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ASA 312® NETWORK INFORMATION COMPUTER™

CALIBRATION MANUAL

April 2002

Document No. RF 002331D

Digital Lightwave®

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- Customer Name and Shipping Address
- Customer Contact Name and Telephone Number
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- Customer Supplied Purchase Order Number (if applicable)

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Securely seal the shipping container, and mark **FRAGILE** on the container to ensure careful handling.

Include the **RMA number** on the outside of the shipping container.

If the original shipping container is not available, (a) an ASA 312 shipping container (Part Number **ASA-BOX**) can be purchased from Digital Lightwave, or **(b)** pack the unit (and letter that describes the reason for the return) into the canvas carry bag, and use the following general instructions to repack the unit using commercially available materials:

- Use a strong shipping container, similar to the original ASA 312 shipping box. Verify that the substitute container is rated at **350 lbs. per square inch** pressure durable.
- Make sure that the unit is satisfactorily protected by using a layer of ESD Protected short absorbing foam material. The foam padding must be 3- to 4-inches in thickness (70- to 100-mm) and applied to all six sides of the unit to provide adequate protection. Make sure that the canvas bag and unit cannot move or shift within the container.
- Securely seal the shipping container, and mark **FRAGILE** on the container to ensure careful handling.
- Include the **RMA number** on the outside of the shipping container.

Contact Technical Support for the Repair Department's Return Shipping Address.

When service is complete, your unit will be returned to you postage paid if the shipment is within the United States. You are responsible for paying all shipping charges, duties, taxes, and other charges for products returned to Digital Lightwave, Inc. from any location within or outside of the United States.

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GENERAL SAFETY GUIDELINES

The following safety precautions are provided to avoid injury and prevent damage to this product or any products connected to it during normal operation. Only qualified maintenance personnel should perform service procedures.

Use Proper Power Cord

To avoid fire hazard, use only the power cord specified for this instrument.

Avoid Electric Overload

This unit is designed to be powered from 90–132 and 180–260 VAC, 47-63 Hz, 60 watts. To avoid electric shock, fire hazard, or damage to the instrument, do not apply a higher voltage.

Ground the Instrument

The ASA 312 is grounded through the grounding conductor of the power cord. To avoid electric shock, the grounding conductor must be connected to earth ground. Before making connections to the input or output terminals of the instrument, ensure that the product is properly grounded.

Do Not Operate in Hazardous Conditions

To avoid injury or fire hazard, do not operate this instrument in wet, damp, or other hazardous condition. Do not operate this instrument in an explosive atmosphere.

Eye Protection

Users should never stare into unterminated connectors or broken fibers. In addition, fiber cables and interfaces should always be handled as if they were emitting laser light. Always leave protective covers on optical connectors to prevent damage and prevent laser emissions.

CAUTION

Use of controls or adjustments or procedures other than those specified herein may result in hazardous radiation exposure. ◄

Replacing the Battery

The ASA 312 uses a lithium battery located in the service access area not accessible to customers. To avoid damaging the unit, do not under any circumstances attempt to replace the lithium battery. Return the unit to Digital Lightwave, Inc. for battery replacement.

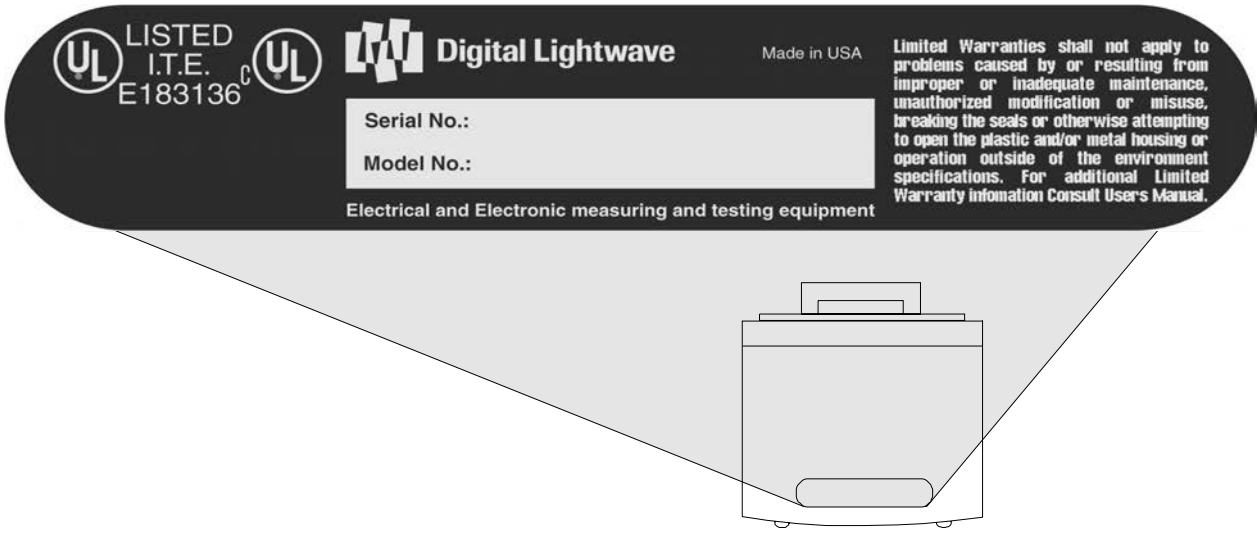
WARNING

Danger of explosion exists if the battery is replaced incorrectly. Do not, under any circumstances, attempt to replace the lithium battery. ◄

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Serial No. / Model No. Label

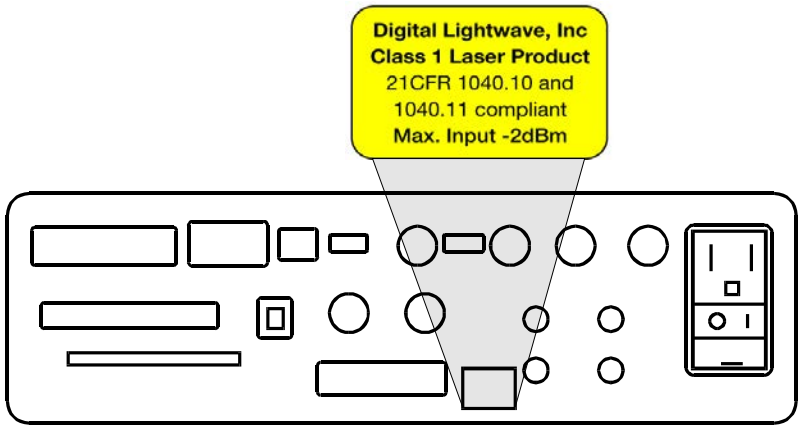
The following label is located on the rear of the ASA 312.



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Class 1 Laser Label

The following label is located on the ASA 312's Connector Panel.



ASA 312 Lasers

Laser	Wavelength	Class	Typical Normal Operation Output Power*
OC-1/12	1310 nm	Class 1	30 µW
OC-1/12	1550 nm	Class 1	29 µW
OC-48	1310 nm	Class 1	25 µW
OC-48	1550 nm	Class 1	22 µW

*** Laser output power measurements are measured during normal operation at 20 cm from meter probe to laser objective lens.**

The CDRH report accession number for the ASA 312 is 9612361.

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Preface

About This Guide

This guide describes how to calibrate the ASA 312 Network Information Computer. Use this guide to obtain a basic understanding of the ASA 312's calibration procedures.

This guide is intended for personnel responsible for maintaining and calibrating the ASA 312. It is assumed that you have a basic understanding of the following:

- ASA 312 Network Information Computer
- Oscilloscopes

NOTE ➤
For ASA 312 configuration and operation information, see the *ASA 312 Network Information Computer User's Guide*, Document No. RF 002470 or the *ASA 312 Network Information Computer and Remote Access Manager User's Guide*, CO 003202. ➤

Organization of This Guide

This guide is organized as follows:

Chapter	Description
Chapter 1	*ASA 312 Calibration Overview.* This chapter provides a brief description of the calibration process.
Chapter 2	*DS1 and Frequency Calibration*. This chapter describes the equipment and procedures required to perform DS1 calibration.
Chapter 3	*DS3 Calibration*. This chapter describes the equipment and procedures required to perform DS3 calibration.
Chapter 4	*STSX-1 Calibration.* This chapter describes the equipment and procedures required to perform STSX-1 calibration.
Chapter 5	*Optical Power Calibration*. This chapter describes how to perform single laser and dual laser optical calibration for OC-1, OC-3, OC-12, and OC-48 configurations.
Chapter 6	*Saving Calibration Values and Passwords.* This chapter describes how to save new calibration values, and how to save and change new calibration passwords.

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Chapter	Description
Appendix A	*ASA 312 Connector Panel*. This appendix illustrates the ASA 312 connector panel.

Document Conventions

Throughout this guide, the following typographical conventions are used:

- This *typeface* indicates a filename or pathname. It is also used to reference a chapter or section within this guide, or another document. For example:

  Save the new calibration values following the procedures in the *Saving New Calibration Values* section.

- This **typeface** is used to emphasize text. For example:

  If you have a **single laser** ASA 312, this concludes the Optical Calibration for an ASA 312 with OC-1, OC-3, or OC-12 optical interfaces.

