

## 1777 VARIABLES IN THE MAGELLANIC CLOUDS.

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IN the spring of 1904, a comparison of two photographs of the Small Magellanic Cloud, taken with the 24-inch Bruce Telescope, led to the discovery of a number of faint variable stars. As the region appeared to be interesting, other plates were examined, and although the quality of most of these was below the usual high standard of excellence of the later plates, 57 new variables were found, and announced in Circular 79. In order to furnish material for determining their periods, a series of sixteen plates, having exposures of from two to four hours, was taken with the Bruce Telescope the following autumn. When they arrived at Cambridge, in January, 1905, a comparison of one of them with an early plate led immediately to the discovery of an extraordinary number of new variable stars. It was found, also, that plates, taken within two or three days of each other, could be compared with equally interesting results, showing that the periods of many of the variables are short. The number thus discovered, up to the present time, is 969. Adding to these 23 previously known, the total number of variables in this region is 992. The Large Magellanic Cloud has also been examined on 18 photographs taken with the 24-inch Bruce Telescope, and 808 new variables have been found, of which 152 were announced in Circular 82. As much time will be required for the discussion of these variables, the provisional catalogues given below have been prepared.

The labor of determining the precise right ascensions and declinations of nearly eighteen hundred variables and several hundred comparison stars would be very great, and as many of the objects are faint, the resulting positions could not readily be used in locating them. Accordingly, their rectangular coordinates have been employed. A reticule was prepared by making a photographic enlargement of a glass plate ruled accurately in squares, a millimetre on a side. The resulting plate measured  $14 \times 17$  inches, the size of the Bruce plates, and was covered with squares measuring a centimetre on a side. Great care was taken to have the scale uniform in all parts of this plate, which was designed to furnish a standard reticule, not only for the Magellanic

Clouds, but for any other region in which it may be desirable to measure a large number of objects. A glass positive was then made from a photograph of each of the Magellanic Clouds, and from this a negative on glass was printed, upon which a print from the plate containing the reticule was superposed. The resulting photograph in each case, was a duplicate of the original negative, with the addition of a reticule whose lines are one centimetre apart, a distance corresponding, on these plates, to ten minutes of arc. For measuring objects on the plates, a scale was made in the manner described in Volume 26, 238, but having each division equal to a third of a millimetre. This was attached to a positive eye-piece having a focal length of an inch and a half, and the measures were made and reduced as described in Volume 26, 238. One division of the scale equals  $20''$ , and estimates were made to tenths. This amount, however, is reduced one half when the differences of the measures from opposite sides of the squares are taken, and the measurements, therefore, were made to single seconds. The measured positions have not been reduced to standard coördinates, but a number of catalogue stars were measured, and furnish the means of making this reduction if desired. Practically, however, the labor involved seems unnecessary for the present purpose, as reproductions of the plates measured accompany this article, and the approximate positions of objects in the catalogues can readily be found on them.

A selection of catalogue stars in the region of the Small Magellanic Cloud is contained in Table I, in which the first three columns give the number in the Argentine General Catalogue, the right ascension, and the declination for 1900. Unfortunately, a large proportion of the stars are double, although the photographic images give no evidence of the fact. The positions in the Table are, in such cases, those of the preceding components as given in the Catalogue. The fourth and fifth columns give the coordinates in  $x$  and  $y$ , as measured from the south-preceding corner of the plate. The approximate centre of the plate has the coordinates,  $x = 12752''$ ,  $y = 10393''$ , and its position is in R.A. =  $0^h 50^m.9$ , Dec. =  $-73^\circ 7'$  (1900). Owing to the great distance of the region from the equator, the order of the coordinates in  $x$  frequently differs from that of right ascension.

A catalogue of the new variables in the region of the Small Magellanic Cloud is given in Table II, which contains 969 stars. All but one of the 23 known variables in the region, are in the clusters N. G. C. 104 and N. G. C. 362, and their positions may be found in Volume, 38, 237. The position of the remaining variable, H 93, is in R. A. =  $0^h 54^m.2$ , Dec. =  $-75^\circ 32'$  (1900). The successive columns give the Harvard Number, the coordinates in  $x$  and  $y$ , the brightest and faintest magnitudes as yet observed, and the observed range. The last is found by subtracting

TABLE I.  
CATALOGUE STARS NEAR THE SMALL MAGELLANIC CLOUD.

A. G. C.	R. A. 1900.			Dec. 1900.			<i>x</i>	<i>y</i>	A. G. C.	R. A. 1900.			Dec. 1900.			<i>x</i>	<i>y</i>
	<i>h.</i>	<i>m.</i>	<i>s.</i>	°	'	"	"	"		<i>h.</i>	<i>m.</i>	<i>s.</i>	°	'	"	"	"
45	0	3	44.41	-74	47	40.3	1606	3218	960	0	57	37.19	-73	14	8.5	14504	9959
193		12	21.88	-70	31	8.7	1220	19235	969		58	10.43	-72	5	10.5	14772	14120
256		16	8.66	-72	31	58.6	3320	11841	1021	1	1	8.21	-72	47	17.2	15490	11542
534		31	34.28	-72	5	32.7	7360	13909	1042		2	7.73	-71	28	8.0	15977	16313
594		34	29.08	-74	30	32.5	8776	5226	1043		2	7.84	-73	5	8.0	15710	10458
599		34	45.44	-73	41	14.6	8638	8205	1092		5	30.63	-72	22	9.3	16752	13002
679		39	51.11	-74	17	2.4	10038	6119	1121		7	4.04	-73	29	22.1	16910	8922
693		40	36.37	-71	42	59.3	9816	15428	1137		8	9.00	-73	32	57.0	17175	8686
730		42	44.16	-73	8	30.2	10602	10282	1269		15	27.14	-74	40	46.7	18618	4450
772		46	8.79	-72	40	31.6	11464	11999	1271		15	40.04	-73	14	48.9	19206	9612
796		47	52.24	-73	13	21.0	11956	10024	1295		16	54.06	-72	19	40.4	19884	12887
894		52	55.88	-74	21	58.5	13247	5882	1449		25	58.66	-72	27	31.2	22394	12103
903		53	26.01	-73	36	31.6	13396	8624	1496		27	59.13	-73	41	16.6	22151	7620
946		56	37.59	-70	42	56.8	14456	19103	1544		30	57.40	-71	22	46.4	24293	15758

the magnitude in the fourth column from that in the fifth, and includes the errors of observation of both quantities. Nearly all of the variables, even when at minimum, are shown on the best plates. When a variable was not seen, the magnitude of the faintest comparison star which was clearly visible is given in the fifth column, and is printed in Italics. Nearly all of the magnitudes depend on rough estimates, based upon comparison stars which were sometimes two or three degrees distant. It is to be expected, therefore, that they will be somewhat changed in the final discussion to be published later. As the stars in this region are densely crowded together, many of the variables have other stars near them. The most noticeable of the pairs and groups thus formed are mentioned in the Remarks which follow the Table. When a variable is described as belonging to a close pair, it usually signifies that the images are difficult to separate on the Bruce plates. It may be assumed that the distance of the two stars in such cases is from two to five seconds of arc. In the Table, Nos. 809 to 865 correspond to Nos. 1 to 57 in Table II of Circular 79. No. 52 in that Table, which is H 860, is outside of the region covered by the plate on which the coordinates of the other variables were measured, and is placed last in the catalogue. Its position is in R. A. =  $1^h 8^m 2^s$ , Dec. =  $-77^\circ 22'.4$  (1900).

TABLE II.

VARIABLES IN THE SMALL MAGELLANIC CLOUD.

Harv. No.	$x$	$y$	Br.	Ft.	R.	Harv. No.	$x$	$y$	Br.	Ft.	R.	Harv. No.	$x$	$y$	Br.	Ft.	R.
809	1907	9287	12.4	13.8	1.4	1357	9479	8136	14.7	15.7	1.0	1400	10304	10786	14.0	14.8	0.8
810	4205	11520	11.7	13.8	2.1	1358	9486	8164	14.8	16.0	1.2	1401	10318	8046	14.7	15.8	1.1
811	4298	12295	11.9	13.0	1.1	1359	9497	8472	15.0	16.3	1.3	1402	10322	5281	14.5	15.2	0.7
812	4421	11640	12.2	12.9	0.7	1360	9507	8932	14.8	15.8	1.0	1403	10324	8948	15.1	16.2	1.1
813	4585	11774	11.7	13.0	1.3	1361	9544	7225	15.1	16.3	1.2	1404	10328	9206	14.8	15.8	1.0
814	5586	11440	12.5	13.2	0.7	821	9570	6141	11.3	12.1	0.8	1405	10334	7881	14.1	15.2	1.1
1323	6639	5040	14.2	15.0	0.8	1362	9574	7680	14.4	15.0	0.6	1406	10374	8043	15.8	16.5	0.7
1324	6762	6237	14.1	14.7	0.6	822	9581	6805	13.5	14.6	1.1	1407	10427	8399	15.1	16.2	1.1
1325	7062	6290	15.2	16.0	0.8	1363	9585	6865	14.0	15.0	1.0	1408	10467	9214	15.4	16.5	1.1
1326	7342	7194	13.7	14.5	0.8	1364	9586	8995	15.8	16.4	0.6	1409	10498	10682	15.4	16.7	1.3
1327	7366	11187	14.2	14.8	0.6	1365	9594	6124	13.8	14.8	1.0	1410	10515	9334	14.8	15.7	0.9
1328	7374	5606	12.7	13.7	1.0	1366	9687	9062	14.8	16.3	1.5	1411	10534	7369	14.0	14.7	0.7
1329	7460	12545	14.4	15.5	1.1	1367	9705	8040	14.6	15.2	0.6	1412	10544	6187	14.5	15.6	1.1
1330	7582	7884	14.7	15.9	1.2	1368	9734	7788	14.6	15.3	0.7	1413	10546	6744	14.6	16.2	1.6
1331	7642	7324	14.1	15.5	1.4	1369	9758	8337	13.2	14.0	0.8	1414	10571	8489	14.9	15.6	0.7
1332	8025	6216	14.6	15.5	0.9	1370	9763	6969	14.0	14.6	0.6	1415	10597	7418	14.3	15.3	1.0
1333	8199	5276	14.0	14.7	0.7	1371	9827	9344	15.3	16.8	1.5	1416	10614	7755	14.1	15.2	1.1
1334	8214	5859	13.6	14.3	0.7	1372	9866	7601	14.5	15.7	1.2	1417	10614	8345	14.9	15.8	0.9
1335	8417	5266	14.2	14.8	0.6	1373	9876	8774	14.1	14.7	0.6	1418	10636	8364	14.9	16.1	1.2
817	8511	12207	12.6	13.7	1.1	1374	9884	6726	13.9	15.3	1.4	1419	10646	7950	14.5	15.2	0.7
815	8564	5186	14.3	15.2	0.9	1375	9885	5706	15.3	16.6	1.3	1420	10649	9186	15.9	17.0	1.1
1336	8617	7978	14.8	15.5	0.7	1376	9887	5659	14.9	16.3	1.4	1421	10655	7274	14.1	14.6	0.5
1337	8706	4904	14.6	15.5	0.9	1377	9894	7554	14.0	14.7	0.7	1422	10663	6353	14.6	16.1	1.5
1338	8724	5752	14.2	15.0	0.8	1378	9898	9518	15.5	16.2	0.7	1423	10665	6685	15.0	16.1	1.1
820	8774	17366	14.0	14.8	0.8	1379	9913	8062	15.0	16.0	1.0	1424	10686	9692	15.0	16.0	1.0
1339	8782	7694	14.8	15.7	0.9	1380	9922	8894	15.8	16.6	0.8	1425	10697	10476	14.3	15.4	1.1
1340	8806	6624	14.6	15.8	1.2	1381	9935	8317	14.7	15.5	0.8	1426	10709	8864	14.2	14.8	0.6
816	8842	5244	14.2	15.2	1.0	1382	9952	7916	14.0	15.1	1.1	1427	10724	8594	14.9	15.6	0.7
1341	8892	4754	14.5	14.9	0.4	1383	9967	5536	14.9	15.9	1.0	824	10734	9857	11.5	12.9	1.4
1342	9027	6013	12.7	13.8	1.1	1384	9974	8362	14.7	15.2	0.5	1428	10816	10243	15.5	16.7	1.2
1343	9054	9175	14.3	15.2	0.9	1385	10003	8884	14.8	15.5	0.7	1429	10829	7126	13.8	14.6	0.8
1344	9162	7062	15.4	16.5	1.1	1386	10022	7574	13.8	14.6	0.8	1430	10845	8972	13.3	14.6	1.3
1345	9175	7940	13.4	14.1	0.7	1387	10035	7584	14.4	15.0	0.6	1431	10912	9683	14.5	15.2	0.7
1346	9189	5650	14.2	16.3	2.1	1388	10036	8094	14.5	15.0	0.5	1432	10915	7333	14.7	15.8	1.1
1347	9216	7506	15.3	16.3	1.0	1389	10049	10794	14.8	16.5	1.7	1433	10951	6334	14.0	14.7	0.7
818	9220	6297	13.6	14.7	1.1	823	10077	6567	12.1	14.0	1.9	1434	10959	7607	14.8	16.0	1.2
1348	9240	7700	15.0	16.0	1.0	1390	10084	9641	15.3	15.9	0.6	1435	11004	8057	14.0	14.9	0.9
1349	9275	9334	14.8	16.0	1.2	1391	10104	9335	14.7	15.7	1.0	1436	11031	10889	14.8	16.7	1.9
1350	9303	8425	15.9	16.8	0.9	1392	10119	9679	14.8	15.3	0.5	1437	11045	9046	14.0	14.4	0.4
819	9326	6146	13.3	14.3	1.0	1393	10143	7532	14.8	15.5	0.7	1438	11054	8712	13.8	14.4	0.6
1351	9358	6836	13.5	14.5	1.0	1394	10197	7423	15.5	16.0	0.5	1439	11072	8817	14.4	15.1	0.7
1352	9361	5322	14.7	16.0	1.3	1395	10203	6663	15.3	15.9	0.6	1440	11076	9006	14.6	15.6	1.0
1353	9394	8698	14.8	15.5	0.7	1396	10205	8302	14.0	14.8	0.8	1441	11086	7175	14.0	14.5	0.5
1354	9406	6785	15.2	16.1	0.9	1397	10274	7332	15.8	16.8	1.0	1442	11086	7711	14.8	15.3	0.5
1355	9406	7445	13.8	15.1	1.3	1398	10293	8858	15.2	16.2	1.0	1443	11089	9373	14.7	15.8	1.1
1356	9425	5556	14.6	15.5	0.9	1399	10304	7749	14.6	15.5	0.9	1444	11108	8623	13.8	14.4	0.6

