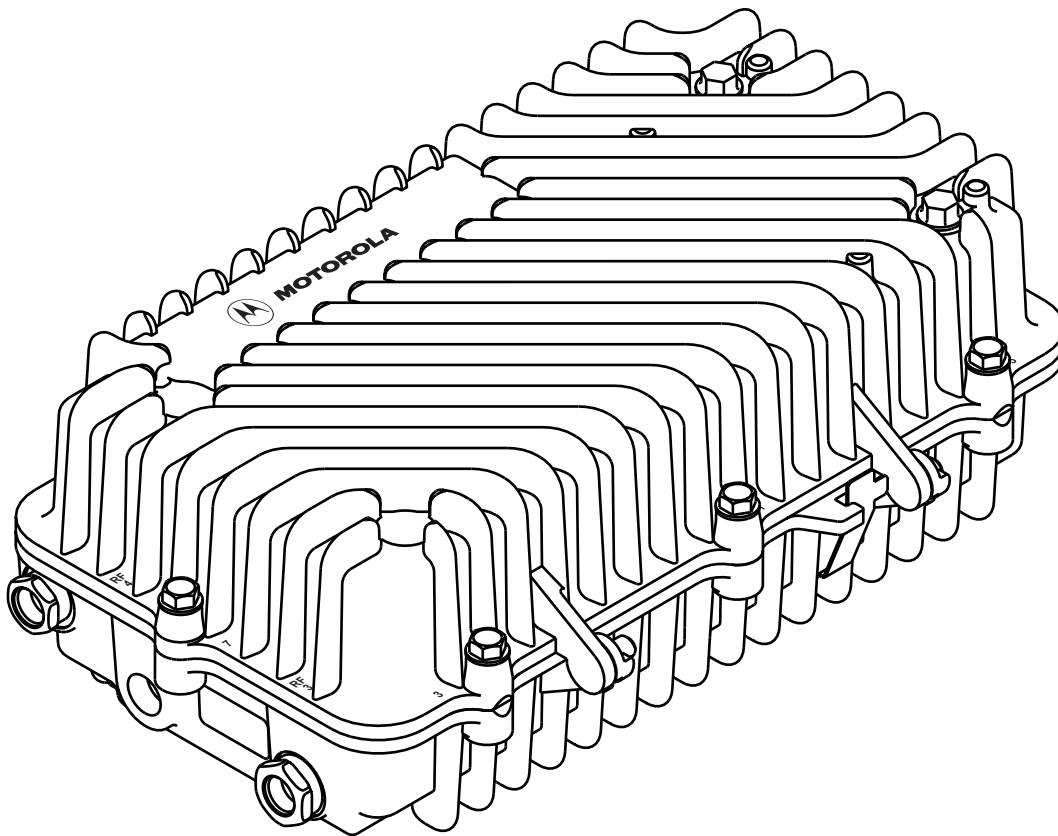


STARLINE®

SG1000 Split Third Port Telecommunications Optical Node



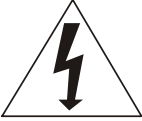

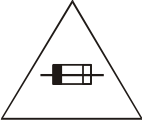
Installation and Operation Manual




Caution

These servicing instructions are for use by qualified personnel only. To reduce the risk of electrical shock, do not perform any servicing other than that contained in the Installation and Troubleshooting Instructions unless you are qualified to do so. Refer all servicing to qualified service personnel.

Special Symbols That Might Appear on the Equipment

 <p>DANGER INVISIBLE LASER RADIATION AVOID DIRECT EXPOSURE TO BEAM PEAK POWER 5.0mW WAVELENGTH 1300nm THIS PRODUCT COMPLIES WITH IEC 60825-1 CLASS 1 SUBCHAPTER J</p>	<p>This is a class 1 product that contains a class IIIb laser and is intended for operation in a closed environment with fiber attached. Do not look into the optical connector of the transmitter with power applied. Laser output is invisible, and eye damage can result. Do not defeat safety features that prevent looking into optical connector.</p>
	<p>This product contains a class IIIb laser and is intended for operation in a closed environment with fiber attached. Do not look into the optical connector of the transmitter with power applied. Laser output is invisible, and eye damage can result. Do not defeat safety features that prevent looking into optical connector.</p>
	<p>This symbol indicates that dangerous voltage levels are present within the equipment. These voltages are not insulated and may be of sufficient strength to cause serious bodily injury when touched. The symbol may also appear on schematics.</p>
	<p>The exclamation point, within an equilateral triangle, is intended to alert the user to the presence of important installation, servicing, and operating instructions in the documents accompanying the equipment.</p>
	<p>For continued protection against fire, replace all fuses only with fuses having the same electrical ratings marked at the location of the fuse.</p>

	<p>This equipment operates over the marked Voltage and Frequency range. Different types of line cord sets may be used for connections to the mains supply circuit and should comply with the electrical code requirements of the country of use. This equipment requires a grounding conductor in the line cord. The line cord provided with the equipment is acceptable for use with NEMA Style 5-15R ac receptacles supplying nominal 120 Volts.</p>
-------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

CAUTION: TO PREVENT ELECTRICAL SHOCK, DO NOT USE THIS (POLARIZED) PLUG WITH AN EXTENSION CORD, RECEPTACLE, OR OTHER OUTLET UNLESS THE BLADES CAN BE FULLY INSERTED TO PREVENT BLADE EXPOSURE.

CAUTION: USE ONLY MAIN LINE CORD THAT COMPLIES WITH THE COUNTRY'S PRODUCT SAFETY REQUIREMENTS.

FCC Compliance

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the Installation Manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his/her own expense. Any changes or modifications not expressly approved by Motorola could void the user's authority to operate this equipment under the rules and regulations of the FCC.

Canadian Compliance

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.
Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

Declaration of Conformity				
We M	otorola, Inc. 101 Tournament Drive Horsham, PA 19044, U.S.A.			
declare under our sole responsibility that the				
STAR LINE®	Model SG1000 Split Third Port			
to which this declaration relates is in conformity with one or more of the following standards:				
EMC Standards				
EN55022	EN55024	EN50083-2	CISPR-22	CISPR-24
Safety Standards				
EN60065	EN60825	EN60950	IEC 60950 + A1: 1992 + A2: 1993 + A3: 1995 + A4: 1996	
following the provisions of the Directive(s) of the Council of the European Union:				
EMC Directive 89/336/EEC	Low Voltage Directive 73/23/EEC			

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Section 1

Introduction

Motorola's® SG1000 telecommunications optical node with split third port performs lightwave-to-RF and RF-to-lightwave signal conversions in an optical transmission link. This product supports a wide variety of advanced hybrid-fiber/coaxial network topologies.

Product enhancements including the activation of Port 3 as a split, fully diplexed RF port are included in this manual.

As broadband communication systems continue to evolve, the demand increases for optical links that carry the signal further into the transport system. These systems require additional features and functionality such as digital compression and alternative access at significantly lower costs. Fully configured, the SG1000 supports these next-generation telecommunication networks. It also supports a variety of single and two-way broadband network applications such as broadcast video, interactive video, telephony, and data.

Figure 1-1 illustrates a closed SG1000 telecommunications optical node:

Figure 1-1
SG1000 node—closed

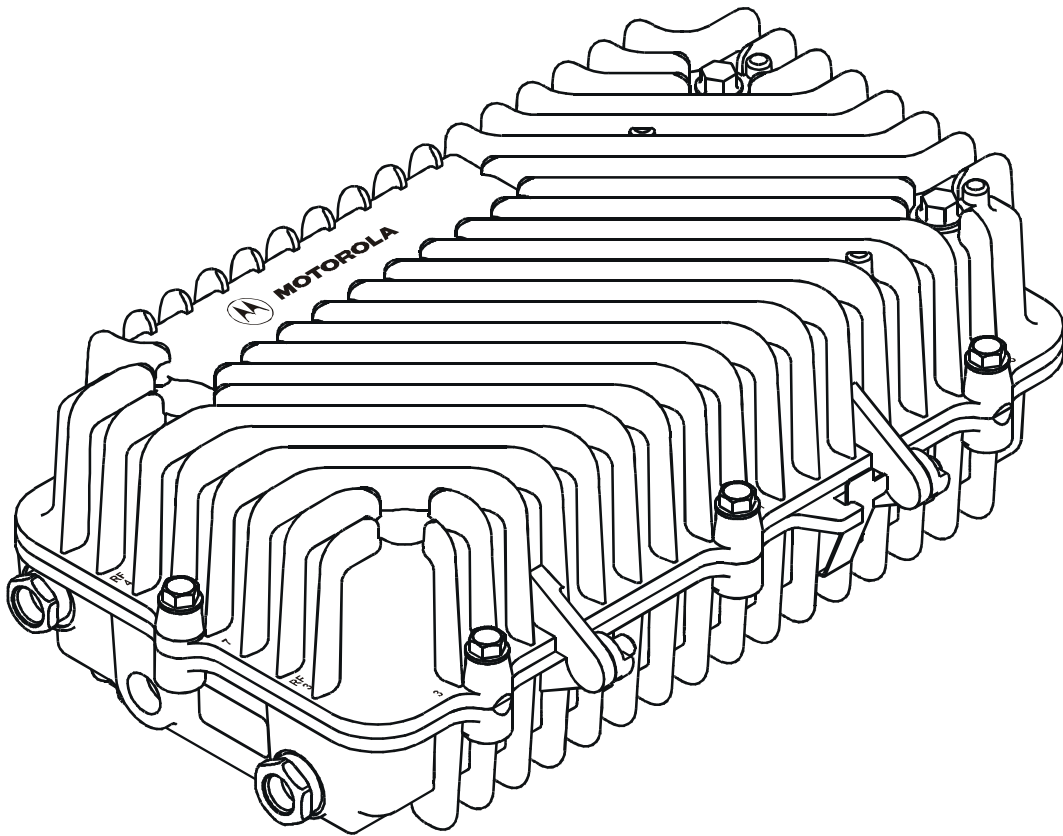
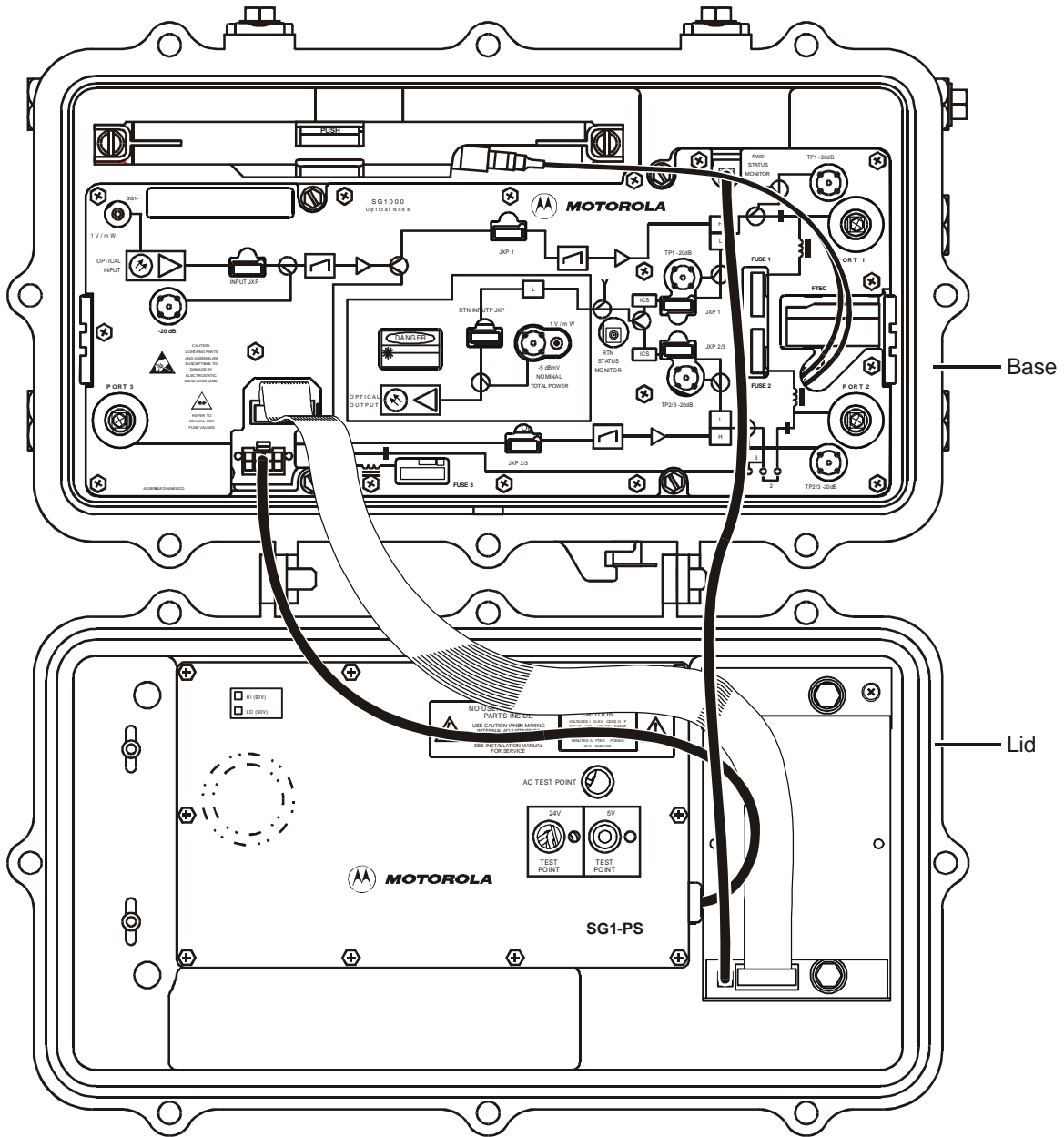


Figure 1-2 illustrates an open SG1000 telecommunications optical node:

Figure 1-2
SG1000 node—open



Features include:

- 750 MHz or 870 MHz forward bandwidth option
- Built-in optical receiver
- Optional optical return transmitter
- Optional LIFELINE™ status monitoring
- Optional ingress switching capability through the LIFELINE status monitor
- One or two RF outputs with optional third port activation using MB-SP and MB-DC*
- Built-in thermal compensation
- 15 amp power passing
- Modular plug-in diplex filters and equalizers
- Support for low, standard, and high slope options
- 60/90 volt powering

Using This Manual

The following sections provide information and instructions to install, configure, and operate the SG1000:

- | | |
|-----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Section 1 | Introduction provides a product description, related documentation, the technical helpline, and repair/return information. |
| Section 2 | Overview describes the functions of the SG1000 and includes details regarding your options and their functions. |
| Section 3 | Setup and Operation provides full configuration, setup of options, and bench testing procedures that are recommended prior to installation. It also provides information governing the applications required by your system. |
| Section 4 | Installation provides instructions on how to install the SG1000. |
| Appendix A | Specifications provides the technical specifications for the SG1000. |
| Appendix B | Torque Specifications provides the appropriate torque specifications for the screws, clamps, connectors, and bolts used in the SG1000. |
| Abbreviations and Acronyms | The Abbreviations and Acronyms list contains the full spelling of the short forms used in this manual. |

Related Documentation

Although these documents provide information that may be of interest to you, they are not required to install or operate the SG1000:

- *LL-CU LIFELINE Control Unit Installation and Operation Manual*
- *LIFELINE for Windows® Site Preparation Guide*
- *LIFELINE for Windows Software Operations Manual*
- *Return Path Level Selection, Setup, and Alignment Procedure Reference Guide*

Document Conventions

Before you begin using the SG1000, familiarize yourself with the stylistic conventions used in this manual:

- | | |
|-------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Bold type | Indicates text that you must type exactly as it appears or indicates a default value |
| SMALL CAPS | Denotes silk screening on the equipment, typically representing front- and rear-panel controls and input/output (I/O) connections, and LEDs |
| *
(asterisk) | Indicates that several versions of the same model number exist and the information applies to all models; when the information applies to a specific model, the complete model number is given |
| <i>Italic type</i> | Denotes a displayed variable, a variable that you must type, or is used for emphasis |

If You Need Help

If you need assistance while working with the SG1000, contact the Motorola Technical Response Center (TRC):

- Inside the U.S.A.: **1-888-944-HELP (1-888-944-4357)**
- Outside the U.S.A.: **1-215-323-0044**
- Online: <http://www.motorola.com/broadband>, click **HTML/Modem Version**, click **Customer Support**, then click **Web Support**.

