

Using DIAGNOSE.EXE with a ColorQuest Sphere

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. Three files must be installed in the same folder on your computer in order to run the diagnostics: DIAGNOSE.EXE, ENGLISH.DGM, and CQ####.CAL, the instrument calibration file.

Note: Only one ColorQuest calibration file, the one matching the instrument to be tested, may be located in the folder containing DIAGNOSE.EXE while the program is in use.

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 and gray tiles as described in your User's Manual. The instrument and lamp should be warm before running the diagnostics. The standard tiles should be dry and at room temperature.
- 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 screens, choose 1, ColorQUEST, and the serial port to which the instrument is connected. The main menu screen then appears.



5. Place the white calibrated tile at the reflectance port. Press F1 to perform the Signal strength test. The raw A/D counts for the white tile are then displayed for each measurement wavelength. The highest A/D value shown should be between 32,768 and 45,875. Press Home to exit the menu.

Auto Image: Construct of the structure F3 Read Sample F4 Tile Date 1 Signal strength F2 Standardize F3 Read Sample F4 Tile Date 5 F6 F7 Read Sample F4 Tile Date 5 Scitt to DOS ColorQUEST - Sphere, A/D = Fast ColorQUEST - Sphere, A/D = Fast 5 SAMPLE SIGNAL STRENGTH 11623 498 22183 576 31239 650 224 140 11623 498 22183 578 31223 650 20 420 16471 508 31247 650 22 640 244 430 17797 518 2655 598 3167 640 18 446 21897 548 31283 640 31367 640 18 456 22387 548 31283 620 32967 798 21 450 22387 548 31285	_ 🗆
1 Signal strength F2 Standardize F3 Read Sample F4 Tile Date 5 F6 F7 F8 ColorQUEST Sphere, A/D = Fast F8 Change 5 ColorQUEST - Sphere, A/D = Fast SaMPLE SIGNAL STRENGTH 400 11717 480 24663 560 29573 640 24 410 11623 490 27183 570 31239 650 22 420 16471 500 24119 580 31271 660 20 430 17797 510 26559 590 31267 680 18 440 2131 520 24447 600 31367 680 18 440 27191 540 2563 620 29915 700 24 420 25819 540 25803 620 29915 700 24	
Sec Exit to DOS ColorQUEST - Sphere, A/D = Fast ColorQUEST - Sphere, A/D = Fast SAMPLE SIGNAL STRENGTH 400 11717 480 24663 560 29573 640 244 410 11623 490 27183 570 31239 650 224 420 16471 500 24119 580 31271 660 209 430 17797 510 26559 590 31267 680 18 440 21911 520 24445 600 31367 680 18 460 22191 540 29563 620 29915 700 18 460 22191 540 29563 620 29915 700 18 470 22819 540 29563 620 29915 700 18	a Menu
Contrologist - sphere, Arb = Past SAMPLE SIGNAL STRENGTH 400 11717 480 24663 560 29573 640 241 410 11623 490 27183 570 31239 650 220 420 16471 500 24119 580 31271 660 200 430 17797 510 26559 590 31672 680 18 440 21911 528 24447 600 31367 680 18 460 22817 540 32553 620 29915 709 81 470 22817 549 32563 620 29915 709 14	ecup
SAMPLE SIGNAL STRENGTH 400 11717 480 24663 560 29573 640 24 410 11623 490 27103 570 31239 650 22 420 16471 500 24119 580 31271 660 20 430 17797 510 26559 590 31267 668 18 440 2191 520 28447 600 31367 680 18 450 22887 540 31563 610 39615 706 21 470 22819 559 31563 610 39615 706 24	
490 11717 480 24663 560 29573 640 24 410 11623 490 27103 570 31239 650 22 420 16471 500 24119 580 31271 660 20 430 17797 518 26559 590 31267 668 18 440 2191 528 24447 640 31367 668 18 450 22887 544 32563 620 39915 706 24 470 22819 554 31571 630 29915 716 14	
410 11623 490 27103 570 31239 650 221 420 16471 500 24119 580 31271 660 200 430 17797 518 26559 590 3127 668 200 440 2191 528 28447 640 31367 688 18 460 22897 540 32563 620 39915 700 28 460 23897 548 32583 620 39915 700 28 450 22887 549 32583 620 39915 700 28 470 22887 540 32583 620 39915 700 28	829
448 17777 518 26577 578 32167 678 21 448 21777 518 26577 578 32167 689 31 469 22191 528 2445 609 31667 689 18 469 22887 548 312683 629 39575 718 14 479 25319 548 31671 638 27815 718 14	395 983
450 23911 530 31255 610 30567 690 22 460 22887 540 29503 620 29015 700 18 470 25319 550 31671 630 27015 710 14	991 973
	175 207 263
	505
dlaway Evit waay	

