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FAR-ULTRAVIOLET STELLAR PHOTOMETRY: A FIELD IN ORION

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ABSTRACT

Far-ultraviolet photometry for 625 objects in Orion is presented. These data were extracted from electrographic camera images obtained during sounding rocket flights in 1975 and 1982. The 1975 images were centered close to the belt of Orion while the 1982 images were centered ~9° further north. One hundred and fifty stars fell in the overlapping region and were observed with both cameras. Sixty-eight percent of the objects were tentatively identified with known stars using the SIMBAD database while another 24% are blends of objects too close together to separate with our resolution. As in previous studies, the majority of the identified ultraviolet sources are early-type stars. However, there are a significant number for which no such identification was possible, and we suggest that these are interesting objects which should be further investigated. Seven stars were found which were bright in the ultraviolet but faint in the visible. We suggest that some of these are nearby white dwarfs.

Subject headings: open clusters and associations: individual (Orion Association) — stars: early-type — surveys — techniques: photometric — ultraviolet: stars — white dwarfs

1. INTRODUCTION

Previous papers have reported results from an ongoing far-ultraviolet survey of various star fields (Carruthers & Page 1983, 1984a, b, c; Schmidt & Carruthers 1993, [hereafter Paper I]). The present paper presents data for a field in Orion.

2. OBSERVATIONS

The data presented in this paper were extracted from five far-ultraviolet images, obtained by Naval Research Laboratory electrographic cameras aboard NASA sounding rocket flights on 1975 December 6 (NASA Aerobee flight 13.118 DG) and on 1982 November 15 (flight 17.019 DG). The same images from the 1975 flight were used in a study of interstellar matter in Orion (Carruthers & Opal 1977a, b). The 1982 images were obtained on the same flight and with the same camera as the images in Monoceros discussed in Paper I. Information on the instrumentation is given in the previous papers but we plot the response functions in Figure 1 so they can be compared directly. The camera used in 1975 was sensitive from ~1230 to 2000 Å with an effective wavelength for flat photon flux distribution of 1519 Å. The camera used in 1982 was sensitive from ~1230 to 1650 Å with an effective wavelength of 1367 Å.

The two 1975 images analyzed here had exposure times of 30 and 100 s and were centered at $\alpha_{1950} = 5^h35^m$, $\delta_{1950} = -1°36'$. The 1982 images had exposure times of 9.5, 19.5, and 64.4 s and were centered at $\alpha_{1950} = 5^h24^m$, $\delta_{1950} = 7°15'$. With a field diameter of a little more than 20°, about one-half of the total field area was included in both sets of images. Figure 2 (Plate 8) shows a print of one frame from the 1982 field. Carruthers & Opal (1977a) published a print and contour plots of the 1975 field.

3. THE REDUCTIONS

The reductions were carried out in exactly the same fashion and at the same time as the reductions for the study of Monoceros (Paper I); the details will not be repeated here. However, a few salient points will be mentioned. As noted previously, the star image diameters are not constant across the field and the FWHM ranges from ~ 2'.5 at the center to FWHM ~ 5' at the edge for the 1982 images. For the 1975 images the range is from ~ 3'.0 to ~ 6'.7. The same correction curve for saturation and dependence of saturation on location was adopted for the 1982 images as previously but they were redetermined for the 1975 data. The change in the saturation magnitude from field center to edge for the 1975 data was 1.2 mag which is smaller than the value of 2.3 mag found for the 1982 data.

To transform the coordinates of the objects to the celestial coordinate system more than 110 objects were identified with SAO stars in each set of images. The coordinate fits had rms scatter ranging from 2'.8 to 5'.0. Photometric calibration was performed using stars from the *IUE* archives which were also among those identified with our objects. After deleting all stars identified in Table 1 as blends (see below), there were 51 stars available to calibrate the 1975 images and 41 for the 1982 images. The differences between our instrumental magnitudes and those derived by convolving *IUE* spectra with the response functions in Figure 1 had an rms scatter of 0.61 mag (1975 images) and 0.39 mag (1982 images). Given the number of calibrating stars our magnitude zero points have standard errors slightly less than 0.1 mag.

Magnitudes for a total of 625 objects were extracted. Of these, 175 were observed only in the 1367 Å band, 300 were observed only in the 1519 Å band, and 150 were observed in both bands. Table 1 lists the stars observed. The coordinates

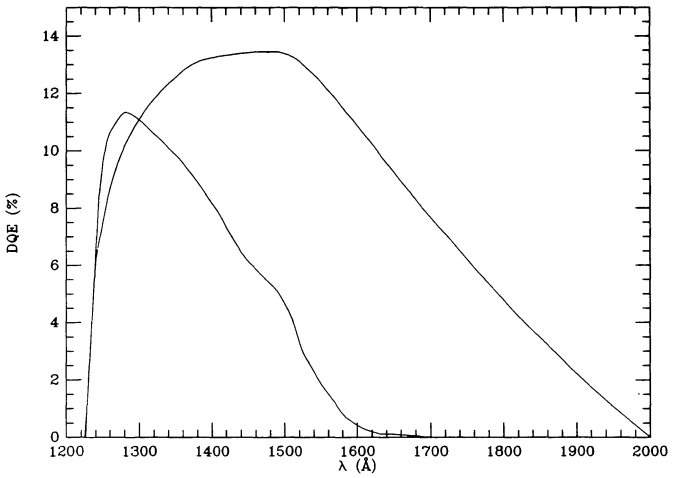

FIG. 1.—Overall detection quantum efficiency as a function of wavelength for the electrographic Schmidt cameras used in this project based on laboratory measurements using the camera as a photodiode in comparison with an NBS-calibrated photodiode. The broader response function which extends to longer wavelengths is for the 1975 flight and the narrower function corresponds to the camera used in the 1982 flight.

determined from our frames are given in columns (2) and (3) while the ultraviolet magnitudes (on the same system as used in Paper 1) are in columns (4) and (5).

4. STAR IDENTIFICATIONS

As before, we used the SIMBAD database to make optical identifications of as many objects as possible. These are listed in column (6) of Table 1. When more than one objects which might plausibly contribute to the ultraviolet flux fell within the camera's resolution we have indicated this by the word "Blend" in column (6). For 42 ultraviolet objects, no corresponding star was found in the SIMBAD database. Column (7) of Table 1 gives the magnitude of the identified star from the SIMBAD database. Most of these are V magnitudes but when only photographic magnitudes are present these have been listed followed by a P. In cases of blends, the combined magnitude is given. The spectral types from the database are listed in column (8). For blends the types of all the stars included in the magnitude are listed in the order of brightness.

5. DISCUSSION

There are 94 stars in Table 1 which have a V magnitude attributed to a single star and both ultraviolet magnitudes. For these stars we formed the colors $(m_{1367} - m_{1519})$, $(m_{1367} - V)$, and $(m_{1519} - V)$. Figure 3 presents plots of the first of these colors against the others. There were three deviant points which fell outside of the range of each plot. The solid lines have slopes calculated from the effective wavelengths using the approximate formula given by Sterken & Manfroid (1992) and zero points chosen to minimize the scatter (with a few discrepant points ignored). Although the adopted slopes are approximate, they provide a satisfactory fit. The rms scatter of the points about the lines is 0.275 and 0.321 for Figures 3*a* and 3*b*, respectively. This suggests that the errors of the ultraviolet magnitudes are of the order of 0.2 mag which is consistent with the errors calculated for some of the same data in Paper 1 using a different method.

The consistency between our ultraviolet magnitudes and the V magnitudes demonstrated in Figure 3 shows that the majority of the identifications in Table 1 are correct. The stars which depart most from the trends (and fall outside the plots) are stars 143, 171, and 326. The first two of these have V magnitudes much too faint for their ultraviolet brightnesses. Additionally, star 171 is identified with an M4 star. These factors suggest that the ultraviolet sources have been mismatched with visible stars and the actual sources are not in the SIMBAD database. Star 326 has very uncertain ultraviolet photometry as indicated in a footnote to the table.

An examination of Table 1 shows that 428 objects (68% of the total) have been uniquely identified with known stars. An additional 147 (24%) are labeled as blends. In the following discussion we will be concerned mainly with the subsample for which we were able to obtain optical data from SIMBAD. We have omitted all the objects identified as blends or with star clusters. Ten stars were also omitted because they lacked either a V magnitude or a spectral subclass. The resulting *selected* sample contains 418 stars.

In Figure 4*a* and 4*b* we plot histograms of the frequency distributions of the full sample of stars and the selected sample for objects measured in each of the rocket flights. It can be seen that the selected sample distribution is very similar to that of the full sample; we will not introduce any bias by using it. It can also be seen that the limiting magnitude for the 1367 Å is at $\sim m_{1367} = 8.5$ while the 1519 Å exposures reached $\sim$1 mag fainter.

In Figure 4*c* we plot the cumulative magnitudes for the two bands. The offset between the two curves is largely caused by the very bright 1519 Å magnitude of star 326. As noted above this is likely to be spurious. Aside from the offset, the two curves in Figure 4*c* are nearly the same shape. Both flatten out at a relatively bright magnitude compared with, for example, the corresponding plots in Paper I. This is due to the presence of a number of very bright, early-type stars in the Orion fields which contribute a significant fraction of the ultraviolet flux.

In Figure 5 we plot a histogram of the spectral types for stars in our selected sample. As in previous studies, the majority of the stars are closely clustered near spectral type A0. There are a few objects which are identified with later type stars. In this case, stars with spectral types of F0 and later make up 6% of the stars in Figure 5 while in the Monoceros field they made up 21% of the selected sample. It is likely that some of these late stars have hot companions which are the source of the ultraviolet radiation, while others are likely to be cases where the actual ultraviolet source is not identified in the visible. Both cases are likely to be interesting objects which should be pursued further.

Figure 6 shows the color-magnitude plots for the stars in the selected sample. These plots are similar to the corresponding plot in Paper I and the discussion there applies here. Again the effect of the limiting magnitude dominates the overall appearance of the plot. The scatter of the main group of stars is similar to that found in Monoceros which is consistent with the fact that the range of extinction is similar in the two fields (Sharov 1964).

