

## ACKNOWLEDGMENTS

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## Variables in the Andromeda Galaxy—Fields I and III

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Fields I and III are situated 15' and 50' south preceding, respectively, the nucleus of M31. Field I has 116 variables, 31 of them Cepheids and 7 novae; Field III has 336 variables, 232 of them Cepheids and 2 novae. The various relations of the Cepheids between period and luminosity, amplitude, and frequency are examined and compared with the 20 Cepheids of Field IV. The Cepheids seem to be most like those of our galaxy, and there are differences between them and those of the Small Magellanic Cloud.

## 1. INTRODUCTION

THIS is the third and final paper about the variables in the Andromeda galaxy initiated by Dr. Baade. Baade took from 80 to 100 plates with the 200-in. telescope on each of the four fields over two-year periods. The location of the fields is shown in Plate I of the previous paper (Baade and Swope 1963), and the positions of the centers together with the number of plates taken in each field and the pairs of plates blinked for variables are given in Table I.

This paper investigates the variables of Fields I and III. The first field is in an amorphous area 15' south preceding the nucleus, and the third field is in the fourth spiral arm 50' south preceding the nucleus (Baade 1963) and is rich in stars. Baade took the majority of the plates of these two fields in 1950 and 1951.

The general properties of the Cepheids of the three fields studied at Mount Wilson are also considered. In discussing the period-frequency relation, the Cepheids of Field II (Gaposchkin 1962) are included, otherwise they are omitted as there may be some question whether they are on the same magnitude system as these three fields, though the Cepheids in the center of Field II do confirm the period-luminosity and period-amplitude relations.

## 2. MAGNITUDES

The method used in deriving the magnitudes for the variables is the same in both Field I and Field III. When work on the variables was begun in 1952, no faint magnitudes were available; therefore, local comparison stars were selected around each variable or group of variables and they were measured by means

of a suitable scale of graduated exposures made from a 200-in. plate. The stars of Selected Area 68 were measured at the same time in the same way. Plates of the same emulsion were taken of the variable field and of SA 68 on the same night in series and developed together. First the SA plate was measured with the fly spanker and then the field, and again the selected area. The measures of SA 68 were reduced to one plate and those of the variable field to the corresponding plate. Seven such pairs of plates were reduced and means taken. The local variable sequences thus were on the same scale system as Selected Area 68. All the variables not too close to the plate edge were measured once on about 75 plates over the two years observed, and the Cepheids and some other interesting stars within the 8' rings were measured twice and mean staken.

In 1954 Baum (private communication) obtained faint photoelectric magnitudes for Selected Area 68. His measures were an extension of the sequence already measured photoelectrically by Stebbins, Whitford, and Johnson (1950). For the few stars that were measured by both observers there was a small systematic difference; therefore, 0<sup>m</sup>03 has been subtracted from the sequence of Stebbins *et al.* and 0<sup>m</sup>02 added to Baum's sequence. Gaposchkin (1962) has published the final SA 68 sequence in Table I, columns 1 and 2, almost as it is used in this paper.

With the new photoelectric sequence of SA 68 available, the local sequences of M31 were reduced to magnitudes by means of the transfer plates. This is not as satisfactory as using a direct photoelectric sequence, as in Field IV (Baade and Swope 1963), but no systematic differences are apparent between that

## VARIABLES IN THE ANDROMEDA GALAXY

TABLE I. Four variable star fields in M 31.

Field	R.A. (1950)	Decl.	Dist. from nucleus	No. of plates	Pairs of plates blinked	No. of var.	Time obs'd	References
I	0 <sup>h</sup> 39 <sup>m</sup> 15 <sup>s</sup>	+40°48'21"	15'	89	32	109	1950-51	
II	0 38 11	+40 31 42	36	83	12	187	1950-51	Gaposchkin 1962
III	0 37 31	+40 18 45	50	91	18	334	1950-51	
IV	0 35 02	+39 40 46	96	100+	24	54	1952-56	Baade and Swope 1963

Table II. Local comparison stars for variables of Field I.

Var. Seq. No. *	Mag.														
51 a	19.67	67 a	21.94	83 a	21.17	100 a	19.90	115 a	20.96	125 a	20.32	134 a	21.32	148 a	20.35
52 b	20.45	b	22.07	84 b	22.05	101 b	20.35	116 b	21.51	b	21.11	135 b	.87	149 b	.75
54 c	.93	c	.54	c	.25	102 c	.85	c	.70	c	.35	136 c	.22	150 c	.21
55 d	21.29	d	.25	d	.95	d	21.95	d	22.21	d	.87	137 d	.32	151 d	.48
56 e	.74	68 a	21.80	85 a	21.07	e	22.08	e	22.54	e	22.54	138		152 c	.75
57 f	22.25	69 b	22.15	86 b	.74	103 a	21.31	118 b	20.20	126 a	21.47	139		f	.88
58 g	.54	c	.59	c	22.28	b	22.00	119 c	.61	b	.93	140		g	22.20
59 a	21.23	Nova 3 a	19.40	87 a	21.00	c	.66	120 d	21.12	c	22.31	141 a	21.17	153 c	19.5
b	.44	b	.78	a		b		121 e	.84	a		142 b	.76	H 16 b	20.0
c	.90	c	20.19	b	.41	104 a	21.18	105 b	.62	c		c	22.08	c	20.6
d	21.25	d	21.25	89 c	22.02	c		c		b	.50	d	.49	d	21.1
60 a	20.84	f	22.30	d	.45	c	22.11	H 5	19.1	c	22.03	143 a	19.38	Nova 1 a	17.7
b	21.31	b		90 a	20.27	106 a	17.6	c	20.0	b	19.6	144 b	20.28	b	18.5
c	.66	c		b	.80	107 b	18.5	d	20.7	c		H 3 c	21.10	c	19.8
d	.92	70 a	20.45	c	21.06	108 c	19.16	128 a	19.69	c		d	.52	d	20.1
61 a	21.55	71 b	21.17	91 a	20.02	109 d	.60	129 b	20.30	c	21.06	e	22.00	Nova 7 a	18.7
b	22.33	73 d	.95	92 b	.70	Nova 4 e	20.26	b	20.08	d	.80	f	.65	b	20.2
c	.97	e	22.20	93 c	.53	Nova 6 f	.98	c	.60	e	22.03	c	20.5		
62 a	21.55	72 c	.57	94 c	21.10	g	21.31	d	21.16	f	.42	145 a	19.45		
b	22.33	75 d	.95	95 b	.70	h	.87	146 b	.93			H 17 c	20.26		
c	.97	e	22.20	96 d	.53	i	.92	130 a	20.69			d	.79		
63 a	20.43	76 a	21.81	97 d	.53	110 a	20.50	131 b	21.13			e	21.16		
b	.73	b	.70	e	22.50	20.50	c	21.06	c		f	.74			
c	21.14	c		f		20.50	d	22.26	d		g	22.16			
d	.71	d		g		20.50	e	22.37	e		h	.76			
e	22.18	77 b	22.79	h		20.50	f	22.33	f						
f	.85	i		j		20.50	g	22.33	g						
65 a	19.9	77 b	22.26	98 d	.67	111 a	21.07	124 a	21.66	132 a	21.71	147 a	20.23		
b	20.2	c	.41	99 c	22.13	b	.61	b	22.25	b	22.08	H 18 b	.75		
c	20.3	d	.92	e	.67	c		c	.71	c		c	21.16		
66 a	18.98	78 a	21.00	100 d	.67	112 a	20.94	125 a	19.30	133 a	19.42	Nova 5 b	20.13	d	.43
b	19.33	79 b	.37	101 b	.69	b	.74	b	20.26	b	21.11	e	22.03	e	.28
c	.73	80 c	.74	102 c	.84	c		c	.89	c	22.12	f			
d	20.23	81 d	22.14	103 d	22.21	113 b	21.21	126 d	21.27	d		g			
e	.75	e	.42	f	.49	114 c	.78	e	.93	e	.41				
f	21.21	g	.66	h		i		j		k					

Table III. Local comparison stars for variables of Field III.

161 a	21.98	173 a	21.51	185 a	21.56	196 a	22.07	215 a	21.39	232 a	20.50	251 a	20.73	265 a	22.36
b	22.28	174 b	.88	186 b	.77	197 b	.55	217 b	.76	234 b	.98	252 b	.91	266 b	23.04
c	.71	c	22.08	d	.66	c	.82	218 c	22.21	c	21.31	253 c	21.17		
d	.46	d		e	.90	e		d	.45	d	.56	f	.26	267 a	20.59
e	20.53	175 a	21.37	187 a	21.51	198 a	20.92	216 a	21.30	235 a	21.04	254 a	21.30	268 b	.95
b	21.15	b	.64	c	22.16	199 b	21.09	200 c	.41	219 b	.76	b	.43	269 c	21.45
c	.73	d		e	.99	d	.65	c	.45	c	.43	255 b	.52	270 d	.82
d	22.09	c		f	.26	e	22.01	220 c	22.33	c	.72	c	.97	271 e	22.31
e	.50	g		h	.38	i		d	.46	d	22.17	d		272 f	.72
163 a	21.10	176 a	21.67	188 a	21.07	189 b	.72	e	.77	236 a	21.35	d	22.27	273 a	21.07
b	.63	b	22.07	c	.37	c	.50	201 a	21.45	221 a	21.68	e	.73	b	.96
c	22.34	d	.91	e	.99	202 b	.66	b	22.15	b	.87	c	22.38	c	22.38
d	.37	f		g	.72	c		c	22.49	c		d		d	23.08
164 a	21.88	177 a	21.12	189 a	21.18	190 b	.77	203 a	20.93	222 a	21.15	256 a	20.45	H 46 b	21.12
b	22.17	b	.36	c	.86	191 b	.77	204 b	21.25	233 b	.65	257 a	20.68	D	.66
c	.59	d		e	.86	205 b	21.90	205 b	21.86	234 b	.80	258 b	21.58	E	21.17
d	22.16	178 a	21.67	c	.97	206 b	21.22	206 b	.76	243 e	22.41	H 37 c	.79	F	.66
e	23.03	179 b	22.15	d	.37	207 b	21.00	207 b	.60	244 a	21.27	d	22.23		
f		180 b	22.15	C	18.7	208 c	.60	208 c	.85	242 b	.60	e	.69	274 a	21.10
g		181 b	.63	E	.83	209 b	21.58	209 b	.99	245 b	.78	275 b	.36	C	20.30
165 a	21.23	182 a	21.33	192 a	20.6	183 a	21.46	224 a	21.67	235 a	.99	257 a	20.68	D	
b	21.07	b	22.00	b	21.1	184 b	20.53	225 b	.99	240 d	.86	258 b	21.58	E	
c	22.01	c	.63	c	.68	185 b	21.58	226 b	.56	241 a	21.27	H 37 c	.79	F	
d	.46	d	21.14	F	20.31	186 b	21.58	227 b	.87	242 b	.45	259 a	21.21	G	
e	22.03	e	22.14	G	.62	187 b	21.58	228 b	.16	244 a	21.36	H 33 A	19.20	H 41 b	
f	22.52	f	.46	h		188 b	21.58	229 b	.56	245 b	.78	260 a	20.20	276 c	
g		189 b	.18	i	.18	189 b	21.58	230 b	.94	246 a	19.98	261 b	21.06	280 a	19.96
166 a	20.15	190 b	.18	j	.18	190 b	21.58	231 b	.98	247 b	20.40	262 c	.56	281 a	19.96
b	.70	c	.18	d	.18	191 b	21.58	232 b	.98	248 c	21.25	263 a	21.20	282 a	19.96
c	21.39	d	.18	e	.18	192 b	21.58	233 b	.98	249 a	20.67	264 b	.63	283 a	20.56
d	.84	e	.18	f	.18	193 a	19.7	234 b	.98	250 b	21.19	265 b	.22	284 a	.75
e	22.40	f	.18	g	.18	194 a	20.53	235 b	.98	251 b	.50	266 b	.98	285 a	.61
f	.84	g	.18	h	.18	195 b	21.15	236 b	.98	252 b	.68	267 b	.88	286 a	.88
g	22.40	h	.18	i	.18	196 b	21.15	237 b	.98	253 b	.86	268 b	.22	287 a	.40
167 a	21.23	197 a	21.33	198 a	20.6	199 b	20.53	238 b	.98	254 b	.78	269 b	.44	288 a	.40
b	.45	c	.46	d	.46	200 b	21.1	239 b	.98	255 b	.82	270 b	.82	289 a	.51
c	.86	d	.46	e	.46	201 b	21.1	240 b	.98	256 b	.82	271 b	.99	290 a	.99
d	.46	e	.46	f	.46	202 b	21.1	241 b	.98	257 b	.82	272 b	.99	291 a	.40
e	22.52	f	.46	g	.46	203 b	21.1	242 b	.98	258 b	.82	273 b	.99	292 a	.40
f		g	.46	h	.46	204 b	21.1	243 b	.98	259 b	.82	274 b	.99	293 a	.40
g		h	.46	i	.46	205 b	21.1	244 b	.98	260 b	.82	275 b	.99	294 a	.40
168 a	20.15	206 b	21.1	207 b	21.1	208 b	.60	245 b	.98	261 b	.82	276 b	.99	295 a	.40
b	.70	c	.18	d	.18	e	.18	246 b	.98	262 b	.82	277 b	.99	296 a	.40
c	21.39	d	.18	e	.18	f	.18	247 b	.98	263 b	.82	278 b	.99	297 a	.40
d	.84	e	.18	f	.18	g	.18	248 b	.98	264 b	.82	279 b	.99	298 a	.40
e	22.40	f	.18	g	.18	h	.18	249 b	.98	265 b	.82	280 b	.99	299 a	.4

Table III (Continued)

Var. No.	Seq. *	Mag.	Var. No.	Seq. *	Mag.	Var. No.	Seq. *	Mag.	Var. No.	Seq. *	Mag.	Var. No.	Seq. *	Mag.	Var. No.	Seq. *	Mag.
282	a	21.37	302	a	20.62	333	A	20.60	358	a	21.45	379	a	21.64	398	a	21.27
283	b	.65	303	b	21.07	334	B	.89	359	b	.84	380	b	22.08	417	a	21.45
c	.67	.50	304	c	.50	C	21.52	c	22.29	c	.51	c	.90	418	a	21.7	
d	.96	.83		d	.83	D	.85	d	.51	c	.99	c	.99	419	a	22.4	
e		.22, .57		e		E	22.54	e	.90	e	.90	e	.8	420	a	22.36	
284	a	20.62				335	a	21.22	360	a	21.07	381	b	21.01	399	a	20.72
b		21.52	305	a	20.67				354	c	.55	382	a	21.08	400	a	21.18
c		22.28	306	b	21.03	336	b	.44	361	b	.46	H49	d	.95	401	b	.65
			307	c	.30		c	22.03	c	22.10	e	22.54			419	a	22.4
285	a	20.50				d	.60	d	.52	d	.24			420	a	22.25	
b		.76				e	.97					382	a	21.08	402	c	22.02
c		21.12				f	22.36	337	a	21.87	361	a	21.31	403	a	20.72	
d		.41				g	23.05		b	22.23	363	b	.90	385	a	21.31	
e		.92						c	.94	c	.98	c	.98	404	b	21.13	
f		22.54	308	A	19.94			d	22.39	d	22.36	d	.22	404	b	21.13	
			B	20.49		338	a	20.70		e	.82	e	.66	405	a	20.72	
287	a	20.51	C	20.73		339	b	21.30	362	a	21.37	386	a	20.13	H30	c	.73
b		21.13				c	.67	363	b	.90	386	b	.80	404	b	20.06	
c		.40	309	a	20.67	d		363	c	22.18	387	b	.80	405	a	19.86	
d		.63	310	b	21.32	e	.56		c	.59	387	b	.80	406	b	19.49	
e		.93	311	c	.72				d	.74	388	a	20.13	407	c	.73	
f		22.27	312	d	22.03	340	a	21.22	364	a	20.74	388	a	20.13	H30	c	.73
			e	.44	.96	341	b	22.05	365	b	21.15	388	b	.80	407	c	20.13
290	a	20.51				f		365	c	.45	H38		.98	408	d	.88	
b		.95						d	22.01	H43	d	21.36	408	d	.88		
c		21.30	313	a	21.30	342	a	21.31	366	c	.45	H40	a	20.70	409	a	20.70
d		.72	b	.91			b	.60	367	a	20.53			409	a	20.70	
			c				c		367	b	22.42			409	a	20.70	
292	a	21.58				d	.51		368	b	.86				410	B	.60
b		.97							H31	c	21.34	388	A	18.96	410	B	.60
c		22.20	314	a	20.71	343	a	19.8	368	d	.69	389	B	19.86	410	B	.60
d		.95	315	b	21.27				369	e	.66	H40	a	19.40	410	B	.60
			c						369	f	.69	389	C	20.50	410	B	.60
293	a	20.86				316	c	.61	370	b	.86	390	C	20.50	411	a	21.08
b		21.35	317	d	22.15		e	.64	370	c	21.36	G	22.25	411	a	21.08	
c		.76				d	21.6		370	d	22.06	H	.72	411	a	21.08	
d		.97	318	a	21.32	344	a	21.69	371	a	20.98	391	D	21.32	411	a	21.08
			320	b	.78		b	22.05	371	b	21.35	391	E	.58	411	a	21.08
295	a	20.96				c	.37		372	c	21.35	391	F	.93	411	a	21.08
b		21.23							372	d	22.22	391	G	.58	411	a	21.08
c		.52	319	A	20.22	345	a	21.69	373	a	20.80	392	a	21.49	411	a	21.08
d		.72	H22	B	.73	345	b	22.16	373	b	21.18	392	b	.86	411	a	21.08
e		22.22	C	21.18			c		373	c	.49	392	c	.45	411	a	21.08
f		.63	D	.48		346	a	22.70	373	d	22.05	392	d	.88	411	a	21.08
			E	22.12					374	a	20.66	393	a	21.41	411	a	21.08
298	a	20.17	F	.66		347	a	20.61	374	b	21.27	393	b	22.17	411	a	21.08
H47	b	.50				348	b	21.36	374	c	.65	393	c	.45	411	a	21.08
c		21.17	321	a	20.92	349	c	.78	374	d	22.12	393	d	.88	411	a	21.08
d		.59	322	b	21.30				375	a	20.80	394	a	21.41	411	a	21.08
e		22.01	323	c	.74	350	a	22.00	375	b	.65	394	b	.86	411	a	21.08
f		.53	d						375	c	.49	394	c	.45	411	a	21.08
			e	.70		350	b	.33	375	d	22.05	394	d	.88	411	a	21.08
299	a	21.21							376	a	21.25	395	a	21.41	411	a	21.08
b		.52	324	a	20.62	351	a	20.63	376	b	.65	395	b	.86	411	a	21.08
c		22.20	325	b	21.19	352	b	.84	376	c	.49	395	c	.45	411	a	21.08
			326	c	.61	353	c	21.43	376	d	22.05	395	d	.88	411	a	21.08
300	A	18.6				d			377	a	20.80	396	a	21.41	411	a	21.08
301	B	18.9							377	b	.40	396	b	.86	411	a	21.08
Nova	C	19.51							H48	c	.70	396	c	.49	411	a	21.08
1951	D	20.19	327	a	20.81	354	a	21.41	377	d	22.17	396	d	.70	411	a	21.08
E		.62	328	b	21.14		b	.87	377	a	.52	397	a	.52	411	a	21.08
F		.95	329	c	.40	355	c	22.28	377	b	.40	397	b	.40	411	a	21.08
G		21.24	330	d	.76		d	.65	378	A	19.81	397	c	.49	411	a	21.08
H		.51	331	e	.99				H25	B	20.38	397	b	.49	411	a	21.08
K		.94	332	f	22.24	355	a	20.34	C	21.27	397	c	.49	411	a	21.08	
L		22.09				356	b	.76	D	.46	397	d	.49	411	a	21.08	
M		.30				357	c	21.31	E	.79	397	e	.49	411	a	21.08	
N		.85				d	.80	F	22.20	397	f	.47	411	a	21.08		
						e	22.41	G	.67	397	g	.91	411	a	21.08		

field and Fields I and III, though in the latter fields the accidental errors are greater.

Intercomparing SA 68 and the local sequences of the variable fields of M31 was a difficult task. The stars of SA 68 were widely separated and the background was clear. In M31 the stars were crowded and the background in Field I was bright with faint unresolved stars, and in Field III bright with faint stars. It seemed as if no correct magnitudes could be derived by using this method. However, when the period-luminosity and period-amplitude relations of Fields I and III were later intercompared and then compared with Field IV, whose magnitudes were based directly on a photoelectric sequence as well as being transferred from SA 68, there seems to be no systematic difference that can be attributed to difference in magnitudes. The main difference is that the plate limit did not go as faint in Fields I and III as it did in Field IV because of the effect of the bright background.

The local sequences for the variables of Field I are

given in Table II and identified in Plate I. Those for Field III are given in Table III and identified in Plates III through VII. Plate III shows the extent of Field III, the variables in the less crowded areas, and the areas covered by Plates IV through VII. These last are portions of Field III, greatly enlarged, on which the variables and their comparison stars are marked.

As only one or two photovisual plates were taken of each field, no attempt was made to obtain photovisual magnitudes, but the plates were measured to obtain relative colors of the variables. The photovisual measures in Field III are given in scale readings, but are approximate; those in Field I are only qualitative.

### 3. NUMBERING OF VARIABLES

In Fields I and III it became apparent that to retain the discovery numbers of the variables presented a serious problem of finding the variables on the charts; therefore, the stars have been renumbered. The variables that were first found by Hubble (1929) are given

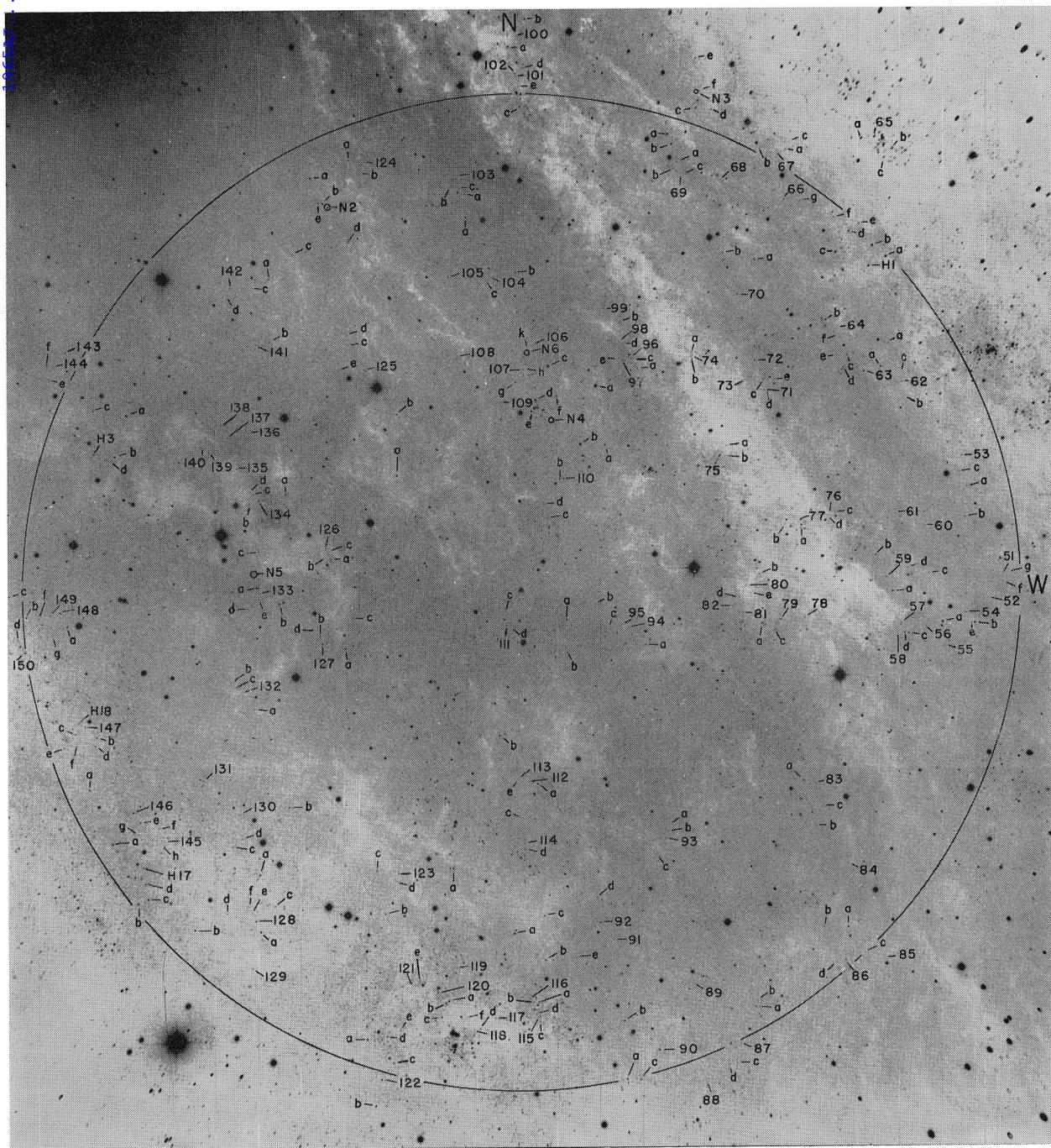


PLATE I. Field I, 106 variables, 5 novae, and their comparison stars.

his numbers, and the new variables have been numbered more or less in order of right ascension across the field. In Field I the new variables are numbered from 51 to 153, and in Field III they are numbered from 161 through 467, beginning on the west side and going to the east side of the plate.

#### 4a. THE VARIABLES OF FIELD I

Thirty pairs of plates were blinked in Field I and 109 new variables and 7 novae were found and con-

firmed. The positions of most of these variables, together with their local sequences, are shown in Plate I. There were four variables (H5, V151, 152, and 153) and two novae (1 and 7) that were bright but close to the edge of the plate. They cannot be shown on Plate I, but are shown on Plate II, together with their sequence stars, and they are listed in Table IV. There were, in addition, 32 faint variables of small amplitude close to the plate edges that have not been measured and are not listed. Table IV lists the 109 variables and

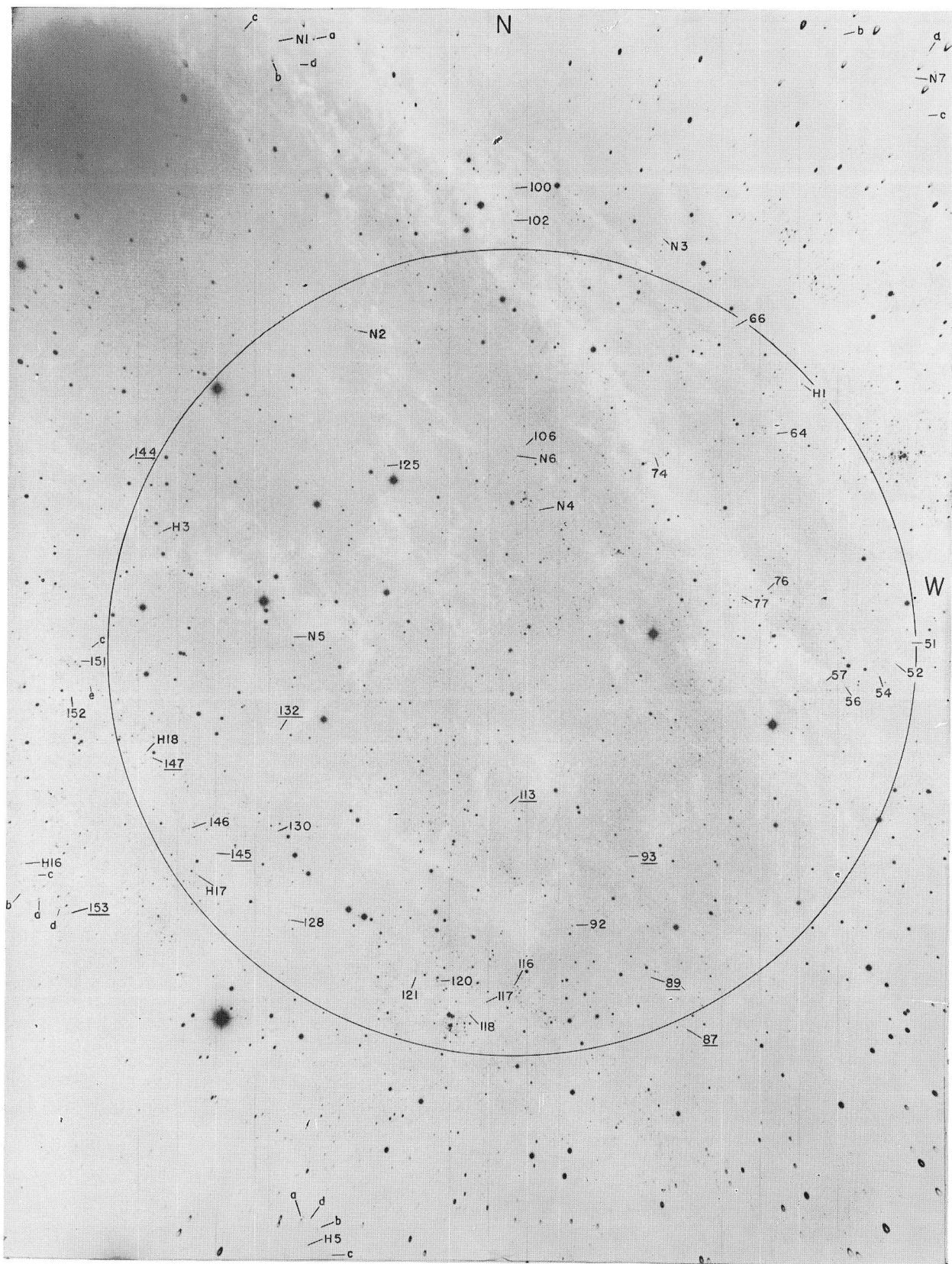


PLATE II. Field I, the distribution of the novae, Cepheids, and Population II variables (underlined).

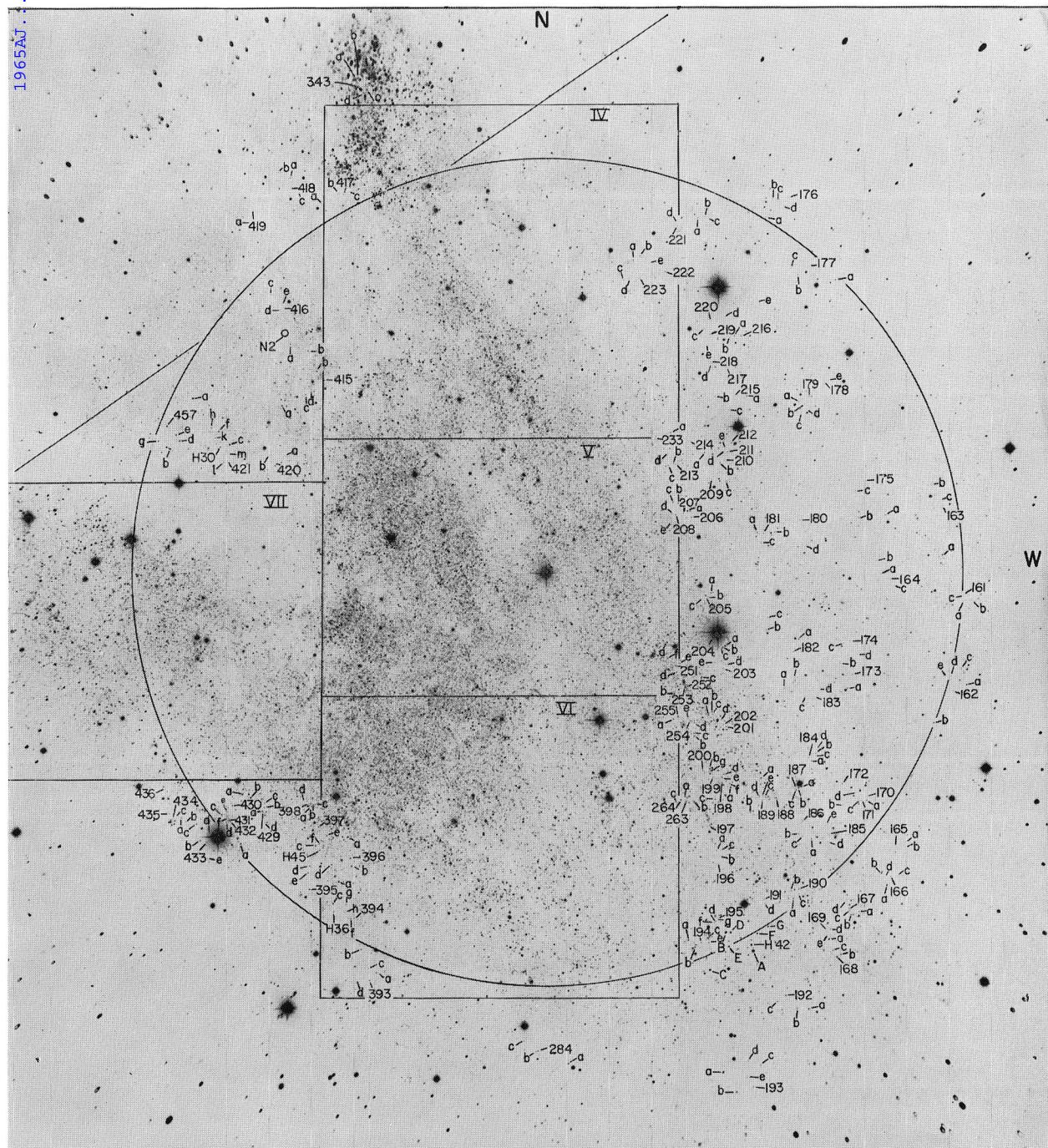


PLATE III. Field III, some variables identified together with their comparison stars and the location of Plates IV through VII.

7 novae. In column 3, where the minimum magnitude is given, the symbol “(” means that the variable is not seen and goes fainter than the magnitude given. This symbol is used this way throughout the paper. When the symbol “)” is given before a maximum magnitude in column 2, it means that the maximum is brighter than the magnitude observed. Column 4 gives the type of variation; the use of the term “short” indicates that the

variable might be a Cepheid with a period less than ten days, though it could also be irregular with rapid fluctuations of small amplitude. A more definite classification of these stars is not possible because (a) the star is superposed on or imbedded in a very dense background, (b) the variable lies toward the edge of the 8' ring and there were few suitable comparison stars available, or (c) the variable has a companion or there is a strong

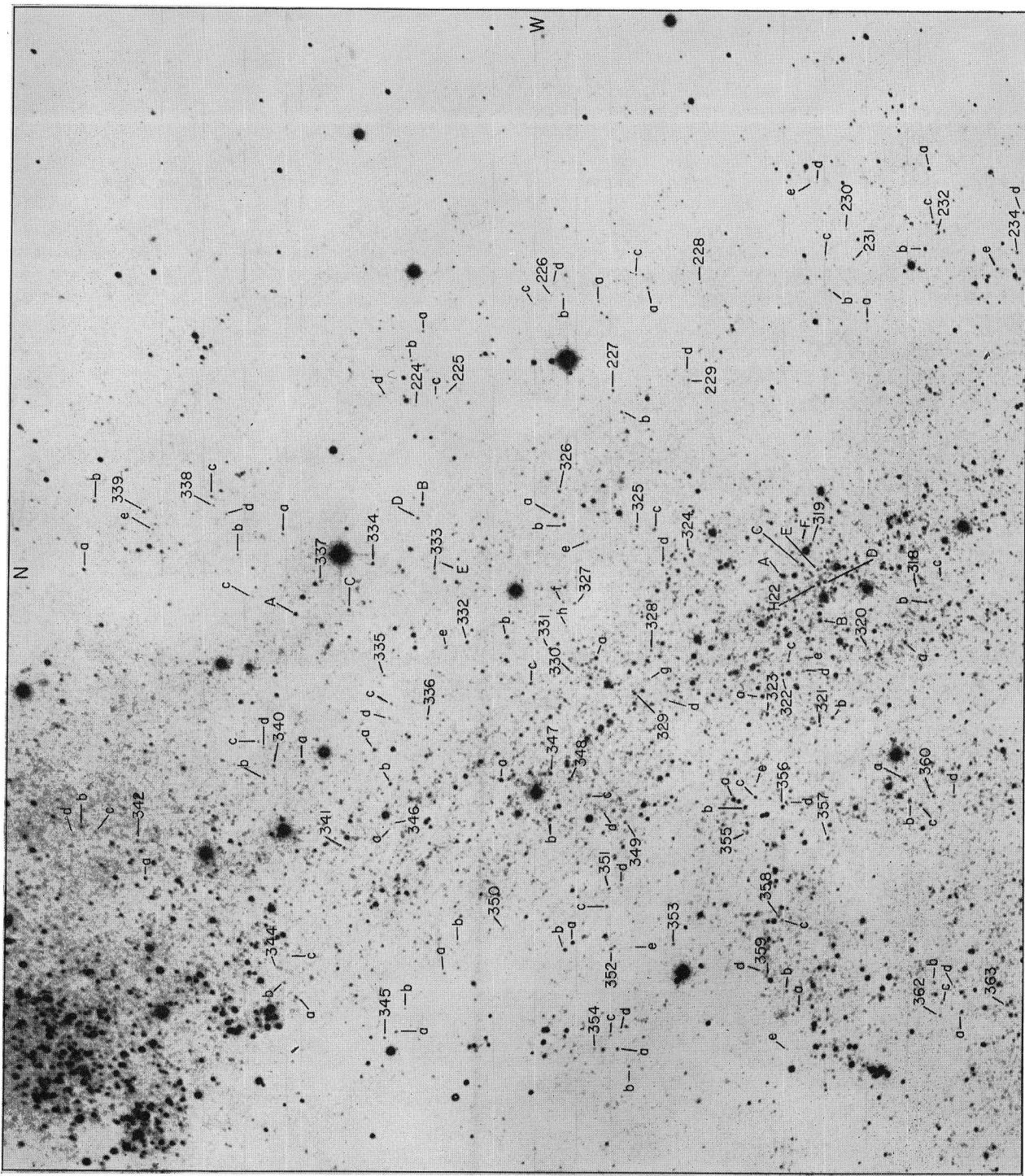


PLATE IV. Field III, north section showing variables and comparison stars.

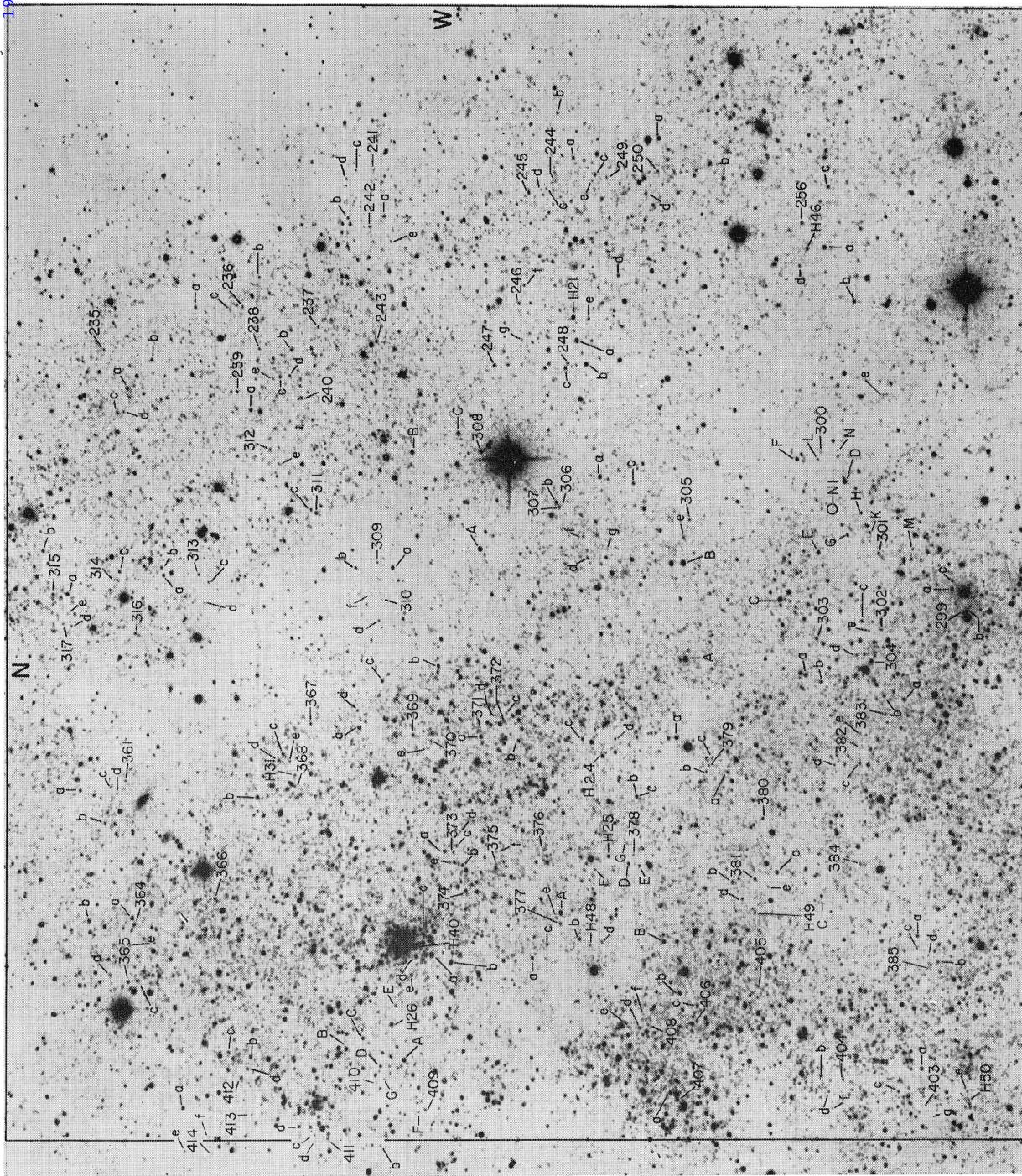


PLATE V. Field III, middle section showing variables and comparison stars.

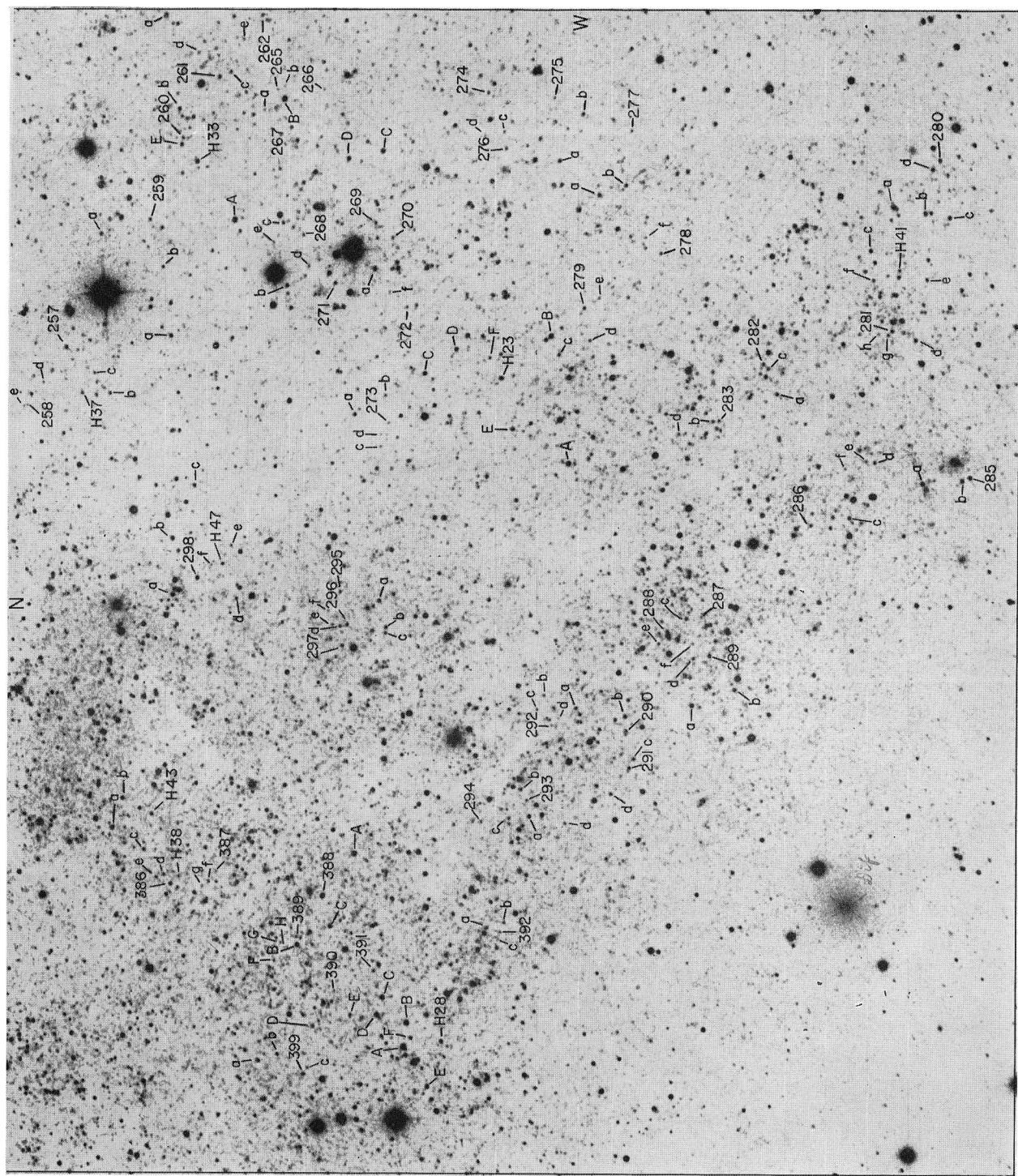


PLATE VI. Field III, south section showing variables and comparison stars.

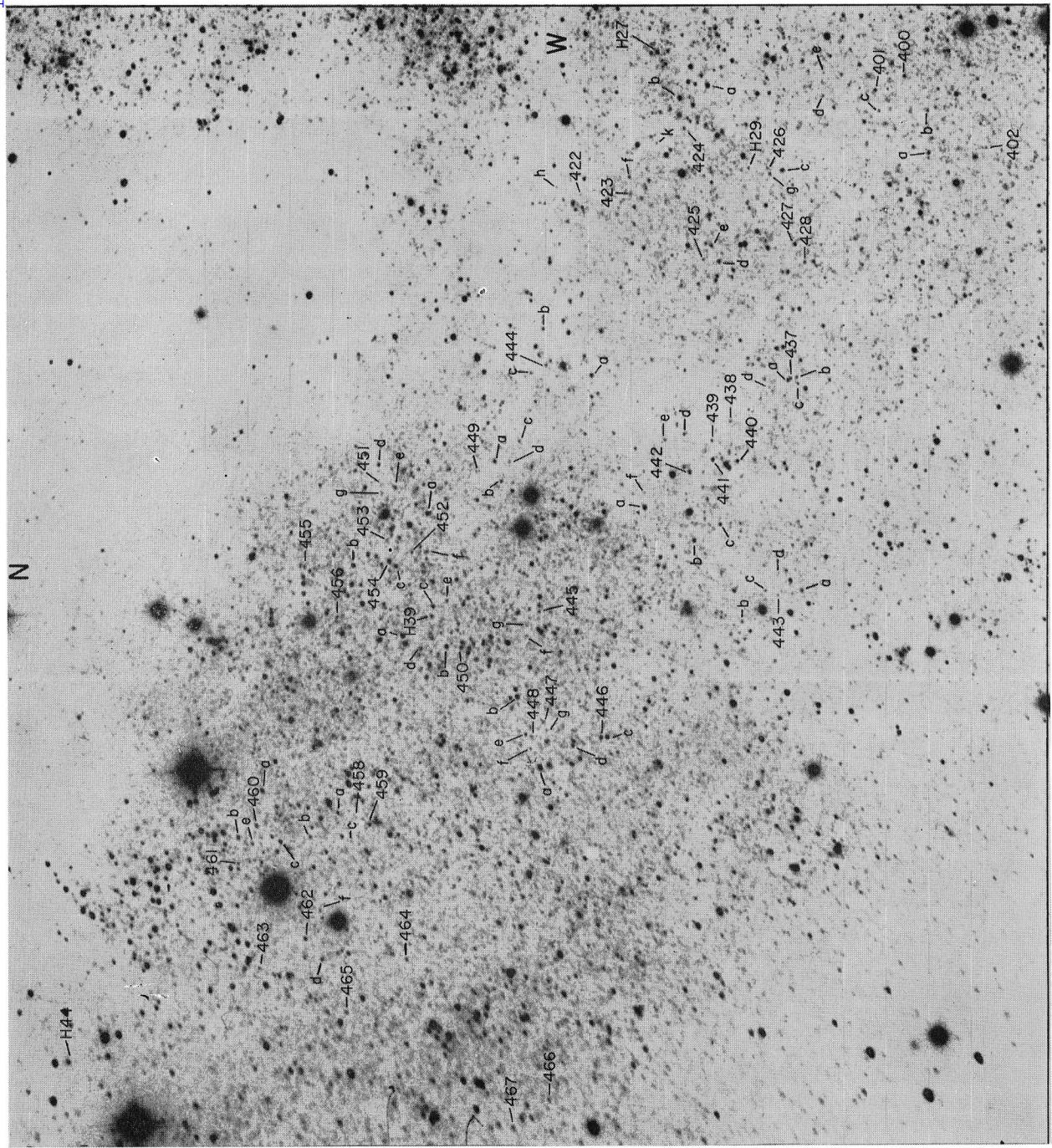


PLATE VII. Field III, following section showing variables and compare stars.

Table IV. One hundred and nine variables and seven novae in Field I.

Var. No. (1)	Max. (2)	Min. (3)	Type (4)	Period (5)	1/p (6)	Relative Color (7)	Note (8)	Remarks (9)	Var. No. (1)	Max. (2)	Min. (3)	Type (4)	Period (5)	1/p (6)	Relative Color (7)	Note (8)	Remarks (9)
H 1	19.00	21.08	Ceph	31.38	0.031863	Reddish			105	21.20	22.10	Irreg			Bluish	d	
H 3	19.80	21.90	Ceph	27.03	0.037002	V. Red			106	21.89	22.55	Ceph	4.64	0.21552	Bluish	d	
H 5	19.47	21.15	Ceph	46.94	0.021305	Red	a		107	21.40	22.05	Irreg			V. Red	d	
H 16	19.48	21.64	Ceph	41.12	0.024319	Red	a		108	21.75	(22.75	Long	190±		-	d	
H 17	19.81	21.39	Ceph	18.77	0.053270	Yellow			109	21.45	22.55	Irreg			Red	d	
H 18	20.36	22.10	Ceph	18.52	0.053981	Yellow			110	20.60	21.70	Irreg			Blue	d	
51	21.86	22.62	Ceph	4.60	0.21740	Yellow			111	21.30	22.65	Semireg			Red:	d	Cycles of 60±d
52	21.57	22.87	Ceph	13.83	0.07230	Red			112	21.10	22.70	Irreg			Yellow		
53	21.30	21.80	Short			Blue	b		113	22.03	22.93	Ceph:	18.96	0.05274	-		
54	21.55	22.43	Ceph	11.58	0.08634	Red			114	21.60	22.70	Irreg			-		
55	21.45	22.40	Irreg			Yellow			115	21.45	22.75	Semireg			Yellow		Cycles of 30-100d
56	20.83	22.43	Ceph	14.40	0.06945	V. Red			116	21.24	22.00	Ceph	7.66	0.13060	Reddish		
57	20.25	22.03	Ceph	14.62	0.06840	V. Red			117	21.42	22.42	Ceph	7.89	0.12670	Reddish		
58	21.60	22.30	Short			-			118	21.70	22.50	Ceph	12.28	0.08145	Red		
59	21.00	21.55	Short			Blue			119	22.10	22.70	Short			-		
60	21.55	22.55	Short			Yellow			120	20.10	21.76	Ceph	44.88	0.02228	V. Red		
61	21.95	22.45	Short			Red:	c		121	21.90	22.65	Ceph	8.32	0.12020	Red		
62	21.35	(22.75	Irreg	500:		Red			122	19.90	21.30	Irreg			Yellow	b	
63	20.55	21.05	Irreg			Red			123	20.95	21.75	Irreg			Yellow		Cycles of 80±d?
64	21.73	22.69	Ceph	4.97	0.20130	Red			124	21.75	(22.75	Irreg			-	d	
65	19.90:	20.20:	Eclip	6.49	0.15416	Yellow	a	Min. 2433572.85	125	20.68	22.04	Ceph	11.80	0.08475	Yellow	d	
66	20.65	21.90	Ceph	28.16	0.03551:	Red			126	21.50	22.15	Short			Yellow	d	
67	21.95	22.40	Short			Yellow	b		127	20.80	(22.75	Irreg			Blue		
68	21.80	22.45	Short			Reddish			128	20.22	22.10	Ceph	27.24	0.03671	Red		
69	22.05	22.55	Short			V. Red			129	20.90	22.30	Irreg			Reddish		
70	20.55	21.90	Irreg			Yellow			130	20.71	22.13	Ceph	20.19	0.04953	Yellow		
71	21.75	(22.75	Irreg			Blue			131	21.40	22.10	Short			Reddish	c	
72	21.00	21.65	Short			Reddish			132	21.85	22.59	RV Tau: 21.13	0.04733		Reddish		
73	21.40	22.05	Short			Blue			133	21.70	22.60	Irreg			Yellow	d	
74	22.16	22.90	Ceph	9.08	0.11014	Reddish			134	21.20	21.75	Short			Blue	d	
75	22.10	22.80	Irreg			Reddish			135	21.05	22.15	Short			Reddish		
76	22.00	23.10:	Ceph	5.86	0.17050	Red			136	21.60	(22.75	Long	260±		-	d	
77	21.96	22.76	Ceph	6.48	0.15434	Red			137	21.40	22.60	Semireg			-	d	Cycles of 25±d
78	21.40	22.30	Short			Yellow			138	21.65	22.40	Short			-	d	
79	21.10	22.05	Irreg			Blue			139	21.60	22.40	Short			-	d	
80	21.50	22.05	Short			Red	c		140	21.30	22.15	Short			Red	d	
81	21.20	22.25	Ceph:			Reddish			141	21.00	22.40	Semireg			Blue	d	
82	20.90	22.40	Irreg			V. Red	d	Brt. 2433835+923	142	21.25	22.40	Irreg			Blue	d	
83	21.75	22.80	Irreg			Yellow			143	21.35	22.62	Irreg			Yellow	b	
84	21.70	22.75	Irreg			Red			144	21.75	22.55	Semireg	60.98	0.01640	-	b, d	
85	21.1	(22.75	Long	380:		Red	b		145	21.63	22.55	Ceph:	17.84	0.05605	Yellow		
86	21.20	22.90:	Irreg			Yellow	b	Long Ecl. Var. ?	146	20.71	21.89	Ceph	7.39	0.13532	Yellow		
87	21.14	22.48	Ceph:	25.63	0.03902	Yellow	b	Field II, No. 195	147	21.15	22.65	Ceph:	27.10	0.03690	Blue:		
88	22.15	(22.75	Long	230:		V. Red	b		148	20.70	21.25	Short			Yellow	c	
89	21.85	22.85	Ceph:	24.94	0.04010	-		Not obs'd at Min.	149	21.20	22.40	Semireg			Yellow		Cycles of 70±d
90	20.55	21.15	Eclip			V. Blue		4 obs. at min.	150	20.35	21.00	Irreg			Red	b	
91	21.90	(22.80	Irreg			Red			151	21.60	(22.4	Ceph	12.97	0.077075	Red	a	
92	20.56	21.96	Ceph	14.35	0.06970	Red			152	21.29	22.45	Ceph	21.19	0.04719	Red	a	
93	22.05	22.90:	Ceph:	26.50	0.03773	Yellow			153	20.25	20.95	Semireg	66.67	0.01500	Yellow	a	
94	21.75	(22.75	Long	350:		Red	d										
95	21.75	22.40	Short:			Yellow	d		Nova 1	17.2	(22.9						
96	21.75	22.65	Irreg			V. Red			Nova 2	19.2	(22.9						
97	21.60	22.35	Short			Blue	d		Nova 3	19.7	(22.9						
98	22.20	(22.75	Long	185:		Red			Nova 4	18.0±	(23.0						
99	21.65	22.40	Short			Blue	d		Nova 5	19.2	(22.9						
100	20.0	22.0	Ceph	16.71	0.05986	Red	a		Nova 6	18.0±	(23.9						
101	21.40	22.20	Short			Red	b		Nova 7	19.5	(22.9						
102	21.39	22.55	Ceph	5.53	0.18085	Red	b										
103	21.40	(22.75	Irreg			-	d										
104	21.65	22.40	Short			Yellow	d										

Notes: a Edge, magnitudes approximate  
 b Edge of measured area, estimates uncertain  
 c Companion or probable companion  
 d Dense background

possibility that it has one. Although it has been determined that the star is a real variable, all these circumstances cause the appearance of the star to change under different seeing conditions. The term "irregular" includes a wide variety of stars—from ones with bluish color to very red ones. Their variability will be discussed in Sec. 4b. "Semiregular" variables are those stars that might be classed as Cepheids but their variation is not periodic but possibly cyclical, rather like an RV Tauri variable or "Semiregular d" as defined in the *Variable Star Catalogue* of Kukarkin, Parenago *et al.* (1958). It is hard to be more specific about these. All the stars were observed during two observing seasons of about five months each; generally, there was one week of observations and three weeks without any plates having been taken. For irregular stars it is advantageous to have more continuous observations for a longer time. Column 6 gives the reciprocal of the period that was used in Table A to compute the phases. Column 7 gives the relative color. In Field I it is very approximate. Its chief value is to distinguish Population II variables from the Cepheids; this is discussed later in Sec. 4c. The color also distinguishes the different kinds of irregular variables. In column 8, under remarks, the letters refer to notes at the foot of the table indicating why the magnitudes may be particularly uncertain. There are also short remarks about some of the variables that are self-explanatory.

