DAVID CARROLL

TELECOMMU-NICATIONS WITH THE IBM PCjr

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Dedication

To Carol, who sees farther and deeper into most things than I do.

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Acknowledgments

Preface

The IBM PCjr microcomputer represents an evolutionary step in the development of the Personal Computer. The PCjr's many capabilities and low cost make it a significant product for use in home, educational, and business applications. The industry growth spurred by its big brothers — the IBM PC, IBM PC-XT, and the new IBM PC-AT — will continue in the lower-priced market through the PCjr.

Although sales of the original PCjr were slow, the upgraded PCjr with 512K expanded memory capability, RAM disk, and a new typewriter style keyboard has eliminated virtually all of the criticisms leveled against the first model. And, to top it all, IBM reduced the price of the 64K Entry PCjr from $699 to $599 and the 128K Enhanced PCjr from $1269 to $999. IBM has also provided several direct mail promotions which offer free software with the purchase of certain PCjr system packages.

For about the same cost as the Apple IIe or Commodore 64, you can purchase a complete 128K expandable memory PC-DOS 16-bit computer that will run almost all of the software packages available for the IBM PC. And, the PCjr supports educational, game, communications, graphics, and home management programs as well.

The PCjr brings a complete, professional-capability computer within the reach of those who could not justify the cost of an IBM PC or compatible, and who were not convinced that an Apple or Commodore could really do everything they might require. In addition, the IBM name on a home computer brings a level of product identification and confidence to a home market that until now was considered by many to consist of only toys and games.

Business users who first scoffed at the PCjr are now seriously considering it for workstation applications with the availability of the new keyboard, additional RAM memory, the PCjr Cluster Attachment for local area networks, the Power Expansion Attachment, third party add-ons, and more sophisticated software such as *Lotus 1-2-3* in cartridge. Such sophisticated business application programs can take advantage of the PCjr's enhanced graphics capabilities as well.

The 1980s are ushering in a new era for America and the world, where value is placed not only on material things, but also on timely and accurate

information. The microcomputer is fast becoming a major tool for reaching the sources of information, storing and manipulating data, and communicating the results to others. Those who would be successful in this new "information age" must have access to the sources of timely and accurate information, and must be able to use it and communicate it to others.

Just a few years ago, sending data over telephone lines was a slow, expensive process requiring specialized knowledge and equipment. Today, a complete PCjr computer system equipped for data communications may be purchased for about the same cost as the remote access computer terminal of the 1970s — a slow Teletype printer and acoustic modem. Today, advanced communications software takes the mystery out of sign-ons and passwords, bits and bytes, codes and protocols, parities and speeds. One no longer needs to be a computer-nik or a Ph.D in computer science to take advantage of this technology — and as mentioned above, you don't have to have the wealth of King Solomon or a government grant to afford it either.

Online services have changed dramatically as well. In just two years the number of online services has nearly doubled, and the number of passwords issued is growing geometrically. Costs have decreased as volume of use has increased and the amount of information and services now available online is truly staggering.

Your PCjr can be the key that opens the door to this expanding world of online information and services. Hopefully, this book will provide an insight into the tip of the information iceberg — a peek at what is available just a phone call away.

David W. Carroll
Volcano, California
October, 1984

Introduction

As the title suggests, this book is a guide to telecommunications for the IBM PCjr personal microcomputer system. It is intended to serve as an introduction to the broad spectrum of data communications and related online computer services available to microcomputer owners today and a guide to how they may be accessed using an IBM PCjr microcomputer system.

The book is divided into two sections: PCjr Data Communications Basics and PCjr Advanced Topics. The first section discusses the reasons for using your PCjr for data communications, the easy steps to get "online" with a PCjr and the IBM Internal Modem, and how to access many of the online services available, as well as an overview of what they offer.

The second section covers the technical concepts required for understanding basic data communications for the IBM PCjr and discusses the software and hardware options available for the PCjr from both IBM and third party vendors, how to use the PCjr to send and receive files and programs, and how to write communications programs for the PCjr.

However, this guide is not intended to serve as a replacement for the *User's Manual* for any particular online service or any hardware or software product. Rather, it provides a complementary overview of each topic with examples of actual applications and use of each service or product. This allows the PCjr owner to review the many different telecommunications services and capabilities available before deciding which is right for his or her needs.

In addition, this book provides application examples and suggestions of the possible uses of data telecommunications for business, home, and education. Specific reference information is included in the appendices, including online services, network access telephone numbers, phone numbers for hundreds of Bulletin Board and file transfer systems throughout the USA and Canada, lists of modems and communications software sources, and other reference resources.

This book is your key to the ever-growing world of online communications with the IBM PCjr. Now, let's get online!

Note: IBM introduced the upgraded components for the PCjr system in August, 1984 because of criticisms that the wireless keyboard on the original

model was unusable for professional typing applications and that more memory and a second disk drive were needed to provide closer compatibility with the full-size IBM PC. Owners of early PCjr models may upgrade their keyboards to the new typewriter-style keyboard unit at no cost. Up to three of the new 128K memory expansion units ($325 each) can be plugged into the side expansion connector with the new Power Expansion Unit ($150) to provide 512K total memory. A RAM disk program is available with the added memory which provides the equivalent of a second disk drive for the PCjr. The PCjr Cluster Attachment is also available to tie in PCjrs to a local area network with other IBM PCs and an IBM PC-XT as disk server. Both Entry and Enhanced PCjr computer systems may be used with the information in this book.

PCjr Data Communications Basics

Why Communicate?

The first question a potential or new PCjr owner might ask upon seeing this book is "Why communicate?" After all, the PCjr will type letters, manage lists, play games, teach math, make music, draw pictures, keep track of budgets, balance checkbooks, and do all the other things personal computers are good at. Why add communications to the list?

Well, the key to many types of success is access to timely information. And information is without value until it is communicated. You can communicate by voice (in person or over the phone), in writing (by hand, typewriter, or word processor), or by computer (by data communications).

Using your PCjr for transferring data to or from other computer-based systems can increase both the efficiency and effectiveness of an individual or a business user. Errors can be decreased or eliminated entirely by transferring information directly between the PCjr and mainframe computers, the PCjr and typesetters, the PCjr and word processors, the PCjr and other personal computers, and between PCjrs, rather than reentering or retyping data to transfer it from one system to another.

In addition, the PCjr can function as a data communications terminal, allowing you to access any of the dozens of electronic mail services, hundreds of online database services, and thousands of bulletin boards and message systems available with just a phone call. Electronic mail services allow you to send postal and electronic letters, telegrams, cables, telexes, TWXs, and transfer data to others around the world without leaving your home or office. The database systems can provide information of almost any type in just a few seconds. From coffee futures to thoroughbred horse bloodlines, restaurant guides to airline schedules, home banking to home shopping, the list goes on and on. The bulletin board and message systems transfer technical and special interest information between users in much the same way as a community or school bulletin board does. Message systems provide limited electronic mail services and allow people with similar interests to meet each other electronically. And best of all, this is NOT a science fiction book — these services are all available online now!

First, let's look at some example applications of using the PCjr to access some online services.

Personal Applications

There are many reasons to go online with your PCjr. The most important applications for many individuals provide personal fulfillment or enjoyment. If enjoyment sounds like "fun," you're right! Of course, you can have fun online. Not just by playing games, but by communicating with others who have interests similar to yours in your local area and throughout the country.

The range of personal online services available is almost unbelievable. Electronic publishing provides interactive magazines and advertisements, news "hot off the wire," newsletters, and stock market information from the Big Board, to name just a few services.
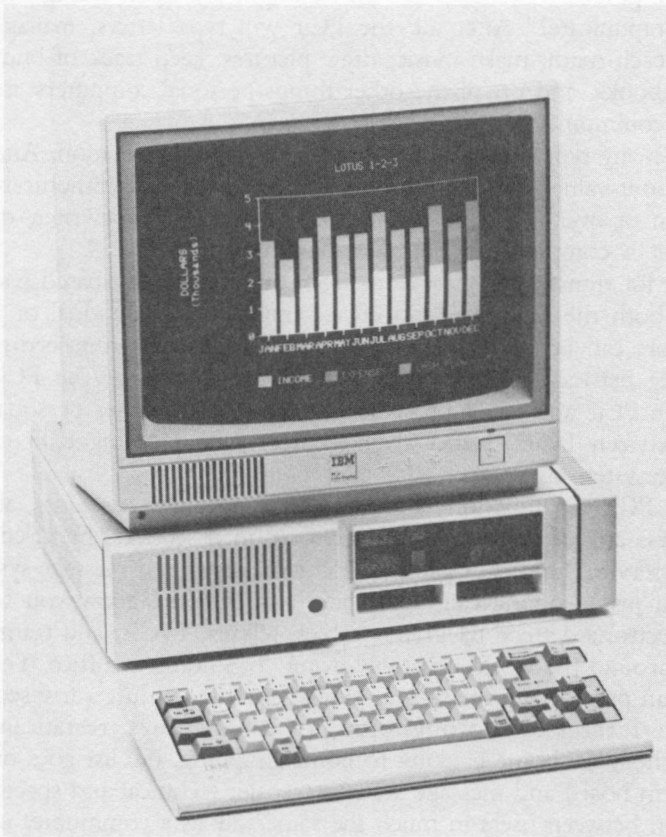
FIGURE 1.1   IBM PCjr System with Typewriter Style Keyboard and PCjr Color Monitor. (Photo courtesy IBM Corporation.)

Electronic services include online travel agents, airline schedules, restaurant guides, calendars of events, discount shopping services, electronic mail, home banking, investment management, employment services, and on and on.

The interactive nature of computer communications allows "online discussions" or teleconferencing through services like CompuServe's CB (the computer equivalent of the partyline conversations on Citizens Band Radio or CB) and the Source's Participate.

Special Interest Groups (SIGs) which allow exchange of information and resources among interested members are available on both CompuServe and the Source as well as on hundreds of free local message systems and bulletin boards around the country. Topics range from the nuclear freeze, to user groups for a particular brand of computer, to gardening and cooking, to graphics, writers, and so on.

For many, however, the games and educational programs are reason enough to subscribe to an online service and pay $5 or $6 per hour online. CompuServe leads in the game area with its selection of interactive multi-player games. MegaWars is the best known, but other space and war game simulations are also available. Both CompuServe and the Source offer a number of teaching and drilling educational programs for subjects from math to foreign language grammar.

Now, let's look at some personal and business applications of the PCjr for data communications.

FIGURE 1.2   IBM PCjr System for the Kids. (Photo courtesy IBM Corporation.)

Typical Personal Applications

These are just a few examples of how you can use your PCjr for personal data communications applications:

Ed is an investor who manages his own stock portfolio and makes his own investment decisions. Ed uses his PCjr to connect to Dow Jones News/Retrieval's online current and historical stock data files to keep track of his

stocks and to analyze the performance of companies he may be interested in investing in. Ed also monitors the daily performance of his stocks by periodically connecting to DJN/R for the current ticker report on just his stocks.

Sue needs to manage her banking business on a regular basis, but she has a heavy work schedule and has trouble getting in to her branch office to take care of her transactions — handling funds transfers between accounts and monitoring interest and account balances. So, Sue uses her PCjr to access Bank of America's computer through its HomeBanking service. Home-Banking allows her to transact all her bank business and even to send electronic mail to her account representative at the bank 22 hours a day, 7 days a week.

Frank's son Billy is having a little trouble with his French grammar, so Frank sits him down with the PCjr, connects to the Source's Education section, and selects French Drills on vocabulary, verbs, and pronunciation. After a few of these drills, Billy's grades begin to improve, as does his typing.

After a hard week at work, Don decides to use his PCjr to play a couple of hours of CompuServe's MegaWars to relax and concentrate on something other than business. Then Don accesses the online restaurant guide for his home town to plan his next evening on the town.

Jane is concerned by her elected Senator's position on critical subjects before the Congress, so she uses her PCjr to send a special "political opinion" telegram to the Senator via Western Union's EasyLink service, and while she's at it, to the President and her Representative in the House.

John and Joan are trying to decide which of three new movies released recently to take the kids to tonight. To solve the problem, they use their PCjr to call the Source and look up the current online movie reviews and ratings.

Frank is considering looking for a new job. He uses his PCjr to call a local number for CLEO's online job service and places his resume information on file. In a few days, Frank has several interviews scheduled.

It's Chris's sister's birthday tomorrow, and Chris forgot to get her a card. Chris calls MCI Mail with her PCjr and sends a personal birthday greeting/letter for delivery to her sister across the country in the morning mail.

Jim is looking for a particular program for his PCjr to create sounds for a game he is writing. Jim contacts a few local IBM PC bulletin boards and finds just the routine he needed. He downloads the program to his PCjr and then gets back to work.

Business Communications

Business data communications applications are more familiar and perhaps more obvious than personal applications, but both can be profitable to the PCjr user. Most people are aware of the masses of business data that are sent across the country every day by computers. However, the image many have is that only large data processing centers with huge mainframe computers take

advantage of data communications. A few years ago, this was true — only large installations could afford the equipment and software to communicate.

Today, the advantages of data communications are within the reach of even the smallest business. The costs for equipment and software are now lower than ever. Data networks enable the error-free transfer of masses of data across the country for only a few dollars an hour. Portable terminals and computers have opened up transfer of data from the field or a customer's office. New work-at-home telecommuting jobs require a communications hookup to "send in" the day's work. More recently, many executives, managers, and other businesspeople are taking projects home to work on and are "hooking up" to the office PC or mainframe computer.

With the announcement of IBM's PC Cluster Network, several PCjrs can be interconnected with other IBM PCs to a "master" IBM PC-XT. The PCs and PCjrs in the Cluster can still act as independent computers as well as share files with the other systems.

Typical Business Applications

Jack is an executive preparing a report on the impact of the AT&T reorganization on his company. He is working at home evenings to complete the report. After dinner, he turns on his PCjr and accesses Dow Jones News/Retrieval Service to search the full text of the Wall Street Journal for the history of the AT&T break-up. He also calls NewsNet to look up articles in several newsletters discussing the direct effects of the break-up. Jack captures this data on his PCjr disk and uses a word processor to include it in his report. Access to these databases has saved Jack hours (perhaps days) of research and hundreds of dollars of newsletter subscription fees. (By using the databases at night, he saved an additional 30 to 70 percent in costs.) Jack's report is accurate and timely. In addition, he can take his finished data disk to work and print or modify it on his company's IBM PC.

Julie is an executive who travels and likes to make her own reservations. Rather than spend hours trying to make sense of the constantly changing airline schedules, she accesses the online OAG (Official Airline Guide) with her PCjr to plan her trip and then places her ticket orders with an online travel agency.

Nick is an independent market researcher working at home. He is preparing a report on the videodisc market. First, he researches the subject by connecting to several Dialog databases with his PCjr, then follows up with telephone interviews of the subject companies. He completes his report on the PCjr with a word processor program, checks it with spelling and grammar checkers, and transmits it by modem over the telephone directly to his client's word processing system, thus saving retyping and errors. Nick's project is completed in weeks instead of months and the information is current and correct.

FIGURE 1.3   IBM PCjr System in the Office. (Photo courtesy IBM Corporation.)

Bill's office has been considering purchasing additional computers to use with their IBM PC-XT system, but the cost has been too high for the budget. They decide to buy several PCjrs with memory expansion and the IBM PCjr Cluster Attachment. By adding the Cluster adapter and software to their PC-XT, they have an inexpensive multiuser network and hard disk server.

Data Banks

Data banks, also called online databases, cause many people to think of the "giant electronic brains" from the science fiction movies of the 1950s and 1960s. In some ways this picture is a true one, while in others it is not. True, these services use huge computer systems with vast storage banks of raw information. True, the information is available at the fingertips of the skilled user within a few seconds. But, even though these computers may have more reference data available than most public libraries, they cannot "think" for themselves. Their worth depends on individuals like us to access, evaluate, and use the data stored in the system.

Online database services began in the early 1960s with several projects to automate the sorting and printing of the periodical indexes of technical journals and magazines. First, the computer service bureaus offered "batch searching" for bibliographic references. This meant sending in a paper "hard copy" search request and receiving an answer in a week or two. Then came "Selective Dissemination of Information" or SDI services, where the researcher's search was run automatically every time the database was updated. Finally, Lockheed Missiles and Space Company and Systems Development Corpora-

tion each received government contracts to develop online retrieval systems. In 1972, Lockheed went commercial with five files online and SDC began its Orbit service with two files online.

Later generations of these systems are seen today in the much more sophisticated Dialog Information System (Lockheed), SDC Orbit (SDC), National Library of Medicine's MEDLARS II (SDC), and NASA's RECON service (Lockheed). Online database services today offer hundreds of files on various topics with millions of online records of information. The major commercial services are Lockheed's Dialog, Bibliographic Retrieval Service (BRS), and SDC Search. Dialog and BRS have each offered a low-cost "off-hours" service since early 1983. Dialog's Knowledge Index offers nearly 30 of the most popular databases at a flat rate of $24.00 per hour, including communications network costs and is available evenings, holidays, and weekends. BRS/After Dark is a similar service with charges ranging from $6.00 to $20.00 per hour and over 50 online databases.

Data Transfer

Data transfer between microcomputers has become more popular as the price of reliable modems and communications software has decreased and the microcomputer has become almost as common as the typewriter. Both personal and business uses for data transfer abound.

On the personal side, letters, programs, hints, tips, fixes, mailing lists, "online magazines," and data files of recipes, checking and tax information, stock data, and many other types of data are exchanged every day over regular phone lines by users of microcomputers like the PCjr.

In business, applications for data transfer are even more numerous. Sales orders, contact and customer lists, expense reports, sales reports, financial data, payroll information, inventory counts, purchasing requirements, engineering data, computer programs, memos, staff reports, typesetting files, mailing lists, spreadsheets, graphics, word processing files, pricing updates — in fact, just about every phase of business — can benefit from fast, accurate data transfer via microcomputer data communications.

Electronic Mail

Electronic mail has been around in one form or another for over a hundred years — since the telegraph first spanned the continent. Today, electronic mail services allow PCjr users to send and receive letters and other documents almost anywhere in the world in a few seconds without leaving the office or home.

Postal letters, telegrams, cables, mailgrams, E-COM letters, online "instant" EMAIL, and TWX and Telex messages can be sent and received at very low cost just by accessing an Email service with the PCjr. Services are offered by

Western Union Easylink, MCI Mail, RCA Globalcom, ITT Worldcom, GTE Telenet, Tymnet, GE Information Service, and Computer Corporation of America, just to name a few.

Online Services

Online services are also known as information utilities, because they provide many different computer services to the public. Many companies have offered computer services on a shared, as-needed basis since the 1960s, but only during the past five years have marketing efforts been directed at the general public. The dramatic growth in the home and office use of home, personal, and desktop microcomputers has opened a new market for online services.
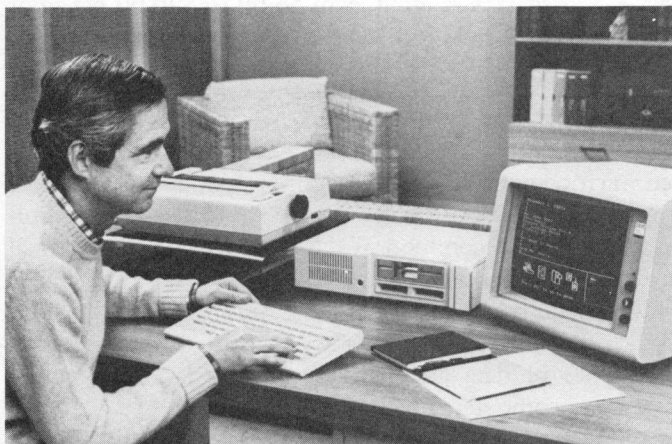
FIGURE 1.4   IBM PCjr System in Office at Home. (Photo courtesy IBM Corporation.)

Before the large base of installed microcomputers existed, online service subscribers had to rent, lease, or buy a data terminal and modem, often at prices that rival the cost of complete computer systems like the PCjr today. Most users of these "timeshared" remote computers were larger businesses who needed backup for their own computers or access to specialized accounting or engineering programs.

Today, services like the Source, CompuServe, and Dow Jones News/ Retrieval provide value-added products as well as the more conventional timeshared computer time.

TIMESHARING

Timesharing of computer resources is the most efficient way to take full advantage of the capabilities of today's powerful mainframe computers. A timeshared user is allocated a segment of the computer's memory and his

"program" is allowed to have the computer's attention for a few micro-seconds, then the next user's, then the next, and so on until the first user's program again has control. This rotating of control may seem awkward, but the mainframe computer operates so quickly that each user appears to have full use of the system. Most of the time, the computer's responses are much faster than the human user's perception anyway. However, if the timeshared computer is also running "batch" programs or has a very large number of users attached, delays in response can become noticeable.

All of the major online services operate in a timeshared mode. If they didn't, the connect charges would be so expensive that no one could afford to use the service.

When someone speaks of using a timesharing computer, they usually mean that they are running a program written in some high-level computer lan-guage on a remote mainframe system, or they may be developing a program in BASIC or some other language on the remote system. The Source and CompuServe allow users to write programs in various languages and then run them on the system.

On the other hand, some online services are transparent to the user — in other words, the user doesn't see that he is running a program, he just inter-acts with the menus and prompts. Systems like Dialog, SDC, BRS, MCI, and Dow Jones work this way. The "front end" or the first messages the user en-counters on the Source and CompuServe also operate this way, but the user can "break out" of the menu system and work with the timeshare computer directly.

Information utilities offer many data-oriented services to the business and individual user. These services have been discussed briefly above, but we will go into a little more detail in the next sections.

TRAVEL

Planning a trip to Tahiti? Travel services are a natural for the information util-ity. First, schedules are changing all the time, and it is difficult for printed guides to stay accurate. Second, most reservation systems are now computer based. Today, the OAG or Official Airline Guide is available online from sev-eral sources. To make reservations there are now several online travel agents, and CompuServe users can now "hook in" directly to the airline reservation computers via TWA.

NEWS & WEATHER

Want to find the ski report for Utah? And you live in Flagstaff? Simple, just call an online news service. Current news and weather forecasts are available from Dow Jones, CompuServe, the Source, and several others like Western Union's FYI service. These services vary from WU's FYI which simply con-nects the user's terminal to a newswire service like Associated Press Interna-

tional to Dow Jones with a staff of editors for online news. Several newspapers are available online, including the *Washington Post, The New York Times*, and the *Wall Street Journal*. Dialog offers a database made up of the complete AP newswire output for the past 30 days.

Weather reports, ski reports, forecasts, etc., come from the U.S. Weather Service weather wire service. Aviation weather information and flight plan filing are also available from some services.

FINANCIAL INFORMATION

Looking for the price of AT&T stock in June 1968? Easy — hook up to an online financial service. Available online financial information includes both current stock market and money market quotes as well as commodities, gold and silver, and almost anything else of interest to the investor. In addition, historical stock performance data, annual reports, and SEC 10K reports are available from Dow Jones, CompuServe, and the Source. Databases like Disclosure II and DUNS Million Dollar Directory offer in-depth information about U.S. corporations.

BANKING

Want to find out your bank balance at 7 p.m. on Saturday night? Just call your bank's computer and ask! A relatively new area of online services is online banking. Information utilities like CompuServe have offered various forms of online banking for a couple of years. However, the banks themselves are getting into the picture. Chemical Bank of New York is now offering its Pronto online service and Bank of America in California is offering its HomeBanking service. Both services allow access to account information regarding balances, activity, and interest due, and also provide for transferring funds between accounts. Both also allow online bill payment for several hundred local department stores, utilities, oil companies, and other merchants. Check with your local area banks to see what they are planning or offering now.

SHOPPING

Shopping online? Sure! Got a yen to buy a stereo at midnight? Just call an online discount shopping service. These services have been very successful on CompuServe and the Source. They allow members to browse through a catalog or to "fill out" an online questionnaire about their product needs and budget and have the service offer possible selections.

These online "shopping malls" have become even more popular with increased automobile and gas costs. Most offer credit card or C.O.D. billing options.

EMPLOYMENT

Looking for a job? Dialog, CLEO, CompuServe, and the Source all offer on-line employment/resume services for both employers and prospective employees. These services offer confidential access to protect the employee from the possibility of his current employer finding his resume online.

Moving On to Online

Now, let's move on to the next chapter where we'll look at how easy it is to use the PCjr as a terminal to access these online services.

Using the PCjr as a Terminal

Now that you have an idea of what's available online, I'm sure you want to set up your PCjr and start communicating right away. The PCjr may be used as a simple terminal or as an advanced communication system, depending on the hardware and software packages you choose to purchase. In any case, the PCjr can serve to open up the world of online communications for you, so let's get started.

What's Needed

The basic requirements for a data communications terminal are as follows:

   a. User Output device (video display or printer)
   b. User Input device (keyboard)
   c. Terminal features (communications program)
   d. Serial data input/output (serial communications port)
   e. Telephone Interface (modem)
   f. Optional Offline Storage (disk drive)
   g. Optional printer and interface

The PCjr can meet all of these requirements with ease. As we will see, the output device is the PCjr video display, the input device is the PCjr keyboard, the terminal features are provided by one of several communications programs, the serial data input/output is built in to the PCjr system's unit, the telephone interface is either the PCjr Internal Modem or an external modem, and the Enhanced PCjr includes a floppy disk drive for offline storage.

ENTRY PCjr

The simplest PCjr package is the Entry level system. It includes 64K bytes of on-board memory, the Intel 8088 16-bit microprocessor, Cassette BASIC in on-board ROM, the sound generator and audio port, one serial port, two game (joystick) ports, two ROM cartridge slots, 40-column video capability, light pen port, cassette tape port, 33-watt power unit, and the new type-writer-style IBM PCjr wireless keyboard. The Entry level system sells for $599.00 at IBM Product Centers. In addition, you will need four AA batter-

ies for the wireless keyboard and a video cable for your display. The IBM Connector for TV ($30.00) enables you to connect the 40-column output of the Entry PCjr to your B&W or color television set. If you wish to store and load BASIC programs, you will also need a good-quality cassette tape recorder and an IBM Adapter Cable for Cassette ($30.00).

FIGURE 2.1   IBM PCjr System with Original Keyboard. (Photo courtesy IBM Corporation.)

Although the Entry PCjr may be used with the Cartridge BASIC program "TERM" and the Internal Modem as a "dumb" terminal to access online services, its communications capabilities are limited by memory size, display capability, and lack of a floppy disk drive. To answer these problems, IBM also offers the Enhanced PCjr system.

ENHANCED PCjr

If you wish to use the PCjr for any serious online communications, other than as a simple "dumb" terminal, you should purchase the Enhanced model, which includes a floppy disk drive and controller card, and a 64K byte internal memory and 80-column display expansion card in addition to all of the Entry level system features above. The Enhanced model allows you to use advanced diskette-based communications software, send and receive files, and emulate a standard terminal (80 columns by 24 lines). The Enhanced PCjr with 128K memory retails for $999.00 at IBM Product Centers. Adding one external memory expansion module brings the price up to $1324.00 for a 256K Enhanced PCjr.

VIDEO MONITOR

To make use of the 80-column display capability, you must also purchase either a monochrome (black and white or black and green) video display or a color video display (not a TV set!) and cable. A television set cannot clearly

display 80 columns of text on a line, but a video monitor can. Your eyes will appreciate the difference. Although the PCjr will work in 40-column mode with a standard television set, many online services work best with an 80-column display and some, like CompuServe's EIS, require it. A good monochrome monitor will cost between $100 and $300 plus $5.00 to $30.00 for the composite video interface cable.

KEYBOARD CABLE

For reliable data communications, I recommend using the PCjr keyboard cable ($25) rather than the infrared link to hook the keyboard to the PCjr. With the keyboard cable, you don't have to worry about missing a character by moving the keyboard accidentally or the batteries running down in the middle of an online session.

MODEM

To connect your PCjr to the telephone line for data communications, you also need a data modem. A modem is an interface between your PCjr and the telephone line, which allows your PCjr to send and receive data over the phone line. The modem may also include advanced features like multiple data speeds, unattended operation, auto answer and originate, auto dial of telephone numbers, tone dialing, and a speaker for call progress monitoring (busy, ringing, wrong number).

FIGURE 2.2 US Robotics Password Modem.

Common data speeds include 110 baud or 10 characters per second (CPS), 300 baud or 30 cps, and 1200 baud or 120 cps. Most 1200-baud (Bell 212A) compatible modems also support 110-300 baud data speeds.

You may choose the 300-baud IBM Internal Modem card, a third party internal modem, or an external modem. Microcom makes the ERA-2 package

for the PCjr, an internal 300/1200 baud modem with software included. Popular external modems include the Hayes Smartmodem 300 and the Hayes Smartmodem 1200, Novation SmartCat 300/1200, U.S. Robotics Password, and others. External modems require the IBM Serial Device adapter cable ($25) and a male to female "DB-25 type RS-232" cable (about $25) as well. If you are not sure which modem best fits your needs, and your dealer can't help you to determine which is best for you, read the rest of this book (particularly Section II) before buying. The IBM Internal Modem costs $199 and the Microcom ERA-2 for PCjr costs $499, while external modems may range from $80 to $600 depending on data transmission speed and other features.

SOFTWARE

Finally, you need communications software. Software is a computer program containing instructions for your PCjr about how to communicate through the modem over the telephone line with other computers. The beginner may choose to use the TERM program included with the IBM PCjr Cartridge BASIC ($75), or he may choose to purchase the IBM *Personal Communications Manager* program ($100) which requires the Enhanced PCjr with a floppy disk drive. Other disk-based software will also require the purchase of IBM PC-DOS 2.1 ($65). Other third-party communications programs are discussed in Section II and range in cost from $25 for "Freeware" like *PC-TALK III* to $195 for advanced commercial programs like *Crosstalk XVI* version 3.5.

PCjr Keyboard

The PCjr keyboard is perhaps the most important interface point between the user and the computer system. In applications like communications, where heavy user interaction is required, the keyboard becomes the focal point of the user interface. In this section we will discuss the keyboard layout and important keys referred to in this book.

ORIGINAL VS. IMPROVED KEYBOARD

The original PCjr keyboard was a major source of criticism of the PCjr product as a whole. It was designed with small rectangular keys (called chicklets) mounted over rubber dome-type contacts. It was difficult for anyone to type with any speed or confidence on this keyboard and the keyboard limitations seriously curtailed the uses for the PCjr.

In August 1984, IBM displayed its commitment to the PCjr when it released a host of improvements and additions to the PCjr product line, including a replacement keyboard for the PCjr. The new 62-key keyboard is the same size, shape, and layout as the original, and uses the same cable interface
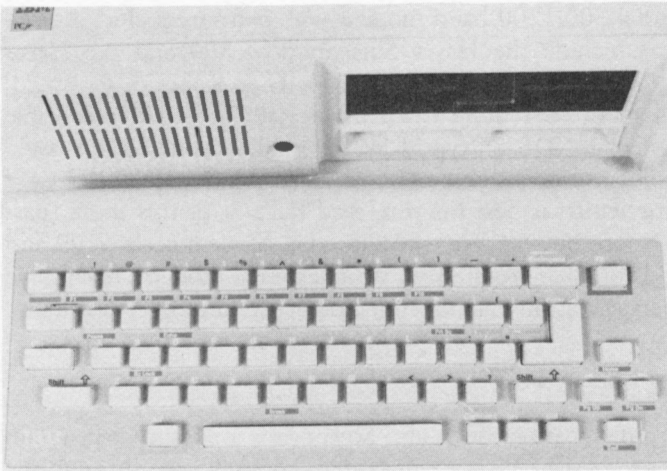
FIGURE 2.3   IBM PCjr Original "Chicklet" Keyboard.

and wireless infrared link as the original. However, the improved keyboard has individually contoured, full-travel keys with a familiar and comfortable typewriter-like layout, appearance and touch. The only major difference between the two keyboards (besides the change in key style and touch) is that the new keyboard will not be able to use the punched mylar keyboard overlays designed for the original keyboard.

FIGURE 2.4   IBM PCjr New Typewriter Style Keyboard. (Photo courtesy IBM Corporation.)

KEYBOARD LAYOUT

The PCjr keyboard has 62 keys compared to 53 keys on a standard IBM Selectric typewriter and 83 keys on the IBM PC keyboard. The PCjr keyboard supports all the normal keyboard functions familiar to those who have used an electric typewriter except tab set/release, margin release, and shift lock. Shift lock is replaced on most computer terminals by the CAPS LOCK function, which only locks the alphabetic characters in upper case. Also, both shift keys' function is reversed when CAPS LOCK is on — shifting alphabetic keys produces lower case characters.
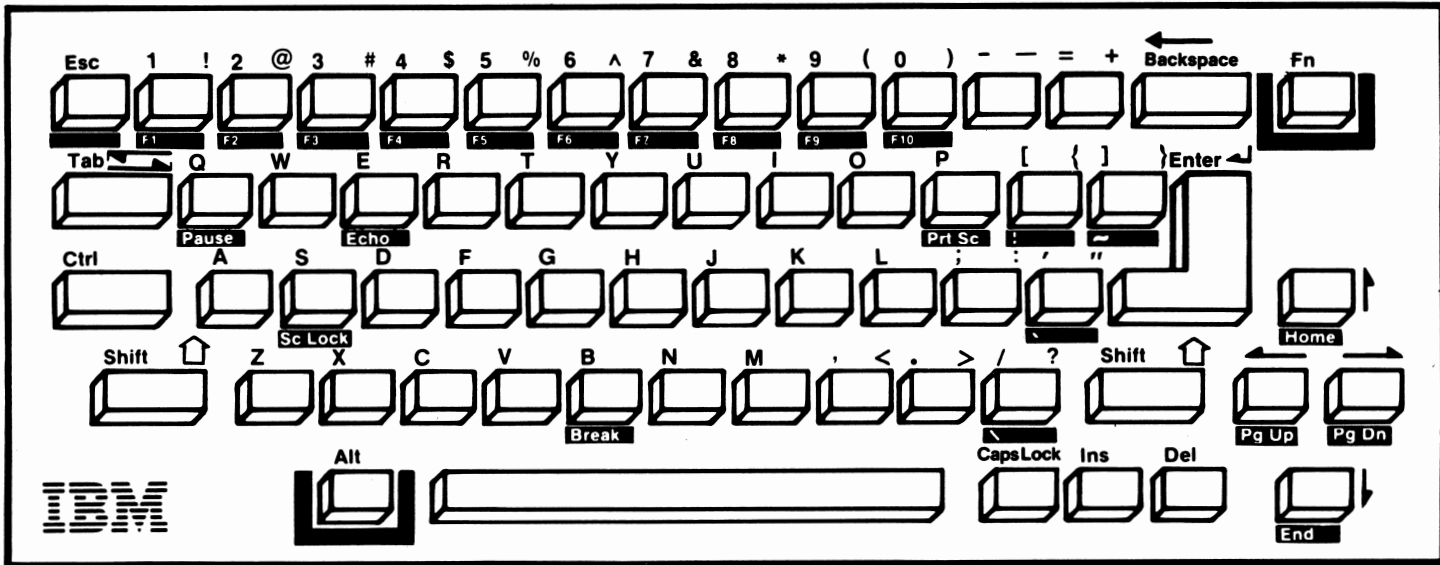
FIGURE 2.5   PCjr Keyboard Layout. (Reprinted courtesy of IBM Corporation.)

The intelligent PCjr keyboard can produce all of the outputs available on the larger IBM PC keyboard through the use of multifunction keys. This is done by using special "shift" keys to change the meaning of other keys on the keyboard. Most computer keyboards (including the PCjr's) have a "Control" key (marked CTRL or CONTROL) which enables the keyboard to produce special, non-printing ASCII characters which have special meaning to the computer.

The IBM PC keyboard has a special "shift" key called the ALT (or alternate) key. This allows all of the keys on the keyboard to take on a special meaning when depressed at the same time as the ALT key. ALT characters are often used to control the operation of a program that handles text input (like a communication program). Pressing the ALT key with another key does not output an ASCII character to the program — rather it sends a special signal which the program can detect easily.

The PCjr keyboard also has an ALT key, but it functions as a normal shift key as well as a special shift key. The ALT key is used as a shift to generate four special characters — "|", "\", "~", and "`" not used on a typewriter keyboard. Keys that can be character shifted with the ALT key are marked in blue on the keyboard. They are:

ALT SHIFTED CHARACTERS

KEY	ALT SHIFTED CHARACTER
[		
]	~
'	`
/	\

The PCjr keyboard has one more special "shift" key not found on other computers — the "Fn" or Function key. The Fn key shifts 19 of the PCjr keys (marked in green) to perform special hardware or software-related functions. Ten of these keys are the number keys 1 through 0, which become function keys F1 through F10 when pressed with the Fn key. The other 9 keys are translated as follows:

"FN" SHIFTED FUNCTIONS

KEY	"Fn" SHIFTED FUNCTION
Q	Pause
E	Echo
P	Print Screen
S	Screen Lock
B	Break
Up Arrow	Home
Down Arrow	End
Left Arrow	Page Up
Right Arrow	Page Down

These special "shift" keys allow the PCjr keyboard to duplicate all of the IBM PC keyboard's functions and outputs with 21 fewer keys. The IBM PC has 10 dedicated function keys and a 15-key numeric/cursor control pad (of which 6 cursor keys are duplicated on the PCjr).

ASCII value	Character	Control character	ASCII value	Character
000	(null)	NUL	034	''
001	☺	SOH	035	#
002	●	STX	036	$
003	♥	ETX	037	%
004	♦	EOT	038	&
005	♣	ENQ	039	'
006	♠	ACK	040	(
007	(beep)	BEL	041	)
008	▪	BS	042	*
009	(tab)	HT	043	+
010	(line feed)	LF	044	,
011	(home)	VT	045	-
012	(form feed)	FF	046	.
013	(carriage return)	CR	047	/
014	♫	SO	048	0
015	☼	SI	049	1
016	►	DLE	050	2
017	◄	DC1	051	3
018	↕	DC2	052	4
019	‼	DC3	053	5
020	¶	DC4	054	6
021	§	NAK	055	7
022	▬	SYN	056	8
023	↨	ETB	057	9
024	↑	CAN	058	:
025	↓	EM	059	;
026	→	SUB	060	<
027	←	ESC	061	=
028	(cursor right)	FS	062	>
029	(cursor left)	GS	063	?
030	(cursor up)	RS	064	@
031	(cursor down)	US	065	A
032	(space)		066	B
033	!		067	C

FIGURE 2.6   ASCII Character Screen Codes. (Reprinted courtesy of IBM Corporation.)

ASCII value	Character	ASCII value	Character	ASCII value	Character
068	D	107	k	146	Æ
069	E	108	l	147	ô
070	F	109	m	148	ö
071	G	110	n	149	ò
072	H	111	o	150	û
073	I	112	p	151	ù
074	J	113	q	152	ÿ
075	K	114	r	153	Ö
076	L	115	s	154	Ü
077	M	116	t	155	¢
078	N	117	u	156	£
079	O	118	v	157	¥
080	P	119	w	158	Pt
081	Q	120	x	159	ƒ
082	R	121	y	160	á
083	S	122	z	161	í
084	T	123	{	162	ó
085	U	124	¦	163	ú
086	V	125	}	164	ñ
087	W	126	~	165	Ñ
088	X	127	⌂	166	ª
089	Y	128	Ç	167	º
090	Z	129	ü	168	¿
091	[	130	é	169	⌐
092	\	131	â	170	¬
093	]	132	ä	171	½
094	∧	133	à	172	¼
095	—	134	å	173	¡
096	`	135	ç	174	«
097	a	136	ê	175	»
098	b	137	ë	176	░
099	c	138	è	177	▒
100	d	139	ï	178	▓
101	e	140	î	179	│
102	f	141	ì	180	┤
103	g	142	Ä	181	╡
104	h	143	Å	182	╢
105	i	144	É	183	╖
106	j	145	æ	184	╕

FIGURE 2.6 (Continued)

ASCII value	Character	ASCII value	Character	ASCII value	Character
185	╣	209	╤	233	Θ
186	║	210	╥	234	Ω
187	╗	211	╙	235	δ
188	╝	212	╘	236	∞
189	╜	213	╒	237	∅
190	╛	214	╓	238	∈
191	┐	215	╫	239	∩
192	└	216	╪	240	≡
193	┴	217	┘	241	±
194	┬	218	┌	242	≥
195	├	219	█	243	≤
196	─	220	▄	244	⌠
197	┼	221	▌	245	⌡
198	╞	222	▐	246	÷
199	╟	223	▀	247	≈
200	╚	224	α	248	°
201	╔	225	β	249	•
202	╩	226	Γ	250	•
203	╦	227	π	251	√
204	╠	228	Σ	252	ⁿ
205	═	229	σ	253	²
206	╬	230	µ	254	■
207	╧	231	τ	255	(blank 'FF')
208	╨	232	Φ		

FIGURE 2.6 (Continued)

KEYSTROKE NOTATION

Because of the multiple key combinations sometimes required to generate a specific signal on the PCjr keyboard, a simple form of keystroke notation will be adopted in this book. Any time a special "shifted" or multiple key input is needed, it will be shown in right and left arrow brackets — "<" and ">". For example, to reset the PCjr, you must type

<Ctrl-Alt-Del>

This means depress the Ctrl, Alt, and Del keys at the same time, or if you are using a shifted key combination, depress the special shift key first. For example, type

<Alt-C>

means depress the Alt key and hold it, then the letter C key, then release both

keys. Similarly, type

   <Ctrl-C>

means depress the Ctrl key and hold it, then the letter C key, then release both keys. Type

   <Enter>

means press the Enter key (also called input, return, or carriage return on some keyboards).

All user input in online dialogs will be highlighted in boldface type for clarity.

This should clear up any questions on the keyboard input instructions in the book, but there will be a brief refresher in Chapter 2 to serve as a reminder.

Basic PCjr Setup

If you are familiar with your PCjr and are comfortable using it, you may wish to skip the Basic Setup section and move right on to the next section — Registering Your Modem.

In this section we will assume you are setting up an Enhanced PCjr with an 80-column composite video monitor.
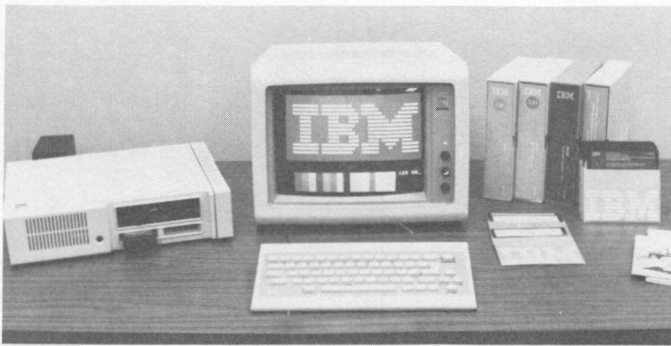
FIGURE 2.7   IBM PCjr System.

If you haven't already done so, the first step is to carefully unpack your new PCjr. Be sure to save all packing materials and pink plastic antistatic bags, in case you need to ship your system in the future. Your Enhanced PCjr Computer package will contain the new typewriter-style cordless keyboard; the PCjr with 128K RAM, 80-column display capability, and one floppy disk drive; the power transformer; the *Guide to Operations* manual; the "Exploring Your PCjr" diskette; and the *Hands-On BASIC* manual.

To use the keyboard, you'll need four AA batteries for the infrared cordless link or the PCjr keyboard cable. You will also need the PCjr Connector for

TV and a standard television set, the IBM Color Monitor and PCjr Adapter Cable, the IBM PCjr Color Monitor, or a composite video monitor and cable.

IBM warns that the IBM PC Color Monitor should not be placed on top of the Enhanced PCjr System Unit because of possible interference with the operation of the floppy disk drive. This is apparently not a problem when the IBM PCjr Color Monitor is used. Check with your dealer for possible problems with other types of monitors.

Pick an indirectly lighted location with a clear table area to set up your system. It should be near a wall outlet and your telephone wall jack if possible. To reduce fatigue, sit in a comfortable, straight-backed chair while using your system. The best table height for typing is about 27 inches from the floor, allowing the legs and arms to extend at right angles from the body.

If you use the PCjr casually (i.e., in an armchair, on a coffee table, etc.) you can expect to make more mistakes in your typing and get tired much quicker. If the display is too far away, or too close you may also experience eyestrain. Do not use the system in a dark room or in direct sunlight or you may also find that your eyes tire quickly.

The next step is to set up your system. Be sure to remove the cardboard shipping insert from the disk drive on the Enhanced model. Connect the power unit to the connector on the right end of the back panel on the PCjr, connect the video monitor to the proper jack on the rear panel, then plug the monitor into the AC wall outlet and turn it on. Connect the keyboard cable to the keyboard and the "K" connector on the PCjr rear panel (or install the batteries if you are using the keyboard in the wireless mode). Plug in the power unit to the AC wall outlet. Turn on the power switch and you should see the IBM logo and a shaded or colored bar at the bottom of the screen.
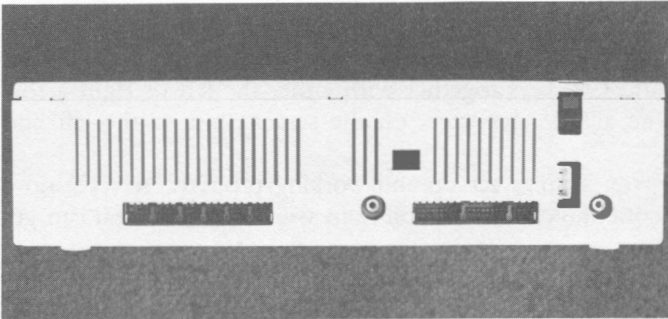
FIGURE 2.8   IBM PCjr rear view.

The display will remain on the screen for about 10 seconds and the number in the lower right-hand corner will change from 004 KB to 064 KB to 128 KB (for the Enhanced PCjr) as the self-test program progresses. If all is well, the screen will clear and the disk drive light and motor will come on. After another 10 seconds or so, the drive will stop and the screen will display:

The IBM Personal Computer Basic
Version C1.20 Copyright IBM Corp 1981
62940 Bytes free
Ok

The Version C indicates that the system is now running IBM Cassette BASIC from its internal ROM memory. The bottom of the screen will display the current commands assigned to the Function keys:

1 LIST 2 RUN ← 3 LOAD" 4 SAVE" 5 CONT ←

The screen is automatically set to 40-column mode on power-up, no matter what monitor you have installed on your system. Thus, only the first five Function key assignments are shown. If the words are fuzzy or not clear (or nothing is displayed) adjust the brightness and contrast controls on your monitor. Also, check that the monitor cable is plugged into the PCjr correctly (to the "V" plug, not the "A" plug if you are using a composite video monitor).

Now, assuming all went well, type

WIDTH 80

to change the width of the screen display to 80 columns. The screen should clear and the characters should be about half their previous size. Now you will see:

Ok

at the top of the screen and:

1LIST 2RUN ← 3LOAD" 4SAVE" 5CONT ← 6,LPT1 7TRON ← 8TROFF ← 9KEY 10SCREEN

at the bottom.

You can easily center the screen display on your video monitor or TV set by pressing the Alt and Ctrl keys together with either the left or right arrow key. Try this and note all the characters on the screen shift to the left and right.

Well, it looks like your PCjr is set up and working properly, so let's move on to installing the communications capability in your system so you can get online.

Registering your Modem

Current Federal Communications Commission regulations require that you notify your telephone company before connecting any customer-owned equipment to the telephone line. Today's modems are registered by their manufacturers for direct connection to the phone lines with the FCC.

Direct connect modems may not be connected to a party line or a pay telephone.

You should call your local business office and advise them you are connecting a modem to your telephone line. They will need to know:

a. Your telephone number;
b. The FCC registration number on the modem;
c. The ringer equivalence; and
d. The telephone line interface type (USOC RJ11C and RJ11W). Note: If you are connecting to a business telephone system, another type of interface may be required.

The required information will be found in the user manual accompanying your modem and (often) on a label attached to the modem itself. For the IBM PCjr Internal Modem it is located on page 3 of the installation and operating instructions.

Installing the Internal Modem

Installing the IBM PCjr Internal Modem is quite easy. Follow the directions included with it which are summarized here.

> FIRST — TURN OFF THE POWER TO YOUR PCjr AND ALL ATTACHED OPTIONAL EQUIPMENT AND REMOVE ALL AC POWER PLUGS FROM WALL OUTLETS!!!! Working on the inside of the PCjr with the power on could damage the equipment or expose you to serious shock hazards. Allow a few minutes for the power supply to cool before removing the cover on the PCjr.

Now, remove the top panel from your PCjr by inserting a small screwdriver in each of the three small slots at the top rear and turning slightly until the top pops up. Lift off the cover.

The Internal Modem installs between the 80-column display-RAM memory expansion and the floppy disk controller. See Figure 2.9. Plug in the modem card, making sure that the small connector on the end of the modem board connects with the two prongs at the rear of the PCjr circuit board and the board is secured by the rear guide in the PCjr case. The pins are used to test whether or not the modem card is installed in your system. Next, plug the modular telephone cord provided with the modem into the connector at the rear of the modem board through the opening marked "M" on the back of your PCjr. Make sure the modem board is well seated in its slot and replace the PCjr top panel.

Now, reconnect the power for the PCjr and peripheral equipment. If you have installed an Internal Modem in your PCjr, you can skip the next section.
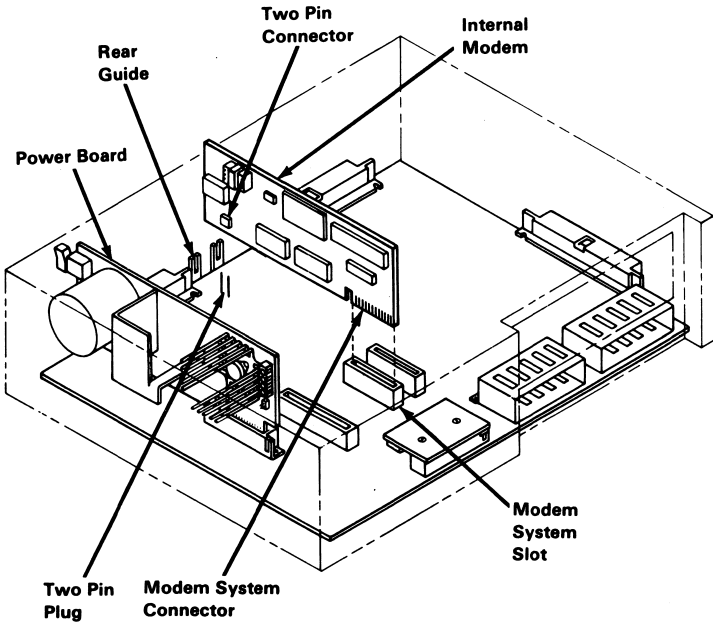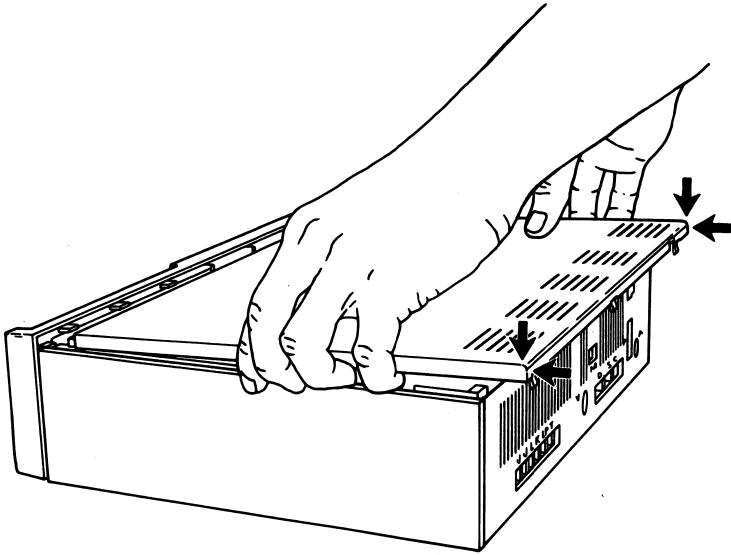
FIGURE 2.9 Installing internal modem/removing cover. (Reprinted courtesy of IBM Corporation.)
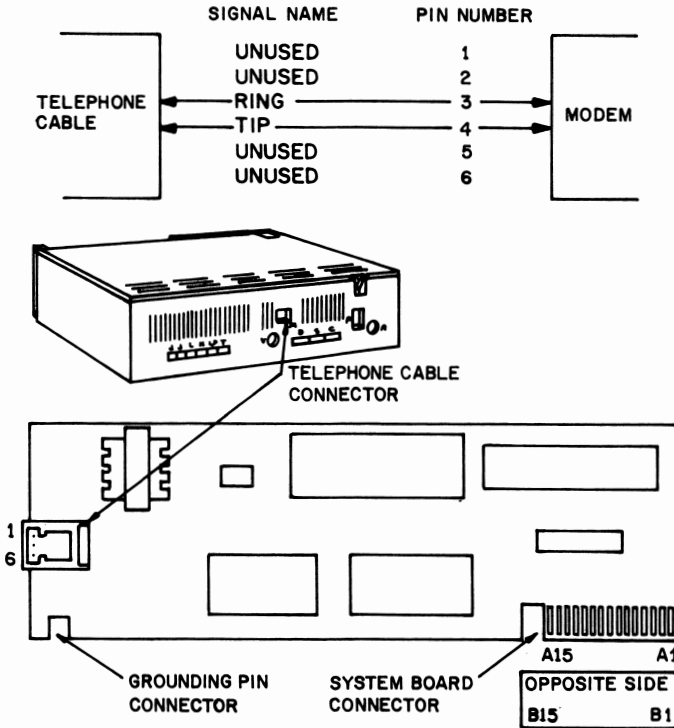
FIGURE 2.10   PCjr Internal Modem connectors. (Reprinted courtesy of IBM Corporation.)
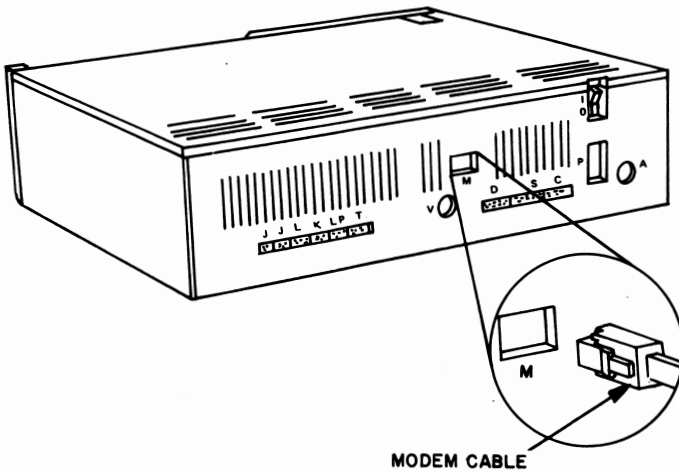
FIGURE 2.11   Connecting Modular Telephone cable to modem. (Reprinted courtesy of IBM Corporation.)

Installing an External Modem

Installing an external modem on the PCjr is also very easy. First, turn off the power to your PCjr. Unpack the Serial Device Adapter Cable and connect the small plug to the socket marked "S" on the rear of the PCjr. Connect the large plug on the Serial Adapter Cable to the female end of your RS-232 data cable, and the male end of the cable to your external modem. (The data cable should be a "straight" cable, with female connector pin number 1 connected to male connector pin number 1, 2 to 2, and so on.)

Plug one end of the modular telephone cable supplied with your modem into the connector marked "line" on the modem.

Connecting to the Phone Line

Now, you are ready to hook up to the telephone line. When using the IBM Internal Modem or an external modem without a second connector for plug-
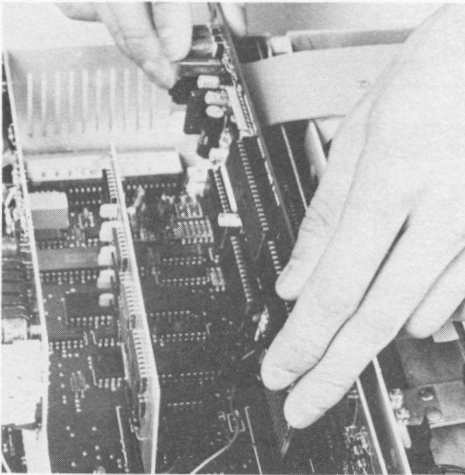
FIGURE 2.12   Installing Internal Modem Card in PCjr.

ging in your telephone, it will be necessary to use a "dual modular" adapter or to manually switch cables between the telephone set and the modem when you wish to use the modem. The two-way adapter is often referred to as a 267A dual modular adapter. The dual modular adapter allows you to plug two modular cords into one socket. Thus, with the adapter, your telephone plugs into one socket on the adapter and your modem into the other. The adapter then plugs into your wall or baseboard telephone outlet.

If you do not have a modular outlet on the telephone line you wish to use with your PCjr and modem, you must contact your telephone company and request that they install one for you. However, if you have the older four-prong outlet, you may purchase a four-prong to modular adapter at your local computer or electronics dealer.
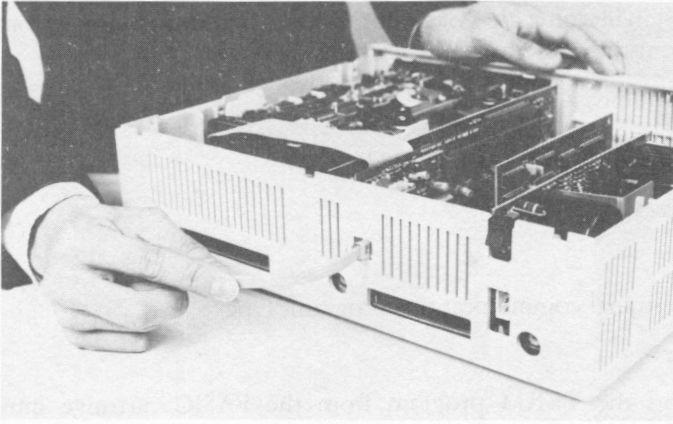
FIGURE 2.13   Connecting modular telephone cord to PCjr Internal
Modem Card.

If you wish to connect your modem to a business telephone line appearing on multiple line telephones, you must request your telephone company to install a modular jack for your modem.

Now, with everything connected, try out your telephone and make sure it still works properly. You might also have a friend call you to make sure you can still receive calls. If you have problems at this point, disconnect the modem from the dual adapter and try your phone again. If problems persist, disconnect the modem and adapter and contact your local dealer for assistance.

Notes on Examples

For the examples in Section I, we will assume you have an Enhanced PCjr with an 80-column monitor, the Internal Modem card, and the IBM BASIC cartridge. The examples will use the TERM program included in the PCjr BASIC cartridge as the communications software.

If you are using a 40-column display, or do not have the Enhanced PCjr, don't worry — almost everything in Section I will still apply. However, you *must* have at least the IBM BASIC cartridge and a modem to use the examples in Section I.

If you are using an external modem, the modem commands given in the following examples will not work (unless your external modem is a Novation SMART-CAT). You must read the appropriate part of your modem manual for the correct commands for each operation in the examples.

Testing the System

Well, there's no time like the present — insert the PCjr BASIC cartridge and turn on your monitor and PCjr (and external modem if used).

After the self-test will come the Cartridge BASIC sign-on, similar to but slightly different from the Cassette BASIC sign-on message:

The IBM PC jr Basic
Version J1.00
Copyright IBM Corp. 1981, 1982, 1983

60130 Bytes free

Ok

Now, to start the terminal communications program, type

TERM<Enter>

Your PCjr will load the TERM program from the BASIC cartridge into RAM memory. A menu of communications options will appear on the screen.

```
(TERM) — Terminal Emulator

1 Line bit rate        [300] (300, 4800)
2 Data bits            [7] (7 or 8)
3 Parity type          [E] (E,O, or N)
4 Host echoing         [Y] (Y or N)
5 Screen width         [80] (40 or 80)

Change <line,data>? [ ]

f1 = Conv   f2 = Exit   f3 = Nul   f4 = Break

IBM PCjr TERM Terminal Emulator Menu
```

Depress the "Fn" (Function) and "1" buttons together <Fn-1>. The menu will disappear. You are now in terminal mode, and your screen and keyboard are connected to the modem.

Using the Internal Modem

All commands for the IBM PCjr Internal Modem begin with Control-N <Ctrl-N>, the default "command character," which is entered by pressing the Ctrl key and the "N" key together. Try this now — enter <Ctrl-N> by pressing and holding the Ctrl key (like a shift) and then pressing the "N" key. Release both keys, then press the Enter key. All modem commands are activated by the Enter key. Your modem should respond by displaying "OK" on the screen. This indicates that you have installed the modem properly and it is working.

<Cntl-N> tells the modem the following characters are a command, and <Enter> tells the modem to perform the command just typed. Refer to the command table for the valid Internal Modem commands.

IBM INTERNAL MODEM COMMANDS

COMMAND	FUNCTION
ANSWER or A	Off-hook, answer mode
BREAK n or B n	Send break signal for n * 100 ms
COUNT n or C n	Set auto-answer to n rings
DIAL m...m or D m...m	Dial number up to 33 chars
FORMAT n or F n	Set data format
HANGUP or H	On-hook (disconnect)
LONG RESPONSE o or L o	Controls modem messages
MODEM or M	Start data state, turn on carrier
NEW p or N p	Change command char. to p
ORIGINATE or O	Off-hook, originate mode
PICKUP or P	Off-hook, voice state
QUERY or Q	Request modem status
RETRY or R	Redial 10 times every 40 sec
SPEED o or S o	Set baud rate
TRANSPARENT n . . . n or T n . . . n	Set transparent state for data
VOICE or V	Set voice state
WAIT or W	Set wait state — no actions
XMIT m . . . m or X m . . . m	Send DTMF tones (Touch-Tone)
ZTEST o or Z o	Self test mode

Note: The above commands require the command format:
    <Ctrl-N>command<space>argument<Enter>

All PCjr Internal Modem commands are entered in the following format:

<Ctrl-N>command<space>argument(s)<Enter>

The default command character <Ctrl-N> may be changed by the NEW command. The command may either be the whole command word or just the first letter. The argument(s) (where required) are ASCII numbers or letters specified by the code in the command table as follows:

CODE	VALID CHARACTERS
m	ASCII decimal digits 0-9, *, #, I, P, W
n	ASCII hexadecimal digits 0 through F
o	ASCII decimal digits 0 through 9
p	Any ASCII character

Next, let's dial a number. Type <Cntl-N>, then "DIAL", then a space, then the telephone number you wish, then <Enter>.

<Cntl-N>DIAL 555-1212<Enter>

The above notation will be used from now on. Any combination of multiple keys or special function keys will be enclosed in right and left angle brackets "<" and ">".

For testing, call your own number — it will be busy. You should see a display something like this on the screen:

    OK
    5551212 . . . . . . BUSY

    or

    OK
    5551212 . . . . . . UNSUCCESSFUL

It's a little confusing not being able to see what you type on the screen, isn't it? Well, let's change that now. Press

    <Fn-1>

to return to the options menu. Next, type

    4,N

to enable your PCjr to echo your typed characters to the screen. Type

    <Fn-1>

again to return to terminal communications mode.

Now try calling again. You should see a music note on the screen (for the Cntl-N) followed by the DIAL command and the phone number you entered. If you see double characters after you get online, you can return to the menu with

    <Fn-1>

and enter

    4,Y

to turn off the local echo, then go back to the communications mode with

    <Fn-1>

again.

Let's try another call. Select an RBBS-PC system (Remote Bulletin Board System for IBM PC) in your local area from the list in Appendix D and call it. Remember: If you call long distance, you will be charged for any calls that are answered. The number may be busy. If so, try again or pick another number. When you see the "CONNECTED" message, press the Enter key two or three times. This allows the remote system to figure out your data speed and other communication parameters. The remote system will sign on by asking one or two questions like:

    CAN YOUR TERMINAL DISPLAY LOWER CASE? (Y/N)
    (Answer Y, then <ENTER>)

    or

How many nulls (0-9)?
(Answer 0, then <Enter>)

or

Nulls (y)
(Answer N for no, then <Enter>)

and then a message like:

XYZ RBBS-PC System
Anytown, USA
213/555-1212

Congratulations, you are now ONLINE with a bulletin board system!

Go ahead and explore the system you are now connected to. Most RBBS-PC systems are menu-driven and fairly easy to use. Many now require user validation, which means that all you can do the first time you call is look at the system's layout and what kind of files are available. You can also leave a message for the system operator (SYSOP) requesting that you be allowed full privileges on the system. If you get confused or lost in the RBBS system, just type the modem hang-up command at any time

<Cntl-N>HANGUP<Enter>

to leave the system and disconnect the telephone connection, or unplug the modem phone cable, or turn off the power on your PCjr system.

Note: It is always best to sign off the remote system in the proper way before disconnecting the modem. Usually, the system offers a menu of options which will include Goodbye or Exit or Quit. If possible, make this menu selection first, before you hang up.

The Next Step

Now you should be able to call almost any online service or bulletin board and communicate online with your modem and the TERM program. Many "free" services are listed in the appendices. Of course, you will need to become a subscriber to any commercial service you want to use. The most popular of these services are covered in Chapter 5.

As you gain experience, you may begin to wish for more features and capabilities like auto-dialing, phone number directories, disk save and list, and preset parameter files. If so, you may wish to use an advanced program like IBM's *Personal Communications Manager*. Using different speeds, parities, and word sizes will require understanding some of the technical concepts presented in Section II.

If you have purchased IBM's *Personal Communications Manager* program or are considering purchasing it, go on to the next chapter. If not, skip to Chapter 4.

IBM's Personal Communications Manager

The IBM *Personal Communications Manager* program works on the 128K IBM PC, PC-XT, PC-AT, and Enhanced PCjr computers. It offers several valuable data communications functions in one program and retails at IBM Product Centers for $100.00. The IBM *Personal Communications Manager* was actually written by Microcom Corp., which also sells the ERA 2 modem/software packages for the PC and PCjr.

The *Personal Communications Manager* allows the PCjr to emulate a remote terminal (somewhat like the operation of the TERM program). This enables the user to connect to almost any online service (like the Source or CompuServe) and communicate online interactively with that service. In addition, the user can preprogram sign-on sequences and special function keys, send and receive text files, capture online sessions to disk, and copy the session to the printer.

This sophisticated program also contains a complete private electronic mail system, which enables users to set up their own EMAIL network using standard telephone lines and any combination of IBM PC, PC-XT, PC-AT, or Enhanced PCjr computers. Features of the electronic mail system include an "address book," distribution lists, unattended sending and receiving of messages at predetermined times using the Microcom error-correcting protocol, incoming and outgoing mail logs, and receiving interactive messages from other standard ASCII terminals and computers.

Installing PCM

Before you can use your *Personal Communications Manager* program, you must make a working copy of your master disk. The programs on the master disk should only be used for making working copies. (Note: Your PCM work disk cannot send EMAIL to a system using another copy of the same master — you must purchase a PCM package for each system in your EMAIL network.)

The installation of the *Personal Communications Manager* is covered in detail in Chapter 3 of the PCM manual. It is quite a simple procedure. All that
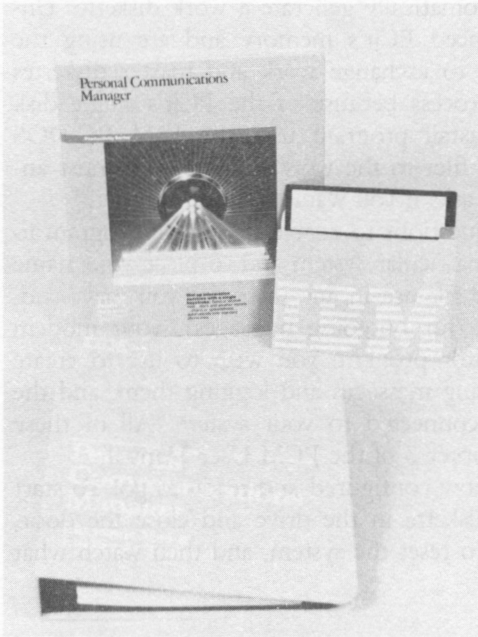
is needed is the PCM master diskette, a blank diskette, and your Enhanced PCjr system with a modem.

The installation process consists of making a work copy of the PCM master diskette containing only the files needed for operation of the PCM system on it.

Note: Always use the work copy for day-to-day communications. After your work copy is made, place your master diskette in a safe (cool, dry, non-magnetic) place and only use it to make additional work copies or to reconfigure your PCM system.

First turn on your video monitor and PCjr and insert the PCM master floppy diskette in the disk drive. IBM's PC-DOS (Disk Operating System) is included on the master diskette, so the system will automatically start up or "boot" and you will be asked to choose the system configuration you wish to install on your work diskette.

For the PCjr the correct answer is Setup 3 — one dual-sided diskette drive. You must also choose whether a 40 or 80-column screen display is to be used. The install routine will stop and ask you to type the correct setup command at the system "A>" prompt.

For a 40-column video display type:

A>**SETUP 3 40**

and for an 80-column display type:

A>**SETUP 3 80**

The system will take over and automatically generate a work diskette. Unless you have expanded your Enhanced PCjr's memory and are using the RAM Disk program, you will have to exchange work and master diskettes about five times during the copy process because of the PCjr's single disk drive limitation. Since the PCM install program uses the IBM PC-DOS DISKCOPY program to transfer the files to the work diskette, you must answer "N" for NO when the program asks if you want to "copy another."

Finally, you will be asked several questions to enable the install program to configure the work diskette to your particular system and to place your name and telephone number on a data file for use in any messages you may send. These questions include your name (for outgoing messages), your modem phone number (for replies), the editor program you wish to use to create messages, the proper drive for receiving messages and logging them, and the type of modem and video display connected to your system. All of these questions are covered in detail in Chapter 3 of the PCM User Manual.

Well, your PCM work diskette is now configured and ready to go. To start the program, just insert the work diskette in the drive and close the door, then push the <Ctrl-Alt-Del> keys to reset the system, and then watch what happens.

Starting Up PCM

Personal Communications Manager is a fully menu-driven program. This means that all of your options at any point in the program's operation will be displayed on the screen and that choices may be made by simply selecting a number or letter corresponding to the desired function. The first thing you will see after the PCM graphic sign-on screen is the Main Menu:

Personal Communications Manager

1. Enter Terminal Emulator
2. Enter Electronic Mail
3. Edit File
4. Reconfigure
5. Exit Program

Make Selection 1-5 [ ]

PCM Main Menu

The PCM Main Menu allows you to run the terminal emulator program, the electronic mail program, a user-specified text editor program, the configuration program, or to exit back to the DOS.