TABLE 1

OBJECTS DETECTED IN THE ULTRAVIOLET

No.	α_{1950}	δ_{1950}	m_{1367}	m_{1519}	Identification	V	Sp. Type	Note
1	4:44:14	5:48	7.00	——	HD 30365	6.70	A0	
2	4:44:35	6:43	7.00	——	———	——	——	
3	4:45:35	3:41	6.58	——	Blend	7.22	B9,A0	
4	4:47:17	8:24	5.52	——	HD 30677	6.84	B1II-III	
5	4:47:44	6:58	7.88	——	HD 30714	7.10	A2	
6	4:47:55	8:53	5.81	——	HD 30739	4.37	A1Vn	
7	4:48:18	5:36	2.12	——	HD 30836	3.70	B2III+..	
8	4:48:27	10:19	6.76	——	———	——	——	
9	4:49:06	9:57	5.45	——	HD 30870	6.11	B5V	
10	4:49:17	5:25	5.27	——	AG+05 528	9.20	F5	
11	4:50:16	12:52	7.55	——	AG+12 485	9.90	F5	
12	4:50:18	12:21	8.31	——	HD 30989	7.28	B8	
13	4:50:18	5:48	7.08	——	———	——	——	
14	4:50:48	1:33	8.33	——	HD 31209	6.61	A1Vn	
15	4:51:03	12:35	9.43	——	HD 287192	10.P	A0	
16	4:51:18	2:25	2.00	——	HD 31237	3.72	B3III+..	
17	4:51:40	7:10	7.59	——	Blend	7.53	K0,K0	
18	4:52:12	11:59	7.81	——	Blend	6.64	A0,A,A0	
19	4:52:21	10:05	7.11	——	HD 31295	4.65	A0V	
20	4:52:45	12:41	6.09	——	HD 287193	9.3P	K2	a
21	4:53:02	12:46	7.81	——	AG+12 489	10.00	A0	b
22	4:53:15	5:21	7.45	——	HD 31411	6.50	A0V	
23	4:53:22	3:09	7.81	——	AG+03 549	8.00	B9	
24	4:53:35	13:36	8.16	——	HD 31374	7.81	B9	
25	4:56:10	0:33	8.27	——	Blend	10.24	G4,?	
26	4:56:43	14:29	6.10	——	Blend	5.85	B7V,B6V	
27	4:57:54	3:34	5.59	——	Blend	5.15	A0,B9Vn,B9Vn,B8	c
28	4:57:59	3:13	7.89	——	AG+03 563	8.00	B9	
29	4:58:06	13:21	10.39	——	Blend	7.9P	K0,K0,K0,K0,G0	
30	4:58:10	10:47	8.47	——	HD 32021	6.81	B9	
31	4:58:28	3:39	5.71	——	HD 32145	7.24	B8	c
32	4:58:38	2:56	8.17	——	Blend	7.94	G5,G0	
33	4:58:51	1:52	——	7.29	———	——	——	c
34	4:58:51	1:30	5.39	5.77	Blend	6.02	B8V,A1IV	
35	4:59:16	11:13	7.32	——	HD 32202	7.19	B8	c
36	4:59:21	1:58	6.77	7.40	AG+01 519	8.30	A0	c
37	4:59:51	11:15	7.18	——	HD 287411	0.00	F5	c
38	5:00:10	3:24	6.06	——	HD 32359	8.00	B9	
39	5:00:21	- 3:17	——	7.98	NGC 1753	——	——	
40	5:00:29	9:13	6.51	——	HD 32366	7.59	A0	
41	5:00:46	3:56	6.61	——	AG+03 573	9.00	B8	
42	5:01:06	9:28	7.42	——	———	——	——	
43	5:01:32	10:33	6.73	——	———	——	——	
44	5:01:35	- 6:23	——	6.92	———	——	——	
45	5:01:51	10:52	5.57	——	G 97 -15	13.75	——	
46	5:01:58	- 1:29	——	9.37	AG-01 504	8.80	F5	
47	5:02:02	- 3:17	——	5.00	———	——	——	
48	5:02:03	6:44	8.06	——	AG+06 526	9.60	F8	
49	5:02:09	12:31	8.89	——	HD 32562	8.73	A0	
50	5:02:19	15:19	6.14	——	HD 32549	4.68	A0sp...	
51	5:02:19	13:09	7.32	——	HD 32595	7.50	B8	
52	5:02:38	8:46	6.52	——	HD 32660	7.46	B9	
53	5:02:48	7:23	6.21	——	HD 32685	7.59	B9	
54	5:02:53	1:46	8.96	8.91	AG+45 495	9.80	A	
55	5:02:56	0:44	——	11.04	HD 289876	10.0P	G5	
56	5:03:14	7:07	7.90	——	Blend	7.99	K2,G0	
57	5:03:21	4:28	7.87	8.15	AG+04 537	8.60	A0	
58	5:03:25	2:35	6.60	7.02	HD 32867	7.51	B8V	
59	5:03:26	- 3:44	——	8.13	Blend	10.17	F5V,F8V	
60	5:03:47	16:08	6.24	——	AG+16 432	8.40	A5	
61	5:04:04	- 4:54	——	5.12	———	——	——	
62	5:04:37	3:41	——	9.37	AG+03 583	9.60	K5	
63	5:04:40	2:23	6.85	7.40	Blend	7.40	B8V,B9V	
64	5:04:44	- 3:33	——	8.62	SAO 131783	8.31	A0V	
65	5:04:58	4:57	7.72	——	Blend	8.14	K0,F8	
66	5:05:07	10:41	7.99	——	HD 33020	7.10	A0	
67	5:05:11	4:25	8.03	——	AG+04 544	8.20	A0	
68	5:05:12	- 5:20	——	5.18	Blend	8.68	K0,G9	
69	5:05:32	3:07	——	8.53	AG+03 584	10.60	A8V	
70	5:05:37	- 2:27	——	7.58	HD 33190	8.70	B8V	
71	5:05:43	14:50	5.81	——	———	——	——	
72	5:05:44	1:12	8.95	8.72	HD 33189	8.70	B9V	
73	5:06:04	- 1:52	——	9.60	———	——	—	c
74	5:06:25	- 1:42	——	9.63	AG-01 514	10.10	B8V	c
75	5:06:35	- 6:42	——	7.63	———	——	——	
76	5:06:52	- 1:29	7.18	——	AG-01 516	9.10	A1V	
77	5:07:14	2:52	8.74	9.10	HD 33403	8.80	B9V	
78	5:07:26	9:45	6.92	——	HD 33368	7.70	A0	
79	5:07:33	- 4:02	——	9.22	HD 33431	7.80	B9V	
80	5:08:07	- 1:50	8.38	8.44	Blend	7.71	B8V,A3V	
81	5:08:16	- 5:22	——	7.97	Blend	8.26	B8V,A2	
82	5:08:31	- 5:46	——	9.44	HD 33590	9.03	B9	
83	5:08:40	- 6:15	——	9.21	HD 33610	7.91	A0	
84	5:09:01	0:28	6.33	6.51	HD 33647	6.67	B9Vn	
85	5:09:06	0:59	8.08	8.00	Blend	5.88	F5,A8V	
86	5:09:06	4:44	——	7.68	AG+04 550	8.40	K0	
87	5:09:49	- 0:36	——	10.11	HD 33752	8.89	A0V	
88	5:09:56	- 3:09	——	9.21	HD 33766	8.70	B9V	
89	5:10:09	6:17	7.67	——	———	——	——	
90	5:10:19	4:39	7.19	——	AG+04 554	8.89	B8	

