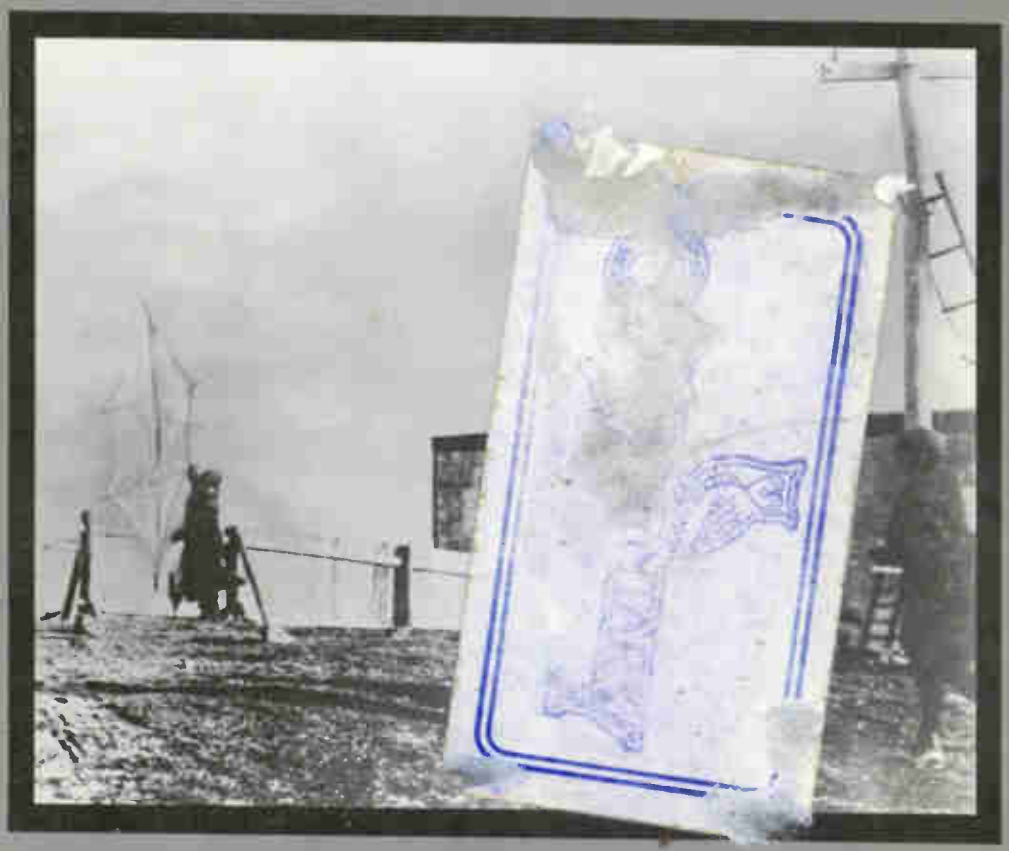
Radio, TV & Cable



A Telecommunications Approach

Marvin Smith

RADIO, TV & CABLE

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CONTENTS

LIST OF ILLUSTRATIONS

LIST OF ABBREVIATIONS

ACT Action for Children's Television
ADI area of dominant influence
AFTRA American Federation of Television and Radio Artists
ALJ administrative law judge
AM amplitude modulation
ASCAP American Society of Composers, Authors, and Publishers
AQR average quarter-hour rating
CAB Cooperative Analysis of Broadcasting
CARS cable television relay service
CATV community antenna television
CCU camera control unit
CED capacitance electronic disc
CP construction permit
CPGRP cost per gross rating point
CPM cost per thousand
DBS direct broadcast satellites
DMA designated market area
EFTS electronic funds transfer services
EIAJ Electronic Industries Association of Japan
EMRC Electronic Media Ratings Council
ENG electronic news-gathering
ERP effective radiated power
FCC Federal Communications Commission
FM frequency modulation
FTC Federal Trade Commission
HAAT height above average terrain
HDTV high-definition television
HUR households using radio
HUT households using television
ICC Interstate Commerce Commission
INTELSAT International Telecommunications Satellite Organization
ITFS instructional television fixed service
ITU International Telecommunication Union
LPTV low-power television
MBS Mutual Broadcasting System
MDS multipoint distribution service
MSO multiple system owner
NAB National Association of Broadcasters
NADR *National Audience Demographics Report*
NOI notice of inquiry
NPRM notice of proposed rule making
NRBA National Radio Broadcasters' Association
NSI *National Station Index*
NTI *National Television Index*
NTIA National Telecommunication and Information Administration
O&O a broadcast station owned and operated by a national broadcast network
PTAR prime time access rule
PTVI, II, III program services of PBS
PUT persons using television
RADAR Radio's All-Dimensional Audience Research
RF radio frequency
RHH radio households
ROS run-of-schedule
SCA subsidiary communications authorization
SIA storage instantaneous audimeter
SMATV satellite master antenna television
SMSA standard metropolitan statistical area
SPC station program cooperative
SRDS Standard Rate and Data Service
STL station-transmitter link
STV subscription television
TSA total survey area
TVHH television households
VCR video cassette recorder
VF video frequency; voice frequency
VOA Voice of America
VTR video tape recorders

PREFACE

This book is designed to be used in a one-semester or one-quarter course that surveys radio, television, and cable. Portions of the text may be used in advanced courses. It will also be useful as a reference book for those who need information in summary form about the various aspects of radiocommunication, telecommunications, and related media.

Writing a survey text is never easy, and it is particularly difficult to plan texts for broadcast and cable courses. Curricula vary widely. Some universities offer courses emphasizing theory and research; others have professionally oriented programs that seek to train practitioners. No text can be all things to all instructors. However, this text attempts to provide both a theoretical and a practical orientation, and can be used in a variety of curricular environments. A second problem in designing a text for this field is the rapid change that is occurring within the telecommunications industry. Whenever possible, this text attempts to steer clear of details in areas prone to change. However, in some areas, particularly in the rules and regulation that govern the industry, this is impossible. I have tried to solve this problem by emphasizing fundamentals, things that change more slowly than equipment or FCC rules.

A third problem is meeting the needs of students whose motivations for taking a first course in electronic media are very different. Some students enroll in a survey course because they plan to major in the field. Other students are simply shopping around for a major and take a broadcasting course to "see what it's like." A few students come to broadcast classes because they want exposure to the field and hope to apply it to their own disciplines. Others simply want to become better consumers of electronic media. This text tries to meet the needs of each of them.

How is this text different?

First, it takes a telecommunications approach to the study of broadcasting and cable by focusing not only on the traditional broadcast media but on the new delivery technologies and services. Unlike most texts of this type, there are no separate chapters on the history of broadcasting and television. Rather, historical material is woven into the fabric of each chapter. This creates a context for the study of the technology, institutions, services, and practices of the telecommunication industry. The text begins with a section on mass communication theory (Chapter 2), the effects of the communications revolution (Chapter 3), and a historical survey of the development of the telephone and telegraph (Chapter 4). With this background, students are better prepared to understand the technology, structure, and business practices of the industry discussed in the rest of the book. The text ends with a chapter on the effects of electronic media on individuals and political institutions.

Some instructors who teach in departments where mass communication theory is covered in a separate course might wish to skip chapters 2 and 3. Others might feel that the history of the telephone and telegraph are irrelevant to an understanding of broad-

casting and choose to eliminate Chapter 4. Students can successfully master the material in chapters 5 through 18 without covering the preceding chapters. The text attempts to provide students who will continue to work in the field with information fundamental to their continuing education. In a field changing as rapidly as electronic communications, it is important for students to be aware of how to find out about changes as they occur. The bibliography and the materials cited in the text are intended to provide students with the resources for future learning.

Other features of the text are clearly stated learning objectives for each chapter and numerous illustrations. Its presentations of data and photos are designed both to serve as pedagogical aids and to stimulate classroom discussion. The chapters on regulation cover not only the FCC but the FTC as well. Words that appear in boldface in the text are defined in a complete glossary at the end of the text.

An instructor's manual is also available.

Like many of the instructors who will choose to use this text, I have worked both as an academic and as a professional broadcaster. Professional and intellectual biases tend to creep into the material. Hopefully, I've kept these to a minimum. I hope you find the book useful and challenging.

Marvin Smith
January 1984

ACKNOWLEDGMENTS

A textbook is not the product solely of its author, and this text is no exception. The readers who reviewed the early drafts deserve to be acknowledged. They are the ones who waded through masses of material and helped separate the wheat from the chaff. In large part what is good about this text is the result of their work. I am thankful for their contribution to this project, and their criticisms are gratefully acknowledged: Burrell Hansen, Utah State University; Dennis Harp, Texas Tech University; James Harris, Eastern Kentucky University; Emory Johnson, California State University, Northridge; Frank Kelly, Wichita State University. However, important as reviewers are in the development process, the final responsibility is mine.

Others have given of their time and effort. My former colleagues at the University of Arizona carefully deserve some credit. Especially helpful were Betsy Leebron, Don Godfrey, Wes Marshall, and Frank Barreca. A special thanks to my department head, Bill Slater, who stole the time for me to work on this project, and Boyd Rooney, who also provided me with release time. Tom Lyon of KUAT-TV helped supply much of the photo material on public broadcasting. Ron Stewart and Tom Boone of the KUAT engineering staff helped smooth out the details of the chapters on technology. Allison Moskowitz helped pull together some of the research material. Pat Varney typed the earliest drafts, my TRS-80 Model 3 with its Epson printer the later efforts. Special thanks to Frida Schubert of RCA, Shelly Cagner of Arbitron, and Susan Meier of SRDS. And a final thank you to Beth Ann Carr, who patiently read all the early drafts and corrected comma splices, sentence fragments, and misspellings, and told me when she didn't understand. Kelly Carr-Smith helped, also.

INTRODUCTION

CHAPTER 1 OUTLINE

1

RADIO/TELEVISION/ CABLE: A PREVIEW

Today we stand on the threshold of an exciting era in the history of the world. Advances in genetic engineering, energy production, medicine, agriculture, manufacturing, transportation, communications, and many other fields hold the potential to radically change the world in which we live.

Radio, television, and cable are not sheltered from the winds of change that sweep the last quarter of the twentieth century: we are in the midst of a *communications revolution*. The metamorphosis includes not only developments in hardware but fundamental changes in the structure of the industry as the relationship between information provider and information recipient evolves. This decade and perhaps the next will mark the boundary between the *Age of Manufacturing* and the *Age of Information* (Porat, 1978). These changes have probably already begun to affect you and your family. Electronic media have entered the classroom. College curricula have begun to emphasize computer literacy and have introduced courses designed to help students enter the world of high technology. Perhaps a member of your family has lost a job as a result of the introduction of robots, computers, or other advances into the workplace.

The changes wrought by the communications revolution are both obvious and subtle. We entertain ourselves in different ways. Our opportunities to get information and educational materials are numerous. We begin to think differently, to interact with others in

new ways. Institutional structures are changed, and organizations develop new relationships both with each other and with their human constituencies. New social hierarchies develop.

Not too many years ago radio and television could be studied apart from other communications technologies. Today that is no longer possible. First, radio was challenged by television. Then both were challenged by cable. Recently, all three are being challenged by a number of new technologies and services. Radio, television, and cable are part of a spectrum of communications technologies. In order to understand broadcasting and cable, we must appreciate how each medium fits into the overall scheme of communications technology. Thus, this book uses a *telecommunications* approach to the study of radio, television, and cable, and also covers new technologies that have developed.

It is important that you, as future leaders, develop the skills needed to adapt to a changing world. These skills will allow you to recognize and evaluate changes as they occur, and additionally to develop new strategies for dealing with the consequences of change. The development of these skills depends upon understanding not only the new communications technologies but the old as well.

At the beginning of each chapter is a list of learning objectives. These broad goals will help you orient yourself toward the material in the chapter and focus on its more important aspects. The objectives of this chapter are:

First, to present a rationale for the study of radio, television, and cable.

Second, to orient you to the world of telecommunications and provide you with a context for radio, television, and cable.

Third, to provide you with an overview of the basic structure of the radio, television, and cable industries.

1.1 WHY STUDY RADIO, TELEVISION, AND CABLE?

In the midst of a communications revolution in which many different kinds of technological changes are occurring, why should we focus on radio, TV, and cable?

First, radio, television, and cable are becoming increasingly important as windows on the world. We come into contact with people representing many diverse cultures. Radio and television take us where we would not normally go—we sit on the front lines of a battle, we are on the reviewing stand when a world leader is assassinated, we go into the home of a family living in another part of the country. We are witnesses daily to events that forty years ago would have appeared only on the back pages of newspapers.

We rely on radio, television, and cable to provide us with *information* about our world. Over sixty years ago a single radio station carried news of the election of Warren Harding, and its audience was only a few thousand. Today an audience of tens of millions learns the projected winner of a presidential election from thousands of stations. This places a tremendous responsibility on the electronic media to report the news accurately and fairly. When asked where they get most of their news, the majority of Americans respond that they get it via radio or television (Lichty, 1982). Few dispute that radio and television news have an enormous impact on what people think and talk about.

Each communications medium presents a unique picture of the world. A sunset can

be depicted by a writer, rendered by a painter, photographed by a motion picture camera, or described by a small child. Each will present a portrait of the sunset based not only on individual interpretation but on the limits of the medium. Each medium creates its own special logic. Radio and television, too, present a special view of reality; the world is portrayed by radio and television in a special way. There is a kind of *media logic* (Altheide and Snow, 1979). Because radio and television have such widespread use, it is important that we understand the grammar of each medium.

Radio and television receivers are found in almost every home in the United States. The manufacture, distribution, and sale of radio and television receivers is a major industry in the United States and other countries.

The use of radio and television is *the* major leisure-time activity for the American people. The average person watches television approximately 1,500 hours per year and listens to the radio 1,200 hours per year. Eighty-one percent of our leisure hours are spent either watching television or listening to the radio. Compare that to the amount of time spent reading books (2.1 percent) and newspapers (6 percent), listening to records and tapes (5.7 percent), playing video games (1 percent), and watching video cassettes (1 percent) (*Broadcasting*, July 12, 1982). The average television household uses the television set six hours and forty-five minutes per day.

The widespread use of radio and television has had profound and important effects on our society. Radio and television provide us with portrayals of the world outside our immediate experience. The professions portrayed, the events shown, the songs played, the fashions seen, the products advertised, the language used on radio and television are just some of the many elements people take from the world of electronic media and use in their real lives. Television in particular has a key role in determining acceptable modes of behavior. It influences our attitudes toward others; it gives approval to ideas and people. If it appears on television it must be okay!

Television has been called a *homogenizer* of American (and world) culture; as a homogenizer it not only breaks down differences but provides a wider range of choices for millions of viewers and listeners. East and West meet on our radios and on the screens of our television sets. We are introduced to new ideas, products, fashions, and manners of speech. Yet our range of choices is limited to that seen on television or heard on the radio. Radio and television have assumed a position of influence once limited to the school, church, and family. The electronic media have enormous power to stimulate cultural change. To control the amount and direction of this change we must understand how and why the electronic media work the way they do.

Television is big business. In 1981 $12.7 billion was spent on TV advertising alone. But television advertising is just the tip of the financial iceberg; conservative estimates predict telecommunications information will be a $400 billion industry by 1990. Radio, television, and cable will have a major slice of the financial pie.

There is one other reason for studying broadcasting and cable. Quite simply, it's fun! Most of us listen to the radio or watch television because we want to be entertained. When we study radio and television we're carrying a leisure-time activity into the world of education. What better way to enjoy studying than to study something we enjoy?

Perhaps you're studying broadcasting because it seems like a glamour business. The television and radio stars work in glamorous settings and appear to be doing exciting things. We read about the large salaries of the top network executives and stars and

perhaps wish that we were a part of the action. Radio and television people are "personalities," and are portrayed as leading active and, seemingly, romantic lives. The television and radio industries appear to be interesting, fun, and lucrative places in which to work. Perhaps you're planning to work in the radio, television, or cable industry when you graduate.

Radio and television *are* glamorous, interesting, and fun, and many people working within the industry are well paid—but for every star making an enormous salary there are hundreds toiling for minimum wages. For every well-paid network executive there are a hundred production assistants striving to work their way up the corporate ladder into an assistant producer slot. For every network news anchor covering political conventions there are hundreds of reporters covering the latest car accident on the interstate highway. Broadcast radio and television is like any other industry, only it's smaller and thus more competitive. Those who succeed are aggressive, aren't afraid of hard work, and have the talent to make it when the opportunity arises.

1.11 How Do We Study Radio, Television, and Cable?

The study of radio, television, and cable uses many different techniques from a variety of academic disciplines. We study the history of broadcasting and cable in terms of technology; we study how we have managed, supported, and regulated the media; we study the content of programs, and the people who shaped broadcasting and cable. Radio, television, and cable are a combination of business, popular culture, and art form. Thus we must combine some understanding of economics with the sensibilities of reviewer and critic. The effects of the media are measured by using the research techniques of the social sciences; the likes and dislikes of audiences are analyzed using marketing research techniques. Elementary knowledge of physics and electrical engineering is useful in understanding how the media work. In the strictest sense of the word, the study of radio, television, and cable is *interdisciplinary*.

This text reflects that interdisciplinary perspective. Telecommunications media operate in society; thus we'll study the social context of radio, television, and cable. It is important to understand the nuts and bolts of how broadcasting and cable operate, so we'll study the technology. The structure and economic basis of the business of telecommunications are important. The messages carried by the media will be examined. So will the social controls that we use to regulate the media, and how they help shape the content. Finally, we'll study the effects of the media. Throughout the text the theme of change will underlie the material presented. We are looking for the elements that are common to telecommunications, with particular emphasis on radio, television, and cable. That is what we mean by the telecommunications approach.

1.2 THE WORLD OF TELECOMMUNICATIONS

The definition of *telecommunications* has evolved in the past century. Today nonelectrical or nonelectromagnetic means of communication—for example, visual signaling systems—are no longer included in the official definition of telecommunications. The

Federal Communications Commission defines telecommunications as "Any transmission, emission or reception of signs, signals, writing, images, and sounds or intelligence of any nature by wire, radio, optical or other electromagnetic systems" *(Code of Federal Regulations)*.

The world of telecommunications is made up of many different communication technologies. Figure 1–1 shows some of the telecommunications services available today. The purpose of all telecommunications media is to transport information from one place to another. The various forms of telecommunication differ in terms of whether the information is transported via a wire or through the use of radio waves.

FIGURE 1–1. Sample Telecommunications Technologies and Services

RADIOCOMMUNICATION

Broadcast Services
Radio
- FM SCA
- Utility load management
- AM/FM mass listener services

Television
- Full service UHF/VHF—commercial/noncommercial
- LPTV
- STV
- ITFS
- Teletext

Nonbroadcast Services
Direct Broadcast Satellites (some signals are meant for direct home reception)

Multipoint Distribution Services
Facsimile
Aeronautical Services
- Radionavigation services
- Airport control services
- Radar

Maritime Services
- Radionavigation services

Meterological Aids Service
- Radiosonde

Radiotelegraphy and Radiotelephony

CABLE SERVICES

Cable Communication
- Television/radio retransmission
- Videotext
- Personal computer services
- Data base access
- Games, home services, banking, bill paying
- Electronic mail
- Shopping services
- Polling

Telephone Services
- Voice communications
- Computer data access and linkage
- Industry data networks
- Electronic mail

1.21 Radiocommunication

Radiocommunication media transport information through space using a special form of energy called *electromagnetism*. Figure 1–2 illustrates the basic radiocommunication system: an electromagnetic signal is transmitted from a tower to a receiver that is tuned to receive the signals. Radiocommunication media include radio and television as well as long-distance telephone microwave links, satellite communication devices, communication links between airplanes and control towers, and auto telephones. Radiocommunication systems consist of a transmitter that propagates the radio waves into the atmosphere and a receiver that processes the waves into a form useful to the recipient of the message.

The transmitter and receiver may either be **mobile** or **fixed**. An example of a mobile radiocommunication device is a portable television transmitter designed to be used in conjunction with remote coverage of a live news event, or a citizens' band radio which can be used as both transmitter and receiver while the vehicle in which it is installed is in motion. An example of a fixed radiocommunication device is the primary transmitter of a broadcast station which transmits the signal to the home receiver. The microwave relay towers seen along railroad tracks or on the tops of mountains are other examples of fixed radiocommunication devices.

1.22 Radio and Television as Broadcast Media

Radio and television stations transmit radio waves through the atmosphere. In this respect they are similar to other radiocommunication services. However, unlike long-distance telephone or telegraph services which use radiocommunication techniques to transport information, radio and television broadcast station operators *intend* that the signals transmitted be received by the *general public*. The intent on the part of the op-

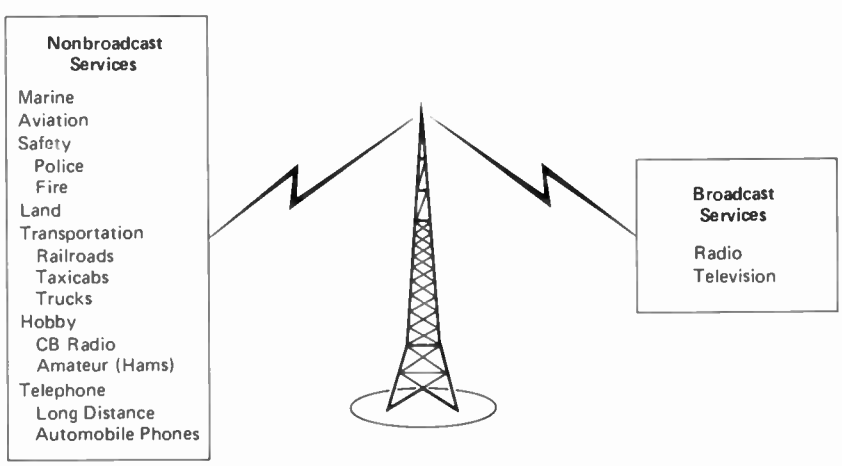


FIGURE 1–2. Plain Old Radiocommunication Service All radiocommunication services consist of an antenna that transmits radio waves into the atmosphere. These electromagnetic signals are picked up by specially tuned receivers.

erator for public reception of the transmitted signals is the characteristic which differentiates broadcasting from other radiocommunication services.

There are some exceptions to the intent criterion. Most operators of radio and television stations intend their signals to be received by anyone with a receiver. However, there are some broadcast services whose signals are not intended for reception by the general public, only by those who are subscribers. For example, reception of subscription television station (STV) signals is limited to those who pay a fee to the operator for a decoder. The decoder is attached to the subscriber's television receiver and unscrambles the signal transmitted by the STV station.

1.23 Cable Communications Systems

Cable communications systems transport information using electrical and electromagnetic signals transmitted through a network of interconnected wires rather than through the atmosphere. The local telephone system is one example of a wire or cable communications system, but when we think of cable we probably think of cable television service.

In its simplest form, cable appears to be nothing more than a retransmission service which brings a better television or radio signal into the home and provides a greater number of channel selections. However, cable has the potential to be much more. Cable system operators can originate locally produced programming, provide alternatives to the programs presented by the local broadcast stations, and deliver many different types of signals, including computer data, specialized programs delivered on demand, interactive voice and video communication, and facsimile signals for printing newspapers or articles in the home. When *cable* is used in this book, it refers to a cable communications system which delivers both conventional radio and television signals and information services via wire to subscriber homes. Cable communications systems are called *broadband* systems because they can deliver many different channels and services simultaneously using the same set of wires.

1.3 ECONOMICS AND INSTITUTIONS

One of the objectives of most survey courses is to familiarize students with the vocabulary of the discipline under study. Many of the terms used in radio, television, and cable are probably familiar to you. But some of the most common terms are used in specialized ways inside the industry. Others will be totally new. Figure 1–3 shows a number of commonly used terms and their definitions.

Radio, television, and cable are *businesses* which provide a service for a price. Participants in this economic exchange include the audience, the station or cable operator, and advertisers. Supporting and regulating the system is a surprisingly large number of institutions.

FIGURE 1–3. A Primer of Broadcast and Cable Terminology

Advertising Agency:	A company that develops, produces, and coordinates the execution of advertising campaigns on behalf of a client.
Audience:	The people who experience a radio, television, or cable program.
Bottom Line:	A reference to the last line on a business's balance sheet, reflecting pretax profit or loss. Also, slang for the sum total or ultimate conclusion.
Cable Company:	The local business organization which runs a cable communication system.
Call Letters:	Identifying letters assigned to a broadcast station.
Commercial:	A portion of a program during which an advertiser tells the audience of the availability of a product or service.
Copy:	The written portion of a program or commercial that will be read over the air.
Delayed Broadcast:	Presentation of a program after the time it was originally made; generally the delayed program is videotaped.
FCC:	Abbreviation for Federal Communications Commission, the major U.S. government agency which regulates broadcasting.
FTC:	Abbreviation for Federal Trade Commission, a U.S. government agency with responsibilities to prevent false, misleading, or deceptive advertising and unfair business competition.
Independent Station:	A radio or television station not contractually affiliated with any one network; a station not carrying over ten hours of programming supplied by any one network.
NAB:	Abbreviation of the National Association of Broadcasters, a major trade organization which serves its members by providing information, establishing standards, and lobbying government officials.
Network:	Two or more stations linked together for the purpose of sharing programs and commercial material.
Network Affiliate:	A broadcast station that is part of a network and broadcasts over ten hours of programming per week supplied by the network.
O&O:	A broadcast station owned and operated by a national broadcast network.

FIGURE 1–3. *(Continued)*

Program:	A self-contained unit of program material designed to be broadcast by a station or distributed by a cable system. Also, a set of instructions for a computer.
Rating:	Any one of several measurements used to quantify the amount of audience using a program.
Receiver:	An electronic device which reproduces radio and/or television programs. Also, the recipient of a message.
Sponsor:	An advertiser that buys commercial time or pays for the presentation of a program.
Sustaining Program:	A program broadcast at the station's or network's expense, usually as a public service.

1.31 Organization of the Broadcast and Cable Industry

The broadcast and cable industry is a large and complex organization, with the audience as its central focus. Some parts of the industry define their business as the delivery of audiences to advertisers, while other parts focus on the delivery of programs to audiences. However, no matter what the business focus, there is a core of functions common to both economic perspectives: *program production, program distribution, program exhibition.* When we speak of a program, we refer not only to the entertainment and news programs which are the mainstay of radio and television, but also to any sort of service delivered via broadcast or cable. Other participants in the system are advertisers, audience measurers, regulators, and trade associations and lobbyists. The relationship between the various parts can be seen in figure 1–4. The functional components are defined in figure 1–5.

PROGRAM PRODUCERS

Program producers are those individuals and groups who develop and produce the programs and commercials which you listen to and watch. Large production studios like MCA, MTM Productions, Warner Brothers, and Paramount Television generate television and cable programs for national distribution. Local production companies and stations also produce programs, usually for local or regional consumption. Data base managers like The Source or Compuserve provide text information such as electronic newspapers and financial data. The data are delivered via telephone lines or cable communication systems and are displayed on the normal television receiver. Also included in this group are writers, producers, actors, and other technical and craft union personnel who have a hand in producing programs.

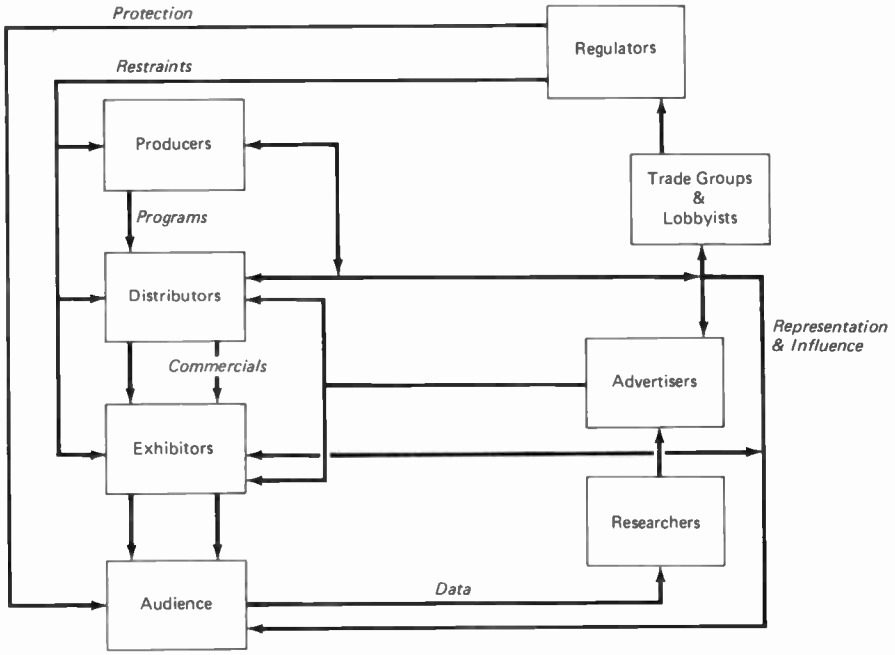


FIGURE 1–4. Major Components of the Broadcast and Cable Industries.
The broadcast and cable industries are made up of many different industrial units. Some of these units may have multiple functions. For example, a television network such as NBC may function as producer, distributor, exhibitor, researcher, and lobbyist.

FIGURE 1–5. Components and Functions of the Broadcast and Cable Industries

COMPONENT	*FUNCTION*	*EXAMPLE*
Audience	Consumes content of electronic media	Everyone who uses electronic media
Producer	Develops and produces program materials	Local television or radio station or cable company, national broadcast and cable networks, motion picture production companies, independent film and television producers
Distributor	Delivers programs to exhibitors. Two types—	
	Technical: Provides technical facilities only	American Telephone and Telegraph, Hughes Communications
	Network: Provides programs to local affiliates for exhibition	Commercial radio, television, and cable networks—ABC, CBS, NBC, HBO

FIGURE 1–5. *(Continued)*

COMPONENT	*FUNCTION*	*EXAMPLE*
Exhibitor	Delivers program materials to local audience	Local broadcast station or cable system; direct broadcast satellite programmer
Advertiser	Uses the electronic media to promote product sales	Product manufacturers, advertising agencies, and station representatives
Regulator	Controls the production, distribution, exhibition, and advertising functions	Federal Communications Commission, Federal Trade Commission, other government agencies; self-regulatory bodies such as the National Association of Broadcasters and the Radio-Television News Directors' Association
Researcher	Provides data to producers, distributors, exhibitors, advertisers, and regulators	A. C. Nielsen Co.; Arbitron; McHugh & Hoffman, Inc.
Trade Group, Lobbyist	Represents various groups and constituencies to regulators and other industry components	National Association of Broadcasters, National Cable Television Association, Action for Children's Television, Morality in the Media

PROGRAM DISTRIBUTORS

Information distributors include all organizations that provide programs to exhibitors for local use. National and regional radio and television networks such as CBS and pay program services like Home Box Office or The Movie Channel are distributors. Syndicators who sell programs directly to the local station are also part of the distribution subsystem.

Another part of the subsystem is the organizations that provide and manage the technical apparatus necessary to move the programs from the central collection point to the local exhibitors. Organizations included in this category are American Telephone and Telegraph, Eastern Microwave, Communications Satellite Corporation (COMSAT), MCI, RCA, Southern Pacific, and Western Union.

PROGRAM EXHIBITORS

Program exhibitors are those organizations which provide the programs directly to the public. Included in this subsystem are local radio and television stations, subscription tele-

vision stations, and cable companies. Some distributors deliver programs directly to the home by eliminating the local exhibitor. Companies involved in direct broadcast to the home via satellite signals are an example.

ADVERTISERS

Advertisers are an important part of the broadcast and cable industry. Advertisers pay money to producers for the production of commercial messages. They also buy time from exhibitors and distributors for the display of those messages. Vital parts of the advertising industry are advertising agencies and station representatives.

REGULATORS

Since broadcasting and cable use public resources, there is a degree of government regulation. Regulatory bodies are found at all levels of government—local, state, federal. Compared with other countries, the U.S. broadcast and cable industries are minimally regulated. Examples of regulatory bodies include the Federal Communications Commission (FCC), Federal Trade Commission (FTC), and state cable television commissions.

RESEARCHERS AND MEASURERS

All parts of the industry are interested in getting as much information as possible about the audience. Producers and distributors want to know what people want to see and advertisers want to know how many watched or listened to their commercial messages. Various research companies measure audience size and program preferences, as well as product recognition. Research activities also include traditional social science research.

TRADE ASSOCIATIONS AND LOBBYISTS

Trade associations and lobbyists represent their constituencies before regulatory and legislative bodies. The National Association of Broadcasters (NAB) represents its members by submitting testimony to Congress and the FCC. Some organizations, such as the Radio-Television News Directors' Association, set standards for their members. Other functions of these types of organizations are providing educational and research materials, statistics, and other information used by members.

1.4 SUMMARY

We are in the midst of a revolution in communication technology which is changing relationships between individuals, restructuring social institutions, and increasing the amount of information readily available to consumers. Radio, television, and cable are stimulating change and being affected by it. We study radio, television, and cable because they provide us with a window on the world beyond our local residence.

Television and radio receivers are found in almost every home in the United States and are the dominant form of leisure-time activity. People are becoming increasingly dependent upon radio, television, and cable to provide them with information they need in order to function in society. Because of their importance, radio, television, and cable are big businesses.

Telecommunication refers to any system of long-distance communication which uses wire, radio waves, optical systems, or other electromagnetic means. Radio, television, and cable are some of the many different forms of telecommunications services. The purpose of telecommunication is to transport information from one point to another; these points may either be mobile or fixed.

A radiocommunication device transmits radio waves through the atmosphere; when the radio waves are transmitted with the intention of being received by anyone with a receiver, we say that the waves are broadcast. Radio and television are broadcast media. Cable is a wire system which carries radio waves from one point to another point or series of points.

The broadcast and cable industries are organized to deliver programs to audiences. There are three major parts to the industry:

Program producers who create the program material
Distributors who package the material and convey it to the local community
Exhibitors who deliver the product to the audience.

Other parts of the industry are advertisers, audience measurers, regulators, and trade associations and lobbyists.

SECTION

I

CONTEXTS

CHAPTER 2 OUTLINE

2.1 COMMUNICATION: IN GENERAL

2.11 What Is Communication?
2.12 Function and Intent of Communication

2.2 MASS COMMUNICATION

2.21 Interpersonal and Mass Communication
2.22 The Mass Audience
2.23 Easy Availability
2.24 Asymmetric Network Structure
2.25 Immediate Use and Efficient Delivery of Information
2.26 Sources of Mass Communication Messages

2.3 MODELS AND THEORIES OF MASS COMMUNICATION

2.31 Mass Communication: General Theories
2.32 Utilization Theories

2.4 SUMMARY

2

THE NATURE OF MASS COMMUNICATION

One of the distinguishing characteristics of humankind is its ability to use **symbols**. The process of symbolic interaction is called *communication*. A basic understanding of the human communication process is necessary if we are to better understand how the electronic media interact with humankind. The inventory of telecommunications effects includes the effects of electronic media on society, the effects of society on the media, and the effects the electronic media have on the structure of the mass communications industry. Of particular interest to students of broadcast and cable is the process of mass communication.

When you've mastered this chapter you'll be able to:

1. Define communication
2. Identify the key elements of interpersonal and mass communication
3. Recognize some of the models and theories of mass communication.

2.1 COMMUNICATION: IN GENERAL

The study of human communication is the focus of many different academic disciplines. Psychology, sociology, anthropology, linguistics, political science, economics, education, mathematics, and even some branches of engineering have made the study of human

communication a primary part of their research and teaching agendas. Communication is a complex process. There is no single unifying **theory** of human communication; rather there are many different theories, each of which focuses on a particular aspect of the communication process. Most theories include a **model** which outlines the key points of the theory. A model may take the form of a graphic representation, a mathematical formula, an annotated description of a situation, or a simple word outline.

2.11 What Is Communication?

Definitions of communication vary widely. Some define communication as any transfer of information; it doesn't matter whether the transfer is between humans or machines. Others define communication in terms of the intent of one of the participants to evoke a response from another person. Dance (1970) has collected fifteen different definitions of communication. Despite the plethora of definitions, we'll define communication in the simplest manner: the process of symbolic interaction in a social context.

As you are probably already aware from your own experience, communication occurs in many different contexts; we communicate with ourselves (intrapersonal), with others in one-to-one situations (interpersonal), in groups (organizational and small group), and through various media (mass communication). You might wish to list a variety of communication situations and classify them. Some situations might be placed in two or more categories.

2.12 Function and Intent of Communication

When we communicate we do so for one or more of the following reasons: to *inform*, to *educate*, to *entertain*, to *persuade* (Schramm, 1972). Messages intended to inform are designed so that the content can be accepted by the receiver and either used immediately or stored for use at a later date. In an informational message the emphasis is on the content and the content alone. Wire service news copy is an example of messages designed primarily to inform. On the other hand, a message intended to educate emphasizes both content and the behaviors which utilize that content. There is not only an emphasis on the present but also on future action.

A message designed to entertain emphasizes primarily the enjoyment of the receiver. Most radio and television programs are intended by senders and used by receivers for entertainment. Sometimes these entertainment programs also enable us to better understand the world around us. However, understanding is of secondary importance.

Messages intended to persuade are designed by senders to bring about a specific change in behavior on the part of receivers. Commercials, editorials, and political speeches are messages designed to persuade receivers to buy a product, to think in a certain way, or to vote for a particular candidate.

In most communication situations messages are sent and received for more than one reason. Viewers of prime time television normally watch to be entertained. Senders of commercial messages must obtain the attention of the receiver if they are to persuade, so entertainment devices are used. One of the elements of persuasion is to provide information, so the commercial message must to some degree inform, too. News programs are designed to provide audiences with information, but the news must be pre-

sented in an entertaining manner if large audiences are to be attracted to the program.

The needs of receivers as well as senders must be taken into consideration when designing both the content and the manner of presentation of messages. Novice politicians soon learn that what works on a live audience of supporters at a political rally won't work on television. If they want to be elected they must modify their approach to take advantage of both the medium and the intent of the audience watching television. Style, entertainment values (often called *production values*), and manner of information presentation must all be taken into account if the message is to be received intact.

2.2 MASS COMMUNICATION

Mass communication, like interpersonal communication, seems to be uncomplicated: a sender transmits a message to a large number of people, with each of the receivers obtaining the message at approximately the same time. Yet beneath the surface of this simple sequence of events is a complex system which may include all other forms of communication behavior.

2.21 Interpersonal and Mass Communication

Some theorists believe all forms of communication are simply extensions of interpersonal communication. There are instances when mass communication and interpersonal communication seem similar. For example, the relationship between an individual member of the audience and the person on the television screen may be so intense that the receiver might believe he or she has a personal relationship with the media personality. Radio and television, and to a certain extent motion pictures, give the illusion that the media personality is actually with us. The special relationship between the apparent sender and the receiver is called a *para-social relationship* (Horton and Wohl, 1956).

Despite the similarities between interpersonal and mass communication, there are some substantial differences. The most obvious one is that the receiver is neither one person nor a small group, but a large mass of people called an *audience*. Audience members receive a message simultaneously, or nearly so. Other differences include the use of a medium, the easy availability of the message to all potential audience members, the asymmetric nature of the mass communication network, and the efficient delivery of messages to audiences. Additionally, the sources of mass communication messages tend to be large organizations. The table in figure 2–1 summarizes some of the major differences between interpersonal and mass communication channels.

2.22 The Mass Audience

The concept of the *mass* audience is an important factor which differentiates mass communication from other forms of communication behavior. The mass audience is made up of numerous individual receivers, each of whom chooses to receive the same message at approximately the same time. Acquaintance with other members of the audience or specific knowledge of the sender is not an important factor in mass communication. The mass audience has neither specific leadership nor recognizable organization. Despite the

FIGURE 2–1. Characteristics of Interpersonal and Mass Communication Channels

CHARACTERISTICS	*INTERPERSONAL CHANNELS*	*MASS MEDIA CHANNELS*
1. Message flow	Tends to be two-way	Tends to be one-way
2. Communication context	Face to face	Interposed
3. Amount of feedback readily available	High	Low
4. Ability to overcome selective processes (primarily selective exposure)	High	Low
5. Speed to large audiences	Relatively slow	Relatively rapid
6. Possible effect	Attitude formation and change	Knowledge change

SOURCE: "Mass Media and Interpersonal Communication" by Everett M. Rogers, in *Handbook of Communication* (edited by I. S. Pool et al.), copyright © 1973 by Houghton Mifflin Company, used by permission.

existence of many receivers, the mass communication experience is not normally shared with other receivers. Individual receivers have a one-to-one relationship with the sender, but there is no opportunity for the sender to receive immediate feedback.

It should not be concluded that mass communication audiences are passive. Research has shown that even though there is not an opportunity for immediate feedback, audiences do respond to mass communication messages. Examples include cancelled subscriptions to newspapers, lack of viewers for television programs, and boycotts of advertisers associated with programs objectionable to certain portions of society.

2.23 Easy Availability

One of the characteristics of mass communication is that messages tend to be available to whoever wishes to receive them. The general public is the audience in the mass communication network. Senders don't discriminate in the selection of audience members. In order to receive a message a potential audience member needs only a device which can display the message—a radio or television receiver, access to motion picture equipment, or the paper pages of a newspaper.

2.24 Asymmetric Network Structure

Because of the inability of receivers to provide immediate feedback to the message source, mass communication networks are asymmetric, that is, do not allow two-way flow of information. For example, readers of newspapers can't immediately question in-

formation providers about the accuracy of their portrayal of a news event. There is no opportunity for points to be clarified or expanded. Despite the use of call-in programs and the encouragement of letter writing and direct comment, mass communication networks are asymmetric. In contrast, most interpersonal communication is symmetric, that is, it allows a two-way flow of information.

2.25 Immediate Use and Efficient Delivery of Information

Mass communication messages are normally used immediately. Radio programs are heard simultaneously by thousands of people and then forgotten. Newspapers are read the same day they are delivered; any delay, and today's news becomes tomorrow's history. Storage media—tapes, records, books—allow audience members delayed access to messages, but in general the mass communication message is used almost as soon as it is sent.

Mass communication allows for greater speed in the delivery of messages to large groups of people. Having one source provide information to large numbers of people results in greater efficiency than if the message had to be delivered to each audience member individually. The costs of generating and delivering information are spread over a large number of people. This results in a lower per-unit cost than if the message were delivered in an interpersonal communication situation. Since costs are high, sources try to maximize audiences.

2.26 Sources of Mass Communication Messages

The sources of messages carried through mass communication networks tend to be large organizations. Because of the high costs involved in setting up the channel, information sources tend to send a lot of messages. The need for large amounts of information necessitates large numbers of information gatherers, editors, and so on. The end result is a corporate information structure with all the advantages and disadvantages of large organizational size—ability to generate lots of information, but also impersonality, inability to respond quickly to change, and a tendency to focus on the needs of the organization rather than the needs of receivers. Sources may be as small as the local newspaper or they may be regional, national, or international in scope.

2.3 MODELS AND THEORIES OF MASS COMMUNICATION

Mass communication theories differ from each other in that they emphasize different aspects of the mass communication process. Theories of mass communication can be divided into three major categories:

1. General theories emphasize the basic processes of mass communication.
2. Utilization theories seek to determine why people use mass media.
3. Effects theories focus on the effects of mass media on both mass society (macro theories) and small groups or individuals (micro theories).

The concerns of *macro theories* include such topics as communication and national development, how mass media function in the overall distribution of information through a society, and the impact of media on history and social structure. *Micro theories* focus on research on the role of media in attitude formation and change, public opinion, propaganda, advertising, and political communication. Some representative general and utilization theories are outlined in the remainder of this chapter. Chapter 3 focuses on macro theories and section 5 deals with micro effects theories.

2.31 Mass Communication: General Theories

As with interpersonal communication, several general theories of mass communication have been developed which, with their corresponding models, attempt to explain the process of that type of communication.

Information theory is the term applied to one type of general theory. The approach was developed by several scholars working independently, but is most often connected with Claude Shannon and Warren Weaver (1949). Shannon and Weaver's model is portrayed in figure 2–2. The model is similar to others in that it has a *source*, a *destination (receiver)*, a *message*, and *encoding and decoding* functions. However, the substance of information theory doesn't lie in its graphic portrayal of process. Rather, it seeks to quantify and measure the amount of information flowing through the system. Information theory is commonly (and mistakenly) thought to apply only to the engineering of communication devices. In fact, information theorists apply the general theory to a wide range of communication situations, including the study of variations in the meaning of messages, the process of meaning, and how receivers utilize information received.

The theory developed by Harold Lasswell (1948) is radically different from the mathematical approach used by the information theorists. The Lasswell model is posed as a simple question:

Who
says What
in Which Channel
to Whom
with What Effect?

The Lasswell model can be used in any type of communication situation, but has been most often utilized in the analysis of mass communication processes. The *Who* is the source that sends a message *(What)* to a receiver *(Whom)*. A *Channel* is utilized to deliver the message from source to receiver. Explicit in the model is the *Effect* of the mes-

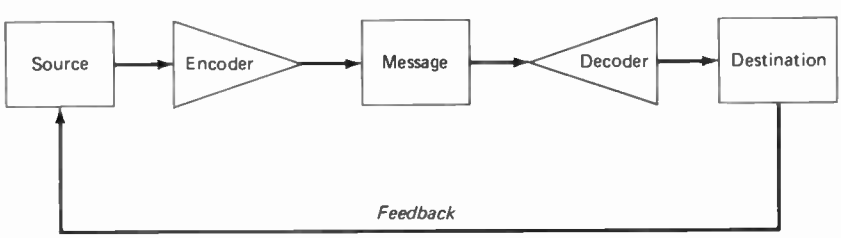


FIGURE 2–2. The Shannon-Weaver Communication Model

sage on the receiver. Lasswell's model also has a functional aspect. He postulated that there are three basic functions of mass communication: surveillance of the environment (the "news" function), correlation of parts of the society in responding to the environment (the homogenizing effect of mass media), and the transmission of social heritage (the "educational" function).

The Westley-MacLean model (1957) focuses on the structure of the mass communication process. The model, which may be seen in figure 2–3, has five elements. The *X*'s represent events in the sensory field, stimuli which are processed by those exposed to them. *A* represents a source of a message, for example, a reporter; *B* is the intended receiver. Between *A* and *B* is *C* which represents the channel function. The model pays particular attention to the channel's role as a filter between *A* and *B*. *C* may be an editor or a publisher, or the medium itself, which demands that information be presented in a certain fashion, or peculiarities in the distribution system which may alter the message. *C* functions as a **gatekeeper**, allowing some information through while filtering out or rerouting other information.

Electronic media are characterized by the presence of gatekeepers. Anyone who makes a decision concerning what informaion will or will not be transmitted performs a gatekeeping function. News editors are certainly gatekeepers, as are program managers.

2.32 Utilization Theories

Mass communication theories of the general type begin with the message and seek to explain the process by which sender interacts with receiver. Previously we defined the intent of receivers in terms of whether they sought to be entertained, informed, educated, or persuaded. This approach assumes that the most important part of the mass communication interaction is the content of the message. However, the content of the message doesn't explain why a particular individual chooses to watch television rather than listen to the radio, or how audiences use the mass media experience.

Do people use mass media solely to obtain a message? Practical experience tells us

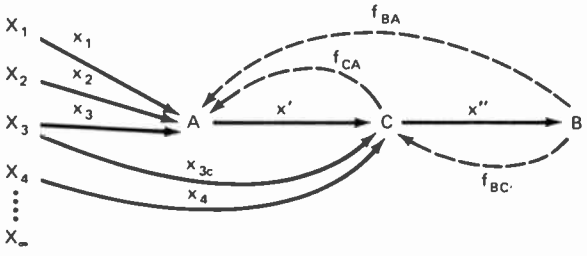


FIGURE 2–3. The Westley-MacLean Communication Model
The Westley-MacLean model takes into account the effects of the varying stimuli (the *X*'s in the figure) on both sender and receiver. In the figure, *A* transmits a message (*x'*) to *B*. *C* is either a media channel or a gatekeeper. *C* affects the content of the message. External stimuli also affect perception of the content and the encoding process. Note that feedback becomes a variable in the model. In a mass communication situation there are a greater number of variables.
SOURCE: "A Conceptual Model for Communications Research" by Bruce Westley and Malcolm MacLean. Reprinted from the Winter 1957 issue of *Journalism Quarterly* by permission.

no. For example, many people turn on the radio just for the sake of having it on, not to listen to a particular program. Reading and television viewing are often done at the same time. Working while listening to music is a habit not limited to the student population. People seek out information not only to learn something new but to reinforce what they already know, and television serves as a companion to millions of people. Utilization theories begin with the audience member and seek to explain why one medium is chosen over another and what gratifications are obtained through the use of one particular medium as opposed to another.

One explanation for mass media use is that it is a substitute for *social interaction*. A leading theorist, Nordlund (1978), proposes that all humans have a fundamental need for social interaction with others, although the intensity of the need may vary from individual to individual. When the opportunity to interact with others is reduced there is an attempt to replace the lost social interaction with something else. Nordlund's research indicates that mass media may serve to replace some types of social interaction. The choice of medium used as a substitute is determined by the extent to which the chosen medium is able to approximate reality. Media with sound and moving images are more "real" than media limited only to sound, or to visual images, or to printed words and still pictures. Content, too, appears to be of some importance. Messages which have one or more dominant, easily recognizable characters seem more likely to be used for interaction purposes than messages with unfamiliar characters. Messages with high interaction potential include television serials, advice columns, and magazine articles about familiar celebrities. Messages with low interactive potential include news and public affairs programs on radio and television, the news content of newspapers, and how-to articles.

Another avenue toward better understanding the audience's use of mass media is the *"uses and gratifications"* approach (Katz and Blumler, 1974). The model developed by this theory contains the following elements. First, audience members are *active participants* in the communication process and are goal-directed; that is, they choose to utilize mass communication in order to achieve specific personal goals. Second, the *initiative* for meeting personal needs lies with the individual member of the audience—each member seeks out specific programs. Third, there is intense *competition* among mass communication media to obtain audience attention. A specific medium is chosen based upon the ability of the medium to deliver needs satisfaction. Whatever effects occur in the audience as the result of the mass communication experience are by-products of an active audience attempting to meet its own needs. Gratifications obtained from the media are the result of content, exposure, and the social context in which the medium is used. Uses and gratifications theorists have also examined the *interchangeability* of media to meet audience needs. Figure 2–4 portrays the interchangeability of five mass media.

Another theory which seeks to explain mass communication processes from the point of view of the audience is William Stephenson's *Play Theory of Mass Communication* (1967). Play theory sees the audience as an active participant in the mass communication process, manipulating the media for the purpose of reducing the anxieties created by the real world. Stephenson categorizes human activity as work or play. Work consists of those activities which involve effort for a purpose deemed to be gainful, while play is pursued only for its own sake. The use of mass media is a play activity, he argues, and is necessary for a happy and adjusted society. Thus the various mass media function as a force which unifies society rather than divides it.

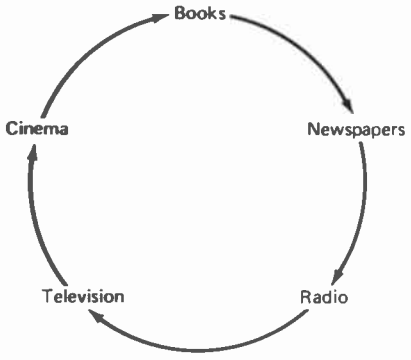


FIGURE 2–4. Functional Interchangeability of Five Mass Media
Do people substitute one medium for another? Research conducted by Katz, Gurevitch, and Haas (1973) indicates that they do. In the illustration above, newspapers may be substituted for books, but may be replaced by radio. Would this model vary according to the function of the medium?

The reflective-projective theory proposed by Loevinger (1968) is a broad theory that sees mass media as mirrors of society. However, the images seen in the media mirrors tend to be ambiguous. Individual audience members interpret content in terms of their own particular vision of self and society. According to this theory, people become upset by what they see or hear in the media because often the image reflected back is an unflattering portrayal of both the viewer and society.

2.4 SUMMARY

The ability to engage in symbolic interaction with others is one thing that distinguishes humankind from other forms of life. There are many different definitions of communication. For the purposes of this book, communication is defined as the process of symbolic interaction in a social context. There are four major intents of communication: to inform, to educate, to entertain, to persuade. Communication networks can be symmetric or asymmetric.

There are differences between interpersonal and mass communication. The latter is distinguished by the size of the audience, the use of a medium to convey the message, the easy availability of the message, an asymmetric network structure, efficient delivery of information, and large organizations serving as sources. There are three general types of mass communication theories: (1) general theories, which emphasize process; (2) utilization theories, which seek to determine why people use mass media; (3) effects theories, which attempt to determine the effects of mass media on audiences and society.

Some representative general theories are:

Information theory, which focuses on the measurement of the quantity of information

Lasswell's theory, which presents the model "Who says What in Which Channel to Whom with What Effect?"

The Westley-MacLean model, which introduced the concept of the gatekeeper through which information is filtered for distribution to the audience

Utilization theories, which seek to determine why audiences use specific mass media; various theorists have explained mass media use as a substitute for social interaction, as a source of needs satisfaction, and as play, while others describe the media as mirrors in which we see the image of society that we desire.

CHAPTER 3 OUTLINE

3.1 TECHNOLOGY AND CHANGE

3.11 Diffusion Theories
3.12 Communication and National Development
3.13 The Canadian Effects Theorists

3.2 THE FALLOUT OF THE REVOLUTION

3.21 Characteristics of the Information Economy
3.22 Too Much Change Too Quick?

3.3 A COMBINATION OF TECHNOLOGIES

3.31 The Telephone
3.32 Radiocommunication
3.33 The Computer
3.34 Telephone + Radiocommunication + Computer = Communications Networks
3.35 Redefining What We Watch and Hear

3.4 HARDWARE, SOFTWARE, AND SYSTEMS

3.41 Audio and Video Production
3.42 Distribution Hardware and Systems
3.43 Regional, National, and International Systems
3.44 Exhibition: Gizmos and Toys
3.45 Programs: The Dichotomies

3.5 SUMMARY

3

THE COMMUNICATIONS REVOLUTION

In chapter 1 we noted that we are in the midst of a revolution in communications technology. The evolving technology of mass communications has stimulated change in the lives of tens of millions of people. Jobs are being redefined. Established businesses face new opportunities for growth and profit. Social institutions are forced to change in order to better meet the challenges of the last quarter of the century. Computers are common in both workplace and home, and can interface with an assortment of data bases. Computer data is displayed on the home television receiver. Radio and television receivers offer audiences more and more channels and services that have little to do with the entertainment function of the media.

In this chapter we are going to look at the technological hardware and software that are affecting the world, and at some of the theories which attempt to explain how these new communications technologies are changing the world in which we live. By the end of this chapter you should be able to:

1. Name some of the key theories dealing with the impact of communications technology on society as a whole and the role of communications in national development

2. Identify some of the effects the communications revolution has had on production and distribution-exhibition subsystems as well as on programs

3. Identify the technologies which have stimulated the communications revolution.

3.1 TECHNOLOGY AND CHANGE

As you look at the world around you, you probably recognize the importance of *technology* in your life. But what is it? Technology is simply a way of doing something. It may take the form of a machine (hardware), or it may be something like a computer program (software). Technology is an integral part of the evolution of societies. Communications technology in particular seems to play a very important role in societal change.

Just as there are many theories which address the process of interpersonal and mass communication, there are many theories on the role of communication in social and cultural change. These are called *macro theories* because they are concerned with the effects of communications technology on entire societies, cultures, and nations. In this section we'll examine three types of macro theories: first, the theory of *innovation diffusion;* second, a theory of *national development and change;* third, a *theory of effects* developed by an economic historian, Harold Innis, and a medievalist, Marshall McLuhan.

3.11 Diffusion Theories

The rate at which new technologies are adopted by a society varies. This variance is created by differences in the adoption rates between individuals. As individuals vary in their acceptance of the new, so too do groups and nations. Within any given population there are those who try out new ideas and products before others. The *diffusion theorists,* led by the sociologists Everett Rogers and F. Floyd Shoemaker (1971), have identified specific *adopter categories.* Figure 3–1 identifies five adopter groups within the total population and describes each category's characteristics. Note that the "Innovators" have a higher exposure to communications technologies than do "Late Majority" adopters. You probably are acquainted with persons who fall into all adopter categories. Some of your friends are the first to have any new gadget that appears, while others delay buying an innovation until they're sure it will last, and still others lag far behind.

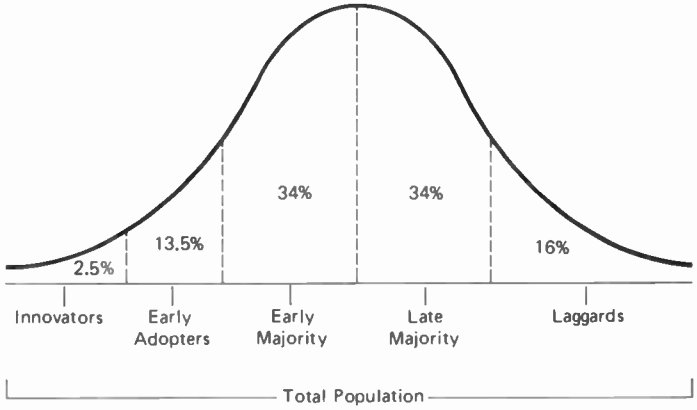
3.12 Communication and National Development

One of the most interesting theories concerning the impact of communications technology on the world has been fostered by Daniel Bell (1973), who believes we are entering a new stage in our development which he calls the *"information economy."*

Bell sees world history as divided into three distinct phases—*preindustrial, industrial,* and *postindustrial.* Most of the world is still, according to Bell, in the preindustrial stage of development. At this stage the majority of the labor force is engaged in *extractive activities,* for example, mining, forestry, agriculture, fishing. The primary struggle is one of man against nature. By contrast, industrial societies are primarily *goods-producing.* In these societies work has become predominantly technical and rationalized. The machine dominates. Man's struggle is against a fabricated, mechanical nature.

Bell argues that a few nations, including the United States, are entering a new phase, the postindustrial age, where society is based on *services* rather than extractive industries or fabricated goods. In postindustrial society, what counts is not muscle power or

FIGURE 3–1. Adopter Categories



Innovators:	Venturesome; desire the hazardous, the rash, the daring, the risky; eager to try new ideas; accept setbacks.
Early Adopters:	Integrated into social system; cosmopolites; opinion leaders; hold respect of peers.
Early Majority:	Deliberate; seldom lead; form link between early adopters and the late majority.
Late Majority:	Skeptical and cautious; adoption may be both an economic and a social necessity; social norms must favor adoption.
Laggards:	No leadership qualities; suspicious of innovation; focus on the past; alienated from the world.

SOURCE: Reprinted with the permission of Macmillan Publishing Company, from *Communication of Innovations, A Cross Cultural Approach*, 2nd ed., by Everett M. Rogers and F. Floyd Shoemaker. Copyright 1971 by The Free Press.

the large amounts of energy used to run manufacturing plants, but *information*. Mass media provide the channels for the distribution of this information. Telecommunication has a key role in the evolution of our world, one that Bell recognizes.

3.13 The Canadian Effects Theorists

In their provocative and controversial theoretical approaches, Harold Innis and Marshall McLuhan have chosen to focus on the effects of communications technology and the changes technology has wrought on culture, cultural institutions, and the individual.

Harold Innis (1951, 1960) was a Canadian economist who was primarily interested in tracing the influence of communication in history. After considerable study Innis came to the conclusion that communications media are the primary determinants of the institutional structure of a society. He called this the *bias* of communications media. He divided societies into two structural types, determined by whether their communications media were *space-binding* or *time-binding*.

Space-binding media are light and easily transportable and support the establishment of *political empires*, a large bureaucracy, a strong military, or all three. The bias of a space-bound society is toward the future, with an emphasis on planning for future action.

Time-binding media are heavy and difficult to transport and tend to favor governmental functions *centralized* in a city-state type of government in which a small group controls access to information. There is a bias toward the past, with an emphasis on history and collection of archival materials.

For Innis, print is a space-binding medium, and its adoption resulted in massive changes in Western culture. The mechanization of printing resulted in the mechanization of other parts of life. The availability of printed books stimulated widespread interest in political authority. The result was the establishment of competing empires and an attempt to monopolize access to knowledge. Innis bemoaned the adoption of space-binding media and preferred the time-binding oral tradition which gave rise to the Golden Age of Greece.

Perhaps the most controversial of the artistic-historical theorists is Marshall McLuhan (1962, 1964; McLuhan and Fiore, 1967). A disciple of Innis, McLuhan developed a theory of media effects quite unlike anything previously presented. McLuhan focused his theory on explaining the changes that beset a culture during a change in the medium used for communication. McLuhan felt that the medium was the most important factor in communication and that content was incidental. For him, *"The medium is the message."* A communications medium is simply an extension of some human facility. Change the medium and you create a new *"ratio between the senses."* The result is a change in the way we structure the world and perceive reality. For example, the world of the ear is very different from the world of the eye. Print puts us in a sight-dominated mode: space is perceived in terms of planes and our thinking tends to be linear and constricted. By contrast, the world of the ear is a circular universe with no up or down, only near and far.

McLuhan also divided media into *"hot"* and *"cool"* categories. A hot medium extends one particular sense in *high definition*. Stated in the language of information theory, there is little information and a high level of redundancy. A cool medium is one of *low definition*, in which several senses are brought into play and the user fills in the information gaps. Participation is the key to cool media. Television is a cool medium, while radio, cartoons, and motion pictures are hot media.

McLuhan explained the chaotic nature of the modern world in terms of the shift from print, a hot medium, to the cool world of **electronic** communications. This sort of shift produces social stresses on a grand scale. However, the widespread adoption of electronic communications media recreates an aural society. The world becomes like a small village—a "global village."

3.2 THE FALLOUT OF THE REVOLUTION

The changes in communication may well be changing the ratio of the senses, as McLuhan theorizes. However, the adoption of electronic-based telecommunications technology is producing changes more smoothly than McLuhan foresaw. The *communications revolu-*

tion promises to change the way we work and play. Toffler (1980) says that the entire world order will change as a result of the "third wave" of history. Others woefully predict that there will only be more of the same. Telecommunications will not bring about fundamental change in society.

3.21 Characteristics of the Information Economy

One of the key concepts of the revolution is that of the *"information economy"* (Porat, 1978). Porat analyzed the composition of the U.S. labor force in terms of how many worked with information, as opposed to making things or extracting natural resources. Porat has noted that since 1920 there has been an increasing number of information workers and a steady decrease in the number of agricultural and industrial workers.

The information economy is characterized by three things:

1. The majority of workers are no longer in the "blue-collar" category, but are engaged in processing information, creating or collecting information, organizing information, sending information, or managing information.

2. Decision making is decentralized into a committee or bureaucratic structure. The decision-making process tends to be shielded from public view.

3. The economic foundation is the computer and information technology. Society is dependent upon the ability of the computer to process, store, and retrieve information quickly and efficiently.

Porat's theory of the information economy has been criticized as being grandiose and of little practical value in the formulation of communications policy. Admittedly, he is redefining particular jobs in terms of their information-processing characteristics. Some claim that he is just giving new names to old realities. A case can be made that any administrative or managerial position's predominant characteristic has always been the amount of information the job holder is required to handle. But Porat would argue that the important thing is not that the nature of any particular occupation has changed, but that particular job categories have grown at a faster rate than has the work force as a whole. Whether Porat is right or wrong, his ideas are valuable. They force us to think about the future.

3.22 Too Much Change Too Quick?

Most of us enjoy change. It keeps us on our toes, challenges us, enables us to learn new things. Change is a positive thing as long as it doesn't occur too fast. But when it does there are problems—problems for the individual, problems for society.

In 1970 Alvin Toffler described a disease of change that he called *"future shock."* Future shock is a disease that has both psychological and biological dimensions. According to Toffler's theory, the disease is caused by the failure to adjust or adapt to the rapid proliferation of new technologies and the corresponding changes in lifestyles. Other causes of future shock are the death of permanence, an increase in the pace of life, the reorganization of our institutions, and a constant demand for the new and novel.

Although Toffler foresaw massive problems for our society, his predictions, fortunately, have yet to become a reality. There have been no waves of mass hysteria directly attributable to rapid changes in technology. However, we should note the rise of religious fundamentalism and of yearning for the "good old days." Could these be examples of future shock at work?

There is something disquieting about the rapidity with which the world is changing today. Many people are concerned about **information overload**. Others note that we seem to be not only losing our privacy but also our sense of individuality. The use of two-way, interactive telecommunications systems appears to be a two-edged sword which both threatens and supports the future of democratic institutions. Some researchers see a trend toward *less participation* in government by citizens who use the media as a primary information source. Others see an opportunity for a small portion of the audience to unduly influence the actions of elected officials. There is speculation that we are coming to a point in our nation's history when those who control the media will truly control the functions of government.

We have evolved from our turn-of-the-century innocence. Technology at that time was viewed as a means to social utopia. In the ensuing decades we have come to view technology as the central theme of our era and to question its value in our search for a better life. A continual examination of the place of technology in society is of paramount importance if we are to control it and make it serve us. No longer is it adequate to ask what technology can do for us. We must also ask what technology does to us. These questions are especially appropriate to ask of both old and new telecommunications technologies.

3.3 A COMBINATION OF TECHNOLOGIES

The communications revolution is, in part, the result of telecommunications technology becoming available *worldwide*. In addition, the technology itself is changing. The new telecommunications technology has resulted from the combining of three already existing technologies—the *telephone*, *radiocommunication*, and the *computer*. These new communication technologies are telecommunications hybrids which transport many different types of information faster than ever before, using both **digital** and **analogue** techniques.

3.31 The Telephone

The telephone system was one of the first modern telecommunications systems. The telephone has been so successful in the United States that we can say we've literally "wired the nation." Our telephone system is the single *largest* telecommunications network in the world. The local telephone service is a *wire-based system*. Voice communications or other data are sent from one telephone receiver set to another through a pair of wires called a *twisted pair*. In the early days of the telephone the connections between individual telephones were made manually by telephone operators sitting at switchboards. Later

a mechanical switch was developed which allowed telephone callers to bypass local operators. Today most switching is done electronically. Figure 3–2 shows the "plain old telephone service."

The telephone has some specific characteristics which differentiate it from other media:

1. The telephone is a *point-to-point* medium; that is. a message which originates at one point of the system is intended for delivery to one or more other specific points in the system.

2. The telephone is an *interactive* medium. The telephone facilitates interpersonal communication and gives the opportunity for immediate feedback.

3. Closely related to the interactive nature of the medium is the fact that the telephone allows *duplex operation.* This is a telecommunications term that refers to the ability of a communications channel to handle the transmission of information in both directions simultaneously.

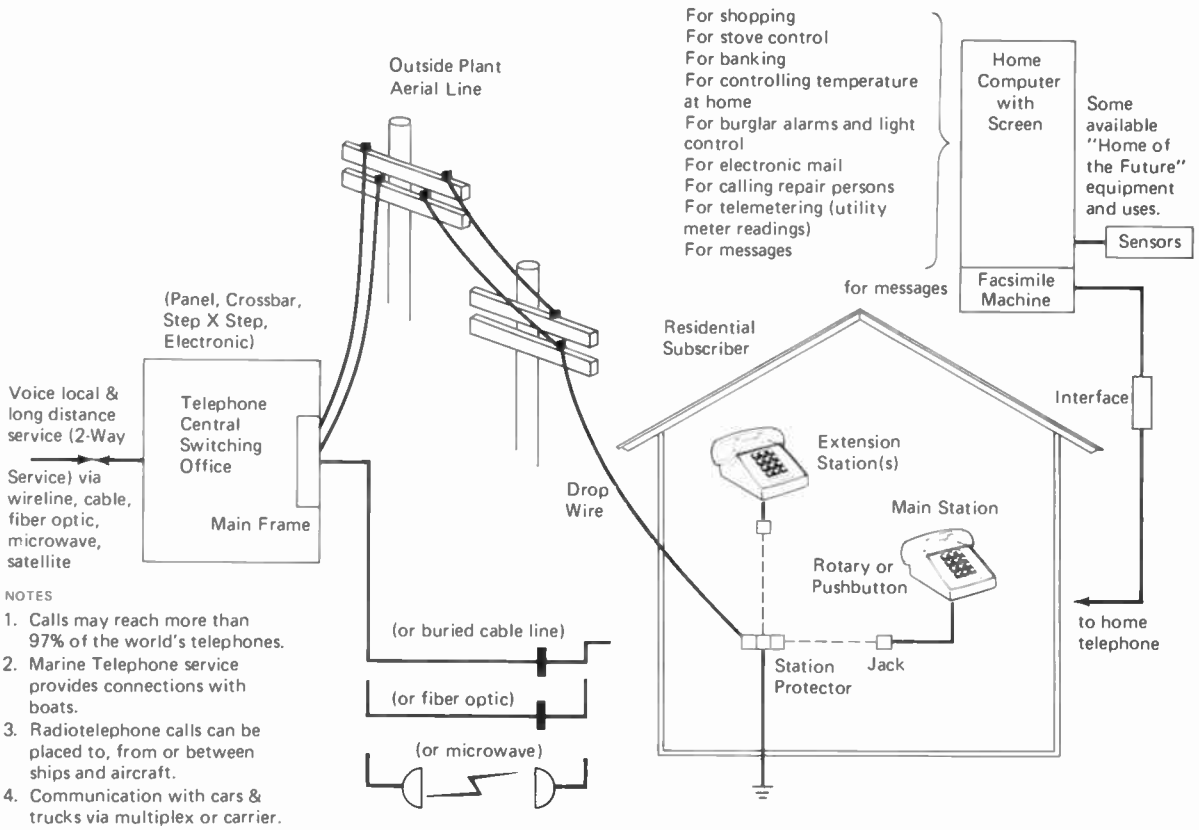


FIGURE 3–2. Plain Old Telephone Service (POTS)
SOURCE: Federal Communications Commission.

4. The telephone is a predominantly *wire-based* communications system. Almost all local telephone calls are effected using large cables made up of many twisted pairs. Each serves a particular phone number and in turn is connected to a type of wire with greater **channel capacity**.

3.32 Radiocommunication

In chapter 1 radiocommunication was defined as a means of conveying messages through the atmosphere by using *radio waves*. Radio and television are *broadcast* media which use radiocommunication techniques as the method of message transmission. In chapter 1, figure 1–2 illustrated a typical radiocommunication system. You may wish to review that exhibit. Notice that there is a transmitter which produces radio waves in the atmosphere. These radio waves are detected by the **antenna** connected to a receiver, which processes the signals and reproduces the original message.

Like the telephone, radiocommunication has characteristics which differentiate it from other means of communication. We divide services which use radiocommunication into two classes: *broadcasting* and *private radiocommunication services*.

Broadcasting is characterized by the sending of messages through the atmosphere to the *general public*. Broadcast services consist of radio and television stations. The signals produced by the station transmitters are meant to be received by anyone who has a receiver. A second characteristic is the inability of the broadcast service to provide same-channel interactive capability. We can't "talk back" directly to the source of radio and television programs using broadcast methods.

Private radiocommunication services are characterized by *point-to-point* transmission of messages to a specific receiver. The private services with which we're most familiar are police, taxi cab, and citizens' band (CB) radio. These types of services are called *mobile radio* and may be either one-way or two-way operations. Long-distance telephone calls and telegrams are transmitted using private radiocommunication services, too.

3.33 The Computer

In the past thirty-five years the *computer* has radically changed the way in which we work, play, and communicate. Few inventions have had such an impact on the world in such a short time. A computer is an electronic machine that stores and processes data according to a preestablished plan called a **program**. A computer is not a computer unless it can be *reprogrammed* to accomplish different tasks. For example, most of the cheaper varieties of pocket calculators are not computers; they are not reprogrammable. The computer is a piece of **hardware**; the program and the data are **software**. A television receiver displays computer data in **alphanumeric** form as well as entertainment programs.

The first computers introduced in the 1940s were cumbersome machines which needed a large amount of space and special cooling. The machines were constructed with **vacuum tubes**, and by today's standards were slow and stupid. The **transistor** replaced

the vacuum tube and the computer slowly began shrinking in size; it developed greater memory capacity and could work with greater speed. Later **integrated circuits** were used to perform many of the same functions as the transistor. But most important was the development of *large-scale integration* techniques, or LSI. LSI allowed literally thousands of circuits to be placed on a silicon chip about a quarter the size of a postage stamp. These integrated circuits increase the speed of computer operations and allow complex switching operations to occur. In addition, LSI has allowed the manufacture of sophisticated **microprocessors** and **memories,** advances in technology that allow ever greater amounts of information to be processed and stored.

3.34 Telephone + Radiocommunication + Computer = Communications Networks

Communications satellites, high-speed data networks, packet switching, cellular telephone, teletext, videotext . . . these are just a few of the "buzz words" of the communications revolution. The new developments in communications are the result of using LSI and computer hardware to form sophisticated communications networks. These complex computer-controlled networks have the ability to break down any type of information into bits of data which are transmitted sequentially using wires or radiocommunication devices. The new communications networks are capable of providing us with all kinds of information which we can access via our television sets. There have been three major changes in broadcasting which have resulted from the combining of computer and telephone technology with radiocommunication. We can summarize them in terms of quantity, quality, and flexibility.

QUANTITY

Computers and computerlike devices allow us to access an *increasing amount* of information quickly and easily. LSI technology allows thousands of times more data to be conveyed by radiocommunication systems and telephone lines than was possible two decades ago. Today it is possible to transmit two completely different television programs on the same channel. Only a decade ago the number of channels available on our television receivers in even the largest communities could be counted on our fingers—in most communities one hand would suffice. Today cable television systems are being built which can provide over a hundred channels of information. Computer switching techniques allow us to interact with our television sets. The "boob tube" of the 1970s has been transformed into a computerlike terminal which can provide a potpourri of information.

"Television of abundance" has become a much discussed concept in academic and political circles, and even in the average household. The phrase refers to the potential of the new technologies to radically increase our opportunity to access all types of programming. For example, the twisted-pair cable which delivers telephone calls can provide television signals as well as all sorts of alphanumeric information, including electronic mail service. In England a system called Prestel is managed by the post office and uses tele-

phone lines to carry written messages from one phone to another. *Electronic mail* has the potential of saving American industry millions of dollars each year in postage costs. Bills, personal messages, and advertising are just three of the many types of information that could be carried via electronic mail.

QUALITY

Quality is most often measured subjectively. What is high-quality entertainment to one person is lowest-common-denominator fare to another. Communications technology can't guarantee high-quality programs, but it can provide audiences with a *greater range of choices* so that the opportunities to receive "quality" programs increase. The economics of broadcast service at present demand that broadcasters provide program materials that will appeal to large numbers of people. Broadcasting is literally *broad casting*. When a communications system has the ability to provide many channels, it becomes possible to provide programs to specialized audiences; this is called *narrowcasting*.

FLEXIBILITY

A third important result of the communications revolution is the increased flexibility enjoyed by both information providers and consumers. No longer do audiences have to be in lockstep with a utilization schedule designed by a television or radio station. Multiple channels provide the potential to deliver program material on demand. The application of LSI technology in audio and video recording devices means that programs can be recorded for play at a later time. Programs not in general circulation can be requested for play at a certain time, or the programs can be rented for play whenever convenient.

The *interactive* capability of television when it is joined with the computer means that many more educational activities can take place in the home. LSI technology and computer programming techniques can allow us to interact with a previously recorded educational program or a teacher in a classroom. Transportation, building, maintenance, and personnel costs are decreased; flexibility is increased.

3.35 Redefining What We Watch and Hear

The adoption of new communications technology has been so widespread that we've been forced to redefine the material brought to us via radio and television. When we can receive both traditional news and entertainment programs plus alphanumeric information, video games, and all sorts of home services, the word "program" seems somehow inappropriate. What we need is a word that will accurately describe all the various types of materials we can receive and still allow a degree of flexibility as we discover new ways to use the electronic media. The word hasn't been invented yet, so just remember that when we speak of a "program" it includes anything that you can receive on your television or radio receiver.

3.4 HARDWARE, SOFTWARE, AND SYSTEMS

In this portion of the chapter we'll examine some of the communications hardware and software developments that are revolutionizing telecommunications. The framework we'll utilize for our analysis consists of the already familiar concepts of *production, distribution and exhibition,* and *programs.*

3.41 Audio and Video Production

The production of television and radio programs has undergone a radical transformation in the past decade. The use of *LSI technology* has transformed not only the news-gathering process but the production of entertainment programs as well. Lightweight portable video equipment allows events to be covered live, in the field. Video has almost replaced motion picture film as a production medium for entertainment programs.

AUDIO EQUIPMENT

The introduction of lightweight and portable audio recorders, studio-quality microphones which can be used in the field, and portable transmitters has resulted in radio news-gathering systems which are *field-based* rather than limited to studio recording only. This means that reporters can go to the news rather than bringing the newsmakers to a recording studio or using expensive telephone lines for "on the scene" reports.

AUDIO EDITING

LSI technology has had an impact on the editing and mixing of audio signals, too. Field use of studio-quality mixers is becoming increasingly common as the costs decrease and reliability increases. Low-noise electronic components allow a higher degree of **fidelity,** resulting in greater realism and less distortion. Many of the devices are digital. Many of these systems can create realistic sound and musical effects electronically, thereby eliminating the use of sound effects paraphernalia. Computer-based *music synthesizers* are being used both experimentally and professionally.

TELEVISION PRODUCTION

The trend in television production, as in audio production, is toward smaller equipment, a higher degree of audio and video fidelity, increased flexibility in editing, and the use of digital electronics to create visual effects. Video cameras and videotape are so widespread today that it is rare to find a television station which still uses film in news gathering. The newest ENG (electronic news-gathering) cameras consist not only of camera systems but also of built-in videotape recorders.

In the area of entertainment program production, new cameras are being developed which function in a manner similar to motion picture cameras but without the need for chemical processing of film. Videotape can be viewed immediately after recording, without processing. Because video is cheaper to produce than motion pictures, television producers are increasingly substituting videotape for film. As this trend continues, many

professionals predict that videotape will almost totally replace film in the recording of entertainment programs. As the technology is developed to increase the color quality and **resolution** of the video image, and as the quality of video projectors is improved, video may well replace film totally.

HDTV

High-definition television systems have already been developed and may be in general use by the middle of the next decade. Prototypes of various HDTV systems have been demonstrated and enthusiastically reviewed. Attempts are being made to develop one standard for all systems. An HDTV picture has *twice* the resolution of a standard American television image and is similar in both proportion and quality to a wide-screen motion picture.

EDITING

Computerized editing systems have been in existence for many years, but the newest systems are more flexible and easier to use. Hand in hand with editing systems are special effects systems, which can manipulate a video image in many different ways. One of the newest systems is called ADO (Ampex Digital Optical Effects). The ADO system can take a video image and manipulate it by flipping, spinning, tumbling, compressing, and expanding, while still keeping the image in true perspective.

VIDEOART

The convergence of computer and television technologies is best seen in the numerous *videoart* systems which have appeared in the past few years. These systems vary in price and sophistication, but each is designed to allow an artist to paint a picture using a light pen and an electronic tablet. The artist then stores the picture in a computer memory and transfers it to videotape or to a transmitter for broadcast. These systems will be utilized for video animation increasingly in the coming years.

3.42 Distribution Hardware and Systems

The creation of new methods of distribution is a key element in the communications revolution. *Distribution* is basically the process of getting information from one place to another. There are three main methods used to distribute programs. First, the information can be sent using *radiocommunication* techniques, that is, distributed through the atmosphere from a transmitter to a receiver. Second, the information can be distributed via *wires*. Third, the information can be stored using some sort of *storage medium* and then retrieved and displayed at some time in the future. Examples of storage media are video or audio tape, photographic film, records, and paper. Computer technology has allowed broadcasters to use digital techniques to distribute information that once could only be sent using the **analogue** AM and FM techniques.

LOCAL STATIONS

Of all the methods of information distribution, we are probably most familiar with the radio and television stations in our community. These stations provide us with many types of programs—popular entertainment, news, educational and cultural programs. Advances in transmitter technology allow broadcast stations to distribute other types of programs simultaneously with the main program material. FM radio stations can broadcast background music for stores and restaurants, reading services for the blind, and special information used by stockbrokers, investors, and other business people. The technique used is called a *subsidiary communications authorization*, or SCA. Subscribers use a special decoder which is sensitive to the radio waves transmitted and allows reception of the specially transmitted information. SCA doesn't interfere with or degrade the primary transmitted signal in any way.

MDS AND ITFS

The number of MDS and ITFS television systems has increased in recent years. Both systems are *broadcast*-based. MDS stands for *multipoint distribution service*, and is being used primarily by entrepreneurs to provide subscription television programs to local communities. ITFS stands for *instructional television fixed service*, and is used to provide instructional television programs to schools and colleges. Some ITFS systems allow for teacher-student interaction through the use of telephone lines in conjunction with the television signal. Figure 3–3 shows a typical MDS configuration.

LPTV

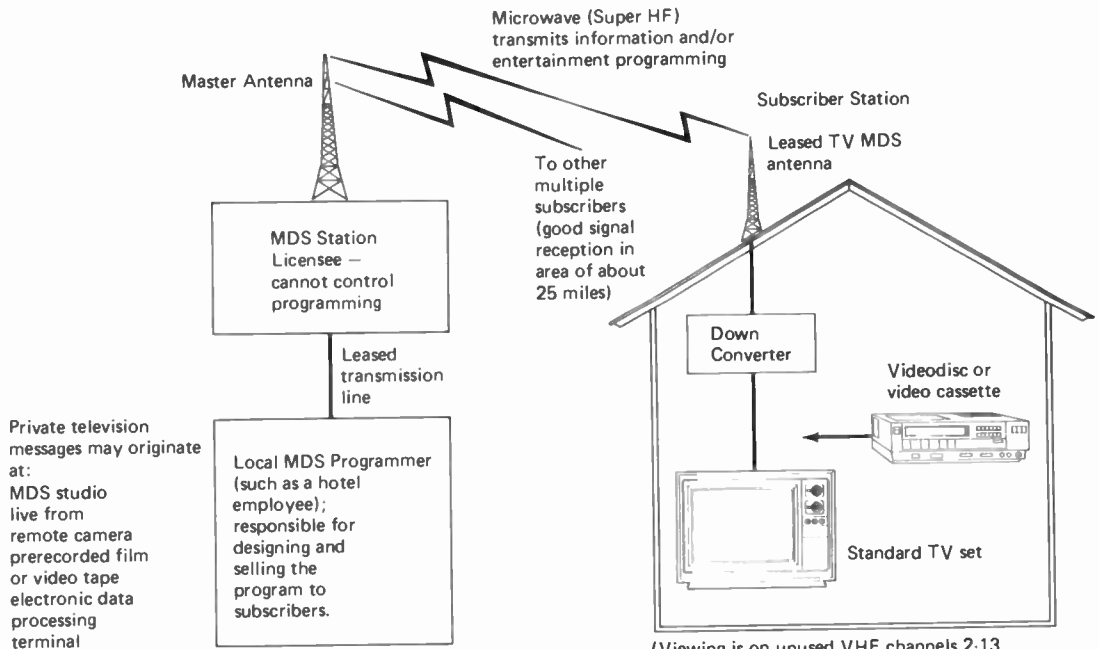
A *low-power television station* or LPTV operates in much the same manner as other television stations in the community, except that it doesn't cover as large an area as regular stations. LPTVs were designed to be used to provide communities with programming for audiences not adequately served by existing stations. It remains to be seen whether these stations will seek only to serve these segments or will choose to compete with stations in the existing system.

CARRIER CURRENT STATIONS

Carrier current stations are hybrids of cable and broadcast. A carrier current station consists of cables, cold-water pipes, or some other similar conductor through which are sent low-powered radio signals. The conducting material serves as a radio transmitter whose signals can be received by a standard radio receiver. Carrier current operations are used in airports to provide incoming passengers with the latest flight information, in tunnels to provide motorists with information about traffic conditions or with uninterrupted radio service, and on college campuses for dormitory radio services.

LOCAL WIRE DISTRIBUTION SYSTEMS

The local telephone system is the biggest and most advanced wire distribution system in the local community. However, because of legal decisions and antitrust consent agreements, the telephone portion of the AT&T system at this time is allowed only to be a **common carrier**. It cannot generate programs or information. It can only transport the material to subscriber homes.



NOTES:
1. MDS is a common carrier service used primarily to carry subscription (pay) TV programming.
2. Can offer data, fascimile or teleconferencing.
3. Flexibility allows for a variety of 2-way communications systems.

FIGURE 3–3. Multipoint Distribution Service (MDS)
SOURCE: Federal Communications Commission.

FIBER OPTICS

Optical fibers are being used in communities in Japan, Great Britain, and some parts of the United States to carry audiovisual information. Optical fibers are similar to copper wires except they are made of glass. They have a far greater channel capacity than twisted pairs, are relatively cheap to produce, and can withstand much physical abuse. During the coming decades the wire-based communications system will probably convert to optical fiber technology.

CABLE TELEVISION

Next to the telephone system, cable television is the best-known wire-based communications system in the local community. Because of the vast array of services available on local cable television systems they probably should be called *cable communications systems*. The many different types of services provided by cable systems are discussed below.

3.43 Regional, National, and International Systems

Much of the material we hear on our radios and most of what we see on our televisions is not locally produced. One of the major functions of the regional and national information distribution systems is to get program material from one point to others as quickly and easily as possible. This material includes not only broadcast and cable programs but telephone calls, business data, newspaper text, and other types of information. There are two basic methods used to get information across the country: fixed *earth-based* broadcast towers linked together in a *transcontinental network*, and *communications satellites*. Both use a combination of radiocommunication and cable technology.

LONG LINES

Around broadcast stations and cable operations the phrase *long lines* is often heard. The term itself conjures up a vision of long wires stretching across the United States, carrying telephone messages from point to point. In the early days of both the telephone and the telegraph, wires were in fact laid across the vast American countryside. The invention of wireless communication changed that, and a system of broadcast transmitters and receivers was built to carry information from coast to coast. Today **microwave** relay towers are used. These are the "long lines" to which broadcasters refer.

The largest and best-known company that operates long lines is the American Telephone and Telegraph Company. AT&T is not the only company which provides common carrier services, however; Western Union, International Telephone and Telegraph (IT&T), General Telephone and Telegraph (GTE), Southern Pacific, MCI, CPI, and American Microwave & Communications are a few of the regional common carriers which provide services similar to AT&T's.

COMMUNICATIONS SATELLITES

The proliferation of *communications satellites* and their demonstrated usefulness in national and regional distribution are two of the reasons cable television has been installed in so many communities. **Direct broadcast satellite** (DBS) systems will allow portions of the world with low population densities to receive the same radio, television, and telephone services formerly available only in cities of substantial size. Both the traditional analogue technique and the newer digital techniques are being utilized for the transmission of audio, video, and alphanumeric data. Figure 3–4 shows the structure of a typical DBS operation.

INTERNATIONAL SHORTWAVE

Despite the increased utilization of satellites for national and international communication, *shortwave* communications systems still flourish. These stations use transmitters to produce a type of radio wave which can travel long distances both day and night. Various international common carriers use shortwaves. The international broadcast arms of the French and British broadcast organizations, the Voice of America, and some religious stations are a few of the organizations broadcasting internationally.

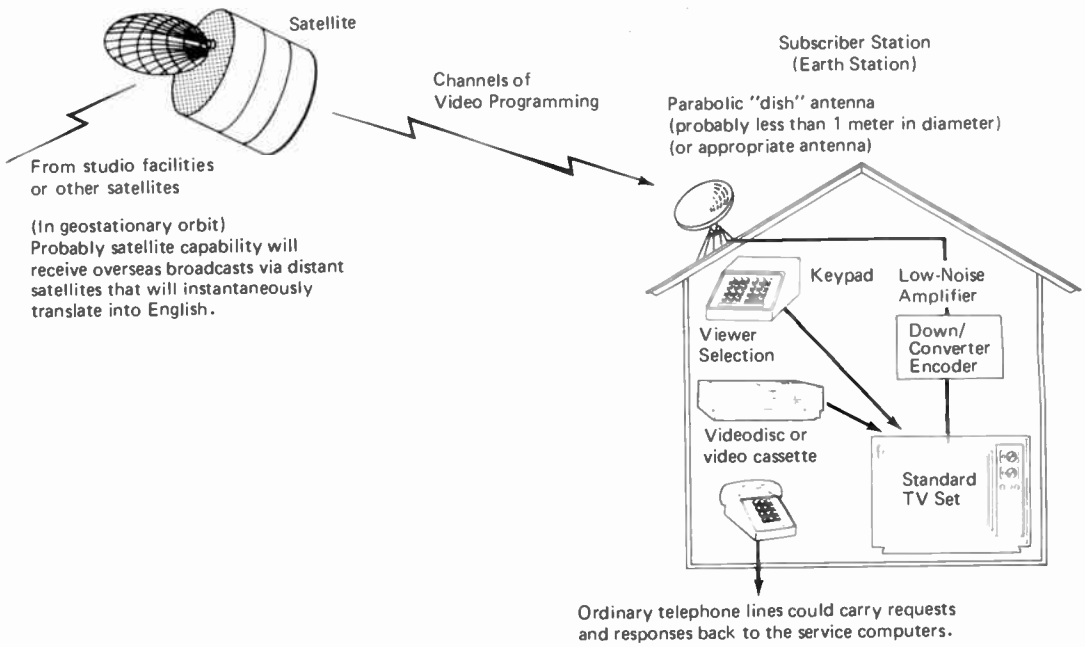


FIGURE 3–4. Direct Broadcast Satellite (DBS)
SOURCE: Federal Communications Commission.

3.44 Exhibition: Gizmos and Toys

The first radio receivers were crude devices which detected the presence of a radio signal through the shifting of iron filings in a glass tube. Later the development of voice communications through the **ether** led to the development of crystal receiver sets complete with **cat's whisker** and earphones. Families planned their activities so as not to miss a favorite radio or, later, television program.

Advances in technology have resulted in a world in which we no longer are forced to plan our lives around the delivery of our favorite program. We merely set our home video recorders and watch the program at our convenience, not the station's. If we miss seeing a movie we can rent a video cassette and watch it when we wish. Plays, educational programs, and other types of information are available at the flick of a switch.

There are two major classifications of exhibition equipment. First, there are devices which allow us to *play back* programs recorded on a storage medium, for example, video cassette machines. Second, there are devices which *display* the information for us. These devices include radios, television sets, and video projectors.

