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**UBVRI FILTERS
&
FILTER TURRET**

**OPTEC INC.
199 Smith St.
Lowell, MI 49331**

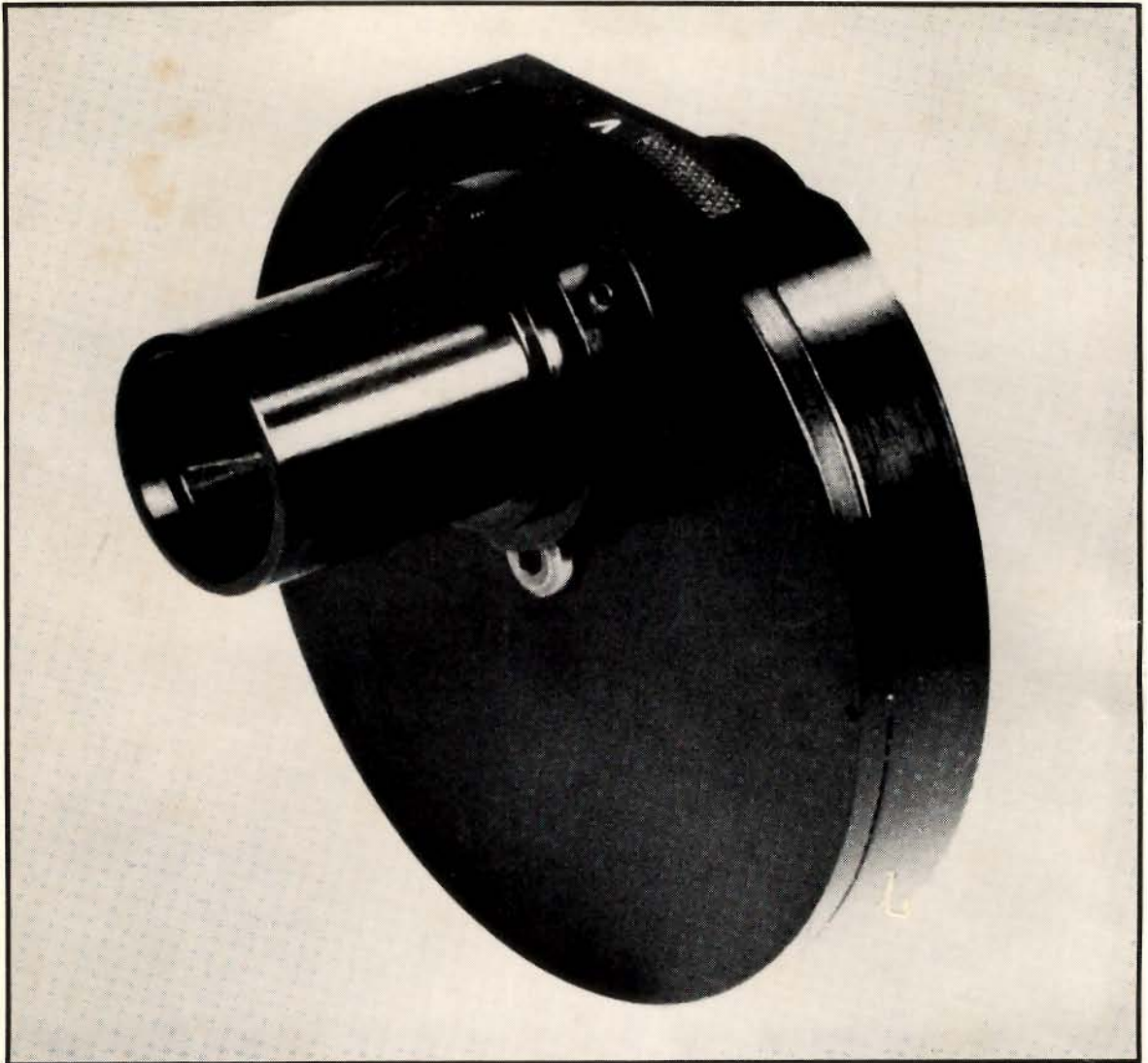


Figure 1. Filter Turret with standard 1 1/4-inch adapter attached.

UBVRI FILTERS AND FILTER TURRET

for the

SSP-2 PHOTOMETER

OPTEC, Inc.
199 Smith St.
Lowell, Michigan 49331

April 1, 1981

INTRODUCTION

The optional filters and filter turret allow the photometric observations to be made in one or more specific wavelengths. This allows the observer to do work in such fields as infrared astronomy and colorimetry - the measurement of stellar temperature. Filters are available to match the standard UBVRI system and are factory installed in the filter wheel. The filter wheel has six positions to hold all 5 or any combination of fewer filters with one position reserved for a clear window. Figure 1 and 2 show the filter turret assembly.

