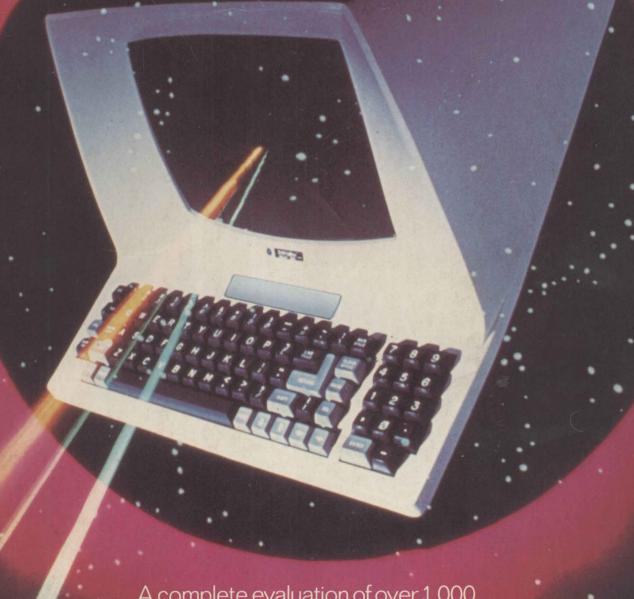# OMNI
ONLINE DATABASE
DIRECTORY

Mike Edelhart and Owen Davies

A complete evaluation of over 1,000
databases available through your personal computer
Uses, content, providers, and addresses

ONLINE DATABASE DIRECTORY

Mike Edelhart and Owen Davies

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What Is a Database?

In theory, it's simple: A database is nothing more than an organized collection of facts in computer-readable form. It may deal with any subject and may be arranged in any form. A list of recipes is a database. The instructions for creating a computer program to analyze financial statistics are also a database. The text of Dickens' *Tale of Two Cities* is a database, as are the names and pictures of all the world's known chemical compounds. Databases can be big or small, can consist of words or numbers, bibliographic citations or texts, or any combination of them. They can be complicated or very simple.

In practice, databases are a revolution in our ability to store and use information that may easily rival the impact of the printing press. This new, electronic library can be consulted instantaneously by anyone with a home computer or terminal and a modem to connect them to the telephone. To see what this means, look at the traditional way of locating facts:

Somewhere within its stately marble confines, Manhattan's cavernous New York Public Library contains virtually any fact a person could ever need. Up the long stairs and to the left stands the catalog room, which can lead you to anything the library contains. Further down the hall is the humanities file. Maps and historical documents can be found in the room around the corner. Other rooms contain scientific and technological books and magazines, reference materials in foreign languages, and books about business and finance. Hardly a single subject that has ever occupied human thought has been left out.

But try to use this impressive array of information: Start by taking a cab or bus to midtown Manhattan—a plane if you're from out of town. Then, hike up and down those lovely, daunting marble stairs for hour after hour. Often you search through the vast card catalog and trudge to a reading room only to find that someone else has checked out what you need, or that it has been lost or vandalized. In all, to search through the New York Public, or any large library, for information can be a heartbreaking lesson in frustration.

The library is the traditional repository of human knowledge. Here, in one huge center, are kept the books, journals, and manuscripts that record the achievements of our species, to be shared by anyone with the urge to learn. The library was one of the greatest ideas in the development of civilization; it has served humanity well. But it's an old idea, inefficient, limited, and needlessly expensive.

Now, let's imagine the New York Public Library in a different form. In this new library, you can share information just as you did in the big, old building with the lions on the stairs. But you never have to leave your desk. Books and magazines can never get lost, and you never have to wait for anyone else to finish with a reference source before you can use it; a thousand people can read one book at the same time. You don't even have to leaf through the card catalog or periodical indexes. This library comes equipped with an untiring librarian who will make your searches for you—at incredible speeds—and will report the findings in any form you need.

The books and magazines of this new library are stored inside a computer. Instead of walking from room to room, you can zip electronically from file to file. Instead of leafing through cards or pages, you can scan the computer's contents at a rate of thousands of items per second. In the old library, you and the other users shared space—the rooms, seats, and tables of the building. Here, you and other users share not space, but resources and time. This compression brings new speed, accuracy, and convenience to our library, and it makes maintaining and using our library much less expensive than at the vast edifice in New York.

With this convenience comes a major change in our use of information. It is not just the kind of relief we find when we trade our old hand lawnmower for a riding model, not merely a chance to do the same old chores faster and more easily. Suddenly, almost any fact we could need is as near as our telephone. This difference, if we take advantage of it, can transform the kind and quality of information we use, not just the quantity. We need not guess how long it will take to fly to Akron, vaguely recall that the governor has changed his speeches—if not his policies—now that the election is near, or wonder whether doctors have made any progress against arthritis. We can know, for sure, in the time it takes to make a call and punch a few questions

into a terminal. And because of this, we can make all our decisions, guide our lives, with a certainty never before possible.

Databases are amazingly varied, but they do have some common features. Let's take the word, "database," apart and examine it:

Data. These resources contain facts, usually in large quantities. The word data implies that these are facts that people will want to use and that the collection is not static; data grows, changes, and is modified over time. And remember, it is not an "information base." Data is not information; it is the raw materials from which we build information. Data become information when we organize it to solve problems that confront us.

