V.3400
Manual

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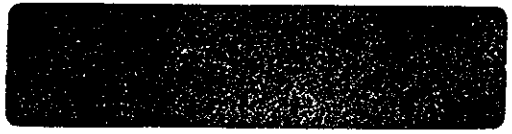

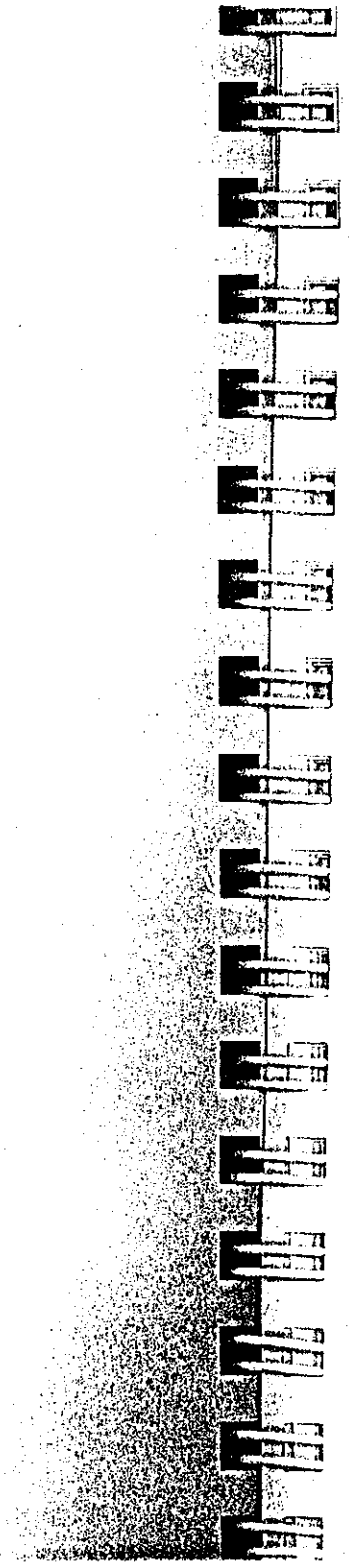

V.3400

User's Guide

Motorola
5000 Bradford Drive
Huntsville, AL 35805-1993

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Updates to the products and the manual can be obtained at participating Motorola dealers and distributors, or directly from Motorola.

FCC REQUIREMENTS

This equipment complies with FCC rules Part 68. Located on the equipment is the FCC Registration Number and Ringer Equivalence Number (REN). You must provide this information to the telephone company if requested.

The Registration Number and REN will be inscribed on the printed circuit board on insert cards or on a label attached to either the chassis bottom or metal end-plate on standalone or rack models. In any case the FCC requires these numbers be prominently displayed on an outside surface of the equipment.

The REN is used to determine the number of devices you may legally connect to your telephone line. In most areas, the sum of the REN of all devices connected to one line must not exceed five (5.0). You should contact your telephone company to determine the maximum REN for your calling area.

A variety of Universal Service Ordering Code telephone wall jacks are available for different types of devices or services. Please note that the USOC jack required for this unit is RJ11.

The telephone company may change technical operations or procedures affecting your equipment. You will be notified of changes in advance to give you ample time to maintain uninterrupted telephone service.

If you experience trouble with this telephone equipment, please contact

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for information on obtaining service or repairs. The telephone company may ask that you disconnect this equipment from the network until the problem has been resolved. If your equipment continues to disrupt the network the telephone company may temporarily disconnect service. If this occurs you will be informed of your right to file a complaint with the FCC.

This equipment may not be used on coin service provided by the telephone company. Connection to party lines is subject to state tariffs.

An FCC compliant telephone cord and modular plug are provided with this equipment, which is designed to connect to the telephone network or premises wiring using a compatible modular jack that is Part 68 complaint. See installation instructions for details.

WARNING

> This equipment uses, generates, and can radiate radio frequency energy interfering with radio communications if not installed and used according to the instruction manual. It has been tested and complies with the limits for a Class A computing device according to FCC Rules, Part 15. Operation of this equipment in a residential area may cause interference. If it does, you must correct the cause of the interference.

Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

SHIELDED CABLES

This product has been tested and complies with FCC limits for a Class A computing device. Testing was done with shielded computer cables. Using unshielded cables could cause your system to emit excess radio frequency, increasing the chance of interference. To comply with FCC regulations it is necessary to use shielded computer cables with your installation.

SPECIAL REQUIREMENTS FOR CANADA

Certain requirements exist for data communication products manufactured for use in Canada. Principle among these requirements is the application of the IC label as described below. However, certain data communication products do not require the IC label nor adherence to IC requirements. If this is the case the IC label will not be affixed to the units.

INDUSTRY CANADA (IC) REQUIREMENTS

IC labels are affixed to each unit sold in Canada. This label has the certification number for that particular unit. The numbers are different for each model.

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

Before installing this equipment, users should ensure that it is permissible to be connected 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 be extended by means of a certified connector assembly (telephone extension cord). The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be made by an authorized Canadian maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment. For their own protection users should ensure that the electrical ground connections of the power utility, telephone lines and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

CAUTION

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

LOAD NUMBER

The Load Number (LN) assigned to each terminal device denotes the percentage of the total load to be connected to a telephone loop which is used by the device, to prevent overloading. 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.

CANADIAN EMISSION REQUIREMENTS

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

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Chapter 1
Introduction

GENERAL

The Motorola V.3400 series of modems are synchronous, asynchronous, and fax modems that can establish and maintain data communications or facsimile links between a computer at your location, and a remote computer, fax, or Data Terminal Equipment (DTE) located anywhere a standard or cellular telephone can reach. Data transmission can be over standard dial-up, private leased telephone lines, or wireless communication.

The V.3400 series of modems communicate at standard data rates up to 28800 bps with compatible modems connected to similarly equipped computers, computer services, and data bases. Advanced error control and data compression ensure data integrity and increase data throughput.

When used with a Class 1 Fax software package, the modem can exchange fax documents at data rates of up to 14400 bps with any Group 3 fax machine or PC with a fax modem.

A high level security feature allows secure operation of the modem both locally and remotely.

FEATURES

The modem is a flexible telecommunications tool that offers outstanding compatibility and the following standard features:

Data Mode

- Full-duplex operation on 2-wire public, 2-wire or 4-wire private telephone connections with 2-wire public automatic or manual backup
- 300, 1200, 2400, 4800, 7200, 9600, 12000, 14400, 16800, 19200, 21600, 24000, 26400, and 28800 bps DCE data rates

- Compatible with these standards:
  CCITT V.34
  CCITT V.33
  CCITT V.32 bis
  CCITT V.32
  CCITT V.29
  CCITT V.27
  CCITT V.22 bis
  CCITT V.22
  CCITT V.21
  CCITT V.13
  Bell 212A
  Bell 103
  Plus a variety of software packages
- Synchronous operation at all DCE data rates, and asynchronous operation up to 115200 bps
- CCITT V.42 bis and MNP level 5 data compression
- CCITT V.42 and MNP 4 error control protocol
- LCD configuration and status for easy operation
- Front panel lockout
- Autodial and Autoanswer capability
- Autobaud DTE rate and character format selection
- AT command set
- V.25 bis autodialer
- Configuration memory
- Phone number storage
- Multiple levels of security with auto callback and password protection and up to 50 users
- Automatic speed matching to originating modem
- Remote configuration using command mode or LCD
- Built-in standard diagnostics for testing phone line quality and modems at each end
- 801 auto dial support

- Many user options to support a wide range of operating environments

Fax Mode

- Fax speeds to 14.4 kbps
- HDLC framing to allow T.30 Error Correction Mode
- Standard Class 1 interface conforms to EIA-578
- Group 3 compatibility: CCITT V.21 Channel 2, V.27 ter, V.29, V.17
- Autoanswer under software control
- Automatic fax/data detection

COMMUNICATIONS SOFTWARE

Because software directs the computer and modem to communicate with each other, you will need Mirror III (available from Motorola) or another communications software package for most data mode operations involving the modem. After installing the modem consult the software user's manual for information on the communications software, commands, and features. Software operating commands provide the operator with complete control of the modem.