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TABLE 1—*Continued*

No.	α_{1950}	δ_{1950}	m_{1367}	m_{1519}	Identification	V	Sp. Type	Note
91	5:10:23	- 0:12	——	10.57	AG-00 591	8.10	A0V	
92	5:10:45	1:56	——	9.28	HD 33883	6.09	A5V	
93	5:10:50	4:07	8.56	9.29	AG+04 556	8.71	B9	
94	5:10:52	- 2:37	——	10.54	HD 33917	9.80	A0V	
95	5:11:07	- 3:42	——	5.66	HD 33928	7.60	B8V	
96	5:11:11	- 2:03	——	8.94	HD 33975	9.30	B8V	
97	5:11:25	- 6:56	——	6.46	HD 33994	7.34	B8	
98	5:11:38	4:52	——	6.98	———	——	——	c
99	5:11:48	- 2:27	——	9.47	HD 293868	10.10	A5V	
100	5:12:08	- 7:30	——	7.90	BD-07 1009	8.54	A0	
101	5:12:09	- 8:25	——	1.34	HD 34085	0.12	B8Iab:	
102	5:12:16	0:23	——	9.36	BD+00 992	9.50	B8V	
103	5:12:18	4:50	6.47	6.95	AG+04 559	8.77	B8	c
104	5:12:28	14:56	8.76	——	HD 34054	7.30	B9V	
105	5:12:29	14:32	5.94	——	———	——	——	
106	5:12:35	- 9:05	——	7.36	———	——	——	
107	5:12:46	0:01	7.31	7.63	———	——	——	c
108	5:12:52	8:15	8.69	——	HD 34149	7.70	A0	
109	5:13:09	0:51	——	7.03	AG+00 514	9.30	B8V	
110	5:13:10	11:08	6.40	——	HD 34203	5.50	A0V	
111	5:13:33	0:05	7.13	——	Blend	7.86	A5V,A2V	c
112	5:13:45	- 1:42	7.76	7.78	HD 34307	8.60	B8V	
113	5:13:51	- 3:31	——	8.74	HD 34280	7.78	B8V	
114	5:13:56	- 5:10	——	9.02	HD 34342	8.92	B9V	
115	5:14:12	1:55	7.74	7.47	HD 34317	6.42	A0V	
116	5:14:13	- 0:55	——	9.14	Blend	8.38	B9V,A6V	
117	5:14:13	9:44	6.77	——	HD 34338	7.60	B8	
118	5:14:16	12:53	8.80	——	AG+13 436	8.30	A0	
119	5:14:39	- 2:36	——	8.65	HD 34430	9.30	B8V	
120	5:15:00	0:24	——	11.45	HD 290122	10.90	F4III	
121	5:15:07	- 4:48	——	9.46	HD 34481	9.05	A0V	
122	5:15:12	- 6:57	——	3.08	HD 34503	3.59	B5III	
123	5:15:29	- 0:03	5.65	6.13	HD 34511	7.39	B5V	
124	5:15:51	5:11	7.88	——	AG+05 596	8.70	B9	
125	5:16:40	- 1:08	7.79	7.48	Blend	7.32	A0,B8V,B9V,A3V	
126	5:16:41	- 5:01	——	10.31	Blend	7.10	A2V,B9V	
127	5:16:42	0:26	——	11.43	Blend	——	B9V,A5V,A5	
128	5:16:53	1:06	——	9.13	AG+01 554	9.10	A0	
129	5:16:58	- 1:26	4.45	4.91	Blend	6.23	B1.5V,B9V	
130	5:16:59	- 7:27	——	7.90	HD 34736	7.86	B9	
131	5:17:01	- 2:23	7.75	——	AG-02 124	9.10	A3V	
132	5:17:15	15:30	7.24	——	HD 34811	7.70	A3V	
133	5:17:22	- 9:56	——	8.45	BD-09 1124	10.00	A0	
134	5:17:22	11:45	8.03	——	———	——	——	
135	5:17:29	- 7:02	——	8.75	HD 34813	8.82	A0	c
136	5:17:30	- 7:14	——	8.40	HD 34814	9.10	A0	c
137	5:17:33	- 5:15	——	5.98	HD 34827	7.21	B9	c
138	5:17:41	- 5:53	——	6.95	Blend	7.75	B8,A0	
139	5:17:43	14:53	8.66	——	AG+15 462	8.30	B9V	
140	5:17:56	- 5:23	——	5.81	Blend	6.27	B8III,B9	c
141	5:18:26	4:25	7.65	8.14	AG+04 575	8.41	B8	
142	5:18:37	16:24	7.81	——	AG+16 464	10.60	A7V	
143	5:18:41	- 3:01	5.81	8.39	HD 294005	11.00	B9V	c
144	5:18:46	3:58	5.59	5.91	HD 34959	6.57	B5Vp	
145	5:18:52	- 1:34	6.70	6.71	HD 35008	7.11	B8V	
146	5:18:56	8:17	3.56	——	HD 34989	5.79	B1V	
147	5:19:13	- 0:24	2.57	2.86	Blend	4.35	B2IV-V,B3V	
148	5:19:15	- 3:00	5.81	6.08	HD 35079	7.06	B3V	c
149	5:20:02	14:39	7.94	——	BD+14 891	10.50	G2IV	
150	5:20:13	5:20	——	7.94	———	——	——	
151	5:20:14	13:48	7.92	——	Blend	9.54	A1V,A0V	
152	5:20:17	0:08	8.11	8.28	AG+00 529	8.30	B8V	
153	5:20:21	2:46	8.50	7.92	HD 35134	6.74	A0	
154	5:20:23	3:30	3.28	3.49	Blend	4.24	B1Vn,B1V	
155	5:20:37	0:26	7.72	8.00	AG+00 532	8.35	B9	
156	5:20:38	1:42	7.33	6.93	Blend	7.72	B9,A0,A2	
157	5:20:38	2:08	——	7.74	HD 287767	10.0P	A5	
158	5:20:40	9:23	7.05	——	———	——	——	
159	5:20:45	1:06	6.45	6.56	Blend	6.70	A0,B6V	
160	5:20:46	- 8:12	——	7.73	Blend	7.21	A0,A0	
161	5:20:47	15:55	6.49	——	AG+16 468	10.10	B9V	
162	5:20:50	- 1:26	7.19	7.68	Blend	7.87	B8V,A8V,A4V	
163	5:20:55	- 1:01	7.42	7.55	HD 35271	8.30	B8V	
164	5:21:01	- 8:30	——	5.40	HD 35281	5.99	B8III	
165	5:21:02	0:39	8.28	8.47	HD 35258	8.80	B8	
166	5:21:16	- 0:09	3.33	3.87	HD 35299	5.70	B1.5V	
167	5:21:19	16:28	8.08	——	AG+16 473	8.20	A0	
168	5:21:28	2:04	6.62	6.80	HD 35298	7.89	B3Vw...	
169	5:21:29	0:52	7.63	8.02	HD 35305	8.40	B6.5IV-V	
170	5:21:33	-10:36	——	8.05	HD 35320	8.00	A0	
171	5:21:39	6:24	4.53	1.29	V435 Ori	12.50	M4	
172	5:21:42	3:23	——	6.23	AG+03 635	9.70	A2	
173	5:21:46	- 2:24	1.46	1.69	Blend	2.57	B1,B0.5V	
174	5:22:08	17:07	6.90	——	HD 35349	7.60	B5	
175	5:22:15	2:20	4.78	5.02	HD 35407	6.32	B4IVn	
176	5:22:18	- 2:52	6.01	5.98	HD 35502	7.36	B5V	
177	5:22:24	1:50	2.87	3.27	HD 35439	4.94	B1Vpe	
178	5:22:30	0:47	8.40	8.16	Blend	8.23	B9,A0	
179	5:22:32	6:12	0.27	——	HD35468	1.64	B2III	
180	5:22:33	12:26	7.01	——	AG+12 548	10.10	K2	

TABLE 1—*Continued*

No.	α_{1950}	δ_{1950}	m_{1367}	m_{1519}	Identification	V	Sp. Type	Note
181	5:22:52	2:45	8.17	9.10	Blend	8.0P	A0,A3,B9	
182	5:22:58	15:19	6.91	——	HD 35522	7.10	B9V	
183	5:23:01	- 1:30	4.37	4.91	HD 35575	6.43	B3V	
184	5:23:03	- 0:32	6.59	6.79	HD 35548	6.57	B9sp...	
185	5:23:05	15:33	7.63	——	Blend	6.53	B9V,B9V	
186	5:23:17	- 2:18	——	5.96	HD 294046	8.27	B8	
187	5:23:22	16:36	4.80	——	HD 35532	6.24	B2Vn	
188	5:23:24	0:32	4.11	4.59	HD 35588	6.16	B2.5V	
189	5:23:28	- 5:30	——	6.09	HD 35640	6.23	B9.5Vn	
190	5:23:38	6:50	7.31	6.36	HD 35656	6.42	A0Vn	
191	5:23:38	- 3:03	——	13.26	HD 35658	8.70	A0	
192	5:23:38	13:25	6.93	——	HD 35635	7.70	B9	
193	5:23:45	0:51	7.20	7.34	Blend	7.32	B8,B9,A3,B9	
194	5:24:04	-10:55	——	6.83	HD 35685	8.00	B9	
195	5:24:19	- 0:37	——	8.51	HD 35731	9.30	A0	
196	5:24:20	- 2:23	4.53	5.03	HD 35777	6.62	B2V	
197	5:24:26	5:33	——	8.86	AG+05 621	8.60	A0	
198	5:24:28	3:04	2.48	2.78	HD 35715	4.59	B2IV	
199	5:24:29	3:36	5.30	5.55	HD 35730	7.20	B5p	
200	5:24:30	2:04	7.73	8.03	Blend	7.94	B9,A0	c
201	5:24:35	- 2:56	——	10.01	Blend	8.73	A0,A	
202	5:24:35	- 1:22	5.45	5.80	HD 35792	7.22	B3V	
203	5:24:37	15:56	6.38	——	HD 35746	7.70	B9	c
204	5:24:42	2:15	8.50	8.31	Blend	8.6P	A0,A2	c
205	5:24:42	3:50	4.76	5.08	HD 35762	6.68	B2V	
206	5:24:52	15:45	6.27	——	HD 35770	5.50	B9.5Vn	c
207	5:25:00	- 4:10	——	7.82	Blend	8.55	G5,G5,G	
208	5:25:00	- 2:14	5.82	——	HD 35899	7.52	B5V...	c
209	5:25:03	1:36	9.29	——	BD+01 1017	8.89	B9	
210	5:25:05	0:16	——	8.47	HD 35836	8.93	A2	
211	5:25:11	- 1:50	6.38	6.31	HD 35882	7.80	B8	c
212	5:25:17	- 0:15	7.70	7.87	HD 35867	8.12	B9	
213	5:25:21	- 2:04	6.21	5.96	HD 290470	9.77	A0	c
214	5:25:27	1:07	4.85	5.10	Blend	6.97	B8V,B8V	c
215	5:25:29	16:31	7.67	——	HD 35865	7.90	B9	
216	5:25:35	- 2:00	6.21	6.14	Blend	7.54	A0,A,A2	c
217	5:25:39	5:55	6.93	——	Blend	7.90	A2,A2,A0	
218	5:25:42	1:18	4.28	4.57	HD 35912	6.41	B2V	c
219	5:25:43	3:31	6.22	6.52	Blend	7.29	B6V,B8	
220	5:25:49	0:48	7.46	7.48	HD 35926	8.35	B7IV	
221	5:26:01	0:02	6.51	6.34	HD 35971	6.67	B9	
222	5:26:03	16:22	7.76	——	HD 35945	7.65	B9	
223	5:26:04	- 2:41	——	8.37	HD 35971	6.67	B9	
224	5:26:15	8:54	7.66	——	AG+08 605	9.30	A0	
225	5:26:17	- 0:37	6.98	6.78	Blend	7.23	B9,A0,A0,A5	
226	5:26:22	- 3:16	——	6.82	HD 36058	6.39	A0Vn	
227	5:26:26	1:39	5.18	5.43	HD 36013	6.88	B3V:n	
228	5:26:29	- 2:07	——	7.97	Blend	7.86	B9,A0,B2	
229	5:26:29	2:10	6.03	6.27	HD 36012	7.24	B5Vne	
230	5:26:31	12:09	5.87	——	HD 36104	7.00	B8	
231	5:26:35	- 5:46	——	7.18	HD 36120	7.96	B9	
232	5:26:38	- 2:54	——	7.91	HD 36089	8.65	A0	
233	5:26:56	- 7:15	——	5.32	HD 36151	6.71	B5V	
234	5:26:57	5:12	7.12	7.96	HD 36115	8.23	B8	
235	5:27:00	0:03	——	8.15	———	——	——	b
236	5:27:12	3:08	5.44	5.74	HD 36133	6.94	B5V	
237	5:27:13	- 0:46	——	11.58	HD 36150	6.49	A2	
238	5:27:28	- 1:46	6.81	6.82	Blend	7.25	B9,A0	
239	5:27:32	- 0:05	5.76	6.62	Blend	6.16	A0,A0	
240	5:27:32	0:56	6.36	——	BD+00 1092	10.50	A0	
241	5:27:35	- 5:11	——	7.71	HD 36234	8.64	A0	
242	5:27:36	1:48	3.67	4.03	HD 36166	5.78	B2V	
243	5:27:37	2:09	7.17	7.09	HD 36165	8.13	B7V	
244	5:27:42	10:09	5.82	——	Blend	7.36	B9,A5	
245	5:27:42	- 1:00	——	7.91	Blend	7.91	A0,A0,A0,A2	
246	5:27:44	11:59	5.61	——	HD 36262	7.63	B3V	
247	5:27:44	3:33	8.99	——	Blend	8.24	A0,A0,A2	
248	5:27:51	- 7:25	——	4.36	HD 36285	6.33	B2IV-V	
249	5:28:02	5:55	3.25	3.28	Blend	3.4P	B5V,B5IV,B7V	
250	5:28:07	- 0:03	5.76	5.71	Blend	7.95	B8,A1:	
251	5:28:12	- 2:23	7.54	7.54	HD 36341	8.36	B9	
252	5:28:16	9:03	6.90	——	Blend	8.69	G5,K7	c
253	5:28:21	- 1:16	9.77	——	HD 290510	11.69	A7	
254	5:28:26	4:39	6.74	7.16	HD 36310	7.95	B6V	
255	5:28:27	14:48	5.91	——	HD 36337	6.60	B5	
256	5:28:29	- 6:09	——	8.46	HD 36366	8.09	B9	
257	5:28:33	- 1:48	——	8.09	HD 290540	9.53	A0	
258	5:28:38	9:10	6.87	——	Blend	7.63	B8,B9	c
259	5:28:44	- 2:03	7.19	7.01	Blend	7.32	A0,B8,A2,A5	
260	5:28:47	- 6:41	——	4.52	HD 36430	6.23	B2V	c
261	5:28:52	3:17	3.36	3.67	HD 36351	5.46	B1.5V	
262	5:29:10	1:42	5.81	6.06	HD 36392	7.56	B3V	
263	5:29:21	2:50	6.05	6.34	HD 36429	7.56	B5V	
264	5:29:22	- 7:16	——	2.37	HD 36512	4.62	B0V	
265	5:29:24	17:00	5.60	——	Blend	5.11	B7IIIe,B7IV	
266	5:29:24	9:36	7.16	——	AG+09 540	8.50	A0	
267	5:29:28	- 6:41	——	4.80	HD 36541	7.69	B8V	c
268	5:29:34	- 0:17	0.60	0.30	Blend	1.44	O9.5II-I,O9.5II	
269	5:29:43	- 6:22	——	7.56	Blend	7.95	A0,A0	
270	5:29:51	4:13	——	7.54	———	——	——	

