

Operator's Manual

Redundancy Switch Model 10209A/C/E

MAN-10209-RSU Rev C



2015 West Chestnut Street
Alhambra, California 91803
(626) 293-3400
Fax: (626) 293-3428
www.emcore.com

Disclaimer

Every attempt has been made to make this material complete, accurate, and up-to-date. Users are cautioned, however, that Ortel, A Division of Emcore reserves the right to make changes without notice and shall not be responsible for any damages, including consequential, caused by reliance on the material presented, including, but not limited to, typographical, arithmetical, or listing errors.

Copyright Information

© 2003 by Emcore Corporation

Ortel, A Division of Emcore
Alhambra, California, 91803, USA

October 2003

WARNINGS, CAUTIONS, AND GENERAL NOTES

Safety Considerations

When installing or using this product, observe all safety precautions during handling and operation. Failure to comply with the following general safety precautions and with specific precautions described elsewhere in this manual violates the safety standards of the design, manufacture, and intended use of this product. Ortel assumes no liability for the customer's failure to comply with these precautions.

CAUTION

Calls attention to a procedure or practice, which if ignored, may result in damage to the system or system component. Do not perform any procedure preceded by a CAUTION until described conditions are fully understood and met.

Electrostatic Sensitivity

ESD = Electrostatic Sensitive Device

Observe electrostatic precautionary procedures.

Semiconductor laser transmitters and receivers provide highly reliable performance when operated in conformity with their intended design. However, a semiconductor laser may be damaged by an electrostatic charge inadvertently imposed by careless handling.

Static electricity can be conducted to the laser chip from the center pin of the RF input connector, and through the DC connector pins. When unpacking and otherwise handling the transmitter, follow ESD precautionary procedures including use of grounded wrist straps, grounded workbench surfaces, and grounded floor mats.

Exposure to electrostatic charge is greatly reduced after the transmitter has been installed in an operational circuit.

If You Need Help

If you need additional help in installing or using the system, need additional copies of this manual, or have questions about system options, please call Ortel's Sales Department.

Service

Do not attempt to modify or service any part of the system other than in accordance with procedures outlined in this Operator's Manual. If the system does not meet its warranted specifications, or if a problem is encountered that requires service, return the apparently faulty plug-in or assembly to Ortel for evaluation in accordance with Ortel's warranty policy.

When returning a plug-in or assembly for service, include the following information: Owner, Model Number, Serial Number, Return Authorization Number (obtained in advance from Ortel's Customer Service Department), service required and/or a description of the problem encountered.

Warranty and Repair Policy

The Ortel Quality Plan includes product test and inspection operations to verify the quality and reliability of our products.

Ortel uses every reasonable precaution to ensure that every device meets published electrical, optical, and mechanical specifications prior to shipment. Customers are asked to advise their incoming inspection, assembly, and test personnel as to the precautions required in handling and testing ESD sensitive opto-electronic components and accompanying RF devices.

These products are covered by the following warranties:

1. **General Warranty**

Ortel warrants to the original purchaser all standard products sold by Ortel to be free of defects in material and workmanship for one (1) year from date of shipment from Ortel. During the warranty period, Ortel's obligation, at our option, is limited to repair or replacement of any product that Ortel proves to be defective. This warranty does not apply to any product, which has been subject to alteration, abuse, improper installation or application, accident, electrical or environmental over-stress, negligence in use, storage, transportation or handling.

2. **Specific Product Warranty Instructions**

All Ortel products are manufactured to high quality standards and are warranted against defects in workmanship, materials and construction, and to no further extent. Any claim for repair or replacement of a device found to be defective on incoming inspection by a customer must be made within 30 days of receipt of the shipment, or within 30 days of discovery of a defect within the warranty period.

This warranty is the only warranty made by Ortel and is in lieu of all other warranties, expressed or implied, except as to title, and can be amended only by a written instrument signed by an officer of Ortel. Ortel sales agents or representatives are not authorized to make commitments on warranty returns.

In the event that it is necessary to return any product against the above warranty, the following procedure shall be followed:

- a. Return authorization shall be received from the Ortel Sales Department prior to returning any device. Advise the Ortel Sales Department of the model, serial number, and the discrepancy. The device shall then be forwarded to Ortel, transportation prepaid. Devices returned freight collect or without authorization may not be accepted.
- b. Prior to repair, Ortel Sales will advise the customer of Ortel test results and will advise the customer of any charges for repair (usually for customer caused problems or out-of-warranty conditions).

