Raven Electronics Corporation

Raven 41800-002

RFMOW V2

Users Manual

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CHAPTER 1 INTRODUCTION

GENERAL INFORMATION

Thank you for purchasing the 41800-002 RFMOW V2 from Raven Electronics Corporation. Please contact us if you have any questions, concerns, product ideas, or ideas to improve this manual. We can be contacted at:

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www.ravencomm.com

Please be Electro-Static Discharge (ESD) protected before starting any procedures contained in this manual.

RAVEN ELECTRONICS' WARRANTY

This warranty expressly precludes any liability by Raven for consequential damages however arising after delivery to the purchaser of the affected equipment, and is limited to the expressed warranty, excluding all implied warranties including merchantability. All equipment manufactured by Raven is warranted against defective materials and workmanship for a period of two (2) years from the date of delivery to the original purchaser or end-user. Liability under this warranty is limited to servicing, adjusting, repairing or replacing, as necessary, any equipment returned to the factory, transportation prepaid for that purpose. Factory examination must disclose a manufacturing defect. Repaired or replaced items will be returned to the purchaser surface freight prepaid within the continental U.S.A.

This warranty does not extend to any equipment which has been subjected to transportation damage, misuse, neglect, accident, improper installation, or any other circumstances reasonably beyond the control of Raven. Beyond the warranty period, repairs will be billed to the purchaser at cost. In such cases, an estimate will be submitted for approval before repair is initiated. Repaired equipment will be returned to the purchaser with transportation charges collect, unless agreed to between the purchaser and Raven.

CHAPTER 1 INTRODUCTION

SYSTEM DESCRIPTION

The 41800-002 RFMOW V2 is a standard 19" rack-mountable unit which provides a common point for connecting various hardware elements, signaling protocol converters, Secure Voice Unit, satellite modem, and housing for a COMSEC device. The Unit contains signal switching and level conversion printed circuit boards, and power supply. The Unit will support the Network Terminal (NT) configuration.

Front panel indicator lights display the operational status of each internal modular component, current data path that interfaces with J2 (the modem data connection), control path that interfaces with the modem and/or other equipments, and the power supply.

NOTE: The KIV-7 is not included within the Unit. The COMSEC device must be manually installed by the user prior to system operation.

The Unit operates on standard AC power sources of 90 to 264 VAC, 47 to 63 Hz. The Unit provides 12 VDC power to a rear panel connector (J7) and power for the COMSEC device contained within the Unit.

CHAPTER 2 INSTALLING and SETTING UP THE UNIT

UNPACKING THE EQUIPMENT

Upon receiving the RFMOW V2, remove it from the shipping container. Remove all packing materials from inside the RFMOW V2 KIV Carrier. Be sure to retain loose cables and the 41875 KIV adapter board that are in the Carrier. Inspect for any obvious signs of external damage due to shipping. Retain the original shipping containers in case the unit needs to be returned to the depot for repair.

INITIAL INSTALLATION AND SETUP

The following sections provide information required for installing, setup, and preparing the Replacement Frequency Modulated Orderwire (RFMOW V2) Model 41800-002 for use. The information includes:

- Power distribution and grounding
- Setup and preparation for use

The RFMOW V2 is designed to be rack-mounted in a standard depth, 19-inch wide equipment rack.

POWER DISTRIBUTION AND GROUNDING

The following subparagraphs describe the power distribution and grounding of the RFMOW V2.

WARNING

Proper grounding is an important safety feature, and must be a primary consideration in all electrical and electronic equipment installations. Ensure that all grounding connections are secure and that all grounding cables are kept out of vehicle and personnel paths.

WARNING

Use extreme care when working around electrical equipment to avoid the possibility of severe or fatal electrical shock. Remove all jewelry (i.e. rings, necklaces, etc.) before working with the RFMOW.

WARNING

Ensure that all power connection is properly insulated, clean, and mechanically secure to prevent personnel injury when the RFMOW V2 is powered up and operated. When the RFMOW V2 power cable is installed, carefully inspect all connectors and wiring for worn or broken parts. Make any necessary repairs

before powering up the Unit. If any cable or connector damage is discovered while the Unit is operating, the Unit should be powered down and the damage repaired immediately.

The Unit accepts 90-264 VAC, 47-63 Hz AC power via the AC Power Connector (located on rear panel of the RFMOW V2 chassis). The panel connector is an IEC-320-C14 type. Use a right angle type plug and secure it with the Velcro cord retainer.

Grounding to the user equipment rack shall consist of a grounding cable attached to the RFMOW V2 grounding stud on the rear panel of the chassis.

SETUP AND PREPARATION FOR USE

Install the RFMOW V2 by performing the steps:

Tools Needed:

- 3/8" Nut Driver
- 1/8" Flat-Tip Screwdriver
- #2 Phillips Screwdriver

Install the Unit into the equipment rack. Refer to page 18 for rear panel connector locations.

1. Attach the Grounding Cable to the Grounding Stud on the rear panel (Item 19) and tighten with a 3/8" nut driver.
2. Plug the power cord into the AC Power Input Connector on the rear panel (Item 18). Secure the power cord with the Velcro cord retainer.
3. Attach the Modem Control Cable to J5 on the rear panel and tighten with a 1/8" Flat-Tip screwdriver.
4. Attach the Modem Data Cable to J2 on the rear panel and tighten with a 1/8" Flat-Tip screwdriver.
5. Attach the Secure Voice Unit Cable to J1 on the rear panel and tighten with a 1/8" Flat-Tip screwdriver.
6. Attach the Modem Output cables (not supplied) to the TX IN and TX OUT BNC connectors. This places the internal RF Attenuator in the Modem RF Output path.
7. Plug the Ethernet Cable (not supplied) into the Ethernet Port on the rear panel (Item 1) (if used).
8. Plug the USB Cable (not supplied) into the USB Port on the rear panel (item 2)(if used).
9. Place the RFMOW V2 in to the equipment rack.
10. Place rack screws in the four mounting holes and tighten to the rack using a #2 Phillips screwdriver (or other appropriate tool if not using Phillips head screws).

CHAPTER 2 INSTALLING and SETTING UP THE UNIT

Install the KIV-7M into the RFMOW V2 carrier assembly (see page 17 for KIV Carrier location).