For operation as a fax modem, a computer and a Class 1 fax software package are required. A fax connection cannot be established except with software control. You will need FaxTalk Plus (available from Motorola) or another Fax communication package.

DESCRIPTION

Functional

The V.3400 processes serial asynchronous data from a DTE at all standard rates from 300 bps to 115.2 kbps, and serial synchronous data at rates from 300 to 28.8 kbps. Transmission can be over either dial-up lines or either 2- or 4-wire leased lines. The maximum line speed is 28.8 kbps. Built-in test features can determine system performance and isolate faults in the data link.Operation and configuration are controlled by either the front panel LCD, the AT command set, or the V.25 bis command set.

Physical

The V.3400 has a 32 character LCD front panel with three pushbuttons for option selection (Figure 1-1).

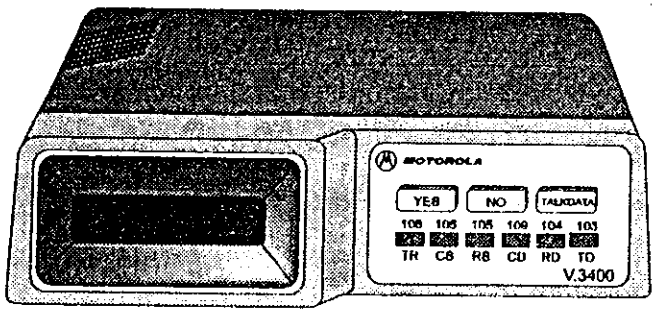


Figure 1-1 Typical Front Panel

The V.3400 rear panel has an EIA-232 DTE connector, an 8-pin AUX jack, an 8-pin LINE jack, the power switch, fuse, and cord (Figure 1-2).

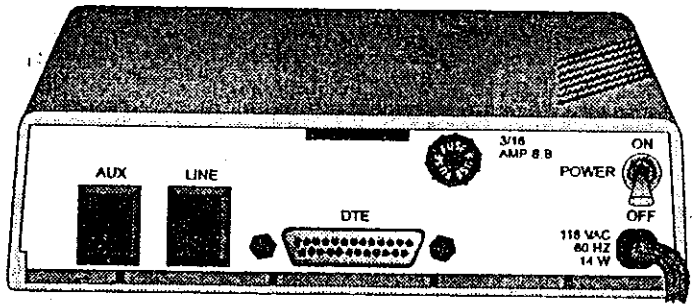


Figure 1-2 Rear Panel (115 Vac Model)

The shelf mount unit has edge connectors that insert into the shelf backplane. The shelf backplane performs the same functions as the standalone rear panel.

Chapter 2
Installation

GENERAL

This chapter provides information for the mechanical and electrical installation of the modem.

ELECTRICAL INSTALLATION

The rear panel (Figure 2-1) includes connectors for the DTE cable and telephone lines.

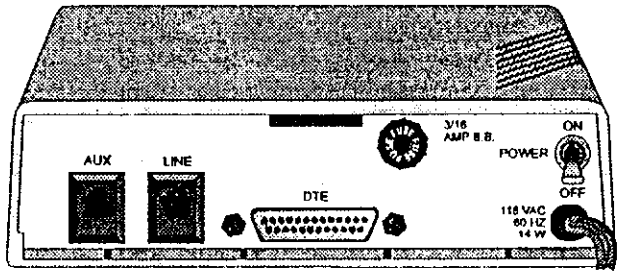


Figure 2-1 Rear Panel Connections

AC Power Connection

Power is supplied through a 6-foot line cord with a grounded 3-wire plug. If common ground is available through the third prong of the plug, a separate ground wire is not required.

DC Power Connection

Caution

To protect the DC to DC converter from damage, ensure the positive and negative leads are properly connected.

If the modem is equipped for dc power input, connect 12 to 60 VDC power to the terminal block attached to the modem back panel. A chassis ground connection is also supplied on the terminal block.

DTE CONNECTION

The DTE connector is a 25-pin D-series type conforming to EIA-232 specifications. Pin signals are shown in Figure 2-2 and described in Table 2-1.

