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REVISION	DESCRIPTION	DATE
1.0	First Release	July 03
2.0	Second Release	Aug 04
3.0	Third Release	Dec 04
4.0	Fourth Release – Updated LTA specs	Jan 05
5.0	Added updated safety and new assembly & labeling section	July 05
6.0	Added LTA optical squelch information	July 06

CAUTION

If LED7 is On or flashing there will be DC voltage for LNB power at the L-BAND IN connector. This can damage some test equipment. You can turn off the LNB power by switching DIP switch 3 to the Off position.

1. OVERVIEW

The 7705LT/LTA and 7705LR L-band Transmitter/Receiver modules are used for conveying L-Band satellite signals over fiber optic cable. The 7705LT/LTA accepts one L-Band RF coaxial input and provides a fiber optic output signal. An L-Band BNC RF output is also available for monitoring or further signal distribution. The 7705LR accepts a fiber optic input from the 7705LT/LTA and provides two L-Band RF output signals via BNC's.

The 7705LT/LTA and 7705LR modules each occupy one card slot and can be housed in either a 1RU frame, which will hold up to three modules, or a 3RU frame which will hold up to 15 modules.

Features:
- Broadband operation - 950 to 2150MHz
- Protocol transparent - handles all video, audio and data modulation formats
- Fully hot swappable from front of frame
- Available in SC/PC, SC/APC, ST/PC and FC/PC connector options
- Supports multi-mode and single-mode fiber optic cable

7705LTA Features
- Wide operating frequency range
- High dynamic range input (-20 to –65 dBm)
- Wide AGC hold range (50dB)
- Optical squelch function for hardware redundancy applications

7705LT Features
- Automatic gain control on RF input
- Additional L-Band BNC output
- Injects LNB power (+13 or +17 VDC selectable with built-in current limiting) into RF input cable

7705LR Features
- Supports manual and automatic gain control
- Two L-Band RF outputs for extra signal distribution or monitoring functions
- RF output independent of optical loss (within AGC range)