TABLE 1—*Continued*

No.	α_{1950}	δ_{1950}	m_{1367}	m_{1519}	Identification	V	Sp. Type	Note
271	5:29:56	-10:03	——	8.76	HD 36542	8.66	B9V	
272	5:30:02	- 2:01	——	7.32	Blend	8.40	B9,A2	c
273	5:30:17	- 1:40	2.82	2.85	HD 36591	5.35	B1IV	
274	5:30:18	- 4:32	——	5.93	Blend	6.92	B2Vvar,B7III,B9	c
275	5:30:19	- 0:41	6.71	6.43	HD 36605	7.96	B9	
276	5:30:20	2:06	7.96	7.70	HD 36549	8.58	B6Vwp...	
277	5:30:21	- 5:16	——	6.00	NGC 1977 50	8.60	B9	
278	5:30:21	- 2:11	——	8.08	HD 36617	8.42	B9	c
279	5:30:38	14:11	4.03	——	HD 36653	5.63	B3V	
280	5:30:38	- 4:23	——	6.69	NGC 1977 62	8.98	A0	c
281	5:30:43	2:30	7.73	7.71	Blend	8.21	A0,A0,A0	c
282	5:30:47	3:08	6.40	6.59	HD 36627	7.56	B6V	
283	5:30:56	- 1:12	2.75	——	HD 36695	5.38	B1V	c
284	5:31:02	2:23	7.63	7.65	HD 36645	8.64	B9	c
285	5:31:05	0:38	7.73	7.23	HD 36668	8.06	B6Vwp...	
286	5:31:19	- 0:02	6.20	6.64	Blend	7.81	A0,A0	
287	5:31:26	- 1:04	2.65	2.84	HD 36779	6.23	B2.5V	c
288	5:31:33	- 2:55	4.72	5.13	HD 36827	6.68	B5	
289	5:31:35	- 0:28	6.75	6.36	Blend	7.11	B7V,O8,A0	
290	5:31:38	1:25	4.40	4.74	HD 36741	6.59	B2V	
291	5:31:40	- 2:30	7.19	——	HD 294188	10.55	A2	c
292	5:31:41	13:18	8.97	——	AG+13 468	8.40	B8	
293	5:31:47	- 2:21	6.12	7.06	HD 36826	8.21	B5Vn	c
294	5:31:47	9:29	2.20	——	HD 36822	4.41	B0III	
295	5:31:47	4:49	7.39	7.95	AG+04 610	8.53	B8	
296	5:31:52	3:46	7.59	6.73	HD 36777	5.36	A2V	
297	5:31:53	- 4:27	——	3.48	Blend	6.33	B5V,B8V,B7V	
298	5:31:58	15:32	7.52	——	HD 36820	7.30	B9	
299	5:32:00	10:12	5.24	——	HD 36881	5.60	B9IIImnp	
300	5:32:01	9:53	1.40	——	Blend	2.59	O8III,O...	
301	5:32:01	5:39	5.02	5.14	HD 36824	6.69	B3V	
302	5:32:15	- 4:05	——	5.60	HD 36916	6.73	B8IIIp	
303	5:32:21	6:36	6.27	——	AG+06 595	8.20	A2	
304	5:32:27	- 6:31	——	7.09	HD 37001	8.89	A0	
305	5:32:28	- 0:07	5.63	5.51	HD 36898	7.04	B5	c
306	5:32:29	- 0:18	5.48	5.96	HD 36935	7.50	B7V	c
307	5:32:37	- 5:24	——	1.59	NGC 1977	——	——	
308	5:32:38	5:29	5.69	——	Blend	7.85	B8,A3	
309	5:32:41	- 4:26	——	2.54	NGC 1977	——	——	
310	5:32:42	- 0:44	5.05	4.55	HD 36954	6.94	B3V	
311	5:32:42	- 4:47	——	2.11	NGC 1977	——	——	
312	5:32:44	- 2:20	——	7.98	Blend	8.27	A0,B3	
313	5:32:48	- 5:51	——	1.22	HD 37043	2.77	O9III	d
314	5:32:54	15:19	8.43	——	———	——	——	
315	5:32:57	4:50	8.06	8.37	AG+04 612	8.90	A0	
316	5:33:00	- 3:14	——	5.05	HD 37055	6.41	B3IV	
317	5:33:01	- 3:36	——	8.58	HD 37057	9.27	A0	
318	5:33:04	- 8:38	——	8.35	HD 37079	8.00	A0	
319	5:33:05	0:31	8.07	7.80	Blend	8.05	A0,A3	
320	5:33:09	0:05	7.96	7.39	Blend	8.22	B9,A0	
321	5:33:17	- 6:15	——	5.15	Blend	7.99	B9,A0	
322	5:33:19	0:45	7.90	8.12	HD 37054	8.75	A0	
323	5:33:21	11:46	7.10	——	AG+11 548	8.10	B9	
324	5:33:25	- 4:24	——	3.17	Blend	4.8P	B2.5V,B2.5IV,B3V,B2Vp	
325	5:33:26	- 0:50	5.53	——	Blend	7.60	B6V,A0,A0Vpe	
326	5:33:32	- 1:09	0.51	-1.33	HD 37128	1.70	B0Iab:	e
327	5:33:32	- 7:22	——	6.70	HD 37151	7.38	B8V	
328	5:33:43	- 1:40	6.54	5.24	Blend	7.53	B8V,B9.5V	
329	5:33:49	- 6:25	——	6.34	Blend	7.48	B9IV-Vp,B9	
330	5:33:51	- 0:19	8.12	——	Blend	7.59	B8p...,A0,B8,B8	
331	5:33:53	- 2:02	6.34	6.82	HD 37173	7.86	B6V	
332	5:33:54	- 6:01	——	2.32	HD 37209	5.72	B1V	
333	5:34:15	8:57	4.11	——	HD 37232	6.12	B2IV-V	
334	5:34:26	- 0:42	6.23	5.27	Blend	7.75	B8V,A1III-IV	
335	5:34:28	5:10	——	9.85	———	——	——	
336	5:34:38	- 1:42	6.69	5.75	Blend	7.36	B5V,A0,B8	
337	5:34:39	4:46	7.67	7.87	Blend	7.47	B9,A3	
338	5:34:45	- 5:54	——	3.50	NGC 1977 10	6.05	B1Vvar	
339	5:34:53	7:34	5.55	5.50	HD 37320	5.88	B8III	
340	5:34:58	9:53	8.09	——	AG+09 567	9.00	A0	
341	5:35:00	- 1:27	5.04	5.29	Blend	6.93	B4V,B8	
342	5:35:00	6:00	——	8.77	Blend	6.65	F5,K5	
343	5:35:00	- 4:53	——	4.41	HD 37334	7.17	B1.5V	c
344	5:35:03	- 0:14	6.31	5.98	Blend	7.85	A0,A0	c
345	5:35:11	- 4:47	——	4.22	HD 37356	6.19	B2IV-V	c
346	5:35:15	- 0:47	5.76	4.84	Blend	7.14	B5V,A1III-IV,A	
347	5:35:15	- 6:42	——	5.92	Blend	7.70	B9,A0,A5II-III	
348	5:35:32	0:59	5.76	5.98	Blend	6.90	B6V,B5V	
349	5:35:33	- 4:06	——	8.76	HD 37410	6.87	A2	
350	5:35:40	- 0:11	5.71	5.59	Blend	6.29	B6V,B9,B8V,B9,A0,B8	c
351	5:35:41	- 1:12	4.60	4.70	HD 37397	6.83	B2V	
352	5:35:43	- 1:44	——	7.48	Blend	7.80	A0,B8V	
353	5:35:48	- 6:08	——	6.86	Blend	7.54	B9p,A0,A0	
354	5:35:51	14:28	8.49	——	HD 37441	7.30	A0	
355	5:35:55	- 6:32	——	4.09	HD 37481	5.96	B1.5IV	
356	5:36:04	- 2:38	1.11	1.23	HD 37468	3.80	O9.5V	
357	5:36:14	- 7:11	——	7.20	HD 37507	4.80	A4V	
358	5:36:14	- 8:27	——	6.74	HD 37492	7.09	B9	
359	5:36:20	- 5:10	——	6.24	Blend	6.85	B3V,A2	
360	5:36:29	2:52	7.38	7.23	HD 37467	7.90	B7IV-V	

