U.S.Robotics™

THE
PASSWORD™
MODEM
INSTRUCTION
MANUAL

FCC REGISTRATION NUMBER:

This equipment generates and uses radio frequency energy and if not installed and used properly, that is, in accordance with the manufacturer's instructions, may cause interference to radio and television reception. The **Password** modem has been tested and found to comply with the limits for a Class B computing device in accordance with the specifications in Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment on and off, the user is encouraged to try to correct the interference by one or more of the following measures:

Reorient the receiving antenna
Relocate the computer with respect to the receiver
Move the computer away from the receiver
Plug the computer into a different outlet so that the computer and receiver are on different branch circuits

If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions.

U.S. ROBOTICS, INC.
PASSWORD MODEM
INSTRUCTION MANUAL

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CHAPTER 1:
GENERAL INFORMATION

CONGRATULATIONS!

You have just purchased the **Password** *modem**, produced by U.S. Robotics, Inc. The **Password** modem is one of the most advanced communication devices in the world. We're sure it will give you excellent service.

Once you connect your new **Password** Modem to your computer or terminal—and to your telephone—you will be able to use your computer in exciting new ways. We will describe some of the things you can do with the modem on the next page.

But to get the most out of your new **Password** modem, you should read this "User-Tested" Instruction Manual carefully!

First discover what your **Password** modem is like, and what it will (and won't) do. Then, starting on page 5, you will learn about unpacking, assembling, testing, and using your new **Password.**

Modem (pronounded, MOH-dem). Briefly, a device that translates the language your computer speaks into a data language that can be sent down the phone lines. A modem at the other end of the line then re-translates the data into a language that particular computer can understand. Your own modem also translates incoming messages into a language your computer can handle. "Modem" is a shortened form of the term "modulator-demodulator." The modem actually *modulates* (translates) data generated by your computer and *demodulates* incoming data.

For an interesting history of modems and modern telecommunications, see Appendix E of this manual.

*NOTE: At the bottom of each page of this manual we will define some of the more difficult technical terms we use. Every time you see a word that is *italicized* in this fashion, you can find out what it means by looking at the bottom of the page. If you already know how to translate these terms into ordinary English, please ignore the footnotes.

A BRIEF DESCRIPTION OF **PASSWORD'S** MANY IMPORTANT FEATURES

1. The **Password** modem is UNIVERSAL. It can be connected to any RS-232-compatible computer or terminal that uses *ASCII* characters.*

2. The **Password** modem is VERSATILE. It can be used with most telecommunication software.

3. The **Password** modem is COMPATIBLE with most other modems, including Bell 103-, 113-, and 212A-type modems. You can use the **Password** on almost any telephone line, and can call up almost any other modem in the free world.

4. The **Password** modem is EFFECTIVE. It will communicate at either full or half *duplex* and will transmit or receive data at any speed between 0 and 300 or 1200 *baud.*

5. The **Password** modem has been CERTIFIED by the Federal Communications Commission for the uses described in this manual. (See inside front cover of this manual for details.)

6. The **Password** modem is EASY TO USE. Just follow the simple instructions on the following pages.

ASCII ("AS-KEE"). Means "American Standard Code for Information Interchange."

*NOTE: Password works with any RS-232-compatible computer using ASCII characters. However, the Osborne 1 requires a special modem cable, called the RS-232/TTL (with 9 pins instead of 25). To use **Password** with the Osborne 1, you need a special cable which should be included with your unit if you told the dealer you own the Osborne 1. Aside from the special cable, **Password** works the same with the Osborne 1 as with other personal computers.

Duplex (DUE-plex). From the Latin words meaning "two parts." Older computers could either *transmit* data or *receive* data, but couldn't perform both "halves" of the communication process at the same time. This is the "half duplex" condition, so called because the computer could do just half of what modern machines can do. Almost all modern machines—including your new **Password** modem—can send and receive simultaneously. This is the "full duplex" condition.

BAUD (rhymes with Maude). Literally, "bits of information per second." The speed at which data is sent over telephone lines from one computer or terminal to another. 300 and 1200 baud are the most common transmission rates.

WHAT YOUR NEW **PASSWORD** MODEM
CAN DO FOR YOU

1. **Password** allows your computer or terminal to communicate with other modems and computers all over the world.

2. **Password** will dial telephone numbers for you automatically. (See "Auto Dial," page 13.)

3. **Password** will answer your telephone automatically and accept messages sent to you from other computers and terminals. (See "Auto Answer," page 17.)

4. When used with the appropriate *Telecommunications Software*, **Password** lets you record data from other computers, down load programs from various computer-users' clubs and organizations, and retrieve information from such commercial organizations as "The Source™," Dow Jones News/Retrieval Service™, MCI Mail™, and other database services.

5. **Password** has a built-in loudspeaker that lets you check up continuously on the communication process. (See "Audio Monitor," Note E. on page 14.)

Telecommunications Software. Computers and modems are *hardware*—that is, machines which come pre-wired ("hard-wired") with many different capabilities. The different types of programs that tell the computers how to function are often called *software*, because they are usually contained on flexible floppy disks or magentic tape. **Telecommunications software** is a type of computer program that allows your computer to retrieve and "memorize" data stored in other computers.

    Password can be used with most telecommunications software, including U.S. Robotics TELPAC and Ward Christensen's PUBLIC DOMAIN programs, such as "X-Modem." (Public Domain programs are free to the public, and are available through many user-group boards and from many university computer centers. Contact your local university or nearby user groups for details).
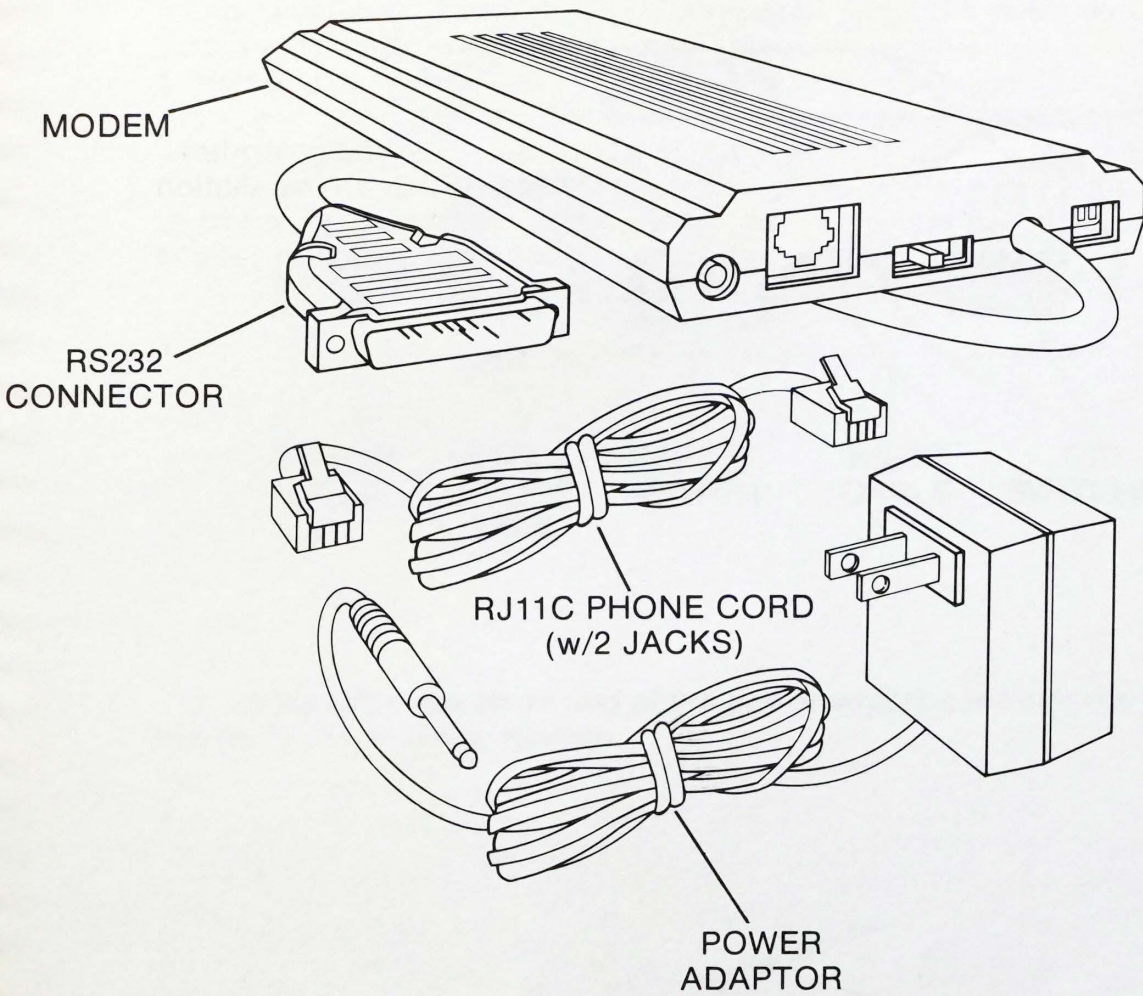
WHAT YOUR NEW **PASSWORD MODEM** *WON'T* DO

1. **Password** will work on most phone lines, but won't work over digital networks, such as Bell's Dataphone Digital Service (DDS). If you wish to use your **Password** modem on a DDS line, you will need an "analog converter" (which you can purchase at a Bell Service Center).

