

### 3.4.3 NAC COLLIMATOR

*Updated version of Reference 3.4.3-1*

**Reference 3.4.3-1 - "NAC Collimator" write-up, David I. Brown**

**Reference 3.4.3-2 - NAC Collimator Throughput Data, B. Wallis & K. Manatt, Sept. 22, 1997**

#### 3.4.3.1 NAC COLLIMATOR DESCRIPTION

The NAC collimator is a converted 'design model' NAC, producing a 1:1 system with the NAC. The collimator has an optical barrel that has holders and spacing for two fused silica clear filters and a field flattener, thus simulating the NAC itself. It provides access for a photodiode which is used to determine its optical throughput. The target holder is motorized in the focus direction and capable of 3-axis motion. (The focus motion has a second reference as a check on the stepper motors.) The targets were illuminated by visible/IR and UV light sources. The collimator/light source system as a whole was designed to be GN2 purged. The NAC collimator was used for all calibration tests requiring the use of a target.

#### 3.4.3.2 GEOMETRIC DISTORTION

Since the NAC/NAC collimator system is 1:1, the effects of any small amount of distortion in either optic would cancel. In subsystem testing, any measurable distortion would be due to the CCD, but this was expected to produce virtually no distortion either. Due to these factors, a distortion calibration test was not performed on the NAC collimator alone.

#### 3.4.3.3 OPTICAL THROUGHPUT

The NAC collimator optical throughput calibration test was performed from 200 to 1100 nm (Reference 3.4.3-2). Since its coatings are of SiO<sub>2</sub>, the throughput in the UV was expected, and is shown to be, somewhat less than the NAC (see Figure 3.4.3-1 and Table 3.4.3.3-1).