The TRC is open from 8 AM to 7 PM Eastern Time, Monday through Friday and 10 AM to 6 PM Eastern Time, Saturday. When the TRC is closed, emergency service *only* is available on a call-back basis. Web Support offers a searchable solutions database, technical documentation, and low priority issue creation/tracking 24 hours per day, 7 days per week.

Calling for Repairs

If repair is necessary, call the Motorola Repair Facility at **1-800-642-0442** for a Return for Service Authorization (RSA) number before sending the unit. The RSA number must be prominently displayed on all equipment cartons. The Repair Facility is open from 7:00 AM to 4:00 PM Pacific Time, Monday through Friday.

When calling from outside the United States, use the appropriate international access code and then call **52-631-311-1100**, to contact the Repair Facility.

When shipping equipment for repair, follow these steps:

- 1 Pack the unit securely.

Enclose a note describing the exact problem.

Enclose a copy of the invoice that verifies the warranty status.

Ship the unit **PREPAID** to the following address:

Motorola BCS

c/o Exel

Attn: RSA # _____

6908 East Century Park Dr.

Tucson, AZ 85706

Section 2

Overview

Motorola's STARLINE® SG1000 with split third port is the newest addition to the next generation of telecommunications optical nodes. It provides a low cost solution to support evolving fiber-deep networks. It meets the latest demands of a single and two-way broadband network application including broadcast video, telephony and data.

Configured with one optical receiver, two high-level RF outputs, and an optional return-path module, the node offers low-cost flexibility. Ingress switching through LIFELINE enables you to identify and isolate ingress problems and mitigate the effects. Modular design enables system upgrades and component replacement with minimal system interruption.

Additional features include:

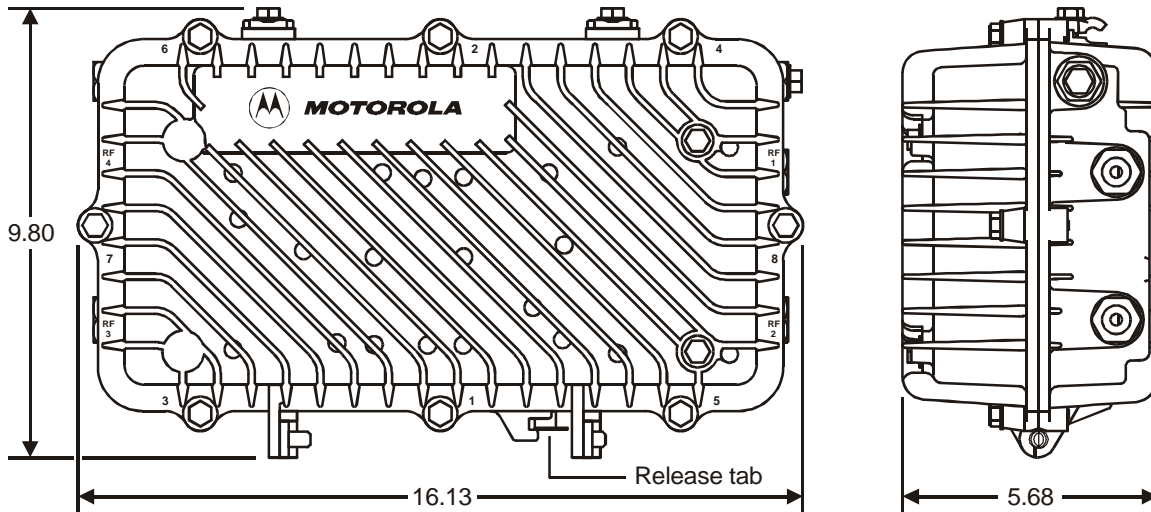
- SC/APC or FC/APC connectors
- Pedestal or strand mount housing
- Gas tube or Fast Trigger Electronic Crowbar (FTEC) surge protection
- Optional Silicon or Gallium Arsenide (GaAs) output hybrid
- Optional isolated distributed feedback (DFBT/* and DFBT3/*), isolated Fabry-Perot (IFPT/*), enhanced isolated Fabry-Perot (EIFPT/*), or non-isolated (FPT/*) optical-return transmitters
- User-friendly fiber management
- Standard gain models

Housing

The SG1000 optical node is furnished in an aluminum housing that protects the electronics from weather and dissipates internally generated heat.

Figure 2-1 illustrates the SG1000 housing:

Figure 2-1
SG1000 housing dimensions — front and side view



Coaxial cable connections to the housing are made with conventional 5/8 inch - 24-thread, stinger-type connectors. For strand mounting, two clamps are located at the top of the housing and are secured with 5/16 inch - 18-thread stainless steel bolts.

Housing Lid

A spring-release tab is located on the hinge side of the lower housing half as illustrated in Figure 2-1. It prevents sideways motion of the lid on the hinge pin when the node is open. You can remove the lid without tools by pressing down on the release tab and sliding the lid to the left.

Mounting Holes

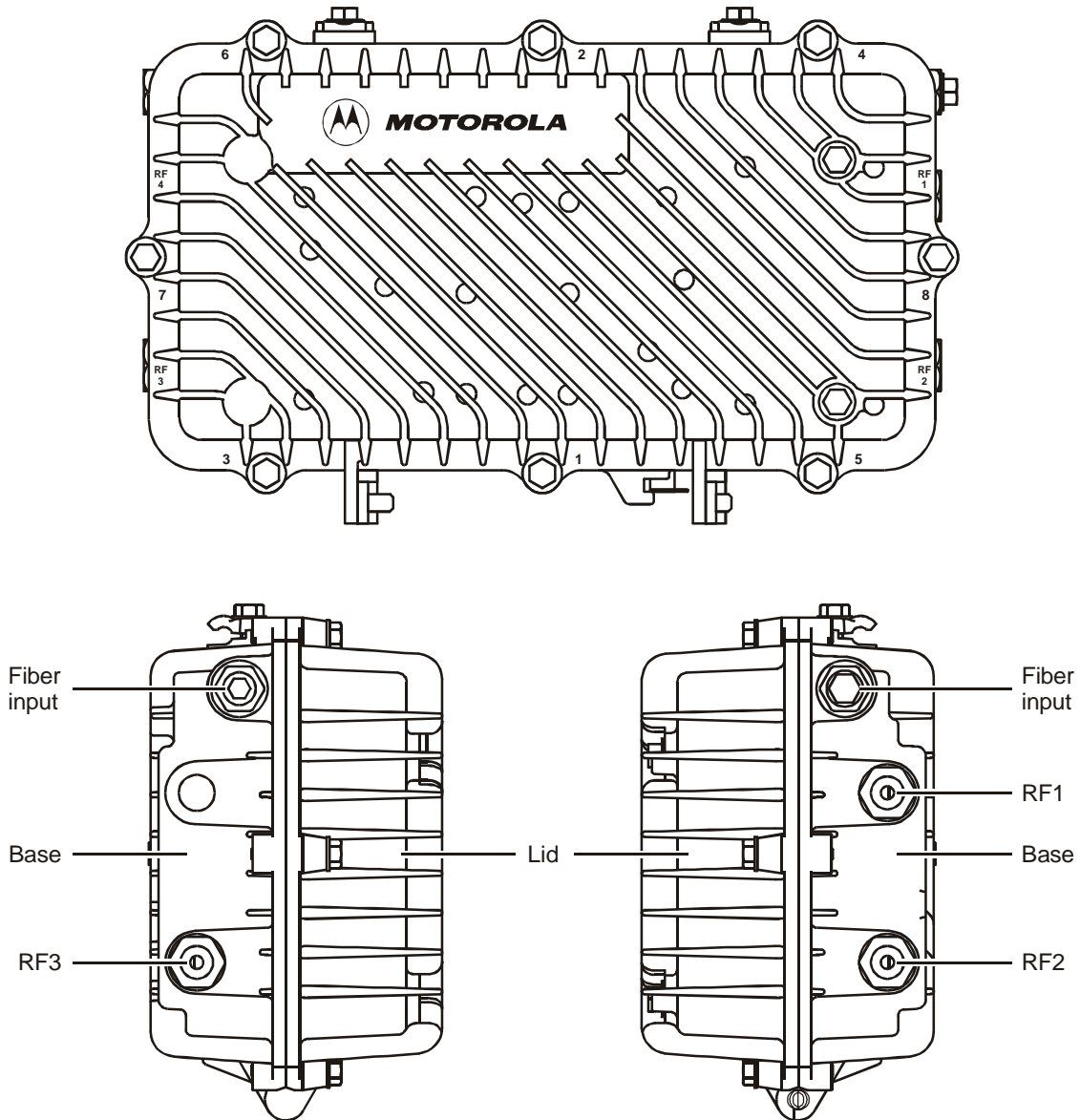
Two threaded holes, separated by 9.96 inches center-to-center, are located in the back of the housing on the horizontal center-line as illustrated in Figure 4-1. You can use these holes and the bolts from the strand clamps for pedestal mounting. These holes are threaded to a depth of 0.55 inches.

Port Locations

The housing provides five cable connections (three RF ports and two optical-fiber ports). All ports are protected by factory-inserted threaded plugs or plastic cap plugs. Discard these plugs when you install the cable connectors.

Figure 2-2 illustrates a front and end view of the closed housing and the port locations:

Figure 2-2
Port locations

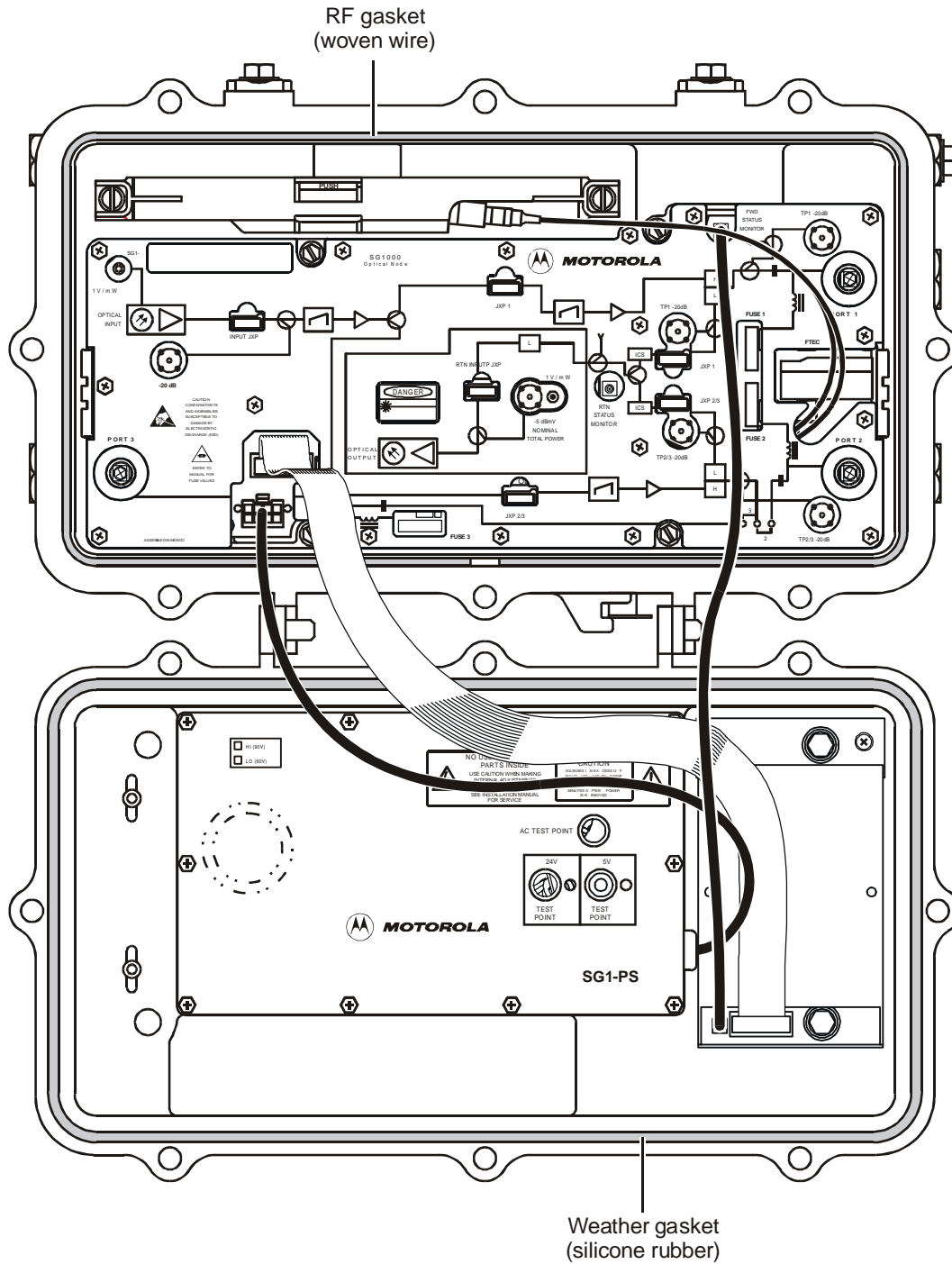


Gaskets

Each housing is equipped with a woven-wire RF gasket and a silicone-rubber weather gasket to provide a seal between the housing base and lid. These gaskets provide efficient ground continuity, RF shielding, and weather protection. Both gaskets must be in place and in good condition to ensure proper operation and protection of the station. The weather gasket should be lightly coated with silicone grease each time the node is opened. Replace this gasket if it becomes damaged or deformed.

Figure 2-3 illustrates the housing gaskets:

Figure 2-3
Housing gaskets



Power Supply

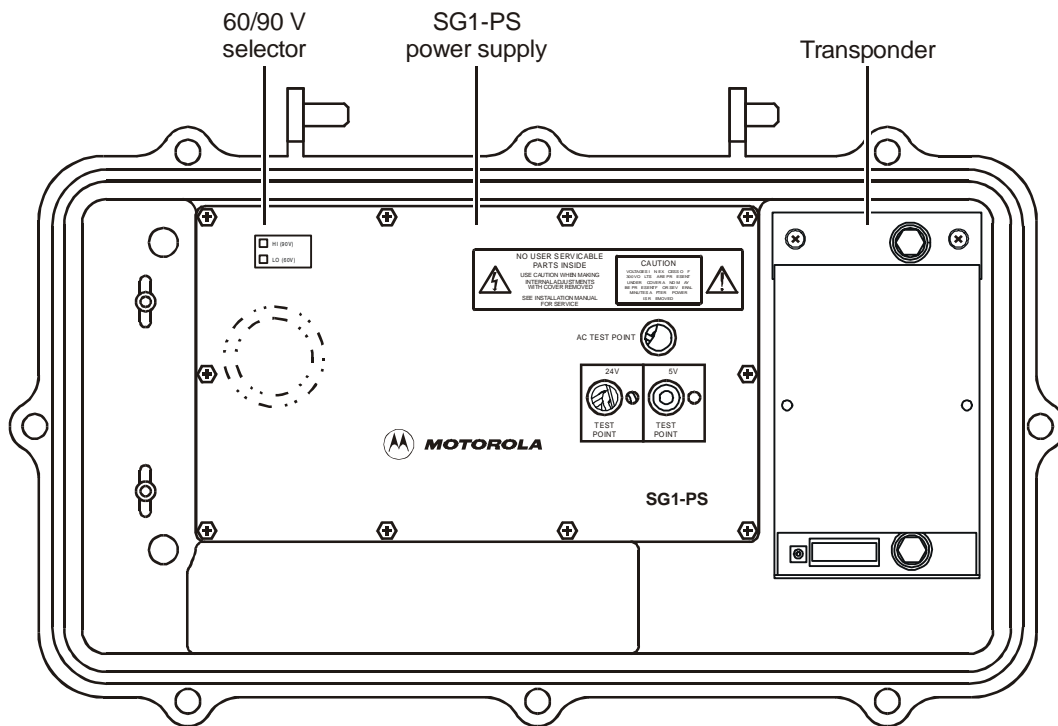
The SG1000 power supply (SG1-PS) is located in the housing lid to optimize heat transfer and to balance the thermal load between the base and the lid. An umbilical cord connects the SG1-PS to the housing base.