2. **Password** won't work on party lines.

3. Like **all other** modems, **Password** may not work immediately on all personal computers. To operate your new **Password** on a personal computer, you must first put the computer into what is called a *Terminal Mode.* Check your computer's manual to find out how to put your machine into "Terminal Mode." On some personal computers, you must change the machine's dip switches or use an installation disk. If this isn't possible—or if you plan to transmit large blocks of information to and from your computer—use a telecommunications software package such as U.S. Robotics "Telpac."

Terminal Mode. For you to communicate successfully with other modems over the phone lines, your computer must be "dumb." That is, your computer must send information to and receive information from the modem. Thus your computer must transmit your commands to the modem rather than trying to carry them out itself. When your computer is in the "terminal mode," only its keyboard, screen, and RS-232C plug will function—the rest of the computer is "dumb" or non-functional. *No matter what kind of modem you use,* your computer must be in the "terminal mode" if the modem is to work properly.

(The RS-232C plug is the large plug at one end of the communications cord that connects your new **Password** modem to your computer. The RS-232C plug contains 25 "pins." A description of the functions of the "pins" appears in Appendix A of this manual.)

CHAPTER 2:
UNPACKING YOUR NEW **PASSWORD** MODEM

When you open the box containing your new **Password** modem, you should find the following three items: (1) The modem itself; (2) the power supply; and (3) the communications cord that connects the modem to your telephone line.

MODEM

RS232
CONNECTOR

RJ11C PHONE CORD
(w/2 JACKS)

POWER
ADAPTOR

CHAPTER 3:
ASSEMBLING AND TESTING
YOUR NEW **PASSWORD** MODEM

To assemble your new **Password** modem, please follow these easy steps:

1. First, look carefully at the end of the modem containing the connecting cable.

POWER JACK   RJ11C PHONE JACK   ON/OFF SWITCH   RS232 CABLE   DIP SWITCHES
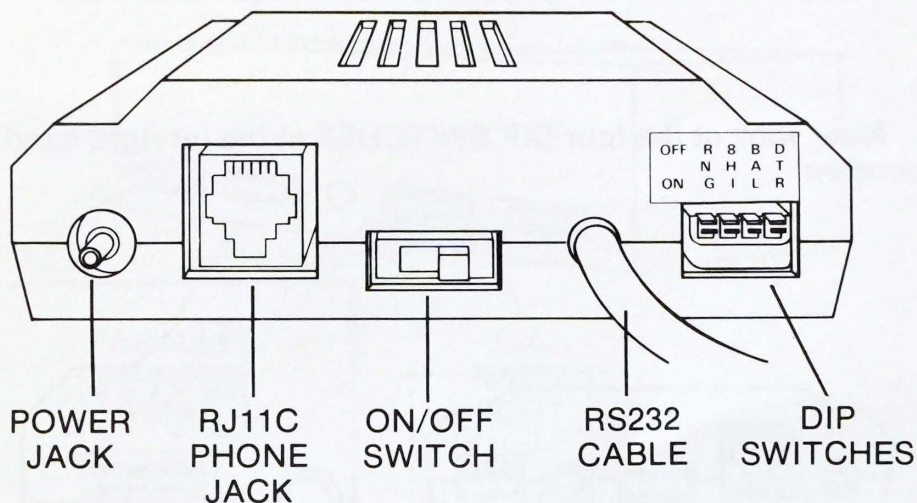
2. Now, plug the small end of the power supply cord into the jack at the far left side of the modem.
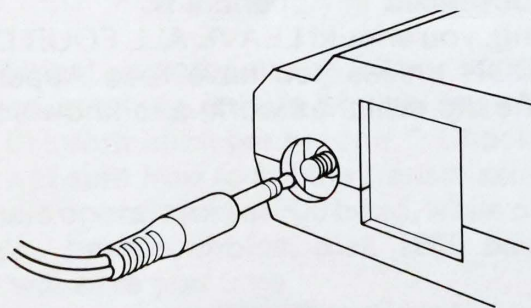
3. Next, plug the large end of the power supply into a wall socket (115 volts AC). (Note: It's safer to connect the cord to the modem **before** you plug the cord into the wall.)

4. Connect one end of the *Modular* phone cord to the telephone junction box. (You may have to disconnect your telephone first.) Then connect the other end of the phone cord to the modem.

> **NOTE:** Most modern telephones are connected to wall boxes with modular connections. So you can just disconnect your phone and plug in the phone cord that runs to your modem. However, if your phone doesn't have a modular connection, you will have to purchase an adapter and RJ11C connector either from your phone company or from a computer dealer.
>
> Ordinarily, you can't use your telephone while you're using the modem. However, if you wish to use both instruments at once, you can purchase an RJ11C *Duplexer* from your phone company or computer dealer. The duplexer fits into the wall box, and allows you to connect both your phone and the modem into the box.

5. Now, look at the four DIP SWITCHES at the far right hand side of the modem.
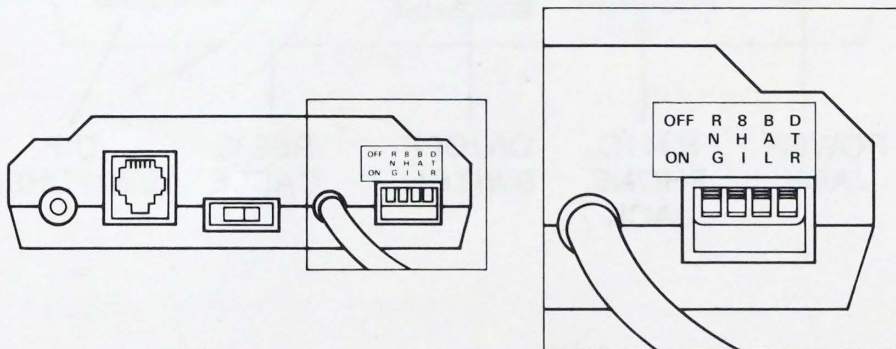
When you unpack your **Password** modem, all the dip switches will be in the "OFF" position. If you are using a regular phone line, and if your computer is one of the most popular brands, you won't need to change any of these switches. If you have a special circumstance, the function of each dip switch is described in Appendix D.

Generally speaking, you should LEAVE ALL FOUR DIP SWITCHES IN THE "OFF" POSITION unless you have read Appendix D, are quite familiar with how the dip switches work, and know you should change one of them.

Modular (MOD-you-lar). A fancy name for any equipment that uses phone plugs like the ones on the phone connector cable included with your modem. Use of the same type ("modular") plugs by various equipment manufacturers allows you to connect many different types of products together successfully.

Duplexer (DUE-plex-er). A telephone duplexer is a small device that has two modular jacks in it so that two pieces of equipment can be connected to the phone line at the same time.

6. Now, plug the modem into your computer. There may be two receptacles that the plug will fit into. One will probably be marked "printer." Plug the modem into the other receptacle, perhaps marked "modem" or "communications" or "EIA."

PARALLEL   "EIA"
PRINTER   RS232
PORT   PORT
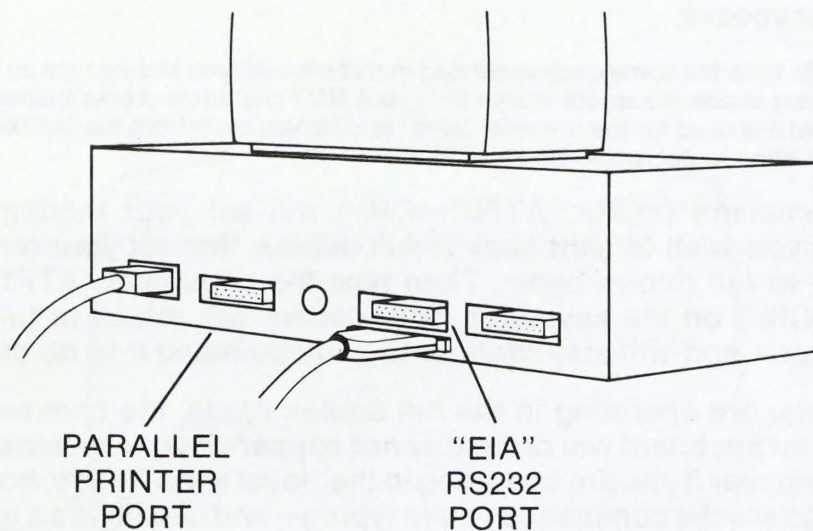
7. Turn on your computer or terminal and clear the screen.