If returned devices meet full specifications and do not require repair, or if non-warranty repairs are not authorized by the customer, the device may be subject to a standard evaluation charge. Customer approval for the repair and any associated costs will be the authority to begin the repair at Ortel. Customer approval is also necessary for any removal of certain parts, such as connectors, which may be necessary for Ortel testing or repair.

- c. Repaired products are warranted for the balance of the original warranty period, or at least 90 days from date of shipment.

3. **Limitations of Liabilities**

Ortel's liability on any claim of any kind, including negligence, for any loss or damage arising from, connected with, or resulting from the purchase order, contract, or quotation, or from the performance or breach thereof, or from the design, manufacture, sale, delivery, installation, inspection, operation or use of any equipment covered by or furnished under this contract, shall in no case exceed the purchase price of the device which gives rise to the claim.

EXCEPT AS EXPRESSLY PROVIDED HEREIN, ORTEL MAKES NO WARRANTY OF ANY KIND, EXPRESSED OR IMPLIED, WITH RESPECT TO ANY GOODS, PARTS AND SERVICES PROVIDED IN CONNECTION WITH THIS AGREEMENT INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. ORTEL SHALL NOT BE LIABLE FOR ANY OTHER DAMAGE INCLUDING, BUT NOT LIMITED TO, INDIRECT, SPECIAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF OR IN CONNECTION WITH FURNISHING OF GOODS, PARTS AND SERVICE HEREUNDER, OR THE PERFORMANCE, USE OF, OR INABILITY TO USE THE GOODS, PARTS AND SERVICE.

Ortel will not be responsible for loss of output or reduced output of opto-electronic devices if the customer performs chip mounting, ribbon bonding, wire bonding, fiber coupling, fiber connectorization, or similar operations. These processes are critical and may damage the device or may affect the device's output or the fiber output.

Ortel test reports or data indicating mean-time-to-failure, mean-time-between-failure, or other reliability data are design guides and are not intended to imply that individual products or samples of products will achieve the same results. These numbers are to be used as management and engineering tools, and are not necessarily indicative of expected field operation. These numbers assume a mature design, good parts, and no degradation of reliability due to manufacturing procedures and processes.

Ortel is not liable for normal laser output degradation or fiber coupling efficiency degradation over the life of the device.