## VARIABLES IN THE ANDROMEDA GALAXY

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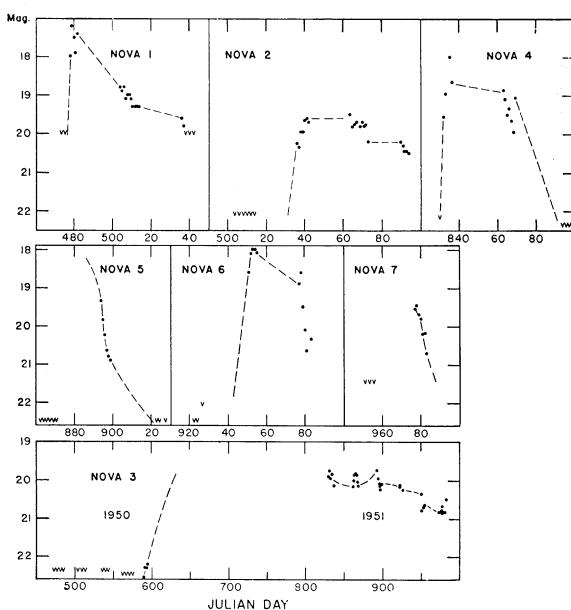


FIG. 1. Seven novae of Field I.

## 4b. NOVAE LONG-PERIOD AND IRREGULAR VARIABLES OF FIELD I

There are seven novae that were found in Field I during the two years it was observed for variables. They are plotted in Fig. 1. The abscissa is Julian Day and for six of the novae it has the same scale, 20 days per division; for Nova 3 the scale is 50 days per division.

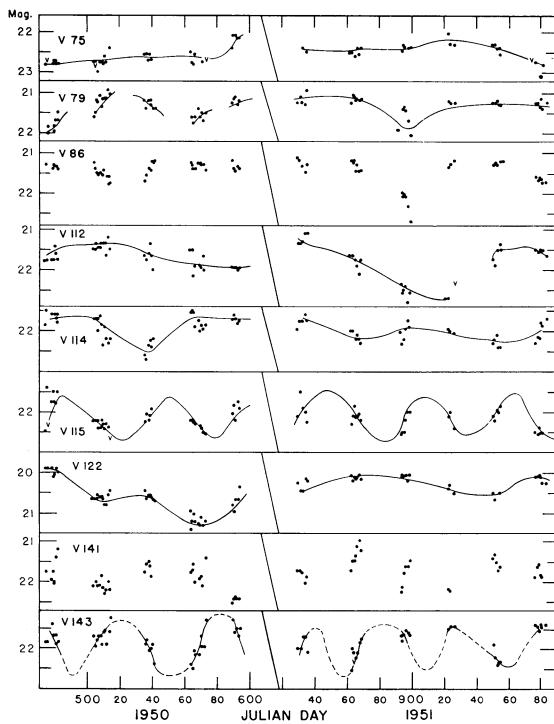


FIG. 2. Nine irregular variables of Field I.

TABLE V. Sixteen irregular variables in Field I.

Var. No.	1950		1951	
	Max.	Min.	Max.	Min.
55	21.9	22.4	21.4	21.9
62	21.5	22.0	22.3	(22.8)
70	20.7	20.8	20.9	21.8
71	22.2	(22.4	21.7	22.0
83	21.7	22.2	22.1	22.7
84	21.9	22.6	21.6	22.4
91	22.0	22.8	...	(22.7)
96	21.7	22.1	22.2	22.6
103	22.0	(22.5	21.4	22.0
109	22.1	22.6	21.4	22.4
110	21.0	21.7	20.7	21.3
124	21.7	22.3	...	(22.5)
127	20.8	21.1	22.0	(22.5)
133	21.7	22.2	22.2	22.6
149	21.2	22.1	21.5	21.9
150	20.4	20.9	20.7	21.0

The novae appear to be like those found by Arp (1956) except that they are not as bright. This may be due to the fact that they are not observed at maximum light or that the magnitude systems are not the same. The latter is a possibility as the plates for the Cepheids are overexposed for the bright stars and the fly spanner used to measure the magnitudes did not have an image big enough diameter for any star above the 19th



TABLE VI. Thirty-one Cepheids in Field I in order of period.

Var. No. (1)	Period (2)	Log P (3)	Mag. of mean <sub>i</sub> (4)	Computed phase of max. (6)	Julian Day of obs'd max. 2 433 000 + (7)	
H 5	46.937	1.671	20.38:	1.68	.370	482.9
120	44.883	1.652	20.81	1.66	.980	
H 16	41.120	1.614	20.45	2.16	.950	511.0
H 1	31.384	1.497	20.11	2.08	.110	
66	28.161:	1.450	21.50:	1.25:	.900	
128	27.241	1.435	21.19	1.88	.600	
H 3	27.026	1.432	20.82	2.10	.650	
152	21.191	1.326	21.87:	1.16:	.760	482.3
130	20.190	1.305	21.49	1.42	.860	
H 17	18.772	1.273	20.66	1.58	.000	
H 18	18.525	1.268	21.18	1.74	.900	
100	16.706	1.223	21.21:	2.00:	.480	509.2
57	14.620	1.165	21.25	1.78	.610	
56	14.399	1.158	21.67	1.60	.260	
92	14.347	1.157	21.34	1.40	.100	
52	13.831	1.140	22.36	1.30	.010	
151	12.974	1.103	...	1.00:	.680	514.8
118	12.277	1.089	22.11	0.80	.840	
125	11.799	1.072	21.45	1.36	.940	
54	11.582	1.064	21.99	0.88	.010	
74	9.079	0.958	22.48	0.74	.400	
121	8.319	0.920	22.22	0.75	.120	
117	7.893	0.897	21.96	1.00	.900	
116	7.657	0.884	21.64	0.76	.200	
146	7.390	0.869	21.30	1.18	.800	
77	6.479	0.812	22.46	0.80	.400	
76	5.865	0.768	22.44	1.10:	.900	
102	5.529	0.743	21.65	1.16	.400	
64	4.968	0.696	22.31	0.96	.110	
106	4.640	0.667	22.31	0.66	.890	
51	4.600	0.663	22.30	0.76	.120	

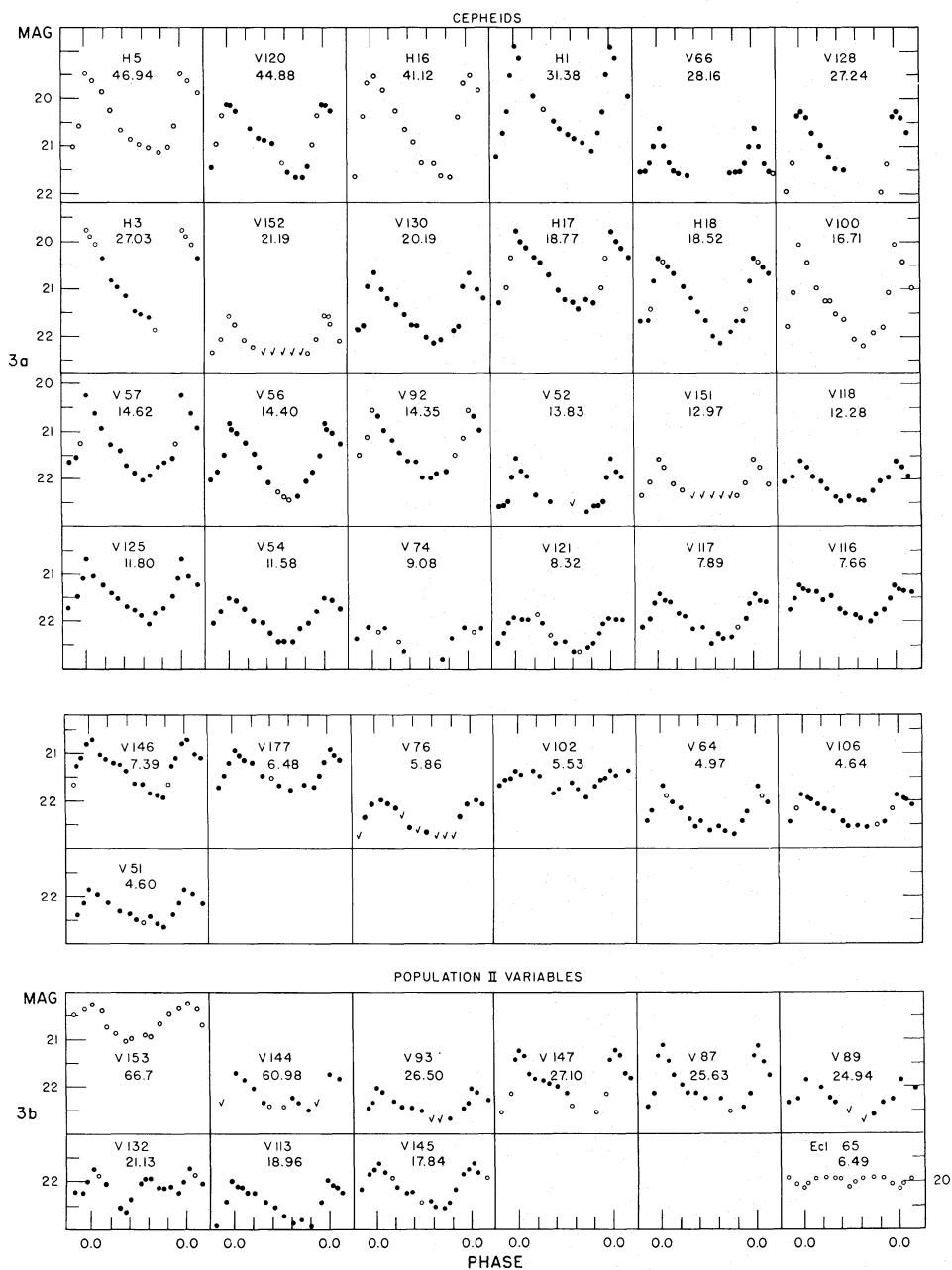


FIG. 3. Field I, (a), mean light curves of 31 Cepheids; (b), mean light curves of 9 Population II variables and 1 eclipsing variable. Solid dots are means of 3 or more observations; open circles, means of 1 or 2 observations; light curves of open circles represent variables outside 8' ring.

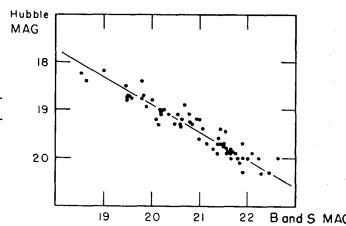
magnitude, and hence the bright magnitudes are extrapolated.

There are also six probable long-period variables; the very tops of their maxima are seen and, because they were observed only over two years, the periods given in the table are approximate. In addition, there are 34 variables that are called irregular or semiregular in Table IV. They were estimated by eye once; therefore, some of the scatter in magnitude is due to measuring error and some is intrinsic in the star. Sixteen of

them have slow variations that differ between observing seasons. They are listed in Table V, with the magnitude range for 1950 in the second column and that for 1951 in the third column. Of these, V62, 84, 91, 96, 109, and 150 are red stars, but V71, 110, and 127 are blue, while V55, 70, 83, 133, and 149 are yellow. Colors for V103 and 124 were not determined.

Nine variables are plotted in Fig. 2. Of these, V75 is reddish, V86, 112, 115, 122, and 143 are yellow, and V79 and 141 are blue, while for V114 the color was not

FIG. 4. Curve for converting Hubble's magnitudes to present system.



determined. Of the nine remaining variables, their type of variation is described in the remarks column and their colors are red for V63, 82, 107, 111, and 129, yellow for V105 and 142, and undetermined for V137.

#### 4c. CEPHEIDS AND POPULATION II VARIABLES OF FIELD I

Table VI lists the 31 Cepheids and Table VII the 9 Population II variables as defined in the paper on Field IV (Baade and Swope 1963), Secs. 9 and 10, in order of decreasing period. Their distribution in the field is shown in Plate II. Plate II also shows the location of the seven novae. The novae are in the northern half of the field. The Cepheids for the most part outline the spiral arm, with one or two exceptions which probably lie in front of the background stars, such as V125. The nine Population II variables are underlined in Plate II; they fall on the south following half of the plate, but mostly not along the spiral arm—with the exception of V145 and 147—but on the inner side of the arm or beyond it.

The mean light curves of the Cepheids are shown in Fig. 3(a), and in Fig. 3(b) are the light curves of the Population II variables. The solid dots represent normal points with three or more observations, and the open circles normal points of one or two observations. The light curves made up exclusively of open circles are near the edge of the field. They are H5, H16, and V100, 151, 152, and 153.

Table A gives the observations and phases for 34 of the variables. The phases are computed using: Phase  $= 1/p(JD - 2433000)$  except for Hubble's variables, which are computed using Phase  $= 1/p(JD - 2400000)$ .

Since there are only a few plates between Hubble's observations and those of 1950–1952, the observations on 100-in. plates are not listed, but a conversion curve (Fig. 4) has been given to convert Hubble's magnitudes (1929) to the present system. As Hubble did not give his comparison stars, a rough conversion curve was formed by taking his maximum and minimum values for each Cepheid and plotting it against the magnitudes of maximum and minimum for the same Cepheid given in Tables IV and VIII of this paper. It is rather remarkable that the agreement is as good as it is and that it is a straight line. At the bright end the difference between the magnitude systems is  $0^m5$ , and for the faint observations the difference is about  $2^m0$ . The converted magnitudes fit the new periods that have been only slightly altered from Hubble's original periods and there is no indication of any real change of period.

TABLE VII. Nine Population II variables in Field I.

Var. No.	Period	Log P	Mag. of mean <sub>1</sub>	Ampl.	Computed phase of max.	Julian Day of obs'd max. 2,433,000 +
153	66.67	1.826	20.66	0.70:	.300	954.0
144	60.98	1.785	22.19	0.80	.050	
147	27.10	1.433	21.97	1.50:	.700	
93	26.50	1.423	22.47	0.86:	.370	
87	25.63	1.408	22.00	1.34	.890	
89	24.94	1.397	22.35	1.00:	.040	
132	21.13	1.324	22.10	0.74	.400	
113	18.96	1.278	22.46	0.90	.630	
145	17.84	1.251	22.14	0.92	.940	

The observations for the six variables near the edge of the field are not given in Table A, but the Julian Day of an observed maximum is given in the remarks of Tables VI and VII.

V132, plotted in the lower left corner of Fig. 3(b), is called a Population II variable, but it is rather anomalous. It has alternating deep and shallow minima over the two years observed, but its period seems short for an RV Tauri star. It may be an eclipsing variable—but then its color appears to be too red, unless it is also a very much reddened star.

The one eclipsing star with a period, V65, is plotted in the lower right corner of Fig. 3(b) and the Julian Day of an observed minimum is given in the remarks of Table IV.

#### 5a. THE VARIABLES OF FIELD III

In Field III Baade blinked eight pairs of plates and later Miss Swope blinked ten pairs. Of the 390 variables marked, 39 were not measured because of closeness to the plate edge, 17 were in the northeast corner overlapped by Field II and were better measured by Gaposchkin (1962). The remaining 334 variables and 2 novae and their local sequences (Table VIII) are marked on Plates III through VII, and they are listed in Table VIII. Of these, 237 variables were found by Baade and 97 by Miss Swope. The first 27 variables of the table were originally discovered by Hubble (1929) and retain his numbers. The periods given are essentially the same as his, but they now fit all the observations from 1920 through 1952. There is no evidence for any change of period. H47, 48, 49, and 50, for which Hubble found no periods, are also Cepheids. They were too faint to be seen on most of the 100-in. plates.

All the variables within an 8' ring of the plate center were measured and, in addition, a few stars in the south preceding spiral arm and in the following arm outside the ring have been included. Table VIII is similar to Table IV. In column 4 there are 38 variables that are called "Cepheid;" or short; their variation is similar to that described in Sec. 4a for Field I. In column 7 the relative color is given as the scale difference between the photographic and the photovisual plates, as all the variables and their comparison stars were measured on

Table VIII. Three hundred and thirty-four variables and two novae in Field III.

Var.	Max.	Min.	Type	Period	Reciprocal of period	Relative Color	Remarks	Var.	Max.	Min.	Type	Period	Reciprocal of period	Relative Color	Remarks
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
H 21	20.20	21.80	Ceph	17.154	0.058294	+ 7	*	219	21.52	22.34	Ceph	5.266	0.18991	0	
22	19.90	21.70	Ceph	17.569	0.056920	+ 13	*	220	21.50	22.40	Ceph	5.900	0.16949	- 2	Nebulous
23	19.55	21.45	Ceph	17.557	0.056936	+ 9	*	221	21.55	22.60	Ceph	5.823	0.17173	+ 12	
24	20.79	22.05	Ceph	17.609	0.056790	+ 15	*	222	21.25	22.27	Ceph	8.094	0.12555	6	
25	20.35	21.65	Ceph	11.831	0.084521	+ 8	*	223	21.58	22.46	Ceph	3.808	0.26230	+ 3	
H 26	20.25	21.75	Ceph	26.196	0.038174	- 16	*	224	22.05	22.70	Short	-	-	-	
27	19.60	21.55	Ceph	24.130	0.041442	+ 10	*	225	21.70	22.46	Ceph	7.780	0.12853	+ 6	
28	18.55	20.60	Ceph	26.790	0.037328	-	*	226	22.05	22.87	Ceph	5.640	0.17729	-	
29	20.78	22.64	Ceph	19.492	0.051302	- 12	*	227	21.63	22.47	Ceph	5.848	0.17100	+ 3	
30	19.50	21.60	Ceph	18.291	0.054672	+ 10	*	228	21.50	22.50	Ceph	7.613	0.13135	+ 6	
H 31	20.55	22.23	Ceph	22.725	0.044004	- 12	*	Field II, No. 102							
33	19.50	20.84	Ceph	18.853	0.053043	+ 3	*	229	21.65	22.25	Ceph	9.208	0.10860	+ 5	
36	20.20	21.50	Ceph	17.914	0.055823	+ 4	*	230	21.60	22.74	Ceph	6.508	0.15366	+ 5	
37	20.49	21.57	Ceph	13.338	0.074973	+ 8	*	231	21.80	22.40	Eclips:	-	-	- 14	4 min.
38	20.60	22.00	Ceph	10.125	0.098764	+ 8	*	232	20.85	21.35	Ceph	5.117	0.19542	0	Nebulous
H 39	20.20	21.84	Ceph	23.970	0.041719	+ 13	*	233	21.60	22.26	Ceph	4.837	0.20673	0	
40	19.65	20.95	Ceph	33.510	0.029842	+ 11	*	234	20.72	21.70	Ceph	9.933	0.10067	+ 7	
41	20.04	21.50	Ceph	25.487	0.039236	+ 7	*	235	21.07	22.17	Ceph	8.010	0.12485	+ 3	
42	18.30	20.10	Ceph	176.68	0.00566	- 23	*	236	21.20	22.05	Ceph?	27.115	0.03688	+ 1	Max. not obs'd
43	20.70	21.30	Irreg	-	-	- 37	*	237	21.60	22.42	Ceph	7.085	0.14115	+ 3	
238	21.86	22.46	Ceph	6.283	0.15917	+ 5									
H 44	19.85	21.45	RCrB	-	-	+ 0	* a. Field II, No. 215	239	21.50	21.95	Eclips:	-	-	- 14	1 1/2 min.
45	20.13	21.65	Ceph	12.889	0.077587	+ 6	*	240	21.20	22.00	Eclips:	-	-	+ 1	3 min.
46	20.62	21.58	Ceph	12.923	0.07738	+ 4	*	241	21.48	22.34	Ceph	6.329	0.15800	0	
47	21.41	22.45	Ceph	6.006	0.16650	+ 2	*	242	21.60	22.35	Ceph:	-	-	- 1	
48	21.40	22.30	Ceph	5.320	0.18797	+ 4	*	243	21.30	22.36	Ceph	8.435	0.11856	+ 2	Companion
H 49	21.00	21.90	Ceph	10.265	0.09742	+ 6	*	244	21.60	22.68	Ceph	4.219	0.23705	- 4	Companion
H 50	21.00	22.40	Ceph	11.378	0.08789	+ 7	*	245	21.23	22.56	Eclips	8.216	0.12172	- 17	
161	21.84	22.50	Ceph	4.025	0.24844	-		246	21.35	22.31	Ceph	4.946	0.20217	+ 1	
162	21.03	22.15	Semireg	65.10	0.01536	0	Max. poorly obs'd	247	20.55	21.81	Ceph	7.006	0.14273	0	
163	21.24	22.28	Ceph	4.368	0.22891	- 6		248	21.45	22.15	Short	4.±	-	-	
164	22.00	22.70	Ceph:	-	-	-		249	21.50	22.12	Ceph	8.809	0.11352	+ 3	
165	22.00	23.00	Ceph:	8.±	-	-	a	250	21.08	21.96	Ceph	8.301	0.12047	+ 3	
166	20.70	22.40	Ceph	22.302	0.04484	+ 9	a	251	21.30	22.15	Ceph	5.260	0.19010	0	
167	21.35	22.45	Ceph	6.047	0.16536	0	a	252	20.80	21.45	Ceph	13.089	0.07640	+ 2	V 253 companion
168	20.20	21.50	Ceph	13.125	0.07619	+ 5	a	253	20.90	21.50	Ceph	9.551	0.10470	+ 2;	of V 252
169	21.30	22.40	Ceph	6.207	0.16110	0	a	254	21.40	22.40	Ceph	6.978	0.14330	+ 1	
170	21.52	22.70	W Vir:	17.346	0.05765	- 7		255	21.10	(21.7:	Eclips	8.978	0.11138	- 2	
171	21.80	22.50	Ceph	5.081	0.19680	-		256	21.30	22.20	Ceph	5.333	0.18750	- 5	
172	21.53	22.55	Ceph	11.013	0.09080	-		257	20.75	21.65	Ceph	9.038	0.11065	+ 6	
173	21.45	22.40	Ceph	5.008	0.19969	- 3		258	21.60	22.60;	Ceph	5.500	0.18182	- 3	Companion
174	21.90	22.40	Eclips	-	-	- 17	7 min.	259	21.20	21.52	Ceph	5.316	0.18812	- 1	
175	21.60	22.15	Short	-	-	+ 6		260	21.45	22.45	Short	-	-	-	
176	21.75	22.55	Ceph	2.5±	-	-	a	261	21.25	21.65	Ceph	11.368	0.08797	+ 7	
177	21.28	21.98	Ceph?	27.972	0.03575	- 4		262	20.45	21.45	Ceph	8.762	0.11413	+ 5	
178	22.15	23.00	Short	-	-	+ 2		263	21.15	21.80	Short	-	-	-	
179	21.70	22.30	Irreg:	-	-	+ 20		264	20.95	22.05	Ceph	9.524	0.10500	+ 2	
180	21.65	22.27	Ceph	9.181	0.10892	+ 3		265	22.30	22.95	Short	-	-	-	
181	21.70	22.30	Eclips:	-	-	- 10		266	22.40	23.00	Short	-	-	-	
182	21.45	22.00	Eclips	-	-	- 12	6 min.	267	21.08	22.40	Ceph	13.250	0.07547	+ 11	
183	22.15	23.05	Ceph	5.350	0.18690	-		268	20.84	21.84	Ceph	14.440	0.06925	+ 8	
184	21.95	22.90	Ceph	6.048	0.16534	-		269	21.40	22.12	Ceph	4.620	0.21645	- 2	
185	22.14	22.85	Ceph	7.704	0.12980	-		270	21.01	22.01	Ceph	10.017	0.09983	+ 7	
186	21.50	22.80	Ceph	6.293	0.15890	+ 8		271	20.85	21.97	Ceph	7.911	0.12640	+ 2	
187	21.85	22.55	Ceph	7.042	0.14200	+ 3	Near bright star	272	21.25	22.40	Ceph	6.545	0.15278	- 3	
188	21.20	22.38	Ceph	11.947	0.08370	+ 10		273	21.65	22.51	Ceph	9.741	0.10266	+ 4	
189	21.65	22.55	Ceph:	3.±	-	-		274	21.31	22.25	Ceph	6.823	0.14657	0	
190	21.35	21.95	Ceph	3.346	0.29890	- 3		275	21.20	22.45	Ceph	21.556	0.04639	+ 17	
191	21.10	22.10	Ceph	6.545	0.15280	+ 2		276	21.24	21.72	Eclips	5.005	0.19980	- 18	
192	20.80	21.50	Ceph	4.773	0.20950	-	a	277	21.50	21.96	Ceph	2.747	0.36400	- 7	
193	19.70	21.25	Ceph	15.524	0.064415	-	a	278	20.87	22.05	Ceph	9.881	0.10120	- 7	
194	20.93	21.89	Ceph	10.479	0.09543	+ 9		279	21.37	22.25	Ceph	4.921	0.20320	- 3	
195	21.49	22.41	Ceph	4.289	0.23313	- 0		280	20.34	20.96	Ceph	13.850	0.07220	+ 4	
196	22.15	22.60	Short	-	-	-		281	21.30	22.16	Ceph	9.699	0.10310	+ 12	
197	22.05	22.70	Ceph:	3.±	-	-		282	21.35	21.70	Short	-	-	-	
198	21.00	22.28	Ceph	6.002	0.16660	- 4		283	21.50	22.00	Ceph:	4.±	-	-	
199	21.42	22.38	Ceph	6.101	0.16390	- 2		284	20.95	21.90	Eclips:	-	-	- 12	4 min.
200	21.95	22.70	Irreg:	-	-	+ 23		285	20.45	22.90	RCrB	-	-	0	*
201	21.55	22.05	Ceph	3.227	0.30990	- 2		286	21.25	22.35	Ceph	4.915	0.20345	+ 7	
202	21.64	22.32	Ceph	6.460	0.15480	- 2		287	21.15	22.15	Ceph	5.095	0.19626	- 1	
203	21.85	22.30	Eclips	-	-	- 8	3 min.	288	21.02	21.62	Ceph	9.573	0.10446	0	
204	21.05	21.80	Eclips	-	-	- 8	5 min, close to brt. st.	289	20.30	21.65	Ceph:	6.±	-	-	
205	22.55	23.17	Eclips	6.944	0.14400	- 5		290	20.54	21.20	Semireg	67.95	0.014716	+ 1	*
206	21.56	22.06	Eclips	4.265	0.23445	- 9		291	20.95	21.45	Irreg:	-	-	- 7	
207	20.98	21.94	Ceph	6.545	0.15280	0		292	21.95	22.75	Ceph	8.±	-	+ 12	
208	21.02	22.24	Ceph	12.402	0.08063	+ 7		293	20.91	21.99	Ceph	15.015	0.06660	+ 10;	
209	21.80	22.60	Eclips	-	-	- 8		294	21.20	21.98	Ceph	7.570	0.13210	+ 3	
210	21.92	22.90	Ceph	5.120	0.19533	0		295	21.50	22.25	Short	-	-	0	
211	21.63	22.37	Ceph	3.833	0.26900	- 3		296	21.44	22.26	Ceph	9.412	0.10625	+ 6	
212	21.55	22.90	Eclips	-	-	- 2	Period over 500 days	297	20.90	22.12	Ceph	10.288	0.09720	+ 10	
213	22.00	22.42	Ceph:	4.07:	0.2455:	+ 11		298	20.46	21.54	Ceph	13.479	0.074188	+ 2	*
209	22.00	22.60	Short	-	-	-		299	21.00	22.00	Ceph	10.591	0.09442	- 6	Companion
215	21.45	22.51	Ceph	5.420	0.18450</										

Table VIII. (continued)

Var.	Max.	Min.	Type	Period	Reciprocal of period		Relative Color	Remarks	Var.	Max.	Min.	Type	Period	Reciprocal of period		Relative Color	Remarks		
					(1)	(2)								(1)	(2)				
304	20.75	21.41	Ceph	8.365	0.11954	+ 1	Companion	389	21.75	22.35	Short:	-	-	-	-	-	-	Companion	
305	21.45	22.63	Ceph	5.589	0.17893	0		390	21.95	22.55	Short:	-	-	+12					
306	21.80	(22.80	Long	370.		+30:		391	20.85	21.95	Ceph	7.619	0.13125	+ 4					
307	20.75	21.53	Ceph	8.961	0.11160	- 3:		392	21.70	22.40	Ceph	6.196	0.16140	+ 5					
308	19.98	20.65	Eclip	4.9462	0.202174	-15		393	21.15	21.90	Irreg	-	-	-14	a				
309	21.08	22.40	Ceph	7.667	0.13043	+ 7		394	21.50	22.25	Ceph	5.285	0.18920	+ 2					
310	22.25	(23.00	Ceph	8.210	0.12180	-		395	20.40	21.62	Ceph	10.741	0.093101	+ 6	*				
311	20.80	21.82	Ceph	8.171	0.12238	+ 4		396	20.50	21.30	Semireg	100.00	0.00100	+ 3	*				
312	21.84	22.90	Eclip	4.898	0.20418	-16		397	21.45	21.95	Ceph:	6.±	-	-					
313	21.29	22.41	Ceph	10.689	0.09355	+13		398	21.60	(22.60	Ceph	7.008	0.14270	+ 6					
314	21.62	22.36	Ceph	14.306	0.06990	+ 7	Companion	399	21.27	21.93	Ceph	5.580	0.17920	- 5					
315	20.93	21.59	Ceph	8.464	0.11815	- 3		400	21.20	22.50	Irreg	-	-	+ 5					
316	20.70	21.90	Ceph	10.526	0.09500	+ 6		401	21.23	22.00	Eclip	8.227	0.12155	-13					
317	21.63	22.39	Ceph	6.313	0.15840	0		402	21.68	22.52	Ceph	4.904	0.20390	+ 6					
318	21.40	22.44	Ceph	9.921	0.10800	+ 4		403	21.95	22.75	Ceph	5.103	0.19596	- 1					
319	21.25	22.30	Ceph	7.553	0.13240	+ 4	Companion	404	21.15	22.55	Ceph	17.247	0.05798	+14					
320	21.40	22.58	Ceph	7.823	0.12783	+10		405	20.78	22.02	Ceph	10.549	0.09480	+ 2					
321	21.40	22.00	Ceph	7.723	0.12948	0	Lg. scatter, comp.	406	20.85	(22.00	Ceph	13.643	0.07330	+10					
322	21.54	22.48	Ceph	5.482	0.18240	-	Companion	407	20.95	22.10	Ceph	13.912	0.07188	+11					
323	21.00	21.60	Eclip	18.748	0.05334	- 2		408	21.85	22.67	Ceph	6.188	0.16160	+ 7					
324	21.60	(22.60	Ceph	6.481	0.15430	+ 5	Companion	409	21.45	22.10	Eclip:	3.5±	-	- 5					
325	21.10	21.75	Ceph	9.483	0.10545	0:	Companion	410	21.86	22.80	Ceph	6.036	0.16567	+ 3					
326	20.95	22.11	Ceph	7.000	0.14286	+ 2		411	21.20	22.70	Ceph	15.833	0.06316	+ 6					
327	21.60	22.40	Eclip:	-	-	- 4		412	20.90	21.70	Ceph	7.992	0.12512	+ 2					
328	21.53	22.23	Ceph	6.660	0.15014	+ 3	Field II, No. 30	413	21.95	22.75	Irreg	-	-	+30					
329	20.75	22.00	Ceph	12.312	0.08122	+13	Field II, No. 135	414	21.55	22.67	Ceph	3.742	0.26726	- 5					
330	21.05	22.21	Ceph	6.709	0.149055	+ 2	Field II, No. 29	415	20.80	22.30	Ceph	13.125	0.07619	+10					
331	21.30	22.30	Ceph	5.978	0.16728	0		416	21.44	22.48	Ceph	14.364	0.06962	-					
332	21.10	22.36	Ceph	7.457	0.13410	+ 2	Field II, No. 70	417	21.65	22.23	Ceph	4.967	0.20131	+ 2					
333	21.90	22.56	Ceph	5.486	0.18228	-		418	21.40	22.05	Irreg	-	-	+34	a			a slow	
334	20.75	21.60	Ceph	12.294	0.08134	+ 9	Field II, No. 133	419	22.35	(22.9	Long	343.	-	-	+30:	a			
335	21.33	22.35	Ceph	5.750	0.17390	- 4	Field II, No. 173	420	22.10	22.95	Short:	-	-	-					
336	21.80	22.56	Ceph	4.610	0.21692	+ 7		421	22.30	23.00	Short:	-	-	-					
337	21.85	22.45	Short	-	-	-	Close to other stars	422	21.95	(23.0	Ceph	18.519	0.05400	+18					
338	21.95	22.71	Ceph	5.647	0.17707	-	Field II, No. 203	423	21.42	22.54	Ceph	14.388	0.06950	+15:					
339	21.00	22.30	Ceph	15.232	0.06565	+15	Field II, No. 150	424	21.85	22.75	Ceph	6.726	0.14868	+ 2					
340	21.20	22.20	Ceph	6.645	0.15050	+ 8	Field II, No. 151	425	22.00	22.55	Ceph:	6.±	-	+ 7					
341	20.50	21.84	Ceph	9.881	0.10120	-		426	21.70	22.40	Ceph	9.425	0.10610	+ 5					
342	21.60	22.30	Short	-	-	-	Field II, No. 153	427	21.05	22.40	Ceph	11.257	0.08883	+ 6					
343	20.0	21.5:	Ceph	13.210	0.07570	-	a, Field II, No. 57	428	21.07	21.65	Ceph	6.024	0.16600	0				Shift in phase	
344	21.73	22.27	Ceph	5.040	0.19840	-	Companion	429	21.45	22.75:	Ceph	5.679	0.17610	+ 2				Companion	
345	21.60	21.90	Irreg	-	-	+23		430	20.40	21.20	Irreg	-	-	-10				Slow	
346	22.65	(22.80	Ceph	-	-	-		431	21.30	21.90	Ceph	4.082	0.24498	+ 2				Close to V432	
347	20.75	21.55	Short	-	-	+12	Close to other stars	432	21.63	22.42	Eclip	67.20	0.01488	+ 2					
348	21.20	22.10	Ceph	9.662	0.10350	+10	Field II, No. 68	433	20.65	22.40	Eclip	22.978	0.04352	+14	a				
349	21.95	22.45	Irreg	-	-	+ 5		434	21.95	22.45	Irreg	-	-	+40	a				
350	21.50	22.20	Ceph	5.351	0.18688	- 3	Field II, No. 174	435	21.70	22.54	Ceph	4.686	0.21340	+ 3	a				
351	21.50	22.64	Ceph	5.719	0.17487	+ 1	Field II, No. 153	436	22.10	22.90	Short:	-	-	0	a				
352	20.84	21.80	Ceph	6.071	0.16473	+ 1	Field II, No. 175	437	21.55	(22.55	Ceph	6.231	0.16050	-				Companion	
353	21.50	21.98	Ceph	2.932	0.341095	-	Field II, No. 67, comp.	438	21.34	22.70:	Ceph	12.811	0.07806	+13					
354	21.58	22.44	Ceph	7.368	0.13573	+ 7	Field II, No. 61	439	20.52	22.44	Ceph	21.698	0.046088	+13					
355	20.61	21.69	Ceph	15.699	0.06370	+ 4	Field II, No. 114	440	20.85	22.50	Ceph	25.707	0.03890	+16					
356	20.50	21.05	Irreg	-	-	- 1		441	21.00	21.80	Eclip	-	-	-16				3 min.	
357	21.03	22.51	Ceph	13.293	0.07523	+ 6		442	20.73	21.45	Eclip	9.583	0.10435	-18					
358	21.60	22.30	Ceph	11.922	0.08388:	+ 9	Companion	443	21.60	22.76	Ceph	4.990	0.20040	+ 5					
359	21.50	22.80	Ceph	6.75:	0.1481:	0	Close to brt. stars	444	21.50	22.50	Eclip	-	-	-13				2 min.	
360	21.35	22.10	Irreg	-	-	- 7	7 min.	445	22.00	22.68	Eclip:	-	-	- 9					
361	21.59	22.55	Ceph	6.039	0.16560	+ 3		446	20.15	21.50	Ceph	14.130	0.070770	+ 6	*				
362	21.40	22.38	Ceph	11.074	0.09030	+10		447	21.82	22.52	Ceph	5.456	0.18330	+ 7					
363	21.70	22.05	Short	-	-	-		448	21.65	22.55	Ceph	6.475	0.15445	+ 8				Companion	
364	20.80	21.44	Ceph	7.120	0.14045	+ 2		449	21.20	22.68	Ceph	19.395	0.05156	+19					
365	21.10	22.50	Ceph	20.568	0.04862	+18		450	20.25	21.65	Ceph	11.700	0.08547	+ 6				Companion	
366	20.95	22.35	Ceph	14.407	0.06941	+11		451	21.88	22.70	Ceph	10.969	0.09117	+ 9					
367	21.20	21.90	Irreg	-	-	+ 6		452	20.80	22.20	Ceph	10.951	0.09132	+ 8					
368	21.20	22.20	Ceph	-	-	+ 3	Slow	453	21.34	22.56	Ceph	20.602	0.04854	+15					
369	20.70	21.35	Irreg	-	-	+ 2		454	20.85	21.45	Ceph	15.152	0.06600	+ 6				Companion	
370	21.40	22.30	Ceph	7.537	0.13267	+ 3	Companion	455	21.65	22.35	Ceph	7.138	0.14010	-				Companion	
371	21.20	21.95	Short	-	-	- 5		456	20.80	22.40	Ceph	11.534	0.08670	+ 8				Companion	
372	21.35	22.50	Ceph	4.608	0.21700	0	Companion	457	20.35	21.20	Eclip	2.51145	0.398177	-17				* Field II, No. 65	
373	21.86	23.00	Ceph	5.442:	0.18377	+ 5	Companion	458	21.90	(22.90	Ceph	4.635	0.21575	0				a	
374	20.80	22.90	RCrB	-	-	+11		459	21.70	22.20	Ceph	8.576	0.11660	+ 8	a				
375	21.65	22.95:	Ceph	3.654	0.27367	-	Companion	460	21.05	22.55	Ceph	18.570	0.05385	+15	a				
376	21.40	22.50	Ceph	5.276	0.18954	+ 5	Companion	461	20.95	22.85	Ceph	25.151	0.03976	+16	a				
377	21.40	22.58	Ceph	8.367	0.11952	+ 6		462	21.40	22.90:	Ceph	11.086	0.09020	-	a				
378	21.64	22.74	Ceph	6.198	0.16135	+ 4		463	20.68	22.04	Ceph	12.834	0.07792	+12	a				
379	21.70	22.15	Ceph	8.596	0.11633	+12		464	21.60	22.40	Irreg	-	-	+30	a				
380	21.23	22.65	Ceph	13.300	0.07519	+11		465	20.20	22.00	Ceph	14.973	0.0667						

\* Observed on 100-in. plates.

<sup>a</sup> Outside the 8' circle, magnitudes approximate.

two photovisual plates in Field III with the aid of the fly spanker. The relative colors range from -20, which is a very blue star, to +40, which is a very red one. The colors for Cepheids lie between -8 and +22, and for eclipsing binaries between -18 and +2. The colors for the irregular variables go from blue to red. The remarks are much the same as in Table IV. In addition, for 25 variables which were in the south preceding corner of Field II but are within the 8' circle of Field III, Gaposchkin's variable star numbers are given in the remarks column. These variables are about 0<sup>m</sup>5 fainter in that paper because they were in a corner and difficult to measure. In general, the periods agree; if there is a difference, it is mostly a matter of judgment of the individual observer and is not due to any change of period, as they were observed essentially over the same period of time. In only three cases (H22, V416, and V457) is a radically different period given here.

### 5b. NOVAE, R CORONAE BOREALIS, LONG-PERIOD AND IRREGULAR VARIABLES OF FIELD III

In Field III there are 2 novae, 3 R Coronae Borealis stars, and 2 long-period variables. They are plotted in Fig. 5 together with the irregular variable H43. The ordinate for all the variables is photographic magnitude, the abscissa is Julian Day; for the 2 novae there are 20 days to a division, for the 3 R CrB stars and for H43 there are 200 days to a division, and for the 2 long-period variables, 100 days to a division.

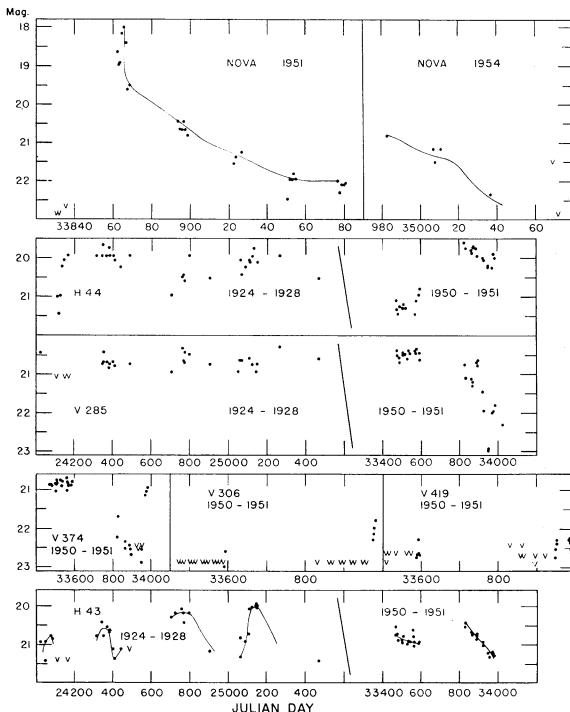


FIG. 5. Field III, 2 novae, 3 R Corona Borealis, 2 long-period, and 1 irregular variables.

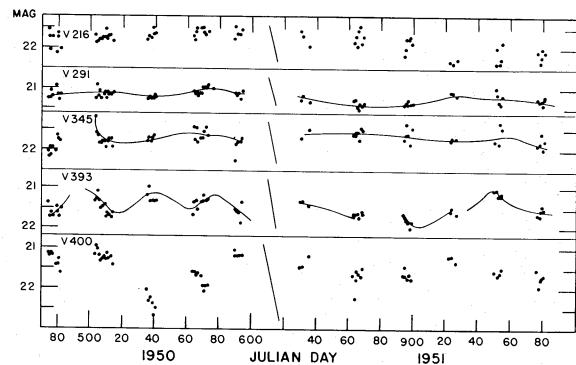


FIG. 6. Five irregular variables of Field III.

The first nova was seen in 1951, but probably not at maximum; the second nova was found in 1954 long after maximum light. H44 is an R Corona Borealis star and appears nebulous at minimum. Its relative color is about zero. V285 seems to be the same kind of star, but its color during a minimum is reddish. V374 was only observed during 1950 and 1951, but it is also a probable R CrB star. These three stars are not like R Coronae Borealis itself, which has a range of 9 magnitudes, but they seem to resemble the average of the R CrB stars of the *Variable Star Catalogue* (Kukarkin, Parenago, *et al.* 1958). Their range is about 2<sup>m</sup>0 or a little less and their color seems to be bluish-yellow.

V306 and V419 are long-period variables; only the tops of the maxima are seen during the two observing seasons. The periods could not be uniquely determined, but from the data one is shorter and the other longer than a year. H43, a bright irregular variable, was observed on 100-in. plates and looks as if it might be cyclical.

There are also 16 irregular variables. Five of them have well-defined variation and are shown in Fig. 6. V216 is red, V345 is reddish, V291 and V400 have the colors of Cepheids but are irregular or semiregular, and V393 is a blue star. Of the other 11 irregular variables, 6 are redder than +20 on the relative color scale. They are V179, 200, 413, 418, 434, and 464; their mean magnitudes seem to change slowly, but short rapid fluctuations are superposed. Five are not red, but bluer than +6 on the relative color scale. They are V349, 356, 367, 393, and 430.

### 5c. ECLIPSING BINARIES OF FIELD III

There are also 36 variables that are probably eclipsing binaries. They are all blue stars; 18 of them have few observed minima and, hence, have no periods. Seventeen of them have periods and light curves. The observations are given in Table D and they are plotted in Fig. 7 in order of period, except for V303 which is out of place because of convenience. The observations of V212 are also given in Table D and are plotted in the lower

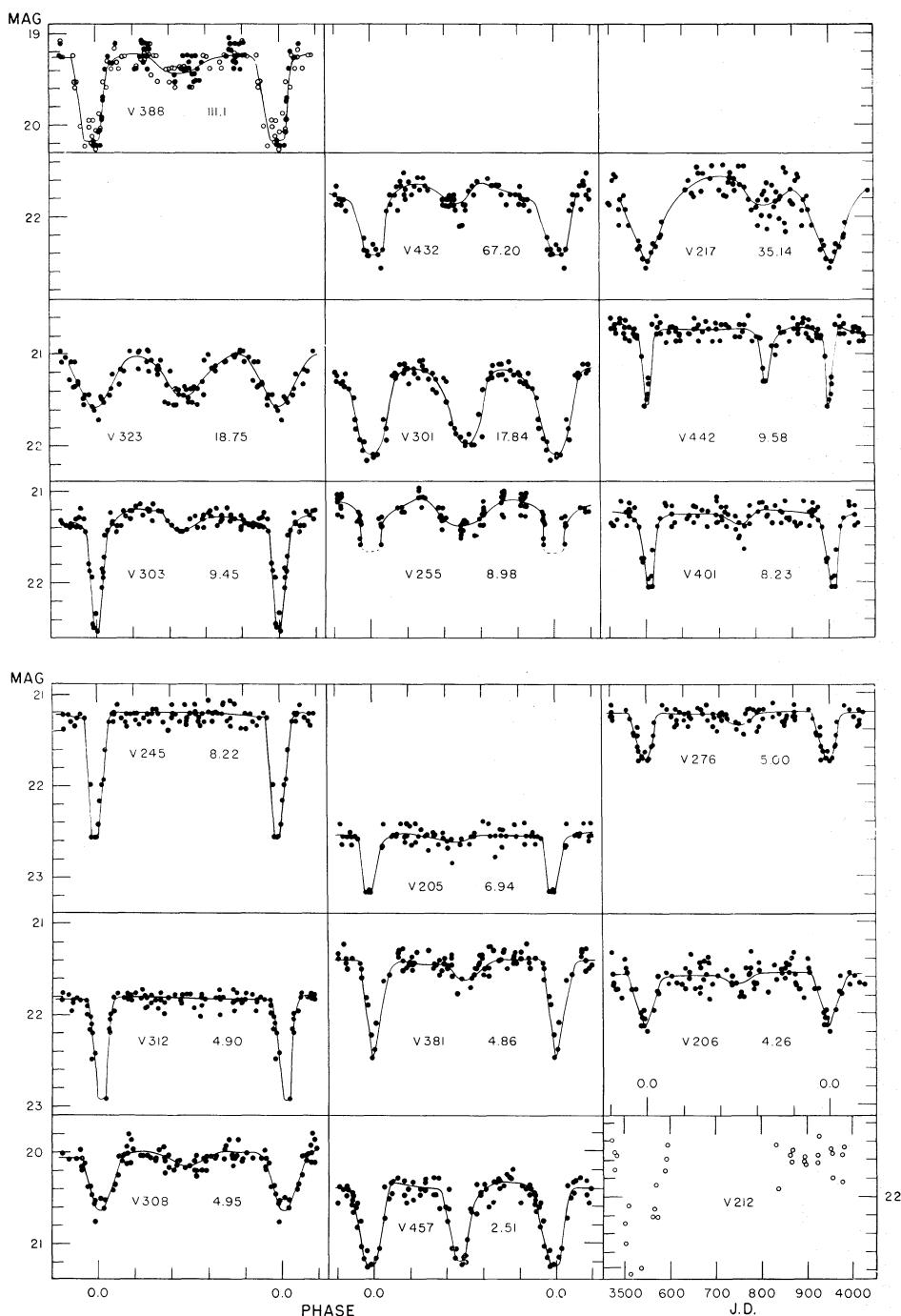


FIG. 7. Light curves of 17 eclipsing variables of Field III, and in the lower right figure observations for 1 eclipsing variable, with Julian Day as the abscissa.

right-hand corner of Fig. 7, but the abscissa is Julian Day instead of phase. Its period is probably over 500 days. The eclipsing stars have either  $\beta$  Lyr- or Algol-type light curves; V217 seems to be a  $\beta$  Lyr binary with a peculiar light curve between minimum. It may have an eccentric orbit and be variable. V442 is an Algol-type binary with marked eccentricity.