1. Loosen the four thumb screws on the front panel of the Unit. Slide the KIV Carrier out of the chassis until it stops. Press the finger releases on each slide of the carrier and pull the carrier the rest of the way out of the chassis.
2. Loosen two thumbscrews on the rear of the carrier and remove the KIV Carrier lid.
3. If not already in position, attach the KIV keeper near the printed circuit board with the tabs pointing toward the rear of the carrier. Use a #2 Phillips screwdriver.
4. Attach the Raven R207-0002 cable to the KIV-7M power connector. Tighten the jackscrews by hand.
5. Attach the Red and Black signal cables to the appropriate connectors on the rear of the KIV-7M. Tighten the jackscrews by hand.
6. Confirm that all four cables attached above are plugged into the appropriate places on the printed circuit board. Store the KIV-7HSB power cable and adapter board in a secure place.
7. Place the lid back on the carrier and tighten the thumbscrews on the rear of the carrier by hand.
8. Insert the carrier into the chassis until it stops. Press the finger releases on the slides and slide the carrier all the way into the chassis. Tighten four thumbscrews on the front panel of the Unit.

Install the KIV-7HSB into the RFMOW V2 carrier assembly (see page 17 for KIV Carrier location).

1. Loosen the four thumb screws on the front panel of the Unit. Slide the KIV Carrier out of the chassis until it stops. Press the finger releases on each slide of the carrier and pull the carrier the rest of the way out of the chassis.
2. Loosen two thumbscrews on the rear of the carrier and remove the KIV Carrier lid.
3. If not already in position, attach the KIV keeper away from the printed circuit board with the tabs pointing toward the front of the carrier. Use a #2 Phillips screwdriver.
4. Attach the Raven R209-0007 cable to the KIV-7HSB power connector. Tighten the jackscrews by hand.
5. Attach the Raven 41875 Adapter Board to the rear of the KIV-7HSB. Tighten the thumbscrews by hand.
6. Attach the Red and Black signal cables to the appropriate connectors on the 41875 Adapter Board. Tighten the jackscrews by hand.
7. Confirm that all three cables attached above are plugged into the appropriate places on the printed circuit board. Store the KIV-7M power cable and KIV-7M HCI port Ethernet cable in a secure place.
8. Place the lid back on the carrier and tighten the thumbscrews on the rear of the carrier by hand.
9. Insert the carrier into the chassis until it stops. Press the finger releases on the slides and slide the carrier all the way into the chassis. Tighten four thumbscrews on the front panel of the Unit.

CHAPTER 2 INSTALLING and SETTING UP THE UNIT

EQUIPMENT SETUP

The RFMOW V2 enclosure contains the necessary hardware to interface the ports of a Monitor, Keyboard, Mouse, Secure Voice Unit, KIV carrier, and satellite modem. All interface connections to external equipment are mounted on the rear panel. See the rear panel diagram on page 18 for the location of the connectors mentioned below.

Warning: *This device has High Voltage. Make sure to disconnect the power cord before servicing the unit. Failure to do so may result in physical injury due to electrical shock.*

J1 – Secure Voice Interface

- The Unit supports full duplex RS-232 specification signals for transmit and receive data on J1. In addition, transmit and receive clocks are provided from the network clock frequency divided by 1, 2, 4 or 8 (the division is under software control).

J2 –Modem Data Port

- The Unit supports full duplex RS-422 specification signals for transmit and receive data on J2. In addition, the Unit expects to receive network transmit and receive clocks from the modem with RS-422 specification signals.

J4 – Modem Control Data Port (PC) (This connector is only used in "IU Mode".)

- The Unit supports full duplex RS-232 specification signals for transmit and receive modem control signals on J4. This connector, along with J6, is for connecting an external PC/controller. In addition, the Alarm Horn and the COMSEC / Secure Voice data source switch ("A / B" switch) are controlled by RS-232 specification signals on this connector.

J5 – Hardware Control Bus Port (Modem)

- The Unit supports full duplex RS-485 specification signals for transmit and receive modem control signals on J5. The port is designed as a 4-wire port (separate transmit and receive wires) but may be connected as a 2-wire port (transmit and receive wires connected together), since the transmit buffer is tri-stated when it is not transmitting.

J6 – Primary Data Port (PC) (This connector is only used in "IU Mode".)

- The Unit passes signals on this port directly to the COMSEC device Red connector. This connector, along with J4, is for connecting an external PC/controller.

J7 – DC Power

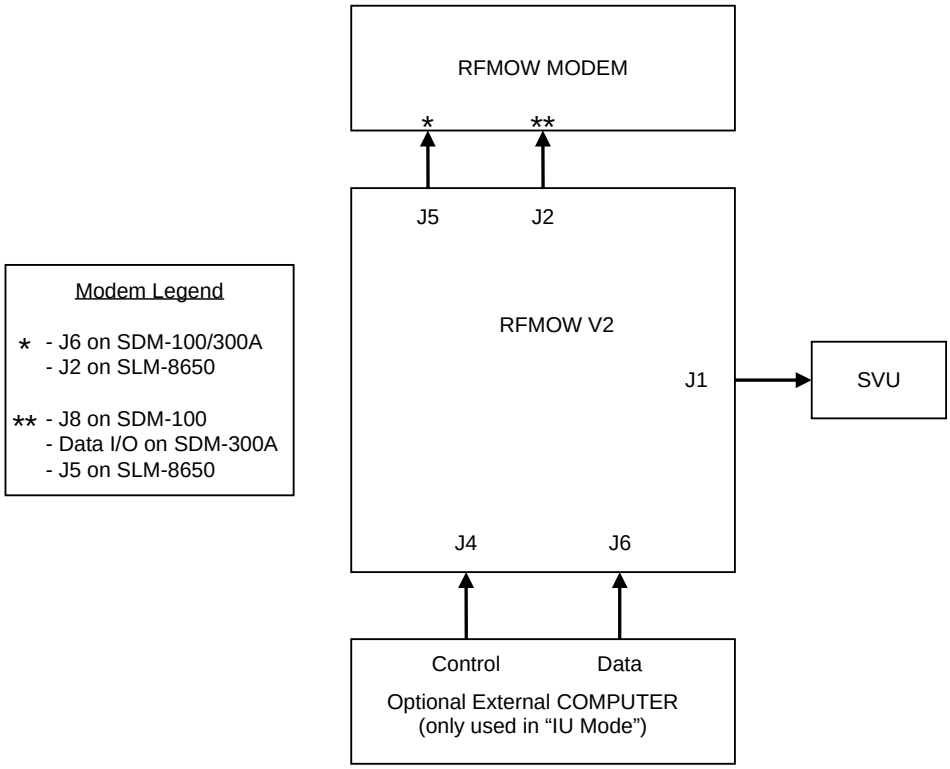
- The Unit supplies +12 VDC power to this connector for external use. Current drain is limited to 1 Amp total.