NAC COLLIMATOR THROUGHPUT

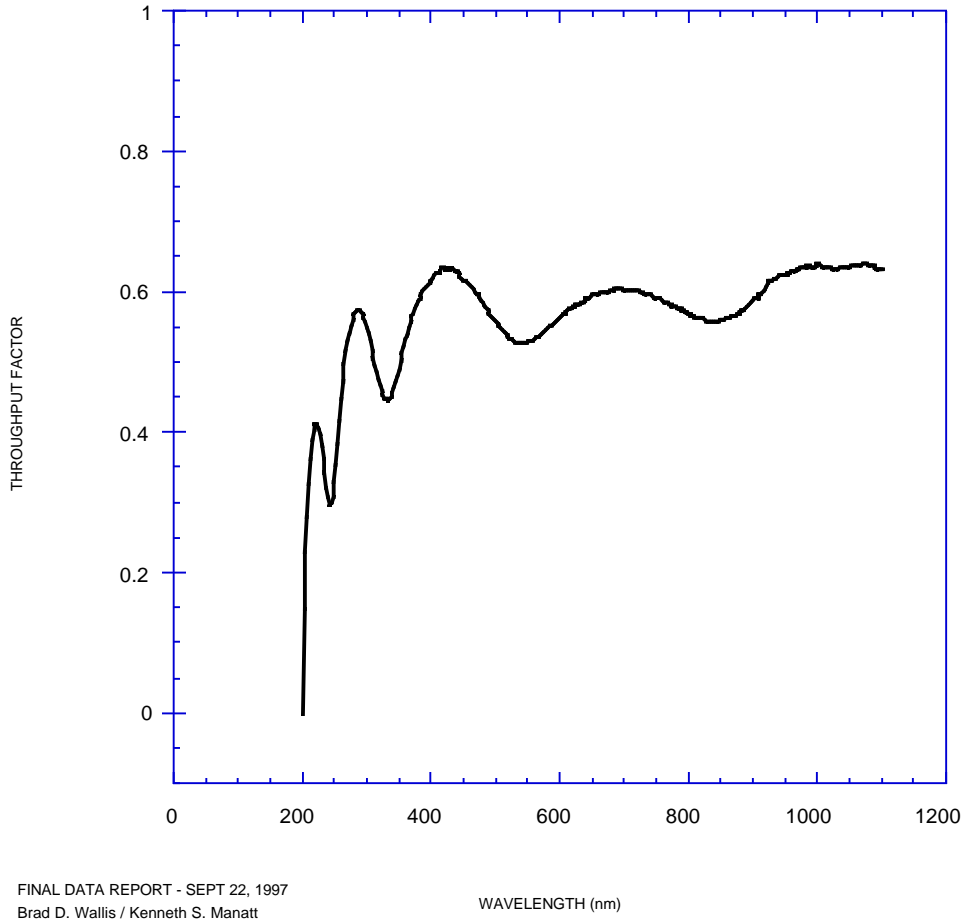


Figure 3.4.3-1 - NAC Collimator Throughput Graph

**Table 3.4.3.3-1 - NAC Collimator Throughput Data**

Wavelength (nm)	Transmission	Estimated Error	Wavelength (nm)	Transmission	Estimated Error
200.000	0.00000	+/- .05	315.000	0.484718	+/- .02
202.500	0.146608	+/- .05	317.500	0.475237	+/- .02
205.000	0.231046	+/- .05	320.000	0.466964	+/- .02
207.500	0.280391	+/- .05	322.500	0.459032	+/- .02
210.000	0.325869	+/- .05	325.000	0.453484	+/- .02
212.500	0.363629	+/- .05	327.500	0.448749	+/- .02
215.000	0.389597	+/- .05	330.000	0.446385	+/- .02
217.500	0.403274	+/- .05	332.500	0.445520	+/- .02
220.000	0.413058	+/- .05	335.000	0.447721	+/- .02
222.500	0.412567	+/- .05	337.500	0.451082	+/- .02
225.000	0.407394	+/- .05	340.000	0.457113	+/- .02
227.500	0.397378	+/- .05	342.500	0.463489	+/- .02
230.000	0.382327	+/- .05	345.000	0.471634	+/- .02
232.500	0.363256	+/- .05	347.500	0.479738	+/- .02
235.000	0.342525	+/- .05	350.000	0.488963	+/- .02
237.500	0.321311	+/- .05	352.500	0.501383	+/- .02
240.000	0.305993	+/- .05	355.000	0.512397	+/- .02
242.500	0.296625	+/- .05	357.500	0.520618	+/- .02
245.000	0.297807	+/- .05	360.000	0.531445	+/- .02
247.500	0.307948	+/- .05	362.500	0.538786	+/- .02
250.000	0.327992	+/- .05	365.000	0.549083	+/- .02
252.500	0.354103	+/- .05	367.500	0.557762	+/- .02
255.000	0.384992	+/- .05	370.000	0.564646	+/- .02
257.500	0.416409	+/- .05	372.500	0.568320	+/- .02
260.000	0.446669	+/- .05	375.000	0.577998	+/- .02
262.500	0.473410	+/- .05	377.500	0.583638	+/- .02
265.000	0.496287	+/- .05	380.000	0.588205	+/- .02
267.500	0.515597	+/- .05	382.500	0.591131	+/- .02
270.000	0.530984	+/- .05	385.000	0.595748	+/- .02
272.500	0.542295	+/- .05	387.500	0.601357	+/- .02
275.000	0.552014	+/- .05	390.000	0.605021	+/- .02
277.500	0.560527	+/- .05	392.500	0.606394	+/- .02
280.000	0.567653	+/- .05	395.000	0.610776	+/- .02
282.500	0.571351	+/- .05	397.500	0.613327	+/- .02
285.000	0.573064	+/- .05	400.000	0.615756	+/- .02
287.500	0.572758	+/- .05	402.500	0.618414	+/- .01
290.000	0.571255	+/- .05	405.000	0.624255	+/- .01
292.500	0.567875	+/- .05	407.500	0.625122	+/- .01
295.000	0.563070	+/- .02	410.000	0.625607	+/- .01
297.500	0.556312	+/- .05	412.500	0.624927	+/- .01
300.000	0.548918	+/- .02	415.000	0.629370	+/- .01
302.500	0.539686	+/- .02	417.500	0.635869	+/- .01
305.000	0.529621	+/- .02	420.000	0.634140	+/- .01
307.500	0.517555	+/- .02	422.500	0.632776	+/- .01
310.000	0.505461	+/- .02	425.000	0.634011	+/- .01
312.500	0.494311	+/- .02	427.500	0.632399	+/- .01

Wavelength (nm)	Transmission	Estimated Error
430.000	0.631818	+/- .01
432.500	0.633832	+/- .01
435.000	0.632315	+/- .01
437.500	0.629264	+/- .01
440.000	0.629391	+/- .01
442.500	0.626347	+/- .01
445.000	0.621284	+/- .01
447.500	0.618972	+/- .01
450.000	0.616574	+/- .01
452.500	0.615296	+/- .01
455.000	0.612258	+/- .01
457.500	0.610918	+/- .01
460.000	0.609295	+/- .01
462.500	0.607033	+/- .01
465.000	0.603393	+/- .01
467.500	0.600021	+/- .01
470.000	0.596770	+/- .01
472.500	0.595802	+/- .01
475.000	0.592018	+/- .01
477.500	0.588851	+/- .01
480.000	0.585383	+/- .01
482.500	0.579744	+/- .01
485.000	0.577778	+/- .01
487.500	0.573677	+/- .01
490.000	0.569571	+/- .01
492.500	0.566784	+/- .01
495.000	0.563272	+/- .01
497.500	0.560850	+/- .01
500.000	0.557599	+/- .01
502.500	0.554310	+/- .01
505.000	0.551347	+/- .01
507.500	0.549613	+/- .01
510.000	0.546620	+/- .01
512.500	0.545026	+/- .01
515.000	0.541263	+/- .01
517.500	0.537836	+/- .01
520.000	0.535753	+/- .01
522.500	0.533367	+/- .01
525.000	0.532270	+/- .01
527.500	0.530277	+/- .01
530.000	0.528415	+/- .01
532.500	0.527385	+/- .01
535.000	0.527982	+/- .01
537.500	0.527787	+/- .01
540.000	0.526201	+/- .01
542.500	0.526977	+/- .01
545.000	0.527742	+/- .01
547.500	0.527795	+/- .01