- This typeface indicates a command name, menu selection, button, or icon. For example:

  Press the Optical Power Range command and select 1.

Related Document

Related document:

- *ASA 312 Network Information Computer and Remote Access Manager User's Guide*, CO 003202.

Also review Software Release Update Notes for new features that may not yet be described in the User's Guide.

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1 ASA 312 Calibration Overview

Introduction

The ASA 312 Network Information Computer is a portable test set capable of operating at rates from DS0 through OC-48. Periodic calibration of the ASA 312 is required to maintain its accuracy and precision. This document describes the equipment and procedures necessary to calibrate the ASA 312's voltage, power, and frequency measurements.

Although the ASA 312 may be calibrated at any time, it is recommend that calibration procedures be performed only during routine scheduled maintenance. (Digital Lightwave recommends a calibration interval of two years.) This avoids any accidental changes to the unit's default and calibration settings.

The ASA 312's Touch Screen user interface provides convenient access to calibration commands. After calibration is complete, a system password is required to save the new calibration parameters. This feature prevents unauthorized or unintentional calibration changes to the unit's default and operational settings. Changes to the ASA 312's calibration settings will only be saved with user verification and authorization.

This document assumes that you are familiar with the ASA 312's operations and capabilities. For information regarding the unit's operations, functions and testing capabilities, refer to the user's guide that is supplied with your unit.

Due to the technical aspects of calibrating the ASA 312, it is recommended that you read through this manual prior to calibrating the unit. If you need assistance calibrating your instrument, or have questions concerning the operations or service of the ASA 312, please contact your Digital Lightwave Sales or Technical Support representative.

Technical support is available by call 1-877-929-HELP (4357) or 1-800-548-9283.

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Calibration Overview

The ASA 312 uses a soft calibration method to maintain the accuracy of several measurement factors.

To perform calibration of the unit, you will attach several different scopes, generators, meters, and cables to the ASA 312 to measure, and if necessary adjust, electrical and optical measurement parameters of the ASA 312.

A typical calibration scenario involves:

- Attaching the proper ASA 312 output and input to external measuring devices
- Entering the correct parameters into the measuring devices
- Configuring the ASA 312 for the appropriate measurement
- Recording the proper measurement
- Entering the adjusted measurement into the ASA 312
- Saving the new measurement

The remainder of this document describes the equipment required to complete a proper calibration of the ASA 312 and the procedures for setting up, recording, and saving measurements to the ASA 312.

A complete calibration of the ASA 312 involves measuring the following factors:

- Frequency calibration
- DS1 calibration
- DS3 calibration
- STSX-1 calibration
- Optical power calibration

Required Equipment

The following equipment is required to perform a complete calibration of the ASA 312:

NOTE ➤
For ASA 312 operation, refer to the *ASA 312 Network Information Computer User's Guide* or the *ASA 312 Network Information Computer and Remote Access Manager User's Guide*.

For setup and operation procedures for the remaining equipment, refer to the user documentation for each device. ➤

- An ASA 312 Network Information Computer
- A BNC T-connector
- Two 2-ft., 75 ohm coaxial cables with male BNC connectors
- Two 3-ft. single-mode, fiber optic cables

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- A 3-ft., 100 ohm BNC-to-Bantam cable
  This is a custom cable that can be ordered directly from Digital Lightwave (Part Number 002727). It is used for Frequency Adjustment calibration.
- A 3-ft., 75 ohm BNC-to-Bantam cable with 1.0 µF capacitor
  This is a custom cable that can be ordered directly from Digital Lightwave (Part Number 001901). It is used for DS1 calibration.
- An 8-digit or greater frequency counter with a frequency rating of 225 MHz or greater
  (Digital Lightwave uses an HP53131A Universal Counter.)
- A function generator
  (Digital Lightwave uses a Tektronics CFG253 3-MHz Function Generator or equivalent device.)
- A digital oscilloscope
  (Digital Lightwave uses a Tektronics TDS380 Digitizing Oscilloscope or equivalent device.)
- A 75 ohm attenuator
  (Digital Lightwave uses a JFW Industries Model 75DR-003 or equivalent device.)
- A variable optical attenuator
  (Digital Lightwave uses a Laser Precision DB2910 or equivalent device.)
- An optical power meter
  (Digital Lightwave uses a Laser Precision LP-5000 or equivalent device.)
- A fiber optics cleaning kit

Measurements

The ASA 312 uses a soft-calibration method to adjust parameters for the following measurements:

- Frequency calibration
- DS1 calibration
- DS3 calibration
- STSX-1 calibration
- Optical power calibration

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Calibration Commands

The ASA 312 is unique in that you can calibrate the unit in the field or on-site. The calibration commands are accessible from any of the four protocol processors.

To display calibration commands on the ASA 312 Touch Screen user interface:

– Press the Settings Function Group button.

– Press CAL.

The calibration commands appear as shown in the following figure.

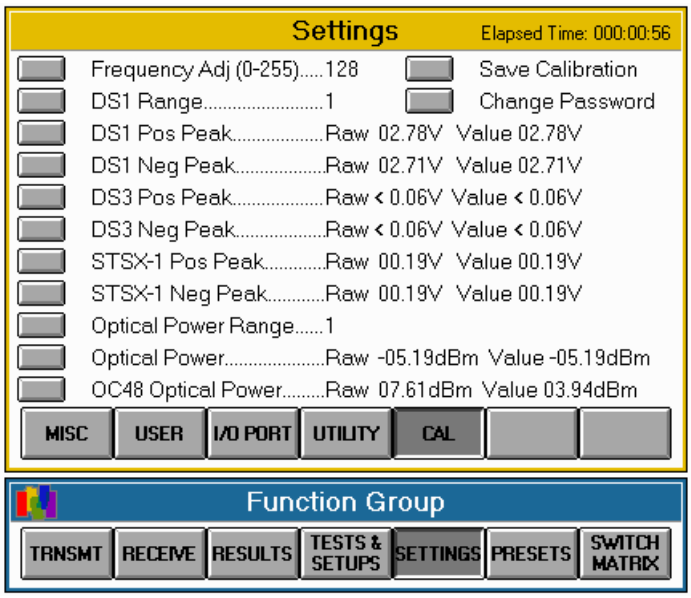


Figure 1-1. Calibration Commands

The following describes the commands associated with the CAL button.

Frequency Adj (0-255) Set the internal time base of the ASA 312. Frequency Adjustment values range from 0 to 255 and are entered using a Touch Screen keypad. Refer to Chapter 2 for information about Frequency Adjustment.

DS1 Range Sets the gain, or scale, applied to the DS1 Signal. There are eight calibration values available. Refer to Chapter 2 for information about DS1 calibration.

DS1 Pos Peak Enters the positive peak range for the DS1 signal as recorded by an attached oscilloscope. Use the Touch Screen keypad to enter this value.

DS1 Neg Peak Enters the negative peak range for the DS1 signal as recorded by the attached measuring device. Use the Touch Screen keypad to enter this value.

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DS3 Pos Peak Enters the positive peak range for the DS3 signal as recorded by the attached measuring device. Use the Touch Screen keypad to enter this value. Refer to Chapter 3 for information about DS3 calibration.

DS3 Neg Peak Enters the negative peak range for the DS3 signal as recorded by the attached measuring device. Use the Touch Screen keypad to enter this value.

STSX-1 Pos Peak Enters the positive peak range for the electrical signal as recorded by the attached measuring device. Use the Touch Screen keypad to enter this value. Refer to Chapter 4 for information about STSX-1 calibration.

STSX-1 Neg Peak Enters the positive peak range for the electrical signal as recorded by the attached measuring device. Use the Touch Screen keypad to enter this value.

Optical Power Range Sets the optical power range. There are four calibration ranges available for this command. Refer to Chapter 5 for information about Optical Power calibration.

Optical Power Enters the optical power as measured by an optical power meter. Use the Touch Screen keypad to enter this value.

OC48 Optical Power Sets the optical power measurements for the OC-48 hardware. This command is available only if the OC-48 option is installed. Refer to Chapter 5 for information about OC-48 Optical Power calibration.

Save Calibration Saves any calibration value changes. You must enter a calibration password for the ASA 312 to accept the new values. Use the Touch Screen keypad to enter the password. Refer to Chapter 6 for information about saving new calibration values.

Change Password Creates and saves a new calibration password. Use the Touch Screen keypad to enter a new password. Refer to Chapter 6 for information about changing calibration passwords.

Before You Calibrate the ASA 312

Read the procedures presented in Chapters 2 through 6 before attempting to calibrate the ASA 312.

When calibrating the ASA 312, you can:

- Complete a calibration procedure and then immediately save the new settings for that specific calibration, or
- Complete all calibration procedures and then save all of the new calibration settings at once.

The ASA 312 stores new calibration values only when the new data is intentionally saved using the Save Calibration command.

If an error is made during calibration and the user wants to go back to the system default calibration settings, simply turn the ASA 312 OFF, then ON again, prior to using the Save Calibration command.

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2 DS1 and Frequency Adjustment Calibration

Overview

This chapter describes the various procedures used to calibrate and save Frequency Adjustment and DS1 parameters of the ASA 312. Each section of this chapter lists the equipment required and the necessary equipment settings to perform each calibration procedure.