Base. Not a book or report or unit, but a base. A base is something you build upon, and databases, by and large, are information resources designed to get you started. They are places to begin an information hunt. The knowledge they contain, while vast, seldom can substitute for individual initiative. They can tell you who has done something before, but not necessarily how to do it yourself. They can show you what has been written, but not tell you what to write. Even instructions or recipes contained in databases can only give you the template to follow in your own work; they can't guarantee your labors will produce the results you want.

As a foundation, though, computerized databases are so much larger and more powerful than anything available before, that they make it incomparably easier to build tall, intricate information structures. The bigger the base, the more you can build. That is the key to the importance of databases.

Why a Database Revolution Now?

Why has the field of online information storage and retrieval become so important today? After all, computers have been around for decades and people have been storing all kinds of records in them since they were invented. Why the sudden insight that computer databases hold enormous importance for average citizens?

The most obvious reason is that people are so much more familiar with computers now than they were even a few years ago. Millions of homes and virtually every business have computers. Even the smallest libraries today have computer terminals. Some colleges are even requiring their students to own personal computers when they arrive at school. After a few months of playing games, many people are eager to find practical and exciting new uses for their computers. The incredible

promise of online databases makes them the most appealing new opportunity for small-computer owners.

People have also grown more comfortable with the idea of online information services. We have spent a generation watching our airline and hotel reservations made by computer terminals. Many of us have looked on as a librarian used a terminal to search distant libraries for a book we needed. The idea of locating information by computer is no longer intimidating. It represents a new way to control impersonal forces that influence our lives. If you make your own airline reservations on your own computer, you know you got the best flight, seat, and price you could. No one stands between you and the information.

A third reason for the explosion of interest in databases is their increasing number and the growing breadth of subjects they cover. In 1975, there were just over 300 computer databases available in the United States. Most of these were technical and specialized information resources of interest only to scientists or big businesses. By 1982, the number of word-oriented databases alone exceeded 775, with hundreds of number-centered bases besides. This year, more than 1,500 databases are open for business to any person with a computer or a terminal and a minimum of extra gear.

In 1975, some 50 million records were stored in computerized databases. Today, there are more than 300 million records in computer-readable form. And they are no longer limited to scientific data. Today's databases cover the arts, music, shopping, personal finance, food, taxes, farming—virtually every topic imaginable is covered by at least one database, usually by several.

The growing availability of databases, and computers to access them, has sent the number of people using them skyrocketing in the past couple of years. Excluding the specialized legal databases, which are among the most heavily used, the number of database searches has escalated from fewer than one million during 1975 to more than eight million in 1982. At the same time, the number of organizations putting their resources online—the database producers—and the number of companies making databases available to the public—known as online service vendors—have both increased dramatically. The entire field of computerized information banks is growing explosively and shows no signs of slowing.

Networks: The Ties That Bind

The concept of taking unrelated books from many sources and binding them together in an orderly, searchable manner is what gave libraries their importance. But within this format, libraries themselves vary widely. Some are general, some specific to a particular

field; some are skewed toward entertainment, others toward pure research. But all gather together elements from many sources to create an informational environment to help a particular kind of user.

In online information, a similar concept has proven crucial. Databases can be derived from many different sources. Some are computer-readable versions of established print references, such as *Who's Who*. Many are collections of abstracts and bibliographic citations from newspapers or magazines, or technical journals. Still others contain financial or economic data collected by specialist organizations—insurance statistics, metal prices, stock quotations, and such.

With so many kinds of information being generated by so many different kinds of organizations, online research could easily become far too difficult for anyone but a specialist. All this material must be collected in one place so that it is not necessary to deal with dozens of providers, each of whom supplies a database that might someday be useful. And the data must be organized in a comprehensible, library-like fashion so that we need not learn a different search procedure for every base we use.

Happily, a number of companies have taken on the task of gathering numerous databases into useful libraries. These organizations are called online service vendors. They are discussed in the chapter Major Online Vendors. For now, we want to look at how their work affects the way you can use computerized information.

The online service vendors have gathered varied collections of databases—DIALOG Information Systems, the largest, has more than 200 separate bases online—and placed them into powerful computers. Then they have created more-or-less uniform search procedures to make the data more accessible. And finally, many have made their data available over so-called packet-switching networks, or telecommunications utilities. These allow you to make a local telephone call and to be connected via leased telephone lines to the vendor's computers almost anywhere in the world.

Wherever you are you can share the information and computing power of the online vendor's big computer through networking. You share in the hardware that houses the data, the software that allows you to sift through the data, and the data itself. In some cases, you can even take software from one location, run it on a computer at a second site, and read the results on your computer or terminal at a third, thousands of miles away. In most cases, though, the online vendor provides the hardware, software, and information for his customers.

The computers of online service vendors have access numbers that are similar to your phone number. When you type in the computer's number, the telecom-munications utility will route your signal to the computer you want.

Telecommunications utilities will also connect you with the one other kind of online information provider—a full-service system. These companies take on the roles of both database producer and online service vendor. The best known of these are The Source and CompuServe, which are described more fully in separate chapters. They provide their subscribers with a home-oriented mix of informational databases, some of which they produce and others they get from outside, along with such interactive services as bulletin boards, electronic mail boxes, shopping services, classified and personal columns. Another kind of full-service system doesn't offer all these special options, but does serve as both the producer and the sole provider of its databases.