PCM Terminal Emulator

Choosing selection 1 from the main menu will start the PCM Terminal Emulator program, which has its own menu. A terminal emulator is a program which allows the PCjr to act like a remote data terminal for interactive online communications applications.

The Terminal Emulator menu looks like this:

```
Terminal Emulator

1. Enter Interactive Mode
2. Display/Change Comm. Settings
3. Create/Edit User Function
4. Save Terminal Options
5. Load Terminal Options
6. Print Terminal Options
7. Display Directory

Make Selection 1-7 [ ]
Press Esc to exit
```

PCM Terminal Emulator Menu

The PCM terminal emulator is similar in many ways to the TERM program discussed earlier, but the PCM program offers many more features. In the interactive mode, the PCM terminal emulator allows the user to automatically dial telephone numbers, turn the printer on and off, capture data from the remote system and transmit files to the remote system, and of course, communicate as a terminal.

In addition, the user may set the communications parameters for a session (speed, parity, etc.), set up and change up to 10 user-defined functions (accessed by the <FN-1> through <FN-10> keys), and save or load these parameters from a disk file. The PCM terminal emulator also allows the user to view the current disk directory.

INTERACTIVE MODE

The interactive mode of the PCM Terminal Emulator is the actual communications function. While in interactive mode, the user can select from ten predefined command-driven functions and up to 10 user-defined functions by using ALT and Fn key sequences.

A status line is displayed at the bottom of the monitor to show the current status of the modem, printer, file controls, and the system time of day or the elapsed connection time.

The interactive mode screen looks like this:

Terminal Emulator Interactive Mode

ALT-A ... Auto answer
ALT-B ... Send break
ALT-C ... Clear display
ALT-D ... Dial telephone
ALT-E ... Exit interactive mode
ALT-H ... Hang up telephone
ALT-P ... Printer on/off
ALT-Q ... Help
ALT-R ... Receive file control
ALT-S ... Send file control
F1-F10 .. User functions

NO Connect   12:10:02   Printer OFF   Snd ON   Rcv ON   ALT Q--Help

PCM Interactive Mode Command Display

COMMUNICATIONS SETTINGS

The communications parameters for your PCjr and modem are set with the Change Communications Settings Menu. All of the normally used communications settings are available with the PCM Terminal Emulator.

Terminal Emulator Change Communications Settings

Baud Rate 300
Parity .... even
Duplex mode .... full
Filter control chars .... yes
Transmit CR-LF .... no
Add LF on receive .... no
Flow control .... yes

Options: 110 300

Press   or   to change selection
Press Spacebar to change option
Press Esc to exit

PCM Communications Settings Menu

Possible speed selections are shown under the "Options:" section of the menu and are dependent on the type of modem selected at installation. For example, if the IBM PCjr Internal Modem is selected, speeds of 110 and 300 baud will be shown in the options section. If a manual modem is selected in the setup process, speeds from 110 baud to 4800 baud (the PCjr's maximum) will be displayed.

Parity may be even, odd, or none. If no parity is selected, the word size is set to 8 bits automatically, otherwise 7 bits is used. Most online systems use 7 bits even parity or 8 bits no parity.

The full and half-duplex selections have to do with the way characters are displayed on your screen. With full-duplex transmission, all the characters on your screen are sent by the online host system — that is, the host is responsible for "echoing" the characters you type as well as sending its responses to

your PCjr. With half-duplex communications, the PCM software "echos" the characters you type directly, as well as displaying any characters sent by the host computer. Thus, if the host is not echoing your characters and the PCM is set for full-duplex mode, you will not see anything you type on the screen, but all of the host's responses will be displayed. Conversely, if the host is echoing and the PCM is set for half-duplex mode, you will see two characters on your screen for every one you type. Most online systems echo characters unless otherwise specified, so full duplex is the correct mode. On the other hand, most TWX or TELEX-based electronic mail systems (except MCI Mail) do not echo characters, so half-duplex mode is correct for them.

In addition to transmission speed, parity, and full/half-duplex selections, the PCM also supports four other communications functions.

The "Filter Control Characters" mode is used for receiving text files. It automatically adjusts all incoming characters to 7 bits and removes any control characters except for the following:

Carriage Return	(ASCII 13)
Line Feed	(ASCII 10)
Form Feed	(ASCII 12)
Tab	(ASCII 9)
Backspace	(ASCII 8)
Bell	(ASCII 7)

This process insures correct reception and storage of text data between computer systems of different manufacturers. Special control characters used on one system may have undesirable effects when used on another system (like your PCjr).

Two other communications modes relate to the way in which text files are stored in computer systems. Some systems (and some software) require a carriage return (CR) and a line feed (LF) at the end of each line of text, while others require that no line feeds be transmitted. The "Transmit CR-LF" mode handles this requirement. When Transmit CR-LF is ON, the PCM system will insure that each CR transmitted has an LF appended to it, while when this mode is OFF, all LFs are removed before transmission. In a similar manner, the "Add LF on Receive" mode will append an LF to each CR received when this mode is ON.

The final communications mode available in the PCM Terminal Emulator is "Flow Control." When this mode is ON, the internal communications data buffer is monitored when receiving files or capturing an online session to disk. When the buffer is nearly full, the PCM will end an XOFF (transmission off) character (ASCII 19 or <Ctrl-S>) to the remote computer to request that it pause in transmission to allow the PCjr buffer to be written to the diskette file. When the data has been saved and the buffer cleared, the PCM will send an XON (transmission on) character (ASCII 17 or <Ctrl-Q>) to the remote computer to tell it to proceed with the transmission. Similarly, when uploading to a remote system, the remote computer can send an

XOFF to stop the PCM transmission and an XON to request resumption of the transfer.

Note: Not all online hosts support XON-XOFF protocol, but most popular systems do. In some cases, when accessing a host through a communications network like Telenet or Tymnet, it is necessary to send a command to the network as well, to enable the XON-XOFF protocol. (See Chapter 4.)

USER FUNCTIONS

The *Personal Communications Manager* program allows you to set up pre-defined user functions which may be activated by the ten function keys on the PCjr. These user functions may be saved to disk with the other terminal options, allowing easy reloading before beginning an online session.

Menu selection 3 allows you to create and edit the ten user functions. Just about anything that can be typed in the interactive mode can be included in a user function, including calling other user functions. Other special commands which can be used include Break, Exit, Hang up, Time wait, and Wait.

The technique used to create these functions isn't clearly explained in the IBM PCM manual, but it is actually a simple process.

CREATING A USER FUNCTION

To make a sign-on script, select the Create/Edit User Function screen from the PCM Terminal Emulator menu — item No. 3. The program will request

Which function key to edit? - [ ]

Type in the key you wish by pressing <Fn> and a number key from 1 to 0 (for Functions 1 to 10) at the same time. Then, when the Create/Edit screen appears, just type the commands and prompts in the order expected by the online service. Commands like Dial are entered by typing Alt plus the key letter (in this case — "D"). If more data is needed by the command, it will be requested in the lower left corner of the screen, like this for the Dial command:

Enter telephone number:
[   ]

After editing the data entry, press <Enter> to move the command and any data up to the entry line on the screen.

A normal sign-on script sequence would be:

1. Dial the access number
2. Either wait for a prompt
    or
    send a character or return to get a prompt

3. Enter network address (for Telenet, Tymnet, or Uninet access)
4. Wait for ID prompt
5. Enter ID or account code
6. Wait for password prompt
7. Enter password

SAMPLE PCM SIGN-ON SCRIPT

Here's a sample script for MCI Mail using the 800 number for access:

«D-1-800-323-0905 . . . . »«T-3.0»øø
«W-name:l00:20lH»JJONESø«W-Password:l00:20lH»ABCDEFGHø

Here's an explanation of this script. First, the program will dial the access number for MCI Mail — 1-800-323-0905. Next the program waits for 3.0 seconds after connect and then types two carriage returns (shown as ø). It then waits up to 20 seconds for MCI Mail to send the string "name:" which is part of the "Please enter user name:" prompt. If this string is not received, the program hangs up. If the string is received, the program sends "JJONES" followed by a carriage return as the user name. Next, the program waits up to 20 seconds to receive the string "Password:" from MCI Mail. Again, if it is not received, the program hangs up. If the string is received, the program sends the password "ABCDEFGH" followed by a carriage return. The program script then returns control to the user in interactive mode.

The scripts that are possible with the Terminal Emulator are just about unlimited. The Time wait function allows you to set a time of day as well as an elapsed time. The ability to chain to another function provides a complex programming capability that is discussed in detail in Chapter 6 of the PCM manual.

Several script files are included on the IBM *Personal Communications Manager* master diskette. They include files for Dow Jones News/Retrieval Service, CompuServe, and the Source. Each file offers two access methods for each service. They must be customized by the PCM user to add his or her ID, password, and local access telephone number before they can be used. These scripts are described in Chapter 6 of the PCM manual.

The Dow Jones file also includes a set of sample scripts for unattended operation to automatically capture information from the online service at the lowest possible cost.

When you are done building your function, don't forget to save the terminal options to a diskette file before signing off or you will lose all of your hard work.

Terminal Emulator Create/Edit User Function 3

<A>uto answer	<D>ial phone	<P>rinter echo	<T>ime wait
<B>reak	<E>xit	<R>eceive file	<W>ait
<C>lear display	<H>ang up	<S>end file	

F1-F10 Invoke user function

«D-1-800-555-1212 . . . . »^C«W-ID:l00:20IH»70000,100ø

Type text or Alt-<x> for command
Press End when finished
Press Esc to cancel

PCM Create/Edit User Function Screen

SAVE/LOAD TERMINAL OPTIONS

All of the terminal options may be saved to a diskette file and later reloaded into the PCM system. These options include the communications settings and user-defined functions. This allows you to set up a parameter file for each on-line service you communicate with and to load these specific command files (including log-on scripts) into memory before you go online.

PRINT TERMINAL OPTIONS

This command allows you to print out the current settings for all of the terminal options on the line printer or monitor screen. Such a printout can help in debugging user functions and can also help document each of your online service option files.

DISPLAY DIRECTORY

Often, when sending or receiving files, it is necessary to check the diskette directory for the exact file name of a file to send or for an available file name for a receive or capture file to avoid duplication. The "Display Directory" command allows you to list the directory of a diskette while online.

PCM Electronic Mail

Selection 2 from the main menu will select the PCM Electronic Mail program, which has its own menu. The Electronic Mail menu looks like this:

Electronic Mail   .

1. Send/Receive Mail
2. Review/Address Outgoing Mail
3. Review Incoming Mail
4. Address Book Maintenance

Make Selection 1-4 [ ]
Press Esc to exit

PCM Electronic Mail Menu

The *Personal Communications Manager* program includes a complete private electronic mail communications subsystem. It allows the creation of messages (with an editor), storage of messages, unattended transmission and reception of messages, logging of all calls, and management of a name and address directory and mail distribution lists. The program will communicate automatically with other IBM PCs, PC-XTs, PC-ATs, and PCjrs running the PCM.

Electronic mail (EMAIL) is defined by IBM in the PCM User Manual as "the process of sending and receiving messages and data between computers and/or remote terminals. This differs from regular mail in that electronic mail is essentially paperless." This is a valid definition for the EMAIL system provided in the PCM. Messages are entered into the PC or PCjr at each location in the "network" and delivery "addresses" (phone numbers) and times are specified. Each personal computer in the system operates independently to attempt to send its messages at designated times. If the called station is busy, the call will be automatically retried later. Locations using ASCII terminals or computers which are not running PCM may call into any PCM location and leave messages.

The PCM address book contains 40 "mailboxes" or addresses for frequently contacted PCM users. These mailbox addresses can be combined into up to 10 distribution lists for automatically sending mail to all parties on a list.

The PCM requires a user-provided editing program for message preparation. This process is done externally to the PCM system, although the specified editor can be called from the PCM main menu. Editors that can be used include Edlin (on the DOS disk), EasyWriter, WordStar, and others compatible with the PCjr. Because the PCjr's disk space is limited, it is advisable to use a separate "edit disk" for preparing messages, and then copy them to the PCM work disk for transmission.

The operation of the PCM electronic mail system is covered in detail in Chapters 7-11 of the PCM Users Manual. You should refer to the user manual for more information on the PCM EMAIL system. In addition, the Tutorial provided in Chapter 4 of the PCM Manual is a good way to get familiar with the program.

Message Editing

The main menu allows the user to access an editor program from within the PCM system. During setup the name of the user's editor is saved in the PCM configuration file. Later, this editor can be called from the menu when text messages are to be prepared for either the terminal emulator or the electronic mail system.

The limited disk space of the PCjr's single disk drive makes it difficult to use the larger editor programs like WordStar with PCM. The user must prepare a second disk with certain PCM files on it and swap disks for editing and after entering the PCM Electronic Mail system. This operation is detailed in Chapter 12 of the PCM User Manual.

Reconfiguring PCM

The PCM main menu also allows reconfiguring the work diskette at any time (for example, if a new editor program is chosen). This process is identical to the installation procedure covered in detail in Chapter 3 of the PCM User Manual.

PCM Limitations

While the IBM *Personal Communications Manager* is a complex and powerful program, it does have a few limitations that the prospective user should be aware of.

PCM MASTER NEEDED FOR EACH USER

As was mentioned earlier, the PCM program is serialized, thus insuring that each user in a PCM EMAIL network must purchase his own copy of the *Personal Communications Manager* program. Copies of the same master disk running on different systems aren't allowed to communicate with each other.

The master diskette serial number is shown during the graphic sign-on message. The PCM program diskette for each system in a PCM EMAIL network must have a different serial number to communicate with the other network members.

NO XMODEM BINARY FILE TRANSFERS

The *Personal Communications Manager* allows the user to connect with most types of remote systems, including bulletin boards and message systems in text mode, but does not include the capability of transferring text and binary files using the Ward Christensen (XMODEM) public domain error-checking protocol. While PCM does include the Microcom protocol, this can only be used to "talk" to other Microcom compatible systems. This is a serious limitation for users who wish to transfer program and data files to and from RBBS systems.

LIMITED DISK SPACE

A major limitation of the *Personal Communications Manager* when used on the single disk PCjr without the RAM-Disk option is that it requires nearly 220K bytes or disk space on the PCM work disk, leaving only about 140K bytes of space for incoming and outgoing mail, an editor, and any session text capture or send files. This could be a real problem when capturing or sending large text files, but there is a solution!

PC-DOS permits the user to change floppy disks at will without notifying

the operating system. This allows the user to create a second work disk for data files and his editor program. This topic is covered briefly in Chapter 12 of the PCM manual.

When setting up for unattended operation it may be desirable to "swap" disks to allow large messages or a large volume of messages to be transmitted or received.

PC-DOS 2.10 also allows the reassignment of the PCjr's single disk drive from logical drive A: to drives B: or C:, but this operation is not covered in the PCM manual. This DOS feature can make the *Personal Communications Manager* program much more useful on the PCjr.

Summary of PCM

As a stand-alone EMAIL system, IBM's *Personal Communications Manager* is perhaps without equal in its price range. As a terminal communications program, however, the PCjr user may prefer to choose another third-party software product. The final decision depends on the type of regular data communications the user requires.

What's Next?

The balance of Section I will take a look at the communications networks, some of the available online services, their costs and features, and sample on-line sessions. If you are impatient to start, refer to Section II and the Appendices for more technical information and listings of access numbers for services and bulletin boards in your area. You may wish to purchase a sign-up kit for the Source or CompuServe at your local computer dealer or IBM Product Center, and begin to explore the world of the online communications with Communications Networks and Information Utilities as you read the next chapters.

Communications Networks

Communications networks provide the link over which information is transmitted between two or more locations. We are all familiar with the ubiquitous telephone and the worldwide network of switching centers, cables, microwave towers, satellites, and earth stations that allow us to dial from Volcano, California, to Frankfurt, West Germany, without even talking to an operator. Today we may even take the telephone network for granted — except when we get the bill for our calls!

In addition to the telephone system, there are other types of communications networks that handle only computer data. They are called by several names, including packet-switching networks, data networks, and value-added networks to name a few. These services were created in the early 1970s to solve two basic problems of computer data communications — first, the high cost of the public telephone network for long distance calls, for leased private line service, and for lengthy connections; and second, the difficulties encountered when sending data at high speed over the public network or leased private lines. Today there are three major "public" data networks and dozens of semi-private and private networks in the United States.

Understanding all of these services is important to the PCjr owner who wants to go online because at least one of these networks must be used to connect your PCjr to the online service! Even to call your local bulletin board system, you must use the public telephone network in your city. Familiarity with the different services available can also save you money — if you can choose the lowest cost network alternative available to you.

Telephone Networks

The century-old Bell System was ordered broken up by a federal court as of January 1, 1984. This has allowed competition in many areas for voice telephone long distance service. In addition to the AT&T Communications common carrier telephone network (formerly AT&T Long Lines as a part of the Bell System) in the United States, there are now dozens or even hundreds of

private long distance telephone service vendors. The best known are probably GTE Sprint and MCI Communications.

These companies (and even AT&T in some areas) offer discounted rates for long distance calls from almost every large city in the country. If you are calling bulletin boards, RBBS systems, or conference systems regularly, using one of the discount plans can possibly save you hundreds of dollars. Be warned — online telecommunications can be habit forming! It is also good to be aware that long distance rates have been going up in many areas since the breakup. Better to start with a discount service than to wish you had after receiving a $100 or $200 long distance bill for your online calls.

If you don't live in a large city with one of the alternative services, take heart. By the end of 1985, all areas must be served by alternative service if available.

Data Networks

On the other hand, if you are calling a major online service, there will usually be several alternative ways to connect to their host computer(s) from your town. You may direct dial (expensive!), use their IN-WATS service (a toll-free 800 number — but in most cases you will be charged by the online service), or use a data network local access number.

The three major public data networks are GTE Telenet, Tymnet, and Uninet. Each has a private, high-speed data network connecting hundreds of cities in the U.S. and (for Telenet and Tymnet) throughout the world. This digital network has special features to insure that all data carried on the network remains error-free. (When long distance data calls are placed over regular telephone lines, there is no assurance that data won't become scrambled.)

In each city, computerized data switches interconnect local telephone lines to this data network. So, this makes it possible for a subscriber in Chico, California, to make a local call to Tymnet and then be connected to CompuServe in Columbus, Ohio, with no long distance charges. Of course, someone must pay the data network charges — in this case, the subscriber does as a surcharge to his CompuServe time charges. But, the cost of calling on a data network is almost always much less than calling by long distance, because within the contiguous United States, the cost of a data network connection is based on connect time and speed, rather than distance. Thus, the cost is the same regardless of the distance between the caller and the online service. For Telenet or Tymnet access to CompuServe, the surcharge is $2.00 per hour in the evening and $10.00 per hour during prime time.

Many online services also operate their own data networks. This is true of CompuServe, Dialog, General Electric Information Systems, Mead Data Central, and others.

If our same subscriber (above) lived in Sacramento, California, he could access CompuServe using the CompuServe network because there is a local ac-

cess number (called a "node") for CompuServe in Sacramento. His access surcharges would be only 25 cents per hour for either evening or prime time access.

Some services include the network communications charges in their hourly rate. This is true of Delphi, BRS After Dark, Knowledge Index, The Source, Dow Jones News/Retrieval, and NewsNet. Of course, if you have to make a message unit or long distance call to reach the network access number, you must pay any charges incurred.

Telenet and Tymnet, two of the major data networks, have hundreds of access nodes in the United States as well as in major cities throughout the world. Uninet operates a smaller network, but offers lower-cost connections for users. Access information for all three data networks are included in Appendix A.

Access Procedures

Each data network has a different access or "sign-on" procedure. Access involves dialing an access number, setting parameters for your terminal type and speed, specifying any optional parameters for the connection, and requesting a connection to the desired service.

Note: In the following examples, the user must enter the information shown in bold type.

GTE TELENET

To access the Telenet network, get the local access number nearest you by calling the customer service number in Appendix A. Be sure your PCjr is set up and ready to communicate. Type the command to dial the local access number. When the service answers, type:

<Enter><Enter>

Telenet will figure out your baud rate and then sign on with the node and port number you are connected to:

TELENET
916 19A

TERMINAL =

Now, you must tell the network what type of terminal you are using. Type "D1":

TERMINAL = **D1<Enter>**

@

The "@" character is the Telenet prompt. To request a connection, type "C" for connect, followed by a space and the network address of the system you

wish to connect to. For the Source, system 12, you would type:

@ C 30147<Enter>

301 47

Connected to THE SOURCE

>

Now, complete the sign-on procedure by entering your ID and password:

>ID TCA123 SECRET99<Enter>

TYMNET

To access the Tymnet network, get the local access number nearest you by calling the Tymnet customer service number listed in Appendix A. Be sure your PCjr is set up and ready to communicate. Type the command to dial the local access number. When the service answers, you will see:

please type your terminal identifier

If your modem is set for 1200 baud, this message may be garbled. Type <Enter> while the message is printing to set the new speed. Now, you must tell the network what type of terminal you are using. Type "A" (Note: Do not type <Enter>):

please type your terminal identifier **A**

-3300-005-

please log in:

Now, type the address (name) of the system you wish to connect to. For all CompuServe services you would type:

please log in: **CPS<Enter>**

host: WELCOME TO COMPUSERVE 1133

User ID:

Now, complete the sign-on procedure by entering your User ID and password:

User ID: **70000,100<Enter>**

Password: **GOOSE?WALK<Enter>**

UNINET

To access the Uninet network, get the local access number nearest you by calling the Uninet customer service number listed in Appendix A. Be sure

your PCjr is set up and ready to communicate. Type the command to dial the local access number. When the service answers, you will see

>L?

at 300 baud or

|x|

at 1200 baud. Now type:

<Enter>.<Enter> (note the period)

uninet pad 77ca port 05

service:

Now type the correct code for accessing the online service. For the Source, system 14, type "S14":

service: **S14<Enter>**

*u001 000 connected to 70300007

Connected to THE SOURCE

>

Now, complete the sign-on procedure by entering your ID and password:

>**ID TCA123 SECRET99<Enter>**

NETWORK ACCESS TABLE

SERVICE	NETWORKS
CompuServe CIS/EIS	Telenet, Tymnet, DataPac, CompuServe
% The Source	Telenet, Uninet, SourceNet
% Dow Jones News/Retrieval	Tele, Tym, MCI
% Delphi	Tymnet, DataPac, Direct Dial
% NewsNet	Tymnet, Telenet
Dialog	Tele, Tym, Uni, IN-WATS, DialNet
% Knowledge Index	Telenet, Uninet
BRS	Telenet, Uninet
% BRS/ After Dark	Telenet, Uninet
% MCI Mail	MCI Mail Net, IN-WATS, DJN/R, BRS
% Mead Data (LEXIS, NEXIS)	MeadNet, Tym, Tele, Uni

Of course, all of the above services are available by direct dial access as well as through data networks.

% Note: Communications network charges are included in basic connect rate.

Special Commands

The Tymnet and Telenet data networks respond to certain special commands for setting user transmission parameters. These commands are entered before the network address to set the network node in the mode(s) your system requires.

One important network communications parameter is the XON - XOFF flow control protocol. XON - XOFF allows the receiving system to request that the sending system pause in its transmission until the receiving system is again ready for data.

This command may be used manually from the keyboard by pressing <Ctrl-S> for XOFF and <Ctrl-Q> for XON during transmission. While most online systems respond to XON - XOFF protocol, the data networks do not, unless the user specifically requests that the flow control mode be turned on. Both networks have separate commands for each direction of data flow, from the terminal (PCjr) and from the network (online host).

In Telenet this is done by entering ENABLE FLOW (from host) and EN-ABLE TFLOW (from terminal) at the @ prompts, before entering the network address:

> @ **ENABLE FLOW<Enter>**
>
> @ **ENABLE TFLOW<Enter>**
>
> @ **C 12345<Enter>**

When using Tymnet a similar procedure applies — the user must enter the special control characters <Ctrl-R> (from host) and <Ctrl-X> (from terminal) immediately before the user name is entered at log in.

> please log in: **<Ctrl-R><Ctrl-X>Dialog<Enter>**

Network User Guides

The data networks publish detailed user guides which are available free on request from their respective customer service toll-free numbers. They are:

How To Use Telenet

How To Use Tymnet

How To Use Uninet

See Appendix H for information on addresses and telephone numbers.
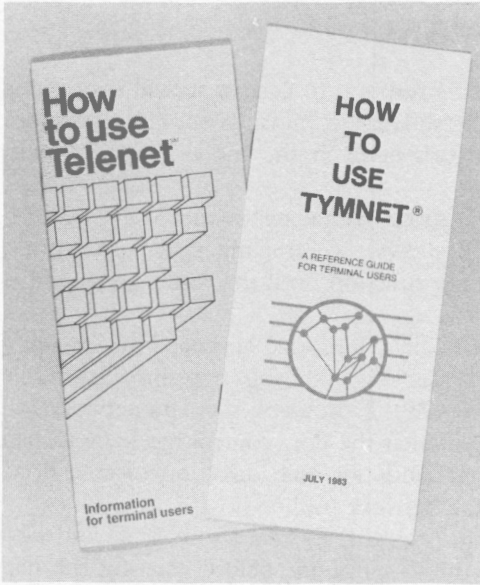
FIGURE 4.1   Telenet/Tymnet User Manuals.

Information Utilities

The Information Utilities represent what may be the most popular reason for going online today. They offer business and consumer services ranging from weather reports to stock prices, from massive databases to multi-player games, from shopping services to online newspapers, and from instant electronic mail to 24-hour electronic banking. Commercial information utilities charge money for their services, so if you wish to explore this area of the online world, be prepared to invest between $5.00 and $300.00 per online connect hour. I think you'll find good value for your money with most services. This chapter and the next two should help you decide which of the online services is right for your needs and budget. Your PCjr is your key to accessing the growing world of online services.

What Are Online Services?

First, we should start by defining what online services are. There are two major categories of online services — information utilities and electronic mail services.

Information utilities are businesses that offer a wide variety of computing and information (database) services to their subscribers. They usually charge for connect time and online storage (and some charge additional for host processor time used for sorting, searching, or processing data). Subscribers access the host computers of these services with their personal computers or terminals from their homes or offices using regular telephone lines and some type of a modem.

Electronic mail services use data communications to send textual data from one location to another. The messages may be sent directly from the sender's machine to the recipient's machine, or may be stored in an intermediate host system in an electronic "mailbox" for pickup, or may be hand-delivered by the U.S. Postal Service or a private courier service. In any case, the message is carried electronically for at least a portion of its journey. Charges are typically

based on message length rather than connect time or distance (within the United States). Electronic Mail services are also accessed by users with their microcomputers or terminals and a modem through standard dial-up telephone lines.

As can be seen, "online services" is a broad term encompassing the public timesharing services, the online database services, and the electronic mail (EMAIL) services. The exact demarcation lines between these services is growing hazy because the timesharing services are offering databases and EMAIL, the online database services are selling products and offering EMAIL services, and the EMAIL services are providing access to databases and shopping services.

For the purposes of this book, we will break these services down into three categories, based on their main service or function. These categories are:

1. Information Utilities — the consumer and executive Timesharing Services
2. Information Utilities — the executive and professional Online Database Services
3. Electronic Mail Services

There will be some overlap, and some services will be mentioned in both chapters, but the primary description will be in their main service category.

It is important to note that these online services are in a constant state of development and that new features and databases are being offered almost weekly. Thus, the information in this book is a "snapshot" overview of the state of these services as of October 1984. You should review current documentation and menus of each service when you subscribe and each time you sign on.

This chapter will cover the consumer and executive information utilities, Chapter 6 will cover the professional database services, and Chapter 7 will cover the electronic mail services.

Types of Information Utilities

Information utilities may also be categorized by their intended user market — consumer/executive or professional. Consumer services are designed and priced to be used by individuals at home for personal enrichment. Executive services are designed for use by managers and executives in the evening from home as well as from their desks at work. Professional services are designed for use by information specialists in business and government for research and planning, and are priced accordingly.

INFORMATION UTILITY SERVICES

SERVICE	TYPE
CompuServe Consumer Information Service	Consumer
CompuServe Executive Information Service	E/P
The Source	C/E
The Source Plus	E/P
Dow Jones News/Retrieval Service	C/E/P
Dialog	Professional
Dialog Knowledge Index	E/P
Bibliographic Retrieval Service (BRS)	Professional
BRS/After Dark	E/P
NewsNet	E/P
Delphi	C/E
Systems Data Corp. SDC — Search	Professional
Mead Data Central LEXIS	E/P
Mead Data Central NEXIS	E/P

P = Professional; E = Executive; C = Consumer

Now, let's see how you can use the PCjr to access these services and then we'll take a look at each of them in detail.

The table above shows the most popular online services in the United States and the focus of their products. These 14 services account for perhaps 90 percent of the active users in the United States. There are many more special interest or "vertical market" services offering just one or at most a few online products to a select clientele.

In early 1984, the *Directory of Online Database Services* published quarterly by Cudra and Associates (see bibliography), identified some 327 information utilities offering one or more online database. Together, these services offered some 2,225 different databases of information online. Both numbers are growing at over 20 percent per year, indicating the popularity of these services and the trend towards online information services.

CONSUMER/EXECUTIVE SERVICES SIGN-UP COSTS

SERVICE	SIGN-UP
CompuServe Consumer Information Service	$49.95
CompuServe Executive Information Service	$89.95
The Source	$49.95
Dow Jones News/Retrieval Service	$45.00
Dialog Knowledge Index	$35.00
BRS/After Dark	$75.00
NewsNet	N/C
Delphi	$49.95

300 BAUD ACCESS COSTS

SERVICE	PRIME TIME*	NON-PRIME TIME
CompuServe **		
Consumer Information Service	$12.50/hr	$6.00/hr
Executive Information Service	$12.50/hr	$6.00/hr
The Source	$20.75/hr	$7.75/hr
The Source Plus	$39.75/hr	$34.75/hr
Dow Jones News/Retrieval Service	$54-$72/hr	$12-$36/hr
Dialog Knowledge Index	N/A	$24.00/hr
BRS/After Dark	N/A	$6-$20/hr
NewsNet	$24-$60/hr	$18-$60/hr
Delphi	$16.00	$6.00/hr

* Prime time is normally 6-8 a.m. to 5-6 p.m. local time during normal business days (depending on the service).
Note: ** Communications access charges additional on CompuServe.

1200 BAUD ACCESS COSTS

SERVICE	PRIME TIME*	NON-PRIME TIME
CompuServe **		
Consumer Information Service	$15.00/hr	$12.50/hr
Executive Information Service	$15.00/hr	$12.50/hr
The Source	$25.75/hr	$10.75/hr
The Source Plus	$44.75/hr	$37.75/hr
Dow Jones News/Retrieval Service	$108-$144/hr	$24-$72/hr
Dialog Knowledge Index	N/A	$24.00/hr
BRS/After Dark	N/A	$6-$20/hr
NewsNet	$48-$120/hr	$36.00/hr
Delphi	$16.00	$6.00/hr

* Prime time is normally 6-8 a.m. to 5-6 p.m. local time during normal business days (depending on the service).
Note: ** Communications access charges additional on CompuServe.

Consumer and Executive Services

The consumer and executive-oriented online services are the best known and most popular in terms of number of subscribers. Their low rates for evening and weekend access and the wide spectrum of information, programs, and computer-based services available ensure these companies can offer something for almost everyone.

CompuServe and the Source have been the pioneers in the consumer online market, both having begun consumer operations in 1979. More recently, Delphi has entered the arena with inexpensive services aimed at consumers.

The executive service area has become a clear market just in the past two years, although Dow Jones News/Retrieval has been offering stock market information services to brokers and investors since 1974. CompuServe began its

Executive Information Service specifically for managers and executives in 1983. The Source added The Source Plus services for business users at a slightly higher cost. Dialog and BRS, two of the major online database services, introduced their "evening and weekend" low-cost services (Knowledge Index and BRS/After Dark) for executives and other end users in early 1983. NewsNet is also a relative newcomer to the market.

Now, let's take a look at each of these services in more detail.
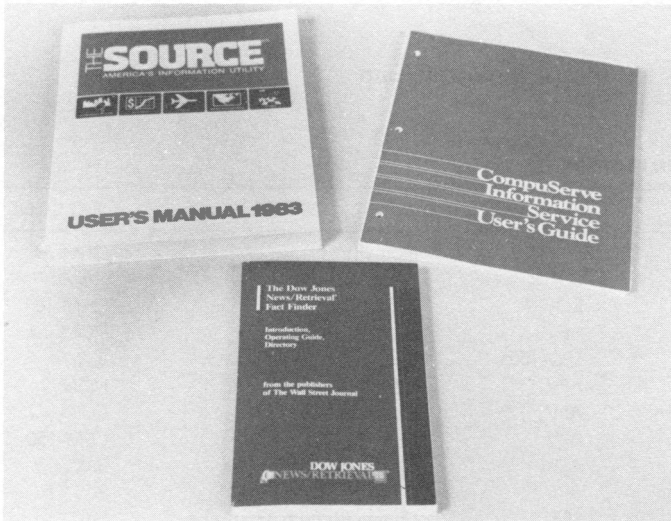
FIGURE 5.1   The Source, CompuServe, and Dow Jones News/Retrieval User Manuals.

COMPUSERVE

CompuServe began as a commercial timesharing computer service company. In 1979, it began to offer MicroNet, an evening service focused at the growing home and hobbyist computer user market, offering access to a bulletin board and several high-level programming languages. MicroNet had about 4,000 subscribers in 1980, when CompuServe was purchased by H&R Block Corporation. Marketing was stepped up at the same time as the personal computer "boom" began to gain momentum. Features were added to include online newsletters, interactive games, special interest and user groups, databases, electronic mail, online conferences, shopping and banking, and many other services. In 1980, CompuServe joined with Tandy Corporation (Radio Shack) to offer inexpensive sign-up kits to computer users. Now, four years later, CompuServe boasts over 150,000 subscribers to both its Consumer Information Service, the descendent of the original MicroNet service, and the new Executive Information Service.

Among other advanced features, CompuServe operates its own data network, offering local toll-free telephone access from over 250 cities nationwide.

CompuServe is also accessible through the Tymnet and Telenet data networks.

CONSUMER INFORMATION SERVICE

CompuServe's Consumer Information Service (CIS) is truly an information utility. CIS offers something for just about everyone!

Let's take a look at the subject index from CompuServe and see just what's available online.

Note: SIG stands for Special Interest Group.

COMPUSERVE CIS SUBJECT INDEX

SUBJECT	GO CODE	SUBJECT	GO CODE
AAMSI Communications	AAM	Biorhythms	GAM-29
AAMSI SIG	SFP-5	Blackjack	GAM-60
ADCIS Forum	EDU-7	Bridge	GAM-18
AOPA Forum	AOP	Bulletin Board	HOM-30
AP Datastream	SPD-1005	Business & Law Review	BLR
AP Videotex, Business	APV	CB Interest Group SIG	HOM-9
AP Videotex, Entertainment	APV	CB Society	CUP
AP Videotex, Politics	APV	CEMSIG SIG	CEM-450
AP Videotex, Weather	APV	CP Business Info Wire	BIW
AP Videotex, World News	APV	CP/M Users Group SIG	PCS-47
ASCMD SIG	SFP-7	Caines Mystery Magazine	HTC
ASI Flight Operations	ASI-11	Calculate A Raise	HOM-15
ASI Monitor	ASI-10	Calculate Net Worth	HOM-16
ASI Service Difficulty	ASI-12	Changing Password	CIS-175
Academic Amer. Encyclopedia	AAE	Changing Terminal Type	CIS-9
Access Phone Numbers	LOG-50	Checkbook balancer	HOM-14
Adventure	GAM-8	Children's Games	TMC-27
Aircraft Insurance	AVL	Citizen's Band Simulator	CB-10
Alternative Educ. Services	AES	Civil War	GAM-14
Altertext Report	ALT	Clarke School for the Deaf	CSD
American Ski Association	SKI	Classic Quotes	TMC-7
Apple User Group SIG	PCS-51	CoalScoop	CMP
Astrology	GAM-45	College Press Service	CPS
Atari SIG	PCS-132	Color Computer SIG	PCS-126
Athlete's Outfitter	HAN	Color Graphics	CIS-91
Aunt Nettie	NET	Columbus Chamber Comm.	CCC
AutoNet	ATO	Command Summary	CIS-58
Aviation Rules & Reg.	AVR	Commodore	CBM
Aviation SIG (AVSIG)	SFP-6	Commodore 64 SIG	PCS-156
Aviation Safety Institute	ASI	Commodore Programming	PCS-116
Aviation Weather	AWX	Sig	
Bacchus Data Services	VIN	Commodore VIC20 &	PCS-155
Backgammon	GAM-31	Pet/CBM	
Baffle Word Game	GAM-526	Communication Industry	SFP-35
Banking Services	HOM-45	Comp-U-Store	CUS
Banshi	GAM-30	CompuServe Rates	BIL

COMPUSERVE CIS SUBJECT INDEX (Cont'd)

SUBJECT	GO CODE	SUBJECT	GO CODE
CompuServe logon instruct	LOG	Football	GAM-27
CompuServe's Softex	PCS-40	Fur trader	GAM-36
Computer Art SIG	PCS-157	GameSIG Archives	GSA
Computer Job Bank	TDC-4	Golf	GAM-21
Computer Resume Bank	TDC-4	Gomoku	GAM-22
Computer Wire, The	TDC-4	Good Earth SIG	HOM-145
Computing Across America	CAA	Government Publications	GPO
Computing Tutorials	PCS-121	H. Caines Mystery Review	HTC
Concentration	GAM-32	HamNet SIG	HOM-11
Cook's Underground	HOM-109	Hammurabi	GAM-37
DISCOVER ORLANDO	ORL	Hand. Users' Database	HUD
DataPac logon instruct	LOG-41	Hangman	GAM-23
Democratic Forum	HOM-39	Heath User Group SIG	PCS-48
Department of State	DOS	Heathkit Catalog	HTH
Dice	GAM-33	Hi-Tech Forum SIG	CCC-150
Digital Research Forum	PCS-13	Hollywood Hotline	HHL
Digital Research Inc.	DRI	Home Management	HOM-80
Direct Connection, The	TDC	Howard Sams' Books	SAM
Dor Sageth	GAM-527	Human Sexuality	HSX
EMAIL	EMA	Huntington National Bank	HNB
EMI Flight Planning	EMI	IBM-PC SIG	PCS-131
EPIE Database	EPI	IRIS Database	IRI
EPIE Forum	edu-8	Incorporating Guide	INC
ERIC Database	erc	Index	IND
Economic News	FIN-10	Industry Standard Databases	TDC-4
Educ. Research Forum	hom-28	InfoText	IFT
Educational Research SIG	HOM-28	InfoWorld	INF
Educators Forum	HOM-137	Information on Demand	IOD
Educators' SIG	HOM-137	Intelligence Test	TMC-32
Edutech	CAI	Internal Revenue Services	IRS
Edutech Project Pilot	CAI	Kaypro Users Forum	PCS-25
Election '84	VOT	Kesmai	GAM-46
Electronic Bounce Back	EBB	Legal SIG	SFP-40
Electronic Gourmet	HMS	Literary SIG	HOM-136
Entertainment SIG	HOM-29	Loan Amortization	HOM-17
Environmental SIG	SFP-38	Logicial Systems Inc SIG	PCS-49
EpsOnLine	PCS-19	Lunar Lander	GAM-24
Evans Economic Inc.	EEI	MUSUS SIG	PCS-55
FOI Newsline - FDA Info.	FOI	Magic Cube Solution	GAM-35
Family Matters SIG	HOM-144	Max Ule's Tickerscreen	TKR
Fantasy	GAM-16	Maze	GAM-38
FasterMind	GAM-17	MegaWars I	GAM-209
Fedwatch Newsletter	MMS	MegaWars II	GAM-305
Feedback to CompuServe	CIS-8	MegaWars III	GAM-105
Fifth Avenue Shopper	FTH	MicroQuote	FIN-9
Financial Forecasts	FIN-4	MicroShoppe	MCS
Financial Services	FIN-20	Microsoft SIG	PCS-145
Fire Fighters' SIG	SFP-36	Military Vets Forum	SFP-10
Firstworld Travel Club	TVL	Mine Equipment	MIN-100
Flying Buffalo	GAM-41	Miner's Underground	SFP-44
Food Buyline SIG	HOM-151	Money Market Services	MMS

COMPUSERVE CIS SUBJECT INDEX (Cont'd)

SUBJECT	GO CODE	SUBJECT	GO CODE
Monthly Charges	MON	SHO-TIME Movie Catalog	MOV
Mugwump	GAM-39	Science Educ. Forum	edu-13
Multi-Player GameSIG	GAM-300	Scott Adams' Games	GAM-28
Music Information Service	MUS	Scramble	GAM-43
Music SIG	HOM-150	SeaWar	GAM-57
NOAA Weather Wire	WEA	Shareholders Freebies	FRE
NSBA Forum	EDU-9	Shawmut Bank of Boston	SHW
NSPRA Forum	EDU-10	Shop-at-home	HOM-40
NWS Aviation Weather	AWX	Showbiz Quiz	SBQ
Narrow-Gauge Scout	LMC	Ski SIG	HOM-36
National Issues SIG	HOM-132	Social Security Admin.	SSA
National Water Well Assoc.	WWA	Society of Mining Engineers	SME
Netwits Database	WIT	Software Author's SIG	PCS-117
Netwits SIG	WIT-100	Space SIG	HOM-127
New Adventure	GAM-59	Space Trek	GAM-26
News-A-Tron	NAT	Space War	GAM-25
Newspapers	HOM-10	Sports SIG	HOM-110
Node Abbreviations	LOG-51	StL Post-Disp., Autos	SPD
OS9 SIG	PCS-18	StL Post-Disp., Business	SPD
Official Airline Guide	OAG	StL Post-Disp., Classified	SPD
Ohio Scientific SIG	PCS-125	StL Post-Disp., Jobs	SPD
OnModem Magazine	ONM	StL Post-Disp., Real Estate	SPD
Orch-90 SIG	HOM-13	StL Post-Disp., Sports	SPD
Outdoor SIG	HOM-38	StL Post-Disp., U.S. News	SPD
PDP-11	PCS-53	Standard & Poor's	FIN-20
PGA Official Tour Guide	PGA	State Capital Quiz	TMC-44
PR and Marketing Forum	SFP-48	Stevens Business Reports	SBR
Pan Am Travel Guide	PAN	TELE Forum	edu-11
Panasonic SIG	PCS-114	TELECUE Forum	edu-12
Parenting & Family Life	PFL	TRS-80 Prof. Forum	PCS-21
Pascal SIG	PCS-55	TRS80 Model 100 SIG	PCS-154
Peak Delay Guide	PDG	TYMNET logon instructions	LOG-11
Personal Computing	PCS	Tandy Newsletter	TRS
Personal File Area	CIS-174	TeleComm SIG	PCS-52
Personality Profile	TMC-17	Telenet logon instruct	LOG-20
Popular Science, Autos	PSC	Terminal Software	PCS-20
Popular Science, Energy	PSE	Texas Instruments Forum	PCS-27
Popular Science, New Prod.	PSP	Text Editors	PCS-20
PowerSoft's XTRA-80	PCS-56	The Business Wire	TBW
Primetime Radio Classics	PRC	The College Board	TCB
Product Ordering	CIS-54	The Electronic Mall	EM
Programmer's SIG	PCS-158	The Multiple Choice	TMC
Quick Quote	FIN-20	The National Satirist	KCS
Quick Reference List	CIS-185	The New Tech Times	NTT
RCA SIG	PCS-57	The World of Art	ART
Rapaport Diamond Broker	RDC	The World of Lotus	LTS
Religion SIG	HOM-33	Touch-Type Tutor	TMC
Republican Forum	HOM-41	Travel Fax	ESC
Reversi	GAM-40	Travel SIG	HOM-157
Roulette	GAM-42	TravelVision	TRV
SAVINGS-SCAN	SAV	Trivia Test	TMC

COMPUSERVE CIS SUBJECT INDEX (Cont'd)

SUBJECT	GO CODE	SUBJECT	GO CODE
USA Olympics	USA	Wash. Post, Gov't News	TWP
Unified Management	UMC	Wash. Post, Politics	TWP-15
United American Bank	HOM-152	Wash. Post, Sports	TWP
User Directory	HOM-4	Wash. Post, U.S. News	TWP
VAX SIG	PCS-16	Wash. Post, World News	TWP
VIDTEX Information	VID	West Coast Travel	WCT
Value Line Financials	FIN-20	What's New	NEW
Value Line Projections	FIN-18	Whole Earth Software SIG	WEC
Veterinarians Forum	SFP-37	Words of Wit & Wisdom	WWW
Video Information	VIF	Work-at-home SIG	HOM-146
Wash. Post, Business	TWP-12	Worldwide Exchange	WWX
Wash. Post, Editorials	TWP	Wumpus	GAM-44
Wash. Post, Financial	TWP		

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It's kind of breathtaking, isn't it? All those services and categories of information available for just $6.00 per hour! Well, we said at the beginning that the world of online services available through your PCjr would be hard to believe, and it is. And CompuServe CIS is just one service of dozens that is available to the everyday PCjr user.

In this chapter, we can only look at the bare minimum of what these services have to offer. If you are interested, pick up a book that details each service or contact the service directly and ask for more information. Appendix H has addresses and telephone numbers for most consumer and executive services.

The way we will survey these services is to scan the available user menus. This gives a pretty good general idea of what's online at each service.

Let's take a look at some of the main menus for CompuServe's Consumer Information Service, and see why CompuServe is now the second most popular information utility.

CompuServe   Page CIS-1

CompuServe Information Service

1 Home Services
2 Business & Financial
3 Personal Computing
4 Services for Professionals
5 The Electronic Mall (tm)
6 User Information
7 Index

Enter your selection number, or H for more information.

CompuServe CIS Main Menu

CompuServe   Page HOM-1

HOME SERVICES

1 News/Weather/Sports
2 Reference Library
3 Communications
4 Home Shopping/Banking
5 Discussion Forums
6 Games
7 Education
8 Home Management
9 Travel
10 Entertainment

Last menu page. Key digit or M for previous menu.

CompuServe CIS Home Services Menu

CompuServe   Page FIN-1

BUSINESS AND FINANCIAL SERVICES

1 News & Financial Analysis
2 Investments & Quotations
3 Communications
4 Brokerage & Banking
5 Reference Library
6 Discussion Forums
7 Travel Services
8 Personal Finance

Last menu page. Key digit or M for previous menu.

CompuServe CIS Business & Financial Services Menu

CompuServe   Page PCS-1

PERSONAL COMPUTING SERVICES
1 News
2 Reference
3 Communications
4 Shop at Home
5 Communication Forums
6 Personal File Area

Last menu page. Key digit or M for previous menu.

CompuServe CIS Personal Computing Services Menu

CompuServe   Page SFP-1

Services for Professionals

1 Aviation
2 Communications/ Data Processing
3 Engineering/Technical
4 Legal
5 Medical
6 Jewelers
7 Real Estate
8 Military Veterans Services

Last menu page. Key digit or M for previous menu.

CompuServe CIS Professional Services Menu

The Electronic Mall   Page EM-1

. . . .

                    The Electronic Mall (tm)

. . . .

1 Introduction
2 New & Noteworthy
3 Ordering Instructions
4 Directory of Merchants
5 Browse the Mall
6 Talk to the Mall Manager
7 Enter the Electronic Mall

Key digit or M for previous menu

CompuServe CIS Electronic Mall Menu

CompuServe   Page CIS-4

USER INFORMATION

1 What's New
2 Command Summary & Usage Tips
3 Feedback to CompuServe
4 Order Products, Guides, etc.
5 Change Terminal Settings
6 Change Your Password
7 Billing: Your Charges, Rates Options, Making Changes
8 Logon Instructions & Numbers
9 Online Today Electronic Edition

Last menu page. Key digit or M for previous menu.

CompuServe CIS User Information Menu

```
CompuServe          ·              Page IND-1

INDEX

1 Search for Topics of Interest
2 List ALL Indexed Topics
3 Quick Index List
4 Explanation of Index

Last Menu page. Key digit or M for previous menu
```

CompuServe CIS Index Menu

CIS Menus reprinted by permission of CompuServe, Inc.

EXECUTIVE INFORMATION SERVICE

In mid-1983, CompuServe introduced a new service for business managers and executives called the Executive Information Service. The new service offers sophisticated financial and business databases and several types of EMAIL services to business subscribers for home and office use.

The Executive Information Service is focused on engineering, financial, and management professionals and offers many special services in addition to access to the Consumer Information Service.

The EIS is designed for access by professional computers as well, and supports a full 80-column by 24-line screen size. A special communications package, The PC Professional Connection, has been developed for the IBM PC and PCjr (version 2.2 and later) by CompuServe to support the enhanced terminal functions of EIS.

A look at the available menus for the CompuServe EIS will give an idea of the wide variety of services available.

```
CompuServe                    Page EIS-1

EXECUTIVE INFORMATION SERVICE

1 Communications              6 Shopping
2 Investments & Quotations    7 Weather
3 Decision Support            8 Professional & Technical
4 News                        9 Consumer Information Service
5 Travel                      10 User Information

Enter your selection number, or H for more information.
```

CompuServe EIS Main Menu

CompuServe   Page COM-1

COMMUNICATIONS

1 InfoPlex (Electronic Mail)   5 Directory of Users
2 Electronic Conferencing   6 Feedback to CompuServe
3 National Bulletin Board   7 Transaction Charges
4 Professional Forums

Last menu page. Key digit or M for previous menu.

CompuServe EIS Communications Menu

CompuServe   Page IQ-1

INVESTMENTS & QUOTATIONS

1 Ticker Retrieval Reports   7 Investment Analysis
2 Expert User   8 Economic/Financial Outlooks
3 Current-Day Pricing   9 Financial Forums
4 Historical Pricing   10 Banking & Brokerage Services
5 Annual & Quarterly Reports   11 User Information
6 Estimates & Projections   12 Transaction Charges

Last menu page. Key digit or M for previous menu.

CompuServe EIS Investments & Quotations Menu

CompuServe   Page DS-1

DECISION SUPPORT

1 Demographics
2 Statistics
3 Information on Demand
4 IRS Tax Information
5 Donoghue Moneyletter
6 Transaction Charges
Last menu page. Key digit or M for previous menu.

CompuServe EIS Decision Support Menu

CompuServe   Page NWS-1

NEWS

1 AP Viewdata   7 InfoWorld
2 CP Business Information Wire   8 Evans Economics Electronic News Svc.
3 The National Business Wire   9 News-A-Tron Market Reports
4 The Washington Post   10 Business & Law Review
5 MMS Financial Reports   11 Transaction Charges
6 Stevens' Small Business Rpts

Last menu page. Key digit or M for previous menu.

CompuServe EIS News Menu

CompuServe   Page TRA-1

TRAVEL

1 Official Airline Guide
2 Firstworld Travel Club
3 Transaction Charges

Last menu page. Key digit or M for previous menu.

CompuServe EIS Travel Menu

CompuServe   Page SHO-1

SHOPPING

1 Comp-U-Store
2 The Software Exchange - SOFTEX

Last menu page. Key digit or M for previous menu.

CompuServe EIS Shopping Menu

WEATHER   Page WX-3

 1 State Forecasts
 2 Extended Forecasts
 3 Forecast Explanation
 4 Probability of Precipitation
 5 Marine Forecasts
 6 Sports Forecasts
 8 Weather Warnings
12 Aviation Weather Menu

Selection:

CompuServe EIS Weather Menu

CompuServe   Page TIS-1

Professional and Technical Services

1 Introduction to Professional and Technical Services
2 Aviation
3 Data Processing
4 General Engineering
5 Mining and Energy

Last menu page. Key digit or M for previous menu.

CompuServe EIS Professional & Technical Services Menu

CompuServe   Page PF-10

AVIATION

1 ASI Newsletter
2 Special Interest Group
3 NWS Aviation Weather
4 EMI Flight Plan
5 Peak Delay Guide
6 Aircraft Insurance
7 Official Airline Guide

Key digit or H for help

CompuServe EIS Aviation Services Menu

CompuServe   Page GUI-1

USER INFORMATION

1 What's New	8 Customer Service
2 Index	9 Feedback
3 Telephone Numbers	10 Service Rates
4 Terminal Settings	11 Reviewing Your Charges
5 Command Summary / Usage Tips	12 Changing Your Password
6 Commonly Asked Questions	13 Changing Your Credit Card Information
7 Ordering Documentation / Products	

Last menu page. Key digit or M for previous menu.

CompuServe EIS User Information Menu

You are entering the CompuServe Information Service. Type GO EIS at any
exclamation prompt to return to the Executive Service.

CompuServe   Page CIS-100

CompuServe Information Service

1 Home Services
2 Business & Financial
3 Personal Computing
4 Services for Professionals
5 The Electronic Mall (tm)
6 User Information
7 Index
8 Executive Information Service

Enter your selection number, or H for more information.

CompuServe EIS Consumer Information Service Menu

EIS menus reprinted by permission of CompuServe, Inc.

THE SOURCE

The Source was founded in 1979 as Source Telecomputing Corporation and was acquired by The Reader's Digest Association in 1980. The Source has benefited from its parent's heavy capital commitment to expansion and has added many features and services since 1980.

The Source had about 60,000 subscribers as of October, 1984. This number is growing at about 50 percent per year. One reason why the Source's growth has been slower than that of CompuServe or Dow Jones is that until mid-1984 the Source charged $100 for a sign-up kit — twice that of the other services. Now the price has been reduced to a more competitive $49.95.

The Source offers the most complete user manual of any of the major services — the 1983 edition was a soft-bound 8½ x 11-inch, 271-page user manual. This makes it easier, and less expensive to learn how to use the service.
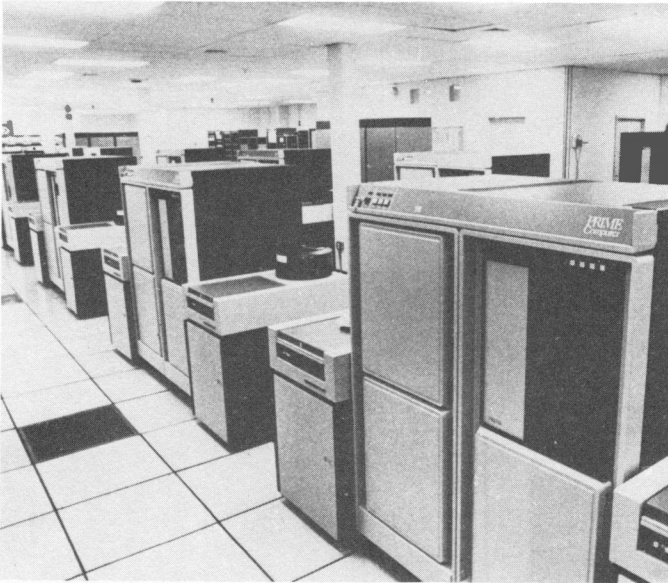
FIGURE 5.2   The Source Computer Center. (Photo courtesy Source Telecomputing Corp.)

As it is difficult to give an in-depth survey of the online services, we will list the basic menus available on the Source at the time of publication. This gives a good idea of what the Source has to offer online.

WELCOME TO THE SOURCE

1 USING THE SOURCE
2 TODAY
3 BUSINESS UPDATE
4 THE SOURCE MAIN MENU
5 WHAT'S NEW
6 COMMAND LEVEL

Enter item number or HELP

The Source - Welcome Menu

```
          ***************
   ******   TODAY   ******
          ***************
             Friday
       September 28, 1984
```

1 A DAY TO REMEMBER, BECAUSE...
2 YOUR HOROSCOPE FOR TODAY
3 TV HIGHLIGHTS
4 CRITIC'S CHOICE: Mini Movie Reviews
5 OPINION FORUM: Manliness A Campaign Issue
6 FEATURES: Fulfilling Your Sports Fantasies
7 PERSONALITIES: Ellsworth Bunker Dead At Age 90; People

Remember: For the latest news of the day, type BULLETIN
          For all the sports results, type SPORTS

Enter item number or Help

The Source — Today

THE SOURCE MAIN MENU

1 NEWS AND REFERENCE RESOURCES
2 BUSINESS/FINANCIAL MARKETS
3 CATALOGUE SHOPPING
4 HOME AND LEISURE
5 EDUCATION AND CAREER
6 MAIL AND COMMUNICATIONS
7 PERSONAL COMPUTING

Enter item number or HELP

The Source — Main Menu

NEWS & REFERENCE RESOURCES

1 NEWS AND SPORTS
2 GOVERNMENT AND POLITICS
3 BYLINES NEWS FEATURES
4 ACCU-WEATHER ** NEW **

Enter item number or HELP

The Source — Resource Menu

NEWS AND SPORTS

1 UPI NEWS SERVICE
2 SCRIPPS-HOWARD NEWS SERVICE
3 THE EDITORIAL PAGE
4 UPI SPORTS
5 THE WASHINGTON POST
6 ASSOCIATED PRESS

Enter item number or HELP

The Source — News and Sports Menu

GOVERNMENT AND POLITICS

1 PRESIDENT'S SCHEDULE (DAILY)
2 SENATE COMMITTEE
3 HOUSE COMMITTEE
4 POLITICAL COMMENTARY

Enter item number or HELP P

The Source — Government and Politics Menu

BYLINES on THE SOURCE

FRI, SEP. 28 1984

1 Viewpoints
2 The Arts
3 The Locker Room
4 Around the House
5 Confidentially . . .
6 Leisure
7 Health and Technology
8 Lifestyles

Enter item number or <H>elp:

The Source — Editorial Page Menu

BUSINESS/FINANCIAL MARKETS

1 FINANCIAL MARKETS
2 ANALYSIS
3 NEWS AND COMMENTARY
4 RESEARCH AND REFERENCE

Enter item number or HELP

The Source — Business and Financial Markets Menu

RESEARCH AND REFERENCE

1 INFORMATION ON DEMAND
2 MANAGEMENT CONTENTS

Enter item number or HELP P

The Source — Research Menu

FINANCIAL MARKETS

1 NYSE CLOSING PRICES
2 AMEX CLOSING PRICES
3 UNISTOX
4 MEDIA GENERAL STOCK ANALYSIS
5 STOCKCHECK

Enter item number or HELP P

The Source — Financial Markets Menu

NEWS AND COMMENTARY

1 UPI BUSINESS NEWS
2 MANAGEMENT CONTENTS
3 DONOGHUE MONEY LETTER

Enter item number or HELP P

The Source — Business News Menu

CATALOG SHOPPING

1 BOOKS
2 RECORDS, RADIO CLASSICS
3 CLASSIFIED ADS
4 COMP-U-STORE

Enter item number or HELP

The Source — Shopping Menu

HOME AND LEISURE

1 GAMES
2 ADVICE AND BIORHYTHMS
3 TRAVEL & DINING
4 ENTERTAINMENT

Enter item number or HELP 1

The Source — Home & Leisure Menu

GAMES

1 INSTRUCTIONS
2 THE SOURCE GAME LIBRARY
3 ADVENTURE (550 PT VERSION)
4 CASTLEQUEST
5 HANGMAN
6 BIORHYTHM
7 MARKET
8 STOCKS
9 MORE GAMES

Enter item number or HELP 9

GAMES MENU II

1 SUPER BLACKJACK
2 BLACKDRAGON
3 CHECKERS
4 CIVIL WAR
5 OFF TRACK BETTING
6 EXPLORE
7 PRINTWIZ
8 BACKGAMMON

Enter item number or HELP

The Source — Games Menus

TRAVEL & DINING

1 DOMESTIC FLIGHTS
2 INTERNATIONAL FLIGHTS
3 TRAVEL TIPS & SPECIALS
4 TRAVEL RESERVATIONS
5 RESTAURANT GUIDE
6 OFFICIAL AIRLINE GUIDE
7 ACCU-WEATHER ** NEW **

Enter item number or HELP

The Source — Travel and Dining Menu

ENTERTAINMENT

1 WEEKLY BESTSELLERS LIST
2 MOVIE REVIEWS
3 MUSIC NEWS
4 TV PREVIEWS
5 SOAP OPERA TUNE IN

Enter item number or HELP

The Source — Entertainment Menu

MAIL AND COMMUNICATIONS

1 MAIL
2 CHAT
3 POST
4 PARTICIPATE
5 MAILGRAM MESSAGES
6 ECOM MESSAGES
7 MEMBER DIRECTORY

Enter item number or HELP P

The Source — Mail and Communications Menu

PERSONAL COMPUTING

1 MICROLINE
2 USER PUBLISHING
3 SOURCE MANUALS
4 TEXT EDITOR
5 FILE TRANSFER TO THE SOURCE
6 PROGRAMMING
7 MICROSEARCH

Enter item number or HELP

The Source — Personal Computing Menu

The Source menus reprinted by permission of Source Telecomputing, Inc.

DOW JONES NEWS/RETRIEVAL

Dow Jones News/Retrieval Service has been operating since 1974, offering stock market and financial information, but it did not begin its dramatic growth until 1980 when it struck a deal with Tandy Corporation (Radio Shack) to sell a simple sign-up kit with Radio Shack compatible VIDTEX software for TRS-80 computers.

DJN/R now boasts over 160,000 subscribers — more than any other service — and offers a full spectrum of online services. It is also one of the most

expensive services, with minimum rates of $.90 per minute ($54 per hour) for 300 baud and $1.80 per minute ($108 per hour) for 1200 baud during prime time. Dow Jones is able to charge these rates because of the value of its online information.

With its major emphasis on stock and financial information, Dow Jones is primarily a service for investors and brokers, financial experts, and business managers. Many people who manage their own investment portfolios find DJN/R information priceless.

Dow Jones also offers several software packages which allow the user to automatically access the service, extract the needed information, and store it offline in their PC with the minimum online connect time for later analysis.

The PCjr user interested in these packages should contact Dow Jones directly to verify specific DJ software product compatibility with the IBM PCjr.

A look at the Dow Jones News/Retrieval menus gives a good picture of what is available online from this service, and why DJN/R is the most popular consumer/executive online service.

```
                    DOW JONES NEWS/RETRIEVAL
                       COPYRIGHT (C) 1984
                    DOW JONES & COMPANY, INC.
                       ALL RIGHTS RESERVED.


ARGENTINA, IMF REACH ACCORD
ON PROGRAM TO PAY OFF
FOREIGN DEBT, SEE //NEWS.
DATA-BASE LIST IN //MENU.
ENTER QUERY
     //MENU



                        Master Menu
                      Copyright (C) 1984
                   Dow Jones & Company, Inc.



PRESS                              FOR
  A            Dow Jones Business And Economic News Services
  B            Dow Jones Quotes
  C            Dow Jones Text-Search Services
  D            Financial And Investment Services
  E            General News And Information Services
  F            Mail Service and Free Customer Newsletter
```

Dow Jones News/Retrieval Main Menu

Dow Jones Business
And Economic News Services

For help, type code and HELP.
(Example: //DJNEWS HELP)

TYPE	FOR
//DJNEWS	90-Day News From The Broadtape, Selections From Barron's And The Wall Street Journal
//UPDATE	Weekly Economic Update: A Roundup Of The Past Economic Week
//WSJ	Wall Street Journal Highlights Online: Summaries Of The Past Five Editions Of The Wall Street Journal

Dow Jones News/Retrieval Business News Menu

Dow Jones Quotes

For help, type code and HELP.
(Example: //CQ HELP)

TYPE	FOR
//CQ	Current Price Quotes On Stocks And Other Financial Instruments, Delayed 15 Minutes
//CQE	Enhanced Current Quotes: //CQ With Dow Jones News Alert
//DJA	Historical Dow Jones Averages: Daily Summaries Of The 4 Dow Jones Market Averages
//HQ	Historical Stock Market Price Quotations
	✶ ✶ ✶
//RTQ	Real Time Quotes: Major Exchange Stock Quotes With No Delay And Dow Jones News Alert

Dow Jones News/Retrieval Quotes Menu

Dow Jones Text-Search Services
For help, type //TEXT HELP

TYPE	FOR
//TEXT	Text-Search Services
	1. Wall Street Journal Full-Text Version From January 1984
	2. Dow Jones News From June 1979

Dow Jones News/Retrieval Free Text-Search Menu

Financial and
Investment Services

For help, type code and HELP.
(Example: //DSCLO HELP)

TYPE	FOR
//DSCLO	Disclosure II: Financial And Management Information On 9,400 Public Companies
//EARN	Corporate Earnings Estimator: Consensus Earnings Forecasts For 3,000 U.S. Companies
//FORBES	Forbes Directory: Rankings of Top Corporations And Major U.S. Industries
//KYODO	Japan Economic Daily: Same-Day Coverage of Business and Economic News From Japan
//MEDGEN	Media General: Price, Volume and Fundamental Data on Over 4,300 Companies And 180 Related Industries
//MLYNCH	Weekly Highlights Of Investment Research From The Securities Research Division of Merrill Lynch
//MMS	Money Market Services: Weekly Survey Of U.S. Money Market And Foreign Exchange Trends
//OAG	Official Airline Guide: Airline Schedules and Fare Information

For an overview, type //DJ HELP

Dow Jones News/Retrieval Financial/Investment Services Menu

General News And
Information Services

For help, type code and HELP.
(Example: //DEFINE HELP)

TYPE	FOR
//DEFINE	Words of Wall Street: Definitions Of 2,000 Investment Terms
//ENCYC	Electronic Edition Of The Academic American Encyclopedia
//MOVIES	Reviews Of Thousands Of Movies Produced Since 1926 With Weekly Updates Of New Films
//NEWS	Continuously Updated World News Report
//SPORTS	Continuously Updated Sports Report
//STORE	Comp-U-Store: Online Shopping Service
//SYMBOL	Directory Of Stock Symbols, Updated Daily
//WTHR	Weather News And Temperature Tables
//WSW	Transcripts Of The PBS Television Show 'Wall Street Week'

* * *
Press D and RETURN for airline
fares and schedules.
* * *

For an overview, type //DJ HELP

Dow Jones News/Retrieval General News & Information Menu

Dow Jones News/Retrieval menus reprinted by permission of Dow Jones News/Retrieval.

Users may access Dow Jones News/Retrieval Service directly by subscription to the service and also via an MCI Mail account. MCI Mail users can access Dow Jones News/Retrieval Service by choosing DOWJONES from the MCI Mail Main Menu. All regular services except the non-delayed stock quote service are available to MCI Mail subscribers at normal Dow Jones rates.

DELPHI

Delphi, the newest consumer information service, offers many of the same features as the larger services, but is focused more toward computer users (much as the original MicroNet on CompuServe was oriented toward computer users). Delphi has somewhat limited services at present, but they have been growing at a rapid rate, and currently boast over 5,000 subscribers.

Delphi's user guide is a small 10-page pamphlet listing all of the currently available commands. The system has an online help system like its larger brothers, but it is not as sophisticated.

Delphi has games, an encyclopedia, online news, electronic mail, online publishing, travel and financial services, a bulletin board, online conferences, and special user groups, just like the other services. So what's the difference? For one thing, Delphi only costs $6.00 per hour including communications charges during non-prime hours at both 300 and 1200 baud. For another, Delphi is small enough to still be personal — that is, it's not a monolithic organization. If you have a new idea for a user group or an online service, they might be open to trying it.

Delphi also has a rather neat introduction to their system — the guided tour. When you sign on for the first time, Delphi will take you on a tour of many of the system's features and facilities. And, if you want to go again, just select the Guided Tour from the PROFILE menu.

Here's a brief sample of some of Delphi's menus:

MAIN Menu:

BULLETIN-BOARDS	MAIL
CONFERENCE	NEWS
DELPHI-ORACLE	ONLINE-MARKETS
EXIT	PROFILE
FINANCIAL-SERVICES	SCHEDULER
GAMES	SPECIAL-INTERESTS
HELP	TRAVEL
INFOMANIA	WRITERS-CORNER
LIBRARY	USING-DELPHI

MAIN>What do you want to do?

Delphi Main Menu

DELPHI MAIL Menu:

CATALOG of Mail Files	TELEX (Outgoing)
ECOM (CompuMail)	WRITERS-CORNER
GLOBALINK Translation	HELP
MAIL (Electronic)	EXIT
SCAN for New Messages	

DMAIL>(Cat, ECOM, GLOBAL, Mail, Scan, Telex)

Delphi Mail Menu

WRITERS-CORNER Menu:

APPEND	HELP
CATALOG	HOME
COMMON	LIST
COPY	PUBLISH
CREATE	PURGE
DELETE	RENAME
DOWNLOAD	TYPESET
EDIT	UPLOAD
EXIT	

WC> (Please Select a Command)

Delphi Writer's Corner Menu

BULLETIN-BOARDS Menu:

ADD your own message
EXIT
HELP
READ posted messages
MEMBER-LISTS
CONFERENCE-SCHEDULE

BBOARDS>(ADD,READ,MEM-LIST,CONF-SCHED)

List of all groups . . .

ADAM	APPLE
ATARI	CHATTER
COLOR COMPUTER	CPM
DIGITAL	EPSON QX-10
GENERAL	IBM-PC
MARINE RESEARCH	TEXAS INSTRUMENTS
TIMEX/SINCLAIR	TRS80
VIC-COMMODORE	

Delphi User Groups and Bulletin Boards

Delphi menus reprinted by permission of General Videotex Corp.

Accessing Information Utilities with the PCjr

All you need to connect to an information utility is your Entry or Enhanced PCjr computer system equipped with a modem and communications software, a sign-up kit or a password (and account) for the service you wish to use, and your telephone.

HARDWARE AND SOFTWARE

First, you must set up your PCjr for communications as covered in the previous chapters by installing a modem and connecting the modem to your telephone line.

Second, you must select a communications software package to use. To start out, the TERM program included with IBM PCjr Cartridge BASIC is a useful terminal emulator. The IBM *Personal Communications Manager* program covered in Chapter 3 is also a good program to use for online access if you have an Enhanced PCjr. Any of the programs covered in Chapter 11 would also be useful for hooking up to the online services.

SIGN-UP KITS

Next, you must set up an account or buy a subscription kit for the service or services you wish to use. The best deal going is the Radio Shack Compu-Serve/Dow Jones sign-up kit for $19.95 (Catalog No. 26-2224). Other retail options include the Source Pack sign-up kit for $49.95, the CompuServe CIS kit (with 5 hours online time) for $49.95, the CompuServe EIS kit for $89.95, and the Dow Jones News/Retrieval Connector kit for $45. In addition, some modem makers offer free subscriptions to one or more services with the purchase of modems or other products. If you haven't yet selected your modem, you might look for these values.