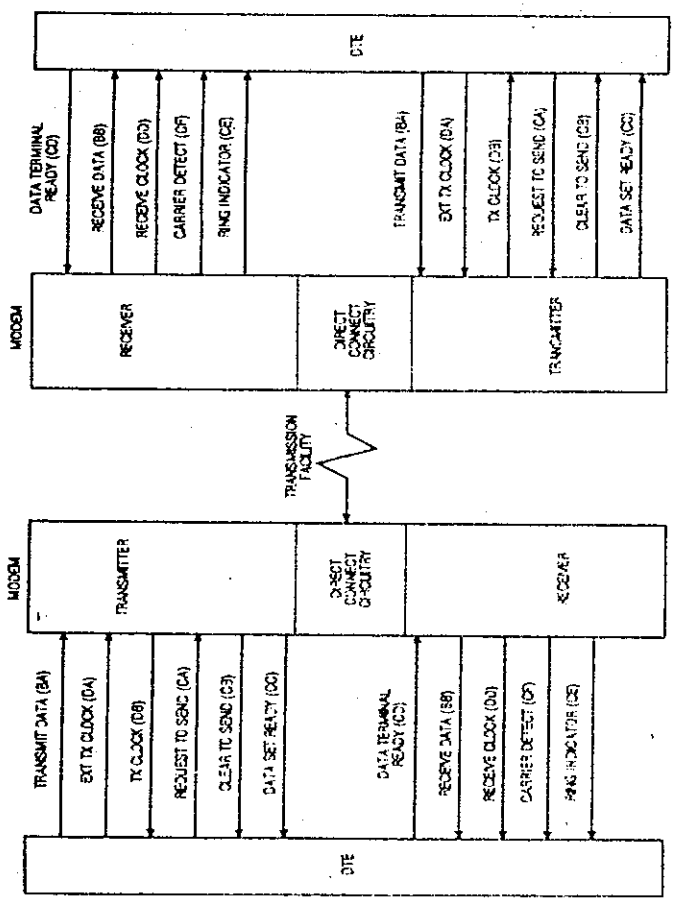


Figure 2-2 Digital Interface Signals

Table 2-1. Digital Interface Signal Descriptions

Pin No.	EIA-232D	CCITT V.24	Signal Name	Description
1		101	Shield	No connection
2	BA	103	Transmitted Data	Serial digital data (to be modulated) from a data terminal or other digital data source: Synchronous data must be accompanied by the modem transmit clock (pin 15) or by an external data rate clock (pin 24). Data transitions should occur on positive-going clock transitions; asynchronous data does not require a transmit clock.
3	BB	104	Received Data	Serial digital data output to the DTE interface: Sync data is accompanied by an internal data rate (receive) clock (pin 17) that has positive-going transitions on the data transition. Async data does not require a receive clock.
4	CA	105	Request to Send	A positive level to the modem when data transmission is desired
5	CB	106	Clear to Send	A positive level from the modem in response to Request to Send and when the modem is ready to transmit. *
6	CC	107	Data Set Ready	A positive level from the modem when power is on and ready to operate: In dial-up operation, the modem must be off hook to give a high DSR signal.*
7	AB	102	Signal Ground or Common Return	Common signal and DC power ground
8	CF	109	Received Line Signal Detector	A positive level from the modem indicating the presence of a received signal (carrier detect). *

** Modem options may force these signals on or cause them to be ignored.*

Table 2-1. Digital Interface Signal Descriptions (Continued)

Pin No.	EIA-232D	CCITT V.24	Signal Name	Description
9			+12 Volts	+12 voltage reference
10			-12 Volts	-12 voltage reference
11			Signal Quality Indicator	This circuit indicates probability of errors in the received data: a positive level indicates poor signal quality while a negative level indicates good signal quality. †
15	DB	114	Transmit Clock (DCE)	A transmit data rate clock output for use by an external data source: Positive clock transitions correspond to data transitions.
17	DD	115	Receive Clock	A receive data rate clock output for use by an external data sink: Positive clock transitions correspond to data transitions.
18		141	Local Loopback (Loop 3) Control	A positive level causes the modem to enter the local analog loopback test mode.*
20	CD	108.2	Data Terminal Ready	This circuit is positive when the DTE is ready to originate or answer a call in dial-up operation. DTR must always be active (high) in 2-wire private line operation. Cycling DTR causes retraining.*
21		140	Remote Digital Loopback	A positive level causes a digital loopback test mode at the remote modem.*
22	CE	125	Ring Indicator	In direct dial operation this circuit is positive in response to an incoming ring signal.*
23	CH	111	Data Rate Select	Supplies a data rate control input to select primary or fallback data rate: Negative voltage selects primary data rate and positive voltage selects fallback data rate.*