Databases: Many Forms and Functions

Whichever online-service "library" you decide to use, you will find that it contains many different kinds of database. Finding your way through the online service's catalog might be easier if we look over some of the different ways computer databases can be classified:

Data Type. Bases can be classified by the kind of information they contain, whether it is numbers or words, whether it is instructions or bibliographic references. Each type of data lends itself to a different use for the database. Bases in the same subject area may have different uses based upon the form of the data they contain.

Numeric databases often contain information in very raw form. Many, for example, supply records of stock transactions. Companies use these strings of numbers or equations with their own in-house formula to create a more organized structure of their own.

Representational databases contain information in the form of structural models, such as graphics of the shape of chemical compounds. To use them requires a graphics computer.

Alphanumeric bases have both text and numbers. Newspaper databases are alphanumeric. So are annual reports. Some alphanumeric bases contain the full text of material noted, others only a facsimile, condensation, or abstract of the included references. Most alphanumeric bases use some form of concentration of the original material.

Bibliographic databases make no attempt to give a sense of the original document. They simply note its

existence and the subject of its contents or other information of a purely research nature. Bibliographic databases can cover vast amounts of informational territory, but none of it very deeply.

Purpose. A second way to classify databases is by their purpose.

Reference databases are designed to point the way to some other source. They can contain bibliographic citations, lists of software that can be accessed elsewhere, or similar data. In any case, they simply point the way for further research.

Source databases provide everything the searcher is likely to need in one place. A full-text base of the *New York Times* is a source base. An econometric modeling program is another. Both provide all you are likely to need to accomplish the goal they address.

Goal. A third method of classifying databases is by their goal. Why was the base created, and who was it designed to serve? Different bases in the same subject area can have different goals.

Problem-oriented databases are designed to help users learn about a particular problem and solve it. Many environmental databases, for example, are aimed at helping users learn about pollution problems so that they can better cope with them or eliminate them.

Discipline-oriented databases are aimed at gathering any information in any field that will help achieve a specific long-range goal. The NASA database is mission-oriented; it contains information from dozens of fields, all united by the fact that it can help in space exploration.

Interdisciplinary and multidisciplinary databases work in more than one field. Interdisciplinary bases try to interrelate two fields; *Environmental Chemical Ab-stracts* is a good example. Multidisciplinary bases cover many different fields; *ISI Index*, a general-science base, and *NPIS*, a base looking at public-interest topics, are both examples of this type.

Information Segment. The most obvious way to classify databases is by the general informational segment they fall into. The most common breakdown of online information categories is:

Science and Technology;
Business and Finance;
Humanities;
General Information.

Many online services bundle their bases into categories such as these to give potential cutomers an idea of their coverage in different areas of knowledge.

You can use these different methods of classification in selecting which online service to use and which bases on that service to query for any given question. Begin with the information segments and look for a service that has many bases in those areas of greatest interest to you. Then, for each visit you make to the electronic library, use the other classifications to make your selection more precise: Are you trying to solve a problem? Are you interested in one field or in a question that goes beyond a single discipline? Does it touch on two fields or many? Is it related to a goal that a mission-oriented base might deal with best? Do you want to get directions for a hands-on library search, or do you want to find everything you need in one base?

By asking yourself questions like these, by becoming aware of the different kinds of database available and what each kind can do best, you'll be able to make the best possible use of the incredible informational resource that your computer has brought into your life.

Equipment for Life Online

One of the joys of online information services today is that using them takes little equipment and a relatively small investment. You don't even really need a computer—though, for many other reasons, it's useful to have one around. Here is all you need to tie into the emerging network of information online:

A Terminal (or Computer). Any device that can communicate with computers qualifies as a terminal. The most basic kind is no more than a typewriterlike keyboard that sends out a computer-readable signal each time you hit one of the keys. This type of terminal requires a video screen or printer to display any messages received from an online supplier's computer. Most terminals have a video screen of some kind built into them.

Terminal prices can vary from $150, for the simplest keyboard that works with a television, to more than $10,000 for extraordinary devices that can display color graphics with the clarity of a photograph. A typical terminal with a keyboard and video screen costs between $600 and $1,200. At the high end of this range, it is possible to buy portable terminals with a coupler to connect them to a telephone and a built-in printer instead of a screen.

Most terminals are designed according to very broad industry conventions, and online services have set up their systems to work with those parameters. This means that most terminals will work with most vendors. The criteria in buying a terminal, therefore, are matters of comfort and convenience. Is the keyboard comfortable to use? Is it laid out typewriter-fashion or as a standard ASCII terminal, or are the keys located in positions that you will have trouble getting used to? Is the screen bright and clear, with well-formed, readable characters? Try several models before you make your decision. You will probably spend many hours at the terminal, and a clumsy keyboard or blurry screen can turn an otherwise pleasant chore into misery.

Keep in mind that a few online services require you to purchase their dedicated terminal in order to receive their bases. Mead Data Central is the most significant of these because it produces Lexis and Nexis, including all of the *New York Times* databases—two of the larger, more desirable bases available. The Mead terminal is an excellent piece of equipment, and you can use it to access the DIALOG system as well as Mead, but it limits your future flexibility—which, of course, is just what Mead and other terminal-requiring services have in mind.

If you have a personal computer already, or want one, there is no reason to buy a special terminal for online use. Any computer can be programmed to operate as a terminal. The only requirement is that it have a place to connect a modem. This is the serial port, or "RS-232" port. Separate terminals also connect to a serial port; so do some printers. Unless your computer has a built-in keyboard, you will need at least two RS-232 ports.