Other services include Delphi, the fairly new consumer-oriented utility with a one-time $49.95 sign-up fee and NewsNet, an online full-text special interest business newsletter database with no sign-up charge and a $15 per month minimum billing.

Dialog Knowledge Index and BRS/After Dark may be ordered by mail or by calling their customer service agents directly. The numbers are listed in Appendices F and G. Knowledge Index requires credit card billing while BRS/After Dark will use either a credit card or a cash deposit account. Currently, a Knowledge Index account costs $35 to set up and a BRS/After Dark account costs $75 to start.

GOING ONLINE

Well, the big moment is at hand! You have your starter kit, password, and local telephone access number. You have the TERM program (or other software) in your PCjr and the modem is plugged in and tested.

Now, turn on the PCjr and your monitor. Start the communications program; set the communications parameters to 300 baud, 7 bits even parity or 8 bits no parity, full duplex mode; and dial the access number. For Compu-Serve, this will be the nearest CompuServe access number if possible (to keep online costs low) and for the other services this number will be the local Tymnet or Telenet number for 300 baud access.

For specific sign-on procedures, refer to the following sections for the particular service you are calling. Note that user entries are shown in bold type.

COMPUSERVE CONSUMER INFORMATION SERVICE

CompuServe CIS is available for standard or non-prime time access from 6 p.m. to 5 a.m. local time weekdays and all day on Saturday, Sunday, and announced CompuServe holidays for just $6.00 per hour at 300 baud. Prime time access is much more expensive — $12.50 per hour for 300 baud access between 8 a.m. and 6 p.m. local time on weekdays.

To sign on CompuServe CIS, you will need your ID and password and your local direct or network access telephone number.

Contact CompuServe customer service for more sign-on details or for help at 800/848-8990.

Note: If you use the Tymnet or Telenet data networks to access CompuServe, you will be subject to an added communications surcharge of $2.00 for standard time and $10.00 for prime time connections. Use the nearest CompuServe direct access number if at all possible for the lowest cost.

CIS DIRECT ACCESS

Note: These instructions assume you have accessed CompuServe Consumer Information Service through a CompuServe local access number. If you have used Tymnet or Telenet, a different procedure (below) applies.

Dial the local direct access CompuServe number (listed in Appendix B). When your PCjr system announces that you are connected, type <Ctrl-C>:

   <Ctrl-C>

The CompuServe computer will respond with:

   User ID:

You should type your User ID number like this:

   User ID: **70000,100<Enter>**

The host computer will respond (after a short delay):

   Password:

You should now type the temporary password provided in your sign-up kit (usually two words separated by a punctuation mark) like:

   Password: **GOOSE?DOOR<Enter>**

The password you type will not show on your screen! This is to protect your password from being seen by others near your terminal. If you make a typing error, you will be given a second chance to sign on.

Now, read the section on CIS Service Sign-up below.

CIS VIA TYMNET

Dial the local Tymnet access number. When your PCjr system announces that you are connected, you will see

   please type your terminal identifier

(Note: The above message will be garbled if you are signing on at a speed other than 300 baud, and will look something like

   |x|x|

so don't be concerned.) Now type "A" (do not type <Enter>!). The Tymnet network controller will respond with:

   please type your terminal identifier **A**
   -3300-031-
   please log in:

Now enter the CompuServe network address code: "CPS<Enter>"

   please log in: **CPS<Enter>**

Note: if you are asked for the "host name" type "CIS<Enter>".

   host: WELCOME TO COMPUSERVE 1133
   User ID:

You should type your User ID number like this:

   User ID: **70000,100<Enter>**

The host computer will respond (after a short delay):

   Password:

You should now type the temporary password provided in your sign-up kit (usually two words separated by a punctuation mark) like:

   Password: **GOOSE?DOOR<Enter>**

   Now, read the section on CIS Service Sign-up below.

CIS VIA TELENET

Dial the local TELENET access number. When your PCjr system announces that you are connected, type

   <Enter><Enter>

   The TELENET network controller will respond with:

   TELENET
   202 08C

   TERMINAL =

Now type "D1<Enter>"

   TERMINAL = **D1<Enter>**

   @

Now type the TELENET network address connect code for CompuServe
"C 202202<Enter>" or "C 614227<Enter>"

> @C 202202<Enter>

> 202 202 CONNECTED

> User ID:

You should type your User ID number like this:

> User ID: 70000,100<Enter>

The host computer will respond (after a short delay):

> Password:

You should now type the temporary password provided in your sign-up kit
(usually two words separated by a punctuation mark) like:

> Password: GOOSE?DOOR<Enter>

Now, read the section on CIS Service Sign-up below.

CIS SERVICE SIGN-UP

The first time you sign on, you will be asked to provide billing and other information to set up your account. This question and answer session is brief
and easy to complete. If you wish, you may terminate the sign-up procedure,
but your online access will stop when your free time runs out, so you should
complete the sign-up as soon as possible to receive your regular password
quickly.

At this point you should see the sign-on bulletins and then the Compu
Serve CIS Main Menu, Page CIS-1. You must push <Enter> or a selection at
each menu to proceed through the CompuServe system. You may also type
"GO CIS-1" (or any other page) to go directly to a specific area. Compu
Serve provides a Subject Index with page numbers to help users navigate
through the system easily.

You made it! You are now connected to CompuServe's Consumer Information Service. Happy exploring, but don't forget the $6.00 per hour evening
access charge plus the communications surcharge.

THE SOURCE

The Source is available via TELENET, UNINET, and SOURCENET. TE
LENET and UNINET procedures are outlined below. SOURCENET is a
direct access network available to users in Washington, D.C., New York, and
Chicago.

To sign on the Source you need your computer system number, your ID number, your password, and your local network access telephone number from Appendix A. Contact the Source customer service at 800/336-3366 for more sign-on details or for help.

THE SOURCE VIA TELENET

Dial the local TELENET access number. When your PCjr system announces that you are connected, type

> \<Enter\>\<Enter\>

The TELENET network controller will respond with:

> TELENET
> 202 08C

> TERMINAL =

Now type "D1\<Enter\>"

> TERMINAL = **D1\<Enter\>**

> @

Now type the TELENET network address connect code for The Source corresponding to the computer system number you have been assigned:

SOURCE TELENET SYSTEM ADDRESSES

SYSTEM	CODE
System 10	C 30124
System 11	C 30138
System 12	C 30147
System 13	C 30128
System 14	C 30149
System 15	C 30148
System 16	C 301156
System 17	C 301159
System 18	C 301162
System 19	C 301158

Thus, if you are assigned to System 14, you would enter

> **@C 30149\<Enter\>**

> 301 49 CONNECTED
> Connected to THE SOURCE
> \>

Next, enter "ID ", followed by your ID number and password as

>**ID TCA000 JOE**<**Enter**>

TCA000 (user 99) logged in Thursday, 18 Oct 84 16:26:48.
Welcome, you are connected to THE SOURCE.
Last login Thursday, 18 Oct 84 16:21:40

You will now see the Source introductory menu.

THE SOURCE VIA UNINET

Dial the local UNINET access number. When your PCjr system announces
that you are connected, type

<**Enter**>.<**Enter**> (Note the period)

The UNINET network controller will respond with:

uninet pad 77ca port 06
service:

Now type the UNINET network address connect code for The Source corre-
sponding to the computer system number you have been assigned:

SOURCE UNINET NETWORK ADDRESSES

SYSTEM	CODE
System 10	S10
System 11	S11
System 12	S12
System 13	S13
System 14	S14
System 15	S15
System 16	S16
System 17	S17
System 18	S18
System 19	S19

Thus, if you have been assigned to System 14, type

service: **S14**<**Enter**>

*u001 000 connected to 70300007
Connected to THE SOURCE
>

Next, enter "ID ", followed by your ID number and password as

>**ID TCA000 JOE<Enter>**

TCA000 (user 99) logged in Thursday, 18 Oct 84 16:26:48.
Welcome, you are connected to THE SOURCE.
Last login Thursday, 18 Oct 84 16:21:40

You will now see the Source introductory menu.

SOURCE VIA IN-WATS

SOURCENET also offers IN-WATS line service (with a 25-cent-per-minute surcharge) for those subscribers who are located a considerable distance from a city with a local network access. The IN-WATS service is available at 300 baud only and uses an access procedure similar to that of TELENET.
   The access numbers for IN-WATS are:

800/368-3343 (U.S. except Virginia)
800/572-3517 (Virginia only)

Dial the SOURCENET IN-WATS access number. When your PCjr system announces that you are connected, type

<Enter><Enter>

The SOURCENET network controller will respond with:

SOURCENET
@

Now type the SOURCENET network address connect code for The Source corresponding to the computer system number you have been assigned:

SOURCE SOURCENET SYSTEM ADDRESSES

SYSTEM	CODE
System 10	C 30124
System 11	C 30138
System 12	C 30147
System 13	C 30128
System 14	C 30149
System 15	C 30148
System 16	C 301156
System 17	C 301159
System 18	C 301162
System 19	C 301158

Thus, if you are assigned to System 14, you would enter

> **@C 30149<Enter>**
> 301 49 CONNECTED
> Connected to THE SOURCE
> >

Next, enter "ID ", followed by your ID number and password as

> **>ID TCA000 JOE<Enter>**
> TCA000 (user 99) logged in Thursday, 18 Oct 84 16:26:48.
> Welcome, you are connected to THE SOURCE.
> Last login Thursday, 18 Oct 84 16:21:40

You will now see the Source introductory menu.

Note: Remember, SOURCENET IN-WATS access has a 25-cent-per-minute ($15/hour) surcharge!

DOW JONES NEWS/RETRIEVAL

Dow Jones News/Retrieval Service is available online via all three data networks, TELENET, TYMNET, and UNINET.

To sign on to Dow Jones News/Retrieval, you need your password and your local network access telephone number. Contact Dow Jones customer service at 800/257-5114 for more sign-on details or for help.

DJN/R VIA TYMNET

Dial the local Tymnet access number. When your PCjr system announces that you are connected, you will see

> please type your terminal identifier

(**Note:** The above message will be garbled if you are signing on at a speed other than 300 baud, and will look something like

> |x|x|x|

so don't be concerned.) Now type "A".

Note: Do not press <Enter>! The Tymnet network controller will respond with:

> please type your terminal identifier
> -3300-031-
> please log in:

Now enter the Dow Jones network address code: "DOW1;;"

Note: The second semicolon will not print on your screen. Also, do not press <Enter>.

> please log in: **DOW1;**
> tc> host is online
> WHAT SERVICE PLEASE????

type "DJNS<Enter>"

> WHAT SERVICE PLEASE????
> **DJNS<Enter>**
> ENTER PASSWORD
> MMMMMMMMMMMMMM

Now, enter your password

> ENTER PASSWORD
> **12AB34CDEF<Enter>**

You will now see the Dow Jones News/Retrieval sign-on menu.

DJN/R VIA TELENET

Dial the local TELENET access number. When your PCjr system announces that you are connected, type

> **<Enter><Enter>**

The TELENET network controller will respond with:

> TELENET
> 202 08C
> TERMINAL =

Now type "D1<Enter>"

> TERMINAL = **D1<Enter>**
> @

Now type the TELENET network address connect code for Dow Jones "C 60942<Enter>":

> @**C 60942<Enter>**
> 609 42 CONNECTED
> WHAT SERVICE PLEASE????

type "DJNS<Enter>"

> WHAT SERVICE PLEASE????
> **DJNS<Enter>**
> ENTER PASSWORD
> MMMMMMMMMMMMMM

Now, enter your password

> ENTER PASSWORD
> **12AB34CDEF<Enter>**

You will now see the Dow Jones News/Retrieval sign-on menu.

DJN/R VIA UNINET

Dial the local UNINET access number. When your PCjr system announces that you are connected, type

> **<Enter>.<Enter>** Note the period)

The UNINET network controller will respond with:

> uninet pad 77ca port 06
> service:

Now type the UNINET network address code for Dow Jones News/Retrieval Service "DOW"

> service: **DOW<Enter>**
> *u001 000 connected to 60900006
> WHAT SERVICE PLEASE????

type "DJNS<Enter>"

> WHAT SERVICE PLEASE????
> **DJNS<Enter>**
> ENTER PASSWORD
> MMMMMMMMMMMMMM

Now, enter your password

> ENTER PASSWORD
> **12AB34CDEF<Enter>**

You will now see the Dow Jones News/Retrieval sign-on menu.

DELPHI

Delphi is available online only by direct dial and via the TYMNET data network.

To sign on to Delphi, you need your assigned user name, your password, and your local network access telephone number. Contact Delphi customer service at 800/544-4005 for more sign-on details or for help.

DELPHI VIA DIRECT DIAL

Delphi is available via direct dial at 617/576-0862. The sign-on procedure is

very simple. Dial the DELPHI access number (above). When your PCjr system announces that you are connected, type

    <Enter><Enter>

the system will respond with

    Username:

Now enter your assigned user name like "JSMITH<Enter>"

    Username: **JSMITH<Enter>**
    Password:

And enter your password like "123456ABC<Enter>"

    Password: **123456ABC<Enter>**
    Hello JSMITH
    Welcome to DELPHI

You will now see the bulletins and Delphi main menu.

DELPHI VIA TYMNET

Dial the local Tymnet access numbers. When your PCjr system announces that you are connected, you will see

    please type your terminal identifier

(**Note:** The above message will be garbled if you are signing on at a speed other than 300 baud, and will look something like

    |x|x|x|

so don't be concerned.) Now type "A".

Note: Do not press <Enter>! The Tymnet network controller will respond with:

    please type your terminal identifier **A**
    -3300-031-
    please log in:

Now enter the Delphi network address code: "DELPHI<Enter>"

    please log in: **DELPHI<Enter>**
    host: call connected
    Username:

Now enter your assigned user name like "JSMITH<Enter>"

    Username: **JSMITH<Enter>**
    Password:

And enter your password like "123456ABC<Enter>"

Password: **123456ABC<Enter>**
Hello JSMITH
Welcome to DELPHI

You will now see the bulletins and Delphi main menu.

Next — Database Services

The next chapter discusses the executive and professional online database services. These services offer millions of records of online data which is accessible through your PCjr or other computer or terminal. Although using these services can be expensive, their cost can often easily be justified by the time savings realized in retrieving specific, timely, and accurate data.

If you ever have need of patent, legal, bibliographic, medical, or other types of data, you should consider using one of these online database services.

Online Database Services

The online database services offer an amazing wealth of information for the researcher. These services specialize in organized files of information or "databases." The information may be in the form of references to the original source publication of the data (bibliographic files giving reference to a specific magazine or journal article), it may be in raw numeric form (tables of numbers on a given topic, like "Export Sales of Wheat, 1971-1984"), or it may be in full text form (a transcribed copy of the original source document, like the full text of *The Wall Street Journal* on Dow Jones News/Retrieval).

This section will discuss some of the major online database services. These services are broken down into two categories — executive and professional.

The executive services are designed to be used by the person who will actually make use of the resulting data — the data end user. They are priced at levels of $20 to $60 per hour and include many "online help" features. Some are limited to access at night and on weekends. Billing is usually to credit card accounts.
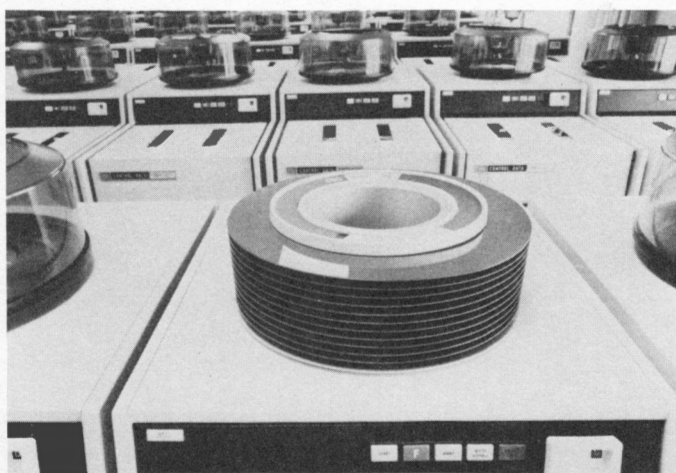
FIGURE 6.1   Dialog Computer Center — 130 Gigabytes of Online Storage. (Photo courtesy of Dialog Information Systems, Inc.)

The professional services are designed for use by a skilled intermediary rather than the end user. The intermediary is often an information specialist or librarian who is a trained online searcher. These services are also used by end users, but to a much smaller degree. Most require a one to three-day training class before using the system. Classes are also available on individual database files and on search techniques. Costs for using the professional services range from $35 to $300 per hour plus communications charges. There is usually no discount for evening or weekend access.

Executive Services

As was discussed in the previous chapter, the executive online services are a relatively new concept in the industry. As more and more managers, engineers, and executives are becoming comfortable with computers, more are doing their own online research. The executive services are designed for the occasional user who needs rapid access to specific and current information. Extensive help menus allow the user to get to the data without special training or constant system use.

Whether this required information is the history of a specific stock's performance or the date of the first Apollo moonwalk, it is probably available online. While this information may also be found using traditional library or industry resources, it may be worth the cost of the online search to have it immediately, without leaving the home or office. Considering the cost of a typical manager's or executive's time, this may be true most of the time.

There are several online services that offer executive databases. CompuServe and The Source are not included here, even though some of their services may be considered executive databases. For those services, please refer to Chapter 5.

DOW JONES NEWS/RETRIEVAL SERVICE

In addition to the financial and stock services discussed in the previous chapter, Dow Jones News/Retrieval Service offers the full text of *The Wall Street Journal*, the Dow Jones News Wire, and Barron's magazine online. A Dow Jones Connector subscription kit costs $49.95, and the Free-Text search service at 300 baud costs $1.20 per minute ($72 per hour) during prime time and $.60 per minute ($36 per hour) during non-prime time.

The full-text search capability of *The Wall Street Journal* is a very useful service for those interested in any type of economic, political, corporate, national, or business research. *The Wall Street Journal* is the largest circulation newspaper in the United States today. This database can be used to research background information on a wide variety of subjects.

To gain the most benefit from the full text search capabilities of DJN/R, subscribers should request the manual "An Introduction to Free Text Search

of Dow Jones News Database" from customer service at 800/257-5114. It is available for no charge.

SAMPLE DOW JONES FREE TEXT SEARCH

WHAT SERVICE PLEASE????
DJNS
ENTER PASSWORD
XXXXXXXXXXXXX

    DOW JONES NEWS/RETRIEVAL
    COPYRIGHT (C) 1984
    DOW JONES & COMPANY, INC.
    ALL RIGHTS RESERVED.

EXXON REPORTS EARNINGS RISE
IN THIRD QUARTER, SEE .XON 01.
STANDARD & POOR'S ONLINE,
//SP, NOW UPDATED.
ENTER QUERY
    //TEXT

                    DOW JONES TEXT-SEARCH SERVICES
                         COPYRIGHT (C) 1984
                      DOW JONES & COMPANY, INC.

PRESS   FOR

    1   THE WALL STREET JOURNAL: FULL-TEXT VERSION FROM JANUARY 1984 * * A
             NEW SERVICE * *

    2   DOW JONES NEWS: BROADTAPE, AND SELECTED STORIES FROM BARRON'S AND
             THE WALL STREET JOURNAL FROM JUNE 1979

    2
DJ/NRS - SEARCH MODE - ENTER QUERY

    1__: IBM

RESULT   2502 DOCUMENTS

    2__: PCJR

RESULT   39 DOCUMENTS

    3__: 1 AND 2

RESULT   35 DOCUMENTS

    4__: 3 AND APPLE

RESULT   10 DOCUMENTS

    5__: . . P 4 ALL/1

DOCUMENT =   1 OF   10   PAGE =   1 OF   7

AN   120810-0715.
HL   IBM PLANS A PARTY -- ANALYSTS THINK TO INTRODUCE COMPUTER
DD   08/10/84
SO   WALL STREET JOURNAL (J)
CO   IBM INTC
IN   COMPUTERS (EDP)
TX   INTERNATIONAL BUSINESS MACHINES CORP. IS THROWING A BIG
            PARTY IN DALLAS NEXT WEEK, AND THE GUEST OF HONOR IS EXPECTED
            TO BE A NEW DESKTOP COMPUTER.
                THE COMPUTER INDUSTRY IS BETTING THAT IBM WOULDN'T HAVE
                                    - MORE -

DOCUMENT =   1 OF   10   PAGE =   2 OF   7

INVITED 1,500 DEALERS, LEADING SOFTWARE PUBLISHERS AND
INDUSTRY CONSULTANTS TO TEXAS JUST TO CELEBRATE THE THIRD
BIRTHDAY OF ITS INDUSTRY-LEADING PERSONAL COMPUTER, WHICH
FALLS ON SUNDAY. INSTEAD, MOST DEALERS AND CONSULTANTS
EXPECT IBM TO USE THE OCCASION TO INTRODUCE A SUCCESSOR TO
THE PC.
    IBM NEVER DISCUSSES PLANS AND STRICTLY FORBIDS OUTSIDE
SUPPLIERS AND DEALERS FROM MENTIONING EVEN THE SMALLEST
DETAILS. BUT OTHERS WHO MAKE A LIVING DIVINING IBM'S NEXT
MOVES EXPECT A NEW DESKTOP COMPUTER -- PROBABLY THE
                                    - MORE -

DOCUMENT =   1 OF   10   PAGE =   3 OF   7

LONG-AWAITED PRODUCT WITH THE NICKNAME "POPCORN." IT WOULD BE
PRICED MUCH HIGHER THAN THE EXISTING PC PRODUCTS AND HAVE FAR
GREATER SPEED AND STORAGE CAPACITY.
    SOME ALSO EXPECT IBM'S ENTRY SYSTEMS DIVISION, WHICH
DEVELOPED AND MARKETS THE PC, TO INTRODUCE SOME TYPE OF
LOCAL-AREA NETWORK.
    THE NEW MACHINE IS EXPECTED TO USE THE 80286
MICROPROCESSOR DEVELOPED BY INTEL CORP., ALLOWING IBM TO
OFFER A COMPUTER THAT CAN PERFORM SEVERAL JOBS AT ONCE. THE
COMPUTER COULD BE A MULTIUSER SYSTEM, ABLE TO BE LINKED TO
                                    - MORE -

DOCUMENT =   1 OF   10   PAGE =   4 OF   7

OTHER TERMINALS. BUT SOME ANALYSTS SAY ANOTHER POSSIBILITY IS
A STANDALONE MACHINE THAT COULD SERVE AS A CENTRAL FILE FOR
PC'S AND PCJR'S HOOKED TOGETHER IN A NETWORK.
    THE DALLAS PARTY INDICATES THAT IBM IS MAKING AN ALL-OUT
EFFORT TO ROUSE DEALER ENTHUSIASM, POSSIBLY INSPIRED BY APPLE
COMPUTER INC.'S EXPENSIVE PARTIES EARLIER THIS YEAR IN
CONNECTION WITH ITS INTRODUCTIONS OF THE MACINTOSH AND THE
APPLE IIC.
    THE ANTICIPATED MACHINE IS EXPECTED TO BE PRICED AT $7,000
OR MORE, PUTTING IT AT THE TOP OF IBM'S PC LINE. AARON
                                    - MORE -

```
        DOCUMENT =      1 OF      10      PAGE =      5 OF      7
GOLDBERG, A SANTA CLARA, CALIF.-BASED ANALYST WITH
INTERNATIONAL DATA CORP. EXPECTS IBM TO OFFER A MACHINE THAT
CAN BE USED BY SEVERAL PEOPLE WORKING AT DIFFERENT TERMINALS.
ROBERT T. FERTIG, A GREENWICH, CONN., CONSULTANT, EXPECTS A
MACHINE HE DUBS "PC SENIOR" WHICH WOULD OFFER MUCH MORE
MEMORY STORAGE THAN THE CURRENT PC.
        FERTIG AND JOHN R. KIEFER OF INFOCORP IN CUPERTINO,
CALIF., EACH EXPECT IBM ALSO TO INTRODUCE A LOCAL-AREA
NETWORK TO LINK THE LARGE FILING CAPACITY OF THE NEW MACHINE
WITH OTHER DESKTOP COMPUTERS. KIEFER SAYS THE NETWORK IS
                            - MORE -

        DOCUMENT =      1 OF      10      PAGE =      6 OF      7
LIKELY TO BE SUPPLIED TO IBM BY AN OUTSIDE MAKER, PROBABLY
SYTEK INC., THAT COULD FURTHER PERPLEX BUYERS OF
OFFICE-NETWORK PRODUCTS, WHO WERE TOLD EARLIER THIS YEAR THAT
ANOTHER IBM DIVISION'S LOCAL-AREA NETWORK, APPARENTLY
INTENDED TO LINK A MUCH BROADER ARRAY OF IBM PRODUCTS, IS AT
LEAST TWO YEARS AWAY. A SPOKESWOMAN FOR SYTEK DECLINED TO
COMMENT.
        THE EXPECTED COMPUTER COULD RESTORE SOME LUSTER TO IBM'S
DESKTOP-COMPUTER IMAGE, TARNISHED SOMEWHAT BY THE PCJR. AND
IT COULD GIVE A NEEDED BOOST TO DEALERS, WHOSE PROFIT MARGINS
                            - MORE -

        DOCUMENT =      1 OF      10      PAGE =      7 OF      7
ARE BEING SQUEEZED BY RECENT PC PRICE CUTS.

        END OF DOCUMENT
```

. . S

  6___: &OFF

TEXT-SEARCH SERVICES SIGNOFF COMPLETE

TO REACH ANOTHER DATA BASE, TYPE TWO
SLASHES (//) AND THE DATA-BASE CODE.

    EXAMPLE: //NEWS (RETURN)

OR, TYPE //MENU FOR A DATA-BASE LIST.

    DISC

LOG ON: 16 16 LOG OFF: 16 20 EASTERN TIME OCTOBER 23, 1984

609 42 DISCONNECTED 00 00

@

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NEWSNET

NewsNet is a new online service with about 6,000 subscribers that provides
the full text of several hundred specialized industry newsletters online. Sub-

scriptions to all of these newsletters would cost about $50,000 per year, but most are available online for $60 per hour or less at 300 baud. There are no sign-up or subscription charges, just a $15 per month minimum billing.

These files may be searched for very current information on many industry-specific topics. NewsNet also offers their FLASH service, which will alert subscribers to new information in their specific interest areas.

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The following electronic editions are available on NewsNet. Their publication codes and prices are shown below. Validated subscribers (individuals, not companies) receive the VAL rate for READ time. Non-validated subscribers receive the NON-VAL rate for READ time. Only the newsletter publisher can validate you for the lower READ rate.

CODE	SERVICE	300 BAUD -HOURLY READ RATES- VAL	NON-VAL
IT18	APS Diplomat	$24	$120
IV27	APS Review	24	120
GT10	Access Reports/Freedom of Information	24	48
OF01	Advanced Office Concepts	36	60
IT15	Africa News	24	36
FF01T	Agri-Markets Data Service	24	120
EV10	Air/Water Pollution Report	24	48
MT04	Altman & Weil Report to Legal Management	24	36
FI10	American Banker	36	48
OF04	Automated Office Systems	24	36
IV25	B&S Investment Focus: Applied Technology	36	36
FI07	Banking Regulator	24	96
SS01	Behavior Today	36	48
IV06	Biotechnology Investment Opportunities	24	24
MT03	Business Computer Digest	24	36
TX13	CCH State Tax Week (State Tax Review)	24	96
TX10	CCH Tax Day: A Digest of Federal Taxes	24	96
TE02	CableNews	24	48
TE21	Cellular Radio News	24	48
TX14	Charitable Giving	24	48
SS05	ChurchNews International	24	48
ED01	College Press Service	24	24
TE26	Common Carrier Week	24	48
EC06	Communications & Distributed Resources	24	48
TE01	Communications Daily	36	60
GT15	Compliance Alert: Federal Register Digest	24	36
GT14	Compliance Management Report	24	36
EC27	Computer Book Review	24	36

* UPI Wires available only through NewsFlash

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SCAN, SEARCH, and all other NewsNet services are billed at $24/hour.

1200 BAUD CHARGES ARE DOUBLE FOR ALL SERVICES.
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		300 BAUD -HOURLY READ RATES-	
CODE	SERVICE	VAL	NON-VAL
EC08	Computer Market Observer	24	48
GT20	Congressional Activities	24	48
PB18	Copyright Management	24	48
TX02	Corporate Acquisitions and Dispositions	48	XX
FI12	Corporate EFT Report	24	48
FI06	Credit Union Regulator	24	96
TE15	DBS News	24	48
IV05	Daily Industrial Index Analyzer	48	48
MM01	Daily Metals Report	48	48
EY01T	Daily Petro Futures	48	48
EC32	Data Base Informer	24	24
TE22	Data Channels	24	48
AE02	Defense Industry Report	36	48
AE03	Defense R&D Update	36	48
HH02	Diack Newsletter	24	24
EC24	E-COM News	24	48
FI11	EFT Report	24	48
PB13	Editors Only	24	72
AU01	Electric Vehicle Progress	24	48
TX03	Employee Retirement Plans	48	XX
EY10	Energy & Minerals Resources	24	48
EY07	Energy Management Online Network	36	48
BC07	Engelsman's Construction Cost Indexes	24	36
MT01	Entrepreneurial Manager's Newsletter	24	36
MT02	Executive Productivity	24	36
PO04	Frost & Sullivan's Political Risk Letter	24	96
RD10	Federal Research Report	24	48
FI01	Federal Reserve Week	24	60
IV18	Fedwatch	24	24
TE08	Fiber Optics & Communications	24	36
TE09	Fiber Optics & Communications Weekly News	24	48
TE29	Fiber/Laser News	24	48
FI09T	Fintex All-Day Foreign Exchange Monitor	120	120
IT13T	Fintex International Economic Summaries	120	120
IV01	Ford Investment Review	24	36
IV26	Futures Focus	24	48
IV21	Gary North's Remnant Review	24	36
GT03	Grants & Contracts Weekly	24	XX
GT03#	Grants & Contracts Alert	24	XX
CH10	Hazardous Waste News	24	60
HH01	Health Benefit Cost Containment	36	48
RD06	Hi Tech Patents: Data Communications	24	48
RD05	Hi Tech Patents: Fiber Optics Technology	24	48

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CODE	SERVICE	300 BAUD -HOURLY READ RATES-	
		VAL	NON-VAL
RD04	Hi Tech Patents: Laser Technology	24	48
RD07	Hi Tech Patents: Telephony	24	48
IT21	High Tech	24	48
EL09	Hollywood Hotline	48	48
IV20	Howard Ruff's Financial Success Report	24	36
PB15	IIA Friday Memo	24	48
IN02	IMS Weekly Marketeer	24	48
TX01	IRS Practices & Procedures	48	120
TE07	ISIS New Electronic Media Newswire	120	120
LA04	Industrial Health & Hazards Update	36	48
RD09	Innovator's Digest	24	36
IV17	Insight: Monthly Economic Report	60	60
EC14	Interactive Video Technology	24	36
TE24	Interconnection	24	48
GB02	International Intertrade Index	24	36
TE41	International Videotex Teletext News	24	36
RD12	Invention Management	24	36
EC28	Japan High Tech Review	24	60
EC43	Japan Semiconductor Quarterly	24	60
IT24	Japan Weekly Monitor	24	60
AE06	Japanese Aviation News: Wing	24	120
IT22	Japanese Trade & Industry Briefs	24	60
FI16	Japan's Monthly Finance Review	24	72
TE10	LAN	24	48
EV02	Land Use Planning Report	24	48
PO02	Legislative Intelligence Week	24	36
PB10	Link News Briefs	24	120
IV14	Low-Priced Stock Alert	36	36
SS02	Marriage and Divorce Today	36	48
EC31	McGraw-Hill New Business Books/Software	24	24
AD01	Media Science Reports	24	36
ME01	Medical Abstracts Newsletter	24	24
ME04	Micro MD Newsletter	24	36
EC11	Micro Moonlighter	36	48
IT23	Mid-East Business Digest	24	48
GB06	Midwest Technology	24	36

* UPI Wires available only through NewsFlash

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2400 BAUD CHARGES ARE TRIPLE FOR ALL SERVICES.
ONLY 300, 1200, OR 2400 BAUD ACCESS IS PERMITTED BY NEWSNET.

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CODE	SERVICE	300 BAUD -HOURLY READ RATES- VAL	NON-VAL
EC09	Mini/Micro Bulletin	24	48
TE25	Mobile Phone News	24	48
PB03	NA Hotline	24	48
TE31	NTT Topics	24	36
PB99	NewsNet Action Letter	24	24
PB99#	NewsNet's Online Bulletin	24	24
EV03	Nuclear Waste News	24	60
OAG	Official Airline Guides	36	36
TE20	On-Line Computer Telephone Directory	24	48
PB07	Online Database Report	24	120
GT06	PACs & Lobbies	24	48
PR01T	PR Newswire	24	24
PR06	PR Hi-Tech Alert/Video Monitor	24	36
IV13	Penny Stock Preview	36	36
EC03	Personal Computers Today	24	48
EY02	Petroleum Information International	24	60
PB04	Public Broadcasting Report	24	48
SS04	RFC News Service	24	48
SS07	RNS Daily News Reports	24	72
RE03	Real Estate Investing Letter	24	48
LA06	Reports of Interest to Lawyers	48	48
RD02	Research Monitor News	24	48
EC16	Robotronics Age Newsletter	48	48
AU02	Runzheimer on Automotive Alternatives	24	48
EC02	S. Klein Newsletter on Computer Graphics	24	48
TE19	SMR News	24	48
TE03#	Satellite News Bulletin Service	24	XX
TE28	Satellite Television Newsletter	24	48
AE01	Satellite Week	24	48
EC35	Semiconductor Industry & Business Survey	60	120
SS03	Sexuality Today	36	48
CC02	Sid Cato's Newsletter on Annual Reports	24	36
CH13	Sludge Newsletter	24	60
EC37	Software Review	36	60
FI05	Small Business Profit Digest	24	36
AE04	Space Calendar	24	36
AE05	Space Commerce Bulletin	24	48
EY11	Solar Energy Intelligence Report	24	48
AD02	Source	24	36
IV24	Stock Search	36	36
BC06	Surplus Alert	24	36
TB10	TMA Cigarettes and Cigars	24	XX
TB03	TMA Executive Summary	24	XX

NEWSNET ONLINE NEWSLETTERS — OCTOBER 1984 (Cont'd)

The following electronic editions are available on NewsNet. Their publication codes and prices are shown below. Validated subscribers (individuals, not companies) receive the VAL rate for READ time. Non-validated subscribers receive the NON-VAL rate for READ time. Only the newsletter publisher can validate you for the lower READ rate.

		300 BAUD -HOURLY READ RATES-	
CODE	SERVICE	VAL	NON-VAL
TB08	TMA International Tobacco Report	24	XX
TB06	TMA Issues Monitor	24	XX
TB05	TMA Leaf Bulletin Summary	24	XX
TB01	TMA National Bulletin	24	XX
TB09	TMA Smoking; Chewing and Snuff	24	XX
TB04	TMA State Bulletin	24	XX
IT05	Tax Notes International	24	24
TX12	Tax Notes Today	24	36
IV03	Tax Shelter Insider	36	48
RD08	Techline	24	24
TE16	Telecommunications Counselor	24	48
TE42	Telephone Angles	24	36
TE04	Telephone News	24	48
PB01	Television Digest	24	48
EC22	The Business Computer	24	24
EC10E	The Computer Cookbook	24	36
CC01	The Corporate Shareholder	24	48
IT04	The Exporter	24	48
EL05	The Fearless Taster	24	24
EL02	The Gold Sheet	24	24
PB12	The Photoletter	24	120
OF03	The Seybold Report on Office Systems	24	36
EC20	Seybold Report on Professional Computing	24	36
PB05	The Seybold Report on Publishing Systems	24	36
TX15	The Small Business Tax Review	24	36
IV07	The Stanger Report	60	84
IV22#	The Wellington Alert Bulletin Service	24	XX
IV33	The Wellington Commodity Technician	24	72
IV23	The Wellington Letter	24	60
IV22	The Wellington Letter Alert	24	120
CH12	Toxic Materials News	24	60
PB11	Travelwriter Marketletter	24	36
IV34	Trendvest Ratings	24	36
IT17	United Nations Report	24	24
UP	UPI — All UPI Wires*	36	36
UP01	UPI Business & Financial Wire*	36	36

* UPI Wires available only through NewsFlash

XX = Validation required (use MAIL for information, or ORDER to order a print subscription).

SCAN, SEARCH, and all other NewsNet services are billed at $24/hour.

1200 BAUD CHARGES ARE DOUBLE FOR ALL SERVICES.
2400 BAUD CHARGES ARE TRIPLE FOR ALL SERVICES.
ONLY 300, 1200, OR 2400 BAUD ACCESS IS PERMITTED BY NEWSNET.

NEWSNET ONLINE NEWSLETTERS — OCTOBER 1984 (Cont'd)

The following electronic editions are available on NewsNet. Their publication codes and prices are shown below. Validated subscribers (individuals, not companies) receive the VAL rate for READ time. Non-validated subscribers receive the NON-VAL rate for READ time. Only the newsletter publisher can validate you for the lower READ rate.

CODE	SERVICE	300 BAUD -HOURLY READ RATES-	
		VAL	NON-VAL
UP02	UPI Domestic News Wire*	36	36
UP03	UPI Political Wire*	36	36
UP04	UPI International News Wire*	36	36
UP05	UPI Sports Wire*	36	36
GT12	U.S. Census Report	24	60
EC13	UNIQUE: Your Independent UNIX/C Advisor	24	36
SS06	United Methodist Information	24	24
GB03	Update/The American States	48	60
PG01	Utility Reporter	48	48
EL01	Video Week	24	48
TE12	VideoNews	24	48
TE27	Videotex Products	24	24
PB09	Viewdata/Videotex Report	24	120
TE18	Viewtext	24	48
IV08	Wall St. Monitor: Weekly Market Digest	48	48
IV28	Wall Street S.O.S.	24	48
FF06	Washington Beverage Insight	24	60
FI02	Washington Credit Letter	24	60
PB16	Wiley Book News	24	24
EV01	World Environment Report	24	36
PB08	Worldwide Videotex Update	24	36

* UPI Wires available only through NewsFlash

XX = Validation required (use MAIL for information, or ORDER to order a print subscription).

SCAN, SEARCH, and all other NewsNet services are billed at $24/hour.

1200 BAUD CHARGES ARE DOUBLE FOR ALL SERVICES.
2400 BAUD CHARGES ARE TRIPLE FOR ALL SERVICES.
ONLY 300, 1200, OR 2400 BAUD ACCESS IS PERMITTED BY NEWSNET.

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DIALOG/KNOWLEDGE INDEX

Knowledge Index is a service of Dialog Information Systems, one of the pioneers in the online database industry and by far the largest online database service in the world. Dialog designed a user friendly "front-end" program for Knowledge Index which interfaces with the standard Dialog search program.

This program includes online help files, simple commands, and limitation of the Dialog features available to the KI user.
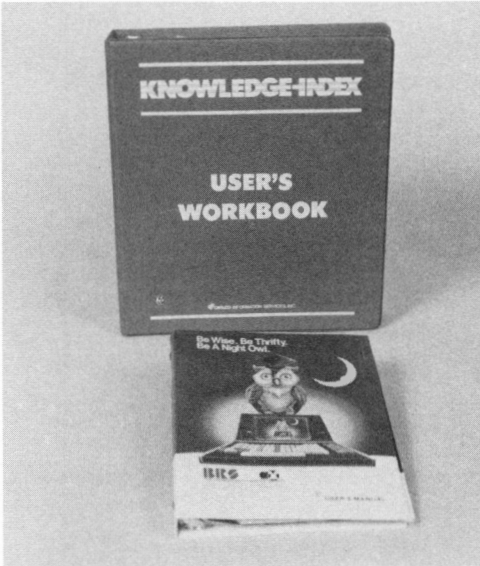
FIGURE 6.2   Knowledge Index and BRS After Dark User Guides.

Knowledge Index costs $35.00 to start service and a flat rate of $24.00 per hour online for either 300 or 1200 baud. All data network access charges are included in the hourly rate. There is no minimum charge. Billing is only available to credit card accounts. Copies of source publications may be ordered online through an outside service (Information on Demand) for $6.50 per document plus $.20 per page copied.

The Knowledge Index subscription includes a handsome 3-ring binder with access instructions, database information, and a complete self-teaching tutorial on searching the databases.

Knowledge Index operates during evenings and weekends:

Monday - Thursday	6 p.m. to 5 a.m.
Friday	6 p.m. to midnight
Saturday	8 a.m. to midnight
Sunday	3 p.m. to 5 a.m. Monday

all local time

Knowledge Index started in December 1982 with 11 online databases. As of October 1984 KI had 27 databases online in 14 sections or subject areas and claimed about 7,000 subscribers.

KNOWLEDGE INDEX DATABASES — OCTOBER 1984

SECTION NAME	DATABASE NAME
AGRI - AGRIculture	
Database: AGRICOLA	(AGRI1)
BOOK - BOOKs	
Database: BOOKS IN PRINT	(BOOK1)
BUSI - BUSIness Information	
Database: ABI/INFORM	(BUSI1)
Database: TRADE AND INDUSTRY INDEX	(BUSI2)
COMP - COMPuters and Electronics	
Database: INSPEC	(COMP1)
Database: INTERNATIONAL SOFTWARE DATABASE	(COMP2)
Database: MICROCOMPUTER INDEX	(COMP3)
Database: THE COMPUTER DATABASE	(COMP4)
CORP - CORPorate News	
Database: STANDARD & POOR'S NEWS	(CORP1)
EDUC - EDUCation	
Database: ERIC	(EDUC1)
ENGI - ENGIneering	
Database: ENGINEERING LITERATURE INDEX	(ENGI1)
GOVE - GOVErnment Publications	
Database: GPO PUBLICATIONS REFERENCE FILE	(GOVE1)
Database: NTIS	(GOVE2)
LEGA - LEGAl Information	
Database: LEGAL RESOURCE INDEX	(LEGA1)
MAGA - MAGAzines	
Database: MAGAZINE INDEX	(MAGA1)
MATH - MATHematics	
Database: MATHFILE	(MATH1)
MEDI - MEDIcine	
Database: MEDLINE 1980+	(MEDI1)
MEDLINE 1973-79	(MEDI2)
MEDLINE 1966-72	(MEDI3)
Database: INTERNATIONAL PHARMACEUTICAL ABSTRACTS	(MEDI4)
Database: BIOSIS PREVIEWS 1981+	(MEDI5)
BIOSIS PREVIEWS 1977-1980	(MEDI6)
BIOSIS PREVIEWS 1969-1976	(MEDI7)
NEWS - Newspapers	
Database: NEWSEARCH	(NEWS1)
Database: NATIONAL NEWSPAPER INDEX	(NEWS2)
PSYC - PSYChology	
Database: PSYCINFO	(PSYC1)
Database: MENTAL HEALTH ABSTRACTS	(PSYC2)

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SAMPLE KNOWLEDGE INDEX SEARCH

DIALOG INFORMATION SYSTEMS
PLEASE LOGON:

****

ENTER PASSWORD:

****

WELCOME TO KNOWLEDGE INDEX
Accounting starting at 8:55:24 EST

For instructions on how to use Knowledge Index, enter HELP KI or ? August cost summaries now online. Type Bulletin for announcements and changes.

** MAGA1 IS NOT WORKING **

?BEGIN BUSI1

10/23/84 8:56:22 EST
Now in BUSINESS INFORMATION (BUSI)
            Section
     ABI/Inform (BUSI1) Database
   (Copyright 1984 Data Courier Inc.)

?FIND IBM

           S1 4535 IBM

?FIND PCJR

           S2   18 PCJR

?FIND S1 AND S2

           S3   18 S1 AND S2

?FIND S3 AND APPLE

PROCESSING
              683 APPLE
           S4   6 S3 AND APPLE

?DISPLAY S4/L/1

            Display 4/L/1
84020931

Apple Is Back
  Murray, Thomas J.
  Dun's Business Month v123n6 PP: 62-63 Jun 1984 CODEN:
DURVAH ISSN: 0279-3040 JRNL CODE: DMI
  DOC TYPE: Journal Paper LANGUAGE: English LENGTH: 2 Pages
  AVAILABILITY: ABI/INFORM
  At the beginning of 1984, it was reported that International Business Machines Corp. (IBM) was winning the personal computer (PC) war. However, Apple Computer Co. executives strongly disagreed, and they appear to have been right. Apple's new Macintosh computer is selling far better than expected, as are the Lisa and the Apple IIe. While IBM's PCjr has shown poorer-than-expected sales, Apple's new Apple IIc portable has gotten a strong welcome from dealers, with up to 400,000 units expected to be sold this year. Apple's earnings are also improving. Most of the credit for the firm's rapid turnaround goes to President and Chief Executive Officer John Sculley, who brought the company some much-needed marketing skills. He also reorganized Apple, dividing it into 2 divisions: one to run the Apple II family of products, the other to handle the Macintosh and Lisa lines. He thinks the products are now properly positioned to take advantage of key segments of the PC market.
  DESCRIPTORS: Apple Computer-Cupertino Calif; Computer industry; Corporate reorganization; Market strategy; Case studies; Market shares
  CLASSIFICATION CODES: 8651 (CN = Computer industry); 7000 (CN = Marketing); 9110 (CN = Company specific)

?REVIEW

In BUSI1 database:
  S1   4535 IBM
  S2   18 PCJR
  S3   18 S1 AND S2
  S4   6 S3 AND APPLE

?COST

10/23/84 8:59:06 EST
Session Total: 0.062 Hours $ 1.49 User U43135

?LOGOFF

10/23/84 8:59:23 EST
Session Total: 0.066 Hours $ 1.58 User U43135

415 48K DISCONNECTED 00 00

@

BRS/AFTER DARK

Bibliographic Retrieval Service (BRS) is the number two "supermarket" type online database service in the United States. BRS began offering an executive

database service in January 1983 (at just about the same time as Dialog introduced Knowledge Index).

Subscription to the service costs $75, with hourly rates ranging from $6 to $20 per hour depending on the database being accessed, including communications charges. Rates for 300 and 1200 baud access are the same. There is a $12 per month minimum charge for an account. Any connect charges apply against the minimum. Credit card billing is preferred, or a prepayment deposit account may be set up. Online ordering of source publication photocopies is not available.

The subscription includes an 8 1/2-inch by 11-inch, 3-ring binder with detailed database descriptions, access instructions, and a self-training guide to online searching.

The BRS/After Dark service is available evenings and weekends, much like Knowledge Index:

Monday - Friday	6 p.m. to 4 a.m. Eastern time
Saturday	6 a.m. to 4 a.m. Eastern time
Sunday	6 a.m. to 2 p.m. Eastern time
	and
Sunday	7 p.m. to 4 a.m. Eastern time

BRS/After Dark may be accessed through Telenet, Uninet, and by direct dial.

The BRS/After Dark service has grown from an original 22 databases to 51 databases as of October 1984. These databases are broken up into five subject areas:

1. Science and Medicine
2. Business and Financial
3. Reference
4. Education
5. Social Science and Humanities

BRS/AFTER DARK DATABASES — OCTOBER 1984

SCIENCE AND MEDICINE DATABASES
****

DATABASE NAME	LABEL
AGRICOLA	CAIN
ACS (AMERICAN CHEMICAL SOCIETY) JOURNALS ONLINE	CFTX
BIOSIS PREVIEWS	BIOL (1978 TO DATE)
	BIOB (1970-1977)
CHEMICAL ABSTRACTS	CHEM (1977 TO DATE)
	CHEB (1970-1976)
DISC	DISC
HEALTH PLANNING & ADMINISTRATION	HLTH

INSPEC	INSP
INTERNATIONAL PHARMACEUTICAL ABSTRACTS	IPAB
IRCS MEDICAL SCIENCE DATABASE	IRCS
KIRK-OTHMER ENCYCLOPEDIA OF CHEMICAL TECHNOLOGY	KIRK
MATHEMATICAL REVIEWS	MATH
MEDLARS	MESH (1979 TO DATE)
	MS78 (1975-1978)
	MS74 (1971-1974)
	MS70 (1966-1970)
NATIONAL TECHNICAL INFORMATION SERVICE	NTIS
PRE-MED	PREM
ROBOTICS INFORMATION	RBOT

BUSINESS AND FINANCIAL DATABASES

****

DATABASE NAME	LABEL
ABI/INFORM	INFO
HARVARD BUSINESS REVIEW	HBRO
INTERNAL REVENUE SERVICE PUBLICATIONS	IRSP
MANAGEMENT CONTENTS	MGMT
ONLINE MICRO-SOFTWARE DIRECTORY	SOFT
PATDATA	PATS

REFERENCE DATABASES

****

DATABASE NAME	LABEL
ABSTRAX 400	A400
ACADEMIC AMERICAN ENCYCLOPEDIA	AAED
BOOKS IN PRINT	BBIP
DISC	DISC
INTERNAL REVENUE SERVICE PUBLICATIONS	IRSP
NATIONAL COLLEGE DATABANK	PETE
ONLINE MICRO-SOFTWARE DIRECTORY	SOFT

EDUCATION DATABASES

****

DATABASE NAME	LABEL
BILINGUAL EDUCATION BIBLIOGRAPHIC ABSTRACTS	BEBA
EDUCATION RESOURCE INFORMATION CENTER (ERIC)	ERIC
EXCEPTIONAL CHILD EDUCATION RESOURCES	ECER
NATIONAL COLLEGE DATABANK	PETE
ONTARIO EDUCATION RESOURCES INFORMATION SYSTEM	ONED
RESOURCES IN COMPUTER EDUCATION	RICE
SCHOOL PRACTICES INFORMATION FILE	SPIF
TEXAS EDUCATION COMPUTER COOPERATIVE	TECC

SOCIAL SCIENCE AND HUMANITIES DATABASES
****

DATABASE NAME	LABEL
ABLEDATA - OF NARIC	ABLE
FAMILY RESOURCES	NCFR
MENTAL MEASUREMENTS YEARBOOK	MMYD
NATIONAL REHABILITATION INFORMATION CENTER	NRIC
PUBLIC AFFAIRS INFORMATION SERVICE	PAIS
PRE-PSYC	PREP
PYSCINFO	PSYC
RELIGION INDEX	RELI
SOCIAL SCIENCE CITATION INDEX	SSCI
SOCIOLOGICAL ABSTRACTS	SOCA

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SAMPLE BRS/AFTER DARK SEARCH

ENTER BRS PASSWORD
XXXXXXXXX
ENTER SECURITY PASSWORD
XXXXXXXXX

*SIGN-ON 11.28.44   10/23/84:

WELCOME TO BRS AFTER DARK

PLEASE TYPE IN SCREEN LINE LENGTH (20, 40, OR 80) 80

PLEASE TYPE IN THE NUMBER OF LINES ON YOUR SCREEN (20, 21, 22, ETC.)

CHECK MENU ITEM 6 FOR INFORMATION ON NEW AFTER DARK DATABASES AND SYSTEM EN-
HANCEMENTS. SIX NEW DATABASES HAVE BEEN ADDED TO THE SYSTEM SINCE JULY, 1984!!!!!!!

TONIGHT'S MENU IS:

NUMBER	ITEM
1	LOOKING FOR INFORMATION? . . . SEARCH SERVICE
2	WANT TO HEAR THE LATEST? . . . NEWSLETTER SERVICE
4	KEEP IN TOUCH! . . . ELECTRONIC MAIL SERVICE
6	WHAT'S NEW? . . . NEW SYSTEM FEATURES
7	WANT TO CHANGE YOUR SECURITY PASSWORD? . . . SECURITY

TYPE IN MENU ITEM NUMBER THEN HIT ENTER KEY FOR DESIRED SELECTION
   1

YOU ARE NOW CONNECTED TO THE BRS AFTER DARK SEARCH SERVICE. THE FOLLOWING CAT-
EGORIES OF DATABASES ARE AVAILABLE FOR SEARCHING.

CATEGORY	DESCRIPTION
1	SCIENCE AND MEDICINE DATABASES
2	BUSINESS AND FINANCIAL DATABASES
3	REFERENCE DATABASES
4	EDUCATION DATABASES
5	SOCIAL SCIENCE AND HUMANITIES DATABASES

TYPE IN CATEGORY NUMBER THEN HIT ENTER KEY FOR CATEGORY OF DATABASES DESIRED. 2

BUSINESS AND FINANCIAL DATABASES
****
DATABASE NAME   LABEL

ABI/INFORM   INFO
HARVARD BUSINESS REVIEW   HBRO
INTERNAL REVENUE SERVICE PUBLICATIONS   IRSP
MANAGEMENT CONTENTS   MGMT
ONLINE MICRO-SOFTWARE DIRECTORY   SOFT
PATDATA   PATS

TYPE IN LABEL FOR DATABASE DESIRED: INFO

WOULD YOU LIKE INSTRUCTIONAL PROMPTS? PLEASE TYPE YES OR NO: YES

WOULD YOU LIKE A DESCRIPTION OF THE DATABASE? (YES OR NO) NO

BRS/INFO/1971 - SEP 1984
TYPE IN SEARCH TERM, OR ENTER COMMAND
  M TO RETURN TO MASTER MENU, D TO CHOOSE NEW DATABASE, OR O TO SIGN OFF.
S1 -->   IBM

A1   4591 DOCUMENTS FOUND
TYPE IN SEARCH TERMS, OR ENTER COMMAND
        P TO PRINT DOCUMENTS FOUND, R TO REVIEW SEARCH QUESTIONS,
        M TO RETURN TO MASTER MENU, D TO CHOOSE NEW DATABASE,
        OR O TO SIGN OFF.
S2 -->   PCJR

A2   18 DOCUMENTS FOUND
TYPE IN SEARCH TERMS, OR ENTER COMMAND
        P TO PRINT DOCUMENTS FOUND, R TO REVIEW SEARCH QUESTIONS,
        M TO RETURN TO MASTER MENU, D TO CHOOSE NEW DATABASE,
        OR O TO SIGN OFF.
S3 -->   1 AND 2

A3   18 DOCUMENTS FOUND
TYPE IN SEARCH TERMS, OR ENTER COMMAND
        P TO PRINT DOCUMENTS FOUND, R TO REVIEW SEARCH QUESTIONS,
        M TO RETURN TO MASTER MENU, D TO CHOOSE NEW DATABASE,
        OR O TO SIGN OFF.
S4 -->   3 AND APPLE

A4   6 DOCUMENTS FOUND
TYPE IN SEARCH TERMS, OR ENTER COMMAND
        P TO PRINT DOCUMENTS FOUND, R TO REVIEW SEARCH QUESTIONS,
        M TO RETURN TO MASTER MENU, D TO CHOOSE NEW DATABASE,
        OR O TO SIGN OFF.
S5 -->   P

ENTER A SEARCH QUESTION TO PRINT FROM (E.G. 1 OR 2, ETC.) 4

ENTER S FOR SHORT PRINT FORM, M FOR MEDIUM PRINT FORM, OR HIT ENTER FOR LONG
PRINT FORM.

ENTER DOCUMENT NUMBER(S) TO BE PRINTED. USE A HYPHEN FOR SEQUENTIAL DOCU-
MENTS (X-X), COMMAS FOR NON-SEQUENTIAL DOCUMENTS (X,X,X), OR ENTER INDIVIDUAL
NUMBER (X). TYPE ALL TO PRINT ALL DOCUMENTS OR HIT ENTER TO PRINT FIRST DOCUMENT.
    1

   1
AN   84-20931. 8408.
AU   Murray-Thomas-J.
TI   Apple Is Back.
SO   Dun's Business Month. VOL: v123n6. PAG: 62-63, 2 pages. Jun 1984.
CC   8651 7000 9110.
DE   Apple-Computer-Cupertino-Calif. Computer-industry.
     Corporate-reorganization. Market-strategy. Case-studies.
     Market-shares.
AV   ABI/INFORM.
AB   At the beginning of 1984, it was reported that International Business Machines Corp. (IBM)
     was winning the personal computer (PC) war. However, Apple Computer Co. executives
     strongly disagreed, and they appear to have been right. Apple's new Macintosh computer is
     selling far better than expected, as are the Lisa and the Apple IIe. While IBM's PCjr has
     shown poorer-than-expected sales, Apple's new Apple IIc portable has gotten a strong wel-
     come from dealers, with up to 400,000 units expected to be sold this year. Apple's earnings
     are also improving. Most of the credit for the firm's rapid turnaround goes to President and
     Chief Executive Officer John Sculley, who brought the company some much-needed mar-
     keting skills. He also reorganized Apple, dividing it into 2 divisions: one to run the Apple II
     family of products, the other to handle the Macintosh and Lisa lines. He thinks the products
     are now properly positioned to take advantage of key segments of the PC market.
PT   02.
LG   EN..
CD   DURVA.
YR   84..
JC   CD-DMI.
IS   0279-3040.

END OF DOCUMENT. HIT ENTER TO SEE NEXT DOCUMENT, OR TYPE ANOTHER DOCUMENT
NUMBER, OR TYPE S TO CONTINUE SEARCHING, P TO PRINT DOCUMENTS FOUND, R TO RE-
VIEW SEARCH QUESTIONS, M TO RETURN TO MASTER MENU, D TO CHOOSE NEW DATABASE,
OR O TO SIGN OFF.
    R

BRS/INFO/1971 - SEP 1984
1 (IBM)
    RESULT   4591
2 (PCJR)
    RESULT   18
3 (1 AND 2)
    RESULT   18
4 (3 AND APPLE)
    RESULT   6
TYPE IN SEARCH TERMS, OR ENTER COMMAND
        P TO PRINT DOCUMENTS FOUND, R TO REVIEW SEARCH QUESTIONS,
        M TO RETURN TO MASTER MENU, D TO CHOOSE NEW DATABASE,
        OR O TO SIGN OFF.
S5 -->   O

CONNECT TIME   0:02:19 HH:MM:SS   0.039 DEC HRS   SESSION   322*

SIGN-OFF 11.31.38   10/23/84:
15 20B DISCONNECTED 00 00

@

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MEAD DATA CENTRAL

Mead Data Central, a division of Mead Corporation, has been operating a full-text database service for over ten years. First came LEXIS, a legal reference database, then NEXIS was added in 1980 with full text of over 30 magazines, 30 newsletters, 9 wire services and 14 newspapers. In addition, the New York Times Information Bank covering some 60 publications was added to NEXIS in 1983.

LEXPAT is the newest MDC service featuring the full text of all U.S. patents from the present back to 1975 (at present) and expanding backwards as files are added.

Until late 1983, Mead customers had to use a special Mead terminal with a direct line connection to MeadNet. By popular demand, LEXIS and NEXIS are now available through several microcomputers and terminals (including the IBM PC and PCjr) and by telephone dial-up like other databases.

Hourly rates start at $90 per hour for the first 5 online hours per month, $75 per hour for the next 5 hours, etc. There is a $50 monthly charge for NEXIS access and an added $150 per month for LEXPAT. LEXIS rates are based on the number of attorneys in a firm.

Professional Services

The so-called professional online database services began in the early 1970s as an outgrowth of the batch-computerized indexing services then available. Specialized systems were developed for the U.S. Government (the National Library of Medicine and NASA) and were expanded to meet the needs of the educational, scientific, and research communities for fast, accurate access to reference information. Dialog and System Development Corp. (SDC) were the early pioneers in the online database industry.

TYPES OF DATABASES

The online databases were originally all bibliographic in nature — that is, they provided references to books, magazines, journals, and other published works. They did not provide much in the way of hard data or facts — only enough key information about the published work was included to facilitate searching. The researcher then had to find a copy of the original document

referenced in the search results to get the actual data he needed.

Then, databases became available that actually contained the end data. These databases were called source databases as opposed to the reference bibliographic databases. Early source databases were made up primarily from computer tapes of U.S. Government data from the Census Bureau, the Commerce Department, and the Bureau of Labor Statistics.

Around this time, Mead Data Central started offering LEXIS, a full text legal database and later NEXIS, a full text general information database. Full text means that the entire word-for-word text of the original document is included in the database. Thus, there is no need to go to the source document for more information. Also, searches can be more exact and much more complex in that the relationship of words in the original text can be specified in the search.

PROFESSIONAL SEARCHERS

The online services had very few users in the beginning and were quite expensive. It could take weeks of training and months of experience to develop a good searcher. As may be imagined, specialized and highly trained searchers or information specialists (mostly librarians) were used as intermediaries to find references to the needed data as quickly and as inexpensively as possible.

Professional database searchers usually attend one or more two-day classes on each online service they use, and sometimes on each database they use regularly. As online hourly rates range from $24 to $300 per hour, most of the planning and preparation for a search is done offline before the search is started. Because most of the professional searching is still done by information specialists, the average search takes less than 15 minutes of online time.

More and more end users of data (like executives and scientists) are performing their own searches instead of using intermediaries. This is due to the availability of microcomputers that can function as terminals (like the PCjr) and to the increased familiarity of these users with the use of these microcomputers, with data communications, and with the online database systems. These end-user searchers can best define their search requirements and many need access to data immediately — not when an intermediary gets around to it. Many of these end-user searchers use the evening and weekend services like Knowledge Index and BRS/After Dark to gain search experience at a much lower cost than the parent professional service (i.e., Dialog or BRS) would charge. Also, any searching they can do at the lower rates saves them significant amounts on their search budget.

MAJOR PROFESSIONAL SERVICES

Today, the major professional services offer a "supermarket" selection of many types of databases from many sources. The largest commercial online database service in the world is Dialog Information Systems, with over 300 database

files online and over 80 million records (or entries) of information totaling 130 Gigabytes of storage online (or 130,000 billion characters of data). Other popular services include Bibliographic Retrieval Service (BRS) and SDC Search.

DIALOG INFORMATION SYSTEMS

Dialog Information Systems is the "granddaddy" of online services, dating back to the early 1970s as Lockheed-Dialog. Data retrieval systems were developed both for NASA and for internal Lockheed use.

Today, Dialog is the largest public database system in the world. Dialog has a staggering amount of online data available at the touch of a few keys on a terminal or personal computer. Over 300 databases are represented online with subjects from *Books in Print* to the National Technical Information Service, from the Electronic Yellow Pages to the Medline database of medical journal articles.

FIGURE 6.3   Dialog Master Control. (Photo courtesy of Dialog Information Systems, Inc.)

There is a penalty for all this, however. Dialog is very popular, and service can slow down during peak search hours — and you still pay by the minute. But, all in all, Dialog is reasonably easy to use and is unsurpassed as to subject coverage. Dialog has over 50,000 active passwords.

Dialog offers classes in database searching regularly throughout the world for new and experienced users.

SAMPLE DIALOG SEARCH

ENTER YOUR DIALOG PASSWORD
XXXXXXXX

** FILE 46 IS UNAVAILABLE **
** FILE 139 IS NOT WORKING **
** DIALORDER IS NOT WORKING ON TYMNET**

DIALOG News (Enter ?NEWS for details):

DIALNET access from Phase 1 cities
now available. See ?DIALNET for
details.

DIRECT DIAL AND WATS USERS SEE
?NEWDIAL FOR IMPORTANT NEWS.

-

Free offer:
   Free articles from UMI Article Clearinghouse. (See ?NEWS for details.)
Now available (see ?NEWS):
   OAG ELECTRONIC EDITION (gateway service)
   BUSINESS SOFTWARE DATABASE (File 256)
Free time in October:
   CENDATA (File 580) or menu version-- up to one-half hour free connect time.
Announcements:
   CLAIMS U.S. PATENT and UNITERM files (Files 23, 24, 25, 223, 224, 225) reloaded.
   EMBASE (Excerpta) divided into four files. (See ?NEWS.)
   ONTAP CA SEARCH (File 204) expanded.
   Swedish Patent Office--new DIALORDEr supplier.
   Price change for CA SEARCH (Files 308, 309, 310, 311 and 320) now in effect.
   IRIS (File 53) no longer available.

? B 15

```
                    23oct84 11:02:06 User36674
$0.53               0.021 Hrs File1*
$0.17               Telenet
$0.70               Estimated Total Cost
```

File15:ABI/INFORM - 71-84/Sep
(Copr. Data Courier Inc.)

	Set	Items	Description
? S IBM			
	1	4535	IBM
? S PCJR			
	2	18	PCJR
? S S1 AND S2			
	3	18	S1 AND S2
? S S3 AND APPLE			
		683	APPLE
	4	6	S3 AND APPLE

? T 4/5/1
4/5/1
84020931
Apple Is Back
   Murray, Thomas J.
   Dun's Business Month v123n6 PP: 62-63 Jun 1984 CODEN: DURVAH ISSN:
0279-3040 JRNL CODE: DMI

DOC TYPE: Journal Paper LANGUAGE: English LENGTH: 2 Pages
AVAILABILITY: ABI/INFORM

At the beginning of 1984, it was reported that International Business Machines Corp. (IBM) was winning the personal computer (PC) war. However, Apple Computer Co. executives strongly disagreed, and they appear to have been right. Apple's new Macintosh computer is selling far better than expected, as are the Lisa and the Apple IIe. While IBM's PCjr has shown poorer-than-expected sales, Apple's new Apple IIc portable has gotten a strong welcome from dealers, with up to 400,000 units expected to be sold this year. Apple's earnings are also improving. Most of the credit for the firm's rapid turnaround goes to President and Chief Executive Officer John Sculley, who brought the company some much-needed marketing skills. He also reorganized Apple, dividing it into 2 divisions: one to run the Apple II family of products, the other to handle the Macintosh and Lisa lines. He thinks the products are now properly positioned to take advantage of key segments of the PC market.

DESCRIPTORS: Apple Computer-Cupertino Calif; Computer industry; Corporate reorganization; Market strategy; Case studies; Market shares

CLASSIFICATION CODES: 8651 (CN = Computer industry); 7000 (CN = Marketing); 9110 (CN = Company specific)

? LOGOFF

	23oct84 11:05:15 User36674
$3.94	0.054 Hrs File15 3 Descriptors
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$0.20	1 Types
$4.57	Estimated Total Cost

LOGOFF 11:05:18

415 20 DISCONNECTED 00 00

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BIBLIOGRAPHIC RETRIEVAL SERVICE

Bibliographic Retrieval Service (BRS) is the newest of the professional online services offering a "supermarket" selection of databases. BRS began operation in 1976, and now supports over 15,000 users with more than 82 databases online.

BRS is located in upstate New York and is the main competition for Dialog. BRS focuses on educators, libraries, and scientific researchers, and offers competitive rates to those of Dialog.

As can be seen from the online examples, BRS doesn't waste much time with online bulletins. Also, the search response time of the BRS system is significantly faster than Dialog's during the peak morning and afternoon search hours. The BRS search took 2:09 minutes (0.036 hrs) while the Dialog search took nearly 3:14 minutes (0.054 hrs), or 1.5 times longer.

SAMPLE BRS SEARCH

ENTER BRS PASSWORD
XXXXXXXXX

ENTER A-M-I-S PASSWORD
XXXXXXXXX

BROADCAST MESSAGE CHANGED 10/19/84 AT 13:46:50.

ENTER 'Y' OR 'N' FOR BROADCAST MESSAGE.___: N

*SIGN-ON   12.05.16   10/23/84:

ENTER DATA BASE NAME___: INFO

BRS/INFO/1971 - SEP 1984

BRS - SEARCH MODE - ENTER QUERY

1___: IBM

RESULT   4591

2___: PCJR

RESULT   18

3___: 1 AND 2

RESULT   18

4___: 3 AND APPLE

RESULT   6

5___: .. P 4 F5/DOC = 1

1
AN   84-20931. 8408.
AU   Murray-Thomas-J.
TI   Apple Is Back.
SO   Dun's Business Month. VOL: v123n6. PAG: 62-63, 2 pages. Jun 1984.
CC   8651 7000 9110.
DE   Apple-Computer-Cupertino-Calif. Computer-industry.
      Corporate-reorganization. Market-strategy. Case-studies. Market-shares.
AV   ABI/INFORM.
AB   At the beginning of 1984, it was reported that International Business Machines Corp. (IBM)
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      strongly disagreed, and they appear to have been right. Apple's new Macintosh computer is
      selling far better than expected, as are the Lisa and the Apple IIe. While IBM's PCjr has
      shown poorer-than-expected sales, Apple's new Apple IIc portable has gotten a strong wel-
      come from dealers, with up to 400,000 units expected to be sold this year. Apple's earnings
      are also improving. Most of the credit for the firm's rapid turnaround goes to President and
      Chief Executive Officer John Sculley, who brought the company some much-needed mar-
      keting skills. He also reorganized Apple, dividing it into 2 divisions: one to run the Apple II
      family of products, the other to handle the Macintosh and Lisa lines. He thinks the products
      are now properly positioned to take advantage of key segments of the PC market.

PT   02.
LG   EN . .
CD   DURVA.
YR   84 . .
JC   CD-DMI.
IS   0279-3040.

END OF DOCUMENT

——:   . . O

CONNECT TIME   0:02:09 HH:MM:SS   0.036 DEC HRS   SESSION 324

*SIGN-OFF 12.07.25   10/23/84:

315 20B DISCONNECTED 00 00

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SDC SEARCH

SDC Search is based in Santa Monica, California, and offers many specialized databases in addition to some of the more common files like ABI/Inform used in the previous examples. SDC has a number of exclusive databases in the engineering, oil, and world patent areas. About 50 percent of SDC Search customers are outside the United States.
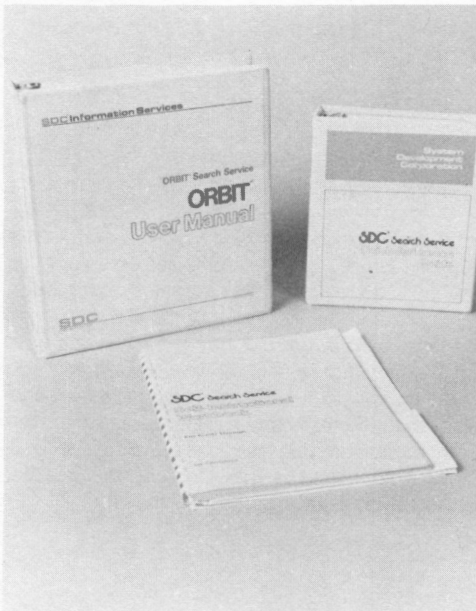
FIGURE 6.4   SDC Orbit Search Guides.

Corporate Online Services

In addition to the professional online database services, there is a group of firms offering primarily economic and sophisticated financial databases and vertical market databases (like insurance claims files). These databases include forecasts as well as historical data.

