![ASU] FLEXIBLE DISPLAY CENTER	Document Owner: Barry O'Brien	Release Date:
Document Title: ECO_RS FTIR Operating Procedure	Document No: FDC-OP-0000000000	Document Rev: 01

SPECIFICATION FORMAT:

EQUIPMENT MANUFACTURER: Thermo Electron

EQUIPMENT MODEL: Nicolet 6700

FDC ASSIGNED TOOL ID NUMBER:

APPLICATION PROGRAM(S) AND REVISION: Windows 2000
Windows XP Professional

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1.0 SCOPE

1.1 The Nicolet 6700 spectrometer collects spectra in the mid-IR, far-IR, and near-IR spectral ranges.

1.2 Manuals

1.3 The Nicolet FT-IR User's Guide.

1.4 Installing OMNIC or EZ OMNIC Guide.

1.5 The Spectrometer Safety Guide.

1.6 On-line tutorials.

1.7 On-line Help.

2.0 EQUIPMENT AND SUPPLIES

2.11 Windows XP Professional**.**

2.12 Microprocessor. Intel Pentium II, 400 MHz (minimum).
2.13 Random access memory (RAM). 128 megabytes (minimum).
2.14 Disk Drives. 2.0 gigabytes (minimum).
2.15 Video. 15-inch SVGA

2.2 Standard Product + Supplies

2.21 Sample to be measured.
2.22 Clean room wipes.
2.23 The spectrometer may be cleaned with a damp (H2O) clean room wipe. Do not use solvents or chemicals of any kind.

2.3 Parts and Consumables List (Supplier Information)

Thermo Fisher Scientific, IR source, Part # 713-020 600

3.0 SAFETY

3.1 Additional Reference Specification

3.11 The Spectrometer Safety Guide.

3.12 Safety glasses must be worn in the cleanroom.
3.13 Latex gloves must be worn in the cleanroom.
3.14 Keep fingers and hands clear of moving parts.
3.15 Do not test flammable or explosive materials.
3.16 Use only nitrogen or dry air to purge.
3.17 Do not touch infrared source housing; it may be very hot.
3.18 Do not place anything on the electronics cover of a Nicolet Avatar spectrometer.
3.19 Never block any of the vents, or the power supply on a spectrometer.
3.20 Never stare into the laser beam or at its bright reflection.

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4.0 PROCEDURES

Thermo Electron ECO/RS FTIR Spectrometer Operating Procedure

4.1 Start OMNIC software:

4.2 From the desktop, double click on the "Eco Research" icon to start the program.

4.3 Collect a background spectrum:

4.4 Click on "Col Bkg" icon on the toolbar.

4.5 Click "OK" on the confirmation screen.

4.6 When background collection is finished, the message "Data Collection Has Stopped" will appear. Click on "yes" to add the scan to the displayed window.

4.7 Collect bare substrate spectrum:

4.8 Click on "ECO" on the toolbar.

4.9 Select "Manual Load" from the pull down menu. The stage will move out.

4.10 When the stage has finished moving, the message "Place Wafer on the Wafer Stage" will appear.

4.11 Load the wafer with the flat toward you; click "OK" in the "Place Wafer" screen. The stage will move back in.

4.12 Collect spectrum:

4.13 Click on the "Col Smp" icon on the toolbar. Enter a name for the sample at the prompt, i.e "A_5_01 Bare Si"

4.14 Click "OK" two times when the message boxes pop up.

4.15 When the spectrum has been collected, the "Data Collection Has Stopped" message box will

4.16 appear. Click "OK" to add the spectrum to the window.

4.17 Unload the sample: click on "ECO" on the toolbar.

4.18 Select "Manual Unload" from the pull down menu. The stage will move out.

4.19 When the stage has stopped moving, the message "Remove Wafer From Wafer Stage" will appear.

4.20 Remove the wafer; click on "OK" on the information box

4.21 Collect Coated Substrate Spectrum:
    4.21.1 Click on "ECO" on the toolbar
    4.21.2 Select "Manual Load" from the pull down menu. The stage will move out.
    4.21.3 When the stage has finished moving, the message "Place Wafer on the Wafer Stage" will appear.

4.21.4 Load the wafer with the flat toward you; click "OK" in the "Place Wafer" screen. The stage will move back in.

4.22 Collect spectrum:

Click on the "Col Smp" icon on the toolbar. Enter a name for the sample at the prompt, i.e. "A_5_01 Bare Si"

4.23 Click "OK" two times when the message boxes pop up.

4.24 When the spectrum has been collected, the "Data Collection Has Stopped" message box will appear. Click "OK" to add the spectrum to the window.

