OMS11

Outdoor Modem Switch

Installation and Operation Manual

TM133
Revision 1.1

Comtech EF Data • 2114 W 7th St. • Tempe, AZ 85281 • (480) 333-2200 • Fax: (480) 333-2540 • www.comtechefdata.com

Warranty Policy

WP

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All equipment returned for warranty repair must have a valid RMA number issued prior to return and be marked clearly on the return packaging. Comtech EF Data strongly recommends all equipment be returned in its original packaging.

Comtech EF Data Corporation's obligations under this warranty are limited to repair or replacement of failed parts, and the return shipment to the buyer of the repaired or replaced parts.

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The warranty does not cover any labor involved in the removal and or reinstallation of warranted equipment or parts on site, or any labor required to diagnose the necessity for repair or replacement.

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Before a warranty repair can be accomplished, a Repair Authorization must be received. It is at this time that Comtech EF Data will authorize the product or part to be returned to the Comtech EF Data facility or if field repair will be accomplished. The Repair Authorization may be requested in writing or by calling:

Comtech EF Data Corporation
2114 W 7th Street.
Tempe, Arizona 85281 (USA)
ATTN: Customer Support
Phone: (480) 333-2200
Fax: (480) 333-2540

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When a product is returned for any reason, Customer and its shipping agency shall be responsible for all damage resulting from improper packing and handling, and for loss in transit, not withstanding any defect or nonconformity in the product. By returning a product, the owner grants Comtech EF Data permission to open and disassemble the product as required for evaluation. In all cases, Comtech EF Data has sole responsibility for determining the cause and nature of failure, and Comtech EF Data's determination with regard thereto shall be final.

Preface

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This manual provides installation and operation information for the Radyne OMS11 1:1 Redundancy Switch. This is a technical document intended for use by engineers, technicians, and operators responsible for the operation and maintenance of the OMS11.

Conventions

Whenever the information within this manual instructs the operator to press a pushbutton switch or keypad key on the Front Panel, the pushbutton or key label will be shown in "less than" (<) and "greater than" (>) brackets. For example, the Reset Alarms Pushbutton will be shown as <RESET ALARMS>, while a command that calls for the entry of a '7' followed by 'ENTER' Key will be represented as <7,ENTER>.

Cautions and Warnings

A caution icon indicates a hazardous situation that if not avoided, may result in minor or moderate injury. Caution may also be used to indicate other unsafe practices or risks of property damage.

A warning icon indicates a potentially hazardous situation that if not avoided, could result in death or serious injury.

A note icon identifies information for the proper operation of your equipment, including helpful hints, shortcuts, or important reminders.

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Record of Revisions

Revision Level	Date	Reason for Change
1.0	11-30-07	Initial Release
1.1	2-08-08	Updates. Added Fault Detection

Comments or Suggestions Concerning this Manual

Comments or suggestions regarding the content and design of this manual are appreciated. To submit comments, please contact the Comtech EF Data Corporation Customer Service Department.


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Introduction

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1.0 Description

The Radyne OMS11 Outdoor Modem Switch provides redundancy protection for the OM20 Outdoor Modem, BUC and LNB. The OMS11 offers redundancy support for OM20 user data, Asynchronous data, RS485 and BUC/LNB Waveguide Switching control. The OMS11 redundancy system is based on a Chain switching system that switches the IF/RF primary path to the IF/RF Backup path. Optional BUCs, LNBs, Waveguide Switches and Mounting hardware are optional items that can be supplied with the system. Contact Radyne for supported hardware options. Refer to Figure 1-1 for an illustration of the OMS11 1:1 Redundancy Switch Front Panel and Figure 1-3 of an OMS11 Functional Block Diagram.

Operating in the Automatic Mode, the OMS11 immediately places a Backup Modem and IF/RF Path online in the event of a Primary Modem/IF/RF path fails. The OMS11 chain switches the modem, BUC and LNB. In the Manual Mode, the user may designate the selected Online Primary Modem from either the Interactive Front Panel or a remote Terminal Interface. The backup functions of the OMS11 may be performed manually via the front panel or the RS485, RLLP remote protocol or the RS232 Terminal port.

Figure 1-1 OMS11 1:1 Redundancy Switch Front Panel

1.1 Redundant Power Supplies

The OMS11 is equipped with two fully redundant internal power supplies. Each power supply is independent of the other, including their source of AC or DC input source. The OMS11 remains fully operational as long as either power supply is providing a source of power. The power supplies are internal to the OMS11 Chassis.

1.2 Front Panel Controls

The Front Panel of the OMS11 provides all of the necessary controls and LED indicators to provide the operator with online status and backup status of the online and backup OM20 Modems.

1.3 Power-Up Defaults

During power-up, the OMS11 initializes itself to the last mode set by the Front Panel Pushbuttons.


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Theory of Operation

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2.0 Theory of Operation

The Radyne OMS11 Outdoor Modem Switch provides redundancy protection for the OM20 Outdoor Modem, BUC and LNB. The OMS11 redundancy system is based on a Chain switching system that switches the IF/RF primary path to the IF/RF Backup path. The Chain Switching system can includes BUCs, LNBs, Waveguide, Waveguides Switches, mounting hardware and connecting cables. BUCs, LNBs, Waveguide Switches and Mounting hardware are optional items that can be supplied with the system. Refer to Figure 1-1 for an illustration of the OMS11 1:1 Redundancy Switch Front Panel and Figure 2-1 for the OMS11 Functional Block Diagram.

The BUC and LNB switch over fault detection system is primarily done by the OM20 Modem. When the OM20 is configured to supply power to the BUC and LNB, the modem uses internal detection circuitry to monitor current and voltage status of the BUC and LNB. User must properly set up the BUC/LNB voltage and current threshold limits on the OM20. Refer to the OM20 user manual for proper set.

In cases where the BUCs are powered by an external power supply, fault detection can be detected by the OM20 only if the BUC includes Normally Closed contact closures. In order to support BUC redundancy, the BUC must have Normally Closed Contact closures available for the OMS11/OM20 to support redundancy.

2.1 OMS11 Operation

A block diagram of the signal flow is shown in Figure 2-1 below.

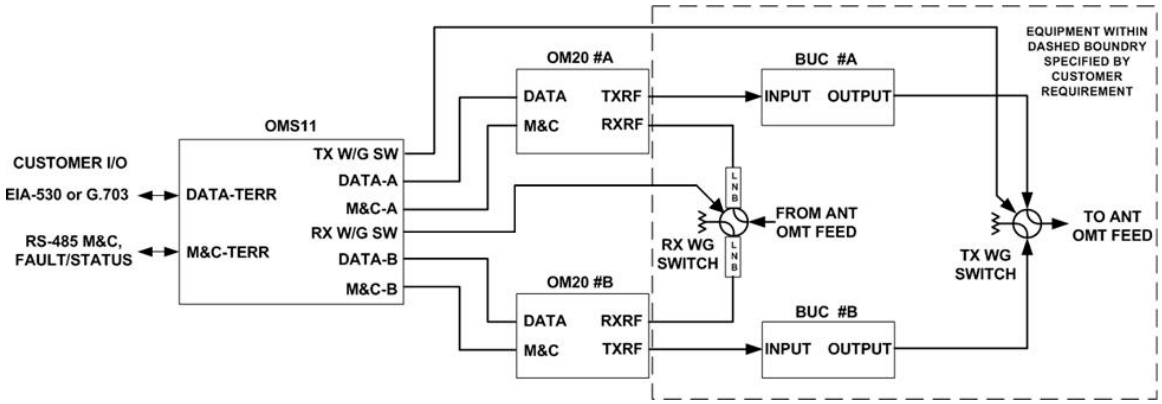

Figure 2-1 Functional Block Diagram

2.1.1 Operating Procedures

The OMS11 is designed to require minimal operator intervention and control during normal operation. After initial setup, the unit should operate in a relatively 'transparent' manner, providing trouble-free backup of the online Modems. The scope of this section is limited to instruction on the various modes of control available to the operator. Refer to Section 3-1 for the OMS11 Front Panel Controls and Indicators and Table 2-1 for a description of the Controls and Indicators.

2.1.2 Configuring the OMS11

The redundancy switch must be properly configured prior to operation. Date interface type, Remote communication type and remote baud rate must be set correctly to meet the users needs. Configuring these options can only be done by removing the cover and accessing the dip switches on the board. Appendix A of this manual gives specific information about the dip switch settings for configuring the Terminal and Remote ports. If you need assistance with the settings, contact Radyne customer service department.

2.1.3 Front Panel Controls (Refer to Figure 2-1)

The purpose of the 'ENABLE' pushbutton on the front panel is to reduce the risk of accidentally changing the operating modes of the OMS11 by accidentally bumping any one of the front panel pushbuttons. For any one of the front panel pushbuttons to function, the 'ENABLE' pushbutton must be depressed simultaneously with the desired function pushbutton. Depress the 'ENABLE' pushbutton. This pushbutton must be depressed to allow the operator to proceed with any other configurations. The 'MANUAL' LED should illuminate and the FAULT indicator may momentarily flash. Under the MOD region of the front panel, depress 'SELECT A' to bring Modem 'A' modulator online. The green LED should illuminate. Under the DEMOD region of the front panel, depress 'SELECT A' to bring modem 'A' demodulator online. The Green LED should illuminate. The OMS11 should now be in backup mode with modem 'A' online.

2.1.4 Manual Mode

To manually select which Modem is to be placed online, simultaneously depress the 'ENABLE' pushbutton and the appropriate Modem 'SELECT' pushbutton. When a Modem selection is made, the OMS11 enters Manual Mode to carry out the selection, and will not respond to either modem's Modem Fault signals until placed back into Auto Mode.

2.1.5 Auto Mode

To enable automatic backup in the event of a Modem failure, the OMS11 must be placed into the Auto Mode. First, select which Modem that will be active by following the 'Manual Mode' procedure in the previous paragraph. To enter the Auto Mode, simultaneously depress the 'ENABLE' pushbutton and the 'SELECT AUTO' pushbutton. The OMS11 will then enter into Auto Mode with the last selections made in Manual Mode. In the Auto Mode, the decision to switch from one Modem to another is made automatically by monitoring the Fault signals from each modem.

2.1.6 Power-Up Defaults

During power-Up, the OMS11 initializes itself to the last mode set by the operator on the front panel pushbuttons.

2.2 OMS11 Major Assemblies

The OMS11 Redundancy Control Unit contains the modules that control and monitor the operation of the 1:1 Switch system. The 1:1 Switch is composed of the following major assemblies and components:

Main Switch Board
Waveguide Switch Board
Front Panel
Dual (Redundant) Power Supplies

2.2.1 Main Switch Board

The Main Switch Board contains the OMS11 1:1 Switch Intelligence and Memory Circuitry and all switching circuitry. The microprocessor controls and coordinates all of the major functions of the Switch and performs all necessary calculations. The non-volatile system memory on the board stores the switching parameter settings for each modem channel. Control and data signals are routed to the appropriate devices in the system through various latches and transceivers that are controlled by the microprocessor.

2.2.2 Front Panel

The Front Panel contains the LED Indicators and the pushbutton switches needed to control and operate the OMS11. Refer to Figure 3.0 for a description of Front Panel Indicators.

2.2.3 Redundant Power Supplies

The 1:1 Switch comes equipped with two fully redundant internal power supplies (PS1 and PS2) that supplies power to the switch and external switching components. Each supply is fully independent of the other, including their source of AC/DC power and fusing. The Switch can remain fully operational as long as it is supplied with a source of voltage from either power supply.

2.3 OMS11 General Operation

2.3.1 Data Signals

Modem data signals are backed-up through a passive switching system. Signals that are required to maintain the modem in off-line (hot-standby) are buffered by appropriate circuitry to minimize loading on incoming signals.

2.3.2 Backup

If an online Modem fault is sensed, and the off-line Modem is in a non-faulted state, the OMS11 will switch to the Modem without the fault. The Fault Signal has a small debounce delay to prevent false triggering. If the faulted Modem has its fault cleared, it stays off-line unless the other MODEM has subsequently faulted.

2.3.3 Fail-Safe

If the OMS11 has a non-recoverable internal fault, the switch will revert back to Modem A, the Switch Fault LED is illuminated, and the Switch Fault Relay switches to a faulted state.

If Power Supply 1 and Power Supply 2 simultaneously fail, the switching circuitry in the OMS11 reverts back to Modem A, and the Switch Fault Relay switches to a faulted state. Modem B does not receive buffered signals in this condition.

2.3.4 OMS11 Fault Relays

The OMS11 M&C Connector (J8) has Form-C contacts available that indicate modem online and OMS11 Fault status. Refer to section for additional information.

2.4 Fault Detection

The OMS11 & OM20 work simultaneously to determine the status of all the components within this system. The OMS11 & OM20 are capable of monitoring BUC and LNB redundancy system. Faults detection is established by the OM20 and forwarded to the OMS11. Fault detection for a redundant BUC system will be different based on whether the BUC Power is supplied by the OM20 or if the BUC Power is supplied by an external power source. If the BUC power is supplied externally, then the BUC must have Normally Closed Form C Fault contacts so the OMS11/OM20 can monitor the BUC fault status.

Fault detection with the OM20 supplying power to BUC:

- BUC Faults - OM20 uses internal fault detection circuitry to determine BUC status and initiates a fault that is forwarded to the OMS11
- OM20 uses internal fault detection circuitry to determine LNB status and initiate fault

Fault detection with BUC power supplied externally:

- BUC must have Normally Closed Form C contacts in order for BUC fault detection to work
- OM20 data cable CAR5902 or CAR5918 has an external connector that is used to connect and monitor Form C Contacts from the BUC.
- OM20 uses internal fault detection circuitry to determine LNB status and initiate fault


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User Interfaces

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3.0 User Interfaces

These are:

- Front Panel Interface – Refer to Section 3.1.
- Remote Interface – Refer to Appendix B.

Figure 3-1 OMS11 Front Panel

3.1 Front Panel Interface

Table 3-1. OMS11 Front Panel Controls and Indicators

Nomenclature	Description	Function
Power 1	Indicates PS1 has power applied	LED illuminates Green for Power Available
Power 2	Indicates PS2 has power applied	LED illuminates Green for Power Available
Fault	Indicates a Switch Fault has occurred	LED illuminates Red for Switch Fault
Auto (LED)	Indicates OMS11 is in the Auto Mode	LED illuminates Green for Auto Mode
Manual (LED)	Indicates the OMS11 is in the Manual Mode	LED illuminates Green for Manual Mode
SELECT AUTO (Pushbutton)	----------	Allows the operator to select Automatic Mode of operation
ENABLE (Pushbutton)	----------	Enables Front Panel controls to function

SELECT Modem A (Pushbutton)	----------	Allows the operator to select Modem A
SELECT Modem B (Pushbutton)	----------	Allows the operator to select Modem B
Modem A Controls and Indicators		
Online LED	Indicates Modem A is online	LED illuminates Green for Online
Fault LED	The OMS11 has received a fault from Modem A	LED illuminates Red for Fault
Modem B Controls and Indicators		
Online LED	Indicates Modem B is online	LED illuminates Green for Online
Fault LED	The OMS11 has received a fault from Modem B	LED illuminates Red for Fault


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Installation

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4.0 Installation Requirements

The diagrams in this section display the OMS11 and OM20s mounted on the Antenna King Post as shown in figure 4-1 and 4-2. The cables supplied in the base system are based on this layout utilizing the mounting kit supplied by Radyne.

! WARNING!!

There are no user-serviceable parts located inside the OMS11 Chassis. There is a potential shock hazard internally at the power supply module. DO NOT open the OMS11 Chassis under any circumstances.

! CAUTION!!

Before initially applying power to the unit, it is a good idea to disconnect the transmit output from the operating ground station equipment. This is especially true if the current OMS11 configuration settings are unknown, where incorrect setting could disrupt existing communications traffic.

! WARNING!!

The OMS11 is shipped with protective covers over the connectors. The protective covers are used to create a moisture tight seal. Protective covers must remain on the unit if connector is not used.

