THE ASTRONOMICAL JOURNAL VOLUME 111, NUMBER 2 FEBRUARY 1996

PHOTOELECTRIC *UBV* PHOTOMETRY OF GALAXIES IN THE CLUSTERS PEGASUS I, PEGASUS II, ABELL 262, ABELL 1367, AND ABELL 2197−9

R. BUTA

University of Alabama, Tuscaloosa, Alabama 35487
Electronic mail: buta@sarah.astr.ua.edu

Received 1995 August 11; revised 1995 October 23

ABSTRACT

This paper presents photoelectric *UBV* multiaperture photometry of 144 galaxies, 139 of which are associated with six nearby bright clusters. The observations were made at the McDonald Observatory from 1986 September to 1987 November and were part of the production of the *Third Reference Catalogue of Bright Galaxies* (RC3). The observations were used to compute total magnitudes and color indices published in RC3. The observations can also be used to calibrate CCD images. © *1996 American Astronomical Society.*

1. INTRODUCTION

The *Third Reference Catalogue of Bright Galaxies* (RC3, de Vaucouleurs *et al.* 1991) includes photoelectric total magnitudes and color indices for nearly 3500 galaxies in the Johnson *UBV* system. For 133 of these galaxies, mostly members of the clusters Pegasus I, Pegasus II, Abell 262, Abell 1367, and Abell 2197−9, the published photometric parameters are based either all or in part on data which I obtained at the McDonald Observatory during the period 1986 September to 1987 November. The observations were originally made for the distance scale and were intended to complement the work of Buta & Corwin (1986a, 1986b), who used a variety of tertiary distance methods to derive the distance to the Hercules Supercluster. Here I present these observations in their entirety, but only as a companion paper to the more extensive paper which describes the analysis of *UBV* data for RC3 (Buta *et al.* 1995, hereafter referred to as BCVVL). The photometry is referred to as source "BUT-87" in Table 1 of BCVVL.

2. OBSERVATIONS

The photoelectric observations were made with an uncooled Amperex 56-DVP photometer attached to the 0.91 and 2.1 m telescopes of McDonald Observatory. It was essential to use as wide a range of apertures as possible to define the magnitude–aperture relations (or "growth curves"), because this was needed to obtain integrated magnitudes to 0.15 mag or better accuracy. For most of the sample galaxies, three apertures ranging from 32″ to 2.′2 proved adequate, although for the larger cases a 12 mm aperture giving a diameter of 3.′5 on the 0.91 m had to be used. Each observation consisted of five to six 10 s integrations, with sky readings interspersed between, also ten seconds each in duration. Twelve or more standards from the lists of Landolt (1973, 1983) were observed each night, and, when possible, extinction coefficients (first and second order) were determined for each night. A total of 20 nights provided useful data over the period 1986 September to 1987 November.

Table 1 summarizes the *UBV* data. The information provided is as follows:

Column 1: Number in *Catalogue of Principal Galaxies* (Paturel *et al.* 1989).

Column 2: Standard name (see RC3 for references).

Column 3: Revised Hubble stage on RC3 numerical scale.

Column 4: Log of extinction- and inclination-corrected isophotal diameter (units of 0.′1) from RC3 or G. Paturel (private communication).

Column 5: Log of diameter of circular diaphragm used for the photometry (units of 0.′1).

Column 6: $X=\log A/D_0$.

Columns 7–9: Magnitude and colors in Johnson *UBV* system.

Column 10: Date.

Column 11: Notes to field star or companion galaxy contaminations.

Column 12: Diameter of telescope mirror in centimeters.

In many cases field stars contaminated one or more apertures, and these stars were measured separately; their magnitudes and colors are summarized in the Notes to Table 1. The usual procedure was to measure these stars with a 1 mm aperture (16″ on the 0.91 m), and take local sky readings in directions roughly parallel to the isophotes of the galaxy. Occasionally, the contaminating object was another galaxy (e.g., as in NGC 3861, NGC 7499, NGC 7501, and UGC 6697), and this was also measured separately and some correction made. In no case were field objects ignored or assumed to be negligible, if they were visible at all within an aperture. Great care was taken to insure that sky fields suffered no contamination that could be serious as well. If an aperture included contaminating field stars, the name in column 1 of Table 1 is appended with, for example, "$+s$," "$+2s$," etc. The appendage "$+s$" means that a visible field star is included in the photometric measurement, while "$+2s$" means two field stars were visible. Measurements corrected for these stars are appended with "$-s$," "$-2s$," etc. If a companion galaxy contaminates a measurement, then the appendages are "$+c$" and "$-c$." The corrected

 0004-6256/96/111(2)/591/12/$6.00

TABLE 1. *UBV* photometry of cluster galaxies.

PGC	Object	T	$logD_o$	$logA$	X	V	$B-V$	$U-B$	Date	Notes	Telescope
1	2	3	4	5	6	7	8	9	10	11	12
2248	ESO 350−40+2c		1.05	1.54	0.49	13.44	0.50	−0.14	87Nov17	1	091
6502	NGC 668	3	1.27	0.73	−0.54	13.73	0.73	0.10	86Oct02		091
6502	NGC 668	3	1.27	1.04	−0.23	13.27	0.71	0.03	86Oct02		091
6502	NGC 668	3	1.27	1.34	0.07	13.08	0.68	0.07	86Oct02		091
6560	NGC 669	2	1.51	0.73	−0.78	13.51	1.04	0.63	86Sep30		091
6560	NGC 669	2	1.51	1.04	−0.47	12.81	1.07	0.46	86Sep30		091
6560	NGC 669	2	1.51	1.34	−0.17	12.49	1.02	0.57	86Sep30		091
6711	NGC 679	−3	1.34	0.73	−0.61	13.07	1.08	0.56	86Dec30		091
6711	NGC 679	−3	1.34	1.04	−0.30	12.73	1.05	0.64	86Dec30		091
6711	NGC 679	−3	1.34	1.34	0.00	12.50	1.00	0.55	86Dec30		091
6782	NGC 687	−2	1.18	0.73	−0.45	13.10	1.05	0.63	86Dec30		091
6782	NGC 687	−2	1.18	1.04	−0.14	12.73	1.02	0.61	86Dec30		091
6782	NGC 687+s	−2	1.18	1.34	0.16	12.44	0.96	0.58	86Dec30		091
6782	NGC 687−s	−2	1.18	1.34	0.16	12.50	0.98	0.63	86Dec30	1	091
6799	NGC 688	3	1.40	0.73	−0.67	13.89	0.87	0.21	86Sep30		091
6799	NGC 688	3	1.40	1.04	−0.36	13.37	0.69	0.08	86Sep30		091
6799	NGC 688	3	1.40	1.34	−0.06	12.91	0.69	0.09	86Sep30		091
6865	UGC 1319		0.97	0.43	−0.54	15.18	0.72	0.00	87Nov19		091
6865	UGC 1319		0.97	0.73	−0.24	14.25	0.67	0.00	87Nov19		091
6865	UGC 1319		0.97	1.04	0.07	13.96	0.69	−0.01	87Nov19		091
6865	UGC 1319		0.97	1.34	0.37	13.89	0.59	0.14	87Nov19		091
6948	UGC 1344	1	1.24	0.43	−0.81	14.16	1.05	0.51	87Jan02		091
6948	UGC 1344	1	1.24	0.73	−0.51	13.59	0.99	0.50	87Jan02		091
6948	UGC 1344+s	1	1.24	1.04	−0.20	10.65	0.65	0.11	87Jan02		091
6948	UGC 1344−s	1	1.24	1.04	−0.20	13.04	0.97	0.14	87Jan02	1	091
6948	UGC 1344+s	1	1.24	1.34	0.10	10.62	0.65	0.12	87Jan02		091
6948	UGC 1344−s	1	1.24	1.34	0.10	12.82	0.88	0.23	87Jan02	1	091
6957	NGC 703	−3	1.09	0.43	−0.66	14.33	1.14	0.61	86Dec31		091
6957	NGC 703	−3	1.09	0.73	−0.36	13.87	1.09	0.58	86Dec31		091
6957	NGC 703+s	−3	1.09	1.04	−0.05	13.42	0.96	0.53	86Dec31		091
6957	NGC 703−s	−3	1.09	1.04	−0.05	13.55	1.04	0.64	86Dec31	1	091
6961	UGC 1347	5	1.12	0.43	−0.69	14.96	0.91	0.15	87Jan02		091
6961	UGC 1347+s	5	1.12	0.73	−0.39	13.64	0.69	0.08	87Jan02		091
6961	UGC 1347−s	5	1.12	0.73	−0.39	13.96	0.76	0.08	87Jan02	1	091
6961	UGC 1347+s	5	1.12	1.04	−0.08	13.05	0.65	0.06	87Jan02		091
6961	UGC 1347−s	5	1.12	1.04	−0.08	13.23	0.67	0.06	87Jan02	1	091
6962	NGC 708	−5	1.50	0.43	−1.07	14.30	1.15	0.72	86Dec31		091
6962	NGC 708+s	−5	1.50	1.04	−0.46	12.76	1.05	0.55	86Dec31		091
6962	NGC 708−s	−5	1.50	1.04	−0.46	12.95	1.09	0.62	86Dec31	1	091
6962	NGC 708+s	−5	1.50	1.34	−0.16	12.25	1.02	0.58	86Dec31		091
6962	NGC 708−s	−5	1.50	1.34	−0.16	12.36	1.04	0.62	86Dec31	1	091
6969	NGC 709			0.43		14.85	1.08	0.56	87Nov19		091
6969	NGC 709			0.73		14.59	0.96	0.57	87Nov19		091
6969	NGC 709			1.04		14.30	1.03	0.26	87Nov19		091
6972	NGC 710	6	1.14	0.43	−0.71	15.43	0.63	−0.03	86Oct02		091
6972	NGC 710	6	1.14	0.73	−0.41	14.47	0.70	0.02	86Oct02		091
6972	NGC 710	6	1.14	1.04	−0.10	13.95	0.58	−0.08	86Oct02		091
6977	UGC 1350	3	1.26	0.73	−0.53	14.47	0.96	0.44	87Nov17		091
6977	UGC 1350	3	1.26	1.04	−0.22	13.67	0.95	0.49	87Nov17		091
6977	UGC 1350+3s	3	1.26	1.34	0.08	13.01	0.93	0.35	87Nov18		091
6977	UGC 1350−3s	3	1.26	1.34	0.08	13.31	0.98	0.25	87Nov18	1	091
7009	NGC 714	0	1.18	0.73	−0.45	13.45	1.04	0.64	86Dec30		091
7009	NGC 714+s	0	1.18	1.04	−0.14	13.15	1.09	0.53	86Dec30		091
7009	NGC 714−s	0	1.18	1.04	−0.14	13.17	1.12	0.59	86Dec30	1	091
7009	NGC 714+2s	0	1.18	1.34	0.16	12.93	0.96	0.56	87Jan02		091
7009	NGC 714−2s	0	1.18	1.34	0.16	13.11	0.99	0.57	87Jan02	2	091
7033	NGC 717	0	1.10	0.43	−0.67	14.81	1.07	0.47	87Jan03		091
7033	NGC 717	0	1.10	0.73	−0.37	14.37	1.01	0.45	87Jan03		091
7033	NGC 717+s	0	1.10	1.04	−0.06	13.87	0.95	0.43	87Jan03		091
7033	NGC 717−s	0	1.10	1.04	−0.06	14.05	0.99	0.50	87Jan03	1	091
7097	NGC 721	4	1.25	0.73	−0.52	14.52	0.84	0.15	86Dec31		091
7097	NGC 721	4	1.25	1.04	−0.21	13.73	0.72	0.05	86Dec31		091
7097	NGC 721	4	1.25	1.34	0.09	13.47	0.80	0.11	87Jan02		091
7097	NGC 721	4	1.25	1.34	0.09	13.51	0.71	0.00	86Dec31		091
7282	NGC 735	3	1.28	0.73	−0.55	14.06	0.91	0.34	87Nov17		091
7282	NGC 735+s	3	1.28	1.04	−0.24	13.01	0.84	0.33	87Nov20		091
7282	NGC 735−s	3	1.28	1.04	−0.24	13.49	0.87	0.23	87Nov17	1	091
7282	NGC 735+3s	3	1.28	1.34	0.06	12.80	0.78	0.26	87Nov20		091
7282	NGC 735−3s	3	1.28	1.34	0.06	13.34	0.79	0.17	87Nov17	2	091
7387	NGC 753	4	1.42	0.73	−0.69	13.38	0.80	0.18	86Dec31		091
7387	NGC 753	4	1.42	1.04	−0.38	12.80	0.73	0.09	86Dec31		091
7387	NGC 753+2s	4	1.42	1.34	−0.08	12.36	0.71	0.02	86Dec31		091
7387	NGC 753−2s	4	1.42	1.34	−0.08	12.43	0.70	0.00	86Dec31	1	091
7387	NGC 753+2s	4	1.42	1.34	−0.08	12.37	0.71	0.06	86Dec30		091
7387	NGC 753−2s	4	1.42	1.34	−0.08	12.45	0.69	0.04	86Dec30	1	091