These ports may be part of the basic computer, or they may come on an internal accessory known as a communications card. Not all computers have them as standard equipment—and salesmen often won't mention their absence if you don't ask about it. For instance, the Apple III and Osborne computers have communication cards built in. The IBM does not. A communications card can cost upward of $150, so make sure you consider the cost in comparing computers you might buy, and make sure you buy one with your machine. Nothing is as frustrating as getting home, setting up your system, and then discovering that it won't do what you want it to.

At least one computer, the Attache portable from Otrona, automatically acts as a very basic terminal unless you give it instructions to the contrary. Others have a built-in program that allows you to use the computer as a terminal at will. The lap-sized Radio Shack Model 100 is one. Most micros, however, require a terminal software package, which is put into the machine as a disk or tape, like any other program. The Apple IIe, Commodore 64, and most other computers fall into this category. A few computers come with such programs, but most often they must be added at your own expense. Terminal software often costs $100 or more, so a computer that includes it in the purchase price

might offer the online searcher a minor bargain. The chapter on software offers more detailed information about terminal programs you can buy.

For simply searching online databases there is little difference today between a terminal and a personal computer. This is because all the computer power for searching comes from the big mainframe computer maintained by the online service vendor. However, computers offer many advantages, and anyone setting up for online searching should consider buying one.

One benefit of using a computer is the opportunity to save in its own memory information found by a search and later manipulate that information at any time. The practice of taking a mass of information from an online database and saving it on your own computer's disks is known as "downloading." This is most often done with a particular block of references the user knows he will need repeatedly. Downloading can save the user a great deal of money because he must access the online service only once; thereafter he need simply work with his own machine. After the first use, there are no telecommunications, connection, or outside computer charges at all.

Downloading to a personal computer can also help save money during a search if you want a printout of the information you are seeing. Often, databases feed information into a computer faster than the printer can print. With a terminal, you must remain online until the printer is done; at 30 characters per second, or less with some letter quality printers, it can take many minutes. With a computer, however, you can download your search results at up to 120 characters per second, save them in your storage disks, and then print them out after you have gone offline. You don't have to pay for all that waiting time online as the printer grinds through its chores.

In addition, online services, which once favored terminals for their customers almost universally, are gearing their offerings more and more toward personal computers. The main reason here is the growing popularity of online services. As A. C. Markkula of Apple Computer wrote: "Even a cursory study of the characteristics of terminals indicates that, while they have an enormous future as telecommunications links to central computers within companies, their usefulness to consumers in communicating with distant databases will become increasingly limited.

"The reason is simple: Terminals, were they to grow in number, would place too great a processing load on databases. To handle millions of terminals on a single big computer—no matter how big it is—is going to bog the machine down so it's no longer effective. The telecommunications revolution won't be complete until the processing is distributed, the central database computers are freed to perform only search and locate functions, and subscribers' personal computers perform all other processing."

A final word on terminals: If you do decide to buy a terminal, consider getting one with a modem built in. A modem is necessary in any case, and it may be cheaper as part of the terminal than as a separate peripheral.

A Modem. Modem stands for modulator/demodulator. You need a modem to go online because the digital signals created inside a computer or terminal will not travel over telephone lines. The modem translates these computer pulses into audio signals the telephone system can recognize (modulation), and it converts audio signals from the phone lines into digital signals the computer can read (demodulation). A modem is sometimes built into a terminal or computer, but most often it must be purchased separately.

Modems come in many styles. Some are little boxes that clip directly into the telephone cable. They are called direct-connect modems. Others use an acoustic coupler to tie the modem and the telephone. This coupler contains two rubber cups, one for the mouthpiece of the telephone and one for the earphone. The phone is put into the cups and "talks" to the modem. Acoustically coupled modems are often cheaper than direct-connect models, and they can be used with any telephone. They are sensitive to outside vibrations, however, and direct-connect modems carry messages more reliably.

Most modems use standard RS-232 connections and can work with virtually any terminal or computer. A few fit into the computer itself, like a memory board. These models are specific to a particular computer or class of computers. The Hayes Micromodem, which works only with an Apple computer, is one popular example. Others are available for the IBM Personal Computer and for machines that use the S-100 buss. These modems do away with the need for a serial port, but they cannot be transferred to a new machine if you decide to change computers.

Another question is whether to buy a "full-duplex" modem or a "half-duplex" model. A full-duplex modem can send and receive data at the same time, allowing the vendor's computer to "echo" the messages it receives back to your own terminal or computer. A half-duplex modem can only send or receive at a given moment; they are considerably cheaper than full-duplex modems. Most vendors are equipped to deal only with full-duplex modems, however; buying a half-duplex model will probably turn out to be a waste of money.

Some modems are "originate only" devices; they can place a call, but not receive one. Originate/answer modems can fulfill either role. The price difference between the two is relatively small, so it makes sense to get one of the more versatile models.

Two added features, somewhat more costly, are

"auto-dial" and "auto-answer." Auto-dial modems make it possible to place a call to your online vendor simply by issuing a command from the keyboard of your terminal or computer. Auto-answer modems, if you wish, will answer the telephone when it rings and automatically link it to the computer—a handy ability if you want to query your computer from a remote terminal or wish to set up your own remote bulletin-board system, a kind of amateur data bank that is growing increasingly popular.