** Modem options may force these signals on or cause them to be ignored.*

† This function can be disabled or its logic sense reversed by hardware straps. Refer to Strap Options.

Table 2-1. Digital Interface Signal Descriptions (Continued)

Pin No.	EIA-232D	CCITT V.24	Signal Name	Description
24	DA	113	External Transmit Clock	A serial data rate clock input from the data source. Positive clock transitions correspond to data transitions.
25		142	Test Mode	Indicates the modem is in a test mode

TELEPHONE LINE CONNECTION

The modem operates in one of three line-related modes:

- Permissive (PSTN)
- Programmable (PSTN)
- Private line

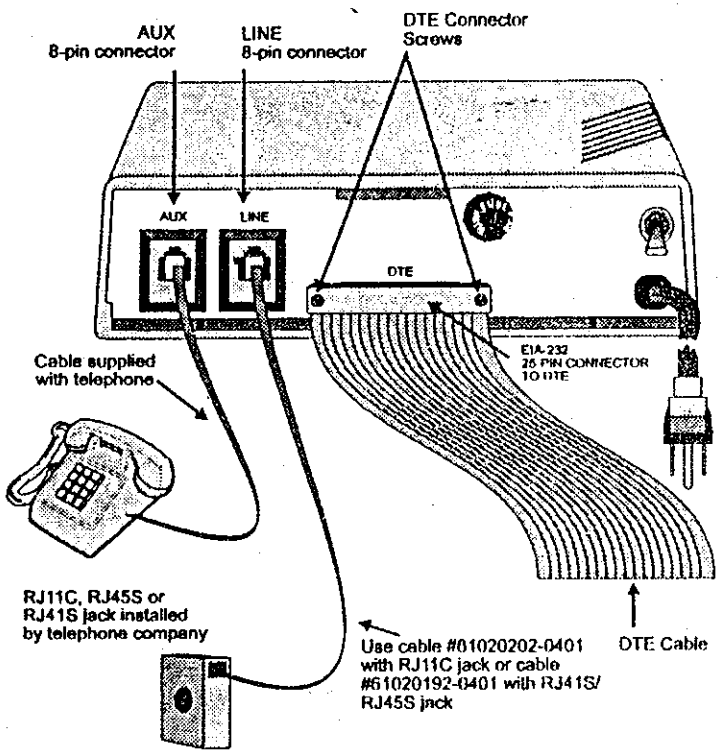
Permissive and programmable modes are used on the Public Switched Telephone Network (PSTN). Private line mode is used on 4-wire or 2-wire leased lines. The user must decide which mode to use and then select the telephone jack arrangement.

PSTN Connection

Modems are registered with the Federal Communications Commission (FCC) for direct connection to the PSTN (dial-up network). The label on the chassis bottom gives the FCC registration number and other information required for network operation.

Direct connection to the PSTN provides two modes of operation (Figure 2-3):

- Permissive (standard domestic or home use)
- Programmable



Notes:

1. *The AUX jack is provided on the back of the modem for use with a standard rotary or tone dial telephone regardless of the telephone jack arrangement ordered from the telephone company.*
2. *This standard rotary or tone dial telephone set can be used for originating a call or for voice communication. For sites requiring only autoanswer capability, a phone is not needed.*

Figure 2-3 Dial-up Connection

Permissive

In permissive mode, the modem transmits a maximum signal level of -9 dBm. Signal loss between the modem and telephone company central office is not controlled.

