



SignalOn[®] Series

D3.1/CCAP™
Compliant

1.2 GHz

Forward Path Amplifier Products

INSTALLATION & OPERATION MANUAL

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About This Manual

The SignalOn Forward Path Amplifier product line includes gain amplifiers, power supplies, and power kits. The mechanical dimensions, cable management, and aesthetics of the amplifier and power supplies are compatible with the SignalOn product line. The system is designed to accommodate superior cable management and ease of use. Amplifier and power supplies are designed to be installed in the 8- or 20-position SignalOn Series chassis. Each amplifier or power supply occupies two positions in the chassis.

Admonishments

Important safety admonishments are used throughout this manual to warn of possible hazards to persons or equipment. An admonishment identifies a possible hazard and then explains what may happen if the hazard is not avoided. The admonishments — in the form of Dangers, Warnings, and Cautions — must be followed at all times. These warnings are flagged by use of the triangular alert icon (seen below), and are listed in descending order of severity of injury or damage and likelihood of occurrence.



Danger: *Danger is used to indicate the presence of a hazard that **will** cause severe personal injury, death, or substantial property damage if the hazard is not avoided.*



Warning: *Warning is used to indicate the presence of a hazard that **can** cause severe personal injury, death, or substantial property damage if the hazard is not avoided.*



Caution: *Caution is used to indicate the presence of a hazard that **will** or **can** cause minor personal injury or property damage if the hazard is not avoided.*

General Safety Precautions



Warning: *Never install equipment in a wet location or during a lightning storm.*



Warning: *Before making any connections to the chassis, verify that the power is off (fuse removed at the fuse and alarm panel) and that the plug-in module is removed from the chassis. Do not install plug-in module until after the chassis wiring is completed.*

Certification

The SignalOn Forward Path products have been tested and found to comply with the requirements of UL 60950, EN 1950, and CSA 22.2 No. 0.7.

FCC Compliance Statement

The SignalOn Forward Path Amplifier product line has been certified to comply with the requirements for class A computing devices per part 15 of the FCC regulations.



Warning: *This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual, may cause interference to radio communications. It has been tested and found to comply with limits for a Class A digital device pursuant to Subpart B of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference to TV and radio reception in which case the user, at their own expense, will be required to take whatever measures may be required to correct the interference.*

This equipment does not exceed Class A limits for radio emission for digital apparatus, set out in the radio interference regulation of the authorization methods of Industry Canada. Operation in a residential area may cause unacceptable

interference to TV and radio reception requiring the owner or operator to take whatever steps are necessary to correct the interference.

Standards

| | |
|-------------------|---|
| EN55022 | Limits and Methods of Measurement of Radio Interference Characteristics of Information Technology Equipment |
| ISTA+7 | International Safe Transit Authority |
| ANSI/SCTE 06 1999 | Composite Distortion Measurements |
| ANSI/SCTE 01 1996 | “F” Port (Female Outdoor) Physical Dimensions |
| NCTA | Part 4 NTC REPORT No.7 Video Facility Testing |
| TR-TSY-000332 | Reliability Prediction Procedure for Electronic Equipment |

List of Acronyms and Abbreviations

The acronyms and abbreviations used in this manual are detailed in the following list:

| | |
|-------------|---------------------------------------|
| AWG | American Wire Gauge |
| ANSI | American National Standards Institute |
| BDFB | Battery Distribution Fuse Bay |
| CATV | Cable TV |
| CPE | Customer Premise Equipment |
| CI | Customer Interface |
| FCC | Federal Communications Commission |
| GND | Ground |
| MBB | Make-Before-Break |
| MON | Monitor |
| NID | Network Interface Device |
| RCV | Receive |
| TTL | Transistor-Transistor Logic |
| XMT | Transmit |

GENERAL

1. General

The SignalOn system is a modular system that permits high isolation combining, splitting, and amplification of headend signals in a CATV system. The system is designed to accommodate strong cable management, EMI shielding, and ease of use. This facilitates easy reconfiguration and high performance within a dynamic headend environment.