These specialized online services are primarily designed for use by government and corporation researchers. These online corporate database companies include:

Data Resources Inc.
Chase Econometrics/Interactive Data Corp.
ADP Network Services
General Electric Information Systems
CDC Business Information Services
Dun and Bradstreet Online
Interactive Market Systems
Computer Corporation of America
TRW Credit Data
Tymshare
GTE Telenet Medical Information Network

These services offer sophisticated statistical, graphics, comparison, and trend analysis programs for use with their databases. Their charges are based not only on connect time and data accessed, but also on use of their timesharing computer facilities for these analyses.

In a unique joint project, Data Resources and VisiCorp put together a service and software package which allows users to use the VisiLink program to automatically download data from DRI's economic files and then use the data offline on the customer's microcomputer (IBM PC or PCjr) for analyses performed with VisiCalc.

What's Next

The next chapter will survey the various ways in which your PCjr can be used to send text messages across the country and around the world instantly from your home or office. Electronic mail (EMAIL) is becoming a more and more popular way to send documents when it has to be there quickly. Communication with EMAIL is inexpensive, accurate, reliable, and easy.

Electronic Mail Services

Electronic mail is fast becoming a major use of home and business microcomputers. Electronic mail is a much-used term which describes several very different methods of transferring textual information. In this book, we will define electronic mail to be any method of textual document transmission in which some part of the journey from sender to addressee takes place electronically.

In the absolute sense, the telegraph of a hundred years ago was the forerunner of today's electronic mail systems. In the late 1800s, a customer would go to the local telegraph office and write out his message on a form, which was then translated into electrical impulses by the telegraph operator and sent on its way across the country. The message was repeated many times, but finally — often within a few minutes or hours — it reached the destination telegraph office and was transcribed on paper again by the receiving operator. Then, the addressee picked up his message at the receiving telegraph office or a delivery boy took the message to the addressee. This process saved several weeks or months of time compared to the U.S. Post Office's mail service of that time.

No matter how much progress we claim to have made, things aren't too different today for most of us. To send a telegram today, the sender calls in a message to Western Union or writes it on a form at the Western Union office, where it is entered on a CRT terminal, then sent electronically to a WU office near the addressee where it is printed out, and finally is delivered, telephoned, or mailed to the addressee. And, even in this technological age, the U.S. Postal Service still can take a week to send a letter across country.

There are other forms of electronic mail which have been in use for many years by businesses and governments, including facsimile transmission and the worldwide Telex and domestic TWX teleprinter networks. However, these services have required installing special lines and leasing expensive, specialized teleprinter machines to use their networks.

Today, rapid delivery of documents is taking on an increased importance. The popularity of overnight courier delivery services (like the Federal Express Overnight Letter for $14.00) is due in part to the incredible volume of letters

FIGURE 7.1   EMAIL in the 1950's. (Photo courtesy of RCA Global Communications.)

and packages carried by the U.S. Postal Service. Even the Postal Service recognizes this market and offers their Express Mail service for $9.75, guaranteeing one-day delivery between major cities and two-day delivery to most other areas. Time-critical mail services have become an 8 billion dollar industry in the United States.

Overnight is great, but how about delivery in four hours? Or in one minute? With computer-based electronic mail systems, your messages and documents can be sent across the country or around the world in seconds, not days or weeks, and for much lower cost than by other methods.

Accessing Electronic Mail Services with the PCjr

Your PCjr can serve as a gateway to the many different electronic mail systems. Using just the simple TERM program included in the PCjr BASIC cartridge and a modem with your PCjr, you can connect to MCI Mail, RCA Global Communications, ITT World Communications, Western Union EasyLink, CompuServe, The Source, Delphi, and many others.

To use the electronic mail services effectively, however, you should have an enhanced PCjr. All services except MCI Mail require 80-column display capability and offline message preparation, editing, and storage. Also, specialized EMAIL communications software can simplify EMAIL system use on a day-to-day basis.

With MCI Mail you can send a multipage letter to a postal address overnight, or have it hand delivered by courier in most major cities within four hours, or have it delivered instantly to another MCI Mail subscriber's elec-

FIGURE 7.2   "Electronic Mail."

tronic mailbox or to any Telex or TWX subscriber in the world.

Through several online services you can send WU Telegrams, WU Cable-grams, WU Mailgrams, WU Computer Letters, and USPS E-COM Letters from your computer.

By connecting to RCA Globalcom, ITT Worldcom, MCI Mail, WU Easy-link, Graphnet, ITT Dialcom, CCI, or a number of other services, you can send or receive a TWX or Telex message anywhere in the world with your PCjr.

IBM's *Personal Communications Manager* provides even simpler access to the above services than with the TERM program and more. It also enables you to set up your own private electronic mail network of IBM PCjrs, IBM PCs, and other ASCII compatible computers and terminals.

Delivery Methods

Electronic mail services can best be compared by looking at their delivery methods. You can have your electronically transmitted message delivered to the addressee by postal or courier paper mail; by direct electronic access to his terminal, teleprinter, or computer system; or by sending it to his personal "electronic mailbox" in an online computer system.

HARD COPY DELIVERY

The first delivery method (paper delivery) has been around since the tele-graph and telegram were first invented. Delivery of a paper hard copy of the message that was sent electronically is still a popular way to handle electronic mail. It does not require the addressee to be a subscriber to the network or EMAIL system. This method is used for Cablegrams, Telegrams, Mailgrams, and E-COM letters. Even Federal Express's new Instant Letter facsimile ser-vice falls in this category.

Actual delivery may be accomplished by the U.S. Postal Service, by a third party courier service, or by the message carrier's own employees (i.e., Western Union telegrams).

For postal delivery, Western Union Mailgrams are printed in one of 140 postal mail facilities nearest the delivery point, E-COM letters are printed in one of 25 USPS E-COM centers across the country, and MCI Mail letters are printed in one of MCI's 18 serving offices and delivered to the nearest postal distribution center. MCI Mail and WU Mailgrams are usually delivered the next postal delivery day, while E-COM is guaranteed to be delivered by the second postal delivery day (not counting delays encountered in an intermedi-ate carrier, like the Source or Easylink). For less time critical delivery, Western Union also offers Computer Letters which are printed in its EMAIL center in New Jersey and mailed from there — with a five-day average delivery time.

DIRECT ELECTRONIC DELIVERY

The second method (direct electronic delivery to a terminal) has been popular with businesses since the 1930s when the first teleprinter networks were es-tablished. Since 1950, it has been possible to send Telex messages almost any-where in the world (to another subscriber) in real time or through local government services to non-subscribers. There are over 1.6 million Telex ter-minals and about 150,000 TWX terminals worldwide. Of course, the difficul-ties of non-subscriber access and the recently increased private access line charges in the U.S. have somewhat limited this type of service. Recently, on-line services have been established to allow subscribers to dial into a "message computer" and thereby eliminate the dedicated private line formerly required for network access.

ELECTRONIC MAILBOXES

The newest method of electronic mail delivery is the electronic mailbox. An electronic mailbox is a storage area in a message-switching computer that is assigned to a specific subscriber and given a Telex or TWX number, just as a real teleprinter connected to the network would have. Messages addressed to the number are received and acknowledged by the computer and stored until
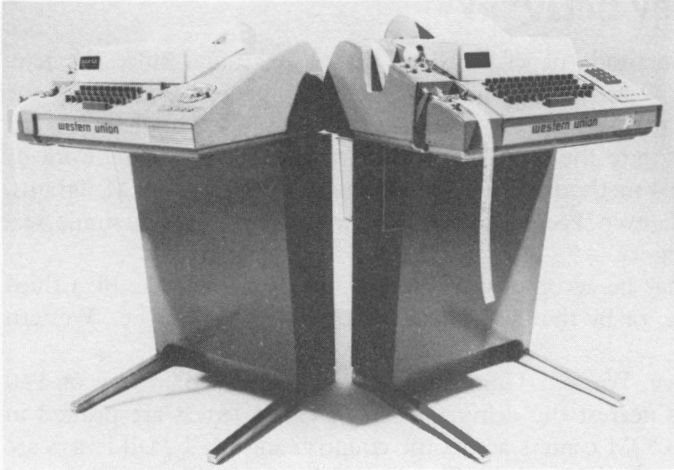
FIGURE 7.3   Telex machines — Teletype ASR 32 and 33. (Photo courtesy of Western Union.)

called for by the subscriber. The subscriber accesses the computer periodically much like an online service, and downloads his messages. He can also enter outgoing messages in real time from his terminal or upload prepared messages for transmission by the message computer at specified times.

In addition, the message computer can be programmed to automatically dial the subscriber's auto-answer terminal or computer telephone line with messages as they arrive or at a certain time each day.

Message Computers

Message computer systems began as an outgrowth of electronic switching systems used to route Telex and TWX traffic around the world. With the increasing complexity of the possible routes and the demand for additional features, these electronic switching centers became computerized message switches, with store-and-forward, automatic retransmission, mailboxes, speed and protocol translation, abbreviated dialing, and dial access capabilities.

These message computer systems offer many features. For the casual user, it is important only to know how to send a message from your PCjr or terminal to a TWX, Telex, or mailbox number; and how to retrieve messages from your mailbox.

Today, almost all of the domestic and international TWX and Telex carriers offer some form of message computer service as do some online services. RCA Globalcom, ITT Worldcom's Timetran, TRT Communications, MCI International (formerly Western Union International), Western Union Telegraph Company's Easylink, Western Union Electronic Mail, Consortium Communications Inc. (CCI), ITT Dialcom, Tymshare's OnTyme II, GTE Telenet's Telemail, MCI Mail, CCA's Comet, and others offer everything from

FIGURE 7.4   RCA Global Communications Computer Center. (Photo courtesy of RCA Globalcom.)

telephone access to the Telex network to advanced electronic mail services.

The Western Union and MCI Mail message computers also interface with the U.S. Postal Service, enabling Mailgrams, Computer Letters, USPS E-COM letters, and MCI Mail Postal Letters to be sent through their facilities, for delivery by the Postal Service overnight in many cases. MCI Mail also provides optional courier delivery in major cities either overnight or within four hours of message transmission.

Large mailings and automatic, computer-generated mailings (like dunning notices) are popular uses for Mailgrams, Computer Letters, and E-COM Letters. MCI Mail Letters are more commonly used for business and personal correspondence because MCI's high-quality laser printing of both text and letterheads has a more personal touch than other types of mass-printed computer letters.

Using EMAIL Systems

With the exception of MCI Mail, the EMAIL services offered by the major telex carriers are "bare bones" services. Although they have many features, the burden of operating the system is placed on the user. There are no user friendly menus and few if any online help aids.

This means that if you want to send a Telex to Australia, you must spend a few minutes researching the procedure, carrier codes, country codes, rates, and format before you even begin to send your message. The necessary information is usually provided by the service you subscribe to, but you must look it up in the manual or directory, or call customer service and ask. You will also need to create your message and address files offline with an editor or word processor program or a specialized EMAIL communications program.

Note: All rates quoted here are current as of January, 1985. However, all rates are subject to change! Contact the service in question for current rates and tariffs.

"POSTAL DELIVERY" EMAIL PRICING (Cont'd)
As of January, 1985

PROVIDER	SERVICE	DELIVERY METHOD/ TIME	BASIC MESSAGE-PAGE SIZE	MAXIMUM LENGTH	COST 1ST PG/ EA ADDL	REMARKS
Western Union EasyLink	WU Mailgram	USPS - Local PO Next Day	41/52 lines	14,925 chr	$2.40/.80	$25 min/ month
Western Union EasyLink	WU Computer Letter	USPS - Up to 5 days	41 lines	371 lns	$1.25/.40	$25 min/ month
Western Union EasyLink	USPS E-COM	USPS - Serving PO - 2 Days	41/56 lines	2 pgs	$1.15/.35	$25 min/ month
W.U. Electronic Mail Inc	WU Mailgram	USPS - Local PO Next Day	41 lines	14,925 chr	$3.00/1.50	No monthly or sub. - must use² Postman Software
W.U. Electronic Mail Inc	WU Computer Letter	USPS - Up to 5 days	41/52 lines	14,925 chr	$1.35/.50	No monthly or sub. - must use Postman Software
W.U. Electronic Mail Inc	USPS E-COM	USPS - Serving PO - 2 Days	41 lines	2 pgs	$1.50/.50	No monthly or sub. - must use Postman Software
The Source	USPS E-COM	USPS - Serving PO - 2 Days	41/56 lines	2 pgs	$1.35/.25	Plus connect time $20.75/ $7.75/hr eves, $49.95 sub.
The Source	WU Mailgram	USPS - Local PO Next Day	100 words	14,925 chr.	$5.15/1.00*	Plus connect time $20.75/ $7.75/hr eves, $49.95 sub
CompuServe EIS	USPS E-COM	USPS - Serving PO - 2 Days	41/56 lines	2 pgs	$1.50/.50	Plus connect time $12.50/ $6/hr nites, $89.95 sub.
Delphi	USPS E-COM	USPS - Serving PO - 2 Days	41/56 lines	2 pgs	$.95 each	Plus connect time $16.00/ $6.00/hr eves. $49.95 sub.
US Postal Service	USPS E-COM	USPS - Serving PO - 2 Days	41/56 lines	2 pgs	$0.26/.05	$50/yr + 200 message/ batch minimum ($52)

"POSTAL DELIVERY" EMAIL PRICING (Cont'd)
As of January, 1985

PROVIDER	SERVICE	DELIVERY METHOD/ TIME	BASIC MESSAGE-PAGE SIZE	MAXIMUM LENGTH	COST 1ST PG/ EA ADDL	REMARKS
MCI Communications	MCI Mail	USPS - Local PO - Next Day	3 pages	none	$2.00/$1.00* each addl 3 pages - mailbox $18 per year	
MCI Communications	MCI Mail	COURIER - Overnight	6 pages	none	$8.00/$1.00 each addl 3 pages - mailbox $18 per year	
MCI Communications	MCI Mail	COURIER - 4 hours	6 pages	none	$30/$1.00 each addl 3 pages - mailbox $18 per year	

*Discount for multiple identical messages.

MCI MAIL

Perhaps the most powerful and easiest-to-use electronic mail service is MCI Mail. An MCI Mail subscription allows you to use your PCjr or other microcomputer to generate, send, and receive mail to and from correspondents all over the world. Within the United States, your postal MCI Mail to most destinations will be delivered the next business day in the distinctive orange MCI envelope. If that is not quick enough, courier delivery is available for either

FIGURE 7.5   MCI Mail User Guides.
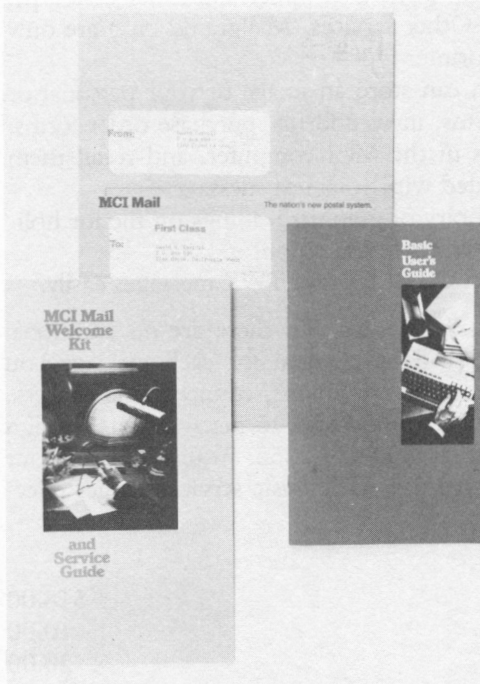
next day or four-hour service in larger cities. If your message is for another MCI Mail subscriber, you can send your correspondence instantly to his electronic mailbox.

MCI Mail offers several advantages compared to other EMAIL services:

1. Non-subscribers may be contacted by either postal or courier delivery.
2. There are no sign-up, connect time, communications, or minimum charges. There is an $18 annual mailbox fee.
3. Occasional users find the menu system helpful while heavy users can choose advanced service (for $10 per month) and eliminate the menus as well as adding several features.
4. A reasonable-sized document is covered in the minimum charges.
5. Online editing and message storage are provided, unlike other services which require real-time entry or offline message preparation and erase each incoming message after it is read the first time.
6. An 800 IN-WATS number is available at a $.15/minute extra charge for users in outlying areas.
7. MCI Letters are usually delivered with the next postal mail (overnight).
8. Access is provided to Dow Jones News/Retrieval Service through MCI Mail. Conversely, MCI Mail may be accessed from Dow Jones News/Retrieval and from BRS/After Dark.
9. MCI Mail paper letters are printed with high-quality laser printers on bond paper and they look like typed correspondence.
10. MCI Mail letters are stored and printed in upper and lower case type, much like typewritten letters. Other services (Mailgrams, etc.) are only in upper case, computer line printer type.
11. For a $20 annual charge, you can store an image of your personal or business letterhead, memo forms, invoice forms, purchase order forms, and so on as graphic designs in the MCI computer, and recall them whenever you want to be printed with your text message.
12. Advanced users can use the library of graphic headings on file for holiday greetings, birthdays, anniversaries, and so on.
13. Subscribers may send and receive TELEX and TWX messages easily.

An MCI Mail mailbox costs $18.00 per year, but there are no additional charges for receiving messages. You will be charged for each message you send, of course, but there are no monthly minimums, connect time charges, or local access charges (the 800 number does cost $.15 per minute). To sign up, just call MCI Customer Service at 800/624-2255. You will have your password and new user kit in about 10 days. The basic service charges effective January 1, 1985, are:

Subscription charges:
Annual mailbox fee	$18.00
Advanced service (monthly)	10.00
Graphics registration (annual)	20.00
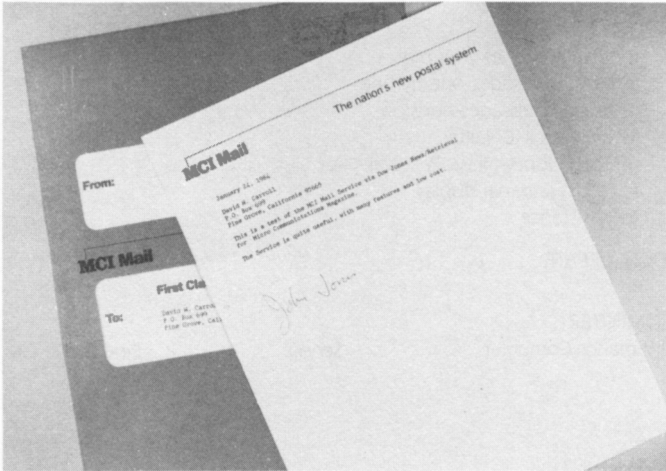
FIGURE 7.6   MCI Mail Paper Letter.

The only other charges are for messages sent. They are:

MCI Instant Mail (Electronic mailbox delivery)

Up to 500 characters total length	$ 0.45
501-7500 characters total length	1.00
Each additional 7500 characters	1.00

MCI Paper Mail

MCI Letter — U.S. Mail overnite	3 pages	$ 2.00
Overnite Letter — Courier	6 pages	8.00
4 Hour Letter — Courier	6 pages	30.00

Each additional 3 pages are 1.00 regardless of delivery option.

Mail Alert — notification of waiting mail $1.00 ea.

Note: Other billing options are available for the heavy volume user. Telex messages are priced according to current tariffs.

MCI MAIL SAMPLE SESSION — SENDING MAIL

Port: 11.

Please enter your user name: DCARROLL
Password: XXXXXXXX
Connection initiated. . . Opened.
Welcome to MCI Mail!

MCI Mail Version 2.2

There are no messages waiting in your INBOX.

Press <RETURN> to continue

You may enter:

SCAN	for a summary of your mail
READ	to READ messages one by one
PRINT	to display messages nonstop
CREATE	to write an MCI Letter
DOWJONES	for Dow Jones News/Retrieval
ACCOUNT	to adjust terminal display
HELP	for assistance

Command (or MENU or EXIT): CREATE

TO: AMADOR COMPUTER
   107-1731   Amador Computer   Service   Pine Grove CA
TO:

CC:

Subject: Test Letter

Text: (Enter text or transmit file. Type / on a line by itself to end.)

Dear Sirs:

   This is a test letter for the MCI Mail Service. This letter was written on an IBM PCjr computer and transmitted to MCI Mail by telephone modem connection. It was then delivered electronically to your mailbox in the MCI Mail computer in a few seconds.

   I trust that this demonstration has shown you the value of MCI Mail for your personal and business correspondence.

Sincerely,

David W. Carroll

/

You may enter:

READ	to review your letter
READ PAPER	to review your letter for paper
EDIT	to correct your letter
SEND	U.S. Mail for paper; instant electronic delivery
SEND ONITE	OVERNIGHT courier for paper; PRIORITY electronic delivery
SEND 4HOUR	FOUR-HOUR courier for paper; PRIORITY electronic delivery
HELP	for assistance

Command (or MENU or EXIT): send

One moment please; your message is being posted.

Your message was posted: Sat Oct 27, 1984 2:35 pm PDT.
There is a copy in your OUTBOX.

Press <RETURN> to continue

You may enter:

SCAN	for a summary of your mail
READ	to READ messages one by one
PRINT	to display messages nonstop
CREATE	to write an MCI Letter
DOWJONES	for Dow Jones News/Retrieval
ACCOUNT	to adjust terminal display
HELP	for assistance

Command (or MENU or EXIT): exit
Signing off from MCI Mail.
Call clearing requested by remote source.

MCI MAIL SAMPLE SESSION — RECEIVING MAIL

Port: 11.

Please enter your user name: amador
Password: XXXXXXXX
Connection initiated. . . Opened.
Welcome to MCI Mail!

MCI Mail Version 2.2

Your INBOX has 1 message

Command: read inbox

Date:	Sat Oct 27, 1984 2:35 pm PDT
From:	David Carroll / MCI ID: 111-1864
TO:	* Amador Computer / MCI ID: 107-1731
Subject:	Test Letter

Dear Sirs:

   This is a test letter for the MCI Mail Service. This letter was written on an IBM PCjr computer and transmitted to MCI Mail by telephone modem connection. It was then delivered electronically to your mailbox in the MCI Mail computer in a few seconds.

   I trust that this demonstration has shown you the value of MCI Mail for your personal and business correspondence.

Sincerely,

David W. Carroll

Press RETURN for more; type NO to stop:

Command: exit
Signing off from MCI Mail.
Call clearing requested by remote source.

WESTERN UNION EASYLINK

Western Union Easylink service is perhaps the second most popular electronic mail system for microcomputer users. Easylink allows subscribers to send and receive Telex and TWX messages, to correspond with other Easylink users through their electronic mailboxes, and to send WU Computer Letters, Mailgrams, Telegrams, Cablegrams, and USPS E-COM letters.
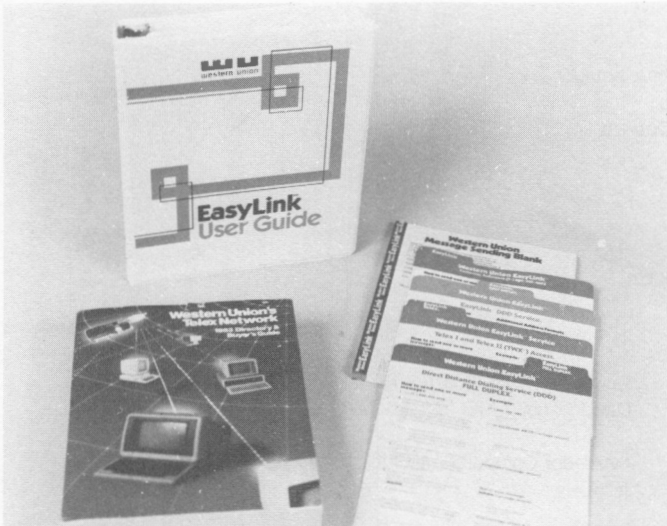
FIGURE 7.7   Easylink User Guide & WU Directory.

WU Easylink no longer has a $35 monthly charge or a sign-up charge, but instead it has a $25 monthly minimum billing which applies to any transmissions. WU charges for connect time and for using their toll-free 800 number. It pays to use a local access number if available and to prepare your messages offline. Most WU Easylink rates are based on connect time for inputting the message, so prepared messages are least expensive. For example, connecting at 300 baud, a message to another Easylink mailbox costs $.30 per minute. At 300 baud, this rate amounts to $.01 per character sent, making the Easylink message about 100 times more expensive than the 7500-character MCI Mail Instant Letter for $1.00 (at $.00013 per character). An Easylink message to a domestic WU Telex I or Telex II (TWX) subscriber costs $.43 per minute.

Other Western Union Easylink rates are:

WU Mailgrams:	first page	$3.00
	addl. pages	$ .75
WU Computer Letter:	first page	$1.50
	addl. pages	$ .50
USPS E-COM:	first page	$1.50
	second pg.	$ .50
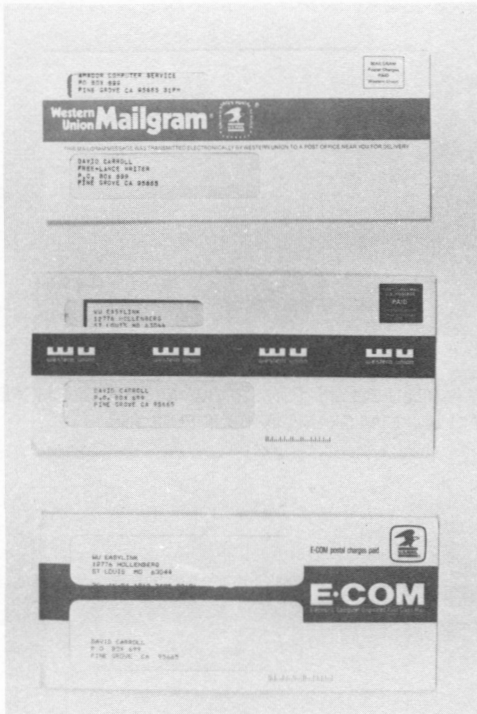
FIGURE 7.8   Western Union EMAIL —
Mailgram, Conputer Letter, and E-COM.

Easylink is a useful service, but it has several limitations which make it less than ideal for the casual subscriber. Easylink does not allow online editing or storage of outgoing messages, so messages must be typed in real time (and errors on other than the current line cannot be corrected) or created offline by a word processor and then uploaded to the Easylink computer. As can be seen from the example that follows, there is no interactive online help available (other than a few "how-to" messages). However, most information needed is provided in the well-prepared, three-color Easylink User's Manual in an 8½ by 11-inch ring binder.

Western Union also offers a 24-hour-a-day, 7-day-a-week toll-free help line for subscribers — 800/982-2737. This number can also be used for ordering a new subscription to Easylink.

Easylink users can select either full or half-duplex transmission by entering a two-digit code following the sign on message "ID?". Code 01 gives full duplex, 80-column conversational operation and code 16 gives half-duplex, 80-column conversational operation. Easylink operates at either 300 or 1200 baud.

SENDING A MAILGRAM VIA WU EASYLINK

```
EASYLINK
ID?01 EIDXXXXXX USERNAME.PASSWORD

6588161A 29OCT84 09:58 EST
PTS
/ZIP
DAVID CARROLL
P.O. BOX 699
PINE GROVE CA 95665
(AMADOR COMPUTER SERVICE
P.O. BOX 198
VOLCANO CA 95689) +

GA
MR CARROLL,

THIS IS A MAILGRAM MESSAGE WHICH YOU WILL RECEIVE TOMORROW MORNING. I HOPE
THAT THIS ILLUSTRATES THE BENEFIT OF USING WU MAILGRAMS IN YOUR BUSINESS.

SINCERELY

JOHN Q. SMITH

LLLL

ACCEPTED 6588161
EASYLINK

6588753A 29OCT84 10:01 EST
PTS
/QUIT
```

RCA GLOBALCOM COMPUTER-TO-TELEX

RCA Global Communications (RCA Globalcom), one of five major U.S. International Record Carriers (IRCs), has offered its Computer-to-Telex service for several years to allow interfacing terminals and computers with its international Telex network. (Note: A record carrier handles many distinct messages in batches with each message having its own address.) With recent federal decisions to allow more competition in the international and domestic record carrier industries, new services have appeared in both areas.

RCA's TELEXTRA DATABANK™ service allows dial-up users to have an RCA Telex number of their own associated with an electronic mailbox in the RCA computer system. They may send and receive messages from virtually
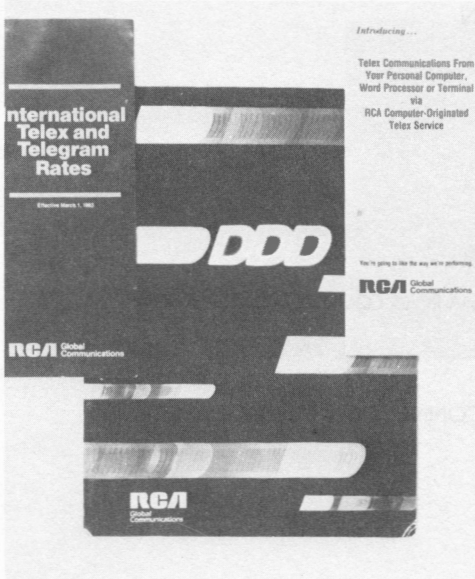
FIGURE 7.9 RCA Globalcom Computer-Telex User Manuals.

any computer or terminal with a modem. Toll-free 800 numbers are available for users as well as local access numbers.

Both real-time connections and store-and-forward connections are available. With real-time connections, each character you type at your terminal appears on the remote terminal "as you type it" (with transmission delays, of course). This allows actual conversations between Telex subscribers halfway around the world. In a store-and-forward connection, the message is stored in the RCA computer and transmission is attempted at the time you have specified (this allows sending low-priority messages at lower evening rates). If the called terminal is busy, the computer will retry several times.

Of course, messages can be sent to other RCA Computer-to-Telex and DATABANK subscribers as well. There is no difference between sending to a computer mailbox or an actual Telex terminal, except that two-way real-time connections are not possible.

RCA Globalcom charges $15 per month for a DATABANK mailbox. There is no charge for the incoming Telex number. The cost of domestic messages between RCA Telex terminals or mailboxes is $.60 per minute real-time and $.55 per minute store-and-forward. Connections to other domestic services (Western Union or ITT) cost $.90 per minute for real-time and $.75 per minute for store-and-forward. All billing time is computed as delivery connection time for delivery at the 50-baud Telex rate (even if the addressee is another mailbox subscriber) regardless of the time required to upload the message to the RCA computer. Incoming DATABANK messages must be picked up regularly (within three days) or service will be canceled. RCA Customer Service at 800/526-3969 will set up a new account at no charge.

SAMPLE RCA REAL-TIME CONNECTION

RCA GA
291124+
299999 ABCDE UR
OCT 30 1448 544178
291124 ALAN UR
FR: DAVID CARROLL
RE: TELEX SERVICE

HI ALAN,

THIS IS A REAL-TIME TELEX MESSAGE SENT VIA RCA'S COMPUTER-TO-TELEX SERVICE.

0000.7

SAMPLE RCA STORE-AND-FORWARD CONNECTION MESSAGE SENDING

RCA TELEXTRA
299999 ABCDE UR

OCT 30 15:01 101063

GA MSGS
299999+

THIS IS A TELEX MESSAGE TEST USING RCA'S STORE AND FORWARD TELEXTRA SERVICE.

RCVD 101063

SAMPLE RCA DATABANK MESSAGE RECEPTION

RCA TELEXTRA
299999 ABCDE UR

OCT 30 15:05 070320
GA MSGS

LLLLL

PLS ENTER COMMAND

MAIL

ENTER PASSWORD
XXXXX

LAST PICKUP: OCT 30 05:47 FROM 287147 TRCON HR

RCA DATABANK MSG 0106 TO 299999 RCVD OCT 30 15:05
299999 ABCDE UR

THIS IS A TELEX MESSAGE TEST USING RCA'S STORE AND FORWARD TELEXTRA SERVICE.

299999 ABCDE UR 0106

299999 ABCDE UR

DATABANK CALLBACKS:

TELEXTRA RCA UR

YR 15:01 10/30 REF 101063

TO 299999 (299999 ABCDE UR)

DEL 15:06 10/30 MINS:0.7 CHARGES:0.70

END OF MAIL
299999 ABCDE UR

PICKUP COMPLETED - THANK YOU

PLS ENTER COMMAND

ITT WORLDCOM TIMETRAN

ITT World Communications (ITT Worldcom) provides TimeTran™ service for its dial-up computer and terminal users. Its services are similar to those of RCA Globalcom, with the exception that at present there are no monthly charges or minimums. ITT does not offer toll-free 800 numbers for access to its TimeTran computer, but several local access numbers are available.

Call ITT Worldcom Customer Service at 800/922-0184 for more information.

FIGURE 7.10   ITT Worldcom Timetran Manuals.

USPS E-COM

The U.S. Postal Service operates a computerized mail service called E-COM designed for large-volume mail users. The service is currently for sale to a private contractor, but it will continue operation whether publicly or privately owned.

Direct E-COM users send mail in batches to the nearest postal E-COM center through a dial-up telephone connection. E-COM has a minimum of 200 pieces per batch. Mail costs $.26 each for the first page and $.05 for the second page. There is an annual registration fee of $50.00, and all postage must be prepaid to a deposit account in advance. The Postal Service guarantees second-day delivery for direct E-COM mail. Software used for mail transfer must be precertified by the Postal Service. DigiSoft of New York offers an inexpensive E-COM certified software program for the IBM PC and PCjr.

E-COM mail may also be sent at higher cost through an intermediate carrier such as Easylink, The Source, CompuServe, or Delphi.
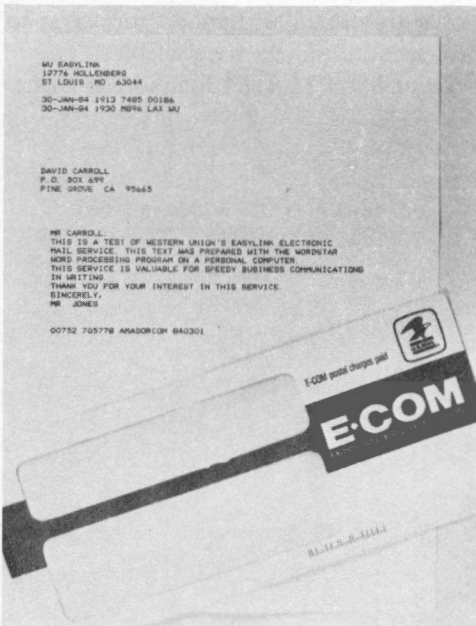
FIGURE 7.11   USPS E-COM Mail.

THE SOURCE

The Source has a sophisticated EMAIL system for all of its subscribers, available at the standard hourly connect rates. Each SourceMail user must be a Source subscriber. The Source also allows its subscribers to send Western

Union Mailgrams and USPS E-COM letters, though at somewhat higher rates than if they had interfaced directly with the particular service.

The basic rates for sending Western Union Mailgrams via the Source are:

MAILGRAM MESSAGE RATES

# OF MGRAMS	1-100 WORDS	101-200 WORDS	201-300 WORDS
1	$5.15	$6.15	$7.15
2-25	4.25 ea.	5.25 ea.	6.25 ea.
26-100	3.50 ea.	4.50 ea.	5.50 ea.
101-200	3.00 ea.	4.00 ea.	5.00 ea.

You are not limited in the length of messages you may send. Just add $1.00 for each 100 words (or portion thereof) over 300 words. Add $1.00 to each quote for Mailgrams sent to Canada.

E-COM letters sent via the Source cost $1.35 for the first page (41 lines) and $.25 for the second page (56 lines).

An online editor and storage for electronic mail text and address files is available to Source subscribers.

The Source also provides a real-time conference facility for subscribers called Participate and a user-to-user real-time communications facility called CHAT.

COMPUSERVE

Both of CompuServe's information utilities (CIS and EIS) provide forms of electronic mail service. Each offers subscriber services for communicating with other CompuServe subscribers. The consumer service offers a simple EMAIL system and the executive service has the advanced InfoPlex® service.

CIS EMAIL allows creation of messages and forwarding of them to any other CIS subscriber for notification and delivery the next time he signs on to CIS. There is no charge in addition to the normal connect time charges.

EIS InfoPlex service offers an advanced EMAIL service for contacting other EIS subscribers, and also for sending E-COM letters. EIS electronic mail rates are as follows (in addition to normal connect time charges):

InfoPlex Messages	$ .50 each
E-COM	$ .50 per message + $1.00 /first page + $ .50 /second page

CompuServe also provides a conference feature where two or more subscribers may communicate in real time.

DELPHI

Delphi offers its subscribers several advanced electronic mail features. Delphi's electronic mail system provides for EMAIL between subscribers (for no extra charge), sending E-COM letters, and sending messages to Telex subscribers worldwide. Delphi also offers a unique service called Batch Mailthru which allows Delphi subscribers to send EMAIL messages to subscribers on other services (CompuServe, The Source, and ITT Dialcom) for $.75 per message. Messages are sent at 6 a.m. EST every day. All mail service costs are in addition to normal connect charges. Delphi even has a language translation service available online to its subscribers.

DELPHI E-COM LETTER RATES

Single E-COM Letter -	$.95 each (one or two pages)
10 or more E-COM Letters in a batch -	$.52 each

DELPHI TELEX RATES

Domestic Telex	$ .50/100 characters or fraction
Canada/Mexico	$1.00/100 characters or fraction
International	$2.00/100 characters or fraction

OTHER SERVICES

There are a number of other services which offer both Telex and mailbox type EMAIL. A list of these services is included in Appendix I.

Specialized Software

The best way to use Easylink and the other Telex carrier services is with a "smart" software program which provides dialing, sign-on, offline editing, address list management, and menu-driven program operation. A few EMAIL communications programs are available to interface the IBM PC to specific services such as WU Easylink, ITT TimeTran, and RCA. These software packages include *Micro EZ LNK*, *Postman*, and *GRAM-A-SYST/TLX-A-SYST*.

Most of these packages will be available for the PCjr by the time this book is published. Be sure to specify that you wish to use a package on the PCjr when you order. A list of software is included in Appendix J.
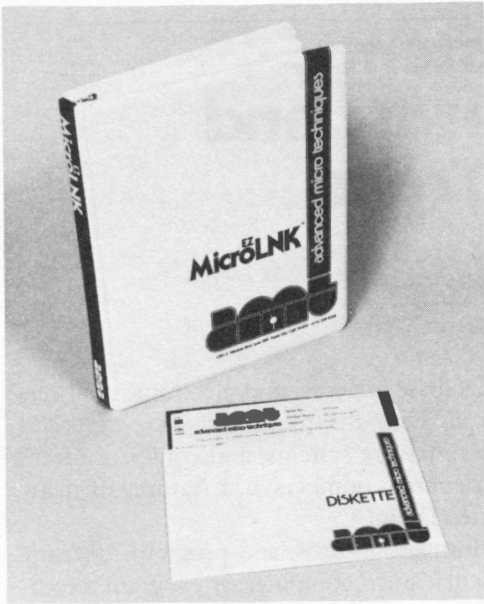
FIGURE 7.12   Micro EZ LNK Software Package.

Message Systems, Bulletin Boards, and Conference Trees

Besides information utilities, online database services, and electronic mail services, your PCjr can also communicate with the more than one thousand computer bulletin boards, public access message systems, and conference trees throughout the United States. The telephone numbers and features of many of these systems are listed in Appendices D and E.

These systems allow exchange of information, ideas, and programs in many areas of interest — from using a particular microcomputer or program to religion, jokes, peace, politics, and dozens of other topics. All it takes to access most of these public systems is your PCjr, set up for communications with software, a modem, and a telephone line (and the money to pay for any long distance charges!).

Origins of Computer Bulletin Boards

A few electronic bulletin boards first appeared several years ago when users of timesharing computers wanted a way to leave messages for each other and to share programs and information. Then, when hobbyist microcomputers became available, some were set up as hosts for "Public Access Message Systems" or PAMS. Other names for these systems include "Remote Bulletin Board Systems" or RBBSs, "Computer Bulletin Board Systems" or CBBSs, "Technical Bulletin Board Systems" or TBBSs, "Remote CP/M Systems" or RCP/Ms, and many others. These microcomputer-based systems allowed computer users to exchange programs and both public and private messages about hardware and software bugs and fixes, about equipment for sale, about product reviews, about other bulletin boards, and about upcoming events.

Soon, many users wished to have access to the increasing library of Public Domain (FREE!) software. This public domain software library is made up of programs written by microcomputer users and placed in the public domain for free exchange so that others can benefit from their solutions to common problems. These programs were originally available only through user groups. This limited their availability, so many bulletin board system operators wanted

to add program distribution and collection to their online capabilities. This was a problem as source listings of programs could be saved as messages, but transferring them to other computers was often difficult and error-prone. Binary files (.COM and .EXE programs) could not be sent as listings at all.

Determined to solve the problem of file transfer, Ward Christensen, a skilled programmer in Chicago, designed a block-oriented file transfer technique which allows for TEXT and BINARY file transfer with extensive, yet simple error checking. His first version of the program, called MODEM, was written in September 1977 and appeared on CP/M User Group Disk 25. It allowed two microcomputer users, each running the CP/M 8 bit operating system, to exchange both ASCII text files and binary ".COM" files by modem or direct connect (there were many different types of CP/M systems and most disk formats were not compatible, so directly transferring files over a communications link was often the only way to move programs from one type of computer to another). By 1979, BYE, an unattended system control program and XMODEM, the unattended version of MODEM, had been written and were operating in bulletin boards across the country. Many other programs were based on MODEM, BYE, and XMODEM and on the programs written for the first microcomputer-based "Computer Bulletin Board System" (CBBS) in Chicago, also written in part by Ward Christensen.

Versions of this popular file transfer protocol (now called the "XMODEM," "MODEM7," or "Christensen" protocol) are used in almost every major public bulletin board system online today. XMODEM protocol has even been recently added to the available file transfer protocols on CompuServe.

Although these programs (and others) have been available for CP/M based microcomputers for over five years, the wide variety of CP/M system hardware and the technical difficulties of getting each brand of system up and running have slowed the spread of general interest bulletin boards. Apple II and TRS-80 bulletin boards have been somewhat more popular because their hardware was more rigidly defined, making "standardized" systems easier to set up.

The BBS world changed after IBM introduced the IBM Personal Computer system. Because the IBM PC was a very powerful and popular system, and it was absolutely standardized, a powerful generic bulletin board program could be written for the PC that did not require much technical knowledge to install and yet would address a large market (there are now over 2 million IBM PCs installed). And, because adding a hard disk to an IBM PC is now a fairly inexpensive and simple task, many PC-based bulletin boards have 10 megabyte or larger hard disk libraries. The RBBS-PC program for the IBM PC is available free online or for $10 from the Capital PC User's Group or from its co-author Jon Martin (Aircomm RBBS). It is also available online from most RBBS-PC systems. Other BBS programs such as Hostcomm and Remote Access PC are also available for the IBM PC system.

Today, there are over a thousand bulletin board systems online nationwide, most allowing free public access. Some systems are primarily for program exchange, others are bulletin boards for user groups or technical information,

and still others provide multitopic conferences, dating services, jokes, and other specialized features.

Even some of the information utilities have gotten into the picture. CompuServe, The Source and Delphi all operate bulletin boards, file exchange areas, and conferences on many special interest topics.

The program exchange systems offer a large variety of programs for both the novice and experienced programmer, as well as for those who just want to download a few games or a spreadsheet model for only the cost of a phone call (most local systems in your area cost nothing to access). As mentioned above, many of these systems have hard disks connected to them which can store over a thousand programs online.

Legal Problems

The wonderful world of bulletin boards has been tarnished by a few malicious callers who have used these valuable public resources for their own criminal purposes. Because these systems have become very popular, and more and more people have access to microcomputers and terminals, it is to be expected that a few social misfits would also get involved with bulletin board systems.

These computer criminals, sometimes incorrectly called "hackers" by the media, have come up with several ways to misuse bulletin boards. They have:

Distributed copyrighted software illegally

Listed telephone credit card numbers of others

Distributed trade secrets (source code of CP/M, etc.)

Listed telephone numbers, access codes, and passwords for private online
  services (like TRW Credit Data)

Provided information on copying "protected" programs for the purpose of
  pirating the software

Distributed programs designed to "break in" to online systems (often called
  War Games Dialers)

As a result, some system operators or "sysops" have had their systems raided and confiscated by local telephone companies working with the police and the FBI. Most "sysops" were innocent parties and their systems were misused without their knowledge or consent, but they still have had to deal with the resulting legal problems.

To guard against these problems, many systems now require user validation before full access is granted. This may involve a "sign-up" phone call where user data is placed on file and verified by the sysop before use is allowed, or it may involve writing a letter to the sysop before a password is issued to the new user. Some systems even state that incoming caller's telephone numbers are recorded by the telephone company to aid in tracing abusers. Both state and federal laws are being enacted to deal specifically with online computer system break-ins.

All in all, not much has changed except that you may not be allowed full system access on your first call. A few days' delay is frustrating to the new user, but the sysops have a right to protect themselves and their investment in hardware from the small number of misguided abusers.

Subscription Systems

Another effect of the popularity of online bulletin board and file transfer systems is that the "good" systems are quite often busy. Though sysops have instituted daily time limits to allow a larger number of callers to access their systems, lines are still very busy (especially on weekends).

To remedy this situation, and to allow the sysop to put additional systems online (with more phone lines), donation and subscription systems have begun to appear. These systems charge between $20 and $30 per user per year and limit the number of subscribers per system to a few hundred. This makes it much easier to get online, and allows the sysop to add hard disk systems and multiple networked computers as the number of users grows.

One of the most successful subscription systems is the Toronto RCP/M Systems run by Jud and Colleen Newell. Starting with one public system, they became so well known for having the best and the most up-to-date software that they became a subscription system in 1982. Now they have six networked computers online and over 1,000 subscribers.

Many public systems are beginning to offer separate subscription systems as well because of their popularity. Kingcomm and the Fargo Board are two of these "dual" systems. Often, these multiple systems all share the expensive hard disk storage and files and have individual telephone lines for each system.

Most of the subscription systems are well worth the small annual fee, especially if they are in or near your home town and if they have software for your particular computer or support your special interests.

Free Software

Free software is available on many general interest bulletin board systems. Callers should check out systems that have software compatible with their computers. PCjr users will find that most RBBS-PC systems have a large amount of IBM PC software which will run with little or no modification on the PCjr. This is especially true of BASIC programs like games and financial or educational applications.

However, downloading software via modem almost always requires a communications program which will support the Christensen protocol (XMODEM). Getting an XMODEM file transfer program and the subject of free software is covered in more detail in Chapters 11 and 13.

Special Types of Files

A couple of subject areas which are often confusing to the new RBBS user are "squeezed" files and "library" files. These special types of files are really easy to understand and use, because of some powerful public domain programs which help deal with them.

To speed up file transfer communications (and reduce toll costs) and to save valuable disk space in RBBS systems, Dick Greenlaw, a very talented programmer, designed a text compression program called SQ and a companion text expansion program called USQ or UNSQ. These programs use advanced coding techniques to compress files by as much as 50 percent for storage and transmission. The files can then be expanded when needed to their original form. This means the file will take much less time to transfer by phone. Squeezed programs are often found on RBBS-PC and other systems. They can be picked out because the second letter of their filename extension is always "Q" (XXXXXXXX.XQX) for sQueezed. Thus, PROGRAM.DOC becomes PROGRAM.DQC and MODEM.ASM becomes MODEM.AQM.

Another bulletin board problem addressed by some skilled programmers is the transfer of a group of related programs — how to tie them together so the user will get everything he needs when he downloads the program(s). The answer here is a program called LU or Library Utility. This useful program will create a single library file made up of a number of individual files that can then be transferred as a single unit. Later, LU can break out each of the files again for use in the end user's system as they are needed. For example, an author could create a library file made up of all his book chapters. If he needed to access one or more chapters later, he could by using the LU program. Library files of this type are identified by the file name extension of ".LBR" (XXXXXXXX.LBR).

Versions of the SQ, UNSQ, and LU utility programs are available on almost every RBBS-PC system and should be among the first files you download to your system.

Accessing an RBBS-PC

To sign on an RBBS system, set up your PCjr for communications as discussed in Chapter 2. You will need to use a communications program that allows XMODEM file transfers to get the most out of your RBBS session. To use the XMODEM protocol you must set your system for 8-bit data with no parity. Pick the phone numbers of one or more nearby RBBS-PC systems for your first calls from Appendix D.

SIGNING ON

Call the number with your modem connected and when the system answers hit <Enter> twice. Answer the questions asked by the system. If you call a registration system, you may have to wait a day or longer for the system operator to verify your personal data. On an open system, you should see something like the following example.

Note: Until you are familiar with using RBBS systems you should answer "N" for NO to the second question on most RBBS-PC systems. This question enables the transmission of graphics characters to your computer and they will display as garbage unless your software can handle them properly.

RBBS-PC SAMPLE SESSION

CAN YOUR TERMINAL DISPLAY LOWER CASE? Y

RBBS-PC VERSION CPC12.2D --(compiled)

OPERATING AT 1200 BAUD, NO PARITY, 8 DATA BITS, 1 STOP BIT.

Do you want IBM Graphics Characters and COLOR (requires ANSI.SYS)? N

* <Ctrl K> to abort. <Ctrl S> to suspend *

Welcome to the San Joaquin Valley's first BBS system, located in KERN County.

<<<<<<<<<<<<<<<<<< KERNCOM 805-833-0359 >>>>>>>>>>>>>>>>>>

Operating 24 Hrs. per day 7 days a week. Your System Operator is
Rick Huron-Heming

KERNCOM is a private system owned by the SYSOP and operated with the cooperation of the KERN IBM-PC User Group and Computerland of Bakersfield.

ver. 12.2D

BULLETIN 6 LAST UPDATED 8-10-84. PLEASE READ IT ON A REGULAR BASIS

More? Y,N,NS <C/R = Yes>? Y

What is your FIRST Name? DAVE
What is your LAST Name? CARROLL
Checking User File . . .

Type of system (Carriage Return <C/R> if IBMPC) are you calling from? PCjr
CITY and STATE are you calling from? PINE GROVE, CA
DAVE CARROLL from PINE GROVE, CA
Is this correct? Y

For future calls, set your PASSWORD (not IBMPC)? ABCD1234
Type PASSWORD again for double check? . . . .

DAVE, your password is needed to logon again.

Logging DAVE CARROLL to disk . . .
DAVE, there are 6 bulletins today. Skip them? N

KERNCOM BULLETIN MENU

1 - SYSTEM REFERENCE CARD - 1 page summary of the system functions. Can be downloaded as REFCARD For a long detailed guide download USRGUIDE.TXT
2 - Color Screen Test File - download as BULLET2
3 - KERN IBM PC USER GROUP (KIPUG) meeting info.
4 - IBM PC bulletin boards list (9-1-84 WHMC) can be download as BULLET4
5 - COLOR/SGR installation & use information.
*6 - SYSTEM NOTES, RULES AND UPDATE INFO. Last update indicated on WELCOME screen.

Bulletin # <1 through 6, L)ist or Carriage Return <C/R> to end>? 6

* <Ctrl K> to abort. <Ctrl S> to suspend *

   THIS FILE WILL CONTAIN SYSTEM INFORMATION THAT IS IMPORTANT FOR
USERS TO KNOW. CHECK IT WHENEVER IT IS UPDATED (listed on WELCOME)

8-10-84
In the past this BBS instituted a "Registered User Only" validation procedure. During the 2 weeks this was in effect the SYSOP had second thoughts about operating a "closed system" It has always been my intention to provide KERNCOM as a FREE BBS that is open to ALL More? Y,N,NS <C/R=Yes>? users, providing some rules and guidelines are followed. The registration process was instituted because of a handful of users who, in my opinion, were taking advantage of the system resources, calling in excess of 4 and 5 times per day, and generally making a nuisance of themselves. I found that I had to monitor the message content on a regular basis just to weed out inappropriate comments.

I don't like the closed system and therefore it has been eliminated. I also don't like to babysit this BBS. In light of these feelings, users will be advised of any problems on an individual basis and I will expect the problem to go away immediately. If not, a lockout will be made for that user only. As a user of this system, YOU have a responsibility to make the open access successful.

Bulletin # <1 through 6, L)ist or Carriage Return <C/R> to end>?

Checking message file . . .

Sorry, DAVE, no mail for you today.

Entering message subsystem . . .

RBBS-PC Version CPC12.2D -- (compiled)
You are caller #   -> 4540
# of Active msgs   -> 68
Next msg # will be   -> 113

* <Ctrl K> to abort. <Ctrl S> to suspend *

<<<<<< Welcome to KERNCOM >>>>>>

To IBM Users- This Bulletin Board is dedicated to your machine and you are encouraged to use it
          fully.

To non-IBM callers - Your interest is appreciated! You are welcome to use the system but programs
          and messages of a technical nature will be limited to IBM and related 8086/8088
          machines.

* <Ctrl K> to abort. <Ctrl S> to suspend *

———————————————— FUNCTIONS SUPPORTED ————————————————

o Send and receive messages with password protection
o Download and upload 7-bit ASCII files
o Download and upload 8-bit binary files using XMODEM protocol
o List files available for download with directory number select
o Save caller's expert/novice, prompt & page length preference
o Save caller's last message read mark and line feed preference
o List personal mail message numbers or says no personal mail
o Quick scan and scan of messages with stacked number option
o Read messages with stacked number or from last message read
o Read SYSOP bulletins from bulletin menu
o Password protection READ for messages if desired
o Chat with System Operator
o New file since last call search in File Subsystem
o Permits baud change to 450 (Hayes feature)
o Graphic menus (for IBM users) and welcome.
o RBBS-PC files available for download.

Time remaining = 57 min.

——————————————— KERNCOM MAIN MENU ———————————————

PERSONAL COMMUNICATIONS		UTILITIES	ELSEWHERE
B)ulletins	O)perator	H)elp	F)iles system
C)omment	P)ersonal mail	L)ines per page	G)oodbye
E)nter message	Q)uick scan	X)pert on/off	U)tilities
I)nitial welcome	R)ead messages	?)Functions	W)indows
K)ill message	S)can messages		

Main Function <B,C,E,F,G,H,I,K,L,O,P,Q,R,S,U,W,X,?>?

TRANSFERRING FILES

Now, go to the files system by typing "F" and take a look at the main system directory by typing "L". Then list individual directories to see what files are available by typing "L;dir#". It is helpful to turn on your printer (if you have one and if your software supports online printing) during this process to get a hard copy of the system's directories. This will save frantically writing down file names or continuously relisting the directories after each transfer.

When you have found a file you want to download to your system, type "D", and then the file name when prompted. Next, the system will ask what type of transfer you want, ASCII or XMODEM. Some files can only be transferred by XMODEM protocol. I recommend that you use XMODEM for all transfers to minimize errors.

The RBBS system will advise the file length and time required for the transfer at the current baud rate. If you wish to cancel, type <Ctrl-X> several times.

Activate the XMODEM file receive mode in your communications program and sit back while the file is transferred. It's a good idea to have a few blank, formatted disks on hand to use for receiving files. Once online, it is more difficult (and expensive) to format new disks when needed and keep open the connection at the same time.

The following example shows the directory listing process and one file transfer using XMODEM protocol.

Main Function <B,C,E,F,G,H,I,K,L,O,P,Q,R,S,U,W,X,?>? F

Entering File Subsystem . . .

Time remaining = 56 min.

———————————————————————— FILE MENU ————————————————————————

D)ownload a file   H)elp   L)ist files   N)ew files
U)pload a file   ?) Xfer info

———————————————————————— ELSEWHERE ————————————————————————

G)oodbye   Q)uit to main menu
File Function <D,G,H,L,N,Q,U,?>? L
* <Ctrl K> to abort. <Ctrl S> to suspend *

——————————————————— KERNCOM FILE SYSTEM DIRECTORY ———————————————————
12 - Assorted Utilities   36 - Disk Catalogs   56 - Music Programs
14 - Assembly Language   44 - Finance/Acctng.   68 - Unprotection
18 - RBBS Program Info.   46 - Games!!   74 - Spreadsheet Stuff
24 - Communications   52 - X-PLICIT Items   78 - Word Proc./Text Ed.
32 - Data Base Programs   54 - Misc. Programs   99 - Recent Uploads

To LOOK at a directory, enter L;## at the files menu prompt. ie, to see Assorted Utilities L;12, note ## can be stacked, L;12;54 for Util & Misc.

Time remaining = 56 min.

———————————————————————— FILE MENU ————————————————————————

D)ownload a file   H)elp   L)ist files   N)ew files
U)pload a file   ?) Xfer info

———————————————————————— ELSEWHERE ————————————————————————

G)oodbye   Q)uit to main menu
File Function <D,G,H,L,N,Q,U,?>? L;74
* <Ctrl K> to abort. <Ctrl S> to suspend *

	KERNCOM			SPREADSHEET - DIRECTORY 74	
FILE	EXT	SIZE	00-00-84	= DATE ADDED	DESCRIPTION
XYFIT	.WKS	3712	08-24-84	Lotus Linear Regression Worksheet	
TRAVEL	.WKS	11264	08-08-84	TRAVEL WORKSHEET FOR LOTUS123	
RCMACRO	.WKS	4,224	05-04-84	Lotus Macro Builds WKS C col X R rows	
RENTAL	.WKS	4736	03/18/84	RENTAL INCOME WORKSHEET	
123PREP	.EXE	30208	03/01/84	PREPARES ASCII FOR TRANSFER, IN FIELDS!	
123PREP	.DOC	8704	03/01/84	"	
123STAR	.UNP	1024	02-01-84	UNPROTECT 123 STAR VER.	
123VER1A	.UNP	640	02-01-84	UNPROTECT 123 VER 1A	
123RANGE	.BAS	7040	02/01/84	PRINTS RANGE NAMES WITH LOCATIONS	
IRR	.WKS	7808	02-01-84	RATE OF RETURN	
LEDGER	.WKS	2176	02-01-84	GENERAL LEDGER WKS	
MENU	.WKS	8832	02-01-84	MENU DRIVER WKS	

Time remaining = 55 min.

———————————————————————— FILE MENU ————————————————————————

D)ownload a file   . H)elp   L)ist files   N)ew files
U)pload a file   ?) Xfer info

———————————————————————— ELSEWHERE ————————————————————————

G)oodbye   Q)uit to main menu

File Function <D,G,H,L,N,Q,U,?>? D
Enter full filename to download? LEDGER.WKS
Download type <X>modem, <A>scii, <Q>uit? X

File size is 17 blocks.
Transfer time: 0 min., 23 sec.
Ready to send. Enter <Ctrl X> to abort transfer...

At this point, you should insure you have enough space on your diskette to hold the file and then you should activate the XMODEM file receive function in your communications program. When the transfer is completed, the file will be on your diskette.

Note: When transferring files, be sure to transfer any related DOC or DQC file so you will also have the instructions for using the new program.

SIGNING OFF

When your transfers are completed, upload a couple of public domain files that aren't on the system now. This helps cross-pollinate the bulletin board network and it insures you will be allowed to continue to use this system. (Many systems require one upload for each 5 or 10 downloads.)

Finally, don't just hang up — use the sign-off procedure so that the system will be available for others to use. On the RBBS-PC systems type "G" at the file system or main menus.

Time remaining = 54 min.

———————————————————————— FILE MENU ————————————————————————

D)ownload a file   H)elp   L)ist files   N)ew files
U)pload a file   ?) Xfer info

———————————————————————— ELSEWHERE ————————————————————————

G)oodbye   Q)uit to main menu

File Function <D,G,H,L,N,Q,U,?>? G

It is now 11:50 AM.
You have been on for 6 Min. and 17 Sec.
Thanks for calling, DAVE!

Next in Line

This chapter concludes Section I on basic topics and "how to use" your PCjr for communications. Section II deals more with "how it all works" from a technical standpoint. Topics include detailed information on hardware and software for communicating using the PCjr and how to write communications programs for the PCjr.

SECTION II
PCjr Advanced Topics

Introduction to Data Communications

Telecommunications literally means communication over a distance. Telecommunications with the IBM PCjr involves sending and receiving information, or data, in a coded format (much like Morse telegraph code) over regular telephone lines and data networks to other computers.

The most common form of human/computer interface is in the form of printed or displayed letters and numbers — our familiar alphabet. Microcomputers like the PCjr can keep words together in the right order in word processors, add numbers in accounting programs and spreadsheets, and manage various types of word and number data files in database management programs.

At present, most microcomputers cannot use spoken language easily, but the ability for basic speech output is becoming more readily available. Although there are more and more hardware and software interfaces being developed, the English language is not very logical and it is very difficult for computers to understand or generate conversational responses like the computers in science fiction movies and novels do. Inexpensive interfaces have been developed to allow most computers to "speak" data in the same way they print out data. But this is still a long way from the friendly HAL computer in the movie *2001 — A Space Odyssey*.

To work with our "human" data, computers must convert the symbols of our everyday letters, words, and numbers into numeric codes which can be easily handled by their very simplistic integrated circuits. For the truth is that computers only understand numbers — and most computers can really only add, complement, and compare. They derive their usefulness from the incredible speeds at which they can perform these very simple operations.

Binary and Hexadecimal Numbers

Today's microcomputers can only understand two things — on and off, "1" or "0," yes or no. Unlike humans, who use the ten digits from "0" to "9" to

represent values, computers operate entirely with the binary number system, based on the two digits "1" and "0." You can imagine a computer's problem in counting to ten! The binary (or base 2) number system is the computer's counterpart to our decimal (or base 10) number system. Due to the electrical nature of the computer, it can best represent numbers in binary by a "1" value (on) or a "0" value (off). We humans use ten values in our decimal system: "0," "1," "2," "3," "4," "5," "6," "7," "8," and "9."

As computers have evolved in the past 20 years, computer engineers and programmers come up with better ways of writing binary numbers — all those 1s and 0s — over and over. Not only are the long strings of numbers hard to write accurately, they also are hard for humans to interpret and understand. So, various forms of shorthand have become popular over the years, depending on the physical hardware of the computers in use at the time. One of the number systems popular on large computers a few years ago was the octal or base 8 number system. The octal number system counts "0," "1," "2," "3," "4," "5," "6," and "7." Octal numbers can represent three binary bits of data and, as many computers of the time used 24-bit words, their data could be easily represented by eight octal digits (8 digits times 3 bits = 24 bits).

010	110	011	100	000	110	101	111	(24-bit binary word)
2	6	3	4	0	6	5	7	octal number

When 8-bit microcomputers became popular, octal notation dropped out of common use because octal is most efficient for bit lengths evenly divisible by 3 (like 24 or 12), since each digit represents three binary bits. Octal was replaced by hexadecimal or base 16 notation which represents groups of four binary bits. Hexadecimal or "hex" as it is called, uses the digits "0," "1," "2," "3," "4," "5," "6," "7," "8," and "9" just like our decimal system plus six more symbols — "A," "B," "C," "D," "E," and "F" for the six added values in the hexadecimal notation system.

Two hex digits can represent one byte or 8 bits of data. In the 16-bit computer world of the PCjr, two bytes of data make up a word of 16 bits. A 16-bit data word can be represented by four hexadecimal digits. For example:

1101	1001	0110	1111	(16-bit word)
D	9	6	F	(hex value)

The hexadecimal number D96F is certainly simpler to write and remember than the binary number 1101100101101111, isn't it?

Here is a simple table which lists the values from one to sixteen in decimal, binary, octal, and hexadecimal:

DECIMAL	BINARY	OCTAL	HEXADECIMAL
0	0	0	0
1	1	1	1
2	10	2	2
3	11	3	3
4	100	4	4
5	101	5	5
6	110	6	6
7	111	7	7
8	1000	10	8
9	1001	11	9
10	1010	12	A
11	1011	13	B
12	1100	14	C
13	1101	15	D
14	1110	16	E
15	1111	17	F
16	10000	20	10

Even without understanding the mathematical basis for binary numbers it is fairly easy to see that binary uses a repeating pattern of ones and zeros to represent the same decimal values we are familiar with in everyday life.

The ASCII Code

Like numerical values, the individual characters we use to make up our written language must be represented by binary codes so the computer can work with them. You may recall using a simple substitution code as a child where each letter of the alphabet was replaced by another letter or a number. Computers use the same method to represent textual letters and numbers internally.

The most widely used code in microcomputers today is the American Standard Code for Information Interchange or ASCII (pronounced "ASS-KEY"). For example, in ASCII the letter "A" is represented inside the computer by the value 65 in decimal or 1000001 in binary, the letter "B" as the value 66 or 1000010 in binary, and so on. Each upper and lower case letter, each symbol, and each control character has its own unique code value. The ASCII standard provides codes for a total of 128 different characters using a 7-bit binary code. Refer to the ASCII Character Chart for the full code translation table for the PCjr.

You should understand that the characters representing the Arabic numerals or digits we use to write numeric values ("1," "2," "3," etc.) are not the same to a computer as the numerical values they represent. For example, the text character "5" is represented in the ASCII code as 0110101, while the numerical value 5 is simply a binary 101.

ASCII CHARACTER CHART

7-BIT BINARY	HEXA-DECIMAL	DECIMAL	ASCII CHAR	INTERPRETATION	PCjr KEYBOARD
Control Codes:					
0000000	00	0	NUL	Blank (Null)	CTRL-2
0000001	01	1	SOH	Start of Header	CTRL-A
0000010	02	2	STX	Start of Text	CTRL-B
0000011	03	3	ETX	End of Text	CTRL-C
0000100	04	4	EOT	End of Transmission	CTRL-D
0000101	05	5	ENQ	Enquiry	CTRL-E
0000110	06	6	ACK	Acknowledge	CTRL-F
0000111	07	7	BEL	Bell	CTRL-G
0001000	08	8	BS	Backspace	CTRL-H
0001001	09	9	HT	Horizontal Tab	CTRL-I
0001010	0A	10	LF	Line Feed	CTRL-J
0001011	0B	11	VT	Vertical Tab	CTRL-K
0001100	0C	12	FF	Form Feed	CTRL-L
0001101	0D	13	CR	Carriage Return	CTRL-M
0001110	0E	14	SO	Shift-Out	CTRL-N
0001111	0F	15	SI	Shift-In	CTRL-O
0010000	10	16	DLE	Data Link Escape	CTRL-P
0010001	11	17	DC1	Device Control 1	CTRL-Q (XON)
0010010	12	18	DC2	Device Control 2	CTRL-R
0010011	13	19	DC3	Device Control 3	CTRL-S (XOFF)
0010100	14	20	DC4	Device Control 4	CTRL-T
0010101	15	21	NAK	Neg. Acknowledge	CTRL-U
0010110	16	22	SYN	Synchronization	CTRL-V
0010111	17	23	ETB	End of Text Block	CTRL-W
0011000	18	24	CAN	Cancel	CTRL-X
0011001	19	25	EM	End of Medium	CTRL-Y
0011010	1A	26	SUB	Substitute	CTRL-Z
0011011	1B	27	ESC	Escape	ESC
0011100	1C	28	FS	File Separator	CTRL-\
0011101	1D	29	GS	Group Separator	CTRL-]
0011110	1E	30	RS	Record Separator	CTRL-6
0011111	1F	31	US	Unit Separator	CTRL -
Symbols:					
0100000	20	32	SP	Space	Spacebar
0100001	21	33	!		!
0100010	22	34	"		"
0100011	23	35	#		#
0100100	24	36	S		S

ASCII CHARACTER CHART (Cont'd)

7-BIT BINARY	HEXA-DECIMAL	DECIMAL	ASCII CHAR	INTERPRETATION	PCjr KEYBOARD
0100101	25	37	%		%
0100110	26	38	&		&
0100111	27	39	'	Closing Quote	'
0101000	28	40	(		(
0101001	29	41	)		)
0101010	2A	42	*		*
0101011	2B	43	+		+
0101100	2C	44	,	Comma	,
0101101	2D	45	-	Hyphen or minus	-
0101110	2E	46	.	Period	.
0101111	2F	47	/		/
0110000	30	48	0	Numeric zero	0
0110001	31	49	1		1
0110010	32	50	2		2
0110011	33	51	3		3
0110100	34	52	4		4
0110101	35	53	5		5
0110110	36	54	6		6
0110111	37	55	7		7
0111000	38	56	8		8
0111001	39	57	9		9
0111010	3A	58	:		:
0111011	3B	59	;		;
0111100	3C	60	<		<
0111101	3D	61	=		=
0111110	3E	62	>		>
0111111	3F	63	?		?

Upper Case Alphabet:

7-BIT BINARY	HEXA-DECIMAL	DECIMAL	ASCII CHAR	INTERPRETATION	PCjr KEYBOARD
1000000	40	64	@		@
1000001	41	65	A		A
1000010	42	66	B		B
1000011	43	67	C		C
1000100	44	68	D		D
1000101	45	69	E		E
1000110	46	70	F		F
1000111	47	71	G		G
1001000	48	72	H		H
1001001	49	73	I		I
1001010	4A	74	J		J
1001011	4B	75	K		K
1001100	4C	76	L		L
1001101	4D	77	M		M
1001110	4E	78	N		N
1001111	4F	79	O		O
1010000	50	80	P		P
1010001	51	81	Q		Q
1010010	52	82	R		R
1010011	53	83	S		S

ASCII CHARACTER CHART (Cont'd)

7-BIT BINARY	HEXA-DECIMAL	DECIMAL	ASCII CHAR	INTERPRETATION	PCjr KEYBOARD
1010100	54	84	T		T
1010101	55	85	U		U
1010110	56	86	V		V
1010111	57	87	W		W
1011000	58	88	X		X
1011001	59	89	Y		Y
1011010	5A	90	Z		Z
1011011	5B	91	[	Opening Bracket	[
1011100	5C	92	\	Reverse Slant	\
1011101	5D	93	]	Closing Bracket	]
1011110	5E	94	^	Circumflex	^
1011111	5F	95	_	Underline	_

Lower Case Alphabet:

7-BIT BINARY	HEXA-DECIMAL	DECIMAL	ASCII CHAR	INTERPRETATION	PCjr KEYBOARD
1100000	60	96	'	Opening Quote	'
1100001	61	97	a		a
1100010	62	98	b		b
1100011	63	99	c		c
1100100	64	100	d		d
1100101	65	101	e		e
1100110	66	102	f		f
1100111	67	103	g		g
1101000	68	104	h		h
1101001	69	105	i		i
1101010	6A	106	j		j
1101011	6B	107	k		k
1101100	6C	108	l		l
1101101	6D	109	m		m
1101110	6E	110	n		n
1101111	6F	111	o		o
1110000	70	112	p		p
1110001	71	113	q		q
1110010	72	114	r		r
1110011	73	115	s		s
1110100	74	116	t		t
1110101	75	117	u		u
1110110	76	118	v		v
1110111	77	119	w		w
1111000	78	120	x		x
1111001	79	121	y		y
1111010	7A	122	z		z
1111011	7B	123	{	Opening Brace	{
1111100	7C	124	|	Vertical Line	|
1111101	7D	125	}	Closing Brace	}
1111110	7E	126	~	Overline (Tilde)	~
1111111	7F	127	DEL	Delete/Rubout	CTRL-Backspace

Note: The PCjr keyboard offers several methods of generating some codes. This chart shows only the most commonly used keystrokes.