TABLE 1—*Continued*

No.	α_{1950}	δ_{1950}	m_{1367}	m_{1519}	Identification	V	Sp. Type	Note
361	5:36:35	- 0:23	5.26	——	Blend	9.4P	K7,?	
362	5:36:38	11:09	8.13	——	AG+11 556	8.80	A0	
363	5:36:42	4:07	3.51	3.68	———	——	——	
364	5:36:53	0:30	6.54	——	HD 290715	10.0P	F5	
365	5:36:53	9:30	7.89	——	AG+09 574	8.60	A0	
366	5:37:12	4:26	7.15	7.00	HD 37591	8.01	B9	
367	5:37:12	- 6:37	——	7.25	Blend	9.27	F8,A5	
368	5:37:12	- 3:19	——	6.97	HD 37642	8.04	B9	c
369	5:37:18	- 9:42	——	5.49	HD 37635	6.50	B7V	
370	5:37:20	0:55	8.17	7.51	Blend	7.83	A0,A0	
371	5:37:21	1:32	6.02	6.43	HD 37606	6.90	B8V	
372	5:37:32	-11:17	——	6.34	HD 37622	8.01	B3Vn	
373	5:37:38	- 1:30	5.03	4.39	Blend	6.51	A2,B3Vn	
374	5:37:39	- 0:45	——	9.23	HD 290798	10.36	A2	
375	5:37:39	- 2:30	6.33	5.49	Blend	7.40	B5,B9	
376	5:37:43	- 4:25	——	6.83	HD 37700	7.90	B6V	
377	5:37:45	- 3:26	——	6.40	Blend	6.68	B8,B9	c
378	5:38:03	- 3:56	——	9.14	HD 37745	9.18	A0	
379	5:38:03	- 2:49	——	4.38	Blend	6.02	B1.5V,A0	
380	5:38:11	- 2:01	0.18	0.28	Blend	0.99	O9Iab:,O9.5Ib	
381	5:38:15	9:14	5.74	——	Blend	7.32	B8,A0	
382	5:38:17	16:30	3.31	——	Blend	-0.02	B3IV,B3V,B4V	
383	5:38:18	- 1:09	2.82	3.11	HD 37756	4.95	B2IV-V	
384	5:38:21	- 1:33	4.68	3.62	HD 37776	6.98	B2IV	
385	5:38:23	8:28	8.55	——	———	——	——	
386	5:38:24	0:33	6.73	——	HD 290775	10.32	A2	
387	5:38:29	- 8:01	——	9.78	HD 37846	8.05	A0	
388	5:38:29	- 3:38	——	6.10	HD 37807	7.90	B8	c
389	5:38:32	15:56	9.77	——	AG+16 499	8.50	K0	
390	5:38:37	0:17	——	8.70	HD 290779	10.82	A3	
391	5:38:39	-10:26	——	5.76	HD 37808	6.45	B9.5IIIs	
392	5:38:42	- 6:54	——	6.00	Blend	7.40	B2V,A0	
393	5:39:00	- 8:14	——	11.21	———	——	——	
394	5:39:03	- 3:45	——	6.48	HD 37887	7.67	A0V	c
395	5:39:04	- 2:16	——	3.79	Blend	6.92	B1.5V,A5	
396	5:39:16	- 2:48	——	6.55	Blend	6.26	A9IV-V,B9	
397	5:39:20	5:52	5.62	——	AG+05 654	9.30	F5	
398	5:39:31	14:07	7.60	——	HD 37981	6.73	K1IV	
399	5:39:52	- 8:06	——	10.18	HD 38023	8.86	B4V	
400	5:39:53	2:22	6.94	6.69	HD 37958	6.68	B8	
401	5:40:02	11:06	5.09	——	AG+11 563	9.50	F5	
402	5:40:03	- 4:38	——	8.78	HD 38051	8.53	B8	
403	5:40:15	5:17	7.02	6.96	HD 38022	8.17	B9	
404	5:40:26	- 2:19	——	6.37	HD 38087	8.28	B5V	
405	5:40:26	10:53	7.86	——	———	——	——	
406	5:40:28	- 4:59	——	8.79	Blend	8.58	A0,A0V	
407	5:40:34	1:29	7.29	7.21	HD 38047	8.90	A0	
408	5:40:39	6:56	6.39	6.52	Blend	6.85	B8,B9	
409	5:40:44	5:27	6.73	——	HD 38098	6.75	B8	
410	5:40:44	- 2:03	6.62	——	HD 290853	10.0P	A2	
411	5:40:58	- 7:16	——	8.74	HD 38184	9.53	A0	
412	5:41:17	- 8:55	——	6.07	HD 38185	7.61	B9	
413	5:41:18	- 0:58	——	8.48	HD 38165	8.79	B9	
414	5:41:48	- 4:42	——	8.27	HD 38292	7.20	A0	
415	5:41:51	13:40	8.61	——	AG+13 483	8.78	B9	
416	5:41:57	- 6:51	——	9.58	HD 38312	6.78	A2	
417	5:42:01	- 7:43	——	9.51	BD-07 1162	8.00	A0	
418	5:42:04	6:23	6.68	6.66	Blend	6.99	B8,A2	
419	5:42:08	3:51	8.02	7.64	HD 38270	7.50	B9	
420	5:42:23	- 0:07	——	8.88	HD 38311	8.72	A0	
421	5:42:31	4:47	——	10.61	AG+04 639	8.30	A0	
422	5:42:37	2:00	8.23	——	Blend	9.2P	G,G0	
423	5:42:47	11:07	6.76	——	———	——	——	
424	5:43:01	- 0:57	6.27	——	———	——	——	
425	5:43:35	15:49	5.58	——	HD 38478	6.00	B8IIImnp	
426	5:43:36	-10:48	——	8.64	HD 38454	8.00	A0	
427	5:43:38	- 4:00	——	8.78	BD-04 1237	8.13	B9	
428	5:43:41	15:23	7.94	——	AG+15 521	8.30	F8	
429	5:43:50	14:27	8.22	——	HD 38545	5.72	A3Vn	
430	5:43:59	0:38	7.62	——	Blend	——	——	f
431	5:44:11	8:38	7.60	——	HD 38623	8,21	A0	
432	5:44:11	2:37	——	9.02	HD 38528	7.90	A0	
433	5:44:12	2:14	7.63	7.61	Blend	7.97	A0,A3	
434	5:44:14	0:00	7.91	8.01	———	——	——	
435	5:44:20	- 7:50	——	7.87	BD-07 1170	9.10	G0	
436	5:44:20	13:53	3.67	——	HD 38622	5.29	B2IV-V	
437	5:44:33	12:25	5.99	——	HD 38672	6.68	B5	
438	5:44:46	6:26	——	8.58	HD 38710	5.27	A5V	
439	5:44:51	4:07	7.37	7.80	HD 38650	7.67	B9	
440	5:45:05	- 6:26	——	6.64	HD 38755	7.62	B6V	
441	5:45:19	12:01	6.14	——	AG+12 603	8.50	F0	
442	5:45:23	- 6:08	——	8.17	HD 38800	8.46	B8	
443	5:45:30	-10:33	——	8.10	HD 38735	6.03	A4V	
444	5:45:32	- 9:38	——	1.19	HD 38771	2.06	B0Iab:	
445	5:45:43	- 8:21	——	6.47	HD 38824	7.29	B9	
446	5:45:44	4:43	7.58	7.83	HD 38798	7.29	A0	
447	5:45:45	14:05	7.62	——	AG+14 546	8.50	B9	
448	5:45:49	- 5:51	——	8.45	HD 38868	8.23	A0	
449	5:46:06	12:39	4.99	——	HD 38899	4.91	B9IV	
450	5:46:10	14:26	8.69	——	AG+14 548	9.10	B8	

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TABLE 1—*Continued*

No.	α_{1950}	δ_{1950}	m_{1367}	m_{1519}	Identification	V	Sp. Type	Note
451	5:46:15	0:41	5.84	5.98	Blend	7.11	B8,A0	
452	5:46:26	4:13	7.23	7.86	Blend	7.39	B9,A0	
453	5:46:58	13:17	5.96	——	BD+13 994	8.8P	K7	
454	5:47:00	- 0:46	6.81	6.87	HD 39000	7.62	A0	
455	5:47:23	- 0:16	——	9.24	BD-00 1098	9.40	A0	
456	5:47:26	4:54	——	8.77	HD 39082	7.42	B9	
457	5:47:26	3:31	5.80	——	———	——	——	
458	5:47:32	14:27	6.26	——	HD 39098	6.75	B9	
459	5:47:53	1:15	7.77	——	HD 39068	8.80	G5	
460	5:47:54	2:00	7.83	7.37	HD 39118	5.98	G8III+..	
461	5:47:57	1:42	——	7.99	HD 39103	9.12	B8	
462	5:48:08	8:35	8.52	——	AG+08 662	8.40	B9	
463	5:48:48	- 7:29	——	3.63	HD 39291	5.35	B2IV-V	
464	5:48:50	3:47	8.33	8.31	AG+03 713	8.30	A0	
465	5:49:07	- 0:53	8.43	——	———	——	——	
466	5:49:08	14:12	6.99	——	HD 39317	5.59	B9spe...	
467	5:49:13	- 7:55	——	8.18	HD 39348	8.31	A0	
468	5:49:40	- 6:50	——	8.84	Blend	8.34	B9,A2	
469	5:49:49	- 9:01	——	7.74	HD 39421	5.97	A2Vn	
470	5:50:20	13:36	6.66	——	———	——	——	
471	5:50:53	- 6:25	——	10.06	HD 39614	9.41	B9	
472	5:51:01	- 5:43	——	7.58	HD 39647	7.09	B9	
473	5:51:09	11:49	8.09	——	HD 39662	6.59	A2V	
474	5:51:17	8:10	7.44	——	HD 39683	7.14	B9	
475	5:51:24	- 6:44	——	7.34	HD 39716	8.51	B5	
476	5:51:30	13:54	6.19	——	Blend	6.92	O6:pe...,A0,A2	
477	5:51:32	-10:41	——	9.28	HD 39635	8.70	A0	
478	5:51:52	- 4:07	——	4.88	HD 39777	6.57	B1.5V	
479	5:51:52	5:55	6.75	6.76	HD 39773	6.80	B9	
480	5:52:16	- 0:19	——	8.62	HD 39803	9.20	B9V	
481	5:52:21	- 7:30	——	10.70	BD-07 1211	9.20	A0	
482	5:52:30	- 2:01	——	8.90	AG-02 171	10.00	A0	c
483	5:52:37	4:41	——	9.06	AG+04 671	8.20	A0	
484	5:52:39	- 2:25	——	9.25	BD-02 1405	9.50	A0	
485	5:52:42	11:35	7.26	——	HD 39907	7.90	B9	
486	5:52:44	- 9:09	——	8.86	HD 39852	8.00	A0	
487	5:52:45	13:00	6.78	——	HD 39882	8.17	B5	
488	5:52:45	0:44	——	8.11	Blend	9.01	A0V,A4V	c
489	5:52:51	- 4:50	——	7.16	Blend	5.86	A2III,A0	
490	5:52:54	7:57	9.04	——	AG+07 683	8.30	A0	
491	5:53:06	- 1:56	——	9.02	HD 39849	7.30	A2	c
492	5:53:09	- 7:26	——	9.34	HD 39957	8.50	A0	
493	5:53:10	9:36	6.53	——	HD 39985	5.99	A0IV	
494	5:53:25	0:42	——	8.04	HD 39953	7.60	A0V	c
495	5:53:25	- 3:53	——	8.86	HD 40011	8.07	B8	
496	5:53:47	- 1:55	——	8.61	AG-01 660	8.50	A0	c
497	5:54:06	- 7:36	——	10.28	HD 40118	9.20	B9	
498	5:54:16	- 3:11	——	10.36	HD 40134	8.70	A0	
499	5:54:16	- 1:17	——	8.19	AG-01 661	8.20	A0V	
500	5:54:18	9:41	8.14	——	AG+09 617	8.38	A0	
501	5:54:38	12:58	6.72	——	Blend	7.89	B9,B8,A0	
502	5:54:52	- 0:06	——	7.06	HD 40210	6.90	A0V	
503	5:54:53	0:17	——	7.96	Blend	8.16	A,A2V,A0V	
504	5:54:59	- 8:29	——	9.09	BD-08 1267	9.20	A2	
505	5:55:03	- 1:56	——	8.76	Blend	8.94	B9,B8	
506	5:55:04	5:42	7.74	——	AG+05 694	9.70	F8	
507	5:55:27	- 2:39	——	9.28	HD 40348	9.20	A0	
508	5:55:53	1:46	——	9.04	Blend	5.61	A5me...,A0	
509	5:56:00	- 2:12	——	8.58	HD 40429	8.70	A0	
510	5:56:08	- 1:11	——	8.77	Blend	8.34	B9,B3V	
511	5:56:14	0:25	——	5.98	HD 40446	5.22	A1Vs	
512	5:56:16	9:22	8.89	——	Blend	8.25	A0,A2	
513	5:56:34	- 8:12	——	8.74	———	——	——	
514	5:56:37	- 4:25	——	8.07	Blend	8.38	A0,B9	
515	5:57:00	- 1:34	——	6.24	HD 40574	6.62	B8IIIn	
516	5:57:02	- 8:01	——	9.38	HD 40618	8.70	K0	
517	5:57:04	- 2:26	——	7.92	Blend	7.90	A5,B9	
518	5:57:05	3:58	8.09	7.76	Blend	7.53	A0,A2	
519	5:57:07	- 9:32	——	8.20	HD 40536	5.03	A6m	
520	5:57:07	12:41	6.96	——	HD 40571	6.50	B9	
521	5:57:32	- 0:38	——	7.71	HD 40635	7.70	B9V	c
522	5:57:51	- 0:48	——	7.78	AG-00 724	8.50	A0V	c
523	5:57:52	10:51	6.25	——	———	——	——	
524	5:58:05	- 7:34	——	7.56	HD 40728	8.20	B8	
525	5:58:06	- 3:57	——	10.50	HD 40759	8.55	A0	
526	5:58:29	7:42	8.05	——	Blend	7.81	F5,F5	
527	5:58:46	3:09	6.66	6.70	HD 40836	7.40	B8	
528	5:58:49	2:52	7.54	7.54	HD 40837	7.50	A0	
529	5:58:58	5:46	——	9.83	———	——	——	
530	5:59:03	- 3:58	——	8.97	HD 40903	9.20	A0	
531	5:59:11	- 3:45	——	9.92	HD 40914	8.00	A2	
532	5:59:34	1:34	——	6.28	Blend	6.23	B8V,A0	
533	5:59:34	7:47	7.11	——	HD 40963	7.95	B8	
534	5:59:36	- 0:12	——	9.28	AG-00 726	8.40	A1V	
535	5:59:39	0:58	——	8.57	Blend	8.19	B9V,A5V	
536	5:59:49	- 7:16	——	6.59	HD 40998	7.15	A0	
537	6:00:16	11:46	6.78	——	HD 41076	6.08	A0Vs	
538	6:00:24	6:05	6.82	——	———	——	——	
539	6:00:25	8:40	7.36	——	HD 41121	8.40	B8	
540	6:00:40	- 2:35	——	6.66	HD 41176	7.00	A0	

