



DATA INTERFACE

*Installation and
Operations Manual*

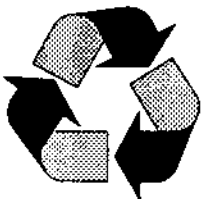
Data Interface Installation and Operations Manual

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Gentner Part No. 800-076-201



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VRC DATA INTERFACE

OPERATIONS MANUAL

Date of this revision: September 6, 1991

SECTION ONE – THE BASICS

1.1 Introduction

This manual will provide you with all the information you need to properly install, use, and maintain the VRC Data Interface. Read this manual thoroughly before attempting to install the VRC Data Interface in your VRC-2000.

Please refer to this manual first if you have any questions or problems regarding the installation or operation of this unit. If you can't find an answer in this manual, please contact:

Gentner Electronics Corporation
Customer Support
1825 Research Way
Salt Lake City, Utah 84119
Tel: (801) 975-7200
FAX: (801) 977-0087

Please check your VRC Data Interface shipment to be certain that each item listed below is included. If any item is missing, notify Gentner immediately.

ITEM	GENTNER PART NUMBER
a) [1] VRC Data Interface unit	850-076-201
b) [1] Operations Manual	800-076-201
c) [1] RS-232 Cable for VRC-2000 Unit Chassis	830-076-001
d) [1] Unterminated RS-232 Cable for VRC-1000 Unit Chassis	830-076-002
e) [1] Nine Pin D Connector	671-020-009
f) [2] 6/32" x 1/4" PPH Screws	681-010-604
g) [1] Warranty Registration Card	432-600-000

NOTE: If you ordered the VRC Data Interface which was factory installed in a VRC-2000 unit, your package will not contain items d) and e) above.

Before reading further, completely fill out the Warranty Registration Card and return it to Gentner. This will notify Gentner that you are a properly registered owner of the VRC Data Interface. It will also allow you to receive notices of VRC updates and new accessories when they become available.

1.2 Overview

VRC Data Interface is specifically to be installed in the Gentner VRC-2000 remote control unit. (You can also use the VRC Data Interface with VRC-1000 units which have been equipped with VRC-2000 firmware.)

The VRC Data Interface incorporates a modem and an RS-232 serial communications port which allows the VRC-2000 to communicate directly with the VRC Video Display Terminal, or a personal computer running the SetupVRC 2000 software package in the Terminal Mode.

The VRC Data Interface's modem can be set to operate at 300, 1200, or 2400 bits per second (baud). The RS-232 serial communications port can also be set to operate at 300, 1200, or 2400 baud. The baud settings for both the VRC Data Interface modem and RS-232 serial port are determined by a single Berg shorting jumper on the VRC Data Interface.

You can use the VRC Data Interface, plus the VRC Video Display Terminal or a personal computer running SetupVRC 2000 in the Terminal Mode, to take readings from the Metering and Status Channels, to activate the Command Channels, and to receive notice of Alarms on a VRC-2000. You can also use this package to clear pending VRC-2000 Alarms.

You can also use the VRC Data Interface in conjunction with either SetupVRC 2000 software or the VRC Video Display Terminal plus a computer printer to automatically log Alarms, and automatically log all Metering, Status, and Command Channel readings for a VRC-2000.

When used with either the VRC Video Display Terminal or SetupVRC 2000 software, the VRC Data Interface allows you to label each parameter for the Status, Metering, and Command Channels with any combination of keyboard characters. That is, you are not limited by the VRC-2000's Word List when using the VRC Data Interface.

The VRC Data Interface is controlled by a special sub-set of the VRC-2000 firmware. This firmware provides all the data to display all the information about the Status, Metering, and Command Channels for the VRC-2000 in an easy to read and use format.

In order to get the most out of the VRC Data Interface, read this manual thoroughly before attempting to install or use the VRC Data Interface.

Refer to the Operations Manuals for SetupVRC 2000, the VRC Video Display Terminal, and the VRC-2000 for more information about the functions and operation of the VRC remote control system.

The VRC Data Interface provides you with these benefits:

- a) Easy visual access to all VRC-2000 operational parameters using the VRC Video Display Terminal or a personal computer running SetupVRC 2000 software in the Terminal Mode.
- b) Three speed internal modem operation: The VRC Data Interface's modem will operate at 300, 1200, or 2400 bits per second (baud).
- c) Three speed built-in RS-232 serial communications port: the VRC Data Interface's serial port will operate at 300, 1200, or 2400 baud.
- d) Easy installation in all VRC-2000 units, or VRC-1000 units which have been equipped with VRC-2000 firmware.

- e) VRC Data Interface will communicate over standard dial telephone lines with a VRC Video Display Terminal which is equipped with the VRC Standalone Modem, or the SetupVRC 2000 software package running on a 100% IBM-compatible personal computer which is equipped with a 100% Hayes-compatible modem.

NOTE: "IBM" is a registered trademark of International Business Machines Corporation. "Hayes" is a registered trademark of Hayes Microcomputer Products, Inc.

Use the VRC Data Interface to visually monitor the Status Channels and Metering Channels on your VRC-2000. You can also activate the Command Channels on your VRC-2000 by using the keyboard on the VRC Video Display Terminal, or the keyboard on your personal computer running SetupVRC 2000 in the Terminal Mode.

1.3 Brief Technical Description

The VRC Data Interface includes a high speed modem and an RS-232 serial communications port.

All circuitry and components for the VRC Data Interface are contained on a single printed circuit board. The VRC Data Interface is specifically designed to be mounted in VRC-2000 remote control units, or VRC-1000 units which have been equipped with VRC-2000 firmware.

The modem section of the VRC Data Interface is asynchronous and is capable of full or half duplex operation. All commands for the modem section are issued by the VRC-2000.

The VRC Data Interface can transmit and receive data using the CCITT V.22, V.22bis, and V.21 standards, and in the Bell 212A and 103 standards.

The unit utilizes Quadrature Amplitude Modulation for 2400 baud operation, Differential Phase Shift Keying for 1200 baud operation, and Frequency Shift Keying for 300 baud operation.

The modem section of the VRC Data Interface has two operating modes: the Command Mode and the On-Line Mode. While in the Command Mode, the unit accepts commands from the VRC to terminate communications, initiate communications, or any of the other functions available in the AT command set. In the On-Line Mode, the unit transfers data to and from the VRC-2000 and ignores the AT commands.

The VRC Data Interface is capable of receiving commands from either the RS232 port section or through the modem section.

1.4 Physical Specifications

The VRC Data Interface comes to you on one printed circuit board, with associated connectors and cables.

The VRC Data Interface's physical dimensions are:

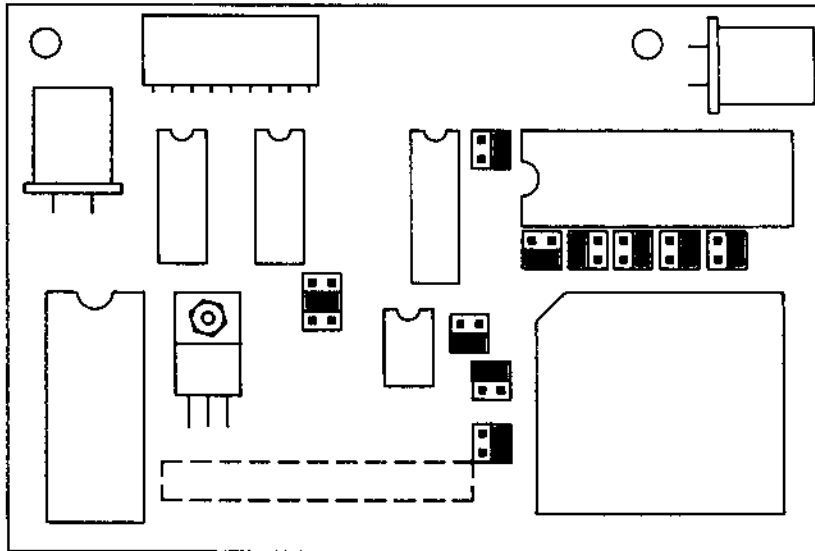
Height: .50" (1.27 cm)

Width: 4.25" (10.79 cm)

Depth: 3.08" (7.82 cm)

Weight (dry): 3 oz/85 gm

Shipping Weight: 1 lb/.45 kgs



Note: All Jumpers Shown in Default Positions

**VRC Data Interface
Top View**

Figure 1

1.5 Electrical Specifications

- a) System Type: Contains 300, 1200, 2400 bits per second (baud) modem section (speed is hardware selectable), plus 300, 1200, 2400 baud RS-232 serial communications port. Must be installed in Gentner VRC-2000 remote control unit, or Gentner VRC-1000 remote control unit which has been equipped with VRC-2000 firmware. All controlling firmware for VRC Data Interface is contained in the VRC-2000 firmware.
- b) Compatibility: CCITT V.22, V.22bis, V.21; Bell 212A, 103
- c) Modem Data Encoding: 2400 baud (V.22bis); Quadrature Amplitude Modulation; 16 possible symbols consist of three amplitudes and twelve phase angles; each symbol conveys four bits of information with a signaling rate of 600 symbols per second.
- 1200 baud (V.22 and 212A); Differential Phase Shift Keying; four possible symbols consist of one of four phase angles; each symbol conveys 2 bits of information with a signaling rate of 600 symbols per second.

300 baud (Bell 103 or CCITT V.21);
Frequency Shift Keying; two possible
symbols consist of one of two
frequencies; each symbol conveys one
bit of information with the signaling rate
equal to the data rate.

d) Pin-Outs and Protocol for RS-232 Serial Communications Port
Section:

<u>Pin</u>	<u>Symbol</u>	<u>I/O</u>	<u>Description</u>
1	DCD	OUT	Data Carrier Detect
2	Tx	IN	Transmit Data
3	Rx	OUT	Receive Data
4	DSR	OUT	Data Set Ready
5	GND		Ground
6	DTR	IN	Data Terminal Ready
7	CTS	OUT	Clear To Send
8	RTS	IN	Request To Send
9	NC		No Connection

Protocol for RS-232

Handshaking: OFF
Data Length: 8 bits with 1 stop bit
Parity: NONE
Communication: FULL DUPLEX

- e) **Temperature Range:** Gentner recommends that the VRC Data Interface be operated in an environment of between -20 and + 70 degrees Celsius.

- f) **Power Requirements:** All power for the VRC Data Interface is supplied directly from the VRC-2000 remote control unit. No modifications to the VRC-2000's power supply are required to operate the VRC Data Interface.

SECTION TWO -- WARRANTY

2.1 Warranty Agreement

The Gentner Warranty Agreement on the following page is effective as of the date of receipt by the purchaser of the VRC Data Interface. This warranty shall not be effective unless Gentner is notified in writing by the purchaser of the receipt of the unit and the unit's serial number.

You have been supplied with a Gentner Warranty Registration Card. Use this card to notify Gentner of your purchase of the VRC Data Interface and the serial number of your unit.

WARRANTY

GENTNER COMMUNICATIONS CORPORATION (Manufacturer) warrants that this product is free of defects in both materials and workmanship. Should any part of this equipment be defective, Manufacturer agrees, at its option, to:

A. Repair or replace any defective part free of charge (except transportation charges) for a period of one year from the date of the original purchase, provided the owner returns the equipment to the Manufacturer at the address set forth below. No charge will be made for parts or labor during this period;

B. Furnish replacement for any defective parts in the equipment for a period of one year from the date of original purchase. Replacement parts shall be furnished without charge, except labor and transportation.

This Warranty excludes assembled products not manufactured by Manufacturer whether or not they are incorporated in a Manufacturer product or sold under a Manufacturer part or model number.

THIS WARRANTY IS VOID IF:

A. The equipment has been damaged by negligence, accident, act-of-God or mishandling, or has not been operated in accordance with the procedures described in the operating and technical instructions; or,

B. The equipment has been altered or repaired by other than Manufacturer or an authorized service representative of Manufacturer; or,

C. Adaptations or accessories other than those manufactured or provided by Manufacturer have been made or attached to the equipment which, in the determination of Manufacturer, shall have affected the performance, safety or reliability of the equipment; or,

D. The equipment's original serial number has been modified or removed.

NO OTHER WARRANTY, EXPRESS OR IMPLIED, INCLUDING WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR USE, APPLIES TO THE EQUIPMENT, nor is any person or company authorized to assume any warranty for Manufacturer or any other liability in connection with the sale of Manufacturer's products.

Manufacturer does not assume any responsibility for consequential damages, expenses or loss of revenue or property, inconvenience or interruption in operation experienced by the customer due to a malfunction in the purchased equipment. No warranty service performed on any product shall extend the applicable warranty period.

In case of unsatisfactory operation, the purchaser shall promptly notify Manufacturer at the address set forth below in writing, giving full particulars as to the defects or unsatisfactory operation, upon receipt of such notice, Manufacturer will give instructions respecting the shipment of the equipment, or such other matters as it elects to honor this warranty as above provided. This warranty does not cover damage to the equipment during shipping and Manufacturer assumes no responsibility for such damage. All shipping costs shall be paid by customer.

This warranty extends only to the original purchaser and is not assignable or transferable.

Gentner

GENTNER COMMUNICATIONS CORPORATION

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Salt Lake City, Utah 84119

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2.2 Special Notices

The information contained in this manual is subject to change without notice. Gentner Electronics Corporation makes no warranty of any kind with regard to this material including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose. Gentner Electronics Corporation shall not be liable for errors contained herein or for incidental or consequential damages in connection with the furnishing, performance, or use of this material.

