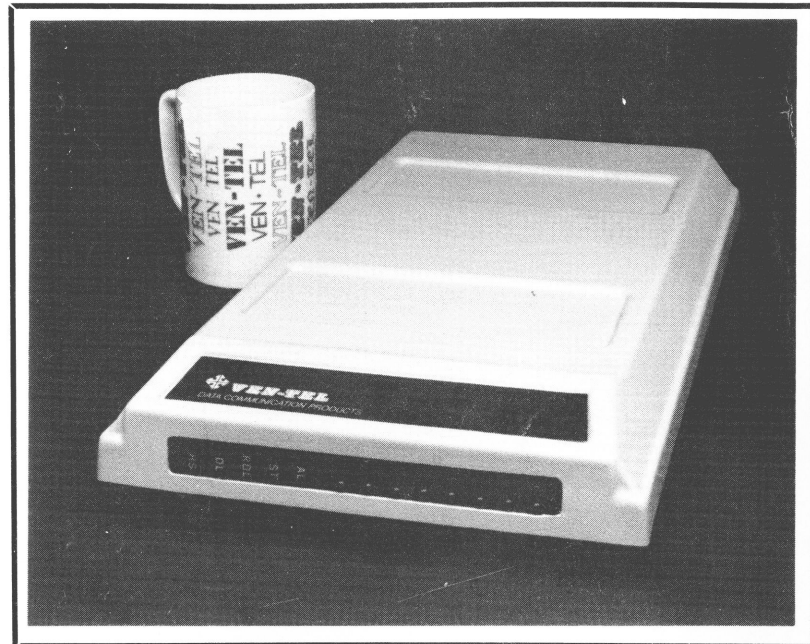




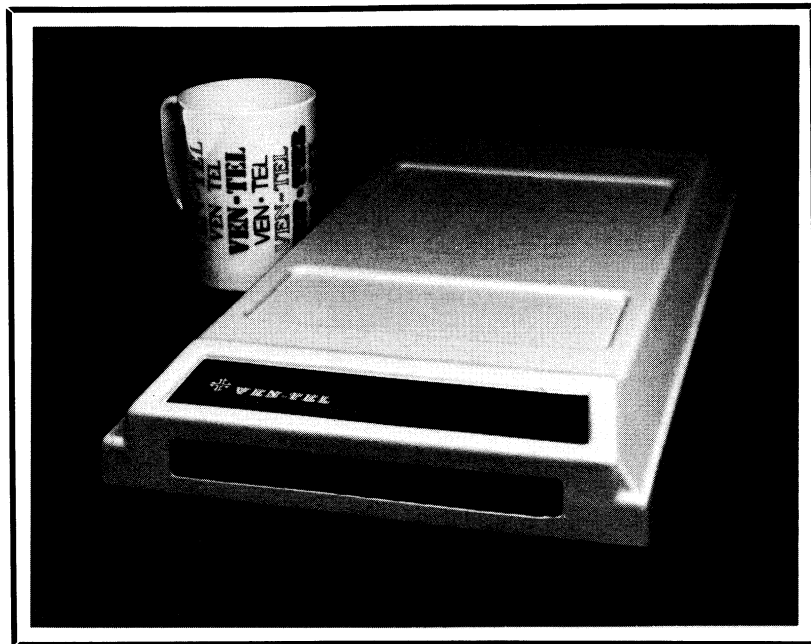
**Ven-Tel™ MD212-3E
Operator's Manual**



**Ven-Tel Inc.
2342 Walsh Ave.,
Santa Clara, CA**



**Ven-Tel™ MD212-3E
Operator's Manual**



copyright 1983

Ven-Tel Inc.
2342 Walsh Ave.,
Santa Clara, CA
(408) 727-5721

TABLE OF CONTENTS

CHAPTER 1 - GENERAL INFORMATION

Page

1.1	OVERVIEW	1-1
1.2	DESIGN HISTORY	1-1
1.3	QUALITY ASSURANCE	1-1
1.4	FUNCTIONAL DESCRIPTION	1-1
1.5	COMPATIBILITY	1-1
1.6	INTEGRAL AUTODIALER	1-1
1.7	INSTANT HELP LIST	1-1
1.8	REDIAL AND DIAL FOREVER	1-1
1.9	NETWORK ADDRESSING	1-2
1.10	MULTIPLE SPEEDS, DATA MODES	1-2
1.11	ORIGINATE AND AUTO-ANSWER	1-2
1.12	MODULATION TECHNIQUES	1-2
1.12.1	High Speed Mode - 1200 bps	1-2
1.12.2	Low Speed Mode - 300 bps	1-2
1.13	DIRECT CONNECT TO THE SWITCHED NETWORK	1-2
1.14	INTERFACE CONNECTIONS	1-2
1.15	CIRCUITRY FEATURES	1-2
1.16	FIELD SELECTABLE CONFIGURATION FEATURES	1-2
1.17	INTEGRAL DIAGNOSTIC TEST FEATURES	1-2
1.18	STANDALONE MD212	1-3
1.19	RACK MOUNTED CARDS	1-3

CHAPTER 2 - INSTALLATION

2.1	GENERAL	2-1
2.2	UNPACKING AND HANDLING	2-1
2.3	PLACEMENT	2-1
2.4	OPTION SELECTION	2-1
2.5	CONNECTION TO THE DTE	2-1
2.6	CONNECTION TO THE TELEPHONE LINES	2-1
2.7	TELEPHONE LINES	2-1
2.8	MODULAR JACKS	2-1
2.8.1	Programmed Arrangement USOC - RJ45S	2-1
2.8.2	Fixed Loop Arrangement USOC - RJ41S	2-2
2.8.3	Permissive Arrangement USOC - RJ11C	2-2
2.9	MODULAR PLUGS	2-2
2.10	INSTALLATION OF TELEPHONE LINE CABLE	2-2
2.11	TELEPHONE HANDSETS	2-2
2.12	ORDERING TELEPHONE LINES AND EQUIPMENT	2-2
2.13	VEN-TEL STANDARD EIA RACK ENCLOSURE	2-2
2.14	INSTALLATION OF RACK ENCLOSURE IN CABINET	2-3
2.15	PS4000 SWITCHING POWER SUPPLY	2-3
2.16	INSTALLATION OF PS4000 POWER SUPPLY	2-3
2.17	RACK CARD INSTALLATION	2-3
2.18	PRE-OPERATIONAL TESTING	2-3

CHAPTER 3 - OPERATION

3.1	GENERAL	3-1
3.2	FRONT PANEL SWITCHES AND CONTROLS	3-1
3.3	INDICATOR LAMPS	3-2
3.4	ORIGINATE OPERATION	3-2
3.5	CONTROL SWITCH SELECTION	3-2
3.6	INDICATOR LAMP DISPLAY	3-2
3.7	ORIGINATION UTILIZING INTEGRAL AUTODIALER	3-2
3.8	INITIATING THE DIALER	3-3
3.9	SETTING PARITY	3-3
3.10	HELP COMMAND	3-4
3.11	KEYBOARD DIALING	3-4
3.12	RE-DIALING	3-4
3.13	RE-DIALING UNTIL CONNECTED (FOREVER DIAL)	3-5
3.14	RESPONSES	3-5
3.15	ROTARY OR TONE DIALING	3-5
3.16	BLIND DIALING	3-5

TABLE OF CONTENTS

3.17	LOCAL COPY OPERATION	3-6
3.18	NUMBER LENGTH	3-6
3.19	EDITING.....	3-6
3.20	ABORTING A COMMAND.....	3-6
3.21	INTRODUCTION.....	3-6
3.22	INTERMEDIATE DIAL TONE.....	3-6
3.23	PAUSE.....	3-7
3.24	SUMMARY OF PBX DIALING.....	3-7
3.25	NUMBER STORAGE - GENERAL.....	3-7
3.26	CLEAR.....	3-8
3.27	DISPLAY.....	3-8
3.28	STORING A NEW NUMBER.....	3-8
3.29	DIALING STORED NUMBERS	3-9
3.30	LINKING.....	3-9
3.31	COMPUTER PORT DIALING.....	3-9
3.32	NULLS	3-10
3.33	BLOCK MODE TRANSFER.....	3-10
3.34	SUMMARY OF COMMANDS.....	3-11
3.35	AUTO ANSWER OPERATION	3-11
3.36	TERMINATING CALL	3-11

CHAPTER 4 - CONFIGURATION OPTIONS

4.1	GENERAL	4-1
4.2	FACTORY SWITCH POSITIONS.....	4-1
4.3	OPENING THE MODEM CASE.....	4-1
4.4	REMOVING THE MODEM CIRCUIT CARD	4-1
4.5	SWITCH SELECTABLE OPTIONS.....	4-2
4.6	SELECTION OF JUMPER CONFIGURATION OPTIONS.....	4-3
4.7	VEN-TEL MD212 SERIES CONFIGURATION OPTIONS.....	4-4
4.7.1	Modem Controls DTR Signal.....	4-4
4.7.2	Transmit Timing Signal.....	4-4
4.7.3	Enable Synchronous Receiver Clock.....	4-4
4.7.4	Slave Transmit Clock to Receive Clock.....	4-4
4.7.5	Make Busy During Analog Loopback Test.....	4-4
4.7.6	Proprietary.....	4-4
4.7.7	Answer Mode Indicator	4-4
4.7.8	Originate Only	4-4
4.7.9	Pulse/Tone Dial (Factory Selection Tone)	4-4
4.7.10	High Speed Transmission Mode	4-4
4.7.11	Local Copy	4-5
4.7.12	Blind Dial.....	4-5
4.7.13	Receiver Responds to Remote Digital Loop.....	4-5
4.7.14	Send Space On Disconnect.....	4-5
4.7.15	Respond to Space Disconnect.....	4-5
4.7.16	Loss of Carrier Disconnect.....	4-5
4.7.17	Speed Mode.....	4-5
4.7.18	Character Length 9 Bit/10 Bit.....	4-5
4.7.19	Modem Speed Indicator	4-5
4.7.20	EIA Signals May Initiate ALB.....	4-5
4.7.21	Common Ground.....	4-5
4.8	IDENTIFYING JUMPER PIN NUMBERS (Jumper E-1 & 2).....	4-6

CHAPTER 5 - MAINTENANCE

5.1	GENERAL	5-1
5.2	POWER FAILURE.....	5-1
5.3	FAULT ISOLATION TESTS.....	5-1
5.4	SELF TEST FUNCTION	5-1
5.5	ANALOG LOOPBACK FUNCTION.....	5-1
5.6	DIGITAL LOOPBACK FUNCTION	5-1
5.7	ANALOG LOOPBACK SELF TEST.....	5-1
5.8	ANALOG LOOPBACK TEST.....	5-2
5.9	REMOTE DIGITAL LOOP SELF TEST	5-2
5.10	REMOTE DIGITAL LOOPBACK TEST	5-2
5.11	DIGITAL LOOPBACK SELF TEST.....	5-3

TABLE OF CONTENTS

5.12	DIGITAL LOOPBACK TEST	5-3
5.13	END TO END SELF TESTING.....	5-4
5.14	VEN-TEL TECHNICAL SUPPORT	5-4
5.15	FAILURE CONFIRMATION.....	5-4
5.16	VEN-TEL FACTORY SERVICE PROCEDURES.....	5-4
5.17	WARRANTY.....	5-5
5.18	ENHANCED SERVICE ARRANGEMENTS	5-5
5.18.1	Ven-Tel S.A.F.E. Plan	5-5
5.18.2	Ven-Tel F.A.S.T. Plan	5-6

CHAPTER 6 - FCC REGULATIONS

6.1	GENERAL	6-1
68.104	Means of Connection	6-1
68.106	Notification to Telephone Company.....	6-1
68.108	Incidence of Harm	6-2
68.110	Compatibility.....	6-2
68.216	Repair of Registered Equipment	6-2
68.218	Additional Regulations.....	6-2

CHAPTER 7 - APPENDIX

7.1	TABLE A - VEN-TEL EQUIPMENT LIST.....	7-1
7.2	TABLE B - UNIVERSAL SERVICE ORDER CODES (USOC).....	7-1
7.3	TABLE C - TELEPHONE LINE INTERCONNECT CABLES	7-2
7.4	TABLE D - DATA TERMINAL EQUIPMENT INTERFACE CONNECTION.....	7-2
7.5	TABLE E - TECHNICAL CHARACTERISTICS	7-3
7.6	TABLE F - 212 PRINTED CIRCUIT BOARD.....	7-4

CHAPTER 8 - GLOSSARY

CHAPTER 1

GENERAL INFORMATION

1.1 OVERVIEW

Ven-Tel is one of the leading manufacturers of devices for communications between computers and computer peripherals over telephone networks. When computers and peripherals are close, they communicate by transmitting short electrical pulses. When the devices are too far apart to communicate over cables, modems provide a reliable, inexpensive method of data communications. A modem converts the electrical impulses into tones which are transmitted over the telephone lines to a remote location where another modem re-converts the tones to electrical impulses. The word "Modem" is a contraction of Modulator-Demodulator.