Harv. No.	x	y	Br.	Ft.	R.	Harv. No.	x	y	Br.	Ft.	R.	Harv. No.	x	y	Br.	Ft.	R.
1445	11109	9584	14.2	15.0	0.8	1491	11663	10415	15.0	15.8	0.8	1537	12063	5931	14.5	15.0	0.5
825	11125	10813	13.3	14.1	0.8	1492	11666	10803	13.8	14.9	1.1	1538	12072	6487	14.4	15.2	0.8
1446	11146	10941	14.8	16.4	1.6	1493	11669	7094	15.1	15.9	0.8	1539	12076	6205	14.8	16.0	1.2
1447	11163	8648	15.1	15.8	0.7	1494	11686	15915	14.6	15.1	0.5	1540	12076	6975	14.4	15.1	0.7
1448	11175	9057	14.8	16.1	1.3	1495	11687	11068	14.8	16.1	1.3	1541	12086	8297	13.3	14.0	0.7
1449	11186	9834	15.3	16.2	0.9	1496	11696	6478	15.0	15.8	0.8	1542	12095	12748	14.8	15.3	0.5
1450	11195	7147	14.7	15.8	1.1	1497	11698	6400	14.4	15.6	1.2	1543	12106	7540	13.5	14.2	0.7
1451	11206	8022	13.5	14.2	0.7	1498	11702	7679	15.3	15.9	0.6	1544	12107	8498	14.8	15.3	0.5
1452	11224	6984	14.9	15.8	0.9	829	11706	9748	11.0	12.7	1.7	1545	12110	8994	14.5	15.8	1.3
1453	11241	9003	14.5	15.3	0.8	1499	11707	8699	14.5	15.3	0.8	1546	12116	8133	14.8	15.8	1.0
1454	11243	7873	13.8	14.5	0.7	1500	11712	6566	15.0	16.0	1.0	1547	12116	10356	14.4	15.3	0.9
1455	11251	5735	13.2	14.0	0.8	1501	11749	9005	13.5	14.5	1.0	1548	12119	10596	14.3	14.8	0.5
1456	11254	6363	14.4	15.4	1.0	1502	11764	11845	14.5	15.6	1.1	1549	12121	6754	15.0	15.8	0.8
1457	11254	9412	15.0	16.0	1.0	1503	11771	10125	14.7	15.7	1.0	1550	12125	8717	14.6	15.3	0.7
1458	11295	9471	15.3	15.9	0.6	1504	11779	8653	14.8	15.8	1.0	1551	12126	7066	14.6	15.2	0.6
1459	11301	7070	14.9	15.6	0.7	1505	11781	12212	14.8	16.1	1.3	1552	12154	6940	14.6	15.2	0.6
1460	11311	12362	14.3	16.2	1.9	830	11782	6843	14.6	15.7	1.1	1553	12156	8037	14.1	14.8	0.7
1461	11314	7839	15.0	15.8	0.8	1506	11784	11355	15.1	16.5	1.4	1554	12162	6403	14.9	15.8	0.9
1462	11346	6826	14.4	15.4	1.0	1507	11802	6917	15.6	16.3	0.7	1555	12171	10944	14.0	14.8	0.8
1463	11360	6214	14.7	15.6	0.9	1508	11805	6979	15.1	16.3	1.2	1556	12177	10314	14.5	15.0	0.5
1464	11366	8074	14.2	14.7	0.5	1509	11843	7850	14.0	15.1	1.1	1557	12233	7273	14.8	15.1	0.3
1465	11380	10079	15.3	16.1	0.8	1510	11845	15900	13.5	14.1	0.6	833	12233	20164	9.4	14.7	5.3
1466	11384	9086	15.3	16.5	1.2	1511	11847	10780	14.8	16.4	1.6	1558	12247	9275	15.2	16.1	0.9
1467	11384	9178	15.3	17.0	1.7	1512	11849	7094	14.5	15.0	0.5	1559	12279	10104	14.6	15.2	0.6
1468	11397	6423	14.9	15.8	0.9	1513	11853	11282	15.2	16.2	1.0	1560	12280	8975	14.1	15.2	1.1
1469	11432	6621	14.8	16.0	1.2	1514	11859	7483	14.1	15.0	0.9	1561	12284	7926	15.3	16.0	0.7
1470	11432	7575	14.6	15.6	1.0	1515	11880	11225	15.3	16.4	1.1	1562	12284	9494	14.1	15.0	0.9
1471	11434	9228	14.1	15.0	0.9	1516	11886	6513	15.0	16.1	1.1	1563	12286	6386	15.4	16.2	0.8
1472	11444	6986	14.7	15.4	0.7	1517	11890	11181	14.8	16.6	1.8	1564	12286	8905	13.7	14.5	0.8
826	11445	7449	14.0	14.7	0.7	1518	11904	6734	14.3	14.9	0.6	1565	12311	7566	15.2	15.8	0.6
1473	11445	11808	15.5	16.4	0.9	1519	11905	9279	14.7	15.6	0.9	1566	12324	6326	15.0	15.6	0.6
1474	11461	10194	14.4	15.3	0.9	1520	11914	9846	14.0	15.3	1.3	1567	12342	7629	14.9	16.1	1.2
827	11473	10674	13.3	14.3	1.0	1521	11922	10414	13.8	14.3	0.5	1568	12344	16633	14.2	15.3	1.1
1475	11474	7747	12.4	13.5	1.1	831	11926	6774	14.8	15.7	0.9	1569	12367	10947	14.6	15.3	0.7
1476	11483	10852	14.8	16.3	1.5	1522	11928	8166	13.9	14.8	0.9	1570	12384	9264	14.1	15.2	1.1
1477	11484	10494	14.1	15.6	1.5	1523	11934	10387	14.5	15.0	0.5	1571	12397	11537	14.8	16.1	1.3
1478	11503	7695	13.9	15.0	1.1	832	11943	10143	13.3	14.1	0.8	1572	12406	6657	14.8	16.1	1.3
1479	11514	8826	14.2	14.9	0.7	1524	11954	8072	14.4	15.2	0.8	1573	12434	9378	14.1	14.8	0.7
1480	11520	8480	15.1	15.8	0.7	1525	11955	6637	14.6	16.0	1.4	1574	12444	10789	14.8	15.6	0.8
1481	11540	7996	13.8	14.6	0.8	1526	11957	6847	14.6	15.5	0.9	1575	12466	11322	14.2	15.4	1.2
1482	11544	8344	13.4	14.2	0.8	1527	11971	9056	14.2	15.0	0.8	1576	12471	8755	14.5	15.2	0.7
1483	11544	8739	14.5	16.1	1.6	1528	11971	11495	15.3	16.7	1.4	1577	12475	6645	15.1	15.9	0.8
1484	11561	8727	14.0	14.6	0.6	1529	11981	6792	14.1	15.6	1.5	1578	12480	14724	14.5	15.4	0.9
1485	11570	11320	15.1	16.5	1.4	1530	12006	6407	14.5	16.0	1.5	1579	12483	8451	13.5	14.5	1.0
1486	11587	8294	13.9	15.0	1.1	1531	12006	6675	14.1	14.7	0.6	1580	12484	7586	15.4	16.0	0.6
1487	11593	9874	14.5	15.0	0.5	1532	12013	8936	15.1	16.5	1.4	1581	12488	6813	14.1	15.0	0.9
828	11594	8045	14.0	15.7	1.7	1533	12040	8773	14.0	15.0	1.0	1582	12495	11735	13.6	14.5	0.9
1488	11603	6802	14.4	15.2	0.8	1534	12044	7235	14.5	15.6	1.1	1583	12496	7068	14.6	15.3	0.7
1489	11628	6966	14.7	15.2	0.5	1535	12048	6665	14.8	15.8	1.0	1584	12519	8465	14.5	15.0	0.5
1490	11634	8844	15.3	16.2	0.9	1536	12055	8213	15.0	15.4	0.4	1585	12534	7359	14.6	15.1	0.5

Harv. No.	<i>x</i>	<i>y</i>	Br.	Ft.	R.	Harv. No.	<i>x</i>	<i>y</i>	Br.	Ft.	R.	Harv. No.	<i>x</i>	<i>y</i>	Br.	Ft.	R.
1586	12534	10416	14.9	15.8	0.9	1634	12926	9524	15.2	16.0	0.8	1681	13260	12163	15.0	15.8	0.8
1587	12540	10703	14.6	15.8	1.2	1635	12927	8264	14.8	16.2	1.4	1682	13281	7471	13.7	14.2	0.5
1588	12544	7804	14.5	15.4	0.9	1636	12934	9714	13.2	14.0	0.8	1683	13294	9446	14.6	15.3	0.7
834	12555	11451	11.0	12.6	1.6	1637	12944	7680	14.2	15.6	1.4	1684	13304	13313	14.1	14.9	0.8
1589	12564	9194	14.0	15.1	1.1	1638	12960	11820	15.0	16.3	1.3	1685	13305	7160	13.8	14.5	0.7
1590	12566	11506	14.8	15.6	0.8	1639	12962	8523	14.7	15.4	0.7	1686	13305	8016	14.8	15.6	0.8
1591	12571	10597	14.3	14.9	0.6	1640	12966	9934	14.3	15.2	0.9	1687	13308	9061	14.6	15.8	1.2
1592	12579	9113	13.9	14.8	0.9	1641	12974	12406	14.1	15.2	1.1	1688	13311	7442	14.0	15.4	1.4
1593	12591	6824	14.1	15.3	1.2	1642	12980	6024	15.0	15.8	0.8	1689	13314	10896	14.0	14.7	0.7
1594	12603	7232	14.4	15.1	0.7	1643	12983	7836	14.9	15.6	0.7	1690	13324	12577	14.4	15.1	0.7
1595	12606	6849	14.3	15.0	0.7	1644	12995	7356	13.8	15.0	1.2	1691	13324	13504	14.4	15.0	0.6
1596	12612	8804	14.0	14.7	0.7	1645	12996	7973	14.8	15.7	0.9	1692	13325	7906	15.2	15.8	0.6
1597	12626	12759	15.3	16.1	0.8	1646	13012	10047	14.4	15.4	1.0	1693	13333	8804	14.2	15.6	1.4
1598	12641	9945	14.1	15.5	1.4	1647	13021	7565	14.1	14.6	0.5	1694	13355	9205	15.4	16.0	0.6
1599	12646	8794	14.4	15.0	0.6	1648	13021	9135	14.9	15.2	0.3	1695	13359	11462	13.8	14.9	1.1
1600	12668	13076	14.0	14.6	0.6	1649	13021	9944	14.3	15.5	1.2	1696	13363	10565	14.7	15.8	1.1
1601	12685	6625	14.2	15.4	1.2	1650	13023	7936	14.3	14.9	0.6	1697	13364	10447	14.5	15.4	0.9
1602	12685	7044	14.7	16.2	1.5	1651	13037	6604	14.8	15.2	0.4	1698	13383	11641	14.1	14.8	0.7
1603	12685	15060	14.8	15.8	1.0	1652	13037	10326	13.1	13.7	0.6	1699	13402	12015	13.7	14.6	0.9
1604	12694	12730	14.6	15.6	1.0	1653	13051	8761	15.0	16.2	1.2	1700	13406	7454	14.4	15.4	1.0
835	12722	10260	13.7	14.3	0.6	1654	13058	13356	14.7	15.4	0.7	1701	13408	7986	15.1	15.7	0.6
1605	12723	6456	14.5	15.4	0.9	1655	13065	9663	15.8	16.5	0.7	1702	13410	9064	14.8	15.8	1.0
1606	12724	6740	14.6	16.3	1.7	1656	13070	9203	15.2	16.1	0.9	1703	13414	13791	14.9	15.6	0.7
1607	12744	11525	14.0	15.3	1.3	1657	13075	9673	15.0	16.2	1.2	1704	13417	9104	14.0	15.3	1.3
1608	12760	11617	14.6	15.1	0.5	1658	13086	11751	14.8	15.3	0.5	1705	13424	9345	14.1	14.9	0.8
1609	12764	8405	15.4	16.0	0.6	1659	13094	11419	14.6	15.3	0.7	1706	13445	9877	14.9	16.2	1.3
1610	12767	11006	13.3	14.9	1.6	838	13095	8168	14.0	15.5	1.5	1707	13463	4449	14.7	15.6	0.9
1611	12769	13055	13.8	15.0	1.2	1660	13099	8694	14.6	15.6	1.0	1708	13463	12373	15.0	16.0	1.0
1612	12777	7914	14.6	15.5	0.9	1661	13108	8133	15.2	15.8	0.6	1709	13479	7146	14.1	14.8	0.7
1613	12784	8716	14.5	15.0	0.5	1662	13124	14094	14.9	15.8	0.9	1710	13480	10294	14.4	15.3	0.9
1614	12792	9748	14.7	16.1	1.4	1663	13132	7390	14.0	15.2	1.2	1711	13482	10993	15.6	16.5	0.9
1615	12796	11654	14.9	15.8	0.9	1664	13136	6711	15.5	16.0	0.5	1712	13484	11187	14.9	15.6	0.7
1616	12798	13566	14.8	15.2	0.4	1665	13144	9774	14.5	15.0	0.5	1713	13487	6640	14.7	15.2	0.5
1617	12799	7943	14.7	15.6	0.9	1666	13149	11134	14.0	15.0	1.0	1714	13487	9928	14.8	15.4	0.6
1618	12800	12307	14.3	15.2	0.9	836	13150	14274	13.4	14.1	0.7	1715	13489	8574	15.0	15.9	0.9
1619	12805	12764	14.0	15.0	1.0	1667	13157	8466	14.2	15.3	1.1	1716	13506	7178	14.6	15.4	0.8
1620	12816	10555	13.2	13.9	0.7	1668	13162	6785	14.3	14.8	0.5	1717	13506	13701	14.6	15.6	1.0
1621	12824	9054	14.6	15.2	0.6	1669	13162	10796	13.8	14.2	0.4	1718	13507	13124	15.0	15.8	0.8
1622	12854	6955	14.8	15.5	0.7	837	13164	12554	12.2	13.4	1.2	839	13508	15187	13.8	14.7	0.9
1623	22862	5513	14.8	15.6	0.8	1670	13165	7613	15.3	16.2	0.9	1719	13514	8786	14.0	17.0	3.0
1624	12862	10886	14.6	15.4	0.8	1671	13178	12849	14.8	15.8	1.0	1720	13518	11474	14.8	15.8	1.0
1625	12866	6744	15.0	16.1	1.1	1672	13180	7769	14.6	15.1	0.5	1721	13524	4335	15.0	15.8	0.8
1626	12874	7429	14.8	16.0	1.2	1673	13184	8121	15.0	15.4	0.4	1722	13525	8498	14.7	16.1	1.4
1627	12884	7928	14.4	14.8	0.4	1674	13185	8973	15.2	16.3	1.1	1723	13526	10548	15.4	16.5	1.1
1628	12887	8233	15.0	16.1	1.1	1675	13205	8045	15.7	16.5	0.8	1724	13529	7398	15.0	16.1	1.1
1629	12906	10521	14.8	15.8	1.0	1676	13213	7258	14.8	15.6	0.8	1725	13539	6748	14.7	16.0	1.3
1630	12916	8634	13.9	14.5	0.6	1677	13215	8779	14.8	15.8	1.0	1726	13559	8226	14.4	15.0	0.6
1631	12920	12318	14.2	15.0	0.8	1678	13217	9168	15.3	16.1	0.8	1727	13564	13783	14.7	15.8	1.1
1632	12924	11599	14.2	14.8	0.6	1679	13241	12884	14.8	15.6	0.8	1728	13573	8665	14.5	15.1	0.6
1633	12925	8354	14.2	14.8	0.6	1680	13260	11213	14.5	15.0	0.5	1729	13583	8511	15.0	16.0	1.0