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2.3 VRC Updates

Gentner Electronics will offer updates and new accessories for the VRC Remote Control System. As a registered owner of a VRC product, you will be eligible to receive updates when they become available.

You must return a completed Warranty Card in order to be notified of VRC updates and new accessories. (You may also notify us by letter if you prefer. Your letter must include the following information: VRC Data Interface serial number; your name; the name of your organization; your telephone number; your address; the name of the company from whom you purchased your VRC Data Interface; the date of purchase.)

SECTION THREE -- INSTALLATION

3.1 Introduction

You can install the VRC Data Interface in all Gentner VRC-2000 units, and VRC-1000 units which have been equipped with VRC-2000 firmware. The VRC Data Interface will NOT operate with any version of VRC-1000 firmware.

3.2 Installing the VRC Data Interface in a VRC-2000 Remote Control Unit

To install the VRC Data Interface in VRC-2000 units, first remove the VRC-2000 from service and disconnect AC power to the unit.

Carefully remove the top cover the VRC-2000, exposing the internal circuitry of the unit. You will notice a male multi-pin connector on the main printed circuit board. This male multi-pin connector is labeled J10, and is located near the front of the printed circuit board just behind the front panel.

Notice the VRC Data Interface's female multi-pin connector, located near the edge of the unit. This connector mates with the matching male connector on the main printed circuit board in the VRC-2000.

Carefully position the VRC Data Interface above the VRC-2000's printed circuit board so that their connectors match each other. There are two screw holes in the VRC Data Interface which must be aligned with the two mounting standoffs in the VRC-2000. Plug the Data Interface into the VRC-2000.

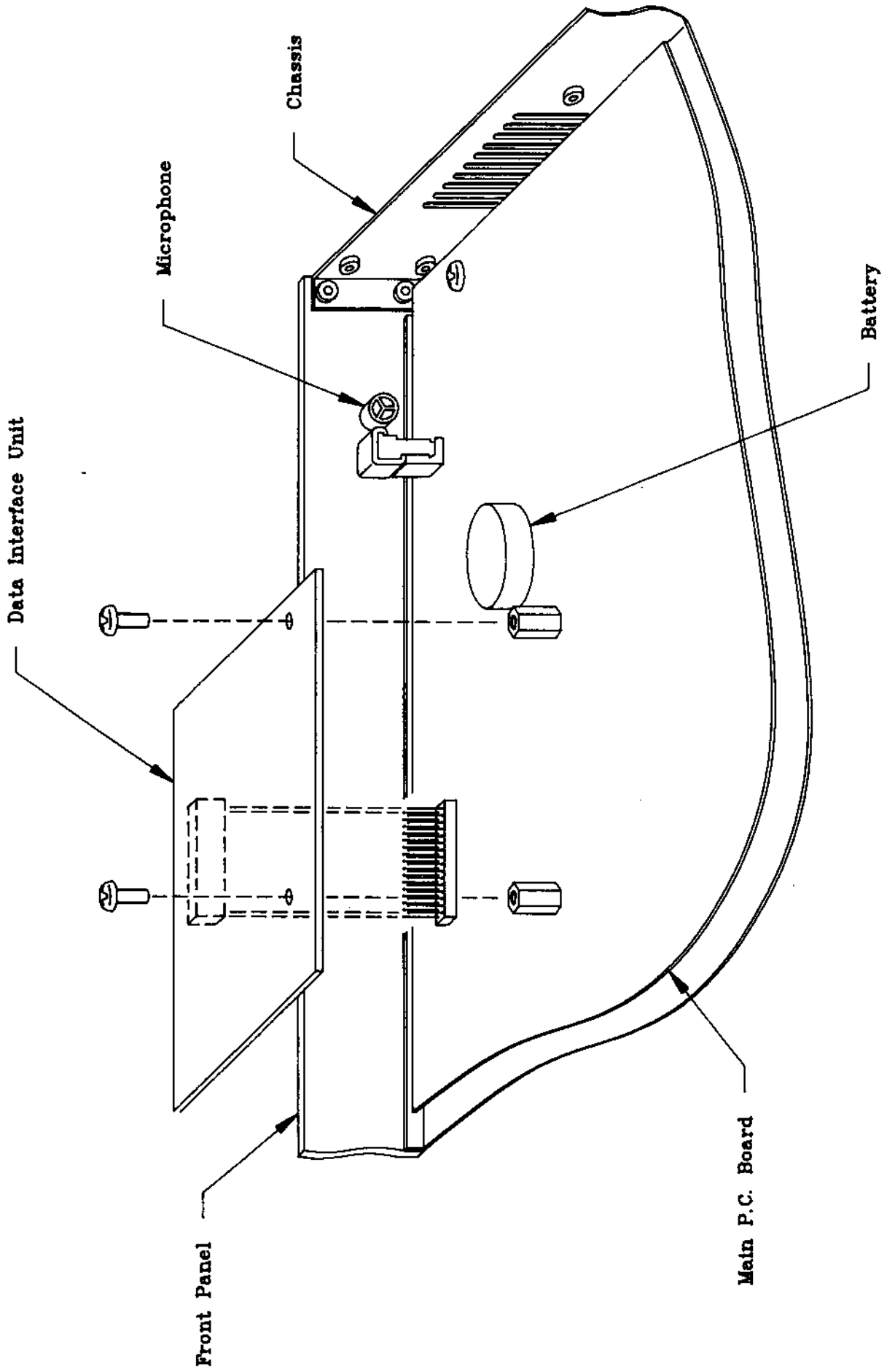
NOTE: You must be very careful to match the two connectors exactly. Be certain that the pins on the VRC-2000 circuit board match the connector on the VRC Data Interface. Do not plug the VRC Data Interface in so that some of the pins on the male connector are left out of the female connector on the VRC Data Interface. Your VRC Data Interface will not operate properly unless the unit is correctly positioned and connected with the VRC-2000 circuit board.

You have been provided with two screws which you should now use to permanently mount the VRC Data Interface into the VRC-2000. Be careful not to over tighten these screws.

Now connect the RS-232 serial communications port connector to the rear panel of the VRC-2000 (labeled COM on the rear panel of the VRC-2000) using the screws and double-ended nuts. Then connect the other end of the cable to J1 on the VRC Data Interface as shown in Figure 3.

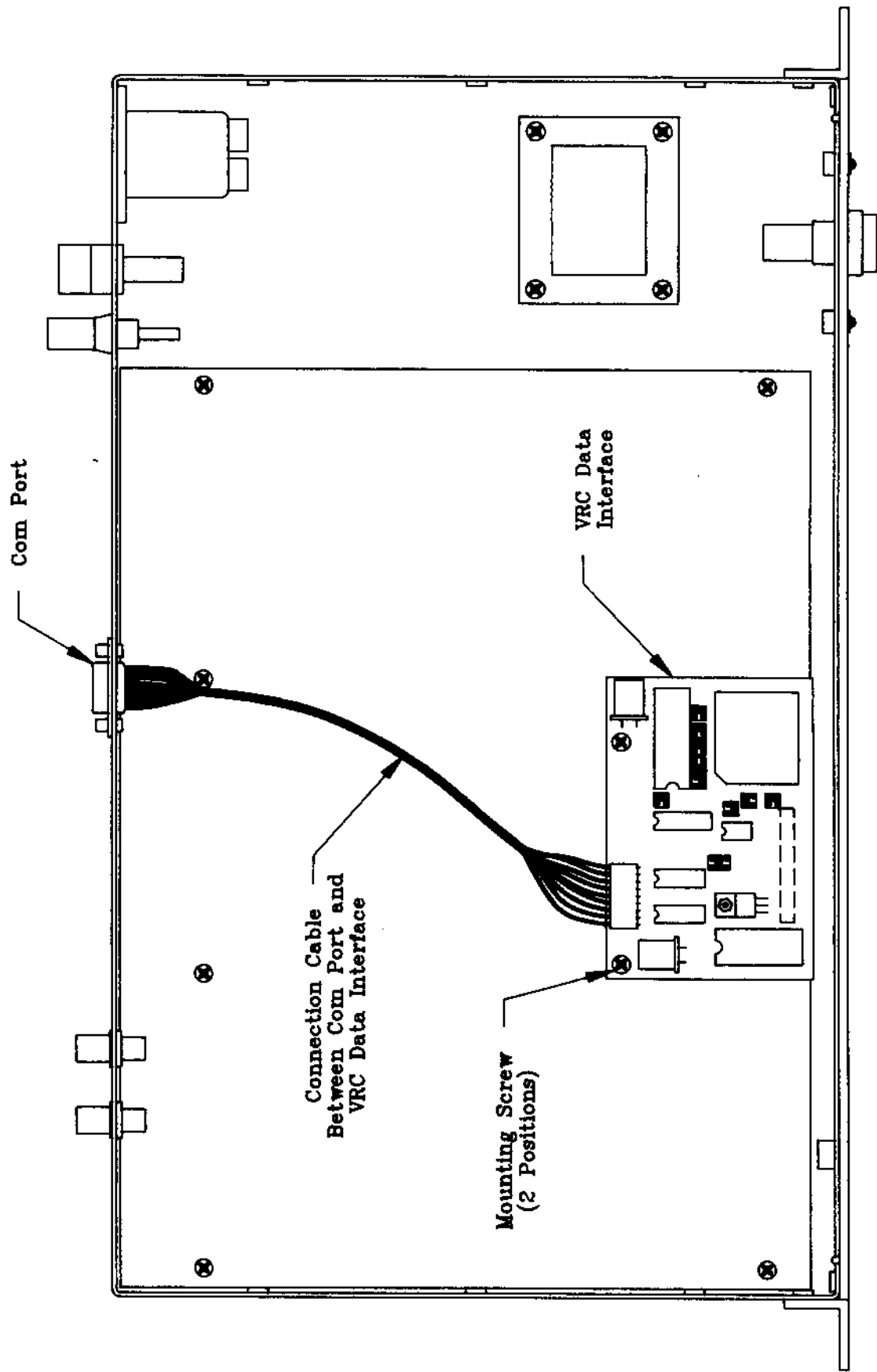
Carefully replace the top cover for the VRC-2000 and return your unit to service.

Refer to Figure 2 and Figure 3 for more information on how to install the VRC Data Interface in your VRC-2000.



Installing the VRC Data Interface into the VRC-2000 Unit

Figure 2



VRC Data Interface Installed in a VRC-2000 Unit

Figure 3

3.3 Installing the VRC Data Interface in VRC-1000 Remote Control Units

You can install the VRC Data Interface in VRC-1000 units which have been equipped with VRC-2000 firmware. The VRC Data Interface will not operate in VRC-1000 units which have not been equipped with VRC-2000 firmware.

To install the VRC Data Interface in these VRC-1000 units, first remove the VRC-1000 from service and disconnect AC power to the unit.

Carefully remove the top cover of the VRC-1000, exposing the internal circuitry of the unit. You will notice a male multi-pin connector on the main printed circuit board. This male multi-pin connector, labeled J10, is located near the front of the printed circuit board, in the middle of the unit.

Notice the VRC Data Interface's female multi-pin connector, located near the edge of the unit. This connector mates with the matching male connector on the main printed circuit board in the VRC-1000.

Carefully position the VRC Data Interface above the VRC-1000's printed circuit board so that their connectors match each other. There are two screw holes in the VRC Data Interface which must be aligned with the two mounting standoffs in the VRC-1000. Plug the Data Interface into the VRC-1000.

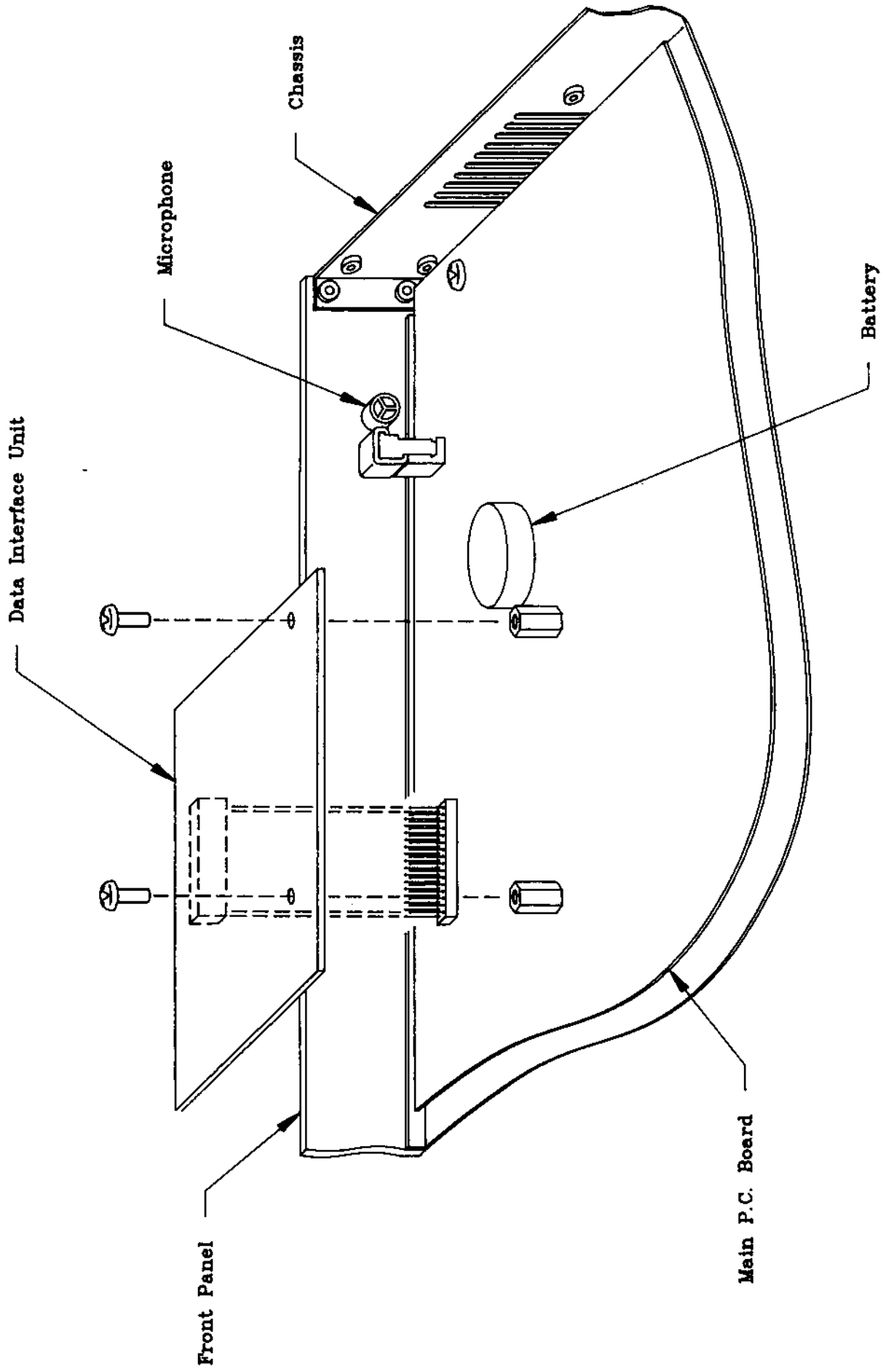
NOTE: You must be very careful to match the two connectors exactly. Be certain that the pins on the VRC-1000 circuit board match the connector on the VRC Data Interface. Do not plug the VRC Data Interface in so that some of the pins on the male connector are left out of the female connector on the VRC Data Interface. Your VRC Data Interface will not operate properly unless the unit is correctly positioned and connected with the VRC-1000 circuit board.