> **NOTE:** If you're using a personal computer, make sure the machine is in "terminal mode." As we noted on page 4, **Password** will function properly ONLY if your computer is "dumb." That is, only the computer's keyboard, screen, and RS-232 port should be functional. If you wish to use the other functions of your computer while communicating—say, to run a program—you must use telecommunications software. This is true of ALL MODEMS, not just **Password.**

8. Turn the power switch on the PASSWORD modem to the ON position. The red LED "Power Light" on the front end of the modem should now be lit.

9. Set your terminal or computer to 300 or 1200 baud. (Briefly put, "baud" is the speed at which data is transmitted. As we noted earlier, baud means "bits of information per second.") Check the manual of your machine if you're not sure how to set the transmissin rate (baud). Some computers/terminals operate just at 300 baud, while others can operate at either speed. If you have a choice, pick 1200 baud since this faster transmission rate will save you time.

Your **Password** modem automatically adjusts to whatever transmission rate both your own terminal/computer sends data at, **as well as the rate incoming data** is received at. We'll have more to say about this important point in Appendix C.

10. Set your terminal or computer to full duplex. Again, check your manual to see how to do this. Your **Password** modem is automatically set at full duplex when you turn it on. At least 90% of all data transmissions these days are in the full duplex mode.

Some older computers require half duplex rather than full duplex. If you must communicate with one of these older machines, enter a carriage return (<CR>) on your keyboard. Next, type "ATFØ" plus another <CR> on your keyboard.

> **NOTE:** In all the commands described in this manual, you should type all letters and numbers inside the quote marks (" "), but NOT the quote marks themselves. The symbol Ø is used for the numeral "zero" to differentiate it from the capital letter "O," which often looks like a "zero" in print.

This command (<CR> "ATFØ" <CR>) will set your modem to half duplex. If you wish to shift back to full duplex, first set your terminal or computer to full duplex again. Then type the command "ATF1" (<CR> "ATF1" <CR>) on the keyboard. The modem will return to full duplex status again—and will stay there until you command it to do otherwise.

When you are operating in the full duplex mode, the commands you type on your keyboard will ordinarily **not appear** on your terminal screen. They **will** appear if you are operating in the "local echo" mode, however. If you wish to see the commands you're typing—and usually it's a good idea to do so—you should type the command "ATE1" (<CR> "ATE1" <CR>). This command tells the modem to **echo back** or display your commands on the screen as you type them. Once you give the modem this command, it will continue to display what you type until you reset the machine. If you wish to turn off the echo, type the command "ATEØ" (<CR> "ATEØ" <CR>). You can, of course, switch back and forth at any time, by giving the modem the proper command ("ATE1" for echo, "ATEØ" for no echo).

> **NOTE:** Generally speaking, whenever you wish to transmit or receive data from a modem or computer you've not dealt with before, you should call ahead of time and ask what baud (transmission rate) and duplex the modem/computer will accept. You can then set your terminal and modem to the proper settings prior to making a data call.

11. To make sure your new modem is ready to accept your commands, first give a carriage return (<CR>), then type "AT" on your computer keyboard and then <CR> again. Make sure that you type the letters "AT" in uppercase (CAPITAL) letters. ("AT" means "attention".)
The modem should respond "OK."

```
AT
OK
```
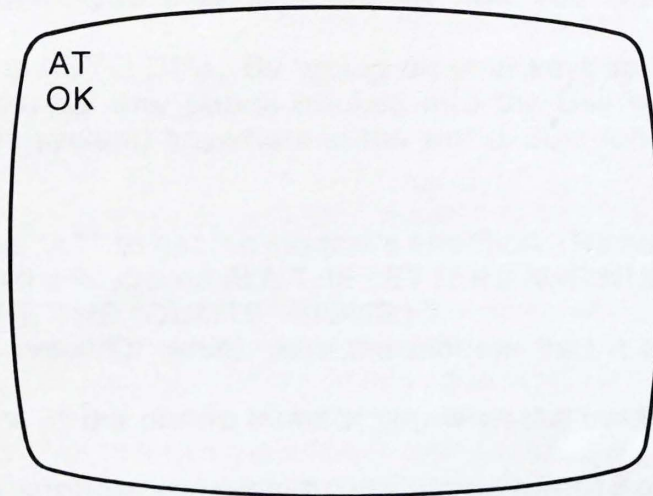
CHAPTER 4:
OPERATING YOUR NEW **PASSWORD** MODEM

The purpose of your new modem is to allow you to communicate with other modems, computers and terminals. Now that you have hooked up (and tested) your **Password**, it's time to try out the modem to see how it works.

DIALING ANOTHER STATION (AUTO DIAL)
Since you probably will have disconnected your phone in order to plug in your new modem, you may well wonder how you can call another computer.

The answer is AUTO DIAL. By typing on your keyboard, you can tell your modem to dial any phone hooked into the Bell system (or any Bell-compatible system) anywhere in the world. Just follow these easy steps:

1. First, type "AT" to get the modem's attention. (Remember that you should type on the keyboard ALL THE LETTERS AND NUMBERS THAT APPEAR INSIDE THE "QUOTE" SIGNS.)
2. Second, type "D" which tells the modem that it must do some dialing for you.
3. Next, type in the phone number you wish the modem to call.

For example, suppose you wish to call a phone whose Area Code is 312, and whose number is 123-4567. You would type

"ATD 1 312 123 4567"

on your keyboard. Then you hit the carriage return (<CR>) to let the modem know you've given it a complete command.

Important Notes:
A. The letters "AT" let the modem know that you are talking to it. Thus, you must START EACH COMMAND with the letters "AT," and end each command with a <CR>. The only exception to this rule is the "A/" command, which we will explain later.
B. The modem will not operate until you hit the <CR>. If you make a mistake in typing out your command, just backspace and correct it BEFORE hitting <CR>.
C. The modem will ignore all spaces, hyphens, parentheses, and other punctuation symbols (*except* for the comma). Thus "ATD 1 (312) 123 4567" and "ATD - 1 - 312 - 123 - 4567 and "ATD13121234567" are all the same command as far as the modem is concerned.

D. The modem reads a **comma** as a command to pause for 2 seconds before continuing. If you type in two commas in a row, the modem will wait for 4 seconds before continuing, and so forth. The comma is thus a very important part of some commands. For instance, if you must dial 9 to get an outside line, you may occasionally have to wait a second or two to get outside of your local system. To use your modem under these circumstances, simply type

"ATD9,13121234567" (or "ATD9,,1321234567") <CR>.

E. **Password** has a feature called an "Audio Monitor" that can be quite useful. Once you give the modem a D (dial) command, it "lifts the receiver" and gets a dial tone. In technical jargon, this action is called "going off hook." Once the modem is "off hook," it then dials the number you've commanded it to dial.

You will hear the dial tone and the dialing through the loudspeaker on the back of the modem. Being able to hear what is happening as the modem executes your commands is a very important feature of the **Password** modem. This "Audio Monitor" tells you at once what is happening on the telephone line as the modem goes about its tasks. If a person rather than another modem answers your call, you will hear the person's voice over the loudspeaker. Or, if the line is busy, you will hear the busy signal.

F. After **Password** dials the number you've told it to dial, the modem will keep trying to establish contact with another modem or computer for 30 seconds. **Password** does not recognize voices or busy signals. It is "listening" for a high-pitched squeal from another modem or computer. This squeal is called a "carrier tone." If the line is busy, or the phone doesn't answer, or a human answers the phone, **Password** will send the message "NO CARRIER" back to your computer or terminal. However, **because the loudspeaker lets you listen to the call as it is being made**, you will already know why you haven't made contact with the modem/computer you are dialing.

G. If the other phone does answer, and the high-pitched carrier tone comes on, **Password** will send the message "CONNECT" to your terminal immediately. Once this contact is made, you can begin sending data to the phone you've just been connected with. You will also hear a high-pitched squeal **through the loudspeaker** as **Password** "shakes hands" electronically with the other modem and thus makes contact.

H. Once you start transmitting data, the modem will automatically turn off the loudspeaker so you don't have to listen to the odd noises involved in sending data over the phone line. If, for some reason, you wish to listen to the actual data transmission, type

<p style="text-align:center">"ATM2" <CR></p>

on your keyboard. Or, if you wish to suppress the loudspeaker entirely, type "ATM0" <CR>. If you wish to return to normal operation (in which the loudspeaker works until the two modems "shake hands"), type "ATM1" <CR> When you first turn the modem on, it will always be in the M1 condition and will remain in that condition until you command it to do otherwise.