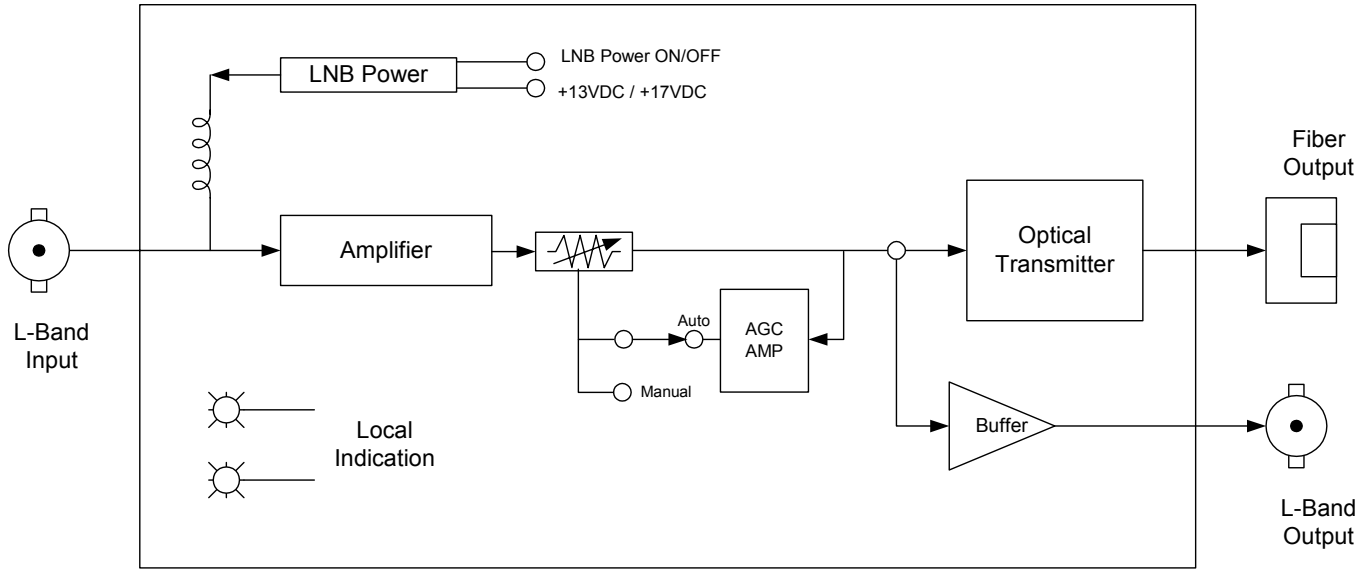

Figure 1: 7705LT/LTA Block Diagram

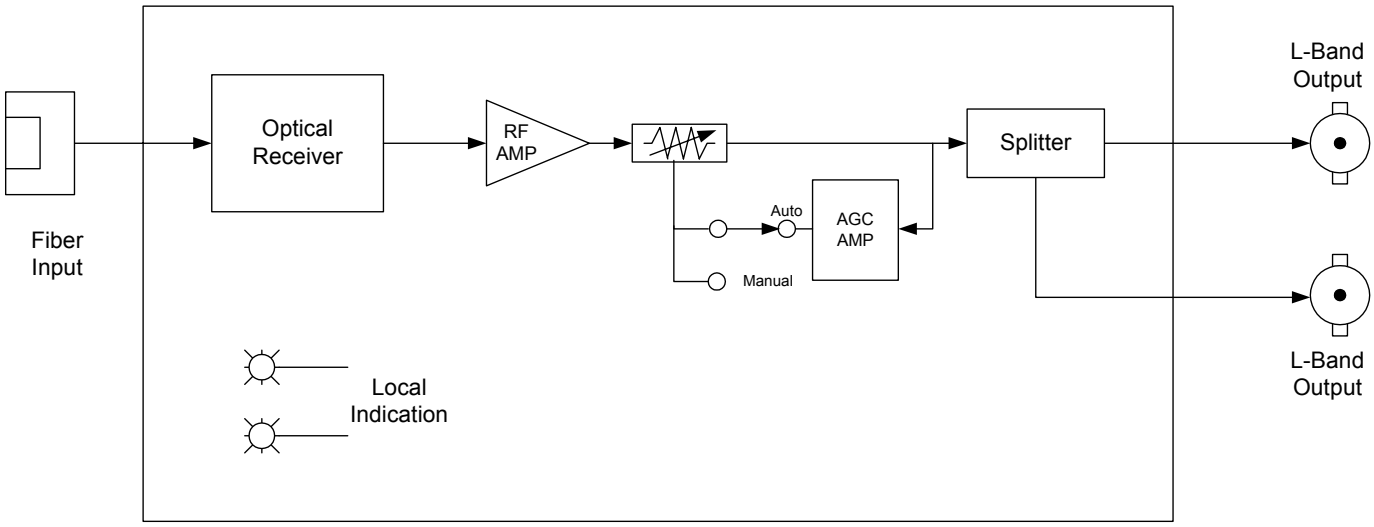

Figure 2: 7705LR Block Diagram

2. INSTALLATION

Each of the modules in the 7705L series comes standard with a companion +3RU rear plate. The rear plate must be specified during the time of order. SC/PC, SC/APC, ST/PC or FC/PC optical connectors are available for these modules and must be specified during the time of order. For information on mounting the rear plate and inserting the module into the frame, see the 7700FR manual for detailed instructions.

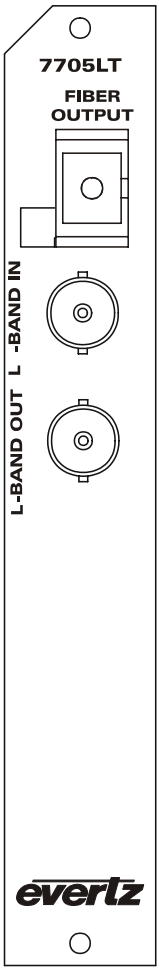

Figure 3: 7705LT/LTA Rear Panel

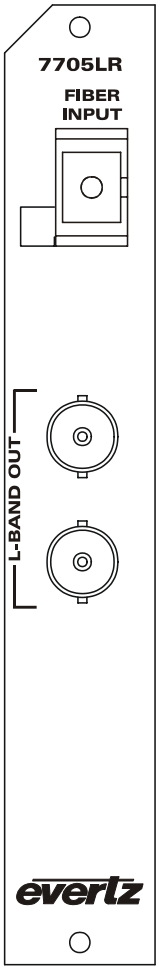

Figure 4: 7705LR Rear Panels

2.1. 7705LT/LTA CONNECTIONS

L-BAND IN Input BNC connector for L-band satellite signals. This connector can also carry LNB power back to the satellite receiver (See section 5.1.1)