PLAYBACK DEVICES

There are two basic types of video playback devices: *video cassette record/playback machines* (VCRs) and *videodisc machines.*

The video cassette machine uses *videotape* as the storage medium. Videotape is simi-

lar to audio recording tape, in that when material is recorded on the tape it causes portions of the tape to be magnetized.

A *videodisc* machine performs the same playback function as a VCR. Videodisc machines that can record information are not yet in distribution for home use. These machines are used primarily in automated office settings for record storage. There are three videodisc systems in use today. (Each is incompatible with any other disc system. That is, recordings that can be played on one system can't be used on the others.) Two of the systems, capacitance electronic disc (CED) and video high density (VHD), operate in a manner similar to audio record discs. The third system, LaserVision (LV), uses a laser beam to detect information placed on the disc.

PRESENTATION DEVICES

Radio receivers are not the only methods of exhibiting radio broadcast signals. Audio receivers are also integral parts of home audio systems. **Audiophiles** take pride in their sophisticated electronic systems, which accurately reproduce the signal received.

Television receivers come in all sizes and shapes. Some screens are only a couple of inches in diameter, while others have screens in excess of forty-eight inches. Flat screens that can hang on the wall are in development, and a set that can present four channels at the same time is already on the market.

Video projectors are appearing in more and more homes and public places. A video projector is a television receiver coupled with a projection device that presents a picture similar to that on a movie theater screen. Unfortunately, the quality of video projectors is not comparable to motion picture images. But most experts agree that rapid advances in technology will close the gap in the coming years.

3.45 Programs: The Dichotomies

Twenty years ago when we spoke of radio and television programs, we were discussing a relatively narrow range of offerings. Today radio and television programs range from the still popular entertainment series to news headlines displayed in text form. We can shop for groceries or securities via television. We can play video arcade games and register our preferences on issues of local and national importance as we "talk back" to our TVs. So rapidly has the program landscape changed that the program environment has developed three major dichotomies: *mass appeal* versus *specialized programs; text* versus *nontext; free* versus *pay*. The final concept we'll examine is that of the *superstation*.

MASS APPEAL VERSUS SPECIALIZED PROGRAMS

Mass appeal programs are the radio and television offerings that most of us watch. This is the mainstream popular entertainment fare that entertains us each day as we use radio and television. Mass appeal programs continue to be the most important program form, and the production, distribution, and exhibition of these programs continues to make up the bulk of the radio, television, and cable business.

Specialized programs, on the other hand, are designed to appeal to specific *audience segments* much smaller than the audience reached by mass appeal programs. The group

may be defined by ethnic similarity ("soul" or Spanish-language stations), or unity of interests (local government hearings, educational offerings, cultural programs), or need (employment information, meeting schedules, transportation information). The specialized information may be distributed using any of the systems outlined previously. Cable television, with its numerous channels, is an extremely active participant in specialized program activity.

PUBLIC ACCESS

Although *public* **access** is applicable to any type of electronic communications system, it is most often applied to cable television. Public access is quite simply the idea that all persons have the right to make their views known to the public via the media. Many cable systems make specific channels available to the public on a first-come, first-serve basis. These channels are used by groups and individuals to provide information of interest to a specialized segment of the audience.

TEXT VERSUS NONTEXT INFORMATION

The widespread use of alphanumerics as a separate information service and in conjunction with programs is a recent development in television and cable. Alphanumeric information which is broadcast is called *teletext;* in a teletext system there is no opportunity for receivers to respond directly into the system. Alphanumeric information delivered via a wire is called *videotext,* or *viewdata,* and receiver feedback is possible with this system. Figures 3–5 and 3–6 show typical teletext and videotext configurations.

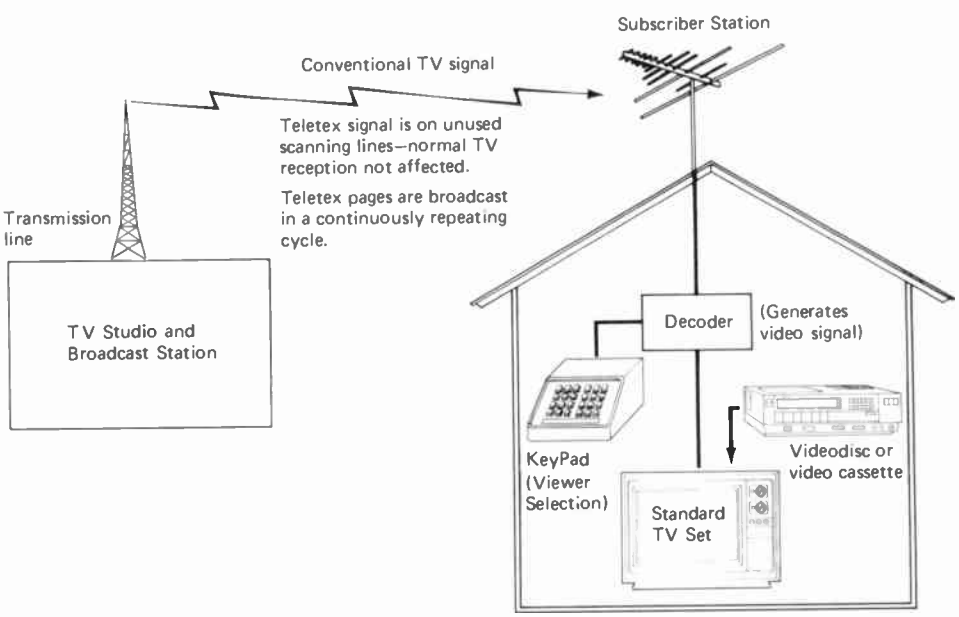
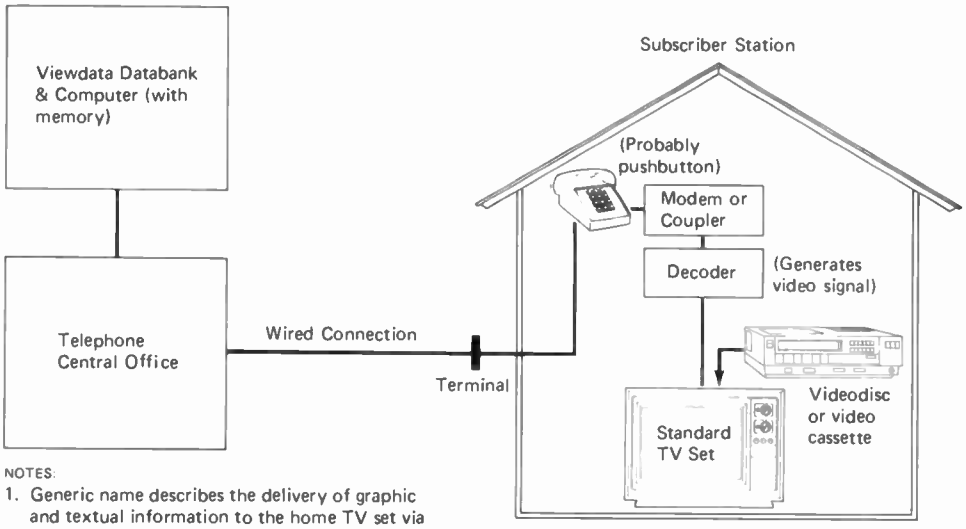


FIGURE 3–5. Teletex
SOURCE: Federal Communications Commission.



NOTES:
1. Generic name describes the delivery of graphic and textual information to the home TV set via wired connections, typically, telephone.
2. Can offer Closed-Captioning ability.

FIGURE 3–6. Videotext
SOURCE: Federal Communications Commission.

The most common use of text information is in the **closed captioning** of television programs for the hearing-impaired, but it is not the only one. Earlier we noted that financial data were being sent via SCA. The placement of a teletext signal in the radio or television broadcast signal is an important service for many stations.

Cable videotext services include electronic funds transfer services (EFTS, an electronic banking system), electronic mail, information retrieval (news, financial data, weather reports, transportation schedules), data processing services, video games, and home management services such as fire and theft alarms, health emergency calls, product ordering and television shopping, and educational classes.

FREE VERSUS PAY SERVICES

Two economic models are used in the telecommunications industry. One system allows *direct* payment for services delivered. In the other system payment is made by the consumer *indirectly*, through increased product costs.

When we pay directly for information we are using either a pay or a subscription system. Subscription payment is characteristic of cable and subscription television systems, in which we subscribe to a program service and pay for that service by the month or at some other time interval. The process is similar to subscribing to a magazine.

With a pay system we pay for the service of the event. If we want to watch a special movie then we pay to watch it, in much the same way that we buy a ticket at a theater box office. Pay television is often used for the presentation of special events such as athletic contests, plays, nightclub acts, or movies.

SUPERSTATIONS

Another recent phenomenon is the *superstation*, a local broadcast station (either radio or television) whose signal is distributed outside the community in which it is located. The signal may be carried by either microwave or satellite, or both. At present eight television stations and one radio station are designated as superstations; they are listed in figure 3–7.

FIGURE 3–7. Broadcast Superstations

KBMA-TV Kansas City	KSTW-TV Tacoma-Seattle
KTVT-TV Dallas	*WGN-TV Chicago
*WOR-TV New York	WPIX-TV New York
WSBK-TV Boston	*WTBS-TV Atlanta
*WFMT (FM) Chicago	

*Carried on satellite.

SOURCE: *Broadcasting/Cablecasting Yearbook 1982.*

3.5 SUMMARY

Technology is simply the "way things are done," and consists of both hardware and software. The proliferation of communications technology has been both a blessing and a curse. Peoples of the world are being divided into the information-rich and the information-poor. In the rich nations, people are suffering from information overload and future shock as they try to cope with a world that changes faster than their ability to adapt. The diffusion theorists have found that individuals tend to adopt innovation at differing rates. Those who are innovators generally show a tendency to use mass media in greater amounts than those who adopt new technology at slower rates. A strong correlation has been demonstrated between adoption of new communications technology and national development. As a nation's citizens begin to be exposed to mass media, urbanization and literacy increase and more participation in the economic and political life of the nation is demanded. Other theorists have postulated that we are heading into a postindustrial society in which the primary product is information. Harold Innis and Marshall McLuhan theorized that communications media are the central influence in change and that with changes in media come fundamental changes in social structure and the perceptual framework of individuals.

New telecommunications technology has been developed by combining the technologies of the telephone, radiocommunication, and the computer. The telephone is a wire-based system that is utilized for point-to-point communication potential, interactive participation and from both sender and receiver, and full duplex operation. Radiocommunication consists of both broadcast and private radio services, and uses radio waves rather than wires to transport information between points. The use of computers for

signal switching and complex networking has resulted in an increase in the quantity, quality, and flexibility of the programs we receive. Programs are produced for both mass audiences and specialized audience segments. The new technology has created new means of producing, distributing, and exhibiting programs, which can consist of traditional mass media content or alphanumeric content, or both, and can be obtained free or for a price.

CHAPTER 4 OUTLINE

4.1 MECHANICAL TELECOMMUNICATIONS DEVICES

4.2 ELECTRICAL SYSTEMS: THE TELEGRAPH

4.3 ELECTRICAL-ACOUSTIC SYSTEMS: THE TELEPHONE

4.31 Prelude to the Telephone: The Nature of Sound
4.32 Early Telephonic Devices
4.33 The Bell Telephone
4.34 The Problems with Communication by Wire

4.4 ELECTROMAGNETISM

4.5 THE DEVELOPMENT OF WIRELESS TELECOMMUNICATION

4.51 The Branley-Lodge Coherer
4.52 The Russian Marconi
4.53 Marconi's Apparatus
4.54 Marconi and Lodge Develop Tuning
4.55 Radio Waves Cross the Atlantic

4.6 SUMMARY

4

PRELUDE TO MODERN TELECOMMUNICATION

The means of transporting information vary greatly. In most cases face-to-face communication is the most effective way of sending a message to someone who is in close proximity. But we aren't always close to those with whom we wish to communicate, and other means have to be used to transport the information. One method of delivering information is to send a messenger. Probably the most famous messenger in history is the Greek runner Philippides, who ran from Marathon to Athens. Transmission of messages in this fashion is not very efficient, fast, or cost-effective, and it's maddeningly tough on personnel. Later horse power was substituted for leg power and written correspondence was carried on horseback from one land point to another, while ships provided courier service from port to port. However, the problem remained that information still moved only as fast as the means to transport it. What was needed was a way of moving information faster and more efficiently.

The path from marathoners to radio and television is littered with the telecommunications devices invented by hundreds of scientists and engineers to solve the problem of transporting information. The evolutionary path includes complex machines, electrical apparatuses, and electrical-acoustic devices. The discovery of *electromagnetic energy* set the stage for the invention of wireless telecommunications devices. The inventions of the nineteenth century form the foundation on which modern telecommunications technol-

ogy stands. Each of the devices examined in this chapter was developed to solve a specific communications problem. If we are to understand modern telecommunication, some basic knowledge of past devices is necessary. By the end of this chapter you should:

1. Know the four basic classifications of telecommunications devices
2. Understand the basic technology of the telegraph and the telephone
3. Be able to trace the history of the development of wireless telecommunication.

4.1 MECHANICAL TELECOMMUNICATIONS SYSTEMS

Many different mechanical systems have been used by societies to communicate. Drums, signal fires, smoke signals, and **heliography** are a few examples. The problem with most primitive devices is that the information transmitted can't be very complex, nor can it be transmitted very quickly. For example, if you agree that the burning of a signal fire means "The battle has been won," you've no way of using the signal to say "The king is dead." Once the participants decide on the code there is no way of changing it short of physically delivering a message.

One of the first solutions to the problem of delivering more sophisticated messages was developed by King James II. James's solution was to use *flags* in various combinations to communicate between ships at sea. It was a hundred years later that the French engineer Claude Chappe developed an optical telegraph system, illustrated in figure 4–1.

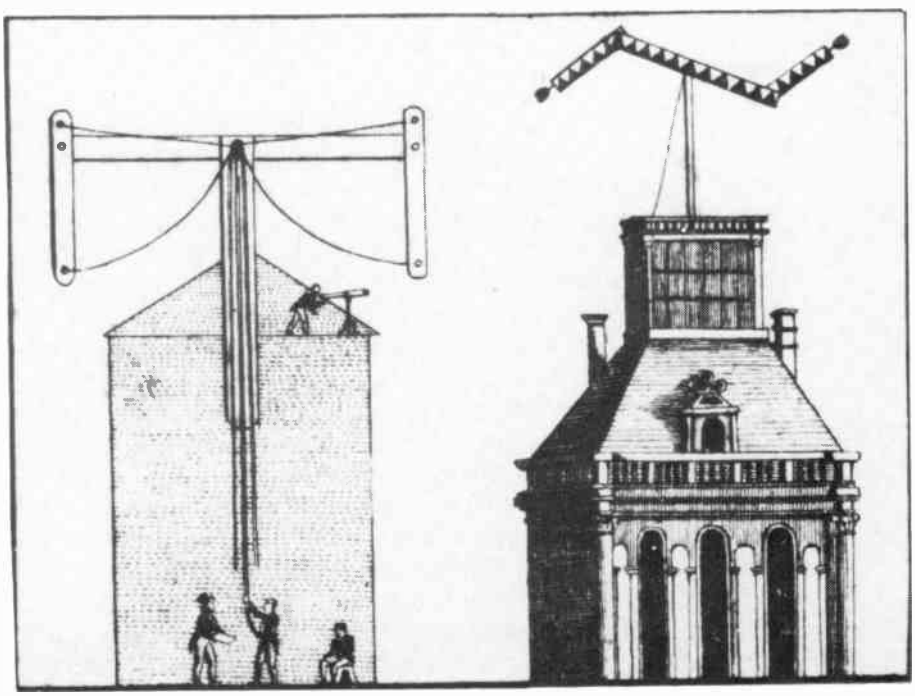


FIGURE 4–1. The Optical Telegraph of Chappe, ca. 1830
SOURCE: The Bettman Archive, Inc.

The Chappe system used *towers* at the top of which were *movable arms* which could be placed in various positions; the towers became known as **semaphore** towers.

Despite the advantages *optical telegraph* systems had over other forms of telecommunication, there were still problems. The problem of darkness was solved by using lanterns, but fog, rain, and other types of bad weather interfered with the work of the signal watchers. Then there was the human problem: watchers had to be alert at all times in order to spot the messages coming from a tower several miles away. Finally, there was the problem of speed. The towers' signal arms were infernally slow: one tower system owner boasted that his best crew could transmit the Lord's Prayer in just a little over thirty-six minutes. However, these problems didn't keep Congress from seriously considering building a system connecting New Orleans with Washington. In 1837 Samuel F. B. Morse (a New York professor of "literature of the arts of design") wrote to the secretary of the Treasury advising against building the semaphore system and informing him of Morse's own experiments with a signaling system which used electricity to carry messages. The telegraph was about to enter center stage.

4.2 ELECTRICAL SYSTEMS: THE TELEGRAPH

The *telegraph* evokes images of dedicated men and women hunched over small keys sending and receiving messages of life-and-death importance. Without the telegraph the intricate network of transcontinental railroads wouldn't have been possible. People would have had to wait many weeks for news of important events if it weren't for telegraphic interconnection of reporter with newspaper. The telegraph system was the first *transcontinental* telecommunications system. The telegraph is a digital system in which a code of on-off pulses of electricity is sent through a wire.

The story of the invention of the electric telegraph has romantic elements which seem to be characteristic of the development of revolutionary means of communication—patent fights, disputes, and personal tragedy. Although Americans like to claim that Samuel Morse invented the telegraph, he was only one among many who developed a system of electrical communication using wires. But Morse was lucky enough to have a court of law declare that his system was developed first.

The process of telegraphy consists of sending intermittent currents of electricity down a **conductor** to a detector which indicates in some manner the presence or absence of the current. What sounds like a simple process took almost one hundred years to develop into a workable system.

There is little doubt that the telegraphic device patented in 1839 by Samuel Morse was based upon principles and inventions developed by others. Morse acknowledged the contributions of many persons, including Joseph Henry, Alfred Vail, and chemist L. D. Gale, without whose aid the Morse telegraph would never have been developed. Nevertheless, it was Morse who developed the system, and his right to a patent was upheld by the Supreme Court of the United States. Morse made many refinements to his system and developed a concise code used by telegraphic system operators. Morse code is still in use today.

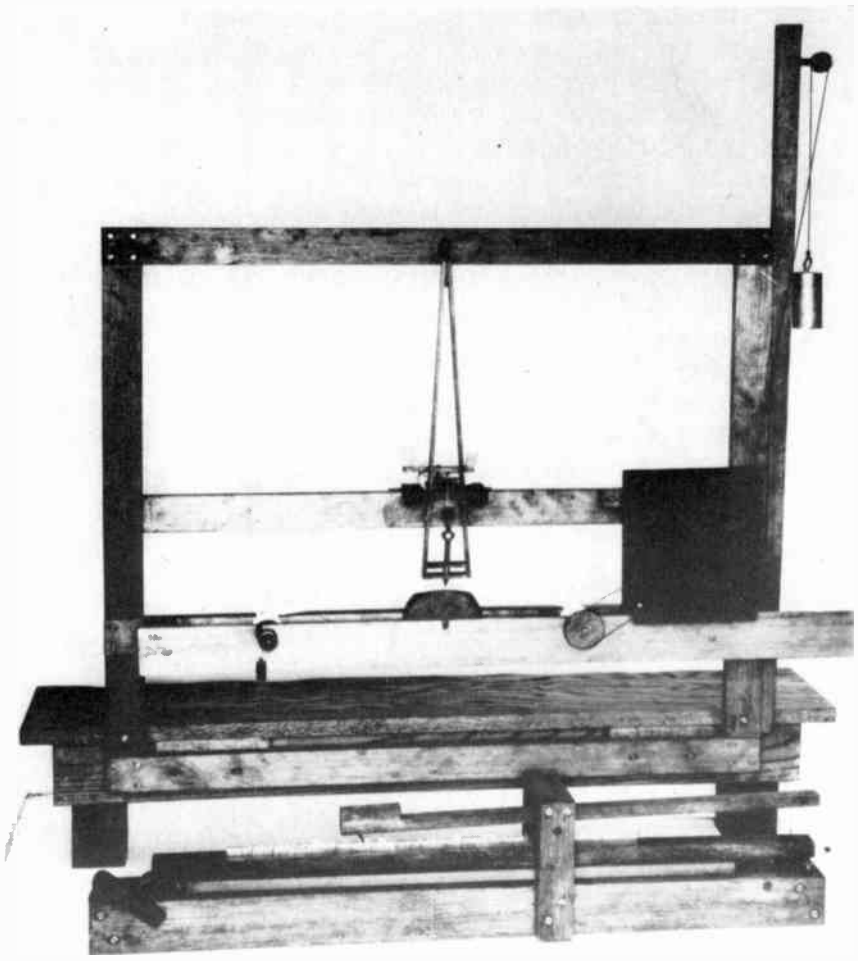


FIGURE 4–2. Morse's First Telegraph, 1835
SOURCE: The Bettman Archive, Inc.

4.3 ELECTRICAL-ACOUSTIC SYSTEMS: THE TELEPHONE

The building of telegraph systems that linked major urban areas was a stunning advance in communications. However, as fast and efficient as the sending of coded messages was, it still didn't replace conversation in terms of communication effectiveness. What was needed was a communications device that was electrical and could transport the sound of the human voice. What was needed was the telephone!

The telephone uses a continually varying pattern of electrical current to represent sound. The vibration of a diaphragm in a magnetic field creates a pattern of inductive current; the current is carried down a wire, where it causes another diaphragm to vibrate in the manner of the first. This produces a sound like the original.

4.31 Prelude to the Telephone: The Nature of Sound

Sound, unlike radio waves, is a *physical* phenomenon in which the atmosphere is disturbed, creating areas of high pressure and low pressure which move through the atmosphere in *wavelike* motions. The atmospheric disturbances may be caused by the vibrations of a solid object, such as the tuning board of a piano or the voice box (larynx) in your neck, or by electrical discharges, such as lightning.

Sometimes these atmospheric waves, or sound waves, are of sufficient strength and type to set other solid objects vibrating. For example, if you were to direct your voice toward the head of a drum and speak loudly, the sound waves produced by your voice would cause the drum head to vibrate. If you could attach some sort of marker or stylus to the head of the drum you could trace the pattern of the vibrations, which might look similar to that presented in figure 4–3. The encoding of atmospheric disturbances into electrical disturbances is the basic principle of *electrical-acoustic* telecommunications devices.

4.32 Early Telephonic Devices

It's not just the 20/20 hindsight the passage of a century provides that makes it seem amazing that a workable telephone system was not developed prior to 1876. The theoretical foundations were certainly established long before Alexander Graham Bell and Elisha Gray visited the patent office on the same day in 1876 to register drawings and descriptions of separate telephonic devices. The history of the telephone proves the adage that sometimes it takes many years after the discovery of basic principles for inventors to come up with technologies that use those discoveries to society's advantage.

Developing a method of reproducing sounds through the use of electricity took many years. The key is a process called **electrical induction.** The telephone is simply a device which converts sound into a pattern of electrical signals through *inductive* means. The electrical signal pattern is carried down a wire to a receiver which converts the signals back into sound. A German inventor, Phillipp Reis, used the mechanics of the ear as the inspiration for a telephonelike device. The first of Reis's devices was presented in 1860,

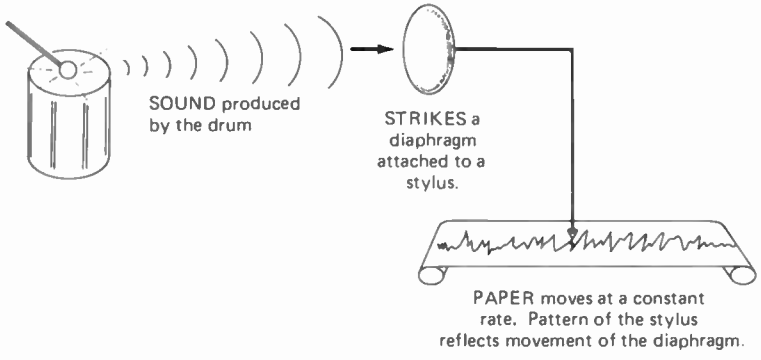


FIGURE 4–3. The Dynamics of Sound

and for the next fourteen years he made steady improvements in his devices, but circumstances conspired to prevent him from being declared the father of the telephone. Reis's devices could reproduce the sound of musical instruments but they never satisfactorily reproduced the complexities of the human voice. Reis died in 1874, and it wasn't until the Bell telephone first appeared in Europe that the Germans recognized the genius of one of their own countrymen.

4.33 The Bell Telephone

Alexander Graham Bell was born in Scotland. In 1871 he moved to Boston, where he had received an appointment as a professor at Boston University. Bell had been trained as a teacher of the deaf and attempted in his early years to develop instruments to improve his teaching methods and aid the deaf and mute. It was while working on an apparatus that would allow the sending of eight telegraph signals simultaneously that he began to work on devices that would eventually lead him to develop the telephone. Another inventor, Elisha Gray, working in Chicago, also developed a telephonic device similar to Bell's, but unluckily reached the patent office two hours after Bell's attorney. The patent office, moving with an alacrity amazing even for 1876, awarded Bell patent number 174,465 on March 7. It should be noted that Bell did not reproduce the sound of the human voice using his instruments until three days after his patent had been awarded.

4.34 The Problems with Communication by Wire

Although the telegraph and the telephone were important developments in the history of communications, both devices possessed an inherent problem—they were wire based. Nowhere were the limitations of communication by wire more apparent than in the attempts to create a *transoceanic* telegraph system.

One of the major problems was the cable itself. Early cables lacked adequate insulation from the water; when the water corroded the insulation, they became useless. Early solutions to the insulation problem included layers of cloth, rosin, and beeswax; exotic mixtures of asphaltum and tar; and even glass tubing. The first workable solution was gutta-percha, a natural substance gathered from a tropical tree and similar to rubber. The first successful use of a cable insulated with gutta-percha in the United States occurred in 1850, when a telegraph line was extended across the Connecticut River at Middletown. In 1858 Cyrus Field laid the first transatlantic telegraph cable, but it worked for only a few months. Two more attempts were made and finally in 1866 an Atlantic cable was successfully completed.

Cyrus Field spent millions of dollars and over ten years to create a transoceanic communication system. But the cables broke frequently and the cost of the wire, the ships, and the men needed to complete the engineering feat of laying the cable required the investment of large amounts of capital. Capacity was also a problem, for a cable can carry only so many messages at the same time. As interest grew in telegraph and telephone the number of messages steadily increased. Soon almost every moment available

for sending a message was taken. What was needed was a system that was free from the limitations of wire-based telecommunication.

4.4 ELECTROMAGNETISM

The fourth class of telecommunications devices are *electromagnetic*. In 1865 an English scientist, James Clerk-Maxwell, developed a series of mathematical equations which purported to prove the existence of a type of energy he called "electromagnetism." Clerk-Maxwell theorized that there existed a form of energy which moved through space in the form of *waves* at the speed of light. He called it "electromagnetism" because this special kind of energy theoretically would possess characteristics similar to both electricity and magnetism. Clerk-Maxwell's work was greeted with skepticism by his colleagues, who believed in the existence of ether, which was thought to be a special form of electrical-magnetic matter permeating all things in varying degrees. Electromagnetism they dismissed as only a theory. If the skeptics were to be satisfied there had to be some proof of its existence.

Heinrich Hertz furnished the proof in a series of brilliant experiments which he reported in 1888. While lecturing one day he noticed that when he discharged a spark through a coil of wire, a current was generated in another coil across the room. The energy which was transferred from one coil to another was the electromagnetism of Clerk-Maxwell.

Shortly after Hertz reported his initial findings a colleague suggested to him that **Hertzian waves** could be used for wireless communication. Hertz immediately dismissed the idea as a foolish fantasy because there was no practical means of detecting the waves once they were produced. But it took only a few years for Guglielmo Marconi to put together the necessary apparatus for a wireless communication system.

4.5 THE DEVELOPMENT OF WIRELESS TELECOMMUNICATION

The technology used to send messages through space without the use of wires or other physical conductors is not the result of the work of any one person. Many people, representing many different countries, contributed to the development of wireless telecommunication. One thing they all shared was a dream that someday communication would not be dependent upon geographic proximity, the willingness of a messenger to brave the perils of a cross-country journey, or the ability of a ship's captain to navigate a vessel across dangerous seas. Each hoped that the means might be found to use the atmosphere itself as a conduit for messages. Many other substances had been suggested—seawater, the earth itself, sympathetic magnets—but had been found to be unsuitable for telecommunication.

Guglielmo Marconi was born in Bologna, Italy, in 1874. His father was a wealthy landowner, his mother the daughter of an influential family in Dublin, Ireland. Young Marconi was shy, retiring, and studious, with an interest in electricity, and thanks to his family's financial situation he was able to devote all his time to his studies. He was fortunate

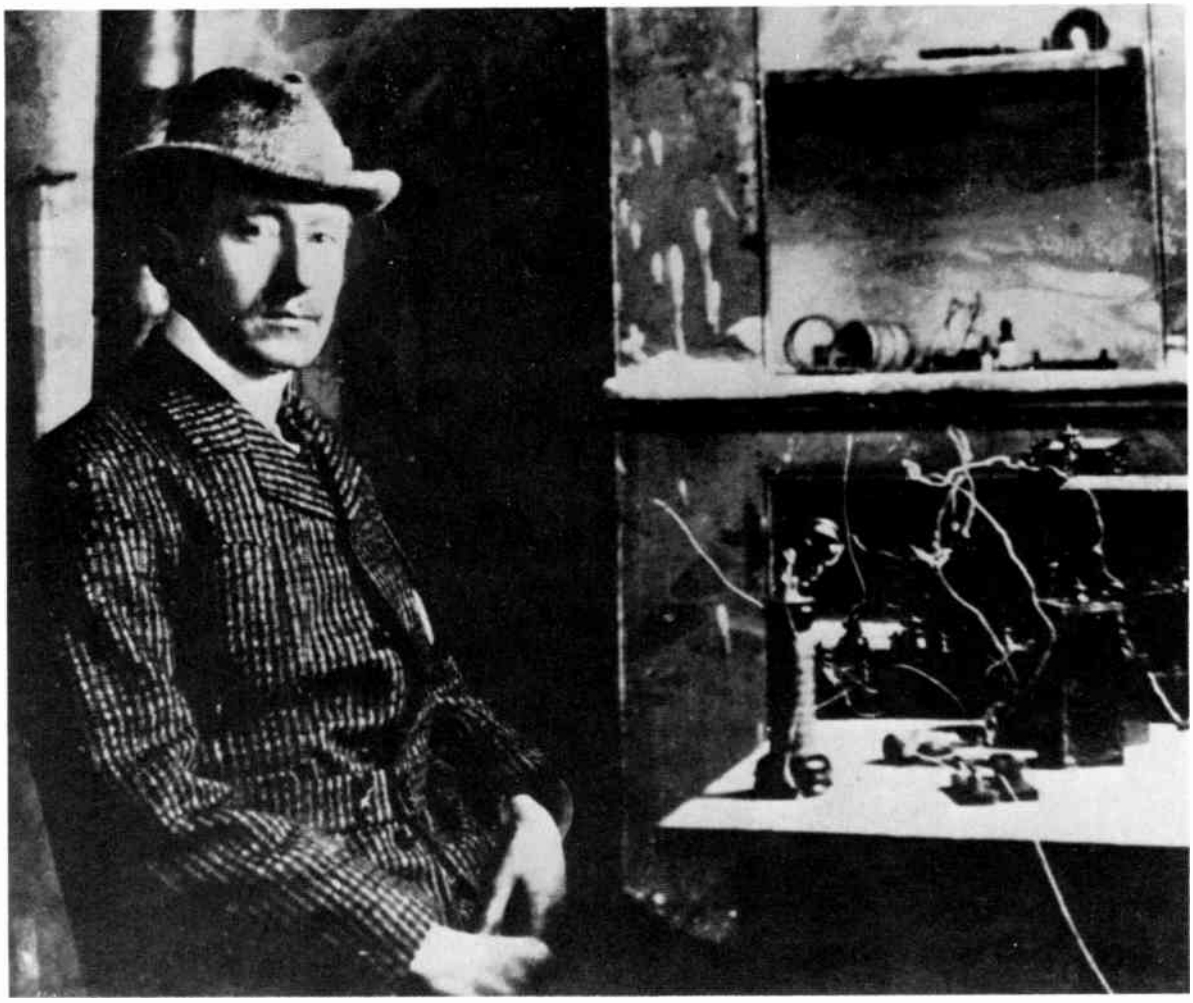


FIGURE 4–4. Guglielmo Marconi and Early Wireless Apparatus
SOURCE: Reprinted with permission of RCA.

enough to work with the Italian physicist Augusto Righi, who was conducting investigations into Hertzian waves.

In retrospect it seems almost impossible that wireless telegraphy using Hertzian waves was not developed prior to 1896, when Marconi applied for a patent to protect his wireless system. Sir William Crookes had suggested in 1892 that once a method was developed of generating Hertzian waves of a *specific wavelength* and once receivers capable of *detecting* Hertzian waves were built, then it might be possible to communicate without wires. By 1894 all the apparatus necessary for wireless communication had been developed—Hertz used a simple **resonator** to generate electromagnetic waves in his laboratory, many people had used aerials to detect inductive currents, and a wave detector

had been invented. Within the scientific community were many others who were older, wiser, and more scientifically sophisticated than Marconi, and had better-equipped laboratories. Why didn't they develop wireless? Perhaps the answer lies in the *character* of Marconi—a practical man, an applied scientist, who was interested in results which were usable rather than in abstract theories. Whatever the reason, it was Marconi who accomplished what others tried to do but couldn't. He invented wireless!

4.51 The Branley-Lodge Coherer

Hertz had generated distinct radio waves in his laboratory experiments, but his means of detecting the radio energy he produced was primitive. An **induction coil** with a small break in the wire turnings served as his detector. If wireless were to develop, a more sensitive detector had to be found. The answer was the *Branley-Lodge coherer*. In 1891 Edouard Branley, a Frenchman, discovered that the resistance of a tube filled with fine metal particles decreased when placed in proximity to a resonator **(spark gap generator)**. When the tube was tapped, the particles that had stuck together were disturbed. The flow of current through the tube stopped. Sir Oliver Lodge used Branley's tube as a detector of Hertzian waves and made some improvements. Lodge called the device a *coherer* because the metal particles cohered to one another until disturbed by the tapper.

4.52 The Russian Marconi

Before examining Marconi's device in detail, another pioneer of wireless should be acknowledged. Alexander Stepanovich Popov is believed by many to be one of the first (if not actually the first) to use electromagnetic waves for communication. In March 1896 he reported that he had sent a coded message 250 meters using no wires. He used a coherer and tapper as his detector, and connected it to a telegraphic printer which wrote out the sequence of signals. Considered by his Russian countrymen to be the inventor of radio, he is honored in the Soviet Union each May 7 on *Radio Day*.

4.53 Marconi's Apparatus

In the design of his initial wireless system Marconi used the work of several of his predecessors and nothing of his own invention. Marconi improved upon others' inventions and arranged them so that they generated and detected radio waves; in other words, Marconi put them together in a *system* that worked. So obvious was the design to Marconi that he assumed someone else would announce some practical application of Hertzian waves to wireless communication. After twelve months of waiting and seeing nothing Marconi began to refine the apparatus used in his laboratory.

In Marconi's first experimental transmissions he sent signals over a distance of two miles. In 1896 he left Italy and went to England, where he applied for his first wireless patent and demonstrated his apparatus to various military and civilian officials. During

his demonstrations he discovered that he could increase the distance the signals were transmitted by increasing the length of his antenna wire and the amount of power he used. He also improved the sensitivity of his coherer.

There was much excitement in England about the new invention. The English navy saw its usefulness in maritime communication. The press wanted to use wireless to cover sporting events and began calling Marconi "the father of the wireless," a title he never claimed for himself. Marconi and his cousin established the Wireless Telegraph and Signal Company, Ltd., in 1898 to exploit the commercial potential of the invention. The company later became known as British Marconi. Later an American branch was formed, called American Marconi.

In March 1899 Marconi succeeded in bridging the English Channel with wireless. The demonstration was conducted for the benefit of the British War and Navy departments. In the United States, Marconi used wireless to transmit the proceedings of the America's Cup yacht races back to newspaper reporters on shore. So impressed were representatives of the American army and navy that they bought wireless systems too.

4.54 Marconi and Lodge Develop Tuning

By 1900 the Marconi enterprise was facing serious competition from other companies using equipment based on different patents. With the increase in the amount of transmission activity there was a corresponding increase in *interference*. No one as yet had the ability to control the frequency at which the radio waves were generated, and since the spark gap method of generating radio waves was the only method known at the time, most transmitters operated at or near the same frequency. Wireless privacy was almost nonexistent. Anyone with a sensitive enough receiver could listen in on the coded messages being sent back and forth between transmitters. A device or technique was needed that could allow an operator of a transmitter or receiver to tune his apparatus to a particular frequency. It was this problem that Marconi addressed.

In the mid-1890s Sir Oliver Lodge carried out a sequence of experiments which led to the discovery of resonance, or **syntony**. Lodge built transmitters and receivers which had matched **inductances, capacitances,** and antennas. The major problem with Lodge's system and the systems built by others was that very little energy was transmitted into space. Once again it was the practical, systematic mind of Marconi that put together existing elements to solve the problem.

In 1900 Marconi developed an improved system based upon Lodge's principles of syntony. The system added a circuit which created a much more powerful wave able to sustain its power for a much greater distance. The receiver was based upon the same principles. Marconi received both a British and an American patent on his arrangement of circuits, which was superior to anything in existence at the time. Privacy could be obtained and interference was reduced. Marconi now had a virtual monopoly on *syntonic tuning* of radio apparatus. The stage was set for Marconi's greatest accomplishment—spanning the Atlantic.

4.55 Radio Waves Cross the Atlantic

Transmit radio waves across the Atlantic Ocean? "Never!" exclaimed the scientists of the day. "It's too far. Radio waves travel in straight lines." Few disputed the scientific dogma of the day, yet Marconi had experimental evidence that this simply was not true. Even with his low-powered transmitter he had succeeded in covering sixty to one hundred miles, a distance well beyond the limits of the horizon. Marconi didn't know why his signals were traveling beyond the theoretical limits; he simply knew that they were.

Marconi knew that in order to span the Atlantic a more powerful transmitter had to be utilized. He used a 25 kilowatt **alternator** which he connected to a transformer se-

FIGURE 4–5. Marconi's Associates Launch an Antenna Kite at Poldhu
SOURCE: Reprinted with permission of RCA.

ries that could develop 20,000 volts of electrical potential. He built the transmitter station at Poldhu in the county of Cornwall, England. On the other side of the ocean, he wanted to locate a receiver site on Cape Cod in the United States, but twice gales blew down his massive antenna apparatus, so he moved the reception site to a hill overlooking St. John's Harbor, Newfoundland. On December 9, 1901, he had finished constructing the receiving station. He had instructed his assistants at Poldhu to begin sending the Morse code letter *S* between 11:00 A.M. and 3:00 P.M. on December 11. On the 11th a gale struck St. John's Harbor and the balloon which carried the aerial aloft was lost. The weather worsened on the 12th and the kite which was used to carry the antenna would not stay steady in the gusting wind. A desperate Marconi changed coherers, trying to find something more sensitive. Finally at 12:30 P.M. the young inventor heard something in his earphones. It was the sound of the three short bursts of tone representing the letter *S* being transmitted from over two thousands miles away. Marconi had crossed the Atlantic!

Marconi's achievement was called "an epoch in human history" by Sir Oliver Lodge. The public imagination was fired by Marconi's accomplishment, but quickly the achievement was shrouded in controversy. First the American-Anglo Telegraph Company, which had a monopoly on communication activities in Newfoundland, demanded that Marconi cease his experiments. Then a more serious controversy erupted. Marconi was accused of faking the transatlantic transmission—it was charged he hadn't really heard anything! Marconi proceeded to replicate his experiment, and soon all the world acknowledged his accomplishment.

While Marconi's achievements were enormous, there was still no wireless device that could transmit the human voice. Marconi's invention was a wireless telegraph. Development of a wireless telephone and broadcasting would have to await new technological breakthroughs, which will be examined in chapter 6.

4.6 SUMMARY

The means of telecommunication have evolved greatly. The use of human messengers was one of the earliest means of communicating information. Later horses and ships were used, but still information moved only as fast as the means to transport it. The challenge was to develop systems that could move information over land and water with speed and efficiency.

The earliest telecommunications media were mechanical systems such as signal fires, smoke signals, and heliography. In the seventeenth century flags were used to communicate between ships, and later optical telegraph systems were built across Europe and in the United States. The telegraph, an electrical system, overcame many of the problems of the visual systems and allowed more sophisticated messages to be sent at greater speed.

The telephone was invented by Alexander Graham Bell in 1876, but was based upon the discoveries of others. Submarine telephone cables were laid beneath large bodies of water but were limited in capacity and were quickly destroyed by the corrosive action of seawater.

The discovery of electromagnetic energy gave hope that a wireless telecommunications device could be developed. The first system for transmitting and receiving wireless signals was developed by Guglielmo Marconi in 1896. In 1900 he developed a system of tuning, so that particular frequencies could be transmitted and received, and in 1901 he succeeded in transmitting a signal across the Atlantic Ocean. Yet despite these advances in telecommunication, there was still no wireless device that could transmit the voice.

SECTION

II

TECHNOLOGY AND DEVELOPMENT

CHAPTER 5 OUTLINE

5.1 DESCRIBING ELECTROMAGNETIC ENERGY

5.11 The Electromagnetic Spectrum
5.12 Velocity, Frequency, and Wavelength
5.13 The Constant Relationship
5.14 Amplitude, Attenuation, and Phase

5.2 RADIO WAVES

5.21 Classification of Radio Waves
5.22 Generation of Radio Energy

5.3 MODULATION

5.31 Harmonics
5.32 Sidebands and Channels
5.33 Channel Capacity

5.4 MANAGEMENT OF THE SPECTRUM

5.41 Licensing
5.42 Multiplexing
5.43 Use of Sidebands

5.5 PROPAGATION AND WAVE TYPES

5.51 Ground Waves
5.52 Direct Waves
5.53 Sky Waves
5.54 The Ionosphere
5.55 Factors Affecting Propagation

5.6 SUMMARY

5

ELECTROMAGNETIC ENERGY

Electromagnetic energy is the key ingredient in modern telecommunications systems. Without the ability to manipulate electromagnetic energy we would have no radio or television, cable communications systems, telegraph, long-distance telephone or telegraph, satellite communications, police radio, cab calls, or radio astronomy!

At the end of this chapter you should be able to:

1. Describe electromagnetic waves and determine the relationship between velocity, wavelength, and frequency

2. Identify and describe the two ways of modulating electromagnetic energy

3. Understand the variations in propagation characteristics among various types of radio waves.

5.1 DESCRIBING ELECTROMAGNETIC ENERGY

Electromagnetic energy is very different from sound, yet we use many of the same terms to describe them both—velocity, frequency, harmonics, wavelengths. Some people think sound and electromagnetic energy are the same. They're not. Sound is a physical phenomenon; electromagnetic energy is a special type of energy. Sound needs a *physical sub-*

stance, such as air, through which to travel. Electromagnetic energy needs no physical substance as a medium of transport. It can travel through a vacuum. Some kinds of electromagnetic energy can travel through physical substances, while others cannot. For example, light can't travel through a wall, but radio waves can.

5.11 The Electromagnetic Spectrum

There are many different forms of electromagnetic energy. Figure 5–1 shows the various types of energy which make up the **electromagnetic spectrum**. Note that each specific form requires a different *sensory apparatus* to perceive it. Different portions of our body are sensitive to different portions of the spectrum—eyes are sensitive to light, for example, skin to ultraviolet. X-rays and gamma rays may change the structure of the cell nucleus. Microwaves cook our food, and infrared rays keep it warm. Radio and television receivers are sensitive to that portion of the spectrum known as radio waves. But communication with electromagnetic energy isn't limited to radio waves. Telephones and telegraphs use electricity, and in the past decade special forms of light utilizing fiber optic technology have been used in communications devices.

5.12 Velocity, Frequency, and Wavelength

Unlike sound, whose velocity varies in relation to atmospheric conditions, the speed of electromagnetic energy is constant. Electromagnetic energy travels at *300,000,000 meters per second*, or approximately *186,300 miles per second*.

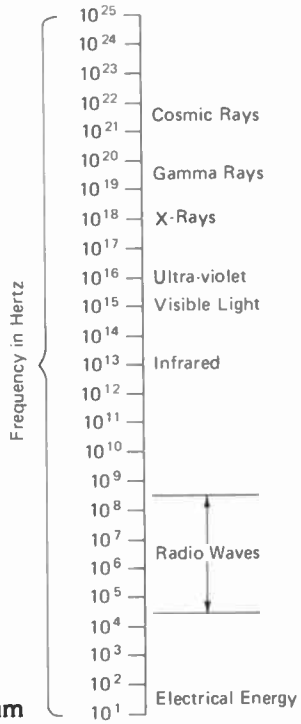


FIGURE 5–1. The Electromagnetic Spectrum

Frequency is a term used to describe the number of waves of energy which pass a given point within a specific unit of time. The time unit used is generally a second; thus frequency is expressed in cycles per second. By international agreement the term **hertz** (abbreviated Hz) is used to represent one cycle per second. Rather than say 60 cycles per second, we say 60 hertz. Since the portion of the electromagnetic spectrum we use in radiocommunication consists of energy with a frequency of thousands, millions, billions, and even trillions of hertz, we use the prefixes **kilo-, mega-,** and **giga-** with the word "hertz" for frequencies of thousands, millions, and billions of cycles per second.

Wavelength refers to the distance between waves, and is normally expressed in metric units. Here too we use the prefixes "kilo-," "mega-," and "giga-." But many wavelengths are less than one meter, and in such cases we use the prefixes **centi-, milli-,** and **micro-**.

5.13 The Constant Relationship

Sometimes we want to graphically portray electromagnetic waves. Representing them in three dimensions is awkward, so we use a two-dimensional format. A wave of electromagnetic energy can be seen in figure 5–2a. The curve in figure 5–2a is called a *wave form,* and the particular wave form shown is called a *sine wave;* it is equivalent to one hertz. It took one second to pass and is 4 units in length. If we were to add another similar wave to our display, it would look like figure 5–2b. Each wave took one second to pass and the distance between waves is 4 units. The frequency of wave A and wave B is one hertz and the wavelength is 4 units.

Now let's suppose we wanted to double the frequency from one hertz to two hertz. What do you suppose happens to the wavelength? You can see by looking at figure 5–2c. Note that when we double the frequency the wavelength decreases proportionally, from 4 units to 2 units. Since the velocity of electromagnetic energy is constant there is always a direct relationship between frequency and wavelength. This relationship is expressed in the formula

$$f \times wl = v$$

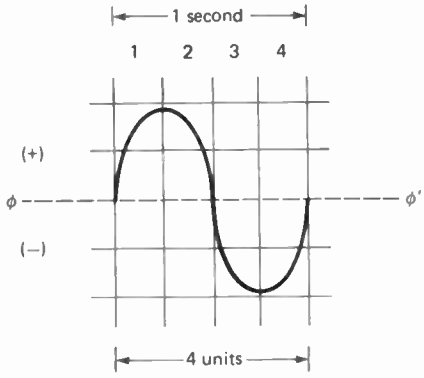
where f = frequency in hertz,
wl = wavelength in meters,
and v = velocity (300,000,000 meters per second or 186,300 miles per second).

Thus if a radio station is located at 1,200 kilohertz (1,200,000 hertz) it has a wavelength of 250 meters.

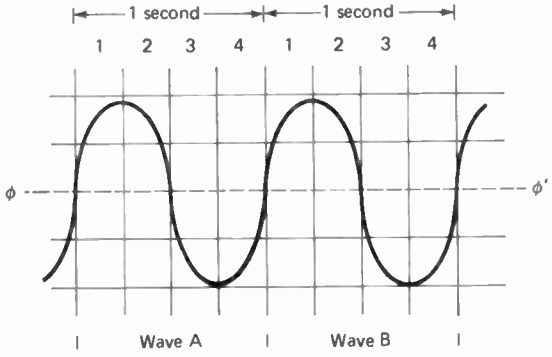
5.14 Amplitude, Attenuation, and Phase

When we speak of the **amplitude** of an electromagnetic wave we are talking about its *power* relative to other waves. The amplitude of a sine wave is measured by the peak height of the wave above the 0–0′ line. In figure 5–3a we see two waves. Wave A has an amplitude of 2 units as measured from the 0–0′ axis, while wave B an amplitude

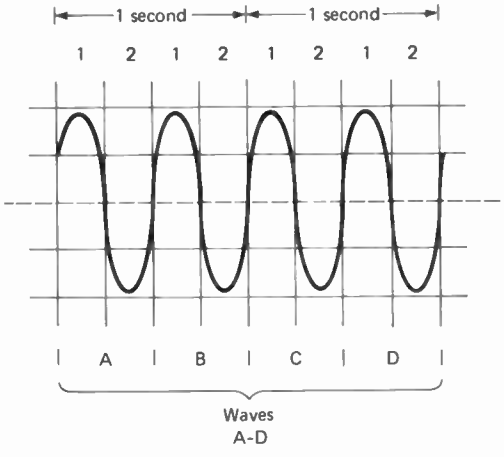
FIGURE 5–2. Sine Wave Forms



(a) A Sine Wave Equivalent to 1 Hertz.



(b) Two Sine Waves.
Each Has a Wavelength of 4 Units

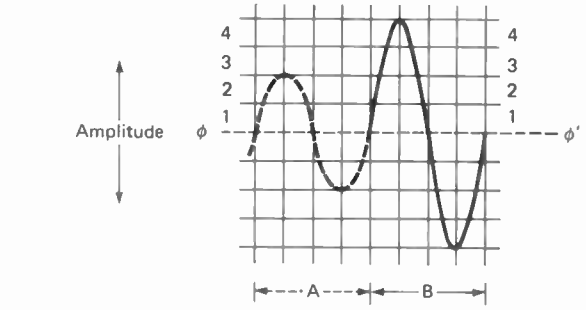


(c) Four Sine Waves.
Each Has Twice the Frequency of (b) and One Half the Wavelength.

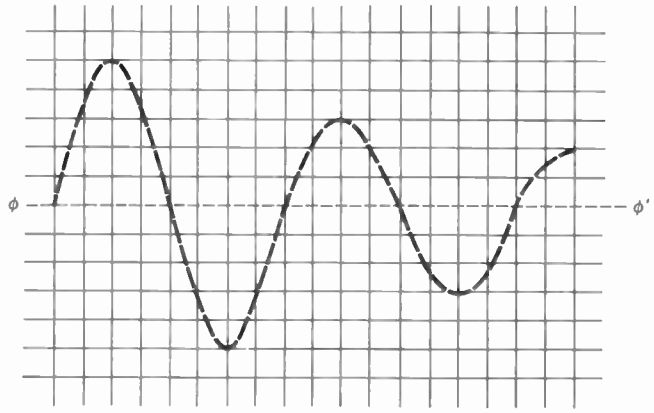
of 4 units, so wave B is more powerful than A. The power of radio waves is expressed in **watts.**

Electromagnetic energy is absorbed by physical substances, for example the atmosphere and the ground. This loss of energy, called **attenuation,** may be seen as a decrease in the amplitude of the wave form. Figure 5–3b portrays a wave that has an amplitude of 4 units which then decreases to 3 units, 2 units, 1 unit, and finally ceases to exist. Note that neither the frequency nor the wavelength is affected by attentuation. Attenuation also occurs when a constant amount of electromagnetic energy is spread over an *increasing* amount of area. For example, as you move away from a light source the amount of light per square foot decreases. As you move farther away from a transmitter of radio waves the power of the signal decreases, so that you have to keep increasing the volume on your radio until the station fades out entirely.

Phase is an important concept in both radio and television. Suppose we have two sources of electromagnetic energy, each transmitting waves at a frequency of one hertz and each transmitting the same content. The transmitters are operating so that when transmitter A's wave is a quarter of the way through a complete cycle transmitter B begins its wave cycle. In figure 5–4a transmitter A's wave is represented by the dotted sine wave and B's by the solid wave. When you received the signals from A and B there would be interference between the two signals because they are *out of phase.*



(a) Wave B Has Twice the Amplitude of Wave A.



(b) Attenuation.

FIGURE 5–3. Sine Wave Amplitude and Attenuation

What happens if two signals have the same frequency, are in phase with one another, but have different amplitudes? The result is a third signal whose amplitude is the sum of the two original signals. Two signals that are out of phase but have the same frequency will result in a decrease in the amplitude of each signal.

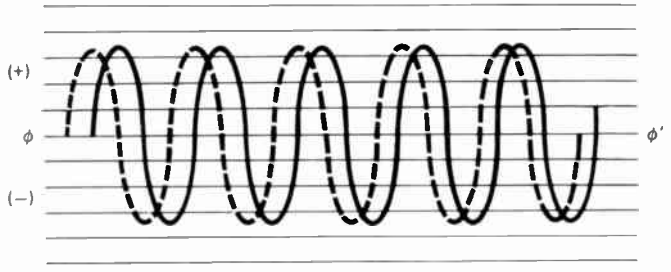
In figure 5–4b we see an example of two signals that are completely out of phase. Note that when the dotted wave is at its peak of 2 units on the plus side of 0–0′ the solid wave is at its peak of 2 units on the minus side. This opposition of polarities means that the two waves cancel each other out.

5.2 RADIO WAVES

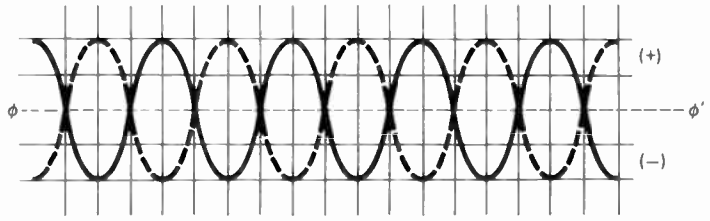
Thus far we've examined the attributes of the electromagnetic spectrum common to all forms of electromagnetic energy. Of particular interest to us is the portion of the electromagnetic spectrum whose energies are known as *radio waves*. Radio waves' frequencies range from greater than 10,000 hertz to 300 gigahertz (300,000,000,000 hertz). Return to figure 5–1 and note the relationship of radio waves to other forms of electromagnetic energy. Note that radio waves have a higher frequency than electrical energy but a lower frequency level than infrared or light energy.

5.21 Classification of Radio Waves

Radio waves of different frequencies tend to act in different ways. In the early days of broadcasting, engineers and scientists divided radio energy into three categories: long waves, medium waves, and short waves. Today there are eight classifications. Figure 5–5 shows the various classes of radio waves and some of the telecommunications applications for each classification.



(a) Waves A and B Are Out of Phase.



(b) Waves A and B Are Out of Phase Resulting in the Cancelling-Out of Each Signal.

FIGURE 5–4. Examples of Phase

FIGURE 5–5. Classes of Radio Waves and Some of Their Uses

FREQUENCY RANGE	*DESIGNATION*	*USES*
3 to 30 kilohertz (kHz)	Very low frequencies (VLF)	Long-range navigation, sonar
30 to 300 kHz	Low frequencies (LF)	Navigational aids, radio beacons
300 to 3,000 kHz	Medium frequencies (MF)	Maritime radio, direction finding, distress calling, Coast Guard radio, AM radio
3 to 30 megahertz (MHz)	High frequencies (HF)	Search and rescue, air-sea communication, telephone, telegraph, facsimile, ship-to-coast
30 to 300 MHz	Very high frequencies (VHF)	VHF television, FM radio, air traffic control, taxicab and police radio, navigation
300 to 3,000 MHz	Ultra high frequencies (UHF)	UHF television, radar, satellite
3,000 to 30,000 MHz	Super high frequencies (SHF)	Satellite, microwave, radar, mobile telephone, walkie-talkies
30 to 300 gigahertz (GHz)	Extremely high frequencies (EHF)	Radar, railroad, experimental

5.22 Generation of Radio Energy

The radio energy used for radio, television, and cable communication is generated by manipulating electricity. If you *increase* the frequency of electrical energy enough, a point is reached where the electromagnetic energy begins to *radiate* from the conductor into the surrounding space. Radio waves can also be generated by sparks. In fact, this was the method used by Hertz in his experiments, and by Marconi in the first wireless equipment. The use of sparks for the generation of radio signals has been replaced by electronic **multipliers** and **oscillators**.

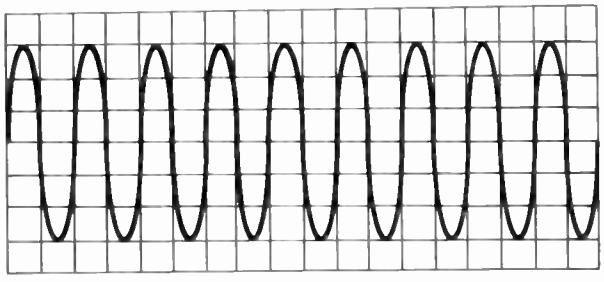
5.3 MODULATION

The process of imposing information (encoding) on radio waves is called **modulation**, the decoding process **demodulation**. Prior to modulation, sound or light must be converted into a series of radio frequencies. The conversion is handled by a **transducer**. The electromagnetic frequency outputted by the transducer is called an **audio** (or video) **frequency** (AF or VF). The modulator takes the audio frequency and imposes it onto the **carrier wave** that is generated by the transmitter. Modulation of the carrier wave means that the fundamental form of the wave is changed by the introduction of a second elec-

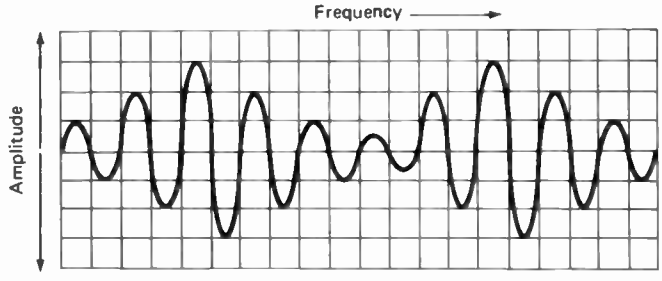
tromagnetic frequency. The combination of the AF and the carrier wave is called a **radio frequency** (or RF).

There are two methods of modulating the carrier: *amplitude modulation* (AM) and *frequency modulation* (FM). Suppose we generate a sound of 500 hertz. If we were using an amplitude modulation method, the amplitude of the carrier wave would change 500 times a second; circuits in the receiver would decode the amplitude variations and read the signal as a sound with a frequency of 500 hertz.

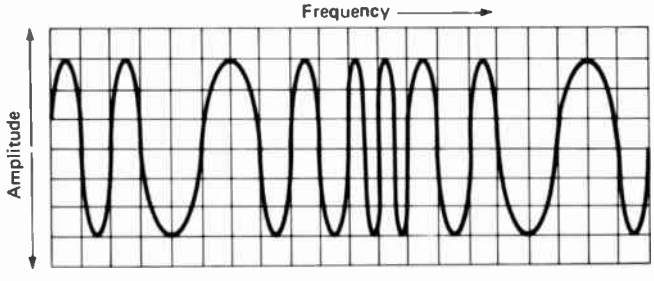
The frequency modulation method uses the number of *variations* in the frequency as the encoding method. A sound of 500 hertz would be encoded by changing the frequency of the carrier wave 500 times per second. Figure 5–6 shows an unmodulated carrier wave (a), a wave modulated by amplitude (b), and one modulated by frequency (c).



(a) Unmodulated Carrier Wave.



(b) Amplitude Modulated Carrier Wave (Frequency Is Constant–Amplitude Is Changed).



(c) Frequency Modulated Carrier (Amplitude Is Constant–Frequency Is Changed).

FIGURE 5–6. AM and FM Carrier Waves
SOURCE: FCC Radio Operator's Handbook.

5.31 Harmonics

Rarely does a musical instrument or the human voice ever produce a pure tone. Most sounds are made up of many different tones and produce complex wave forms. For example, a guitar string is plucked. The sound waves produced by the vibration of the string produce vibrations in the body of the guitar and in other objects in the room. Each vibration is slightly out of phase with the others. The result is a pleasing sound full of overtones. By contrast, if we were to produce a pure tone in an acoustically dead environment it would sound flat and uninteresting.

Overtones are a part of the world of **harmonics**. If we were to generate a sound of 500 Hz, overtones of 1,000 Hz, 1,500 Hz, 2,000 Hz, and so on are produced. When electromagnetic waves are produced the same phenomenon occurs. A carrier wave of 20,000 Hz will produce electromagnetic waves at 40,000 Hz, 60,000 Hz, and so on. Modulating the carrier wave with an audio frequency disturbs the frequencies immediately above and below the frequency of the carrier wave. These frequencies are processed by the receiver and reproduced as complex audio (or video).

5.32 Sidebands and Channels

The generation of frequencies other than the carrier frequency through modulation means that telecommunicators must be assigned not one frequency but a band of frequencies. This band of frequencies is called a channel, and the frequencies above and below the carrier wave frequency are called sidebands. The number of frequencies in the sideband determine the bandwidth. The more complex the information to be encoded on the carrier frequency and the shorter the time needed for delivery, the greater the bandwidth needed.

5.33 Channel Capacity

A channel might be compared to a pipe, and information transmitted through it compared to water. If we want to fill a swimming pool we could use a garden hose with a diameter of three-quarters of an inch. In that case the pool will fill very slowly. But if we use a pipe with a diameter of one foot and maximize the water pressure, the pool will fill much more quickly. Similarly, one frequency can only carry one **bit** of information per second. The greater the amount of information which must be carried per second, the *greater the bandwidth* needed. Thus the width assigned to a telecommunications channel depends upon the amount of information which will be transported and the desired speed of transport.

Various media differ in the channel capacity needed. The telephone doesn't require a wide bandwidth because absolute fidelity isn't required for most telephone conversations. Therefore the bandwidth of your phone is only 4 kilohertz. FM radio requires that sound be produced in high fidelity, so its bandwidth is much greater than that of telephone circuits. Television has both sound and picture and requires a bandwidth greater than either the telephone or FM radio.

5.4 MANAGEMENT OF THE SPECTRUM

The radio wave portion of the electromagnetic spectrum is a natural resource which, although not depleted through use, is of limited size. Therefore its use must be *managed* very carefully. As with most things, there are technological and *economic trade-offs* to be made in the use of the electromagnetic spectrum. The technology which uses the spectrum most efficiently is less expensive than that which is less efficient. The amount of information which can be transmitted per channel is limited by the channel's bandwidth. Decreasing the present bandwidths of radio and television channels may result in a deterioration in the quality of the sound and the picture. Yet no radio or television station uses the entire bandwidth of the channels assigned to it. Meanwhile many different telecommunication services are competing for spectrum space. Mobile phones compete with earth-fixed stations. Satellite signals compete with microwave signals carrying long-distance telephone calls. Spectrum management allows us to assign portions of the spectrum to specific services and to make more efficient use of channels.

Without spectrum management, *interference* results. If too many people transmit on the same frequency there will be **cochannel interference**. If there are no standards for transmitting and receiving equipment, there will be **adjacent channel interference,** or receivers may not be able to receive the transmitted signals. Without some sort of plan and international cooperation in the execution of that plan, efficient and effective telecommunication is impossible.

Using techniques that are wasteful of spectrum space cannot be tolerated when there is greater demand for channels than there is spectrum space available. So governments cooperate with one another in the allocation of blocks of frequencies for specific purposes. For example, broadcasting in the United States uses channels in the MF, VHF, and UHF bands. International broadcasting is assigned to the HF band. Other countries might use channels in the LF and HF bands for domestic communication. The allocation of frequencies for specific use on a worldwide basis is administered by the International Telecommunication Union (ITU).

5.41 Licensing

From the internationally generated allocation assignments individual governments create allotment tables which assign specific channels for specific uses. Then an agency of the government licenses persons and organizations to use specific channels for those predetermined purposes. The license allows the holder to transmit on the assigned frequency at the power and time and for the use previously determined. In some countries the holder of the license is the government itself; in some, for example the United States, there is a mixture of assigned government frequencies and frequencies provided for private use.

5.42 Multiplexing

In addition to government-imposed allocation—international assignment of channels and licensing—there are other ways to more efficiently use a channel. **Polarization** of the

transmitted wave is one technique that can be used. This is particularly popular in the VHF and higher-frequency bands.

Multiplexing is the means whereby two or more signals are placed within a single channel, and can be used to increase the efficiency of both broadcast and wire. FM stereo and quadraphonic, color television, and videotext all use multiplexing. There are two basic types of multiplexing: frequency division and time division.

In *frequency division multiplexing* unused frequencies are utilized for information transport. For example, suppose you have a channel that is 200 kHz wide and you only use 100 kHz for sound transmission. The other 100 kHz could be used for other types of information—computer data, stock market quotes, or a reading service for the blind, for instance. In electronic media that produce a wide band of usable frequencies, the bandwidth is divided into specific channels and each channel is assigned a particular service, for example an FM station.

In *time division multiplexing* a finite amount of time is allocated for one type of information. Suppose we divided up a second into 10 equal parts of 100 units each. During the first part we would transmit a telephone conversation to home A, during the second sales information to corporation X, during the third, fourth, and fifth units a radio signal, and so on. By filling in all the spaces between bits of information we can use a single channel more efficiently.

5.43 Use of Sidebands

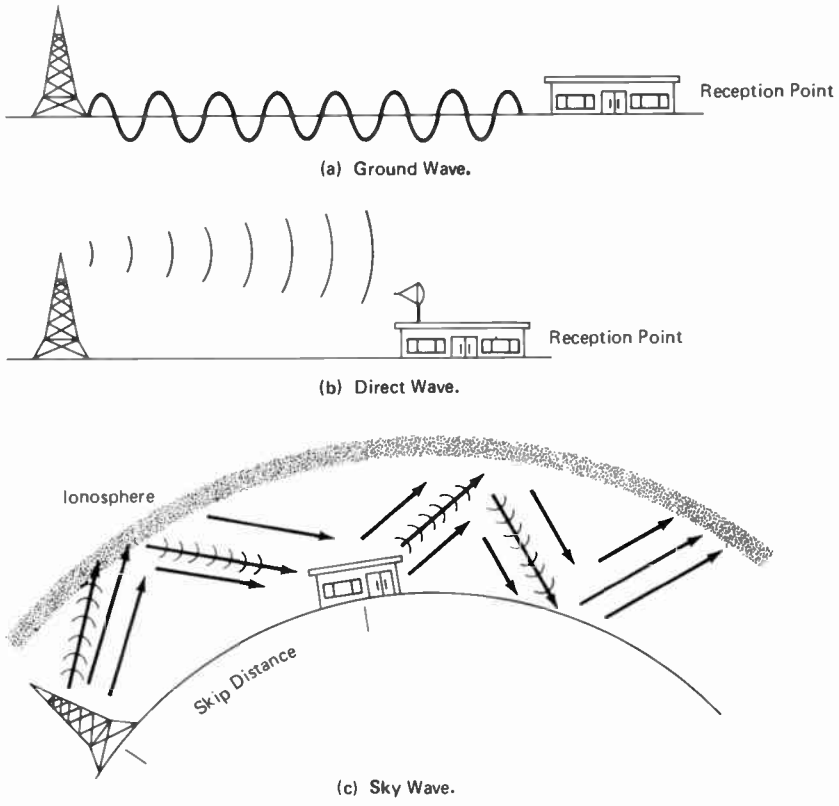
Another spectrum management technique utilizes unused portions of assigned channels for the transport of information. In some telecommunications services, CB and AM radio for example, it is possible to use only one side of the channel for the carriage of the primary information while using the remaining portion of the channel to carry other information.

5.5 PROPAGATION AND WAVE TYPES

Propagation refers to the path taken by radio waves through the atmosphere. All things being equal, it might be expected that all radio waves would propagate and attenuate in the same manner. They don't. A number of factors influence the behavior of radio waves. They are subject to *reflection* by physical objects, and *refraction* and *absorption* by the atmosphere. In addition, the **coverage area** is affected by atmospheric and solar conditions, the amount of **ground conductivity,** the transmitter's power, and, in some instances, the placement of the transmitter.

In general, the higher the frequency of a radio wave the more like light it behaves. Radio energy with frequencies greater than 30 megahertz are called **quasi-optical**. High-frequency waves are more susceptible to some sort of physical or atmospheric disturbance. So while lower-frequency waves are susceptible to atmospheric noise, higher-frequency waves react to interference from solar storms and other forms of "electron noise." Another variable in the behavior of radio waves is how they travel through space. Three classes of radio waves have been designated: *ground, sky,* and *direct*. The three modes of wave travel are illustrated in figure 5–7.

FIGURE 5–7. Carrier Wave Propagation Methods



5.51 Ground Waves

Radio waves that are transmitted through the surface of the earth are known as ground waves. Ground waves are not limited to the line of sight between transmitter and receiver, but can travel as far as their power and the conductivity of the soil allow. (The greater the moisture content of the soil, the farther ground waves can travel given the same amount of power.) For example, a ground wave transmitted by an antenna operating at 50,000 watts of power will travel farther than a ground wave transmitted at 500 watts given the same frequency and ground conductivity.

5.52 Direct Waves

Radio waves that are transmitted from the antenna straight through the atmosphere to the receiver are called *direct waves*. Although the horizon is the theoretical limit to direct wave reception, in practice atmospheric refraction allows receivers beyond direct line of sight to receive direct waves.

Direct waves are used in the VHF, UHF, SHF, and EHF bands, whose frequencies are

particularly susceptible to absorption and diffusion by the atmosphere. Under certain atmospheric conditions these signals are subject to **ducting**.

5.53 Sky Waves

Most direct waves propagated into the atmosphere simply travel into space. However, frequencies in the MF and HF bands are refracted by the **ionosphere** to such a degree that they travel back to earth. Sometimes the radio waves are then reflected from the earth back to the ionosphere again, and go back and forth until the energy of the signal is too weak to be detected. This skipping effect can be seen in figure 5–7c. It is because of the bending of the radio waves by the ionosphere that we can hear distant AM radio stations at night.

Both direct waves and sky waves travel to the ionosphere. Whether they are refracted or not depends in part on the **angle of radiation,** the frequency of the wave, and ionospheric conditions. If the angle is increased beyond a certain point *(critical angle)*, the radio energy is not refracted but travels out into space. If the radio wave is refracted then it travels back to the earth, where it can be received by a reception antenna. The reception zones are not uniform and there will be areas of nonreception, called *skip zones.*

5.54 The Ionosphere

Actually, the ionosphere is made up of not one but several layers, which are designated by the letters *D, E,* and *F.* The *F* layer has two sublayers, designated *F1* and *F2.* Figure 5–8 shows the various layers of the ionosphere. The energy from the sun acting on the atoms of the gases which make up the atmosphere creates these layers of positively

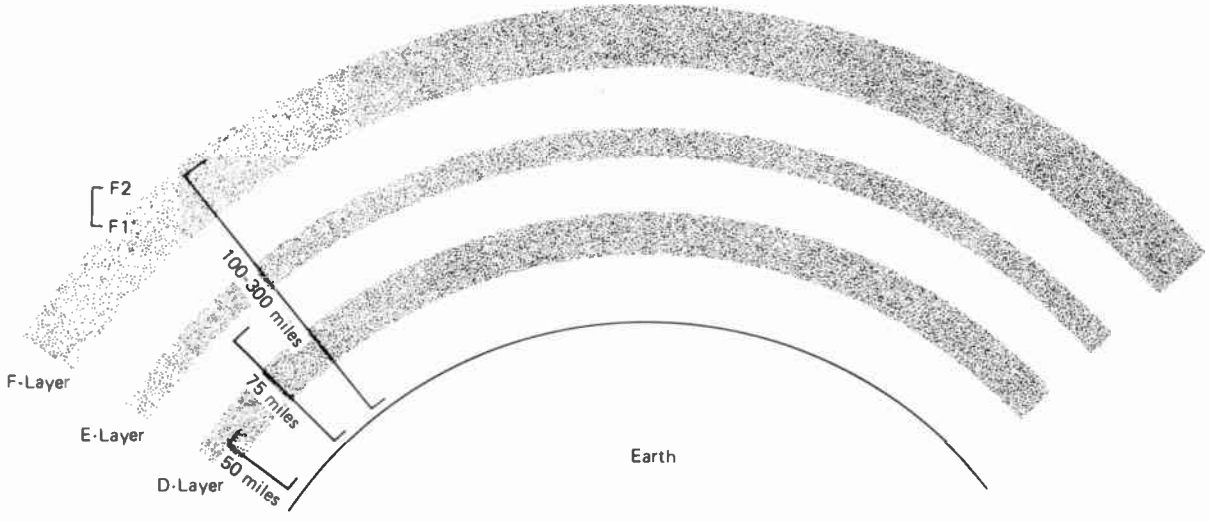


FIGURE 5–8. Structure of the Ionosphere

charged atoms and free negatively charged electrons. The layers of the ionosphere may refract or absorb radio waves, depending on the season, time of day, and sunspot activity.

5.55 Factors Affecting Propagation

Various factors affect the propagation of radio waves—time of day, season of the year, sunspot activity. The frequency of the radio energy is also of great importance. A summary of the propagation characteristics of the various frequency bands can be seen in figure 5–9.

FIGURE 5–9. Propagation Characteristics of Frequency Bands

BAND	*FREQUENCY RANGE*	*DESIGNATION*	*RANGE*		
			Ground	Direct	Sky
2	30 to 300 Hz	Extremely low frequencies (ELF)	nu	nu	nu
3	300 to 3,000 Hz	Voice frequencies (VF)	nu	nu	nu
4	3 to 30 kHz	Very low frequencies (VLF)	long-range	nu	nu
5	30 to 300 kHz	Low frequencies (LF)	moderate: land long: water	nu	nu
6	300 to 3,000 kHz	Medium frequencies (MF) (AM radio)	moderate: land long: water	nu	short–medium: day medium: night
7	3 to 30 MHz	High frequencies (HF) (Shortwave radio)	short: land moderate: water	nu	medium–long: day long: night
8	30 to 300 MHz	Very high frequencies (VHF) (TV and FM radio)	short	quasi-optical	nu
9	300 to 3,000 MHz	Ultra high frequencies (UHF) (TV channels 14–83)	nu	quasi-optical	nu
10	3,000 to 30,000 MHz	Super high frequencies (SHF) (Microwave and satellite)	nu	quasi-optical	nu
11	30 to 300 GHz	Extremely high frequencies (EHF) (Microwave)	nu	quasi-optical	nu

NOTE: Short = 50 miles, medium = 50–1,000 miles, long = + 1,000 miles; nu = not usable.

5.6 SUMMARY

Electromagnetic energy, the key ingredient of the telecommunication process, has characteristics of both electricity and magnetism. Electricity, cosmic rays, and radio waves are forms of electromagnetic energy. When we describe electromagnetic energy we use the terms *frequency*, *wavelength*, and *velocity*. These have a special relationship with one another, which can be described using the formula

f (in hertz) $\times$ wl (in meters) = v (300,000,000 meters per second).

Other terms used to describe electromagnetic energy include *amplitude*, *attenuation*, and *phase*.

Radio waves are the form of electromagnetic energy used in broadcasting and cable. They are formed by increasing the frequency of alternating electrical current until it radiates into space from an antenna. The radio wave transmitted is called a carrier wave. Information is encoded on the carrier through a process called modulation, in which either the amplitude or the frequency of the carrier wave is modulated. The process of creating the carrier wave results in the creation of other carrier frequencies immediately above and below the primary carrier. These frequencies are called sidebands, and the number of frequencies on either side of the carrier is the bandwidth. The entire band of frequencies is called a channel.

The electromagnetic spectrum is managed through the licensing of certain frequencies for particular uses, use of efficient equipment, use of unused sidebands, and multiplexing. The propagation characteristics of a radio wave are determined by its frequency, power, ground conductivity, and the absence or presence of physical objects. There are three types of radio waves. Ground waves travel through the ground until their energy is totally dissipated. Direct waves travel in a direct line from transmitter to receiver. Sky waves are refracted back to the earth by the ionosphere.

CHAPTER 6 OUTLINE

6.1 CONTINUOUS WAVES AND WIRELESS TELEPHONES

6.2 THE BEGINNING OF BROADCASTING

6.21 The First Station
6.22 The "Radio Music Box"

6.3 RADIO TRANSMISSION MODEL

6.31 AM Radio Antennae
6.32 Directional and Nondirectional Radiation Patterns

6.4 AM RADIO

6.41 Frequency Assignment and Channel Width
6.42 Coverage Areas
6.43 Channel and Station Classification
6.44 AM Sound Quality
6.45 AM Stereo and Other Services
6.46 Carrier Current Stations
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6.5 FM RADIO

6.51 Armstrong's Fight for FM
6.52 FM Radio Channels
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6.6 RADIO PRODUCTION TECHNOLOGY

6.61 Principles of Modern Sound Recording
6.62 Tape and Equipment Formats
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6.7 SUMMARY

6

BROADCASTING: ITS /ELOPMENT AND STRUCTURE

Of all the forms of radiocommunication, radio broadcasting is probably the most pervasive. In the United States over 98.6 percent of all households have a radio receiver. In excess of 100 million of the nation's automobiles are equipped with radio receivers. On March 31, 1984, the Federal Communications Commission had authorized 4,910 AM and 5,282 FM stations to operate in the United States. International shortwave stations using the HF band can be heard in remote locations far away from urban centers. In less than a century radio has literally covered the planet.

Before radio broadcasting could evolve into the form we know today, two developments had to occur. First, the technology had to be developed that would allow voice telecommunication rather than just telegraph signals. Second, a means of organizing the technology had to be formulated to keep people from interfering with one another's use of the technology. This chapter will examine the development of the technology of radio broadcasting and the organizational structure which is in place today to keep interference to a minimum.

When you complete this chapter you'll be able to:

1. Trace the development of radio broadcast technology
2. Outline the process of radio transmission and reception

3. Identify and differentiate between the various kinds of radio
4. Understand the means utilized to produce radio programs.

6.1 CONTINUOUS WAVES AND WIRELESS TELEPHONES

Although no one disputes the importance of Marconi's achievements to broa fact is that Marconi was not a broadcaster. He could not transmit voice me what he did transmit was not meant for reception by the general public. They *vate* messages. The equipment developed by Marconi and others was a crude mation of the equipment used today. It could be tuned to a certain extent, but no tuned. The distance covered was limited by a lack of knowledge of the structure properties of the ionosphere. The spark gap method was noisy and dangerous to Communication was limited to exchanges of code. Early wireless was designed for *wi less telegraphy*, not voice messages.

In order to transmit voice messages, three things had to be developed in addition to the equipment of Marconi: first, a more sensitive detector; second, a means of producing continuous waves; third, a process of modulating those waves. As is typical of broadcast technology, these advances were made by scientists working in several nations who sometimes came up with the same innovation at almost the same time. Figure 6–1 presents the evolution of the technology from Marconi to the beginnings of broadcasting.

FIGURE 6–1. The Evolution of Technology from Radiotelegraphy to Broadcasting

IMPROVEMENTS IN DETECTION

1900 Marconi develops a magnetic detector called a "Maggie."

1903 Greenleaf Whittier Pickard discovers minerals that can detect radio waves. He settles on silicon for his detector.

1906 Henry Dunwoody invents a reliable detector for use on board ships that foreshadows solid-state electronics.

TRANSMISSION OF THE HUMAN VOICE

1901 Reginald Fessenden begins experiments on transmitting voice via wireless.

1906 Ernst F. W. Alexanderson of General Electric develops a high-powered alternator for Fessenden's use. Fessenden uses it for a voice and music transmission on Christmas Eve.

FIGURE 6–1. *(Continued)*

DEVELOPMENT OF THE VACUUM TUBE

1904	John Fleming develops the first crude electronic device. He calls it an "oscillation valve." Later it becomes known as the Fleming valve, or diode.
1908	Lee De Forest invents the first true vacuum tube, or audion. It can be used as an amplifier, rectifier, or oscillator.

6.2 THE BEGINNING OF BROADCASTING

One of the characteristics which distinguishes broadcasting from other forms of radiocommunication is the *intention* of being received by a general audience. The wireless stations organized by Marconi and other turn-of-the-century telecommunications entrepreneurs were designed to transmit *private messages* from one point to another point. It was not until after the first decade of the twentieth century that serious thought was given to the idea that wireless could be something other than telegraphy or telephony.

6.21 The First Station

One of the exercises broadcast historians frequently engage in is determining the *first* broadcast station. At stake in the debate are corporate pride, public relations opportunities, and the American drive to be first, so of course there are disputes over which organization should hold the title of "first." The differences of opinion frequently result from differing definitions. Certainly Fessenden's Christmas Eve broadcast in 1906 would be a contender for first, as would the early efforts of Lee De Forest both in Paris and New York. However, neither of these men made any attempt to schedule their broadcasts on a regular basis. There were thousands of radio amateurs across the country who were regularly transmitting in Morse code, but their intent was to communicate with other amateurs, not the general public. So active were these amateurs that in 1915 they formed the American Radio Relay League. Stations located at universities also made broadcasts. These were primarily experimental and not intended for reception by the general public.

It appears that a Californian by the name of Charles D. "Doc" Herrold was one of the first broadcasters, if not the first. Herrold operated a College of Engineering and Wireless in San Jose and operated a station as a part of the program. In 1909 he was operating every Wednesday evening, presenting news and music. Soon he began operating every day. He placed receivers in hotel lobbies in the area and in 1915 broadcast six to eight hours a day from the San Francisco Exposition. But when the United States entered World War I Herrold's activities, like those of other radio enthusiasts, were brought to an end.

6.22 The "Radio Music Box"

Few saw wireless in terms of a medium that could be used in the home. Some, like Herrold, thought it might have uses in public places. However, one person did see in wireless the potential for something more than radiotelegraphy or radiotelephony. He envisioned *broadcasting*. David Sarnoff, the young radio operator who first received the

FIGURE 6–2. David Sarnoff
David Sarnoff first came to public attention when, while working as a telegraph operator, he heard the first calls for help from the sinking *Titanic*. He became general manager of Radio Corporation of America (RCA) and finally chairman of the board.
SOURCE: Photograph courtesy of RCA.

distress messages from the sinking *Titanic*, proved to be a prophet when he presented the idea of a *"radio music box"* to his superiors at American Marconi Co. in late 1915. In his memorandum he spoke of radio as holding the potential to become a "household utility." The receiver which young Sarnoff called a "radio music box" could be tuned to several frequencies. Listeners would be able to hear lectures, important events, concerts, and baseball scores. Sarnoff saw radio as an influential medium for reaching a mass audience. The Sarnoff memorandum of 1915 reflects a vision of wireless as something of greater value to the public than a point-to-point communications system. The cessation of World War I, the formation of the patents pool, and the creation of RCA contrived to create an environment favorable to the formation of radio broadcast stations as we know them today.

6.3 RADIO TRANSMISSION MODEL

Carrier waves are transmitted into space from *radiating elements* located on an antenna tower. In some cases, such as AM radio, the tower itself serves as the radiating element. In other cases, FM and television, the elements are attached to the tower structure. Antennae and the radiating elements vary greatly in size. Broadcast services generally use radiating elements whose length is one-half or one-quarter the wavelength of the carrier wave. For example, AM stations generate carrier waves with wavelengths of approximately 187.5 meters to 555.5 meters. Thus the length of the radiating element for a station broadcasting at 1,600 kHz might be 93.75 meters (one-half the wavelength) or 46.875 meters (one-quarter the wavelength). An FM station operating at a carrier frequency of 101.1 MHz might use a radiating element measuring a full wavelength, 2.967 meters.

6.31 AM Radio Antennae

AM radio is also known as *standard broadcasting*. It uses ground waves and sky waves to deliver information to listeners. The AM radio radiating element consists of the entire tower plus copper wires underground. Since physical obstructions don't hinder ground waves, and line of sight with receivers is not a necessity, AM antennae can be located nearly anywhere. In choosing a site for an AM antenna, broadcast engineers look for a place where there is good soil conductivity, where the tower won't interfere with aircraft, and where its presence won't detract from the visual environment.

6.32 Directional and Nondirectional Radiation Patterns

Since the entire tower is used in AM broadcasting as the radiating element, electromagnetic energy is normally transmitted equally in all directions. Such stations are called *nondirectional* stations. One method used for efficient management of the radio spectrum is the construction of towers so that they transmit signals more strongly in certain direc-

tions. Stations using this type of antenna configuration are called *directional* stations. A station might use a directional antenna system to avoid interfering with another station operating on or close to the same carrier frequency. Another reason to use a directional system might be to cover a greater portion of a populated area and less of an unpopulated one, or to strengthen the station's signal.

Directional AM stations consist of multiple towers. Each transmits carrier waves at the same frequency but at different phases and at different powers. The carrier waves which radiate from the antennae are reinforced in some directions and cancelled in others. This creates a predictable coverage area. Figure 6–3 shows two stations. Station B is nondirectional, station A directional.

Because the entire tower is used to radiate AM signals, and since the towers are perpendicular to the surface of the ground, AM stations' waves are *vertically* polarized. Receiving antennae must have the same vertical orientation in order to receive the signals well. FM signals are either *horizontally* or *circularly* polarized.

The term *polarization* refers to the orientation of the electromagnetic wave to the

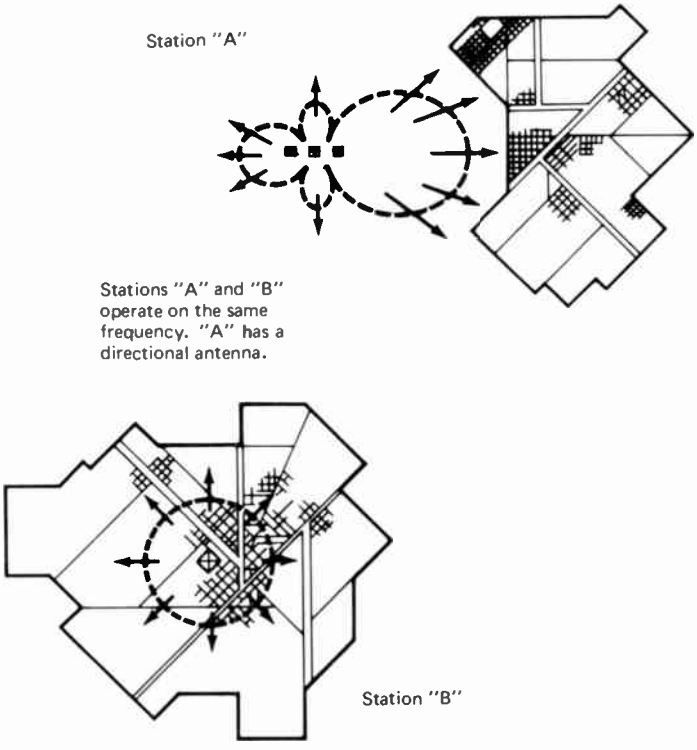


FIGURE 6–3. Directional and Nondirectional Station Configurations
Station A has a directional transmission pattern tuned to serve its community of license. Station B is nondirectional, and thus must locate its transmitter in the central part of its community of license.
SOURCE: *FCC Radio Operator's Handbook.*

surface of the earth. Waves that are transmitted from an antenna perpendicular to the surface of the earth are vertically polarized. Signals transmitted by an antenna whose orientation is parallel with the earth's surface transmit waves with a horizontal polarization. Some stations use a special type of antenna that transmits waves in a corkscrew pattern. Waves of this type have a circular polarity. Television signals generally are circularly polarized.

6.4 AM RADIO

AM radio stations make up the largest single category of stations licensed in the United States. AM radio stations are licensed by the Federal Communications Commission for not more than *seven* years. Applications for renewal may be filed with the Commission and are generally renewed.

6.41 Frequency Assignment and Channel Width

AM radio stations are assigned to 107 channels located between 535 and 1,605 kHz. International use allocations allow standard broadcasting between 535 and 1,705 kHz, but no stations have been licensed in the United States in the additional 100 kHz of spectrum.

AM stations broadcast on a channel that is 10 kHz wide. Each of the sidebands extend 5 kHz above and below the carrier frequency. Thus a station located at 1,550 kHz broadcasts on a channel ranging from 1,545 kHz to 1,555 kHz.

6.42 Coverage Areas

The amount of ground area covered by an AM station's ground wave determines the *primary coverage area.* The additional area covered by the station's sky wave is known as the *secondary coverage area.* AM stations vary greatly in the amount of area their signals cover. The variable factors affecting coverage area include frequency, power, soil conductivity, time of day (and year), and whether the station is operating a directional or nondirectional antenna. The relationships between these variables must be carefully calculated prior to licensing so there will be minimal interference with other stations broadcasting at the same frequency.

As we learned in the previous chapter, the higher the frequency, the more power it takes to transmit a radio wave a given distance. Thus, putting aside all other factors, a station operating with a power of 50,000 watts and broadcasting on 650 kHz will have a larger daytime coverage area than a station operating at the same power at 1,550 kHz. The nighttime coverage area is dependent on the condition of the ionosphere. But all other things being equal, *the lower the frequency, the greater the sky wave coverage.*

FIGURE 6–4. Standard Broadcast Channel and Station Classifications

CHANNEL CLASSIFICATION	*FREQUENCY in kHz*	*STATION CLASSIFICATION*							
		I		II			III		IV
		A	B	A	B	D	A	B	
Clear	640, 650, 660, 700, 750, 820, 830, 840, 870, 1040, 1160, 1200	X		X	X	X			Class I-A: Dominant signal, power to 50 kw Class I-B: Dominant signal, power 10 kw–50 kw
	670, 720, 770, 780, 880, 890, 1020, 1030, 1100, 1120, 1180, 1210	X	X	X					Class II-A: Secondary signal, 250 w–50 kw day, 10 kw–50 kw night
	680, 710, 810, 850, 940, 1000*, 1060*, 1070*, 1080, 1090*, 1110, 1130*, 1140*, 1170, 1190*, 1500, 1510, 1520, 1530, 1540*, 1550*, 1560*		X	X	X	X			Class II-B and II–D: Secondary signal, power 250 w–50 kw, 250 w–1 kw in some markets
Foreign clears	540, 690, 730, 740, 800, 860, 900, 940, 990, 1040, 1050, 1220, 1570, 1580			X	X	X			
Regional	550, 560, 570, 580, 590, 600, 610, 620, 630, 790, 910, 920, 930, 950, 960, 970, 980, 1150, 1250, 1260, 1270, 1280, 1290, 1300, 1310, 1320, 1330, 1350, 1360, 1370, 1380, 1390, 1410, 1420, 1430, 1440, 1460, 1470, 1480, 1590, 1600						X	X	Class III-A: 1 kw–5 kw Class III-B: 5 kw day, 500 w–1 kw night
Local	1230, 1240, 1340, 1400, 1450, 1490								X Class IV: 250 w night, 250 w–1 kw day

*Shared with foreign stations.

