SA6940-RT SERIES

RETURN TRANSMITTER

INSTRUCTION MANUAL

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SAFETY WARNINGS

LASER RADIATION

The **SA6940-RT** laser transmitter emits invisible laser radiation that can cause permanent eye damage. ***AVOID DIRECT EXPOSURE TO BEAM***. Operate the transmitter only with the proper optical fiber installed in the transmitter optical connector. The power to the SA6940-RT should be turned off whenever the optical connector is opened or exposed (as when the fiber connection is being installed or removed from the transmitter connector).

NEVER **USE ANY OPTICAL INSTRUMENT TO VIEW THE OUTPUT OF THE LASER TRANSMITTER. "OPTICAL INSTRUMENT" INCLUDES MAGNIFYING GLASSES, ETC.**

NEVER **LOOK INTO THE OUTPUT OF THE LASER TRANSMITTER**

NEVER **LOOK INTO THE OUTPUT OF A FIBER CONNECTED TO A LASER TRANSMITTER.**

NEVER **LOOK INTO OR USE ANY OPTICAL INSTRUMENT TO VIEW THE DISTANT END OF A FIBER THAT MAY BE CONNECTED DIRECTLY OR VIA AN OPTICAL SPLIT, TO A TRANSMITTER THAT MAY BE OPERATING. THIS SPECIFICALLY APPLIES TO FIBERS THAT ARE TO BE CONNECTED TO RECEIVERS OR OTHER DEVICES AT ANY DISTANCE FROM THE LASER TRANSMITTER.**

SHOCK HAZARD

Care should be used when installing the SA6940-RT to prevent shock and injury as there are voltages within the Node which exceed 48 Volts.

INTRODUCTION

The Olson Technology Inc. SA6940-RT is a high quality, cost effective, Dual Return Transmitter module designed around the latest optical transmitter technology. It is designed to operate and meet full specifications with an optical output level of 1 to 3mW. The transmitter RF path includes a plug-in OMI pad which is preset at the factory for +7dBmV per carrier for 36MHz loading.

The SA6940-RT receives preconditioned $24V_{DC}$ from the Node and plugs directly into the preexisting locations within the Node. The primary RF connection is made through the built in connector on the bottom of the transmitter or the top of the transmitter by changing a strap inside the transmitter for the 4x4 configuration. For models equipped with a secondary laser, an SMB connector is located on the top of the transmitter. The transmitter can be ordered with an optical connection that will match the factory setup. Heat transfer for the SA6940-RT is provided via the bottom surface of the module to the Node housing for full outdoor temperature operation.

INSTALLATION / ENVIRONMENTAL CONSIDERATIONS

The SA6940-RT operates with an exterior temperature on the Node of -40 to + 60°C. However, like any other electronic device, it will probably have a longer life span if it is not operated at the upper limit of it's temperature range continuously. Installation of the SA6940-RT should be done such that water, dirt and other contaminates do not enter either the Node or the module. Do not install equipment in locations that are accessible by either children or other unqualified personnel. This unit is meant to be field-installed into the Scientific Atlanta 6940 Optical Node by qualified field service technicians.

To install the SA6940-RT, loosen the eight closure bolts on the Scientific Atlanta 6940 Node casting enough free them from the other half of the housing. Open the housing and locate the plug in module section of the Node. Place the SA6940-RT module into one of the two transmitter locations making sure the SA6940-RT module is in line with the mating connector in the Node.

NOTE: If replacing an existing transmitter, remove it and place the SA6940-RT in place of it (See Figure 1, next page).

Push the SA6940-RT into position firmly, seating the connector. Tighten the two captive screws firmly. Connect the incoming fiber to the transmitter, then dress the fiber as to keep it clear of anything that may pinch or damage it.

NOTE: Be sure the fiber termination of the incoming fiber matches that of the transmitter, an easy way to tell is by the color of the termination.

If the transmitter is equipped with a 2nd laser to be used in a redundancy configuration, then the supplied splitter board must be installed.

OPTICAL CONNECTORS AND CLEANING

The standard optical connector provided with the SA6940-RT is an SC/APC with an 8° angle. No tools are required for connection to/from this type of optical connector.

The fiber ends can be damaged by the insertion of contaminated connectors into a bulkhead or receptacle, or by the insertion of a clean connector into a dirty bulkhead. Fiber connectors should never be left uncovered. Optical connectors should be cleaned before usage. Prepackaged alcohol wipes are the most convenient way to insure clean optical connectors. Fresh, clean alcohol and lint free wipes or swabs may also be used.