4.1 Unpacking

The OMS11 was carefully packaged to avoid damage and should arrive complete with the following items for proper installation:

- OMS11 1:1 Redundancy Switch Unit
- Two AC or DC Mating connectors (J6 & J10)
- Data Mating Connector (J7)
- M&C Mating Connector (J8)
- OMS11/OM20 Interconnect Cables and Materials as required
- 1:1 Switch System Test Data Sheet
- An Installation and Operation Manual
- C-Band or Ku Band Waveguide Switches (Optional)
- Antenna Mounting hardware (Optional)
- BUCS and LNBS (Optional)

4.1.1 Test Data Sheet

Each OMS11 1:1 Redundancy Switch system is shipped with a Test Data Sheet. This report contains information on the results of the Switch quality control testing. The report also includes information pertaining to the system settings that were made at the factory. Radyne recommends that the user save this report for future reference.

4.2 Site Considerations

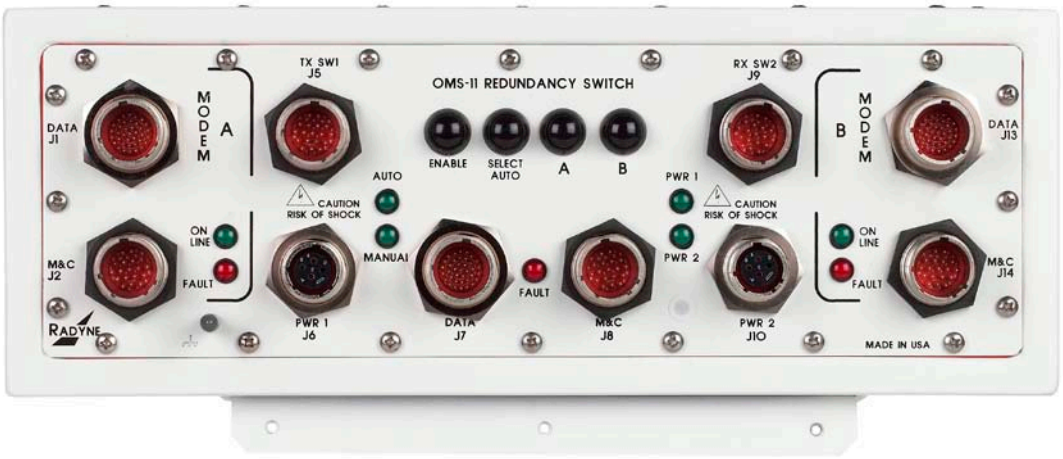
Adequate site planning and preparation simplifies the installation process and results in a more reliable system. The user should ensure that the site has adequate electrical power, environmental controls and protection against sources of electrical radiation and interference.

4.2.1 Power Sources

The power sources should be properly grounded and as free as possible from electrical interference. The OMS11 employs a dual redundant power supply configuration. Each power connection on the OMS11 must be plugged into its own separate power circuit. Each circuit must have its own independent circuit breaker.

Grounding is achieved automatically when the properly terminated power connector is inserted into the power receptacle. This should be checked by testing that there is no voltage present between the chassis of the Switch and the power line ground.

PROPER GROUNDING PROTECTION: During installation and setup, the user must ensure that the unit is properly grounded. The equipment shall be connected to the protective earth connection through the end use protective earth protection.



4.3 System Setup & Connections

1. Install OMS11/OM20 Mounting kit as shown in Figure 4-1 and Table 4-1. This displays the optional Radyne unistrut mounting kit for antenna kingpost mounting.

2. Mount the units as shown per figure 4-2 below. Configure units.
   Note: Customer configurations may vary.

3. Install BUCs, LNBs and waveguide hardware onto mounting kit as shown in Figure 4-4. This displays the optional Radyne unistrut mounting kit for antenna kingpost mounting.

4. Attach the Power Cords to the OMS11 and OM20 units to be connected.

5. Power up the units to be connected. Their Green Power LEDs should illuminate. If not, refer to the appropriate Installation and Operation manual for further action to be taken.

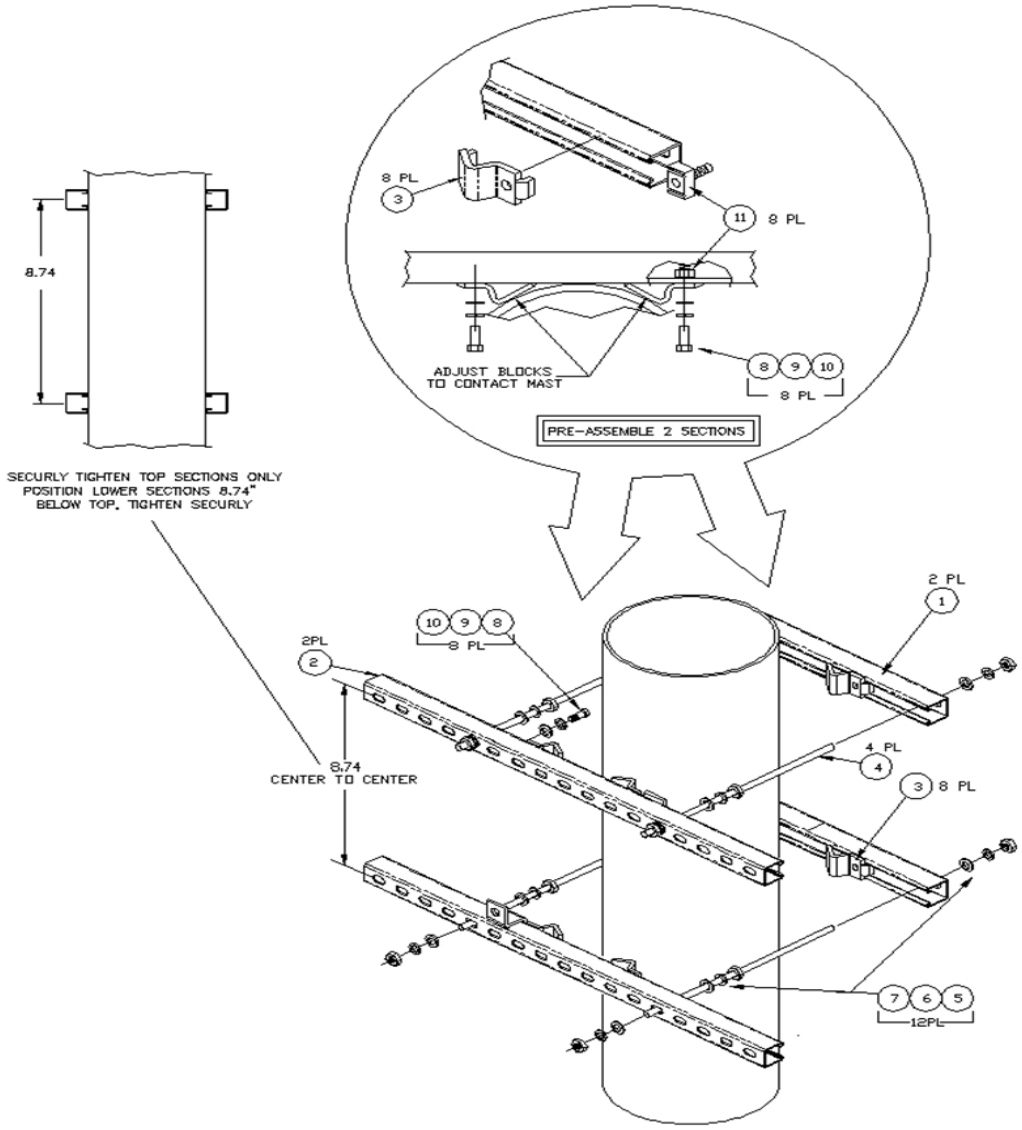


Figure 4-1 Antenna Mounting Kit

Item	Radyne P/N	Description
1	FP5914-2	UNISTRUT 2 FEET
2	FP/5914-4	UNISTRUT 4 FEET
3	ZB356	PIPE BLOCK ELECTRO-PLATED FINISH
4	Z15ATC-04403	ALL THRD ROD 7/16-14 18.8 SS 3FT
5	Z15FNC3-044	NUT, 7/16-14, 18.8 S/S HEX
6	Z15LW3-044	LOCK WASHR 7/16 18.8 SS MEDIUM SPLT
7	Z15LW3-044	WASHER, 7/16, 18.8 S/S FLAT
8	Z15LW3-038	WASHER SPLIT LOCK 3/8 SS
9	Z15LW3-038	WASHER 3/8IN SS FLAT
10	Z15CSC3-0380125	BOLT HEXHD 3/8X1-1/4IN SS
11	ZN228WO	CHANNEL NUT 3/8-16 ELEC PLATE ZINC

Table 4-1 Antenna Mounting Kit

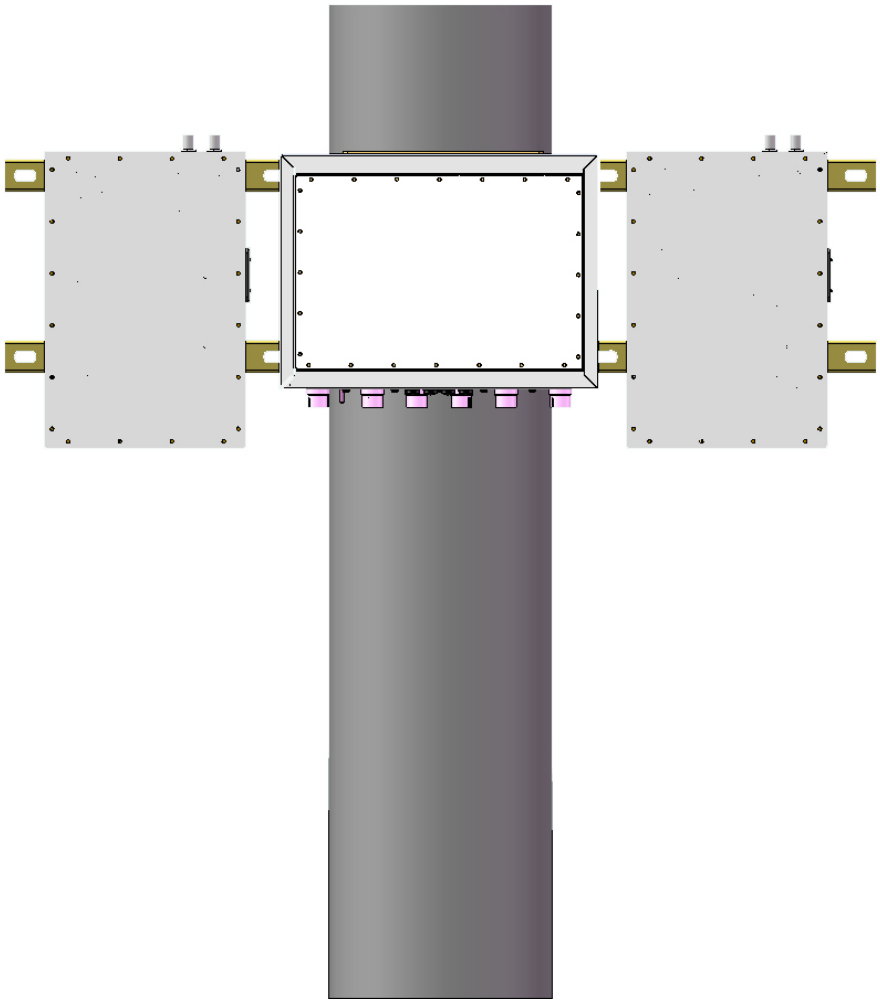


Figure 4-2 Antenna Mount Front View on King Post
NOTE: All connections are facing down

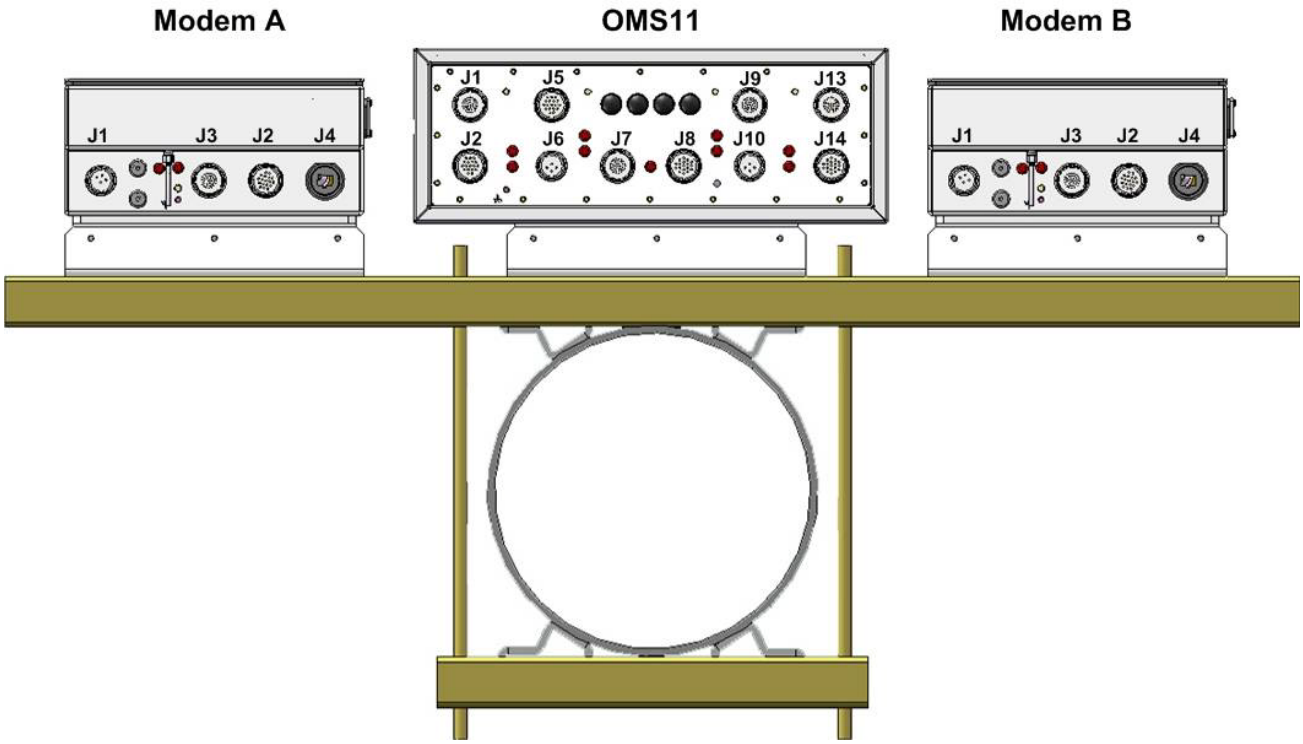


Figure 4-3 Antenna Mount Bottom View

Cable Connects	OMS11 Location	Modem A Location	Modem B Location	TX Waveguide	RX Waveguide	BUC A/B
CAR5902*	J1	J3	--	--	--	
CAR5902	J13	--	J3	--	--	
CAR5918**	J1	J3	--	--	--	
CAR5918**	J13	--	J3	--	--	
CAR5903	J2	J2	--	--	--	
CAR5903	J14	--	J2	--	--	
CAR5904	J5	--	--	J	--	
CAR5904	J9	--	--	--	J	
CAR5933		J3 Plug				J
CAR5933			J3 Plug			J

* CAR5902 is for G703 Balanced Communications
** CAR5918 is for RS422 Serial Communications

Table 4-3 Cable Connections between OM20 and OMS11

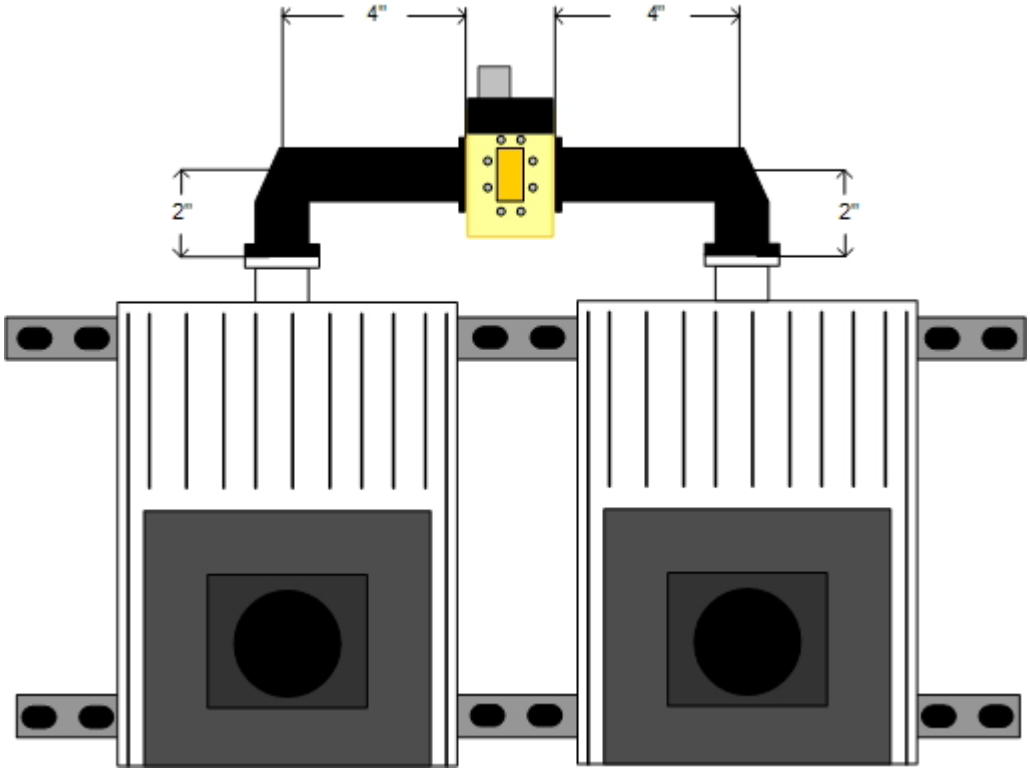


Figure 4-4 BUC Mount Front View on King Post
NOTE: Reference only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Connector Pinouts

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5.0 OMS11 External Interface Connections

All OMS11 external connections are interconnected to labeled connectors located on the front of the unit. Any connection interfacing to the OMS11 must utilize the appropriate mating connector (supplied). Refer to Table 5-1. OMS11 Connections and Figure 5-1. OMS11 Connection Ports for the standard unit. Reference throughout this section will be identified as the OMS11.

