UBVRI(JHKLMN) - Johnson - 1965

Extention toward the infrared of the *UBV - Johnson and Morgan - 1953* system.
The system is also often called “The Arizona system”.

GENERAL INFORMATION

AUTHORS	H. L. Johnson
TELESCOPE	0.71cm (reflector), Lunar and Planetary Lab.
DETECTOR	1P21 (for *UBV*), ITT FW-118 (S-1 cathode, for *RI*), PbS or InSb cells (for *JHKL*), liquid He cooled Ge bolometer (for *M* and *N*)
MAIN ARTICLE	Johnson, H. L. 1965, ApJ 141, 923

SYSTEM DESCRIPTION

BANDS DESCRIPTION			FLUX CALIBRATION (#) [152], [153]	
band	λ_0 (μm) [152]	half-width (μm) [285], pg. 292	F(λ) (W cm^{-2} μm^{-1})	F(λ) (W m^{-2} Hz^{-1})
U	0.36	0.04	$4.35\ 10^{-12}$	$1.88\ 10^{-23}$
B	0.44	0.10	$7.20\ 10^{-12}$	$4.44\ 10^{-23}$
V	0.55	0.08	$3.92\ 10^{-12}$	$3.81\ 10^{-23}$
R	0.70	0.21	$1.76\ 10^{-12}$	$3.01\ 10^{-23}$
I	0.90	0.22	$8.3\ 10^{-13}$	$2.43\ 10^{-23}$
J	1.25	0.3	$3.4\ 10^{-13}$	$1.77\ 10^{-23}$
H (##)	1.62	0.2	$1.26\ 10^{-13}$	
K	2.2	0.6	$3.9\ 10^{-14}$	$6.3\ 10^{-24}$
L	3.4	0.9	$8.1\ 10^{-15}$	$3.1\ 10^{-24}$
M	5.0	1.1	$2.2\ 10^{-15}$	$1.8\ 10^{-24}$
N	10.2	6.0	$1.23\ 10^{-16}$	$4.3\ 10^{-25}$

(#) Fluxes for a 0.0 mag star.

(##) The H band appeared later in 1967 as part of the Arizona system, and its transmission profile has been a subject of debate. A profile for it is tabulated in *VJHKLL'M - Bessell and Brett - 1988* [34].

O (λ_0 = 11.5 μm), *P* (λ_0 = 13.1 μm) and *Q* (λ_0 = 20.0 μm) bands have been sometimes associated with this system.

The *UBV* bands are essentially those of *UBV - Johnson and Morgan - 1953*.

In the table with the band transmission profiles, the *L* band is indicated with *L'* ($\lambda_{eff} = 3.5\ \mu$m) when realized with a InSb detector, *L"* ($\lambda_{eff} = 3.4\ \mu$m) for a PbS detector.

ZERO POINT: Color indices are zero for unreddened A0 V stars. [151]