Harv. No.	x	y	Br.	Ft.	R.	Harv. No.	x	y	Br.	Ft.	R.	Harv. No.	x	y	Br.	Ft.	R.
1730	13588	8081	15.8	16.4	0.6	1776	13946	10014	14.5	15.6	1.1	1823	14292	7917	15.7	16.2	0.5
1731	13591	8489	16.0	16.4	0.4	1777	13953	7343	14.5	16.1	1.6	1824	14295	7794	15.3	16.1	0.8
1732	13593	13434	14.6	15.6	1.0	1778	13967	9084	14.6	15.3	0.7	1825	14297	12032	14.5	15.2	0.7
1733	13603	12658	14.7	15.9	1.2	1779	13968	14789	14.3	14.9	0.6	1826	14331	10624	15.2	15.8	0.6
1734	13606	9766	14.2	15.3	1.1	1780	13980	7514	14.7	16.2	1.5	1827	14345	12034	14.2	14.8	0.6
1735	13607	9009	15.0	15.8	0.8	1781	13982	8499	14.8	16.2	1.4	1828	14353	6028	14.6	15.8	1.2
1736	13613	11673	14.2	14.8	0.6	1782	13983	7194	14.7	15.4	0.7	1829	14355	10154	14.0	15.0	1.0
1737	13623	10051	14.3	15.2	0.9	1783	13986	12834	13.8	14.5	0.7	1830	14360	9640	14.6	15.2	0.6
1738	13624	6538	14.7	16.0	1.3	844	14024	12823	14.4	15.5	1.1	1831	14361	7700	14.4	14.9	0.5
1739	13630	7905	15.7	17.0	1.3	1784	14027	8746	13.9	14.7	0.8	1832	14366	7487	14.9	15.6	0.7
1740	13634	9155	14.0	15.0	1.0	1785	14042	12444	14.5	15.0	0.5	1833	14374	8975	15.6	16.1	0.5
1741	13635	7906	16.3	17.0	0.7	1786	14046	9534	14.7	15.4	0.7	1834	14375	6173	15.0	15.8	0.8
1742	13640	10519	14.2	16.0	1.8	1787	14046	12266	13.4	14.1	0.7	1835	14408	9626	13.6	14.6	1.0
1743	13654	9703	15.0	15.9	0.9	1788	14054	14254	13.9	14.5	0.6	1836	14408	11672	14.5	15.4	0.9
1744	13666	11504	13.4	14.0	0.6	1789	14068	8970	14.2	15.3	1.1	1837	14417	8103	15.2	16.3	1.1
1745	13681	9609	14.4	15.0	0.6	1790	14071	9393	14.3	15.3	1.0	1838	14424	8464	15.7	16.5	0.8
1746	13692	7659	14.3	15.4	1.1	1791	14075	7722	14.6	15.6	1.0	1839	14425	6784	14.6	15.4	0.8
840	13703	11000	13.1	13.7	0.6	1792	14085	7311	14.4	15.4	1.0	1840	14428	9774	14.9	15.4	0.5
1747	13726	7194	14.7	16.2	1.5	1793	14090	13204	14.2	15.3	1.1	1841	14439	9826	15.0	16.1	1.1
1748	13726	8074	14.6	15.1	0.5	1794	14093	6699	14.1	14.9	0.8	1842	14444	9489	14.5	15.3	0.8
1749	13732	11645	15.1	15.9	0.8	1795	14122	9386	15.0	16.0	1.0	1843	14445	6522	14.8	16.1	1.3
1750	13741	10055	15.1	15.8	0.7	1796	14125	10874	14.8	16.1	1.3	1844	14453	8425	15.3	16.0	0.7
1751	13743	11462	14.8	15.6	0.8	1797	14127	9176	14.3	15.9	1.6	1845	14461	6694	14.1	15.2	1.1
1752	13747	8335	15.0	16.0	1.0	1798	14133	8353	15.4	16.0	0.6	1846	14462	7556	14.5	15.4	0.9
1753	13766	8114	14.1	15.1	1.0	1799	14134	10140	14.8	15.4	0.6	1847	14471	8345	15.3	16.5	1.2
1754	13771	9074	14.9	16.1	1.2	846	14139	7182	14.3	15.0	0.7	1848	14515	7415	14.9	15.8	0.9
1755	13795	13686	15.0	15.8	0.8	1800	14139	10078	14.8	16.0	1.2	1849	14515	12265	14.0	14.7	0.7
841	13805	13274	14.4	15.5	1.1	1801	14144	7525	14.5	15.0	0.5	1850	14536	12333	14.0	15.3	1.3
1756	13812	7154	15.0	16.1	1.1	1802	14146	10184	15.2	16.1	0.9	1851	14538	6582	15.2	16.0	0.8
1757	13814	7484	14.2	15.0	0.8	1803	14149	5603	14.1	15.2	1.1	1852	14548	8762	14.7	15.3	0.6
1758	13824	9206	13.8	15.0	1.2	1804	14168	10492	14.4	15.8	1.4	1853	14552	8904	15.4	16.2	0.8
1759	13835	13825	15.0	15.6	0.6	1805	14178	9618	15.7	16.3	0.6	1854	14562	8765	14.3	14.8	0.5
1760	13844	6025	14.7	15.2	0.5	1806	14191	10984	15.2	15.8	0.6	847	14582	11765	12.4	13.8	1.4
1761	13854	12156	14.0	14.4	0.4	1807	14192	13701	14.2	15.3	1.1	1855	14593	13199	13.9	14.6	0.7
1762	13856	10326	14.8	15.8	1.0	1808	14193	8122	14.7	15.7	1.0	1856	14616	7347	14.4	15.0	0.6
1763	13858	7267	14.7	15.4	0.7	1809	14201	12772	14.2	15.4	1.2	848	14624	11901	14.9	15.7	0.8
842	13863	10884	14.6	16.2	1.6	845	14206	9359	13.6	14.4	0.8	1857	14626	6654	14.2	14.7	0.5
1764	13867	11286	14.1	14.9	0.8	1810	14208	10618	14.5	15.3	0.8	1858	14645	11578	14.1	15.0	0.9
1765	13868	7160	14.7	16.0	1.3	1811	14212	14595	14.2	15.4	1.2	1859	14657	6397	14.6	15.2	0.6
843	13871	10860	13.8	15.1	1.3	1812	14235	9144	14.6	15.2	0.6	1860	14664	12992	14.6	15.4	0.8
1766	13893	9244	14.8	16.3	1.5	1813	14236	10168	14.5	16.0	1.5	1861	14666	9404	15.0	15.9	0.9
1767	13896	7532	14.5	15.8	1.3	1814	14237	9019	15.2	16.3	1.1	1862	14673	8234	14.6	16.2	1.6
1768	13898	11946	14.0	14.5	0.5	1815	14245	9872	14.5	15.4	0.9	1863	14682	15095	15.4	16.3	0.9
1769	13910	4760	15.2	16.3	1.1	1816	14247	9097	14.8	15.4	0.6	1864	14685	7426	15.0	15.8	0.8
1770	13919	8654	15.6	16.2	0.6	1817	14264	10343	14.8	15.4	0.6	1865	14694	9784	15.1	16.6	1.5
1771	13923	11117	14.5	15.2	0.7	1818	14265	8988	15.5	16.1	0.6	1866	14694	11377	14.7	15.8	1.1
1772	13926	7755	15.2	16.2	1.0	1819	14268	7836	14.7	15.6	0.9	1867	14703	7774	14.8	15.6	0.8
1773	13926	9166	14.5	15.6	1.1	1820	14274	9066	14.7	15.6	0.9	1868	14706	11314	14.6	16.1	1.5
1774	13935	9019	14.8	15.2	0.4	1821	14276	4022	14.8	15.8	1.0	1869	14713	15059	15.3	15.8	0.5
1775	13937	9285	14.4	15.4	1.0	1822	14286	8915	14.7	15.8	1.1	1870	14724	7281	14.8	15.4	0.6

Harv. No.	$x$	$y$	Br.	Ft.	R.	Harv. No.	$x$	$y$	Br.	Ft.	R.	Harv. No.	$x$	$y$	Br.	Ft.	R.
1871	14744	14984	15.8	16.5	0.7	1919	15129	14918	15.0	15.8	0.8	1968	15546	12724	14.9	16.1	1.2
1872	14754	8796	14.5	15.0	0.5	1920	15140	9583	14.9	15.8	0.9	1969	15550	6969	14.8	16.0	1.2
1873	14764	10718	13.7	14.1	0.4	1921	15144	7174	15.4	16.3	0.9	1970	15554	13732	15.5	16.2	0.7
1874	14774	10673	13.8	15.0	1.2	1922	15154	9514	14.9	15.8	0.9	1971	15567	5683	14.6	15.2	0.6
1875	14775	8266	14.7	15.9	1.2	1923	15164	11763	14.7	15.8	1.1	1972	15567	11301	14.3	15.3	1.0
1876	14794	11155	13.8	14.4	0.6	1924	15165	7895	14.0	15.4	1.4	1973	15586	7402	14.0	15.1	1.1
1877	14805	12128	13.1	13.7	0.6	1925	15167	10474	13.4	13.8	0.4	1974	15586	11204	13.8	15.6	1.8
1878	14813	7585	14.5	15.3	0.8	1926	15191	9677	15.5	16.1	0.6	1975	15610	6556	15.0	15.8	0.8
1879	14826	6244	14.1	15.4	1.3	1927	15194	9382	14.4	15.0	0.6	1976	15624	14292	15.0	15.6	0.6
1880	14826	10720	13.5	13.8	0.3	1928	15206	8887	15.3	16.3	1.0	1977	15639	9473	15.6	16.4	0.8
1881	14831	9551	14.6	15.6	1.0	1929	15214	13025	14.0	14.6	0.6	1978	15649	12586	14.6	15.3	0.7
1882	14835	7275	14.9	15.6	0.7	1930	15224	10008	15.6	16.4	0.8	853	15650	6404	13.8	14.6	0.8
1883	14835	15844	14.5	15.3	0.8	1931	15226	8592	14.5	15.1	0.6	1979	15656	10030	14.0	14.9	0.9
1884	14836	11765	13.4	14.0	0.6	1932	15226	9090	14.6	15.8	1.2	1980	15668	8771	14.9	15.8	0.9
1885	14846	9636	14.6	15.8	1.2	1933	15234	12454	13.2	13.8	0.6	1981	15673	11206	15.6	16.4	0.8
1886	14847	6884	15.2	16.1	0.9	1934	15237	13381	14.4	15.0	0.6	1982	15712	14925	15.2	16.0	0.8
1887	14859	7154	14.4	15.6	1.2	1935	15240	10115	14.9	16.1	1.2	1983	15715	13715	14.7	15.4	0.7
1888	14871	7242	14.7	15.7	1.0	1936	15241	6828	15.3	16.1	0.8	1984	15718	7381	14.5	15.4	0.9
1889	14879	8824	14.8	15.8	1.0	1937	15258	9985	15.0	16.1	1.1	1985	15723	8214	14.9	15.8	0.9
1890	14888	14051	15.0	16.0	1.0	1938	15271	8684	14.2	14.9	0.7	1986	15725	11004	14.3	15.0	0.7
1891	14894	12640	14.0	15.2	1.2	1939	15281	8255	14.9	16.1	1.2	1987	15728	13150	14.0	15.1	1.1
1892	14904	13494	15.3	15.8	0.5	1940	15292	7504	15.0	15.8	0.8	1988	15740	6706	13.9	14.9	1.0
1893	14906	6312	15.3	16.3	1.0	1941	15295	7630	15.2	16.1	0.9	1989	15743	13763	14.9	15.6	0.7
1894	14909	6314	15.0	16.3	1.3	1942	15308	11224	14.1	15.0	0.9	1990	15750	6732	15.0	15.8	0.8
1895	14951	7004	14.8	15.3	0.5	1943	15310	8800	15.9	16.6	0.7	1991	15752	8055	14.0	14.5	0.5
1896	14980	5630	14.2	15.3	1.1	1944	15327	6845	15.5	16.1	0.6	1992	15754	4793	14.0	15.0	1.0
1897	14984	15083	15.1	15.9	0.8	851	15328	10347	13.8	15.5	1.7	1993	15764	6134	14.7	15.6	0.9
1898	14999	13586	15.0	15.7	0.7	1945	15332	12964	14.7	15.5	0.8	1994	15785	11552	14.6	15.0	0.4
1899	15002	7653	14.7	15.7	1.0	1946	15338	8817	15.5	16.3	0.8	852	15789	11804	14.1	14.9	0.8
1900	15004	8589	15.2	16.6	1.4	1947	15344	10009	14.6	15.3	0.7	1995	15814	9213	14.7	15.3	0.6
1901	15007	14301	14.8	15.4	0.6	1948	15355	9050	15.8	16.6	0.8	1996	15830	9386	13.8	14.9	1.1
1902	15014	7746	15.7	16.4	0.7	1949	15356	8054	15.0	15.6	0.6	1997	15833	6333	14.7	15.6	0.9
1903	15021	11024	14.5	15.1	0.6	1950	15356	12925	14.0	14.6	0.6	1998	15844	12365	13.4	13.9	0.5
1904	15023	6385	14.9	16.1	1.2	1951	15360	7998	13.9	14.8	0.9	1999	15865	13820	14.9	15.6	0.7
1905	15026	12164	14.0	15.0	1.0	1952	15394	9640	15.0	16.2	1.2	2000	15875	11766	14.5	15.4	0.9
1906	15041	15486	15.0	16.0	1.0	1953	15397	10347	14.6	15.6	1.0	2001	15886	8214	15.0	15.8	0.8
1907	15045	14906	15.0	15.6	0.6	1954	15397	11614	13.4	13.9	0.5	2002	15893	13015	15.9	16.8	0.9
849	15063	19530	10.4	14.9	4.5	1955	15399	10684	14.6	15.0	0.4	2003	15914	13986	14.8	15.2	0.4
1908	15074	9553	14.6	15.3	0.7	1956	15406	9725	11.9	13.7	1.8	2004	15946	10579	15.2	16.1	0.9
1909	15079	7394	14.1	15.7	1.6	1957	15406	10672	14.2	15.0	0.8	2005	15956	13484	14.0	14.5	0.5
850	15083	12522	14.1	16.3	2.2	1958	15417	14567	15.0	16.1	1.1	2006	15966	7045	15.5	16.7	1.2
1910	15086	7400	15.0	16.1	1.1	1959	15425	11105	14.7	15.5	0.8	2007	15973	9313	15.0	15.4	0.4
1911	15088	7714	14.8	16.2	1.4	1960	15436	7321	14.8	15.4	0.6	2008	15976	8093	14.3	15.4	1.1
1912	15090	7514	15.3	16.3	1.0	1961	15438	7266	15.0	15.8	0.8	2009	15981	7146	15.4	17.0	1.6
1913	15093	6626	13.9	15.1	1.2	1962	15474	11898	14.0	14.8	0.8	2010	15984	9820	14.5	14.9	0.4
1914	15100	9106	14.9	15.4	0.5	1963	15477	10365	14.0	15.2	1.2	854	15994	7824	12.5	13.7	1.2
1915	15114	6701	15.0	15.8	0.8	1964	15497	8545	15.6	16.6	1.0	2011	16014	8062	15.4	16.5	1.1
1916	15114	7673	14.8	16.2	1.4	1965	15500	10624	14.7	15.8	1.1	2012	16016	7684	15.3	16.2	0.9
1917	15114	9053	14.7	15.6	0.9	1966	15534	11626	14.1	14.8	0.7	2013	16032	13554	14.3	15.4	1.1
1918	15126	8223	15.2	16.3	1.1	1967	15537	12425	12.1	13.7	1.6	2014	16054	13366	15.2	16.0	0.8