Once all those lesser decisions are made, the main consideration in getting a modem is the speed, or baud rate, at which it operates. An operating speed of 10 baud equals 1 character sent or received per second. Most modems will operate at either 300 baud or 1,200 baud—30 characters per second or 120. A few can go as high as 9,600 baud, but to use one requires a dedicated phone line between your computer and the vendor's. Some vendors operate at both 300 and 1,200 baud, others at only one speed or the other. Again you must shop for service first and hardware second.

Faster modems cost considerably more than slower ones. A 300-baud Hayes Smartmodem, for example, lists for about $280, while the 1,200-baud model of the same machine has a list price just under $700. Which is better? It depends on what you plan to do online. For instance, it is almost impossible to read words that are scrolling down your video screen at 1,200 baud. So, if you plan to do a great deal of text searching with a terminal, 1,200-baud operation could be a drawback. However, if you plan to download material into your computer, the faster modem could save you considerably in online charges. Many vendors charge about double for 1,200-baud access what they do for 300-baud access. However, the material is fed into your machine four times as quickly, so you end up the winner. Your thinking time, typing time, and reading time all remain the same, though, at any baud rate.

Like the Hayes model, most 1,200-baud modems transmit at the lower speed as well; this gives you the advantages of speed and avoids all drawbacks except the price. Most 300/1,200-baud modems are direct-connect, originate/answer models capable of full-duplex operation, and many are equipped with auto-dial and auto-answer. If you buy one of these, all the technical questions are answered.

Some modems even have a bit of intelligence of their own. You can store phone numbers for your online vendors or even program in certain signals the modem should look for. A few will warn you if the phone connection is poor or the phone line is filled with extraneous electronic noise. If you plan to be online a lot these features are probably worth considering.

A Printer. If you have a computer, you probably have a printer already; for many reasons, it is the first accessory that almost any computer owner adds to his system. It is not an absolute necessity for online searching, but it adds enormously to the convenience of working with the information you call up. This is especially true if you are working with a terminal. In a computer you can save your searches on your storage disks, and get immediate, permanent, personal access to all the information you glean online. A terminal can't save anything. You must either have a printer or order hard copy records of your searches from the online vendor. This is expensive and slow; it can take weeks to get documents from some vendors.

In addition, if you have a computer but order your hard copies through the mail from the vendor you are wasting the computer's marvelous ability to format text. What you get from the vendor will simply duplicate the online screen. What you print on the computer can appear as you choose. With the right software, downloaded information can be sorted, edited, or included in your own reports or letters. You gain a great deal of flexibility when you team online services with a computer and printer.

Buying a printer can be a difficult decision, however. Printers are the most expensive computer peripherals that most people are likely to own, and choosing the best one for you involves a tricky problem of balancing speed against quality and expense.

Your basic choice is between two kinds of printer: dot matrix and letter quality. The dot matrix machine creates letters by placing tiny dots of ink along a path that outlines a letter's shape. Dot matrix printers are extremely fast; some can print more than 200 characters per second. But the quality of their lettering is mediocre—readable at best, but never attractive. You can buy an adequate dot matrix printer for $500.

Letter quality printers produce fully formed letters as clear as any from the best typewriter with a carbon-film ribbon. They also offer a wide range of type styles—more than twenty are available for some models of printer—and most can print bold-faced lettering and offer other special effects. But you pay dearly for this versatility; letter quality printers can easily cost $1,200, and many are priced upward of $2,500. Letter quality also takes a toll in speed; these machines seldom print more than forty characters per second, often much less.

For the online user the question is one of balance. Dot matrix printers can turn online data into hard copies faster than letter quality printers. This can save money in charges for connecting to a database, particularly if you use a simple terminal and cannot download information. In addition, these printers are considerably less expensive to begin with. However, you can't

generate business quality reports or letters with a dot matrix printer. For that, you must make the extra investment to get a letter quality model.

It is impossible to lay down rules about what kind of printer will work best for a particular person. In general, though, if you have a terminal you should probably stick with a dot matrix printer; you don't have the computing power handy to create neatly formatted reports or letters, so a letter quality printer is a needless expense. If you have a computer, get the best printer you can afford. The flexibility of letter quality printers and the neat appearance of their output will allow you to do far more with your computer—both online and with documents you create yourself.

You can buy a terminal, modem, and printer just about anywhere you would buy a computer—a computer store, an audio or electronics shop, even some large appliance dealers and the like. Many mail-order sellers carry them, and one or two specialize in terminals and printers. There are advantages and disadvantages to each possible supplier. The basic trade-off is between price and support.

A few computer shops discount their merchandise, but most demand full list price for their wares. In return, the best of them offer technical expertise and a commitment to their customers. They will replace or repair defective merchandise, teach the buyer to use the equipment properly, and answer the baffling questions that any beginner faces. In time of trouble, such a dealer can be as necessary and welcome as a life preserver on a stormy sea. Many shops, however, are far less knowledgeable and reputable, including some outlets of well-known chains. It is perfectly possible to pay list price—or more!—and receive no help at all.

Discounters are a mixed bag at best. A few know their field and will conscientiously try to help the novice, though giving much assistance quickly eats up their limited profits. Those who have no technical ability and offer no aid are more common. One prominent discounter in New York City, for example, often sells Osborne computers and any of a variety of printers. With each system, they supply the same type of cable, no matter what the printer. So far, no one has ever found a printer for which the cable is appropriate. When the customer finally figures out why the printer cannot be made to operate, the store cheerfully exchanges the cable for credit toward disks or accessories, leaving the buyer to search for a qualified computer dealer willing to help get the printer working. Unfortunately, most computer shops have little interest in dealing with equipment purchased from others.