You have been provided with two screws which you should now use to permanently mount the VRC Data Interface into the VRC-1000. Be careful not to over tighten these screws.

If you plan to use the RS-232 serial communications port with your VRC-1000, you must route the required cable out one of the ventilation slots on the side of the VRC-1000. First attach this cable to J1 on the VRC Data Interface with the connector provided. The other end of this cable has no connector on it. This allows you to easily route the cable through a ventilation slot. Connect the nine pin D connector to the unterminated end of the cable once you have routed it through one of the ventilation slots. Use the pinout list as shown in the Specifications Section 1.5. The two ends of the cable will have different type connectors but the pin numbers of the two ends will correspond exactly. The pinout is also shown in section 3.6.

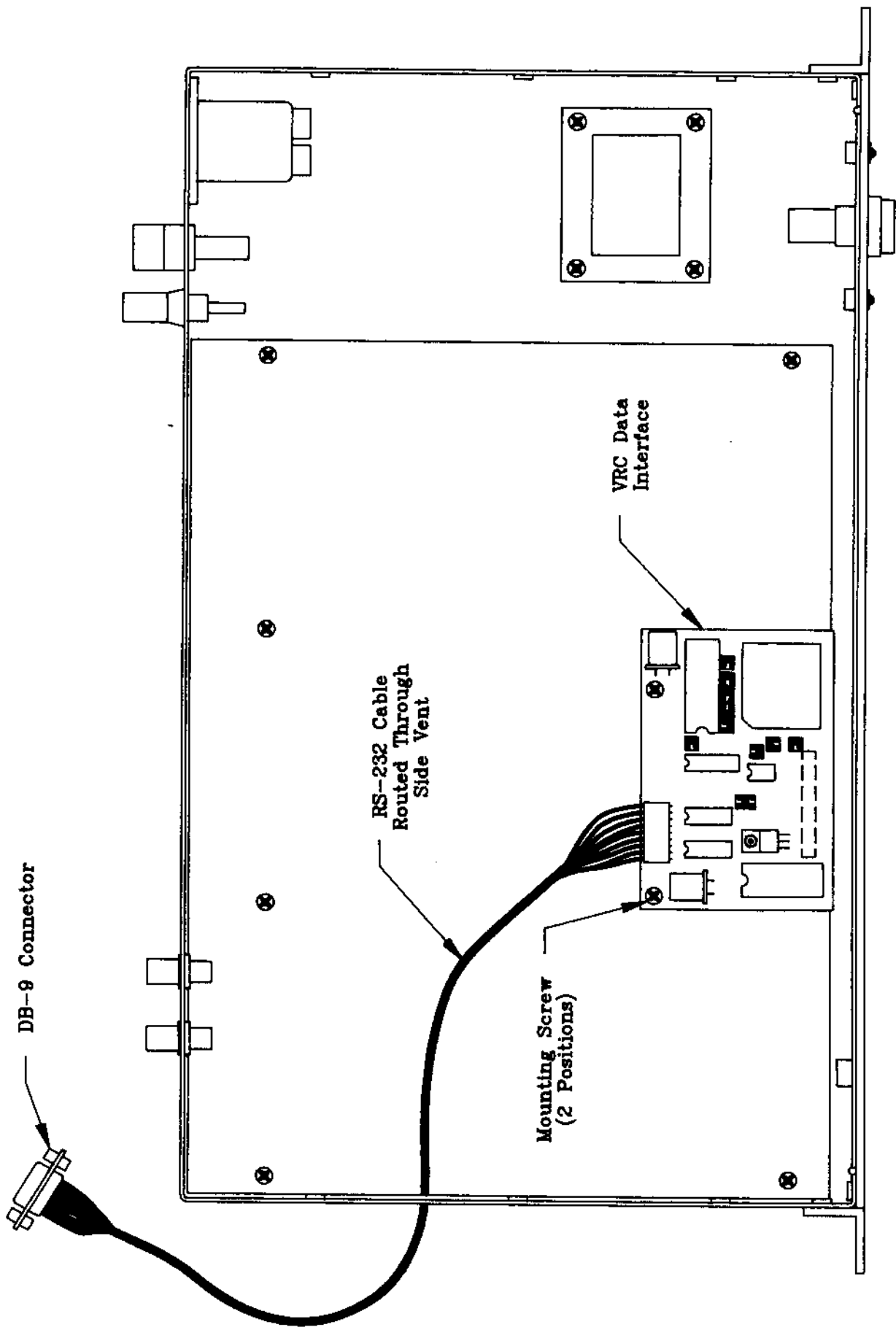
Carefully replace the top cover for the VRC-1000 and return your unit to service.

Refer to Figure 4 and Figure 5 for more information on how to install the VRC Data Interface in your VRC-1000.



Installing the VRC Data Interface into the VRC-1000 Unit

Figure 4



VRC Data Interface Installed in a VRC-1000 Unit

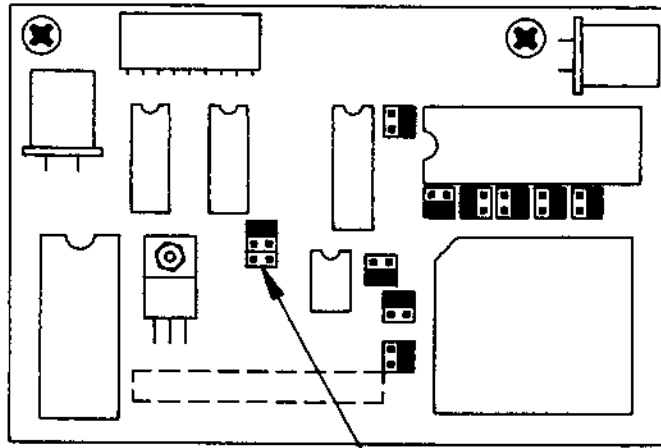
Figure 5

3.4 Selecting the Bits Per Second (BAUD) Rate for the VRC Data Interface

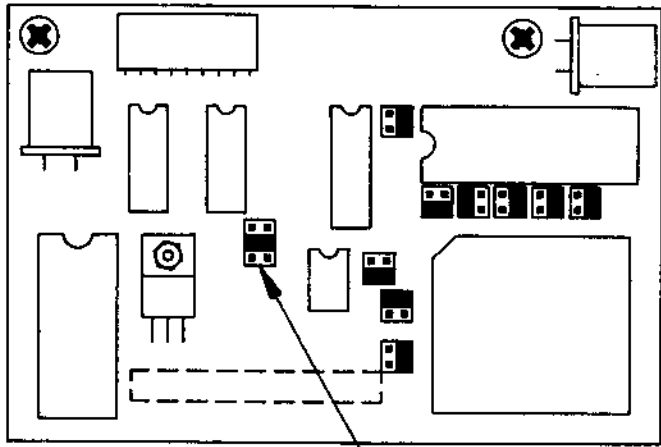
The VRC Data Interface will operate at 300, 1200, or 2400 bits per second (baud). You can select which speed you want to use with a single shorting jumper on the VRC Data Interface.

NOTE: You can only select one baud rate for the VRC Data Interface. That is, the rate you select will apply to both the RS-232 serial communications port and to the modem section of the Data Interface.

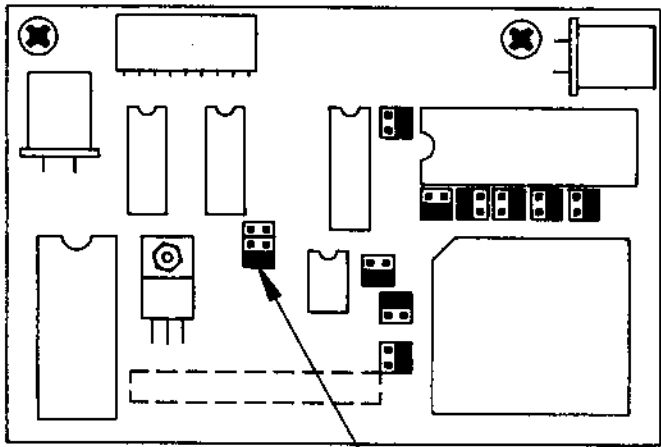
This jumper is labeled "JP9" on the Data Interface's printed circuit board. The jumper position nearest to U3 is for 300 baud. Moving away from U3, the second position selects 1200 baud and the third position selects 2400 baud. Refer to Figure 6 for instructions on how to set the jumper to select the VRC Data Interface's baud rate.



Speed Selection Jumper
with 300 Bits per Second Selected



Speed Selection Jumper
with 1200 Bits per Second Selected
(Default Position)



Speed Selection Jumper
with 2400 Bits per Second Selected

Selecting the Bits per Second Rate

Figure 6

3.5 Setting Other Jumpers on the VRC Data Interface

There are other jumpers on the VRC Data Interface which must be correctly positioned in order for your particular installation to function properly.

NOTE: For most installations, the only jumper you will have to move is the BAUD Rate Selection jumper. See Section 3.4. It is recommended that you first try using your VRC Data Interface without moving any jumpers other than BAUD Rate.

a) The Carrier Detect Jumper

Placing the Carrier Detect Jumper in the first position programs the VRC Data Interface to accept a carrier detection signal through the LINE jack on the rear panel of the VRC-2000, or through the AUDIO IN connector on the rear panel of the unit.

Placing the Carrier Detect Jumper in the second position programs the VRC Data Interface to accept a carrier detection signal only through the VRC Data Interface's RS-232 serial communications port.

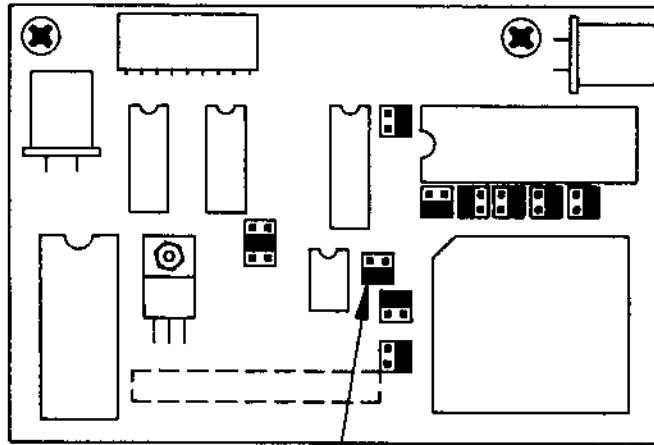
This selection will determine which is the primary control source for the VRC Data Interface.

In position one, called the internal position, the VRC Data Interface will only transmit and receive data through the RS-232 communications port when an external modem is properly connected and communicating with the unit through the LINE jack or the AUDIO IN and AUDIO OUT jacks on the rear panel of the VRC-2000. This is the position closer to the front of the VRC.

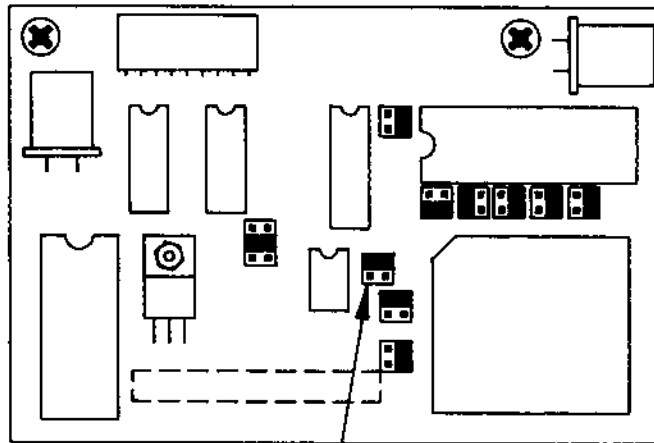
In the second position, called the external position, the modem section of the Data Interface will not operate. This is the jumper position toward the rear of the VRC. Place the jumper in this position only if you are using a VRC Video Display Terminal connected directly to the VRC-2000's RS-232 serial communications port, and you are not accessing the unit via an external modem through the LINE and/or AUDIO connectors. In this case you will also have to change the Command Acceptance jumper JP14 to JP13.