TABLE 1. (continued)

PGC	Object	T	$logD_o$	$logA$	X	V	$B-V$	$U-B$	Date	Notes	Telescope
1	2	3	4	5	6	7	8	9	10	11	12
7397	NGC 759	−5	1.22	0.43	−0.79	13.92	1.04	0.47	87Nov19		091
7397	NGC 759	−5	1.22	0.73	−0.49	13.37	1.05	0.56	87Nov19		091
7397	NGC 759	−5	1.22	1.04	−0.18	12.97	1.09	0.56	87Nov19		091
7488	IC 178	2	1.12	0.73	−0.39	13.81	0.87	0.21	87Nov19		091
7488	IC 178	2	1.12	1.04	−0.08	13.49	0.81	0.22	87Nov19		091
7488	IC 178	2	1.12	1.34	0.22	13.40	0.73	0.30	87Nov19		091
7581	IC 179	−5	1.27	0.43	−0.84	13.78	1.08	0.63	87Jan03		091
7581	IC 179	−5	1.27	0.73	−0.54	13.27	1.03	0.61	87Jan03		091
7581	IC 179	−5	1.27	1.04	−0.23	12.95	1.02	0.57	87Jan03		091
7832	NGC 797	1	1.22	0.73	−0.49	13.58	1.02	0.50	86Oct02		091
7832	NGC 797+s	1	1.22	1.04	−0.18	13.13	0.94	0.44	86Oct02		091
7832	NGC 797−s	1	1.22	1.04	−0.18	13.17	0.95	0.46	86Oct02	1	091
7832	NGC 797+3s	1	1.22	1.34	0.12	12.42	1.00	0.52	86Oct02		091
7832	NGC 797−3s	1	1.22	1.34	0.12	12.85	0.97	0.40	86Oct02	2	091
7847	NGC 801	5	1.52	0.73	−0.79	13.97	1.02	0.43	86Dec30		091
7847	NGC 801	5	1.52	1.04	−0.48	13.51	0.96	0.41	86Dec30		091
7847	NGC 801	5	1.52	1.34	−0.18	13.13	0.94	0.21	87Jan03		091
7847	NGC 801	5	1.52	1.34	−0.18	13.19	0.84	0.37	86Dec30		091
7847	NGC 801+5s	5	1.52	1.54	0.02	12.75	0.90	0.27	87Nov20		091
7847	NGC 801−5s	5	1.52	1.54	0.02	13.01	0.91	0.24	87Nov17	1	091
7847	NGC 801+5s	5	1.52	1.54	0.02	12.92	0.83	0.69	87Nov20		091
7847	NGC 801−5s	5	1.52	1.54	0.02	13.22	0.82	0.80	87Nov17	1	091
8185	NGC 818	5	1.48	0.73	−0.75	13.54	0.91	0.22	86Dec31		091
8185	NGC 818	5	1.48	1.04	−0.44	12.93	0.74	0.15	86Dec31		091
8185	NGC 818+s	5	1.48	1.34	−0.14	12.57	0.70	0.15	86Dec31		091
8185	NGC 818−s	5	1.48	1.34	−0.14	12.62	0.69	0.12	86Dec31	1	091
8283	NGC 828	1	1.48	0.73	−0.75	13.44	0.92	0.38	87Jan02		091
8283	NGC 828	1	1.48	1.04	−0.44	12.90	0.89	0.37	87Jan02		091
8283	NGC 828	1	1.48	1.34	−0.14	12.49	0.89	0.37	87Jan02		091
8352	NGC 834		1.05	0.73	−0.32	13.58	0.74	0.01	87Nov20		091
8352	NGC 834		1.05	1.04	−0.01	13.27	0.77	0.07	87Nov20		091
8352	NGC 834+s		1.05	1.34	0.29	12.54	0.99	0.41	87Nov20		091
8352	NGC 834−s		1.05	1.34	0.29	13.17	0.73	0.16	87Nov20	1	091
8372	NGC 841	2	1.26	0.73	−0.53	13.19	0.92	0.42	86Sep30		091
8372	NGC 841	2	1.26	1.04	−0.22	12.79	0.86	0.29	86Sep30		091
8372	NGC 841	2	1.26	1.34	0.08	12.62	0.83	0.29	86Sep30		091
8438	NGC 845	3	1.24	0.73	−0.51	14.13	1.01	0.45	87Nov20		091
8438	NGC 845	3	1.24	1.04	−0.20	13.81	0.91	0.39	87Nov20		091
8438	NGC 845+s	3	1.24	1.34	0.10	13.49	0.80	0.56	87Nov20		091
8438	NGC 845−s	3	1.24	1.34	0.10	13.67	0.82	0.71	87Nov20	1	091
9062	UGC 1840	10	1.20	0.73	−0.47	13.88	1.02	0.58	87Nov17	1	091
9062	UGC 1840+	10	1.20	1.34	0.14	11.82	0.67	0.14	87Nov17	2	091
20383	UGC 3705		1.16	1.04	−0.12	13.89	0.55	−0.10	87Nov20		091
20460	UGC 3730	10	1.47	0.73	−0.74	13.92	0.82	0.34	87Nov20	1	091
20460	UGC 3730	10	1.47	1.34	−0.13	12.85	0.70	0.04	87Nov20	2	091
35328	UGC 6476	4	1.16	0.73	−0.43	14.14	0.66	0.02	87Nov19		091
35328	UGC 6476	4	1.16	1.04	−0.12	13.72	0.57	0.05	87Nov19		091
35328	UGC 6476	4	1.16	1.34	0.18	13.61	0.61	0.05	87Nov19		091
35347	NGC 3697	3	1.37	0.73	−0.64	14.05	0.90	0.24	87Nov17		091
35347	NGC 3697	3	1.37	1.04	−0.33	13.47	0.76	0.19	87Nov17		091
35347	NGC 3697	3	1.37	1.34	−0.03	13.19	0.70	0.02	87Nov17		091
35347	NGC 3697	3	1.37	1.54	0.17	13.09	0.73	−0.01	87Nov17		091
35405	NGC 3701	4	1.28	0.73	−0.55	13.99	0.57	−0.05	87Nov17		091
35405	NGC 3701	4	1.28	1.04	−0.24	13.40	0.59	−0.10	87Nov17		091
35405	NGC 3701+s	4	1.28	1.34	0.06	12.93	0.59	−0.07	87Nov20		091
35405	NGC 3701−s	4	1.28	1.34	0.06	13.13	0.54	−0.13	87Nov17	1	091
35405	NGC 3701+s	4	1.28	1.54	0.26	12.90	0.49	0.11	87Nov20		091
35405	NGC 3701−s	4	1.28	1.54	0.26	13.10	0.43	0.08	87Nov17	1	091
35521	UGC 6509	7	1.32	1.34	0.02	14.53	1.02	−0.08	87Nov20		091
35521	UGC 6509	7	1.32	1.34	0.02	15.09	0.39	0.38	87Nov20		091
35701	UGC 6546	4	1.05	0.73	−0.32	15.41	0.82	0.06	87Nov19		091
35701	UGC 6546	4	1.05	1.04	−0.01	15.19	0.70	−0.04	87Nov19		091
35701	UGC 6546	4	1.05	1.34	0.29	14.75	0.99	−0.05	87Nov19		091
35952	UGC 6586	4	1.26	0.73	−0.53	14.61	0.71	0.02	87May02		091
35952	UGC 6586	4	1.26	1.04	−0.22	13.99	0.61	−0.09	87May02		091
35952	UGC 6586	4	1.26	1.34	0.08	13.81	0.62	−0.12	87May02		091
35978	MCG 4−28− 3		0.94	0.43	−0.51	15.73	0.74	0.18	87Nov20		091
35978	MCG 4−28− 3		0.94	0.73	−0.21	15.03	0.67	−0.08	87Nov20		091
35978	MCG 4−28− 3		0.94	1.04	0.10	14.70	0.68	0.07	87Nov20		091
35978	MCG 4−28− 3		0.94	1.04	0.10	14.89	0.58	−0.22	87Nov20		091
35978	MCG 4−28− 3		0.94	1.34	0.40	14.63	0.59	0.26	87Nov20		091
36060	UGC 6607	7	1.15	0.73	−0.42	15.13	0.60	−0.17	87May03		091
36060	UGC 6607	7	1.15	1.04	−0.11	14.68	0.47	−0.08	87May03		091

