



*Innovations in Spectroscopy
and Optical Sensing*

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Ocean Optics SAD500 Diagnostics

SADTest tests several levels of hardware interfacing to the SAD500.

- A port sweep verifies all serial ports attached to your computer.
- The low-level diagnostics test the requested serial port.
- The mid-level diagnostics test communication with the SAD500 using SAD_ functions from Ocean Optics Windows Interface Package (OOIWinIP).
- Finally, the high-level diagnostics test communication with the SAD500 using the OOI_ functions of the OOIWinIP. The high-level functions are the ones used by all Ocean Optics applications to communicate with the SAD500.

SADTest is designed to run from the command prompt of Windows 95/98 or Windows NT. The command prompt icon is usually under Start | Programs | MS-DOS Prompt for Windows 95/98 or Start | Programs | Command Prompt under Windows NT. In either case, you can select Start | Run and type `command` and click OK to start the Command Prompt window. SADTest is installed in the `C:\SADTest` directory. After starting the MS-DOS or Command Prompt, issue the following commands:

```
C:  
cd\SADTest
```

Start the SADTest program using the command-line syntax below.

Command line syntax:

<code>SADTest /?</code>	displays help and contact information
<code>SADTest /x</code>	tests SAD500 connect to serial port x
<code>SADTest /comx</code>	tests SAD500 connect to serial port x
<code>SADTest /COMx</code>	tests SAD500 connect to serial port x
<code>SADTest /x > test.txt</code>	tests serial port x, outputs results to file test.txt

Port Sweep

During this section of the test, SADTest looks for all serial ports attached to your computer (COM1 through COM8) and tries to open them. Possible results are:

Result	Cause
PASS	Serial port opened successfully
FAIL Port in use	The serial port was in use by another device
FAIL Port not present or enabled	The specified serial port was either not present, or disabled in CMOS
FAIL Too many opened ports	Too many serial ports are opened
FAIL Unknown error	The port opening failed for some other reason

If the requested serial port exists and was successfully opened, the testing continues. If there was an error opening the requested serial port, SADTest terminates.

Low-level Diagnostics

The tests performed in this section act only upon the serial port specified in the command line. The first test is to open the serial port using functions in Ocean Optics serial communication library. Possible results are:

Result	Cause
PASS	Serial port opened successfully
FAIL	Serial port could not be opened, and SADTest exits

Next, communication parameters such as data bits, stop bits and parity are set. Possible results are:

Result	Cause
PASS	Communication parameters successfully set
FAIL	Communication parameters could not be set

Hardware baud rates ranging from 2400 baud to 115,200 baud are then verified. Possible results are:

Result	Cause
PASS	Hardware supports baud rate
FAIL	Hardware does not support baud rate

The baud rate is returned to 9600 baud, and the user is instructed to toggle power to the SAD500. On power-up, the SAD500 transfers a string that indicates any internal errors. This string reads:

Result	Cause
Ocean Optics Serial A/D – 0	No error on power-up
Ocean Optics Serial A/D – xx (where xx is some number other than 0)	An error occurred on power-up. The number xx reports the type of error that occurred.

The final low-level test performed is to close the serial port. Possible results are:

Result	Cause
PASS	Serial port was closed
FAIL	Serial port was not closed

Mid-level Diagnostics

The mid-level diagnostics utilize the SAD_ functions of the Ocean Optics Windows Interface Package (OOIWinIP). These functions test bi-directional communication with the SAD500. In order for these tests to be successful, the file OOIDRV32.DLL must be in the same directory as SADTest.

The first test performed is to open the specified serial port at 9600 baud. Possible results are:

Result	Cause
PASS	Serial port was opened
FAIL	Serial port was not opened and SADTest closes

The next test queries the SAD500 for its firmware version. Knowing which firmware version you are operating is very important to our Technical Support Department in troubleshooting SAD500 communication problems. The result of this query is:

Result	Cause
SAD500 firmware version xx	xx is the firmware version

The next set of tests changes the baud rate of both the serial port and the SAD500 from 2400 baud to 115,200 baud. After the baud rate is changed, SADTest again queries the SAD500 for its firmware version. The firmware version returned at all baud rates must match the firmware version returned in the previous step. The fastest possible baud rate is internally stored and used for all subsequent tests. Possible results are:

Result	Cause
PASS	Baud rate change was successful
FAIL	Baud rate change was not successful

The next set of tests sets the integration time for the SAD500. Integration times range from 40 msec to 240 msec, in 25 msec increments. After the integration time is successfully set, SADTest queries the SAD500 for the current integration time. The result of the query is tested against the desired integration time. Possible results are:

Result	Cause
PASS	Integration time was set and successfully verified
FAIL	Integration time was either not successfully set or not successfully verified

The next test resets the SAD500. This restores the integration time to 100 msec. Possible results are:

Result	Cause
PASS	Reset was successful
FAIL	Reset was not successful

The next test reads the integration counter of the SAD500. Internally, the SAD500 keeps a counter that indicates how many integration periods have passed. Possible results are:

Result	Cause
1 2 3 4 5 6 7 8 9 10	The integration counter was successfully read. Do not be worried if one or more of the numbers in this sequence are skipped.
0 0 0 0 0 0 0 0 0 0	The integration counter was not successfully read

All previous tests can be successfully passed without having a spectrometer attached to the SAD500. However, this is not the case for all of the following tests. The next test performed acquires spectral data from the master spectrometer channel, and reports the scope-mode intensity of pixel 500. Ten scans are acquired. Possible results are:

Result	Cause
Scan X returned Y, pixel 500 value Z	For each scan X, the return value should be 1. The intensity should be non-zero, and vary from scan-to-scan.
INVALID RESULT	The scan returned invalid spectral data, indicating that 1) the spectrometer is not connected to the SAD500 or 2) the baseline of the spectrometer is configured for the DAQ-700 A/D card and is below 0 VDC.

The last of the mid-level diagnostics is the closing of the serial port. Possible results are:

Result	Cause
PASS	Serial port was closed
FAIL	Serial port was not closed and subsequent tests may fail

High-level Diagnostics

The high-level diagnostics utilize the OOI_ functions of the OOIWinIP. These are the same functions used by all standard Ocean Optics applications.

The first high-level function performed is the configuration of the device driver OOIDRV32.DLL to use the SAD500 as the A/D Type, and to use the specified serial port. After this configuration is performed, SADTest verifies communication at all possible baud rates from 2400 baud to 115,200 baud. The highest successfully set baud rate is used for all further diagnostics. Possible results are:

Result	Cause
PASS	Baud rate of both the serial port and the SAD500 were successfully changed
FAIL	Baud rate was not successfully changed

The second test performed by the high-level diagnostics is a verification that the configuration step above was performed successfully. Possible results are:

Result	Cause
PASS	A/D type was properly configured
FAIL	A/D type was not properly configured and SADTest exits

The next test acquires 10 spectral acquisitions from the master spectrometer channel and reports the scope-mode intensity of pixel 500. Ten scans are acquired. Possible results are:

Result	Cause
Scan X returned Y, pixel 500 value Z	For each scan X, the return value should be 0. The intensity should be non-zero, and vary from scan-to-scan.
INVALID RESULT	The scan returned invalid spectral data, indicating that 1) the spectrometer is not connected to the SAD500 or 2) the baseline of the spectrometer is configured for the DAQ-700 A/D card and is below 0 VDC.

The next test acquires one spectrum from each possible spectrometer channel (Master through Slave 7) and displays the scope-mode intensities. Possible results are:

Result	Cause
Channel X returned Y, value Z	For each spectrometer channel X, the return value should be 0. The intensity should be non-zero, and vary from scan-to-scan.
INVALID RESULT	The scan returned invalid spectral data, indicating that 1) the spectrometer is not connected to the SAD500 2) the spectrometer channel is not present or 3) the baseline of the spectrometer is configured for the DAQ-700 A/D card and is below 0 VDC.

The high-level diagnostics end with the closing of the OOIDRV32.DLL device driver.

