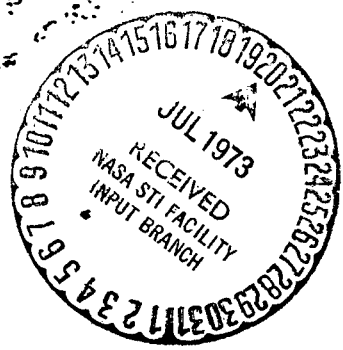
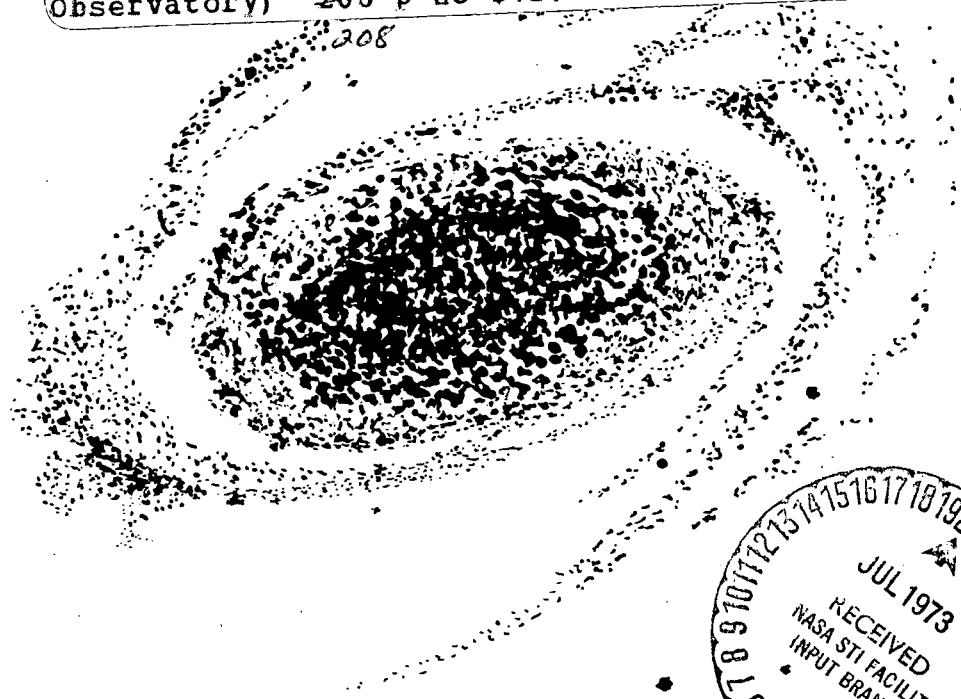


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CELESCOPE CATALOG OF ULTRAVIOLET STELLAR OBSERVATIONS MAGNETIC TAPE VERSION

R. J. DAVIS, W. A. DEUTSCHMAN,
and K. L. HARAMUNDANIS

NASA-CR-133259)	CELESCOPE CATALOG OF	N73-26889
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OBSERVATORY (Smithsonian Astrophysical		Unclas
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Smithsonian Astrophysical Observatory
SPECIAL REPORT 350

Research in Space Science
SAO Special Report No. 350

MAGNETIC TAPE VERSION

CELESCOPE CATALOG OF ULTRAVIOLET STELLAR OBSERVATIONS

5068 Objects Measured by the Smithsonian Experiment
Aboard the Orbiting Astronomical Observatory (OAO-2)

Robert J. Davis, William A. Deutschman, and Katherine L. Haramundanis

May 3, 1973

Smithsonian Institution
Astrophysical Observatory
Cambridge, Massachusetts 02138

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FOREWORD

This Special Report is being issued for use in conjunction with the magnetic-tape version of the Celelescope Catalog of Ultraviolet Observations. It contains the same information about the experiment as does the printed version of the Catalog, published by the Smithsonian Institution Press (1973); in addition, it describes the magnetic-tape format (Section 7) and a collection of programs (Sections 8 and 9) written to manipulate the data on the magnetic tape. These programs, available with the tape, provide an easy method for extracting data from the tape.

The tape version of the Catalog is issued to make the Celelescope data readily available for computer analysis. It contains all the data included in the printed version as well as all the individual measurements of each star. We hope that this introductory material and program descriptions will facilitate the use of the magnetic-tape version of the Celelescope Catalog of Ultraviolet Observations.

PREFACE

This volume represents another step in man's long journey to the stars. It is the first catalog of the heavens as they appear in ultraviolet light – a catalog that would have been impossible 15 years ago, for the data contained here were gathered by a satellite in space above the restricting limits of the earth's atmosphere.

This Catalog is based on more than 8000 ultraviolet television pictures taken by the special Uvicon cameras of Project Celescope, the Smithsonian Astrophysical Observatory's experiment aboard the extraordinarily successful Orbiting Astronomical Observatory (OAO-2) launched by the National Aeronautics and Space Administration on December 7, 1968. During 16 months of routine operation, Celescope observed approximately 10% of the entire sky, including 20% of the region near the Milky Way, where the majority of ultraviolet stars are found. The final Catalog created from this mass of raw data lists, for each of 5068 stars, the ultraviolet magnitude, as well as the position, spectral type, and other astrophysical information, including cross references to ground-based literature.

