

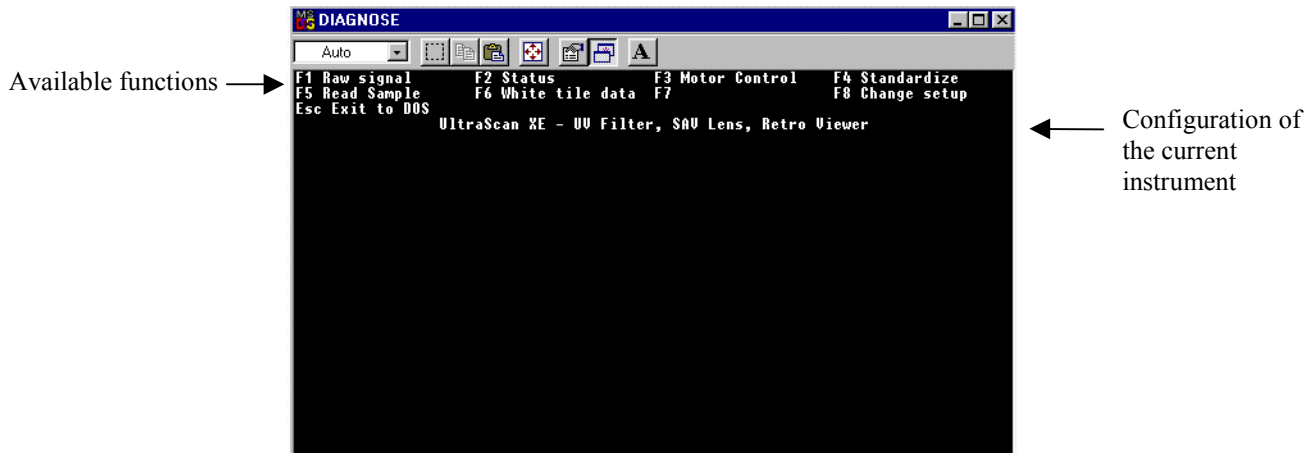
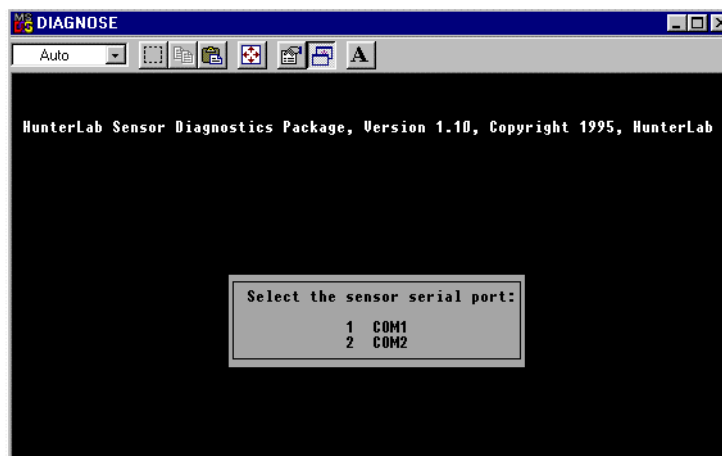
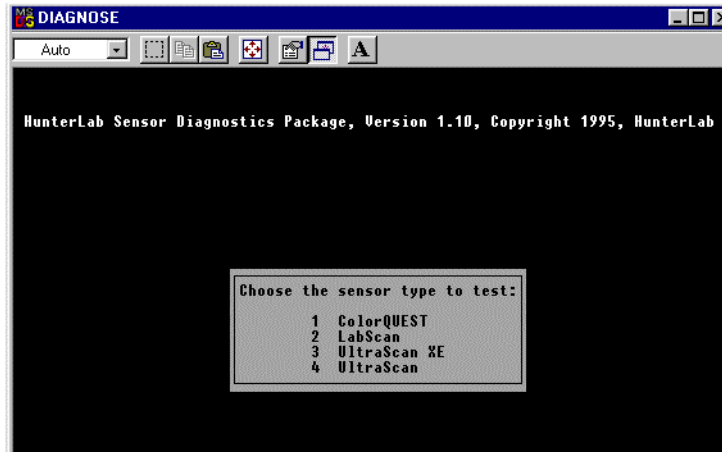
Using DIAGNOSE.EXE with an UltraScan XE

