This chapter will give you an idea of what the DCM-212 can do in the Tandy
protocol mode. The Videotex Plus communications package for Tandy's Model
II,12,16, and 6000 microcomputers is used in the following sample sessions.
With this package, you can communicate with a variety of information
services and host computer systems. The examples will help familiarize you
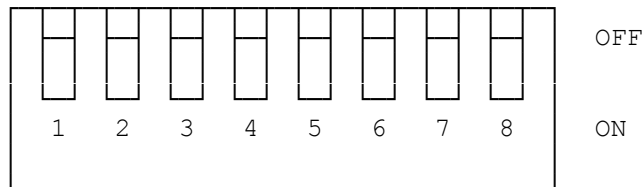with some of the operations the modem is capable of performing.

If you are using an MS-DOS operating system, feel free to move to the auto
logon session in Chapter 3, HAYES PROTOCOL MODE OPERATION, that uses
DeskMate's Telecom application. XENIX users might want to skip to Appendix
D.

For a detailed discussion of all the available commands in Tandy protocol,
refer to Appendix A.

SAMPLE PROGRAMMING SESSIONS

All modem functions are controlled by ASCII-encoded commands that you send
from your computer keyboard.

1. Check again that all peripherals are correctly connected and receiving
   power.

2. Set the DIP switches as follows:

```
   ┌───────────────────────────────────────┐
   │  ┌─┐  ┌─┐  ┌─┐  ┌─┐  ┌─┐  ┌─┐  ┌─┐  ┌─┐ │    OFF
   │  │ │  │ │  │ │  │ │  │ │  │ │  │ │  │ │ │
   │  └─┘  └─┘  └─┘  └─┘  └─┘  └─┘  └─┘  └─┘ │
   │   1    2    3    4    5    6    7    8  │    ON
   │                                        │
   └───────────────────────────────────────┘
```

3. Flip the power switch on the modem's front panel to the ON position.

4. Load and run the Videotex Plus communications program as described in
   your user's guide.

5. At TRSDOS Ready, type VIDTEX <ENTER>. TERMINAL READY indicator lights.

6. Set the communications protocol (bit speed, word size, parity, and stop
   bits) that you want to use.

7. Open the DCM-212 Modem for programming by typing the wake-up command
   sequence: <*> <.>.

You might notice that the * does not echo until you press <.>. That's
because both keys are needed to determine the parity. When the correct
operation speed is detected, the character * (Hex 2A) is output.

The modem is now in the command receptive state and is waiting for you to
begin programming of setting the internal switches that will tell it what
operations are to be performed.

8. When the * echoes on your computer screen, press <L> (LIST command) to
   display or list the modem's current parameters, When cold-started, the

screen shows the following:

```
                          PHONE NO:
                          ABORT CHAR: OF
                          LOSS OF CARR: Y
                          SEND SPACE: Y
                          RECEIVE SPACE: Y
                          ABORT ENABLE: Y
                          HIGH SPEED: Y
                          ANALOG LOOP: N
                          ORIG MODE: Y
                          MANUAL MODE: N
                          FORCE CAR-DET: Y
                          PULSE DIAL: Y
                          SLOW DIAL: Y
```

After the parameters are listed, the modem returns to the command receptive state and waits for further instructions.

COMPUSERVE LOGON

CompuServe Information Service is widely known for its numerous on-line service for both business and home computer owners. Dedicated telephone numbers in major cities provide you access to CompuServe. Use you information service user's guide to find out how to contact and use the service.

Since the DCM-212 is already in the command receptive state--waiting for your command--all you have to do to begin the logon is prepare the modem to dial the information service access number.

1. Press <D> to place thee modem in the dialer programming mode. For
   example, if you enter (111)555-1234 as your local 1200 bps access number,
   the sequence appears as: D(111)555-1234

2. When the phone number is properly formatted (see D command, Tandy
   Protocol Reference), press <X> to force the modem to execute the switches
   and seize the telephone lines and to begin dialing the number. OFF HOOK
   indicator lights.

The screen shows: DIALING...(111)555-1234

3. When the dialing is successful, the screen shows: CONNECT 1200

If you have selected low speed mode operation, the screen shows CONNECT.