I. If the other phone is busy, you can redial the same number a few moments later simply by typing "A/" on your keyboard. This command tells the modem to repeat the last command you gave it. If the last command is an "auto dial" command—as it would be in this case—**Password** will redial the number for you automatically.

Notice that you needn't hit the carriage return after typing "A/".

The "A/" command is particularly useful when you've asked the modem to dial a complicated number, and the line is busy the first few times you try. Each time you wish to redial, just type "A/." (But if you wish to keep on redialing, just make sure that you don't give **Password** another command in the meantime. For "A/" tells the modem to **repeat the last command you gave it.**

J. Your new modem can operate either with **pulse dialing** (found on older phones with rotary dials), or with **tone dialing** (modern "touch tone™" phones). When you first turn your modem on, it will operate on pulse dialing. But you can tell it to switch to tone dialing by using the command "ATT" <CR>. If you wish to return to pulse dialing, just type "ATP" <CR>. But note this point: The modem will **remain** in the last setting you've given it until you tell it to change.

K. You can switch from **pulse dialing** to **tone dialing** in the middle of a command. For example, suppose that your phone line will only accept pulse dialing (which is much slower than tone dialing). But suppose also that you subscribe to SPRINT, MCI, or some other alternate long distance service. All of these services accept tone dialing. So you can switch from pulse to tone once you're hooked into the long-distance service.

EXAMPLE: You want to call your local SPRINT number on pulse, then enter your SPRINT code number, then dial another phone.

(1). Type "ATDP" ("ATTENTION" "DIAL" "PULSE"). No "<CR>".
(2). Then type in the local SPRINT phone number, let's say 765-4321.
(3). Add 3 commas to give the SPRINT computer 6 seconds to answer.
(4). Next, type "T" to tell the modem to switch to tone dialing.
(5). Then type in your SPRINT account number (let's say it's 888-888).
(6). Add 3 more commas to give the computer time to process your call.
(7). Now, at last, you can add the phone number you want to reach (let's say it's 312-123-4567) <CR>.

"ATDP 765-4321 ,,, T 888-888 ,,, 312-123-4567 <CR>"

NOTE: As you may already have discovered, the computers that control SPRINT and other long distance services often make mistakes in "reading" the numbers you dial. The "A/" automatic redial feature of the **Password** modem is particularly useful if SPRINT (or any other such service) rejects your account number for any reason, or if the line is busy. Typing "A/" is surely much simpler than retyping the entire sequence of numbers.

L. WARNING: If you hit any key on the keyboard while **Password** is dialing (or waiting for a dial tone), the modem will **cancel the call immediately.** You must then retype the message "A/" to get the modem to redial.

M. Any command that you give to **Password** can be as many as 60 characters in length. For instance, you could type "ATMØ DT9, 765-4321" all on the same line before hitting CR. The modem would first shut the loudspeaker off, then dial the number. However, the **last command** in the sequence of commands must be the "dial" command, and there must be **only one dial command** per line.

N. After **Password** has executed the command(s), it will wait for 250 milliseconds (a quarter of a second) and then respond "OK."

AUTOMATIC ANSWERING

Now that you know how to make your new **Password** modem dial numbers, let's see how you can get it to answer the phone for you even when you're not around.

1. When you first turn the modem on, it's actually ready to do two things: either accept a command from your computer/terminal, or accept an incoming call over the phone.

2. If you want **Password** to **accept incoming calls** from other computers (even when you're not home), just turn on both your computer/terminal and the modem. When a call comes through, **Password** will send a high-pitched tone down the line, then send the message "ring" to the computer.

The modem will then "pick up the receiver" (go "off hook") and listen. But it does not **listen for voices.** Rather, it is listening for an answering high-pitched carrier tone. **Password** will wait for 17 seconds for this tone to return on the line. If the tone does come through, **Password** will send the message "CONNECT" to your computer/terminal. If no tone occurs after 17 seconds, the modem will send the message "NO CARRIER" to your computer terminal and "hang up."

3. Because **Password** will accept incoming calls, you can leave your computer and the modem "on line" while you're gone, and friends or business associates can call up your number and leave messages or data for you.

4. After an incoming call is completed, **Password** will hang up the phone and wait for the next incoming call.

> **NOTE:** If you are using the same phone line for conventional (voice) calls as well as computer messages, be sure to turn the modem OFF when you're not using it. Otherwise, it may answer the phone before you do. And since **Password** is insensitive to voices, it might disconnect incoming conventional calls before you could get to the phone yourself.

CHAPTER 5:
VOICE/DATA COMMUNICATION

As we noted on page 8, you may find it convenient to install an RJ11C duplexer, so you can connect both your modem and your telephone to the phone line at the same time. If you do so, you can then call up another line on your phone and talk to the person who answers. After establishing what baud rate and duplex condition the other person's modem accepts, both of you can turn the call over to your modems.

You turn the call over the the modem in the following manner:

1. **Without hanging up your phone**, type "ATD" <CR>. This command makes your modem the "originator" of the call.

2. The other party should type "ATA" <CR> to put his/her modem into the answer mode **before hanging up the phone.**

3. Once the two modems have "shaken hands" and thus are in communication with each other, both you and the other person may hang up your phones. The modems should maintain the phone link while transmitting data.

4. If you wish, rather than typing "ATA" one of you may depress and release the RNG dip switch on the back of the modem. Doing so puts the modem into the "answer mode" in the same fashion as typing "ATA" <CR>.

> **NOTE:** Sometimes several "garbage" characters will appear on your screen when you hang up the phone. You can avoid these "garbage" characters by hanging up your phone as soon as you hear the modem go "off hook"—that is, during the 1 to 2 seconds it takes the modems to "shake hands" and connect with each other.

CHAPTER 6:
IF YOU ENCOUNTER PROBLEMS

PROBLEM	SUGGESTED SOLUTION
Modem will not answer the phone, or go "off hook" to dial a number	Check to make sure that your computer/terminal is providing a positive voltage on pin 20 of the RS-232C plug. See "Data Terminal Ready Override" on page 29.
Modem doesn't respond "OK" when you type "AT"	1. Make sure you're typing in uppercase letters and that you've hit the carriage return after you typed "AT" 2. Make sure your computer is in "terminal mode" and check to see that it is sending on pin 2 of the RS232C plug. See "Send/Receive Data" on page 30. 3. Make sure your terminal is set to 300 or to 1200 baud. If your baud rate is okay, check your computer I/O board to make sure it is set properly. See "Bits Per Character" on page 29. 4. If your terminal requires pin 8 high, push 8HI dip switch to "ON" position. See Appendix D for description of dip switches.
Your computer reacts as if a data link has already been established when no call has actually been received	Check to see if you have the 8HI dip switch on. If so, turn it off because the system may be reacting to improper signals received on pin 8.
While in the "answer mode" your computer/ terminal reacts as if a carriage return had been received when no <CR> has been typed by the originating terminal	When a call comes in, the modem sends a carriage return and a line feed both before and after sending the words "RING" and "CONNECT" to your terminal. Your terminal may be misreading these signals from the modem. Typing the command "ATQ1" <CR> to put the modem in the "quiet" mode should eliminate the problem.

Modem dials the number for you, another modem answers and you get a carrier tone, but the two modems don't "shake hands" and thus no further communication takes place

1. Listen carefully to the sounds through the loud-speaker as the call goes through. The proper sequence for a low-speed (300 baud) call is: Answer modem answers and puts out a high-pitched, clear tone. Originating modem should respond with a lower-pitched clear tone.

   For a high speed call (1200 baud), the sequence is: Answer modem puts out a high-pitched, clear tone. Originating modem responds with a raspy sounding, lower-pitched note. Answer modem should switch to a raspy sounding, higher-pitched noise.

   If you don't hear the proper sequence over the loudspeaker, check to make sure you are transmitting at the proper baud rate.

2. If your modem is transmitting the proper tone signals, and still the "handshake" doesn't occur, it is likely that you have a poor-quality phone line and the other modem doesn't "hear" the actual tone your modem is transmitting.

   Because of the poor quality of microwave relays used by MCI, SPRINT, and other alternative long distance services, data transmission is often difficult if not impossible. Try several calls, and if you still can't get through, try dialing direct over the Bell lines. If you still have problems, try calling another modem to see if it will accept your call. If this second modem accepts your call, the problem lies with the modem you first tried to dial up.

3. Make sure the modem at the other end of the line is Bell 212A- or Bell-103-compatible. Some modems operate on frequencies other than the Bell standards. Unlike **Password**, these other modems do not meet Bell standards.

Your modem "shakes hands" with the other modem, but squiggly lines appear on your terminal when you are neither sending nor receiving signals

Chances are that you are transmitting at 1200 baud and there is some problem on the phone line that connects the two modems.