Harv. No.	<i>x</i>	<i>y</i>	Br.	Ft.	R.	Harv. No.	<i>x</i>	<i>y</i>	Br.	Ft.	R.	Harv. No.	<i>x</i>	<i>y</i>	Br.	Ft.	R.
2015	16055	14776	14.9	15.4	0.5	2063	16504	13178	13.8	14.7	0.9	2111	16969	4915	15.2	16.1	0.9
2016	16066	11665	13.4	13.8	0.4	2064	16505	10526	13.1	13.7	0.6	2112	16991	10164	13.7	16.5	2.8
2017	16084	12832	13.4	14.5	1.1	2065	16506	9966	14.4	15.4	1.0	2113	17004	10452	14.7	15.5	0.8
2018	16092	8683	14.9	15.6	0.7	2066	16532	10166	14.7	15.4	0.7	2114	17011	14436	14.4	15.3	0.9
2019	16107	11707	15.5	16.1	0.6	2067	16546	12727	14.0	15.1	1.1	2115	17012	14245	14.8	15.6	0.8
2020	16108	7444	15.4	16.2	0.8	2068	16574	14204	14.6	15.6	1.0	2116	17034	6234	14.7	15.3	0.6
2021	16115	11878	14.7	15.4	0.7	856	16583	14153	13.4	14.1	0.7	2117	17034	13006	14.5	15.2	0.7
2022	16116	12364	15.2	16.3	1.1	2069	16605	10308	14.6	15.6	1.0	2118	17049	9048	14.5	15.4	0.9
2023	16119	7452	15.1	16.1	1.0	2070	16619	9905	15.2	15.8	0.6	2119	17054	10614	14.1	14.9	0.8
2024	16119	8864	14.1	14.9	0.8	2071	16644	4281	14.6	15.3	0.7	2120	17054	13027	15.0	15.6	0.6
2025	16126	7557	14.5	16.0	1.5	2072	16644	7771	15.2	16.5	1.3	2121	17063	10509	14.4	15.2	0.8
2026	16134	10653	14.7	15.3	0.6	2073	16645	10408	14.5	15.0	0.5	2122	17065	13338	15.2	16.2	1.0
855	16142	7994	12.6	13.4	0.8	2074	16646	13004	14.5	15.2	0.7	2123	17070	9048	15.0	15.6	0.6
2027	16154	11392	14.5	15.8	1.3	2075	16650	9324	15.0	15.6	0.6	2124	17074	14912	14.3	15.0	0.7
2028	16160	8042	14.1	14.9	0.8	2076	16662	13614	14.1	15.4	1.3	2125	17085	9114	14.5	15.3	0.8
857	16173	6117	13.4	13.9	0.5	2077	16684	9085	15.0	16.3	1.3	2126	17093	10305	15.0	16.3	1.3
2029	16185	10138	14.0	15.2	1.2	2078	16689	15713	14.1	15.2	1.1	859	17098	10222	13.8	14.7	0.9
2030	16190	8484	14.9	15.6	0.7	2079	16694	10884	14.5	15.3	0.8	2127	17104	12623	14.6	15.4	0.8
2031	16195	11343	14.4	15.0	0.6	2080	16703	8678	15.0	16.1	1.1	2128	17108	12055	14.4	15.1	0.7
2032	16200	7907	14.9	15.6	0.7	2081	16705	10203	13.8	14.4	0.6	2129	17119	13914	14.1	15.0	0.9
2033	16206	10062	14.6	15.2	0.6	2082	16715	7544	14.7	15.4	0.7	2130	17136	10772	14.8	15.4	0.6
2034	16207	6954	14.6	16.0	1.4	2083	16724	7269	14.8	15.2	0.4	2131	17148	14804	14.6	15.8	1.2
2035	16224	11586	14.9	15.6	0.7	2084	16733	7566	12.6	14.1	1.5	2132	17153	9105	14.4	15.4	1.0
2036	16233	7807	14.5	15.2	0.7	2085	16742	13754	14.8	15.4	0.6	2133	17177	9982	14.2	15.4	1.2
2037	16242	6865	14.4	15.1	0.7	2086	16749	8236	15.0	15.8	0.8	2134	17184	9924	14.5	15.6	1.1
2038	16254	9852	14.3	15.2	0.9	2087	16779	11182	14.3	15.0	0.7	2135	17194	9108	14.5	15.4	0.9
2039	16262	13824	15.9	16.5	0.6	2088	16784	14526	13.5	14.8	1.3	2136	17204	14243	14.1	14.8	0.7
2040	16291	10534	13.6	14.6	1.0	858	16795	12185	13.8	15.2	1.4	2137	17245	9104	15.3	16.1	0.8
2041	16292	10637	14.0	15.0	1.0	2089	16799	8916	15.4	16.0	0.6	2138	17259	10558	14.9	15.8	0.9
2042	16302	9784	14.8	15.4	0.6	2090	16804	9406	14.6	15.4	0.8	2139	17264	12526	14.5	15.7	1.2
2043	16322	13454	13.7	14.5	0.8	2091	16806	5634	13.1	14.0	0.9	2140	17294	3766	14.0	15.0	1.0
2044	16324	7305	15.5	16.6	1.1	2092	16808	12632	14.2	15.0	0.8	2141	17297	9164	14.1	15.0	0.9
2045	16331	13975	15.5	16.2	0.7	2093	16820	9673	15.0	15.8	0.8	2142	17303	14794	13.8	15.0	1.2
2046	16342	12721	14.5	15.3	0.8	2094	16824	5426	15.2	15.8	0.6	2143	17305	9575	14.4	15.2	0.8
2047	16352	8033	14.8	15.5	0.7	2095	16825	10375	14.7	15.8	1.1	2144	17328	7851	14.3	15.0	0.7
2048	16360	11846	14.1	15.0	0.9	2096	16827	8074	15.3	16.3	1.0	2145	17334	8865	14.5	15.6	1.1
2049	16360	12578	14.8	15.4	0.6	2097	16843	8336	14.9	15.6	0.7	2146	17335	9220	15.0	15.8	0.8
2050	16366	7345	14.8	15.9	1.1	2098	16845	12871	14.6	15.6	1.0	2147	17346	9123	15.2	16.1	0.9
2051	16368	9468	13.9	15.0	1.1	2099	16866	7413	15.0	15.8	0.8	2148	17347	9076	14.6	15.3	0.7
2052	16386	8589	13.4	13.9	0.5	2100	16875	7045	14.6	15.3	0.7	2149	17373	14393	14.8	16.2	1.4
2053	16400	13208	14.8	15.6	0.8	2101	16876	9161	14.8	15.3	0.5	2150	17394	13934	14.9	15.4	0.5
2054	16403	13284	14.0	14.8	0.8	2102	16906	15132	14.5	15.5	1.0	2151	17407	14246	14.6	15.4	0.8
2055	16405	14575	15.4	16.2	0.8	2103	16908	8131	14.2	15.0	0.8	2152	17413	12082	15.3	16.1	0.8
2056	16413	11258	14.2	15.3	1.1	2104	16922	11642	14.5	15.6	1.1	2153	17429	10846	14.0	14.7	0.7
2057	16414	13234	14.8	15.8	1.0	2105	16922	12544	14.4	14.8	0.4	2154	17468	9744	14.9	15.6	0.7
2058	16437	12744	15.4	15.9	0.5	2106	16931	10426	14.7	15.4	0.7	2155	17503	9178	14.0	14.7	0.7
2059	16456	13345	14.5	15.2	0.7	2107	16948	14447	14.4	15.4	1.0	2156	17507	14807	14.4	15.4	1.0
2060	16478	11400	13.4	14.1	0.7	2108	16961	11327	14.4	15.3	0.9	2157	17517	9606	14.6	15.4	0.8
2061	16486	10244	14.7	15.4	0.7	2109	16964	13124	15.2	16.0	0.8	2158	17523	15495	14.3	15.0	0.7
2062	16504	9284	15.0	15.8	0.8	2110	16965	13444	15.0	15.8	0.8	2159	17528	9928	14.8	15.6	0.8

Harv. No.	$x$	$y$	Br.	Ft.	R.	Harv. No.	$x$	$y$	Br.	Ft.	R.	Harv. No.	$x$	$y$	Br.	Ft.	R.
2160	17543	11582	14.7	15.3	0.6	861	17860	10474	13.8	14.7	0.9	2212	18914	12149	14.6	15.2	0.6
2161	17575	13825	14.2	15.1	0.9	2187	17871	10335	14.5	15.4	0.9	2213	19034	13420	14.4	15.1	0.7
2162	17582	9664	14.4	15.4	1.0	2188	17945	13270	15.1	15.8	0.7	2214	19101	14174	15.2	16.2	1.0
2163	17585	8615	14.0	15.0	1.0	2189	17946	10618	13.4	14.5	1.1	2215	19134	4889	13.8	14.8	1.0
2164	17585	10799	14.2	15.0	0.8	2190	17958	10518	14.7	15.4	0.7	2216	19137	13836	14.5	15.6	1.1
2165	17591	13531	14.8	16.1	1.3	2191	18010	12773	14.3	15.0	0.7	2217	19205	9194	14.4	15.4	1.0
2166	17623	12606	14.1	15.4	1.3	2192	18097	9554	14.7	15.4	0.7	2218	19313	9207	14.6	15.3	0.7
2167	17624	10071	14.3	15.4	1.1	2193	18103	9721	14.4	15.2	0.8	2219	19314	13425	15.0	16.0	1.0
2168	17634	13477	14.7	15.4	0.7	2194	18132	13999	14.4	15.4	1.0	2220	19456	8547	13.1	13.7	0.6
2169	17644	14496	14.8	15.4	0.6	2195	18166	9904	11.4	13.2	1.8	2221	19512	13333	14.3	15.4	1.1
2170	17651	15414	14.3	15.0	0.7	2196	18203	9922	14.6	15.2	0.6	2222	19604	8905	13.1	14.1	1.0
2171	17655	8423	14.8	15.5	0.7	862	18215	13426	13.4	15.2	1.8	2223	19865	7166	13.4	14.7	1.3
2172	17667	12204	15.0	15.7	0.7	2197	18266	7894	15.6	16.0	0.4	2224	19943	10324	13.6	14.4	0.8
2173	17695	14324	14.7	15.6	0.9	2198	18292	13683	14.2	15.2	1.0	2225	20158	3833	13.9	14.6	0.7
2174	17706	14395	14.2	14.7	0.5	2199	18298	14005	14.8	15.6	0.8	2226	20374	7129	13.7	14.6	0.9
2175	17737	14668	14.4	14.9	0.5	2200	18323	14154	15.1	16.0	0.9	2227	20661	4305	13.9	14.9	1.0
2176	17748	11744	14.8	15.4	0.6	2201	18338	12444	13.2	14.0	0.8	2228	20893	10639	14.0	15.0	1.0
2177	17749	6965	14.6	15.6	1.0	2202	18386	9775	13.6	14.2	0.6	2229	21018	5414	12.0	14.0	2.0
2178	17774	9168	14.6	15.6	1.0	2203	18386	13133	14.4	15.4	1.0	863	21397	5445	11.2	12.6	1.4
2179	17775	14454	14.9	16.1	1.2	2204	18443	14295	14.8	15.6	0.8	2230	21764	8985	13.4	13.8	0.4
2180	17776	11164	14.5	15.2	0.7	2205	18513	6044	13.7	15.0	1.3	864	21863	198	10.8	13.1	2.3
2181	17811	10664	14.3	14.8	0.5	2206	18596	11161	14.4	15.3	0.9	2231	22120	7120	12.5	14.5	2.0
2182	17842	11104	14.7	15.3	0.6	2207	18615	13400	14.6	15.2	0.6	2232	22155	7113	13.0	14.7	1.7
2183	17844	14649	14.7	15.4	0.7	2208	18757	9824	13.7	14.5	0.8	2233	23178	4830	13.0	14.5	1.5
2184	17846	7410	15.6	16.0	0.4	2209	18774	6366	11.9	13.1	1.2	2234	23438	10574	12.7	13.5	0.8
2185	17847	13865	14.9	15.5	0.6	2210	18774	13394	14.5	15.5	1.0	865	23924	2424	12.1	13.1	1.0
2186	17859	14455	14.6	15.3	0.7	2211	18846	10442	14.8	15.5	0.7	860	..	..	10.8	13.8	3.0

## REMARKS.

1323. A fifteenth magnitude star follows 9".  
 1354. The northern star of a close pair, in a group of five.  
 1358. Probably a close pair, of which the variable is the preceding star.  
 1377. The preceding star of a close pair.  
 1380. A sixteenth magnitude star follows, and is south 6".  
 1381. The north following star of a close pair.  
 1391. The southern star in a line of three.  
 1392. The southern star of a close pair.  
 1395. A seventeenth magnitude star precedes 5".  
 1398. A sixteenth magnitude star precedes 7".  
 1404. The following star in a line of three.  
 1424. A fifteenth magnitude star precedes, and is south 8".  
 1427. A sixteenth magnitude star is south 6".  
 1449. A sixteenth magnitude star is south 6".  
 1453. The following star in a line of three.  
 1464. The central star in a line of three.  
 1469. A fifteenth magnitude star precedes 9".  
 1474. The central star in a line of three.  
 1480. A thirteenth magnitude star precedes 9".  
 1483. A sixteenth magnitude star is north 6". There are probably other faint stars within 1" or 2".  
 1485. Perhaps of the Algol type. Uniformly bright on all but two plates.  
 1495. A fifteenth magnitude star is north, and follows 10".  
 1505. A fifteenth magnitude star precedes 15".  
 1506. A fifteenth magnitude star follows 12".  
 1509. The variable appears to be at the centre of an extremely small, faint cluster.  
 1514. The northern star of a close pair.  
 1526. A sixteenth magnitude star is south 5", and perhaps varies slightly.  
 1532. A fifteenth magnitude star is north 9".  
 1539. A sixteenth magnitude star is south 10".

1547. The following star of a close pair.  
 1552. The north following star of a close pair.  
 1562. Between two fifteenth magnitude stars.  
 1566. The southern star in a line of three.  
 1569. A fifteenth magnitude star is north, and precedes 6".  
 1570. The variable is on the edge of a faint cluster.  
 1588. The northern star of a close pair.  
 1604. A fifteenth magnitude star follows 10".  
 1624. The south preceding star of a pair.  
 1625. The following star of a close pair. The companion also is perhaps variable.  
 1629. The south preceding star in a close group of three.  
 1639. The following star of a close pair.  
 1640. Period probably long.  
 1641. A fifteenth magnitude star is north 6".  
 1646. The following star in a close group of three.  
 1661. The northern star of a close pair.  
 1680. The southern star of a close pair.  
 1681. The preceding star of a close pair.  
 1723. A sixteenth magnitude star follows, and is north 6".  
 1725. A sixteenth magnitude star is south 8".  
 1739. A seventeenth magnitude star north of 1739 and 1741 forms an equilateral triangle with them.  
 1741. See 1739.  
 1747. The following star in a close group of three.  
 1750. A sixteenth magnitude star follows 6".  
 1751. The northern star of a close pair. The companion also is perhaps variable.  
 1767. A sixteenth magnitude star precedes 5".  
 1805. A sixteenth magnitude star follows 5".  
 1807. The variable is in a faint cluster.  
 1844. The variable has a nebulous appearance. It may be involved in a nebula or in a small, faint cluster. A similar object is south 10", and is perhaps variable also.  
 1854. A fifteenth magnitude star follows 2".  
 1857. The southern star in a group of three.  
 1860. The preceding star of a close pair.  
 1861. The northern star of a close pair.  
 1889. The central star in a line of three.  
 1896. The preceding star in a line of three.
1905. The variable is in a small, faint cluster.  
 1908. The following star of a close pair.  
 1909. The preceding star of a close pair.  
 1920. A sixteenth magnitude star follows 9".  
 1935. The central star in a line of three, extending north and south.  
 1937. On the preceding edge of a close group of stars.  
 1938. The preceding star of a close pair.  
 1945. A sixteenth magnitude star follows 5".  
 1953. The northern star of a close pair.  
 1959. A sixteenth magnitude star is north 5".  
 1972. The following star of a close pair.  
 1977. Two stars of the seventeenth magnitude form an equilateral triangle, 10" on a side, with the variable. The latter is at the preceding angle.  
 1982. A fifteenth magnitude star is south, and follows 10".  
 2000. A fifteenth magnitude star precedes, and is south 9".  
 2002. A seventeenth magnitude star is south, and precedes 8".  
 2039. A sixteenth magnitude star precedes 4".  
 2042. The south preceding star of a pair.  
 2056. The south preceding star in a line of three.  
 2059. The variable appears to be situated in a small, faint cluster.  
 2067. A fifteenth magnitude star is south 4", and another of the same magnitude is north 6".  
 2070. The preceding star of a close pair.  
 2079. The northern star of a close pair.  
 2099. The variable has a nebulous appearance, which is probably due to its being in a small group of faint stars.  
 2107. The south preceding of two stars.  
 2108. In the northern part of a faint cluster.  
 2110. The south preceding star of a close pair.  
 2112. Period probably long.  
 2126. A fifteenth magnitude star precedes 4".  
 2133. Probably a close pair, of which the variable is the following star.  
 2173. A fourteenth magnitude star is south 15".  
 2185. A sixteenth magnitude star is south, and follows 5".  
 2222. A fourteenth magnitude star is north 10".

The positions of the catalogue stars in the region of the Large Magellanic Cloud are given in Table III, which is in the same form as Table I. The approximate centre of the plate has the coordinates,  $x = 12125''$ ,  $y = 10554''$ , and the position is in R. A. =  $5^h 25^m.7$ , Dec. =  $-69^\circ 0'$  (1900).

TABLE III.  
CATALOGUE STARS NEAR THE LARGE MAGELLANIC CLOUD.

