



Maintenance

This section describes maintenance procedures for the node.

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Opening and Closing the Housing

Installation or maintenance of the node requires opening the housing to access the internal modules.

Proper housing closure is important to maintaining the node in good working condition. Proper closure ensures a good seal against the environment, protecting the internal modules.

Opening the Housing

Open the housing as follows.

1. Remove the bolts securing the lid to the base.
2. Carefully open the lid to allow access to the inside of the housing.
3. Inspect gaskets on the cover flange and on the test port plugs.
4. Replace any gaskets showing signs of wear (cracked, twisted, pinched, or dry) with new, silicon-lubricated gaskets.

Closing the Housing

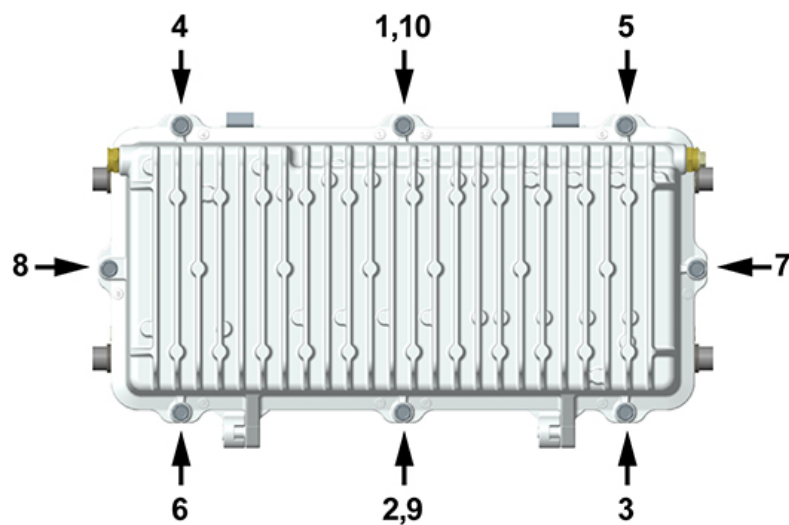
Close the housing as follows.

1. Ensure any worn gaskets are replaced, and the gaskets are clean and in the correct position.
2. Carefully close the lid.

**Caution**

Use caution when closing housing. Improper closing may result in the unit not being sealed from the environment.

3. For strand-mounted housings, pull the lid away from the base and remove the slack from the hinge before rotating the lid up toward the base.
4. Ensure no cables are pinched between lid and base.
5. Secure lid to base with bolts. Tighten from 5 to 12 ft-lbs (6.8 to 16.3 Nm) in the sequence shown in the following illustration. Repeat the sequence twice, ending with the final torque specification.



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Preventative Maintenance

Preventive maintenance procedures are regularly scheduled actions that help prevent failures and maintain the appearance of the equipment.

Schedule

Perform the preventive maintenance procedures at these intervals.

Procedure	Interval
Visual Inspection:	
External Surfaces	Semiannually
Connectors	Semiannually
Indicators	Semiannually

Procedure	Interval
Wiring/Cable Assemblies	Annually
Cleaning:	
External Surfaces	Annually
External Controls/Connectors	Annually
Internal Connectors/Circuit Cards	Annually

Visual Inspection

Visually inspect the following items.

What to Inspect	How to Inspect
Exterior surfaces	Inspect for: <ul style="list-style-type: none"> • dust, dirt, lubricants, or other foreign matter worn spots or deep scratches on surfaces • corrosion • marred protective finish exposing bare metal • missing, incorrect or obliterated marking, decals, or reference designators
Connectors	Inspect for: <ul style="list-style-type: none"> • broken, loose, bent, corroded, or missing pins • cracked insulator inserts
Wiring and cables	Inspect for: <ul style="list-style-type: none"> • cuts, nicks, burns, or abrasions • exposed bare conductors • sharp bends • pinched or damaged wires • broken or loose lacing or clamps

Cleaning

Clean exterior surfaces of the equipment at least annually.