The DIAGNOSE.EXE program, which may be used to assess instrument performance and diagnose potential problems, is installed automatically with HunterLab's Universal and EasyMatch Coatings software packages. For users of other software packages, the program may be forwarded to you from HunterLab Customer Support if a problem with your instrument is suspected. Two files must be installed in the same folder on your computer in order to run the diagnostics: DIAGNOSE.EXE and ENGLISH.DGM.

Perform the following steps periodically to assess instrument performance or if there is any reason to suspect that the instrument is not operating properly.

Perform the following steps to complete all the available diagnostics. If any diagnostic results are outside the stated range, follow the instructions for contacting HunterLab that are given at the end of the procedure.

1. Exit Universal, EasyMatch, or your instrument control software.
2. Clean the white tile as described in your User's Manual. The tile should be dry and at room temperature before use.
3. Locate the DIAGNOSE.EXE program file (in your UNIVERSE or EZMATCH folder if you are using one of those packages) using the Windows File Manager or Windows Explorer. Double-click on the DIAGNOSE name to open the program.
4. On the opening Diagnose screen, choose 3, UltraScan XE, and the serial port to which the instrument is connected. The main menu screen then appears.



5. Press **F1** to perform the **Raw signal test**. Press 3 to select Sample offset only. Type an interval between reads and press Enter. This interval should be short enough that you can examine several measurements quickly, but long enough that you have time to record the values. Five seconds is suggested. Examine and record the raw A/D counts as they are displayed. The sample offset values are the electronic analog values received for the sample channel when there is no signal. All values should be between 1,000 and 1,500 counts. These values may decrease as the sphere and/or lamp dirty or degrade. Performance

problems may be noted when the values reach 15-20% outside this window. Press Insert to return to the Raw signal menu.

W/L	Sample Offset	W/L	Sample Offset	W/L	Sample Offset
360	1115	500	1125	630	1111
370	1128	510	1152	640	1102
380	1121	520	1103	650	1115
390	1135	530	1111	660	1095
400	1108	540	1113	670	1100
410	1118	550	1113	680	1119
420	1115	560	1111	690	1119
430	1115	570	1119	700	1123
440	1122	580	1112	710	1120
450	1134	590	1120	720	1122
460	1107	600	1104	730	1125
470	1118	610	1104	740	1110
480	1112	620	1106	750	1119
490	1111				

<Ins> Re-select Data setup
<Home> Exit Menu

- Press 4 to select Monitor offset only. Choose an interval between reads. Examine and record the raw A/D counts as they are displayed. The monitor offset values are the electronic analog values received for the monitor channel when there is no signal. All values should be between 1,000 and 1,500 counts. These values may decrease as the sphere and/or the lamp dirty or degrade. Performance problems may be noted when the values reach 15-20% outside this window. Press Insert to return to the Raw signal menu.

W/L	Monitor Offset	W/L	Monitor Offset	W/L	Monitor Offset
360	1282	500	1284	630	1299
370	1282	510	1293	640	1325
380	1276	520	1290	650	1303
390	1288	530	1266	660	1281
400	1292	540	1272	670	1298
410	1274	550	1293	680	1299
420	1283	560	1299	690	1291
430	1308	570	1296	700	1309
440	1301	580	1295	710	1297
450	1296	590	1318	720	1312
460	1296	600	1284	730	1312
470	1306	610	1294	740	1297
480	1294	620	1291	750	1284
490	1331				

<Ins> Re-select Data setup
<Home> Exit Menu

- Place the white calibrated tile at the port. Press 1 to select Sample and offset. Choose an interval between reads. Examine and record the sample raw A/D counts as they are displayed. These are the electronic analog values received for the sample channel on reading of the white tile. For the white tile, the highest sample value shown should be between 25,000 and 35,000 counts. Performance problems may be noted when the counts reach 10,000 counts outside this window. Press Insert to return to the Raw signal menu.