If LED7 is On or flashing there will be DC voltage for LNB power at the L-BAND IN connector. This can damage some test equipment. You can turn off the LNB power by setting DIP switch 4 to the Off position.

L-BAND (MONITORING) OUT Monitoring output BNC is an L-Band RF output for monitoring of your L-band satellite signals.

FIBER OUTPUT SC/PC, SC/APC, ST/PC or FC/PC female connector with the optical output from the 7705LT/LTA as shown in section 3.1.3. This connector should be connected to the FIBER IN connector of a 7705LR module at the destination end with a suitable fiber optic cable. The 7705LT/LTA transmits on the wavelength marked on the rear panel.

2.2. 7705LR CONNECTIONS

FIBER INPUT SC/PC, SC/APC, ST/PC or FC/PC female connector with the optical input to the 7705LR as shown in section 3.2.2. This connector should be connected to the FIBER OUT connector of a 7705LT module at the origination end with a suitable fiber optic cable.

L-BAND OUT Two output BNC connectors for received L-band satellite signals. The top connector (closest to the fibre input) is the monitoring output and the bottom connector is the L band signal for further distribution in your system.

2.3. CARE AND HANDLING OF OPTICAL FIBER

2.3.1. Safety

CLASS 1 LASER PRODUCT

Background colour: yellow
Triangular band: black
Symbol: black

2.3.2. Assembly

Assembly or repair of the laser sub-module is done only at Evertz facility and performed only by Evertz technical personnel.

2.3.3. Labelling

Certification and Identification labels are combined into one label. As there is no enough room on the product to place the label it is reproduced here in the manuals.

- There is no date of manufacture on this label as it can be traced by bar code label placed on the PCB of each Evertz plug-in product
- Model number is 7705LTA13

Reproduction of 7705LTA Certification and Identification Label

2.3.4. Handling And Connecting Fibers

Never touch the end face of an optical fiber. Always keep dust caps on optical fiber connectors when not connected and always remember to properly clean the optical end facet of a connector before making a connection.

The transmission characteristics of the fiber are dependent on the shape of the optical core and therefore care must be taken to prevent fiber damage due to heavy objects or abrupt fiber bending. Evertz recommends that you maintain a minimum bending radius of 5 cm to avoid fiber-bending loss that will decrease the maximum attainable distance of the fiber cable. The Evertz fiber optic modules come with cable lockout devices, to prevent the user from damaging the fiber by installing a module into a slot in the frame that does not have a suitable I/O module.

3. 7705LT/LTA SPECIFICATIONS

3.1.1. RF INPUT:

Connector: 1 BNC
I/O Impedance: 75 Ω (50 Ω optional)
Return Loss: 10dB
Input Frequency Range LT: 950MHz – 2150MHz
Input Frequency Range LTA: 950MHz – 2250MHz
Input Power Range:
- **LT:** -20 to –50dBm
- **LTA:** -20 to –65dBm

AGC Hold Range:
- **LT:** -20 to –40dBm
- **LTA:** -25 to –55dBm

3.1.2. RF OUTPUT:

Number of outputs: 1
Connector: BNC

I/O Impedance: 75 Ω (50 Ω optional)
Return Loss: Better than 10dB
Output Frequency Range LT: 950MHz – 2150MHz
Output Frequency Range LTA: 950MHz – 2250MHz
Flatness LT: -3dB @ 950MHz – 1000MHz
±1.5dB @ 1000MHz – 2150MHz
±0.25dB @ and 36MHz BW
Flatness LTA: ±1.5dB @ 1000MHz – 2250MHz
±0.25dB @ and 36MHz BW

