the book is to build up the readers' confidence with a variety of tasks, so that when, in the course of their studies, they face an unfamiliar text in English they will have at their disposal techniques which will permit them access to the information contained in the text *in the least possible time.* The intention is not only to help the students to read more fluently in English but also to improve their overall reading speed.

The exercises

All the exercises in this book have been designed to fulfil a specific purpose in training the student to acquire or develop the skills and techniques necessary to become a fast and fluent reader—one who is able to determine quickly what needs to be extracted from a given text, who can assess to what extent a general or "global" understanding will be enough, and when (and how far) it is essential to go into detail.

The exercises themselves fall broadly into four categories:

1. Those designed to help the student to read better and faster by identifying themes and topics.
2. Those designed to help the reader to understand the text and syntactic structures in detail.
3. Sentence- and text-level production exercises.
4. Information transfer exercises, to develop the skill of transposing information from one format to another.

Exercise types

In category 1 there are the types which involve the reading techniques of *skimming* and *scanning*. In both cases the reader must go through the text very quickly, not pausing over every unknown word. In skimming, however, the idea is to get a general grasp, in the broadest terms, of what the text is about. In scanning, the reader is searching for more specific details.

In category 2 there are true/false, multiple choice, synonym/antonym and cloze exercise types, designed to help the student to appreciate word meaning, usage, sentence structure and the functions of prediction and reference within the text.

In category 3 the emphasis is on the production of well-formed sentences and the guided construction of paragraphs.

In category 4 there are flow charts, tables and diagrams, highly characteristic of technical writing presentation, where the reader is called upon to draw information from the text in order to add labels, complete lists, or otherwise incorporate textually-presented content with schematic representation.

How to use the book

Before starting to read any of the texts, the students should first look at the accompanying exercises, to see what will be required from their reading of the passage. They should look particularly at the first exercise, which, in most Units, will be a skimming or scanning exercise. It is advisable to work through the exercises in order, as, in

general, they are arranged to lead from a "global" view, through a detailed examination to a reformulation of the main points. When the exercises for a Unit have been completed, and the answers checked against the key (see below), the text can be used later in a controlled procedure designed to increase reading speed. Once the Unit has been exhaustively studied, the text should be put aside for several days. Then the student should read it again, straight through, making a careful note of the time taken. A log of the results should be kept, showing the length of the passage (number of words) and the reading speed in minutes and seconds. The student can then plot progress with each succeeding text. Two things should be stressed at this point:

1. In work of this nature, the student is in competition with himself, or at least against the clock, and is in no way competing with members of a group or class.
2. The actual reading should always be silent—reading aloud by a student should play no part in any classroom activity aimed at achieving a reading competence. It is a highly specialized skill, and not one that is frequently called for in ordinary life. It may occasionally be necessary for a teacher to read a text to a group, but in the main, for the student reading is a private, personal and, above all, silent proceeding.

Classwork

Where the book is being used with a class, the teacher should encourage the students to work in pairs, or small groups, depending on the type of exercise. The skimming or scanning exercises could be tackled by two students working together, while most of the rest could very well be done by group work. A small group of, say, four students can exchange ideas and reach a consensus. Then each group's answer could be examined by the other groups.

The student alone

The materials are all suitable for the student working alone, and can be used for unsupervised self-study. In such a case it is imperative that the student uses the Answer Key in a constructive way (see below).

The answer key

A complete set of answers to the exercises is provided, and it is vital that proper attention is paid to the checking of answers against this key. Where there is no one "right" answer, several possible ones

are suggested. In all cases, however, the student must appreciate why one answer is to be preferred to another, and why an answer can be rejected as wrong. The answers must be studied, especially by the student working alone. It is not enough just to accept that a question may have been wrongly answered, and then pass on. The student should return to the text, examine it again until the reason for the right answer becomes apparent. In class, correcting exercises should be done carefully, with adequate time for discussion, and perhaps protest and dissension. It must not be a mere "rubber-stamping" of ticks and crosses.

Acknowledgements

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Contents

UNIT 1

Telecommunications

Communication, the exchange of ideas and information, is fundamental to human nature. Since time began, man has looked for ways of sending his messages over longer distances, using, for example, drums, arrows, smoke signals and flags. As civilization has grown, so has the need for fast long-distance communication in everyday life. Now we possess advanced technology to speed our messages around the world almost as fast as thought itself. This is the new science of telecommunications.