Each amplifier or power supply occupies two positions in a chassis. Up to nine amplifiers and one power supply, or eight amplifiers and two load-sharing, redundant power supplies can be installed in a vertical 20-position SignalOn chassis. Ten amplifiers may be installed in the vertical 20-position SignalOn chassis if an external +24 VDC power source is used.

Each amplifier or power supply occupies two positions in a chassis. Up to three amplifiers and one power supply, or two amplifiers and two load-sharing, redundant power supplies can be installed in a horizontal 8-position SignalOn chassis. Four amplifiers may be installed in the horizontal 8-position SignalOn chassis if an external +24 VDC power source is used.



1.1. Compatibility with SignalOn® Product Line

The SignalOn amplifiers and power supplies may be installed in the same chassis as the SignalOn Passive modules. They are not physically compatible with the existing RF Worx® chassis.

SignalOn passive modules may be installed in MAXNET chassis, if mounting screws are replaced. Consult ATX technical support for more info.

Refer to the [SignalOn Chassis & Power Supply manual](#) for more information.

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PRODUCT DESCRIPTION

2. Product Description

This section provides physical, functional, and technical descriptions of the SignalOn Forward Path Amplifier, chassis, 100/120/240 VAC power supply, and -48 VDC power supply.

2.1. Physical Description

2.1.1. Forward Path Amplifier

Each Forward Path Amplifier provides adjustable amplification with low distortion and low noise for the forward path.

The SignalOn Forward Path Amplifier is available in the following variations:

- 20 or 30 dB adjustable gain (F Connectors)
- 10 - 20 or 20 - 30 dB adjustable gain
- 50 - 1002 or 50-1218MHz bandwidth
- F or BNC connector * (note that BNC not available for 1218MHz amplifiers)

Each SignalOn Forward Path Adjustable Gain Amplifier has two connectors for monitor ports on the front panel. Recessed push buttons for gain and tilt control are also located on the front panel. Two RF connectors are located on the rear panel (RF IN and RF OUT). Each amplifier acquires its main and redundant +24 VDC power from the integral power connector located at the top-rear of the amplifier module. A front and rear view of the Forward Path Amplifier is shown in Figure 1.