A. G. C.	R. A. 1900.	Dec. 1900.	$x$	$y$	A. G. C.	R. A. 1900.	Dec. 1900.	$x$	$y$
	<i>h. m. s.</i>	<i>° ' "</i>	"	"		<i>h. m. s.</i>	<i>° ' "</i>	"	"
5560	4 48 19.78	-68 56 14.2	-44	9881	6636	5 35 5.20	-68 16 1.3	15251	13119
5665	52 56.54	-70 13 36.5	2055	5450	6680	36 37.37	-71 11 46.5	15253	2493
5672	53 21.08	-66 50 6.8	602	17680	6729	38 54.82	-70 0 55.3	16170	6734
5779	57 57.38	-71 4 32.4	3922	2578	6746	39 42.86	-67 5 26.1	17062	17303
5821	5 0 15.49	-68 43 36.0	3738	11126	6810	42 37.21	-68 45 15.5	17645	11214
6035	9 57.09	-66 32 39.0	6443	19281	6895	46 24.77	-67 44 34.3	19212	14766
6131	14 15.02	-71 10 14.5	8714	2600	6945	48 54.38	-69 46 42.9	19338	7345
6186	16 55.74	-67 38 52.6	9087	15392	7145	56 2.29	-68 3 34.9	22354	13274
6255	19 30.77	-68 50 13.2	10074	11107	7150	56 18.75	-67 32 56.5	22685	15098
6477	29 7.09	-66 45 42.5	13345	18637	7235	59 28.79	-69 51 31.7	22585	6656
6527	30 57.83	-70 2 50.3	13705	6721					

A catalogue of 800 of the new variables in the Large Magellanic Cloud is given in Table IV, in the same form as Table II. Nos. 872 to 1023 correspond to Nos. 1 to 152 in Circular 82. As the systematic observation of variables in this region is not yet begun, the estimates of magnitudes, like those for variables in the Small Cloud, are subject to revision.

TABLE IV.  
VARIABLES IN THE LARGE MAGELLANIC CLOUD.

Harv. No.	$x$	$y$	Br.	Ft.	R.	Harv. No.	$x$	$y$	Br.	Ft.	R.	Harv. No.	$x$	$y$	Br.	Ft.	R.
2235	617	17776	14.5	15.2	0.7	875	3025	8114	13.0	13.7	0.7	882	4084	7975	12.0	14.0	2.0
2236	834	7678	14.4	15.4	1.0	880	3097	14178	13.9	14.9	1.0	2262	4085	5764	14.2	15.0	0.8
2237	883	14198	13.8	15.0	1.2	873	3192	2557	12.7	14.7	2.0	2263	4087	11645	14.5	15.3	0.8
2238	1075	5955	14.0	15.0	1.0	2250	3199	11220	13.7	14.2	0.5	884	4099	12937	11.4	15.5	4.1
2239	1415	17182	12.3	13.7	1.4	2251	3228	18174	12.0	14.4	2.2	2264	4116	5354	14.3	14.8	0.5
2240	1575	13503	14.0	15.4	1.4	2252	3361	14108	14.6	15.3	0.7	881	4146	4733	13.3	14.8	1.5
872	1597	14889	13.9	14.8	0.9	2253	3376	13163	14.3	14.9	0.6	2265	4410	14524	13.5	14.0	0.5
2241	1885	18265	12.0	13.0	1.0	879	3581	7918	12.8	14.7	1.9	2266	4418	14874	14.9	16.0	1.1
876	2274	15323	14.0	14.9	0.9	2254	3695	19844	14.6	15.4	0.8	2267	4426	2223	13.9	14.7	0.8
2242	2347	8720	14.0	15.0	1.0	878	3746	6094	12.8	14.5	1.7	2268	4426	8444	13.2	14.2	1.0
877	2520	13111	13.8	14.7	0.9	883	3767	11609	11.7	13.9	2.2	2269	4430	8624	14.0	14.6	0.6
2243	2612	3114	13.0	13.7	0.7	2255	3800	5414	13.8	14.8	1.0	2270	4472	7746	14.5	15.0	0.5
2244	2717	13714	13.8	15.0	1.2	2256	3836	14724	14.7	15.7	1.0	2271	4502	14400	14.5	15.5	1.0
2245	2725	7001	14.2	15.0	0.8	2257	3844	6140	12.4	13.2	0.8	2272	4520	5033	15.0	15.6	0.6
2246	2777	6856	14.0	14.8	0.8	886	3855	19734	12.8	14.2	1.4	885	4554	10046	13.0	14.0	1.0
2247	2778	7690	13.2	14.1	0.9	2258	3926	15895	13.4	14.4	1.0	2273	4586	15345	14.0	15.0	1.0
2248	2794	6642	13.8	15.1	1.3	2259	4000	8348	13.7	14.4	0.7	2274	4596	11873	13.9	14.5	0.6
2249	2800	15625	13.8	14.8	1.0	2260	4030	11684	14.5	15.4	0.9	2275	4640	15340	14.9	15.5	0.6
874	3004	4901	14.3	15.0	0.7	2261	4053	5579	13.7	14.8	1.1	888	4678	16045	12.7	14.8	2.1

Harv. No.	x	y	Br.	Ft.	R.	Harv. No.	x	y	Br.	Ft.	R.	Harv. No.	x	y	Br.	Ft.	R.
2276	4712	10648	14.8	16.0	1.2	2318	6018	10324	14.9	15.3	0.4	912	7372	13162	13.9	14.4	0.5
2277	4744	8302	14.2	15.0	0.8	2319	6080	11104	13.8	15.0	1.2	2354	7432	17510	13.3	16.2	2.9
2278	4786	5557	14.4	15.3	0.9	2320	6084	11186	15.1	15.8	0.7	911	7444	9484	13.3	14.6	1.3
2279	4805	10840	14.2	15.0	0.8	898	6093	11283	14.3	15.0	0.7	909	7454	4689	12.5	13.7	1.2
2280	4811	10514	14.8	15.4	0.6	2321	6104	10873	14.3	15.2	0.9	2355	7505	14436	14.9	16.4	1.5
2281	4840	10924	14.7	15.5	0.8	2322	6124	3748	14.6	15.0	0.4	2356	7522	9877	14.0	14.7	0.7
2282	4894	5829	14.6	15.4	0.8	2323	6124	10500	14.5	15.2	0.7	2357	7564	13222	15.4	16.2	0.8
2283	4899	8095	14.7	15.2	0.5	2324	6124	12276	13.9	14.8	0.9	2358	7584	11484	14.7	15.7	1.0
887	4904	7773	13.8	14.9	1.1	2325	6195	11779	15.0	16.5	1.5	2359	7654	9249	14.8	15.6	0.8
2284	4932	3366	14.9	16.0	1.1	2326	6235	9683	14.4	14.8	0.4	2360	7665	16084	13.9	14.5	0.6
2285	4987	10581	14.4	15.2	0.8	2327	6241	11185	15.2	16.2	1.0	2361	7666	11764	15.6	16.2	0.6
2286	5026	12094	14.6	15.3	0.7	899	6244	10284	13.0	14.7	1.7	2362	7675	13343	13.9	14.6	0.7
2287	5074	14775	14.9	15.7	0.8	2328	6340	10294	15.0	16.1	1.1	2363	7786	16134	13.8	14.4	0.6
2288	5085	8946	13.9	14.9	1.0	894	6354	4202	14.0	15.0	1.0	2364	7824	10585	14.7	15.8	1.1
2289	5104	4073	13.8	14.5	0.7	2329	6394	9294	14.0	14.9	0.9	913	7849	9607	14.1	14.8	0.7
2290	5126	3098	14.3	15.6	1.3	2330	6445	4602	14.5	15.5	1.0	2365	7880	4643	14.0	15.4	1.4
2291	5144	10215	14.3	15.0	0.7	2331	6475	4115	13.9	14.5	0.6	2366	7892	6419	14.8	15.5	0.7
2292	5147	9224	13.7	14.8	1.1	900	6540	6135	12.2	13.6	1.4	2367	7923	10464	14.0	14.8	0.8
2293	5154	9784	13.9	14.5	0.6	2332	6544	12906	14.1	14.8	0.7	2368	7979	11900	15.2	16.2	1.0
2294	5154	18230	13.0	14.0	1.0	901	6546	9014	13.9	14.9	1.0	2369	7985	17065	12.0	14.0	2.0
2295	5174	10195	14.6	15.7	1.1	897	6566	3346	13.7	15.0	1.3	2370	7999	420	12.4	13.6	1.2
889	5186	10012	13.1	14.7	1.6	904	6586	10716	12.2	14.4	2.2	2371	8060	9194	14.1	14.9	0.8
2296	5190	10354	14.3	15.2	0.9	2333	6720	11157	14.7	15.3	0.6	2372	8127	9991	14.1	14.9	0.8
2297	5198	11354	14.1	15.6	1.5	2334	6738	13316	14.8	16.0	1.2	914	8137	9668	14.4	15.0	0.6
892	5277	10770	13.8	14.5	0.7	2335	6763	12477	14.2	15.2	1.0	2373	8143	10871	15.0	16.0	1.0
2298	5284	6167	13.7	14.1	0.4	2336	6783	718	14.1	14.7	0.6	2374	8186	18573	14.4	15.0	0.6
2299	5323	15154	14.0	15.0	1.0	2337	6786	13404	14.5	15.2	0.7	2375	8279	18667	15.0	15.8	0.8
890	5327	9495	14.0	14.6	0.6	2338	6820	1714	13.6	14.4	0.8	2376	8382	3918	14.0	15.5	1.5
891	5363	9694	13.0	15.0	2.0	2339	6826	9938	13.8	14.5	0.7	916	8407	15670	13.5	14.8	1.3
2300	5385	9418	15.0	16.2	1.2	902	6847	4645	13.0	13.8	0.8	2377	8446	8751	13.5	14.2	0.7
2301	5524	3202	14.4	15.0	0.6	905	6888	10880	13.6	15.0	1.4	2378	8474	9764	15.0	16.0	1.0
2302	5547	4212	13.6	14.1	0.5	907	6924	14114	13.8	14.1	0.3	2379	8499	13952	14.9	16.9	2.0
2303	5563	12524	14.2	15.0	0.8	2340	6942	12491	14.6	15.0	0.4	2380	8504	6876	14.6	16.0	1.4
2304	5646	4247	14.1	14.8	0.7	2341	6959	19037	14.4	15.4	1.0	2381	8514	4344	14.5	15.3	0.8
2305	5696	11874	14.8	15.4	0.6	2342	6964	10026	14.0	14.6	0.6	2382	8554	19684	14.3	14.8	0.5
2306	5725	8705	13.3	14.0	0.7	903	6977	3942	13.7	14.8	1.1	2383	8555	9804	14.7	15.4	0.7
2307	5735	8907	14.0	15.0	1.0	2343	6993	2037	14.2	14.8	0.6	2384	8588	5313	14.8	15.4	0.6
2308	5737	11753	15.1	15.7	0.6	906	7000	10301	13.9	15.0	1.1	2385	8600	8004	15.5	16.3	0.8
2309	5763	10374	14.6	15.4	0.8	2344	7023	12965	15.3	16.6	1.3	2386	8605	4826	14.8	15.4	0.6
2310	5777	12744	15.2	16.5	1.3	2345	7054	4933	14.6	15.5	0.9	2387	8612	4084	15.0	15.6	0.6
2311	5807	9109	15.4	16.4	1.0	910	7089	11202	14.3	15.0	0.7	915	8651	9317	14.2	14.7	0.5
2312	5845	17623	13.5	14.1	0.6	2346	7104	8154	14.0	14.4	0.4	2388	8670	19829	14.3	15.0	0.7
2313	5860	8645	14.7	15.2	0.5	2347	7163	5074	13.9	14.5	0.6	2389	8671	10903	14.5	15.0	0.5
2314	5861	5541	15.2	16.1	0.9	908	7186	9985	14.4	14.9	0.5	2390	8685	6577	14.7	15.3	0.6
2315	5880	15384	14.6	15.0	0.4	2348	7206	8728	13.5	14.0	0.5	2391	8689	17494	14.9	15.5	0.6
895	5889	11024	13.7	14.8	1.1	2349	7247	9448	14.7	15.6	0.9	2392	8727	8306	14.2	14.9	0.7
2316	5904	8604	15.4	16.2	0.8	2350	7254	6931	14.6	15.2	0.6	2393	8743	8568	14.6	15.6	1.0
896	5924	11960	14.4	15.0	0.6	2351	7305	13853	14.3	15.4	1.1	2394	8744	10746	15.0	15.5	0.5
893	5956	9473	13.4	14.9	1.5	2352	7344	5017	13.2	14.0	0.8	2395	8808	4884	14.9	15.8	0.9
2317	6010	13087	14.7	16.5	1.8	2353	7354	5067	14.2	14.9	0.7	2396	8835	8246	15.5	16.2	0.7

Harv. No.	$x$	$y$	Br.	Ft.	R.	Harv. No.	$x$	$y$	Br.	Ft.	R.	Harv. No.	$x$	$y$	Br.	Ft.	R.
2397	8856	8220	14.7	15.3	0.6	2434	9793	2116	14.6	15.2	0.6	2472	11176	11524	14.9	15.7	0.8
2398	8871	9993	14.3	15.0	0.7	2435	9825	12950	10.8	11.7	0.9	942	11185	5983	14.6	15.2	0.6
2399	8952	6547	14.8	15.6	0.8	2436	9845	8346	14.9	16.4	1.5	943	11214	10357	14.4	15.1	0.7
918	8962	9794	14.3	15.1	0.8	2437	9891	8331	15.0	15.6	0.6	2473	11233	4745	14.5	15.2	0.7
2400	8973	8710	14.4	15.4	1.0	2438	9900	8604	14.3	15.3	1.0	944	11280	7922	14.3	15.0	0.7
917	8980	9281	14.6	15.0	0.4	2439	9902	7802	14.8	15.6	0.8	2474	11298	6315	14.8	15.8	1.0
2401	8985	16897	13.2	14.0	0.8	2440	9905	7707	14.0	14.9	0.9	2475	11334	8154	14.0	14.5	0.5
2402	9011	8144	14.5	15.2	0.7	2441	9908	20130	14.1	14.9	0.8	945	11395	6846	14.7	15.4	0.7
921	9061	9834	14.3	14.9	0.6	2442	9917	7384	14.2	14.9	0.7	946	11404	7959	14.2	14.8	0.6
2403	9073	14127	14.3	14.9	0.6	2443	9928	7293	14.8	15.4	0.6	2476	11421	6704	15.4	16.4	1.0
920	9092	9179	14.4	15.0	0.6	930	9957	12914	14.1	14.7	0.6	2477	11434	6554	14.9	15.7	0.8
919	9110	6044	13.9	15.0	1.1	2444	10055	9955	14.3	14.9	0.6	2478	11440	7634	14.8	15.6	0.8
2404	9124	3687	14.3	15.4	1.1	2445	10127	8860	15.1	15.7	0.6	2479	11462	8624	14.2	15.0	0.8
2405	9129	3906	14.8	15.2	0.4	931	10142	3784	14.4	15.0	0.6	2480	11467	7346	14.5	15.6	1.1
2406	9134	10204	14.7	15.6	0.9	2446	10214	15925	13.5	16.5	3.0	2481	11472	6010	15.1	15.7	0.6
2407	9153	8777	14.3	15.1	0.8	2447	10235	11304	12.0	12.8	0.8	2482	11476	9192	15.0	16.1	1.1
2408	9165	9838	14.8	15.4	0.6	2448	10248	9274	14.7	15.6	0.9	2483	11480	8576	14.0	14.7	0.7
2409	9175	10121	14.8	15.6	0.8	2449	10258	11923	15.0	16.1	1.1	2484	11493	5200	14.8	15.5	0.7
2410	9203	10002	14.8	15.8	1.0	2450	10263	13548	12.8	13.7	0.9	2485	11579	6706	15.2	16.0	0.8
2411	9214	8796	15.2	16.1	0.9	2451	10270	6284	15.2	16.2	1.0	2486	11584	1859	14.5	15.3	0.8
2412	9226	10254	14.7	15.7	1.0	2452	10282	10314	14.7	15.3	0.6	2487	11595	4580	14.2	15.5	1.3
2413	9253	10728	15.5	16.3	0.8	932	10305	7978	13.6	14.6	1.0	2488	11611	9094	14.0	14.6	0.6
2414	9269	8164	14.5	15.0	0.5	2453	10357	8330	14.1	14.9	0.8	947	11623	6985	13.9	14.8	0.9
2415	9286	6787	14.8	15.4	0.6	934	10380	13986	13.4	14.7	1.3	2489	11726	6726	15.1	16.1	1.0
922	9286	8398	14.2	15.0	0.8	2454	10407	18657	13.6	14.6	1.0	948	11738	6585	14.7	15.2	0.5
2416	9295	7534	14.8	15.5	0.7	2455	10432	7896	15.4	16.1	0.7	2490	11744	5628	14.1	15.3	1.2
2417	9304	3975	14.9	15.6	0.7	935	10464	13524	14.2	14.6	0.4	2491	11756	13724	14.1	15.0	0.9
923	9321	8144	14.3	14.9	0.6	933	10474	9546	14.0	14.9	0.9	2492	11820	8704	13.2	14.2	1.0
925	9393	7486	14.7	15.3	0.6	2456	10491	9014	14.5	15.0	0.5	2493	11831	5994	15.6	16.4	0.8
2418	9404	11500	14.5	14.9	0.4	2457	10515	3029	14.8	16.0	1.2	2494	11832	4779	14.9	15.8	0.9
2419	9418	6014	14.7	15.4	0.7	2458	10516	9162	14.6	15.6	1.0	950	11869	7304	14.3	14.9	0.6
2420	9444	18704	14.8	15.4	0.6	2459	10517	10058	14.2	14.8	0.6	2495	11910	10492	14.0	14.6	0.6
924	9454	4276	13.0	14.0	1.0	2460	10524	11204	14.4	14.9	0.5	2496	11927	14325	14.0	14.5	0.5
926	9488	5436	14.5	15.1	0.6	2461	10534	19822	13.7	15.0	1.3	2497	11980	8015	14.0	14.9	0.9
2421	9491	5888	14.9	15.6	0.7	936	10564	7967	14.1	14.9	0.8	949	11985	13144	14.9	15.3	0.4
2422	9508	8795	15.1	15.9	0.8	2462	10580	5622	14.6	15.2	0.6	2498	11987	5982	15.2	15.7	0.5
927	9514	8933	14.4	15.1	0.7	2463	10606	10093	14.0	14.7	0.7	2499	11999	7554	14.8	15.7	0.9
2423	9560	7458	14.8	15.6	0.8	2464	10653	6312	14.0	15.2	1.2	951	12001	13124	14.8	15.2	0.4
2424	9624	13236	13.7	14.6	0.9	2465	10692	9730	15.1	16.1	1.0	953	12002	15144	11.7	12.8	1.1
2425	9638	11687	15.1	15.7	0.6	2466	10726	8321	14.1	15.0	0.9	2500	12009	6006	15.7	16.4	0.7
929	9660	16615	12.9	14.0	1.1	937	10728	6411	14.3	15.1	0.8	954	12012	6827	14.3	15.0	0.7
2426	9676	8874	13.8	14.9	1.1	2467	10824	7917	14.6	15.2	0.6	2501	12012	17634	14.7	15.7	1.0
2427	9681	9413	15.2	16.0	0.8	938	10846	10004	12.9	14.0	1.1	2502	12013	6923	14.9	15.6	0.7
2428	9695	9580	15.0	15.9	0.9	939	10865	7275	13.9	15.0	1.1	2503	12034	7605	15.0	15.8	0.8
928	9724	3752	13.6	14.5	0.9	2468	10967	7204	14.2	14.7	0.5	2504	12039	3405	15.0	15.7	0.7
2429	9727	7085	14.5	15.1	0.6	2469	11054	5941	14.8	15.3	0.5	2505	12044	11969	14.0	14.6	0.6
2430	9728	8617	14.1	14.9	0.8	2470	11084	10714	14.7	15.4	0.7	2506	12048	7694	14.8	15.5	0.7
2431	9734	6128	14.9	15.4	0.5	2471	11118	8807	14.8	15.6	0.8	952	12072	9414	14.1	15.0	0.9
2432	9748	12591	13.6	14.4	0.8	940	11124	10414	14.2	15.0	0.8	2507	12074	19637	13.3	14.0	0.7
2433	9785	14292	14.4	15.2	0.8	941	11155	8848	14.8	15.1	0.3	2508	12109	7585	14.4	15.2	0.8