Data processing equipment may be connected to the telephone network acoustically or directly. Ven-Tel acoustic couplers convert data to sound which is communicated through the microphone of the telephone handset. Most modems, including the MD212 series are connected directly to the telephone network with small plastic modular jacks similar to the RJ11C jack now supplied with most residential telephones.

Ven-Tel produces a full line of medium and low speed modems. Many of our dial-up units are available with keyboard dialing, busy-out and other advanced, human engineered features.

1.2 DESIGN HISTORY

Ven-Tel has been producing high quality medium and low speed modems since 1975. The current design for the MD212 was introduced in 1979. The 212 PLUS was introduced in 1980. The MD212 offers full duplex (simultaneous send and receive) 1200/300 bits per second data communications.

1.3 QUALITY ASSURANCE

Every Ven-Tel data communication product has been carefully tested and inspected at every step of the manufacturing process to build quality and reliability into the product. The MD212 undergoes a minimum of 43 separate tests and inspections before being released for shipment. Each device undergoes a 72 hour burn-in at 135 Degrees F. During the entire burn-in procedure, the MD212 is operating in a dynamic self test exercise. These quality assurance measures are among the highest in the industry. They are designed to assure you that you will receive a dependable product which provides the reliability and stability you require.

1.4 FUNCTIONAL DESCRIPTION

The 212 PLUS incorporates a microprocessor based integral autodialer into a Bell 212A compatible modem for full-duplex data communications over the switched network. The modem operates at two distinct bit rates. In the 300 bps low-speed mode of operation it is compatible with existing switched network low-speed modems such as the 103 and 113 types. At 1200 bps it is compatible with the Western Electric 212A.

1.5 COMPATIBILITY

All MD212 series modems provide full-duplex data communication over the standard network and are functionally compatible with the Bell 212A modem. The MD212 operates at 0 to 300 bps with 103, 113 and 212A industry standard modems and 1200 bps with industry standard 212A modems. The MD212 offers both originate and auto-answer for either synchronous or asynchronous transmission as well as automatic disconnect upon loss of carrier. The MD212 is not functionally compatible with Racal-Vadic 3400 modems.

1.6 INTEGRAL AUTODIALER

The integral autodialer offers microprocessor controlled dialing from either computer or terminal equipment. No telephone is needed. The 212 PLUS will remember five thirty digit numbers in its continuous battery supported memory as well as the last number dialed. Numbers not stored in memory can be keyed directly from the local terminal equipment.

1.7 INSTANT HELP LIST

The 212 PLUS provides a HELP list of simple operator instructions and instantly reports and prints the dialing results with "Online, Busy, No Answer or Dead Phone."

1.8 REDIAL AND DIAL FOREVER

Instant redialing of any number saves valuable time in making a connection. Dial Forever commands permit automatic redialing of a number until a connection is completed, to even impossibly busy credit reporting services or timesharing ports. The operator can turn his attention to important tasks while the PLUS continues to dial unattended. The modem even alerts the user to the connec-

GENERAL INFORMATION

tion by sounding the bell in the users terminal just before going "online". In addition, numbers can be linked so that if the first number is busy, an alternate number will be dialed automatically.

1.9 NETWORK ADDRESSING

Network addressing capability makes the 212 PLUS useable in virtually any data communications environment. User selectable tone/pulse dialing permits use of the PLUS with even small independent rural telephone systems. PBX and special networks are no problem for the powerful integral autodialer. Special characters may be inserted into the number stream to tell the microprocessor to pause and wait for specific intervals of time or even for a second dial tone.

1.10 MULTIPLE SPEEDS, DATA MODES

The MD212 PLUS can be operated in the high-speed mode at 1200 bps and in low speed mode at 300 bps. In the high-speed mode the operation can be either asynchronous or synchronous and is compatible only with another 212A modem. Speed selection is determined by the modem that is originating the connection; the answering modem automatically adapts to the speed of the originating modem.

1.11 ORIGINATE AND AUTO-ANSWER

The MD212 PLUS provides automatic dialing and auto-answer operation.

1.12 MODULATION TECHNIQUES

The MD212 employs two distinct modulation techniques for the high speed (1200 bps) and the low speed (300 bps) transmission modes.

1.12.1 High Speed Mode - 1200 bps

Phase shift keyed modulation techniques are used to impart and sense four distinct electrical qualities on each of two frequencies. The originating modem transmits on 1200 Hz and the receiving modem transmits on 2400 Hz. Each MD212 has the circuitry to function as either an originate or answer device.

1.12.2 Low speed Mode - 300 bps

Frequency shift keyed modulation techniques are used to encode data on each of two frequencies. The originating modem transmits on 1070/1270 Hz and the receiving modem transmits on 2025/2225 Hz. Each MD212 has the circuitry to function as either an originate or answer device.

1.13 DIRECT CONNECT TO THE SWITCHED NETWORK

The MD212 contains an FCC registered telephone line interface which allows for direct connect to the switched network. No DAA (Direct Access Arrangement) or other special equipment is required. FCC Regulations previously required the user to interface with Direct Access Arrangement (DAA) which could only be leased from the telephone company if he desired to connect a modem directly to the telephone line. A recent FCC ruling permits direct connect of modems with an FCC registered DAA.

1.14 INTERFACE CONNECTIONS

The MD212 provides three rear mounted female interface connectors. One is a 25 pin EIA business machine interface, the other two are for connecting either an RJ11C or RJ41/45S telco line connector to the switched network interface.

1.15 CIRCUITRY FEATURES

The MD212 is a microprocessor controlled device utilizing state of the art solid state circuitry. The design provides extreme reliability, low power consumption, compactness and easy maintenance.

1.16 FIELD SELECTABLE CONFIGURATION FEATURES

A large variety of optional configuration features may be implemented by the user to meet virtually any data communications need. See Chapter 4 for details.

1.17 INTEGRAL DIAGNOSTIC TEST FEATURES

Integral diagnostic test features permit fast, thorough tests of the local modem, the associated business machine, the intervening line and the remote modem. A pattern generating error detection circuit and test logic substantially reduce the need for external test equipment.

1.18 STANDALONE MD212

Ven-Tel's standalone MD212 is packaged in an attractive, sturdy, flame resistant, vacuum formed high-impact, plastic enclosure designed to compliment the appearance of the modern office. Connection to the AC power line is made through a wall mounted transformer with a cable which enters the modem at the rear of the enclosure. Inside are two printed circuit boards with telephone line and business machine interfaces. The front panel has eight LED diagnostic status indicators plus five double action test switches. A variety of user selectable features may be selected from two miniature ten position switches mounted on the board. The enclosure measures 7 inches wide, by 2 inches high, by 14 inches deep and weighs 4 pounds. The printed circuit board may be removed from the case and inserted into the DS1200-3 rack enclosure. (See Section 4.3 & 4.4 for instructions on opening the modem case and removing the card.

1.19 RACK MOUNTED CARDS

The MD212 Rackmount modem consists of two printed circuit boards measuring 6 inches by 14 inches and weighs less than a pound. Sixteen individual modems can be mounted in Ven-Tel's standard 19" EIA rack, which is suitable for mounting in a standard equipment cabinet. A variety of user selectable features may be selected from two miniature ten position switches mounted on the board. The Ven-Tel DS1200 rackmount enclosure will accommodate any of the rackmount modems from the Ven-Tel product line. The MD212 rackmount card can be placed in the standalone case, with an external wall mounted power supply for desktop use.

CHAPTER 2

INSTALLATION

2.1 GENERAL

The word modem is a contraction of "Modulator - Demodulator." A modem converts digital signals (electrical pulses) from the computer or terminal to analog waveform signals suitable for the transmission over a telephone line. The modem is connected to the computer equipment with an EIA RS232C cable. The connection to the telephone line is made with small modular plug similar to those now supplied with most residential telephone installations.

2.2 UNPACKING AND HANDLING

The Ven-Tel shipping container has been designed to protect the modem from damage in shipment. Carefully open the box by cutting the tape. Remove and inspect the unit for visible damage. If any damage is observed, notify the appropriate authority, IMMEDIATELY. Do not discard shipping containers or packing materials; they may be required for transporting or re-shipping.

2.3 PLACEMENT

Install all equipment in a location with ventilation. Do not locate directly above other equipment that generates heat. **DO NOT STACK STANDALONE MODEMS.**

2.4 OPTION SELECTION

There are 20 field selectable configuration options available to condition the MD212 for virtually any application. Each of the options has been factory set in the most commonly utilized asynchronous mode. In most instances the modem will function properly without changing any of the configuration options. (See chapter 4 for a detailed explanation of the configuration options and the recommended factory setting.)

2.5 CONNECTION TO THE DTE

MD212 series modems are connected to the DTE with a standard 25-pin EIA-RS232C interface cable which plugs into the rear mounted female interface connector. (See Appendix, Table D, page 7-2 for a listing of the signals provided.)

2.6 CONNECTION TO THE TELEPHONE LINES

The MD212 Series of modems are registered for direct connect to the switched network. These are the same telephone lines used for normal voice conversations. Under FCC regulations, connection to the switched network is achieved with FCC prescribed standard modular plugs and jacks. No special telephone or voice-data switch is necessary to originate calls with the MD212 PLUS. No DAA or other devices are required.

2.7 TELEPHONE LINES

It is anticipated because of the high quality of the telephone service that the MD212 will work on normal voice grade lines. However, in order to assure the best possible data transmission, specify DATAPHONE ENGINEERED LINES TYPE II to be used with the MD212. This is a "NO CHARGE" service from the telephone company when an RJ41S or RJ45S service arrangement has been ordered or supplied; but it should be specified at time the line is ordered. If you order the DATAPHONE ENGINEERED LINES TYPE II service after the line is installed, there will be an additional service charge for the visit to perform the conditioning this service entails. Voice grade lines are provided with this arrangement. This feature **IS NOT** available with the RJ11C jack arrangement provided with residential installations.

2.8 MODULAR JACKS

There are three modular jack arrangements available from the telephone companies for use with the MD212. They are available in multiple arrangements. They are usually described by the Universal Service Order Code (USOC) which is used by most telephone companies for ordering purposes. They are the RJ45S, the RJ41S and the RJ11C. A detailed explanation of the USOC connection is provided in the Appendix, Table B, page 7-1.

2.8.1 Programmed Arrangement USOC - RJ45S

The programmable configuration sets the modems output transmit level from 0 dBm to -12 dBm. This is accomplished by the telephone installer placing an external programming resistor in the jack box at the time of equipment installation. (RJ45S)

INSTALLATION

2.8.2 Fixed Loss Loop Arrangement USOC - RJ41S

The fixed loss loop arrangement involves setting modem output transmit level to -4dBm. Telephone company installers introduce sufficient attenuation in the jack box to make total losses from the data jack to the local central office equal to -12 dBm. (RJ41S)

2.8.3 Permissive Arrangement USOC - RJ11C

The permissive arrangement sets the output signal level so that modem output transmit level cannot exceed -9 dBm. This is the type of jack supplied with most residential telephone installations. (RJ11C)

2.9 MODULAR PLUGS

The MD212 is delivered with a standard 7 Foot cable with modular type connectors at each end. Cables are available for either RJ11C, or RJ41C/RJ45S arrangements. If your cable does not have the right modular jack, contact your supplier for an exchange. Longer cables are available upon special request. See Appendix, Table A, page 7-1 for the Ven-Tel part number for any specific cable requirement.