#### 5d. CEPHEIDS AND POPULATION II VARIABLES OF FIELD III

The distribution of the 232 Cepheids is shown in Plate VIII. The greatest number lie along the spiral arms made up of stars and dust, but avoid the dust and background of fainter stars seen in the north following corner. The 232 Cepheids have been divided

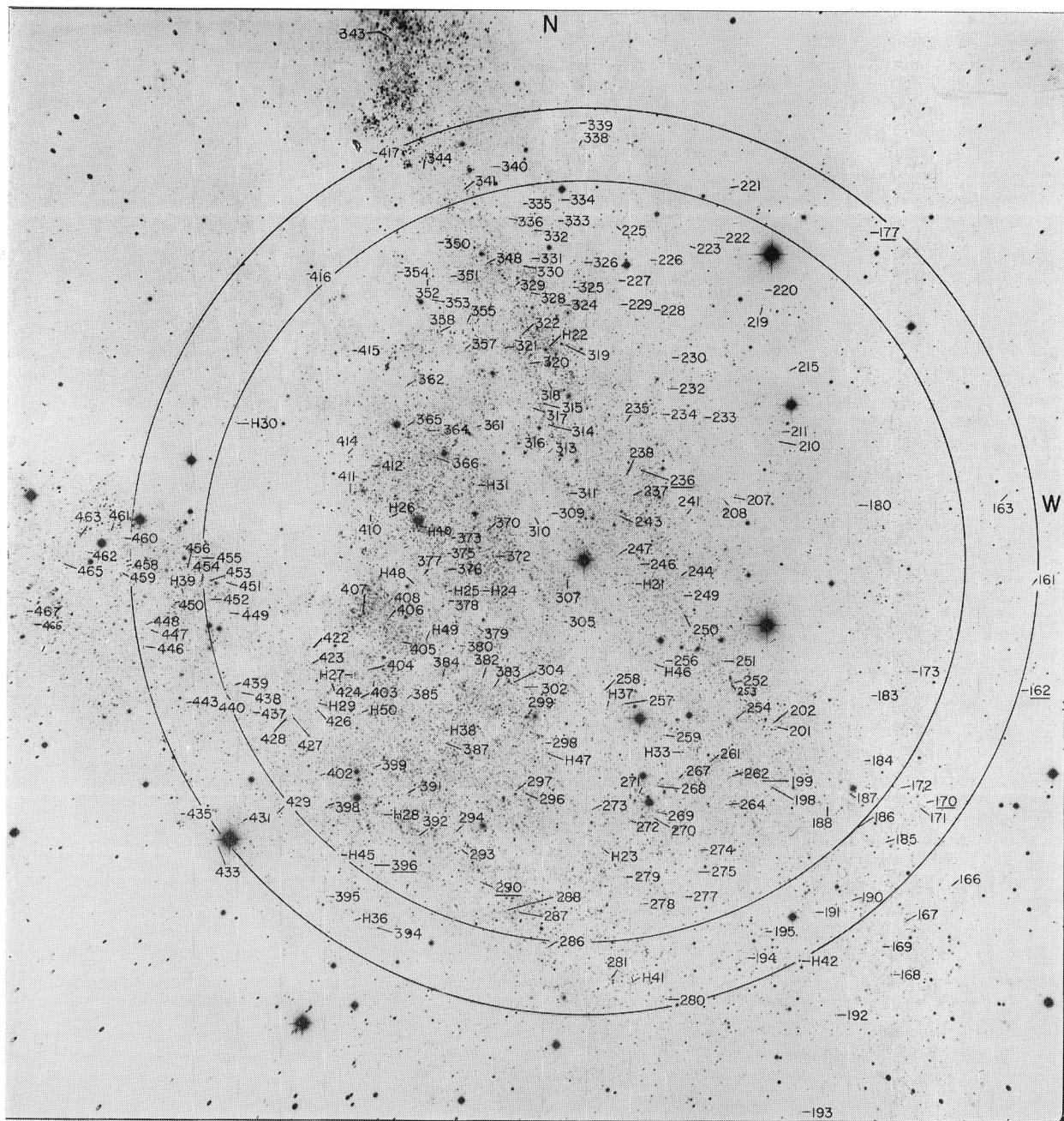


PLATE VIII. Field III, the distribution of the novae, Cepheids, and Population II variables (underlined).



into three groups. The 148 Cepheids of the first group lie within the inner circle of Plate VIII; they are listed in Table IX in order of decreasing period and their light curves are plotted in Figs. 8 through 15. The 28 Cepheids of the second group fall within the outer ring, presumably their magnitudes and amplitudes are not as reliable. They are listed in Table X and shown in Figs. 16 through 18. The 56 Cepheids of the last group are listed in Table XI. Nineteen of them fall outside the rings and 37 have companions affecting the accuracy

of the magnitudes. Since their light curves are not shown, a Julian Day of an observed maximum is given under remarks in Table XI, and these variables have been used only in discussing the period-frequency relationship.

There are also 6 Population II variables in Field III that are listed in Table XII and shown in Fig. 19. They are underlined in Plate VIII and appear to have a tendency to avoid the spiral arms. One of these variables may still have an indeterminate period. It is V177 with

## VARIABLES IN THE ANDROMEDA GALAXY

Table IX. One hundred and forty-eight Cepheids in center ring of Field III.

Var. No.	Period	Log P	Mag. of mean <sub>I</sub>	Computed phase of Zero			Var. No.	Period	Log P	Mag. of mean <sub>I</sub>	Computed phase of Zero		
				Ampl.	Max.	Zero					Ampl.	Max.	Zero
H 40	33.510	1.525	20.32	1.30	.100	.100	222	8.094	0.908	21.63	1.02	.500	.550
H 28	26.790	1.427	19.76	2.05	.530	.550	235	8.010	.904	21.59	1.10	.660	.700
H 26	26.196	1.418	21.07	1.50	.220	.250	412	7.992	.903	21.31	0.80	.650	.700
440	25.707	1.411	21.63	1.65	.000	.000	271	7.911	.898	21.43	1.12	.250	.250
H 27	24.130	1.383	20.65	1.95	.400	.400	385	7.893	.897	21.92	1.15	.680	.700
H 31	22.725	1.356	21.40	1.68	.410	.400	320	7.823	0.893	21.91	1.18	.260	.300
439	21.698	1.326	21.51	1.92	.300	.300	225	7.780	.891	22.08	0.76	.980	.000
275	21.556	1.323	21.82	1.25	.800	.850	309	7.667	.885	21.62	1.32	.000	.000
453	20.602	1.314	22.00	1.22	.200	.200	391	7.619	.882	21.43	1.10	.680	.700
365	20.568	1.313	21.78	1.40	.710	.750	228	7.613	.882	22.02	1.00	.700	.700
302	20.024	1.301	21.61	1.56	.150	.150	294	7.570	0.879	21.60	0.78	.120	.150
H 29	19.492	1.290	21.74	1.86	.750	.750	332	7.457	.873	21.64	1.26	.780	.800
449	19.395	1.288	22.00	1.48	.930	.950	354	7.368	.867	21.99	0.86	.200	.200
H 33	18.853	1.275	20.16	1.34	.650	.650	364	7.120	.852	21.09	0.64	.750	.750
422	18.519	1.268	22.7 :	-	.720	.750	237	7.085	.850	22.00	0.82	.760	.800
H 30	18.291	1.262	20.72	2.10	.070	.100	247	7.006	0.845	21.29	1.26	.960	.950
H 24	17.609	1.246	21.41	1.26	.880	.900	326	7.000	.845	21.50	1.16	.050	.100
H 22	17.569	1.245	20.90	1.80	.270	.300	254	6.978	.844	21.81	1.00	.460	.500
H 23	17.557	1.244	20.59	1.90	.180	.200	274	6.823	.834	21.82	0.94	.930	.950
404	17.247	1.237	21.86	1.40	.660	.700	424	6.726	.828	22.37	0.90	.350	.350
H 21	17.154	1.234	21.02	1.60	.240	.300	330	6.709	0.827	21.63	1.16	.150	.150
411	15.833	1.199	21.81	1.50	.010	.000	328	6.660	.823	21.88	0.70	.720	.750
355	15.699	1.196	21.20	1.08	.350	.350	272	6.545	.816	21.83	1.15	.600	.600
293	15.015	1.176	21.49	1.08	.950	.950	207	6.545	.816	21.46	0.96	.160	.200
384	14.799	1.170	21.70	1.30	.650	.650	230	6.508	.813	22.18	1.14	.950	.950
268	14.440	1.160	21.39	1.00	.480	.500	202	6.460	0.810	22.04	0.68	.380	.400
366	14.407	1.158	21.70	1.40	.060	.050	241	6.329	.801	21.97	0.86	.200	.200
423	14.388	1.158	22.04	1.12	.020	.050	317	6.313	.800	22.06	0.76	.620	.600
298	13.479	1.130	21.07	1.08	.780	.800	238	6.283	.798	22.16	0.60	.650	.700
H 37	13.338	1.125	21.21	1.08	.970	.000	378	6.198	.792	22.16	1.10	.360	.400
380	13.300	1.124	22.01	1.42	.620	.600	392	6.196	0.792	22.09	0.70	.700	.700
357	13.293	1.124	21.86	1.48	.660	.650	408	6.188	.792	22.26	0.82	.200	.150
267	13.250	1.122	21.77	1.32	.980	.000	199	6.101	.785	21.91	0.96	.620	.650
415	13.125	1.118	21.64	1.50	.300	.300	352	6.071	.783	21.38	0.92	.650	.650
H 46	12.923	1.111	21.16	0.96	.320	.350	184	6.048	.782	22.47	0.95	.280	.300
H 45	12.889	1.110	21.02	1.52	.670	.650	361	6.039	0.781	22.15	0.96	.100	.100
438	12.811	1.106	22.09	1.36	.580	.600	410	6.036	.781	22.39	0.94	.920	.950
208	12.402	1.093	21.67	1.22	.720	.750	428	6.024	.780	21.36	0.58	.950	.950
329	12.312	1.091	21.42	1.25	.500	.500	H 47	6.006	.779	21.93	1.04	.910	.900
334	12.294	1.090	21.15	0.85	.600	.600	198	6.002	.778	21.69	1.28	.280	.300
188	11.947	1.077	21.76	1.18	.860	.900	331	5.978	0.777	21.88	1.00	.520	.500
H 25	11.831	1.073	21.06	1.30	.160	.150	227	5.848	.767	22.08	0.84	.630	.650
261	11.368	1.055	21.46	0.40	.280	.300	335	5.750	.760	21.82	1.02	.820	.850
427	11.257	1.052	21.74	1.35	.780	.800	351	5.719	.757	22.10	1.14	.900	.900
362	11.074	1.044	21.95	0.98	.980	.000	226	5.640	.751	22.48	0.82	.120	.150
451	10.969	1.040	22.32	0.82	.620	.650	305	5.589	0.747	21.98	1.18	.100	.150
452	10.951	1.039	21.58	1.40	.650	.650	399	5.580	.747	21.60	0.66	.450	.500
313	10.689	1.029	21.89	1.12	.750	.800	333	5.486	.739	22.23	0.66	.400	.400
405	10.549	1.023	21.42	1.24	.020	.050	215	5.420	.734	22.03	1.06	.860	.900
316	10.526	1.022	21.36	1.20	.270	.300	350	5.351	.728	21.88	0.70	.740	.750
297	10.288	1.012	21.48	1.22	.030	.050	183	5.350	0.728	22.61	0.90	.500	.500
H 38	10.125	1.005	21.33	1.40	.270	.250	256	5.333	.727	21.73	0.90	.360	.350
270	10.017	1.001	21.47	1.00	.960	.950	H 48	5.320	.726	21.89	0.90	.250	.250
234	9.933	0.997	21.19	0.98	.400	.450	259	5.316	.726	21.34	0.32	.500	.550
318	9.921	0.997	21.85	1.04	.900	.900	219	5.266	.721	21.99	0.82	.000	.000
278	9.881	0.995	21.31	1.18	.870	.900	251	5.260	0.721	21.72	0.85	.030	.050
273	9.741	.989	21.97	0.86	.270	.350	210	5.120	.709	22.44	0.98	.170	.200
348	9.662	.985	21.60	0.90	.630	.700	403	5.103	.708	22.41	0.80	.700	.700
288	9.573	.981	21.33	0.60	.040	.100	287	5.095	.707	21.74	1.00	.000	.000
264	9.524	.979	21.36	1.10	.500	.400	173	5.008	.700	21.89	0.95	.400	.400
426	9.425	0.974	22.01	0.70	.450	.450	246	4.946	0.694	21.91	0.96	.070	.100
383	9.425	0.974	21.44	0.40	.550	.550	279	4.921	.692	21.87	0.88	.900	.900
296	9.412	0.974	21.74	0.82	.030	.050	402	4.904	.691	22.10	0.84	.780	.800
229	9.208	0.964	21.95	0.60	.350	.350	233	4.837	.685	21.92	0.66	.080	.150
180	9.181	.963	21.94	0.62	.580	.600	269	4.620	.665	21.85	0.72	.600	.600
257	9.038	0.956	21.17	0.90	.770	.700	336	4.610	0.664	22.25	0.76	.020	.000
307	8.961	.952	21.18	0.78	.800	.800	387	4.487	.652	22.28	0.70	.700	.750
249	8.809	.945	21.74	0.62	.900	.900	211	3.833	.584	22.06	0.74	.010	.050
262	8.762	.943	20.99	1.00	.170	.200	223	3.808	.581	22.04	0.88	.820	.850
379	8.596	.934	21.98	0.45	.650	.650	414	3.742	.573	22.11	1.12	.220	.250
315	8.464	0.928	21.27	0.66	.920	.950	382	3.454	0.538	22.60	0.70	.460	.500
377	8.367	.923	21.88	1.18	.910	.950	201	3.227	.509	21.79	0.50	.100	.100
250	8.301	.919	21.46	0.88	.950	.950	277	2.747	.439	21.71	0.46	.840	.900
310	8.210	.914	22.68:	0.85:	.860	.900							
311	8.171	.912	21.31	1.02	.660	.650							

a period of 27.97 days. Its relative color of -4 is rather blue and fits the supposition that it is a Population II variable. The minimum has not been observed. However, there is still the possibility that the period may be 14.35 days with a large magnitude scatter. In that case it should be classified as a Cepheid, but its color would then be altogether too blue.

The observations and phases of all the Cepheids of

Tables IX and X and the Population II variables of Table XII are given in Tables B and C in the Appendix. The phases were computed with the reciprocal of the period given in column 6 of Table VIII, using the following equation:

$$\text{Phase} = (1/p)(\text{JD} - 2433000),$$

except for the stars that were observed also on the

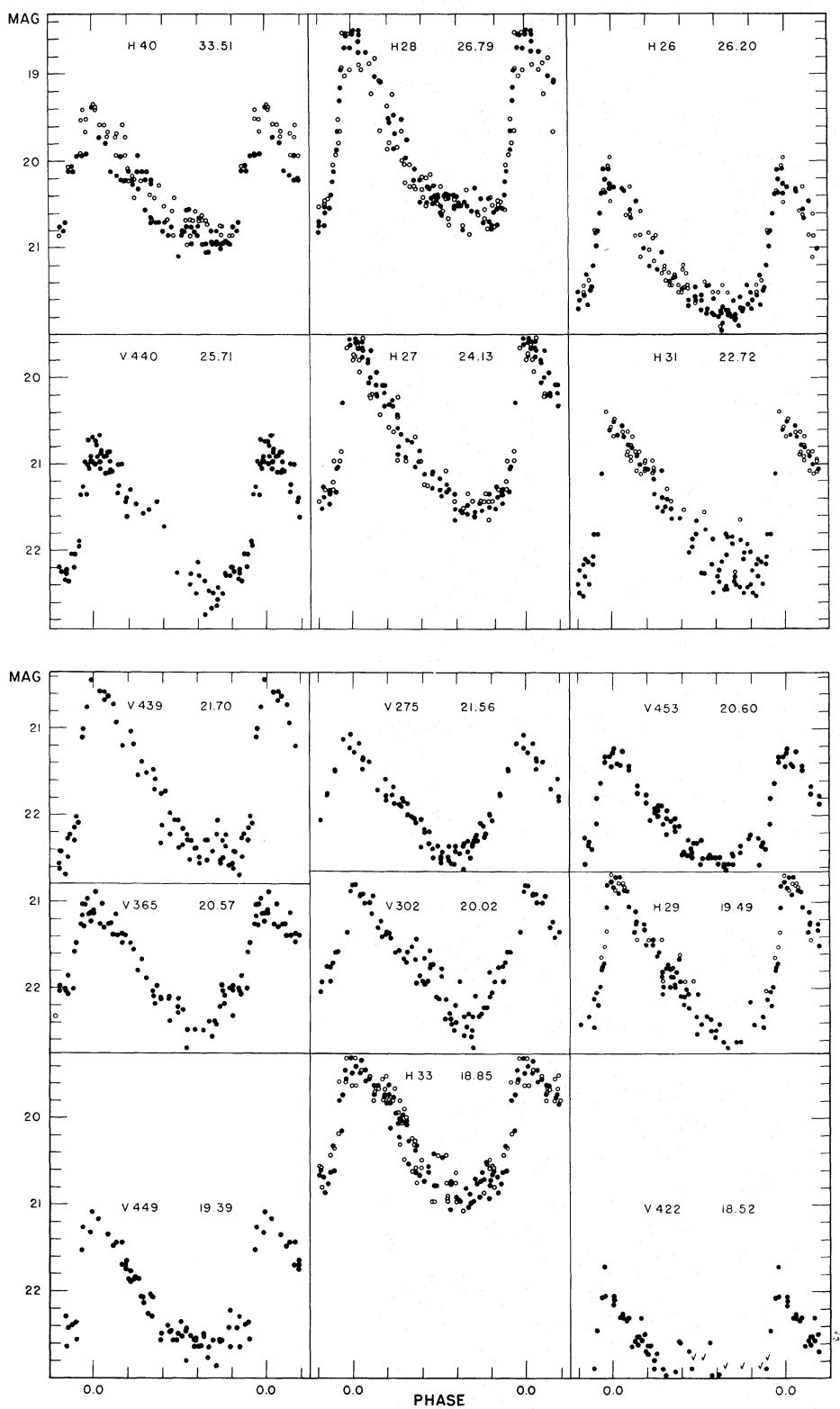


FIG. 8. Cepheids of Field III within inner ring; solid dots, 200-in. observations; open circles, 100-in. observations.

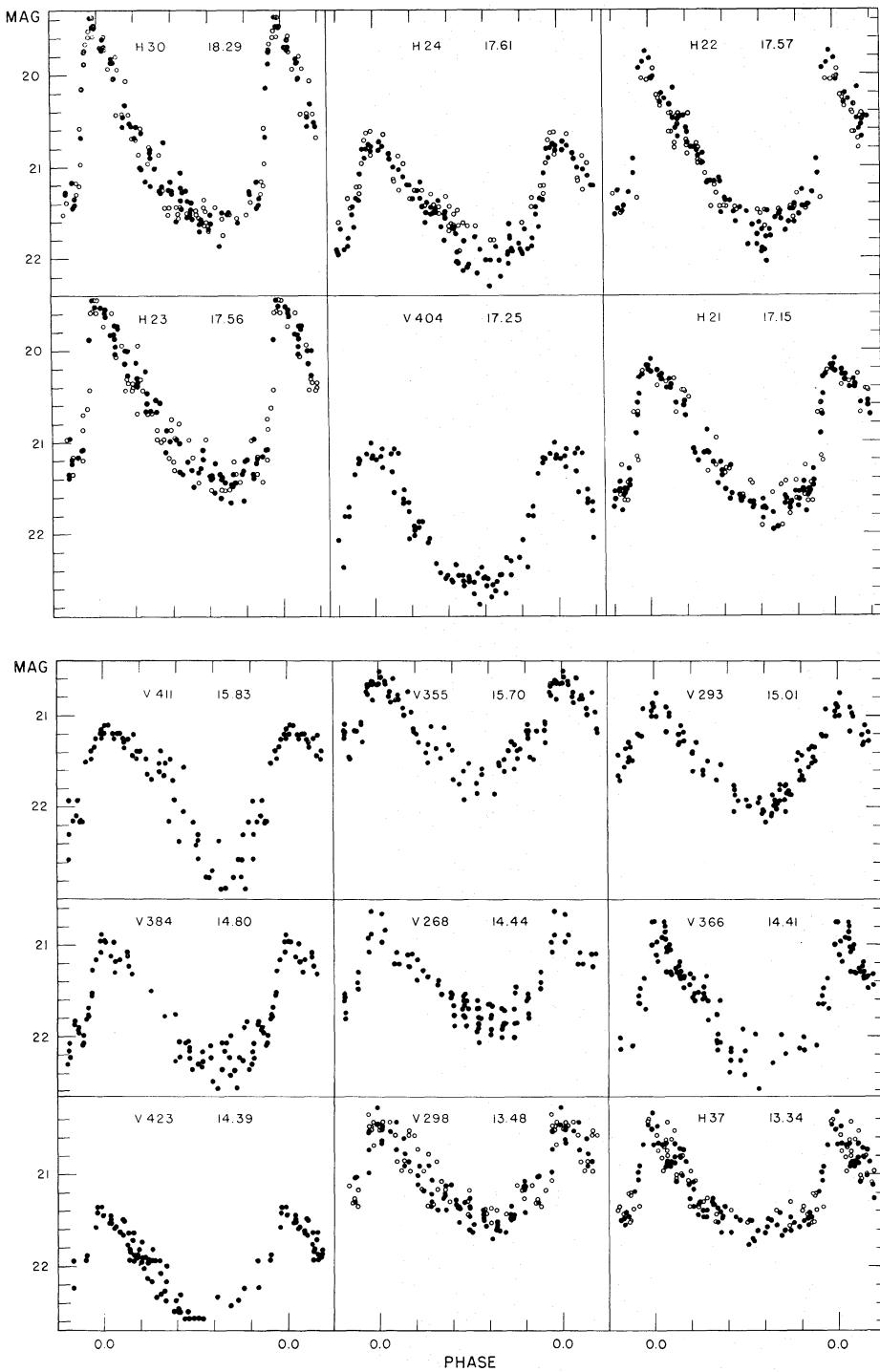


FIG. 9. Cepheids of Field III within inner ring; solid dots, 200-in. observations; open circles, 100-in. observations.

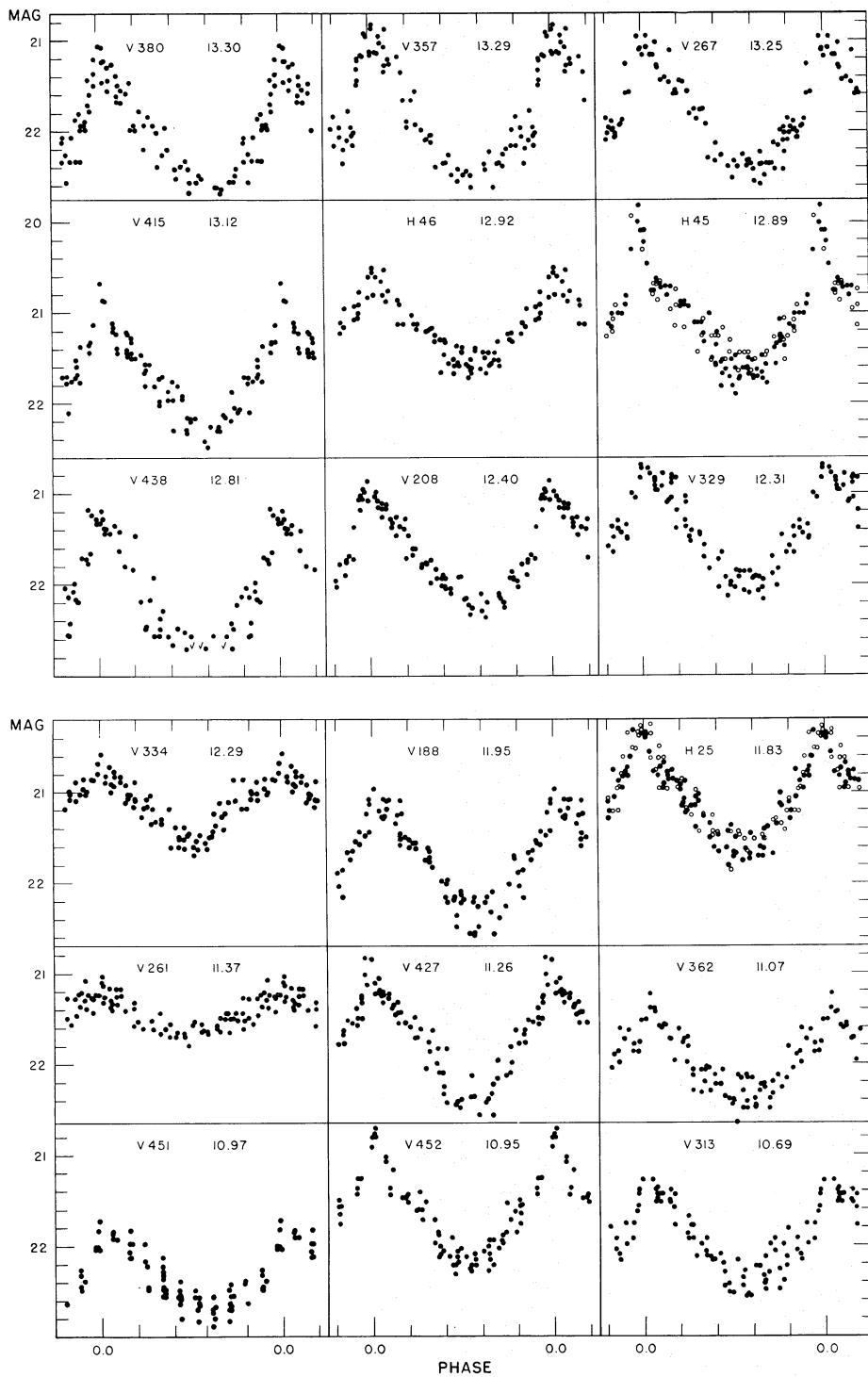


FIG. 10. Cepheids of Field III within inner ring; solid dots, 200-in. observations; open circles, 100-in. observations.

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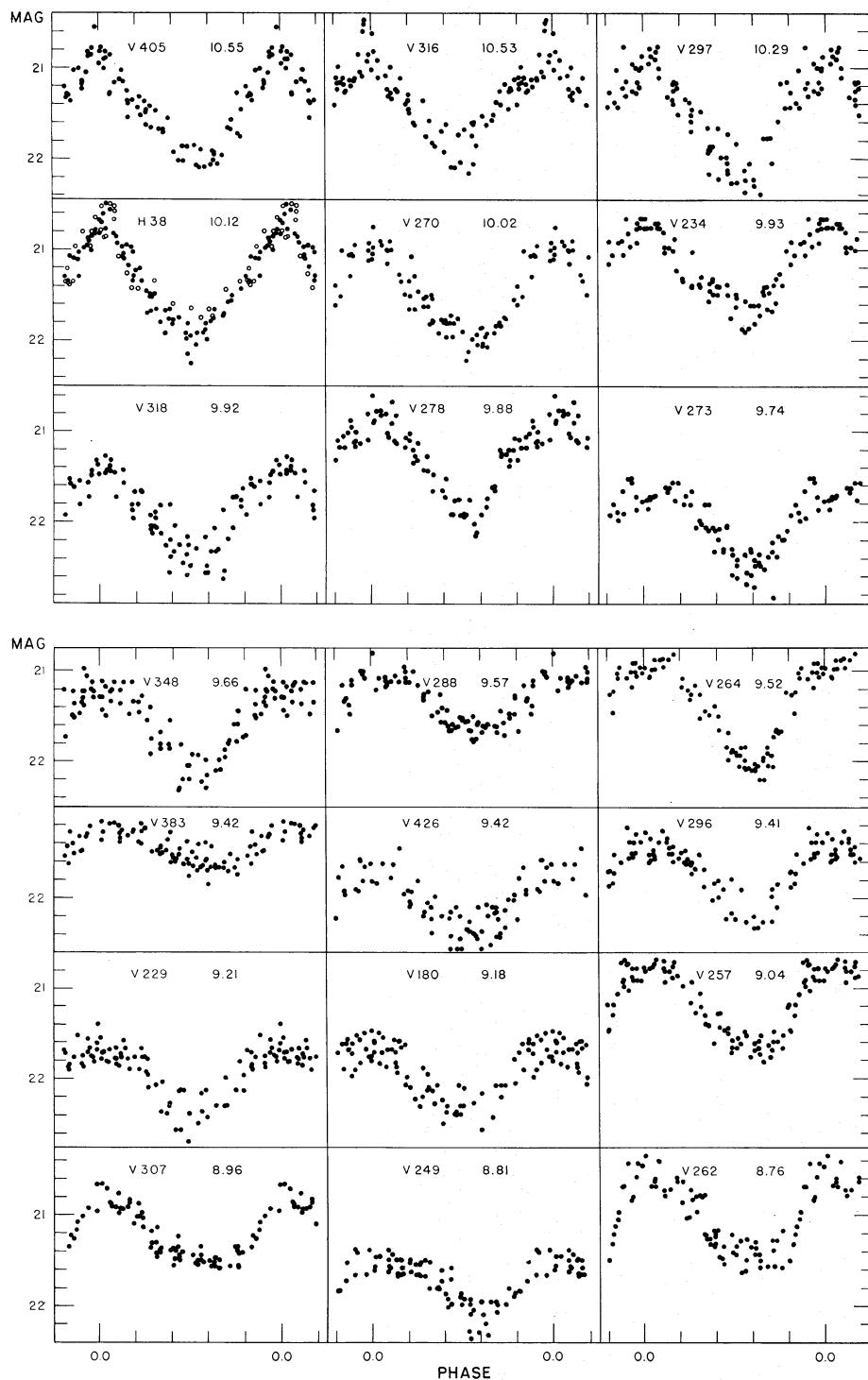


FIG. 11. Cepheids of Field III within inner ring; solid dots, 200-in. observations; open circles, 100-in. observations.

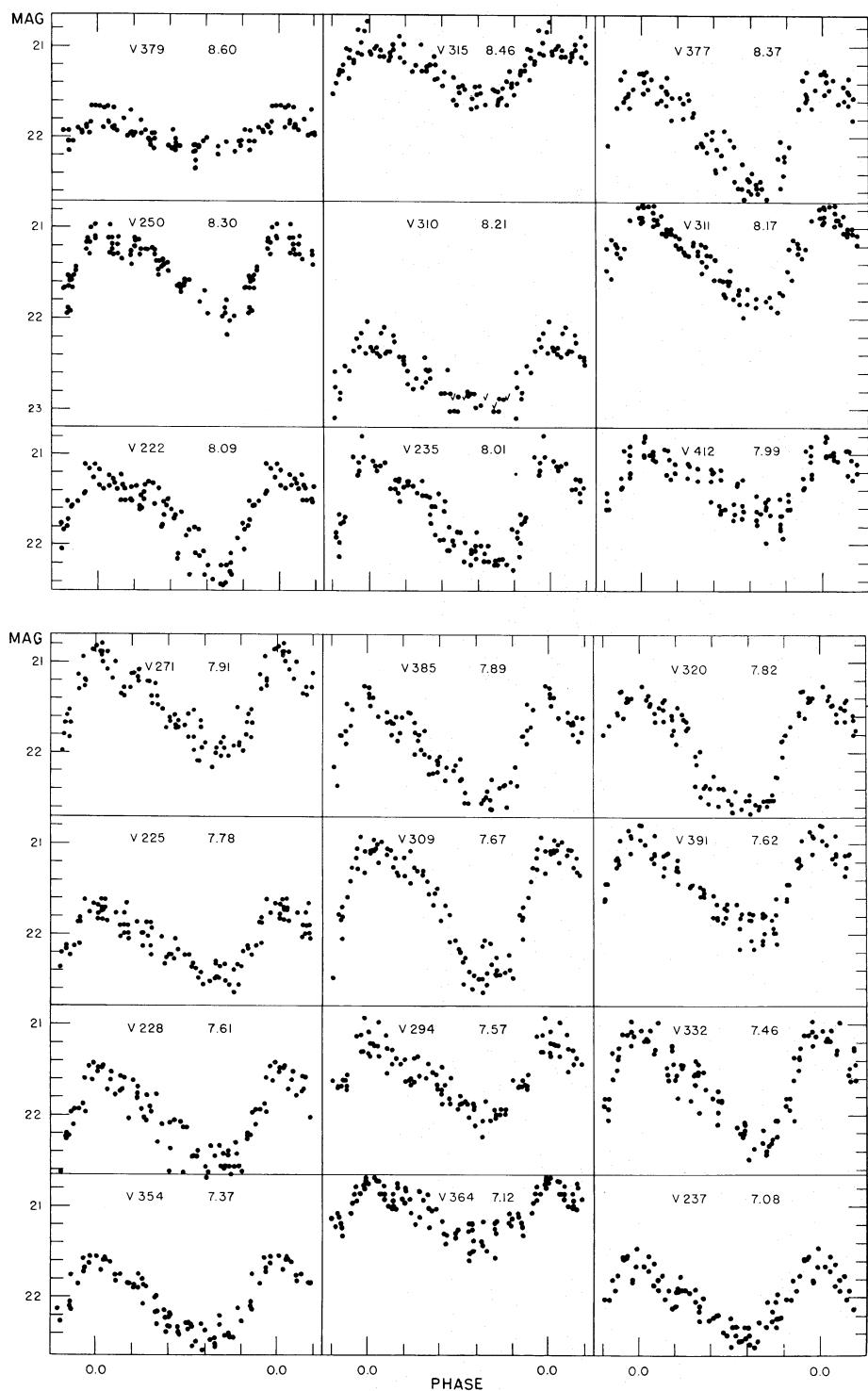


FIG. 12. Cepheids of Field III within inner ring; solid dots, 200-in. observations; open circles, 100-in. observations.

## VARIABLES IN THE ANDROMEDA GALAXY

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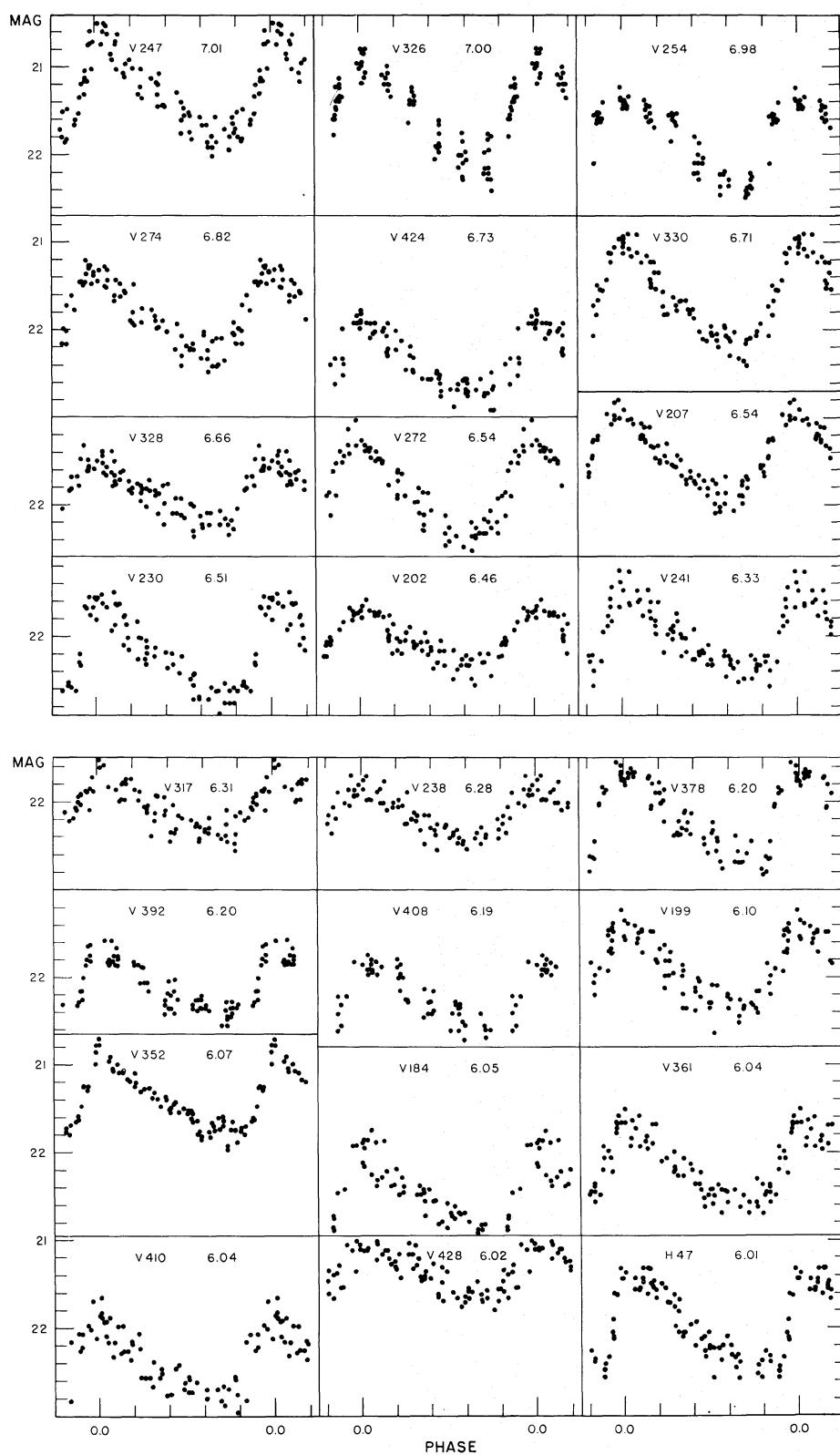


FIG. 13. Cepheids of Field III within inner ring; solid dots, 200-in. observations, open circles, 100-in. observations.

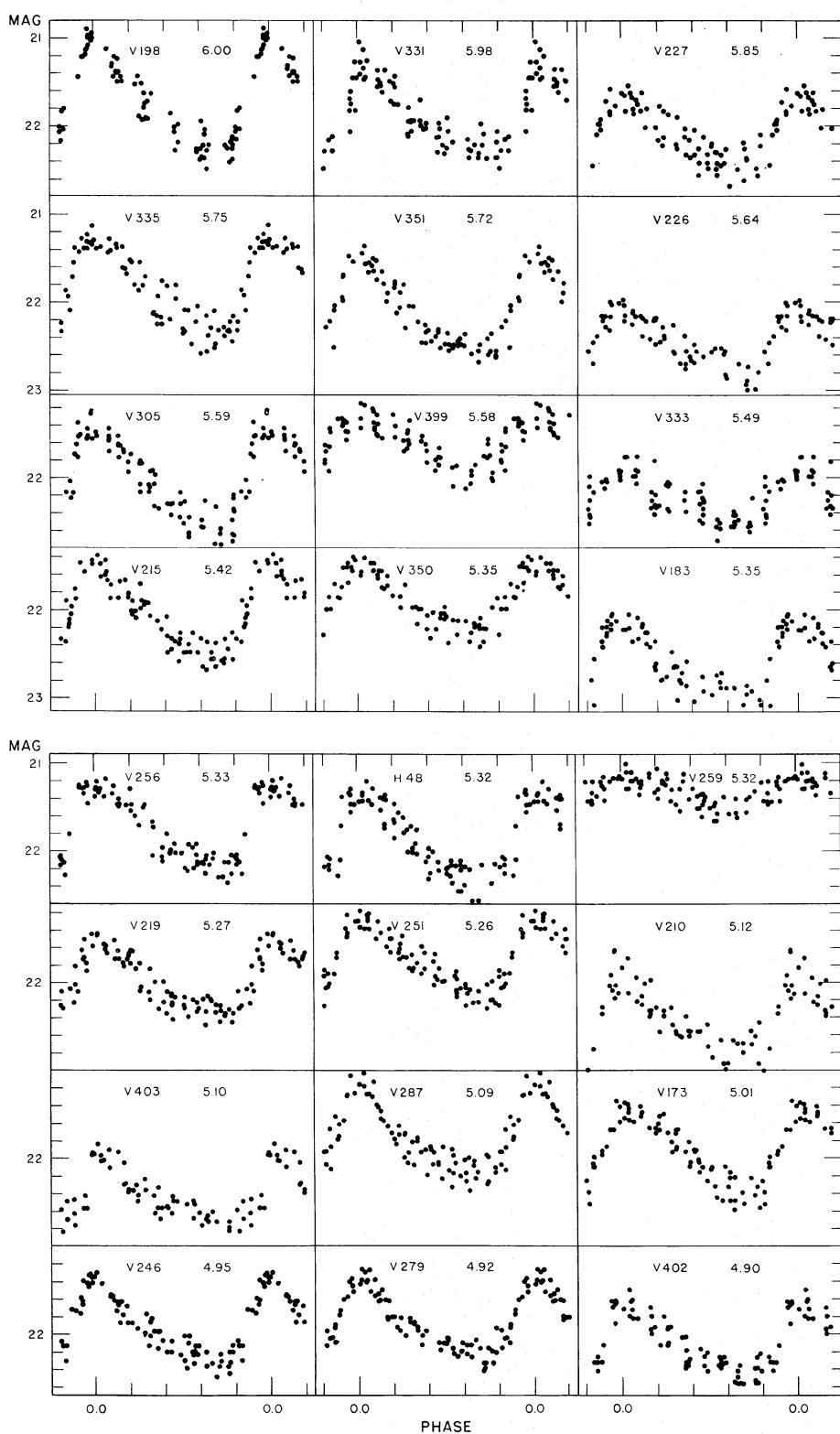


FIG. 14. Cepheids of Field III within inner ring; solid dots, 200-in. observations; open circles, 100-in. observations.

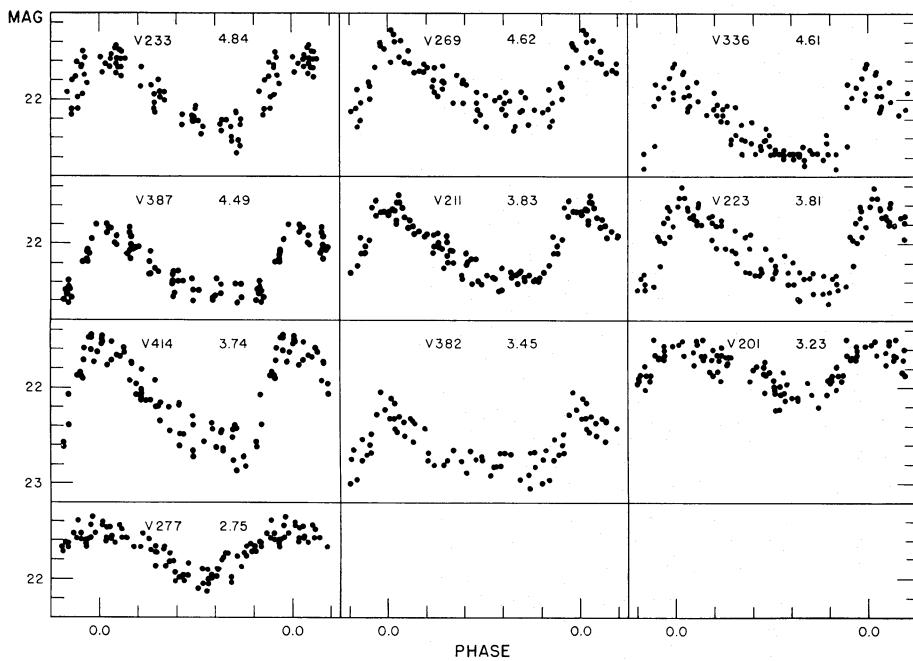


FIG. 15. Cepheids of Field III within inner ring; solid dots, 200-in. observations; open circles, 100-in. observations.

100-in. plates (marked with an asterisk in Tables VIII and B), and for them the following equation was used:

$$\text{Phase} = (1/p)(\text{JD} - 2424000).$$

In Figs. 8 through 19 the solid dots are single observations from the 200-in. plates of 1950 and 1951, and the open circles are 100-in. observations from 1924 through 1948.

Hertzsprung (1926) had observed for the galactic Cepheids a progressive change in shape of the light curve with the change of period length. He notes a hump that ascends the ascending branch as the period grows shorter from about 15 days until 10 days, and then from 9 days to 6 days the hump goes down the descending branch. From 9 to 11 days there is a symmetry around the maximum and often a shoulder on either side of the maximum is visible. The Cepheids of M31 seem to show the same short of progression, particularly around 9 and 10 days where a symmetry around maximum light is observed.

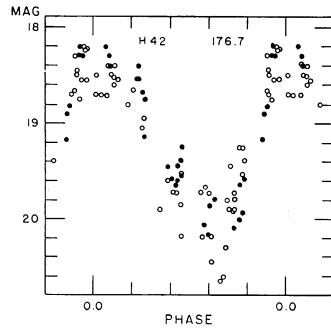


FIG. 16. A 176-day Cepheid in outer ring of Field III; solid dots, 200-in. observations; open circles, 100-in. observations.

TABLE X. Twenty-eight Cepheids in outer ring of Field III.

Var. No.	Period	Log P	Mag. of Mean <sub>1</sub>	Ampl.	Computed phase of Max.	Zero
H 42	176.68	2.247	19.03	1.80	.400	.400
H 41	25.487	1.406	20.73	1.46	.930	.950
H 39	23.970	1.380	21.13	1.64	.450	.450
H 36	17.914	1.253	20.98	1.30	.110	.150
339	15.232	1.183	21.71	1.30	.000	.000
416	14.364	1.157	22.07	1.04	.770	.800
446	14.130	1.150	20.97	1.35	.360	.350
280	13.850	1.141	20.70	0.62	.430	.450
172	11.013	1.042	22.03	1.02	.930	.950
395	10.741	1.031	21.07	1.22	.310	.300
194	10.479	1.020	21.37	0.96	.300	.300
341	9.881	0.995	21.17	1.34	.750	.750
281	9.699	.987	21.71	0.86	.280	.300
185	7.704	.887	22.57	0.71	.230	.250
340	6.645	.822	21.71	1.00	.580	.600
191	6.545	0.816	21.57	1.00	.130	.150
186	6.293	.799	22.15	1.30	.250	
221	5.823	.765	22.16	1.05	.420	.450
338	5.647	.752	22.39	0.76	.130	.150
447	5.456	.737	22.22	0.70	.740	.700
394	5.285	0.723	21.86	0.75	.680	.700
171	5.081	.706	22.20	0.70	.600	.600
443	4.990	.698	22.27	1.16	.600	.650
286	4.915	.692	21.75	1.10	.880	.900
163	4.368	.640	21.83	1.04	.850	.850
195	4.289	0.632	21.96	0.92	.850	.850
161	4.025	.605	22.19	0.66	.250	.300
190	3.346	.525	21.68	0.60	.590	.600

#### 6. PERIOD-LUMINOSITY RELATION

The period-luminosity relation is shown in Fig. 20. Figure 20(a) shows the 25 Cepheids of Field I within the 8' circle. The solid lines are the period-luminosity

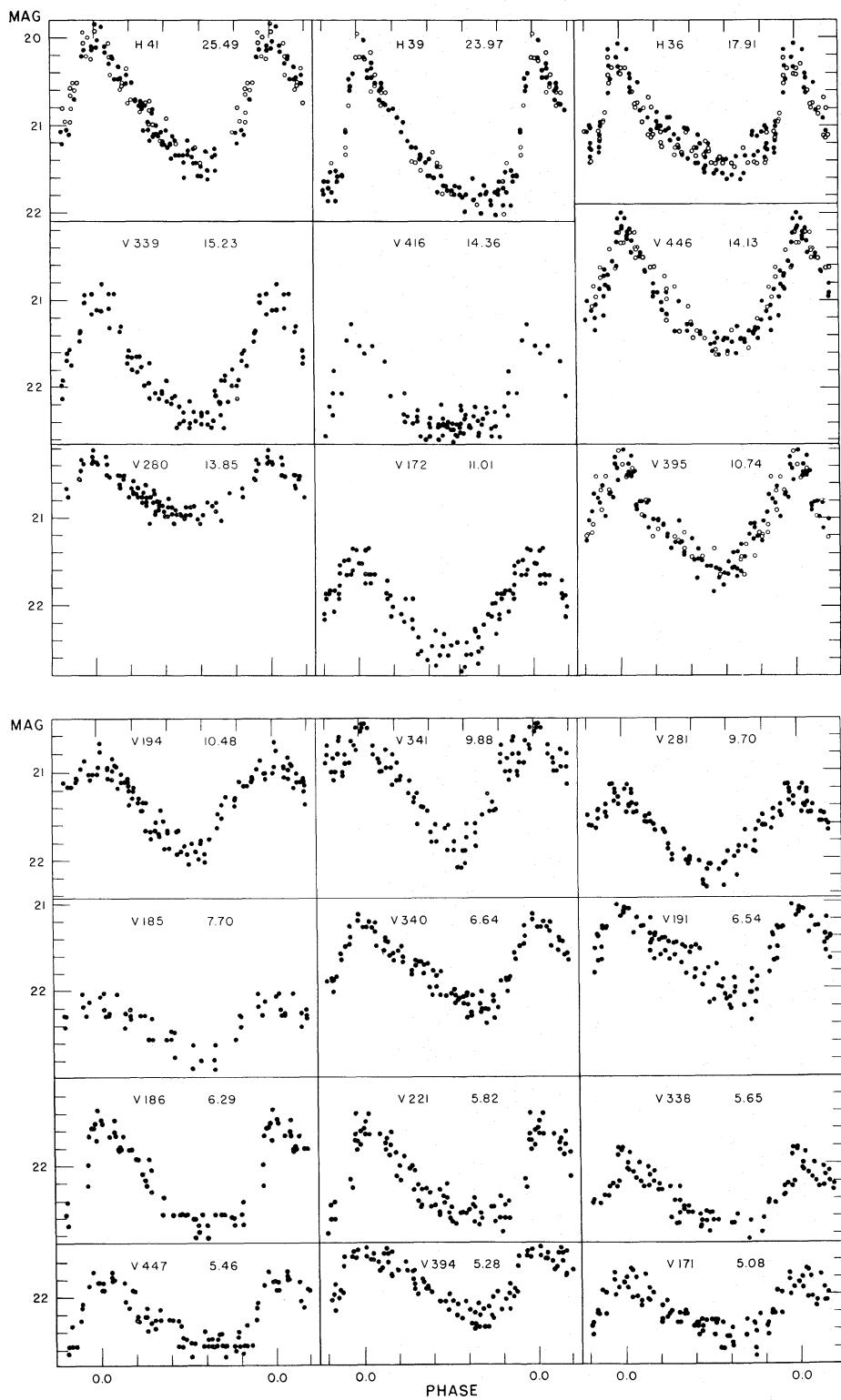


FIG. 17. Cepheids in outer ring of Field III; solid dots, 200-in. observations; open circles, 100-in. observations.

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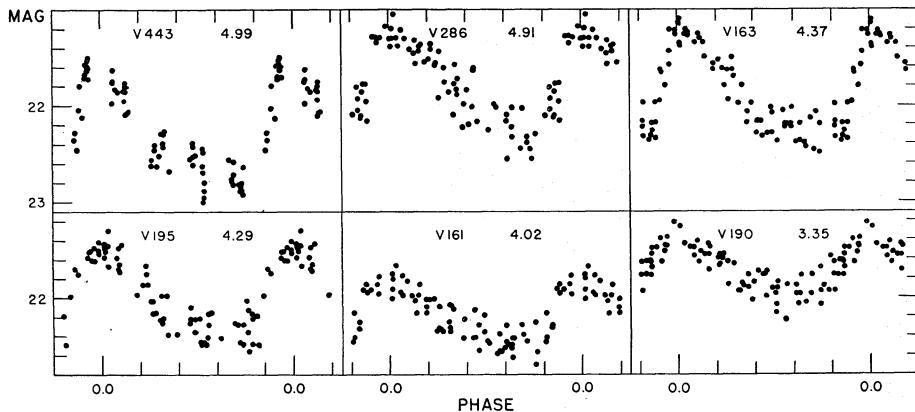


FIG. 18. Cepheids in outer ring of Field III; solid dots, 200-in. observations; open circles, 100-in. observations.

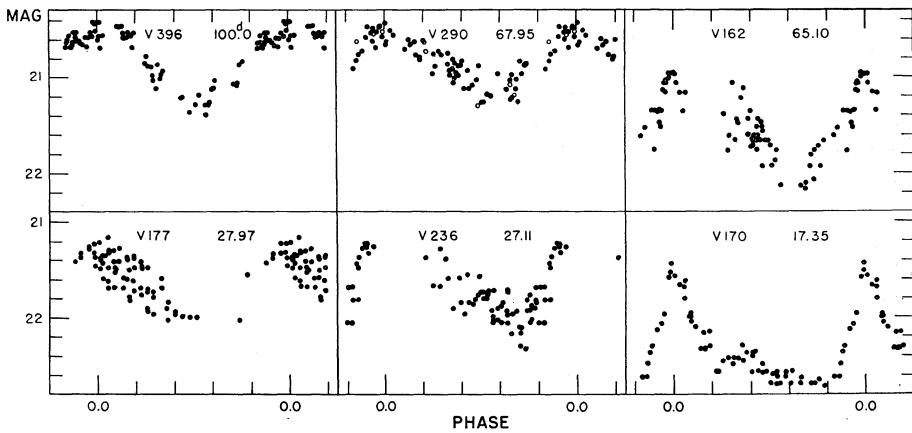


FIG. 19. Six Population II variables of Field III; solid dots, 200-in. observations; open circles, 100-in. observations.

relations as derived from Field IV (Baade and Swope 1963). It is apparent that the Cepheids of Field I show more scatter below the curve and that there are only a few Cepheids a little above the line. This is probably due both to more general absorption in the field and to more variable absorption, although there is the possibility that it is due to differences in the magnitude systems—but this seems unlikely when all the material is reviewed. Also, it is apparent that the variables are not as short nor do they go as faint as in Field IV. This is because the background of faint stars of Field I makes it impossible to measure stars to the plate limit.

In Fig. 20(b) are shown the Cepheids of Field III; the solid dots represent those in Table IX and the open circles are from Table X. This field is 50' from the nucleus in a region where there are bright star clouds and some dust. The solid lines again are taken from Field IV. Here it is apparent that the Cepheids also suffer from much variable absorption but that some of the Cepheids are relatively free from absorption, as in Field IV, as they are above the curve.

There is one variable star, V422, in Field III that is very faint, but it has been called a Cepheid and not a

Population II variable because of a relative red color index of +18.

In the lower diagram, Fig. 20(c), the Cepheids of Fields I and III are combined with those of Field IV. The small open circles represent the Cepheids of Field I, the solid dots Field III, and the large open circles the 20 Cepheids of Field IV. It is seen that though there are some Cepheids of Field I and III above the curve, none are brighter than those found in Field IV. This indicates that the magnitudes are probably consistent between the three fields. It is also apparent that there are many Cepheids in Field IV that are shorter and fainter than those found in the other fields. This is because in Field IV the background of faint stars is mostly missing and, therefore, it is possible to measure to a fainter plate limit.

#### 7. PERIOD-LUMINOSITY RELATION OF POPULATION II VARIABLES

The faintest variables for their length of period are plotted as open squares in Fig. 20 and are listed as Population II variables in Tables VII and XII. They

TABLE XI. Fifty-six Cepheids with close companions (37) or in outer areas (19) of Field III.