6. Place the black card over the lens in the transmission compartment and press **F1** again. All of the A/D values should be between 655 and 2,621. Press Home to exit the menu.

DIAGNO	DIAGNOSE										
Auto			11	A							
-1 Signal -5 Esc Exit 1	strength to DOS	F2 Standar F6 Color	dize QUEST - S	F3 Read : F7 Sphere, A/[Sample D = Fast	F4 Tile F8 Chan	Data Menu ge setup				
SAMPLE S	SIGNAL STRE	NGTH									
400 410 420 430 440 450 460 470	914 930 921 913 922 929 921 928	480 490 510 520 530 540 550	925 923 928 927 930 929 931 933	560 570 590 600 610 620 630	927 929 922 930 922 921 921 920 924	640 650 670 680 690 700 710	923 928 919 930 927 931 923 938				
<home> E</home>	Exit menu										

7. Press **F2** to **standardize the instrument** in RSIN mode. Standardization prompts very similar to those seen in Universal Software will be obtained. Press Insert after completing the instructions described by each prompt.



Auto Image: Second		_ 🗆 >
Signal strength F2 Standardize F3 Read Sample F4 Tile Data Menu Sc Exit to DOS ColorQUEST - Sphere, A/D = Fast Place the Calibrated White tile at the sample port (Ins> - Read White Tile (Home> - Exit without calibrating Signal strength F2 Signal strength F2 Signal strength F2 Signal strength F2 Sc Exit to DOS ColorQUEST - Sphere, A/D = Fast	Auto 🖸 🗈 🖻 🚯 🚱 🗳 🕂 🗛	
Place the Calibrated White tile at the sample port <ins> - Read White Tile <home> - Exit without calibrating SDIAGNOSE Auto I Signal strength F2 Standardize F6 Sc Exit to DOS ColorQUEST - Sphere, A/D = Fast Place the Calibrated Gray tile at the sample port <ins> - Read Gray Tile <home> - Exit without calibrating</home></ins></home></ins>	1 Signal strength F2 Standardize F3 Read Sample 5 F6 F7 sc Exit to DOS ColorQUEST - Sphere, A/D = Fast	F4 Tile Data Menu F8 Change setup
Class - Read white Tile (Ins> - Exit without calibrating Auto Signal strength F3 Read Sample F4 Tile Data Menu F5 F6 F7 F8 ColorQUEST - Sphere, A/D = Fast Place the Calibrated Gray tile at the sample port (Ins> - Read Gray Tile (Home> - Exit without calibrating	Disco the Coliberted White tile at the samele post	
<pre>Ins> - Read white Tile (Home> - Exit without calibrating) DIAGNOSE Auto Auto Signal strength F2 Standardize F3 Read Sample F4 Tile Data Menu F8 Change setup Sc Exit to DOS ColorQUEST - Sphere, A/D = Fast Ins> - Read Gray Tile (Ins> - Read Gray Tile (Home> - Exit without calibrating</pre>	Prace che campraceu white the at the sample port	
DIAGNOSE Auto Signal strength F2 Standardize F3 Read Sample F4 Tile Data Menu F8 Change setup Sc Exit to DOS ColorQUEST - Sphere, A/D = Fast Place the Calibrated Gray tile at the sample port <ins> - Read Gray Tile <home> - Exit without calibrating</home></ins>	<ins> - Read White Tile <home> - Exit without calibrating</home></ins>	
DIAGNOSE Auto Auto Signal strength F2 Standardize F3 Read Sample F4 Tile Data Menu F8 Change setup Sc Exit to DOS ColorQUEST - Sphere, A/D = Fast ColorQUEST - Sphere, A/D = Fast Place the Calibrated Gray tile at the sample port <ins> - Read Gray Tile <home> - Exit without calibrating</home></ins>		
Auto Image: Second		
SDIAGNOSE Image: Strength F2 standardize F3 Read Sample F4 Tile Data Menu F7 1 Signal strength F2 standardize F3 Read Sample F6 Change setup Sc Exit to DOS F4 Tile Data Menu F8 Change setup F8 Change setup Sc Exit to DOS Sc Exit to DOS ColorQUEST - Sphere, A/D = Fast Place the Calibrated Gray tile at the sample port <ins> - Read Gray Tile <home> - Exit without calibrating</home></ins>		