EXTERNAL TEST POINTS

The SA6940-RT has one external test point for optical power output calibrated at 1V/mW. It should be monitored with a high impedance voltmeter. This test point is for long term monitoring purposes. The optical output power should be measured using an optical power meter at the time of installation.

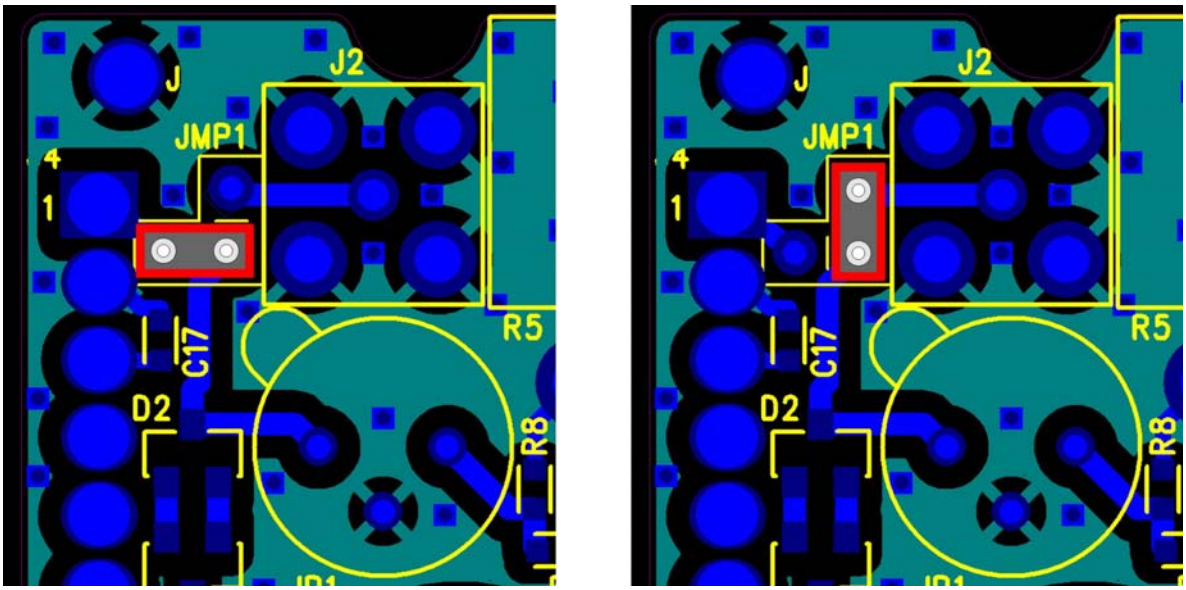
Figure 1 - Dual Olson SA6940 Transmitters in S.A. Node.

ALIGNMENT PROCEDURE

The SA6940-RT optical transmitter's OMI has been optimized with an RF input level of +7.0dBmV per carrier (Six analog carriers) maximum loading at the transmitters input. The Scientific Atlanta 6940 node has 8dB of loss between the ports and the optical transmitter input when equipped with a 0dB reverse pad.

EXAMPLE: A reverse level of +18.0dBmV per carrier at the nodes ports will require a reverse pad of 3dB to get a +7.0dBmV level at the transmitter.

+18.0dBmV node input minus the **3dB** pad equals **+15dBmV**
+15dBmV minus **8dB** node loss equals **+7dBmV** input level at the transmitter