4.24.1 Unload the sample: click on "ECO" on the toolbar.
4.24.2 Select "Manual Unload" from the pull down menu. The stage will move out.
4.24.3 When the stage has stopped moving, the message "Remove Wafer From Wafer Stage" will appear.
4.24.4 Remove the wafer; click on "OK" on the information box.

4.25 Save the data to the appropriate folder:
4.25.1 Select "Edit" from the toolbar; click on "Select All" on the pull down menu to select all the spectra.
4.25.2 Select "File" from the toolbar; click on "Save As" on the pull down menu.
4.25.3 Enter the filename and the location where you want to save the data. Usually, the data should be saved in the appropriate folder in the "Spectra" folder in the following path:

C:\OMNIC\Spectra

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5.0 WEEKLY QUALIFICATION

5.1 Start OMNIC software.

5.2 From the desktop, double click on the "Eco Research" icon to start the program.

5.3 Collect a background spectrum.

5.4 Click on "Col Bkg" icon on the toolbar.

5.5 Click "OK" on the confirmation screen.

5.6 When background collection is finished, the message "Data Collection Has Stopped" will appear. Click on "yes" to add the scan to the displayed window.

5.7 Collect bare substrate spectrum.

5.8 Click on "ECO" on the toolbar.

5.9 Select "Manual Load" from the pull down menu. The stage will move out.

5.10 When the stage has finished moving, the message "Place Wafer on the Wafer Stage" will appear.

5.11 Load the wafer with the flat toward you; click "OK" in the "Place Wafer" screen. The stage will move back in.

5.12 Collect spectrum.

5.13 Click on the "Col Smp" icon on the toolbar. Enter a name for the sample at the prompt, i.e "070820 pre"

5.14 Click "OK" two times when the message boxes pop up.

5.15 When the spectrum has been collected, the "Data Collection Has Stopped" message box will

5.16 appear. Click "OK" to add the spectrum to the window.

5.17 Unload the sample: click on "ECO" on the toolbar.

5.18 Select "Manual Unload" from the pull down menu. The stage will move out.

5.19 When the stage has stopped moving, the message "Remove Wafer From Wafer Stage" will appear.

5.20 Remove the wafer; click on "OK" on the information box.

5.21 Deposit 3k SiN on the wafer. Deposit 3k a-Si on two wafers. Refer to P5000 process specification.

5.22 Collect Coated Substrate Spectrum:
    5.22.1 Click on "ECO" on the toolbar
    5.22.2 Select "Manual Load" from the pull down menu. The stage will move out.
    5.22.3 When the stage has finished moving, the message "Place Wafer on the Wafer Stage" will appear.
    5.22.4 Load the wafer with the flat toward you; click "OK" in the "Place Wafer" screen. The stage will move back in.

5.23   Collect spectrum:

>   Click on the "Col Smp" icon on the toolbar. Enter a name for the sample at the prompt, i.e. "070820 3kSiN"

5.24   Click "OK" two times when the message boxes pop up.

5.25   When the spectrum has been collected, the "Data Collection Has Stopped" message box will appear. Click "OK" to add the spectrum to the window.

>   **5.25.1**   Unload the sample: click on "ECO" on the toolbar.
>   **5.25.2**   Select "Manual Unload" from the pull down menu. The stage will move out.
>   **5.24.3**   When the stage has stopped moving, the message "Remove Wafer From Wafer Stage" will appear.
>   **5.25.4**   Remove the wafer; click on "OK" on the information box.

5.26   Save the data to the appropriate folder:
>   **5.26.1**   Select "Edit" from the toolbar; click on "Select All" on the pull down menu to select all the spectra.
>   **5.26.2**   Select "File" from the toolbar; click on "Save As" on the pull down menu.
>   **5.26.3**   Enter the filename, i.e. "070820". This is the year, the month, then the date. In the "Chamber C" folder and the "Year SiN" folder. The 3k a-Si wafer folder is labeled "Year a-Si".

6.0 ROUTINE MAINTANENCE

6.1   Calibrations

6.1.1   From the desktop, double click on the "Eco Research" icon to start the program.

6.1.2   Click on "Collect" at the top of the screen. See Illustration #1.

Select "Experiment Setup" from the pull down menu.
Select "Bench" located at the top of the page. See Illustration #2.
Select the "circle" for "Min/Max" or "Peak to Peak". See Illustration #3.
Log the requested information into the "FTIR logsheet" located in the folder next to the FTIR.