TABLE 1—*Continued*

No.	α_{1950}	δ_{1950}	m_{1367}	m_{1519}	Identification	V	Sp. Type	Note
541	6:00:40	4:18	——	9.23	AG+04 693	8.20	A0	
542	6:00:50	6:38	8.39	——	———	——	——	
543	6:01:13	2:45	——	6.10	HD 41253	7.31	B5	
544	6:01:23	- 3:52	——	12.36	HD 41272	9.50	A0	
545	6:01:24	3:06	——	7.26	AG+03 733	10.30	K2	
546	6:01:33	2:01	——	8.98	HD 41287	9.20	A0	c
547	6:01:34	0:30	——	8.34	HD 41288	8.80	A0	
548	6:01:49	- 6:41	——	3.91	HD 41335	5.21	B2Vne	
549	6:01:52	9:40	7.81	——	Blend	8.07	A0,A	
550	6:01:59	- 1:40	——	8.28	HD 41381	6.80	A0	
551	6:02:10	9:03	8.13	——	HD 41378	8.19	A0	
552	6:02:11	2:02	——	9.93	AG+02 673	7.66	B9	c
553	6:02:13	- 2:47	——	9.72	HD 41421	9.20	A0	
554	6:02:25	- 5:22	——	8.72	HD 41434	7.90	B9	
555	6:02:27	5:51	7.14	7.58	———	——	——	
556	6:02:54	- 1:20	——	8.78	HD 41503	9.00	A2	
557	6:03:04	- 4:47	——	8.55	Blend	8.3P	A0,A2,A0	
558	6:03:28	- 6:19	——	8.77	HD 41583	8.60	B9	
559	6:03:29	- 4:35	——	8.55	Blend	8.26	A0,B9	
560	6:04:03	- 4:14	——	4.68	HD 41692	5.39	B5IV	
561	6:04:03	5:29	——	9.43	———	——	——	
562	6:04:06	2:06	——	7.97	HD 41715	7.70	A0	
563	6:04:16	- 0:19	——	8.41	HD 41734	8.80	A0	
564	6:04:19	0:45	——	9.53	HD 41755	9.00	A0	
565	6:04:20	- 3:24	——	5.89	HD 41756	6.92	B5	
566	6:04:30	3:03	——	7.70	HD 41808	7.70	A0	
567	6:04:40	- 1:00	——	8.10	HD 41810	8.90	A0	
568	6:04:42	- 2:01	——	8.41	AG-01 679	8.20	A0	
569	6:04:59	5:02	——	8.01	Blend	8.36	B9,A2	
570	6:05:02	- 3:38	——	9.08	HD 41895	8.40	B9	
571	6:05:07	0:04	——	10.79	HD 291204	10.0P	F5	
572	6:05:21	3:22	——	7.49	Blend	7.33	A0,A0	
573	6:05:31	- 3:51	——	11.28	HD 294670	9.00	K5	
574	6:05:35	- 7:07	——	8.81	HD 41950	8.60	A0	
575	6:05:36	- 2:38	——	9.43	Blend	8.78	A0,A	
576	6:05:43	- 2:02	——	9.08	Blend	7.97	A0,A	
577	6:05:48	- 6:11	——	7.83	SAO 132867	9.65	B1.5V	
578	6:05:59	- 5:20	——	6.59	SAO 132876	8.10	B1V	
579	6:06:08	2:28	——	6.94	Blend	4.67	A0,A3Vn,A0	
580	6:06:12	- 6:30	——	8.83	SAO 132875	8.90	B3	
581	6:06:32	4:48	——	6.98	HD 42203	7.80	B8	
582	6:06:34	3:42	——	8.94	Blend	8.37	A0,A2	
583	6:06:45	- 7:52	——	7.91	HD 42133	6.70	A2	
584	6:06:48	- 3:50	——	7.02	HD 42204	8.45	B5	
585	6:07:04	0:55	——	8.08	HD 42257	7.60	B9	
586	6:07:18	- 6:17	——	8.07	Blend	8.67	B3V,A0,A	
587	6:07:25	- 0:23	——	8.84	HD 42335	8.41	A0	
588	6:07:32	2:54	——	6.61	HD 42353	6.90	B9	
589	6:07:35	3:56	——	8.15	AG+03 752	8.20	B9	
590	6:08:16	- 2:48	——	9.42	HD 42482	9.10	A0	
591	6:08:32	- 1:55	——	9.00	HD 42533	8.00	A0	c
592	6:08:34	- 3:40	——	9.07	Blend	8.45	A0,A0	
593	6:08:35	3:55	——	8.67	Blend	7.63	A3,A0,A0,A0	
594	6:08:47	- 3:26	——	8.25	HD 42563	8.89	B9	
595	6:08:51	- 2:01	——	8.66	AG-01 691	8.90	A0	c
596	6:08:55	- 0:47	——	8.02	HD 42602	8.30	A0	
597	6:08:59	2:28	——	7.71	Blend	7.88	A0,A2	
598	6:09:00	- 5:56	——	9.29	———	——	——	
599	6:09:13	0:42	——	8.35	HD 42638	8.30	A0	
600	6:09:20	- 1:21	——	7.98	Blend	7.54	B8,A0	
601	6:09:22	- 4:40	——	5.78	HD 42657	6.18	B9mnp...	
602	6:09:42	- 6:31	——	3.21	HD 42690	5.05	B2V	
603	6:09:57	- 0:51	——	9.39	———	——	——	
604	6:10:05	3:36	——	6.59	HD 42845	7.51	B8	
605	6:10:09	2:54	——	8.79	HD 42846	8.48	A0	
606	6:10:12	- 2:31	——	7.90	HD 42824	6.63	A2V	
607	6:10:18	0:44	——	7.80	AG+00 636	8.50	A0	c
608	6:10:19	- 3:45	——	9.57	BD-03 1341	9.60	A0	
609	6:10:35	0:34	——	8.00	AG+00 638	8.30	A0	c
610	6:10:35	0:08	——	7.38	HD 42877	8.40	B8	
611	6:11:07	- 2:17	——	7.24	HD 42959	7.79	B8	
612	6:11:09	- 1:55	——	10.13	Blend	8.6P	A3,A0	
613	6:11:19	- 1:05	——	7.73	Blend	7.6P	A0,A2,B8	
614	6:11:52	2:44	——	8.86	Blend	7.56	A0,A2	
615	6:11:52	2:19	——	6.30	HD 43113	7.30	B9	
616	6:12:16	- 0:24	——	8.33	HD 43191	8.10	A0	
617	6:12:22	- 4:33	——	4.25	HD 43157	5.83	B5V	
618	6:12:23	- 2:57	——	11.50	HD 43193	8.80	A0	
619	6:12:56	0:51	——	6.38	Blend	6.78	B5,B9	
620	6:13:35	- 2:15	——	8.82	Blend	8.4P	A0,A2	
621	6:13:44	0:01	——	6.63	Blend	7.16	B8,A2	c
622	6:13:45	1:06	——	6.13	HD 43461	6.62	B6V	
623	6:13:48	- 2:51	——	8.88	HD 43462	8.00	A0	
624	6:14:23	- 0:04	——	7.60	AG-00 765	8.60	B8	c
625	6:14:26	- 3:25	——	8.60	BD-03 1368	8.60	K5	

[a] This star has a neighbor within 12′ which is more than mag fainter in the ultraviolet.
[b] This star has a neighbor within 12′ which is more than 1 mag brighter in the ultraviolet.
[c] This star has a neighbor within 12′ which is within 1 mag of the same ultraviolet brightness.
[d] This star is a member of NGC 1977.
[e] Ultraviolet magnitudes uncertain due to the brightness of this star.
[f] This object coincides with several faint F, G, and K stars.