Parity

The eighth bit in the ASCII code was originally used for a type of simple error detection known as parity checking. There are three types of parity — odd, even, or none. Odd parity means that the total number of "1" bits in each character transmitted will always be odd. If the number of "1" bits is even, as in the character "A" (7-bit ASCII code of 1000001), the parity bit is turned on, making the 8-bit odd parity ASCII code for the character "A" equal to 11000001 in 8-bit binary. Character "C" (7-bit ASCII code of 1000011) doesn't need the parity bit because the number of "1" bits is already odd, so the parity bit is turned off, making an 8-bit odd parity code of 01000011.

Even parity works the same way as odd, but in reverse. The parity bit is turned on to insure an even number of "1" bits when the number of "1" bits would otherwise be odd, as in the character "C" (7-bit code of 1000011) making an 8-bit even parity code of 11000011. On the other hand, character "A" doesn't need the help of the parity bit for even parity; it already has an even number of "1" bits in its 7-bit code of 1000001, so its 8-bit even parity code is 01000001.

Today, online information services most often interface with remote callers using 7-bit data with even parity or 8-bit data with no parity. The communications software you use to communicate with these services must be able to set the data character length and type of parity checking to be used. Most packages allow this configuration process.

Data Word Length

You may have noted the mention of 7-bit and 8-bit data in the above discussion. Data word length is an important consideration when transmitting data. The ASCII code requires 7 bits of data to represent each of the 128 characters available. Why then would we want to use an 8-bit data word with no parity?

If we wish to transmit extended character sets, like those used on the IBM PC and PCjr, we must have all 256 characters available, and this requires an 8-bit data word. Or, if we wish to transmit or receive programs in binary or "machine language" form (like .COM and .EXE files), we must have all 8 bits available.

The parity error checking scheme is quite simple, and it offers only a 95 percent chance of detecting an error in transmission. Block protocols like the XMODEM scheme offer better than 99.4 percent chance of error detection. Most file transfers between microcomputers today use a block type error checking protocol (with either Cyclic Redundancy Check or Checksum checking), so parity checking is not required.

Some systems (mostly older mainframe computers) do not support 8-bit data word mode. On these systems, a conversion program is used (often

called BINHEX) to convert binary files to hexadecimal text files. In this process, each byte or character of data (8 bits) is converted to two hexadecimal text characters plus a space and then transmitted as a text file. At the receiving computer, the text file is converted back to binary with another program — HEXBIN. Though this is much less efficient than binary transfer, requiring three times the characters to transmit a binary file, it does get the job done.

To sum up, 7-bit even parity is popular for online services for ASCII text file transfer, but 8-bit no parity is preferred for block mode binary file transfers. Where 8-bit is not available, binary files can be translated into 7-bit text files for transmission and then converted back at the destination.

Parallel and Serial Data

The bits of information or ones and zeros (on and off signals) that make up the data used by a computer are transmitted from one device to another by one of two methods: in parallel (at the same time) or serially (one after another). Most data in microcomputers today is made up of many 8-bit "bytes" or characters of data, representing machine instructions, numeric values, or textual information in ASCII code. The 8 ones and zeros making up a single character can be sent all at the same time over 8 individual wires — in parallel, or one bit after another — serially.

Parallel transmission is used where extremely high-speed data transfer is needed (100 kilobytes per second or more) — as on the internal bus of the computer itself, or where a simple and inexpensive interface is needed to send data a short distance (less than 50 feet) — as in a parallel Centronics-type printer interface. Parallel transfer is not practical for longer distances — you can imagine the problems trying to send parallel data over eight separate telephone lines at once!

Asynchronous (not synchronized) serial transmission is used for inexpensive lower speed transmission over medium and long distances by direct connection or by telephone line using a modem. Dial telephone lines are commonly used for data rates between 110 bits per second (baud) and 1200 baud. Higher speeds are possible but require very expensive telephone line interfaces (modems).

Two computers using asynchronous mode serial communications to transmit data operate completely independently. In the idle state, both monitor their incoming data line for activity. When one is ready to send data, it sends a start bit, 7 data bits and one parity bit or 8 data bits without parity, and 1 or 2 stop bits. The other computer begins timing the signal when the start bit is received and assembles the incoming bits into the transmitted character. It checks for various types of errors and if it confirms a valid character, it transfers the character to memory. Thus, it takes 10 or 11 bits to send a 7 or 8-bit data item. Systems operating at speeds of 300 baud and above typically use one start bit and one stop bit. Thus, a 1200-baud link can send 120 data

characters per second using the standard 10-bit word.

Synchronous transmission (where both computers use the same timing or "clock" signal) is a more complex system used for high volume and high-speed communications links such as those between two mainframe computers. Synchronous communication systems using a block protocol like IBM's SDLC are more efficient for these applications because the extra parity and start/stop bits are not required. Each block of data is sent as a self-contained message, and each message has its own error checking codes included in the message.

Modems

Since the PCjr uses binary code — ones and zeros — to represent information internally, it is most efficient to use this same code to exchange data with other computers. Unfortunately, telephones are designed for transmitting the human voice made up of analog (continuously varying) tones rather than computer codes made up of direct current electrical signals. The solution? An interface between the computer's binary on and off DC codes and the telephone's analog signals called a modem.

FIGURE 9.1   Intelligent Modems.

The term modem is an acronym for MOdulator/DEModulator, which describes the modem's actual function. The modem connects between the computer and the telephone line. At the sending end of a data connection, the modem changes the computer's on and off binary signals to modulated tones which vary in frequency (or tone) as the computer's data signal changes, much like an organist playing two different notes corresponding to the ones and zeros in the serial data stream being sent. These tones can be carried by the voice telephone network quite well at lower speeds.

At the receiving location, another modem detects the tones coming over the phone line and demodulates them, converting the tones back into binary signals (on and off) for the receiving computer or terminal. Today's modems use two pairs of tones, one pair for each of the two directions of transmission, answer and originate, in what is called full-duplex operation.

The two tones used to transmit data in each direction represent the on and off signals of the computer, sometimes called "mark" (1) and "space" (0) from the teleprinter days. In 300 baud modems, the two tones are 200 hertz apart, the originate set at 1070 hz and 1270 hz and the answer set at 2025 hz and 2225 hz. Figure 9.2 shows how these signals are transmitted over standard dial telephone lines.
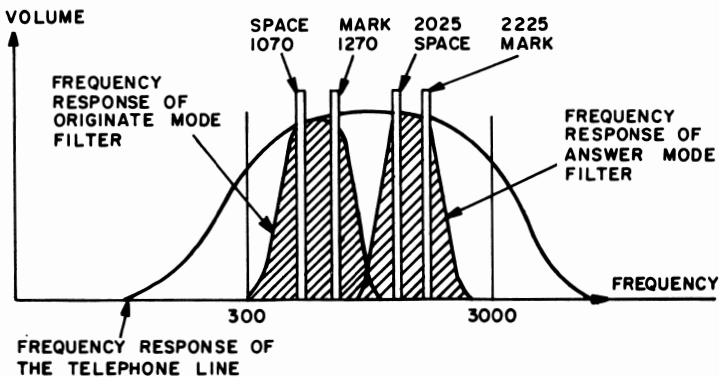
FIGURE 9.2   300 baud Modem Frequencies.

Modems vary in speed, type of modulation, method of connection to the phone line, intelligence, and, of course, price. The cost of modems has been decreasing over the past few years with the increase in demand and the many advances which have occurred in the technology. The rule a few years ago was that modems cost about a dollar per baud, or $300 for a 300-baud modem. Today, 300-baud manual modems cost between $60 and $100 and 1200-baud modems are priced from $200 to $600, depending on features.

BELL STANDARDS

As an innovative leader in data communications technology, Bell Laboratories designed many of the early modems, or data sets as they were called. Regulations at the time did not allow connection of customer-owned equipment to the telephone network, so modems were provided by the local telephone companies. The Bell System set many of the standards still used today in data communications. Two of the best-known standards are the Bell 103 standard and Bell 212 standard, named for the model numbers of Bell data sets used at that time.

BELL 103

The Bell 103 standard specifies a low-speed modem based on frequency shift keying. Various parts of the standard specify originate, answer, manual and automatic operation, and the data set to data terminal equipment (DTE) connection. The Bell 103 standard was designed to operate between 110 and 300 baud, or 10 to 30 characters of data per second. Teletype model 33 teleprinter terminals were the most common data communications device at that time and operated at 10 characters per second with an 11-bit data word.

As the use of data terminals grew, acoustically coupled modems were developed which did not require a hardwired connection to the telephone line, because the telephone companies would not allow such a hook-up. These acoustic modems were often subject to error caused by poor connections, defective telephone sets, and room noise.

Today, modems are available from scores of manufacturers, and virtually all are certified by the FCC for direct connection to the telephone company's lines. The IBM PCjr Internal Modem is a Bell 103 compatible 110-300 baud modem.

BELL 212A

The Bell 212A standard for full duplex 1200-baud data communications over dial-up telephone lines was a dramatic step forward in the technology of data communications. It represented a fourfold increase in data transmission speed. This was accomplished by using phase-shift modulation (PSK) instead of the FSK used in the Bell 103 modems. The Bell 212A data rate of 1200 baud allows transmission of 120 characters per second.

Today, most 212A-type modems feature intelligent operation, with auto dialing, auto answer, and internal memories. Most also offer a fall-back to Bell 103 operation at 300 baud or even 110 baud if the remote system or poor line conditions require slower speed operation. The Hayes Smartmodem 1200 recommended by IBM for the PCjr is such a modem.

ACOUSTIC MODEMS

In the early days of data communications, acoustic modems became popular because they were less expensive than the rented telephone company modems, and direct connection was not allowed. Even after privately owned modems were allowed to be connected to the telephone company's lines in the mid-1970s, a "data access arrangement" or DAA was required to isolate the equipment from the phone lines.

Acoustic modems are now about the same cost as direct connect modems. They are used mostly in portable applications and where direct connect modems are impractical (pay phones and multiline business phones). Almost all acoustic modems are limited to a maximum speed of 300 baud.
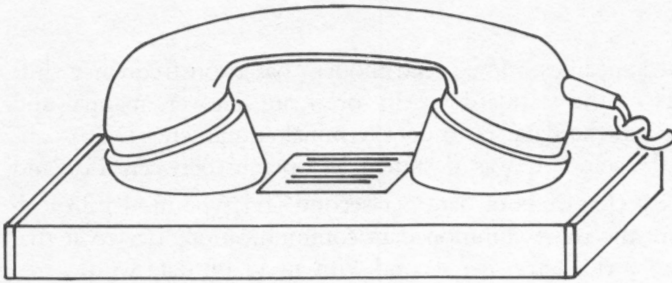
FIGURE 9.3   Acoustic modem.

Today, an acoustic modem offers little advantage, but if you have one, it can be used as a manual modem connected to the PCjr with the serial adapter cable.

DIRECT CONNECT MODEMS

Direct connect modems that are certified to meet stringent Federal Communications Commission standards may be plugged in to the telephone line directly, usually with a modular telephone cord. The modem may plug into a dual modular adapter, like the SE-267A made by Suttle Equipment or directly into the telephone company's wall jack (RJ-11). Some direct connect modems have a modular jack also to plug in a telephone set, eliminating the need for the adapter.

FIGURE 9.4   Dual Modular Adapter.

Intelligent modems with automatic dial features actually do not need a telephone set for operation, as the dialing is done by the modem in response to commands from the computer or terminal connected to it. Advanced modems

can even provide "call progress" detection, notifying the user of busy, ringing, and no-answer conditions on the line while some other modems have a built-in speaker so the user can hear what's happening on the phone line (busy tone, ringing, etc.).

IBM's *Personal Communications Manager* program will support third-party modems in addition to the IBM PCjr Internal Modem. The program supports three intelligent modems, the Microcom direct connect automatic modem, the Microcom ERA 2 internal 212A modem for the PCjr, and the D.C. Hayes Smartmodem 300 or 1200. Other manufacturers' modem products are supported only in manual mode.

INTEGRATED MODEMS

With the microcomputer industry's growth has come a new type of modem pioneered by D. C. Hayes Co. The integrated modem is built on a printed circuit board which plugs directly into the microcomputer's bus structure, making it a directly controlled peripheral of the system's microprocessor. These modems are available for Apple, IBM PC, S-100, and other computers. They are usually less expensive than traditional modems connected via an RS-232 serial I/O port.

FIGURE 9.5   Cermetek InfoMate 212A Modem.

The IBM PCjr supports the IBM PCjr Internal Modem made by Novation for IBM. This optional Internal Modem plugs into a special connector in the PCjr's main circuit board and becomes a part of the system. It operates at up to 300 baud and offers auto dial and auto answer operation and many "intelligent" features. The telephone line is connected to the modem by a modular plug at the rear of the PCjr.

Microcom's ERA 2 is a 110/300/1200-baud intelligent integrated modem which can also be installed inside the PCjr. The ERA 2 system includes complete communications software for the PCjr. It features automatic dialing, auto answer, a speaker for call progress monitoring, and a number of other features. The ERA 2 is also a direct connect modem and is compatible with the Hayes Smartmodem command structure.

RS-232C Standard

If you are using the IBM PCjr Internal Modem, you will probably not need to understand the details of the EIA RS-232-C standard for interconnection of serial communications devices. However, if you are going to transfer data between the PCjr and another computer by hardwired cable, between the PCjr and a printer or plotter, or between the PCjr and an external modem, you will need to learn how RS-232-C works.
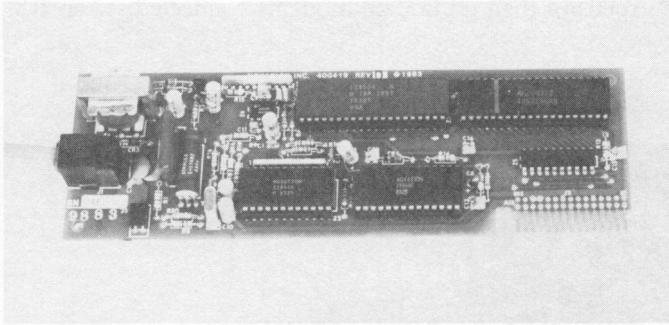
FIGURE 9.6   IBM PCjr Internal Modem Card.

The RS-232-C standard was developed in the 1960s when it became apparent that some common serial electrical interface between data processing equipment of various manufacturers and modem equipment was needed. The Bell System was instrumental in using the RS-232-C standard developed by the Electronic Industries Association for interconnecting Bell System data sets (modems) with customer data terminal equipment. This interface standard recommends a 25-pin "DB" type connector as the RS-232-C interface.

RS-232-C is intended for short-haul (50 feet) low-speed (19.2K baud or less) digital (D.C. voltage) serial communications. The interface consists of two signal or data lines, grounds, and several control/status lines in each direction. The control lines are used to provide telephone line and modem control and status signals between the data communications equipment (DCE) — the modem — and the data terminal equipment (DTE) — the computer or terminal.
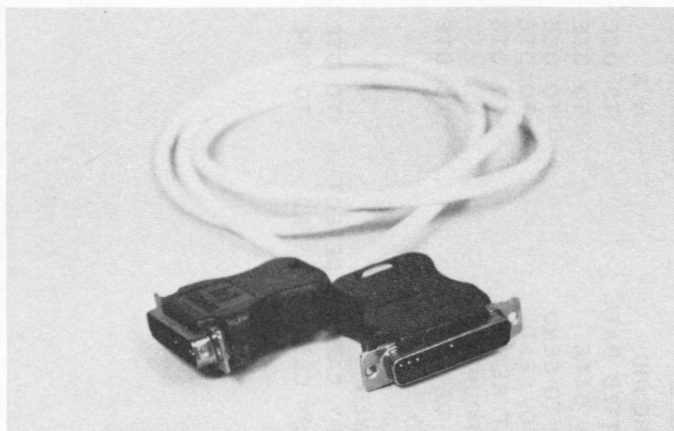
FIGURE 9.7   RS-232C Cable.

Only about ten of these lines are commonly used for asynchronous serial communications. They are:

RS-232 STANDARD (COMMON SIGNALS)

PIN	NAME	DTE/DCE	FUNCTION
1	CG	---	Chassis Ground
2	TD	-->	Transmit Data
3	RD	<--	Receive Data
4	RTS	-->	Request to Send
5	CTS	<--	Clear to Send
6	DSR	<--	Data Set Ready (Modem ready)
7	SG	---	Signal Ground
8	DCD	<--	Data Carrier Detect
12	CI	<--	Hi Speed Indicator (Hayes)
20	DTR	-->	Data Terminal Ready
22	RI	<--	Ring Indicator

Although the de facto industry standard has been to install a female connector on the equipment chassis (modem or terminal) and to use dual male ended cables for interconnection, IBM has used another approach in the IBM PC and PCjr. The serial port connector on the IBM PC chassis is male. The DB-25 type RS-232-C connector on the Serial Device Adapter Cable from IBM for the PCjr is also male. Thus, to interface a PC or PCjr with most external devices (printers, modems, etc.) an RS-232 male to female cable is required.

The IBM PC and PCjr are both designed to act as the DTE end of the RS-232-C connection. Therefore, with the proper "straight through" (pin 1 to pin 1, pin 2 to pin 2, etc.) male-female RS-232 cable, a standard modem may be directly plugged in and will probably work properly.

DIRECTION	NAME		NAME	DIRECTION
TO DCE	SECONDARY TRANSMITTED DATA —14	1	EARTH GROUND	N.A.
TO DTE	TRANSMIT CLOCK —15	2	TRANSMITTED DATA	TO DCE
TO DTE	SECONDARY RECEIVED DATA —16	3	RECEIVED DATA	TO DTE
TO DTE	RECEIVER CLOCK —17	4	REQUEST TO SEND	TO DCE
	UNASSIGNED —18	5	CLEAR TO SEND	TO DTE
TO DCE	SECONDARY REQUEST TO SEND —19	6	DATA SET READY	TO DTE
TO DCE	DATA TERMINAL READY —20	7	LOGIC GROUND	N.A.
TO DTE	SIGNAL QUALITY DETECT —21	8	CARRIER DETECT	TO DTE
TO DTE	RING DETECT —22	9	RESERVED	
TO DCE	DATA RATE SELECT —23	10	RESERVED	
TO DCE	TRANSMIT CLOCK —24	11	UNASSIGNED	
	UNASSIGNED —25	12	SECONDARY CARRIER DETECT	TO DTE
		13	SECONDARY CLEAR TO SEND	TO DTE

FIGURE 9.8   RS-232C signals and DB-25 connector.

To connect two DTE devices together (i.e., a PCjr and a non-IBM serial printer) it may be necessary to cross the data and control/status lines with a cable or adapter called a "null modem." The null modem takes the place of two back-to-back modems or DCE devices and allows the connecting of two DTE devices directly together.

Note: The simple null modem shown here does not always provide all the connections needed for some types of equipment. Check with your dealer if you have problems.
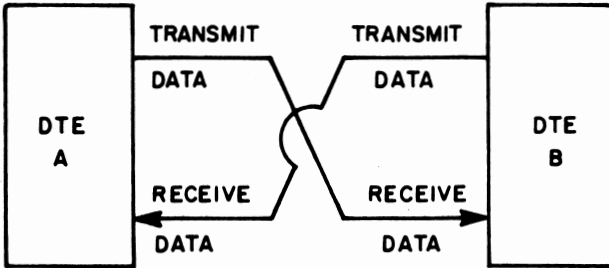
FIGURE 9.9   Null Modem Data Flow.

NULL MODEM FOR DTE — DTE CONNECTION

DTE	TO	DTE
1	- - -	1
2	- - -	3
3	- - -	2
4	- - -	5
5	- - -	4
6	- - -	20
7	- - -	7
20	- - -	6

Next Up

In the next chapter we will investigate the hardware operation of the PCjr computer system in regard to data communications functions and programming. We will also consider the differences between the PCjr and its big brother, the IBM PC.

IBM PCjr and Data Communications

To use the IBM PCjr for any type of data communications, you first must have installed the necessary hardware and software on your computer. You can set up the system yourself, or you can have your dealer or a knowledgeable friend do the installation and configuration of your system.

PCjr Models

As mentioned, the PCjr is available in either the "entry" model or the "enhanced" model. The entry model includes a 16-bit 8088 microprocessor, 64KB of permanent Read Only Memory (ROM) which includes IBM Cassette BASIC, 64KB of user memory, a cordless 62-key keyboard, a desktop transformer, two slots for ROM cartridges, light pen port, serial communications port, and an audio sound generator. It can display 40 columns of information on either a standard television set or on a compatible video monitor.
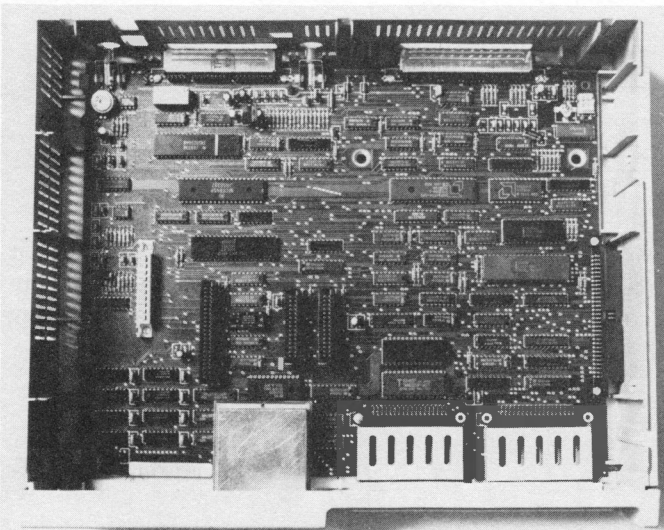
FIGURE 10.1   IBM PCjr Bare Internal View.

The entry model is intended primarily for playing games and using simple educational programs. The PCjr computer includes more advanced color graphics capability than its big brother, the IBM PC. By adding a data cable, the PCjr can use a standard audio cassette tape recorder for external data and program storage. The entry model PCjr is priced at $599 at IBM Product Centers.

The PCjr enhanced model includes an additional 64KB of user memory for a total of 128KB as well as a single 360KB, dual-sided, slim-line 5 1/4-inch floppy diskette drive. It also has the capability to display up to 80 columns of information on a monitor. The price of the enhanced PCjr is $999 at IBM Product Centers.

PCjr Hardware

The PCjr uses the Intel 8088 microprocessor chip just like two other members of the IBM PC family, the IBM PC and PC-XT. In many ways, the PCjr is very similar to the IBM PC. The major differences are in expandability and capacity. IBM announced limited expansion capability for the PCjr in 1984 in the form of additional RAM memory (to a total of 512KB) and a new typewriter-style keyboard. Several third-party firms have announced products to enhance the PCjr, ranging from new keyboards, hard disk drives, and an add-on floppy drive to a PC-compatible expansion chassis with 512K bytes of memory.
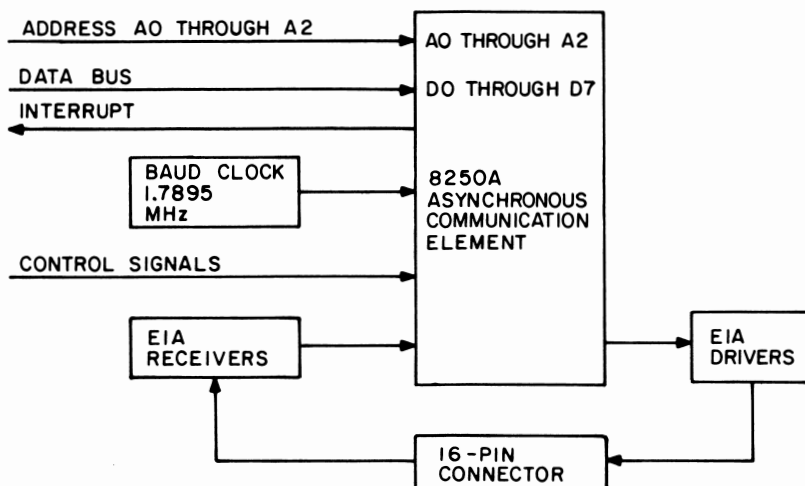
FIGURE 10.2   PCjr serial port block diagram. (Reprinted courtesy of IBM Corporation.)

The most important hardware consideration of the PCjr for communications applications are the serial input and output (I/O) port and the modem port. Serial and modem I/O ports for the PCjr are both handled by the powerful INS8250A programmable Asynchronous Communications Element, a

large-scale integration (LSI) chip which includes many advanced features.

The INS8250A provides an internal baud rate generator and internal interfaces for most of the RS-232 signals commonly used in asynchronous communications. This is a close relative to the INS8250 serial chip used in the IBM PC and IBM PC-XT computers, so most machine level programs interface in the same way on the PCjr and the larger PCs.

INS8250A Asynchronous Communications Element features

Full double-buffering which eliminates the need for precise synchronization
Independent receiver clock input
Full Modem control functions: CTS, RTS, DSR, DTR
Even, odd, and no-parity-bit generation and detection
False start bit detection
Complete status reporting
Line-break generation and detection
Break, parity, overrun, and framing error simulation
Automatic internal loopback test
Full prioritized interrupt system controls
Internal baud rate generator (50 to 4800 baud)

IBM PCjr VS. IBM PC COMPATIBILITY

The PCjr is compatible in design to the IBM Personal Computer in most respects, but there are some significant differences that affect communications operations.

First, and perhaps most important, the PCjr does not have built-in "direct memory access" (DMA) hardware. This limits its capability for simultaneous operations. Whereas the IBM PC can receive data from the keyboard, write to the disk, and monitor a serial communications port — all at the same time — the PCjr cannot. This means that the PCjr cannot support keyboard input and data communications at rates of over 1200 baud at the same time, and when data must be read to or written from the disk drive, keyboard and communications dataflow must be stopped. This limitation is the one reason why many communications programs (like Crosstalk XVI) for the IBM PC were rewritten so they would operate properly on the PCjr.

When operating at data rates of 1200 baud and above you may notice some loss of characters on the screen display with certain programs like MODEM7PC. In machine language programs, this is caused by the slow speed of the video display scrolling routines in the PCjr BIOS. These screen routines operate about 25 percent slower in the PCjr than in the IBM PC. Therefore, some programs that operate properly on the PC will miss characters sent to the screen when used on the PCjr.

In BASIC programs, including TERM, this problem can be aggravated because input from the serial port is automatically captured to a string buffer. If
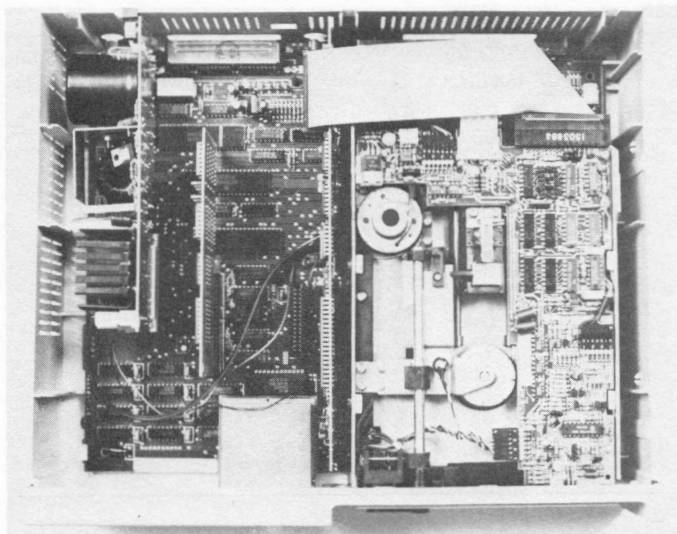
FIGURE 10.3   IBM PCjr Enhanced Unit Internal View.

this buffer is not large enough or if it is not emptied quickly enough, it will be overrun — resulting in garbage on the screen or an error message. Use of XOFF/XON or other protocol control may be necessary to insure that these routines have time to display the data to the screen and empty the buffers.

The serial ports cannot be used during diskette operations because the BIOS system software masks off all interrupts except for the Diskette Interrupt during disk operations.

PCjr asynchronous receive operations cannot exceed a rate of 1200 baud when overlapped with keyboard operations, due to the BIOS's use of the 8088 processor for direct deserialization of the keyboard data signal.

Some IBM PC communications programs interface directly with the I/O hardware rather than using the PC-DOS, BIOS, or BASIC system calls to initialize the hardware baud rate for the communications ports. Programmers who use direct hardware calls to set up the baud rate of the INS8250 serial ACE chip for the IBM PC rather than using the system BIOS calls will find that their programs will not operate on the PCjr. This is due to the slower internal clock rate used in the PCjr. Thus, the PCjr requires a different frequency divisor to directly set a particular baud rate than does the IBM PC. Programs which use BIOS, DOS, and BASIC "system" calls to set the baud rate will not have this problem. A side effect of this difference is that the PCjr serial ports can not be used at speeds higher than 4800 baud, because of the large error in speed at higher rates caused by the slower clock rate.

Some communications programs tested on the PCjr encountered problems because they use direct keyboard mapped input, rather than the system BIOS routines provided. Because the PCjr keyboard is mapped differently than that of the IBM PC, many of the keyboard codes are different as well.

PCjr BAUD RATE TABLE

DESIRED BAUD RATE	DIVISOR USED TO GENERATE 16X CLOCK		PERCENT ERROR PER BIT DIFFERENCE BETWEEN DESIRED AND ACTUAL
	(DECIMAL)	(HEX)	
50	2237	8BD	.006
75	1491	5D3	.017
110	1017	1A1	.023
134.5	832	167	.054
150	746	12C	.050
300	373	175	.050
600	186	BA	.218
1200	93	5D	.218
1800	62	3E	.218
2000	56	38	.140
2400	47	2F	.855
3600	31	1F	.218
4800	23	17	1.291

Baud Rate at 1.7895 MHz

Another compatibility problem may be caused by the hardware assignment of serial ports in the PCjr. Under PC-DOS, BIOS, and BASIC, hardware "ports" have logical names which correspond to their physical hardware addresses. Software which uses these "system" calls will work properly on both the PC and PCjr. With the Internal Modem installed, the physical addresses of the two standard serial communications ports in the PCjr match the IBM PC. The Internal Modem slot address is based at hex 3F8 (logical COM1) and the serial port served by the rear connector on the PCjr is based at address hex 2F8 (logical COM2). However, when the Internal Modem is not installed, the serial port (still based in hardware at address hex 2F8) becomes logical COM1.

Thus, any software which accesses the serial port using its hardware address rather than logical "system" address will not use the serial port automatically when the Internal Modem is not installed. Any such software which does not allow manual selection of either communications port (COM1 or COM2) will not work on the serial port of the PCjr.

IBM PC VS. PCjr SERIAL PORT COMPATIBILITY

ADDRESS (HEX)	IBM PC	IBM PCjr W/INT MODEM	IBM PCjr W/O INT MODEM
3F8	COM1	COM1	N/A
2F8	COM2	COM2	COM1

PCjr INTEGRATED MODEMS

Integrated modems are installed inside the computer and interface directly with the internal microcomputer data bus. Two integrated modems are available for the PCjr as of this writing — the IBM PCjr Internal Modem and the Microcom ERA 2 internal modem for the PCjr. The IBM modem is an intelligent Bell 103 (300 baud maximum) modem and the Microcom ERA 2 modem is an intelligent Bell 212A/103 (maximum 1200 baud) modem.

FIGURE 10.4   IBM PCjr with modem and Personal Communications Manager.

A special connector on the PCjr motherboard detects whether a modem card is installed and allows the PCjr system BIOS to automatically reassign the logical address for the built-in serial port from COM1 to COM2 when the modem card is plugged in.

IBM PCjr INTERNAL MODEM

The IBM PCjr Integrated Modem is a Bell 103-type direct connect 110 or 300 baud intelligent modem card that installs inside the PCjr. It lists for $199 and features both automatic and manual answer and originate modes. It will automatically dial a specified telephone number by either Touch-Tone or pulse dialing. Full logical call progress detection is also provided.

The PCjr Internal Modem includes Novation's proprietary LSI digital modem components. The modem card interfaces with the PCjr system bus via an INS8250A Asynchronous Communications Element (as does the PCjr's built-in serial port).
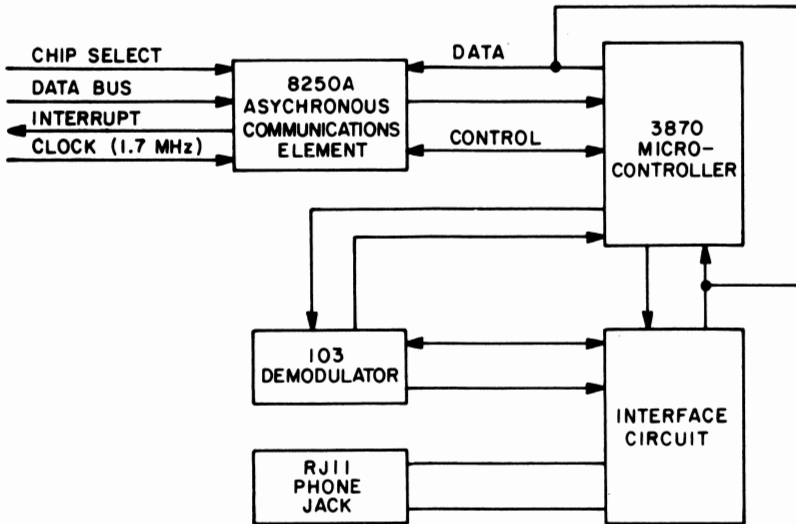
FIGURE 10.5   PCjr Internal Modem block diagram. (Reprinted courtesy of IBM Corporation.)

The IBM Internal Modem is supported by IBM's *Personal Communications Manager* program as well as other commercial software.

MICROCOM ERA 2 MODEM

The Microcom ERA 2 modem for the PCjr is a piggyback printed circuit card containing a complete intelligent Bell 212A/103 modem. The ERA 2 provides a full set of intelligent features including automatic dialing, answer and originate modes, 110/300/1200 baud operation, and on-board speaker for call progress monitoring. The ERA 2 modem comes with a complete communications software program, and uses Hayes-compatible modem commands. The package retails for $499 at most computer stores. The ERA 2 modem operates with the IBM *Personal Communications Manager* as well as with the ERA 2 software program.

EXTERNAL MODEMS

Some users of the IBM PCjr may wish to use an external modem instead of the IBM or other integrated internal modem. There are several reasons why an external modem may be preferable:

1. An external modem may already be available;
2. The user may plan on upgrading to an IBM PC, and buying an external modem will allow it to be used on a different machine in the future;
3. The user may wish to use the modem on more than one PCjr and the external modem is much easier to transfer and transport;

4. The user may wish to communicate at 1200 baud and the IBM modem is only capable of 300 baud;
5. The user may wish to purchase a used modem;
6. The user's software may require a specific modem such as a D.C. Hayes Smartmodem;
7. An external modem may be less expensive, discounted, or packaged with other hardware, software, or online subscriptions; and
8. The user may wish to minimize the drain on the PCjr internal power supply by using an external modem.

Note: Items 4 and 6 may also be answered by the ERA 2 internal modem.

There are literally hundreds of different external modems available today. They range in price from $100 to $700 and in operational features from manual to super intelligent. They operate at speeds of 110, 300, and 1200 baud (and some speeds in between).

The Radio Shack DC-1 (or Modem I) manual direct connect modem for $99.95 is useful for contacting information utilities and for limited file transfers. Other manual modems include the Novation D-CAT at $189 and the Anchor Signalman for $99. Automatic Bell 103 modems are typically just as expensive as the IBM Internal Modem, and do not all include the intelligent features provided with the IBM Modem for $199.95. The automatic Radio Shack Modem II is priced at $199.95 and the Hayes Smartmodem 300 costs $289.00. The Novation Smart-CAT 103 is $249.

Intelligent Bell 212A modems are becoming more and more popular among microcomputer users because of the four times higher data transfer rate and the ease of operation offered by these "smart" modems when combined with a sophisticated communications program like *Crosstalk XVI*. These modems are priced from the U.S. Robotics Password at $449 to the Novation Smart CAT 103/212 for $595 and the Hayes Smartmodem 1200 for $699. A number of intelligent modem vendors are listed in Appendix J.

RADIO SHACK MODEM I

The Radio Shack Modem I is a simple manual Bell 103 modem that provides both originate and answer data connections at 110 to 300 baud. It connects directly to the telephone line using a modular connector and has a jack for plugging in a local telephone set. It is powered by a small wall transformer. It supports a standard RS-232 interface. The cost is $99.95.

HAYES SMARTMODEM 1200

The Hayes Smartmodem 1200 is virtually the industry standard for intelligent modems. It is a complete automatic answer and originate Bell 212A/103 modem with intelligent features. The Smartmodem has 8 modem status lights and an internal speaker for call progress monitoring and it supports a full RS-

FIGURE 10.6   Hayes Smartmodem 1200 Modem.

232 interface. This modem is so popular that many communications software programs (including IBM's *Personal Communications Manager*) come pre-configured for it. The Smartmodem 1200 has a list price of $699.

PCjr INTELLIGENT MODEM COMPARISON

PRODUCT	SPEED	PRICE
IBM PCjr Internal Modem	110/300	$199
Microcom ERA 2 for PCjr	110/300/1200	499
Hayes Smartmodem 300	110/300	289
Hayes Smartmodem 1200	110/300/1200	699
Cermetek 212A	110/300/1200	595
Novation SmartCat 103	110/300	249
Novation SmartCat 103/212	110/300/1200	595
U.S. Robotics Password	110/300/1200	449

CONNECTING EXTERNAL MODEMS

External acoustic or direct connect modems may be connected to the PCjr by installing the $25 IBM Serial Device Adapter — a short 6-inch cable with an IBM PCjr Berg-type connector on one end and a male RS-232 connector on the other. Most external modems have a female RS-232 connector on their chassis, but the PCjr Serial Device Adapter cable is not long enough to con-nect most types of external modems. As modems do not include the female-male RS-232 extension cable required to connect IBM PC or PCjr computers
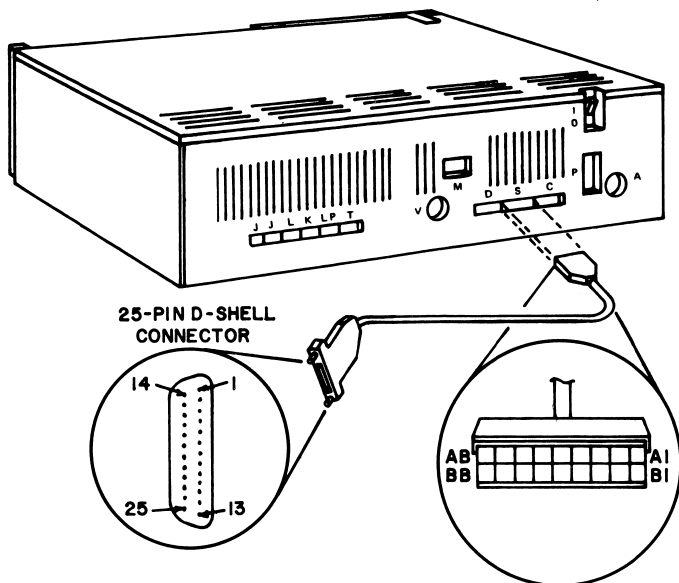
FIGURE 10.7   PCjr Serial Adapter Cable. (Reprinted courtesy of IBM Corporation.)

to a modem, this cable is also required to use an external modem with the PCjr. Such cables typically cost about $25.

DIRECT SERIAL INTERFACE

The PCjr may be connected directly to another computer or serial peripheral device (i.e., printer, plotter, etc.) without using a modem if the total cable length is less than 50 feet. Transmission speed is not a problem as the PCjr

SYSTEM CONNECTOR	CABLE	25-PIN D-SHELL CONNECTOR
A1	NOT USED	
A2	DATA TERMINAL READY	20
A3	REQUEST TO SEND	4
A4	TRANSMIT DATA	2
A5	CARRIER DETECT	8
A6	DATA SET READY	6
A7	CLEAR TO SEND	5
A8	RECEIVE DATA	3
B1	SHIELD GND	1
B2	SIGNAL GND	7
B3–B8	NOT USED	
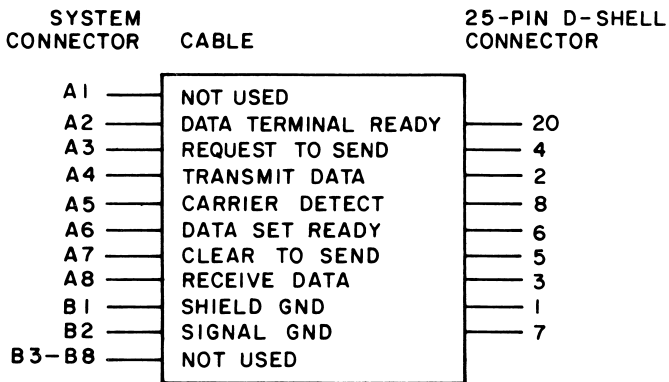
FIGURE 10.8   PCjr Serial Adapter Cable Berg Connector Specs. (Reprinted courtesy of IBM Corporation.)

does not support speeds above 4800 baud. The PCjr Serial Device Adapter is wired as a DTE device to allow easy connection to modems (DCE).

Often, when interconnecting two RS-232 serial devices a null modem is required. The null modem allows direct connection of two devices configured in DTE mode. The null modem is discussed in more detail in the previous chapter.

PCjr Software

Although the IBM PCjr is similar to the IBM PC, it is not completely hardware compatible. This means that there are still several communications software packages which do not work on the PCjr at the present time, although many software manufacturers are modifying their existing packages to run on the PCjr.

The specific compatibility of various IBM PC communications software packages with the PCjr is addressed in the chapter on Communications Software.

PCjr BASIC

Both models of the PCjr include Cassette BASIC as a standard part of their internal system Read Only Memory (ROM). Cassette BASIC provides cassette tape recorder input and output as well as support for the keyboard, display, printer, light pen and joysticks.

Cartridge BASIC is a $75 optional ROM program in a removable cartridge. It extends the built-in Cassette BASIC language to provide a full set of instructions, commands, and built-in functions for either PCjr model. Cartridge BASIC is similar to Advanced Disk BASIC in the IBM PC and PC-XT. It supports the floppy disk drive on the Enhanced model PCjr and will also function with PC-DOS 2.1 on the Enhanced PCjr.

Cartridge BASIC includes commands to access and control the serial communications ports of the PCjr and a built-in terminal emulator program called TERM.

PC-DOS 2.1

The IBM Personal Computer Disk Operating System (PC-DOS) 2.1 for the Enhanced PCjr costs $65 and provides the required support for disk-based software to operate on the PCjr hardware. PC-DOS 2.1 operates on the IBM PC and PC-XT as well, although version 2.0 is recommended for these machines. Program and data disks generated under PC-DOS 1.1, 2.0, or 2.1 are usable by all three models, but only version 2.1 disks will "boot" on the PCjr.

Program and data disks written under Microsoft MS-DOS 1.25 (compatible with PC-DOS 1.1) and Microsoft MS-DOS 2.11 (compatible with PC-

DOS 2.0) on IBM-compatible machines can be read by the PCjr, but again, the "system" disk must be a PC-DOS 2.1 disk.

IBM *PERSONAL COMMUNICATIONS MANAGER* PROGRAM

The diskette-based IBM *Personal Communications Manager* program was written by Microcom for IBM. It operates on the IBM PC, IBM PC-XT, and IBM PCjr computers. This program has two main functions — terminal emulation and electronic mail.

The IBM *Personal Communications Manager* retails for $100 and requires the Enhanced PCjr hardware capabilities (128K bytes of user memory, one dual-sided diskette drive) for operation, and works with either the IBM PCjr Internal Modem or the Serial Device Adapter with a supported auto-dial or manual external modem. The PCM program is covered in detail in Chapter 3.

Documentation

The PCjr user who wishes to explore the hardware and software of the PCjr in detail should purchase the IBM PCjr Technical Reference Manual. This document contains complete schematics, a BIOS listing, and details on all hardware and software interfaces.

Data sheets on the INS8250A are available from the National Semiconductor Corporation marketing department.

Communications Software

Communications software is the magic "glue" that pulls together all of the hardware components of your PCjr and enables them to act together as a communications terminal. Communications software ranges from a simple PCjr BASIC program like TERM to sophisticated programs like IBM's *Personal Communications Manager* and Microstuf's *Crosstalk XVI*. Communications software for the PCjr can range in cost from nothing to several hundred dollars.

It is important to evaluate how you wish to use your PCjr for communications (if possible) before purchasing a communications software package. Though there are many alternatives for hardware (modems), they all can perform the basic task of data communications, with the only major differences between products being speed and intelligence.

Not so with software! Some communications programs work best as terminal emulators, some are designed for private file transfer between PCjrs and PCs, others are designed for accessing public bulletin board systems, some others are for accessing specific online services, and still others are generalized packages for most or all of the above functions.

This chapter will discuss many of the public domain and commercial communications programs available and their operation on the PCjr. Sources for the programs discussed here are listed in Appendices K and L.

Public Domain & User-Supported Software

The microcomputer industry has spawned an almost unique community of highly talented programmers who have been willing to share their work with others in the form of programs placed into the public domain for use by anyone who wants them. There are now literally tens of thousands of these programs available for free (or the cost of copying) from user groups and online bulletin board systems.

One area which has been addressed by these programmers is microcomputer communications. As a sometimes little understood field, good public do-

main data communications programs are well appreciated by their (often) novice users.

A few of these programmers have started requesting contributions from users to enable them to devote more time to their programs, provide updates, and generally give the programs more support. These "user supported" programs are also freely available, as the contributions are optional.

MODEM-PC

Perhaps the most famous of all communications programs is the public domain *MODEM* program originally written by Ward Christensen of Chicago in 1976. This program uses a fairly simple binary file block transfer protocol with error detection and recovery which has become a de facto standard in the microcomputer world. This protocol is often referred to as the "XMODEM" protocol after the name of the bulletin board remote transfer program that uses it. Virtually every remote access system with file transfer capability supports the Christensen protocol for file transfer (even including CompuServe).

Since it was originally written, the *MODEM* communications program has been enlarged and improved by dozens of programmers who have provided the results of their labors to others without charge.

When the IBM PC was released, version 3.0 of MODEM was translated from 8-bit 8080 assembly code into 16-bit 8088 assembly code by Ward Christensen, and both the source code and .COM program are available "free" through many user groups and bulletin boards.

When used on the PCjr, *MODEM* works best in the BW 80 mode. It allows "dumb" terminal operation and protocol file transfers. As *MODEM* is a primitive utility program rather than an advanced package, the user must exit from the program to PC-DOS between each operation. All communications parameters must be set using the PC-DOS MODE command before entering *MODEM*. Control commands for "intelligent" modems must be typed in manually by the user while in terminal mode.

MODEM allows the user to send or receive files using the Christensen XMODEM protocol and to act as either the terminal or computer end of the connection. Due to the speed of the video scrolling routines in the IBM PC and PCjr BIOS (see Chapter 10), *MODEM* drops display characters in the terminal mode at 1200 baud, but runs fine at 300 baud. However, you may use 1200 baud for protocol file transfers without error. Use the "MODE COM1:30,N,8,1" DOS command for 300 baud (or "MODE COM1:12,N,8,1" for 1200 baud) to set up for protocol transfer before running *MODEM*.

When using the Internal Modem, type MODEM T to enter terminal mode and <Ctrl-C> to exit. When using the serial port, type MODEM T2 instead to start. Dial the phone number of the remote system if you are using a manual or acoustic modem or type the modem control command and phone

number for auto-dial modems. When you hear the high-pitched tone (for manual and acoustic modems) connect the modem to the line. The carrier light should come on. Automatic modems will connect when the data carrier is detected. Follow the instructions of the remote system to sign on.

After sign-on, select the Files (F) menu on RBBS-PC systems. List (L) the available directories and the files in each (L;XXX). Select the file(s) you wish to download. To download, select the D option from the files menu on RBBS-PC systems. After typing the file name, specify X for XMODEM protocol. Then hit <Ctrl-C> to exit *MODEM* and type MODEM R FILE.NAM (or MODEM R2 FILE.NAM for the serial port) to start the transfer. Be sure you have enough room on your disk for the file. (See Chapter 8 for more details.)

Most people today only use *MODEM* to transfer other, more user friendly public domain communications programs to their systems.

MODEM7-PC

MODEM7 is an enhanced version of Ward Christensen's *MODEM*, and was first written in 1980 by Mark Zeigler for the 8-bit CP/M operating system. It was converted to 8088 code by Bruce Kendall in 1982 and is available through many user groups and remote systems as either MDM7I.COM or MODEM7PC.COM. *MODEM7* is menu driven and eliminates the need to exit the program to change modes (as in *MODEM*). It also allows setting the baud rate and listing the directory from within the program, and it allows multiple file transfers between two systems running *MODEM7*.

MODEM7 has one limitation; it is written for direct access to the main serial port on the IBM PC — port hex 3F8 — which is the Internal Modem port on the PCjr. If you wish to use an external modem on the serial port of the PCjr (hex 2F8) or a direct serial connection, you must patch *MODEM7* to change the port or use a modified version called MODEM72.COM for port COM2. An overlay file is available to aid in patching the main program. *MODEM7* is many times more powerful and convenient to use than *MODEM*. However, it suffers from the same lost character display problem as does *MODEM* at data rates of 1200 baud or greater. As with *MODEM*, if protocol transfers are the primary goal, 1200 baud will work without error during the transfers.

PC-TALK III

Andrew Fluegelman, editor of *PC World* magazine, released the popular *PC-Talk* communications program in March 1982 in the form of "User Supported" software, or "Freeware" (a term he is registering). Copies of the program are available free on BBS systems around the country, or from Fluegelman's company, The Headlands Press, for a donation of $35.00. If you get a copy from a friend, user group, or BBS, and find it useful, Fluegel-

man asks that you send him "what you think it's worth, or $35.00."

The current version, *PC-TALK III*, is written in IBM BASIC and is available in source code (interpreter) and compiled versions. In addition to terminal emulation, it supports XMODEM file transfer protocol as well as ASCII (XON-XOFF) file uploading and downloading. It is designed to work with the Hayes Smartmodem and compatible modems and supports automatic dialing.

PC-TALK III is perhaps the best value in communications software available today — and it works on the PCjr! Some problems have been noted with file transfers, but a fix is available (see Appendix N).

PC-DIAL

Another "user supported" software product is *PC-DIAL*, formerly known as 1-RingyDingy or 1RD, by Jim Button. Users of 1RD or PC-DIAL are requested to send a contribution of $25.00 to the author if they find the program useful.

1RD and *PC-DIAL* are written in IBM BASIC and are available only in compiled form. No source code is available. A 15-page manual is included on the disk. 1RD and *PC-DIAL* offer many features, including terminal emulation, file transfer (XMODEM), ASCII upload and download, and profile setup files.

PC-DIAL only supports the COM1 port at the present time, and so will only work with the PCjr Internal Modem.

MINITEL

MINITEL is a compact version of *TELINK* written by Tom Jennings. *MINITEL* offers terminal emulation, ASCII file uploading and downloading, and protocol file transfer. It supports XMODEM, *MODEM7*, and TELINK protocols. The standard version works only with the IBM PCjr Internal Modem due to the port calls used, but it works well. Modem commands must be entered manually, much like TERM, but many more features are available to the user.

KERMIT

KERMIT is an extensive machine language program which offers a unique packet-based protocol for file transfer between a wide variety of mainframes, minicomputers, and PCs. Both source code and the assembled files are available from colleges, user groups, and bulletin boards.

Commercial Software

Although there are dozens of commercially available communications programs for the IBM PC and compatibles, several do not currently operate on

the PCjr due to the hardware and software differences in the PCjr's design. Some of the more popular commercial programs are discussed here.

IBM CARTRIDGE BASIC — *TERM*

The *TERM* program included on the IBM PCjr BASIC Cartridge is a simple terminal emulator. It allows setting the communications parameters from a simple menu and then entering terminal conversational mode. This program does not allow file transfer or capture. Written in BASIC, it uses a string buffer for handling communications port data. At 1200 baud, this buffer is quickly filled, resulting in garbage. The *TERM* program is only practical for use at speeds of 600 baud and lower.

IBM PC-DOS SUPPLEMENTAL PROGRAM — *COMM.BAS*

The IBM PC-DOS Supplemental programs diskette (disk 2) includes a program called *COMM.BAS* which is designed to allow IBM PCs to communicate as "dumb" terminals with online services like CompuServe, Dow Jones, and The Source. *COMM.BAS* does not work with the PCjr without modification.

IBM *PERSONAL COMMUNICATIONS MANAGER*

IBM's *Personal Communications Manager* program is discussed in detail in Chapter 3. *Personal Communications Manager* provides two primary functions — terminal emulation and an electronic mail networking system. It runs on both the IBM PC and the PCjr under PC DOS 2.10 and supports the IBM Internal Modem on the PCjr as well as the Hayes Smartmodem and the Microcom ERA 2 modem.

IBM'S *ASYNCHRONOUS COMMUNICATIONS SUPPORT 2.0*

IBM's Asynchronous Communications Support program version 2.0 does not operate on the PCjr and it is not expected to be upgraded to operate on the PCjr in the future.

CROSSTALK XVI FOR THE PCJR

Crosstalk XVI for the IBM PCjr is a special version of the popular *Crosstalk XVI* communications program for the IBM PC family from Microstuf. It costs $195. It is included with the standard *Crosstalk XVI* in version 3.50 and later. It supports both XMODEM and *Crosstalk* protocol file transfers

and will capture and transmit ASCII text files to and from disk. It also includes a smart terminal emulator.

All functions are menu and command driven, and virtually all parameters may be reset by the user. Automatic "script" command files may be used for log-ons and other often repeated procedures. Several "smart" modems and the IBM PCjr Internal Modem are supported as are both communications ports. It includes a receive buffer to insure reliable operation in terminal mode at 1200 baud.

MICROCOM *ERA 2*

The Microcom *ERA 2* communications program is included with the 300/1200 baud ERA 2 internal modem for the PCjr priced at $499. The program provides advanced features including auto dialing, script files, MNP protocol file transfers, ASCII file upload and download, user functions, unattended operation, and remote system access. The only major deficiency is that XMODEM file transfers are not supported. The *ERA 2* modem will work with IBM's *Personal Communications Manager* program (also written by Microcom). The ERA 2 modem is Hayes Smartmodem command structure compatible.

MITE/MS

MITE/MS is the 16-bit version of MITE, an advanced communications program from Mycroft Labs. It costs $195.00. Version 2.8 of *MITE/MS* is included in the communications section of Ashton-Tate's *Framework* integrated business software package.

MITE/MS version 2.7 and later operates on the PCjr without problems, and allows use of either the IBM PCjr Internal Modem or the serial port with an external modem. *MITE/MS* is configurable for several types of popular modems.

MITE/MS is a complete communications program which supports both ASCII and XMODEM file transfers as well as smart terminal emulation. It includes a receive buffer to insure reliable operation in terminal mode at 1200 baud.

ENVOY-PC

Envoy-PC is a new communications package developed by Artisoft for the IBM PC and PCjr. It costs $49.95 and offers smart terminal functions, ASCII file capture and transmission, XMODEM protocol file transfers, and it supports the ANSI X3.28 file transfer protocol as well.

Envoy-PC supports both serial ports on the PCjr, and allows the user to define modem control strings in its dialed number directory. Thus, it can be

used with either the IBM Internal Modem or an external modem connected to the serial port. It includes a 4K byte receive buffer, insuring reliable terminal operation at 1200 baud.

MOVE-IT

Move-It is a smart terminal and data transfer program by Woolf Software. The current version (3.0) does not run properly on the PCjr due to the differences in the keyboard and interrupt functions between the PCjr and the PC.

Specialized Communications Programs

Several online services offer specialized software packages for connecting to their facilities. A few are discussed here.

MCI MAIL — ACCESS

MCI Mail offers the MCI Mail's *Access* program for $49.95 which enables IBM PC and PCjr users to take full advantage of all of the features of MCI Mail. The program is specifically designed to work on the PCjr. *Access* includes a complete communications program tailored to MCI Mail. It features automatic dialing, automatic sign-on, session and file capture, online review of previous screens of data, and encrypted document transmission and reception. It also will translate and send text files generated by any of several word processing programs, insuring their compatibility with MCI Mail. The program includes an install routine for many of the popular modems, including the Hayes Smartmodem and the IBM PCjr Internal Modem. It supports both color and monochrome monitors and many types of printers as well.

COMPUSERVE — PC PROFESSIONAL CONNECTION

CompuServe's *PC Professional Connection* program version 2.2 was revised to run on the IBM PCjr as well as the IBM PC and PC-XT. It costs $89.95 and is available directly from CompuServe as well as through dealers.

The program allows protocol file transfers using the CompuServe "B" protocol and supports several graphics features when communicating with CompuServe. In addition, many of the menus are built in for the EIS, and the program allows preselection of the area in CompuServe you wish to access. It will automatically take you there with a minimum delay when you sign on. Auto dialing and sign-on scripts are supported.

THE SOURCE — *SOURCELINK*

The Source sells its *SourceLink*™ communications software package for the IBM PC and Apple II computers. At the present time, *SourceLink* does not operate on the PCjr.

PCJR COMMUNICATIONS SOFTWARE COMPATIBILITY CHART

PROGRAM	VERSION	OPERATION ON PCJR
IBM Personal Communications Manager	1.0	yes
IBM Async. Comm Support	2.0	no
IBM Cartridge BASIC TERM	---	yes
Crosstalk XVI (for PCjr)	3.5	yes
Envoy PC	1.0	yes
MCI Mail Access	1.0	yes
ERA 2 for PCjr	---	yes
MITE/MS	2.7	yes
CompuServe Professional Connection	2.2	yes
Move-It	3.0	no
SourceLink	---	no
PC-TALK III	3.0	yes with mods
MODEMPC	3.0	yes (Com1)
MODEM7PC	7.0	yes (Com1)
PC-DIAL		yes (Com1)
MINITEL		yes (Com1)

PCjr Networking

The PCjr is a complete microcomputer system and, as such, it may be used as an element in a larger system or network. It may be used as a "dumb" remote terminal, an intelligent or Remote Job Entry (RJE) terminal, or as a terminal/ workstation node in a local area network.

Networking Advantages

PCjrs have several advantages in network applications for business and education. First, they are inexpensive. An ASCII CRT terminal typically costs between $500 and $1,000 and only offers data entry and display capabilities. The Enhanced PCjr costs $999 and offers a complete microcomputer system with disk drive and memory. (Of course you must add another $150 or so for a monitor or video display).

Other advantages of the PCjr include its built-in sound, graphics, and color display capabilities. A color graphics terminal can easily cost $3,000 or more. The PCjr also has an advanced BASIC language available which supports its sound, graphics, and color features.

Finally, the PCjr can be used with up to 64 other IBM PCjrs, PCs, portable PCs, and one or more PC-XTs or PC-ATs, in a local network with the IBM PCjr Cluster Adapter and the IBM Cluster Program.

At the present, the PCjr does not operate with the new IBM PC Local Area Network.

The IBM PC Cluster Network

The IBM PC Cluster local area network was announced in the spring of 1984. The IBM PC Cluster Network is a local area network using a coaxial cable baseband bus topology (much like a cable TV system) with the Carrier Sense Multiple Access with Collision Avoidance (CSMA/CA) access method. It supports a data transmission rate of 375K bits per second. The Cluster network allows a main bus length of up to 1000 meters (3280 feet) and a drop

cable length to each station of up to 5 meters (16 feet). A total of 64 computers may be attached to the bus. It resembles the Xerox Ethernet local area network design very closely.
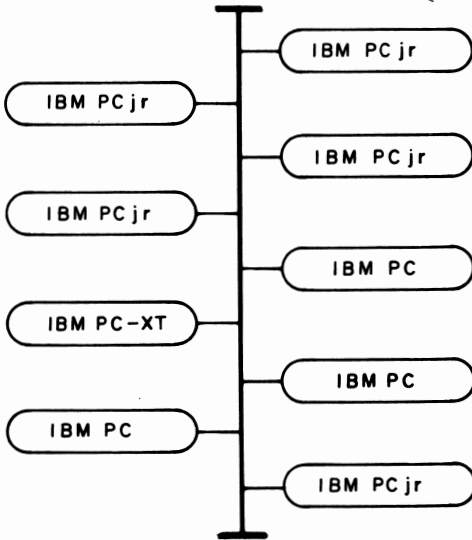
FIGURE 12.1   PCjr Cluster Network.

The IBM PC Cluster local area network is made up of the Cluster Adapter for IBM PCs, Portable PCs, PC-XTs, and PC-ATs; the Cluster Attachment for IBM PCjrs; the Cluster Cable Kit; and the Cluster Program.

A Cluster Cable Kit is required for the first two computers and each additional computer in the Cluster. It includes two BNC "T" connectors, two 3-meter (9 feet) cable drops, two terminating plugs, and a 10-meter (32 feet) main bus cable.

Cluster connections are made to IBM PCjrs with a Cluster Attachment interface which mounts on the bus expansion port on the side of the PCjr. PCjrs with a diskette drive, internal modem, or any side attachment (i.e., RAM expansion or printer interface) in addition to the Cluster Attachment must use the IBM Power Expansion Attachment ($150). The Power Expansion Attachment will power up to three of the side attachment accessories above.

The PCjr may be used in the Cluster with or without diskette drive. However, if any PCjr in the Cluster does not have a diskette drive, then at least one PC-XT, PC with expansion chassis (and hard disk), or PC-AT must be included in the Cluster as disk server to provide the initial program load (IPL) of DOS to the PCjr(s) without diskette drives. PCjrs used in the cluster must be equipped with 128K of RAM and the 80-column display adapter.

The PCjrs without drives attached share space on the hard disk server and each PCjr "thinks" it has diskette drives attached. This configuration can be especially economical for educational and data entry applications.

IBM Cluster Program

The IBM Cluster Program ($92) provides the software to operate the Cluster network. If a PC with a hard disk is included in the system as disk server, then each user may have space on the hard disk for private read/write space as well as access to a public library read-only space on the hard disk. In addition, users may transfer files to each other and send messages to one or all users.

The Cluster Program requires 128K RAM in all attached computers except the disk server which requires 256K RAM. The disk server (if used) must have at least a double-sided diskette drive.

The Cluster program is also available in a "five-pack" which includes license agreements and documentation for five systems and one program diskette.

The Cluster Programs provide the following features:

Remote IPL (boot or Initial Program Load)
One Disk Server:
    One public read-only volume
    One private read/write volume per remote
Menu-driven programs:
    Disk Configurator — creates volumes
    Public Volume Manager — add and delete programs
    Information Transfer —
        Exchange messages or files
        Broadcast Messages
        Control Drive Access

PCjr Cluster Applications

The IBM Cluster Network allows a number of PCjrs to be attached to a common network. They can share hardware and software resources, exchange messages, and transfer files of data. Where would these features be useful?

In an educational application, each student could be provided his own PCjr connected to a Cluster in a computer lab and would have access to his own space on the teacher's hard disk system, or he could keep his assignments and work on his own diskette with the system programs and languages being stored on the disk server.

In a small business, each data entry station could be a PCjr connected to the Cluster, with each running an application program to accept input data into their own private disk volume. The data could then be combined in a batch run and a master data file in the public library updated.

In a management application, PCjrs could be provided to junior managers and administrative assistants, while PCs were used by managers and executives in a cluster, with all users sharing company databases like budget, sales, etc.

As can be seen, the PCjr with the IBM Cluster can provide a flexible, useful, and economical multiuser network system.

CLUSTER RESTRICTIONS

It is important to keep in mind that most software (including all IBM software — DOS, the Cluster Program, etc.) is licensed for use on a single computer. This means that you are violating the license agreement if you put a program on the public library of the disk server of your cluster and make it available to all of the Cluster users. Each program vendor must be contacted and licenses purchased for the number of users you have on your Cluster, or you must buy a copy of the software for each user. Placing single-computer licensed software on a multiuser system or network is much the same as copying the software and giving it to others, and carries a similar legal liability.

Another fact which must be kept in mind when considering the IBM PC Cluster local network is that the IBM Cluster Program does not support true "multiuser" database applications at this time. In other words, each user has read/write access only to his own private area of the shared disk (and his own PC's floppy drives, of course). The public or common area of the disk is restricted to read-only library type access. Thus, it is not possible to have several users updating a common database file in real time. Such an update application must be run in batch mode offline on a periodic basis.

Free and User-Supported Software

The title of this chapter should awaken the interest of most PCjr users — Free Software! Yes, it is true, there are lots of programs available free for the taking from the hundreds of online bulletin board systems and user groups around the country. There are many very good programs and probably just as many poor to terrible ones.

Of the thousands of public domain programs, many are excellent, well documented, and well supported. The best of these are now available as user-supported software, often directly from the author.

Public Domain Programs

Public domain programs are programs whose authors have given them to the world to use without restriction (usually for non-commercial purposes). Many of these programs were written to solve common problems encountered with using a particular computer or software package. Some are programs written for the author's entertainment (like the many Adventure games). Others are useful utilities like communications programs, word processors, file managers, filters, word count routines, and so on.

The PCjr owner has both good and bad news to look forward to in the search for public domain programs for his computer. The good news is that many of the programs written for the IBM PC will run perfectly on the PCjr — especially many BASIC games and utilities. This is now even more true with the availability of additional RAM memory for the PCjr. The bad news is that there are (as yet) few PCjr specific user groups or bulletin boards that can offer PCjr specific programs which take full advantage of the PCjr's many enhanced features.

User-Supported Software

Some of the best examples of user-supported software are *PC TALK III, PC-DIAL, PC-WRITE,* and *PC-FILE.* The authors of these programs have provided good, usable software and in return ask that those who find the soft-

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ware useful send in a donation of whatever they feel the program is worth — usually in the range of $25 to $100. In return, the author will keep improving the program and make documentation and updates available.

User Groups

If you join a local IBM PC user group, there will probably be a sub-group for PCjr users. In any case you will have access to the club library of a large number of IBM PC programs which will probably run on the PCjr.

User Group Libraries

Another way to get some of the public domain software is to buy user group library disks from the larger user groups. Each disk may contain anywhere from one program package (like *PC-TALK III*) to a dozen or more programs. Disks are usually sold for $10.00 each including shipping — and you might get twenty or thirty programs on each disk.

User Group Library Source List

PC-SIG
PC Software Interest Group
1556 Howard Avenue No. 130
Santa Clara, California 95051

Disks - $6.00 each
Printed directory of disks $4.95

MICROCOMP Services
4691 Dundas Street West
Islington, Ontario, Canada M9A 1A7
(416) 239-2835

Disks $10.00 each
Information free, directories on disks at $10.00 ea.

Capital PC Software Exchange
P.O. Box 6128
Silver Spring, Maryland 20906

Disks $8.00 each

Software Distributor's Clearinghouse
3707 Brangus
Georgetown, Texas 78626

Disks - $10.00 and up

P.J.'s Company
National Public Domain Software Center
1082 Taylor
Vista, California 92083
(619) 941-0925

Rent 100 PC/SIG Disks for $99.95/week

International PC Owners, Inc. (IPCO)
P.O. Box 10426
Pittsburgh, Pennsylvania 15234

Membership $20/year bulk mail
            $30/year first-class mail

Software - $6.00 per disk +
           $3.00 per program
           - or -
           Fixed selections for $15.00 per disk

Downloading

If a club isn't available or just isn't your style, most of these same programs
are just a phone call away for PCjr users with XMODEM protocol file trans-
fer capability available in their communications software package. Although
XMODEM is not absolutely required to transfer programs in BASIC ASCII
source code, most IBM BASIC programs are stored in binary tokenized for-
mat to save space and require XMODEM. Many bulletin boards will not al-
low users to download in ASCII format because of the high error potential of
non-protocol transfers.

The main communications programs available which support XMODEM
file transfers seem to be public domain programs like *MODEM-PC*,
MODEM7-PC, and *PC-TALK III*. Unfortunately, you must have an XMO-
DEM program to download copies of these from your local bulletin board
system.

Which came first — the chicken or the egg? Well, there are several ways
you can get an XMODEM download program for your PCjr. Here are just a
few:

1. Buy a commercial program that supports XMODEM like *Envoy PC* or
   Crosstalk XVI version 3.5 or later.
2. Order a user group library disk that has the program you wish.
3. Go to a user group meeting and copy the program.
4. Order the program from its author (ie., *PC-TALK-III*).
5. Order the special version of MODEM7 for the PCjr from the author for
   $10.00 (see Appendix L).

6. Type in the BASIC program provided in Chapter 14 and use it to download the software you want.

File Transfers

Once you have an XMODEM compatible program, file transfers are a breeze. Just be prepared to pay your phone bill if you are calling long distance to find that elusive 1-2-3 worksheet or Adventure game.

HOW TO UPLOAD AND DOWNLOAD FROM RBBSS

Uploading and downloading software is a simple procedure once you have your PCjr system set up for communications and you have an appropriate communications program that supports XMODEM protocol.

Start up your communications program, dial the RBBS system you select, enter terminal mode, and sign on the RBBS system. Assuming that you are allowed immediate access, or that your user information has already been verified, you can now go to the FILES menu on RBBS-PC systems and proceed as discussed back in Chapter 8.

PC TO PC TRANSFERS

Communications programs can also be used to send files to another PC or PCjr system just about anywhere there is a telephone line. For either business or personal reasons, remote file transfer can be really handy.

The procedure is the same, except that both systems must be attended and one user sends while the other receives.

1. Place the modem on one system in answer mode and call it from the other system. (Be sure you are both using the same speed and word mode — N,8,1.)
2. When the modems are communicating, enter terminal mode on both systems and type a few words in each direction to insure that the link is good. (Note: One system must provide echo or neither user will see his own typing.)
3. Now, decide on the files to be transferred and send them, using XMODEM. If you have more than one file, use Batch Mode (on MODEM7 the command is SB for send batch, followed by the filename with wildcards, like SB *.BAS). Note that the receive command does not include the file name in batch mode — just RB. A drive name may be added if a drive other than the default is to be used.
4. IBM PC systems work best in the "Quiet mode," without screen display of blocks as they are sent, so add a Q to the above commands — SBQ *.BAS or RBQ .
5. When the transfers are completed, MODEM7 will return to the command menu.