DIALING...and CONNECT are the result codes (discussed later in this section) that keep you informed of the status or progress of a phone call. If you receive a ? instead of the message shown, you probably entered a key that the modem does not recognize.

4. Press <CTRL> <C>, and when the screen prompts, type the User ID number
   that you received with the software package. USER ID:

5. Next, when the prompt appears, type the password that you received with
   the software package.   PASSWORD:

To retain the secrecy of your password, it is not printed on the screen.

At this point, your logon to CompuServe is complete, and you can begin using the service. To use other information services and host systems, simply substitute thee appropriate dialog as provided in the information service user's guide.

ANSWER OR ORIGINATE A CALL AUTOMATICALLY

When communication with the information service is completed, the modem reverts to the disconnect mode. To program the modem to monitor the telephone lines for incoming calls, enter:

<*> Wake up!
<A> Select answer mode.
<X> Do it.

The modem displays the message WAITING FOR RING and waits for the telephone to ring.

To change the operation mode from auto-answer to auto-originate again (assuming no other call has been made and the modem is waiting for the telephone to ring), press <*> <.> to turn off the call waiting mode, Then, program the modem to dial (originate) a number by entering:

<O> Select originate mode.
<X> Do it.

OFF HOOK indicator lights. The modem seizes the phone line and begins dialing the access number that you used earlier. Any number entered in the dialer memory remains intact until a new number is entered, the modem is turned off, or the Dialer Memory is erased. (See "D" + "C" commands.) When the call is completed, the modem goes back off line, and communication ends with the DISCONNECT prompt.

Automatically answering and originating calls is discussed in more detail in the section AUTOMATIC MODE OPERATIONS.

ADVANCED PROGRAMMING OPTIONS

When the DCM-212 detects a busy signal after dialing a number, the message BUSY is printed on the screen. (The modem enters the disconnect mode.) If the modem is programmed to redial a number that was busy, a second attempt is made after a 60-second delay. This cycle--disconnect, wait, redial, disconnect, wait,...--continues until the number of programmed attempts is completed or until you cancel the process with the <*> command.

To change the default dial attempts setting, follow these steps:

<*> <.>   Wake up!
<I>   Bring the advanced programming options to the screen.

1. Press <ENTER>. The DIAL ATTEMPTS prompt appears on the screen. DIAL
   ATTEMPTS:1?

2. Change the default number to a value other than 1 by typing a new number.
   Press <ENTER> (six times) to scroll through all the options and exit the

menu.

3. Press <D>, enter the phone number you want to dial, and press <X>.

As you might have noticed, the I command has seven other options in addition to the dial attempts setting. For more information, refer to I command in Appendix A.

MANUAL MODE OPERATIONS

When operating in manual mode, you can control the system by manually dialing and answering the telephone. Manual mode (answer or originate) is useful when you want to talk by telephone to a friend at a remote location and later exchange computer data without redialing.

EXAMPLE 1: MANUAL ANSWER MODE

The phone rings, and you answer by picking up the receiver. After talking a while to your friend, you decide to exchange information by computer (telecommunications) without breaking the voice call:

1. Your friend selects to be the originating station, while you are the answering station. Remember that automatic originate mode is a preset condition at initial power-up, so you must set up your modem by entering:
   <*> Wake up!
   <M> Select manual mode.
   <A> Select answer mode.

2. Give your friend time to set up the originate modem.

3. Press <X>. The modem transmit a carrier tone.

The carrier is the sound you hear through the built-in speaker or when you pick up the receiver while the modem is communicating with another modem. The carrier tone sounds similar to running water or static during high speed operation and is a steady, pure tone during low speed operation.

4. The answer station always issues the X command first. After hearing the answer modem's carrier tone, the originate station sends the X command to complete the connection, and the screen prompts: CONNECT 1200 (OR CONNECT IN LOW SPEED MODE)

Hang up both handsets.

Be sure to keep quiet when the handset is off hook--noise picked up could cause errors in the data being passed by the modems.

Also, be careful when you hang up the telephone since slamming or dropping the phone back on hook while the modems are controlling the lines can disrupt carrier long enough to start a loss-of-carrier disconnect sequence.