- For most installations, leave this jumper in position one, the default position. This position will allow the RS-232 port to echo all data going to the Data Interface Modem.

This jumper is labeled "JP11" on the Data Interface's printed circuit board. Figure 7 shows the different positions available for this jumper.



Carrier Detection Jumper with
Position 1 (Internal) Selected
(Default Position)



Carrier Detection Jumper with
Position 2 (External) Selected

The Carrier Detection Jumper

Figure 7

b) The Command Acceptance Jumpers

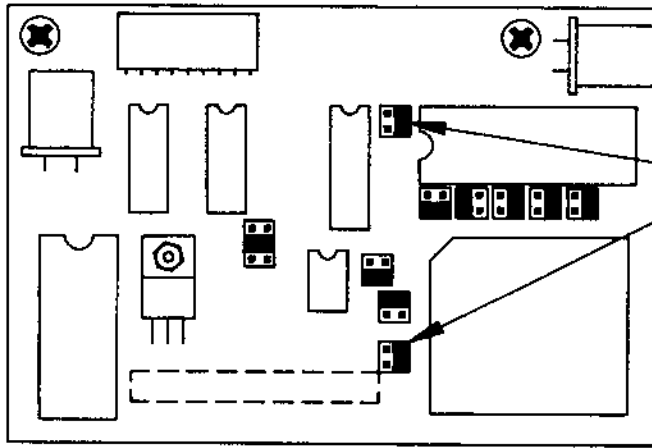
There is a set of four jumpers which you can use to tell the VRC Data Interface whether to allow Commands to be entered through the RS-232 serial communications port, through the LINE or AUDIO jacks on the VRC-2000, or both.

For most installations, leave these jumpers in the default positions, JP3 and JP14 (as supplied from the factory). The default position allows commands to be received by the VRC Data Interface by either the local VRC Video Display Terminal or by an external modem connected to the LINE jack on the rear panel of the VRC-2000. In this mode the RS-232 port will only be active when the Data Interface modem is connected through the LINE, SET, or AUDIO jacks. The modem is the primary control source and the serial port is a secondary control source.

These jumpers are labeled "JP2", "JP3", "JP13", and "JP14" on the Data Interface's printed circuit board. Refer to Figure 8 for instructions on how to set these jumpers.

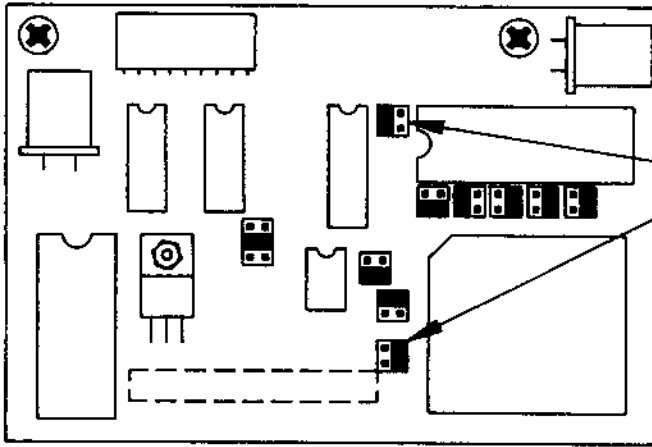
Switching from the default JP3 to JP2 disables the RS-232 serial port. Changing from the default JP14 to JP13 disables the modem and leaves the serial port as the primary control source.

When using the serial port as the primary control source you must also change the Carrier Detect jumper to Position 2. The serial port is then activated by dialing 020# through either the LINE, SET, or AUDIO jacks. Note that in this mode the serial port can be active in the Data Mode while the VRC is active in the Voice Mode through either LINE, SET, or AUDIO jacks. The only limitation is that an "Error" voice message will turn off the serial port. If you turn on the Data Interface from the VRC Set-up Mode, leaving Set-up will also turn off the Data Interface.



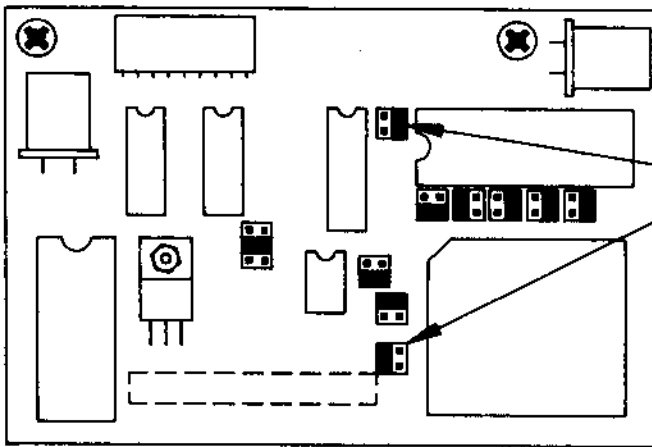
**Command
Acceptance
Jumpers**

**Positioned to Allow
Commands Through
Either Port
(Default Position)**



**Command
Acceptance
Jumpers**

**Positioned to Allow
Commands Only Through
the Line Jack on the
VRC-2000**



**Command
Acceptance
Jumpers**

**Positioned to Allow
Commands Only Through
the RS-232 Port**

The Command Acceptance Jumpers

Figure 8

c) The 300 BAUD Standards Jumper

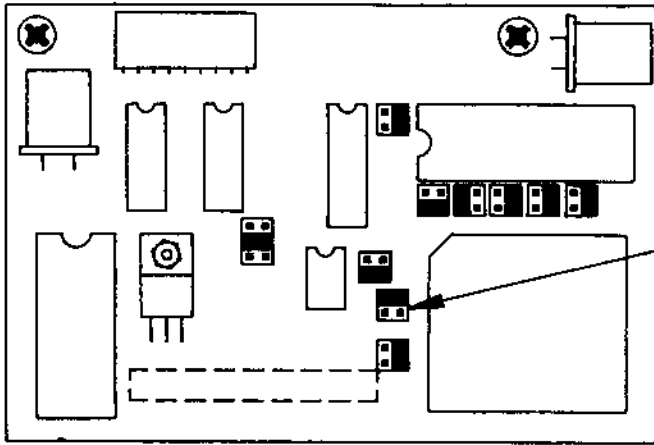
The VRC Data Interface will operate at 300, 1200, and 2400 bits per second (baud). There are several different standards for modem transmissions in use in various parts of the world. If you use the VRC Data Interface at 1200 or 2400 baud, the unit will automatically detect the standard being used by the modem which is communicating with the VRC Data Interface, and will automatically adjust itself to comply with that standard.

If you are using the VRC Data Interface at 300 baud, you must manually select the standard you want to use.

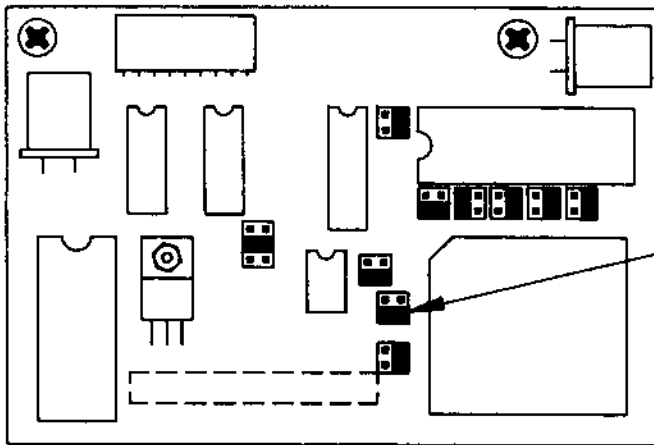
The two standard that you select from are the Bell 103 standard (which is commonly used in the U.S.A.) and the CCITT V.21 standard (commonly used in Europe and Australia.)

Refer to the operations manual for the modem you are using to communicate with the VRC-2000 for more information about standards, and how to determine which standard your modem uses for 300 baud operation.

This jumper is labeled "JP12" on the Data Interface's printed circuit board. The jumper position toward the rear of the VRC is the default position. Figure 9 shows how to position the 300 BAUD Standards Jumper.



300 BPS Standards Jumper
 In Position to Accept
 Bell Standard
 (Default Position)



300 BPS Standards Jumper
 In Position to Accept
 CCITT Standard

The 300 BPS Standards Jumper

Figure 9

d) The RS-232 Control Line Enable Jumper

This jumper can be set to allow the VRC-2000 to enable and disable the RS-232 serial communications port's control lines. In the default position (as supplied from the factory), these control lines are always enabled.

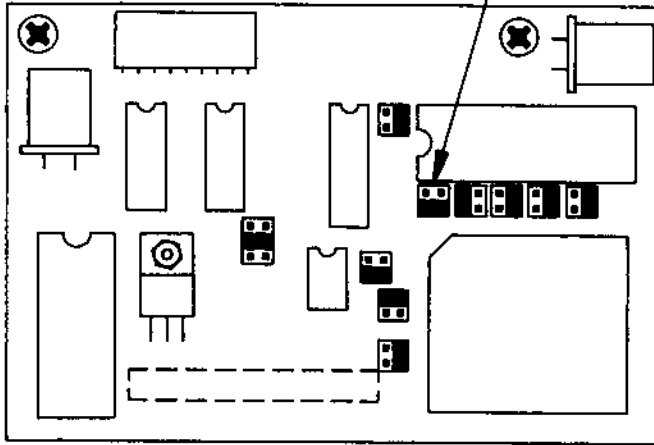
For most installations, you should leave this jumper in the default position (as supplied from the factory.)

- Do not move this jumper unless you have a special installation which requires a "smart terminal" or other intelligent electronic device connected to the RS-232 serial communication port.

This jumper is labeled "JP4" on the Data Interface's printed circuit board. The default position is toward the front of the VRC. Refer to Figure 10.

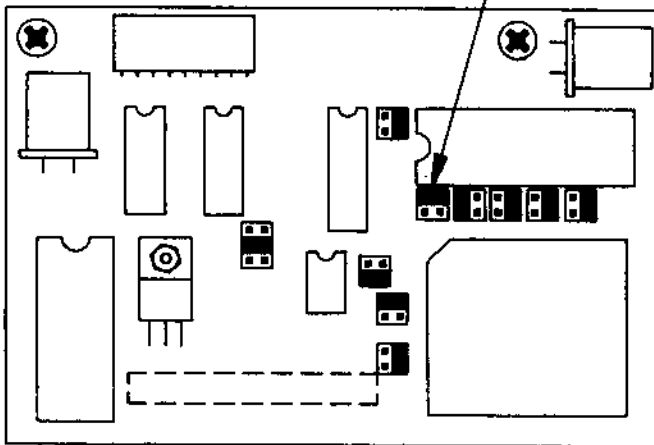
RS-232 Control Line Enable Jumper

Control Line Enable Selected
(Default Position)



RS-232 Control Line Enable Jumper

Control by VRC Unit Selected



The RS-232 Control Line Enable Jumper

Figure 10

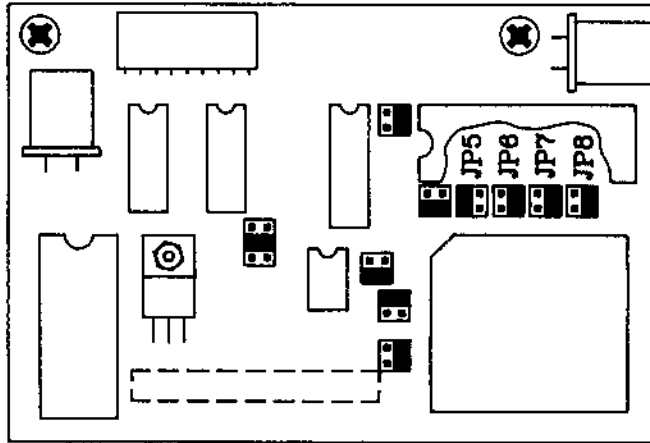
e) The Transmission Level Jumpers

This set of four jumpers set the transmission level for the modem section of the VRC Data Interface. The transmission level can be varied from -5 dBm to +10 dBm for the AUDIO OUT connector on the rear panel of the VRC-2000. The transmission level can be varied from -20 dBm to -11.8 dBm on the LINE connector on the rear panel of the VRC-2000.

- This set of jumpers is factory set for a nominal transmission level of -14 dBm through the LINE connector on the rear panel of the VRC-2000, and +3 dBm through the AUDIO OUT connector. For most installations, these jumpers should remain in the default positions (as supplied from the factory.)

Some newer telephone company central office switches may have higher audio levels in use. If this is the case a reduction of transmission level can reduce display errors and reduce such problems as the VRC not disconnecting from the phone line.

These jumpers are labeled "JP5", "JP6", "JP7", and "JP8" on the VRC Data Interface's printed circuit board. Refer to Figure 11 for the specific transmission level settings.