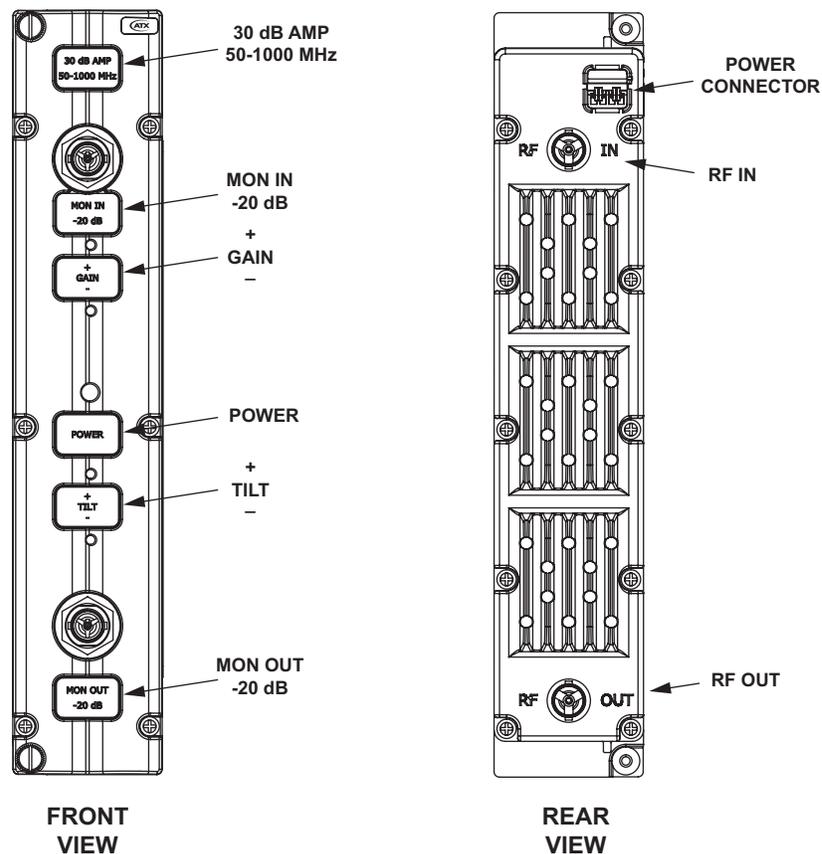


Figure #1: 30 dB Forward Path Amplifier

2.2. Functional Description

2.2.1. Forward Path Amplifier

The SignalOn Forward Path Amplifier is an electronically adjustable amplifier, and is intended for CATV and other providers requiring low distortion/noise signal amplification in the forward path (50 to 1000 MHz). Figure 6 shows a circuit block diagram for the Forward Path Amplifiers. Recessed push buttons located on the front panel are used to increment or decrement the signal without signal interruptions.

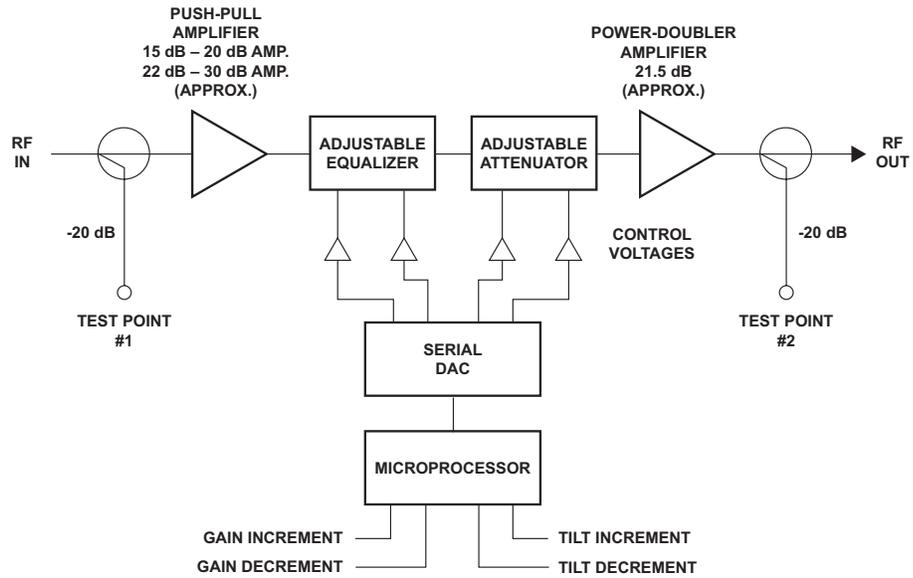


Figure #2: Adjustable Gain Amplifier Schematic

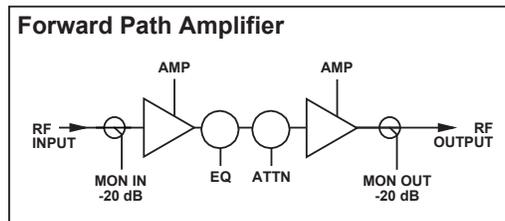


Figure #3: Forward Path Amplifier Schematic

2.2.2. Power Supplies

The SignalOn power supplies use either 100/120/240 VAC or –48 VDC input power. AC/DC or DC/DC power supplies include circuitry for the detection of a power supply failure. Alarm contacts are located on the rear panel of the power supply module. These contacts support existing customer-supplied alarm systems. The DCALM contact is used to indicate DC power failure. FANALM is used to indicate fan failure.

When power supply output drops below 18 VDC from its nominal value of 24 VDC the relay circuitry closes a switch completing an external alarm circuit, resulting in an alarm.

2.2.3. A/B Redundancy

Power distribution backplane automatically accommodates power redundancy and load sharing when two power supplies are inserted into any chassis position. If one power supply fails the other power supply picks up the entire load.

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INSTALLATION

3. Installation

3.1. Installing Forward Path Amplifier

Each forward path amplifier module occupies two slots in the chassis. Use the following procedure to install modules in the SignalOn Series chassis.