Var. No. (1)	Period (2)	Log P (3)	Mag. of mean <sub>I</sub> (4)	Ampl. (5)	J.D. of obs'd max. 2 433 000 + (6)	Phase of max. (7)
461	25.151	1.401	21.86	1.90	574.00	.820
433	22.978	1.361	21.53	1.75	507.40	.080
166	22.302	1.348	21.55	1.70	565.70	.370
460	18.570	1.269	21.79	1.50	537.10	.910
193	15.524	1.191	20.48	1.55	480.00	.660
454	15.152	1.180	21.15	0.60	565.00	.300
465	14.973	1.175	21.16	1.80	509.20	.080
314	14.306	1.156	21.98	0.74	572.80	.050
407	13.912	1.143	21.53	1.15	594.70	.730
406	13.643	1.134	21.50	1.30	513.00	.600
343	13.210	1.121	(20.8:)	1.50	475.00	.910
168	13.125	1.118	20.85	1.30	474.80	.170
252	13.089	1.116	21.13	0.65	476.50	.400
463	12.834	1.108	21.47	1.36	536.70	.820
358	11.922:	1.076:	21.95	0.70	538.00	.130
450	11.700	1.068	20.95	1.40	504.00	.070
456	11.534	1.061	21.60	1.60	505.90	.860
H 50	11.378	1.056	21.70	1.40	565.40	.700
462	11.086	1.045	22.14	1.50:	572.90	.680
466	10.971	1.040	21.75:	1.20:	478.00	.570
299	10.591	1.025	21.50:	1.00	565.70	.400
H 49	10.265	1.011	21.45	0.90	505.70	.260
253	9.551	0.980	21.20	0.60	477.60	.000
325	9.483	.977	21.43	0.65	504.90	.250
459	8.576	.933	21.95	0.50	509.90	.450
243	8.435	0.926	21.63	1.06	536.50	.600
304	8.365	.923	21.07	0.66	476.70	.970
467	7.843	.894	22.00	0.80	593.80	.700
321	7.723:	.888	21.77	0.60	514.90	.690
319	7.553	.878	21.78	1.05	509.00	.400
370	7.537	0.877	21.88	0.90	513.70	.160
455	7.138	.854	22.00	0.70	513.60	.950
187	7.042	.848	22.20	0.70	539.80	.660
398	7.008	.845	22.3	1.00:	505.90	.200
324	6.481	.812	22.15:	1.10:	540.90	.460
448	6.475	0.811	22.10	0.90	479.80	.110
437	6.231	.794	22.10:	1.10:	507.00	.350
169	6.207	.793	21.85	1.10	540.60	.100
167	6.047	.781	21.90	1.10	539.70	.280
220	5.900	.771	21.88	0.90	508.50	.200
429	5.679	0.754	22.10	1.30	508.70	.600
258	5.500	.740	22.10	1.00	515.00	.640
322	5.482	.739	22.10	0.94	566.80	.380
373	5.442	.736	22.58	1.14	572.80	.260
376	5.276	.722	21.95	1.10	506.90	.080
232	5.117	0.709	21.15	0.50	505.90	.850
344	5.040	.702	22.02	0.54	591.70	.360
417	4.967	.696	21.96	0.58	571.00	.940
192	4.773	.679	21.15:	0.70	513.60:	.600
435	4.686	.671	22.21	0.84	566.70	.940
458	4.635	0.666	22.50	1.20:	536.90	.830
372	4.608	.664	21.93	1.15	570.90	.900
244	4.219	.625	22.21	1.02	482.90	.440
431	4.082	.611	21.60	0.60	504.90	.680
375	3.654	.563	22.30:	1.30:	537.80	.180
353	2.932	0.467	21.75	0.46	506.80	.900

have also rather small amplitudes (Fig. 21) and relatively blue color indices, from -7 to +3, for their length of period, as seen in Fig. 22(a). The lower straight line in each diagram of Fig. 20 is the period-luminosity relation of these stars taken from Field IV.

TABLE XII. Six Population II variables of Field III.

Var. No.	Period	Log P	Mag. of mean <sub>I</sub>	Ampl.	Phase of Max.	Phase of Zero
396	100.0	2.00	20.81	0.80	.830	.800
290	67.95	1.832	20.81	0.66	.470	.500
162	65.10	1.814	21.53	1.12	.350	.350
177	27.972	1.441	21.70	0.70	.270	.250
236	27.115	1.433	21.50:	1.00:	.300	.300
170	17.346	1.239	22.28	1.18	.490	.500

It is possibly too faint for the mean of all the Population II variables by over a tenth of a magnitude. This might be a difference in the magnitudes derived for each field, but the Cepheid variables have shown that this is not likely. It could be that the magnitudes of the Population II variables are made too bright by companions or

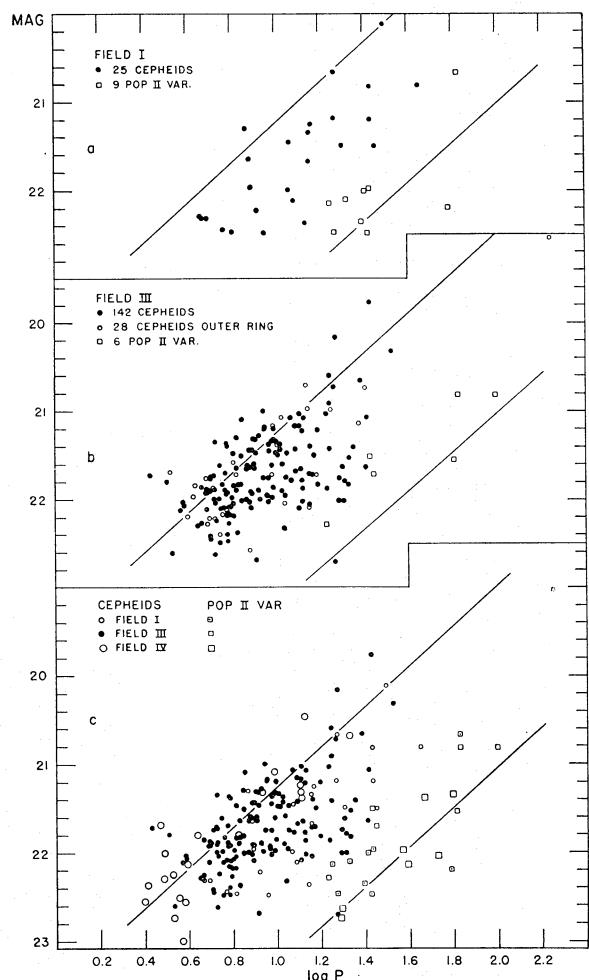


FIG. 20. Period-luminosity curves. (a) Field I: dots, Cepheids; open squares, Population II variables. (b) Field III: dots, Cepheids in inner ring; open circles, Cepheids in outer ring; open squares, Population II variables. (c) Combined P-L curves: open circles, Field I Cepheids; dots, Field III Cepheids; large open circles, Field IV Cepheids. Open squares are Population II variables and the solid lines are the P-L relation for Field IV (Baade and Swope 1963) in all the diagrams.

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TABLE XIII. Distribution of variable type.

Type	Field I No.	Field I Percent	Field II No.	Field II Percent	Field III No.	Field III Percent	Field IV No.	Field IV Percent
Cepheids	32	28	101	57	247	74	21	39
Short	26	22	7	4	23	7	1	2
Pop. II	9	8	6	3	6	2	7	13
Eclipsing	2	2	16	9	36	10	10	18
Irregular	34	29	46	26	20	6	14	26
Long period	6	5	1	1	2	1	1	2
Nova	7	6	1	1	2	1	0	0
Total	116	...	178	...	336	...	54	...

backgrounds of faint stars, but an inspection of Plates II and VIII shows that the underlined Population II variables lie mainly in areas where there is no bright background of faint stars and they do not seem to have companions to make them appear too bright. It is probably a selection effect, and in Field I and III only the brightest of the Population II variables have been found and the fainter ones are lost in the greater amount of absorption present. Fields I and III have relatively fewer Population II variables than Field IV, both compared to the total number of variables found or to the number of Cepheids present. This is shown in Table XIII and it suggests that possibly only the very brightest of these stars have been found in Fields I and III.

## 8. PERIOD-AMPLITUDE RELATION

Figures 21(a), (b), and (c) show the period-amplitude relation. The three diagrams are for Field I, Field III, and for the combined Fields I, III, and IV, and the same symbols are used as in Fig. 20. The straight-line curve

is taken from Kraft's (1963) amplitude envelope for Cepheids in the Galaxy, and it is apparent that the distribution of amplitudes for M31 is like that found in our Galaxy. Although the discovery of shorter-period Cepheids in M31 is incomplete, there is no evidence for a bimodal distribution such as found for the Small Magellanic Clouds (Arp 1960). The shorter the period, the smaller is the amplitude in M31, and there is no evidence for the large amplitudes for short-period Cepheids, such as is found in the Magellanic Clouds. If the faint variables of M31 had large amplitudes, it should have been possible to find the periods for some of them instead of calling them "short."

In Fig. 21 it is also seen that the longer the period of the Cepheids, the bigger the amplitude, whereas the Population II variables tend to have smaller amplitudes—which is another piece of evidence for classifying them separately from the classical Cepheids.

## 9. PERIOD-COLOR RELATION OF FIELD III

In Fig. 22(a) the relative color of the Cepheids of Field III has been plotted as the ordinate and the logarithm of the period as the abscissa. The solid dots

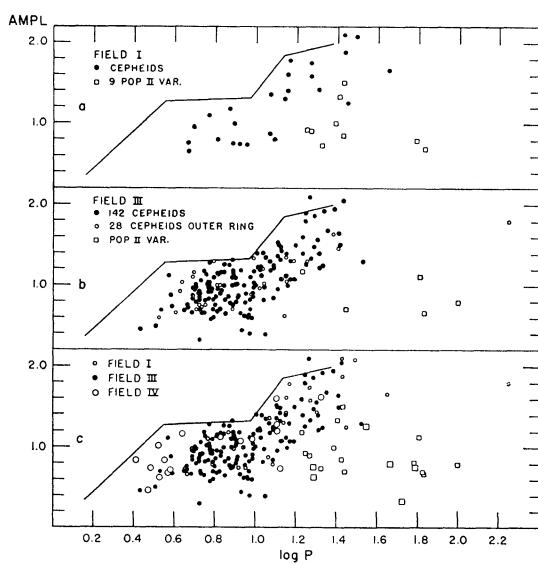


FIG. 21. Period-amplitude curves. (a) Field I, (b) Field III, (c) Fields I, III, and IV. The same symbols are used as in Fig. 20. The enveloping curve is from Kraft (1963).

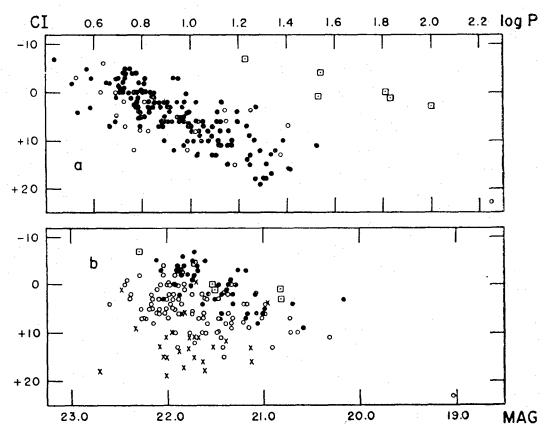


FIG. 22(a). Period-color relation for Field III. Solid dots are Cepheids of inner ring; open circles, Cepheids from outer ring; open squares, Population II variables. (b). Color-luminosity relation for Field III. Solid dots are Cepheids above P-L curve of Fig. 20(b); open circles, Cepheids above curve to  $0^m7$  below; crosses, Cepheids below  $0^m7$  of P-L curve; open squares are Population II variables.

are the inner-ring Cepheids of Plate VIII, the open circles, the 28 Cepheids in the outer ring, and the squares are the Population II variables. The diagram shows that as the periods of the Cepheids grow longer the variables tend to become redder. The Population II variables stand out from the classical Cepheids and are relatively blue for their period length. The dispersion for the Cepheids is partly intrinsic, but is due mostly to varying absorption, which is seen quite clearly in Fig. 22(b), where the relative color is plotted against luminosity. The solid dots are the observations above the P-L curve of Fig. 20(b), the open circles are the observations that fall under the P-L curve to  $0^m7$  below, and the crosses are the Cepheids that fall  $0^m7$  or more below the P-L curve. From this diagram it is clear that the solid dots representing the stars that lie above the P-L curve are the bluest and least obscured, and the crosses that represent the stars that fall more than  $0^m7$  below the P-L curve are the reddest and must be the most heavily obscured. It is interesting to see that the open squares that represent the Population II variables which fall more than  $1^m0$  below the P-L curve lie among the black dots of the least obscured Cepheids.

The same kind of relationship is also indicated in Field I, but the color determinations are even more approximate and, therefore, they have not been plotted.

#### 10. DISTRIBUTION OF VARIABLE TYPES AND THE PERIOD-FREQUENCY RELATION

The distribution of the types of variables found in each of the four fields is given in Table XIII, both the number of variables and the percentage. Field I and Field IV were fairly completely searched for variables. Field II and Field III have not as yet been completely searched and with more blinking more variables could be found. However, it is interesting to note that the number and percent of Cepheids steadily increases as distance from the center increases, and then it drops in the furthest field. The number of Population II variables seems to be relatively constant in all four

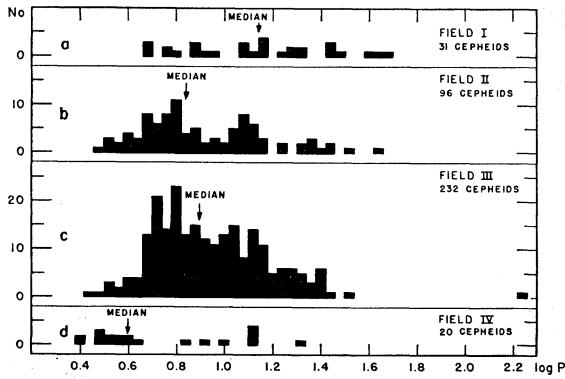


FIG. 23. Period-frequency of Cepheids in (a) Field I, (b) Field II, (c) Field III, and (d) Field IV.

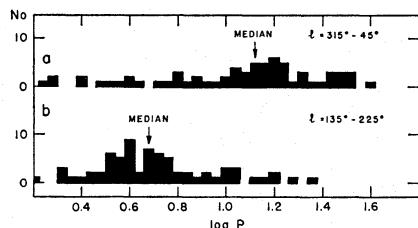


FIG. 24. Period-frequency of Cepheids fainter than 10th magnitude in low latitudes in the Galaxy: (a) towards center between  $l \approx 315^\circ$  and  $45^\circ$ ; (b) towards anticenter between  $l \approx 135^\circ$  and  $225^\circ$ .

fields—while the percentage of eclipsing binaries increases with the distance from the nucleus. Most novae are also found closest to the center. This seems also true for the long-period variables, but it should be remembered that only a few of the brightest have been found.

The period-frequency relation is given in Fig. 23 for each of the four variable fields of M31, including Field II (Gaposchkin 1962). From an inspection of the figure, it is clearly seen that as the distance from the nucleus increases, the periods tend to become shorter. This is most marked for the longest variables in each field, if variable H42 of Field III is excluded. The longest Cepheids are the brightest, and they have big amplitudes and hence are the most easily found, and there is no reason to suppose that they have been missed. In the field 15' from the nucleus the longest period is 47 days; in the middle fields, 42 and 33 days, respectively; while in the furthest field, 96' from the center, it is only 21 days.

The same tendency is also seen in the median and mean periods given in Table XIV, but this tendency may also be the effect of difference in the limiting magnitude shown in column 2 of Table XIV. The differing limiting magnitude is due to the background effect of faint stars and not to differences in plate limit.

H42 (Fig. 16) has been excluded because there is some question as to whether it is truly a Cepheid. It has a period of 176 days and a median magnitude of 19.0. It shows some variability in its light curve, particularly at minimum magnitude. If it is in the Andromeda

TABLE XIV. Distance from nucleus and period length of Cepheids.

M31	Distance	Plate limit	Period Longest	Period Median	Period Mean	Percentage of periods $<6^d3$
Field I	15'	$22^m45$	$46^d9$	$13^d8$	$16^d8$	16%
II	36'	...	42.3	7.0	9.8	36
III	50'	22.7	33.5	8.1	9.8	27
IV	96'	22.8	21.3	3.9	6.9	60
Galaxy						
Toward center		...	39.0	13.5	...	22
Toward anti-center		...	23.5	4.8	...	73

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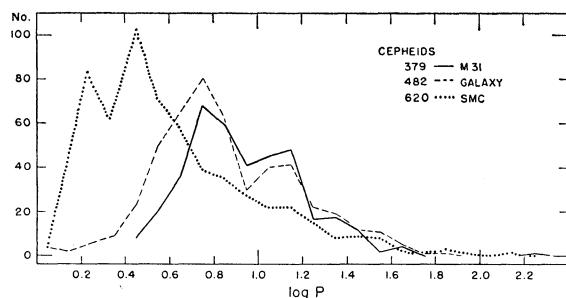


FIG. 25. Comparison of period-frequency. Solid line, 379 Cepheids in M31; dashed line, 482 Cepheids in the Galaxy not suspected of belonging to Population II (Kukarkin, Parenago, et al. 1958); and dotted line, 620 Cepheids in the Small Magellanic Cloud (McKibben et al. 1942; Nail 1949; Shapley et al. 1948; Shapley and McKibben 1940b).

galaxy, it must have an absolute magnitude of over  $-5^m0$ . This is the correct magnitude if it is a Cepheid, but it seems much too bright for a long-period variable that has a maximum fainter than  $21^m5$  in M31. It could be a faint long-period variable in our own system, but this, too, seems unlikely.

The same variation of length of period with distance from the nucleus is also evident in our Galaxy. This is shown in Fig. 24, where all the Cepheids have been plotted from the *Variable Star Catalogue* (Kukarkin, Parenago, et al. 1958) that are within certain limits of galactic longitude and fainter than  $10^m$  in their mean, are within  $\pm 10^\circ$  latitude of the galactic equator, and are not called W Virginis type in the Catalogue or otherwise known to be Population II variables. In Fig. 24, diagram (a) is for the Cepheids of low latitude toward the galactic center and (b) is for the Cepheids in the anticenter region. Again it is evident that the longest periods are found in the direction of the nucleus and that they become shorter toward the anticenter direction. In this diagram there is no reason to suppose that the search for variables in both directions is not rather similar and there is no effect of limiting magnitude; therefore, the mean and median periods decreasing and the relative number of short periods increasing in the anticenter direction are notable.

Figure 25 is the period-frequency curve of the Cepheids in M31 (solid line) compared with the Galaxy (dashed line) and the Small Magellanic Cloud (dotted line). The Milky Way system and M31 show essentially the same distribution of periods. There are  $280 \pm 1$  Cepheids with periods longer than  $\log P = 0.75$  in both systems; both curves show a dip at  $\log P = 0.95$ , though it is more pronounced in the Galaxy than in M31. The discovery of variables shorter than  $\log P = 0.7$  is not as complete in M31 as in the Galaxy due to the faintness

of the variables and the fact that none are found shorter than  $\log P = 0.4$  because of plate limit, but the distribution looks as if it would be the same as in the Galaxy and not like that of the Small Magellanic Cloud.

The Cloud is represented by 620 variables—more than in either of the other systems, but it has only 168 Cepheids longer than  $\log P = 0.75$ . There is no indication of a dip at  $\log P = 0.95$ , and for Cepheids shorter than  $\log P = 0.7$  the number increases rapidly until it reaches a maximum at  $\log P = 0.4$ , then diminishes but still shows many variables of short period. It should be remembered that most of these short-period Cepheids of the Small Magellanic Cloud (Arp 1960) have large amplitudes, whereas in both the Galaxy and M31 (Fig. 21) there is a tendency for the short-period Cepheids to have small amplitudes. In the Small Magellanic Cloud the short-period and large-amplitude Cepheids are found mostly in the outlying areas (Shapley and McKibben 1940a). Field IV lies in one of the outer arms of the Andromeda galaxy. It has periods as short as 2.5 days, but they tend to have small amplitudes. If there were some of large amplitude, they would probably have been found, as it is easier to find a variable and its period with a large range than a small one.

In the Milky Way system there are a few variables of short period and large amplitude, but these are the exceptions and it is possible that some of these should be classed as RR Lyrae variables that belong to Population II and should not be considered as true Cepheids.

## 11. SUMMARY

This paper is principally a catalogue of light curves and tables of observations of the Cepheids in the two fields of M31. It corroborates what has been noted before in Field IV. It demonstrates that the Cepheids of M31 are very like the Cepheids of our Galaxy and that there still remain unexplained differences between the Cepheids of the two galaxies and the Cepheids of the Magellanic Clouds.

## ACKNOWLEDGMENTS

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## APPENDIX

Table A. 200-inch photographic observations and phases of twenty-six Cepheids and eight "Population II" variables in Field I.

J.D. 2,433,000+	Mag. H 1*	Phase H 1*	Mag. H 3*	Phase H 3*	Mag. H 17*	Phase H 17*	Mag. H 18*	Phase H 18*	Mag. V 51	Phase V 51	Mag. V 52	Phase V 52	Mag. V 54	Phase V 54	Mag. V 56	Phase V 56	Mag. V 57	Phase V 57	Mag. V 64		
474.90	20.46	.611	19.78	.638	20.40	.208	20.53	.008	22.09	.243	22.54	.335	21.55	.003	22.51	.982	21.71	.483	-		
475.89	.60	.642	19.90	.675	20.54	.261	20.66	.062	-	-	.46	.089	22.15	.050	21.18	.551	-	-	-		
478.90	.62	.738	20.35	.786	21.05	.421	21.14	.224	21.99	.113	.82	.624	21.96	.348	20.81	.260	20.88	.757	22.71	.402	
479.91	.78	.770	.49	.824	.26	.475	.23	.279	22.18	.333	.48	.697	22.15	.435	20.90	.330	21.05	.826	.42	.604	
480.90	.91	.802	.67	.860	.38	.527	.48	.332	.31	.548	-	-	.58	.521	21.25	.398	.38	.893	(22.5	.805	
481.90	20.88	.834	20.60	.897	.08	.581	.51	.386	-	-	.58	.607	.10	.468	.49	.962	22.15	.006	-	-	
482.89	21.00	.865	21.02	.934	.21	.634	.76	.440	.42	.980	.62	.913	.45	.693	21.61	.537	.52	.030	21.90	.207	
504.92	20.49	.567	20.15	.749	21.46	.807	21.73	.629	.48	.770	(22.6	.506	.45	.595	22.05	.067	21.58	.536	-	-	
505.87	.47	.597	.21	.784	20.97	.857	22.11	.680	22.45	.976	(22.7	.574	.45	.677	21.92	.132	20.40	.601	(22.7	.831	
506.84	.62	.628	.15	.820	20.46	.909	21.58	.733	21.80	.187	(22.7	.644	22.48	.760	21.85	.200	.60	.668	22.34	.027	
507.85	.70	.661	.43	.857	19.71	.963	.82	.787	22.19	.406	(22.7	.717	21.92	.847	20.84	.270	20.54	.737	21.90	.230	
508.85	.78	.692	.78	.894	20.05	.016	21.16	.841	.42	.624	(22.6	.790	.96	.934	20.89	.340	21.02	.805	22.25	.431	
509.84	.88	.724	.70	.931	.15	.069	20.35	.895	.54	.839	-	-	.58	.019	21.19	.408	.26	.873	-	-	
510.84	.81	.756	20.67	.968	.32	.122	.43	.948	.12	.056	22.45	.934	.58	.106	.35	.478	.43	.941	.82	.834	
511.90	.84	.790	21.00	.007	.42	.179	.54	.006	.21	.287	21.52	.010	21.61	.197	.54	.551	.80	.014	22.15	.045	
512.82	.76	.819	.18	.041	.40	.228	.49	.055	.31	.487	.86	.077	22.11	.277	21.81	.615	.92	.077	21.96	.231	
513.87	20.73	.852	.08	.080	.54	.284	.87	.112	-	-	21.86	.153	21.89	.367	22.21	.688	21.92	.149	22.54	.442	
514.83	21.08	.883	.49	.116	20.78	.335	20.97	.164	.72	.924	22.28	.222	.22	.34	.450	.20	.755	22.15	.214	(22.7	.635
536.89	20.60	.586	21.00	.922	21.13	.510	21.76	.355	.62	.720	(22.7	.817	21.77	.355	20.68	.287	20.75	.722	21.96	.076	
537.75	.62	.613	20.81	.964	.26	.556	.45	.401	22.54	.907	.22	.58	.879	.22	.18	.439	20.86	.347	20.88	.782	
538.74	.76	.645	21.13	.000	.46	.609	21.91	.455	21.74	.122	22.24	.951	.45	.515	21.29	.415	21.18	.850	22.68	.450	
539.75	.78	.677	21.00	.038	.41	.662	22.21	.509	22.09	.342	21.58	.024	.54	.602	.26	.485	.26	.913	.54	.652	
540.74	.78	.708	20.76	.074	.18	.715	.21	.563	.28	.557	.89	.096	.42	.688	.41	.554	.24	.987	-	-	
541.76	.78	.741	21.24	.112	21.21	.770	22.12	.618	-	-	22.02	.169	.07	.775	-	-	-	-	-	-	
564.75	.37	.474	20.94	.962	20.07	.994	20.57	.859	.34	.777	.58	.831	.09	.760	21.61	.222	20.20	.629	22.57	.684	
565.70	.43	.504	21.00	.998	.10	.045	.41	.910	.48	.983	.54	.900	22.09	.842	20.84	.288	.55	.694	22.80	.875	
566.69	.52	.535	20.97	.035	.37	.097	.49	.963	.05	.198	22.05	.972	21.71	.929	21.10	.357	20.83	.762	21.96	.076	
567.70	.52	.568	21.05	.072	.37	.151	.60	.018	.48	.418	21.89	.045	.39	.015	.19	.427	21.26	.831	-	-	
569.69	.58	.631	.38	.146	.46	.257	.89	.125	-	-	22.05	.189	21.83	.188	.71	.565	.41	.967	-	-	
570.79	.60	.666	.55	.186	.73	.316	20.87	.185	.15	.090	.42	.268	22.14	.282	21.65	.641	.58	.042	-	-	
571.77	.68	.697	.29	.223	.67	.308	21.35	.238	.05	.303	.51	.339	.42	.367	22.31	.709	21.58	.109	21.77	.097	
572.89	.60	.733	.52	.264	20.88	.428	.43	.298	.62	.546	.45	.420	.24	.463	.44	.787	22.01	.186	22.09	.323	
573.93	.68	.766	21.32	.302	21.08	.483	.32	.354	.41	.772	(22.5	.495	22.38	.553	.32	.859	21.89	.257	.54	.532	
590.75	20.00	.302	20.91	.925	.08	.379	.28	.262	.34	.429	22.76	.711	21.68	.005	22.24	.027	.74	.407	.76	.918	
591.65	19.83	.331	.81	.958	.21	.427	.35	.311	.45	.625	.65	.776	.52	.083	21.97	.090	.71	.469	.09	.099	
592.64	19.98	.362	.94	.995	.35	.480	.64	.364	22.62	.840	.76	.848	21.83	.169	.99	.159	21.49	.537	.22	.300	
593.64	20.10	.394	20.94	.032	.32	.533	.86	.418	21.99	.057	22.62	.920	22.09	.255	21.61	.228	20.26	.603	.45	.501	
594.81	20.13	.431	21.24	.075	21.41	.595	21.84	.481	22.24	.312	21.74	.005	21.89	.356	20.99	.310	20.54	.685	22.84	.735	
830.92	21.32	.955	20.03	.812	20.29	.173	21.18	.227	22.48	.642	22.02	.076	22.12	.742	22.03	.707	21.33	.835	22.09	.264	
832.91	20.62	.018	.37	.885	.46	.279	.58	.334	-	-	21.99	.914	.42	.845	.49	.971	-	-	-	-	
833.92	19.86	.050	20.65	.923	20.78	.333	.54	.389	.21	.294	-	-	.49	.001	.42	.915	.71	.040	-	-	
835.96	19.06	.115	21.02	.988	21.21	.442	21.92	.499	.42	.738	22.42	.440	.86	.177	22.14	.057	.96	.190	.00	.279	
836.90	18.90	.145	.08	.033	21.26	.492	22.02	.550	-	-	(22.5	.508	21.83	.258	21.70	.123	.89	.244	(22.5	.468	
863.83	20.76	.003	21.02	.029	20.29	.926	20.67	.003	-	-	22.32	.583	22.29	.993	21.77	.086	22.34	.889	-	-	
864.84	20.46	.035	20.97	.067	19.85	.980	.66	.058	22.28	.016	(22.7	.528	.48	.670	22.38	.063	22.05	.155	21.89	.092	
865.93	19.23	.070	21.24	.107	19.93	.038	20.82	.117	-	-	.12	.764	-	-	22.02	.312	-	-	-	-	
866.90	18.74	.101	.33	.143	20.18	.090	21.12	.169	.38	.464	(22.7	.677	22.00	.848	21.62	.206	21.99	.296	.38	.507	
867.85	19.08	.131	.41	.178	.18	.141	.09	.220	-	-	21.65	.931	20.78	.273	.68	.362	.48	.700	-	-	
868.86	.16	.163	.26	.216	.49	.195	.29	.275	22.65	.890	22.72	.818	.58	.017	20.97	.342	.61	.430	22.71	.901	
869.86	19.21	.195	.74	.253	20.54	.244	.42	.329	21.86	.107	.54	.891	.71	.104	21.38	.412	21.41	.498	21.92	.103	
894.79	20.64	.990	.41	.175	-	-	.73	.875	22.38	.527	-	-	.99	.256	22.08	.143	.55	.121	-	-	
895.01	.81	.996	.41	.183	21.10	.587	.60	.686	-	-	-	-	.89	.274	21.79	.158	21.96	.213	21.76	.163	
895.95	20.60	.026	.29	.218	.46	.637	.65	.737	.51	.779	22.65	.777	21.96	.356	.36	.224	.80	.283	22.28	.354	
896.94	19.84	.058	.63	.255	.26	.690	.62	.791	22.41	.994	.58	.849	22.35	.442	.06	.292	.85	.351	.32	.554	
897.94	19.08	.090	.46	.292	.05	.745	21.15	.845	21.89	.212	22.51	.921	.51	.529	.08	.362	.68	.419	.61	.755	
898.83	18.85	.118	.58	.325	.13	.791	20.27	.893	22.28	.405	22.51	.861	.48	.605	.39	.424	.71	.480	22.25	.934	
899.84	19.33	.151	.61	.362	21.18	.844	.64	.467	.91	.625	21.80	.058	.34	.642	.49	.494	.35	.549	21.67	.137	
923.74	21.16	.912	.52	.246	.23	.122	.19	.242	.58	.841	-	-	.05	.763	.93	.160	.96	.190	22.44	.967	
924.77	.98	.945	.37	.172	21.52	.293	.34	.045	22.51	.861	22.05	.844	.37	.225	.99	.254	.65	.448	21.89	.156	
927.85	.37	.043	.74	.398	20.86	.336	.28	.459	.54	.714	21.86	.083	21.68	.109	.33	.439	.65	.465	22.42	.776	
951.65	20.72	.801	.65	.279	21.61	.604	.21	.97	.744	-	-	22.55	.804	.65	.165	.98	.092	.80	.093	.68	.567
952.64	21.05	.833	.71	.316	.61	.657	21.74	.797	-	-	.71	.251	-	-	.88	.161	-	-	-	-	
953.67</td																					

## VARIABLES IN THE ANDROMEDA GALAXY

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Table A. (continued)

J. D. 2,433,000+	Mag. V 66	Phase	Mag. V 74	Phase	Mag. V 76	Phase	Mag. V 77	Phase	Mag. V 87	Phase	Mag. V 89	Phase	Mag. V 92	Phase	Mag. V 93	Phase	Mag. V 102	Phase	Mag. V 106	
511.90	21.62	.178	22.15	.380	22.54	.279	23.00	.006	21.55	.974	(22.6	.527	22.16	.679	22.42	.314	21.61	.577	22.28	.324
512.82	.56	.210	-	-	.82	.435	(22.8	.148	.46	.010	(22.6	.564	22.04	.743	.45	.348	.71	.743	22.65	.523
513.87	.62	.248	-	-	-	-	22.15	.311	.77	.051	-	-	21.68	.817	-	-	.61	.933	-	-
514.83	.50	.282	.76	.703	.21	.778	21.80	.459	.99	.087	(22.6	.645	22.21	.883	.15	.425	.86	.107	21.80	.956
536.89	.50	.065	.68	.133	.54	.540	(22.8	.863	.48	.949	(22.6	.529	21.41	.421	.54	.257	.96	.096	22.48	.710
537.75	.68	.096	.82	.228	(22.8	.686	22.48	.996	.38	.983	-	-	.58	.481	.45	.289	.61	.252	21.77	.896
538.74	.65	.131	.18	.337	22.12	.855	(22.8	.150	.70	.022	(22.6	.604	21.74	.550	22.18	.327	.52	.431	22.18	.110
539.75	.62	.167	-	-	.18	.026	-	-	.89	.061	-	-	22.12	.620	21.89	.365	.58	.614	-	-
540.74	.68	.202	-	-	-	-	21.96	.459	.78	.100	(22.6	.684	21.89	.690	22.15	.402	.99	.793	-	-
541.76	.56	.238	-	-	-	-	22.05	.481	.89	.105	-	-	22.04	.700	.02	.408	.96	.820	.42	.572
564.75	.52	.054	.44	.201	.79	.290	.82	.163	-	-	(22.7	.646	.37	.365	22.38	.308	.92	.135	22.58	.715
565.70	.56	.088	.02	.306	.68	.452	.45	.310	21.98	.074	.46	.429	.42	.344	.41	.307	21.86	.920	-	-
566.69	.68	.123	.42	.416	.82	.622	.14	.464	22.09	.112	(22.7	.726	.43	.498	.31	.381	.46	.486	22.15	.134
567.70	.68	.159	-	-	.42	.793	.24	.619	21.92	.152	22.54	.765	.61	.569	.21	.419	.38	.668	22.51	.351
569.69	.71	.230	-	-	-	-	22.09	.230	-	-	21.65	.707	-	-	-	-	-	-	-	-
570.79	.59	.269	-	-	(22.5	.320	(22.5	.097	.15	.272	-	-	22.12	.784	.24	.536	.77	.227	21.92	.018
571.77	.64	.304	(22.7	.974	-	-	(22.5	.246	.12	.310	-	-	21.70	.852	.09	.573	.46	.404	22.09	.228
572.89	.64	.343	-	-	(22.8	.678	22.02	.420	.09	.354	.54	.973	.49	.930	.31	.615	.32	.607	.45	.469
573.93	.56	.380	-	-	22.48	.855	.31	.580	.34	.395	.42	.014	21.52	.003	.51	.654	.65	.795	-	-
590.75	.18	.978	23.00	.065	23.00	.723	.82	.176	21.95	.051	(22.8	.689	20.67	.175	.31	.290	.65	.837	.34	.318
591.65	.32	.009	23.00	.164	21.89	.876	22.54	.315	21.92	.086	-	-	20.97	.238	22.31	.323	.83	.000	.54	.512
592.64	.52	.045	22.12	.274	22.12	.046	21.99	.470	22.24	.125	22.76	.765	21.13	.307	21.80	.361	.71	.180	.54	.727
593.64	.56	.080	.12	.384	.58	.217	22.18	.624	.02	.164	.76	.805	.06	.377	22.09	.398	.38	.360	.05	.942
594.81	21.56	.122	22.05	.511	22.51	.415	22.45	.803	22.05	.209	(22.7	.852	21.71	.458	21.89	.442	21.38	.571	22.28	.193
830.92	21.73	.506	-	-	-	-	22.15	.422	22.09	.320	21.68	.915	22.09	.351	21.58	.272	-	-	-	-
832.91	.56	.577	-	-	22.28	.013	21.92	.552	.58	.500	-	-	21.10	.054	.12	.426	.65	.631	22.45	.511
833.92	.67	.613	-	-	-	-	-	-	.42	.540	-	-	20.51	.124	.21	.464	.86	.814	-	-
835.96	.46	.685	(22.8	.072	(22.8	.531	22.72	.022	.51	.619	.15	.522	20.97	.266	.28	.541	.61	.183	.09	.166
836.90	.49	.718	-	-	(22.6	.691	.72	.167	-	-	.21	.560	21.15	.332	.48	.576	.52	.353	-	-
863.83	.62	.675	(22.6	.142	(22.6	.283	-	-	.34	.707	-	-	20.94	.209	.18	.592	.80	.223	.31	.172
864.84	.59	.711	22.28	.253	22.72	.455	22.18	.479	.45	.746	.48	.680	21.14	.279	.48	.630	.55	.406	.62	.389
865.93	.62	.749	-	-	-	-	.15	.647	.34	.788	-	-	.02	.355	-	.57	.603	-	-	-
866.90	21.41	.784	.24	.480	.34	.806	.62	.797	22.16	.826	.34	.760	.46	.423	.36	.708	.89	.779	.04	.834
867.86	20.92	.818	-	-	.18	.970	.68	.945	21.29	.864	.42	.841	.58	.490	.45	.744	.68	.952	.21	.041
868.86	.88	.853	(22.7	.696	.38	.140	.68	.100	.24	.903	.42	.841	.48	.559	.38	.782	.89	.133	.24	.256
869.86	.20	.78	21.44	.889	(22.6	.806	.62	.311	.76	.254	.29	.942	.54	.881	.65	.629	.38	.820	.43	.314
869.79	21.44	.774	22.15	.552	(22.8	.561	(22.8	.102	.08	.915	-	-	.46	.367	.58	.760	.71	.823	21.65	.845
895.01	.35	.782	.21	.575	(22.8	.597	(22.8	.134	-	-	-	-	.49	.381	-	-	.68	.861	21.83	.890
895.95	21.08	.816	.42	.680	(22.8	.759	22.62	.281	.43	.960	.02	.927	.67	.448	.62	.804	.83	.032	22.21	.095
897.94	.73	.886	-	-	21.86	.099	22.15	.589	.83	.037	.05	.007	21.68	.586	-	-	.43	.392	-	-
898.83	.60	.918	.65	.998	22.31	.250	.45	.725	.98	.072	22.12	.043	21.26	.648	(22.8	.913	.38	.553	22.42	.716
899.84	20.70	.954	.65	.108	.62	.423	.51	.881	21.92	.111	21.58	.083	22.33	.719	(22.7	.951	.92	.736	21.74	.933
923.74	21.44	.803	-	-	(22.7	.498	22.31	.570	.74	.044	21.77	.042	21.58	.385	(22.7	.853	.89	.058	22.24	.103
924.77	.56	.806	-	-	-	-	-	-	.68	.048	22.02	.046	.52	.391	.42	.856	.89	.074	22.24	.103
927.85	20.60	.949	(22.4	.852	22.76	.673	.62	.729	21.92	.084	21.96	.083	.61	.456	.61	.244	22.48	.306	-	-
951.65	21.59	.794	-	-	(22.5	.256	(22.7	.877	.09	.133	22.18	.161	21.29	.329	(22.5	.906	.92	.106	22.28	.100
952.64	.46	.830	-	-	-	-	-	-	.18	.172	.21	.200	.37	.398	.55	.285	-	-	-	-
953.67	21.38	.866	(22.6	.037	(22.7	.600	(22.8	.189	22.28	.212	.28	.242	.58	.478	(22.5	.983	.38	.471	.62	.534
954.72	20.70	.904	(22.6	.153	22.65	.780	22.18	.351	21.99	.253	.31	.283	.58	.544	(22.7	.021	.29	.661	.21	.761
955.83	20.54	.943	22.21	.274	21.86	.969	.24	.523	22.05	.296	22.42	.329	21.58	.621	-	-	.61	.862	.12	.000
977.63	21.56	.717	-	-	(22.8	.686	(22.8	.887	21.96	.147	21.77	.203	20.73	.141	(22.7	.886	.52	.804	22.45	.699
978.63	.73	.753	.42	.786	22.05	.856	22.68	.042	22.24	.186	.71	.243	20.77	.210	(22.7	.924	.62	.985	.21.95	.914
979.63	.81	.759	-	-	21.86	.887	.05	.193	21.71	.250	.05	.193	21.71	.250	21.00	.223	.76	.018	22.08	.953
980.68	.59	.788	.45	.896	.77	.026	.21	.251	22.51	.196	.21	.225	22.21	.283	.12	.286	(22.7	.961	.78	.166
981.69	.71	.826	(22.8	.011	22.45	.206	.18	.358	.12	.266	.02	.325	.41	.353	-	-	.46	.356	-	-
983.78	20.73	.936	-	-	-	-	-	-	-	-	-	-	.58	.424	(22.7	.039	21.24	.538	(22.6	.574
	V 113	V 116	V 117	V 118	V 120	V 121	V 125	V 128	V 130	V 132										
474.90	22.42	.046	21.80	.022	21.99	.170	22.28	.681	21.77	.581	21.86	.083	21.26	.248	21.92	.433	22.42	.522	-	-
475.89	-	-	.58	.152	22.29	.297	22.05	.762	.77	.603	21.99	.203	.62	.332	21.99	.470	21.99	.571	-	-
478.90	23.00	.257	.68	.544	22.34	.678	21.83	.096	.46	.670	22.58	.564	.67	.587	20.43	.580	.96	.720	22.72	.666
479.91	22.82	.310	.83	.675	21.80	.804	22.12	.088	.65	.692	.54	.684	.76	.672	.26	.617	.96	.770	.31	.713
480.90	.82	.362	21.96	.806	.58	.930	.72	.169	.86	.714	.65	.804	.52	.756	.29	.654	21.00	.819	.26	.056
481.90	-	.20	.055	.45	.251	-	-	-	-	-	21.54	.841	.40	.690	20.70	.727	20.65	.918	.22	.055
482.89	(22.8	.468	21.58	.066	.85	.181	.68	.332	21.80	.759	.21	.044	20.74	.925	20.70	.727	20.65	.918	22.05	.655
504.92	21.99	.629	22.05	.942	.71	.973	.51	.126	20.73	.250	.58	.691	21.68	.792	21.08	.535	21.26	.099	21.83	.898
505.87	22.14	.679	21.96	.067	.96	.093	.31</td													

Table A. (continued)

J.D. 2,433,000+	Mag. V 113	Phase	Mag. V 116	Mag. V 117	Mag. V 118	Mag. V 120	Mag. V 121	Mag. V 125	Mag. V 128	Mag. V 130	Mag. V 132		
J.D. 2,433,000+	V 144	V 145	V 146	V 147									
570.79	-	-	21.71	.546	22.24	.319	22.42	.491	21.41	.717	22.48	.610	
571.77	-	-	21.83	.673	.31	.443	22.24	.570	.80	.739	(22.6	.727	
572.89	(22.8	.214	22.02	.819	.21	.585	21.80	.662	.55	.764	22.42	.861	
573.93	(22.8	.269	22.05	.955	22.15	.717	21.96	.746	21.71	.787	.42	.986	
590.75	22.76	.156	21.43	.152	21.55	.848	22.12	.116	20.46	.162	22.02	.008	
591.65	22.95	.203	.32	.269	.52	.962	.42	.190	.62	.182	21.99	.116	
592.64	23.05	.256	.43	.400	21.80	.088	.58	.271	.62	.204	22.05	.236	
593.64	26.00	.309	.38	.530	22.05	.215	.34	.352	.57	.226	21.86	.357	
594.81	22.82	.370	21.71	.682	22.05	.362	22.54	.447	20.76	.252	22.18	.496	
830.92	21.80	.823	21.52	.518	21.99	.277	22.12	.678	21.21	.513	-	-	
832.91	-	-	22.05	.779	22.31	.530	21.58	.841	.49	.557	21.92	.117	
833.92	-	-	22.09	.910	-	-	21.76	.923	.41	.580	-	.74	
835.96	22.62	.088	21.43	.176	21.24	.916	22.18	.089	.86	.625	22.42	.482	
836.90	(22.6	.138	21.41	.299	21.77	.035	.21	.165	21.38	.646	-	-	
863.83	(22.6	.558	22.09	.816	22.42	.447	.28	.359	20.65	.246	-	-	
864.84	-	-	21.96	.947	22.39	.574	.45	.441	.81	.268	22.18	.954	
865.93	-	-	-	-	-	-	.24	.530	-	-	.65	.295	
866.90	22.15	.720	.39	.217	21.90	.836	22.16	.609	.85	.314	21.86	.084	
867.86	-	-	.58	.342	.71	.958	21.96	.687	.75	.336	-	-	
868.86	.24	.824	.49	.473	21.52	.084	.83	.769	20.70	.358	22.09	.437	
869.86	-	-	21.77	.604	22.02	.211	.53	.850	21.02	.380	-	-	
894.79	.76	.191	22.12	.860	.28	.370	.55	.881	20.37	.936	.58	.554	
895.01	22.76	.202	-	-	-	-	-	-	-	-	.21	.58	
895.95	23.00	.252	21.86	.011	.28	.517	21.92	.975	.08	.962	20.77	.932	
896.94	(22.8	.305	.54	.141	22.38	.643	22.16	.056	.14	.984	(22.6	.812	
897.94	(22.8	.357	.38	.272	21.89	.769	.12	.138	.18	.006	22.28	.933	
898.83	23.00	.404	.29	.387	.61	.882	.15	.210	.18	.026	21.92	.039	
899.84	22.95	.457	.35	.518	.58	.018	.62	.291	20.23	.048	-	-	
923.74	21.89	.718	.96	.640	.68	.038	.31	.238	21.58	.581	22.02	.033	
924.77	22.18	.772	.96	.652	21.86	.050	.18	.246	.58	.583	21.99	.044	
927.85	-	-	.10	.177	.28	.558	.48	.573	21.96	.672	-	-	
951.65	.82	.190	.32	.285	.21	.574	.72	.512	20.60	.203	21.99	.388	
952.64	-	-	.52	.416	22.38	.699	.31	.593	.65	.225	-	.65	
953.67	(22.8	.296	21.61	.549	21.96	.830	22.12	.676	.86	.248	22.42	.631	
954.72	(22.8	.352	22.02	.686	.52	.963	21.92	.762	.88	.271	.76	.757	
955.83	(22.8	.410	22.02	.831	.89	.104	.60	.852	20.90	.296	.54	.891	
977.63	22.21	.560	21.71	.678	.71	.866	.92	.630	21.71	.781	.38	.511	
978.63	21.96	.613	.78	.809	.54	.992	.96	.709	.68	.804	.45	.631	
.81	.51	.621	.88	.832	.53	.013	.99	.724	.48	.808	.34	.653	
979.63	21.39	.666	21.96	.940	21.83	.119	.92	.791	.21	.826	.54	.751	
.79	22.02	.674	22.05	.960	22.09	.139	.71	.804	.46	.830	.65	.771	
980.68	.12	.721	21.74	.077	21.99	.253	.67	.876	21.10	.849	.72	.878	
981.69	22.22	.774	.05	.208	22.09	.380	21.83	.957	20.81	.872	22.34	.998	
983.78	-	-	21.21	.482	-	-	-	-	20.40	.919	-	-	
J.D. 2,433,000+	V 144	V 145	V 146	V 147									
J.D. 2,433,000+	V 144	V 145	V 146	V 147									
474.90	22.37	.789	(22.4	.618	21.74	.263	22.54	.524			830.92	22.21	.627
475.89	.40	.805	(22.4	.674	21.86	.397	.44	.561			832.91	.28	.660
478.90	.44	.854	21.99	.842	20.83	.805	21.46	.671			833.92	.21	.676
479.91	.48	.871	.83	.898	21.05	.941	.17	.709			835.96	22.21	.709
480.90	.68	.887	.61	.954	.24	.075	.42	.745			836.90	(22.4	.725
481.90	.42	.903	.65	.010	.29	.211	.52	.782			863.88	21.97	.167
482.89	(22.4	.919	21.80	.066	.55	.345	21.67	.819			864.84	.92	.183
504.92	22.02	.281	22.21	.301	21.58	.326	22.15	.632			865.93	.77	.201
505.87	.21	.296	.34	.354	22.21	.454	21.48	.667			866.90	.76	.217
506.84	.28	.312	.45	.408	21.96	.585	.30	.702			867.86	.74	.233
507.85	.48	.329	.58	.465	21.02	.722	.25	.740			868.86	.86	.249
508.85	.48	.345	.65	.521	20.67	.857	.36	.777			869.86	21.99	.266
509.84	.21	.361	.72	.577	21.15	.991	.46	.813			894.79	22.22	.675
510.84	.42	.378	.68	.633	.02	.127	.60	.850			895.01	.28	.678
511.90	.42	.395	.65	.692	.35	.270	21.60	.889			895.95	.22	.693
512.82	.34	.411	22.65	.743	.55	.395	22.05	.923			896.94	.30	.710
513.87	.42	.428	21.85	.802	.89	.537	21.82	.962			897.94	.28	.726
514.83	.39	.443	.74	.856	.21	.667	.84	.997			898.83	.51	.741
536.89	.48	.805	21.89	.093	21.46	.652	.77	.811			899.84	22.24	.757
537.75	.58	.819	22.12	.141	20.76	.768	.79	.843			923.74	.21	.92
538.74	.54	.836	.28	.196	20.88	.902	.21	.900			924.77	.08	.166
539.75	.42	.852	.28	.253	21.10	.039	22.05	.917			925.75	.09	.217
540.74	.42	.868	.24	.309	.21	.174	22.02	.953			927.85	.09	.217
.89	-	-	.42	.317	.41	.193	21.93	.959			951.65	.42	.607
541.76	-	-	-	-	.58	.311	22.00	.991			952.64	-	-
564.75	22.03	.262	.42	.654	.65	.422	21.86	.839			953.67	.24	.640
565.70	21.89	.278	.31	.707	.77	.550	21.81	.874			954.72	.42	.657
566.69	-	-	.31	.763	21.41	.684	22.00	.911			955.83	22.31	.676
567.69	22.06	.312	22.02	.819	20.73	.821	21.71	.948			977.63	21.77	.033
568.69	.15	.345	21.71	.931	21.29	.090	22.03	.022			978.63	.55	.050
570.79	.18	.362	.61	.993	21.55	.239	21.97	.062			979.63	.68	.052
571.77	.24	.378	.77	.048	22.05	.372	.96	.098			980.68	.77	.083
572.89	.15	.395	21.92	.110	22.02	.523	21.90	.140			981.69	.77	.100
573.93	.21	.412	22.31	.169	21.15	.664	22.16	.178			983.78	21.77	.134
590.75	.42	.678	.02	.111	.10	.946	21.57	.799			21.08	.125	-
591.65	.34	.707	.34	.162	.21	.062	.75	.832			-	-	-
592.64	.34	.723	.31	.218	.10	.197	.83	.868			-	-	-
593.64	.42	.740	.28	.274	.49	.333	.84	.905			-	-	-
594.81	22.42	.755	22.42	.339	21.89	.490	21.84	.948			-	-	-

## VARIABLES IN THE ANDROMEDA GALAXY

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Table B. 200-inch photographic observations and phases of one hundred seventy-six Cepheids and six "Population II" variables in Field III.