				Transmit Level		
	JP5	JP6	JP7	JP8	Line Jack	BNC
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-11.8dbm	+10dbm
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-12dbm	+9dbm
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-12.2dbm	+8dbm
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-12.5dbm	+7dbm
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-12.7dbm	+6dbm
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-13dbm	+5dbm
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-13.5dbm	+4dbm
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-14dbm	+3dbm (Default Position)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-14.5dbm	+2dbm
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-15dbm	+1dbm
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-15.5dbm	0dbm
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-16dbm	-1dbm
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-17dbm	-2dbm
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-18dbm	-3dbm
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-19dbm	-4dbm
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-20dbm	-5dbm

Transmission Level Jumpers

Figure 11

3.6 Connecting the VRC Video Display Terminal to the VRC Data Interface's RS-232 Serial Communications Port

The VRC Video Display Terminal can be easily connected to VRC-2000's which have been equipped with the VRC Data Interface.

Use the RS-232 serial cable provided with the VRC Video Display Terminal to the COM port on the rear panel of the VRC-2000. This is Gentner part number 830-007-001. You will also need the 9 pin to 25 pin adapter cable part number 830-077-004 to make a direct connection to the serial port.

If you have a VRC-1000 which has been equipped with VRC-2000 firmware and the VRC Data Interface, you must use the RS-232 serial communications cable which you routed through the vent holes on the side of the VRC-1000 chassis.

The pin-outs for the VRC Data Interface's serial communications port are:

<u>Pin</u>	<u>Symbol</u>	<u>I/O</u>	<u>Description</u>
1	DCD	OUT	Data Carrier Detect
2	Tx	IN	Transmit Data
3	Rx	OUT	Receive Data
4	DSR	OUT	Data Set Ready
5	GND		Ground
6	DTR	IN	Data Terminal Ready
7	CTS	OUT	Clear To Send
8	RTS	IN	Request To Send
9	NC		No Connection

Refer to Section 1.5, "Electrical Specifications", for more information about the RS-232 serial communications port.

3.7 Connecting a 100% IBM-Compatible Personal Computer to the VRC Data Interface's RS-232 Serial Communications Port

You can easily connect a 100% IBM-compatible personal computer directly to the VRC Data Interface's RS-232 serial communications port. Your personal computer must be equipped with at least one RS-232 serial port. Refer to the operations manual for your personal computer for more information about its serial ports.

First, connect the RS-232 serial port on your computer to the DB-9 connector on the rear panel of the VRC-2000. You can either make a cable for this purpose or use the two Gentner cables described in the previous section.

The VRC Data Interface will operate at 300, 1200, or 2400 bits per second (baud). You can select which speed you wish to use with a jumper on the VRC Data Interface. Refer to Section 3.4 for instructions on how to select the baud rate for the VRC Data Interface.

You must also make sure that the RS-232 serial communications port on your computer is properly configured for the VRC Data Interface. The baud rate for the RS-232 serial communications port on your personal computer must correspond to the baud rate you have selected for the VRC Data Interface. This baud rate is selected in the Modem Parameters Menu of SetupVRC2000. The Com Port assignment for the PC serial port must also match the Com Port selected by SetupVRC2000. Refer to the Operations Manual for your personal computer, and the SetupVRC 2000 Operations Manual for more information.

Refer to the SetupVRC 2000 Operations Manual for information on how to use the program with the VRC-2000 system.

3.8 Connecting a VRC-2000 with VRC Data Interface to a Telephone Line

You can connect VRC-2000 units equipped with the VRC Data Interface to the telephone line using the LINE jack on the rear panel of the VRC-2000 unit. This will allow you to access the VRC in data mode from any PC or terminal with a modem.

When you wish to turn on the VRC Data Interface, you must enter the correct series of Touch-Tones through the LINE jack. When the VRC has answered and you have supplied the correct access code, dial 020# to turn on the Data Interface. With either a terminal or PC you can program function keys to dial the access code and 020# with just a single button to push.

NOTE: "Touch-Tone" is a registered trademark of American Telephone and Telegraph Corporation.

Refer to the VRC-2000 Operations Manual for more information on how to turn on the VRC Data Interface.

SECTION FOUR -- SETTING UP A CONTROL SITE

4.1 Introduction

You can easily set-up a control site for your equipment using the VRC-2000, the VRC Data Interface, and other VRC accessories. This control site can be located at the equipment site, or located at a remote site and connected to your equipment with a telephone line, dedicated line or radio/microwave link.

Refer to the VRC-2000 Operations Manual for more information about the VRC-2000 and its accessories.

4.2 Installing the VRC Video Display Terminal and Standalone Modem at a Remote Control Site

You can locate the VRC Video Display Terminal and VRC Standalone Modem to set-up a remote control site.

The VRC 2400 baud Standalone Modem will operate at 300, 1200, or 2400 bits per second (baud). For most applications, you will select 1200 baud. This is a faster rate than the old VRC-1000 modem, but will result in the best compromise between fast transfer of data and reliable operation. If you have a high quality connection between the VRC and the PC or terminal you can use 2400 baud for fastest operation.

NOTE: For most modems, you must select the baud rate of the modem with the terminal, or the personal computer you have connected to the modem. This is true of the VRC Standalone Modem and the VRC Video Display Terminal. Refer to the operations manuals for the Standalone Modem and the Video Display Terminal.

You must set-up the VRC Video Display Terminal to operate at the same baud rate that you have selected for the Standalone Modem. Most modems will automatically follow the rate you select on the Terminal. Refer to the Operations Manual for the VRC Video Display Terminal for instructions on how to set it up to operate at the same baud rate as the VRC Standalone Modem.

You must connect the VRC Standalone Modem to the DATACOM jack on the back side of the VRC Video Display Terminal with the RS-232 cable supplied with the VRC Standalone Modem. This is Gentner part number 830-077-001. You must also connect a telephone line to the LINE jack on the Standalone Modem.

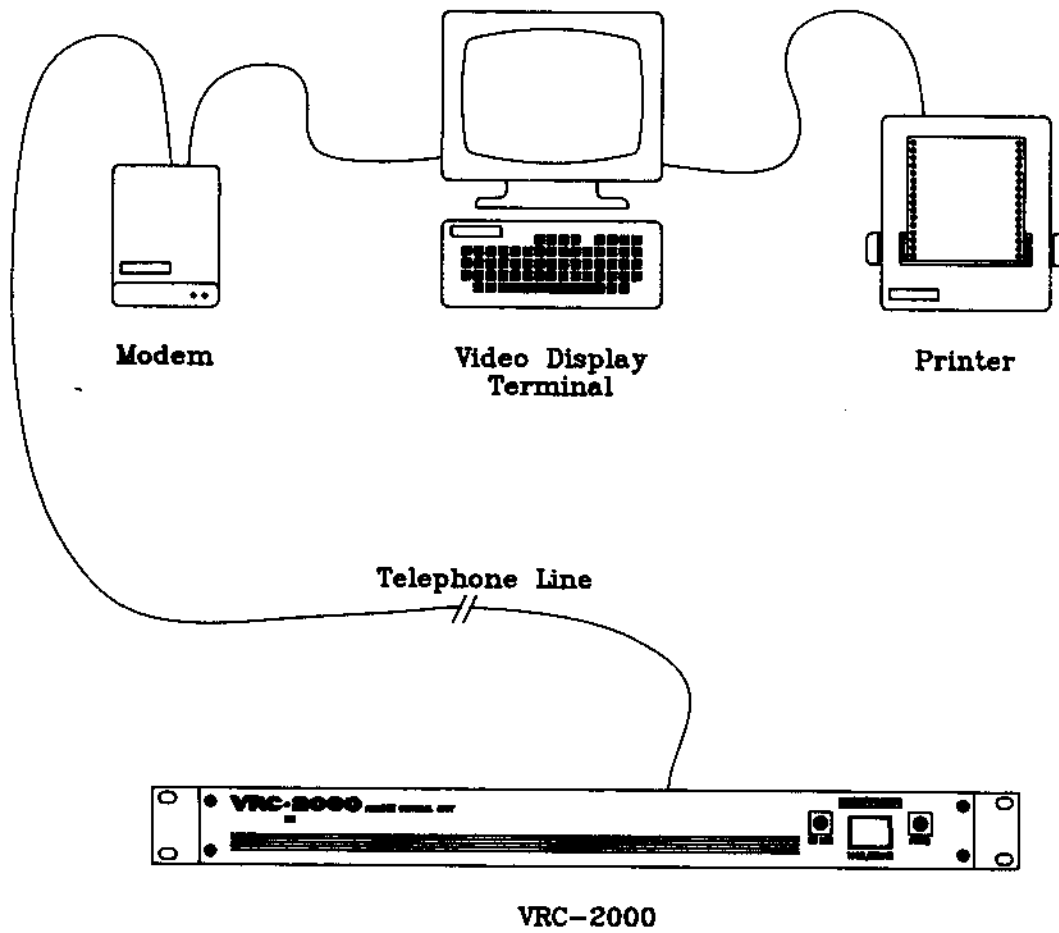
Check to be sure that the Standalone Modem is properly connected to the Video Display Terminal, and that all settings for both units are correctly set-up. Make sure each unit has been supplied with AC power, and that each unit is ON. Then press the <Enter> key on the Video Display Terminal five times, and then type:

AT<Enter>

The screen should respond with "OK". This indicates that the Standalone Modem and the Video Display Terminal are working together properly.

You can also connect the VRC Printer to the VRC Video Display Terminal. This allows you to print logs of the readings for your VRC-2000's Status, Metering, and Command Channels. The VRC Printer is supplied with an RS-232 cable which you can use to connect to the PRINTER connector on the VRC Video Display Terminal. This cable is Gentner part number 830-077-003. In order to use the VRC Printer, it must be ON LINE, and supplied with paper. Refer to the Operations Manual for the VRC Printer.

The interconnection of the components is shown in Figure 12.



Remote Control Site Configuration Using
VRC Video Display Terminal

Figure 12

4.3 Installing SetupVRC 2000 at a Remote Control Site

You can use a 100% IBM-compatible personal computer and a 100% Hayes-compatible modem, along with the SetupVRC 2000 software package to set-up a remote control site.

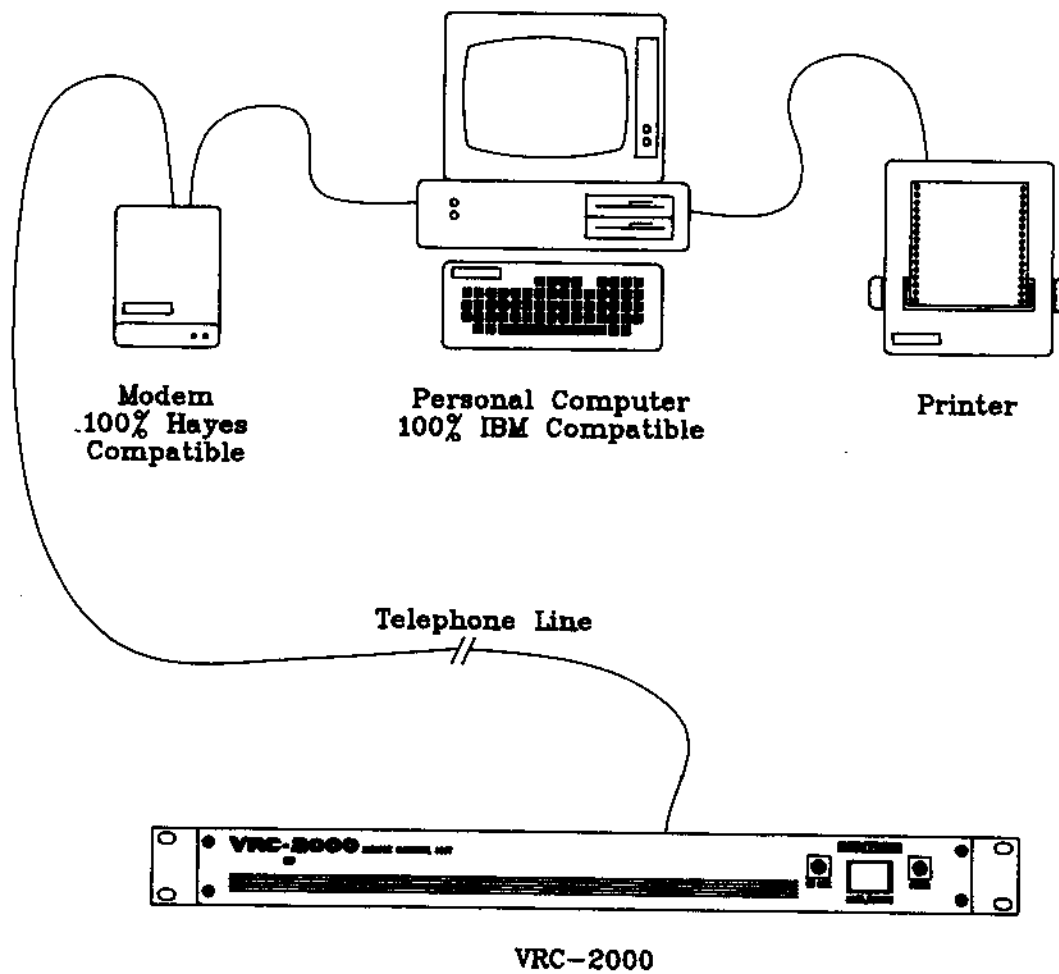
Your personal computer's modem must operate at 300, 1200, or 2400 bits per second (baud). Refer to your modem's operations manual for instructions on how to select the baud rate you wish to use. For most applications, you will select 1200 baud or 2400 baud. The fastest rate that the VRC Data Interface will accept is 2400 baud.

You must connect your modem to a serial communications port on your personal computer or use an internal modem in the PC. Refer to the operations manual for your personal computer for more information. You must also connect a telephone line to the LINE jack on your modem.