6.43 Channel and Station Classification

The Federal Communications Commission has established a system of classifying AM radio channels and stations so as to minimize interference between them. There are three channel categories—*clear*, *regional*, and *local*—and four station categories—I, II, III, and IV. Each station category may have subcategories. A summary of the various channel and station types appears in figure 6–4.

CLEAR CHANNELS

There are *sixty* clear channels authorized by the FCC. Some stations operating on these channels have transmitters operating at the maximum allowable power of 50,000 watts and are designated *dominant signals*. Each station's primary coverage area is protected from encroachment by other signals. At night the signal is protected to within 750 miles from the transmitter site. Although more than one station may operate on the channels designated clear, the secondary station must protect the integrity of the primary station's signal in the protected area. Secondary stations protect the signals of dominant stations through a variety of means, including reduced nighttime power, directional antenna configurations, and cessation of operations between sundown and sunrise.

CLEAR CHANNEL STATION CLASSES

A Class I station is the *dominant* station operating on the assigned clear channel. Stations designated I-A are the only dominant stations assigned to that frequency and may operate at a power of 50 kw day and night. Because I-A stations operate at maximum power day and night, they have large coverage areas. Twenty-five of the sixty clear channels have only one dominant station assigned to each of them.

Stations designated I-B *share* their dominant status with another station. Both stations operate at powers ranging from 10 kw to 50 kw. Potential interference between I-B stations is eliminated by careful location of the transmitters, use of directional antenna configurations, and reduction of power. Twenty-one of the sixty clear channels allow I-B stations to operate.

A Class II station is a *secondary* station operating on a clear channel assigned to a Class I station. The Class II station must operate so that its signal does not interfere with a signal of the Class I-A or B station in its protected coverage area. Class II station power varies from the maximum of 50 kw to a minimum of 250 w.

Stations designated II-A operate only in certain designated states and with a nighttime power of not less than 10 kw and a daytime power of between 250 w and 50 kw. Stations with the designation II-B have unlimited operation time and transmit at powers ranging from 250 w to 50 kw. Class II-D stations may operate at powers ranging from 250 w to 50 kw, but are limited in their hours of operation. Most II-D stations are **daytimers**.

Of the sixty channels designated clear, twenty-four have foreign stations broadcasting on them. Of these twenty-four, fourteen have dominant foreign stations operating, with U.S. stations occupying secondary (Class II) positions.

REGIONAL CHANNELS AND STATION CLASSES

There are forty-one regional channels designed to serve a principal area of population and its contiguous rural area. Several stations may operate on one frequency. Interference is avoided by limiting the maximum power of each station and (where needed) using directional antennae. Stations operating on regional channels are designated Class III stations. Class III stations are further subdivided into III-A and III-B categories.

A Class III-A station operates at a maximum power of 5 kw and a minimum power of 1 kw day and night. Class III-B stations operate at 5 kw during the day and between 500 w and 1 kw at night.

LOCAL CHANNELS AND STATIONS

Local channels are designed to serve relatively small geographic areas. These are designated Class IV stations. They must operate with a power of not less than 250 w and not in excess of 1 kw during the day and 250 w at night. Although there are only six channels assigned to local service, the number of stations assigned to this class of service make up approximately 25 percent of the total number of stations licensed in the United States. The licensing of so many local stations is the result of careful spectrum management by the FCC. Use of reduced power at night and of directional antennae reduces the chances of interference. Almost every community that can support a radio station has the opportunity to obtain one. As we'll see in chapter 16, *local service* is one of the policy objectives of both the Congress and the FCC.

6.44 AM Sound Quality

Although the quality of the sound put out by AM radio stations is not comparable to the high-fidelity sound reproduced by high-quality sound equipment, it is acceptable, given the limitations of bandwidth, modulation method, and spectrum assignment. AM radio signals are subject to atmospheric noise and distortion caused by electrical interference from power lines and lightning. Today, AM stations broadcast audio frequencies from 30 to 5,000 Hz. The FCC has allowed some stations to broadcast a greater range of frequencies so long as they don't interfere with other stations. Stations in the 1,500 to 1,600 kHz portion of the spectrum have been allowed to broadcast audio frequencies of 10,000 Hz using *single sideband modulation*. However, only a few stations have taken advantage of the opportunity to become "high-fidelity" AM stations.

6.45 AM Stereo and Other Services

In 1982 the FCC authorized AM stations to begin broadcasting in stereo. The commission refused to choose any one specific system for stereo broadcasting, preferring to let the marketplace decide between the competing systems.

In the same year the FCC also authorized AM stations to engage in services other than broadcasting. AM stations have FCC authorization to generate *subaudile* tones which can be used to remotely control public utility generators and electrical switches.

6.46 Carrier Current Stations

Carrier current stations combine broadcasting and wire communications techniques. A very low-powered AM signal of a specific frequency is fed into a metallic network such as the water pipes, electrical system, or frame of a building. The weak broadcast signal radiates from the metallic conductor and can be received by nearby receivers. Carrier current stations operate in some college dormitories and are used to provide travelers with flight information in airports. They also provide AM radio service in tunnels and other locations where standard and FM signals can't reach.

6.47 International Standard Broadcasting

Some U.S. stations use standard broadcasting techniques to reach audiences in foreign countries. The majority of the stations engaged in international broadcasting are government-operated stations such as those of the Voice of America (VOA), Radio Liberty, and the Armed Forces Radio Network. VOA operates four transmitters in the United States. Their signals are received in eight foreign countries and then retransmitted to the nation or area of the world previously chosen by VOA management. In addition to the government-operated stations, there are a few private stations operating internationally. Most are **noncommercial** stations linked with religious organizations. Recently the FCC authorized a commercial station to begin broadcasting popular music and commercial messages to Europe from a transmitter located in Louisiana.

International broadcast stations are sometimes called *shortwave stations* because they operate in the HF frequency band, where wavelengths are much shorter than in the medium-frequency band of AM radio station assignments. Shortwave stations operate both day and night. They need a wave path conducive to long-distance communication, and since the ionosphere changes during the course of the day and from season to season, shortwave transmitters must operate at several different frequencies, depending upon the season of the year and time of day. Stations must build several different antennae and each must be directional.

The bands assigned to shortwave stations are shown in figure 6–5. Each station normally broadcasts on several assigned channels, each with a bandwidth of 5 kHz. There are four different broadcast "seasons" and there is a limit to the number of hours each frequency can be used during each broadcast season. Ionospheric changes are predictable, and the FCC assigns stations specific operating hours, frequencies, and **zones of reception** four times per year.

FIGURE 6–5. International Shortwave Broadcast Bands

FREQUENCY RANGE (in kHz)	*WAVELENGTH (in meters)*
5,950–6,200	50.42–48.38
7,100–7,300	42.25–41.09
9,500–9,775	31.57–30.69
11,700–11,975	25.64–25.05
15,100–15,450	19.86–19.41
17,700–17,900	16.94–16.75
21,450–21,757	13.98–13.79
25,600–26,100	11.71–11.49

6.5 FM RADIO

During the 1970s FM radio grew rapidly, not only in terms of the number of stations but also in terms of listeners and advertising revenues. Part of the increase is attributable to the lack of available AM channels in large markets, a situation which forced broadcasters to seek FM licenses. However, the large number of FM receivers in homes and automobiles and the shift to programming that had once been the sole province of AM radio also contributed to the increase in the importance of FM. Like AM stations, FM stations are licensed by the FCC for a period of seven years.

6.51 Armstrong's Fight for FM

Edwin Armstrong, who had already developed the regenerative circuit, in the early 1920s began work to solve the problems of static and interference characteristic of standard broadcasting. By 1933 he had applied for and received four patents for a system of broadcasting which utilized frequency modulation rather than the standard amplitude modulation technique. In 1934 Armstrong demonstrated his system to RCA and sought additional funds to refine the system. RCA, which had had a long relationship with Armstrong and held an option to purchase his inventions, was impressed enough with the demonstration to provide some assistance. Improvements came slowly as Armstrong encountered problems with interference and fading. Finally, RCA withdrew its support, fearing that Armstrong's invention might undermine RCA's already large investment in AM radio. RCA instead chose to devote more funds to support the development of television.

Armstrong continued to work on refining his system, using his own considerable fortune to finance his efforts. In 1935 the FCC authorized the licensing of experimental FM stations. Armstrong built a station in Alpine, New Jersey, within sight of New York City, and began broadcasting in the spring of 1938. In that same year the Yankee Network,

a group of twenty AM stations located in the New England area, built an FM station. Soon FM stations were built by General Electric and RCA. By the spring of 1940 there were more than twenty experimental FM stations on the air. In 1940 the FCC held hearings on the new system and on January 1, 1941, allocated forty channels in the 42 to 50 MHz band to FM. Of the forty channels allocated, thirty-five were commercial channels, with five reserved for educational use.

The entry of the United States into World War II retarded the growth of FM radio but didn't stop it completely. More stations were authorized and began broadcasting, and Edwin Armstrong sought to establish a national network of FM stations. In congressional hearings held in 1944 it became clear that FM and television were competing for the same spectrum space. Edwin Armstrong led the fight to retain the already allocated channels for FM and to increase FM's spectrum allocation. His opposition, led by RCA, won out, though. In 1945 the FCC reallocated FM to a series of channels located between 88 and 108 MHz. This band of frequencies is still used today.

Armstrong fought the change in the courts, but to no avail. Although he had gained an increase in the number of channels allocated to FM the FCC had chosen to move the portion of the spectrum allocated to the experimental FM service. The result was the immediate obsolesence of all existing FM transmitters and of approximately 400,000 receivers capable of receiving FM signals.

6.52 FM Radio Channels

There are 100 FM radio channels located between 88 MHz and 108 MHz in the VHF portion of the spectrum. The FCC assigns each channel a number between 201 and 300, but stations identify themselves by frequency, not channel. For example, KUAT-FM is located at 90.5 MHz and identifies itself as "KUAT-FM, 90.5 MHz in Tucson, Arizona," not as channel 213.

Each channel is 200 kHz wide, but only the middle 150 kHz of the bandwidth is used for the FM signal. The remaining 25 kHz at each end are used as guard bands and for transmitting other types of information.

6.53 Wave Propagation and Coverage Variables

Since FM channels are located in the VHF portion of the spectrum, direct wave propagation is used. The radiating elements are attached to a tower. Coverage area is determined by:

1. The frequency of the channel (the lower the frequency, the less power needed to cover the same area at a higher frequency)
2. the **effective radiated power** (ERP) of the transmitter (the more power, the greater the coverage area)
3. the height of the radiating element above the surface of the earth, or HAAT (height above average terrain). The higher the element, the greater the area that can be covered.

6.54 Interference and Channel Allocation Tables

In order to minimize interference between FM stations the FCC has prepared an *allocation table* listing communities eligible for FM stations and assigning channels to each community. A sample of the allocation table can be seen in figure 6–6. Channels 201 to 220 are reserved for noncommercial use, channels 221 to 300 for commercial use. As a further step to avoid interference the FCC has divided the United States into three zones: I, I-A, and II.

6.55 Station Classification

The FCC has divided FM stations into four classes: A, B, C, and D. Class A stations must operate with a minimum ERP of 100 w and a maximum of 3 kw. Antenna height above average terrain (HAAT) is limited to 300 feet. Class A stations may be located in all three zones and may operate on any available channel.

Class B stations may be located in either Zone I or I-A but not in Zone II, and must operate with a minimum ERP of 5 kw and a maximum of 50 kw. Maximum HAAT is 500 feet. Class B1 stations are allowed a maximum power of 25 kw and a maximum tower height of 329 feet (100 meters).

(a) *General.* The following Table of Assignments contains the channels (other than noncommercial educational channels) assigned to the listed communities in the United States, its territories and possessions. Channels designated with an "A" are for Class A FM stations. All other listed channels are for Class B stations in Zones I and I–A and for Class C stations in Zone II. Channels designated with an asterisk are assigned for use by noncommercial educational broadcast stations only. There are specific noncommercial educational FM assignments (Channels 201–220) for various communities in Arizona, California, New Mexico, and Texas. These are set forth in § 73.507.

Alabama:	Channel No.
Abbeville	232A
Albertville	286
Alexander City	291
Andalusia	251
Anniston	263
Arab	221A
Ashland	237A
Athens	282
Atmore	281
Auburn	249A
Bay Minette	288A
Birmingham	229, 233, 243, 258, 284, 295, 299
Brewton	292A
Butler	228A
Carrollton	231
Chatom	276A
Chickasaw	252A
Clanton	249A
Cullman	221A, 266
Decatur	245, 271
Demopolis	292A
Dothan	238, 259
Enterprise	245, 294
Eufaula	224A
Evergreen	228A

Alabama—Continued	Channel No.
Fairhope	221A
Fayette	251
Florence	297
Gadsden	279
Geneva	228A
Greenville	240A
Guntersville	240A
Haleyville	224A
Hamilton	221A
Huntsville	236, 256
Jackson	285A
Jasper	273
Marion	280A
Mobile	225, 235, 241, 248, 260
Monroeville	257A
Montgomery	222, 255, 270, 277
Muscle Shoals	288A
Oneonta	249A
Opelika	265A
Opp	272A
Ozark	280A, 285A
Phenix City	261A
Prattville	237A
Reform	269A
Roanoke	272A
Scottsboro	252A

FIGURE 6–6. FM Channel Assignments
The Federal Communications Commission assigns specific FM channels to communities across the country. Shown here are the assignments for Alabama.
SOURCE: Chapter 47, section 73.202, *Code of Federal Regulations*, 1983.

Class C stations may be located only in Zone II. C1 stations may operate with a maximum power of 100 kw and a maximum height of 300 meters. C2 stations may operate with a maximum power of 50 kw and a maximum height of 150 meters.

Class D stations are noncommercial entities broadcasting on channels 220 to 300 (commercial channels) or, if there are no commercial channels available, on a noncommercial channel (201 to 220). They are limited to 10 w ERP. In some instances Class D stations designated *secondary* may have to change channels or cease operations if their signal has the potential to cause interference with any other station. Class D stations afford universities the opportunity to enter FM broadcasting on a very limited basis.

Class A, B, and C stations are known as *primary stations*. Because FM stations use direct waves, both natural and man-made obstacles may interfere with reception of the primary station's signal. In order to fill in these shadow areas another type of station is authorized. *FM translator stations* rebroadcast the signal coming from the primary station's transmitter on a different frequency. FM translators may be located on any channel whose use will not create interference for any existing primary station or operating translator. Translator stations located east of the Mississippi River are limited to a maximum power of 1 watt. Those west of the Mississippi are limited to 10 watts. Translators may not be used to increase the coverage area of the primary transmitter.

FM broadcast booster stations are limited to rebroadcasting the signal of an FM station on the same frequency as the primary FM stations. The only portion of the original station's signal that may be altered is the amplitude.

6.56 FM Quality and Services

Despite the limit in coverage area caused by the use of direct waves, FM stations produce a high-quality sound not achievable by AM stations. One of the reasons is the bandwidth, 200 kHz versus 10 kHz. The large bandwidth allows FM stations to reproduce sounds within the entire range of human hearing, complete with overtones. FM also allows a greater range of loud and soft. This large dynamic range adds depth to the sound. And FM is less subject to atmospheric noise and static.

Almost all FM stations broadcast in stereo, and experiments are being conducted which would allow *quadraphonic (four-channel) broadcasting*. In a stereo broadcast system there are two channels, designated right *(R)* and left *(L)*. The two are added together to form one signal, $R+L$. A second signal is formed by taking the difference between the L and the R to form $L-R$. The two signals are placed on the carrier wave and transmitted. A monaural receiver "sees" only the $R+L$ signal but a stereo receiver "sees" both. Stereo receivers process the signals in such a way that the right and left channels are separated and fed to separate audio amplifiers.

Yet even with high-quality sound and multichannel broadcasting, FM stations have enough space to broadcast other information. The use of additional **subcarriers** multiplexed with the main carrier allows delivery of such things as reading services for the blind, financial and computer information, and specialized music services for department stores and restaurants.

6.6 RADIO PRODUCTION TECHNOLOGY

Like other forms of broadcast and cable technology the production of radio programs has grown more and more sophisticated. In the early days of radio all programs were done live. Sound effects were created on the spot by specialists, and the music was provided by a studio orchestra or band or the old reliable organ. Today radio programs mix *live* and *prerecorded* sources. There are even some stations which broadcast recorded material almost 100 percent of the time. Even in live programs, such as a talk show or a musical program presided over by a disc jockey, some segments are prerecorded. Thus the production of recorded material is an important part of the radio industry.

6.61 Principles of Modern Sound Recording

Although there are a variety of sound record/playback machines available, each uses essentially the same principle of operation. Figure 6–7 shows the head configuration of a typical machine. The audio tape is supplied from the supply reel located on the left side. The tape travels over a tape guide and flywheel, then comes into contact with the first of three heads. When the machine is in the record mode, an electric current is routed through the *erase head*, creating a magnetic field which erases all information on the tape. In the playback mode no magnetic field is generated, so the tape is not erased.

The tape next comes into contact with the *record head*. A bias current of constant frequency is routed through the record head in the playback mode. When an audio frequency is placed in the circuit, the bias current changes frequency in sympathy with the changes in audio frequency. The resulting fluctuation creates a magnetic pattern in the metallic oxide on the tape. The pattern corresponds to the original audio frequency.

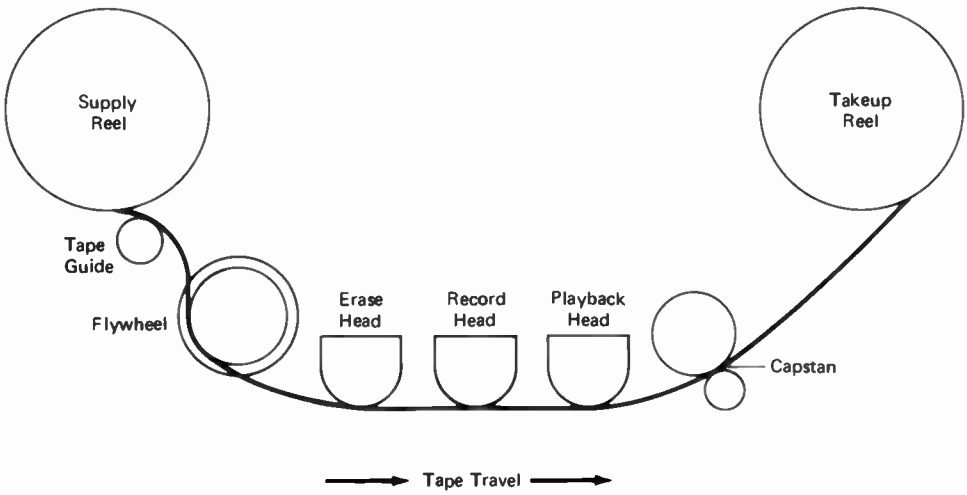


FIGURE 6–7. Typical Audio Record/Playback Head Configuration

When the tape is run over the *playback* head the differences in the magnetic pattern on the tape create distortions. These distortions are read by the machine and the original audio frequency is reconstructed by the machine. The output is then fed to a series of amplifiers and routed to the speakers.

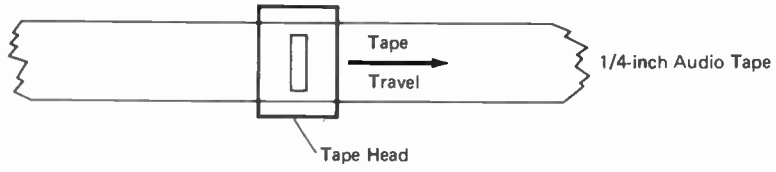
6.62 Tape and Equipment Formats

There are three types of audio tape machines in use today. Two of the three are commonly used in the broadcast and cable industry—the reel-to-reel and cartridge machines. The third, the cassette machine, is limited to home use.

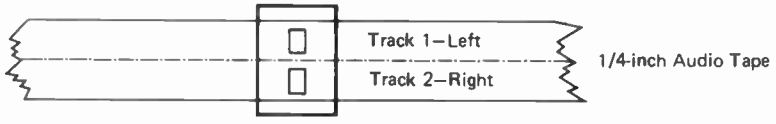
The reel-to-reel audio tape deck is also known as an *open reel* machine, referring to the method of storing the magnetic tape on open reels. One reel functions as the supply reel, the second as the take-up reel. Most monaural reel-to-reel machines are full-track record/playback devices whose record and playback heads cover the entire width of the tape. Stereophonic machines have heads with two record and playback areas. One covers the top half of the tape and delivers a signal to one of the two channels. The other covers the lower half and delivers a signal to the other channel. Most reel-to-reel machines used for broadcast purposes use audio tape that is a quarter inch across. However, some reel-to-reel machines used for high-quality recording use one-inch tape divided into as many as sixteen separate tracks. Two-inch audio tape has thirty-two tracks.

The cartridge machine, or *cart deck*, uses quarter-inch magnetic tape stored in a continuous loop within a plastic container. Although both reel-to-reel and cart machines are easily cued and are used for both program material and commercial messages, the cart has the advantage that it can be automatically cued back to the beginning point after each use. Reel-to-reel machines can also be rewound, but cartridge machines are faster and can be cued more accurately.

The cassette machine also uses magnetic tape stored in a plastic container. Unlike the cartridge machine the tape is not in a continuous loop configuration, and the tape is only



(a) Full Track Audio Tape/Head Configuration.



(b) Two Track Stereo Tape/Head Configuration.

FIGURE 6–8. Audio Tape and Playback Head Configuration

a sixteenth of an inch wide. The technical quality of cassette machines approaches that of cart and reel-to-reel machines, but difficulty in cuing cassette tapes limits their use in professional broadcasting.

6.63 Editing and Mixing

Audio tape is edited by physically cutting and splicing the tape. Program material which is not to be used on the air can be easily eliminated. Programs which are too long can be shortened, and short programs can be lengthened. **Leader** can be spliced onto the beginning of the tape to make cuing easier.

Most audio programs consist of three major elements: voice material, music, and effects. While many programs are done live, most commercials and dramatic programs rely on postproduction mixing to achieve the desired effect. The process of mixing consists of taking a number of program elements and placing them in proper relationship onto a *master* tape. Sometimes the "mix" is done on multitrack tape machines. This allows the audio engineer to control each element with great precision. Sophisticated mixing techniques are used in putting together records.

6.64 Sources of Radio Programming

Radio program material is either performed live or played back from already recorded material. The trend in radio is toward stations that are *automated*. This minimizes the use of live talent on the air. Automated stations have multiple audio machines. The tapes consist of all the music and commercials to be used during that day. An engineer simply starts the correct machine at the designated hour. The only thing "live" is an announcement of the time or the reading of local news.

The completely automated station is still rare, and while tape has replaced much of the live material, many stations broadcast "live" almost exclusively. Disc jockeys play records on the trusty turntable and chatter between songs, talk-show hosts interview guests and take telephone calls—all live. Newspersons file on-the-spot reports from the scene of the news. It appears that despite the advantages of automation, live radio will continue.

6.7 SUMMARY

Radio broadcasting is probably one of the most widespread forms of radiocommunication. Early technological advances which led to the development of the radio broadcast industry included the high-powered alternator of Ernst Alexanderson, the first voice transmissions of Reginald Fessenden, the audion tube of Lee De Forest, and the regenerative circuit of Edwin Armstrong.

Radio waves are transmitted from radiating elements located on towers. AM radio stations use the entire tower plus copper wires buried underground as transmitter ele-

ments. FM stations use elements mounted on the tower frame. Both AM and FM stations may transmit their signals using directional antenna configurations. Directional broadcasting reduces interference between stations and may increase coverage area. Other factors determining coverage area of AM stations are soil conductivity, frequency, power, and ionospheric conditions. FM coverage is determined by frequency, power, and the height of the radiating elements above average terrain.

AM radio stations operate on 107 channels located in the MF band between 535 and 1,705 kHz. Each channel is 10 kHz wide, with the carrier frequency located in the middle of the band. There are three categories of channels: clear, regional, and local. Stations are designated I, II, III, or IV, depending on the frequency they are assigned, and operate at powers ranging from 250 w minimum to 50 kw maximum.

FM radio was developed by Edwin Armstrong. FM stations operate on 100 channels located between 88 and 108 MHz in the VHF band. Each channel is 200 kHz wide, and the first twenty channels are restricted to noncommercial use. The FCC has divided the United States into three zones for FM purposes: I, I-A, and II. Channels are designated A, B, C, and D. Only certain channels are assigned to each zone. FM stations have better-quality sound than AM stations because of the type of modulation system they use and their greater bandwidth.

Audio recording for broadcast purposes is done primarily on tape. Records are another source of programming. The audio tape recorder comes in three formats. The reel-to-reel machine and the cartridge machine are used in professional broadcasting. Cassette machines are limited to home use. Audio tape may be physically edited, and final master tapes are produced by mixing separate elements together.

CHAPTER 7 OUTLINE

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7.12 Characteristics of the Television Image

7.2 THE DEVELOPMENT OF TELEVISION TECHNOLOGY

7.3 PRINCIPLES OF TELEVISION TRANSMISSION AND RECEPTION

7.31 Scanning the Image
7.32 Blanking and Sync Signals
7.33 Line Frequency
7.34 Color
7.35 Mixing the Various Video Sources
7.36 The Audio System, Diplexing, and Transmission
7.37 The Receiver
7.38 High-Definition Television
7.39 Closed Captioning and Teletext

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7.63 Video Mixing and Effects
7.64 Videotape Recorders and Formats
7.65 Videotape Editing
7.66 Videodisc Technology

7.7 SUMMARY

7

THE TECHNOLOGY OF TELEVISION

Of all the forms of telecommunication, television has probably had the greatest impact. American households watch television almost seven hours per day, and most use television as the primary source of information and entertainment programming. There were already 1,452 stations broadcasting television programs as of March 31, 1984, plus thousands of applications for low-powered television stations waiting for FCC approval.

In this chapter we'll examine the technology of this powerful medium. At the end of this chapter you'll:

1. Be able to trace the development of a system of transmitting pictures and sound through the air

2. Know the basics of how television works

3. Understand the organization of the portion of the electromagnetic spectrum in which television operates and know the different kinds of stations that operate on those frequencies

4. Be able to identify the types and basic operating principles of videotape production equipment.

7.1 THE TELEVISION IMAGE

The television image is unlike any other form of visual and audio representation. Some theorists say that its physical characteristics involve us to a greater degree than any other medium of communication (McLuhan, 1962, 1964). They believe that when we watch TV we become more than just viewers: we are participants. Others violently disagree with this notion. Arguments about the nature and influence of television are frequently found in the pages of newspapers, magazines, and academic journals. Some are against television, others defend it, but all seem to agree that it is influential. The television image is among the most powerful forces acting on the world today.

7.11 Persistence of Vision

Television, like motion pictures, is characterized primarily by the *moving image*. Yet the images don't really move at all. What appears to us as a continuous visual display is really a series of still images projected in a manner and at a rate designed to provide the illusion of movement. The pictures don't move: our minds are tricked into believing that they move.

Figure 7–1 shows four frames of an action sequence. When seen at the proper speed, it would appear that the ball is hitting the surface. This phenomenon is called *persistence of vision*. It's the tendency of the mind to hold an image and to compare it to the next image. If there is a change in the position of objects in the visual image, the mind translates that change into movement. Persistence of vision is what makes us see a circle of

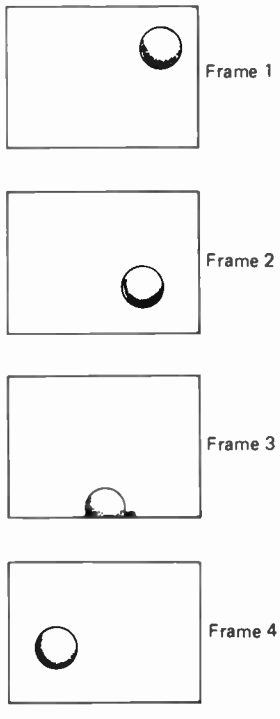


FIGURE 7–1. Persistence of Vision
A falling ball hitting a surface as it might appear in four motion picture or television frames. Persistence of vision creates the illusion of motion.

fire when someone waves a torch in a circular pattern at night. In television and film the rate at which the individual images are projected is important. If the rate is too slow, something called *objectionable flicker* occurs. In television a projection rate of at least fifty images per second is needed to eliminate the flicker problem.

7.12 Characteristics of the Television Image

At first glance the television image seems very similar to motion picture and other photographic images. When engineers first established standards for the television image, they used the motion picture image as a model. However, there are differences between the television image and the film image. First, the television image is not as sharp as the motion picture image. It has *less resolution* and fidelity. The average eight-by-ten photograph is made up of about two million small dots called elements. A thirty-five-millimeter motion picture frame has approximately one million separate elements. But the television picture on your home receiver has only 150,000 elements. The relatively small size of the television picture helps overcome the low resolution. When the size of the television image is increased with, for instance, a video projector, the low resolution is easily seen.

Second, the motion picture image has *greater range* of color and gray portrayal. The television image can't approach the film image in its portrayal of details in shadow or subtle differences in color.

Third, the motion picture image is generally *larger* than the television image. This difference in size and, to a certain degree, the film image's greater fidelity allow motion pictures to show great, sweeping landscapes. Television generally is best when working in close proximity to the object shown.

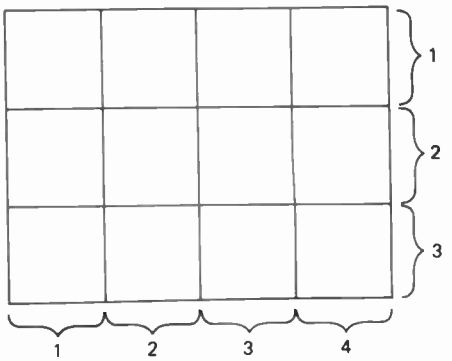
Fourth, the motion picture image is *projected* onto a surface which reflects the image back to the eye. The television image is generated directly on the screen surface. This fourth difference may seem small, but there are many who feel that creation of the visual image directly on the screen surface is one of the most important characteristics of television (Zettl, 1973).

Fifth, there is a difference in the relationship between the height and width of the image. All broadcast television images have a 4:3 *aspect ratio*. Motion pictures have a variety of aspect ratios. Some are so wide in relation to height that the image wraps around the audience. Recently some high-definition television systems have been developed which use a wide-screen aspect ratio, but none are in general use.

Sixth, there is a difference in the *quality* of sound. Motion pictures are capable of presenting sound in high fidelity and from many directions. Television is limited by its narrow frequency range, the technology of the television sound reproduction system, and the lack of consumer demand for higher-quality sound.

Television is an extremely sophisticated technology capable of bringing sounds and visions from all over the world into our homes. Although the technology exists to provide a visual and audio image which compares favorably with that of the motion picture, we are content to accept lower-quality pictures and sound. We have chosen to make trade-offs in terms of equipment costs and the amount of the electromagnetic spectrum we use for television.

FIGURE 7–2. Television's Aspect Ratio
A television picture is four units wide and three units high. The 4:3 aspect ratio is the same as that of early motion pictures.



7.2 THE DEVELOPMENT OF TELEVISION TECHNOLOGY

The development of a technology that would transport moving images and sound from one point to another occurred over centuries. The discovery of how to render scenes in atmospheric perspective was an important development in the history of visual arts. The invention of photography allowed natural objects to be represented in a manner that almost duplicates nature. The motion picture added a greater dimension of reality to the photographic image than had been previously known. But in order to transport these visual images from one point to another the medium itself had to be moved. The actual physical image had to be sent from one place to another.

Television, like wireless, did not develop overnight. It evolved slowly, following several distinct lines which periodically merged. Finally, in the mid-1930s it made its debut in essentially the same technological form as exists today. Figure 7–3 traces the development of television technology.

FIGURE 7–3. Development of Television Technology

THE DISCOVERY OF PHOTOELECTRIC MATERIALS

1873 Willoughby Smith and Joseph May discover the photoelectric properties of the element selenium.

1875 George McCarey breaks visual images into discrete parts; builds a machine made up of banks of selenium cells.

1880 Maurice Leblanc refines the McCarey machine so that only two wires are needed; the fundamental concept of scanning the visual image is developed.

MECHANICAL SCANNING DEVICES

1883 Paul Nipkow develops the first mechanical scanning disc.

1923 John Baird develops the first operational television system using the mechanical disc configuration. Images were only black-and-white silhouettes and were transmitted by wire.

FIGURE 7–3. *(Continued)*

1923	Frances Jenkins sends still television images using a mechanical system and wireless.
1925	Baird transmits moving silhouettes without wires.
1926	Baird transmits moving images with gray tones.
1927	Herbert Ives of Bell Laboratories develops a television system that can transmit images and sound hundreds of miles via wire.
1927	Philo T. Farnsworth demonstrates the first electronic television system.
1928	Baird transmits television images across the Atlantic.
1928	Ives develops a color television system.

THE DEVELOPMENT OF ELECTRONIC TELEVISIONS

1897	Karl Braun develops the cathode ray oscilloscope.
1907	Boris Rosing uses Braun's invention as a receiver.
1908	A. A. Campbell Swinton uses a cathode ray tube as a receiver and applies scanning principles to image formation.
1928	Vladimir Zworykin patents the iconoscope. It forms the basic technology for electronic television systems.
1921–38	Farnsworth patents seventy-three devices that improve electronic television.
1930	RCA and General Electric pool resources and form the Camden Group. Under the leadership of Zworykin, the research team improves the electronic television system.
1936	The first television broadcast airs from the New York World's Fair.

7.3 PRINCIPLES OF TELEVISION TRANSMISSION AND RECEPTION

Although the processes for delivering radio and television images to audiences are similar, television is a more complex system. Television requires that both sound and visual images be encoded, transmitted, and decoded. Millions of separate pieces of information are transmitted and received each second. The process requires accurate electronic equipment and a high degree of compatibility between transmitter and receiver.

The television system consists of two subsystems, the *audio subsystem* and the *video subsystem*. The production and reception of the audio portion of the medium is almost exactly like that used in radio. But what about the video portion?

Just as sound is the raw material of audio, light is the raw material of video. In a television camera light, reflected from an object, travels through a lens system which

focuses the image on the face of a video tube. The image is br
information, then stored or transmitted as *video RF*. The video
to a cathode ray tube, called a kinescope, which uses the video
original image on the screen. The image may be either in co
The audio radio frequencies are processed by an audio receiver
is located in the receiver cabinet.

into bits of electronic
s received and routed
als to reconstruct the
in black and white.
h, like the kinescope,

7.31 Scanning the Image

The first step in the video system consists of focusing a visu
sitive area, the **target**, of a video tube. Since the development
rykin, video tubes have increased in sensitivity and decreased
the video tube is called an image orthicon, a vidicon, or a p
sentially the same manner.

Like the iconoscope, the modern video tube emits a stream
ode. The position of the electron stream is controlled by th
the deflection coils in the tube. The movement of the electr
across the surface onto which the image has been focused is
plete scan of the image from top to bottom is called a *fra*
number of frames generated per second—the *frame rate*—i
tems use a frame rate of twenty-five.

However, the projection of only thirty frames a second re
To get an acceptable image the frame rate must be increase
interlace scanning. The electron beam first scans line 1, th
to scan line 3, then to line 5, and so on until the bottom of
reaching the end of the bottom odd-numbered line, the be
frame at the beginning of line 2 and proceeds to scan th
illustrated in figure 7–4. In this way each frame is made up
even-line field. So while the frame rate of the U.S. television
the field rate is double that, creating a picture that moves in

ge onto the light-sen-
e iconoscope by Zwo-
e. However, whether
on, it operates in es-

ctrons from the *cath-*
netic fields created by
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lines. This process is
an odd-line field and an
em is thirty per second,
of flickers.

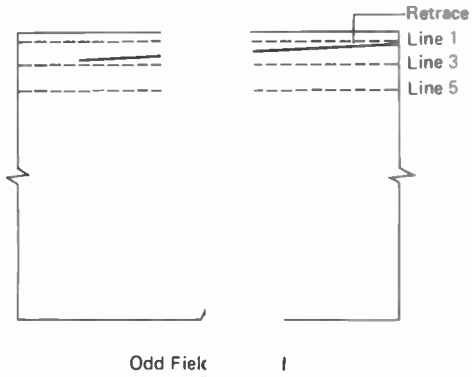

FIGURE 7–4. The Television Scanning Process
Here the odd-line field is being scanned. Once all the odd lines are scanned, the beam will scan the even lines. The U.S. television system scans thirty odd fields and thirty even fields per second.

7.32 Blanking and Sync Signals

Whenever the electron beam reaches the end of a line it moves either vertically or horizontally to the beginning of the next line. If during the *retrace* sequence the electron beam were to continue to scan the target area of the tube, the resulting path of light would interfere with picture quality. In order to eliminate this, the electron beam is turned off during the retrace period. This is called *blanking*. There are two types of blanking. *Horizontal blanking* occurs when the beam moves from the end of one line to the beginning of another. *Vertical blanking* occurs when the end of one field is reached and another begins.

During the blanking phase of the process *accessory signals* are transmitted. These signals are sets of instructions telling the various components of the television system what to do and when to do it. One type of accessory signal, a *sync signal*, makes sure that the scanning process is synchronized in both the video tube (in the camera) and the receiver tube (the kinescope). If the signal is properly in sync, the electron beam is scanning the same portion of each tube at the same time. Failure to provide accurate sync signals results in a distorted picture on the receiver. Other accessory signals determine white, black, and color levels. The various accessory signals are generated electronically in the *camera control unit* (CCU) and the *sync generator*. The CCU and the sync generator may be located internal or external to the **camera head**. If the information to be transmitted is from some other source than a video camera, additional sync signals may be placed onto the video signal before the signal goes to the transmitter. The external sync generator is sometimes called *station sync*. The receiver takes the accessory signals and reconstructs the video image originally seen by the camera.

7.33 Line Frequency

The television system used in the United States consists of thirty frames per second with a line frequency of 525. The image which is focused onto the target portion of the video tube is dissected by the electron beam into 525 separate lines of information. In practice, not all 525 lines are used for picture information; some are used for the various accessory signals. A black-and-white television receiver uses about 340 lines, a color receiver approximately 280 lines for visual information. Each frame is made up of approximately 150,000 separate picture elements, with 15,750 lines of information being broadcast per second (thirty frames with 525 lines a frame).

The frame rate of U.S. television sets, thirty per second, meshes neatly with our electrical system's frequency of sixty hertz. However, other countries use a different electrical standard and hence their television system varies from that used in the United States. The five different systems in use throughout the world are summarized in figure 7–5. Note that the methods of modulating audio carrier and channel width vary.

7.34 Color

Thus far the discussion of television images has been limited to black-and-white pictures. Yet color systems were developed very early in the history of television. The first color

FIGURE 7–5. TV Systems around the World

SYSTEM	LINES/ FRAME	CHANNEL WIDTH (MHz)	SOUND	FRAMES/ SECOND	USER
A	405	5	AM	25	Great Britain
B	625	7	FM	25	Western Europe (with exceptions)
D	625	8	FM	25	Eastern Europe, Soviet Union
E	819	14	AM	25	France
M	525	6	FM	30	United States, Japan, Canada

television system adopted in the United States was a mechanical system developed by CBS and approved for use by the FCC in 1950. However, the pictures transmitted using this system couldn't be received and reproduced by existing black-and-white television sets. RCA solved the problem by developing an all-electronic **compatible** color television system. In December 1953 the FCC reevaluated its original decision on color television and approved the RCA system.

The color system uses two separate picture signals. One signal consists of information about the *luminance*, or brightness, of a scene; the other, information about the *chrominance*, or color. Color receivers use both signals, while black-and-white receivers ignore the chrominance signal and use only the luminance information. Almost any hue can be recreated by mixing the light primaries (red, blue, and green). Each color is fed into a video tube and the outputs of the video tubes are combined to form the luminance and chrominance signals, which are then *multiplexed* together. The three primary color signals are differentiated by differences in signal phase. A special accessory signal, *color burst*, controls the multiplexing process and allows the home receiver to distinguish between the various color phases.

7.35 Mixing the Various Video Sources

A camera is not the only source of video. Video may originate from storage devices such as videotape recorders and slow-motion recorders, from computerlike devices which generate alphanumeric information, and from telecine chains which use a video camera to read photographic slides and motion picture film. There are also situations in which more than one camera is used. When more than one video source is utilized the signals can be routed to a mixing device called a *switcher* or *video mixer*, which allows the director to choose among several video sources or to combine them.

7.36 The Audio System, Diplexing, and Transmission

The output of the switcher is sent to a *diplexer*, where it is combined with the audio frequencies and placed onto the carrier frequencies. The television audio system is similar to that used in radio: sound is converted to an audio signal and amplified, then encoded onto the audio carrier using *single sideband frequency modulation*. The video signal is

placed onto the carrier wave using amplitude modulation. The modulated carrier frequencies are delivered to the transmitting element, which is mounted on a tower. The television carrier wave is circularly polarized, meaning that the waves travel in a corkscrew fashion. Circular polarization decreases the amount of distortion caused by attenuation and atmospheric or electronic disturbances.

7.37 The Receiver

The television receiver operates in a manner similar to a radio receiver. The FM audio signal is picked up by the receiver antenna and routed through a series of amplifiers and filters to separate the audio frequencies from the carrier frequency. The audio frequency is then routed to the speaker, where it is transformed back to sound.

The AM visual signal is amplified, filtered, and routed to the *kinescope* tube. The kinescope is similar to the cathode ray tube developed by Braun but much more sophisticated. A diagram of a simple kinescope tube can be seen in figure 7–6. The *cathode* (C) is heated with an electrical current and emits negatively charged electrons which are attracted to the positively charged *anode* (A). In the center of the anode is a hole that allows some of the electrons to escape into a magnetic field formed by the *plates* P1 and P2. As the magnetic field is varied the electron beam moves so that its scans the *face* of the tube, which has been coated with a luminescent material. Each line of the screen is made up of hundreds of individual dots which glow when the electron beam strikes them. Variances in brightness are achieved by passing the electron beams through a *grid* (not pictured in the figure). The grid's voltage varies according to the changes in the received video carrier signal.

The color kinescope tube is a marvel of precision engineering. The screen is scanned in a manner similar to the black-and-white kinescope. However, for every one dot of material in the black-and-white kinescope there are three in the color kinescope—one red, one blue, and one green. The inside of the screen is covered by a mask, into which hundreds of thousands of holes have been poked, one hole in front of each dot. In the older type of kinescope tubes there are three cathodes, each of which scans one color. The three-cathode system requires that each of the electron guns be precisely aligned. However, this alignment is difficult to achieve, and picture quality sometimes suffers. A

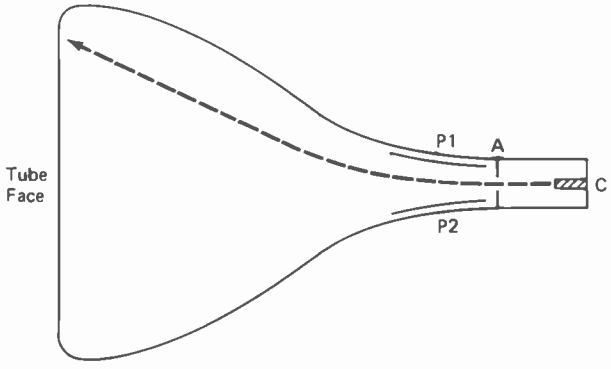

FIGURE 7–6. The Kinescope Tube
An electron beam generated by the cathode (*C*) scans the face of the tube in a manner prescribed by the anode (*A*) and plates P1 and P2.

second-generation three-gun system uses vertical strips of phosphorescent material. The Sony Corporation has developed a one-gun system, called the "Trinitron" system, which illuminates successive vertical strips of material.

7.38 High-Definition Television

Although there are a number of different television systems in use throughout the world, each suffers from the same problem: poor picture definition. *High-definition television*, or HDTV, solves the problem, but with an increase in channel bandwidth from 6 MHz to approximately 100 MHz. The HDTV system provides three discrete channels of video. Each channel is 30 MHz wide and one of the light primaries (red, green, blue) is assigned to each channel. The remaining 10 MHz is utilized for sound and the additional accessory signals needed to synchronize the three color channels. The result of the increased bandwidth is a video picture made up of 1,150 lines instead of only 525 and a format equivalent to that used in wide-screen motion pictures, approximately 1.85:1. The resulting picture is comparable in quality to a thirty-five-millimeter motion picture image.

7.39 Closed Captioning and Teletext

Some television programs are broadcast with captions which appear at the bottom of the television picture. These visual summaries of voice material are used by viewers with hearing impairments. The captions may be either *open* or *closed*. Programs broadcast with open captions may be seen on any receiver. Those with closed captions require a special processor to decode the captioned material and display it on the screen. The material appearing in the closed captions is multiplexed onto the broadcast signal during the blanking interval of line 21.

Teletext is a one-way electronic publishing service that is transmitted over either a portion or the full width of the standard six-megahertz television channel. Most teletext systems offer approximately two hundred pages of alphanumeric information which can be called up via a keypad connected to the television receiver. In excess of twenty broadcast stations have experimented with the various forms of teletext technology. These technologies include Ceefax (Britain), Telidon (Canada), Antiope (France), and the North American Broadcast Teletext Specification system developed by AT&T. The FCC has proposed allowing stations to utilize seven lines of the vertical blanking interval for teletext services. Lines 14 to 20 would be dedicated to the new service, while line 21 would be shared with closed captioning services. NBC and CBS have announced that they will provide a national teletext service once standards are established.

7.4 TELEVISION CHANNELS AND WAVE PROPAGATION

The development of television technology in the mid-1930s did not mean that it could emerge as a full-blown broadcast service immediately. First a place for it had to be found in the electromagnetic spectrum. This allocation process took years. It was hindered by

many false starts, many changes, a world war, and a total freeze on the licensing of television stations.

7.41 The Evolution of Channel Location

The FCC moved slowly both in establishing the technical standards for television and in reaching a final decision on where the service should be located in the spectrum. In 1937 the FCC allocated nineteen channels to be used for television experimentation. In conjunction with industry study groups, the commission began to analyze the problems of spectrum location and technical standards for the new broadcast technology. In 1940 the bands allotted for television use were changed slightly, resulting in a reduction in the number of channels to eighteen and a loss of the designation "experimental." Still to come was a decision on technical standards. On May 3, 1941, after much industry infighting and accompanying delays, the commission approved the standards recommended by the *National Television Systems Committee:* 525 lines, thirty frames, FM sound, and a six-megahertz channel width. The FCC also announced that it would begin licensing commercial television stations. Conditions seemed to be right for a strong beginning for the television industry. However, the entry of the United States into World War II and the necessary emphasis on the production of war goods meant that only a few stations were able to begin broadcasting.

The war was not the only reason for the slow development of television. Beginning in 1943 the FCC began to examine how the electromagnetic spectrum could be more efficiently managed. These deliberations resulted in great confusion and consternation within the fledgling industry. No one knew whether television would remain in the spot assigned in 1941 or be moved to a new location. Few were willing to risk the capital necessary to build a station with a transmitter which soon might be outmoded.

Finally, in 1945 the FCC decided to assign thirteen channels to television—six channels in the 44 to 88 MHz band and seven from 174 to 216 MHz—and to allow television experimentation in the UHF portion of the spectrum. The FCC decision had serious flaws, one of the most serious being the lack of contiguous television channels. The lack of contiguity meant that television receivers would need multiple tuners to cover the four separate bands used for television. This greatly increased the cost of receivers. In 1948 the FCC took channel 1 away from television, leaving only twelve channels (2 through 13).

When the war ended the FCC began receiving applications for television stations. By 1948 the commission realized that it had made a serious error. Not only were the number of channels already allocated inadequate to support a nationwide system, but there were severe interference problems. The FCC response was to freeze the television licensing process in 1948. The four-year freeze allowed the FCC to set up a workable channel allocation system and solve the interference problem. It also bought time for RCA and CBS to develop workable color television systems (Sterling and Kittross, 1978).

In its "Sixth Report and Order" issued in 1952, the FCC slightly adjusted the location of the already existing channels (2 through 13) and established seventy additional channels (14 through 83) in the UHF frequency band (see figure 7–7). In order to solve the interference problem, it formulated a *Table of Assignments* assigning specific channels

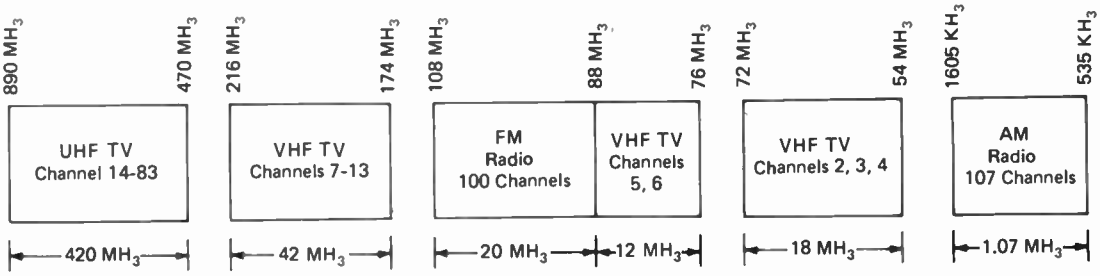

FIGURE 7–7. Location of VHF and UHF Channels in Relation to AM and FM Radio Channels

for commercial and noncommercial use to hundreds of communities across the nation. A sample from the Table of Assignments can be seen in figure 7–8. This allocation plan remains in effect today, with two exceptions. In 1963 the commission assigned UHF channel 37 to radio astronomy use. In 1970 channels 70 through 83 were assigned to land mobile use (taxi cabs, wireless microphones); however, some television translators still operate on those channels.

	Channel No.
Alabama:	
Andalusia	*2−
Anniston	40−
Birmingham	6−, *10−, 13−, 21−, 42+, *62+, 68+
Decatur-Hunstville	54
Demopolis	*41
Dothan	4, 18, *39+, 60−
Florence	15, 26, *36−
Gadsden	44+, 60
Huntsville	19, *25+, 31+, 48−
Huntsville-Decatur	54
Louisville	*43+
Mobile	5+, 10+, 15+, 21+, *31, *42
Montgomery	12, 20, *26+, 32, 45−
Munford	*7−, *16−
Opelika	66
Selma	8, 29−
Tuscaloosa	17, 33, *39−
Tuscumbia	47−
Alaska:	
Anchorage	2−, 4−, *7−, 11, 13−
Bethel	*4
Dillingham	10
Fairbanks	2+, 4+, 7+, *9+, 11+, 13+
Juneau	*3, 8, 10
Ketchikan	2, 4, *9
Seward	3−, 9−
Sitka	13

	Channel No.
Arizona:	
Ajo	*23−
Coolidge	*43
Douglas	3, *28
Flagstaff	2, 13, *16
Globe	*14+
Holbrook	*18+
Kingman	6−, *14−
McNary	*22+
Mesa	12−
Nogales	*16+
Page	*17
Parker	*17−
Phoenix	3+, 5−, *8+, 10−, 15−, 21, 33, *39
Prescott	7, *19
Safford	*23+
Tucson	4−, *6+, 9−, 13−, 18−, *27−, 40
Tucson-Nogales	*11
Yuma	11−, 13+, *16−
Arkansas:	
Arkadelphia	*9+
Batesville	*17
El Dorado	10−, 18−, *30+
Fayetteville	*13−, 29+
Fort Smith	5−, 24+, 40−
Harrison	*31+
Hot Springs	*20, 26
Jonesboro	8−, *19+
Little Rock	*2−, 4, 7−, 11, 16−, *36
Mountain View	*6−
Pine Bluff	25−, 38−
Russellville	*28+

FIGURE 7–8. Sample of FCC's Table of Assignments for Television Service.
SOURCE: Chapter 47, Section 73.606(b), *Code of Federal Regulations.*

7.42 Structure of the Television Channel

The U.S. television channel has a width of 6 MHz. The first 1.25 MHz is called the *vestigial sideband* and is used to guard against interference from the next lower channel. The next 4 MHz is used for video information. The remaining .75 MHz is used for audio information and for another, narrower, guard band. A diagram of the architecture of a television channel can be seen in figure 7–9. Note that the U.S. television channel is six hundred times the width of an AM channel and thirty times the width of an FM channel. A television channel uses so much of the spectrum because it must provide much more information per second than either AM or FM radio. Over 4,500,000 bits of picture information, accessory signals, and sound information are transmitted each second.

7.43 Wave Type and Coverage Variables

Because television channels are located in the VHF and UHF portions of the spectrum, direct waves are transmitted. In addition, the attenuation of the signal is severe, particularly for the UHF channels. Coverage area is determined by the height of the transmitting element above ground, the power, and the frequency assigned.

In order to minimize cochannel interference between stations, each station must predict the coverage area of its signal. The area covered is divided into two parts: a *Grade A* contour area and a *Grade B* contour area. The Grade A area is the portion of the coverage area closest to the transmitter. Its outermost boundary is defined as the point at which the strength of the signal attenuates to 50 percent of the original level 50 percent of the time. In general, the audio and video quality is consistently good within the Grade A contour area. The outer limit of the Grade B contour is the point at which the strength of the signal attenuates to 50 percent of the original level 10 percent of the time. Audio and video quality within the Grade B contour area varies widely and is subject to noise and distortion.

Total coverage in either the Grade A or Grade B contour areas is rare. There are often gaps or *shadow areas* created by tall buildings or natural obstructions such as moun-

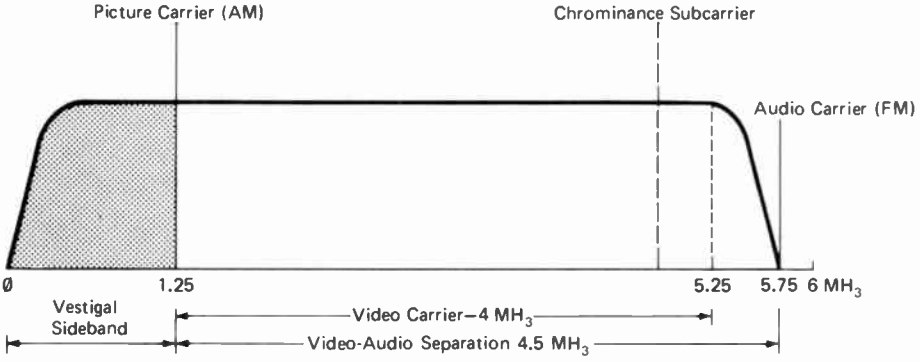

FIGURE 7–9. Television Channel Architecture

tains. In addition, the pattern of signal transmission may be such that there are null areas close to the transmitter *(blanket area)* or within the Grade A and B contours. Sometimes these areas can be filled by careful orientation of the transmitter elements.

7.5 TELEVISION STATIONS

Most consumers don't differentiate between the various types of television services they receive. For them, television is whatever they see on their receiver. Yet within broadcast television there are many different types of stations providing many different types of services. During the past decade there has been an increase in the types of services provided to audiences and stations licensed by the FCC. Some of these stations are used simply to relay television station signals from one transmission point to another. These signals are not broadcast for reception by the general public. Others are designed to be received by homes and businesses. The channels assigned to these types of services fall into one of four categories: *full-service stations*, *translators*, *auxiliary stations*, and *other broadcast stations* (including low-power television stations, multipoint distribution services, instructional television fixed service, and direct broadcast satellites).

7.51 Full-Service Stations

A full-service television station is one that operates on channels 2 through 69, located in the VHF and UHF portions of the electromagnetic spectrum. As of March 31, 1984, 672 commercial and noncommercial VHF stations and 760 UHF stations had been licensed. Full-service stations make up the largest class of stations licensed by the FCC and are subject to a greater number of rules and regulations than other station classes. A full-service commercial station must operate at a minimum power of 100 w. It must broadcast at least two hours daily each calendar week and at least twenty-eight hours per week. Noncommercial stations have no specific minimum number of broadcast hours.

7.52 Translators

In many instances the signal generated by a station's primary transmitter operating on channels 2 through 69 doesn't cover the entire area of its Grade A or B contours. To fill in these coverage gaps a station may obtain a license for a translator station. The translator station's assigned channel may be on any VHF channel or UHF channel listed in the Table of Assignments and not already licensed. If all channels assigned to a community are taken, then any VHF channel or UHF channels from 55 to 69 may be used, provided there is no cochannel or adjacent-channel interference. If interference is a problem, the highest available UHF channel from 14 through 54 may be used. Translator stations must not interfere with any other primary station's coverage area, and may not substantially increase the coverage contour of the primary transmitter. The channel must be used only for the retransmission of the primary station's signal and for no other purpose. However, the translator operator (with the permission of the FCC) may operate the translator as a low-power television station.

7.53 Auxiliary Stations

In most instances a station's primary transmitter and translator are located at a distance from the studio and business offices. This necessitates two types of auxiliary stations: a *television STL station* channel to relay the signal generated from the studio to the main transmitter, and a *television translator relay station* to carry the signal from the studio to the translator.

Another type of auxiliary station is used to deliver material back to a station from a remote location. This type is called a *television pickup station.* Sometimes stations belonging to the same owner or network, or stations whose communities are in close proximity, agree to exchange program material. This material is delivered via a *television intercity relay station.*

The frequencies assigned to these four types of stations are found in three bands. Band A has been assigned frequencies from 1,990 MHz to 2,500 MHz; Band B, frequencies between 6,875 MHz and 7,125 MHz; and Band D, frequencies from 12.7 GHz to 13.2375 GHz. These stations may be used only for program material for the primary station. They may not be used for a program service different from that of the primary station.

7.54 Low-Power Television Stations

Low-power television (LPTV) stations are the newest class of television broadcast stations authorized by the FCC. Created in the spring of 1982, LPTV stations are licensed to operate in a secondary status on any available VHF or UHF channel; whenever a license is awarded for a full-service station on the channel used by the LPTV station it must immediately cease operating on that channel. In order to minimize interference with full-service stations, LPTV stations must operate at low power (a maximum of 10 watts VHF and 1,000 watts UHF) so they don't interfere with the Grade B contour signal of existing stations. Any interference must be corrected immediately or the station will be required to cease broadcast operations.

LPTV stations operate within an environment less restrictive than full-service stations. They may originate programs, provide subscription television services, or rebroadcast signals from other stations (with permission, of course). Unlike full-service stations, there is no minimum number of hours they must broadcast per week. The FCC predicts that as many as four thousand new television stations may be authorized between the summer of 1982 and the end of 1985.

7.55 Subscription Television Stations

Subscription television (STV) stations operate on one of the VHF or UHF channels and provide a program service to members of the public for a fee. The signal broadcast by an STV station is *scrambled.* Subscribers rent or buy a device which unscrambles the picture. STV stations are subject to many of the same rules and regulations as full-service stations. There is, however, no minimum number of broadcast hours required of STV

stations. Many STV stations provide free programming during the daytime and subscription programming during the evening hours.

During the 1950s, when many of the stations operating on UHF frequencies were facing bankruptcy, there was an attempt to use these stations as *pay-television* outlets. In 1951 Zenith, the large electronic equipment manufacturer, had experimented with a pay-TV system in Chicago called Phonevision, but the results of the experiment were inconclusive. Another company, Skiatron, tested its Subscriber-vision pay service using the facilities of WOR-TV in New York. In 1955 the FCC held hearings on a proposal to establish a subscription system and decided to allow further experimentation to occur. A six-year experiment was conducted in Hartford, Connecticut, to see if the service was financially viable, but again the results were inconclusive. The most ambitious experiment took place in Los Angeles, where a former NBC executive, Sylvester "Pat" Weaver, founded the Subscription Television Company. Public outcry led to a referendum in California, where voters killed pay TV. The vote was later ruled unconstitutional. At the urging of television stations fearful that pay TV would siphon off movies and sporting events, the FCC passed restrictive rules limiting the kinds of programs subscription television stations could broadcast. These rules are no longer in effect.

7.56 Instructional Television Fixed Service

Instructional television fixed service (ITFS) stations are licensed to educational and cultural organizations for the purpose of providing instructional materials to students enrolled in educational institutions. Other authorized uses include in-service training and other types of continuing education for professionals. Also included are exchanges of data and administrative materials. Stations operate on twenty channels in a noncontiguous band of frequencies between 2,500 and 2,690 MHz. Power is limited to the amount needed to provide a usable signal to reception points; normally this is approximately 10 w. Each ITFS station may also operate one or more ITFS response stations, which are restricted to transmitting data or aural material from the reception site to the ITFS station. An ITFS station with a response capability can use interactive instructional techniques. Up to four ITFS stations may be licensed to a single entity in a single community.

7.57 Multipoint Distribution Service

Multipoint distribution service (MDS) stations are licensed to operate on several groups of channels located from 2,150 MHz to 2,690 MHz. Stations are licensed as common carriers and provide a number of communications services ranging from telephone and data transmission to pay television. MDS stations broadcast a scrambled signal which is received with a special antenna. A *converter* reduces the frequency to that used by one of the standard VHF television channels, 2 through 13. In mid-1982 an estimated 750,000 homes were served by pay-television franchises using MDS channels.

One of the major problems of MDS is that the frequencies assigned to the service propagate poorly. In order to cover a large urban area, several signals must be used. In early 1982 the Microbaud Corporation of America petitioned the FCC to expand and restructure MDS by transferring some ITFS channels to MDS use, which the FCC did.

7.58 Direct Broadcast Satellites

Direct broadcast satellite (DBS) services deliver *(uplink)* a signal broadcast from an earth station to a communications satellite located 22,300 miles above the equator, and rebroadcast *(downlink)* the signal to earth, where a home-based satellite dish picks up the signal and delivers it to the receiver. Because it serves both a distribution and an exhibition function DBS is considered a *hybrid service.*

Satellites currently operate at 4 GHz (C band) and 12 GHz (Ku band) with a transmitter power of between 5 and 20 w. Frequencies between 17.3 GHz and 17.8 GHz are used for uplinks. A new generation of satellites designed specifically for direct broadcast to the home will operate with 400 w of power focused on a small geographical area. Present technology allows room for delivery of between 110 and 152 television channels per time zone. The new generation of satellites will allow a significant increase in the number of channels.

The FCC rules governing DBS are temporary, and final decisions on permanent frequencies for both uplinks and downlinks as well as satellite spacing are subject to international treaty. Applicants for DBS licenses have proposed a number of services, including both conventional broadcasting and subscription-type programming.

7.6 TELEVISION PRODUCTION TECHNOLOGY

The production of a television program is a complex operation that involves many different people. Programs are more complex than those for radio because the elements (audio and video) are more numerous and difficult to control. As with the production of all programs, there are three distinct parts of the television production process: *preproduction, production,* and *postproduction.* The preproduction phase consists of developing a script, planning and budgeting the production, hiring the personnel who will work on the program, and raising the money to pay for the costs. The production phase consists of the actual production of the program material. In postproduction the material recorded is put together into final form.

A lot of equipment is used in television production. Video sources include material recorded on videotape, talent, film and slides which are scanned by a special camera located in a film chain, and alphanumerics generated by a **character generator**. Equipment includes four categories: (1) cameras; (2) video switchers and mixers; (3) video recorders; and (4) audio equipment (see chapter 6).

7.61 Types of Television Production

Television programs are produced to be broadcast live or on videotape or film. Programs that are produced live normally don't go through a postproduction phase unless they are being recorded for later release or rebroadcast. In local stations many programs are produced live. There are fewer instances of live production at the network level, but news programs, on-the-spot coverage of news events, sports programs, and some talk shows are produced live.

In addition, programs are produced either in a *studio* setting or on a *remote* location. Generally, there is a greater degree of control over programs produced in a studio—the lighting can be controlled, sound quality is consistent, and the surroundings are familiar. Remote location production is more difficult but is a common ingredient of television news, sports, and entertainment programming. Equipment used on remote location is generally light and portable. In some cases, like coverage of sports events, remote vans are used. These function as portable control rooms similar in size and function to control rooms used in television studios.

Another variable in the production scheme is the number of cameras used. News stories shot in the field generally use only a single camera, an audio setup, and a portable videotape recorder. Called *electronic news-gathering* (ENG) equipment, this portable equipment allows reporters to work in locations inaccessible to remote vans or to heavier, cumbersome video equipment. ENG has almost totally replaced motion picture film as a news-gathering medium. Studio productions, on the other hand, use at least two cameras, most often three, and sometimes four or more. A sophisticated sports production may use twelve or more cameras.

7.62 Basic Characteristics of Cameras

Television cameras vary in size and type of video tubes used. The first (and largest) tube developed is the *image orthicon* tube, called IO for short. It is large and requires a great amount of light to make it produce a clear picture. Some cameras still use IOs as the black-and-white or brightness tube.

The *vidicon* tube is smaller than the IO tube but is less sensitive, that is, it requires even more light. There are still studio cameras being manufactured which use this type of tube, but it is rapidly being replaced by the plumbicon.

The *plumbicon* tube is extremely sensitive and can be used in low-light situations often found in remote locations. The target area of the tube is coated with a light-sensitive lead-based material. The tube is small, allowing cameras to be light enough to be hand-held rather than supported by a tripod.

7.63 Video Mixing and Effects

Productions which use multiple cameras or other sources of video (such as film, slides, videotape, alphanumerics) require a piece of equipment that will switch between the various video inputs. Figure 7–10 shows the basic elements in the mixing process. The device which chooses between the multiple signals is called a *video mixer* or *switcher*. The modern switcher is a complex electronic device which makes it possible not only to choose from among many sources but to create a variety of visual effects using a component called an *effects generator*.

The simplest method of going from one video source to another is the **cut**. Depending on their electronic design, switchers can also **fade**, **dissolve**, and **wipe** between sources. The effects components of the switcher can be used to create a new shape and size for the video image, combine two or more video sources to create a new image, **key** titles and backgrounds, or create a unique visual world unlike anything in the real world.

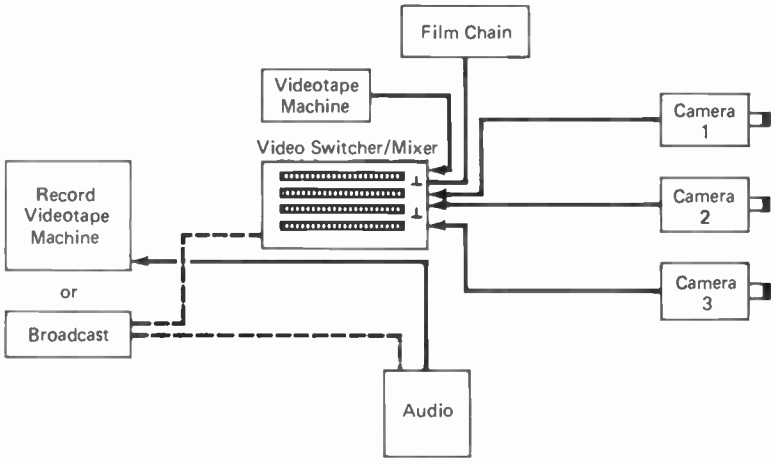

FIGURE 7–10. The Mixing Process: From Multiple Video Elements to Switcher

7.64 Videotape Recorders and Formats

In the early days of television the only way to record a program was to film it directly from the television screen. These film records, or **kinescopes,** were of poor quality. But if a program was produced in New York and you had a station outside the eastern time zone, you either broadcast it live at a time inconvenient for most potential viewers or you ran a kinescope. Because there was no other recording medium besides film, programs were either done live, start to finish without stopping, or shot on film and then edited. Today it is easy to take *videotape recording* for granted. *Video cassette recorders* (VCRs) are found in many homes. Every television station has at least one professional-quality machine in operation. Video recording technology has developed to the point that there are two different formats in use: *transverse quadraplex* and *helical scanning.*

The problems of developing an electronic means to record video information with the ease of the audio recorder were enormous. First, the overall amount of information needed by the television system is much greater than that used in audio reproduction. Second, the amount of information per second is much greater. Early attempts to develop videotape recorders (VTRs) focused on using wider *magnetic tape* run at very fast speeds over a configuration of three stationary heads. An early recorder demonstrated by RCA in 1954 used a tape speed of 360 inches per second. But the problems with the RCA longitudinal method were numerous. Large amounts of tape were required, it was difficult to accurately control the speed of the tape, and not enough information could be produced to fill the entire band so as to obtain a quality picture (J. Robinson, 1981b).

QUADRAPLEX VIDEOTAPE RECORDERS

The problem was solved in 1956 by the Ampex Corporation. First, the Ampex engineers slowed down the speed of the tape. To achieve the necessary tape-to-head speed they wrapped the two-inch-wide magnetic tape around a two-inch-diameter cylinder onto which four video heads were mounted. The cylinder was then rotated at a speed of 240 to 250 revolutions per second. By speeding up the head, the head-to-tape speed necessary to produce pictures was achieved. The process was called *transverse quadraplex,* or

quad for short. The basic principles of quadraplex recording and playback are still used today. On November 30, 1956, CBS became the first commercial network to broadcast a videotaped program.

Today quad machines come in two configurations, cassette and reel-to-reel. The reel-to-reel machines are used for the recording of program materials of all lengths and for the playback of longer programs. Cassette machines are used for shorter program materials, such as news stories and commercials. Both types of machines use two-inch videotape and the quad head configuration.

HELICAL SCAN VIDEOTAPE RECORDERS

Two problems with quad machines are that they are large and they are expensive, factors that kept videotape recorders out of the hands of all except professional broadcasters for many years. However, in 1964 the Sony Corporation developed a new type of videotape record/playback machine. This new machine, which scanned the videotape using a more efficient helical scanning design, allowed people other than professional broadcasters to produce videotape material. Soon other manufacturers provided their alternatives to quadraplex recording. The result was a mishmash of standards, tape sizes, and recording formats. Moreover, the machines were unreliable and could not produce a picture up to the broadcast standards established by the FCC. The picture quality was inferior.

The past twenty years have seen many improvements in the quality of helical scan equipment. In fact, ENG would not be possible without helical scan recorders. The machines have been standardized using the *EIAJ* (Electronic Industries Association of Japan) *format* and have improved to such a degree that many can be used in conjunction with quad machines for broadcast purposes. And helical scan machines have a further important advantage over quad machines: they can be played in a slow-motion and stop-action mode. In addition, videotape can also be edited using helical equipment.

Although there are numerous helical scan machines on the market, only a few are used for professional purposes. There are four types used today: (1) one-inch-tape machines, used for production; (2) three-quarter-inch cassette machines; (3) half-inch machines used for in-house viewing; and (4) the experimental quarter-inch machines.

The one-inch helical scan recorders are the highest quality nonquad machines in use today. They cost about half as much as comparable quad machines, are lighter, and can produce a video signal suitable for broadcast. There are two formats in use today, although the C-format seems to be the industry standard. One-inch machines are fast replacing quads in local stations.

There is no multiple-format problem in the three-quarter-inch machines. The U-matic cassette format developed by Sony has become the industry standard. This type of recorder is primarily used in situations that call for an ENG approach. Although the three-quarter-inch recordings cannot be broadcast directly, an electronic signal processing device called a time-base-corrector (TBC) can improve the signal quality to the point that direct broadcast is possible. Cable systems can use three-quarter-inch machines without a TBC for playback of programs.

Half-inch cassette format machines are used primarily for viewing material. Unfortunately the two formats in use today, *VHS* and *Beta*, are not compatible: tapes recorded in one format will not play on machines of the other format. Then there is the quarter-

inch videotape recorder, built into a camera. While these machines appear to be more flexible than other types, they too pose a problem of several competing, incompatible formats. Until one or two standards are accepted by the industry, these machines will probably not be used in many professional situations.

7.65 Videotape Editing

Videotape, like audio tape, can be edited. In fact, the earliest method of videotape editing was to physically *splice* the two pieces of tape together. But the physical editing method is imprecise and results in an unstable picture of low quality. Electronic editing, the method used today, allows the operator to use multiple sources of material and to combine them onto the master tape.

Electronic editing systems come in a variety of configurations; figure 7–11 shows a typical one. Electronically controlled electronic editing systems allow editors to find edit points and automatically transfer material from one tape machine to another. For example, computer-controlled editing devices place a code onto the material to be edited. The editor views the tape and notes the exact edit points and programs them into a computer. When the master tape is ready to be compiled the computer controls the final editing process, which allows tapes to be edited with great precision.

7.66 Videodisc Technology

The latest devices to enter the world of television technology are videodisc players. They are found mostly in the home and can be used only to play back material already recorded. At present there are three different systems in use, none of them compatible with the others. Each system begins with a videotape of the program material. The AM waves of video material are transformed into FM signals and the variances etched into the surface of a master videodisc. At this point the differences between the systems begin.

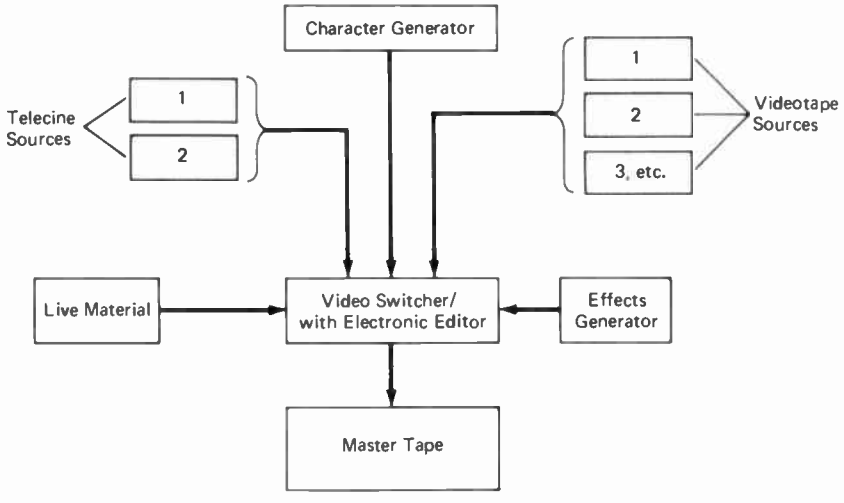

FIGURE 7–11. Editing Elements

RCA's *capacitance electronic disc* (CED) system resembles the technology of the audio record. A needle rides in the grooves of a disc made out of a plastic that conducts electricity. The disc spins at 450 revolutions per minute and is flooded with electricity. As the needle rides over the previously made etchings it receives a constantly varying flow of electricity which corresponds to the information originally encoded. This is decoded into a video signal and fed to a television receiver.

The *video high-density* (VHD) disc system is manufactured by JVC of Japan. Like the CED system, it uses a plastic disc that conducts electricity. However, the VHD disc has no grooves. The video information is encoded by means of a series of pits that vary in depth. A second series of pits at a depth different from the video information tells the tone arm where to travel.

The third system was developed by the N. V. Phillips company of the Netherlands. It uses a laser beam and is called *LaserVision* (LV). The etched videodisc is covered with a reflective material and encased in protective plastic. The disc spins at 1,800 revolutions per minute while being scanned by a laser. The light beam bounces off the disc unless it hits one of the pits etched into the disc surface; then the amount of light reflected depends upon the depth of the pit. The sequence of pits produces a varying pattern of light which corresponds to the information on the disc. One of the advantages of the LV system is that the disc can be scanned quickly, and individual program segments can be displayed within seconds after being requested. The LV system can be used not only for the storage of video material but also for text material storage and for instructional purposes.

7.7 SUMMARY

The television image is unlike any other audio-video representation. The illusion of movement is created through a physical phenomenon called persistence of vision. Compared to the motion picture image, the television image has less resolution and fidelity, a smaller range of color and contrast, a smaller image size, a uniform aspect ratio (of 4:3), and poorer sound quality. Yet despite these problems television remains one of the most powerful mass communications media.

The technology of television, like that of radio, developed slowly over a number of years. The discovery in 1873 by Smith and May that the element selenium possessed photoelectric qualities led some to believe that it had potential for use in a visual telegraph. Leblanc in 1880 developed the concept of scanning, breaking a visual image into a series of small parts. An important breakthrough was the development of the mechanical scanning disc by Paul Nipkow in 1883. However, neither Nipkow nor others who refined his mechanical system were able to develop a system that provided an acceptable quality of visual image.

John Baird broadcast television signals in 1928. The problem of poor picture quality was solved by the development of an electronic television system. Vladimir Zworykin refined the iconoscope, an electronic picture tube based on the cathode ray tube invented by the German scientist Karl Braun. One lone inventor, Philo T. Farnsworth, made major contributions to the development of the electronic system. In 1930 RCA and General

Electric formed a research group, known as the Camden Group, to systematically develop a workable television system. It made many improvements in the television system.

The process of broadcasting television images is similar to that used in radio. The visual image is focused onto a light-sensitive surface, where it is scanned. Each complete scanning is called a frame. So that there is no flicker, each frame is made up of two fields; the odd field consists only of the odd lines of the scan, the even field of the even lines. The video signal is joined with accessory signals consisting of sync and blanking. Color television signals are compatible with black-and-white signals, and differ in their phase orientation to one another. The video signal and audio signals are joined and modulated with the carrier wave in the diplexer; the video signals use the AM technique, the audio the FM.

The television channel is six megahertz wide. The visual image has a line frequency of 525 lines projected at thirty frames per second. Channels have been assigned in both the VHF (channels 2 to 13) and UHF (channels 14 to 83) frequency bands. Television channels are assigned to local communities by the FCC through a Table of Assignments. There are full-service, translator, auxiliary, LPTV, MDS, and ITFS stations. In addition, television signals may be broadcast directly into the home via satellites.

The television production process consists of preproduction, production, and postproduction. Programs are broadcast either live or from videotape. In addition, programs may be produced either in the studio or in a remote location. Three tubes are used in television cameras. The image orthicon is large and not in general use. The vidicon is smaller than the IO and more sensitive. The smallest tube, the plumbicon, is the most sensitive of the three to light. A video production uses materials from many different sources—cameras, telecine, character generators, and videotape machines. To blend all these sources into a finished production, a video mixer or switcher is used. Switchers are also capable of generating a variety of visual effects. There are two types of video record/playback devices in use, quadraplex and helical scan. Quad machines, the industry standard, use two-inch tape, while helical scan machines use a variety of formats and sizes of tape. Electronic editing and computerized editing allow finished tapes to be made from a variety of pretaped and live material. The newest type of video playback machine is the videodisc device, which comes in three incompatible formats.

CHAPTER 8 OUTLINE

8

CABLE TELECOMMUNICATIONS TECHNOLOGY

The alternative to broadcasting a program is to deliver it into a home or business via a *cable communications system.* A cable system is simply a means of delivering conventional audiovisual materials through the use of a wire. It may be a limited system utilized for the distribution of instructional television programs across a university campus, or a system serving tens of thousands of subscribers in a major city. Regardless of the system's size, cable has grown into one of the dominant forms of television today.

Cable television has become synonymous with the concepts of the "wired nation" and the "television of abundance." Having a hundred or more television channels delivered into our home via a cable seems to be a vast improvement over the limited number of channels provided by regular television in even the most heavily saturated broadcast market. Yet cable has the capacity to deliver more than television programs. Radio and alphanumeric information, including video games and computer programs, are part of the menu of services offered by many of the most modern cable systems.

What is cable? It's a *nonbroadcast* telecommunications distribution system consisting of wires and associated equipment designed to carry one or more television broadcast signals. Cable communications systems operate on several channels at the same time.

They use bandwidths of up to 400 megahertz per wire to deliver sixty or more channels of program material. Because of the broad bandwidth, cable systems are called *broadband.*

Since almost every home in the United States is already wired for telephone service, it might seem logical for the twisted pair to not only conduct our telephone messages but also deliver television and radio programs into our homes and businesses. But there is a problem: the twisted pair doesn't have the channel capacity to handle a six-megahertz television signal. Therefore a different technology is needed to deliver a large number of radio, television, and data channels to the home television and radio receiver.

When you finish this chapter you should:

1. Be able to outline the history of cable communications
2. Understand the basic design of cable systems
3. Be able to identify the various components of the system
4. Know the different types of services provided by cable communications systems.

8.1 CABLE COMMUNICATIONS: A HISTORICAL OVERVIEW

In over three decades of operation the modern cable telecommunications system has evolved from a service delivering an acceptable over-the-air broadcast signal to homes without television service to a system offering stations and services from all over the world. In 1982 it was estimated that 27.5 million households received some form of cable television service. This is 32 percent of all households that have a television receiver. And estimates are that by the beginning of the next decade cable **penetration** will more than double.

8.11 Cable Telecommunications Prehistory

The earliest wire system which allowed voice communication was the telephone. The use of this simple instrument to transmit voice messages soon led to attempts to transmit news, music, and other types of entertainment and cultural programming to a mass audience (Sivowitch, 1970). Prior to Bell's patenting of the telephone in 1876, Elisha Gray sent "electroharmonic" broadcasts via wire (Sivowitch, 1970). Bell, too, used the telephone to transmit musical concerts. Wired stereophonic broadcasts were achieved by Clament Ader in 1881 and became a part of the Paris Electrical Exposition.

By 1893 a commercial wire broadcasting system called Telefon-Hirmondo (telephonic newseller) was established in Budapest, Hungary. Regularly scheduled news and music programming was provided to subscribers for up to twelve hours a day. Within months

the Electrophone Company was organized in London. In November 1894 the Chicago Telephone Company broadcast election returns to a network of more than 15,000 subscribers.

8.12 Early Cable Television in the United States

Today cable television systems provide a wide variety of services. Subscribers not only receive local broadcasting stations, but many systems carry signals from radio and television superstations as well as pay services. This wasn't always the case. The first cable system was established in 1949 in Astoria, Oregon. Within a year other systems had sprung up in mountainous regions of Pennsylvania and in Palm Springs, California. These early cable operations were small systems, offering only three or four channels. Their sole purpose was to provide an acceptable television signal to homes otherwise unable to receive television. By 1952 there were approximately seventy systems in operation.

The construction of all these early systems followed the same basic pattern. A large antenna was placed in a position where it could receive the television signals serving a larger community located nearby. The received signals were carried down a wire, amplified, and delivered into the homes of subscribers. The small systems that developed in the 1950s were known as *community antenna television* (CATV). Monthly fees averaged $5 per home, a small price to pay for the opportunity to receive television in a community that might have to wait years for its own local station to be built.

The number of cable systems grew throughout the 1950s. Technological advances allowed more channels to be delivered into the homes of subscribers. Systems of twelve channels were built, and late in the 1950s systems of twenty channels and more emerged. By the early 1960s nearly eight hundred systems had been built. The CATV systems of the 1950s had evolved into a telecommunications enterprise that provided subscribers not only with the signals of nearby stations but also those of more distant ones. Broadcasters began to object to cable operators using their signals without paying a fee and to their importation of distant signals. Of particular concern was the duplication of syndicated programs, for which the local broadcasters had paid a fee to obtain exclusive rights. Suddenly the FCC began to develop an interest in cable.

8.13 Regulation Impairs, Then Stimulates Cable Growth

Fearful that cable television might seriously impair the profitability of television stations, and thereby lead to the loss of local service, the FCC in 1962 began to regulate cable indirectly. Prime targets of these early attempts at cable regulation were the *interstate microwave systems* which delivered the distant signals to the cable operator. In 1965 and 1966 the FCC extended its regulation to include both inter- and intrastate micro-

wave systems. The commission required that all stations within sixty miles be carried on the cable system and that systems in the hundred largest television markets get FCC permission to import distant signals. In addition, cable operators were prohibited from presenting syndicated programs broadcast by local stations for fifteen days before or after local station carriage (the syndicated exclusivity rule). In essence, the rules of the mid-1960s stopped the growth of cable in the same way that the FCC's freeze on licensing television stations in the late 1940s and early 1950s had stalled the growth of broadcast TV.

In 1972 the FCC issued the first comprehensive set of rules governing the operation of cable communications systems. Included in the rules was a provision establishing a minimum channel capacity of twenty and the necessity for two-way communication ability for all systems built after the date the new rules went into effect. Although the new rules lifted the pseudofreeze affected in 1965–66, cable growth almost stopped. Economic downturns in the mid-1970s dried up venture capital, so funds were unavailable for building new systems or upgrading or expanding older ones. But the 1970s also saw the birth of new programming services designed specifically to serve cable and STV. Delivered by satellite, these program services made cable attractive to potential subscribers tired of the sameness of the three commercial networks.

In 1980 the FCC did away with the rules on importation of distant signals and duplication of syndicated programs. This created a new expansionist attitude among cable operators. The largest cities were now available for wiring. By mid-1982 12,411 communities were being served by 5,642 systems. Smaller systems were bought out by larger companies, and the multiple system owners (MSOs) began to form. The ten largest are listed in figure 8–1. However, while the FCC was relaxing its cable rules it was allowing other services to enter the marketplace. STV, LPTV, DBS, and MDS provided new competition to cable. In 1983 the amount of money cable operators paid for copyright licen-

FIGURE 8–1. The Top Ten Multiple System Owners

RANK	*MULTIPLE SYSTEM OWNER*	*SUBSCRIBERS*
1.	Tele-Communications Inc.	2,500,000
2.	American Television and Communications	2,248,525
3.	Group W Cable	1,812,000
4.	Cox Cable Communications	1,400,000
5.	Warner Amex Cable	1,340,294
6.	Storer Cable	1,288,873
7.	Times-Mirror Cable Television	844,600
8.	Newhouse Broadcasting	751,625
9.	Continental Cablevision	696,000
10.	Viacom Cablevision	692,981

SOURCE: *CableVision*, October 24, 1983.

ses increased dramatically. Many systems were forced to drop some of the imported stations because they could not afford to pay the copyright fees. The predicted golden future of cable was starting to look like fool's gold.

8.2 THE TECHNOLOGY OF CABLE

Although the number of channels and services offered to subscribers by cable communications system operators has increased, the basic design of the systems has remained essentially the same. A typical cable communications system is shown in figure 8–2.

8.21 Cable System Design

Cable communications systems utilize signals originating from a number of sources. The signals of local broadcast stations are received by antennae similar to those used by

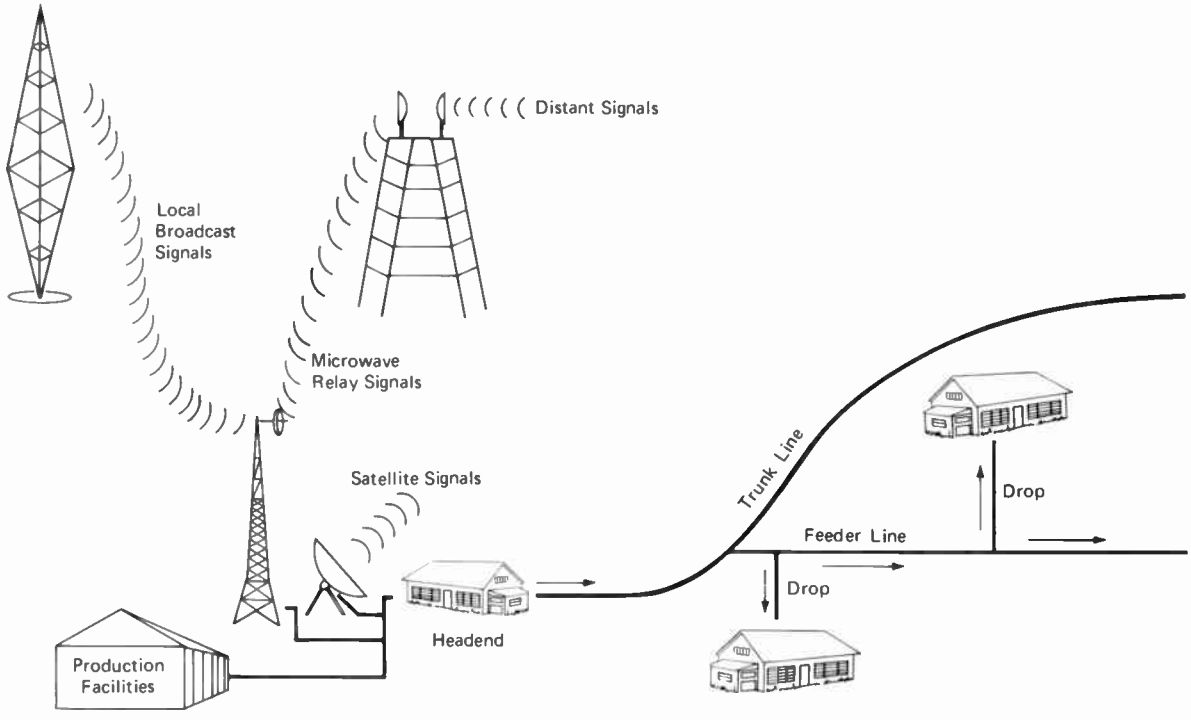

FIGURE 8–2. A Typical Cable Communications System.

homeowners. Distant broadcast signals and pay signals are delivered via microwave relay towers or satellites. Local nonbroadcast signals originate in production or playback facilities operated by the cable system.

All signals are routed to a central point called the *headend*. There the signals are processed—frequencies are changed and signals amplified. In the case of pay channels, a special code may be inserted into the signal to allow only subscribers to receive it. The range of frequencies sent to the subscriber's home is greater than the width of a single broadcast channel. The broadband signal is fed down one or more *trunk* wires which are placed either on utility poles or in underground conduits. Branching off the trunk line are the *feeder* lines, which carry signals to small groups of subscribers. A *drop* carries the signal from the feeder to the subscriber's residence.

In large cable communications systems more than one distribution point may be needed. In such cases one central reception point (headend) for the broadcast signals might be connected to several distribution centers. From these centers the signal is then fed out to different segments of the community. Distribution of the signal from the headend to these distribution centers can be through a cable or through signals broadcast by a cable television relay service (CARS). This system design results in a *hub system* similar to the one seen in figure 8–3. Hub systems have the advantage of allowing specialized programming to be delivered to specific neighborhoods on the same channel. Some cable systems have also installed *institutional networks*, linking together similar institutions—hospitals, schools, or businesses, for example—so that they can communicate privately with each other.

8.22 Coaxial Cable

The broadband signal generated by a cable television system consists of high-frequency radio energy. Conventional wire used for telephone lines lacks the capacity to handle

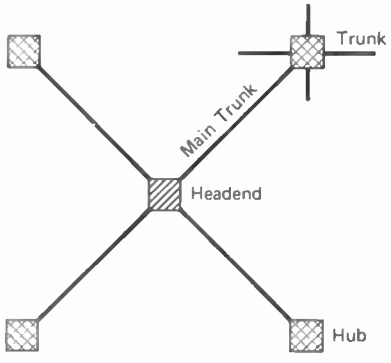

FIGURE 8–3. A Cable Communications Hub Distribution System

such a signal. In addition, the high frequencies used in television signals cause the wire to function as a transmitting antenna, with the resulting signal attenuation. So a special kind of wire which can both handle the broad range of frequencies and keep the signal from radiating from the wire is needed. The solution is coaxial cable.