Table 5-1. OMS11 Connections

Connector	Label	Description	Location
J1	DATA A	RS422 Data I/O / G.703 Balanced / Async	MODEM A
J2	M&C A	RS485 Monitor & Control	MODEM A
J5	TX SW1	TX Waveguide I/O, 48V	OMS11
J6	PWR 1	Power	OMS11
J7	DATA	RS422 Data I/O / G.703 Balanced / Async	OMS11
J8	M&C	RS232/RS485 Monitor & Control	OMS11
J9	RX SW2	RX Waveguide I/O, 48V	OMS11
J10	PWR 2	Power	OMS11
J13	DATA B	RS422 Data I/O / G.703 Balanced / Async	MODEM B
J14	M&C B	RS485 Monitor & Control	MODEM B

Figure 5-1. OMS11 Connection Ports

5.1 LED Indicators

There are nine (9) Light Emitting Diodes (LED'S) on the front of the unit. LEDs identify status of Modem A, Modem B and OMS11. LEDs for Modem A and Modem B include Modems Online Status and Fault Status. LEDs for the OMS11 include Power 1 Status, Power 2 Status, OMS11 Fault status, Auto Mode and Manual Mode. When power is supplied to the unit and the power supply is functioning normally, this LED will be Green. Refer to Table 5-2. LED's for pin-out descriptions.

Table 5-2. LED's

Label	Description	Location
ONLINE	Modem online	MODEM A
FAULT	Modem has a fault	MODEM A
AUTO	Auto Mode selected	OMS11
MANUAL	Manual Mode selected	OMS11
FAULT	OMS 11 has a fault	OMS11
PWR 1	Power 1 status	OMS11
PWR 2	Power 2 status	OMS11
ONLINE	Modem online	MODEM B
FAULT	Modem has a fault	MODEM B

5.2 Power Input

5.2.1 AC Power Input (J6, J10)

AC Inputs are located on connector J6 and J10 of the OMS11. The auto-ranging universal power supply input allows for the connection of AC power to the port between the range of 100 – 240 VAC and 50 – 60 Hz. Power consumption for the unit is 1.0A (OMS11) only. An external chassis ground post is located on the OMS11. The ground post is a #10-32 threaded stud that is used for external grounding and should not be used to ground the AC power Source on J6 and J10. The mating power connector is a 4-pin socket MFG P/N (D38999/24FC4SN) connecter. The mating connector supplied with the unit.

Refer to Table 5-3 AC Powerfor the connector pinouts.

Table 5-3 AC Power

A	Line (L1)
B	Neutral (L2)
C	Ground

5.2.2 DC Power Input (J6, J10) (Optional)

An Optional DC Power Input is available for the OMS11. DC Inputs are located on connector J6 AND J10 of the OMS11. The unit may be powered from a 44 – 56 VDC source with maximum power consumption is 1.5 amps. This port is a 4-pin plug MFG P/N (D38999/24FC4PN) connector. The mating connector supplied with the unit. Refer to Table 5-4. DC Power for the connector pinouts.

Table 5-4. DC Power	
A	– VDC
B	+ VDC
C	Ground
D	N/C

5.3 Ground Lug

An external chassis ground post is located on the OMS11, which requires a #10-32 threaded stud.

WARNING!!

PROPER GROUNDING PROTECTION: During installation and setup, the user must ensure that the unit is properly grounded. The equipment shall be connected to the protective earth connection through the end use protective earth protection.

5.4 Remote Monitor & Control (J8)

This port functions as the OMS11 Remote and Fault port utilizing an 18-Pin D38999/24FD18PN Connector. The Remote Port located on J8 allows for control and monitoring of parameters and functions via an RS-232 Serial Interface or RS-485 for RLLP Protocol. 'Equipment remote setup parameters can be configured via the main board or Terminal mode. Based on the user's application, this may require the user to set the Remote Port, properly configuring the units for Multidrop Address followed by setting the Remote Interface from RS232 to RS485.

The mating connector is supplied with the unit. Refer to Table 5-5 for the Remote/Terminal connector pinouts.

The OMS11's internal M&C system is connected to most of the circuitry on any board contained in the chassis. These connections provide status on the condition of the circuitry and provide the data required for the various measurements the OMS11 provides. The on-board M&C processes this information and generates status indications and alarms when necessary. Status information is available via the Remote port and the Form-C fault connections available on this connector. This summary information can be connected to external equipment or alarms. Refer to Table 5-3.

5.4.1 Terminal Mode (RS232)

The Terminal Mode has the advantage of providing full screen access to the switches parameters, but requires a separate terminal or computer running a Terminal Program. No external software is required other than VT-100 Terminal Emulation Software (e.g. "Procomm" for a computer when used as a terminal. The Control Port is normally used as an RS–232

Connection to the terminal device. This is the standard configuration when shipped from factory. Refer to Table 5-5for pinouts. Refer to Appendix A for configuring unit to RS232 Terminal.

The factory terminal setup is as follows:

Emulation Type: VT-100 (can be changed)
Baud Rate: 9600
Data Bits: 8
Parity: No Parity (Fixed)
Stop Bits: 1 Stop Bit

The factory terminal Baud Rate can be changed by accessing dip switches located on the main board. Internal DIP switches are accessible only by removing the top cover. Refer to Appendix A, Figure A2.

5.4.2 Modem Remote Communications (RLLP/RS485)

The RLLP Remote Port is located on J8 allows for control and monitoring of parameters and functions via an RS-485. Control and status messages are conveyed between the modem and all subsidiary modems and the host computer using packetized message blocks in accordance with a proprietary communications specification. This communication is handled by the Radyne Link Level Protocol (RLLP), which serves as a protocol 'wrapper' for the RM&C data. Complete information on monitor and control software is contained in the following sections. Refer to Table 5-5 for pinout descriptions. Refer to Appendix A for configuring the unit to RS485 Remote. Refer to Appendix B for the RLLP Protocol.

This requires the user to first properly setup the unit ensuring Multidrop Address are configured as needed. The OMS11 has internal DIP switches that are accessible only by removing the top cover. DIP switch S3 is used to configure remote baud rates and addressing. Refer to Appendix A, Figure A2 for dip switch information. If you are having trouble with DIP switch settings, contact Radyne Customer Service for any additional help.

5.4.3 Common Equipment Faults (J8)

Common equipment fault hardware is available on the OMS11. The OMS11 M&C Connector (J8) has Form-C contacts available that indicate which modem is online and indicates OMS11 Fault status. Refer to Table 5-5.

Table 5.5. Remote Monitor & Control / Faults (J8)

Pin No.	Signal Name	Signal	Direction
A	Receive Data RS-232	RXD-232	Input
B	Transmit Data RS-232	TXD-232	Output
C	Reserved	---	---
D	Transmit Data RS-485 (+)	TX-485-B	Output
E	Transmit Data RS-485 (-)	TX-485-A	Output
F	Receive Data RS-485 (+)	RX-485-B	Input
G	Receive Data RS-485 (-)	RX-485-A	Input

H	Ground	GND	---
J	Switch Fault – C	SF-C	---
K	Switch Fault – NC	SF-NC	---
L	Switch Fault – NO	SF-NO	---
M	No Connect	---	---
N	No Connect	---	---
S	DSR		---
R	No Connect	---	---
U	No Connect	---	---
P	Modem A Online Relay – NC	MO-NC	---
T	Modem B Online Relay – NO	MO-NO	---

5.4.3.1 Fault Detection

The OMS11 & OM20 work simultaneously to determine the status of all the components within this system. The OMS11 & OM20 are capable of monitoring BUC and LNB redundancy system. Faults detection is established by the OM20 and forwarded to the OMS11. Fault detection for a redundant BUC system will be different based on whether the BUC Power is supplied by the OM20 or if the BUC Power is supplied by an external power source. If the BUC power is supplied externally, then the BUC must have Normally Closed Form C Fault contacts so the OMS11/OM20 can monitor the BUC fault status.

Figure 5-2 reflects the BUC fault detection connector which is required for BUC that are using external Power supplies.

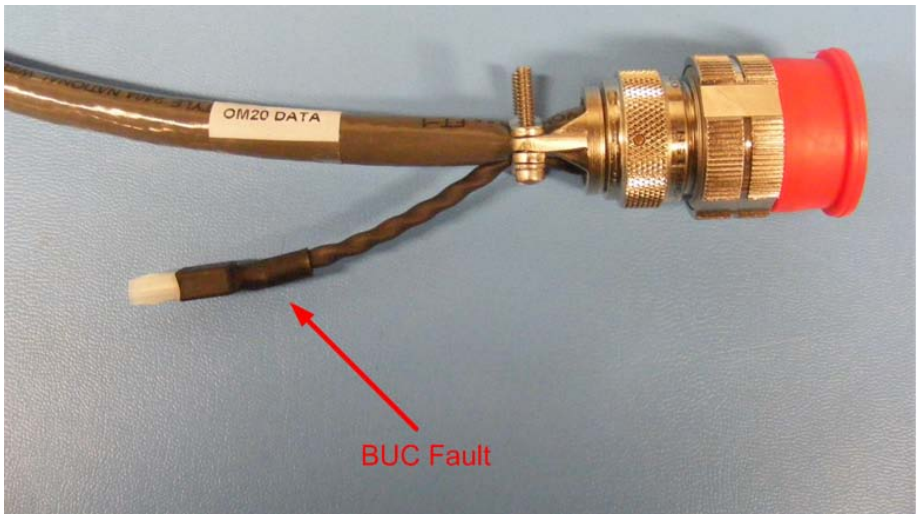

Figure 5-2 External BUC fault detection on CAR5902 or CAR5918

Fault detection with the OM20 supplying power to BUC:

- BUC Faults - OM20 uses internal fault detection circuitry to determine BUC status and initiates a fault that is forwarded to the OMS11
- OM20 uses internal fault detection circuitry to determine LNB status and initiate fault

Fault detection with BUC power supplied externally:

- BUC must have Form C contacts in order for BUC fault detection to work
- OM20 data cable CAR5902 or CAR5918 has an external connector that is used to connect and monitor Form C Contacts from the BUC.
- OM20 uses internal fault detection circuitry to determine LNB status and initiate fault

5.5 Terrestrial Data Interface (J7) – RS422 Synchronous Data, Asynchronous Overhead Data, and G.703 Balanced Data I/O Port

This 37 Pin D38999/24FD35PN Connector contains the RS422 data connections, the RS485 Asynchronous Overhead data interface and the G.703 Balanced interface.
Refer to Table 5-6 for pin-outs. Refer to Table 5-7 for G.703 Balanced pin-outs.

Table 5.6. RS422 Synchronous Data I/O; Async Data Connector (J7)

J7 Pin No.	Signal Name	Signal	Direction	EIA-530 25 Pin Connector Reference
1	Shield--- ---			1
2	Send Data B (+)	SD-B	Input	14
3	Send Data A (-)	SD-A	Input	2
4	Send Timing A (-)	ST-A	Output	15
5	Receive Data	RD-A	Output	3
6	Receive Data B (+)	RD-B	Output	16
7	Request To Send A (-)	RS-A	Input	4
8	Receive Timing A (-)	RT-A	Output	17
9	Clear To Send A (-)	CS-A	Output	5
10				
11	Data Mode A (-)	DM-A	Output	6
12	Request To Send B (+)	RS-B	Input	19
13	Signal Ground	SGND	---	7
14	Data Terminal Ready A (-)	TR-A	Input	20
15	Receiver Ready A (-)	RR-A	Output	8
16				
17	Receive Timing B (+)	RT-B	Output	9
18	Data Mode B (+)	DM-B	Output	22
19	Receiver Ready B (+)	RR-B	Output	10
20	Data Terminal Ready B (+)	TR-B	Input	23
21	Terminal Timing B (+)	TT-B	Input	11
22	Terminal Timing	TT-A	Input	14
23	Send Timing B (+)	ST-B	Output	12
24	No Connect	---	---	25
25	Clear To Send B (+)	CS-B	Output	13

Table 5.6 cont. RS422 Synchronous Data I/O; Async Data Connector (J7)				
J7 Pin No.	**Async - Signal Name**	**Signal**	**Direction**	
26	Transmit Data B (Async)	TXD_B	Input	N/C
27	Transmit Data A (Async)	TXD_A	Input	N/C
30	Receive Data A (Async)	RXD_A	Output	N/C
31	Receive Data B (Async)	RXD_B	Output	N/C

Table 5.7. G.703 Balanced (J7)				
J7 Pin No.	**G703 Balance - Signal Name**	**Signal**	**Direction**	**G.703 Balanced 15 Pin Connector Reference**
32	Send Data (-)	SD-A	Input	1
35	Receive Data A (-)	RD-A	Output	3
34	Ground	GND	---	4
33	Send Data (+)	SD-B	Input	9
36	Receive Data B (+)	RD-B	Output	11
37				
29				
28				

5.6 Modem A Data Interface (J1) – RS422 Synchronous Data, Asynchronous Overhead Data, and G.703 Balanced Data I/O Port

This 37Pin D38999/24FD35PN Connector contains the RS422 data connections, RS485 Asynchronous Overhead data interface; G.703 Balanced interface, and the Open Collector Modulator and Demodulator Faults. Refer to Table 5-8 for pin-outs. Refer to Table 5-9 for G.703 Balanced.