Refer to the SetupVRC 2000 Operations Manual for more information about how to use the program in the Terminal Mode.

You can also connect a printer to the "LPT1:" printer port of your personal computer. This allows you to print logs of the readings for your VRC-2000's Status, Metering, and Command Channels. Refer to the operations manuals for your personal computer and your printer for instructions on how to properly connect the printer to the "LPT1:" port on your computer.

This control site method is shown in Figure 13.



Remote Control Site Configuration Using
SetupVRC-2000 Software and Personal Computer

Figure 13

4.4 Installing the VRC Video Display Terminal at a Local Control Site

You can also set-up a local control site for your VRC-2000 using the VRC Video Display Terminal. This set-up does not require a VRC Standalone Modem. You use the VRC Data Interface's RS-232 serial communications port to directly connect the Video Display Terminal to your VRC-2000.

First, connect the DATACOM jack on the rear panel of the Video Display Terminal to the COM jack on the rear panel of the VRC-2000. An adaptor cable for this purpose has been provided with the VRC Video Display Terminal. Use this cable (part number 830-077-004) along with the VRC Serial Cable (part number 830-077-001).

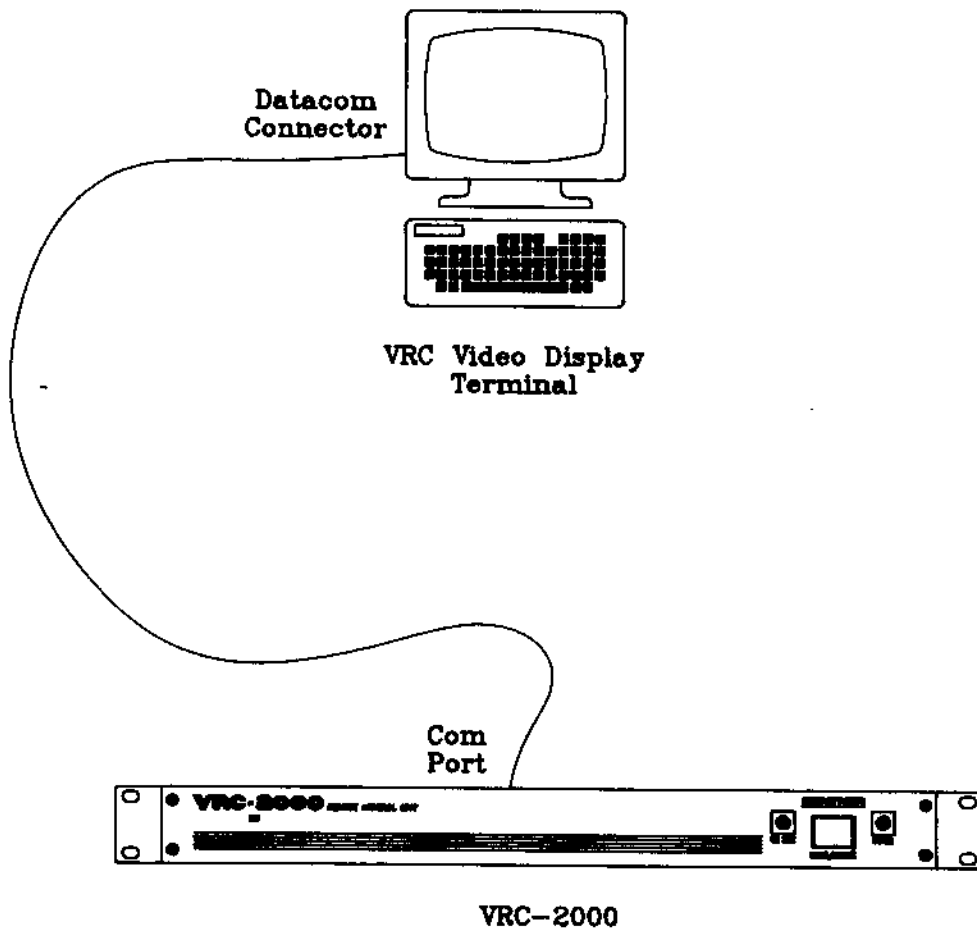
Refer to Section 3.6 for more information on how to connect the VRC Video Display Terminal to the VRC-2000's RS-232 serial communications port.

The VRC Data Interface will operate at 300, 1200, or 2400 bits per second (baud). You can select which speed you wish to use with a jumper on the VRC Data Interface. Refer to Section 3.4 for instructions on how to select the baud rate for the VRC Data Interface.

You must also make sure that the VRC Video Display Terminal is properly configured for the VRC Data Interface. The baud rate for the VRC Video Display Terminal must correspond to the baud rate you have selected for the VRC Data Interface. Refer to the Operations Manual for the VRC Video Display Terminal for more information.

The Data Interface Carrier Detect jumper must be set to the External position (see Section 3.5a) and the Command Acceptance jumpers must be set for either the default position or for serial access only (see Section 3.5b). In the default position the Serial Port will echo the data sent to the Data Interface Modem.

You must also have a telephone connected to the SET jack of the VRC to turn on the Data Interface.



Using the VRC Video Display Terminal
at a Local Site

Figure 14

4.5 Installing SetupVRC 2000 at a Local Control Site

You can also set-up a local control site for your VRC-2000 using a 100% IBM-compatible personal computer and SetupVRC 2000 software. Your personal computer must be equipped with at least one RS-232 serial communications port.

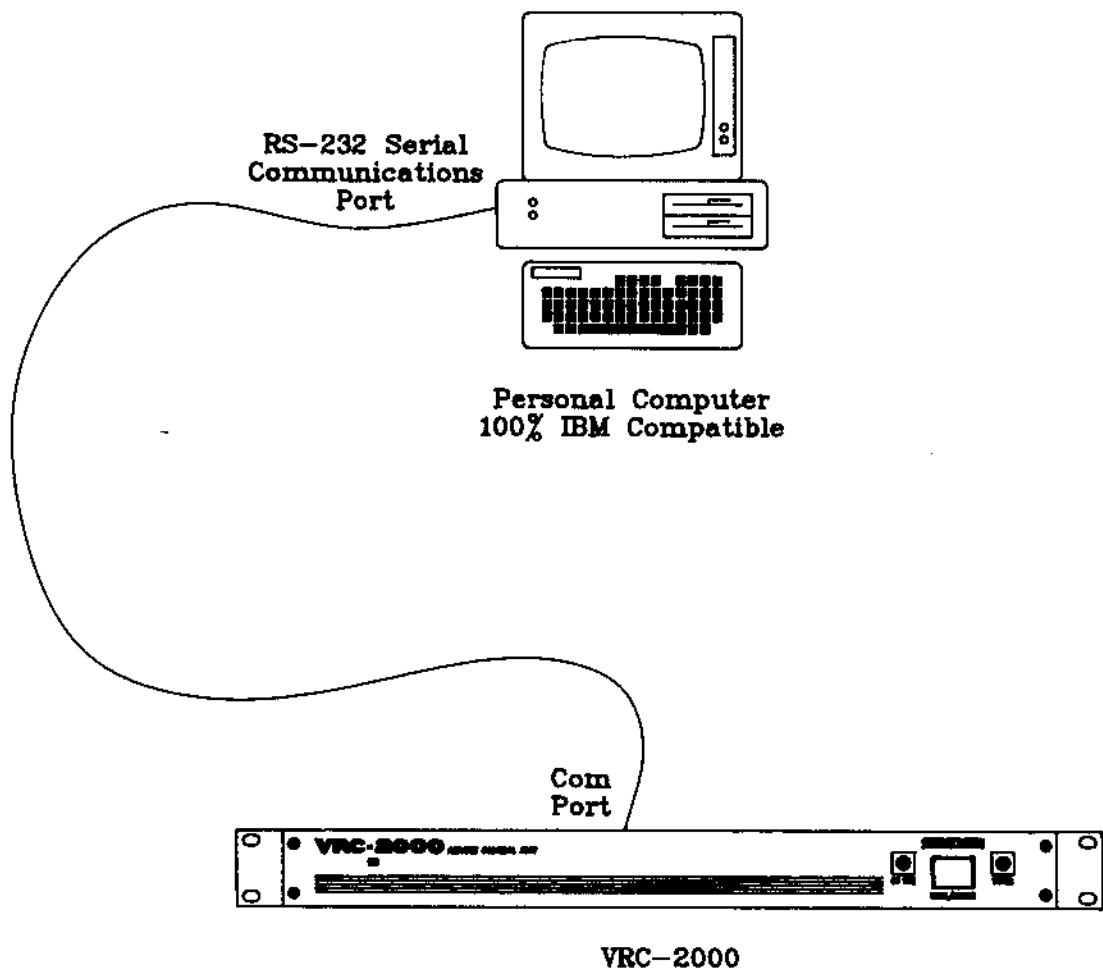
A local control point does not require a modem for your personal computer. Use the VRC Data Interface's RS-232 serial communications port to directly connect the RS-232 serial port on your personal computer.

Connect the RS-232 serial port on your computer to the COM jack on the rear panel of the VRC-2000. You may have to make a cable for the purpose if your PC serial port connector does not match the Gentner serial cable (if it is a 9 pin serial port, for example). Refer to Section 3.7 for more information.

The VRC Data Interface will operate at 300, 1200, or 2400 bits per second (baud). You can select which speed you wish to use with a jumper on the VRC Data Interface. Refer to Section 3.4 for instructions on how to select the baud rate for the VRC Data Interface.

You must also make sure that the RS-232 serial communications port on your computer is properly configured for the VRC Data Interface. The baud rate for the RS-232 serial communications port on your personal computer must correspond to the baud rate you have selected for the VRC Data Interface. Refer to the operations manual for your personal computer, and the SetupVRC 2000 Operations Manual for more information. You must also have a telephone connected to the VRC SET jack to turn on the Data Interface.

Refer to the SetupVRC 2000 Operations Manual for information on how to use the program with the VRC-2000 system. You cannot do the initial set-up of the VRC or any voice mode control through the RS-232 port.



Using SetupVRC-2000 at a
Local Control Site

Figure 15

SECTION FIVE -- USING THE VRC DATA INTERFACE

5.1 Introduction

The VRC Data Interface works in conjunction with the VRC-2000 firmware to allow you to take readings from the Metering and Status Channels, activate the Command Channels, read information about Alarms, clear Alarms, and perform other functions for the VRC-2000 using the VRC Video Display Terminal or the SetupVRC 2000 software program running in the Terminal Mode on a 100% IBM-compatible personal computer. Refer to Section 3.6 and Section 3.7 for instructions on how to properly connect the VRC-2000 to the VRC Video Display Terminal or your personal computer.

5.2 Establishing a Connection with the VRC-2000 from a Remote Control Site

The VRC-2000 will always answer telephone calls in the Voice Mode. Before you enter the codes which turn on the VRC Data Interface, you must first enter the correct User or Operator Access Code for the VRC-2000. Refer to the SetupVRC 2000 Operations Manual for instructions on how to establish a connection with the VRC-2000 using SetupVRC 2000.

To use the VRC Video Display Terminal, first make sure that the Standalone Modem is properly connected to the VRC Video Display Terminal and a telephone line. Your VRC-2000 must also be properly connected to a telephone line. See Section Three and Section Four.

The following chart presents the characters you must enter in order to establish a connection between the VRC Video Display Terminal with Standalone Modem and the VRC-2000.

You enter:	To Perform This Operation:
ATDT	This tells the Standalone Modem to get ready to dial an outbound call using Touch-Tones.
Telephone Number	You must enter the complete telephone number for the telephone line you have connected to the VRC-2000. Be sure to enter all the numbers, including any long distance access codes required. You can enter commas (,) to cause the Standalone Modem to pause for two seconds. Pauses may be required for some long distance services or some office PBX telephone systems.

.....

You will probably have to enter about ten commas (,) after the telephone number. Each comma will cause the Standalone Modem to pause for two seconds. Ten commas will cause the Standalone Modem to pause for 20 seconds. This long pause is required to allow the telephone connection to be made. You may have to lengthen this pause, depending on the Ring Count you have programmed into the VRC-2000. See VRC-2000 Operations Manual. Experiment with pauses of different lengths until you are able to reliably establish a connection with VRC-2000.

Access Code

You must enter the correct User Access Code for the VRC-2000 you are calling. Enter the correct Operator Access Code for the VRC-2000 if you just want to take readings from the Metering and Status Channels. Refer to the VRC-2000 Operations Manual for more information about the User and Operator Access Codes.

....

This eight second pause will allow time for the VRC-2000's voice buffer to catch up with the numbers and symbols you are entering.

0 2 0 #

This sequence will turn the VRC Data Interface ON. The screen on your VRC Video Display Terminal will say "CONNECT", and then begin showing you the Main Terminal Display (see Section 5.4).

For example, a valid sequence of numbers and symbols to enter to establish a connection with the VRC-2000 would be:

· ATDT18019757895,,,,,,,,,12345,,,,020# < Enter >

This sequence will:

- a) Dial the telephone number: 1 (801) 975-7895
- b) Pause for 20 seconds
- c) Enter a User Access Code (1 2 3 4 5)
- d) Pause for eight seconds
- e) Turn the VRC Data Interface ON.

With most terminals you can program function keys with the information listed above. Then you can make the connection with the VRC and enter the Data Mode with the press of only one button. Your terminal manual will show you how to program keys with your dialing information.