A flexible power-distribution design enables you to power the node from any of the three RF ports. Using fuses and shunts, you can configure the node to distribute power to the remaining active ports.

The power supply includes a heavy-duty, gas discharge tube surge protector located on the amplifier module. You can replace this surge protector with the optional FTEC surge protector. The FTEC triggers at approximately 230 Vac and presents a short circuit to the line during periods of overvoltage. After the ac input voltage returns to normal, the FTEC returns to its open circuit state. This provides the node with a level of protection against surge currents on the ac line.

Figure 2-4 illustrates the SG1-PS power supply:

Figure 2-4
SG1-PS power supply



Network Monitoring

The optional LIFELINE status monitoring system (LL-SG1) enables you to monitor the SG1000 from a headend or remote location. The LL-SG1 transponder is located in the lid, as illustrated in Figure 2-4, and is connected to the electronics package (E-pack) with an umbilical cord.

The LIFELINE network monitoring system includes:

LL-CU control units	These units are connected to the system at the headend and interrogate each SG1000 field transponder with FM outbound and inbound transmissions. You can select a variety of outbound and inbound frequencies depending on the system configuration. The control unit reports this information to the status-monitor computer.
Status-monitor computer and software	Includes an IBM®-compatible computer that is connected to the control unit LL-CU through an RS-232 link. LIFELINE software enables you to view measurements taken by the transponders.
LL-SG1-* field transponders	Installed in individual SG1000 nodes, this unit interfaces with the LL-CU at the headend. It reports such parameters as: forward amplifier dc current draw and gain control voltage, ac supply voltage, optical power at receiver input and transmitter output, +24 V supply voltage and current, forward-path RF output level, and management and control of RF ingress switching and tamper status.

Ingress Control

Two ingress control switches (ICS) provide return-path signal attenuation in the SG1000. Attenuation is accomplished using the LIFELINE status-monitoring transponder (LL-SG1) located in the lid next to the power supply. The status monitor transponder controls the ICS through digital control lines. Using a downstream command through the LIFELINE status-monitoring system, the return paths can be attenuated through the SG1000 by 6 dB or by 40 dB. By adjusting the ingress switch from the headend, you can isolate the ingress source. After you isolate an ingress source to the last possible node, you can shut the return path off at that location to limit the impact of the ingress on the remainder of the network.

Configuration

To accommodate unique system criteria, the SG1000 is shipped as a configured product. Hundreds of variations are available with configurations designed to address varied system requirements including:

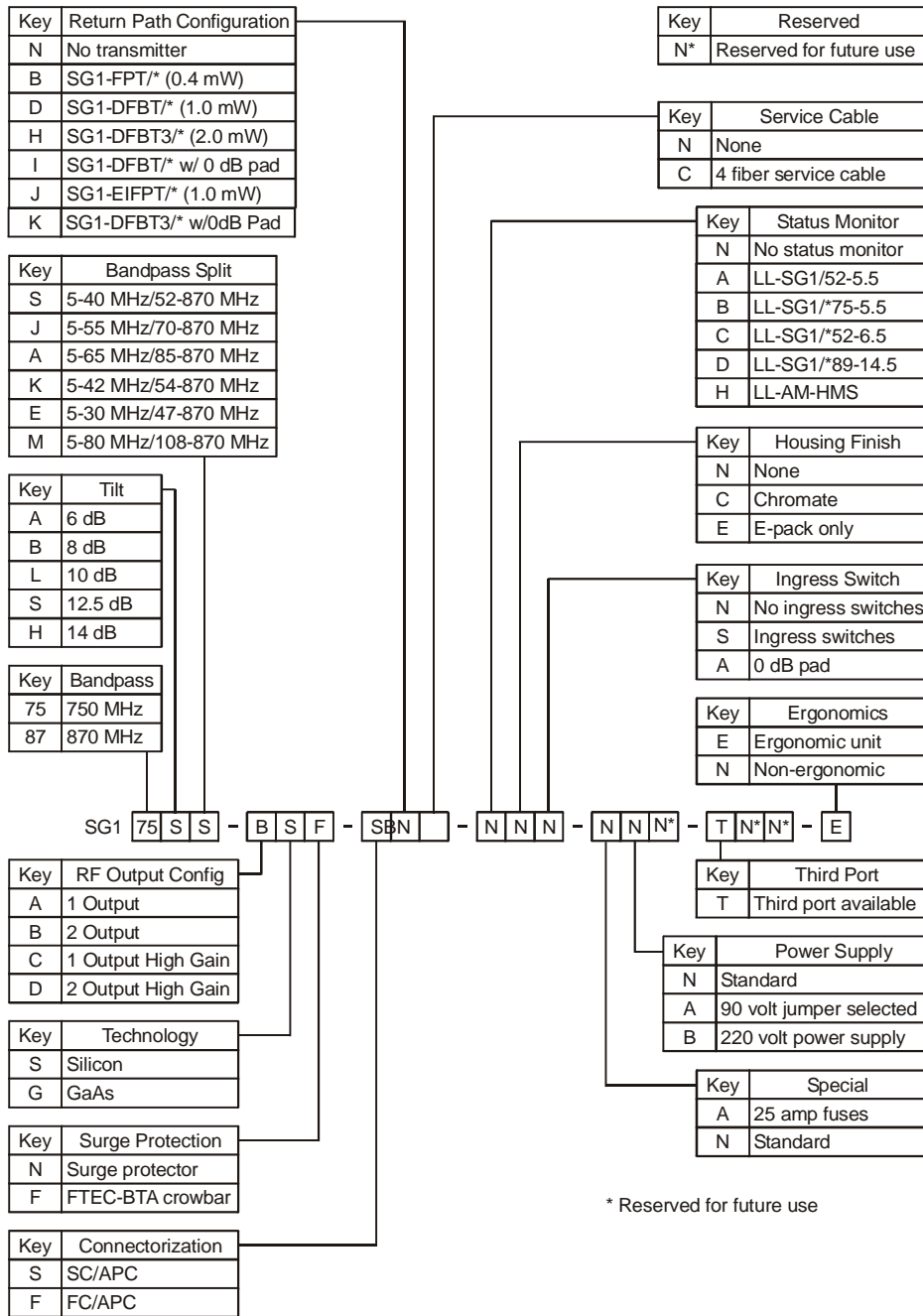
Optional features include:

- Fiber optic service cable
- Surge protection
- Chromate or epoxy housing finish
- SC/APC or FC/APC optical connectors
- Optical return transmitter
- Ingress Switching
- Network monitoring

The shipped configuration is noted in a label on the RF chassis cover illustrated in Figure 3-4.

Figure 2-5 illustrates the configuration notation:

Figure 2-5
Configuration notation



The current catalog may contain information not presented in this configuration diagram.

Forward RF Path

The receiver module is integrated within the E-pack. The receiver's integrated optical hybrid photo-detector improves RF performance over the entire 47 through 870 MHz passband. An optical-power monitor circuit provides assessment of the fiber link status. The receiver module is fully compatible with the status-monitor transponder enabling remote monitoring of key module and link performance parameters.

A positive intrinsic-negative (PIN) attenuator, driven by an integrated thermal control circuit, provides temperature compensation for the forward RF path.

An SG1000 distribution response correction (1DR) plug-in board follows the PIN attenuator and is selected during configuration according to the 750 or 870 MHz requirements. It provides a portion of the required slope characteristic. Plug-in forward equalizers located before each output hybrid provide the remainder of the slope characteristic.

Each output stage uses a Silicon or GaAs power-doubled output hybrid. The duplex filters are selected during configuration according to the preferred frequency split. You can change the filters to accommodate different splits. You will also need to change the RPLPF in the return transmitter.

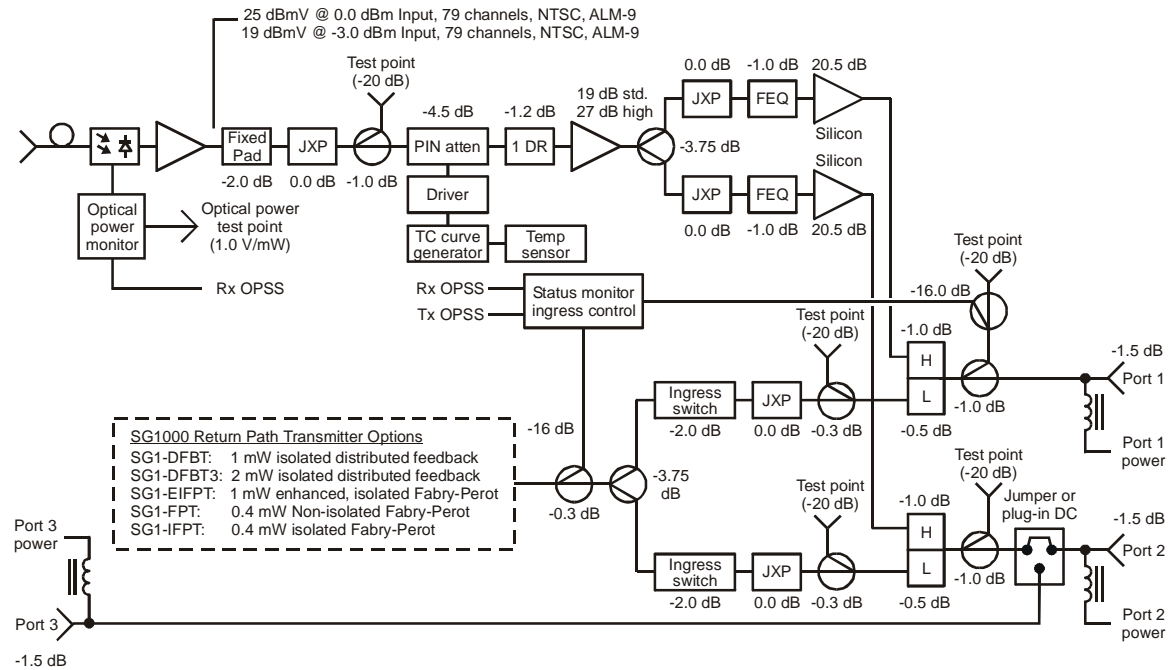
The SG1000 can be factory configured for one or two outputs. If you require only one output, the second RF output is not populated on the E-pack. To field upgrade a single-output node to a dual-output node, contact your Motorola sales representative for the appropriate kit.

Port 1 is a dedicated node output in the SG1000. Where you install the furnished MB-JMP jumper determines whether the other path feeds Port 2 or Port 3. The model MB-SP splitter and model MB-DC/* directional coupler are available separately and provide an output at Port 2 and Port 3. The MB-SP provides equal output levels, while the MB-DC/* provides one high-level port and one low-level port. The high-level signal is routed to Port 2 or Port 3 and is based on the MB-DC/*'s orientation during installation. Figure 2-1 illustrates the port numbers identified on the amplifier cover.

For each port, the status monitor transponder input is taken from the port one, forward RF output, test point. A directional coupler is used to ensure that the operation of the RF output test point is unaffected by the presence or absence of the status monitor. A new MCX connector has been added before the return-path transmitter that enables the status monitor to inject its output signal.

Figure 2-6 illustrates a dual-output, optical-return configuration using the SG1-DFBT/*, DFBT3/*, IFPT/*, EIFPT/*, or FPT/* return-path transmitter:

Figure 2-6
SG1000 – dual-output, optical-return block diagram



Level Control

The gain of hybrid IC amplifiers varies with temperature. The integrated thermal control circuit senses temperature and works to offset the gain variation in the hybrid IC amplifier by signaling needed changes to the RF PIN attenuator.

In addition, changes in system channel loading and/or splices in the fiber link can change the level of the received signal.

Tilt Selection

To use the tilt selection charts, first determine the system operating bandwidth, either 750 MHz or 870 MHz. Next, determine the preferred system channel load. Use the corresponding bandwidth and channel loading chart (Figure 2-7 or 2-8) to determine the preferred tilt.

Figure 2-7 illustrates the relative level dB chart for 750 MHz bandwidth:

Figure 2-7
Relative level dB versus 750 MHz

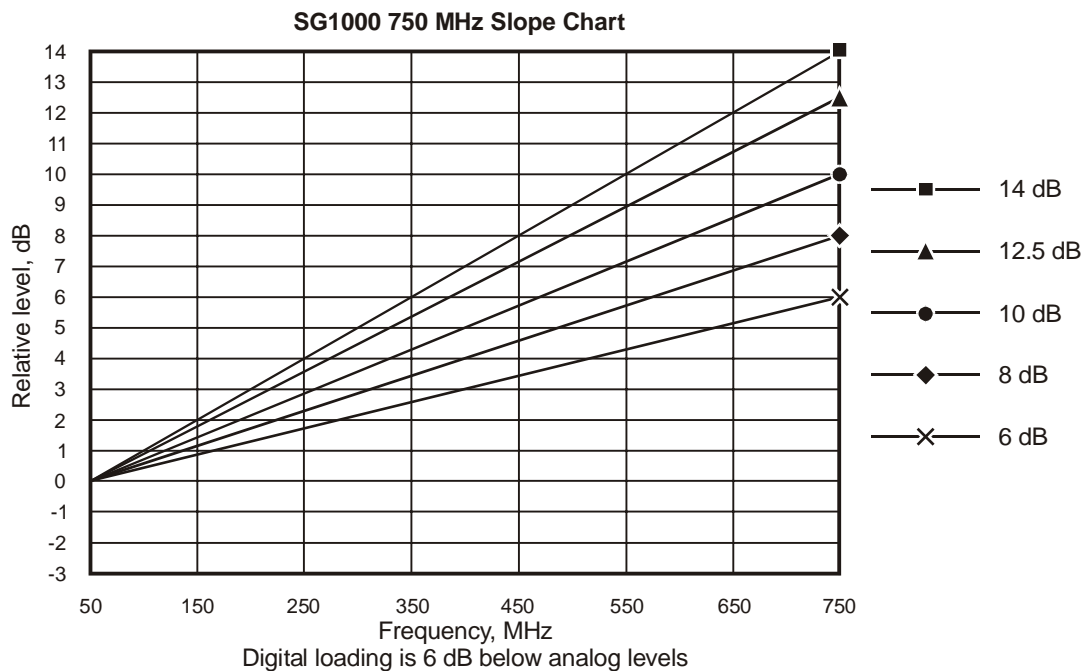
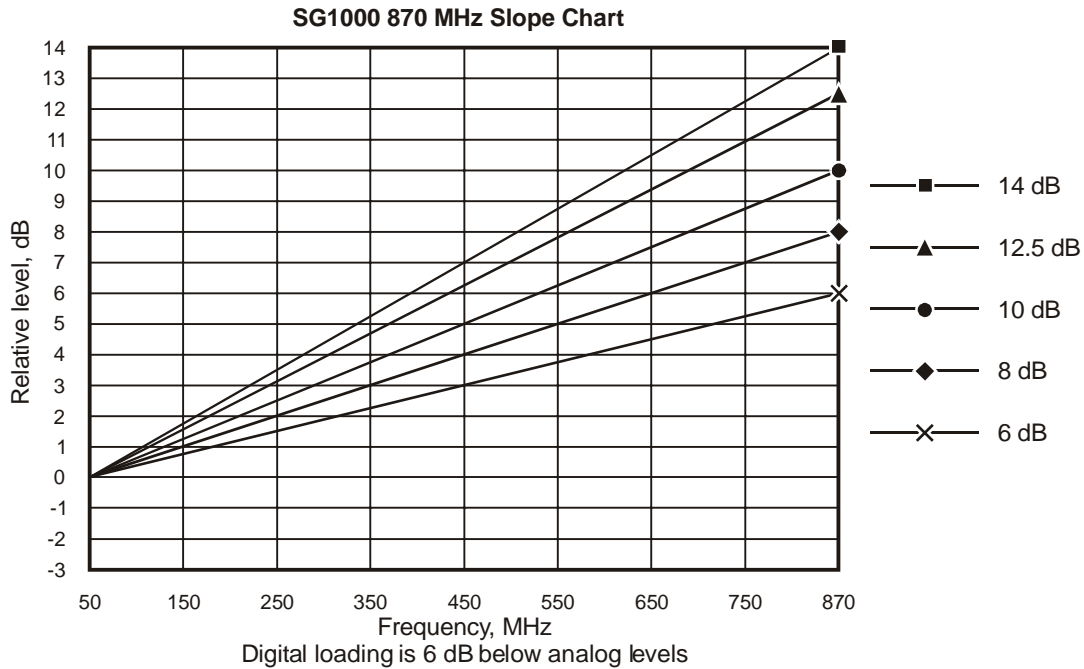


Figure 2-8 illustrates the relative level dB chart for 870 MHz bandwidth:

Figure 2-8
Relative level dB versus 870 MHz



Return Path

To meet present and future return-path requirements, you can configure the SG1000 with one of five optical transmitters to accommodate data and video signal transmission.