To return to voice communications after transmitting data:

1. Carefully pick up the handsets (both modems).

2. Using the keyboard, type that you are aborting carrier. For example, you might signal your friend by typing: THAT'S ALL! I AM ABORTING CARRIER.

3. Be sure your handset is off hook, and then enter the abort character
   <CTRL> <O> to force the modem off line.

After 3 seconds of inactivity, your modem logs out with the DISCONNECT
prompt, and your friend's modem (if automatic) shuts down, too.

If your computer does not have the <CTRL> key, refer to your computer manual
to find out the key of hex value 0F, or change the abort character using
abort character redefinition @. Refer to Appendix A, @ command.

EXAMPLE 2: MANUAL ORIGINATE MODE

1. Assume your friend selects answer mode this time and you have to set your
   modem to originate mode. First, return the DCM-212 to command receptive
   mode, and then check the current parameters:

<*> <.> Wake up!
<L>   List current parameters.

2. The mode parameters should show:

     ORIG MODE: Y
     MANUAL MODE: Y

If not, change the parameters by pressing <O> (originate mode) and <M>
(manual/automatic toggle).

3. Wait for the carrier from the answer modem. When you hear it, press <X>.
   The screen prompts: CONNECT 1200

Continue by following the procedures in Example 1.

AUTOMATIC MODE OPERATIONS

You can program the DCM-212 to make a call or answer your telephone
automatically. In the automatic mode operation, you can call an information
service without picking up the phone--just type in the phone number on your
computer keyboard. You can also tell the modem to auto-answer your
telephone.

EXAMPLE 3: AUTOMATIC ANSWER MODE

1. To program your DCM-212 to answer incoming calls, press <*> <.> to wake
   up the modem, and then press <A> to send the answer command. Remember,
   if this is a cold start-up, the DCM-212 will default to automatic
   originate mode, and you must press <A> to select answer mode. The
   display shows: *A

To check that all the parameters are set correctly, press <L> for the list
command, and look for the ORIG MODE and MANUAL MODE parameters. Then, press
<X> to force the modem to monitor the phone line.

2. The modem prompts WAITING FOR RING and waits for the telephone to ring.

3. When the phone rings, the modem begins counting the rings, and the screen
   shows the message RING for each ring. After two rings, the modem answers

by seizing the telephone line and asserting carrier. The calling modem
replies with its carrier. Then the screen shows: CONNECT 1200

The modems are now in ON-LINE status, and telecommunications can begin.

When the modem does not receive a valid tone from the other modem within 30
seconds, it cancels the call and sends the message NO CARRIER. The DCM-212
then returns to the auto-answer mode.

If you break the connection after a successful data exchange, the DCM-212
send the message DISCONNECT. If the modem at the other end breaks the
connection, the DCM-212 alerts you by sending the message NO CARRIER. In
either case, the DCM-212 returns to the auto-answer mode and monitors the
line.

Regardless of the number of calls received or the number of calls that
transferred computer data to your system, the DCM-212 will always return to
the call-waiting state. You can turn off this call-waiting mode by pressing
<*> <.>. When the modem detects the * . command, it returns to the command
receptive state.

NOTE: The parameters are still not changed! If you want to return to the
auto-answer mode, send the X command. If you want to make an outside call,
press <O> (originate mode) to take the modem out of the answer mode.

The ring number is set to 2 at power-on. This means your modem will seize
the phone line after two rings. When you want to change this number, use
the I command.

EXAMPLE 4: AUTOMATIC ORIGINATE MODE

When you want to call another modem but do not want to dial it yourself,
you can program the DCM-212 to dial using the auto-originate mode.

1. Press <*> <.> to wake up the modem. When you turn on the modem, it
   defaults to automatic originate mode. Press <L> to check the modem's
   current parameters. These commands echo as *L.

If your listing does not show MANUAL MODE:N and ORIG MODE:Y, press <M>
and/or <O>.

2. Enter the D command to program the dialer memory--tell the modem what
   number to dial. After typing the phone number, press <X> to force the
   modem out of the command receptive state and to begin dialing the number.

