Appendix A

Channel to Control Bit Mapping

Switch Data Register 0	Channel Descriptor	Connector Channel	Connector Channel
00_{16}- $7f_{16}$	04	COM 0	No Connection
80_{16}	00	COM 0	00
81_{16}	01	COM 0	01
82_{16}	02	COM 0	02
83_{16}	03	COM 0	03

Switch Data Register 1	Channel Descriptor	Connector Channel	Connector Channel
00_{16}-$7f_{16}$	14	COM 1	No Connection
80_{16}	10	COM 1	10
81_{16}	11	COM 1	11
82_{16}	12	COM 1	12
83_{16}	13	COM 1	13

Appendix B

1260-84 Address Map

Address Offset	Data								Register Description
$00f_{16}$	ERR 1	BUSY 1	ERR 0	BUSY 0	X	X	STRB 1	STRB 0	Switch Strb/Status

Address Offset	Data								Register Description
003_{16}	D7	D6	D5	D4	D3	D2	D1	D0	Switch Data 1
001_{16}	D7	D6	D5	D4	D3	D2	D1	D0	Switch Data 0

Note: the Actual Address is:

A24 Base Address + (400_{16} X Module Address) + Address Offset

---

Maintenance of Fiberoptic Cables and Connectors

Handling Fiberoptic Cables

Optical cables should be handled with care to avoid cable damage and minimize the optical loss. The minimum bend radius for most optical cables is 35 mm (1.4 inches). Never bend an optical cable more sharply than this specification. Optical performance will degrade and the cable may break.

- Avoid bending any optical cable near a cable strain relief boot. Bending an optical cable near a strain relief boot is one of the easiest ways to permanently damage the optical fiber.

- Avoid bending any optical cable over a sharp edge.

- Avoid using cable tie wraps to hold optical cable. Tie wraps when tightened can create micro-bends or break an optical cable. Microbends can cause a dramatic reduction in optical performance.

- Do not pull on the bare fiber as this can break the fiber inside the optical switches.

- Avoid using soldering irons near any optical cable. Accidental damage can easily occur when an optical cable is used near a soldering iron. In addition, solder splatter can contaminate and permanently damage optical fiber connectors.

- In order to obtain the most stable, repeatable optical performance, immobilize optical cables using wide pieces of tape or some form of mechanical cushion after the optical cables have been connected.

Storing Optical Connectors

The 1260-84 is shipped with dust caps in place covering all Front Panel optical connector adapters. These optical connector adapters should remain covered at all times when the instrument is not in use.

Cleaning Optical Connectors

Clean any mating connector to the 1260-84 using a cleaning kit supplied by the connector manufacturer or high-grade isopropyl alcohol and a cotton swab. To clean with alcohol and a swab, soak the tip of a cotton swab in alcohol and then shake off any excess alcohol. The tip should be moist, not dripping wet. Stroke the swab tip gently across the surface of the connector and around the connector ferrule. Either allow the connector a minute to dry, or blow dry the connector using compressed air. Be careful when using compressed air because improper use may deposit a spray residue.

If the 1260-84 optical performance appears degraded, the optical ports may be dirty. The provided adapter cleaner tip (Racal P/N 921601 or equivalent) can accomplish cleaning of the optical ports. If an adapter cleaner tip not available, cleaning the optical port requires the following steps:

1. Remove power from the 1260-84 and remove it from the chassis.

2. Use a Phillips screw driver to remove the screws that secure the 1260-84 top cover.

3. Unscrew the front panel locknut on the adapter and remove the adapter and connector.

4. Carefully unscrew the switch connector from the bulkhead adapter. Be careful not to bind the fiber. Refer to the figure below.
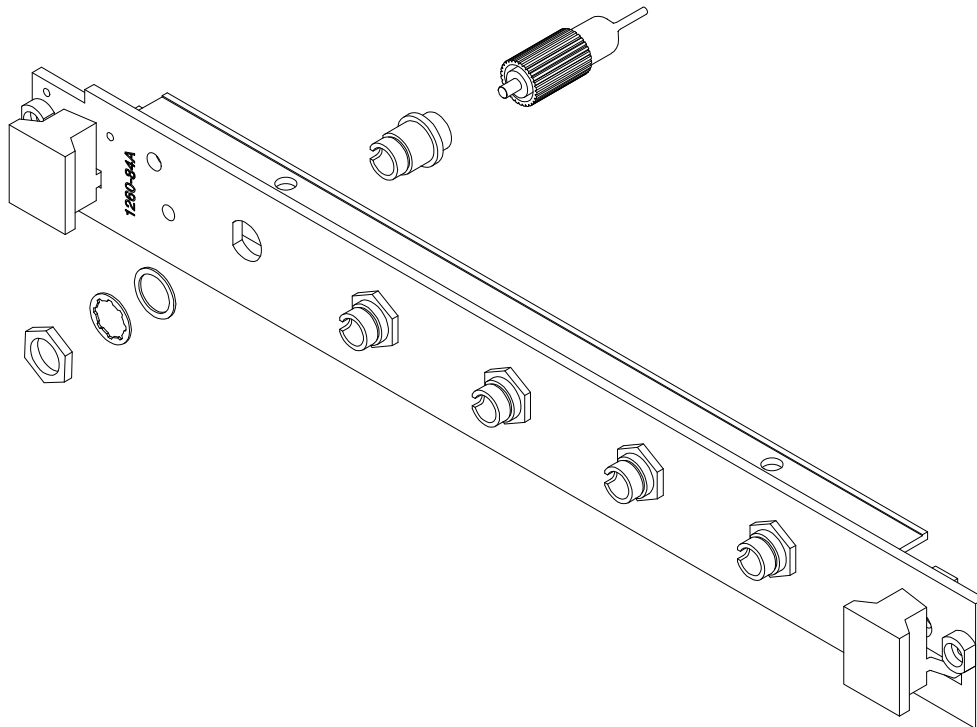

Figure C-1, Cleaning the Optical Connectors

5. Clean the ferrule tip of the connector using the steps described above.

6. Apply a small drop of medium strength loctite (242) to the adapter threads.

7. After cleaning reinstall the connector to the bulkhead adapter finger tight only. DO NOT overtighten.

NOTE: To minimize the amount of cleaning keep the provided dust caps on any adapters that are not being used.

Mating Optical Connectors

- Clean both connectors prior to mating. Any small particles trapped during the mating process can permanently damage the connector.

- If possible, measure optical power throughput while mating connectors.

- Align the connector key with the adapter and insert the connector ferrule into the front panel adapter smoothly. Do not allow the fiber tip to contact any surface. If the tip accidentally contacts a surface before mating, *stop.* Re-clean the connector and try again.

- Tighten the connector until it is finger tight, or to the torque specified by the connector manufacturer. Do not over-tighten the connector as this can lead to optical loss and connector damage.

- Check the optical insertion loss. If the loss is unacceptable, Remove the connector, re-clean both ends of the mate, and reconnect. You may have to repeat this process several times before a low-loss connection is made.

- After you make the connection, monitor the stability of the optical throughput for a few minutes. Optical power trending (slowly increasing or decreasing) is caused by the slow evaporation of alcohol trapped in the connection. Continue to monitor optical power until it stabilizes. If the loss is unacceptable, re-clean the connectors and start again.

Appendix D

PERFORMANCE VERIFICATION

Equipment List

Racal 1261B Mainframe or any VXI C-size or D-size mainframe with a minimum cooling capacity of 1.0 liters/sec (at 0.12 mm H_2O; see the Installation Instructions, Chapter 2 in this manual. Set the 1260-84 module address to 1, see the 1260-84 side panel label for details.