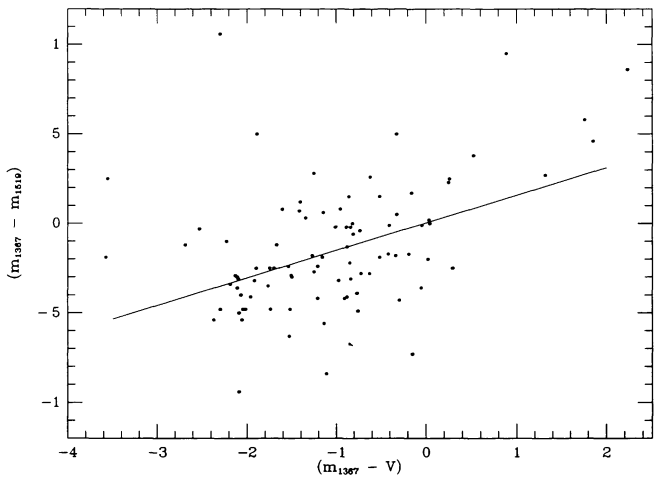

FIG. 3a

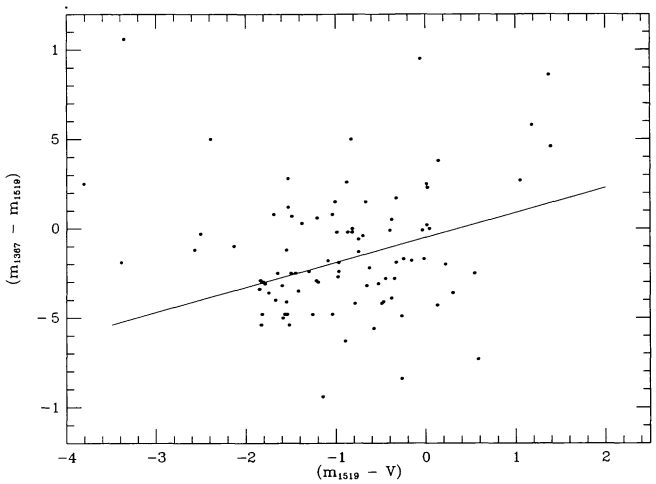

FIG. 3b

FIG. 3.—Color-color plots for stars for which we have measured both ultraviolet magnitudes and for which a V magnitude is available. Three stars fall well outside of the plotted areas.

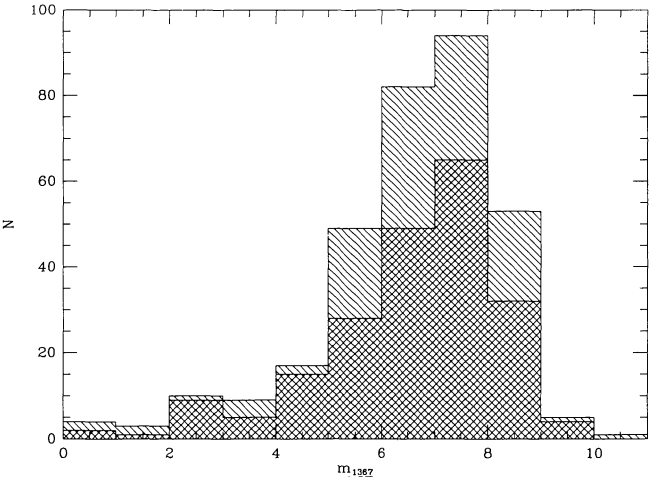

FIG. 4a

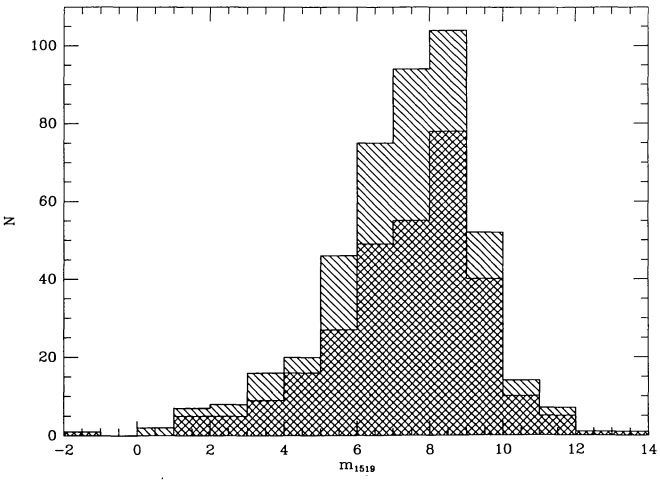

FIG. 4b

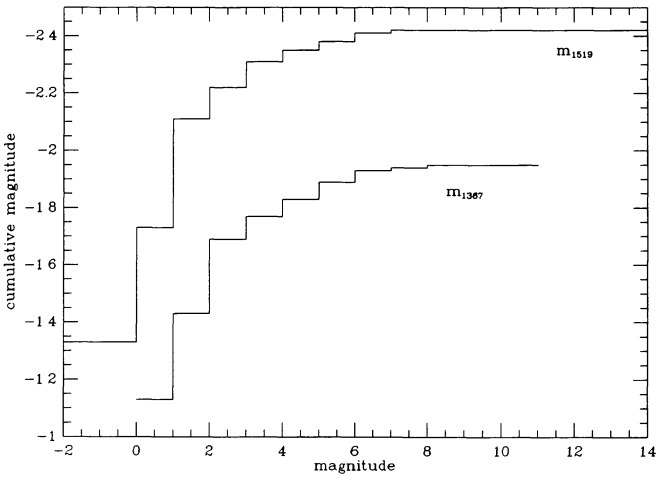

FIG. 4c

FIG. 4.—(a)–(b) Number of objects from Table 1 in 1 mag intervals vs. the ultraviolet magnitudes. The darker shaded region corresponds to the counts of objects in the selected sample. (c) The cumulative magnitude of all the objects in Table 1 as a function of magnitude.

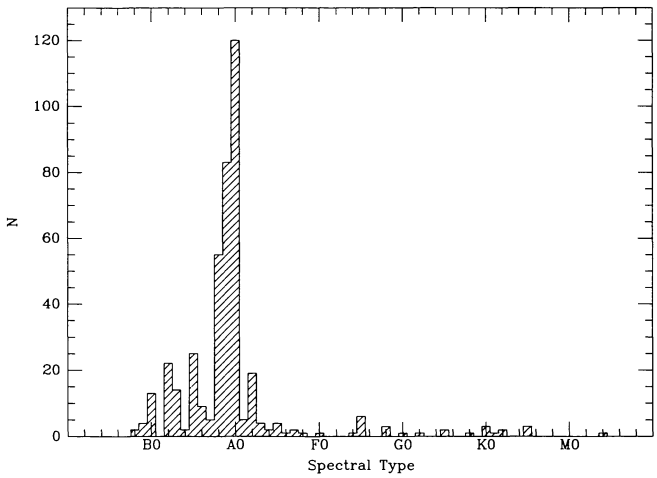

FIG. 5.—The frequency distribution of stars in our selected sample as a function of spectral type.

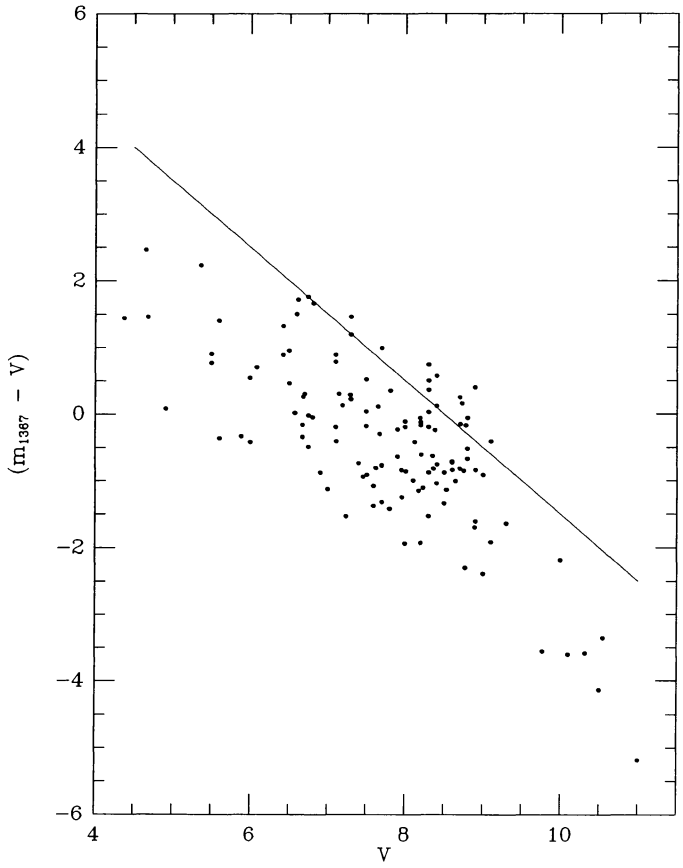

FIG. 6*a*

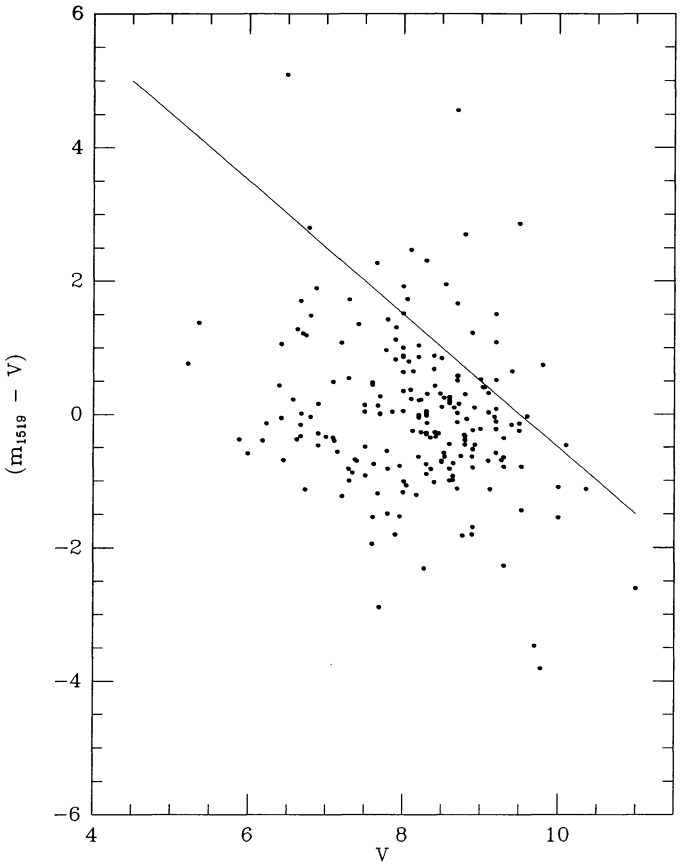

FIG. 6*b*

FIG. 6.—Plots of $(m_{1367} - V)$ and $(m_{1519} - V)$ against the V magnitude for stars from the selected sample with spectral types of B8, B9, A0, A1, and A2. The solid diagonal lines represent the limiting magnitudes of our ultraviolet photometry.