Communication is usually effected by the exchange of a series of signals or signs agreed by both sender and receiver. In telecommunications the information is converted from its original form, such as the human voice, to an electronic signal; the equipment which carries out this conversion is called a transducer. The electronic signal is transmitted through a suitable transmission path, to be converted back to its original form by a second transducer at the receiving end. In line communications the frequency of oscillation of an electric current or voltage serves as the carrier of information, whereas in radio systems the carrier wave consists of periodic oscillation in the

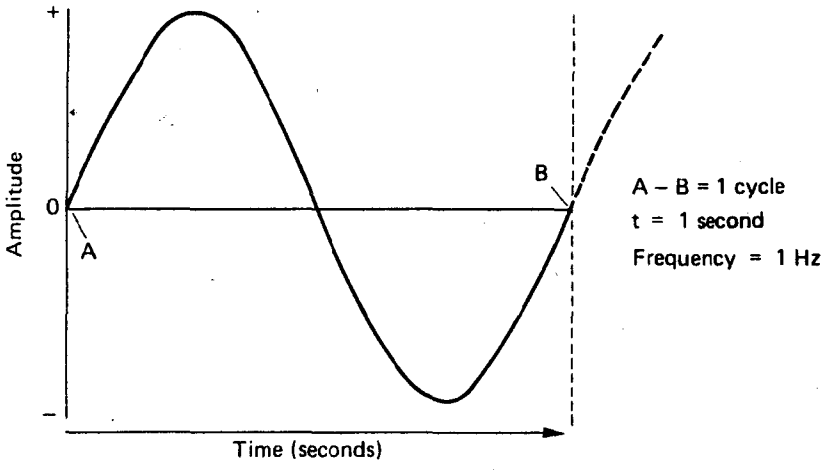


FIG. 1. A sinusoidal waveform.

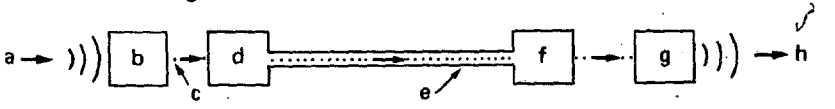
electromagnetic field. The speed with which signals can be transmitted is of great importance. Electromagnetic energy travels at speeds up to that of light, depending on the medium through which it is travelling.

One of the simplest waveforms is the sinusoidal waveform of an alternating current produced by the rotation of a wire loop in a magnetic field. The number of complete cycles in 1 second is the frequency in Hertz (Hz): 1 Hz = 1 c/s. 1000 Hz = 1 kilohertz (kHz); 1000 kHz = 1 megahertz (MHz); 1000 MHz = 1 gigahertz (GHz).

EXERCISES

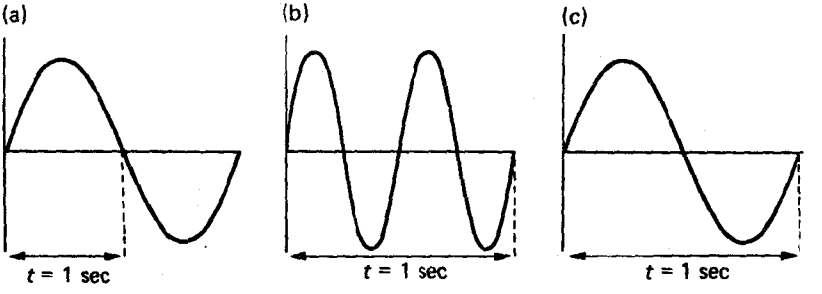
1.1 Choose the following:
(a) Which word means "the exchange of information"?
(b) Which word means "long distance communication"?
(c) Which word means "modern scientific equipment"?

