TITLE Title Page

IBM Personal System/2
Model L40 SX
Internal Data/Fax Modem
Operating Instructions

Approval Draft

Document Number 84F7576

IBM Personal System/2
Internal Data/Fax Modem for Model L40 SX
Operating Instructions

PICTURE 1

This operating instruction provides information necessary for the operator
to program and use the IBM Personal System/2 Internal Data/Fax Modem for
Model L40 SX.

Note: The hardware drawings in this publication might look slightly
      different from your hardware.

84F7576

International Business Machines Corporation   Armonk, New York, 10577

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  () Limited Warranty page 2 of 2

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  **() Limited Warranty - Canada - page 2 of 2   Form 6064-1
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PICTURE 2

The following statement applies to this IBM product. The statement for
other IBM products intended for use with this product will appear in their
accompanying manuals.

Subtopics
FRONT_1.1 Federal Communications Commission (FCC) Statement
FRONT_1.2 Part 68 of the Federal Communications Commission (FCC) Regulations
FRONT_1.3 The Canadian Department of Communications (DOC) Requirements

FRONT_1.1 Federal Communications Commission (FCC) Statement

Note: This equipment has been tested and found to comply with the limits
for a Class B digital device, pursuant to Part 15 of the FCC Rules. These
limits are designed to provide reasonable protection against harmful
interference in a residential installation. This equipment generates,
uses and can radiate radio frequency energy and, if not installed and used
in accordance with the instructions, may cause harmful interference to
radio communications. However, there is no guarantee that interference
will not occur in a particular installation. If this equipment does cause
harmful interference to radio or television reception, which can be
determined by turning the equipment off and on, the user is encouraged to
try to correct the interference by one or more of the following measures:

    Reorient or relocate the receiving antenna.

    Increase the separation between the equipment and receiver.

    Connect the equipment into an outlet on a circuit different from that
    to which the receiver is connected.

    Consult an IBM authorized dealer or service representative for help.

Properly shielded and grounded cables and connectors must be used in order
to meet FCC emission limits. Proper cables and connectors are available
from IBM authorized dealers. IBM is not responsible for any radio or
television interference caused by using other than recommended cables and
connectors or by unauthorized changes or modifications to this equipment.
Unauthorized changes or modifications could void the user's authority to
operate the equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject
to the following conditions: (1) this device may not cause harmful
interference, and (2) this device must accept any interference received,
including interference that may cause undesired operation.

CAUTION:
This product is equipped with a 3-wire power cord and plug for the user's
safety. Use this power cord in conjunction with a properly grounded
electrical outlet to avoid electrical shock.

FRONT_1.2 Part 68 of the Federal Communications Commission (FCC) Regulations

Type of Service

This modem complies with Part 68 of the FCC Regulation, and is designed to be used on standard device telephone lines using a standard jack called the USOC RJ11C. Connection to telephone company-provided coin service (central office implemented systems) is prohibited. Connection to party lines service is subject to State tariffs (see modem label for registration number).

Telephone Company Procedures

The goal of the telephone company is to provide you with the best service it can. To do this, it may occasionally be necessary for them to make changes in their equipment, operations, or procedures. When these changes might affect your service or the operation of your equipment, the telephone company will give you notice, in writing, to allow you to make the changes necessary to maintain uninterrupted service.

If you have any questions about your telephone line, such as how many pieces of equipment you can connect to it, the telephone company will provide this information upon request.

It may be necessary for the telephone company to request information from you concerning the equipment which you have connected to your telephone line. Upon such request provide the FCC registration number and ringer equivalence number (REN) of the equipment that is connected to your line; both of these items are listed on the equipment label located on the inside of the battery compartment door. The sum of all of the RENs on your telephone lines should be less than five to assure proper service from the telephone company. A REN is an equivalent impedance loading number.

If Problems Arise

If any of your telephone equipment is not operating properly, immediately remove it from your telephone line as it may harm the telephone network. If the telephone company notes a problem caused by improper operation of this equipment, it may temporarily discontinue service. In some extreme cases, the telephone company may disconnect your device and leave it disconnected if it is deemed the cause of harm to the network. When practical, you will be notified in advance of this disconnection. If advance notice is not feasible, you are notified as soon as possible. When notified, you will be given the opportunity to correct the problem and informed of your right to file a complaint with the local telephone company and further to the FCC if necessary.

In the event repairs are needed to your modem in the U.S., the modem should be returned to the place of purchase.

Canadian Department of Communications compliance statement

This equipment does not exceed Class B limits per radio noise emissions for digital apparatus, set out in the Radio Interference Regulation of the Canadian Department of Communications. Operation in a residential area may cause unacceptable interference to radio and TV reception requiring the owner or operator to take whatever steps are necessary to correct the interference.

Avis de conformité aux normes du ministère des Communications du Canada

Cet équipement ne dépasse pas les limites de Classe B d'émission de bruits radioélectriques pour les appareils numériques, telles que prescrites par le Règlement sur le brouillage radioélectrique établi par le ministère des Communications du Canada. L'exploitation faite enmilieu résidentiel peut entraîner le brouillage des réceptions radio et télé, ce qui obligerait le propriétaire ou l'opérateur á prendre les dispositions nécessaires pour en éliminar les causes.

FRONT_1.3 The Canadian Department of Communications (DOC) Requirements

The Canadian DOC label identifies certified equipment. This certification
means that the equipment meets certain telecommunications network
protective, operational and safety requirements. The DOC does not
guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, be sure it is permissible to connect it
to the facilities of the local telecommunications company. The equipment
must also be installed using an acceptable method of connection. In some
cases, the company's inside wiring associated with a single line
individual service may b extended by means of a certified connector
assembly (telephone extension cord). The customer should be aware that
compliance with the above conditions can cause degradation of service in
some situations.

Repairs to certified equipment should be made by an authorized Canadian
maintenance facility designated by the supplier. Repairs or alterations
made by the user may give the telecommunications company cause to request
the user to disconnect the equipment.

For their own protection users should be sure that the electrical ground
connections of the power utility, telephone lines and internal metallic
water pipe, if present, are connected together. This precaution can be
particularly important in rural areas.

CAUTION:

Users should not attempt to make such connections themselves, but should
contact the appropriate electric inspection authority, or electrician, as
appropriate.

To prevent over loading, the Load Number (LN) assigned to each terminal
device denotes the percentage of the total load to be connected to a
telephone loop used by the device. The termination on a loop may consist
of any combination of devices subject only to the requirement that the
total of the Load Numbers of all the devices does not exceed 100. An
alphabetic suffix is also specified in the Load Number for the appropriate
ringing type (A or B), if applicable. For example, LN = 20A designates a
Load Number of 20 and an "A" type ringer. The Load Number for this device
is 5.9.

In the event repairs are ever needed to your modem in Canada, the modem
should be returned to the place of purchase.

1.0 Description

The IBM (*) Personal System/2 (*) Internal Data/Fax Modem for
Model L40 SX (hereafter called the Adapter) is one of the optional
features of the Model L40 SX that enables the computer to communicate with
other computers through the telephone line. This Adapter provides dual
functions: a data modem and a facsimile modem.

The data modem is a Hayes (**) compatible modem that uses the AT command
set and operates at speeds of 300, 1200, and 2400 bits per second.
Existing application programs and any communication programs written for
operation with the AT command set works on this data modem. Error
correction and the data compression/expansion function are realized with
MNP service classes 4 and 5. The operational protocol of the data modem
complies with CCITT V.22bis, V.22, V.21, BELL 212A, and BELL 103.