CHAPTER 2 INSTALLING and SETTING UP THE UNIT

NT CONFIGURATION

The interconnections between the RFMOW V2 and the RFMOW system must be made as follows:

1. The COMSEC device interface cables within the RFMOW V2 must be connected to the KIV-7. For KIV-7HSB, mount the 41875 Adapter Board on the back of the COMSEC device.
2. If an external PC/Controller is used, the PC's COM1 and COM2 must be connected to the RFMOW V2 ports J6 and J4, respectively.
3. The Secure Voice Unit (SVU) is connected to the RFMOW V2 via J1 on the rear panel.
4. The interconnection between the Control Modem and the RFMOW V2 is made via the J2 and J5 connectors on the rear panel.



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CHAPTER 3

OPERATION

INTRODUCTION

This chapter provides the information necessary for setup, initialization, and operating the RFMOW V2. This chapter includes:

NETWORK TERMINAL (NT)

- Controls and indicators
- Equipment power-up
- Equipment power-down
- Equipment Theory of Operation and functional diagrams

CONTROLS AND INDICATORS

The RFMOW V2 user interface is through the front panel display, pushbuttons, and indicators. These are illustrated on page 17.

EQUIPMENT POWER-UP

WARNING

Ensure that all power connections are properly insulated, clean, and mechanically secure to prevent personnel injury when the Unit is powered up and operated. Carefully inspect all connectors and wiring for worn or broken parts. Make any necessary repairs before powering up the Unit. If any cable or connector damage is discovered while the Unit is operating, it should be powered down and the damage repaired immediately.

Perform the following procedure to power up the Unit:

a. Ensure that power is connected to the rear panel of the chassis.
b. Install a KIV in the RFMOW V2 carrier. See page 5 for instructions.
c. Press the RFMOW ON/OFF button on the front panel to turn on the Unit (see page 17 for location).
d. Refer to TM 11-5895-1780-13 for procedures on installing and operating the RFMOW Software suite.

EQUIPMENT POWER-DOWN

Perform the following procedure to power-down the Unit:

a. Press the RFMOW ON/OFF button on the front panel.
b. Loosen the four thumbscrews on the front of the KIV carrier. Pull the carrier out of the chassis. When the carrier stops press the finger releases on each side of the carrier and pull the carrier the rest of the way out.

EQUIPMENT THEORY OF OPERATION

The 41800-002 RFMOW V2 acts as a data-switching and control device between various peripherals including the satellite modem, secure voice unit, and COMSEC device. The RFMOW V2 can operate in 2 different modes:

- Normal Mode- The RFMOW V2's internal computer is used for control.
- Interface Unit (or IU) Mode- An external computer is used for control.

Switching is controlled by the RFMOW Software that is installed on the controller computer.

Device Control

The J5 Modem Control connector on the rear panel of the Unit (see page 18) is the Controller Interface. The controller computer utilizes the COM2 serial port to control the satellite modem within the RFMOW network. Connector J5 is an RS-422 / RS-485 signaling device. The port can be used as a 4-wire port with separate transmit and receive wires or as a 2-wire port with the transmit and receive wires tied together. When the Unit is not transmitting, the transmit wires are open circuit.

"A / B" Switch Operation

In the NT mode of operation, it is necessary to switch between the voice and data paths. In order to control the "A / B" switch on the RFMOW V2, the controller computer utilizes the COM2 serial port. To switch from data to voice mode, the computer asserts the DTR line of the communications port. De-asserting DTR returns Unit to data mode. This functionality is handled automatically using the RFMOW Software as described in TM 11-5895-1780-13 Replacement Frequency Modulated Orderwire (RFMOW).

ALERT Horn Operation

The ALERT Horn is controlled by the RFMOW Software. The RFMOW Software asserts the COM2 RTS pin to turn on the Unit's ALERT horn. De-asserting the RTS pin turns the horn off.

Data Communications

KIV Data communications is controlled by the RFMOW Software. The RFMOW Software uses the COM1 serial port to interface with KIV RED data.

Voice Communications

Voice communication occurs by connecting a Secure Telephone device (STU or STE III) to J1 on the rear panel of the RFMOW V2. DTR on COM2 must be asserted in order for the Unit to select the voice path on the "A / B" switch. This is handled automatically using the RFMOW software.

CHAPTER 4

TROUBLESHOOTING

WARNING

Proper grounding is an important safety feature, and must be a primary consideration in all electrical and electronic equipment installations. Ensure that all grounding connections are secure and that all grounding cables are kept out of vehicle and personnel paths.

WARNING

Use extreme care when working around electrical equipment to avoid the possibility of severe or fatal electrical shock. Remove all jewelry (i.e. rings, necklaces, etc.) before working with the Unit.

WARNING

Ensure that all power connections are properly insulated, clean, and mechanically secure to prevent personnel injury when the Unit is powered up and operated. When the power cable is installed, carefully inspect all connectors and wiring for worn or broken parts. Make any necessary repairs before powering up the Unit. If any cable or connector damage is discovered while the Unit is operating, the Unit should be powered down and the damage repaired immediately.

WARNING

Even with covers removed, lethal voltages may still be present inside the Unit. Failure to exercise caution could result in fatal or serious injury to personnel.

WARNING

AC line voltage is present in this equipment. Use extreme caution and ensure that at least two people are present while performing inspection, test, and maintenance procedures. Failure to comply may result in fatal or serious injury to personnel.

WARNING

Ensure that power is removed during the performance of equipment replacement and cleaning procedures. Do not open equipment enclosures when cleaning. Use of damp cleaning materials can cause shock, resulting in fatal or serious injury to personnel.

WARNING

Hazardous voltages are present. Use care when measuring for voltage. Failure to do so can result in fatal or serious injury to personnel.

CAUTION

This equipment contains static-sensitive devices. Always follow ESD handling procedures when working on this equipment.

PROBLEM	PROBABLE CAUSE	MAINTENANCE TASK
Power LED is off.	1. Power cord is not properly seated. 2. RFMOW ON/OFF button has not been pressed.	1. Check power cord for proper seating. 2. Press the button to turn on the Unit.
SVU lights are not functioning.	1. SVU Cable is not properly seated. 2. Controller cable is not properly seated.	1. Check cable connections at J1 for proper seating. 2. Check J4 cable connections if using external controller.
Data won't send	1. Cables are not properly seated or are in the wrong location. 2. KIV is not installed or operating properly.	1. Check cables for proper location and seating. 2. Make sure KIV is installed and operating properly.
KIV lights are not functioning	1. Cable is not properly seated. 2. KIV not properly installed.	1. Check cable connections at J6. 2. Install KIV per page 5.
CONTROL RCV/XMT lights are not functioning.	1. Loose or disconnected COM2 Cable. 2. Loose or disconnected J5 Cable	1. Check J4 Cable if using external controller. 2. Check J5 Cable
ALERT does not operate	1. Loose or disconnected COM2 Cable	1. Check J4 Cable if using external controller.

CHAPTER 5

SPECIFICATIONS

TECHNICAL CHARACTERISTICS

The 41800-002 RFMOW V2 technical data includes the physical, electrical, and environmental data described in the following paragraphs.