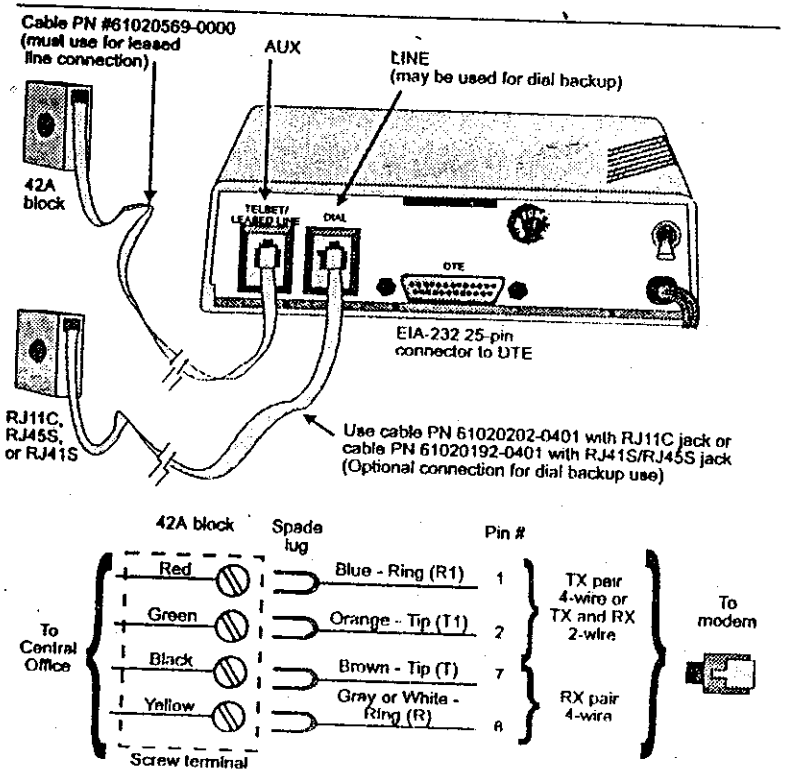
Programmable

Programmable mode corrects for the signal level loss between the modem and the telephone company central office. This is done by setting the modem transmit output signal level with a fixed-value programming resistor selected and installed in the jack by the telephone company. This allows the output signal to reach the central office at the optimum level of -12 dBm. Jack arrangements for this mode are the RJ45S (Programmable) and RJ41S (Universal). The RJ41S has a switch option that must be selected to Programmed (P). Cable PN 61020192-0401 is used to connect the LINE jack on the back of the modem to the RJ41S or RJ45S wall jack.

Leased Line Connection

Leased lines use either a 2-wire or 4-wire connection. The telephone company will install the leased line and wall jack at your site. The line connects to the modem at the 8-position AUX jack.

Figure 2-4 illustrates the typical hook-up of the modem for operation over private leased lines with dial backup.



Notes:

1. *Set the transmit output level to 0 dBm.*
2. *DTR, which is the signal on pin 20 of the DTE interface, must be active or the option DTE IGNORED must be set for 2-wire OR 4-wire leased line operation.*
3. *The connection shown includes dial backup. Connect only the 42A block to the AUX jack for regular leased line use.*

Figure 2-4 Leased Line Connection

Chapter 3
Getting Started

OPTION SELECTION

There are six ways to change or select options:

- LCD - Using the front panel LCD and pushbuttons is simple, straightforward, and requires the least amount of technical background. Chapter 4 explains LCD operation.
- AT Commands - The AT compatible command set can be used to select modem options. Chapter 5 describes AT commands.
- V.25 bis Commands - An extended set of V.25 commands allows selection of modem options during synchronous operation. Refer to Chapter 11.
- Status Registers - A series of special ATS commands allows the operator to change the decimal or hexadecimal value of a memory byte to change one or more options in that byte. Chapter 10 describes S-registers.
- Single Bit Status Registers - A second series of special ATS commands allows the user to change single bits within a byte to change an option. Chapter 10 explains single bit control.
- Software program - A wide variety of software programs are available, or advanced computer users can write their own software programs to interact with the modem. This manual does not discuss software programs.

POWERUP

A powerup procedure is not required. Turn the ON/OFF power switch on the rear panel to ON. The modem is factory configured to operate in most public switched telephone applications. If a user has stored a desired option set it will be automatically be restored at power up.