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REVISION HISTORY

REVISION	DESCRIPTION	DATE
1.0	Original Version	June 1999
1.1	Updated specifications	Sep 2000
1.2	Updated power dissipation specification	May 2002
1.3	Added information abou48VDC version	Jan 2003
1.4	Updated power specification and Safety information	May 2005
1.4.1	Added max power consumption, max current and max load specifications	Jul 2005
1.4.2	Added GROC relay specifications	Jan 2006
1.5	Added information about 7700FR-G version	Mar 2006
1.5.1	Updated Power Supply LED descriptions, added Frame Status section	Jul 2006
1.5.2	Updated typos in Overview section	Jan 2007
1.6	Added slot blocker information	Sept 2010

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1. OVERVIEW

The 7700FR is a 3 rack unit high rack frame for the 7700 series modular system. This advanced rack frame design can house up to 15 modules of any combination of the 7700 series distribution, conversion, processing and synchronization modules. Special care was taken during the design process to ensure that the 7700FR meets the demanding needs of television studios today has sufficient flexibility to satisfy the emerging demands of the future.

The 7700FR is designed with a high density capacity to conserve on precious equipment rack space. Care has been taken to ensure sufficient thermal relief for up to 200 watts of processing power per frame, to meet the increasing power demands of future high speed processing cards.

Hot swappable redundant switching power supplies and cooling fans allow power supply or fan replacement without compromising the integrity of critical signal paths. The 7700FR is available with either auto ranging 100-240 VAC or 48VDC power supplies.

The front loading design permits extraction of the power supplies and active modules from the front without compromising performance even at 1.5Gb/s. Thus, there is no need for time consuming re-cabling nor is there need to have access to the rear of the frame replace or exchange modules.

The Frame is available in different versions to suit a variety of applications. Throughout this manual references to 7700FR refer to all models of the frame unless otherwise specified.

Model	Description
7700FR (no longer available – replaced by 7700FR-C)	AC powered frame with **no** slot for 7700FC VistaLINK™ Frame Controller.
7700FR-C	AC powered frame with slot for 7700FC VistaLINK™ Frame Controller.
7700FR-C-48VDC	DC powered frame with slot for 7700FC VistaLINK™ Frame Controller.
7700FR-G	AC powered frame with global reference inputs. Slot for 7700FC VistaLINK™ Frame Controller.

Features:
- Houses up to 15 processing modules
- Each slot has individually configurable inputs and outputs
- Front monitoring window for verifying module and power supply status
- Frame status contact closure alarm signals power supply or fan failures and user selectable module alarms
- Front extractable modules, power supplies and fans
- 7700FR-C and 7700FR-G versions has auto-ranging power supply that operates from 100-240VAC at 50/60hz
- 7700FR-C-48VDC version has auto-ranging power supply that operates from 36 to 60 VDC
- Power supply and frame cooling fans are fully redundant and hot-swappable
- High-speed bussing and control system provided for modular applications
- 7700FR-G version has two BNCs for connecting two separate genlock references for modules equipped to take a frame reference input.

1.1. SPECIFICATIONS

1.1.1. Electrical – 7700FR-C & 7700FR-G Frame

AC Mains Input:	Auto ranging, 100 ⇔ 240 VAC, 50/60 Hz
Maximum Operating Current:	2.9 A (@ 120 VAC), 1.8 A (@ 240 VAC)
Maximum Power Consumption:	250 W
Maximum Module Load:	200 W (13.3 W per slot)
Power Supply Configuration:	Dual, redundant, separate inlets
Connector:	IEC 60320 - 1 per power supply
Fuses:	4 amps, 250 Volt time delay 5 x 20 mm. – 2 per power supply
Status Indicators (each power supply):	
	PSU status LED
	Local Error/Failure LED
Tally Output Connector:	4 pin terminal, relay N/O, N/C for status/fault alarm, 1A, 30 VDC max.
Temperature:	0 - 40°C

1.1.2. Electrical – 7700FR-C-48VDC Frame

DC Input:	Auto ranging 36 ⇔ 60 VDC
Maximum Operating Current:	5.2 A (@ 48 VDC)
Maximum Power Consumption:	250 W
Maximum Module Load:	200 W (13.3 W per slot)
Power Supply Configuration:	Dual, redundant, separate inlets
Connector:	3 pin screw terminal strip – 1 per power supply
Fuses:	10 amps, 250 Volt time delay 5 x 20 mm. – 1 per power supply
Status Indicators (each power supply):	
	PSU status LED
	Local Error/Failure LED
Tally Output Connector:	4 pin terminal, relay N/O, N/C for status/fault alarm, 1A, 30 VDC max.
Temperature:	0 - 40°C