Optical Return Transmitters

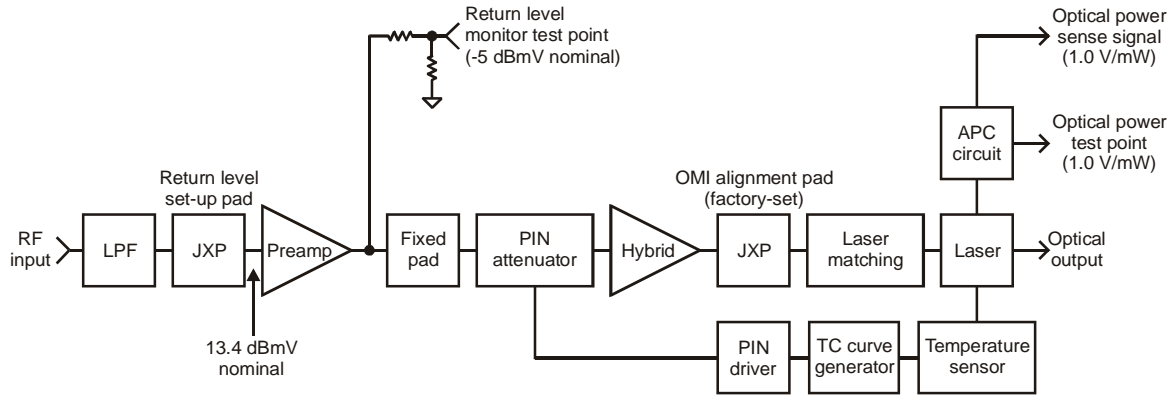
The five optical return transmitters and their features include:

- SG1-IFPT/*** Uses an uncooled, Fabry-Perot laser operating at 400 μ W. Carries a full 35 MHz of digital data or up to two video channels.
- SG1-EIFPT/*** Uses an uncooled, Fabry-Perot laser operating at 1 mW. Carries a full 35 MHz of digital data or up to two video channels.
- SG1-DFBT/*** Uses an uncooled, isolated DFB laser operating at 1 mW for improved link performance. Carries a full 35 MHz of digital data or up to two video channels.
- SG1-DFBT3/*** Uses an uncooled, isolated DFB laser operating at 2 mW for improved link performance. Carries a full 35 MHz of digital data or up to two video channels.
- SG1-FPT/*** Uses a non-isolated Fabry-Perot laser and is intended for data transmission only.

All transmitters include thermal compensation to minimize the change in received optical and RF signal level at the headend as the node temperature varies. To enable remote monitoring of key performance parameters, all transmitters are fully compatible with the status-monitor transponder.

Figure 2-9 illustrates a functional block diagram of the SG1000 optical transmitter:

Figure 2-9
SG1000 optical transmitter block diagram



Section 3

Setup and Operation

This section provides information governing the use of various options and applications required by your system.

Before you install the SG1000, it must be setup to meet the power and configuration requirements for the node location. Bench setup is recommended to ensure proper functioning of all components and to simplify field installation.

Powering the Node

You can conveniently power the node by applying 60 Vac or 90 Vac to any of the three RF ports. You can configure the node to distribute power from any port to either or both of the remaining ports. You can also select the 220 Vac powering option.

60/90 Vac Supply

For optimal operation, the ac input from the feederline to the power supply must be between 44 V and 90 V root mean square (rms) with a line frequency of 50 Hz or 60 Hz. The waveshape of the input voltage must be quasi-squarewave. A precision output regulator protects against overcurrent and short circuits thus providing a precise output voltage.

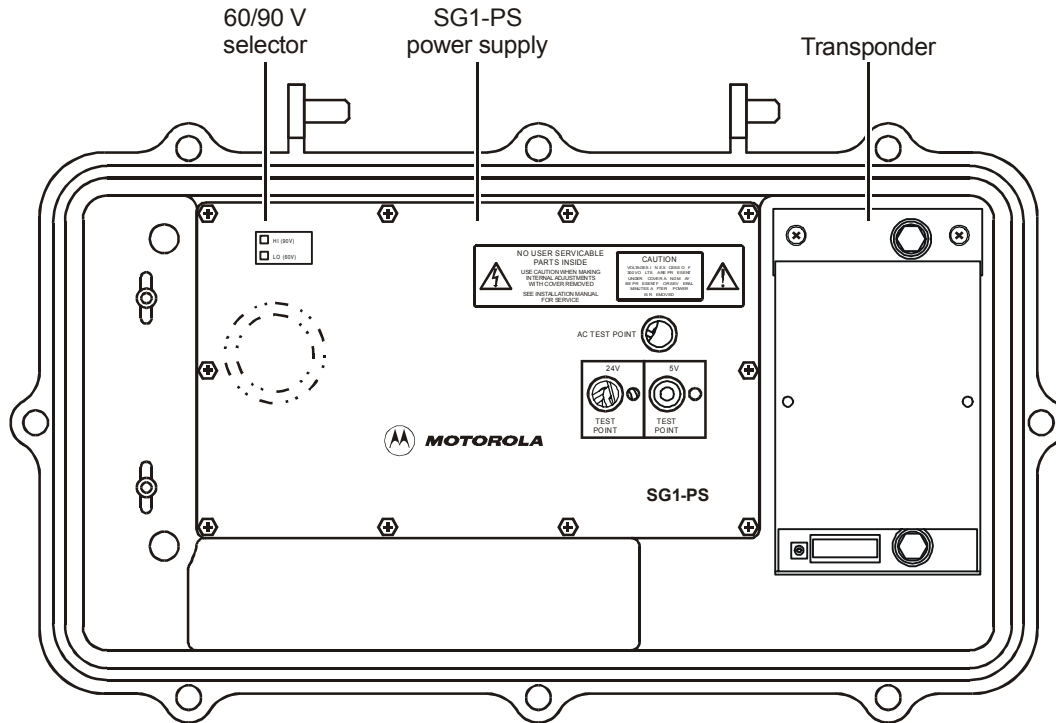
You can power the SG1000 from 60 Vac or 90 Vac system supplies. The unit is shipped from the factory set for 60 Vac (LO). To change the power-supply setting, use a Phillips head screwdriver or one-quarter inch nut driver to remove the ten screws that secure the cover. Remove the cover. If your system uses 90 Vac powering, reposition the suitcase jumper on the dc power supply to the 90 V (HI) position to optimize the supply turn-on voltage for the higher input range.

No damage results if you do not change the jumper. In a 90 V system, changing the jumper ensures that the dc supply does not turn on until the proper input voltage level is reached. This prevents excessive loading of the system power supply during turn on after a power-off situation.

Test points are provided for the ac, 24 Vdc, and 5 Vdc supplies. A green LED indicates powering of the dc circuits.

Figure 3-1 illustrates the SG1000 60/90 Vac power supply:

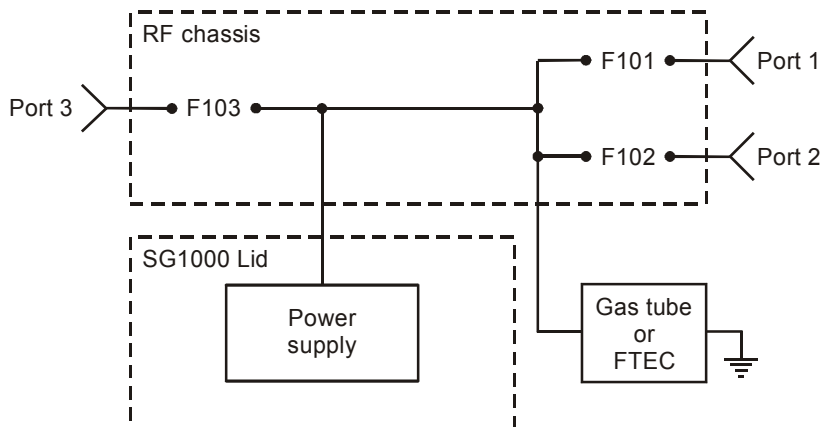
Figure 3-1
SG1000 60/90 Vac power supply



All ports are rated at 15 amperes maximum and are fused with common, blade-type 20 ampere fuses. A gas-discharge tube, or optional FTEC, clamps ac surges and prevents them from coupling into the dc power supply. In addition to providing overcurrent protection, fuse locations also determine the paths for ac bypassing through the housing.

Figure 3-2 diagrams fuse configurations for ac powering:

Figure 3-2
Fuse configuration



DANGER!



Voltages up to 90 Vac are accessible. To avoid a shock hazard, confirm that the node is not powered before removing the cover or replacing the fuses.

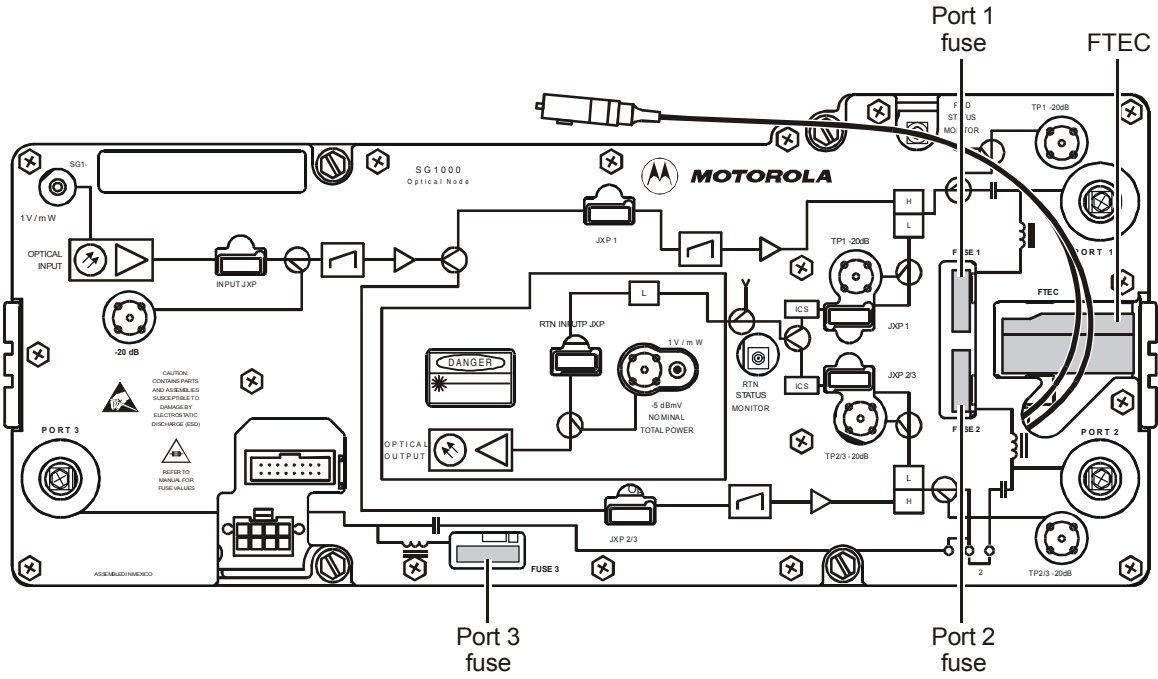
Table 3-1 identifies and describes the ac fuse options:

Table 3-1
AC fuses

Fuse Function	Rating	Type
F101 ac power to/from port one.	20 A, 32 Vdc	Blade-type, plug-in, fast blow
F102 ac power to/from port two.	20 A, 32 Vdc	Blade-type, plug-in, fast blow
F103 ac power to/from port three.	20 A, 32 Vdc	Blade-type, plug-in, fast blow

Figure 3-3 illustrates the RF chassis cover and fuse locations for the 60/90 Vac power supply:

Figure 3-3
Fuse locations



220 Vac Supply

The SG1000 is now available with a 220 Vac line power option. This node is designed for indoor use only and has a reduced operating temperature.

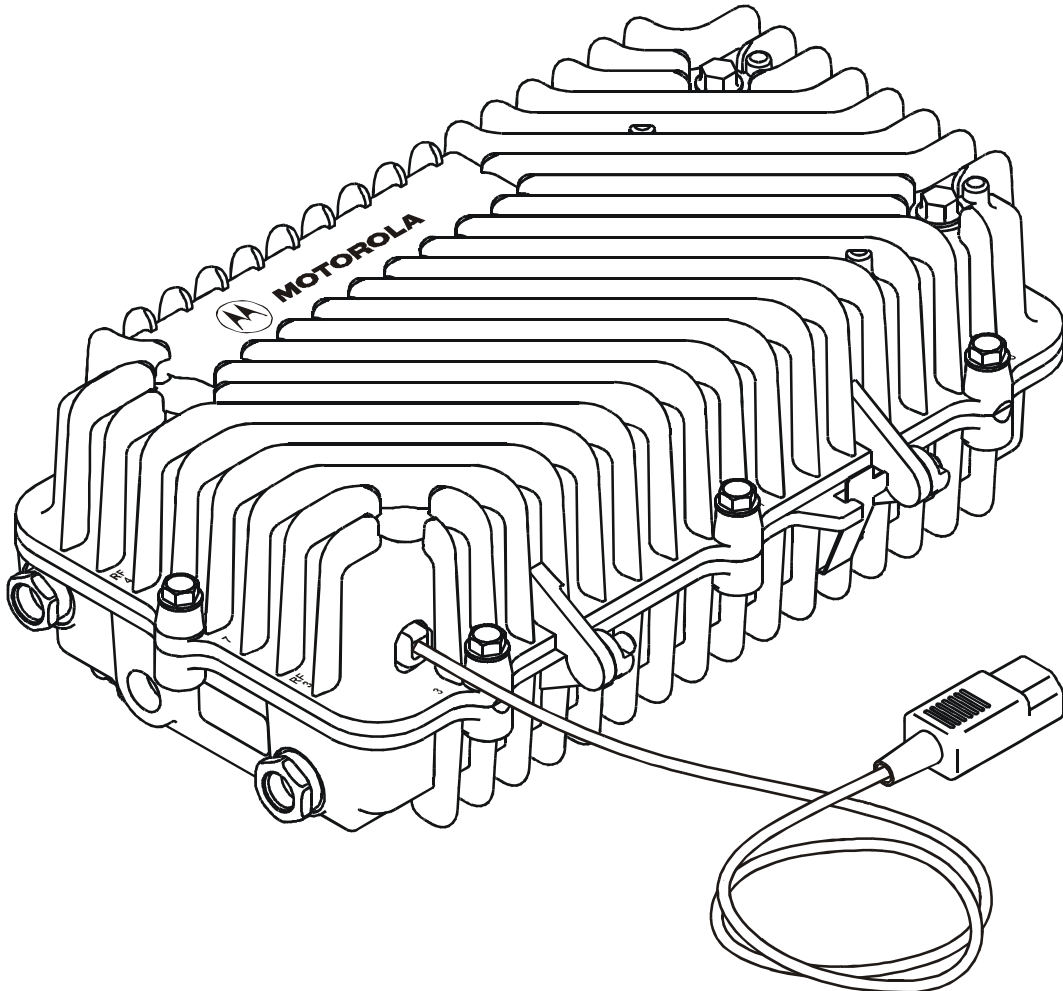
Do not use this power supply in conjunction with a coaxial network-powered system.

The SG1-PS/220 power supply is also located in the housing lid to optimize heat transfer and balance the thermal load between the base and the lid. An internal umbilical cord connects the SG1-PS/220 to the housing base. The ac power cord is terminated with an IEC 320 male connector and enters the housing lid through a nylon strain relief.

Lightning protection and fusing are also provided; however, there are no internal user-serviceable parts.