J. D. 2,433,000+	Mag. H 21*	Phase H 21*	Mag. H 22*	Phase H 22*	Mag. H 23*	Phase H 23*	Mag. H 24*	Phase H 24*	Mag. H 25*	Phase H 25*	Mag. H 26*	Phase H 26*	Mag. H 27*	Phase H 27*	Mag. H 28*	Phase H 28*	Mag. H 29*	Phase H 29*	Mag. H 30*	Phase H 30*		
-474.96	20.41	.333	20.06	.315	21.35	.655	21.21	.083	21.71	.833	21.61	.697	20.58	.661	19.03	.681	21.87	.084	20.68	.015		
475.96	.58	.391	.21	.372	.48	.713	.26	.140	.68	.917	.61	.736	.92	.703	.10	.719	21.93	.136	19.38	.070		
476.95	20.71	.449	.48	.428	.08	.769	.39	.196	21.11	.001	.61	.774	.75	.744	.69	.756	22.07	.186	.70	.124		
477.95	21.21	.508	.46	.485	.55	.826	21.37	.253	20.96	.086	.44	.812	20.83	.785	.48	.793	.52	.238	19.83	.178		
479.93	.46	.623	20.86	.598	.44	.939	22.05	.365	.78	.253	.98	.888	21.12	.867	19.97	.867	.56	.339	20.56	.287		
480.96	.63	.683	21.17	.656	.21	.999	22.07	.423	20.86	.340	.76	.926	.37	.910	20.22	.905	.62	.392	21.03	.343		
481.96	.63	.741	.35	.713	.23	.055	21.90	.480	21.08	.425	.84	.965	.30	.951	.48	.943	-.	-.	.21	.398		
482.92	.66	.797	.50	.768	21.08	.109	22.02	.535	21.03	.506	.73	.002	.52	.991	20.48	.978	.62	.493	.28	.450		
503.87	.66	.018	.77	.960	19.73	.302	21.68	.725	20.83	.276	.71	.801	.28	.859	19.52	.760	.42	.567	.55	.596		
504.95	.44	.082	.58	.022	20.38	.363	21.47	.786	20.86	.370	.58	.842	.17	.903	.69	.800	.33	.623	.63	.655		
505.90	21.48	.137	.48	.076	.34	.418	20.81	.840	21.21	.448	.73	.878	.24	.943	.52	.836	22.20	.672	.68	.707		
506.87	20.30	.193	.26	.131	.46	.473	.78	.895	.26	.530	.73	.915	.65	.984	19.76	.872	21.06	.721	.87	.767		
507.87	.24	.252	21.28	.188	.56	.530	20.78	.952	.48	.615	.61	.957	.54	.025	20.10	.910	20.71	.773	.50	.815		
508.88	.32	.311	19.94	.245	20.98	.588	21.01	.009	.66	.700	.57	.992	.58	.067	.22	.947	20.86	.824	.61	.870		
509.89	.38	.370	19.83	.303	21.32	.645	.11	.067	.68	.785	.44	.030	.56	.109	.30	.985	21.11	.876	.30	.926		
510.89	20.61	.428	20.31	.360	.30	.702	.35	.123	.41	.870	.61	.069	.54	.150	.50	.222	.32	.928	21.35	.980		
511.85	21.08	.484	.33	.414	.28	.756	.61	.178	21.13	.951	.32	.105	.50	.190	.60	.059	.44	.977	19.87	.033		
512.87	.13	.543	.46	.472	.39	.815	.46	.236	20.76	.037	21.21	.145	.39	.232	.38	.096	.81	.029	.49	.088		
513.81	.23	.598	.80	.526	.39	.869	.52	.289	.83	.117	.20	.61	.180	.30	.271	.40	.131	.78	.077	19.70	.140	
514.88	.52	.600	20.97	.587	21.35	.929	21.73	.350	.41	.207	20.36	.221	.03	.315	.48	.171	21.66	.132	20.04	.198		
516.83	.93	.940	21.88	.836	19.52	.180	22.20	.596	.88	.062	21.71	.058	.52	.225	.30	.991	22.42	.258	20.91	.398		
517.80	.63	.996	.75	.891	.55	.235	21.93	.632	.32	.144	.55	.096	.32	.265	.40	.027	.49	.318	21.21	.451		
518.80	.71	.055	.50	.948	19.73	.292	.93	.708	.56	.229	21.46	.134	21.05	.307	.52	.064	.42	.359	.26	.506		
519.80	21.52	.113	.52	.005	20.14	.349	.87	.765	.96	.313	.81	.172	20.29	.348	.40	.102	.69	.411	.28	.561		
540.86	20.91	.175	.61	.066	.30	.409	21.37	.825	20.98	.403	.22	.211	19.62	.392	.52	.141	22.62	.465	.37	.619		
541.81	20.17	.230	21.52	.120	20.58	.463	20.76	.879	21.39	.483	20.27	.247	.59	.431	.52	.177	-.	-.	.57	.671		
544.80	21.13	.570	20.15	.428	21.19	.772	21.50	.185	.23	.426	21.50	.126	.55	.384	.46	.035	21.76	.693	.28	.927		
565.75	.23	.626	-.	-.	.23	.826	.50	.239	.11	.507	20.98	.163	.55	.424	.63	.070	20.76	.742	21.42	.979		
566.74	.26	.683	.80	.539	.44	.883	21.50	.295	.61	.590	.10	.201	.69	.465	.43	.107	20.71	.793	19.76	.033		
567.75	.66	.742	20.97	.596	.44	.941	22.05	.352	.37	.676	.32	.239	19.69	.507	.55	.145	21.06	.845	.48	.088		
569.74	.73	.859	21.37	.710	.19	.054	.16	.466	.61	.844	.32	.315	20.09	.589	.52	.219	.50	.947	19.87	.197		
570.85	.96	.923	.61	.773	21.08	.117	.30	.528	.35	.938	.56	.358	.33	.635	.31	.261	.63	.004	20.32	.257		
571.83	.61	.980	.50	.828	19.45	.173	22.02	.585	21.21	.020	.20	.496	.66	.676	.43	.298	.78	.054	20.56	.311		
572.84	.55	.059	21.86	.886	.59	.231	21.76	.642	20.78	.106	21.01	.433	.20	.72	.43	.335	21.96	.106	21.16	.366		
573.88	.76	.100	22.04	.945	.87	.290	.90	.700	20.36	.194	.21	.472	21.03	.761	.60	.374	22.20	.159	21.01	.423		
590.65	.55	.077	21.61	.900	.62	.245	.90	.653	21.66	.611	21.66	.113	.19	.456	.29	.000	21.59	.020	20.63	.340		
591.70	21.30	.138	.70	.960	19.76	.304	.96	.712	.71	.700	20.83	.153	.20	.499	.43	.039	.73	.073	.81	.399		
592.69	20.45	.196	.50	.016	20.00	.361	.78	.769	.73	.784	.38	.192	.18	.540	.40	.076	21.81	.124	20.73	.463		
593.69	.10	.255	.48	.073	.38	.418	21.08	.826	.63	.868	.10	.230	.18	.582	.40	.113	22.02	.175	21.28	.507		
594.76	20.27	.317	21.46	.134	20.66	.479	20.83	.886	21.16	.959	20.30	.270	.20	.27	.626	20.41	.153	22.33	.230	21.46	.565	
831.94	21.44	.143	.634	.988	21.63	.356	21.93	.005	20.35	.323	19.59	.455	20.43	.006	-.	-.	21.59	.532	21.59	.532		
832.95	20.27	.203	.50	.691	21.39	.046	22.10	.413	20.83	.091	20.66	.363	19.83	.497	.40	.044	-.	-.	.26	.587		
836.96	20.56	.436	21.89	.920	19.82	.274	21.63	.640	20.88	.430	21.26	.515	20.89	.663	.80	.194	22.05	.655	21.52	.807		
836.92	21.70	.008	20.50	.454	21.33	.809	.61	.172	21.50	.709	.26	.545	20.97	.781	.40	.201	21.99	.040	20.22	.280		
864.89	.63	.064	.75	.509	.61	.864	.50	.227	.46	.790	.39	.582	21.12	.821	.58	.237	21.78	.089	21.03	.334		
865.88	.57	.121	20.89	.566	.66	.921	.81	.283	.52	.874	.35	.620	.10	.862	.52	.273	-.	-.	20.86	.388		
866.84	.97	.215	.127	21.12	.571	.48	.926	.57	.293	.39	.882	.26	.624	.30	.866	.66	.277	22.10	.145	21.06	.392	
866.84	20.58	.177	.19	.620	.35	.976	.68	.338	.01	.955	.48	.656	.30	.901	.72	.309	.23	.189	.26	.440		
867.91	.22	.240	.13	.681	.35	.037	.81	.399	21.06	.046	.68	.696	.32	.946	.70	.349	.07	.244	.26	.498		
868.91	.22	.598	.37	.738	21.16	.094	21.76	.455	.20	.613	.46	.735	.35	.987	.75	.387	.33	.295	.37	.554		
869.91	.55	.047	.60	.445	.37	.802	.16	.158	.44	.665	.76	.880	.26	.230	.18	.506	.20	.88	.23	.193		
869.91	.59	.105	20.58	.503	21.35	.859	.52	.216	.76	.750	.73	.918	.46	.272	.18	.504	21.23	.885	20.56	.248		
923.80	21.13	.498	21.65	.862	19.52	.220	.87	.572	.63	.769	.76	.831	.30	.262	.20	.24	.436	21.99	.111	21.06	.554	
924.82	20.88	.557	.92	.921	.83	.279	.96	.630	.71	.856	.81	.869	.32	.304	.19	.673	.52	.391	21.99	.675	20.15	.024
927.90	.59	.747	.879	19.75	.281	21.01	.635	.20	.92	.994	21.13	.420	.72	.769	.52	.110	.60	.399	21.80	.685	19.75	.035
951.70	.59	.737	21.61	.096	20.66	.453	.35	.805	20.73	.116	.90	.987	19.66	.432	.18	.62	.589	.36	.321	21.50	.778	
951.70	21.11	.564	.70	.928	19.83	.285	.78	.637	20.79	.329	.69	.891	.15	.836	.78	.926	.16	.542	19.48	.079		
952.70	20.71	.183	.63	.507	.41	.866	.44	.214	.81	.934	.19	.666	.49	.540	.16	.544	-.	-.	.73	.134		
953.70	.17	.241	20.83	.565	.48	.923	.66	.271	.73	.297	.84	.972	.20	.001	.54	.552	22.13	.644	19.87	.189		
954.77	.27	.303	21.17	.625	21.32	.984	21.66	.331	20.88	.387	.71	.013	.21	.545	.75	.592	21.73	.700	20.46	.247		
955.78	20.41	.362	.17	.683	20.96	.041	22.13	.389	21.16	.472	.52	.053	20.33	.587	.18	.75	.629	20.83	.751	20.66	.302	
977.69	21.37	.639	.92																			

Table B. (continued)

J.D. 2,433,000+	Mag.	Phase																		
	H 31*		H 33*		H 36*		H 37*		H 38*		H 39*		H 40*		H 41*		H 42*		H 45*	
511.85	21.01	.559	20.61	.537	21.26	.980	20.81	.132	20.98	.428	21.37	.824	20.96	.851	20.78	.207	19.60	.837	21.11	.996
512.87	.06	.604	19.73	.591	21.18	.036	21.08	.208	21.52	.529	.39	.867	.96	.881	.78	.247	.55	.843	.01	.075
513.81	.35	.646	.48	.641	20.63	.089	.39	.279	.68	.622	.77	.907	.76	.909	20.83	.284	.80	.848	.81	.148
514.88	.55	.693	.34	.698	20.34	.149	21.63	.359	.99	.727	.70	.952	20.71	.943	21.08	.326	19.55	.654	21.73	.231
516.83	.50	.659	19.83	.862	21.04	.374	20.48	.005	.66	.895	.59	.867	21.11	.598	20.71	.187	20.07	.978	20.68	.934
517.80	.50	.701	20.22	.913	.04	.428	.91	.077	.50	.991	.48	.907	20.81	.627	20.81	.225	20.07	.984	21.11	.009
518.80	.63	.745	.27	.967	.16	.485	20.73	.152	21.08	.090	.70	.949	.56	.657	21.06	.264	19.94	.989	.50	.087
519.80	21.63	.789	.32	.020	.04	.549	21.44	.227	20.96	.189	.75	.991	.81	.687	.01	.304	20.07	.995	.63	.164
540.86	22.02	.836	.56	.076	.11	.600	.30	.306	20.78	.233	.80	.035	.66	.718	.18	.346	.17	.009	.71	.247
541.81	21.81	.878	.78	.127	.21	.652	21.35	.378	21.06	.387	.80	.075	—	—	.21	.382	.36	.005	.73	.320
544.80	21.66	.889	.98	.345	.13	.936	20.88	.102	21.78	.658	21.72	.034	.71	.433	.13	.284	.22	.137	.59	.104
565.75	22.26	.931	.63	.395	21.04	.988	20.86	.173	22.26	.752	22.00	.073	.71	.461	.13	.322	20.07	.142	.71	.178
566.74	.16	.975	.71	.448	20.96	.044	21.30	.247	21.99	.849	21.86	.115	.61	.491	.06	.361	19.80	.149	.61	.255
567.75	.23	.019	20.76	.502	.48	.100	.32	.323	.71	.949	22.01	.157	.71	.520	.13	.400	19.93	.153	.63	.333
569.74	.30	.107	19.55	.607	.63	.212	.50	.472	21.03	.146	22.04	.240	—	—	.18	.478	20.01	.165	.37	.488
570.85	.10	.156	.41	.666	20.83	.274	.61	.555	20.68	.255	21.72	.286	.86	.613	.28	.522	19.73	.171	21.01	.573
571.83	.02	.199	.45	.718	21.06	.328	.50	.629	20.93	.352	.52	.327	.76	.642	.58	.561	.94	.176	20.31	.649
572.84	.30	.243	.73	.772	21.01	.385	.61	.704	21.23	.452	.61	.59	.76	.672	.63	.600	.94	.132	.46	.728
573.88	.16	.289	.73	.827	20.91	.443	21.57	.782	.50	.555	20.61	.413	.76	.704	.28	.641	.59	.193	20.73	.809
590.65	22.13	.027	.59	.717	21.01	.379	20.68	.040	21.01	.211	21.61	.112	.12	.204	.11	.299	19.17	.283	21.30	.110
591.70	21.84	.073	.62	.772	.18	.437	21.08	.118	20.56	.315	.80	.156	.17	.235	.23	.340	18.96	.289	.52	.191
592.69	22.39	.117	.76	.825	.26	.492	.26	.193	21.19	.412	.77	.197	.22	.265	.23	.380	.90	.295	.61	.268
593.69	.02	.161	.76	.878	.39	.548	.46	.268	.22	.294	.35	.418	.82	.300	.71	.346	21.39	.426	21.39	.428
594.76	22.23	.208	19.97	.935	21.21	.608	21.52	.348	21.93	.617	21.65	.234	20.22	.327	21.44	.460	18.82	.306	21.39	.428
831.94	21.08	.645	20.63	.517	21.63	.848	20.71	.130	—	—	20.22	.404	21.21	.766	18.40	.648	20.71	.831	—	—
832.95	.08	.689	19.80	.570	21.11	.905	21.16	.206	21.30	.141	21.86	.221	.22	.435	21.11	.805	.25	.664	20.93	.909
836.96	21.96	.865	19.62	.782	20.23	.128	.76	.506	21.50	.537	21.08	.388	20.76	.555	20.12	.963	18.75	.676	21.90	.220
863.92	22.42	.052	20.73	.212	21.48	.634	.71	.528	20.91	.200	20.46	.513	19.94	.360	.15	.021	19.24	.830	.71	.312
864.89	21.64	.095	20.96	.264	.55	.688	.63	.600	20.50	.296	.53	.553	20.12	.388	.24	.059	.24	.836	.78	.387
865.88	22.42	.138	21.03	.316	.55	.743	.55	.674	21.11	.394	.53	.595	.12	.418	.48	.098	—	—	.32	.464
866.84	.42	.180	.321	.39	.748	.41	.681	20.96	.402	.58	.599	.12	.421	.46	.102	.38	.842	.28	.472	
867.91	.52	.227	.51	.424	.55	.855	21.48	.827	.80	.584	.91	.679	.71	.478	.71	.177	.38	.853	20.81	.621
868.91	22.39	.271	.68	.476	.08	.912	20.98	.902	.75	.693	20.97	.721	.81	.508	.73	.216	.17	.853	.10	.699
869.91	21.81	.315	20.32	.530	21.08	.968	20.51	.977	21.92	.792	21.26	.763	.86	.538	.96	.256	.24	.864	.63	.777
894.84	20.51	.412	19.62	.851	20.96	.359	21.41	.846	20.83	.255	.39	.802	—	—	20.78	.234	.76	.005	.10	.711
895.81	.53	.415	19.73	.855	20.86	.363	21.46	.851	.83	.261	.35	.805	.22	.284	21.06	.237	—	—	.22	.716
895.81	.56	.455	20.07	.903	21.06	.414	20.91	.918	20.86	.350	.44	.843	.12	.310	21.18	.272	.70	.010	.66	.786
896.78	.99	.463	.01	.913	20.91	.425	.68	.932	21.10	.379	.59	.852	.22	.312	20.86	.279	—	—	.68	.801
897.81	20.91	.543	.63	.009	.04	.525	20.88	.668	.54	.547	.59	.927	.32	.371	.23	.350	.73	.022	20.91	.941
898.90	21.06	.591	.73	.067	.44	.586	21.01	.150	.83	.655	.75	.972	.56	.402	.39	.393	.80	.028	21.11	.026
899.91	.18	.636	.78	.121	.59	.642	21.32	.226	.95	.755	.70	.014	20.66	.433	.35	.432	.94	.033	21.59	.104
923.80	.39	.687	.73	.387	.01	.976	20.66	.017	21.10	.114	.80	.011	19.73	.146	.26	.370	.59	.169	20.93	.958
924.82	.41	.732	.78	.442	.26	.033	.86	.093	20.86	.215	.83	.053	.80	.177	.18	.410	.59	.175	21.23	.037
927.90	21.87	.867	19.45	.600	20.58	.205	21.26	.324	21.70	.519	.80	.182	19.94	.269	.44	.530	19.66	.192	.60	.276
951.70	22.26	.915	20.12	.868	21.40	.534	20.66	.109	.80	.870	.70	.175	20.56	.979	.61	.465	18.30	.327	.21	.122
952.70	21.87	.979	.01	.921	.44	.589	21.11	.184	.58	.968	.92	.217	19.94	.009	.37	.504	.25	.332	.81	.200
953.70	22.30	.003	.53	.974	.37	.648	.39	.259	21.30	.067	.80	.255	.94	.039	.59	.543	.20	.338	.61	.278
954.77	.24	.456	.66	.031	.37	.705	.37	.339	20.98	.173	.77	.303	.87	.071	.30	.586	.25	.344	.66	.361
955.78	21.93	.094	.63	.084	.63	.761	21.63	.415	20.71	.273	.59	.345	19.38	.100	.37	.625	.30	.350	.57	.439
977.69	21.81	.058	.91	.247	.21	.984	20.91	.057	21.35	.436	.75	.259	20.96	.754	.35	.484	.20	.474	.68	.139
978.69	.75	.258	.92	.250	.28	.987	.87	.062	.30	.442	.65	.261	.86	.757	.29	.487	—	—	.52	.144
978.69	22.36	.102	.81	.300	21.01	.040	20.81	.132	.68	.535	.54	.300	.96	.784	.44	.524	.25	.479	.48	.217
979.69	21.87	.146	.71	.352	20.32	.096	21.35	.207	.76	.634	.65	.343	20.96	.813	.48	.563	.30	.485	.68	.294
980.64	21.93	.188	.71	.403	.07	.149	.46	.278	.92	.728	21.08	.382	21.01	.842	.52	.600	.35	.490	.48	.368
981.62	22.16	.231	.66	.455	.41	.204	.41	.352	.92	.825	20.56	.423	20.96	.871	.52	.639	—	—	.35	.444
981.62	.75	.237	20.61	.462	20.46	.211	21.46	.362	.06	.308	21.21	.429	20.96	.873	21.39	.645	18.40	.496	21.26	.454
981.62	H 46	H 47	H 48	V 161	V 162	V 163	V 170	V 171	V 172	V 173										
474.96	21.52	.752	21.66	.081	21.44	.278	22.39	.999	21.35	.295	22.26	.723	22.36	.381	21.95	.472	21.89	.126	22.16	.845
475.96	.57	.830	22.05	.247	21.86	.466	21.96	.247	.16	.311	21.26	.952	22.07	.439	22.02	.669	21.92	.216	—	—
476.95	.63	.907	22.56	.412	22.07	.652	22.01	.494	21.01	.326	21.80	.179	21.44	.496	.19	.864	22.52	.307	22.10	.242
477.95	.52	.984	—	—	22.46	.840	22.42	.742	20.96	.341	22.19	.408	21.68	.554	.30	.060	.69	.397	21.44	.442
479.93	.23	.137	21.37	.908	21.30	.212	21.86	.234	21.06	.372	21.39	.861	22.							

## VARIABLES IN THE ANDROMEDA GALAXY

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Table B. (continued)

J. D. 2,433,000+	Mag.	Phase	Mag.	Phase	Mag.	Phase	Mag.	Phase	Mag.	Phase	Mag.	Phase	Mag.	Phase	Mag.	Phase	Mag.	Phase			
	H 46		H 47		H 48		V 161		V 162		V 163		V 170		V 171		V 172		V 173		
571.83	20.91	.248	21.81	.210	21.56	.487	22.56	.065	21.66	.783	21.21	.899	22.57	.966	21.75	.536	21.35	.923	22.56	.188	
572.84	.81	.325	22.05	.378	22.01	.677	.01	.316	.44	.798	21.63	.130	.59	.024	21.92	.735	.65	.014	21.59	.390	
573.88	20.76	.407	.56	.551	.19	.872	.36	.575	.52	.814	22.36	.367	.62	.084	22.22	.940	21.86	.108	21.72	.598	
590.65	21.46	.704	.13	.343	22.36	.024	.13	.741	.81	.073	.19	.205	.69	.051	.59	.240	22.66	.631	22.45	.947	
591.70	.55	.785	.30	.517	21.48	.221	22.46	.002	.76	.088	.22	.446	.69	.111	.19	.446	21.98	.726	22.42	.156	
592.69	.66	.862	22.36	.682	21.75	.408	21.77	.248	.71	.104	22.22	.672	.69	.168	.04	.641	.83	.816	21.68	.353	
593.69	.67	.939	21.61	.849	22.04	.596	22.16	.496	.93	.119	21.28	.901	.69	.226	.26	.838	.65	.906	.66	.553	
594.76	21.59	.022	21.61	.027	22.36	.797	22.29	.762	21.66	.135	21.70	.146	22.72	.288	22.36	.049	21.35	.004	21.93	.768	
831.94	20.81	.375	-	-	-	-	21.66	.778	22.02	.439	-	-	-	-	-	-	-	-	-		
832.95	20.86	.454	22.56	.686	22.01	.570	22.42	.938	.76	.793	.16	.670	(22.6	.019	22.32	.924	22.36	.632	21.68	.332	
836.96	21.67	.764	.10	.354	21.44	.323	.52	.934	.71	.855	22.49	.588	(22.6	.251	21.77	.714	21.65	.997	22.23	.132	
863.92	.61	.850	22.10	.842	.54	.390	.08	.632	.36	.272	21.63	.760	22.49	.805	22.46	.019	22.32	.444	21.48	.516	
864.89	.44	.925	21.32	.004	21.98	.574	.56	.873	.52	.285	21.35	.982	.29	.861	.56	.210	.75	.532	21.68	.710	
865.88	.32	.002	.71	.169	22.20	.760	.16	.119	-	-	22.07	.208	.36	.918	-	-	.26	.622	22.13	.908	
867.97	.52	.010	21.76	.184	.46	.777	22.32	.142	.14	.300	21.98	.228	.39	.923	22.32	.423	.52	.630	.33	.926	
866.84	.23	.076	22.20	.329	.56	.940	21.95	.358	21.06	.315	22.19	.428	.49	.973	21.86	.594	.13	.709	22.52	.099	
867.91	.16	.159	.20	.507	22.29	.141	22.32	.623	.20	.96	.331	22.22	.673	.69	.035	22.13	.805	22.07	.806	21.87	.313
868.91	21.16	.236	.42	.673	21.48	.329	.39	.872	.96	.346	21.26	.902	22.56	.092	.36	.001	21.48	.897	.50	.512	
869.91	20.56	.314	22.13	.840	.63	.517	22.42	.120	20.96	.362	.50	.131	.49	.198	21.75	.988	.87	.712			
894.84	20.78	.243	21.57	.990	.35	.202	21.92	.314	21.60	.745	.21	.838	21.99	.587	.46	.104	.26	.257	21.50	.705	
895.81	20.51	.318	.71	.150	.50	.385	22.10	.555	.73	.761	.52	.060	22.33	.643	.46	.295	.62	.339	22.26	.884	
896.78	.88	.394	21.93	.314	21.72	.568	.19	.796	.61	.775	22.16	.262	.30	.699	21.98	.486	.46	.427	22.39	.078	
897.81	20.91	.472	22.10	.485	22.26	.761	22.70	.052	.61	.790	22.42	.518	.45	.759	22.07	.689	.42	.521	21.96	.284	
898.90	21.18	.557	.52	.667	22.19	.066	21.80	.323	.48	.807	21.65	.767	.42	.821	.22	.903	22.29	.620	.41	.501	
899.91	.18	.635	.05	.835	21.72	.156	22.36	.574	.93	.822	21.50	.998	.36	.880	.29	.102	21.98	.712	.66	.703	
923.80	.13	.484	22.33	.813	22.13	.647	.01	.509	.61	.189	22.39	.467	22.65	.257	.32	.804	.65	.881	.59	.474	
924.82	.13	.562	21.55	.983	.13	.839	.56	.762	.53	.205	22.36	.700	-	-	.32	.004	.52	.974	.82	.677	
927.90	.39	.801	-	-	21.41	.417	.01	.527	.76	.252	22.22	.405	21.52	.493	21.92	.611	21.92	.254	21.93	.292	
951.70	.18	.642	22.36	.458	22.22	.891	.16	.440	.39	.618	21.14	.854	.24	.865	22.29	.294	22.56	.414	22.49	.045	
953.70	.59	.797	22.56	.791	21.44	.267	22.62	.937	.61	.649	22.29	.311	.56	.981	.13	.688	.56	.596	21.57	.445	
954.77	.41	.880	21.44	.969	.67	.468	21.92	.203	.06	.666	22.46	.556	.62	.042	.32	.899	22.18	.693	21.71	.658	
955.78	.59	.958	21.55	.137	21.98	.658	21.86	.454	21.44	.681	20.80	.788	(22.7	.101	.29	.097	21.83	.785	22.10	.860	
977.69	.32	.653	22.49	.785	22.29	.776	22.52	.597	22.13	.017	.26	.840	.49	.370	22.46	.415	.86	.777	22.10	.239	
978.69	.57	.731	21.57	.952	.16	.964	22.26	.146	.16	.033	21.56	.032	22.13	.421	21.80	.606	.50	.865	21.39	.434	
979.69	.44	.808	.50	.118	22.10	.152	21.83	.394	22.10	.048	22.16	.402	.26	.479	22.29	.803	.52	.856	.50	.634	
980.64	.39	.882	21.96	.276	21.48	.231	22.22	.630	21.83	.063	.36	.478	.66	.534	.36	.990	21.65	.042	21.93	.824	
981.62	.44	.958	22.23	.440	21.80	.515	.56	.874	-	-	.32	.703	21.99	.530	.49	.183	22.13	.131	22.16	.019	
981.75	21.57	.968	22.20	.461	22.01	.540	22.29	.906	22.07	.080	22.49	.732	22.05	.598	22.39	.208	22.01	.143	22.22	.046	
	V 177	V 180	V 183	V 184	V 185'	V 186	V 188	V 189	V 190	V 191	V 192	V 194									
474.96	21.32	.980	21.87	.733	22.80	.770	22.29	.530	(22.7	.650	21.93	.471	21.54	.754	21.90	.965	21.50	.574	20.76	.325	
475.96	.37	.015	-	-	-	-	-	-	-	-	.08	.838	22.05	.264	-	-	21.18	.425			
476.95	.06	.051	22.27	.950	22.89	.142	22.70	.859	(22.9	.908	22.62	.797	.08	.921	21.46	.560	22.36	.878	.21	.515	
477.95	.30	.087	.39	.059	23.03	.329	(22.7	.024	-	-	.10	.005	.86	.859	21.28	.031	.68	.610			
479.93	.39	.158	22.42	.274	22.26	.699	22.26	.352	22.29	.295	21.48	.261	21.72	.170	.61	.451	.39	.333	.84	.800	
480.96	.71	.193	21.78	.386	.72	.891	.49	.522	.52	.402	21.81	.424	22.16	.256	.55	.759	.50	.491	.81	.898	
481.96	.46	.228	.99	.495	-	-	(22.6	.687	-	-	.10	.340	.73	.058	.77	.644	.48	.993			
482.92	.70	.264	.81	.604	(22.9	.528	22.7	.846	-	-	22.56	.736	.22	.59	.420	.68	.345	.99	.790	.35	.085
503.87	.21	.013	21.88	.882	(22.9	.173	22.6	.310	.26	.402	22.42	.065	21.65	.174	.26	.607	.54	.991	.37	.084	
504.95	.35	.049	22.23	.999	22.30	.370	.36	.488	.32	.554	21.36	.237	22.01	.264	.92	.929	.06	.187			
505.90	.41	.084	.10	.103	.23	.553	.49	.645	.46	.666	21.66	.388	.13	.343	.87	.213	.48	.302	21.02	.278	
506.87	.28	.121	.16	.208	22.69	.734	.70	.806	.62	.792	22.05	.542	.56	.424	.39	.503	.61	.450	20.96	.370	
507.87	.37	.156	22.20	.317	(23.0	.921	.89	.971	.62	.921	.56	.701	.32	.508	.59	.802	21.96	.603	21.11	.476	
508.88	.35	.192	21.61	.427	22.89	.109	22.73	.138	.29	.053	.69	.861	22.26	.593	.96	.104	22.10	.757	.44	.562	
509.89	.48	.228	.57	.536	(22.9	.298	21.89	.305	.29	.184	.60	.021	.76	.406	22.02	.911	.73	.659			
510.89	.73	.263	.84	.645	22.16	.455	22.39	.370	.26	.313	22.23	.180	21.56	.761	.63	.705	21.28	.064	.68	.754	
511.85	.78	.299	21.59	.750	.16	.665	.39	.629	.32	.438	21.61	.333	.14	.842	.84	.992	.35	.211	.81	.845	
512.87	21.59	.335	22.30	.861	.23	.655	.59	.798	-	-	.10	.927	.96	.297	.61	.367	.76	.943			
513.81	22.02	.370	.07	.963	-	-	-	-	-	-	.46	.006	.21	.578	.21	.83	.51	.033			
514.88	21.93	.407	22.07	.081	23.10	.331	.86	.130	.80	.831	22.69	.814	.63	.095	.65	.897	22.13	.674	21.16	.135	
516.83	.37	.191	21.57	.472	(22.9	.333	.80	.759	.76	.680	21.66	.302	.19	.933	.76	.458	21.66	.028	20.86	.230	
537.80	.41	.226	.76	.578	22.13	.514	22.80	.920	-	-	21.93	.456	.24	.014	.55	.748	.08	.176	.66	.322	
538.80	.48	.262	.68	.687	.42	.702	(22.7	.085	-	-	22.36	.615	.56	.098	21.76	.047	.66	.329	20.93	.417	
539.80	.73	.297	22.22	.840																	

Table B. (continued)

J.D. 2,433,000+	Mag. Phase V 177	Mag. Phase V 180	Mag. Phase V 183	Mag. Phase V 184	Mag. Phase V 185	Mag. Phase V 186+	Mag. Phase V 188	Mag. Phase V 190	Mag. Phase V 191	Mag. Phase V 194
866.84	21.37 .992	21.71 .416	22.92 .012	21.95 .323	22.29 .516	-	22.39 .555	21.90 .098	21.46 .454	21.87 .722
867.91	.35 .027	.83 .532	(22.9 .212	22.19 .500	-	22.56 .911	21.72 .644	.93 .418	21.84 .616	22.05 .825
868.91	.30 .063	.50 .641	22.56 .399	.73 .666	.89 .784	22.69 .070	.75 .728	.52 .717	22.23 .770	21.93 .920
869.91	.52 .099	.59 .751	22.20 .586	(22.6 .831	.90 .914	21.71 .229	.48 .811	.73 .016	21.87 .922	21.52 .015
874.84	.46 .991	.61 .466	23.10 .246	-	-	.21 .898	.68 .468	22.07 .732	20.98 .394	-
.91	.55 .993	.68 .474	22.86 .259	22.92 .964	.04 .159	.57 .201	.28 .903	.48 .488	.13 .743	20.91 .401
895.81	.48 .025	.68 .572	20 .427	-	.04 .276	.66 .345	.35 .979	.44 .758	.05 .880	21.16 .457
.99	.38 .032	.76 .593	.30 .462	22.76 .145	.29 .301	21.81 .375	.26 .995	.55 .814	22.16 .909	.30 .505
896.78	.61 .060	21.87 .677	.36 .608	21.92 .273	.42 .402	22.10 .499	.61 .060	.76 .047	21.52 .029	.66 .580
897.81	.48 .097	22.07 .787	.76 .800	22.22 .444	.56 .536	-	.75 .146	.87 .355	.08 .186	.55 .678
898.90	.59 .136	.13 .908	.76 .004	.49 .624	.49 .677	.56 .835	21.98 .238	21.57 .681	.44 .352	.90 .782
899.91	.78 .171	22.36 .018	.89 .193	.86 .791	(22.8 .808	(22.8 .995	22.49 .322	22.02 .983	.52 .506	.99 .878
923.80	.59 .026	21.61 .620	.20 .658	.83 .741	22.80 .909	22.83 .792	.36 .322	21.84 .124	.11 .157	.16 .158
924.82	.32 .063	.71 .732	22.65 .849	(22.8 .910	-	.56 .954	.22 .407	.76 .428	.18 .312	.03 .255
.94	.46 .067	21.93 .745	-	-	-	-	.16 .417	.48 .464	21.39 .330	.08 .266
927.90	.81 .172	22.36 .067	-	22.29 .419	-	-	22.04 .665	.93 .349	22.05 .783	.30 .549
951.70	.48 .023	21.71 .659	23.03 .873	21.75 .354	-	21.52 .225	21.89 .657	.55 .463	21.66 .420	21.93 .821
952.70	.48 .059	21.66 .767	-	-	-	-	.65 .741	.71 .762	.78 .573	22.02 .916
953.70	.68 .094	22.20 .876	(22.9 .246	22.42 .685	(22.7 .790	22.30 .542	.24 .824	.99 .061	.99 .725	21.37 .011
954.77	.68 .133	.49 .994	22.42 .446	.70 .861	-	.56 .712	.30 .914	.93 .381	.78 .889	21.11 .114
955.78	.50 .169	22.30 .104	.10 .635	(22.7 .028	22.29 .060	22.83 .873	.51 .999	.48 .683	.30 .043	20.96 .210
977.69	.23 .952	21.72 .490	.65 .730	22.42 .651	-	21.81 .355	.44 .833	.96 .231	.41 .391	21.01 .301
.75	.11 .955	.61 .497	.62 .741	.46 .660	-	21.81 .360	-	.76 .240	.57 .399	20.94 .307
.98	.23 .988	.48 .600	.59 .917	.73 .817	.56 .034	22.23 .514	.30 .917	.52 .530	.52 .544	20.83 .396
979.69	.39 .024	21.68 .708	.83 .104	.83 .982	.19 .164	.56 .673	.52 .001	21.59 .829	21.99 .697	21.37 .492
980.64	.68 .060	22.10 .812	.92 .282	.89 .139	.22 .287	.76 .824	.56 .080	22.07 .113	22.20 .842	.35 .582
981.62	.68 .093	.10 .918	.13 .465	22.13 .301	-	-	.62 .162	21.63 .406	21.81 .992	.68 .676
.75	21.50 .098	22.13 .932	22.23 .489	21.86 .322	22.22 .431	22.60 .000	21.77 .173	21.61 .445	21.68 .011	21.87 .689
	V 195	V 198	V 199	V 201	V 202	V 207	V 208	V 210	V 211	V 215
474.96	21.75 .727	22.04 .128	21.84 .846	21.63 .190	21.76 .524	21.76 .574	22.33 .296	-	22.10 .917	22.62 .630
475.96	21.44 .960	21.00 .295	22.36 .010	21.81 .500	-	22.10 .726	.36 .377	-	21.81 .177	21.46 .815
476.95	22.39 .191	.50 .460	.65 .172	22.07 .806	22.16 .832	21.90 .878	22.13 .457	21.63 .163	22.33 .435	.71 .997
477.95	22.16 .424	21.63 .626	22.33 .336	21.55 .117	22.49 .987	.28 .031	21.93 .538	22.32 .358	22.30 .696	21.95 .182
479.93	21.30 .886	22.22 .956	21.35 .660	22.13 .730	21.68 .293	.28 .333	21.18 .698	-	21.87 .214	22.36 .547
480.96	22.16 .126	21.80 .128	.81 .829	21.61 .049	21.76 .452	.55 .491	20.98 .780	22.70 .946	22.42 .482	21.90 .737
481.96	.22 .359	20.94 .294	21.93 .993	.68 .359	22.05 .607	.66 .643	21.28 .861	21.92 .141	22.29 .743	.38 .922
482.92	.49 .583	21.44 .454	22.30 .150	.84 .657	.13 .756	.87 .790	.39 .938	22.01 .329	21.55 .994	.81 .099
503.87	22.42 .467	22.49 .945	21.44 .584	.66 .149	.26 .999	.55 .992	21.68 .627	.56 .421	22.10 .460	.57 .964
504.95	21.70 .718	21.83 .124	.71 .761	.93 .484	.07 .166	.03 .157	20.98 .714	.56 .632	22.30 .741	21.99 .163
505.90	21.48 .940	.03 .283	21.81 .917	.95 .778	21.71 .313	.21 .303	21.16 .791	(22.7 .817	21.71 .990	22.45 .338
506.87	.22 .26	.39 .444	22.05 .076	.57 .079	.73 .463	.52 .451	.32 .870	23.00 .007	21.93 .243	.65 .517
507.87	.42 .400	.92 .611	.23 .240	21.68 .389	21.96 .618	21.73 .604	.71 .950	21.83 .202	22.16 .503	22.33 .702
508.88	22.22 .635	21.95 .779	22.16 .405	22.10 .702	22.36 .775	22.03 .757	.78 .032	22.29 .400	22.33 .767	21.48 .888
509.89	21.46 .870	22.29 .948	21.71 .571	21.68 .015	.33 .931	21.81 .912	21.93 .113	.22 .56 .597	21.66 .030	21.66 .075
510.89	22.04 .104	22.16 .114	.50 .735	21.71 .325	22.20 .086	21.26 .065	22.10 .194	23.00 .792	21.90 .291	22.13 .259
511.85	22.36 .327	21.08 .274	21.87 .892	22.23 .622	21.93 .234	20.91 .211	.16 .272	22.46 .980	22.42 .541	.39 .426
512.87	-	.39 .444	22.13 .059	22.02 .938	.59 .392	21.32 .367	.10 .354	.13 .179	22.33 .807	22.59 .624
513.81	21.58 .784	21.92 .600	-	21.71 .230	21.86 .538	.44 .511	22.10 .430	.32 .362	21.70 .053	21.87 .798
514.88	21.97 .034	22.19 .779	22.33 .389	.73 .561	22.16 .703	.73 .674	21.93 .515	.39 .571	22.05 .332	.87 .995
516.83	22.19 .151	21.50 .436	21.99 .987	21.76 .363	22.45 .101	21.46 .028	22.23 .285	.70 .859	21.66 .059	21.68 .045
517.80	.46 .377	21.92 .597	22.36 .145	22.05 .664	21.84 .251	20.80 .177	.30 .363	.76 .048	21.89 .312	22.07 .224
518.80	22.36 .610	22.29 .764	22.45 .309	21.87 .974	21.71 .406	21.26 .330	22.16 .444	.13 .244	22.33 .573	.49 .408
519.80	21.41 .843	.36 .931	21.84 .473	21.71 .284	22.02 .561	.55 .482	21.86 .525	.32 .439	22.39 .834	22.39 .593
540.86	21.86 .090	22.01 .107	.23 .647	22.02 .612	21.96 .725	.81 .644	.96 .610	-	21.57 .110	21.76 .789
541.81	22.22 .312	21.12 .265	-	21.93 .907	-	.68 .790	.06 .686	.66 .832	.99 .358	.44 .964
564.80	22.49 .672	22.22 .096	.46 .571	.57 .031	21.73 .431	.21 .301	.93 .540	.26 .322	21.92 .356	21.93 .206
565.75	21.67 .893	21.19 .254	21.61 .726	21.93 .326	22.07 .578	.44 .447	.73 .617	.56 .508	22.36 .603	22.59 .381
566.74	22.04 .124	.21 .419	22.13 .888	22.23 .633	.07 .731	21.68 .598	.03 .697	(22.7 .701	22.30 .862	.49 .563
567.75	22.46 .369	.80 .587	.39 .054	21.87 .946	.16 .888	22.09 .752	.03 .775	22.80 .899	21.63 .125	22.20 .750
569.74	21.61 .824	21.95 .918	22.30 .380	22.05 .562	22.05 .196	.21 .26 .057	.28 .939	.22 .290	22.49 .644	21.90 .117
570.85	21.66 .082	22.07 .104	21.93 .562	21.90 .906	21.66 .367	.03 .226	.81 .029	.60 .504	22.02 .934	22.30 .322
571.83	22.10 .311	20.89 .267	.41 .723	.55 .210	22.05 .519	.35 .376	21.84 .108	.73 .695	21.90 .189	.33 .503
572.84	.22 .26	.546	21.39 .435	21.64 .888	21.78 .523	.10 .675	.48 .530	22.05 .189	(22.7 .893	22.23 .453
573.88	21.52 .789	.72 .608	.22 .159	.55 .059	22.32 .835	.90 .689	22.16 .272	.22 .29 .096	22.42 .725	21.44 .881
590.65	.98 .698	.32 .402	21.48 .807	21.66 .042	21.76 .433	.01 .251	21.76 .624	.36 .372	21.57 .100	.66 .975
591.70	21.70 .942	.94 .577	21.87 .980	.75 .368	22.20 .595	.50 .411	20.96 .708	.56 .577	22.07 .375	21.90 .169
592.69	22.22 .173	21.86 .742	22.30 .142	.96 .675	.26 .748	.71 .563	21.08 .788	.66 .770	.49 .634	22.36 .351
593.69	.29 .406	22.26 .908	.52 .306	.50 .984	.39 .903	.71 .715	.37 .668	.62 .965	22.23 .894	.69 .536
594.76	22.19 .656	22.16 .087	22.07 .481	21.84 .316	22.30 .069	21.90 .879	21.46 .955	22.04 .174	21.75 .173	22.36 .733
831.94	21.65 .950	-	-	-	-	20.96 .120	21.99 .079	-	-	-
832.95	21.98 .186	-	-	21.90 .520	21.52 .131	22.26 .940	21.08 .274	22.05 .161	-	-
836.96	22.16 .120	21.24 .929	21.10 .178	21.68 .374	.16 .561	.99 .887	22.20 .484	22.29 .483	.13 .363	.49 .419
863.92	.16 .406	22.10 .929	21.48 .596	22.10 .729	.16 .735	21.68 .007	21.37 .457	-	.20 .396	.26 .393
864.89	22.66 .632	22.39 .090	.46 .755	21.71 .029	.49 .885	20.98 .154	20.86 .735	.56 .939	22.26 .649	.56 .572
865.88	21.44 .862	21.14 .255	.71 .917	.66 .336	.20 .038	21.23 .306	21.11 .815	.04 .132	21.95 .907	22.10 .755
.97	.48 .873	20.97 .270	21.96 .932	.66 .364	.30 .052	.21 .320	.11 .823	.10 .150	22.10 .930	21.96 .772
866.84	21.75 .086	21.44 .415	22.02 .075	.99 .634	22.10 .187	.30 .452	.26 .893	.16 .320	21.84 .158	21.63 .932
867.91	22.39 .336	21.75 .594	.36 .250	.93 .965	21.71 .352	.76 .614	.68 .979	.62 .529	22.36 .435	22.01 .129
868.91	.22 .46	.569	22.07 .760	.84 .275	21.93 .507	.90 .870	21.76 .060	.86 .724	22.36 .699	.49 .314
869.91	.21 .61	.802	.04 .927	21.73 .578	.84 .585	22.13 .662	.71 .922	22.02 .141	(22.9 .920	21.96 .960
894.84	.22 .13	.614	.19 .080	.57 .664	.66 .311	21.99 .521	.76 .732	21.90 .150	-	22.20 .464
.91	.49 .630	22.26 .092	.39 .676	21.57 .332	.22 .20 .532	.87 .74				

## VARIABLES IN THE ANDROMEDA GALAXY

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Table B. (continued)

J.D. 2,433,000+	Mag. V 195	Phase	Mag. V 198	Phase	Mag. V 199	Phase	Mag. V 201	Phase	Mag. V 202	Phase	Mag. V 207	Phase	Mag. V 208	Phase	Mag. V 210	Phase	Mag. V 211	Phase	Mag. V 215		
951.70	21.58	.870	21.44	.553	22.20	.983	21.78	.932	21.76	.323	21.52	.420	21.08	.735	22.70	.895	22.02	.298	22.65	.589	
952.70	-	-	-	-	.68	.242	.78	.478	.61	.573	.16	.816	22.36	.091	-	-	22.05	.773			
953.70	22.22	.336	22.26	.886	.27	.311	.81	.552	21.90	.633	.99	.726	.46	.897	21.95	.286	22.39	.820	21.61	.958	
954.77	22.29	.585	22.26	.064	22.20	.487	.93	.883	22.30	.798	.78	.888	.61	.983	22.49	.495	21.76	.099	21.71	.155	
955.78	21.48	.821	21.21	.233	21.54	.652	.76	.196	22.33	.955	.26	.043	.76	.064	22.49	.692	22.20	.363	22.33	.341	
977.69	.58	.929	22.29	.883	22.20	.243	.66	.986	21.73	.346	.46	.391	.16	.831	(22.8	.972	21.66	.079	.39	.384	
.75	.72	.938	.26	.893	.26	.253	.70	.004	21.80	.356	.32	.401	.12	.836	-	-	21.80	.094	.26	.395	
978.69	21.98	.162	22.22	.050	22.36	.407	.87	.296	22.02	.501	.66	.544	.37	.912	22.19	.167	22.26	.340	.56	.568	
979.69	22.49	.395	21.44	.216	21.52	.571	.93	.606	.07	.656	21.81	.697	.61	.992	.39	.363	.36	.601	22.16	.753	
980.64	22.56	.617	.12	.375	.57	.727	.93	.900	.16	.803	22.07	.842	.73	.079	.62	.548	22.36	.849	21.48	.928	
981.62	21.54	.845	.52	.538	.99	.887	.52	.204	.23	.955	21.59	.992	.93	.148	(22.8	.740	21.50	.105	22.02	.109	
.75	21.52	.875	21.89	.559	21.99	.909	21.50	.244	22.33	.975	21.63	.011	21.93	.158	-	-	21.73	.138	22.10	.133	
	V 219		V 221		V 222		V 223		V 225		V 226		V 227		V 228		V 229		V 230		
474.96	21.66	.200	21.62	.565	21.51	.681	22.23	.724	21.73	.047	22.26	.206	22.45	.218	22.56	.386	21.66	.581	21.52	.982	
475.96	22.22	.390	22.29	.737	.50	.805	21.71	.987	.66	.175	-	-	-	-	-	-	22.16	.136			
476.95	.33	.578	.49	.907	21.57	.927	22.30	.247	21.87	.302	.49	.558	21.73	.558	21.96	.647	22.13	.797	.13	.288	
477.95	22.30	.768	22.62	.078	22.33	.051	22.30	.510	22.26	.431	.56	.736	21.71	.729	21.61	.779	22.16	.906	22.23	.442	
479.93	21.73	.144	21.50	.418	22.20	.295	21.81	.030	.36	.685	.16	.087	22.05	.068	22.30	.039	21.81	.121	-		
480.96	21.99	.340	21.86	.595	21.57	.423	22.36	.300	22.20	.818	.39	.270	22.26	.244	.07	.174	.52	.228	21.55	.904	
481.96	22.39	.529	22.27	.767	.11	.546	22.33	.562	21.61	.946	.56	.446	-	-	.56	.305	.61	.340	21.87	.058	
482.92	.26	.712	.69	.932	21.39	.665	.21	.512	.815	.918	.62	.617	21.87	.579	.39	.431	21.78	.445	22.02	.205	
503.87	22.25	.690	-	-	22.42	.253	22.23	.316	22.39	.762	.19	.331	22.20	.162	.13	.183	22.39	.720	.42	.425	
504.95	21.81	.894	.22	.715	21.52	.386	22.49	.600	21.87	.901	.70	.522	.69	.346	.62	.325	.69	.838	.72	.591	
505.90	.66	.075	.39	.878	.16	.504	21.52	.849	.83	.023	-	-	22.10	.509	.65	.450	22.42	.940	22.59	.736	
506.87	21.78	.259	.66	.045	.35	.624	21.86	.104	.90	.148	.89	.862	21.84	.675	22.10	.577	21.99	.045	21.66	.886	
507.87	22.23	.449	22.46	.216	.37	.747	22.13	.367	21.87	.277	.22	.039	22.02	.845	21.52	.709	.68	.154	21.93	.039	
508.88	.16	.641	21.77	.390	21.55	.872	22.42	.632	22.23	.407	.10	.218	.04	.008	21.57	.841	.87	.262	22.02	.194	
509.89	22.26	.833	21.77	.563	22.10	.997	21.75	.897	.36	.536	.42	.398	.42	.191	22.02	.974	.71	.372	.19	.350	
510.89	21.44	.023	22.46	.735	.13	.120	22.30	.160	.49	.665	.56	.575	22.36	.362	.62	.105	.58	.482	.72	.503	
511.85	.78	.205	.62	.900	22.45	.239	.42	.412	22.33	.789	.86	.745	21.93	.526	.45	.231	21.76	.586	.89	.651	
512.87	21.99	.399	.56	.075	21.84	.365	.25	.480	21.81	.920	.80	.925	.63	.700	22.45	.365	22.04	.699	22.59	.808	
513.81	22.23	.578	22.42	.236	.11	.481	21.81	.926	.71	.041	.04	.092	21.78	.861	-	-	.13	.799	21.59	.952	
514.88	22.45	.780	21.65	.420	.24	.613	22.33	.207	.99	.178	.22	.283	22.36	.044	21.87	.629	22.36	.916	21.76	.116	
537.80	.63	.133	21.72	.356	.52	.445	22.33	.226	.76	.124	.19	.346	22.26	.964	21.59	.640	.68	.406	.62	.638	
538.80	21.84	.323	21.83	.528	.18	.569	22.36	.489	21.99	.252	.56	.523	.42	.135	.71	.771	.90	.514	22.56	.792	
539.80	22.16	.513	22.07	.700	.35	.692	21.73	.751	22.33	.381	-	-	.49	.307	.61	.903	21.78	.622	21.57	.946	
540.86	.33	.714	.22	.882	.35	.823	21.76	.030	.23	.517	(22.7	.888	22.45	.488	21.76	.042	22.26	.737	22.10	.108	
541.81	.02	.895	-	-	.50	.941	-	-	-	-	22.16	.057	21.63	.650	-	-	-	-	-	-	
564.80	.05	.261	.56	.993	.58	.781	22.30	.316	.56	.594	.01	.133	.84	.581	22.62	.186	21.68	.337	22.56	.787	
565.75	.45	.441	.66	.156	.39	.894	22.52	.566	.33	.716	.42	.302	.63	.743	.69	.311	.66	.441	21.68	.933	
566.74	.33	.630	22.16	.326	21.65	.021	21.42	.826	22.16	.843	.70	.477	21.87	.913	22.56	.441	21.76	.549	21.63	.085	
567.75	22.10	.821	21.65	.500	22.33	.145	22.07	.091	21.76	.973	(22.9	.656	22.42	.085	21.96	.574	22.07	.658			
569.74	21.68	.199	22.29	.841	21.73	.391	22.37	.614	21.87	.229	22.39	.099	22.56	.425	.73	.835	.39	.873			
570.85	22.36	.410	.46	.032	.26	.528	21.80	.905	22.02	.371	.13	.206	21.78	.615	21.78	.981	.30	.993	.76	.717	
571.83	.36	.597	22.79	.200	.32	.656	21.93	.162	.23	.497	.29	.379	22.02	.783	22.07	.110	22.13	.100	22.20	.867	
572.84	22.36	.789	21.83	.374	.35	.774	22.59	.428	.52	.627	.70	.558	.23	.955	.45	.242	21.76	.210	21.66	.022	
573.88	21.44	.985	.89	.552	.81	.903	21.93	.701	.65	.761	.83	.743	.33	.133	22.33	.379	21.76	.323	21.84	.182	
590.65	21.81	.170	21.41	.432	.71	.975	22.10	.105	22.10	.916	.52	.716	.13	.001	21.93	.582	22.13	.145	22.62	.759	
591.70	22.30	.370	22.19	.613	21.84	.104	.42	.380	21.61	.051	.99	.902	.30	.181	.48	.720	21.75	.260	21.76	.920	
592.69	.20	.558	.49	.783	22.45	.227	22.49	.640	21.90	.178	.32	.078	22.26	.350	21.71	.850	.78	.367	21.63	.073	
593.69	22.36	.748	.56	.954	21.76	.350	21.75	.903	22.23	.306	.16	.255	21.99	.521	22.05	.981	.76	.475	22.26	.226	
594.76	.21	.874	22.49	.138	21.42	.482	21.90	.184	22.05	.444	22.26	.445	21.68	.704	22.36	.122	21.76	.591	22.33	.391	
831.94	21.59	.994	-	-	21.61	.786	-	-	-	-	-	-	-	-	-	21.40	.349	-	-		
832.95	.73	.186	22.49	.042	.78	.911	21.78	.733	21.71	.059	-	-	22.23	.434	22.42	.408	21.86	.459	21.63	.991	
836.96	.71	.947	22.49	.731	.59	.406	.82	.786	22.49	.574	22.39	.385	22.13	.120	21.68	.935	22.49	.894	22.59	.607	
836.92	21.57	.067	21.41	.360	.52	.737	21.73	.865	21.73	.040	.04	.165	21.87	.729	22.42	.476	.13	.822	22.76	.750	
864.89	22.10	.251	21.75	.527	.32	.857	22.20	.120	21.99	.164	.19	.336	22.13	.895	21.93	.603	.13	.927	21.68	.899	
865.88	.26	.439	22.29	.697	21.68	.979	.30	.380	22.02	.291	.33	.065	.48	.733	.30	.035	.50	.051			
866.84	.20	.622	.36	.862	.10	.098	22.33	.632	.23	.414	.62	.528	.56	.080	.46	.745	22.30	.045	21.63	.065	
867.91	.91	.825	.39	.046	.23	.230	21.61	.913	.35	.552	.73	.872	22.49	.411	21.90	.000	.84	.255	.36	.363	
868.91	21.46	.014	22.62	.218	.20	.354	22.30	.176	.49	.680	.19	.049	21.59	.582	22.05	.131	.71	.364	.42	.517	
869.91	.63	.204	.51	.390	.30	.447	22.65	.458	.42	.579	.01	.081	22.26	.083	.45	.263	.73	.472	-	-	
894.84	.73	.939</td																			

Table B. (continued)