The facsimile modem operates as a Group 3 (G3) facsimile that is capable
of operating at a speed of 300, 2400, 7200, and 9600 bits per second. The
communication protocol conforms to CCITT T.30 and data
compression/expansion comply with CCITT recommendation T.4. The Fax
Utility program supplied with the Adapter helps you perform easy facsimile
operation.

The Adapter is registered with the Federal Communications Commission and
the Terminal Attachment Program of Canada.

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    International Business Machines Corporation.

 (**) Hayes is a trademark of Hayes Microcomputer Products, Inc.

2.0 Operating Instructions

The command set for the data modem is fully compatible with the Hayes
AT command set. If a program does not operate with this modem,
describe the modem as a Hayes compatible 2400 bps modem and try to use
it again.

Audio monitoring of the telephone line is provided through the
computer speaker. To set the speaker volume, use the **L** command in the
AT command set. The **L** command is described in a later section.

To operate the facsimile modem, describe the modem as a facsimile
modem for *Service Class 1* (see "Service Class Definition"   in
topic 5.1).

The Fax Utility allows you to use the facsimile modem without learning
the facsimile commands (see "Fax Utility" in topic 6.0).

Make sure *Data/Fax Modem power* option specified by the Set Features
program is set to **On** when using this modem. Refer to the *PS/2 Model
L40 SX Quick Reference* for more information about the Set Features
program.

You can make an ordinal phone call using a telephone that is connected
to the Adapter. However, receiving an ATD or ATH1 command from the
system causes the Adapter to change its state from Voice to Data.

When the Adapter detects a correct incoming carrier over the telephone
line, this icon PICTURE 3 is displayed in the system-status display
and the Adapter sends answer tone back to the calling station to
establish the communication.

Subtopics
2.1 Connecting the Adapter to the Communication Line
2.2 Applying Power to the Adapter

2.1 Connecting the Adapter to the Communication Line

The Adapter has two modular telephone receptacles that accept cables both
from the communication line and the telephone. Connect these cables as
shown. Make sure that one end of the communication cable has an electric
noise protector attached closest to the Adapter.

PICTURE 4

Figure 1. Connecting the Adapter

2.2 Applying Power to the Adapter

Power to the Adapter is supplied as long as the computer power is on
unless the modem power control option on the Set Features Menu is off.
For further information about the Set Features program, refer to the *Model
L40 SX Quick Reference.*

3.0 AT (Attention) Command Set Description

This command set is described here for users who wish to write programs
that use this modem. Additional Interface information can be found in the
IBM PS/2 Internal Data/Fax Modem for Model L40 SX Technical Reference.

This modem is controlled and configured by the Attention (AT) command.
Each command consists of the following elements:

    The two-character sequence AT

    A command

    A command parameter

    A carriage return (Enter).

The two-character sequence AT and the commands may be uppercase or
lowercase. A command is not performed until a carriage return (Enter) is
received. Spaces entered are ignored. For example, to enter the command
ANSWER, type **ATA** or **ata** and press Enter.

Some commands do not have parameters. Any missing parameter in a command
is assigned the value zero, which may be a valid parameter for the
command. The sequence AT followed by Enter causes the modem to enter the
command state. That is, AT without a command serves as the "wake up"
code, and an OK appears on the screen.

The modem queues commands in a 40-character command line. The command
line begins with AT and can contain several commands. A separator is not
required between the commands.

The command line format is

  AT command [parameter] command [parameter] ... Enter

When a carriage return is received, which terminates the line, the
commands are performed in the order in which they are sent to the modem.
If more than 40 characters excluding spaces are sent to the modem, an
error occurs and all commands must be reentered.

Subtopics
3.1 AT Commands
3.2 Result Codes
3.3 Register Summary
3.4 Bit-mapped Registers

3.1 AT Commands

+---+
¦   Command   ¦ Command Name and Function   ¦
+------------------+--¦
¦   A   ¦ **Answer**   ¦
¦   ¦   ¦
¦   ¦ This command takes the modem *off-hook* and into   ¦
¦   ¦ answer mode. The modem immediately answers an   ¦
¦   ¦ incoming call, or, during a call, switches from   ¦
¦   ¦ voice to data. The modem does not wait for a ring ¦
¦   ¦ on the line. If the modem is in voice mode, this ¦
¦   ¦ command puts the modem into data mode.   ¦
¦   ¦   ¦
+------------------+--¦
¦   A/   ¦ **Re-execute Last Command**   ¦
¦   ¦   ¦
¦   ¦ When you press Enter, the command A/, with no   ¦
¦   ¦ preceding AT command and none following, causes the¦
¦   ¦ most recent command line to be re-executed. This ¦
¦   ¦ command can be used to dial the number again.   ¦
¦   ¦   ¦
+------------------+--¦
¦   B   ¦ **BELL/CCITT Selection**   ¦
¦   ¦   ¦
¦   ¦   -   **B0** = CCITT V.22N   ¦
¦   ¦   -   **B1** = BELL 212A (Default).   ¦
¦   ¦   ¦
¦   ¦ This command puts the modem to CCITT or BELL   ¦
¦   ¦ standards only for 1200 bps communications.   ¦
¦   ¦   ¦
+---+

+---+
¦   Command   ¦ Command Name and Function   ¦
+------------------+--¦
¦   D   ¦ **Dial (D n...n)**   ¦
¦   ¦   ¦
¦   ¦ This command takes the modem *off-hook* and waits the¦
¦   ¦ specified period of time that was set in the S6   ¦
¦   ¦ register, then dials the characters contained in the¦
¦   ¦ parameter, and controls the modem during dialing. ¦
¦   ¦ If **D** is entered with no parameters, the modem goes¦
¦   ¦ *off-hook* without dialing. The parameter may consist¦
¦   ¦ of a combination of these characters: ¦
¦   ¦   ¦
¦   ¦ 0 1 2 3 4 5 6 7 8 9 # * T P R W , ; @ !   ¦
¦   ¦   ¦
¦   ¦   -   **0 1 2 3 4 5 6 7 8 9 # *** = Dialed   ¦
¦   ¦   characters.   ¦
¦   ¦   ¦
¦   ¦   -   **( ) <punctuation space>** = Dialed characters¦
¦   ¦   are used as expressions to increase   ¦
¦   ¦   readability. An example is: (66)555-1234. ¦
¦   ¦   ¦
¦   ¦   -   **T** = Switches modem to tone dialing. An ¦
¦   ¦   example using tone dialing T is: ATDT   ¦
¦   ¦   555-1234 CR.   ¦
¦   ¦   The command AT = attention, D = dial, T =   ¦
¦   ¦   tone, 555-1234 = dialed characters, and CR =¦
¦   ¦   carriage return or Enter.   ¦
¦   ¦   ¦
¦   ¦   -   **P** = Switches modem to pulse dialing   ¦
¦   ¦   (Default).   ¦
¦   ¦   An example is: ATDP 555-1234 CR.   ¦
¦   ¦   ¦
¦   ¦   -   **R** = Puts modem in answer mode.   ¦
¦   ¦   The R is placed at the end of the dial   ¦
¦   ¦   string, and is used for communicating with ¦
¦   ¦   originate-only modems. An example is: ATDT ¦
¦   ¦   555-1234R CR.   ¦
¦   ¦   ¦
+---+

