



# GainMaker System Amplifier RF Split Upgrade Application Note

## Overview

### Introduction

As cable operators experience an exponential rise in the requirements for more reverse path bandwidth due to the popularity of advanced, on-demand services from an increasing number of subscribers, operators need an upgrade path for deployed equipment to overcome this operational challenge.

### Purpose

This application note describes the RF split upgrade procedure for 1 GHz GainMaker® System Amplifier.

You will note that the final instruction in the split change process calls for the verification of forward and reverse signal for each port. This verification is included to ensure that all component replacements with respect to the split upgrade were performed correctly and to ensure that all replacement components perform as specified. Making this type of significant product change in the field rather than in a test environment would likely cause additional network downtime as troubleshooting any sort of issue associated with the upgrade could be quite time consuming.

While our amplifier products would generally perform acceptably without this verification, we recommend this extra step to ensure that our products meet customer expectations immediately upon placement into service.

Should you need assistance with your upgrade, contact Cisco for support.



#### **WARNING:**

**Avoid electric shock. Opening or removing this equipment cover may expose you to dangerous voltages. RF split upgrades should only be conducted on amplifiers that have been removed from the cable system, not on amplifiers actively in service.**

### Qualified Personnel

Only appropriately qualified and skilled service personnel should attempt to install, operate, maintain, and service this product.

 **WARNING:**  
Allow only qualified and skilled personnel to install, operate, maintain, and service this product. Otherwise, personal injury or equipment damage may occur.

### Related Publications

You may find the following publications useful as you implement the procedures in this document.

- *1 GHz GainMaker Broadband Amplifier Platform System Amplifier Modules and Housings Installation and Operation Guide*, part number 4009928

### In This Document

- Before You Begin ..... 3
- Upgrading the RF Split in the GainMaker System Amplifier ..... 4
- For Information ..... 8

## Before You Begin

Before you start the upgrade procedure, make sure you have all the components, tools, and equipment ready.

### Components Required to Make the Split Change

**Note:** Part numbers differ depending on amplifier type being modified and desired final split.

- (1) Reverse Amplifier PWB Assembly
- (1) High Pass Filter Trim PWB Assembly
- (2) Mirrored Diplex Filters
- (2) Non-mirrored Diplex Filters
- Part number label

### Tools and Equipment Required to Make the Split Change

- 1/2-inch socket driver
- Torx T-10 screwdriver
- Torx T-15 screwdriver
- Flat-head screwdriver
- Plug-in PWB extraction tool (Electronix Express Model #060404 or equivalent)
- Torque wrench with 1/2-inch socket

## Upgrading the RF Split in the GainMaker System Amplifier

Using spare or in-stock units, perform these steps to upgrade out-of-service units. Use the upgraded units to replace in-service units, which then become the next units for upgrade and swap procedures.



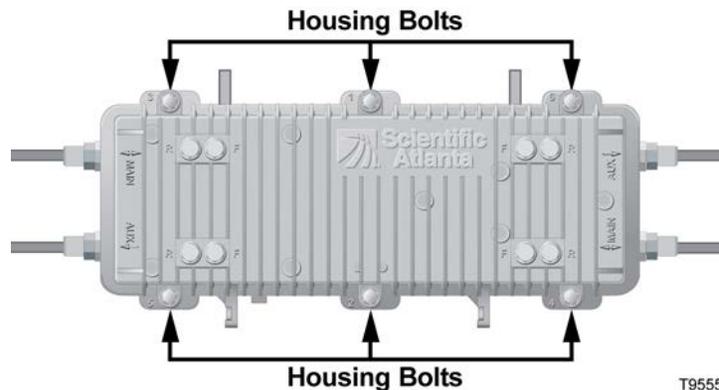
### CAUTION:

To prevent electrostatic discharge (ESD) to electronic equipment, take ESD precautions, including the use of an ESD wrist or ankle strap or an anti-static mat.

**Important:** Before unscrewing the housing bolts, make sure the removable locking screw in the hinge is in place and secure. The locking screw prevents separation of the lid from the base.