Figure 3-4 illustrates a closed SG1000 node and 220 Vac power cord:

Figure 3-4
SG1000 with 220 Vac power cord

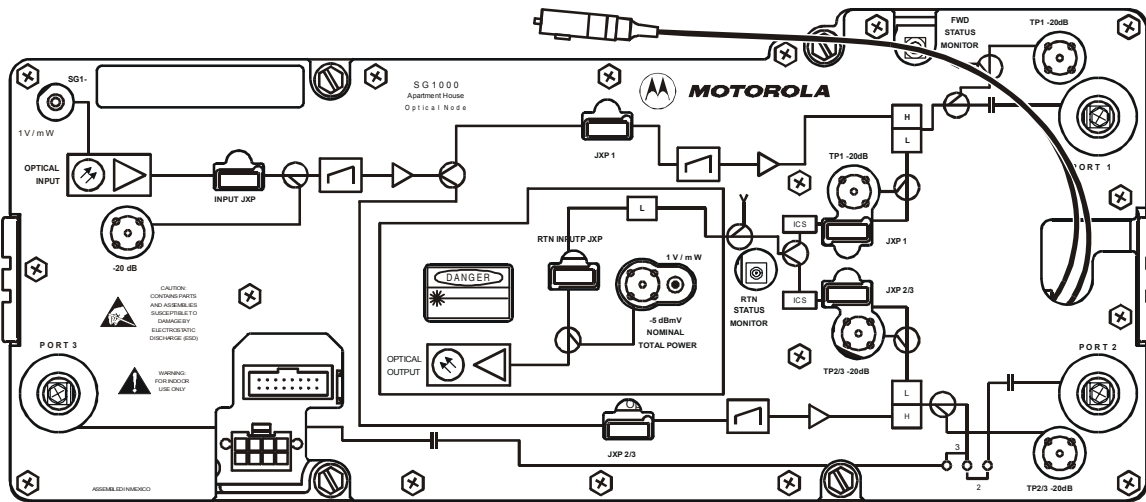


Bench setup is recommended and requires a 220 Vac power source with a female IEC 320 connector to interface with the line cord.

The SG1-PS/220 equipped node has no power passing capability, and the fuses on the main board have been removed at the factory.

Figure 3-5 illustrates the RF amplifier cover on the SG1000 with the 220 Vac power option:

Figure 3-5
SG1000 amplifier cover with 220 Vac power option

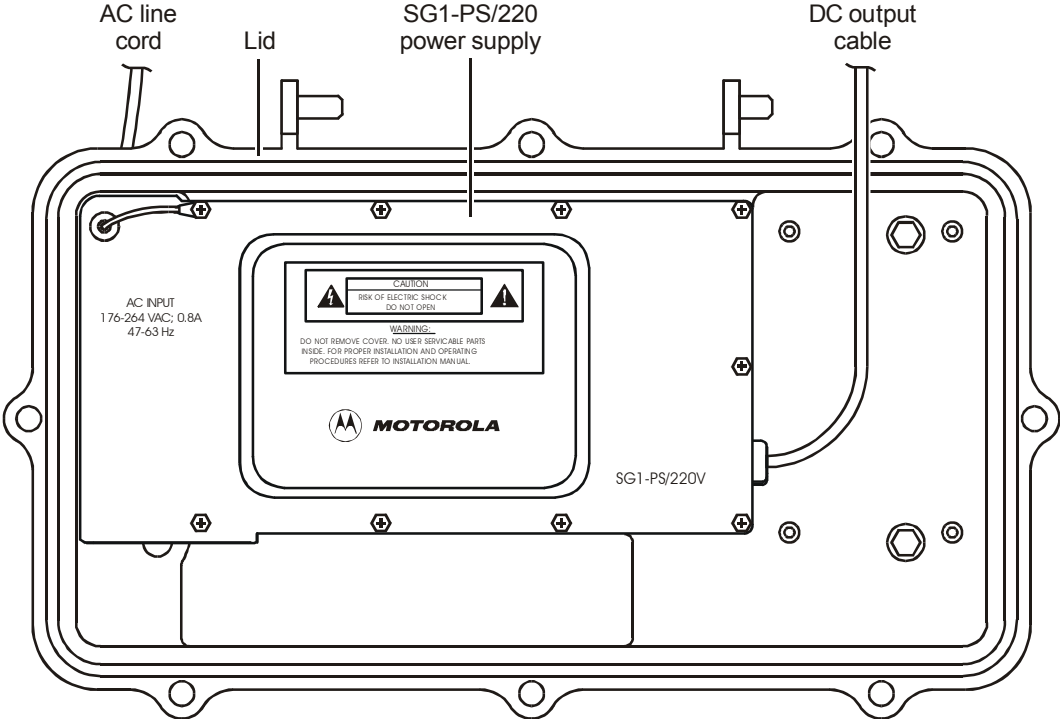


For operation, the ac input from the line cord to the power supply must be between 176 Vac and 264 Vac and a frequency of 47 Hz to 63 Hz sinusoidal wave. A precision output regulator protects against overcurrent and short circuits thus providing precise output voltages of +24 and +5 Vdc.

There are no test points or LEDs on the SG1-PS/220 to indicate powering of the dc circuits. The yellow wire from the power supply cover is used for factory tests only. Do not disconnect the screw or lug under any circumstances.

Figure 3-6 illustrates the SG1-PS/220 installed in the lid of the SG1000:

Figure 3-6
SG1-PS/220 installed in the SG1000



Setting-Up the Forward Path

The following subsections provide information for specific forward-path functions.

For your convenience, Figures 3-7 and 3-8 show the RF chassis installed in the SG1000 housing base.

Figure 3-7 illustrates the RF chassis with the cover on as it provides a functional diagram and indicates the location of all major components:

Figure 3-7
RF chassis with cover

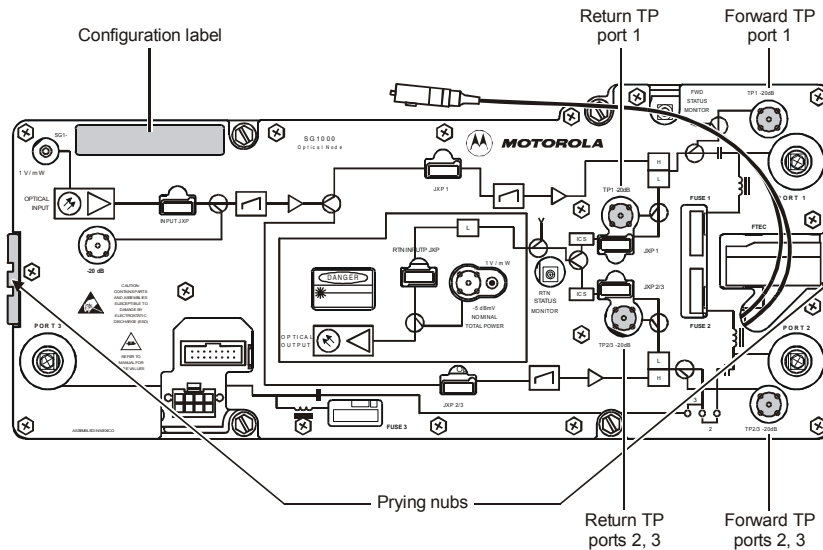
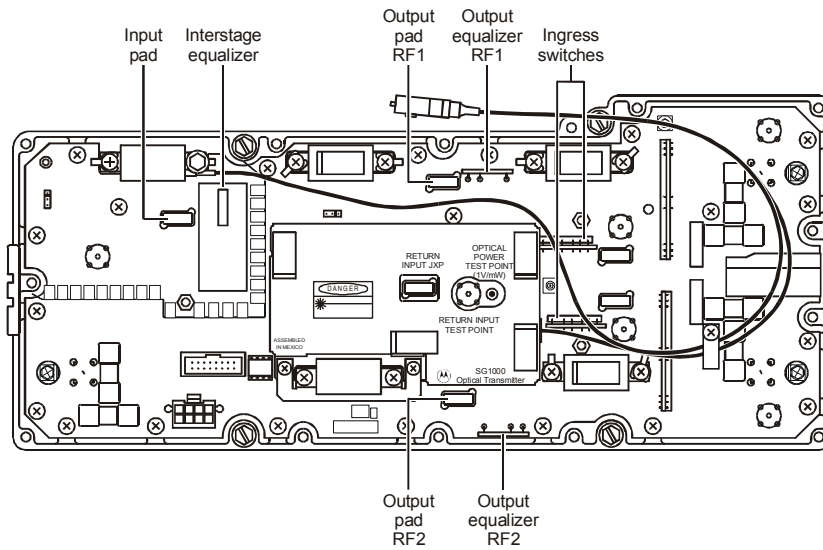


Figure 3-8 illustrates the RF chassis with the cover removed for a better view of the board components:

Figure 3-8
RF chassis with cover removed



Before you begin:

- Test the input power using an optical power meter to ensure that expected levels are present.
- Refer to Section 4, “Installation,” Installing the Fiber Cables to verify that required connections have been made to the bulkhead fitting.

Selecting the Gain Control

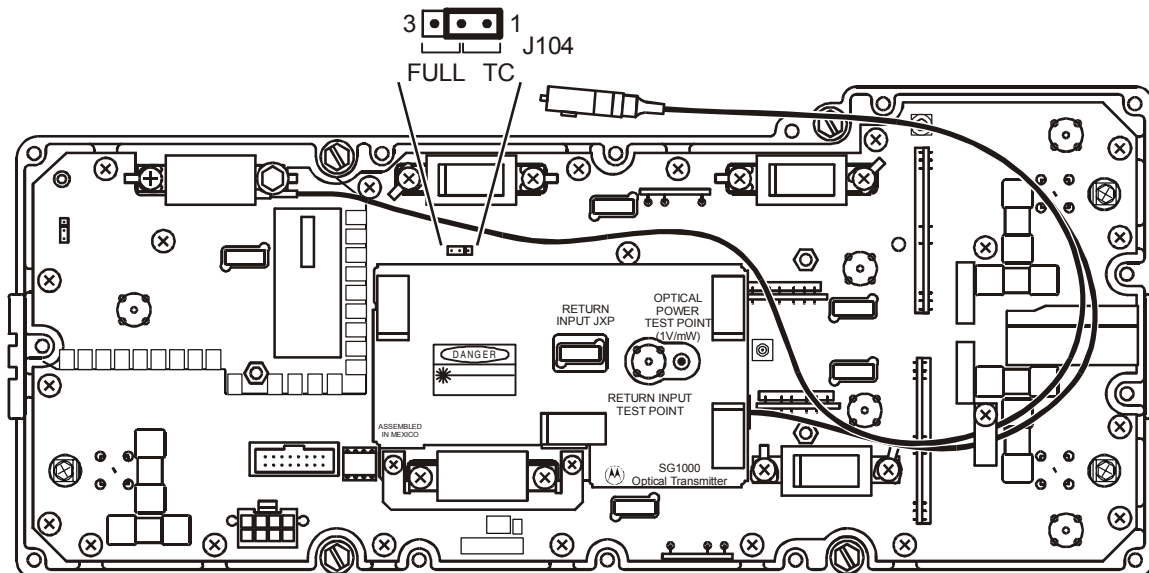
Thermal control circuitry provides thermal gain control that compensates for changes in gain caused by temperature variations. The available gain reserve is factory-set for optimum operation and is not field adjustable. You can however, set an internal jumper to disable thermal gain control. This enables you to operate the station at full gain for applications that do not require gain stabilization.

The gain-control jumper is factory-set to enable thermal gain control. If you want to reset the jumper:

- 1 Loosen the chassis cover screws and remove the cover.
- 2 Position the jumper on the appropriate pins for the preferred gain control mode.
- 3 Replace the chassis cover and torque the screws to 15 to 17 in-lbs. Be careful that you do not pinch the fibers between the chassis cover and chassis.

Figure 3-9 illustrates the gain control jumper and its location:

Figure 3-9
Gain control jumper



Forward Path Padding

The pad values, presented in Table 3-2, serve as a starting-point reference for typical installations. These charts are prepared specifically for 77 channel systems with an upper-band edge of 750 MHz or 870 MHz. For a 110 channel system, reduce the value of the input JXP by 1.5 dB.

The pad values shown are the minimum values expected. If you need more padding, increase the input pads to a maximum of 10 dB and place the remainder of the required padding at the output pad facility.

Table 3-2
SG1000 pad chart, silicon-hybrid, high-gain

Input dBm/ mW	Output dBmV at 547.25 MHz														
	38	39	40	41	42	43	44	45 46	47 48	49 50	51				
2.0/1.6	Receiver				10	10	10	10	10	10	10	9	8	7	
	JXPs				10	9	8	7	6	5	4	3	2	1	0
	Output JXPs														
1.5/1.4	Receiver			10	10	10	10	10	10	10	10	10	9	8	
	JXPs			10	9	8	7	6	5	4	3	2	1	0	0
	Output JXPs														
1.0/1.3	Receiver		10	10	10	10	10	10	10	10	10	10	9	8	
	JXPs		10	9	8	7	6	5	4	3	2	1	0	0	0
	Output JXPs														
0.5/1.1	Receiver	10	10	10	10	10	10	10	10	10	10	9	8	7	
	JXPs	10	9	8	7	6	5	4	3	2	1	0	0	0	0
	Output JXPs														
0.0/1.0	Receiver	10	10	10	10	10	10	10	10	10	9	8	7	6	
	JXPs	9	8	7	6	5	4	3	2	1	0	0	0	0	0
	Output JXPs														
-0.5/0.9	Receiver	10	10	10	10	10	10	10	10	9	8	7	6	5	
	JXPs	8	7	6	5	4	3	2	1	0	0	0	0	0	0
	Output JXPs														
-1.0/0.8	Receiver	10	10	10	10	10	10	10	9	8	7	6	5	4	
	JXPs	7	6	5	4	3	2	1	0	0	0	0	0	0	0
	Output JXPs														
-1.5/0.7	Receiver	10	10	10	10	10	10	9	8	7	6	5	4	3	
	JXPs	6	5	4	3	2	1	0	0	0	0	0	0	0	0
	Output JXPs														
-2.0/0.6	Receiver	10	10	10	10	10	10	9	8	7	6	5	4	3	2
	JXPs	5	4	3	2	1	0	0	0	0	0	0	0	0	0
	Output JXPs														
-2.5/0.6	Receiver	10	10	10	10	10	9	8	7	6	5	4	3	2	1
	JXPs	4	3	2	1	0	0	0	0	0	0	0	0	0	0
	Output JXPs														
-3.0/0.5	Receiver	10	10	10	10	9	8	7	6	5	4	3	2	1	0
	JXPs	3	2	1	0	0	0	0	0	0	0	0	0	0	0
	Output JXPs														

Reduce receiver JXP by 8 dB for standard gain.

Reserve gain set for 2 dB.

GaAs levels are approximately 2 dB lower

Selecting the Wavelength

You can use the SG1000 with 1310 or 1550 nm transmitters. An internal wavelength-selection jumper optimizes the optical-power test point calibration for the system wavelength. This jumper has no effect on the optical-to-RF performance (gain, flatness, slope) of the node.