Buying by mail often produces the best price, but the chance of receiving needed help is almost nonexistent. Though some mail-order dealers will try to answer their customers' technical questions, solving any but the simplest problem over the telephone is virtually impossible. Unless you are confident of your ability to answer your own questions, buying by mail is probably not for you.

A last possibility is to buy used equipment. Secondhand hardware is advertised in many computer magazines and in the "classified ads" on The Source and CompuServe. Careful shopping can produce some stunning bargains. Used computers and accessories frequently sell for half the price of new hardware, and occasionally for less. A used terminal or modem can be highly reliable even after several years of service; printers, with many mechanical components, are more susceptible to wear and are more likely to prove failure-prone. Again, there is virtually no hope of support if something goes wrong. Do not buy any used equipment unless you or a computer-wise friend have checked it carefully and know you can get it serviced. Otherwise, you could find you've spent your hardware budget and have nothing useful to show for it.

Whichever course you choose—with home computer prices plummeting, it is now possible to keep your total start-up cost to $500 or less—you can always build from there. You'll find that life online more than repays your investment.

Choosing an Online Service

Beyond considerations of price or hardware, a prospective database user should ask literally dozens of questions before choosing among the hundreds of computerized libraries available. A supplier might brag, for example, about how many million citations a database contains. But quantity won't help if the information is out-of-date or inaccessible.

Nor is it enough to select an online service by subject area. A doctor will surely want to look up medical articles, an accountant will need accounting information. But in most subject areas there are several databases in the general field that most interests you. One vendor may provide several of these, while another offers only one—but that one happens to be in your exact specialty. Several vendors may offer the same database, but with different selections of other bases, which may or may not appeal to you.

And most of us have many interests, all of which could benefit from an occasional search online. A computer salesman from Chicago may want to find some background information about microchips, arrange a flight to Atlanta, locate a good Chinese restaurant there, and check how far his stocks have fallen, all within a few minutes. It can all be done online. Much of it can be done through several online services. To find out which, check the catalog section of this directory.

Some vendors, though, make such tasks more convenient than others. Deciding which is best for you requires some careful thought. Here, then, we offer a broad range of questions to start with before you select an online service:

1. How Easy Is the Vendor's System to Use? Does it require that you master a cumbersome command language, or are the commands—the instructions you give to the computer—similar to normal language?

For example, on the Samsom DATANET online service, the command to find the Delft Hydro database is BASE DHYD, and the command to locate the word "energy" in that file is FIND ENERGY. The commands are quite a bit like ordinary English. By comparison, if you want to ask a Cronos-Eurostat database to print out charts of gross capital formation per head in Eu-rope and Japan, you type GRA TS+SEC1: 041055610m46, INT=6501,8112,PAG=35,GO. This command is entirely in a proprietary code. While it is extremely powerful—it gives the computer a number of instructions at one time—it is also much more complex and less easy to grasp than the Sansom commands.

Also, does the vendor's computer let you know when you've made a mistake and suggest how you might have made it, or are you left in the cold to figure everything out by expensive trial and error?

If the system is not easy to operate, obviously you're going to run up extra time connected to the online vendor trying to figure out how to make it work. Instead of solving any problems related to the search, you'll just be dealing with the imposing difficulties of the system itself. Before settling for any particular system, the best thing to do is to get some hands-on experience with the online service so you can evaluate closely the difficulty you may have in using the system.

2. How Complete and Accurate Is the Vendor's Information? Do the databases he offers provide the full texts of articles, summaries of articles, or merely an article's title, author, and place of publication? In the case of numerical databases, does the vendor provide raw numbers or well organized statistics? Do the figures come from many different sources or from one source with a vested interest in a particular view of the subject? Must you scan all the available articles in their entirety or can you select to see less time-consuming synopses if you wish? What is the most recent entry on a typical base? How often is material the vendor supplies updated? How much attention do the producers whose material the vendor delivers pay to the quality of the data in their bases?

3. How Many Ways Can You Get Into the Vendor's Information? Must you use an index of terms provided by the vendor or supplier as a kind of access dictionary? Or can you ask to see any item in which freely chosen words or phrases appear? Can you do both? On DIALOG, for example, you can request to look at the thesaurus of terms for any base to deter-

mine what index terms the base contains or you can simply type SELECT X and the system will search the file for that word.

4. How Quickly Can You Reach the Information You Are Seeking? Is the vendor's computer powerful enough to do the work you need done as quickly as you need it to be? Is the information organized in the vendor's computer intelligently enough for you to find what you want efficiently? Let's take an example: On one vendor, to locate data about Tasmanian pottery in the 1950s might take four steps: 1. Search for "Tasmanian." 2. Search for "pottery." 3. Compare the listings with "Tasmanian" and "pottery" and show me those that contain both terms. 4. Only display those published in the 1950s. On another vendor you could accomplish the same task in one step: 1. Search for the words "Tasmanian" and "pottery" in the same paragraph and limit to 1950s publications. If the first base in our example were poorly setup, you might find that your search recovered virtually nothing because the system only searches indexed terms, not every word of the text. Since this subject isn't of wide enough interest to get its own index term, you have to begin with general terms ("Pottery, Asia", for instance) and then read through the material you find to get what you're looking for.