Figure 8–4 shows a drawing of a coaxial cable. A center conductor is surrounded by foam insulation; a second conductor consists of a web of metal mesh surrounded by insulation. This layer keeps the electromagnetic energy from being radiated into space. The exterior is covered with a flexible plastic material. Sometimes two or more coaxial cables are placed within a single cable package. Each coaxial cable can carry approximately 400 megahertz.

8.23 Converters

Most of the recently built cable communications systems provide subscribers with more than thirty-five different channels of program material. In order to deliver that many channels, a broadband signal ranging from 50 MHz to 400 MHz (or more) is generated. Since the tuner built into the television set is designed to handle only the frequencies represented by the VHF and UHF channels, some sort of device is needed to take the broadband signal generated at the headend and process it into discrete channels whose frequency range is usable by the receiver. This processing device is called a *converter*.

The channel capacity of a cable communications system is determined to a great degree by the type of converter used by the system operator. Converters vary according to *channel capacity* and *addressability*. Systems that have been built since 1982 tend to use converters that can handle two coaxial inputs, each delivering the equivalent of 60 television channels for a total of 120 channels. Converters of this type are called "400 MHz converters" and handle the band of frequencies from 50 to 450 MHz. Recently converters have been introduced with a capacity to handle an even larger bandwidth.

An *addressable* converter is a device that allows some signals to be passed through to the television receiver while keeping unauthorized signals from being viewed. This allows the cable operator to control the channels received by the individual subscriber. For ex-

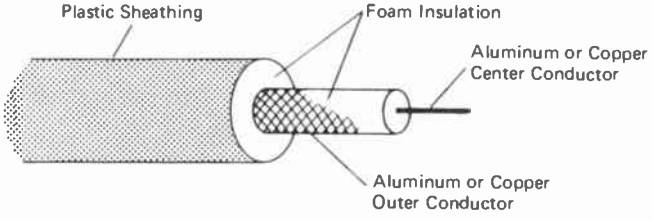

FIGURE 8–4. A Coaxial Cable

ample, subscribers who pay for the **basic services** plus three **pay channels** will receive only those channels to which they subscribe. Should a subscriber wish to receive a **pay-per-view** program or add another pay channel, the operator simply reprograms the computer controlling the system.

8.3 CABLE SERVICES AND SMATV

Cable communications systems are capable of providing a wide variety of services, and cable's flexibility and its ability to minimize use of valuable electromagnetic spectrum space allow television to be used in innovative ways. Cable telecommunication systems generally serve large numbers of homes. *Satellite master antenna television* (SMATV) systems, on the other hand, serve smaller areas.

8.31 Interactive Cable

Some converters allow the subscriber to "talk back" to his television set. A keyboard similar to that of a simple calculator or a typewriter allows subscribers to send alphanumeric data **upstream** to the headend. Interactive cable services such as Qube and Indax are being offered in some recently built systems, but use of interactive systems has thus far been limited. Subscribers who have the interactive service can participate in instantaneous polling, vote for their favorites in local beauty contests, and respond to presidential addresses.

Cable enables groups of users to be linked together into specialized interactive networks. Schools can deliver instructional programs to students unable to attend regular classes. Students can interact with the instructor and each other via television signals delivered by coaxial cable. In both England and Japan interactive cable television experiments are underway. Systems have been developed that allow two-way transmission-reception of video signals as well as upstream transmission of alphanumerics.

8.32 Videotext

The broadband signal of the cable communications system makes it an ideal carrier of alphanumeric information. Videotext is a technology that allows two points to interact via a cable using text messages. Videotext performs the same function as teletext, but the channel capacity of cable systems allows cable operators to supply many more channels of information than a broadcast station can. Telephone companies and cable television systems are both pioneering videotext services. Electronic newspapers, home banking, shop-at-home services, information services, and video games are just a few of the uses for videotext.

As with broadcasting's teletext, no one single technical system has been accepted for videotext. There are four major systems competing for acceptance: AT&T's Presenta-

FIGURE 8–5. QUBE
The QUBE system developed by Warner Amex Cable was the nation's first interactive cable system. Simply by touching the keys on the pad viewers could "talk back" to their televisions.
SOURCE: Reprinted with permission of Warner Amex Cable Communications/QUBE.

tional Level Protocol Syntax (PLPS), Canada's Telidon, Britain's Prestel, and France's Antiope. All four operate in a similar fashion and differ from each other primarily in the encoding language used. Proponents of the PLPS system claim that it is compatible with the Telidon and Antiope systems and that all three are capable of high-resolution color graphics. The Prestel system, on the other hand, is cheaper to install and maintain. No matter which system is chosen, it appears that "electronic publishing" will become a major offering of cable communications systems.

8.33 SMATV

Cable communications systems offer a wide range of services. To benefit from **economy of scale** they must serve a large area. By contrast, satellite master antenna television (SMATV) systems are similar to the early CATV systems, whose sole purpose was to deliver a viewable signal to a subscriber's home receiver. But unlike CATV, which delivered only local signals, SMATV systems deliver both local and satellite signals. In contrast to cable systems, SMATV systems operate solely on private property—in apartment build-

ings, multiunit condominium developments, private housing developments, and mobile home parks—so none of their lines cross public streets or rights-of-way. Therefore SMATV operators are not subject to licensing by any governmental body. They contract with the owner of the property to be served. SMATV operators, in general, don't provide any local production facilities. Therefore their capital investment is much lower than that for cable systems.

SMATV operations were started in 1979 when the FCC repealed its rules requiring satellite receivers to be licensed. Falling prices for receivers and the fact that there is no need to invest in production facilities made it economically feasible for an operator to serve fewer homes than the traditional cable system operator.

The technology of SMATV is simple. A satellite receiver dish is installed on the property to be served. The satellite signal received is mixed with the locally received broadcast signals and distributed via coaxial cable to the living units on the property. The owner (or renter) of the unit pays a subscription fee similar to a cable subscriber. Addressable converters allow operators to deliver subscription channels and pay-per-view programs to subscribers, and to shut off service to those who are tardy in paying their bill.

A new twist is the use of CARS to deliver signals to several SMATV systems located throughout a community. A central receiving dish collects the satellite signals and the CARS station transmits the broadband signal to receivers throughout the city. A system of this type is planned for Washington, D.C. A new development in satellite receivers allows one receiver to pick up the signals of two adjacent satellites.

8.4 DISTRIBUTION OF PROGRAMS TO CABLE SYSTEMS

Programs reach cable systems in much the same fashion as they reach broadcast stations. Local programming is produced live or is prerecorded on videotape, and is sent down the cables from a **master control** area. Programming that is produced outside the local community may be delivered by sending a videotape. An alternative is to provide the program via a network, which may consist of a single microwave relay system or a combination of land-based microwave and satellite systems.

8.41 Microwave Carriers

Microwave carrier systems vary in size and in the amount of programming they can carry. The largest system is the AT&T long lines system, a massive telecommunications network that carries not only cable programs but telephone traffic, computer data, and other kinds of information. The long lines are fed the program via a local telephone loop; the program is then transferred across the country to the cable system via a system of microwave relay towers.

Smaller common carriers compete with AT&T for cable's microwave business. They pick up one or more off-air broadcast signals and provide them to cable systems. They

may own their own microwave systems or lease them from AT&T. For example, a carrier may pick up the signals of a number of television stations located in southern California, then carry these signals via microwave to cable systems throughout the Southwest.

8.42 Satellite Distribution

Satellites have already been mentioned in chapter 7 as a means of distributing programs directly into the home. In this case the communications satellite signal bypasses the local broadcast or cable system. However, the communications satellite has also had an enormous impact on the cable communications business during the last ten years.

The first communications satellite, Telstar, was placed in orbit in 1962. In the twenty-plus years since that initial step into global communications, the satellite has become increasingly important in the telecommunications environment. In 1964 satellites were used for transoceanic delivery of television signals. In 1975 the first commercial television program was carried via satellite. Communications scarcity and monopoly, represented by the three commercial television networks and AT&T, have been replaced by the "communications of abundance." Telephone calls, computer data, television news and entertainment programs, broadcast superstations, and **teleconferences** are carried via satellite. Two broadcast networks, the Public Broadcasting Service and the Spanish International Network, use satellites exclusively to provide programs to their affiliates. Yet nowhere has the communications satellite been more important than in cable.

A communications satellite, or *bird*, is a telecommunications device positioned in **geostationary** orbit, 22,300 miles above the earth's equator. Satellites operate in either the C band (4 to 6 GHz) or the Ku band (12 to 14 GHz). DBS services are confined to the Ku band.

A microwave relay system delivers program material (of any type) to a ground station, called an *uplink*. The ground station sends the information via super-high-frequency radio waves to a designated satellite. The satellite processes the signal and rebroadcasts it down to earth on one of its channel outputs, or **transponders**. In order to conserve valuable spectrum space, the output of the satellite's transponders consist of overlapping transmission bands. To minimize interference, one transponder will transmit a carrier wave which is *horizontally polarized*, while the adjacent channel will transmit a *vertically polarized* carrier wave. This technique greatly expands the number of available channels.

Each transponder can relay one color television signal or 1,000 telephone calls. The satellite signals are received by a satellite dish called an *earth station*. The signals are then distributed to the broadcast station, local phone company, business, or cable company.

In 1975 a cable and subscription television program service called Home Box Office began distributing its programs via satellite. Soon other program services began using satellites as a means of distribution, including a number of television and radio stations that were to become known as superstations. Communications satellites are owned by such companies as RCA (which owns the Satcom series of satellites), Western Union (the Westar series), Hughes Communications (the Galaxy series), Southern Pacific Communi-

cations (the Spacenet satellites), Comsat (the Comstar series), AT&T (Telstar), and Satellite Business Systems. Satellites Satcom III and Westar V carry primarily cable programming.

8.5 SUMMARY

Cable communications systems are nonbroadcast telecommunications services which distribute programs and alphanumeric material via coaxial cable. As early as the late 1800s cable systems in Europe and the United States distributed news, music, and other program forms via telephone lines. Early regulatory efforts in the 1960s and 1970s slowed the growth of cable in the United States, but since the mid-1970s cable has grown appreciably in both systems and subscribers.

Cable communications systems distribute a broadband electromagnetic signal via coaxial cable, a specially designed wire which allows high-frequency electromagnetic energy to be carried without loss from radiation. The signals distributed by the cable system consist of (1) local and distant broadcast signals; (2) pay services obtained through reception of microwave or satellite signals; and (3) local signals originating in the cable company. The multiple signals are collected, processed, and distributed from the headend down trunk, feeder, and drop lines to the point of reception. Complex systems may use a hub design, with one major headend and several other subdistribution points.

A converter processes the cable signal prior to its entering the receiver and assigns various portions of the signal to specific channels. Addressable converters allow subscribers to receive only those channels to which they've subscribed. Cable systems can allow viewers to send signals upstream to the headend or to other subscribers. Some systems allow only alphanumeric information to be sent upstream, but other advanced systems allow television signal interaction. Videotext is an interactive electronic publishing and computer service that allows the cable system to be used like a computer.

Satellite master antenna television systems distribute broadcast and satellite signals within apartment complexes and small home developments, and are similar in function to cable communications systems. Because they do not use public rights-of-way, SMATV systems aren't regulated by federal, state, or local authorities, as cable is.

Programs are delivered to cable systems through the physical delivery of a tape or film, by microwave relay, or by satellite. Communications satellites have had an enormous impact on the cable industry. In satellite communications systems signals are delivered to an uplink by microwave transmission. The earth station then transmits the signal to the satellite, which processes the material and transmits it to an earth receiver. Several different companies are engaged in operative satellite communications systems.

SECTION

III

ECONOMICS/ PROGRAMMING/ ADVERTISING

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9.7 SUMMARY

9

ECONOMIC AND ADMINISTRATIVE ORGANIZATION

Much of the economic and administrative organization of the broadcast industry dates from the years immediately following World War I. Since those days hundreds of different companies have been organized. Some have prospered and grown. Others have failed and disappeared. New technologies have emerged and joined the competition for audience attention. Yet despite the passage of over six decades, there has been little change in the fundamental structure of the American broadcast industry. The essential functions remain the same: produce the program, get the program to the exhibitor, deliver it to the consumer.

In this chapter we'll focus on the historical development of the broadcast and cable industries and outline the organization of their major components. When you complete this chapter you will:

1. Understand the historical development of broadcast stations and networks and the cable industry

2. Be able to reproduce the organizational chart of a typical broadcast station and network, and delineate key positions and job functions

3. Identify some of the important trade associations, unions, and consumer groups involved with broadcasting and cable.

9.1 THE DEVELOPMENT OF BROADCAST STATIONS AND NETWORKS

In section 6.2 we saw the beginnings of broadcasting in the activities of Charles Herrold and David Sarnoff. Yet during the years immediately prior to World War I there was little development of this concept in the United States. There are at least two reasons for this.

First, few in positions of authority in the corporate world seemed to share the dream of David Sarnoff. Some saw that wireless could be used for more than point-to-point communication, but few were willing to take the necessary financial risks. So broadcast activities were left to amateurs and university-based scientists.

The second reason for the slow development of broadcasting was the problem of patents. During the first part of the century many different inventors had contributed to the development of wireless technology. While there were several different systems for producing the codes of wireless signals, no one system stood out. Important patents were held by many companies located in several foreign countries, and large-scale manufacturers of receivers and transmitters who used a patent without permission ran the risk of having to pay a large fine. The solution was cooperation and the negotiation of cross-licensing agreements. However, this development had to wait until after the end of World War I.

9.11 The Patents Pool

When the United States entered World War I in 1917 most civilian wireless activity abruptly halted. Wireless stations were confiscated by the U.S. government as a security measure. Radio operators were drafted and assigned to train others to operate radio equipment. However, it soon became evident that the training of operators solved only one of the problems of harnessing wireless to the war effort.

The patent problem was solved by edict. The United States government indemnified manufacturing companies from damages that might result from patent infringement suits. In essence, the many different patent holders pooled their patents for the duration of the war. Manufacturers could build transmitters and receivers using any device they wished. As a result the military, particularly the navy, received high-quality equipment that aided in shortening the war.

Prior to the entry of the United States into the war, British Marconi, through its American Marconi subsidiary, began negotiations with General Electric to obtain exclusive rights to the *Alexanderson alternator*. GE at that time had no interest in the communications business. In addition, after the Armistice it was strapped for cash because the military no longer needed GE's electrical products. Owen D. Young, a GE executive, was sent to seek counsel from Franklin D. Roosevelt, the acting secretary of the navy. There Young found strong opposition to the American Marconi proposal. The view in Washington was that the United States would not tolerate foreign domination of international radiocommunication. A *"chosen instrument"* must be found to protect U.S. telecommunications interests. Two American naval officers, Admiral William Bullard and Commander Stanley Hooper, worked with Owen Young to persuade the GE board to buy control of

American Marconi. In return for the sale of American Marconi, British Marconi received the alternators it sought.

In October 1919 GE formed a new, separate corporation to operate what once was American Marconi. The new organization was the Radio Corporation of America (RCA). On the same day RCA was incorporated it signed a cross-licensing agreement with GE. One of the other major patent holders was AT&T, which through its Western Electric manufacturing subsidiary held title to the De Forest audion patent rights. On July 1, 1920, AT&T pooled its patents with those of GE and RCA. Some smaller companies that held patents joined the pool, and in July 1921, Westinghouse finally joined. The agreement between the four corporate giants was a complex piece of cooperation that assigned each company a specific role in the radiocommunication marketplace.

First, RCA (most of whose stock was owned by the other three) administered the patents pool, collected royalties, sold radio receivers, and operated all maritime and transoceanic radiocommunication for hire. Anyone who wanted to send a message from the United States to any foreign country would have to pay for the use of the RCA facilities.

Second, AT&T had the sole right to sell broadcast transmitters to those outside the pool. In addition, AT&T received the right to use domestic radiotelephony for hire.

Third, GE and Westinghouse had the exclusive right to manufacture radio receivers. The receivers were to be sold by RCA.

Fourth, all four could build equipment for their own use.

The patents pool agreements were negotiated in a context of *point-to-point* communication—not broadcasting. The appearance of hundreds of broadcast stations across the country, the founding of networks, and the use of radio for advertising soon created new frictions between the pool partners. Within five years after Westinghouse joined the pool a new agreement would be needed.

9.12 The Beginnings of Broadcasting

In October 1919 the U.S. government lifted the wartime ban on amateur radio activities. One of the first to resume experiments was Dr. Frank Conrad, operating from his home studio in Wilkinsburg, Pennsylvania. Bored with the everyday chit-chat and exchange of technical information among radio hams, Conrad began playing music over the air. Soon amateurs from all over the country were writing to request specific songs. To meet the demand, the enterprising scientist began transmitting two hours every Wednesday and Saturday evening. He called his activity *"broadcasting."* A local record store owner provided him with free records in exchange for an on-air mention.

By October 1920 the broadcasts were so popular that a Pittsburgh-based department store mentioned Conrad's broadcasts in its advertising for radio receivers. Harry Davis, a vice-president of Westinghouse, read the ad and realized that the world stood on the threshold of an opportunity to make radio a medium of mass communication. Westinghouse applied for a license to broadcast and, with Dr. Conrad's aid, built a transmitter. The station, whose call letters were KDKA, signed on the air at 6:00 P.M. November 2 and carried the presidential election results.

KDKA was soon joined by other broadcast stations. A few of these pioneer stations were:

WWJ (originally WBL), licensed to a group of De Forest associates with financial backing from the Detroit *News* in Detroit, Michigan
KCBS (originally KQW), licensed to "Doc" Herrold in San Francisco
WHA, licensed to the University of Wisconsin
WEAF, licensed to AT&T to operate in New York City.

GE and RCA established stations, and soon each member of the patent pool was building at least one station.

Many of the early stations were established by groups who did not participate in the patents pool. Most saw broadcasting as a tool to be used to sell radio receivers. Thus manufacturing companies, hardware stores, and department stores began broadcasting in order to create a market for receivers. Others entered broadcasting for entirely different reasons. Schools and universities wanted to tap radio's potential as an educational tool. Churches saw radio as an extension of their ministries. Newspapers entered broadcasting to enhance their reputations as public service organizations.

Only thirty stations were on the air at the beginning of 1922. Six months later, hundreds of stations had signed on, though many signed off just as quickly. By February 1, 1923, the number of stations was 576, and despite a high attrition rate, 556 stations were operating in 1926.

9.13 Radio Advertising Begins

Soon the novelty of running a broadcasting station wore off. Not only was it hard work, it was also expensive. Performers began demanding payment for services. Record stores quickly tired of giving away records for nothing more than a mention on the air. Even the radio manufacturers wondered how they could finance station operations once everyone had a receiver. Numerous solutions were proposed to solve the financial crisis. David Sarnoff proposed a 2 percent tax on receiver sales, the proceeds to be used to support stations. Audience donations were solicited. Stations sold program guides. But the technique that has lasted is the commercial.

When AT&T signed on in New York City with WEAF it was made clear that the station would sell time to anyone who cared to buy it. On August 28, 1922, a spokesman for the Queensboro Corporation talked for ten or fifteen minutes on a new development the company was building in New York City. The message was repeated for five consecutive days and cost $100. Though most were reluctant to try the experiment, a few other companies also made use of the new advertising medium.

Then other stations began to sell time to advertisers. Believing that it had the sole right to use *radiotelephony for hire*, AT&T charged these stations additional royalties for the use of their transmitters. Of course the stations objected, as did the other members of the patents pool, but AT&T held firm in its position.

9.14 The Formation of Networks

The interconnection of broadcast stations into "chains," or *networks*, began in 1922 when WJZ (New York) joined with WGY (Schenectady) to broadcast the World Series. As with the beginnings of advertising, AT&T took the lead in the creation of networks. In early 1923 AT&T engineers interconnected WEAF in New York City with WNAC in Boston. The experiment proved that permanent interconnection of stations was possible. At first temporary networks were formed for one-time-only programs for several months. The first permanent network was established by AT&T in July 1923. By March 1924 the AT&T network, with WEAF as its flagship station, consisted of twenty affiliates. RCA established a rival network, with WJZ as the main supplier of programming to a smaller group of affiliates. The AT&T network became known as the *"Telephone Group,"* the RCA network as the *"Radio Group."*

AT&T's attitude toward networking was similar to its position on advertising: AT&T felt it had the exclusive right to interconnect stations. It used high-quality telephone voice lines to interconnect its affiliates, while other members of the patents pool had to interconnect using inferior lines furnished by Western Union. Advertisers were interested in the networks, because through them they could reach large audiences at less cost than other media. And by this time advertising, not receiver sales, had become the major source of radio broadcast revenues. Desperate to attract and hold advertisers, AT&T's rivals tried other means of interconnection, including radio waves. By 1925 the split on the issue of advertising and interconnection was so serious that lawsuits had been filed and the very existence of the patents pool was threatened.

9.15 From the New Patents Pool Comes NBC

During the conflict between the Radio and Telephone Groups, public confidence in some of the companies waned. It was discovered that RCA charged receiver manufacturers royalties of up to 7½ percent of the selling price of the receivers they manufactured. AT&T alienated public opinion when it won a suit against station WHN for its use of a transmitter not manufactured by AT&T. The Federal Trade Commission started proceedings to investigate RCA's international communications business activities. It soon became clear that some sort of settlement had to be reached to resolve the conflicts among the members of the original patents pool and restore public confidence in the viability of the patents pool concept.

In 1926 the members of the patents pool redefined their agreement to conform with the realities of the new telecommunications environment. First, the pooling agreements were renegotiated. Second, AT&T received the exclusive right to interconnect broadcast stations into networks. Third, AT&T agreed to sell its WEAF station (and its network, Broadcasting Corporation of America) to RCA for $1 million. AT&T further agreed that it would not seek to establish a broadcast station for eight years. RCA, which had been buying stations in anticipation of the sale of AT&T broadcast properties, now established a subsidiary corporation of its own, the *National Broadcasting Company*, or NBC. On No-

vember 15, 1926, the NBC network debuted. Twenty-five stations carried the initial program, most of them former AT&T network affiliates.

In addition to taking over WEAF and its network, NBC also operated WJZ, RCA's station in New York City. WJZ continued to be the flagship station of what had been the old RCA network, which was reorganized and began operations anew on January 1, 1927. The WJZ network was known as the Blue network, the WEAF-based operation as the Red network. In April 1927 NBC started a third network on the West Coast, known as the Pacific Coast Network. It was eliminated in 1928 when both the Red and the Blue networks began coast-to-coast distribution of programs. In addition to operating the two networks, NBC continued to buy stations, often owning two in the same market. By 1933 it owned ten stations, whose profits formed a firm financial foundation for network expansion.

9.16 The Creation of CBS

The economic concept of the network is simple. The network purchases time on its affiliated stations, sells that time to advertisers, and provides the stations with programming and the commercial messages that make the programming possible. This can be extremely profitable. While RCA was creating the two NBC networks, a second organization was attempting to form a rival network. The United Independent Broadcasters Inc. (UIB) was founded in January 1927. Within weeks it had organized a network of twelve stations, with WOR, located in New Jersey and covering the New York City market, as the flagship station. However, there was no money to operate the network. The UIB merged with the Columbia Phonograph Corporation and created a third, separate corporation to handle broadcast activities called the Columbia Phonograph Broadcasting System, Inc. Later the name was changed to the *Columbia Broadcasting System*, or CBS. For a while CBS and UIB existed as two networks. Later they merged into one operation.

The new venture lost money. Investors could no longer be found to buy stock, and a buyer for the network was sought. He came from an unlikely place. William S. Paley, vice-president of the Congress Cigar Company of Philadelphia, and son of one of the company's owners, came forward to buy the network. Paley's company had been one of the first advertisers to sign on with CBS. Impressed with the results of the advertising, Paley had developed an interest in broadcasting. In September 1928 he bought CBS for $300,000. Investing another $400,000, he bought a station (WCBS) in New York to serve as the flagship station for the network. He originally intended to spend only six months or so organizing CBS, but Paley stayed on to run the company until he stepped down as chairman of the board in 1983.

9.17 Other Broadcast Networks

While ABC, NBC, and CBS are the household-name broadcast networks, they are not the only ones. Many other national radio and television networks provide services to broad-

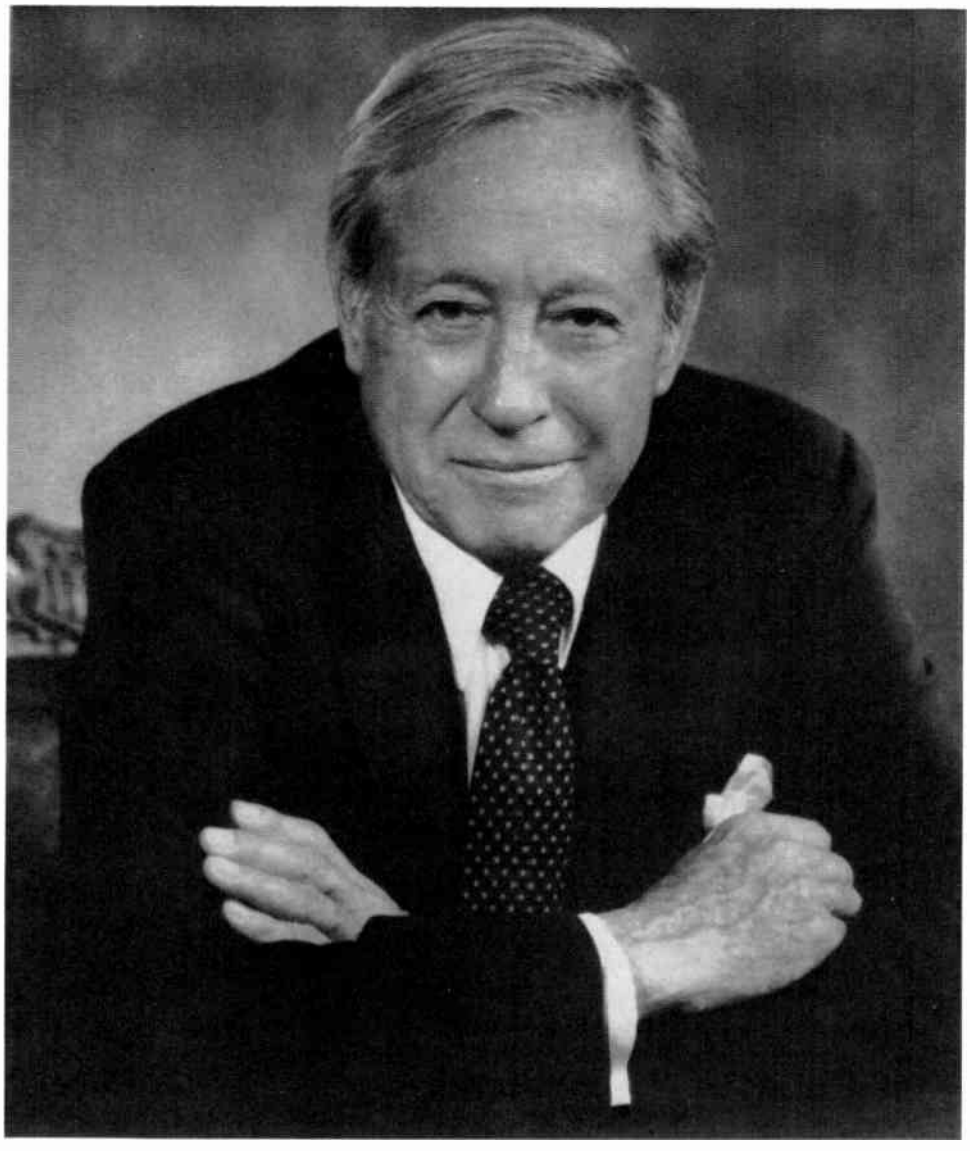

FIGURE 9–1. William S. Paley
When Paley bought the network in 1928 he planned to stay at CBS for only six months. He stayed on as chairman of the board until his retirement in 1983.

cast stations. Some of these are listed in figure 9–2. In addition, there are twenty-one regional television networks and ninety-eight regional radio networks.

One of the largest radio networks is the *Mutual Broadcasting System*, MBS, or Mutual, was created in 1934 by four stations—WGN Chicago, WOR Newark, WLW Cincinnati, and WXYZ Detroit—on a cooperative basis. All members of the network were equal partners. The network neither owned nor operated any stations. In 1936 the network

Figure 9–2. National Radio and Television Networks

TV NETWORK	*RADIO NETWORK*
ABC (American Broadcasting Company)	ABC APR (Associated Press Radio)
CBS (Columbia Broadcasting System)	CBS Radio Network MBS (Mutual Broadcasting System) NBN (National Black Network)
NBC (National Broadcasting Company)	NBC Radio Network UPI (United Press International Audio Network) RKO (RKO Radio Network) Sheridan Broadcasting Network
SIN (National Spanish Television Network) Hughes Television Network TVS (TVS Television Network) PBS (Public Broadcasting Service)	
	NPR (National Public Radio)

SOURCE: *Broadcasting/Cablecasting Yearbook 1983.*

expanded from four to seventeen affiliates when the Colonial Network joined Mutual. The Don Lee Network brought in ten more affiliates in 1940. Soon the Texas Network added twenty-three more. The network's unique structure didn't guarantee success, however. Many affiliates were also associated with either CBS or NBC. As a consequence, Mutual programs were often used as fillers, or at times when the audience was small. Nevertheless, Mutual is still operating today.

Except for PBS, the noncommercial television network, no organization has successfully challenged the dominance of the three national commercial television networks. The *Dumont Television Network* was announced in 1944 and began operating after World War II, but it ceased operating in 1955. Its failure was attributable, in part, to the lack of VHF stations assigned to the top fifty markets. Another television network, the United Network, operated for only thirty-one days in 1967. The most successful television networks outside the three major networks have been regional networks and sports networks operated on a per-event basis.

9.18 RCA's Legal Problems Result in ABC

During the 1930s the networks dominated the radio industry. In order to be financially successful a station had to be affiliated with one of the major networks. The networks bound their affiliates into five-year contracts specifying the amount of network programming affiliates had to carry. In the early 1940s, at the instigation of the smaller radio networks, the FCC investigated what were said to be "abusive" network affiliate agreements, and passed a series of rules governing network-affiliate relations. One of the rules forced NBC to sell one of its networks. Edward J. Nobel, the maker of Lifesaver

candies, bought the Blue network for $8 million in 1945. He renamed it the *American Broadcasting Company*, or ABC.

The Blue network was the weaker of NBC's two networks. As a consequence, ABC often found itself in financial straits during its early years. As television developed in the early 1950s the new network needed cash to expand its operations into the new medium. United Paramount Theaters, fresh from a bout with antitrust problems of its own, merged with ABC, providing it with much-needed cash. Nobel remained as chairman of ABC while Leonard Goldenson of United Paramount served as president of the company until 1972, when he became chairman. But the merger didn't solve all of ABC's problems. In the mid-1960s International Telephone & Telegraph attempted to merge with ABC. However, the threat of intervention by the Justice Department discouraged ITT, and it dropped its merger plans.

9.2 ECONOMIC MODELS

The telecommunications industry provides services for a fee. Broadcasting and cable companies are established for the purpose of making a profit. The exception is public broadcasting, but even though it is noncommercial it still must have money in order to operate. The American telecommunications system uses two different models of economic exchange, indirect and direct.

9.21 The Indirect Model

Figure 9–3 portrays the indirect economic model. In this type of exchange system, programs and other telecommunications services are provided to consumers (audiences) without direct payment to the providers. The program providers (stations and networks) are paid by advertisers for time during which commercial messages are broadcast. The audience pays for the program service indirectly, through the increase in the cost of products and services brought about by advertising. While many broadcasters like to talk

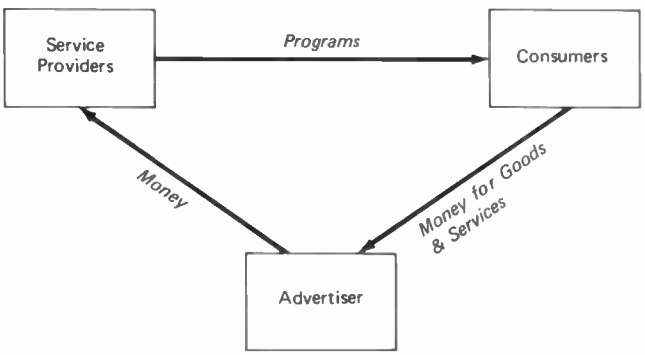

FIGURE 9–3. Indirect Payment
This model of economic exchange is used in the commercial broadcasting business. The network and stations receive compensation from advertisers, not audiences. Audiences pay for the programs they listen to and watch through increased product costs. This type of system places the economic burden on both those who use the service and those who don't.

about "free television" and "free radio," broadcasting isn't really free. We all pay for advertiser-supported radio and television, whether we use the service or not.

9.22 The Direct Model

The alternative model is the system portrayed in figure 9–4. In this exchange system, those who use the services pay the providers of the service directly. This is the economic system used by cable, subscription television, and other forms of pay radio and television, as well as by other forms of telecommunication.

9.3 THE LOCAL STATION

The local station is the broadcast organization with which we most often come into contact. Radio stations vary in size, from a one-person operation to organizations with a hundred or more employees. Television stations require more personnel, but some stations are run by only two or three employees. No matter what the size of the station or the market it serves, its function is the same—delivering programs to audiences and audiences to advertisers.

9.31 Administrative Organization

Large or small, radio or television, some specific functions are common to all stations. Figure 9–5 shows a typical organizational chart for a broadcast station. There are eight functional divisions in every station: top management, business, engineering, sales, news, programming and production, promotion, and research. Depending upon the size of the station, the implementation of these functions may be divided in a number of different ways. In the small station personnel perform several different functions during the course of the workday. In the larger station jobs are more specialized.

Many stations are part of a larger corporate organization that owns that station plus others. Normally it is the *general manager* (or GM) of the station who is held responsible for the performance of the station. The GM is the head of the executive office.

In larger stations there may also be a *station manager* who oversees day-to-day operations. Engineering, programming and production, promotion, and research may report directly to the station manager, while news, business, and sales may report directly

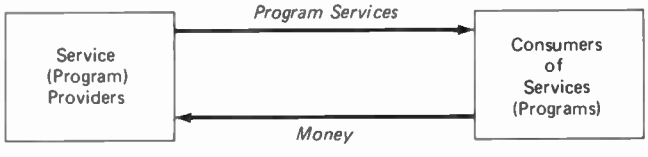

FIGURE 9–4. Direct Payment
This model features direct payment by consumers to program and service providers. A provider must be responsive to audience needs or consumers will find another provider.

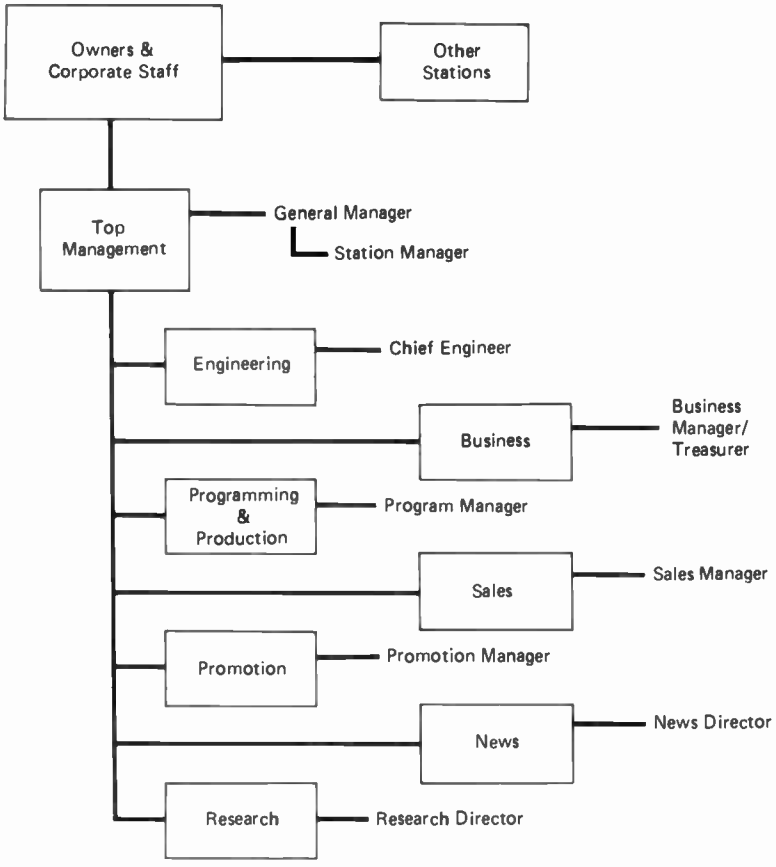

FIGURE 9–5. Functional Organization of a Typical Broadcast Station

to the GM. There is no single system of station organization, however. Individual station structures depend to a large degree on the management style of the GM and the desires of the owners.

9.32 Ownership

In the early days of broadcasting stations were organized primarily to sell radio receivers. Today broadcast stations are expected to be money-makers for the owners. While there are some owners who have only one station, most corporations in the business of broadcasting own more than one station. A *group owner* is any organization or person who owns a controlling interest in three or more radio stations or at least two television stations. A few of the prominent group owners are listed in figure 9–6. Many group owners are involved in businesses other than broadcasting, or in related aspects of the communications business—newspaper and magazine publishing, cable television, equipment manufacturing, and networking.

FIGURE 9–6. Some Prominent Group Owners

GROUP OWNER	*TV*	*AM*	*FM*	*OTHER COMMUNICATIONS INTERESTS*
Athens Broadcasting Inc.	0	2	1	None
Corinthian Broadcasting Corp.	0	0	6	Subsidiary of Dun & Bradstreet, Inc. Also owns TVS Sports Network
Cox Broadcasting Corp.	5	7	5	Cable television, newspapers
Gannett Broadcasting Group	7	6	7	Newspapers, television production
Hearst Stations	4	4	3	None
Metromedia Inc.	7	7	7	Outdoor advertising, regional radio networks, print publishing, Ice Capades, Harlem Globetrotters
Storer Broadcasting Co.	7	0	0	Cable
Taft Broadcasting Co.	7	6	6	Cable, amusement parks
Westinghouse Broadcasting Co.	7	7	5	Cable, program production

SOURCE: *Broadcasting/Cablecasting Yearbook 1982.*

The three major commercial television networks each own radio and television stations. The *owned-and-operated stations* (O&O's), stations owned by one of the networks, are overseen by a corporate department but are free to make their own programming decisions. Sometimes a station may not carry a program provided by its parent network. A list of the stations owned by each of the major broadcast networks is presented in figure 9–7.

9.33 Investment, Profit, Loss

A broadcast station is not only a day-to-day business enterprise; it is also an investment. And as in any other industry, some stations make large profits, others sustain losses. The financial investment in a station is considerable. Not only does it take a long time to obtain a broadcast license, but preparing and filing the application for FCC consideration is an expensive process. If the license is awarded, large investments must be made in property for studios and transmitter sites, building costs, and equipment. For example, the Corporation for Public Broadcasting (1980) estimated that the average cost of an LPTV station able to orginate local programming would be approximately $300,000. A new full-service station might cost in excess of $500,000. In 1980 a total of $3.6 billion had been invested by television stations and networks in property and capital equipment (*Broadcasting*, August 10, 1981).

Once a station is on the air, there are operating expenses. Figures 9–8, 9–9, and 9–10 show the expense breakdowns for the radio and television industries for 1980. Note that the largest expense in radio is in the "general and administrative" category. In

FIGURE 9–7. Major Network 0&0 Stations

NETWORK	AM		FM		TV	
ABC	WABC	(New York)	WPLJ	(New York)	WABC	(New York)
	WLS	(Chicago)	WLS	(Chicago)	WLS	(Chicago)
	WXYZ	(Detroit)	WRIF	(Detroit)	WXYZ	(Detroit)
			KSRR	(Houston)		
	KABC	(Los Angeles)	KLOS	(Los Angeles)	KABC	(Los Angeles)
	KGO	(San Francisco)	KSFX	(San Francisco)	KGO	(San Francisco)
	WMAL	(Washington)	WRQX	(Washington)		
CBS	WCBS	(New York)	WCBS	(New York)	WCBS	(New York)
	KNX	(Los Angeles)	KNX	(Los Angeles)	KNXT	(Los Angeles)
	WBBM	(Chicago)	WBBM	(Chicago)	WBBM	(Chicago)
	WCAU	(Philadelphia)	WCAU	(Philadelphia)	WCAU	(Philadelphia)
	KCBS	(San Francisco)	KRQR	(San Francisco)		
	KMOX	(St. Louis)	KMOX	(St. Louis)	KMOX	(St. Louis)
	WEEI	(Boston)	WEEI	(Boston)		
NBC	WNBC	(New York)	WYNY	(New York)	WNBC	(New York)
	WRC	(Washington)	WKYS	(Washington)	WRC	(Washington)
	WMAQ	(Chicago)	WKQX	(Chicago)	WMAQ	(Chicago)
					WKYC	(Cleveland)
	KNBR	(San Francisco)	KYUU	(San Francisco)		
					KNBC	(Los Angeles)

television the largest expense is programming. This reflects the difference in the programming of the two media. Radio primarily broadcasts recorded music, for which it pays a relatively small amount. The large amount spent for television programming reflects the costs involved in developing and producing programs. Also, note that television is much more profitable than radio. In part this reflects the less competitive environment of television, that is, the fact that there are fewer stations per market.

FIGURE 9–8. Radio Expenses and Profits, 1980

EXPENSE CATEGORY	AM AND AM-FM	FM
Technical (6.5%)	$ 142,861,000	$ 48,734,000
Program (27.8%)	611,103,000	198,773,000
Sales (23.3%)	458,995,000	219,781,000
General and administrative (42.2%)	892,753,000	338,212,000
Miscellaneous (0.2%)	2,451,000	2,551,000
TOTAL EXPENSES	2,108,163,000	805,500,000
TOTAL INCOME	2,201,534,000	863,805,000
OPERATING PROFIT	93,371,000	55,755,000

SOURCE: *Broadcasting*, February 8, 1982.

FIGURE 9–9. Average Profit or Loss of Radio Stations, 1971–80

	AM, AM-FM		*INDEPENDENT FM*		*FM ASSOCIATED WITH AM*	
YEAR	**Profit**	**Loss**	**Profit**	**Loss**	**Profit**	**Loss**
1980	$ 89,401	$78,860	$139,439	$113,682	$203,229	$112,574
1979	118,910	78,317	123,225	89,620	166,456	100,579
1978	110,928	64,362	103,064	58,176	149,622	64,829
1977	94,138	55,808	77,014	56,687	122,303	61,053
1976	82,173	51,224	63,259	49,581	90,566	69,282
1975	66,873	45,544	43,589	52,023	71,292	63,344
1974	62,310	48,998	41,830	60,669	56,914	53,933
1973	63,373	43,785	49,186	49,186	59,518	54,518
1972	61,837	38,473	31,557	43,333	45,923	52,030
1971	58,950	35,354	26,598	40,200	45,695	59,680

NOTE: Not every station in every market makes a profit. The figures above should give you some idea of the average profit or loss of a station during a ten-year period. Note that FM stations did the best over the decade, but that many had sizable losses.
SOURCE: Federal Communications Commission.

Network-owned-and-operated stations are profitable. In 1980 the network television O&O's had revenues of $700.3 million and expenses of $491.8 million, for a profit of $208.5 million. The profit made by the O&O's makes up almost 30 percent of the profit of the television industry (*Broadcasting*, August 10, 1981). The size of the market is also a factor in the amount of station profit. Figure 9–11 compares the profits of radio and television stations located in five different markets. In two of the markets, radio had an overall loss for the year. This might mean that one or two stations were very profitable while the others weren't, or that the market just couldn't support that many radio stations.

FIGURE 9–10. Expenses and Profits for TV Stations, 1980

EXPENSE CATEGORY	***VHF***	***UHF***
Technical (10.8%)	$ 312,100,000	$ 77,900,000
Program (43.9%)	1,339,100,000	249,200,000
Sales (13.4%)	394,800,000	92,400,000
General and administrative (31.7%)	918,100,000	231,100,000
TOTAL EXPENSES	2,964,100,000	650,500,000
TOTAL INCOME	4,252,300,000	690,200,000
OPERATING PROFIT	1,288,200,000	39,700,000

NOTE: 0.2% lost to rounding.
SOURCE: *Broadcasting*, August 10, 1981.

FIGURE 9–11. Station Profits in Five Markets

MARKET (Size)	*RADIO* (Number of Stations)	*TELEVISION* (Number of Stations)
New York (1)	$19,370,263 (41)	$94,580,000 (10)
Phoenix (24)	442,953 (31)	20,491,000 (7)
Syracuse (66)	−411,282 (21)	2,096,000 (3)
Corpus Christi (131)	418,901 (16)	1,306,000 (4)
Albany, Ga. (150)	−15,768 (7)	3,510,000 (3)

NOTE: Size refers to the market's rank compared to other markets. New York is the largest while Albany ranks 150.
SOURCE: FCC Financial Data, 1980.

9.34 Buying and Selling Stations

Profitable and not-so-profitable stations are sold frequently. In 1982, 627 stations changed hands. Of these, 30 were television stations and 597 were radio stations. The average price of a television station was approximately $12 million; in 1983 one station sold for $145 million. The average price of an FM station sold in 1982 was approximately $1.2 million. The largest price paid for an AM station in 1982 was $6 million, but the average sale price was approximately $500,000.

Prices of stations vary widely depending upon the *service* and *market size*. Another factor is the *profitability* of the station. Most experts agree that stations sell for between eight and ten times their yearly revenues. The *station broker* is the person who handles the station's sale. Often the broker will not only find a buyer or a seller but will help make the financing arrangements. For this service the broker receives a commission which is a percentage of the sale price.

9.4 THE BROADCAST NETWORKS

The network is clearly an important component of the broadcast industry. Networks can do things that stations simply don't have the money or the personnel to accomplish. First, networks have the capital to provide national and international news coverage. No single station could afford to develop the news-gathering apparatus of a network. Second, networks have the ability to obtain high-quality entertainment programs and provide them to a station at a much lower cost than if the individual station undertook to produce the programs itself. Third, the networks centralize time sales to national advertisers, which works to the advantage of both the advertiser and the station. ABC, CBS, and NBC are called *full-service networks* because they provide a variety of services to their affiliates. In addition to programming and national advertising, the full-service net-

works pay for the technical interconnection fees, provide news inserts to be used locally, promote national programs, and provide a center of expertise for their affiliates.

9.41 Types of Networks

A network is simply the interconnection of two or more stations for the purpose of sharing programming. Most networks are interconnected electronically. However, in one type of network, called a *bicycle network*, the affiliates must physically exchange the programs.

Networks are classified by the geographical area that they cover. *National* networks are set up to interconnect stations throughout the entire nation. The interconnection is accomplished either through AT&T long lines or by satellite. *Regional* networks are organized to serve stations within a state or several states. Their signals are relayed primarily through long lines.

While most networks are intended to be permanent, temporary networks are organized for one program or a limited series of programs. Operation Prime Time is a network that occasionally provides programs to independent television stations. Radio sports networks are organized to deliver the games of major league and college teams to affiliate stations.

9.42 Network Organization

The three companies running the three largest national networks are complex corporate organizations that include not only broadcasting but other activities such as publishing, research, international communications, record production, and electronic equipment manufacturing. ABC and CBS are the corporate entities of those two networks and their other business activities, while NBC is part of the corporate structure of RCA. All three networks have their corporate headquarters in New York City. They also have extensive offices in the Los Angeles area. The corporate organization of CBS Inc. can be seen in figure 9–12.

9.43 Network-Affiliate Relations

A station not affiliated with any network is called an *independent* station. Over a hundred television stations are independents. Most are located in the UHF portion of the spectrum. Some of the major independent stations are WOR-TV in New York, WTBS-TV in Atlanta, WGN-TV in Chicago, and KTLA-TV in Los Angeles.

Stations associated with one of the three major television networks are called net-

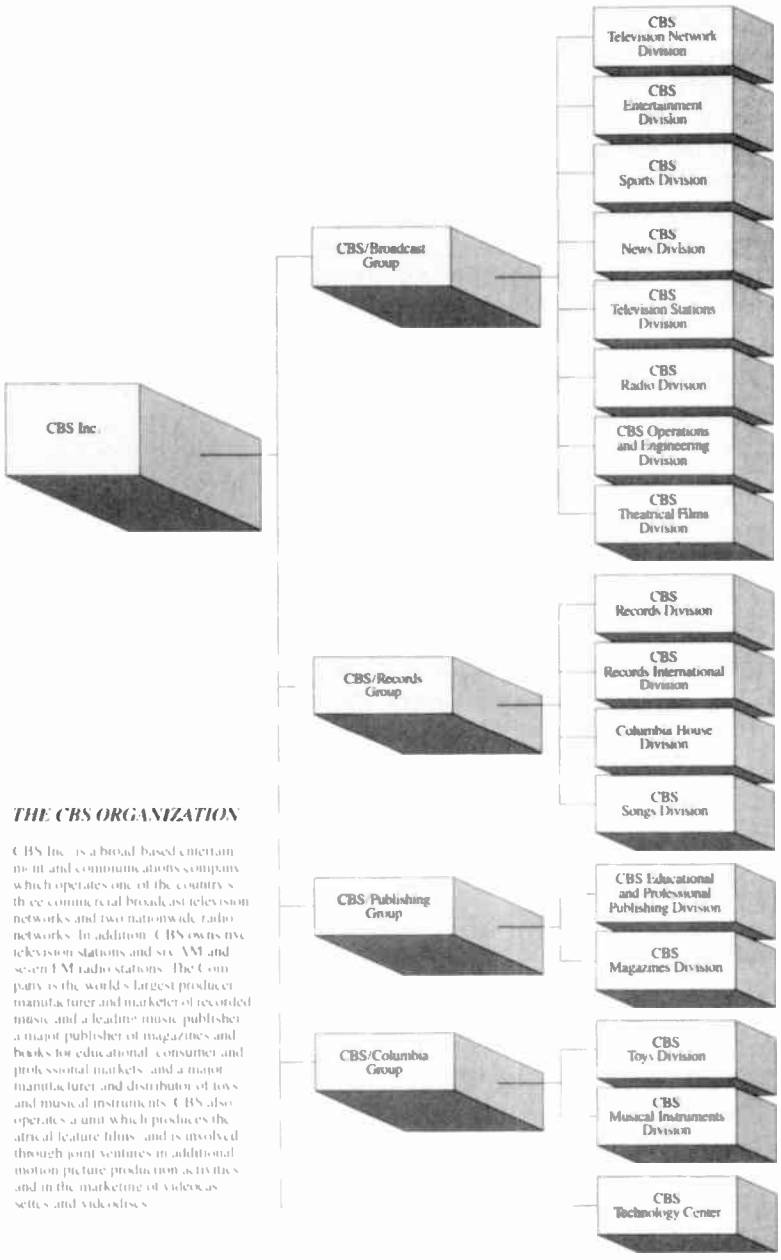

FIGURE 9–12. The Corporate Organization of CBS Inc.
SOURCE: Used with permission of CBS Inc.

work *affiliates*. A *primary affiliate* is associated with only one network, a *secondary affiliate* with two or more networks. The affiliation contracts that form the basis of the agreement between the networks and their affiliates are regulated by the Federal Communications Commission, and are limited to two years. The key to each contract is the amount of money—the *network compensation*—the network will pay the affiliate to run the network's programming and the accompanying national commercials.

The amount of network compensation varies from station to station depending on the size of the market, the size of the audience, and other factors. The method used to figure the amount of compensation received by the station varies also. In addition, the networks provide slots for stations to place local and regional commercial messages. The quality of the programs provided by the networks generates larger audiences than the stations could attract on their own. This means that the local television station has a large audience as a **lead-in** for its local programming.

9.5 THE CABLE INDUSTRY

The cable communications industry is relatively young compared to radio and television, yet the basic structure is roughly the same. The key element is the local franchise, often owned by a large corporation called a multiple system owner. Most of the program offerings are delivered by either over-the-air broadcast stations or national program services. Unlike the major commercial networks, the national program services are not full-service networks. At present they provide only programs.

9.51 The Local Franchise

The cable communications equivalent to the broadcast station is the local franchise. Unlike local broadcast stations, there is normally only one cable operator serving a community or portion of a community. The cable operator has a monopoly on the service. The rationales for allowing a local monopoly range from achieving economies of scale to maximizing the profit potential of the local operator so that the operator can provide the city with access and local origination channels. There are some communities with competing cable companies, however. Phoenix, Arizona, is the largest community where that situation exists.

The organization of the local cable franchise is similar to a local broadcast station's. A general manager (GM) is responsible for the operation of the franchise. If the system is owned by one of the MSOs, the GM reports to corporate headquarters. In turn, four areas report to the GM: engineering, programming, marketing, and business affairs.

The business affairs function mirrors that of a broadcast station. Accountants, bookkeepers, secretaries, purchasing agents, and similar positions make up the business department. Engineering, too, is similar to the engineering function in the broadcast sta-

tion. A cable engineering department is responsible for the physical plant of the system—the cables, the headend and hubs, and the studio and its equipment.

However, the marketing division is different from the sales department of a broadcast station. Like a broadcast station's sales department, it is responsible for selling local advertising on the local origination channels. But the cable marketing department is also responsible for selling the cable station's many different services to subscribers. The sales effort involves selling not only to the individual homeowner or apartment dweller, but also to the owners of large multiunit dwellings. The marketing division may also be responsible for publicity and for putting together a monthly (or weekly) program guide sent to subscribers by the company.

The programming area includes not only the traditional programming functions of a broadcast station but also supervision of local origination and access channels. Part of the administrative task of the cable programmer is community outreach, which includes teaching potential users of local origination and access channels how to use the equipment to make television programs.

9.52 Ownership

A cable communications system may be owned by a local resident, but most of them are owned by large multiple system owners. The ten largest MSOs are listed in figure 8–1. There is no limit to the number of cable systems any one company can own. Some MSOs like Time Inc. not only own cable systems (American Television and Communications is a Time Inc. subsidiary), but own program services as well (Home Box Office is a Time Inc. subsidiary too). Figure 9–13 shows the ten largest cable systems.

FIGURE 9–13. The Ten Largest Cable Systems

RANK	*LOCATION*	*OPERATOR*	*SUBSCRIBERS*
1.	San Diego	Cox Cable	225,000
2.	Woodbury (Long Island), NY	Cablevision	203,000
3.	Houston	Warner Amex	184,900
4.	New York	American Television and Communications	176,700
5.	San Antonio	Rogers UA Cable	164,531
6.	West Orange, NJ	Maclean Hunter	152,148
7.	Wayne, NJ	Rogers UA Cable	124,000
8.	Cincinnati	Warner Amex	110,500
9.	Tulsa	United Cable TV	108,673
10.	Audubon, NJ	NYT Cable	105,690

SOURCE: *Cablevision*, October 24, 1983.

9.53 Investment, Profit, Loss

Cable facilities require a much larger investment than a single broadcast station does. Not only must an operator string wire or bury it underground, but there are antennae and towers to build, amplifiers and converters to buy, and headends and studios to build and equip. When a system rebuilds there are the same types of expenses. In 1982, the cable communications industry spent $1.756 billion to build 83,768 miles of new lines and 32,422 miles of rebuild (*Cablevision*, January 10, 1983).

A cable operator figures that it costs approximately $20,000 per mile to build a new system. Aerial cable installation costs less than underground construction. MSOs save money by using their own construction crews to build systems. Another expense is the cost of converters. Addressable converters bought in lots of a thousand units cost cable operators between $125 and $200 per unit.

Cable communications systems can be very profitable. Good management and minimization of **churn** can result in consistent profitability. Thus far there haven't been enough sales of cable systems for any specific price pattern to develop. Most sales to date consist of transfers of the entire assets of MSOs, that is, the entire company is sold, not just one or two cable systems.

9.54 Program Networks

In chapter 11 we'll examine the specific offerings of the various program networks in greater detail. The offerings of a cable operator consist of three fundamental types of material: (1) radio and television program services; (2) alphanumeric information and computer-type services; and (3) home security services, such as burglar and fire alarms.

Radio and television cable program networks are classified into two types: basic and pay. A basic service is generally an advertiser-supported program service for which the cable operator pays a small amount per month for each subscriber (ten to twenty cents). Some basic services are provided to the operator free of charge. A pay service has no advertising, and the cable operator pays the network a set amount per month per subscriber to the service. The subscriber to the service then pays seven to ten dollars per month for the channel. The operator may keep 50 percent of the monthly fee, while the remainder goes to the provider of the pay service. A list of a few basic and pay services can be seen in figure 9–14.

9.6 TRADE ASSOCIATIONS, PROFESSIONAL AND CONSUMER GROUPS, AND UNIONS

A major part in the broadcast and cable industry is played by trade associations and professional groups, unions, and consumer groups. These organizations represent the interests of their constituencies. While the primary activity of trade associations and con-

FIGURE 9–14. Representative National Basic and Pay Cable Services

NAME	*SERVICE*	*SUBSCRIBERS*
Basic Services		
Alpha Repertory Television Service (ARTS)	Fine arts and cultural programming	12,300,000
Cable News Network (CNN)	News	21,788,000
CBN Cable Network	Religious, entertainment, sports	22,500,000
Entertainment and Sports Programming Network (ESPN)	Sports	24,600,500
Music Television (MTV)	Rock music videos	15,000,000
Nickelodeon	Children's programming	13,950,000
WTBS	Superstation from Atlanta	27,654,000
Pay Services		
Cinemax	Movies	2,500,000
Disney Channel	Family entertainment	425,000
Home Box Office	Movies, sports, specials	12,500,000

NOTE: New cable services are introduced frequently. You may wish to check in one of the trade magazines listed in the bibliography and see how many of the services listed here are still operating.

SOURCE: *Cablevision*, October 31, 1983.

sumer groups is lobbying, they also provide information to both their memberships and the general public. Unions also disseminate information, but their primary function is to represent their members in labor negotiations with management.

9.61 National Trade Associations and Professional Groups

The largest and most powerful trade association connected with the electronic media is the National Association of Broadcasters (NAB). The NAB was founded in 1923 to fight the demands for higher royalties made by the American Society of Composers, Authors, and Publishers (ASCAP). Initially twenty stations were members; today almost all the television and about half the radio stations are members. The NAB is an effective representative of the interests of broadcasters, and also provides its member stations with information useful to the conduct of business. Until 1982, one of the major activities of the NAB was the creation and implementation of its radio and television codes. Each code was a statement of principles which guided the content of programs and commercial messages and the amount of commercial advertising. In 1982 the NAB lost an antitrust suit and was forced to withdraw the advertising portions of the code as part of a consent agreement with the Department of Justice.

A group which specifically represents the interests of radio stations is the National Radio Broadcasters' Association. The major lobbying group for the cable television industry is the National Cable Television Association. The Electronic Media Rating Council accredits broadcast and cable research companies, and sets standards for the conduct of audience-related research projects. The Television Information Office provides general information about the television industry and conducts research. The Television Bureau of Advertising and the Radio Advertising Bureau provide information to potential advertisers about the use of television and radio for advertising purposes. They also conduct research on the advertising effectiveness of the media and promote the use of radio and television as advertising media.

Two organizations which have codes of conduct for journalists are the Society of Professional Journalists (Sigma Delta Chi) and the Radio Television News Directors' Association. Both organizations back the concept of the journalist as an unbiased reporter of events who will actively resist attempts of all persons (including management) to color or distort the news. American Women in Radio and Television and Women in Communications Inc. are trade associations which provide information to women about working and succeeding in the broadcast, cable, advertising, and other communications-oriented businesses.

9.62 Consumer Advocates and Representatives

Many different groups attempt to represent the media audience to Congress and regulatory bodies. Morality in the Media, Accuracy in the Media, the Coalition for Better Television, and the Moral Majority focus on the content of radio, television, and cable. Action for Children's Television (ACT) has been instrumental in obtaining meaningful concessions from the three major television networks concerning the content of children's programming and the advertising which surrounds it. The Office of Communication of the United Church of Christ has been active in representing the interests of ethnic minorities in license renewal hearings. The National Black Media Coalition has successfully represented the interests of black Americans.

9.63 Unions and Guilds

Many different unions represent a variety of workers in the broadcast and cable industry. The best known is probably the American Federation of Television and Radio Artists (AFTRA). AFTRA sets the minimum wage scales for actors in most network radio, television, and cable productions. There are also AFTRA rules concerning the length of the workday, meals, travel, wardrobe and dressing facilities, and *residuals*. Guilds function similarly to unions in negotiating wage scales and working conditions. The three best known are the Writers' Guild of America, the Directors' Guild of America, and the Producers' Guild of America.

Turn Off the Tube and React

Ask your children to list all the foods advertised on children's television and then to list all the foods they think they should eat to be healthy. Compare the two lists.

Have your children make up a commercial for their favorite fruit or vegetable and act it out.

List all the kinds of programs you and your children would like to see. Think of books that would make good dramas, hobbies you would like to learn about, careers you could explore. Compare your lists to the local TV schedule.

Spend a part of each day doing something special with your family, like reading aloud, playing a board game, or baking cookies.

Call the community relations department at a local TV station and arrange for your family to watch a program being made.

Let people know what you think of children's television. You and your children can write a family letter to ABC, NBC, CBS, PBS, local TV stations, local cable operators, toy manufacturers, cereal companies, candy makers, the FTC, the FCC, your Senator, your mayor, your newspaper, and ACT.

Form a local TV action group. You and some friends can discuss children's television programs, meet with local broadcasters, plan parent-teacher talks, and organize community support for increasing children's TV choices.

Putting Cable to Work for You

By1985, it is likely that one-third of all families will have cable television.

Cable can provide more than 50 channels to choose from. That means entire channels can be devoted to sports, or black news, or children's programs.

Cable can offer public access to TV channels, so children and adults can learn to make programs for their communities.

If your town doesn't yet have cable television, let your town councilors know that you want to be involved in the cable franchising process.

Work to ensure that your town's cable contract calls for a variety of children's programming produced nationally, locally, and by young people in your community and shown without commercials.

Ask your local cable company for a schedule describing all its programs and a lockout device to block out certain channels. Then you can plan and control your family viewing.

FIGURE 9–15. Two Ads Developed by Action for Children's Television
One of ACT's major activities is providing information for parents, teachers, and others interested in the effects of television on children. The educative function of these ads typifies the approach used by ACT.
SOURCE: Reprinted from *ACT TV Time Chart*, with permission from Action for Children's Television.

9.64 Other Organizations

There are also many other groups which represent media personnel. The American Society of Composers, Authors, and Publishers (ASCAP), Broadcast Music Inc. (BMI), and the Society of European Stage Artists and Composers (SESAC) are music-licensing groups. Radio, television, and cable companies that wish to use music controlled by one of these three groups must pay a yearly license fee, which is normally a set percentage of the gross revenues of the station or cable company. The artists receive their portion of the fee after administrative expenses are deducted.

Agents represent actors, producers, directors, and writers in contract negotiations with employers. Two of the largest agencies are the William Morris Agency and International Creative Management. Most production companies and networks deal only through agents, so it's important to have one. Agents generally take a 10 percent commission on what their clients earn each year.

9.7 SUMMARY

The basic economic and administrative structures of broadcasting were formed immediately after World War I. Prior to the beginning of the war, there were numerous conflicts between the holders of patents. The United States government forced the wartime pooling of all wireless patents so that the army and navy could have access to high-quality wireless equipment. British Marconi, through its American subsidiary, attempted to gain control of the Alexanderson alternator. Through an agreement that included both the U.S. government and private industry, GE bought the assets of American Marconi and established a new corporation, RCA. GE, AT&T Westinghouse, and RCA pooled their patents and divided up the radiocommunication market. But the beginnings of radio advertising and the formation of networks strained the agreement. In 1926 a new arrangement was made.

The Columbia Broadcasting System was created in 1928 out of the United Independent Broadcasters network. William Paley was the major force in the network, which grew to rival NBC's Red and Blue networks. Forced to sell one of the two networks, in 1945 NBC sold its Blue network to Edward J. Nobel, who renamed it the American Broadcasting Company. The other national radio network is the Mutual Broadcasting System.

The local broadcast station is divided into eight functional parts. Stations are owned by individuals and by corporations. Owners of many stations are called group owners. A large capital investment is required to start a broadcast station. Then once a station is operating there are additional costs. The largest expense category is general and administrative expenses for radio; for television it is programming.

There are various kinds of networks. A full-service network provides stations with more than just programming. Promotion, payment of technical interconnection fees, sale of national advertising, and production of news are some of the services full-service networks provide to their affiliates. Other types of networks include bicycle networks, regional and local networks, and networks formed for a single program or a short series. Stations associated with networks are either primary or secondary affiliates, while stations with no network affiliation are called independents.

The cable industry is organized in a similar manner. The cable equivalent of the local broadcast station is the local franchise organization, which normally has a monopoly on local cable communications service. A cable system may be owned by a local investor or by a corporation that owns many systems, an MSO. The networks offered to the cable operator are of two types. The basic service is generally advertiser supported; the operator may receive the service free of charge or pay a small fee. Pay services, the second

type, have no advertising, and the cable operator pays a set amount per subscriber to the service.

The two major broadcast and cable trade associations are the National Association of Broadcasters and the National Cable Television Association. Trade associations represent their members in lobbying activities and provide them with information. Unions and guilds represent various employee groups in negotiations with management. The best-known consumer group is Action for Children's Television.

CHAPTER 10 OUTLINE

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10.13 Radio After Television

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10.6 SUMMARY

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RADIO PROGRAMMING

Radio is the member of the electronic media family with which most of us come into contact. When we think of radio we don't picture modulated electromagnetic waves traveling through space. Radio means programming—music, news, weather reports, time checks, interviews, and drama. But radio programs don't just happen. They are planned and scheduled according to the listening habits of the audience and the interests of particular audience segments. More than either broadcast television or cable, radio stations target their programming to a particular portion of the mass audience.

In this chapter we'll examine radio and its programs. We'll look at how and when audiences use radio. We'll survey the evolution of radio programming. At the end of this chapter you'll be able to:

1. Trace the main lines in the evolution of radio programming from the early 1920s to today
2. Identify the major characteristics of the medium and the audience that uses it
3. Define the major radio formats
4. Understand the role of the program manager and the other members of the program area
5. Recognize the major sources of radio program material.

10.1 THE DEVELOPMENT OF RADIO PROGRAMMING

The first radio program was a report on the presidential election of 1920. The first network program was a play-by-play account of the World Series. While these types of programs are still heard on radio stations today, radio programming has changed radically since KDKA broadcast for the first time. The early amateur efforts of local talent gave way to sophisticated network fare. Then the wholesale acceptance of television by the American people forced radio to search for radically new forms of programming. Today, radio programming is a complex mélange of *competing formats* designed to meet the needs of specific audience segments.

10.11 Early Radio Programming

Radio stations' first efforts at programming were haphazard. The two major popular entertainment forms of the late 1910s and early 1920s were the motion picture and **vaudeville**. The motion picture couldn't be copied by the new medium, but vaudeville entertainment could. So early radio programs consisted mostly of musical acts, with some comedy and dramatic segments thrown in for variety. Stations tried to plan the programs in advance, but every night was an adventure. Sometimes announced acts couldn't (or wouldn't) perform, and local amateurs had to be substituted. Some stations presented remote broadcasts of dance bands, presented live from hotel ballrooms. These programs often continued for as long as the band played.

The first announcers had to be jacks-of-all-trades. A fine voice was a prerequisite, of course. Musical ability was also useful, for the announcer might have to sing or play a musical instrument to round out the evening's entertainment. The early announcers didn't use their names on the air, but were identified by initials. One of the first was Thomas C. Cowan, who worked at station WJZ in Newark, New Jersey. He was identified by the initials ACN, which stood for "Announcer Cowan, Newark."

Music was the content of most early radio programs. Unlike today, the music was performed *live*. Few stations used recorded music; records' sound was of poor quality and they were used only in desperation. A second factor was the resistance of the musicians' union to use of recorded music. The networks refused to use records under any conditions. Bands and other musical groups hired by local stations provided the major musical offerings. Some of the groups achieved national stature. One such group is the Lawrence Welk band; it started out playing on a small station in South Dakota and is still heard today on television.

Some vaudeville performers made the transition from stage to microphone. Comedy teams would travel to a station, stay for a few weeks, and then move on to another community. Al Jolson was one of the first vaudevillians to star on radio. He was soon joined by others who established the format of the comedy-variety program. George Burns and Gracie Allen, Jack Benny, and Fred Allen were featured performers in the first decade of radio.

By the late 1920s NBC and CBS dominated radio programming. Stations began to use *recorded* music as the primary source of local program material. The networks supplied a variety of entertainment forms. The entertainment magazine, or variety show, was the mainstay of early network programming. It was similar to vaudeville programs in that there were several acts, but the dominant entertainment form was music. The "Fleischmann Yeast Program," starring Rudy Vallee, was the first such program to achieve national popularity.

Country music programs were also popular. The "National Barn Dance" was one of the first. It was originated by a former newspaper reporter, George D. Hay, and presented over WLS Chicago. But the king of country music radio programs was (and still is) the "Grand Ole Opry," broadcast by WSM in Nashville, Tennessee. On November 28, 1925, NBC presented four hours of music originating from WSM. The first hour was hosted by Dr. Walter Damrosch, who presented a music appreciation hour. The last three hours were entirely different. The first "Grand Ole Opry" program was presided over by George D. Hay, who had moved from Chicago to Nashville, and now called himself the "solemn old judge." The opening segment of the "Opry" consisted of a black harmonica player, DeFord Bailey, and a fiddle player, Uncle Jimmy Thompson, who was said to be able to fiddle "the taters off the vine."

In 1929 Gertrude Berg originated the first continuing dramatic program on radio. "The Rise of the Goldbergs" focused on the lives of the members of a Jewish family in a large city. Soon other dramatic programs were offered. "One Man's Family" and "Ma Perkins" were two of the first **soap operas**. Comedy drama began in the late 1920s with the "Amos 'n' Andy" program. Within months after its initial broadcast "Amos 'n' Andy" became the most popular program on radio.

Radio provided audiences with coverage of special events such as national political conventions and the trial of the kidnapper of the Lindbergh baby. Yet in the first days of radio there were no daily news programs. Pressure from newspapers and the classification of radio as an entertainment medium seemed to conspire to slow down the growth of radio news. When news did begin to appear on radio, the newspaper industry attempted to stifle the competition. In 1933 came the signing of the Biltmore Agreement, by which the radio networks, their stations, and the newspaper industry restricted the amount of news that could be broadcast. But within months the agreement was in shambles, as independent stations not included in the pact set up their own news-gathering organizations.

10.12 The Golden Age of Radio

By 1934 the radio industry had reached maturity and was in its prime. The period from the mid-1930s to the late 1940s is aptly called the "golden age of radio." During this period entertainment programming grew in popularity. Radio drama prospered. Radio news made important contributions toward better public understanding of the rise of Nazism.

Of all the radio dramas that have ever been broadcast, none has had the impact of the "Mercury Theater of the Air" dramatization of H. G. Wells's *War of the Worlds*. The play, written in the form of a series of news broadcasts, concerned a Martian invasion of northern New Jersey. Although it had been announced as a dramatic, not a news, program, it provoked widespread panic. Much of its impact was probably the result of its being broadcast on Halloween. In addition to the "Mercury Theater" there were other dramatic **anthology** series. One of the longest running was the "Lux Radio Theatre," first presented in 1934.

The action adventure program was popular with audiences of the late 1930s. Programs like "Gangbusters" and "Mr. District Attorney" were similar to television programs today. "The Green Hornet" caught criminals even the G-men couldn't catch. "The Shadow" knew the evil that lurks in the hearts of men. "Lights Out" and "Inner Sanctum" presented mystery and suspense programs. "The Lone Ranger," "Terry and the Pirates," "Sgt. Preston," and "Jack Armstrong—All-American Boy" were typical of programs designed to appeal to children.

Soap operas proliferated on daytime radio. "The Guiding Light," "Backstage Wife," "Just Plain Bill," and "Pepper Young's Family" were among the daily dramas that presented the ups and downs of life. Game shows and contests were also broadcast, including "Information Please," "Twenty Questions," "Truth or Consequences," and "The Original Amateur Hour."

Local stations who had shied away from using records began subscribing to music transcription services. Subscribers were initially furnished with several hundred recorded musical selections, then received new selections monthly. The records were sixteen-inch

FIGURE 10–1. Edward R. Murrow Called by many the father of broadcast journalism, Murrow worked in both radio and television. He set a standard of excellence for others who followed in his path.

discs which were played at a speed of 33⅓ revolutions per minute (rpm). The networks also provided musical programs. For example, "Your Hit Parade" ran down the top ten popular songs every week, while "The Voice of Firestone" and the NBC Symphony Orchestra presented light classical offerings.

The *situation comedy* program made its first appearance in the mid-1930s. "Blondie," "Baby Snooks," "Henry Aldrich," "Fibber McGee and Molly," "Lum and Abner," and "The Perfect Fool" are a few of the programs that were successful during the "golden age."

By the late 1930s most radio stations were offering news broadcasts in one form or another. Radio news differentiated itself from newspaper coverage by focusing on more *international* and *national* news. American correspondents went to Europe to cover events there. H. V. Kaltenborn covered the Spanish Civil War for CBS. In 1936, he made a memorable broadcast describing the battle surrounding him while he hid in a haystack. In 1938 came another innovation in radio news. CBS European reporters began delivering a live program from Europe to the United States every night describing that day's events. In 1940 Edward R. Murrow covered the German bombing of Great Britain in his "This Is ... London" broadcasts. Probably more than any other correspondent, he illuminated events in Europe and prepared America for the coming war. Stations responded to the war crisis by giving more time to news.

10.13 Radio After Television

The late 1940s and early 1950s saw a change in radio programming. In 1948 CBS began a *talent raid* on the other networks. Anticipating the popularity of television, CBS attempted to sign up the radio stars and stockpile them for television use. CBS succeeded in luring many of the top names, and those that CBS didn't hire signed long-term contracts with their own networks. With television about to become a reality, the radio networks began to develop cheaper programming. Game shows were further developed, ABC began to use recorded music, and the format of the musical clock—music, weather, and time—was instituted.

By the late 1950s network entertainment radio was all but dead. The predominant network evening format was news. The few remaining music programs were poor imitations of the musical variety programs of the golden age. The local station had to rely on its own resources for the first time in decades.

During the period 1952–54 two station owners, Gordon McLendon and Todd Storz, began experimenting with a new format based on the popular music that was selling well at the time. Record stores provided a list of the hits, but the key to the format was the fast-paced, personality-oriented style of the disc jockey. The musical hour consisted of three or four new songs, the same number of hits, and an oldie or two. Between records the DJ would throw in some commercials, time, weather, and some news headlines. The important thing was to create a sound image for the station, and so the *jingle* became the device used to imprint the call letters on the minds of listeners. **Formula radio** in the form of the *Top-40 format* was born.

Another development which affected radio was the invention of the *transistor*, which allowed radio to become more portable and personal. For some years, small transistor radios seemed to grow from the ears of the American populace. Young people particularly listened to the radio at all times and in all places. Radio for the first time could go anywhere.

Station after station leaped into Top-40 with success. Crucial to that success was getting radio personalities that the public liked. The DJs on the clear channel stations soon developed national followings. Alan Freed, Dick Clark, and Wolfman Jack were three of the best known. Record companies soon discovered that the key to a hit record was getting it played on the radio. Salesmanship was important, but soon it wasn't enough. Record companies began offering money, expensive gifts, women, and drugs to DJs in return for air play for this or that recording. Investigations of *"payola"* and *"plugola"* ensued, and many DJs were found guilty.

The 1960s and 1970s saw an increasing amount of specialization in radio formats. FM stations began to make inroads into the AM audience. The *all-news station* appeared first in some of the largest markets, and then moved into almost every major market. Again, it was the innovative Gordon McLendon who pioneered the all-news format. Group W refined the format on its owned-and-operated stations. Country and western stations dramatically increased in number. Some of the old radio programs were revived. *Music services*, similar to the old transcription services of the thirties and forties, provided stations with music scientifically chosen to appeal to specific audience segments. Stations began to automate, but personalities were still an important part of some formats. Some stations developed programs around the talents of two disc jockeys. The duos talked, told jokes, read commercials, and played a little music during the early morning and late afternoon. After a year or so the personality duo became an established way of attracting audiences.

10.2 THE MEDIUM AND ITS AUDIENCE

Radio wakes us up in the morning. It accompanies us to work or school in the morning and home in the afternoon. Many of us work while the radio is playing. Radio services such as Muzak are used in restaurants and in retail businesses. There are more radios than people in the United States. Radio stations outnumber daily newspapers by more than three to one. We grow up with radio and, as we grow older, it continues to provide us with entertainment and information in a way no other medium does.

10.21 Characteristics of Radio

Radio is a simple medium, especially when compared with television. It is totally dependent upon sound, but allows a great deal of creativity. Radio is less expensive than television or film, so new ideas can be tried out with less financial risk. It doesn't require

sophisticated equipment, and one person can do all the jobs—produce, write, perform, and edit the program.

Radio is an intensely *personal* medium. People use radio one-on-one; listeners feel as if the program is presented directly to them. Radio has as many audiences as there are listeners. Radio requires that the listener do nothing except listen, and users can do other things while listening. Many people read, work, eat, iron, do the dishes, and so on while listening to the radio. Studies have shown that radios may be found in every room of the house, yet another indication that radio listening is a flexible activity.

In addition to being a personal medium, radio is a *personality* medium. Disc jockeys and announcers become like a part of the family to their listeners. What the DJ says is heeded by the audience. Advice is given and taken. Products are recommended and bought. Jokes are told and repeated by thousands the same day. Radio appeals directly to the emotions of listeners.

Finally, radio is *mobile*. It is the one electronic medium that we can take with us wherever we go. Portable radios are relatively inexpensive and small. Some radios can even be worn on the wrist. A radio in the car has become as common as tires. Radios go to football games and other sporting events so that fans can hear about the game they're watching or another game. Radio music is national music, cutting across regional and ethnic lines like no other popular art form.

10.22 Audience Segmentation and Localization

In the early 1950s radio stations tried to appeal to a mass audience. Soon programmers discovered that they could divide the audience into specific *segments* by playing a particular kind of music. These audience segments had different demographic and psychographic characteristics. Given the low costs of radio, advertisers didn't seem to mind trading the mass audience for a smaller but more predictable group of listeners. By the middle of the 1950s stations began to specialize, playing only one type of music, such as country, middle-of-the-road (MOR), classical, and "good" (a.k.a. easy listening) music. In recent years the number of stations using talk or all-news formats has increased.

Audiences for popular music are segmented primarily by *age*. Research shows that particular types of music appeal predominantly to particular age groups. For example, "easy listening" stations, those that play a lot of soft, background-type music, appeal primarily to older members of the audience. Top-40 stations appeal to a younger audience. Some formats appeal to ethnic audiences; for example, soul or rhythm and blues stations are aimed primarily at black audiences, Spanish-language stations at Hispanics.

One of the important aspects of radio programming is to *localize* the station. Some of the strategies used to create an image of localism are:

1. Making use of local advertisers
2. Creating radio personalities with strong ties to the community
3. Getting actively involved with local events, charities, and so on
4. Emphasizing local news coverage
5. Using contests to promote the station in the community.

The success or failure of a station often depends on its ability to create a local image while at the same time delivering programming that is national in scope. It isn't an easy task.

10.23 Listening Habits

One of the characteristics of radio is that its audience is made up of people from all portions of the population. The average American spends twenty-two hours a week listening to the radio. According to Arbitron, one of the major radio audience research companies, the listening habits of radio audiences vary from weekday to weekend. A graph of the listening habits of radio listeners can be seen in figure 10–2. During the week, the audience begins building at 6:00 A.M. and reaches a peak at 7:00 A.M. By 9:00 A.M.

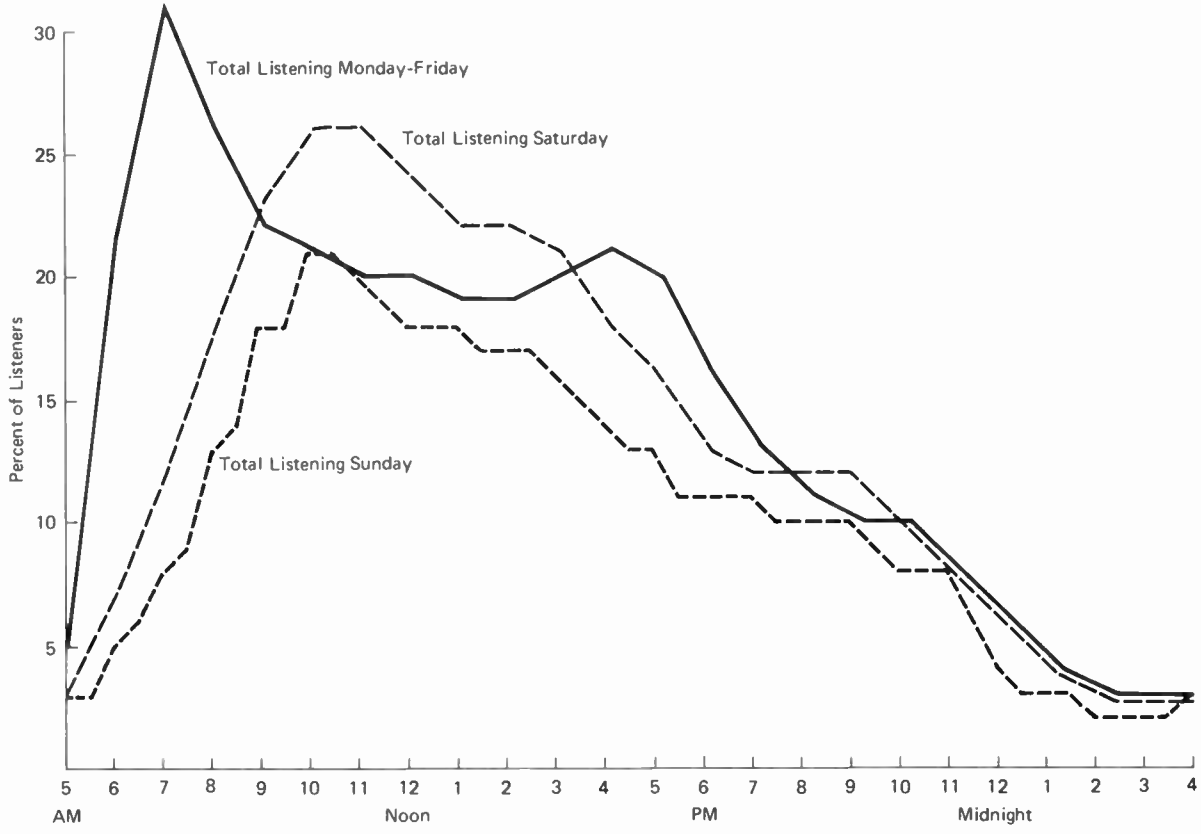

FIGURE 10–2. Audience Listening Tendencies: All Radio
SOURCE: *Radio Today*. 1982 Arbitron Ratings Company. All audience estimates are approximations subject to statistical variations related to sample size and other limitations.

the audience is back at the 6:00 A.M. level. Note that morning listening on the weekends peaks much later, at 10:00 A.M., and decreases steadily during the day. During the week, late morning and afternoon audiences remain relatively stable, with a slight increase during the late afternoon.

Ninety-five percent of the population age twelve or older listens to radio at least once a week. The audience for radio during the day tends to be older than the audience at night. Eighty percent of the radio audience listens five or more days a week. Twenty-six percent of the audience listens to two stations, 23 percent to only one station, and 23 percent to three. One percent of the audience listens to eight or more!

In the morning most people listen to the radio at home. In the afternoon most listening is done away from home. Weekend listening is done mostly at home. At-home listeners are represented in all age groups, but children between twelve and seventeen and people over sixty-five dominate the audience. Away-from-home audiences tend to be persons from eighteen to forty-nine.

Listener use of AM and FM also shows some differences, particularly among the audience that uses radio away from home. Twenty-one percent of the listening audience uses only AM radio, 34 percent uses only FM, and 45 percent uses both.

10.24 Radio Dayparts

Because listening tendencies tend to change during the day, the radio day is divided into five major *dayparts:*

Morning drivetime—6:00 A.M. to 10:00 A.M.
Midday—10:00 A.M. to 3:00 P.M.
Afternoon drivetime—3:00 P.M. to 7:00 P.M.
Evening—7:00 P.M. to midnight.
Overnight—midnight to 6:00 A.M.

During morning drivetime people are getting up, preparing for work or school, eating breakfast, and in transit to their day's activities. In addition to their dominant format, most stations program news headlines, weather reports, time checks, and traffic reports during morning drivetime. Entertainment programming tends to be light.

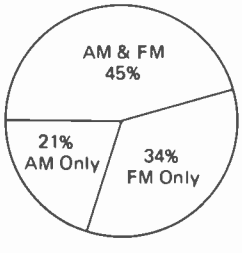

FIGURE 10–3. Audience Listening Tendencies: AM & FM Radio
SOURCE: *Radio Today*, 1982 Arbitron Ratings Company. All audience estimates are approximations subject to statistical variations related to sample size and other limitations.

The midday portion tends to have less news and information than morning drivetime. The exception is the noon hour, when listeners tend to be adults who are working either in the home or at their job. Radio programs tend to be used as background rather than as a dominant entertainment source.

The afternoon drivetime is the period during which children get home from school and adults begin returning home from work. Young people in the listening audience are looking for entertainment, while adults are looking for a mixture of entertainment and news (particularly traffic reports and news headlines).

During the evening hours most of the adult audience shifts to television, so the radio audience is made up mostly of younger listeners who want entertainment. The adults that remain in the radio audience tend to favor information radio, such as talk shows or sports programs, but there is also some adult audience for entertainment programming.

The overnight audience is small. Listeners are at work, in transit, or up late at night for some other reason, and use radio primarily for companionship.

10.3 RADIO FORMATS

The type of programming chosen for a station is called its *format*. The choice of a format is generally based on five elements (Routt, 1981):

1. The technical facilities, or in other words, the station's coverage area: the larger the coverage area the better
2. The characteristics of the local market
3. The target audience
4. The budget available to run the station
5. The revenue that might be generated given elements 1 through 4.

There are three major and two minor formats in use today. The major formats are music, talk, and all-news; the minor formats are religious and variety. In each format class there are a number of variations.

10.31 Music

Music formats dominate the world of radio programming, but the type of music varies widely. There is no single set of terms to describe music formats. The music a station programs may overlap one or more categories, and trends alter formats as well. Music formats are classified by the *type* of music presented, the *audience* orientation, and the *age* of the musical selections. Music is divided into rock, country, classical, and popular. Figure 10–4 lists several music formats used today and the percentage of AM and FM stations that offer that type of music.

FIGURE 10–4. Music Format Distribution among AM and FM Stations (Percentage)

FORMAT	*AM*	*FM*
Rock		
Top-40 (includes all stations of this type)	3.1	11.9
Progressive; album-oriented rock (AOR)	0.9	13.3
Soft contemporary (includes "mellow rock" and "soft rock")	0.6	2.5
Popular Music		
Adult contemporary (includes MOR)	25.0	21.4
Easy listening (includes "beautiful music," "sweet music," "good music")	1.7	15.8
Golden oldies (popular music and rock since the mid-1950s)	2.9	1.8
Standard/nostalgia (popular music from before the 1950s)	12.9	3.4
Country (includes western and country rock)	20.8	15.5
Others		
Classical	1.0	2.0
Black (includes "urban contemporary")	6.1	3.9
Ethnic (predominantly Spanish)	2.3	0.8

NOTE: Percentages do not total 100%. Many stations use a variety of formats or have developed approaches not easily classified.
SOURCE: Based on estimates provided by *Radio/Television Advertising Age* and data from *Broadcasting/Cablecasting Yearbook 1983.*

ROCK FORMATS

The oldest type of rock format is Top-40, which has evolved into Top-30, Top-50, Top-100, and so on. This format's age emphasis is teens through midtwenties. Female listeners outnumber males. The musical selections are restricted to the top forty records of the week introduced by a strong-personality disc jockey. Singles and album cuts are used. Some "golden oldies" are played. Sometimes there is a song *request* or *dedication* phone line. Some news is programmed, but *news inserts* are very short. The formula demands that news be given at an odd time, for example, at thirty-seven minutes after the hour, so as not to disturb the **audience flow** in and out of the station. Radio station audiences are measured in quarter-hour segments. Listeners are counted if they listen for as little as two minutes per quarter hour. Top-40 stations try to play music across the quarter hour to reduce the possibility of dial switching when news or commercials are played.

Progressive rock or album-oriented rock stations evolved out of the Top-40 format. However, some progressive stations also play jazz. The target audience for this format is between the ages of eighteen and thirty-four, although jazz stations may program for all age groups. With the exception of jazz, the music is almost totally rock and roll and the music is taken from albums rather than singles. It isn't unusual to have twenty-five to thirty minutes of straight music and then two to three minutes of commercials. Best-

selling albums are used, although some stations are programming larger amounts of "new music" (new wave and punk).

Stations with a soft contemporary format, often called "mellow rock" or "soft rock" stations, tend to attract listeners between eighteen and thirty-four. They broadcast absolutely no hard rock; the emphasis is on lyrical ballads and softer instrumentals. Terms like "the softer side of pop" are used by the announcers to describe the music. Musical selections are a mixture of recent and not-so-recent hits by well-known groups. Fads are avoided; songs are always "safe." The DJs are not as personality-oriented as in Top-40 formats, and there is a minimal amount of talk. News, generally presented on the hour, makes heavy use of network news with some local stories plugged in when appropriate.

POPULAR MUSIC FORMATS

"Adult contemporary" formatted stations often are called "popular music" or middle-of-the-road (MOR) stations. This is the most popular format used in radio, and stations using this format are often the most listened-to in the market. The audience emphasis is on the eighteen-to-forty-nine age group. The musical emphasis is on a *mixture* of popular music forms. This format is perhaps the least specialized of all the radio music formats. In general, very little hard rock is heard. The sound tends to be softer than that of progressive or album-oriented rock stations, and many stations use a mixture of older songs with new releases. As in rock formats, on-air personalities are important to the success of the station, and most adult contemporary stations also try to create strong local ties. Individual DJs often have great freedom in choosing the music that they play during their programs. There is generally a *strong news* component to the station, and news is broadcast on the hour or half-hour.