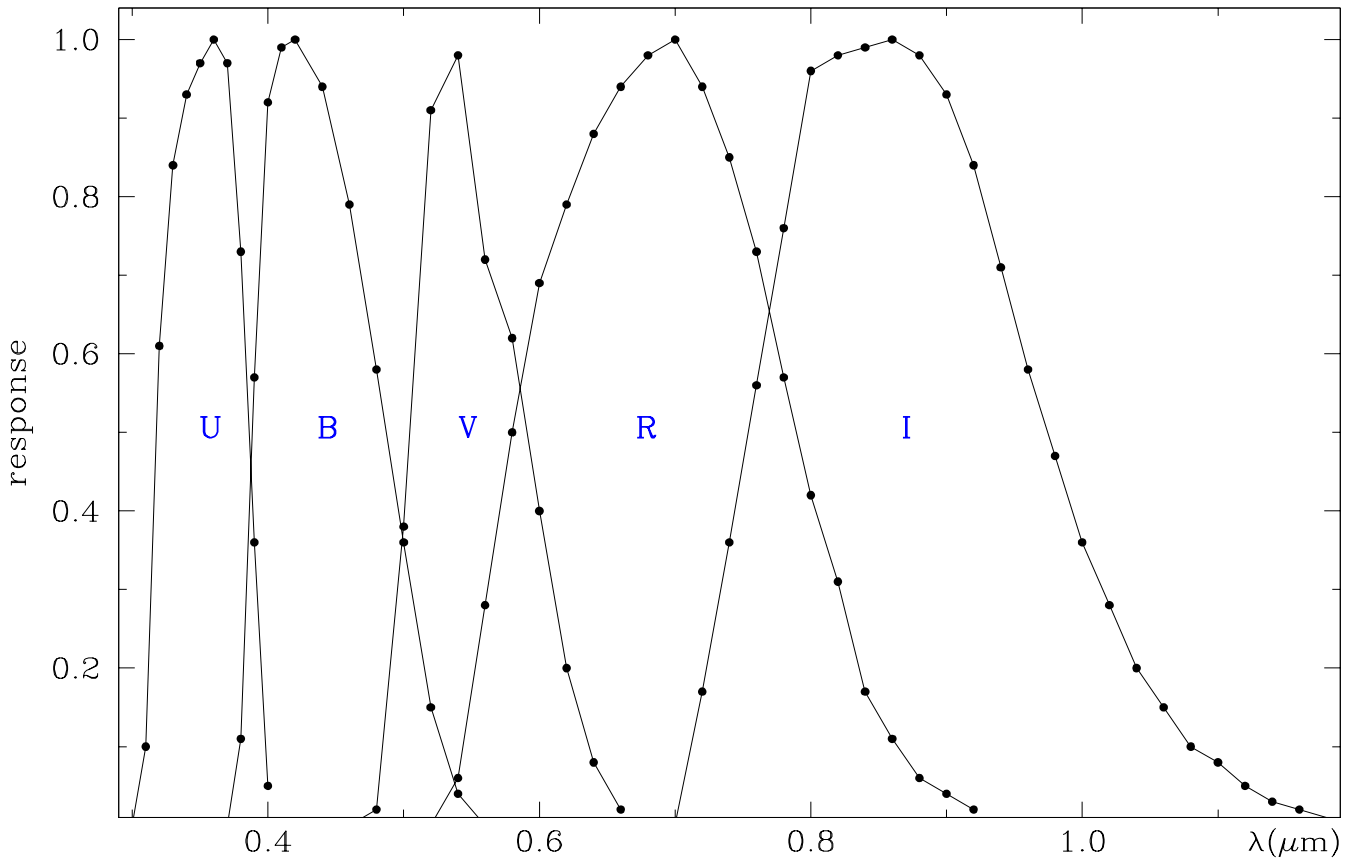
SYSTEM ANALYSIS

REDDENING RATIOS [258]