DIAGNOSE											
Auto											
F1 Raw signal			F2 Status			F3 Motor Control			F4 Standardize		
F5 Read Sample			F6 White tile data			F7			F8 Change setup		
W/L	Sample	Offset	W/L	Sample	Offset	W/L	Sample	Offset	W/L	Sample	Offset
360	31696	1115	500	22931	1124	630	22418	1111			
370	30475	1127	510	22696	1153	640	20678	1102			
380	21014	1121	520	23180	1103	650	20349	1115			
390	29064	1135	530	26406	1110	660	18054	1095			
400	18762	1107	540	25743	1112	670	16467	1099			
410	21935	1117	550	23469	1112	680	22438	1119			
420	27197	1115	560	22524	1112	690	20904	1119			
430	26011	1114	570	23714	1119	700	18340	1123			
440	26893	1121	580	23015	1111	710	17999	1120			
450	27078	1135	590	23649	1119	720	23507	1122			
460	28048	1107	600	23945	1104	730	23542	1125			
470	27097	1118	610	23477	1104	740	22001	1110			
480	27379	1112	620	22598	1106	750	19793	1118			
490	28029	1111									

<Ins> Re-select Data setup
<Home> Exit Menu

8. Leave the white tile at the port. Press 2 to select Monitor and offset. Choose an interval between reads. Examine and record the sample raw A/D counts. These are the electronic analog values received for the monitor channel on reading of the white tile. The monitor peak should be between 45,000 and 55,000. Performance problems may be noted when the counts reach 10,000 counts outside this window. Press Home to return to the diagnostics menu.

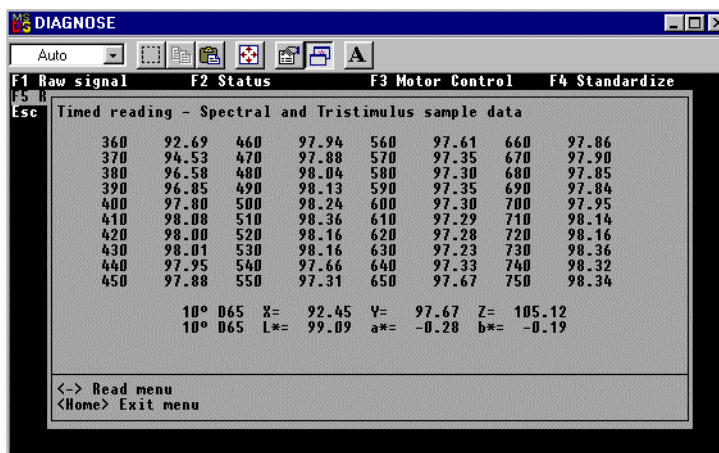
DIAGNOSE											
Auto											
F1 Raw signal			F2 Status			F3 Motor Control			F4 Standardize		
F5 Read Sample			F6 White tile data			F7			F8 Change setup		
W/L	Monitor	Offset	W/L	Monitor	Offset	W/L	Monitor	Offset	W/L	Monitor	Offset
360	20503	1283	500	38232	1284	630	36074	1300			
370	34944	1282	510	37645	1293	640	33054	1324			
380	31496	1277	520	38977	1289	650	32621	1303			
390	46838	1287	530	44344	1266	660	31270	1280			
400	30766	1292	540	42588	1271	670	26479	1297			
410	36092	1274	550	38896	1293	680	33546	1299			
420	45971	1283	560	38007	1299	690	31379	1291			
430	44998	1308	570	38938	1296	700	28440	1308			
440	46354	1301	580	38190	1295	710	27586	1297			
450	46496	1296	590	39050	1317	720	36022	1312			
460	47672	1296	600	39674	1284	730	36277	1311			
470	45201	1306	610	38772	1293	740	33457	1297			
480	46097	1293	620	37343	1291	750	29924	1284			
490	46793	1331									

<Ins> Re-select Data setup
<Home> Exit Menu

9. Press **F2** to check the **instrument status**. Confirm that the RAM, ROM, internal battery, and Flash lamp power supply checks have results of "OK." Record the test results. Press Home to exit the menu.