Consumable Materials

Use the materials listed below (or equivalent) when cleaning the equipment.

Item	Specification
Isopropyl alcohol	TT-I-735
Cheesecloth	CC-C-440
Spray-type contact cleaner	(none)

Procedure

Clean the equipment as described below.

1. Use a small paintbrush to brush dust from connectors.
2. Wipe surfaces dry with clean, dry cheesecloth.
3. Clean exterior surfaces with clean cheesecloth moistened with isopropyl alcohol or general-purpose detergent. Do not let alcohol or detergent get inside equipment or connectors.



Warning



Isopropyl alcohol is flammable. Use isopropyl alcohol only in well-ventilated areas away from energized electrical circuits and heated objects such as soldering irons or open flames. Avoid excessive inhalation of vapors or prolonged or repeated contact with skin. Wear industrial rubber gloves and industrial safety goggles to avoid contact with skin. Do not take internally. Failure to comply with this admonishment can cause injury, physical disorder, or death.



Caution



Do not use cleaning fluids containing trichloroethylene, trichloroethane, acetone or petroleum-based cleaners on equipment. Failure to comply with this caution could harm equipment surfaces.

4. Clean electrical contacts with spray-type contact cleaner.
5. Clean internal connectors and circuit boards with hand-controlled, dry-air jet. Do not use pressure exceeding 15 lb/in² (1.05 kg/cm², or 103.43 kPa).
6. Clean interior surfaces with clean cheesecloth moistened with isopropyl alcohol or general-purpose detergent.
7. Clean internal electrical contacts with clean cheesecloth moistened with spray-type contact cleaner.
8. Dry interior with clean, dry cheesecloth.

Removing and Replacing Modules

This procedure describes how to remove and replace the internal modules of the node. All field-replaceable modules can be removed and replaced without removing power from the node.

Field-replaceable modules include:

- Power supply modules
- RF amplifier assembly
- iRPD



Caution

Removing power from the node will interrupt customer service. Removing any module will interrupt customer service unless that module has a redundant backup.

Module Replacement Procedure

Follow this procedure to remove and replace an iRPD, or power supply module.

1. Open the housing. See [Opening and Closing the Housing, on page 1](#).
2. Carefully tag and remove any optical fibers from iRPD.



Warning

Laser light hazard. Never look into the end of an optical fiber or connector. Failure to observe this warning can result in eye damage or blindness.

3. Loosen the screws securing the module.
4. Lift the module straight up out of the housing to unplug it.



Note

Pull up on the built-in handle on the module.

5. Position the new module in the same location and carefully slide the module into its slot until connected to the optical interface board.
6. Tighten the screws securing the module. Torque screws to 25 to 30 in-lbs (2.8 to 3.4 Nm).
7. Carefully reconnect any optical fibers that were removed from the original module. Clean optical connectors before reconnecting. See [Care and Cleaning of Optical Connectors, on page 8](#) for cleaning procedure.

**Warning**

Laser light hazard. Never look into the end of an optical fiber or connector. Failure to observe this warning can result in eye damage or blindness.

8. Close the housing. See [Opening and Closing the Housing, on page 1](#).
9. Refer to [Cisco GS7000 Super High Output Intelligent Node Software Installation and Configuration Guide](#) to verify node performance.

Diplexers and Trim modules

The diplexer modules and High Pass Filter/Trim modules plug into the RF amplifier assembly through cut-outs in its cover.

To remove these modules, loosen the screw (for diplexer modules), pull up carefully on their integrated handles until they separate from the RF amplifier assembly.

RF Amplifier Assembly Replacement Procedure

Follow this procedure to remove and replace the RF amplifier assembly.

1. Open the housing. See [Opening and Closing the Housing, on page 1](#).
2. Remove the AC power shunts and make a note of their location for reinstallation in the replacement RF amplifier assembly.