1. Try placing the call again. Even on local calls, the telephone network will route the call differently each time.
2. Try calling a different modem to see if the problem persists. If it does, the problem may still be with your phone line.
3. As we noted above, if you are using MCI, SPRINT, or some other long distance service that uses microwave carriers, you can expect mistaken transmissions fairly often. Dial direct over the Bell system to see if that clears the problem.
4. If your phone line is part of a PBX (Private Branch Exchange), the signal within the PBX may be strong and undistorted. Your modem has an equalizer that compensates for the average phone line. Turning this equalizer off—by turning the BAL dip switch to the "ON" position—may help.
   Also, the PBX may use digital encoding techniques which disrupt your calls. Your PBX vendor may be able to provide you with an "Analog Converter" which will allow you to use the modem on PBX lines.

Connection is made, but only "garbage" (random) characters appear on screen

1. Make sure that both **Password** and your computer or terminal is set at the same baud rate as the computer or modem you are calling.
2. Make sure that both **Password** and your computer or terminal is set at the same duplex setting as the computer or modem you are calling.
3. You might be calling an 11-bit computer. See "Bits Per Character" on page 29.

You get double characters on the terminal screen

1. If the modem is set at **half duplex**, set it to **full duplex** by typing the command "ATF1" <CR>.
2. If the modem is set at **full duplex**, make sure the "echo" mode is off by typing the command "ATE∅" <CR>.
3. Make sure that your computer/terminal is also set to **full duplex.**

IF YOU STILL HAVE PROBLEMS...
The problems described above are by far the most common ones that users encounter with the modem. If the suggestions we've given won't clear up your difficulties, try the following:

1. First, **read the manual carefully** to see if you've missed something.
2. Then, **call or visit the dealer** you bought the **Password** from. Chances are that your dealer will be able to give you just the assistance you need. Checking with your dealer **first** is a much more efficient and time-saving way of handling problems than returning the modem to U.S. Robotics.
3. If your dealer can't clear up your difficulties, call the U.S. Robotics Customer Service Department at 1-312-982-5151. Our Service Representatives will be happy to give you assistance over the phone Monday through Friday from 8:30 a.m. to 5 p.m. (Central Time Zone).
4. If necessary, the Service Representative you talk to may give you a "Returned Merchandise Authorization" number (RMA number). We will **not accept returned modems without an RMA number.**
5. If you do return the modem to us, please follow this procedure:
    a. Ship the unit **POSTAGE PAID** to us in its original container. If the original container is not available, pack the modem carefully in a strong box of corrugated cardboard with plenty of packing material and return it to us.
    b. Ship the well-packed modem to the following address:

    Customer Service Department
    U.S. Robotics, Inc.
    8100 McCormick Blvd.
    Skokie, Illinois 60076

    c. Be sure to include your RMA number inside the package, **along with your name and address.** Put your return address and your RMA number on the shipping label as well.
    d. Please note that U.S. Robotics **will not accept packages sent COD,** so be sure to send the modem POSTAGE PAID.
    e. If you follow these rules, U.S. Robotics will repair your modem and send it back to you **within one working day** after we receive it.

APPENDIX A:
LIST OF COMMANDS

NOTE: Remember that ALL COMMANDS (other than "A/") must be preceded by "AT" and that you must hit <CR> when you want **Password** to execute the command you've typed.

COMMAND   **FUNCTION**

A   Answer mode. This command ("ATA <CR>") puts modem in answer mode even though it hasn't received an incoming call. You may also put the modem into the answer mode by turning the RNG dip switch "ON."

A/   Re-execute last command. The modem remembers every command until the next command is entered. Typing "A/" tells the modem to re-execute the last command you gave it.

D   Dial a number and go into the originate mode (see Auto Dial)
  P   Pulse Dial
  T   Tone Dial
  ,   (Comma) 2 second pause

E   Echo mode
  EØ   Do not echo back commands (default)
  E1   Echo back commands

F   Duplex
  FØ   Half Duplex
  F1   Full Duplex (default)

M   Loudspeaker
  MØ   Loudspeaker always off
  M1   Loudspeaker on at beginning of call until carrier established (default)
  M2   Loudspeaker on during entire call (often useful for debugging)

P   Pulse Dial

Q   Quiet mode
  QØ   Result messages sent (default)
  Q1   Result messages "made quiet" (useful when modem messages would interfere with data stream)

S	Set register commands
	These commands are of the form Sx=n, where x is one of the S registers. Giving the command "ATS∅=7 <CR> will cause the modem to answer on the 7th ring.
S∅=n	Causes the modem to answer on the nth ring. The special case S∅=∅ may be used to disable the Auto Answer operation.
S2=n	Sets the escape code character (see below). The default is S2=43 (ASCII code for +).
S7=n	Length of time (in seconds) modem will wait for a carrier when originating a call. Defaults to 30. Especially useful when you are making international calls, where it may take over 60 seconds to reach the called party.
T	Tone dialing
V	"Terse" mode. In some instances, you may prefer for the modem to use numbers rather than words to inform you of what is happening, or what it is doing. Shifting from words to numbers is called "shifting from Verbose to Terse mode."
V∅	Terse mode. Modem responds with numbers rather than words
V1	Verbose mode (default). Modem responds with words. Typically, verbose responses are preceded and followed by a carriage return but no line feed.

RESPONSE CODES

Verbose Mode	Terse Mode
OK	$\emptyset$
CONNECT	1
RING	2
NO CARRIER	3
ERROR	4
CONNECT 1200	5

X   Set Result Code. These codes are the same as the "Response Codes" listed immediate above. They are also the responses that the modem sends to your computer/ terminal.

X$\emptyset$ Standard result code set ($\emptyset$ through 4 above). Default mode.

X1   Extended result code set ($\emptyset$ through 5 above). When you give the modem this command, it will respond CONNECT 1200 on high speed calls, and CONNECT on low speed calls. (See High Speed/Low Speed section on page 33 of this manual.)

Z   Reset. This command resets the modem to its default values, as if you had just turned the modem on.

+++   Escape code sequence. The modem can be forced to disconnect a data call and return to command state by sending it the code "+++" preceded and followed by at least one second of no data. This is the **only command** which the modem itself hears while online and connected to another modem. The escape guard time of one second protects against a "disconnect" that might result if the data stream contained "+++" somewhere in the transmission. You may also change the escape code from "+++" to anything else by using the S2 command.

APPENDIX B:
ADDITIONAL TECHNICAL DATA

DATA TERMINAL READY OVERRIDE ("DTR" Dip Switch)

When the 4th dip switch—marked "DTR"—is in the "OFF" position, the modem won't send or receive data unless your computer/terminal provides a high voltage on pin 20 of the RS-232C communications plug. Ordinarily, your computer/terminal tells the modem it is ready to receive data by providing this high voltage all the time. You can program your computer to turn the modem ON or OFF in the Auto Answer mode as you desire by having your computer provide the high voltage signal only when you want the modem to answer calls. Even after you have established a data link with another modem/computer, you can disconnect the call at any time by having your computer turn off the high voltage on pin 20. You may wish to use this capability of your **PASSWORD** modem in order to add security to your database system.

BITS PER CHARACTER

A single character of data is transmitted by your modem in serial format. Each character is made up of seven DATA BITS ($\emptyset$'s and 1's) that define that character. In addition, this information is preceded by a START BIT and trailed by a PARITY BIT and a STOP BIT for a total of 10 bits per character.

As we noted earlier, the term "baud rate" refers to "bits per second" transmitted by the equipment. A 1200 baud modem transmits 1,200 bits per second. At 10 bits per character, this rate equal 120 characters per second, or 120 CPS.

10 bits per character is the industry standard. However, some equipment is designed to function with 8 DATA BITS rather than the standard 7 DATA BITS. You may select 11 bits per character by closing the push-pull jumper switch (labeled J2) inside the modem.

Open the modem by unscrewing the four screws on the bottom of the unit. Locate the push-pull J2 jumper switch inside the unit (see drawing below). Push the switch down (closed) to select 11 bits. The factory setting is for 10 bits per character, by far the most common requirement for data transmission.