In Paper I we argued that the stars in the lower right corner of the color-magnitude diagram are likely to be hot white dwarfs due to their combination of very blue colors and faint visible manitudes. Stars 143, 161, 172, 213, 240, 291, and 386 appear in that group in one or both of the plots in Figure 6. The first two of these objects have spectral types of B9V. This is inconsistent with their being white dwarfs and with their positions in Figure 6. It is thus likely that the sources of the ultraviolet radiation are not the B stars. The other five objects do not have MK spectral types and are possible white dwarfs. There are no doubt more such stars which were not included in Figure 6 because they lacked optical data.

We have searched in the white dwarf catalog of McCook & Sion (1987) for the stars listed in the previous paragraph. None of them are in the catalog. On the other hand, there are nine stars in the catalog which are in our field. While none of them correspond to any of our ultraviolet objects, they are all faint and might lie below our detection threshold in the ultraviolet.

The objects we have identified as white dwarfs, those we have identified with late-type stars and those for which we have no identification should all be investigated further. Since the accuracy of the ultraviolet coordinates is no better than a few minutes of arc, the identifications in Table 1 are somewhat uncertain. The inspection of the region on objective prims plates and the measurement of colors of stars in the vicinities of the ultraviolet objects would both be useful in addressing these points. CCD observations are planned for this purpose.

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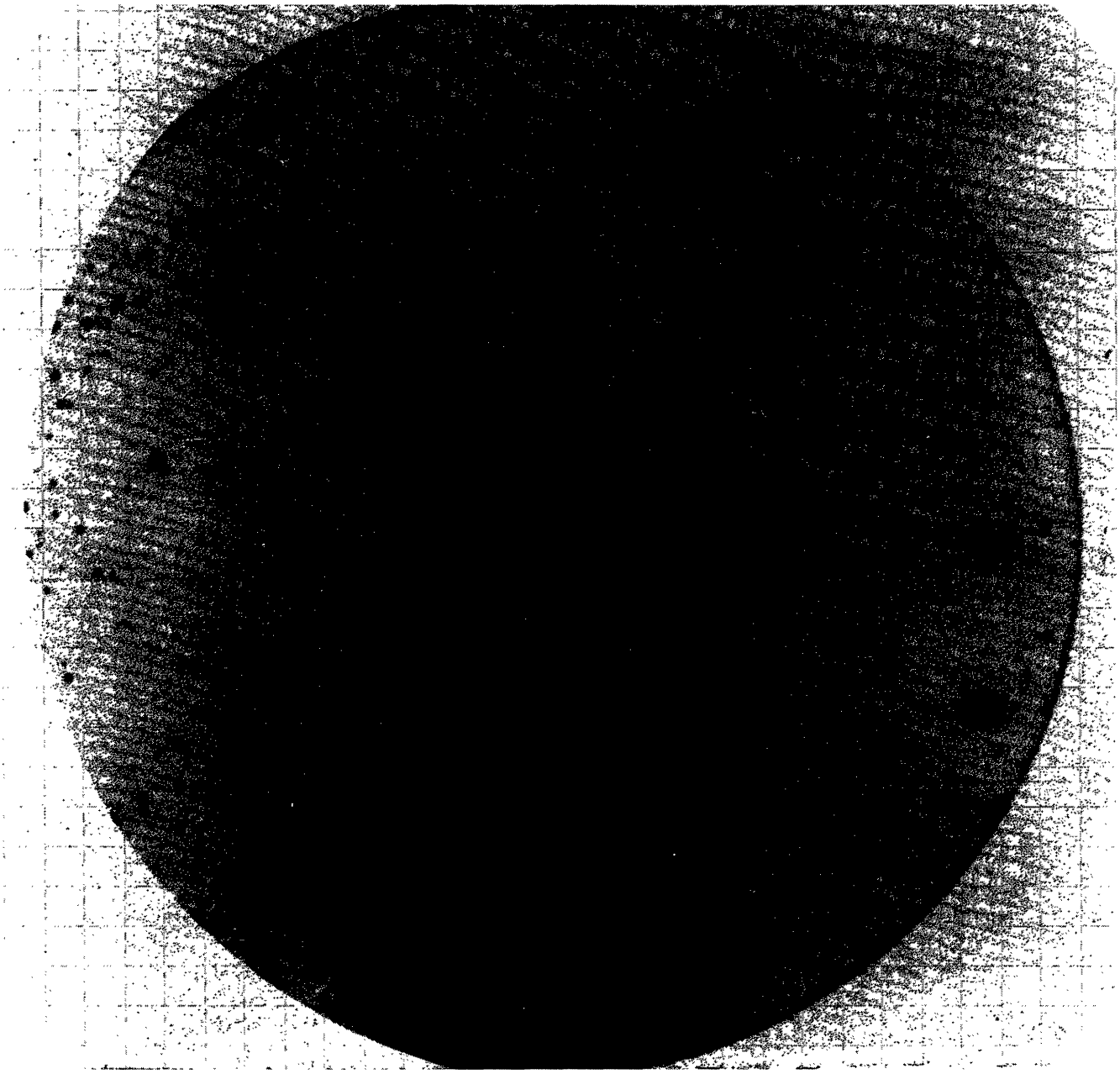

FIG. 2.—Print of an image of the 1982 field. The rings and arcs near field center are instrumental artifacts.

PLATE 9

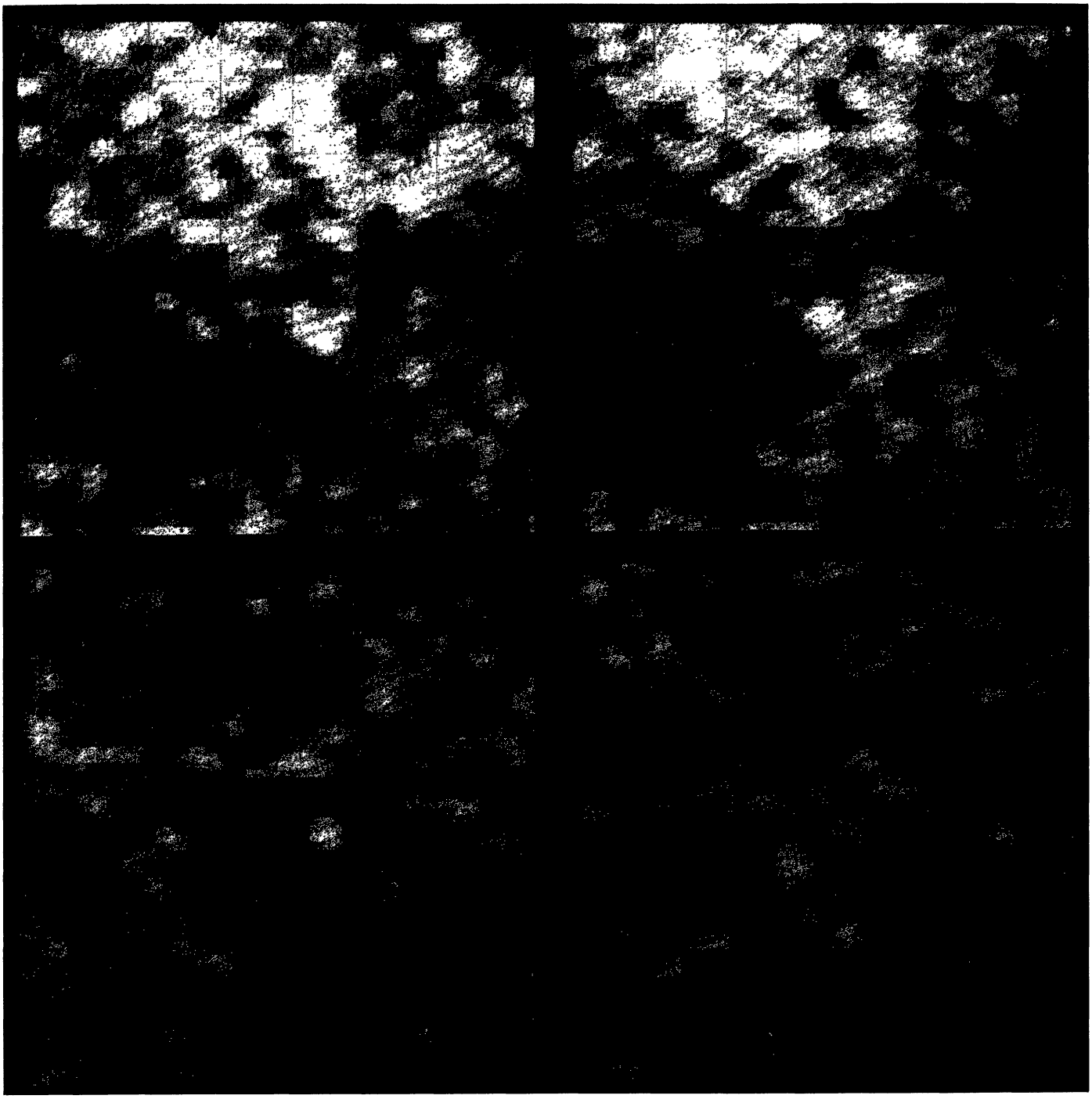

FIG. 9.—Samples of four position-position continuum-subtracted images shown in gray scale. The display is linear: emission appears white, absorption appears black. *Clockwise from upper left:* $V_{LSR} = -46.5, -59.1, -23.4$, and -72.4 km s^{-1}.