Physical Characteristics

The 41800-002 physical characteristics are listed in Table 5-1.

Table 5-1 RFMOW V2 Physical Data			
Raven 41800-002 RFMOW V2 Characteristics		Standard	Metric
Measurements:			
	Width	19.00 inches	48.26 cm
	Depth	15.70 inches	39.88 cm
	Height	3.46 inches	8.79 cm
Weight (fully loaded, no KIV)		27 lbs.	12.25 kg

Electrical Characteristics

The 41800-002 electrical characteristics are listed in Table 5-2.

Table 5-2 Electrical Data	
41800-002 Characteristics	Value
Input Power	90 to 264 VAC, 47-63 Hz

Environmental Characteristics

The 41800-002 environmental data is listed in Table 5-3.

Table 5-3 Environmental Data		
Characteristics		Value
Temperature (Ambient)	Non-Operating	-40°C to 70°C (-40°F to 158°F)
	Operating	0°C to 60°C (32°F to 140°F)
Relative Humidity	Non-Operating	10 to 90% Non-Condensing
	Operating	10 to 90% Non-Condensing
Altitude	Non-Operating	To 15,000 ft. above mean sea level
	Operating	To 10,000 ft. above mean sea level

Table 5-3 Environmental Data		
Characteristics		Value
Shock and Vibration	Non-Operating	As encountered during normal equipment transport by common carrier as secured cargo by land, sea, or air, and as encountered during tactical off-road movement
	Operating	As encountered during normal operation and maintenance

EQUIPMENT REQUIRED BUT NOT SUPPLIED

The equipment that is required, but not supplied for the 41800-002 Unit is shown in Table 5-4.

Table 5-4 Government Furnished Equipment	
Equipment	Remarks
COMSEC Equipment	KIV-7 and Secure Telephone Equipment (STEIII) or Secure Telephone Unit (STU)

OPTIONAL EQUIPMENT NOT SUPPLIED

The optional equipment which is not supplied for the 41800-002 Unit is shown in Table 5-5.

Table 5-5 Optional Equipment	
Equipment	Remarks
Keyboard and Monitor Assembly	Provides for Data Input and Output and Control
Laptop Computer connected through Ethernet Port	Provides for Data Input and Output and Control

OPTIONAL EXTERNAL CABLES AVAILABLE WITH THE RFMOW V2

These cables are required for use with the Unit when operating in the RFMOW network:

- Raven R209-0005 for J5 Modem Control to Comtech SDM-300A modem
- Raven R237-0003 for J2 Modem Data to Comtech SDM-300A modem
- Raven R225-0007 for J1 Secure Voice Unit to Secure Voice Unit (STU or STE)

Additionally, these cables are required when operating the RFMOW V2 in “IU Mode”:

- Raven R209-0006 for J4 Controller to External Computer COM2 (RS-232)
- Raven R225-0006 for J6 Modem Data to External Computer COM1 (RS-232)

APPENDIX A

DIAGRAMS

The following diagrams illustrate the front panel and the rear panel features of the RFMOW V2.

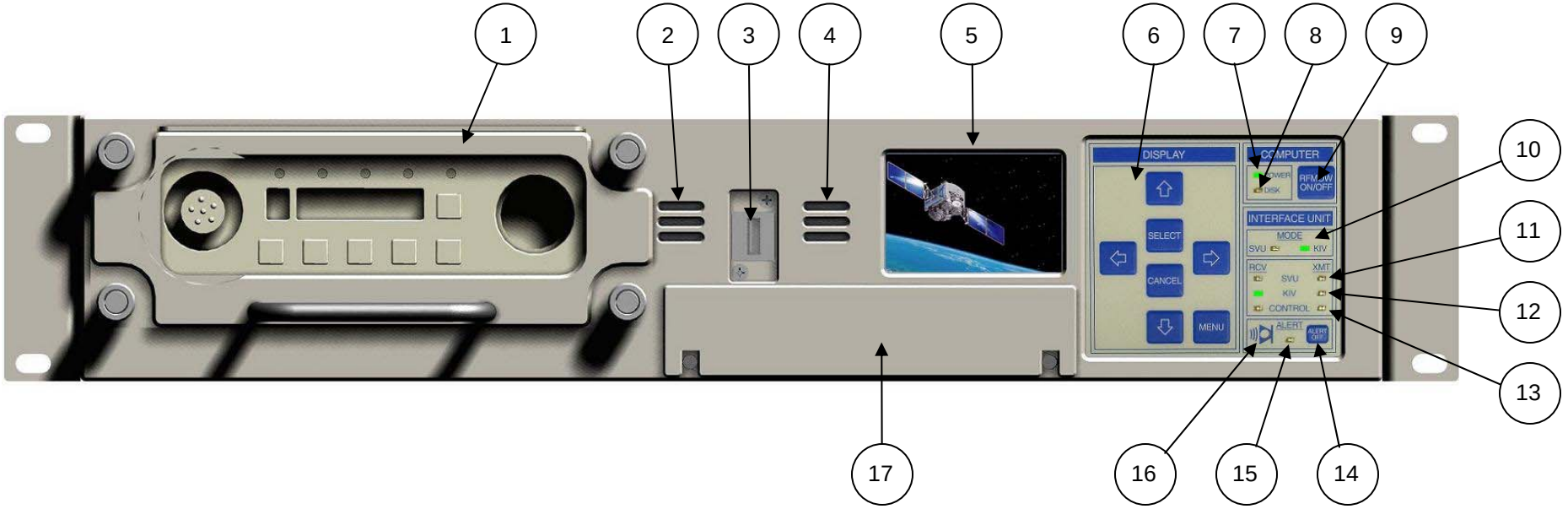


Figure 1-1 RFMOW V2(Front Panel)

Table 1-1 RFMOW V2 (Front Panel)			
ITEM	COMPONENT	ITEM	COMPONENT
1	KIV-7 Carrier (Removable)	10	Voice/Data Mode LEDs
2	Left Speaker	11	Voice RCV/XMT LEDs
3	USB Port	12	Data RCV/XMT LEDs
4	Right Speaker	13	Control RCV/XMT LEDs
5	LCD Display	14	Alert Horn Control Button
6	Display and Cursor Controls	15	Alert LED
7	Power LED	16	Alert Horn
8	Hard Disk Drive LED	17	CD-RW/DVD Access Cover
9	RFMOW V2 ON-OFF Switch		