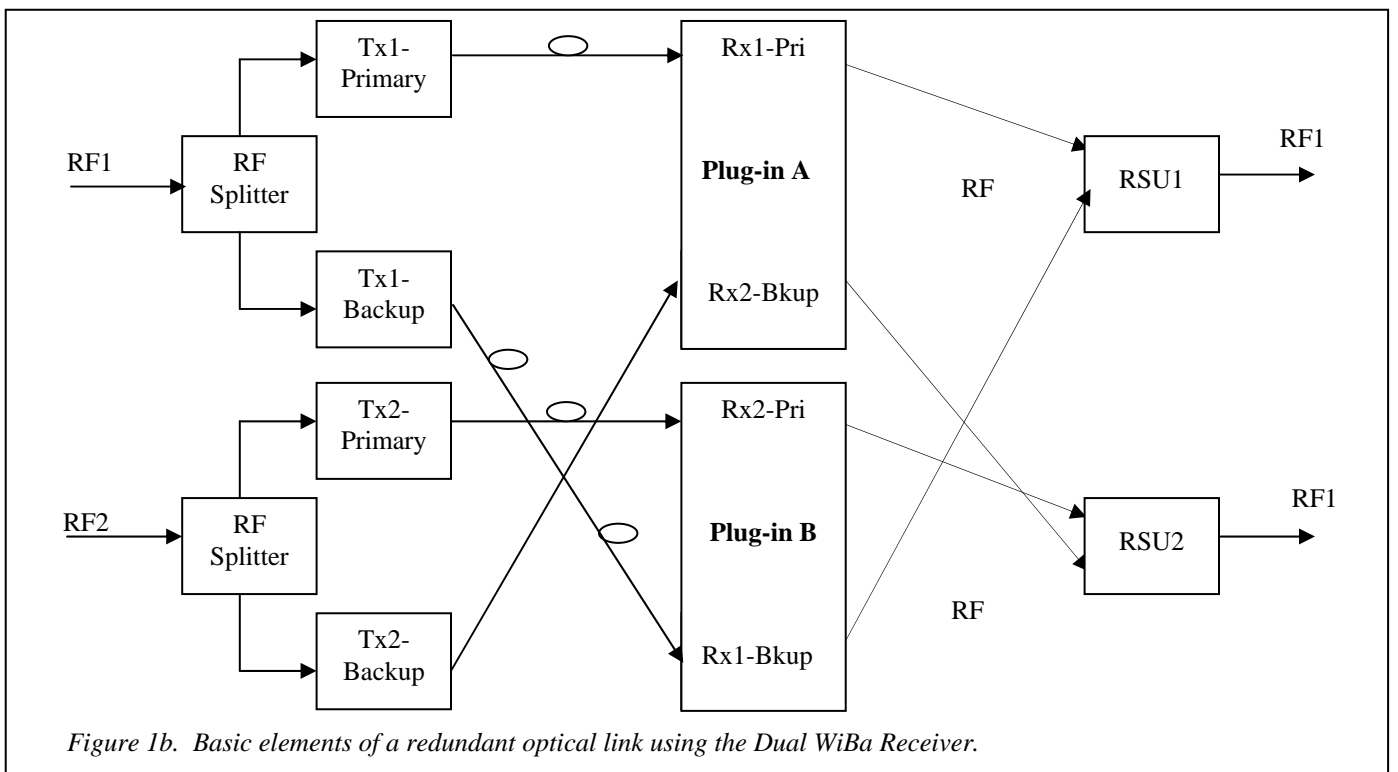
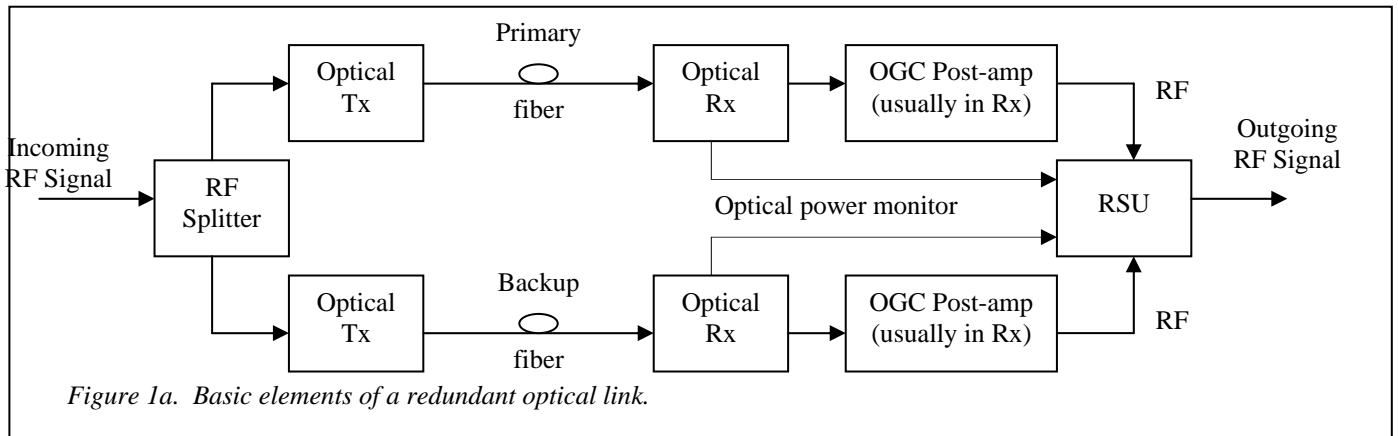
DANGER

This redundancy switch product is intended for use with fiber coupled laser products. In certain situations, laser light can pose a safety or health hazard. Ensure that any specific precautions described with the laser product are followed. As a minimum during installation, service, or maintenance, the service technician is warned to **take precautions, which include not looking directly into the fiber connector or the fiber, which is connected to the fiber connector before it is connected to the fiberoptic receiver. The light emitted from the fiberoptic connector or any fiber connected to the connector is invisible and may be harmful to the human eye. Use either an infrared viewer or fluorescent screen for optical output verification. All handling precautions as outlined by the FDA and ANSI Z136.2 and other authorities appropriate to the power class of the laser must be observed.**

1. GENERAL INFORMATION

Ortel’s Model 10209 Series of Redundancy Switch Units (RSU) provide protection against fiber or laser failure by incorporating two sets of links for each circuit desired, as shown in figure. If the optical power incident on either of the optical receivers falls below the factory preset of about 0.1 mW, the RSU toggles an internal electro-mechanical RF switch to pass the other good signal. A manual mode also can be used to override the automatic switching.