1. Make sure the ATX logo (or any other front panel lettering) is readable. Align the power connector at the top of the module with the power connector in the chassis. Slide the plug-in module into its designated location in the chassis.
2. Secure the module using its two captive retaining screws. See Figure 13 or Figure 14.
3. After each module is loaded into the chassis, refer to your work order, and connect the designated RF cables to the appropriate F connectors on the modules in the chassis.
4. Carefully route cables through the cable management slots located on each side of the rear of the chassis. Use the cable management guidelines found in this manual to route cable from the chassis to the rack/cabinet.
5. Perform any cabling or operational tests required at your facility.

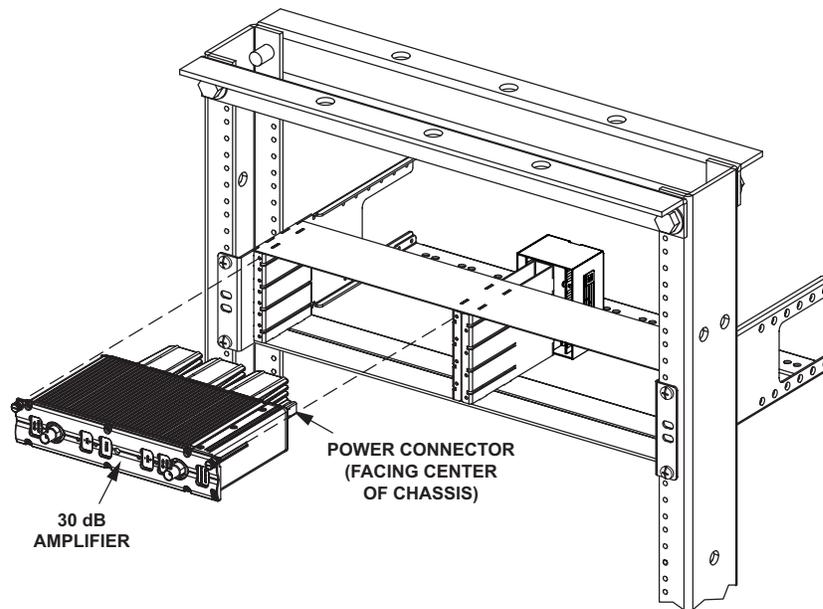


Figure #4: Amplifier Installation 2RU Chassis

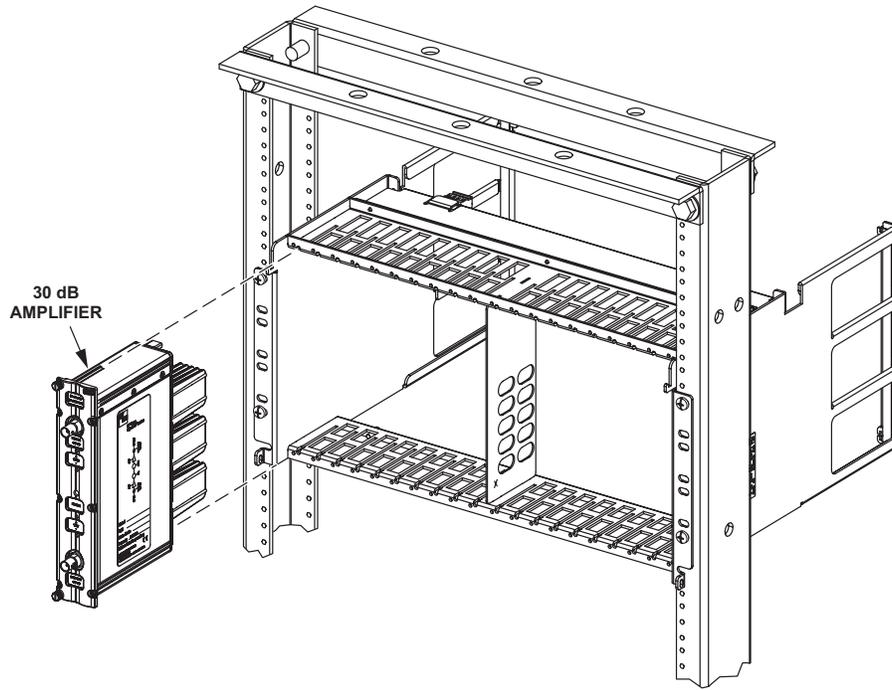


Figure #5: Amplifier Installation 5RU Chassis

OPERATING INSTRUCTIONS

4. Operating Instructions

4.1. Forward Path Amplifier

An LED on the front of the Forward Path Amplifier lights green when the amplifier is operating. If no power is present at the amplifier the LED is off.