1.1.3. Compliance

Safety:	CSA Listed to CSA C22.2 No. 60065-03, UL 60065-03
	IEC 60065-(2001-12) 7th Edition
	Complies with CE Low voltage Directive 93/68/EEC
EMC:	Complies with FCC part 15, class A.
	Complies with EU EMC directive 89/336/EEC

1.1.4. Physical

Height:	5.25" (133 mm)
Width:	19" (483 mm)
Depth:	14.5" (368 mm)
Module Capacity:	15 slots
Weight:	Approx. 17.4 lbs. (7.9 Kg) with 2 power supplies, no slots occupied
	Approx. 32 lbs. (14.5 Kg) with 2 power supplies all slots occupied

1.2. COOLING

The 7700FR frame is designed to ensure adequate cooling for up to 200 watts of processing power per frame. Fans at the front and rear of each power supply module accomplish forced air cooling. Adjacent equipment may be mounted immediately to the top and bottom of the 7700FR frame. Additional module cooling is provided by interior cooling channels to ensure that even fully loaded frames mounted adjacent to each other will operate within the normal temperature range.

> **For proper cooling, the frame must contain either two 7700PS power supplies, or one 7700PS power supply and one 7700PS-FM power supply blank panel with cooling fan.**

1.2.1. Fan Exhaust

The cooling fans for the power supplies, located at the front of the frame, draw air in the front and exhaust out the sides of the frame. The cooling fans for the modules, located at the rear of the frame, and draw air in the front and the exhaust out the rear of the frame.

> **CAUTION: To ensure adequate cooling, care should be taken to ensure that the fan inlets and exhaust openings are free of obstructions.**

1.3. MOUNTING

The 7700FR Rack frame requires 3 rack units i.e. 5.25 inches (133 mm) of standard.19 inch (483 mm) wide rack space. To securely fasten the frame to the equipment rack, make sure that all four mounting screws are tightened securely.

1.4. POWER

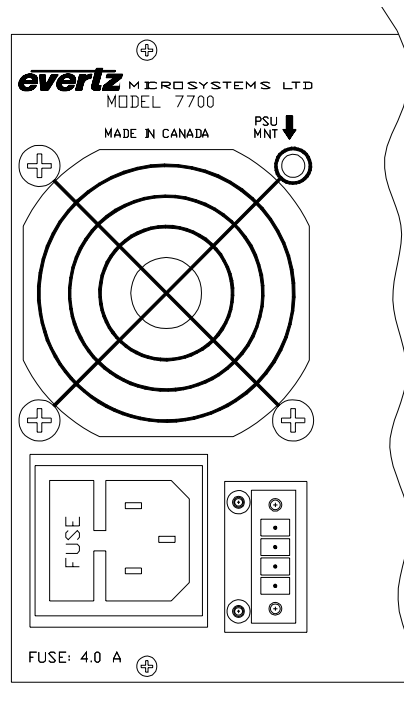### 1.4.1. Connecting the Power - AC Powered Frames

Figure 1-1: AC Powered Frames - Rear Panel

The 7700FR-C and 7700FR-G frames come standard with one auto-ranging power supply that automatically senses the input voltage over the range of 100 to 240 VAC. An additional power supply (7700PS) can be ordered to provide fully redundant powering of the frame. When only one power supply is fitted, the frame will be fitted with a 7700PS-FM fan module to ensure the thermal integrity of the frame cooling. Power should be applied by connecting a 3-wire grounding type power supply cord to the power entry module on the rear panel of each power supply. The power cord should be minimum 18 AWG wire size; type SVT marked VW-1, maximum 2.5 m in length.

The power entry modules contain a standard IEC power inlet connector, two 5 x 20 mm fuse holders and an EMI line filter.