1.2 Label the diagram:



ELECTRONIC SIGNAL TRANSDUCER RECEIVER TRANSMITTER PATH ORIGINAL SIGNAL TRANSMISSION PATH

1.3 Give the frequency of:



UNIT 2

The Telephone

telephone A system for converting sound waves into electric variations that can be sent over wires and reproduced at a distant point. Used primarily for voice communication. It consists essentially of a telephone transmitter and receiver at each station, interconnecting wires, signaling devices, a central power supply, and switching facilities. Also called phone.

telephone capacitor A small fixed capacitor connected in parallel with a telephone receiver to bypass higher audio frequencies and thereby reduce noise.

telephone carrier current A carrier current used for telephone communication over power lines or to obtain more than one channel on a single pair of wires.

telephone channel A one- or two-way path suitable for the transmission of audio signals between two stations.

telephone circuit The complete circuit over which audio and signaling currents travel.

telephone dial A switch operated by a finger wheel, used to make and break a pair of contacts the required number of times for setting up a telephone circuit to the party being called.

telephone line The conductors extending between telephone subscriber stations and central offices.

telephone receiver The portion of a telephone set that converts the a.f. current variations of a telephone line into sound waves.

telephone relay A relay that has a multiplicity of contacts on long spring strips mounted parallel to the coil, actuated by a lever arm or other projection of the hinged armature. Used chiefly for switching in telephone circuits.

telephone repeater A repeater inserted at one or more intermediate points in a long telephone line to amplify telephone signals, to maintain the required current strength.

telephone switchboard A switchboard for interconnecting telephone lines and associated circuits.

telephone transmitter The microphone used in a telephone set to convert speech into a.f. signals.

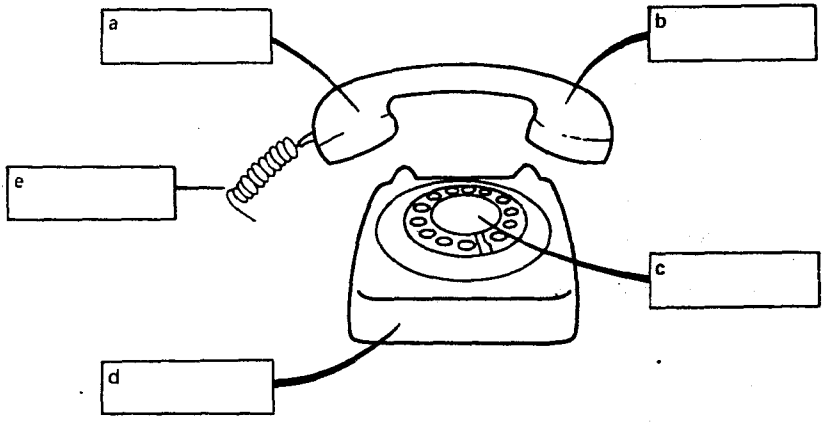
35 **telephony** The transmission of speech and sounds to a distant point for communication purposes.

(From: John Markus, *Electronics Dictionary*, 4th ed. © McGraw-Hill Inc., 1978. Reproduced with permission.)

EXERCISES

2.1 Do you think this text comes from:
(a) a technical manual?
(b) a general textbook?
(c) a reference book?

2.2 Find terms from the text to label the diagram:



2.3 If these terms were added to the list, where would they go?
(a) telephone jack: between _____ and _____.
(b) telephone plug:
(c) telephone loading coil:
(d) telephone ringer:
(e) telephone wire:

2.4 Fill in the blanks:
In a telephone system (1)_____ waves are (2)_____ into (3)_____ variations and sent over (4)_____. Used primarily for (5)_____ communications, it consists of a (6)_____ and a (7)_____ connected by (8)_____.

UNIT 3

The Telephone Exchange

The business of a telephone exchange is, on demand, to connect two or more of the exchange terminations together for a period, usually to permit speech signals to pass. A termination may be a subscriber's line, a junction line connecting with another exchange, or an access to a special service, such as speaking clock or directory enquiry. Means have to be provided to indicate a demand for a call, to receive the instructions for a connection and to *supervise* the connection so that it can be cleared when done with.

These basic functions must be carried out by any telephone-exchange system, whether it be a simple manual switchboard or a complex automatic system. The means for indicating that a line is calling must be individual to that line, and is called the *line circuit.* Since this type of circuit is the most numerous in any exchange, it is made as simple and cheap as possible. The line circuit must register the following conditions of the line to indicate them to the operator of a manual exchange or the switching equipment of an automatic exchange:

(a) line idle;
(b) line calling (but call not yet attended to);
(c) line engaged in a connection.