10. Press **F3** to perform the **Motor Control test**. Check control of the specular exclusion port door (1) by opening and closing the door through the software and visually confirming the position of the door inside the transmission compartment. Also check that the small area view lens is coming into position using the lens motor command (2) if the SAV option is installed and confirm positioning of the UV filter (3), if installed. You will be able to see the specular exclusion door open and close, but you will only be able to listen for the SAV and UV motors and to watch the indicator lights on the front of the instrument. Be sure that the specular exclusion port door is closed, large area view is in use, and all UV filters are out before continuing. Press Home to exit the menu.
11. Press **F4** to **standardize the instrument** in RSIN, RSEX, TTRAN, or RTRAN. Standardization prompts very similar to those seen in Universal Software will be obtained.
12. Press **F5**, **Read Sample**. Press 1 to perform timed readings of a sample. After you enter the measurement interval, the spectral and tristimulus readings of the sample will be shown and continuously updated at the interval selected. Press - on the number pad to return to the Read Sample menu.

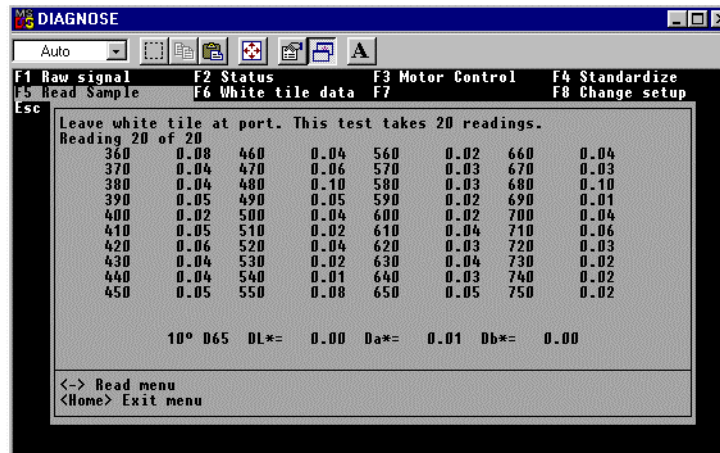


13. Press 2 to perform the Repeatability Test. Place the white calibrated tile at the reflectance port. Press Insert. Twenty reads of the tile will commence and Delta L*, a*, and b* values (between the first and last reading) will be displayed on the screen along with delta values for reflectance at each wavelength read. If any of the Delta L*a*b* values is greater than 0.02 or

if any of the spectral value deltas is outside the following specifications, record the result and contact the HunterLab Field Service Department.

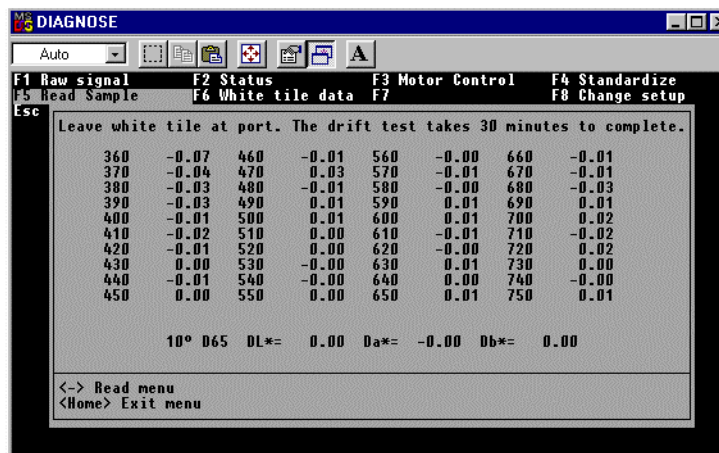
Spectral Data Specifications, Delta, Spectral reflectance:

360 nm	≤0.31
370 nm	≤0.21
380-420 nm	≤0.16
430-680 nm	≤0.08
690-750 nm	≤0.16



Press - on the number pad to return to the Read Sample menu.