J2
JUMPER
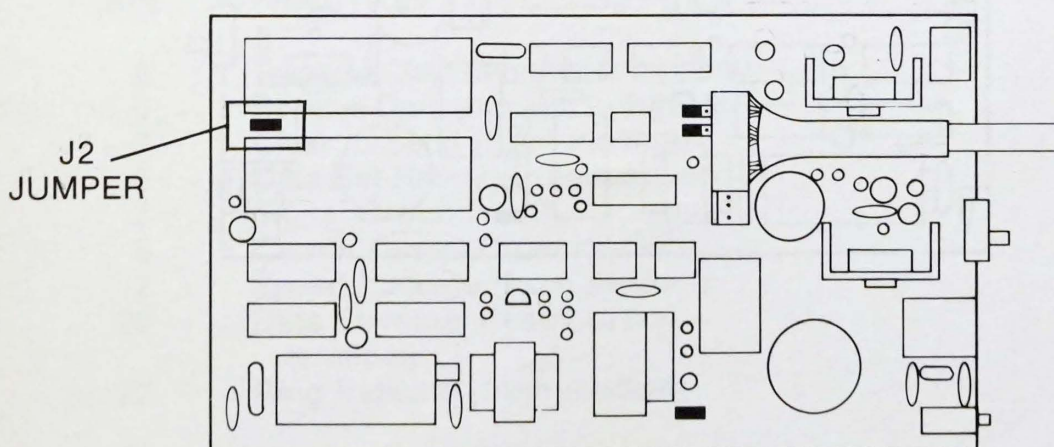
SEND/RECEIVE DATA

Pins 2 and 3 of the RS-232C communications plug are used to send and receive data between the **Password** modem and your computer/terminal. The factory setting provides for data to be sent out of the modem on pin 3 and received by the modem (from the terminal or computer) on pin 2. Some computer/terminals reverse these functions on pins 2 and 3. If this is the case with your computer/terminal, simply reset jumper switches J3 and J4 inside the modem.

CAUTION: Changing the function of pins 2 and 3 is rarely required. Before making a change, compare the RS-232C pin definitions of the **Password** modem (given later in this manual) with the definitions for your computer or terminal. NEVER SELECT A SWITCH SETTING OTHER THAN THOSE SHOWN IN THE TABLE BELOW. You may damage your equipment if you do so.

To reach jumper switches J3 and J4, unscrew the four bottom-panel screws on the modem and lift off the top half of the case. J3 and J4 are three-post connectors located at the base of the RS-232C cable attachment.
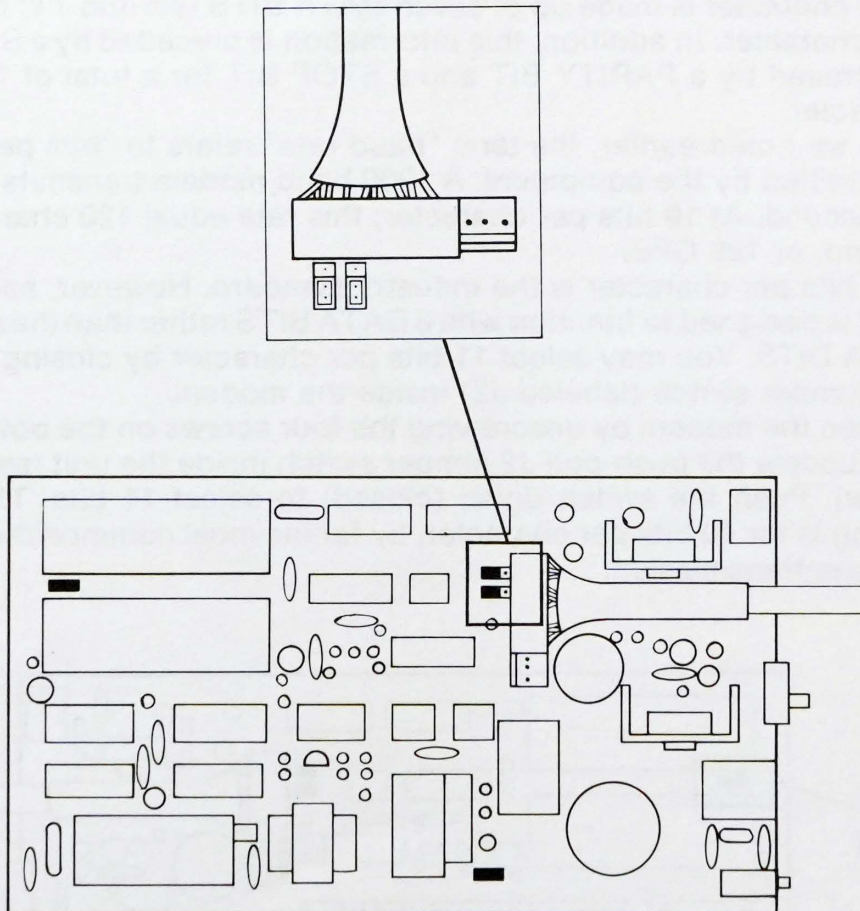
RS-232C PIN FUNCTIONS

FACTORY SET:
Pin 2—Receive from terminal
Pin 3—Transmit to terminal

ALTERNATE:
Pin 2—Transmit to terminal
Pin 3—Receive from terminal

JUMPER SWITCH SETTINGS

The jumpering shunt on each three-post connector should connect the middle post of the connector to the posts FARTHEST from the RS-232C cable interface.

The jumpering shunt on each three-post connector should connect the middle post to the post NEAREST the RS-232C cable interface.
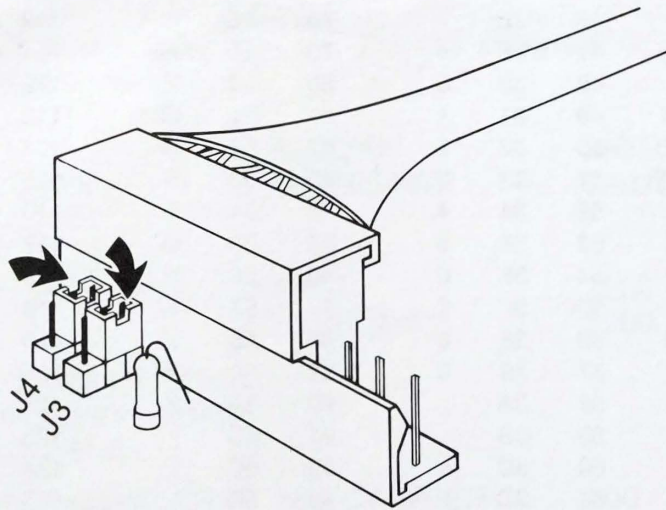
PINS IN ALTERNATE POSITION

RS-232C INTERFACE PIN DEFINITIONS (FACTORY SETTINGS)

PIN	FUNCTION
2	Transmit Data (terminal to modem)
3	Receive Data (modem to terminal)
5	Clear to Send (from modem)
6	Data Set Ready (from modem)
7	Signal Ground
8	Carrier Detect (from modem)
12	Speed Indicate (from modem)
20	Data Terminal Ready (from terminal)
22	Ring Indicate (from modem)

III. ASCII CHART

DEC	HEX	CHAR	DEC	HEX	CHAR	DEC	HEX	CHAR	DEC	HEX	CHAR
00	00	NUL	32	20	SP	64	40	@	96	60	`
01	01	SOH	33	21	!	65	41	A	97	61	a
02	02	STX	34	22	"	66	42	B	98	62	b
03	03	ETX	35	23	#	67	43	C	99	63	c
04	04	EOT	36	24	$	68	44	D	100	64	d
05	05	ENQ	37	25	%	69	45	E	101	65	e
06	06	ACK	38	26	&	70	46	F	102	66	f
07	07	BEL	39	27	'	71	47	G	103	67	g
08	08	BS	40	28	(	72	48	H	104	68	h
09	09	HT	41	29	)	73	49	I	105	69	i
10	0A	LF	42	2A	*	74	4A	J	106	6A	j
11	0B	VT	43	2B	+	75	4B	K	107	6B	k
12	0C	FF	44	2C	,	76	4C	L	108	6C	l
13	0D	CR	45	2D	-	77	4D	M	109	6D	m
14	0E	SO	46	2E	.	78	4E	N	110	6E	n
15	0F	SI	47	2F	/	79	4F	O	111	6F	o
16	10	DLE	48	30	0	80	50	P	112	70	p
17	11	XON	49	31	1	81	51	Q	113	71	q
18	12	DC2	50	32	2	82	52	R	114	72	r
19	13	XOFF	51	33	3	83	53	S	115	73	s
20	14	DC4	52	34	4	84	54	T	116	74	t
21	15	NAK	53	35	5	85	55	U	117	75	u
22	16	SYN	54	36	6	86	56	V	118	76	v
23	17	ETB	55	37	7	87	57	W	119	77	w
24	18	CAN	56	38	8	88	58	X	120	78	x
25	19	EM	57	39	9	89	59	Y	121	79	y
26	1A	SUB	58	3A	:	90	5A	Z	122	7A	z
27	1B	ESC	59	3B	;	91	5B	[	123	7B	{
28	1C	FS	60	3C	<	92	5C	\	124	7C		
29	1D	GS	61	3D	=	93	5D	]	125	7D	}
30	1E	RS	62	3E	>	94	5E	^	126	7E	~
31	1F	US	63	3F	?	95	5F	_	127	7F	DEL

APPENDIX C:
HIGH SPEED/LOW SPEED PROTOCOL

In ORIGINATE MODE, if the extended result codes are in effect, the modem operates at whatever baud rate your terminal/computer uses to give it commands. The modem will respond "CONNECT," "CONNECT 1200," or "NO CARRIER" at the baud rate of your terminal.