Output Signal Range
7705LT AGC Mode: -25dBm ± 2dB (with input from -40 to -20dBm)
7705LTA AGC Mode: -20dBm ± 2dB (with input from -55 to -25dBm)
7705LT Manual Mode: (Input Signal) –(5dB) + (15dB) ±1dB
7705LTA Manual Mode: (Input Signal) –(5dB) + (30dB) ±1dB

Manual Gain Settings
7705LT: 15dB
7705LTA: 30dB

Intermodulation Products
7705LT: -55dBc (LT: AGC mode, I/P –20dBm; LR: AGC mode –5dBm optical)
7705LTA: -55dBc (LT: AGC mode, I/P –25dBm; LR: AGC mode –5dBm optical)

Signal To Noise
7705LT: -60dBc (LT: AGC mode, I/P –20dBm; LR: AGC mode –5dBm optical)
7705LTA: -60dBc (LT: AGC mode, I/P –25dBm; LR: AGC mode –5dBm optical)

3.1.3. OPTICAL OUTPUT

Number of outputs: 1
Connector: Female SC/PC, SC/APC, ST/PC, FC/PC
Operating Wavelength: 1310nm
Optical Power:
1310nm FP(LT): -5 dBm ± 1dBm
1310nm FP(LTA): 0 dBm ± 1dBm
Fiber Size: 9 μm core / 125 μm overall

3.1.4. ELECTRICAL

Voltage: +12VDC
Power: 6 Watts (Non DWDM)
EMI/RFI: Complies with FCC regulations for class A devices
Complies with EU EMC directive.

3.1.5. PHYSICAL

7700 or 7701 frame mounting:
Number of slots: 1

3.2. 7705LR SPECIFICATIONS

3.2.1. RF OUTPUT:

Number of outputs: 2
Connector: BNC
I/O Impedance: 75 Ω (50 Ω optional)
Return Loss: 10dB
Output -20dBm (nominal AGC mode)

Intermodulation Products with Paired 7705LR:
7705LT13: -40dBc (LT:AGC mode, I/P –20dBm ; LR:AGC mode –5dBm optical)
7705LTA13: -50dBc (LT:AGC mode, I/P –20dBm ; LR:AGC mode 0dBm optical)

Signal To Noise with Paired 7705LR:
7705LT13: -55dBc (LT:AGC mode, I/P –20dBm ; LR:AGC mode –5dBm optical)
7705LTA13: -55dBc (LT:AGC mode, I/P –20dBm ; LR:AGC mode 0dBm optical)

Flatness: ± 1.5dB @950MHz-2150MHz

Carrier to Noise: 35dB @ 36MHz BW / 25km* (10dB optical Loss)(-5dBm optical Tx)
Carrier to Noise:
Standard: 35dB @ 36MHz BW / 25km* (10dB optical Loss)(-5dBm optical Tx)
-H Version: 35dB @ 36MHz BW / 40km* (16dB optical Loss)(-5dBm optical Tx)
*1310nm fiber attenuation 0.4dB/km

3.2.2. OPTICAL INPUT:

Number of inputs: 1
Connector: Female SC/PC, SC/APC, ST/PC, FC/PC
Operating Wavelength: 1270nm - 1610nm
Maximum Input Power: +2dBm
Optical Sensitivity: -14dBm @ 35dB S/N @ 36MHz BW

3.2.3. ELECTRICAL

Voltage: +12VDC
Power: 5 Watts
EMI/RFI: Complies with FCC regulations for class A devices
Complies with EU EMC directive.

3.2.4. PHYSICAL

7700 or 7701 frame mounting:
Number of slots: 1

4. STATUS INDICATORS AND DISPLAYS

4.1.1. 7705LT/LTA STATUS INDICATORS

The 7705LT/LTA module has 9 LED Status indicators on the front card edge to show operational status of the card at a glance.

Two large LEDs on the front of the board indicate the general health of the module

LOCAL FAULT: This Red LED indicates poor module health and will be illuminated if a board power fault exists (i.e.: a blown fuse) or if the laser is nearing the end of the life cycle. The LOCAL FAULT indication can also be reported to the frame through the FRAME STATUS jumper.

MODULE OK: This Green LED indicates good module health. It will be On when the board power is good.