CAUTION - TO REDUCE THE RISK OF ELECTRIC SHOCK, GROUNDING OF THE GROUND PIN OF THE MAINS PLUG MUST BE MAINTAINED

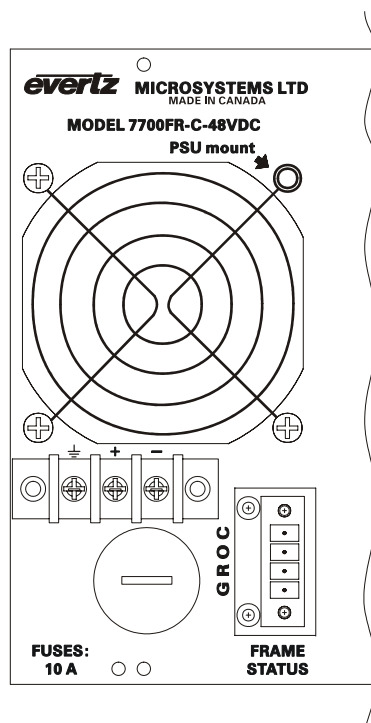### 1.4.2. Connecting the Power - DC Powered Frames

Figure 1-2: 7700FR-C-48VDC Rear Panel

The 7700FR-C-48VDC frame comes standard with one auto-ranging power supply that automatically senses the input voltage over the range of 36 to 60 VDC. An additional power supply (7700PS-48VDC) can be ordered to provide fully redundant powering of the frame. When only one power supply is fitted, the frame will be fitted with a 7700PS-FM fan module to ensure the thermal integrity of the frame cooling. Power should be applied by connecting a 2 conductor twisted pair shielded power supply cord to the screw terminals on the rear panel of each power supply. The power cord should be minimum 18 AWG wire size; maximum 2.5 m in length.

The frame rear panel is fitted with a three terminal wiring block, and a 5 x 20 mm fuse holder for each power supply.

1.4.3. Turning the Power On and Off

Each power supply is fitted with its own power switch. When the switch is turned off, the remaining power supply will power the 7700FR frame. To completely remove power from the frame, both power supplies must be turned off.
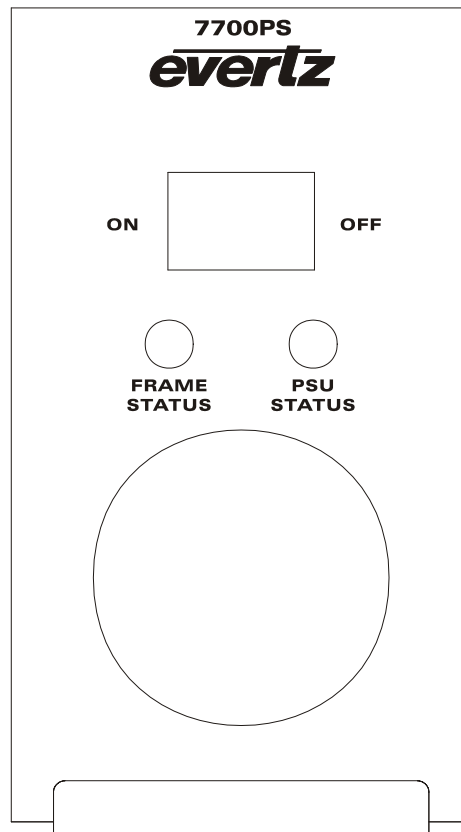
1.4.4. Power Supply Status Indicators

Figure 1-3: 7700PS Status Indicators

Each power supply has two status indicator LEDs. The green PSU STATUS LED indicates the health of the local power supply. The FRAME STATUS LED indicates the health of the entire frame and is operated by the frame status buss of the frame. The red FRAME STATUS LED will be Off under normal conditions and On when there are Frame Status Fault conditions. See section 2 for more information about frame status buss fault conditions.

> **On early versions of the 7700PS the FRAME STATUS LED is Green and will be On under normal conditions and Off when there are Frame Status Fault conditions.**

If one of the power supplies malfunctions, (power cord disconnected, power switch is off, fuse is blown, rear fan is stopped, etc,) then its PSU STATUS LED will go Off, and the red FRAME STATUS LED on both power supplies will turn On. (If the power supplies are fitted with green FRAME STATUS LEDs they will turn Off) The PSU STATUS LED on the power supply that is functioning will remain On. If the frame is connected to VistaLINK® then the power supply fault will send a trap message from the frame.

> **If there is a fuse failure, contact Evertz customer service regarding the power supply immediately. The power supplies are short circuit protected and should not blow the fuse under a short circuit condition.**

2.   FRAME STATUS FAULT CONDITIONS

The Frame is fitted with a global Frame Status monitoring buss that is connected to each of the power supplies and to each of the modules. When a fault condition occurs on one of the power supplies, or one of the modules, a Frame Status Fault condition is active on the frame status buss. When this occurs the red FRAME STATUS LED on the power supply will come on and the relay on the Frame Status Tally terminal block will activate.