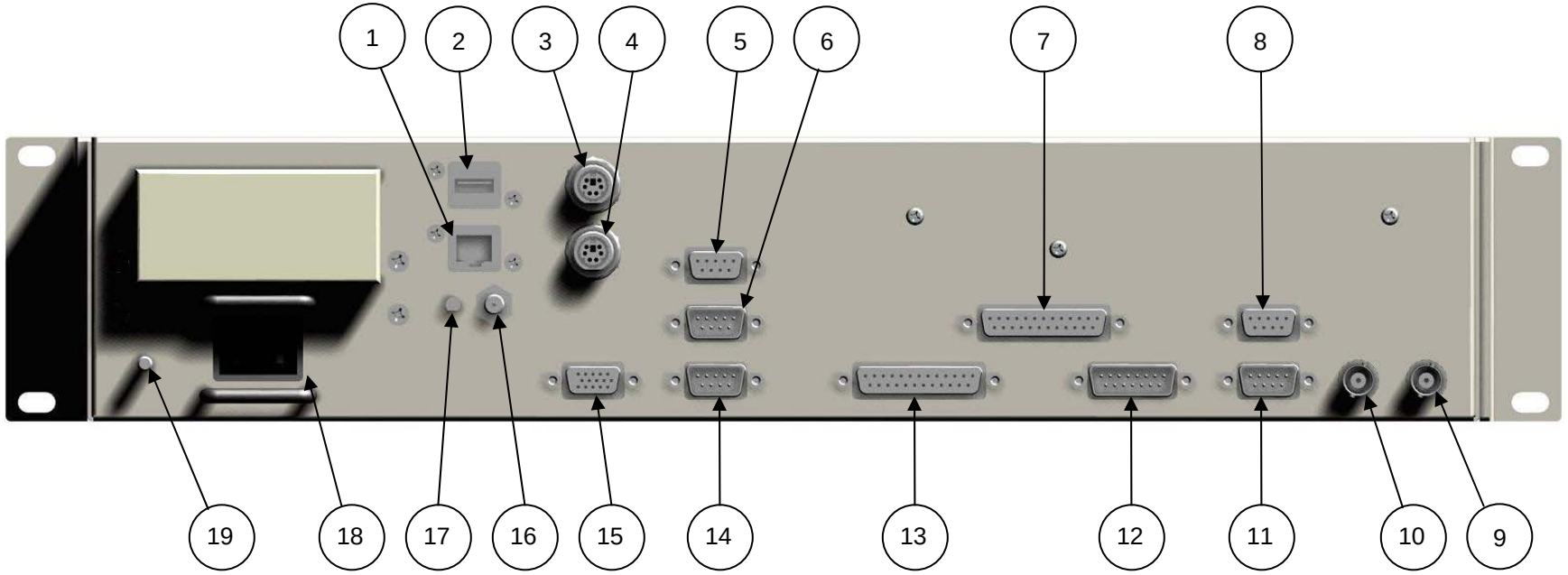


Figure 1-2 RFMOW V2 (Rear Panel)

Table 1-11 RFMOW V2(Rear Panel)

ITEM	COMPONENT	ITEM	COMPONENT
1	Ethernet Port	10	Modem RF Attenuator In Connector
2	USB Port	11	J5 Modem Control (RS-485) Connector
3	Keyboard Connector	12	J2 Controller Modem Data Connector
4	Mouse Connector	13	J1 Secure Voice Unit Connector
5	J4 Controller Connector (“IU Mode”)	14	COM 4 (RS-232) Connector
6	COM 3 (RS-485) Connector	15	VGA Video Connector
7	J6 Modem Data Connector (“IU Mode”)	16	Pulse Per Second Connector (GPS option)
8	J7 Power Connector	17	GPS Antenna Connector (GPS option)
9	Modem RF Attenuator Out Connector	18	AC Power Connector
		19	Grounding Stud

APPENDIX B

CONNECTORS (Pin Outs)

Page 18 illustrates the location of external connectors for the 41800-002 RFMOW V2. Figures B-1 through Figure B-10 illustrate pin outs for these connectors. Connector pin outs are described in Table B-1 through Table B-10, respectively.

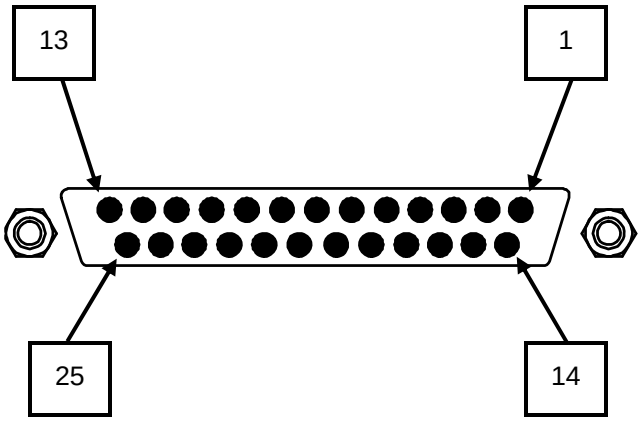
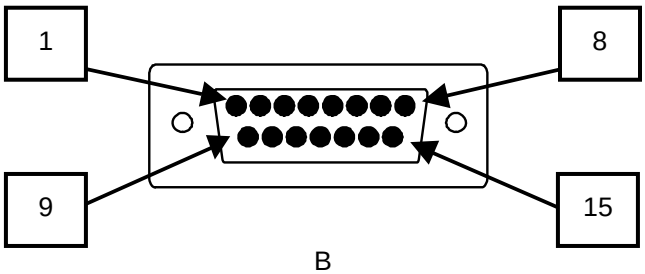


Figure B-1 STU III/STE Telephone Connector (J1)
(Female 25 pin D-Sub)

Table B-1 STU III/STE Telephone Connector (J1)			
Pin #	Description	Pin #	Description
1	Not Used	14	Not Used
2	RS-232 Data From the STE Phone	15	RS-232 Transmit Clock **
3	RS-232 Data To the STE Phone	16	Not Used
4	Not Used	17	RS-232 Receive Clock **
5	+12 V	18	Not Used
6	+12 V	19	Not Used
7	Ground	20	Not Used
8	+12 V	21	Not Used
9	Not Used	22	Not Used
10	Not Used	23	Not Used
11	Not Used	24	Not Used
12	Not Used	25	Not Used
13	Not Used		

** Under software control, the STU III/STE Transmit and Receive Clocks are divided by 1,2,4 or 8 from the network data rate clock.

+12 V power is supplied through a 1000 ohm resistor.