TABLE 1. (continued)

PGC	Object	T	$logD_o$	$logA$	X	V	$B-V$	$U-B$	Date	Notes	Telescope
1	2	3	4	5	6	7	8	9	10	11	12
36200	NGC 3801	−2	1.51	0.73	−0.78	13.32	1.07	0.54	86Dec31		091
36200	NGC 3801	−2	1.51	1.04	−0.47	12.69	1.00	0.51	86Dec31		091
36200	NGC 3801	−2	1.51	1.34	−0.17	12.26	1.01	0.44	86Dec31		091
36200	NGC 3801	−2	1.51	1.54	0.03	12.12	0.95	0.44	87Nov20		091
36203	NGC 3802		1.06	0.43	−0.63	14.92	0.98	0.57	87Nov20		091
36203	NGC 3802		1.06	0.73	−0.33	14.13	1.01	0.48	87Nov20		091
36203	NGC 3802		1.06	1.04	−0.02	13.60	0.97	0.38	87Jan02		091
36203	NGC 3802+2s		1.06	1.34	0.28	12.76	0.82	0.36	87Jan02		091
36203	NGC 3802−2s		1.06	1.34	0.28	13.41	0.89	0.42	87Jan02	1	091
36231	NGC 3806	3	1.15	0.73	−0.42	14.71	0.72	−0.06	86Dec30		091
36231	NGC 3806	3	1.15	1.04	−0.11	14.01	0.56	−0.01	86Dec30		091
36231	NGC 3806	3	1.15	1.34	0.19	13.67	0.55	−0.01	86Dec30		091
36292	NGC 3816	−2	1.24	0.73	−0.51	13.36	0.96	0.52	86Dec31		091
36292	NGC 3816	−2	1.24	1.04	−0.20	12.91	0.99	0.52	86Dec31		091
36292	NGC 3816	−2	1.24	1.34	0.10	12.66	0.95	0.44	86Dec31		091
36328	MCG 3−30− 48		0.74	1.04	0.30	14.95	1.10	0.12	87Jan01		091
36349	MCG 3−30− 51		1.05	0.73	−0.32	14.41	0.70	0.12	86Dec31		091
36349	MCG 3−30− 51		1.05	1.04	−0.01	14.06	0.69	0.07	86Dec31		091
36349	MCG 3−30− 51		1.05	1.34	0.29	13.86	0.73	0.05	86Dec31		091
36355	UGC 6670	10	1.48	0.43	−1.05	16.60	0.37	0.01	86Dec31		091
36355	UGC 6670	10	1.48	0.73	−0.75	14.46	0.50	−0.09	86Dec31		091
36355	UGC 6670	10	1.48	1.04	−0.44	13.65	0.51	−0.14	86Dec31		091
36355	UGC 6670+s	10	1.48	1.34	−0.14	13.12	0.42	−0.20	86Dec31		091
36355	UGC 6670−s	10	1.48	1.34	−0.14	13.17	0.42	−0.21	86Dec31	1	091
36361	NGC 3827		0.97	0.73	−0.24	13.71	0.47	−0.21	86Dec30		091
36361	NGC 3827		0.97	1.04	0.07	13.36	0.48	−0.14	86Dec30		091
36361	NGC 3827		0.97	1.34	0.37	13.28	0.52	−0.15	86Dec30		091
36371	MCG 3−30− 55		0.94	0.73	−0.21	14.55	0.84	0.19	87Jan01		091
36371	MCG 3−30− 55		0.94	1.04	0.10	14.21	0.87	0.09	87Jan01		091
36371	MCG 3−30− 55		0.94	1.34	0.40	14.17	0.79	0.13	87Jan01		091
36431	UGC 6686	3	1.42	0.73	−0.69	14.80	1.04	0.25	87May02		091
36431	UGC 6686	3	1.42	1.04	−0.38	14.54	0.81	0.27	87May02		091
36431	UGC 6686	3	1.42	1.34	−0.08	14.30	0.78	0.11	87May02		091
36446	NGC 3832	4	1.29	0.73	−0.56	14.45	0.74	0.19	87Jan03		091
36446	NGC 3832	4	1.29	1.04	−0.25	13.46	0.68	0.09	87Jan03		091
36446	NGC 3832	4	1.29	1.34	0.05	12.92	0.69	0.05	87Jan03		091
36466	UGC 6697	10	1.27	0.73	−0.54	14.38	0.57	−0.25	86Dec30		091
36466	UGC 6697+c	10	1.27	1.04	−0.23	13.76	0.48	−0.33	86Dec30		091
36466	UGC 6697−c	10	1.27	1.04	−0.23	13.84	0.46	−0.35	86Dec30	1	091
36466	UGC 6697+c	10	1.27	1.34	0.07	13.53	0.52	−0.32	86Dec30		091
36466	UGC 6697−c	10	1.27	1.34	0.07	13.60	0.50	−0.34	86Dec30	1	091
	UGC 6697 c		0.43			16.61	0.83	0.05	86Dec30	1	091
36469	NGC 3841		0.82	0.43	−0.39	14.62	1.01	0.50	87Jan02		091
36469	NGC 3841		0.82	0.73	−0.09	14.18	1.02	0.49	87Jan02		091
36469	NGC 3841		0.82	1.04	0.22	13.77	1.01	0.47	87Jan02		091
36470	NGC 3845		0.89	0.43	−0.46	14.59	0.99	0.44	87Jan02		091
36470	NGC 3845		0.89	0.73	−0.16	14.24	1.00	0.47	87Jan02		091
36470	NGC 3845		0.89	1.04	0.15	14.13	0.96	0.33	87Jan02		091
36477	NGC 3840	1	1.03	0.43	−0.60	14.85	0.79	0.02	87Jan02		091
36477	NGC 3840	1	1.03	0.43	−0.60	14.90	0.69	0.08	87Jan01		091
36477	NGC 3840	1	1.03	0.73	−0.30	14.34	0.73	0.09	86Dec30		091
36477	NGC 3840	1	1.03	1.04	0.01	14.02	0.65	0.00	86Dec30		091
36477	NGC 3840	1	1.03	1.34	0.31	13.79	0.82	−0.08	86Dec30		091
36477	NGC 3840	1	1.03	1.34	0.31	13.93	0.71	0.05	87Jan02		091
36481	NGC 3844	0	1.03	0.43	−0.60	14.53	1.04	0.47	87Jan02		091
36481	NGC 3844	0	1.03	0.73	−0.30	14.19	0.98	0.55	87Jan02		091
36481	NGC 3844	0	1.03	1.04	0.01	14.00	0.99	0.40	87Jan02		091
36487	NGC 3842	−5	1.11	0.43	−0.68	13.81	1.03	0.59	87Jan02		091
36487	NGC 3842	−5	1.11	0.73	−0.38	13.16	1.00	0.63	86Dec30		091
36487	NGC 3842	−5	1.11	1.04	−0.07	12.63	0.99	0.52	86Dec30		091
36487	NGC 3842+2s	−5	1.11	1.34	0.23	12.17	0.98	0.52	86Dec30		091
36487	NGC 3842−2s	−5	1.11	1.34	0.23	12.25	0.98	0.52	86Dec30	1	091
36494	CGCG 97− 99			1.04		14.81	0.74	0.36	87Jan01		091
36574	UGC 6719		1.08	0.73	−0.35	14.12	0.90	0.34	86Dec31		091
36574	UGC 6719		1.08	1.04	−0.04	13.74	0.84	0.34	86Dec31		091
36574	UGC 6719		1.08	1.34	0.26	13.57	0.88	0.25	86Dec31		091
36582	NGC 3859		1.07	0.73	−0.34	14.47	0.63	0.14	87Jan01		091
36582	NGC 3859		1.07	1.04	−0.03	14.20	0.67	0.17	87Jan01		091
36582	NGC 3859		1.07	1.34	0.27	14.22	0.50	0.16	87Jan01		091
36603	IC 2955		0.34	0.43	0.09	14.76	1.02	0.62	87Jan01		091
36603	IC 2955		0.34	0.73	0.39	14.36	1.06	0.49	87Jan01		091

TABLE 1. (continued)