Figure 1b shows an alternate way to configure a set of links when the optical receivers are double density, as with the Models 10482 or 10484 of Ortel’s WiBa family. Because these particular models include two receivers in a single plug-in unit, Ortel recommends associating a particular RF signal with two separate plug-ins rather than using the two receivers of a single plug-in for the same RF signal. As an example for figure 1b, if anything in the primary path of RF signal 1 fails then RSU1 will switch to Rx1-Bkup, thus putting both receivers in Plug-in A into the non-active paths for both RF1 and RF2. Plug-in A could then be removed, tested or replaced without disrupting any traffic coming out of either RSU.



The three models available are listed in table 1. More detailed specifications, as well as installation and operating instructions, are provided later in this manual.

Table 1. RSU models and key features				
Model	Frequency	Input Connectors	Output Connector	Impedance
10209A	10 - 2300 MHz	BNC	BNC	75Ω
10209C	10 - 2300 MHz	F	F	75Ω
10209E	10 - 18000 MHz	SMA	SMA	50Ω

2. INSTALLATION

The RSU product includes the following components:

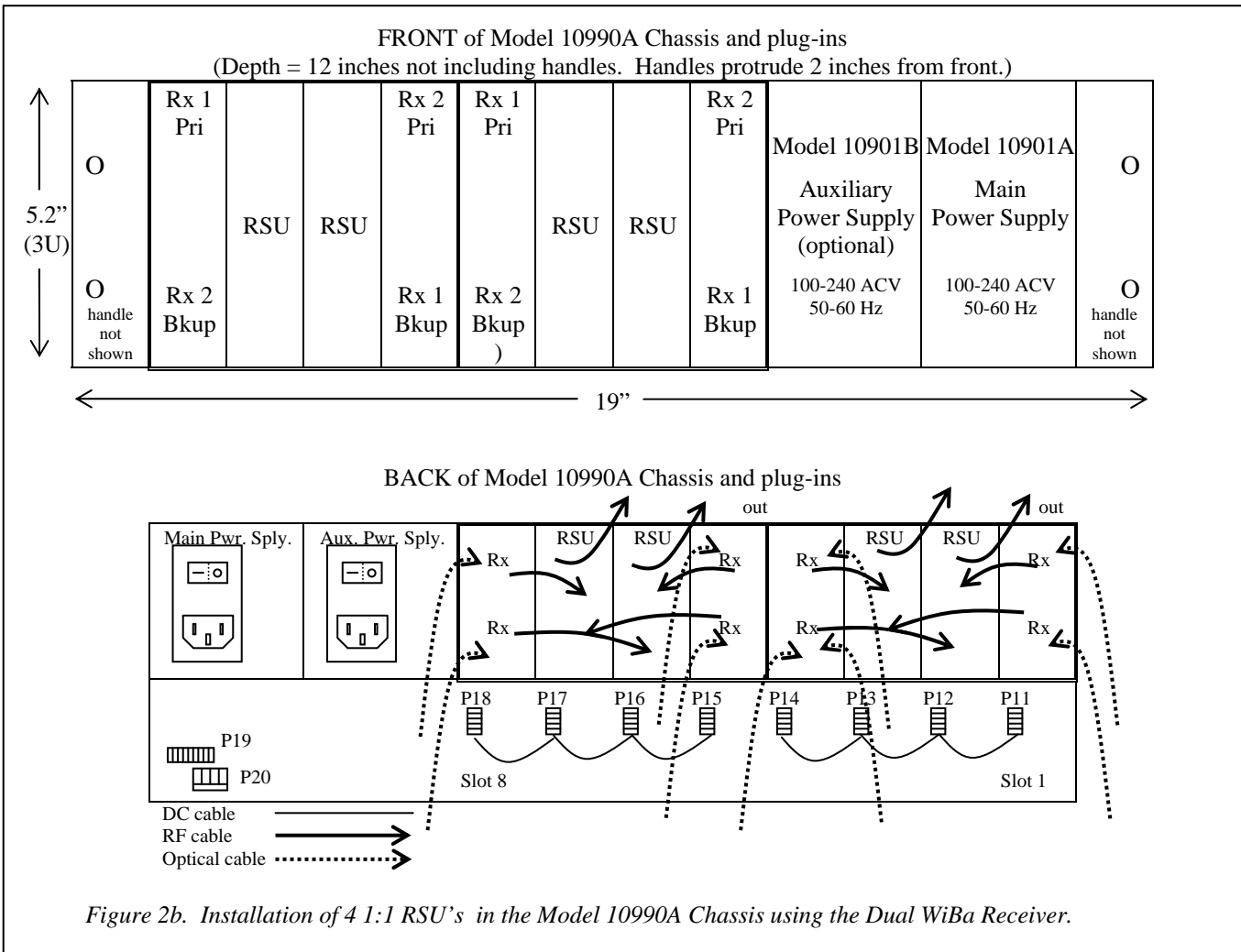
- RSU plug-in module (qty 1)
- RF jumper cables (qty 2)
- DC jumper cable, with 3 connectors (qty 1) used with all receivers except Dual WiBa
- DC jumper cable, with 4 connectors (qty 1) used only with Dual WiBa