B

Figure B-2 Controller Modem Data Connector (J2)
(Male 15 pin D-Sub)

Table B-2 Controller Modem Data Connector (J2)			
Pin #	Description	Pin #	Description
1	RS-422 Data – From the Modem	9	RS-422 Data + From the Modem
2	RS-422 Data – to the Modem	10	RS-422 Data + to the Modem
3	Not Used	11	Not Used
4	Not Used	12	Not Used
5	RS-422 Clock – From the Modem (Receive)	13	RS-422 Clock + From the Modem (Receive)
6	RS-422 Clock – From the Modem (Transmit)	14	RS-422 Clock + From the Modem (Transmit)
7	RS-422 Clock – To the Modem (Transmit)	15	RS-422 Clock + To the Modem (Transmit)
8	Not Used		

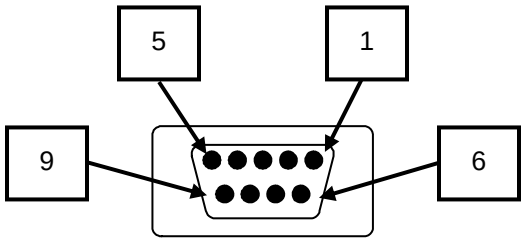


Figure B-3 Optional External PC Control Signals Connector (J4)
(Female 9 pin D-Sub)

Table B-3 Optional External PC Control Signals Connector (J4)	
Pin #	Description
1	RS-232 Telephone OFF HOOK Signal Hi = off hook, Low = on hook
2	RS-232 Control Signal to PC Used to confirm controls from the Modem
3	RS-232 Control Signal from the PC Used to control the Modem or other Equip. on Bus
4	RS-232 Control Signal for the “A / B” Switch Hi = voice from the STE, Low = Data from the PC transmitted to and received from the Modem Data Port
5	Ground
6	Not Used
7	RS-232 Control Signal for the Alarm Horn Hi = Horn On, Lo = Horn Off *The front panel alarm horn sounds continuously when this signal is high.*
8	Not Used
9	Not Used

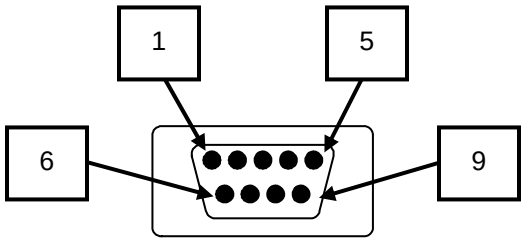


Figure B-4 Control Signals to the Modem and/or other Equipment (J5)
(Male 9 pin D-Sub)

Table B-4 Control Signals to the Modem and/or other Equipment(J5)	
Pin #	Description
1	Ground
2	Not Used
3	Not Used
4	RS-485 Signal + to the Modem
5	RS-485 Signal – to the Modem
6	Not Used
7	Not Used
8	RS-485 Signal + From the Modem
9	RS-485 Signal – From the Modem

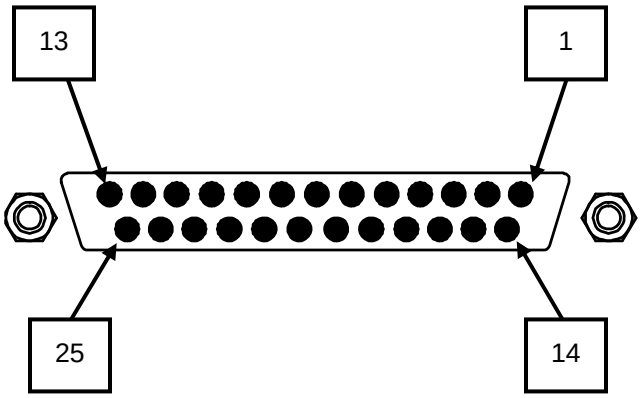


Figure B-5 Data From/To the Optional External PC (J6)
(Female 25 pin D-Sub)

Table B-5 Data From / To the Optional External PC (J6)			
Pin #	Description	Pin #	Description
1	Not Used	14	Not Used
2	RS-232 Data From the External PC to the COMSEC Device	15	Not Used
3	RS-232 Data To the External PC from the COMSEC Device	16	Not Used
4	Not Used	17	Not Used
5	RS-232 Black Alarm Indicator from the COMSEC Device	18	Not Used
6	RS-232 Red Alarm Indicator from the COMSEC Device	19	Not Used
7	Ground **	20	RS-232 Sync Command Transmit / Receive to the COMSEC Device
8	Not Used	21	Not Used
9	Not Used	22	Not Used
10	Not Used	23	Not Used
11	Not Used	24	Not Used
12	Not Used	25	Not Used
13	Not Used		

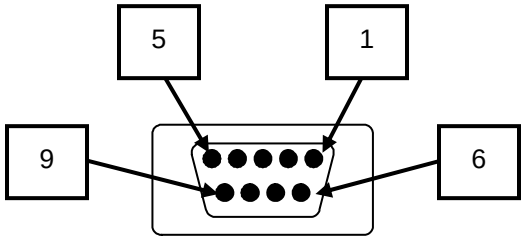


Figure B-6 Optional Power for External Equipment (If Needed) (J7)
(Female 9 pin D-Sub)

Table B-6 Power Out (J7)	
Pin #	Description
1	+12 VDC
2	+12 VDC
3	+12 VDC
4	+12 VDC
5	Ground
6	Ground
7	Ground
8	Ground
9	Ground

NOTE: Up to a total of 1.0 Amp may be drawn from the combination of +12 VDC pins.

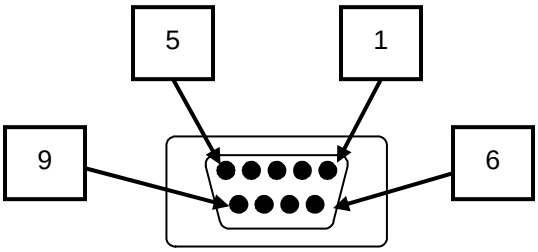


Figure B-7 RS485 Port
(Female 9 pin D-Sub)

Table B-7 RS485 Serial Port	
Pin #	Description
1	Receive Data A (Input) -
2	Transmit Data B (Output) +
3	Transmit Data A (Output) -
4	Not Used
5	Ground
6	Not Used
7	Not Used
8	Not Used
9	Receive Data B (Input) +

NOTE: This port is connected to COM3 on the RFMOW V2 internal computer.

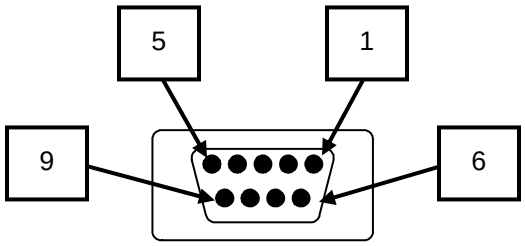


Figure B-8 RS232 Port
(Female 9 pin D-Sub)

Table B-8 RS232 Serial Port	
Pin #	Description
1	Data Carrier Detect (Input)
2	Receive Data (Input)
3	Transmit Data (Input)
4	Data Terminal Ready (Output)
5	Signal Ground
6	Data Set Ready (Input)
7	Request to Send (Output)
8	Clear to Send (Input)
9	Not Used

NOTE: This rear panel port is connected to COM4 on the RFMOW V2 internal computer. This rear panel port is disabled when the software directs the input and output of the GPS receiver to COM4 on the internal computer. Also under software control, the internal port can be connected to the Secure Voice Unit circuits for testing, at which time this rear panel port is disabled.