PGC	Object	T	$logD_o$	$logA$	X	V	$B-V$	$U-B$	Date	Notes	Telescope
1	2	3	4	5	6	7	8	9	10	11	12
36604	NGC 3861	3	1.36	0.73	−0.63	13.63	0.94	0.40	86Dec30		091
36604	NGC 3861	3	1.36	1.04	−0.32	13.13	0.86	0.21	86Dec30		091
36604	NGC 3861+c	3	1.36	1.34	−0.02	12.72	0.75	0.20	86Dec30		091
36604	NGC 3861−c	3	1.36	1.34	−0.02	12.84	0.75	0.21	86Dec30	1	091
36606	NGC 3862	−5	1.17	0.43	−0.74	13.97	0.99	0.48	87Jan01		091
36606	NGC 3862	−5	1.17	0.73	−0.44	13.51	0.99	0.53	87Jan01		091
36606	NGC 3862	−5	1.17	1.04	−0.13	13.05	1.02	0.51	87Jan01		091
36610	MCG 3−30− 94		0.80	0.73	−0.07	15.16	0.77	0.12	86Dec30	1	091
36619	MCG 3−30− 98		0.52	0.43	−0.09	14.78	0.95	0.55	87Jan02		091
36619	MCG 3−30− 98		0.52	0.73	0.21	14.30	1.02	0.40	87Jan02		091
36619	MCG 3−30− 98		0.52	1.04	0.52	14.15	0.88	0.41	87Jan02		091
36649	NGC 3867		1.18	0.73	−0.45	13.91	1.03	0.54	86Dec31		091
36649	NGC 3867		1.18	1.04	−0.14	13.42	0.98	0.42	86Dec31		091
36649	NGC 3867		1.18	1.34	0.16	13.20	1.02	0.68	86Dec31		091
36684	UGC 6743	4	1.20	0.73	−0.47	14.54	0.87	0.25	87Jan03		091
36684	UGC 6743	4	1.20	1.04	−0.16	13.91	0.71	0.17	87Jan03		091
36684	UGC 6743	4	1.20	1.34	0.14	13.72	0.67	0.25	87Jan03		091
36706	NGC 3884	0	1.31	0.43	−0.88	14.32	1.01	0.53	87Jan03		091
36706	NGC 3884	0	1.31	0.73	−0.58	13.70	1.00	0.44	87Jan03		091
36706	NGC 3884	0	1.31	1.04	−0.27	13.05	0.98	0.43	87Jan03		091
36740	NGC 3883	3	1.47	0.73	−0.74	14.22	0.98	0.56	87Jan03		091
36740	NGC 3883	3	1.47	1.04	−0.43	13.51	0.95	0.43	87Jan03		091
36740	NGC 3883	3	1.47	1.34	−0.13	12.90	0.81	0.23	87Jan03		091
36779	MCG 3−30−114		0.99	0.43	−0.56	15.16	1.06	0.11	87Nov19		091
36779	MCG 3−30−114		0.99	0.73	−0.26	14.81	0.79	0.47	87Nov19		091
36779	MCG 3−30−114		0.99	1.04	0.05	14.53	1.07	0.15	87Nov19		091
36779	MCG 3−30−114		0.99	1.34	0.35	14.66	0.85	0.14	87Nov19		091
36929	UGC 6794	8	1.16	0.73	−0.43	15.00	0.47	−0.09	87May03		091
36929	UGC 6794	8	1.16	1.04	−0.12	14.34	0.53	−0.09	87May03		091
36929	UGC 6794	8	1.16	1.34	0.18	14.16	0.61	−0.16	87May03		091
37052	UGC 6821	4	1.16	0.73	−0.43	14.64	0.78	0.17	87Jan03		091
37052	UGC 6821	4	1.16	1.04	−0.12	14.04	0.64	0.17	87Jan03		091
37052	UGC 6821	4	1.16	1.34	0.18	13.84	0.65	0.17	87Jan03		091
37056	IC 742	2	1.05	0.73	−0.32	14.71	0.88	0.66	87May01		091
37056	IC 742	2	1.05	1.04	−0.01	14.05	0.86	0.41	87May01		091
37056	IC 742	2	1.05	1.34	0.29	13.93	0.89	0.10	87May01		091
37156	NGC 3933		1.07	0.73	−0.34	14.00	0.78	0.11	87May02		091
37156	NGC 3933		1.07	1.04	−0.03	13.62	0.76	−0.01	87May02		091
37156	NGC 3933		1.07	1.34	0.27	13.61	0.68	0.08	87May02		091
37264	NGC 3947	3	1.17	0.73	−0.44	14.05	0.83	0.23	87Jan03		091
37264	NGC 3947	3	1.17	1.04	−0.13	13.45	0.75	0.10	87Jan03		091
37264	NGC 3947+s	3	1.17	1.34	0.17	13.02	0.80	0.21	87Jan03		091
37264	NGC 3947−s	3	1.17	1.34	0.17	13.21	0.75	0.13	87Jan03	1	091
37288	NGC 3951		1.03	0.73	−0.30	13.95	0.75	0.06	87May02		091
37288	NGC 3951		1.03	1.04	0.01	13.69	0.70	0.10	87May02		091
37288	NGC 3951		1.03	1.34	0.31	13.65	0.69	−0.01	87May02		091
37324	UGC 6876	2	1.00	0.73	−0.27	14.52	0.89	0.53	87May01		091
37324	UGC 6876	2	1.00	1.04	0.04	14.03	0.95	0.24	87May01		091
37324	UGC 6876	2	1.00	1.34	0.34	13.90	0.97	−0.10	87May01		091
37591	NGC 3987	3	1.35	0.73	−0.62	14.05	1.04	0.37	87May04		091
37591	NGC 3987	3	1.35	1.04	−0.31	13.50	1.06	0.32	87May04		091
37591	NGC 3987+s	3	1.35	1.34	−0.01	13.05	0.95	0.39	87May04		091
37591	NGC 3987−s	3	1.35	1.34	−0.01	13.10	0.95	0.35	87May04	1	091
37591	NGC 3987+2s	3	1.35	1.54	0.19	12.85	1.00	0.32	87Nov20		091
37591	NGC 3987−2s	3	1.35	1.54	0.19	12.95	0.99	0.31	87Nov20	2	091
37629	NGC 3997	3	1.22	0.43	−0.79	14.73	0.49	−0.14	87May04		091
37629	NGC 3997	3	1.22	0.73	−0.49	13.98	0.54	−0.12	87May04		091
37629	NGC 3997	3	1.22	1.04	−0.18	13.59	0.56	−0.02	87May04		091
57882	UGC 10349	2	1.13	0.73	−0.40	14.31	1.04	0.40	87May03		091
57882	UGC 10349	2	1.13	1.04	−0.09	13.89	0.99	0.46	87May03		091
57882	UGC 10349	2	1.13	1.34	0.21	13.67	0.95	0.43	87May03		091
57927	NGC 6131	6	1.02	0.38	−0.64	15.40	0.70	−0.05	87Aug31		208
57927	NGC 6131	6	1.02	0.69	−0.33	14.37	0.58	−0.04	87Aug31		208
57927	NGC 6131	6	1.02	0.99	−0.03	13.51	0.57	−0.01	87Aug31		208
57927	NGC 6131	6	1.02	1.19	0.17	13.39	0.52	0.08	87Aug31		208
57927	NGC 6131	6	1.02	1.19	0.17	13.41	0.55	−0.02	87Aug31		208
57978	UGC 10367	3	1.09	0.73	−0.36	14.19	0.85	0.24	87May02		091
57978	UGC 10367	3	1.09	1.04	−0.05	13.57	0.79	0.16	87May02		091
57978	UGC 10367	3	1.09	1.34	0.25	13.32	0.73	0.11	87May01		091
57978	UGC 10367	3	1.09	1.34	0.25	13.37	0.84	0.20	87May02		091

TABLE 1. (continued)

PGC	Object	T	$logD_o$	$logA$	X	V	$B-V$	$U-B$	Date	Notes	Telescope
1	2	3	4	5	6	7	8	9	10	11	12
58149	MCG 7−34− 35		0.93	0.73	−0.20	14.85	0.54	−0.11	87May02		091
58149	MCG 7−34− 35		0.93	1.04	0.11	14.18	0.54	−0.17	87May02		091
58149	MCG 7−34− 35+s		0.93	1.34	0.41	12.63	0.73	0.25	87May02		091
58149	MCG 7−34− 35−s		0.93	1.34	0.41	14.05	0.57	−0.16	87May02	1	091
58348	NGC 6173	−5	1.24	0.73	−0.51	13.19	1.03	0.57	87May01		091
58348	NGC 6173	−5	1.24	1.04	−0.20	12.74	1.03	0.52	87May01		091
58348	NGC 6173	−5	1.24	1.34	0.10	12.39	1.03	0.50	87May01		091
58357	UGC 10420	3	1.23	0.73	−0.50	14.82	0.90	0.41	87May02		091
58357	UGC 10420	3	1.23	1.04	−0.19	14.21	0.79	0.01	87May02		091
58357	UGC 10420	3	1.23	1.34	0.11	13.96	0.67	0.01	87May02		091
58385	UGC 10430	4	1.04	0.38	−0.66	15.50	0.90	0.40	87Aug31		208
58385	UGC 10430	4	1.04	0.69	−0.35	14.59	0.80	0.14	87Aug31		208
58385	UGC 10430	4	1.04	0.69	−0.35	14.60	0.80	0.08	87Aug31		208
58385	UGC 10430	4	1.04	0.99	−0.05	14.21	0.72	0.02	87Aug31		208
58410	UGC 10436	5	1.11	0.73	−0.38	14.49	0.76	0.10	87Aug27		091
58410	UGC 10436	5	1.11	1.04	−0.07	13.97	0.69	0.10	87Aug27		091
58410	UGC 10436+s	5	1.11	1.34	0.23	13.79	0.70	0.05	87Aug27		091
58410	UGC 10436−s	5	1.11	1.34	0.23	13.85	0.67	0.04	87Aug27	1	091
58662	UGC 10488	2	1.12	0.73	−0.39	14.33	0.97	0.36	87Aug27		091
58662	UGC 10488	2	1.12	1.04	−0.08	14.00	0.86	0.50	87Aug27		091
58662	UGC 10488+s	2	1.12	1.34	0.22	13.96	0.81	0.50	87Aug27		091
58662	UGC 10488−s	2	1.12	1.34	0.22	14.02	0.79	0.48	87Aug27	1	091
59083	NGC 6239	3	1.41	1.54	0.13	12.44	0.49	−0.19	87May03		091
70265	UGC 12304		1.22	0.73	−0.49	14.71	0.87	0.30	87Aug27		091
70265	UGC 12304		1.22	1.04	−0.18	14.14	0.88	0.12	87Aug27		091
70265	UGC 12304		1.22	1.34	0.12	13.99	0.72	0.22	87Aug27		091
70265	UGC 12304+s		1.22	1.54	0.32	13.80	0.85	0.38	87Aug27		091
70265	UGC 12304−s		1.22	1.54	0.32	13.84	0.85	0.42	87Aug27	1	091
70482	UGC 12361	10	1.00	0.38	−0.62	17.21	0.70	−0.11	87Aug31		208
70482	UGC 12361	10	1.00	0.69	−0.31	16.22	0.66	−0.09	87Aug31		208
70482	UGC 12361	10	1.00	0.99	−0.01	15.70	0.56	−0.06	87Aug31		208
70482	UGC 12361+s	10	1.00	1.19	0.19	15.40	0.59	0.00	87Aug31		208
70482	UGC 12361−s	10	1.00	1.19	0.19	15.57	0.57	0.00	87Aug31	1	208
70507	UGC 12370	6	1.20	0.73	−0.47	15.23	0.66	0.03	87Nov17		091
70507	UGC 12370	6	1.20	1.04	−0.16	14.82	0.61	−0.06	87Nov17		091
70507	UGC 12370+s	6	1.20	1.34	0.14	10.61	0.50	0.03	87Nov17		091
70507	UGC 12370−s	6	1.20	1.34	0.14	14.39	0.86	−0.14	87Nov17	1	091
70541	UGC 12382	6	1.06	0.38	−0.68	16.31	0.96	0.14	87Aug30		208
70541	UGC 12382	6	1.06	0.69	−0.37	15.91	0.93	0.14	87Aug30		208
70541	UGC 12382	6	1.06	0.99	−0.07	15.68	0.80	0.07	87Aug30		208
70541	UGC 12382	6	1.06	1.19	0.13	15.52	0.92	−0.08	87Aug30		208
70566	NGC 7495	5	1.27	0.73	−0.54	14.41	0.83	0.09	86Sep30		091
70566	NGC 7495	5	1.27	1.04	−0.23	13.50	0.76	0.16	86Sep30		091
70566	NGC 7495+s	5	1.27	1.34	0.07	13.00	0.74	0.15	86Sep30		091
70566	NGC 7495−s	5	1.27	1.34	0.07	13.10	0.72	0.10	86Sep30	1	091
70566	NGC 7495+2s	5	1.27	1.54	0.27	12.22	0.66	0.04	86Sep30		091
70566	NGC 7495−2s	5	1.27	1.54	0.27	13.19	0.65	−0.01	86Sep30	2	091
70608	NGC 7499	−2	1.04	0.73	−0.31	14.06	1.16	0.58	86Dec30		091
70608	NGC 7499	−2	1.04	1.04	0.00	13.51	1.16	0.52	86Dec30		091
70608	NGC 7499+c	−2	1.04	1.34	0.30	13.05	1.09	0.56	86Dec30		091
70608	NGC 7499−c	−2	1.04	1.34	0.30	13.17	1.11	0.57	86Dec30	1	091
70608	NGC 7499+c	−2	1.04	1.34	0.30	13.05	1.11	0.37	86Dec31		091
70608	NGC 7499−c	−2	1.04	1.34	0.30	13.17	1.12	0.35	86Dec31	1	091
	NGC 7499 c			0.43		16.23	1.15	0.39	86Dec30	1	091
	NGC 7499 c			0.73		15.51	0.96	0.52	86Dec30		091
70619	NGC 7501	−5	1.03	0.38	−0.65	14.91	1.13	0.69	87Aug31		208
70619	NGC 7501	−5	1.03	0.69	−0.34	14.39	1.10	0.62	87Aug31		208
70619	NGC 7501+c	−5	1.03	1.19	0.16	13.64	1.09	0.47	87Aug31		208
70619	NGC 7501−c	−5	1.03	1.19	0.16	13.77	1.09	0.50	87Aug31	1	208
	NGC 7501 c			0.69		15.99	1.06	0.31	87Aug31	1	208
70628	NGC 7503	−5	1.06	0.73	−0.33	14.13	1.13	0.69	86Dec30		091
70628	NGC 7503	−5	1.06	1.04	−0.02	13.72	1.11	0.52	86Dec30		091
70628	NGC 7503	−5	1.06	1.19	0.13	13.68	1.11	0.47	87Aug31		208
70628	NGC 7503	−5	1.06	1.34	0.28	13.45	1.10	0.85	86Dec30		091
70699	NGC 7515		1.24	0.73	−0.51	13.33	0.87	0.25	86Sep30		091
70699	NGC 7515		1.24	1.04	−0.20	12.70	0.78	0.20	86Sep30		091
70699	NGC 7515		1.24	1.34	0.10	12.43	0.79	0.15	86Sep30		091
70702	IC 1474	6	1.05	0.73	−0.32	14.25	0.82	0.17	87Aug27		091
70702	IC 1474	6	1.05	1.04	−0.01	14.00	0.82	0.03	87Aug27		091
70702	IC 1474+s	6	1.05	1.34	0.29	13.87	0.83	0.13	87Aug27		091
70702	IC 1474−s	6	1.05	1.34	0.29	13.91	0.84	0.12	87Aug27	1	091
70708	UGC 12423+s	5	1.56	1.34	−0.22	13.59	0.90	0.33	86Sep30		091
70708	UGC 12423−s	5	1.56	1.34	−0.22	13.94	0.88	0.33	86Sep30	1	091