A VXI slot-0 controller and/or Resource Manager

A software utility to send and receive VXI, message-based commands and queries to a VXI device.

Averaging Optical Power Meter with the following requirements:

$\pm$0.01dB resolution

$\pm$0.005dB stability

80dB sensitivity

Relative dB level to arbitrary reference capability

Sensitive (>80dB range) at 1300 nm or 1550 nm

A Stable Optical Source with the following requirements:

Greater than 0.01dB stability over 1 minute

Output greater than 1 mW of optical power into the fiber type of the 1260-84

Wavelength of 1300 $\pm$120 nm or 1550 $\pm$120 nm for testing

Two fiber optic jumper cables, 9 μm core, single mode.

Power Up

1. Insert the 1260-84 into a powered-down VXI Mainframe (see the option 01T Users Manual)

    Make certain that the 1260-84 is securely inserted into the mainframe.

2. Turn the VXI mainframe power on.

    A few seconds are required after mainframe power-up before the slot-0 resource manager deasserts system reset and the 1260-84 Fail LED (Red) lights momentarily, then turns off.

3. Execute the resource manager software to configure the VXI system. The optical switch status LED's (Green) will turn off.

Front Panel LEDs

NOTE:

Whenever the optical switches in the 1260-84 are accessed over the VXI Bus the green STATUS LED on the front panel should light briefly. The length of time the LED is lighted is relatively short (tenths of seconds), depending on the speed of the switch, but it is usually observable by the user.

1. Check that the STATUS LED's (green) light momentarily when closing a path on the optical switch.

Switch Isolation

1. Send the command **CLOSE(@1(08,18))**; this causes the optical switches to go to the reset or off state.
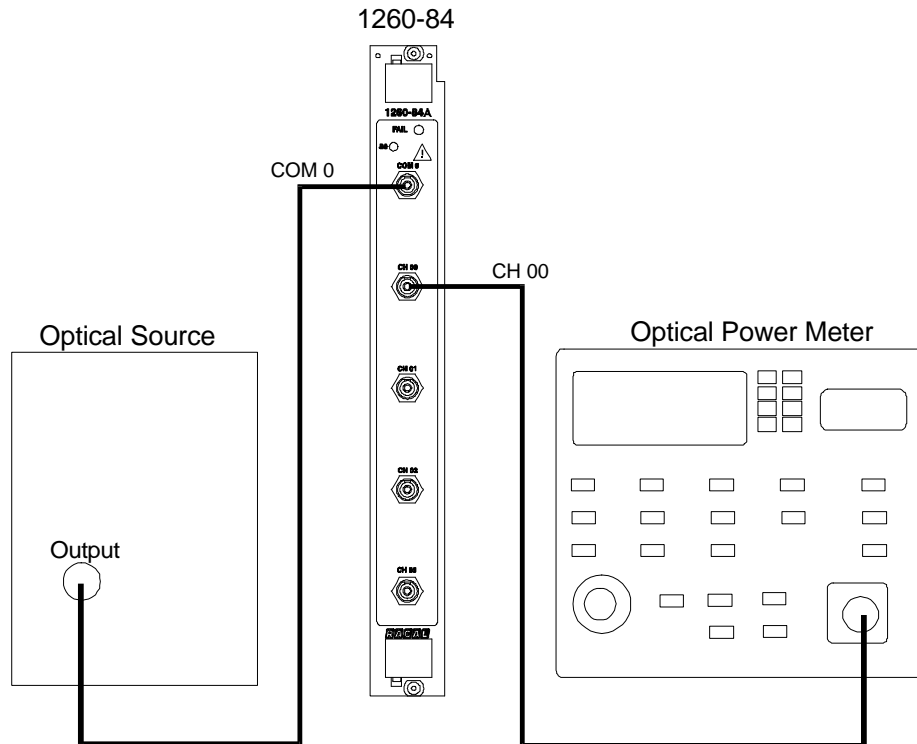
1260-84

Figure D-1, Setup for Switch Disable Procedure

2. If you have not already done so, connect an optical source to the COM 0 input of the 1260-84 using a single mode optical fiber jumper cable.