+---+
¦   Command   ¦ Command Name and Function   ¦
+------------------+--¦
¦ D (..continue)   ¦   -   **W** = Wait for dial tone.   ¦
¦   ¦   The W causes the modem to wait for a dial   ¦
¦   ¦   tone for 30 seconds. If no dial tone is   ¦

```
                               detected after this time, the modem hangs up
                               and indicates that no dial tone was
                               received.  An example showing this command
                               with a 9 to dial outside a local telephone
                               network is:
                               ATDT 9W555-1234 CR.

                        -      , = Modem pause (Default is 2 seconds).
                               The comma causes the modem to pause for a
                               specified period of time, which was set in
                               the S8 register.  An example is: ATDT
                               9,555-1234 CR.
                               Multiple commas can be used consecutively to
                               generate longer pauses.

                        -      @ = Quiet the line before dialing
                               The @ causes the modem to wait for one or
                               more rings followed by a 5-second wait
                               before processing the next dialed character.
                               In the event that a "quiet state" is
                               required to access some PBXs or host
                               systems, place the @ in the dialed
                               characters.

                        -      ! = Modem goes off-hook for 1/2 second.
                               The exclamation takes the modem off-hook for
                               1/2 second to transfer calls.

                        -      ; = Returns the modem to the command state.
                               The semicolon is placed at the end of a dial
                               string to put the modem in a state that
                               accepts commands after dialing.  An example
                               is:  ATDT 555-1234;CR.
```

Command	Command Name and Function
E	**Echo**
	- **E0** = Disable
	- **E1** = Enable (Default).
	This command controls whether characters sent to the modem by the computer while in the command state are echoed back to the computer and displayed on the screen.
H	**On/Off Hook**
	- **H0** = On-Hook (Default)
	- **H1** = Off-Hook.
	This command controls the telephone switch *hook.* The H0 command forces the modem to go *on-hook* or *hang up.* The H1 command forces the modem *off-hook.*

Command	Command Name and Function
I	**Identification Inquiry**
	- **I0** = Returns the identification code of the modem
	- **I1** = Returns the checksum
	- **I2** = Returns the validity of the checksum
	-- Correct = *OK*
	-- Not correct = *ERROR*
	This command is used to query the identification information and the checksum of the modem.
L	**Speaker Volume**
	- **L0,L1** = Low Volume
	- **L2** = Medium Volume (Default)
	- **L3** = High Volume.
	This command sets the volume of the computer speaker.
M	**Speaker Control**

	- **M0** = Disables speaker
	- **M1** = Enables speaker until carrier acknowledged (Default)
	- **M2** = Always enables speaker.
	This command controls the computer speaker.
O	**Online/Originate**
	- **O0** = Online (Default) This command forces data mode after an established call has been interrupted by the escape sequence. If *on-hook*, this command puts the modem *off-hook* and in the original mode.
	- **O1** = Initiate an equalize retraining sequence and return to online. This command causes the modem to initiate an equalize retraining sequence and then returns to data mode after equalizing the line.
P	**Pulse**
	This command puts the modem in the pulse dial mode for all characters dialed after P. This is the power-on default. It may be inserted anywhere in the dialing sequence.

Command	Command Name and Function
Q	**Response Control**
	- **Q0** = Command responses are displayed or printed. (Default)
	- **Q1** = Command responses are NOT displayed or printed.
	This command suppresses responses sent by a remote modem. This command helps you avoid printing when modems are connected to devices that print everything received from a remote modem.
R	**Reverse Mode**
	This command is used at the end of a dialing string and places the modem in answer mode after dialing. This allows connections with originate-only modems.
Sr?	**Read S-Register**
	- **r** = 0 - 27
	This command causes the contents of the S-register specified by **r** to be read. See "Register Summary" in topic 3.3.
Sr = n	**Set Register**
	- **r** = 0, 2 - 12, 18, 25
	- **n** = 0 - 255
	This command causes the S-register specified by **r** to be set to value **n**. See "Register Summary" in topic 3.3.
T	**Tone Dial**
	This command puts the modem in tone dial mode. It stays in this mode until pulse mode is entered. The tone dial mode is the default and the speed for tone dialing is set by Register S11.

Command	Command Name and Function

V	**Verbose/Terse Result Codes**
	
	  - **V0** = Terse
	  - **V1** = Verbose (Default).
	
	This command controls the type of result codes returned to the computer from the modem. V0 causes the result codes to be sent as digits. V1 causes the result codes to be sent as words.

W	**Wait for Dial Tone** This command causes the modem to wait for 30 seconds. If no dial tone is received during this period, the modem goes *on-hook*.

Command	Command Name and Function

X	**Basic/Extended Result Code Set**
	
	  - **X0** = Enable result codes 0 to 4
	  - **X1** = Enable result codes 0 to 5 and 10
	  - **X2** = Enable result codes 0 to 6 and 10
	  - **X3** = Enable result codes 0 to 5, 7 and 10
	  - **X4** = Enable result codes 0 to 10 (Default).
	
	This command selects the result code to be returned. See "Result Codes" in topic 3.2.

Y	**Long Space Disconnect**
	
	  - **Y0** = Disable (Default)
	  - **Y1** = Enable.
	
	This command controls whether the modem disconnects the line when it receives a continuous space signal (Break) from the remote modem for more than 1.6 seconds.
	
	After the modem receives a Break, it sends a continuous space signal for 4 seconds before going *on-hook* upon receiving an H0 command or detecting an On-to-Off transition on DTR if the &D2 option is selected.

Z	**Software Reset** This command resets the modem to its default settings and leaves the modem in the command state. Any commands on the command line after the Z command are not performed because the reset clears the command buffer. If the modem is online, the reset breaks the connection. The application must wait for 2 seconds before issuing the next command to the modem.

&C	**Carrier Signal Control**
	
	  - **&C0** = Sets RLSD (Receive Line Signal Detect) bit on
	  - **&C1** = Allows RLSD to track actual carrier (Default).
	
	This command causes the modem to detect and track the carrier signal.