4.1.1. Gain Adjustment

Amplifier gain is adjusted using the pushbuttons on the front of the amplifier module. There are two buttons, labeled “+” and “-” for gain increment and decrement, respectively. The “+” button increments the gain by approximately 0.5 dB and the “-” button decrements the gain by approximately 0.5 dB. There are 20 step increments in all, which is equal to about 10 dB. The gain will quickly scroll up or down by pressing and holding the appropriate button for a duration of approximately one second.



NOTE: Gain and Tilt settings are stored in the amplifier and are not lost if a power failure occurs.

4.1.2. Tilt Adjustment

Amplifier tilt is adjusted using the pushbuttons on the front of the amplifier module. There are two buttons, labeled “+” and “-” for tilt increment and decrement, respectively. The “+” button increments the tilt by approximately 0.5 dB and the “-” button decrements the tilt by approximately 0.5 dB. There are 20 step increments in all, which is equal to about 10 dB. The tilt will quickly scroll up or down by pressing and holding the appropriate button for a duration of approximately one second. Tilt pivot point is set at 860 MHz, and has a linear profile. The maximum tilt settings attenuates the signal by 10 dB at 50 MHz.

4.1.3. Monitor Test Ports

Two -20 dB directional coupler monitor test ports are standard on the adjustable gain amplifiers, one before RF amplification and one after.

4.2. Power Supply

The power supply front panel has LEDs to indicate fan and power conditions and a test point to verify the +24 VDC. There are three LED indicators on the power supply front panel. Refer to Table 2 for a functional description of each indicator and the test point. The location of the indicators and test point is shown in Figure 26.

| INDICATOR | COLOR | DESCRIPTION |
|---------------|-------|--|
| FAN FAIL | Green | Fan fail alarms (green to red) on fan failure. Continues to operate (Green) if current shared with another power supply. |
| | Red | Fan failure. |
| DC OUT FAIL | Green | Operating properly. |
| | Off | No DC power output to the chassis backplane. |
| POWER IN FAIL | Green | Operating properly. |
| | Off | No input power present. |
| 24V TST PT | N/A | +24 VDC measured between + and - jacks. |

Table #1: Front Panel Indicators and Test Point

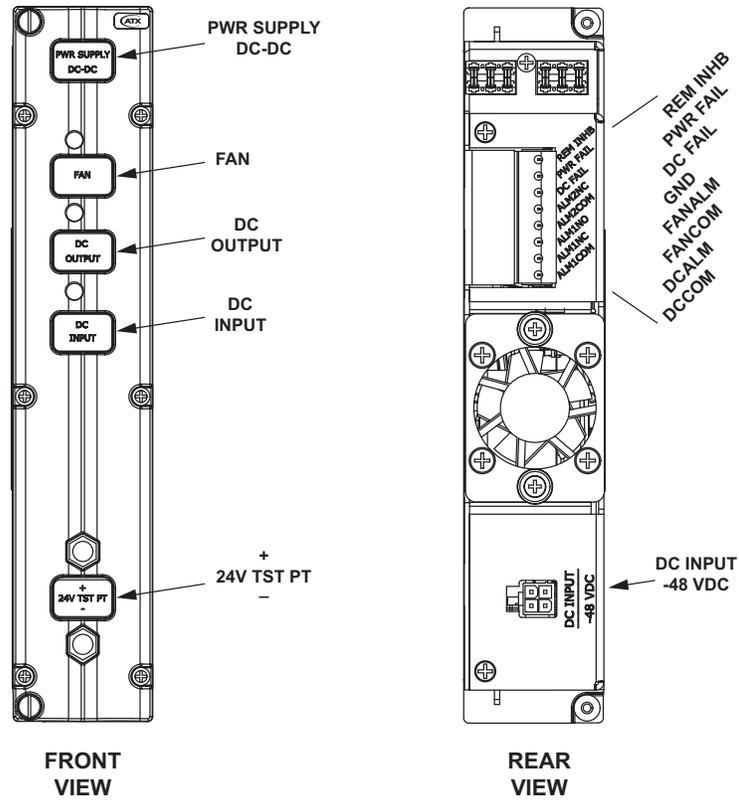


Figure #6: -48 VDC Power Supply

MAINTENANCE

5. Maintenance

Maintenance requirements for the SignalOn series amplifiers and chassis covered in this manual are minimal, consisting merely of periodic surface cleaning and fan filter cleaning.