A typical output for a SADTest execution is shown below for reference. Spectral values will vary from spectrometer to spectrometer. The command line syntax was

```
SADTest /com1 > test.txt
```

The output from the file test.txt is shown below.

```
---BEGIN PORT SWEEP---  
COM1 opened PASS  
COM2 opened **FAIL** -- Error Code 00000002 -- Port not present or enabled  
COM3 opened **FAIL** -- Error Code 00000002 -- Port not present or enabled  
COM4 opened **FAIL** -- Error Code 00000002 -- Port not present or enabled  
COM5 opened **FAIL** -- Error Code 00000002 -- Port not present or enabled  
COM6 opened **FAIL** -- Error Code 00000002 -- Port not present or enabled  
COM7 opened **FAIL** -- Error Code 00000002 -- Port not present or enabled  
COM8 opened **FAIL** -- Error Code 00000002 -- Port not present or enabled  
---END PORT SWEEP---
```

Requested port found. Continuing low-tests.

```
---BEGIN LOW-LEVEL DIAGNOSTICS---  
Low-level open PASS  
Setting communication parameters PASS  
Setting 2400 baud PASS  
Setting 4800 baud PASS  
Setting 9600 baud PASS  
Setting 19200 baud PASS  
Setting 38400 baud PASS  
Setting 57600 baud PASS  
Setting 115200 baud PASS  
Resetting 9600 baud PASS
```

Buffer was ---

```
Ocean Optics Serial A/D - 0  
Low-level close PASS  
---END LOW-LEVEL DIAGNOSTICS---
```

```
---BEGIN MID-LEVEL DIAGNOSTICS---  
SAD_Init on COM1 PASS  
SAD500 firmware version 1020  
Verifying mid-level baud rates  
    2400 baud PASS  
    4800 baud PASS  
    9600 baud PASS  
    19200 baud PASS  
    38400 baud PASS  
    57600 baud PASS  
    115200 baud PASS  
Setting integration time  
    Setting 40 msec PASS  
    Setting 65 msec PASS  
    Setting 90 msec PASS  
    Setting 115 msec PASS  
    Setting 140 msec PASS  
    Setting 165 msec PASS  
    Setting 190 msec PASS  
    Setting 215 msec PASS  
    Setting 240 msec PASS  
Resetting SAD500 PASS  
Verifying integration counter.  
    1 2 3 4 5 6 7 8 9 10
```

```
Acquiring master channel scans.
  Scan 0 returned 1, pixel 500 value 83
  Scan 1 returned 1, pixel 500 value 87
  Scan 2 returned 1, pixel 500 value 86
  Scan 3 returned 1, pixel 500 value 86
  Scan 4 returned 1, pixel 500 value 86
  Scan 5 returned 1, pixel 500 value 83
  Scan 6 returned 1, pixel 500 value 85
  Scan 7 returned 1, pixel 500 value 87
  Scan 8 returned 1, pixel 500 value 80
  Scan 9 returned 1, pixel 500 value 84
Mid-level close PASS
---END MID-LEVEL DIAGNOSTICS---

---BEGIN HIGH-LEVEL DIAGNOSTICS---
Configuring spectrometer and A/D
Verifying baud rates
  Setting 2400 baud PASS
  Setting 4800 baud PASS
  Setting 9600 baud PASS
  Setting 19200 baud PASS
  Setting 38400 baud PASS
  Setting 57600 baud PASS
  Setting 115200 baud PASS
Setting A/D type PASS
Acquiring master channel scans with OOI_DoScan.
  Scan 0 returned 0, value 86.000
  Scan 1 returned 0, value 88.000
  Scan 2 returned 0, value 86.000
  Scan 3 returned 0, value 87.000
  Scan 4 returned 0, value 82.000
  Scan 5 returned 0, value 89.000
  Scan 6 returned 0, value 84.000
  Scan 7 returned 0, value 89.000
  Scan 8 returned 0, value 82.000
  Scan 9 returned 0, value 80.000
Verifying spectrometer channels
  Channel 0 returned 0, value 87.000
  Channel 1 returned 0, value 151.000
  Channel 2 returned 0, value 150.000
  Channel 3 returned 0, value 148.000
  Channel 4 returned 0, value 0.000 -- INVALID DATA
  Channel 5 returned 0, value 0.000 -- INVALID DATA
  Channel 6 returned 0, value 0.000 -- INVALID DATA
  Channel 7 returned 0, value 0.000 -- INVALID DATA
---END HIGH-LEVEL DIAGNOSTICS---
```

Additional Assistance

For additional assistance, please feel free to contact us via e-mail at

TechSupport@OceanOptics.com

or by phone at (727) 733-2447.