TABLE 1. (continued)

PGC	Object	T	$logD_o$	$logA$	X	V	$B-V$	$U-B$	Date	Notes	Telescope
1	2	3	4	5	6	7	8	9	10	11	12
70712	NGC 7518	1	1.17	0.73	−0.44	14.02	0.87	0.25	86Sep30		091
70712	NGC 7518	1	1.17	1.34	0.17	13.50	0.75	0.30	86Sep30		091
70723	UGC 12426	6	1.09	0.69	−0.40	16.02	0.64	0.08	87Aug31		208
70723	UGC 12426	6	1.09	0.99	−0.10	15.43	0.70	−0.05	87Aug31		208
70723	UGC 12426	6	1.09	1.19	0.10	15.33	0.69	0.00	87Aug31		208
70723	UGC 12426	6	1.09	1.34	0.25	15.91	0.65	−0.22	86Sep30		091
70755	NGC 7529		0.94	0.73	−0.21	14.61	0.57	−0.07	87Nov17		091
70755	NGC 7529		0.94	1.04	0.10	14.16	0.52	−0.04	87Nov17		091
70755	NGC 7529		0.94	1.34	0.40	14.13	0.54	−0.04	87Nov17		091
70761	NGC 7535	7	1.19	0.73	−0.46	15.12	0.76	0.26	86Dec31		091
70761	NGC 7535+s	7	1.19	1.04	−0.15	13.81	0.69	0.09	86Sep30		091
70761	NGC 7535−s	7	1.19	1.04	−0.15	14.22	0.68	0.09	86Sep30	1	091
70761	NGC 7535+s	7	1.19	1.04	−0.15	13.76	0.68	0.10	86Dec31		091
70761	NGC 7535−s	7	1.19	1.04	−0.15	14.12	0.65	0.11	86Dec31	2	091
70761	NGC 7535+s	7	1.19	1.34	0.15	13.56	0.57	0.07	86Sep30		091
70761	NGC 7535−s	7	1.19	1.34	0.15	13.86	0.53	0.05	86Sep30	1	091
70761	NGC 7535+2s	7	1.19	1.34	0.15	13.36	0.70	−0.05	86Dec31		091
70761	NGC 7535−2s	7	1.19	1.34	0.15	13.70	0.68	−0.11	86Dec31	3	091
70765	NGC 7536+s	4	1.30	1.34	0.04	13.40	0.65	0.06	86Sep30		091
70765	NGC 7536−s	4	1.30	1.34	0.04	13.46	0.65	0.06	86Sep30	1	091
70799	MCG 1−59− 19		0.92	0.43	−0.49	16.19	0.57	−0.03	87Nov20		091
70799	MCG 1−59− 19		0.92	0.73	−0.19	15.50	0.62	−0.13	87Nov20		091
70799	MCG 1−59− 19		0.92	1.04	0.12	15.52	0.39	0.36	87Nov20		091
70799	MCG 1−59− 19		0.92	1.34	0.42	15.69	0.15	−0.01	87Nov20		091
70803	UGC 12451	10	1.22	0.69	−0.53	16.11	0.57	−0.06	87Aug30		208
70803	UGC 12451	10	1.22	0.99	−0.23	15.44	0.55	−0.09	87Aug30		208
70803	UGC 12451	10	1.22	1.19	−0.03	14.97	0.74	−0.19	87Aug30		208
70803	UGC 12451	10	1.22	1.19	−0.03	15.10	0.64	−0.08	87Aug30		208
70854	NGC 7557		0.83	0.73	−0.10	14.32	1.03	0.48	86Oct01		091
70854	NGC 7557		0.83	1.04	0.21	14.08	1.11	0.03	86Oct01		091
70872	NGC 7563	1	1.30	0.73	−0.57	13.34	1.03	0.69	86Dec31		091
70872	NGC 7563	1	1.30	1.04	−0.26	13.00	1.03	0.68	86Dec31		091
70872	NGC 7563+s	1	1.30	1.34	0.04	12.72	1.09	0.53	86Dec31		091
70872	NGC 7563−s	1	1.30	1.34	0.04	12.82	1.08	0.51	86Dec31	1	091
70874	NGC 7562	−5	1.33	1.34	0.01	11.84	1.08	0.68	86Oct01		091
70912	NGC 7570	1	1.21	0.73	−0.48	13.92	0.86	0.12	86Dec30		091
70912	NGC 7570+s	1	1.21	1.04	−0.17	13.42	0.73	0.10	86Dec30		091
70912	NGC 7570−s	1	1.21	1.04	−0.17	13.49	0.73	0.09	86Dec30	1	091
70912	NGC 7570+s	1	1.21	1.34	0.13	13.22	0.70	0.04	86Dec30		091
70912	NGC 7570−s	1	1.21	1.34	0.13	13.27	0.70	0.04	86Dec30	1	091
70981	NGC 7593		1.02	0.73	−0.29	14.03	0.61	−0.01	87Nov17		091
70981	NGC 7593+s		1.02	1.04	0.02	13.49	0.62	−0.04	87Nov17		091
70981	NGC 7593−s		1.02	1.04	0.02	13.67	0.67	−0.08	87Nov17	1	091
70981	NGC 7593+s		1.02	1.34	0.32	13.49	0.62	0.00	87Nov17		091
70981	NGC 7593−s		1.02	1.34	0.32	13.67	0.66	−0.04	87Nov17	1	091
70991	IC 1478	3	1.16	0.73	−0.43	14.44	0.92	0.20	86Oct04		091
70991	IC 1478	3	1.16	1.04	−0.12	13.86	0.89	0.21	86Oct04		091
70991	IC 1478	3	1.16	1.34	0.18	13.76	0.85	0.10	86Oct04		091
70996	NGC 7591	4	1.30	0.73	−0.57	13.75	0.97	0.26	87Jan02		091
70996	NGC 7591	4	1.30	1.04	−0.26	13.32	0.85	0.27	87Jan02		091
70996	NGC 7591	4	1.30	1.04	−0.26	13.34	0.82	0.26	86Sep30		091
70996	NGC 7591	4	1.30	1.34	0.04	13.05	0.85	0.22	87Jan02		091
70996	NGC 7591+s	4	1.30	1.34	0.04	13.11	0.74	0.15	86Sep30		091
70996	NGC 7591−s	4	1.30	1.34	0.04	13.18	0.70	0.15	86Sep30	1	091
71022	NGC 7601	5	1.09	0.73	−0.36	14.62	0.67	0.01	87Nov20		091
71022	NGC 7601	5	1.09	1.04	−0.05	14.11	0.63	−0.05	87Nov20		091
71022	NGC 7601	5	1.09	1.34	0.25	13.93	0.73	−0.12	87Nov20		091
71034	UGC 12494	7	1.17	0.43	−0.74	16.44	0.51	−0.26	87Nov20		091
71034	UGC 12494	7	1.17	0.73	−0.44	15.50	0.46	−0.10	87Nov20		091
71034	UGC 12494	7	1.17	1.04	−0.13	14.86	0.60	−0.01	87Nov20		091
71051	IC 5309	3	1.15	0.43	−0.72	15.27	0.89	0.01	87Nov20		091
71051	IC 5309	3	1.15	0.73	−0.42	14.48	0.79	0.05	87Nov20		091
71051	IC 5309+s	3	1.15	1.04	−0.11	13.34	0.79	0.21	87Nov20		091
71051	IC 5309−s	3	1.15	1.04	−0.11	13.87	0.82	0.20	87Nov20	1	091
71051	IC 5309+2s	3	1.15	1.34	0.19	13.12	0.83	0.17	87Nov20		091
71051	IC 5309−2s	3	1.15	1.34	0.19	13.71	0.86	0.07	87Nov20	2	091
71052	UGC 12497	10	1.09	0.73	−0.36	15.70	0.49	−0.06	87Aug27		091
71052	UGC 12497	10	1.09	1.04	−0.05	15.12	0.61	−0.11	87Aug27		091
71052	UGC 12497+s	10	1.09	1.34	0.25	15.04	0.44	−0.32	87Aug27		091
71052	UGC 12497−s	10	1.09	1.34	0.25	15.22	0.40	−0.41	87Aug27	1	091
71055	NGC 7608		1.19	0.73	−0.46	14.63	0.95	0.37	87Nov18		091
71055	NGC 7608		1.19	1.04	−0.15	14.28	0.82	0.23	87Nov18		091
71055	NGC 7608		1.19	1.34	0.15	14.31	0.75	0.20	87Nov18		091
71083	NGC 7611	−1	1.13	0.43	−0.70	13.51	1.03	0.58	87Nov20		091
71083	NGC 7611	−1	1.13	1.34	0.21	12.60	1.03	0.46	87Nov20		091

