SERVICE/CALIBRATION REPORT on Thessaloniki Brewers - July/2002

By: Ken Lamb, Int'l Ozone Services Inc. Gr-cal02.doc Dec. 30, 2002

The main purpose of visit was to replace optical gratings in MKIII Brewer #086 so that hopefully the sensitivity would increase. Due to the extended time this testing and change took, the calibration checks were very limited with #086. However the calibration status of Greece Brewers #005, #001, and #041 was completed against traveling standard #017 from July 18-21 at the University of Thessaloniki. Just after this visit #005 was used as reference to establish new extraterrestrial (ETC) constants for #086.

Test Results, (reference graphs and data files):

Sun scan tests identified that #005 needed -2 steps adjustment (from 158-156), i.e. standard operating wavelength position. Dispersion tests using mercury and cadmium lamp lines was again completed on #005. It was determined from these test results that wavelength accuracy could be improved by 6 steps with use of the new dispersion constants, (dcf20202.005). Reference dispersion processing in file LF20202f.005 and new slit file dcf20202.005.dwl containing slit width information for #005.

Dispersion data from #086 (day 27602) was evaluated and it was found lines 325 and 328 could not be used. The data from HG line 296.7 nm was poor also and should be re-done and as well the Cd line 361 nm be scanned with slit 5. Sun scans should be done as well to determine if step 1028 is proper. IOS offers to help evaluate results.

Ozone Calibration Summary for #005 and #086 - July/02:

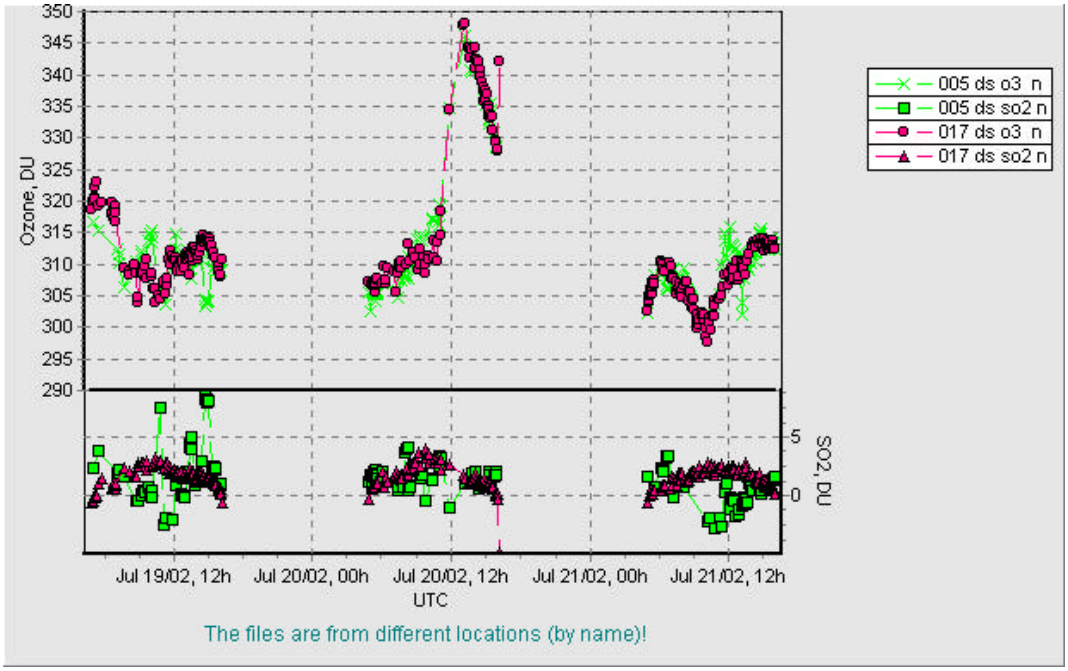
Reference daily mean results of #005 and #017 in file ozoavg2002.005 and graphs on next page. The results with existing constants ETC's = 3020/3200, absn.: .33366, 1.1065 and SL ratios - R6/R5 1765/3410, had quite good agreement to #017. A further analysis was done with the new ozone absorption coefficient of .3426 at step 156 from dispersion test and then the ETC for ozone had to set to 2973. However the results did not agree any better and so no changes are recommended to the constants for #005 which were last established in July 2000 versus #017. Note that in 2000 the SL ratios were 1785/3455 and it is unusual that this difference did not have to be applied to the ETC's. The dead time (DT) results now are lower and perhaps should be taken into account. It is suggested that DT be measured with higher signal levels to evaluate what proper constant should be. The DUV results from #005 were about 15% less than #017.

Data from after this visit was processed using #005 as reference and ETC constants for #086 were calculated as follows: ETC's = 1912 / 228, absn.: .3476, 1.1636, when R6/R5 = 635/830. Some data after day 28302 show the ratios at 610/785 and so the ETC constants should be adjusted down 25/55 units.