Another Resource

One other resource for those looking for free software is Alfred Glossbren-ner's book *How to Get Free Software* published by St. Martin's Press in 1984. This 436-page book is a really good guide to all types of free software. Other resources are listed in Appendix M.

Programming the PCjr for Communications

The PCjr has many communications capabilities which may be controlled with programs written in PCjr Cartridge BASIC, 8088 machine language (also called assembly language), and other programming languages.

This chapter discusses how to program the IBM PCjr for communications applications and includes listings of sample BASIC programs and a complete XMODEM terminal communications program for the PCjr with the IBM Internal Modem.

The *TERM* Program

The *TERM* program included in the IBM PCjr BASIC cartridge is an example of the type of powerful programs which may be developed using PCjr Cartridge BASIC. It may be listed or saved easily for study and modification.

Just turn on your PCjr and video monitor, plug in the PCjr BASIC cartridge, and in a few seconds, you should see the sign-on message:

The IBM PC jr Basic
Version J1.00
Copyright IBM Corp. 1981, 1982, 1983
60130 Bytes free
Ok

Now, to start the *TERM* program, type

TERM<Enter>

Your PCjr will load the *TERM* program from the BASIC cartridge into RAM memory and then begin running it. A menu of communications options will appear on the screen. To stop the program, type

<Fn-2> (Function and 2)

and the "Ok" prompt will reappear, indicating that BASIC has returned to the command mode. You can now LIST the TERM program to the screen or LLIST it to the printer (if installed), or save it to disk for future modification or analysis, if you have PC-DOS 2.1.

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PCjr BASIC Communications Programs

IBM PCjr Cartridge BASIC provides excellent support of the hardware serial communications capabilities of the PCjr. In addition to the complete terminal emulator program *TERM* included in the BASIC cartridge, the PCjr BASIC provides several powerful communications commands which may be used to develop your own communications application programs. The communications port interface to BASIC is an interrupt-driven buffer, insuring that no incoming data will be lost (except during disk operations).

A buffer may be thought of as a first-in first-out storage area, much like a candy or soda vending machine — the first item in the storage area is the first one released to the user. Buffers are an important consideration in communications programming, especially where the data is arriving at a faster speed than the receiving program can handle it. Interrupt-driven buffers, as on the PCjr, automatically handle receiving data and place it in the buffer, without the BASIC program being directly involved in the hardware level operations required.

BASIC Commands

The primary communications command is the OPEN command, which allows the user to set up a communications channel as a buffered I/O file and ignore most of the hardware level activities necessary to send and receive data. The communications ports are designated the COM1: and COM2: devices. The OPEN command, when used for communications, includes setup instructions for the serial port, such as:

    410 OPEN "COM1:300,N,8,1" AS 1

to open the COM1: serial port for communications at 300 baud using no parity, 8 data bits, and 1 stop bit as file #1.

The incoming and outgoing data are accessed through the send and receive buffers with the PRINT# (to send data) and INPUT# or INPUT$ (to receive data) commands, much like using a diskette file. The communications file is closed with the CLOSE X command, where X is the file number.

Other important communications functions include EOF(), LOC() and LOF(). These file functions each have a special meaning when used on a communications file. The EOF() function returns a logical value of true if the specified input buffer is empty; LOC() gives the number of characters (up to 255) in the input buffer waiting to be read; and LOF() returns the free space in the input buffer. The size of the communications input buffer is set by the /C: command used when starting the BASICA program, for example

    A> BASICA JRCOMM /C:4096

The PCjr screen and keyboard may also be used as buffered I/O files with the SCRN: and KYBD: device commands. This can simplify the programming task considerably. The TERM program only requires 1½ pages of BASIC code to provide some very sophisticated features.

Other useful keyboard-related PCjr BASIC commands are ON KEY () to test for function keys, KEY (n) to trap specified keys, and INKEY$ to input single-character keystrokes. Screen commands include CLS to clear the screen, LOCATE to control the cursor, and SCREEN to define colors or return a screen character at a given location to the BASIC program.

Special ASCII Characters for Communications

The ASCII character set has several characters which have special meanings when used in communications. Most are control characters with decimal values between 1 and 26 (<Ctrl-A> to <Ctrl-Z>). These characters were originally used in teleprinter communications in the military and government. Later, they were adopted for the Bell System's TWX network and by many remote timeshared computer systems.

The most commonly used characters for online interface are the XOFF (ASCII 19 or <Ctrl-S>) and XON (ASCII 17 or <Ctrl-Q>) pair. They allow both the host and the remote terminal to request a pause in transmission to empty the incoming data buffer or to perform hardware operations which might result in losing characters (like disk operations on the PCjr). It is important to note that sending a <Ctrl-S> will not result in an immediate halt of the incoming data. Both the sending computer and any intermediate network may continue to send until their data buffers are empty.

Other ASCII characters are used for protocol file transfers such as XMODEM. They include:

DESIGNATION	ASCII VALUE	CTRL CODE	MEANING
SOH	1	<Ctrl-A>	Start of Header
EOT	4	<Ctrl-D>	End of Transmission
ACK	6	<Ctrl-F>	Acknowledge
NAK	21	<Ctrl-U>	Negative Acknowledge
CAN	24	<Ctrl-X>	Cancel
SUB	26	<Ctrl-Z>	End of File
XON	17	<Ctrl-Q>	Transmission On
XOFF	19	<Ctrl-S>	Transmission Off

Some other characters which often have to be specially handled are:

DESIGNATION	ASCII VALUE	CTRL CODE	MEANING
NUL	0	<Ctrl-@>	Null for delay
BEL	7	<Ctrl-G>	Bell
BS	8	<Ctrl-H>	Backspace
HT	9	<Ctrl-I>	Horizontal Tab
LF	10	<Ctrl-J>	Line feed
VT	11	<Ctrl-K>	Vertical Tab
FF	12	<Ctrl-L>	Form feed
CR	13	<Ctrl-M>	Carriage Return

Programming the Internal Modem

When sending commands to the IBM Internal Modem, <Ctrl-N> (an ASCII 14) is used as an attention character to switch the modem from data to command mode.

To send 8-bit binary data without the possibility of activating the <Ctrl-N> command mode switch in the modem, it is necessary to place the modem in transparent mode with the "T 0" command. When the transmission is completed, the modem port address must be reset directly to return to interactive mode. First, the program must read the modem control register of the INS8250A ACE chip at port hex 3FC. Next it must set bit 2 (which controls the OUT1 line of the chip) to a "1" (or high) to reset the modem's transparent mode.

The instructions for this are:

```
1000 IC% = INP(&H3FC)
1010 IZ% = IC% OR &H4
1020 OUT &H3FC, IZ%
```

To reset the modem chip and allow transparent mode to be used again, include these commands:

```
2000 IC% = INP(&H3FC)
2010 IZ% = IC% AND &HFB
2020 OUT &H3FC, IZ%
```

XMODEM Protocol

The XMODEM protocol, design by Ward Christensen in 1976, allows microcomputer users to exchange data and program files over asynchronous communications links reliably. Since then, it has become the most widely used microcomputer communications protocol in the United States.

Communications protocols like XMODEM allow the transmission of data over ordinary telephone lines in a block format with error checking and recovery. Instead of the simple error checking provided by parity, block formats can use more elaborate checksum or CRC formulas to insure data integrity. Although it is simple, the checksum method used in the XMODEM protocol provides over 99% data reliability and offers an effective scheme for detecting errors and retransmitting bad data blocks.

The XMODEM protocol uses five of the ASCII characters described above — SOH, ACK, NAK, EOT, and CAN — for special functions. In XMODEM transmissions, the SOH, EOT, and CAN characters are used by the sending computer. They are only recognized by the receiving computer if they appear at the beginning of a block or alone in a block. The receiving computer uses ACK, NAK, or CAN to respond to each block sent.

The XMODEM data block is made up of 132 bytes, four header bytes and 128 bytes of data. The first header byte is the SOH character, the second header byte contains the block number (0 to 255 in 8-bit binary — NOT ASCII), the third header byte contains the 1's complement of the block number (NUM% XOR 255), and the fourth header byte is the 8-bit checksum of the ASCII value of all the data bytes added together (CKSUM% AND 255). The next 128 bytes are the actual data being transmitted. If the last record contains less than 128 bytes, it is filled with nulls (ASCII 0) to make 128 bytes.

The block number starts with block one, not zero, and counts to 255, and at 256, becomes zero to start over again.

XMODEM DATA BLOCK FORMAT

BYTE	CONTENTS
1	SOH
2	Block number (8 bit)
3	1's complement of block number
4	Checksum of data
5-132	Data bytes

The actual XMODEM protocol is also quite simple. The sending program transmits a block and waits for a response from the receiving program. If the block was received properly and checks out (block number, checksum, length), an ACK is sent. If there was a problem, a NAK is sent, requesting retransmission of the block. If the transfer is canceled by either the transmitter or receiver, a CAN is sent.

At the start of a transfer, the sending program sends the first block. If the receiving program was not ready, no problem — it sends a NAK as its first action, which causes the retransmission of the first block. When the last block has been sent, the transmitter sends an EOT and waits for an ACK.

XMODEM PROTOCOL

Transmitter	Receiver
<------- NAK-------	
----- Block #1----->	OK
<------- ACK-------	
----- Block #2----->	Error
<------- NAK-------	
----- Block #2----->	OK
<------- ACK-------	
------- EOT------->	End
<------- ACK-------	
END OF TRANSFER	

One other part of the XMODEM protocol is important — receiver time-outs. When awaiting the first character of a block, a 10-second timeout is used, and 10 timeouts are allowed. Once block transmission has begun, the timeout is reduced to one second for each block character (or byte). The transmitter has a single one-minute master timeout for lack of activity.

Sample BASIC Programs

One of the best ways to learn programming techniques is to look at the work of others. This can show newcomers how to mix the ingredients discussed above into a working PCjr BASIC communications program. You should go through each program, line-by-line with the PCjr Cartridge BASIC reference manual at hand for looking up commands you don't understand.

As mentioned above, the TERM program in the BASIC cartridge is a good example to start with, as it is already stored in the computer, and it can be listed and modified easily. Just run it once with the TERM command and then exit to BASIC. Now it can be modified, listed, and saved to disk — but be sure to use a different name than TERM for the new program.

The Appendix F of the IBM PCjr BASIC reference manual includes an 11-page detailed discussion of accessing the PCjr's communications features from BASIC. This appendix includes two BASIC communications programs for experimentation. Program One is a dumb terminal emulator and Program Two is a data transfer program using XON and XOFF data flow control to capture data to a diskette file.

In addition to these examples, I have provided in this chapter some simple BASIC language terminal communications programs for the PCjr which show the basic elements and a complete advanced XMODEM communications program for the IBM PCjr Internal Modem which can by typed in, saved to disk, and used to upload and download files with either ASCII capture or XMODEM protocol from online systems and bulletin boards. Of course, these programs may be changed and enhanced to meet your particular tastes and needs.

SAMPLE PROGRAM NO. 1

In the first sample program, a simple two-way full duplex terminal communications capability is provided. All variables are defined as integers for speed. No "built-in" modem features are included and all IBM PCjr Internal Modem commands must be entered manually by typing <Ctrl-N> plus the command. This program uses even parity, seven-bit data, and one-stop bit for communicating. Note that using eight-bit binary data on the IBM Internal Modem requires sending both the FORMAT 4 command and the TRANSPARENT command. Eight-bit binary data is usually used only for sending binary files.

```
10 REM ***********************************************
15 REM *   PCJR TERMINAL COMMUNICATIONS PROGRAM 1
20 REM *   BY DAVID W. CARROLL
25 REM *   COPYRIGHT 1984
30 REM *   ALL RIGHTS RESERVED
35 REM *
40 REM *   9/28/84
45 REM *   FROM
50 REM *   "TELECOMMUNICATIONS WITH THE PCJR"
55 REM *   PUBLISHED BY
60 REM *   MICRO TEXT/PRENTICE HALL - 1984
65 REM *
70 REM *   RUN WITH BASICA
75 REM ***********************************************
100 REM * Set up variables, screen params
110 DEFINT A-Z
120 SCREEN 0,0
130 WIDTH 80
140 CLOSE
150 KEY OFF
160 OPEN "COM1:300,E,7" AS 1
499 REM * Communications loop
500 IF EOF(1) THEN 700
510 I$=INPUT$(1,1)
600 PRINT I$;
700 K$=INKEY$:IF K$<>"" THEN PRINT #1,K$;
800 GOTO 500
```

SAMPLE PROGRAM NO. 2

Our second sample program supports some limited IBM Internal Modem commands such as initialization and automatic dialing before entering terminal mode. The program also checks for nulls and line feeds, and eliminates them from the data displayed on the screen. <Break> will exit the program.

```
10 REM ***********************************************
15 REM *   PCJR TERMINAL COMMUNICATIONS PROGRAM 2
20 REM *   BY DAVID W. CARROLL
25 REM *   COPYRIGHT 1984
```

```
30 REM *    ALL RIGHTS RESERVED
35 REM *
40 REM *    9/28/84
45 REM *    FROM
50 REM *    "TELECOMMUNICATIONS WITH THE PCJR"
55 REM *    PUBLISHED BY
60 REM *    MICRO TEXT/PRENTICE HALL - 1984
65 REM *
70 REM *    RUN WITH BASICA /C:4096
75 REM ******************************************
100 CLS
110 DEFINT A-Z
120 SCREEN 0,0
130 WIDTH 80
140 CLOSE
145 PRINT "Please wait......"
150 KEY OFF
160 N$=CHR$(14)
210 OPEN "COM1:300,E,7" AS 1
205 REM **** INSERT TELEPHONE NUMBER IN NEXT LINE ***
220 NUM$="1800555-1212"
230 PRINT #1,N$;"I "
240 PRINT "INITIALIZING MODEM..."
250 FOR I=1 TO 7000:NEXT I
300 GOSUB 5000
400 PRINT #1,N$;"D ";NUM$
420 PRINT "DIALING - ";
430 PRINT NUM$
440 LOCATE ,,1 ' TURN ON CURSOR
499 REM * Communications loop
500 IF EOF(1) THEN 700
510 I$=INPUT$(1,1)
550 IF I$="" THEN 700 'Check for no data and skip
560 IF I$=CHR$(0) THEN 700 'Check for nulls and skip
570 IF I$=CHR$(10) THEN 700 'Check for line feeds and skip
600 PRINT I$;
700 K$=INKEY$:IF K$<>"" THEN PRINT #1,K$;
800 GOTO 500
4999 REM * Print Title
5000 CLS
5100 PRINT TAB(15);"PCJR COMMUNICATIONS PROGRAM - VER 2"
5110 PRINT:PRINT
5200 RETURN
```

SAMPLE PROGRAM NO. 3

The next program adds two more modem functions, redialing and hanging up, to the available features. It uses the ON KEY command to trap function key inputs and jump to their servicing subroutines. The two functions are activated by:

    <Fn-8> to begin redialing
    <Fn-9> to hang up and quit to BASIC

```
10 REM ***********************************
15 REM *   PCJR COMMUNICATIONS PROGRAM 3
20 REM *   BY DAVID W. CARROLL
25 REM *   COPYRIGHT 1984
30 REM *   ALL RIGHTS RESERVED
35 REM *
40 REM *   9/28/84
45 REM *   FROM
50 REM *   "TELECOMMUNICATIONS WITH THE PCJR"
55 REM *   PUBLISHED BY
60 REM *   MICRO TEXT/PRENTICE HALL - 1984
65 REM *
70 REM *   RUN WITH BASICA /C:4096
75 REM *********************************************
100 CLS
110 DEFINT A-Z
120 SCREEN 0,0
130 WIDTH 80
140 CLOSE
145 PRINT "Please wait......"
150 KEY OFF
160 N$=CHR$(14)
210 OPEN "COM1:300,E,7" AS 1
220 NUM$="1800555-1212"
230 PRINT #1,N$;"I "
240 PRINT "INITIALIZING MODEM..."
250 FOR I=1 TO 7000:NEXT I
300 GOSUB 5000
340 ON KEY(8) GOSUB 2000
350 ON KEY(9) GOSUB 3000
400 PRINT #1,N$;"D ";NUM$
420 PRINT "DIALING - ";NUM$
430 LOCATE ,,1
440 KEY(8) ON
450 KEY(9) ON
500 IF EOF(1) THEN 700
510 I$=INPUT$(1,1)
550 IF I$="" THEN 700
560 IF I$=CHR$(0) THEN 700
570 IF I$=CHR$(10) THEN 700
600 PRINT I$;
700 K$=INKEY$:IF K$<>"" THEN PRINT #1,K$;
900 GOTO 500
2000 PRINT #1,N$;"R "
2010 PRINT "REDIALING -"
2020 RETURN
3000 PRINT #1,N$;"H "
3010 PRINT "HANGING UP..."
3100 CLOSE
3200 END
5000 CLS
5100 PRINT TAB(15);"PCJR COMMUNICATIONS PROGRAM - VER 3"
5110 PRINT:PRINT
5200 RETURN
```

PCjr XMODEM BASIC Program

The final BASIC program in this chapter is a complete telecommunications program for the PCjr, allowing both ASCII and XMODEM transfers and full terminal emulation. There are several BASIC communications programs for the IBM PC in the public domain, but none of them to date were written for the PCjr.

Timing and sequence of operations is very important for proper operation of communications programs on the PCjr, due to the lack of DMA capability and the disabling of interrupts during disk operations.

Program lines 100 to 400 set up the screen and data constants and variables. Line 410 opens a file buffer for communications. Lines 420 to 770 initialize the modem and function keys and input the number to dial. Subroutine 780 enables the function key trapping. Lines 900 to 1190 are the main communications loop, the character traps, and the functions for ASCII capture and transmission.

Lines 1200 to 1480 are the modem and general function key service routines. Subroutine 1490 displays the main title screen, and subroutine 1570 displays the work/menu screen. Subroutines 1690 and 1700 display and update the status line on line 25.

Subroutine 1890 toggles the addition of line feeds to carriage returns and subroutine 1930 changes from full to half-duplex operation (local echo). Subroutine 3000 to 3370 opens and sends an ASCII file while subroutine 4000 to 4260 enables capture of ASCII data to a file.

Subroutine 4270 waits a specified time (T) for a character and subroutine 4300 to 4430 tries 10 times to receive a block header for XMODEM transfers. Subroutine 5000 sends an XOFF or XON and keeps track of the previous data flow state.

Subroutine 6000 receives an XMODEM file transfer and checks each block for errors. Subroutine 7000 traps BASIC error codes and takes correct action as well as displaying error messages. Finally, subroutine 8000 sends a file with XMODEM protocol.

This program may be manually typed in and saved to disk or it may be ordered on disk with other communications programs for the PCjr from the author:

David W. Carroll
P.O. Box 699
Pine Grove, California 95665
Price: $15.00

I would like to acknowledge the work of Russ Lane and B.J. Reckman in the Capital PC group's program IBMODEM.ASC. for the inspiration it provided in the development of the following program.

```
10 REM ****************************************
12 REM *    PCJR XMODEM COMMUNICATIONS PROGRAM
15 REM *    FOR IBM INTERNAL MODEM AT 300 BAUD
20 REM *
25 REM *    JRXMODEM.BAS
30 REM *
35 REM *    BY DAVID W. CARROLL
40 REM *    COPYRIGHT 1984
45 REM *    ALL RIGHTS RESERVED
50 REM *    VERSION XMODEM X38A
55 REM *    11/07/84   3:18 PM
60 REM *    FROM
65 REM *    "TELECOMMUNICATIONS WITH THE PCJR"
66 REM *    BY DAVID W. CARROLL
70 REM *    PUBLISHED BY
75 REM *    MICRO TEXT/PRENTICE HALL - 1984
80 REM *
85 REM *    USE BASICA /C:8192 TO RUN THIS
90 REM *    PROGRAM
95 REM ****************************************
100 CLS
110 DEFINT A-Z
120 SCREEN 0,0
130 WIDTH 80
140 CLOSE
150 ON ERROR GOTO 7000
160 KEY OFF
170 GOSUB 1490
180 DIM A(4096)
190 DIM B$(4)
200 DISK =0
210 TER$="TERMINAL"+SPACE$(7)
220 MO$=TER$
230 FE$="LF-"
240 SEND = 0
250 PAUSE1=0
260 ONLINE =-1
270 PAUSE = 0
280 HALF=0
290 DU$="FULL DUPLEX"
300 ST$="ON LINE"
310 PRINT "Please wait....."
320 LOCATE ,,1
330 N$=CHR$(14)
340 XON$=CHR$(17):XOFF$=CHR$(19)
350 ACK$=CHR$(6):NAK$=CHR$(21)
360 SOH$=CHR$(1):EOT$=CHR$(4):CAN$=CHR$(24)
370 BK$=CHR$(29)+CHR$(32)+CHR$(29)
380 BK1$=CHR$(32)+CHR$(29)
390 FEED = 0
400 LF$=CHR$(10)
```

```
410 OPEN "COM1:300,N,8,1" AS 1
420 REM **** PUT DEFAULT TELEPHONE NUMBER IN NEXT LINE ****
430 NUM$="17012935973"
440 PRINT #1,N$;"I "
450 PRINT "INITIALIZING MODEM..."
460 FOR I=1 TO 7000:NEXT I
470 GOSUB 1700
480 PRINT
490 PRINT "Enter phone number to call or <Enter> for default -
    ";
500 INPUT NX$
510 IF NX$="" THEN GOTO 540
520 NUM$=NX$
530 GOSUB 1700
540 PRINT
550 PRINT "Hit <Enter> to place call, <Esc> to quit - ";
560 X$=INKEY$:IF X$="" THEN 560
570 IF X$=CHR$(27) THEN 1440
580 GOSUB 1570
590 ON KEY(1) GOSUB 1890
600 ON KEY(2) GOSUB 1930
610 ON KEY(3) GOSUB 3000
620 ON KEY(4) GOSUB 4000
630 ON KEY(5) GOSUB 8000
640 ON KEY(6) GOSUB 6000
650 ON KEY(7) GOSUB 1200
660 ON KEY(8) GOSUB 1310
670 ON KEY(9) GOSUB 1380
680 ON KEY(10) GOSUB 1440
690 ON KEY(11) GOSUB 1570
700 PRINT #1,N$;"F 4"
710 FOR I=1 TO 500:NEXT I
720 PRINT #1,N$;"C 3"
730 FOR I=1 TO 500:NEXT I
740 PRINT #1,N$;"D ";NUM$
750 PRINT "DIALING - "
760 GOSUB 780
770 GOTO 900
780 KEY(1) ON
790 KEY(2) ON
800 KEY(3) ON
810 KEY(4) ON
820 KEY(5) ON
830 KEY(6) ON
840 KEY(7) ON
850 KEY(8) ON
860 KEY(9) ON
870 KEY(10) ON
880 KEY(11) ON
890 RETURN
900 IF EOF(1) THEN 1030
910 IF LOC(1) = 255 AND PAUSE1=0 THEN PRINT #1,XOFF$;:PAUSE1=-1
920 I$=INPUT$(1,1)
930 I$=CHR$(ASC(I$)AND 127)
```

```
940 IF I$>CHR$(31) THEN 1010
950 IF I$="" OR I$=CHR$(10) OR I$=CHR$(0) THEN 1030
970 IF I$<>CHR$(8) THEN 1010
980 IF POS(0)=1 THEN 1000
990 PRINT BK$;:GOTO 1020
1000 PRINT BK1$;:GOTO 1020
1010 PRINT I$;
1020 IF DISK THEN GOSUB 1120
1030 IF EOF(1) AND PAUSE1 THEN PRINT #1,XON$;:PAUSE1=0
1040 IF SEND THEN RETURN
1050 K$=INKEY$:IF K$<>"" THEN PRINT #1,K$;:IF HALF THEN GOSUB 1080
1060 IF FEED AND K$=CHR$(13) THEN PRINT #1,LF$;
1070 GOTO 900
1080 IF K$<>CHR$(8) THEN 1110
1090 IF POS(0)>1 THEN PRINT BK$;:RETURN
1100 IF POS(0)=1 THEN PRINT BK1$;:RETURN
1110 PRINT K$;:RETURN
1120 A(I1)=ASC(I$):I1=I1+1
1130 IF (EOF(1) AND I1>128) OR I1>512  THEN GOSUB 1150
1140 RETURN
1150 GOSUB 5000 :PAUSE1= -1
1160 FOR I2=1 TO 300 :NEXT I2
1170 FOR J1=0 TO I1:PRINT #3,CHR$(A(J1));:NEXT J1:I1=0
1180 GOSUB 5000 :PAUSE1=0
1190 RETURN
1200 REM * FN 7
1210 GOSUB 1570
1220 PRINT "Enter new number - ";
1230 INPUT NX$
1240 IF NX$="" THEN 1270
1250 NUM$=NX$
1260 GOSUB 1700
1270 PRINT #1,N$;"D ";NUM$
1280 GOSUB 1570
1290 PRINT "DIALING - "
1300 RETURN
1310 REM * FN 8
1320 PRINT #1,N$
1330 FOR I=1 TO 500:NEXT I
1340 PRINT #1,N$;"R "
1350 PRINT
1360 PRINT "REDIALING -"
1370 RETURN
1380 REM * FN 9
1390 PRINT
1400 PRINT #1,N$;"H "
1410 PRINT "HANGING UP..."
1420 FOR I=1 TO 1000:NEXT I
1430 RETURN
1440 REM * FN 0
1450 PRINT "BACK TO BASIC NOW..."
1460 CLOSE
1470 CLS
1480 END
```

```
1490 REM * TITLE SCREEN
1500 CLS
1510 PRINT TAB(20);"IBM PCjr TERINAL COMMUNICATIONS PROGRAM"
1520 PRINT TAB(20);"      for the IBM Internal Modem"
1530 PRINT TAB(20);"         Copyright  (c) 1984"
1540 PRINT TAB(20);"         by David W. Carroll"
1550 PRINT
1560 RETURN
1570 REM * WORK SCREEN
1580 CLS
1590 PRINT TAB(20);"IBM PCjr TERMINAL COMMUNICATIONS PROGRAM"
1600 PRINT
1610 PRINT TAB(20);"Fn 1 = Auto Line Feed  Fn 2 = Echo On/
     Off     "
1620 PRINT TAB(20);"Fn 3 = ASCII File XMT  Fn 4 = ASCII File
     Capture ON/OFF"
1630 PRINT TAB(20);"Fn 5 = XMODEM File XMT Fn 6 = XMODEM File
     Recv"
1640 PRINT TAB(20);"Fn 7 = New Number      Fn 8 = Start redial"
1650 PRINT TAB(20);"Fn 9 = Hang up phone   Fn 0 = Quit to
     BASIC"
1660 PRINT TAB(20);CHR$(24);" = Display Menu"
1670 PRINT TAB(20);"<Esc> to cancel operation in progress."
1680 PRINT:PRINT
1690 MO$=TER$
1700 REM * PRINT STATUS LINE
1710 COL=POS(0)
1720 LN=CSRLIN
1730 COLOR 0,7
1740 LOCATE 25,1
1750 PRINT SPACE$(79);
1760 LOCATE 25,1
1770 PRINT "STAT: ";ST$;
1780 LOCATE 25,16
1790 PRINT FE$;
1800 LOCATE 25,20
1810 PRINT "MODE: ";MO$;
1820 LOCATE 25,45
1830 PRINT "TELE # ";NUM$;
1840 LOCATE 25,68
1850 PRINT DU$;
1860 LOCATE LN,COL,1
1870 COLOR 7,0
1880 RETURN
1890 FEED = NOT FEED
1900 IF NOT FEED THEN 1920
1910 FE$="LF+":GOSUB 1700:RETURN
1920 FE$="LF-":GOSUB 1700:RETURN
1930 HALF=NOT HALF : IF NOT HALF THEN 1950
1940 DU$="HALF DUPLEX":GOSUB 1700:RETURN
1950 DU$="FULL DUPLEX":GOSUB 1700:RETURN
3000 REM * SEND ASCII FILE
3010 MO$="DISK --> MODEM":GOSUB 1700
3020 PAUSE = 0
```

```
3030 PRINT
3040 PRINT "Send ASCII File":PRINT
3050 PRINT
3060 "Enter SEND file name: ";
3070 INPUT F$
3080 IF F$="" THEN 3320
3090 OPEN "I",#3,F$
3100 PRINT "Transmit file ";F$;
3110 INPUT "(Y/N) ";X$
3120 X$=LEFT$(X$,1)
3130 IF X$<>"Y" AND X$<>"y" THEN 3320
3140 SEND=NOT SEND
3150 WHILE NOT EOF(3) AND K$<>CHR$(27)
3160    IF PAUSE THEN 3210
3170    LINE INPUT #3,TX$
3180    PRINT #1,TX$
3190    IF FEED THEN PRINT #1,LF$;
3200    FOR I=1 TO 500:NEXT I
3210    WHILE NOT EOF(1)
3220       GOSUB 920
3230       IF I$=XOFF$ THEN PAUSE = -1
3240       IF I$=XON$ THEN PAUSE = 0
3250    WEND
3260    K$=INKEY$
3270 WEND
3280 SEND=NOT SEND
3290 CLOSE 3: DISK = 0: PRINT "File closed" : GOSUB 1690
3300 PRINT
3310 RETURN
3320 PRINT "Aborted"
3330 PRINT
3340 GOSUB 1690
3350 IF NOT ONLINE THEN GOSUB 5000
3360 DISK = 0
3370 RETURN
4000 REM * RECEIVE ASCII FILE
4010 DISK = NOT DISK
4020 IF DISK THEN 4080
4030 GOSUB 1150
4040 CLOSE 3
4050 PRINT:PRINT "File closed"
4060 GOSUB 1690
4070 RETURN
4080 I1=0
4090 MO$= "MODEM --> DISK":GOSUB 1700
4100 PRINT
4110 PRINT "Capture ASCII File":PRINT
4120 GOSUB 5000
4130 INPUT "Enter RECEIVE Filename: ",F$ : IF F$="" THEN 4210
4140 CLOSE 3 : OPEN "I",#3,F$
4150 PRINT "File ";F$; : INPUT " Exists - Erase? (Y/N) ", X$
4160 PRINT
4170 PRINT
4180 IF LEFT$(X$,1)="Y" OR LEFT$(X$,1)="y" THEN 4200
```

```
4190 GOTO 4130
4200 CLOSE 3 : OPEN "O",#3,F$ : GOSUB  5000 : RETURN
4210 PRINT "Aborted"
4220 PRINT
4230 CLOSE 3
4240 GOSUB  5000
4250 DISK=0
4260 RETURN
4270 REM * GET A CHARACTER - XMODEM
4280 FOR J=1 TO T: IF NOT EOF(1) THEN W$=INPUT$(1,1):RETURN
4290 NEXT J : W$="" : RETURN
4300 REM * MULTI-TRY
4310 T=T1*10
4320 FOR B = 1 TO 10
4330 GOSUB 4270
4340 K$=INKEY$:IF K$=CHR$(27) THEN 6450
4350 IF W$=SOH$ THEN RETURN
4360 IF W$=EOT$ THEN 6360
4370 IF W$=CAN$ THEN 6460
4380 IF W$<>"" THEN GOSUB 6470 :PRINT #1,NAK$;: GOTO 4300
4390 PRINT "Timeout ";B
4400 BAD=BAD+1
4410 NEXT B
4420 GOSUB 6470
4430 GOTO 6450
5000 REM * SEND XOFF/XON
5010 ONLINE = NOT ONLINE : IF NOT ONLINE THEN 5030
5020 PRINT #1, XON$;:ST$="ON LINE ":GOSUB 1700: RETURN
5030 PRINT #1, XOFF$;:ST$="OFF LINE ":GOSUB 1700 : RETURN
6000 REM * RECEIVE FILE WITH X MODEM PROTOCOL
6010 PRINT "Receive File With XMODEM Protocol" : PRINT
6020 MO$="XMODEM --> DISK":GOSUB 1700
6030 GOSUB 4120
6040 V$="" : SEC=1 : BLK=1 : BAD=0 : N1=0 : T1=240
6050 GOSUB 6470
6060 PRINT #1,NAK$;
6070 GOSUB 4300
6080 T=T1
6090 V$=V$+W$
6100 WHILE LEN(V$) <=131
6110    X1=0
6120    GOSUB 4270
6130    IF W$<>"" THEN 6160
6140      X1-X1+1:PRINT "Character Timeout ";X1 : BAD=BAD+1: IF
          X1>1 THEN 6180
6150      GOTO 6120
6160    V$=V$+W$
6170 WEND
6180 IF LEN(V$)= 132 THEN Z$=MID$(V$,4,128) : N=132 : GOTO 6230
6190 IF V$=EOT$ THEN 6360
6200 IF V$=CAN$ THEN 6460
6210 GOTO 6380
6220 IF SEC = ASC(MID$(V$,2,1))+1 AND (SEC XOR 255) =
     ASC(MID(V$,3,1)) THEN 6420
```

```
6230 IF SEC<> ASC(MID$(V$,2,1)) THEN 6410
6240 IF (SEC XOR 255) <> ASC(MID$(V$,3,1)) THEN 6430
6250 FOR Q=1 TO 128 : CK=CK+ASC(MID$(Z$,Q,1)) : NEXT
6260 IF (CK AND 255) <> ASC(MID$(V$,N,1)) THEN 6400
6270 IF BAD=0 THEN LOCATE CSRLIN-1,1
6280 PRINT "Received #";BLK : SEC=255 AND (SEC+1)
     :BLK=BLK+1:BAD=0
6290 N1=N1+1:B$(N1)=Z$
6300 IF N1=4 THEN 6330
6310 PRINT #1,ACK$;
6320 V$="" : CK=0 : GOTO 6070
6330 PRINT #3,B$(1);B$(2);B$(3);B$(4);
6340 N1=0:GOTO 6310
6350 BAD=BAD+1 : GOTO 6320
6360 IF N1=0 THEN 6440
6370 FOR I=1 TO N1: PRINT #3,B$(I);:NEXT I : GOTO 6440
6380 PRINT "Short Block in #"    ;BLK : PRINT #1,NAK$; : GOTO
     6350
6390 PRINT "Long  Block in #"    ;BLK : PRINT #1,NAK$; : GOTO
     6350
6400 PRINT "Checksum Error in #";BLK : PRINT #1,NAK$; : GOTO
     6350
6410 PRINT "Block #  Error in #";BLK : PRINT #1,NAK$; : GOTO
     6350
6420 PRINT "Block #  Repeated in #";BLK-1 :BAD=BAD+1:GOTO 6310
6430 PRINT "Complement Error in #";BLK:PRINT #1,NAK$; : GOTO
     6350
6440 PRINT "File Closed." : CLOSE 3 : PRINT #1,ACK$; : GOTO
     6490
6450 PRINT "Transfer Canceled" : CLOSE 3 :KILL F$: PRINT
     #1,CAN$; : GOTO 6490
6460 PRINT "Transfer Aborted at Receiver"  : CLOSE 3 :KILL F$:
     GOTO 6490
6470 REM * PURGE BUFFER
6480 WHILE NOT EOF(1) : JUNK$=INPUT$(1,1) : WEND : RETURN
6490 PRINT:GOSUB 1690:GOSUB 780:GOTO 900
7000 REM ERROR VECTOR TABLE
7010 PRINT
7020 IF ERR=24 THEN PRINT "Device Timeout" : PRINT : RESUME
     6490
7030 IF ERR=27 THEN PRINT "Printer"        : PRINT : RESUME
     6490
7040 IF ERR=57 AND ERL=4280 THEN RESUME 4280
7050 IF ERR=57 AND ERL=920 THEN RESUME 900
7060 IF ERR=57 THEN PRINT "Device I/O Error": PRINT : RESUME
     6490
7070 IF ERR=52 THEN PRINT "Bad Filename"         : GOTO 7170
7080 IF ERR=61 THEN PRINT "Disk Full"            : GOTO 7170
7090 IF ERR=67 THEN PRINT "Directory Full"       : GOTO 7170
7100 IF ERR=70 THEN PRINT "Disk Write Protected" : GOTO 7170
7110 IF ERR=71 THEN PRINT "Drive Not Ready"      : GOTO 7170
7120 IF ERR=72 THEN PRINT "Disk Media Error"     : GOTO 7170
7130 IF ERR=53 AND ERL= 4140 THEN RESUME    4200
7140 IF ERR=53 THEN PRINT "File Not Found" : PRINT : FILES :
     GOTO 7170
```

```
7150 IF ERR=58 THEN PRINT "File Already Exists" : PRINT : FILES
     : GOTO 7170
7160 ON ERROR GOTO 0
7170 PRINT : DISK=0 : CLOSE 3 : IF NOT ONLINE THEN GOSUB 5000
7180 LOCATE ,,1 : RESUME 6490
8000 REM * SEND FILE WITH XMODEM PROTOCOL
8010 PRINT
8020 PRINT "Send File With XMODEM Protocol" : PRINT
8030 MO$="DISK -->\XMODEM":GOSUB 1700
8040 IC%=INP(&H3FC)
8050 IZ%=IC% AND &HFB
8060 OUT &H3FC, IZ%
8070 PRINT #1,N$;"T 0"
8080 PRINT
8090 PRINT "Enter SEND file name: ";
8100 INPUT F$
8110 IF F$="" THEN 8200
8120 OPEN "I",#3,F$
8130 CLOSE 3
8140 OPEN F$ AS 3 LEN=128:FIELD #3,128 AS Z$
8150 PRINT "Transmit file ";F$;
8160 INPUT " (Y/N) ";X$
8170 X$=LEFT$(X$,1)
8180 IF X$<>"Y" AND X$<>"y" THEN 8200
8190 GOTO 8240
8200 PRINT
8210 IF NOT ONLINE THEN GOSUB 5000
8220 DISK = 0
8230 GOTO 8580
8240 SEC=0 : GOSUB 6480
8250 EOT=0 : W$="" : FL!=LOF(3) : TBLK!=LOF(3)/128
8260 BKS=INT(TBLK!)
8270 IF LOF(3) MOD 128 >0 THEN BKS=BKS+1
8280 PRINT "Total blocks to send: ";BKS
8290 PRINT:PRINT
8300 BLK=0 : CT!=0 : BAD = 0
8310 WHILE NOT EOF(1)
8320    W$=INPUT$(1,1)
8330    IF W$=CAN$ THEN 8580
8340    IF W$=NAK$ THEN 8430
8350 WEND
8352 IF INKEY$=CHR$(27) THEN 8580
8354 GOTO 8310
8360 WHILE NOT EOF(1)
8370    W$=INPUT$(1,1)
8380    IF W$=ACK$ THEN CK=0 : W$="" : GOTO 8420
8390    IF W$=NAK$ THEN BAD=BAD+1:GOSUB 6480:GOTO 8520
8400    IF W$=CAN$ THEN 8580
8410 WEND
8412 IF INKEY$=CHR$(27) THEN 8580
8414 GOTO 8360
8420 IF EOT THEN 8590
8430 CK=0:W$="":BLK=BLK+1:BAD=0
8440 CT!=CT!+128 : GET #3,BLK
```

```
8450 IF CT!<=FL! THEN 8470
8460 Z$=MID$(Z$,1,128-(CT!-FL!))+STRING$(CT!-FL!,CHR$(0)) :
     EOT=-1
8470 CK=0 : FOR I=1 TO LEN(Z$) : CK=CK+ASC(MID$(Z$,I,1)) : NEXT
8480 CK=(CK AND 255)
8490 IF CK>255 THEN CK=CK-256 : GOTO 8490
8500 SEC=(255 AND BLK)
8510 A$=SOH$+CHR$(SEC)+CHR$(SEC XOR 255)+Z$+CHR$(CK)
8520 IF BAD> 9 THEN 8580
8530 PRINT #1,A$;
8540 IF BAD=0 THEN LOCATE CSRLIN-1,1
8550 PRINT "Sending #";BLK;" --- ";INT((BLK/BKS)*100;"%
     Complete
8560 K$=INKEY$:IF K$=CHR$(27) THEN 8580
8570 GOTO 8360
8580 PRINT "Transfer Aborted":CLOSE 3:PRINT #1,CAN$;:GOTO 8660
8590 PRINT "Transmission Ended." : CLOSE 3 : PRINT #1,EOT$;
8660 IC%=INP(&H3FC)
8670 IZ%=IC% OR &H4
8680 OUT &H3FC, IZ%
8690 WHILE EOF(1)
8700 WEND
8710 I$=INPUT$(1,1)
8720 IF I$=ACK$ THEN PRINT "Transfer Acknowledged":PRINT:RETURN
     900
8730 RETURN 930
8740 REM **** END OF PROGRAM ****
```

Assembly Language Communications Programs

Writing assembly language programs for the PCjr requires familiarity with the Intel 8088 family of microprocessors and their machine language. It is beyond the scope of this book to teach assembly language programming, but this section will cover some of the important topics for experienced programmers.

PCjr HARDWARE

As was discussed earlier in Chapter 9, the PCjr is quite similar in most ways to its big brother, the IBM PC. However, in the area of communications, there are some differences. These will be recapped briefly here.

First and most important, the PCjr does not include any DMA capability. This means that communications activity must stop during disk accesses. At data rates above 1200 baud, receive communications activity must be halted during keyboard input. Also, the PCjr does not support data transfers at rates above 4800 baud, due to the master clock rate used in its serial port.

Another factor to keep in mind is that the screen display routines in the PCjr BIOS firmware are about 25 percent slower than those in the IBM PC. Thus, terminal emulation software that works on the PC at 1200 baud may drop characters on the PCjr at the same speed.

The hardware used in the PCjr's serial ports is different from that used in the IBM PC. Although the IBM PC uses the INS8250 and the PCjr uses the INS8250A, for all practical purposes the interface is the same. However, the clock rate used in the PCjr results in a different baud rate divisor table from that used in the IBM PC. If initialization is done through the appropriate BIOS call, this problem is eliminated.

The PCjr's serial port allocation scheme can be confusing. In assembly programs which do direct port calls, port 3F8 hex is always the IBM Internal Modem and port 2F8 hex is always the RS-232 serial port. However, to access the port from the BIOS, DOS, or BASIC, when the Internal Modem is installed, it is logically COM1 and the serial port is COM2. Without the Internal Modem installed, the serial port becomes logical COM1, but its address remains 2F8 hex using Interrupt level 3.

PCjr SERIAL PORT I/O DECODES

I/O DECODE (IN HEX)	REGISTER SELECTED	DLAB STATE
2F8	TX Buffer	DLAB = 0 (Write)
2F8	RX Buffer	DLAB = 0 (Read)
2F8	Divisior Latch LSB	DLAB = 1
2F9	Divisor Latch MSB	DLAB = 1
2F9	Interrupt Enable Register	DLAB = 0
2FA	Interrupt Identification Registers	(Don't Care)
2FB	Line Control Register	(Don't Care)
2FC	Modem Control Register	(Don't Care)
2FD	Line Status Register	(Don't Care)
2FE	Modem Status Register	(Don't Care)
2FF	Scratch Register	(Don't Care)

PROGRAM DESIGN

Communications programs written in assembly code for the PCjr have a few basic requirements for reliable operation, and must take into account the above factors and limitations of the PCjr's hardware design.

If the program is to be used for interactive communications at data rates above 300 baud, a circular FIFO buffer (usually 4K in size) is required to both receive and transmit because of the slow screen update routines in the PCjr BIOS. Receive data should be trapped with an interrupt-driven routine and sent to the buffer to insure that no data is lost. All of the commercial programs which run on the PCjr use buffers for this purpose.

Diskette drive access operations must halt data transfer over the communications port, either with XON and XOFF, or by pausing in block mode transfers (like XMODEM).

Support should be provided for both the IBM Internal Modem and third-party external modems (like Hayes) using the serial port. This involves port selection for both I/O operations and initialization of parameters and baud rate. It also might involve smart modem commands being built in to the program for dialing, hang up, and so on.

Conclusion

This concludes the final chapter of *Telecommunications with the PCjr.* You are now armed with the information and tools to use your PCjr to communicate with the thousands of online services, mail systems, data bases, and bulletin boards.

I hope you will join the growing community of microcomputer users who have found both fulfillment and entertainment in online communications.

Tymnet, Telenet, and Uninet Network Access Numbers

Included in this appendix are the procedures to download lists of the access telephone numbers for the three major value added data networks — Tymnet, Telenet, and Uninet.

TYMNET

1. Dial nearest local access number. (Call customer service for number — see Appendix H.)

2. When connected you will see

   please type your terminal identifier

   If this message is garbled (usually when accessing at 1200 baud), then type

   <Enter><Enter>

3. Type your terminal identifier "A"

   please type your terminal identifier **A**

4. The system will sign on with

   -3300-013-
   please log in:

5. Type "INFORMATION;"

   please log in: **INFORMATION;**

6. The system will now enter an automatic menu-driven program to provide the phone number list and other data. Turn on disk capture or printer as required.

TYMNET INFORMATION SERVICE

Welcome to TYMNET's Information Service! TYMNET is the world's largest Public Data Network, with local access in over 500 U.S. cities and access to and from over 50 foreign countries. If you need more help, please don't hesitate to call one of our sales offices listed in the directory for more personal and extensive help with your application. To exit this service, please type the word 'EXIT'.

1. HELP IN USING THE INFORMATION SERVICE
2. DIAL-UP ACCESS INFORMATION
3. DATA BASE AND TIMESHARING SERVICES AVAILABLE OVER TYMNET
4. INTERNATIONAL ACCESS INFORMATION
5. X.25 PRODUCTS CERTIFIED BY TYMNET
6. PERSONAL COMPUTER COMMUNICATION PRODUCTS VERIFIED BY TYMNET
7. HOST TYPES CURRENTLY INTERFACED ON TYMNET
8. TYMNET SALES OFFICE DIRECTORY

TYPE THE NUMBER OF THE DESIRED MENU ITEM FOLLOWED BY A CARRIAGE RETURN:2

TYMNET DIAL-UP ACCESS INFORMATION

TYMNET is the world's largest Public Data Network with dial-up local access in over 500 cities nationwide. For a list of telephone numbers for your state, or modem information, select the appropriate entry from the menu.
To return to the main menu, type the word 'UP'. To exit, type 'EXIT'.

1. LIST OF STATES AND AREAS
2. LIST OF ACCESS NUMBERS FOR A SPECIFIC STATE OR AREA
3. LIST OF ALL ACCESS NUMBERS SORTED BY STATE / CITY
4. LIST OF ALL ACCESS NUMBERS SORTED BY NODE NUMBER
5. INFORMATION ON CHANGED NUMBERS AND NEW CITIES
6. INFORMATION ON MODEMS

TYPE THE NUMBER OF THE DESIRED MENU ITEM FOLLOWED BY A CARRIAGE RETURN:3

7. To exit the information service, type EXIT at any menu prompt.

TELENET

1. Dial nearest local access number. (Call customer service for number — see Appendix H.)

2. When connected type

    \<Enter>\<Enter>

3. The service will sign on with

    TELENET
    202 08C

    TERMINAL =

4. Type your terminal code "D1"

   TERMINAL = D1<Enter>

5. The service will respond with

   @

6. Type "MAIL" to enter TELEMAIL

   @MAIL<Enter>

7. Type "PHONES" for both user name and password

   User name? **PHONES**
   Password? **PHONES**

8. The system will now enter an automatic menu-driven program to pro-
   vide the phone number list. Turn on disk capture or printer as required.

   WELCOME TO THE TCO ACCESS LISTING. THERE ARE SEVERAL WAYS YOU CAN GET IN-
   FORMATION ON OUR TCO'S. PLEASE SPECIFY WHETHER YOU WANT INFORMATION ON
   A 'STATE', 'AREA.CODE', 'ALL' OR 'SALES.OFFICE' LOCATIONS BY TYPING THE WORD THAT
   IS IN DELIMITERS.

9. When the listing is completed, you will see:

   This mail session is now complete.

   TELEMAIL DISCONNECTED 00 5B 00:00:03:55 217 8

   @

UNINET

1. Dial nearest local access number. (Call customer service for number —
   see Appendix H.)

2. When connected type

   <Enter>.<Enter>

3. The service will sign on with

   uninet pad 77ca port 06
   service:

4. Type "NNI" at the service prompt for information

   service: NNI<Enter>

5. The system will prepare to run the information program

> *u001 000 connected to 41202040
> UIS System 3 Node 1-118 Port 9 12-Aug-84 15:42
>
> User Number: [20012,100]
> Job 15 - System 3
>
> [ENTER YOUR HOST ACCESS CODE]
> *

6. At this point you must enter a host code, like DLG for Dialog Information Systems.

> * **DLG<Enter>**

7. The system will now enter an automatic menu-driven program to provide the phone number list and other data. Turn on disk capture or printer as required.

UNINET INFORMATION SYSTEM
INFORMATION LAST UPDATED ON 10-AUG-84

****

DO YOU WANT THE OUTPUT FORMATTED FOR A CRT (Y/N) ? N
ENTER OPTION OR ZERO -0- TO LIST AVAILABLE OPTIONS ? 0

AVAILABLE INFORMATION OPTIONS

1 - LIST NETWORK ACCESS PHONE NUMBERS BY CITY
2 - LIST NETWORK ACCESS PHONE NUMBERS BY STATE
3 - LIST NETWORK ACCESS PHONE NUMBERS BY AREA CODE
4 - LIST SERVICE CHANGE INFORMATION
5 - LIST SIGN-ON AND TROUBLE REPORTING INFORMATION
6 - LIST INTERNATIONAL INFORMATION
7 - LIST UNINET MESSAGES

99 - END INFORMATION MANAGER

CompuServe Access Numbers
As of October 24, 1984

CITY	ST	A/C NUMBER		CITY	ST	A/C NUMBER	
Birmingham	AL	205 879-2254	+	San Diego	CA	619 283-6091	*
Birmingham	AL	205 879-2280	–	San Francisco	CA	415 956-4191	–
Huntsville	AL	205 536-4405	*	San Francisco	CA	415 956-4281	*
Montgomery	AL	205 262-0010	*	San Francisco	CA	415 982-9055	+
Little Rock	AR	501 666-8484	–	San Jose	CA	408 249-5361	–
Little Rock	AR	501 666-8478	*	San Jose	CA	408 249-5472	*
Phoenix	AZ	602 256-2951	*	San Mateo	CA	415 591-5591	–
Tucson	AZ	602 748-2004	–	San Mateo	CA	415 591-5846	*
Tucson	AZ	602 748-2009	+	Santa Clara	CA	408 988-8762	*
Vancouver	BC	604 687-6043	–	Sierra Madre	CA	818 355-4816	*
Vancouver	BC	604 689-2706	+	Stockton	CA	209 463-8507	*
Anaheim	CA	714 520-9724	–	Thousand Oaks	CA	805 499-0371	*
Anaheim	CA	714 520-9733	*	Thousand Oaks	CA	805 499-0388	*
Castro Valley	CA	415 581-2631	*	Torrance	CA	213 542-4311	*
Culver City	CA	213 390-9617	*	Torrance	CA	213 542-9021	+
Culver City	CA	213 397-8812	+	Van Nuys	CA	818 891-0651	*
Fresno	CA	209 252-1892	*	Van Nuys	CA	818 892-7211	–
Irvine	CA	714 851-9612	*	Colorado Springs	CO	303 593-9200	*
Long Beach	CA	213 591-8392	*	Denver	CO	303 623-4711	+
Los Angeles	CA	213 487-6461	+	Denver	CO	303 629-0668	*
Los Angeles	CA	213 739-0371	*	Denver	CO	303 629-5563	–
Los Angeles	CA	213 739-8906	–	Grand Junction	CO	303 241-1885	–
Mountain View	CA	415 961-7242	–	Grand Junction	CO	303 241-1889	*
Newport Beach	CA	714 851-9612	*	Bridgeport	CT	203 926-0001	*
North Hollywood	CA	818 982-1813	*	Danbury	CT	203 797-0467	*
Palo Alto	CA	415 591-5591	–	Hartford	CT	203 236-2581	*
Palo Alto	CA	415 591-5846	*	Hartford	CT	203 236-5931	*
Pleasanton	CA	415 846-0828	–	Stamford	CT	203 967-4589	*
Pomona	CA	714 623-2651	*	Waterbury	CT	203 573-0392	+
Rancho Bernardo	CA	619 487-6648	–	Waterbury	CT	203 574-0500	*
Riverside	CA	714 359-7801	*	Westport	CT	203 222-1742	+
Sacramento	CA	916 971-4681	*	Westport	CT	203 222-1748	–
San Bernardino	CA	714 381-3469	*	Washington	DC	703 352-7500	*
San Diego	CA	619 283-6021	–	Washington	DC	703 352-8750	+

NOTE: – 300 Baud Only   + 1200 Baud Only   * 300/1200 Baud Access

CITY	ST	A/C NUMBER		CITY	ST	A/C NUMBER
Washington	DC	703 841-9834	*	Burlington	MA	617 272-3615 *
Wilmington	DE	302-652-8732	*	Concord	MA	617 371-0354 –
Ft. Lauderdale	FL	305 771-8074	*	Framingham	MA	617 875-3814 –
Ft. Lauderdale	FL	305 772-3240	*	Georgetown	MA	617 352-2328 *
Jacksonville	FL	904 241-8191	*	Hudson	MA	617 568-8019 –
Jacksonville	FL	904 246-9961	–	Maynard	MA	617 897-4779 –
Miami	FL	305 665-6425	*	Medfield	MA	617 359-7603 –
Miami	FL	305 667-3564	–	Medway	MA	617 533-2722 –
Orlando	FL	305 273-8780	–	Mendon	MA	617 478-0653 –
Orlando	FL	305 273-8805	*	Springfield	MA	413 734-7362 *
Palm Bay	FL	305 723-2353	*	Waltham	MA	617 890-0232 –
Tallahassee	FL	904 222-4144	*	Westboro	MA	617 366-1577 –
Tallahassee	FL	904 224-6021	*	Worcester	MA	617 793-9839 –
Tampa	FL	813 875-0633	*	Baltimore	MD	301 254-1150 +
Atlanta	GA	404 237-3003	*	Baltimore	MD	301 254-7113 –
Atlanta	GA	404 237-8113	–	Baltimore	MD	301 254-7311 *
Augusta	GA	404 733-0346	*	Hyattsville	MD	301 559-0200 *
Des Moines	IA	515 270-1581	–	Camden	ME	207 236-8505 *
Des Moines	IA	515 270-9410	*	Ann Arbor	MI	313 761-1202 *
Boise	ID	208-384-5660	–	Detroit	MI	313 963-7657 +
Boise	ID	208 384-5666	*	Detroit	MI	313 964-2344 *
Aurora	IL	312 896-2137	*	Detroit	MI	313 964-4745 –
Chicago	IL	312 332-7382	*	Flint	MI	313 238-6202 *
Chicago	IL	312 372-1402	+	Kalamazoo	MI	616 344-2298 –
Chicago	IL	312 443-1250	–	Kalamazoo	MI	616 344-5312 *
Lombard	IL	312 953-9680	*	Lansing	MI	517 321-2388 *
Oakbrook Terr.	IL	312 932-7370	*	Saginaw	MI	517 893-1161 *
Springfield	IL	217 522-5101	*	Troy	MI	313 362-2540 *
Ft. Wayne	IN	219 447-0573	*	Minneapolis	MN	612 342-2207 *
Indianapolis	IN	317 638-2517	–	Minneapolis	MN	612 375-0328 +
Indianapolis	IN	317 638-2762	*	Kansas City	MO	816 474-3770 *
Indianapolis	IN	317 638-5785	+	St. Louis	MO	314 241-3101 –
Osceola	IN	219 674-5171	*	St. Louis	MO	314 241-3102 *
Osceola	IN	219 674-5665	+	St. Louis	MO	314 241-3110 +
Wichita	KS	316-689-8765	*	Jackson	MS	601 982-0463 *
Lexington	KY	606 259-3446	*	Charlotte	NC	704 333-6654 –
Louisville	KY	502 581-9526	*	Charlotte	NC	704 333-7155 *
Louisville	KY	502 581-9804	+	Greensboro	NC	919 373-1635 *
Baton Rouge	LA	504 273-0184	*	Raleigh	NC	919 878-8570 *
New Orleans	LA	504 948-9542	–	Omaha	NE	402 895-5288 *
New Orleans	LA	504 949-2086	*	Merrimack	NH	603 883-0884 *
Shreveport	LA	318 424-5380	–	Cherry Hill	NJ	609 665-6244 –
Shreveport	LA	504 424-5380	+	Cherry Hill	NJ	609 665-7893 +
Amherst	MA	413 256-8194	*	Greenbrook	NJ	201 968-9000 *
Boston	MA	617 267-2569	–	Hackettstown	NJ	201 852-8070 *
Boston	MA	617 267-3764	+	Hackettstown	NJ	201 852-8502 *
Boston	MA	617 267-3808	+	Montclair	NJ	201 783-5400 *
Brockton	MA	617 586-9803	–	Newark	NJ	201 484-2275 *

NOTE: – 300 Baud Only   + 1200 Baud Only   * 300/1200 Baud Access

CITY	ST	A/C NUMBER		CITY	ST	A/C NUMBER	
Parsippany	NJ	201 898-1935	*	Portland	OR	503 232-4026	*
Princeton	NJ	609 683-4770	–	Allentown	PA	215 776-6960	*
Princeton	NJ	609 683-4776	*	Erie	PA	814 453-3624	*
Princeton	NJ	609 921-8930	+	Harrisburg	PA	717 657-9633	*
Albuquerque	NM	505 345-3426	+	King of Prussia	PA	215 265-7230	*
Albuquerque	NM	505 345-3631	*	Philadelphia	PA	215 563-1008	+
Las Vegas	NV	702 878-0056	*	Philadelphia	PA	215 563-1051	*
Reno	NV	702 786-5308	–	Pittsburgh	PA	412 391-7732	*
Reno	NV	702 786-5356	*	Pittsburgh	PA	412 391-8218	+
Binghamton	NY	607 772-1225	*	Pittsburgh	PA	412 391-8818	–
Buffalo	NY	716 874-3751	*	Reading	PA	215 374-5600	*
Hicksville	NY	516 681-7240	–	Providence	RI	401 781-8500	–
Hicksville	NY	516 681-7347	*	Providence	RI	401 781-8505	*
New York City	NY	212 344-5674	+	Charleston	SC	803 556-0422	+
New York City	NY	212 758-0330	+	Charleston	SC	803 763-0090	*
New York City	NY	212 758-2090	+	Columbia	SC	803 798-3630	*
New York City	NY	212 758-4114	–	Rapid City	SD	605 341-4580	*
Rochester	NY	716 458-3460	–	Knoxville	TN	615 673-8901	*
Rochester	NY	716 458-3465	*	Memphis	TN	901 452-1710	*
Selden	NY	516 732-2198	*	Memphis	TN	901 452-2470	+
Syracuse	NY	315 463-6512	*	Memphis	TN	901 452-8530	–
Tonawanda	NY	716 694-6263	*	Nashville	TN	615 366-1947	*
White Plains	NY	914 428-9270	–	Austin	TX	512 444-7234	*
White Plains	NY	914 428-9335	*	Dallas	TX	214 748-0976	+
White Plains	NY	914 949-4510	*	Dallas	TX	214 761-0599	*
Williston Park	NY	516 877-2862	*	Dallas	TX	214 761-9040	–
Woodstock	NY	914 679-8666	*	El Paso	TX	915 565-4661	–
Akron	OH	216 867-1237	–	El Paso	TX	915 565-4670	*
Akron	OH	216 867-1243	*	Fort Worth	TX	817 870-2461	–
Canton	OH	216 455-2126	*	Fort Worth	TX	817 870-2468	*
Canton	OH	216 455-2516	–	Houston	TX	713 225-2330	*
Cincinnati	OH	513 241-2187	+	Houston	TX	713 225-2500	+
Cincinnati	OH	513 579-0908	–	Houston	TX	713 225-2550	–
Cincinnati	OH	513 721-2691	*	Lubbock	TX	806 763-5081	*
Cleveland	OH	216 771-0723	–	Midland	TX	915 687-1464	*
Cleveland	OH	216 771-6860	*	San Antonio	TX	512 435-3883	*
Columbus	OH	614 451-5573	+	Salt Lake City	UT	801 521-2890	–
Columbus	OH	614 457-2105	–	Salt Lake City	UT	801 521-2895	+
Columbus	OH	614 457-6133	+	Arlington	VA	703 841-9834	*
Dayton	OH	513 461-1064	*	Charlottesville	VA	804 973-8815	–
Granville	OH	614 587-0932	*	Fairfax	VA	703 352-7500	*
Toledo	OH	419 243-9925	+	Fairfax	VA	703 352-8750	+
Toledo	OH	419 255-8116	–	Hampton	VA	804 245-0021	*
Oklahoma City	OK	405 946-4799	–	Norfolk	VA	804 461-6128	–
Oklahoma City	OK	405 946-4860	*	Norfolk	VA	804 461-6167	*
Tulsa	OK	918 749-8801	–	Richmond	VA	804 358-8274	*
Tulsa	OK	918 749-8850	*	Seattle	WA	206 633-0522	+
Toronto	ON	416 366-1869	*	Seattle	WA	206 634-1713	–
Portland	OR	503 232-1072	–				

NOTE: – 300 Baud Only   + 1200 Baud Only   * 300/1200 Baud Access

CITY	ST	A/C NUMBER		CITY	ST	A/C NUMBER	
Seattle	WA	206 634-1901	–	Charleston	WV	304 768-9700	*
Spokane	WA	509 326-0515	*	Huntington	WV	304 736-2331	*
Madison	WI	608 256-6525	*	Parkersburg	WV	304 295-3391	*
Milwaukee	WI	414 475-6381	*	Wheeling	WV	304 232-3589	–
Milwaukee	WI	414 475-6935	–				

NOTE: – 300 Baud Only   + 1200 Baud Only   * 300/1200 Baud Access

MCI Mail

MCI Mail is perhaps the best value in EMAIL services available today. There is an annual charge for a mailbox of only $18.00, no monthly charge for Basic service, and no storage charge. Also, there is no network access charge if you use the MCI Mail numbers listed below (the 800 number costs $.15 per minute).

MCI Mail Rates, effective January 1, 1985.

Subscription charges:

Annual mailbox fee	$18.00
Advanced service (monthly)	10.00
Graphics registration (annual)	20.00

The only other charges are for messages sent. They are:

MCI Instant Mail (Electronic mailbox delivery)

Up to 500 characters total length	$ 0.45
501-7500 characters total length	1.00
Each additional 7500 characters	1.00

MCI Paper Mail

MCI Letter — U.S. Mail Overnite	3 pages	$ 2.00
Overnite Letter — Courier	6 pages	8.00
4-Hour Letter — Courier	6 pages	30.00

Each additional 3 pages are 1.00 regardless of delivery option.

Mail Alert — notification of waiting mail $ 1.00 ea

Note: Other billing options are available for the heavy-volume user.

MCI Mail Sign-Up Procedure

It is quite simple to sign up for MCI Mail service — you just call an operator at a toll-free number.

The voice telephone number for sign-up is (800) 624-2255 or in Washington, DC 833-8484.

MCI Mail Access Numbers

Access Numbers
sorted by state
as of October 24, 1984

* Customer Service: (800) 424-6677
* In Washington, call: (202) 833-8484

CITY	ST	A/C NUMBER	CITY	ST	A/C NUMBER
Phoenix	AZ	(602) 266-1148	Boston	MA	(617) 262-6468
Los Angeles	CA	(213) 620-1449	Baltimore	MD	(301) 583-6850
Oakland	CA	(415) 540-1114	Detroit	MI	(313) 962-5980
Sacramento	CA	(916) 442-6986			
San Diego	CA	(619) 268-1708	Minneapolis	MN	(612) 893-9462
San Francisco	CA	(415) 543-1560	Kansas City	MO	(816) 474-3169
San Jose	CA	(408) 995-6711	St. Louis	MO	(314) 991-1881
Santa Ana	CA	(714) 550-7128	Hackensack	NJ	(201) 488-2622
Sherman Oaks	CA	(818) 906-8989	Newark	NJ	(201) 623-0295
Denver	CO	(303) 831-8139	Buffalo	NY	(716) 847-6050
Hartford	CT	(203) 728-1909	Long Island	NY	(516) 596-0404
Stamford	CT	(203) 325-8133	New York City	NY	(212) 245-0355
Washington	DC	(703) 525-6500	Rochester	NY	(716) 955-9850
Clearwater	FL	(813) 586-0955	White Plains	NY	(914) 232-7527
Jacksonville	FL	(904) 358-1749	Cincinnati	OH	(513) 651-1204
Largo	FL	(813) 586-0955	Cleveland	OH	(216) 771-7177
Miami	FL	(305) 381-9012	Columbus	OH	(614) 221-3451
St. Petersburg	FL	(813) 586-0955	Philadelphia	PA	(215) 636-9060
Tampa	FL	(813) 221-1597	Pittsburgh	PA	(412) 261-9918
Atlanta	GA	(404) 577-7363	Memphis	TN	(901) 523-9314
Honolulu	HI	(808) 545-3050	Dallas	TX	(214) 754-0461
Chicago	IL	(312) 856-9000	Ft. Worth	TX	(817) 338-4159
Naperville	IL	(312) 369-0805	Houston	TX	(713) 850-1005
Oakbrook	IL	(312) 850-9511	Seattle	WA	(206) 282-3077
Indianapolis	IN	(317) 634-2208	Milwaukee	WI	(414) 347-1769

- National Toll-Free Access Number -
-----------(800) 323-0905-----------

IBM PC RBBS List

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*                                                                               *
*                          December 1, 1984                                     *
*                                                                               *
*                        THE NATIONAL LIST OF                                    *
*                    I B M (tm)   C O M P A T I B L E                            *
*                    B U L L E T I N   B O A R D S   (2 6 0)                      *
*                          Volume II, Number 12                                  *
*                              by W.H.M.C.                                        *
*                        Reprinted by permission.                                *
*                                                                               *
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ALABAMA

[205]821-5134 AUBURN (SYSOP: RANDAL DePRIEST)   RBBS
        300/1200 (6pm-8am, 24 Hrs. Wkends, 30 Mb. Hd. Dsk.)

[205] 987-9818 BIRMINGHAM (SYSOP: RICHARD DRIGGERS)   RBBS
        300/450/1200 (24 Hrs., 140 Mb. Hard Disk)

[205] 988-4816 BIRMINGHAM (SYSOP: RICHARD DRIGGERS)   RBBS
        300/450/1200 (24 Hrs., 140 Mb. Hard Disk)

ARKANSAS

[501] 327-7490 CONWAY (SYSOP: DAVID REYNOLDS)   FIDO
        300/1200 (6pm-8am, 10 Mb. Hard Disk)

ARIZONA

[602] 954-0413 PHOENIX (SYSOP: ARNOLD THOMSEN)   RBBS
        300/1200 (24 Hrs., Phoenix IBM-PC User Group)

[602] 742-5187 TUCSON (SYSOP: BILL CRIDER)   RBBS
        300/1200 (6pm-10am, 24 Hrs. Wkends.)

CALIFORNIA

[213] 402-6217 ARTESIA (SYSOP: GEORGE GILBERT)   RBBS
        300/1200 (11pm-6am)

[805] 833-8359 BAKERSFIELD (SYSOP: RICK HEMMING)   RBBS
        300/1200 (24 Hrs., KERNCOM)

[707] 745-9753 BENICA (SYSOP: JEFF BROWN)   RBBS
        300/450/1200 (24 Hrs., 50 Mb. Hard Disk)

CALIFORNIA (Cont'd)

[213] 859-9051 BEVERLY HILLS (SYSOP: STEVE MAY)   RBBS
            300/1200 (24 Hrs., The Commodity Corner)

[415] 680-1022 CONCORD (SYSOP: ROBERT LE'BOEUF)   RBBS
            300/1200 (24 Hrs.)

[415] 689-2090 CONCORD (SYSOP: JON MARTIN)   RBBS
            300/450/1200 (24 Hrs., Hard Disk, AIRCOMM)

[213] 839-2264 CULVER CITY (SYSOP: JOE TOSCHACK)   RBBS
            300/1200 (24 Hrs.)

[415] 838-7687 DANVILLE (SYSOP: DAVE/JIM BERRETTA)   RBBS
            300 (6pm-11pm, 9am-Midnight Wkends.)

[415] 339-8457 EAST BAY (SYSOP: ANN MEYER)   RBBS
            300/450/1200 (8pm-8am, Women's Interests)

[415] 794-9624 FREMONT (SYSOP: BERNIE BELEW)   RBBS
            300/1200 (12am-2pm Wkdays, 12am-10am Wkends)

[714] 995-2478 IRVINE (SYSOP: ROBERT COLLINS)   RBBS
            300/1200 (24 Hrs.)

[213] 438-6783 LONG BEACH (SYSOP: PHIL GLATZ)   RBBS
            300/1200 (24 Hrs., Music, PC-Talk3 Color)

[213] 472-7339 LOS ANGELES (SYSOP: ANDY KANTER)   RBBS
            300/1200 (24 Hrs., "Beyond War Institute")

[213] 739-6362 LOS ANGELES (SYSOP: JEFF BROWN)   RBBS
            300/1200 (6pm-8am, 10 Mb. Hard Disk)

[415] 927-1216 MARIN COUNTY (SYSOP: DON WATKINS)   RBBS
            300/450/1200 (24 Hrs., Hard Disk)

[818] 368-5801 NORTHRIDGE (SYSOP: DANNY GAUDENTI)   RBBS
            300 (24 Hrs.)

[714] 981-3787 ORANGE COUNTY (SYSOP: CONRAD WILCOXIN)   RBBS
            300/450/1200 (24 Hrs., Hard Disk)

[714] 676-3378 ORANGE COUNTY (SYSOP: JOE DORNER)   RBBS
            300/1200 (24 Hrs., Assembly & C Language)

[213] 459-6480 PACIFIC PALISIDES (SYSOP: MIKE ROTHMAN)   RBBS
            300/1200 (24 Hrs.)