J. D. 2,433,000+	Mag.	Phase	Mag.	Phase	Mag.	Phase	Mag.	Phase	Mag.	Phase	Mag.	Phase	Mag.	Phase	Mag.	Phase	Mag.	Phase	
	V 233		V 234		V 235		V 236		V 237		V 238		V 241		V 246		V 247		
479.93	21.58	.216	20.93	.314	21.30	.919	21.84	.700	21.55	.742	-	-	22.36	.828	21.39	.027	21.83	.500	
480.96	22.01	.429	.93	.417	21.77	.048	.84	.738	.63	.887	22.02	.554	22.32	.990	.63	.236	.86	.648	
481.96	-	-	20.71	.518	22.01	.173	.80	.775	21.78	.029	21.99	.713	21.44	.148	21.96	.438	.83	.790	
482.92	22.26	.834	21.01	.615	22.16	.292	.73	.811	22.01	.164	21.99	.866	21.58	.301	22.02	.632	21.03	.927	
503.87	21.54	.165	.03	.724	21.30	.908	.28	.582	.05	.121	22.33	.201	22.26	.611	22.20	.867	20.60	.917	
504.95	22.04	.389	.35	.833	.58	.042	.39	.622	.39	.274	22.42	.373	.16	.781	21.41	.086	21.03	.070	
505.90	.22	.585	.76	.928	21.95	.161	.90	.656	.33	.408	21.90	.524	.22	.931	.68	.278	.03	.207	
506.87	.39	.785	.87	.026	22.01	.282	.59	.692	22.16	.545	21.71	.679	22.29	.084	21.96	.474	.46	.345	
507.87	22.10	.992	21.66	.127	22.22	.407	.55	.730	21.76	.686	22.07	.838	21.26	.242	22.23	.676	.56	.488	
508.88	21.67	.200	-	-	21.98	.533	.81	.767	.66	.828	.33	.998	21.61	.402	22.20	.880	.58	.632	
509.89	21.80	.408	20.91	.330	20.80	.659	.73	.804	.93	.971	.42	.159	22.01	.562	21.35	.084	21.86	.777	
510.89	22.22	.615	.66	.430	21.10	.784	.71	.841	21.91	.112	.36	.318	.32	.720	21.87	.287	.20	.920	
511.85	22.56	.815	20.71	.527	.35	.904	.71	.877	22.20	.248	22.16	.471	.49	.892	-	-	20.72	.057	
512.87	21.75	.025	21.23	.630	21.48	.031	21.84	.915	22.33	.392	21.81	.633	22.25	.033	22.13	.687	21.24	.203	
513.81	.50	.220	.41	.724	22.07	.148	.22	.05	.948	-	-	21.78	.782	21.26	.181	22.13	.877	.44	.337
514.88	.92	.441	.32	.833	22.07	.283	21.93	.988	21.93	.675	22.13	.953	21.72	.351	21.35	.093	.75	.489	
516.83	.61	.979	.61	.043	21.46	.023	.57	.799	.84	.773	22.42	.447	22.32	.819	22.20	.531	.92	.622	
517.80	.46	.179	.48	.141	21.80	.144	21.76	.835	.81	.910	21.93	.608	22.32	.972	.20	.726	.52	.760	
518.80	21.95	.386	.01	.241	22.10	.269	22.02	.873	21.93	.052	22.02	.761	21.58	.130	22.30	.928	21.17	.903	
519.80	22.22	.593	21.06	.342	22.22	.394	22.05	.909	22.26	.193	.26	.920	.48	.287	.20	.924	.68	.165	
540.86	22.13	.812	20.66	.448	21.67	.526	21.73	.947	22.42	.342	.26	.089	.98	.455	21.93	.345	21.32	.197	
541.81	21.65	.008	20.76	.544	.10	.645	-	-	-	-	-	-	.22	.07	.538	.44	.332	-	
546.80	22.21	.761	21.50	.858	.86	.515	21.81	.830	21.59	.721	.05	.899	.63	.238	21.55	.186	.80	.614	
565.75	21.80	.958	.63	.954	.24	.635	22.05	.865	21.71	.856	.35	.050	21.83	.389	21.99	.378	.72	.750	
566.74	.66	.162	.61	.054	.14	.759	21.87	.903	22.13	.995	-	-	.22	.01	.545	.23	.578	21.14	.891
567.75	21.86	.372	21.68	.156	21.37	.885	.96	.940	.10	.138	22.39	.368	.26	.705	22.49	.783	.20	.863	
569.74	22.29	.782	20.66	.356	22.07	.133	22.10	.014	.42	.419	21.99	.684	22.29	.020	.21	.184	21.08	.320	
570.85	21.95	.012	.66	.467	.07	.272	22.05	.055	22.23	.575	22.07	.861	21.39	.195	21.84	.409	21.54	.479	
571.83	.67	.214	20.81	.566	22.19	.394	21.81	.088	21.59	.714	.16	.018	.48	.350	22.30	.607	22.02	.619	
572.84	21.98	.423	21.32	.668	21.92	.520	22.05	.128	.55	.856	.39	.177	21.75	.509	22.23	.811	21.80	.762	
573.88	22.29	.638	21.30	.772	.19	.649	21.81	.164	21.95	.003	.30	.344	22.19	.673	21.76	.021	.20	.710	
590.65	21.56	.105	20.76	.461	.19	.743	.76	.783	22.49	.370	.49	.014	21.77	.323	22.02	.412	21.46	.303	
591.70	21.86	.322	20.98	.567	.28	.874	.80	.822	22.05	.518	.36	.181	22.04	.489	.39	.624	.48	.453	
592.69	22.16	.527	.71	.999	.10	.336	22.02	.070	22.45	.394	.16	.041	22.26	.960	22.33	.765	.92	.595	
593.69	.32	.734	.41	.767	21.52	.123	22.02	.895	21.46	.799	22.07	.497	.22	.803	.21	.666	.65	.737	
594.76	22.10	.955	21.41	.874	22.22	.256	21.93	.935	22.02	.950	21.87	.668	22.36	.972	21.86	.243	21.17	.890	
831.94	-	-	<b>21.39</b>	<b>.751</b>	-	-	-	-	-	-	-	-	-	-	<b>21.57</b>	<b>.193</b>	<b>21.77</b>	<b>.743</b>	
832.95	21.58	.196	.41	.853	21.30	.994	21.96	.719	22.23	.571	21.87	.581	22.26	.606	.76	.397	.05	.887	
836.96	21.56	.025	.16	.257	22.29	.494	21.99	.867	22.26	.137	22.42	.219	21.65	.490	.21	.63	.56	.459	
863.92	22.22	.598	.52	.971	21.30	.860	22.16	.861	21.76	.639	22.20	.511	22.13	.497	.23	.307	.21	.307	
864.89	22.42	.799	.81	.068	21.90	.895	21.96	.079	21.76	.664	.16	.553	22.36	.855	.41	.441	.59	.182	
865.88	.97	-	.39	.167	.95	.105	-	-	22.23	.219	.22	.809	21.41	.055	.67	.583	.81	.295	
866.84	.50	.202	21.59	.176	21.63	.116	.71	.936	.20	.232	22.02	.837	.26	.823	.32	.071	.86	.595	
867.91	21.92	.423	.83	.372	22.19	.358	22.16	.006	.33	.505	.26	.145	21.67	.130	22.16	.465	21.21	.873	
868.91	22.36	.630	20.76	.472	21.83	.483	21.81	.044	22.02	.646	.42	.304	21.61	.288	.33	.667	20.63	.015	
869.91	22.22	.836	21.03	.574	.03	.608	21.90	.081	21.66	.788	.26	.464	22.19	.446	.33	.870	21.03	.162	
894.84	21.98	.991	.61	.083	.08	.720	22.10	.002	22.23	.306	.20	.432	21.89	.385	.07	.910	.95	.720	
895.81	.91	.005	.73	.090	.14	.729	.30	.005	.33	.316	.32	.443	21.98	.396	.22	.13	.58	.730	
895.81	.44	.191	.32	.180	.39	.841	22.33	.034	.56	.443	.20	.586	22.22	.538	.21	.30	.35	.859	
896.78	.99	.230	.26	.200	.52	.865	21.93	.045	.28	.470	21.94	.616	.18	.568	.42	.145	21.32	.886	
897.81	.08	.604	20.96	.382	.95	.091	.68	.112	21.57	.726	22.26	.904	.52	.854	.22	.20	.20	.919	
898.90	22.49	.829	.76	.491	21.98	.227	.44	.151	.87	.880	.39	.078	22.22	.026	.36	.731	21.19	.300	
899.91	21.83	.038	20.98	.594	22.01	.354	21.28	.183	21.90	.022	.45	.239	21.67	.186	.13	.935	.61	.444	
923.80	.77	.977	21.87	.999	.10	.336	22.02	.070	22.45	.394	.16	.041	22.26	.960	22.33	.765	21.54	.854	
924.82	.73	.188	.46	.102	.22	.464	22.05	.106	.26	.538	22.49	.203	.21	.71	.971	.26	.500	.66	.870
927.90	22.42	.825	20.78	.412	21.28	.848	<b>21.32</b>	<b>.217</b>	-	-	21.99	.694	.92	.608	21.77	<b>.439</b>	.99	.335	
951.70	22.22	.745	21.57	.808	.39	.820	.64	.098	.33	.332	22.26	.482	.80	.369	22.13	.405	21.61	.836	
952.70	-	-	.39	.908	.35	.944	.61	.135	-	-	-	-	21.98	.527	.02	.607	20.75	.979	
953.70	21.58	.158	.90	.009	.89	.069	.37	.172	22.02	.615	.10	.800	22.32	.685	.23	.36	21.12	.122	
954.77	22.10	.380	.41	.117	21.86	.203	.23	.21	21.81	.766	.23	.971	.29	.854	.21	.61	.026	.124	
955.78	22.19	.588	21.39	.218	22.19	.329	.26	.249	21.93	.908	22.30	.131	22.22	.013	.21	.66	.230	.418	
977.69	21.72	.118	.20	.714	.42	.684	.76	.057	.22	.10	.001	21.87	.619	.21	.92	.475	.220		
978.69	.62	.130	.76	.430	.44	.072	.93	.060	21.93	.009	.21	.93	.628	.21	.95	.484	.14	.672	
979.69	22.26	.531	20.88	.625	22.01	.314	.68	.131	.42	.283	.20	.937	.46	.791	.21	.46	.064	21.67	
980.64	22.26	.728	21.41	.721	22.16	.433	.48	.166	.52	.417	.05	.088	22.49	.941	.78	.256	20.50	.967	
981.62	21.92	.930	.46	.820	21.75	.555	.23	.205	22.33	.556	.49	.244	21.95	.096	.21	.96	.454	21.08	
.73	22.16	.957	21.50	.833	21.70	.567	21.26	.209	21.96	.574	22.55	.265	21.77	.117	22.07	.480			

## VARIABLES IN THE ANDROMEDA GALAXY

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Table B. (continued)

J.D. 2,433,000+	Mag. Phase V 250	Mag. Phase V 251	Mag. Phase V 254	Mag. Phase V 256	Mag. Phase V 257	Mag. Phase V 259	Mag. Phase V 261	Mag. Phase V 262	Mag. Phase V 264	Mag. Phase V 267
538.80	21.17 .909	21.66 .426	- -	22.13 .024	20.81 .618	21.44 .359	21.17 .398	20.97 .493	20.81 .574	22.36 .663
539.80	.12 .030	22.16 .616	- -	22.16 .211	.78 .729	.21 .547	.32 .486	21.17 .607	21.16 .679	.42 .739
540.86	.21 .157	21.99 .817	21.48 .505	21.28 .410	20.81 .846	.30 .746	.52 .579	.28 .728	.39 .790	22.02 .819
541.81	.24 .272	.44 .998	- -	21.48 .589	21.16 .951	.44 .925	.61 .663	21.44 .837	.87 .890	21.93 .890
564.80	.30 .041	.87 .368	22.10 .936	22.02 .900	21.21 .495	.23 .250	.54 .685	20.72 .460	21.08 .304	22.56 .625
565.75	.12 .156	21.99 .549	.22 .072	22.03 .078	20.68 .600	.18 .429	.70 .766	21.32 .569	20.96 .404	22.36 .697
566.74	.37 .275	22.23 .737	22.46 .214	21.81 .264	.81 .710	.18 .615	.65 .856	.21 .682	20.96 .508	21.99 .772
567.75	.65 .397	21.66 .929	21.56 .358	21.39 .453	20.81 .822	.21 .805	.58 .945	.35 .797	21.08 .614	.99 .848
569.74	.98 .636	.71 .307	.44 .644	22.02 .826	21.39 .042	.39 .179	.50 .120	21.32 .025	.70 .824	.11 .998
570.85	.67 .770	21.84 .518	.63 .803	.26 .034	.44 .165	.21 .388	.30 .218	20.58 .151	21.84 .940	.03 .082
571.83	.24 .888	22.23 .705	21.87 .943	22.10 .213	.52 .273	.26 .572	.10 .304	.60 .263	22.20 .042	.46 .156
572.84	.12 .010	22.02 .897	22.19 .088	21.30 .407	.63 .385	.48 .762	.26 .392	.63 .378	21.66 .145	.46 .232
573.88	.39 .135	21.39 .094	22.29 .237	.29 .602	.18 .500	.52 .958	.39 .484	.80 .497	21.08 .257	21.87 .311
590.65	.12 .156	21.66 .282	21.58 .640	.73 .747	.81 .355	.63 .113	.65 .960	20.86 .411	22.02 .018	22.33 .576
591.70	.46 .282	22.03 .482	21.61 .790	21.93 .943	21.52 .471	.44 .311	.52 .052	21.21 .531	21.66 .128	.23 .655
592.69	.63 .401	.26 .670	22.01 .932	22.30 .129	20.93 .581	.30 .497	.56 .139	.35 .644	.46 .232	22.13 .730
593.69	.83 .522	22.26 .860	.22 .076	21.28 .316	.91 .691	.21 .685	.24 .227	.61 .758	21.18 .337	21.86 .806
594.76	21.95 .651	21.37 .064	22.36 .229	21.26 .517	20.93 .810	21.52 .886	21.14 .321	21.56 .880	20.98 .450	21.93 .886
831.94	21.24 .224	21.50 .152	- -	- -	21.41 .054	21.21 .504	- -	- -	21.01 .354	21.96 .786
832.95	.48 .345	.84 .344	21.54 .362	22.05 .178	.23 .500	.23 .694	21.24 .275	.20 .97	.064	20.88 .460
836.96	.48 .828	.30 .106	22.22 .936	.23 .930	20.73 .609	.16 .449	.67 .627	20.79 .522	21.90 .881	21.11 .165
863.92	.35 .076	.39 .231	21.56 .799	.13 .965	.98 .593	.11 .520	.44 .999	21.32 .599	.52 .712	.59 .200
864.89	.24 .193	.59 .415	22.29 .939	22.13 .167	.78 .700	.13 .703	.61 .085	.35 .710	.50 .813	.81 .273
865.88	.35 .312	21.93 .604	- -	21.32 .352	.78 .810	.38 .889	.46 .172	.37 .823	21.93 .917	.76 .348
.97	.41 .323	22.13 .621	- -	.26 .369	.70 .820	.36 .904	.24 .180	.30 .833	22.05 .926	21.93 .355
866.84	.58 .428	22.02 .786	22.39 .218	21.48 .532	20.98 .915	.59 .070	.26 .256	.28 .932	22.10 .018	22.13 .420
867.91	21.95 .557	21.48 .990	21.61 .371	22.05 .733	21.30 .034	.44 .271	.17 .350	21.05 .054	21.66 .130	.52 .501
868.91	.22 .04	.677	.44 .180	.39 .515	.20 .921	.46 .145	.19 .459	.41 .438	20.43 .169	21.23 .235
869.91	.21 .89	.798	.84 .370	21.46 .658	.30 .108	.48 .255	.35 .647	.61 .526	.41 .283	.20 .91 .340
894.84	.92 .802	.28 .109	22.22 .228	.07 .783	.06 .014	.23 .337	- -	.84 .128	21.99 .953	.89 .533
.91	.58 .810	.39 .122	22.39 .240	22.13 .796	.26 .022	.16 .350	.65 .725	.80 .136	22.07 .966	.35 .539
895.81	21.00 .918	.63 .293	21.54 .369	21.96 .964	.28 .122	.21 .520	.58 .804	.68 .239	21.96 .060	.36 .607
.99	20.97 .941	.71 .329	.41 .396	22.13 .999	.44 .142	.37 .555	.56 .820	.63 .260	.84 .080	.42 .621
896.78	21.24 .035	21.76 .478	.44 .508	22.13 .146	.61 .228	.26 .702	.67 .890	.72 .349	21.66 .162	.49 .680
897.81	.14 .159	.22 .05	.674	.63 .656	21.28 .339	.73 .342	.52 .896	.50 .980	20.83 .467	20.96 .270
898.90	.37 .290	21.90 .881	21.67 .812	.48 .544	21.66 .463	.41 .101	.44 .076	21.24 .591	.96 .384	21.90 .840
899.91	.67 .412	.18 .073	22.10 .957	.21 .68 .733	.20 .71 .575	.48 .291	.28 .165	.44 .707	20.88 .499	21.59 .916
923.80	.52 .290	21.87 .614	21.63 .380	22.05 .212	21.66 .218	.30 .785	.28 .267	.03 .433	22.10 .999	22.36 .719
924.82	.72 .413	22.20 .808	.48 .526	21.39 .404	.66 .331	.50 .977	.30 .356	.26 .550	21.93 .106	.23 .796
.94	.65 .427	22.23 .831	.35 .544	.32 .426	21.52 .345	.59 .000	.41 .366	.26 .563	.73 .120	22.10 .805
927.90	.95 .784	21.78 .394	- -	.93 .981	.20 .91 .672	.23 .556	.44 .627	.28 .901	.08 .430	20.96 .028
951.70	.89 .651	.90 .918	.61 .378	.35 .444	21.61 .306	.39 .034	.70 .721	.46 .617	21.93 .929	21.96 .825
952.70	.67 .772	.23 .108	.44 .522	.61 .631	.59 .416	.33 .222	- -	- -	22.03 .034	21.87 .900
953.70	.17 .892	.57 .298	.54 .665	21.81 .819	21.30 .527	.18 .410	.65 .897	.50 .846	21.66 .139	20.96 .976
954.77	.28 .021	21.96 .502	21.54 .818	22.13 .019	20.91 .645	.13 .611	- -	21.17 .968	21.03 .251	21.16 .056
955.78	.41 .143	22.08 .694	22.04 .963	22.08 .209	- -	.13 .801	.26 .080	20.69 .083	20.91 .357	21.41 .133
977.69	.65 .782	21.93 .859	.36 .103	21.26 .317	21.71 .181	.35 .923	.65 .007	21.17 .584	21.32 .657	22.10 .786
.75	.59 .789	22.06 .870	.29 .112	.30 .328	.65 .187	.39 .934	.50 .012	.22 .591	.26 .665	.02 .791
978.69	21.30 .903	21.30 .049	22.26 .246	.35 .504	.76 .292	- -	.52 .095	.41 .698	.48 .763	22.07 .862
979.69	20.97 .023	.50 .239	21.61 .389	.21 .48 .692	.68 .402	.21 .299	.37 .183	.44 .812	.99 .868	21.57 .927
980.64	21.26 .138	21.90 .420	.48 .526	22.02 .870	.48 .507	.01 .478	.44 .267	.39 .920	21.84 .968	.18 .009
981.62	.22 .256	22.10 .606	.63 .666	.05 .053	21.03 .615	.30 .662	.39 .353	.21 .032	22.20 .071	.28 .083
.75	21.30 .271	22.08 .631	21.70 .684	.22 .08 .078	.20 .88 .630	21.23 .687	.21 .35 .365	21.12 .047	22.05 .084	21.30 .093
	V 268	V 269	V 270	V 271	V 272	V 273	V 274	V 275	V 277	V 278
474.96	21.52 .801	21.67 .805	21.81 .415	21.50 .035	21.44 .564	22.20 .759	22.42 .615	21.59 .033	21.57 .885	21.10 .066
475.96	.56 .960	- -	- -	21.30 .161	.46 .717	.62 .861	- -	.68 .080	22.02 .249	.44 .167
476.95	.70 .028	22.01 .236	22.07 .614	20.89 .286	21.63 .868	.72 .963	21.28 .906	.90 .126	21.66 .610	.52 .267
477.95	.65 .098	22.22 .452	21.84 .714	21.37 .413	22.23 .021	.23 .33 .066	21.61 .053	21.87 .172	.48 .974	.95 .368
479.93	.70 .235	21.89 .881	20.96 .911	.65 .663	22.26 .324	21.52 .269	- -	22.16 .264	.66 .694	.28 .569
480.96	.61 .306	.95 .104	20.76 .014	.52 .793	21.84 .481	.87 .375	22.23 .495	.49 .312	.66 .069	.10 .673
481.96	.21 .411	.376	.98 .320	21.01 .114	- -	.03 .634	.68 .478	.42 .641	.49 .358	.99 .433
482.92	.20 .97	.442	.67 .528	.35 .210	.92 .041	.50 .780	21.71 .577	.22 .16 .782	.52 .403	.66 .783
503.87	21.52 .893	.92 .062	.52 .301	21.70 .689	21.96 .981	.22 .07 .727	21.46 .852	.42 .374	.90 .408	21.14 .992
504.95	.54 .968	- -	.78 .409	22.10 .825	.22 .46 .146	.59 .838	.52 .010	.56 .424	.44 .802	.32 .101
505.90	.61 .033	.86 .501	.90 .504	21.89 .946	22.52 .291	.30 .935	.90 .149	.45 .469	.71 .147	.67 .197
506.87	.65 .100	.63 .711	.87 .601	.98 .068	21.93 .439	.39 .035	21.90 .291	.42 .513	.73 .500	.92 .295
507.87	.70 .170	21.86 .828	.84 .701	.26 .195	.13 .592	22.10 .137	22.42 .438	.30 .560	.44 .864	.76 .396
508.88	.52 .240	- -	.41 .801	.08 .322	.39 .747	21.96 .241	.23 .587	.26 .607	.81 .232	.75 .498
509.89	.54 .310	.10 .365	.08 .902	.12 .450	21.90 .901	.78 .345	22.07 .748	22.07 .654	.73 .600	.39 .601
510.89	.30 .379	.21 .48 .581	.11 .002	.24 .576	22.07 .054	- -	21.21 .895	.57 .964	.19 .702	- -
511.85	.21 .446	.63 .799	.16 .098	.72 .698	.36 .200	.57 .545	.44 .022	.48 .745	.84 .313	21.14 .799
512.87	.20 .666	.85 .010	.08 .200	21.72 .827	22.33 .356	21.99 .651	21.96 .172	.18 .792	.63 .685	20.78 .902
513.81	.21 .211	.581	.21 .214	.63 .294	22.04 .945	21.61 .500	.22 .10 .748	- -	.08 .835	21.66 .027
514.88	.10 .655	22.29 .446	.21 .81 .400	.21 .67 .081	21.26 .663	.42 .859	22.19 .466	.18 .885	22.05 .416	21.21 .106
536.83	.21 .889	.175	.10 .197	22.05 .592	21.89 .855	.22 .30 .017	22.20 .111	.22 .36 .683	.35 .903	22.13 .406
537.80	.22 .021	.242	.22 .13 .407	.21 .84 .688	22.04 .978	.26 .165	21.99 .210	.21 .78 .826	.39 .948	21.59 .759
538.80	.21 .58	.312	.21 .61 .623	.55 .788	21.83 .104	.22 .39 .318	.87 .313	.32 .972	.71 .995	.70 .123
539.80	.21 .48 .381	.21 .92 .840	.30 .888	.20 .86 .231	21.90 .470	.71 .415	.59 .119	.78 .041	.80 .487	.21 .21 .628
540.86	.20 .889	.454	.22 .04 .069	.13 .994	21.19 .345	.32 .632	.76 .525	.78 .274	.87 .090	.41 .873
541.81	.20 .97	.520	- -	.01 .089	.21 .485	.21 .52 .778	.93 .413	21.81 .134	.73 .219	.21 .10 .831
564.80	.21 .77	.112	.32 .251	.78 .384	.35 .391	.22 .36 .290	.24 .45 .982	.73 .783	.22 .05 .201	.87 .587
565.75	.72 .178	22.04 .456	.76 .479	.37 .511	22.20 .435	.23 .39 .080	.32 .922	.05 .245	21.61 .933	.73 .254
566.74	.46 .247	21.39 .670	.93 .578	.72						

Table B. (continued)

J.D. 2,433,000	Mag. Phase V 268	Mag. Phase V 269	Mag. Phase V 270	Mag. Phase V 271	Mag. Phase V 272	Mag. Phase V 273	Mag. Phase V 274	Mag. Phase V 275	Mag. Phase V 277	Mag. Phase V 278
593.69	21.92 .113	22.00 .504	21.46 .268	21.89 .042	21.39 .704	22.59 .948	21.32 .017	22.33 .541	21.59 .103	21.35 .081
594.76	21.86 .187	21.72 .736	21.93 .375	20.94 .178	21.93 .867	22.33 .058	21.48 .174	22.10 .591	21.78 .493	21.48 .190
831.94	21.21 .612	- -	20.91 .052	- -	- -	21.73 .407	21.39 .937	- -	21.52 .826	- -
832.95	.10 .681	21.92 .292	21.28 .153	20.80 .285	- -	21.57 .510	21.63 .085	21.99 .640	.66 .194	21.93 .294
836.96	.70 .959	22.01 .160	.99 .554	21.98 .792	21.73 .871	22.56 .922	22.10 .673	.23 .826	.66 .653	21.06 .700
863.92	.39 .826	21.80 .996	.66 .245	21.21 .199	21.81 .990	.07 .690	22.13 .625	.87 .077	.90 .467	22.13 .429
864.89	.58 .893	22.04 .206	.78 .342	20.89 .322	22.33 .138	.30 .790	21.99 .767	.99 .122	.35 .820	21.66 .527
865.68	.61 .962	- -	.71 .441	21.28 .447	.20 .289	- -	.30 .912	21.93 .168	.68 .180	.18 .627
866.84	.67 .968	21.90 .440	21.96 .450	.12 .458	.36 .303	- -	.48 .925	22.16 .172	.81 .213	21.08 .636
867.91	.98 .103	21.97 .859	22.07 .643	.65 .704	21.41 .599	22.16 .099	21.93 .210	.20 .262	.55 .919	.81 .832
868.91	.92 .172	22.16 .076	21.76 .743	.65 .830	.48 .752	21.90 .202	22.02 .356	.39 .309	.96 .283	20.81 .933
869.91	.86 .241	22.13 .292	.01 .843	.83 .957	.90 .905	21.73 .305	22.16 .503	.49 .355	.71 .647	21.18 .035
894.84	.77 .967	21.61 .688	.50 .332	.52 .107	.35 .713	22.49 .863	21.93 .157	.30 .511	.52 .721	.21 .558
.91 .77 .972	.50 .703	.81 .339	21.67 .116	- -	- -	.81 .167	- -	.39 .747	.26 .565	
895.81	21.70 .035	21.83 .898	.81 .429	20.86 .230	.90 .862	.49 .963	.84 .299	.26 .556	.52 .075	.32 .656
.99 .22.07 .048	22.04 .939	21.81 .447	20.83 .254	.65 .891	.36 .982	21.90 .327	.23 .565	.66 .144	.18 .675	
896.78	21.80 .102	.29 .108	22.23 .525	21.00 .353	21.86 .010	22.23 .063	22.07 .441	22.13 .602	.96 .428	21.13 .754
897.81	22.01 .173	22.26 .331	21.96 .628	.17 .483	22.42 .167	21.93 .167	.33 .592	21.99 .649	.57 .803	20.61 .858
898.90	21.86 .249	21.44 .567	.76 .737	.52 .621	.33 .334	.52 .280	22.16 .752	.78 .700	.87 .199	20.91 .969
899.91	.75 .318	.72 .785	.52 .838	.70 .749	.13 .488	21.73 .385	21.37 .900	.50 .747	.76 .567	21.03 .071
923.80	.80 .973	.75 .956	.52 .223	21.56 .768	22.13 .138	22.30 .837	22.23 .401	.28 .855	.99 .263	.84 .488
924.82	.92 .044	21.98 .177	.78 .325	22.16 .897	- -	.33 .941	.33 .551	.48 .902	.63 .634	.26 .592
.94 .80 .052	- -	.55 .337	22.01 .912	- -	.22 .42 .954	22.07 .568	.37 .907	.63 .678	21.21 .604	
927.90	- -	.93 .632	20.89 .286	21.48 .764	21.66 .238	21.52 .002	.84 .045	21.52 .755	20.83 .903	
951.70	.89 .905	22.04 .995	21.06 .008	21.00 .295	22.26 .401	21.81 .701	22.23 .491	21.84 .149	22.00 .419	21.78 .312
952.70	- -	20.91 .108	.08 .421	21.52 .553	22.05 .804	.10 .628	22.02 .196	21.63 .783	- -	
953.70	.80 .044	22.10 .428	21.66 .208	.21 .548	.35 .706	.36 .907	22.02 .784	.36 .242	21.86 .147	.63 .514
954.77	.67 .118	21.56 .659	.63 .314	21.58 .683	21.61 .870	.52 .016	21.35 .941	.20 .292	22.03 .536	.32 .623
955.78	.86 .188	.86 .878	.96 .415	22.10 .810	22.13 .024	22.20 .120	.48 .089	.36 .339	21.57 .904	.03 .725
977.69	.39 .705	.28 .621	21.87 .602	21.37 .582	.33 .371	21.76 .370	.99 .300	.56 .355	.61 .879	.03 .942
.75 .16 .709	.40 .634	22.05 .608	.48 .588	22.20 .380	.75 .376	21.90 .309	.45 .368	.45 .901	.07 .948	
978.69	.35 .774	21.80 .837	21.81 .702	.72 .706	21.52 .524	.63 .472	22.30 .446	.36 .401	.93 .243	.08 .043
979.69	.54 .843	22.22 .054	.61 .802	.95 .633	.32 .677	21.81 .575	22.49 .593	.42 .448	.76 .607	.44 .145
980.64	.77 .909	22.29 .259	21.06 .897	.95 .953	.76 .822	22.02 .672	21.93 .732	.62 .492	.44 .953	.66 .241
981.62	.61 .977	- -	.20 .93 .995	.80 .077	21.98 .972	.13 .773	.50 .876	.36 .537	21.96 .310	.93 .340
.75 .21 .70 .986	21.83 .500	20.98 .008	21.58 .093	22.10 .992	22.33 .786	21.46 .895	22.30 .543	22.10 .357	21.93 .353	
	V 279	V 280	V 281	V 286	V 287	V 288	V 290*	V 293	V 294	V 296
474.96	22.13 .512	20.76 .292	21.93 .968	22.45 .630	21.84 .215	21.50 .614	20.53 .433	21.76 .632	21.90 .742	21.99 .464
475.96	21.96 .715	.56 .365	.93 .071	21.35 .834	21.86 .412	.48 .448	.87 .698	- -	- -	
476.95	.26 .916	.22 .437	.44 .173	.32 .035	22.02 .606	.52 .822	.68 .463	.71 .765	21.68 .004	22.33 .676
477.95	21.93 .119	.30 .509	.39 .277	21.58 .239	21.93 .802	.48 .927	.46 .478	21.50 .831	20.93 .136	22.10 .782
479.93	22.23 .522	.66 .651	21.68 .481	22.55 .642	21.71 .131	.11 .133	.43 .505	20.76 .963	21.59 .399	21.55 .993
480.96	22.05 .731	.71 .725	22.02 .587	21.30 .851	22.19 .393	.08 .241	.63 .520	21.01 .032	.55 .535	.52 .102
481.96	21.30 .934	.93 .798	.02 .690	.39 .055	- -	.26 .345	.51 .535	.11 .099	21.87 .667	.52 .208
482.92	21.97 .129	.88 .667	22.13 .789	21.84 .250	22.10 .778	.41 .446	.56 .550	21.39 .162	22.05 .794	21.61 .310
503.87	22.10 .386	.38 .379	21.39 .949	22.56 .512	21.61 .889	.57 .634	.81 .859	22.16 .558	21.76 .561	22.16 .536
504.95	.22 .422	.38 .457	.81 .060	21.81 .732	.39 .101	.44 .747	.85 .874	21.81 .630	21.87 .705	.33 .651
505.90	21.73 .799	.53 .526	.66 .158	.05 .925	.93 .288	.30 .846	.88 .889	.87 .693	22.05 .828	22.26 .752
506.87	.57 .996	.51 .596	.35 .258	21.41 .123	21.87 .478	21.16 .948	20.83 .904	.66 .758	21.61 .956	21.71 .855
507.87	21.87 .199	.71 .668	.21 .361	22.02 .326	22.23 .674	20.81 .052	21.11 .919	21.35 .825	21.13 .090	.23 .961
508.88	22.07 .404	.86 .741	.59 .466	.33 .532	21.52 .873	21.11 .157	20.93 .934	20.93 .892	20.98 .221	.28 .069
509.89	22.33 .610	.81 .814	21.84 .570	22.05 .738	.26 .071	.13 .262	21.11 .948	21.01 .959	21.39 .355	.35 .176
510.89	21.61 .813	20.96 .887	22.02 .673	21.30 .941	21.71 .267	.23 .367	.08 .963	20.98 .026	.44 .488	.48 .282
511.85	.63 .008	21.01 .955	.30 .772	.59 .136	22.07 .456	.44 .468	21.03 .978	21.30 .091	21.59 .615	.87 .384
512.87	21.87 .215	21.01 .029	22.07 .877	21.68 .343	22.03 .656	.57 .574	20.88 .992	.61 .158	22.10 .750	.90 .492
513.81	22.05 .406	20.83 .097	21.87 .974	22.23 .535	21.66 .840	.61 .672	21.26 .006	.65 .220	21.99 .874	21.90 .592
514.88	.22 .39 .624	21.03 .174	.59 .084	22.13 .752	.27 .050	.57 .784	21.26 .021	.70 .291	.61 .016	22.26 .706
516.83	21.81 .084	21.06 .759	.39 .347	21.87 .218	21.93 .358	.21 .077	20.91 .343	.44 .752	.99 .915	21.39 .038
517.80	21.96 .281	20.86 .829	.59 .447	22.26 .415	22.16 .549	.06 .178	.83 .358	.46 .817	.55 .044	.39 .141
518.80	22.20 .484	.91 .901	.71 .550	22.39 .619	.01 .283	.76 .373	21.23 .884	.21 .176	.57 .248	
519.80	21.93 .687	20.88 .973	21.90 .653	.28 .822	.28 .941	.50 .387	.73 .388	20.91 .950	.37 .308	.52 .354
540.86	.44 .903	21.06 .050	22.26 .763	.51 .078	.57 .149	.66 .498	.58 .403	20.91 .021	.57 .447	.81 .466
541.81	.81 .096	20.86 .118	- -	22.10 .231	.21 .76 .336	.66 .597	.46 .417	21.32 .084	.87 .573	- -
564.80	.93 .767	.68 .778	.21 .16 .231	21.39 .908	.22 .13 .848	.01 .999	.96 .755	22.02 .615	.87 .610	.30 .010
565.75	21.28 .960	.93 .847	.16 .329	.52 .102	21.18 .034	.08 .098	.88 .770	21.84 .678	21.87 .735	.57 .111
566.74	22.02 .162	.96 .918	.59 .431	21.84 .304	.73 .228	.13 .202	.73 .785	.76 .745	22.02 .666	.44 .216
567.75	22.19 .367	.88 .992	21.68 .555	22.16 .509	.93 .427	.16 .307	.76 .800	21.30 .812	21.68 .999	.61 .323
569.74	21.90 .771	.83 .136	22.03 .740	21.30 .914	.93 .817	.63 .515	.86 .830	20.88 .945	.26 .264	21.78 .534
570.85	.39 .997	.71 .216	.13 .855	.57 .139	.03 .035	.59 .631	.93 .844	21.18 .018	.63 .410	22.20 .653
571.83	21.82 .195	.66 .286	22.20 .956	21.66 .339	21.63 .227	.61 .733	20.91 .859	.21 .084	.66 .539	21.90 .757
572.84	22.05 .401	.56 .360	- -	22.02 .545	20.27 .425	.28 .839	.21 .074	.41 .152	.87 .673	.71 .864
573.88	22.33 .612	.30 .434	21.44 .167	.13 .756	21.99 .630	.11 .947	20.98 .889	.61 .220	.84 .810	.39 .975
590.65	21.63 .020	.76 .644	22.05 .896	- -	.57 .921	.59 .699	21.13 .137	.87 .337	.66 .025	.99 .757
591.70	21.96 .234	.83 .721	21.87 .004	- -	.21 .46 .127	.48 .809	.23 .152	.93 .407	.08 .163	.87 .868
592.69	22.16 .435	.96 .792	.63 .106	.04 .583	22.07 .321	.30 .912	.21 .167	21.99 .473	.44 .294	.57 .973
593.69	22.16 .638	.98 .864	.39 .209	22.16 .786	.22 .13 .517	.08 .017	.13 .182	22.02 .540	.35 .426	.52 .080
594.76	21.37 .855	20.98 .941	21.21 .320	21.41 .004	21.96 .727	21.08 .129	21.26 .196	21.96 .611	21.46 .568	21.52 .193
831.94	21.61 .050	20.96 .066	- -	21.73 .258	22.05 .276	21.32 .004	20.78 .686	- -	21.93 .899	- -
832.95	22.13 .255	.93 .138	22.32 .877	- -	.22 .23 .475	.01 .010	.61 .701	21.99 .474	.68 .032	22.23 .501
836.96	21.84 .070	.38 .428	21.89 .290	22.23 .279	21.99 .262	.26 .429	20.76 .760	21.61 .741	.73 .562	21.61 .927
863.92	22.26 .548	.34 .374	.68 .070	21.78 .764	22.05 .553	.01 .245	21.03 .157	22.05 .537	.11 .124	.84 .792
864.89	22.05 .745	.36 .445	.55 .170	.21 .961	22.26 .743	.32 .				

## VARIABLES IN THE ANDROMEDA GALAXY

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Table B. (continued)

J.D. 2,433,000+	Mag. V 279	Phase	Mag. V 280	Phase	Mag. V 281	Phase	Mag. V 286	Phase	Mag. V 287	Phase	Mag. V 288	Phase	Mag. V 290*	Phase	Mag. V 293	Phase	Mag. V 294	Phase	Mag. V 296		
895.81	21.50	.029	20.73	.677	21.26	.358	21.90	.252	22.07	.811	21.57	.576	20.60	.628	21.93	.660	21.44	.337	21.39	.180	
896.99	.81	.067	.76	.691	.48	.378	.99	.291	21.87	.849	.66	.596	—	—	.76	.673	.63	.362	.52	.200	
896.78	21.93	.226	.78	.747	.50	.458	21.99	.450	.16	.002	.61	.678	.66	.643	.50	.725	.59	.475	.63	.283	
897.81	22.23	.435	20.86	.821	21.90	.564	22.30	.659	.78	.204	.71	.785	.63	.657	.57	.794	.81	.601	21.68	.392	
898.90	22.20	.656	21.06	.900	22.07	.676	21.18	.881	21.90	.418	.16	.899	.76	.672	21.21	.867	.93	.745	—	—	
899.91	21.46	.862	20.98	.973	22.33	.781	.55	.086	22.16	.616	.03	.004	20.81	.687	20.96	.934	.99	.878	22.26	.615	
923.80	22.13	.716	.66	.698	21.16	.244	.39	.947	21.81	.305	.59	.500	21.18	.038	21.90	.525	.71	.034	21.26	.154	
924.82	21.39	.923	.76	.772	.41	.349	.93	.155	—	—	.90	.606	21.20	.053	22.07	.593	.35	.169	.50	.262	
924.94	21.41	.947	.83	.780	.37	.361	.61	.179	.90	.529	.93	.619	—	—	21.99	.600	.23	.185	.61	.275	
927.90	—	—	.96	.994	—	—	21.78	.781	21.41	.110	.39	.928	20.96	.099	21.37	.798	21.66	.576	—	—	
951.70	22.10	.385	.76	.712	.63	.120	22.33	.623	22.16	.781	.46	.414	.61	.449	22.05	.383	22.02	.720	.55	.118	
952.70	—	—	.73	.785	—	—	21.28	.827	21.26	.977	.61	.519	.53	.464	21.93	.450	21.93	.852	—	—	
953.70	21.78	.792	.98	.857	.48	.326	.46	.030	.63	.173	.76	.623	.48	.479	21.96	.516	.68	.984	.68	.331	
954.77	.55	.009	.98	.934	.48	.437	21.78	.248	21.90	.383	.68	.735	.58	.494	22.10	.588	.30	.125	21.84	.444	
955.78	21.86	.214	.86	.007	21.68	.541	22.02	.453	22.20	.581	.48	.841	.66	.509	21.78	.655	.52	.259	22.23	.552	
977.69	22.33	.666	.63	.589	22.07	.800	21.30	.911	21.79	.881	.18	.129	.75	.832	.28	.119	.32	.153	21.84	.880	
978.75	22.21	.678	.66	.594	22.07	.806	.20	.923	.75	.893	21.16	.135	—	—	.21	.161	.73	.886	—	—	
978.69	21.52	.870	.58	.661	21.93	.903	21.37	.114	.30	.077	20.96	.234	20.98	.847	.30	.181	.28	.286	.52	.986	
979.69	21.63	.073	.63	.734	.69	.006	22.20	.318	21.71	.274	21.30	.338	21.06	.862	.50	.248	.37	.418	.35	.092	
980.64	22.02	.266	.81	.802	.51	.104	.10	.511	22.05	.460	.57	.438	20.96	.876	.54	.311	.71	.543	.46	.193	
981.62	.26	.465	.83	.873	.48	.205	22.10	.710	.08	.653	.52	.540	—	—	.77	.376	.78	.672	.57	.297	
981.75	22.10	.492	20.88	.883	21.52	.218	21.93	.736	22.16	.678	21.52	.554	20.87	.891	21.81	.385	21.84	.689	21.63	.311	
	V 297	V 298*	V 302	V 305	V 307	V 309	V 310	V 311	V 313	V 315											
474.96	21.26	.166	20.61	.928	22.42	.719	22.16	.984	21.01	.006	21.28	.949	22.32	.850	21.59	.125	22.30	.432	20.90	.116	
475.96	.52	.263	21.01	.002	21.93	.769	21.52	.163	.13	.117	20.98	.079	.16	.972	—	—	.23	.526	20.99	.235	
476.95	.90	.366	.35	.076	22.30	.819	21.93	.341	.23	.228	21.35	.208	.42	.092	.87	.369	22.16	.619	21.44	.352	
477.95	21.99	.457	.26	.150	22.69	.849	22.35	.520	.50	.339	21.55	.339	.70	.214	21.13	.491	21.57	.712	.44	.470	
479.93	22.39	.649	.35	.297	21.81	.947	22.76	.874	.55	.560	22.45	.597	22.7	.455	20.91	.734	.39	.898	.39	.704	
480.96	21.59	.749	.48	.373	.76	.999	21.52	.058	21.16	.675	.45	.732	22.7	.581	21.23	.860	21.93	.994	21.03	.825	
481.96	.39	.846	.55	.448	.59	.049	21.70	.237	20.96	.787	22.05	.862	23.10	.703	.50	.982	22.07	.088	20.73	.944	
482.92	.26	.940	21.48	.519	21.35	.117	22.07	.409	20.91	.894	21.32	.987	22.36	.820	21.59	.100	.20	.177	21.17	.057	
503.87	21.03	.976	20.91	.073	20.81	.163	21.48	.157	21.35	.232	22.45	.720	23.02	.371	20.76	.664	.16	.137	.44	.532	
504.95	20.78	.081	21.13	.154	21.01	.217	21.73	.351	.35	.352	21.81	.861	22.9	.503	21.05	.796	.52	.238	.50	.660	
505.90	21.16	.173	.33	.224	20.93	.265	22.32	.521	.50	.458	.08	.984	22.89	.619	.30	.913	.56	.327	.41	.772	
506.87	21.59	.268	.37	.296	21.41	.313	.45	.694	.42	.567	.06	.111	.89	.738	.30	.031	22.49	.418	.08	.887	
507.87	22.16	.365	.50	.370	.42	.363	22.65	.873	21.08	.678	.08	.241	.16	.858	.78	.154	21.99	.512	.12	.005	
508.88	.13	.463	.57	.445	.57	.413	21.37	.054	20.66	.791	.21	.68	.373	.10	.981	.87	.278	22.10	.606	.13	.124
509.89	22.13	.561	.44	.520	.59	.464	.55	.235	20.76	.904	22.16	.505	.59	.105	.93	.401	21.63	.701	.28	.244	
510.89	21.78	.658	.13	.594	.44	.514	21.80	.413	21.01	.015	.49	.635	22.56	.226	21.21	.523	.28	.795	.29	.362	
511.85	.18	.752	21.30	.665	.96	.562	22.30	.585	.46	.122	22.42	.761	23.02	.343	20.88	.640	.50	.884	.48	.475	
512.87	21.03	.851	20.53	.741	.73	.613	.49	.768	.44	.236	21.59	.894	22.83	.467	20.86	.765	.87	.980	.65	.595	
513.81	20.96	.942	.66	.810	21.78	.663	22.49	.936	.55	.341	.08	.016	.21	.26	.890	.680	21.99	.068	.65	.707	
514.88	20.88	.046	20.73	.890	22.36	.713	21.23	.127	21.59	.461	.16	.156	22.59	.712	21.30	.011	22.10	.167	.37	.833	
536.83	21.16	.180	21.44	.518	.45	.809	.76	.055	20.98	.910	.11	.019	23.02	.386	20.76	.697	.52	.220	.65	.426	
537.80	.46	.274	.13	.590	.10	.858	21.52	.228	20.88	.018	.26	.145	(22.9	.504	21.06	.815	.56	.311	.67	.541	
538.80	.90	.371	21.03	.664	.23	.908	22.16	.407	21.39	.130	.30	.276	(22.9	.626	.16	.938	.42	.405	.63	.659	
539.80	21.73	.468	20.73	.739	22.05	.958	.30	.586	.46	.242	21.85	.406	22.88	.743	.35	.060	22.49	.498	21.32	.777	
540.86	22.23	.571	.48	.817	21.76	.011	.26	.776	.50	.360	22.26	.544	.39	.877	.68	.190	21.92	.598	20.97	.903	
541.81	—	—	20.43	.888	21.59	.056	22.36	.946	—	—	—	—	—	—	—	—	.93	.686	21.05	.015	
564.80	20.78	.898	21.16	.593	20.91	.206	21.52	.060	.03	.032	.42	.667	.59	.793	.76	.120	.52	.837	.46	.731	
565.75	20.88	.991	21.03	.664	21.14	.253	.44	.230	.41	.138	22.39	.791	.32	.908	.66	.237	.78	.916	.05	.843	
566.74	21.11	.087	20.53	.737	.23	.303	21.84	.407	.50	.248	21.26	.920	.19	.029	.76	.358	21.78	.019	.10	.960	
567.75	.23	.185	.51	.812	.37	.353	22.42	.588	.44	.361	.01	.052	.66	.152	21.57	.482	22.13	.113	.05	.080	
569.74	21.87	.379	20.86	.960	.71	.453	22.20	.944	.41	.583	21.30	.311	.86	.394	20.91	.725	.29	.300	.21	.315	
570.85	22.26	.487	21.18	.042	.68	.508	21.55	.142	21.01	.707	22.09	.456	(22.9	.530	21.11	.861	.33	.404	.52	.446	
571.83	.22	.058	.39	.115	.66	.557	21.68	.317	20.66	.816	.60	.584	(22.9	.649	.37	.981	.26	.495	.52	.562	
572.84	21.78	.680	.11	.190	.73	.608	22.07	.048	20.93	.929	22.26	.715	.72	.772	.73	.105	22.05	.590	.48	.681	
573.88	.44	.781	.30	.267	.87	.660	.69	.684	21.13	.045	21.84	.851	.04	.898	.84	.231	21.76	.686	.21	.804	
590.65	21.66	.411	.50	.511	.52	.497	.63	.685	20.93	.917	20.96	.039	.39	.941	.78	.284	22.16	.255	.30	.785	
591.70	22.26	.513	.08	.589	.93	.550	22.59	.873	20.97	.034	21.35	.175	.42	.069	.71	.412	22.23	.354	.10	.909	
592.69	.30	.609	21.03	.662	21.76	.599	21.61	.050	21.37	.144	.35	.304	.76	.190	21.33	.533	21.99	.446	21.12	.026	
593.69	22.05	.707	20.98	.737	22.13	.649	.57	.229	21.41	.256	21.68	.435	.83	.311	20.75	.656	.81	.5			

Table B. (continued)

J.D. 2,433,000+	Mag. Phase V 297	Mag. Phase V 298*	Mag. Phase V 302	Mag. Phase V 305	Mag. Phase V 307	Mag. Phase V 309	Mag. Phase V 310	Mag. Phase V 311	Mag. Phase V 313	Mag. Phase V 315
980.64	21.48 .318	21.52 .444	21.93 .973	22.10 .466	21.48 .439	21.41 .905	22.86 .442	21.41 .011	21.28 .739	21.17 .863
981.62	22.23 .413	21.35 .516	.93 .022	.17 .641	.35 .549	.08 .033	-. -	.59 .131	.44 .830	.03 .978
.75	21.99 .426	-	21.71 .028	22.26 .664	21.41 .564	21.08 .050	(22.9 .577	21.46 .146	21.44 .842	21.00 .994
	V 316	V 317	V 318	V 320	V 326	V 328	V 329	V 330	V 331	V 332
474.96	21.24 .121	22.36 .234	21.32 .876	22.26 .714	22.42 .853	22.36 .310	20.97 .576	22.02 .795	21.70 .451	21.35 .692
475.96	21.12 .216	22.16 .392	.46 .977	-	21.21 .996	22.07 .461	20.80 .657	21.93 .944	21.56 .618	.18 .826
476.95	20.63 .310	21.89 .549	.81 .076	22.62 .969	20.80 .137	21.68 .609	21.10 .738	.13 .092	22.13 .784	.48 .959
477.95	21.00 .405	21.86 .707	21.93 .177	21.86 .097	21.36 .280	.50 .759	21.46 .819	.11 .241	.30 .951	21.84 .093
479.93	.37 .593	22.46 .021	22.59 .376	.37 .350	.62 .563	21.84 .057	20.01 .980	21.78 .536	22.36 .282	22.20 .359
480.96	.70 .690	.42 .184	.56 .481	21.63 .482	21.98 .710	22.10 .211	21.86 .064	22.05 .690	21.83 .455	.16 .497
481.96	.74 .785	22.10 .342	22.62 .580	22.04 .610	22.29 .853	-. -	.92 .145	-. -	21.48 .622	22.05 .631
482.92	21.86 .877	21.95 .495	21.76 .678	22.39 .732	21.35 .990	22.35 .506	.70 .223	22.07 .982	22.10 .783	20.96 .760
503.87	22.07 .868	.86 .813	.55 .790	21.50 .410	21.37 .983	21.78 .651	.72 .924	21.06 .104	22.30 .287	22.05 .569
504.95	21.58 .970	21.95 .985	.37 .899	21.63 .549	20.86 .137	.57 .813	.85 .012	.23 .265	21.77 .467	21.11 .713
505.90	.46 .061	22.21 .136	.73 .994	22.36 .670	21.21 .273	21.87 .954	21.86 .089	.83 .407	.55 .627	.18 .841
506.87	.28 .153	.39 .289	21.66 .092	.52 .794	.35 .411	22.10 .101	22.16 .168	21.87 .551	21.80 .789	.61 .971
507.87	.05 .248	22.22 .448	22.13 .193	.66 .922	21.89 .554	.16 .251	21.83 .249	22.20 .700	22.13 .956	.56 .105
508.88	.11 .343	21.52 .608	.20 .294	22.26 .052	22.10 .698	.10 .403	.65 .331	22.16 .851	.16 .125	21.73 .240
509.89	.24 .439	21.75 .767	.26 .397	21.58 .181	22.22 .843	22.05 .554	21.48 .413	21.50 .002	.19 .294	22.23 .375
510.89	.61 .534	22.22 .926	.49 .497	-. -	21.41 .986	21.48 .704	20.72 .494	.13 .151	22.07 .461	22.39 .509
511.85	.58 .625	.19 .079	22.05 .594	.52 .431	.20 .123	.29 .849	.92 .573	.16 .294	21.37 .622	21.81 .638
512.87	.63 .723	.30 .240	21.63 .697	21.65 .561	.28 .269	21.96 .002	20.89 .656	21.63 .446	21.95 .792	21.13 .775
513.81	.68 .812	.56 .390	.81 .791	22.56 .682	.30 .403	22.23 .143	21.03 .734	22.02 .586	22.13 .950	20.98 .902
514.88	.54 .914	.10 .559	.48 .900	.66 .817	21.98 .556	22.02 .304	21.44 .819	21.98 .746	22.26 .129	21.48 .045
536.83	.39 .999	.04 .034	.81 .112	.13 .623	22.26 .691	21.84 .600	20.92 .601	.21 .66 .017	21.95 .800	.28 .989
537.80	.14 .051	.23 .188	21.90 .209	.59 .746	22.16 .830	21.59 .746	21.39 .690	20.96 .161	21.98 .963	.40 .119
538.80	.21 .14 .186	22.46 .346	22.33 .310	.62 .874	21.24 .973	21.71 .896	.52 .761	21.47 .310	22.36 .130	21.84 .253
539.80	.20 .94 .281	21.92 .504	.49 .400	22.59 .002	20.86 .116	22.02 .046	.56 .843	21.71 .460	22.07 .298	22.16 .387
540.86	.21 .10 .382	21.83 .672	22.33 .517	21.70 .138	21.08 .267	21.93 .205	.65 .929	22.10 .014	21.46 .476	22.30 .529
541.81	.12 .472	-. -	.39 .259	.26 .403	-. -	-. -	-. -	.52 .634	-. -	-. -
564.80	21.87 .656	22.19 .464	21.28 .932	.32 .198	21.77 .687	.44 .799	.83 .873	20.91 .186	.28 .480	21.11 .749
565.75	22.10 .746	21.61 .614	.44 .028	26 .320	22.16 .823	.73 .941	.92 .951	21.23 .327	.63 .639	.06 .868
566.74	22.16 .840	.80 .771	21.68 .127	.41 .446	21.56 .964	.84 .090	.86 .031	21.68 .476	21.95 .804	.61 .000
567.75	21.63 .936	21.93 .931	22.26 .239	21.72 .575	20.80 .109	21.93 .241	.92 .113	22.13 .626	22.04 .973	21.96 .136
569.74	21.00 .125	-. -	.30 .430	22.42 .830	21.39 .393	22.27 .540	.46 .274	22.02 .923	22.49 .306	22.49 .403
570.85	20.86 .230	22.12 .421	.33 .542	.59 .972	21.89 .552	21.59 .707	.30 .365	21.23 .088	21.83 .491	22.05 .551
571.83	20.83 .323	21.89 .577	22.07 .640	22.04 .097	22.29 .692	.50 .853	21.00 .445	20.91 .235	.37 .655	21.37 .683
572.84	21.35 .420	21.98 .736	21.52 .742	21.44 .226	22.29 .836	.78 .006	20.72 .526	21.73 .385	21.95 .824	.06 .818
573.88	.50 .519	22.39 .902	21.73 .847	.45 .359	21.39 .984	.76 .162	20.78 .611	.76 .540	22.32 .999	.55 .957
590.65	.12 .112	21.86 .559	22.07 .537	21.90 .503	21.65 .380	.32 .680	22.13 .973	.55 .040	.06 .804	21.81 .206
591.70	.14 .211	22.00 .726	21.73 .643	.49 .638	22.07 .530	.63 .837	.07 .058	.08 .195	.22 .979	22.13 .347
592.69	.03 .305	.13 .883	.59 .743	.39 .764	.16 .672	.76 .986	22.07 .138	.54 .343	.29 .145	22.30 .479
593.69	.32 .400	.36 .041	.57 .844	.52 .892	22.22 .814	.78 .136	21.89 .220	.66 .492	22.29 .312	21.90 .613
594.76	21.37 .502	22.32 .210	21.39 .952	22.52 .028	21.61 .967	21.99 .296	21.58 .306	21.96 .652	21.46 .491	21.08 .757
	V 333	V 334	V 335	V 336	V 338	V 339	V 340	V 343	V 348	V 350
831.94	21.19 .034	-. -	21.44 .859	21.41 .347	21.80 .851	21.61 .907	20.83 .570	-. -	22.22 .167	22.23 .563
832.95	.17 .130	21.92 .939	21.32 .961	21.58 .476	.26 .995	.71 .058	20.83 .652	21.06 .155	22.16 .336	21.26 .698
836.96	.46 .511	.72 .574	22.45 .365	22.52 .988	.92 .568	.48 .660	21.98 .978	22.10 .753	21.92 .006	22.10 .236
863.92	.24 .072	21.89 .844	21.96 .083	21.65 .435	.50 .420	.57 .709	21.95 .167	.13 .771	.28 .517	21.18 .853
864.89	21.26 .164	22.10 .998	22.09 .181	21.75 .559	.77 .558	.66 .854	22.01 .246	22.07 .916	.50 .679	.28 .982
865.88	.97 .258	.29 .155	.56 .281	-. -	21.86 .699	.87 .003	21.37 .326	21.44 .063	21.95 .854	.66 .114
	.52 .266	.26 .169	.39 .290	22.39 .697	22.07 .712	.81 .017	.48 .334	.13 .077	22.01 .859	.52 .126
866.84	.20 .92 .349	.42 .307	.36 .377	.56 .808	21.83 .836	21.99 .147	21.35 .404	.16 .206	.26 .005	21.96 .243
867.91	21.26 .450	22.07 .476	22.16 .485	.56 .945	.14 .990	22.30 .307	20.69 .492	.35 .366	.36 .184	22.07 .387
868.91	.63 .545	21.58 .635	21.87 .586	22.26 .073	.14 .132	22.23 .459	20.86 .573	21.66 .515	22.29 .351	22.33 .521
869.91	.83 .641	.75 .794	21.84 .687	21.32 .200	.21 .275	21.81 .608	21.05 .654	22.07 .664	21.41 .518	21.81 .655
894.84	.26 .009	.80 .743	22.05 .200	.56 .387	.77 .837	22.23 .751	20.83 .679	21.57 .380	.72 .689	.44 .997
.91	.41 .016	21.98 .754	21.96 .207	.65 .396	.95 .847	.26 .362	21.19 .685	.84 .391	.52 .701	.57 .007
895.81	.41 .101	22.04 .897	21.81 .298	.50 .511	.50 .975	.16 .496	.48 .758	.78 .525	21.72 .851	.44 .128
.99	.18 .119	.13 .927	22.05 .318	.57 .535	.35 .002	22.18 .525	.41 .774	21.78 .553	22.04 .883	.52 .153
896.78	21.21 .193	.32 .050	.16 .395	21.98 .635	.00 .114	21.68 .642	21.70 .836	22.05 .669	.07 .014	21.84 .258
897.81	20.86 .291	.35 .213	.56 .499	22.39 .767	.00 .261	.39 .796	22.04 .920	22.33 .822	.32 .186	22.10 .396
898.90	.21 .24 .395	.22 .49 .396	.22 .20 .609	.52 .906	.41 .417	.81 .960	.04 .009	21.73 .985	22.13 .368	.22 .26 .542
899.91	.21 .41 .491	21.89 .546	21.93 .711	22.46 .035	.67 .561	.87 .112	22.10 .091	20.96 .136	21.48 .537	.21 .50 .678
923.80	.22 .10 .761	22.39 .330	21.66 .119	21.86 .089	21.48 .974	.61 .700	21.92 .031	22.13 .697	.14 .533	.32 .881
924.82	.21 .75 .858	22.01 .491	22.07 .222	.61 .220	20.97 .120	.73 .853	.92 .124	.39 .364	.76 .704	.81 .018
.94	.63 .869	21.92 .510	21.81 .234	.31 .235	21.08 .137	.76 .871	.92 .124	.22 .40 .867	21.76 .727	.21 .44 .034
927.90	.12 .150	22.16 .979	-. -	22.36 .613	.92 .560	-. -	.39 .364	21.44 .308	22.10 .219	22.36 .431
951.70	.28 .411	21.80 .749	.46 .931	.39 .656	.61 .960	.63 .888	.65 .297	22.13 .856	21.98 .200	21.81 .623
952.70	.30 .506	-. -	.57 .032	-. -	.03 .103	21.81 .038	.44 .378	21.84 .005	-. -	.23 .757
953.70	.75 .601	22.16 .066	21.66 .133	.46 .911	.21 .246	22.10 .188	21.05 .459	.35 .534	.28 .891	.28 .891
954.77	21.92 .703	.19 .236	22.13 .241	.52 .048	.44 .398	.13 .350	.20 .748	.78 .464	22.04 .882	.71 .170
955.78	22.04 .799	.32 .396	.26 .343	21.56 .177	21.92 .543	22.23 .501	21.10 .628	.78 .464	22.04 .882	.71 .170
977.69	21.61 .880	.06 .866	.30 .551	22.52 .978	22.01 .673	.21 .52 .790	-. -	21.96 .730	21.46 .548	.55 .108
.75	.60 .886	.09 .876	22.30 .557	22.52 .986	22.01 .681	.64 .799	21.50 .413	.20 .08 .739	.26 .558	.55 .116
978.69	.52 .975	.36 .024	21.73 .652	21.80 .106	.21 .98 .815	.83 .941	20.83 .489	22.10 .879	.44 .716	21.84 .242
979.69	.26 .070	.46 .183	.61 .753	.44 .234	21.80 .958	.20 .90 .090	.20 .97 .570	21.55 .028	21.98 .882	22.20 .376
980.64	.21 .19 .161	.26 .333	.48 .848	.50 .355	20.97 .094	22.13 .233	.21 .08 .647	.01 .169	22.19 .042	22.42 .504
981.62	.20 .83 .254	.10 .489	.44 .947	.80 .480	21.10 .234	.10 .380	.30 .727	.23 .315	.22 .205	.21 .93 .635
.75	.20 .75 .266	.22 .04 .510	21.44 .960	21.75 .497	21.14 .253</td					