Easy listening or "beautiful" music is often called "wallpaper music" because it is used as a sound background. Instrumentals make up 95 percent of the selections, and individual vocalizations are rarely heard. Recent popular selections are played, but the arrangements are lush, with lots of strings. Commercials and music are *clustered*, and generally a minimum of personality is exhibited by the announcers. News is brief and to the point, seldom longer than two minutes, so as not to interrupt the music. Stations that use this format generally use the resources of a syndicated music house to program the station. These stations also tend to be automated.

Another popular music format is called "golden oldie." Stations using this format program rock hits from the 1950s through 1970s in an attempt to reach the older rock listener. There is some news on the hour or half-hour, but the emphasis is on the music. Commercials are clustered.

The standard or nostalgia format is designed for listeners over the age of forty-five, although a small portion of the audience is between thirty-four and forty-five. It is the fastest-growing format of the early 1980s. Selections are primarily hits of the 1930s and '40s. There is some programming of music of the 1950s, but no rock and roll. Personalities are unimportant in this format; the emphasis is on musical *selection* and *flow*.

Country music stations program a variety of music forms. Music includes traditional country music of the Grand Ole Opry type, western music, modern country, "the Nashville sound," and country rock. The age group for country music is generally over

twenty-five. Some stations use a Top-40 approach, playing only the best-selling country records plus a few country "golden oldies." The DJ's role is limited to introducing records and giving weather and time checks. Other stations use a more personality-oriented approach, with the disc jockey playing an integral role in the format. The amount of news varies from station to station.

OTHER MUSICAL FORMATS

Classical music stations offer traditional classical, semiclassical, and fine arts programming such as drama and arts information features. The emphasis is on the music, and the personality of the disc jockey is subdued. There are few commercials, and usually they are clustered. Some stations play a wide range of classical music, while others use a classical Top-40 approach, with favorites dominating. Audiences tend to be over twenty-five, affluent, and more highly educated than the audience for any other format.

Black stations are separated from the "ethnic" category because of the wide appeal of the stations' music. Black stations may program soul, rhythm and blues, disco, or a sound called "urban contemporary," black-oriented popular music that is a mixture of disco and jazz. Although black stations program for blacks and tend to play only music by black artists, listeners of all races are found in the audience. The target age group is generally eighteen and older. Stations vary in the freedom they give their disc jockeys. Some emphasize personality, others don't. News and other nonmusical program material is oriented to the black community. Commercials are clustered.

Ethnic stations direct their programming to a particular minority group. The largest category of ethnic stations is Spanish-language stations, although almost every minority group has at least one station oriented toward its needs. Hispanic stations' approaches vary from community to community. Some stations attempt to appeal to Mexican-Americans, others to Puerto Ricans, some to Cuban-Americans. The amount of Spanish used varies from 100 percent to less than 50 percent. The type of music also varies. Some stations program all types of popular music, and use Spanish between selections and for commercial messages. Others program only music with a Hispanic orientation, such as Tex-Mex, ranchera, trios, traditional Mexican ballads, and Afro-Cuban music. Personalities are an important part of an ethnic station. News is generally targeted toward the interests of the ethnic audience.

10.32 All-News

The all-news format, first developed by Gordon McLendon, was pioneered by Group W in the mid-1960s. It targeted listeners who didn't like music formats and wanted news and information. Research showed that the all-news format would attract about 10 percent of the radio audience, and that the all-news listener would tend to be over the age of thirty-five. By the early 1980s almost every major market had at least one such station.

Of all format types, the all-news format is probably the *most difficult to program* well. In addition, it is probably the most costly format to produce. However, if pro-

grammed carefully it can be extremely successful in terms of both service to listeners and profitability. The key to the format is to provide news headlines often enough so that the tune-in/tune-out listener can get capsulated versions of the news within fifteen minutes after tuning to the station. In addition to news headlines, stations also provide weather, time checks, business information, news features, local and regional news coverage, sports, and entertainment news. Some use a lot of local public-service-type informational programming. Stations located outside major metropolitan areas are dependent upon the news networks (AP, UPI, Mutual, and so forth) for much of their material. About 3.8 percent of AM stations use this format, but all-news formats are rare among FM stations.

10.33 Talk and Call-in

"Talk radio" came into being in 1960 when KABC Los Angeles threw away its records and began broadcasting the sound of the human voice twenty-four hours a day. In the late 1970s other broadcasters began to move toward the talk format as an alternative to all-news stations. This format can be divided into two distinct types. In the *talk/news format* a host interviews newsmakers and breaks into the conversation for short summaries of the news. The host may call out to the interviewees or have them in the studio. The *talk/call-in format* consists of in-studio interviews with listeners calling in questions.

The talk format is primarily *personality-based*, and in most stations is approached as a type of journalism. The success or failure of the format depends upon the on-air personality's ability to interview guests, stimulate listeners to call in their questions, and maintain control of the situation. Managers of talk stations realized very early that it was impossible to keep the hosts' biases out of talk programs. Indeed, many talk-show hosts use their own beliefs to stimulate conversation and interest. However, the format demands an overall even-handed approach if a talk-show program is to retain its credibility. The format appeals to all age groups, with the largest segment of the audience being over thirty-five. About 7.5 percent of AM stations and 0.5 percent of FM stations use this format.

10.34 Religious Stations

About 6.6 percent of AM stations and 3.6 percent of FM ones are religious stations. Some are owned by churches and other religious organizations and used for evangelical purposes. Others are privately owned and sell blocks of time to church groups. Some program a mixture of messages delivered by radio preachers and religious music, ranging from gospel to popular music forms with religious lyrics. The latter is called "Jesus rock" by some programmers. Some stations don't broadcast any commercial messages.

On those that do, the commercials tend to be for religious supply houses and publishers and similar businesses.

10.35 Variety Formats

Some stations don't stick to any one format and program a variety of program types during a day. On this type of station music programs vary throughout the day, as do the news and informational programs. A typical broadcast day may start with a farm news program and then move to two hours of country music. Soft rock programs may follow. Around noon the programming may be directed specifically toward women. Later in the afternoon there may be a local news roundup. The variety format is more commonly found in small-town radio stations than in major urban markets.

10.4 PROGRAMMING THE STATION

One of the major parts of every station is the program and production department. The union of programming and production is traditional, but the two functions are very different. Programming determines long-range goals, seeks out programming to meet those goals, acquires that programming, and designs the broadcast schedule so that the goals are reached. Programming is concerned with the strategy of achieving goals (Head, 1981). Production, on the other hand, is concerned with the short-term tactics of producing program materials that meet programming's specifications.

10.41 The Program Department

The program department of a radio station is responsible for all the programming that is heard on the station. In some stations there is an exception: the news director reports directly to the general manager, leaving the program manager responsible for all non-news programs. A simplified organization chart of the typical radio program department is shown in figure 10–5.

The head of programming is called the *program manager*. A successful program manager is an information processor who knows not only the profile of the market's audience but its listening habits as well. The radio program manager has a complex job, and must know the entire radio operation. Knowledge of the goals of the station, the competition, strengths and weaknesses of the staff, and the format and programs broadcast are all necessary for programming success.

In some cases the program manager may be responsible for choosing the format of the station. However, in most instances top management and the owners have already decided what format will be used. Often, in fact, the program manager is hired because

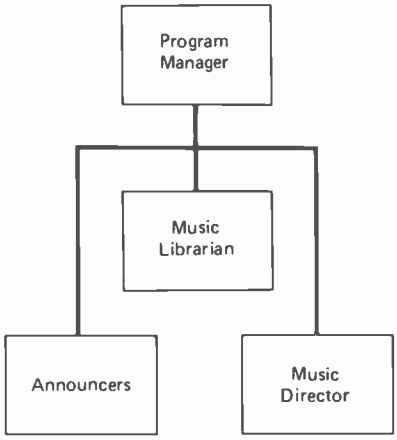

FIGURE 10–5. Organization of a Typical Radio Program Department

of his experience with the format to be used. The program manager is also responsible for the "sound" of the station. Once a format is chosen the program manager must develop a plan to execute that format. How much personality is going to be allowed? What will the ratio of instrumental to vocals be? Are "golden oldies" going to be used? If so, when? Where are the commercial breaks going to be placed? Is the station going to use **music sweeps,** and when are they going to be scheduled? Is the station going to use any syndicated programming? Will network programming be used?

Once the format is chosen and the sound developed the announcers must be hired. This too is the responsibility of the program manager, and is an important function for stations that emphasize personalities as well as music. In a talk format it is probably the most important function, since the entire program thrust of the station is toward personalities who can stimulate listeners to call in questions and comments to the station.

What makes a good *announcer*? There is no single quality, and different formats require different skills. Yet there are some common attributes of good announcers. Most have reasonably good voices and a presence that makes listeners feel the announcer is talking directly to them. An announcer must be able to handle the technical aspects of the board, that is, play records, tapes, and make announcements smoothly. A good announcer has a sense of the audience and what they are doing as they listen. Good announcers keep the program moving and make the content interesting.

Most stations normally establish a library of music selections. Stations that choose their own music and don't use one of the syndicated music program services (see section 10.51) must have a well-organized library. The person in charge of the music library is called the *music librarian.*

Most large stations that program music have someone serving as *music director.* The music director is responsible for developing the station's **playlist** and revising it according to a fixed schedule. Sometimes the music director actually programs the specific songs to be played and the order in which they are used on the air. In other operations

the music director just establishes the playlist and allows the disc jockeys to choose what songs they will use and when.

10.42 The News Department

Most radio stations have some kind of news operation. In its simplest form the news department just culls reports that come over a wire service teletype machine and reads them word for word. This is called a "rip and read" news operation. News programming may also include a national news service provided by one of the radio networks. A more sophisticated news operation will have a *news director* who oversees the activities of one or more reporters. In an all-news station the news director functions essentially as the program manager.

News programs consist of a variety of materials, all of which are classified as news. The *news report*, a description of what happened when, may consist only of a reporter describing what happened or it may include the presentation of **actuality** interview material. *News analysis* comments on the impact of news events and attempts to determine why they occurred. *Editorials* are expressions of opinion on events or issues.

10.43 Program Strategies

One of the most important functions of the programming process is to *schedule* the program material to be used. The ordering of material throughout the broadcast day is not only important in talk and call-in formats and news, but in music formats as well. Programming is a game in which the players (the programmers) try to maximize the audience listening to the station so that sales of advertising time can also be maximized. In some markets a station with a unique format may have no competition from other stations. However, research has shown that some formats are interchangeable for a sizable portion of the audience (Lully, Johnson, and Sweeny, 1978). Thus a progressive station may find itself competing for audience with a black-formatted station, or an all-news station may be in competition with a talk/news station.

There are a number of steps in designing and implementing a programming strategy. After analyzing the market and the resources of the station, the format is chosen. Next, the station's *sound image* is designed. Since each market presents a different set of listener variables, the format must be adjusted to take into account both the number and type of listeners. This is called *dayparting*. For example, a station may want a heavy dose of personality during morning and afternoon drivetimes. In addition, morning drivetime may demand twice-an-hour news headlines, four-per-hour time checks, and an in-depth weather report between 7:00 A.M. and 8:00 A.M. The mix and sequence of program elements in each daypart is outiined in terms of the *sound hour*, also called the "hot clock." Figure 10–6 shows a sound hour for a Top-40 radio station for a typical midday daypart

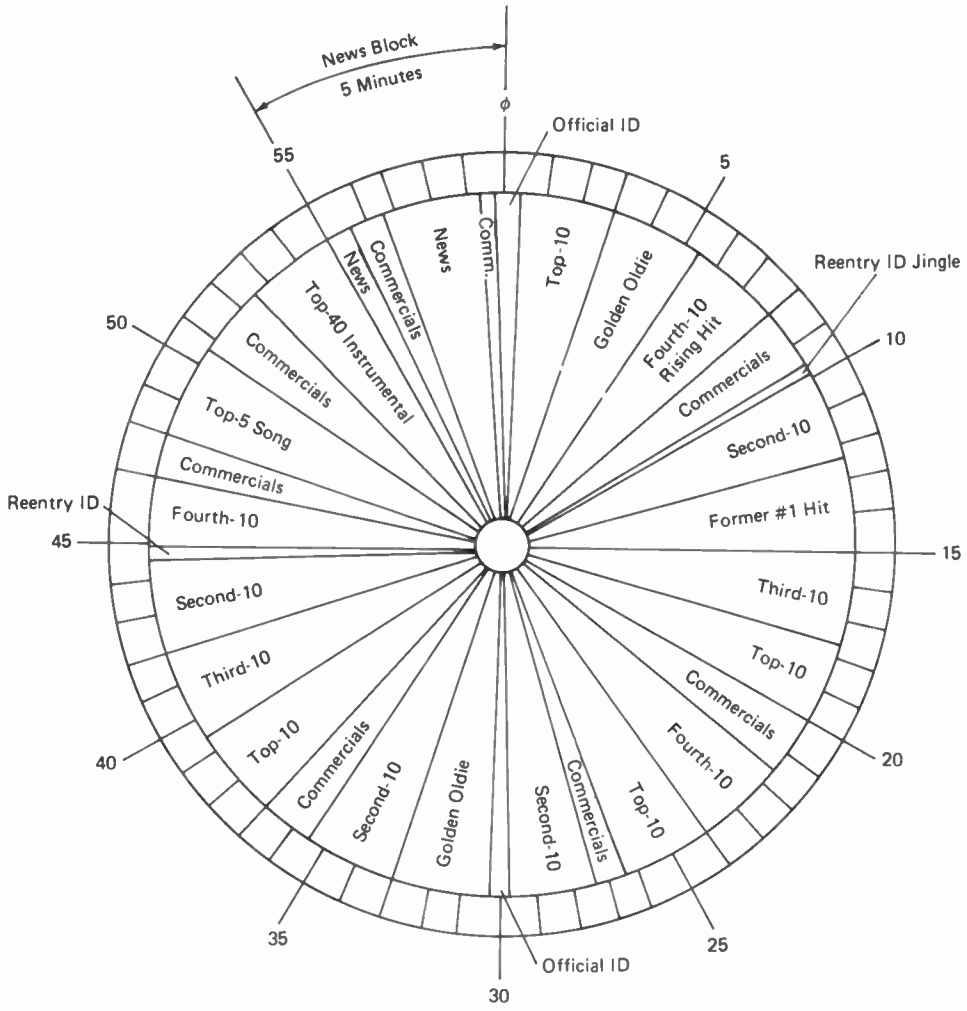

FIGURE 10–6. A Top-40 Sound Hour

hour. The design of the sound hour is based on the need of the station to maximize audience during each quarter-hour of the broadcast day. Music programmers generally use a music sweep which extends on either side of the quarter-hour in order to maximize measured audience. Nonmusic material, such as news or commercials, that interrupts the flow of music is called a *stop set*. Stop set materials are generally placed in the middle portion of the quarter-hour segment. In figure 10–6, there is a five-minute news block from minute 55 to the top of the hour. In this example, the station has decided to take an aggressive news stance and to use the news as a major portion of its programming strategy.

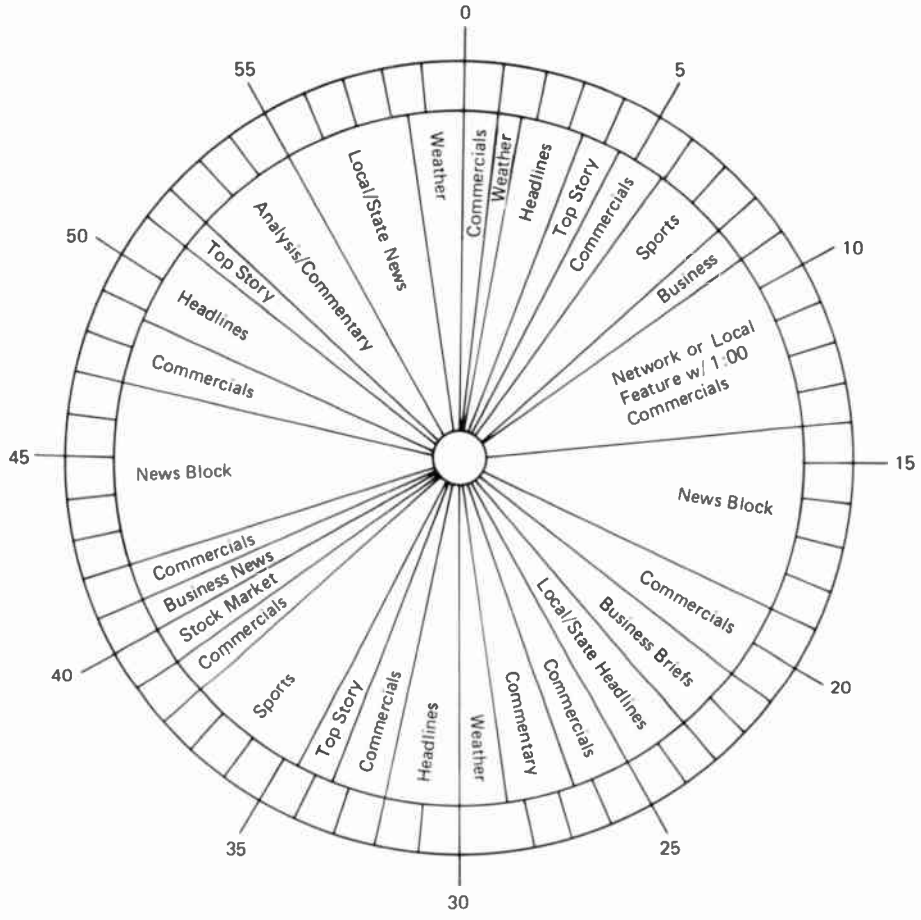

FIGURE 10–7. An All-News Sound Hour

A problem in programming any radio station is determining the number of *commercial minutes* that will be allowed per hour. Experience has proven over and over that audiences for music-formatted radio don't like commercials. Therefore the trick is to place commercials in the hour so that a minimum of audience irritation occurs. This is the basis for the natural tension between the sales department, which wants lots of commercials, and the programming department, which wants to minimize commercial interruption. In the example in figure 10–6, there are set times for commercials. The DJ may also insert additional commercial messages whenever there is time, but never between single musical selections except where indicated. At minutes 10 and 45 there are two reentry IDs, ten-second jingles that say the name of the station only.

A clock for an all-news station is shown in figure 10–7. Note that there are two major *news blocks* in each half-hour, and a network or locally produced feature in the first

half-hour and analysis and commentary in the second. News headlines, the top story, weather, business and stock reports, and a local or state news block are segmented throughout the hour.

10.5 PROGRAM SOURCES

Radio stations have a variety of sources for their program material. The four major sources of radio programming are *local* sources, *automated* program services, *syndicated* programs, and *network* programs. No station uses any one source exclusively; most use a combination of two or more.

10.51 Local Program Sources

Local program sources include music obtained by the station and other programs that are produced by the station's own staff. Obtaining popular music is generally not difficult. A music programmer will contact record *companies* and *distributors* and ask to be placed on their distribution lists. Since radio play of music aids record sales, most record companies are happy to provide stations with promotional copies of singles and albums. There are exceptions, however. Classical and jazz stations often have to buy albums, because sales of these types of recordings are not large enough to support extensive station promotion efforts by record companies. Obtaining "golden oldies" is also a problem for some new stations. Sometimes a station has to build its oldie library from scratch. Most stations keep their oldies under lock and key, to stymie unauthorized collectors. One method of reducing wear on records is to record them on *carts*.

10.52 Music Program Services and Consultants

Music stations sometimes decide to use the services of a **program service** or a *music consultant*. Often the program service also provides consultants to work with a station on its format and special "sound." There are numerous services for almost every format. Some of the best known are Drake-Chenault, Century 21 Productions and Programming, Bonneville Broadcasting Consultants, and Schulke. Each has several different formats that they supply to stations.

A music service can program an entire station, if management wishes. Normally these services function like the old network music transcription services. The station receives audio tapes of music on large reels. It can either run the reels as they are or cart the individual music selections. Local announcers can read commercials live or run the commercial carts at the times designated in the format.

The advantage of using a music service is that the station gets a thoroughly tested product that is constantly updated. The format and sound have proven appeal to the target audience. In essence the music service does the work of the music director in developing the station's playlist. Costs are high, however. In some cases the cost of a music service can be $5,000 to $10,000 a month. Another cost is the loss of a station's local identity. Some services will localize the station as much as possible, even placing advertising so as to create a local image. Yet no matter how skillfully a service localizes, it never quite achieves the feeling that local personnel can communicate to an audience.

Sometimes a station may want to employ the services of a program consultant, who will analyze the market, the station's place in the market, the sound and format of the station, and the execution of the program plan by the station's personnel. Consultants may be connected with a program service or they may operate independently.

10.53 Syndicated Programming

Another source of programming is the radio syndicator. Syndicated programming differs from network or music service material in that it is normally sold to stations on a program series basis. Programs in the series may be used on a daily basis. Other series programs are used weekly or monthly. Sometimes some of the commercial spots have already been filled by national sponsors, allowing local stations to sell the remaining **availabilities**. In other cases the programs come without any commercial messages.

Syndicated programming is available for all types of station formats. Rock stations can buy a concert series, the "King Biscuit Flour Hour"; an information series such as the Zodiac News Service; or "American Top-40," which runs down the week's top forty pop songs and also presents interviews with rock stars and other short features. Other stations may buy consumer reports, such as David Horowitz's "Fight Back" series; "Kids Say the Darndest Things" with Art Linkletter; or old radio programs. Talk stations often broadcast "The Larry King Show," the most popular overnight talk program in the country, which is distributed by a radio network, the Mutual Broadcasting Network. These are only a few of the syndicated programs available.

10.54 Networks

The program services provided by radio networks are limited. Most provide some type of news service and feature materials. Additional program material ranges from sports to live coverage of news events.

Unlike the old full-service radio networks, the newer networks provide specific services to their subscriber stations. Some entertainment programs are provided, but the majority of program material is news and information.

The American Broadcasting Company runs several separate radio networks designed to meet the needs of stations with different formats. For example, American Contem-

porary Radio markets to rock stations and attempts to appeal to the eighteen-to-twenty-four age group, while American FM Radio, which similarly targets teens and younger adults, is used by FM Top-40 and progressive stations. American Entertainment Radio is used by stations with soft rock and MOR formats to appeal to the eighteen-to-forty-nine age group. American Information Radio, which programs for "beautiful music" and call-in stations, seeks to serve an older audience than the other services.

CBS provides a basic *news-on-the-hour* program with some comment and analysis from the CBS news staff. It also offers weekend sports coverage and Monday night professional football. NBC provides news-on-the-hour programs and some information features. Mutual provides news services, sports coverage, and the Larry King talk program. Other radio networks are primarily news services.

10.6 SUMMARY

The first radio programs were primarily copies of vaudeville, with music dominating the content. As radio networks developed, so did new types of programs. One of the important new program formats was the soap opera, a daily program that presented a continuing story. The "golden age of radio" began in the mid-1930s and lasted until the late 1940s. During this period, radio programming matured and flourished. Radio drama, situation comedy, music and comedy variety programs, game shows, and news broadcasts made up the bulk of the networks' program fare.

After television began to spread in the early 1950s, radio programming changed. Network domination of radio programming diminished and local stations gained control over more of their programming. Shunning the temptation to try to appeal to a mass audience, stations began to program toward select portions of the mass audience. The first example of formula radio was the Top-40 radio concept. By the mid-1960s radio specialization had dramatically increased. All-news and talk-radio formats began to appear in larger cities and to spread into medium-size markets.

In addition to using only sound, radio has three other characteristics which differentiate it from television. It is a personal medium, it emphasizes the personality of the radio communicator, and it is mobile. Radio stations attempt to appeal to particular segments of the mass audience, by providing specialized music, news, or talk formats. In addition, stations attempt to localize themselves as much as possible. Some things used to create a local image are local advertising, radio personalities with community ties, local news coverage, and contests.

About 95 percent of Americans twelve or older listen to radio at least once per week, and the average listener listens about twenty-two hours per week. Younger and older persons tend to use radio at home; the middle age groups, eighteen to forty-nine, away from home. The heaviest use of radio is in the morning, peaking at 7:00 A.M. The size of the radio audience and the audience's listening habits vary through the course of the day. In recognition of this fact, programmers divide the radio day into five dayparts: morning drivetime, midday, afternoon drivetime, evening, and overnight.

Radio formats are divided into five major classifications: music, all-news, talk/call-in, religious, and variety. Music is used by most stations, with the format varying depending

on music type. Stations program three types of rock music—Top-40, progressive or album-oriented, and soft contemporary—while popular music is classified into adult contemporary, easy listening, golden oldies, standard or nostalgia, and country music formats. Other music formats include classical, black, and ethnic.

The program department is responsible for programming the station. Most program managers develop a sound hour concept, which divides the radio hour into segments during which music, news, commercials, or other types of program material are presented. The sound hour may vary according to daypart. Sources of radio programming include local material, programs provided by music program services and syndicators, and material supplied by networks.

CHAPTER 11 OUTLINE

11.1 THE DEVELOPMENT OF TELEVISION AND CABLE PROGRAMMING

11.11 Television Programming's Early History
11.12 The "Golden Age" (1952–60)
11.13 The Sixties: A Decade of Change
11.14 The Turbulent Seventies and the Spin-off
11.15 New Technologies Challenge the Networks

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11.22 Television Dayparts

11.3 TELEVISION PROGRAM TYPES

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11.6 SUMMARY

11

TELEVISION AND CABLE PROGRAMMING

A knowledge of the problems faced by television and cable programmers and the techniques they use to attract audiences helps us better understand the competitive nature of the telecommunications business.

When you complete the study of this chapter you should be able to:

1. Trace the development of television and cable programming
2. Know the primary behavioral characteristics of the television audience
3. Differentiate between the major types of television programs
4. Name the steps in developing a television program and identify the primary program sources and distributors
5. Understand the basic principles of programming a local station, a network, and cable systems.

11.1 THE DEVELOPMENT OF TELEVISION AND CABLE PROGRAMMING

The first television broadcasts were *experimental.* Therefore the programs themselves were of little importance to the development teams, who were interested solely in de-

veloping a new means of telecommunication. By the late 1930s, however, public interest in television had begun to grow, and programs began to be more carefully planned.

The history of television programming can be divided into five distinct periods, roughly corresponding to the five decades of the existence of commercial television broadcasting. The years before 1952 might be called the "early era," the time from 1952 to 1960 the "golden age." The 1960s can be thought of as the "decade of specialization," the 1970s the "era of the spin-off and British influence." While the 1980s are not yet complete, indications are that this will be the "decade of cable."

11.11 Television Programming's Early History

The early days of television programming were characterized by innovation and energy. While some of the earliest programs were simply copies of already existing entertainment forms or translations of radio programs to the new medium, some were experiments designed to test the limits of television technology. NBC began the first regularly scheduled television service on April 30, 1939. The occasion was the opening of the New York World's Fair, and viewership was limited to the New York City area. Soon CBS began a rival television service. The programs and the way they were scheduled were much different than today's. First, the majority of the programs were broadcast in the evening. Second, only a few **series** were presented; most programs were one of a kind. Third, the programs didn't have many star performers, and most were produced using unknowns.

Despite the differences, most of the major program forms were introduced prior to 1952. These were the **variety program**, the **news**, the **public affairs** magazine, the **soap opera**, and the **special**.

Many established and popular radio programs made the transition to television in the late 1940s and early 1950s. There were also programs that experimented with new formats. One of these, "Garroway at Large," was a product of the "Chicago school" of television experimenters. A former disc jockey, Dave Garroway hosted a live program based in Chicago which featured the laid-back style of its host. Garroway later became the first host of NBC's early morning news magazine, "Today." Another important contributor to the development of television as a visual medium was the comedian Ernie Kovacs. Some of his programs are still broadcast today.

In New York and other large cities that had television stations, viewing reached the same level as radio listening in 1950. With the increase in audiences came an increase in criticism of the new medium. Some viewers objected to the "blue" jokes told by Arthur Godfrey and the low-cut gowns worn by Faye Emerson and Ilka Chase. The large television audiences also attracted those who sought to use television to call attention to causes or for personal publicity. In the early summer of 1950 a spectator at a baseball game created a disturbance designed to draw the attention of the cameras. When the cameras had focused on the man, he killed himself.

The early 1950s were witness to one of the most shameful episodes in American his-

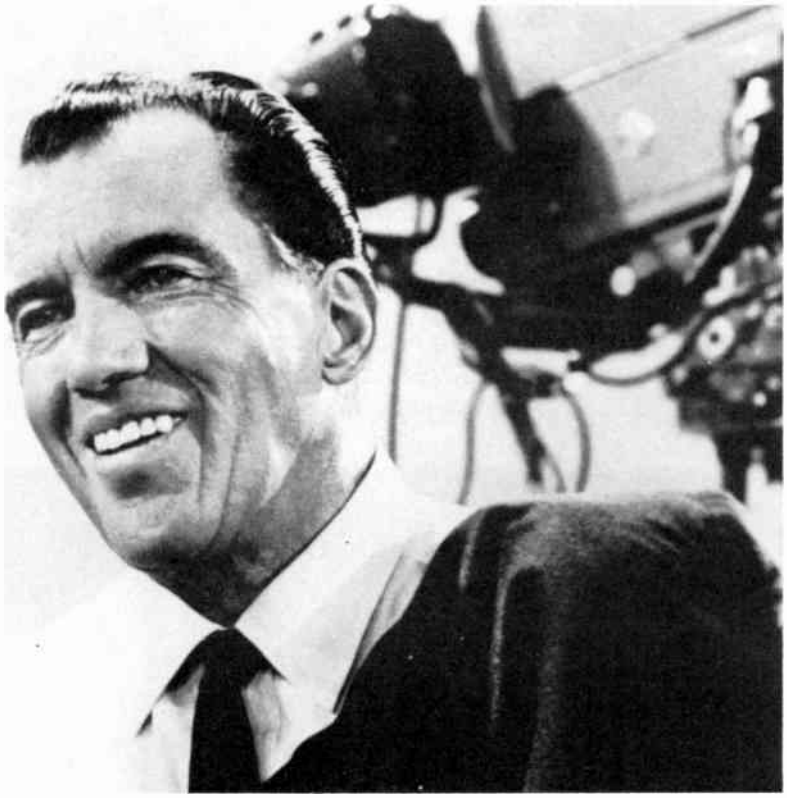

FIGURE 11–1. Ed Sullivan
Sullivan was a newspaper columnist who hosted a vaudeville-style variety program from 1948 to 1971.
SOURCE: CBS Inc.

tory—**blacklisting**. Hundreds of actors, writers, and other artists had their careers ruined almost overnight because they were accused of having communist sympathies and were refused work in the industry. And because blacklisting works by *innuendo*, the accused seldom had the opportunity to face their accusers. While some blacklisting had occurred in network radio in the late 1940s, the practice became widespread in the 1950s. When an organization called American Business Consultants, through a subsidiary called "Counterattack," issued *Red Channels: The Report of Communist Influence in Radio and Television*, the practice gained public attention. The document listed 151 radio and television personalities said to have ties with the Communist party. The networks panicked. Quickly they began requiring loyalty oaths from their employees; those who refused were denied work. Advertisers balked at sponsoring programs that involved anyone who was on "the list." Congressional hearings were held and many entertainers were prohibited from working in television or motion pictures.

11.12 The "Golden Age" (1952–60)

The years between 1952 and 1960 are often called the "golden age of television." Some critics would have us believe that television has never been better than it was in the 1950s. Perhaps one of the reasons television of the fifties appears so golden is the dramatic programming. Between 1952 and 1960 dramatic programming developed into a unique television art form. It made up almost half of the total number of hours of network-supplied programming by 1960. During the same period daytime dramatic programming consisted primarily of soap operas, with a few motion pictures shown in the afternoon. A prime time dramatic program, "Studio One" on CBS, premiered in 1948. It quickly established a reputation for high-quality programming, with presentations ranging from original plays written for television to adaptations of Shakespearean drama—"Julius Caesar" was presented in 1949. By 1953 all the networks had one or more **dra-**

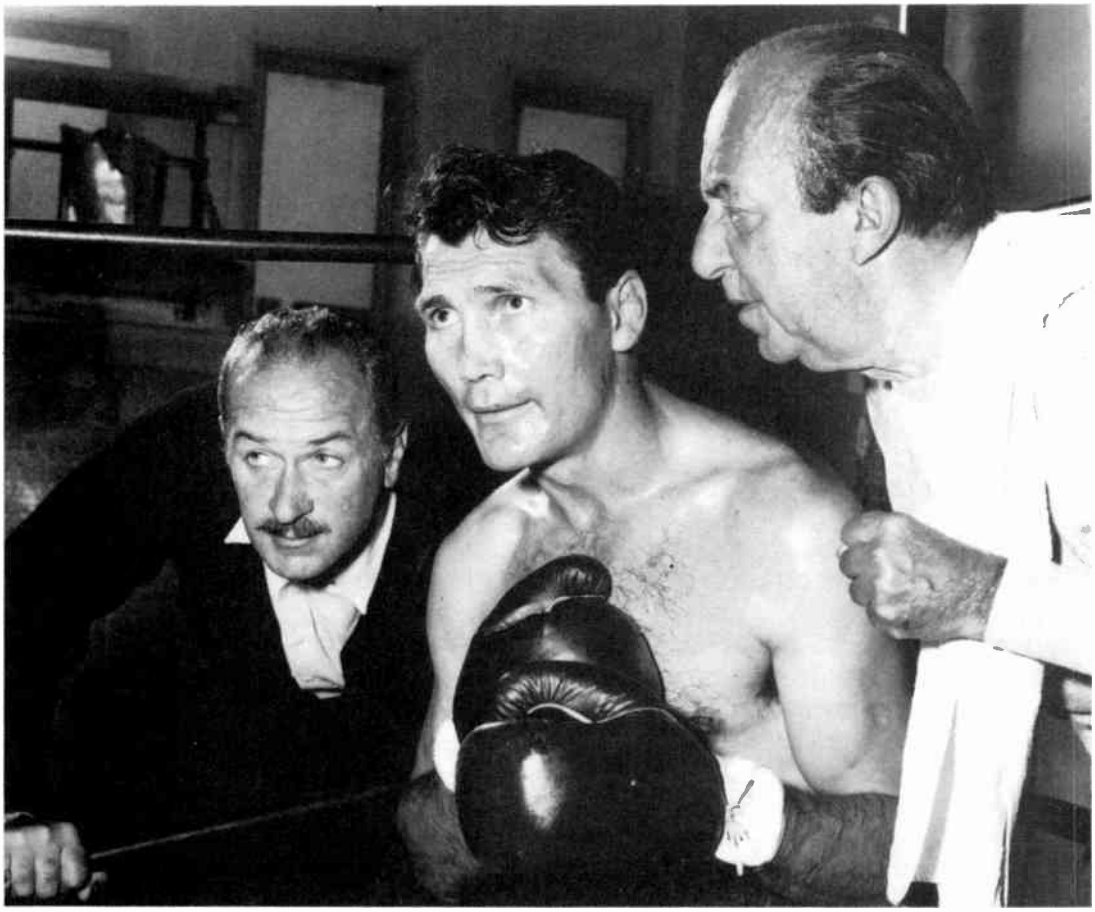

FIGURE 11–2. A scene from *Requiem for a Heavyweight*, presented by the "Playhouse 90" series on CBS (1956)

matic anthology series. Plays such as *Requiem for a Heavyweight*, *The Miracle Worker*, and *The Days of Wine and Roses* were broadcast live to appreciative audiences.

Another form of dramatic programming was the **situation comedy**. Perhaps the definitive "sit-com" was "I Love Lucy" which first appeared in 1951 and ran as a weekly series until the end of the 1957 season. During its six seasons it was the number-one program for four years and finished second once and third once. The program pioneered new production methods. It was shot on film, using *three* cameras instead of the traditional single camera. As a result the program had a different look from the usual live productions and the kinescopes run by some stations. In addition, the program was done in front of a *live audience*, something that would not become commonplace until the 1970s. Finally, the program was produced in *California*, while most programs were produced in the then capital of television, New York.

Several children's programs produced during the fifties should be noted. "Disneyland" was Walt Disney's first attempt at a television series, and it proved to be extremely popular. Disney followed with "The Mickey Mouse Club," seen each afternoon Monday through Friday. If featured a group of children ranging from six to sixteen and was also successful. Soon kids of all ages were discarding the coonskin caps popularized by "Disneyland's" Davy Crockett series in favor of the Mouseketeer ears. "American Bandstand" was designed for a slightly older audience. It featured Dick Clark and a group of kids who danced to the latest hits. Various recording artists made appearances on the pro-

FIGURE 11–3. "The Mickey Mouse Club"
SOURCE: Walt Disney Productions.

gram and new records were rated by a panel of teenagers. There were other programs for children. Preschoolers were treated to locally produced versions of "Ding Dong School" and CBS's morning offering of "Captain Kangeroo." Almost every station produced a weekday cartoon program with a live audience of children, and many offered locally produced versions of "American Bandstand."

Quiz shows were used in both daytime and nighttime program schedules. "The $64,000 Question" first appeared in the summer of 1955 and quickly became a top-ten program. It was soon followed by "The $64,000 Challenge" and a host of similar programs. The appeal was simple. Contestants were placed in "isolation booths" and answered questions. If they answered correctly, they won large amounts of money, automobiles, trips, and prizes. In 1958 the bubble burst on the quiz shows when several contestants from CBS's daytime program "Dotto" revealed that the program had been *rigged*. Within days every quiz program had been removed from network schedules and an investigation was launched. Investigators found that contestants on several quiz shows had been given the answers prior to the program.

The "golden age" saw the beginnings of late night television. In 1954 NBC launched the "Tonight" variety show starring Steve Allen. The program was extremely popular and proved that there was a substantial audience for late-night programming. Steve Allen turned the program into a highly creative, at times controversial exercise in television comedy. He once staged a landing of Marines on the beach of Miami, throwing hundreds of tourists into a panic. In 1957 Allen left the program for his own prime-time series. With his replacement, Jack Parr, the program increased in popularity, and Parr gained superstar status. By 1962 he too had had enough of the nightly grind. He was replaced by a daytime television personality, Johnny Carson, who had hosted the quiz program "Who Do You Trust?" but was almost completely unknown to the nighttime television audience. Since that time Carson has become the acknowledged king of late night television.

One of the major developments during the "golden age" was in broadcasting of aggressive news and public affairs programming. ABC extensively covered Senator Joseph McCarthy's hearings on communism in the armed forces and experimented with lengthening its evening news program to thirty minutes. CBS also experimented in the news and public affairs program area. Two newsmen stand out during the "golden age": Edward R. Murrow and Fred Friendly, both of CBS. The two created such programs as "Small World," an interview program featuring world leaders and celebrities; "See It Now," a thirty-minute documentary program; and a live-remote interview program, "Person to Person." The chain-smoking Murrow appeared on camera, while Friendly served as producer or executive producer.

The years between 1952 and 1960 were not only times of high-quality programming, but also years in which the television industry was evolving.

First, there was the tremendous *expansion* of television stations that occurred between 1952 and 1960. In 1951, there were 107 commercial television stations operating. By 1960, 515 stations were operating, and 87.1 percent of U.S. homes had a receiver (Sterling and Kittross, 1978).

A second factor was the change in *sponsorship pattern*. In its first years television developed sponsorship patterns similar to those of radio. Advertisers sponsored the en-

tire program; often they also produced the program. Sponsorship of a program continued over a number of years, which lent a degree of stability to programming. The sponsor developed a commitment to the program, and changes in format or direction were the sponsor's decision, not the network's. But in television the cost of weekly sponsorship of an entire program soon grew beyond the reach of most advertisers. Sponsors stopped producing and sponsoring programs and moved into **participating sponsorships**.

The third factor was the change from live programs to *taped* programs. Eighty percent of the programs presented in 1953 were broadcast live; by 1960 only 36 percent of the network programs were live (Sterling and Kittross, 1978). This meant that each time zone could be programmed to meet audience viewing habits.

A fourth factor was the *lengthening* of programs to the now standard thirty and sixty minutes. In the earliest years of television, programmers were uncertain of the length of the attention span of the adult viewer. Many programs were fifteen minutes long, some as short as ten.

Thus the "golden age" was an era not only of many first-class television programs, but a time during which the new industry was organized and spread throughout the nation.

11.13 The Sixties: A Decade of Change

The sixties saw major upheavals and conflicts in the United States. The Vietnam war and the struggle of black Americans for equal rights were brought into the living rooms of America via television. The first nationally televised debates between candidates for president occurred during the 1960 campaign, and they are popularly credited with having helped a brash Boston Democrat, John F. Kennedy, win the election. When he died three years later, the victim of an assassin's bullet, television covered Kennedy's funeral and helped a shocked nation grieve for its president. A few days later, while the nation watched, Kennedy's accused killer was himself killed within view of the ever-present television cameras. As the sixties ended, television covered man's first walk on the moon.

Six major trends in programming developed during the sixties. First was the increase in *technology*, and therefore in costs. Widespread adoption of *videotape recorders* by local stations allowed programs to be delayed for more convenient replay, while satellites allowed news to be fed to the United States from Europe and Asia. Color television further increased the cost of program production. Second, the increase in the sheer number of hours to fill with programming resulted in a *degradation* of overall program quality. Third, as costs rose and television increased in importance as a medium for advertising, programmers grew more *cautious*. There was less experimentation and more reliance on **program cycles**. Fourth, the manner in which television programs *premiered* changed. In the 1960s all new programs premiered during one week each fall; programs that failed to deliver a large enough audience were canceled and their replacements premiered during January's **second season**. Fifth, desperate for new and fresh ideas, programmers increasingly looked toward England for programming ideas and began to use movies in prime time. Finally, programmers reacted to governmental pressures to im-

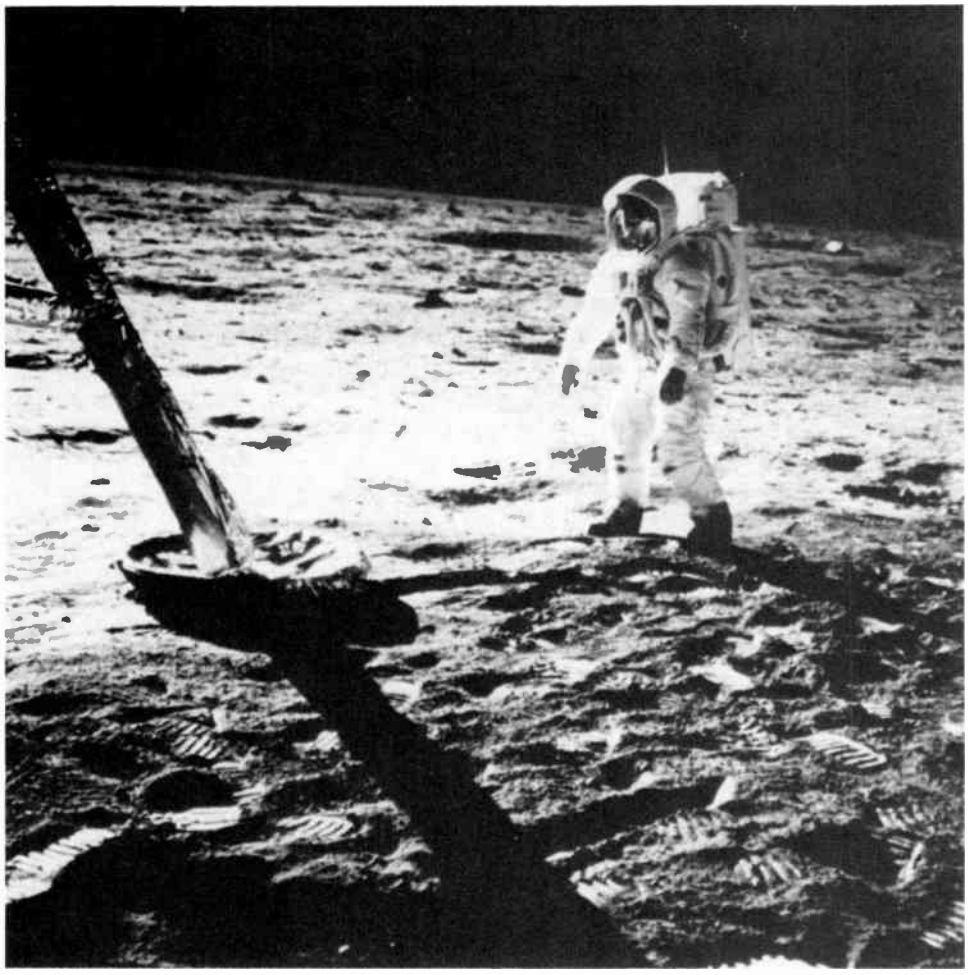

FIGURE 11–4. Television Covers the First Moonwalk
SOURCE: NASA

prove content and decrease the amount of sex and violence on America's television screens.

Increases in production costs and the availability of videotape led to the increase in the use of **reruns**. Programmers discovered that the second run of a program could draw as large an audience as had the initial presentation, and sometimes larger. And substantial amounts of money could be saved by cutting down on the number of new programs broadcast each season. In the 1950s a series might have thirty-nine different programs during the year; then during the summer a replacement program was broadcast. By the end of the fifties, series produced only twenty-six (or fewer) new programs each year for network release.

In 1962 the first communications satellite, Telstar, was launched. Telstar and other satellites made it possible to gather and transmit news from Europe and Asia *directly* to New York or Los Angeles. Network news departments increased personnel to cope with the new opportunities. News became an important part of the networks' early evening schedules, and competition between the networks' news departments was fierce. In 1962 Walter Cronkite took over the helm from Douglas Edwards on the "CBS Evening News." "The NBC Nightly News" had established Chet Huntley and David Brinkley as permanent anchors in 1956. In 1963 CBS and NBC expanded their evening news programs to thirty minutes. In 1968 CBS started a news program that it called "60 Minutes." Broadcast on Sunday evenings, the program was the television equivalent of a weekly magazine. NBC attempted to counter the CBS move with "First Tuesday," and ABC attempted a variety of similar tactics, but neither could ever find a formula to match the popularity of the CBS effort.

FIGURE 11–5. Walter Cronkite
Cronkite, who anchored the CBS Evening News from 1962 to 1980, became "the most trusted man in America."
SOURCE: CBS Inc.

With occasional exceptions, by 1960 television network nighttime schedules had degenerated in quality. Dominating the evenings were tired sit-coms and violent action-adventure programs. In 1961, as was customary, the chairman of the Federal Communications Commission addressed the spring gathering of the National Association of Broadcasters. What was not customary was the way the newly appointed FCC chairman, Newton Minow, addressed the group. In the presence of the major executives of the three networks and hundreds of other television notables, Minow chastised the industry for creating a "vast wasteland." (For excerpts of his speech, see figure 11-6.) With the network schedules for the following fall already in place, there was little that program executives could do to counter Minow's criticism. However, in succeeding seasons there

FIGURE 11–6. Excerpts from Newton Minow's Address to the 39th Annual Convention of the National Association of Broadcasters (May 9, 1961)

Governor Collins, Distinguished Guests,
Ladies and Gentlemen:

Thank you for this opportunity to meet with you today. . . .

I want you to know that you have my admiration and respect. Yours is a most honorable profession. Anyone who is in the broadcasting business has a tough row to hoe. You earn your bread by using public property. When you work in broadcasting, you volunteer for public service, public pressure and public regulation. You must compete with other attractions and other investments, and the only way you can do it is to prove to us every three years that you should have been in business in the first place.

I can think of easier ways to make a living.

But I cannot think of more satisfying ways.

I admire your courage—but that doesn't mean I would make life any easier for you. Your license lets you use the public's airwaves as trustees for 180 million Americans. The public is your beneficiary. If you want to stay on as trustees, you must deliver a decent return to the public—not only to your stockholders. So, as a representative of the public, your health and your product are among my chief concerns. . . .

I have confidence in your health.

But not in your product. . . .

Like everybody, I wear more than one hat. I am the Chairman of the FCC. I am also a television viewer and the husband and father of other television viewers. I have seen a great many television programs that seemed to me eminently worthwhile, and I am not talking about the much-bemoaned good old days of "Playhouse 90" and "Studio One."

I am talking about this past season. Some were wonderfully entertaining, . . . some were dramatic and moving, . . . some were marvelously informative, . . . When television is good, nothing—not the theater, not the magazines or newspapers—nothing is better.

But when television is bad, nothing is worse. I invite you to sit down in front of your television set when your station goes on the air and stay there without a book, magazine, newspaper, profit-and-loss sheet or rating book to distract you—and keep your eyes glued to that set until the station signs off. I can assure you that you will observe a vast wasteland.

You will see a procession of games shows, violence, audience participation shows, formula comedies about totally unbelievable families, blood and thunder, mayhem, violence, sadism, murder,

Western badmen, Western good men, private eyes, gangsters, more violence and cartoons. And, endlessly, commercials—many screaming, cajoling and offending. And most of all, boredom. True, you will see a few things you will enjoy. But they will be very, very few. And if you think I exaggerate, try it.

Is there one person in this room who claims that broadcasting can't do better?

Well, a glance at next season's proposed programing can give us little heart. Of seventy-three and a half hours of prime evening time, the networks have tentatively scheduled fifty-nine hours to categories of "action-adventure," situation comedy, variety, quiz and movies.

Is there one network president in this room who claims he can't do better?

Well, is there at least one network president who believes that the other networks can't do better?

Gentlemen, your trust accounting with your beneficiaries is overdue.

Never have so few owed so much to so many.

Why is so much of television so bad? I have heard many answers: demands of your advertisers; competition for ever higher ratings; the need always to attract a mass audience; the high cost of television programs; the insatiable appetite for programming material—these are some of them. Unquestionably these are tough problems not susceptible to easy answers.

But I am not convinced that you have tried hard enough to solve them.

I do not accept the idea that the present over-all programing is aimed accurately at the public taste. The ratings tell us only that some people have their television sets turned on, and of that number, so many are tuned to one channel and so many to another. They don't tell us what the public might watch if they were offered half a dozen additional choices.... I believe in the people's good sense and good taste, and I am not convinced that the people's taste is as low as some of you assume....

I believe that the public interest is made up of many interests. There are many people in this great country, and you must serve all of us. You will get no argument from me if you say that, given a choice between a Western and a symphony, more people will watch the Western. I like Westerns and private eyes too—but a steady diet for the whole country is obviously not in the public interest. We all know that people would more often prefer to be entertained than stimulated or informed. But your obligations are not satisfied if you look only to popularity as a test of what to broadcast. You are not only in show business; you are free to communicate ideas as well as relaxation. You must provide a wider range of choices, more diversity, more alternatives. It is not enough to cater to the nation's whims—you must also serve the nation's needs....

Every one of you serves a community in which the people would benefit by educational, religious, instructive or other public service programing. Every one of you serves an area which has local needs—as to local elections, controversial issues, local news, local talent. Make a serious, genuine effort to put on that programming....

We need imagination in programing, not sterility; creativity, not imitation; experimentation, not conformity; excellence, not mediocrity. Television is filled with creative, imaginative people. You must strive to set them free....

What you gentlemen broadcast through the people's air affects the people's taste, their knowledge, their opinions, their understanding of themselves and of their world. And their future.

The power of instantaneous sight and sound is without precedent in mankind's history. This is an awesome power. It has limitless capabilities for good—and for evil. And it carries with it awesome responsibilities—responsibilities which you and I cannot escape....

was a trend away from violent action-adventure programs toward gentler programs featuring doctors and lawyers.

The medical profession was the subject of two popular series. "Ben Casey" (ABC) was a tough resident neurosurgeon who worked under the guidance of a wise mentor. "Dr. Kildare" (NBC) was a young doctor, softer than Casey, who also worked under an older, wiser mentor. The legal profession was the subject of "The Defenders" (CBS). "The Defenders" broke new ground when it presented a program dealing with a performer who had been blacklisted. Over the next few years other programs began dealing with issues once thought to be too controversial for television.

CBS, more than any other network, used the *situation comedy* to build nighttime audiences. Under the leadership of program chief Jim Aubrey, CBS programmed night after night of half-hour situation comedies, many of them with rural themes. "The Real McCoys," which premiered on ABC in the fall of 1957, was the first *rural* comedy. By the spring of 1958 it was one of the ten most popular programs on television. The premise was a simple one—a country family packs up and moves to the Los Angeles area. In 1960, the second hillbilly hit premiered on CBS, "The Andy Griffith Show." The country craze had started. During the next few years America's audiences watched the corn grow on CBS with programs like "The Beverly Hillbillies" (featuring newly rich hillbillies from the Ozarks who settle in Beverly Hills), "Petticoat Junction," "Mayberry, R.F.D.," "Gomer Pyle, U.S.M.C.," and "Green Acres." There was even a country variety program on CBS called "Hee Haw." It is still in syndication.

In the fall of 1961 NBC began to program feature-length films on Saturday nights. NBC's "Saturday Night at the Movies" was a ratings success, and in the spring of 1962 ABC began programming a movie on Sunday night, "ABC Sunday Night Movie." CBS resisted movie fever until the fall of 1965, when the "CBS Thursday Night Movie" appeared. The networks realized quickly that the number of big motion pictures was limited and began developing properties for production into feature-length motion pictures. The first made-for-TV movie, "See How They Run," was broadcast in 1964.

By 1969 advertising had evolved to the point where the size of the audience didn't matter as much as the **demographic** makeup of the audience. Programmers began to reach for those high-income, big-spending groups so desired by the advertising community. Yet while the situation comedies certainly attracted some important audience segments, sex and violence still drew the masses. In early 1969 Senator John Pastore conducted hearings on the amount of sex and violence on the networks. The networks reacted to the Pastore hearings in the same way as they had to Newton Minow's attack: in the fall of 1969 doctors and lawyers reappeared. Once again television was on the defensive.

11.14 The Turbulent Seventies and the Spin-off

The 1970s were a turbulent decade for the television industry. Television increased its *live* coverage of world events. Women moved from the home to the work force in large numbers. Soap-opera-type programs, once only seen during the daytime hours, now

were broadcast during prime time. Movies and sports programming increased. The networks began to program short, multisegment series presented over several successive evenings. The British influence continued to be seen in situation comedies. And the program cycle evolved into the **spin-off** series.

In the fall of 1970, television audiences could watch seven different network movies per week. Many of the movie presentations were of the made-for-television variety, but the majority were films that had been first seen in motion picture theaters. As the decade progressed, the competition between the three networks resulted in a dramatic increase in the prices they had to pay for television film rights. The networks found that they could produce made-for-television movies for less money. Some of the series promoted under movie titles were not really feature film presentations. For example, the "NBC Mystery Movie" that first premiered in 1971 was a series of three (later four) **long-form** police and mystery programs that rotated throughout the year. Some of the made-for-television movies were *pilots* for series that would later appear. The use of the long-form program for piloting purposes was a technique that was used as early as the 1950s. Both "The Untouchables" and "The Defenders" were originally plays for television.

Program executives increasingly used *sports programs* in prime time. Basketball, baseball, and boxing had first been used as program vehicles in the 1940s, but most contests had been covered in a manner similar to news events. Throughout the 1960s ABC had further developed its sporting events coverage technique, using drawings, slow motion, expert commentary, and extensive coverage of the happenings which surrounded the sporting event. During the 1960s ABC provided coverage of the Olympic Games and developed a team of sports producers and on-air talent second to none. In 1970, ABC obtained the rights to broadcast a professional football game on each Monday night during the season. "ABC Monday Night Football" more often than not is among the top twenty-five series each year. NBC began broadcasting baseball on Monday nights in the summer of 1972. ABC took over the Monday night baseball slot in 1976.

In the 1960s public television (see chapter 14) had begun broadcasting British-produced programs that serialized novels. By the 1970s "The Forsyte Saga" and the anthology series "Masterpiece Theatre," particularly the latter's long-running "Upstairs Downstairs," were popular among public television's small but loyal audience. The limited series format seemed applicable to commercial television, but the first attempt to present a novel for television did not occur until February 1976, when ABC adapted Irwin Shaw's best-seller *Rich Man, Poor Man*. Twelve hours of programming were presented in prime time during the course of one week. The audience response was immediate and positive. In September of the same year ABC presented a sequel, "Rich Man, Poor Man—Book II." It too was popular with audiences. NBC got into the book adaptation cycle with the series "NBC's Best Sellers." In January 1977 ABC programmed the most successful limited series in television history, "Roots." The series was based on Alex Haley's novel and traced a family of blacks from 1750 in Gambia, West Africa, to the United States at the end of the Civil War. "Roots" was presented on eight successive nights and attracted an audience whose size was unprecedented. The series was lauded, but it also received much criticism for what some charged was distortion of history and for the manner in which

black-white relations were portrayed. The success of "Roots" spawned a sequel two years later, "Roots: The Next Generations." Soon all three commercial networks were programming limited series based on best-selling novels.

During the middle of the decade, the British influence began to be felt on the situation comedy. Producer Norman Lear used a British comedy series, "Till Death Do Us Part," as the inspiration for "All in the Family" (CBS), which first aired in January 1971. A radical departure from previous sit-com efforts, it didn't portray America or Americans in near-perfect terms. The chief character, Archie Bunker, was a loud-mouthed bigot who entertained as he offended. While Archie was the focus of the series, there were other strong characters, who were later spun off into series of their own.

11.15 New Technologies Challenge the Networks

As more households subscribed to cable, the three networks' share of the audience decreased. A certain amount of *erosion* was inevitable. As viewers were given more choices, more took advantage of the opportunity to watch the **imported signals** of independents and the **pay channels** offered on the local system. Figure 11–8 shows the distribution of the prime time audience among various forms of television from 1979 through 1981. Note that in homes without any form of cable the percentage watching the networks remained relatively stable, while the homes watching "other on-air" signals increased by approximately a third. When homes with only pay cable services are added, there is an increase in the number of homes watching television during the evening. However, fewer homes with pay services watch network television. The consensus among television executives and analysts is that the networks will continue to lose prime time audience to the pay services for the remainder of the decade. There is sharp disagreement on the predicted size of the loss, however. Some forecast that the networks' share may drop to as low as 60 percent of the prime time audience by 1990.

Much as television executives might wish to blame cable for the loss of audience, the numbers in figure 11–8 show that even in households without cable there has been some loss of audience to *independent* and *public stations*. Another factor is the use of *home video recorders* and *video games*. Many families use their recorders not only for recording programs for playback at more convenient times, but also for viewing rented or purchased movies. The video game craze in the early 1980s also might have contributed to lower audience numbers. Some critics point out that as the quality of network television has decreased, the audience has become increasingly choosy about the programs it watches. They predict that the audiences will return to network television when the quality of programs improves.

The networks' response has been to change programming strategy slightly. In the winter of 1983, ABC seemed to be planning to program more limited series based on best-selling novels. Both "The Thorn Birds" and "The Winds of War," broadcast in February and March 1983, drew large audiences. Both NBC and CBS had previously scheduled these "big" programs during national rating sweep periods. Now it appears that all three networks will follow this strategy for some time. NBC has responded to the quality problem by developing a few series with greater sophistication than programs seen in

FIGURE 11–7. "All in the Family"
"All in the Family" brought the harsh reality of Archie Bunker's bigotry into the homes of America. Television comedy was never the same.
SOURCE: CBS Inc.

FIGURE 11–8. Prime Time Viewing, 1979–81

	RATINGS		
	1979	*1980*	*1981*
HUTS without Cable			
Network affiliates	53.5 (91)	54.7 (88)	53.7 (87)
Other stations	6.8	8.7	9.5
HUTS with Basic Cable			
Network affiliates	55.7 (72)	50.9 (82)	49.0 (81)
Other stations	10.0	11.4	10.7
Basic cable	2.4	2.2	2.6
HUTS with Pay Cable			
Network affiliates	50.5 (72)	53.8 (70)	45.8 (65)
Other stations	9.5	12.1	13.3
Basic cable	1.9	2.9	3.2
Pay cable	10.5	10.9	12.0
Composite HUT			
Network affiliates	53.6 (88)	54.1 (84)	51.5 (81)
Other stations	7.6	9.6	10.5
Basic cable	0.6	0.8	1.0
Pay cable	0.9	1.5	2.3

NOTE: A rating is the percentage of homes having television receivers that are watching during a particular time period. HUTS stands for households using television. Numbers in parentheses are "share," the percentage of homes watching television that are watching a specific channel.
SOURCE: *Broadcasting, Broadcasting/Cable Yearbook 1983*, and Nielsen Company, 1982.

recent years. While these programs have not developed into overwhelming hits, the oldest network seems to have a long-range plan to carve out a particular audience segment which will be insulated from pay channel erosion.

11.2 THE TELEVISION AND CABLE AUDIENCE

Television is the most popular source of entertainment and information in the United States today. As the medium has grown in popularity, so has the number of stations. The increased use of cable multiplies the number of stations and channels available to consumers. Figure 11-9 shows the increase in the number of stations available. Note cable's impact on the number of viewing options available to subscriber households.

When we look at the world of the television audience, we are examining a large group of people:

In January 1982 it was estimated that 81.5 million American households, representing 215 million persons, owned at least one television set.

FIGURE 11–9. Increase in the Number of Channel Choices, 1964–81

NUMBER OF STATIONS	PERCENT OF HOMES WITH TELEVISION THAT CAN RECEIVE STATIONS/CHANNELS			
	1964	1972	1981	1981
1–3	22	6	3	3
4	19	11	5	5
5	14	12	8	8
6	19	10	9	9
7	12	18	10	8
8	6	12	9	6
9	4	11	13	8
10+	4	20	43	53

SOURCE: Nielsen Company, 1982.

Fifty-two percent of the homes had two or more sets.

Color sets made up 86 percent of the total number of receivers.

Seventy-five percent of the persons who make up the television audience are 18 or older.

Twenty-one percent of the adults are over the age of 55, 23 percent are between 35 and 55, and 31 percent are between 18 and 35.

Forty-seven percent of the adult audience is male, 53 percent female.

11.21 Audience Composition and Viewing Behavior

Television differs from radio not only in terms of its *physical* characteristics—an audio-visual versus a strictly audio medium—but also in terms of its *portability*. While portable sets can be used to watch programs outside the home, most viewing is done in the home. Viewing behavior is determined by a number of factors, including the amount of time spent at home, work schedules, and the programs offered at a particular time. Some viewers use home video recorders to tape programs they miss while they are away from home. The impact of these machines on audience behavior has yet to be evaluated, but common sense tells us they have the potential to influence viewing behavior.

One of the many things television programmers evaluate when developing a program schedule is how much television people view, and who watches when. During the 1980–81 television season the average television household watched an estimated 6 hours and 44 minutes per day, 47¼ hours per week. There are seasonal variations—the heaviest viewing occurs in the winter months, and viewers watch least in the summer. The amount of television consumed by Americans has steadily increased over the years.

Unlike radio, television's audience steadily *increases* during the day. At 7:00 A.M. less that 10 percent of the television households are watching, by noon approximately 25 percent of the homes have tuned in, and in the evening nearly 70 percent of the televi-

sion households are watching. By midnight about 25 percent of the homes are still viewing.

The amount of television a household watches seems to be influenced by at least three factors.

First, the presence of *children* in the household will significantly increase the amount of television viewed—approximately sixty hours per week for households with children, versus about forty-three hours for homes without children.

A second factor is *household size;* the larger the household, the more viewing is done.

The third factor is whether the home subscribes to *pay cable.* Pay cable homes watch more television than do homes without pay cable.

Who watches television? Research done by the A. C. Nielsen Company (1982) indicates that women watch more television than men, older persons watch more than young persons, young children watch more than older children and teens, and black households watch more than nonblack households. Almost a third of the total audience viewing is done in the evening hours. However, other parts of the day also have heavy viewer use. The Monday–Friday late afternoon slot makes up 16 percent of the hours viewed. Fourteen percent of the total number of hours viewed comes in the 10 A.M. to 4:30 P.M. weekday slot. Less than 5 percent of the total amount of viewing is done during the day on weekends.

11.22 Television Dayparts

Like radio programmers, television programmers divide the day into specific dayparts, which have distinct characteristics that reflect the audience's use of television. The television dayparts commonly used are seen in figure 11–10. A network affiliate normally broadcasts network-supplied programming during the early morning, morning, prime

FIGURE 11–10. Television Dayparts

DAYPART	*TIME*
Early morning	6:00 A.M.–9:00 A.M.
Morning	9:00 A.M.–Noon
Afternoon	Noon–4:00 P.M.
Late afternoon or early fringe	4:00 P.M.–6:00 P.M.
Early evening	6:00 P.M.–7:30 P.M.
Prime access	7:30 P.M.–8:00 P.M.
Prime time	8:00 P.M.–11:00 P.M.
Late evening or late fringe	11:00 P.M.–11:30 P.M.
Late night	11:30 P.M.–2:00 A.M.

NOTE: Time shown in eastern standard time/Pacific standard time. Subtract one hour for central standard time/mountain standard time.

time, and late night dayparts. Some network programming may appear in the afternoon and early evening dayparts. The local station normally programs the late afternoon, prime access, and late evening slots.

11.3 TELEVISION PROGRAM TYPES

While the titles, stars, and stories of television programs change regularly, the formats don't change nearly as often. *Format* is the term used to describe the basic elements of a program. These elements include whether it is a comedy or a drama, live or animated, news or fiction; the type of characters and the situation in which they live; and the manner of presentation.

Why don't formats change very often? The answer is simply that audiences seem to like specific formats and programmers feel comfortable with the tried and true. In general, there are two major classes of programs: *entertainment* and *news and public affairs*. Each class consists of many different formats and types, and in some instances there are overlaps.

11.31 Entertainment Programs

Programs designed to entertain make up the bulk of commercial television programming. Although many critics castigate commercial television for its failure to provide more programs designed to inform and educate, research shows that most people watch television primarily for entertainment.

The *situation comedy* is the backbone of the prime time television schedule. Sit-coms are almost always thirty minutes in length and entertain through comedy. Each series focuses on a particular set of characters and traces them through a variety of situations. In developing a situation comedy, it is especially important to develop main characters who are likable and interesting and who function in a situation that can be exploited for comedy. Both character and situation are important if the program is going to be successful.

The other major entertainment program form is the *dramatic program*. Dramatic programs can be divided into several different categories: action-adventure; dramatic anthology series; continuing dramatic series, including soap operas (also called "domestic drama"); professional or situational dramatic programs; and docudramas and long-form dramatic documentaries. Most dramatic series are a minimum of one hour in length, and many run two hours or more.

In the *action-adventure* program the premium is on the development of one strong character who functions in an environment which lends itself to action. Generally the strong main character has a friend or sidekick who provides support. A calmer form of the action-adventure program is the mystery-suspense series. While there is some action

in this type of program, the emphasis is on solving the mystery. Programs such as "Hart to Hart" and "Remington Steele" feature both action and mystery.

The *professional* or *situational dramatic series* is similar to the action-adventure except that the emphasis is on character and a calmer resolution to the problem. The main character often has a professional occupation. Some programs don't use a major character, but focus on a family or a situation to provoke the dramatic situation each week. One recent series, "Fame," used New York City's High School of Performing Arts as the setting for its drama and managed to weave in musical numbers as a part of the program.

The *soap opera* is a program form that has been around almost since the beginning of television. The form is simple: Utilize a cast of continuing characters and place them in an environment which forces them to come together. Allow the drama to continue from day to day in a manner similar to a serial. Always have several plot lines going at the same time. Occasionally bring in new characters and delete old ones to keep the stories fresh and interesting.

Soap operas can address subject matter often taboo on prime time television. At one time the most controversial thing that soap operas could portray was marital problems brought on by drinking or an occasional flirtation. Today soap operas routinely deal with adultery, incest, homosexuality, multiple-partner pairings, abortion, venereal disease, and catastrophic illness. If it plays in the soaps, chances are you'll soon see it on prime time. Soap operas have also been used to inform viewers of the dangers of cancer and other illnesses. Because of their large and loyal viewership, soap operas are an important part of the American television scene.

In the late seventies the soap opera came to prime time. These programs consist of a continuing story (or stories) that unfolds over a **season**. The dramatic situation may be the goings-on in a family ("Dallas," or "Dynasty") or a professional situation ("Hill Street Blues"). Normally more than one story unfolds during a single program. The last program of the season ends with the major characters in dire straits, in hopes of holding audience interest until the fall, when the new programs of the series begin.

The *dramatic anthology* series has not appeared on commercial television in several years. What serious drama there is on commercial television is restricted to occasional specials of two hours or more. Some of these specials are *docudramas* or long-form dramatic **documentaries**. A docudrama is a dramatized historical situation. Programs such as "Roots," "Missiles of October," "Blood Feud," and "Behind Closed Doors" are examples of docudramas. Long-form dramatic documentaries are programs of two hours or more that portray a real-life situation in dramatic terms. Unlike docudramas, dramatic documentaries are presented in traditional documentary style and don't take dramatic liberties with the content.

Another popular entertainment form found most often during the daytime is the *game show*. The ingredients for a game show vary, but there seem to be some common elements. First, contestants must be able to win fairly large prizes. Second, the master of ceremonies must be pleasant and relatively good-looking, and is almost always male. Third, the contestants must be equally pleasant. In addition, they must not only be good at the contest but must perform while winning or losing. They also must be types with

whom audience members quickly identify. Finally, there must be some level of audience participation in the studio—encouraging the contestants, giving them advice, moaning when they lose.

Children's programs are perhaps the most controversial type. Most children's programming is scheduled for weekend mornings and consists of animated action-adventure programs. Only a few are real-life drama. Some dramatic programming for children is run on weekday afternoons, but these are infrequent afternoon specials. Prime time programming for children consists of animated specials seen mostly around holidays, and the Walt Disney programs. Children are often called commercial television's forgotten audience.

An audience segment that isn't forgotten by commercial broadcasters is sports fans. Sports programs range from simple coverage of an event to events staged especially for television. Examples of the latter are competitions pitting sports and show business personalities against one another as they run, bicycle, and so on. These programs are sometimes called *trash sports*.

11.32 News and Public Affairs Programs

News and public affairs programs are an important part of the program schedules of both networks and local stations. Programs produced by local stations are almost always news and public affairs programs. A local station's news department normally produces between ninety minutes and two hours of programming per day during the week and about an hour per day on the weekend. A station may present a thirty-minute news program at noon, an hour or more during the early evening, and a thirty-minute late evening newscast. The local news program generally emphasizes local, state, and regional news. Weather and sports are also important components of the local news program.

The network nightly news programs emphasize national and international news. Weather and sports are not covered on a regular basis. All three networks have large news-gathering organizations that compete vigorously with one another. Networks place particular emphasis on successful news programs because the audiences they draw normally will watch the local news efforts, too. The person who reads the news is called the *anchor*. Much of the success of any news program rests on the ability of the anchor to make the news comprehensible to the average television viewer. Anchors must develop a relationship with their viewers. Once these news personalities establish themselves, networks are reluctant to make changes.

Other types of news and public affairs programs are *news interview* programs and *news magazines*. Most news interview programs have similar formats: a guest who is a prominent newsmaker is interviewed by one or more reporters. "Face the Nation" (CBS), "Meet the Press" (NBC), and "Issues and Answers" (ABC) are the best-known network programs of this type. Most local stations produce similar programs. News magazine programs come in a variety of formats. CBS's weekly "60 Minutes" consists of three short documentary segments plus a few lighter features. Similarly, ABC's "Good Morning

America," presented each weekday morning for two hours, consists of news, interviews, and light features.

There are some interesting *syndicated programs* that fill in the gaps not covered by network or local station informational programs. Group W's "PM Magazine" is produced using segments produced by stations that broadcast the program. While many of the segments are light, some short documentary material is used. "Entertainment Tonight" is produced each weeknight and emphasizes coverage of show business. "At the Movies" takes a weekly critical look at the latest films; the program is hosted by film reviewers Gene Siskel and Roger Ebert.

During the first two decades of television the *documentary* was an important program form. Today television programmers have replaced the traditional documentary with the docudrama and the long-form documentary, program forms more palatable to the entertainment-oriented television audience. Thus there is no regularly scheduled documentary series on commercial television. However, the networks do occasionally present a news documentary program in the guise of a special. As the number of documentaries has declined, the number of news events covered by the networks has increased. News conferences, the landing of the space shuttle, visits by foreign dignitaries, and congressional hearings are just a few of the events covered by the news departments of the commercial networks.

11.33 The Electronic Church

Since the earliest days of television there have been *religious programs*. As early as the mid-1950s the three commercial networks each presented one or more weekly religious programs on Sunday mornings and, just prior to sign-off, a nightly devotional program. Since 1970 there has been a rapid increase in the number of religious programs appearing on television. Part of the impetus for the growth of religious broadcasting has been the growth of evangelical religious organizations. These fundamentalist groups use television as a vital part of their ministry. Most such groups have a leader with a strong television presence. Personalities like Pat Robertson, Oral Roberts, Jerry Falwell, Rex Humbard, and Jimmy Swaggart have long-running television programs. Billy Graham presents hour-long programs in prime time to advance his ministry. Other groups buy prime time to present programs about their work and to raise money to continue it. Generally, these programs feature name entertainers who are active in the movement.

11.34 Teletext, Videotext, and Video Games

While commercial broadcast television and cable services count audiences in the millions, teletext and videotext operators are looking at much smaller audiences. Videotext and teletext are still in the experimental stages, not only in the United States but also in for-

eign countries. Although some analysts predict a rosy future for many of the companies that translate text into television, others feel that there is little consumer demand for text information and that the emphasis must be on entertainment material. And cable operators, who have already invested millions in building their systems, have thus far shown little inclination to invest more in developing videotext services.

There really is no clearly defined market for text services. The services that have the most subscribers use personal computers to access the data base rather than a television or cable signal. The largest three services of this type are The Source, CompuServe, and the Dow Jones News Retrieval Service.

Despite the cloudy future, some companies have made the plunge into teletext and videotext. CBS has started a teletext service called ExtraVision. The system is designed to be advertiser-supported, with the consumer paying only for the decoding device which allows the material to be displayed on the television receiver. Time Inc. is planning to enter the teletext business with a 5,000-page service which it will sell to consumers on a monthly subscription basis. NBC plans to enter the field also.

Videotext services have started in some areas. Knight-Ridder, in partnership with American Bell Inc., started a commercial videotext service in southern Florida in the summer of 1983. The service offers 75,000 pages of news, weather, sports, banking services, and games to subscribers. Times-Mirror started a videotext service called Gateway in parts of Los Angeles in the spring of 1984. The services offered will be similar to those provided by Knight-Ridder. *Indax*, a system developed by Cox Cable, is in the testing stage. Cox is also experimenting with videotext technology in the educational services area.

In the mid-1970s electronic games began to compete with traditional pinball machines for consumer attention. By the early 1980s video games had become a national phenomenon, and the hardware had entered the home. Atari, Intellivision, and Colecovision were the best-known names in the field. Today video game machinery has been teamed up with more sophisticated computer devices and competes with conventional television programs for audiences. How much of an impact video games have had on television viewing is not known. However, some entrepreneurs feel that there is a sizable market for a video games service delivered to the home, and one called the Games Network is scheduled to begin operations in the fall of 1984.

11.35 Cable Program Services

Cable systems are supplied by many different program services, some of whose product is unique. The national basic and pay services are delivered to the cable operator via satellite. The regional services may be satellite-delivered or distributed by microwave systems. One of the distinctive qualities of cable services is that they tend to be specialized. Even the advertiser-supported basic services attempt to appeal to a sizable yet specialized audience segment. A list of a few of the basic and pay services is given in figure 11–11.

FIGURE 11–11. Selected Basic and Pay Cable Program Services

BASIC SERVICES

News and Public Affairs
- Cable News Network (CNN)
- CNN Headline News
- C-SPAN America's Network
- Dow Jones Cable News
- Financial News Network

Specialized Information
- Electronic Program Guide (EPG)
- The Weather Channel

Entertainment
- Country Music Network
- Music Television (MTV)
- The Nashville Network (TNN)

Sports
- Entertainment and Sports Programming Network (ESPN)
- USA Network

Ethnic and Religious
- Black Entertainment Television (BET)
- CBN Cable Network
- Eternal Word Television Network
- National Christian Network
- National Jewish Network
- Spanish International Network (SIN)

PAY SERVICES

Movies
- Cinemax
- Home Box Office (HBO)
- The Movie Channel/ Showtime

Adult Programming
- Bravo
- The Playboy Channel

Variety
- Galavision
- Home Theatre Network Plus
- The Disney Channel

11.4 PROGRAM SOURCES

There are three sources of the television and cable programs we watch on our local stations or cable system. First, there are *commercial television networks*, the *regional television networks*, and the various *cable program* services. Second, there are *syndicators*. Third, the *local station* and *cable system* produce programs. Most programs go through the same sort of development process.

11.41 Program Development

All television programs begin with an *idea*. The idea may be to take a well-known novel and develop it for television, or it may simply be a desire to inform children about the world around them. Whether the idea is simple or complex, the first step is to get it down on paper. Once the idea has been written down, the producer can begin to flesh it out and make decisions concerning whether the idea deserves a single program or a series.

After the original idea has been thought out and made more concrete, the next step is to develop a *treatment*. A treatment is simply a summary of the program in narrative form. For a dramatic program, it reads much like a short story. Short portions of dialogue may be included in the treatment. For a news, variety, game, or other such program it may be more like a detailed outline, with some descriptive material included to amplify key points.

If the treatment is approved by the person in charge of the development of the program and if the necessary financial backing is obtained, a *pilot*, or sample program, will be produced to show the network, syndicators, or stations what the proposed program will look like. The first step in developing a script for the pilot is to write a *scenario*, a detailed outline of the story. It provides the basis for the first draft of the shooting script, the document from which the cast and crew will work to film or tape the program. It may take several drafts before the first script is completed. Then the program is produced, edited, and shown to prospective buyers. Even if the pilot is sold, the buyers may want changes in the final series.

11.42 The Network's Role in Programming

One of a network's major advantages is that it centralizes many of the business functions that are national in scope, and carries out these activities at a lower cost to the individual station than the station could achieve on its own. There are two areas in which centralization is very efficient: the sale of *national* advertising, and *programming*. In the programming area, the networks perform two important functions: they *develop* programming for possible network play, and they *schedule* and *distribute* the programming to their affiliated stations.

When the pilots that have been ordered by the networks from independent producers are finished, they are viewed by program executives, and decisions about ordering additional programs are made. Networks order more pilots than they can possibly use; in fact, most pilots are never approved for full series production and the ideas die. Some producers try to sell the ideas to other networks, or attempt to find another buyer for the series. Sometimes these programs will be sold to stations through a syndication service.

The second major function of the network's programming area is the scheduling of programs. Network programs are generally premiered during one of three seasons. Most new programs are premiered in September–October, the beginning of the fall season. Within a few weeks some programs are withdrawn because of low ratings; others are shifted to new times. The second season begins in January. During this month many replacement series are premiered and major changes in program lineups are made. The third season begins in March–April. During this period short series of only a few episodes are shown. Programmers watch the ratings data carefully to see if there is enough audience to warrant putting the program into full production. Many of the successful short series are brought back for a full run in the next fall season.

The development, piloting, and production of a television series costs hundreds of millions of dollars each year. But few of the ideas ever come to fruition, and the majority

of programs that do premier each season fail. Programming is a *high-risk* business. Not only must the network programmer come up with new ideas, but the ideas must be acceptable to the fickle television audience. In order to decrease the risk of failure, programmers tend to stay with ideas, formats, plot lines, production personnel, and on-air talent that have proven to be successful in the past. Many situation comedy series are based on programs that have been successful in Great Britain: if the American adaptation fails, the programmer can always hide behind the fact that it was successful once. Critics of the television industry blame the cost of program development and the high risks involved for what they see as the low quality of television.

11.43 Syndicators

When a network buys a series it generally only owns the **rights** to broadcast each program two or three times. If the series has run for three or more years, there generally are enough episodes to warrant syndicating the program. Often a program is syndicated while original segments are still being shown. The station that is programming the reruns can use the network series to help build interest in the rerun material, and vice versa.

The series is sold by the producer to a syndicator who then sells it to local stations. Syndicators not only provide stations with reruns of network series but also sell original series and movie packages. In most cases, series are sold to a station for so much per program. The station gets unlimited broadcast rights to the programs in the series for a set period of time. Costs to a station may vary from a few hundred dollars per program in a small market to more than $100,000 per episode in one of the top two or three markets.

11.44 Local Production

Production in the local broadcast station varies according to the size of the market in which the station is located. Almost all stations produce some commercials for local advertisers. Most stations produce a local news program and one or more public affairs programs. Almost none produce entertainment or children's programs designed to meet the needs of the local audience.

The news program is the one local program that stations can use to make a profit. The competition for audiences among news programs is stiff, and intensifies during the four-times-a-year **sweeps** when audience ratings are measured. Each news staff develops special segments designed to encourage audiences to tune into the program. Perhaps the most important ingredient for the local news program is the *on-air talent*. Most local news programs have one or two anchors who read the news, a sports reporter, and a person who does the weather. The confidence of the viewing public in the objectivity of the anchors is an important factor in whether they are deemed "credible" or not. Most anchors present themselves as news professionals. They avoid extraneous comments designed to entertain, which may be interpreted by the viewer in a manner that harms the

anchor's professional image. On the other hand, the sports and weather talent are there to provide not only information but also entertainment. Thus we often find the sports and weather personalities making jokes and wisecracks about one another.

During the past few years stations have expanded their local news coverage. Often we find a noon news program, a program of an hour or more in the early evening, and another half-hour of news in the late fringe slot. These programs may vary in format and focus. For example, many stations produce an hour of local news in the early evening daypart, often two thirty-minute programs. The early program does some local, state, and national news highlights with a **teaser** announcing that an in-depth treatment will follow in the next half-hour. Other program elements in the early news include a short weather and sports summary. Much of the remainder of the program consists of softer news features about happenings in the local community, short informational segments obtained from syndicators of this type of material, movie and entertainment reviews, and consumer information. The later news program focuses on harder news.

When news programs fail to attract audiences in sufficient numbers *news consultants*, or "news doctors" may be called in. They analyze the news program in terms of its format and on-air talent, and conduct research to measure viewers' opinions on the program and the on-air personnel. Sometimes consultants recommend that the program be reformatted and new talent brought in.

Locally produced public affairs programs are predominantly **talking head** programs. Most use a one-on-one interview format. Some more ambitious stations will occasionally produce documentaries or public affairs specials. Few local stations go beyond that. The lack of adequate resources, meaning anything from personnel to profits, is the excuse given for not doing more local production.

Operators of cable systems also participate in local production. This area of local programming is relatively new, and the quality of programming varies widely from community to community. Unlike broadcast stations, many cable operators produce more than news and public affairs programs. Since there are so many more channels available for programming, many operators encourage members of the local community to produce programs using facilities provided by the cable company or a local group set up by the cable company. While this **origination** and **access** programming has its share of home movies, sex and violence, and exercises in self-indulgence, much of the programming is good. Citizen-produced public affairs programs on local problems, programs that display local talent, call-in informational programs, and programs similar to newspaper classified ad sections are a few of the shows that appear on cable systems. Some operators are discovering that local programs can attract large enough audiences to warrant advertiser participation.

11.45 Pay Cable's Role in Programming

Up until the early 1980s pay cable networks used recently released movies for most of their program offerings. However, as competition for subscribers has increased, so has the amount of original material produced for the pay channels. *Entertainment specials* featuring big-name entertainers are promoted to attract potential subscribers. Sports

programs are used on some channels, and Showtime has begun to produce series similar to those seen on commercial television. The Disney Channel weaves together Disney Studio movies and original programming (including some interactive program offerings) to produce a daily schedule similar to that found on broadcast stations.

11.5 PROGRAMMING STRATEGY

Television programs are developed in terms of potential appeal to viewers. However, no matter what the appeal of the individual program, it must be shown at a time when the audience is available to see it. In developing a schedule, programmers deal with three variables: (1) the *characteristics* of the audience, (who is watching when?); (2) the *programs available* to the network or station; and (3) the programs offered by *competitors*.

Program selection and the placement of those programs into a schedule reflect a philosophy of programming. One philosophy believes that audiences watch television relatively uncritically and will choose the program that is the least offensive. This "least offensive program," or LOP, philosophy attempts to attract viewers early in the daypart and to keep them by offering programs that are similar. The concept of **audience flow** is an important part of this programming strategy, which attempts to sequence programs so that once a viewer begins watching a station he stays with it until the end of the daypart. Programs developed within the confines of this philosophy attempt to do nothing that might offend viewers and provoke them to change channels. The other programming philosophy believes that audiences actively seek out programs. Adherents to this point of view believe that while audience flow is important, a particularly attractive, properly chosen program will cause viewers to switch channels.

11.51 Fundamental Concepts of Television Schedules

Programmers use a special jargon to describe various strategic methods of developing program schedules. A *crossover point* is a time in the schedule when two or more stations end programs. In figure 11–12, crossover points occur at 7, 7:30, 8, 9, 10, and 11 P.M. At each one of these times the station is vulnerable: viewers may switch to another channel. Careful scheduling reduces the temptation to switch channels.

Stripping is a term used to describe a program schedule that places the same program in one time slot Monday through Friday. For example, most stations strip their local news programs in the early evening and late fringe time slots. Since viewing habits are different on the weekend, stations generally don't strip the same program for seven days.

Checkerboarding is similar to stripping, except that instead of one program, five different programs of a similar format type are scheduled at the same time Monday through Friday. For example, in figure 11–12 WCCC schedules a syndicated game show at 7:30. If each day a different game show is presented, then WCCC has checkerboarded the 7:30 slot.

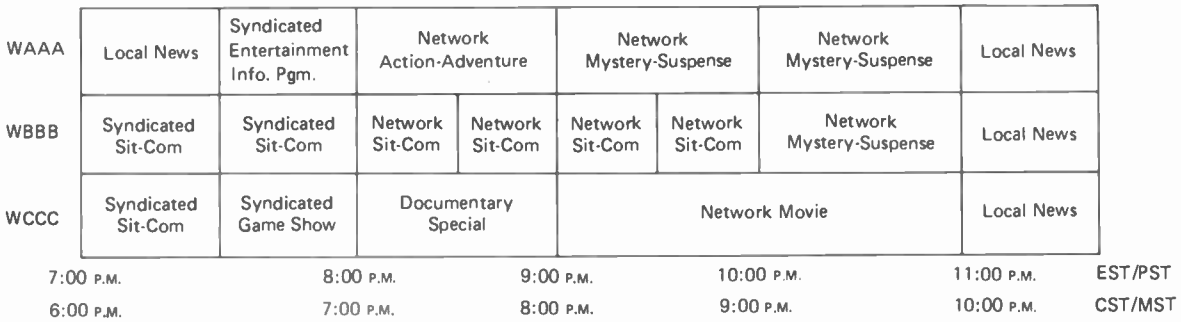

FIGURE 11–12. Prime Time Programming on Three Television Stations

Block programming describes another program schedule strategy. In order to create audience flow, programmers attempt to avoid abrupt changes in mood throughout the evening. One way is to schedule only one type of program for a major portion of the daypart. CBS used this programming strategy with great effectiveness by scheduling four or more situation comedies in a row during prime time. The three networks' lineups of two or more hours of soap operas in the late morning and early afternoon is also an example of block programming.

A concept similar to block programming is the creation of *adjacencies*. An adjacency is created when two or more programs that follow one another each become popular: the audience flows without interruption from one program to the next. When new programs are introduced it sometimes becomes necessary to break up adjacencies to create a solid spot for the newcomer. Surrounding a new program with programs that have proven audience appeal is called *hammocking*, the theory being that the two successful programs will create a strong audience flow across the time slot in which the new program is placed. *Tent-poling* is just the opposite of hammocking. The strategy is to place a strong program at, for example, 8 or 9 P.M. in hopes that it will attract audience for the program before and after it.

The last concept is *counterprogramming*. A station counterprograms when it offers a program different from that offered by another station. Scheduling a movie opposite a situation comedy and a mystery-suspense program is an example of counterprogramming. Independent stations use counterprogramming as their primary programming technique; they offer an alternative to the program fare available on the commercial stations.

11.52 Using Special Programs to Build Audiences

In addition to using the strategic ploys described in the preceding section, programmers also use *stunting*. One type of stunt is to create a program where the characters on one popular series visit a not quite so popular program. This is called a *crossover* (not to be confused with a crossover point in a schedule). The programmer hopes that the audience

for the popular program will follow its favorite characters to the other program and perhaps view future episodes.

Another type of stunting is the scheduling of **blockbusters** and special movies. Specials and movies with big-name stars are often scheduled during sweeps. The scheduling of a *limited series* on two or more successive nights is also a form of stunting, as is using stars to make guest appearances on programs that aren't drawing sizable audiences. These strategies have been used on programs across all dayparts.

While stunts may attract audiences for a brief period, programmers hope to attract substantial numbers of viewers each day over the whole season. When stunting is occurring, networks will also promote other programs in the schedule, in hopes that the heavy promotion will pay off in larger overall audiences.

11.53 Programming Cable

Three types of programming activities occur in cable. The first type of activity is choosing which basic and pay program services will be offered on the system and scheduling the local origination and access channels. The second type is programming the pay and basic program services. The third type is programming superstations.

Since the local origination and access channels aren't advertiser-supported, the cable operator can schedule more in terms of audience needs than of strong audience flows across dayparts. Thus you may find radically different programs adjacent to one another on local cable channels. Choosing the basic and pay services that will be offered on the system is primarily a matter of which services have the most audience appeal. There are presently in excess of sixty basic and pay program services in operation or whose start-up dates have been announced. The cable operator generally doesn't have enough channels to carry all of them. Careful market analysis must be done to determine which channels will meet the needs of the greatest number of people. The operator also must look at the economics of the situation. If the choice is between a basic service that charges a fee per subscriber and for which there is little return to the operator, on one hand, and a pay channel which may make the operator a profit of $4 to $5 per hookup, on the other, the operator makes the programming decision with the system's profit-and-loss statement in mind.

The programmer of the basic or pay service faces programming decisions similar to those made by broadcast programmers. However, in some instances there are radical differences. Most cable program services are designed to appeal to a particular segment of the audience. Here the programming decisions are similar to those faced by radio programmers. For example, the Cable News Network is designed to appeal to viewers who want news. So for CNN the major programming decisions are how to format the news presentations and structure the dayparts so that viewers can get the information they want within a short period of time. Other pay channels are competing against one another and the broadcast networks for audiences that want entertainment. Most pay channels feature movies that are repeated anywhere from four to eight times during the month. The movie offerings are scheduled so that there is a logical audience flow from one feature to another. Entertainment specials and other similar programs are often

used as counterprogramming devices. The important thing to remember about the pay channels is that each month the subscriber makes a choice concerning whether to continue to use the service. Subscribers who are dissatisfied will quickly switch to a service that they think will give them better service.