DIAGNOSE Image: Sector of the sample of		
Auto Image: Constraint of the symple F4 Tile Data Menu 1 Signal strength F2 Standardize F3 Read Sample F4 Tile Data Menu 1 Signal strength F2 Standardize F3 Read Sample F4 Tile Data Menu sc Exit to DOS ColorQUEST - Sphere, A/D = Fast Place the Calibrated Gray tile at the sample port <ins> - Read Gray Tile <home> - Exit without calibrating</home></ins>		
Auto Image: Constraint of the symple F4 Tile Data Menu 1 Signal strength F2 Standardize F3 Read Sample F4 Tile Data Menu 1 Signal strength F2 Standardize F3 Read Sample F4 Tile Data Menu 5 Sc Exit to DOS ColorQUEST - Sphere, A/D = Fast Place the Calibrated Gray tile at the sample port <ins> - Read Gray Tile <home> - Exit without calibrating</home></ins>		
DIAGNOSE Image: Constraint of the symple F4 Tile Data Menu F8 change setup 1 Signal strength F2 standardize F3 Read Sample F4 Tile Data Menu F8 change setup sc Exit to DOS ColorQUEST - Sphere, A/D = Fast Place the Calibrated Gray tile at the sample port <ins> - Read Gray Tile <home> - Exit without calibrating</home></ins>		
Auto Image: Constraint of the standardize F3 Read Sample F4 Tile Data Menu F8 1 Signal strength F2 Standardize F3 Read Sample F4 Tile Data Menu F8 1 Signal strength F2 Standardize F3 Read Sample F4 Tile Data Menu F8 1 Signal strength F6 ColorQUEST - Sphere, A/D = Fast ColorQUEST - Sphere, A/D = Fast Place the Calibrated Gray tile at the sample port <ins> - Read Gray Tile <home> - Exit without calibrating</home></ins>		_ 🗆 >
1 Signal strength F2 Standardize F3 Read Sample F4 Tile Data Menu F8 Change setup Sc Exit to DOS ColorQUEST - Sphere, A/D = Fast Place the Calibrated Gray tile at the sample port <ins> - Read Gray Tile <home> - Exit without calibrating</home></ins>	Auto 💽 🖻 🛱 🔂 🖆 💾 🗚	
SC Exit to DOS ColorQUEST - Sphare, A/D = Fast Place the Calibrated Gray tile at the sample port <ins> - Read Gray Tile <home> - Exit without calibrating</home></ins>	1 Signal strength <mark>F2 Standardize F</mark> 3 Read Sample 5	F4 Tile Data Menu F8 Change setup
Place the Calibrated Gray tile at the sample port <ins> - Read Gray Tile <home> - Exit without calibrating</home></ins>		
Place the Calibrated Gray tile at the sample port <ins> - Read Gray Tile <home> - Exit without calibrating</home></ins>	sc Exit to DOS ColorQUEST - Sphere, A/D = Fast	
<ins> - Read Gray Tile <home> - Exit without calibrating</home></ins>	sc Exit to DOS ColorQUEST - Sphere, A/D = Fast	
<pre><ins> - Kead Gray Tite <home> - Exit without calibrating</home></ins></pre>	sc Exit to DOS ColorQUEST - Sphere, A/D = Fast Place the Calibrated Gray tile at the sample port	
	ColorQUEST - Sphere, A/D = Fast	
	ColorQUEST - Sphere, A/D = Fast Place the Calibrated Gray tile at the sample port <ins> - Read Gray Tile <home> - Exit without calibrating</home></ins>	
	sc Exit to DOS ColorQUEST - Sphare, A/D = Fast Place the Calibrated Gray tile at the sample port <ins> - Read Gray Tile <home> - Exit without calibrating</home></ins>	
	sc Exit to DOS ColorQUEST - Sphare, A/D = Fast Place the Calibrated Gray tile at the sample port <ins> - Read Gray Tile <home> - Exit without calibrating</home></ins>	
	sc Exit to DOS ColorQUEST - Sphare, A/D = Fast Place the Calibrated Gray tile at the sample port <ins> - Read Gray Tile <home> - Exit without calibrating</home></ins>	
	sc Exit to DOS ColorQUEST - Sphare, A/D = Fast Place the Calibrated Gray tile at the sample port <ins> - Read Gray Tile <home> - Exit without calibrating</home></ins>	