Harv. No.	$\alpha$	$\gamma$	Br.	Ft.	R.	Harv. No.	$\alpha$	$\gamma$	Br.	Ft.	R.	Harv. No.	$\alpha$	$\gamma$	Br.	Ft.	R.
2509	"	"	13.7	14.7	1.0	970	"	"	14.7	15.1	0.4	2583	"	"	15.1	15.7	0.6
2510	12161	12418	14.0	15.0	1.0	2545	12841	5777	14.8	15.7	0.9	2584	13491	8564	14.7	15.2	0.5
955	12209	16206	12.8	14.6	1.8	2546	12842	6570	14.8	15.7	0.9	2585	13492	9123	14.8	15.4	0.6
2511	12214	6803	14.5	15.0	0.5	2547	12847	6581	14.4	15.2	0.8	2586	13518	17774	13.6	14.6	1.0
2512	12216	7740	14.9	15.7	0.8	2548	12854	8862	14.3	14.9	0.6	983	13543	5729	14.7	15.2	0.5
2513	12219	7156	14.9	15.5	0.6	2549	12865	667	13.2	14.0	0.8	2587	13546	19254	14.3	15.2	0.9
2514	12232	7240	14.7	15.3	0.6	2550	12936	19212	14.0	14.7	0.7	2588	13554	8985	14.8	15.4	0.6
2515	12249	7203	14.8	15.8	1.0	972	12944	7146	14.2	14.7	0.5	2589	13605	7122	14.7	15.7	1.0
956	12258	7524	14.8	15.1	0.3	2551	12947	8514	13.6	14.7	1.1	2590	13616	5496	14.5	15.7	1.2
2516	12285	8442	14.7	15.4	0.7	969	12954	12485	13.8	14.4	0.6	982	13654	9686	13.8	14.1	0.3
2517	12300	7083	14.4	15.3	0.9	2552	12957	7006	14.4	15.0	0.6	2591	13657	7998	14.8	15.4	0.6
2518	12315	5894	15.3	16.0	0.7	2553	12974	18173	14.0	15.0	1.0	980	13695	15482	14.4	15.0	0.6
957	12317	9946	13.8	14.8	1.0	973	12996	6576	13.2	14.8	1.6	985	13714	7055	14.0	15.0	1.0
2519	12339	5827	15.3	16.1	0.8	2554	13021	6982	15.4	16.5	1.1	988	13734	4291	14.4	15.1	0.7
2520	12353	7166	14.5	15.1	0.6	2555	13034	19143	13.7	14.7	1.0	984	13766	8666	13.3	14.2	0.9
2521	12354	8353	14.9	15.6	0.7	974	13047	7347	14.1	15.0	0.9	987	13774	6401	14.6	15.2	0.6
2522	12394	18516	14.0	14.6	0.6	2556	13047	9784	14.3	15.0	0.7	2592	13775	7576	14.8	16.5	1.7
2523	12423	2504	14.4	15.2	0.8	971	13054	17255	13.9	14.7	0.8	2593	13780	3660	15.1	15.9	0.8
2524	12423	19235	14.4	15.5	1.1	2557	13055	2394	14.7	16.1	1.4	2594	13786	1984	15.0	15.8	0.8
2525	12424	20106	12.7	13.3	0.6	2558	13132	6334	15.0	15.6	0.6	2595	13796	16286	12.4	13.4	1.0
2526	12432	8195	15.1	16.8	1.7	2559	13135	9524	13.9	14.3	0.4	2596	13808	8177	15.3	16.0	0.7
2527	12436	2593	14.6	15.1	0.5	2560	13136	5506	14.7	15.8	1.1	2597	13815	7753	15.0	15.7	0.7
958	12455	6931	14.3	14.9	0.6	2561	13167	13440	13.2	13.6	0.4	2598	13838	8370	13.9	14.8	0.9
2528	12476	9073	14.4	14.9	0.5	2562	13186	8631	15.4	16.4	1.0	2599	13839	3685	14.8	15.7	0.9
959	12494	7131	14.5	15.1	0.6	2563	13197	7110	14.8	15.3	0.5	989	13845	6833	14.1	15.2	1.1
2529	12525	7703	14.4	15.0	0.6	2564	13206	10204	14.0	14.6	0.6	992	13876	6324	14.4	15.1	0.7
2530	12533	7824	14.5	15.1	0.6	2565	13214	9918	14.0	14.5	0.5	2600	13885	15914	14.0	14.5	0.5
2531	12544	7312	14.6	15.3	0.7	2566	13217	12285	13.6	14.0	0.4	2601	13886	8491	14.3	15.3	1.0
961	12547	7235	14.8	15.2	0.4	2567	13227	11285	13.6	14.0	0.4	2602	13886	10290	14.1	14.7	0.6
960	12553	8062	13.9	15.0	1.1	2568	13233	7076	14.7	15.2	0.5	991	13901	6746	14.5	14.8	0.3
2532	12554	9582	14.0	14.7	0.7	2569	13243	6741	14.7	15.4	0.7	993	13906	6834	14.8	15.2	0.4
2533	12593	8305	14.1	14.6	0.5	2570	13246	9135	14.0	14.8	0.8	2603	13910	7530	14.5	15.4	0.9
2534	12594	4694	14.9	15.7	0.8	2571	13251	5386	14.8	15.3	0.5	2604	13915	9314	13.9	14.8	0.9
962	12596	7567	14.4	14.9	0.5	2572	13252	9039	15.5	16.4	0.9	2605	13915	9554	11.8	12.4	0.6
2535	12600	17444	13.8	14.4	0.6	977	13262	7784	14.8	15.5	0.7	2606	13916	7282	14.8	15.6	0.8
2536	12649	12369	13.9	14.9	1.0	976	13265	7776	14.8	15.2	0.4	2607	13935	11184	13.9	14.2	0.3
966	12664	2321	13.8	15.2	1.4	975	13265	7783	14.4	15.5	1.1	2608	13943	7357	14.7	15.5	0.8
2537	12714	10836	14.6	15.2	0.6	978	13280	6746	13.8	15.0	1.2	2609	13946	2315	14.5	15.0	0.5
2538	12734	12072	14.0	14.9	0.9	2573	13304	9892	14.0	14.6	0.6	2610	13954	7308	14.8	15.8	1.0
2539	12746	6559	14.8	15.4	0.6	2574	13314	7106	14.4	15.1	0.7	2611	13974	7454	13.9	14.5	0.6
2540	12749	6695	13.9	14.8	0.9	2575	13338	14775	15.4	16.4	1.0	2612	14009	5483	15.4	16.0	0.6
2541	12750	5394	14.9	15.8	0.9	979	13345	7228	14.1	15.1	1.0	2613	14010	8110	14.8	15.8	1.0
965	12760	7155	14.3	14.8	0.5	2576	13353	6586	15.2	16.5	1.3	2614	14014	7506	14.1	15.3	1.2
2542	12775	6336	14.5	15.7	1.2	2577	13385	429	15.0	15.7	0.7	2615	14018	13327	14.6	15.2	0.6
2543	12779	16774	12.0	12.7	0.7	2578	13401	7350	16.1	17.0	0.9	2616	14026	8316	14.9	16.0	1.1
964	12784	16495	13.8	15.5	1.7	2579	13424	15785	13.2	14.3	1.1	2617	14034	9913	13.3	14.0	0.7
968	12786	7184	14.3	14.8	0.5	981	13446	7471	14.1	14.9	0.8	986	14074	15934	13.1	14.3	1.2
2544	12803	9568	13.9	14.7	0.8	2580	13451	20264	13.0	14.0	1.0	994	14075	6365	14.7	15.1	0.4
963	12804	17885	13.0	14.1	1.1	2581	13453	7026	14.5	15.3	0.8	2618	14084	3385	13.0	13.7	0.7
967	12820	5441	14.9	15.3	0.4	2582	13459	10233	14.7	16.3	1.6	2619	14104	6965	14.6	15.2	0.6

Harv. No.	$\alpha$	$y$	Br.	Ft.	R.	Harv. No.	$\alpha$	$y$	Br.	Ft.	R.	Harv. No.	$\alpha$	$y$	Br.	Ft.	R.
2620	14112	8054	15.2	15.8	0.6	2666	14727	10554	15.0	15.7	0.7	2710	15740	5642	15.2	16.1	0.9
2621	14114	9682	14.0	14.4	0.4	2667	14735	18502	13.0	14.5	1.5	1002	15754	18573	12.2	13.8	1.6
2622	14115	3164	13.2	14.0	0.8	2668	14833	7516	15.1	15.6	0.5	2711	15761	2650	14.7	16.0	1.3
2623	14125	16463	14.0	14.9	0.9	2669	14845	8846	13.7	14.2	0.5	2712	15804	5682	15.1	15.8	0.7
2624	14127	7034	14.8	15.3	0.5	2670	14847	6206	14.0	14.5	0.5	2713	15815	5876	15.3	16.5	1.2
2625	14153	302	15.0	15.7	0.7	2671	14874	5820	15.2	16.2	1.0	2714	15825	6066	14.9	15.6	0.7
2626	14202	9101	14.7	15.4	0.7	2672	14880	7614	14.5	15.0	0.5	2715	15906	6812	15.2	16.4	1.2
2627	14224	15995	14.2	15.0	0.8	2673	14903	1251	15.0	16.0	1.0	2716	15946	5174	14.8	15.6	0.8
2628	14225	4933	14.4	15.1	0.7	2674	14937	9572	13.9	14.7	0.8	2717	15953	5914	15.3	16.0	0.7
2629	14233	9773	14.0	14.8	0.8	2675	14966	14795	14.4	15.0	0.6	1004	15954	17745	13.8	14.8	1.0
2630	14241	6741	14.8	15.7	0.9	2676	15003	17373	13.8	14.3	0.5	2718	15966	5865	14.7	15.8	1.1
990	14249	19308	12.4	14.2	1.8	998	15052	15183	13.7	14.7	1.0	2719	15986	5244	15.0	16.1	1.1
2631	14253	5124	14.4	15.0	0.6	2677	15066	10324	14.5	16.3	1.8	2720	15990	6124	14.9	15.9	1.0
2632	14254	9284	14.2	14.7	0.5	2678	15103	19074	13.6	14.4	0.8	2721	16004	5207	15.0	16.1	1.1
2633	14258	6771	15.2	15.8	0.6	2679	15108	8926	13.9	14.2	0.3	2722	16008	18894	14.0	14.9	0.9
2634	14259	6544	14.0	14.8	0.8	2680	15140	16095	14.1	15.0	0.9	2723	16016	4799	14.5	16.0	1.5
995	14275	6936	14.7	15.2	0.5	1000	15147	13894	14.0	14.8	0.8	2724	16022	5044	14.8	15.7	0.9
2635	14287	9544	13.8	14.3	0.5	2681	15156	9336	13.6	14.0	0.4	1006	16035	8474	13.4	14.8	1.4
2636	14314	15206	14.5	15.2	0.7	2682	15157	13332	15.1	16.1	1.0	2725	16036	15776	14.7	15.6	0.9
2637	14326	15384	14.6	15.3	0.7	999	15166	14530	13.6	14.4	0.8	1008	16043	5632	14.5	15.0	0.5
2638	14340	7945	15.0	15.7	0.7	2683	15172	2241	15.0	15.7	0.7	1009	16056	5661	14.9	15.2	0.3
2639	14351	9372	14.8	15.3	0.5	2684	15215	5024	15.0	15.7	0.7	2726	16060	6207	14.9	15.5	0.6
2640	14356	5905	15.0	15.6	0.6	2685	15232	11364	14.2	14.9	0.7	2727	16099	6655	14.8	15.4	0.6
2641	14358	2174	14.9	15.8	0.9	2686	15257	13464	14.3	15.2	0.9	2728	16113	8449	14.3	14.8	0.5
2642	14360	18566	14.9	15.6	0.7	2687	15260	10930	14.4	14.9	0.5	1010	16140	6484	14.4	15.1	0.7
2643	14383	6613	14.8	15.3	0.5	2688	15311	6754	15.2	15.7	0.5	2729	16144	4696	15.1	15.6	0.5
2644	14385	6715	14.8	15.7	0.9	2689	15312	2274	15.2	15.8	0.6	2730	16153	8714	14.0	14.9	0.9
2645	14406	10243	15.0	16.1	1.1	2690	15316	6242	14.8	15.5	0.7	2731	16239	15234	14.0	14.9	0.9
2646	14452	6714	14.7	15.4	0.7	2691	15420	10674	14.5	15.2	0.7	2732	16269	8484	14.3	15.3	0.7
2647	14465	10266	14.6	15.5	0.9	2692	15422	4199	14.1	15.3	1.2	2733	16274	18366	13.9	14.7	0.8
2648	14467	17350	13.8	14.5	0.7	2693	15433	10095	14.3	14.8	0.5	2734	16276	4234	15.5	16.1	0.6
2649	14482	9234	13.7	14.3	0.6	2694	15435	7976	15.1	16.0	0.9	2735	16287	4912	15.3	16.1	0.8
2650	14483	14314	14.3	15.3	1.0	2695	15464	5698	14.8	15.6	0.8	2736	16315	4946	15.2	15.8	0.6
2651	14519	10386	13.9	14.6	0.7	2696	15466	5994	15.2	16.1	0.9	1012	16327	4254	14.4	15.2	0.8
2652	14526	9777	13.9	14.6	0.7	2697	15467	11055	14.8	16.2	1.4	2737	16344	5306	14.8	15.3	0.5
2653	14545	1441	14.0	15.0	1.0	1001	15475	14833	13.6	14.2	0.6	2738	16352	18817	14.0	14.5	0.5
996	14563	14165	13.1	14.1	1.0	2698	15506	6816	15.0	16.2	1.2	2739	16354	4310	15.3	16.0	0.7
2654	14564	5786	14.8	15.4	0.6	2699	15514	6374	15.0	16.1	1.1	2740	16354	9601	15.2	16.2	1.0
2655	14581	8902	14.7	15.2	0.5	1003	15543	11924	12.3	13.4	1.1	1011	16411	5448	14.2	15.1	0.9
2656	14600	12387	14.0	14.7	0.7	2700	15550	17346	13.7	15.0	1.3	2741	16434	5146	15.0	15.8	0.8
2657	14606	5266	15.3	15.8	0.5	2701	15590	5074	12.6	13.1	0.5	2742	16463	3337	15.4	16.2	0.8
2658	14632	5691	14.9	15.7	0.8	2702	15594	6734	13.9	14.2	0.3	2743	16469	17658	14.0	14.6	0.6
2659	14634	14102	14.8	15.7	0.9	2703	15606	4746	14.6	15.8	1.2	1014	16487	5364	14.5	15.0	0.5
2660	14638	7155	15.4	16.2	0.8	2704	15619	7210	15.4	16.5	1.1	1007	16493	13530	13.9	14.9	1.0
2661	14667	15955	15.4	16.0	0.6	2705	15634	16522	13.9	14.5	0.6	2744	16553	8947	14.3	14.9	0.6
2662	14678	20180	13.9	14.3	0.4	2706	15661	6214	14.7	15.3	0.6	2745	16557	12744	14.9	15.7	0.8
2663	14687	724	15.0	15.7	0.7	2707	15671	5714	15.2	16.1	0.9	2746	16573	13619	14.2	15.7	1.5
997	14696	13181	13.6	14.8	1.2	1005	15689	10884	13.0	14.6	1.6	1016	16574	5319	14.6	15.1	0.5
2664	14714	6394	14.7	15.2	0.5	2708	15719	6743	14.9	15.6	0.7	2747	16626	12944	14.2	15.5	1.3
2665	14726	16836	14.0	14.5	0.5	2709	15721	5665	14.8	15.5	0.7	2748	16637	5177	14.6	15.4	0.8