Frequency Adjustment

This procedure calibrates the ASA 312's internal clock using the Frequency Adj (0-255) Calibration command. This is a single adjustment that applies to all four protocol processor test sets.

The ASA 312 uses a digital potentiometer that allows adjustment of the frequency in 255 steps, where 0 is the lowest frequency, 128 is the center frequency, and 255 is the highest frequency.

Review the procedures in this section before attempting to adjust the ASA 312's frequency.

Required Equipment

The following equipment is required to perform this procedure:

- ASA 312
- Frequency counter
- A BNC-to-Bantam, 100 ohm test cord
  This is a 3-ft 100 ohm coaxial BNC-to-Bantam cable that is available from Digital Lightwave, Inc. (Part Number 002727). Some of these cables have a red boot near the BNC connector.

Hardware Setup

The following section describes how to attach cables between the ASA 312 and the frequency counter (refer to Figure 2-1).

To attach cables between the ASA 312 and the frequency counter:

1. Make sure that both the ASA 312 and frequency counter are turned on.
2. Attach the cable's BNC connector to the BNC connector on the frequency counter.
3. Attach the cable's Bantam connector to the ASA 312's DS1 TX Bantam jack.

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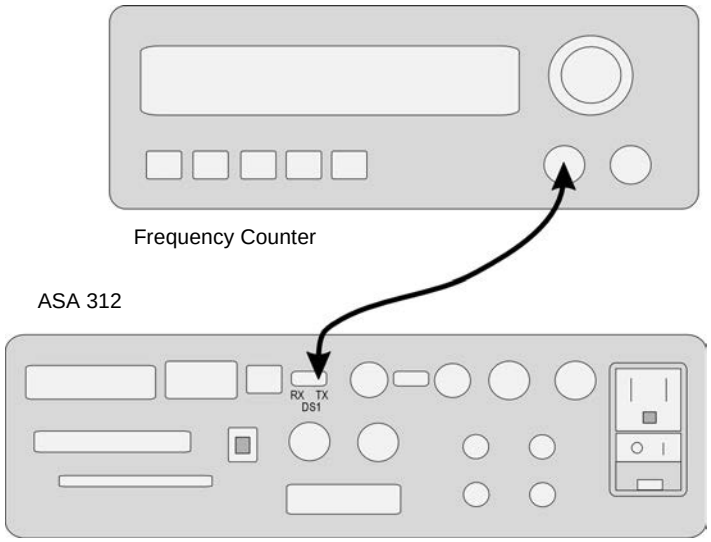


Figure 2-1. ASA 312 (Bantam) to Frequency Generator (BNC) Connection

ASA 312 Settings

To set up the ASA 312 for Frequency Adjustment:

1. Using the ASA 312 Touch Screen, select the DS1 Protocol Processor.
2. Press the Trnsmt Function Group button.
3. Press the Settings button.
4. Press the Clock Reference command and select Internal.
5. Press the Framing command and select Unframed.
6. Press the Pattern command and select All Ones.

   The ASA 312 is ready for Frequency Adjustment calibration. Continue to the next section for adjustment procedures.

Adjusting the Frequency

The following procedures require user input to both the frequency counter and the ASA 312.

1. Observe the signal frequency that appears on the frequency counter display. The desired frequency is 772 KHz ± 1 ppm.

   If the frequency is within the range of 772 KHz ± 1 ppm, then there is no need to adjust the frequency. If the frequency is not within this range, proceed to Step 2.

2. From the ASA 312 Touch Screen:
   - Press the Settings Function Group button.
   - Press CAL
3. Press the Frequency Adj (0-255) command.
   A touch screen keypad appears. The median setting is 128. The value that appears for your unit may vary.

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– If the frequency reading is **above** 772 KHz, use the keypad to enter a value that is less than the value that appears, and then press Enter to lower the frequency.

  For example, if the Frequency Adj command is 128, enter a value between 0 to 127.

– If the frequency reading is **below** 772 KHz, use the keypad to enter a value that is greater than the value that appears, and then press Enter to raise the frequency.

  For example, if the Frequency Adj command is 128, enter a value between 129 and 255.

You may need to wait several seconds before the ASA 312 accepts the change, and the new frequency value appears on the frequency counter display.

4. Observe the signal frequency on the frequency counter. If necessary, repeat Step 3 until the signal frequency is within the range of 772 KHz ± 1 ppm.
5. After adjusting the frequency, you can save the new frequency value using the procedures described in Chapter 6, *Saving Calibration Values and Passwords*, or you can proceed to the next calibration section.

DS1 Positive and Negative Peak Settings

The DS1 Range setting represents the gain or scale applied to the DS1 signal. There are eight calibration values related to the DS1 measurement. During this procedure, you will measure and enter the positive and negative peak values for the first range, and then repeat this procedure for the remaining six ranges.

Review these procedures before attempting to calibrate DS1 parameters.

Required Equipment

The following equipment is required to perform this procedure:

- ASA 312
- Function generator
- Digital oscilloscope
- BNC T-connector
- A 2-ft, 75-ohm coaxial cable with male BNC connectors
- A BNC-to-Bantam, 75 ohm test cord
  This is a 3-ft 75 ohm coaxial BNC-to-Bantam cable (AC coupled) that is available from Digital Lightwave, Inc. (Part Number 001901). Some of these cables have a blue boot near the BNC connector.

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Hardware Setup

The following describes how to attach cables between the measuring devices and how to configure these devices for DS1 calibration (refer to Figure 2-2).

To attach cables between the ASA 312, the oscilloscope, and function generator:

1. Make sure that the ASA 312, the oscilloscope, and function generator are turned on.
2. Attach the BNC T-connector to the output of the function generator.
3. Attach one end of the BNC cable to the BNC T-connector and the other end of the BNC cable to the oscilloscope's input.
4. Attach the BNC-to-Bantam cable's BNC connector to the BNC T-connector.
5. Attach the BNC-to-Bantam cable's Bantam connector to the DS1 RX bantam jack.
6. Set the function generator's frequency output to 772 KHz ± 10 KHz.

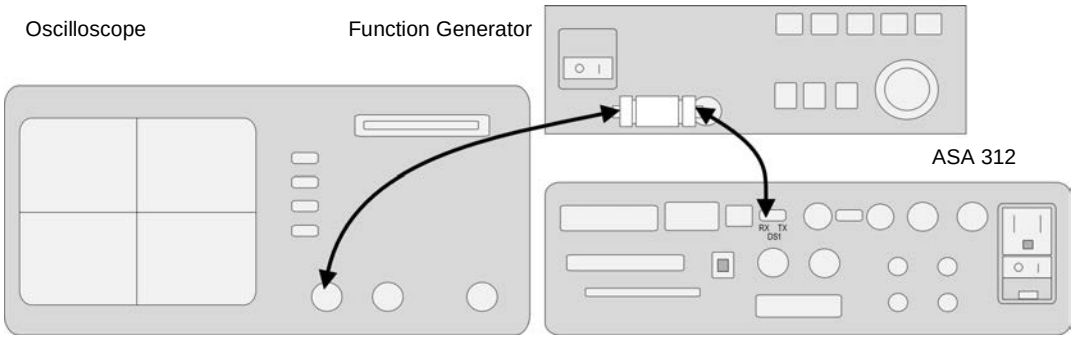


Figure 2-2. DS1 Calibration Setup

ASA 312 Settings

To setup the ASA 312 for DS1 calibration:

1. From the ASA 312 Touch Screen, select the DS1 Protocol Processor.
2. Press the Trnsmt Function Group button.
3. Press the Framing command and select Unframed.
4. Press the Pattern command and select All Ones.
5. Press the Line Code command and select AMI.

Oscilloscope Settings

Configure the oscilloscope to the following settings. Refer to the oscilloscope's user documentation for specific operation:

- 250 ns per horizontal division
- AC Coupled
- 20 MHz bandwidth limited
- 0V vertical offset
- Measuring frequency—maximum peak voltage and minimum peak voltage
- Acquisition set to average 8 samples

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Function Generator Settings

Configure the function generator to the following settings. Refer to the function generator's user documentation for specific operation.

- Sine wave output
- 0V DC offset
- 3Vp (6 Vp-p) amplitude
- 772 KHz ± 10 KHz

Calibrating DS1

The following procedures describe how to calibrate a total of eight ranges for DS1 calibration. During these procedures, you will:

- First calibrate the positive and negative peak values for Range 1
- Repeat these procedures to calibrate the remaining six ranges (Range 2, Range 4, Range 8, Range 16, Range 32, and Range 64).

To set DS1 Range 1:

1. Set the oscilloscope's Volts/Division to 1 V.

   NOTE ➤
   For subsequent DS1 Range settings, use the corresponding value that appears in the Oscilloscope (V/Div.) column in Table 2-1. ➤

2. Adjust the frequency generator so that the positive peak voltage output is within the range of 2.98 Vp and 3.02 Vp.

   NOTE ➤
   For subsequent DS1 Range settings, use the corresponding minimum and maximum Vp values that appear in Table 2-1. ➤

Table 2-1. Function Generator Voltage Outputs and Oscilloscope Vertical Settings

DS1 Range	Minimum (Vp)	Maximum (Vp)	Oscilloscope (V/Div.)
1	2.98	3.02	1 V
2	1.49	1.51	500 mV
4	0.595	0.605	200 mV
8	0.295	0.305	100 mV
16	0.195	0.205	50 mV
32	0.095	0.105	50 mV
64	0.048	0.053	20 mV

3. Using the oscilloscope, measure and record the absolute positive and negative peak values.
4. From the ASA 312 Touch Screen:
   - Press the Settings Function Group button.
   - Press CAL.