2.10 INSTALLATION OF TELEPHONE LINE CABLE

One end of the modular cable is inserted into the appropriate plug on the back of the modem marked "RJ11C" or "RJ41/45" and the other inserts into the wall mounted modular plug where the phone was connected. No telephone is required.

2.11 TELEPHONE HANDSETS

The MD212 PLUS does not require a telephone, dialing is accomplished through the terminal keyboard. If manual origination is desired, you must use an exclusion key telephone or voice/data switch. The telephone or VD switch must be plugged into the jack marked Tel Set and option S7-5 "Respond to RDL" must be disabled see section 4.5.

2.12 ORDERING TELEPHONE LINES AND EQUIPMENT

To order telephone lines and equipment call the telephone company business office and ask for your local "Data Communications Service Representative."

a. Request a telephone line(s) for data communications registered equipment (if telephone line is already installed, give telephone number and request conversion for registered equipment). We suggest that you order Data Engineered Lines Type II.

b. Provide manufacturers name: VEN-TEL, INC.

c. Provide model number, registration number and ringer equivalence number.

Model MD212-3E - Standalone Modem - FCC Registration No.:
AU692V-68547-DM-E
Ringer Equivalence: 0.4B

Model MD212-4 - Rackmount Modem - FCC Registration No.:
AU692V-68547-DM-E
Ringer Equivalence: 0.4B

d. Specify the USOC modular jacks to be supplied. See Section 2.8, RJ41S or RJ45S jacks must be ordered if you request DATAPHONE ENGINEERED SERVICE TYPE II for the associated telephone lines. The RJ41S is recommended.

e. If you want the telephone company to provide a telephone, specify a standard single line telephone with an RJ11C jack arrangement.

2.13 VEN-TEL STANDARD EIA RACK ENCLOSURE

The Standard Ven-Tel EIA Rack Enclosure, measuring 19 inches wide, 7 inches high and 14 inches deep, mounts in any standard EIA cabinet. The rack enclosure accommodates up to 16 standard Ven-Tel rackmount modem cards together with a standard Ven-Tel PS4000 switching power supply.

2.14 INSTALLATION OF RACK ENCLOSURE IN CABINET

The Rack Enclosure slides easily into any standard EIA cabinet. The front of the rack enclosure has a flange on each side with slots to accept standard spaced retaining bolts. The enclosure is held securely in the cabinet with four bolts, two on each flange.

2.15 PS4000 SWITCHING POWER SUPPLY

The PS4000 Switching Power Supply measures six inches high, three and 1/2 inches wide and fourteen inches deep and weighs 10 pounds (22 kilograms).

2.16 INSTALLATION OF PS4000 POWER SUPPLY

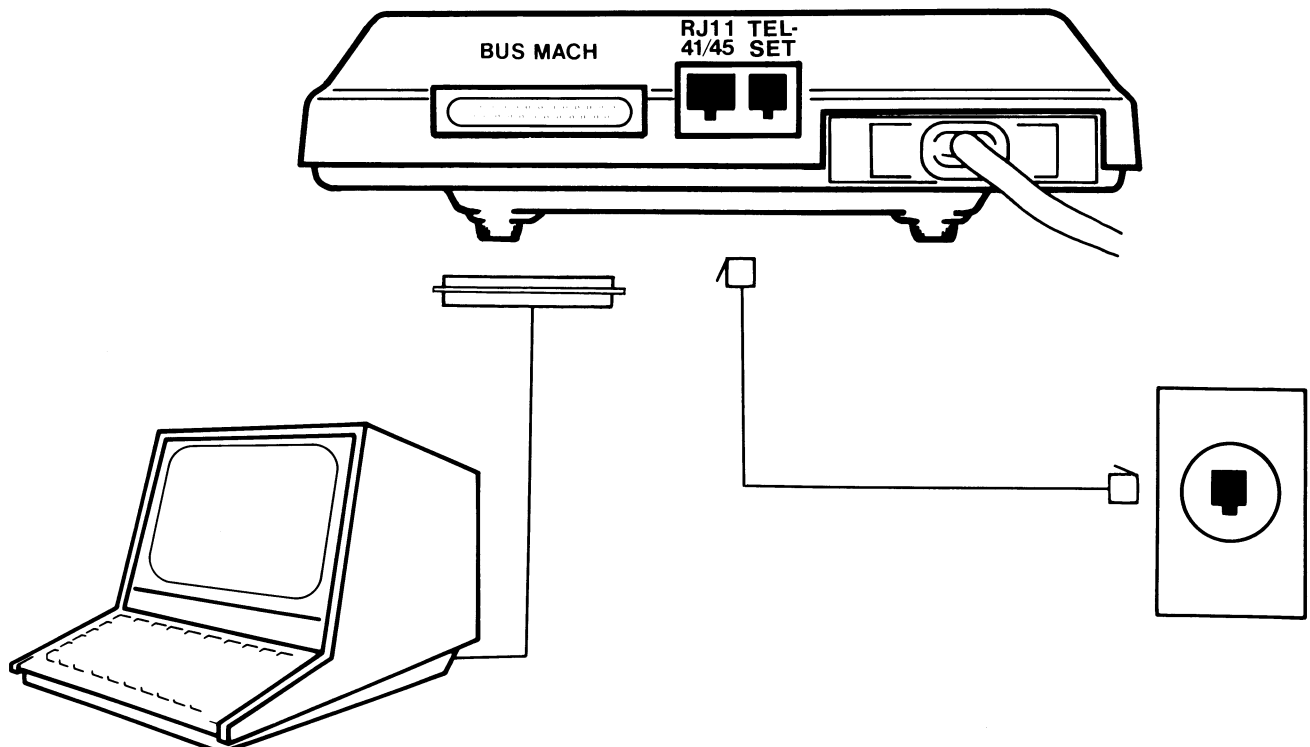
The power supply is a modular unit which slides into the right side of the rack enclosure. It may be secured in the enclosure with retaining screws if you desire, but this usually is not necessary. The power cord is inserted into the rear of the power supply. Unplug the power supply when installing or removing modem cards. Care should be exercised when installing or removing the power supply to avoid accidental damage due to dropping.

2.17 RACK CARD INSTALLATION

Each modem card slides into one of 16 individual slots in the enclosure. The edge connector on the rack card interfaces with a power buss at the rear of the enclosure. These connectors extend through an opening in the rear of the rack enclosure. NOTE: The modular telephone plug MUST be inserted into the appropriate modular connector (RJ11C or RJ41/45) at the rear of the rack-mount card. The modem will not operate properly if the plug is inserted into the smaller jack.

2.18 PRE-OPERATIONAL TESTING

The MD212 should be tested prior to initiating operation. Perform the tests in the manner directed in Chapter 5, Maintenance. For assistance, or if the modem fails the test, contact Ven-Tel, Inc. at corporate headquarters in Santa Clara, California at (408) 727-5721. Ask for a Technical Support Representative to assist you.

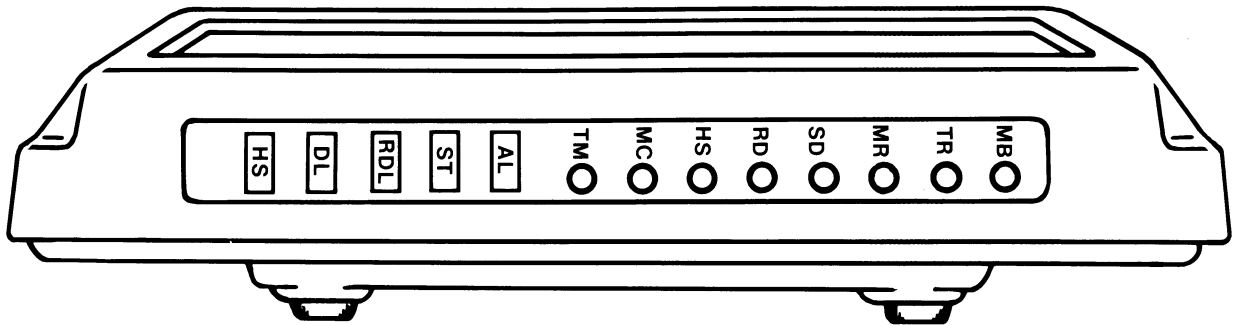


Typical Installation

CHAPTER 3 OPERATION

3.1 GENERAL

The MD212 PLUS can be used to initiate calls automatically from a keyboard or a computer. It is simple to operate. The modem provides an array of control switches and functional indicators for the convenience of the operator.



212 Front Panel Indicator Lights and Control Switches
Figure 3-1

3.2 FRONT PANEL SWITCHES AND CONTROLS

Four of the five black double action switches and the eight LED diagnostic status indicators on the front panel are for system analysis and testing. The fifth switch, HS, is for speed control. Familiarize yourself with the purpose and use of the switches and indicators. The modem will not function unless the test switches are properly configured. The LED display provides a constant report of the operational status of the modem.

AL - Analog Loop	When depressed, the output of the local modem's transmitter is connected to the input of the local receiver to permit testing from the DTE via the EIA RS232C interface. The phone line is made busy.
ST - Self Test	When depressed, the modem is disconnected from the EIA interface, initiating the transmission of an internal test pattern. An error detection circuit is activated which monitors the received data and provides error indication. High speed only.
RDL - Remote Digital	When depressed, the local modem signals Loop the remote modem which automatically goes into the Digital Loop mode. This mode, utilizing the local DTE, tests the local and remote modems and the intervening channels.
DL - Digital Loop	When depressed, the modem is disconnected from the EIA interface and the receiver output is connected to the transmitter input. This mode allows for testing of the local data set from a remote location such as a data test center.
HS - High Speed	The HS switch must be depressed when utilizing the AL testing feature for a valid test. The position of the HS switch has no effect on the speed mode of the 212 PLUS. In the originate mode, speed is always determined by the speed the DTE is set for, in the answer mode the speed is always determined by the originating modem.

Detailed explanations of the use of the test switch combinations in Fault Isolation testing procedures appear in Chapter 5, Maintenance.

OPERATION-GENERAL

3.3 INDICATOR LAMPS

The MD212 modem front panel displays eight status indications using LED (Light Emitting Diode) lamps. The status lamps are described below:

MB - Make Busy	The ON condition of this LED indicates that the internal make busy circuit is activated and/or that the modem is ready for an Analog Loop test.
TR - Terminal Ready	The ON condition of this lamp indicates that the DTE is applying a voltage to Pin 20 of the EIA interface or that the voltage is being provided by the modem's "Assert DTR" option.
MR - Modem Ready	The ON condition of this lamp indicates the modem has gone off hook and is prepared to initiate or receive a call, except when the modem is in Self Test or Analog Loop modes. In these modes, the MR lamp monitors the status of the internal Modem Ready circuit. This LED will blink during pulse dialing to reflect dialing sequence.
SD - Send Data	The ON condition of this lamp indicates a space signal is present on EIA Pin 2, and flickers during normal data transmission. Lamp is OFF during Self Test and Digital Loop mode.
RD - Received Data	The ON condition of this lamp indicates a space signal is present on EIA Pin 3, and flickers during normal data transmission. Lamp is OFF during Self Test and Digital Loop mode.
HS - High Speed	ON to indicate the modem is operating in the high-speed mode.
MC - Modem Check	ON continuously to indicate modem has power and is in Idle mode, OFF in Data mode , but will flicker upon loss of carrier. During a back to back Self Test (both modems in ST mode) mode the lamp lights after each detected error. "MC" stays on continuously if in one way Self Test.
TM - Test Mode	ON to indicate the modem is in a Test Mode.

3.4 ORIGINATE OPERATION

Prior to originating a call, the control switches should be checked and set.

3.5 CONTROL SWITCH SELECTION

No HS switch selection is necessary for auto-dial origination. Calling speed is determined by the terminal configuration. The HS switch must be depressed for 1200 bps Analog Loopback testing. The HS switch is a black rectangular double action switch on the front of the modem.