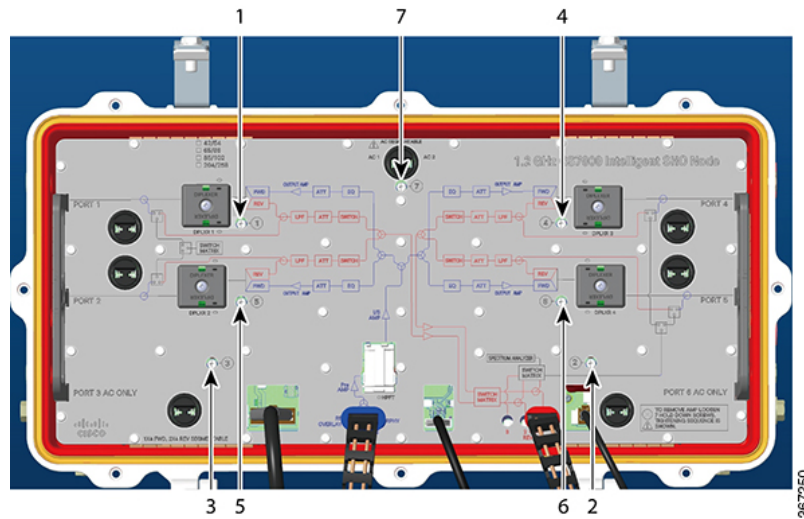
**Caution**

Damage to the node may result if AC power shunts are not removed before replacing the RF amplifier assembly.

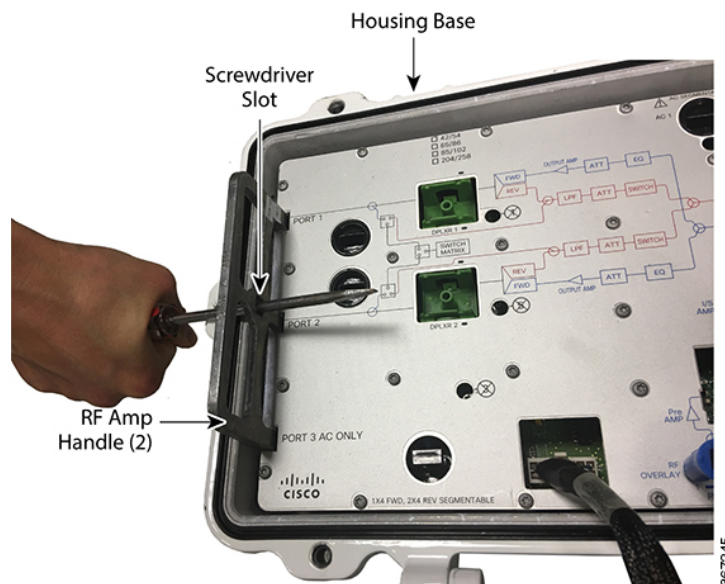
3. Unplug AC1/DC connector, forward path connector, control cable connector, reverse path connector and AC2 connector on the RF amplifier assembly.
4. Loosen the seven shoulder screws securing the RF amplifier assembly to the housing.



Note The screw locations are identified by number, 1 through 7.