5. How Deep Is the Coverage? Not all bases cover all publications in their fields from cover to cover. Many include only the major sources in their fields, or even limit themselves to sources in a single language, missing much that would be of interest. Often the coverage included with a particular base varies among different online service vendors. Be sure to check.

6. How Long Is the Delay Between Publication in a Primary Journal, Appearance in an Indexing Publication, and Inclusion in the Database? Nowadays, most databases get information before it appears in the indexing publications, because the database is created at the same time that the information goes to the typesetter. But some bases are slower at updating than others, and the update rate may vary for a base from one vendor to another.

7. Do the Vendor's Bases Provide Abstracts or Just Bibliographic References? Obviously, abstracts are more informative. This is because a bibliographic citation merely tells you that a particular report exists and where, but it can't give you any real sense of what the document contains. The abstract gives you a quick look into the contents in addition to containing all the publication data the citation does. Full text is often better still, since it provides not just a glimpse into the document but the whole thing; however, the number of full text systems remains small, and they tend to be quite expensive. In most subject areas you can find a base that offers abstracts, and this should be your goal. Unless, that is, simple bibliographic data are all you need.

Abstracts have the additional advantage that they contain more keywords and, as a result, have more access points to the information than citations provide. A keyword is any word you can use as part of an online search. Let's say we are researching a topic in music history. In a citation base, we'll merely find the titles, authors, and publishing data about articles. When we type in our search terms, "Beethoven" and "Vienna," we get no hits. The file claims it contains nothing of interest to us. The words "Beethoven" and "Vienna" do not appear in any title together. However, if the same file provided abstracts we might find an article titled "Austria in the Hearts of Composers" that contained an entire section on Beethoven and Vienna. The abstract notes this fact, and when the computer searches for us, it can find our keywords there. In undertaking research, abstract bases are likely to provide a better searching medium than bibliographic bases.

8. Which Data Elements Are Included in the Records? A data element is any part of an abstract or citation you can use in a search. It may be a word, a date, a section of text, a file number, any segment of the information contained in a service vendor's files. There are two questions you must ask about data elements: First, how many different elements does the vendor display in his bases? Do the bases display the title, author, affiliation, publisher, and associated names and addresses? In numerical bases, are all the lines and columns of financial statistics clearly noted and displayed? You always want a vendor whose listings contain the greatest number of data elements. They are like pegs for hanging your searches on.

Now, though, we come to the crucial second question. How many of the elements displayed in a vendor's bases can you search? Often, only a few of these elements are available for searching, even if the base displays all of them. An example of a base that gives excellent access to data elements is the EUCAS international chemical patents file. Each report in the base offers these searchable elements: affiliation, author, classification code, corporate source, conference title, patent application date, descriptor, publication date of documents or patents, document type, issue number, index terms, journal title, keywords, language or document, Chemical Abstract number, patent source, International Patent Classification, priority for patents, patent assignee, registry number, source, and title. The availability of so many searchable elements means you spend little time wandering around in the file looking for what you need. You can home in on your informa-

tion very efficiently by linking or eliminating certain data elements.

9. How Large Are the Vendor's Bases? Bases can range from 100,000 records to tens of millions. While the largest bases, obviously, contain the greatest amount of information, they aren't necessarily the best searching media for you. You might be better off with smaller bases that contain more specific files than with massive listings. If, for example, you are looking for veterinary listings, you would probably do better in a small veterinary database than in MEDLINE, which covers the entire spectrum of medicine. If at all possible you should try to test search a couple of bases carried by a vendor you are interested in before signing up. See if their size and coverage seem to suit your needs. In data bases, biggest is not always best.

10. How Do the Vendor's Databases Compare with Similar Hard Copy Reference Books and Journals? Databases and their hard copy counterparts don't always contain identical information. Sometimes one has more, sometimes the other. Also, the titles of the information source and the form of its contents may differ slightly from one version to the other. This is important to know if you are trying to work with both versions; it can be easy to get confused. Especially when you are looking through abstracts, where you must often go to the printed source for the full text, you want to know that both the online and the printed forms use the same nomenclature.

11. What Is the Structure of Information? How much can you limit or direct the search using the vendor's command system? Can you search a term only in the title, or a citation, or only in combination with other words? Can you limit the number of citations or phrases that come into play during stages of a search? For example, if you enter the word "sun" must you then read everything about Sun Oil Company, or Sun Myung Moon, or can you limit the search to instances where sun appears with words like "energy" and "environment" or with the word "tan." If you want references to black-body radiation, do you also have to get all references to people whose surname is Black? Another element you want to consider is whether you can develop your questions and move them from base to base on the same service. This means that you won't have to rewrite your questions each and every time you enter a file.

12. How Flexible Are the Options You Can Use to Search the Vendor's Bases? Do they allow you to comment on the files? One CompuServe base for doctors actually functions as a kind of electronic debate platform. Subscribers to the service can enter their comments in any one of several medical specialty areas. Then, their colleagues can comment online about the original statement. They can write rebuttals or defenses of it, can even suggest changes in it, all in the same online file. Other, less dramatic possibilities for online comment include noting new court cases that affect principals noted in legal bases, or capsule reviews of abstracted articles by users so that future customers can have even greater focus in selecting articles to save or print out.