Superstations have programming problems not faced by most stations. Because they, too, compete with other services for channel space, programs with proven audience appeal must be offered. The three major superstations (WTBS-TV, WGN-TV, WOR-TV) are each programmed in a similar fashion. Offerings include sports, movies, and syndicated material with proven audience drawing power.

11.6 SUMMARY

The development of television programming can be divided into five major periods. The early period runs from 1939 to 1951. During these years television programs were either experimental or predictable copies of radio programs already being broadcast. The last few years of the period were marred by blacklists which banned certain performers from working in the industry. The years from 1952 to 1960 are known as television's "golden age." During this period the first situation comedies became popular, and dramatic programming reached a level never achieved since. But quiz show scandals undermined the public's confidence in the new medium, and the first of many government investigations of the industry occurred in 1958. New technologies changed television in the 1960s. The largest impact was in news and public affairs. Newton Minow's "vast wasteland" speech stimulated the networks to develop programs that didn't rely on sex or violence to attract audiences. During the 1970s the spin-off series became the single most important program form. And the early 1980s saw cable challenge the networks for audience shares.

The amount of television watched in a particular household varies. Factors involved include the presence of children, household size, and whether the home is a subscriber to a pay cable service. Television programs are divided into two major types: entertainment, and news or public affairs. Other types of television programs are religious programming, teletext and videotext services, and video games. Cable programs fall into the same categories.

Television programs are generated by local stations, television and cable networks, independent producers, and syndicators. In developing programming strategy, programmers deal with the characteristics of the audience, the type of programs available, and the programs offered by the competition. Techniques used in creating audience flow through a daypart include stripping, checkerboarding, block programming, hammocking, tent-poling, counterprogramming, and use of blockbusters during sweep periods.

CHAPTER 12 OUTLINE

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12.7 SUMMARY

12

MEASURING AUDIENCES

Seldom does a week go by without the press reporting the ratings of the three commercial television networks. Next to the programs themselves, ratings are probably the best-known part of the broadcast and cable business. Ratings are also the most misunderstood.

The numbers we see reported are derived from research conducted by a number of companies, and represent estimates of the size of an audience. The term *ratings* includes a number of different types of measurements. Included in the various numbers reported are size estimates of the total audience as well as smaller **demographic** segments. The demographic characteristics most often used are the age of the audience members, their sex, and whether women members work or not. Other demographic classifications include economic status, education, and ethnic representation.

When you have mastered the material in this chapter you'll be able to:

1. Understand the history of ratings research and know what ratings do and don't tell you

2. Identify the key elements of audience behavior

3. Define the methods used to obtain audience information and the key concepts used to express audience size

4. Recognize the major audience research companies and know how their methods differ.

12.1 THE DEVELOPMENT OF BROADCAST AND CABLE RATINGS RESEARCH

When broadcast stations first began operating, there was little need to *measure* audiences. The audiences were small, and the reason for establishing a station was to sell receivers. Even with the introduction of advertising in 1922 (see section 13.11) sponsors weren't really interested in knowing how many people listened. Competition from other advertising media, the creation of a large, national audience for radio programming, and a new economic climate soon changed that. Advertisers began to wonder if they were getting their money's worth from the advertising dollars they were investing in radio. A way to measure audience size was needed so that advertisers could make buying decisions based on facts.

Archibald M. Crossley created the Cooperative Analysis of Broadcasting (CAB) in 1929. Funded by the two major radio networks, NBC and CBS, the purpose of the organization was to determine how many people listened to the programs presented by the two networks. The information was published every two weeks and sent to advertising agencies and sponsors. The method used by the CAB researchers was simple. They called a group of people each morning and asked them to recall what they had listened to the previous day. After several surveys were taken it became clear that radio use varied not only from day to day but from daypart to daypart. The hours of heaviest use were between 7:00 P.M. and 11:00 P.M., and this became known as *prime time*. By the late 1930s, CAB was surveying thirty-three cities and calling at four different times during the day.

In 1934 Clark-Hooper Inc. founded a rival company, designed to measure the audiences for radio and magazines. When the company split into two parts in 1938, the radio portion was known as C. E. Hooper Inc. It measured the audiences for sponsored network programs. Like the CAB, Hooper used the telephone to survey audiences. However, rather than calling the morning after, Hooper called listeners during the day and asked them what program they were listening to at the time. This method of surveying audience listening patterns is called the *telephone coincidental* method.

A new method of measuring audience listening patterns was introduced in 1942 by A. C. Nielsen Inc. A mechanical device, called an *audimeter*, was attached to the radio receivers of a selected group of listeners. The audimeter recorded the stations to which the receiver was tuned and the amount of time that the receiver was tuned to a station. The results were published in the *Nielsen Radio Index*. Although the mechanical device was seen as a breakthrough in measuring the radio audience, its primary use has been for television.

During the 1950s there were an increasing number of complaints about the accuracy and use of ratings. The Federal Trade Commission took action against the major ratings companies and in 1963 forced them to stop advertising "100 percent accurate ratings." At hearings held in the House of Representatives that year, a procession of critics of the

ratings methods testified, causing one member of the committee to remark that the ratings looked like a "con game."

The broadcast, advertising, and ratings industry responded to criticism and formed a new organization to supervise and approve methods of measuring audiences. In late December 1963, the *Broadcast Ratings Council* was formed. The organization accredited research companies based on carefully designed criteria. While ratings remain controversial, the Broadcast Ratings Council has proven its value and maintained high accreditation standards. In 1982 the council changed its name to the *Electronic Media Ratings Council (EMRC)*. The name better reflects EMRC's concern with research done not only for radio and television but also for cable.

12.2 METHODS AND PROBLEMS

Ratings are part of the *feedback system* that provides information to programmers, sales personnel, sponsors, and advertising agencies. There are other methods that audience members might use to send feedback, such as letters and organized boycotts and protests. Generally, these forms of feedback represent the views of only a small part of the population, as research by McGuire and Leroy (1977) has demonstrated.

12.21 Defining the Research Problem

In the first portion of this chapter it was stated that ratings are the result of a process of research. The first step in undertaking any research project is to determine what it is we are trying to find out. Advertisers, stations, programmers, and others in the business of broadcasting and cable need to know the *number* of people who watch or listen to a station or a particular program. In addition to the size, we're also interested in the *demographic composition* of the audience.

Thus, we are interested in finding the answers to these four questions:

1. What is the total size of the audience watching or listening to a station?
2. What is the size of the audience watching a specific program presented at a particular time on a station?
3. What is the demographic composition of the audience in questions 1 and 2?
4. How does the size of one station's audience relate to other stations'?

12.22 Choosing a Research Method

There are four major methods used by researchers to gather data for analysis: **laboratory research, field study, content analysis,** and **survey research.** While survey research may be used to answer a variety of research questions, it is particularly well suited for determining the size of audiences for electronic media presentations. Survey

research is characterized by (1) the use of *samples* to represent the population under study; (2) the collection of data in *realistic* settings; and (3) the use of *statistical techniques* to analyze the data. When done correctly, it produces reliable and useful information.

Survey research is designed to provide answers to one of two types of questions. A *descriptive study* attempts to describe what the situation is at a specific point in time or during an interval of time. An *analytical study* not only describes a situation but attempts to determine why the situation is as reported. The measurement and the reporting of the size of audiences is a descriptive study. Some attempts are made to use ratings data for analytical studies, but this type of research normally requires additional data.

12.23 Selecting a Sample

Now that we've posed the research questions, we must begin to focus on the population we are going to examine. Ratings research focuses on a group of people who are defined by their ownership of a radio or television receiver. Cable studies focus on people who are cable subscribers. The total number of people who own receivers is called a *population*. We could collect data from every person in the population. This process is called a *census*. It takes a long time and is extremely expensive. Rather than survey everyone, we might choose a smaller group, representative of the entire community. The small group is called a *sample*. The relationship of a sample to a population can be seen in figure 12–1. There are advantages to using a sample rather than a population. A sample can be surveyed more quickly and much less expensively.

Samples can be chosen in a number of different ways. Broadcast research companies such as A. C. Nielsen Inc. and the Arbitron Ratings Company use the most basic technique, called *random sampling*. In random sampling, the sample to be surveyed is constructed by randomly choosing households that have television sets. Each household in the community has an equal chance of being chosen. In most broadcast ratings research, the random sample is chosen using a process called *multistage sampling*. First, the population to be sampled is chosen. Second, particular districts or blocks are chosen. Third, individual blocks within those districts are designated. Fourth, one home in that block is chosen as part of the sample.

Sometimes the use of multistage procedures doesn't result in a group that accurately reflects the community's demographics. In the multistage process described above, step two might result in underrepresentation of Mexican-Americans in the sample because of

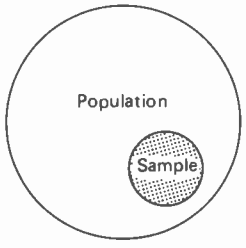

FIGURE 12–1. Relationship Between a Population and a Sample

traditional housing patterns. The researcher would have to give those areas in which there were heavy concentrations of Mexican-American families greater weight to ensure that a representative sample was selected. This process is called *stratified sampling.* Great care must be used to avoid overrepresentation of one or more groups in a randomly chosen sample. But obtaining a sample that perfectly reflects the demographics of the population is almost impossible. In order to overcome the over- and underrepresentation of specific demographic groups a technique called *weighting* is used. The demographic group representation in the sample is compared with the demographics in the population. Then the sample data is weighted so that the demographics of the sample reflect the actual demographics of the population.

12.24 Determining the Size of the Sample

How large should the sample be? There is no simple answer. The question of sample size is dependent upon how accurate you'd like the data to be and how much money you're willing to pay for the survey. The larger the sample, the more accurate the data, and the greater the cost. The most accurate sample would be everyone in the population. This is also the most expensive sample. There comes a point where the amount of additional accuracy simply won't be worth the additional expense.

Whenever we use samples of populations, we automatically introduce a *margin of error* into the results. These types of errors are called **standard errors** or **sampling errors**. Although a number of different factors may cause error, in general error is related to the size of the sample. The concept of standard and sampling error is important to accurate interpretation of ratings reports. Research companies that develop ratings reports for the electronic media state the amount of standard error in their measurements as well as the size of the sample used. Such statements are required for a research company to receive accreditation from the Electronic Media Ratings Council. When we read ratings data, we should keep in mind that the numbers are *estimates* and that they represent *measurement intervals.* For example, a rating of 10 represents the midpoint of an interval that may run from 8 to 12. The actual rating lies somewhere in the interval.

If ratings are only estimates, why is so much emphasis placed on them? The major reason is that they are the only measurement we have. Broadcasters and advertisers realize that the ratings are not exact representations of audience behavior. But since all stations are being measured on the same standard, industry professionals use the ratings data with a great deal of confidence.

12.3 GATHERING AND REPORTING THE DATA

Broadcast audience research services are provided by a number of different companies. The largest marketing research company is the A. C. Nielsen Company, which provides five Nielsen reports for television. Each report focuses on a different aspect of the television audience. Arbitron Ratings Company, a subsidiary of Control Data, provides local

radio reports and two television reports. Statistical Research Inc. releases one radio report. Radio Marketing Research Inc. releases a radio report also. Each company uses slightly different approaches to collect the data that makes up the report. In this section we'll examine the three basic methods of gathering data, the ways it's reported, and the four major companies that do the reporting.

12.31 Methods of Collecting Data

Survey data is collected using one or a combination of three methods: an electronic data-gathering instrument attached to the receiver, diaries, and interviews. The best-known electronic data-gathering instrument is the *audimeter*, first introduced by the A. C. Nielsen Company. The version used today by Nielsen is called a *storage instantaneous audimeter* (SIA). The SIA is attached to the television receiver and automatically records the time of usage and the channels tuned. Twice a day the SIA is contacted by a computer located at the Nielsen offices in Dunedin, Florida. On command the SIA feeds the data to the computer, where it is processed. This method of gathering data is the most accurate. However, it also costs the most of the three methods.

Diaries are used to gather much of the data for local radio and television reports. The subjects in the sample are contacted by telephone and asked to participate for a week in the survey. They receive a booklet, called a diary, in which they record the stations and the times they tuned to them. One of the problems with the diary method is that many are illegible, or subjects aren't conscientious about filling them out accurately. In many surveys only 50 percent of the diaries are returned and found to be usable. However, the diary method is less costly than the use of electronic equipment.

The third way of collecting data is through the use of *interviews*. Face-to-face interviews are no longer used in ratings research. Telephone interviews, however, are a feature of some of the national and local reports. There are two methods of telephone interviewing. The first is called the *telephone recall interview*. In this method, appointments are made with the sample home for a specific time over a period of seven days. A member of the household is chosen to participate in the survey and reports once or twice a day the household's radio and/or television use. The use of specific appointments overcomes the problem of portions of the sample dropping out, and seems to aid in accurate recall. The other telephone method is called *telephone coincidental*. Homes are called at random and asked what they are watching or listening to at the moment. The telephone coincidental method is very accurate, but many persons are unwilling to cooperate and feel the call is an intrusion on their privacy. Despite the large number of calls that must be made, it is a fast and cheap way to gather data.

12.32 Nielsen Reports

The A. C. Nielsen Company provides television broadcasters and marketing personnel with a variety of research services. The four reports that are the most important to broadcasters are the *National Television Index*, the *Nielsen Metered Market Service*, the

National Station Index, and the *National Audience Demographics Report*. Cablecasters use the *National HomeVideo Index*, which measures the use of cable channels and home video recorders in sample households.

The research activities that produce the *National Television Index* (NTI) continue fifty-two weeks a year. The weekly NTI reports provide audience estimates for nationally sponsored network television programming. Data is gathered using a sample of at least 1,700 households. Both meters and diaries are used to collect data. The *National Audience Demographics Report* (NADR) provides estimates of the composition of television households. This survey is conducted as a part of the NTI process. The *Nielsen Metered Market Service* provides daily and weekly reports on viewing in New York, Los Angeles, Chicago, San Francisco, Philadelphia, Detroit, Dallas, Washington, Boston, St. Louis, and Houston; scheduled for metered service by the end of 1985 are Miami, Minneapolis, and Cleveland. The daily reports are called *overnights*. They provide network and advertising executives with an almost instant picture of the previous day's viewing in the metered markets.

The *National Station Index* (NSI) is a report on television viewing in local markets, based on data gathered using meters and diaries. Some markets are surveyed seven times a year. Four times a year (November, February, May, and July) the NTI and NADR activities are combined with the NSI process to survey each of the over two hundred Nielsen markets individually. the four month-long periods during which local markets are being surveyed are called **sweep** periods, and the reports themselves are often called sweep reports. Plans are being made to include cable viewing data in the NSI reports.

12.33 Arbitron

Originally started by the American Research Bureau, Arbitron is now a subsidiary of Control Data Inc. Abitron provides three main broadcast services. It provides overnights for the same markets as Nielsen and, in addition, surveys of local television markets. The Arbitron sweeps coincide with the Nielsen sweeps. Arbitron is best known for its *local radio market surveys*, used by almost all advertisers to determine which stations to place spots on. Radio sweeps are conducted four times a year: January, April/May, July/August, and October/November. Diaries are used to collect the data.

12.34 RADAR

The only survey of network radio is conducted by Statistical Research Inc. under a contract from the radio networks. The reports are called *RADAR (Radio's All-Dimensional Audience Research)* and are issued twice a year.

12.35 The Birch Report

Radio Marketing Research Inc. surveys radio markets and publishes the results in *The Birch Report*. The data for the survey is collected using the telephone recall method. The

sample is drawn from homes with both listed and unlisted telephone numbers. The Birch Report is not yet accredited by the Electronic Media Ratings Council and does not cover as many markets as Arbitron.

12.4 FUNDAMENTAL CONCEPTS OF RATINGS RESEARCH

Although the term *rating* is used generically by newspapers and magazines to report the size of audiences for television and radio programs, a rating is only one of several measurements used by broadcasters and others in the industry. In this section we'll examine the terms used primarily to describe audience size. In the next chapter we'll expand the terms to include those commonly used by advertisers and advertising agencies as they make time-buying decisions.

12.41 The Market

Ratings reports measure one of two populations. National reports provide estimates of listening and viewing behavior for the entire country. A second type of report provides the same data for one particular location. This small segment of the entire nation is called a *market*. Figure 12–2 shows the United States divided into market segments. This map is from the A. C. Nielsen Company; other ratings researchers, such as Arbitron, use slightly different market designations. The A. C. Nielsen map of the Tucson, Arizona, market is shown in figure 12–3. The area in white is known as the *metro area*, which is the *standard metropolitan statistical area* (SMSA) as defined by the federal Office of Management and Budget. Sometimes, in the opinion of the researcher, the SMSA doesn't reflect the true metropolitan area of a community. In these cases, additional territory is included within the "metro" designation, and the new area is known as the *central area*.

The *designated market area* (DMA) includes all the counties in the metro area plus additional areas where the station is heavily watched or listened to. In the Tucson market, Pima County (in which Tucson is located) is the metro area, while the DMA also includes several other Arizona counties, plus two counties in New Mexico. Arbitron uses the term *area of dominant influence* (ADI) instead of DMA, but DMA and ADI may be used interchangeably.

The *total survey area* (TSA) includes all the homes that report viewing the station outside the DMA. Sometimes stations are used by persons outside the DMA and reported in the survey as "adjacent areas." The TSA contains the largest group of homes that receive a station.

12.42 Choosing the Survey Sample

Once the market to be surveyed is designated, the next task is to choose a sample. The samples used in broadcast and cable ratings reports are chosen from among all the households that have a television or radio receiver. These are known as *television house-*

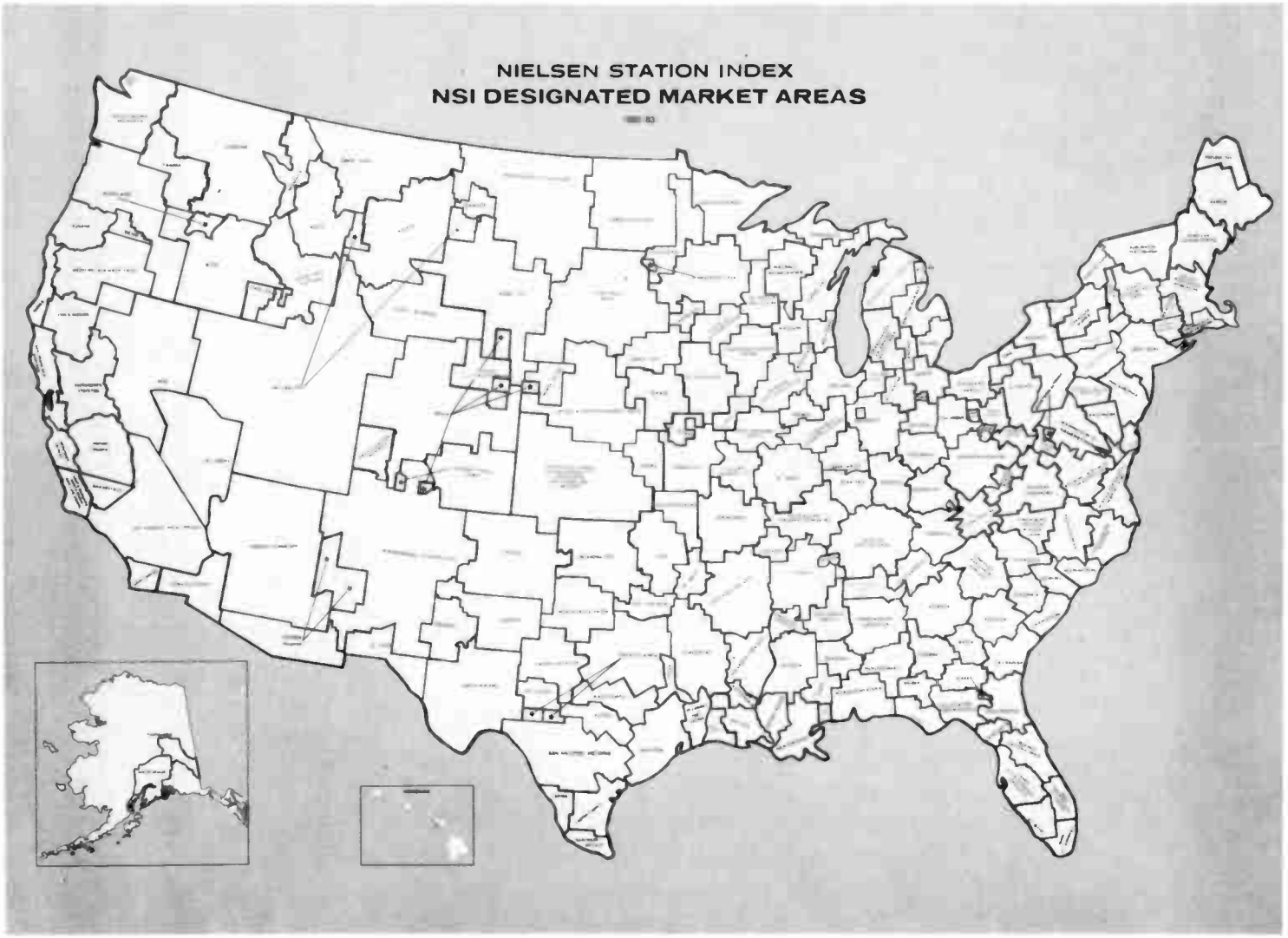

FIGURE 12–2. Market Segments of the United States
SOURCE: Permission A. C. Nielsen Company.

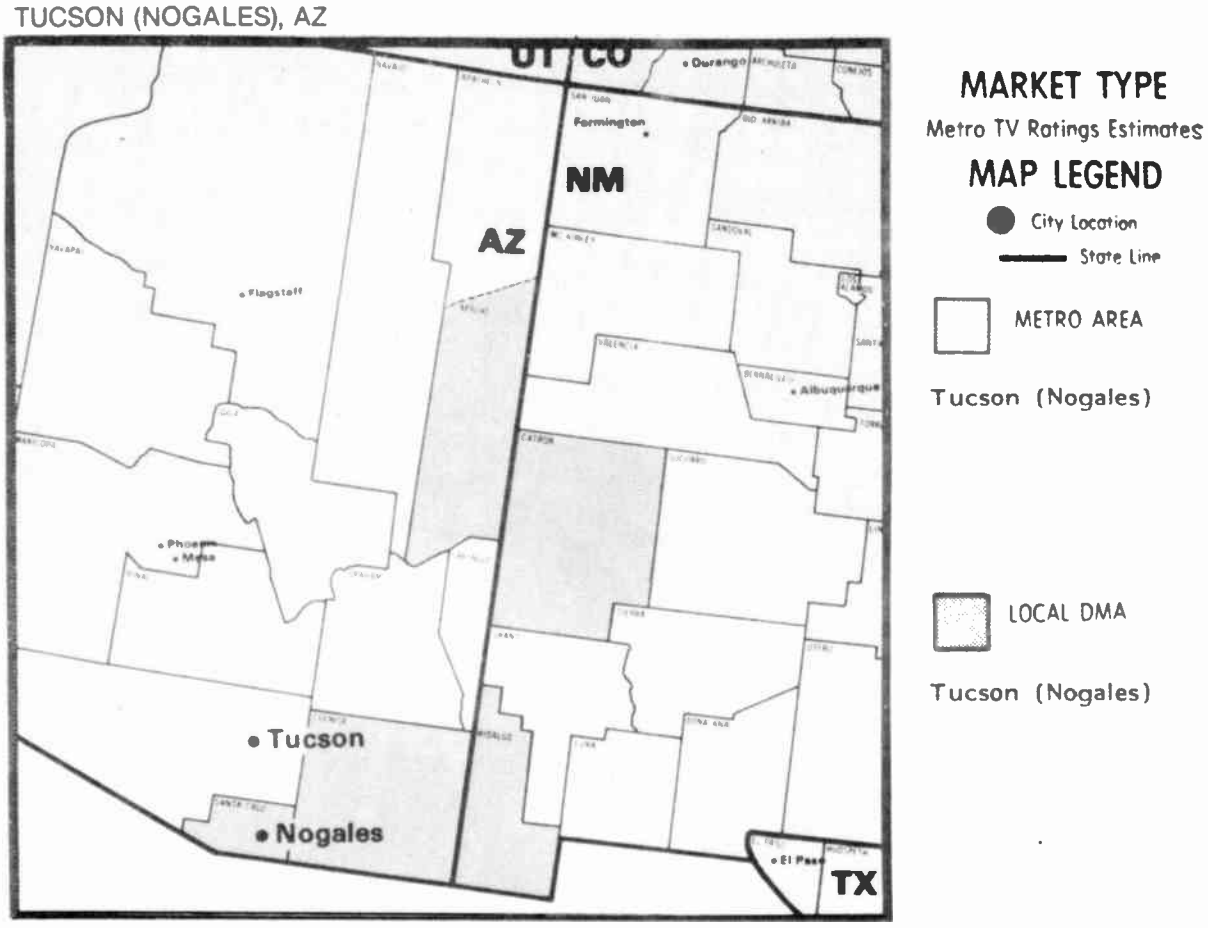

FIGURE 12–3. The Tucson, Arizona, Market
SOURCE: Permission A. C. Nielsen Company.

holds (TVHH) or *radio households* (RHH). The survey sample is chosen using methods similar to those outlined in section 12.23.

12.43 Ratings

Once the sample has been chosen it is surveyed, using meters, diaries, or telephone interviews. The survey data is collected, processed, and presented in a report called a market report, a ratings report, a ratings book, or simply "the book." The book provides a lot of different information, and on first reading it is a bit confusing. A simplified display of ratings data is shown in figure 12–4. This is a portion of the data collected for five stations in a market, including both the metro area and the designated market area.

FIGURE 12–4. Simplified Ratings Data

	METRO HH				*DMA HH*					
			Station	Program	Ratings				Multiweek Average	
Time	RTG	SHR		Week 1	2	3	4		RTG	SHR
7:00 P.M.	18	36	WAAA	Program "A"	18	21	13	20	18	35
	8	16	WBBB	Program "B"	9	5	10	7	8	16
	14	28	WCCC	Program "C"	16	16	11	9	13	25
	2	4	WIII	Program "I"	4	—	—	3	1	2
	5	10	WPPP	Program "P"	6	4	5	6	5	10
	50		HUT Totals*						51	

*HUT totals reflect all viewers. Viewers may be watching cable or stations not covered in the survey.
NOTE: SHR = share.

A *rating* is the average percentage of homes that have radios or televisions (TVHH or RHH) that viewed or listened to a program during a particular time period. Households that were using television or radio during the time surveyed are called "households using television" (HUT) or "households using radio" (HUR). The rating number is calculated using the following formula:

$$\text{Rating} = \frac{\text{Station HUT}}{\text{TVHH}}$$

For example, suppose that out of a total of 1,000 TVHH sampled, 180 homes were watching station WAAA between 7:00 and 7:30 P.M. WAAA would have a rating of 18 (that is, 18 percent, or .18, obtained by dividing 180 by 1,000) for that time period.

Normally, there is a criterion for what "viewing" or "listening" means. A common standard is five minutes; that is, if a viewer watches a program for at least five minutes, researchers consider that the program has been viewed. In figure 12–4 the metro rating for WAAA was 18. This means that, on the average, an estimated 18 percent of the metro area sample watched WAAA during the period from 7:00 P.M. to 7:30 P.M. WBBB was watched by an estimated 8 percent, WCCC by 14 percent, and so on. In the DMA portion of the data there is a more detailed breakdown of the average rating for each individual week of the month-long survey period.

At the bottom of the station program column are the HUT totals for the metro and DMA areas (50 and 51). This figure is the total percentage of homes or persons viewing at the time. Note that neither 50 nor 51 equals the sum of the ratings of the stations surveyed. The discrepancy results from the viewing of stations outside the designated market area and from cable viewing.

The rating is a useful quantity when we know the size of the market. For example, if there is a total of 100,000 TVHH in the metro market described in figure 12–4, we can figure the number of homes watching at any one time by multiplying the TVHH figure by the total rating (50 percent of 100,000). In the metro area a total of 50,000 homes

were watching television during the 7:00–7:30 time frame. WAAA was watched by 18,000 homes, 8,000 watched WBBB, and so on.

Another term closely related to the rating is the *average quarter-hour rating* (AQR). The AQR is the estimated percentage of the number of HUTs or HURs that utilized a station for a minimum of five minutes within a fifteen-minute time frame. The AQR quantity is useful to both radio and television advertisers trying to decide where to place commercial announcements for maximum effectiveness at minimum cost.

12.44 Share

Figure 12–4 also has two columns designated *share* (SHR). The metro area share for WAAA is 36, for WBBB the share is 16, and so on. The share is the estimated percentage of HUTs that are tuned to a particular station. It can be expressed as a formula as follows:

$$\text{Share} = \frac{\text{Station HUT}}{\text{Total HUT}}$$

To calculate the metro share for station WAAA during the 7:00–7:30 time period we divide WAAA's rating, 18, by .50, the HUT total of 50 percent. Thus WAAA's share is 36.

The share figure is useful in determining audience behavior during various dayparts and in determining how a station is doing in relation to its competitors.

12.45 Demographics

Broadcast ratings reports also provide information about the demographics of an audience. In figure 12–5 we see the demographic totals for five stations during the 7:00 P.M.–10:00 P.M. daypart, Monday through Friday. There are two general categories based on sex, a designation for working women, and ten different age classifications.

According to figure 12–5, WAAA has an estimated average rating of 12 for women who are eighteen or older. This means that an average of 12 percent of the estimated audience for WAAA from 7:00 P.M. to 10:00 P.M. is women eighteen or older.

The ratings reported along the "HUT/PUT Totals" row show that an average of 49 percent of the metro households using television watched during the daypart reported. The PUT (persons using television) totals for women and men show that 42 percent of the women watched during that daypart, 34 percent of the men. Another PUT column shows that 36 percent of the teens between twelve and seventeen watched.

12.46 CUMES

On the right side of figure 12–5 are three sets of figures. The first two columns are each station's CUME (cumulative audience), the estimate of the number of unduplicated persons who listened or viewed a station for at least five minutes during a particular

FIGURE 12–5. Demographic Totals

METRO HH		*MONDAY–FRIDAY*	*DESIGNATED MARKET AREA RATINGS*															*WEEKLY CUME*		
			Women					F&M		Men					Teens	Children		Cur	Cur	Station
RTG	SHR	7:00 P.M.– 10:00 P.M.	18+	18-34	18-49	25-49	25-54	Wkg	12-24	18+	18-34	18-49	25-49	25-54	12-17	2-11	6-11	Metro HH (%)	DMA HH (%)	Total HH (thousands)
15	30	WAAA	12	15	13	11	11	10	13	9	8	9	10	10	12	8	10	69	69	175
13	27	WBBB	11	10	10	11	10	8	8	8	7	7	8	8	8	8	9	68	67	174
4	8	WCCC	3	1	1	2	2	2	*	2	1	2	2	2	*	*	*	22	22	55
13	26	WIII	11	7	8	9	10	8	6	9	6	7	8	8	8	6	8	60	60	157
3	5	WPPP	2	1	2	2	2	1	1	2	1	1	2	2	2	1	1	19	17	41
49		HUT/PUT Totals	42	38	39	40	40	34	31	34	27	31	36	36	36	25	29			

NOTE: CUME = cumulative audience.
Wkg = working women.
PUT = persons using television.
* = too small to be accurately reported.

daypart. In the example in figure 12–5, an estimated average of 69 percent of the metro audience viewed WAAA for at least five minutes during the 7:00 P.M.–10:00 P.M. daypart. This cumulative rating represents an estimated 175,000 DMA households (third column). The CUME audience measure is equivalent to the circulation figure used in print media.

12.5 CRITICISMS OF RATINGS

Ratings are probably one of the most misunderstood forms of research. Many blame the ratings for the demise of their favorite programs. Others feel that ratings don't tell the whole story. Most simply don't understand how comparatively few homes, the rating sample, can determine the viewing habits of millions.

12.51 What Ratings Tell You (and What They Don't)

One of the most common misconceptions is that ratings are facts. They are not; they are merely estimates of the viewing behavior of a large population. Ratings are not an absolute, quantified description of what went on at a particular time. People who use ratings know that they are approximations. They also know that gathering totally accurate data would necessitate surveying every home in the market. Ratings are the best measure we have of audience attention and are used to help make business decisions in the broadcast and cable world.

Ratings do not measure quality. Hundreds of good programs have failed because of low ratings. The numbers reflect the size of the audience, not the quality of the programs. While attempts are being made to develop a system which will provide data on viewer satisfaction with a program, qualitative ratings are still not in general use (see section 12.6).

Different companies measuring audience behavior in the same market may report different results. Variations in the method of collecting data and of choosing the population to be sampled can affect the results. For example, it is documented that estimates of HUTs made using meters are often higher than those gathered from diaries.

Ratings do not measure whether someone actually watched or listened to a program. Ratings only measure whether the set was on at a particular time. This is especially true of data collected by an audimeter. Even diary data can be manipulated by the subjects to reflect what they want people to believe they watched rather than what they really watched. No form of survey research can ensure that the reports are absolutely accurate.

12.52 Criticisms

There are many different criticisms of ratings. Although there have been problems in the past with broadcast research, in general research companies are not guilty of gross wrongdoing. While there may be isolated instances of abuse, the ratings business at the

researcher end is ethical. After all, a research company is only as good as the data it reports. If it's accurate, given the limitations of the type of research, then the company stays in business. A company that takes shortcuts, doctors data, or doesn't use acceptable methods of data collection soon folds. The research business is not difficult to break into; all you need is knowledge and the wherewithal to gather and analyze the data for clients. But ease of entry does not guarantee success. Clients demand good data because they have lots of dollars (sometimes hundreds of millions of dollars) at stake. A company that gets a reputation for supplying data that is inaccurate quickly goes out of business.

One of the major criticisms of the ratings is that they can be manipulated by the subjects in the sample. It is inevitable that station employees are sometimes chosen in a random ratings sample. Ethics demand that they eliminate themselves from the sample. Arbitron asks that a sign be posted in all broadcast stations informing employees that they are not to participate in Arbitron survey samples.

Stations can manipulate ratings through the presentation of special programs, games, or giveaways while a ratings survey is going on. This practice is called *hypoing*. Research companies have the option of excluding a station's data if they feel a station has been guilty of excessive hypoing.

The method used to select samples is also subject to criticism. Students, military personnel, and others who live in group settings are normally excluded from the sample, meaning that the viewing and listening preferences of these groups are not included in the final data. Both Nielsen and Arbitron are making efforts to correct this problem.

12.6 NONRATINGS RESEARCH

The broadcast and cable industries use other types of research data in addition to ratings reports. **Psychographic** data is important in the advertising decision-making process. And determining whether an audience likes or dislikes a program prior to broadcast might save millions of dollars in program development costs.

12.61 Qualitative Ratings

For several years the Corporation for Public Broadcasting and Arbitron have been attempting to develop qualitative ratings that would supplement the present ratings system by measuring the impact of individual programs on audiences. Variables like program appeal, information gained, and retention of content would be measured. This type of information would aid programmers and producers in long- and short-term planning, development of strategies to appeal to particular audiences, and discovery of ways to deliver programs to new or underserved audiences. While a number of pilot studies have been done, a nationwide qualitative ratings system has not yet been developed. However, most researchers expect a complete system to be in operation before the end of the decade.

12.62 Focus Groups

The use of a *focus group* involves the interviewing of two or more persons simultaneously. Although interviewers have an agenda of information they are trying to obtain, the discussions are informal and freewheeling. The qualitative data collected using this method is used to indicate future research directions. The data may also be used to determine the public's opinion about a station and its programming and on-air personalities. There are seven basic steps in conducting a focus group survey (Wimmer and Dominick, 1983):

1. Define the problem
2. Select a sample
3. Determine the number of groups necessary
4. Organize the process, train the moderators
5. Prepare the materials
6. Conduct the session
7. Analyze the data and prepare the report.

12.63 Program Testing

The testing of programs and commercials before general release to the public is an important part of nonratings research. Prior to the beginning of production, descriptions of the program are provided to individuals. Then they are interviewed and their reactions are recorded. If the idea is generally viewed with approval, a rough program or a **storyboard** of the commercial is developed and shown to test audiences. Sometimes the finished pilot is shown to a preview audience which provides written responses to what they see or hear.

Preview House, located in Hollywood, California, is used to test programs. Members of the audience manipulate dials, located on their seats, to indicate a range of responses from "very good" to "very dull." As the program is viewed, the subjects respond to it. Testing sessions begin with a Mr. Magoo cartoon, to allow audiences to learn how to use the dial and to form a referent for the decisions to be made on the test program. Then the test program is shown to the audience. The results of these tests are often called "Magoos."

Vox-Box, a research service run by The Percy System of Seattle, Washington, uses 500 subjects linked to a computer via a cable. Viewings are done in the home, and subjects indicate one of eight reactions to a program: excellent, credible, informative, funny, dumb, unbelievable, boring, and zap. There is also a button that can be pushed to indicate a favorable response to a personality.

12.64 Performer Q

Data about individual performers and personalities is collected by Market Evaluations Inc. A sample of about a thousand families is used to determine a performer's familiarity and

likability. The quantities are expressed in a form similar to ratings and are known as a *performer Q*. The higher the rating, the more popular and likable the performer.

12.65 Music Call-outs

A research method especially useful for radio is the music call-out study. In this type of survey a sample group is chosen and then telephoned by an interviewer. A second sample of a musical selection is played and a reaction solicited. Such research is useful in developing music formats and playlists.

12.7 SUMMARY

Ratings reports are derived from research on the viewing and listening habits of audience members. There are four basic methods used in mass media research—content analysis, field studies, laboratory experiments, and survey research. Ratings are obtained through the use of survey methods.

Survey research uses a sample selected from the population to be studied. The amount of sample error in the data is, in part, dependent upon the size of the sample. The quantities that appear in ratings reports are estimates that lie midpoint in a range of possible values. Methods used to collect data include electronic devices attached to home receivers, viewer diaries, and telephone interviews. Nielsen reports consist of television overnights, audience composition studies, and sweeps done four times a year in over 200 local markets. Arbitron does overnights, sweeps, and surveys of radio markets. RADAR surveys only network radio, while *The Birch Report* surveys over fifty local radio markets.

A rating is an estimate of the average percentage of the households with radios or televisions that are tuned to a program at a particular time. A share is an estimate of the average percentage of receivers in use that are tuned to a particular station.

Ratings do not in any way measure the quality of a program. Nor can they determine whether or not someone actually watched or listened to the program. They are estimates and will vary depending on the methodology used. Criticism of ratings include (1) the ease with which members of the sample can manipulate results, (2) hypoing by stations, and (3) unrepresentative samples.

Nonratings research includes use of audience response to programs, qualitative measurements designed to indicate audience satisfaction, the use of focus groups, and measures of performer likability and popularity.

CHAPTER 13 OUTLINE

13

SUPPORTING THE SYSTEM: ADVERTISING AND PAY SERVICES

When asked what they most dislike about radio and television, many users will mention commercials. Radio and television professionals are aware of the public's antipathy to commercial messages. For many people, one of the attractions of pay cable is the lack of commercials. Radio stations boast they have "fewer commercials" than their competitors, and many stations create formats that allow twenty-five minutes or more of uninterrupted music. However, some members of the television audience indicate that commercials are often better than the programs surrounding them. Many television commercials are produced to provide entertainment value, rather than simply sell.

Whether you like or dislike media advertising, commercial messages support broadcasting and the basic cable services. Even the noncommercial stations have begun to experiment with advertising to supplement their revenue. The link between advertising and the electronic media is a pervasive one. Some view the broadcaster as one who delivers people to advertisers. In this chapter we're going to survey the field of electronic media and advertising. By the end of this chapter, you should be able to:

1. Trace the key points in the evolution of radio, television, and cable advertising
2. Identify and explain the function of each member of the electronic media advertising team
3. Define and calculate cost per thousand

4. Name the pros and cons of using radio, television, and cable as advertising media

5. Describe several strategies used by advertisers to maximize their investment in broadcast and cable time.

13.1 ADVERTISING AND ELECTRONIC MEDIA

Advertising on the electronic media was controversial from the earliest days of radio broadcasting. In 1922 Herbert Hoover, then secretary of commerce, urged broadcasters not to allow radio to become commercialized. If advertising were allowed on radio, he warned, it would kill the new medium. Another radio pioneer, David Sarnoff, hoped that some other means could be found to pay for the costs of radio programming. He suggested a *tax* on receivers, but that idea was never seriously considered.

13.11 The Evolution of Advertising

The first commercial message broadcast by WEAF on August 28, 1922, led to the sale of time on other stations. But advertising revenues grew slowly in the first few years of commercial broadcasting. Both advertisers and broadcasters really didn't know exactly how to utilize radio most effectively for advertising purposes. Within a few years, however, it became apparent that advertising on a network was a *cost-effective* way to reach potential customers.

The first radio commercials were much different from the sophisticated sales presentations of today. First, they were much *longer*. Second, although the product was described in great detail, *little mention* was made of the name of the product. Advertisers tended to sponsor *entire programs* that took on the name of the sponsor. Sometimes even the performers were named after the sponsor's product. The Dutch Master Minstrels, the Golddust Twins, and the Michelin Tiremen are a few examples. A third difference was in the *placement* of the commercial messages. At first, advertising was broadcast only during the *daytime*. The restriction on nighttime advertising was enacted so that the family wouldn't be disturbed by business activities that were thought to be best restricted to "normal business hours." That didn't last long. Soon broadcasters began allowing advertising during the evening hours, and charged sponsors higher prices during these *prime* hours, when the audience was the largest. By 1928 advertising was a vital factor in the business of broadcasting.

As radio entered its "golden age" the institutional components of the "media mix" began to develop. Advertising agencies began to represent the sponsor by buying time and developing programs for network distribution. For the radio networks this was an advantageous arrangement. No longer would the networks have to put up the money for program development—the agency would take care of that. The network simply had to deliver the program to the affiliates. Soon advertisers were demanding more advertising time than was available on the networks, so agencies began to try to buy time directly from the stations. In 1932 Edward Petry & Company was formed to represent the interests of client stations in such deals. Other companies followed, and *station rep-*

resentatives became an integral part of the advertising business. By the mid-1930s radio had become a significant advertising medium. In 1943 it surpassed the advertising revenues generated by newspapers.

During the period from 1945 to 1952 the total spent on radio advertising grew from $423.9 million to $624.1 million (Sterling and Kittross, 1978). The increase was primarily in local spot buying. As television encroached on radio's dominance of the *national* market, advertisers shifted their dollars from radio networks to *local* stations. So while the advertising revenues of the networks actually decreased from 1945 to 1952, ad revenues for local stations increased substantially. Thanks to the tremendous growth in local radio advertising during the late 1940s and early 1950s, many AM station owners were able to siphon off money to support their unprofitable FM and TV station properties. Advertisers were still reluctant to invest in *local* FM and TV programs.

Other changes were occurring in the relationship between sponsor, agency, and network or station. The increasing cost of producing television programs led the agencies to give up their program development role. No longer could a sponsor take on the responsibility and the cost of a daily or weekly program. The retreat of the agency meant that networks *regained control* over the programming they distributed. While some advertisers continued to sponsor entire programs, others moved into different sponsorship patterns. Two sponsors might alternate sponsorship of one program, or a sponsor might be only one of several participating sponsors.

However, there was no wholesale rush into television by advertisers. On the contrary, many were reluctant to invest much money in the new, unproven medium. One of the key breakthroughs occurred when Kraft used television to advertise its slow-moving Imperial Cheese. Within three weeks of the ad's appearance, every package of Imperial Cheese in New York City had been sold. Yet despite the proven effectiveness of television advertising, its cost made potential advertisers wary. Programs were expensive, but the cost of producing a commercial for television was substantially greater than for radio. To save money many of the earliest television commercials consisted simply of a picture of the product or the product's name with an off-screen announcer reading the advertising message. Soon national advertisers and their agencies began to use both the visual and audio qualities of television, and commercials became more sophisticated. As the television audience grew the cost of production became of less concern to advertisers.

13.12 Advertiser Use of Electronic Media

Electronic media compete with other forms of mass media for advertising dollars. When *advertisers* and *media planners* plan how best to use the advertising budget, they must evaluate each medium in terms of how many people it reaches, the costs, the programs available, the flexibility, and the characteristics of the audience.

RADIO

The characteristics of radio make it an ideal medium for certain types of advertisers. Because so many of the listeners are in their automobiles or away from home, it is particularly appropriate for advertisers trying to reach shoppers and others who might drive

by their place of business. Taken as a group, all the radio stations in a market reach a good cross section of the population. The low cost of radio means that advertisers can buy more time than on television or cable. Should an advertiser wish to reach one specific demographic group, there is probably a station that appeals to the target audience. Another advantage of radio is its flexibility. Radio spots can be produced much less expensively and much faster than television spots. Advertisers who want to alter their approach can do it almost overnight in radio.

TELEVISION

Television is a dynamic medium for the advertiser. The ability to use both sight and sound for product presentation is unquestionably an advantage television has over radio. However, that dynamism also means higher production costs. The audiences drawn by the average television station are much larger than those for either radio or cable, so overall costs for time are higher. Yet with the higher costs comes a greater efficiency in reaching the mass audience. The amount of time available for television advertising is significantly less than that available on radio. Also, the ability to adjust messages is limited: once a commercial is produced, it is very difficult and costly to change it.

CABLE

Cable advertising is seen primarily on the basic service channels, but may also appear on the videotext channels. Basic cable shares characteristics of both radio and television. Each basic service appeals to a particular set of audiences. Time is relatively cheap, allowing advertisers to buy more opportunities to reach prospective customers. It's a dynamic medium.

Videotext advertising is similar to the classified pages of a newspaper. Advertisers simply list their products or services and how to obtain them. If the videotext system is interactive, users may be able to order products directly through their television receivers.

13.2 THE ADVERTISING MILIEU

When we speak of the *advertising milieu* we are referring to all the major portions of the broadcast and cable advertising system: the local station or cable system, the station representative, the network, the advertising agency, and the advertiser.

13.21 The Advertiser and the Advertising Agency

The advertiser has a product or service to *sell*, and advertising is a method of *informing* potential customers of the availability of the product and *persuading* them to use it. Some advertisers work directly with a station or network. Often companies of this type

have *in-house* advertising agencies. But most advertisers use an *independent advertising agency*. A *full-service* ad agency performs a number of different functions, including advising clients on how best to use their advertising dollar, creating commercials, buying time from stations and cable systems, paying the bills, conducting research, and designing total ad campaigns. The agency takes a percentage of the total amount billed on behalf of a client; generally the fee is 15 percent. The ten largest advertising agencies in terms of billings are listed in figure 13–1. The ten companies that spend the most on media advertising are listed in figure 13–2. Note that the majority of them manufacture and distribute either food or household products.

The ad agency buys time directly from one of the networks, or from a station representative if it wants time on a local station. The station rep bills the agency and takes a 10 to 15 percent *commission* before sending the payment to the station. Companies use *screeners* such as Broadcast Advertising Reports (BAR) to make sure that commercial messages that stations report they ran were in fact broadcast.

13.22 The Station's Sales Department

The organization of a broadcast station's sales department varies according to the size of the station. Figure 13–3 shows how a station in a medium-size market might organize the various functions of the sales area. National sales are handled by the station representative. All sales activities which occur *outside* the station's immediate market are handled by the station representative (station rep), who works with the *sales manager*. The station rep represents the station to national advertisers and advertising agencies.

FIGURE 13–1. Top Ten Advertising Agency Radio and TV Billings for 1982 (In thousands of dollars)

AGENCY	COMBINED BILLINGS	TOTAL TV	TV NETWORK	TV SPOT	TOTAL RADIO	RADIO NETWORK	RADIO SPOT
1. Young & Rubicam	926.2	861.3	603.9	257.4	64.9	18.8	46.1
2. J. Walter Thompson	903.4	833.4	531.3	302.1	70.0	17.0	53.0
3. BBDO	609.0	552.0	349.0	203.0	57.0	21.0	36.0
4. Leo Burnett	545.0	515.0	376.0	139.0	30.0	3.0	27.0
5. Dancer Fitzgerald Sample	487.5	464.6	295.3	169.3	22.9	8.6	14.3
6. Ogilvy & Mather	467.2	439.3	289.3	150.0	27.9	7.2	20.7
7. Grey Advertising	448.2	425.1	314.7	110.4	23.1	1.3	20.5
8. Doyle Dane Bernbach	382.9	362.4	213.6	148.8	20.5	—	20.5
9. D'Arcy-MacManus & Masius	380.0	325.0	170.0	155.0	55.0	10.0	45.0
10. Foote, Cone & Belding	369.0	325.0	205.0	120.0	44.0	12.0	32.0

SOURCE: *Broadcasting*, March 24, 1983.

FIGURE 13–2. Top Ten Television Advertisers for 1982 (In thousands of dollars)

ADVERTISER	*SPOT*	*NETWORK*	*TOTAL*
1. Procter & Gamble	179,473	397,418	576,891
2. General Foods	70,802	232,349	303,151
3. General Mills	107,682	93,628	201,151
4. American Home Products	36,682	160,767	197,450
5. General Motors	27,241	164,261	191,502
6. PepsiCo	88,030	75,857	163,888
7. AT&T	66,092	95,086	161,178
8. Lever Brothers	43,761	111,811	155,573
9. McDonald's	94,148	59,875	154,487
10. Ford	22,602	128,885	151,487

SOURCE: *Broadcasting*, April 11, 1983.

National and regional sales activities are handled solely by the rep, who takes a commission (generally 10 to 15 percent) of the total amount billed by the company.

Local sales activities are overseen by the *local sales manager*, while the actual selling is done by *account executives* (salespeople). Good sales personnel develop long-term relationships with clients and agencies. They may be called in to help advise clients on how best to spend their advertising dollars. Sometimes this means that an account representative is forced to turn down business because it's not in the best interest of the client.

The *traffic department* handles the placing of all commercial messages in the schedule, coordinates their broadcast with the program department, and instructs the business department on invoicing clients. The traffic department keeps a record of all **availabilities** and makes sure that advertising messages are broadcast in accordance with the station's **adjacency policy**. The traffic area also schedules **make-goods**.

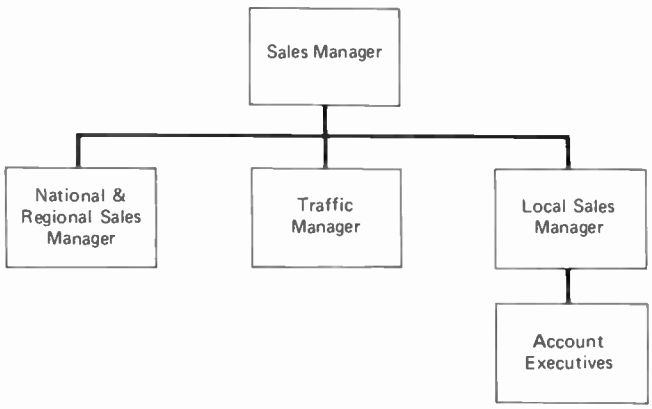

FIGURE 13–3. Organization of a Station Sales Department

13.3 BUYING TIME

One of the services provided by an advertising agency is buying time from the networks or local stations. **Media buyers** and media planners work with the account rep assigned to the sponsor's account. In selecting programs the buyer must choose program vehicles that are *compatible* with the product or service advertised, appeal to the *target audience*, and are *sufficiently popular* so that the number of persons reached is large enough to justify the expenditure. The amount of money budgeted for electronic media advertising by an advertiser is limited, so the buyer's responsibility is to find the most cost-effective way to maximize dollars invested.

13.31 Rates

The amount of money a station charges an advertiser to broadcast their advertising message is called a *rate*. Radio, television, and cable systems publish *rate cards* that summarize the costs of time during the various dayparts and around certain programs. The Standard Rate and Data Service (SRDS) publishes a monthly compilation of all the rates charged by radio and television stations, titled *Spot Radio Rates and Data* and *Spot Television Rates and Data*. Stations pay SRDS for inclusion in their publications.

Figures 13–4 and 13–5 show SRDS entries for a radio and a television station respectively. The data is supplied to SRDS by the stations according to a set format. The radio listing in figure 13–4 shows the name of the station and of its station rep (the Cristal Company Inc.), and indicates that it's a member of the NAB (National Association of Broadcasters) and the NRBA (National Radio Broadcasters' Association). The station has certain restrictions which are listed by code in section 5. Also listed in the same section are the rates the station charges for a one-minute and a thirty-second commercial announcement. The television listing is similar, except that the rates are quoted by program and there are some package rates shown.

13.32 The Variables in Rate Making

Radio advertising rates vary according to several variables. The first variable is *time of day*. Station KCEE, shown in figure 13–4, has divided its day into four parts (AAA, AA, A, and B). AAA time is the most expensive and includes those portions of the radio day when audiences are the greatest. The second variable is *the length of the spot*. In the rate listing, the station lists two spot lengths (one minute and thirty seconds).

Another variable is the *type of plan* or *grid* an advertiser chooses to purchase. Four grids are listed (I, II, III, and IV). These grids differ in terms of spot *position, preemptibility, number* of spots bought, and *special packages*. Spot position refers to the placement of a spot in a particular daypart. Sponsors can buy a specific time within a daypart, for example, between 7 and 8 A.M. Monday through Friday. If buyers want to guarantee that their spot will be broadcast at the time preferred, they buy a *nonpreemptible* spot,

KCEE
1958
TUCSON

Christal

nab NRBA

Media Code 4 203 7500 8.00 Mid 006306-000

790 Inc
2100 N. Silverbell Rd., Box 5886, Tucson, AZ 85745.
Phone 602-623-7556

PROGRAMMING DESCRIPTION

KCEE Programmed for adults 25-49 MUSIC, handled by personalities, current hits plus oldies from 1955. NEWS: twice per hour during AM & PM drive M-F, network at 60; business reports, stock market 3x 6-10 am, 3x 3-6 pm, network Contact Representative for further details. Rec'd 8/30/82

1. **PERSONNEL**
Executive Vice-President—Stephen O. Jacobs
General Sales Manager—Laury Behan
Program Director—Ken Roberts

2. **REPRESENTATIVES**
The Christal Company, Inc.

3. **FACILITIES**
5,000 w days, 500 w nights 790 khz Directional
Operating schedule 24 hours daily MST

4. **AGENCY COMMISSION**
15/0

5. **GENERAL ADVERTISING See coded regulations**
General: 2a, 2b, 3a, 3b, 4a, 4d, 5, 7b, 8
Rate Protection: 10b, 12b, 13b, 14b
Basic Rates: 20a, 22a, 23a, 24b, 25a, 28c, 29a, 30
Contracts: 40c, 41, 42a, 44b, 45, 46.
Comb., Cont. Discounts: 60a, 60e, 60i, 61a, 61b, 61c, 62b, 62d
Cancellation: 70a, 70e, 71a
Affiliated with Christal Radio Network
Affiliated with MBS

TIME RATES
Eff———Rec'd 2/4/83
AAA—Mon thru Fri 5:30-10 am, Sat 5:30 am-3 pm
AA—Mon thru Sat 3-8 pm
A—Mon thru Fri 10 am-3 pm, all day Sun
B—Mon thru Sat 8 pm-1 am

6. **SPOT ANNOUNCEMENTS**

	1 min				30 sec			
GRID:	**AAA**	**AA**	**A**	**B**	**AAA**	**AA**	**A**	**B**
I	48	40	40	24	42	33	33	19
II	44	36	36	21	38	29	29	17
III	40	32	32	18	34	26	26	14
IV	36	28	28	15	30	22	22	12

FIGURE 13–4. An SRDS Listing for a Radio Station
SOURCE: Standard Rate and Data Service Inc., *Spot Radio Rates and Data*, vol. 65, no. 4, 1983, p. 29.

meaning that the spot cannot be bumped by another sponsor. Nonpreemptible spots broadcast at a certain time are the most expensive. Cheapest are preemptible spots that are broadcast on an *ROS (run-of-schedule)* basis. This means that the spot may be run at any time during the day or at any time during a specific daypart. They may be preempted by any spot bought in a higher grid; for example, a grid IV can be bumped by a grid III.

Television time is sold on a less complex basis. Stations' rate cards list specific programs with a cost per thirty-second spot. Most stations also use some form of *preemptibility grid*, with nonpreemptible spots costing more than preemptible ones. Some television stations are reluctant to publish detailed rate cards, preferring to allow their account representatives and station reps a wide latitude in making deals. None of the three major networks publish any official listing of rates; however, all of the networks' O&O's publish rate cards.

KVOA-TV
(Airdate September 15, 1953)
TUCSON

NBC Television Network

nbc

Media Code 6 203 0400 6.00 **Mid 007214-000**
Channel Four Television Co.
209 West Elm St., Tucson, AZ 85705. Phone 602-792-2270, TWX, 910-952-1100.
Mailing Address: Box 5188, Tucson, AZ 85703.

1. PERSONNEL
President—Jack Harris.
Exec. Vice-Pres. & Gen'l Mgr.—Jon F. Ruby.
Station Manager—James Joslyn.
Program Director—David Hatfield.

2. REPRESENTATIVES
Petry Television, Inc.

3. FACILITIES
Video 35,000 w., audio 7,000 w. (maximum); ch 4
Antenna ht.: 3,650 ft. above average terrain
Operating schedule: 6-3 am, MST.

4. AGENCY COMMISSION
15% to recognized advertising agencies on net charges for station time; no cash discount.

5. GENERAL ADVERTISING See coded regulations
General: 3a, 3d, 4a, 5, 8.
Rate Protection: 10m, 11m, 13m, 14c, 17.
Contracts: 20a, 21, 22a, 24a, 25, 26, 29, 31a, 32b, 32d, 33, 34c.
Basic Rates: 40b, 42, 43a, 44a, 44b, 47a, 49, 50, 51, 52.
Comb.; Cont. Discounts: 60b, 60c, 61a, 62b.
Cancellation: 70a, 70i, 70n, 71, 73a.
Prod. Services: 80, 83, 85, 86, 87b.
The rates and discounts for time periods designated herein apply only to products of a single advertiser. Piggyback commercials do not earn frequency for more than 1 announcement.
Affiliated with NBC Television Network.

6. TIME RATES
No. 60 Eff 9/27/82—Rec'd 8/6/82
Rev. Rec'd 8/15/83.

7. SPOT ANNOUNCEMENTS
DAY AND FRINGE

	Grid 1
30 SECONDS	
MON THRU FRI.	
6-6:30 am, It's Your Business	40
6:30-7 am, NBC News At Sunrise	70
7-9 am, Today Show	125
9 am-3:30 pm, NBC Daytime Rotator	105
PM:	
Noon-12:30, Eyewitness News	160
3:30-4:30, CHiPs	140
4:30-5 Mon thru Sat, Newscope	325
5-6:30 Mon thru Sat, Eyewitness News	425
6:30-7, Entertainment Tonight	425
10-10:30 Mon thru Sun, Eyewitness News	500
10:30-11:30, Tonight Show	200
11:30 pm-1 am, Thicke Of The Night	70
1-2 am Mon thru Thurs, NBC Overnight News	40
2-2:30 am Mon thru Thurs, Tomorrow News	40
1-2:30 am, Friday Night Videos	55
SAT:	
6-11 am, NBC Kids Rotator	120
PM:	
3:30-4:30, Battlestar Galactica	120
6-7, Hee Haw	140
10:30-midnight, NBC Saturday Night Live	160
Midnight-1 am, Entertainment This Week	50
SUN, PM:	
3:30-4:30, Jacques Cousteau	100
4:30-5, Taking Advantage	100
10:30-concl, NBC Late Night Movie	85
7 am-5 pm Mon thru Sun, 15 spots 6:30 am-5 pm 30 sec	825
NBC SPORTS	
11 am-3 pm Sun, NFL Football	600
Noon-4 pm Sat, Sportsworld	180
PRIME TIME	
MON:	
7-8, Boone	700
8-10, NBC Monday Night Movie	800
TUES:	
7-9, The A Team/Remington Steele	1000
9-10, Bay City Blues	800
WED:	
7-8, Real People	800
8-9, Facts of Life/Family Ties	800
9-10, St. Elsewhere	800
THURS:	
7-8:30, Gimme A Break/Mama's Family/Got It Made	85(
8:30-10, Cheers/Hill Street Blues	160(
FRI:	
7-8, Mr. Smith/Jennifer	700
8-10, NBC Friday Night Movie	850
SAT:	
7-8, Different Strokes/Silver Spoons	700
8-9, Rousters	700
9-10, Yellow Rose	750
SUN:	
6-7, First Camera	600
7-8, Knight Rider	750
8-10, NBC Sunday Night At The Movie	850
7-10 Mon thru Sat; 6-10 Sun, Primetime ROS	400

60 sec: twice the applicable 30 sec.
10 sec: 60% of applicable 30 sec.

11. SPECIAL FEATURES
COLOR
Schedules network color, film, slides, tape and live
Equipped with high and low band VTR.

13. CLOSING TIME
All program and announcement material, either script, film or slide, must be on hand at station 72 hours prior to the scheduled time of the telecast

FIGURE 13–5. An SRDS Listing for a Television Station
SOURCE: Standard Rate and Data Service Inc., *Spot Television Rates and Data*, vol. 65, no. 4, 1983, p. 16.

13.33 Trade-outs, Co-ops, Barter, and Special Services

Not every time buy results in money changing hands. Sometimes advertisers pay for time by providing the station with goods or services. For example, a restaurant may provide credit of so much per month in exchange for 100 ROS spots. Or an auto company may provide the sales manager with a new car each year in exchange for advertising time. This practice is called *trading out*, and the merchandise is called a *trade-out*. Managers like to take a certain number of trade-outs for use by station employees as rewards for

good job performance. Sometimes they are part of the station's basic benefit package for certain key employees.

In *cooperative advertising*, the local distributor of a product pays for a fixed percentage of the advertising while the national distributor pays for the remainder. For example, suppose General Motors establishes a cooperative advertising plan with its dealers. GM pays for 50 percent of the cost of all local advertising, and supplies the spots. The station bills the local dealer for 50 percent of the bill and GM for the other 50 percent. Almost all large consumer-oriented companies have some kind of cooperative advertising plan, and many stations actively seek out that type of business.

Barter is an advertising practice that comes and goes, but is once again increasing in popularity. In a barter deal a sponsor develops a program and uses a certain number of commercial slots within the program. The program is then supplied to stations free of charge and the station is free to sell advertising to fill out the vacant commercial slots. The station gets a free program and generates revenues from the open slots, and the advertiser gets free advertising time. Of course, the program has to be good enough to attract an audience.

Many stations, particularly in radio, have *special services packages* which are available to sponsors. These special services may range from producing the commercial message to doing remote broadcasts from the advertiser's place of business.

13.4 THE MATH OF TIME BUYING

The larger the audience, the more a station or network can charge for advertising time. The key figure is the *rating*. Radio buyers are interested in the *average quarter-hour audience*, television buyers in the various rating figures. Both are interested in *audience demographics*.

13.41 Analysis of the Client's Needs

Let's suppose that we are a **media buyer** working on the account of a foreign automobile manufacturer. The client uses network television spots frequently, but wants to develop an advertising campaign directed specifically toward buyers in the southwestern portion of the United States. The client is particularly interested in reaching women between the ages of eighteen and thirty-four, but is not willing to spend in excess of $12 for every thousand persons who see the advertisement on television, or $6 for every thousand radio listeners.

One of the first things we do is consult the most recent market rating reports for those areas in which the client is seeking exposure. As we review the ratings data we discover that a syndicated situation comedy program scheduled from 7:00 to 7:30 P.M. on station WAAA-TV has a large audience of women between eighteen and thirty-four. We check the *Spot Television Rates and Data* and find that WAAA-TV charges $200 for a thirty-second spot during that time slot. Before making a definite buy decision, we

must calculate whether the cost of the spot is within the client's specifications. In order to begin our calculations we construct a table similar to the one shown in figure 13–6.

Tables like these are developed by media planners and buyers to measure the relative cost of delivering an advertising message to a specific audience. Most of the time buyers compare the CPM (cost per thousand) and CPGRP (cost per gross rating point) figures for several stations and attempt to purchase the best audience for the least cost. Media planners often compare various media to determine which reaches the greatest number of persons for the least cost.

13.42 Calculating the CPM

One of the most important concepts used in advertising buying decisions for any medium is the notion of *cost per thousand* households or persons reached. CPM is figured by the following formula:

$$\text{CPM} = \frac{\text{Cost of the spot}}{\text{HUT or PUT}}$$

The decision to use HUT (households) or PUT (persons) depends on what our target group is. Since we're interested in persons, we'll figure cost per thousand persons. The CPM figures for the demographic group in which we're interested can be seen in the data column farthest to the right in figure 13–6. Note that even though the CPM figures for women 18–24 and 24–34 are larger than our $12 limit, the CPM for women 18–34 is only $10, which is well within the client's specifications. CPM figures vary from medium to medium. Figure 13–7 shows a table that compares the average CPM figures for various types of radio and television time with those for print media. Note that eve-

FIGURE 13–6. Cost Data for WAAA-TV, 7:00–7:30 P.M. Monday–Friday

Market size: 100,000 TVHH, 250,000 persons.
Cost per spot: $200 per 30 seconds.
Number of spots: 10 per week (two each night Monday–Friday, one in 7:00–7:15 slot, one in 7:16–7:30 slot).

	AVERAGE RATING	*AUDIENCE* (in thousands)	*CPM* (PUT)
Men and Women 18+	10	25	$ 8.00
Women 18–24	5	12	16.67
25–34	3	8	25.50
18–34	8	20	10.00
35+	1	2	100.00
Men 18+	1	1	200.00

FIGURE 13–7. CPM Comparison Between Nine Different Media

ADVERTISING VEHICLE	DAY NET TV	EVE NET TV	SPOT TV	MAG*	NEWS*	SUPP*	SPOT RADIO	NET RADIO	OUTDOOR
Day net TV	0	−7	26	27	19	25	32	29	22
Eve net TV	7	0	31	32	24	30	36	34	27
Spot TV	−36	−45	0	1	−11	−2	7	4	−6
Spot radio	−47	−57	−8	−7	−19	−10	0	−3	−15
Net radio	−42	−52	−4	−4	−15	−6	3	0	−11

*MAG = magazines
NEWS = newspapers
SUPP = supplements

NOTE: This table portrays the difference in the CPM between broadcast and other advertising media. The formula used is as follows:

$$\left(\frac{a-b}{a}\right) \times 100$$

where a = Bates CPM Index Value for each broadcast medium and b = Bates CPM Index Value for each medium compared. Thus daytime network television, for example, is 7 percent cheaper than nighttime network television and 26 percent more expensive than spot TV.

SOURCE: Study by Ted Bates Advertising published in *Broadcasting*, March 21, 1983.

ning network TV is the most expensive medium iisted. It averages 7 percent more than daytime network TV and 36 percent more than spot radio. All forms of radio compare favorably with print media figures.

13.43 Calculating the CPGRP

Most advertising campaigns consist of multiple spots. To more accurately express the cost-effectiveness of such spots, buyers often use a figure called the cost per gross rating point (CPGRP), which is calculated as follows:

$$\text{CPGRP} = \frac{\text{Cost of one spot}}{\text{Number of spots in a time slot} \times \text{average rating}}$$

CPGRP is a useful figure when we are placing spots that will run throughout all dayparts. It helps media buyers choose between stations with different ratings and spot costs. It can be used for both radio and television.

13.5 OTHER ADVERTISING STRATEGIES

Although the mathematics of buying radio and television time is a key part of advertising, other factors must also be considered, such as the approach to selling the product, the length of the message, and the placement of the spot.

13.51 Approaches to Commercials

Commercial messages vary widely in approach. Not all commercial messages are designed to sell a product or service. Some *institutional advertising* seeks only to create a positive image of the sponsor. Other commercial messages deliver opinions on controversial issues. Some spots are broadcast as station or network promos to inform audiences about future programs. But the majority of commercial messages are broadcast to sell products and services. Advertisers want viewers and listeners to remember their messages and the associated product. Figure 13–8 presents the ten best-liked commercials for 1982. Notice the wide variance in the CPM figures.

Although creating commercial messages that are remembered is one of the major goals of radio and television advertising, the campaigns have to be conducted at a cost that is reasonable. Generally a campaign to introduce a new product costs more than one for an established product because of the need for greater audience exposure; in other words, more messages are needed.

There are six basic approaches used by advertisers to present products or services to potential customers: demonstration, documentation, association, humor, description, and entertainment. Although sometimes a commercial uses only one approach, most commercial messages use a mixture of devices. All commercial messages must first get the audience's *attention*. Then the message must present some sort of a *problem* that the product or service can *solve*. Third, the message must strongly and clearly present the *name* of the product or service.

Messages that use *demonstration* show the product or service in actual use. The strategy which underlies this approach presumes that seeing the product in action will make the audience more disposed to buy it. Commercial messages that use this approach present products like the Veg-o-matic slicer, miracle knives that never need sharpening, and record albums with fifty songs by the original artists.

FIGURE 13–8. The Ten Best-Liked Television Commercials of 1982

BRAND **(Agency)**	***CPM***
1. Miller Lite Beer (Backer & Spielvogel)	$29.86
2. Coca-Cola (McCann-Erickson)	8.96
3. Federal Express (Ally & Gargano)	22.01
4. McDonald's (Leo Burnett)	11.50
5. Pepsi-Cola (BBDO)	10.35
6. Burger King (J. Walter Thompson)	9.08
7. Budweiser Light (Needham, Harper, & Steers)	41.67
8. Dr. Pepper (Young & Rubicam)	7.83
9. Atari Video Games (Doyle Dane Bernbach)	NA
10. Bell System (N. W. Ayer)	18.33

SOURCE: Rankings made by Video Storyboard and reported in the *Wall Street Journal*, March 3, 1983.

The *documentation* approach is commonly used with pain relievers and other over-the-counter drugs. In these commercial messages the problem is presented in a straightforward manner and so is the message that "the product will solve the problem." Often there are testimonials by persons who have used the product, and sometimes well-known persons endorse it.

Some commercial messages attempt to *associate symbols or images* with their product. Commercials of this type don't attempt to portray a need for the product. The message is simply that if you use the product you will be associated with the image presented in the advertising message. Before being banned from radio and television, cigarette advertising used association as a primary strategy. Perfumes and other cosmetics often use the association approach, as do some types of automobile advertising.

Humor is used by some advertisers to bring a product or service to the attention of the audience. Stan Freberg is one of the best-known creators of humorous advertisements. The strategy is to create a pleasant experience in connection with the product, in hopes that the product will be linked with the experience and will be remembered by the audience. Well-known humorous advertising campaigns include those for Qantas Airways, Alka-Seltzer, the Bic "Banana," and Miller Lite beer.

The most basic and most straightforward form of advertising is *description*. It is simply a presentation of the product. Generally, a spokesperson shows the product and says something about it and how much it costs. This type of advertising is purely informational, and is most often produced for local businesses.

Some commercials are more interested in *entertaining* than in selling. The entertainment commercial is designed to place the product in a secondary role, while the commercial's story or situation has primary importance. Messages of this type are commonly used in Europe. Many present a little story which is resolved during the commercial. The product is mentioned only at the end, although it may figure in the story line. Recently Calvin Klein jeans began a campaign in the United States using this approach, with the name of the product mentioned only at the very end of the message. Whether this type of commercial message will prove cost-effective or sell products remains to be seen.

13.52 Commercial Length

The standard lengths for both radio and television messages are thirty and sixty seconds. Some local television stations will accept commercials of ten seconds. None of the networks will accept messages of that length, but the three commercial networks allow advertisers to *piggyback* two product ads in one thirty-minute slot. Although they are restricted to products made by the same company, these piggyback techniques may allow advertisers to reduce costs while not significantly increasing the amount of advertising seen on television.

A recent development in cable is the *infomercial*, a commercial message which runs for more than sixty seconds. Infomercials are seen primarily on a cable service called The CableShop which has programming primarily devoted to advertising and shopping services. While infomercials attempt to sell products, they are especially interested in providing potential customers with information about products or services. For example, Kraft

provides on-air cooking lessons, Ford provides technical information about its automobiles, Kodak shows tips on how to take better pictures, and Tenneco shows industrial films about itself and its products. At present infomercials are still experimental, but they may prove to be a successful and unique advertising form for cable communications systems.

13.6 ADVERTISING CODES AND OTHER ISSUES

Electronic media advertising has the potential to be deceptive, false, and misleading. These abuses have been the target of government regulation. The activities of the Federal Trade Commission and the Federal Communications Commission will be discussed in more detail in chapter 15. In addition to government regulation, many industry groups have developed codes and other self-regulation pertaining to advertising practices. Three other issues seem to be of concern to many users of electronic media: clutter, the audio level of commercial messages, and advertising on cable.

13.61 Advertising Codes

The best-known statements codifying electronic media advertising practices, the Radio and Television Codes of the National Association of Broadcasters, were withdrawn in 1982 because of antitrust problems. Despite the fact that the codes are no longer binding on subscribers, most stations continue to follow their major provisions. The codes prohibited, among other things, **host selling** in children's programs and the advertising of hard liquor, contraceptives, fortune-telling and other similar services, and gambling.

The Business and Professional Advertising Association (BPAA) has a code of ethics that focuses on false and misleading advertising. The American Advertising Federation has a nine-point Advertising Code that demands that advertising be truthful, avoid offensive or indecent content, refrain from **bait and switch** techniques, use only accurate price claims, use only testimonials from persons who have actually used the product and can honestly recommend it to others, and avoid unprovable claims.

13.62 Clutter

An excessive number of commercial messages in a break seems to be one of the things that irritates audiences the most. Overscheduling of commercials, or clutter, concerns advertisers also. Few sponsors want to be in fifth place in a seven- or eight-commercial string. In order to combat clutter, most stations schedule no more than five commercials in a row. Radio stations attempt to schedule no more than eighteen minutes of advertising in any one hour period, while television stations try to schedule no more than ten minutes of nonprogram material during prime time, and no more than sixteen minutes at other times.

However, all such time restraints are voluntary. Neither the NAB nor the FCC have any set amount of commercial time that is deemed "acceptable."

13.63 Audio Levels

Some commercial messages on radio and television have a much higher audio level than the program material. In an effort to deal with this continuing problem, sponsors, advertising agencies, and production companies are periodically urged to be more careful about the sound level. Stations may refuse to broadcast commercial messages that don't adhere to a certain audio standard.

13.64 Cable Advertising

The newest advertising medium is cable. Since it is a new venture, activity has been slow and cautious. Cable as an advertising medium suffers from a lack of consistent market reporting and small audiences, as well as the natural hesitance of agency personnel and sponsors to take a risk on a new medium. Some sponsors have increased their advertising on the three major superstations (WTBS, WGN, and WOR). Others have focused on audience segments already identified as good prospects for their products. Basic services such as Cable News Network, ESPN, or USA are particularly appealing. Some of the agencies have returned to the practices of the 1950s and are developing programming for cable.

Local cable systems have become increasingly aggressive in seeking local advertising dollars. Advertisers are often approached directly about producing their own commercials using the cable system's studios and equipment. These spots are then placed on a local channel that draws a large enough audience to bring the CPM within acceptable limits.

13.7 SUMMARY

Advertising is the primary means of financial support for the American system of broadcasting. However, from the very beginning commercials were controversial. Early advertisements were very different from those presented today on radio, television, and cable.

Each of these media has strengths and weaknesses that media planners must analyze before deciding which ones to use in an advertising campaign. Participants in the advertising milieu include the local station, the network, the station representative, the advertising agency, and the advertiser or sponsor. A full-service advertising agency performs a wide range of services for its clients, from buying time to conducting research on advertising effectiveness. The station representative represents client stations with national advertisers and agencies. The local station's sales department includes national and regional sales, local sales, and traffic departments.

Types of ad buys include straight time sales, cooperative advertising, trade-outs, and barter. Media buyers determine local station advertising rates by consulting publications

of the Standard Rates and Data Service. In determining whether to buy time on a station, media buyers use a number of variables, including rating, cost per thousand, and cost per gross rating point.

An important aspect of advertising strategy is the approach to commercial content presentation. The six basic presentational strategies are demonstration, documentation, association, humor, description, and entertainment. Standard commercial lengths are thirty and sixty seconds, although local stations sometimes schedule ten-second commercial messages, and networks allow piggybacking in thirty-second spots.

CHAPTER 14 OUTLINE

14.1 THE DEVELOPMENT OF PUBLIC BROADCASTING

14.11 Educational Radio and Television Before 1967
14.12 Educational Broadcasting Becomes Public Broadcasting
14.13 The Problems of the Seventies and Eighties
14.14 Program Highlights of Public Broadcasting
14.15 Public Broadcasting Pioneers Satellite Interconnection

14.2 ORGANIZATION OF PUBLIC TELECOMMUNICATIONS

14.21 National Organizations
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14.3 THE SELLING OF PUBLIC BROADCASTING

14.31 Audiences for Public Broadcasting
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14.33 The Noncommercial Commercial Experiment

14.4 INSTRUCTIONAL AND CORPORATE VIDEO

14.5 SUMMARY

14

PUBLIC BROADCASTING AND OTHER ALTERNATIVE USES OF ELECTRONIC MEDIA

Radio, television, and cable compete in the marketplace for profits. The commercial use of the electronic media is one of the distinguishing characteristics of the American system of telecommunications. Yet other systems coexist with the commercial system. One of these is public broadcasting; another is corporate communications and education. In this chapter we'll examine these alternative systems.

When you complete this chapter you'll be able to:

1. Trace the evolution of public broadcasting
2. Identify the components of the public broadcasting system and explain their relationship to one another
3. Name some of the uses of television beyond broadcasting and cable.

14.1 THE DEVELOPMENT OF PUBLIC BROADCASTING

Public television and radio are broadcasting systems that provide audiences with an alternative to the programming seen on commercial radio, television, and cable. Public stations are part of a *noncommercial* system, by which we mean that the organizations that

run the stations are nonprofit. Commercial and noncommercial stations differ philosophically. Public stations exist to deliver programs to audiences. Commercial broadcast stations, by contrast, are primarily in the business of delivering audiences to advertisers, and cable communications systems deliver services to paying subscribers.

The history of public broadcasting falls into two distinct eras. Prior to 1967, noncommercial radio and television were primarily educational. After 1967, noncommercial radio and television expanded to include cultural, informational, and entertainment programming.

14.11 Educational Radio and Television Before 1967

The idea of using the electronic media as an educational tool is not of recent vintage. Stations were established in the early 1920s by land grant and private universities. Some of the early university broadcasters were Cornell, Tulane, Purdue, Iowa, Wisconsin, Minnesota, and Arkansas. For some the radio station served as a *laboratory* for the physics and engineering departments. In other cases, administrators saw that radio could be used to *publicize the activities* of the university or utilized to raise money for campus activities. Some saw radio primarily as an *educational tool* to be used for adult education courses and to support agricultural extension programs. Whatever the reasons for establishing these early stations, each faced the same problem—money. By the early 1930s most of these early educational stations had gone off the air because they couldn't afford to operate. "Inadequate financial resources" is a theme that can be identified throughout the history of public broadcasting.

The concept of establishing a specific set of frequencies for noncommercial and educational use was first developed in the late 1920s. The idea was to set aside certain frequencies for universities and other educational institutions to use for the broadcast of classes and other instructional programs, so that commercial interests would not have to compete with educational interests for spectrum space. However, it took many years for the FCC to act on the idea. In 1938 the Federal Communications Commission set aside a *specific band of channels* in the 41–42 MHz range for educational use. Later the band was changed to 42–43 MHz. Finally the FCC designated the 88–92 MHz FM band specifically for educational use. Some educators established educational radio stations using both local programs and programs distributed by the National Association of Educational Broadcasters.

When the FCC froze new applications for television stations in 1948, it gave educators an opportunity to work with the FCC and Congress on establishing a group of television channels for noncommercial use. But the educational establishment was slow to respond to the opportunity. It was not until 1950 that the Joint Council on Educational Television asked the FCC to set aside channels in each community for educational use. The FCC did set aside the channels as requested, but this did little to solve the problems faced by educational broadcasters. Most of the educational channels assigned to the largest markets were in the UHF portion of the spectrum, and at that time few television sets were equipped to receive those channels. Despite the handicap of a UHF channel,

some educational institutions and community groups did put stations on the air. KUHT-TV, licensed to the University of Houston, was the first station established after the 1948 freeze. It was licensed in May 1953 and is considered by many to be the oldest educational television station in the United States.

Few educational institutions and community groups had the resources to completely finance a new station, so outside help was needed. Major aid to the early educational stations came from the *Ford Foundation*. From the late 1950s through the mid-1970s, the Ford Foundation poured almost $300 million into educational television. Much of the money went to buy equipment, but some went for the production of programs. In 1962 Congress passed the Educational Television Facilities Act, which appropriated $32 million for equipping educational stations. By early 1967 there were 126 noncommercial television stations operating. Programs consisted of instructional offerings, educational programs provided by syndicators, and programs distributed by *National Educational Television* (NET) via a bicycle network.

Despite the support of the Ford Foundation and the federal dollars provided by the Facilities Act, money continued to be a problem. In 1965 the *Carnegie Commission* formed a blue-ribbon panel to examine educational television and make recommendations concerning its direction and method of funding. Two years later, the commission released its report, *Public Television: A Program for Action*. While the new system it envisioned had "educational" and "instructional" components, the commission sought to create a noncommercial system that went beyond the confines of the classroom. The world was to be the schoolhouse, and the programs presented via this new type of radio and television were to adhere to standards of excellence not possible in commercial broadcasting. No longer was the term "educational" an accurate description of noncommercial radio and television. *Public* broadcasting was born.

14.12 Educational Broadcasting Becomes Public Broadcasting

The Carnegie report served as a basis for congressional action. With the support of President Lyndon Johnson, Congress passed the Public Broadcasting Act of 1967, which made a declaration of public policy consisting of seven tenets:

1. It is in the public interest to encourage the use of public radio and television for instructional, educational, and cultural programming.

2. The policy includes broadcast as well as nonbroadcast telecommunications services.

3. There must be freedom, imagination, and initiative at both local and national levels.

4. In addition to state and local governments, the federal government has a legitimate concern with the development of noncommercial telecommunications services.

5. These noncommercial services should reflect both local and national diversity and be responsive to needs.

6. Noncommercial services should be made available to everyone.

7. A private corporation should be established to carry out the federal policy so as to insulate local entities from extraneous interference and control.

The corporation that was established to carry out these policy objectives was the *Corporation for Public Broadcasting*. The CPB began functioning in 1968 with private support. Not until 1969 did Congress appropriate $5 million for what was now known as public broadcasting. The legislation that established the CPB prohibited it from engaging in the production or distribution of programs, nor could it engage in any sort of station interconnection—in other words, the CPB was not to function in any way as a network. One of the first actions of the CPB was to help establish the *Public Broadcasting Service* (PBS), whose primary function was to distribute programs to its member stations. While PBS could not produce programs, it did schedule programs and worked with the CPB in deciding what programs should receive CPB funding. *National Public Radio* (NPR) was launched in 1970 as a membership organization. Unlike PBS, NPR was allowed to produce its own programs.

14.13 The Problems of the Seventies and Eighties

It is ironic that a system carefully designed to be insulated from political pressures found itself bobbing like a cork on the political seas. It became clear in the first years after the Public Broadcasting Act that the system had serious problems. One problem stemmed from the structure of the CPB and PBS. The CPB controlled the federal funds—how much money was given directly to stations, how much went to the production of programming, and how much went to support other services that the CPB felt were a part of its mandate. These services included the training of minorities and women, the support of independent producers, and the creation of a new cadre of creative personnel who would produce the programs of the future. Almost from the beginning, CPB and PBS disagreed on *money*. PBS took the position that the television stations should receive most of the federal funding; CPB disagreed. Another factor in the *politicizing* of public broadcasting was the lack of any long-range funding for the system. The CPB went from year to year never knowing how much money Congress would appropriate to public broadcasting. A third factor resulted from the innovative and often *controversial* programming that was developed from 1967 through 1972. While commercial stations were cutting back on documentaries and investigative journalism programs, public stations were broadcasting several each week. The "Black Journal" series provided a weekly outlet for the views of black Americans, views that often ran counter to the prevailing opinions of white America. Investigative pieces like "Banks and the Poor" publicized discriminatory policies carried out by financial institutions. Consumer advocate Ralph Nader appeared regularly on public stations. Many of public broadcasting's public affairs programs were accused of being journalistically unsound, and producers were accused of presenting facts out of context or distorting them.

Not every program was anti-Establishment or otherwise controversial, however. Many other public broadcasting programs designed to meet the needs of special audiences were widely acclaimed. "Sesame Street" was one of the first instructional programs to use television in an innovative and exciting way. Produced by the Children's Television

FIGURE 14–1. "Sesame Street"
"Sesame Street" is produced by the Children's Television Workshop, using federal grants and private funds. It proved that television could educate as well as entertain.
SOURCE: Children's Television Workshop.

Workshop, this program for preschoolers was later followed by a program on reading called "The Electric Company." British serialized drama first appeared on public broadcasting in the multiepisode dramatization of John Galsworthy's *The Forsyte Saga*. Classic films, how-to-do-it shows, book reviews, comedy, popular music programs, and American drama were weekly features on PBS.

Yet despite the wide variety of programs distributed by PBS, it was the controversial *public affairs* programs that were noticed by members of Congress and the White House. President Nixon showed his displeasure with public broadcasting by vetoing a two-year, $155 million authorization bill for the Corporation for Public Broadcasting. In his veto message, Nixon accused public stations of deserting the idea of localism by placing programming decisions in the hands of the PBS and CPB staffs. Until such time as public

broadcasting returned to the original purpose for which it had been established, said Nixon, there would be no hope of any sort of *long-range, multiyear funding* for the public stations.

The leadership of the CPB resigned and was replaced by two Nixon appointees—former congressman Thomas Curtis took over as chairman of the board and Henry Loomis as president of the corporation. Under its new leadership, the CPB withheld funding for public affairs programming, refused to fund the centralization of public affairs programming in Washington, and reclaimed decision-making powers previously delegated to PBS. PBS disagreed with these actions and sought to undermine the CPB board's decisions. However, at the urging of congressional leaders PBS and CPB negotiated their differences and in May 1973 signed a *partnership agreement*. The PBS negotiating team was led by Ralph Rogers, the founder of the Texas Instruments Corporation, and Robert Schenkkan, representing the many different stations that made up PBS. The agreement that resulted from the negotiations contained four key provisions:

1. PBS would continue to operate the interconnection service under a contract with the CPB.

2. The stations would fund all other PBS activities, including programming, promotion, research, and representation to Congress.

3. There would be an increase in the amount of money the CPB provided directly to the stations in the form of community service grants.

4. The CPB would make all final decisions concerning which programs it would fund in consultation with PBS staff.

Working together, the CPB and PBS managed to convince Congress to pass a multiyear funding bill, which President Gerald Ford signed into law in 1975. For the first time in its history, public broadcasting could plan for the future without worrying about the level of federal funding. The euphoria was short-lived. The election of Ronald Reagan to the White House in 1980 and his federal spending cuts resulted in less money actually being appropriated to the CPB by Congress. As federal dollars became scarcer, public broadcasting was once again faced with financial uncertainty.

In 1977 a *second Carnegie Commission* had been appointed to make recommendations on public broadcasting. Its findings were published in a volume called *A Public Trust* (1979). In this report the commission recommended abolishing the Corporation for Public Broadcasting and replacing it with a private, nongovernmental, nonprofit corporation called the Public Telecommunications Trust. It also recommended a large increase in the amount of federal support for public telecommunications. Congress has taken no action on the commission's proposals. However, the CPB and PBS did engage in some reorganization consistent with the commission's recommendations.

Public broadcasting continues to have a roller coaster existence. In 1981 the Annenberg Foundation, through the Annenberg School of Communications, awarded a fifteen-year grant of $150 million to the Corporation for Public Broadcasting. The purpose of the grant is to create new college-level course materials and to address the problems of higher education via telecommunications technologies. On the down side, National Public

Radio announced in the spring of 1983 that it faced a deficit of over $9 million, and was forced to fire staff and severely reduce its cultural and news and information programming.

14.14 Program Highlights of Public Broadcasting

Despite their financial troubles, public radio and television stations provide American audiences with some of the highest-quality programs available anywhere. Public stations have sought to provide a diverse schedule of programs that, while not appealing to the mass audiences of commercial radio and television, are meaningful to significant audience segments. The Public Broadcasting Service provides most of the prime time programming, with local stations using locally produced and syndicated material to fill in the schedule.

PBS provided the first prime time, dramatic miniseries with "The Forsyte Saga." "Upstairs Downstairs" became a national fad. Both series were imported from Great Britain. American drama has also appeared on PBS in the series "American Playhouse" and in the

FIGURE 14–2. "Dance In America"
Public television is known for its distinctive arts programs. Opera, dance, and theater are three of the lively arts spotlighted on public stations.
SOURCE: Used with permission Educational Broadcasting Corporation; Don Perdue photographer.

FIGURE 14–3. Jim Lehrer and Robert MacNeil
In 1983 the **MacNeil/Lehrer News Hour** became television's first regularly scheduled hour news program.
SOURCE: Used with permission Educational Broadcasting Corporation; Don Perdue photographer.

adaptation of Hawthorne's *The Scarlet Letter*. Programs such as "Nova," "Cosmos," and "Life on Earth" have provided viewers with insights into science and technology seldom offered on television, while "3-2-1 Contact" presents science topics to younger viewers. In September 1983 PBS became the only broadcast network to offer an hour-long news program every weekday, "The MacNeil/Lehrer News Hour." Documentaries continue to be a consistent part of the public television schedule. "Sesame Street" revolutionized children's television, and the award-winning "Mr. Rogers' Neighborhood" is one of the few programs, commercial or noncommercial, to address the problems of preschoolers. Public television has even made forays into the world of commercial programming. For example, "The National Geographic Specials" came to PBS after several years of being shown on commercial television. "The Paper Chase," a victim of the network ratings wars, is another commercial program that found its way to PBS. But it is for the cultural programs that public television is best known. Drama, dance, opera, and symphonic and chamber music have important spots in the public television schedule.

FIGURE 14–4. Made in Taiwan: Television from the Republic of China
International programming is frequently seen on public television stations.
SOURCE: Frank Sheng for KUAT-TV/Public Broadcasting International.

Some public broadcasting personalities have become national celebrities. Among those achieving celebrity status are Julia Child ("The French Chef"), the Muppets ("Sesame Street"), Gene Siskel and Roger Ebert ("Sneak Previews"), and Leo Buscaglia ("The Art of Being Fully Human").