Command	Command Name and Function

&D	**DTR (Data Terminal Ready) Signal Control**
	
	  - **&D0** = Sets DTR bit on.
	  - **&D1** = When the modem detects the On to Off

```
|               |               transition in a DTR signal, this command   |
|               |               forces the modem to the command state.  But |
|               |               the modem does not go on-hook if it is       |
|               |               already in the online state.                |
|               |           -   &D2 = When the modem detects the On to Off  |
|               |               transition in a DTR signal, this command   |
|               |               forces the command state, disables auto     |
|               |               answer, and puts the modem on-hook.  Auto   |
|               |               answer can be re-enabled by turning DTR back |
|               |               On (Default).                                |
|               |           -   &D3 = When the modem detects the On to Off  |
|               |               transition in a DTR signal, this command   |
|               |               forces initialization state.                |
|               |                                                            |
|               |                                                            |
+---------------+------------------------------------------------------------+
|      &F       | Retrieving the Factory Configuration                       |
|               |                                                            |
|               | This command recalls the configuration stored in           |
|               | ROM. All previously changed parameters are reset to        |
|               | the default values.                                        |
|               |                                                            |
+---------------+------------------------------------------------------------+
|      &G       | Guard Tone Control                                         |
|               |                                                            |
|               |           -   &G0 = No guard tone (Default)               |
|               |           -   &G1 = 550 Hz guard tone (for Sweden only)   |
|               |           -   &G2 = 1800 Hz guard tone                    |
|               |                                                            |
|               | This command selects the frequency of the guard tone       |
|               | according to CCITT standards.  U.S. and Canada do          |
|               | not use guard tones.                                       |
|               |                                                            |
+---------------+------------------------------------------------------------+
|      &L       | Line Selection                                             |
|               |                                                            |
|               |           -   &L0 = Switched line (Default)               |
|               |           -   &L1 = Leased line                           |
|               |                                                            |
|               | This command is used to select the type of                 |
|               | communication line.                                        |
|               |                                                            |
+---------------+------------------------------------------------------------+
|      &P       | Pulse Dial Control                                         |
|               |                                                            |
|               |           -   &P0 = Make/Break ratio of the dial pulse is |
|               |               39/61.  (Default)                           |
|               |           -   &P1 = Make/Break ratio of the dial pulse is |
|               |               33/67.                                      |
|               |                                                            |
|               | This command selects the make/break ratio of the           |
|               | dial pulse.                                                |
|               |                                                            |
+---------------+------------------------------------------------------------+
```

```
+------------------------------------------------------------------------------+
|    Command    | Command Name and Function                                  |
+---------------+------------------------------------------------------------+
|      &T       | TEST                                                       |
|               |                                                            |
|               |           -   &T0 = Turn off test                         |
|               |           -   &T1 = Initiate local analog loopback test   |
|               |           -   &T2 = Not used                              |
|               |           -   &T3 = Initiate local digital loopback test  |
|               |           -   &T4 = Accept remote digital loopback test   |
|               |               (Default)                                   |
|               |           -   &T5 = Don't accept remote digital loopback  |
|               |               test                                        |
|               |           -   &T6 = Initiate remote digital loopback test |
|               |           -   &T7 = Initiate remote digital loopback test |
|               |               with self-test                             |
|               |           -   &T8 = Initiate local analog loopback test   |
|               |               with self-test.                            |
|               |                                                            |
|               | This command allows the modem to check its function        |
|               | using the built-in diagnostics tests.                      |
|               |                                                            |
+---------------+------------------------------------------------------------+
|      &W       | Write S-Register                                          |
|               |                                                            |
|               | This command stores the current values of the              |
|               | S-register into the modem memory from which default        |
|               | settings are retrieved either by executing the Z           |
```

```
¦                ¦   command or by powering on.                        ¦
¦                ¦                                                     ¦
¦                ¦                                                     ¦
+----------------+-----------------------------------------------------¦
¦     &Z=n       ¦   Store Phone String                                ¦
¦                ¦                                                     ¦
¦                ¦   n = Any string of numbers and dialabel characters ¦
¦                ¦   not longer than 32 digits                         ¦
¦                ¦                                                     ¦
¦                ¦                                                     ¦
+----------------+-----------------------------------------------------¦
¦    + + +       ¦   Escape Sequence                                   ¦
¦                ¦                                                     ¦
¦                ¦   The escape sequence (three consecutive escape     ¦
¦                ¦   characters preceded and followed by the pause set in ¦
¦                ¦   register S12) changes the modem from the data state ¦
¦                ¦   to the command state.  The escape character is    ¦
¦                ¦   selectable (see register S2).  The plus sign, ASCII ¦
¦                ¦   43 (hex 2B), is the default.  ASCII 28 (hex 1C) or ¦
¦                ¦   ASCII 29 (hex 1D) may also be used.               ¦
¦                ¦                                                     ¦
+----------------------------------------------------------------------+
```

Figure 2. AT Commands

3.2 Result Codes

The set of result codes that are returned can be selected (see the command
X). Digit codes are followed by a carriage return character. Word
responses are preceded and followed by a carriage return character and a
line feed character.

Digit Code	Word	Description
0	OK	Command executed without errors.
1	CONNECT	Carrier detected at 0-300, 1200 bps or 2400 bps for result code set X0. Carrier detected at 300 bps for X1-X4.
2	RING	Ringing signal detected (incoming).
3	NO CARRIER	Carrier lost or never connected.
4	ERROR	Error in command line Invalid command. Invalid parameter in command statement. Command line exceeds 40 characters.
5	CONNECT 1200	Carrier detected at 1200 bps (for X1-X4 result code set).
6	NO DIALTONE	No dial tone detected. For result code sets of X2 and X4, NO DIALTONE is returned if no dial tone is detected within 5 seconds or 30 seconds if the command W is used.
7	BUSY	Busy signal detected.
8	NO ANSWER	No reply from the remote modem.
9		Not used.
10	CONNECT 2400	Carrier detected at 2400 bps.

Figure 3. Result Code

3.3 Register Summary

Register	Range	Default	Function
S0	0-255 Rings	0	Number of rings before modem automatically answers. A value of 0 (default) disables automatic answering.
S1	0-255 Rings	0	Number of rings that have occurred. Resets to 0 after 8 seconds with no rings (read-only register).
S2	0-127 ASCII	043	Escape code character. This register stores the decimal ASCII value of the Escape code. Because the Escape code is required to receive from the DTE at the current communication speed, the communication program must be set at the same communication speed as the modem.
S3	0-127 ASCII	013	Carriage return character. This character terminates both command line and modem responses. Default is the carriage return character.
S4	0-127 ASCII	010	Line feed character. This character follows the carriage return character in a full-word result code. If S4 is set to 0, a NULL is sent. Default is the line feed character.
S5	0-32, 127 ASCII	008	Backspace character. This character erases the last character in the command line being entered. The default is the backspace character.

Register	Range	Default	Function
S6	2-255 seconds	2	Wait time for dial. This is the delay between going *off-hook* and beginning to dial if the result code set is X0, X1, or X3. The dial tone is assumed to be present after the delay has passed. With values below 2, the delay is 2 seconds. Dialing begins when the dial tone is detected if the result code set is X2 or X4. If no dial tone is detected, the modem goes *on-hook* and responds with the result NO DIALTONE.
S7	1-255 seconds	30	Wait time for carrier after dialing.
S8	0-255 seconds	2	Length of pause caused by comma in the dialed characters.
S9	0-255 secs/10	6	Carrier valid delay. To be

			detected, the carrier must be present for this time.
S10	0-255 secs/10	14	Time between loss of carrier and going *on-hook*. Setting of 255 disables carrier-loss disconnect.
S11	0-255 milliseconds	70	DTMF (dual tone multi-frequency) intervals. This register stores the duration between DTMF tones.
S12	0-255 secs/50	50	Escape sequence guard time. The dialed character stream must be silent for this time before and after the escape sequence to enter the command state from the data state.

Register	Range	Default	Function
S18	0-255 seconds	0	Test timer. The modem finishes the test when the test timer times out. If this value is set to 0, the test continues until it is interrupted by the Escape command.
S19-S20			Not used.
S21-S23			Bit mapped register (read only).
S24			Not used.
S25	0-255 secs/100	5	Delay to DTR (data terminal ready). The modem ignores a status change of DTR for less than the setting value.
S26			Not used.
S27			Bit mapped register (read only).