In AUTO ANSWER MODE, the modem must let your computer know whether a High Speed or a Low Speed call is coming in. The modem does this by raising the voltage on pin 12 of the RS-232 interface for a high speed call, and by lowering the voltage on pin 12 for a low speed call. It also responds "CONNECT" for a 300 baud call, and "CONNECT 1200" for a 1200 baud call if the extended result codes are in effect. The modem will give these responses to your computer at the old baud rate before changing to the new baud rate. If the modem is powered up and no commands are issued to it, it defaults to 1200 baud.

If your computer does not respond automatically to incoming calls at different baud rates, you may be able to program it do so. Use the following example as a guide:

ACTION	MODEM RESPONSE	MODEM RESPONSE BAUD RATE
1. Power on.		
2. Low speed call comes in.	RING CONNECT	1200 1200
3. Data link is established. Data transmission takes place at 300 baud.		
4. End of data session. Call is ended. Loss of carrier.	NO CARRIER	300
5. High speed call comes in.	RING CONNECT 1200	300 300
6. Data link is established. Data transmission takes place at 1200 baud.		
7. End of data session. Call is ended. Loss of carrier.	NO CARRIER	1200

NOTES REGARDING THE ABOVE EXAMPLE:

1. The modem is powered on. No command is initially given to the modem, so by default it operates at 1200 baud.

2. A remote terminal or computer with a 300 baud modem calls your number. The **Password** modem senses the incoming ring signal and sends the messages "RING" and "CONNECT" to your computer/terminal via the RS-232 interface. These messages are sent at 1200 baud since your modem has been operating at 1200 baud since it was turned on.

3. Since the **Password** modem responded "CONNECT" rather than "CONNECT 1200," your computer must recognize that the incoming call is at 300 baud and adjust accordingly. After sending the message "CONNECT," the **Password** modem automatically shifts to 300 baud operation to accept data from the incoming call.

4. The data session is ended and the modem drops the carrier. It responds "NO CARRIER" to your computer via the RS-232 interface. Since it was last operating at 300 baud, this response is sent at 300 baud.

5. A high speed call comes in. The modem responds "RING" and "CONNECT 1200." Since the modem was last operating at 300 baud, this response is sent at 300 baud.

6. Since the **Password** modem responded "CONNECT 1200" rather than "CONNECT," your computer must recognize that the incoming call is at 1200 baud and adjust accordingly. After sending the message "CONNECT 1200," the **Password** modem automatically shifts to 1200 baud operation to accept data from the incoming call.

7. The data session is ended and the modem drops the carrier. It resonds "NO CARRIER" to your computer via the RS-232 interface. Since it was last operating at 1200 baud, this response is sent at 1200 baud.

8. To put the matter simply, you must program your machine to shift to 1200 baud when it receives the "CONNECT 1200" message from the modem, and to shift to 300 baud when it receives the "CONNECT" message from the modem.

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APPENDIX D:
THE FOUR DIP SWITCHES

As we noted earlier, if you are using a regular phone line and a popular brand of computer, chances are you should leave the dip switches in the "OFF" position. However, if you have a special circumstance, read through this section to determine what you should do.

1. RNG = RING
    OFF = Auto Answer (for most regular phone lines where you "dial" numbers)
    ON = Continuous Answer (for special phone lines that connect **just two phones**)

Unless you have what is called a "dedicated line" that hooks up just two phones—and that can't be used to dial any other phones—leave this dip switch in the "off" position.

2. 8HI = PIN 8 HIGH (CARRIER DETECT signal)
    OFF = RS232 pin 8 goes high and low with carrier detect
    ON = RS232 pin 8 clamped high

If you are working with a terminal, you may need to turn the 8HI switch "ON" to unlock the terminal's RS-232 port for transmission of modem commands to **Password.** If you are working with a computer, however, leave the 8HI switch "OFF" so that the computer's communications software can read the actual status of the communications link.

3. BAL = BALANCE (LINE EQUALIZATION)
    OFF = Standard phone line
    ON = Very short line

If you are using your modem over a standard dial-up network (such as Bell, GTE, etc.), leave the switch "OFF." If you are using the modem on a closed inter-office phone system, PBX, or very short dedicated line, turn the BAL switch "ON."

4. DTR = DATA TERMINAL READY
    OFF = Computer pin 20 controls modem
    ON = DTR override, modem ignores pin 20

If you are using a terminal, it should be sending a high voltage on pin 20 of the RS-232, and you can leave the DTR switch "OFF." If you are using a computer, however, you may need to turn the DTR switch "ON," unless you know your computer is using DTR for security control.

APPENDIX E:
THE WORLD OF DATA COMMUNICATIONS

I. INTRODUCTION

Now that you have a modem and, presumably, a computer or terminal, you are now ready to enter into one of the most amazing aspects of computing—the world of data communications. With the **Password** modem, you can now link up with The Source™ and other public information utilities, with time-sharing services offered by universities and larger corporations, and with friends and associates almost anywhere in the world. You can send messages via electronic mail, download programs, read about news almost as it is happening, and utilize the enormous facilities of mainframes. The possibilities are limitless.

You probably already have a few ideas as to how you will use your modem. There may be, however, some applications which you haven't considered. The other parts of this manual explain how to make your modem work; this chapter deals with the many ways you can make your modem work for you.

The most important thing to remember about data communications is that it is difficult, even for advanced users, to make everything work right the first time. Always feel free to "play around" with your set-up; in doing so, you'll learn a great deal, and you just may discover an application for it that you've never considered.

II. WHAT YOU NEED TO GO "ON-LINE"

Essentially, all the equipment you need to dial up a host computer over the phone lines is a modem, a computer or terminal with an RS232C port which utilizes ASCII characters, and a phone wall-box with an "RJ11C" jack (the kind that fits the phone cord provided with your modem). These are the absolute necessities.

With the above equipment, however, your computer may function only as a "dumb terminal", that is, only your computer's keyboard, CRT screen, and RS232C port are operational. This is so your computer won't attempt to interpret commands you are sending on-line.

To send or receive files of information, to record an on-line session, to store phone numbers with individual log-on procedures, or to download programs, you need "telecommunications software", such as U.S. Robotics' TELPAC. Telecommunications software controls your computer so that it can go in and out of the "terminal mode"; it goes into terminal mode to actually transmit a small block of data, out of it to record the data, back in to transmit another block, and so on. In this manner, you may send large files of information, programs, or even get out of an on-line session to run your own programs, then back in to send the results. Telecommunications software, furthermore, usually has the capacity to store phone numbers for easy dialing, even with the log-on procedures necessary to connect to a host computer. Software gives you a lot of potential in data communications, and makes the whole thing much easier to operate in general.

With your modem, terminal or computer, and telecommunications software, you are now ready to begin transmitting data.

III. THE PUBLIC INFORMATION SERVICES

One of the main uses of modems is to link up into professional on-line services. There are a large number of services available; the following is a partial list of offerings.

1. The Source™: A public information service offering news, airline schedules, games, electronic mail, user group bulletin boards, and consumer services such as a shop-at-home service.

2. Comp-U-Serve™: Another public information service which offers news, games, travel schedules, electronic mail, bulletin boards, and consumer services.

3. Dow Jones News/Retrieval Service™: An information service which provides up-to-the-minute business news, access to stock prices and the Dow Averages, detailed reports on all publicly-held companies, and more.

4. NewsNet™: A service which offers access to over 150 newsletters covering specific industries, businesses, and markets. It has a "search" feature which allows you to search for and retrieve articles covering a variety of topics.

5. Dialog™: A service which will search and retrieve articles on almost any topic. This service is for more advanced users; for example, seminars on the use of Dialog are offered periodically across the USA.

6. BRS After Dark™: A version of the well-known library search service, BRS, offered to general consumers. It is in operation only from 6 pm to 6 am. You can search for and retrieve the titles of almost any article published in the United States and abroad, on every topic.

7. MCI Mail™: A service which offers 4 types of electronic mail. You can send a letter or message, for $1, to another MCI Mail subscriber (it will sit in his "mail box" to be accessed whenever he calls up the service). For $2, you can send a letter electronically to anywhere, where it is printed out and deposited in the local mail system and delivered, usually in about a day. You can send a letter across the country electronically, guaranteed to be delivered by noon the following day, for $6. And, for $25, you can send a letter to most locations in only 4 hours.

8. Official Airline Guide™: This is a service allowing you to access the schedules of any airline. It can aid in routing you to a location, determine the cheapest flight available, and create a flight plan which fits into your particular time constraints.