PERFORMANCE SPECIFICATIONS

Filters

The UBVRI system established by Johnson et al (1966)¹ is generally followed today and exactly defines color bands

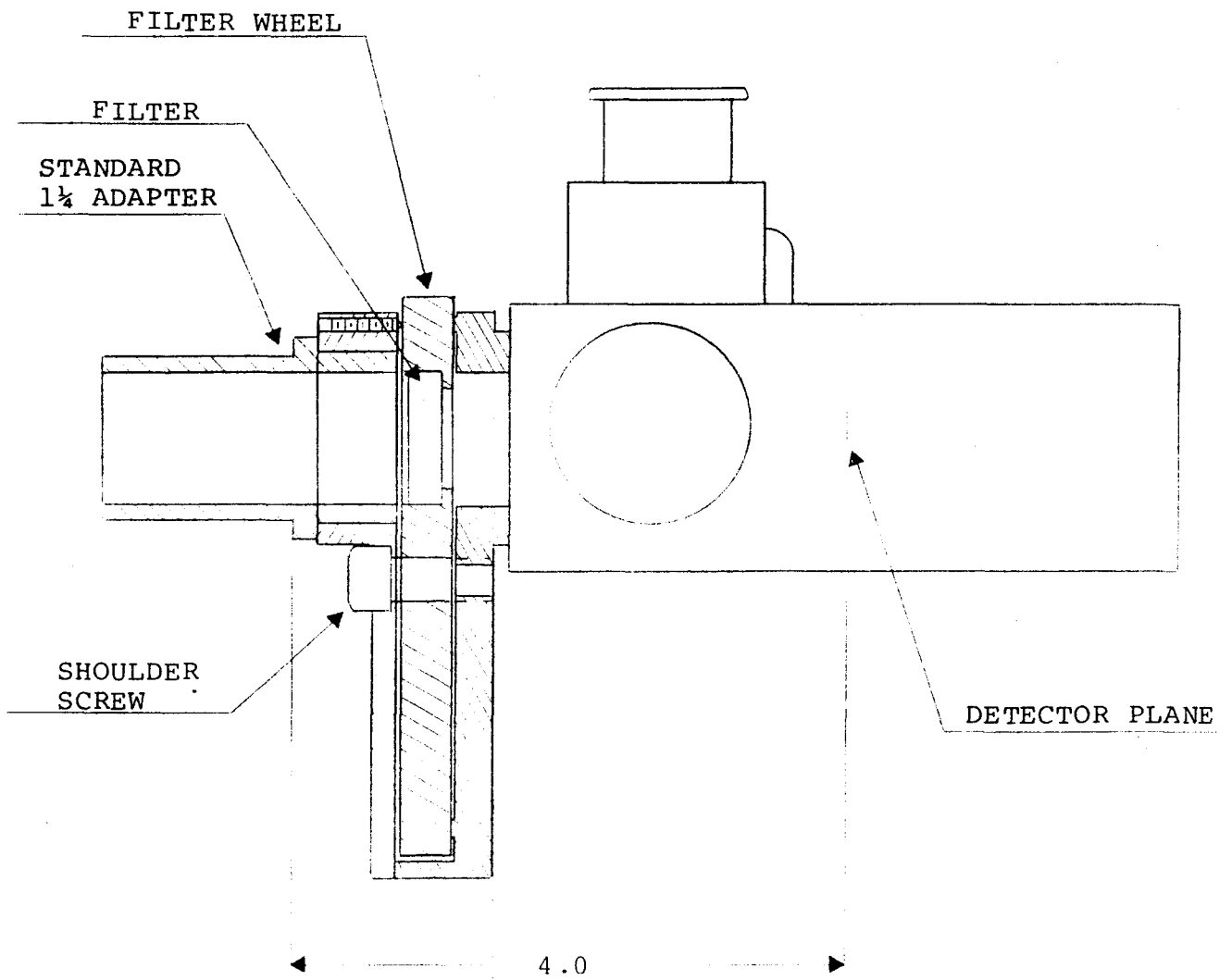


Figure 2. Schematic diagram of Filter Turret assembly.

in the spectrum from 300 to 1200nm. Table 1 lists the filter-detector response functions of this system as originally defined; all data has been normalized to 100% at the filter transmission peaks. Table 2 lists the filter-detector response functions for the filters used with the SSP-2 photometer.

As can be seen from tables 1 and 2, most filters match closely the standard values with the exception of the U filter. Blocking the red leak of the filter glass used in this filter results in loss of UV transmission from 300 to 350nm. The filter is still useful for comparison purposes even though it does not transform into the standard system accurately.

Filter Turret

The filter turret mounts in front of the Detector/Electrometer Head as shown in Figure 2. Two #8 set screws on the Head securely fasten the filter turret in place. To remove the filter wheel, the 5/16 shoulder screw is unscrewed which allows the turret to come apart freely. Wheels with custom or 13-color narrow band filters can then be easily installed.

The 1½ inch standard adapter which comes with the SSP-2 photometer fits into the front of the filter turret and is fastened in place by two #8 set screws. Optional adapters for 2-inch focusing mounts, Questar², and Quantum³ series telescopes are available and fit on the standard 1½ adapter.