   The source should be relatively stable (>0.1 dB stability over 1 minute) and should emit at least 1 mW of optical power into the fiber jumper used for input to the 1260-84. The source must emit light at a wavelength within the specification of the 1260-84 (1290 nm to 1570 nm).

   An average optical power meter is required. The meter should be able to accept the fiber of the jumpers being used.

3. Before continuing, cap the input to the Optical Power Meter and properly zero the meter.

4. Send the command **CLOSE (@1(00))**. This closes the optical path to channel 0.

5. Connect a fiber of equal or greater core diameter than

1260-84 to the channel 00 of the 1260-84.

6. Connect the other end of the fiber jumper to the input of the Optical Power Meter.

7. Record the power reading from the Optical Power Meter as **P_0**.

8. If a relative dB mode is available on the Power Meter, set the dB reference level of the Power Meter to the measured **P_0** value.

9. Send the command **CLOSE (@1, (08))** to open the optical path for maximum isolation.

10. Record the new reading of the Optical Power Meter as P_f; if the dB relative mode is available, then record the new reading's value relative to the $P_0=0$ dB reference. If P_f is ≤ 0.00, substitute 1×10^{-14} W for P_f. If the Relative dB mode is not available, the relative dB is calculated as

$$Relative\ Attenuation\ (dB) = 10 \times \log \frac{P_f}{P_0}$$

The Relative Attenuation should be > 80 dB lower; that is, the power meter in relative mode should read less than –80 dB (eg. –89dB).

NOTE:

Most Optical Power Meters cannot accurately measure at low power levels; consequently, the meter may simply display the lowest value it possibly can when the path is open.

---

11. Repeat steps 5 through 10 for the remaining channels.

12. Repeat steps 2 through 11 to verify a second switch if applicable.

Insertion Loss

1. Send the command **CLOSE (@1(08))**; this causes the 1260-84 to go to the reset or off state.

2. Properly zero the Average Optical Power Meter to be used.

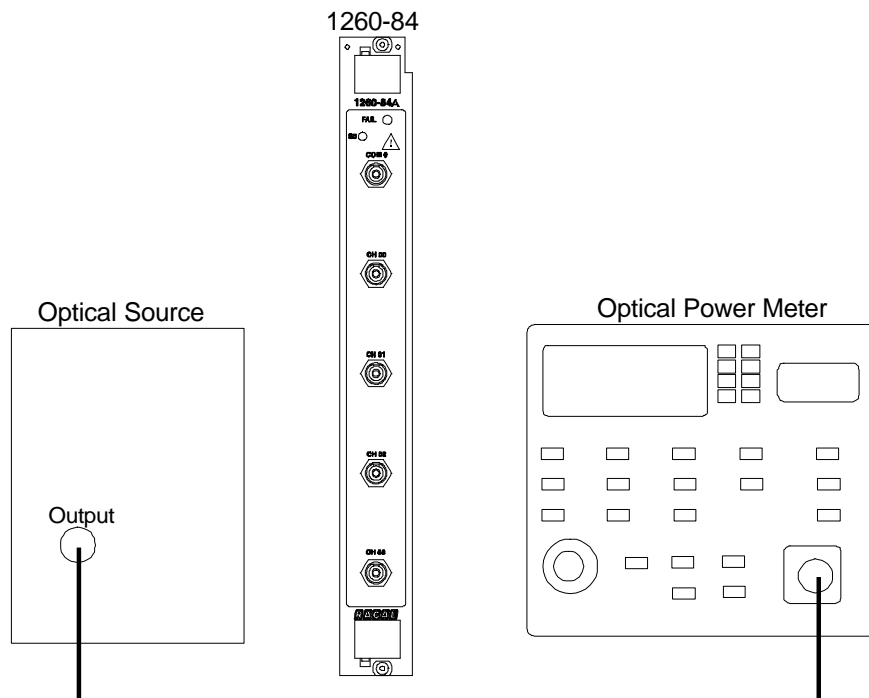3. Send the command **CLOSE(@1(00))**; this closes the optical path for channel 00.