[415] 327-6197 PALO ALTO (SYSOP: JAMES ARNOLD)   RBBS
            300/1200 (Irregular Hours)

[213] 633-4675 PARAMOUNT (SYSOP: L. J. HERMAN)   RBBS
            300/1200 (24 Hrs., Hard Disk, Programming)

[213] 376-7089 REDONDO BEACH (SYSOP: GEORGE PECK)   RBBS
            300/1200 (24 Hrs., Hard Disk, PC News)

[916] 922-7484 SACRAMENTO (SYSOP: CHUCK HORTON)   RBBS
            300/450/1200 (24 Hrs., Hard Disk)

[415] 974-6559 SAN FRANCISCO (SYSOP: JOHN SUMMERS)   RBBS
            300/1200 (Evenings, Mixed Board)

[415] 861-5733 SAN FRANCISCO (SYSOP: HARRY LOGAN)   RBBS
            300/1200 (6pm-8am, 24 Hrs. Wkends)

[415] 864-1418 SAN FRANCISCO (SYSOP: TOM JENNINGS)   FIDO
            300/1200 (24 Hrs., "FIDO BBS")

[415] 793-9983 SAN FRANCISCO (SYSOP: BOB HERRICK)   RBBS
            300/1200 (24 Hrs., Risk Management & Insurance)

C A L I F O R N I A (Cont'd)

[408] 225-1845 SAN JOSE (SYSOP: GENE LOWRY)   RBBS
        300/450/1200 (24 Hrs., "Bigfoot's RBBS")

[408] 972-4765 SAN JOSE (SYSOP: MARK CHANCE)   RBBS
        300 (24 Hrs., San Jose PC Users Club)

[415] 895-9423 SAN LEANDRO (SYSOP: CRAIG KIM)   RBBS
        300/1200 (6pm-8am, 24 Hrs. Wkends, Pswd = "RBBS")

[415] 481-0252 SAN LORENZO (SYSOP: TERRY TAYLOR)   RBBS
        300/1200 (24 Hrs., "No-Name RBBS")

[415] 341-2962 SAN MATEO (SYSOP: MARTIN FITCH)   RBBS
        300/1200 (24 Hrs., "Computers for Christ")

[714] 898-8634 SANTA ANA (SYSOP: SANFORD ZELKOVITZ)   RBBS
        300/1200 (24 Hrs., Hard Disk, DOS 3.0)

[714] 842-6348 SANTA ANA (SYSOP: LARRY DIGHERA)   RBBS
        300/1200 (6pm-6am, 24 Hrs. Wkends)

[714] 771-1451 SANTA ANA (SYSOP: DIANE GIRARD)   RBBS
        300/1200 (24 Hrs.)

[805] 937-0124 SANTA MARIA (SYSOP: ART SCHAEFER)   RBBS
        300/1200 (24 Hrs., Hard Disk)

[213] 390-3239 SANTA MONICA (SYSOP: MARC SCHOENBERG)   PNET
        300 (Limited Hours)

[213] 395-0460 SANTA MONICA (SYSOP: ANDREW SILBER)   RBBS
        300/1200 (24 Hrs., Hard Disk)

[707] 795-0354 SANTA ROSA (SYSOP: DON WATKINS)   RBBS
        300/1200 (24 Hrs., Hard Disk)

[619] 561-7277 SANTEE (SYSOP: BILL BLUE)   FIDO
        300 (24 Hrs., "People's Message RBBS")

[408] 741-0404 SARATOGA (SYSOP: JIM THOMAS)   RBBS
        300/450/1200 (24 Hrs., "Compuguys RBBS")

[818] 896-7450 SHERMAN OAKS (SYSOP:)   RBBS
        300/1200 (24 Hrs., "Ecanet RBBS")

[818] 240-6006 SHERMAN OAKS (SYSOP: CARL SPENCER)   RBBS
        300/1200 (24 Hrs., "BluePrint RBBS")

[805] 526-6147 SIMI VALLEY (SYSOP: DON SJOLSETH)   RBBS
        300/1200 (24 Hrs., "Simi Valley RBBS")

[408] 246-9735 SUNNYVALE (SYSOP: SCOTT SAWICKI)   RBBS
        300 (7pm-8am, 24 Hrs. Wkends)

[408] 735-7190 SUNNYVALE (SYSOP: VERN TALLMAN)   RBBS
        300/450/1200 (24 Hrs., "The Software Exchange)

[415] 937-0156 WALNUT CREEK (SYSOP: WES MEIR)   RBBS
        300/450/1200 (24 Hrs., Hard Disk, "WC-RBBS")

[415] 945-8013 WALNUT CREEK (SYSOP: BRIAN MEGEL)   RBBS
        300/1200 (5pm-10am, "Compushack RBBS")

C A N A D A (SASKATCHEWAN)

[306] 244-3134 SASKATOON (SYSOP: TOM DZUBIN)   RBBS
        300/1200 (6pm-9am, IBM-AT, Saskatoon PC User Group)

C A N A D A (ONTARIO)

[416] 751-6337 TORONTO (SYSOP: DOUG PEEL)   HOST
        300/1200 (24 Hrs., Password = "IBMPC")

C O L O R A D O

[303] 449-3306 BOULDER (SYSOP: FRANK HAENDEL)   RBBS
        300/1200 (24 Hrs., Religion, Philosophy)

[303] 494-0167 BOULDER (SYSOP: HARRY BOLLS)   RBBS
        300/1200 (6pm-6am, 24 Hrs. Wkends, "Databank RBBS")

[303] 777-4326 DENVER (SYSOP: MIKE PORTUGAL)   RBBS
        300/1200 (24 Hrs., 20 Mb. Hard Disk)

[303] 690-4566 DENVER (SYSOP: CHRIS CARSON)   RBBS
        300 (24 Hrs.)

[303] 973-9338 DENVER (SYSOP: OSCAR BARLOW)   RBBS
        300/1200 (6am-11pm)

[303] 223-0983 FORT COLLINS (SYSOP: LEROY CASTERLINE)   RBBS
        300/1200 (24 Hrs. Wkends, "C" Language)

[303] 279-5657 GOLDEN (SYSOP: MARK EHR II)   RBBS
        300/450/1200 (24 Hrs., Robotics)

C O N N E C T I C U T

[203] 239-6321 EAST HARTFORD (SYSOP: SCOTT MAENTZ)   HOST
        300/1200 (6pm-9am, 24 Hrs. Sunday)

[203] 724-6043 HARTFORD (SYSOP: WINTHROP CODY)   RBBS
        300/1200 (24 Hrs., "Traveler's RBBS")

[203] 748-5146 HARTFORD (SYSOP: JIM RYAN)   FIDO
        300/1200 (24 Hrs., "Silver Screen System")

[203] 521-1991 WEST HARTFORD (SYSOP: JOHN O'BOYLE)   HOST
        300/1200 (24 Hrs., Conferences, Password = "IBMPC")

D I S T R I C T   O F   C O L U M B I A

[202] 362-2707 WASHINGTON, D.C. (SYSOP: MIKE TODD)   RBBS
        300 (Irregular Hours)

[202] 332-9512 WASHINGTON, D.C. (SYSOP: SAM HARGADINE)   IBBS
        300 (24 Hrs., IBM & Apple Files)

D E L A W A R E

[302] 655-7387 WILMINGTON (SYSOP: ALEX DRUMMOND)   RBBS
        300/1200 (6pm-6am, 24 Hrs. Wkends)

F L O R I D A

[305] 994-9626 BOCA RATON (SYSOP: FR. C. HOWE)   RBBS
        300 (Evenings, 24 Hrs. Wkends, High Sch. Students)

[305] 273-0020 ORLANDO (SYSOP: ASA FULTON)   RBBS
        300/1200 (24 Hrs., Communications)

[305] 842-1861 ORLANDO (SYSOP: MOLLY CAMPBELL)   RBBS
        300/1200 (24 Hrs., "Mensa RBBS")

[813] 887-3984 TAMPA (SYSOP: DAVE HACQUEBORD)   RBBS
        300/450/1200 (24 Hrs., 20 Mb. Hard Disk)

F L O R I D A (Cont'd)

[813] 875-8096 TAMPA (SYSOP: STEVEN SMITH)   RBBS
          300/1200 (24 Hrs., Hard Disk)

[813] 688-7805 TAMPA (SYSOP: C. DANIEL AKES)   RBBS
          300/1200 (Evenings, 24 Hrs. Wkends, "Lawyer RBBS")

[305] 471-5683 WEST PALM BEACH (SYSOP:)   RBBS
          300/1200 (9:30pm-5:30pm)

[813] 294-6233 WINTER HAVEN (SYSOP: INGRAM LEEDY)   NCHG
          300/1200 (24 Hrs., Online Games)

GEORGIA

[404] 634-5731 ATLANTA (SYSOP: RANDY BULLARD)   RBBS
          300/1200 (24 Hrs.)

[404] 979-4457 ATLANTA (SYSOP: DOUG VINSON)   RBBS
          300/1200 (24 Hrs.)

[404] 587-4198 ATLANTA (SYSOP: JIM CLOSS)   NCHG
          300/1200 (24 Hrs., New "NoChange BBS" Software)

[404] 451-7180 ATLANTA (SYSOP: ROD ROARK)   LBBS
          300/1200 (24 Hrs.)

[404] 252-4146 ATLANTA (SYSOP: NANCY/BOB FRANK)   HOST
          300/1200 (2:30pm-8am, Password = "IBMPC")

[404] 761-3635 ATLANTA (SYSOP: LEE NELSON)   RBBS
          300/1200 (24 Hrs., "PC-Forum RBBS")

[404] 296-3712 ATLANTA (SYSOP: CLARA MAILER)   RBBS
          300/1200 (6am-11pm)

[404] 355-8587 ATLANTA (SYSOP: BO McCORMICK)   MNET
          300/1200 (6pm-10 am, Concurrent Access, UNIX)

[912] 236-3047 SAVANNAH (SYSOP: RANDY WILSON)   RBBS
          300/1200 (24 Hrs., IBM-AT & DOS 3.0)

[404] 355-8587 WOODSTOCK (SYSOP: KEN SHACKELFORD)   RBBS
          300/1200 (10pm-3pm Weekdays)

IOWA

[319] 363-3314 CEDAR RAPIDS (SYSOP: BEN BLACKSTOCK)   RBBS
          300/1200 (24 Hrs.)

[515] 782-9205 CRESTON (SYSOP: STEVE LORIMOR)   RBBS
          300/1200 (24 Hrs., Hard Disk)

[319] 386-4248 DAVENPORT (SYSOP: JOHN MARDOCK)   RBBS
          300/1200 (24 Hrs.)

[319] 338-2750 DES MOINES (SYSOP: KEITH DAVIS)   RBBS
          300/1200 (24 Hrs., Hard Disk, Conferences)

[319] 332-7648 DUBUQUE (SYSOP: JEFF MACHUSAK)   RBBS
          300/1200 (24 Hrs., 10 Mb. Hard Disk)

ILLINOIS

[312] 972-0628 BOLINGBROOK (SYSOP: DICK LAIN)   RBBS
          300/1200 (6pm-6am, 24 Hrs. Wkends)

[217] 359-9090 CHAMPAIGN (SYSOP: TOM STUBNER)   RBBS
          300/1200 (Evenings)

[312] 729-2101 CHICAGO (SYSOP: LES MULTACK)   RBBS
          300/450/1200 (24 Hrs., Hard Disk)

I L L I N O I S (Cont'd)

[312] 940-6496 CHICAGO (SYSOP: RON FOX)   RBBS
                300/1200 (Evenings, 24 Hrs. Wkends, Artificial Intel.)

[312] 376-7598 CHICAGO (SYSOP: PETE CONICEAK)   RBBS
                300/450 (24 Hrs.)

[312] 267-2066 CHICAGO (SYSOP: DAVE JESCHKE)   RBBS
                300/1200 (24 Hrs.)

[312] 396-1022 CHICAGO (SYSOP: TOM SPEAKER)   RBBS
                300/1200 (7pm-9am, 24 Hrs. Wkends)

[312] 502-5942 CHICAGO (SYSOP: EVAN MURPHY)   RBBS
                300/1200 (8am-8pm Wkdays, Human Resource Management)

[312] 882-4227 CHICAGO (SYSOP: GENE PLANTZ)   RBBS
                300/1200 (24 Hrs., Registration Required)

I N D I A N A

[317] 846-8675 INDIANAPOLIS (SYSOP: PAUL McLEAR)   RBBS
                300/1200 (10pm-4pm, 24 Hrs. Wkends)

[219] 259-8008 SOUTH BEND (SYSOP: MIKE EDGARTON)   RBBS
                300/1200 (Evenings)

[219] 291-5212 SOUTH BEND (SYSOP: TERRY ALLEY)   RBBS
                300/1200 (24 Hrs.)

K A N S A S

[913] 827-3310 SALINA (SYSOP: DIRK SPEED)   RBBS
                300/1200 (24 Hrs., 23 Mb. Hard Disk)

K E N T U C K Y

[502] 896-4419 LOUISVILLE (SYSOP: MIKE WEXLER)   RBBS
                300/1200 (6pm-9am, 24 Hrs. Wkends, 15 Mb. Hard Disk)

[502] 425-4052 LOUISVILLE (SYSOP: BILL PHELPS)   RBBS
                300/1200 (24 Hrs., "The BILL Board RBBS")

[502] 606-6235 RICHMOND (SYSOP:)   RBBS
                300/1200 (24 Hrs.)

L O U I S I A N A

[504] 949-2027 NEW ORLEANS (SYSOP: JOHN SHEPARD)   RBBS
                300 (24 Hrs., "Livewire RBBS")

[504] 895-5852 NEW ORLEANS (SYSOP: PETE SMOTHERS)   RBBS
                300/1200 (8pm-7am)

[318] 688-7078 SHREVEPORT (SYSOP: SAM HOLOVIAK)   RBBS
                300/450/1200 (24 Hrs., Hard Disk, Mixed Board)

M A S S A C H U S E T T S

[617] 470-2548 ANDOVER (SYSOP: LAYNE DUBOSE)   RBBS
                300/450 (24 Hrs.)

[617] 881-1128 ASHLAND (SYSOP: THEODORE HOMER III)   RBBS
                300/1200 (24 Hrs.)

[617] 353-9312 BOSTON (SYSOP: DICK ROHRDANZ)   RBBS
                300/450/1200 (5:30pm-9am, 24 Hrs. Wkends, "Boston Comp. Soc.")

[617] 791-1957 BOSTON (SYSOP: HACKERNET)   RBBS
                300/450/1200 (6pm-8am, 24 Hrs. Wkends)

MASSACHUSETTS (Cont'd)

[617] 277-6538 BROOKLINE (SYSOP: DAVID WATSON) 300/1200 (24 Hrs.)	RBBS
[617] 769-9358 NORWOOD (SYSOP: PAUL GRUPP) 300/1200 (24 Hrs., Mixed Board)	RBBS

MARYLAND

[301] 956-3396 ANNAPOLIS (SYSOP: ANDY SMITH) 300/450 (24 Hrs.)	RBBS
[301] 267-4930 ANNAPOLIS (SYSOP: VINCE CASTELLI) 300/1200 (Evenings, 24 Hrs. Wkends)	RBBS
[301] 363-6436 BALTIMORE (SYSOP: LARRY FERBER) 300/1200 (12pm-11pm Monday thru Saturday)	RBBS
[301] 465-3176 BALTIMORE (SYSOP: L. CHOICE) 300/1200 (9pm-9am, 24 Hrs. Wkends)	RBBS
[301] 484-2831 BALTIMORE (SYSOP: COMPUTERLAND) 300/1200 (24 Hrs., Hard Disk)	FIDO
[301] 986-9408 BETHESDA (SYSOP: STEVE STERN) 300/1200 (24 Hrs., Password = "IBMPC")	HOST
[301] 365-0991 BETHESDA (SYSOP: TIM LONG) 300/1200 (10pm-10am, Games)	RBBS
[301] 299-3228 BETHESDA (SYSOP: BRIAN DRISCOLL) 300/1200 (24 Hrs., HTSBBS Software)	FIDO
[301] 796-1223 COLUMBIA (SYSOP: THOMAS VERVAEKE) 300/1200 (24 Hrs.)	RBBS
[301] 596-3569 COLUMBIA (SYSOP: JORGE DEL PINAL) 300/1200 (24 Hrs., Capital PC Statistics SIG)	RBBS
[301] 371-6271 FREDERICK (SYSOP: GARY HORWITH) 300/1200 (24 Hrs., Medical Interests)	RBBS
[301] 428-7931 GAITHERSBURG (SYSOP: LARRY JORDAN) 300/1200 (24 Hrs., Communications)	RBBS
[301] 926-8187 GAITHERSBURG (SYSOP: STAN STATEN) 300/1200 (24 Hrs., "Ham" Radio Interests)	RBBS
[301] 948-5718 GAITHERSBURG (SYSOP: LYNNE ROSENTHAL) 300/1200 (24 Hrs.)	RBBS
[301] 972-2245 GERMANTOWN (SYSOP: JOHN MACVOY) 300/1200 (24 Hrs.)	RBBS
[301] 971-5381 HICKORY (SYSOP: KEITH HOLTER) 300/1200 (24 Hrs.)	RBBS
[301] 424-5817 POTOMAC (SYSOP: DOUG THOMPSON) 300/1200 (24 Hrs., Capital PC Article Uploads)	HOST
[301] 924-5323 ROCKVILLE (SYSOP: EILEEN RODGERS) 300/1200 (Evenings, 24 Hrs. Wkends, "CEAM SIG")	RBBS
[301] 340-1376 ROCKVILLE (SYSOP: COMPUTERLAND) 300/1200 (24 Hrs.)	RBBS
[301] 948-6574 ROCKVILLE (SYSOP: JOSEPH ENGLAND) 300/1200 (24 Hrs., Mixed Board)	RBBS
[301] 946-2565 ROCKVILLE (SYSOP: HOWARD LAMBERT) 300/1200 (24 Hrs., "Hownan's BBS")	RBBS

MARYLAND (Cont'd)

[301] 949-8848 ROCKVILLE (SYSOP: RICH SCHINNELL)   HOST
            300/1200 (24 Hrs., Password = "IBMPC")

[301] 468-1439 ROCKVILLE (SYSOP: JOHN NALEZKIEWICZ)   RBBS
            300/1200 (6:30pm-8:30am, 24 Hrs. Wkends)

[301] 963-5249 ROCKVILLE (SYSOP: P.L. OLYMPIA)   RBBS
            300/1200 (24 Hrs., Mixed Board)

[301] 252-4891 TIMONIUM (SYSOP: DOUG SHREVE)   RBBS
            300/1200 (9am-5pm, ENTRE Computer Center)

[301] 661-2175 TOWSON (SYSOP: CHRIS TUREK)   RBBS
            300/450 (24 Hrs., Zenith 100)

[301] 592-6214 TOWSON (SYSOP: JOE PISTRITTO)   RBBS
            300/1200 (24 Hrs.)

MICHIGAN

[313] 940-6496 ANN ARBOR (SYSOP:)   RBBS
            300/1200 (24 Hrs.)

[313] 887-7429 DETROIT (SYSOP: JIM KOVALSKY)   RBBS
            300/1200 (24 Hrs., "Sailboard BBS")

[313] 357-3606 WEST BLOOMFIELD (SYSOP: DAVID KOPPY)   RBBS
            300/450/1200 (24 Hrs., 10 Mb. Hard Disk)

MINNESOTA

[518] 525-1788 DULUTH (SYSOP: RON CARLSON)   RBBS
            300/1200 (24 Hrs.)

[612] 724-7066 MINNEAPOLIS (SYSOP: SAFEHOUSE)   FIDO
            300/1200 (24 Hrs., Messages, Interest Grps.)

[507] 281-9070 ROCHESTER (SYSOP: ALFRED ANDERSON)   RBBS
            300/450/1200 (24 Hrs., 20 Mb. Hard Disk)

MISSOURI

[314] 741-8655 ST. LOUIS (SYSOP: KARL KRUMMENACHER)   RBBS
            300/450/1200 (24 Hrs.)

[314] 892-9411 ST. LOUIS (SYSOP: JAMES HINCHCLIFT)   RBBS
            300/450/1200 (24 Hrs., 20 Mb. Hard Disk)

MISSISSIPPI

[601] 366-6742 JACKSON (SYSOP: MICRO DESIGN'S)   RBBS
            300/1200 (24 Hrs.)

MONTANA

[406] 256-8717 BILLINGS (SYSOP: DAVE WILLIAMS)   RBBS
            300/450/1200 (24 Hrs., Hard Disk, Amateur Radio)

[406] 862-2635 WHITEFISH (SYSOP: TONY MACE)   RBBS
            300/1200 (7pm-9am, 24 Hrs. Sunday)

NORTH CAROLINA

[704] 332-5439 CHARLOTTE (SYSOP: BILL TAYLOR)   RBBS
            300/1200 (24 Hrs., Mixed Board)

[704] 365-4311 CHARLOTTE (SYSOP: CHUCK McCURRY)   RBBS
            300/1200 (24 Hrs., Registration to Download)

NORTH CAROLINA (Cont'd)

[919] 782-0829 RALEIGH (SYSOP: TERRY RAY)   RBBS
                300/1200 (24 Hrs., Spreadsheets)

[919] 323-8600 RALEIGH (SYSOP: BEAR SKELTON)   RBBS
                300/1200 (24 Hrs., Messages)

[919] 847-4625 RALEIGH (SYSOP: RANDY RAY)   RBBS
                300/1200 (24 Hrs., Hard Disk)

[704] 873-5140 STATESVILLE (SYSOP: MAC WILEY)   RBBS
                300 (9pm-8am, 24 Hrs. Wkends)

NORTH DAKOTA

[701] 293-5973 FARGO (SYSOP: LOREN JONES)   RBBS
                300/450/1200 (24 Hrs., 20 Mb. Hard Disk)

[701] 780-3228 GRAND FORKS (SYSOP: ROBIN STABLER)   RBBS
                300 (5pm-8am, 24 Hrs. Wkends)

NEBRASKA

[402] 339-7809 OMAHA (SYSOP: MIKE YAKUS)   ABBS
                300 (7pm-7am, Mixed Board w/fast growing IBM Section)

NEW HAMPSHIRE

[603] 424-5497 MERRIMACK (SYSOP: BOB WESTCOTT)   RBBS
                300/450/1200 (24 Hrs., Hard Disk)

NEW JERSEY

[201] 963-3115 HOBOKEN (SYSOP: RONALD CLARK)   RBBS
                300/1200 (24 Hrs., "The Police Station")

[201] 327-6973 MAHWAH (SYSOP: BOB MATHES)   RBBS
                300/1200 (24 Hrs., 40 Mb. Hard Disk, Jobs/Resumes)

[201] 728-5497 RINGWOOD (SYSOP: LLOYD KRIGER)   RBBS
                300/1200 (24 Hrs., Hard Disk)

NEW YORK

[716] 836-6964 BUFFALO (SYSOP: ROBERT TAYLOR)   RBBS
                300 (9pm-9am, 24 Hrs. Wkends)

[914] 238-4251 CHAPPAQUA (SYSOP: CHARLES WEISS)   RBBS
                300/1200 (24 Hrs., Dating System thru Windows)

[914] 221-0774 HOPEWELL JUNCTION (SYSOP: JOHN GIBERSON)   RBBS
                300/450/1200 (24 Hrs., Hard Disk)

[914] 221-2248 HOPEWELL JUNCTION (SYSOP: DIETRICH JAEGER)   RBBS
                300/1200 (24 Hrs.)

[516] 487-1200 LONG ISLAND (SYSOP:)   RBBS
                300 (6pm-8am, 24 Hrs. Wkends)

[516] 944-6712 LONG ISLAND (SYSOP: MIKE KREIGER)   RBBS
                300/1200 (24 Hrs., Hard Disk)

[212] 431-1194 NEW YORK (SYSOP: MICHAEL RUSSELL)   RBBS
                300/1200 (24 Hrs., Hard Disk)

[212] 591-4487 NEW YORK (SYSOP: DAN FEINSMITH)   HOST
                300/1200 (24 Hrs., "C" Interest)

[212] 541-5975 NEW YORK (SYSOP: MIKE HERMANN)   RBBS
                300/1200 (24 Hrs., Hard Disk)

NEW YORK (Cont'd)

[212] 975-0046 NEW YORK (SYSOP: DAVID GROSSMAN)   RBBS
        300/1200 (6pm-9am, Hard Disk)

[914] 358-8879 NYACK (SYSOP: CHARLIE INNUSA)   RBBS
        300/1200 (24 Hrs., 10 Mb. Hard Disk)

[914] 297-0665 POUGHKEEPSIE (SYSOP: RAY HYDER)   RBBS
        300/1200 (24 Hrs., Registration)

[716] 227-1156 ROCHESTER (SYSOP: DON RACE)   RBBS
        300/1200 (24 Hrs., Mixed Board)

[914] 634-8385 ROCKLAND COUNTY (SYSOP: DENNIS FRIEDMAN)   RBBS
        300/1200 (6pm-Noon, 24 Hrs. Wkends, "DATA RBBS")

OHIO

[513] 831-5330 CINCINNATI (SYSOP: JOHN HARRINGTON)   RBBS
        300/1200 (24 Hrs., Hard Disk)

[216] 331-0510 CLEVELAND (SYSOP: WILLIAM TOBIN)   RBBS
        300/1200 (24 Hrs., Hard Disk, Validation)

OKLAHOMA

[405] 237-0558 ENID (SYSOP: STEVE EBEY)   RBBS
        300/450/1200 (24 Hrs., Hard Disk, Registration)

[405] 355-4482 LAWTON (SYSOP: SHARON SWANSON)   RBBS
        300/1200 (6pm-9am, 24 Hrs. Sunday)

[918] 749-0718 TULSA (SYSOP: LYNN LONG)   RBBS
        300/1200 (24 Hrs., "C" Language)

[918] 664-8737 TULSA (SYSOP:)   RBBS
        300/1200 (24 Hrs., Hard Disk)

OREGON

[503] 754-5564 CORVALLIS (SYSOP: LEE DAMON)   RBBS
        300 (10pm-9am, 24 Hrs. Sunday)

[503] 667-9186 GRESHAM (SYSOP: DOUGLAS FORMAN)   RBBS
        300/1200 (24 Hrs., Hard Disk)

PENNSYLVANIA

[717] 299-3124 LANCASTER (SYSOP: DAVE SCHREINER)   RBBS
        300/1200 (4:30pm-8:30am, 24 Hrs. Wkends)

[215] 565-7639 MEDIA (SYSOP: WARREN FOX)   RBBS
        300/1200 (24 Hrs., Hard Disk)

[412] 963-0248 PITTSBURGH (SYSOP: RICHARD SMITH)   RBBS
        300/450/1200 (24 Hrs., Hard Disk)

RHODE ISLAND

[401] 463-9480 WARWICK (SYSOP: LLOYD SPRAGUE)   RBBS
        300/1200 (24 Hrs., "Zulu Connection")

SOUTH CAROLINA

[803] 736-3302 COLUMBIA (SYSOP: JOHN BROOME)   RBBS
        300/1200 (6:30pm-8:30am, 24 Hrs. Sunday)

[803] 548-7080 FORT MILL (SYSOP: DAVID WAUGH)   RBBS
        300/450/1200 (24 Hrs., Hard Disk)

SOUTH DAKOTA

[605] 343-5906 RAPID CITY (SYSOP: JERRY HALSTEAD)	RBBS
300/1200 (8pm-4pm, "The Electric Fence")	
[605] 336-3935 SIOUX CITY (SYSOP: LORIN DOBSON)	RBBS
300 (3pm-Noon, 24 Hrs. Wkends)	

TENNESSEE

[901] 332-0248 MEMPHIS (SYSOP: JOHN MAHAFFEY)	RBBS
300/1200 (24 Hrs., Hard Disk, NEW TELEPHONE # COMING)	

TEXAS

[915] 698-4310 ABILENE (SYSOP: KENNETH OSTRACO)	RBBS
300/1200 (24 Hrs., Hard Disk)	
[806] 353-7484 AMARILLO (SYSOP: DORN STICKLE)	RBBS
300/450/1200 (6pm-8am, 24 Hrs. Wkends, Hard Disk)	
[214] 640-1282 ARLINGTON (SYSOP: CARL BURGE)	RBBS
300/1200 (24 Hrs., Hard Disk)	
[214] 991-7934 DALLAS (SYSOP: CHRIS BRADLEY)	RBBS
300/1200 (24 Hrs., Hard Disk)	
[214] 661-2368 DALLAS (SYSOP: RAY WOTTRICH)	RBBS
300/1200 (Afternoons, 24 Hrs. Wkends)	
[214] 931-8073 DALLAS (SYSOP: DAVE CRANE)	RBBS
300/1200 (24 Hrs., Hard Disk, Membership)	
[214] 985-7926 DALLAS (SYSOP: MATT LEGARE)	FIDO
300/1200 (24 Hrs., Hard Disk)	
[214] 261-7120 DALLAS (SYSOP: BILL PERKINS)	RBBS
300/1200 (24 Hrs., Membership)	
[214] 985-8889 DALLAS (SYSOP: LYNDON PAYNE)	IBBS
300/1200 (24 Hrs., Subscription)	
[214] 463-6581 DENISON (SYSOP: LEE CLAYTON)	RBBS
300/1200 (5pm-7am, 24 Hrs. Wkends)	
[817] 288-9639 FORT WORTH (SYSOP: JOHN BECK)	RBBS
300/1200 (5pm-7am, 24 Hrs. Wkends, Hard Disk)	
[817] 481-6334 GRAPEVINE (SYSOP: MARK SEHORNE)	RBBS
300/1200 (24 Hrs., IBM-AT)	
[713] 776-8043 HOUSTON (SYSOP: DON JAMES, JR.)	RBBS
300/1200 (24 Hrs., "The Brainbusters")	
[713] 486-9800 HOUSTON (SYSOP: GARY MORRIS)	RBBS
300/450/1200 (6pm-7am, 24 Hrs. Wkends)	
[713] 831-3768 HOUSTON (SYSOP: DAVE REINSEL)	RBBS
300/1200 (6pm-6am, 24 Hrs. Wkends, "American Connection")	
[713] 488-8771 HOUSTON (SYSOP: PAUL WELLS)	FIDO
300/1200 (24 Hrs.)	
[713] 955-7564 HOUSTON (SYSOP: WALTER HOLMES)	RBBS
300/1200 (24 Hrs., Hard Disk, "Ham" Radio)	
[713] 332-4006 HOUSTON (SYSOP: STEVE LIEBER)	RBBS
300/1200 (24 Hrs.)	
[713] 333-4004 HOUSTON (SYSOP: TONY KEGRESSE)	RBBS
300/1200 (24 Hrs., 30 Mb. Hard Disk, "The Yellow Rose RBBS")	

T E X A S (Cont'd)

[713] 772-5259 HOUSTON (SYSOP: KENNY MANCHESTER)   RBBS
                300/1200 (24 Hrs., "The QUIJA Board")

[713] 376-6345 HOUSTON (SYSOP: ED FOUNTAIN)   RBBS
                300/1200 (Evenings, "NITE-COM")

[713] 661-2768 HOUSTON (SYSOP: JOHN SUMMERS)   RBBS
                300/450/1200 (24 Hrs., 21 Mb. Hard Disk, "Friendly RBBS")

[713] 464-8814 HOUSTON (SYSOP: GENE CHESSER)   RBBS
                300/1200 (Evenings, 24 Hrs. Wkends)

[713] 360-1316 KINGWOOD (SYSOP: KENT GALBRAITH)   RBBS
                300/450/1200 (24 Hrs., 27 Mb. Hard Disk, "KINGCOMM")

[806] 763-3375 LUBBOCK (SYSOP: BOB WAGNER)   RBBS
                300/1200 (24 Hrs.)

[713] 482-5526 SEABROOK (SYSOP: RICHARD RHODING)   RBBS
                300/450/1200 (24 Hrs., Hard Disk)

U T A H

[801] 581-4005 SALT LAKE CITY (SYSOP: CLARKE WHITEHEAD)   RBBS
                300/1200 (24 Hrs., 20 Mb. Hd. Dsk., Univ. of Utah)

V I R G I N I A

[703] 765-1415 ALEXANDRIA (SYSOP: DOUG ANDERSON)   RBBS
                300 (7am-Midnight)

[703] 671-3494 ALEXANDRIA (SYSOP: RICHARD CORONA)   RBBS
                300/1200 (Evenings)

[703] 560-0979 ANNANDALE (SYSOP: WES MERCHANT)   CONN
                300 (24 Hrs., Capital PC Message Center)

[703] 354-7957 ANNANDALE (SYSOP: MARIE PINHO)   RBBS
                300/1200 (24 Hrs., Capital PC DBMS SIG)

[703] 323-0041 BURKE (SYSOP: DANNY PLUNKETT)   RBBS
                300/1200. (Irregular Hours)

[703] 680-5220 DALE CITY (SYSOP: TIM MULLINS)   RBBS
                300/1200 (24 Hrs., New Product Reviews)

[703] 590-9613 DALE CITY (SYSOP: BRUCE ST.CYR)   RBBS
                300 (24 Hrs.)

[703] 978-9592 FAIRFAX (SYSOP: DON WITHROW)   HOST
                300/1200 (24 Hrs., Capital PC BASIC SIG)

[703] 759-5049 GREAT FALLS (SYSOP: TOM MACK)   RBBS
                300/450/1200 (24 Hrs., Hard Disk, Philosophy/Politics)

[703] 471-0632 HERNDON (SYSOP: DON BEILFUSS)   RBBS
                300/1200 (Noon-6am, Lotus 1-2-3 Worksheets)

[703] 430-2535 HERNDON (SYSOP: BILL HARDIN)   RBBS
                300/1200 (24 Hrs., Engineers, Programmers)

[703] 237-4322 McLEAN (SYSOP: BOB JUENEMAN)   RBBS
                300/1200 (6:30pm-7:30am, 24 Hrs. Wkends, Cyptography)

[703] 370-8893 OAKTON (SYSOP: GREG GALLAGHER)   HOST
                300/1200 (Irregular Hours, Conferences)

[703] 476-9459 RESTON (SYSOP: MICHAEL CONNICK)   RBBS
                300/1200 (24 Hrs., "C" Source Code)

VIRGINIA (Cont'd)

[703] 569-6747 SPRINGFIELD (SYSOP: SHANE O'NEILL)   RBBS
     300/1200 (24 Hrs. Wkends)

[703] 321-7441 SPRINGFIELD (SYSOP: JOHN McDERMOTT)   RBBS
     300/1200 (24 Hrs., Communications)

[703] 971-5381 SPRINGFIELD (SYSOP: KEITH HOLTER)   RBBS
     300/1200 (24 Hrs., Chameleon Files)

[703] 759-6941 VIENNA (SYSOP: RICHARD CUNNINGHAM)   ABBS
     300/1200 (24 Hrs., Capital PC "C/UNIX" SIG)

[804] 481-1824 VIRGINIA BEACH (SYSOP: BOB CECCHINO)   RBBS
     300/450/1200 (24 Hrs., 23 Mb. Hard Disk)

[703] 665-0846 WINCHESTER (SYSOP: PAUL KIELMEYER)   RBBS
     300/1200 (24 Hrs.)

WASHINGTON

[206] 784-9968 SEATTLE (SYSOP: CRAIG DEROUEN)   FIDO
     300/1200 (24 Hrs., 32 Mb. Hard Disk)

[206] 725-9413 SEATTLE (SYSOP: C.E. LANGENBERG)   FIDO
     300/1200 (24 Hrs., "C" Language)

[206] 367-7949 SEATTLE (SYSOP: JIM SHIELD)   RBBS
     300 (10pm-9am)

[509] 697-7298 SELAH (SYSOP: PAT O'FARRELL)   RBBS
     300/1200 (6pm-7am, 24 Hrs. Wkends, PC Bibliography Files)

WISCONSIN

[608] 256-8088 MADISON (SYSOP: GARY LONDON)   RBBS
     300/450/1200 (24 Hrs., Hard Disk)

[608] 244-1528 MADISON (SYSOP: RANDAL BURKARDT)   RBBS
     300/1200 (6pm-7am, 24 Hrs. Wkends)

[608] 262-4939 MADISON (SYSOP: READ GILGEN)   RBBS
     300/1200 (Evenings, 24 Hrs. Wkends)

[414] 964-5160 MILWAUKEE (SYSOP: BOB MAHONEY)   RBBS
     300/450/1200 (24 Hrs., Hard Disk)

[414] 354-7433 MILWAUKEE (SYSOP: BOB MAHONEY)   RBBS
     300/450/1200 (24 Hrs., Hard Disk)

[608] 325-4910 MONROE (SYSOP: JIM KLOSS)   NCHG
     300/1200 (24 Hrs., New "NoChange BBS" Software)

WEST VIRGINIA

[304] 345-1436 CHARLESTON (SYSOP: BOB PAYNE)   RBBS
     300/1200 (24 Hrs., Hard Disk)

[304] 344-8088 CHARLESTON (SYSOP: BOB KETCHAM)   RBBS
     300/1200 (24 Hrs., Hard Disk)

Public Access Message Systems

This list includes over 1100 BBS systems available in the U.S. and Canada. It was compiled from over 20 other lists from all over the country (including the preceding list) and several hundred telephone calls to check the status of systems. Due to the large number of changes in these types of lists, you can expect to receive "disconnected number" recordings on some of these numbers by the time this book is printed.

However, many of these systems have been operating for several years, and will continue to do so. Popular systems are difficult to reach and are often busy.

Refer to the resources and systems listed in the Bibliography for updates to the system lists.

PAMS List By Area Code and Type -
Version 10A - Oct. 10, 1984

rb	denotes call, let ring once and call back
!	new system or new number to existing system
#1	denotes original system of that type
dd	denotes game-oriented system
dl	download/upload capabilities
ml	mail/info exchange only
rl	religious orientation
so	sexually oriented messages
$$	May be a subscription system
—	denotes 8-12 hour evening operation only
+	denotes 8-12 hour daytime operation only
*	denotes mostly 24 hrs 7 day operation
we	denotes WEEKEND operation only
$	Supports VADIC 3400 series 1200 bps
&	Supports 212A 1200 baud operation
%	Also supports Baudot operation (45.5 bps)
pw	password to sign-on

201

AMIS Jolly Roger BBS, Park Ridge, NJ .... (201) 391-5519
Aphrodite-E, Paterson, NJ .... (201) 831-1042 so.
BBS IBM PC, Trenton, NJ ....&(201) 783-6976*
BBS Limericks, New Brunswick, NJ .... (201) 572-0617
BMBBS The Garage, Livingston, NJ .... 1(201) 994-0988*
BMBBS The Hospital, Livingston, NJ .... 1(201) 992-9893we.
CONFERENCE-TREE Flagship, Rockaway, NJ .... (201) 627-5151*
CONNECTION-80, Nutley, NJ .... (201) 667-2504
Computers & Economics BBS ....1 &(201) 398-6724*
Ed Gelb's Data Base, Wayne Township, NJ ....&(201) 694-7425
FORUM-80 Linden, NJ .... (201) 486-2956*
FORUM-80 Monmouth, Brielle, NJ .... (201) 974-1196*
NET-WORKS, Livingston, NJ .... (201) 994-9620*
PHOTO-80, Haledon, NJ .... (201) 790-6795
PMS - Rutgers Univ. Microlab, Piscataway, NJ .... (201) 932-3887
RBBS IBM PC Northern NJ ....&(201) 728-3595*
RCP/M CP/M-Net, Piscataway, NJ .... 1(201) 249-0691*
RCP/M Flanders, NJ ....&(201) 584-9227*
RCP/M Metroplex Somerville, NJ ....&(201) 722-8297*
RCP/M RBBS Cranford, NJ .... (201) 272-1874*
RCP/M RBBS KUGNJI, Atlantic Highlands, NJ .... 1(201) 291-8319*
RCP/M RBBS Ocean, NJ ....&(201) 775-8705
RCP/M RBBS Paul Bogdanovich, NJ .... (201) 747-7301
RCP/M RBBS Rutgers, New Brunswick, NJ .... (201) 932-3879*
TBBS Metuchen, NJ .... (201) 494-3649
The C-Line, NW NJ .... (201) 625-1797– *we

202

AMIS ARMUDIC, Washington, DC .... (202) 276-8342
ARQUIMEDES Washington, DC .... (202) 332-9512*
PSBBS Washington, DC .... (202) 337-4694*

203

AMIS BBS, New Haven, CT .... 1(203) 776-9723* dl.
BBS IBM Hostcomm W. Hartford, CT ....&(203) 521-1991*
BBS IBM PC East Hartford, CT .... (203) 289-6321–
BMBBS The Firehouse, Greenwich, CT .... 1(203) 869-7569*
BULLET-80 Danbury, CT ....#1(203) 744-4644
BULLET-80 Seymour, CT .... (203) 888-7952
BULLET-80 Windsor, CT .... (203) 688-8467
Education-80 Greenwich, CT .... (203) 629-4375*
RBBS IBM PC New Canaan, CT .... (203) 966-8869
RCP/M Micro Decision UG, CT ....&(203) 445-5019*
RCP/M RBBS Xerox East, Hartford, CT ....&1(203) 232-3180*
Silver Screen BBS, CT .... 1(203) 748-5146– *we
Telcom 7, New Fairfield, CT .... (203) 746-5763*
Westico Software Norwalk, CT .... (203) 853-0816

205

FORUM-80 Montgomery, AL .... (205) 272-5069
RBBS IBM PC Birmingham, AL ....&(205) 969-0049–
RBBS IBM PC Birmingham, AL ....&(205) 988-3284*

205 (Cont'd)

RBBS IBM PC Huntsville, AL .... &(205) 586-1956–
RCP/M RBBS NACS/UAH, Huntsville, AL .... (205) 895-6749*rb.

206

ABBS Apple Crate I, Seattle, WA .... (206) 872-6789
ARBB Seattle, WA .... (206) 546-6239
BBS IBM PC Seattle, WA .... (206) 367-7949–dd.
BBS IBM PC Seattle, WA .... (206) 522-1340*dd.
BBS IBM PC Seattle, WA .... (206) 883-4403–dd.
CONFERENCE-TREE Tacoma, WA .... (206) 759-0615*
DIAL-YOUR-MATCH #16 Vancouver, WA .... (206) 256-6624 so.
FORUM-80 Seattle, WA .... (206) 723-3282
JCTS Redmond, WA .... (206) 883-0403*
Mags BBS, Lacey, WA .... (206) 491-4143
Mail Board-82 Seattle, WA .... (206) 527-0897*
Micronet NW Tacoma, WA .... (206) 535-2837
Mini-Bin Seattle, WA .... (206) 762-5141*
NWWCUG Edmunds, Seattle, WA .... (206) 743-6021
PMS - Software Unltd., Kenmore, WA .... (206) 486-2368*
RCP/M NW Comp. Soc. WA ....&(206) 621-8665*
RCP/M Olympia, WA .... (206) 357-7400*
RCP/M RBBS Xerox Corp., Yelm, Olympia, WA .... (206) 458-3086–rb.
Seacomm-80, Seattle, WA .... (206) 763-8879*
Tech BBS Tacoma, WA .... (206) 756-0448

207

RCP/M Programmers Anonymous, Gorham, ME .... &(207) 839-2337*

208

TBBS Idaho Falls BBS, Idaho Falls, ID .... !&(208) 523-7400*

209

High Sierra RCP/M RBBS, Pine Grove, CA .... &(209) 296-3534*
RBBS IBM PC Stockton, CA ....&(209) 227-2083– *we
RCP/M CBBS Merced HUG, Merced, CA .... !(209) 383-6417–
RCP/M Oxgate 005, Fresno, CA .... !(209) 383-3511–
RCP/M Oxgate 005, Fresno, CA .... (209) 787-3511

212

ABBS New York, NY .... (212) 877-7703*
AMIS Manhattan Message Manager, New York, NY .... (212) 879-5182
BBS Bronx, NY .... (212) 933-9459
BBS IBM PC New York, NY ....&(212) 490-1146
BMBBS Avenger's Mansion, New York, NY .... !(212) 534-2858*
CONNECTION-80 New York, NY .... (212) 991-1664
CONNECTION-80 South Shore Oceanside, NY ....&(212) 536-3510
CONNECTION-80 Woodhaven, NY .... (212) 441-3755*
DATAbase (DABBS), New York, NY .... (212) 772-7167
FIDO #8, Demon, New York, NY .... (212) 591-4487–
MMMMMM#2, New York, NY .... (212) 541-5975–so.
NET-WORKS Brooklyn, NY .... (212) 410-0949

212 (Cont'd)

PMS - McGraw-Hill Books, New York, NY .... (212) 997-2488
RBBS IBM PC New York, NY .... &(212) 591-4487*
RBBS IBM PC New York, NY .... &(212) 246-0838–
RBBS IBM PC New York, NY .... &(212) 431-1194*
RBBS IBM PC New York, NY .... &(212) 975-0046–
RCP/M CURA, Brooklyn, NY .... &I(212) 625-5931*
RCP/M RBBS NY Apple UG, NY .... &(212) 989-2696* S
SISTER, Staten Island, NY .... (212) 442-3874*
TCBBS Astrocom, New York, NY ....#1(212) 799-4649*
Tickerscreen New York, NY .... (212) 986-1660

213

ABBS Image Base, Long Beach, CA .... (213) 597-0064*
ABBS Pacific Palisades, Los Angeles, CA .... (213) 459-6400
BBS B.R., Los Angeles, CA .... (213) 394-5950*
BBS IBM PC Comp. Res. Ctr., Santa Monica, CA .... (213) 828-1331–
BBS IBM PC Comp. Res. Ctr., Santa Monica, CA .... (213) 829-1487
BBS IBM PC Culver City, CA .... (213) 371-8825*
BBS IBM PC Culver City, CA .... &(213) 410-0714*
BBS IBM PC Santa Monica, CA .... &(213) 390-4182*
BBS IBM PC Santa Monica, CA <pw = Personalized> .... (213) 390-3239*
CLEO, Los Angeles, CA .... (213) 618-8800*
COMPUREF#1 Lawndale, CA .... (213) 371-8825
COMPUREF#2 Seal Beach, CA .... (213) 493-3013
CONFERENCE-TREE Kelp Bed, Los Angeles, CA .... (213) 372-4800
CONFERENCE-TREE Santa Monica, CA .... (213) 394-1505
California/80 Huntington Park, CA .... (213) 589-0372
Cinema Board, Beverly Hills, CA .... (213) 273-1314
DIAL-YOUR-MATCH #19 Santa Monica, CA .... (213) 390-3239 so.
DIAL-YOUR-MATCH #22 Van Nuys, CA .... (213) 990-6830 so.
DIAL-YOUR-MATCH #36 Marina del Rey, CA .... (213) 452-6111 so.
DIAL-YOUR-MATCH #58 Hollywood, CA .... (213) 874-6644 so.
DIAL-YOUR-MATCH #89 Culver City, CA .... (213) 837-2789 so.
Dragon's Lair, Long Beach, CA .... (213) 595-9346*dd.
Father John's Place, South Bay LA, CA .... &(213) 545-2146*
L.A. Interchange, Los Angeles, CA .... (213) 631-3186*
Los Angeles Communication System, LA, CA .... &(213) 935-7570*
Lusty Lady BBS, Hermosa Beach, CA .... I(213) 318-6626 so.
MMMMMM#1, Santa Monica, CA .... (213) 390-3239–so.
MMMMMM#3, Marina del Rey, CA .... (213) 452-6111–so.
MMMMMM#4, Lawndale, CA .... (213) 821-2257–so.
NET-WORKS Computer World, Los Angeles, CA .... (213) 859-0894*
NET-WORKS Magnetic Fantasies, Los Angeles, CA .... (213) 388-5198
NET-WORKS Softworx, West Los Angeles, CA .... (213) 473-2754
RBBS IBM PC Beyond War, Los Angeles, CA .... I&(213) 472-7339*
RBBS IBM PC Hawthorne, CA .... I(213) 973-2374*
RBBS IBM PC Los Angeles, CA .... (213) 739-6362–
RCP/M El Segundo, CA .... I(213) 640-2545*
RCP/M Los Angeles, CA .... (213) 296-5927*
RCP/M MBBS, Hollywood, CA ....#11(213) 653-6398*
RCP/M Mystery Caverns, LA, CA .... &(213) 806-2227– *we
RCP/M PatVac, Venice, CA .... &I(213) 306-1172*

213 (Cont'd)

RCP/M RBBS Bankers & Hackers, LA, CA .... &(213) 498-6581*
RCP/M RBBS ComputerFood Press, LA, CA .... &(213) 559-9033*
RCP/M RBBS EPSON, Torrance, CA <pw=Toledo> .... (213) 618-8674
RCP/M RBBS GFRN Dta Exch. Palos Verdes, CA .... S&(213) 541-2503*
RCP/M RBBS SCCF, LA, CA .... (213) 746-7427* rb S
RCP/M RBBS Software Center, WLA, CA .... (213) 649-6314*
TRS-80 Color BBS, Los Angeles, CA .... I(213) 690-4589
Telephone Software Connection Torrance, CA .... (213) 516-9432
The Interface, Los Angeles, CA .... (213) 477-4605
The Software Bank, Northridge, CA .... (213) 701-7670

214

ABBS Teledunjon III, Dallas, TX .... (214) 960-7654*dd.
ABBS The Pulse, Dallas, TX .... (214) 631-7747*so.
BBS 80 DALTRUG, Dallas, TX .... (214) 289-1386*
BBS IBM Hostcomm Plano, TX .... &(214) 985-8889*
DIAL-YOUR-MATCH #40 Dallas, TX .... (214) 987-3547 so.
HBBS Dallas Heathkit .... (214) 742-1380
NET-WORKS Eclectic Computer Sys., Dallas, TX .... (214) 239-5842
RBBS IBM PC Dallas, TX .... (214) 223-0983*
RCP/M CBBS Dallas, TX .... &(214) 931-8274–
RCP/M RBBS EPSON, Dallas, TX <pw=Epsonstc> .... (214) 659-0387
TBBS Hawkins, TX .... &(214) 769-3036*

215

BBS Churchboard PA .... &(215) 932-8829*
COMNET-80 North Wales, PA .... (215) 855-3809 so.
Email BBS .... I(215) 489-4465
Hermes-80 Allentown, PA .... (215) 434-3998
RBBS IBM PC Allentown, PA .... (215) 439-5696*
RBBS IBM PC Media, PA .... &(215) 565-7639*
RCP/M BBS Compusers Valley Forge, PA .... &(215) 666-5381*
RCP/M RBBS Allentown, PA .... (215) 398-3937*
RCP/M RBBS EPSON, Bristol, PA <pw=Epson> .... (215) 788-5614

216

ABBS Akron Digital Group, Akron, OH .... (216) 745-7855*
ABBS Cleveland, OH .... (216) 779-1338
Art's Archives Lorain, OH .... &(216) 282-3423*
BULLET-80 Chesterland, OH .... (216) 729-2769
COMNET-80 Akron, OH .... &(216) 645-0827*
DIAL-YOUR-MATCH #34 Cleveland, OH .... (216) 932-9845 so.
FORUM-80 Cleveland, OH .... &(216) 943-2388
INFOEX-80 Akron, OH .... (216) 724-2125*
Micro-Com, Louisville, OH .... (216) 875-4582*
PMS - Massillon, OH .... (216) 832-8392*
PMS - RAUG, Akron, OH .... (216) 867-7463*
RBBS IBM PC Cleveland, OH .... (216) 331-0510*

217

BULLET-80 Springfield, IL .... (217) 529-1113
MCMS Word Exchange, Springfield, IL .... (217) 753-4309*

217 (Cont'd)

NET-WORKS C.A.M.S., Decatur, IL . . . . (217) 875-7114–
RBBS IBM PC Old Jack, Springfield, IL . . . . I (217) 546-8231*

219

AMIS Hart City BBS, Elkhart, IN . . . . (219) 262-3980*
RBBS IBM PC South Bend, IN . . . . &(219) 291-5212*

301

A-C-C-E-S-S Annapolis, MD . . . . (301) 267-7666*
ARMUDIC Computer Age, Baltimore, MD . . . . (301) 587-2132
BBS IBM Hostcomm Bethesda, MD . . . . &(301) 986-9408*
BBS IBM Hostcomm Potomac, MD . . . . (301) 424-5817*
BBS IBM Hostcomm Rockville, MD <pw=IBMPC> . . . . (301) 949-8848*
HEX Silver Spring, MD . . . . (301) 593-7033*
PMS - Ellicott City, MD . . . . (301) 465-3176–
PMS - Pikesville, MD . . . . (301) 653-3413
RBBS IBM PC Annapolis, MD . . . . (301) 956-3396*
RBBS IBM PC Annapolis, MD . . . . (301) 267-4930–
RBBS IBM PC Bethesda, MD . . . . &(301) 926-3470–
RBBS IBM PC Bethesda, MD . . . . (301) 460-0538*
RBBS IBM PC Columbia, MD . . . . &(301) 596-3569*
RBBS IBM PC Frederick, MD . . . . (301) 371-6271*
RBBS IBM PC Gaithersburg, MD . . . . (301) 926-3470*
RBBS IBM PC Gaithersburg, MD . . . . (301) 948-9143*
RBBS IBM PC Gaithersburg, MD <pw=IBMPC> . . . . (301) 251-6293*
RBBS IBM PC Germantown, MD . . . . &(301) 972-2456*
RBBS IBM PC Hickory, VA . . . . &(301) 971-5381*
RBBS IBM PC Rockville, MD . . . . &(301) 924-5323– *we
RBBS IBM PC Towson, MD . . . . &(301) 592-6214*
RBBS IBM PC Wheaton, MD . . . . &(301) 946-6790*
RCP/M MAKUE, Mt. Airy, MD . . . . I (301) 865-5025*
RCP/M MEIE, Gaithersburg, MD . . . . I (301) 948-5718*
RCP/M RBBS BHEC, Baltimore, MD . . . . (301) 661-2175*
RCP/M RBBS BHUG, Baltimore, MD . . . . I (301) 768-1499*
RCP/M RBBS Cambridge, MD . . . . I (301) 228-4621*
RCP/M RBBS Laurel, MD . . . . (301) 953-3753*
RCP/M RBBS Pikesville, MD . . . . I (301) 484-2831*
RCP/M St. Mary's College, St. Mary, MD . . . . I (301) 863-7156*
Remote Northstar NASA, Greenbelt, MD . . . . (301) 344-9156
Tech-Link, Forest Glen, MD . . . . (301) 565-9051*

302

RBBS IBM PC Wilmington, DE . . . . &(302) 655-7387*

303

BBS IBM PC Boulder, CO . . . . &(303) 449-3306*
Computer Comm Svc, Colorado Springs UG, CO . . . . &(303) 598-4500* S
Electronic Corrage Colorado Springs, CO . . . . (303) 632-3391
GBBSII Apple Pl, Bloomfield, CO . . . . (303) 469-7541*
GBBSII Aurora-Net, Denver, CO . . . . (303) 343-8401*
GBBSII Eamon, Sullivan, CO . . . . S(303) 750-3783–
GBBSII Off The Wall, Boulder, CO . . . . (303) 443-3367*

303 (Cont'd)

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GBBSII Sullivan, CO .............................................. (303) 693-1064–
MUMon Denver, CO .............................................. (303) 423-3224
P.dBMS #2 - Denver, CO ...................................... S&(303) 755-5380*ml.
RBBS IBM PC Denver, CO ...................................... &(303) 777-4326*
RBBS IBM PC Denver, CO ...................................... &(303) 973-9338*
RBBS IBM PC Golden, CO ...................................... &(303) 279-5657*
RBBS IBM PC Golden, CO ...................................... &(303) 279-5525– *we
RCP/M Boulder, CO .............................................. (303) 499-9169–
RCP/M CUG-NOTE, Denver, CO ............................... (303) 781-4937*
RCP/M RBBS Arvada Elect., Colorado Springs, CO ......... (303) 598-4662*
RCP/M RBBS Computer Parlors Arvada, CO ................. &(303) 420-8052*
RCP/M RBBS Lakewood, Denver, CO ......................... (303) 985-1108*
RCP/M RBBS Pinecliffe, CO .................................... I(303) 499-3034*
RCP/M RBBS Prof Sftwr Colorado Springs, CO ............. &(303) 591-8756–
RCP/M World Peace, Denver, CO ............................. &(303) 320-4822*
RMP/M RBBS Pinecliff, CO ..................................... &(303) 642-3034*
TBBS Aurora Computer Peripherals, Aurora, CO ........... &(303) 897-9037*
TBBS Aurora, CO ............................................. #1(303) 690-4566
TBBS Denver, CO .............................................. &(303) 741-4071
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304

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BULLET-80 Evans, WV .......................................... (304) 372-9654
Mountaineer Softline #1 Morgantown, WV ................. (304) 599-0760
NET-WORKS Charleston, WV ................................... (304) 345-6502*
RBBS IBM PC Charleston, WV ................................. &(304) 344-8088*
TBBS Comet, WV .............................................. (304) 273-4136
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305

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ABBS Byte Shop, Ft. Lauderdale, FL .......................... (305) 486-2983–
ABBS Byte Shop, Miami, FL .................................... (305) 261-3639–
ABBS West Palm Beach, FL .................................... (305) 848-3802
BBS Coco, Miami, FL ........................................... (305) 681-8490
BBS Homestead, FL ............................................ (305) 246-1111
BBS IBM PC West Palm Beach, FL ............................ &(305) 848-5847*
CONNECTION-80 Orlando, FL .................................. (305) 644-8327*
FORUM-80 Ft. Lauderdale, FL ................................. (305) 772-4444*
INFOEX-80 West Palm Beach, FL .............................. (305) 683-6044*
Micro-80 West Palm Beach, FL ................................ (305) 686-3695–
NET-WORKS Big Apple, Miami, FL ............................ (305) 948-8000
RBBS IBM PC Orlando, FL .................................... S&(305) 830-4340*
RCP/M Astronomy, Titusville, FL .............................. &(305) 268-8576*
RCP/M CCPB, West Palm Beach, FL .......................... I(305) 967-0344–
RCP/M Hackers BBS, Melbourne, FL .......................... &(305) 676-3573*
RCP/M MBEB, Miami, FL ....................................... I(305) 854-7274*
RCP/M Oracle 002, W. Palm Beach, FL ....................... I(305) 439-5754*
RCP/M Orlando, FL ............................................ &(305) 677-8086* S
RCP/M RBBS Orlando, FL ..................................... S&(305) 671-2330*
TBBS Pizza-Net, Orlando, FL .................................. (305) 645-5543*
TRADE-80 Ft. Lauderdale, FL ............................... #1(305) 525-1192
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306

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RCP/M RBBS Regina, Saskatchewan, CN ...................... &(306) 586-5585*
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307

PET BBS SE Wyoming PUG, Cheyenne, WY .... (307) 637-6045*
RCP/M Computer Concepts Cheyenne, WY .... &(307) 635-8366*

309

ABBS Peoria, IL .... (309) 692-6502
NET-WORKS MAGIE, Galesburg, IL .... Also: (309) 563-9543*
NET-WORKS MAGIE, Galesburg, IL .... (309) 343-3799*

312

ABBS CODE, Glen Ellyn, IL .... (312) 882-2926*
ABBS Gamemaster, Chicago, IL .... (312) 475-4884*
ABBS Nessy Game System, Itasca, IL .... (312) 773-3308*
ABBS Rogers Park, Chicago, IL .... (312) 973-2227
ACS Arlington Heights, IL .... #1(312) 392-2403
ACS Chicago, IL .... (312) 445-1130
AMIS Clarendon Hills, IL .... (312) 789-3610*
Aurora Computers Chicago, IL .... (312) 897-9037
BBS IBM PC Chicago, IL .... &(312) 944-4847*
BBS IBM PC Niles, IL .... (312) 991-8887*
C.M.M.S. Chicago, IL .... (312) 957-3924*
CBBS Chicago, IL .... #1(312) 545-8086*
CBBS MAUDE Milwaukee, WI .... Also: S&(312) 876-0974*
CBBS/CPMUG Chicago, IL .... (312) 849-1132
Cass-80 Hickory Hills, IL .... (312) 598-4861
Commodore Video King, Skokie, IL .... (312) 674-6502
DIAL-YOUR-MATCH #39 Chicago, IL .... (312) 243-1046 so.
DIAL-YOUR-MATCH #44 Waukegan, IL .... (312) 662-6453 so.
GREENE MACHINE Chicago, IL .... (312) 622-4442 so.
KUG Chicago, IL .... (312) 397-0360
MCMS C.A.M.S. Chicago, IL .... #1&(312) 927-1020*
MCMS L.A.M.S. Round Lake, IL .... (312) 740-9128
MCMS P.C.M.S. Wheaton, IL .... &(312) 462-7560*
MCMS WACO Hot Line, Schaumburg, IL <pvt> .... (312) 351-4374*
MODEM MEDIUM Apple-Net, Chicago, IL .... I(312) 685-9573*
MODEM MEDIUM Chicago, IL .... #1&I(312) 348-0097*
MODEM MEDIUM Khasablanca, Chicago, IL .... I(312) 971-1736
MODEM MEDIUM Marvin, Chicago, IL .... I(312) 674-9246*
MODEM MEDIUM No. Shore Line, Chicago, IL .... I(312) 948-5728*
MODEM MEDIUM The Unknown BBS, Chicago, IL .... I(312) 972-1974*
Multi Image Info Line Chicago, IL .... (312) 882-5766
NET-WORKS Adventure's Inn, Lake Forest, IL .... (312) 295-7284*
NET-WORKS Apple Net, Chicago, IL .... (312) 963-5384
NET-WORKS Apple-Technical, Chicago, IL .... (312) 935-3091
NET-WORKS Chipmunk, Hinsdale, IL .... (312) 323-3741*
NET-WORKS RJNET, Warnville, IL .... (312) 393-4755
OS-9 6809 BBS, Palatine, IL .... (312) 397-8308
PBBS Co-operative Comp Svc, Palantine, IL .... (312) 359-9450*
PET BBS Commodore, Chicago, IL .... (312) 397-0871*
PMS - Chicago Public Library, Chicago, IL .... (312) 235-3200–
PMS - Chicago, IL .... (312) 373-8057*
PMS - Downers Grove/SRT, Downers Grove, IL .... (312) 960-2308
PMS - I.A.C., Lake Forest, IL .... (312) 295-6926*

312 (Cont'd)

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RBBS IBM PC Chicago, IL ........................................ &(312) 267-2066*
RBBS IBM PC Chicago, IL ........................................ (312) 396-1022–
RBBS IBM PC Chicago, IL <pw = Personalized> ..................... (312) 376-7598*
RBBS IBM PCmodem Chicago, IL .................................. &(312) 882-4228*dl.
RBBS IBM PCmodem Chicago, IL .................................. &(312) 882-4227*dl.
RCP/M Bridgeport, IL .......................................... (312) 326-4392*
RCP/M CBBS CASAT, Chicago, IL ................................. I (312) 443-3744*
RCP/M Chicago, IL ............................................. &(312) 941-0049*
RCP/M El Division, Argonne, IL ................................ (312) 972-6979
RCP/M Glen Ellyn, Chicago, IL ................................. (312) 469-2597*
RCP/M Ham Radio, Morton Grove, IL ............................. (312) 967-0052
RCP/M Logan Square, Chicago, IL ............................... (312) 252-2136*
RCP/M NEI, Chicago, IL ........................................ &(312) 949-6189–
RCP/M North Chicago, Chicago, IL .............................. (312) 937-5639
RCP/M Palantine, Chicago, IL .................................. I (312) 359-8080*
RCP/M Prairie View, Chicago, IL ............................... I (312) 537-7888–
RCP/M RBBS AIMS, Hinsdale, IL ................................. (312) 789-0499*
RCP/M RBBS Xerox Midwest, Chicago, IL ......................... I (312) 384-0013 +
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313

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AMIS A.R.C.A.D.E. Sterling Heights, MI ........................ (313) 978-8087*
AMIS M.A.C.E. Detroit, MI ..................................... #1(313) 589-0996*
BBS Good News Plymouth, MI .................................... (313) 459-8375
BBS IBM PC Ann Arbor, MI ...................................... &(313) 994-6333*
BBS IBM PC Canton, MI ......................................... (313) 455-4227* so.
BULLET-80 Waterford, MI ....................................... (313) 628-4350*
Bit Bucket Detroit, MI ........................................ (313) 343-0877
COMNET-80 Mt. Clemens, MI ..................................... &(313) 465-9531
DIAL-YOUR-MATCH #37 Flint, MI ................................. (313) 736-1398 so.
Download Detroit, MI .......................................... (313) 933-1425
Download Livonia, MI .......................................... (313) 261-0885
RBBS SBC's Channel 85, Union Lake, MI ......................... (313) 360-2050*
RBBS XEROX CORP MI ............................................ (313) 827-2266 rb
RBBS-80 Tony's Corner MI ...................................... &(313) 754-1131*
RCP/M CBBS MINICBBS/SAG, Detroit, MI .......................... I (313) 535-9186*
RCP/M CBBS Technical, Detroit, MI ............................. (313) 846-6127*
RCP/M MCBBS Keith Petersen, Royal Oak, MI ..................... (313) 759-6569*
RCP/M RBBS Schooner Cove, Detroit, MI ......................... I (313) 483-0070*
RCP/M RBBS Southfield, MI ..................................... (313) 559-5326*
T-NET Central Processing Unit, Plymouth, MI ................... (313) 547-7903*
T-NET Special Corp, W. Bloomfield, MI ......................... (313) 855-6321*
T-NET The Nucleus, Clarkston, MI .............................. I (313) 623-6309
T-NET Twilight Phone, Warren, MI .............................. #1(313) 775-1649*
The Computer Exchange, Waterford, MI .......................... (313) 623-1089&
Westside Download, Detroit, MI ................................ (313) 348-4479
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314

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Commodore Communications CBM, St. Louis, MO ................... (314) 867-6950
EMC-80 St. Louis, MO .......................................... (314) 645-1047
FIDO #4, Chance Lode Mgt., St. Louis, MO ...................... &(314) 895-6471*
Midwest, St. Louis, MO ........................................ (314) 227-4312 so.
NET-WORKS Forth Dimension, St. Louis, MO ...................... (314) 532-4652
NET-WORKS Great White North, St. Louis, MO .................... (314) 849-3171
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314 (Cont'd)

RBBS IBM PC St. Louis, MO ....&(314) 741-8655*
RCP/M RBBS HUG, St. Louis, MO ....I (314) 291-1854*

315

NET-WORKS DATA-LINE, Minetto, NY ....I (315) 598-3994*
RCP/M Facility of Dolgeville, NY ....&I (315) 429-8185*
RCP/M RBBS CNY Technical, Syracuse, NY ....&I (315) 437-4890–
RCP/M RBBS KUG of Central NY, Syracuse, NY ....&I (315) 468-2887*
Tele-Master Message System, Utica, NY ....(315) 733-3199*

316

ABBS Arkansas City, KS ....I (316) 442-7139*
FORUM-80 Hutchinson, KS ....(316) 665-3985
FORUM-80 Wichita, KS ....&(316) 682-2113*
RCP/M RBBS Wichita, KS ....I (316) 682-9093 we.