Wavelength (nm)	Transmission	Estimated Error
550.000	0.527318	+/- .01
552.500	0.529043	+/- .01
555.000	0.529901	+/- .01
557.500	0.530665	+/- .01
560.000	0.532772	+/- .01
562.500	0.534501	+/- .01
565.000	0.535143	+/- .01
567.500	0.536529	+/- .01
570.000	0.538709	+/- .01
572.500	0.541398	+/- .01
575.000	0.543769	+/- .01
577.500	0.546055	+/- .01
580.000	0.547475	+/- .01
582.500	0.549532	+/- .01
585.000	0.551247	+/- .01
587.500	0.552094	+/- .01
590.000	0.554100	+/- .01
592.500	0.556574	+/- .01
595.000	0.558243	+/- .01
597.500	0.560769	+/- .01
600.000	0.562514	+/- .01
602.500	0.565886	+/- .01
605.000	0.568111	+/- .01
607.500	0.569531	+/- .01
610.000	0.571604	+/- .01
612.500	0.574599	+/- .01
615.000	0.576565	+/- .01
617.500	0.578018	+/- .01
620.000	0.579263	+/- .01
622.500	0.580311	+/- .01
625.000	0.581798	+/- .01
627.500	0.582110	+/- .01
630.000	0.583322	+/- .01
632.500	0.584183	+/- .01
635.000	0.585812	+/- .01
637.500	0.587564	+/- .01
640.000	0.589651	+/- .01
642.500	0.591262	+/- .01
645.000	0.591519	+/- .01
647.500	0.593662	+/- .01
650.000	0.594953	+/- .01
652.500	0.595814	+/- .01
655.000	0.595844	+/- .01
657.500	0.596265	+/- .01
660.000	0.597153	+/- .01
662.500	0.597897	+/- .01
665.000	0.597804	+/- .01
667.500	0.597604	+/- .01

Wavelength (nm)	Transmission	Estimated Error
670.000	0.598384	+/- .01
672.500	0.598924	+/- .01
675.000	0.599994	+/- .01
677.500	0.601206	+/- .01
680.000	0.602069	+/- .01
682.500	0.602847	+/- .01
685.000	0.603698	+/- .01
687.500	0.603421	+/- .01
690.000	0.603336	+/- .01
692.500	0.603246	+/- .01
695.000	0.602942	+/- .01
697.500	0.602524	+/- .01
700.000	0.601986	+/- .01
702.500	0.602244	+/- .01
705.000	0.602050	+/- .01
707.500	0.601917	+/- .01
710.000	0.601313	+/- .01
712.500	0.601064	+/- .01
715.000	0.601633	+/- .01
717.500	0.601808	+/- .01
720.000	0.600893	+/- .01
722.500	0.600829	+/- .01
725.000	0.599739	+/- .01
727.500	0.598440	+/- .01
730.000	0.598258	+/- .01
732.500	0.596647	+/- .01
735.000	0.596316	+/- .01
737.500	0.595672	+/- .01
740.000	0.594658	+/- .01
742.500	0.593898	+/- .01
745.000	0.593179	+/- .01
747.500	0.591758	+/- .01
750.000	0.590277	+/- .01
752.500	0.589740	+/- .01
755.000	0.589948	+/- .01
757.500	0.588739	+/- .01
760.000	0.587785	+/- .01
762.500	0.586056	+/- .01
765.000	0.585412	+/- .01
767.500	0.584518	+/- .01
770.000	0.583464	+/- .01
772.500	0.581795	+/- .01
775.000	0.580769	+/- .01
777.500	0.580155	+/- .01
780.000	0.579800	+/- .01
782.500	0.577592	+/- .01
785.000	0.576126	+/- .01
787.500	0.575546	+/- .01