There are 7 small LEDs that indicate the status of the incoming RF signal, laser status, LNB power, and AGC/manual operation.

RF HIGH: This red LED (LED1) will be On when the incoming RF signal is higher than the permitted Input signal range of –18dBm ± 3dBm (-28dBm± 3dBm 7705LTA) when in AGC mode and –25dBm ± 3dBm (-35dBm± 3dBm 7705LTA) when in Manual Mode.

RF OK: This green LED (LED2) will be On when the incoming RF signal is within the permitted Input signal range.

RF LOW: This yellow LED (LED3) will be On when the incoming RF signal is lower than the permitted Input signal range of –40dBm ± 3dBm (-50dBm± 3dBm 7705LTA) when in AGC mode and –40dBm ± 3dBm (-50dBm± 3dBm 7705LTA) when in Manual Mode.

LASER FAIL: This red LED (LED4) will be On when the laser is at the end of its life. This is a sign that the laser should be replaced immediately.

LASER OK: This green LED (LED5) will be On when the output laser is operating with its normal output power. This LED will also be flashing when the optical power is squelched (Dip 1 is ON and RF low LED is ON).

LNB POWER: The LED (LED6) will be On yellow when there is LNB power (+13 or +17 volts DC) being output on the RF input BNC. (DIP switch 3 is On) See section 5.1.1 for a description of how to set the LNB power.

The LED (LED6) will be yellow and flashing On and Off if LNB power is enabled and there is a short on the RF Cable connected to the RF Input BNC. Remove the short circuit from the cable and then reset the cable short via the card edge menu. The LED should stay On if the short was removed.

AGC ON: This Green Led (LED 7) is On when AGC Mode is enabled and Off when Manual mode is enabled.

To enable AGC mode, set DIP switch 4 to the OFF position.
To disable AGC and set to manual mode, set DIP switch 4 to the ON position (towards PCB).

If the LNB POWER LED (LED6) is On or flashing there will be DC voltage for LNB power at the L-BAND IN connector. This can damage some test equipment. You can turn off the LNB power by setting DIP switch 3 to the Off position.

If the LNB POWER LED (LED6) is flashing when the board is first plugged in, reset the cable short option via card edge menu to reset the LNB power circuitry. If the flashing continues, then the RF cable has a short.

4.1.2. 7705LR STATUS INDICATORS

The 7705LR modules have 9 LED Status indicators on the front card edge to show operational status of the card at a glance.

Two large LEDs on the front of the board indicate the general health of the module

LOCAL FAULT: This Red LED indicates poor module health and will be On during the absence of a valid optical input signal, or if a local input power fault exists (i.e.: a blown fuse). The LOCAL FAULT indication can also be reported to the frame through the FRAME STATUS jumper.

MODULE OK: This Green LED indicates good module health. It will be On when a valid optical input signal is present, and the board power is good.

There are 7 small LEDs that indicate the status of the output RF signal, and optical input signal.

RF HIGH: This red LED (LED1) will be On when the output RF signal is higher than the rated output signal range of –17dBm ± 3dB in AGC Mode and –14dBm ± 3dBm in Manual Mode.

RF OK: This green LED (LED2) will be On when the output RF signal is within the rated output signal range.

RF LOW: This yellow LED (LED3) will be On when the incoming RF signal is lower than the rated output signal range of –23dBm ± 3dB in AGC Mode and –30dBm ± 3dBm in Manual Mode.

OPTICAL INPUT HIGH: This red LED (LED4) will be On when the input optical power is above 0dBm.

OPTICAL INPUT OK: This green LED (LED 5) will be On when the input optical power is within the rated input range.

OPTICAL INPUT LOW: This yellow LED (LED6) will be On when the optical power is below –37dBm.

AGC ON: This Green Led (LED 7) is On when AGC Mode is enabled and Off when Manual mode is enabled.
To enable AGC mode, set DIP switch 4 to the OFF position.
To disable AGC and set to manual mode, set DIP switch 4 to the ON position (towards PCB).