If you are using SetupVRC 2000 with a PC, you can use the preceding instructions after you have chosen Activate Terminal Mode from the menu. As an alternative you can select Remote Connection from the menu, Turn Data Interface On from the Modem Commands menu choice, Activate Terminal Mode from the menu, and then press <Shift> and <F1> at the same time. The screen will then show the Main Terminal Display.

5.3 Establishing a Connection with the VRC-2000 from a Local Control Site

To establish a connection with the VRC-2000 from a local control site, make sure that your VRC Video Display Terminal is properly connected to the VRC Data Interface's RS-232 serial communications port. See Section Three and Section Four.

The following chart shows you the characters you must enter in order to establish a connection between the VRC Video Display Terminal and the VRC-2000.

NOTE: The Carrier Detect jumper must be in position two, or the external position. This allows the VRC Data Interface to accept a carrier detection signal only through the VRC Data Interface's RS-232 serial communications port.

The Command Acceptance jumpers must be set to accept commands from the Data Interface's RS-232 port **ONLY**. See Section 3.5

You must have a telephone set connected to the SET jack of the VRC-2000 unit.

First press the LOCAL/REMOTE button on the front panel of the VRC-2000. Then use the telephone set to enter the following Touch-Tones into your VRC-2000 unit:

You enter:	To Perform This Operation:
Access Code	You must enter the correct seven digit System Access Code for the VRC-2000 you are using. Refer to the VRC-2000 Operations Manual for more information about the System Access Code.
9 2 0	This sequence places the VRC-2000 in the Local User mode. This will allow you to take readings from the Metering and Status Channels, activate Command Channels, and clear Alarms.
0 2 0 #	This sequence will turn the VRC Data Interface ON. The screen on your VRC Video Display Terminal will begin showing you the Main Terminal Display (see Section 5.4).

NOTE: While you are using the VRC-2000's RS-232 serial communications port in a local control site configuration, the VRC-2000 will not be able to answer telephone calls.

If you are using a PC with a serial port and SetupVRC 2000, you must select Activate Terminal Mode from the menu before executing the preceding steps.

5.4 The Main Terminal Display

When you first establish a data connection with the VRC-2000, it will automatically begin showing you the Main Terminal Display. This display shows you the current readings for all Metering and Status Channels, plus state of each Command Channel.

If you have SetupVRC 2000, you can easily enter the labeling information you want to use for the Main Terminal Display into your VRC-2000. This labeling information is stored in the RAM in the VRC-2000 or in a disk file. Refer to the SetupVRC 2000 Operations Manual for more information about programming the Main Terminal Display.

You can also use the VRC Video Display Terminal to enter the labeling information you want to use for the Main Terminal Display. This labeling information is stored in the RAM for the VRC-2000. Refer to Section 5.4.

Figure 16 shows the Main Terminal Display without any labeling information entered. This is how the Main Terminal Display will look the first time you use it, before you enter any labeling information. Figure 17 shows an example of a Main Terminal Display with labeling information entered in each label field. The Terminal Display labels can be anything you wish and are not limited to the VRC Word List.

Notice that there are two blank lines at the top of the display. These are the Site Identifier Lines. These lines can be used to describe the site in any way you wish. You will want to keep two things in mind when filling in the Site Identifier Lines. First, you should not use the phrase "VRC-2000 Remote Control Unit" on either line if you are logging to disk files and you want to use the Log File Browser feature of SetupVRC 2000. This phrase is used to identify the start of each log page.

Second is that these lines are used to identify logging sites if you are using the Logging Set-up feature of SetupVRC 2000. This allows logging from multiple transmitter sites and choosing to log to disk and/or printer.

VRC-2000 Remote Control Unit

Metering channels		Status channels		Command channels	
01	.0000	01	(LOW)	01	(A)
02	.0000	02	(LOW)	02	(A)
03	.0000	03	(LOW)	03	(A)
04	.0000	04	(LOW)	04	(A)
05	.0000	05	(LOW)	05	(A)
06	.0000	06	(LOW)	06	(A)
07	.0000	07	(LOW)	07	(A)
08	.0000	08	(LOW)	08	(A)
09	.0000	09	(LOW)	09	(A)
10	.0000	10	(LOW)	10	(A)
11	.0000	11	(LOW)	11	(A)
12	.0000	12	(LOW)	12	(A)
13	.0000	13	(LOW)	13	(A)
14	.0000	14	(LOW)	14	(A)
15	.0000	15	(LOW)	15	(A)
16	.0000	16	(LOW)	16	(A)

User Mode

Command |__

- = Momentary

Blank Main Terminal Display

Figure 16

VRC-2000 Remote Control Unit

JAN 01 1989 03:55 AM

KXYZ-AM AND KXYZ-FM REMOTE TRANSMITTER SITE
SALT LAKE CITY, UTAH

Metering Channels		Status Channels		Command Channels	
01 FILAMENT VOLT.	6.314 VOLTS	01 FILAMENTS ON		01 MAIN FILAMENT ON	
02 PLATE VOLTAGE	4.987 KV	02 TRANSMITTER ON AIR		02 MAIN PLATE ON	
03 PLATE CURRENT	0.976 AMPS	03 BATTERY SUPPLY OFF		03 RAISE POWER	
04 INDIRECT POWER	4.867 KW	04 BATTERY LOW CHARGE		04 FINE POWER RAISE	
05 POWER OUTPUT	5.020 KW	05 STL RCY A ON		05 MAIN ANTENNA SELECT	
06 ROOM TEMP.	65.75 DEG/F	06 STERED GENERATOR ON		06 STANDBY FILAMENT OFF	
07 FUEL LEVEL	765.9 GAL.	07 TOWER LIGHTS ON		07 STANDBY PLATE OFF	
08 BACK-UP BATTERY	13.25 VOLTS	08 TOWER BEACON ON		08 STANDBY POWER OFF	
09 PHASE 1 POWER	122.2 VAC	09 INTRUSION ALARM OK		09 STL RCY A SELECT	
10 PHASE 2 POWER	199.6 VAC	10 OUTSIDE ENTRY OK		10 GENERATOR STOP	
11 PHASE 3 POWER	121.5 VAC	11 DOOR ENTRY CLEAR		11 TRANSFER SW-AC MAIN	
12 OUTSIDE TEMP.	32.59 DEG/F	12 FIRE ALARM OK		12 MICROWAVE RCY VERT.	
13 TOWER LIGHTS	15.55 AMPS	13 FUEL LEVEL OK		13 AIR COMPRESSOR ON	
14 LINE PRESSURE	22.78 LBS.	14 STANDBY GEN. OFF		14 ANTENNA PRESSURE UP	
15 STL RCY LEVEL	175.9 UNLT	15 FIRE SENSOR OK		15 OUTSIDE LIGHTS ON	
16 METERING TEST	5.002 VOLTS	16 MUTE ENABLE OFF		16 MUTES OFF	

Alarm Pending

User Mode

Command : ___

✓ = Momentary

Example of Main Terminal Display
with Labeling Information

Figure 17

5.5 Alarm Screens

There are two Alarm Screens which you can view, either with the VRC Video Display Terminal or with SetupVRC 2000 running in the Terminal Mode.

The first Alarm Screen displays the first 16 possible pending Alarms for the VRC-2000. The VRC-2000 can store up to 32 pending Alarms.

The second Alarm Screen displays the second 16 possible pending Alarms for the VRC-2000.

The Alarm Screens are accessed by pressing <Shift> and <F2> for Screen A or <Shift> and <F3> for Screen B.

Figure 18 presents an example of the type of information you might see displayed in Alarm Screen A.

VRC-2000 Remote Control Unit

JAN 01 1989 03:55 AM

KXYZ-AM AND KXYZ-FM REMOTE TRANSMITTER SITE
SALT LAKE CITY, UTAH

Chn	Identification	Value	Units	Limit	Exceeded	Time of Day
01	M01 AM FILAMENT VLT	3.460	VOLTS	1st LOW	4.000	JAN 01 1989 03:55 AM
02	M01 AM FILAMENT VLT	6.637	VOLTS	1st HIGH	6.000	JAN 01 1989 03:55 AM
03	S15 11 SMOKE // FIRE 11					JAN 01 1989 03:54 AM
04	F07 METERING SYSTEM FAIL					JAN 01 1989 03:54 AM
05						
06						
07						
08						
09						
10						
11						
12						
13						
14						
15						
16						

Alarm Pending Alarm Screen #1 Command !.....

Example of Alarm Screen A

Figure 18

5.6 Terminal Screens

You can program the Site Identifier Lines and the labeling information you want to use for the Metering, Status, and Command Channels on the VRC-2000. In order to see all the different labels that you have programmed into the VRC-2000, you must access the Terminal Screens. There are two Terminal Screens, each displaying a different set of labeling information for the VRC-2000. These are called Terminal Screen A and Terminal Screen B.

Terminal Screen A shows you:

- a) The two Site Identifier Lines
- b) Channel Identifiers for Metering Channels
1 thru 16
- c) Units Identifier for each Metering Channel
- d) Channel Identifiers for Status Channels
1 thru 16
- e) Low Input Identifier for each Status Channel
- f) Channel Identifiers for Command Channels
1 thru 16
- g) (A) Switch Identifier for each Command Channel

Terminal Screen B shows you:

- a) The two Site Identifier Lines
- b) Channel Identifiers for Metering Channels
1 thru 16
- c) Units Identifier for each Metering Channel
- d) Channel Identifiers for Status Channels
1 thru 16
- e) High Input Identifier for each Status Channel
- f) Channel Identifiers for Command Channels
1 thru 16
- g) (B) Switch Identifier for each Command Channel

Notice that some of the information is the same on the two screens. When using SetupVRC 2000 or a Qume terminal, Terminal Screen A is accessed by pressing <Ctrl> and <F1> at the same time while on line with the VRC. When using a Hewlett-Packard terminal press <Shift> and <F5>. Access Terminal Screen B by pressing <Ctrl> and <F2> at the same time with SetupVRC 2000 or the Qume terminal. Use <Shift> and <F6> with the Hewlett-Packard terminal.

You can enter any characters you wish in the label and identifier fields of the Terminal Screens except the Per Cent sign (%). All others are valid. Be aware of the previously mentioned considerations for the contents of the Site Identifier Lines.

If you are using the VRC Video Display Terminal, you can easily change the labeling information for any of the items presented on Terminal Screen A or Terminal Screen B.

Use the arrow keys to move the cursor to the field you want to change. Type in the information you want to use for the label in the selected field. Then press the <Enter> key.

NOTE: You must press the <Enter> key in order to save the new label information in the VRC-2000. Be sure you hit the <Enter> key on the VRC Video Display Terminal not the normal "<RETURN>" key. The proper key is located in the far bottom right hand corner of the keyboard.

The <TAB> key will move you to the next available label field. You can enter new information for an entire line on the screen before pressing the <Enter> key. However, for your new label information to be saved, you must press the <Enter> key before moving to the next line on the screen.

Note that you can enter information in two Site Identifier fields. You can use these fields to describe the location of the particular VRC-2000 you are accessing.

You can also change the label information presented in Terminal Screen A using SetupVRC 2000 in the Set-Up Mode. Refer to the SetupVRC 2000 Operations Manual.

Figure 19 presents Terminal Screen A with no label information entered into it yet.

If you are using a PC with SetupVRC 2000 in the Terminal Mode, the screen labels cannot be changed while you are on line with the VRC in the Terminal Mode. To change the screen labels you must use the Terminal Screen A and Terminal Screen B choices in the Setup Menu of SetupVRC 2000.

VRC-2000 Remote Control Unit

Metering channels		Status channels	Command channels
01	.0000	01 (LOW)	01- (A)
02	.0000	02 (LOW)	02- (A)
03	.0000	03 (LOW)	03- (A)
04	.0000	04 (LOW)	04- (A)
05	.0000	05 (LOW)	05- (A)
06	.0000	06 (LOW)	06- (A)
07	.0000	07 (LOW)	07- (A)
08	.0000	08 (LOW)	08- (A)
09	.0000	09 (LOW)	09- (A)
10	.0000	10 (LOW)	10- (A)
11	.0000	11 (LOW)	11- (A)
12	.0000	12 (LOW)	12- (A)
13	.0000	13 (LOW)	13- (A)
14	.0000	14 (LOW)	14- (A)
15	.0000	15 (LOW)	15- (A)
16	.0000	16 (LOW)	16- (A)

Set Up Mode A

Blank Terminal Screen A

Figure 19

5.7 VRC Data Interface Commands

There are several commands for the VRC Data Interface available to you with the VRC Video Display Terminal or SetupVRC 2000.

Refer to the SetupVRC Operations Manual for information on how to access command functions for the VRC Data Interface using SetupVRC 2000.

When you first establish a connection with the VRC Data Interface using the VRC Video Display Terminal, the screen will begin displaying a listing of the readings for the Metering and Status Channels, plus the Command Channels. This is called the Main Terminal Display.

You can access other information about the VRC-2000 by using combinations of Function Keys and the <Shift> key on the Video Display Terminal Keyboard. You can also cause the VRC-2000 to disconnect the line between the Video Display Terminal and the VRC-2000.

NOTE: In the following explanation, "Shift-F1" means that you should hold down the <SHIFT> key on the keyboard while simultaneously pressing the Function 1 (<F1>) key.

These key combinations apply ONLY to the VRC Video Display Terminal (Hewlett-Packard Model 700/41 or 700/43 Video Display Terminal). These commands are slightly different if you are using SetupVRC 2000 in the Terminal mode (or a Qume QVT-101 Video Display Terminal). Refer to the SetupVRC 2000 Operations Manual.