6.1.3   Select "Diagnostic" located at the top of the page. See Illustration #2.

Click on "Check Desiccant"
The screen at the top should say "Desiccant passed test"
Contact Engineering if it does not pass. There will be a yellow circle.
Click on the "Okay" button in the Check Desiccant window.
Click on the "Okay" button in the Experiment setup window.

6.1.4   Click on "Collect" at the top of the screen.

Select "Advanced Diagnostics" from the pull down menu. See Illustration #2.
Click on "Performance Test" located at the bottom of the page. See Illustration #4.
Follow instructions on the pop-up window that appears.
The Noise Performance test will run two, 36 scans.
Log the requested information into the "FTIR logsheet" located in the folder next to the FTIR.

6.1.5   Click on the Back Arrow. See Illustration #5.

Click on "Advanced Tests". See Illustration #5.

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The Signal to Noise test runs one 256 scan and one 50 scan. See Illustration #6.
Log the requested information into the "FTIR logsheet" located in the folder next to the FTIR.
Click on the close out arrow.

6.1.6 Click on "Collect" at the top of the screen. See Illustration #1.

Select "Advanced Diagnostics" from the pull down menu. See Illustration #4.
Click on "Report" located
View Summary of Power Supply.
Make sure all say "Pass".
Click on "View More".
Click on "Return.
Close out the window.

6.1.7 Collect Background twice. Do not move stage.

Press yes to add to window 1.
Select All.
Save Group in Bench Diagnostics.
Use current date, i.e."070904 100pct stage in."

6.1.8 Click on the "Spectral cursor tool located at the bottom of the screen.

Move cursor to bottom of profile. Log the "y" reading.
Move cursor to top of profile. Log the "y" reading.
Enter data on FTIR logsheet located in the SPC folder. The logsheet will calculate percentage.

6.2 Cleaning

The spectrometer may be cleaned with a damp (H2O) clean room wipe. Do not use solvents or chemicals of any kind.

6.3 Filling and/or Changing

To be performed by maintenance or engineering.

6.4 PM Additional Reference Specification

Refer to Nicolet Service manual.

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7.0 ILLUSTRATIONS AND PHOTOS
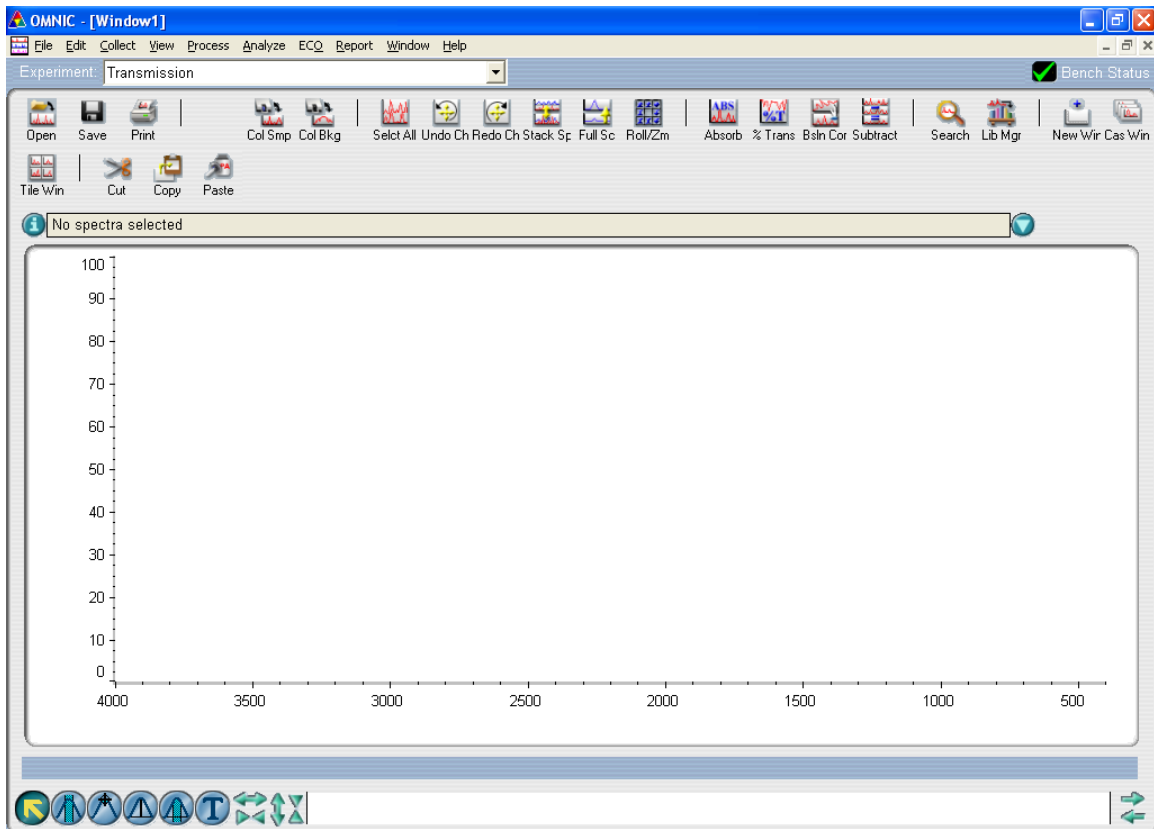
Illustration #1