Of course, this list is by no means complete; these are only some of the most popular services now available. For a more complete list, consult one of the many books on information services, such as INC. Magazine's GUIDE TO DATABASICS.

IV. BULLETIN BOARD SYSTEMS (BBS)

Bulletin Board Systems, or BBS's, are, in effect, message boards, similar to those found on the walls of supermarkets. They are computers which allow you to either place messages for others to read, or to read the messages yourself. Generally, there is no cost to access these systems. Often they are "machine specific", that is, a central place of interaction for all users of a specific machine, such as Apple.

Bulletin Board Systems abound (because the cost of maintenance is very low), and vary from small systems run by hobbyists to huge multi-user access systems, as are run by many universities. Sometimes they are for specific purposes—in Chicago, there is one for electrical engineers and designers—while in other cases they are wide open. Many "user groups", clubs for owners of specific machines, run bulletin boards for their members.

Because they are often run by hobbyists in their spare time, BBS's come and go frequently. As such, it is impossible for me to list them here. To find out about BBS's in your area, consult user groups, university computer centers, or other computer users. There also exists a variety of books which list bulletin boards now in use, often divided regionally.

Because the cost to access BBS's are low—usually there is NO cost—they represent a great way to explore the uses of your computer and modem. At the same time, they are often timely sources for information, as well as a chance to interact with other computer users.

V. OTHER DATA COMMUNICATIONS POSSIBILITIES

In relation to business, the best way you can utilize your modem is to connect permanently to another computer. For example, you can link up your inventory computer to your accounting computer, or link a computer in your home to your office computer. Writers can link up to their publisher's typesetting computer.

Your **Password** modem can successfully hook up to any other computer which uses a "Bell compatible" modem. Bell set the standards for low- and medium-speed transmissions, and modems which are Bell-compatible can successfully connect together. As I said before, when you are actually transmitting, your computer functions only as a dumb terminal; hence, it doesn't matter if your personal computer's operating system or software is compatible to the host computer or not. If there's a Bell-compatible modem at the other end, connection should be no problem.

Before you get the wrong impression, however, limitations DO exist. If you plan to transmit blocks of data, your telecommunications software must be compatible to the software of the host; that way, when your software sends the message "I'm sending you some data now", the host computer will understand what it is saying. The most universal "protocol" (i.e. characteristics of the software) in telecommunications is the "Ward Christensen protocol", such as his program "MODEM". Christensen-compatible software all use the same commands to "talk" to one another.

Secondly, compatibility presents a problem when data has been transmitted. If you have just received information from a host computer, your computer must be able to "read" it, and that takes compatibility between host and remote computers. If you have just sent a new program you've written to another user, his machine must be able to run it as well.

Because of the exhaustive amount of considerations which must go into determining compatibility—as you may already have discovered—I cannot lay down a set of rules concerning it. As a rule of thumb, however, remember this: if you plan merely to access another computer, to go on-line and manipulate data within that computer (say to run programs on it), then compatibility presents no barrier. If, however, you plan to send or receive large blocks of information, download programs onto your own system, or use your computer in any way other than as a dumb terminal, then compatibility IS an issue. There are two ways to determine compatibility: the first is simply try it out and see; the second is to consult either specialists, other users of your specific machine (such as user groups), your dealer, or one of the many books available on computers.

VI. A FINAL WORD

Of course, there are a lot more things you can do with your modem than what is listed here; this serves only as an introduction to the world of computer communications. Probably the best source of advice on going on-line is other users, so I recommend that you seek them out. Look up user groups meeting in your area. Talk to your dealer. Call your local university. More than just helping you go on-line, these sources may be able to provide you with solutions to other problems you may be experiencing with your machine.

APPENDIX F:
GLOSSARY

ACOUSTIC COUPLER: A device which modifies electrical waves into audio (sound) waves, then transmits them over the phone lines via a telephone handset. These are the older types of modems.

AMPLITUDE MODULATION: A mode of transmission where the 1's and Ø's in a data stream are differentiated by varying the amplitude of the carrier signal.

ANALOG: In data communications, the type of electrical signal which is transmitted over the phone lines. See also "Digital".

ASCII: American Standard Code for Information Interchange. The seven-bit-plus-parity character code established by the American National Standards Institute to achieve compatibility between systems.

ASYNCHRONOUS TRANSMISSION: Transmission in which the length of time between transmitted characters may vary. Transmission is controlled through the use of start and stop bits at the beginning and end of each character.

AUTO ANSWER: A feature in modems allowing the device to answer an incoming call from over the phone lines without requiring a telephone receiver.

AUTO DIAL: Same as above, except with dialing instead of answering.

BANDWIDTH: The range of frequencies over a line, or the difference between the lowest and highest frequencies, measured in Hertz. For example, the bandwidth of "Voice grade" lines is from 300-3400 Hertz.

BAUD: A unit of signalling speed equal to the number of "signal events" transmitted in one second. "Baud" equals "Bits per second" only when the signal event equals exactly one bit.

BINARY DIGIT (BIT): The characters "1" or "Ø" in binary notation. "Bit" is the common abbreviation.

BYTE: A set of binary digits equalling one character.

CARRIER: A continuous frequency capable of being either modulated or impressed with a signal.

CCITT: Comite Consultatif Internationale de Telegraphie et Telephonie. An international organization which establishes the standard for transmissions internationally.

CHARACTER: A coded representation of an alphabetic character, a number, or a symbol.

CROSSTALK: Interference caused by the transfer of electrical energy from one telephone line to another.

CYCLIC REDUNDANCY CHECK: A method of error detection whereby an equation known to both sender and receiver is used to "add up" the bits in a transmitted block. Errors are detected by comparing the values gained from the equation to see if they are equal.

DATA COMMUNICATION EQUIPMENT (DCE): The equipment which initiates, maintains, and terminates transmission between two data sources. This is the device which does all the coding and translation necessary, and may or may not be an integral part of the DTE.

DATA TERMINAL EQUIPMENT (DTE): The equipment which is composed of the data source, the data sink, or both.

DEDICATED (LEASED) LINE: A non-phone-system line which is used to connect a limited number of data sources together for one customer.

DEMODULATION: The process whereby an analog signal, such as is transmitted over the phone lines, is converted into a digital signal so that the computer can manipulate it.

DIGITAL: In data communications, the signal which the computer manipulates within its own confines. Modems must convert this into analog to transmit it over the phone lines.

ELECTRONIC INDUSTRIES ASSOCIATION (EIA): An organization which establishes the standard for electrical interface equipment. (Often, RS232 ports on the back of computers are labelled "EIA".)

EQUALIZATION: The process which conditions a particular line in order to transmit signals correctly.

FREQUENCY MODULATION: A method of transmission whereby 1's and Ø's are differentiated by varying the frequency of the signal.

FREQUENCY SHIFT KEYING: A method of frequency modulation whereby the frequency, at various moments, is made to vary either fluidly or abruptly. Often, 1's and Ø's are each sent on separate frequencies.

FULL-DUPLEX: Simultaneous, two-way transmission over a line.

HALF-DUPLEX: Transmission over a line which can go in both directions, but only one at a time.

HERTZ: A unit of frequency equal to one cycle per second.

HOST COMPUTER: A computer which can be accessed over the phone lines.

INTERFACE: A shared connection between two pieces of electrical equipment.

MODEM (MODulator-DEModulator): A DCE device which converts digital signals (from the computer) into analog signals, so they can be transmitted, and which converts analog signals (from the phone line) into digital signals, which the computer can understand.

PARITY CHECK: A method of error detection whereby one bit in a byte, not part of the seven information bits, is added to the information bits to produce either an even number ("even parity") or an odd number ("odd parity"). These numbers are compared by the sender and receiver to detect errors.

PHASE MODULATION: A method of transmission whereby the 1's and Ø's in a data stream are differentiated by varying the phase of the carrier wave.

SERIAL TRANSMISSION: A method of transmission whereby the bits in a data stream are sent one at a time.

SYNCHRONOUS TRANSMISSION: A method of transmission where a group of bits are sent at regular intervals. No start or stop bit is necessary.

VOICE-GRADE LINE: A telephone line primarily used for the transmission of the voice. The range is from 300-3400 Hertz. It is also sometimes used for analog data transmission.

APPENDIX G:
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NOTIFYING THE TELEPHONE COMPANY:

Before you install your **Password,** you should notify the telephone company that you plan to use a modem on your phone line. You will need to give the company the following information:

1. The telephone number (or numbers) to which **Password** is to be connected.
2. The FCC registration number, FCC68 CJE794-11323-DM-E, which is shown on the bottom of the unit.
3. The "ringer equivalence," which is 0.4.

You should also inform the telephone company if you permanently remove the **Password** from your phone line.

If the telephone company has any questions or raises problems, ask them to call U.S. Robotics, Inc., at (312) 982-5151.