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5. Press the DS1 Range command and select 1.

   NOTE ➤
   For subsequent DS1 Range settings, select the appropriate Range value (2, 4, 8, 16, 32, or 64). ➤

6. Press the DS1 Pos Peak command and use the Touch Screen keypad to enter the measured DS1 positive peak adjustment value.

   Press Enter to accept the new value.

7. Press the DS1 Neg Peak command and use the Touch Screen keypad to enter the measured DS1 negative peak adjustment value.

   Press Enter to accept the new value.

   This concludes the procedures for entering DS1 positive and negative peak values for DS1 Range 1.

8. Repeat Steps 1–7 to measure and enter the values for DS1 Ranges 2, 4, 8, 16, 32, and 64.

After performing this calibration, you can save the new values using the procedures described later in Chapter 6, *Saving Calibration Values and Passwords*, or you can proceed to the next calibration section.

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3 DS3 Calibration

Overview

This chapter describes procedures for calibrating the DS3 Test Set for Terminated, Monitor, and High signals.

DS3 Terminated Positive and Negative Peak Settings

The following section describes the equipment and procedures required to calibrate a DS3 Terminated signal.

Review these procedures before attempting to calibrate DS3 Terminated parameters.

Required Equipment

The following equipment is required to perform DS3 Terminated calibration:

- ASA 312
- Digital oscilloscope
- BNC T-connector
- Two 2-ft., 75-ohm coaxial cables with male BNC connectors

Hardware Setup

The following describes how to attach cables to the measuring devices and how to configure these devices for DS3 Terminated calibration (refer to Figure 3-1).

To attach cables between the ASA 312 and the oscilloscope:

1. Make sure that the ASA 312 and oscilloscope are turned on.
2. Attach the BNC T-connector to the oscilloscope's BNC input connector.
3. Attach one end of a 75 ohm BNC coaxial cable to the BNC T-connector and the other end of the BNC cable to the ASA 312's DS3 TX BNC connector. (Refer to Figure 3-1.)
4. Attach one end of a 75 ohm BNC coaxial cable to the BNC T-connector and the other end of the BNC cable to the ASA 312's DS3 RX BNC connector.

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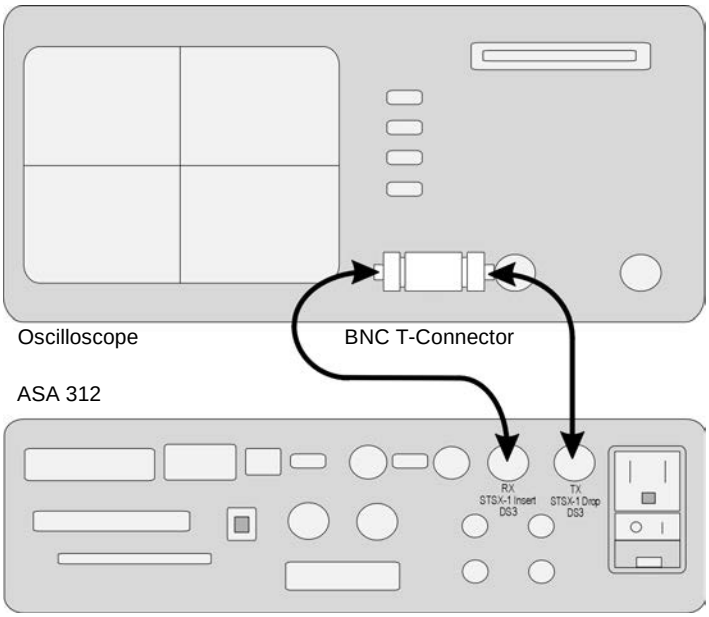


Figure 3-1. DS3 Terminated Setup

ASA 312 Settings

To setup the ASA 312 for DS3 Terminated calibration:

1. From the ASA 312 Touch Screen, select the DS3 Protocol Processor.
2. Press the Receive Function Group button.
3. Press the Line Interface Input Termination command and select Terminated.
4. Press the Framing command and select Unframed.
5. Press the Pattern command and select All Ones.
6. Press the Trnsmt Function Group button.
7. Press the Signal Level command and select DSX-3.

Oscilloscope Settings

Configure the oscilloscope to the following settings. Refer to the oscilloscope's user documentation for specific operation:

- 250 ns per horizontal division
- AC Coupled
- 20 MHz bandwidth limited
- 0V vertical offset
- Measuring frequency—maximum peak voltage and minimum peak voltage
- Acquisition set to average 8 samples

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Calibrating DS3 Terminated

Use the following procedures to calibrate DS3 Terminated settings:

1. Using the oscilloscope, measure and record the positive and negative peak values.
2. From the ASA 312 Touch Screen:
   - Press the Settings Function Group button.
   - Press the CAL button.
3. Press the DS3 Pos Peak command, and use the Touch Screen keypad to enter the measured DS3 positive peak adjustment value.

   Press Enter to accept the new value.
4. Press the DS3 Neg Peak command, and use the Touch Screen keypad to enter the measured DS3 negative peak adjustment value.

   Press Enter to accept the new value.

This concludes DS3 Terminated calibration.

After performing this calibration, you can save the new values using the procedures described later in Chapter 6, *Saving Calibration Values and Passwords*, or you can proceed to the next calibration section.

DS3 Monitor Positive and Negative Peak Settings

The following section describes the equipment, settings, and procedures required to calibrate a DS3 Monitor signal.

Review these procedures before attempting to calibrate DS3 Monitor parameters.

Required Equipment

The following equipment is required to perform DS3 Monitor calibration:

- Digital oscilloscope
- Three 2-ft., 75-ohm coaxial cables with male BNC connectors
- 75 ohm attenuator
- BNC T-connector

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Hardware Setup

The following sections describe how to configuring the ASA 312 and oscilloscope for DS3 Monitor calibration.

ASA 312 Settings

To setup the ASA 312 for DS3 Monitor calibration:

1. From the ASA 312 Touch Screen, select the DS3 Protocol Processor.
2. Press the Receive Function Group button.
3. Press the Line Interface Input Termination command and select Monitor.
4. Press the Framing command and select Unframed.
5. Press the Pattern command and select All Ones.
6. Press the Trnsmt Function Group button.
7. Press the Signal Level command and select DSX-3.

Oscilloscope Settings

Configure the oscilloscope to the following settings. Refer to the oscilloscope's user documentation for specific operation:

- High impedance input
- 250 ns per horizontal division
- AC Coupled
- 20 MHz bandwidth limited
- 0V vertical offset
- Measuring frequency—maximum peak voltage and minimum peak voltage
- Acquisition set to average 8 samples

Calibrating DS3 Monitor

The following procedures describe how to:

- Attach cables between the ASA 312, attenuator, and oscilloscope to adjust the DS3 signal to 90 mV peak (refer to Figure 3-2)
- Attach cables between the ASA 312 and oscilloscope to measure and enter the positive and negative peak adjustment values for a DS3 Monitor signal.

Hardware Setup

Use Figure 3-2 to attach cables between the ASA 312, the attenuator, and the oscilloscope:

1. Make sure that the ASA 312 and oscilloscope are turned on.
2. Attach a BNC T-connector to the oscilloscope's BNC input connector.
3. Connect a BNC cable from the ASA 312's DS3 TX connector to the 75-ohm attenuator's input connector.
4. Connect a BNC cable from the 75-ohm attenuator's output connector to the BNC T-connector on the oscilloscope's BNC input connector.
5. Connect a BNC cable from the ASA 312's DS3 RX connector to the BNC T-connector on the oscilloscope.

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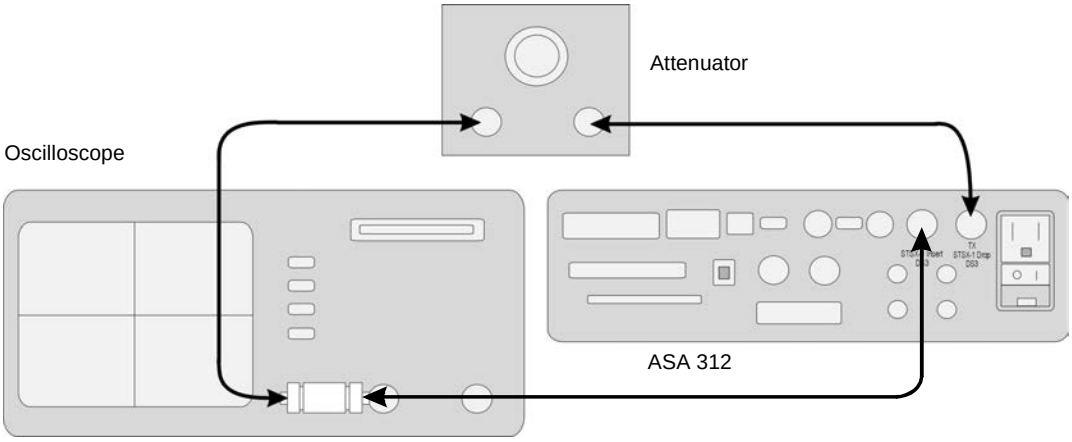


Figure 3-2. DS3 Monitor 90 mV Peak Adjustment Setup

90 mV Peak Adjustment

To adjust the DS3 signal to 90 mV peak

1. Adjust the attenuator so that the ASA 312's output is approximately equal to 90 mV peak on the oscilloscope.
2. Using the oscilloscope, measure and record the positive and negative peak values.
3. From the ASA 312 Touch Screen:
   - Press the Settings Function Group button.
   - Press the CAL button.
4. Press the DS3 Pos Peak command, and use the Touch Screen keypad to enter the measured DS3 positive peak adjustment value.