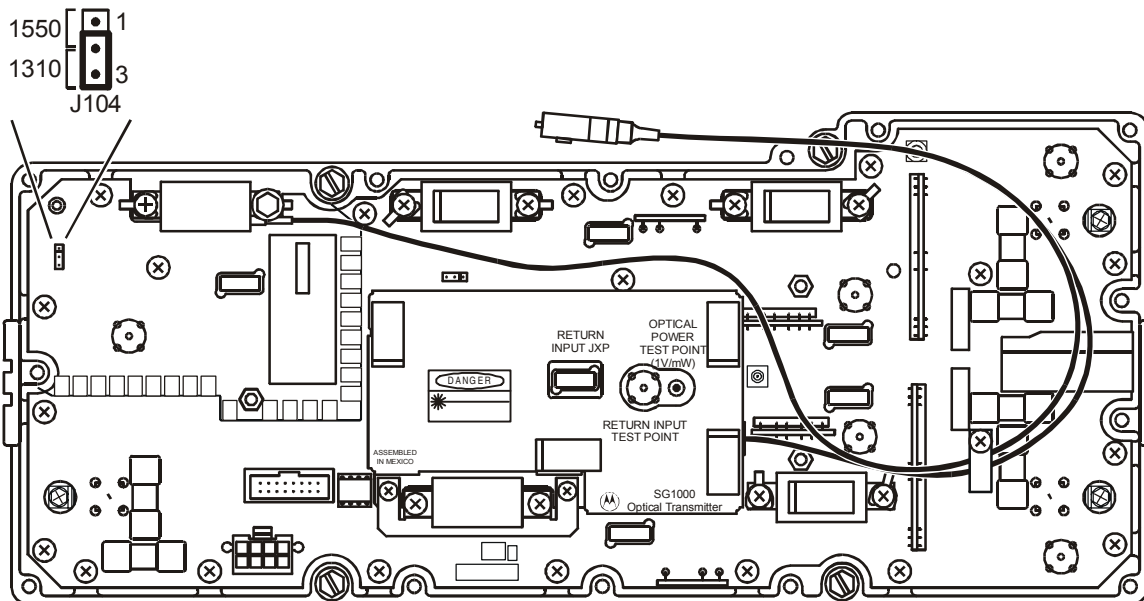
The wavelength jumper is factory-set and provides optimum calibration in a 1310 nm system.

To reset the jumper:

- 1 Loosen the chassis cover screws and remove the cover.
- 2 Position the jumper on the appropriate pins for the preferred wavelength.
- 3 Replace the chassis cover and torque the screws to 15 to 17 in-lbs. Be careful that you do not pinch the fibers between the chassis cover and chassis.

Figure 3-10 illustrates the wavelength selection jumper and its location:

Figure 3-10
Wavelength selection jumper



Optical Power Test Point

The optical power test point is provided to monitor the optical power level at the input to the node. An optical power sense signal is also provided to the status monitor to enable remote monitoring. The nominal scale factor for both the test point and sense signal is 1.0 V/mW.

The receiver levels measured:

- Are on the input side of the forward input JXP (P101).
- Assume the signal source is a Motorola advanced laser module (ALM) series transmitter at 1310 nm.
- Are typically 2 dB greater than the minimum levels listed in the table.

Table 3-3 provides minimum output levels for the SG1 receiver.

Table 3-3
SG1 receiver minimum output levels

Optical input level (dBm)	77 channels (dBmV)	110 channels (dBmV)
2.00	28.31	26.76
1.50	27.31	25.76
1.00	26.31	24.76
0.50	25.31	23.76
0.00	24.31	22.76
-0.50	23.31	21.76
-1.00	22.31	20.76
-1.50	21.31	19.76
-2.00	20.31	18.76
-2.50	19.31	17.76
-3.00	18.31	16.76
-3.50	17.31	15.76
-4.00	16.31	14.76

Verifying RF Output Levels

Check the output at the node output test points located in the right corners of the chassis cover as illustrated in Figure 3-7. These test points have 20 dB insertion loss. Port 2 and Port 3 share a common test point and JXP-* pad facility.

Output Passives

Use the furnished MB-JMP jumper to select Port 2 or Port 3 as the second output port. Install the proper output splitter to obtain signal output at Port 2 and Port 3. The MB-SP splitter provides equal output at Port 2 and Port 3. If you require high-level output at Port 2 or Port 3 and an 8 dB, 10 dB, or 12 dB lower level at the other port, install the appropriate MB-DC/* directional coupler.

Figure 3-11 illustrates the MB-SP splitter:

Figure 3-11
MB-SP splitter

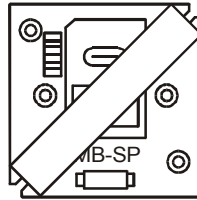
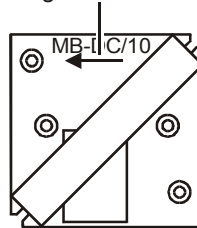


Figure 3-12 illustrates the MB-DC/* directional coupler:

Figure 3-12
MB-DC/* directional coupler

Arrow on silkscreen indicates
direction of signal flow to coupled port



Configuring the Return-Path

Designed specifically for use in the SG1000, the optical modules combine high performance with easy maintenance.

The optical return-path modules available with the SG1000 include:

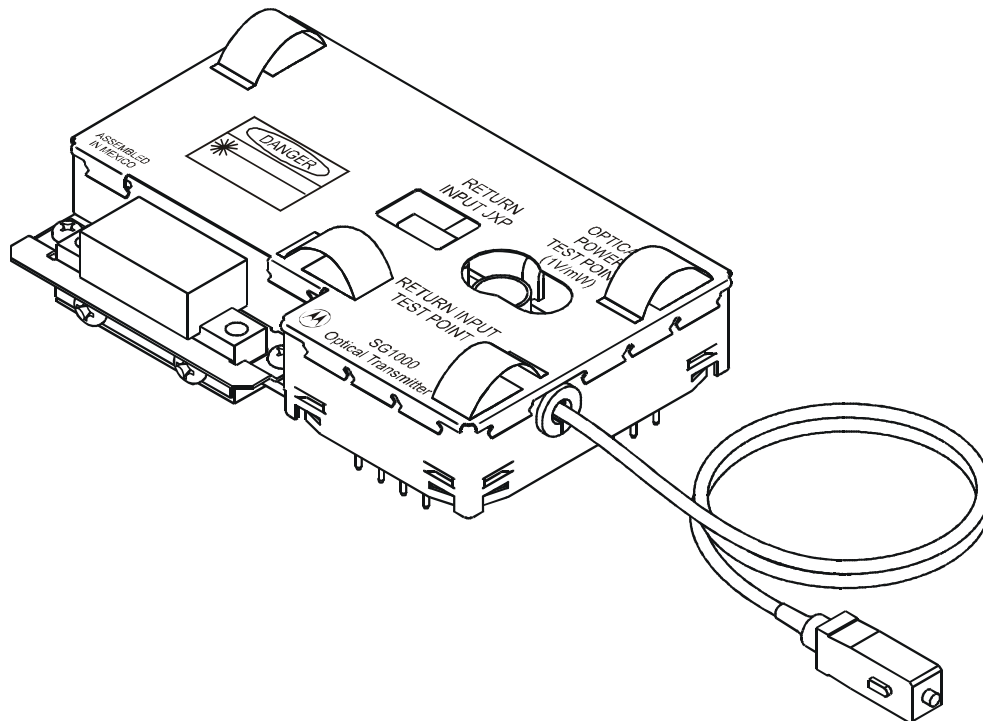
- SG1-FPT/*** This is a non-isolated Fabry-Perot transmitter with a nominal optical output power of 0.4 mW. It is intended for data applications only.
- SG1-IFPT** This is an isolated Fabry-Perot transmitter with a nominal optical output power of 0.4 mW. It is intended for data and video applications.
- SG1-EIFPT/*** This is an isolated Fabry-Perot transmitter with a nominal optical output power of 1.0 mW. It is intended for data and video applications.
- SG1-DFBT/*** This is an isolated distributed feedback transmitter with a nominal optical output power of 1.0 mW. It is intended for data and video applications.
- SG1-DFBT3/*** This is an isolated distributed feedback transmitter with a nominal optical output power of 2.0 mW. It is intended for data and video applications.

All transmitters are designed to operate at a recommended 28 dBmV/ch total power at the housing inputs.

You can use all of the transmitters in conjunction with Motorola AM-RPR, AM-OMNI-RPR/2, AM-OMNI-RPR/2C, GX2-RX200, or other similar return-path optical receivers.

Figure 3-13 illustrates an SG1-DFBT/* optical transmitter. The structure of the DFBT3/*, EIFPT/* and FPT/* transmitters is identical. The specific model is stamped on the side of the module.

Figure 3-13
SG1-DFBT optical transmitter



Additional optical transmitter features include:

Optical power test point	This test point enables you to monitor the optical output level of the module. The nominal scale factor is 1.0 V/mW. This test point does not track changes in optical power caused by laser tracking error. Under normal operating conditions, the optical power test point for each transmitter should measure within the following ranges: SG1-FPT/*: 0.368 V to 0.434 V SG1-IFPT/*: 0.368 V to 0.434 V SG1-EIFPT/*: 0.922 V to 1.084 V SG1-DFBT/*: 0.922 V to 1.084 V SG1-DFBT3/*: 1.847 V to 2.168 V
RF input test point	This test point enables you to monitor the RF input signal level applied to the module. The transmitter is factory-aligned for best operation with a total power level of -5 dBmV measured at the test point.
Input JXP	The input JXP pad enables you to set the transmitter operating point. Choose this pad to drive the transmitter to its recommended operating point when the total combined power at all the station ports approximates +28 dBmV. You can adjust this pad value for specific system requirements.
Low-pass filter (LPF)	The LPF provides additional rejection of any forward path signals that may be present at the module input. The optical modules use SG2-RPLPF-*-N LPFs with the filter split matched to the preferred station split.

The SG1000 transmitters are designed so that the OMI (20% for the DFBT and DFBT3) is achieved when -5 dBmV is measured at the test point. When a DFBT or DFBT3 with a 5 dB JXP is installed, the loss from the input of the transmitter to the test point is 25.4 dB.

Because of the specifications, 35 MHz of noise-like signals (QPSK, nQAM, and others), loaded on a constant-power-per-Hz basis and, at a total power that drives the transmitter optimally, results in -5 dBmV total power being measured at the test point. If you load the 1 MHz signal at the same constant-power-per-Hz value that results from the specified 35 MHz of loading, the level at the test point would be $(-5 \text{ dBmV}) + 10 * \log(1 \text{ MHz}/35 \text{ MHz}) = -20.44 \text{ dBmV}$ total power.

Installing SG1000 Optical Modules

The SG1000 optical module's design enables you to install them with the node in service.

DANGER!



Voltages up to 90 Vac are accessible. Use caution when performing any procedure on an open node.

To install the SG1-FPT/*, SG1-EIFPT/*, SG1-DFBT/* or SG1-DFBT3/* optical module:

- 1 Remove the module cover if one is present.
- 2 Install the proper LPF for the preferred split. Use SG2-RPLPF-*-N series filters.
- 3 Install a JXP-5A in the input pad location if the module is used in a dual-output SG1000. P202 and R201 are selected at the factory for proper module operation and must not be changed.
- 4 Loosen the screws that secure the chassis cover to the chassis and remove the cover. Insert the optical module into the return path module location illustrated in Figure 3-7.

- 5 Secure the optical module with the four 6-32 × 0.25 printed-circuit board mounting screws and torque to 8 to 12 in-lbs. Torque the two 6-32 × 0.75 hybrid mounting screws to 15 to 17 in-lbs.
- 6 Install the cover on the optical module.
- 7 Loosen the screw holding the fiber strain relief just enough to rotate the strain relief cover away from the strain relief block. Support the strain relief block so that it does not rotate and damage the fibers.
- 8 Swing the strain relief cover away from the strain relief block and place the optical module fiber into the empty slot in the block. Replace the strain relief cover.
- 9 Tighten the screw that holds the fiber strain relief to 8 to 12 in-lbs. Support the strain relief block so that it does not rotate.
- 10 Route the fiber pigtails through the slot in the chassis cover as illustrated in Figure 4-4.
- 11 Install the chassis cover and torque the screws to 15 to 17 in-lbs. Be careful that you do not pinch the fibers between the chassis cover and chassis.
- 12 If present, remove the dust covers from the service cable connector and the module's optical connector.
- 13 Carefully clean the optical connectors as described in *Cleaning the Optical Connectors* at the end of this section.
- 14 Connect the module's optical connector to the appropriate bulkhead connector on the fiber tray. The fiber tray is marked to help you make the proper connections.
- 15 Pull up on the fiber tray carriage and open the fiber tray to expose the fiber connections.
- 16 Connect the service cable optical connector to the bulkhead adapter.
- 17 Lift and insert the fiber tray into the fiber tray carriage. Push the fiber tray carriage into the housing base until it snaps in place.
- 18 If necessary, check the optical power levels with an optical power meter and verify the voltage reading at the optical-power test point. Check and align the RF power levels in accordance with system requirements and procedures.

Removing SG1000 Optical Modules

The SG1000 optical module's design enables you to remove them with the node in service.

CAUTION!



The module surfaces may be hot. Exercise caution before making contact with any surfaces.

To remove an optical module:

- 1 Disconnect the module's optical connector from the fiber tray assembly. Place dust covers on the optical connector and on the bulkhead adapter.
- 2 Loosen the screws that secure the chassis cover to the chassis and remove the cover.
- 3 Loosen the screw holding the fiber strain relief just enough to rotate the strain relief cover away from the strain relief block. Support the strain relief block so that it does not rotate and damage the fibers.

- 4 Swing the strain relief cover away from the strain relief block and lift out the fiber from the optical module. Replace the strain relief cover.
- 5 Tighten the screw that holds the fiber strain relief. Support the strain relief block so that it does not rotate.
- 6 Remove the optical module cover.
- 7 Remove the two hybrid screws and the four printed circuit board (PCB) screws that hold the optical module to the amplifier chassis. Pull-up on the module to remove it.
- 8 Route the fiber pigtailed through the slot in the chassis cover as illustrated in Figure 4-4.
- 9 Re-install the chassis cover and torque the screws to 15 to 17 in-lbs. Be careful that you do not pinch the fibers between the chassis cover and chassis.

Ingress Control Option

As an option, you can incorporate electronic ingress control switching in the SG1000. This enables you to choose one of three alternatives for troubleshooting noise sources. The ingress switches are controlled remotely through the LL-SG1 status-monitor transponder in communication with the status-monitoring system. You can install an ingress control switch for both RF ports. Figure 3-8 illustrates their location on the RF amplifier.

Table 3-4 identifies and describes the three states of the ingress switch:

Table 3-4
Ingress switch states

State Function

Off	This state effectively isolates the contaminated leg by adding a minimum of 40 dB attenuation.
-6 dB	This states provides -6 dB additional attenuation to the return signal. This is useful in diagnosing noise presence without interfering with normal service.
On	This state completes the return path without alteration to the return signal.

If you do not use the ingress switches, populate their location on the RF amplifier with a JXP pad. A JXP-2A is normally used to mimic the insertion loss of the ingress switch. You can use larger or smaller value pads as system requirements dictate.

Status Monitor Option

The model LL-SG1-*/* transponder is available as part of the Motorola LIFELINE status-monitoring system. The LL-SG1-*/* transponder continuously monitors node parameters, executes commands, and reports to the polling computer when interrogated. Section 2, "Overview," provides additional information regarding status-monitoring functions.

Following physical installation, the transponder must be added to the software system and the alarm parameters must be configured. To complete these tasks, refer to the *LIFELINE for Windows Software Operations Manual*.

Factory installed transponders are tested and calibrated using special automatic test fixtures. The transponder cannot be repaired, calibrated, or aligned in the field.

If a problem is suspected, the LED visible on top of the transponder is useful in troubleshooting. During normal operations, it indicates the following:

- The LED illuminates when the module is powered up
- A flashing LED indicates two-way communication with the LL-CU control unit
- A dark LED indicates loss of communication or power

Table 3-5 lists some common problems and possible solutions:

Table 3-5
Common problems

Fault/Indication Check/S	uggested Action
LED is off	Check the input power to the receiver. Check the amplifier fuses and circuit breakers.
LED is lit but not flashing	This indicates that there is no communication with the control system. Check for proper installation of the control system. Verify that the RF levels are correct and that there are no interfering signals.
Spurious tamper alarms are occurring	Check for a malfunctioning photo-optic diode.

If problems persist, call for help or return the unit for repair using the instructions provided in the documents associated with the LL-SG1-*/** transponder.

Cleaning the Optical Connectors

The design of the SG1000 optical connector interface enables you to easily clean the connectors without removing the optical modules from the node.

DANGER!



The SG1000 contains a class IIIb laser. Do not look into the optical connector of the transmitter with power applied. Laser output is invisible and eye damage can result.

To clean the optical connectors on the optics modules:

- 1 Remove the modules' optical connector from the bulkhead adapter located on the fiber tray as illustrated in Figure 4-7.
- 2 Carefully clean the optical connector using a suitable optical connector cleaning kit. If a cleaning kit is not available, wipe the end of the connector using pure isopropyl alcohol (99%) and a lint-free wipe. Dry it with filtered compressed air. You can also clean the bulkhead adapter with the same compressed air.
- 3 Reconnect the module's optical connector into the same bulkhead adapter from which it was removed. The fiber tray is marked to assist you in making the proper connections.