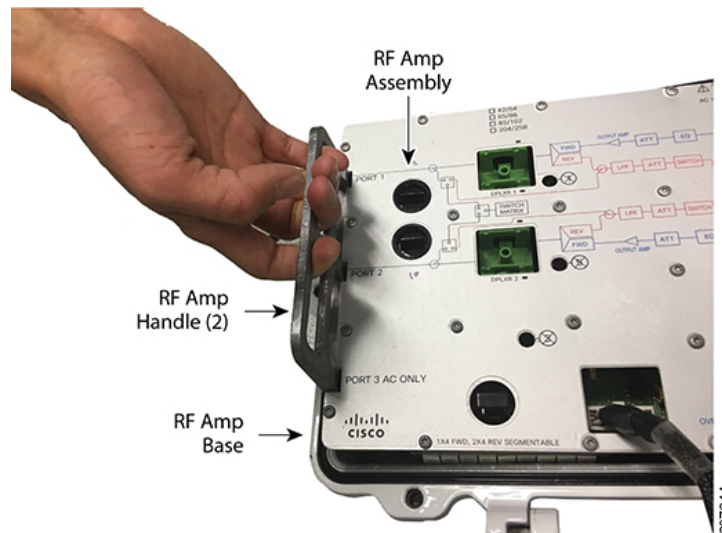


5. Insert a flat-blade screwdriver into the small holes in the metal handles on each side of the RF amplifier assembly and pry up carefully to disconnect the RF amplifier assembly's rear panel connectors.



Important Be careful not to damage the housing with the screwdriver.

6. Grasp the two metal handles on the RF amplifier assembly and carefully lift the RF assembly out of the housing.



7. To replace the RF amplifier assembly in the housing, carefully align the assembly in the housing, lower it into place and push down to reconnect the rear panel connectors.
8. 8 Secure the RF amplifier assembly to the housing with the seven cross-head shoulder screws.


Important

Tighten the screws in order by number, 1 through 7. Repeat the sequence twice, ending with a torque of 18 to 20 in-lbs (2.0 to 2.25 Nm).

9. Plug AC1/DC connector, forward path connector, control cable connector, reverse path connector and AC2 connector on the RF amplifier assembly.
10. Reinstall the AC power shunts in their proper locations on the RF amp assembly.
11. Close the housing. See [Opening and Closing the Housing](#), on page 1.
12. Refer to [Cisco GS7000 Super High Output Intelligent Node Software Installation and Configuration Guide](#) to verify node performance.

Care and Cleaning of Optical Connectors


Caution


Proper operation of this equipment requires clean optical fibers. Dirty fibers will adversely affect performance. Proper cleaning is imperative.

The proper procedure for cleaning optical connectors depends on the connector type. The following describes general instructions for fiber-optic cleaning. Use your company's established procedures, if any, but also consider the following.

Cleaning fiber-optic connectors can help prevent interconnect problems and aid system performance. When optical connectors are disconnected or reconnected, the fiber surface can become dirty or scratched, reducing system performance.

Inspect connectors prior to mating, clean as needed, and then remove all residues. Inspect connectors after cleaning to confirm that they are clean and undamaged.

Recommended Equipment

- CLETOP or OPTIPOP ferrule cleaner (CLETOP Type A for SC, Type B for LC)
- Compressed air (also called “canned air”)
- Lint-free wipes moistened with optical-grade (99%) isopropyl alcohol
- Bulkhead swabs for LC or SC type connectors (choose appropriate type)
- Optical connector scope

Tips for Optimal Fiber-Optic Connector Performance

- Do not connect or disconnect optical connectors with optical power present.
- Always use compressed air before cleaning the fiber-optic connectors and when cleaning connector end caps.
- Always install or leave end caps on connectors when they are not in use.
- If you have any degraded signal problems, clean the fiber-optic connector.
- Advance a clean portion of the ferrule cleaner reel for each cleaning.
- Turn off optical power before making or breaking optical connections to avoid microscopic damage to fiber mating surfaces.

To Clean Optical Connectors



Warning



- Avoid personal injury! Use of controls, adjustments, or performance of procedures other than those specified herein may result in hazardous radiation exposure.
 - Avoid personal injury! The laser light source on this equipment emits invisible laser radiation. Avoid direct exposure to the laser light source.
 - Avoid personal injury! Viewing the laser output with optical instruments (such as eye loupes, magnifiers, or microscopes) may pose an eye hazard.
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- Connect or disconnect fiber only when equipment is OFF or in Service mode.
 - Do not apply power to this equipment if the fiber is unmated or unterminated.

- Do not look into an unmated fiber or at any mirror-like surface that could reflect light that is emitted from an unterminated fiber.
- Do not view an activated fiber with optical instruments such as eye loupes, magnifiers, or microscopes.
- Use safety-approved optical fiber cable to maintain compliance with applicable laser safety requirements.