   Press Enter to accept the new value.
5. Press the DS3 Neg Peak command, and use the Touch Screen keypad to enter the measured DS3 negative peak adjustment value.

   Press Enter to accept the new value.

This concludes DS3 Monitor calibration.

After performing this calibration, you can save the new values using the procedures described later in Chapter 6, *Saving Calibration Values and Passwords*, or you can proceed to the next calibration section.

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DS3 High Settings

The following section describes the equipment and procedures required to calibrate a DS3 High signal.

Review these procedures before attempting to calibrate DS3 High parameters.

Required Equipment

The following equipment is required to perform DS3 High calibration:

- ASA 312 or DS3 test equipment with a signal output capacity up to 1.2 volts peak
- Digital oscilloscope
- BNC T-connector
- Two 2-ft., 75-ohm coaxial cables with male BNC connectors

Hardware Setup

The following describes how to attach cables to the measuring devices and how to configure these devices for DS3 High calibration (refer to Figure 3-3).

To attach cables between the ASA 312 and the oscilloscope:

1. Make sure that the ASA 312 and oscilloscope are turned on.
2. Attach the BNC T-connector to the oscilloscope's BNC input connector.
3. Attach one end of a 75 ohm BNC coaxial cable to the BNC T-connector and the other end of the BNC cable to the ASA 312's DS3 TX BNC connector. (Refer to Figure 3-1.)
4. Attach one end of a 75 ohm BNC coaxial cable to the BNC T-connector and the other end of the BNC cable to the ASA 312's DS3 RX BNC connector.

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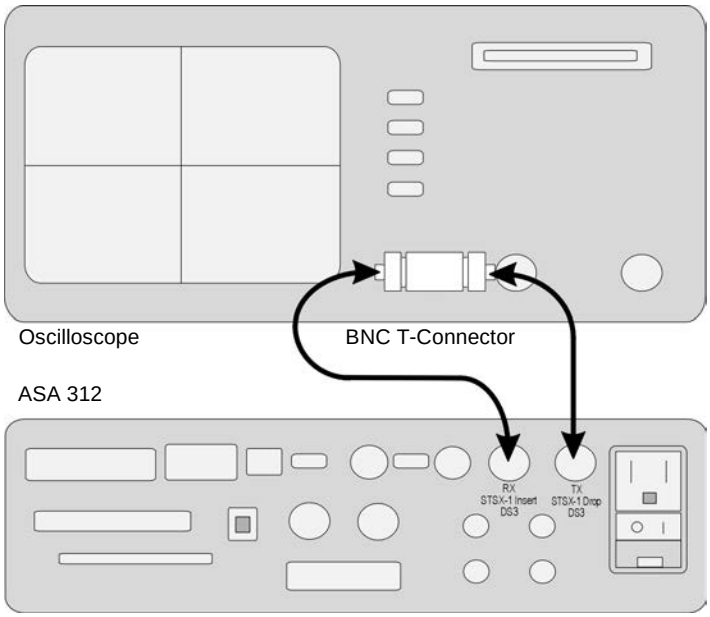


Figure 3-3. DS3 High Setup

ASA 312 Settings

To set up the ASA 312 for DS3 High calibration:

1. From the ASA 312 Touch Screen, select the DS3 Protocol Processor.
2. Press the Receive Function Group button.
3. Press the Line Interface Input Termination command and select High.
4. Press the Framing command and select Unframed.
5. Press the Pattern command and select All Ones.
6. Press the Trnsmt Function Group button.
7. Press the Signal Level command and select DS3 High.

Oscilloscope Settings

Configure the oscilloscope to the following settings. Refer to the oscilloscope's user documentation for specific operation:

- 250 ns per horizontal division
- AC Coupled
- 20 MHz bandwidth limited
- 0V vertical offset
- Measuring frequency—maximum peak voltage and minimum peak voltage
- Acquisition set to average 8 samples

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Calibrating DS3 High

IMPORTANT ➤
Some units may need to be calibrated with a DS3 High signal greater than the ASA 312's DS3 High signal level. In these cases, another piece of testing equipment with an output signal up to 1.2 volts peak must be used. ◄

Use the following procedures to calibrate DS3 High settings:

1. Using the oscilloscope, measure and record the positive and negative peak values.
2. From the ASA 312 Touch Screen:
   - Press the Settings Function Group button.
   - Press the CAL button.
3. Press the DS3 Pos Peak command, and use the Touch Screen keypad to enter the measured DS3 positive peak adjustment value.
4. Press Enter to accept the new value.
5. Press the DS3 Neg Peak command, and use the Touch Screen keypad to enter the measured DS3 negative peak adjustment value.
6. Press Enter to accept the new value.

   If these values are not accepted by the ASA 312, use testing equipment with an output signal up to 1.2 volts peak. Calibrate using a value range between 0.96 to 1.2 volts peak until the ASA 312 accepts a value.

   This concludes DS3 High calibration.

After performing this calibration, you can save the new values using the procedures described later in Chapter 6, *Saving Calibration Values and Passwords*, or you can proceed to the next calibration section.

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4 STSX-1 Calibration

STSX-1 Positive and Negative Peak Settings

The following section describes the equipment, settings, and procedures required to calibrate the STSX-1 signal.

Required Equipment

The following equipment is required to perform STSX-1 calibration:

- ASA 312
- Digital oscilloscope (Use highest bandwidth available.)
- BNC T-connector
- Two 2-ft., 75 ohm coaxial cables with male BNC connectors

Hardware Setup

The following describes how to attach cables to the measuring devices and how to configure these devices for STSX-1 calibration.

To attach cables between the ASA 312 and the oscilloscope (refer to Figure 4-1):

1. Make sure that the ASA 312 and oscilloscope are turned on.
2. Connect the BNC T-connector to the oscilloscope's BNC input connector.
3. Connect one end of a BNC cable to the ASA 312's STSX-1 TX BNC connector and connect the other end of the cable to the BNC T-connector attached to the oscilloscope.
4. Connect one end of a BNC cable to the ASA 312's STSX-1 RX BNC connector and connect the other end of the cable to the BNC T-connector attached to the oscilloscope.

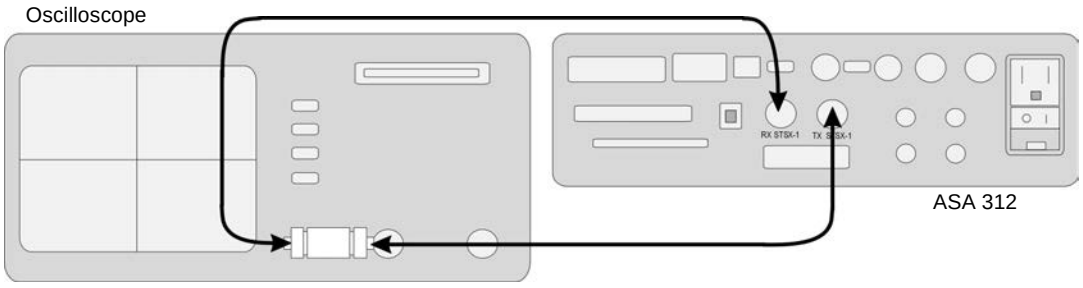


Figure 4-1. STSX-1 Setup

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ASA Settings

To set up the ASA 312 for STSX-1 calibration:

1. From the ASA 312 Touch Screen, select the SONET Protocol Processor.
2. Press the Trnsmt Function Group button.
3. Press the Settings button.
4. Press the Transmit Interface command and select STSX-1.

Oscilloscope Settings

Configure the oscilloscope to the following settings. Refer to the oscilloscope's user documentation for specific operation:

- High impedance input
- 250 ns per horizontal division
- AC Coupled
- Use highest bandwidth available on the oscilloscope
- 0V vertical offset
- Measuring frequency—maximum peak voltage and minimum peak voltage
- Acquisition set to average 8 samples

Calibrating STSX-1

The following procedures describe how to perform STSX-1 calibration using an ASA 312 and oscilloscope:

1. Using the oscilloscope, measure and record the average positive and negative peak values. *The acceptable peak value is 0.750 Vp ± 0.1 Vp.*
2. From the ASA 312 Touch Screen:
   - Press the Settings Function Group button.
   - Press CAL.
3. Press the STSX-1 Pos Peak command and use the Touch Screen keypad to enter the measured STSX-1 positive peak value.

   Press Enter to accept the new value.
4. Press the STSX-1 Neg Peak command and use the Touch Screen keypad to enter the measured STSX-1 negative peak value.