5. DIP SWITCH CONTROLS

5.1. 7705LT/LTA DIP SWITCH CONTROLS

The 7705LT/LTA modules are equipped with a 4 position DIP switch at the front card edge. All positions are assigned sequentially such that switch 1 is located at the top of the DIP switch (farthest from the card ejector). Table 1 gives an overview of the front DIP switch functions and section 5.1.1 describes the front DIP switch function in more detail. The On (closed) position is down, or closest to the printed circuit board. The Off (open) position is up, or farthest from the printed circuit board.

DIP Switch	Function
1	Optical Squelch Enable (7705LTA)
2	LNB Voltage
3	LNB Power Enable
4	Manual Gain

Table 1: Front DIP Switch Functions

5.1.1. Enabling the Optical Squelch Function

In applications where redundant 7705LTA – 7705LR links are employed with a 7702BPX-LB RF bypass protection switch, the optical squelch function can be used to disable the laser below the RF low threshold indicated by the RF low LED (LED3). This will prevent false RF readings on the BPX switch.

To enable the optical squelch (mute) function, set DIP switch 1 to the ON position. If the RF level drops below –50 +/-3dBm and optical squelch is enabled, the laser will be disabled. The Laser OK LED (LED5) will flash to indicate that the laser has been disabled. If the RF level rises above the lower threshold (RF OK LED (LED2) is ON), the laser will be enabled.

5.1.2. 7705LT/LTA Configuring the LNB Power

The 7705LT/LTA has the ability to inject 13 or 17 volts DC into the cable connected to the RF input BNC to power the antenna LNB device. DIP switches 2 and 3 at the front of the card control the LNB Power injector circuitry. The LNB POWER LED (LED6) indicates whether there is LNB power being delivered to the receiver on the RF Input. See section 4.1.1.

DIP 2	DIP 3	DESCRIPTION
---	Off (default)	LNB power Off
Off	On	+ 13 VDC LNB power On
On	On	+ 17 VDC LNB power On

Table 2: 7705LT/LTA LNB Power Switch Settings

If the LNB POWER LED (LED6) is On or flashing there will be DC voltage for LNB power at the L-BAND IN connector. This can damage some test equipment. You can turn off the LNB power by setting DIP switch 3 to the Off position.

5.1.3. 7705LT/LTA Configuring AGC or Manual mode

The 7705LT/LTA input RF stage has an automatic gain control (AGC) that adjusts to varying input RF levels. To set the unit in AGC (Automatic Gain Control) mode, set Dip 4 to the Off (open) position. To set the unit in Manual mode, set Dip 4 to the On (closed) position. Once the card has been set to Manual mode there is 15dB of gain applied applied to the input signal for the 7705LT and 30dB of gain for the 7705LTA.

5.2. 7705LR DIP SWITCH CONTROLS

The 7705LR modules are equipped with a 4 position DIP switch at the front card edge. All positions are assigned sequentially such that switch 1 is located at the top of the DIP switch (farthest from the card ejector). The On (closed) position is down, or closest to the printed circuit board. The Off (open) position is up, or farthest from the printed circuit board.

DIP Switch	Function
1	
2	
3	
4	Manual Gain

Table 3: Front DIP Switch Functions

5.2.1. 7705LR Configuring AGC or Manual mode

The DIP switches control the gain of the RF output section of the 7705LR and can be used to adjust for losses in varying lengths of fiber optic cable in the system.

The 7705LR output RF stage has an automatic gain control (AGC) that adjusts to varying input optical levels. To set the unit in AGC (Automatic Gain Control) mode, set Dip 4 to the Off (open) position. To set the unit in Manual mode, set Dip 4 to the On (closed) position. Once the card has been set to Manual mode 12dB of RF gain is applied to the input signal.

NOTE: In order to conduct a frequency response sweep, the 7705L cards must be set and configured to Manual Mode and not AGC mode

Output RF power measurements are made with 1 m of fiber optic cable between the transmitting module and the receiving module.