Strap Location for RF Input from Bottom of Tx

Strap Location for RF Input at Top of Tx

Figure 2 - RF Input Strap Locations

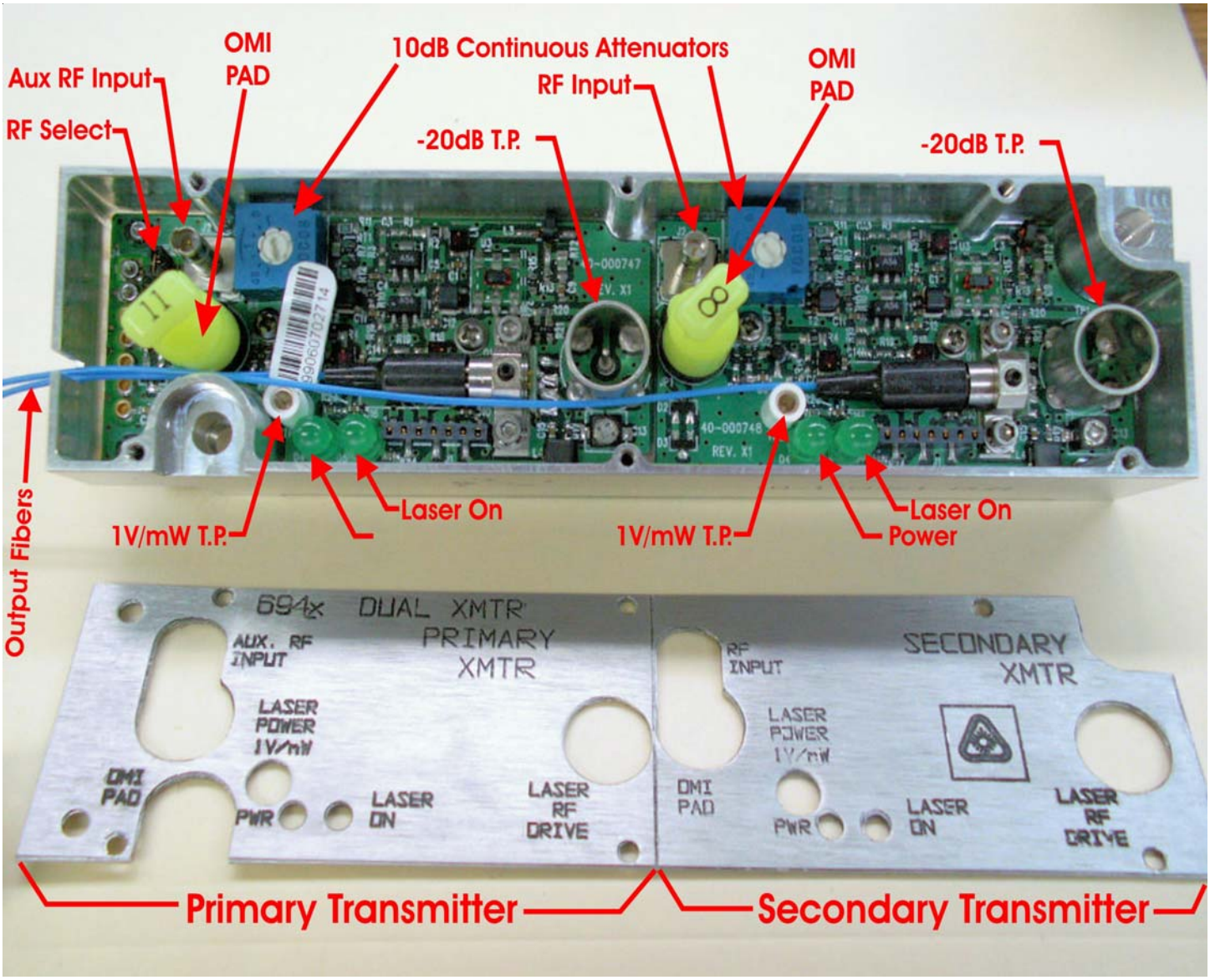


Figure 3 - Inputs, Outputs, Controls & Indicators on the SA6940-RT

CHANNEL LOADING

Olson SA6940-RT DFB/CWDM R-TX's have a minimum of 7dB additional gain available for CNR improvement in lower channel or bandwidth loading scenarios. For example, if only two channels (or 12MHz loading) are used, the Input Loading Curve (see Figure 4) allows for an additional 5dB of RF input level without inducing laser clipping to improve the CNR level accordingly.

The optimum RF drive level for the SA6940-RT is 7.0dBmV per channel with a standard loading of six analog video channels (or 36MHz loading). The chart below shows the change in RF input level according to the amount and type of channel loading. The chart shows on the right what the RF drive level should be to the transmitter. If loading with data channels only (QPSK, QAM) refer to the amount of total bandwidth the data channels are consuming. 7.0dBmV per analog video channel is equivalent to -53dBmV/Hz with +15dBmV per carrier at node input. With a standard 4/1 combiner installed in the node, there is 8dBmV of loss through the node (not counting the PAD loss for each port) before the return test point at J6. To achieve +7dBmV at the transmitter with a zero PAD in each port, an input level of +15dBmV will be required. A typical NPR curve is shown in Figure 5 on the next page.