NOTE: Data cables between the Modem and OMS11 are different based on interface type:
G703 Balanced CAR5902
RS422 CAR5918

Table 5.8. RS422 Synchronous Data I/O; Async Data Connector (J1)

J1 Pin No.	RS422 - Signal Name	Signal	Direction	EIA-530 Std. 25 Pin Reference
1	Shield--- ---			1
2	Send Data B (+)	SD-B	Input	14
3	Send Data A (-)	SD-A	Input	2
4	Send Timing A (-)	ST-A	Output	15
5	Receive Data A (-)	RD-A	Output	3
6	Receive Data B (+)	RD-B	Output	16
7	Request To Send A (-)	RS-A	Input	4
8	Receive Timing A (-)	RT-A	Output	17
9	Clear To Send A (-)	CS-A	Output	5
10	Modulator Fault – Open Collector	MF	Output	18
11	Data Mode A (-)	DM-A	Output	6
12	Request To Send B (+)	RS-B	Input	19
13	Signal Ground	SGND	---	7
14	Data Terminal Ready A (-)	TR-A	Input	20
15	Receiver Ready A (-)	RR-A	Output	8
16	Demodulator Fault	DF	Output	21
17	Receive Timing B (+)	RT-B	Output	9
18	Data Mode B (+)	DM-B	Output	22
19	Receiver Ready B (+)	RR-B	Output	10
20	Data Terminal Ready B (+)	TR-B	Input	23
21	Terminal Timing B (+)	TT-B	Input	11
22	Terminal Timing	TT-A	Input	14
23	Send Timing B (+)	ST-B	Output	12
24	No Connect	---	---	25
25	Clear To Send B (+)	CS-B	Output	13

Table 5.8 cont. RS422 Synchronous Data I/O; Async Data Connector (J1)				
J1 Pin No.	**Async - Signal Name**	**Signal**	**Direction**	
26	Transmit Data B (Async)	TXD_B	Input	N/C
27	Transmit Data A (Async)	TXD_A	Input	N/C
28	No Connect	---	---	N/C
30	Receive Data A (Async)	RXD_A	Output	N/C
31	Receive Data B (Async)	RXD_B	Output	N/C

Table 5.9 G.703 Balanced (J1)				
J1 Pin No.	**G703 Balance - Signal Name**	**Signal**	**Direction**	**G.703 Balanced 15 Pin Reference**
32	Send Data (-)	SD-A	Input	1
35	Receive Data A (-)	RD-A	Output	3
34	Ground	GND	---	4
33	Send Data (+)	SD-B	Input	9
36	Receive Data B (+)	RD-B	Output	11
37	No Connect	---	---	14
29	No Connect	---	---	15

5.7 Modem B Data Interface (J13) – RS422 Synchronous Data, Asynchronous Overhead Data, and G.703 Balanced Data I/O Port

This 38 Pin D38999/24FD35PN Connector contains the RS422 data connections, RS485 Asynchronous Overhead data interface; G.703 Balanced interface, and the Open Collector Modulator and Demodulator Faults. Refer to Table 5-10 for pin-outs. Refer to Table 5-11 for G.703 pin-outs.

NOTE: Data cables between the Modem and OMS11 are different based on interface type:
G703 Balanced CAR5902
RS422 CAR5918

Table 5-10 RS422 Synchronous Data I/O; Async Data Connector (J13)

J13 Pin No.	RS422 - Signal Name	Signal	Direction	EIA-530 Std. 25 Pin Reference
1	Shield--- ---			1
2	Send Data B (+)	SD-B	Input	14
3	Send Data A (-)	SD-A	Input	2
4	Send Timing A (-)	ST-A	Output	15
5	Receive Data	RD-A	Output	3
6	Receive Data B (+)	RD-B	Output	16
7	Request To Send A (-)	RS-A	Input	4
8	Receive Timing A (-)	RT-A	Output	17
9	Clear To Send A (-)	CS-A	Output	5
10	Modulator Fault – Open Collector	MF	Output	18
11	Data Mode A (-)	DM-A	Output	6
12	Request To Send B (+)	RS-B	Input	19
13	Signal Ground	SGND	---	7
14	Data Terminal Ready A (-)	TR-A	Input	20
15	Receiver Ready A (-)	RR-A	Output	8
16	Demodulator Fault	DF	Output	21
17	Receive Timing B (+)	RT-B	Output	9
18	Data Mode B (+)	DM-B	Output	22
19	Receiver Ready B (+)	RR-B	Output	10
20	Data Terminal Ready B (+)	TR-B	Input	23
21	Terminal Timing B (+)	TT-B	Input	11
22	Terminal Timing	TT-A	Input	14
23	Send Timing B (+)	ST-B	Output	12
24	No Connect	---	---	25
25	Clear To Send B (+)	CS-B	Output	13

Table 5-10 cont. RS422 Synchronous Data I/O; Async Data Connector (J13)				
J13 Pin No.	**Async - Signal Name**	**Signal**	**Direction**	
26	Transmit Data B (Async)	TXD_B	Input	N/C
27	Transmit Data A (Async)	TXD_A	Input	N/C
28	No Connect	---	---	N/C
30	Receive Data A (Async)	RXD_A	Output	N/C
31	Receive Data B (Async)	RXD_B	Output	N/C

Table 5-11 G.703 Balanced (J13)				
J13 Pin No.	**G703 Balance - Signal Name**	**Signal**	**Direction**	**G.703 Bal 15 Pin Connector Reference**
32	Send Data (-)	SD-A	Input	1
35	Receive Data A (-)	RD-A	Output	3
34	Ground	GND	---	4
33	Send Data (+)	SD-B	Input	9
36	Receive Data B (+)	RD-B	Output	11
37	No Connect	---	---	14
29	No Connect	---	---	15

5.8 Modem A Remote/Terminal/Fault Port on OMS11 (J2)

This port provides Fault status and RS485 Communications to the OMS11 from the OM20 (Modem A). This port utilizes an 18-Pin D38999/24FD18PN Connector. Refer to Table 5-12 for the pinout information. .

Table 5-12 Remote/Terminal/Fault Connector (J2)

Pin No.	Signal Name	Signal	Direction
A	Receive Data RS-232	RX-232	---
B	Transmit Data RS-232	TX-232	---
C	No Connect	---	---
D	Transmit Data RS-485 (+)	TX-485-B	Output
E	Transmit Data RS-485 (-)	TX-485-A	Output
F	Receive Data RS-485 (+)	RX-485-B	Input
G	Receive Data RS-485 (-)	RX-485-A	Input
H	Ground	GND	---
J	Mod Fault – Common	MF-C	---
K	Mod Fault – NC	MF-NC	---
L	Mod Fault – NO	MF-NO	---
M	Demod Fault - Common	DF-C	---
N	Demod Fault – NO	DF-NO	---
S	Demod Fault – NC	DF-NC	---
R	Ground	GND	---
U	No Connect	---	---
P	No Connect	---	---
T	No Connect	---	---

5.9 Modem B Remote/Terminal/Fault Port on the OMS11 (J14)

This port provides Fault status and RS485 Communications to the OMS11 from the OM20 (Modem B). This port utilizes an 18-Pin D38999/24FD18PN Connector. Refer to Table 5-13 for the pinout information.

Table 5-13 Remote/Terminal/Fault Connector (J14)

Pin No.	Signal Name	Signal	Direction
A	Receive Data RS-232	RX-232	---
B	Transmit Data RS-232	TX-232	---
C	No Connect	---	---
D	Transmit Data RS-485 (+)	TX-485-B	Output
E	Transmit Data RS-485 (-)	TX-485-A	Output
F	Receive Data RS-485 (+)	RX-485-B	Input
G	Receive Data RS-485 (-)	RX-485-A	Input
H	Ground	GND	---
J	Mod Fault – Common	MF-C	---
K	Mod Fault – NC	MF-NC	---
L	Mod Fault – NO	MF-NO	---
M	Demod Fault - Common	DF-C	---
N	Demod Fault – NO	DF-NO	---
S	Demod Fault – NC	DF-NC	---
R	Ground	GND	---
U	No Connect	---	---
P	No Connect	---	---
T	No Connect	---	---

5.10 TX & RX Waveguide Switch Interface (J5 & J9)

These ports provide 48Volts for switching the RX and TX Waveguide switches. For TX waveguide switching, connect the CAR5904 cable between the J5 of the OMS11 to the TX waveguide Switch. For RX waveguide switching, connect the CAR5904 cable between the J9 of the OMS11. The chart below identifies the J5 & J9 pinouts on the OMS11 and the mating connector pinout for a Sector Microwave Switch. Connector information and pinout descriptions are identified below. Refer to Table 5-14 and Figure 5-3. CAR5904 is supplied by Radyne when waveguide switching hardware is supplied by Radyne.

Table 5-154 CAR5904 OMS11 TO SECTOR MICROWAVE W/G SWITCH		
CONNECTOR	**OMS11 J5 / J9**	**SECTOR MICROWAVE SWITCH TX / RX W/G SW**
MFGR	AMPHENOL	SOUR
HOUSING	AL07F15-18P	MS3116F12-10S
DESCRIPTION	JAM NUT RECPT	CONN. W/ST.RELF.
CONTACTS	10-251415-205	INC.
STRAIN RELIEF	M85049-38S15N	INC.
CABLE INFO	MFG: NATIONAL CABLE	P/N: NQP-1928SJ

WIRING LIST		
SIGNAL	**CONN # PIN #**	**CONN # PIN #**
N/C	**N/C**	**N/C**
Common	B	B
Pos 2 Volts	C	C
Pos 1, Ind 1	D	D
Pos 1 Common	E	E
Pos 2, Ind 1,	F	F
Pos 1, Ind 2	G	G
Ind 2, Com	H	H
Pos 2, Ind 2	J	J
N/C	K	**N/C**
N/C	L	**N/C**
N/C	M	**N/C**
N/C	N	**N/C**
N/C	S	**N/C**
N/C	R	**N/C**
N/C	U	**N/C**
N/C	P	**N/C**
Pos 1 Volts	T	A

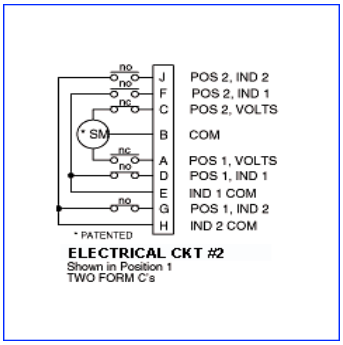

Figure 5-3. Pinout for Sector Microwave Switch

5.11 Mating Connectors

The chart below identifies Radyne and Manufacturer part numbers for the mating connectors to the OMS11. Refer to Table 5-15 for connector part numbers.

Table 5-15 Mating Connectors

Connector	Description	Radyne P/N	MFG P/N Amphenol
J1 & J13	Data	CN/26FD35SN	JD3899/26FD35SN
J1 & J13	Data / Stress Relief	CN/M85049/38-15	M85049/3/-15A
J2 & J14	Faults	CN/26FD18SN	JD38999/26FD18SN
J2 & J14	Faults / Stress Relief	CN/M85049/38-15	M85049/38-15A
J5 & J9	TX/RX WG SW	CN/26FD18SN	JD38999/26FD18SN
J5 & J9	TX/RX WG SW / Stress Relief	CN/M85049/38 -15	M85049/38-15A
J6 & J10	Power / DC	CN/26FC4PN	D38999/26FC4PN
J6 & J10	Power / DC / Stress Relief	CN/M85049/38-13	M85049/38-13A
J6 & J10	Power / AC	CN/26FC4SN	D38999/26FC4SN
J6 & J10	Power / AC / Stress Relief	CN/M85049/38-13	M85049/38-13A
J7	Data	CN/26FD35SN	JD3899/26FD35SN
J7	Data / Stress Relief	CN/M85049/38-15	M85049/3/-15A
J8	Faults	CN/26FD18SN	JD38999/26FD18SN
J8	Faults / Stress Relief	CN/M85049/38-15	M85049/38-15A


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Maintenance and Troubleshooting

6

6.0 Basic Troubleshooting and Maintenance

This section provides information on the basic troubleshooting and repair procedures for the OMS11 1:1 Switch that may be performed on-site by qualified personnel. Only minor repairs will be discussed. For serious failures, the user should not attempt to repair the unit without first contacting the Radyne Customer Service Department at 602-437-9620 for further information and instructions.

6.1 Basic User Checks

Upon the detection of an operational failure, the source of the failure must be determined. Basic user checks include checking the various cables and connectors.

6.1.1 Checking the Cabling and Connectors

Problems that appear difficult to solve can often be traced to a loose or defective cable or connector. The user should first verify the following:

- All cables within the system have no broken or loose connections. Cables that are suspect should be replaced.
- All jacks on the units have no bent or broken pins.
- Both AC Power Cords are properly plugged into the rear of the OMS11.

6.2 Major and Minor Faults

Major faults are failure conditions or combinations of conditions that result in loss of service on one or more channels. Minor faults are failure conditions that do not result in loss of service.

Possible Major Fault conditions are:

A Read-Only Memory (ROM) failure in the Switch;
A Random Access Memory (RAM) failure in the Switch;
A loss of Carrier Detect on a Demodulator Channel where this attribute is monitored;
A loss of Terrestrial Input Clock on a Channel where this attribute is monitored;
A failure of two monitored Modulators;
A failure of two monitored Demodulators;
A failure of both OMS11 power supplies.

Possible Minor Fault conditions are as follows:

A failure of one of the Switch's two redundant power supplies;
A failure of one Demodulator that is being monitored (i.e., a Demodulator that has not been locked out);
A failure of one Modulator that is being monitored;
A reference clock slip.


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Technical Specifications

7

7.0 Introduction

This section defines the technical performance parameters and specifications for the OMS11 1:1 Redundancy Switch.

7.1 General

Modes of Operation:	Auto, Manual, Remote
Configurations:	Modem (Chain Switch)
Modem Switch Time:	50 msec Maximum

7.2 Monitor and Control

Operating parameters can be monitored and controlled via the RS232 Terminal port or the RS485 RLLP control channel. The following modem parameters may be controlled and/or monitored:

Parameters Monitored:	Mode, Modem, Power Supply Status, Internal Switch Settings, Software Revision, Auto/Manual, Select A, Select B
Parameters Controlled:	Modem, Auto/Manual, Select A, Select B

7.3 Terrestrial Interfaces

RS422 & G703 Balanced
RS422 & G703 Unbalanced (Optional)

7.4 Modem Data Cables

CAR5902	G703 Balanced
CAR5918	RS422

7.5 Front Panel LED Indicators

Unit:	Power Supply 1
	Power Supply 2
	Switch Fault
	Auto
	Manual
Modem:	Online A
	Online B
	Fault A
	Fault B

7.6 Front Panel Controls

Enable
Select Auto
Modem Select A
Modem Select B

7.7 Power and Environmental

Prime Power:	100 to 240VAC, 50/60 Hz, 40W typ, 200W Max 44 - 56VDC, 40W typical, 200W Max during switchover
Operating Temperature:	-40 to 50°C, 95% Humidity, Noncondensing
Storage Temperature:	-50 to 70°C, 99% Humidity, Noncondensing

7.8 Physical

OMS11 Chassis Size:	11.4” L x 15.4” W x 5.7” H (28.9 cm x 39.1 cm x 14.48 cm) 12 Pounds (5.4 Kg)


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OMS11 DIP Switch Configuration

A

The OMS11 has four internal DIP switches that are accessible only by removing the top cover. These DIP switches S2, S3, S4 & S5 are used to configure Interface options, data rates and remote baud rates. An upgrade or change from an existing interface or configuration to another may require a change to one or more of the DIP switch settings. If you are having trouble with DIP switch settings, contact Radyne Customer Service for any additional help.

Figure A-1 Illustrates the DIP switch positions for the OM20.
Figure A-2 Illustrates the unit Addressing for and Baud Rate switch positions for remote M&C.