3.6 INDICATOR LAMP DISPLAY

The TR LED indicates that the associated terminal equipment is supplying the necessary voltage on Pin 20 of the EIA cable. If the DTR signal is not provided, the modem will not operate. If TR is not lit, there are several probable causes. A DTE in "local" mode usually does not supply DTR; Make sure your DTE is in "conversational" or "online" mode. Compare the interface chart for the DTE to make sure DTR is being provided on Pin 20. Some equipment does not provide DTR. If all else fails, you can configure the MD212 to provide DTR to itself. This is not necessarily desirable because control of the DTR signal is commonly used to reset the telephone connections.

The MC LED indicates that the modem has power, is in Idle mode and is ready to originate or automatically answer a call.

3.7 ORIGATION UTILIZING INTEGRAL AUTODIALER

The Ven-Tel 212 PLUS modem provides an integral automatic dialer that removes the need for a telephone. Two basic types of auto dialing are supported: Direct (keyboard) dialing, and stored-number dialing. Keyboard dialing is the simpler of the two; the user simply types the number to be dialed on the terminal's keyboard. Stored number dialing can be used when the same telephone number is repeatedly called, or for more sophisticated applications. Either rotary dialing or the faster touch tone dialing are switch selectable options. A stored menu of instructions can be displayed on the users terminal to assist in operating the modem/dialer.

3.8 INITIATING THE DIALER

All of the functions of the automatic dialer in the 212 PLUS are accessible when the modem is in the "interactive mode". This mode is entered by pressing the carriage return key twice in rapid succession. As each CR character is received by the modem, the RD LED will FLASH. When the modem replies with a sign-on message the SD LED will FLASH. If the transmission is at 1200 bps the HS LED will light. The modem will print a sign-on message and display a prompt character (the dollar sign). For example:

```
<cr><cr>  
VEN-TEL 212 PLUS  
1200 BAUD  
$
```

Note: Throughout this manual the characters that are typed by the user will be underlined, while the modems responses (those printed on the users terminal) will not be.

The Ven-Tel 212 PLUS will automatically set its baud rate to either 300 or 1200 baud, to reflect that of the terminal. Any other baud rate will result in incorrect operation. The front panel speed selection switch (HS) is disregarded when using the automatic dialer.

To change the baud rate first change the baud rate on the terminal; then reset the 212 PLUS by pressing and then releasing the AL switch. The interactive mode can now be entered by pressing the carriage return key twice.

NOTE; It is important that the carriage return key be used to enter the interactive mode. Although other keys may appear to work, they will not be consistent.

Once the modem has displayed the '\$' prompt any number of commands can be given to invoke the special functions of the 212 PLUS. Please note that the modem will not automatically answer an incoming call when in interactive mode. The interactive mode can be exited by resetting the modem (alternating engaging and releasing the AL switch), by completing a call, or by typing "Q" for Quit.

3.9 SETTING PARITY

When the 212 PLUS is used for the first time with a terminal, the response to the two carriage returns may be "garbage". This is due to a parity mismatch between the terminal and modem. The 212 PLUS can be "trained" to send the correct parity to your terminal. This is done by typing 'VENTEL' (in all upper case) as the first command. For example:

```
<cr><cr>  
?????? ??????      (characters not readable.  
???? ?????         may appear differently)  
$VENTEL  
PARITY IS EVEN  
$
```

There are four "parity" modes that the 212 PLUS will automatically recognize:

```
PARITY IS EVEN  
PARITY IS ODD  
NO PARITY, BIT 8 0 (space parity)  
NO PARITY, BIT 8 1 (mark parity)
```

Since the parity setting of the modem is maintained in a perpetual CMOS memory, the 212 PLUS only needs to be taught the parity once. After the first training the "VENTEL" command need only be executed if the configuration of the terminal is changed.

OPERATION-AUTOMATIC DIALING

3.10 HELP COMMAND

A help list of the available interactive commands can be displayed at any time by pressing the letter 'H'. For example:

\$H

COMMANDS ARE:

K	DIAL FROM KEYBOARD
S1-S5	STORE/CHANGE NUMBER
1-5	DIAL STORED NUMBER
R	RE-DIAL LAST NUMBER
F	RE-DIAL FOREVER
D	DISPLAY STORED NUMBERS
C	CLEAR NUMBERS
B	BUSY OUT
H	HELP
Q	QUIT
\$	

The HELP command acts as a built in electronic reminder, should the user ever forget the available commands.

3.11 KEYBOARD DIALING

To have the modem dial a number, type the letter "K" (for "keyboard") and enter the number, terminating the number with a carriage return character. For example, to dial the number 555-1212 the following would be typed (the users input is underlined, as usual):

```
$K  
DIAL: 555 1212 <CR>  
DIALING: 555 1212
```

Note that the embedded space (between the 5 and the 1) is optional. Spaces can be used freely to improve the readability of the number. However each space is counted as a character and therefore limits the length of the number that can be dialed. Any character other than the digits 0-9, the % and & characters, the letter L, and the carriage return, will appear and be counted as a space. Telephone numbers of up to 30 characters can be dialed with the 212 PLUS.

Some examples of valid numbers are:

```
1$K  
DIAL: 408 555 1212 <CR>
```

```
$K  
DIAL: 4085551212 <CR>
```

```
$K  
DIAL: 14085551212 <CR>
```

If an error is made while typing the number, it can be corrected by typing a "control H", which is the ASCII backspace character. For each control H typed, one character will be erased. Control H is sent by holding down the "CONTROL" key on the terminal while pressing the "H" key. Many terminals have a key labeled "BACKSPACE", or a cursor control pad that has a backspace. These will usually work, but not on all terminals.

3.12 RE-DIALING

The 212 PLUS has a special internal memory that "remembers" the last number that was dialed. This "last number" can be re-dialed by the use of a special command. For example, if the last number dialed was busy, the re-dial command will automatically re-try the number for you. To use this feature, simply type "R" (for Re-dial). To extend our example above:

```
$K  
DIAL: 555 1212 <cr>  
DIALING: 555 1212          BUSY  
$R  
DIALING: 555 1212          ON LINE
```

The first time the call was placed, the line was busy. The "R" command re-dialed the number, and this time the call was completed.

OPERATION-AUTOMATIC DIALING

Note that the "last dialed" number is remembered forever. If you do not use the modem for several days, or even weeks, the last number you called will still be "remembered" and can be dialed with the "R" command. The command is very convenient for those users who call only one computer center.

3.13 RE-DIALING UNTIL CONNECTED (FOREVER DIAL)

The 212 PLUS has two re-dial commands. The first, the "R" command, is described above. The second re-dial command, "F", is an extension of "R". While the "R" command will re-try the last number once, the "F" command will continue re-trying forever until a data connection is made. If the user gets a busy signal on several subsequent "R" commands, instead of typing multiple "R"s, an "F" can be used to call the same number until a modem answers.

When the 212 PLUS detects that another modem has answered the call, an audible indication is given by sounding the bell in the user's terminal. (This feature will only operate with terminals that recognize control G as the "bell" character).

Note that the "F" command will continue dialing until a modem answers. If the call is answered by a person, the 212 PLUS will hang up and re-try until one of its own kind answers. Once the call is answered by a modem the 212 PLUS will attempt to handshake at the selected speed and go online. If the called modem aborts at this stage for any reason, the 212 PLUS will NOT re-dial. The "F" command will continue dialing only until a modem answers the call. Once the call is answered the 212 PLUS acts like a standard 212 modem.

3.14 RESPONSES

After dialing the specified number, the 212 PLUS will display the results of the attempt to reach another modem. The possible results are:

BUSY	Number called is busy.
NO ANSWER	Phone is not answered, but is ringing.
DEAD PHONE	No ringback or busy. Possible problem answered by a non-modem.
ONLINE	The call went through and answer tone was detected.

Because of the wide variation in telephone exchanges, particularly non-Bell system exchanges, the 212 PLUS may at times incorrectly identify the problem if a call is not complete. For example, a "DEAD PHONE" message may result when the line was actually busy. Although the internal algorithms and circuitry used to detect the different states of the telephones response were very carefully designed, noise on the line or other causes may result in an incorrect message. **NOTE: THESE ERRORS OCCUR ONLY IF THE CALL IS NOT COMPLETED. THE 212 PLUS WILL ALWAYS CORRECTLY IDENTIFY THE "ONLINE" STATE.**

3.15 ROTARY OR TONE DIALING

As briefly mentioned earlier, the 212 PLUS can either rotary or tone dial. The choice is strictly dependent on the users telephone system. Tone dialing is almost ten times as fast as rotary and should be used if the customers equipment can accept it. Note that the ability to accept tone dialing rests with the phone company central office (or PBX). Option switch S7-1 controls tone or rotary dialing. The switch should be OFF for ROTARY, ON for TONE.

3.16 BLIND DIALING

The 212 PLUS dial tone detection circuitry has been designed to correctly determine, on a wide variety of telephone systems, when dial tone is present. In some areas of the country, particularly where "local" (non-Bell system) phone companies predominate, the dial tone sent over by the central office may be "non-standard". In these cases the 212 PLUS may be unable to determine that dial tone is present. This problem will manifest itself by the "DEAD PHONE" error message. For example:

```
$K  
DIAL: 555 1212  
DIALING.....DEAD PHONE
```

Each period printed indicates a one-half second wait for dial tone. The 212 PLUS will wait for 5 seconds, hang up (go "on hook") for 3 seconds, then try again for 5 seconds. This process will be repeated for four 5 second intervals. If no dial tone is detected, the message "DEAD PHONE" is printed.

If this occurs and the user is sure that the phone system is working (dial tone can be heard on a telephone connected to the same line), then the problem is a non-standard dial tone. There is a configuration option on the 212 PLUS that bypasses the normal dial tone detection function. By setting switch S7-4 ON, the 212 PLUS will "blind dial". When this option is enabled, the 212 PLUS will

OPERATION-AUTOMATIC DIALING

wait 5 seconds for dial tone (as above) and then dial regardless of whether dial tone is detected. The above example would appear as:

```
$K
DIAL: 555 1212
DIALING.....BLIND 555 1212   ONLINE!
```

Please note that the blind dialing option also applies to waits for intermediate dial tones ('&'). If a PBX gives a nonstandard dial tone, the blind dial option can be set to allow dialing.

NOTE: Care should be exercised in using the blind dial option. It should be used only when the local dial tone cannot be detected by the 212 PLUS.

3.17 LOCAL COPY OPERATION

The 212 PLUS has a switch option that allows it to be used with a half-duplex terminal. Setting switch S7-3 to the ON position will suppress the character echo and eliminate the "double printing" characteristic of half-duplex terminals. The half-duplex option is only active during interactive mode: once the 212 PLUS goes online it always operates in full-duplex mode.

3.18 NUMBER LENGTH

The maximum length for a number that the 212 PLUS can dial is 30 "characters". A character, in this context, can be either a digit 0-9, or one of the special characters: "%", "&", or space (the special characters are described later in this manual). If a number is too long to fit, the spaces, which serve only to make the number more readable can be removed.

3.19 EDITING

As described on page 3-4, there is a backspace function that can be used to correct errors that occur while entering numbers. To erase the last digit entered, type a "control H". The control H is not entered into the number and does not take up one of the 30 positions.

3.20 ABORTING A COMMAND

Most 212 PLUS commands can be aborted by typing any key on the terminal while the command is executing. The printout of the help message (H command) can be stopped by pressing any key while the menu is being displayed. Likewise if the 212 PLUS is dialing, pressing any key will abort that operation. For example:

```
$K
DIAL: 555 1212
DIALING: .555 1 (any key is pressed)
ABORT
$
```

In this case the dialing process was stopped by pressing a key. Note that "ABORT" will be printed on the terminal each time a command is interrupted in this fashion.

3.21 INTRODUCTION

The 212 PLUS can be programmed to dial through private branch exchanges (PBXs) or other specialized phone systems that require dialed access codes. There are two special characters, the ampersand (&) and percent sign (%) that perform these functions when they are entered as part of the telephone number.

3.22 INTERMEDIATE DIAL TONE

The 212 PLUS can be programmed to wait for an intermediate dial tone by using the "&" character. To illustrate:

```
$K
DIAL: 9&555 1212
DIALING: .9&.555 1212 ONLINE!
```

In this example the modem dialed "9" (to get an outside line), waited for a second dial tone and then dialed the number. In this example the phone line that the modem was using was on a PBX system that used the digit "9" to dial an outside call. There are of course many different systems that require various codes to dial, but the key point is that the ampersand character will cause the modem to wait for a dial tone before proceeding with dialing the next digits.