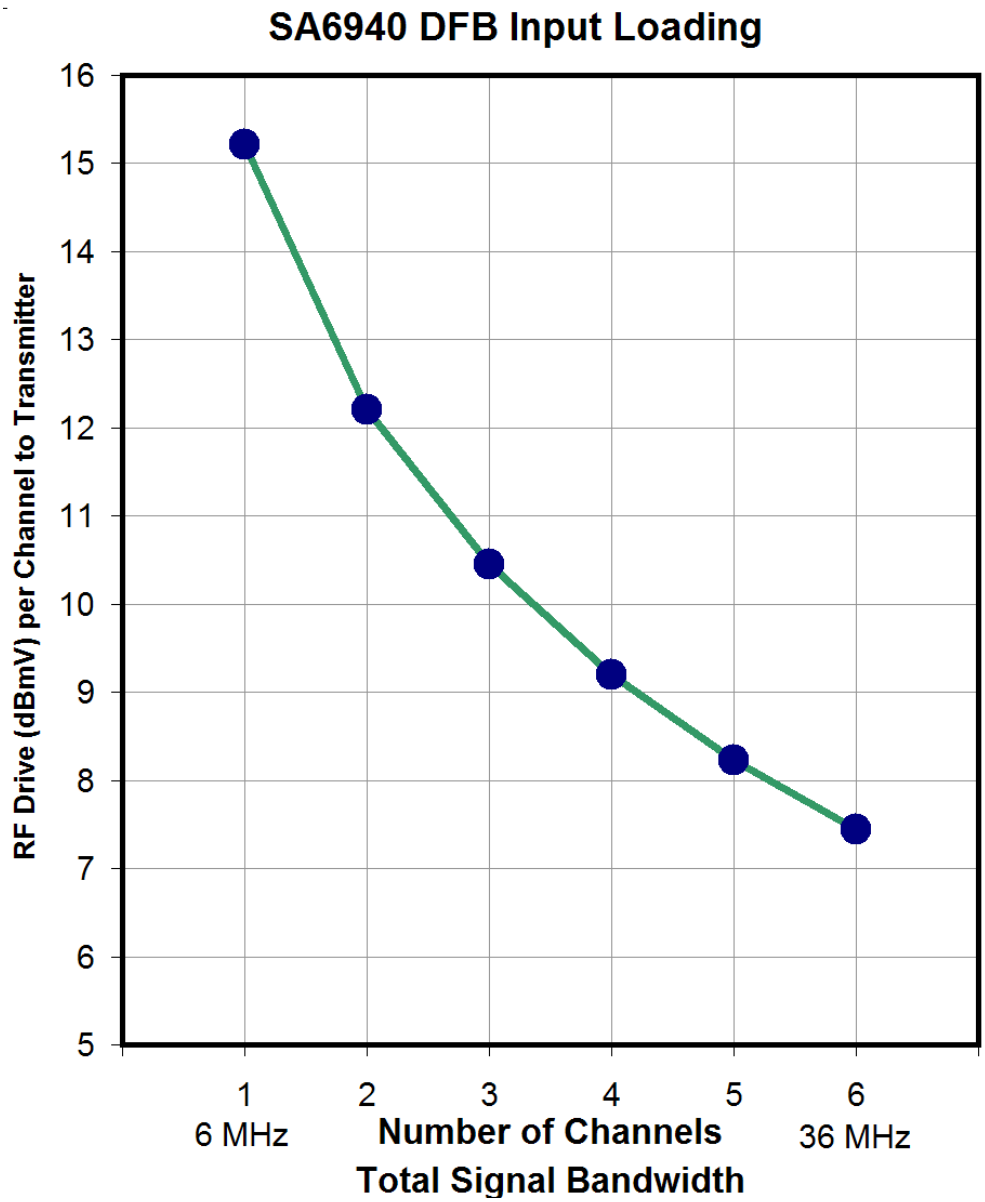


Figure 4 - SA6940 DFB Input Loading

Noise Power Ratio Test

2/18/07 3:27:30 PM — Model: SA6940-RT
Technician: Brent Martin — Unit S/N:
Station: MASTER — Assy ID#:
Software: OTNPRauto 0.98c 4/11/02 — Laser S/N:
Minimum NPR: 41.0 dB — Peak NPR: 53.2dB@-49.8dBmV/Hz
Minimum Range: 15.0 dB — Thresholds: -62.3dBmV/Hz, -45.5dBmV/Hz