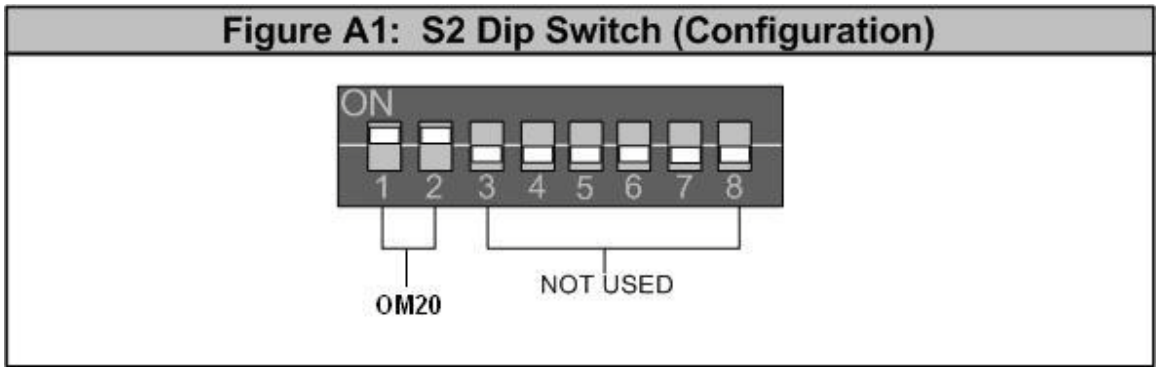


Figure A-1. DIP Switch Positions for the OM20

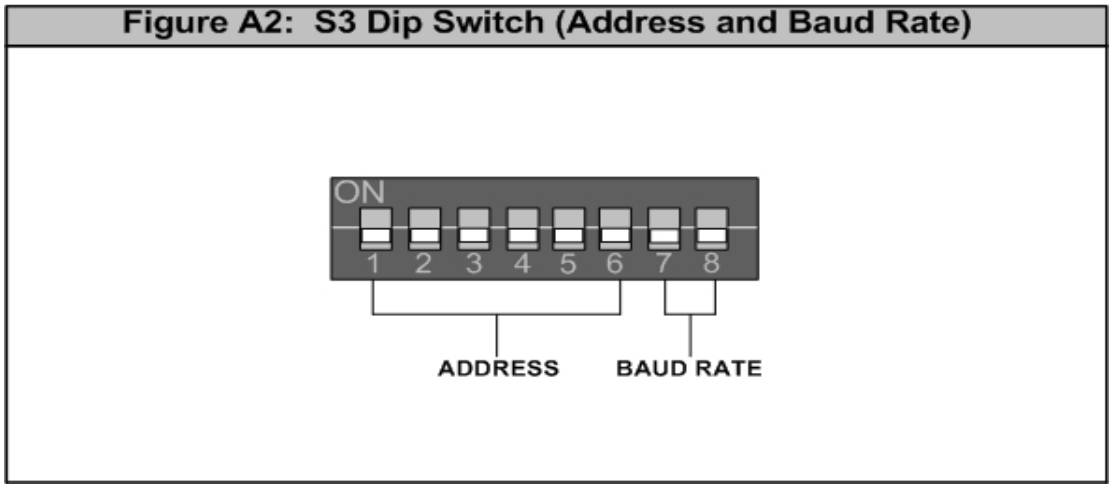


Figure A2. DIP Switch showing Address and Baud Rate

Table A-1 identifies the various S3 dip switch positions. Pins 1 - 6 are utilized for M&C unit addressing when using multiple switches. Pins 7 & 8 are utilized for baud rate for the terminal or remote M&C. Address settings are also accessible through the Remote Port (J-20) with the switch in Terminal Mode. An empty space in Table A-1: represents the (off) position.

Table A-1. Baud Rate Switch Positions								
BAUD RATE	**SW-1**	**SW-2**	**SW-3**	**SW-4**	**SW-5**	**SW-6**	**SW-7**	**SW-8**
9600								
4800							ON	
2400								ON
ADDRESS								
32								
33	ON							
34		ON						
35	ON	ON						
36			ON					
37	ON		ON					
38		ON	ON					
39	ON	ON	ON					
40				ON				
41	ON			ON				
42		ON		ON				
43	ON	ON		ON				
44			ON	ON				
45	ON		ON	ON				
46		ON	ON	ON				
47	ON	ON	ON	ON				
48					ON			
49	ON				ON			
50		ON			ON			
51	ON	ON			ON			
52			ON		ON			
53	ON		ON		ON			
54		ON	ON		ON			
55	ON	ON	ON		ON			
56				ON	ON			
57	ON			ON	ON			
58		ON		ON	ON			
59	ON	ON		ON	ON			
60			ON	ON	ON			
61	ON		ON	ON	ON			
62		ON	ON	ON	ON			
63	ON	ON	ON	ON	ON			
64						ON		
65	ON					ON		
66		ON				ON		
67	ON	ON				ON		
68			ON			ON		
69	ON		ON			ON		
70		ON	ON			ON		
71	ON	ON	ON			ON		
72				ON		ON		
73	ON			ON		ON		
74		ON		ON		ON		
75	ON	ON		ON		ON		
76			ON	ON		ON		
77	ON		ON	ON		ON		
78		ON	ON	ON		ON		
79	ON	ON	ON	ON		ON		
80					ON	ON		
81	ON				ON	ON		
82		ON			ON	ON		
83	ON	ON			ON	ON		
84			ON		ON	ON		
85	ON		ON		ON	ON		
86		ON	ON		ON	ON		
87	ON	ON	ON		ON	ON		
88				ON	ON	ON		
89	ON			ON	ON	ON		
90		ON		ON	ON	ON		
91	ON	ON		ON	ON	ON		
92			ON	ON	ON	ON		
93	ON		ON	ON	ON	ON		
94		ON	ON	ON	ON	ON		
SOFT	ON	ON	ON	ON	ON	ON		

NOTE

When Jumpers are set for SOFT, this allows user to set the Baud and Unit Addresses remotely via the terminal port.

Figure A3 Illustrates how to configure the Dip Switches for RS232 Data on an OMS11.

Figure A3: S4 Dip Switch (RS232 Driver)

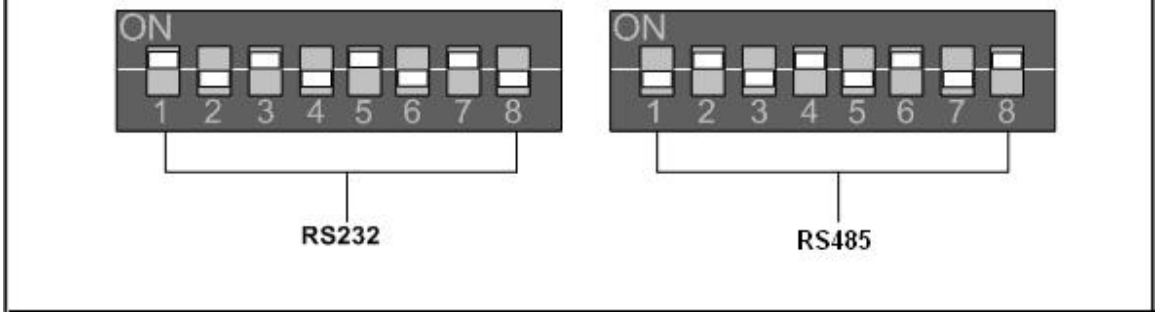


Figure A3. DIP Switch on the RS232 Driver

Figure A4 Illustrates how to configure the Dip Switches for G.703 Unbalanced data on an OMS11 with Universal Data Interface.

Figure A4: S5 Dip Switch (G.703 Driver)

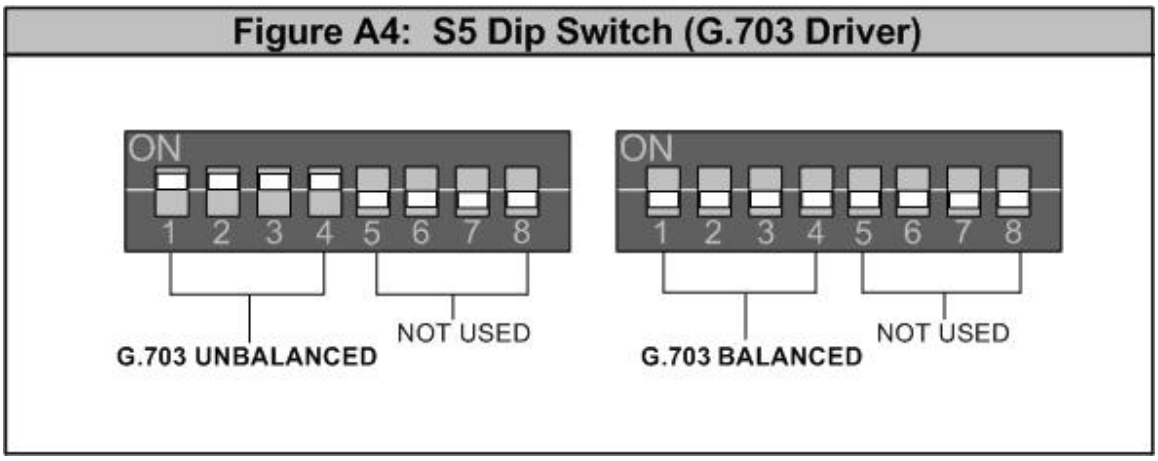


Figure A4. DIP Switch on the G.703 Driver

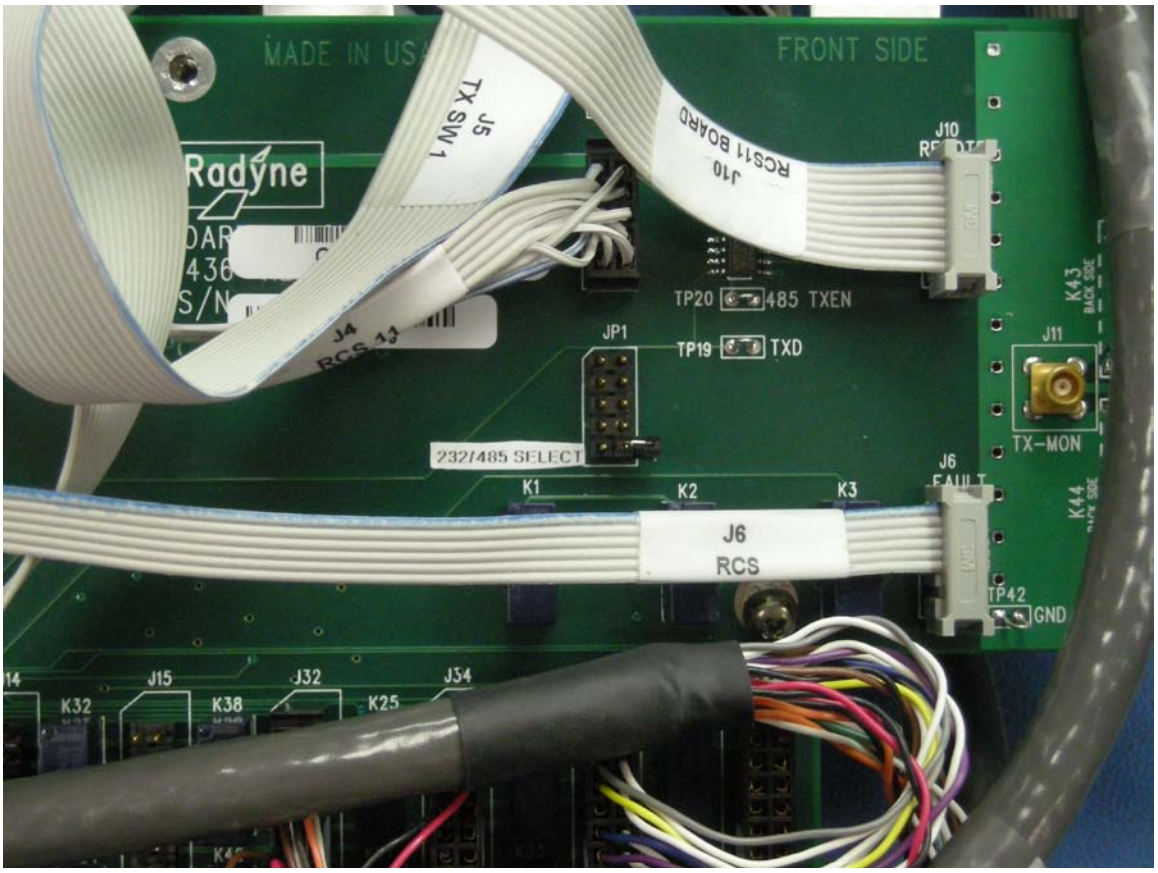


Figure A5. JP1 on AS/3436-6

Figure A5 illustrates the standard jumper block for configuring unit to RS485 Remote or RS232 Terminal mode. Unit is configured to RS232 Terminal when shipped from the factory as per the picture above.

The diagram above indicates an RS232 configuration. Installing the jumper, connecting the pins will configure the unit for RS485.


RADYNE

OMS11 Remote Communications

B

B.0 Host Computer Remote Communications

Control and status messages are conveyed between the OMS11 and the host computer using packetized message blocks in accordance with a proprietary communications specification. This communication is handled by the Radyne Link Level Protocol (RLLP), which serves as a protocol 'wrapper' for the RM&C data.

Complete information on monitor and control software is contained in the Radyne RLLP Protocol Reference Guide.

NOTE

For RS485 Remote communication, install CA/3733 gender changer into the remote port. Gender changes port from RS232 to RS485

B.0.1 Protocol Structure

The Communications Specification (COMMSPEC) defines the interaction of computer resident Monitor and Control software used in satellite earth station equipment such as Modems, redundancy switches, multiplexers, and other ancillary support gear. Communication is bi-directional, and is normally established on one or more full-duplex 9600-baud multi-drop control buses that conform to EIA Standard RS-485.

Each piece of earth station equipment on a control bus has a unique physical address, which is assigned during station setup/configuration or prior to shipment. Valid decimal addresses on one control bus range from 032 through 255 for a total of up to 224 devices per bus. Address 255 of each control bus is usually reserved for the M&C computer.

B.0.2 Protocol Wrapper

The Radyne COMMSPEC is byte-oriented, with the Least Significant Bit (LSB) issued first. Each data byte is conveyed as mark/space information with two marks comprising the stop data. When the last byte of data is transmitted, a hold comprises one steady mark (the last stop bit). To begin or resume data transfer, a space (00h) substitutes this mark. This handling scheme is controlled by the hardware and is transparent to the user. A pictorial representation of the data and its surrounding overhead may be shown as follows:

S1	S2	B_0	B_1	B_2	B_3	B_4	B_5	B_6	B_7	S1	S2, etc.

The stop bits, S1 and S2, are each a mark. Data flow remains in a hold mode until S2 is replaced by a space. If S2 is followed by a space, it is considered a start bit for the data byte and not part of the actual data (B_0 - B_7).

The COMMSPEC developed for use with the Radyne Link Level Protocol (RLLP) organizes the actual monitor and control data within a shell, or 'protocol wrapper', which surrounds the data. The format and structure of the COMMSPEC message exchanges are described herein. Decimal numbers have no suffix; hexadecimal numbers end with a lower case h suffix and binary values have a lower case b suffix. Thus, 22 = 16h = 000010110b. The principal elements of a data frame, in order of occurrence, are summarized as follows:
<SYN> - the message format header character, or ASCII sync character, that defines the beginning of a message. The <SYN> character value is always 16h.

<DATA COUNT> - the 2 Byte Data Count is the number of bytes in the <DATA> field, ranging from 0 through 509.

<SOURCE ID> - the Source Identifier defines the multi-drop address origin. Note that all nodes on a given control bus has an unique address that must be defined.

<DESTINATION ID> - the Destination Identifier serves as a pointer to the multi-drop destination device that indicates where the message is to be sent.

<FRAME SEQUENCE NUMBER> -the FSN is a tag with a value from O through 255 that is sent with each message. It assures sequential information framing and correct equipment acknowledgment and data transfers.

<OPCODE> - the 2 Byte Operation Code field contains a number that identifies the message type associated with the data that follows it. Equipment under MCS control recognizes this byte via firmware identification and subsequently steers the DATA accordingly to perform a specific function or series of functions. Acknowledgment and error codes are returned in this field. 1 Byte for the DMD5000 protocol and 2 Bytes for the DMD15 protocol.

<DATA > - the Data field contains the binary, bi-directional data bytes associated with the <OPCODE> - The number of data bytes in this field is indicated by the <BYTE COUNT> value.

<CHECKSUM> - the checksum is the modulo 256 sum of all preceding message bytes, excluding the <SYN> character. The checksum determines the presence or absence of errors within the message. In a message block with the following parameters, the checksum is computed as shown in Table 1.