OPERATION-AUTOMATIC DIALING

The pause for dial tone within a number is very similar to the initial wait for dial tone. The only difference is that if the dial tone is not detected within 5 seconds, the call is aborted. To modify the previous example:

```
$K  
DIAL: 9&555 1212  
DIALING .9&..... DEAD PHONE
```

In this case no dial tone was detected after "9" was dialed, so the call was aborted. This could be the result of all outgoing lines being busy. If it was desired to have the 212 PLUS continue trying for an outside line, the "F" command could be used. To illustrate:

```
$K  
DIAL: 9&555 1212  
DIALING .9&.....DEAD PHONE  
$F  
DIALING .9&.....DEAD PHONE LINKING ...  
DIALING .9&.....DEAD PHONE LINKING ...  
DIALING .9&.555 1212
```

In this example it took four tries to get an available outgoing line.

NOTE: If blind dialing is enabled, the 212 PLUS will proceed with dialing after 5 seconds regardless of whether dial tone is found.

3.23 PAUSE

Some private telephone systems require that a special account number or access code be entered during the dialing process. Most systems require that a slight pause be made between numbers. The percent sign, "%", when embedded in a dialed number will cause the 212 PLUS to pause for 5 seconds. If delays longer than 5 seconds are required, multiple "%" can be used. For example:

```
$K  
DIAL: 555 1212 %% 55555  
DIALING .555 1212 %% 55555
```

The number 555 1212 is dialed, the modem waits for 10 seconds and then gives a five digit access codes, 55555. As another example:

```
$K  
DIAL: 9&12345%% 408 555 1212  
DIALING .9&.12345%% 408 555 1212
```

In this case "9" was dialed to get an outside line. When a second dial tone was detected the five digit billing code, "12345" was dialed, a delay of 10 seconds was then followed by ten digit number, "408 555 1212".

3.24 SUMMARY OF PBX DIALING

As illustrated in the preceding examples, the 212 PLUS can dial through many specialized phone systems. The two special commands, "&" and "%", can be used in various combinations to meet the requirements of a particular system. The user should note that some experimentation may be required to solve a particular problem. For example, in some cases, the "%" could be used instead of the "&" to wait for an intermediate dial tone. This may be applicable in a situation where the intermediate dial tone is non-standard.

3.25 NUMBER STORAGE - GENERAL

The 212 PLUS has five memory registers for storing commonly used numbers. Each of these numbers can be dialed, reviewed or changed at any time. The numbers are stored in a "perpetual" CMOS memory: the modem will not "forget" the numbers even if there is a power failure, or if the modem is unplugged and moved to another location.

Each of the memory registers can hold a number containing up to 30 digits or special characters. All of the special functions that can be used during keyboard dial can also be "stored" in the memory registers. In addition to those functions, each number in storage has a special "link" command. This is described later in the manual.

OPERATION-AUTOMATIC DIALING

There are several commands that affect the numbers stored in memory registers. These commands are as follows:

C	Clear all stored numbers
S1-S5	Store a new number in memory register 1,2,3,4 or 5
D	Display all stored numbers
1-5	Dial the number stored in that memory register

3.26 CLEAR

The clear command erases all five stored numbers simultaneously; it does not affect the last dialed memory. Before actually clearing the memory, the user will be asked to confirm his intention. This is done as a safety precaution to prevent accidental erasure. For example:

```
$CLEAR (Y/N) Y
```

If the user wants to erase the numbers a "Y" for "yes" should be entered: any other response will abort the clear command. Note that in this example the numbers were in fact cleared.

3.27 DISPLAY

The display command will print on the users terminal the contents of all five number storage registers. For example:

```
$D
#1 555 1212
#2
#3 408 555 1212
#4 415 555 1212 %%14356
#5
```

In this case memory registers 2 and 5 are empty, while 1,3 and 4 contain the numbers shown. The "D" command can be aborted by pressing any key during the printout. For example:

```
$D
#1 555 1212
#2
#3 408 555 1
ABORT
$
```

In this case the user pressed a key while register #3 was being printed. Aborting the display command does NOT alter the contents of any of the memories; it simply stops the printout.

3.28 STORING A NEW NUMBER

The storage of numbers can be best illustrated by example:

```
$S1
OLD: 555 1212
NEW: 408 555 1212 <cr>
```

When the command "S1" is given, the 212 PLUS will display the current contents of the #1 memory register. In this case the "old" number stored was 555 1212. The user is then prompted ("NEW") to enter a new number. The number entered replaces the old one in memory register #1.

If the user now executed a Display command, the following would be printed:

```
$D
#1 408 555 1212
#2
#3 408 555 1212
#4 415 555 1212 %%14356
#5
```

Note that the contents of memory register #1 have in fact been changed to reflect the number just stored; all of the other memory registers are unchanged.

OPERATION-AUTOMATIC DIALING

The backspace function, described earlier in conjunction with the "K" command, also works when storing numbers. Typing a control H character will erase the last digit entered. Please note that if no entry is made, i.e. a carriage return is the only character entered, the memory register is erased. To erase the number that was stored in the previous example:

\$S1

OLD: 408 555 5555

NEW: <cr>

\$D

#1

#2

#3 408 555 1212

#4 415 555 1212 %%14356

#5

As one would surmise, all of the special function characters described earlier can be used with number storage. Also note that each of the 5 memory registers behave in the same way; the example just given also applies to memory registers 2, 3, 4 and 5.

3.29 DIALING STORED NUMBERS

All that is required to actually dial one of the stored numbers is to type a digit from 1 to 5. To dial the number stored in memory register #3 the following would be used:

\$3

DIALING: 408 555 1212 ON LINE !

3.30 LINKING

One of the most powerful functions of the 212 PLUS is the number linking capability. This feature allows the user to specify an alternate number should the first number be busy (or out of order).

Let us assume that a certain data center has two numbers, either of which can be used for 212 calls. Since there is no difference to the user, it would be desirable to automatically try the second number if the first is busy. If the two numbers are 555 4444 and 555 5555 respectively, the following commands would link them:

\$S1

OLD:

NEW: 555 4444 L2

\$S2

OLD:

NEW: 555 5555 <cr>

The linkage of numbers is done by using the special character "L" when entering the number. The "L" must be followed by a number from 1 to 5. This number specifies which of the five memory storage registers is to be "linked to" in case the number being dialed does not connect. In this case "L2" means "if this number does not connect, dial the number stored in register #2".

To dial the data center, the user commands the 212 PLUS to dial stored number #1:

\$1

DIALING .555 4444

DIALING .555 5555

BUSY LINKING..

ONLINE!

In this instance the first number was busy. The 212 PLUS automatically then dialed the alternate number, which gave a valid connection.

As can be seen from this example number linking is very simple to use. All that is required is to enter the special character "L" in the number when storing it, and specify which number is to be used as an alternate. The "L" (and the linking number) MUST be the last two characters entered. The 212 PLUS will automatically do a carriage return after the link is entered.

3.31 COMPUTER PORT DIALING

Although the 212 PLUS was designed to be used with an interactive data terminal, it can also be used with a port on a computer. Using a 212 PLUS in this configuration allows the computer to initiate dialing out in addition to the usual mode of accepting (answering) calls.

OPERATION-AUTOMATIC DIALING

All of the commands of the 212 PLUS are available for computer (programmed) dialing. Care must be taken, however, to insure that the 212 PLUS is not "over run" with data. The dialer of the 212 PLUS is limited in the rate at which it can accept characters. To be safe, the user should allow 3 character times between characters transmitted to the 212 PLUS. This delay must be accounted for whenever a computer port (or buffered terminal) is dialing out. This is necessary because someone typing at a terminal inherently leaves space between characters, while a computer will pack characters immediately next to each other and the 212 PLUS needs that time for internal processing of commands.

3.32 NULLS

The 212 PLUS dialer will ignore ASCII nulls when they are embedded in a command. Thus to insure that the inter-character time is not violated three ASCII nulls can be sent between each pair of characters. For example:

```
SI would be sent as:  
S <null> <null> <null> 1
```

3.33 BLOCK MODE TRANSFER

The 212 PLUS contains a special command to allow "full speed" dialing from a computer or buffered terminal. By enclosing a string of commands in angular brackets "<" and ">" the 212 PLUS will suspend processing and buffer the commands. This allows a computer to transmit characters at full speed (with no gaps between characters) to the 212 PLUS. For example, to store 555-1212 in #1 the following could be used:

```
$<S1555 1212cr>  
  
$$1  
OLD:  
NEW: 555 1212  
$ (terminal will beep)
```

Where "cr" indicates a carriage return character. Note: The 212 PLUS will NOT echo the characters as they are sent.

When the 212 PLUS receives the ">" character, the modem will begin executing the commands between the two brackets. During command execution the 212 PLUS will set CTS (clear to send, pin 5 of the EIA) false to indicate that the dialer is "busy". All of the text normally printed by the 212 PLUS will still appear, as in the above example. When the command is complete, CTS will be raised true and an ASCII bell character (control G) will be sent to the computer. The computer should use this character as a command complete indication.

The user should note that any number of commands can be embedded between the angular brackets. For example a single string can contain several "S" commands. In the following case the 212 PLUS's internal memory is cleared, three numbers are stored and then the numbers are displayed:

```
$<CYS1727 0000crS2555 1212crS3727 0001cr>  
CLEAR (Y/N) Y  
$$1  
OLD:  
NEW: 727 0000  
$$2  
OLD:  
NEW: 555 1212  
$$1  
OLD:  
NEW: 727-0001  
  
$ ("bell")
```

It is important to note that the commands must be entered in exactly the correct syntax. For example, the clear command requires a confirming "Y", so the correct syntax to clear is CY.

3.34 SUMMARY OF COMMANDS

cr cr	Enter dialer from idle mode
Special Characters:	
control H	Backspace one character
&	Wait for dial tone
%	Pause for 5 seconds
space	No function, helps readability
L	Enter link number
Number Storage:	
	Up to 5 stored numbers, plus last dialed.
	UP to 30 digits each, plus link.
H	Help. Prints menu of commands.
B	Busy Out. Puts the modem "off hook" until character typed.
R	Re-dial last number.
F	Re-dial last number forever until connected.
Sn	Store a new number into memory n; (n is 1, 2, 3, 4 or 5)
D	Display stored numbers.
n	Dial stored number n (n is 1, 2, 3, 4 or 5)
Q	Quit; return to idle mode (software reset)
VENTEL	Set parity to terminals setting.
<	Buffered Mode entry, ">" to terminate.
To abort a command:	Any command can be aborted by typing a character on the terminal keyboard.

3.35 AUTO ANSWER OPERATION

For Auto-answer, the modem must be in Idle mode. This will be indicated by the TR and MC LED's being lit. If there is a telephone associated with the modem, when a call is received, you will hear one ring. If there is no telephone, the modem will simply answer the call when it occurs. This will be indicated by the MR LED lighting to indicate that the phone line is "Off Hook". No action from the operator is necessary. If the incoming call is a valid 212A transmission, MC goes off. If the incoming call is originated in High Speed mode, the HS LED will come on.

3.36 TERMINATING CALL

The line connection may be terminated this may be done by turning off the DTR signal (or by doing a power reset of the modem). The DTR signal can be controlled by most computers. Most terminals will turn off DTR if you turn off the AC power or if you place the terminal in local mode. Calls also may be terminated by resetting via the AL switch.

CHAPTER 4

CONFIGURATION OPTIONS

4.1 GENERAL

The more common configuration options are available for user selection on the MD212 series modems via two 10 position switches mounted on the printed circuit card. They are located to the front, approximately 4 inches from the front panel. Three additional configuration options are selectable from internal miniature jumpers. The switches and jumpers are described in Section 4.5-4.6. A detailed explanation of each of the configuration options is in Section 4.7.