Figure D-2, First setup for Insertion Loss Procedure

4. If you have not already done so, connect an optical source to the input of the Average Optical Power Meter using a single mode optical fiber jumper cable.

   The source should be relatively stable (>0.1 dB stability over 1 minute) and should emit at least 1 μW of optical power into the fiber jumper used. The source must emit light at a wavelength within the specification of the 1260-84 (1290 nm to 1570 nm).

5. Record the power reading from the Optical Power Meter as P_1.

   If a relative –dB mode is available on the Power Meter, set the dB reference level of the Power Meter

to the measured P_1 value.

1260-84

Figure showing setup with Optical Source, 1260-84 module (COM 0, CH 00, CH 01, CH 02, CH 03), and Optical Power Meter.
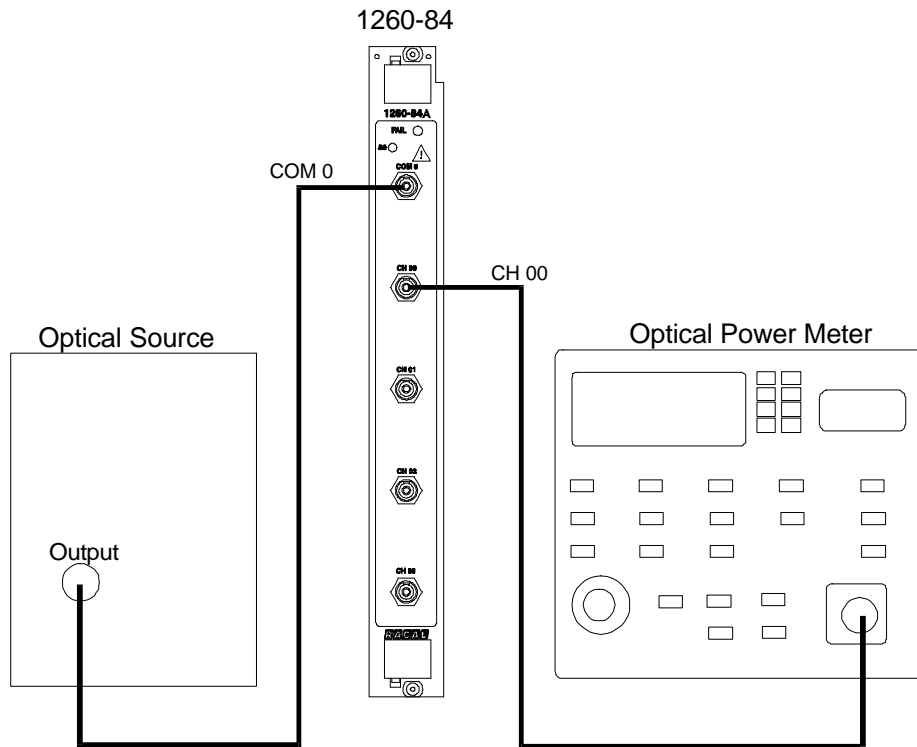
Figure D-3, Second setup for Insertion Procedure

6. If you have not already done so, attach the optical source to the COM 0 of the 1260-84 using the fiber jumper.

7. Attach the CH00 output of the 1260-84 to the Optical Power Meter using a fiber of greater than or equal core diameter compared to the 1260-84.