The outside of the chassis and components should be cleaned during routine office equipment maintenance. Care must be taken to prevent dust and dirt from getting into any of the coaxial jacks or connectors.



NOTE: There are no customer serviceable parts in the amplifiers in this system; return all failed amplifiers to ATX Networks for service or repair. Opening amplifier voids all applicable warranties.

5.1. Power Supply Fan Replacement Procedure

Each power supply module is equipped with a rear cooling fan that draws air in and pushes it through the power supply module. The heated air is then exhausted through vent holes on the power supply module. This method of cooling is preferred so that airborne contaminants are caught on the outside of the fan filter. This reduces dust buildup on the fan blades, as well as internally in the power supply. Over time, dust and airborne contaminants can cause the air filter to become blocked. The time it takes for the filter to get sufficiently blocked is dependent on the environment that the unit operates in.

Due to the same environmental conditions, fan bearings may also wear out. This results in the red “FAN FAIL” LED to illuminate on the front of the module as shown in Figure 27. The fan assembly is as a field replaceable component. Catalog number for the fan replacement kit is: N-ACC-FAN-01 (with filter) or N-ACC-FAN (without filter). Please note that these fans are not compatible with each other so be sure to order the correct replacement depending on the device purchased. Older units do not have filters (visible from outside). The fan replacement kit may be purchased through your local distribution channel, or ATX Networks. Fan replacement may be performed while power supply is in service, or out of service.

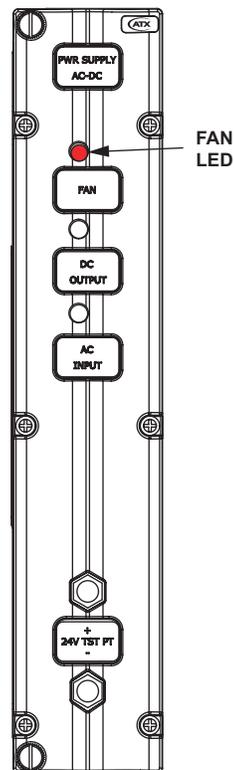


Figure #7: AC Power Supply (Front View)

Use the following procedure to replace cooling fan:

1. Carefully move any cables away from the rear of the power supply that may be blocking fan.
2. Loosen the two thumbscrews that secure the fan assembly to the power supply module. See Figure 28.
3. Carefully withdraw fan assembly from power supply module until the wiring harness is exposed and connector is accessible.
4. Depress latch release on the fan connector and unplug the connector from the connector on the wiring harness.
5. Plug new fan connector into the wiring harness connector.
6. Carefully push fan wiring and connector back into the power supply module making certain no to pinch or break the fan wires.
7. Position fan assembly in the module and tighten thumbscrews.
8. If a fan failure caused the power supply to overheat and shut down, the power supply input voltage must be cycled. For DC primary powered systems, remove the primary fuse feeding the SignalOn chassis from the BDFB fuse panel and reinsert. For AC primary powered systems, remove and replace AC power cord connection from AC socket located on the rear of the power supply.
9. Verify that the power supply starts, LED status for input and output voltage and fan are green, and that the fan is operating properly.
10. Verify that all active modules located in the chassis are powered up and operational.
11. Re-tie any cables moved away from rear of the power supply module.