When the X command is received, the DCM-212 outputs a carriage return and
line feed. Then, it seizes the telephone line and outputs to the computer:
DIALING...telephone no.

Each number dialed is flashed on your screen in the sequence and speed
specified. See PROGRAMMING COMMANDS in Appendix A for fast and slow
signaling rates.

3. When the carrier tone is heard, the modem sends the message: CONNECT or
   CONNECT 1200

When the DCM-212 reaches the end of its programmed dialer memory, another

carriage return/line feed is issued, and the modem's line status circuitry
checks the progress of the call made.

The types of line conditions detectable by the modem are discussed below.

LINE STATUS CONDITIONS

After a number has been successfully dialed, one of three status conditions
results: ring back, busy signal, or re-order signal.

LINE CONDITION 1--RING BACK

When the modem hears the phone ring, the message RING... is displayed. Each
ring cycle detected by the modem is counted until the ringing stops. The
modem stops counting when the telephone receiver is picked up of if the
modem is programmed (using the I command) to cancel a call that is not
answered in a designated number of rings.

When the ringing stops, the modem checks for carrier. When it detects the
carrier, it outputs the message CONNECT. As soon as the carrier tone is
received from the called modem, you can begin communications. You are now
in the on-line mode.

LINE CONDITION 2--BUSY SIGNAL

When a busy signal is detected, the message BUSY appears on your display.
The modem disconnects from the telephone lines and returns to the off-line
waiting state until it receives the wake up command.

If the modem's DIAL ATTEMPTS parameter (see I command in Appendix A) is
programmed for a number other than 1 (the default number), the redial
sequence is activated. After the first attempt, the modem automatically
waits for about 60 seconds. Then it seizes the line, dials the number,
 and monitors the progress of the call.

If the line is still busy, the DCM-212 hangs up and starts the process
again. When the modem is programmed for two dial attempts and has tried
twice but failed to complete the call, everything stops, and the modem
enters the off-line state. If programmed for more than two dial attempts,
the modem waits for 60 seconds and tries again. The modem keeps trying
until the specified number of attempts is completed, the message CONNECT
is printed to the display.

LINE CONDITION 3--RE-ORDER TONE

The re-order tone is a beeping tone the telephone company uses to tell you
that something is wrong. Either your modem's numeric data is incorrect, you
dialed too fast or, for some reason, the call can not be processed. The
modem will not try to dial again.

DIAL SEQUENCE EMERGENCY SHUTDOWN COMMAND

When you discover that the modem is dialing an incorrect telephone number or
you do not want to wait for the time out to expire after having executed the
dialer command with the X command, you can turn off the dial sequence. Just
enter any character. The dialer command is shut down, and the modem returns
the message: DISCONNECT.

BUSY NUMBER REDIAL INTERRUPTION

While the modem is in the 60-second timer delay (before making another
attempt to redial a busy number), you can interrupt the process by pressing
<*>. The wake up command forces the modem into the command receptive state
and aborts the busy redial mode.

ON-LINE MODE ABORT

There are four conditions that will abort an on-line status while you are
communicating over the telephone lines.

* Loss of carrier
* Loss of data terminal ready (DTR)
* Reception of a long space
* Transmission of the abort character

CONDITION 1--LOSS OF CARRIER

The carrier is the sound you hear if you pick up the receiver while the
DCM-212 is in communications with another modem. During low speed (300 bps)
operation, the carrier sounds like a steady, pure tone. You can hear a
change in the pitch of the tone if you type on the keyboard. In high speed
operation (1200 bps), the carrier sounds like running water, or static.

Regardless of the operation speed, the tone (or noise) is the carrier
signal. When the carrier signal is detected, the CARRIER DETECT indicator
on the front panel lights. If the carrier is interrupted longer than 0.7
seconds, the modem begins the disconnect sequence. The message NO CARRIER
is displayed on your screen and the modem goes into the ON-HOOK (off-line)
state.

A "loss of carrier" disconnect can occur when the carrier is turned off by
one of the modems. The disconnect can also occur for other reasons. If you
drop the receiver onto the telephone cradle or shout into the handset, the
noise generated can be strong enough to MASK the carrier so that the DCM-212
thinks carrier is turned off. Although the low speed carrier is less
susceptible to noise than the high speed carrier, there is always the
possibility of data errors.