### Removing the Amplifier Module from the Housing

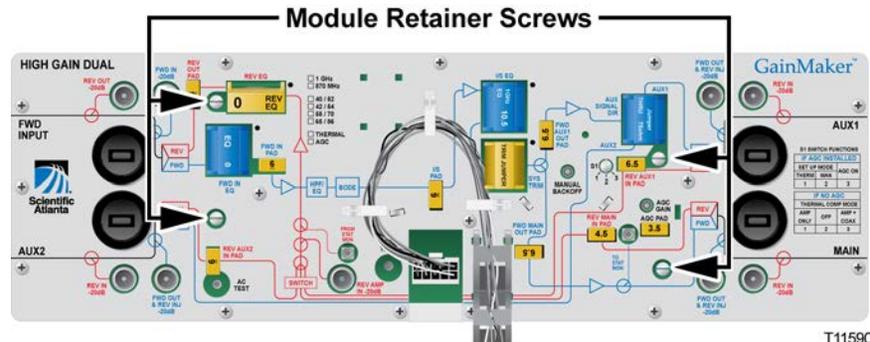
- 1 Unscrew the 1/2-inch housing closure bolts on the housing lid until they are loose.



- 2 Open the housing.

**Note:** The closure bolts will remain attached to the housing.

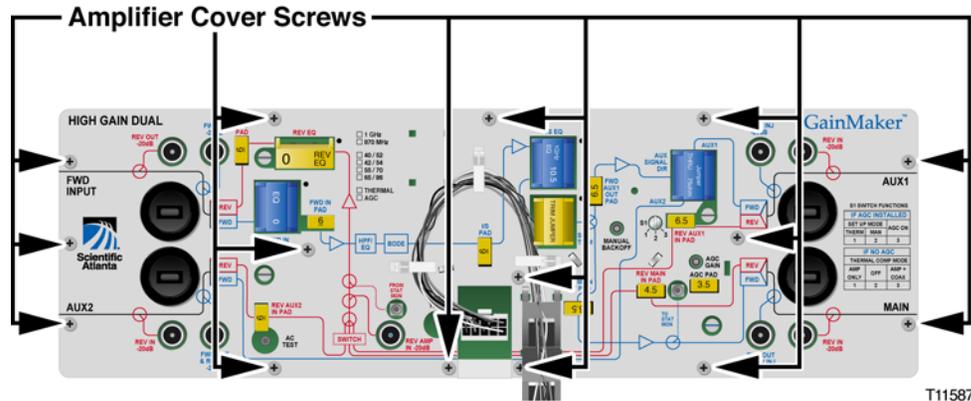
- 3 Unscrew the four module retainer screws.



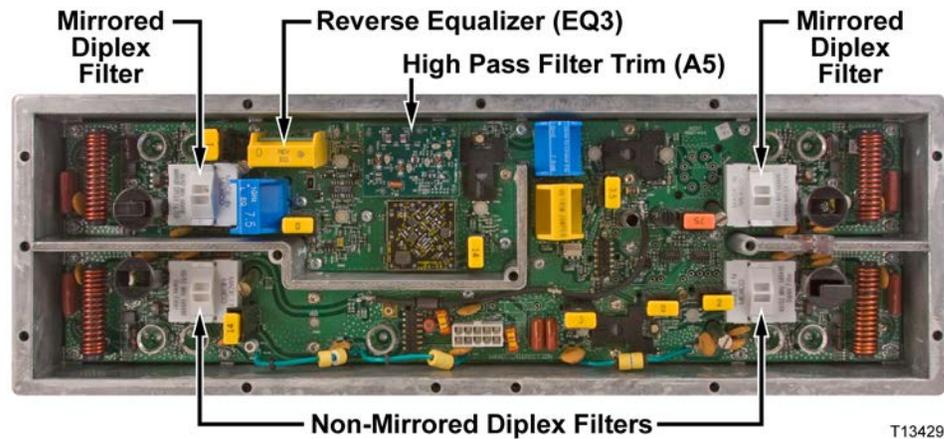
- 4 Remove the RF amplifier module from the housing.

Upgrading the Amplifier Module

- 1 Remove the RF amplifier module's cover by removing the amplifier cover screws using a Torx T-15 screwdriver.



- 2 Remove the four (4) Diplex filters using the plastic handle on the component. There are two (2) “mirrored”/blue PCB material and two (2) “non-mirrored”/green PCB material Diplex filters.