Wavelength (nm)	Transmission	Estimated Error
790.000	0.574859	+/- .01
792.500	0.572757	+/- .01
795.000	0.570730	+/- .01
797.500	0.569986	+/- .01
800.000	0.568443	+/- .01
802.500	0.567201	+/- .01
805.000	0.565906	+/- .01
807.500	0.564541	+/- .01
810.000	0.563505	+/- .01
812.500	0.562820	+/- .01
815.000	0.561740	+/- .01
817.500	0.562240	+/- .01
820.000	0.562434	+/- .01
822.500	0.562022	+/- .01
825.000	0.560681	+/- .01
827.500	0.558259	+/- .01
830.000	0.556830	+/- .01
832.500	0.557691	+/- .01
835.000	0.558894	+/- .01
837.500	0.558435	+/- .01
840.000	0.557335	+/- .01
842.500	0.557743	+/- .01
845.000	0.558584	+/- .01
847.500	0.560291	+/- .01
850.000	0.560837	+/- .01
852.500	0.561284	+/- .01
855.000	0.560764	+/- .01
857.500	0.561830	+/- .01
860.000	0.562951	+/- .01
862.500	0.563649	+/- .01
865.000	0.564191	+/- .01
867.500	0.564975	+/- .01
870.000	0.565963	+/- .01
872.500	0.567058	+/- .01
875.000	0.568090	+/- .01
877.500	0.569550	+/- .01
880.000	0.571018	+/- .01
882.500	0.572756	+/- .01
885.000	0.574250	+/- .01
887.500	0.577144	+/- .01
890.000	0.580007	+/- .01
892.500	0.581788	+/- .01
895.000	0.582356	+/- .01
897.500	0.584269	+/- .01
900.000	0.586646	+/- .01
902.500	0.589464	+/- .02
905.000	0.589946	+/- .02
907.500	0.591655	+/- .02

Wavelength (nm)	Transmission	Estimated Error
910.000	0.594797	+/- .02
912.500	0.596463	+/- .02
915.000	0.598898	+/- .02
917.500	0.602483	+/- .02
920.000	0.607873	+/- .02
922.500	0.612491	+/- .02
925.000	0.614345	+/- .02
927.500	0.616048	+/- .02
930.000	0.616535	+/- .02
932.500	0.618040	+/- .02
935.000	0.619068	+/- .02
937.500	0.620386	+/- .02
940.000	0.622106	+/- .02
942.500	0.622591	+/- .02
945.000	0.623234	+/- .02
947.500	0.623080	+/- .02
950.000	0.622380	+/- .02
952.500	0.624247	+/- .02
955.000	0.625799	+/- .02
957.500	0.627139	+/- .02
960.000	0.628346	+/- .02
962.500	0.629954	+/- .02
965.000	0.630255	+/- .02
967.500	0.631315	+/- .02
970.000	0.632021	+/- .02
972.500	0.632710	+/- .02
975.000	0.633346	+/- .02
977.500	0.633581	+/- .02
980.000	0.633683	+/- .02
982.500	0.633639	+/- .02
985.000	0.636048	+/- .02
987.500	0.637550	+/- .02
990.000	0.635426	+/- .02
992.500	0.633782	+/- .02
995.000	0.634916	+/- .02
997.500	0.637975	+/- .02
1000.00	0.640539	+/- .02
1002.50	0.638758	+/- .05
1005.00	0.636017	+/- .05
1007.50	0.635103	+/- .05
1010.00	0.633874	+/- .05
1012.50	0.633516	+/- .05
1015.00	0.633159	+/- .05
1017.50	0.634351	+/- .05
1020.00	0.633454	+/- .05
1022.50	0.632864	+/- .05
1025.00	0.632032	+/- .05
1027.50	0.632218	+/- .05

Wavelength (nm)	Transmission	Estimated Error
1030.00	0.632665	+/- .05
1032.50	0.632423	+/- .05
1035.00	0.633724	+/- .05
1037.50	0.633792	+/- .05
1040.00	0.634505	+/- .05
1042.50	0.634433	+/- .05
1045.00	0.634227	+/- .05
1047.50	0.634574	+/- .05
1050.00	0.635351	+/- .05
1052.50	0.636103	+/- .05
1055.00	0.636454	+/- .05
1057.50	0.636589	+/- .05
1060.00	0.637471	+/- .05
1062.50	0.636986	+/- .05
1065.00	0.637447	+/- .05
1067.50	0.638337	+/- .05
1070.00	0.639144	+/- .05
1072.50	0.638987	+/- .05
1075.00	0.639315	+/- .05
1077.50	0.639088	+/- .05
1080.00	0.638209	+/- .05
1082.50	0.636517	+/- .05
1085.00	0.636027	+/- .05
1087.50	0.635932	+/- .05
1090.00	0.635477	+/- .05
1092.50	0.633154	+/- .05
1095.00	0.631870	+/- .05
1097.50	0.631333	+/- .05
1100.00	0.631834	+/- .05