> ✍   **On older versions of the 7700PS Power Supply, the FRAME STATUS LED is green and will be On when no fault condition exists and Off when a Frame Status Fault is active.**

Power supplies, will assert a frame status fault when their PSU STATUS LED is off.

Each module has a large red LOCAL FAULT LED and a large green MODULE OK LED at the top of the card edge. This green LED indicates good module health while the red LED indicates that there is a fault condition on the module. Each module has its own criteria that determines when the red fault LED comes on. When the red LOCAL FAULT LED is On the module can also assert a fault condition on the Frame Status buss. On each module there is a jumper that disables sending local card fault information to the Frame Status Buss. For more information about fault conditions on individual modules, and for the location of the Frame Status Jumper on the module consult the individual chapter for the module. For example, if a module requires video or audio for its functionality and the video or audio is not present, the red LOCAL FAULT LED on the module will be On and the fault will be reported on the frame status buss if the FRAME STATUS jumper on the module is set to the On position (default).

2.1.   FRAME STATUS TALLY TERMINAL BLOCK

There is a green terminal block at the rear of the frame that has a normally open and normally closed relay contact that can be used to indicate frame status fault conditions to external equipment. There are 4 connections.

Label	Pin #	Function
G	1	Chassis Ground (connect to cable shield)
R	2	Common (connect to Ground or your reference)
O	3	Open with respect to common when Frame Status fault exists
C	4	Closed with respect to common when Frame Status fault exists

Table 2-1: Frame Status Tally Terminal Block Pin Assignments

The relay contacts can sink up to 1A and operate up to 30 VDC.

> ✍   **The Status indicator terminal block connector on the 7700FR-G version is a different type than used on the other frames to make room for the new reference BNCs.**

3. INSTALLING AND REMOVING THE MODULES

3.1. INSTALLING THE MODULE REAR PLATES

Each module is shipped with a matching rear panel plate which houses the connectors appropriate for the module. When installing a rear plate, locate the desired slot position where you wish to install the rear plate. Make a note of the slot number where you are installing the rear plate. Orient the plate so that the labeling is visible when the plate is installed. Loosely fasten the plate to the extrusions using the mounting screws provided, beginning with the top screw. You will tighten the screws after the main module is installed.

3.2. OPENING AND CLOSING THE FRONT PANEL

In order to insert or remove modules you will have to open the front panel. Turn the two captive screws located on the front panel counter clockwise several turns until they release completely from the front extrusions. Carefully lower the front panel door so that the front edge of the door is lower than the rear of the door.

3.3. INSTALLING THE MODULES

Orient the module vertically such that the white card ejector is on the bottom. Align the card with the card guide corresponding to the slot number where you installed the rear panel plate. Carefully slide the module into the frame and press it completely into the rear panel connectors. Make sure that the connectors are fully seated in the rear panel. When this is done, close the front panel and then tighten the screws that hold the rear panel in place.

3.3.1. Slot Blocker

If you are trying to install a 7800 series module into the 7700FR frame, please review the following information.

Some 7800 series modules require a "slot Blocker" as the card must occupy 2 slots in a 7700FR to ensure that the frame power is managed properly. Please note that not all 7800 series modules come with a slot blocker and therefore they will not fit into the 7700FR. For more information on installing and using a slot blocker, please refer to the individual module chapter of this binder.
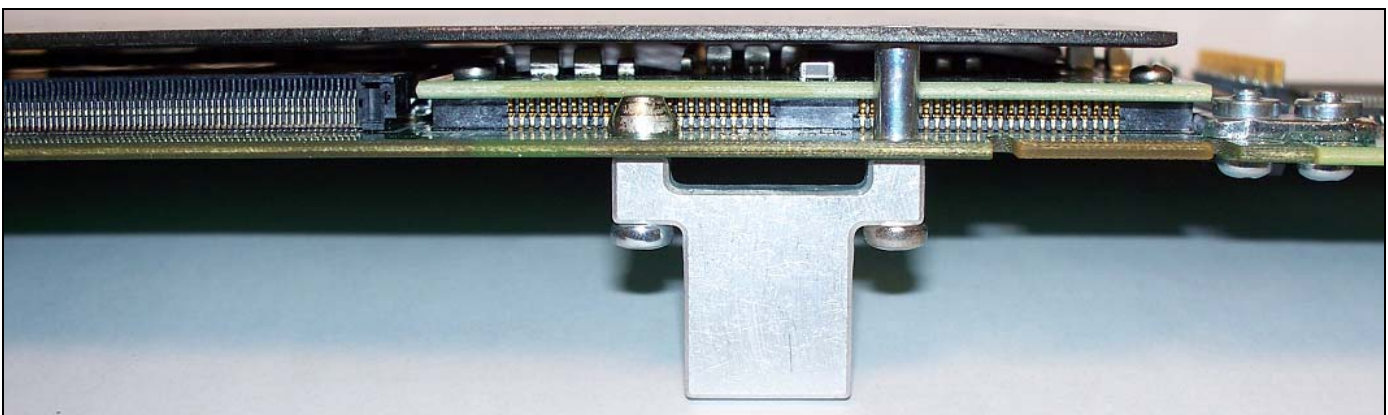