Figure 4. Register Summary

3.4 Bit-mapped Registers

Register	Bit	Value	Description
S14	0		Undefined
	1	0	Local echo disabled
		1	Local echo enabled (Default)
	2	0	Result codes enabled (Default)
		1	Result codes disabled
	3	0	Result codes sent as Numbers
		1	Result codes sent as Words (Default)
	4		Reserved
	5	0	Tone dial (Default)
		1	Pulse dial
	6		Undefined
	7	0	Answer mode
		1	Originate mode (default)

Figure 5. Bit-mapped Register 14

Register	Bit	Value	Description
S16	0	0	Local analog loopback disabled
		1	Local analog loopback enabled
	1		Undefined
	2	0	Local digital loopback disabled
		1	Local digital loopback enabled
	3	0	Not in the state of remote digital loopback test in progress
		1	Remote digital loopback test in progress
	4	0	Remote digital loopback disabled
		1	Remote digital loopback enabled
	5	0	Remote digital loopback with self test disabled

Register	Bit	Value	Description
		1	Remote digital loopback with self test enabled
	6	0	Local digital loopback with self test disabled
		1	Local digital loopback with self test enabled
	7	1	Undefined

Figure 6. Bit-mapped Register 16

Register	Bit	Value	Description
S21	0	0	Telephone jack RJ-11/RJ-415/RJ-45S
		1	Telephone jack RJ-12/RJ-13
	1		Reserved
	2		Reserved
	3,4	0	The modem ignores DTR
		1	On to Off transition on the DTR signal forces command state
		2	On to Off transition on the DTR signal forces hang up
		3	On to Off transition on the DTR signal forces reset
	5	0	DCD (Data Carrier Detect) always On
		1	An On-condition on DCD indicates the presence of a valid data carrier
	6	0	DSR (Data Set Ready) bit on
		1	DSR bit goes on when the modem goes *off hook*
	7	0	Long space disconnect disabled
		1	Long space disconnect enabled

Figure 7. Bit-mapped Register 21

Register	Bit	Value	Description
S22	0,1	1	The speaker volume is low

Register	Bit	Value	Description
		2	The speaker volume is medium
		3	The speaker volume is high
	2,3	0	Speaker Off
		1	Speaker On until carrier is detected
		2	Speaker On
	4,5,	0	Dials without looking for dial tone. The result code is CONNECT.
		4	Dials without looking for dial tone. The result code is the following.
			CONNECT for 300 bps
			CONNECT 1200 for 1200 bps
			CONNECT 2400 for 2400 bps
		5	Wait for dial tone before dialing. The result codes are same as 4.
		6	Dials without looking for dial tone. The result codes are same as 4. When busy tone is detected, the result code returns BUSY.
		7	Wait for dial tone before dialing. All result codes are enabled.
	7	0	Make/Break ratio of pulse dial is 39/61
		1	Make/Break ratio of pulse dial is 33/67

Figure 8. Bit-mapped Register 22

Register	Bit	Value	Description
S23	0	0	Rejects the request of remote digital loopback test from the remote modem.
		1	Allows the request of remote digital loopback test from the remote modem.
	1,2	0	Bit rate 0-300 bps
		1	Reserved
		2	Bit rate 1200 bps
		3	Bit rate 2400 bps
	3		Reserved
	4,5	0	Even parity
		1	Space parity (data bit 8 set to space)
		2	Odd parity
		3	Mark parity (data bit 8 set to mark)
	6,7	0	Guard tones disabled

```
+-----------+-----+--------+-------------------------------------------|
|           |     | 1      | 550 Hz guard tone                         |
+-----------+-----+--------+-------------------------------------------|
|           |     | 2      | 1800 Hz guard tone                        |
+-----------+-----+--------+-------------------------------------------|
|           |     | 3      | Reserved                                  |
|           |     |        |                                           |
|           |     |        |                                           |
+-----------+-----+--------+-------------------------------------------+
```
Figure 9. Bit-mapped Register 23

```
+-----------------------------------------------------------------------+
| Register   | Bit | Value  | Description                               |
|            |     |        |                                           |
+-----------+-----+--------+-------------------------------------------|
| S27        | 0,1 | 0      | Transmission mode                         |
|            |     |        |                                           |
|            |     |        |                                           |
|            |     |        |                                           |
+-----------+-----+--------+-------------------------------------------|
|            | 2,  |        | Reserved                                  |
|            | 3,  |        |                                           |
|            | 4,  |        |                                           |
|            | 5   |        |                                           |
+-----------+-----+--------+-------------------------------------------|
|            | 6   | 0      | CCITT V.22                                |
+-----------+-----+--------+-------------------------------------------|
|            |     | 1      | BELL 212A                                 |
|            |     |        |                                           |
|            |     |        |                                           |
|            |     |        |                                           |
+-----------+-----+--------+-------------------------------------------|
|            | 7   |        | Undefined                                 |
|            |     |        |                                           |
|            |     |        |                                           |
|            |     |        |                                           |
+-----------------------------------------------------------------------+
```
Figure 10. Bit-mapped Register 27

4.0 MNP Command Set Description

The MNP (**) (Microcom Network Protocol) command set provides the modem
with error correction and data compression/expansion capabilities. With
the AT command set, the MNP commands make it possible to perform more
reliable data communication. To perform data communication using the MNP
commands, the remote modem also has to have the same capability of
handling the MNP commands. This modem supports MNP Classes 3, 4, and 5.

The modem can operate under the following four modes of operation.

> *Reliable*
>
> In this mode, if the remote modem supports MNP commands, communication
> is established under MNP protocol. If not, communication is canceled.
>
> *Auto-reliable*
>
> If the remote modem supports the MNP commands, the communication is
> established under the MNP commands. If not, the communication is
> maintained under Direct mode.
>
> *Normal*
>
> The modem acts as an ordinary modem and is operated without error
> correction.
>
> *Direct*
>
> In this mode, the modem acts as an ordinary modem and is operated
> without error correction. Baud adjustment is always *on* and one
> communication speed is used. Information is never put into a buffer.

 (**) MNP is a trademark of the Microcom, Inc.

Subtopics
4.1 MNP Commands
4.2 MNP Commands Unique to Service Class 5

4.1 MNP Commands

+---+
| Command | Command Name and Function |
+--------------+--+
%An	**Auto-Reliable Fall-back Character**
	- **n** = 0 - 21 or 23 - 127 (Default is 0.)
	This command causes the modem to return to Normal mode
	when the modem receives the Auto-reliable fall-back
	character, n, from the remote modem. The n can be the
	range from 0 through 127 that corresponds to the ASCII
	code for a particular character. Do not use the ASCII
	character 22 as the Auto-reliable fall-back character.
	The command \C2 must be set before the Auto-reliable
	fall-back character is in effect.
+--------------+--+
\Bn	**Transmit Break**
	- **n** = 0.1 - 0.9 second (Default, n = 3)
+--------------+--+
\Cn	**Set Auto-Reliable Buffer**
	- **\C0** = Cancels buffering (Default)
	- **\C1** = Enables buffering for:
	-- 200 characters
	-- 4 seconds
	-- A period of time that the synchronization
	character (ASCII 22) is not received.
	Note: If the synchronization character (ASCII
	22) comes in 200 characters or 4
	seconds, the modem enters Reliable mode.
	If no synchronization character comes in
	the first 200 characters or 4 seconds,
	the modem enters Normal mode.
	- **\C2** = Cancels buffering with option
	Note: If the command %A comes before the
	synchronization character, the modem
	enters Normal mode unless Baud Adjust is
	On. If the Baud Adjust is On, the modem
	enters Direct mode. See "Baud Rate
	Adjustment" in topic 4.1.
	If the command %A comes after the
	synchronization character, the modem
	enters Reliable mode.
	This command causes a buffer to hold up to 200
	characters or to wait 4 seconds while trying to
	establish a Reliable communications link.
+---+