8. Place a sample or tile at the reflectance port and press F3, Read Sample. Press 1 to perform timed readings of the sample. 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 note the values. Five seconds is suggested. 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.

Me DI	AGNO	SE														-	□ ,
Aı	ito	•	l P		•			\mathbf{A}									
1 S'	ignal	streng	th	F2 St	andar	dize		F3 P	ead (Samp	le		F4	Tile	Data	a Mer	nu
Esc	Timed	readi	ng -	Spec	tral	and	Trist	imulı	us sav	mple	data	a, a	it 5	seco	onds		
		400 410 420 430 440 450 460 470 480 490 500	65. 78. 83. 84. 85. 85. 85. 85. 85. 85. 85. 86.	76 95 51 42 81 15 50 78 93 93 12		510 520 540 550 560 570 580 590 600 610	86. 85. 85. 85. 85. 85. 85. 85. 85. 85. 85	26 12 95 87 82 .62 .34 .07 .96 .75		62(63) 64(65) 66(67) 68(69) 70) 71)	0 0 0 0 0 0 0 0 0	84. 84. 84. 84. 83. 83. 83. 83.	69 50 47 20 12 99 81 55 12				
			10° 10°	D65 D65	X= L*=	80 94	.66 .14	Y= a*=	85. -0.	59 98	Z= b*=	91 C	. 12				
	<-> R <home< th=""><th>ead me > Exit</th><th>nu men</th><th>u</th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th></home<>	ead me > Exit	nu men	u													

9. 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 readings) will be displayed on the screen along with delta values for reflectance at each wavelength read. If any of the spectral value deltas is outside the following specifications, record the result and contact HunterLab Customer Support. Spectral Data Specifications, Delta, Spectral reflectance:

Should be <0.16 at 400, 410, 700, and 710 nm

Should be <0.11 at all other wavelengths.



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

10. 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 (between the first and last readings) will be displayed on the screen along with delta values for reflectance at each wavelength read. If any of the delta values for L*a*b* are greater than ±0.10 unit, record the result and contact HunterLab Customer Support. Press Home to return to the diagnostics menu.

DI,	AGNO	DSE											-	□,
Au	to	•		r) (B 🚯	ľ	B	\mathbf{A}						
Si	gnal	str	engt	n F2 F6	Standa	rdize		F3 F7	Read	Sample	F4 F8	Tile Da Change	ata Mer setup	hu
	Test	is 400 410 420 430 440 450 460 470 480 490	comp [*])))))))	0.28 0.22 0.19 0.14 0.09 0.07 0.06 0.04 0.00 0.01	Follow	ing is 510 520 530 540 550 550 560 570 580 590 600	the 0 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0	dif .02 .00 .02 .03 .03 .03 .03 .03 .04 .04	feren	ce data 620 630 640 650 660 670 680 690 700 710	from th -0.04 -0.03 -0.03 -0.06 -0.09 -0.15 -0.20 -0.26 -0.29	e read [:]	ings.	
	<-> <hom< th=""><th>Read e> E</th><th>) d menu Exit r</th><th>0.01 10° D6 J menu</th><th>55 DL*</th><th>610 = -0.</th><th>-0</th><th>.05 Da*=</th><th>0.</th><th>01 Db*:</th><th>= -0.07</th><th></th><th></th><th></th></hom<>	Read e> E) d menu Exit r	0.01 10° D6 J menu	55 DL*	610 = -0.	-0	.05 Da*=	0.	01 Db*:	= -0.07			