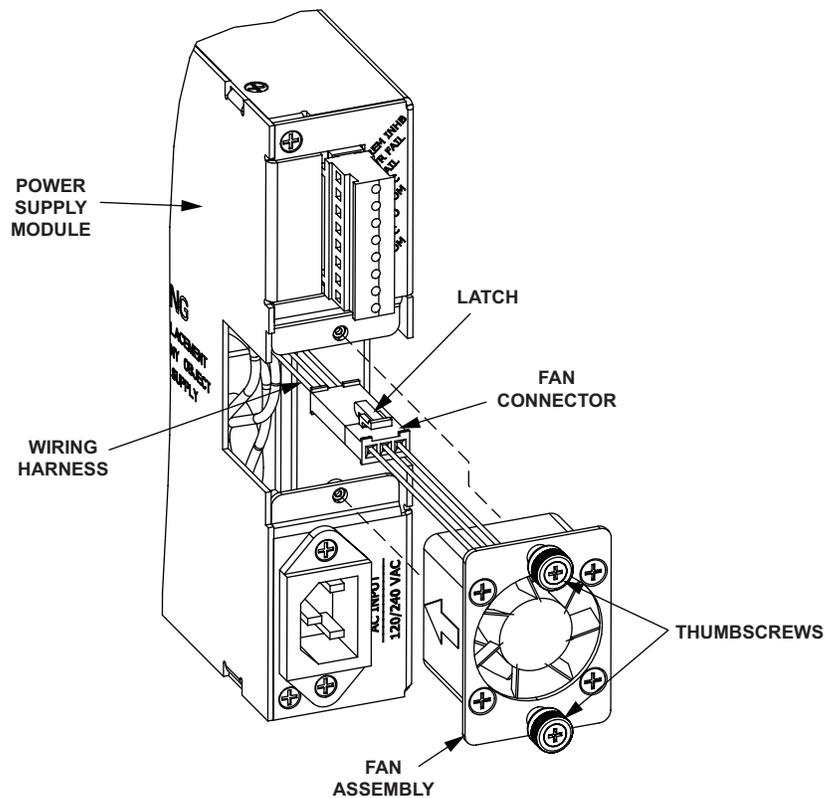


Figure #8: Power Supply Fan Replacement

5.2. Preventative Actions

1. Regularly change facility air handling equipment filters every 30-60 days.
2. Stock a 1% spares inventory of fan assemblies to facilitate quick field repairs.
3. Develop a maintenance plan for periodic visual inspection, and cleaning of the fan filters.

5.3. Cooling Fan Maintenance

Maintenance of the power supply cooling fan is a simple procedure that is quickly accomplished in usually less than 5 minutes.

1. Carefully move any cables away from the rear of the power supply that may be blocking fan.
2. Loosen the two thumbscrews that secure the fan assembly to the power supply module. See Figure 28.
3. Carefully withdraw fan assembly from power supply module by pulling straight back until the wiring harness is exposed and the connector is accessible.
4. Depress latch release on the fan connector and unplug the fan connector from the connector on the wiring harness.
5. Holding the fan assembly, use compressed air to blow the dirt & dust particles out of the fan filter by first blowing the air through the fan assembly from the inside to outside. Next, use compressed air to blow off dirt particles on the external side of the fan assembly.
6. An alternative to Step 5 would be to use a small shop vacuum cleaner to remove dirt & dust from the external side of the filter.
7. Once the fan assembly has been thoroughly cleaned, re-insert the fan assembly into the power supply module using Step 5 through Step 11 in the fan replacement procedure in this section.

NOTE: Depending on the environmental conditions and the location of where this equipment operates, power supply may overheat and cause a thermal shut down if proper air flow is not supplied to the module. Do not allow power supplies to operate without a fan assembly for any extended period of time.

For any other repairs, contact ATX Networks at the telephone number listed in Section 9, Service & Support, of this manual.