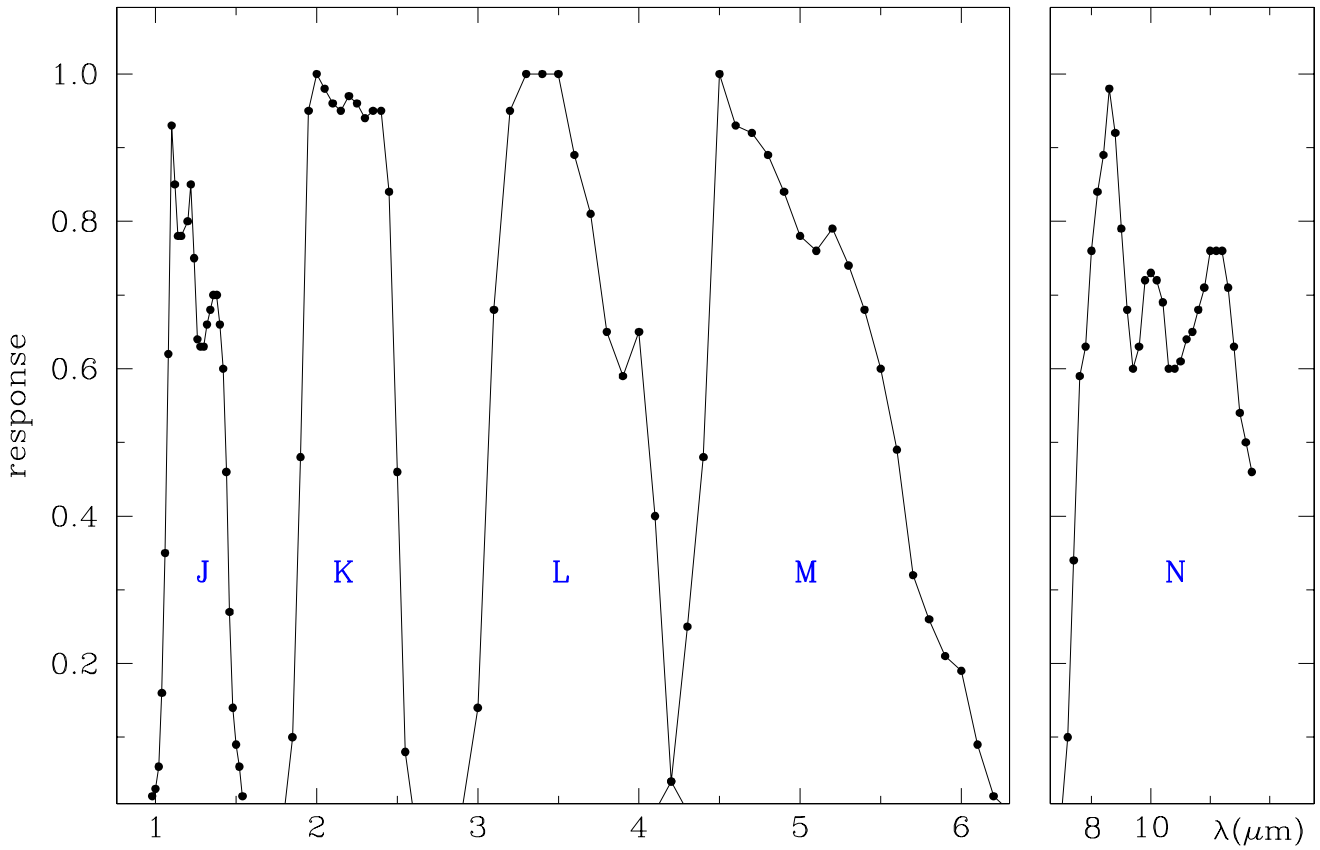
$A_R = 2.32\,E(B-V)$ $A_I = 1.50\,E(B-V)$ $A_J = 0.87\,E(B-V)$

$A_K = 0.38\,E(B-V)$ $A_L = 0.16\,E(B-V)$

TRANSMISSION CURVES [151]



U		*B*		*V*		*R*				*I*			
λ (μm)	ϒ	λ (μm)	ϒ	λ (μm)	ϒ	λ (μm)	ϒ	λ (μm)	ϒ	λ (μm)	ϒ	λ (μm)	ϒ
0.30	0.00	0.37	0.00	0.46	0.00	0.52	0.00	0.82	0.31	0.68	0.00	0.98	0.47
0.31	0.10	0.38	0.11	0.48	0.02	0.54	0.06	0.84	0.17	0.70	0.01	1.00	0.36
0.32	0.61	0.40	0.92	0.50	0.38	0.56	0.28	0.86	0.11	0.72	0.17	1.02	0.28
0.33	0.84	0.42	1.00	0.52	0.91	0.58	0.50	0.88	0.06	0.74	0.36	1.04	0.20
0.34	0.93	0.44	0.94	0.54	0.98	0.60	0.69	0.90	0.04	0.76	0.56	1.06	0.15
0.35	0.97	0.46	0.79	0.56	0.72	0.62	0.79	0.92	0.02	0.78	0.76	1.08	0.10
0.36	1.00	0.48	0.58	0.58	0.62	0.64	0.88	0.94	0.01	0.80	0.96	1.10	0.08
0.37	0.97	0.50	0.36	0.60	0.40	0.66	0.94	0.96	0.00	0.82	0.98	1.12	0.05
0.38	0.73	0.52	0.15	0.62	0.20	0.68	0.98			0.84	0.99	1.14	0.03
0.39	0.36	0.54	0.04	0.64	0.08	0.70	1.00			0.86	1.00	1.16	0.02
0.40	0.05	0.56	0.00	0.66	0.02	0.72	0.94			0.88	0.98	1.20	0.00
0.41	0.01			0.68	0.01	0.74	0.85			0.90	0.93		
0.42	0.00			0.70	0.01	0.76	0.73			0.92	0.84		
				0.72	0.01	0.78	0.57			0.94	0.71		
				0.74	0.00	0.80	0.42			0.96	0.58		