14. Press 3 to perform the Drift Test. Place the white tile at the reflectance port, press Insert, and wait 30 minutes for the test to be automatically performed. Delta L*, a*, and b* values will be displayed on the screen (between the first and last reading) along with delta values for reflectance at each wavelength read. If any of these delta values is greater than 0.06 units, record the result and contact HunterLab Customer Support. Press Home to return to the Diagnostics menu.



15. Press **F6** to display the **white tile data** stored in the instrument. Press Home to exit this screen and return to the main menu.

The screenshot shows a window titled "DIAGNOSE" with a menu bar and a main display area. The menu bar includes "Auto" and several icons. The main display area has a header with function keys: F1 Raw signal, F2 Status, F3 Motor Control, F4 Standardize, F5 Read Sample, F6 White tile data, F7, F8 Change setup, and Esc Exit to DOS. Below the header is a table with three columns of data, each with three sub-columns: W/L, RSIN, and RSEX. The table contains 15 rows of data, with W/L values ranging from 360 to 490. At the bottom of the window, there is a prompt: <Home> Exit Menu.

W/L	RSIN	RSEX	W/L	RSIN	RSEX	W/L	RSIN	RSEX
360	93.35	87.92	500	98.19	93.58	630	97.69	93.37
370	94.77	89.40	510	98.22	93.65	640	97.62	93.32
380	95.97	90.73	520	98.23	93.70	650	97.56	93.30
390	96.94	91.81	530	98.23	93.72	660	97.56	93.30
400	97.64	92.55	540	98.21	93.72	670	97.64	93.40
410	97.95	92.95	550	98.20	93.70	680	97.70	93.52
420	98.04	93.13	560	98.14	93.70	690	97.77	93.55
430	98.08	93.19	570	98.13	93.69	700	97.80	93.60
440	98.04	93.21	580	98.09	93.68	710	97.79	93.64
450	98.04	93.25	590	98.05	93.66	720	97.80	93.59
460	98.07	93.34	600	97.98	93.61	730	97.77	93.62
470	98.11	93.41	610	97.90	93.54	740	97.76	93.59
480	98.12	93.47	620	97.78	93.46	750	97.72	93.59
490	98.16	93.53						

16. Press **F8** to **change the sensor type** for diagnostic testing. You will obtain the same selection screen listing the instruments that was shown when the software was first entered.

17. When all diagnostics are complete, press Esc to exit the diagnostics program.

If any of these diagnostics indicates a problem, contact HunterLab Customer Support at (703) 471-6870 and describe the tests performed and the exact results obtained.

If the sensor passes all diagnostics, enter your software package, standardize the UltraScan XE, and commence normal operation.

Other Diagnostics for the UltraScan XE

Several diagnostic procedures are described in your instrument User's Manual and may also be used to assess instrument operation and performance. These tests are performed within your normal software package.

- **White Tile Check:** Standardize the instrument in RSIN mode using large area view with all UV filters out/nominal. Set your data display to show XYZ values using the D65 illuminant and 10° observer. Read the white calibrated tile and compare the values read to those shown on the standards card. All values read should be within ± 0.05 units of the values shown on the standards card immediately after standardization of the instrument. If any of the values are out of this specification, clean the white tile and read it again.
- **Green Tile Check:** Standardize the instrument in RSIN mode using large area view with all UV filters out/nominal. Set your data display to show XYZ values using the D65 illuminant and 10° observer. Read the green calibrated tile and compare the values read to those shown on the back of the tile. All values read should be within ± 0.15 units of the values on the back of the tile immediately after standardization of the instrument. If any of the values are out of this specification, clean all the tiles and perform the test again. More complete instructions on checking the green tile are given in your User's Manual.
- **Didymium Filter Check:** Perform the didymium filter check as described in your User's Manual.

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