317

FBBS #1, Purdue, IN ....&S(317) 494-6643*
PMS - Indianapolis, IN ....(317) 787-5486*

318

NET-WORKS ACE-NET, Leesville, LA ....I (318) 537-0276
NET-WORKS Apple Gumbo, Shreveport, LA ....(318) 861-1012*
NWLAIBMPCUG, Shreveport,, LA ....(318) 688-7078
RCP/M Bossier City, LA ....I (318) 742-1772*
TBBS Shreveport, LA ....(318) 635-8660*

319

ABBS Iowa City, IA ....I (319) 338-2750*
ABBS Wiznet, Cedar Rapids, IA ....I (319) 395-7258*dl.
BBS IBM PC Hawkeye-PC, Cedar Rapids, IA ....I &(319) 363-3314*
CBBS Cedar Rapids, IA ....(319) 364-0811*

401

BBS Colornet, Providence, RI ....S(401) 521-2626–
BBS Heathkit Store, Warwick, RI ....(401) 738-5152–
BBS Syslink, Providence, RI ....(401) 272-1138*
RCP/M Providence, Providence, RI ....(401) 751-5025 we.
RI Tandy Users Group, Cranston, RI ....(401) 944-4689*

402

ABBS LINX, Lincoln, NE ....(402) 476-1177*dl.
ABBS Omaha, NE ....(402) 339-7809
GABBS Food for Thought, Omaha, NE ....(402) 551-4618*
Mages Inn, Omaha, NE ....(402) 734-4748*
RBBS The Meeting Place, Omaha, NE ....&(402) 734-6959*dl.
TRADE-80 Omaha, NE ....(402) 292-6184

403

DIAL-YOUR-MATCH #53 Calgary, CN ....(403) 251-0058 so.
Lethbridge Game Sys., Lethbridge, Alberta, CN ....(403) 320-6923

403 (Cont'd)

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RCP/M Edmonton, Alberta, CN  .....................................  S&(403) 454-6093*
RCP/M Meadowlark, Alberta, CN  ...................................  &(403) 484-5981*
RCP/M RBBS Computron, Edmonton, Alberta, CN  ....................  (403) 454-6093
RCP/M RBBS Computron, Edmonton, Alberta, CN  ....................  (403) 482-6854*
RCP/M Southside Edmonton, Alberta, CN  ...........................  (403) 463-5774
RCP/M Stadium, Edmonton, Alberta, CN  ............................  (403) 471-8080    S
RCP/M Stadium, Edmonton, Alberta, CN  ...........................  I(403) 479-3450*
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404

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BBS IBM Hostcomm Atlanta, GA <pw=IBMPC>  ......................  (404) 252-4146*
BBS IBM PC Atlanta, GA  ..........................................  &(404) 296-3712*
BBS IBM PC The Midnight Express, Atlanta, GA  ...................  I(404) 294-6879–
BBS IBM PC The Software Link, Atlanta, GA  .........................  (404) 252-9438*
BULLET-80 Fayetteville, GA  .......................................  (404) 461-9686
Bulletin/68 Ringgold, GA  .........................................  (404) 891-0136
FIDO #3, MICRONET, Atlanta, GA  ................................  (404) 979-5105*
MLBBS IBM PC Atlanta, GA  .......................................  &(404) 634-5731*
NET-WORKS AGS, Augusta, GA  ...................................  (404) 733-3461*
RCP/M RBBS Atlanta, GA  .........................................  I(404) 627-7127*
Telemessage-80, Atlanta, GA  .....................................  (404) 962-0616
UNIX IBM PC Atlanta, GA  ........................................  (404) 355-8587–
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405

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FlexNet Oklahoma City, OK  .......................................  (405) 728-7654
RBBS IBM PC Enid, OK  ...........................................  (405) 237-0558*
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406

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BBS IBM PC Billings, MT  ..........................................  &(406) 256-8717–
BBS IBM PC Billings, MT <pw=Personalized>  ......................  I(406) 656-9624*
RCP/M RBBS Helena Valley, Helena, MT  ............................  (406) 443-2768+
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408

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ABBS APPLER ][, San Jose, CA  .....................................  (408) 259-7194
AMIS GRAFEX Cupertino, CA  ......................................  (408) 253-5216
AMIS IBBBS San Jose, CA  .........................................  (408) 298-6930
AMIS T.A.B.B.S. Sunnyvale, CA  ....................................  (408) 942-6975
Atari Zone, San Jose, CA  ..........................................  (408) 249-6946
BBS IBM PC Sunnyvale, CA  ........................................  (408) 735-8181
BBS Van Vision, Sunnyvale, CA  ....................................  (408) 732-1079
BULLET-80 Silicon Valley, Cupertino, CA  ..........................  (408) 255-8919
Bird House, San Jose, CA  ..........................................  (408) 267-7399
Buccaneer's Harbor, San Jose, CA  ............................  RB(408) 980-0276
CLEO, San Jose, CA  ..............................................  (408) 294-2000
COLOR-80 BBS, Sunnyvale, CA  ...............................  #1(408) 733-6809
COMPUCAT San Jose, CA  ........................................  (408) 353-1836
CONFERENCE-TREE Santa Cruz, CA  ..............................  (408) 475-7101
CalTex-99 San Jose, CA  ......................................  #1(408) 926-8767
Computers for Christ, San Jose, CA  ...............................  (408) 997-2790
DataTech 008, San Jose, CA  ......................................  (408) 253-3066
GARS KINGDOM San Jose, CA  ....................................  (408) 729-5023
MaxBBSS BBS  ...................................................  (408) 629-2277
NET-WORKS The Dragon's Lair NW, San Jose, CA  .................  (408) 996-7464
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408 (Cont'd)

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PC TIE IBM PC San Jose, CA  .......................................  (408) 972-4765*
PC TIE IBM PC Sunnyvale, CA  ......................................  (408) 246-9735– *we
PMS Santa Cruz, CA  ..............................................  (408) 688-9629
RCP/M Atlas Micro Assoc., San Jose, CA  .............................  1 (408) 379-8086–
RCP/M DBASE ][, Campbell, CA  .....................................  (408) 378-8733*
RCP/M Oracle 001, Sunnyvale, CA  ..................................  1 (408) 732-9190 +
RCP/M Oracle 003, BAYLIST, Sunnyvale, CA  .........................  1 (408) 730-8733–
RCP/M Oxgate 001, Monte Serono, CA  .............................  S&(408) 354-5934*
RCP/M Oxgate 002, San Jose, CA  ..................................  (408) 263-2588
RCP/M Oxgate 012, San Jose, CA  ..................................  1 (408) 378-7474*
RCP/M RBBS COMP-NET Sunnyvale, CA  ............................  (408) 637-1404*
RCP/M RBBS DataTech 007, San Jose, CA  ..........................  (408) 238-9621*
RCP/M RBBS Metal, Sunnyvale, CA  .................................  (408) 733-1364
RCP/M RBBS Piconet #4 WK, San Jose, CA  .........................  1 (408) 281-7059*
RCP/M RBBS Santa Clara, CA  ......................................  1 (408) 247-2853 +
RCP/M Skyhouse Systems, Santa Clara, CA  .........................  1 (408) 296-5078*
SCAVENGER San Jose, CA  .........................................  (408) 867-7982
STUART II Boulder Creek, CA  ......................................  (408) 338-9511
The Dragon's Lair, San Jose, CA  ..................................  (408) 996-7464
The Excalibur, Sunnyvale, CA  .....................................  (408) 395-3560
The General Store CA  .............................................  (408) 253-8528
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409

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Compuque-80 #2, Galveston, TX  ...................................  (409) 265-5296
MOUSE-NET, Galveston, TX  ........................................  (409) 744-5095*
RCP/M Oxgate College Station, TX  .................................  (409) 845-0509*
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412

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CBBS PACC, Pittsburgh, PA  ........................................  (412) 822-7176*
RBBS IBM PC Pittsburgh, PA  .......................................  (412) 963-0248*
RCP/M RBBS Greensburg, PA  ......................................  (412) 836-8407
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413

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TBBS Springfield, MA  ............................................  &(413) 733-1749
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414

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ABBS Colortron Computer, Racine, WI  ..............................  (414) 637-9990*
BBS SUE Milwaukee, WI  ..........................................  (414) 645-6849–
Big Top Games System, Milwaukee, WI  .............................  (414) 259-9475
CBBS MAUDE Milwaukee, WI  ....................................  S&(414) 241-8364*
PET BBS S.E.W.P.U.G., Racine, WI  .................................  (414) 554-9520*
RBBS IBM PC Milwaukee, WI  ....................................  &(414) 964-5160*
RCP/M Ft. Fone File Folder, Ft. Atkinson, WI  ........................  1 (414) 563-9932*
RCP/M MYBBS CHANL-3, Milwaukee, WI  ..........................  1 (414) 353-1667*
RCP/M RBBS MHUG, Milwaukee, WI  ..............................  1 (414) 873-7564*
TBBS Beer City, Milwaukee, WI  ..................................  &(414) 355-8839*
TBBS Canopus, Milwaukee, WI  ...................................  (414) 281-0545*
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415

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ABBS Byte Shop, Hayward, CA  ....................................  (415) 881-5662
ABBS Lafayette, CA  ..............................................  (415) 284-9524
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415 (Cont'd)

ABBS South of Market, San Francisco, CA .... (415) 469-8111 so.
Atari BBS, San Francisco, CA .... (415) 587-8062
BBS IBM PC Berkeley, CA <pwd=GUEST> .... (415) 655-5472*
BBS IBM PC Berkeley, CA <pw=Guest> .... (415) 845-9462*
BBS IBM PC San Ramon, CA ....&(415) 829-8691*
BBS Livermore, CA .... (415) 455-5437
BBS Moraga, CA .... (415) 376-3632
CBBS Lambda, Berkeley, CA .... (415) 658-2919 so.
CBBS Proxima, Berkeley, CA .... (415) 357-1130
CLEO, San Fransicso, CA .... (415) 482-1550*
CONFERENCE-TREE #1, Berkeley, CA ....#1(415) 526-7733
CONFERENCE-TREE #2, San Francisco, CA .... (415) 928-0641
CONFERENCE-TREE #4, Apex-Net, San Francisco, CA .... (415) 928-0412
CONFERENCE-TREE Hayward, CA .... (415) 538-3580
CONFERENCE-TREE Palo Alto, CA .... (415) 948-1474
CONFERENCE-TREE San Francisco, CA ....#1(415) 861-6489
CONFERENCE-TREE Sausalito, CA .... (415) 332-8115
CONNECTION-80 Fremont, CA .... (415) 651-4147*
Computers for Christ, San Mateo, CA ....&(415) 341-2962*
DATABOARD/80 Redwood City, CA .... (415) 367-7638
DATACOM/80 San Leandro, CA .... (415) 895-8980
DIAL-YOUR-MATCH #08 San Francisco, CA .... (415) 467-2588 so.
DIAL-YOUR-MATCH #10 San Francisco, CA .... (415) 566-9927 so.
DIAL-YOUR-MATCH #17 Daly City, CA .... (415) 991-4911 so.
DataTech 005, El Sobrante, CA .... (415) 223-4579
DataTech 010, Palo Alto, CA .... (415) 858-2840
DataTech 011, Leasametric, Foster City, CA .... X2(415) 574-4427
Disk Byters BB, Fremont, CA .... (415) 489-0388
Download 80-PLUS Concord, CA .... (415) 827-5549
Download-80 Mojo's, Forest Knolls, CA ....&(415) 488-9145*
Drummer, San Francisco, CA .... (415) 552-7671 so.
FIDO #1, San Francisco, CA ....#1&(415) 864-1418*
FORUM-80 San Mateo, CA ....&(415) 348-2139
GREENE MACHINE Golden State BBS, Novato, CA .... (415) 897-2783
Humor & Wisdom BBS ....&(415) 674-0660*
IAC Message Base, Menlo Park, CA .... (415) 367-1339
INFO-NET Foster City, CA .... (415) 349-3126
Kinky Kumputer, San Francisco, CA .... (415) 552-8268*
LBBS Friends of Lisp, San Francisco, CA .... (415) 333-5663*
LBBS Menlo Park, CA .... (415) 327-8876
Living BBS, Education SIG, San Francisco, CA .... (415) 565-3037
MRC BBS, Mountain View, CA .... (415) 968-1093
MUdos, Heathkit, Redwood City, CA ....NT(415) 365-4915
Motherboard, San Leandro, CA .... (415) 352-8442
NET-WORKS Computer Line, Alameda, CA .... (415) 865-2831
NET-WORKS Winner's Circle, Berkeley, CA .... (415) 845-4812
Networks Apple-Core, San Francisco, CA .... (415) 585-6334
NibbleWorks Apple San Francisco, CA .... (415) 569-0461
Oasis BBS San Francisco, CA ....#1(415) 591-5509
PMS - Pleasanton, CA .... (415) 462-7419*
PMS - Portola Valley, CA .... (415) 851-3453*
Peace-Net, San Francisco, CA .... (415) 896-0893

415 (Cont'd)

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RBBS IBM PC Concord, CA . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . &(415) 689-2090*
RBBS IBM PC Danville, CA <pw = Diablo>  . . . . . . . . . . . . . . . . . . . . . . . (415) 838-7687– + we
RBBS IBM PC Palo Alto, CA . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . &(415) 327-6197*
RBBS IBM PC San Francisco, CA . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . &(415) 974-6559*
RBBS IBM PC San Francisco, CA . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . (415) 861-5733*
RBBS IBM PC San Lorenzo, CA . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . (415) 481-0252*
RBBS IBM PC San Rafael, CA . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . &(415) 927-1216– *sun
RBBS IBM PC Santa Clara, CA <pw = BBS> . . . . . . . . . . . . . . . . . . . . . . . &(415) 856-1110*
RBBS IBM PC Walnut Creek, CA . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . (415) 937-0156*
RCP/M CrosNest II, San Mateo, CA  . . . . . . . . . . . . . . . . . . . . . . . . . . . . 1(415) 341-9336*
RCP/M Palo Alto, CA . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 1(415) 949-2563 +
RCP/M RBBS DataTech 001, San Carlos, CA . . . . . . . . . . . . . . . . . . . . #1S&(415) 595-0541*
RCP/M RBBS EPSON, San Francisco, CA <Epson>  . . . . . . . . . . . . . . . . . (415)-589 5062
RCP/M RBBS Marin County, CA . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . (415) 383-0473–
RCP/M RBBS Metal, Mt. View, CA  . . . . . . . . . . . . . . . . . . . . . . . . . . . . . (415) 949-1476
RCP/M RBBS Piconet, Mt. View, CA  . . . . . . . . . . . . . . . . . . . . . . . . . . . . (415) 965-4097
RCP/M RBBS San Francisco, CA  . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . (415) 563-4953
RCP/M Rich & Famous, San Francisco, CA  . . . . . . . . . . . . . . . . . . . . . . . (415) 552-9968*
SYSTEM/80 San Leandro, CA  . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . (415) 895-0699
Sunrise Omega-80, Oakland, CA . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . (415) 452-0350
System/80 San Leandro, CA  . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . (415) 782-4402
TBBS Noah's Ark, Fremont, CA . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . (415) 490-8083*so.
THE WOLF DEN San Leandro, CA . . . . . . . . . . . . . . . . . . . . . . . . . . . . . (415) 895-5706
The Adventure Board #4, San Rafael, CA  . . . . . . . . . . . . . . . . . . . . . . . . (415) 457-4467
The Energy Tree, SF, CA  . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . (415) 332-8115
The Story, Literary Foolery, SF, CA  . . . . . . . . . . . . . . . . . . . . . . . . . . . . . (415) 366-8029
Trade-A-Board, SF, CA . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . (415) 392-6302
WellNet BBS, SF, CA  . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . (415) 968-1126
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416

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BBS IBM Hostcomm Toronto, Ont., CN <pw = IBMPC> . . . . . . . . . . . . . . . . . (416) 499-7023*
BBS The BULL, Toronto, Ontario, CN . . . . . . . . . . . . . . . . . . . . . . . . . . . . (416) 423-3265 so.
CBBS Willodale, Ontario, CN  . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . S&1(416) 226-9260*
NET-WORKS Toronto, Ontario, CN  . . . . . . . . . . . . . . . . . . . . . . . . . . . . (416) 445-6696*
PET BBS PSI WordPro, Ontario, CN  . . . . . . . . . . . . . . . . . . . . . . . . . . .#1(416) 624-5431*
PET BBS TPUG, Toronto, Ontario, CN  . . . . . . . . . . . . . . . . . . . . . . . . . . (416) 223-2625*
PMS - Logic Inc., Toronto, Ontario, CN . . . . . . . . . . . . . . . . . . . . . . . . . . (416) 445-5192*
RCP/M Mississauga HUG, Toronto, Ont., CN . . . . . . . . . . . . . . . . . . . . . S&(416) 232-2644*
RCP/M OsBoard, Toronto, CN  . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 1(416) 484-9663
RCP/M System 1, Toronto, Ontario, CN . . . . . . . . . . . . . . . . . . . . . . . . . &(416) 232-0442*
RCP/M System 2, Toronto, Ontario, CN . . . . . . . . . . . . . . . . . . . . . . . . . &(416) 231-1262*
RCP/M System 3, Toronto, Ontario, CN . . . . . . . . . . . . . . . . . . . . . . . . . &(416) 232-0269*
RCP/M System 4, (IBM) Toronto, Ontario, CN . . . . . . . . . . . . . . . . . . . . . &(416) 231-0538*
RCP/M System 5, Toronto, Ontario, CN . . . . . . . . . . . . . . . . . . . . . . . . 1&(416) 232-1449*
RCP/M Toronto, Ontario, CN  . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . &(416) 231-9538*
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417

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TBBS The Computer Matrix, Springfield, MD . . . . . . . . . . . . . . . . . . . . . . 1&(417) 869-5294*
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419

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Toledo Apple Users BBS, Toledo, OH . . . . . . . . . . . . . . . . . . . . . . . . . . . (419) 537-9777*
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501

PBBS Arc-Net, Little Rock, AR . . . . (501) 372-0576*
PMS - Ft. Smith Comp. Club, Ft. Smith, AR . . . . (501) 646-0197–

502

NET-WORKS Assembly Line, Louisville, KY . . . . (502) 459-5531–
NET-WORKS Baud-ville, Louisville, KY . . . . (502) 423-0695–
RBBS IBM PC Louisville, KY . . . . &(502) 896-4419– *we
RBBS IBM PC Richmond, IN· . . . . &(502) 606-6235*

503

BBS Bit Bucket, Portland, OR . . . . (503) 761-6345*
BBS IBM PC Corvallis, OR . . . . (503) 754-5564– *sun
BULLET-80 Klamath Falls, OR . . . . (503) 883-3735
CBBS NW, Portland, OR . . . . (503) 646-5510*
FIDO #6, CastleNet, Corvallis, OR . . . . (503) 754-5244–
FORUM-80 Medford, OR . . . . (503) 535-6883*
PMS - Portland, OR . . . . (503) 245-2536*
Professional YAM, OR . . . . &(503) 621-3746*
RBBS IBM PC Portland, OR . . . . &(503) 635-5679–
RCP/M Agate Desert, OR . . . . &(503) 826-9317*
RCP/M Beaverton, OR . . . . (503) 642-7028*

504

Baton Rouge Data System, Baton Rouge, LA . . . . (504) 926-0181*
RBBS IBM PC New Orleans IBM PCUG, LA . . . . &(504) 895-5259–
RBBS IBM PC New Orleans, LA . . . . (504) 949-2027*
RBBS IBM PC New Orleans, LA . . . . &(504) 895-5852–
RCP/M RBBS Baton Rouge, LA . . . . (504) 273-3116*
RCP/M Redstick, Baton Rouge, LA . . . . I (504) 275-7846*

505

RCP/M Four Corners, NM . . . . (505) 327-2344
RCP/M Mesilla Valley Las Cruces, NM . . . . &(505) 524-6920
RCP/M Mesilla Valley, Las Cruces, NM . . . . I (505) 522-8856*
RCP/M Tom Sanderson's Belen, NM . . . . (505) 864-7676

507

RBBS IBM PC Rochester, MN . . . . (507) 281-0970*

509

RCP/M RBBS Liberty Lake, WA . . . . I (509) 255-6324*

512

Bathroom Wall, TX . . . . (512) 655-8143
DIAL-YOUR-MATCH #38 Austin, TX . . . . (512) 451-8747 so.
FORUM Texas, TX . . . . (512) 696-9628
NET-WORKS Alamo City, TX . . . . (512) 442-1116
NET-WORKS Sparklin' City, Corpus Christi, TX . . . . (512) 882-6569
TBBS Austin, TX . . . . #1(512) 385-1102*
The Black Box, Austin, TX . . . . (512) 835-9742*
Voyeur, San Antonio, TX . . . . (512) 657-5286 so.

513

Komputer Klassified Cincinnati, OH .... (513) 631-3332
Micro-Com, Cincinnati, OH .... (513) 671-2753
RBBS IBM PC Cincinnati, OH .... (513) 831-5330*
RCP/M RBBS Cincinnati, OH .... (513) 489-0149–
RCP/M RBBS Dayton, OH .... 1(513) 256-7227*
RCP/M W. Carrolton, Dayton, OH .... (513) 435-5201*

514

CONNECTION-80 Laval BELE, Laval, Quebec, CN .... (514) 622-1274*
Micro-Dial, Montreal, Quebec, CN .... (514) 487-2792
RCP/M Montreal, Quebec, CN .... 1(514) 481-6329–

515

NET-WORKS Health BBS, Ames, IA .... (515) 233-5254*

516

ABBS New York, NY .... (516) 473-1005*
ABBS Pirates Cove, Long Island, NY .... (516) 698-4008
CBBS LICA LIMBS, Long Island, NY .... (516) 561-6590*
CBBS Long Island, NY .... (516) 334-3134*
CONNECTION-80 Centereach, NY .... (516) 588-5836
CONNECTION-80 Long Island, NY .... 1(516) 567-8267*
CONNECTION-80 RTPM Long Island, NY ....&(516) 567-8995–
RBBS IBM PC Long Island, NY .... (516) 487-1200– *we
RBBS IBM PC Long Island, NY .... (516) 944-6712*
RCP/M Mid-Suffolk, Long Island, NY .... (516) 741-5639–

517

BabbleNet Lansing, MI ....&(517) 321-9652
CONNECTION-80 Lansing, MI .... (517) 339-3367

518

Capital City BBS, Albany, NY .... (518) 346-3596*
Cohoes Forum, Cohoes, NY .... (518) 393-2467
Nibble One, Schenectady, NY .... (518) 370-8343

601

BULLET-80 Hattiesburg, MS .... (601) 264-2361*

602

A-C-C-E-S-S Call-A-Lawyer, Phoenix, AZ .... (602) 275-6644
A-C-C-E-S-S Phoenix, AZ ....&(602) 957-4428*
A-C-C-E-S-S Scottsdale, AZ .... (602) 998-9411*
ABBS Phoenix, AZ .... (602) 898-0891
BBS Apollo, Phoenix, AZ .... (602) 246-1432*
Blax 80 BBS, Phoenix, AZ .... (602) 952-1382*
CBBS TSG, Tucson, AZ .... (602) 574-0327*
CONFERENCE-TREE Phoenix, AZ .... (602) 931-1829*
Creepy Corridors, Phoenix, AZ .... (602) 956-5021–
Diamond III, Phoenix, AZ .... (602) 890-0972*
GREENE MACHINE Yuma, AZ ....&(602) 726-7533*

602 (Cont'd)

Genesys, Phoenix, AZ .... (602) 967-4529*
Microsystems, Phoenix, AZ .... (602) 938-4508*
Omega, Phoenix, AZ .... (602) 952-2018–
RBBS IBM PC Tucson, AZ .... (602) 742-5187–
RCP/M Valley Technical Phoenix, AZ ....&(602) 938-7480*
The Garden of Eden, Phoenix, AZ .... (602) 991-0144*
Voyager, Phoenix, AZ .... (602) 247-6034

603

ACCESS-80 Nashua, NH .... (603) 888-6999
CONNECTION-80 Peterborough, NH .... (603) 924-7920
NET-WORKS Portsmouth, NH .... (603) 436-3461
RBBS IBM PC Merrimack, NH ....&(603) 424-5497*
RCP/M Nashua, NH ....&1 (603) 888-4488*

604

ABBS Analog, Port Coquitlam, BC, CN .... (604) 941-0041*
ABBS Vancouver, BC, CN .... (604) 437-7001
BBS Victoria BC, CN .... (604) 382-2024 +
CBBS Prince George, B.C., CN .... (604) 562-9515
H&S Microsystems, Burnaby, B.C., CN .... (604) 430-4145–
HBBS, Victoria BC, CN .... (604) 384-4711
MBBS, Mission, BC, CN .... (604) 462-8633–
RCP/M CBBS Frog Hollow, Vancouver, BC, CN .... (604) 937-0906*
Satyricon, Burnaby, BC, CN .... (604) 438-2468*
TVG Systems, Burnaby, BC, CN .... (604) 738-1640*

605

BBS IBM PC Sioux Falls, SD ....&(605) 336-3935*

606

K-Net Users Group, Lexington, KY .... (606) 276-1957
RCP/M RBBS OvatioNet, Lexington, KY .... (606) 273-8634–

607

RCP/M SJBBS Johnson City, NY .... (607) 797-6416–

608

JADE Janesville, WI .... (608) 752-7840
RBBS IBM PC Madison, WI <pw = Personalized> ....&(608) 262-4939*

609

ABBS Turnersville, NJ .... (609) 228-1149
BBS Gandalf #2, Hightstown, NJ .... (609) 448-8244
RATS Wenonah #2, NJ .... (609) 853-8268
RATS Wenonah, NJ .... (609) 468-5293
T-NET Delta Connection, Lawrenceville, NJ .... (609) 896-2436*

612

BBS United Minneapolis, MN .... (612) 731-1063
CBBS Rosemont, MN .... (612) 423 5016

612 (Cont'd)

CONFERENCE-TREE Minneapolis, MN .... (612) 854-9691
LawSIG Minneapolis, MN .... (612) 872-2352
Loki's Corner Minneapolis, MN .... (612) 571-5965
MCMS Goliath, Minneapolis, MN .... (612) 753-3082
MarkeTrak Minneapolis, MN .... (612) 333-8970
PMS - Minneapolis, MN .... (612) 929-6699*
PMS - Twin Cities, Minneapolis, MN .... (612) 929-8966
RBBS IBM PC Safehouse, Minneapolis, MN .... (612) 724-7066*dl.
RCP/M RBBS Twin Cities, Minneapolis, MN .... 1(612) 333-5947*
TBBS Anoka, MN ....&(612) 427-7774*

613

ABBS Compumart, Ottawa, Ontario, CN .... (613) 725-2243

614

Applecrackers, Columbus, OH .... (614) 475-9791*
RCP/M CBBS Columbus, OH .... (614) 272-2227*
RCP/M RBBS Pickerington, OH .... (614) 837-3269

615

Bulletin/68 Hinson, TN .... (615) 842-6809
CONFERENCE-TREE Cookville, TN .... (615) 528-5039*
Knight-Line, Nashville, TN .... (615) 297-6037*
RCP/M Physicians Responsive, Winchester, KY .... 1(615) 967-6889*

616

ABBS Computer Room, Kalamazoo, MI .... (616) 382-0101
AMIS G.R.A.S.S. Grand Rapids, MI .... (616) 241-1971*
HBBS Heath/Zenith, Grand Rapids, MI ....&(616) 538-1041
RCP/M Grand Travers, MI .... 1(616) 947-1246*
RCP/M RBBS OPTEC, Lowell, MI .... 1(616) 897-8628*
RS-CPM Clarksville, MI .... (616) 693-2648

617

Andover Cnode, Andover, MA .... 1(617) 470-2548*
BBS North Shore HUG Peabody, MA .... (617) 531-9332
BENIX Info Exch Boston, MA ....&(617) 423-6985*
BULLET-80 Boston, MA ....&(617) 266-7789*
Boston Computer Society, Boston, MA .... (617) 969-9660
CBBS Boston, MA .... (617) 646-3610*
CBBS Dr. Data, Norfolk, MA ....S&1(617) 528-9009*
CBBS Lawrence General Hospital, Boston, MA .... (617) 683-2119
COLOR-80 #16 Arlington, MA .... (617) 646-6809
Chelmsford Exchange, Chelmsford, MA .... (617) 256-8396
Computer Advertising Network Boston, MA .... (617) 423-6300
DIAL-YOUR MATCH #18 Lynnfield, MA .... (617) 334-6369 so.
FORUM-80 Westford, MA .... (617) 692-3973
Masspet BBS, East Taunton, MA .... (617) 824-4878–
NET-WORKS MicroBBS, Chelmsford, MA .... (617) 889-4330
NET-WORKS Pirate's Harbor, Boston, MA .... (617) 720-3600
RBBS Heath H8, MA .... (617) 966-0416*

617 (Cont'd)

RBBS IBM PC Ashland, MA .... &(617) 881-1128–
RBBS IBM PC Boston, MA .... (617) 367-5773*
RBBS IBM PC Brookline, MA .... &(617) 277-6538*
RBBS IBM PC Computer Society, Boston, MA .... (617) 353-9312–
RBBS IBM PC HackerNet Boston, MA .... &(617) 791-1957– *we
RCP/M Heathkit Wellesley, MA .... &(617) 237-1511*
RCP/M RBBS EPSON, Braintree, MA <pw=Epson> .... (617) 848-8281
RCP/M RBBS Milford, MA <pw=PDBIN> .... &I(617) 478-6062*
RCP/M Superbrain, Lexington, MA .... S&(617) 862-0781*
Visiboard, Wellesley, MA .... (617) 235-5082

618

NET-WORKS N A G S, Alton, IL .... (618) 466-9497
NET-WORKS Warlock's Castle St. Louis, MO .... (618) 345-6638

619

BBS IBM PC SIG, San Diego, CA .... (619) 268-0437*
BBS Jim's Tree, El Cajon, CA .... (619) 562-9759*
CBBS SabaHomline, San Diego, CA .... S&(619) 692-1961*
CLEO, San Diego, CA .... (619) 224-8800*
CVBBS #1, San Diego, CA .... (619) 691-8367*
CVBBS #2, San Diego, CA .... (619) 278-9114
DIAL-YOUR-MATCH #11 Carlsbad, CA .... (619) 434-4600*so.
Forem United Pirate Federation, La Costa, CA .... I(619) 942-7092*
GABBS San Diego, CA .... (619) 578-3743*
P.dBMS #1 - Lakeside, CA .... S&(619) 561-7271*ml.
PMS - Date1 Systems Inc., San Diego, CA .... (619) 271-8613*
PMS - Ed Tech, San Diego, CA .... (619) 265-3428
PMS - Escondido, CA .... (619) 746-0667–
PMS - Floppy House, San Diego, CA .... (619) 579-7036*
PMS - Kid's Message System, San Diego, CA .... (619) 578-2646*
PMS - San Marcos, CA .... (619) 727-7500*
PMS - Santee, CA .... #1(619) 561-7277*ml.
PMS - Teen-Line,Del Mar, CA .... (619) 755-5006*
RBBS IBM PC San Diego, CA .... SI(619) 283-1538*dl.
RBBS IBM PC San Diego, CA .... &(619) 425-8073*
RCP/M Barstow, CA .... S(619) 256-3914*
RCP/M RBBS SDCS HEC#04, La Mesa, CA .... (619) 461-5117*
RCP/M RBBS SDCS San Diego, CA .... (619) 236-0742*
RCP/M RBBS San Diego, CA .... S&(619) 273-4354*
SoftNet-80, Vista, CA .... (619) 758-9057*
TBBS San Diego, CA .... I(619) 691-9695*

701

NET-WORKS Armadillo, Grand Forks, ND .... (701) 746-4959
RBBS IBM PC Fargo, ND .... (701) 293-5973*

702

COMNET-80 Las Vegas, NV .... &(702) 870-9986
FORUM-80 Las Vegas, NV .... (702) 362-3609*
PMS - Century 23, Las Vegas, NV .... (702) 878-9106*
RCP/M Reno, NV .... I(702) 826-2337*

702 (Cont'd)

SIGNON, Reno, NV <pw = FREE> .... (702) 826-7234
SIGNON, Reno, NV <pw = FREE> .... Also: S(702) 826-7277

703

ABBS Software Sorcery, Herndon, VA .... &(703) 471-0610*
BBS IBM Hostcomm Fairfax, VA .... (703) 385-8384*
BBS IBM Hostcomm Fairfax, VA <pw = IBMPC> .... (703) 978-9592*
BBS IBM Hostcomm Oakton, VA .... &(703) 370-8893*
BBS IBM Hostcomm Springfield, VA .... (703) 425-7229*
BBS IBM Hostcomm Vienna, VA <pw = IBMPC> .... (703) 522-4513*
BBS IBM PC Annandale, VA <pw = Personalized> .... (703)-560 0979*
BBS IBM PC Dale City, VA <pw = Personalized> .... I (703)-680 5220*
BBS IBM PC Vienna, VA .... (703) 560-7803*
BBS IBM PC Woodbridge, VA .... (703) 590-9613*
C-HUG Bulletin Board, Fairfax, VA .... (703) 360-3812*
CBBS AMRAD, Washington, DC .... (703) 734-1387*
FORUM-80 Dale City, VA .... (703) 670-5881*
HBBS C-HUG Fairfax, VA .... (703) 759-2072
Magus, Herndon, VA .... (703) 471-0611*
RBBS IBM PC Alexandria, VA .... (703) 765-1415*
RBBS IBM PC Annandale, VA .... &(703) 354-7957*
RBBS IBM PC Burke, VA .... &(703) 323-0041*
RBBS IBM PC Great Falls, VA .... &(703) 759-5049*
RBBS IBM PC Herdon, VA .... &(703) 471-0632*
RBBS IBM PC McLean, VA .... &(703) 237-4322–
RBBS IBM PC Springfield, VA .... &(703) 569-6747*
RBBS IBM PC Springfield, VA .... (703) 971-5381*
RBBS IBM PC Vienna, VA .... &(703) 321-7003*
RCP/M Arlington, VA .... (703) 536-3769–
RCP/M Springfield, VA .... &(703) 644-2299*
RCP/M The Flying Circus, Great Falls, VA .... I (703) 759-6627*
Star City BBS, Roanoke, VA .... (703) 342-1800*
Switchboard, Alexandria, VA .... (703) 765-2161*
TCUG BBS, Washington, DC .... (703) 836-0384*
TRS-80 100 UG, Reston, VA .... I (703) 476-9459–

704

ABBS WAP, Charlotte, NC .... (704) 373-7966*
RBBS IBM PC Charlotte, NC <pw = Guest> .... (704) 365-4311*
RBBS IBM PC Statesville, NC .... (704) 873-5140*rb.

707

BBS 16 Santa Rose, CA .... (707) 527-5908–
Commodore UG, Arcata, CA .... I (707) 826-0181–
Grape Line BBS, Napa Valley, CA .... (707) 538-9124*
Info-Exchange, Vallejo, CA .... (707) 944-8002
NET-WORKS BBS, Arcata, CA .... I (707) 725-9202–
RCP/M RBBS Critical Mass, Gualala, CA .... I (707) 884-4221*
RCP/M RBBS Fairfield, CA .... (707) 422-7256*
RCP/M RBBS Napa Valley, CA .... (707) 996-2427
RCP/M RBBS Napa Valley, CA .... (707) 257-6502*

707 (Cont'd)

RCP/M XEROX North Coast Fortuna, CA .... (707) 725-5230*
Underground Computer, Vallejo, CA .... (707) 996-2427

713

ACOM, Houston, TX .... (713) 530-0164
AE PRO Jolly Roger, Houston, TX .... (713) 468-0174*
AMIS APEX, Houston, TX .... (713) 471-7117*
BBS IBM Hostcomm ProMatch, Houston, TX .... I(713) 729-1257—
BBS MCUA PSEUDONYM, Houston, TX .... &(713) 865-8111*
COLOUR-80, Highlands, TX .... (713) 426-7070*
Compuque-80 #3, Houston, TX .... &(713) 353-0361 dl.
Compuque-80, Houston, TX .... #1&(713) 444-7041 dl.
Cyruss Dimensions, Houston, TX .... (713) 376-6382
DIAL-YOUR-MATCH #12 Houston, TX .... (713) 556-1531*so.
DIAL-YOUR-MATCH #77 Houston, TX .... (713) 981-4062 so.
GABBS Armadillo Media, Houston, TX .... (713) 444-7098*
GABBS The Great Apple, Houston, TX .... #1(713) 455-9502*
GABBS Vox Populi, Houston, TX .... (713) 772-6096*
Golden Coco, Houston, TX .... (713) 941-1542*
Micro-Dimension, Houston, TX .... (713) 448-6283–
NASA Activities TTY, Houston, TX .... (713) 483-4115
NET-WORKS Apple Astronomy, Houston, TX .... (713) 526-5671*
NET-WORKS Briar-Net, Houston, TX .... (713) 782-5706*
NET-WORKS Crystal Dimension, Houston, TX .... (713) 497-2175
NET-WORKS DOC Board, Houston, TX .... (713) 471-4131*
NET-WORKS Daily Net, Houston, TX .... (713) 493-6118*
NET-WORKS Fantasy Voyage, Houston, TX .... (713) 333-1845–
NET-WORKS Mines of Moria, Houston, TX .... (713) 871-8577*
NET-WORKS Space Voyage, Houston, TX .... (713) 568-6595–
NET-WORKS The Dark Realm, Houston, TX .... (713) 333-2309*
NET-WORKS The Digital Dimension, Houston, TX .... (713) 497-4633–so.
NET-WORKS The Inner Realm, Houston, TX .... (713) 583-2002*
NET-WORKS The Shadow World, Houston, TX .... (713) 777-8608*
NET-WORKS The System, Houston, TX .... (713) 785-7996–
NET-WORKS The Weekender, Houston, TX .... (713) 492-8700*
NET-WORKS Zachary*Net, Houston, TX .... (713) 933-7353*
RAINBOARD CoCo Connection 2, Houston, TX .... (713) 772-7327–
RAINBOARD Cracked CoCo, Houston, TX .... (713) 772-2090–
RBBS Grand Illusion, Houston, TX .... (713) 568-2035*
RBBS IBM PC Houston, TX .... &(713) 635-8254*
RBBS IBM PC Place, Houston, TX .... (713) 488-7179*
RCP/M Blue Ridge, Missouri City, TX .... (713) 438-2247*
RCP/M RBBS Pegasus, Houston, TX .... (713) 999-1205*
RCP/M Rio Lobo, Kingwood, TX .... I(713) 356-7104*
RCP/M Satsuma, Houston, TX .... &(713) 469-8893*
RIBBS Houston, TX .... (713) 497-5433*
SOBBS Poor Man's BBS, Houston, TX .... (713) 453-7931*
SOBBS R.A.M.S., Houston, TX .... (713) 859-4409*
SOBBS Test Mode, Houston, TX .... (713) 660-9252
TBBS Freelancin' Alvin, Houston, TX .... &(713) 331-2599*
TBBS Freelancin' Houston, TX .... &(713) 488-2003*
TBBS J.L. Christian, Houston, TX .... (713) 721-0888*rl.

713 (Cont'd)

Vic-20 Online, Houston, TX .... (713) 944-6597*
XIO, Houston, TX .... (713) 495-1422–

714

ABBS Pirates Place, Newport Beach, CA .... 1(714) 675-3326
AMIS A.F.A.C. BBS, Riverside, CA .... (714) 781-8774*
ASCII Attic, San Bernardino, CA .... &(714) 381-2083*
Adventurer's Tavern, Orange, CA .... 1(714) 538-3103
Atari, Santa Ana, CA .... 1(714) 731-6523
BBS Commodore The Grapevine, Santa Ana, CA .... (714) 838-7345*
BULLET-80 Garden Grove, CA .... 1(714) 530-4765
BULLET-80 Newport Beach, CA .... &1(714) 650-6699
BULLET-80 Orange County, Anaheim, CA .... &(714) 952-2110*
BULLET-80 Pirate Place, Newport Beach, CA .... (714) 644-7942
CLEO, Orange County, CA .... (714) 476-8800*
COMNET-80 Riverside, CA .... &(714) 877-2253
COMNET-80 Riverside, CA .... &(714) 359-3189
Color Corner Fontana, CA .... (714) 350-2668
Computers for Christ, Ontario, CA .... (714) 983-9923*
DIAL-YOUR-MATCH #29 Santa Ana, CA .... (714) 857-2470 so.
DIAL-YOUR-MATCH #43 Huntington Beach, CA .... (714) 963-7817 so.
Dimension-80 Orange, CA .... (714) 974-9788
GREENE MACHINE Riverside, CA .... (714) 354-8004
GREENE MACHINE Santa Ana, CA .... 1(714) 836-5627
GREENE MACHINE Sunnymead, CA .... (714) 924-2229*
Growth Net Riverside, CA .... (714) 359-1586
NET-WORKS Pirate's Board, Buena Park, CA .... 1(714) 523-5165
NET-WORKS The Incubus, Orange, CA .... 1(714) 998-2049
OCTUG Orange County, Garden Grove, CA .... (714) 530-8226
Orange County Dta Exchange, Garden Grove, CA .... (714) 537-7913
PMS - **IF**, Anaheim, CA .... (714) 772-8868*
RBBS IBM PC Anaheim, CA .... 1(714) 995-2428*
RBBS IBM PC Capital, Orange, CA .... 1(714) 771-1451
RBBS IBM PC Huntington Beach, CA .... &1(714) 842-6348
RBBS IBM PC Newport Beach, CA .... 1&(714) 673-4040
RBBS IBM PC Orange County, CA .... &(714) 631-4021*
RBBS IBM PC Technical, Westminster, CA .... 1(714) 898-8634*
RBBS IBM PC Temecula, CA .... (714) 676-3378*
RBBS IBM PC Temecula, CA .... &(714) 676-5856*
RBBS Upland, CA .... (714) 981-3787*dl.
RCP/M CBBS ANAHUG, Anaheim, CA .... &(714) 774-7860*
RCP/M CBBS N.O.C. Comp. Club, Orange, CA .... 1&(714) 961-1135
RCP/M MV-HUG, Mission Viejo, CA .... (714) 495-9384–
RCP/M RBBS EPSON, Placentia, CA <pw=Amber> .... 1(714) 630-7104*
RCP/M RBBS GFRN Dta Exch. Garden Grove, CA .... S&(714) 534-1547*
RCP/M RBBS San Dimas, CA .... &(714) 599-2109*
RCP/M RBBS San Dimas, CA .... 1(714) 599-1547+
TRS-80 UG, Orange, CA .... 1(714) 826-7383
The Palace Hotel BBS CA .... 1(714) 824-2129*
VERGA 80, Santa Ana, CA .... (714) 547-6220

715

TBBS Wausau, WI .... (715) 848-3415

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CBBS RAMS, Rochester, NY . . . . (716) 244-9531
CBBS Sparrow, Fairport, NY . . . . &(716) 377-1113*
RBBS IBM PC Buffalo, NY . . . . (716) 836-6964–
RCP/M RBBS Rochester, NY . . . . S&I (716) 323-1214*

717

CAPATUG Camp Hill, PA . . . . (717) 774-6543
DIAL-YOUR-MATCH #42 Harrisburg, PA . . . . (717) 657-4997 so.
RBBS IBM PC Lancaster, PA . . . . &(717) 299-3124– *we

801

Commodore Central Holladay, UT . . . . (801) 277-3913

802

ABBS Vermont, Essex Junction, VT . . . . (802) 879-4981*

803

FORUM-80 Augusta, GA . . . . (803) 279-5392
RBBS IBM PC Fort Mill, SC . . . . (803) 548-0900*
Summerville/80 Sommerville, SC . . . . (803) 873-8544

804

Atari BBS, Virginia Beach, VA . . . . (804) 491-1437*
BBS Coco, Lynchburg, VA . . . . (804) 525-0312
NBBS Norfolk, VA . . . . (804) 444-3392
NET-WORKS T.A.W.B.B.S. Tidewater, VA . . . . (804) 543-7194
RBBS IBM PC Virginia Beach, VA . . . . &(804) 481-1824*
RCP/M Oxgate 007, Grafton, VA . . . . (804) 898-7493*
Remote Northstar, Virginia Beach, VA . . . . (804) 340-5246
Talk-80 ROBB, Portsmouth, VA . . . . (804) 393-2925

805

BBS Coco, Santa Barbara, CA . . . . (805) 687-9400
DIAL-YOUR-MATCH #48 Westlake Village, CA . . . . (805) 497-1158 so.
NET-WORKS Pacific, Oxnard, CA . . . . I (805) 985-2591–
RBBS IBM PC KERNCOM, Bakersfield, CA . . . . &I (805) 833-0359*dl.
RCP/M RBBS Gil Berry, Simi Valley, CA . . . . I (805) 527-8668*
RCP/M RBBS LOBO MAX-80, Goleta, CA . . . . I (805) 964-6626*
RCP/M SIMIAPPLE, Simi Valley, CA . . . . I (805) 584-6054–
RCP/M Simi Valley, CA . . . . (805) 527-2219–
RCP/M Technical #2, Thousand Oaks, CA . . . . I (805) 493-1495*
RCP/M Technical, Thousand Oaks, CA . . . . #1&(805) 492-5472*
Remote Northstar, Santa Barbara, CA . . . . (805) 964-4115

806

RBBS IBM PC Amarillo, TX . . . . (806) 353-7484–

808

CBBS Heath Store, Honolulu, HI . . . . &(808) 487-8755
CBBS Strictly Software, Honolulu, HI . . . . (808) 944-0562
CONFERENCE-TREE Computerland, Honolulu, HI . . . . (808) 487-2001*

808 (Cont'd)

FIDO #7, Strictly Software, Waimea, HI .... &(808) 338-1277*
NET-WORKS Computer Market, Honolulu, HI .... (808) 524-6668–
NET-WORKS Hawaii Connection, Honolulu, HI .... (808) 456-8689*
NET-WORKS Honolulu, HI .... (808) 524-6652
NET-WORKS Memory Lane, Honolulu, HI .... (808) 526-0719*
NET-WORKS Pearl City Network, Honolulu, HI .... (808) 456-3745*
RCP/M RBBS Honolulu, HI .... I (808) 422-8406*
RCP/M RBBS Kauai, Lihue, HI .... I (808) 245-2080*

809

BBS Commodore, San Juan, PR .... (809) 781-0350–

812

RCP/M RBBS Bloomington, IN .... I (812) 334-0609*

813

ACCESS-80, Tampa, FL .... (813) 884-1506*
Alpha Tampa, FL .... (813) 969-0512
BSBB Tampa, FL .... (813) 885-6187
CBBS St. Petersburg, FL .... (813) 866-9945*
Lee County Jail, Ft. Myers, FL .... I (813) 489-0840
Micro Informer, Tampa, FL .... (813) 875-3331
PET BBS Commodore, Largo, FL .... (813) 391-5219+
RBBS IBM PC Tampa, FL .... &(813) 887-3984*
RCP/M RBBS Tampa, FL .... (813) 831-7276
RCP/M Tampa Bay Bandit Board, Tampa, FL .... I (813) 937-3608*
RCP/M Tampa Technical, Tampa, FL .... I (813) 254-4637*

814

RCP/M CUG-NODE, PA State College, PA .... (814) 238-4857*

815

MCMS J.A.M.S. Lockport, IL .... (815) 838-1020*
MODEM MEDIUM Flynn's Game Sys., Rockford, IL .... I (815) 455-2406*

816

BBS Atari AMIS, Kansas City, MO .... (816) 587-9543*
FORUM-80 Kansas City, MO .... &(816) 931-9316
KAY-PER NET MO .... &(816) 734-2717* S
NET-WORKS ABC, Kansas City, MO .... (816) 483-2526
PMS - Apple Bits UG, Kansas City, MO .... I (816) 523-0304

817

COMNET-80 Wichita Falls, TX .... (817) 767-5847
CONNECTION-80 Waco, TX .... (817) 754-1568
RCP/M Ft. Worth-Metroplex KUG, Arlington, TX .... I (817) 467-5110–
RCP/M RBBS Copperas Cove, TX .... I (817) 547-8890*
Rebels Outpost BBS .... I (817) 536-4977
Telcom I/II, Arlington, TX .... (817) 265-8220*

818

BBS IBM PC San Fernando, CA . . . . (818) 368-5801*
DIAL-YOUR-MATCH #01 Burbank, CA . . . . (818) 842-3322 so.
DIAL-YOUR-MATCH #04 Sherman Oaks, CA . . . . (818) 783-2305 so.
DIAL-YOUR-MATCH #07 Burbank, CA . . . . (818) 840-8252 so.
DIAL-YOUR-MATCH #25 Burbank, CA . . . . (818) 842-9452 so.
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DIAL-YOUR-MATCH #51 La Canada, CA . . . . (818) 790-2114 so.
DIAL-YOUR-MATCH #52 Rosemead, CA . . . . (818) 280-8388 so.
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HBBS MOG-UR, Granada Hills, CA . . . . &(818) 366-1238*
Hock Shop, CA . . . . (818) 906-1784
Lemur Connection, CA . . . . (818) 986-8161
Lynzie's Motherboard Los Angeles, CA . . . . (818) 980-6482
NET-WORKS Coin Games, Los Angeles, CA . . . . (818) 336-5535
Novation CO., Los Angeles, CA <pw = CAT> . . . . (818) 881-6880
Oracle North Hollywood, CA . . . . (818) 980-5643 so.
PMS - Los Angeles, CA . . . . (818) 331-3574*
PMS - O.A.C., Woodland Hills, CA . . . . (818) 346-1849
RBBS LA Morrow UG, Calabasas, CA . . . . &(818) 340-9947– *we
RBBS Woolf Software, N. Hollywood, CA . . . . &(818) 704-1871*
RCP/M CBBS Pasadena, CA . . . . (818) 799-1632*
RCP/M Granada Hills, CA . . . . (818) 360-5053*
RCP/M RBBS Altadena, CA . . . . &(818) 798-9673*
RCP/M RBBS Glendale, CA . . . . I(818) 957-5195–
RCP/M RBBS Glendale, CA . . . . I(818) 659-6164*
RCP/M RBBS K-NET Woodland Hills, CA . . . . &(818) 883-8446* rest
RCP/M RBBS La Canada, CA . . . . &(818) 790-3014*
RCP/M RBBS La Canada, CA . . . . I(818) 790-1871*
RCP/M RBBS Litearia Glendale, CA . . . . &(818) 956-6164*
RCP/M RBBS North Hollywood, CA . . . . (818) 509-8599– *we
RCP/M RBBS Northridge, CA . . . . &(818) 708-3284*
RCP/M RBBS Pasadena, CA . . . . S(818) 577-9947*
RCP/M Xanadu, CA . . . . I(818) 906-1636*
Space Age BBS, CA . . . . (818) 782-6031
TRS-80 Country Exchange, Reseda, CA . . . . I(818) 996-1977 +
The Enterprise, Arcadia, CA . . . . I(818) 355-0439–

901

BBS Memphis, TN . . . . (901) 358-8227
FORUM-80 Medical, Memphis, TN . . . . (901) 276-8196*
On Line 80 Memphis, TN . . . . #1(901) 761-5018

901

Access Jax Jacksonville, FL . . . . (904) 399-1926
COLOUR-80, Orange Park, FL . . . . (904) 264-0335*
CONNECTION-80 JACS, Jacksonville, FL . . . . (904) 353-5227*
PMS - SEB Computer, Jacksonville, FL . . . . (904) 743-7050–
RCP/M RBBS JUG, Jacksonville, FL . . . . S(904) 725-4995*

907

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Abacus-by-Phone Anchorage, AK .... (907) 278-4223* S
PMS - Anchorage, AK .... (907) 344-8558
RCP/M Anchorage, AK .... I (907) 349-7996*
RCP/M Anchorage, AK .... (907) 337-1984—
RCP/M RBBS Anchorage, AK .... (907) 349-6882

912

RCP/M Acropolis BBS, Warner Robins, GA .... I (912) 929-8728*
TRADE-80 Albany, GA .... (912) 439-7440*

913

BBS IBM PC Lawrence, KS <pw = Customer> .... I (913) 842-5749*
Experimental-80 Kansas City, MO .... (913) 676-3613
ONLINE Dickinsons Movie Guide, Mission, KS .... (913) 432-5544*
PMS - Apple Bits, Kansas City, MO .... (913) 341-3502
RBBS IBM PC Lawrence, KS .... (913) 841-5220—
RBBS IBM PC Lawrence, KS .... (913) 841-6424*
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RCP/M Mission, KA .... &(913) 362-9583*
RCP/M RBBS AlphaNet, Lawrence, KA .... (913) 843-4259—
RCP/M RBBS Ft. Leavenworth, KS .... I (913) 682-3328*
Steve's BBS/Game Palace, Shawnee Mission, KS .... (913) 648-5301*

914

BBS IBM PC Hopewell Jct., NY .... (914) 221-2248*
BBS IBM PC Poughkeepsie, NY .... (914) 297-0665*dd.
NET-WORKS Pirate's Lodge, New City, NY .... (914) 634-1268
RBBS IBM PC Hopewell Junction, NY .... (914) 221-0774*
RBBS IBM PC South Nyack, NY .... &(914) 358-8879*
RCP/M RBBS S.D.V. Downstate NY .... &(914) 769-2970*
RCP/M RBBS Woodstock, NY .... &(914) 679-8734*
RCP/M SJBBS Bearsville, NY .... (914) 679-6559*rb.
ST80-PBB Monroe Camera Shop, Monroe, NY .... (914) 782-7605—

915

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FORUM-80 El Paso, TX .... (915) 755-1000*
RCP/M RBBS SENECA, El Paso, TX .... &(915) 598-1668*

916

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BULLET-80 Sacramento, CA .... &(916) 971-1395*
RBBS IBM PC Sacramento, CA .... (916) 922-7484*
RCP/M CBBS Sacramento, CA .... I (916) 483-8718*
RCP/M Orangevale, CA .... &(916) 988-2660*

918

BBS IBM PC Tulsa Computer Soc., Tulsa, OK .... (918) 446-5219*
BBS IBM PC Tulsa Info. Exchange, Tulsa, OK .... (918) 438-3363*
BULLET-80 Tulsa, OK .... (918) 749-0059*

918 (Cont'd)

INFOEX-80 Tulsa, OK .... (918) 838-8698*
RBBS IBM PC Tulsa, OK .... (918) 749-0718*
RBBS IBM PC Tulsa, OK ....&(918) 664-8737*
TBBS Tulsa, OK .... (918) 749-0059*

919

BBS IBM Hostcomm Raleigh, NC <pw=IBMPC> .... (919) 847-4625*
BBS Woodworks, Winston-Salem, NC ....&(919) 723-5275*dd.
DIAL-YOUR-MATCH #20 Cary, NC .... (919) 362-0676 so.
SangerNet Greenville, NC .... (919) 758-5261
TBBS Jacksonville, NC .... (919) 353-0610

Overseas

CBBS London, England (European standard) .... (044) 1-399-2136
FORUM-80 Hull, England .... (044) 4-828-59169
RCP/M CBBS MICOM, Melbourne, VIC, Australia 61-03-762-5088*
RCP/M Software Tools, Sydney, Australia 61-02-997-1018*

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(201) 527-0830
(800) 345-1301 US

**General Electric Information
    Services**
401 N. Washington Street
Rockville, Maryland 20850
(301) 340-4000

**GTE Telenet Medical Information
    Network**
8229 Boone Blvd.
Vienna, Virginia 22180
(703) 442-1000

**Chase Econometrics/Interactive
    Data Corp.**
150 Monument Road
Bala Cynwyd, Pennsylvania 19004
(215) 667-6000

Consumer Information Utilities

Source Telecomputing Corp.
1616 Anderson Road
McLean, Virginia 22102
(703) 734-7500
(800) 336-3366

**Dow Jones News Retrieval
Service, Inc.**
P.O. Box 300
Princeton, New Jersey 08450
(609) 452-2000
(800) 257-5114
(800) 222-0081

CompuServe Inc.
5000 Arlington Centre Boulevard
Columbus, Ohio 43220
(614) 457-8600
(800) 848-8990

**Knowledge Index
Dialog Information Systems, Inc.**
3460 Hillside Avenue
Palo Alto, California 94304
(415) 858-2700
(800) 227-1927 US
(800) 982-5838 CA

**BRS/After Dark
Bibliographic Retrieval Service, Inc.**
1200 Route 7
Latham, New York 12110
(800) 833-4707 US
(518) 783-1161

**Delphi
General Videotex Corp.**
3 Blackstone Street
Cambridge, Massachusetts 02139
(800) 544-4005 US
(617) 491-3393

Value Added Networks

Tymnet
20665 Valley Green Drive
Cupertino, California 95014
(408) 946-4900
Cust. Svc. (800) 336-0149

GTE Telenet
8229 Boone Blvd.
Vienna, Virginia 22180
(703) 442-1000
Cust. Svc. (800) 356-0437 US except VA, AK, HI
          (800) 572-0408 VA
          (703) 893-6026 elsewhere

Uninet
10951 Lakeview Avenue
Lenexa, Kansas 66219
(913) 541-4400
Cust. Svc. (800) 821-5340 US except MO, AK, HI
          (800) 892-5915 MO
          (816) 221-2444 elsewhere

Electronic Mail Services

This appendix provides information on the major electronic mail services and on some of the specialized EMAIL communications software packages available.

ELECTRONIC MAIL SERVICES

Graphnet, Inc.
329 Alfred Avenue
Teaneck, New Jersey 07666
(800) 631-1581
(800) 932-0848 in New Jersey

SpeediTelex International
3400 Peachtree Road NE
Atlanta, Georgia 30320
(800) 241-1913

Comet
Computer Corporation of America
675 Massachusetts Avenue
Cambridge, Massachusetts 02139
(617) 492-8860

ITT Dialcom
1109 Spring Street, Suite 410
Silver Spring, Maryland 20910
(301) 588-1572

Telemail
GTE Telenet
8229 Boone Blvd.
Vienna, Virginia 22180
(703) 442-1000
(703) 827-9565
(800) 336-0437 outside VA CS
(800) 572-0408 VA CS

SourceMail
The Source
1616 Anderson Road
McLean, Virginia 22102
(703) 734-7500
(800) 336-3366 mktg

ITT World Communications
100 Plaza Drive
Secaucus, New Jersey 07096
(800) 424-1170

RCA Global Communications
60 Broad Street
New York, New York 10004
(212) 806-7000
(800) 526-3969

MCI Mail
2000 M Street NW
Washington, D.C. 20036
(202) 293-4255
(800) 624-2255

Western Union Telegraph
Company
One Lake Street
Upper Saddle River, New Jersey 07458
(201) 825-5000
(800) 982-2737

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OnTyme II
Tymnet, Inc.
20665 Valley Green Drive
Cupertino, California 95014
(408) 446-7000
(800) 336-0149 outside CA CS

EMAIL/INFOPLEX
CompuServe Information Service
5000 Arlington Centre Blvd.
P.O. Box 20212
Columbus, Ohio 43220
(614) 457-8600
(800) 848-8990

Delphi
General Videotex Corp.
3 Blackstone Street
Cambridge, Massachusetts 02139
(617) 491-3393
(800) 544-4005 US

Western Union Electronic Mail,
   Inc.
1651 Old Meadow Road
McLean, Virginia 22102
(703) 448-9600
(800) 572-2127 in VA
(800) 336-3337 US

Quik Comm
General Electric Information
   Services
401 N. Washington Street
Rockville, Maryland 20850
(304) 340-4000

EMAIL COMMUNICATIONS SOFTWARE

Micro TLX $150
Micro EZ LNK $150
Advanced Micro Techniques
1291 E. Hillsdale Blvd., Suite 209
Foster City, CA 94404
(415) 349-9336

CP/M, MS-DOS, PC-DOS
WU EasyLink Access

Gram-A-Syst for WU EasyLink $250
TLX-A-Syst for ITT Timetran $250
American International
   Communications Corp.
4745 Walnut St.
Boulder, CO 80301
(303) 444-6675

CP/M, MS-DOS, PC-DOS

Postman $50
Sidney Dataproducts, Inc.
315 Laurel Street
San Diego, CA 92101
(619) 231-1775

IBM PC or compatible
WU Electronic Mail Access

MAIL-COM $195
Digisoft Computers, Inc.
1501 Third Avenue
New York, NY 10028
(212) 734-3875

CP/M, MS-DOS, PC-DOS
Certified Direct E-COM Access

Letter Express
Software Marketing Group
6308 Troost
Kansas City, MO 64131
(913) 791-2720

CP/M, MS-DOS, PC-DOS
Certified Direct E-COM Access

Intelligent Modems

IBM PCjr. Internal 300 baud Modem
IBM
Entry Systems Division

Smartmodem 300/1200
Hayes Microcomputer Products
5923 Peachtree Industrial Road
Norcross, GA 30092

SmartCat 300/1200
Novation
20409 Prairie St.
Chatsworth, CA 91311

Password
U.S. Robotics
1123 W. Washington
Chicago, IL 60607

Racal-Vadic
222 Caspian Drive
Sunnyvale, CA 94086

Era 2
Microcom
1400A Providence Hwy.
Norwood, MA 02062

Infomate 212A
Cermetek
1308 Borregas Avenue
Sunnyvale, CA 94086

Universal Data Systems
5000 Bradford Drive
Huntsville, AL 35804

Bizcomp
P.O. Box 7498
Menlo Park, CA 94025

Multi-Tech Systems
82 Second Ave. S.E.
New Brighton, MN 55112

SSM/Transend Corp.
2190 Paragon Drive
San Jose, CA 95131

Ven-Tel
1390 Walsh Avenue
Santa Clara, CA 95051

Public Domain & User-Supported Software

PC-TALK III $35 Donation
The Headlands Press
P.O. Box 862
Tiburon, CA 94920

PC-Dial (formerly 1 Ringy Dingy - 1RD)
OPTIONAL $25 Donation
Enclose Blank Formatted Diskette
Jim Button
P.O. Box 5786
Bellevue, WA 98006

MODEM7-PCjr
David Carroll
P.O. Box 699
PINE GROVE, CA 95665
$10 plus blank formatted disk & mailer or $15.00

Commercial Communications Software Vendors

Personal Communications Manager $100
IBM Entry Systems Division
P.O. Box 1328 S
Boca Raton, FL 33432

Crosstalk XVI for PCjr $195 V 3.50 and
 later
Microstuf
1000 Holcomb Woods Parkway Suite 440
Rosewell, GA 30076
(404) 998-7798

MITE/MS $195 V 2.7 and later
Mycroft Labs
P.O. Box 6045
Tallahassee, FL 32314
(904) 385-1141

Envoy-PC/PCjr $49.95
Artisoft
2450 E. Speedway #4
Tucson, AZ 85719
(602) 327-4305

ASCOM-86 $175
Westico
25 Van Zant Street
Norwalk, CT 06855
(203) 853-6880

ERA 2 — PCjr $499 (inc. modem)
Microcom
1400A Providence Hwy.
Norwood, MA 02062
(617) 762-9310

PC Professional Connection
w/Vidtex V 2.2 for PC & PCjr $89.95
CompuServe
5000 Arlington Centre Blvd. —
    P.O. Box 20212
Columbus, OH 43220
(614) 457-8600

MCI Mail Access — PC & PCjr $49.95
MCI MAIL
2000 M Street NW
Washington, D.C. 20036
(800) MCI-2255

Bibliography

Directory of Online Databases
Cuadra Associates
2001 Wilshire Blvd. Suite 305
Santa Monica, CA 90403
(213) 829-9972
$75/year (2 directories & 2 updates)

Directory of Online Information Resources, 11th ed., 185 pp.
CSG Press
11301 Rockville Pike
Kensington, MD 20895
(301) 881-9400
$22.50 ea. or 2 yrs. (4 issues) for $60.00

Information Industry Marketplace
R.R. Bowker
New York, NY
$39.95

Omni Online Database Directory
By Mike Edelhart and Owen Davies
Collier Books — Macmillan Publishing
    Co., 1983, 292 pp.
$10.95

The Computer Phone Book
By Mike Cane
Plume Books — New American Library,
    Nov. 1983, 451 pp.
Lists and describes over 400 BBS and
    other Online services, but 25% are out
    of date.
$9.95

The Computer Phone Book Update
By Mike Cane
175 Fifth Avenue, Suite 3371
New York, NY 10010
$20.00 per year

OLCTD — On-Line Computer Telephone Directory — 650+ CBBS Systems
J. A. Cambron Company, Inc.
P.O. Box 10005
Kansas City, MO 64111
(816) 756-1847
Now Online Only — See Below ($3/
    quarter reg. fee) and on NewsNet

Other Networks Newsletter
P.O. Box 14066
Philadelphia, PA 19123
$1.00 and a large SASE

BBS Directory of North America — Lists over 1200 BBSs — Excellent
P.O. Box 4150
Beach Station
Vero Beach, FL 32964
$5.95 ea.

Bulletin-Baud Directory — Lists · 1756 BBSs
Ed Gelb's Data Base System
92 Hemlock Terrace
Wayne Township, NJ 07470
$20.00 per year (4 issues), $6.95 ea.

MODEM NOTES

P.O. Box 408472
Chicago, IL 60640
(312) 764-7407
(No listings but an interesting
  newsletter.)
$3.50 ea. — 12 issues for $24.00

BBS Listing — 200+ numbers

Soft Designs
609 Brookview Drive
Chapel Hill, NC 27514
$5.00 ea.

IBM PC RBBS LIST 260+ Systems

W.H.M.C.
P.O. Box 720966
Houston, TX 77272
$1.00 and a SASE

BBS List Update — Over 1000 Listings

David Carroll
P.O. Box 699
Pine Grove, CA 95665
$6.50 ea.

Micro Communications Magazine

500 Howard Street
San Francisco, CA 94105
$22.00 per 12 issues

Link-Up Magazine

3938 Meadowbrook Rd.
Minneapolis, MN 55246
$23.95 per 12 issues

Online Sources

BBS listings are usually available on most BBS systems, but the most complete and current online BBS Lists are available from the following NON-SUBSCRIPTION PUBLIC BBS systems:

Bill Blue's P.A.M.S. List, over 950 systems and over 71,000 bytes available on the Santee, CA Public Access Message System Spooler at (619) 561-8946; ID: pams; PW: pams. Last Update 9/16/84.
  Also on: The Source PUBLIC 112; CompuServe MAUG XA4; Delphi Informania.

Ed Gelb's Data Base System <1700+ numbers>	NJ (201) 694-7425
The Fargo Board PCUG — RBBS-PC List	Fargo, ND (701) 293-5973
Kim Levitt's MBBS RCP/M <RCPM-0XX.LST> (registration required)	CA (213) 653-6398
Message System List OLCTD-BIE (Also on NewsNet) 650+ numbers	Kansas City, MO (619) 649-1207
Kingcomm — WHMC RBBS-PC List	Kingwood, TX (713) 360-1316
Aircomm — RBBS-PC list	Concord, CA (415) 689-2090
High Sierra RBBS/RCP/M Over 1000 listings	CA (209) 296-3534
IBM PC BBS List — David Grossman's RBBS-PC	NY (212) 975-0046
Computerland of Salina RBBS	Salina, KS (913) 827-3310

PC-TALK III Corrections for PCjr

The PC-TALK III program works in terminal mode with the PCjr, but some modifications are necessary to allow it to work in file transfer mode.

This BASIC merge file and its documentation was written by Michael Ergoff and is reprinted here with his permission.

PCT3JR.DOC
PCT3JR.MRG

03/11/84 by MICHAEL EORGOFF Copyright 1984

PCTJR.MRG is a "merge" file for PC-TALK-III. It corrects the activities of the ALT-R (receive file) and ALT-S (print screen) in the PCjr environment. The PCjr turns off and ignores all other interrupts when it is time to do a disk access. For the ALT-R function without any modifiers (i.e. =X), XOFF is sent to the remote computer whenever it is desirable for the PCjr to access the disk drive. The loop in lines 64060-64080 is used to wait for incoming communications activity to stop. All input from the COM buffers is put into intermediate buffers until there is no more data, then the intermediate buffers are written to disk. After the intermediate buffers are written, an XON is sent to the remote computer. Closing the file is nested in a check for non-empty intermediate buffers that must be written before the file is actually closed.

The choice of five buffers for intermediate buffering was made by trial, error, and esthetics. The first reason for multiple buffers is some transmitting programs are slow to react to the XOFF request. PC-TALK is one of these programs. Also, at 1200 baud, there can be an appreciable amount of data in transit in the data network being used. Even though the XOFF has been sent, by your program, the remote computer may not immediately respond. Thus, the communications buffer will not be empty and you must empty it into multiple buffers. The XOFF may be slow in being transmitted by PC-TALK. It appears that IBM BASIC handles all the incoming data before sending the outgoing data on the serial ports. An esthetic consideration was also one of performance. The screen display gets very choppy when a small number of buffers is used. The amount of time overhead needed to wait out the incoming data and the actual disk access time appear to require that more buffering be supplied so that the communications function doesn't appear to be unreasonably slowed down.

The ALT-S (screen dump) is set up with an XOFF-XON pair during the entire duration of its activity to prevent lost characters from the host.

Type in the following BASIC merge program and save it to disk, then load PC-TALK III and merge this program into it.

```
110 CLOSE:DEFINT A-Z:OPTION BASE 1:ON ERROR GOTO 9000:GOSUB
    64010
605 IF LOF(1)<128 THEN GOSUB 64030
635 IF RC THEN GOSUB 64200
720 IF PSE THEN GOSUB 64100
2705 GOSUB 64320:IF RC THEN F2NAME$=RCV$:GOSUB 64360
2710 GOSUB 64100:RETURN
3450 GOSUB 2715:GOSUB 2800:GOSUB 64100:GOTO 515
3595 IF EX=19 THEN GOSUB 64320:F2NAME$=FIL$:GOSUB 64360:ELSE
    CLOSE #3:OPEN FIL$ FOR INPUT AS #3
3810 SOUND 440,2:GOSUB 64320:F2NAME$*DUMP$:GOSUB 64360:MSG$="
    APPENDING TO "+DUMP$+" AT "+TIME$:GOSUB 2600
3820 SOUND 660,2:BEEP:GOSUB 2705:GOSUB 2800:GOSUB 64100:LOCATE
    ROW, COL:GOTO 515
5415 DATA"STRIP #1",0,REPLACE #1,0,"STRIP #2",0,REPLACE
    #2,0,"STRIP #3",0,REPLACE #3,0,PACING P=,,LOGGED
    DRIVE,"A:",MARGIN WIDTH,70
5420 DATA SCREENDUMP FILE,"A:SCRNDUMP.PCT",REDIAL
    DELAY,20,CONNECT PROMPT,CONNECT
64000 '
64010 DIM F2BUF$(5):GOSUB 64150:DPSE=0:RETURN
64020 '
64030 IF PSE THEN RETURN
64040 PRINT #1,XF$;:PSE=-1:RETURN
64050 DPSE=-1:GOSUB 64030 'SET DISK PAUSE, XOFF
64060 GOSUB 64080:IF COFF THEN RETURN ELSE GOTO 64060
64070 '   WAIT FOR MORE CHARS TO COME IN
64080 COMFRE=LOF(1):SOUND 32767,5:SOUND 32767,1:IF
    COMFRE<>LOF(1) THEN COFF=0:RETURN ELSE COFF=-1:RETURN
64090 '
64100 IF NOT PSE THEN RETURN
64110 IF NOT EOF(1) THEN RETURN ELSE IF DPSE THEN GOTO 64230
64120 PSE=0:PRINT #1,XN$;:RETURN
64130 IF NOT PSE THEN RETURN ELSE GOSUB 64120:RETURN
64140 '
64150 F2BUF$(1)="":F2BUF$(2)="":F2BUF$(3)="":F2BUF$(4)="":
    F2BIU=1:F2IO=0:RETURN
64160 '
64170 'ROUTINE TO UP BUFFER AND DECIDE IF TIME TO XOFF
64180 F2BIU=F2BIU+1:IF F2BIU<3 THEN RETURN ELSE GOSUB
    64030:DPSE=-1:F2IO=-1:RETURN
64190 'ROUTINES TO PACK UP BUFFERS FOR WRITING TO FILE #2
64200 F2BL=(255-LEN(F2BUF$(F2BIU))):IF F2BL=0 THEN GOSUB
    64180:F2BL=255
64210 IF F2BL>=LEN(A$) THEN F2BUF$(F2BIU)=F2BUF$(F2BIU)+A$:GOTO
    64230
64220 F2BUF$(F2BIU)=F2BUF$(F2BIU)+LEFT$(A$,F2BL):GOSUB
    64180:F2BUF$(F2BIU)=MID$(A$,F2BL+1)
64230 'CHECK IF OK TO WRITE TO DISK
64240 IF NOT DPSE THEN RETURN
64250 IF NOT EOF(1) THEN RETURN
64260 GOSUB 64080:IF NOT COFF THEN RETURN ELSE IF LOC(1) THEN
    RETURN
64270 'WRITE BUFFERS FOR FILE #2
```

```
64280 GOSUB 64290:GOSUB 64150:DPSE=0:GOSUB 64100:RETURN
64290 FOR F2BI=1 TO F2BIU:PRINT #2,F2BUF$(F2BI);:NEXT:RETURN
64300 'CLOSE #2
64310 IF (0=LEN(F2BUF$(1))) THEN RETURN ELSE GOSUB 64290:RETURN
64320 GOSUB 64050:GOSUB 64310:GOSUB 64330:GOTO 64370
64330 CLOSE #2:F2NAME$="":DPSE=0:RETURN
64340 'OPEN FILE #2
64350 OPEN F2NAME$ AS #2:GOTO 64370
64360 OPEN F2NAME$ FOR APPEND AS #2: GOTO 64370
64370 GOSUB 64150:RETURN
64380 'END OF PCT3JR.MRG
```

INDEX

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About the Author

David W. Carroll is well-known in the world of computer writing. He brings to *Telecommunications with the IBM PCjr* the experience gained from many years of telecommunications consulting for corporations such as Litton Communications, General Dynamics, and California Microwave. His computer articles have appeared in *Dr. Dobbs Journal, Microsystems,* and *Business Computer Systems,* and he is Editor of *Absolute Reference Newsletter.* Mr. Carroll's other books include *Multiplan for the Commodore 64,* and *Programming with Turbo Pascal.*

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