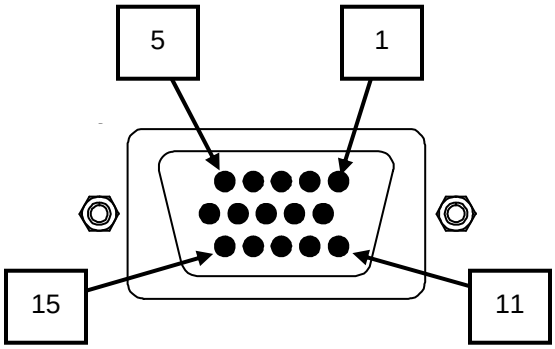


Figure B-9 VGA Serial Port
(Male 15 pin D-Sub)

Table B-9 VGA Serial Port	
Pin #	Description
1	Red
2	Green
3	Blue
4	Not Used
5	Ground
6	Ground
7	Ground
8	Ground
9	Not Used
10	Ground
11	Not Used
12	DDC DAT
13	Horizontal Synchronization
14	Vertical Synchronization
15	DDC Clock

The RFMOW V2 includes a circuit that terminates the VGA color signals for approximately 10 seconds after power up. During this time the video may be distorted as the color signals would be double terminated.

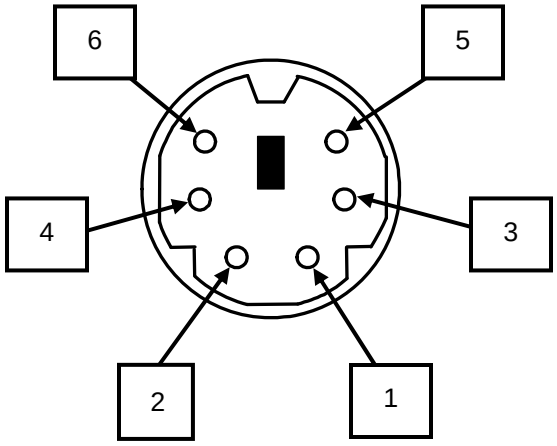


Figure B-10 PS/2 Mouse and Keyboard Connectors

Table B-10 PS/2 Mouse and Keyboard Connectors		
Pin #	Mouse Description	Keyboard Description
1	Data	Data
2	Not Used	Not Used
3	Ground	Ground
4	+5 V	+5 V
5	Clock	Clock
6	Not Used	Not Used

APPENDIX C

GLOSSARY

ACRONYMS AND ABBREVIATIONS

The acronyms and abbreviations used in this manual are defined below:

Abbreviation or Acronym

AC .....Alternating Current
C.....Celsius
CAGE .....Commercial and Government Entity
cm.....Centimeter
COM .....Serial Communications Port
COMSEC.....Communication Security
CTRL.....Control
DEL .....Delete
DEMUX .....Demultiplexer
DTR.....Data Terminal Ready
EIR .....Equipment Improvement Recommendations
EQUIP .....Equipment
ESD.....Electrostatic Discharge
F .....Farenheit
Ft. .....Feet
GND .....Ground
Hi.....High
HPA.....High Power Amplifier
Hz.....Hertz
I/F .....Interface
I/O.....Input/Output
IF .....Intermediate Frequency
in.....Inch(es)
IU.....Interface Unit
kg.....kilograms
KIV-7 .....Crypto Device
KVM.....Keyboard/Video (Monitor)/Mouse
lbs.....Pounds
LCD .....Liquid Crystal Display
LMST.....Light Mobile Satellite Terminal
LNA .....Low Noise Amplifier
Lo .....Low
MAC .....Maintenance Allocation Chart
MUX .....Multiplexer
NABS.....NATO Airbase Satellite Terminal
NSN.....National Stock Number
NCT.....Network Control Terminal
NT.....Network Terminal
oz.....Ounce
PC .....Personal Computer
PMCS.....Preventive Maintenance Checks and Services
PS/2.....Personal System/2
PWR.....Power
RCV.....Receive

Abbreviation or Acronym

RGB.....Red-Green-Blue
RFMOW .....Replacement Frequency Modulated Orderwire
RMA .....Return Merchandise Authorization
RTS .....Ready To Send
RX .....Receive
SMR .....Source, Maintenance, and Recoverability
SRA.....Specialized Repair Activity
STE .....Secure Terminal Equipment
STU .....Secure Telephone Unit
SVU.....Secure Voice Unit
TM .....Technical Manual
T2U.....Technical Terminal Units
TMDE .....Test, Measurement, and Diagnostic Equipment
TX.....Transmit
U/M.....Unit of Measurement
UUT .....Unit Under Test
XMT.....Transmit
VAC .....Volts AC
VGA.....Video Graphics Array

General Conditions of Sales

RAVEN ELECTRONICS CORPORATION
400 EDISON WAY, RENO, NEVADA 89502
TELEPHONE 775-858-2400 FAX: 775-858-2410

1. CONTRACT – The following general conditions of sale apply to this contract and all purchases from Raven Electronics Corporation (hereinafter referred to as Raven). No changes, deletions or additions shall be binding on Raven, unless expressly agreed to in writing and signed by an authorized representative of Raven. Any terms or condition of the Purchaser inconsistent herewith, or in addition hereto, shall be of no force and effect, and Purchasers order shall be governed only by terms and conditions appearing herein. A definite and reasonable expression of acceptance or a written confirmation, which is sent within the time specified in the Raven proposal or sales order, operates as an acceptance of the terms specified herein, even though it states terms different from or additional to those specified herein.

2. PROPOSALS – Raven proposals, when accepted, and any subsequent orders placed as a result of such proposals, are not subject to cancellation changes, reduction in amount or suspension of deliveries except with Raven's written consent and upon terms which indemnify Raven against loss. Information contained in Raven's proposal is valid for a period of sixty (60) days from the date of proposal, unless specified to the contrary in the proposal. Stenographic and clerical errors are subject to correction. Verbal quotations expire, unless accepted, the same day they are made.

3. PRICES (are in United States dollars) – All prices and discounts are subject to change without notice. In the event of price change, the price of equipment on order but not shipped will be the price in effect at the time of acceptance of the order. Equipment already shipped is not subject to a price change. In addition to prices specified herein, purchaser shall pay for all extra components, parts, equipment, materials or services (each or all hereafter called "equipment") requested by the purchaser or made necessary by incompleteness of or inaccuracy in plans, specifications, or other information submitted by the purchaser.