## VARIABLES IN THE ANDROMEDA GALAXY

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Table B. (continued)

J. D. 2,433,000+	Mag. V 333	Phase	Mag. V 334	Phase	Mag. V 335	Phase	Mag. V 336	Phase	Mag. V 338	Phase	Mag. V 339	Phase	Mag. V 340	Phase	Mag. V 343	Phase	Mag. V 348	Phase	Mag. V 350			
505.90	22.26	.215	21.48	.150	21.35	.976	22.53	.739	22.73	.579	21.80	.212	22.00	.138	21.80	.195	21.99	.361	21.87	.542		
506.87	21.99	.392	.24	.229	.71	.145	21.84	.949	.69	.752	21.98	.276	22.16	.284	.90	.296	.59	.461	.40	.724		
507.87	22.16	.574	21.12	.310	21.81	.318	22.02	.166	22.79	.930	22.07	.342	21.87	.434	.60	.397	.52	.564	21.73	.911		
508.88	.39	.759	20.86	.392	22.16	.494	.26	.385	21.90	.108	.16	.408	.13	.586	21.45	.500	.23	.669	22.00	.099		
509.89	.49	.943	.89	.474	22.33	.670	.62	.605	22.25	.286	.46	.474	.40	.741	20.85	.600	.21	.774	.12	.288		
510.89	.52	.125	.86	.556	21.32	.844	22.62	.822	.56	.463	.52	.540	.78	.892	.65	.701	.13	.877	22.22	.475		
511.85	22.13	.300	.89	.634	21.37	.011	21.66	.030	22.56	.633	.30	.603	21.84	.033	.50	.800	.41	.976	21.75	.654		
512.87	21.93	.486	20.83	.717	22.13	.188	21.93	.250	—	—	.46	.670	22.08	.188	20.95	.901	.55	.082	.48	.843		
513.81	22.05	.657	21.08	.793	.30	.352	—	—	22.46	.473	22.23	.328	—	—	—	—	21.72	.021	—	—		
514.88	.42	.852	.35	.880	.52	.538	22.56	.688	21.99	.170	21.98	.802	21.65	.490	21.40	.105	.99	.299	22.10	.221		
536.83	.23	.853	.00	.666	.36	.355	.23	.449	22.36	.056	.83	.243	.66	.793	22.10	.328	.37	.562	22.13	.324		
537.80	22.39	.030	.12	.745	22.30	.524	.62	.659	21.99	.228	21.95	.306	21.68	.940	21.70	.424	.13	.662	21.98	.504		
538.80	21.99	.212	.28	.826	21.87	.697	22.72	.876	22.26	.405	22.13	.372	22.07	.091	.45	.525	.35	.766	.70	.690		
539.80	21.93	.395	.32	.907	.39	.871	21.71	.093	.72	.582	.19	.438	22.07	.241	21.15	.627	.48	.869	.75	.877		
540.86	22.20	.588	.61	.993	.52	.055	22.07	.323	(22.8	.770	.39	.507	21.90	.401	20.75	.734	.93	.979	21.98	.075		
541.81	.16	.761	.39	.071	21.93	.221	—	—	22.29	.570	21.39	.542	20.80	.831	.81	.077	—	—	—	—		
564.80	.59	.952	.35	.941	22.16	.219	.42	.516	22.45	.009	21.32	.079	22.07	.003	21.70	.157	.78	.457	22.29	.550		
565.75	.62	.125	.39	.018	.10	.385	.62	.722	21.87	.176	.37	.141	.15	.147	21.90	.253	.50	.655	21.44	.727		
566.74	.02	.305	.46	.099	22.33	.557	22.49	.937	22.30	.352	.67	.206	22.05	.363	.21	.658	21.62	.912	—	—		
567.75	—	—	21.56	.181	21.55	.733	21.81	.156	.56	.531	.77	.273	22.02	.448	.21	.50	.455	.762	22.00	.100		
569.74	.36	.852	20.86	.343	.81	.079	22.56	.587	—	—	21.92	.403	21.44	.746	21.00	.658	.55	.968	22.22	.473		
570.85	.49	.055	21.08	.433	21.81	.272	22.45	.828	.23	.079	22.22	.476	.73	.913	20.45	.770	21.87	.083	21.52	.680		
571.83	22.16	.233	20.86	.512	22.05	.442	21.63	.040	.26	.253	.42	.540	21.79	.061	.90	.867	22.05	.184	.56	.863		
572.84	21.76	.417	.69	.595	22.33	.618	22.16	.260	.42	.431	.42	.697	22.17	.212	20.90	.972	22.30	.288	.98	.052		
573.88	22.32	.607	20.94	.679	21.39	.798	22.52	.496	.55	.617	22.39	.675	22.33	.369	21.25	.077	21.87	.397	21.98	.247		
590.65	.36	.664	21.52	.043	22.10	.714	21.96	.124	.65	.586	21.98	.776	21.81	.893	20.45	.775	22.33	.132	22.36	.381		
591.70	.52	.855	.54	.129	21.37	.897	22.09	.051	.69	.772	.61	.845	22.06	.052	21.00	.879	21.93	.241	21.86	.576		
592.69	.42	.035	.50	.209	.55	.069	.52	.566	.62	.947	21.39	.910	.07	.201	.10	.979	22.10	.343	.58	.762		
593.69	22.52	.218	.30	.291	21.76	.243	22.56	.783	.20	.124	20.94	.976	22.08	.352	.60	.080	21.59	.447	21.85	.948		
594.76	21.76	.413	21.19	.378	22.23	.429	21.78	.015	22.09	.314	21.12	.046	21.50	.511	21.60	.191	21.23	.558	22.07	.149		
831.94	—	—	20.92	.670	—	—	—	—	—	—	—	—	22.05	.207	—	—	—	—	—	—		
832.95	22.16	.830	21.08	.752	21.30	.850	22.56	.683	22.49	.490	22.10	.683	22.13	.360	21.80	.293	21.93	.210	21.52	.662		
836.96	22.35	.561	.48	.078	22.49	.547	.56	.553	.10	.200	21.03	.944	.21	.81	.964	.20	.699	.23	.625	22.20	.410	
863.92	21.93	.475	.28	.272	.26	.236	.42	.402	22.45	.974	22.32	.717	.21	.78	.021	.21	.70	.425	.78	.416	22.00	.449
864.89	22.10	.652	.10	.350	.49	.404	.52	.612	21.81	.147	21.80	.780	.20	.167	.21	.45	.526	.716	21.87	.630		
865.88	.16	.833	.00	.431	—	—	.36	.826	22.20	.322	.70	.845	.22	.315	.20	.80	.627	.20	.98	.619		
866.84	.26	.851	21.03	.439	22.30	.592	22.56	.846	.30	.337	.58	.851	22.39	.328	.60	.636	21.06	.628	.48	.822		
867.84	.56	.007	20.97	.509	21.38	.743	21.93	.035	.52	.492	.48	.908	21.85	.459	.70	.725	.44	.718	21.98	.995		
867.91	22.36	.202	.80	.596	.44	.930	22.05	.266	.65	.681	21.17	.978	.28	.620	.70	.831	.13	.829	22.22	.194		
868.91	21.96	.385	20.78	.677	21.87	.103	.49	.484	.86	.858	20.82	.044	.60	.771	20.95	.933	.28	.932	.26	.882		
869.91	22.26	.567	21.03	.493	22.20	.277	22.49	.701	.36	.035	20.93	.110	.66	.921	21.25	.034	.87	.036	.00	.568		
894.84	.56	.111	.17	.786	.33	.613	21.87	.109	.69	.449	21.92	.746	.28	.673	20.90	.557	.39	.616	.05	.224		
895.81	.05	.288	.17	.865	21.28	.781	.23	.319	.66	.620	21.13	.810	.55	.819	21.05	.657	.30	.716	.16	.409		
896.78	.99	.323	.19	.881	.32	.814	.34	.361	.65	.654	21.92	.823	.68	.848	20.90	.673	.50	.736	.42	.444		
897.81	22.07	.653	.61	.028	.81	.129	22.56	.753	.42	.975	20.97	.941	.20	.855	.55	.755	.37	.817	22.00	.590		
898.90	.27	.851	.61	.116	21.96	.319	21.87	.989	.07	.168	21.12	.013	.22	.26	.284	.21	.970	21.68	.036	21.85	.986	
899.91	.56	.035	.63	.199	22.56	.494	22.16	.208	.23	.347	21.10	.079	.21	.90	.436	.30	.072	22.30	.141	22.04	.175	
923.80	.02	.390	.63	.142	22.16	.649	.42	.391	.59	.577	22.29	.647	.21	.97	.033	.30	.488	21.23	.613	21.86	.639	
924.82	.32	.576	.44	.225	21.32	.826	.59	.612	—	—	22.19	.714	.22	.16	.187	.00	.590	.13	.719	.56	.830	
927.90	.23	.137	.10	.475	22.33	.362	.23	.280	—	—	21.37	.917	.22	.22	.650	.20	.75	.81	.037	—	—	
951.70	.07	.476	.19	.411	.39	.500	.45	.443	.49	.518	22.12	.479	22.30	.232	.22	.311	.21	.501	21.65	.854	—	—
952.70	.07	.658	21.03	.493	22.23	.674	.56	.660	—	—	.16	.545	—	—	.21	.613	.35	.604	—	—		
954.77	.52	.035	.72	.661	21.68	.034	.10	.108	.26	.062	22.04	.681	.50	.694	21.00	.622	.21	.819	22.18	.427	—	—
955.78	.42	.220	20.92	.743	22.26	.210	.46	.328	22.20	.241	21.86	.747	.21	.63	.845	.20	.50	.726	21.35	.923	21.71	.616
977.69	.10	.213	21.03	.525	21.61	.020	.21	.783	.08	.120	.72	.185	22.07	.142	.21	.15	.940	.20	.051	.53	.705	
978.69	22.46	.224	21.00	.530	21.63	.031	.21	.96	.093	.21	.84	.130	.65	.189	.13	.151	.20	.855	.56	.722		
979.69	21.93	.396	20.58	.607	22.13	.194	.22	.10	.297	22.13	.297	.65	.251	22.02	.294	.21	.10	.041	22.16	.294	21.76	.897
980.64	.26	.758	20.83	.688	.10	.368	.42	.513	.26	.474	21.72	.317	.21	.90	.444	.45	.143	21.96	.395	22.16	.084	
981.62	.56	.751	21.03	.765	22.10	.533	.69	.720	.56	.672	22.07	.379	.20	.586	.65	.244	.73	.496	.39	.262		
981.75	.55	.930	.19	.845	21.93	.704	.22	.07	.933	—	.13	.443	.22	.064	.55	.734	.90	.341	.48	.598		
507.87	21.95	.811	20.79	.660	22.40	.933	.52	.352	.49	.207	21.50	.103	21.63	.861	.19	.330	.03	.693	.58	.251		
508.88	.50	.988	21.20	.827	2																	

Table B. (continued)

J.D. 2,433,000+	Mag. V 351	Phase	Mag. V 352	Phase	Mag. V 354	Phase	Mag. V 355	Phase	Mag. V 357	Phase	Mag. V 361	Phase	Mag. V 362	Phase	Mag. V 364	Phase	Mag. V 365	Phase	Mag. V 366		
567.75	22.30	.283	21.65	.525	22.05	.061	21.10	.165	21.03	.712	21.99	.019	22.32	.268	20.69	.740	21.86	.604	22.07	.408	
569.74	-	-	.26	.853	-	-	20.78	.292	.96	.862	-	-	.39	.447	21.20	.019	.28	.700	.16	.546	
570.85	21.70	.820	.37	.036	21.89	.481	.58	.363	21.99	.946	22.23	.533	.16	.548	.30	.175	.14	.755	.56	.623	
571.83	21.65	.996	.66	.198	22.18	.614	20.60	.426	22.39	.020	.56	.695	.49	.636	.60	.312	.03	.802	.29	.691	
572.84	22.30	.172	.70	.364	.49	.752	21.00	.990	.26	.095	.62	.862	22.16	.727	.19	.454	.26	.851	.19	.761	
573.88	.35	.354	.60	.535	22.20	.893	.21	.556	.49	.173	.23	.034	21.61	.821	21.19	.601	21.39	.890	22.13	.833	
590.65	.47	.287	.83	.298	21.63	.169	.32	.624	.23	.434	.69	.811	22.13	.336	20.80	.957	20.97	.717	21.37	.997	
591.70	.50	.471	.77	.471	.82	.311	.46	.691	22.20	.513	22.07	.985	-	-	21.05	.104	20.89	.768	.19	.070	
592.69	22.60	.644	.00	.635	21.90	.446	.70	.754	21.23	.588	21.84	.149	.16	.520	.30	.243	21.30	.816	.30	.138	
593.69	21.99	.819	.08	.799	22.15	.582	.92	.818	.16	.663	22.10	.315	.23	.610	.39	.384	.39	.865	.35	.208	
594.76	21.75	.006	21.32	.975	22.30	.727	21.86	.886	21.26	.744	22.20	.492	22.26	.707	21.08	.534	21.37	.917	21.52	.282	
831.94	-	-	-	-	-	-	-	-	21.21	.587	-	-	-	-	20.86	.846	-	-	-	-	
832.95	22.37	.658	21.65	.212	22.10	.056	-	-	20.88	.663	22.45	.936	22.30	.215	20.92	.988	21.98	.498	-	-	
836.96	22.32	.360	.21	.872	22.32	.601	20.63	.314	22.10	.964	22.40	.600	22.30	.577	21.14	.551	.17	.693	20.92	.093	
863.92	21.90	.074	.70	.310	21.57	.260	21.48	.031	.13	.997	21.68	.065	21.66	.012	.39	.338	.80	.004	21.65	.965	
864.89	22.23	.244	21.72	.473	21.85	.392	.32	.093	.36	.066	21.81	.226	.73	.099	.17	.473	21.89	.051	21.00	.032	
865.88	.49	.416	20.86	.636	22.16	.526	.17	.156	.42	.140	22.00	.390	.71	.189	.24	.612	-	-	20.75	.101	
.97	.52	.432	20.72	.651	.16	.538	.26	.162	-	-	.26	.404	21.81	.197	21.24	.624	22.19	.103	20.80	.107	
866.84	.56	.584	21.10	.794	.39	.656	21.17	.218	.62	.212	.42	.549	22.20	.276	20.72	.748	.13	.146	21.26	.167	
867.91	22.10	.772	.39	.960	.37	.801	20.69	.286	.42	.292	.42	.726	22.33	.372	.94	.898	.13	.198	21.44	.242	
868.91	21.57	.949	.50	.136	.42	.937	.66	.350	22.36	.368	22.36	.891	.65	.462	20.83	.038	.13	.246	22.10	.311	
869.91	22.13	.122	.67	.300	22.13	.073	20.75	.413	21.99	.443	21.66	.057	22.49	.553	21.41	.179	.49	.295	22.07	.380	
894.84	.43	.477	.75	.407	21.80	.457	21.52	.001	-	.59	.185	21.87	.803	20.86	.680	.10	.507	20.94	.110		
895.81	-	-	.26	.567	22.23	.588	.39	.063	.26	.892	22.41	.346	.78	.892	.86	.816	21.98	.554	.24	.178	
896.78	21.71	.820	.05	.727	.28	.720	.37	.125	22.16	.465	.30	.507	.39	.979	20.97	.952	22.07	.001	.32	.245	
897.81	21.53	.001	.31	.896	.45	.860	.46	.190	21.78	.542	.45	.677	.59	.072	21.03	.098	21.48	.651	21.58	.317	
898.90	22.05	.191	.46	.076	22.26	.008	21.10	.260	.18	.624	.30	.858	21.73	.171	.26	.251	.08	.705	22.16	.393	
899.91	.52	.367	.83	.242	21.72	.145	20.83	.324	21.15	.700	.07	.025	22.07	.262	21.17	.392	.10	.754	22.26	.463	
923.80	.60	.546	.62	.178	21.85	.387	21.52	.846	22.07	.497	22.20	.981	.39	.419	20.80	.748	.48	.915	21.30	.121	
924.82	.29	.720	.75	.346	22.00	.526	.58	.911	22.02	.574	21.63	.150	.13	.511	21.02	.891	.49	.965	.30	.192	
.94	.22	.744	.65	.366	.30	.542	.65	.919	21.32	.583	21.73	.170	22.42	.522	.04	.907	.61	.970	.37	.200	
927.90	.46	.267	.10	.853	22.42	.944	.39	.107	.18	.806	22.42	.660	21.90	.789	.52	.324	21.98	.114	.61	.405	
951.70	.56	.424	.10	.774	21.55	.174	.52	.623	21.44	.596	.61	.601	.52	.938	21.08	.666	22.26	.272	.12	.057	
952.70	.49	.599	.28	.938	.76	.310	-	-	20.83	.672	-	-	.59	.029	20.72	.807	-	-	.05	.126	
953.70	22.04	.773	.55	.103	21.75	.446	.37	.751	20.88	.747	22.39	.933	21.96	.119	20.92	.947	-	-	.37	.196	
954.77	21.67	.961	.77	.279	22.39	.591	.61	.819	21.35	.827	21.66	.110	22.13	.216	.21	.097	.39	.421	.61	.270	
955.78	22.07	.137	.89	.446	.33	.728	21.75	.883	.57	.903	21.68	.277	.05	.307	.35	.239	.39	.470	21.61	.341	
977.69	21.55	.964	.52	.055	.28	.702	20.75	.279	21.96	.551	22.49	.905	.07	.285	.19	.317	.01	.535	22.01	.861	
.75	.59	.979	.50	.065	.36	.710	.66	.283	22.06	.555	.22	.415	.04	.290	.26	.326	.05	.538	.14	.865	
978.69	21.90	.143	.80	.220	.47	.838	.66	.342	20.93	.626	.21	.59	.071	.376	.58	.458	.01	.584	22.10	.930	
979.69	22.45	.318	.98	.386	22.45	.973	.80	.406	20.96	.701	21.96	.237	.13	.466	21.12	.508	22.01	.632	21.70	.000	
980.64	.48	.484	21.63	.540	21.85	.102	.83	.467	21.26	.773	21.20	.394	.39	.552	20.78	.731	21.26	.679	20.97	.066	
981.62	.56	.656	20.97	.703	.70	.235	20.97	.529	.66	.846	.52	.556	.39	.640	21.00	.869	.14	.726	21.00	.134	
.75	22.63	.679	20.92	.724	21.59	.253	21.15	.537	21.90	.857	22.49	.578	22.33	.651	21.02	.887	21.24	.733	21.32	.143	
	V 377	V 378	V 379	V 380	V 382	V 383	V 384	V 385	V 387	V 391											
474.96	22.10	.767	22.23	.635	22.02	.252	21.68	.712	22.32	.506	21.28	.393	22.07	.093	22.20	.177	22.10	.850	22.16	.338	
475.96	21.68	.887	.13	.796	-	-	21.99	.787	-	-	.21	.500	-	-	-	-	-	-	22.10	.467	
476.95	.37	.005	22.69	.956	22.05	.487	22.20	.862	.69	.082	.19	.605	.10	.228	22.39	.430	.56	.294	21.23	.599	
477.95	21.57	.124	-	-	21.96	.605	.39	.937	.54	.371	.32	.710	.22	.295	21.81	.556	.59	.517	.01	.730	
479.93	22.39	.361	21.65	.437	.71	.831	.33	.086	-	-	.48	.920	21.84	.428	.66	.807	.32	.958	.46	.991	
480.96	.56	.484	21.75	.603	.96	.950	.49	.163	.68	.243	.39	.030	.87	.498	21.57	.938	.60	.187	21.66	.126	
481.96	-	-	-	-	21.93	.067	-	-	.43	.532	.58	.136	21.76	.566	.22	.23	.064	-	22.16	.257	
482.92	22.56	.718	22.23	.919	22.16	.178	(22.6	.311	.76	.810	.61	.238	20.96	.631	.22	.14	.186	.19	.624	22.10	.383
503.87	21.59	.222	21.90	.299	.66	.615	21.84	.886	-	-	.48	.460	21.76	.046	.21	.68	.840	.59	.292	21.81	.133
504.95	.22	.362	.66	.474	.89	.740	22.33	.967	-	-	.28	.575	22.16	.119	.21	.87	.977	.22	.463	.78	.274
505.90	.10	.465	21.99	.627	.85	.850	.52	.038	.05	.463	.26	.675	.16	.183	22.10	.097	.21	.745	.78	.399	
506.87	.52	.581	22.36	.783	22.13	.963	.69	.111	.81	.743	.19	.778	.49	.249	.07	.220	.22	.19	.961	.456	
507.87	22.23	.701	.45	.945	.07	.080	(22.8	.187	.91	.033	.52	.885	.07	.317	.52	.347	.36	.183	20.91	.657	
508.88	21.68	.821	.59	.108	.26	.198	22.62	.263	.65	.325	.46	.992	.23	.385	22.60	.475	.42	.408	20.91	.799	
509.89	.30	.942	22.02	.271	.10	.315	-	-	.32	.617	.41	.099	22.30	.453	.21	.71	.603	22.16	.634	21.30	.923
510.89	.44	.062	21.68	.432	22.05	.431	22.07	.414	(22.7	.907	.67	.205	21.96	.521	.39	.730	.21	.89	.857	.50	.055
511.85	21.80	.176	22.05	.567	.90	.543	21.87	.486	.67	.266	.37	.567	.78	.572	22.56	.327	.49	.220	.81	.180	
512.87	22.10	.298	.10	.751	.66	.661	.59	.563	22.23	.480	.52	.416	20.96	.655	.21	.81					

## VARIABLES IN THE ANDROMEDA GALAXY

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Table B. (continued)

J. D. 2,433,000+	Mag. V 377	Phase	Mag. V 378	Phase	Mag. V 379	Phase	Mag. V 380	Phase	Mag. V 382	Phase	Mag. V 383	Phase	Mag. V 384	Phase	Mag. V 385	Phase	Mag. V 387	Phase	Mag. V 391		
864.89	22.13	.372	21.71	.550	21.84	.612	22.42	.031	22.70	.394	21.39	.765	22.36	.441	21.76	.581	21.83	.750	21.61	.516	
865.88	-	-	22.36	.710	-	-	42.107	-	-	-	21.93	.507	.28	.707	22.08	.970	20.86	.647			
866.97	.30	.501	.39	.724	.90	.738	.57	.112	.69	.707	.44	.880	.93	.513	.48	.718	.26	.990	21.11	.658	
866.84	.49	.605	.49	.865	21.96	.840	.52	.178	.75	.959	.61	.972	21.68	.572	21.66	.829	.49	.184	.16	.772	
867.91	22.42	.738	-	-	22.02	.964	.62	.258	.83	.268	.70	.055	20.88	.644	22.02	.964	.62	.422	.26	.913	
868.91	21.61	.852	22.76	.199	.10	.080	.56	.333	.30	.558	.67	.191	21.30	.712	.13	.091	.10	.645	.48	.044	
869.91	.39	.972	21.55	.360	.10	.197	.13	.408	(22.9	.848	.67	.297	21.13	.780	.30	.217	.16	.868	.71	.175	
894.84	.30	.951	.68	.382	-	-	.69	.283	-	-	.48	.943	22.16	.464	.52	.376	-	.99	.448		
894.91	.28	.960	.76	.394	.10	.105	.64	.288	22.82	.087	.54	.950	.07	.469	.30	.385	.56	.440	.78	.457	
895.81	.60	.067	.73	.539	.10	.210	.56	.356	-	-	.63	.045	22.10	.530	.33	.499	22.07	.640	21.18	.575	
896.78	.65	.096	21.80	.570	.05	.232	.42	.370	.60	.402	.65	.066	21.99	.543	22.16	.523	21.80	.683	20.96	.600	
897.78	.63	.183	22.39	.695	.20	.323	22.26	.429	.35	.628	.70	.148	21.28	.595	21.52	.622	21.83	.857	20.88	.702	
897.81	21.96	.306	.42	.862	22.10	.442	21.81	.506	22.66	.926	.70	.257	20.96	.655	.61	.752	22.56	.086	21.13	.838	
898.90	22.02	.436	.69	.038	21.96	.569	.37	.588	23.08	.242	.54	.373	21.16	.739	.61	.890	.52	.329	.48	.981	
899.91	.62	.557	.83	.200	.68	.687	21.30	.664	22.16	.533	.32	.480	.32	.807	21.76	.018	.56	.554	.57	.113	
923.80	.33	.412	.69	.055	.92	.466	22.33	.460	.28	.449	.63	.015	.90	.421	22.23	.045	.04	.878	21.66	.249	
924.82	.58	.534	.62	.220	.87	.585	21.93	.537	-	-	.65	.123	-	-	.29	.105	22.07	.383			
927.90	21.48	.903	.23	.717	-	-	.59	.769	.36	.636	.50	.450	21.13	.698	-	-	.01	.792	.11	.787	
951.70	22.26	.747	.07	.557	21.84	.711	.71	.558	.32	.527	.58	.975	22.16	.306	21.90	.580	.52	.096	.30	.910	
952.70	21.57	.867	.39	.718	-	-	23	.633	-	-	.56	.081	-	-	.35	.707	-	.59	.041		
953.70	.48	.986	.59	.879	22.10	.944	.39	.709	.69	.105	.65	.187	-	-	.81	.834	.49	.541	.87	.172	
954.77	.81	.114	.56	.052	.16	.078	.46	.789	.69	.416	.75	.301	21.90	.514	21.66	.969	.00	.780	.84	.314	
955.78	.73	.235	.80	.215	22.35	.186	.93	.865	.76	.708	.41	.408	21.55	.582	22.23	.097	.29	.005	.93	.446	
977.69	.52	.853	.13	.750	21.68	.735	.99	.512	.83	.051	.24	.733	22.05	.062	21.87	.873	.04	.888	.84	.322	
978.69	.55	.860	.33	.760	.93	.742	.93	.517	-	-	.23	.739	.23	.066	.78	.881	.03	.902	21.78	.330	
979.69	.59	.092	.69	.073	21.96	.968	.44	.663	.56	.630	.61	.945	.26	.198	21.96	.000	.39	.111	22.10	.585	
980.64	21.52	.206	22.65	.226	22.02	.078	.55	.734	.89	.905	.77	.046	-	-	.45	.247	22.62	.545	20.96	.710	
981.62	22.16	.323	21.71	.384	.10	.192	.38	.808	-	-	.85	.150	-	-	.23	.328	.42	.371	21.83	.764	
982.75	22.02	.339	21.78	.405	22.10	.207	21.99	.818	22.91	.226	21.67	.162	22.42	.337	22.62	.388	21.92	.793	21.11	.855	
	V 392	V 394	V 395*	V 396*	V 399	V 402	V 403	V 404	V 405	V 408											
-474.96	21.82	.658	21.78	.862	20.83	.128	20.68	.750	21.86	.113	21.50	.844	22.69	.073	21.81	.538	20.56	.026	22.36	.753	
475.96	21.80	.819	21.93	.051	.38	.221	.58	.760	.48	.292	21.80	.048	-	-	.35	.596	.55	.215	-	-	
476.95	22.07	.979	22.10	.239	20.48	.313	.53	.770	.15	.471	22.17	.250	.72	.463	.13	.654	-	-	-	-	
477.95	.04	.140	22.23	.428	21.11	.406	.41	.780	.28	.650	22.56	.454	.56	.659	.19	.711	21.63	.310	21.75	.237	
479.93	22.29	.461	21.68	.802	.28	.591	.41	.800	-	-	21.61	.858	.62	.047	.13	.826	22.02	.497	22.46	.557	
480.96	21.86	.627	21.93	.998	.68	.687	.41	.810	.61	.188	21.92	.068	-	-	.66	.886	22.07	.595	.42	.723	
481.96	21.82	.788	22.16	.187	.84	.780	.68	.820	.37	.367	22.36	.272	(22.7	.445	21.93	.944	22.6	.885			
482.92	22.07	.943	.23	.368	.64	.869	.56	.829	.37	.539	22.56	.467	.22	.633	22.05	.000	.57	.781	(22.6	.040	
503.87	.32	.324	22.33	.332	.59	.820	-	-	.44	.293	21.63	.739	.02	.738	.49	.214	.66	.766	21.86	.425	
504.85	22.36	.496	21.87	.536	.61	.921	.85	.050	.17	.487	21.70	.960	.49	.949	.36	.277	.21	.869	22.29	.600	
505.90	21.75	.652	.45	.716	21.24	.009	.78	.059	.41	.657	22.39	.153	.62	.136	.69	.332	21.23	.959	.36	.753	
506.87	21.67	.808	.71	.900	20.73	.099	.88	.069	.61	.831	.26	.351	.70	.326	.45	.388	20.96	.051	.62	.910	
507.87	22.07	.970	21.96	.089	.71	.192	.88	.079	.86	.010	22.39	.555	22.83	.522	.45	.446	21.16	.146	22.62	.072	
508.88	.16	.133	22.07	.280	.51	.286	20.98	.089	.56	.190	21.67	.760	21.84	.720	22.07	.505	.35	.241	21.98	.235	
509.89	.36	.296	21.96	.471	20.99	.380	21.03	.099	.35	.369	22.06	.967	22.36	.918	21.71	.563	.42	.337	-	-	
510.89	.36	.457	.57	.660	21.01	.473	21.11	.109	.44	.548	.19	.171	.56	.114	.18	.621	21.55	.432	-	-	
511.85	22.16	.612	.61	.842	.28	.563	20.86	.118	.46	.727	.32	.367	.76	.303	.01	.677	22.02	.523	22.62	.715	
512.87	21.55	.777	21.81	.035	.24	.658	21.01	.129	.67	.906	22.39	.574	.22	.592	.16	.736	21.90	.620	22.42	.880	
513.81	-	-	.55	.745	-	-	20.98	.138	-	-	21.65	.766	21.93	.687	.13	.791	22.05	.709	-	-	
514.88	22.05	.102	22.36	.415	.63	.845	20.93	.149	.80	.265	21.92	.984	22.35	.896	21.63	.852	21.28	.810	21.86	.205	
536.83	21.65	.644	.57	.888	21.28	.368	.75	.200	22.56	.460	(22.7	.197	22.52	.125	.30	.891	22.62	.752			
537.80	.86	.800	.52	.751	.18	.979	.28	.378	.48	.378	21.42	.657	22.72	.387	.56	.182	21.06	.983	.56	.908	
538.80	21.89	.961	21.61	.941	21.03	.072	.26	.388	.28	.553	21.83	.861	22.46	.583	.65	.240	20.91	.078	22.42	.070	
539.80	22.36	.123	22.07	.130	.20	.98	.165	.13	.398	.58	.732	21.92	.066	.49	.298	21.13	.173	21.92	.232		
540.86	.26	.295	22.20	.331	.21	.264	.11	.409	.77	.915	22.22	.282	22.36	.397	.44	.273	.80	.403			
541.81	-	-	-	-	20.81	.319	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
564.80	.26	.159	21.76	.860	21.08	.492	.20	.63	.648	.95	.212	.32	.163	21.96	.678	21.08	.747	21.87	.543	21.92	.272
565.75	.36	.312	21.85	.040	.03	.581	.56	.657	.37	.382	22.39	.357	22.05	.864	.08	.802	22.10	.633	22.16	.425	
566.74	.24	.472	22.23	.227	.48	.673	.68	.667	.52	.561	-	-	.33	.058	21.52	.860	21.96	.727	.29	.585	
567.75	21.80	.635	22.13	.418	.55	.767	.63	.677	.35	.741	21.63	.764	.69	.256	22.02	.918	21.73	.823	.32	.748	
569.74	-	-	21.71	.794	.44	.952	.61	.697	.92	.099	22.04	.170	.42	.646	.33	.033	20.86	.111	22.22	.070	
570.85	22.42	.135	-	-	21.26	.056	.61	.708	.65	.296	.32	.396	.30	.863	.45	.098	20.86	.116	21.92	.249	
571.83	.22	.293	21.99	.190	.20	.633	.47	.718	.44	.472	22.22	.597	.56	.055	.45	.155	21.26	.209	21.89	.408	
572.84	.46	.456	22.16	.381	.56	.241	.66	.728	.54	.652	21.72	.802	.49	.253	.52	.213	.37	.305	22.14	.571</	

Table B. (continued)

J. D. 2,433,000+	Mag. Phase V 392	Mag. Phase V 394	Mag. Phase V 395*	Mag. Phase V 396*	Mag. Phase V 399	Mag. Phase V 402	Mag. Phase V 403	Mag. Phase V 404	Mag. Phase V 405	Mag. Phase V 408
V 410	V 411	V 412	V 414	V 415	V 416	V 422	V 423	V 424	V 426	
924.82	.22.39 .266	.21.81 .976	.21.06 .010	.21.20 .248	.21.67 .725	.22.26 .572	- -	.21.23 .621	.22.07 .673	- -
.94	.22.36 .286	.21.87 .999	.21.11 .021	- -	.61 .749	.42 .597	- -	.21 .628	.22.03 .684	.22.26 .470
927.90	.21.86 .763	.22.02 .559	.20.48 .297	.37 .279	.92 .280	- -	.21.93 .831	.21.32 .800	.21.16 .965	(22.6 .948)
951.70	.22.16 .604	.21.93 .061	.21.21 .513	.06 .517	.24 .544	.22.13 .052	(22.8 .495	.22.52 .180	.39 .221	.22.73 .795
952.70	.21.80 .766	- -	.41 .606	.08 .527	- -	- -	- -	- -	.48 .316	- -
953.70	.21.86 .927	.22.26 .440	.35 .699	.21.06 .537	.86 .903	.49 .460	.22.39 .887	.49 .296	.71 .411	- -
954.77	.22.19 .100	.21.50 .642	.57 .799	.20.86 .548	.98 .095	.22.32 .678	(22.7 .097	.62 .357	.21.87 .512	.21.98 .291
955.78	.22.26 .263	.46 .833	.50 .893	.83 .558	.21.70 .274	.21.83 .884	.22.62 .295	.22.65 .416	.22.10 .608	.22.26 .454
977.69	.21.75 .799	.73 .979	.61 .932	.57 .777	.22.01 .202	.22.35 .352	.76 .588	.21.18 .686	.21.93 .685	(22.6 .995)
.75	.86 .809	.21.71 .990	.30 .937	- -	- -	.29 .364	- -	.15 .689	.95 .691	- -
978.69	.21.89 .960	.22.07 .168	.21.21 .026	.43 .787	.21.58 .381	.22.56 .556	.10 .784	.28 .744	.68 .780	.21.83 .156
979.69	.22.21 .122	.36 .357	.20.78 .119	.51 .797	.51 .560	.21.89 .760	.23 .980	.55 .802	.32 .875	.21.89 .318
980.64	.26 .275	.22.16 .537	.76 .207	.61 .806	.44 .731	.21.95 .954	.49 .166	.67 .857	.21.18 .964	.22.29 .471
981.62	.29 .433	.21.55 .722	.38 .299	- -	- -	.22.32 .154	- -	.87 .914	.20.83 .057	- -
.75	.22.36 .454	.21.59 .747	.20.28 .311	.20.57 .818	.21.77 .910	.22.29 .180	(22.6 .383	.21.96 .922	.20.78 .069	(22.6 .650
474.96	.22.70 .687	.21.26 .998	.21.93 .426	.22.52 .938	.21.68 .187	.22.07 .067	.22.89 .648	.21.57 .010	.22.46 .617	.21.59 .393
475.96	.22.22 .852	.26 .062	.20.96 .551	.21.48 .205	.21.32 .263	- -	.21.71 .703	.52 .079	- -	- -
476.95	.21.89 .016	.35 .124	.81 .675	.21.81 .470	.20.88 .339	.56 .205	.22.05 .756	.63 .148	.62 .913	.46 .605
477.95	.22.24 .182	.39 .187	.20.96 .800	.22.39 .737	.21.44 .415	.20 .275	.30 .810	.93 .217	.22.72 .061	.21.81 .710
479.93	.62 .510	.39 .312	.21.21 .047	.21.46 .266	.21.81 .566	.36 .413	.30 .916	.21.93 .355	.21.93 .356	.22.10 .920
480.96	- -	.71 .377	.35 .176	.22.20 .541	.22.02 .644	.39 .484	.62 .972	.22.49 .427	.22.07 .508	.45 .030
481.96	.26 .846	.21.57 .440	.66 .302	- -	.30 .720	- -	(22.7 .026	.22.56 .496	.49 .657	.22.10 .136
482.92	.16 .005	.22.42 .501	.68 .423	.56 .065	.22.33 .794	.56 .621	(22.8 .078	.62 .801	.21.96 .238	- -
503.87	.73 .476	.30 .824	.21 .044	.19 .664	.21.16 .390	.33 .079	.22.89 .209	.21.41 .019	.69 .915	.81 .469
504.95	.66 .655	.22.16 .892	.33 .179	.22.39 .953	.23 .472	.56 .155	(22.8 .267	.73 .077	.63 .575	- -
505.90	.22.07 .812	.21.35 .953	.46 .297	.21.46 .207	.46 .544	.46 .221	.22.59 .319	.66 .160	.22.33 .218	.21.93 .675
506.87	.21.66 .973	.11 .014	.68 .419	.22.13 .466	.81 .618	.55 .288	.96 .371	.90 .227	.21.90 .362	.22.10 .778
507.87	.22.19 .139	.21 .077	.21.39 .544	.65 .733	.96 .695	.55 .358	(22.8 .425	.21.96 .297	.21.93 .510	.42 .885
508.88	.52 .306	.26 .141	.20.86 .670	.22.83 .003	.21.96 .771	.46 .428	- -	.22.07 .367	.22.33 .661	.26 .992
509.89	.59 .473	.39 .205	.21.23 .796	.21.52 .273	.22.16 .848	.56 .499	(22.8 .535	- -	.58 .810	.20 .099
510.89	- -	.70 .268	.13 .921	.21.92 .540	.26 .925	.56 .568	- -	.49 .507	.69 .959	.22.02 .205
511.85	.22.16 .798	.66 .328	.30 .040	.22.56 .797	.13 .998	.22 .635	(22.8 .640	.56 .573	.22.49 .102	.21.96 .308
512.87	.21.83 .967	.21.93 .393	.66 .169	.22.62 .070	.10 .075	.22.07 .706	.22.07 .696	- -	.21.99 .253	.66 .415
513.81	- -	- -	- -	.21.52 .321	.22 .104	.147 .271	.22 .28 .771	- -	.21.93 .393	.63 .516
514.88	.22.56 .300	.22.30 .520	.81 .422	.22.06 .607	.21.59 .229	.21 .61 .846	.30 .803	.36 .784	.22.02 .552	.21.96 .629
536.83	.12 .937	.21.52 .906	.55 .168	.02 .473	.22 .49 .901	.22 .43 .374	.89 .989	.16 .310	.76 .816	- -
537.80	.26 .097	.26 .967	.63 .289	.30 .732	.30 .975	.47 .442	.89 .041	.26 .377	.72 .960	.22.56 .061
538.80	.39 .263	.11 .031	.26 .514	.22 .72 .000	.22 .05 .051	.36 .511	- -	.36 .447	- -	.22.39 .167
539.80	.70 .429	.21 .094	.26 .539	.21 .50 .267	.21 .71 .127	.29 .581	.56 .149	.56 .516	.22 .52 .257	.21 .78 .274
540.86	(22.8 .604	.21.44 .161	.21.01 .672	.22 .20 .550	.37 .208	.07 .655	(22.8 .206	.22 .56 .590	.21 .93 .415	.21 .59 .386
541.81	- -	- -	.20 .96 .791	- -	.21 .32 .280	- -	- -	- -	.22 .23 .556	- -
564.80	.22.70 .570	.22.89 .673	.21.03 .668	.22.76 .948	.22.20 .032	.40 .321	(22.9 .499	.21.95 .254	.62 .974	.22.56 .925
565.75	.22.59 .728	.56 .733	.20.96 .777	.21.61 .202	.21.71 .104	.21 .387	- -	.21.93 .320	.92 .117	.42 .026
566.74	.21.98 .892	.16 .795	.21.11 .910	.22.10 .467	.52 .180	.34 .456	(22.9 .604	.22.36 .388	.33 .263	.16 .131
567.75	.21.98 .059	.22.10 .859	.16 .037	.22.72 .737	.44 .257	.22.14 .527	.22.45 .659	.49 .459	.10 .413	.22.02 .237
569.74	.22.46 .389	.21.21 .985	.78 .285	.21.57 .269	.39 .408	.21.81 .665	.10 .766	- -	.56 .708	.21.63 .449
570.85	- -	.21 .055	.78 .424	.22.16 .565	.44 .493	.46 .742	.33 .828	.33 .674	.69 .873	.21.78 .567
571.83	.76 .735	.30 .117	.21.39 .547	.36 .827	.63 .568	.53 .811	.56 .879	.42 .742	.69 .020	.22.07 .670
572.84	.01 .902	.48 .180	.20.81 .673	.22.39 .097	.99 .645	.53 .881	.49 .934	.22.23 .812	.22.69 .110	.23 .779
573.88	.29 .075	.65 .246	.21.06 .803	.21.59 .375	.21 .96 .724	.21 .70 .953	.79 .990	.21.93 .885	.21.93 .324	.56 .888
590.65	.07 .853	.52 .305	.26 .903	.22 .62 .857	.22 .16 .001	.22 .41 .121	.52 .895	.44 .050	.22 .76 .818	.05 .668
591.70	.32 .027	.21 .432	.52 .034	.21 .87 .138	.22 .07 .082	.60 .194	.62 .951	.57 .123	.76 .974	.39 .779
592.69	.56 .191	.22 .055	.43 .748	.73 .158	.21 .93 .402	.21 .76 .157	.60 .263	.76 .005	.84 .192	.65 .121
593.69	.76 .357	.22 .16 .497	.73 .283	.22 .16 .670	.21 .52 .233	.49 .333	.96 .059	.21 .90 .261	.39 .270	.36 .990
594.76	.22 .86 .534	- -	.21 .84 .417	.22 .42 .956	.20 .68 .315	.22 .53 .407	.22 .92 .117	.22 .33 .336	.22 .05 .429	.22 .52 .104
831.94	- -	- -	- -	- -	.21 .21 .386	- -	- -	- -	- -	- -
832.95	.22.10 .995	- -	.21.63 .219	.22 .45 .614	.44 .462	.22 .10 .990	- -	- -	- -	.21.93 .376
836.96	(22.8 .659	.21.93 .862	.06 .720	.49 .686	.21.93 .768	.42 .269	.22 .69 .196	.21 .50 .169	.21.93 .439	.21.99 .801
863.92	.22.36 .126	.22.76 .565	.28 .094	.22.66 .891	.22 .26 .822	.26 .146	- -	.44 .042	.22 .13 .448	.22 .10 .662
864.89	- -	.36 .626	.28 .215	.21 .84 .150	.42 .896	.30 .214	.22 .05 .704	.59 .110	.13 .592	.05 .765
865.88	.97 .73 .462	- -	.59 .339	.21 .73 .415	.30 .971	.36 .282	.16 .757	.76 .179	.56 .739	- -
866.84	- -	.76 .750	.61 .459	.49 .672	.21 .87 .044	.41 .349	.26 .810	.81 .245	.89 .882	- -
867.91	.22.83 .787	.56 .817	.21.21 .593	.22 .86 .958	.78 .126	.32 .424	.62 .667	.21 .81 .320	- -	.07 .085
868.91	.21.86 .952	.22.16 .880	.20 .98 .718	.21 .73 .225	.76 .202	.53 .494	.62 .921	.22 .16 .369	.22 .40 .189	.22 .33 .191
869.91	.22.26 .118	.21 .48 .943	.21 .11 .843	.22 .13 .492	.13 .278	.47 .563	(22.8 .975	.22 .45 .459	.21 .85 .338	.21 .66 .297
894.84	.56 .248	.22 .36 .518	.16 .961	.21 .87 .155	.71 .178	.42 .299	- -	.21 .93 .191	.22 .56 .044	.22 .20 .943
895.81	.94 .409	.56 .522	.30 .970	.71 .174	.59 .183	.42 .304	.22 .96 .325	.81 .196	.76 .055	.56 .950
896.78	.62 .440	.76 .579	.66 .083	.21 .73 .414	.35 .252	.56 .366	.46 .359	.21 .73 .259	- -	.10 .045
897.81	.80 .570	.89 .641	.71 .204	.60 .673	.20 .86 .326	.46 .434	.22 .9 .426	.21 .93 .326	.21 .93 .334	.42 .148
898.90	.21 .70 .921	.89 .775	.61 .470	.21 .63 .240	.28 .487	.45 .581	.22 .9 .540	.22 .30 .473	.36 .648	.21 .90 .373
899.91	.21 .98 .088	.22 .16 .838	.21 .26 .597	.22 .13 .510	.66 .564	.33 .652	(22.9 .585	.22 .56 .544	.22 .49 .799	.21 .84 .480
923.80	.22.16 .046	.21.52 .347	.20 .91 .585	.22 .65 .895	.11 .384	.42 .315	.22 .52 .885	.21 .71 .204	.21 .99 .351	.22 .39 .015
924.82	.56 .215	.22 .36 .412	.21 .01 .712	.21 .90 .167	.41 .462	.52 .386	- -	.90 .275	.22 .26 .502	.10 .123
927.90	.56 .725	- -	.63 .099	.22 .8 .990	.87 .697	- -	.56 .107	- -	.22 .56 .960	- -
951.70	.22.89 .668	.21.26 .109	.57 .078	.21 .68 .351	.50 .510	.46 .257	(22.8 .392	.63 .143	.21 .99 .499	.30 .975
952.70	- -	.21 .172	.57 .203	- -	.57 .586	- -	- -	.21 .63 .213	.22 .20 .648	- -
953.70	.21 .92 .999	.48 .236	.99 .328	.22 .45 .886	.70 .662	.26 .396	(22.9 .500	.22 .13 .282	.49 .796	.22 .13 .187
954.77	.22 .07 .177	.21 .61 .303	.52 .462	.21 .59 .172	.21 .81 .744	.23 .471	(22.8 .558	.30 .356	.56 .955	.21 .93 .301
955.78	.22 .76 .344	.22 .16 .367	.01 .588	.42 .200	.30 .541	(22.8 .612	.22 .49 .427	.22 .86 .105	.21 .81 .408	- -
977.69	.21 .69 .974	.56 .751	.61 .329	.76 .297	.21 .32 .490	.31 .067	- -	.21 .93 .949	.21 .78 .363	.22 .20 .733
.75	.21 .92 .984	.22 .30 .755	.67 .337	.21 .71 .313	.50 .495	- -	- -	.22 .30 .798	.87 .953	.21 .82 .370
978.69	.22 .16 .139	.21 .93 .814	.44 .465</							

## VARIABLES IN THE ANDROMEDA GALAXY

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Table B (continued)