Harv. No.	$\alpha$	$y$	Br.	Ft.	R.	Harv. No.	$\alpha$	$y$	Br.	Ft.	R.	Harv. No.	$\alpha$	$y$	Br.	Ft.	R.
2749	16654	9021	14.1	15.0	0.9	2794	17574	16738	14.4	15.7	1.3	2837	18969	13844	14.8	15.4	0.6
2750	16655	5247	15.3	16.1	0.8	1019	17655	6044	13.9	14.7	0.8	2838	18997	14514	14.6	15.7	1.1
2751	16665	5041	15.3	16.4	1.1	2795	17675	10752	14.8	16.1	1.3	2839	19045	9664	14.7	16.2	1.5
2752	16685	6433	15.3	16.1	0.8	2796	17686	11644	15.2	16.0	0.8	2840	19093	19585	13.8	15.0	1.2
2753	16688	8872	15.1	15.7	0.6	2797	17706	16956	14.8	15.4	0.6	2841	19097	18514	15.1	15.7	0.6
2754	16688	12308	14.0	14.9	0.9	2798	17751	9629	13.5	14.0	0.5	2842	19106	3849	14.7	16.0	1.3
2755	16716	9042	14.1	14.8	0.7	2799	17782	15645	14.0	14.9	0.9	2843	19224	17008	15.0	16.0	1.0
2756	16731	6504	14.9	15.7	0.8	2800	17788	15166	12.7	13.7	1.0	1023	19269	13038	13.2	14.4	1.2
2757	16738	4705	14.8	16.2	1.4	2801	17807	16574	14.3	14.9	0.6	2844	19272	4717	15.6	16.2	0.6
2758	16785	4903	15.3	16.1	0.8	2802	17906	16774	14.0	15.4	1.4	2845	19290	16970	14.1	15.0	0.9
2759	16785	5281	15.4	16.2	0.8	2803	17909	15024	14.2	15.5	1.3	2846	19337	14864	14.5	16.1	1.6
2760	16804	7746	13.5	14.0	0.5	2804	17934	18360	12.1	14.3	2.2	2847	19395	16085	14.6	15.3	0.7
2761	16815	9024	14.6	15.1	0.5	2805	17951	5014	15.2	16.0	0.8	2848	19489	15408	14.9	15.6	0.7
2762	16834	5375	15.0	15.6	0.6	2806	17954	7728	14.2	14.9	0.7	2849	19574	16425	14.0	15.0	1.0
2763	16837	8066	14.6	16.0	1.4	2807	17973	16748	15.2	16.4	1.2	2850	19575	15448	14.2	14.6	0.4
2764	16841	7650	13.8	14.4	0.6	2808	18004	4507	15.2	16.1	0.9	2851	19635	5280	14.4	15.4	1.0
2765	16864	9261	13.9	14.9	1.0	2809	18033	13742	15.0	16.0	1.0	2852	19761	14077	14.9	16.0	1.1
2766	16889	5367	14.9	15.6	0.7	2810	18043	14302	14.4	15.7	1.3	2853	19772	13759	14.8	15.5	0.7
2767	16912	5303	15.1	16.2	1.1	2811	18094	13733	14.9	15.9	1.0	2854	19946	17415	14.2	14.6	0.4
1015	16984	10009	14.0	14.5	0.5	2812	18105	4173	15.4	16.0	0.6	2855	19959	15354	14.3	15.2	0.9
2768	17050	6804	15.3	16.2	0.9	2813	18155	16556	15.0	15.6	0.6	2856	19983	16553	14.4	15.2	0.8
2769	17050	14706	14.6	15.6	1.0	1020	18203	11346	14.2	14.7	0.5	2857	19993	15678	14.4	15.4	1.0
1013	17060	14414	13.2	14.2	1.0	2814	18245	9381	14.8	16.0	1.2	2858	20004	16542	14.8	15.2	0.4
2770	17073	8600	13.8	14.3	0.5	2815	18264	9033	14.0	14.8	0.8	2859	20031	5800	15.0	16.0	1.0
2771	17074	7806	15.7	16.5	0.8	2816	18266	15712	14.2	15.1	0.9	2860	20097	13203	14.0	14.8	0.8
2772	17123	3679	14.2	15.4	1.2	1021	18274	8226	14.6	15.1	0.5	2861	20302	14878	14.7	16.1	1.4
2773	17137	10945	14.8	16.0	1.2	2817	18278	17118	14.5	15.7	1.2	2862	20346	6734	14.4	15.1	0.7
2774	17144	11038	14.1	15.0	0.9	2818	18288	7057	14.4	15.0	0.6	2863	20405	17687	14.8	15.7	0.9
2775	17152	4969	15.6	16.1	0.5	2819	18315	14801	13.6	14.2	0.6	2864	20629	17224	14.8	15.3	0.5
2776	17156	10864	14.0	14.6	0.6	2820	18400	5806	15.2	15.9	0.7	2865	20660	16283	14.4	15.4	1.0
2777	17185	5538	14.7	15.7	1.0	2821	18414	13144	14.6	15.4	0.8	2866	20855	15279	14.7	15.4	0.7
1017	17207	9064	14.4	14.9	0.5	2822	18414	14846	9.8	10.6	0.8	2867	20944	16586	14.8	15.6	0.8
2778	17219	7886	13.6	14.2	0.6	2823	18421	16249	14.2	14.8	0.6	2868	21004	8097	14.1	14.9	0.8
2779	17225	11146	14.5	15.1	0.6	1018	18480	18030	14.5	15.0	0.5	2869	21020	15698	14.2	15.4	1.2
2780	17245	5500	15.3	16.0	0.7	2824	18525	11559	14.9	16.0	1.1	2870	21028	8109	14.8	15.4	0.6
2781	17254	9143	13.8	14.7	0.9	2825	18584	15974	14.5	15.0	0.5	2871	21054	15984	14.5	15.4	0.9
2782	17263	17688	14.4	15.7	1.3	2826	18588	11403	14.6	15.4	0.8	2872	21244	17183	15.0	16.1	1.1
2783	17298	4644	15.0	16.0	1.0	2827	18633	18884	12.2	12.6	0.4	2873	21255	15287	14.3	15.2	0.9
2784	17304	5131	15.5	16.4	0.9	2828	18643	5771	14.6	15.6	1.0	2874	21275	16633	14.4	15.2	0.8
2785	17308	15909	15.0	16.0	1.0	2829	18672	12994	13.6	14.1	0.5	2875	21286	12681	14.3	15.7	1.4
2786	17323	18586	14.6	15.1	0.5	1022	18675	9300	14.4	14.9	0.5	2876	21417	16254	14.4	15.2	0.8
2787	17324	9946	13.8	14.9	1.1	2830	18695	16807	14.9	15.6	0.7	2877	21881	12474	14.5	15.5	1.0
2788	17329	11914	14.0	15.0	1.0	2831	18804	16128	15.0	15.7	0.7	2878	21969	17206	13.7	15.2	1.5
2789	17345	7667	14.2	14.9	0.7	2832	18825	14658	14.4	15.0	0.6	2879	22013	15082	14.3	15.2	0.9
2790	17381	9560	14.9	15.8	0.9	2833	18845	17661	14.8	15.4	0.6	2880	22491	15756	14.8	15.6	0.8
2791	17402	4364	15.0	15.7	0.7	2834	18852	19990	14.4	15.2	0.8	2881	22613	14571	13.0	13.7	0.7
2792	17406	7182	15.0	15.7	0.7	2835	18877	7095	15.0	16.0	1.0	2882	23273	3883	11.0	13.6	2.6
2793	17574	11304	13.6	14.4	0.8	2836	18956	15957	14.4	15.7	1.3						

## REMARKS.

2245. Precedes a bright nebula or cluster about 30".
2249. A fourteenth magnitude star precedes 15".
2261. Period probably long.
884. Period probably long.
2271. A fourteenth magnitude star follows 20".
888. Period probably long.
2276. The following star of a close pair.
2277. A fifteenth magnitude star follows 10".
2278. A sixteenth magnitude star precedes 10".
2280. A fifteenth magnitude star follows the variable, south 6".
2288. A thirteenth magnitude star precedes the variable 15", and a fifteenth magnitude star follows by the same amount.
2291. A sixteenth magnitude star precedes 6".
2292. A fifteenth magnitude star precedes the variable, north 6".
2310. Period probably long.
896. The south preceding star of a close pair.
2321. A fifteenth magnitude star precedes 9".
2327. A sixteenth magnitude star precedes 12".
894. The central star in a close group of five.
901. The preceding star of a close pair.
2333. A fifteenth magnitude star is south 15".
2335. The north following star of three which form an equilateral triangle whose sides are 12" apart.
2345. A sixteenth magnitude star precedes 6".
2349. In a very faint cluster.
2351. The variable has a nebulous appearance which is especially noticeable when it is faint.
2357. A fifteenth magnitude star follows 3".
2359. The north preceding star of a close pair.
2362. Period probably long.
2364. A sixteenth magnitude star precedes 5".
2367. The preceding star of a close pair.
2374. A sixteenth magnitude star is north 10".
2379. Period probably long.
2385. Period probably long.
2389. Period probably long.
2411. The southern of a line of three sixteenth magnitude stars, which are less than 6" apart.
2422. This is probably a close pair, and both are perhaps variable.
2423. Period probably long.
2428. A fourteenth magnitude star precedes 9".
2430. A thirteenth magnitude star is north 15".
2434. Period probably long.
2443. A fifteenth magnitude star follows 3".
2444. Period probably long.
2445. The north preceding star of a close pair.
2449. A fifteenth magnitude star follows 9".
2450. Period probably long.
932. The northern star of a close pair.
2471. The southern star of a close pair. The northern star also probably varies slightly.
2482. The preceding star of a close pair.
2497. The following star of a close pair.
949. Nos. 949 and 951 apparently vary alternately.
951. See 949.
2506. A sixteenth magnitude star is south 6".
2508. The southern star of a close pair.
2514. A fifteenth magnitude star is south 12".
2520. A sixteenth magnitude star precedes 6".
2522. A fifteenth star is north 6".
2540. A sixteenth magnitude star is south 6".
2543. This variable is of the Algol Type. Faint on 20 out of 190 plates. Times of minima, J. D. 2,416,820.6 + 2<sup>d</sup>.414 E.
2551. Period apparently long.
2552. A fifteenth magnitude star precedes 15".
2555. A fifteenth magnitude star is north 8".
976. Nos. 976 and 977 were discovered by Mrs. Fleming while confirming adjacent variables.
977. See 976.
2577. A fifteenth magnitude star precedes the variable, north 10".
2586. A fifteenth magnitude star follows 15".
2602. A fifteenth magnitude star is north 15".
2604. The south preceding star of a close pair.
2606. A thirteenth magnitude star follows the variable, north 12".
2607. A fourteenth magnitude star precedes 24".
2616. A fifteenth magnitude star follows 12".
2621. Period probably long.
2629. A thirteenth magnitude star precedes 12".
2636. A thirteenth magnitude star follows 15".
2639. A fifteenth magnitude star follows 10".
2640. A fifteenth magnitude star precedes 10".
2650. A sixteenth magnitude star precedes 10".
2652. The north following star of a close pair.
2668. A fifteenth magnitude star follows 8".
2675. A fourteenth magnitude star is north 10".
2678. Period probably long.
2690. The southern star of a close pair.
2702. Period probably long.
2714. The northern of a line of three sixteenth magnitude stars, distant 10" from one another.
2720. The southern star of a close pair. The northern star also is perhaps variable.
2728. Period probably long.
2745. The preceding star of a close pair.
2753. Period probably long.
2775. The north preceding in a line of five sixteenth magnitude stars, distant about 12" from one another.
2784. A sixteenth magnitude star precedes the variable, south 9".
2785. The southern star of a close pair.
2786. A fourteenth magnitude star precedes 24".
2789. A fourteenth magnitude star is south 12".

2790. A fifteenth magnitude star follows 12".  
 2791. The northern star of a close pair.  
 2814. Midway between two fourteenth magnitude stars, one of which follows the other 50".  
 2824. The south following in a line of three stars, which are 12" distant from one another.  
 2829. The variable is sometimes brighter and sometimes fainter than a fourteenth magnitude star which precedes it, and is south 18".
2842. The following in a triangle of stars 6" distant from one another.  
 2852. The variable has a nebulous appearance, which is probably due to the close proximity of one or more very faint stars.  
 2860. The variable has a nebulous appearance, and is probably in a small, faint cluster.  
 2865. A fourteenth magnitude star follows 15".  
 2872. A fifteenth magnitude star is north 2".