   Press Enter to accept the new value.

This concludes STSX-1 calibration. Proceed to the next calibration section or save the STSX-1 calibration values. Refer to Chapter 6, *Saving Calibration Values and Passwords,* for these procedures.

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5 Optical Power Calibration

Calibrating Optical Power

This section describes how to calibrate the ASA 312's optical power. The procedures vary depending on the ASA 312's optical hardware configuration:

- Single laser configuration
- Dual laser configuration
- OC-48 laser configuration

Required Equipment

The following equipment is required to perform this procedure:

- ASA 312
- Two 3-ft. single-mode, fiber optic cables
- Variable optical attenuator
- Optical power meter
- A fiber optics cleaning kit

Before You Begin

Before performing Optical Power calibration, use a fiber optics cleaning kit to clean the fiber optic ports on the ASA 312, the optical power meter, the optical attenuator, and the fiber cables. Dirty optical ports will effect optical measurements.

Optical Power Calibration for a Single Laser or Dual Laser ASA 312

The following procedures are applicable for OC-1, OC-3, and OC-12 optical interfaces.

During these procedures, you will:

- First obtain the ASA 312's initial optical power measurement
- Calibrate four optical power ranges

NOTE ➤
If you have a dual laser ASA 312:

- Perform all procedures in this section using the 1310 nm laser
- Save the new calibration values for the 1310 nm laser
- Enable the 1550 nm laser, and then repeat all procedures in this section
- Save the new calibration values for the 1550 nm laser ◄

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Initial Optical Power Measurement

To obtain the initial optical power measurement for an ASA 312:

1. Make sure that the ASA 312 and the optical power meter are turned on.

   Make sure that the optical power meter is set for the proper wavelength (1310 nm or 1550 nm).

2. Remove the dustcap that covers the OC-1/3/12 TX optical port on the ASA 312.

3. Connect one end of a fiber optic cable to the OC-1/3/12 TX port.

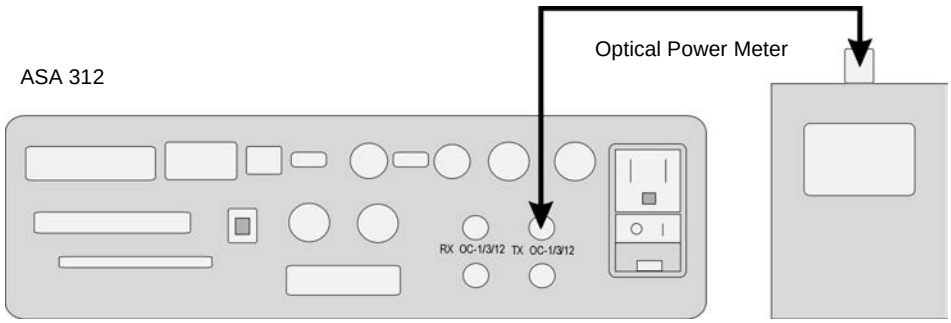
4. Connect the other end of the fiber optic cable to the optical power meter's input port.

   WARNING
   The ASA 312's optical Transmit output is produced by a Class 1 laser device. You should never, under any circumstances, look into an unterminated fiber.

   Always turn the Laser off when a fiber is unterminated. After connecting the fiber, turn the Laser on. ◄

5. Turn the Laser **on**.

   From the ASA 312 Touch Screen, turn the Laser on by pressing the Laser button that appears in the upper left-hand corner.



6. Measure the Laser output level and verify that the power level is within the following ranges:

For a single laser configuration using a ...	The optical power level is from...
1310 nm laser	-8.0 dBm to -2.0 dBm
1550 nm laser	-3.0 dBm to +2.0 dBm

For a dual laser configuration using a ...	The optical power level is from ....
1310 nm laser	-9.0 dBm to -2.0 dBm
1550 nm laser	-4.0 dBm to +2.0 dBm

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NOTE ➤
The Laser Type (either 1310 nm or 1550 nm) appears above the Laser button on the ASA 312 Touch Screen. ◄

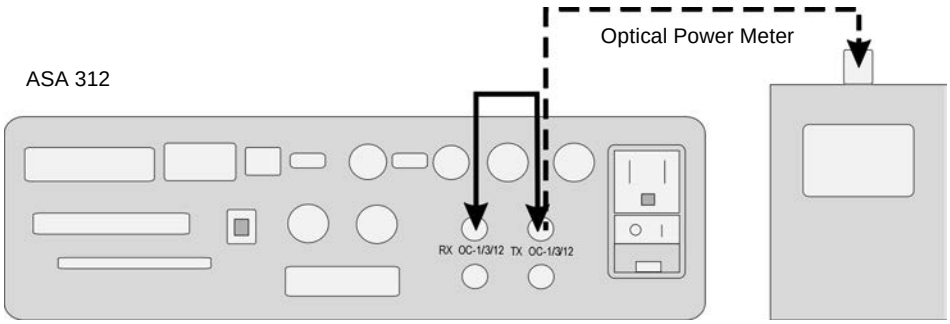
If the laser's optical power level is within the ranges listed above, record this value and proceed to Step 7. You will use this value when entering the optical power value for Range 1 as described in the *Setting Range 1* section.

If the measured optical power level is not within the ranges listed above:

- Verify that the ASA 312's laser is turned on
- Make sure that the fiber optic ports and fiber cables are clean; an optical power level less than -8.0 dBm may be caused by dirty ports and cables
- Reconnect the fiber optic cables and make sure that you have a firm connection
- Repeat Steps 1-6. If this does not resolve the problem, contact Digital Lightwave's Technical Support for product return instructions.

7. Disconnect the fiber optic cable from the optical power meter's input port.
8. Remove the dustcap that covers the OC-1/3/12 RX optical port on the ASA 312.

   Connect the other end of the fiber optic cable to the OC-1/3/12 RX port so that the fiber optic cable is looped from the ASA 312's TX optical port to the RX optical port.



Proceed to the next section to enter the optical power for Range 1.

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Setting Range 1

The following describes how to enter the optical power value for Range 1.

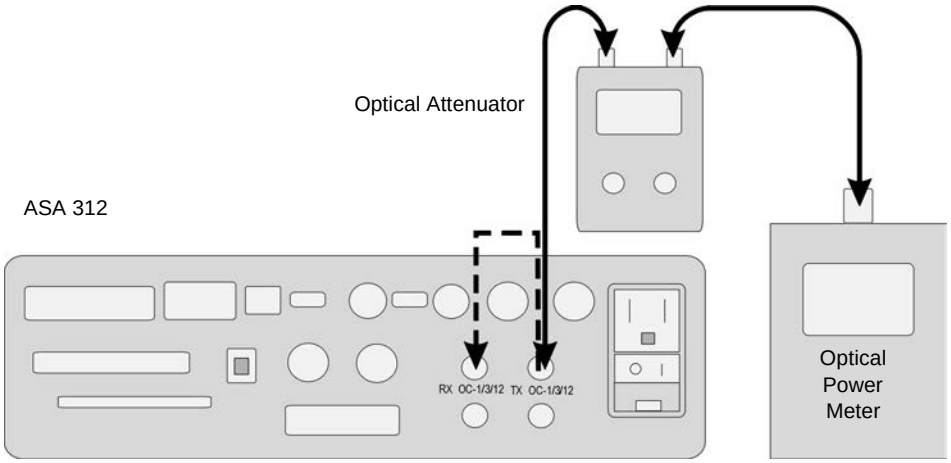
1. From the ASA 312 Touch Screen:
   - Press the Settings Function Group button
   - Press CAL.
2. Press the Optical Power Range command and select 1.
3. Press the Optical Power command and use the Touch Screen keypad to enter the optical power value measured in the previous section (for example, -8.0).

   Press Enter to accept the new value.
4. Disconnect the fiber optic cable from the OC-1/3/12 RX optical port and replace the dustcap.

   WARNING
   The ASA 312's optical Transmit output is produced by a Class 1 laser device. You should never, under any circumstances, look into an unterminated fiber.

   Always turn the Laser off when a fiber is unterminated. After connecting the fiber, turn the Laser on. ◄

   Connect the fiber optic cable to the input of the optical attenuator so that you have a direct fiber connection from the ASA 312's OC-1/3/12 TX port to the optical attenuator's input port.
5. Connect one end of a second fiber optic cable from the optical attenuator's output port to the optical power meter's input port.



6. Proceed to the next section to enter the optical power for Range 2.

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Setting Range 2

The following describes how to calibrate the optical power level value for Range 2.

1. Adjust the optical attenuator so that output power level is -18 dBm.

   Record the power level that appears on the optical power meter's display.