BYTE FIELD	DATA CONTENT		RUNNING CHECKSUM
<BYTE COUNT>	02h	= 00000000b	00000000b
<BYTE COUNT>	02h	= 00000010b	00000010b
<SOURCEID>	F0h	= 11110000b	11110010b
<DESTINATION ID>	2Ah	= 00101010b	00011100b
<FSN>	09h	= 00001001b	00100101b
<OPCODE>	03h	= 00000011b	00101000b
<DATA> (Byte 1)	DFh	= 11011111b	00000111b
<DATA> (Byte 2)	FEh	= 11111110b	00000101b

Table 1. Checksum Calculation Example

Thus, the checksum is 00000101b; which is 05h or 5 decimal. Alternative methods of calculating the checksum for the same message frame are:

02h + FOh + 2Ah + 09h + 03h + DFh + FEh = 305h.

Since the only concern is the modulo 256 (modulo 1 00h) equivalent (values that can be represented by a single 8-bit byte), the checksum is 05h.

For a decimal checksum calculation, the equivalent values for each information field are:
0 + 2 + 240 + 42 + 9 + 3 + 223 + 254 = 773; 773/256 = 3 with a remainder of 5.

This remainder is the checksum for the frame.
5 (decimal) = 05h = 0101b = <CHECKSUM>
]

B.0.3 Frame Description and Bus Handshaking

In a Monitor and Control environment, every message frame on a control bus port executes as a packet in a loop beginning with a wait-for-SYN-character mode. The remaining message format header information is then loaded, either by the M&C computer or by a subordinate piece of equipment (such as the DMD15) requesting access to the bus. Data is processed in accordance with the OPCODE, and the checksum for the frame is calculated.

If the anticipated checksum does not match then a checksum error response is returned to the message frame originator. The entire message frame is discarded and the wait-for-SYN mode goes back into effect. If the OPCODE resides within a command message, it defines the class of action that denotes an instruction which is specific to the device type, and is a prefix to the DATA field if data is required. If the OPCODE resides within a query message packet, then it defines the query code, and can serve as a prefix to query code DATA.

The Frame Sequence Number (FSN) is included in every message packet and increments sequentially. When the M & C computer or bus-linked equipment initiates a message, it assigns the FSN as a tag for error control and handshaking. A different FSN is produced for each new message from the FSN originator to a specific device on the control bus. If a command packet is sent and not received at its intended destination, then an appropriate response message is not received by the packet originator. The original command packet is then re-transmitted with the same FSN. If the repeated message is received correctly at this point, it is considered a new message and is executed and acknowledged as such.

If the command packet is received at its intended destination but the response message (acknowledgment) is lost, then the message originator (usually the M&C computer) re-transmits the original command packet with the same FSN. The destination device detects the same FSN and recognizes that the message is a duplicate, so the associated commands within the packet are not executed a second time. However, the response packet is again sent back to the source as an acknowledgment in order to preclude undesired multiple executions of the same command.

To reiterate, valid equipment responses to a message require the FSN tag in the command packet. These serve as part of the handshake/acknowledge routine. If a valid response message is absent, then the command is re-transmitted with the same FSN. For a repeat of the same command involving iterative processes (such as increasing or decreasing the transmit power level of a DMD15 modulator), the FSN is incremented after each message packet. When the FSN value reaches 255, it overflows and begins again at zero. The FSN tag is a powerful tool that assures sequential information framing, and is especially useful where commands require more than one message packet.

The full handshake/acknowledgment involves a reversal of source and destination ID codes in the next message frame, followed by a response code in the <OPCODE> field of the message packet from the equipment under control.

If a command packet is sent and not received at its intended destination, a timeout condition can occur because a response message is not received by the packet originator. On receiving devices slaved to an M & C computer, the timeout delay parameters may be programmed into the equipment in accordance with site requirements by Radyne Corp. prior to shipment, or altered by qualified personnel. The FSN handshake routines must account for timeout delays and be able to introduce them as well.

B.0.4 Global Response Operational Codes

In acknowledgment (response) packets, the operational code <OPCODE> field of the message packet is set to 0 by the receiving devices when the message intended for the device is evaluated as valid. The device that receives the valid message then exchanges the <SOURCE ID> with the <DESTINATION ID>, sets the <OPCODE> to zero in order to indicate that a good message was received, and returns the packet to the originator.

This "GOOD MESSAGE" opcode is one of nine global responses. Global response opcodes are common responses, issued to the M&C computer or to another device that can originate from and are interpreted by all Radyne equipment in the same manner. These are summarized as follows (all opcode values are expressed in decimal form):

RESPONSE OPCODE DESCRIPTION	OPCODE
Good Message	000
Bad Parameter	255
Bad Opcode	254
Bad Checksum	253
Command Not Allowed in LOCAL Mode	252
Command Not Allowed in AUTO Mode	251
Bad Destination	250
Unable to Process Command	249
Packet Too Long	248

Table 2. Response OPCODES

B.0.5 Software Compatibility

The COMMSPEC, operating in conjunction within the RLLP shell, provides for full forward and backward software compatibility independent of the software version in use. New features are appended to the end of the DATA field without OPCODE changes. Older software simply discards the data as extraneous information without functional impairment for backward compatibility.

If new device-resident or M&C software receives a message related to an old software version, new information and processes are not damaged or affected by the omission of data.

The implementation of forward and backward software compatibility often, but not always, requires the addition of new Opcodes. Each new function requires a new Opcode assignment if forward and backward compatibility cannot be attained by other means.

B.0.6 RLLP Summary

The RLLP is a simple send-and-wait protocol that automatically re-transmits a packet whenever an error is detected, or when an acknowledgment (response) packet is absent.

During transmission, the protocol wrapper surrounds the actual data to form information packets. Each transmitted packet is subject to time out and frame sequence control parameters, after which the packet sender waits for the receiver to convey its response. Once a receiver verifies that a packet sent to it is in the correct sequence relative to the previously received packet, it computes a local checksum on all information within the packet excluding the <SYN> character and the <CHECKSUM> fields. If this checksum matches the packet <CHECKSUM>, the receiver processes the packet and responds to the packet sender with a valid response (acknowledgment) packet. If the checksum values do not match, the receiver replies with a negative acknowledgment (NAK) in its response frame.

The response packet is therefore either an acknowledgment that the message was received correctly, or some form of a packetized NAK frame. If the sender receives a valid acknowledgment (response) packet from the receiver, the <FSN> increments and the next packet is transmitted as required by the sender. However, if a NAK response packet is returned the sender re-transmits the original information packet with the same embedded <FSN>.

If an acknowledgment (response) packet or a NAK packet is lost, corrupted, or not issued due to an error and is thereby not returned to the sender, the sender re-transmits the original information packet; but with the same <FSN>. When the intended receiver detects a duplicate packet, the packet is acknowledged with a response packet and internally discarded to preclude undesired repetitive executions. If the M&C computer sends a command packet and the corresponding response packet is lost due to a system or internal error, the computer times out and re-transmits the same command packet with the same <FSN> to the same receiver and waits once again for an acknowledgment or a NAK packet.

To reiterate, the format of the message block is shown in below in Table 3, Link Level Protocol Message Block.

SYNC	COUNT	SRC ADDR	DEST ADDR	FSN	OP CODE	DATA BYTES	CHECKSUM

Table 3. Link Level Protocol Message Block

B.1 Remote Port Packet Structure:

The OMS11 protocol is an enhancement on the DMD5000 protocol. It also uses a packet structure format. The structure is as follows:

<SYNC> = Message format header character that defines the beginning of a message. The <SYNC> character value is always 0x16. (1 byte)
<BYTE COUNT> = Number of bytes in the <DATA> field. (2 bytes)
<SOURCE ID> = Identifies the address of the equipment from where the message originated. (1 byte)
<DEST. ID> = Identifies the address of the equipment where the message is to be sent. (1 byte)
<F.S.N.> = Frame sequence number insures correct packet acknowledgment and data transfers. (1 byte)

<OPCODE> = This byte identifies the message type associated with the information data. The equipment processes the data according to the value in this field. Return error codes and acknowledgment are also included in this field. (2 bytes)

<...DATA...> = Information data. The number of data bytes in this field is indicated by the <BYTE COUNT> value.

<CHECKSUM> = The modulo 256 sum of all preceding message bytes excluding the <SYNC> character. (1 byte)

CAUTION!!

The DMD15 RLLP is not software-compatible with the following previous Radyne products: RCU5000 and DMD4500. These products may not occupy the same bus while using this protocol as equipment malfunction and loss of data may occur.

NOTE

When transmitting a packet at 9600 baud, the Remote M&C should ensure that the timeout value between characters does not exceed the time it takes to transmit 200 characters (≈200 msec). If this timeout value is exceeded, the equipment will timeout.

Regular Commands

Opcode <2000h> Query OMS11 Device Identification

Query Response Data Field (1 byte):

<1>	Device Identification	26 decimal for OMS11

Opcode <2080h> Query OMS11 Device Firmware Version

Query Response Data Field (19 bytes):

<1>	Device Firmware Version MSB	binary number, implied decimal point
<1>	Device Firmware Version LSB	binary number, implied decimal point
<10>	Device Firmware Name	null terminated string
<7>	Device Firmware Release Date	null terminated string

Opcode <2280h> Command OMS11 Load Factory Defaults

Command Data Field (2 bytes):

<1>	Unlock Code 1	0x55
<1>	Unlock Code 2	0xAA

Opcode <2083h> Query OMS11 Backup Configuration

Query Response Data Field (1 byte):

<1>	Backup Configuration	0 = Modem (Coupled) 1 = Mod Only 2 = Demod Only 3 = Mod/Demod (Uncoupled)

Opcode <2084h> Query OMS11 Backup Mode

Query Response Data Field (1 byte):

<1>	Backup Mode	0 = Manual 1 = Automatic 2 = <unknown>

Opcode <2284h> Command OMS11 Backup Mode

Command Data Field (1 byte):

<1>	Backup Mode	0 = Manual 1 = Automatic

Opcode <2085h> Query OMS11 Backup State

Query Response Data Field (2 bytes):

<1>	Mod Backup state	0 = A online 1 = B online 2 = <none or unknown>
<1>	Demod Backup State	0 = A online 1 = B Online 2 = <none or unknown>

Opcode <2285h> Command OMS11 Force Manual Backup

Command Data Field (2 bytes):

<1>	Mod Backup State	0 = A online 1 = B online
<1>	Demod Backup State	0 = A online 1 = B online

Opcode <2086h> Query OMS11 Switch Delays

Query Response Data Field (8 Bytes):

<1> Switch Delay Mod Fault MSB
<1> Switch Delay Mod Fault LSB
<1> Switch Delay Mod NoFault MSB
<1> Switch Delay Mod NoFault LSB
<1> Switch Delay Demod Fault MSB
<1> Switch Delay Demod Fault LSB
<1> Switch Delay Demod NoFault MSB
<1> Switch Delay Demod NoFault LSB

Opcode <2286h> Command OMS11 Switch Delays

Command Data Field (8 Bytes):

<1> Switch Delay Mod Fault MSB
<1> Switch Delay Mod Fault LSB
<1> Switch Delay Mod NoFault MSB
<1> Switch Delay Mod NoFault LSB
<1> Switch Delay Demod Fault MSB
<1> Switch Delay Demod Fault LSB
<1> Switch Delay Demod NoFault MSB

<1> Switch Delay Demod NoFault LSB

Opcode <2087h> Query OMS11 Switch Alarms

Query Response Data Field (5 bytes):

<1> Global Current Alarm
Bit 0: 1 = Global Alarm
Bit 1:.7: unused, return 0

<1> External Current Alarms
Bit 0: 1 = Mod A Alarm
Bit 1: 1 = Force Mod A Alarm
Bit 2: 1 = Demod A Alarm
Bit 3: 1 = Force Demod A Alarm
Bit 4: 1 = Mod B Alarm
Bit 5: 1 = Force Mod B Alarm
Bit 6: 1 = Demod B Alarm
Bit 7: 1 = Force Demod B Alarm

<1> Switch Current Alarms
Bit 0: 1 = Switch Power 1 Alarm
Bit 1: 1 = Switch Power 2 Alarm
Bit 2: 1 = Switch Firmware Alarm
Bit 3: 1 = Switch NV Alarm
Bit 4: 1 = Switch Internal Alarm
Bit 5:.7: unused, return 0

<2> Spare Current Alarms
Always 0

Opcode: <2089h> Query OMS11 Switch Alarms Mask

Query Response Data Field (4 Bytes):

<1> External Alarm Masks
1 = Enabled, 0 = Masked Off
Bit 0: 1 = Mod A Alarm Enabled
Bit 1: 1 = Force Mod A Alarm Enabled
Bit 2: 1 = Demod A Alarm Enabled
Bit 3: 1 = Force Demod A Alarm Enabled
Bit 4: 1 = Mod B Alarm Enabled
Bit 5: 1 = Force Mod B Alarm Enabled
Bit 6: 1 = Demod B Alarm Enabled
Bit 7: 1 = Force Demod B Alarm Enabled

<1> Switch Alarm Masks
1 = Enabled, 0 = Masked Off
Bit 0: 1 = Switch Power 1 Alarm Enabled
Bit 1: 1 = Switch Power 2 Alarm Enabled
Bit 2: 1 = Switch Firmware Error Enabled
Bit 3: 1 = Switch NV Alarm
Bit 4: 1 = Switch Internal Alarm Enabled
Bit 5:.7: unused, return 0

<2> Spare Current Alarms
Always 0

Opcode: <2289h> Command OMS11 Switch Alarms Masks

Command Data Field (4 Bytes):

<1> External Alarm Masks
1 = Enabled, 0 = Masked Off
Bit 0: 1 = Mod A Alarm Enabled
Bit 1: 1 = Force Mod A Alarm Enabled
Bit 2: 1 = Demod A Alarm Enabled

		Bit 3: 1 = Force Demod A Alarm Enabled Bit 4: 1 = Mod B Alarm Enabled Bit 5: 1 = Force Mod B Alarm Enabled Bit 6: 1 = Demod B Alarm Enabled Bit 7: 1 = Force Demod B Alarm Enabled
<1>	Switch Alarm Masks	1 = Enabled, 0 = Masked Off Bit 0: 1 = Switch Power 1 Alarm Enabled Bit 1: 1 = Switch Power 2 Alarm Enabled Bit 2: 1 = Switch Firmware Error Enabled Bit 3: 1 = Switch NV Alarm Enabled Bit 4: 1 = Switch Internal Alarm Enabled Bit 5:.7: unused, 0 filled
<2>	Spare Current Alarms	0 filled


RADYNE

Interconnecting Cable Drawings

C

The following drawings are included or can be supplied with the OMS11 System.

