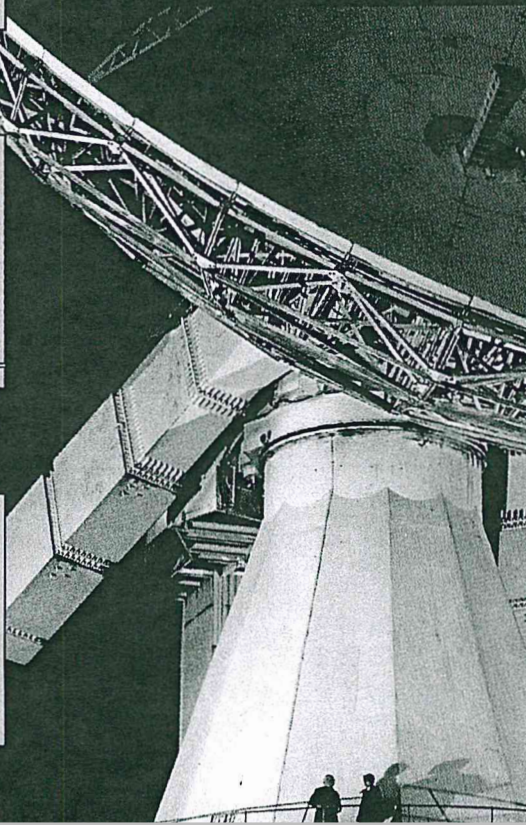
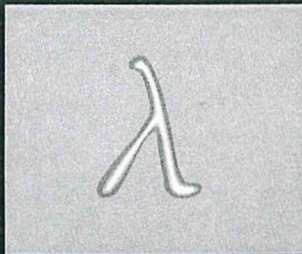
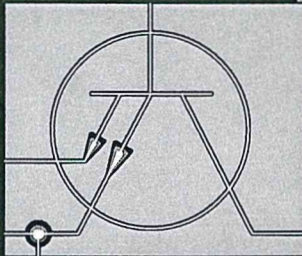
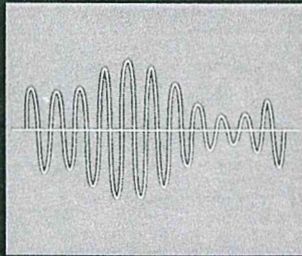
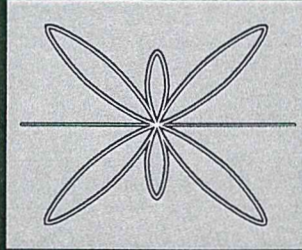
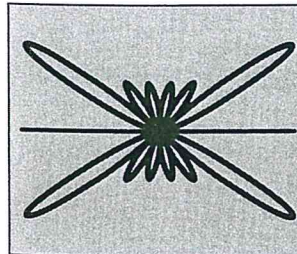
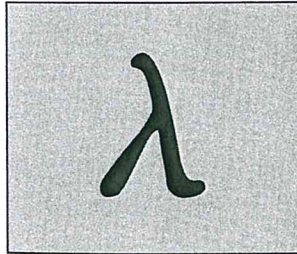
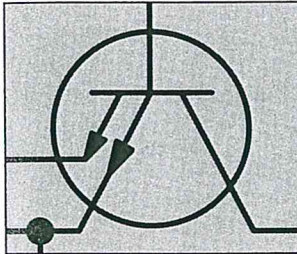
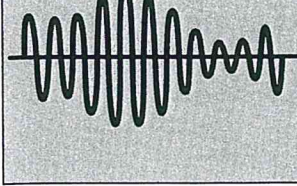


Electronic Communication Systems

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Fourth Edition

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All these are treated in turn, in following chapters.

In order to become familiar with these systems, it is necessary first to learn about amplifiers and oscillators, the building blocks of all electronic processes and equipment. With these as a background, the everyday communications concepts of *noise*, *modulation* and *information theory*, as well as the various systems themselves, may be approached. Any logical order may be used, but the one adopted here is, first, systems, communications processes and circuits, and more complex systems, is considered most suitable. It is also important to consider the human factors influencing a particular system, since they must always affect its design, planning and use.

1-2 COMMUNICATIONS SYSTEMS

Before investigating individual systems, we have to define and discuss important concepts such as *information*, *message* and *signal*, *channel* (see Section 1-2.3), *noise* and *distortion*, *modulation* and *demodulation*, and finally *encoding* and *decoding*. To illustrate these concepts, a block diagram of a general communications system is shown in Figure 1-1.

1-2.1 Information

The communications system exists to convey a message. This message comes from an information source, which originates it, in the sense of selecting one message from a group of messages. Although this applies more to telegraphy than to entertainment broadcasting, for example, it may nevertheless be shown to apply to all forms of communications. The *set*, or total number of messages, consists of individual

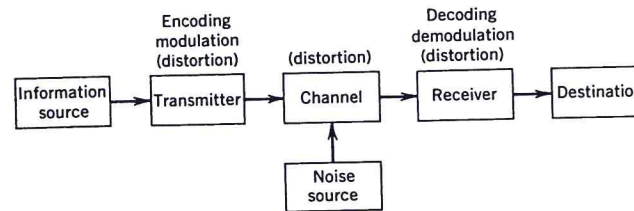


FIGURE 1-1 Block diagram of communications system.

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of the information does not matter, from this point of view, only the quantity
important. It must be realized that no real information is conveyed by a redundant (i.e.
totally predictable) message. Redundancy is not wasteful under all conditions. Apart
from its obvious use in entertainment, teaching and any appeal to the emotions, it also
helps a message to remain intelligible under difficult or noisy conditions.

1-2.2 Transmitter

Unless the message arriving from the information source is electrical in nature, it will
be unsuitable for immediate transmission. Even then, a lot of work must be done to
make such a message suitable. This may be demonstrated in *single-sideband modulation*
(see Chapter 4), where it is necessary to convert the incoming sound signals into
electrical variations, to restrict the range of the audio frequencies and then to *compress*
their amplitude range. All this is done before any *modulation*. In wire telephony, no
processing may be required, but in long-distance communications, a transmitter
required to process, and possibly encode, the incoming information so as to make
suitable for transmission and subsequent reception.

Eventually, in a transmitter, the information modulates the *carrier*, i.e.,
superimposed on a high-frequency sine wave. The actual method of modulation varies
from one system to another. Modulation may be *high level* or *low level*, and the system
itself may be *amplitude modulation*, *frequency modulation*, *pulse modulation* or any
variation or combination of these, depending on the requirements. Figure 1-2 shows
high-level amplitude-modulated broadcast transmitter of a type that will be discussed
in detail in Chapter 6.

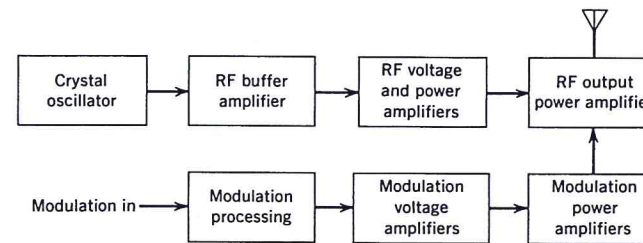


FIGURE 1-2 Block diagram of typical radio transmitter.