Note: TESTED WITH 29KM OF FIBER AND AN OTOR-300 OPTICAL RECEIVER
Hold A: 18.02dB, -60.73dBmV/Hz, -42.70dBmV/Hz, 54.97dB @ -46.04dBmV/Hz

Measured Window: 16.8 dB

PASSED

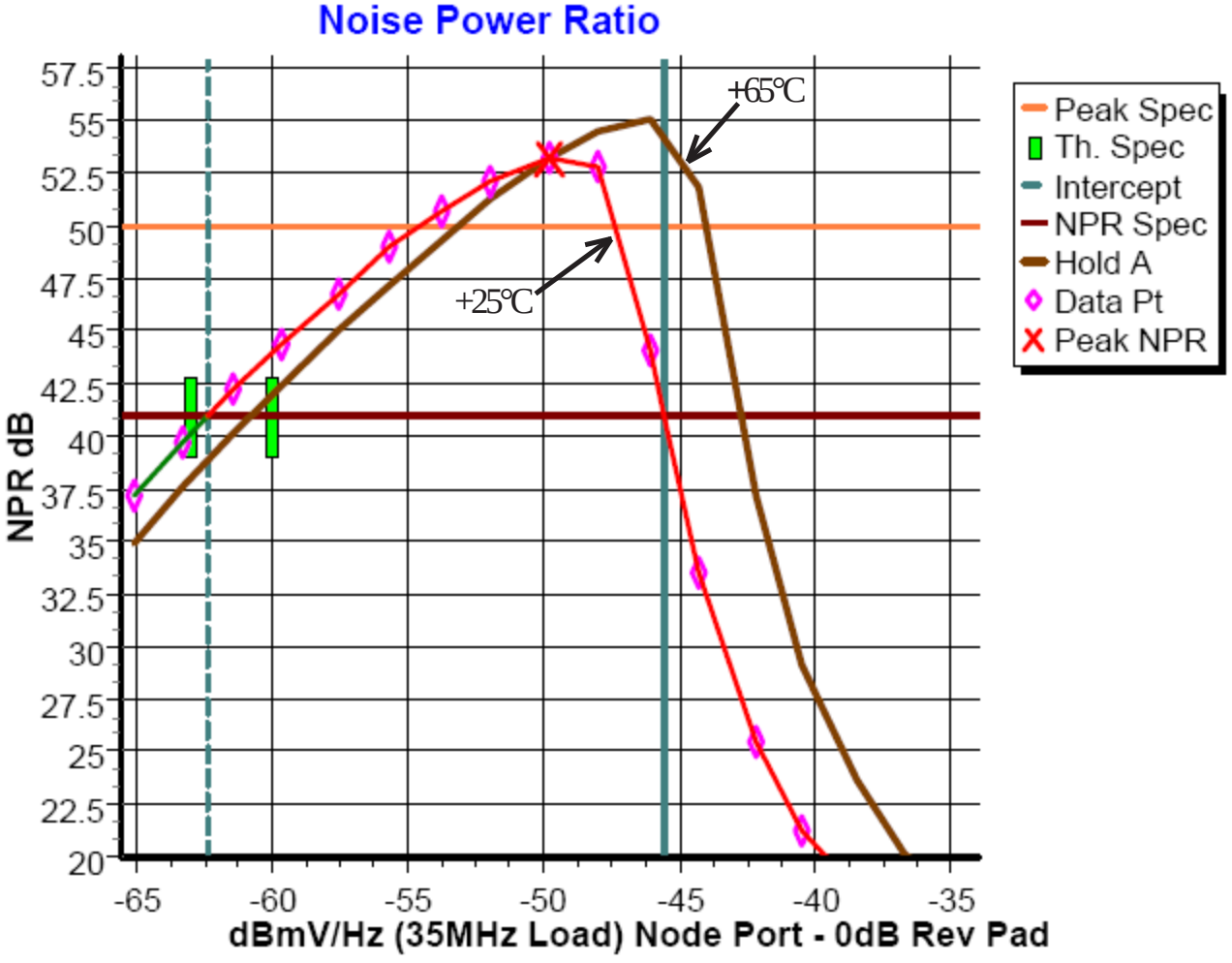


Figure 5 - SA6940 Typical NPR Curve