The region covered by the Large Magellanic Cloud is much more extensive than that contained within the limits of the Small Cloud. Nearly all the plates used in the comparison have the same centre as that on which the reticule is printed, and cover the densest, and apparently the most interesting part of the structure. The position of this centre is in R. A. =  $5^h 26^m$ , Dec. =  $-69^\circ 0'$  (1900). The northern portion of the Cloud was examined on six plates, all of whose centres are near  $-66^\circ$  in declination, while in right ascension, three are at  $5^h 5^m$ , and three at  $5^h 40^m$ . Only eight additional variables were discovered, and while there may be many more, it does not appear probable that they are numerous in comparison with those nearer the centre of the Cloud. The additional variables are outside of the region covered by the plate with the reticule, and their positions are given in Table V. The six columns give the Harvard Number, the right ascension and the declination for 1900, the brightest and faintest magnitudes observed, and the observed range.

TABLE V.

## ADDITIONAL VARIABLES.

Harvard No.	R. A. 1900.	Dec. 1900.	Br.	Ft.	R.	Harvard No.	R. A. 1900.	Dec. 1900.	Br.	Ft.	R.
	<i>h. m. s.</i>	<i>° ' "</i>					<i>h. m. s.</i>	<i>° ' "</i>			
2883	4 55 54	-64 50.7	13.0	14.2	1.2	2887	5 11 41	-66 16.8	14.9	15.4	0.5
2884	5 4 37	-65 44.5	14.0	15.0	1.0	2888	15 0	-65 55.6	13.7	14.6	0.9
2885	10 10	-64 57.4	14.3	15.3	1.0	2889	15 34	-66 4.0	14.4	15.3	0.9
2886	10 58	-65 33.1	13.3	14.0	0.7	2890	24 50	-65 57.1	13.6	14.4	0.8

The systematic observation of variables in the Small Magellanic Cloud is in progress, and the periods of several have been determined and are given in Table VI. Owing to the faintness of the majority of these objects, the number of photographs from which satisfactory observations can be obtained is generally small. The plates most frequently used have exposures of from two to five hours, and were taken on the following dates: September 11, October 3, December 4, 1893; October 28,

November 24, 1896; October 19, October 20, October 23, October 28, 1897; October 10, November 10, 1898; June 18, August 17, September 3, September 29, September 30, October 1 (2 plates), October 3 (2 plates), October 4 (2 plates), October 5, October 6 (4 plates), November 2, 1904; August 24, September 22, 1906. As most of the periods are short, the series of plates taken in 1904 is extremely valuable, comprising as it does, about half of the plates upon which the fainter variables can be readily observed. The two plates taken in 1906 were received after the periods given in Table VI had been computed, and confirmed them in every case. Professor Bailey kindly computed the period of No. 827. In Table VI, the first four columns give the Harvard Number, the maximum and minimum magnitudes as read from the assumed light curve, and the range. The fifth and sixth columns give the epoch, expressed in days and decimals following Greenwich Mean Noon of J.D. 2,410,000, and the period. The approximate time occupied by the rise from minimum to maximum is given in the seventh column, and the average deviation of a single measure, from the light curve, expressed in magnitudes, is given in the eighth column. The ninth, tenth, and eleventh columns give the year of the earliest photograph on which the variable was observed, the number of periods included in the time covered by the observations, and the number of plates measured.

TABLE VI.

PERIODS OF VARIABLES IN THE SMALL MAGELLANIC CLOUD.

Harvard No.	Max.	Min.	Range.	Epoch.	Period.	Min. to Max.	Average Dev.	Earliest Observation.	No. Periods.	No. Plates.
818	13.6	14.7	1.1	4.0	<i>d.</i> 10.336	<i>d.</i> 1.7	.12	1890	566	44
821	11.2	12.1	0.9	97.	127.	49.	.06	1890	45	89
823	12.2	14.1	1.9	2.9	31.94	3.	.13	1890	184	56
824	11.4	12.8	1.4	4.	65.8	7.	.12	1889	94	83
827	13.4	14.3	0.9	11.6	13.47	6.	.11	1890	448	60
842	14.6	16.1	1.5	2.61	4.2897	0.6	.06	1896	843	26
1374	13.9	15.2	1.3	6.0	8.397	2.	.10	1893	574	42
1400	14.1	14.8	0.7	4.0	6.650	1.	.11	1893	724	42
1425	14.3	15.3	1.0	2.8	4.547	0.8	.09	1893	1042	33
1436	14.8	16.4	1.6	0.02	1.6637	0.3	.10	1893	2859	22
1446	14.8	16.4	1.6	1.38	1.7620	0.3	.09	1896	2052	21
1505	14.8	16.1	1.3	0.02	1.25336	0.2	.10	1896	2335	25
1506	15.1	16.3	1.2	1.08	1.87502	0.3	.09	1896	1560	23
1646	14.4	15.4	1.0	4.30	5.311	0.7	.06	1896	681	24
1649	14.3	15.2	0.9	5.05	5.323	0.7	.10	1893	894	32
1742	14.3	15.5	1.2	0.95	4.9866	0.7	.07	1893	954	28

The variables appear to fall into three or four distinct groups. The majority of the light curves have a striking resemblance, in form, to those of cluster variables. As a rule, they are faint during the greater part of the time, the maxima being very brief, while the increase of light usually does not occupy more than from one-sixth to one-tenth of the entire period. It is worthy of notice that in Table VI the brighter variables have the longer periods. It is also noticeable that those having the longest periods appear to be as regular in their variations as those which pass through their changes in a day or two. This is especially striking in the case of No. 821, which has a period of 127 days, as 89 observations with 45 returns of maximum give an average deviation from the light curve of only six hundredths of a magnitude. Six of the sixteen variables are brighter at maximum than the fourteenth magnitude, and have periods longer than eight days. It will be noticed that this proportion is much greater here than in Table II. The number which have been measured up to the present time is 59, and of these the brighter stars were first selected for discussion, as the material for them was more abundant. A few of the fainter variables, selected at random, were then studied, but no attempt has yet been made to determine periods for the remainder. While, therefore, the light curves thus far obtained have characteristics to which the majority of the variables will probably be found to conform, no inference can be drawn with regard to the prevalence of any particular type, until many more of the periods have been determined.

The distribution of the variables in the two regions differs greatly, though not more than the regions themselves differ. The Small Cloud is very compact in its formation, the preceding and southern edges being sharply defined, while the limits on the north and following sides are less definite. The distribution of variables closely follows this configuration, as has already been shown in Circular 96, Table I. The formation of the Large Magellanic Cloud is more open. Its most characteristic feature is a stream of faint stars extending between the group of clusters near N.G.C. 1850, and the remarkable nebula, N.G.C. 2070. The majority of the variables, especially of those fainter at maximum than the fourteenth magnitude, are found in this region. There are numerous other collections of stars, in connection with which groups of variables are found. Comparatively few variables have been discovered, however, in regions where large numbers of stars as bright as the thirteenth magnitude are collected.

The approximate places of the variables in Tables II and IV may be found readily by referring to the plates. Plate I is reduced one-half from Plate D 11367, which is a contact print from Plate A 3393, taken with the 24-inch Bruce Telescope

on November 10, 1898, exposure 300 minutes. A reticule was superposed as described on page 87. The centre of the original photograph is in R.A. =  $0^h 50^m.9$ , Dec. =  $-73^\circ 7'$  (1900). Plate II is a reduction from Plate D 11759, which was similarly prepared from Plate A 7123, taken January 9, 1905, exposure 120 minutes, centre in R.A. =  $5^h 25^m.7$ , Dec. =  $-69^\circ 0'$  (1900). The reproductions are on a scale of about  $120'' = 0.1$  cm., and the lines of the reticule are  $600''$  apart in each case. Measurements were made from the lower right-hand corner of the original plates. The distance of each line from the origin is marked in the margin, in hundreds of seconds, the figure 9 indicating that the corresponding line is  $900''$  from the zero point. Some of the variables have been marked on the plates, although the positions given in the Tables serve to locate an object, within its square, with a high degree of accuracy. On Plate I, variables are marked when outside of the region extending in  $x$  from  $8700''$  to  $18900''$ , and in  $y$  from  $5700''$  to  $14700''$ . Two regions on Plate II have been omitted in marking the variables. One of these extends in  $x$  from  $4500''$  to  $19500''$ , and in  $y$  from  $4500''$  to  $12300''$ , while the other extends in  $x$  from  $8100''$  to  $19500''$ , and in  $y$  from  $13500''$  to the northern edge of the plate. The variable is always at the left of the horizontal line which points to it, or if the line is bent at right angles, the variable is near the end of the vertical portion. Many of the variables are too faint to be seen in the reproductions, although nearly all are visible on the original photographic prints. No attempt has been made to designate variables in crowded regions, and many of them cannot readily be identified without the aid of photographic enlargements.

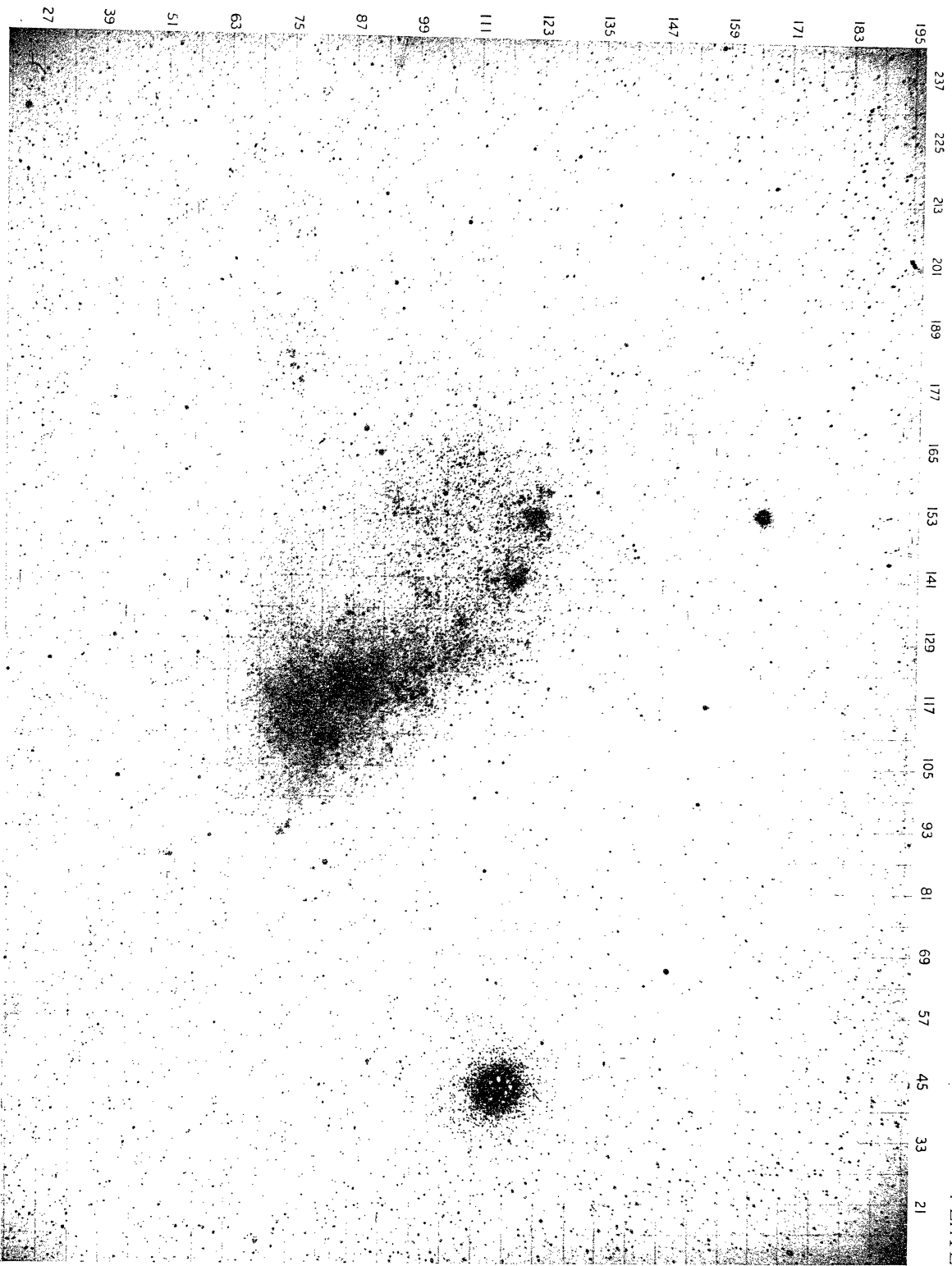


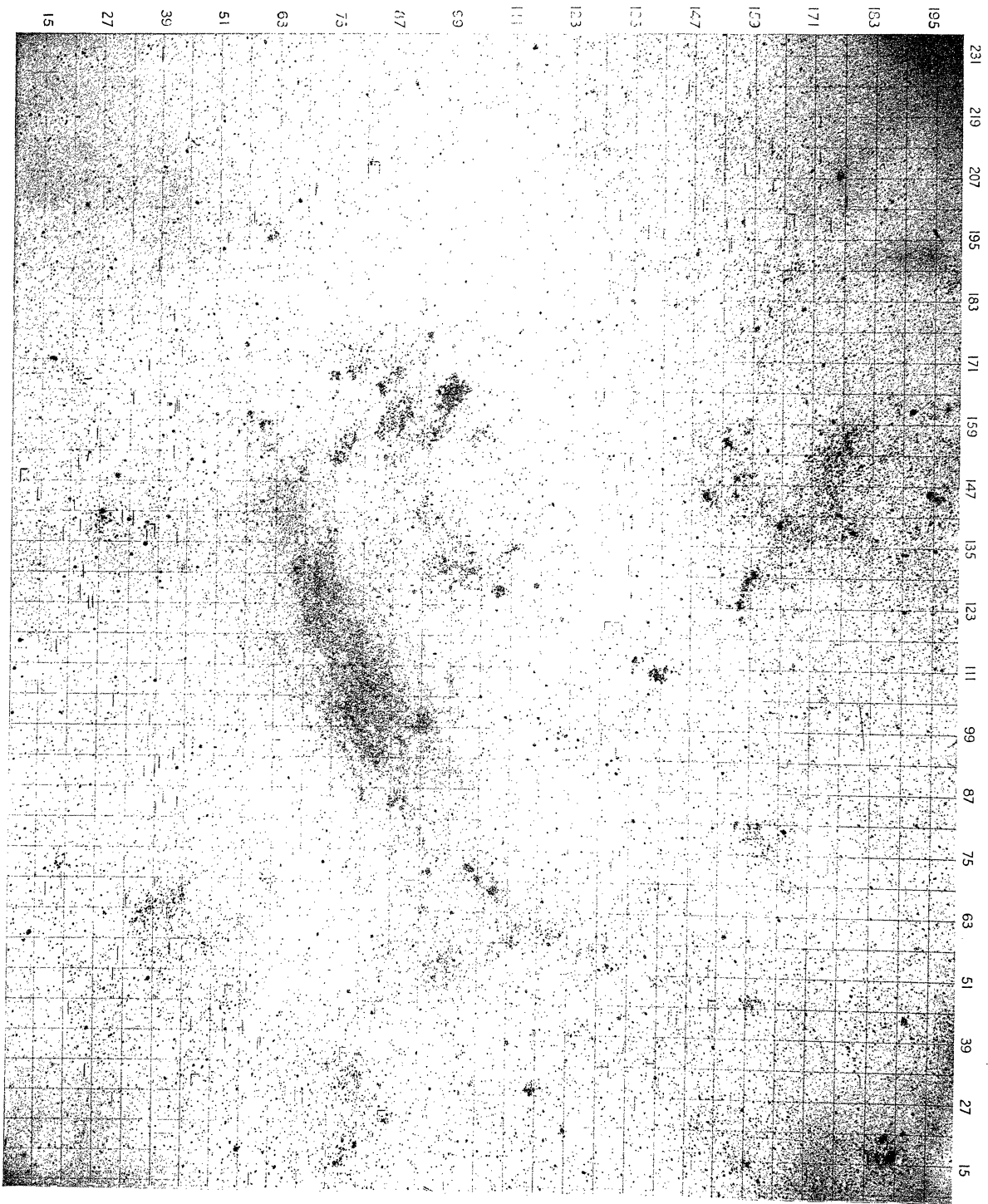
PLATE I.

SMALL MAGELLANIC CLOUD.

1908AnHar...60...87L







LARGE MAGELLANIC CLOUD.

PLATE II.

1908AmHar...60...87L