RF splitters for use at the transmit site are not included.

The RSU plug-in should be mounted in the Ortel Model 10990A 19" rack-mount chassis, as shown in figure 2a applies to all 1:1 configurations except for when the Dual WiBa receiver (models 10482 and 10484) is used. Figure 2b outlines the chassis configuration for use with the WiBa Dual receiver. Depending on the particular Ortel receiver used, an additional Output Gain Control (OGC) may be required, therefore the entire receive site group may incorporate 3 or 5 plug-in components. For convenience these usually are placed in the same rack, however the DC and RF jumpers are long enough that the groups may be split into two or three separate chassis if necessary.

For a 3-piece receiver group, the RF cables are connected directly from the RSU to the receivers, according to the labels on back of the RSU. For a 5-piece receiver group, the RF cables are connected between the RSU and the OGC's.

In comparison, the DC cable is connected between the RSU and both receivers for either 3- or 5-piece receiver groups. The red wires go to the primary receiver and the yellow wires go to the back up receiver.



3. CONTROLLING THE RSU

3.1 Auto Mode

The RSU operates in either an automatic or a manual mode. In the Auto Mode, the internal electronics keeps the RF switch in its present position as long as the photodiode monitor for that position stays above 0.1 volts. If the monitor drops below 0.1 volts or the receiver is pulled from the chassis, then the switch will toggle to the other position, provided that the other link is good. If however the other link is also bad, then the switch stays in its present position. If both are bad and either one of the failed links is restored, the switch toggles to whichever link is restored first.

The primary goals of this latching are to avoid repeated switching for an intermittent failure, and to provide an indication of when a link has failed. For example, if the RSU is initiated in the primary position and the link fails even briefly, the RSU will switch to and remain in the backup position (assuming of course that the backup is good and remains good), thus indicating that there has been an interruption in the primary link.

3.2 Manual Mode

In the Manual Mode, the photodiode monitors are ignored and the switch position is controlled remotely from pin 4 of the back panel connector or locally from the switch on the front panel. Only one of either local or remote control can be active at a time, with the chosen control method indicated by the switch position and the LED's.

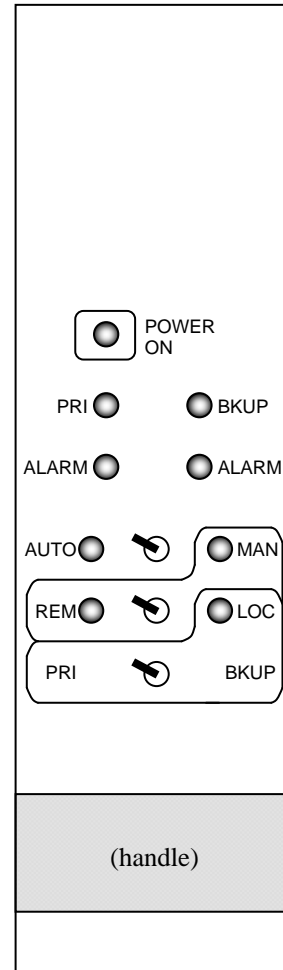


Figure 3. Front panel of RSU

3.3 Indicators and alarm thresholds

Independent of the control state of the RSU, the photodiodes status and RF switch position are indicated by the front panel LED's. The switch position also is indicated by pin 5 of the back plane connector. You may notice that the alarm LED's on the front panel of the RSU trigger at a slightly different level than the alarm LED on the front of the optical receiver. By design the receiver and RSU alarm thresholds are kept independent to allow flexibility for custom applications, especially those with high loss. In particular, if the optical power at the receiver is expected to be 0.1 mW or less, it may be necessary to change the factory pre-set RSU alarm threshold. Ortel can provide further information if your application demands such an adjustment.