TABLE 1. (continued)

PGC	Object	T	$logD_o$	$logA$	X	V	$B-V$	$U-B$	Date	Notes	Telescope
1	2	3	4	5	6	7	8	9	10	11	12
71087	NGC 7610	6	1.40	1.04	−0.36	13.81	0.54	−0.11	86Oct04		091
71087	NGC 7610	6	1.40	1.34	−0.06	13.27	0.45	−0.13	86Oct04		091
71089	NGC 7612	−2	1.18	0.43	−0.75	13.63	1.02	0.56	87Nov20		091
71089	NGC 7612	−2	1.18	1.34	0.16	12.85	0.97	0.51	87Nov20		091
71121	NGC 7619	−5	1.42	0.73	−0.69	12.34	1.09	0.70	87Jan02		091
71121	NGC 7619	−5	1.42	1.04	−0.38	11.90	1.08	0.64	87Jan02		091
71121	NGC 7619	−5	1.42	1.34	−0.08	11.52	1.05	0.65	87Jan02		091
71140	NGC 7626	−5	1.43	1.04	−0.39	11.99	1.06	0.60	87Jan02		091
71140	NGC 7626+s	−5	1.43	1.34	−0.09	11.51	1.03	0.63	87Jan02		091
71140	NGC 7626−s	−5	1.43	1.34	−0.09	11.58	1.05	0.64	87Jan02	1	091
71169	MCG 1−59− 59		0.96	0.43	−0.53	14.12	1.11	0.61	87Jan02		091
71169	MCG 1−59− 59		0.96	0.73	−0.23	13.70	1.12	0.57	87Jan02		091
71169	MCG 1−59− 59		0.96	1.04	0.08	13.50	1.22	0.45	87Jan02		091
71171	CGCG 406− 82+s			1.04		14.30	0.78	0.37	87Jan02		091
71171	CGCG 406− 82−s			1.04		14.86	0.83	0.48	87Jan02	1	091
71181	NGC 7631	3	1.27	1.04	−0.23	13.31	0.88	0.24	86Sep30		091
71181	NGC 7631	3	1.27	1.34	0.07	13.15	0.83	0.22	86Sep30		091
71192	NGC 7634	−2	1.08	0.43	−0.65	13.76	1.00	0.57	86Oct01		091
71192	NGC 7634	−2	1.08	0.73	−0.35	13.30	1.03	0.63	86Oct01		091
71192	NGC 7634+s	−2	1.08	1.04	−0.04	12.66	0.84	0.24	86Oct01		091
71192	NGC 7634−s	−2	1.08	1.04	−0.04	13.00	0.98	0.40	86Oct01	1	091
71192	NGC 7634+s	−2	1.08	1.34	0.26	12.60	0.70	0.41	86Oct01		091
71192	NGC 7634−s	−2	1.08	1.34	0.26	12.91	0.77	0.65	86Oct01	1	091
71200	UGC 12544	10	0.98	0.43	−0.55	16.13	0.63	0.03	87Nov20		091
71200	UGC 12544	10	0.98	0.73	−0.25	14.96	0.67	0.03	87Nov20		091
71200	UGC 12544	10	0.98	1.04	0.06	14.31	0.62	−0.06	87Nov20		091
71200	UGC 12544+s	10	0.98	1.34	0.36	13.69	0.54	0.05	87Nov20		091
71200	UGC 12544−s	10	0.98	1.34	0.36	14.10	0.49	0.00	87Nov20	1	091
71204	UGC 12547		1.10	1.04	−0.06	14.48	0.58	−0.18	86Sep30		091
71204	UGC 12547		1.10	1.34	0.24	14.38	0.49	−0.24	86Sep30		091
71209	UGC 12548	1	1.02	0.73	−0.29	14.17	0.96	0.46	86Sep30		091
71209	UGC 12548	1	1.02	1.04	0.02	13.81	1.01	0.50	86Sep30		091
71209	UGC 12548	1	1.02	1.34	0.32	13.77	1.10	0.67	86Sep30		091
71261	NGC 7643		1.16	0.73	−0.43	13.92	0.84	0.26	87Nov17		091
71261	NGC 7643		1.16	1.04	−0.12	13.40	0.91	0.28	87Nov17		091
71261	NGC 7643		1.16	1.34	0.18	13.23	0.89	0.25	87Nov17		091
71261	NGC 7643+s		1.16	1.54	0.38	13.47	0.67	0.48	87Nov17		091
71261	NGC 7643−s		1.16	1.54	0.38	13.52	0.67	0.53	87Nov17	1	091
71288	UGC 12571		1.11	0.73	−0.38	14.79	0.82	0.20	87Aug27		091
71288	UGC 12571		1.11	1.04	−0.07	14.26	0.81	0.20	87Aug27		091
71288	UGC 12571+s		1.11	1.34	0.23	13.81	0.80	−0.04	87Aug27		091
71288	UGC 12571−s		1.11	1.34	0.23	14.02	0.80	−0.06	87Aug27	1	091
71321	NGC 7648	−2	1.18	0.43	−0.75	14.28	0.71	0.01	87Nov20		091
71321	NGC 7648+2s	−2	1.18	1.34	0.16	12.86	0.79	0.30	87Nov20		091
71321	NGC 7648−2s	−2	1.18	1.34	0.16	13.04	0.79	0.33	87Nov20	1	091
71363	UGC 12585	8	1.24	0.38	−0.86	16.17	0.65	0.09	87Aug31		208
71363	UGC 12585	8	1.24	0.69	−0.55	15.32	0.64	−0.04	87Aug31		208
71363	UGC 12585	8	1.24	0.99	−0.25	14.62	0.55	−0.12	87Aug31		208
71363	UGC 12585	8	1.24	1.19	−0.05	14.33	0.50	−0.07	87Aug31		208
71370	NGC 7653	3	1.22	0.43	−0.79	14.16	0.86	0.21	87Nov20		091
71370	NGC 7653	3	1.22	0.73	−0.49	13.51	0.78	0.13	87Nov20		091
71370	NGC 7653	3	1.22	1.04	−0.18	12.97	0.72	0.13	87Nov20		091
71370	NGC 7653	3	1.22	1.34	0.12	12.77	0.71	0.16	87Nov20		091
71485	NGC 7672	3	1.10	1.34	0.24	13.88	0.83	0.38	87Nov20		091
71628	NGC 7685	5	1.29	1.34	0.05	13.24	0.69	−0.06	86Oct04		091
71628	NGC 7685	5	1.29	1.34	0.05	13.28	0.68	0.04	87Jan02		091
72367	NGC 7750	5	1.22	0.73	−0.49	13.79	0.63	0.03	87Nov18		091
72367	NGC 7750	5	1.22	1.04	−0.18	13.12	0.62	−0.01	87Nov18		091
72367	NGC 7750	5	1.22	1.34	0.12	12.93	0.61	−0.04	87Nov18		091
72367	NGC 7750+s	5	1.22	1.54	0.32	12.85	0.64	0.06	87Nov18		091
72367	NGC 7750−s	5	1.22	1.54	0.32	12.89	0.64	0.04	87Nov18	1	091
	A2307.9+0719.8			0.38		16.23	1.10	0.66	87Aug31	1	208
	A2307.9+0719.8			0.69		15.96	1.10	0.63	87Aug31		208
	A2307.9+0719.8			0.99		15.38	1.10	0.78	87Aug31		208
	A2308.1+0716.5			0.38		16.33	1.18	0.60	87Aug31	1	208
	A2308.1+0716.5			0.69		16.19	1.19	0.52	87Aug31		208
	A2308.1+0716.5			0.99		16.49	0.92	1.63	87Aug31		208

TABLE 1. (continued)