Public radio also has a diverse schedule of programs, with the emphasis on news and public affairs. The two key news programs are "Morning Edition" and "All Things Con-

sidered." Both are produced by National Public Radio in Washington, D.C. Documentaries and informational programs also are produced by NPR. Music programming consists of both classical and jazz offerings. NPR also presents radio drama produced both in the United States and Great Britain; "Star Wars," "A Hitchhiker's Guide to the Galaxy," and the "Earplay" series are a few of the noteworthy programs. Many public stations offer reading services for the blind; Dick Estelle's "Radio Reader" has been a favorite of both sighted and blind listeners for many years.

One of the most popular non-NPR-produced programs on public radio is "A Prairie Home Companion," hosted by writer-humorist Garrison Keillor. Set in the fictitious town of Lake Woebegone, Minnesota, "A Prairie Home Companion" is a Saturday-night mixture of birthday greetings, music, humor, and commercials for fictitious products. It is unlike anything else on radio, commercial or noncommercial. The weekly program is produced by Minnesota Public Radio.

14.15 Public Broadcasting Pioneers Satellite Interconnection

As early as 1966 the Ford Foundation proposed that public broadcasting programs be distributed nationally by satellite. In 1978 the Public Broadcasting Service became the *first* television network to deliver programs via a *communications satellite*. While the initial expense for individual stations was high, the long-term benefits were enormous. First, after ten years the stations would pay off the equipment mortgage and own the uplink and receiving equipment. Second, the overall quality of service improved. Third, in the long run the cost of the service was less than using land lines rented from AT&T. In addition, PBS can rent space on the four **transponders** it operates during periods when they are not being used for PBS activities. Commercial enterprises have used these transponders to distribute commercials and program materials. Fourth, the system as initially designed allowed for six uplinks to the satellite, located outside Washington, D.C., and in South Carolina, Florida, Connecticut, Colorado, and Nebraska. These six uplinks allowed system-wide interconnection. In addition, the Public Satellite Consortium has portable uplinks for use in other parts of the country.

In mid-1980 NPR followed the lead of PBS and began delivery of programs via satellite. The four transponders delivered digitized audio signals to NPR affiliates across the nation. These four channels allowed NPR to deliver programming directly to the stations, consistent with time zone requirements. Seventeen uplinks allowed stations to interconnect with NPR for remote broadcasts. The benefits in terms of improved sound quality, additional programming flexibility, and cost savings are similar to those achieved by use of satellites in television.

14.2 ORGANIZATION OF PUBLIC TELECOMMUNICATIONS

The public telecommunications industry is organized similarly to its commercial counterpart. There is, however, no equivalent to the full-service commercial network. Nationally

we have the CPB, PBS, NPR, and the National Association of Public Television Stations. There are also regional and state networks, and local noncommercial stations.

14.21 National Organizations

The activities of the Corporation for Public Broadcasting, created by the Public Broadcasting Act of 1967, are overseen by a *ten-member* board of directors. Each of the directors is nominated by the president with the advice and consent (approval) of the Senate of the United States. No more than eight directors may be members of the same political party. Board members serve staggered terms of *six* years, and no member may serve more than two consecutive six-year terms. Each year the members of the board elect a chairman.

The CPB is charged by Congress with a wide variety of responsibilities for public telecommunications in the United States. To fund these activities, Congress provides the corporation with an appropriation each fiscal year. In general, the functions of the corporation can be divided into three distinct categories: *support* of local public radio and television stations, *development* of human resources, and *funding* of programs for possible distribution to the public through the stations.

Support of local stations is manifested in several ways. First, the CPB serves as a *representative* of public telecommunications with Congress and other branches of the gov-

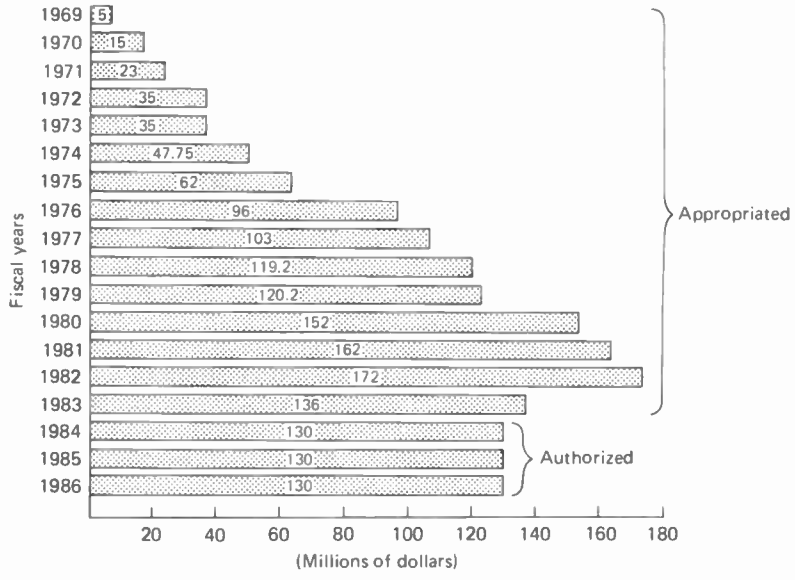

FIGURE 14–5. Federal Dollars and Public Broadcasting
During the 1970s and early 1980s the amount of federal money going to public broadcasting steadily increased. But beginning in 1983 there were substantial reductions.

ernment. The term "public telecommunications" covers a broad spectrum of communications activities. The CPB interprets its congressional mandate as allowing it to represent other interests in addition to those of the stations that are members of PBS and NPR. Many critics of the CPB feel that it tends to slight the PBS and NPR stations' interest, but others, not members of either PBS or NPR, feel that the CPB fails to represent the noncommercial organizations that work in cable, LPTV, and other electronic media. Second, the CPB serves as a *clearinghouse* for all kinds of information. CPB activities in this area have ranged from setting up means of selling programs to foreign broadcast systems, to publishing newsletters in order to achieve wider distribution of information. The corporation has also *funded research* into programming and audiences, new technologies, and telecommunications engineering. The major CPB station-support activity is the *distributing of funds* directly to qualified stations in the form of *community service grants*.

The Corporation for Public Broadcasting has always had a commitment to the training of minorities and women. CPB training programs have consisted of workshops, grants to stations to provide training, and grants to individuals that enable them to get the training they need in order to move into positions of increased responsibility. The CPB has also funded training opportunities for managerial personnel. All of these programs have had the effect of increasing the professionalism of those who work in public broadcasting.

The third major area of activity is the support of program production activities. The corporation provides grants for the production of program materials for both radio and television. In radio, a substantial amount of the funds available for production goes to NPR. Since PBS cannot produce programs, television production funds are distributed to individual stations and independent producers.

The Public Broadcasting Service is a *membership* organization made up of the stations that receive PBS programs. PBS maintains the *interconnection facilities*, chooses and schedules *programs* with the help of programming committees, conducts program-related *research*, and coordinates national *advertising and public relations*. The PBS budget comes almost entirely from the member stations, with a very small amount from other sources. The program service of PBS is divided into three parts: *PTV I*, the major program service of the system, provides stations with the bulk of program offerings and allows for almost simultaneous carriage of programs in prime time. *PTV II* distributes materials to stations for later use. These programs are designed to serve the needs of minority and other specialized audiences. Included in PTV II's services are the programs of the regional networks. *PTV III* carries educational and instructional programs for use by stations and schools.

PTV I programs are selected by the stations in an auctionlike process called the *station program cooperative* (SPC). Each year program production proposals are given to PBS, which distributes them in a catalogue. Stations choose the programs in which they are most interested, and these programs are then offered to stations for a price. In this way the cost of each program is distributed among the stations that express a willingness to purchase it. The price paid by each station varies according to its market size and budget. When enough stations are willing to buy a program it is considered bought, and a grant

is given to the producer. This method of buying national programs is in sharp contrast to the centralized system of the commercial networks.

As a result of the second Carnegie Commission report, PBS reorganized its activities. Part of that reorganization included establishing the *National Association of Public Television Stations* as a lobbying organization. NAPTS is a member-supported organization that works with Congress, the FCC, and other organizations in representing the interests of public television stations.

National Public Radio, unlike PBS, functions similarly to a full-service network. NPR produces and distributes programming and also uses program materials submitted by member stations and independent producers. The American Public Radio Network was organized in 1981 to fill in the gaps in NPR's programming. Located in Minneapolis–St. Paul, APRN offers its member stations a variety of special programs covering a variety of formats.

14.22 Regional Networks

Public broadcasting was founded on the idea that the individual station should be independent to serve its local market as it thinks best. In order to thwart the tendency toward a national network and to meet the needs of regional audiences, four regional networks have been organized. The Eastern Educational Network, Southeastern Educational Communications Association, Central Educational Network, and the Pacific Mountain Network, like PBS, are membership organizations. Each network serves the member stations in its region, but membership is open to all public stations. Regional networks engage in group syndicated program buys, provide some production funds for new programming, and represent the interests of their members.

FIGURE 14–6. The Alphabet Soup of Public Broadcasting

NATIONAL ORGANIZATIONS	
Corporation for Public Broadcasting	CPB
Public Broadcasting Service	PBS
National Public Radio	NPR
Association of Public Television Stations	APTS
American Public Radio Network	APRN
REGIONAL ORGANIZATIONS	
Eastern Educational Network	EEN
Central Educational Network	CEN
Southern Educational Communications Association	SECA
Pacific Mountain Network	PMN

14.23 Local Stations

The 1970s saw a rapid growth in the number of noncommercial radio and television stations in the United States. During this period the number of noncommercial FM radio stations grew from 418 to 1,038, the number of AM stations remained constant at 25, and noncommercial television stations grew in number from 185 to 280. The licensees of noncommercial stations fall into *four* classes: state or municipal stations, college or university stations, public school system stations, and community stations.

Stations licensed to state authorities are generally operated by a state public television commission, a board of education, or a similar government body. State noncommercial licensees tend to be organized into statewide networks, with one station serving as the primary station and the other stations having limited local production. State-operated public television networks exist in Alabama, Georgia, Kentucky, Nebraska, South Carolina, and Oklahoma. The only city-licensed television station is WNYC-TV, owned and operated by New York City.

Stations licensed to institutions of higher learning are found all over the United States. Most university licensees are land grant colleges, but there are exceptions. Stations are licensed to state universities in Wisconsin, Florida, Arizona, Pennsylvania, and New Mexico, among others. Often the stations are connected with some service or educational division of the university. Some are part of academic departments.

The third type of licensee is the public school system. KRMA-TV in Denver, Colorado, is licensed to the Denver school system. During the day the station runs primarily instructional programs. At night its programming is designed to serve the entire community. WDCN-TV in Nashville, Tennessee, is operated in a similar fashion.

The fourth category is the community licensee. In general, these organizations are set up as nonprofit corporations or foundations dedicated solely to the operation of the noncommercial radio or television station. While the first three types of stations receive a large proportion of their funding from tax revenues, community stations lead an existence similar to commercial stations. The result is that community stations are the leaders in producing programs that are nationally distributed by PBS. Many have set up profit-making subsidiaries. WGBH (Boston), WNET (New York), KCET (Los Angeles), WQED (Pittsburgh), KQED (San Francisco), and WTTW (Chicago) are community stations.

In addition to the various types of organizations licensed to operate noncommercial stations, there are two types of radio stations: *CPB qualified* and *non-CPB qualified*. A CPB-qualified station is eligible to receive general support funds distributed by the Corporation for Public Broadcasting. In order to be CPB qualified, a station must meet a number of criteria:

Broadcast a minimum of eighteen hours per day, seven days per week
Operate with a minimum of 3,000 watts
Have at least one production studio and a separate control room
Have an operating budget of at least $80,000 with five full-time employees.

These criteria eliminate approximately 80 percent of the noncommercial FM stations licensed to operate. However, most of these stations operate with very low power (10 watts in many instances) and are located primarily on college campuses.

14.3 THE SELLING OF PUBLIC BROADCASTING

It may seem odd to raise the question of the "selling" of public broadcasting. Yet public broadcasting competes with commercial broadcasting, cable services, and other media for audience attention. And while some public broadcasters may seek only to produce high-quality programming that provides an alternative to commercial fare, nevertheless there must be audiences large enough to justify the money spent on the service. Increasingly, public broadcasters are being forced to think in terms of ratings, audience share, cost per thousand, and benefit-cost ratios.

14.31 Audiences for Public Broadcasting

While the three commercial networks' share of audience is decreasing, public television has shown a slow increase in its CUME. One reason is the increase in public television's coverage. In mid-1983 public television could be received by 96 percent of U.S. homes with television. In January 1983, 54.8 percent of the HUTs watched public broadcasting at least once per week; 33.8 percent watched in prime time. According to PBS research, the average household watched 209 minutes of public television during the survey week, and 116 of those minutes came in prime time. The audience for public broadcasting tends to be white, have a better-than-average income, hold a college degree, and work as a professional or manager (see figure 14–8).

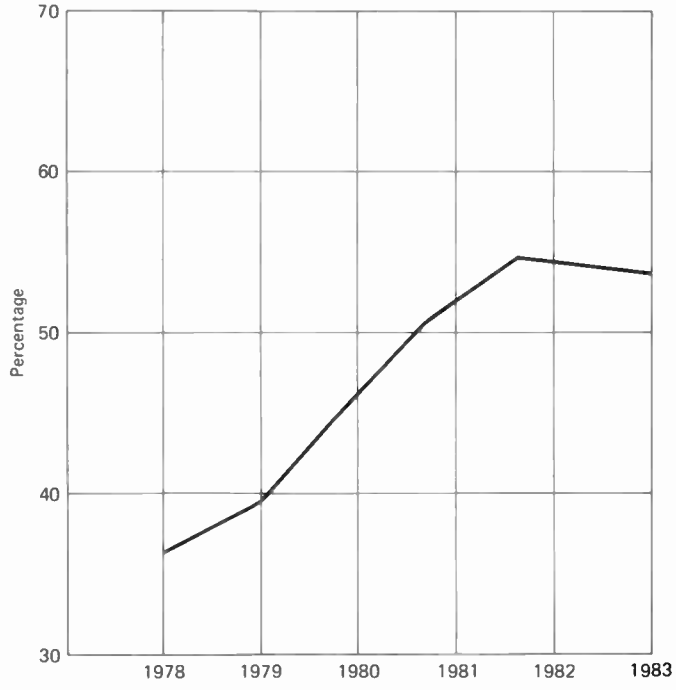

FIGURE 14–7. Yearly Full-Day CUMES for Public Broadcasting

FIGURE 14–8. Selected Demographic Characteristics of Public Television Audiences

	ALL U.S. TV HOUSEHOLDS	*PUBLIC TV HOUSEHOLDS*
Race		
White	85.5%	89.4%
Nonwhite	14.5%	10.6%
Children		
None	60.9%	57.1%
Any	39.1%	42.9%
Any 12–17	18.5%	19.8%
Any 6–11	18.0%	19.0%
Any less than 6	18.1%	21.0%
Education		
Fewer than 4 yrs high school	29.4%	21.4%
4 yrs high school	35.2%	38.6%
1–3 yrs college	15.6%	14.9%
4+ yrs college	19.8%	25.1%
Occupation		
Prof/owner/manager	25.4%	28.4%
Clerical/sales	11.7%	11.5%
Skilled and semiskilled	34.7%	33.3%
Not in labor force	28.2%	26.8%
Household Income		
Less than $10,000	22.7%	16.5%
$10,000–19,999	25.4%	25.7%
$20,000–29,999	21.4%	21.1%
$30,000+	30.5%	36.5%
Age		
Less than 35	31.3%	29.6%
35–49	25.8%	26.0%
50–64	22.6%	24.7%
65+	20.3%	19.7%

SOURCE: PBS, 1983.

There are no regularly reported audience figures for all noncommercial radio stations. However, NPR does collect data on the size and demographics of its audience. Remember that only a small percentage of public radio stations are members of NPR. During the average week a little over seven million listeners tune in to a NPR-affiliated public radio station. The average listener tends to be male, white, under thirty-five, a holder of a college degree with a higher-than-normal income. NPR listeners tend to be lighter-than-average users of television and heavier-than-average users of radio.

14.32 Types and Sources of Income

When compared to commercial television, public television is woefully underfinanced. According to figures released by PBS, during fiscal year 1981 the federal appropriation to public television amounted to $.64 per person. Commercial television spent $31.11 per person during the same period. The Canadian government spent $18.94 per person for

FIGURE 14–9. Selected Demographic Characteristics of National Public Radio Audiences

	TOTAL U.S. RADIO	*NATIONAL PUBLIC RADIO*
Race		
White	87%	91%
Nonwhite	11%	6%
Education		
Fewer than 4 yrs high school	29%	12%
4 + yrs college	15%	37%
Occupation		
Prof/owner/manager	30%	52%
Clerical/sales	25%	18%
Household Income		
Less than $15,000	38%	23%
$30,000 +	27%	39%
Age		
18–34	41%	54%
35–54	30%	31%
55 +	29%	15%

SOURCE: National Public Radio, 1981.

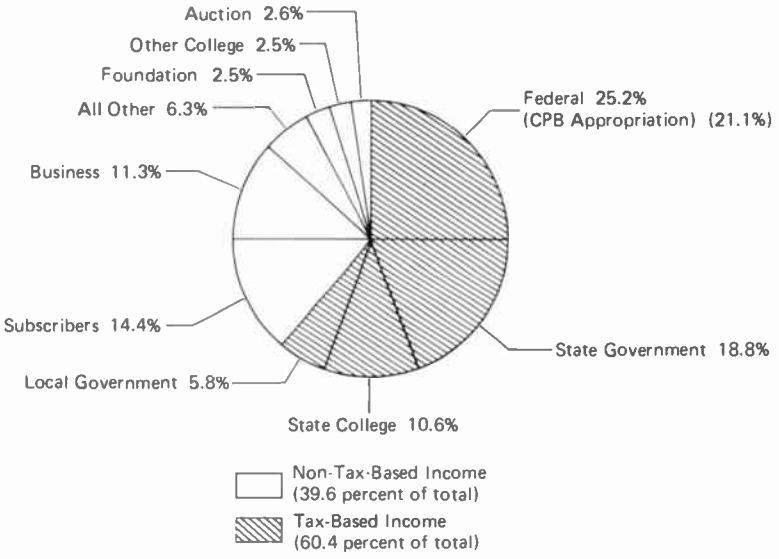

FIGURE 14–10. Public Broadcasting Income by Source, Fiscal Year 1981

its public CBC-TV services, while the British government spent $11.29 per person on BBC-TV.

The funds received by public broadcasting organizations come from a variety of sources. *Tax-based* income from federal, state, and local sources makes up about two-thirds of the total. Federal dollars are channeled to public stations through the Corporation for Public Broadcasting in the form of community service grants (CSGs) and grants for the production of programs. The CPB is required by Congress to use not less than 90 percent of its appropriation for station support. Television activities receive 67.5 percent of the funds (50.625 percent for CSGs, 16.875 percent for production of programs). Radio receives 22.5 percent of the appropriation, split evenly between CSGs and production grants.

Private income makes up one-third of public broadcasting's income. In recent years public stations have had greater incentives to generate nonfederal dollars. The total amount of federal dollars going to the Corporation for Public Broadcasting is dependent upon the amount of money generated by public stations in various fund-raising activities. Stations have created development departments whose sole function is to raise money for public broadcasting activities.

The major source of private income comes from *memberships*. Most stations conduct one or more membership campaigns per year. During these campaigns, members of the station's staff and supporters from the community speak directly with the viewers and ask for money. The appeals range from amateurish hard-sell approaches to slickly mapped-out sales talks designed to motivate viewers to pledge support for the station. While this method of fund-raising has its critics, it is amazingly successful. Development departments also stage *auctions* during which goods and services are sold to the highest

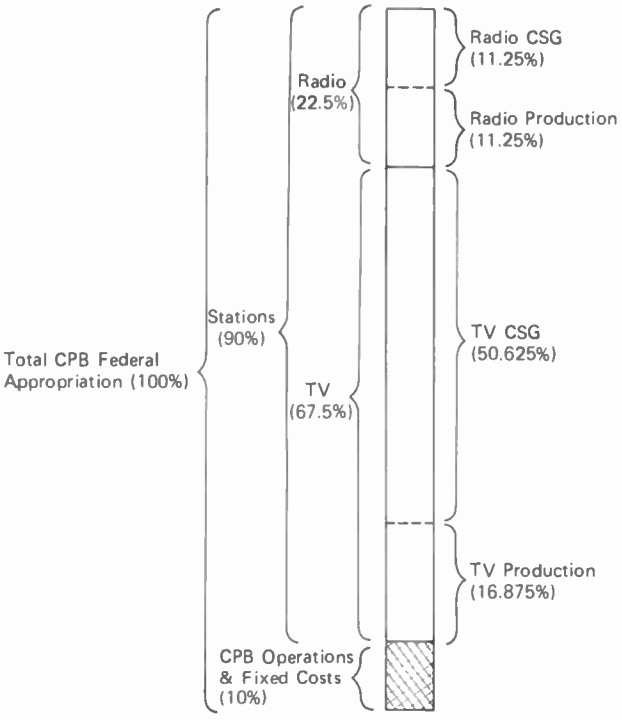

FIGURE 14–11. Dividing the Federal Dollars

bidder, with all the proceeds going to the station. *Direct mail* is another technique used by public stations. Some stations stage special events—with big-name speakers, dances, silent auctions, etc.—to generate funds. The more entrepreneurial-minded have set up *profit-making subsidiaries*, small businesses that distribute video and audio tapes and magazines and engage in commercial production activities in order to support the noncommercial stations.

Corporate development departments are also active in soliciting *foundation and corporate support*. When a foundation or corporation provides funds to produce or broadcast a program, it is acknowledged in the form of an underwriting credit at the beginning and end of the program. The upscale demographics of public broadcasting viewers and listeners appeal both to corporations that normally do institutional advertising and to those that engage in more traditional advertising activities. Both national and local companies are involved in underwriting.

14.33 The Noncommercial Commercial Experiment

In 1981 Congress authorized the FCC to conduct an experiment that would allow a limited number of noncommercial stations to broadcast commercial messages. Not enough

radio stations were interested in the experiment to allow for meaningful research, but ten television stations agreed to participate. Each of the stations went about the commercial enterprise in a slightly different manner. Some simply expanded underwriting announcements to include more information about the sponsoring company or its product. Other stations sold time in a manner similar to a commercial station. However, the commercial messages didn't interrupt programming but were clustered at the beginning and end of programs. The experiment concluded in late 1983 with the FCC reporting to Congress that advertising support could *not* support the noncommercial broadcast system. Whether noncommercial stations will eventually become commercial remains to be seen.

14.4 INSTRUCTIONAL AND CORPORATE VIDEO

One of the fastest-growing areas of electronic media is *video*, meaning television material designed for small audiences and distributed in a manner other than broadcasting or cable. Users of video include educational institutions, health services organizations, government agencies, and corporations.

The use of video came about because of a number of factors: geographic dispersion of corporate offices and government agencies, the expense of travel, a need for common information among widely separated organizations, the increasing costs of educating personnel and consumers, and the necessity of continuing education programs for employees at all levels.

Video is used by traditional educational institutions, government agencies, corporations, and health care organizations to provide educational materials to employees, customers, and potential customers. Video programs are used in schools at all levels, from kindergarten through graduate and postgraduate training. Some of the programs are copies of television programs that first appeared on television broadcast stations. Such programs are used to "enrich" the educational material. However, more and more special programs are being produced that are designed specifically to reinforce material presented by the classroom teacher. Some school systems and universities have set up ITFS systems that distribute materials for both student and teacher.

Government agencies such as the Department of Agriculture have developed extensive libraries of videotapes produced to teach skills to clients both in this country and abroad. General Motors uses videodisc technology to send service technicians material on automobile repair techniques and updates on maintenance procedures. Other corporations use video extensively to train employees in new procedures and to communicate sales and marketing techniques. Hospitals use video for both professional and patient education.

In addition to training functions, corporations use video in a variety of other activities (see figure 14–11), and many have even established in-house production units.

FIGURE 14–12. Corporate Use of Video

EMPLOYEE COMMUNICATIONS

Recruiting
Orientation
Benefits
Career advancement
Corporate issues
Safety training
Preretirement information
Management reports

MANAGEMENT COMMUNICATIONS

Reports from management to shareholders and board of directors
Policy statements by top management
Presentation of corporate services

TRAINING AND DEVELOPMENT

Outside experts
Internal experts
Education and skills development

MARKETING

Product introduction
Marketing support for field personnel
Direct sales tool

14.5 SUMMARY

The concept of educational or public broadcasting goes back to the time when stations were first established. It was not until the Public Broadcasting Act of 1967, however, that public stations began receiving federal support in any great amounts. The act established the Corporation for Public Broadcasting as the parent organization that distributes federal dollars to the various entities that make up the world of public broadcasting.

Although not a network in the commercial sense, the Public Broadcasting Service does provide an interconnection service for its member stations. National Public Radio performs the same function for its member stations, as well as producing programs. Other parts of the public telecommunications family include the Association of Public Television Stations and the four regional television networks.

Public radio and television licensees fall into one of four categories: municipal and state; school board; college and university; or community. Funds are received primarily from the Corporation for Public Broadcasting's community service grants and through PBS membership. Other sources of funds include membership drives, auctions, state and local taxes, foundation gifts, and corporate underwriting.

SECTION

IV

LAW/ REGULATION/ POLICY

CHAPTER 15 OUTLINE

15.1 REGULATION OF TELECOMMUNICATIONS

15.11 The Beginning of Wireless Regulation
15.12 Broadcasting Creates Chaos
15.13 The Communications Act of 1934

15.2 THE FEDERAL COMMUNICATIONS COMMISSION

15.21 The Commissioners
15.22 Administrative Organization
15.23 Rules, Regulations, and Policy
15.24 Remedies for Rules Violations
15.25 Administrative Procedures Act

15.3 THE FEDERAL TRADE COMMISSION

15.31 Origins of the FTC
15.32 Organization
15.33 The FTC and Advertising Practices

15.4 OTHER GOVERNMENTAL ENTITIES WITH AN INTEREST IN TELECOMMUNICATIONS

15.41 The Department of Justice
15.42 The National Telecommunications and Information Administration
15.43 The Department of State
15.44 The Interdepartmental Radio Advisory Committee

15.5 INTERNATIONAL REGULATION OF TELECOMMUNICATIONS

15.51 The International Telecommunication Union
15.52 The International Telecommunications Satellite Organization

15.6 SUMMARY

15

REGULATING TELECOMMUNICATIONS

It is impossible to study or work in the telecommunications industry for very long and remain unaware of the amount of government regulation that pervades the industry. Federal, state, and even local governments regulate some portions of the telecommunications industry. The content of programs and advertisements, business practices, the use of electronic media by candidates for public office, and entry into the industry are all subject to varying degrees of government scrutiny.

During the past decade there has been a trend toward **deregulation**. Those who promote the loosening of the regulatory bonds say that the marketplace is the best judge of the amount and quality of telecommunications services reaching consumers. As we've seen in previous chapters, the lines of demarcation between information and entertainment are becoming increasingly unclear. Those who oppose deregulation point to the trend toward greater concentration in the telecommunications industry. They fear that in some situations deregulation will result in unregulated monopolies that will dominate the marketplace.

In this chapter we'll begin our examination of the regulation of broadcasting and cable. At the end of this chapter you should be able to:

1. Trace the historical evolution of broadcast and cable regulation

2. Outline the structure and powers of the Federal Communications Commission and the Federal Trade Commission
3. Understand the relationship between the regulation of telecommunications in the United States and that in other parts of the world.

15.1 REGULATION OF TELECOMMUNICATIONS

Why do we allow government to regulate private business activities? The answer given by many political scientists is that government regulation is justified if its intent is to protect the *public interest*. Regulatory bodies are creations of the legislative branch of government and are delegated certain responsibilities which are too detailed or require too great a level of expertise to be carried out by members of Congress or state legislatures. Thus regulatory agencies possess a *quasi-legislative* function: they have the authority to make rules that govern the industries they regulate. Regulatory agencies also are given a *quasi-judicial* role that allows agency commissioners to make decisions involving disputes. In this way regulatory agencies help to reduce the work loads of our judicial system. Since regulatory agencies have both legislative and judicial functions they are often called our fourth branch of government.

15.11 The Beginning of Wireless Regulation

Telecommunications regulation began not with a U.S. problem but with a disagreement between the British Marconi Company and Germany. It was the policy of British Marconi to refuse to deliver messages received on its equipment if the signals originated on a rival system. This policy particularly affected Germany because it used the Slaby-Arco wireless system, not the Marconi system. In 1903, at an international conference in Berlin, a protocol was passed requiring all the eight participating nations to relay wireless signals no matter what equipment was used to transmit them. At a second meeting held

FIGURE 15–1. Federal Regulatory Agencies (Year established)

Civil Aeronautics Board (1938)

Federal Communications Commission (1934)

Federal Power Commission (1930)

Federal Trade Commission (1914)

Interstate Commerce Commission (1887)

National Labor Relations Board (1935)

Securities and Exchange Commission (1934)

in Berlin in 1906 and attended by delegates from twenty-four nations, two protocols were negotiated—one for ship-to-ship communication, the other for ship-to-shore message services.

Congress did not immediately ratify the accords of 1903 and 1906. The Marconi interests objected to the provision compelling them to accept messages transmitted by competitors' equipment. Additionally, Congress was reluctant to get involved in what were considered European problems. Finally, pressured by the threat to exclude the United States from future international meetings, Congress ratified the agreements. The resulting legislation, entitled the Wireless Ship Act of 1910, was the first piece of U.S. legislation that addressed wireless telecommunications technology.

The Wireless Ship Act of 1910 required all oceangoing vessels carrying fifty or more passengers and operating between ports 200 or more miles apart to be equipped with wireless apparatus and an operator. The equipment had to have a minimal range of 100 miles day or night. In the wake of the *Titanic* disaster of 1912, Congress amended the Wireless Ship Act to require wireless equipment on ships operating in the Great Lakes. Other amendments required an auxiliary power supply and an on-duty operator at all times. A second law was passed in 1912 concerning the licensing of wireless stations. The Radio Act of 1912 required that operators and stations be licensed by the secretary of commerce. This licensing authority gave the secretary power to assign the frequency on which a station could operate and its power. Other portions of the act provided for the secrecy of messages and gave government stations' transmissions priority.

15.12 Broadcasting Creates Chaos

The Radio Act of 1912 was passed at a time when radio broadcasting didn't exist. But the licensing of the first broadcast stations and the rapid growth in the number of stations created *signal interference* problems: too many people were trying to broadcast on the same frequency at the same time. Herbert Hoover, then secretary of commerce, attempted to solve the interference problem by assigning stations a second frequency on which to operate. By 1923 a third frequency for the more powerful stations was needed. Nevertheless the interference continued. Hoover organized a series of four *National Radio Conferences* (1922–25) to design recommendations for congressional legislation. An extensive list was sent to Congress, but none of the suggestions was passed into law. In 1923 Hoover announced a system for classifying radio stations that created eighty-nine additional frequencies for broadcast use. This new system alleviated the interference problem for only a short time.

The lack of congressional action forced Hoover to take steps to reduce the interference between stations. Many operators obtained their license and frequency assignment and then broadcast on whatever wavelength they desired. Powerful stations interfered with the signals of weaker stations. The situation became even more anarchic as greater numbers of people sought to become broadcasters. A series of adverse court rulings weakened the power of the secretary of commerce to regulate the broadcast industry. A decision by the Court of Appeals restricted Hoover's regulatory activities to the assignment of frequencies and the awarding of licenses (*Hoover* v. *Intercity Radio Co. Inc.*,

1923). The secretary of commerce was reduced to functioning as a clerk! Hoover retaliated by refusing to license any new stations. In 1926 a federal district court ruled that Hoover was powerless under the Radio Act of 1912 to regulate radio broadcasting (*United States* v. *Zenith Radio Corporation et al.*, 1926). The fragile system created by Hoover cracked and then fell—the airwaves were in chaos. The attorney general of the United States supported the court's opinion. Both the court and the attorney general called for new legislation to resolve the situation.

Finally, after five years of attempts, Congress passed the needed legislation, and the Radio Act of 1927 was signed by President Coolidge in February of that year. It was the first piece of legislation reflecting the evolution of radiocommunication from simply a point-to-point service to a mass medium.

The Radio Act of 1927 authorized the creation of the *Federal Radio Commission* (FRC). Congress intended the FRC to quickly sort out the problems of radio, create a system of regulating the stations, and then turn the day-to-day regulation of broadcasting back to the secretary of commerce, and so the FRC was initially authorized for only one year. However, Congress extended its life on a yearly basis until 1929, when it was made a permanent regulatory agency. The first years of the FRC were busy ones. A survey was conducted to determine who was broadcasting on what frequencies during what hours. Since Congress had put broadcasters on notice that their licenses might be revoked, it was in their interest to cooperate with the FRC. The FRC created a classification system similar to the one designed by Herbert Hoover in 1923. It removed many stations from the air, reassigned the frequencies of others, and refused to renew the licenses of some of the worst offenders.

Nearly every act carried out by the FRC was appealed to the D.C. Circuit Court of Appeals. In almost every instance, the appellate court and the Supreme Court upheld the actions of the FRC. The American people finally had a legitimate agency regulating radio in the public interest. Three early legal cases of special interest are the Brinkley and Schuler cases and that of the Nelson Brothers Bond and Mortgage Co.

Dr. John Brinkley presented himself as a physician, although his credentials were obtained from unaccredited diploma mills. His station in Milford, Kansas, broadcast an almost continuous stream of promotions for Brinkley's patent medicines and his goat gland operations, by which he claimed to rejuvenate his male patients. The FRC refused to renew his license because of his broadcast record. Brinkley claimed in his appeal that the FRC was violating his First Amendment rights, but the appellate court upheld the FRC's action, saying that failure to renew a license because of an applicant's past record was not censorship (*KFKB Broadcasting Association Inc.* v. *Federal Radio Commission*, 1931).

The Rev. "Battling Bob" Schuler used his license for KGEF in Los Angeles to broadcast a steady stream of defamations. Among his targets were the Police Department, judges, and anyone who disagreed with him. When the FRC refused to renew his license Schuler appealed on First and Fifth Amendment grounds. Once again the appellate court rejected the censorship argument and stated that the FRC had not confiscated Schuler's property, since he had no property right on the frequency (*Trinity Methodist Church South* v. *Federal Radio Commission*, 1932).

The right of the FRC to choose between **mutually exclusive** applicants for a broadcast license was upheld in the Nelson Brothers case. Here the rival applicants for a frequency were proposing to serve two entirely different populations. The successful applicant wanted to serve the immigrant populations of Gary, Indiana, while the Nelson Brothers proposed to serve the general population of Chicago. The FRC chose the station that proposed to serve the underserved city of Gary. The court upheld the FRC's decision, stating it was neither arbitrary nor capricious and was reached within the context of the public interest standard.

15.13 The Communications Act of 1934

The Radio Act of 1927 provided the basic framework for the regulation of wireless. However, there was no centralized authority regulating **common carriers**. Although the Interstate Commerce Commission (ICC) had responsibility for the regulation of telephone and telegraph, the ICC's focus was on solving the problems of railroads. But the ICC wasn't the only government body with an interest in telecommunications. The postmaster general, the office of the president, and the FRC each had responsibilities in the area. Many states governed intrastate telecommunication services through their state utility commissions, but most weren't equipped to deal with the complex problems of common carrier regulation. Some viewed the state commissions as totally ineffectual. Associate Justice of the Supreme Court Felix Frankfurter observed that while state utility commissions were established to protect the public's interests, often their actions seemed to have just the opposite effect. In 1933 President Franklin D. Roosevelt directed the secretary of commerce to study the problem of common carrier regulation and to consider forming a national communications policy committee.

In early 1934 President Roosevelt sent a message to Congress urging the establishment of a Federal Communications Commission that would centralize telecommunications regulation and policy making. Extensive hearings were held, with the broadcast industry supporting the idea and the common carriers vigorously opposing it. Congress passed the bill and President Roosevelt signed it into law on June 19, 1934. It became known as the Communications Act of 1934.

The act itself has six major chapters, or titles, each dealing with a specific area:

Title I: General provisions, definition of terms, justification for establishing the FCC, and application of the act
Title II: Common carrier provisions
Title III: Provisions relating to broadcasting
Title IV: Procedural and administrative provisions, and methods of appeal
Title V: Provisions for forfeitures and other actions taken against rule violators
Title VI: Miscellaneous provisions.

Congress gave the FCC control over interstate and foreign wireless and wire communication originating in the United States. The FCC was given the responsibility for establishing tariffs for interstate and international telecommunications services. Like the

FIGURE 15–2. President Franklin Roosevelt's 1934 Message to Congress on the Need for a Federal Communications Commission

To the Congress:

I have long felt that for the sake of clarity and effectiveness the relationship of the Federal Government to certain services known as utilities should be divided into three fields: Transportation, power, and communications. The problems of transportation are vested in the Interstate Commerce Commission, and the problems of power, its development, transmission, and distribution, in the Federal Power Commission.

In the field of communications, however, there is no single Government agency charged with broad authority.

The Congress has vested certain authority over certain forms of communication in the Interstate Commerce Commission, and there is in addition the agency known as the Federal Radio Commission.

I recommend that the Congress create a new agency to be known as the Federal Communications Commission, such an agency to be vested and with such authority over communications as now lies with the Interstate Commerce Commission—the services affected to be all those which rely on wires, cables, or radio as a medium of transmission.

It is my thought that a new commission such as I suggest might well be organized this year by transferring the present authority for the control of communications of the Radio Commission and the Interstate Commerce Commission. The new body should, in addition, be given the full power to investigate and study the business of existing companies and make recommendation to the Congress for additional legislation at the next session.

Franklin D. Roosevelt

The White House
February 26, 1934

SOURCE: Senate Document #144, 73d Congress, 2d session.

FRC, the FCC continued to classify stations, prescribe the nature of their service, assign frequencies, determine the power and location of transmitters, create and implement regulations to prevent interference, establish coverage areas, and license stations for a period not to exceed three years. A station's license could be renewed only if the station adhered to FCC rules. It could be revoked "for cause." The FCC was given a wide range of discretionary power by Congress, the only guideline being that it act for the "public interest, convenience and/or necessity." The broadcasters themselves were the parties responsible for what was broadcast. The FCC was specifically prohibited from censoring broadcast content. Finally, Congress made it clear that users of the electromagnetic spectrum had no property right to a license to operate, but were given a temporary license for use of a public resource. The license could be revoked if the FCC found that the licensee was not operating in the public interest.

Although the bill has been extensively amended since it was initially signed into law, the basic philosophical principles of the act are still the same. The *"public interest"* is still the prime criterion on which the actions of the Federal Communications Commission are predicated. The U.S telecommunications system is a privately owned system, and the

Communications Act of 1934 has allowed balanced free enterprise with regulation. The combination has allowed the United States to dominate world telecommunications.

15.2 THE FEDERAL COMMUNICATIONS COMMISSION

The Communications Act of 1934 is a complex piece of legislation. Section I of the act establishes the reason for creating the Federal Communications Commission:

> For the purpose of regulating interstate and foreign commerce in communication by wire and radio so as to make available, so far as possible, to all the people of the United States a rapid, efficient, nation-wide, and world-wide wire and communications service with adequate facilities at reasonable charges, . . . and for the purpose of securing a more effective execution of this policy by centralizing authority heretofore granted by law to several agencies . . . there is hereby established a commission to be known as the "Federal Communications Commission." . . .

The FCC, like other regulatory agencies, engages in three types of procedures: prosecution, adjudication, and rule making:

When the FCC engages in *prosecution* a complaint is filed against an individual or corporation violating its rules. The federal district attorney appointed to the community of the complainant's residence prosecutes the case.

Adjudication is the administrative alternative to a judicial trial. Adjudicatory action occurs whenever there is a dispute between the regulatory agency and another party, or between two parties. Adjudications may involve minor rules violations, hearings on broadcast licenses, or disagreement with staff decisions concerning complaints against broadcasters.

Rule making occurs whenever the FCC adopts a policy or rule.

15.21 The Commissioners

Responsibility for all FCC actions rests with the *five commissioners*. Each is *appointed by the president* and approved by the *Senate*. Section 4 of the act outlines the requirements for appointment as a commissioner, which are summarized in figure 15–3. Each commissioner serves a *seven-year term*, and no more than three commissioners may come from the same political party. The president appoints one of the five commissioners to serve as chairman, the chief executive officer of the commission. The chairman presides at all meetings, is responsible for the commission's staff, and represents the commission in its dealings with other government agencies.

15.22 Administrative Organization

The five commissioners are the tip of the FCC iceberg, a large bureaucracy made up of the professional staff of the FCC. Section 5(b) of the Communications Act authorizes the

FIGURE 15–3. Requirements for FCC Commissioners

Appointment:	Commissioners are appointed by the president with the advice and consent of the Senate.
	The president appoints one member of the commission as chairman.
Restrictions:	No more than three members may come from any one political party.
	No commissioner may have a financial interest in any company with: (a) an interest in the sale and manufacture of communication apparatus; (b) an interest in any company furnishing services to communication companies; (c) an interest in a company holding stocks, bonds, or other securities in a communication company; (d) nor can a commissioner be in the employ of any company regulated by the commission, or hold any other job or engage in any other business activity while a commissioner.
	No former commissioner may represent a client before the commission within one year after ceasing to serve as a commissioner.

commissioners to establish and organize a staff to enable the commission to carry out its congressional mandate. The structure of the FCC has varied over the years. As recently as November 1982 the commission reorganized itself yet again. Figure 15–4 reflects those changes. Notice that there are four bureaus and seven offices.

BUREAUS

The *Mass Media Bureau* handles regulatory matters concerning broadcast and cable. It is divided into four separate divisions. The *Audio Services Division* is responsible for all issues concerning radio licensing, including the processing of licenses for new AM and FM stations, applications for modification of existing facilities, and requests for renewal or transfer of an existing license. The *Video Services Division* functions similarly, with responsibility for all television-related matters. This includes cable, LPTV, DBS, and STV, as well as broadcast television services. The *Policy and Rules Division* provides legal, technical, and economic support for the other areas of the Mass Media Bureau. The *Enforcement Division* is responsible for seeing that licensees adhere to the rules of the FCC. It conducts investigations, handles rules inquiries, and follows up complaints concerning station conduct.

The *Common Carrier Bureau* is responsible for overseeing the activities of all common carriers. Included in its responsibilities are the licensing and handling of requests for increases in tariffs. The *Field Operations Bureau* exercises responsibility for the licensing of all persons responsible for operating station transmitters, approves antenna structures, and approves devices that use electromagnetic energy for purposes other than

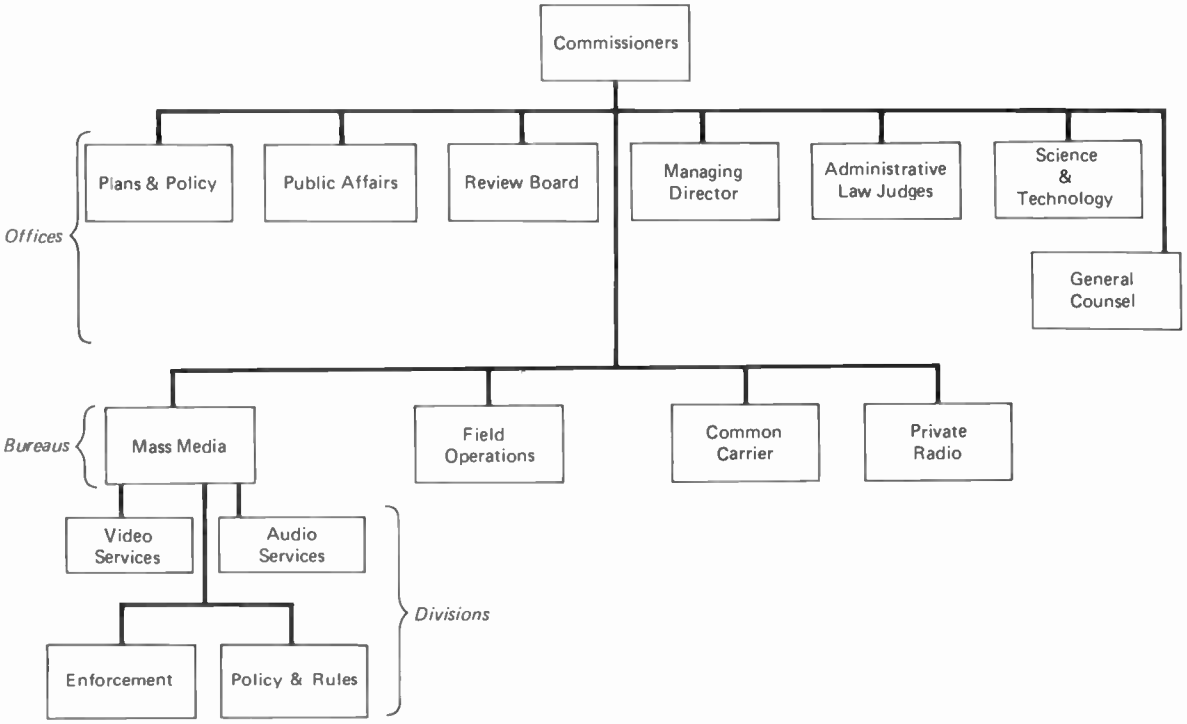

FIGURE 15–4. Organization of the Federal Communications Commission

telecommunication, such as microwave ovens. This bureau also operates fifteen field offices around the nation. Personnel at these regional offices monitor radio signals in order to check on station performance. Field officers also conduct on-site investigations of station equipment and investigate complaints of interference. If a violation is found, a citation is issued to the offender. When more drastic formal action is warranted, the appropriate bureau is notified, and prosecution may commence.

The *Private Radio Bureau* is responsible for overseeing all uses of the electromagnetic spectrum by those operating services for profit or not engaged in broadcasting. These services include the various land mobile uses—paging systems, citizens' band radio, taxicab radio services, and wireless microphones.

OFFICES

The *Office of the Managing Director* reports directly to the chairman and is responsible for overseeing the day-to-day operations of the commission bureaus and divisions.

The *Office of Science and Technology* is headed by the chief scientist, and is responsible for advising commissioners on engineering and scientific matters concerning telecommunications. The day-to-day responsibilities of this office include design of regulations concerning allocation of frequencies, oversight of nonbroadcast experimental radio services, and approval of broadcast transmission and receiving equipment.

The *Office of the General Counsel* is responsible for advising commissioners on issues that transcend general department responsibility, and for the rules and procedures used by the commission in reaching decisions. The general counsel represents the commission in litigation and coordinates preparation of the commission's legislative reports and proposals.

The *Office of Plans and Policy* coordinates policy research among the various parts of the commission and with other governmental agencies. It advises, assists, and makes recommendations to commissioners on specific policy issues.

Personnel from the *Office of the Administrative Law Judges* preside over all FCC hearings. At the conclusion of the hearing, the administrative law judge (ALJ) assigned to the case writes an opinion that presents a solution to the problem being adjudicated and a rationale for the decision. In most instances the *Review Board*, made up of three senior FCC staff members, will review the ALJ's decision.

The *Office of Public Affairs* has primary responsibility for the FCC's public information, consumer assistance, and minority enterprise programs.

15.23 Rules, Regulations, and Policy

The Communications Act allows the commission to make *rules and regulations*. The rules and regulations of the FCC may be found in chapter 47 of the Code of Federal Regulations. The process followed by the FCC in rule making can be seen in figure 15–5. Any person, government agency, FCC staff member, broadcast company, or other organization may *petition* the commission to consider establishing a new rule or eliminating or amending an existing one. All petitions for changes are evaluated by the office or division responsible for the area affected by the proposed change. If the request is minor, the commission may act by issuing a *report and order*. If the request is rejected, the commission issues a *memorandum opinion and order* denying the petition.

If the petition is for a major change in the FCC rules, the commission may do one of three things: (1) *deny* the petition by issuing a memorandum and order to that effect; (2) issue a *notice of proposed rule making* (NPRM) in which the language of the proposed rule is presented, so that interested parties may then comment on the rule; or (3) issue a *notice of inquiry* (NOI) asking for public comment concerning the issues raised by the petition and possible solutions. All official FCC actions must be published in the *Federal Register*.

Once the public comments are collected and evaluated the FCC may take one of several actions. In the case of an NPRM it may (1) issue a report and order amending the rules; (2) issue a report and order leaving the rule the same and closing the process; or (3) ask for *further* comments by the public. Sometimes the FCC issues a report and order amending only a portion of the rules and seeking further comments on related topics. For example, it took the FCC four years and six reports and orders to solve the problem of television during the "freeze" of 1948–52. Some actions take even longer.

FCC actions in cases of NOIs are similar to those in NPRMs: the FCC may issue a

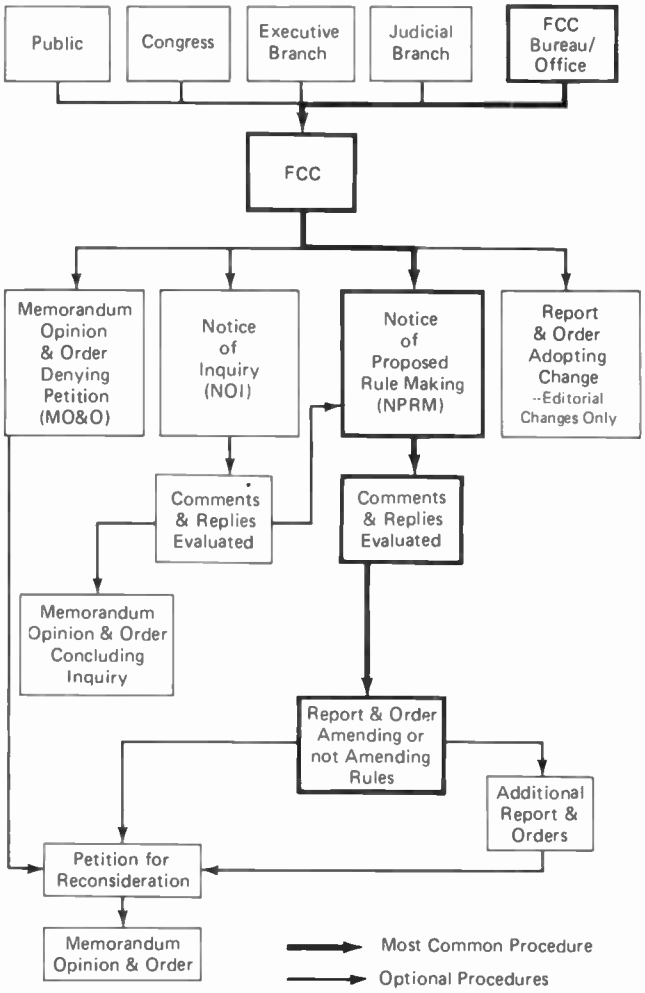

FIGURE 15–5. How FCC Rules Are Made

memorandum concluding the inquiry, or it may decide that a change in the rules is justified and issue a NPRM.

All actions taken by the FCC may be *appealed*. The first step in the appeal process is to petition the FCC for *reconsideration* of its action. If the FCC denies the petition then the appeal may proceed to the *D.C. Circuit Court of Appeals*.

15.24 Remedies for Rules Violations

One of the chief concerns of a regulatory agency is protecting the public interest by enforcing its rules and regulations. If an offense is minor and the offender cooperates with

the FCC, a *letter of reprimand* is usually issued. In some cases more serious action is needed, and the FCC may levy a **forfeiture** against the offender. The Communications Act allows the FCC to levy forfeitures of up to $2,000 per day, with a maximum of $20,000 allowed (section 503). *Cease and desist* orders merely order rules violators to stop their actions.

The most serious actions the FCC may take in cases of willful and repeated rules violations are a *short-term renewal* or *revocation* of the violator's license. A short-term renewal means that the violator's license is renewed for a period of time less than the maximum allowed by law. During the period of short-term renewal, the broadcaster is on probation and must demonstrate to the commission his willingness to operate in the public interest. Revocation or *failure to renew* the license is the commission's ultimate action. These remedies are reserved for the most serious violations. The Communications Act lists seven offenses that may result in revocation. Among the seven offenses are submission of false statements to the FCC and violations of certain federal criminal statutes, including obscenity laws.

15.25 Administrative Procedures Act

All three branches of government—executive, legislative, and judicial—have varying degrees of control over the actions of the FCC. However, the FCC also operates within the framework of the Administrative Procedures Act. Passed in 1946, the act mandates due process for all participants in agency deliberations. A summary of the major provisions of the act can be found in figure 15–6.

15.3 THE FEDERAL TRADE COMMISSION

Unlike the Federal Communications Commission, the Federal Trade Commission (FTC) lacks a high profile within the telecommunications industry. Yet the FTC has enormous influence on the entire telecommunications industry. Mergers and acquisitions, consumer protection, unfair trade practices, and deceptive advertising all come under purview of the FTC. The actions of the Federal Trade Commission are often controversial. Frequently the FTC incurs the wrath of Congress, and as a result budget appropriations are withheld. The FTC is frequently criticized as a regulatory agency that overregulates.

15.31 Origins of the FTC

The FTC was created by Congress to protect the public interest, specifically the rights of businesses and consumers to have protection from unfair trade practices. In 1914 Congress passed the Federal Trade Commission Act and the Clayton Act, which outline the

FIGURE 15–6. Summary of Provisions of the Administrative Procedures Act of 1946

Basic Philosophy:	Reaffirmed the right of the Congress to delegate regulatory powers to independent agencies; agencies can make rules and perform adjudicatory functions
Administrative Law Judges:	ALJs to be independent of agency control of salary, promotion, and tenure
Ex Parte Contacts:	Contacts between agency staff and ALJ specifically prohibited, with the exception of public proceedings
Hearing Procedures:	Burden of proof on the agency in adjudications and rule making; ALJ has power to determine facts of a case and to make procedural rulings
	ALJs findings subject to review by commission
Public Information:	Agency has obligation to keep the public informed as to its organization, location of offices, procedures, and rules and policies currently in effect, intentions to amend rules, final opinions in all adjudications and rule making procedures
	Unless specifically exempted, public has the right to examine all agency records (amended by the Freedom of Information Act of 1976)
Publication of Information:	All formal actions and notifications of proposed rule making to be published in the *Federal Register*
Judicial Review:	Judicial review of agency actions is appropriate; actions may be set aside if unconstitutional, not within the scope of an agency's mandate, if statutory provisions have not been observed, if unsupported by evidence, if unwarranted by the facts, or if "arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with the law"

SOURCE: From *United States Code*, title 5, part I, chapter 5, sections 551–59.

basic responsibilities of the FTC. Congress, however, has frequently added new areas of responsibility to the FTC's charter.

The Clayton Act specifically outlaws practices commonly recognized as being instruments of monopoly. Business practices declared illegal under the act include price discrimination, exclusive dealing contracts that discourage competition from other products, and interlocking directorates. The Federal Trade Commission Act of 1914 was passed to

create an agency to carry out the mandates of the Clayton Act. In addition, the FTC was given responsibility for seeking out unfair trade practices. Since passage of the act, this has been interpreted as regulating *advertising practices*. The FTC's role in advertising was legitimated in 1938, when the Wheeler-Lea amendments were added, making the FTC responsible for false advertising of *food, drugs,* and *cosmetics*. Today that has been expanded to include any advertising using devices deemed to be unfair or deceptive.

15.32 Organization

The FTC is organized similarly to the FCC. It has five commissioners appointed by the president with the advice and consent of the Senate. The president selects one of the five to serve as chairman. Each commissioner has a personal staff. There is a large bureaucracy protected by civil service rules. The organization of the FTC is schematized in figure 15–7.

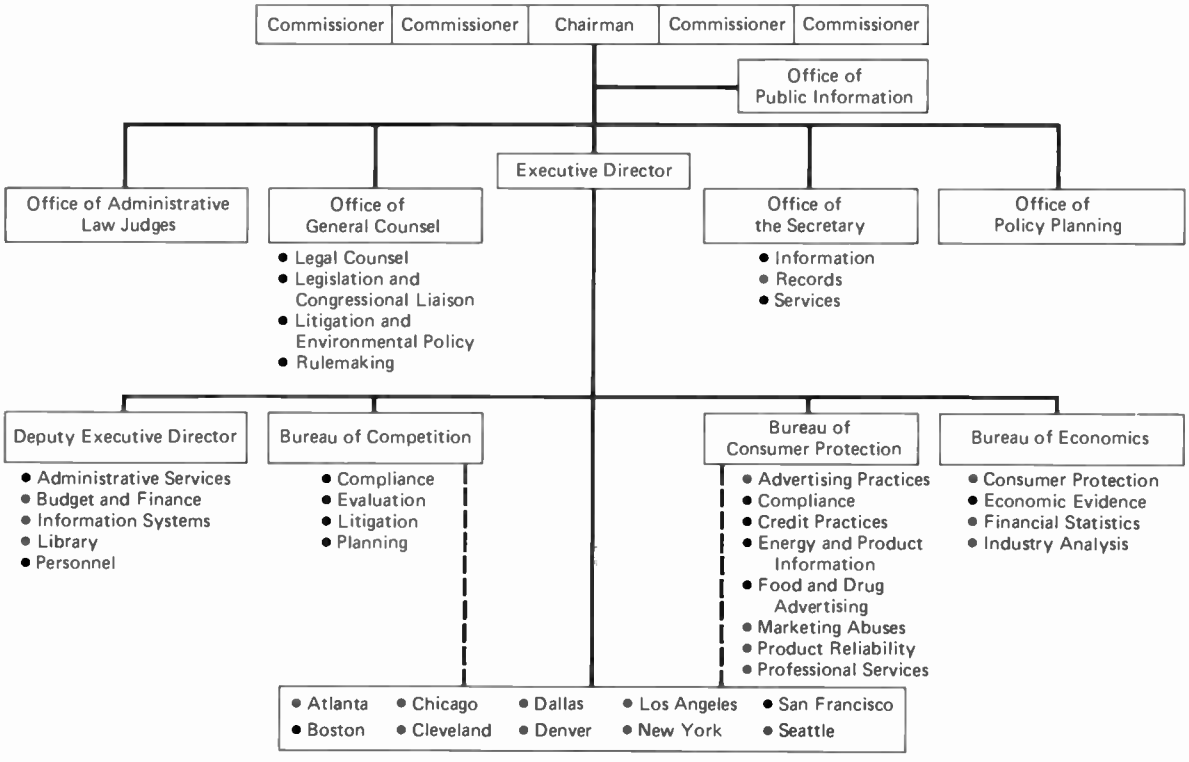

FIGURE 15–7. Organization of the Federal Trade Commission

15.33 The FTC and Advertising Practices

FTC action against advertisers begins as a result of either a complaint from the public or a staff investigation. Nothing within the language of any of the legislation establishing the FTC defines "false," "unfair," or "deceptive." In general, the courts have chosen not to define these words. They instead *defer* to the FTC for determination of what advertising practices are not in the public interest. If, in the judgment of the commission, the overall impression of an advertisement directly or indirectly misleads or deceives the public, then it is designated *false*, *unfair*, or *misleading*. FTC action may be taken even if there is no evidence that the advertiser intended to deceive the public. Some of the advertising devices that may lead to FTC action include "puffery," misleading demonstrations, misleading claims of uniqueness, and other unsubstantiated claims.

"Puffery" is the use of hyperbole to describe a product. However, the use of words like "amazing" or "super" is not necessarily deceitful. For example, it is acceptable to claim that a skin cream is "super for your skin." It is not acceptable to claim that the same cream is *"less irritating"* unless there is some sort of proof that it is in fact less irritating than other, similar products. Advertising copywriters must avoid making specific claims, while still conveying the idea that their product is "better than ...." Claims of instantaneous results should be avoided.

The use of misleading demonstrations is a practice that has largely been abandoned by advertisers. Occasionally the FTC will receive a complaint that marbles are being used in the bowl to prop up the letters in an ad for alphabet soup, or that the ice cream filmed under hot television lights is really mashed potatoes, or that the reason the windows in the glass cleaner commercial look so clean is that there is no glass in the frames. However, unless the actions of the advertiser cause an incorrect consumer perception of the value or performance of a product, the FTC won't take action.

Advertiser claims of *product uniqueness* and *unsubstantiated claims* are similar types of unfair advertising practice. The FTC strongly discourages advertisers from making claims that their products are substantially different from similar, competing products unless a real difference can be proven. For example, one advertiser claimed that Brand A bread had 25 percent fewer calories per slice than Brand B. Each slice of Brand A did in fact have fewer calories, as claimed—but the reduction in calories was accomplished by slicing the bread more thinly. The FTC took strong action in that case. If an advertiser claims that using a particular toothpaste will result in fewer cavities, it had better be able to present evidence backing up that claim. Recent rulings by the FTC indicate a relaxing of the substantiation standards, however; advertisers will not have to provide scientific evidence to back up their claims. This is an example of **deregulation** at work.

When a complaint is found to have merit there may be a hearing before an administrative law judge. ALJ opinions can be appealed to the full commission, the Court of Appeals, and the Supreme Court if necessary. However, the FTC prefers to work with advertisers for *voluntary compliance*. The majority of FTC actions result in *voluntary consent agreements*. When a consent agreement cannot be negotiated or an agreement is violated, the FTC must find other remedies. A *cease and desist* order instructing an advertiser to immediately stop an objectionable practice can be issued. Such an order has

the full force of the law behind it. Sometimes the FTC may require a company to stop all advertising activities for a set period of time, or it may require corrective advertising.

15.4 OTHER GOVERNMENTAL ENTITIES WITH AN INTEREST IN TELECOMMUNICATIONS

The FCC and the FTC aren't the only parts of government with an interest in telecommunications. The *nonfederal* use of the electromagnetic spectrum is the responsibility of the Federal Communications Commission. Yet over 50 percent of the spectrum is used by the federal government. Several other agencies, departments, and congressional committees have an interest in telecommunications regulation, as do state and local governments.

15.41 The Department of Justice

The Department of Justice serves as the respondent for the United States in all appeals of FCC decisions. It prosecutes violations of FCC rules in federal district courts when called upon by the FCC. In addition, its Antitrust Division is concerned with ownership of telecommunications entities. It may bring suit to force the dissolution of companies that are deemed to be monopolies, and it may oppose the merger of two companies.

15.42 The National Telecommunications and Information Administration

The National Telecommunications and Information Administration (NTIA) was created in 1977 by President Carter's government reorganization plan. Carter combined the Office of Telecommunications Policy, housed in the White House, and the Office of Telecommunications, which was a part of the Department of Commerce. The NTIA is headed by the assistant secretary for communications and information in the Department of Commerce, and is responsible for advising the president on telecommunications policy issues. It has four primary functions: policy analysis and development, telecommunications applications, federal systems spectrum management, and telecommunications research.

15.43 The Department of State

The Department of State is the agency that carries out foreign policy, and a vital part of that policy is negotiating international telecommunications treaties with other governments. The office of the *Coordinator for International Communication and Information*

Policy brings together the views of the FCC, the NTIA, the Defense Department, NASA, and the telecommunications industry and develops policy positions for international negotiations.

15.44 The Interdepartmental Radio Advisory Committee

The Interdepartmental Radio Advisory Committee is made up of representatives of all the major users of the electromagnetic spectrum, the majority of whom are governmental. These users include the National Science Foundation, NASA, and the Departments of the Interior, Justice, Treasury, Transportation, Health and Human Services, Agriculture, State, and Energy. In addition, the General Services Administration, the International Communications Agency, and the Veterans Administration are represented. Private users are represented by the FCC. The committee is chaired by a representative of the NTIA and has only advisory powers.

15.5 INTERNATIONAL REGULATION OF TELECOMMUNICATIONS

The coordination of international telecommunications activities has been recognized as an important activity since the middle of the nineteenth century. The effectiveness of international regulation relies upon the *good will* of nations that agree to certain courses of action. Two international organizations are concerned with telecommunications: the International Telecommunication Union and the International Telecommunications Satellite Organization.

15.51 The International Telecommunication Union

The International Telecommunication Union (ITU) is an agency of the United Nations and is responsible for coordinating worldwide telecommunications activities. International telecommunications cooperation began in 1849, when Austria and Prussia signed an agreement joining their telegraph lines. For the next two decades, periodic meetings were held among interested countries to work on the problems of international telegraphy. By 1868 a formal organization had been formed, the International Bureau of Telegraphy. This organization, known as the *Berne bureau*, served as the organizer of international telegraphy conferences. By 1885 the Berne bureau was concerned with the telephone as well as the telegraph. As wireless communication spread, it too became one of international telecommunications' concerns. Wireless interests, however, formed a body separate from the Berne bureau—the Radio-Telegraph Union. In 1938 the two organizations combined, forming the International Telecommunication Union. The treaty

which unified all existing telecommunication agreements was called the International Telecommunication Convention.

The primary functions of the ITU are:

1. Allocation of spectrum space among the various nations
2. Registration of frequency use
3. Coordination of activities to eliminate interference between stations and promote efficient use of the spectrum
4. Aid in the negotiation of tariffs
5. Promotion of measures that aid in the protection of life through the use of radiocommunication
6. Coordination of efforts to aid developing countries in the design and implementation of telecommunications systems
7. Research and publishing of information for members.

ITU member nations meet on a regular basis in committee sessions to work out problems of international telecommunication. Some meetings are regional; others include all the member nations. When amendments to the International Telecommunication Convention are adopted and ratified by the member nations, they become a part of international law.

15.52 The International Telecommunications Satellite Organization

The International Telecommunications Satellite Organization (INTELSAT) is a consortium of over one hundred nations. INTELSAT operates a network of communications satellites which provides worldwide voice, data, and video coverage. While not a regulatory agency, INTELSAT has great influence on international telecommunications satellite policy.

15.6 SUMMARY

The first piece of legislation pertaining to electronic communication in the United States was the Wireless Ship Act of 1910. It was followed two years later by the Radio Act of 1912, placing licensing responsibilities for wireless in the hands of the secretary of commerce. The rapid proliferation of broadcast stations in the first half of the 1920s created monumental interference problems, while court decisions restricted the regulatory powers of the secretary of commerce. Finally, Congress passed the Radio Act of 1927. It was the first statute pertaining directly to radio broadcasting.

The Radio Act of 1927 established the Federal Radio Commission as the major regulatory agency for broadcasting. The FRC established a system of licensing and assigning stations to specific frequencies, powers, and communities. In 1933, President Roosevelt asked Congress to centralize all communications regulation. Although there was resistance on the part of common carriers, Congress passed the Communications Act of

1934. This act established the Federal Communications Commission as the primary regulatory body for nongovernmental use of the electromagnetic spectrum. The FCC is divided into four bureaus and seven offices. The office that handles broadcast and cable is the Mass Media Bureau.

The Federal Trade Commission has been delegated the responsibility of regulating unfair trade practices, including deceptive advertising, such as puffery, misleading demonstrations, and unsubstantiated claims. Other government agencies involved with telecommunications include the Department of Justice, the National Telecommunications and Information Administration, the Department of State, and the Interdepartmental Radio Advisory Committee. Although not a regulatory agency, the International Telecommunication Union serves as a forum for international negotiation and problem solving.

CHAPTER 16 OUTLINE

16.1 FCC POLICIES AND OBJECTIVES

16.11 Marketplace versus Regulatory Philosophy
16.12 Local Service
16.13 Diversity in Ownership
16.14 Network Regulation

16.2 LICENSING BROADCAST STATIONS

16.21 Restrictions on the Licensee
16.22 Application Procedures
16.23 Comparative Hearings
16.24 Lotteries
16.25 License Renewal

16.3 REGULATING OPERATIONS

16.31 Network-Affiliate Agreements
16.32 Logging
16.33 Station Identification

16.4 REGULATION OF CABLE

16.41 Franchising
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16.43 Carriage Rules
16.44 Copyright and Cable
16.45 Ownership Restrictions

16.5 SUMMARY

16

LICENSING AND REGULATING STATION AND CABLE OPERATIONS

Regulation of the telecommunications industry is conducted in three areas: *licensing, operations,* and *content.* In this chapter we'll examine the role of the Federal Communications Commission in licensing and regulating station and cable operations. Since the late 1960s there has been a continual attempt to deregulate the telecommunications industry. The progress toward **deregulation** has been blocked by concern that AT&T and others might monopolize the industry, the strength of the three commercial television networks to dominate programming, and a desire to ensure that local communities continue to be served by broadcast outlets licensed to serve them.

When you complete the study of this chapter you should be able to:

1. Name and define the key elements of the FCC's policy toward broadcasting and cable

2. Outline the steps taken to secure a license to operate a broadcast station

3. Identify some of the areas in which the FCC regulates station operations

4. Delineate the various components of the method used to regulate cable communications systems.

16.1 FCC POLICIES AND OBJECTIVES

As we learned in chapter 15, Congress has provided the FCC with a set of guidelines for the regulation of the telecommunications industry. Key to these guidelines is the concept of the "*public interest*," the only standard used by the commission in making rules and adjudicating disputes. There is no concrete definition of the "public interest," however. While the lack of a concrete definition might seem to be a drawback, the FCC has developed a consistent set of policy objectives. Noll et al. (1973) have identified four general objectives that seem to underlie FCC decisions:

1. Establishing as many telecommunication outlets as possible in each community
2. Achieving as much diversity as possible in the source of programming
3. Licensing outlets to serve the local community and operate in the public interest
4. Encouraging as much competition as possible within the industry.

These policy objectives are articulated by the commission in its *rules* and *policy statements*. Thus the commission has created an implied definition of the public interest. Moreover, public interest standards evolve as conditions in the industry and society change. For example, at one time broadcasters were prohibited from editorializing. Today broadcasters are encouraged to take public positions on issues of importance in their local communities.

16.11 Marketplace versus Regulatory Philosophy

While some may argue to the contrary, the movement toward deregulation of the telecommunications industry has not in itself undermined the FCC's policy objectives. Deregulation, as government policy, has been supported by members of both political parties. The differences between those who support it and those who oppose it are primarily philosophical, not partisan.

The major apologist for broadcast deregulation is Mark Fowler, appointed chairman of the FCC in 1980. He supports what is known as the *marketplace philosophy* of regulation. The marketplace philosophy is characterized by the following principles:

1. Unhindered competition in the marketplace results in greater benefits to the consumer than government intervention. The marketplace adjusts itself to meet the changing needs of media consumers.
2. The competitive environment of the marketplace is defined across traditional media lines. Television competes with cable, pay cable with basic, radio with television, and so forth.
3. Restrictions on the control of media outlets should be defined by antitrust laws,

not by government regulatory edict. There should be no ownership restrictions on the number of stations any one entity can own.

4. All aspects of the electronic media should have full First Amendment rights.

5. The primary function of government regulation in the telecommunications industry is ensuring that licensees don't interfere with each other.

Those who oppose the marketplace philosophy have a markedly different stance on government regulation. They adhere to the following tenets:

1.The marketplace is imperfect. Government intervention in the form of regulation is needed to ensure that the marketplace conducts itself in the public interest.

2. The airwaves are owned by the public. The government, in regulating the use of a public resource, acts on behalf of all the people.

3. While there may be competition among various media, each broadcaster is given a monopoly for the use of a specific frequency. Some degree of content regulation is needed to ensure that the public has access to a variety of viewpoints on issues of importance.

The deregulators and those who want a certain level of government regulation have very different approaches. In the coming years we can count on a continuing battle between these two forces.

16.12 Local Service

One of the most important policy objectives of the FCC is *local service*. In the early days of broadcasting attempts were made to serve the entire nation with a small number of powerful radio stations. This concept was soon discarded in favor of a system that would ensure that every community capable of supporting a station would have one. The classification scheme for AM radio was designed with this in mind. In areas with an inadequate economic base, the FCC ensured that radio would be available by creating clear channel AM stations. For services using direct waves, the FCC created an allocation system. The Table of Allocations for FM and TV is the result of FCC efforts to achieve a local service policy. Other examples of FCC actions to provide for local service include (1) the authorization of FM and TV translators so that stations can completely cover their entire Grade B contour area; (2) the authorization of direct broadcast satellite service; and (3) its loosening of rules governing cable.

The concept of local service is not limited to local outlets. The FCC licenses broadcast stations to *serve* their local communities. As a condition of receiving a license, broadcasters have an *obligation* to provide programming that meets the needs of the local community. The FCC has said, "The principal ingredient of such an obligation consists of a diligent, positive and continuing effort by the licensee to discover and fulfill the tastes, needs, and desires of his service area" (FCC, 1960).

16.13 Diversity in Ownership

The FCC has a number of rules regulating ownership of broadcast and cable systems. The objectives of these rules are to encourage maximum competition in broadcasting and promote a diversity of program sources and viewpoints. The *concentration of control* or "7-7-7" rule attempts to achieve the two objectives nationally and regionally. The rule allows a *maximum* of seven AM, seven FM, and seven TV stations to be licensed to one person or corporate entity. Of the seven television stations allowed, a maximum of five may be VHF stations. The *duopoly rule* prohibits the licensing of more than one broadcast station to the same entity if the signals of the stations will overlap. This is also known as the *"one to a customer" rule*. When the rules were originally adopted, the commission allowed some of the AM-FM combinations to continue. This is called grandfathering. In some cases ownership of a radio station and a UHF television station in the same market is still allowed.

One of the most controversial ownership rules involves licensing a broadcast station to an organization that already owns a newspaper in the same community. The FCC prohibits ownership of this type. In addition, broadcasters are prohibited from owning cable systems serving the same markets. However, there is no prohibition on newspaper-cable ownership.

16.14 Network Regulation

Since networks are not licensed by the FCC, the commission has little direct regulatory power over radio and television networks. The FCC may regulate the *agreements* between affiliates and their networks, however. The FCC has a number of rules that establish guidelines for television affiliates. These agreements will be examined in more detail in section 16.31. Two items are of particular interest at this point—the *financial interest and syndication rule* and the *prime time access rule*. Both attempt to create more program sources by restricting network activities in program development and distribution.

The FCC prohibits television networks from engaging in any syndication activities within the United States. Networks may syndicate programs outside the country, but only those which they solely produced. In addition, the networks may not have any proprietary interest in any program produced by another party. These rules seek to keep the commercial television networks from dominating television programming by prohibiting them from engaging in the financially lucrative syndication business. The FCC has proposed eliminating these rules, but by late 1983 no final action had been taken.

The *prime time access rule* (PTAR) also relates to network programming. The PTAR prohibits stations located in the top fifty markets from showing more than three hours of network programming in prime time. Children's programs, news and public affairs programs, and sports program runovers are not counted as part of the three-hour maximum. When the FCC adopted this rule it hoped that local stations would begin to fill the hour available to them with locally produced programming. Unfortunately, the FCC's

dream has not been fulfilled. Most stations fill their "access" time with syndicated game shows and off-network reruns.

16.2 LICENSING BROADCAST STATIONS

Section 301 of the Communications Act specifically gives the FCC responsibility for *licensing* broadcast stations. There are two methods for obtaining a license to broadcast. You can obtain the approval of the FCC to buy an existing station. Or you can apply to the FCC for a license. Applying for a license is the cheapest way to get into broadcasting. It often is not the fastest. Some license procedures have lasted for twenty-five years or more.

16.21 Restrictions on the Licensee

The FCC awards licenses for broadcast stations if the public interest, convenience, and necessity will be served by the award of such licenses. Radio stations are licensed for seven years, television stations for five years. The act makes it clear that licenses do not carry any property right to the assigned frequency.

Not everyone can obtain a broadcast license. The act specifically prohibits the award of a license to:

1. A foreign government or representative of a foreign government
2. An alien or representative of an alien
3. A corporation organized under the laws of a foreign country
4. A corporation with an alien as officer or director, or with 20 percent of its stock owned (or voted by) an alien, foreign government, or foreign corporation
5. A corporation directly or indirectly controlled by another corporation of which any officer is an alien or more than 25 percent of the stock is controlled by an alien.

Licensees are considered *public trustees* by the FCC. As such, station operators have a fiduciary responsibility to operate their station in the public interest and to serve their community of license. Failure to carry out their public trust or the program set forth in their license application, making false statements to the commission, violations of FCC rules, or violation of the criminal statutes pertaining to broadcasting may result in FCC *revocation* of the station's license. While revocation is unusual, it has happened.

16.22 Application Procedures

Applicants seeking FCC approval to operate a broadcast station generally employ an *engineering consultant* and a *communications attorney* who practices before the FCC. Applicants for an AM station must search for a frequency that is available in the community

in which they wish to locate their station. FM and TV applicants must apply to operate on one of the channels already assigned by the commission. Should they wish to use a channel not allocated, they must request that the commission adjust its rules and assign the channel to their community. The reassignment by the commission does not necessarily mean that the applicants will be awarded the license.

The next step is to apply to the FCC for a *construction permit* (CP). The application materials include data outlining the program service, results of the applicant's **ascertainment** research (in which the needs, interests, and problems of the community were determined), the applicant's financial data, and equipment descriptions.

Once the application for a CP is submitted, the applicants must make *public announcements* in the community, to alert local people who might wish to comment upon the applicants or their application. In addition, the applicants must establish an office or similar place where the public can inspect the application materials.

When the commission receives the application it acknowledges it by publishing a *notice of acceptance* in the *Federal Register*. The Video Services Division staff reviews the application to make sure everything is in order. If there are no competing applications or substantial public objections to the application, the CP is awarded. If the application does not conform to the FCC's standards, or other problems surface (such as the possibility of interference with other services, receipt of a petition to deny objecting to the application, or other financial, technical, or legal problems) a hearing will be set.

16.23 Comparative Hearings

The FCC publishes a notice in the *Federal Register* that an application (or applications) has been designated for hearing. Generally, the participants in the hearing have a minimum of sixty days to prepare their arguments. Most hearings are heard in Washington before one of the commission's administrative law judges. After review of the testimony and additional filings from the participants, the ALJ issues an opinion. It is important to note that the commission need not award a CP just because someone has applied for a license. There have been instances where the commission refused to award a CP or a license because of problems with the application or applicant. Appeals of the ALJ's decision are made first to the Review Board, then to the commissioners, then to the D.C. Circuit Court of Appeals, and finally to the Supreme Court.

When the FCC receives applications for a CP that would result in interference or some other problem, a comparative hearing is held. Here, the ALJ examines the applications materials and awards the permit based on six criteria: other media ownership interests, participation in station management by the owners, proposed program service, past broadcast record, character, and efficient use of the frequency. Decisions made by the ALJ and all subsequent decisions must be based in fact and cannot be arbitrary or capricious. The rationale for a decision must be clearly stated. If not clearly stated, the decision may be remanded back to the commission by the appellate court for further consideration.

Once the CP has been awarded, the permittee must begin construction within sixty days. Upon completion of the construction, the FCC will give the permittee permission to

begin testing the transmitter. If the permittee can furnish the FCC proof that the equipment is working in an acceptable manner, a broadcast license is issued.

16.24 Lotteries

The comparative hearing process takes a long time and is cumbersome to both the commission and the applicants. Congress authorized the commission to experiment with the use of a lottery to choose from among competing applicants. The *lottery method* is being used to award construction permits for LPTV stations. The commission doesn't go through a thorough evaluation of each application. FCC staffers look over the applications as they are received to ensure that the forms are filled out in the correct manner. Each applicant is then "weighted" in a manner designed to give preference to minority applicants and those who don't already own other mass media outlets. Depending on the preferences, each applicant is assigned a unique range of numbers between 0 and 999. Then numbers are drawn at *random*. The applicant whose number is drawn first becomes the first applicant examined, the second applicant drawn becomes the second, and so forth. Once the examination order of the applicants is determined, the commission examines the application of the first applicant. If the application is in order and if no serious objections to awarding the CP are received, that applicant will receive the CP.

16.25 License Renewal

Prior to the end of the license period, broadcasters must reapply for their licenses. A renewal application is filed with the FCC and public announcements are made. If there are no competing applications and no substantive objections are made that would provoke a hearing, the renewal is granted. However, a hearing may be held in the case of competing applications and a CP may be awarded to the new applicant. In comparative hearings the ALJ will use the same criteria it applies in initial licensing hearings. However, particular emphasis will be placed on the incumbent's record.

16.3 REGULATING OPERATIONS

The FCC also has numerous rules governing the operation of broadcast stations. These rules are designed to make sure that the public is served and that the commission receives timely station information.

16.31 Network-Affiliate Agreements

Broadcast licensees must file copies of all contracts they sign. Stations' affiliate contracts are particularly interesting to the commission. FCC rules governing agreements between

radio networks and their affiliates are relatively simple. For example, if an affiliate chooses not to run a network-supplied program, the network may offer that program to another station in the same market. This is known as the *territorial exclusivity rule.*

There are many more rules governing the agreements made between television networks and their affiliates. Stations have the right to refuse programs offered by their networks. Conversely, they can run the programs of other networks if offered. Affiliation agreements cannot run for longer than two years, and the networks cannot control local advertising rates.

16.32 Logging

All stations are required to keep logs of one type or another. Although neither radio nor television stations are required to keep program logs listing all program and nonprogram material and their broadcast times, most do. Both radio and television stations must keep logs that reflect periodic inspection of the station's transmitting apparatus. The FCC is reevaluating all paperwork that stations are required to keep. Many reports are being eliminated as part of deregulations.

16.33 Station Identification

All broadcast stations must identify themselves when they sign on, at least once per hour thereafter, and again when they sign off. Television stations may do this aurally, visually, or both. The ID announcement must include the *call letters* of the station immediately followed by the *community of license.* The FCC allows only the station's frequency or channel to be inserted between the call letters and the community of license.

16.4 REGULATION OF CABLE

The regulation of cable involves a partnership between the Federal Communications Commission and state and local governments. The FCC attempted to stay out of cable regulation until it became clear that cable posed a serious *economic* threat to television stations in small markets. If cable drew away too many viewers, advertising revenues would suffer, and the result would be a decrease in the service provided local communities. In 1962 the FCC refused a license to the Carter Mountain Transmission Corporation which would have enabled the corporation to *import television signals* to small communities in Wyoming. The rationale used by the FCC was that local broadcast stations would suffer economic damage sufficient to force them to reduce the amount of local programming they broadcast. Since stations are licensed to serve the local community, the FCC felt that its action was in the public interest. The D.C. Circuit Court of Appeals upheld the FCC's ruling (*Carter Mountain Transmission Corp.* v. *FCC* 321 F.2d 359). In 1965 the FCC issued its first set of rules governing cable systems served by microwave.

The right of the FCC to regulate cable was upheld by the Supreme Court in 1968 as *"reasonably ancillary"* to its broadcast regulatory activities. The FCC issued comprehensive rules governing cable in 1972. The rules underwent substantial amendment in 1976 and have undergone periodic adjustment almost continually since then.

16.41 Franchising

The FCC has delegated the choice of local cable company to the states or local communities. The local cable company is the equivalent of the local broadcast station. Unlike broadcasting, where several stations coexist in a community, generally only one company provides cable services. The rationale for granting an *exclusive license* rather than several licenses is that the public is better served by one company. Reasons given for allowing a monopoly are: (1) there are more channels available because increased revenues make it economically viable; (2) the cable operator can better afford to build studios and equip them for use by local residents; (3) the cable operator can make a larger profit due to economies of scale; and (4) the franchising authority can increase the amount of tax revenues collected from the operator. Only a few communities find themselves faced with head-to-head competition between cable companies. However, recent court decisions question the immunity of some local municipalities from antitrust laws. If this trend continues, more local municipalities may be forced to grant additional licenses to operators and thereby promote competition.

THE FRANCHISING PROCESS

Although some states handle the franchising process, most *franchising* is done at the local level. The process proceeds in the following manner:

First, the local government creates an *ordinance* under which the cable system (or systems) will operate.

Second, companies interested in the community find local *investors* and establish subsidiary companies. Normally the parent company retains the majority of the stock and controls the local group's activities. Some cynics feel that using locals is no more than an attempt to buy influence. The use of locals is sometimes called "rent-a-citizen."

Sometimes the local government asks for *community input* on the type of services desired. Competing companies will attempt to gain endorsements from local groups. Often they employ local consultants to aid them in planning programs to meet local needs.

The franchising authority then issues a *request for proposals* (RFP). The companies each submit proposals explaining the type of service they would provide. Typical RFP requirements include: (1) financial data on the parent company; (2) proposed rates; (3) engineering and equipment specifications; and (4) a timetable for building the system.

The local government or a hired consultant analyzes the proposals and one of them is chosen. Generally a contract is signed, with the chosen company's proposal included as

part of the contract. The FCC recommends that franchises be awarded for terms of fifteen years or less.

CRITICISMS OF THE FRANCHISING PROCESS

The franchising process has been criticized by both franchisors and franchisees. Although there are exceptions, many cable systems and communities have similar problems. First, the companies' proposals are designed to obtain the franchise. Often they bear little resemblance to the system that is ultimately built. Second, the people in charge of obtaining the franchise aren't necessarily the people who will run it, and the promises they made are soon forgotten. Third, the demands of community officials and groups for production facilities are often unrealistic. The cost of building, supplying, and maintaining production facilities is high, and some cable companies find they can't make a reasonable return on their investment if too much of the profits goes for producing local material of little real value to the viewers. Fifth, despite the hiring of local citizens there is little real local control. And in large cities particularly, the system is managed by outsiders with little knowledge of community problems or interests.

Although the franchising process is not perfect, no viable alternatives have been developed. Most of the nation's large urban areas have awarded franchises. Today's focus is on refranchising systems in communities wired ten or more years ago. This process often convinces the incumbent to upgrade the system and offer new services. The process of refranchising is still too new to allow any meaningful observations about trends, however.

REGISTRATION OF THE SYSTEM WITH THE FCC

Once the franchise is awarded, the company begins building the system. The system operator must file a *registration statement* with the FCC and receive authorization to operate the system. This authorization is not a license and is not subject to the same scrutiny. The registration statement must include the name of the operator, the company that owns the system, the community served, a copy of their equal employment opportunity program, and a list of the broadcast signals to be carried by the system.

16.42 Franchise Fees and Rate Regulation

Local communities are allowed to charge cable operators a *franchise fee*. The FCC has limited the fee to 3 percent of the cable operator's gross revenues. However, a community may have this limit waived, and may charge up to 5 percent. In order to receive the waiver, the community must prove to the FCC that the franchise fees will be used to cover the costs of local regulation or for experimental programs designed to increase local participation in cable services. A portion of the franchise fee may be used to support local production.

The FCC does not regulate the rates a cable operator charges. Generally local com-

munities have some sort of rate regulation policy that requires an operator to seek permission before raising or lowering rates. An area of rate regulation that the FCC sometimes does get involved in concerns disputes over pole attachment fees charged by utility companies. The Communications Act requires that the attachment fees be just and reasonable. The FCC has jurisdiction over the rates except when the state certifies to the commission that it will handle disputes.

16.43 Carriage Rules

The FCC requires cable operators to carry the signals of local television stations. The following signals must be carried by the cable system:

1. All signals transmitted by stations licensed to communities within thirty-five miles of the community in which the cable system is located

2. All noncommercial stations whose Grade B contour includes the community in which the cable system operates

3. The signals of the translators of commercial and noncommercial stations that reach the cable community

4. The signals of other stations that are "significantly viewed" in the community. A commercial affiliate's signal is regarded as significantly viewed if it has an average audience share of 3 and a CUME of 25; an independent's signal is significantly viewed if it has an average share of 2 and a CUME of 5.

Cable systems located in markets outside either the "major" or "smaller" classification have different rules. They are required to carry the signals of all significantly viewed stations, translators, educational stations within thirty-five miles, and stations whose Grade B contour includes the cable community.

The FCC does not require cable systems to originate programming (**origination**), nor are cable systems required to provide equipment for local production by members of the community. Pay programming services are included as part of the origination programming.

16.44 Copyright and Cable

The retransmission of broadcast signals by cable operators creates a substantial copyright problem. Stations and networks pay copyright fees to the owners of programs for the right to broadcast them. Use of those programs by cable systems requires a separate set of clearances. There are thousands of cable systems, each of which would have to negotiate a separate set of fees. Fortunately, Congress solved the cable copyright problem when it passed the Copyright Act of 1976. In the act, Congress established the concept of a compulsory license giving cable systems blanket copyright clearances for the

retransmission of broadcast signals. The *Copyright Royalty Tribunal* oversees the collection of copyright fees paid by cable operators and develops formulas for their distribution to copyright holders. The amount of money paid to the tribunal varies depending upon the number of distant signals carried by the cable system and the system's gross revenues. A cable system that grosses less than $41,500 every six months pays a fee of only $15 semiannually. A large system that grosses over $160,000 every six months pays fees ranging from 0.675 percent of the gross revenues for the first distant signal carried to 0.2 percent for the fifth signal. In late 1982 the Copyright Royalty Tribunal increased the copyright fees. This increase came about as a result of the FCC relaxing its rules on *distant signal importation*. Systems that previously were limited to less than three imported signals were allowed to import any signals they wished. This substantial increase in fees stimulated cries of outrage from cable operators and an investigation by Congress. The final word on the exact amount to be paid by systems in larger communities has yet to be written.

16.45 Ownership Restrictions

Unlike broadcasting, with its 7-7-7 rule, cable has no similar restrictions on either the number of systems owned or the number of subscribers served. There are some restrictions however:

1. Television station owners cannot operate a cable system in a community served by their Grade B signal contour.

2. Telephone companies may not operate cable systems in communities that they serve, unless the community has less than 2,500 inhabitants.

3. The commercial television networks may own a limited number of small systems for the purpose of experimenting with programs and technologies.

An FCC study done in 1980 recommended that all ownership restrictions on cable be eliminated. The FCC has not taken action on this recommendation.

16.5 SUMMARY

The FCC licenses and regulates stations' operations in accordance with the principles laid down in the Communications Act and its own general objectives. These objectives have been defined as (1) the establishment of as many telecommunications outlets as possible in each community; (2) the creation of diversity in programming; (3) local service and (4) competition. There are two major philosophical points of view on regulation, the marketplace philosophy and the regulation philosophy. The FCC encourages multiple outlets in each community with its station allocation system and insistence that stations program to the needs of their local communities. Diversity is encouraged by the 7-7-7 rule, the duopoly rule, and crossownership restrictions. Networks are not directly regulated, but there are rules governing ownership of cable systems, affiliate agreements, network

syndication activities, and the amount of prime time programming that can be originated by the networks.

Licensees of broadcast stations must be U.S. citizens. Persons or corporations who wish to operate a broadcast station must apply to the FCC for a CP. If there is more than one applicant, or if a reason for denial is brought to the attention of the commission, a hearing may be held. Recently the commission has started an experimental lottery system for the awarding of LPTV licenses. Radio licenses are issued for seven years, television licenses for five years. License renewal may involve a comparative hearing if there are other applicants for the frequency or if substantive reasons for denial are raised. Included in the FCC operations rules are guidelines for station identification, logging, and network-affiliate agreements.