+---+
| Command | Command Name and Function |
+--------------+--+
\Jn	**Baud Rate Adjustment**
	- **\J0** = Baud-rate adjustment off
	This cancels the automatic baud rate adjustment
	between the modem and the serial port.
	- **\J1** = Baud-rate adjustment on (Default)
	This enables the automatic baud-rate adjustment
	between the modem and the serial port.
	This command enables automatic baud-rate adjustment to
	be the same communication speed between the modem and
	the remote modem.
+--------------+--+
| \Kn | **Setting Modem to Receive a Break** |

```
|       |       |                                                     |
|       |       | This command causes the modem to put a condition that|
|       |       | is determined by n (0 - 5) and the type of Break     |
|       |       | character.  The default is 5.                        |
|       |       |                                                     |
|       |       |     If a Break comes from the serial port when the  |
|       |       |     modem is in online and is either in Reliable or |
|       |       |     Normal mode, the following occurs.              |
|       |       |                                                     |
|       |       |     -  n = 0, 2, 4                                  |
|       |       |        Enters the command state, but does not send a|
|       |       |        Break.  The Break puts the modem into the    |
|       |       |        command state.                               |
|       |       |     -  n = 1                                        |
|       |       |        Empties buffers and immediately sends a Break|
|       |       |        to the remote modem.                         |
|       |       |     -  n = 3                                        |
|       |       |        Immediately sends a Break to the remote modem,|
|       |       |        but does not empty the buffers.              |
|       |       |     -  n = 5                                        |
|       |       |        Sends a Break in sequence with the data in   |
|       |       |        buffers.                                     |
|       |       |                                                     |
|       |       |     If the Transmit Break (\Bn) is sent when the modem|
|       |       |     is in the command state of either Reliable or   |
|       |       |     Normal mode, the following occurs.              |
|       |       |                                                     |
|       |       |     -  n = 0, 1                                     |
|       |       |        Empties the data buffers and immediately sends|
|       |       |        a Break to the remote modem.                 |
|       |       |     -  n = 2, 3                                     |
|       |       |        Immediately sends a Break to the remote modem,|
|       |       |        but does not empty the buffers.              |
|       |       |     -  n = 4, 5                                     |
|       |       |        Sends a Break in sequence with the data in   |
|       |       |        buffers.                                     |
|       |       |                                                     |
+-----------------------------------------------------------------------+
```

```
+-----------------------------------------------------------------------+
|   Command     | Command Name and Function                             |
+---------------+-------------------------------------------------------|
|       |       | In Normal mode, the Break received from the remote  |
|       |       | modem when the modem is online causes the modem to  |
|       |       | perform the following.                              |
|       |       |                                                     |
|       |       |     -  n = 0, 1                                     |
|       |       |        Empties the data buffers and immediately sends|
|       |       |        a Break to the serial port.                  |
|       |       |     -  n = 2, 3                                     |
|       |       |        Immediately sends a Break to the serial port,|
|       |       |        but does not empty the buffers.              |
|       |       |     -  n = 4, 5                                     |
|       |       |        Sends a Break in sequence with the data in the|
|       |       |        buffer to the serial port.                   |
|       |       |                                                     |
|       |       | In Reliable mode, the modem operation is determined |
|       |       | by the type of break received from the remote       |
|       |       | modem.  The \K setting of the receiving modem has   |
|       |       | no effect on its operation.                         |
|       |       |                                                     |
|       |       |     -  n = 0, 1                                     |
|       |       |        Empties the data buffers and immediately sends|
|       |       |        a Break to the serial port.                  |
|       |       |     -  n = 2, 3                                     |
|       |       |        Immediately sends a Break to the serial port,|
|       |       |        but does not empty the buffers.              |
|       |       |     -  n = 4, 5                                     |
|       |       |        Sends a Break to the serial port in response |
|       |       |        with the data in buffers.                    |
|       |       |                                                     |
+---------------+-------------------------------------------------------|
|   \Nn         | Select Operating Mode                                 |
|       |       |                                                     |
|       |       |     -  \N0 = Normal mode                            |
|       |       |     -  \N1 = Direct mode (Default)                  |
|       |       |     -  \N2 = Reliable mode                          |
|       |       |     -  \N3 = Auto-reliable mode                     |
|       |       |                                                     |
|       |       | This command is used to select the mode of operation.|
```

```
Warning:  Do not use this command after an
establishment of communication with a remote modem.
```

Command	Command Name and Function
\O	**Enter Reliable Mode** This command causes the remote modem to enter the Reliable mode no matter who originated the call. The remote modem must be given the \U command to enter the Reliable mode before the \O command. Use \O command when you are already in online. The modem sends the request to the remote modem twice. If they fail, the modem returns to Normal or Direct mode.

Command	Command Name and Function

\Qn	**Enable and Disable XON/XOFF**
	
	    - **\Q0** = Disable XON/XOFF (Default)
	    - **\Q1** = Enable XON/XOFF
	
	This command is used to enable and disable the XON/XOFF flow control between the serial port and the modem.

\Tn	**Set Inactivity Timer** This command causes the modem to wait for a period of time specified by n (0 - 90 minutes) before hanging up. The default (n = 0) setting disables the timer. The Inactivity Timer is available only in Normal or Reliable mode of operation, and is ignored in Direct mode. Set the Inactive Timer before entering the Online state.

\U	**Accept Reliable Link**
	
	This command causes the modem to accept a request from the remote modem to enter Reliable mode. The modem waits until:
	
	    The Reliable link has been established
	    The command \U is canceled
	    The computer is turned off.
	
	If the modem fails to establish the Reliable link within 45 seconds, it returns to the original online state. To cancel the command \U before the 45 seconds have elapsed, send a Break.
	
	Use the command \U when you are already in online.

\Vn	**Modified-Response Code**
	
	    - **\V0** = Numeric response (Default)
	    - **\V1** = Verbal response
	
	This command tells the modem to use a modified-response code to indicate the Reliable operation. Use the \V1 to get visual confirmation that you have established a Reliable communication link.
	The following shows the responses to the \V command.
	
	Verbal Response *Numeric Response*
	CONNECT 1200/REL 22
	CONNECT 2400/REL 23

Command	Command Name and Function
\Xn	**XON/XOFF Passthrough** - **\X0** = Disables XON/XOFF passthrough (Default) The modem processes the XON/XOFF transmissions from the serial port, but does not send them to the remote modem. - **\X1** = Enables XON/XOFF passthrough The modem processes the XON/XOFF and sends them to the remote modem. In Normal and Reliable modes, the modem assumes the XON/XOFF transmissions from the remote modem to be data.
\Y	**Automatic Switching to Reliable Mode** This command tells the modem to switch to Reliable mode. If the modem originates the call, this command starts establishing the communication in Reliable mode with the remote modem. If the modem is the answering modem, this command acts as the response for the procedure to establish the communication in Reliable mode. If the attempt to establish the communication fails, the modem returns to Normal mode. Use the command \Y when you are already in online.
\Z	**Switching to Normal Mode** This command causes all of the MNP buffers to clear and puts the modem into Normal mode. Unlike the other mode-switching commands, the \Z can be started at either end.

Figure 11. MNP Commands

4.2 MNP Commands Unique to Service Class 5

The following lists the MNP commands for Service Class 5.

Command	Command Name and Function
%Cn	**Data Compression Enable/Disable** - **%C0** = Compression disabled (Default) - **%C1** = Compression enabled If %C0 (disabled) is specified, the communication is performed under Reliable mode without compression. If %C1 (enabled) is specified, the communication is performed under Reliable mode with compression.
\Gn	**Flow Control between Modems** - **\G0** = No modem-layer flow control (Default) - **\G1** = XON/XOFF flow control This command enables and disables XON/XOFF flow control between the modem and the remote modem.
\Qn	**Flow Control between Serial Port and Modem** - **\Q0** = No flow control (Default) - **\Q1** = Enables bi-directional XON/XOFF flow control - **\Q2** = Enables unidirectional CTS flow control - **\Q3** = Enables bi-directional RTS-CTS flow control This command allows various kinds of flow control to use between the serial port and the modem.