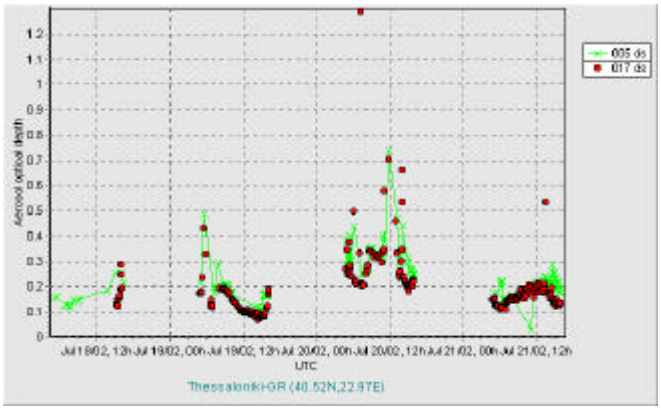
Servicing, software and Recommendations:

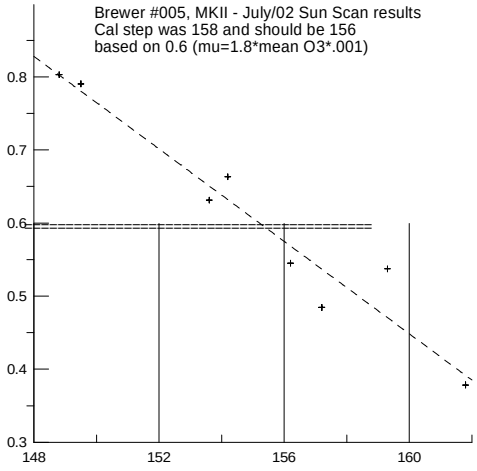
The new gratings in #086 did not improve sensitivity much and so only one was left installed. Delays were experienced due to difficulties with alignment tools and screw adjustment. The micrometer gears were cleaned on both instruments and pushrods lubricated. The rubber seals under shock mounts of #005 were replaced. Both instruments have some temperature dependency that should be investigated with a series of standard lamp tests over a wide temperature range.

Version 375c software was provided and should be evaluated, especially DT routine on #086 which has been modified to remove diffuser in FW#1. The microboard in #086 was replaced with and an IOS uart microboard (9600 baud communications) and old board installed into #041.



Aerosol Optical Depth calibration was transferred to #005 and the good results are shown below, AOD at 320 nm.





SERVICE/CALIBRATION REPORT on Greece Brewers #001 and #041- July/2002

Initial Status and servicing completed:

#001 was operating but with poor lamp test results. The standard lamp was replaced and zenith prism gear aligned to get better results. The instrument's stability has been poor since this calibration and the PMT filter is suspected to need replacement in the future.

#041 had poor shutter operation and high dark counts. The shutter was aligned and photon counter replaced to fix these problems. Then the test results were quite normal.

Test Results, (reference graphs and data files):

Sun scan tests identified that #001 needed -2 steps adjustment (from 158-156), i.e. standard operating wavelength position. For #041 the sun scans showed that step 161 is proper and was set for use in file icf20202.041 and the dead time was set to measured values of 37ns.

Dispersion tests using mercury and cadmium lamp lines was completed on both instruments and results stored in files beginning with (dcf) and (lf) for day 20202. The zero constant on #001 was adjusted from 4269 to the more standard 3469 before the dispersion test.

Ozone Calibration Summary for #001 and #041 - July/02:

Data from day 20102 showed good agreement (reference graph next page) between #001 and #017, using the following new constants: ETC's = 3210 / 3200, absn.: 0.3393 / 1.146, when SL ratios were R6/R5 = 2125/3755. The absorption coefficients were from dispersion test result at step 158, reference file lf20202.001. The next day the ratios increased by 25 units in the middle of day for unknown reasons – note the ozone results in graph on next page. Two weeks later the ratios were down by –75/-150 units and so it is expected that the ETC constants will need to be adjusted frequently in the future to correct results.

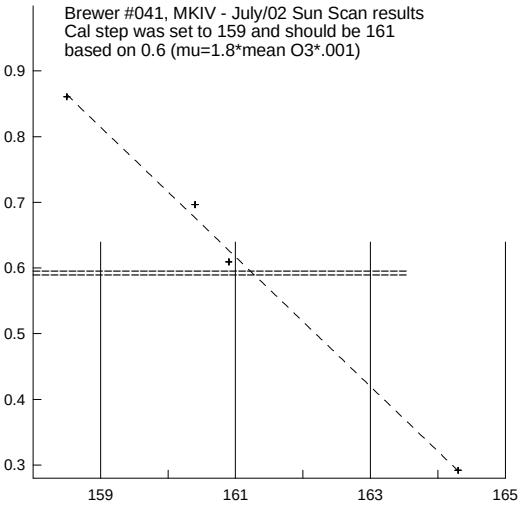
Due to shortage of trackers #041 had limited data collected, however constants were established from day 20202 as follows: ETC's = 3025 / 2794, absn.: 0.3418 / 1.144, when SL ratios were R6/R5 = 2140 / 3900. The absorption coefficients were from dispersion test results at step 161, reference file lf20202f.041.