13. Does the Vendor Provide a Spread Feature So That You Can See How Many Variations Are Indexed of a Term You Are Interested In? For instance: Energy, Energize, Energizing, Energy Level, Energy Costs. You wouldn't know these versions were searchable unless you could see into the base's thesaurus. Also, does the service allow you to truncate? Truncation lets you cut a word at a certain point and search out just the portion of the word you want. Right hand truncation is fairly common—cutting down words from the end; left hand truncation—cutting back words from the front—is less common. Truncation is a powerful search tool and much recommended by professional online researchers for cutting out references that don't strike at the heart of the problem you are researching.

14. How Strong Is the System's Logic? Can you combine terms and create exclusions? Does the base accept Boolean terms—and, or, but, and not? Boolean terms are the basis for effective searching. They derive from Boolean algebra, a system that expresses every fact as a series of true or false statements. Since the two-sided nature of true-false corresponded neatly to the binary on-off nature of computer switches, Boolean logic has provided a powerful tool for using computers to solve problems. The Boolean terms can link sets, combine them, or exclude them. Without these terms, an online searcher would basically have to leaf through files one at a time almost randomly. They are extremely important in the online world and virtually every vendor provides for them.

You should check, though, to see if the vendor you are interested in offers concept or proximity logic in addition to basic Boolean terms. This feature allows you to search one term in relationship to the location of another term in the same sentence, paragraph, or line. Some systems even allow you to specify that the terms should fall within a certain number of words of each other or in a particular order.

15. Can You Set Up a Search Strategy Review? This feature allows you to display each step of your search, so that you can review it to make sure you've done all the steps your search calls for. It helps you to avoid confusion and work efficiently. Often,

when you're involved in a long or intricate search, you can lose track of exactly what steps you took earlier on. Let's say that you started out in the Magazine Index to get general articles, then moved on to SocScience Abstracts for more particular articles, and then to Psychological Abstracts to follow up some leads that led in that direction. At this stage you can't quite remember if you tried out a particular keyword in Magazine Index or not. If you have search review, you can check quickly and authoritatively. Without it, you either have to trust your hazy recollection or go back and do over something you might already have done.

You can also print out search strategy reviews and look them over when your search is through. By looking at your manner of searching and the results you achieved you can find new ways to search more efficiently in the future. And, finally, a search save feature lets you print out the search strategy so that next time you need to search the same topic you can move through the search quickly and decisively by following the path you've already blazed.

16. Can You Search Ranges and Fields? A range is a limit on your search by time—1940–1970, or just a few specific days. This can keep you from dredging up references with the right words in them, but from distant, useless historical periods. Fields specification is different, but equally important, particularly when searching bibliographic files. With this option you can limit searching to words that appear in a certain field of words, such as a body of an article, the title, the author's credit line, or the footnotes. Regular field specification is positive—find "dog" in the title; but fields can also be negative— find "dog" in any field except the title. A capability found on some online systems is called "after the fact field specification." This means that first you can ask the computer to search for dogs and canines. When you get back 12,000 references—far too many to read usefully—you can go back and limit the field to only those references that use "dog" or "canine" as a control vocabulary term—in other words, as the central theme of the article. With after-the-fact fields, you can go back and limit what you've already searched. It's a handy feature to have if you will often be searching from long lists of possibly applicable terms. You can search them all, see what you get, and then limit the field after the fact to the most useful parts.

17. What Are your Print, Display, and Storage Options? Print options and formats are simply ways of displaying what you've found in an online search. Once you have found a set of pertinent documents, you will want to display them on your terminal. At first you might want a brief display that lets you know that what you've found is really what you were looking for. This could simply be a display of titles or a brief description that allows you to read through them quickly. Then you should ask for a full reprint of the bibliographic references or even the full text of the articles that seem most appropriate.

The ability to change the format of the display is very important and is done in two primary ways. Through many systems, one can bring up preformatted kinds of displays. On DIALOG, for example, preformatted displays ranging from the title to the entire reference are available. However, on systems like DIALOG you can't tailor the display menu to your own requirements. If you are not satisfied with any of the available options, there is no recourse. Other systems, such as SDC and BRS, offer a tailored approach. You can tailor the bibliographic display to your needs on every article.

How you can save search terms also becomes quite critical, especially when you are doing a search through many databases offered by a particular vendor. The first question to ask is whether you can save your search instruction and carry them with you from one base to another, or do you have to start your search from scratch with each new base? On DIALOG, for instance, you have to start your search over with every new base you access; on BRS and SDC, however, you can save search instructions when you move among their bases. You also might want to check into the possibility of saving a set of search instructions for a longer period online. This is especially worthwhile if you will be searching similar territory often. It's wonderfully fast and convenient to have all your basic commands already entered in the service vendor's computer when you begin. It saves time and money for searching, too. All major vendors offer search-saving features of some sort. Searches can be saved for short periods of time or can, with some vendors, be stored virtually forever. In effect, this means that a user can go back on and automatically run the saved search over and over again without ever entering another command.

18. Does the Vendor Offer SDI? SDI stands for Selective Dissemination of Information. This is a service where a user can store a series of questions online that are searched automatically every time the system is updated. The customer can specify a set of bases to be searched and a format for printing out the information. The results of this pre-ordered search are mailed to the customer. It allows the user to keep his personal database file current, without any additional work. It's a step up in vendor service from simple search saving. In a saved search, the customer still has to go online and initiate the new information run-through. In SDI, the vendor handles everything once the instructions are given.

SDI is of particular value for business people who are extremely busy and don't have the time to go on-