Figure 12. MNP Commands Unique to Service Class 5

5.0 Facsimile Command Set Description

The facsimile command set is provided as an extension to the AT command
set. All facsimile commands begin with the prefix +F and are used with
the AT command set. This facsimile modem is based on a Facsimile Service
Class 1 and provides a basic service necessary to support Group 3
facsimile operation. Any user application program needs to comply with
the 1988 CCITT T.30 recommended procedures for document facsimile
transmission and T.4 recommendations for responding facsimile images.

Subtopics
5.1 Facsimile Commands

5.1 Facsimile Commands

+--+
¦   Command   ¦ Command Name and Function   ¦
+------------------+---¦
¦   +FCLASS=n   ¦ **Service Class Definition**   ¦
¦   ¦   ¦
¦   ¦   -   0 = Data modem   ¦
¦   ¦   -   1 = Facsimile modem for Service Class 1   ¦
¦   ¦   ¦
¦   ¦ This command is sent to the modem by the DTE (Data   ¦
¦   ¦ Terminal Equipment) to initiate the facsimile   ¦
¦   ¦ operation (n=1). The modem must be set for Service   ¦
¦   ¦ Class 1 before answering the call.   ¦
¦   ¦   ¦
+------------------+---¦
¦   +FCLASS=?   ¦ **Query Service Class**   ¦
¦   ¦   ¦
¦   ¦ Executing this command causes the modem to answer   ¦
¦   ¦ with the current setting of the Service Class. The   ¦
¦   ¦ value of **?** should be 0 or 1.   ¦
¦   ¦   ¦
+------------------+---¦
¦   +FTH=m   ¦ **HDLC Sending**   ¦
¦   ¦   ¦
¦   ¦ This command causes the modem to send data that is   ¦
¦   ¦ framed in HDLC protocol using the modulation mode   ¦
¦   ¦ specified by **m**.   ¦
¦   ¦ The **m** can be any of the following values.   ¦
¦   ¦   ¦
¦   ¦   ¦
¦   ¦ **m**   **Modulation**   **Speed**   **Requirement** ¦
¦   ¦   3   V.21 ch.2   300   FTH and FRH ¦
¦   ¦ 24   V.27ter   2400   FTM and FRM ¦
¦   ¦ 48   V.27ter   4800   FTM and FRM ¦
¦   ¦ 72   V.29   7200   Optional   ¦
¦   ¦ 96   V.29   9600   Optional   ¦
¦   ¦   ¦
¦   ¦   ¦
¦   ¦ **Note:** All commands that take **m** can be queried for ¦
¦   ¦   the range of values supported by the DCE. To ¦
¦   ¦   query the value, put a **?** in place of **m**.¦
¦   ¦   ¦
¦   ¦   ¦
+--+

+--+
¦   Command   ¦ Command Name and Function   ¦
+------------------+---¦
¦   +FRH=m   ¦ **HDLC Receiving**   ¦
¦   ¦   ¦
¦   ¦ This command causes the modem to receive frames in   ¦
¦   ¦ HDLC protocol that are modulated by **m** shown in the ¦
¦   ¦ **HDLC Sending**.   ¦
¦   ¦   ¦
+------------------+---¦
¦   +FTS=t   ¦ **Stop Sending and Wait**   ¦
¦   ¦   ¦
¦   ¦ This command causes the modem to stop any   ¦
¦   ¦ transmission for the specified time by **t**, then the ¦
¦   ¦ modem sends the OK result code to the DTE; **t** can be ¦
¦   ¦ 10 millisecond intervals.   ¦
¦   ¦   ¦
+------------------+---¦
¦   +FRS=t   ¦ **Receive Silence**   ¦
¦   ¦   ¦
¦   ¦ This command causes the modem to monitor on the   ¦
¦   ¦ communication line. If the modem detects silence on ¦
¦   ¦ the communication line for the specified time, the   ¦
¦   ¦ **OK** result code is returned to the DTE. The **t** can be ¦
¦   ¦ 10 millisecond intervals.   ¦
¦   ¦   ¦
+------------------+---¦
¦   +FTM=m   ¦ **Facsimile Sending**   ¦
¦   ¦   ¦
¦   ¦ This command causes the modem to send data using the ¦
¦   ¦ modulation mode specified by **m**. The **m** can be the ¦
¦   ¦ same as described under the HDLC Sending command   ¦
¦   ¦ in topic 5.1.   ¦
¦   ¦   ¦
+------------------+---¦
¦   +FRM=m   ¦ **Facsimile Receiving**   ¦

```
¦                   ¦                                                     ¦
¦                   ¦ This command causes the modem to enter receive mode ¦
¦                   ¦ using the modulation mode specified by m.  The m can ¦
¦                   ¦ be the same as described under the HDLC Sending      ¦
¦                   ¦ command   in topic 5.1.                              ¦
¦                   ¦                                                     ¦
+-------------------+-----------------------------------------------------¦
¦    +FCERROR       ¦ Connect Error                                       ¦
¦                   ¦                                                     ¦
¦                   ¦ This command is returned to the DTE when a          ¦
¦                   ¦ connection problem id detected.                     ¦
¦                   ¦                                                     ¦
+--------------------------------------------------5.1 - 2----------------+
```

Figure 13. Facsimile Command Set

6.0 Fax Utility

The Fax Utility is a program supplied with the Internal Modem and allows
you to send a file to a receiving fax station at the specified phone
number, or to receive it from a sending fax station. Using the FAX OPTION
command, you can easily change features to suit your operational needs.
The major functions provided with the Fax Utility are:

    Sending a file

    Receiving a file

    Viewing a file

    Printing a file

    Creating a configuration file.

The Fax Utility operates under DOS 3.3 or higher and the OS/2 DOS
compatibility mode.

Subtopics
6.1 Programming Considerations
6.2 Installing the Fax Utility
6.3 Using the Fax Utility

Printing a file

6.1 Programming Considerations

Keep the following in mind when programming with the Fax Utility.

Any timing values described in the Fax Utility does not mean a timing loop that may change processor clock speed.

For send or receive a control-break is recognized, terminate the session, and place the Internal Modem *on-hook*.

Certain types of PCX and TIFF files sometimes contain color or unusual formats. When a file format is not supported, the following message is displayed.

FILE filename CONTAINS COLOR OR IMAGE STYLE THAT IS NOT SUPPORTED.

6.2 Installing the Fax Utility

Before using the Fax Utility, you need to copy the program of the utility diskette onto the hard disk (fixed disk) that contains DOS as shown below.

1.   Type **c:** at the DOS prompt and press **Enter**.

2.   Type **md fax** and press **Enter**.

3.   Insert the Fax Utility Diskette into the diskette drive.

4.   Type **copy a:** PICTURE 5**.** PICTURE 6 **c:\fax** and press **Enter** to copy.

Once the utility program is resident on your hard disk, a fax operation can be done by entering a command.

6.3 Using the Fax Utility

To perform a fax operation, follow the instructions as shown below.

In the command syntax, there is no case sensitivity.
For example, entering *FAX RECEIVE* and *fax receive* causes the same results
to occur.