Figure 3-1: Slot Blocker (E7700FR-SLOT-BLOCK)

3.4.   REMOVING THE MODULES

Press the card ejector down to release the module. Grasp then the card using the card ejector and pull the module out from the frame. As the card ejector goes past the front extrusion, you will have to pull it with slightly more force. Carefully place the module in a safe place, free from static discharge.

4. CONNECTING THE FRAME GENLOCK REFERENCE (7700FR-G VERSIONS ONLY)

The 7700FR-G frame is identical to the 7700FR-C version except for the addition of two input BNCs that can be used to deliver reference signals to cards that are housed in the frame. These are labeled **REF 1** and **REF 2** and are located on the rear of the frame in the bottom, left hand side (as facing the rear of the frame) near the GROC connector. See **Error! Reference source not found.**.
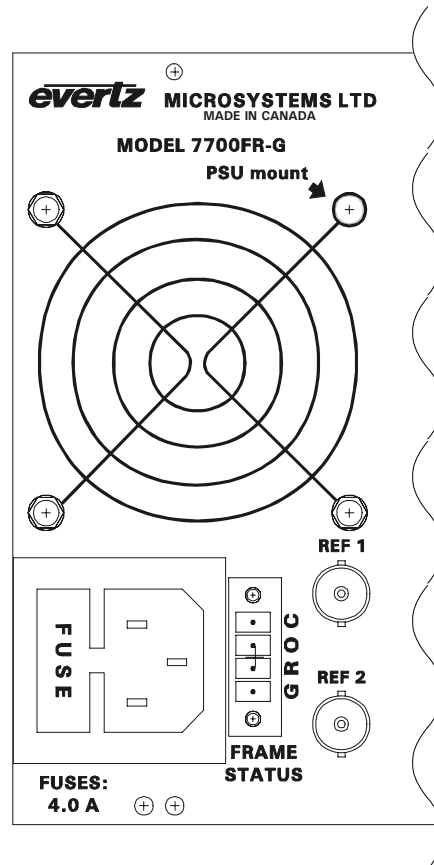

Figure 4-1: 7700FR-G Rear Panel

✎ | **The contact closure GROC connector on the 7700FR-G version is a different type than used on the other frames to make room for the new reference BNCs.**

The **REF 1** and **REF 2** inputs provide an analog connection to the modules in the frame and can carry a wide variety of signals depending on the modules inserted into the frame. For example, NTSC, PAL-B, Tri-level sync, bi-level sync, DARS, etc. is supported. Each card that supports a Frame reference will have a control for selecting which of the references to use. See the specific chapter for the module for information on the reference input operation and control. Because there are two frame reference inputs, you can supply the frame with two completely different signals or two different time bases of the same type of signal. It is up to the system designer/installer/operator to supply appropriate signals and configure modules to use the correct reference input.

Both reference inputs are isolated from the frame and provide a balanced analog signal connection along the module interconnect printed circuit board to all modules. The balanced signal is terminated at the far

end of the module interconnect bus with a 75 Ohm termination. Each installed module that supports the use of these reference inputs will slightly degrade the return loss of the frame reference inputs (approx. 1dB per card). For this reason, it is important that the reference input signal comes directly from a dedicated distribution source like a distribution amplifier without passing through any reference loops or high impedance "T"' connections.

5. SERVICING INSTRUCTIONS

> **CAUTION – These servicing instructions are for use by qualified service personnel only. To reduce risk of electric shock do not perform any servicing instructions in this section of the manual unless you are qualified to do so.**

5.1. CHANGING THE FUSES

> **Check that the line fuse is rated for the correct value marked on the rear panel. Never replace with a fuse of greater value.**

5.1.1. AC Powered Frames

The fuse holder is located inside the power entry module. To change the fuses, pull out the fuse holder from the power entry module using a small screwdriver. The fuse holder contains two fuses, one for the line and one for the neutral side of the mains connection. Pull out the blown fuse and place a fuse of the correct value in its place. Use time delay 5 x 20 mm fuses rated for 250 Volts with a current rating of 4 amps. For your convenience there are spare fuses located in the vinyl pouch in the front of this manual. Carefully reinsert the fuse holder into the power entry module.