8. Record the new reading of the Optical Power Meter as P_2, if the dB relative mode is available, then record the new reading's value relative to the $P_1=0$ dB reference. If the Relative dB mode is not available, the relative dB Insertion Loss is calculated as:

$$Insertion\ Loss\ (dB) = -10 \times \log \frac{P_2}{P_1}$$

    The Insertion Loss should be less than 2.0dB (that is, less than 2.0dB Insertion Loss).

9. Repeat steps 3 through 8 for the remaining optical channels.

Repeatability

This test requires an Optical Source and an Average Optical Power Meter: In order to verify the repeatability of the 1260-84, the Optical Source and Power Meter must both be very stable (>0.01 dB); the repeatability of the measurement devices must be greater than the value being measured. It is necessary that the optical fibers used to carry the signal from the source, to the 1260-84, and then to the Power Meter are not disturbed or moved during this test.
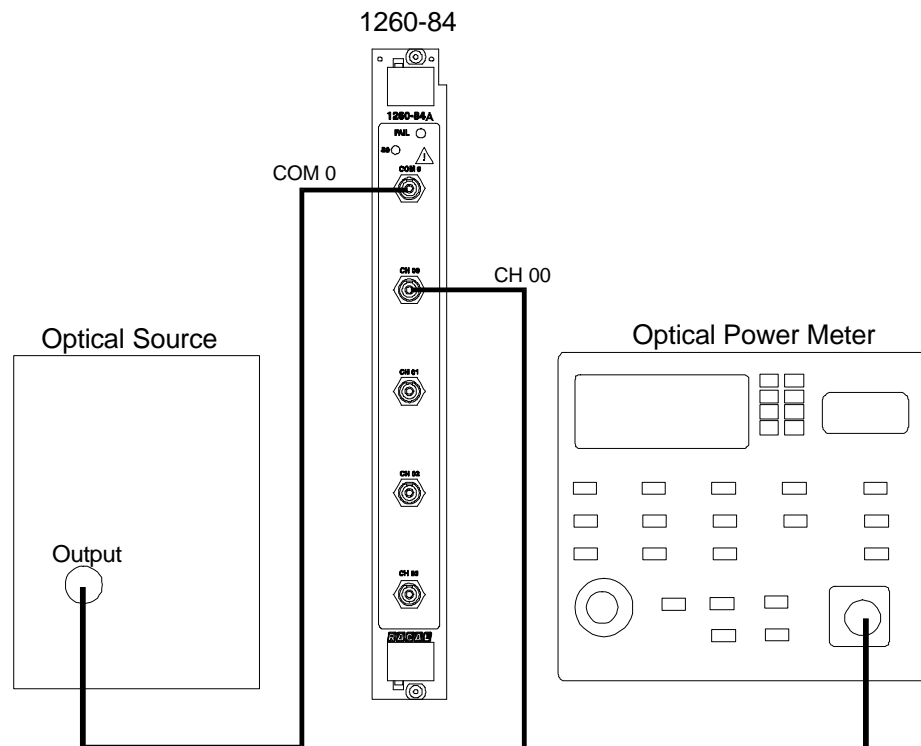

Figure D-4, Setup for Repeatability and Accuracy Procedure

1. Attach the stable source to the COM 0 of the 1260-84 and attach the CH 00 output of the 1260-84 to the Optical Power Meter using the appropriate fiber optic jumper cables. Be sure that the Power Meter wavelength setting matches the source wavelength.

2. Close Channel 00 by sending the command **CLOSE(@1(00))**.

3. Record the dB power level of the Power Meter for channel 00.

4. Close any other random channel (example: send the command **CLOSE(@1(01))**.

5. Close Channel 00 again by sending the command **CLOSE(@1(00))**.

6. Record the dB power level of the meter.

7. Repeat the procedure (steps4-6) for a new set of measurements, for as many times as required. Two repetitions are usually adequate.

8. Verify that the individual channel 00 readings do not vary by $\pm.03$ dB.

9. Repeat the procedure, steps 1 through 8 for the remaining channels.

    This verification assumes that the source has not drifted.