Sending a file   **FAX S**end *filename* to *phonenumber*

This command is used to send the contents of a file to a
receiving fax station identified by a phone number.
Besides alphanumeric characters, all 256 extended PC
symbols and other image symbols (hex 00 through hex FF)
can be sent to a receiving fax station. The line width
(80 or 132 characters) and character style (fixed or
proportional fonts) can be chosen using FAX OPTIONS
command (see "Fax Options" in topic 6.3).

Using a plus sign (+) before the filename, you can
append two or more files on the same page.
For example, in the following command, LETTERHEAD, MEM0,
and MEM2 are on the same page while MEM3 is on the next
new page.

   C:\FAX> FAX S LETTERHEAD + MEM0 + MEM2 MEM3 to 4270590

Notes:

1.   If the length of the appended files on a page
     exceeds 11 inches (279 millimeters), then a new page
     starts.

2.   While sending, the file name and the number of pages
     that have been sent are displayed on the screen. At
     the normal end of transmission, the FAX HAS BEEN
     SENT message appears to assure that the file has
     been successfully sent to the receiving fax station.

     If you leave the telephone handset *off-hook*, you can
     use it in voice mode when completing the FAX
     transmission.

Status Message:

   DIALING XXX-XXX-XXXX
   SENDING filename
   FAX HAS BEEN SENT

Normal completion.

   Does filename specify a text file? (y/n)

File format is not determined. The file must be PCX
or TIFF format, or its file extension should be
.TXT, .LST, or .DOC.

If you answer **y** to this message, the file is assumed
to be a text file. If you answer **n**, the following
message appears.

   THE FILE TYPE IS UNKNOWN. FAX CAN NOT BE SENT.

Receiving a file **FAX R**eceive *filename* |*/C*|

This command is used to receive a file from a sending
fax station. Entering this command causes the Internal
Modem to set the auto-answer mode to get ready for a
call.

While a file is being received, the number of pages that
have been received is displayed on the screen. At the
normal end of receiving, the FAX HAS BEEN RECEIVED
message appears to assure you that the file has been
successfully received.

The received file is stored in a unique data format and
its file extension is assigned to be **.FAX**. The file
name you entered with the command is used for the first

```
arriving fax.  Each subsequent fax is assigned a number
such as RECV0001, RECV0002, RECV0003.
```

When this command is used with the /C option, the
Internal Modem immediately goes *off-hook* and attempts to
connect with an active fax station on the line. This
helps you switch from voice to data mode without
breaking the connection.

If you leave the telephone handset *off-hook*, you can use
it in voice mode when completing the FAX transmission.

To leave the receive mode, press and hold **Ctrl**, then
type **c**.

Status Message:

```
  RECEIVING FROM:  XXXXXXXXXXXXXXXXXXXXXX
  RECEIVING PAGE  9...
  FAX HAS BEEN RECEIVED
```

Normal completion.

Viewing a file   **FAX** **V**iew *filename*

This command is used for browsing a file. The displayed
image can be moved on the screen using F8, F9, F10,
arrow ( ), Page Up, and Page Down keys. Each time you
press **F8**, the image rotates 90 degrees, and rotates 180
degrees when you press **F9**. Pressing **F10** allows the
viewer to zoom in, then pressing **F10** again will return
to normal. The arrow ( ) keys are used to move the
entire screen image. Pressing the **Page Up** or **Page Down**
causes the image to move vertically.

F7 is used to clip a part of the received fax file.
Pressing **F7** causes a clip file to be created in the PCX
format.

Status Message:

```
  THE FILE TYPE IS UNKNOWN.  FAX CAN NOT BE VIEWED.
```

File format is not determined. The file format must be
either in PCX or in TIFF format.

Printing a file   **FAX** **P**rint *filename*

This command is used to print a file on one of the
following printers specified by the *FAX Options Menu*.
If you do not specify any of them, an IBM 5154 Graphics
printer is automatically chosen.

```
    IBM 5154 Graphics printer
    IBM 4207 ProPrinter (*)
    IBM 4216-031 Personal Pageprinter II
    HP LaserJet II (**)
    Diconix printer (1)
```

To stop printing, press and hold **Ctrl**, then press **Break**.
The printer ejects a sheet of paper and returns to text
mode.

Note: The DOS *GRAPHICS* command is not necessary for
         this FAX PRINT command.

Status Message:

```
  THE FILE TYPE IS UNKNOWN.  FAX CAN NOT BE PRINTED.
```

File format is not determined. The file format must be
either in PCX or in TIFF format.

FAX Options   **FAX** **O**ptions

This command allows you to easily choose and store your
operational requirements. Performing this command
causes the *FAX Options Menu* to appear and lets you
choose your desired option. After completing this
command, a FAX.CFG configuration file, which includes
your option, is created. However, the FAX Utility
assumes defaults for all options so that it can continue
even when the configuration file does not exist.

Figure 14 in topic 6.3 shows the Fax Options Menu.

```
+--------------------------------------------------------------------------------+
¦                                                                                ¦
¦                                                                                ¦
¦                                                                                ¦
¦                           FAX Options Menu                                     ¦
¦                                                                                ¦
¦ Dialing type:                          [Tone] 1                                ¦
¦                                                                                ¦
¦ Number rings:                          [1 ]  (0 - 99) 2                        ¦
¦                                                                                ¦
¦ Transmit resolution:                   [Coarse] 3                              ¦
¦                                                                                ¦
¦ Communication port:                    [COM1] 4                                ¦
¦                                                                                ¦
¦ Text style for sending:                                                        ¦
¦        Characters per line:            [80] 5                                  ¦
¦        Character style:                 [Fixed] 6                              ¦
¦                                                                                ¦
¦ Printer:                                                                       ¦
¦        Type:                           [IBM Graphics] 7                        ¦
¦        Port:                           [LPT1] 8                                ¦
¦                                                                                ¦
¦ Type in Header for transmitted pages: 9                                        ¦
¦        Telephone number:               [                    ]                  ¦
¦        Name/Company:                                                           ¦
¦ [                                                                    ]         ¦
¦                                                                                ¦
¦                                                                                ¦
¦ ENTER=Save changes  ESC=Cancel  SPACE=Selects  Arrow keys move cursor  F1=Help ¦
¦                                                                                ¦
+--------------------------------------------------------------------------------+
```

Figure 14. Fax Options Menu

Note: Pressing **ESC** causes you to leave this menu without changing the
       configuration.

Key	Description	Option
1	Selects the dialing type of the telephone connecting to the modem.	**Tone** Pulse
2	Specifies the number of rings to wait before answering a call.	**1** 0 to 99
3	Determines the transmit resolution.	**Coarse** Fine
4	Determines the port address of the modem.	**COM1** COM2
5	Specifies the number of characters per line on a sending file.	**80** 132
6	Selects the style of characters.	**Fixed** Proportional
7	Selects the printer type attached to the computer.	**IBM Graphics** IBM ProPrinter IBM Personal Page Printer HP LaserJet Diconix
8	Determines the port address of the printer.	**LPT1** LPT2, LPT3 COM1, COM2
9	The *Header fields* allow you to insert or delete character anywhere within its line.	The allowable number of characters in *Telephone number* field is 20, and *Name/Company* field is 76.
Note:	Default option is highlighted in the Option column.	

Status Message:

  FAX OPTIONS HAVE BEEN SAVED

All options have been successfully saved and returned to DOS.

Printed in the United States of America

 (*) ProPrinter is a trademark of the International Business
     Machines Corporation.

 (**) HP LaserJet II is a trademark of the Hewlett Packard
     Corporation.

 (1) Diconix printer is manufactured by Eastman Kodak
     Corporation.