This Key

Combination: Will Perform This Operation:

Shift-F1	Returns to the Main Terminal Display. Displays readings for all Status and Metering Channels, plus current state of Command Channels.
Shift-F2	Displays Alarm Screen A. This shows you the first 16 possible pending Alarms. The VRC-2000 can store up to 32 Alarms
Shift-F3	Displays Alarm Screen B. This shows you the second 16 possible pending Alarms.
Shift-F4	Hangs up the telephone line.
Shift-F5	Displays the programming for Terminal Screen A.
Shift-F6	Displays the programming for Terminal Screen B.
Shift-F7	Returns to the Main Terminal Display. Displays readings for all Status and Metering Channels, plus current state of Command Channels.
Shift-F8	Hangs Up the telephone line.

When you are in the Main Terminal Display you can activate the (A) or (B) Switches for any of the Command Channels by using almost the same key combinations you use with a Touch-Tone telephone. For example, to activate Switch (A) for Command Channel 5, you would enter "0 5 *". To activate the (B) Switch for Command Channel 14, you must enter "1 4 #". Refer to the VRC-2000 Operations Manual for more information on Command Channels.

To clear all pending Alarms, enter "C C C". You may use capital or lower case letters. To clear the oldest pending Alarms, enter "# # #". You must be displaying either Alarm Screen A or Alarm Screen B in order to clear the oldest Alarm.

5.8 Disconnecting from the VRC-2000

You should always use the <Shift>-<F4> or <Shift>-<F8> (<Ctrl>-<F4> with SetupVRC 2000 or the Qume terminal) command to hang up from the VRC-2000 when you are finished using the VRC Video Display Terminal. This will turn off the VRC Data Interface, return the VRC-2000 to the Voice Mode, and disconnect the telephone line (if you are using a telephone line.)

5.9 Auto-Logging

If you have a VRC Printer connected to your VRC Video Display Terminal, you can program your VRC-2000 system to automatically print out logs of the readings for the Metering and Status Channels. These logs will also contain information on pending Alarms, and the state of the Command Channels.

These logs can be set to be printed out at intervals of a minimum of 15 minutes. Two logs will be printed on a single 8 1/2" X 11" sheet of paper. The VRC-2000 will automatically feed new paper into your VRC Printer after it has printed a log page.

You can set-up your VRC-2000 system to automatically print out logs in a Local Control Site or Remote Control Site configuration or both. See Section Four.

Refer to the VRC-2000 Operations Manual for instructions on how to program the VRC-2000 to Auto-Log the readings on the Status and Metering Channels. Look in the section on Logging Set-up and refer to the code 020 in Setup Mode on the VRC.

You can also use a personal computer running SetupVRC 2000 in the Terminal Mode for Auto-Logging. Refer to the SetupVRC 2000 Operations Manual for more information. With SetupVRC 2000 you can choose whether logs are printed, sent to disk, or both.

5.10 Alarm Logging

You can program one of the VRC-2000's Outbound Telephone Numbers to automatically call your Remote or Local Control Site and print out a report on the pending Alarm.

Refer to the VRC-2000 Operations Manual for information on how to program the Outbound Telephone Numbers to call a Remote or Local Control Site and send Alarm information using the VRC Data Interface.

Each Alarm Log will be printed on a single 8 1/2" X 11" sheet of paper. The VRC-2000 will automatically feed new paper into your VRC Printer after it has printed an Alarm Log.

You must have a VRC Printer properly connected to the VRC Video Display Terminal, and the Video Display Terminal properly connected to the VRC-2000 or a PC with printer. You can set-up your VRC-2000 system to automatically print out logs in a Local Control Site or Remote Control Site configuration or both. See Section Four.

You can use a personal computer running SetupVRC 2000 in the Terminal Mode for Alarm Logging. Refer to the SetupVRC 2000 Operations Manual for more information.

SECTION SIX -- MAINTENANCE AND TROUBLE- SHOOTING

6.1 Introduction

This section will help you solve installation and operational problems with your VRC Data Interface. Refer to this section first if you have any problems with your Data Interface.

6.2 Questions and Answers

QUESTION: Why doesn't my VRC-2000 respond after installation of the VRC Data Interface?

ANSWER: Check S1 and P1 for proper alignment. Ensure that mounting screws are installed and connector is properly seated. Also be sure the cases of transistors Q1 and Q2 on the main VRC board do not contact the bottom of the Data Interface board.

QUESTION: Why is my VRC Terminal screen jumbled upon connection?

ANSWER: Incompatible bits per second (baud) rates on Data Interface and Terminal. Refer to Section 3.4 and for instructions on setting baud rates.

QUESTION: My VRC-2000 sends proper display to my local VRC Terminal. Why doesn't it respond to input?

ANSWER: Check the Command Acceptance jumpers for proper connection. Refer to Section 3.5 for instructions on how to position the Command Acceptance jumpers.

QUESTION: My VRC-2000 seems to send appropriate display information to my Terminal, and to accept some control keys. Why can't I activate any Command Channel Switches on my VRC-2000?

ANSWER: Remember, you must sign on in the User or System Access mode to issue commands.

QUESTION: Why doesn't my VRC-2000 return to Voice mode after disconnecting?

ANSWER: Check the Carrier Detect jumper. Make sure that it is in the correct position for your installation. Also the transmit level may be too high. Try a reduced send level. Refer to Section Three for installation instructions.

QUESTION: Why doesn't my VRC Terminal's display reflect the labeling information that I programmed into the VRC-2000 with Touch-Tones?

ANSWER: The VRC-2000 contains two sets of labeling information. One set stores the labeling information for the Voice mode. The other set stores the labeling information for the Terminal Mode. Touch-Tones are used for programming the Voice Mode labeling information. You must program the Terminal Mode labeling information while you are on line with the VRC-2000. Refer to Section 5.4 for more information on programming your Terminal Mode screens. You can also program Terminal Mode screens with the SetupVRC 2000 software package. Refer to the SetupVRC 2000 Operations Manual.

QUESTION: Why don't my VRC-2000 Command Channels appear on the Terminal screen? I just programmed them.

ANSWER: The Command Channels that are displayed on the screen reflect the last one that was activated. The very first time you connect via your modem, the VRC-2000 has no record of the last command that was issued. If you wish, just activate the Command Channels to reflect the current state your equipment is in.

QUESTION: It is a lot of trouble to enter a long string of characters every time I want to establish a connection with the VRC-2000. Is there an easier way?

ANSWER: Yes. You can program macros for your Terminal's Function Keys. You can also program macros into the Function Keys of your personal computer if you are using the SetupVRC 2000 software package. You can program strings of up to 40 characters and recall them by pressing one Function Key. Refer to the SetupVRC 2000 Operations Manual and the VRC Video Display Terminal Operations Manual.

QUESTION: My VRC-2000 is reporting metering system failure Alarms. When I remove the VRC Data Interface these Alarms go away. Why?

ANSWER: The Data Interface has a negative 5 VDC regulator on board. The regulator may have excessive AC ripple on the output, which can generate metering system failure Alarms. Refer to your VRC-2000 Operations Manual for more information on metering system failure Alarms.

QUESTION: Why doesn't my VRC Video Display Terminal accept the "print screen" command when I am on line with the VRC2000?

ANSWER: The Video Display Terminal requires an echo of the print screen command from the VRC-2000 before it will execute the command. The VRC-2000 is not capable of this function.

There are two solutions to this problem:

- a) Program an "Esc P" command in a programmable function key in the "Local" mode. Depress it when you want a print out while you are on line with the VRC-2000. The programmable function key **MUST** be set to the Local mode when you program "Esc P" command in for the print function to work properly.
- b) Disconnect the VRC-2000 by pressing "<Ctrl> <F4>" or "<Shift> <F4>". The screen will remain painted. The "Print Screen" command should be operable when you are not connected with the VRC-2000.

6.3 Command Codes and Return Codes

This section provides you with a complete listing of the actual codes transmitted by the VRC Video Display Terminal and by the SetupVRC 2000 software package, and a listing of the return codes transmitted by the VRC-2000.

This information is provided for use by advanced users of the VRC-2000 system.

NOTE: Refer to the operations manual for your particular video display terminal for more information.

Data display in half intensity can be protected by enabling the protect mode. In the line mode only, unprotected data will be transmitted to VRC-2000. A line mode transmission is terminated by CR.

a) Function Key Outputs:

For VRC Video Display Terminal
(Hewlett-Packard Model 700/41 or 700/43
Video Display Terminal)

Function Key	Code Transmitted		
	1st byte	2nd byte	3rd byte
SHIFT-PF1	CTRL-a	D	CR
SHIFT-PF2	CTRL-a	E	CR
SHIFT-PF3	CTRL-a	F	CR
SHIFT-PF4	CTRL-a	G	CR
SHIFT-PF5	CTRL-a	H	CR
SHIFT-PF6	CTRL-a	I	CR
SHIFT-PF7	CTRL-a	J	CR
SHIFT-PF8	CTRL-a	K	CR

Create the CR character by pressing <Ctrl> and lower case letter "m" at the same time.

For SetupVRC 2000 in the Terminal Mode
(or Qume QVT-101 Video Display Terminal)

Function Key	Code Transmitted		
	1st byte	2nd byte	3rd byte
SHIFT-F1	CTRL-a	D	CR
SHIFT-F2	CTRL-a	E	CR
SHIFT-F3	CTRL-a	F	CR
SHIFT-F4	CTRL-a	G	CR
CTRL-F1	CTRL-a	H	CR
CTRL-F2	CTRL-a	I	CR
CTRL-F3	CTRL-a	J	CR
CTRL-F4	CTRL-a	K	CR

b) Control Functions:

CTRL- : NEW LINE

CTRL-I : COLUMN TAB

CTRL-G : RING BELL

CTRL-R : TRANSPARENT MODE ENABLE

c) Escape Sequences:

ESC 1	: SET TAB
ESC 3	: CLEAR ALL TAB
ESC = LINE# COL#	
	: ADDRESS CURSOR
ESC ?	: READ CURSOR ADDRESS
ESC] COL#	: LOAD CURSOR COLUMN
ESC T	: CLEAR LINE TO SPACE
ESC ,	: CLEAR ALL TO BACKGROUND SPACE
ESC P	: PRINT ENTIRE SCREEN
ESC @	: AUX PORT ENABLE
ESC A	: AUX PORT DISABLE
ESC . 1	: BLINK BLOCK CURSOR
ESC . 4	: STEADY UNDERLINE CURSOR
ESC G 0	: NORMAL (LINE ATTRIBUTE)
ESC G 2	: BLINK
ESC G 6	: REVERSE BLINK VIDEO
ESC)	: HALF INTENSITY
ESC (: FULL INTENSITY
ESC &	: PROTECT MODE ENABLE
ESC '	: PROTECT MODE DISABLE
ESC B	: BLOCK MODE ENABLE
ESC C	: CHARACTER MODE ENABLE
ESC D	: BLOCK LINE MODE
ESC #	: KEYBOARD DISABLE
ESC "	: KEYBOARD ENABLE
ESC x CR	: END OF MESSAGE BY CR

SECTION SEVEN -- THEORY OF OPERATION AND SCHEMATICS

7.1 Theory of Operation

The VRC Data Interface contains a 2400 baud modem and RS-232 serial communications port. The Data Interface is specifically designed to be installed in VRC-2000 remote control units, or VRC-1000 units which have been equipped with VRC-2000 firmware.

All connections between the VRC-2000 and the Data Interface are made via J10, a 32 pin header on the VRC-2000 main printed circuit board. P1, a 32 pin socket on the Data Interface, mates with P10 to provide the necessary microprocessor, power and audio connections. J1 provides for direct connection of RS-232 level signals to the VRC-2000 from data terminal equipment.

When transmitting, information is passed from the VRC-2000 data bus to U5, a Motorola MC6850 asynchronous communications interface adapter, where it is converted from the parallel data format coming from the VRC-2000 to the asynchronous serial format that will be transmitted. The operation is reversed for received signals. A 2.4576 MHz crystal in conjunction with U2, R2, R3, C9, and C10 form an oscillator which provides the signals required to control the serial transfer rate. The frequency of the signal is divided by U3, a 74HC393 dual four stage binary ripple counter, which provides the clock pulses necessary for the baud rates selectable at JP9.

U8 is an Intel N89026 application specific processor. This chip performs the modulation and demodulation of the serial data which will be transmitted and received over the line as well as controlling all software functions and options available with the modem section. This chip uses DSP algorithms to process the modem signals. These algorithms adjust gain, modulation, demodulation, and equalization for telephone line delay and amplitude distortion.

Most of the filtering and analog signal processing is done by U1, an Intel P89027 analog front end device. During transmit, the Intel P89027 receives modulation information from U8, converts it to an analog equivalent, filters it, and transmits it over the telephone line. When receiving information from the line, the signal is passed through U7, a LF351 operational amplifier, which amplifies the receive signal 3 dB to provide U1 with the necessary levels needed for proper operation. Once inside U1 the signal is passed through a number a filters and sent to U8 for demodulation.

The conversion to and from RS-232 levels is performed by U4, an RS232 interface device. It uses a single 5 volt supply to convert from TTL to RS232 levels, and has two drivers and two receivers in a single package.

All power for the Data Interface is provided through J10. A regulated source of +5 volts is supplied from pins 21 and 22. The -5 volts required to operate U1 is supplied by U6, a 7905 -5 volt regulator. This receives its input voltage from the -12 volt supply provided at pins 19 and 20 of J10.

7.2 Schematics

Complete schematic diagrams for the VRC Data Interface are presented on the following pages.