4.2 FACTORY SWITCH POSITIONS

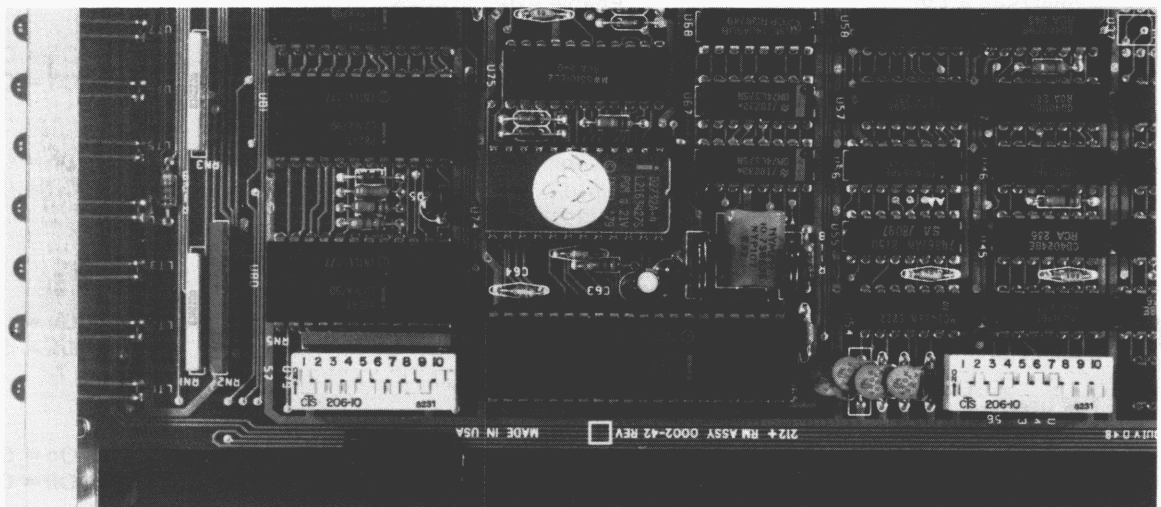


Figure 4-1

4.3 OPENING THE MODEM CASE

To gain access to the printed circuit board:

- a. Unplug the modem from the wall and remove all telephone and EIA connectors.
- b. Remove the power cord connector. It is attached to the circuit card with a connector which slides over the fingers of the edge connector at the back of the board. The connector slides out easily.
- c. Remove the two screws from each side of the case cover.
- d. Grasp the lower edge of the front of the case cover, slide it over the LED's and lift firmly. It is not necessary to remove the circuit board from the case to re-configure the switches or jumpers.
- e. Make the appropriate setting of the switches and mini-jumpers.
- f. Replace top by sliding it over the LED's and snapping it over the telephone and EIA connectors. Replace screws in case cover.

CONFIGURATION OPTIONS

4.4 REMOVING THE MODEM CIRCUIT CARD

To remove the modem circuit card for insertion into the DS1200 rack card enclosure:

- a. Open the modem case and remove the cover as described in section 4.3.
- b. The modem circuit card slides into slotted card guides. The modem card will easily slide forward out of the base.
- c. The modem card may be replaced in the case by reversing this procedure.

4.5 SWITCH SELECTABLE OPTIONS

SWITCH NUMBER	FEATURE	OPTIONS	POSITION
S6-1	Modems controls DTR (See 4.7.1)	DTR Asserted DTR Not Asserted	On = Close Off = Open*
S6-2	Transmit Timing Signal (See 4.7.2)	Disable external clock Enable external clock	On = Close* Off = Open
S6-3	Enable Synchronous Clock of Transmitter (See 4.7.3)	Enable Disable	On = Close Off = Open*
S6-4	Slave TX Clock to RCV Clock (see 4.7.4)	Disable slave Slave tx to rx clock	On = Close* Off = Open
S6-5	Not used		
S6-6	Make busy on ALB (see 4.7.5)	Enable Disable	On = Close* Off = Open
S6-7	Not used		
S6-8	Proprietary	Must be off/open	On = Close Off = Open*
S6-9	Answer Indicate on EIA Pin 22 (See 4.7.7)	Enable Disable	On = Close Off = Open*
S6-10	Auto-Answer (See 4.7.8)	Disable Enable	On = Close Off = Open*

*Denotes Factory Setting

CONFIGURATION OPTIONS

4.5 SWITCH SELECTABLE OPTIONS (continued)

SWITCH NUMBER	FEATURE	OPTIONS POSITION	
S7-1	Dial Mode (See 4.7.9)	Tone Pulses	On = Close* Off = Open
S7-2	Control Synchronous Operation (See 4.7.10)	Bit Synchronous Asynchronous	On = Close Off = Open*
S7-3	Local Copy (See 4.7.11)	Disable Enable	On = Close Off = Open*
S7-4	Blind Dial (See 4.7.12)	Enable Disable	On = Close Off = Open*
S7-5	Respond to Remote DL** (See 4.7.13)	Enable Disable	On = Close* Off = Open
S7-6	Send Space Disconnect (See 4.7.14)	Enable Disable	On = Close Off = Open*
S7-7	Receive Space Disconnect (See 4.7.15)	Enable Disable	On = Close Off = Open*
S7-8	Loss of Carrier Disconnect (See 4.7.16)	Enable Disable	On = Close* Off = Open
S7-9	High Speed Only (See 4.7.17)	Enable Disable	On = Close Off = Open*
S7-10	Character Length (See 4.7.18)	10 Bit 9 Bit	On = Close* Off = Open

*Denotes Factory Setting

4.6 SELECTION OF JUMPER CONFIGURATION OPTIONS

JUMPER SWITCH #	FEATURE	FUNCTIONAL CHOICES	POSITION
JP-1	Make Busy Indication (See 4.7.20)	Disable Make Busy on EIA Pin 25	2-3*
		Enable Make Busy	1-2
JP-2	Interface Speed Indication (See 4.7.19)	Speed Indication on EIA Pin 12	2-3
		No Speed Indication on EIA Pin 12	1-2*
E-1	RJ11C Service	Option Enabled	2-3*
	RJ41/45S Service	Option Enabled	1-2
E-2	Common Ground (See 4.7.21)	Protection & Signal Ground Common	Jumper ON*
		Protection & Signal Ground Not Common	Jumper Cut by Customer

**This option should be disabled when manually originating a call with an exclusion key telephone.

CONFIGURATION OPTIONS

4.7 VEN-TEL MD212 SERIES CONFIGURATION OPTIONS

The VEN-TEL MD212 offers a full complement of user selectable configurations options.

4.7.1 Modem Controls DTR Signal

When disabled, this option utilizes the DTR signal provided by the Data Terminal Equipment. This option should be enabled if the DTE does not provide DTR, because the modem will not work unless the DTR signal is asserted. Note that when this option is disabled, the modem will disconnect from the telephone line when the DTE is powered down and turns off DTR. It is frequently utilized as a method of terminating the connection. This option is factory disabled.

4.7.2 Transmit Timing Signal

This option is utilized for high speed synchronous transmission. It permits the user to designate two possible sources of the transmitter timing signal. A synchronous DTE usually has a clocking device which provides the synchronization timing signal. The modem has such a clock also. If the user wishes to utilize the clock in the local DTE (the external clock) this option should be enabled. If disabled, the clock in the modem will provide the timing signals. If this option is enabled, the Slave transmit clock to Receive clock (See 4.7.4) must be disabled. If this option is enabled, S6-3 must be disabled, otherwise two different clocks will be providing timing signals and produce data errors. This option has no effect on low speed operation. It is factory set to utilize the clock in the modem.

4.7.3 Enable Synchronous Transmitter Clock

This switch physically connects the output of the Transmit Clock to the associated equipment through EIA Pin 15. This option must be enabled for synchronous operation. It usually does not affect asynchronous operation, but some asynchronous DTE'S may be adversely affected by the timing signals. We recommend that the option be disabled for asynchronous operation. If this option is enabled, S6-2 must be disabled.

4.7.4 Slave Transmit Clock to Receive Clock

This option causes the modem to slave its transmitter timing to signal provided by the DD interface lead. This option is rarely used. It is provided for use with multiplexers or other systems requiring slave timing. This option has no affect on low speed transmission. If this option is enabled, the transmit clock output (See 4.7.2) must be disabled. The option is factory disabled. This option must be disabled to perform a high speed Analog loop self test.

4.7.5 Make Busy During Analog Loopback Test

When enabled, this option simulates an offhook or "busy" condition when the Analog Loopback Test switch on the front panel is depressed. This is achieved by disconnecting the modem from the telephone line and connecting a lineholding load across the line between tip and ring. If the option is disabled, the modem still disconnects from the line during AL Testing, but no lineholding load is provided.

4.7.6 Proprietary

4.7.7 Answer Mode Indicator

When enabled this option causes the RI (Ring Indicator) signal to be asserted on EIA Pin 22 after the call has been answered. If the option is disabled, the RI signal is asserted only during ringing. This option is provided because some terminals require the RI signal throughout the connection while others require the RI signal only during the initial ringing cycle.

4.7.8 Originate Only

This option should be enabled where the modem is installed on a telephone line which is also used for voice communications, otherwise, the modem will answer any call to that telephone line. This option is factory disabled; i.e., the modem will originate and automatically answer calls.

4.7.9 Pulse/Tone Dial (Factory Selection Tone)

Tone dialing is substantially faster than pulse dialing. Some local telephone companies and PBX facilities will not accommodate tone dialing. Pulse should be selected when trouble is experienced with tone dialing.

4.7.10 High Speed Transmission Mode

The MD212 will communicate in asynchronous or synchronous mode. This switch should be set for either asynchronous or synchronous to be consistent with the system transmission mode. Note that the state of this option must be the same for any pair of 212's to communicate. This option does not affect low speed transmission. It is factory set for asynchronous transmission.

4.7.11 Local Copy

This option permits the interactive electronics (dialer) to be configured to emulate the line conditions under which the local DTE will be utilized. If the Data Terminal Equipment (DTE) is configured for half duplex communications, disabling the option provides no local echo of the characters entered from the keyboard. If the terminal is to be configured for a full duplex link, enabling the option will supply a character echo to the output of the device in the same manner as the remote DTE.

4.7.12 Blind Dial

With this option disabled, the 212 PLUS will not dial until it senses a dial tone. Where the dial tone is nonstandard for any reason, the enabling of this option will cause the 212 PLUS to wait five (5) seconds for a dial tone and then dial blindly.

4.7.13 Receiver Responds to Remote Digital Loop

This option affects High Speed operation only. When enabled, this option causes the modem to respond to a RDL signal from the remote modem. When the option is disabled, the modem ignores RDL signals. The option does not affect the operation of the Digital Loop switch on the front panel or low speed operation. It is factory enabled.

4.7.14 Send Space On Disconnect

When enabled, this option causes the modem to send a space of about 2 seconds (long space) immediately prior to disconnect. This option may be enabled if other ways of disconnection are not available. DTR controlled disconnect and loss of carrier disconnect are more desirable because they are more reliable.

4.7.15 Respond to Space Disconnect

When enabled, this option causes the modem to automatically disconnect the phone line when it senses an uninterrupted space for approximately 2 seconds. This option is usually disabled to prevent unintentional disconnect which can occur when a non-standard break key is accidentally pressed. This option is factory disabled.

4.7.16 Loss of Carrier Disconnect

This option selection disconnects the telephone line when the received carrier is interrupted for 150 milliseconds. This option might be disabled if DTR controlled disconnect is used at both ends. There is virtually no reason to disable this option. This option is factory enabled.

4.7.17 Speed Mode

This option when enabled permits high speed (1200 bps) operation only. When disabled, the modem will operate in either high speed or low speed mode.

4.7.18 Character Length 9 Bit/10 Bit

This setting must be consistent with the character length of the code utilized by the system. The bit total character length includes eight information bits, one start bit and at least one stop bit. Nine bit total character length includes seven information bits, one start bit and at least one stop bit. It is factory set at 10 bit. The state of this option must be the same for any pair of 212's to communicate. This option does not affect low speed transmission.

4.7.19 Modem Speed Indicator

When enabled, the modem provides an indication of the modem's data rate on the CI lead on EIA Pin 12. High speed is indicated by an ON condition. All other conditions are indicated by an OFF. When disabled, no signal is provided on Pin 12.

4.7.20 EIA Signals May Initiate ALB

This option, when enabled permits the user to initiate Analog Loopback Test or make the port busy by turning on EIA Pin 25. This is desirable if the modem is to be connected to a CPU with software to perform diagnostics on, with some need to make the port busy.