Connector cleanliness is crucially important for optimum results in fiber optic communications links. Even the smallest amount of foreign material can make it impossible to obtain the expected insertion and return losses. This can reduce the range of the equipment, shorten its expected service life, and possibly prevent the link from initializing at all.

New equipment is supplied with clean optical connectors and bulkheads. Clean these connectors and bulkheads in the field only if you observe and can verify an optical output problem.

Connectors and Bulkheads

Most fiber optic connectors are of the physical contact (PC) type. PC type connectors are designed to touch their mating connector to prevent air gaps, which cause reflections. For optimum performance, all dirt must be removed.

Bulkheads can also become dirty enough to affect performance, either from airborne dust or from contamination introduced by connectors.



Warning



Avoid damage to your eyes! Do not look into any optical connector while the system is active. Even if the unit is off, there may still be hazardous optical levels present.



Note

Read the above warning before performing cleaning procedures.

Cleaning Connectors

It is important that all external jumper connectors be cleaned before inserting them into the optical module. Follow these steps to clean fiber optic connectors that will be connected to the optical module:



Important

Before you begin, remove optical power from the module or ensure that optical power has been removed.

1. Inspect the connector through an optical connector scope. If the connector is damaged, e.g., scratched, burned, etc., replace the jumper.
2. If the connector is dirty but otherwise undamaged, clean the connector as follows:
 1. Make several swipes across the face of the connector with the appropriate ferrule cleaner. This will remove dust and some films.
 2. Listen for a slight "squeak" typically generated during this process, indicating a clean connector.
 3. Inspect the connector again through the scope to confirm that it is clean.

3. If a second inspection indicates that further cleaning is needed:
 1. Use 99% isopropyl alcohol and a lint-free wipe to clean the connector.
 2. Use the appropriate ferrule cleaner again to remove any film left over from the alcohol.
 3. Inspect the connector again through the scope and confirm that it is clean.
4. If necessary, repeat steps 3a-3c until the connector is clean.

Cleaning Bulkheads

**Note**

It is generally more difficult to clean bulkhead connectors and verify their condition due to limited accessibility of the fiber end face. For this reason, even on products with accessible bulkhead connectors, you should only attempt to clean a bulkhead connector when a dirty connector is indicated.

Follow these steps to clean the bulkhead:

**Warning**

- Avoid personal injury! Use of controls, adjustments, or performance of procedures other than those specified herein may result in hazardous radiation exposure.
 - Avoid personal injury! The laser light source on this equipment emits invisible laser radiation. Avoid direct exposure to the laser light source.
 - Avoid personal injury! Viewing the laser output with optical instruments (such as eye loupes, magnifiers, or microscopes) may pose an eye hazard.
1. Insert a dry bulkhead swab into the bulkhead and rotate the swab several times.
 2. Remove the swab and discard. Swabs may be used only once.
 3. Check the bulkhead optical surface with a fiber connector scope to confirm that it is clean. If further cleaning is needed:
 1. Moisten a new bulkhead swab using a lint-free wipe moistened with optical-grade (99%) isopropyl alcohol.
 2. With the connector removed, fully insert the bulkhead swab into the bulkhead and rotate the swab several times.
 3. Remove the swab and discard. Swabs may be used only once.
 4. Check with a fiber connector scope again to confirm that there is no dirt or alcohol residue on the optical surface.
 5. If any alcohol residue remains, clean it off with a new dry bulkhead swab.
 4. Mate all connectors to bulkheads and proceed to [Verifying Equipment Operation, on page 12](#) below.

5. It is also recommended that all connectors be visually inspected after cleaning to verify the connector is clean and undamaged.

Verifying Equipment Operation

Perform circuit turn-up. If the equipment does not come up, i.e., fails verification or indicates a reflection problem, clean the connectors and bulkheads again.