4. DETAILED PIN-OUTS & PERFORMANCE of RSU & CHASSIS

Model	10209A	10209C	10209E
Freq. min.	10 MHz	10 MHz	10 MHz
Freq. max.	2300 MHz	2300 MHz	18000 MHz
Impedance	75 Ω	75 Ω	50 Ω
Insertion Loss, module & cables			
Max., plug-in & cables	1.5 dB	1.5 dB	2.0 dB
Typ., plug-in & cables	1.0 dB	1.0 dB	1.5 dB
Typ., plug-in only	0.5 dB	0.5 dB	0.6 dB
Flatness, over any 40 MHz			
Max., plug-in & cables	± 0.25 dB	± 0.25 dB	± 0.50 dB
Typ., plug-in & cables	± 0.20 dB	± 0.20 dB	± 0.25 dB
Typ., plug-in only	± 0.04 dB	± 0.04 dB	± 0.06 dB
Flatness, over any 500 MHz			
Max., plug-in & cables	± 0.50 dB	± 0.50 dB	± 0.60 dB
Typ., plug-in & cables	± 0.25 dB	± 0.25 dB	± 0.30 dB
Typ., plug-in only	± 0.05 dB	± 0.05 dB	± 0.08 dB
VSWR, min. (all ports, w/ switch in corresponding position)	<1.8:1	<1.8:1	<2.0:1
Switch speed, max	25 ms	25 ms	25 ms
Port to Port Isolation, max.	50 dB	50 dB	50 dB
Typical	>65 dB	>65 dB	>65 dB
Drive voltage (pin 1, supplied by chassis & power supply)	15-24 volts DC	15-24 volts DC	15-24 volts DC
Drive current, steady state, max.	60 mA	60 mA	60 mA
Typical	45 mA	45 mA	45 mA
Drive current, peak when switching, max.	300 mA	300 mA	300 mA
Typical	190 mA	190 mA	218 mA

Plug-in unit 9-pin Dsub	Corresponding 5-pin Molex**	10209 RSU	Ortel Optical Receiver	Dual Ortel Optical Receiver
1	--	+VCC	VCC (+15 volts)	VCC (+15 volts)
2	--	nc	nc	VCC (+5 volts)
3	--	nc	nc	nc
4	--	Power Ground	Power Ground	Power Ground
5	1	Reference Ground	Ref. Ground	Ref. Ground
6	2	Input: Photodiode current monitor, Primary	Photodiode cur. mon.	Photodiode cur. mon. Rx 1
7	3	Input: Photodiode current monitor, Backup	*Alarm	*Alarm Rx 1
8	4	*Input: RF position control, if in manual & remote (primary = 0V or open; backup = +5V)	nc	Photodiode cur. mon. Rx 2
9	5	*Output: Position of RF switch (primary = 0V, backup = +5V)	nc	*Alarm Rx 2

*Open positions available for the user. Table 6 indicates the crimp pins to access them.

** The pin numbers above are based on the numbers on the chassis back plane. Some connector vendors switch the order of the numbers; so if in doubt when wiring the connectors, use the number on the Ortel chassis.

Pin	Main Off	Main On	Aux. Off	Aux. On
1	nc	nc	nc	nc
2	nc	nc	nc	nc
3	--	--	closed	open
4	--	--	center	center
5	--	--	open	center
6	center	center	--	--
7	closed	open	--	--
8	open	closed	--	--
9	GND	GND	GND	GND

Pin	Voltage
1	+5 V DC
2	+15 V DC
3	-15 V DC
4	GND

** The pin numbers above are based on the numbers on the chassis back plane. Some connector vendors switch the order of the numbers; so if in doubt when wiring the connectors, use the number on the Ortel chassis.

Back Plane Connector	Mating Connector	Crimp Pins
P11-P18	Molex P/N 22-01-2057	Molex P/N 08-50-0114
P19	Molex P/N 22-01-2097	Molex P/N 08-50-0114
P20	Molex P/N 09-50-3031	Molex P/N 08-50-0108

5. MECHANICAL & ENVIRONMENTAL

Dimensions	5.06 x 1.39 x 9.12 inches (129 x 35 x 232 mm)
Operating Temp.	0 to 50°C
Storage Temp.	-20 to +65°C
Humidity	95% Non-condensing