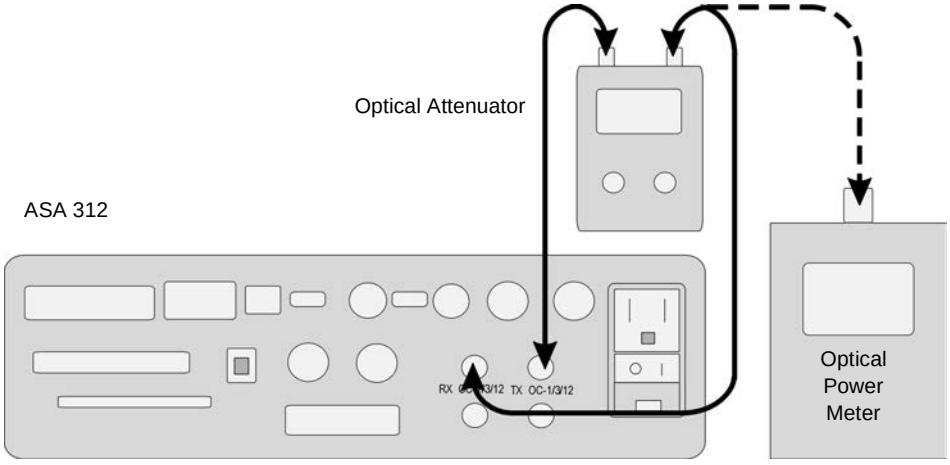
2. Disconnect the second fiber optic cable from the optical power meter's input port. (The other end of the fiber optic cable is still connected to the optical attenuator's output port.)

   WARNING
   The ASA 312's optical Transmit output is produced by a Class 1 laser device. You should never, under any circumstances, look into an unterminated fiber.

   Always turn the Laser off when a fiber is unterminated. After connecting the fiber, turn the Laser on. ◄

3. Remove the dustcap from the OC-1/3/12 RX optical port and connect the second fiber optic cable to the ASA 312's OC-1/3/12 RX optical port.

   This provides a direct fiber connection from the optical attenuator's output port to the ASA 312's OC-1/3/12 RX port.



4. From the ASA 312 Touch Screen, press the Optical Power Range command and select 2.

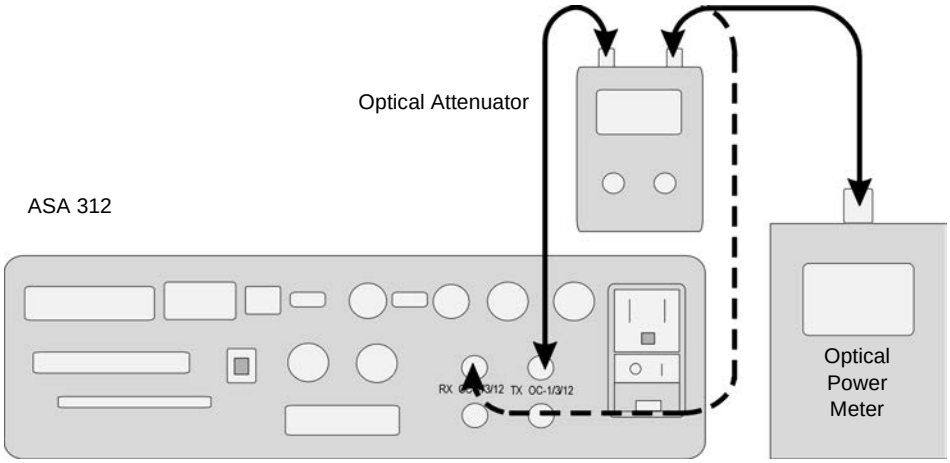
5. Press the Optical Power command and use the Touch Screen keypad to enter the value recorded earlier in Step 1 of this section.

   Press Enter to accept the new value.

6. Disconnect the fiber optic cable from the ASA 312's OC-1/3/12 RX port and replace the dustcap.

7. Connect the fiber optic cable to the optical power meter's input port so that you have a direct connection between the optical attenuator's output port and the optical power meter.

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Proceed to the next section to enter the optical power for Range 3.

Setting Range 3

The following describes how to calibrate the optical power level value for Range 3.

1. Adjust the optical attenuator so that output power level is -28 dBm.

   Record the power level that appears on the optical power meter's display.

2. Disconnect the second fiber optic cable from the optical power meter's input port. (The other end of the fiber optic cable is still connected to the optical attenuator's output port.)

   WARNING
   The ASA 312's optical Transmit output is produced by a Class 1 laser device. You should never, under any circumstances, look into an unterminated fiber.

   Always turn the Laser off when a fiber is unterminated. After connecting the fiber, turn the Laser on. ◄

3. Remove the dustcap from the OC-1/3/12 RX optical port and connect the second fiber optic cable to the ASA 312's OC-1/3/12 RX optical port.

   This provides a direct fiber connection from the optical attenuator's output port to the ASA 312's OC-1/3/12 RX port.

4. From the ASA 312 Touch Screen, press the Optical Power Range command and select 3.

5. Press the Optical Power command and use the Touch Screen keypad to enter the value recorded earlier in Step 1 of this section.

   Press Enter to accept the new value.

6. Disconnect the fiber optic cable from the ASA 312's OC-1/3/12 RX port and replace the dustcap.

7. Connect the fiber optic cable to the optical power meter's input port so that you have a direct connection between the optical attenuator's output port and the optical power meter.

   Proceed to the next section to enter the optical power for Range 4.

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Setting Range 4

The following describes how to calibrate the optical power level value for Range 4.

1. Adjust the optical attenuator so that output power level is -35 dBm.

   Record the power level that appears on the optical power meter's display.

2. Disconnect the second fiber optic cable from the optical power meter's input port. (The other end of the fiber optic cable is still connected to the optical attenuator's output port.)

   WARNING
   The ASA 312's optical Transmit output is produced by a Class 1 laser device. You should never, under any circumstances, look into an unterminated fiber.

   Always turn the Laser off when a fiber is unterminated. After connecting the fiber, turn the Laser on. ◄

3. Remove the dustcap from the OC-1/3/12 RX optical port and connect the second fiber optic cable to the ASA 312's OC-1/3/12 RX optical port.

   This provides a direct fiber connection from the optical attenuator's output port to the ASA 312's OC-1/3/12 RX port.

4. From the ASA 312 Touch Screen, press the Optical Power Range command and select 4.

5. Press the Optical Power command and use the Touch Screen keypad to enter the value recorded earlier in Step 1 of this section.

   Press Enter to accept the new value.

6. Disconnect the fiber optic cable from the ASA 312's OC-1/3/12 RX port and replace the dustcap.

   Disconnect the fiber optic cable from the ASA 312's OC-1/3/12 TX port and replace the dustcap.

7. Press the Optical Power Range command and select 1.

   Turn the Laser **off**.

8. Save the new calibration values following the procedures in Chapter 6, *Saving Calibration Values and Passwords*.

   If you have a **single laser** ASA 312, this concludes the Optical Calibration for an ASA 312 with OC-1, OC-3, or OC-12 optical interfaces.

   If you have a **dual laser** ASA 312:

   – Enable the 1550 nm laser. (Refer to the *Changing the Laser Type for a Dual Laser ASA 312* section, described later in this chapter, for these procedures.)

   – Repeat all procedures in this section (*Optical Power Calibration for a Single Laser or Dual Laser ASA 312*).

   – Save the new calibration values for the 1550 nm laser.

   – This concludes the Optical Calibration for an ASA 312 with OC-1, OC-3, or OC-12 optical interfaces.

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Changing the Laser Type for a Dual Laser ASA 312

To change the laser type for an ASA 312 with dual lasers:

1. From the ASA 312 Touch Screen:
   - Press the Settings Function Group button.
   - Press Misc.
   - Press the OC1/OC3/OC12 Laser Type command and select a Laser Type.

Calibrating Optical Power for OC-48

The following describes how to calibrate OC-48 optical power. To perform this procedure, you will:

- Enter an OC-48 reference value
- Measure and enter two separate OC-48 optical power values

OC-48 Reference Value

To enter the OC-48 reference value:

1. Make sure that the unit is configured for OC-48 operation and that the Laser is **off**. Disconnect any optical fibers attached to the OC-48 optical ports, and make sure that the dustcaps are secured to the OC-48 optical ports.
2. From the ASA 312 Touch Screen:
   - Press the Settings Function Group button.
   - Press CAL.
3. Press the OC48 Optical Power command. The Touch Screen keypad appears.
4. Enter -99.0 and press Enter.

First OC-48 Optical Power Measurement

To enter the first OC-48 optical power measurement:

1. Attach a fiber optic cable from the ASA 312's TX OC-48 optical port to the optical attenuator's input connector.
2. Attach a fiber optic cable from the attenuator to the optical power meter.
3. Turn the Laser **on**.
4. Adjust the attenuator so that the meter reads **-28.0 dBm**. Record the meter's reading.
5. Disconnect the fiber optical cable from the optical power meter and attach it to the RX OC-48 optical port.

   WARNING
   The ASA 312's optical Transmit output is produced by a Class 1 laser device. You should never, under any circumstances, look into an unterminated fiber.

   Always turn the Laser off when a fiber is unterminated. After connecting the fiber, turn the Laser on. ◄
6. Press the OC48 Optical Power command. The Touch Screen keypad appears.
7. Enter the value recorded from the optical power meter.

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Second OC-48 Optical Power Measurement

To enter the second OC-48 optical power measurement:

1. Disconnect the fiber optic cable from the RX OC-48 optical port and attach it to the optical power meter. (You have a direct fiber optic cable connection from the optical attenuator to the optical power meter.)

   WARNING
   The ASA 312's optical Transmit output is produced by a Class 1 laser device. You should never, under any circumstances, look into an unterminated fiber.