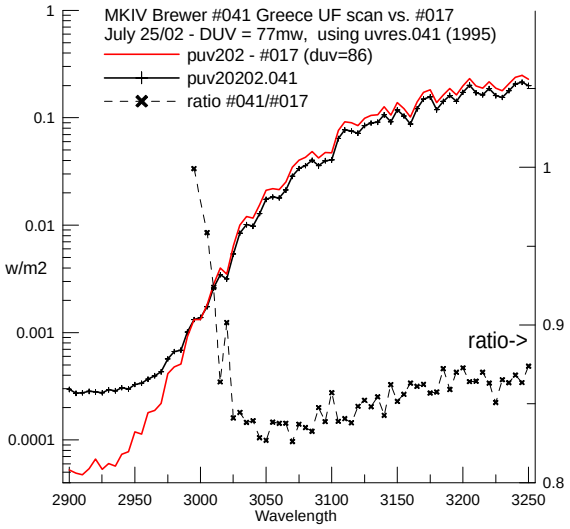
The graph of UV scan results from #041 and #017 on next page shows good wavelength agreement but indicates the absolute calibration should be improved. Note this instrument has been modified and scans up to 363nm with UX command.

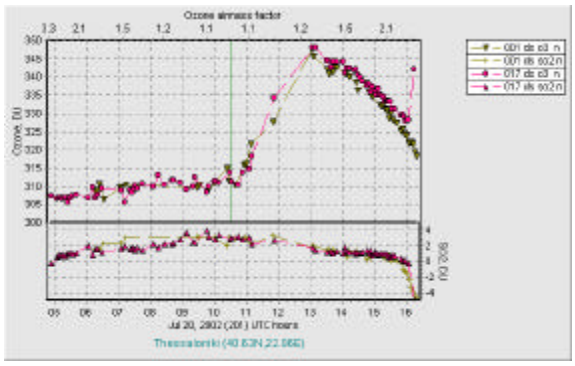
Servicing, software and Recommendations:

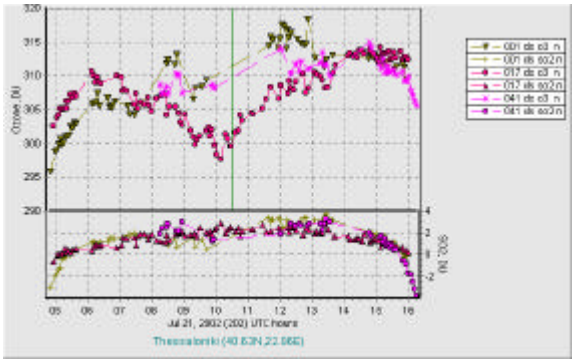
The micrometer gears were cleaned on both instruments and pushrods lubricated. The rubber seals under shock mounts should be replaced to reduce humidity input. Version 375c software was provided which includes provision for use of QL (quick lamp) routine which is especially useful with extended range scanning instruments. The program SETDATE.exe is recommended for use if using windows software and be called in startup batch file (brewer.bat) so that date is set properly in Brewer software.

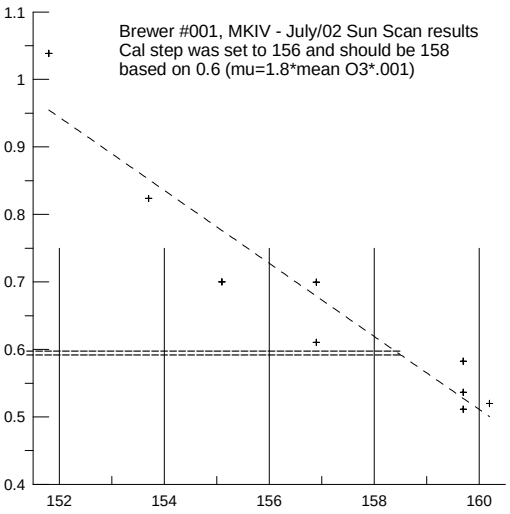
It appears as stated earlier that #001 will need a new PMT filter in the near future to make more stable.











Below is AOD from #001 and #017 at 320nm. for the three days using transferred etc constants, new dispersion constants i/c slit width data.