CONDITION 2--LOSS OF DATA TERMINAL READY (DTR)

Data terminal ready (DTR) is a protocol signal that the DCM-212 receives
from your computer or terminal. It must be true (asserted) before any modem
operation is allowed. If you get to this point (on-line mode), it was
asserted.

The modem's DTR default is on. this means that if your computer does not
have a DTR control wire, the DCM-212 will be sure this signal is set up so
that you can use the modem. Of course, if your cable connection is incorrect
and the DTR pin at the modem is shorted out, you will never be able to get
the modem to talk.

On computers with DTR control, you can stop any function by forcing the
signal to disassert.

Beware of accidentally turning off the DTR switch. For example, if you decide to change a terminal feature (for example, turn on a printer port) while you are communicating with a time-sharing service, you could switch your terminal software around to its utilities menu and, suddenly, the DCM-212 could drop its telephone connection! Some terminal (and software) systems turn off DTR when the system is doing utilities work.

NOTE: If DIP Switch 3 is set to the ON position, the DCM-212 assumes that DTR is always present.

CONDITION 3--RECEPTION OF A LONG SPACE

A long space is a start bit that takes anywhere from a half-second to one full second to end. It is not a character, although some systems consider it to be the null (0) word with a framing error. (It lasted too long before the stop bit appeared.)

In an idle condition, the serial data line going to the DCM-212 over the RS-232C cable is normally in a marking state. When you press a key, a start bit is transmitted (0 space) for a time depending on the speed of operation. The bits that make up the word are then serially transmitted to the modem, one by one. These bits are marking or spacing levels, depending on the type of bit (0 or 1). The last bit to be transmitted is the stop bit, and it is always a marking level.

When the DCM-212 receives a long space from the host computer that lasts 1.5 seconds or longer, the DCM-212 goes into the off-line mode and disconnects from the telephone line.

The long space is an old method that Teletype machines use to say: "Pay attention to me!!!" Several long spaces can be strung together by multiple closures of a key (usually <BREAK>). This string of spaces tell a modern-day modem: "I'm all done. Go ahead and turn off." The long space method of disconnecting a modem from the lines is known as a long space disconnect sequence.

Remember, you can turn off this feature with the I command parameters.

CONDITION 4--TRANSMISSION OF THE ABORT CHARACTER

When the modem is enabled to transmit a long space down the line, the abort character seems to take longer to activate. This is due to the time needed to send the long space (2 seconds) before the line is disconnected.

The abort character disconnect feature enables you to disconnect an on-line DCM-212 without having to remember about long spaces. The abort character can be used in the following manner:

If you transmit the abort character and do not transmit any other character

for 3 seconds afterward, the modem will disconnect from the telephone lines.

The abort character can be turned OFF by typing any key within that 3-second period. The I command parameters are set up to allow you to disable the abort character disconnect feature.

The abort character (when sent) uses long space disconnect signaling to tell

the other end of the line that your modem is about to shut down. This long
space signaling is only true if you have not disabled transmission of the
long space with the I command parameters.

DCM-212 (26-1385A)   RESULT CODES

The modem send the result codes to report its status or telephone line
condition to you.

                    TABLE 2. RESULT CODES

    CODE   MEANING

     ?   The command input is invalid.
NO NUMBER   There's no number to be dialed in the memory.
DIALING...   Modem is dialing the number that follows.
RINGING   Ringback tone detected.
BUSY   Busy signal detected.
REORDER TONE   Reorder tone detected.
NO ANSWER   Call was not answered after 8 ringback tones.
NO DIAL TONE   No dial tone detected.
CONNECT   Detects carrier at 300 bps. Modem goes on line.
CONNECT 1200   Detects carrier at 1200 bps and Modem goes on line.
NO CARRIER   Does not receive carrier or lost it.
DISCONNECT   Goes on hook after connecting.
WAITING FOR RING   Modem is monitoring the telephone line for a ring
                     signal.
RING   Detects an incoming ring signal on the telephone line.

(dkh-08/05/93)