11. Press **F4** to display the **white and gray tile data** stored in the instrument. Press 1 to display the RSIN data and then Home to exit to the diagnostics menu.

DIAGNOSE						- 🗆 ×
Auto 🔹 🦳	ra 🔒 🗄	1	A			
F1 Signal strengt F5	h F2 Stan	dardize	F3 Read	Sample	F4 Ti	le Data Menu ange setup
Esc Exit to DOS	R W/L Wh 400 65 410 788 420 83 420 83 430 84 440 85 450 85 450 85 470 85 470 85 480 86 510 86 510 86 520 86 530 86 550 86 55	SIN RSIN ite Gray .11 53.27 .79 54.67 .51 54.15 .56 53.85 .53 53.59 .31 53.51 .53 53.47 .79 53.61 .88 53.79 .05 53.84 .11 54.12 .20 54.25 .20 54.25 .20 54.25 .20 54.29 .23 53.71	W/L 560 570 580 610 620 630 640 650 660 660 670 680 690 710	RSIN White 86.16 85.97 85.48 85.48 85.03 84.74 84.60 84.30 84.30 84.33 84.36 84.40 84.33 84.36 84.40	RSIN Gray 53.54 53.20 52.83 52.46 52.26 52.01 51.80 51.73 51.65 51.65 51.61 51.61 51.61 51.61 51.61 51.61 51.61	
	<home> Exi</home>	t Menu				

12. Press F4 again. Press 2 to display the RSEX data and then Home to exit to the diagnostics menu.

DIAGNOSE							- 🗆 ×
Auto 💽		•	18	\mathbf{A}			
F1 Signal streng	th F2 St	andardi	ze	F3 Read	Sample	F4 Ti	le Data Menu
ËSC EXIT to DOS	W/L 400 410 420 430 440 450 460 470 480 500 510 520 520 530 530 550	RSEX White 60.29 73.65 78.20 79.33 79.77 80.11 80.33 80.52 80.84 80.86 81.03 80.86 81.03 81.11 81.14	RSEX Gray 48.64 49.66 48.99 48.86 48.54 48.54 48.54 48.54 48.54 48.72 49.13 49.21 49.21 49.21 49.21 49.21	W/L 560 570 590 600 620 630 640 650 660 670 670 690 700 710	RSEX White 81.13 80.98 80.72 80.28 80.28 80.28 80.28 80.29 79.97 79.54 79.52 79.52 79.52 79.55	RSEX Gray 48.69 48.61 47.62 47.47 47.10 46.71 46.71 46.82 46.97 46.97 46.76 46.776	ange secup
	<home> E</home>	xit Men	u				

- 13. Press **F8** to **change the setup** for diagnostic testing. You will obtain the same selection screen listing the instruments that was shown when the software was first entered.
- 14. 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 ColorQuest, and commence normal operation.

Other Diagnostics for the ColorQuest Sphere

Several diagnostic procedures are described in your instrument's 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 the UV filter out. Set your data display to show absolute 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. If any of the values are out of this specification, clean the white and gray tiles and standardize and read again.

• Green Tile Check: Standardize the instrument in RSIN mode using large area view with the UV filter out. Set your data display to show absolute 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 between ±0.30 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.

For Additional Information Contact:

Technical Services Department Hunter Associates Laboratory, Inc. 11491 Sunset Hills Road Reston, Virginia 20190 Telephone: 703-471-6870 FAX: 703-471-4237 www.hunterlab.com