Cable is regulated jointly by the FCC and state and local authorities. Local communities or state commissions are responsible for awarding franchises to operate cable communications systems. Local governments may regulate rates and can charge a 3 percent franchise fee. Upon receipt of a waiver the franchise fee may be as much as 5 percent. The operator must register with the FCC upon activation of the system. Cable operators are required to carry local broadcast signals and obtain a compulsory copyright license to carry signals of distant stations.

CHAPTER 17 OUTLINE

17.1 THE BASIS FOR REGULATING CONTENT

17.11 Spectrum Scarcity
17.12 Impact Theory
17.13 Pervasive Presence of the Electronic Media

17.2 POLITICAL USE OF THE ELECTRONIC MEDIA

17.21 Reasonable Access Rule
17.22 Section 315
17.23 Political Editorializing

17.3 THE FAIRNESS DOCTRINE

17.31 Origins
17.32 Programming and Editorial Responsibility of the Licensee
17.33 Fairness and Advertising
17.34 Personal Attack Rules

17.4 ISSUES IN ELECTRONIC MEDIA CONTENT REGULATION

17.41 The Problem of the "Obscene," "Indecent," and "Profane"
17.42 The Access Problem and Broadcast Journalists

17

REGULATING CONTENT

Few will disagree that government regulation designed to reduce broadcast station interference is in the public interest. However, rules made by the FCC and other government entities to regulate content seem to violate the spirit, if not the letter, of the First Amendment. In this chapter we'll survey some of the rules of the FCC and the laws that govern the content of radio, television, and cable programming and examine some of the reasons why broadcasting and cable have limited First Amendment rights.

By studying this chapter you should be able to:

1. Identify and define the theories that form the basis of regulation of telecommunications content

2. Name the various components of the rules governing the use of broadcast and cable facilities by candidates for elective office

3. Define the general principles of Fairness Doctrine and know how it is applied to broadcast and cable programs

4. Know the federal statutes governing obscene and indecent material.

17.1 THE BASIS FOR REGULATING CONTENT

The *First Amendment* to the Constitution states in part, "Congress shall make no law . . . abridging the freedom of speech, or of the press. . . ." Despite this clear prohibition, the FCC and state and local governments have rules and laws that regulate the content of broadcast and cable programs, and the Supreme Court of the United States has upheld their right to do so! However, any laws or rules that place a government body in the role of censor must follow a specific set of guidelines. For example, no government entity may engage in **prior restraint** unless there is a *clear and present danger* that publication or broadcast of the material will result in harm to the *security* of the United States or physical harm to an individual. Other types of government *censorship* require that the government convince a judge that *irreparable harm* will result if the speech is not restrained. It is very unusual for any judge to allow the government to restrain publication of any type. In this instance, "speech" means speaking, the publishing of written materials, or the broadcast of a program.

The constitutional prohibition against prior restraint doesn't mean that "speakers" cannot be held responsible for what they say or publish. On the contrary, numerous criminal statutes and civil laws allow the government to take actions against speakers. But under these laws the government action takes place *after* publication, not prior to it. *Libel*, *slander*, and *obscenity* laws are examples of legally acceptable means of punishing "speakers."

The sections of the Communications Act that govern the content of broadcast and cable programs are controversial. Although the Communications Act specifically prohibits censorship by the FCC, there are some rules that allow the FCC to look at broadcast and cable content. In 1983 the National Association of Broadcasters launched a campaign to bring "full First Amendment rights" to broadcasters and cablecasters. Specifically, the NAB seeks repeal of sections 315 and 312(a)(7) and of the FCC's Fairness Doctrine. If these were repealed, broadcasters would achieve constitutional parity with print media. Sections 315 and 312(a)(7) deal with political broadcasting and will be examined in section 17.2. Section 326 restrains the FCC from censoring stations prior to the broadcast of material.

What reasons have been used by courts and others to allow government to meddle in content issues in electronic media? While there is no one definitive reason, a number of theories have been proposed to justify such actions. They include *spectrum scarcity*, the enormous *impact* of electronic media, and their *pervasive presence* in our homes. It should be noted that the major issue in content regulation involves *political speech* rather than entertainment programs. Although there are rules concerning indecent and profane

FIGURE 17–1. Section 326 of the Communications Act

Nothing in this Act shall be understood or construed to give the Commission the power of censorship over the radio communications or signals transmitted by any radio station, and no regulation or condition shall be promulgated or fixed by the Commission which shall interfere with the right of free speech by means of radio communication.

language, most of the FCC's rules and policies apply to the presentation of news and public affairs programs. Even in the area of radio formats, the FCC has backed away from a tight regulatory stance. In fact, only under the most extreme circumstances will the FCC step in and adjudicate a citizen complaint about the change of a radio station format (*WNCN Listeners Guild* v. *FCC*, 1981).

17.11 Spectrum Scarcity

The oldest rationale for regulating the electronic media is the *scarcity* of spectrum space. Only a small portion of the electromagnetic spectrum is used for broadcasting, and there are more applicants for licenses than there are frequencies. The Supreme Court has said that so long as demand for frequencies outstrips supply, it is acceptable for the government to regulate content. Licensees are viewed as *public trustees* who have a **fiduciary** relationship with the public. In other words, the collective right of the public to hear and see a variety of points of view is more important than the free speech rights of the users of a public commodity (broadcast frequencies).

The use of the scarcity doctrine to defend content regulation is vulnerable to attack, however. Technological advances have opened opportunities for many more persons to gain access to electronic media. LPTV, DBS, MDS, and cable are only a few of the opportunities that await anyone who wants to communicate. In addition, there are already more electronic media outlets available nationally than there are daily newspapers, which are not subject to this sort of regulation. Of the various rationales used for electronic media content regulation, the scarcity doctrine is the weakest.

But attacks on the scarcity doctrine don't see the trees for the forest. Even though there are numerous electronic outlets for expression, the fact remains that a licensee has a *monopoly* on the use of a frequency. So long as the monopoly remains, the *marketplace of ideas* presented on the station is limited to the menu designed by the licensee. Some degree of content regulation is needed, so say proponents of this theory, to ensure that a variety of points of view are presented.

17.12 Impact Theory

The argument that electronic media have greater impact than print media has been frequently used as a justification for content regulation. However, in recent years the lack of any scientific evidence to support this point of view has led to its abandonment. In addition, it is illogical. If the impact theory is taken to its logical conclusion, regulation is justified on the grounds that the electronic media add to discussion and debate on public issues too effectively; regulation must occur to keep this from happening. This, of course, is exactly the opposite of what we want to occur—we want the electronic media to *stimulate* debate and discussion. Therefore regulations should be enacted to achieve those ends, not defeat them.

17.13 Pervasive Presence of the Electronic Media

The pervasive presence rationale formed the basis for a Supreme Court decision concerning objectionable language broadcast on the radio. The FCC had issued a memorandum critical of a station that broadcast a program consisting of a monologue by comedian George Carlin peppered with four-letter words. In upholding the FCC's action, the Supreme Court noted that electronic media were a *pervasive presence* in the homes of listeners (*FCC* v. *Pacifica Foundation*, 1978). The Court went on to point out that each medium presents its own unique First Amendment problems and that of all media, broadcasting has the most limited First Amendment protection.

The Court's argument for the pervasive presence rationale was based on our *fundamental right to privacy*. The right of an individual to privacy outweighs the First Amendment rights of broadcasters, the Court ruled. Audiences cannot be protected simply by not listening because they are constantly tuning in and out. Prior warnings about the content of material may not be heard and a listener or viewer may inadvertently tune into material they find offensive. The Court stated, "To say that one may avoid further offense by turning off the radio when he hears indecent language is like saying that the remedy for an assault is to run away after the first blow."

17.2 POLITICAL USE OF THE ELECTRONIC MEDIA

Of particular concern to both the FCC and Congress has been the role of the electronic media in political activity. The right of candidates to gain *access* to electronic media, ways of ensuring that all candidates have an *equal opportunity* for access, and the right of the broadcaster to *editorialize* about political contests have all come under scrutiny. Two sections of the Communications Act and an FCC rule address these issues. They are applicable to both broadcast stations and cable systems.

17.21 Reasonable Access Rule

In order to ensure that discussion on national issues is maximized, Congress amended the Communications Act to include Section 312(a)(7). Section 312 allows the commis-

FIGURE 17–2. Section 312(a) (7) of the Communications Act—Access for Federal Candidates

(a) The Commission may revoke any station license or construction permit—. . .
(7) for repeated or willful failure to allow reasonable access to or to permit the purchase of reasonable amounts of time for the use of a broadcasting station by a legally qualified candidate for Federal elective office on behalf of his candidacy.

sion to revoke a station's license if that station refuses to provide an opportunity for a candidate for *federal* elective office to obtain broadcast time. Candidates for federal office include those for president, vice-president, senator, and representative. In order to obtain time the candidate must be legally qualified. Note that the statute only applies to federal candidates—state and local candidates are not included. In addition, stations do not have to provide free time; they only have to give candidates a reasonable opportunity to buy time. However, if a candidate for federal office asks to buy time the station must sell the time requested. The Supreme Court has ruled that the only time a station may refuse such a request is when it would severely disrupt programming or create an undue hardship on the station. The Court has said that the purpose of the law is to meet the *needs of the candidate*, not the needs or convenience of the station.

17.22 Section 315

Section 315 of the Communications Act contains the key provision governing the political use of the facilities of broadcast stations and cable systems. The statute itself, shown in part in figure 17–3, consists of two major provisions. First, if a station allows a candidate for elective office the **use** of its facilities, then it must also provide an equal opportunity for opposing candidates. Second, the amount the station charges candidates for use of its facilities must be the lowest charge for that class and amount of time. The first provision is known as the *equal opportunity rule*, the second as the *lowest unit charge rule*.

One of the most misunderstood aspects of section 315 is the confusion of "equal time" and "equal opportunity." Section 315 does *not* require broadcasters to provide equal time, only equal opportunity to obtain time on the same terms as opposing candidates. Equal opportunity has both a *quantitative* and a *qualitative dimension*. Stations are not required to sell time to all candidates (except those for federal elective office). However, if they sell time to one candidate, then the opposing candidates must have the opportunity to buy the same amount of time, scheduled at approximately the same hour and at the same cost. For example, if Candidate A buys 100 run-of-schedule spots for $10,000 on WAAA, then the station is obliged to provide the opposing candidates the opportunity to buy the same amount of time for the same cost.

One of the most difficult situations for stations concerns appearances by candidates on their stations for which the candidates pay nothing. Such an appearance is considered a "use" by the FCC, and obliges the stations to provide the opportunity for opposing candidates to appear. The appearance of a candidate in an entertainment program, such as a movie, also triggers an equal opportunity obligation for the station. When Ronald Reagan ran for president, stations couldn't show his movies because doing so would trigger an equal opportunity situation: the station would be forced to provide free time to all other presidential candidates. News programs, news documentaries, news interviews, and on-the-spot coverage of news events are exempt from the equal opportunity provisions of section 315.

Section 315 also protects candidates by prohibiting broadcasters from censoring political advertising. On the surface, this anticensorship provision seems to contradict the idea that broadcasters are responsible for what they broadcast. However, this is one instance where the FCC as well as federal and state courts protect the broadcaster from liability for libel or obscene or indecent advertising. Broadcasters are *not* responsible for the content of political advertising.

FIGURE 17–3. Section 315 of the Communications Act

(a) If any licensee shall permit any person who is a legally qualified candidate for any public office to use a broadcasting station, he shall afford equal opportunities to all other such candidates for that office in the use of such broadcasting station: Provided, That such licensee shall have no power of censorship over the material broadcast under the provisions of this section. No obligation is imposed under this subsection upon any licensee to allow the use of its station by any such candidate. Appearance by a legally qualified candidate on any—

(1) bona fide newscast,
(2) bona fide news interview,
(3) bona fide news documentary (if the appearance of the candidate is incidental to the presentation of the subjects covered by the news documentary), or
(4) on-the-spot coverage of bona fide news events (including but not limited to political conventions and activities incidental thereto),

shall not be deemed to be use of a broadcasting station within the meaning of this subsection. Nothing in the foregoing sentence shall be construed as relieving broadcasters, in connection with the presentation of newscasts, news interviews, news documentaries, and on-the-spot coverage of news events, from the obligation imposed upon them under this Act to operate in the public interest and to afford reasonable opportunity for the discussion of conflicting views on issues of public importance.

(b) The charges made for the use of any broadcasting station by any person who is a legally qualified candidate for any public office in connection with his campaign for nomination for election or election, to such office shall not exceed—

(1) during the forty-five days preceding the date of a primary or primary runoff election and during the sixty days preceding the date of a general or special election in which such a person is a candidate, the lowest unit charge of the station for the same class and amount of time for the same period; and
(2) at any other time, the charges made for comparable use of such station by the other users thereof.

(c) For the purposes of this section—

(1) the term "broadcasting station" includes a community antenna television system; and
(2) the terms "licensee" and "station license" when used with respect to a community antenna television system mean the operator of such system.

(d) The Commission shall prescribe appropriate rules and regulations to carry out the provisions of this section.

17.23 Political Editorializing

Under the Fairness Doctrine (see section 17.3), broadcasters are encouraged to *editorialize*. When an editorial is broadcast supporting or opposing the candidacy of someone running for elective office, broadcasters must take a specific set of actions. The licensee must *notify* the opposing candidates within twenty-four hours. The broadcaster must provide the candidates with the date and time of the editorial, a script or tape of it, and a reasonable opportunity for the candidates or their representative to respond. When the editorial is broadcast within seventy-two hours before the election, the licensee must notify the other candidates sufficiently far in advance for them to have a reasonable opportunity to respond.

17.3 THE FAIRNESS DOCTRINE

One of the most controversial FCC policies is called the Fairness Doctrine. It is not a single document but rather a *series* of policy statements made by the FCC. The Fairness Doctrine derives from a single sentence found in section 315, "Nothing in the foregoing sentence shall be construed as relieving broadcasters, in connection with the presentation of newscasts, news interviews, news documentaries, and on-the-spot coverage of news events, from the obligation imposed upon them under this Act to operate in the public interest and afford reasonable opportunity for the discussion of conflicting views on issues of public importance." Like the other portions of section 315, the Fairness Doctrine is applicable to *both* broadcasters and cable operators.

17.31 Origins

In 1941 the FCC strongly criticized broadcast stations for editorializing in a decision that became known as the "Mayflower decision." The Mayflower ruling was not the only limitation on broadcasters dealing with controversial issues. The Code of the National Association of Broadcasters prohibited member stations from selling time to advertisers for the purpose of presenting their points of view on controversial issues. In 1944 the commission acted on a complaint brought by a labor union against WHKC, a radio station in Columbus, Ohio. The union charged that the station had refused to sell it time and had censored its scripts. The FCC ruled that the station had an obligation to provide time on a nondiscriminatory basis for the discussion of controversial issues. Another decision in 1946 reiterated the WHKC decision, and emphasized that stations were expected to air even unpopular points of view as part of their fiduciary duty. In 1949 the FCC issued a statement dealing with broadcast editorials (FCC, 1949). The statement formed the first chapter of what was to become known as the Fairness Doctrine. The FCC issued

major Fairness statements in 1964, 1974, and 1976. In 1969 the Supreme Court upheld the constitutionality of the Fairness Doctrine.

17.32 Programming and Editorial Responsibility of the Licensee

The Fairness Doctrine consists of two key components. First, broadcasters have an *obligation* to broadcast programs that address local needs, interests, and problems. Second, in presenting programs on controversial issues the broadcaster must *seek out* a variety of viewpoints on the issue. It is important to note that the Fairness Doctrine requires broadcasters to take the *initiative* when dealing with controversial issues. Broadcasters must broadcast programs that are issue-oriented; it is their responsibility to identify issues and design programming to address them. However, just providing programming is not enough. Broadcasters must seek out responsible persons who reflect a variety of points of view on the issue. While the Fairness Doctrine demands that broadcasters provide a certain type of programming, it places the *editorial responsibility* for choosing spokespersons in the hands of the broadcasters. In addition, the FCC does not require individual programs to be *balanced*. Rather, fairness is to be carried out in the *overall schedule* of the station.

Part of the broadcaster's editorial responsibility is to *define* the controversial issue. In its 1974 report the FCC recognized that the process of defining a controversial issue is necessarily *subjective*. Broadcasters should look at the amount of coverage given the issue by other media as well as the attention given to it by government leaders. One aspect of issue definition is separating the key issue from ancillary ones. Often one issue relates closely to another—a program on pension funds may also inadvertently raise questions about how those funds are invested, for instance. In complaints alleging Fairness Doctrine violations in this type of situation, the FCC has consistently backed the broadcaster's editorial judgment on the definition and identification of the issue.

The obligation of broadcasters to seek out issues and present programs addressing those concerns is taken seriously by the FCC. In 1976, the FCC refused to renew the license of WHAR, a West Virginia radio station, because the station refused to broadcast programs addressing the issue of strip mining. The FCC determined that the issue was of importance to the community of license and that the station failed in its duty to provide programs addressing controversial issues.

The Fairness Doctrine is under almost continual attack. Critics say that it prevents stations from accomplishing the very thing the policy is designed to encourage—programs on meaningful issues. Many feel that it is an outright violation of the First Amendment. Supporters point out that the doctrine doesn't provide total access, since the choice of issues and spokespersons remains under the control of the broadcaster. While section 315 exempts certain news programs from the equal opportunity requirement, the Fairness Doctrine is applicable to news programs. Supporters state that the Fairness Doctrine just formalizes what any good reporter would do anyway, that is, report a va-

riety of viewpoints. Critics counter by saying that it undermines the editorial process. Periodically a bill is introduced in Congress to repeal the Fairness Doctrine and provide the electronic media with full First Amendment rights. Thus far none of these bills has been passed by Congress. But as the FCC moves toward greater deregulation, the Fairness Doctrine might well become a thing of the past.

17.33 Fairness and Advertising

Commercials often stimulate fairness complaints. A complaint made to the FCC asking for time to respond to cigarette advertising carried on WCBS was upheld by the FCC. Congress reacted in 1969 by passing the Public Health Cigarette Smoking Act, which banned all cigarette advertising on radio and television beginning in 1971. A rash of complaints in the early 1970s provoked the FCC to open an inquiry into the applicability of the Fairness Doctrine to product advertising, public service announcements, and institutional advertising addressing public issues. In 1974 the FCC issued its findings, which stated that the Fairness Doctrine was not applicable to most product or service advertising (FCC, 1974). The commission gave four reasons for its finding. First, Congress was deemed to be the appropriate body for deciding which products harm the public. Second, public understanding of the issues is not furthered by applying Fairness Doctrine considerations to product or service advertising. Third, constitutional rights of broadcasters were being compromised. And fourth, the economic foundation of broadcasting was being threatened (Ginsburg, 1979). However, broadcasters were still expected to adhere to Fairness standards when broadcasting issue-oriented advertising. While there are no set rules pertaining to how broadcasters meet their Fairness Doctrine obligations when issue advertising is presented, the FCC made it clear that the provision of *quasi-equal time* would be consistent with its intent.

17.34 Personal Attack Rules

The use of broadcast or cable as a vehicle for launching a *personal attack* on someone may result in a libel judgment for the person attacked. Such attacks are also subject to the Fairness Doctrine. The FCC has a specific rule governing such situations. If during the presentation of a program addressing a controversial issue of public importance an attack is made on the honesty, integrity, or similar qualities of an identifiable individual or group, a personal attack has occurred. The station or cable operator is required to notify the person or group attacked within seven days of the broadcast. The notification should include the date and time of the broadcast, a script, tape, or accurate summary, and an offer of reasonable time to respond to the attack. News programs are not included, nor are political advertisements. Foreign groups and individuals are not included in the personal attack provisions.

17.4 ISSUES IN ELECTRONIC MEDIA CONTENT REGULATION

In the past decade the electronic media have faced numerous content issues. None, however, is more perplexing than the regulation of material deemed to be obscene or indecent. A different problem is that the electronic media have difficulty gaining access to public proceedings such as court trials and legislative sessions. The difficulty in finding solutions to these problems lies in the intermingling of state and federal jurisdiction and in varying community standards.

17.41 The Problem of the "Obscene," "Indecent," and "Profane"

Although the First Amendment prohibits laws that interfere with our freedom of speech, certain types of material are *exempted* from constitutional protection. Material deemed to be obscene, indecent, or profane is one class of material not provided with First Amendment protection. Section 1464 of the United States Criminal Code prohibits the broadcast of such material. In addition, a variety of state laws makes the distribution of such material a criminal offense. The problem with enforcement of both the federal and criminal statutes lies in *defining* what is obscene, indecent, or profane. Unfortunately, the problem of definition is not as simple as one former associate Supreme Court justice would make it. Although he couldn't define it, he declared, he knew it when he saw it.

One of the earliest cases involving the broadcast of obscene or indecent material occurred in 1931, when a broadcaster was charged with violating the antiobscenity provision in the Radio Act of 1927 (*Duncan* v. *United States*). In upholding Duncan's conviction, the court defined "obscene" as material that would tend to "corrupt the morals of those whose minds are open to such influences by arousing or implanting in such minds lewd or lascivious thoughts or desires." The court deemed some of Duncan's language profane because he had used the words "damn" and "by God." The court's definition in the Duncan case rested on a precedent established in the nineteenth century that sought to protect the *most vulnerable* from obscene materials. That definition is fraught with problems.

In 1957 the Supreme Court had an opportunity to squarely face the issue of defining obscenity. In *Roth* v. *United States* the Supreme Court pried obscenity away from sex. The definition used for obscene material was "Whether to the average person, applying contemporary community standards, the dominant theme of the material taken as a whole appeals to prurient interests." First Amendment protection was not applicable to obscene materials because such publications are without any redeeming social value. Unfortunately, the definition opened more legal issues than it closed. Little guidance was given to what constituted the "average person" or "contemporary community standards." In ensuing cases the Supreme Court tried to adjust the definition, but with little long-term success. Finally, in 1973 the court made major revisions in the Roth definition (*Miller* v. *State of California*). The new approach to the obscenity question did away with the concept of "redeeming social value" and substituted a new test—"serious

FIGURE 17–4. Section 1464 of the United States Criminal Code

Section 1464. Broadcasting Obscene Language.
Whoever utters any obscene, indecent, or profane language by means of radio communication shall be fined not more than $10,000 or imprisoned for not more than two years, or both.

literary, artistic, political, or scientific value." In addition, the contemporary community standards to be used are *state or local standards*, not national ones.

Do the standards articulated by the Supreme Court in the Miller decision apply to broadcast stations and cable systems? Or is violation of the indecency standard enough to bring about FCC action against the offending station or system? In the *FCC* v. *Pacifica Foundation* case, the Supreme Court upheld the commission's action against a station that broadcast a George Carlin monologue titled "Filthy Words." The Court said that section 1464 of the Criminal Code separated indecent from obscene and that the FCC was right in defining indecent language as words that describe, in a patently offensive manner, sexual or excretory functions or organs, broadcast at times of the day when there is reasonable risk that children may be in the audience. The decision does not preclude the FCC from taking action on material deemed to be obscene.

Cable systems face potential problems with their "adult" pay services. Actions taken in 1982–83 against cable companies in Roy, Utah, and Cincinnati, Ohio, sent shock waves through the cable industry. While there have as of yet been no successful prosecutions for violations of local or state obscenity laws, many experts are predicting that local actions will continue and that cable companies will become reluctant to offer "adult" services to subscribers.

17.42 The Access Problem and Broadcast Journalists

One of the major problems facing electronic media journalists is *access* to trials and government meetings. The Sixth Amendment of the Constitution guarantees that defendants in criminal proceedings receive a speedy *public* trial before a panel of impartial jurors. The Fifth Amendment provides that no person will be deprived of life, liberty, or property without due process of law. On the other hand, the First Amendment guarantees freedom of speech, and freedom of speech seems to include public access to public trials by all types of journalism. The print media have almost unlimited access to courtrooms and legislative domains. But access for the electronic media has been stymied by a combination of state court rules, federal legal procedures, and legislative barriers. The problems faced by the electronic media in this area are due, in part, to its lack of full protection under the First Amendment. But getting permission to bring cameras and microphones into the courtroom is not the only problem. Judges occasionally issue gag orders prohibiting the press from printing or broadcasting material because it might prejudice potential jurors.

Some of the objections to the role of the electronic media are justified. The 1960s saw numerous court proceedings in which the conduct of the electronic media played a vital role in the outcome. The Supreme Court overturned the conviction of a confessed murderer because his confession was broadcast by a local television station (*Rideau* v. *Louisiana*, 1963). A second conviction was overturned because the proceedings were televised and filmed (*Estes* v. *Texas*, 1965). Yet another conviction was overturned in 1966 because of massive pretrial publicity and the presence of cameras in the courtroom (*Sheppard* v. *Maxwell*, 1966). In 1981 the Supreme Court ruled that the Constitution did not prohibit states from allowing cameras to be used in the courtrooms under their jurisdiction, and furthermore, that the presence of such cameras did not necessarily compromise the ability of jurors to make fair and impartial judgments concerning the guilt or innocence of a defendant (*Chandler* v. *Florida*, 1981). This opinion stimulated states to experiment with television coverage of trials. Some states have allowed cameras to be present during court proceedings. Others are still analyzing the results of their experiments.

Access to legislative and other public meetings is also a problem for the electronic media. Although the House of Representatives allowed television coverage of its proceedings to be carried on C-SPAN, a cable news and information program service, the Senate has been slow to follow. Many state legislatures still bar cameras and microphones from the floor and galleries. Those who object to such coverage cite the tendency for legislators to grandstand for the cameras, the inability of the viewing public to fully understand what is going on, and the intrusive presence of the equipment and lights. Nevertheless, legislatures are slowly allowing cameras to cover the "people's business."

17.5 SUMMARY

Electronic media don't have the same First Amendment protection as the print media. Because of this, electronic media are subject to some types of content regulation. There are three major theories that provide a rationale for content regulation: spectrum scarcity, impact, and pervasive presence. Political use of electronic media is governed by sections 312(a)(7) and 315 of the Communications Act. Section 312 guarantees access to broadcast and cable media for federal candidates. Section 315 is the "equal opportunities" section. Stations that allow legally qualified candidates for elective office to use their facilities must provide the same opportunity to the candidate's opponents. Political editorials made by stations or cable operators trigger an obligation for the station to notify opposing candidates and provide them with time to reply. One of the most controversial FCC policies is the Fairness Doctrine, which requires that stations and cable operators seek out local issues and problems and present programming that addresses those issues. When presenting issue-oriented programming, it is the obligation of the station to seek out representative points of view. However, the station keeps editorial control over programming in all instances.

Two areas that are extremely important to broadcasters are the issues of obscenity and of access to court proceedings. Section 1464 of the United States Criminal Code prohibits the use of obscene or indecent language on a broadcast station. Problems with enforcing the section are in part the result of a failure to develop definitions of "obscene" and "indecent" that can stand constitutional scrutiny. The Supreme Court allowed state court systems to experiment with allowing cameras to cover trials; most states are still conducting such experiments.

SECTION

V

EFFECTS

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18.6 SUMMARY

18

EFFECTS OF BROADCASTING AND CABLE

We began this survey of broadcasting and cable with the statement that the electronic media affect all of us. We end with an examination of some of those effects. Within the industry itself there is controversy over its organization, the impacts of new technologies, and the proper role of government regulation. It seems that few members of the general public care about these issues, however. The public appears to ask only that the industry provide programs that are entertaining. The greater the number of program choices, the more they watch.

Yet more and more people are becoming concerned about the effects of electronic media, especially television. They believe there is a close relationship between the amount of television that is watched, its content, and human behavior. Concern about the effects of media go back at least to the 1930s, when ratings research was enriched by in-depth analysis of audience listening behavior. Two of the earliest contributions to the field are Frederick Lumley's *Measurement in Radio* and Hadley Cantril and Gordon Allport's *The Psychology of Radio*. The Office of Radio Research was established at Princeton University in 1937. Studies sponsored by that organization paved the way for techniques and devices used in later years to examine television.

While scholarly research is important, the public is more directly influenced by mass media coverage of events. The popular press is filled with stories critical of television. As

early as 1954 congressional investigators looked at the effects of television violence on children. In the past decade grass-roots organizations (such as Action for Children's Television) have been formed to pressure television and cable system managers to eliminate types of programs deemed to be harmful. Religious organizations have sponsored boycotts of advertisers associated with programs they believe are too sexy or violent. Government bodies have passed laws prohibiting the showing of television and cable programs identified as "indecent" or "obscene."

In the courtroom, television has been placed on trial.

In Arizona, a group of five women were accused of assaulting a television news team with hammers. The jury acquitted three of the defendants, and the other two were found guilty of lesser charges. The defense attorney claimed that the women's actions were justified because the news team had invaded their property.

In Florida, a fifteen-year-old killed his next-door neighbor. His defense was temporary insanity due to "television intoxication."

In California, attempts were made to hold NBC liable for damages stemming from the rape of a nine-year-old girl by four other girls. The crime was similar to that portrayed in a made-for-television movie distributed by NBC.

Radio has not escaped criticism either. The FCC issued a warning to stations about playing records that promote the use of drugs. Recently one state seriously considered a law mandating labels on all record albums explaining that there may be harmful material on the record which could only be heard by playing it backwards. A rating code for music similar to that used for motion pictures has been suggested on more than one occasion.

Is the media all-powerful? Are audiences merely clay to be molded in the hands of media manipulators? Do we have a chance to ever again think for ourselves? Or will we be programmed to react in certain ways to the stimuli provided by media moguls? In this chapter we'll survey some of the important theories and concepts of media effects. We'll examine the relationship between television and its audience and some of the effects each has on the other. Three areas of controversy—sex, violence, and stereotyping—will be examined. Finally, we'll briefly survey the impact of television on the political process.

By the end of this chapter you should:

1. Be able to name and identify the major theories of media effects

2. Have an understanding of the interaction between television and its audience

3. Develop a sensitivity for the role of television and the way it affects audiences in its portrayal of violence, presentation of sexual material, and stereotyping and simplification of a complex reality

4. Identify the ways electronic media impact upon the political process.

18.1 THEORIES OF MEDIA EFFECTS

As we saw in chapter 2, there are many theories of the process of mass communication. The study of the effects of electronic media has also produced multiple theories, each of

which has strengths and weaknesses. Underlying all of them, however, is the assumption that there is a *cause-effect* relationship between the media, their content, and the responses of audiences.

By definition, communication causes change. While we may quibble as to whether the agent of change is the information, the medium itself, or both, we cannot deny that change does occur. As we receive more and more information, our view of the world is affected. Perhaps the new information serves to maintain or reinforce our existing notions of reality. Or the information may stimulate us to redefine our reality. The redefining process may occur when:

1. We receive additional information which corresponds in a logical manner to that we already "know"

2. New information forces us to reorganize our reality

3. Information clarifies a part of our world which was previously unclear or ambiguous (Boulding, 1961).

18.11 THE BULLET THEORY

The oldest theory of media effects has its roots in public concern with the propaganda campaigns of World War I. Both sides in the conflict launched print media barrages in an attempt to create public support for an unpopular war. The enemy was portrayed in the most despicable manner, as baby-eaters and ravishers. Accompanying the anti-German propaganda in the United States were materials warning of the threat of Bolshevism.

Those who support the bullet theory view the content of mass media as being similar to bullets or a hypodermic needle. The target is the *mass audience*. When the bullets are launched, the effects are uniform across the entire society. The audience is seen as a homogeneous mass of interdependent individuals whose differences are minimized. Thanks to the media, all are uniformly dragged down to the same level by a general decline in moral values.

While this view of society is dismal, it is consistent with the pessimistic view of humankind that arose from the experience of World War I. Many of the bullet theorists viewed electronic media with alarm. Radio and television offered a charismatic leader the ideal tools with which to persuade and rally the masses. Those fears were realized when Adolf Hitler rose to power in Germany (Kracauer, 1947).

Today the bullet theory has fallen into disrepute. Research has proven that its concept of the mass audience is wrong. No longer is the idea of all-powerful media manipulating the minds of the unsuspecting audience and achieving a uniform response seriously considered by scholars. Yet belief in the bullet theory persists among those who would ban certain types of programming from distribution.

18.12 The Individual Differences Theory

The individual differences theory is almost the exact opposite of the bullet theory. By the end of the 1930s researchers had just about discarded the notion of the homogeneous

mass audience. One reason was that people just didn't react in the same way to the same message. The effects varied from person to person. Why?

One explanation is that a number of factors determine the effect of mass media messages. These factors are called *intervening variables*. Research indicates that each individual differs from others not only in terms of biological makeup, but also in past experiences and environment. Each individual develops a unique set of beliefs and attitudes. Therefore, given the same set of stimuli, we will vary in our reactions to it.

18.13 The Social Categories Theory

Between the extremes of the bullet theory and the individual differences theory is the social categories theory. While the individual differences theory sees the audience as a group of individuals, each responding in a different manner, the social categories theory predicts a *degree of similarity* between groups of similar age, sex, education, and economic status. Ratings research uses these variables in categorizing audience segments. Other studies have developed more detailed criteria for defining groups. Some are merely extensions of *demographic* categories.

18.14 N-Step Flow

One of the most important variables that affects how we react to mass media is the structure of the society in which we live, particularly the *leadership structure*. In 1944 Paul Lazarsfeld and his colleagues published a study of how the people of Erie County, Pennsylvania, decided who to vote for. Of particular concern was the role of mass media in the decision-making process. The study found substantial evidence supporting the social categories approach. Age, sex, economic status, and education were isolated as variables. It was discovered that the mass media function in two ways. First, the media motivated the individual to solidify tenuously held political beliefs. This is called *crystallization*. Second, the media reinforced opinions already crystallized. The researchers could find only a few instances where the media could be said to have changed an opinion.

While interviewing their subjects, the researchers found that political discussions with others were mentioned more often than contact with the mass media. For most, firsthand exposure to the media was limited. For a few, however, exposure to the media was more frequent. These persons seemed to be in positions of influence in the community, and others listened to what they had to say.

It was clear to the researchers that the process of delivering information from mass media to mass audience occurred in two steps. First, a group of people with a disposition toward high media exposure took the information offered by the media and processed it. Second, those with media contact passed the processed information on to those not exposed to the media. Those persons in contact with the media were called *opinion leaders*. It became clear from the Lazarsfeld study that informal social contacts played a key role in the process of attitude change. Subsequent studies reinforced the roles of opinion

leaders not only in the political process but in setting standards of dress, creating fads, and determining public issues. Researchers use the term "N-Step" to classify the various theories and models used to describe the flow of information from media to information user.

18.15 Two Important Concepts: Selective Perception and Exposure

Why do mass media have such little direct effect on changing opinions and attitudes? Part of the reason is *selective perception*. The concept of selective perception is based upon the recognition that each of us has a different physical and psychological makeup. So when we view something we tend to see it in ways consistent with our previous experiences. For example, when proofreading a term paper we sometimes tend to overlook obvious spelling errors. Our minds, programmed by habit, tend to rearrange the letters into the right order and so we do not perceive the error.

A concept similar to selective perception is our tendency to reduce *cognitive dissonance*. We want to be in a state of cognitive consistency. When we are faced with a situation which doesn't correspond to our already established system of beliefs, dissonance is created. We reduce the dissonance by changing the way we perceive the situation. Sometimes we reduce the dissonance of not getting what we want, for instance, by saying that we didn't really want it anyway, or that it wasn't worth having. Highly prejudiced people, when presented with a message that contradicts their beliefs, tend to bend the content to fit within their belief system. This is called the *boomerang effect* (Cooper and Jahoda, 1947) and is a form of dissonance reduction.

Selective exposure is the term used to describe the selection of messages that don't conflict with already existing beliefs. Democrats tend to listen to candidates representing their party. Anti-Semites read anti-Semitic literature and avoid anything that might speak positively of Jews. We use media to reinforce our existing attitudes. Ability to recall messages is dependent upon whether the information is consistent with our already established belief system. We tend to remember best those messages that are consistent with our existing attitudes. We forget those that conflict.

18.16 Reinforcement Theory

One of the earliest attempts to integrate the thousands of empirical studies on communications effects was made by Joseph Klapper (1960). Klapper analyzed the research and attempted to derive some generalizations about the effects of mass media and change. He came up with five generalizations, which form the basis for what is known as *reinforcement theory*.

First, attempts to persuade through the mass media generally result in the reinforcement of existing attitudes.

Second, individuals are influenced to a great extent by the groups to which they be-

long. Mass media are a contributing cause of change, but they are not the sole cause of change.

Third, in the process of dissemination the interpretation of the information by mediators has great impact. If there are no mediators, if the mediators are inoperative, or if the mediators are tending toward change, then change will occur.

Fourth, there are conditions in which the mass media do produce results directly. An individual who is highly susceptible to persuasive messages may be affected directly by mass media. Groups may be affected when there is no definite leadership. The medium then becomes the leader.

Fifth, the source, message, and communications situation contain variables that directly affect the degree of change brought about by the message.

18.17 The Dependency Theory

The dependency theory (Ball-Rokeach and DeFleur, 1976) takes into account three factors in explaining effects: the audience, the media, and the social system. The degree to which media messages affect people is determined by the degree to which they are dependent upon the information provided by the media. There are three major systems which interact to create effects.

The first is the *audience*, which is divided into various subgroups. These subgroups differ in relation to the importance of the information gained from the media and its function. The media system varies, too, in terms of its function for the group and the ease of accessing information.

The second system is the *social system*, the structure of the group. When change is occurring and there is a high degree of conflict, the status quo is challenged. In such situations dependence on the media for information is high.

The third system is the *effects* themselves. There are three classes of effects: behavioral, cognitive, and affective. Behavioral effects include starting a new behavior or stopping an old one. Cognitive effects include the resolution of ambiguities, the formation of new attitudes, the creation of issues to be addressed (agenda-setting function), a broadening of the belief system, and the clarification of values. Affective effects are those that pertain to our feelings and emotions.

18.2 THE TELEVISION AUDIENCE

When conducting research on the effects of television on its audience, the question is not whether there are any effects. This is a given. The task is to identify which behaviors are likely to be influenced and to isolate the specific effects (Greenberg, 1974). As we learned in chapter 2, each individual chooses a medium to meet specific needs. As the needs change, so does the medium chosen. The effect is dependent not only on the medium itself but on the motivations of the user.

One motivation for using television is to gain access to content. We watch television because of the information it provides. While this may certainly be a prime motivation of

many people, research indicates that there are other reasons. Brad Greenberg (1974) has isolated seven basic motivations for young people's use of television.

1. To pass time
2. For enjoyment
3. For companionship
4. For emotional arousal
5. To learn
6. For relaxation
7. As a source of refuge, escapism.

It can be argued that these motivations might just as easily be thought of as *gratifications* derived from using television. The situation is similar to that posed by the question Which came first, the chicken or the egg? It is clear that what viewers derive from television is based in part on their motivation for using it. What is equally clear is that some effects occur independently of the viewer's motivation. The users of electronic media take away more than they expect. It is these effects that worry so many.

18.21 The Public's Attitude Toward Television

The effect of television on its audience is influenced greatly by the attitude of the audience toward television. Audience attitudes have evolved over the years. While the research findings vary in detail, there are some conclusions that can be reached about the public's attitude toward television and use of it.

The first statement that can be made with a high degree of certainty is that the novelty of television has worn off. Television has become entrenched in the lifestyles of American families. No longer is television the central focus of the family's love and affection; it is there to serve the family (McHugh and Hoffman, 1977).

Next, the function of television has shifted from a medium which primarily delivers entertainment to one which provides both entertainment and information. The implication is that the audience increasingly perceives its use of television as meeting a variety of needs.

In the McHugh and Hoffman study cited above, 28 percent of the viewers reported that they were viewing more television than five years before, 33 percent viewing about the same, and 39 percent viewing less. Yet other studies show overall viewing increasing. These studies look at the amount of time the TV set is actually on rather than relying on the subjects' evaluation of how much they watch. Why the difference between people's recollections and the data collected through direct measurement? One explanation is that turning on the television has become equivalent to turning on the lights (Comstock, 1980). Researchers have consistently observed that the attention of the television viewer is often divided between what's on the set and other activities (Allen, 1965; Bechtel et al., 1972). Another explanation is that people just don't want others to know how much time they spend watching TV.

Fourth, while upper-middle-class adults and those who use television less frequently

than the majority of the population continue to be critical of television, there is now evidence of a pervading critical attitude toward television among representatives of all viewer groups. The criticism focuses on sex, violence, news, and commercials.

Lastly, while more of the population finds much wrong with television, most view the world as better off with television than without it (Comstock, 1980).

The contradictions in the statements above should not be viewed with alarm. The fact is, television viewers have complex and often contradictory feelings about the medium. Perhaps the only thing that can really be said with certainty is that the television audience doesn't know what it thinks.

18.22 The "Discriminating" versus the "Passive" Viewer

If, as indicated in section 18.21, television viewers are becoming more discriminating about the medium, are they becoming more selective in what they view? Once again, the opinions of researchers differ.

George Comstock's review of the literature (1980) supports the notion of the individual viewer as a *passive receptacle*. The viewer consumes television as a medium first; only then does the specific program matter. People watch television, not programs. Supporters of this statement point to the narcotic effect of television. Heavy viewers seem to be more passive than normal. This phenomenon is known as *narcotizing dysfunction*.

The McHugh and Hoffman study (1977) indicates just the opposite. Their findings indicate that the television viewer has "come of age." Indications of increased audience selectivity include the increased use of TV guides, reports of an increase in the use of program reviews, attention to promos about upcoming programs, and attempts to control and plan children's viewing, plus reports by viewers that they are more selective.

18.3 THE ROLE OF TELEVISION

While the audience comes to television to obtain fulfillment of certain needs, it often goes away with something very different. It is clear that television continues to have an influence—not only as a shaper of reality, but as a focuser of our attention. In a world of infinite choices, television limits our options to only a few. Television plays a variety of roles: it dominates our attention, homogenizes culture, and separates the important from the unimportant.

18.31 Domination of Attention

Some of the effects of television are a direct outgrowth of the amount of time we spend with it. Television has changed the way we live. Viewing takes time away from other activities. This can be clearly seen in the area of family life. Parents devote less time to child care. Bedtime stories have been replaced with "one more hour" of television. Television functions as babysitter, replacing the nurturing provided by parents. Television

also tends to fragment the family. In multiset households adults tend to watch with other adults while children watch with children. Interaction between members of the family decreases. Television becomes an agent of *socialization* on a par with teacher, parent, and peers. Secondary and elementary school teachers have given up the fight against television and now use it as a learning device. Television sets are common in the classroom. Home viewing assignments are the rule rather than the exception. Television, once a medium of entertainment, is now considered an educational ally.

Because television dominates our attention, it serves as a bond that cuts across social and economic lines. It is social glue creating an otherwise nonexistent commonality between a laborer and a college professor, the television viewing experience they share. In the eyes of the electronic media, all users are equal. We can talk about the "Super Bowl" or "Magnum, P.I." as experiences we share. Through its coverage of funerals, moon landings, and other events, television provides us with experiences we can draw upon over and over again as the years pass.

Another aspect of the "dominance theme" is that we expect a lot from television. When we review the seven motivations for using television outlined in section 18.2 we discover that many consumers apparently expect television to be all things to all people. When we expect the fulfillment of so many needs from one medium, isn't it likely that we'll spend a lot of time with it? Whether television provides us with the gratifications we expect or not is unimportant. Viewers must be getting something they need. Why would they return time and time again if they weren't?

18.32 Impact on Culture

Television and radio provide many individuals with their first taste of the fine arts. In this role the media might be viewed as popularizers of culture. Yet many critics condemn attempts to adapt dance, music, opera, and drama for presentation on the electronic media as an unacceptable bastardization of art. For many, television and radio can never present anything other than popular culture. A review of the programming trends of the past decades gives substance to this claim. Television and radio are dominated by the commonplace, the mundane, and the ordinary. In their race for the mass audience TV and radio must appeal to the least among us. Yet not every play produced on Broadway can be compared with *Hamlet*, nor is each new symphony the quality of one by Hayden or Brahms. Radio and television have more than their share of artistic achievements.

One cannot help but be concerned about the impact of the electronic media on other media, popular or artistic. The decline of the short story as a popular and viable literary form parallels the rise of television. Nonfiction has replaced fiction as a staple of hardback book publishing. Throwaway fiction has replaced the serious novel. Works are chosen for publication not only on their literary merit, but on their authors' potential as interesting talk-show guests. Classical music is packaged to compete with rock, and "Bach's Greatest Hits" and the "Classical Top-40" are huckstered on television. Opera singers and violin virtuosi become media celebrities; they are seen not only performing in the concert hall but selling credit cards alongside football coaches, best-selling writers, and superstar athletes.

Television makes "personalities" out of artists who once would have labored in lifelong obscurity. Then the personality magazines, such as *People* and *Us*, reinforce their stardom by keeping them before the eyes of the masses. The photo spread has become more important than critical reviews. Once the novelty wears off and the audience grows weary, television creates something new. Art movements, which once took decades to develop and mature, today come and go with the same rapidity as new, improved washday detergents.

18.33 Shaper of Reality

In addition to dominating our attention and influencing our culture, the electronic media also shape our reality. The nightly newscasts provide us with thirty- or sixty-second snippets of the world. At the conclusion of half an hour we are told, "That's the way it is, today. . . ." The television news anchorman becomes the most trusted man in America.

As we increasingly rely on the electronic media to perform a *surveillance role*, we give them the authority to pick and choose what is important and what is not. This is not peculiar to the electronic media. Newspapers also perform a *gatekeeping* function. All news media must evaluate hundreds of stories and pick only those which are deemed to be "news." Television faces a more complex problem than print. Not only must it deal with gatekeeping in the form of editorial judgment, but it is forced to concentrate on stories which are suitable for presentation in a visual form. The television medium itself limits what can be called news. Television news is visual news: if it can't be seen on the screen, it won't run. This choosing and ranking of news items is called *agenda setting*. Events are important in the minds of the consumer only to the degree that the news media says they're important. For those who view only one local and national newscast, the agenda is limited indeed. In addition to agenda setting, the news media confers status on the subjects it covers, which sometimes leads to **pseudoevents** and **publicity crimes**.

18.4 VIOLENCE, SEX, AND STEREOTYPES: TELEVISION'S "MEAN WORLD"

News programs are not the only shapers of reality. Many believe that entertainment programs contribute to how we shape the world outside our immediate environment. The television audience lives in two worlds. First, there is the world that we would normally call "the real world." Second, there is the world that is presented to us by our television screens. Both worlds provide a range of experiences which the individual takes in and processes. The result is a symbol system used by the individual to interpret everyday reality. The process of developing the interpretive system is called *cultivation* (Gerbner et al., 1980).

Despite over two decades of efforts, research on television effects is still in the formative stage. However, there are clear indications that the more a viewer is exposed to television, the more the viewer's perceptions of social reality (the symbol system) will

match those seen on television. Since the majority of viewing is done for entertainment, those values will dominate.

What is the world of entertainment television like? Game shows and entertainment programs provide us with constant reinforcement of the theme that riches and consumption solve problems. Violence is another theme, and it dominates prime time television. The average television character is *fifty times more likely to encounter violence* than is the average viewer (Gerbner et al., 1976). Women, young people, and older Americans are underrepresented. Lawyers, doctors, and law enforcement officials are overrepresented. Daytime and nighttime soap operas go from one set of traumas to another. The world is one of short-lived happiness. Sexual encounters occur primarily between persons who are either single or not married to one another. The secret of success, television style, is "take it and run" or, in some cases, beat the other person to the punch so you can keep it.

The settings of television dramas and commercials are dominated by upper-middle-class fixtures. Automobiles are relatively new. Homes are well kept and located in clean neighborhoods. Floors are polished, counters are neat, appliances are tucked away in cozy nooks and crannies, and the carpets are freshly vacuumed. Cloths are clean or, if they're dirty, a wash-day wonder soon solves the problem. While there are exceptions, squeaky clean dominates.

Of course, the degree to which entertainment values are cultivated in the viewer vary. Heavy viewers tend to view the real world in much the same way as it is portrayed on television. But light viewers are not exempt from the effect. If the way the world is portrayed is congruent with viewers' already existing symbol system, they receive reinforcement of their views. The congruence of the world of television and their view of the real world may *resonate*. This leads to an *amplification* of cultivation (Gerbner et al., 1980).

For example, if someone believes that the use of violence is okay so long as he is right and the other person is wrong, that view will be reinforced by many prime time action-adventure programs. This reinforcement of a prevailing attitude by television is called *mainstreaming* (Gerbner et al., 1980). Research evidence shows that people who are heavy users of television are more likely than light users to see the world as a dangerous place where violence is the rule, and where force is an acceptable means of dealing with problems.

Television is a powerful source of learning. While what we learn and how much effect that has on each individual varies, there is particular reason to be concerned about the effects of television on children. Early research focused primarily on television violence, but in recent years researchers have looked at sex and stereotyping and their effects on young viewers.

18.41 Violence

Concern with the effects of violence on children goes back almost to the beginnings of television. The earliest investigation occurred in 1954, with hearings in the Senate. Other congressional investigations occurred in 1961 and 1964. In 1969 the National Commis-

sion on the Causes and Preventions of Violence issued a report in which television violence was examined. The 1969 report concluded that television showed a great amount of violence and that this probably had some effect on children.

In 1972 the surgeon general issued the most comprehensive report on the impact of television violence on children. Entitled *Television and Growing Up: The Impact of Televised Violence* (1972), it was a summary of five volumes of technical reports covering a variety of topics. The evidence was clear: there was a demonstrable relationship between televised violence and aggressive behavior in children.

The surgeon general's report included a study of the number of incidents of violence in television programs. Begun in 1967, these studies have been done continuously under the direction of George Gerbner. The definition of violence is an important factor. Gerbner defines violence as "the overt expression of physical force, with or without a weapon, against self or other, compelling action against one's will on the pain of being hurt or killed, or actually hurting or killing" (Gerbner et al., 1979). While critics claim that the definition is too broad (Coffin and Tuchman, 1973) and includes humorous as well as serious situations, the Gerbner violence index is an important indicator of the overall level of violence on our television screens. Figures 18–1 and 18–2 show a summary of Gerbner's findings from 1967 to 1979. Despite congressional hearings, public outcry, threats of boycotts, editorial condemnation, pressure by advertisers, the instigation of the "family viewing hour," and a generally negative attitude toward violent programs, the level of violence has remained steady.

After all the thousands of research studies are examined, is there anything that we can say for certain about television violence and its effects? The answer is yes. Specific

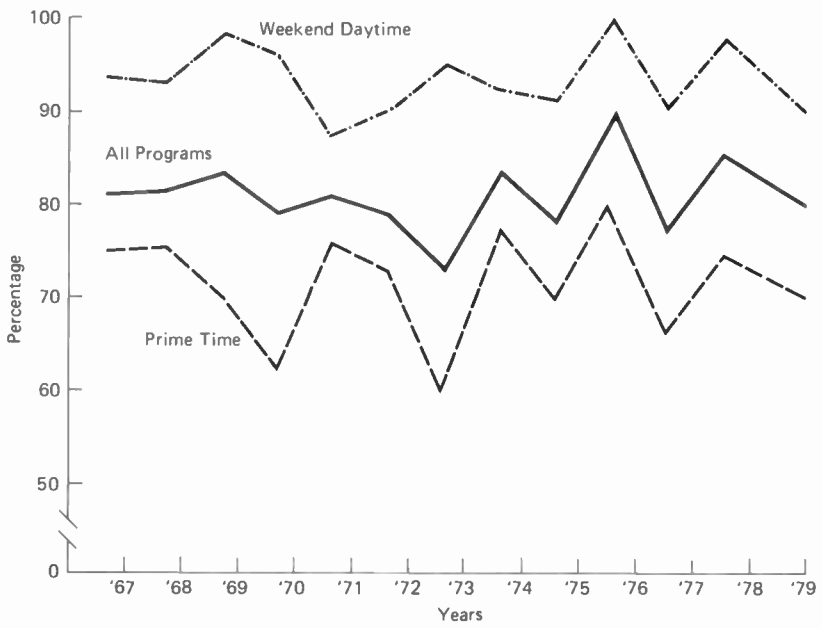

FIGURE 18–1. Percentage of Television Programs Containing Violence, 1967–79
SOURCE: Signorielli, Gross, and Morgan (1982); display taken from reported data.

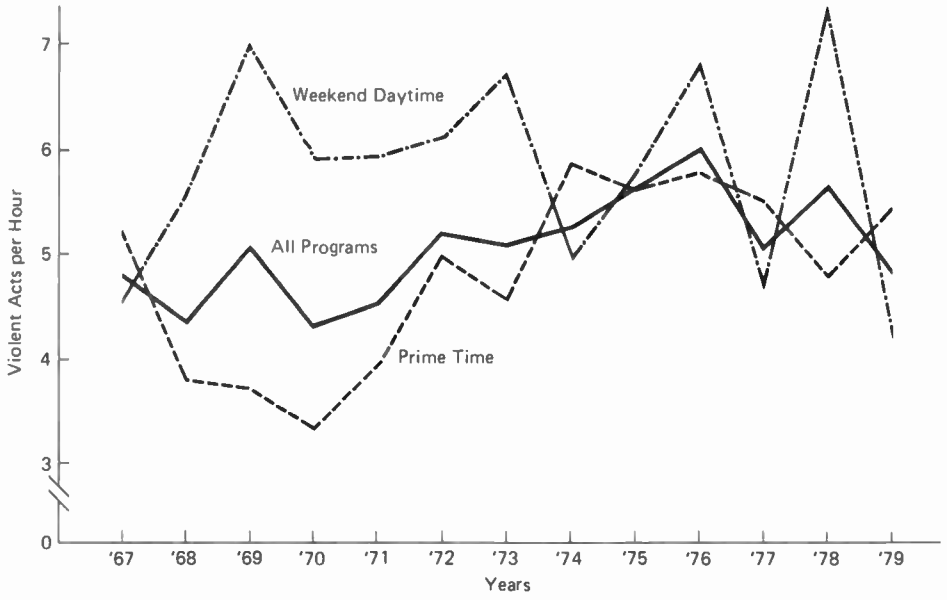

FIGURE 18–2. Violent Acts per Television Hour
SOURCE: Signorielli, Gross, and Morgan (1982); display taken from reported data.

effects of television violence include *arousal, copying,* and *value shaping* (Liebert et al., 1982).

Viewing violent content results in viewer *arousal.* In a child, this emotional state may dissipate quickly or may last for several days. As a result of the increased emotional activity, a child may act more aggressively in resolving problems, sometimes to the point of violence (Tannenbaum, 1980).

Copying behavior is commonly seen in children. There are accounts of harm coming to young persons who try to do stunts seen on television programs. Violent actions on television provide young people with examples of behaviors that they may copy, given the right circumstances. The potential for antisocial action is increased, although the actual realization of that potential is dependent upon other factors, such as personality variables.

Value shaping is probably the most subtle effect. When children are fed a constant diet of heros who engage in violent actions in order to do "good," it seems reasonable to expect them to begin to believe the television reality. Characters held in high regard have qualities that we want to emulate. Often those qualities include violent, aggressive behavior.

In summarizing the research, it appears that we can come to four conclusions about the effects of television violence.

1. All viewers have the potential of being affected.
2. Children that have a predisposition toward violence are more likely to be affected

than are other children. In addition, children between the ages of eight and twelve are more susceptible than younger or older children.

3. Boys are more likely than girls to engage in actual aggressive behavior. Delinquent children are more likely to be affected than others.

4. In terms of amount of viewing and preference for violent programs, boys exceed girls, and working-class children exceed middle-class ones.

18.42 Sex

In recent years the subject of sex on television has aroused considerable researcher interest. In the early days of television sex was taboo. With the changing of American values in the 1960s and '70s, sex and sexuality have become as prevalent as violence on our television screens. The National Council of Churches led the public outcry against a program called "Soap" that appeared on ABC beginning in 1977. While some ABC affiliates refused to run the program, others broadcast it at a later time, when children supposedly weren't viewing television. More recently, boycotts have been launched against products advertising on programs deemed to be morally offensive. The National Federation of Decency, the Coalition for Better Television, and the Moral Majority have backed boycotts in recent years. Cable television has come under attack from groups outraged by so-called "adult channels."

How much sex is shown on television? The answer depends on how you want to define sex. While explicit sexual intercourse has never been seen on commercial or public television, it can be seen on some cable television program services. Sex on television consists mostly of verbal descriptions and innuendos. Other forms of sex include touching or showing overt cues that sexual intercourse either has already taken place or is about to occur. Kissing and hugging are popular ways to exhibit sex on television.

Dramatic realism has allowed sexual themes to be used with increasing frequency. Prostitution has been the subject of several made-for-TV movies. "Hill Street Blues" frequently uses rape and other sexual crimes as subject matter. A homosexual character was presented with sympathy early in the 1982 season, and the bedroom encounters between two of the main characters have become increasingly graphic. Multiple sexual partners and full frontal nudity were features of public broadcasting's "I, Claudius," a BBC production. Broadcasting of sexual material constituted grounds for a license challenge of WGBH-TV in Boston, but the challenge was found to be without merit by the FCC.

Sex appears more frequently in daytime soap operas than in prime time. Intercourse between unmarried persons appears over three times more frequently than intercourse between married persons. The depiction of rape on television has also increased in the past few years (Greenberg et al., 1981).

Sexually oriented jokes have been a staple of late night television for many years. But sex has recently become the basis for prime time situation comedy as well. "Soap" has already been mentioned. The ratings success "Three's Company" focused on a two-girl, one-boy ménage à trois, with the boy posing as a homosexual so that the arrangement would be acceptable to the landlord. "Love, Sydney" also included a homosexual man

living with an unmarried woman and her daughter. Although in both instances homosexuality was not the continual focus, both programs were considered breakthroughs of a sort. Men posed as women in a 1980 series titled "Bosom Buddies." However, both of the main characters were portrayed as dressing in women's clothing only so they could continue living in their females-only apartment building; as soon as they left the house they changed into men's clothes. While there has not been a great deal of research on the effects of televised sex, a recent study has shown that adolescents have a high degree of understanding of sexual innuendo (Silverman and Sprafkin, 1980).

18.43 Stereotyping

One of the powers of television is its ability to portray the world very realistically. Thus the cultivation process is a serious concern. If viewers believe that television reflects the real world, then they have an inaccurate picture of the way things are. Studies have demonstrated that the roles and types of characters played by women and minorities have an effect on the attitudes of people toward those groups. In addition, members of minority groups tend to define their potentials in accordance to the way they are portrayed on television. The presentation of stereotypes also seems to have some effect on the way children think about minority groups.

The world of television does not accurately portray the roles played by women and minorities in the real world. In a study done on prime time television in the early fifties (Smythe, 1954), it was determined that 80 percent of the characters were white, while only 2 percent were black. The remaining 18 percent were white Europeans. In 1979 the United States Commission on Civil Rights presented the results of a study done on television drama in 1975–77. The results are seen in figure 18–3. Note that white males are represented 50 percent more than they would be if television reflected the real world, while white women and male and female minorities are substantially underrepresented.

Underrepresentation is not the only characteristic noted in the roles of minorities and women on television. When women and minorities are portrayed, it is in different terms

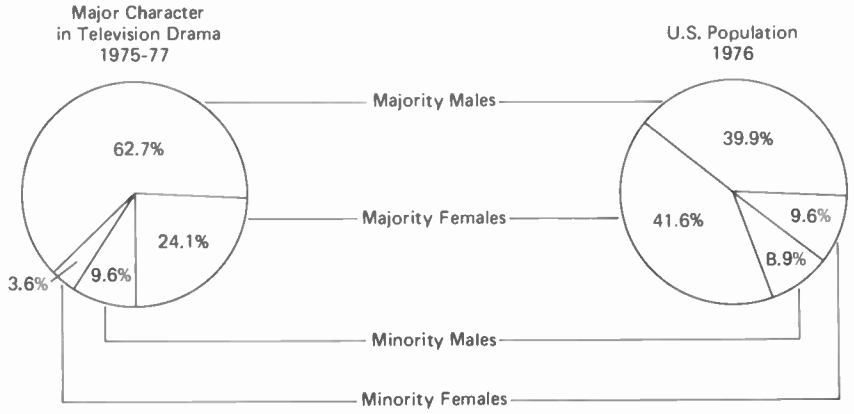

FIGURE 18–3. Distribution by Sex and Race of Major Characters on Prime Time Television, 1975–77
SOURCE: U.S. Commission on Civil Rights, 1979.

than white males. Figure 18–4 shows a summary of occupations held by major characters in television series.

18.5 TELEVISION AND THE POLITICAL PROCESS

Mass media influence has made the game of politics much different in the 1980s than it was two centuries ago. Detailed newspaper coverage of presidential campaigns changed styles of campaigning. Radio allowed political parties to go directly to the mass audience without going through the newspapers, some of which were highly partisan. Television

FIGURE 18–4. The Ten Most Frequently Appearing Occupations on Television, by Race and Sex, 1975–77

MAJORITY MALE		*MAJORITY FEMALE*		*MINORITY MALE*		*MINORITY FEMALE*	
Occupation	**Percent**	**Occupation**	**Percent**	**Occupation**	**Percent**	**Occupation**	**Percent**
1. Police	16.0	1. Unknown	32.3	1. Unknown	19.8	1. Unknown	37.4
2. Unknown	13.3	2. Secretary	7.3	2. Police	15.1	2. Student	10.4
3. Criminal	8.0	3. Student	6.4	3. Criminal	8.2	3. Homemaker	6.0
4. Self-employed	4.8	4. Homemaker	5.5	4. Other	7.0	4. Household worker	6.0
5. Doctor	3.8	5. Nurse	4.8	5. Student	5.8	5. Nurse	4.9
6. Enlisted/ noncom	3.8	6. Criminal	3.4	6. Self-employed	5.6	6. Criminal	3.8
7. Student	3.4	7. Unemployed	2.7	7. Miscellaneous service worker	3.7	7. Secretary	3.3
8. Miscellaneous managers	3.2	8. Hotel/ restaurant service worker	2.5	8. Doctor	2.7	8. Self-employed	2.7
9. Journalist	2.5	9. Military nurse	2.4	9. Hotel/ restaurant service worker	2.7	9. Hotel/ restaurant service worker	2.7
10. Hotel/ restaurant service worker	2.2	10. Police; household worker; self-employed	1.7	10. Enlisted/ noncom	1.9	10. Other	2.7
SUBTOTAL	**61.0**		**72.4**		**72.5**		**79.9**
50 other occupations	39.0	38 other occupations	27.6	36 other occupations	27.5	17 other occupations	20.1
TOTAL	**100.0**		**100.0**		**100.0**		**100.0**

SOURCE: U.S. Commission on Civil Rights, 1979.

coverage of the political process and its demand for the visual has revolutionized the political process as much as any single force. Today politics has become a combination of *polls*, *computers*, and *television* (Mendelsohn and Crespi, 1970). Television has become such a powerful influence that some say it is like a government.

18.51 The Political Process in Society

When we refer to *politics*, we mean not only elections but the *entire* process of government. Included in the political process are such television events as documentaries and docudramas, political satire, daily news programs, interviews, press conferences, editorials, and news magazine programs.

Few processes are as important as politics to our society. It's a process that takes many different forms, which symbolize what we as members of society need to believe about our state. Murray Edelman (1964), a major theorist of the political process and its symbols, notes a number of important factors in the symbolic use of politics: the *symbol* itself, the *setting*, and *language*.

Since television is one of the most powerful influences on our symbolic structuring of reality, what we see on television provides us with the raw material for politics. The use of symbol as it relates to the candidate's image is one of the most important tools that a politician has in swaying the opinion of the electorate. Candidates for elective office must present an acceptable television image. If they do not, their success will be limited. The portrayal of youth and vigor is important. In the case of older candidates, there must be a sense of "father" or "mother." For candidates for the nation's highest office, the importance of looking like a president cannot be underestimated.

The setting in which politicians are portrayed as taking action is also important. Image and milieu are reflected by television like no other medium. Since television is a visual medium, visually interesting settings are important. The portrait of a candidate touring a ghetto neighborhood or flying off to meet with a foreign dignitary is just as important as what the candidate says. The image of the confident candidate pushing through the crowds has proven to be an effective one. The use of pseudoevents is also effective. In the case of incumbents, their milieu is the office they hold. Former President Nixon's strategy in the 1972 elections was in part to wrap himself in the image of the presidency whenever possible. He was always seen "being the president." And apparently it worked—he was reelected. Former President Carter tried the same tactic in 1980, however—and he was not reelected.

Language plays a major part in the political process. Abstractions like justice, fairness, democracy, freedom, and progress play well on television. Ambiguity allows the crafty candidate to appear to give everyone what they want while never getting pinned down to specifics. The important concept is flexibility.

18.52 Impact on the Political Process

One of the major impacts of television on the political process is the *agenda-setting* function of television news. The press has a seemingly unquenchable thirst for news of gov-

ernment. Some comes to the press in the form of government press releases, a form of bureaucratic propaganda. Much of the information reported by the press is coverage of events. Some of these are staged for the benefit of television and are a form of pseudo-event. Much of what we see on television news is conventional reportage, information dug out by a reporter. The extreme competitiveness of the news business forces investigative reports which may or may not be grounded in fact. Issues are created, evaluated, then discarded. Every day is a news day. Radio and television have a specific amount of time devoted to news programming, and that time is filled whether events warrant it or not. The law seems to be that news expands to fill a time slot. This constant barrage of events has an impact on the consumer.

Increasingly news reporters are demanding access to government. While this may be good in theory, much of what happens in government and in electoral politics must be done out of sight. News media demands for access to the process of decision making is changing politics. Today ideas and information are routinely "leaked" to the press. Decision makers then read the public's reaction and make decisions based on that rather than raw information. With increasing regularity government documents, memorandums, and letters are to be found in the pages of newspapers and on the nightly news. As a result, officials become reluctant to put anything down in writing.

As for electoral politics, television has radically changed the structure of our major political parties. Television is blamed for much of what some perceive is wrong with the American political system. Critics say that party leadership is weak and relatively unimportant, now that party conventions are media events, scheduled to coincide with the ebb and flow of the prime time audience. No longer does convention process choose a nominee for president—the state primaries and caucuses have essentially done that, long before the opening gavel. The actual convention has become a time for the two major political parties to try their hands at entertainment. The reluctance of the commercial networks to continue gavel-to-gavel coverage indicates that the parties have failed.

Some say that the greatly increased importance of primaries is primarily due to television coverage. The first primary is held in New Hampshire, and every four years a horde of reporters invade this small New England state and watch the candidates run for their political lives. The voters of New Hampshire are analyzed in depth; each small vacillation in the polls is read by the political forecasters like tea leaves. Primary voters in other states receive the same treatment.

Then, when the primary voters make their choices, election night specials analyze the results, often before the votes are completely cast, and the winner is proclaimed. It doesn't matter that in a field of as many as seven candidates, the person hailed as the winner may receive only a few more votes than the first runner-up. It is the winner who captures attention as the leader, destined for bigger and better things. Losers are not immediately forgotten, however. The press doesn't release them until they finish second once too often. Then the unfortunate take their places among the political debris strewn on the rocks of presidential primaries.

Some critics charge that the emphasis on winning forces candidates to adopt a strategy of "not losing." Candidates become reluctant to address important issues: taking firm stands means that some voters will disagree with you, and disagreement means they'll vote for someone else. When Peter McCloskey was first elected to the House of

Representatives, he was amazed to discover that few voters cast ballots for him based on issues. He received votes because voters liked the way he looked on television.

Television has made political campaigning more *expensive*. Quite simply, it is almost impossible for a candidate to be elected to a federal office without spending a lot of money on television advertising. The reluctance of candidates to be identified with any issues except those that are safe encourages the use of a political language rife with ambiguity and emotional appeals. Television encourages the lack of substance in our political campaigns. Issues get lost in the creation of image, the staging of events, and the feeding and nurturing of the television news reporter. Anne Rawley Saldrich sums up the impact of television on politics by noting that democracy takes time, television is immediate (1979).

18.53 Presidential Debates

A memorable feature of the federal elections of 1976 and 1980 was the televised debates between the major candidates for the office of president of the United States. This was not the first time electronic media were used to give the public an opportunity to see the candidates go head to head. The first radio debate between presidential hopefuls was held in 1948, during the Republican primary in Oregon. The candidates were Thomas Dewey and Harold Stassen. The press reviews were less than enthusiastic.

There was an attempt to get Adlai Stevenson and General Dwight David Eisenhower to debate on television during the 1952 election. But Eisenhower's media advisor told him to avoid it, and Stevenson wasn't very eager either. The first television debate between presidential hopefuls was held in 1960, when Richard Nixon and John Kennedy appeared together on national television. Kennedy had a personality that blossomed on television, while Nixon presented an image that voters found displeasing. Immediately following the debate the press declared Kennedy the "winner." Little coverage was given to the issues discussed; instead the emphasis was on who projected the better image. The lesson was not lost on Nixon, who improved his media image enough to be elected president in 1968 and 1972. He did not engage in television debates either year.

The elections of 1976 and 1980 once again featured debates between the two major candidates for president. Once again the press, both print and electronic, emphasized winning and losing. In 1979 the Twentieth Century Fund published a report on presidential debates that made several recommendations. Included among them were that presidential debates should become a regular part of presidential election campaigns, that they should be sponsored by the League of Women Voters, and that candidates should be obliged to debate.

Do debates really have an appreciable effect on voters? The research results offer no conclusive answer. We can say the following:

1. It seems that debates serve to reinforce already existing attitudes, by the process called crystallization. Debates seem to aid in decision making only for a few people. However, in close elections these few become extremely important.

2. Large numbers of persons watch the debates. The television networks portray

these as contests and appeal to the sporting interest of viewers. All three commercial networks simulcast the 1976 and 1980 debates, which added substantially to the audience. Given the increase in the number of cable homes, it remains to be seen whether those large numbers will persist.

3. Viewers trust the debates more than they do political advertising. They know that the event is not controlled by any of the candidates and as a result view it as more authoritative and trustworthy.

4. Viewers cannot engage in selective exposure. All candidates are a part of the program, so viewers are necessarily exposed to opposing points of view.

18.54 Politics and Policy

Although there are some who doubt the impact of television on the political process (Patterson and McClure, 1976), the majority recognizes its influence. Some feel that television must be changed, so that its influence is used in a manner free of any bias. Part of the problem, according to one critic (Saldrich, 1979), is that television executives have become political gatekeepers who control the agenda, modeling politics to fit the constraints of the television medium. Changes seem to be needed, and Saldrich has proposed some considerations for public policy.

First, the concept of television as government should be examined carefully. If there is reason to believe that television has too much of an influence on the political process, adjustments must be made by the private sector (not institutional government).

Second, candidates should receive free television air time during the two weeks prior to an election. This makes the medium available not only to those with the money to buy time but also to those small parties who are not as well financed.

Third, there is a need for a national program designed to develop electronic literacy. Individuals must be taught about television, how it works, how it affects us, how it creates a reality of its own.

Fourth, there should be a national system of television archives supported by public funds. These archives would be a permanent record of our television lives.

Fifth, government must be given direct access to the airwaves without going through the corporate censorship of the television networks or corporate licensees. This access could take the form of mandated access to stations, through public television or a series of government stations. All government information on television must be designated as such.

18.6 SUMMARY

Many people are concerned with the effects of electronic media on individual users and on our political system. Important theories about media effects include the bullet theory, individual differences theory, social categories theory, N-step flow, reinforcement theory, and dependency theory. The impact of the mass media on opinion change is cushioned by selective perception and retention.

Television is used for a variety of sometimes contradictory reasons, and the public's attitude toward television is ambivalent. Through its domination of our attention and its impact on culture, television is a shaper of reality for all of us.

There is a steady supply of violence on prime time television. While violence does not necessarily provoke violent or aggressive behavior in all children, there is reason to believe that children with aggressive tendencies are more likely to respond to television violence. There is also more and more sex on television, and stereotyping of ethnic minorities and women continues to be a problem in prime time programs.

Electronic media have had a profound effect on the political process in the United States. Issues are lost in the rush to create an image. Political parties, conventions, and even elections have been changed to accommodate the demands of television coverage.

GLOSSARY

Access programs. Locally produced programs distributed on a cable system but not subject to operator control or censorship.

Actuality. A radio or television news segment that broadcasts the actual event rather than just a news report on it.

Adjacency policy. The policy established by a station's sales department concerning the placement of ads for rival products. Normally a station will not place ads for rival products within the same commercial break.

Adjacent channel interference. Interference between two broadcast stations operating on channels located next to one another.

Alphanumeric. Denoting letter or number data displayed on a televisionlike receiver or on paper.

Alternator. An electric generator or dynamo that produces alternating current.

Amplifier. A circuit or series of circuits that strengthens radio energy.

Amplitude. The height of a sine wave above the o-o[1] axis. Amplitude represents the amount of power, measured in watts, possessed by an electromagnetic wave.

Analogue. A class of electronic devices that encode information as part of a continuing flow of energy; the opposite of *digital.*

Angle of radiation. The angle at which a radio wave strikes the ionosphere. The higher the frequency of the radio wave, the less the angle needed for it to pass through the ionosphere into space.

Antenna. A wire or set of wires used to send or receive radio energy.

Ascertainment. The process utilized by stations to determine the needs and interests of the community of license. Ascertainment is a continual process of interviewing community leaders and surveying the audience.

Attenuation. The process by which radio waves weaken as they travel through space.

Audience flow. The movement of audience from program to program during a particular daypart either on the same channel or on different channels.

Audio frequency. The modulated current produced by sound.

Audiophiles. Lovers of fine audio reproduction.

Availabilities. Advertising time slots which have not been sold.

Bait and switch. An unethical and (in some instances) illegal advertising practice. In order to increase customer traffic a product or service is advertised at an extremely low price. When the interested buyers arrive at the store they find that the advertised product is unavailable, and attempts are then made to sell them a more expensive product.

Basic services. The fundamental services offered by cable systems. These services normally consist of delivery to cable subscribers of all local broadcast stations, local cable programming, and a few advertiser-supported cable channels.

Bit. A piece of data, or a specific quantity which when joined with others makes up a piece of data.

Blacklisting. The illegal practice of maintaining lists of individuals who for one reason or another are not to be employed in a specific industry or profession.

Blockbusters. Specials, popular movies, or other programs that have the potential to attract large audiences. Programs of this type are generally scheduled during sweeps.

Camera head. The part of a television camera which contains the controls that adjust the electronic components.

Capacitances. The property of a condenser (electrical storage device) which determines how much of a charge can be stored for a given voltage.

Carrier wave. A radio wave generated by a transmitter at the frequency assigned to a broadcast station.

Cat whisker. A thin metal conductor that rests on the sensitive spot of a crystal used to detect radio energy. The metal wire carries the radio energy to the receiver circuits.

Centi-. A prefix which means one one-hundredth.

Channel capacity. The maximum amount of information that a channel can carry in a specific amount of time.

Character generator. An electronic device used to produce alphagraphic or graphic material for television broadcast.

Churn. The rapid acceptance and then dropping of cable communication services by subscribers. Often subscribers decide to take a pay channel and then drop it within a month or two.

Closed captioning. Text material, broadcast in coded form, which can be seen on the television screen with the aid of a decoding device.

Cochannel interference. Interference between two broadcast stations operating on the same channel.

Common carrier. A telecommunications service that makes its facilities available to the public for a fee. Common carriers differ from broadcasters in that they have no control over the content of the messages they transmit. The fee charged for the use of their facilities is regulated by either the FCC or a state regulatory agency.

Compatible. Used to describe a color television system which can produce a viewable picture on either a color or black-and-white receiver.

Conductor. A substance that allows electricity to flow through it. Materials vary in the amount of electricity they allow to pass through.

Content analysis. A method of studying the content of media. Content analysis activities are designed so that the content of a message or series of messages is inspected in a systematic and objective manner, with the data expressed in quantitative terms.

Continuity. All spoken nonnews material that is broadcast by a station.

Coverage area. The geographical area covered by a broadcast signal.

Cross talk. Any undesired signal which interferes with the reception of the desired signal. In telecommunications, leakage of energy from one line to another resulting in interference.

Cuing. The process of preparing recorded materials for playback; generally the cue point is immediately prior to the audio or video.

Cut. Instantaneous transition from one image to another.

Daypart. A specific part of the broadcast day during which large portions of the audience are engaged in the same type of activity.

Daytimers. AM radio stations whose operation is restricted to between the hours of sunrise and sunset.

Demodulation. The process of decoding radio waves in order to display either the audio or the video content, or both.

Demographic. A classification, such as age, sex, educational or economic level, used by researchers to describe members of an audience. Demographics are used in broadcast ratings studies, as well as in marketing and advertising research, to develop an audience profile.

Deregulation. The relaxing or outright repeal of rules used by a regulatory agency to regulate an industry. In recent years the FCC has carried out a plan to cut down on the number of forms submitted to the commission and has eliminated other rules that some broadcasters found burdensome. Synonyms are *unregulation* and *reregulation.*

Dichroic mirror. A light filter which allows a narrow range of colors to pass through while reflecting other colors.

Digital. A class of electronic devices that break down information into a series of discrete bits. Each bit is encoded into a series of electronic numbers which are distributed to decoding devices.

Direct broadcast satellites. Communications satellites in orbit around the earth which are designed to deliver television and radio signals directly into the home.

Dissolve. The fading out of one image while another image is slowing appearing.

Documentary. A nonfiction program that uses real-life material.

Dramatic anthology. A series of dramatic programs, each distinct from one another in terms of story, characters, setting, etc., broadcast under a common theme. "The U.S. Steel Hour," "Studio One," and "Playhouse 90" are all examples of dramatic anthology series.

Ducting. The condition in which a broadcast signal becomes trapped between two atmospheric layers and travels between them until it escapes. The result is an increase in coverage area far beyond what would normally be expected.

Economy of scale. More efficient use of resources achieved as a system grows larger; the cost per unit goes down because of the spreading of start-up costs over a larger number of units.

Effective radiated power. The amount of power possessed by a broadcast signal when it leaves the antenna. A signal's power can be increased by concentrating it in a particular direction rather than allowing it to travel in all directions equally.

Electrical induction. The creation of an electrical current by passing a conductor through a magnetic field.

Electromagnetic spectrum. The entire range of electromagnetic energy including radio waves, light, X rays, gamma rays, infrared, and cosmic rays.

Electronic. A kind of technology based upon the flow of electrons at very low voltages through gases, vacuums, or solid substances. Electronic equipment is characterized by the use of devices which regulate the amount and direction of electricity flowing through a circuit.

Ether. A material believed to be found in the atmosphere, through which radio waves flowed; it was later discovered to be nonexistent.

Fade. The slow movement of a television image to black.

Fidelity. The degree to which a reproduction is like the original.

Fiduciary. A relationship between persons or entities where one acts in a position of trust for the other.

Field study. A study similar to laboratory research, except that the data is collected in the subject's natural environment.

Fixed. Describing radiocommunication services intended to be used between fixed points.

Forfeiture. A fine levied for a violation of a regulatory agency's rule.

Formula radio. A type of radio in which the format is tightly designed and executed in such a way as to appeal to a particular audience segment.

Gatekeepers. Portions of a communication system through which a sizable amount of the information needed by others must pass.

Geostationary. At a point 22,300 miles above the equator where an object will remain in the same place relative to a position on earth.

Giga-. A prefix, abbreviated G, which means one billion. A gigahertz is equal to 1,000,000,000 hertz.

Ground conductivity. The degree to which the earth will conduct electromagnetic energy; the wetter the ground the higher its conductivity.

Hardware. Machinery or electronic devices designed to aid in work.

Harmonic. A component frequency that is an integral multiple of the fundamental frequency.

Heliography. A means of telecommunication which uses mirrors to reflect sunlight. The pattern of light flashes forms a code.

Hertz. A unit of frequency equal to one cycle per second, and abbreviated Hz.

Hertzian waves. A synonym for radio waves.

Heterodyning. The combining of radio frequencies so as to produce two new frequencies which are the sum and difference of the original frequency.

Host selling. A type of commercial presentation where the host, main character, or other program participant is seen in a commercial message promoting the use of a product. Commercials of this type are objectionable in children's programs because most children can't differentiate between the program material and the commercial messages.

Imported signals. The output of a broadcast station that is carried to a point outside its community of license. The signal may be carried by land-based microwave system or satellite.

Inductance. The matching of the capacities of electrical circuits so that they react in the same way to similar types of radio energy.

Induction coil. An apparatus made up of two coils. Interruptions in the flow of direct current in one coil induce the flow of alternating current in the other.

Information overload. The condition an individual suffers when provided with more data than can be processed.

Institutional advertising. Advertising whose primary purpose is not to sell a specific product or service, but rather to promote good will and establish prestige for the sponsor.

Institutional networks. A type of cable service linking together similar institutions, such as hospitals or schools, or businesses so that they can communicate privately with each other.

Integrated circuit. A small electronic device, consisting of multiple electronic circuits placed on a silicon chip, that can perform the same function as a group of larger circuits.

Interlace scanning. The television scanning process in which each adjacent line belongs to a different field.

Ionosphere. The several electrified layers of the atmosphere located between 50 and 300 miles above the earth. The layers are created by the action of sunlight on gas molecules, resulting in ionization, and can absorb or reflect radio waves.

Key. A special effect used to insert text or graphic material into a television image without degrading the original image.

Kilo-. A prefix, abbreviated k, which means one thousand. A kilohertz is equal to 1,000 hertz.

Kinescope. A film record of a television program. Also, a television picture tube.

Laboratory research. A research method used to investigate a hypothesis under controlled circumstances. Laboratory research activities are designed so that the experiments can be replicated by others.

Leader. Tape, generally not coated with metallic oxide, of a different color than the recording tape; it is placed at the head and tail of a recording and used as an aid in cuing the tape.

Lead-in. The program which immediately precedes another program. Advertisers and programmers attempt to schedule programs with large audiences so that the audience share carries over to the next program.

Long form. Describing a program of at least sixty but most often ninety minutes or more in length.

Make-goods. Free time given to advertisers to make up for the failure to air their commercial messages at the proper time either because of technical problems or because their place would have been in violation of the station's adjacency policy.

Master control. The major switching and routing area in a cable system or television station.

Master control director. The person who does the switching from one program to another. Generally the MCD is an engineer.

Media buyer. Someone who buys time or space on behalf of advertisers.

Mega-. A prefix which means one million and is abbreviated M. A megahertz is equal to 1,000,000 hertz.

Memory. An electronic device designed to store data either temporarily or permanently.

Micro-. A prefix which means one one-millionth.

Microprocessor. An electronic device consisting of many integrated circuits and designed to perform particular functions.

Microwave relay. A radio energy transmitter and receiver which serves as a link in a network system.

Milli-. A prefix which means one one-thousandth.

Mobile. Describing a radiocommunication service intended to be used between movable points.

Model. A representation of a process or situation in words or diagrams.

Modulation. The process of encoding radio waves with audio or video information.

Multiplexing. The process of placing two or more electronic signals onto a single channel.

Multiplier. A device used to increase or decrease the frequency of a radio wave.

Music consultant. Someone paid by a radio station to evaluate its musical programming. Some music consulting organizations also provide music services to client stations.

Music sweeps. The linking together of several musical selections, uninterrupted by nonmusic material, over the boundary between two quarter-hours. For example, music may start at eight minutes past the hour and continue to twenty-two minutes past the hour. Music sweeps are used to maximize average quarter-hour audience.

Mutually exclusive. Describing the state of affairs that results when two or more persons apply for broadcast licenses which, if all were awarded, would result in interference between the stations.

Network. Two or more telecommunications units which form an interconnected system; all members of the system need not be in direct contact.

News. A program that emphasizes the reporting of events of the day, with some use of feature material. A news interview program features interviews of a person or persons deemed to be "newsworthy" by one or more journalists.

Noncommercial. A type of broadcast station, generally licensed to a nonprofit organization, which broadcasts no commercial messages.

Origination. Programs produced by and under the control of the cable operator.

Oscillator. An electronic device which generates radio energy at a particular frequency.

Participating sponsorships. An advertising pattern in which messages from several sponsors appear in a program.

Pay channels. A program service that charges users a monthly fee for the use of the service. Pay channels are found on cable communications systems, MDS channels, and subscription television services.

Pay-per-view. Payment of a fee to view one cable program. Normally the program is a special program, movie, or sporting event not available either on broadcast television or through other cable services.

Phase. The pattern created by electrical sine waves. Two or more waves are said to be in phase when the peak of their amplitudes occurs at the same time.

Photoelectric. Describing a substance or device which emits electrical energy when it absorbs light.

Playlist. A list of songs that have been approved for play on a radio station. Often the contents of the playlist will be divided into several categories, depending on the format used by the station.

Polarization. The position of an electromagnetic wave relative to the surface of the earth; broadcast signals have vertical, horizontal, or circular polarization.

Prior restraint. Any action by government that prohibits or otherwise keeps someone from publishing and distributing some sort of information. For example, a law that makes it a criminal offense to publish material critical of an elected official would constitute prior restraint.

Program. A set of instructions which a computer uses to accomplish a task.

Program cycle. The scheduling of programs of a similar type by competing networks. Program cycles are usually established when one type of program, e.g., a medical program, becomes popular; programmers on other networks imitate the popular program in hopes of capturing the same success.

Program service. An organization that analyzes a client station's market and provides programming designed to attract a specific market segment.

Pseudoevent. A happening that takes place for the purpose of obtaining media attention. Most events of this type would never have taken place except for the potential media coverage. Also called *media events* or *staged events.*

Psychographic. A classification, similar to a demographic, which is psychologically based. Psychographics are used to explain why people think and behave the way they do.

Public affairs. A type of program that focuses on a particular public problem or concern. It may include a panel discussion, feature material, interviews with individuals connected with the problem, or documentary presentation of information.

Publicity crimes. Criminal actions used by the perpetrators to gain media attention. The crime may be anything from orderly civil disobedience to extreme violence.

Quasi-optical. Behaving in a manner similar to light.

Radiation. The process in which energy, especially electromagnetic energy, is sent out into space.

Radio frequency. The number of cycles per second (hertz) of the carrier wave.

Rectifier. Any device, such as a vacuum tube, which changes alternating current into direct current.

Reruns. The rebroadcasting of a program either on the same network or in syndication. A program may be rerun several times.

Residuals. Payments received from producers by actors and other creative personnel when a program or series is syndicated.

Resolution. In television, the degree to which a visual reproduction on the television screen is like a photograph. The higher the resolution, the greater the amount of detail that can be seen.

Resonator. A high-frequency radio energy generator. Also used to describe the radio wave detection circuits of a receiver.

Rights. The exclusive legal right to use of copyrighted materials.

Sampling error. The amount that measurements derived from a sample vary from those which would be obtained if the entire population were measured.

Season. The months during which television networks present new programs. Generally the television season runs from September through May; the fall season is from September to January, the second season from January to April, and the third season from April through May or June.

Second season. The time, usually in January, when the networks make major program changes.

Semaphore. Any system of signaling which uses flags, lights, or mechanical arms; in particular, a system using two flags.

Series. Two or more programs in succession with the same characters, setting, situation, and/or theme.

Situation comedy. A series of programs, usually thirty minutes in length, that consist of a character or characters facing and overcoming a variety of humorous situations.

Soap opera. A radio or television program broadcast on a daily or continuing basis. The individual programs are usually broadcast during the daytime. The plots are constructed in serial form so that one or more plot lines are left unresolved at the end of each program. The name refers to the fact that the advertisers sponsoring these programs are generally soap or home products companies.

Software. A program or any type of information unit used or transmitted by a hardware device.

Spark gap generator. An electrical device consisting of an electrical generator which sends current to an apparatus in which there is a space or gap. A buildup of current in one end causes a spark to jump to the other end, resulting in the generation of a wide band of radio waves.

Special. A one-time-only program, usually variety, that features a big-name star.

Spin-off. A series that is derived from another series. Usually a series in which a popular secondary character from a hit series is the main character. Producers and programmers hope that the audience will watch the spin-off series as well as the original.

Standard error. The estimated amount of error present in a measurement.

Storyboard. A visual representation of a television or film program, generally a graphic representation of the key points of a story or commercial.

STV. Acronym for Subscription Television Services. STV services provide a scrambled broadcast signal to subscribers who possess a descrambler.

Subcarriers. Radio frequencies within the bandwidth of a broadcast channel which are used to carry information other than the primary broadcast material, for example SCA data.

Survey research. A method of collecting data from large populations through the use of questionnaires, interviews, or similar techniques. A sample of the population to be examined is used and the data is processed using statistical techniques.

Sweeps. National audience surveys conducted by either A. C. Nielsen or Arbitron that measure the audiences for programs in over 200 separate markets.

Symbol. Something that stands for or represents another thing.

Sync. Short form of synchronization. The interlocking of a television transmitter and receiver, together with other parts of the system, for the purpose of producing a

stable, viewable picture. The interlocking process is achieved by a series of reference signals and instructions that are sent out during the blanking period of the signal.

Syntony. Resonance; the harmonic relationship between radio energy frequencies.

Talking head. A program whose content consists primarily of people talking to one another or to the audience.

Target. The photosensitive portion of a video tube which emits an electrical current when struck by light.

Teaser. An announcement or other promotional device used immediately before the beginning of a program to arouse audience interest.

Teleconference. The linking of two or more locations via satellite interconnection. The linkage may consist of video only or a combination of video and telephone.

Theory. A systematic statement of principles based upon observed and verified phenomena; a simplification and abstraction of reality.

Transducer. A device that transmits power from one system to another.

Transistor. A small electronic device which controls electron flow in a manner similar to a vacuum tube.

Transponder. A channel output of a communications satellite.

Upstream. The direction of signals traveling from the receiver to the sender.

Use. In regard to regulations governing political use of the electronic media, any appearance by a candidate in which he or she can be readily identified either by visual or audile means.

Vacuum tube. A sealed tube having the air or gas in it exhausted to a high degree and containing metallic electrodes, through which electrical discharges are passed.

Variety program. A program that features two or more performers singing, dancing, acting in comedy skits, or similar entertainments.

Vaudeville. A stage show consisting of several types of acts—music performances, dancing, comedy, acrobatics, or short dramatic performances.

Watt. A measure of power possessed by an electromagnetic wave.

Wipe. The replacement of one image with another by a moving line, circle, or other geometric design.

Zones of reception. The geographic areas in which a radio station, particularly a shortwave station, can be heard.

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The following list includes works cited in the text, plus other material of interest to both the beginning and advanced student. While not an exhaustive review of the available literature, it does provide a starting point for students interested in studying particular topics in greater depth.

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