These conditions can be registered on two relays, (or the electronic equivalent) known as the line relay (L) and the cut-off relay (K). When the subscriber calls by lifting the handset, this completes a loop consisting of the telephone, the line wires, the L relay and the exchange battery. The L relay operates and this signals to the exchange that a connection is required. The K relay operates when the line is connected and this cuts off the calling signal produced by the L relay.

(From: J. E. Flood (ed.), *Telecommunication Networks.* Published by Peter Peregrinus Ltd on behalf of the Institution of Electrical Engineers, 1975)

EXERCISES

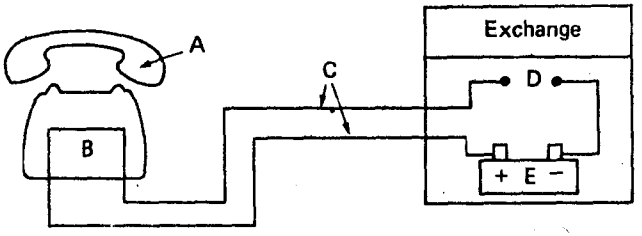
3.1 True or false?

1. The purpose of a telephone exchange is to connect callers with each other or special services.
2. There is no means of supervising a connection.
3. Each line circuit affects only one line.
4. The line circuit is expensive equipment.
5. The K relay produces a calling signal.

3.2

1. What usually happens when two exchange terminals are connected?
2. Name a simple exchange system.
3. What indicates that a line is calling?
4. How many line conditions are registered by the line circuit?
5. What type of circuit is most numerous in an exchange?

3.3



1. Find the sentence in the text which fits the diagram.
2. Name: A. _____
   B. _____
   C. _____
   D. _____
   E. _____

UNIT 4

Radio Waves in the Atmosphere

The air which surrounds the earth is called the atmosphere. This is divided into four layers. The layer nearest to the earth is the troposphere, containing most of the weather effects. Next is the stratosphere, followed by the ionosphere, which is a deep layer of ionized gases. The outermost layer, fading into empty space, is the exosphere. The troposphere and the ionosphere both play an important part in telecommunications.

The density of free electrons in the ionosphere increases with height between 50 and 300 km. If a radio wave interacts with the charges, the more charges it encounters the more it will be affected. The higher its frequency, the less it will be affected.

As the frequency of a h.f. radio wave increases from 4 to 14 MHz, fewer waves are reflected back to earth; those that do return are reflected from a height that increases with frequency.

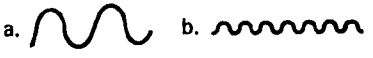
At the lower end of the r.f. band waves are reflected from the lowest portion of the ionosphere, the D region. These waves have a wavelength which is comparable to the distance between the base of the ionosphere and the earth's surface—which also reflects radio waves. The earth and the ionosphere form a waveguide; the waves are guided around the curvature of the earth with very little loss of signal strength, making them ideal for long distance communication and navigation purposes.

Microwave transmissions in the 900 MHz to 5 GHz range can be reflected via the troposphere. Although these frequencies travel through the ionosphere in straight lines, they are scattered by certain atmospheric effects which may be wind, pockets of warm air or layers in the troposphere. The advantages of troposcatter are its efficiency in transmitting over distances which are too long for line-of-sight transmission but too short for ionospheric reflection, and its wide bandwidth. The disadvantages are that severe fading occurs, and a combination of high power transmitters and sensitive receivers is necessary.

EXERCISES

4.1 To what do the following refer?
(a) it (line 10)
(b) that (line 14)
(c) which (line 18)
(d) them (line 21)
(e) these (line 24)
(f) its (line 27)

4.2
1. At what height would there be most free electrons?
   (a) 65 km (b) 165 km (c) 265 km
2. Which wave would be less affected by the ionosphere?



3. Which wave would be reflected first?

4. Which frequency would be most affected by the D region?
   (a) 3 kHz (b) 3 MHz (c) 3 GHz
5. Which of these should not affect tropospheric scatter?
   (a) pressure (b) light (c) temperature

4.3 Name A–F