To clean the optical connectors on the service cable:

- 1 Pull up on the fiber tray carriage and lower the fiber tray to expose the fiber connections as illustrated in Figure 4-5.
- 2 Disconnect the service cable from the bulkhead adapter.
- 3 Carefully clean the optical connector using a suitable optical connector cleaning kit. If a cleaning kit is not available, wipe the end of the connector using pure isopropyl alcohol (99%) and a lint-free wipe. Dry it with filtered compressed air. You can also clean the bulkhead adapter with the same compressed air.
- 4 Reconnect the service cable into the same bulkhead adapter from which it was removed. The fiber tray is marked to assist you in making the proper connections.
- 5 Lift and insert the fiber tray into the fiber tray carriage. Push the fiber tray carriage into the housing base until it snaps in place.

Section 4

Installation

This section provides pre-installation instructions that enable you to prepare the node for mounting. It also provides detailed instructions for installing the node.

Pre-installation Procedures

To decrease weight and the possibility of damage during installation, the housing is normally mounted with the lid and E-pack removed. Node components that have been previously configured and bench-tested may need only minimal alignment following field installation.

Pre-installation instructions include:

- Removing the lid
- Removing the E-pack

Removing the Lid

To remove the lid:

- 1 Loosen the eight bolts that secure the lid to the housing base.
- 2 Open the lid and remove any umbilical cables that connect the lid to the housing base.
- 3 Remove the lid by pressing down on the release tab illustrated in Figure 2-1 and sliding the lid to the left.

Removing the E-pack

To remove the E-pack:

- 1 Remove any pin-type connectors installed in the RF ports by loosening the seizure screw and removing the connector.
- 2 Disconnect the fiber pigtailed and cover the ends with protective caps. If two fiber pigtailed come out of the E-pack, the unit is equipped with an optical return-path transmitter. Mark the pigtailed to avoid confusion during re-assembly.
- 3 Disconnect all umbilical cables that connect the E-pack to the lid.
- 4 Use a 5/16 inch socket and loosen the four hex-head screws that hold the E-pack in the housing. The screws are captive and remain with the E-pack after disengagement from the housing.
- 5 Place the 5/16 inch socket over the prying nubs located on the ends of the E-pack as illustrated in Figure 3-7. Pry up evenly on both nubs to remove the E-pack.

Installing the Node

Installation procedures include:

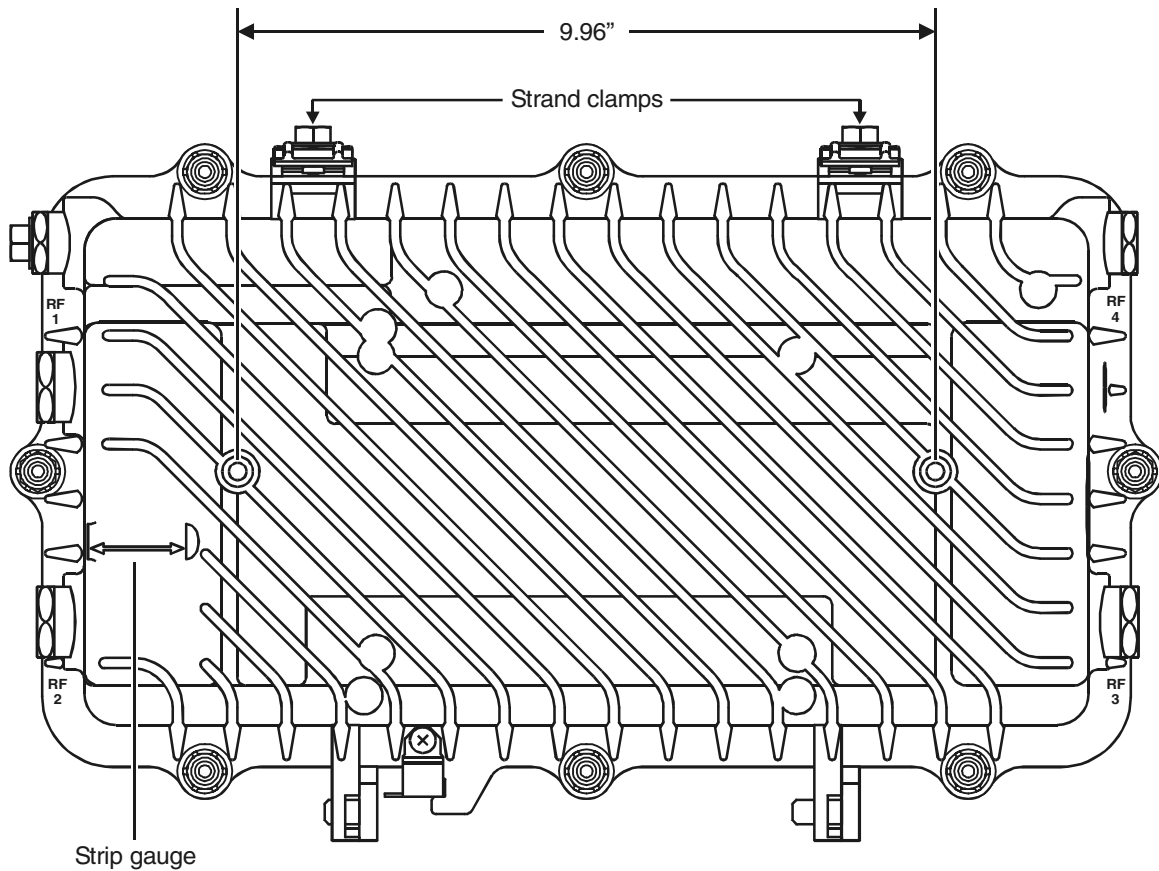
- Installing the housing on the strand
- Installing the E-pack
- Splicing the four-fiber service cable to the transportation fiber
- Installing the pin-type connectors
- Installing the coaxial and fiber cables
- Closing the housing

Strand Wire Mounting

Two strand clamps and bolt assemblies are located on top of the housing for normal horizontal mounting below the strand.

Figure 4-1 illustrates the rear view of the housing, strand clamps, and pedestal mounting holes:

Figure 4-1
Rear view of housing, strand clamps, and pedestal mounting holes



To mount the housing to the strand wire:

- 1 Loosen the two 5/16-18 strand clamp bolts located on top of the housing.
- 2 Engage the strand in the housing strand clamps. Do not fully tighten the hex-head bolts at this time. This enables the clamps to slide along the strand wire until the housing is finally positioned with respect to the cables.
- 3 Re-install all modules and electronic components previously removed.

Installing the E-pack

To re-install the E-pack:

- 1 Remove any dirt or debris from the underside of the E-pack and the machined heat-sink rails on the housing base to ensure good electrical and thermal connection.
- 2 Carefully insert the E-pack in the housing base and use a 5/16 inch socket to torque the screws to 18 to 22 in-lbs.
- 3 Reconnect any umbilical cables to the housing lid.
- 4 Reconnect the fiber pigtails.
- 5 Re-install the pin-type connectors and torque the seizure screws to 11 to 12 in-lbs.

Splicing the Service Cable

The four-fiber service cable can be spliced to the transportation cable at any time during the node installation. Splicing does not need to coincide with the installation of the housing.

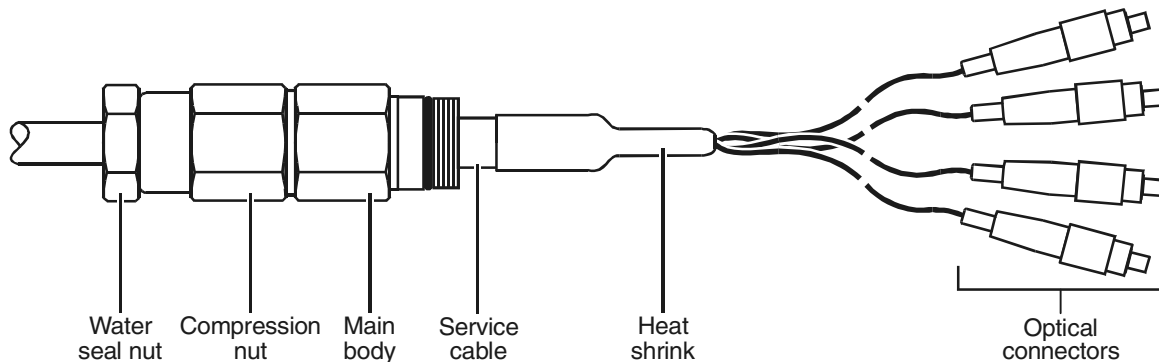
Fusion splicing is recommended because it has low insertion loss and is the most reliable method. Splicing should be performed by an experienced technician.

To splice the fiber:

- 1 Obtain a 50-foot, four-fiber service cable complete with compression fitting.

Figure 4-2 illustrates the service cable connection and compression fitting:

Figure 4-2
Service cable connection and compression fitting



- 2 Splice each fiber according to procedures recommended by the manufacturer of the splicing equipment. A blue-coded fiber is suggested for the forward-signal distribution and a brown-coded fiber is recommended for the return path. Cleanliness in the work area is essential.
- 3 Assemble the splice enclosure following the instructions furnished with the enclosure.

CAUTION!

It is important that the connections at the headend be duplicated. If they are different from the above recommendations, follow the method used for the headend connections.

- 4 Suspend the extra cable from the strand using locally accepted methods. Commonly used methods include suspending it from the strand along its entire length, and/or fashioning a figure-eight coil and suspending it from the strand.

If you install the housing at a later time, protect the compression-fitting end of the service cable and the fiber connectors from dirt and moisture.

DANGER!

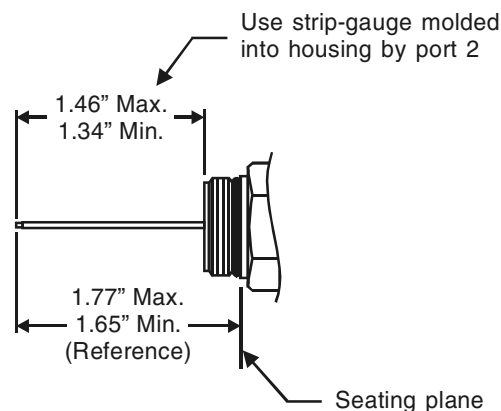
To avoid possible injury to personnel or damage to the equipment, remove 60/90 volt ac power from the system before you install the node.

Installing Pin-Type Connectors

Connections to the housing are made using standard KS-type housing port entry connectors. Pin-type connectors with a nominal center conductor diameter of 0.067 inches are required. It is extremely important that you trim the center conductor to match the dimensions illustrated in Figure 4-3. For your convenience, a strip-gauge is molded into the housing adjacent to RF2 as illustrated in Figure 4-1.

Figure 4-3 illustrates the center conductor:

Figure 4-3
Center conductor length



Installing the Coaxial Cables

To install the coaxial cables:

- 1 Loosen the eight bolts that secure the housing lid to the base.
- 2 Lower the housing lid away from the housing base.
- 3 For each port, verify that the seizure screw is loosened to accept the center pin of the cable connector.
- 4 Screw the connector body into the port and tighten.
- 5 Secure the cable end into the cable connector as described in the instruction sheet for the connector.
- 6 Insert the center conductor fully until it enters the seizure mechanism. Tighten the center conductor seizure screw and torque to 12 in-lbs (1 ft-lb). Do not overtighten.
- 7 Repeat steps 3 through 6 for all other cable connections required.
- 8 Protect all cable connections with heat-shrink tape or tubing.
- 9 Lash the cables to the strand where they approach it and secure the cable lashing wire to the strand with commercial clamps.
- 10 Torque the port plug on any unused ports to 25 to 40 in-lbs.

Installing the Fiber Cables

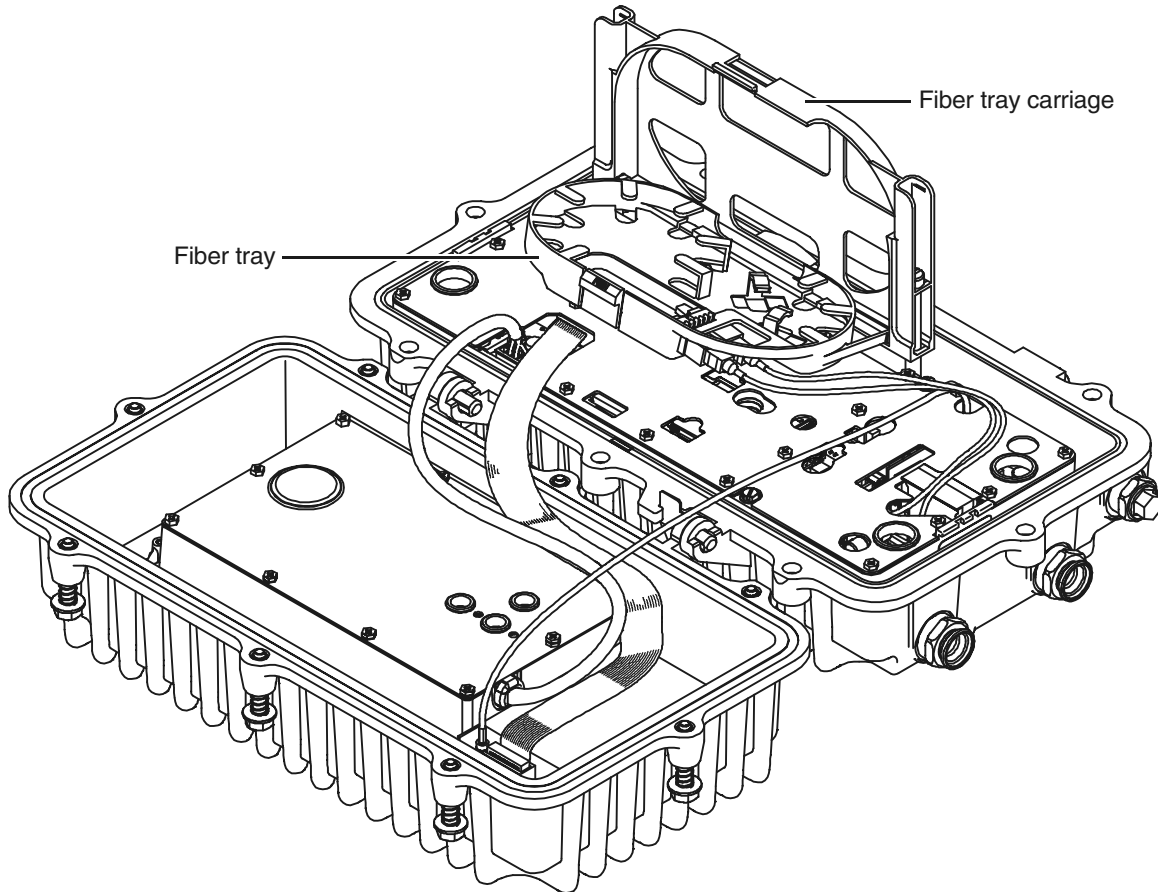
The SG1000 provides two fiber-optic cable ports located on opposite sides of the housing as illustrated in Figure 2-2.

To install the fiber-optic cables:

- 1 Determine which port to use based on the fiber-optic cable routing of your system and remove the protective plug.
- 2 Carefully pass the connector ends of the fiber-optic service cable through this port. Do not remove the rubber caps from the connectors at this time. Insert one connector at a time being careful not to bend the fiber any more than is necessary.
- 3 Thread the compression fitting into the port. The compression nut and rubber grommet must be sufficiently loose to enable the fitting to be turned without turning the fiber cable at the same time. Torque the main body of the fitting to 60 to 70 in-lbs (5 to 6 ft-lbs).
- 4 Note which fiber is used for the forward path and which is used for the return path. The fiber cable contains up to four fibers each jacketed in a different color. You will use two fibers and two will remain as spares.