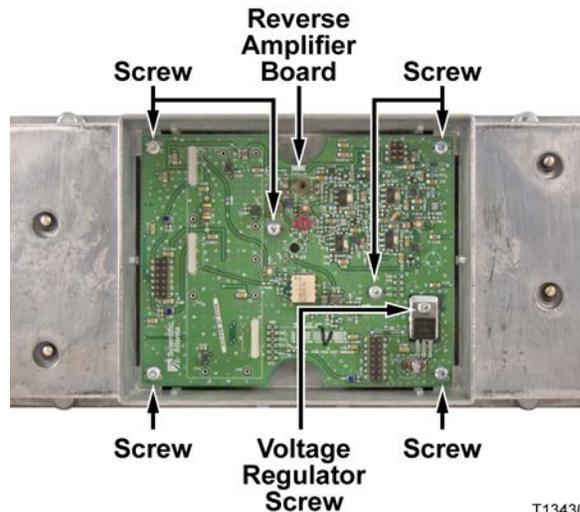


- 3 Install the four (4) new Diplex filters, being careful to match the replacement (2) “mirrored”/blue PCB material at A1 and A3 locations on the PCB and two (2) “non-mirrored”/green PCB material at A2 and A4 locations on the PCB.
- 4 Remove the High Pass Filter Trim at A5 location on the PCB using the appropriate extractor.
- 5 Install the new High Pass Filter Trim at A5 location on the PCB. Take caution to avoid bending any of the pins on this component during installation.
- 6 Remove the current Reverse Equalizer at EQ3 location on the PCB.
- 7 Replace the Reverse Equalizer at EQ3 location on the PCB with a Reverse Equalizer that supports the reverse path design.
- 8 Using a Torx T-15 screwdriver, replace the amplifier cover and tighten the amplifier cover screws from 10 in-lb to 12 in-lb (1.12 Nm to 1.35 Nm).

**Important:** Install the amplifier module cover properly, or RF signal degradation may result.

## Upgrading the RF Split in the GainMaker System Amplifier

- 9 Change the split indicator information on the cover to reflect the new split configuration by either moving the adhesive dot to the proper designation OR remove the dot and use a permanent marker to designate the new configuration. You should also update the part number label on the module to reflect the new split.
- 10 Turn over the amplifier.
- 11 Remove the Reverse Amplifier cover.
- 12 Using a Torx T-10 screwdriver, remove the screws that hold the amplifier board in place AND the screw holding the Voltage Regulator in place.



- 13 Remove the amplifier board.
- 14 Install the new amplifier board being careful to use all the screws removed earlier and tighten the Torx T-10 screws from 5 to 8 in-lb (0.56 to 0.90 Nm).
- 15 Replace the Reverse Amplifier cover.
- 16 Configure the RF Amplifier in the same configuration as the one it is intended to replace in the field (i.e., same attenuator pads, forward/reverse EQ values, and same AGC / Thermal setting).
- 17 All S parameters on each port in the forward and reverse band should be verified using a network analyzer.



### CAUTION:

**Modifying an amplifier's split characteristics will impact the available channel lineup downstream from the upgraded amplifier.**

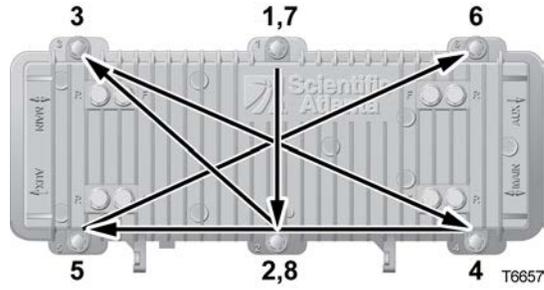
**Note:** Properly dispose of all parts you remove to protect the environment and to avoid their re-use, which could impact network performance.

## Installing the Amplifier Module in the Housing

- 1 Insert the upgraded RF amplifier module into the housing.
- 2 Secure the amplifier module to the housing by tightening the four module retainer screws with a screwdriver from 6 in-lb to 9 in-lb (0.7 Nm to 1.0 Nm).

## Upgrading the RF Split in the GainMaker System Amplifier

- 3 Inspect the housing gasket and all mating surfaces. Wipe off any excess dirt and debris.
- 4 Close the housing and finger-tighten all closure bolts.
- 5 Use a torque wrench with a 1/2-inch socket to tighten each closure bolt from 5 ft-lb to 12 ft-lb (6.8 Nm to 16.3 Nm) each.
- 6 Follow the numbered tightening sequence to tighten the closure bolts.



For Information

## For Information

### If You Have Questions

If you have technical questions, call Cisco Services for assistance. Follow the menu options to speak with a service engineer.





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