   Always turn the Laser off when a fiber is unterminated. After connecting the fiber, turn the Laser on. ◄

2. Adjust the attenuator so that the meter reads **-1.0 dBm**. Record the meter's reading.
3. Disconnect the fiber optic cable from the optical power meter and attach it to the RX OC-48 optical port. (You have a direct fiber optic cable connection from the attenuator to the ASA 312.)
4. Press the OC48 Optical Power command. The Touch Screen keypad appears.
5. Enter the value recorded from the optical power meter.

This concludes OC-48 optical power calibration. Save the new calibration values following the procedures in Chapter 6, *Saving Calibration Values and Passwords.*

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6 Saving Calibration Values and Passwords

Saving New Calibration Values

After entering new calibration values, you must save this data so that the values are retained when the ASA 312 is turned off. A system password must be used to save the values.

The following describes how to save calibration values:

1. From the ASA 312 Touch Screen:
   - Press the Settings Function Group button
   - Press CAL.
2. Press the Save Calibration command.
3. Press OK. A Touch Screen keypad appears.
4. Enter the system password, and then press Enter.

   NOTE ➤
   The initial system password is CALIBRATE. You can change the system password as described in the *Changing the Password* section. ◄

   The new calibration values are set as the ASA 312's default values.

Changing the Password

To avoid accidental or unauthorized modification of the ASA 312's calibration settings, a system password must be entered before any new calibrations can be saved.

The ASA 312 ships from the factory with the default password CALIBRATE. For security, you can change the default password at any time.

The following describes how to change the system password.

1. From the ASA 312 Touch Screen:
   - Press the Settings Function Group button.
   - Press CAL.
2. Press the Change Password command. A prompt for the current system password appears.
3. Press OK. A Touch Screen keypad appears.

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4. Enter the current system password and then press Enter.

   If the current password is correct, a prompt for the new system password appears. Press OK.

   If the password is incorrect, the message Invalid Password appears and the password function is aborted.

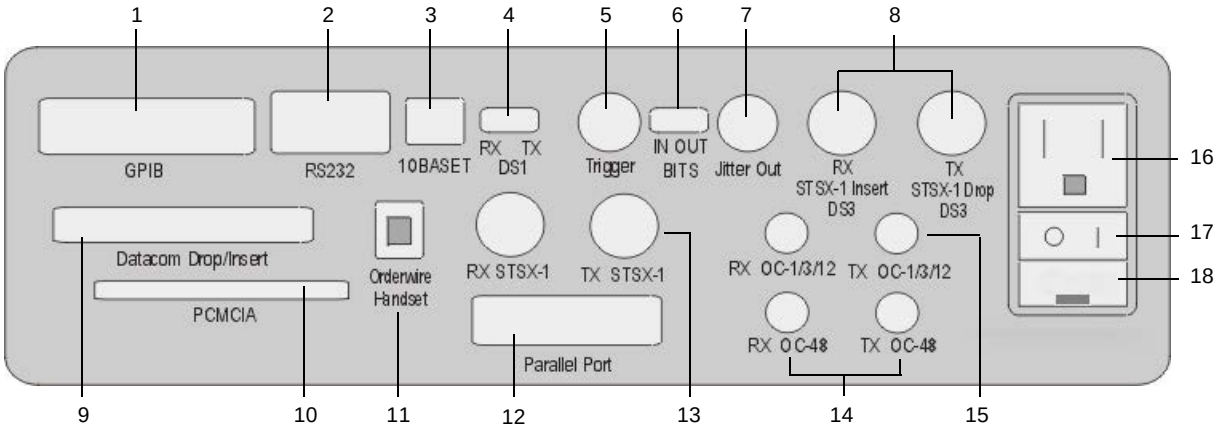
5. A Touch Screen keypad appears. Enter the new system password and press Enter.

NOTE ➤
Passwords are limited to 12 text characters and are not case sensitive. ◄

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A ASA 312 Connector Panel

The ASA 312 connector panel contains a wide variety of auxiliary interfaces. The interfaces are illustrated in the following figures.

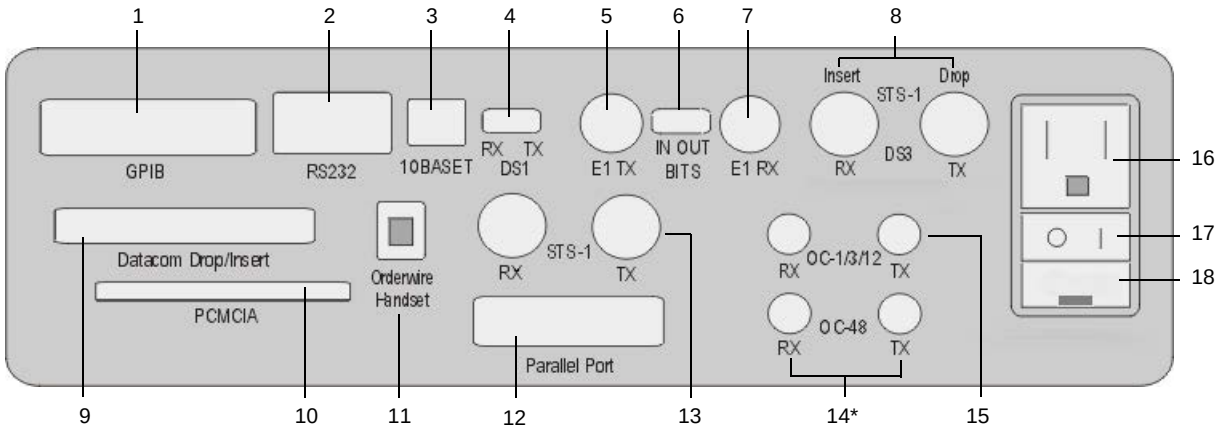


1. **GPIB:** Interface used to connect a GPIB cable for SCPI Command operation
2. **RS232:** 9-pin male connector for mouse, modem, direct connect or printer
3. **10BaseT:** 8-pin modular jack for Ethernet connection
4. **DS1 RX TX:** Bantam connectors for DS1 Transmit and Receive electrical signals
5. **Trigger:** BNC connector for future use
6. **IN OUT Bits:** Bantam jacks for external timing equipment (Unframed 1.544 timing source)
7. **Jitter Out:** BNC connector for future use
8. **DS3 RX TX :** BNC connectors for DS3 Transmit and Receive electrical signals; or **STSX-1 Insert Drop:** For SONET electrical signals
9. **DataCom Drop/Insert:** 37-pin female, RS449 connector for D1 through D12 Overhead bytes
10. **PCMCIA:** Type II PC Card slot for PC Card modem or SRAM Flash card
11. **Orderwire Handset:** 4-pin modular jack. Not intended for direct connection to telecommunications circuits
12. **Parallel Port:** 25-pin female connector for parallel printer
13. **STSX-1 RX TX:** BNC connectors for SONET Transmit and Receive electrical signals
14. **OC-48 RX TX:** FC-PC, ST-PC, or SC-FC type connectors for SONET OC-48 optical signals.
15. **OC-1/3/12 RX TX:** FC-PC, ST-PC, or SC-FC type connectors for SONET optical signals
16. **Power Cord Connector**
17. **On / Off Power Switch**
18. **Fuse Compartment**

NOTE: Connectors will vary based on your hardware configuration.

Figure A-1. ASA 312 Connector Panel (Non E1 Configuration)

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1.	**GPIB:** Interface used to connect a GPIB cable for SCPI Command operation	**7.**	**E1 RX:** BNC connector for E1 Receive electrical signal	**13.**		**STS-1 RX TX:** BNC connectors for SONET Transmit and Receive electrical signals
2.	**RS232:** 9-pin male connector for mouse, modem, direct connect or printer	**8.**	**DS3 RX TX :** BNC connectors for DS3 Transmit and Receive electrical signals; or **STS-1 Insert Drop:** For SONET electrical signals	**14.**	*	**OC-48 RX TX:** FC-PC, ST-PC, or SC-FC type connectors for SONET OC-48 optical signals; or **Jitter Out:** BNC connector for Jitter output
3.	**10BaseT:** 8-pin modular jack for Ethernet connection	**9.**	**DataCom Drop/Insert:** 37-pin female, RS449 connector for D1 through D12 Overhead bytes	**15.**		**OC-1/3/12 RX TX:** FC-PC, ST-PC, or SC-FC type connectors for SONET optical signals
4.	**DS1 RX TX:** Bantam connectors for DS1 Transmit and Receive electrical signals	**10.**	**PCMCIA:** Type II PC Card slot for PC Card modem or SRAM Flash card	**16.**		**Power Cord Connector**
5.	**E1 TX:** BNC connector for E1 Transmit signal	**11.**	**Orderwire Handset:** 4-pin modular jack. Not intended for direct connection to telecommunications circuits	**17.**		**On / Off Power Switch**
6.	**IN OUT Bits:** Bantam jacks for external timing equipment (Unframed 1.544 timing source)	**12.**	**Parallel Port:** 25-pin female connector for parallel printer	**18.**		**Fuse Compartment**

NOTE: Connectors will vary based on your hardware configuration.

***** If the unit is configured for Jitter operation, the OC-48 RX and OC-48 TX connectors are not installed. Instead, the Jitter Out connector will appear in place of the OC-48 RX connector.

Figure A-2. ASA 312 Connector Panel with E1 Configuration

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