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SPECIFICATIONS

6. Specifications

| Forward Path Amplifier | 20 dB FORWARD AMPLIFIER | 30 dB FORWARD AMPLIFIER | 30 dB FORWARD AMPLIFIER |
|--|--|--|--|
| BANDWIDTH | 50-1002 MHz | 50-1002 MHz | 50-1218 MHz |
| MINIMUM RF INPUT⁽¹⁾ | +20 dBmV per Channel | +10 dBmV per Channel | +10 dBmV per Channel |
| MINIMUM FULL GAIN | 20 dB | 30 dB | 30 dB |
| GAIN FLATNESS | +/- 0.4 dB from 50-870 MHz +/- 0.5 dB from 870-1000 MHz | +/- 0.45 dB from 50-870 MHz +/- 0.65 dB from 870-1000 MHz | +/- 0.45 dB from 50-870 MHz +/- 0.65 dB from 870-1218 MHz |
| RETURN LOSS, INPUT & OUTPUT PORTS | -19 dB from 50-870 MHz -16.5 dB from 870-1000 MHz | -18 dB from 50-870 MHz -15 dB from 870-1000 MHz | -16 dB from 50-1218 MHz |
| NOISE FIGURE | 7.3 dB from 50-870 MHz 7.6 dB from 870-1000 MHz | 5.7 dB from 50-870 MHz 6.2 dB from 870-1000 MHz | 6.2 dB from 50-870 MHz 6.7 dB from 870-1218 MHz |
| GAIN/TILT ADJUSTMENT RANGE | 10 +/- 1 dB @ 50 MHz in 0.5 dB Steps | 10 +/- 1 dB @ 50 MHz in 0.5 dB Steps | 10 +/- 1 dB @ 50 MHz in 0.5 dB Steps |
| CTB/CSO⁽²⁾ | -73/-81 dB | | |
| MONITOR PORTS | -20 +/-1 dB Test Point for both RF Input and RF Output | | |
| OPERATING VOLTAGE/POWER DISSIPATION | 24 VDC +/- 5%, 17W (max) | | |
| POWER CONNECTOR | Gold-on-Gold, Slide-on Contacts | | |
| THERMAL SHOCK | Meets MIL-STD-202 Method 107 | | |
| OFFICE VIBRATION | Meets GR-63-Core Section 5.4.2 | | |
| MECHANICAL SHOCK | Meets MIL-STD-202 Method 213 | | |
| ACCELERATED AGING | Meets MIL-STD-202 Method 108 | | |
| CERTIFICATIONS | FCC Class A, U/L, NEBS Level 3 | | |

NOTES:

(1) Analog channel input level, regardless of channel load.

(2) Measured with 110 channel loading and optimum RF input level at full gain and no tilt. Specifications are typical worst-case numbers across the given frequency range, unless otherwise noted.

Table #2: Forward Path Amplifier Specifications

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SERVICE & SUPPORT

7. Service & Support

7.1. Contact ATX Networks

Please contact ATX Technical Support for assistance with any ATX products. Please contact ATX to obtain a valid RMA number for any ATX products that require service and are in or out-of-warranty before returning a failed module to ATX.

TECHNICAL SUPPORT

Tel: 289.204.7800 – press 1
Toll-Free: 866.YOUR.ATX (866.968.7289) USA & Canada only
Email: support@atx.com

SALES ASSISTANCE

Tel: 289.204.7800 – press 2
Toll-Free: 866.YOUR.ATX (866.968.7289) USA & Canada only
Email: insidesales@atx.com

FOR HELP WITH AN EXISTING ORDER

Tel: 289.204.7800 – press 3
Toll-Free: 866.YOUR.ATX (866.968.7289) USA & Canada only
Email: orders@atx.com
Web: www.atx.com

7.2. Warranty Information

All of ATX Networks' products have a 1-year warranty that covers manufacturer's defects or failures.

7.3. Safety

IMPORTANT! FOR YOUR PROTECTION, PLEASE READ THE FOLLOWING:

WATER AND MOISTURE: Care should be taken so that objects do not fall and liquids are not spilled into the enclosure through openings.

POWER SOURCES: The device should be connected to a power supply only of the type described in the operating instructions or as marked on the device.

GROUNDING OR POLARIZATION: Precautions should be taken so that the grounding or polarization means of the device is not defeated.

POWER CORD PROTECTION: Power supply cords should be routed so that they are not likely to be pinched by items placed upon or against them, paying particular attention to cords at plugs, convenience receptacles, and the point where they exit from the device.

SERVICING: The user should not attempt to service the device beyond that described in the operating instructions. All other servicing should be referred to qualified service personnel.

FUSING: If your device is equipped with a fused receptacle, replace only with the same type fuse. Refer to replacement text on the unit for correct fuse type.



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