4.7.21 Common Ground (Jumper E-2)

Initializing this jumper renders the signal and protective ground common. If the jumper is removed, the signal and protective grounds are separate. The jumper is factory initialized. (See Appendix, Chapter 7, Figure F).

CONFIGURATION OPTIONS

4.8 IDENTIFYING JUMPER PIN NUMBERS

Jumpers JP-1 & JP-2: Pin 1 of the mini-jumpers is positioned toward the interface connections on the board. It can be identified by examining the bottom of the printed circuit board. The solder pad beneath Pin 1 is square; the pads beneath the other pins are round. Jumper E-1: See Appendix, Chapter 7, Figure 7 for location.

CHAPTER 5

MAINTENANCE

5.1 GENERAL

FCC Regulations prohibit repair of MD212 modems by anyone other than Ven-Tel, Incorporated. Field maintenance should be limited to Fault Isolation Testing and fuse replacement.

5.2 POWER FAILURE

If there are no indicator lamps lighted on the front panel, check that the modular power supply is properly seated in the AC outlet and the other end of the power cord is firmly seated in the edge connector of the modem card. See Section 4.3 for instructions for opening the modem case. If the modular power supply and edge connector are properly seated and there are still no indicator lamps, return the modem to Ven-Tel for service. See Section 5.16.

5.3 FAULT ISOLATION TESTS

The MD212 series of modems has four front panel test switches for performing system diagnostics. If the modem is operational but data communication malfunction occurs, fault isolation tests enable the user to localize the problem to the modem, DTE, the equipment interface or the telephone line. All tests must be performed while the modem is configured with the option switches in factory settings. Before performing test, always power reset the modem by removing and replacing the modular power supply in the wall outlet.

5.4 SELF TEST FUNCTION

Each MD212 has a test pattern character generator in the transmitter circuit and an error detector in the receiver circuit. It can be used in combination with both the Analog Loopback and Digital Loopback during the fault isolation test procedures, in the High Speed mode only.

5.5 ANALOG LOOPBACK FUNCTION

The analog loopback test function causes the modem to disconnect the telephone line and connects the transmitter output to the receiver input.

5.6 DIGITAL LOOPBACK FUNCTION

The Digital Loopback test function causes the modem to connect the receiver output to the transmitter input for retransmission to the remote modem. This function must be initiated by an attendant from the remote modem at either high or low speed. For Remote Digital Loopback testing, the test is performed in the high speed mode only.

5.7 ANALOG LOOPBACK SELF TEST

This procedure tests the local modem. This test procedure causes the modem to disconnect from the telephone line and connects the transmitter output to the receiver input utilizing the self test feature. Before beginning the test procedure, remove all connections to telephone lines and terminal equipment. Perform power-reset.

- | | | |
|----|--|--|
| a. | Verify that the MC LED is lit. | Data set is in idle mode. |
| b. | Depress HS switch | IMPORTANT: This switch must be depressed for valid test. |
| c. | Depress AL and ST switches | MB, TR, MR, HS, TM LED'S ON |
| d. | Observe MC LED for 1 minute | If MC LED flickers or stays ON modem has failed. |
| e. | To terminate the test, depress to release AL, ST and HS switches | |

MAINTENANCE

5.8 ANALOG LOOPBACK TEST

This test is performed to check the operation of the local modem with its related DTE. This test procedure causes the modem to disconnect from the telephone line and connects the transmitter output to the receiver input. Before beginning the test procedure, remove connection to telephone lines; perform power-reset. The DTE must be in full duplex. Conduct the test in the appropriate speed mode for the DTE. The DTE is connected by an EIA cable to the modem.

- a. Verify that TR and MC a are lit. DTE is supplying DTR signal. (Can be supplied by the modems "Assert DTR" option)
- b. Select speed mode Selection must be made before proceeding. HS must be depressed for 1200 bps.
- c. Depress AL switch. Some random characters may appear initially on the business machine. MB, TR, MR, MC & TM LED's ON; HS LED ON if HS switch depressed.
- d. Type data on the DTE keyboard. The data is looped through the modem and sent back to the DTE and displayed. Compare the input with the output for accuracy.
- e. To terminate the test, depress to release AL and HS switches.

5.9 REMOTE DIGITAL LOOP SELF TEST

This test allows the local modem to force an unattended remote modem to act as a repeater for the test character pattern being transmitted by the local modem. This test must be performed in High Speed mode.

- a. Verify TR and MC LED's are one. DTE is supplying a DTR signal. (Can be supplied by the modems "Assert DTR" option.
- b. Depress the RDL, then the ST and then the HS switch. Switches must be depressed in the order stated for a valid test.
- c. Dial a call to the remote modem, complete connection Remote modem answers automatically and goes to data mode.
- d. Observe local modem lamps. TR,MR,HS,TM lamps ON, MC lamp goes OFF.
- e. Observe MC lamp for 2 minutes. If MC lamp flickers more than 4 times or remains ON, performance is not satisfactory. If another call experiences similar performance, test for failed equipment.
- f. To terminate the test, depress to release RDL and ST switches DO NOT reset the modem until modem switches have been released.

5.10 REMOTE DIGITAL LOOPBACK TEST

This test is identical to the Remote Digital Loopback Self Test except that it uses the business machine to initiate data instead of the self-test feature of the local modem. Procedures are the same except the ST switch is not depressed. By transmitting data from the business machine and comparing it with the received copy, the business machine, modems and telephone lines can be checked.

5.11 DIGITAL LOOPBACK SELF TEST

This test allows the remote modem to act as a repeater for the data being transmitted by the local modem. This test must be performed in High Speed mode.

- | | | |
|----|---|---|
| a. | Verify TR and MC LED's are on. | DTE is supplying a DTR signal. (Can be supplied by the modem's "Assert DTR" option). |
| b. | Depress the ST and then the HS switch on the local modem. | Switches must be depressed in the order stated for a valid test. |
| c. | Depress the DL switch on the remote modem. | This causes the remote modem to function as a repeater for the data being transmitted by the local modem. |
| d. | Dial a call to the remote modem, complete connection. | Remote modem answers automatically and goes to data mode. |
| e. | Observe local modem lamps. | TR, MR, HS, TM lamps ON, MC lamp OFF. |
| f. | Observe MC lamp for 2 minutes. | If MC lamp flickers more than 4 times or remains ON, performance is not satisfactory. If another call experiences similar performance, test individual components for failed equipment. |
| g. | To terminate the test, depress to release DL and ST switches. | DO NOT reset the modem until modem switches have been released. |

5.12 DIGITAL LOOPBACK TEST

This test allows the remote modem to acts as a repeater for the data being transmitted by the local modem and can be performed at either 300 or 1200 baud.

- | | | |
|---|--|---|
| a. | Verify TR and MC LED's are on. | DTE is supplying a DTR signal. (Can be supplied by the modems "Assert DTR" option) |
| b. | (OPTIONAL) Depress the HS switch on the local | Switch must be depressed for a high speed test. modem. |
| c. | Depress the DL switch on the remote modem. | This causes the remote modem to function as a repeater for the data being transmitted by the local modem. |
| d. | Dial a call to the remote modem, complete connection; | Remote modem answers automatically and goes to data mode. |
| e. | Observe local modem lamps. | TR,MR,HS (if a 1200 bps call), TM lamps ON, MC lamp goes OFF. |
| f. | Type data on the DTE keyboard. The data is looped through the Remote modem and sent back to the DTE and displayed. | |
| Compare the input with the output for accuracy. | | |
| g. | To terminate the test depress to release DL and AL switches. | DO NOT reset the modem until modem switches have been released. |

MAINTENANCE

5.13 END TO END SELF TESTING

This test is performed to test the local and remote modem and the intervening channel without external equipment. This test can only be performed in the high speed mode. Attendants with separate telephone voice contact are required at both ends to conduct the test.

Originate a call from the local modem; depress the ST buttons at each end.

- a. Verify TR, MR, HS & TM are lighted; MC out. HS will be lighted.
- b. Observe MC indicator for If MC lamp flickers more than 2 minutes. two minutes. 4 times or remains ON, performance is not satisfactory. If another call experiences similar performance, test individual components for failed equipment.

5.14 VEN-TEL TECHNICAL SUPPORT

Ven-Tel's technical support staff is available to assist you with immediate advice about modem installation, interfacing and operation. This no-charge service is available by calling Ven-Tel at (408) 727-5721 and asking for a Technical Support Technician.

5.15 FAILURE CONFIRMATION

If you have performed the fault isolation tests and believe you have detected a failure, call the Ven-Tel Technical Support Service prior to returning the unit. Discuss the problem and results of your test. After the failure is confirmed, a Return Material Authorization Number (RMA) will be issued for the return of your equipment.

5.16 VEN-TEL FACTORY SERVICE PROCEDURES

To provide prompt, effective service, our service department must be able to have specific information about your equipment problem and maintain control of the flow of equipment through the service department. Ven-Tel has established the following procedure to meet both the needs.

1. All requests for repair will be identified by a Repair Material Authorization Number (RMA). An RMA will be issued by our service department upon request and verification of a problem. Any equipment sent for repair should be prominently marked with the RMA number.

2. When you call for an RMA number, the service department will request your name, shipping address; and phone number; the model number; the serial number and a description of the problem. The warranty status will be verified from our records. If the unit is out of warranty, you will be informed of the exact charges. Out of warranty repairs are performed on a flat charge basis. You must pay shipping to Ven-Tel. If the unit is under warranty, Ven-Tel will pay for UPS charges to return the unit to you. If you want a more expensive form of shipment, we will gladly accommodate your written request, but the shipment will be freight collect. Ven-Tel distributors, government agencies, and educational institutions should include a written purchase order with the unit, all others must prepay charges or the unit may be returned COD. Keep a record of your RMA number. We will need the RMA number to answer any questions or inquiries about the repair of your equipment.

3. Pack the equipment in a carton suitable for shipping. Use the original carton if available. Mark the carton prominently with the RMA, your return address and ship it to:

VEN-TEL, INC.
2342 Walsh Avenue
Santa Clara, CA 95051

ATTN: Service Manager
RMA# _____

Enclose a letter describing your problem as completely as possible. Include your name, complete shipping address and a telephone number where you can be reached to answer any questions.

4. Depending on the problem, the repair process will take 3-7 days once we receive the unit. If you want to inquire about units sent for repair, ask for the service department and give your RMA number. The Service Manager can tell you when the unit arrived, the current status in the repair process and the expected date of shipment to you. He cannot change your written purchase order or our standard shipping procedures without written authority from you.

5.17 WARRANTY

VEN-TEL warrants the equipment, when installed, operated and maintained in accordance with VEN-TEL's operating and maintenance specifications, against defects in material and workmanship for a period of twelve (12) months in accordance with the following:

- a. For a period of twelve (12) months from date of original shipment VEN-TEL will repair, replace or otherwise perform warranty service consisting of Parts and Labor on defective products or components, without charges on any defective equipment returned to VEN-TEL, transportation charges prepaid by Purchaser and will return such equipment U.P.S. transportation charges prepaid except where Purchaser has requested special handling, in which case Purchaser shall pay all such charges.
- b. VEN-TEL shall not be responsible for defects caused by accident, misuse, neglect, alteration, improper installation, unauthorized repair or improper testing. Any modification of the equipment or the substitution of parts or supplies not meeting VEN-TEL's operation specifications shall void this warranty.
- c. VEN-TEL's liability hereunder excludes normal wear and tear and is limited to replacement of defective parts or repair thereof.
- d. THE FOREGOING SHALL CONSTITUTE THE SOLE REMEDY OF THE BUYER AND THE SOLE LIABILITY OF VEN-TEL FOR BREACH OF WARRANTY, AND IS IN LIEU OF ALL OTHER WARRANTIES, WHETHER FOR MERCHANTABILITY FITNESS OR OTHERWISE, AND WHETHER EXPRESSED OR IMPLIED.

5.18 ENHANCED SERVICE ARRANGEMENTS

Ven-Tel does not provide on-site maintenance. However, the following service arrangements are available to support customers with special service needs.