Notes to TABLE 1

NGC 687 ——1. Corr. for star: $V = 15.68$, $B - V = 0.61$, $U - B = 0.03$ (successive measurements in same order)
NGC 703 ——1. Corr. for star: 15.81, 0.49, 0.08
NGC 708 ——1. Corr. for star: 14.76, 0.87, 0.31
NGC 714 ——1. Corr. for star: 17.83, −0.10, −0.46
NGC 714 ——2. Corr. for stars: 15.03, 0.91, 0.88, 17.83, −0.10, −0.46
NGC 717 ——1. Corr. for star: 15.91, 0.80, 0.13
NGC 735 ——1. Corr. for star: 14.13, 0.79, 0.52
NGC 735 ——2. Corr. for stars: 15.96, 0.84, −0.04, 16.06, 0.54, 0.25, 14.13, 0.79, 0.52
NGC 753 ——1. Corr. for stars: 16.07, 0.88, 0.23, 16.09, 1.18, 1.20
NGC 797 ——1. Corr. for star: 16.88, 0.69, 0.09
NGC 797 ——2. Corr. for stars: 13.85, 1.11, 1.09, 15.76, 0.82, 0.29, 16.88, 0.69, 0.09
NGC 801 ——1. Corr. for stars: 16.44, 0.54, 0.09, 16.33, 1.00, 0.54, 15.95, 0.74, −0.01, 15.89, 1.06, 1.07, 16.53, 1.04, 1.94
NGC 818 ——1. Corr. for star: 16.06, 0.84, 1.58
NGC 834 ——1. Corr. for star: 13.40, 1.42, 1.40
NGC 845 ——1. Corr. for star: 15.49, 0.66, −0.07
NGC 3701 ——1. Corr. for star: 14.90, 0.86, 0.48
NGC 3802 ——1. Corr. for stars: 15.43, 0.53, −0.03, 13.86, 0.80, 0.41
NGC 3842 ——1. Corr. for stars: 15.17, 1.03, 0.84, 17.77, 0.56, −0.48
NGC 3861 ——1. Corr. for companion galaxy (MCG 3−30−94) 0.′8 to southeast: 15.16, 0.77, 0.12
NGC 3947 ——1. Corr. for star: 15.05, 1.14, 1.28
NGC 3987 ——1. Corr. for star: 16.29, 0.80, 1.35
NGC 3987 ——2. Corr. for stars: 16.48, 1.07, −0.03, 16.09, 1.07, 0.79
NGC 7495 ——1. Corr. for star: 15.70, 0.95, 1.37
NGC 7495 ——2. Corr. for stars: 12.87, 0.66, 0.05, 15.70, 0.95, 1.37
NGC 7495 ——3. Corr. for stars: 12.89, 0.64, 0.09, 16.01, 0.95, −0.09
NGC 7499 ——1. Corr. for companion galaxy NGC 7499 c (logA = 0.73 measurement): 15.51, 0.96, 0.52
NGC 7499 c ——1. Fainter cluster galaxy located at $23^h\ 07^m\ 52.^s9$, +07° 18′ 26″ (1950), 0.′7 southeast of NGC 7499
NGC 7501 ——1. Corr. for companion galaxy NGC 7501 c: logA = 0.69, 15.99, 1.06, 0.31
NGC 7501 c ——1. Fainter edge−on galaxy located at $23^h\ 08^m\ 00.^s3$, +07° 19′ 07″ (1950), 0.′4 east of NGC 7501
NGC 7535 ——1. Corr. for star: 15.07, 0.71, 0.10
NGC 7535 ——2. Corr. for star: 15.12, 0.76, 0.09
NGC 7535 ——3. Corr. for stars: 15.12, 0.76, 0.09, 16.22, 0.69, 0.40
NGC 7536 ——1. Corr. for star: 16.56, 0.62, −0.05
NGC 7563 ——1. Corr. for star: 15.42, 1.33, 0.82
NGC 7570 ——1. Corr. for star: 16.46, 0.75, 0.22
NGC 7591 ——1. Corr. for star: 16.14, 1.63, 0.07
NGC 7593 ——1. Corr. for star: 15.51, 0.36, 0.13
NGC 7626 ——1. Corr. for star: 14.51, 0.76, 0.48
NGC 7634 ——1. Corr. for star: 14.12, 0.53, 0.02
NGC 7643 ——1. Corr. for star: 16.95, 0.63, −0.32
NGC 7648 ——1. Corr. for stars: 16.01, 0.81, 0.42, 15.31, 0.71, 0.04
NGC 7750 ——1. Corr. for star: 16.56, 0.79, 1.52
IC 1474 ——1. Corr. for star: 17.34, 0.73, 0.34
IC 5309 ——1. Corr. for star: 14.37, 0.75, 0.20
IC 5309 ——2. Corr. for stars: 15.54, 0.88, 0.61, 14.37, 0.75, 0.20
UGC 1344 ——1. Corr. for star: 10.78, 0.62, 0.11
UGC 1347 ——1. Corr. for star: 15.11, 0.52, 0.07
UGC 1350 ——1. Corr. for stars: 14.90, 0.79, 0.48, 16.16, 0.74, 1.43, 17.27, 1.16, 0.70
UGC 1840 ——1. Arp 145: centered on S0 (easternmost) component
UGC 1840+ ——2. Arp 145: centered between ring galaxy and S0 components; includes both and 3 field stars
UGC 3730 ——1. Arp 141, centered on northernmost component
UGC 3730 ——2. Arp 141, includes both components; aperture just avoids including two field stars
UGC 6670 ——1. Corr. for star: 16.60, 0.37, 0.01
UGC 6697 ——1. Corr. for companion galaxy UGC 6697 c: 16.61, 0.83, 0.05
UGC 6697 c ——1. Small galaxy located at $11^h\ 41^m\ 14.^s5$, +20° 15′ 12″ (1950), 0.′5 northeast of UGC 6697
UGC 10436 ——1. Corr. for star: 17.04, 1.77, 1.93
UGC 10488 ——1. Corr. for star: 17.10, 1.36, 1.15
UGC 12304 ——1. Corr. for star: 17.45, 0.74, −0.23
UGC 12361 ——1. Corr. for star: 17.49, 0.73, −0.02
UGC 12370 ——1. Corr. for star: 10.68, 0.49, 0.03
UGC 12423 ——1. Corr. for star: 14.98, 0.96, 0.31
UGC 12497 ——1. Corr. for star: 17.12, 0.73, 0.80
UGC 12544 ——1. Corr. for star: 14.94, 0.64, 0.20
UGC 12571 ——1. Corr. for star: 15.70, 0.78, 0.09
MCG 3−30− 94 ——1. Companion to NGC 3861; $logD_o$ provided by G. Paturel (private communication)
MCG 7−34− 35 ——1. Corr. for star: 12.96, 0.80, 0.49
CGCG 406− 82 ——1. Corr. for star: 15.30, 0.71, 0.24
ESO 350−40 ——1. Cartwheel ring galaxy; large aperture includes two companion galaxies
A2307.9+0719.8 ——1. Pegasus II cluster
A2308.1+0716.5 ——1. Pegasus II cluster

measurements are needed for the computation of total magnitudes by the growth curve method (Sec. 3), but the uncorrected measurements are useful for calibrating CCD frames.

The galaxy samples for each cluster were chosen as follows. For Pegasus I and Abell 1367, the observations heavily favored galaxies with known 21 cm linewidths from Bothun *et al.* (1985, hereafter referred to as BAS85, the code used in BCVVL). This excellent data base also gives aperture photometry for many of those objects, but this usually encompassed only a few measurements over a fairly narrow range

in aperture diameter. Although useful for obtaining rough integrated magnitudes and colors, these data were generally not adequate for RC3. The data in Table 1 serve as a complement to that of BAS85 in providing large apertures and extending the range covered on the growth curves. Many early-type galaxies were also observed in Pegasus I and Abell 1367.

For Abell 262, all of the brighter galaxies in CGCG field 522 (Zwicky & Kowal 1968) were measured, covering a range of types from E to Sc. In Abell 2197−9, the observations were concentrated entirely on faint spirals visible in CGCG field 224 (Zwicky & Herzog 1966). Abell 2197 and 2199 have nearly the same redshift according to Abell *et al.* (1989), and therefore we do not assign a particular membership for any of these galaxies. A large isopleth surrounds all but one of our sample objects in CGCG field 224. Finally, for Pegasus II, the integrated magnitudes and colors of the three brightest members NGC 7499, 7501, and 7503 were measured as accurately as possible. Measurements of five additional fainter members of the cluster were also made.

The internal precision of the new photometry is determined from 17 repeat measurements. The average deviations of the differences are 0.050, 0.081, 0.072, and 0.135 mag for B, V, $B-V$, and $U-B$, respectively. These are fairly large but not unexpected when it is considered that most of the repeat measurements concerned large apertures ($\log A = 1.19$–1.54), where the signal-to-noise is low for these small and faint galaxies. To gauge the external agreement, the new photometry was compared with that of BAS85 and Bothun (1982, hereafter referred to as BOT82), in addition to other sources. Since the observations here were taken with different apertures from those of the other sources, the photometric data sets were compared by examining the residuals about the standard curve fits used to get B_T^A (see Sec. 3). The results show that the new photometry agrees largely with BAS85 and BOT82 except for NGC 3832, NGC 7593, UGC 12426, UGC 12544, and UGC 12571. Except for NGC 7593, their measurements are systematically faint in B (when interpolated) compared to ours, but show no discrepancy in colors. In the case of NGC 7593, the Bothun *et al.* $\log A = 0.99$ measurement is affected by an obvious field star unmeasured by them, but when our measurement of the star is removed from their data, the agreement becomes very good. In the case of UGC 12426, the McDonald 2.1 m data disagree both with a single measurement by BOT-82 and a low signal-to-noise ratio McDonald 0.91 m measurement obtained on 1986 September 30. The 2.1 m data ought to be most reliable for this object, which has very low surface brightness. In the case of UGC 12571, it is possible that the large-aperture measurement presented here is in error. The presence of a field star close to the north and noted in the McDonald observations serves to identify that UGC 12571 was indeed the measured object in our observations.

Comparisons with some other sources revealed clear systematic disagreements. For example, the photometry of Peterson & Baumgart (1986) is systematically too bright for NGC 7495 and NGC 7610 compared to the present photometry, BAS85, BOT82, and other unpublished McDonald observations by M. Frueh and H. Corwin, Jr. (referred to as FRU87 and COR87, respectively, in Table 1 of BCVVL. Observations of NGC 3801 and NGC 3802 made in McDonald series N017 (see Longo & de Vaucouleurs 1983) are systematically fainter than the present observations by a few tenths of a magnitude in B.

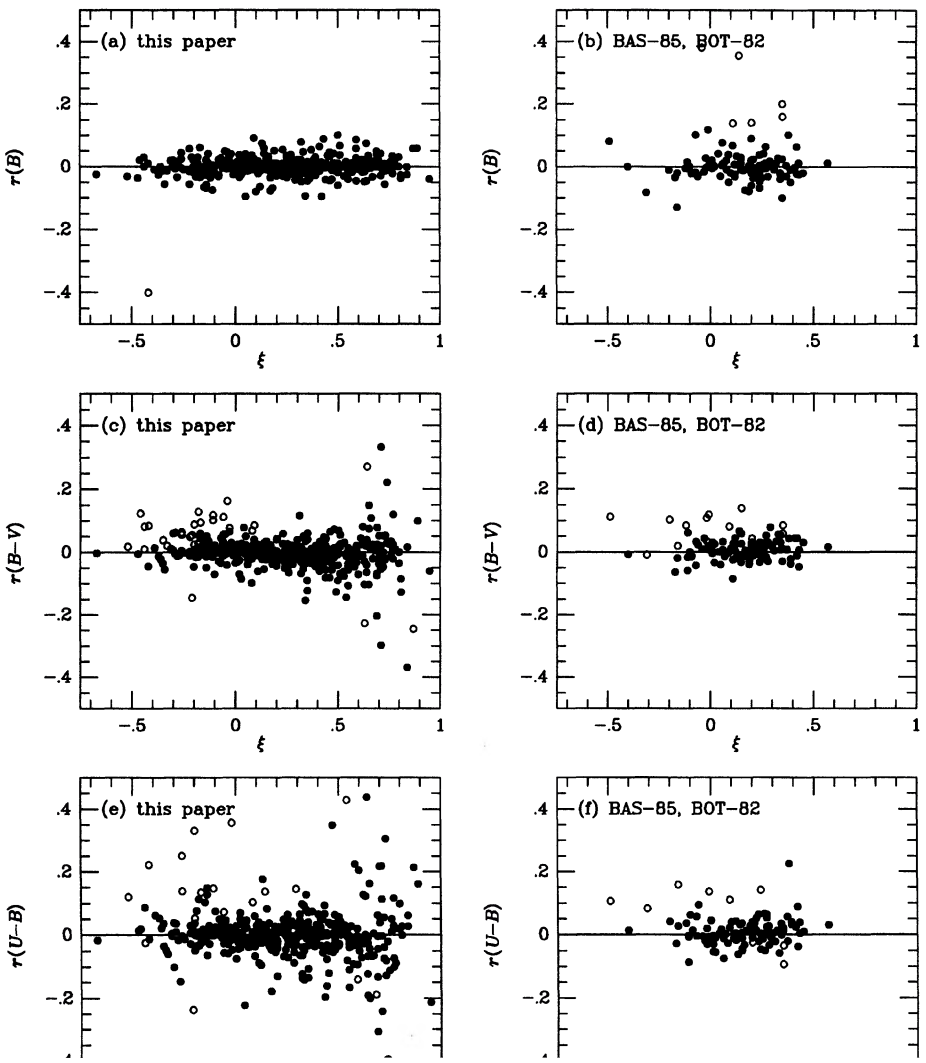
Three entries (UGC 1840, UGC 3730, ESO 350−40) in Table 1 are observations of ring galaxies made by J. Higdon, who also made the observation of NGC 6239. His observations are referred to as "HIG-87" in Table 1 of BCVVL.