NOTE: In order to conduct a frequency response sweep, the 7705L cards must be set and configured to Manual Mode and not AGC mode

6. JUMPERS POSITIONS

6.1. 7705LT/LTA JUMPERS

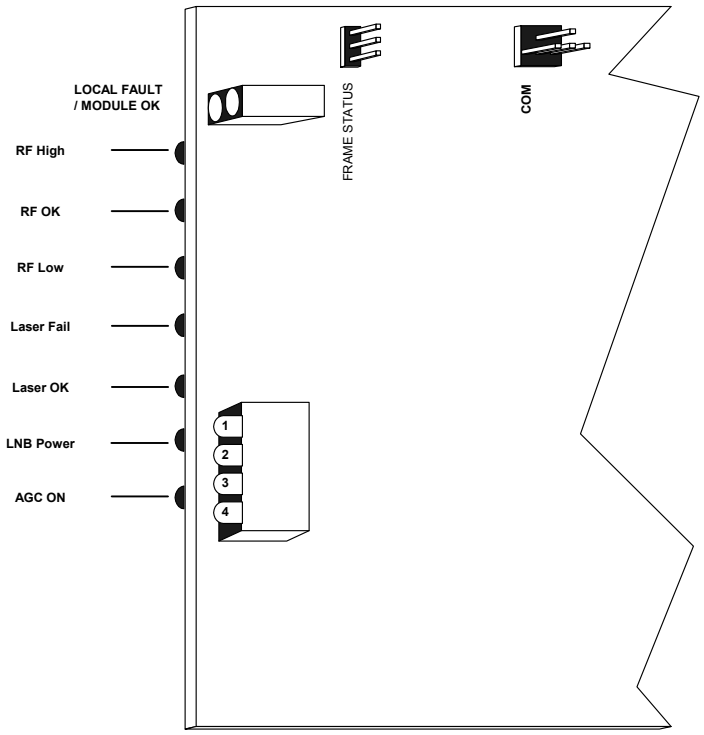

Figure 5: Location of 7705LT/LTA Jumpers and LEDs

6.2. 7705LR JUMPERS

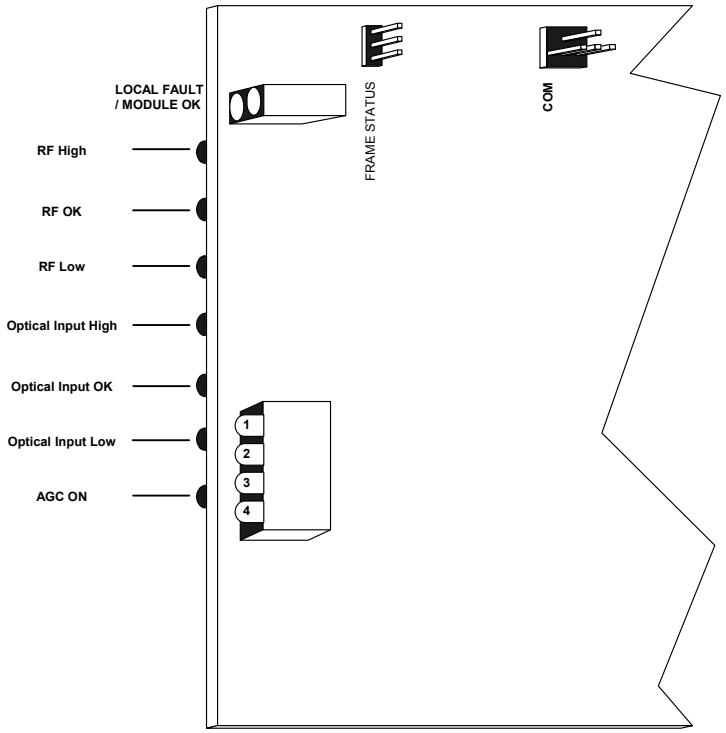

Figure 6: Location of 7705LR Jumpers and LEDs

6.3. SELECTING WHETHER LOCAL FAULTS WILL BE MONITORED BY THE GLOBAL FRAME STATUS

The FRAME STATUS jumper J3 determines whether local faults (as shown by the Local Fault indicator) will be connected to the 7700FR frame's global status bus.

FRAME STATUS To monitor faults on this module with the frame status indicators (on the Power Supply FRAME STATUS LED's and on the Frame's Fault Tally output) install this jumper in the On position. (Default)

When this jumper is installed in the Off position local faults on this module will not be monitored.