J.D. 2,433,000+	Mag. V 427	Phase	Mag. V 428	Phase	Mag. V 438	Phase	Mag. V 439	Phase	Mag. V 440	Phase	Mag. V 443	Phase	Mag. V 446*	Phase	Mag. V 447	Phase	Mag. V 449	Phase	Mag. V 451	
474.96	22.33	.191	21.55	.843	22.52	.075	22.33	.682	22.26	.476	23.00	.182	20.81	.543	22.36	.060	22.80	.489	22.64 .302	
475.96	.49	.280	-	-	-	-	-	-	-	-	20.91	.613	.44	.967	.56	.540	.39	.393	.26 .484	
476.95	.36	.368	.44	.174	.56	.231	.07	.774	.39	.553	21.50	.581	21.01	.684	.43	.425	.52	.592	.26 .484	
477.95	22.33	.457	.45	.340	.56	.309	.35	.820	.49	.592	22.09	.781	.28	.754	.56	.608	.56	.644	22.04 .574	
479.93	21.68	.632	.58	.668	22.07	.463	.56	.911	.46	.669	21.49	.178	.37	.894	.29	.971	.22	.746	21.98 .756	
480.96	.50	.723	.55	.839	21.77	.544	.30	.958	.64	.709	22.80	.384	.44	.967	.26	.160	.29	.798	22.16 .848	
481.96	.23	.812	-	-	.19	.622	-	-	.49	.748	21.61	.585	.44	.038	.40	.343	22.36	.850	.36 .939	
482.92	.23	.898	.17	.165	21.35	.697	.30	.049	.29	.785	21.80	.777	.39	.106	.62	.519	21.26	.899	.39 .027	
503.87	.01	.759	.70	.642	22.42	.332	.23	.014	.13	.600	22.39	.975	.03	.589	.49	.359	.17	.979	.13 .937	
504.95	.21	.855	.30	.822	.04	.416	.36	.064	.73	.642	.89	.192	.35	.666	22.65	.557	.40	.035	.56 .036	
505.90	.44	.939	.10	.979	22.19	.491	.62	.108	.66	.679	22.89	.382	.35	.732	21.84	.731	.44	.083	.49 .123	
506.87	.71	.026	.31	.140	21.24	.566	.27	.153	.42	.717	21.54	.577	.39	.801	22.13	.99	.70	.124	.70 .212	
507.87	.87	.115	.45	.306	.39	.644	22.16	.199	.26	.756	21.86	.777	.50	.872	.26	.092	21.86	.186	.83 .302	
508.88	21.84	.204	.61	.474	.41	.723	21.01	.245	.19	.795	22.26	.979	.46	.943	.53	.278	22.07	.238	.42 .394	
509.89	22.39	.294	.71	.642	21.46	.802	20.41	.292	.32	.834	.63	.182	.60	.015	.56	.463	.29	.290	.32 .486	
510.89	.56	.383	.38	.808	22.16	.880	.58	.338	22.04	.874	22.89	.382	.35	.086	22.08	.646	.49	.341	22.01 .577	
511.85	.56	.467	.12	.967	.29	.955	.63	.382	21.89	.911	21.72	.574	21.23	.153	21.81	.822	.46	.392	21.86 .665	
512.87	22.10	.558	.25	.136	.49	.035	20.94	.429	20.97	.950	21.77	.779	20.88	.226	22.23	.009	.49	.443	22.13 .757	
513.81	21.63	.642	.47	.292	.56	.108	21.21	.472	.97	.987	22.29	.967	.88	.292	-	-	.42	.493	21.98 .844	
514.88	.28	.737	.36	.470	.70	.191	.04	.522	.20	.66	.029	.22	.70	.182	.20	.368	.49	.377	.56 .547	
536.83	.55	.687	.27	.114	.56	.905	.18	.533	22.19	.882	21.59	.580	21.63	.921	.56	.401	.56	.679	.49 .942	
537.80	.80	.13	.773	.21	.275	.56	.981	.39	.578	21.44	.920	21.86	.775	.48	.990	22.33	.579	.42 .729	.49 .031	
538.80	.23	.861	.36	.441	-	-	.48	.624	21.35	.959	22.42	.975	.48	.061	21.84	.762	.42	.780	.56 .122	
539.80	.44	.951	.49	.607	(22.6	.137	.76	.670	20.73	.998	-	-	.44	.132	21.94	.945	22.39	.832	-	
540.86	.71	.044	.66	.783	(22.6	.220	21.73	.719	.83	.039	22.92	.388	21.21	.207	22.26	.140	21.52	.885	.70 .310	
541.81	21.63	.129	.11	.940	-	-	-	-	.86	.076	21.63	.579	20.83	.274	-	-	.32	.935	-	
546.80	22.10	.171	.35	.757	(22.8	.088	22.16	.822	.71	.970	22.96	.186	21.44	.901	22.46	.528	.70	.121	.49 .493	
565.75	.45	.255	.02	.914	(22.7	.162	.30	.866	.73	.007	22.86	.376	.59	.968	21.71	.702	.89	.170	22.01 .579	
566.74	.36	.343	.12	.079	(22.8	.240	.49	.912	20.86	.046	21.72	.574	.44	.038	21.84	.883	21.86	.221	21.92 .670	
567.75	22.39	.433	.34	.246	-	-	.52	.954	21.10	.085	22.10	.777	.37	.110	22.27	.068	22.26	.273	21.83 .762	
569.74	21.78	.610	.60	.578	21.98	.474	.49	.050	.00	.163	.45	.176	21.18	.251	.43	.433	.39	.376	22.32 .944	
570.85	21.39	.709	.60	.761	.65	.560	.56	.101	.30	.206	22.64	.398	20.61	.329	22.27	.637	.56	.433	.56 .044	
571.83	20.85	.795	.36	.924	.44	.637	.69	.146	.46	.244	21.72	.594	.22	.398	21.71	.816	.46	.484	.64 .133	
572.84	21.28	.885	.11	.091	.63	.716	22.30	.193	.57	.283	22.07	.797	.46	.470	22.23	.001	.64	.536	.80 .225	
573.88	21.55	.978	.26	.264	21.83	.797	21.11	.241	.21	.52	.323	.69	.005	20.91	.543	.27	.192	.49 .588		
590.65	22.23	.467	.05	.048	(22.6	.106	22.07	.014	.20	.97	.976	22.83	.366	21.28	.730	.69	.266	22.80 .650		
591.70	21.81	.560	.05	.222	(22.6	.188	.23	.062	.78	.017	21.57	.576	.37	.805	.69	.459	-	-	.46 .945	
592.69	.78	.648	.64	.386	(22.6	.265	.42	.108	.91	.056	21.95	.775	.59	.875	22.13	.640	.64	.559	.59 .036	
593.69	.28	.737	.57	.552	22.49	.343	.49	.154	20.86	.095	22.29	.975	.44	.946	21.81	.823	.76	.611	.83 .127	
594.76	21.06	.632	21.70	.730	22.13	.427	22.02	.203	21.32	.136	22.80	.190	21.30	.021	22.39	.020	22.86	.666	22.89 .224	
831.94	-	-	21.21	.102	22.36	.941	-	-	21.44	.362	-	-	-	-	-	-	-	-	-	
832.95	-	-	.06	.269	-	-	-	-	21.72	.402	22.56	.923	21.50	.878	21.87	.680	21.08	.947	22.56 .940	
836.96	22.13	.347	.05	.935	.70	.333	20.58	.366	22.26	.558	21.83	.726	.01	.161	22.49	.415	21.86	.153	.49 .305	
863.92	21.50	.744	.70	.410	22.56	.437	21.63	.608	.29	.610	22.56	.130	.44	.069	.56	.356	22.56	.544	.22 .763	
864.89	.21	.829	.66	.571	21.70	.513	21.71	.653	.35	.644	.56	.324	.32	.138	22.40	.534	(22.7	.593	.49 .852	
865.88	.35	.917	-	-	.28	.591	22.07	.698	.49	.683	22.36	.522	.35	.208	-	-	-	-	.29 .942	
.97	.46	.925	.48	.751	.32	.598	22.20	.702	.56	.686	21.80	.540	21.06	.214	21.84	.732	-	-	.56 .950	
866.84	21.60	.006	.12	.895	.44	.665	21.99	.742	.56	.720	21.75	.714	20.86	.276	22.05	.892	22.56	.695	.64 .030	
867.91	22.05	.096	.16	.073	21.80	.749	22.07	.072	.29	.761	22.36	.930	.00	.352	.15	.088	.64	.749	.70 .127	
868.91	.10	.185	.16	.239	22.19	.827	.23	.888	.19	.800	.39	.130	.32	.423	.52	.271	.64	.800	.56 .218	
869.91	.42	.274	.31	.405	21.92	.905	.39	.884	.26	.839	.76	.330	.66	.493	.56	.454	22.56	.852	22.70 .310	
894.84	22.16	.488	.71	.544	22.49	.851	.56	.033	.24	.809	-	-	.73	.258	-	-	21.75	.138	21.83 .588	
.91	.21	.964	.58	.555	.46	.857	.56	.036	.22	.847	.46	.530	.66	.263	.30	.037	.65	.142	.72 .589	
895.81	.99	.63	.57	.736	.49	.942	.62	.087	.35	.854	22.13	.558	.06	.339	.49	.235	21.86	.198	21.92 .689	
896.78	21.52	.661	.06	.865	.66	.003	.42	.123	22.04	.885	21.98	.714	.27	.395	.56	.380	22.13	.239	-	
897.81	.34	.148	.22	.226	.39	.083	.23	.170	21.35	.925	22.64	.921	.51	.468	22.56	.568	.07	.291	.49 .853	
898.90	21.23	.849	.16	.217	-	-	22.10	.220	.00	.967	.52	.141	20.96	.545	21.93	.768	.56	.347	.52 .953	
899.91	.55	.939	.65	.384	(22.7	.247	20.76	.267	.00	.006	.73	.342	21.16	.617	22.27	.953	.46	.399	.80 .045	
923.80	21.61	.061	.27	.351	(22.7	.112	.68	.368	.26	.935	.42	.129	20.56	.307	.56	.332	(22.7	.631	.73 .223	
924.82	22.00	.151	.77	.520	-	-	.73	.415	21.05	.975	-	-	.06	.379	.56	.510	22.56	.683	.56 .315	
.94	21.81	.162	.60	.540	22.6	.201	.20	.78	.421	.20	.980	-	-	20.06	.385	.56	.541	22.56	.689	.56 .327
927.90	22.42	.425	.02	.031	22.56	.432	.21	.55	.557	.97	.095	22.52	.951	21.11	.597	-	-	22.04 .597		
951.70	22.13	.540	.10	.982	(22.7	.290	21.59	.654	.91	.021	21.75	.720	20.71	.282	22.56	.447	21.48	.069	21.98 .766	
952.70	-	-	.34	.148	22.22	.368	-	-	20.91	.060	-	-	.18	.352	-	-	.44	.121	-	
953.70	21.57	.718	.36	.314	22.42	.446	22.23	.746	21.08	.099	22.56	.121	.46	.423	21.78	.813	21.77	.173	22.49 .948	
954.77	.11	.813	.67	.492	21.72	.529														

Table B (continued)

J.D. 2,433,000+	Mag. V 452	Phase	J.D. 2,433,000+	Mag. V 452	Phase	J.D. 2,433,000+	Mag. V 452	Phase	J.D. 2,433,000+	Mag. V 452	Phase	J.D. 2,433,000+	Mag. V 452	Phase
831.94	-	-	894.95	21.03	.723	21.98	.439	952.70	-	-	21.44	.244		
832.95	22.13	.065	-	-	895.81	.48	.805	21.89	.482	953.70	22.22	.092	.44	.292
836.96	21.63	.431	22.46	.026	.99	.48	.823	22.10	.492	954.77	.22	.189	.67	.344
863.92	.61	.893	.39	.935	896.78	.61	.894	.07	.530	955.78	.01	.282	.77	.394
864.89	.72	.982	.26	.982	897.81	21.98	.988	.13	.580	977.69	22.29	.283	.95	.457
865.88	-	-	-	-	898.90	22.22	.088	.29	.632	.75	21.95	.288	21.77	.460
.97	21.92	.080	.26	.034	899.91	22.26	.180	.32	.682	978.69	.89	.374	22.22	.506
866.84	22.13	.159	22.39	.076	923.80	21.95	.632	.56	.841	979.69	.77	.465	.13	.554
867.91	.07	.257	21.63	.128	924.82	.50	.454	.46	.891	980.64	21.44	.552	.46	.600
868.91	22.04	.349	.32	.177	.94	.65	.466	.56	.896	981.62	20.91	.641	.39	.648
869.91	21.86	.440	21.41	.225	927.90	.44	.736	22.56	.040	.75	20.78	.653	22.39	.654
894.84	21.08	.717	-	-	951.70	21.41	.909	21.44	.195					

Table C. 100-inch photographic observations and phases of twenty-four Cepheids and two "Population II" variables of Field III.

J.D. 2,400,000+	Mag. H 21	Phase	J.D. 2,400,000+	Mag. H 22	Phase	J.D. 2,400,000+	Mag. H 23	Phase	J.D. 2,400,000+	Mag. H 24	Phase	J.D. 2,400,000+	Mag. H 25	Phase	J.D. 2,400,000+	Mag. H 26	Phase	J.D. 2,400,000+	Mag. H 27	Phase	J.D. 2,400,000+	Mag. H 28	Phase	J.D. 2,400,000+	Mag. H 29	Phase									
24,054.76	21.21	.191	-	-	20.75	.118	21.35	.109	(21.5	.627	21.44	.089	-	-	20.48	.044	20.78	.808																	
058.88	20.43	.432	20.27	.351	20.31	.353	.63	.344	21.42	.976	20.48	.248	19.94	.440	-	-	.78	.198	-	-															
090.88	.39	.298	-	-	19.45	.175	-	-	-	-	20.69	.766	.52	.392	-	-																			
108.70	20.35	.336	-	-	19.59	.191	21.26	.173	20.27	.187	.80	.150	.23	.504	.63	.057	-	-																	
115.80	(21.5	.750	21.44	.591	20.86	.596	-	-	(21.5	.787	20.86	.421	20.97	.799	.57	.322	-	-																	
117.80	(21.5	.867	21.44	.705	-	-	(21.5	.690	-	-	21.17	.498	-	-	-	-	20.47	.397	-	-															
147.72	-	-	20.43	.408	19.94	.413	(21.5	.389	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-							
151.72	(21.5	.844	-	-	-	-	-	-	(21.6	.823	.40	.791	-	-	-	-	15.24	.663	.78	.783	-	-													
171.65	(21.5	.006	21.44	.770	20.97	.776	-	-	21.44	.508	21.21	.554	(21.5	.113	20.45	.497	20.80	.805	-	-															
320.86	(21.5	.704	20.05	.263	19.59	.275	21.30	.222	20.35	.119	19.96	.246	20.97	.297	20.20	.977	(21.5	.461	-	-															
349.93	20.69	.399	(21.5	.918	21.21	.930	20.63	.872	21.26	.576	20.63	.357	.23	.502	.30	.062	21.44	.953	-	-															
353.94	-	-	-	-	19.59	.160	-	-	-	-	-	-	20.23	.668	.34	.212	-	-																	
357.87	(21.6	.862	20.35	.370	20.43	.382	21.65	.323	20.31	.247	21.26	.662	21.26	.831	.52	.358	(21.5	.360	-	-															
377.85	(21.6	.026	20.75	.507	20.86	.521	21.65	.458	21.31	.921	.11	.422	20.97	.659	.78	.104	(21.65	.385	-	-															
384.85	20.43	.434	21.52	.905	21.52	.920	20.72	.855	.26	.528	.48	.690	-	-	-	-	20.78	.366	20.68	.744	-	-													
387.78	21.26	.605	.44	.072	21.44	.086	21.16	.022	21.65	.775	21.44	.804	21.35	.070	19.80	.475	21.44	.893	-	-															
405.78	.35	.654	.44	.097	-	-	20.89	.044	20.50	.297	20.90	.491	.21	.816	20.43	.147	20.82	.217	-	-															
414.76	.17	.178	21.08	.608	20.97	.623	21.85	.554	20.97	.056	21.52	.832	21.44	.188	19.66	.482	(21.5	.278	-	-															
444.66	21.56	.921	20.06	.310	19.94	.326	.52	.252	21.44	.583	-	-	19.59	.427	18.90	.598	20.78	.812	-	-															
493.74	-	-	21.30	.103	20.86	.121	21.26	.039	21.48	.731	-	-	19.45	.461	20.57	.430	-	-																	
709.86	20.31	.380	20.63	.405	20.31	.431	21.44	.313	21.21	.998	21.52	.096	19.73	.418	18.52	.498	-	-																	
731.83	-	-	21.21	.656	-	-	-	-	-	.48	.856	.30	.686	20.97	.328	20.68	.318	(21.5	.544	-	-														
762.81	20.52	.467	20.63	.419	20.43	.447	.70	.320	21.26	.473	21.39	.119	20.58	.612	19.52	.474	21.62	.133	-	-															
770.78	-	-	-	-	(21.4	.901	-	-	20.52	.147	20.58	.424	21.08	.942	.80	.772	-	-																	
771.85	(21.5	.991	21.48	.935	21.44	.963	21.21	.829	20.63	.240	21.03	.470	.44	.990	19.85	.812	(21.5	.593	-	-															
772.97	-	-	-	-	20.97	.025	20.87	.897	-	-	-	-	-	-	-	-	-	20.30	.853	-	-														
800.70	21.30	.676	20.97	.576	21.21	.605	(21.5	.472	21.44	.676	.39	.568	21.65	.182	.05	.888	(21.6	.077	-	-															
908.63	21.48	.967	21.44	.719	-	-	(21.5	.601	-	-	21.44	.686	20.43	.655	20.30	.917	(21.5	.614	-	-															
25,063.95	-	-	20.75	.560	20.75	.598	-	-	21.30	.926	21.35	.616	21.44	.092	19.10	.715	(21.5	.583	-	-															
065.91	21.44	.136	21.30	.671	21.17	.710	-	-	20.61	.092	.48	.690	.35	.173	.24	.788	(21.5	.683	-	-															
083.87	20.69	.183	-	-	-	-	-	-	-	-	-	-	-	-	-	-	.94	.459	-	-															
091.91	-	-	-	-	19.45	.191	21.17	.009	20.97	.289	.30	.682	-	-	-	-	19.38	.759	-	-															
115.84	(21.5	.047	20.75	.514	20.97	.554	.65	.368	.63	.312	.44	.587	.30	.242	18.89	.652	-	-																	
116.81	21.52	.103	20.80	.569	21.30	.609	21.65	.423	20.97	.394	21.44	.632	21.21	.282	18.82	.688	(21.5	.295	-	-															
124.79	.34	.568	(21.5	.023	21.17	.063	20.63	.878	21.21	.068	(21.5	.936	-	-	-	-	20.52	.986	(21.52	.704	-	-													
147.66	.99	-	-	-	19.94	.325	20.35	.366	21.44	.175	.08	.001	(21.5	.810	20.43	.561	19.66	.840	-	-															
149.83	-	-	20.23	.343	.43	.385	.44	.194	21.21	.029	-	-	-	-	-	-	20.05	.852	-	-															
150.85	21.26	.098	20.87	.510	21.00	.545	21.48	.352	20.76	.270	21.52	.925	-	-	-	-	.20	.958	21.45	.032	-	-													
266.62	-	-	-	-	20.63	.141	-	-	20.65	.952	(21.5	.748	-	-	-	-	20.31	.351	-	-	20.63	.230	-	-											
475.84	-	-	21.44	.005	21.35	.058	21.21	.813	-	-	20.58	.337	21.44	.162	20.43	.090	21.35	.713	-	-															
27,684.80	21.44	.802	21.48	.739	21.52	.871	21.44	.260	21.21	.443	21.21	.663	20.97	.705	18.96	.546	21.92	.038	-	-</															

## VARIABLES IN THE ANDROMEDA GALAXY

Table C (continued)

J.D. 2,400,000+	Mag. H 30	Phase	Mag. H 31	Phase	Mag. H 33	Phase	Mag. H 36	Phase	Mag. H 37	Phase	Mag. H 38	Phase	Mag. H 39	Phase	Mag. H 40	Phase	Mag. H 41	Phase	
24,054.75	21.17	.993	20.69	.409	-	-	20.97	.056	20.53	.105	-	-	-	-	20.69	.634	20.75	.148	
058.88	19.94	.219	20.97	.591	20.97	.123	.80	.286	-	-	-	-	19.96	.456	.69	.757	-	-	
090.88	-	-	-	-	19.55	.821	.86	.072	-	-	-	-	-	-	20.69	.712	-	-	
108.70	-	-	-	-	19.80	.766	20.97	.067	21.03	.149	-	-	20.63	.535	19.68	.244	20.97:	.265	
115.80	20.86	.331	(21.5	.095	20.43	.143	21.35	.463	-	-	-	-	-	-	20.43	.456	-	-	
117.80	20.86	.440	(21.5	.184	20.75	.249	-	-	-	-	-	-	-	.52	.515	-	-		
147.72	19.59	.076	-	-	19.51	.838	20.80	.246	-	-	-	-	-	-	20.69	.527	19.94	.953	
151.72	20.69	.294	-	-	-	-	21.26	.469	-	-	-	-	-	-	20.69	.527	19.94	.953	
171.65	20.80	.384	20.86	.553	20.97	.106	21.26	.582	(21.3	.869	(21.5	.953	(21.5	.161	19.38	.122	21.08	.735	
320.86	21.56	.542	(21.5	.119	20.75	.019	-	-	20.63	.056	-	-	21.26	.386	20.43	.575	-	-	
349.93	19.73	.132	20.58	.398	19.59	.562	21.08	.534	21.35	.235	21.35	.560	-	-	.69	.442	-	19.94	.887
353.94	-	-	-	-	19.73	.774	-	-	-	-	-	-	-	-	-	-	-	-	
357.87	21.44	.566	21.44	.748	20.24	.983	21.44	.977	.44	.831	20.58	.344	(21.5	.930	20.69	.680	20.43	.042	
377.85	21.56	.658	20.97	.627	.58	.043	20.52	.002	.52	.329	.50	.318	21.42	.763	19.59	.275	.52	.826	
384.85	19.66	.041	21.56	.935	.52	.414	21.26	.483	21.21	.853	-	(21.5	.055	20.28	.485	.60	.100		
387.78	19.80	.201	(21.7	.064	.18	.569	.18	.646	20.75	.073	20.86	.299	(21.5	.178	20.86	.572	.86	.215	
405.78	-	-	-	-	.43	.524	21.27	.651	21.39	.422	21.21	.076	(21.5	.929	19.58	.110	.00	.921	
414.76	21.44	.676	(21.6	.251	.27	.001	20.42	.153	20.62	.096	(21.5	.963	21.44	.303	20.23	.377	.73	.274	
444.66	20.69	.310	-	-	-	-	-	-	-	-	-	-	20.56	.551	19.73	.270	-	-	
493.74	21.30	.994	-	-	20.43	.189	21.30	.562	20.75	.016	-	-	20.63	.598	20.69	.734	20.92	.373	
709.86	21.52	.809	(21.5	.236	19.31	.653	21.35	.627	21.08	.220	21.35	.108	-	-	19.73	.184	20.52	.852	
731.83	20.97	.010	(21.5	.203	19.80	.818	.26	.854	.52	.867	20.87	.278	-	-	20.75	.839	-	-	
762.81	21.70	.704	21.12	.567	20.58	.462	.35	.583	.35	.190	.68	.338	21.52	.823	20.72	.763	.25	.930	
770.78	19.59	.140	-	-	-	-	21.08	.028	-	-	.97	.125	-	-	-	-	20.75	.242	
771.85	20.43	.202	(21.5	.967	.49	.942	20.43	.085	21.23	.870	20.65	.234	(21.5	.198	19.52	.035	21.00	.285	
772.97	20.06	.260	-	-	.31	.001	20.42	.150	20.43	.952	-	-	-	-	19.66	.068	.21	.328	
800.70	21.56	.776	(21.5	.234	.80	.472	21.44	.698	20.82	.031	21.35	.080	20.78	.404	20.86	.894	21.21	.416	
908.63	(21.5	.676	(21.5	.983	20.97	.196	21.44	.723	21.08	.123	(21.5	.740	21.44	.907	19.38	.115	-	-	
25,663.95	19.94	.168	21.54	.818	20.48	.435	21.25	.394	-	-	21.35	.080	21.35	.387	-	-	-	-	
065.91	20.43	.275	(21.5	.904	20.35	.539	.35	.504	21.35	.915	20.52	.273	20.23	.469	-	-	20.66	.821	
083.87	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
091.91	21.48	.697	(21.5	.048	19.80	.918	21.08	.955	.21	.868	-	-	.43	.553	-	.61	.841	-	
115.84	21.21	.005	(21.5	.101	20.75	.187	20.87	.281	.45	.658	20.97	.205	-	-	19.94	.298	.96	.781	
116.81	19.59	.058	21.65	.144	20.63	.240	21.11	.345	.56	.731	-	-	20.78	.592	20.18	.327	.81	.819	
124.79	21.44	.494	20.63	.495	19.31	.602	21.44	.790	21.44	.330	21.39	.089	21.48	.925	20.58	.566	.36	.132	
147.66	.44	.744	.97	.501	.80	.875	-	-	20.97	.044	20.52	.347	21.31	.879	19.94	.248	.07	.030	
.99	-	-	.69	.515	19.66	.893	20.23	.085	.80	.069	-	-	-	-	20.12	.258	.22	.042	
149.83	.56	.858	20.97	.598	20.62	.991	.35	.182	20.97	.199	(21.5	.552	(21.5	.971	.12	.314	.56	.111	
150.85	21.52	.915	21.09	.641	.49	.043	20.76	.235	21.26	.282	21.60	.661	(21.5	.005	20.22	.344	20.71	.154	
266.62	20.43	.248	-	-	20.97	.185	-	-	20.43	.962	-	-	-	-	-	-	-	-	
475.84	21.35	.687	(21.5	.943	21.08	.283	21.08	.387	-	-	-	-	-	-	19.41	.041	20.22	.906	
27,684.80	21.26	.455	(21.5	.146	20.58	.453	21.44	.700	21.30	.260	(21.5	.925	-	-	20.06	.962	-	-	
28,161.73	21.44	.530	(21.5	.133	19.63	.664	21.11	.324	20.43	.071	21.35	.029	20.63	.623	19.66	.194	20.97	.818	
780.80	20.97	.376	20.40	.374	-	-	21.44	.883	-	-	20.80	.171	20.23	.450	20.86	.669	-	-	
781.77	-	-	.49	.417	19.63	.639	.44	.937	21.52	.503	20.80	.267	.23	.491	.58	.697	-	-	
782.77	21.52	.483	.63	.461	.45	.692	.44	.993	(21.5	.579	21.08	.365	20.18	.532	.63	.727	-	-	
783.78	.52	.539	20.92	.505	.52	.745	21.17	.049	(21.5	.653	.44	.465	-	-	-	-	-	-	
784.76	.52	.592	21.08	.548	.66	.797	20.35	.104	-	-	-	-	-	.79	.787	-	-	-	
785.75	.52	.646	.08	.592	.80	.850	.35	.159	21.35	.801	-	-	-	.83	.816	20.86	.774	-	
786.75	21.65	.701	.08	.636	19.94	.903	20.63	.215	21.39	.877	(21.7	.758	-	.86	.846	.58	.813	-	
786.73	-	-	21.30	.723	20.58	.008	21.12	.326	-	-	-	-	21.44	.781	20.86	.905	20.06	.891	
29,550.82	21.65	.474	-	-	-	-	-	-	-	-	-	-	-	20.97	.647	-	-	-	
851.88	21.39	.934	20.80	.506	20.86	.401	21.44	.675	21.30	.733	21.44	.955	21.92	.134	20.69	.632	-	-	
30,590.89	20.58	.337	(21.5	.025	19.59	.600	21.44	.930	20.80	.139	(21.5	.942	(21.6	.965	20.58	.686	-	-	
615.80	21.61	.699	(21.5	.122	20.31	.921	20.68	.320	20.58	.006	21.26	.403	(21.7	.004	20.39	.429	21.26	.577	
639.73	20.58	.007	(21.5	.175	.92	.190	21.30	.656	21.39	.800	.65	.766	21.80	.002	19.59	.142	.35	.516	
640.71	19.52	.061	(21.5	.218	20.97	.242	(21.3	.711	20.86	.874	21.65	.863	(21.6	.043	.59	.172	.44	.555	
669.65	21.48	.643	20.86	.491	19.66	.778	20.80	.327	20.69	.044	(21.8	.721	(21.6	.251	.94	.035	21.21	.690	
670.64	21.65	.697	20.86	.535	19.66	.830	21.20	.382	21.01	.118	21.75	.819	22.04	.292	19.52	.065	20.96	.729	
964.85	21.75	.782	20.92	.481	20.58	.436	21.48	.806	21.08	.176	21.75	.876	-	-	20.75	.843	20.86	.273	
32,387.97	21.61	.587	22.25	.104	20.06	.923	20.75	.250	21.52	.871	21.52	.429	21.80	.938	20.23	.314	20.46	.110	
	H 42		H 45		H 46		V 290		V 298		V 395		V 396		V 446				
24,054.75	18.66	.309	-	-	-	-	20.75	.235	.062	-	-	-	21.26	-	-	-	-	-	
058.88	.75	.333	-	-	21.44	-	-	-	-	-	-	-	20.86	-	-	-	-	-	
090.88	.40	.514	-	-	-	-	20.52	20.48	.742	-	-	.43	-	-	-	-	-	-	
108.70	18.65	.614	21.26	.434	21.17	-	21.30	20.79	.064	-	-	.69	-	-	-	-	-	-	
115.80	19.05	.654	-	-	20.70	-	20.97	-	-	21.35	.781	.48	-	21.08	.795	-	-	-	
117.80	18.95	.665	-	-	-	-	.97	21.07	.739	-	-	.52	-	-	-	-	-	-	
147.72	19.73	.834	-	-	-	-	-	20.58	.959	-	-	.52	-	-	-	-	-	-	
151.72	20.18	.857	20.69	.771	-	-	20.43	-	-	-	-	20.86	-	-	-	-	-	-	
171.65	20.18	.970	-	-	(21.5	-	21.03	20.35	.734	-	-	21.26	-	-	-	-	-	-	

Table C (continued)

J. D. 2,400,000+	Mag. H 42	Phase	Mag. H 45	Phase	Mag. H 46	Phase	Mag. V 290	Phase	Mag. V 298	Phase	Mag. V 395	Phase	Mag. V 396	Phase	Mag. V 446	Mag. Phase	
24,320.86	19.72	.814	20.92	.894	20.97	-	21.08	-	20.52	.804	-	-	20.63	-	-	-	
349.93	.66	.981	21.17	.150	20.86	-	20.43	-	20.97	.921	21.26	.578	20.92	-	-	-	
353.94	.72	.003	-	-	-	.35	-	-	-	-	-	-	-	-	-	-	
357.87	.60	.026	20.80	.766	-	-	.43	-	21.12	.550	20.43	.318	21.17	20.63	.326	-	
377.85	.90	.139	(21.5	.316	21.17	-	20.80	-	21.17	.032	.69	.178	.44	21.07	.740	-	
384.85	.25	.178	20.97	.859	21.15	-	21.03	-	-	-	-	.26	20.63	.236	-	-	
387.78	19.39	.195	21.26	.086	20.75	-	20.86	20.43	.769	20.53	.102	21.17	.43	.443	-	-	
405.78	18.70	.296	.07	.483	-	-	21.08	-	.86	.104	-	20.27	-	-	-	-	
414.76	.55	.347	21.44	.180	20.86	-	20.48	.97	.69	.770	21.17	.614	.52	20.35	.352	-	
444.66	18.60	.516	-	-	-	-	.97	20.58	.988	20.80	.397	20.97	-	-	-	-	
493.74	19.60	.793	(21.3	.308	21.08	-	20.31	-	21.12	.630	21.30	.967	21.21	-	-	-	-
709.86	20.45	.018	21.26	.076	20.52	-	20.69	-	21.26	.663	21.17	.089	20.86	20.75	.237	-	
731.83	19.73	.141	20.69	.780	-	-	21.21	.18	.293	20.69	.134	20.43	21.35	.792	-	-	
762.81	18.50	.317	21.30	.184	20.58	-	20.63	.26	.591	21.44	.018	21.21	.35	.984	-	-	
770.78	.25	.362	20.69	.802	-	-	.43	.30	.183	-	-	.44	-	-	-	-	
771.85	.55	.367	21.15	.887	21.08	-	.55	.30	.263	-	-	21.37	21.00	.621	-	-	
772.97	.55	.374	-	-	-	-	.43	-	-	-	-	-	-	-	-	-	
800.70	18.55	.531	.26	.124	20.45	-	.97	.37	.402	-	-	20.35	20.85	.665	-	-	
908.63	19.80	.140	21.52	.498	21.24	-	20.35	-	21.52	.409	-	-	20.35	-	-	-	
25,063.95	20.18	.022	21.08	.548	21.12	-	21.26	-	20.86	.932	21.21	.054	20.63	20.43	.296	-	
065.91	20.23	.033	20.31	.701	.44	-	21.12	21.35	.078	20.23	.237	.58	.23	.434	-	-	
082.87	19.90	.135	-	-	-	-	20.52	-	-	-	-	20.43	-	-	-	-	
091.91	19.53	.180	-	-	-	-	.43	20.73	.006	-	-	21.21	-	-	-	-	
115.84	18.45	.317	-	-	.08	.69	-	-	-	-	.35	-	-	-	-	-	
116.81	.70	.321	19.94	.650	21.20	.52	-	20.43	.854	(21.3	.976	.26	-	-	-	-	-
124.79	.25	.366	21.44	.269	20.65	-	20.86	21.39	.446	21.44	.718	21.26	.73	.601	-	-	
147.66	.60	.495	21.08	.043	-	-	21.08	-	-	-	-	20.97	.97	.220	-	-	
.99	.40	.497	-	-	-	-	20.97	.17	.167	-	-	20.97	-	-	-	-	
149.83	.50	.507	(21.5	.204	.63	-	21.14	-	-	-	-	21.13	.35	.366	-	-	
150.85	18.50	.513	21.44	.278	.75	-	20.83	-	21.43	.379	20.91	.144	20.97	20.43	.434	-	
266.62	19.25	.169	-	-	20.52	-	-	20.53	.968	-	-	21.21	-	-	-	-	
475.84	18.20	.353	21.26	.506	21.15	-	20.97	-	21.44	.490	20.80	.402	21.08	20.52	.445	-	
27,684.80	19.85	.856	20.75	.892	20.97	-	20.43	-	21.35	.368	21.21	.058	20.52	21.44	.773	-	
28,161.73	19.60	.555	-	-	21.26	-	20.43	-	20.52	.750	21.14	.461	21.44	20.63	.525	-	
780.80	-	-	21.17	.928	-	-	20.52	-	21.35	.678	21.08	.097	21.08	20.23	.337	-	
781.77	20.65	.065	.44	.003	21.15	.35	-	20.52	.750	-	-	.35	.23	.406	-	-	
782.77	.70	.071	21.52	.081	20.75	.43	-	-	-	20.52	.280	.44	.52	.477	-	-	
783.78	.60	.076	(21.5	.159	21.30	.27	-	.87	.899	20.98	.374	.17	20.63	.548	-	-	
784.76	.30	.082	21.44	.235	20.63	.35	-	-	-	-	-	.08	21.24	.617	-	-	
785.75	20.18	.088	.52	.312	21.05	.43	-	20.97	.045	21.21	.558	.26	.36	.687	-	-	
786.75	19.80	.093	.44	.390	20.85	-	20.52	-	21.17	.119	21.44	.651	.21	21.26	.758	-	
788.73	19.90	.104	21.21	.543	20.97	-	-	-	-	-	-	-	21.21	-	-	-	
29,550.82	18.75	.417	-	-	-	-	21.26	-	-	-	-	-	20.69	21.44	.831	-	
851.88	19.45	.122	21.26	.030	21.44	-	21.03	-	21.08	.139	21.65	.816	21.08	21.21	.137	-	
30,590.89	18.30	.304	(21.4	.367	21.35	-	21.30	.992	20.97	.965	21.35	.618	21.35	20.43	.437	-	
615.80	.75	.445	21.65	.300	.30	-	20.63	.358	20.43	.813	21.44	.938	20.43	20.85	.200	-	
639.73	.80	.581	.52	.156	.12	-	.63	.710	21.17	.588	20.53	.165	.52	21.56	.893	-	
640.71	18.80	.586	.65	.233	.35	-	20.72	.724	21.30	.661	20.39	.256	.86	.61	.963	-	
669.65	19.90	.750	21.30	.478	.35	-	21.08	.151	20.48	.808	21.65	.951	.97	-	-	-	
670.64	19.95	.756	20.92	.555	21.44	-	21.21	.166	20.58	.881	21.17	.042	20.80	21.55	.081	-	
964.85	18.50	.421	21.44	.382	21.26	-	20.52	.494	21.17	.708	21.21	.434	20.43	21.62	.902	-	
32,387.97	18.70	.476	20.87	.797	21.35	-	20.52	.437	21.44	.287	21.44	.928	21.17	20.89	.616	-	

Table D. 200-inch photographic observations and phases of eighteen eclipsing binaries in Field III.																		
J. D. 2,433,000+	Mag. V 205	Phase	Mag. V 206	Phase	Mag. V 212	Phase	Mag. V 217	Phase	Mag. V 245	Phase	Mag. V 255	Phase	Mag. V 276	Phase	Mag. V 301	Mag. V 303		
474.96	22.42	.394	21.55	.354	21.39	-	21.63	.517	21.99	.812	21.32	.901	21.32	.897	21.23	.621	21.41	.241
475.96	-	-	.44	.589	.39	-	.66	.545	.21	.934	.18	.013	.28	.097	.21	.677	.26	.347
476.95	.65	.681	.32	.821	.35	-	.73	.573	.21	.054	.01	.123	.28	.295	.16	.733	.18	.452
477.95	.79	.825	.33	.055	.71	-	.47	.602	.16	.176	.16	.234	.18	.494	.06	.790	.30	.558
479.93	-	-	.73	.520	.81	-	.87	.658	.35	.417	.59	.455	.46	.890	.26	.900	.87	.767
480.96	.56	.258	.81	.761	.71	-	.57	.683	.11	.542	.18	.570	.26	.096	21.81	.958	.23	.876
481.96	-	-	.55	.995	.52	-	.81	.717	.21	.664	.06	.681	.23	.296	22.00	.014	.21	.981
482.92	.59	.540	.99	.221	21.57	-	.93	.744	.26	.781	.32	.788	.28	.487	21.99	.068	.18	.083
503.87	.62	.557	.50	.132	22.23	-	.71	.340	.11	.331	.06	.121	.26	.673	.28	.242	.42	.299
504.95	.52	.713	.59	.385	.36	-	.65	.370	.20	.462	.06	.242	.57	.889	.20	.302	.24	.413
505.90	.49	.850	.68	.608	22.23	-	.68	.398	.35	.578	.59	.347	.37	.079	.35	.356	.18	.514
506.87	22.65	.989	.73	.836	21.99	-	.93	.426	21.21	.696	.39	.455	.23	.272	.48	.410	.35	.617
507.87	23.17	.133	.66	.070	22.56	-	.90	.455	22.56	.818	.23	.567	.18	.472	21.96	.466	.39	.722
508.88	22.56	.279	.59	.307	-	-	.99	.484	21.30	.941	.06	.680	.30	.674	22.13	.523	.84	.829
509.89	.49	.424	.78	.544	.42	-	.81	.512	.21	.064	.32	.792	.59	.876	21.81	.579	.37	.936
510.89	.69	.568	.81	.778	.42	-	.96	.541	.21	.185	.32	.904	.23	.076	.26	.635	.13	.042
511.85	.56	.706	21.50	.003	.69	-	.84	.568	.30	.302	.37	.010	.30	.268	.18	.680	.21	.143
512.87	22.56	.853	22.05	.242	.56	-	21.78	.598	.21	.426	.01	.123	.37	.471	.21	.746	.44	.251
513.81	-	-	21.50	.463	-	-	22.16	.624	.11	.541	.08	.228	.13	.659	.18	.799	.39	.351
514.88	23.17	.143	21.66	.714	22.96	-	21.87	.653	21.38	.671	21.52	.347	21.71	.873	21.42	.859	21.37	.464

## VARIABLES IN THE ANDROMEDA GALAXY

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Table D (continued)

J. D. 2,433,000+	Mag. V 205	Phase	Mag. V 206	Phase	Mag. V 212	Phase	Mag. V 217	Phase	Mag. V 245	Phase	Mag. V 255	Phase	Mag. V 276	Phase	Mag. V 301	Phase	Mag. V 303	
536.83	22.42	.303	21.44	.860	-	-	21.76	.278	21.34	.343	21.18	.792	21.23	.259	21.66	.089	22.49	.785
537.80	.56	.443	.73	.087	-	-	.57	.306	.06	.461	.44	.900	.21	.452	.28	.144	21.35	.888
538.80	.90	.587	.78	.322	22.89	-	.59	.334	.06	.583	.11	.011	.26	.652	.23	.200	.21	.994
539.80	-	-	.42	.556	-	-	.45	.363	21.30	.704	.01	.123	.74	.852	.08	.256	.21	.099
540.86	.56	.884	.57	.805	-	-	.45	.393	22.56	.833	.03	.241	.23	.064	.23	.315	.37	.211
541.81	-	-	.46	.027	-	-	.81	.420	21.21	.949	.26	.347	.23	.254	.21	.368	.30	.312
546.80	.62	.331	.66	.417	22.23	-	.71	.074	21.26	.747	.35	.907	.64	.847	.11	.657	.44	.744
545.75	.72	.468	.59	.640	21.81	-	.76	.101	22.16	.863	.48	.973	.21	.037	.32	.710	.71	.845
546.74	-	-	.52	.872	22.23	-	.46	.130	21.26	.984	.26	.123	.42	.235	.08	.766	.21	.950
547.75	.49	.756	.83	.109	22.05	-	.73	.159	.26	.106	.18	.236	.18	.426	.28	.822	.26	.057
545.74	.56	.042	.57	.575	21.93	-	.44	.216	.26	.349	.39	.457	.71	.834	.76	.934	.44	.266
547.85	.69	.202	.66	.836	21.81	-	.71	.247	.30	.484	.23	.581	.30	.056	.90	.996	.39	.385
541.83	.56	.343	.57	.065	22.23	-	.44	.275	.11	.603	.08	.690	.23	.252	.99	.051	.30	.488
542.84	.52	.489	.76	.302	.10	-	.63	.304	21.35	.726	.30	.803	.42	.453	.39	.108	.39	.595
543.88	.65	.639	.50	.546	22.36	-	21.66	.333	22.42	.853	.35	.919	.21	.661	.13	.166	.28	.705
540.65	.56	.054	.61	.478	21.71	-	22.34	.810	21.61	.894	.30	.786	.18	.012	.90	.106	.32	.479
541.70	.69	.205	.59	.724	.71	-	.46	.840	.35	.022	.35	.903	.23	.221	.26	.165	.42	.590
542.69	.42	.347	.63	.956	.61	-	.49	.868	.30	.142	.26	.013	.16	.419	.21	.220	21.39	.695
543.69	.56	.491	.73	.191	.57	-	.39	.897	.26	.264	.28	.619	.23	.276	22.33	.800		
544.76	22.59	.645	21.68	.441	21.44	-	22.23	.927	21.21	.394	21.28	.244	21.71	.833	21.32	.336	21.37	.914
831.94	-	-	21.39	.048	-	-	21.54	.677	21.11	.264	20.96	.661	21.37	.222	21.21	.630	-	-
832.95	22.56	.945	21.96	.285	21.44	-	21.93	.706	.11	.387	21.18	.774	.30	.423	.11	.687	21.13	.110
836.96	.65	.522	22.05	.225	.93	-	22.26	.820	.99	.875	.08	.221	.26	.225	.52	.912	.32	.534
863.92	.56	.404	21.54	.546	.61	-	21.81	.587	.21	.156	.11	.223	.26	.611	21.81	.423	.26	.386
864.89	.52	.544	.76	.773	.48	-	.52	.615	.21	.274	.23	.332	.64	.805	22.16	.477	.23	.488
865.88	-	-	.61	.005	.61	-	.84	.643	.21	.395	.30	.442	.37	.003	-	-	.26	.593
.97	.56	.700	21.55	.027	.44	-	.71	.646	.30	.406	.28	.452	.30	.021	22.10	.538	.32	.603
866.84	.56	.825	22.13	.231	.76	-	21.61	.671	.21	.516	.18	.549	.30	.195	21.96	.586	21.30	.694
867.91	22.42	.979	21.55	.481	.71	-	22.10	.701	.38	.642	.08	.668	.18	.408	.23	.646	22.52	.808
868.91	23.17	.123	.68	.716	.35	-	21.78	.729	.21	.764	.26	.780	.32	.608	.16	.702	21.44	.913
869.91	22.56	.267	.46	.950	.66	-	22.10	.758	.93	.885	21.37	.891	.74	.808	.26	.758	.16	.019
894.84	.69	.857	.50	.795	.66	-	22.10	.467	.30	.920	20.99	.667	.46	.789	.21	.157	.39	.656
895.81	.56	.997	.49	.867	.81	-	21.83	.469	.30	.328	21.18	.675	.46	.803	.21	.160	.35	.663
.99	22.56	.024	21.68	.067	.71	-	21.73	.500	.28	.062	.42	.787	.35	.021	22.21	.221	22.45	.779
896.78	23.17	.136	22.20	.250	.35	-	22.13	.522	.16	.156	.42	.883	.13	.177	.18	.264	21.42	.861
897.81	22.56	.285	21.35	.491	.52	-	21.90	.551	.21	.281	.35	.998	.45	.382	.30	.322	.26	.970
898.90	.56	.442	.66	.747	.65	-	22.02	.583	.26	.414	.06	.119	.32	.600	.37	.383	.21	.085
899.91	.59	.587	.52	.984	.61	-	22.07	.611	.21	.537	.11	.232	.37	.802	.93	.440	.32	.192
923.80	.52	.027	.28	.585	.57	-	21.78	.291	.30	.445	.52	.893	.23	.575	.13	.779	21.18	.719
924.82	-	-	.50	.824	.71	-	.52	.320	.30	.569	.26	.007	.44	.779	.21	.836	22.05	.827
.94	-	-	.66	.852	.44	-	.59	.324	.26	.583	.21	.021	.59	.803	.39	.843	21.87	.839
927.90	-	-	.71	.546	.30	-	-	-	21.21	.944	.37	.350	.23	.394	-	-	.21	.154
951.70	.65	.045	.40	.126	.48	-	.61	.085	22.56	.841	.42	.000	.18	.150	21.32	.343	.37	.670
952.70	-	-	.68	.360	-	-	.78	.114	21.11	.963	.13	.111	.40	.349	-	-	.93	.776
953.70	.56	.333	.84	.595	.44	-	.52	.142	.33	.084	.16	.223	.11	.549	22.05	.455	.35	.882
954.77	.56	.487	.66	.846	.61	-	.52	.173	.30	.215	.30	.342	.28	.763	22.10	.515	.30	.985
955.78	.65	.632	21.73	.083	.99	-	21.59	.201	.30	.337	.37	.455	.18	.965	21.71	.571	.32	.102
977.69	.42	.787	22.13	.219	.76	-	22.33	.825	.30	.004	.48	.895	.32	.342	.18	.800	.31	.420
.75	-	-	21.96	.233	.93	-	-	-	.21	.012	.34	.902	.34	.354	.18	.803	.27	.426
978.69	.43	.931	.73	.454	.66	-	.56	.853	.21	.126	.26	.007	.26	.542	.28	.855	.26	.526
979.69	.59	.075	.52	.688	.44	-	.39	.882	.40	.248	.08	.118	.18	.742	.30	.912	.37	.632
980.64	.42	.212	.76	.911	.44	-	.33	.909	.21	.363	.26	.224	.13	.932	.87	.965	.30	.732
981.62	.45	.353	.55	.141	.44	-	.20	.937	.21	.483	.32	.333	.16	.128	.96	.020	.93	.836
.75	22.65	.372	21.73	.171	21.50	-	22.06	.940	21.21	.499	21.35	.348	21.23	.154	21.87	.027	21.48	.849
	V 308	V 312	V 323	V 381	V 388*	V 401	V 432	V 442	V 457*									
474.96	20.20	.025	21.93	.977	21.35	.335	21.44	.628	19.38	.266	21.26	.731	21.76	.068	20.58	.562	20.38	.711
475.96	.07	.227	-	-	-	-	.46	.833	.38	.275	.52	.853	-	-	.76	.667	20.32	.109
476.95	.12	.427	.87	.384	.06	.441	.59	.037	.38	.284	.13	.974	.87	.098	.73	.770	21.14	.503
477.95	.10	.629	.84	.588	.16	.494	.23	.242	.24	.293	.35	.095	.76	.112	.86	.874	20.61	.901
479.93	.20	.030	21.76	.992	21.01	.600	.32	.649	.24	.311	.78	.335	.76	.142	.86	.081	.41	.690
480.96	.15	.238	22.02	.202	20.96	.655	.78	.861	.10	.320	.16	.461	.76	.157	.91	.188	20.46	.100
481.96	.38	.441	21.76	.406	21.28	.708	.30	.067	.17	.329	.28	.582	.66	.172	.86	.292	.21	.16
482.92	.04	.635	22.16	.602	.32	.759	.50	.264	.24	.338	.21	.699	.81	.187	.83	.393	.20	.588
503.87	.10	.870	21.81	.880	.46	.876	.52	.570	.24	.527	.23	.245	.93	.500	.78	.579	.53	.222
504.95	.05	.089	.84	.100	.37	.934	.45	.792	.38	.536	.39	.377	.66	.515	.82	.691	.20	.56
505.90	.10	.281	.81	.294	21.16	.985	.35	.988	.38	.545	.39	.492	.76	.530	.68	.790	21.06	.030
506.87	20.56	.477	21.78	.493	20.96	.036	21.44	.187	.24	.554	.35	.610	.81	.545	.73	.887	20.63	.416
507.87	19.87	.679	22.92	.697	.96	.089	22.23	.393	.31	.563	.35	.731	.61	.560	.81	.995	.38	.815
508.88	20.17	.883	21.93	.903	20.96	.143	.21	.600	.31	.572	.55	.854	.76	.575	20.81	.101	.34	.217
509.89	.10	.087	.78	.109	21.13	.197	.50	.808	.24	.581	.13	.977	.66	.590	21.01	.207	.20	.41
510.89	.07	.290	.73	.313	.53	.250	.50	.013	.52	.590	.23	.098	.57	.605	20.73	.311	21.16	.017
511.85	20.76	.484	21.96	.509	.44	.302	21.39	.211	.52	.599	.11	.215	.71	.620	20.86	.411	20.61	.399
512.87	19.97	.690	22.05	.718	.52	.356	22.10	.420	.38	.608	.74	.339						

Table D (continued)

J.D. 2,433,000+	Mag. V 308	Phase	Mag. V 312	Phase	Mag. V 323	Phase	Mag. V 381	Mag. V 388*	Phase	Mag. V 401	Phase	Mag. V 432	Phase	Mag. V 442	Phase	Mag. V 457*		
590.65	20.07	.415	21.90	.599	21.13	.505	22.39	.408	19.10	.310	21.18	.793	21.87	.790	20.71	.635	20.15	.766
591.70	20.04	.627	.81	.813	.08	.561	21.52	.624	.17	.319	.37	.921	.87	.805	.71	.644	.41	.194
592.69	19.98	.827	.87	.015	.01	.614	.35	.827	.10	.328	.35	.041	21.93	.820	.73	.848	20.48	.588
593.69	20.04	.030	.90	.220	.08	.668	.26	.033	.17	.337	.35	.163	22.10	.835	.71	.952	21.24	.987
594.76	20.07	.246	21.84	.438	21.08	.724	21.44	.253	19.10	.346	21.18	.293	22.10	.850	20.58	.063	20.41	.413
831.94	19.94	.198	—	—	21.52	.376	21.57	.005	19.45	.479	21.30	.122	—	—	20.76	.813	20.48	.852
832.95	.98	.402	21.78	.072	21.30	.429	.32	.213	.52	.488	.23	.245	—	—	.68	.919	.48	.254
836.96	.87	.212	.73	.890	20.96	.643	.26	.032	.38	.524	.35	.732	21.76	.455	20.78	.337	.38	.851
863.92	.98	.663	.84	.395	21.07	.082	.39	.579	.24	.767	.23	.009	.87	.856	21.30	.150	20.46	.586
864.89	19.94	.859	.99	.593	20.96	.133	.52	.778	.03	.776	.32	.127	.87	.871	20.76	.251	21.26	.972
865.88	—	—	.81	.795	21.16	.186	.35	.982	.10	.785	.39	.248	—	—	.66	.355	20.63	.366
.97	20.07	.075	.84	.813	.21	.191	.39	.000	—	—	.13	.259	.82	.886	.61	.364	.81	.402
866.84	.04	.253	.84	.991	.33	.237	21.32	.179	.17	.794	.96	.364	.66	.901	.81	.454	.29	.748
867.91	20.46	.470	.79	.210	.55	.294	22.49	.399	.38	.803	.16	.494	.76	.916	.71	.566	.48	.174
868.91	19.80	.672	21.84	.414	.39	.347	21.44	.604	.24	.812	.18	.616	21.61	.931	.86	.670	20.36	.572
869.91	20.22	.874	22.10	.618	.55	.401	.48	.810	19.24	.821	.11	.737	—	—	.61	.774	21.09	.971
894.94	.20	.914	22.16	.709	.35	.731	.71	.934	20.17	.046	.32	.768	22.23	.317	.78	.376	20.66	.895
.95	.15	.928	21.99	.723	.08	.735	.61	.949	.22	.046	.23	.776	.36	.318	20.71	.383	.76	.926
895.81	.04	.110	.81	.906	.48	.783	.50	.134	.22	.055	.39	.886	.36	.332	21.03	.477	.34	.284
.99	.04	.149	.87	.945	.55	.793	.44	.173	—	—	.23	.910	.42	.333	21.57	.498	.30	.360
896.78	.01	.306	.87	.104	.57	.834	.44	.333	.07	.064	.28	.003	.42	.347	20.66	.578	.34	.671
897.81	.50	.515	.81	.315	.48	.889	.37	.545	20.07	.073	.30	.129	.30	.362	.78	.685	.51	.081
898.90	.04	.735	.81	.537	.21	.947	.57	.769	19.94	.082	21.23	.261	.36	.377	.86	.799	.96	.515
899.91	.10	.939	21.96	.744	.18	.001	.46	.976	.73	.091	22.05	.384	22.42	.392	.86	.904	20.56	.917
923.80	.04	.769	22.49	.621	.56	.276	.61	.887	.10	.307	21.32	.288	21.87	.749	20.63	.398	21.06	.429
924.82	.17	.975	21.84	.830	.44	.330	.41	.097	.31	.316	.39	.412	.84	.764	21.50	.503	20.41	.835
.94	.15	.000	.76	.854	.37	.336	.30	.121	—	—	.30	.426	—	—	21.33	.517	.45	.883
927.90	.35	.598	.76	.459	.16	.494	.50	.730	.38	.343	.39	.786	.87	.809	20.65	.826	.73	.062
951.70	.17	.410	.84	.318	.30	.763	.37	.622	.38	.559	.39	.679	.87	.161	.61	.310	20.66	.538
952.70	.04	.612	.87	.522	.44	.816	.39	.827	.59	.568	.26	.800	.81	.176	20.71	.414	21.04	.938
953.70	.10	.814	.81	.726	.71	.870	.50	.033	.45	.577	.16	.922	.87	.191	21.26	.518	.20.48	.335
954.77	.27	.031	.78	.945	.44	.927	.39	.253	.45	.586	.16	.052	.81	.206	20.76	.630	.30	.760
955.78	.04	.235	21.78	.151	.32	.981	.63	.460	.24	.595	.39	.175	.98	.222	.78	.736	.32	.173
977.69	.12	.664	22.20	.625	.18	.149	.50	.964	.20	.793	.28	.838	.81	.748	.81	.022	.53	.887
.75	.12	.677	22.42	.637	.06	.153	.45	.976	—	—	.42	.845	.81	.749	.76	.028	.83	.910
978.69	.07	.867	21.78	.829	.06	.203	.37	.170	.31	.802	.23	.960	.81	.763	.83	.126	.30	.285
979.69	20.20	.069	.81	.033	.18	.256	.90	.375	.10	.811	.23	.081	.76	.778	.71	.231	.30	.683
980.64	19.87	.261	.84	.227	.39	.307	.41	.570	.10	.820	.36	.197	.81	.793	.73	.330	20.38	.061
981.62	20.37	.459	.87	.427	.48	.359	.41	.772	19.10	.829	.40	.316	.76	.808	.78	.432	21.06	.451
.75	20.54	.485	21.84	.454	21.37	.366	21.39	.799	—	—	21.74	.332	21.81	.809	20.81	.445	21.21	.503

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