J				*K*		*L'*		*L"*		*M*		*N*			
λ (μm)	ϒ	λ (μm)	ϒ	λ (μm)	ϒ	λ (μm)	ϒ	λ (μm)	ϒ	λ (μm)	ϒ	λ (μm)	ϒ	λ (μm)	ϒ
0.96	0.00	1.44	0.46	1.80	0.00	2.90	0.00	2.90	0.00	4.10	0.00	7.00	0.00	11.8	0.71
0.98	0.02	1.46	0.27	1.85	0.10	3.00	0.14	3.00	0.14	4.20	0.04	7.20	0.10	12.0	0.76
1.00	0.03	1.48	0.14	1.90	0.48	3.10	0.68	3.10	0.68	4.30	0.25	7.40	0.34	12.2	0.76
1.02	0.06	1.50	0.09	1.95	0.95	3.20	0.95	3.20	0.95	4.40	0.48	7.60	0.59	12.4	0.76
1.04	0.16	1.52	0.06	2.00	1.00	3.30	1.00	3.30	1.00	4.50	1.00	7.80	0.70	12.6	0.71
1.06	0.35	1.54	0.02	2.05	0.98	3.40	1.00	3.40	1.00	4.60	0.93	8.00	0.76	12.8	0.63
1.08	0.62	1.56	0.00	2.10	0.96	3.50	1.00	3.50	0.98	4.70	0.92	8.20	0.84	13.0	0.54
1.10	0.93			2.15	0.95	3.60	0.89	3.60	0.85	4.80	0.89	8.40	0.89	13.2	0.50
1.12	0.85			2.20	0.97	3.70	0.81	3.70	0.69	4.90	0.84	8.60	0.98	13.4	0.46
1.14	0.78			2.25	0.96	3.80	0.65	3.80	0.39	5.00	0.78	8.80	0.92	13.6	0.43
1.16	0.78			2.30	0.94	3.90	0.59	3.90	0.21	5.10	0.76	9.00	0.79		
1.18	0.80			2.35	0.95	4.00	0.65	4.00	0.10	5.20	0.79	9.20	0.68		
1.20	0.85			2.40	0.95	4.10	0.40	4.10	0.02	5.30	0.74	9.40	0.60		
1.22	0.93			2.45	0.84	4.20	0.04	4.20	0.00	5.40	0.68	9.60	0.63		
1.24	0.75			2.50	0.46	4.30	0.00			5.50	0.60	9.80	0.69		
1.26	0.64			2.55	0.08					5.60	0.49	10.0	0.73		
1.28	0.63			2.60	0.00					5.70	0.32	10.2	0.72		
1.30	0.63									5.80	0.26	10.4	0.65		
1.32	0.66									5.90	0.21	10.6	0.60		
1.34	0.68									6.00	0.19	10.8	0.60		
1.36	0.70									6.10	0.09	11.0	0.61		
1.38	0.70									6.20	0.02	11.2	0.64		
1.40	0.66									6.30	0.00	11.4	0.65		
1.42	0.60											11.6	0.68		