Illustration #2

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Experiment Setup - C:\OMNIC\Param\eco.exp

Tabs: Collect | **Bench** | Quality | Advanced | Diagnostic | Configure

Max:7.48   Min:-4.02   Loc:1024

○ Min/Max   ○ Peak to peak

1000
Data points

Parameter	Value
Sample compartment	Main
Detector	DTGS TEC
Beamsplitter	KBr
Source	IR
Accessory	None
Window	None
Recommended range	7400 ---- 350
Max range limit	5000
Min range limit	400
Gain:8	Autogain
Velocity	0.6329
Aperture	100
Sample shuttle	☐

Freeze

☐ Single beam
☐ Tone

Help   Open   Save   Save As   OK   Cancel

Illustration #3

Nicolet 6700 Diagnostics V7.2

Nicolet Series Diagnostics

Power   Laser   Source   Electronics   Detector

The above icons represent the main components of the optical bench. If an icon is covered by a red slash mark, that component is malfunctioning. Note that problems may be present even when the red slash mark is absent.   Click the icon to diagnose the problem, check for other error conditions, or to view information about that component.
If you have questions about this diagnostic, call Thermo Electron Customer Support at 1-800-642-6538 if you are in the United States. Outside the U.S., please call your local Thermo Electron service representative.

Performance Test   Report   Help

Illustration #4

Nicolet 6700 Diagnostics V7.2

Click on the detector to run the performance test. The appropriate source will be selected. You must use OMNIC to select a different beamsplitter.

Bench Serial Number: AGB0500434

Selected Beamsplitter: KBr
Selected Detector: DTGS TEC in the back position of the main bench
Available Detectors:
DTGS TEC in the back position of the main bench
PbSe in the internal reference detector

Advanced Tests

Illustration #5

Nicolet 6700 Diagnostics V7.2

Available advanced bench performance tests:

Rapid Scan — Run the rapid scan performance test.

Visible — Run the Visible extended range test (23000-17000). This test requires the blue filter.

Visible — Run the Visible extended range test (25000-24000). This test requires the narrow blue filter.

Signal to Noise — Run Signal to Noise Test

Click on a button to perform its test. Buttons are disabled when an inappropriate beamsplitter is selected in OMNIC.

Illustration #6

Nicolet 6700 Diagnostics V7.2

Signal to Noise Test

DTGS TEC in the back position of the main bench

| Run Test | Choosing the Run Test button runs the signal to noise test for the above detector. The current bench parameters are saved in SERVICE.EXP, which is located in the OMNIC directory. The current parameters will be restored when the test is finished. Remove any samples from the sample compartment.

This test takes several minutes. The table below shows the results of the test. |

Status:

Region	Expected	Actual	Status
(cm-1)	noise	noise	

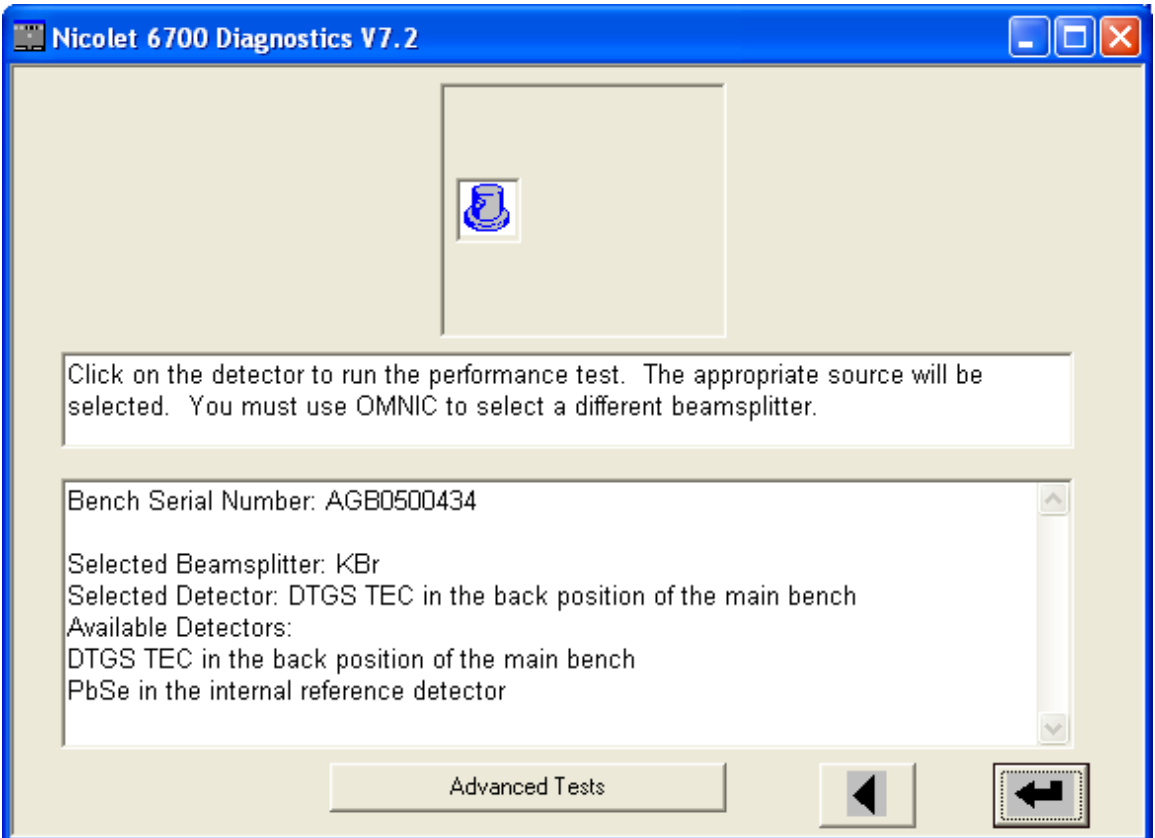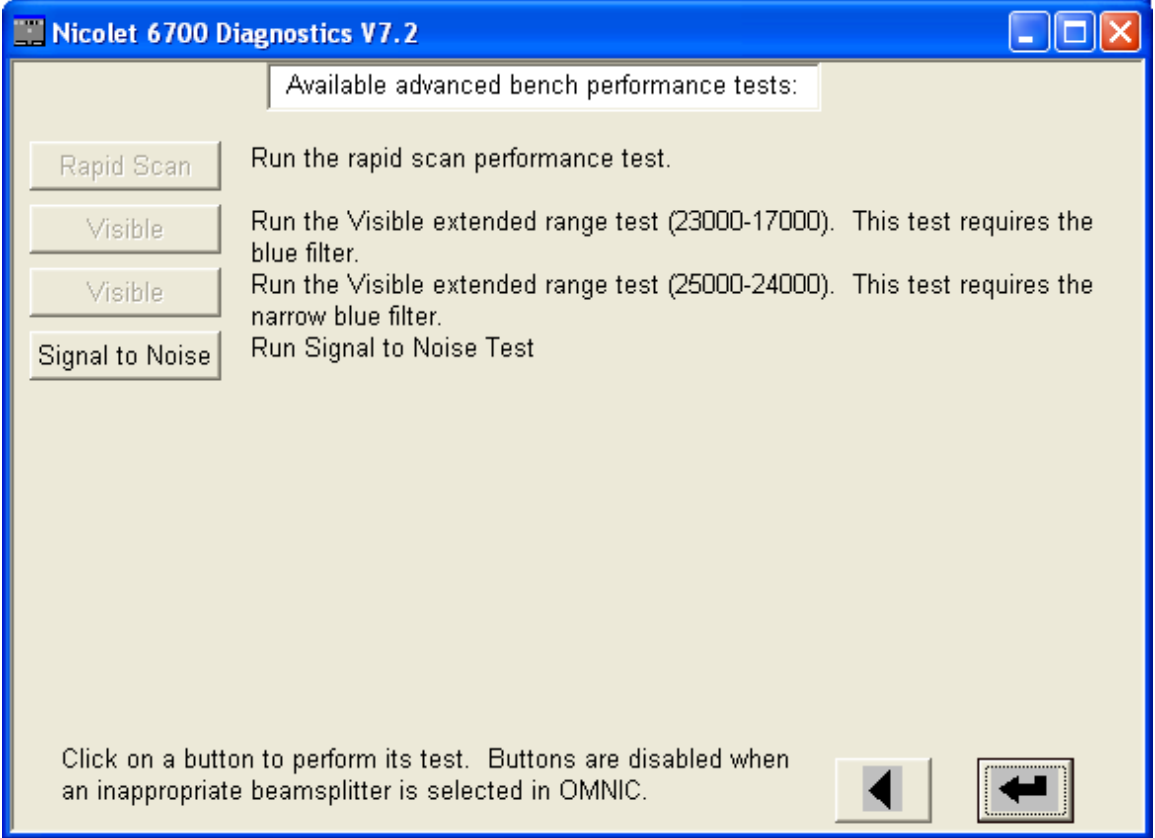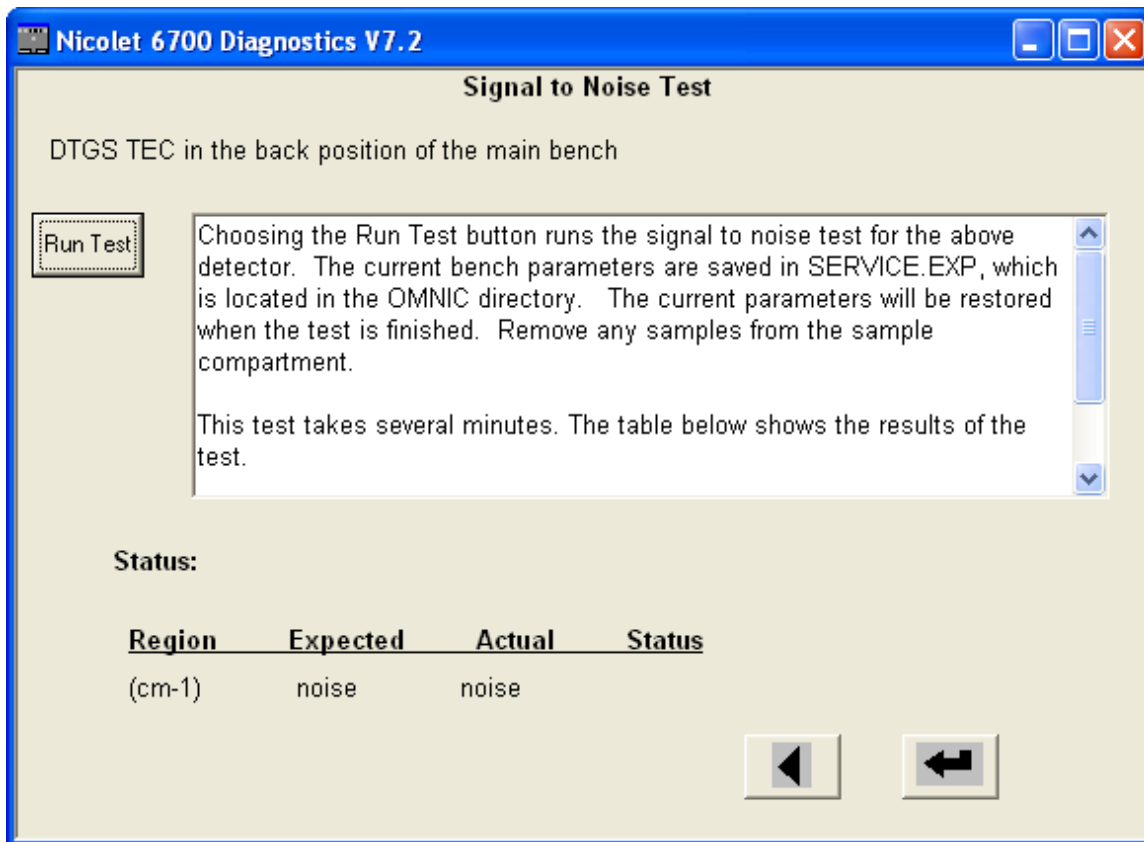**Illustration #7**

8.0 ADDITIONAL REFERENCE SPECIFICATIONS/MATERIAL

Refer to FTIR Logsheet document located in the SPC folder.

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