5.18.1 Ven-Tel Service Agreement for Factory Exchange-S.A.F.E.

Subject to the availability of replacement units, Ven-Tel will provide 24 hour replacement of a failed modem when the modem has been previously registered in the SAFE PLAN and the customer has prepaid the annual service charge.

The customer must call Ven-Tel customer service and request a SAFE PLAN replacement. When Ven-Tel has confirmed the failure, the replacement unit will be included with the next UPS pickup. If you call early in the morning, the replacement usually is shipped that same day. You must return the failed unit to Ven-Tel immediately.

The annual charge is \$24.00 and it must be prepaid at the time of the application. If the modem is out of warranty, you will be charged the out of warranty repair charge. You must pay to return the failed unit. If you request that the replacement be shipped other than UPS common carrier, you will be charged for all shipping.

ANNUAL CHARGE: \$24.00 per unit

ADDITIONAL CHARGES:

Out of warranty repair charges
Freight to return the defective unit(s)
to factory Express shipments

MAINTENANCE

5.18.2 Ven-Tel Fast Action Service Terms - F.A.S.T.

Subject to the availability of replacement units, Ven-Tel will provide 24 hour replacement of a failed modem for a service charge of \$60.00 plus out of warranty repair charges. Return shipping charges, and extraordinary shipping charges when requested by the customer.

The customer must call Ven-Tel customer service and request a FAST PLAN replacement. When Ven-Tel has confirmed the failure, the replacement unit will be included with the next UPS pickup. If you ask early in the morning, the replacement usually is shipped that same day. You must return the failed unit to Ven-Tel immediately.

You will be charged \$60.00 for the replacement service. If the modem is out of warranty, you will be charged the out of warranty repair charge. You must pay to return the failed unit. If you request that the replacement be shipped other than UPS common carrier, you will be charged for all shipping.

COST PER OCCURRENCE: \$60.00 per unit

ADDITIONAL CHARGES:

- Out of warranty repair charges
- Freight to return the defective unit(s)
to factory
- Express shipments

CHAPTER 6

FCC REGULATIONS

6.1 GENERAL

The following information is provided for the information and guidance of the user. FCC Regulations, Part 15, prescribed by the Federal Communications Commission (FCC) specify that we provide the following information.

WARNING

This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

FCC Regulations, Part 68 prescribed by the Federal Communications Commission (FCC) specify that:

68.104 Means of Connection.

(a) General. Except for telephone company-provided ringers and except as provided in Paragraph (c), all connections to the telephone network shall be made through the standard plugs and standard telephone company provided jacks, or equivalent, described in Subpart F, in such a manner as to allow for easy and immediate disconnection of the terminal equipment. Standard jacks shall be so arranged that, if the plug connected thereto is withdrawn, no interference to the operation of equipment at the customer's premises which remain connected to the telephone network, shall occur by reason of such withdrawal.

(b) Data Equipment. Where a customer desires to connect data equipment which has been registered in accordance with 68.308(a) (4) (i) or (ii), he shall notify the telephone company of each telephone line to which he intends to connect such equipment. The telephone company, after determining the attenuation of each such telephone line between the interface and the telephone company central office, will make such connections as are necessary in each standard data jack which it will install, so as to allow the maximum signal power delivered by such data equipment to the telephone company central office to reach but not exceed the maximum allowable signal power permitted at the telephone company central office.

68.106 Notification to Telephone Company

(a) General: Customers connecting terminal equipment or protective circuitry to the telephone network shall, before such connection is made, give notice to the telephone company of the particular line(s) to which such connection is to be made, and shall provide to the telephone company the FCC Registration Number and Ringer Equivalence of the registered terminal equipment or registered protective circuitry. The customer shall give notice to the telephone company upon final disconnection of such equipment or circuitry from the particular line(s).

FCC REGULATIONS

(b) Systems Assembled of Combinations of Individually Registered Terminal Equipment and Protective Circuitry: Customers connecting such assemblages to the telephone network shall, before such connection is made, shall provide the following information to the telephone company:

(1) For each line:

(i) Information required for compatible operation of the equipment with telephone company communications facilities.

(ii) The FCC Registration Numbers for all equipment dedicated to that line.

(iii) The largest Ringer Equivalence to be presented to that line.

(2) A list of FCC Registration Numbers for equipment to be used in the system.

68.108 Incidence of Harm

Should the terminal equipment or protective circuitry cause harm to the telephone network, the telephone company shall, where practicable, notify the customer that temporary discontinuance of service may be required: however, where prior notice is not practicable, the telephone company may temporarily discontinue service forthwith, if such action is reasonable in the circumstances. In case of such temporary discontinuance, the telephone company shall (1) promptly notify the customer of such temporary discontinuance, (2) afford the customer the opportunity to correct the situation which gave rise to the temporary discontinuance, and (3) inform the customer of the right to bring a complaint to the commission pursuant to the procedures set forth in Sub-part E of this part.

68.110 Compatibility of the telephone network and terminal equipment

(a) Availability of interface information. Technical information concerning interface parameters not specified in this Part, including the number of ringers which may be connected to a particular telephone line, which is needed to permit terminal equipment to operate in a manner compatible with telephone company communications facilities, shall be provided by the telephone company upon request.

(b) Changes in telephone company facilities equipment, operations or procedures. The telephone company may make changes its communications facilities, equipment, operations or procedures, where such action is reasonably required in the operation of its business and is not inconsistent with the rules and regulations in this Part. If such changes can be reasonably expected to render any customer's terminal equipment incompatible with telephone company modification or alteration of such terminal equipment, or otherwise materially affect its use or performance, the customer shall be given adequate notice in writing, to allow the customer an opportunity to maintain uninterrupted service.

68.216 Repair of Registered Equipment

Repair of registered terminal equipment and registered protective circuitry shall be accomplished only by the manufacturer or assembler thereof or by their authorized agent; however, routine repairs may be performed by a user, in accordance with the instruction manual if the applicant certifies that such routine repairs will not result in noncompliance with the rules and regulations in Sub-part D of this Part.

68.218 Additional Regulations

Registered terminal equipment or protective circuitry shall not be used with party lines or coin telephone lines.

When a malfunction is experienced the customer shall disconnect the registered equipment from the telephone line to determine if the registered equipment is malfunctioning. If the registered equipment is malfunctioning, the use of such equipment shall be discontinued until the problem has been corrected.

CHAPTER 7

APPENDIX

7.1 TABLE A - VEN-TEL EQUIPMENT LIST

VEN-TEL PART NO.	DESCRIPTION
MD212-3E	Standalone Integral Autodial Modem Unit
MD212-4	Rackmount Integral Autodial Modem Unit
DS1200-3	19 Inch Rack Card Enclosure Accommodates 16 Rack Card Modems with PS4000 switching Power Supply
PS4000	Switching Power Supply
6000-0041-00	Telephone interface cable RJ11
6000-0035-00	Telephone interface cable RJ45
4200-0000-02	Operators Manual, MD212-3E and MD212-4

7.2 TABLE B - UNIVERSAL SERVICE ORDER CODES (USOC)

USOC	USAGE/ARRANGEMENT
RJ11C,RJ12C,RJ13C,RJ11W,RJ12W, RJ13W (W = Portable Wall-Mounted Equipment; C = all other types)	Primarily used for non-data applications but can provide bridged connection of data set Permissive (9 dBm) output to tip and ring leads of a single line. Miniature six-pin jack.*
RJ14C,RJ14W (W = Portable Wall- Mounted Equipment; C = all other types)	Primarily used for non-data applications but can provide bridged connection of data set Permissive (-9 dBm) output to tip and ring leads of first line of two-line facility. Miniature six-pin jack.
RJ45S	Provides bridged connection of Programmed ring leads of single line. Miniature eight-pin keyed jack.
RJ45S (T/R connected ahead of line ckt. of key telephone system) RJ47S (T/R connected behind line ckt. of key telephone system)	Same as RJ45S except A/A1 (Hold) circuit substituted for MI and MIC connections, to serve data equipment used with key telephone system.
RJ41M	Provides bridged connections between up to eight separate cables, from independent programmed or Permissive data equipment, to tip and ring leads of independent lines. Consists of up to eight miniature eight-pin jacks in multiple mounting arrangement.
RJ42M (T/R connected ahead of line ckt. of key telephone system) to serve data RJ43M (T/R connected behind line ckt. of key telephone system)	Same as RJ41M except A/A1 (Hold) circuits substituted for MI and MIC connections, equipment with key telephone system.
RJ45M	Same as RJ41M except serves Programmed or Permissive data equipment only.
RJ46M, RJ47M	Same as RJ42M and RJ43M respectively, except serves Programmed data equipment only.

* Universal of Programmed data jacks listed may be utilized to connect data set with permissive output level to telephone line, provided six-pin plug terminating data set cable is centered in eight-pin jack.

APPENDIX

7.3 TABLE C - TELEPHONE LINE INTERCONNECT CABLES

MD212 Modem PIN NUMBER	RJ11C PERMISSIVE CABLE	TELEPHONE CO. JACK POSITION NO.
MODEM PLUG		RJ11C JACK
3	TIP	3
4	RING	4
RJ41S FIXED LOSS/RJ45S PROGRAMMED CABLE		
MODEM PLUG		RJ45S JACK
5	MI	3
3	TIP	4
4	RING	5
6	MIC	6
7	RESISTOR PR	7
8	RESISTOR PC	8

7.4 TABLE D - DATA TERMINAL EQUIPMENT INTERFACE CONNECTION

25 PIN CONNECTOR PIN NO.	EIA DESIGNATION	FUNCTION	SIGNAL ORIGINATED BY DTE OR M*
1	AA	Chassis Ground	—
2	BA	Send Data (SD)	DTE
3	BB	Receive Data (RD)	M
5	CB	Clear to Send (CS)	M
6	CC	Data Set Ready (MR)	M
7	AB	Signal Ground (SG)	—
8	CF	Received Line Signal Detector (CO)	M
12	CI	Speed Indication (CI)	M
15	DB	Transmit Clock (SCT)	M
17	DD	Receive Clock (SCR)	M
20	CD	Data Terminals Ready (TR)	DTE
22	CE	Ring Indicator (RI)	M
24	DA	External Transmit Clock (SCTE)	DTE
25	CN	Make Busy/Analog Loopback (CN)	DTE

* DTE - DATA TERMINAL EQUIPMENT
M - MODEM

7.5 TABLE E - TECHNICAL CHARACTERISTICS

Physical Dimensions	Standalone Enclosure	Rackmount Card
	8" W (20.2cms.)	6" W
	14.75" D (37.5cms.)	14" D
	2.18" H (5.5cms.)	1/4" H
Weight	4 lbs. (1.81 kgs.)	1 lb (Kgs.)
Power Requirements	117 VAC +- 10% 50/60 Hz	
AC Power Connector	Wall Mounted Power Supply, U.L. Listed	
Power Consumption	8 Watts Nominal	
Operating Temperature	32 Degrees F (0 degree C) to 122 degree F (50 degree C)	
Relative Humidity	20% to 95%, No Condensation	
Business Machine Interface	Electronic Industries Assoc. (EIA) RS232-C	
Telephone Line Interface	FCC Registered Reg. No. AU692V-68547-DM-E Ringer Equivalence 0.4B	
Line Requirements	Two wire switched network	
Data Rate	Low-speed mode - 0 to 300 bps High-speed mode - 1200 bps (+1.0% - 2.5% Asynchronous mode, +-.01% Synchronous mode)	
Transmitter Timing Internal, External or Slave, switch selectable (Synchronous mode)		
Modulator	High-speed mode - Differential Phase shift Keyed Low-speed mode - Frequency Shift Keyed	
Carrier Frequency	High-speed mode - 1200 Hz in Originate mode 2400 Hz in answer mode	
Mark/Space Frequency	Low-speed mode - 1070/1270 Hz in ORIG 2025/2225 Hz in ANSW	
Data Set Compatibility	Low-speed mode: Existing 100 series 300 bps FSK switched network modems High-speed mode: 212 A type Modems only	
Transmitter Output Level	Set by FCC requirements, Part 68	
Line Impedance	600 Ohms, Balanced	
Receiver Sensitivity	-45 +- 4 dbm	

APPENDIX

7.6 TABLE F - MD212-3E/4 Printed Circuit Boards