- 5 Pull up on the fiber tray carriage and open the fiber tray as illustrated in Figure 4-4:

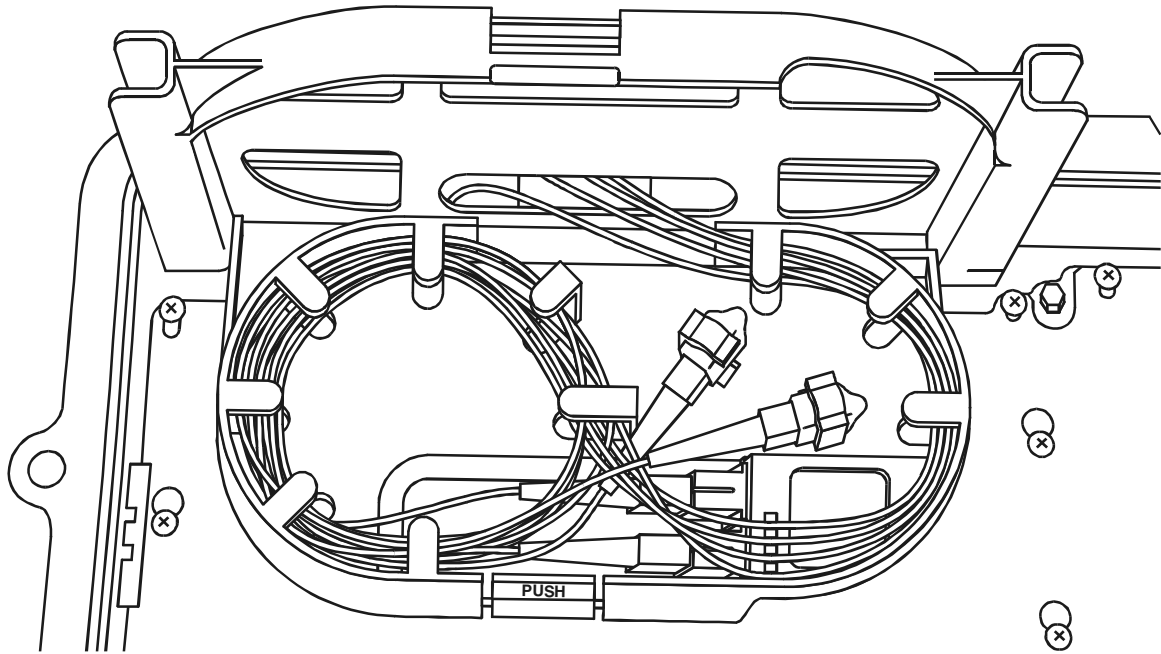
Figure 4-4
Fiber tray and carriage



- 6 Dress the fibers into the two-chambered fiber tray according to the fiber-optic cables point of entry.

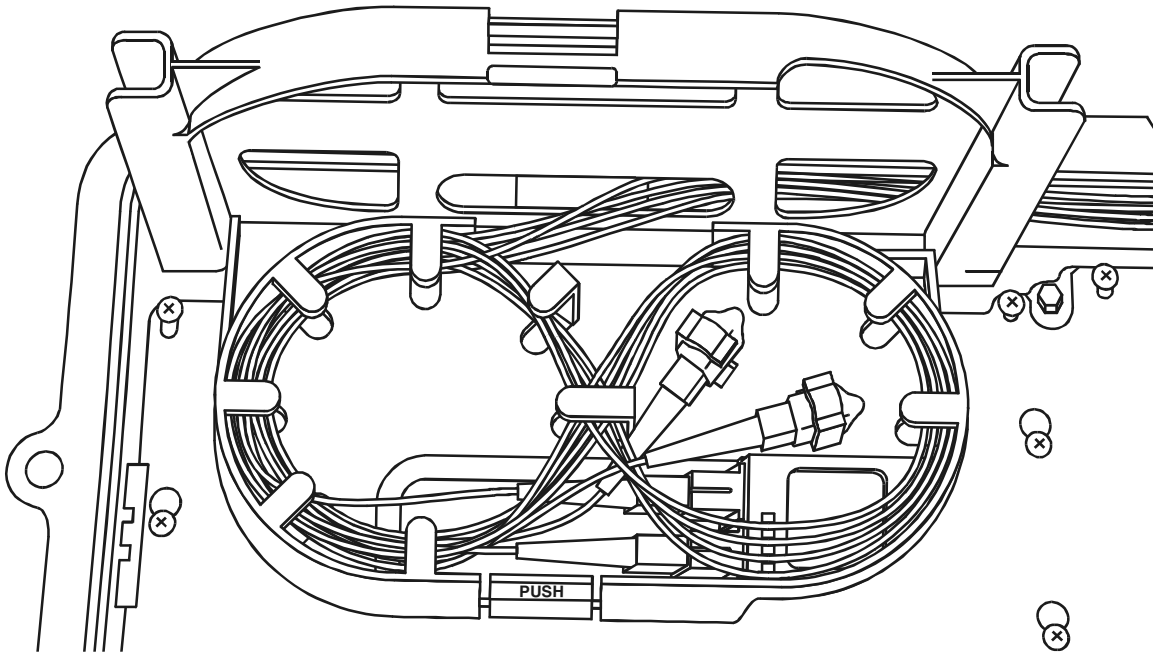
If the fiber service cable enters the housing through the left fiber port: Make one clockwise revolution in the right chamber of the tray then, make two counter-clockwise revolutions in the left chamber as illustrated in Figure 4-5:

Figure 4-5
Cable dressing with left port entry



If the fiber-optic cable enters the housing through the right fiber port: Make one counter-clockwise revolution in the left chamber of the fiber tray then, make one clockwise revolution in the right chamber. Make one final counter-clockwise revolution in the left chamber of the tray as illustrated in Figure 4-6:

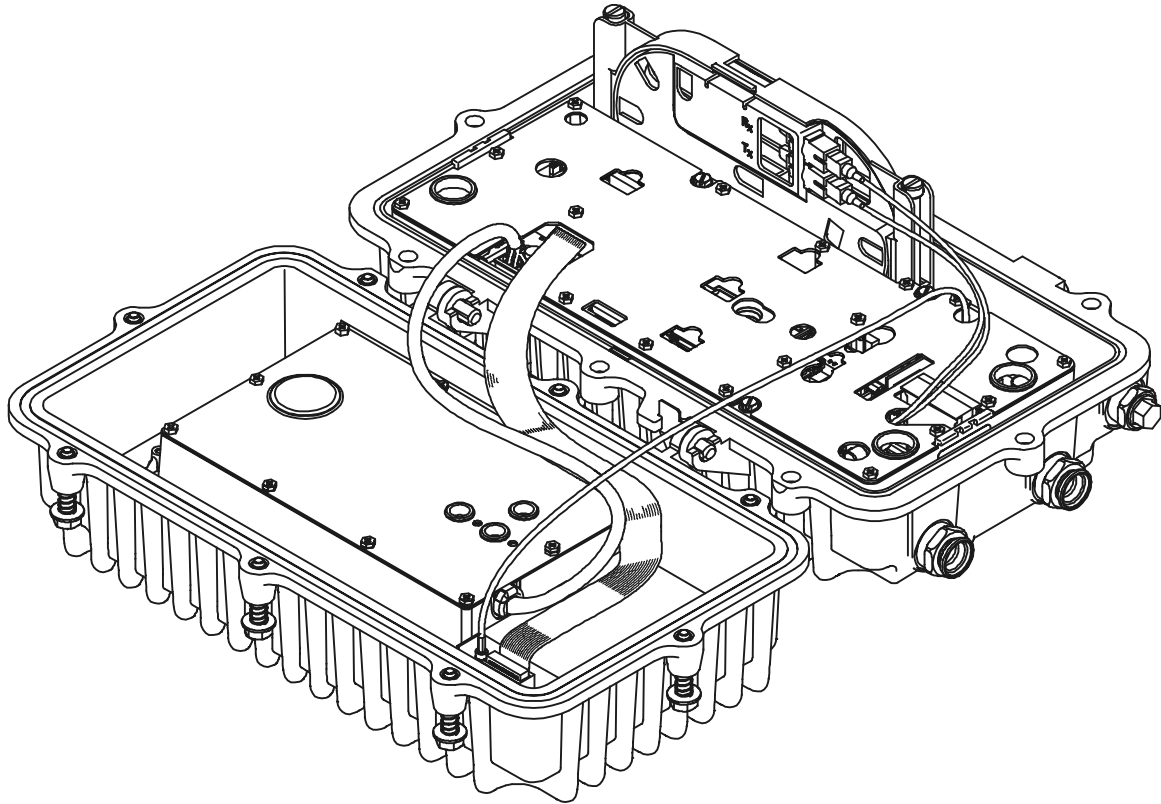
Figure 4-6
Cable dressing with right port entry



- 7 Remove the protective boots from the forward and return path fibers. Clean the fiber connectors as described in Section 3, "Cleaning the Optical Connector."
- 8 Mate the forward path fiber to the Rx bulkhead connector and the return path fiber to the Tx bulkhead connector. Rx and Tx markings are molded into the fiber tray.
- 9 Stow unused fiber connectors under the retaining flanges provided in the fiber tray. Protective boots should remain on the connectors.

- 10 Close the fiber tray and slide the fiber tray carriage into its retracted position in the housing as illustrated in Figure 4-7:

Figure 4-7
Retracted fiber tray

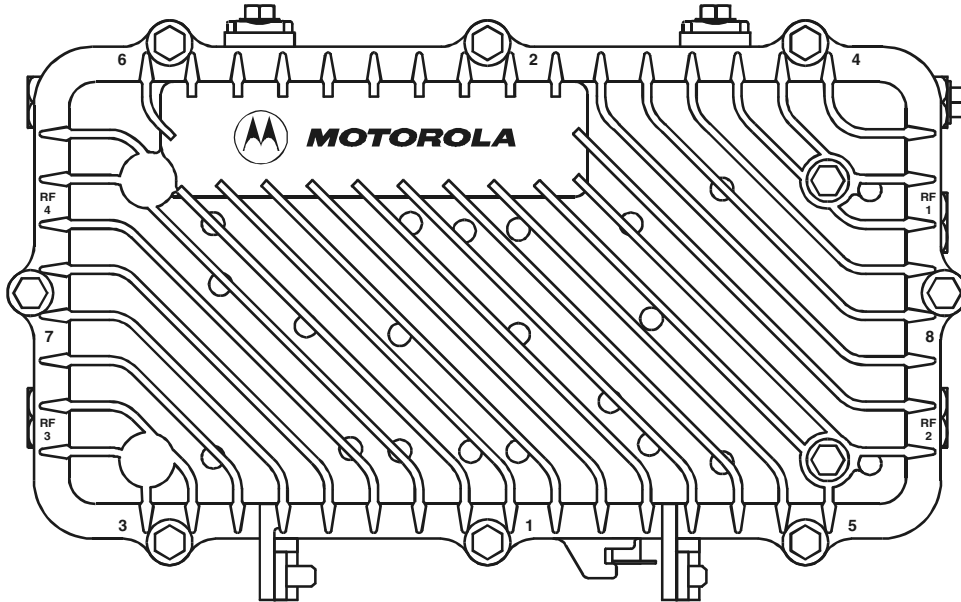


- 11 Tighten the compression nut on the fiber cable until it bottoms out. Finally, tighten the water seal nut until there is no gap between it and the compression nut as illustrated in Figure 4-2.
- 12 Verify that the protective plug in the unused fiber cable port is in place. Torque to 25 to 40 in-lbs.
- 13 Tighten the strand clamps to a torque of 10 to 12 ft-lbs.

Closing the Housing

Close the housing and use a torque wrench to sequentially and progressively tighten the housing bolts to a final torque of 4 to 6 ft-lbs using the numeric sequence molded into the lid as illustrated in Figure 4-8:

Figure 4-8
Housing bolt tightening sequence



After you complete the initial tightening sequence, return to the first two bolts and retorque. Do not exceed a maximum torque of 6 ft-lbs.

Appendix A

Specifications

Specifications for the SG1000 are valid over the given bandpass and operating temperature ranges. Refer to the current product catalog for additional information not provided in this section.

Optical

Optical wavelength	1310 \pm 20 nm to 1550 \pm 30 nm
Optical input-power	
Recommended	-3.0 dBm to +2.0 dBm, continuous
Maximum	+3 dBm
Output power¹	25 dBmV with 0 dBm optical input power and 79 channels NTSC

¹ The integrated receiver cannot be measured by the operator at this point

Station RF

Forward bandpass frequency	47 to 870 MHz, dependent on split
Return bandpass, each port	5 MHz to 80 MHz dependent on split

Splits

S S	40/52 MHz
J J	55/70 MHz
A A	65/85 MHz
K K	42/54 MHz
E E	30/47 MHz
M M	80/108 MHz

Operational gain

RF RF amplifier	30 dB
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Flatness over passband	\pm 0.75 dB, all ports
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Operational tilt

A A	6 dB \pm 1 dB
B B	8 dB \pm 1 dB
L L	10 dB \pm 1 dB
S S	12.5 dB \pm 1 dB
H H	14 dB \pm 1 dB

General

AC input voltage	44 Vac through 90 Vac sinewave or quasi-squarewave
AC bypass current 15	A
Operating temperature	-40°C to +60°C (-40°F to +140°F)
Housing dimensions	16.13"(L) \times 9.80"(W) \times 5.68"(D)
Weight	Maximum 21 lbs.

RF for the SG1-*/* Laser Transmitters

RF passband	
DFBT/*, DFBT3/*, IFPT/*EIFPT/*	5 MHz to 200 MHz, depending on split
FP FPT/*	5 MHz to 65 MHz, depending on split
Flatness (P-V)	1.0 dB maximum

220 Vac Line Power Option

Operating temperature	0°C to +50°C (–32°F to +122°F)
AC input voltage	176 Vac to 264 Vac sinusoidal wave
DC output voltage	+24 Vdc, +5 Vdc

Appendix B

Torque Specifications

Torque specifications are valid for all models of the SG1000 node.

Fastener S	crew Size	Wrench Size	Torque	
			In-lbs	Ft-lbs
Strand clamp/pedestal mounting	5/16 - 18	1/2 inch	120 - 144	10 - 12
Housing/lid closure	5/16 - 18	1/2 inch	48 - 72	4 - 6
Port plugs	5/8 - 24	1/2 inch	25 - 40	2.1 - 3.3
Seizure	#8 - 32	3/16 inch	11 - 12	0.9 - 1.0
Chassis (E-pack)	#10 - 32	5/16 inch	18 - 22	1.5 - 1.8
Chassis cover	#6 - 32	¼ inch	15 - 17	1.2 - 1.4
Optical module	#6 - 32	Phillips	8 - 12	0.6 - 1.0
Power supply cover	#6 - 32	¼ inch	15 - 17	1.2 - 1.4
Status monitor	#6 - 32	Phillips	15 - 17	1.2 - 1.4
Service cable fitting into housing	5/8 - 24	¾ inch	60 - 72	5 - 6
Hybrid	#6 - 32	Phillips	15 - 17	1.2 - 1.4

Abbreviations and Acronyms

The abbreviations and acronyms list contains the full spelling of the short forms used in this manual.

A	ampere
ac	alternating current
AGC	automatic gain control
ALM	advanced laser module
APC	angled physical contact
BW	bandwidth
CATV	Community Antenna Television
c/n	carrier-to-noise ratio
CSO	composite second order
CTB	composite triple beat
CU	control unit
dB	decibel
dBc	decibels relative to the carrier
dBm	decibels relative to 1 milliwatt
dBmV	decibels relative to 1 millivolt across 75 ohms
dc	direct current
DFB	distributed feedback
EIFPT	enhanced, isolated Fabry-Perot transmitter
E-pack	Electronics package
FC	fiber connector
FM	frequency modulation
FTEC	fast trigger electronic crowbar
GaAs	Gallium arsenide
HCS	headend control software
IC	integrated circuit
IFPT	isolated Fabry-Perot transmitter
I/O	input/output
ICS	ingress control switch
km	kilometer
LED	light-emitting diode
LPF	low-pass filter
MHz	megahertz
μW	microwatt
mA	milliamp

mW	milliwatt
nm	nanometer
NTSC	National Television Standards Committee
pcb	printed circuit board
PIN	positive intrinsic-negative
P-V	peak-to-valley
RF	radio frequency
RIN	relative intensity noise
RMS	root mean square
RSA	Return for Service Authorization
SC	snap connector
V	volt



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