5.1.2. DC Powered Frames

The fuse holder is located under the terminal strip. To change the fuses, remove power from the frame. Insert a flat blade screwdriver in the fuse holder and turn to clockwise. Pull out the fuse from the fuse holder using a small screwdriver. Remove the blown fuse and replace with a fuse of the correct value. Use time delay 5 x 20 mm fuses rated for 250 Volts with a current rating of 10 amps. For your convenience there are spare fuses located in the vinyl pouch in the front of this manual. Carefully reinsert the fuse into the fuse holder. Tighten by turning the fuse holder counter clockwise.

5.2. REPLACING THE POWER SUPPLY

Each power supply is a complete assembly and includes the power supply cooling fan and one frame cooling fan. In the event that the power supply or one of the fans malfunctions, you will need to replace the power supply assembly with a spare one while the failed assembly is being repaired.

> **Do not run the frame for extended periods of time with one of the power supplies removed. Proper cooling of the frame requires both power supplies to be inserted into the frame, or one power supply and a 7700PS-FM power supply blank panel.**

The 7700FR power supplies are hot swappable and can be easily replaced from the front without interrupting the signal integrity of the frame. Each power supply is capable of supplying full power to the frame by itself, however we recommend running with both supplies powered for power redundancy. On frames with only one power supply, a 7700PS-FM blank power supply module with cooling fan **must be** inserted into the second power supply space. The 7700PS-FM contains a module cooling fan and baffles to maintain proper airflow within the frame.

The power supply is secured into the frame by a machine screw through the rear panel (as shown in Figure 5-1). This screw must be removed before the power supply can be extracted from the front.

To reduce risk of electric shock you must replace the mounting screw after replacing the power supply.
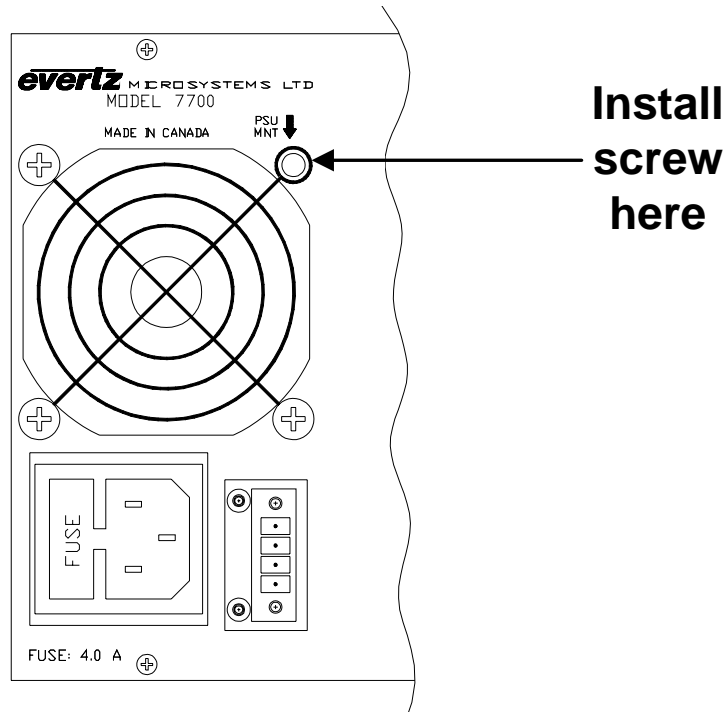
Figure 5-1: Locating the Power Supply Mounting Screw

To replace the power supply the following procedure should be used.

1. Turn off the power supply switch
2. From the rear of the frame locate the power supply mounting screw. This screw is the top right screw holding the fan guard in place, and is indicated by the legend

PSU
MNT ↓

3. Remove the power supply mounting screw.
4. Open the front door of the frame and pull the power supply out of the frame.
5. Reinsert the new power supply into the frame taking care that it is proper aligned with the card guides. Press firmly to make sure that the power supply is fully seated into the rear panel connector.
6. Reinstall the power supply mounting screw from the rear of the frame.
7. Turn on the power switch for the power supply. After a few seconds you should see the PSU STATUS LED come on indicating that the power supply is working correctly.