λ, μ	U	B	V	R	I
0.30	0.00	----	----	----	----
0.31	0.10	----	----	----	----
0.32	0.61	----	----	----	----
0.33	0.84	----	----	----	----
0.34	0.93	----	----	----	----
0.35	0.97	----	----	----	----
0.36	1.00	0.00	----	----	----
0.37	0.97	----	----	----	----
0.38	0.73	0.11	----	----	----
0.39	0.36	----	----	----	----
0.40	0.05	0.92	----	----	----
0.41	0.01	----	----	----	----
0.42	0.00	1.00	----	----	----
0.44	----	0.94	----	----	----
0.46	----	0.79	0.00	----	----
0.48	----	0.58	0.02	----	----
0.50	----	0.36	0.38	----	----
0.52	----	0.15	0.91	0.00	----
0.54	----	0.04	0.98	0.06	----
0.56	----	0.00	0.72	0.28	----
0.58	----	----	0.62	0.50	----
0.60	----	----	0.40	0.69	----
0.62	----	----	0.20	0.79	----
0.64	----	----	0.08	0.88	----
0.66	----	----	0.02	0.94	----
0.68	----	----	0.01	0.98	0.00
0.70	----	----	0.01	1.00	0.01
0.72	----	----	0.01	0.94	0.17
0.74	----	----	0.00	0.85	0.36
0.76	----	----	----	0.73	0.56
0.78	----	----	----	0.57	0.76
0.80	----	----	----	0.42	0.96
0.82	----	----	----	0.31	0.98
0.84	----	----	----	0.17	0.99
0.86	----	----	----	0.11	1.00
0.88	----	----	----	0.06	0.98
0.90	----	----	----	0.04	0.93
0.92	----	----	----	0.02	0.84
0.94	----	----	----	0.01	0.71
0.96	----	----	----	0.00	0.58
0.98	----	----	----	----	0.47
1.00	----	----	----	----	0.36
1.02	----	----	----	----	0.28
1.04	----	----	----	----	0.20
1.06	----	----	----	----	0.15
1.08	----	----	----	----	0.10
1.10	----	----	----	----	0.08
1.12	----	----	----	----	0.05
1.14	----	----	----	----	0.03

Table 1. Standard UBVRI response functions according to Johnson.¹

λ, μ	U	B	V	R	I
0.30	0.00	----	----	----	----
0.31	0.00	----	----	----	----
0.32	0.00	----	----	----	----
0.33	0.02	----	----	----	----
0.34	0.19	----	----	----	----
0.35	0.42	----	----	----	----
0.36	0.75	0.00	----	----	----
0.37	1.00	----	----	----	----
0.38	0.84	0.28	----	----	----
0.39	0.31	----	----	----	----
0.40	0.04	0.63	----	----	----
0.41	0.01	----	----	----	----
0.42	0.00	0.87	----	----	----
0.44	----	1.00	----	----	----
0.46	----	0.95	0.00	----	----
0.48	----	0.60	0.04	----	----
0.50	----	0.20	0.10	----	----
0.52	----	0.06	0.85	0.00	----
0.54	----	0.02	1.00	0.02	----
0.56	----	0.01	0.95	0.25	----
0.58	----	0.00	0.66	0.59	----
0.60	----	----	0.48	0.70	----
0.62	----	----	0.27	0.85	----
0.64	----	----	0.10	0.93	----
0.66	----	----	0.04	1.00	----
0.68	----	----	0.00	0.96	0.00
0.70	----	----	0.00	0.93	0.00
0.72	----	----	----	0.85	0.09
0.74	----	----	----	0.74	0.52
0.76	----	----	----	0.66	0.71
0.78	----	----	----	0.51	0.83
0.80	----	----	----	0.41	0.94
0.82	----	----	----	0.31	0.96
0.84	----	----	----	0.22	0.96
0.86	----	----	----	0.16	0.97
0.88	----	----	----	0.12	1.00
0.90	----	----	----	0.09	0.96
0.92	----	----	----	0.07	0.96
0.94	----	----	----	0.05	0.89
0.96	----	----	----	0.03	0.76
0.98	----	----	----	0.01	0.64
1.00	----	----	----	0.00	0.46
1.02	----	----	----	----	0.31
1.04	----	----	----	----	0.21
1.06	----	----	----	----	0.10
1.08	----	----	----	----	0.05
1.10	----	----	----	----	0.02
1.12	----	----	----	----	0.01
1.14	----	----	----	----	0.00

Table 2. UBVRI response functions of filters used for SSP-2 Photometer

SPECIFICATION SUMMARY

Filters (UBVRI system)

Type	Schott Filter Glass
Flatness	<4 fringes
Surface Quality	Felt-polished scratch and dig 80-50
Wedge	<3 min
Diameter	25.4mm \pm .2
Thickness	7mm \pm .2

Body (Mechanical)

Diameter	4.5 inches
Weight	1.2 lbs.
Material	Aluminum 6061-T6
Finish	Black Anodize

References

1. Johnson, H.L., Mitchell, R.I., Iriate, B., and Wisniewski, W.Z., Comm. Lunar and Planetary Lab., 4, 99 (1966)
2. Questar is a registered trade mark of Questar Corp., New Hope, PA
3. Quantum is a registered trade mark of Optical Techniques, Inc., 205 Pheasant Run, Newtown, PA.