4. TAXES AND TRANSPORTATION – Unless otherwise specified, the prices do not include any applicable taxes (sales, use, ad valorem, property, etc.) for the sale, use, licenses, or delivery of the equipment, software, or services supplied. The purchaser agrees to pay all taxes, licenses and transportation charges.

5. TERMS OF PAYMENT – Terms of payment to Purchasers of satisfactory credit is thirty (30) days from the date of shipment. The same terms are applicable to partial shipment. If in the judgment of Raven, the financial conditions of the Purchaser at any time does not justify continuance of production or shipment on the terms of payment specified, the company may require full or partial payment in advance before shipment. Raven may ship the equipment in installments, and pro rata payments of purchase price are due as shipments are made. If shipments are delayed by Purchaser, payments shall be made based on the contract price and percent completed. Delinquent charges of 1½% per month (18% per annum) will be added to all past due invoices.

6. DELIVERY – Raven shall not be liable for any damages or penalty for delays in delivery and/or completion due to acts of God, acts of omissions of the Purchaser, acts of civil or military authorities, government regulations or priorities, fires, floods, epidemics, quarantine, inability to obtain necessary labor, war, riots, strikes, differences with workmen, accidents to machinery, delays in transportation, failure of or delay in furnishing correct or complete information by Purchaser, impossibility or impracticability of performance or any other cause or causes beyond the control of Raven.

7. SHIPMENT – Unless otherwise specified in this or other documents forming a part of this contract, all shipments will be F.O.B. Raven manufacturing facility. Property of and title to the equipment shall pass to the purchaser upon delivery thereof by Raven to the carrier, and risk of loss, damage or deterioration to the equipment shall thereafter be on the purchaser. If the purchaser requests Raven to postpone shipment beyond the time Raven would be required to ship in order to comply with the delivery dates agreed upon between Raven and the purchaser elsewhere in this or other documents forming a part of this contract, (a) the purchaser shall pay Raven for the expense of storing the equipment, (b) the risk of loss, damage or deterioration to the equipment shall be on the purchaser on and from the date Raven receives the purchasers request to postpone shipment.

8. SHORTAGES – Claims for shortages, damaged, or incorrect material must be made within ten (10) days after receipt of goods.

9. MINIMUM BILLING CHARGE – Orders amounting to less than $50.00 will be billed at $50.00.

10. ACCEPTANCE OF ORDER – All orders are subject to acceptance and approval by a principle officer of Raven.

11. TITLE (Risk of loss) – The purchaser agrees that Raven shall have a security interest in the equipment purchased until paid in full. The purchaser agrees to perform all acts necessary to protect the interests of Raven in the product until such interests are discharged by payment in full. Risk of loss of the equipment or any part of the same shall pass to the purchaser upon delivery of such equipment or parts, F.O.B. Raven's manufacturing facility.

12. CANCELLATIONS – An order once placed with and accepted by Raven can be canceled only with Raven's consent and upon terms which indemnify Raven against loss.

13. WARRANTY – This warranty expressly precludes any liability by Raven for consequential damages however arising after delivery to the purchaser of the affected equipment, and is limited to the expressed warranty, excluding all implied warranties including merchantability. All equipment manufactured by Raven is warranted against defective materials and workmanship for a period of two (2) years from the date of delivery to the original purchaser. Liability under this warranty is limited to servicing, adjusting, repairing or replacing, as necessary, any equipment returned to the factory, transportation prepaid for that purpose. Factory examination must disclose a manufacturing defect. Repaired or replaced items will be returned to the purchaser surface freight prepaid within the continental U.S.A.

This warranty does not extend to any equipment which has been subjected to transportation damage, misuse, neglect, accident, improper installation, or any other circumstances reasonably beyond the control of Raven. Repairs will be billed to the purchaser at cost. In such cases, an estimate will be submitted for approval before repair is initiated. Repaired equipment will be returned to the purchaser with transportation charges collect, unless otherwise agreed to between the purchaser and Raven.

14. RETURN FOR CREDIT – No equipment may be returned for credit until the company has obtained Raven's written approval for return authorization. Materials accepted for return is subject to a re-stocking charge of 15% of the current list price. All transportation charges will be borne by the purchaser. Orders for special non-stock equipment or items become non-cancelable upon initiation of production and are not returnable for credit.

15. RETURNS FOR REPAIR – Equipment returned for repair should be identified with a tag indicating the problem, and returned to Raven's repair service department. Special instructions, i.e., desired modifications, should be noted on the packing slip. Any equipment returned must be packaged to insure safe arrival at Raven. Items modified and/or programmed by customer for special features will be returned to standard Raven configuration, with time billed accordingly, unless modification and/or program instructions or documentation is provided and repairs have been agreed to by Raven.

16. SERVICE – Engineering assistance will be provided on request for permanently installed equipment, and billed at a nominal fee as agreed upon between Raven and the purchaser.

17. APPLICABLE LAW – The validity, performance, construction and interpretation of these terms and conditions shall be governed by the laws of the state of Nevada, United States of America and any litigation must take place in the state of Nevada.

18. PROPRIETARY DATA – Raven retains ownership and rights in all proprietary data disclosed to the purchaser by Raven in connection with this contract. Proprietary samples, software documents and/or drawings shall not be disclosed, reproduced, manufactured or made available to unauthorized persons in whole or in part or used to prepare the same or similar materials without the expressed written permission from Raven. Proprietary data includes all design, engineering, and technical information (whether patentable or not) and other information concerning Raven trade secrets not disclosed by inspection or analysis of the equipment itself.

19. GOVERNMENT REQUIREMENTS – Raven agrees to comply with all applicable state and federal laws, rules and regulations, and all obligations hereunder are subject to applicable government regulation, including those affecting or limiting prices (except price redetermination), production, purchases, sales, use or inventory of materials. If the equipment to be furnished is to the United States government, Raven agrees to comply with applicable requirements for such contracts, with respect to secrecy, use of convict labor, employment of aliens, non-discrimination, plant protection, espionage, sabotage, fair labor standards act of 1938, as amended, the service contract act of 1965 as amended and other provisions relative to hours and conditions of work, if and when applicable.

20. MODIFICATION AND SUBSTITUTION – Raven reserves the right to modify equipment of Raven design sold hereunder, and/or the drawings and specification related thereto, or to substitute equipment of later design to fulfill this contract, providing the modification or substitution will not materially affect the performance of the equipment or lessen in any way the utility of the equipment to the purchaser.

21. DESIGN CHANGES – Raven reserves the right to make design changes at any time without incurring any obligation to modify equipment previously sold.

22. TERMS AND CONDITIONS – The terms and conditions specified herein shall be in addition to those set out in the Raven proposal.

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