C-1. CAR5902 OMS11 to OM20 G.703-ASYNC DATA

C-2. CAR5903 OMS11 to OM20 M&C

C-3. CAR5904 OMS11 to Waveguide Switches

C-4. CAR5918 OMS11 t oOM20 EIA530 DATA

C-5. CAR5939 BUC Fault Codan

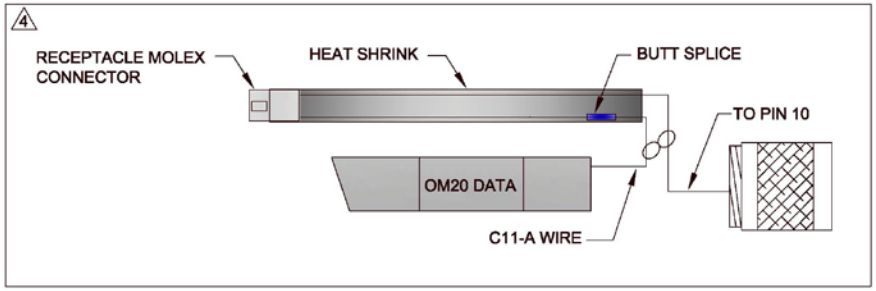
REVISIONS				
REV	E.C.O. NO.	DESCRIPTION	DATE	APPROVED
–X	NONE	ENGINEERING PROTOTYPE	12/20/07	

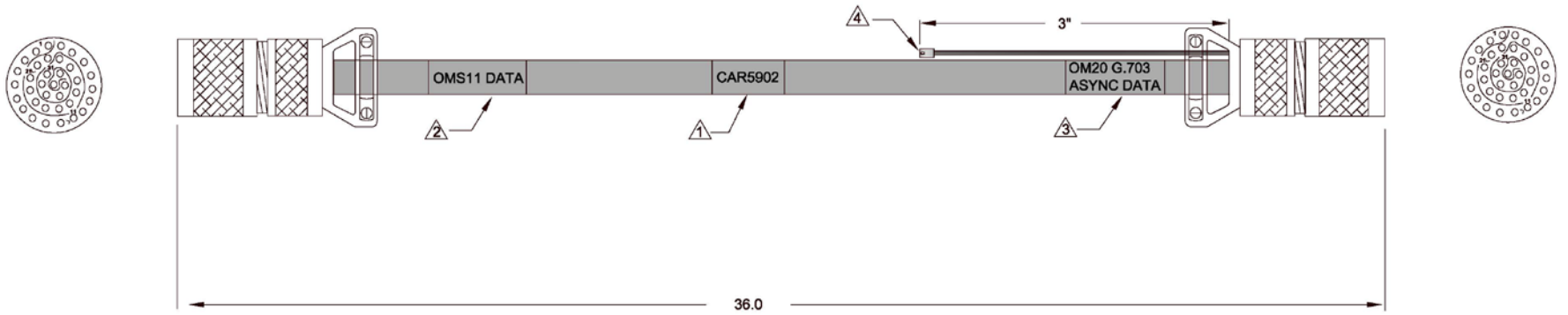
C-1

NOTES	CAR5902 OMS11 TO OM20 G.703 / ASYNC DATA				
CABLED TWISTED PAIRS	CONNECTOR	OMS11 J1 / J13	OM20 J3	FAULT CONN. INNE	FAULT CONN.OUTER
NATIONAL CABLE	MFGR	AMPHENOL	AMPHENOL	MOLEX	MOLEX
NQP-1928SJ	HOUSING	D38999-26FD35PN	D38999-26FD35PN	O3061023	O3062023
	DESCRIPTION	MIL. SPEC. CONN.	MIL. SPEC. CONN.	RECEPTACLE	PLUG HOUSING
USE MFG. COLOR	CONTACTS	FEMALE	FEMALE	FEMALE	MALE
CODE	STRAIN RELIEF	M85049-38S15N	M85049-38S15N	2061201	2062101

WIRING LIST					
PAIR # (WIRE #)	SIGNAL	CONN# PIN #	CONN# PIN #		
C1-1A	SHIELD	1	1		
C1-11A	MF (OC)		10	1	
C1-11B	DF (OC)	16	16		
C2-13A	ASYNC TXD-B	26	26		
C2-13B	ASYNC TXD-A	27	27		
C1-17A	N/C	28	28		
C1-17B	N/C	29	29		
C2-14A	ASYNC RXD-A	30	30		
C2-14B	ASYNC RXD-B	31	31		
C1-12A	G.703 SD-A	32	32		
C1-12B	G.703 SD-B	33	33		
C1-19A	ASYNC GROUND	34	34		
C1-15A	G.703 RD-A	35	35		
C1-15B	G.703 RD-B	36	36		
C1-11A	MF OC	10		2	

WIRE COLOR CODE CHART				
PAIR		COLOR		COLOR
1	C-1A	WHITE	C-1B	BLACK
2	C-2A	WHITE	C-2B	BROWN
3	C-3A	WHITE	C-3B	RED
4	C-4A	WHITE	C-4B	ORANGE
5	C-5A	WHITE	C-5B	YELLOW
6	C-6A	WHITE	C-6B	GREEN
7	C-7A	WHITE	C-7B	BLUE
8	C-8A	WHITE	C-8B	VIOLET
9	C-9A	WHITE	C-9B	GRAY
10	C-10A	BLACK	C-10B	BROWN
11	C-11A	BLACK	C-11B	RED
12	C-12A	BLACK	C-12B	ORANGE
13	C-13A	BLACK	C-13B	YELLOW
14	C-14A	BLACK	C-14B	GREEN
15	C-15A	BLACK	C-15B	BLUE
16	C-16A	BLACK	C-16B	VIOLET
17	C-17A	BLACK	C-17B	GRAY
18	C-18A	BLACK	C-18B	RED
19	C-19A	BLACK	C-19B	ORANGE





NOTES:

1. PLACE LABEL WITH CABLE NUMBER
2. PLACE (OMS11 DATA) LABEL
3. PLACE (OM20 G.703 / ASYNC DATA) LABEL
4. USE FOR EXTERNAL FAULT RELAY THAT IS OPEN ON FAULT
   FOR INTERNAL TESTING JUMPER CONNECT THE BLACK AND RED WIRE TOGETHER
3. INSTALL UNUSED PINS IN CONNECTORS

MATERIAL NOTE:
PART TO BE FREE OF BURRS & SHARP EDGES UNLESS OTHERWISE SPECIFIED.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND PER ANSI Y14.5
XX = .XX ANGLES ANG
XXX = .XXX HOLES HOL

ORIGINATOR: RUMSEY,R	DATE: 11/07	
ENGINEER: MITCHELL,B	DATE: 11/07	
APPROVED: LAST,INITIAL	DATE: 0/00	
JOB NO. N/A		

RADYNE
3138 E. ELWOOD STREET
PHOENIX, AZ 85034
PH: (602) 437-9620
FAX: (602) 437-4811
WWW.RADN.COM

DRAWING TITLE
OMS20 TO OM20 G.703 / ASYNC DATA WITH EXTERNAL FAULT

SIZE	FSCM NUMBER	DWG NO.	REV
C		CAR5902	–X

SCALE: N/A | FILE NAME: | SHEET 1 OF 1

FORMAT_C REV B0

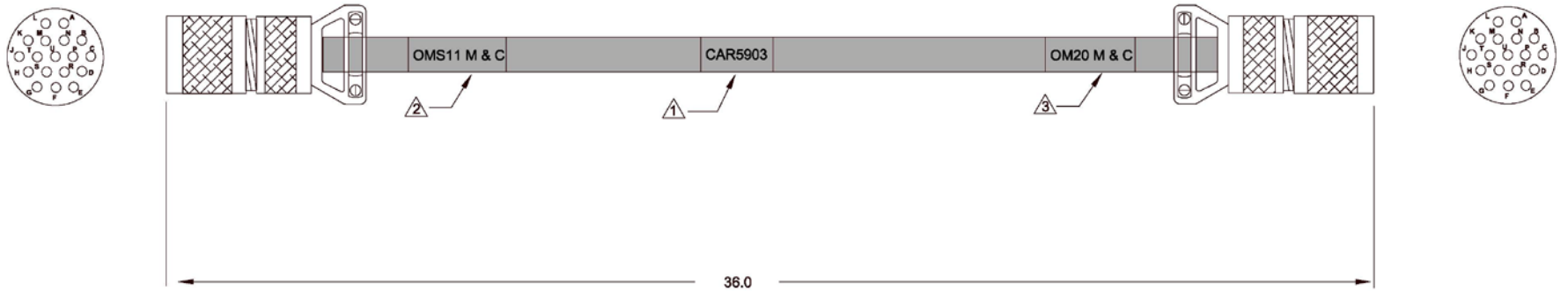
REVISIONS				
REV	E.C.O. NO.	DESCRIPTION	DATE	APPROVED
–X	NONE	ENGINEERING PROTOTYPE	11/21/07	

NOTES	CAR5903 OMS11 TO OM20 M&C		
CABLED TWISTED PAIRS	CONNECTOR	OMS11 J2 / J14	OM20 J2
NATIONAL CABLE	MFGR	AMPHENOL	AMPHENOL
NQP-1928SJ	HOUSING	AL07F15-18P	AL07F15-18P
	DESCRIPTION	JAM NUT RECPT	JAM NUT RECPT
USE MFG. COLOR	CONTACTS	10-251415-205	10-251415-205
CODE	STRAIN RELIEF	M85049-38S15N	M85049-38S15N

WIRING LIST			
PAIR # (WIRE #)	SIGNAL	CONN # PIN #	CONN # PIN #
C1-1A	RX Data, RS232	A	A
C1-1B	TX Data, RS232	B	B
C1-4A	N/C	C	C
C1-2A	TX B (+) Data, RS485	D	D
C1-2B	TX A (-) Data, RS485	E	E
C1-3A	RX B (+) Data, RS485	F	F
C1-3B	RX A (-) Data, RS485	G	G
C1-4B	Ground	H	H
C1-5A	Mod Fault Relay - C	J	J
C1-6A	Mod Fault Relay - NO	K	K
C1-6B	Mod Fault Relay - NC	L	L
C1-5B	Demod Fault Relay - C	M	M
C1-7A	Demod Fault Relay - NO	N	N
C1-7B	Demod Fault Relay - NC	S	S
C1-8A	Ground	R	R
C1-9A	Default	U	U
C1-9B	Default	P	P
N/C	N/C	T	T

WIRE COLOR CODE CHART				
PAIR		COLOR		COLOR
1	C-1A	WHITE	C-1B	BLACK
2	C-2A	WHITE	C-2B	BROWN
3	C-3A	WHITE	C-3B	RED
4	C-4A	WHITE	C-4B	ORANGE
5	C-5A	WHITE	C-5B	YELLOW
6	C-6A	WHITE	C-6B	GREEN
7	C-7A	WHITE	C-7B	BLUE
8	C-8A	WHITE	C-8B	VIOLET
9	C-9A	WHITE	C-9B	GRAY
10	C-10A	BLACK	C-10B	BROWN
11	C-11A	BLACK	C-11B	RED
12	C-12A	BLACK	C-12B	ORANGE
13	C-13A	BLACK	C-13B	YELLOW
14	C-14A	BLACK	C-14B	GREEN
15	C-15A	BLACK	C-15B	BLUE
16	C-16A	BLACK	C-16B	VIOLET
17	C-17A	BLACK	C-17B	GRAY
18	C-18A	BLACK	C-18B	RED
19	C-19A	BLACK	C-19B	ORANGE

C-2



NOTES:

1. PLACE LABEL WITH CABLE NUMBER
2. PLACE (OMS11 M & C) LABEL
3. PLACE (OM20 M & C) LABEL
4. INSTALL UNUSED PINS IN CONNECTORS

MATERIAL NOTE:
PART TO BE FREE OF BURRS & SHARP EDGES UNLESS OTHERWISE SPECIFIED.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND PER ANSI Y14.5
XX ± .XX ANGLES ANG
XXX ± .XXX HOLES HOL

ORIGINATOR: RUMSEY,R	DATE 11/07	
ENGINEER: MITCHELL,B	DATE 11/07	
APPROVED: LAST,INITIAL.	DATE 0/00	
JOB NO. N/A		

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DRAWING TITLE
OMS11 TO OM20 M&C

SIZE	FSCM NUMBER	DWG NO.	REV
C		CAR5903	–X
SCALE: N/A	FILE NAME:	SHEET 1 OF 1	

FORMAT_C REV B0

NOTES	OMS11 TO W / G SWITCH		
CABLED TWISTED PAIRS	**CONNECTOR**	**OMS11 J5 / J9**	**TX / RX W/G SW**
NATIONAL CABLE	**MFGR**	AMPHENOL	SOUR
NQP-1928SJ	**HOUSING**	AL07F15-18P	MS3116F12-10S
	DESCRIPTION	JAM NUT RECPT	CONN. W/ST.RELF.
USE MFG. COLOR	**CONTACTS**	10-251415-205	INC.
CODE	**STRAIN RELIEF**	M85049-38S15N	INC.

TX AND RX COUPLING CONNECTOR IS SUPPLIED WITH WAVE GUIDE SWITCHES

CAR5904-4' (TX W/G SW)
CAR5904-7' (RX W/G SW)

WIRING LIST

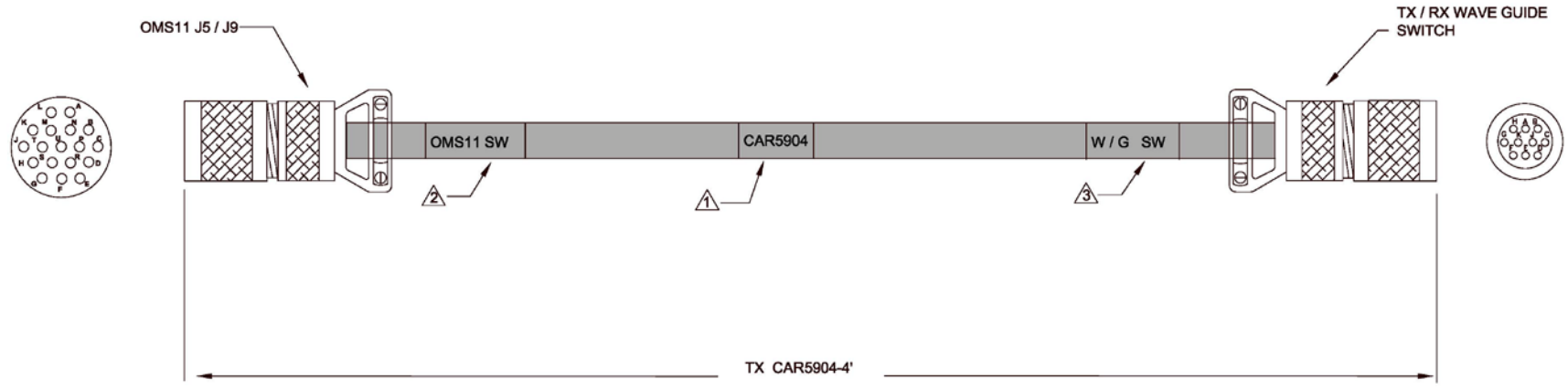
PAIR # (WIRE #)	SIGNAL	CONN # PIN #	CONN # PIN #
N/C	**N/C**	**N/C**	**N/C**
C1-3A,C1-3B,C1-4A	Common	B	B
C1-5A,C1-5B,C1-6A	Pos 2 Volts	C	C
C1-7A	Pos 1, Ind 1	D	D
C1-8A	Pos 1 Common	E	E
C1-7B	Pos 2, Ind 1,	F	F
C1-9A	Pos 1, Ind 2	G	G
C1-8B	Ind 2, Com	H	H
C1-9B	Pos 2, Ind 2	J	J
N/C	**N/C**	K	**N/C**
N/C	**N/C**	L	**N/C**
N/C	**N/C**	M	**N/C**
N/C	**N/C**	N	**N/C**
N/C	**N/C**	S	**N/C**
N/C	**N/C**	R	**N/C**
N/C	**N/C**	U	**N/C**
N/C	**N/C**	P	**N/C**
C1-1A,C1-1B,C1-2A	Pos 1 Volts	T	A

WIRE COLOR CODE CHART

PAIR		COLOR		COLOR
1	C-1A	WHITE	C-1B	BLACK
2	C-2A	WHITE	C-2B	BROWN
3	C-3A	WHITE	C-3B	RED
4	C-4A	WHITE	C-4B	ORANGE
5	C-5A	WHITE	C-5B	YELLOW
6	C-6A	WHITE	C-6B	GREEN
7	C-7A	WHITE	C-7B	BLUE
8	C-8A	WHITE	C-8B	VIOLET
9	C-9A	WHITE	C-9B	GRAY
10	C-10A	BLACK	C-10B	BROWN
11	C-11A	BLACK	C-11B	RED
12	C-12A	BLACK	C-12B	ORANGE
13	C-13A	BLACK	C-13B	YELLOW
14	C-14A	BLACK	C-14B	GREEN
15	C-15A	BLACK	C-15B	BLUE
16	C-16A	BLACK	C-16B	VIOLET
17	C-17A	BLACK	C-17B	GRAY
18	C-18A	BLACK	C-18B	RED
19	C-19A	BLACK	C-19B	ORANGE

REVISIONS				
REV	E.C.O. NO.	DESCRIPTION	DATE	APPROVED
–X	NONE	ENGINEERING PROTOTYPE	11/21/07	

C-3



4. INSTALL UNUSED PINS IN CONNECTORS
3. PLACE (W / G SWITCH) LABEL
2. PLACE (OMS11 DATA) LABEL

NOTES:

1. PLACE LABEL WITH CABLE NUMBER

MATERIAL NOTE:
PART TO BE FREE OF BURRS & SHARP EDGES UNLESS OTHERWISE SPECIFIED.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND PER ANSI Y14.5
XX = .XX ANGLES ANG
XXX = .XXX HOLES HOL

ORIGINATOR: RUMSEY,R DATE 11/07
ENGINEER: MITCHELL,M DATE 11/07
APPROVED: LAST,INITIAL. DATE 0/00
JOB NO. N/A

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DRAWING TITLE
OMS11 TO C BAND WG SWITCHES
RX 229 TX 137 SECTOR SWITCHES

SIZE	FSCM NUMBER	DWG NO.	REV
C		CAR5904	–X

SCALE: N/A FILE NAME: SHEET 1 OF 1

REVISIONS				
REV	E.C.O. NO.	DESCRIPTION	DATE	APPROVED
–X	NONE	ENGINEERING PROTOTYPE	12/20/07	

C-4

NOTES	CAR5918 OMS11 TO OM20 EIA530 DATA				
CABLED TWISTED PAIRS	CONNECTOR	OMS11 J13	OM20 J2	FAULT CONN. INNER	FAULT CONN.OUTER
NATIONAL CABLE	MFGR	AMPHENOL	AMPHENOL	MOLEX	MOLEX
NQP-1928SJ	HOUSING	D38999-26FD35PN	D38999-26FD35PN	O3061023	O3062023
	DESCRIPTION	MIL. SPEC. CONN.	MIL. SPEC. CONN.	RECEPTACLE	PLUG HOUSING
USE MFG. COLOR	CONTACTS	FEMALE	FEMALE	FEMALE	MALE
CODE	STRAIN RELIEF	M85049-38S15N	M85049-38S15N	2061201	2062101

WIRING LIST

PAIR # (WIRE #)	SIGNAL	CONN# PIN #	CONN# PIN #		
C1-1A	SHIELD	1	1		
C1-2A	EIA530 SD-B	2	2		
C1-2B	EIA530 SD-A	3	3		
C1-3A	EIA530 ST-A	4	4		
C1-4A	EIA530 / G.703 RD-A	5	5		
C1-4B	EIA530 / G.703 RD-B	6	6		
C1-5A	EIA530 RS-A	7	7		
C1-6A	EIA530 RT-A	8	8		
C1-7A	EIA530 CS-A	9	9		
C1-11A	MF (OC)		10	1	
C1-8A	EIA530 DM-A	11	11		
C1-5B	EIA530 RS-B	12	12		
C1-1B	EIA530 SGND	13	13		
C1-16A	EIA530 TR-A	14	14		
C1-9A	EIA530 RR-A	15	15		
C1-11B	DF (OC)	16	16		
C1-6B	EIA530 RT-B	17	17		
C1-8B	EIA530 DM-B	18	18		
C1-9B	EIA530 RR-B	19	19		
C1-16B	EIA530 TR-B	20	20		
C1-10A	EIA530 TT-B	21	21		
C1-10B	EIA530 TT-A	22	22		
C1-3B	EIA530 ST-B	23	23		
C1-7B	EIA530 CS-B	25	25		
C2-13A	ASYNC TXD-B	26	26		
C2-13B	ASYNC TXD-A	27	27		
C2-14A	ASYNC RXD-A	30	30		
C2-14B	ASYNC RXD-B	31	31		
C1-19A	ASYNC GROUND	34	34		
C1-11A	MF OC	10		2	

WIRE COLOR CODE CHART				
PAIR		COLOR		COLOR
1	C-1A	WHITE	C-1B	BLACK
2	C-2A	WHITE	C-2B	BROWN
3	C-3A	WHITE	C-3B	RED
4	C-4A	WHITE	C-4B	ORANGE
5	C-5A	WHITE	C-5B	YELLOW
6	C-6A	WHITE	C-6B	GREEN
7	C-7A	WHITE	C-7B	BLUE
8	C-8A	WHITE	C-8B	VIOLET
9	C-9A	WHITE	C-9B	GRAY
10	C-10A	BLACK	C-10B	BROWN
11	C-11A	BLACK	C-11B	RED
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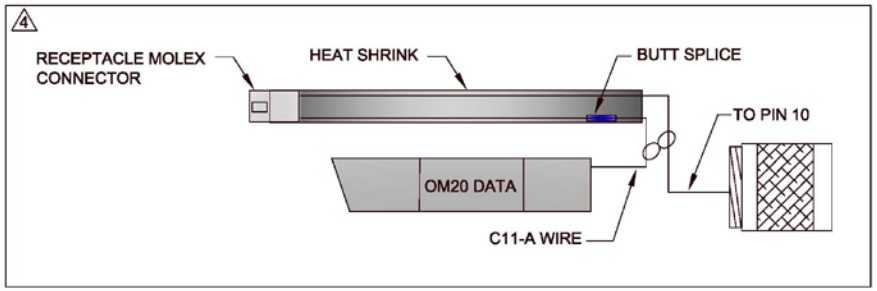
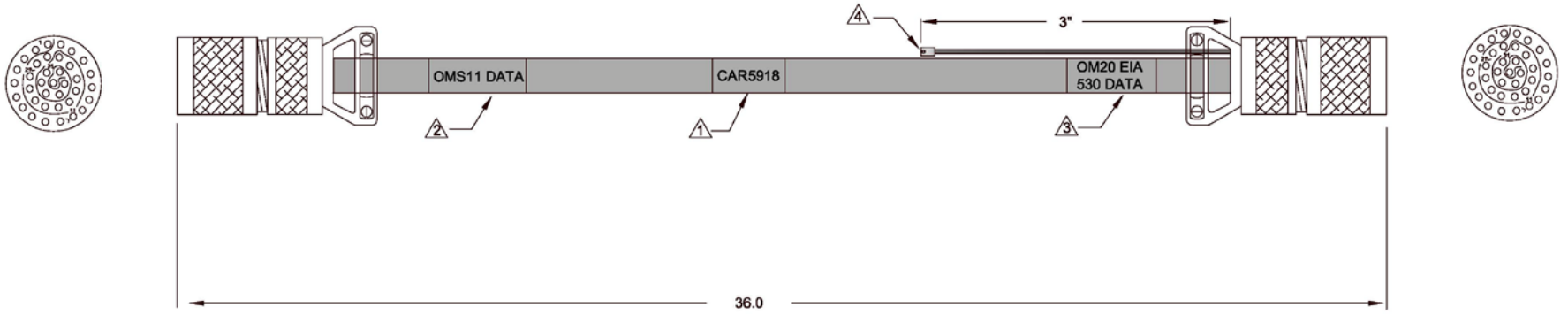
15	C-15A	BLACK	C-15B	BLUE
16	C-16A	BLACK	C-16B	VIOLET
17	C-17A	BLACK	C-17B	GRAY
18	C-18A	BLACK	C-18B	RED
19	C-19A	BLACK	C-19B	ORANGE





4 USE FOR EXTERNAL FAULT RELAY THAT IS OPEN ON FAULT
FOR INTERNAL TESTING JUMPER CONNECT THE BLACK AND RED WIRE TOGETHER

3 PLACE (OM20 EIA 530 DATA) LABEL

2 PLACE (OMS11 DATA) LABEL

NOTES: 1 PLACE LABEL WITH CABLE NUMBER

MATERIAL NOTE:
PART TO BE FREE OF BURRS & SHARP EDGES UNLESS OTHERWISE SPECIFIED.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND PER ANSI Y14.5
XX = XX ANGLES ANG
XXX = XXX HOLES HOL

ORIGINATOR: RUMSEY,R	DATE 11/07	
ENGINEER: MITCHELL,B	DATE 11/07	
APPROVED: LAST,INITIAL.	DATE Q/OO	
JOB NO. N/A		

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DRAWING TITLE
OMS20 TO OM20 EIA 530 DATA WITH EXTERNAL FAULT

SIZE	FSCM NUMBER	DWG NO.	REV
C		CAR5918	–X

SCALE: N/A FILE NAME: SHEET 1 OF 1

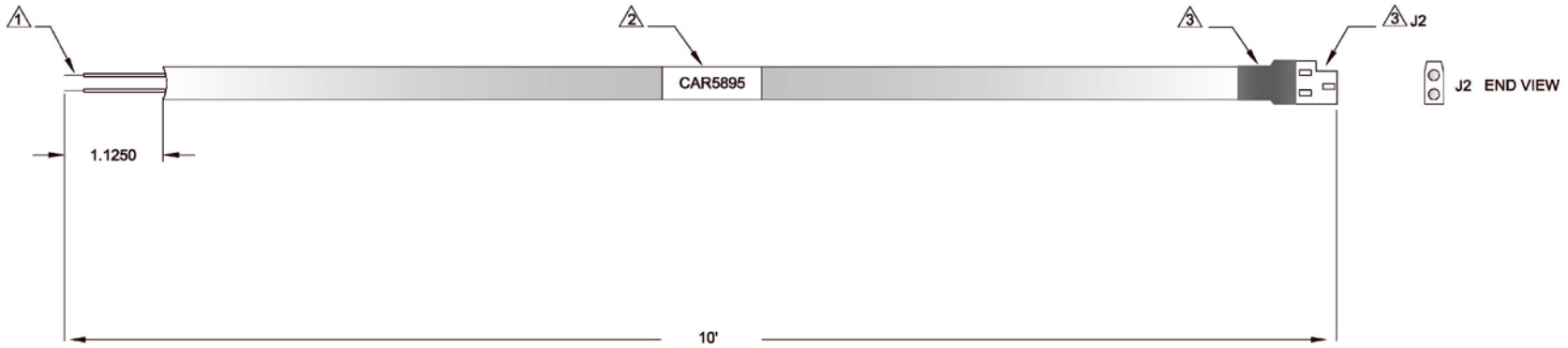
FORMAT_C REV B0

REVISIONS				
REV	E.C.O. NO.	DESCRIPTION	DATE	APPROVED
-X	NONE	ENGINEERING PROTOTYPE	01/21/08	

NOTES	CAR5939 OMS11 BUC FAULT		
Open collector fault	CONNECTOR	OC BUC FAULT	J2 OM20 BUC FAULT
cable from BUC to OM20	MFGR	SUPPLIED BY BUC MANUFACTURER	MOLEX
	HOUSING		3062023
UL1061	DESCRIPTION		MALE PLUG
24 AWG	CONTACTS		2062101

WIRING LIST			
NOTES	SIGNAL	CONN# PIN #	CONN# PIN #
	MF (OC)	1	1
	MF (OC)	2	2

C-5



3 HEAT SRINK

2 PLACE LABEL WITH PART NUMBER

1 STRIP OFF OUTER JACKET

NOTES:

MATERIAL NOTE:
PART TO BE FREE OF BURRS & SHARP EDGES UNLESS OTHERWISE SPECIFIED.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND PER ANSI Y14.5
XX = XX ANGLES ANG
XXX = XXX HOLES HOL

ORIGINATOR: RUMSEY,R	DATE 1/08	
ENGINEER: T,BD	DATE 1/08	
APPROVED: LAST,INITIAL.	DATE 9/05	
JOB NO. N/A		

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DRAWING TITLE
OMS11 BUC FAULT

SIZE	FSCM NUMBER	DWG NO.	REV
C		CAR5939	-X

SCALE: N/A | FILE NAME: | SHEET 1 OF 1

FORMAT_C REV B0


RADYNE

Glossary

G

A	
A	Ampere
AC	Alternating Current
ADC	Analog to Digital Converter
AGC	Automatic Gain Control
AIS	Alarm Indication System. A signal comprised of all binary 1s.
AMSL	Above Mean Sea Level
ANSI	American National Standards Institute
ASCII	American Standard Code for Information Interchange
ASIC	Application Specific Integrated Circuit
ATE	Automatic Test Equipment
B	
BER	Bit Error Rate
BERT	Bit Error Rate Test
Bit/BIT	Binary Digit or Built-In Test
BITE	Built-In Test Equipment
bps	Bits Per Second
BPSK	Binary Phase Shift Keying
BUC	Block Upconverter
Byte	8 Binary Digits

C	
C	Celsius
CATS	Computer Aided Test Software
CA/xxxx	Cable Assembly
CD-ROM	Compact Disk – Read Only Memory
CLK	Clock
cm	Centimeter
COM	Common
CPU	Central Processing Unit
CRC	Cyclic Redundancy Check. A system of error checking performed at the transmitting and receiving stations.
CW	Continuous Wave
C/N	Carrier to Noise Ratio
D	
DAC	Digital to Analog Converter
dB	Decibels
dBc	Decibels Referred to Carrier
dBm	Decibels Referred to 1.0 milliwatt
DC	Direct Current
Demod	Demodulator or Demodulated
DPLL	Digital Phase Locked Loop
DVB	Digital Video Broadcast
D & I	Drop and Insert
E	
E_b/N_0	Ratio of Energy per bit to Noise Power Density in a 1 Hz Bandwidth.
EEPROM	Electrically Erasable Programmable Read Only Memory
EIA	Electronic Industries Association
EMI	Electromagnetic Interference
ESC	Engineering Service Circuits
ES-ES	Earth Station to Earth Station Communication
ET	Earth Terminal

F	
F	Fahrenheit
FAS	Frame Acquisition Sync. A repeating series bit, which allow acquisition of a frame.
FCC	Federal Communications Commission
FEC	Forward Error Correction
FIFO	First In, First Out
FPGA	Field Programmable Gate Arrays
FW	Firmware
G	
g	Force of Gravity
GHz	Gigahertz
GND	Ground
H	
HSSI	High Speed Serial Interface
HW	Hardware
Hz	Hertz (Unit of Frequency)
I	
IBS	Intelsat Business Services
IDR	Intermediate Data Rate
I/O	Input/Output
IEEE	International Electrical and Electronic Engineers
IESS	INTELSAT Earth Station Standards
IF	Intermediate Frequency
INTELSAT	International Telecommunication Satellite Organization
ISO	International Standards Organization
I & Q	Analog In-Phase (I) and Quadrature Signals (Q)
J	
J	Joule

K	
Kbps	Kilobits per Second
Kbps	Kilobytes per Second
kg	Kilogram
kHz	Kilohertz
Ksps	Kilosymbols per Second
L	
LCD	Liquid Crystal Display
LED	Light Emitting Diode
LO	Local Oscillator
M	
mA	Milliampere
Mbps	Megabits per Second
MFAS	Multi-Frame Acquisition Sync. See FAS.
MHz	Megahertz
MIB	Management Information Base
Mod	Modulator or Modulated
ms or msec	Millisecond
M&C	Monitor and Control
N	
NC	Normally Closed
NO	Normally Open
ns	Nanoseconds
NVRAM	Non-Volatile Random Access Memory
N/C	No Connection or Not Connected
O	
OQPSK	Offset Quadrature Phase Shift Keying
P	
PC	Personal Computer
PD Buffer	Plesiochronous/ Doppler Buffer
PLL	Phase Locked Loop
ppb	Parts per Billion
ppm	Parts per Million
P/N	Part Number
Q	
QAM	Quadrature Amplitude Modulation
QPSK	Quadrature Phase Shift Keying

R	
RAM	Random Access Memory
RF	Radio Frequency
ROM	Read Only Memory
rms	Root Mean Square
RU	Rack Unit. 1 RU = 1.75”/4.45 cm
Rx	Receive (Receiver)
RxD	Receive Data
R-S	Reed-Solomon Coding. Reed-Solomon codes are block-based error correcting codes with a wide range of applications in digital communications and storage.
S	
SEQ	Sequential
SYNC	Synchronize
T	
TBD	To Be Designed or To Be Determined
TM	Technical Manual
TPC	Turbo Product Codes
TRE	Trellis
Tx	Transmit (Transmitter)
TxD	Transmit Data
U	
UART	Universal Asynchronous Receiver/Transmitter
UUT	Unit Under Test
V	
V	Volts
VAC	Volts, Alternating Current
VCO	Voltage Controlled Oscillator
VDC	Volts, Direct Current
VIT	Viterbi Decoding

W X Y Z	
W	Watt
Misc.	
µs	Microsecond
Ohms	Ohms
16QAM	16 Quadrature Amplitude Modulation
8PSK	8 Phase Shift Keying