3. INTEGRATED MAGNITUDES AND COLORS

Integrated magnitudes and color indices were derived from the aperture photometry using the technique outlined by BCVVL. This involves the interactive fitting of mean curves which describe the integral of the B band flux and the typical variation of integrated $U-B$ and $B-V$ colors with increasing aperture diameter. With data covering a large fraction of the size of a galaxy, and with good quality photometry, this method can yield reliable total magnitudes B_T^A and total color indices $(B-V)_T$ and $(U-B)_T$, as well as the effective color indices, $(B-V)_e$ and $(U-B)_e$, within the effective (or half power) aperture A_e. The fits included not only the photometry in Table 1 and the photometry of BAS85 and BOT82, but also other sources in the revised *UBV* catalogue described by BCVVL. The weights used for the various sources are compiled in Table 5 of BCVVL.

The residuals about the standard curves for B_T^A and the colors, plotted versus the logarithm of the aperture diameter relative to the effective aperture diameter, are shown in Fig. 1. This has two sets of plots: one for the data in Table 1, and the other for the data from BAS85 and BOT82. These illustrate the much wider range of apertures available for these galaxies from the McDonald data set, as compared to Bothun *et al.* Points in Fig. 1 denoted by open circles were given zero weight in the fits, usually because they did not fit the standard curves. For example, NGC 3883 has a much larger integrated color gradient than a typical Sb galaxy, and the standard color curves simply do not represent it very well. Figure 4 of BCVVL shows how the parameters were derived for this galaxy. NGC 3883 is discussed further by van der Hulst *et al.* (1987).

The integrated parameters derived from the McDonald photometry and the other sources are mostly listed in RC3 and will not be repeated here. Table 2 lists the derived value of B_T^A only for 26 galaxies in the present sample for which a mean value of B_T is listed in RC3, not the photoelectric B_T^A value. The external error in these B_T^A estimates is on the order of 0.13 mag as described in the Introduction to RC3. For these galaxies, B_T in RC3 is an average of B_T^A and magnitudes derived from surface photometry. The latter were taken from Cornell *et al.* (1987, hereafter referred to as CABM), who carried out a CCD survey of more than 100 galaxies in ten clusters in connection with distance scale work. Total magnitudes were not derived for these galaxies, but instead the magnitude within the isophote having surface brightness $\mu_B = 25.0$ mag arcsec^{-2} was computed. These $B(25)$ magnitudes are compared in Fig. 2 with B_T^A values for 63 RC3 galaxies having an internal mean error $\sigma(B_T^A) \leq 0.15$ mag



THE ASTRONOMICAL JOURNAL VOLUME 111, NUMBER 2 FEBRUARY 1996

SPECTROSCOPY OF THE NGC 4782/3 DUMBBELL DOMINATED GROUP OF GALAXIES: DARK HALOES AND MERGER OF SUBGROUPS

H. QUINTANA,[1,2] A. RAMÍREZ,[2,3] AND M. J. WAY[4]

Astrophysics Group, Physics Faculty, P. Universidad Católica de Chile, Casilla 104, Santiago 22, Chile
Electronic mail: hquintana@astro.puc.cl

Received 1995 March 14; revised 1995 October 30

ABSTRACT

A nearly complete sample of new velocities for 96 galaxies covering an area 1°×1.25° centered on NGC 4782/3 are presented. Including data from the literature a total of 125 velocities are compiled. We deduce that 40 galaxies are likely members of the group centered on NGC 4782/3, more than doubling the original confirmed 13 members. Based on this extended velocity sample we analyze the velocity structure of this unusual group. A bi-modal velocity structure centered on each of the dumbbell components provides evidence for an ongoing collision of two subgroups associated to these components. In velocity space the richer subgroup is centered on the more massive NGC 4782. From the subgroup dynamics we derive approximate dynamical masses of 5×10^{13} $\mathcal{M}_\odot$ and 1×10^{13} $\mathcal{M}_\odot$ for the NGC 4782 and NGC 4783 subgroups, respectively. This leads to a group $\mathcal{M}/L\approx300$ $(\mathcal{M}/L)_\odot$, implying that ~90% of the group mass is in dark form, within subsystems associated to each subgroup. The colliding elliptical galaxies have massive haloes which should be important in shaping the outcome of the collision and merger process. In particular, haloes could change the interpretation of the tidal distortions and play a role in the shaping of the radio double bent jet structure of 3C 278. © *1996 American Astronomical Society.*

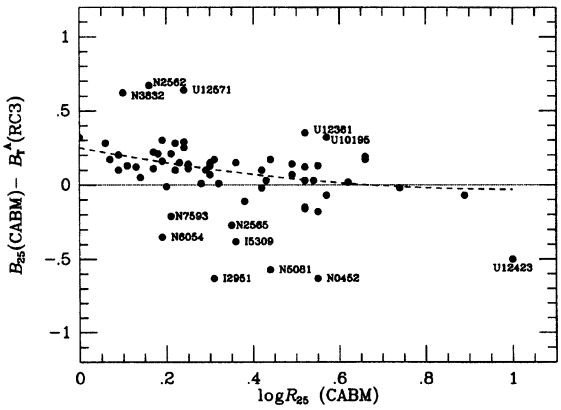


FIG. 2. Comparison between isophotal magnitudes $B(25)$ and total magnitudes from aperture photometry B_T^A, for 63 galaxies from Cornell *et al.* (1987=CABM). The difference between these magnitude estimates is plotted vs the log of the isophotal axis ratio R_{25}, also from Cornell *et al.* Several discrepant cases are labeled by NGC (N), IC (I), and UGC (U) numbers. The comparison sample includes not only galaxies in the present paper, but also other galaxies from RC3.

other discrepant cases (NGC 6054, IC 5309, and UGC 12361) have very well-defined photoelectric growth curves, and it would seem that B_T^A is reliably determined. Further observations should resolve these discrepancies.

After rejection of the labeled objects in Fig. 2, a parabolic relation was fitted to the remaining points. A least-squares fit gave

$$B(25)-B_T^A=-0.03+0.28(\log R_{25}-1)^2. \quad (1)$$

The standard deviation of the relation is 0.10 mag. Equation (1) then can be used to reduce $B(25)$ to the system of B_T^A. The magnitude so reduced is referred to as B_T^c(CABM). For the compilation of RC3, the total magnitudes for the 26 galaxies in Table 1 are weighted means of B_T^A and B_T^c(CABM), where the adopted external errors were $\sigma[B_T^c(\text{CABM})]=0.15$ mag and $\sigma(B_T^A)\geqslant 0.13$ mag (see Introduction to RC3). More details about the analysis of integrated magnitudes from surface photometry for RC3 will be described in a separate paper.

I thank J. L. Higdon for his assistance at the telescope during the 1987 November observing run. I also thank T. Barnes and the McDonald Telescope Allocation committee for the generous amount of time awarded to this project, and the referee, G. Paturel, for constructive suggestions and for providing the PGC numbers of all of the entries in Table 1 as well as positions for the small companion galaxies listed in the Notes to Table 1.

REFERENCES

Abell, G. O., Corwin, H. G., & Olowin, R. P. 1989, ApJS, 70, 1
Bothun, G. 1982, Ph. D. thesis, University of Washington (BOT82)
Bothun, G. Aaronson, M., Schommer, R., Mould, J., Huchra, J., & Sullivan, W. T. 1985, ApJS, 57, 423 (BAS85)
Buta, R., & Corwin, H. G. 1986a, ApJS, 62, 255
Buta, R., & Corwin, H. G. 1986b, ApJS, 62, 282
Buta, R., Corwin, H. G., de Vaucouleurs, G., de Vaucouleurs, A., & Longo, G. 1995, AJ, 109, 517 (BCVVL)
Cornell, M. E., Aaronson, M., Bothun, G., & Mould, J. 1987, ApJS, 64, 507 (CABM)
de Vaucouleurs, G., de Vaucouleurs, A., Corwin, H., Buta, R., Paturel, G., & Fouqué, P., 1991, Third Reference Catalogue of Bright Galaxies (Springer, New York) (RC3)
Landolt, A. 1973, AJ, 78, 959
Landolt, A. 1983, AJ, 88, 439
Longo, G., & de Vaucouleurs, A. 1983, University of Texas Monographs in Astron. No. 3
Paturel, G., Fouqué, P., Bottinelli, L., & Gouguenheim, L. 1989, Catalogue of Principal Galaxies (Observatoire de Lyon, France) (PGC)
Peterson, C. J., & Baumgart, C. W. 1986, PASP, 98, 1273
van der Hulst, J. M., Skillman, E. D., Kennicutt, R. C., & Bothun, G. D. 1987, A&A, 177, 63
Zwicky, F., & Herzog, E. 1966, Catalogue of Galaxies and Clusters of Galaxies, Vol. III (California Institute of Technology, Pasadena)
Zwicky, F., & Kowal, C. T. 1968, Catalogue of Galaxies and Clusters of Galaxies, Vol. VI (California Institute of Technology, Pasadena)