The evolution of Project Celescope from its initial conception in the early years of the Space Age to the launching in 1968 and the subsequent publication of this Catalog is long and arduous. The original plan for Celescope was formally proposed to the National Academy of Sciences in 1958, even before the establishment of NASA. The concept called for an ultraviolet-sensitive television tube to be used in conjunction with an optical system operating in the very far ultraviolet. The telescope would be

mounted in a relatively simple satellite, and its pictures would be telemetered to ground-based astronomers. Even with the simplicity of the original idea, Telescope still required several advances in state-of-the-art technology, such as the development of an image tube sensitive from the near ultraviolet to the lithium fluoride transmission limit at 1050 Å.

In addition, the project demanded high-quality ultraviolet filters for this wavelength and the nearer regions of the ultraviolet, advanced guidance and control systems only then becoming available for rockets, the creation of short-term memory units so that the telemetered data could be read out conveniently at ground stations, and elaborate data-processing techniques for assimilating the vast numbers of data gathered by this satellite.

The unusual requirements at the start of the Project only increased with time. The growth of the Telescope Project from one to four telescopes and the increasing need for more refined techniques throughout all phases created a demand for engineering innovation far beyond the scope of the original concept. For example, as ultraviolet stellar observations from rocket-borne telescopes were analyzed, it became clear that the hot stars were generally an order of magnitude less luminous in the very far ultraviolet than had been anticipated from earlier theory. This meant that the tube manufacturer had to increase image sensitivity so that the final system would (and did!) match early expectations regarding the number of stars observable. At the same time, the increased number of camera tubes required for both testing and operation necessitated a complete change in the method of tube production. All these technical changes and developments were matched by rapid administrative and operational changes in NASA, reflecting in part the great public interest and the support of the national space program.

The Smithsonian's concept of a single telescope and simple spacecraft evolved into the Orbiting Astronomical Observatory program – a series of increasingly sophisticated platforms for space astronomy. Thus, when Celescope finally rocketed above the atmosphere on December 7, 1968, it was aboard the largest, heaviest, and most highly instrumented unmanned spacecraft launched until that time.

Of course, the end results of this often frustrating, sometimes heartbreaking, and always challenging adventure make it all – even the frustrations – seem worthwhile. The combined Smithsonian Celescope Project and Wisconsin Experiment Package on OAO-2, and the Princeton Experiment on board OAO-3, have created a new field: ultraviolet astronomy. The Celescope Catalog of Ultraviolet Stellar Observations is destined to be a valuable tool for future research in this field, both from space and from the ground. Naturally, the Catalog will be used as a finding source for objects of especial interest to observers. Already, Celescope data have helped identify a group of stars in the constellation Orion that are anomalously bright in the ultraviolet; and ground-based observations of these same stars have both confirmed the space observations and helped revise old estimates of stellar temperatures.

The data contained in these pages will be particularly useful to theoreticians constructing models of the hot, rapidly evolving stars that seem to emit most of their light in the ultraviolet band of the spectrum. A companion volume, Blanketed Model Atmospheres for Early-Type Stars, presents, in both tabular and graphical form, theoretical flux distributions as well as visual and ultraviolet magnitudes for stars of given effective temperature and surface gravity. These theoretical models are the most realistic ever produced, incorporating the statistical effects of over

one million spectral lines. The calculated magnitudes can be used in a number of ways to interpret the Telescope Catalog data and to determine the physical properties of observed stars.

The Telescope Catalog of Ultraviolet Stellar Observations is helping to open a new window on the universe.

Cambridge, Massachusetts
October 4, 1972

Fred L. Whipple
Director
Smithsonian Astrophysical Observatory

ABSTRACT

During the 16 months that the Celelescope Experiment operated, it took 8000 frames of data. This report describes the experiment, the data it gathered, the format of the magnetic tape containing the data, and a number of programs that were written to read and manipulate the tape. The tape version of the Catalog contains data on 5068 stars and is available from the National Space Sciences Data Center.

RESUME

Pendant les seize mois que dura l'expérience Célescope 8.000 images de données ont été prises. Ce rapport décrit l'expérience, les données rassemblées, la structure de la bande magnétique contenant les données et un nombre de programmes qui furent écrits pour lire et manipuler la bande. Le catalogue sous forme de bande magnétique contient des données sur 5068 étoiles et peut être obtenu au Centre National de l'Information pour la Science Spatiale.

КОНСПЕКТ

За последние 16 месяцев работы опыта Селескоп им было получено 8000 кадров данных. Этот доклад описывает опыт, полученные данные, формат записи на магнитную ленту содержащую данные и число программ которые были составлены для считывания данных и манипуляций ленты. Записанный на магнитную ленту вариант каталога содержит данные о 5068 звездах и может быть получен от Государственного центра данных космических наук.

CELESCOPE CATALOG OF ULTRAVIOLET STELLAR OBSERVATIONS

R. J. Davis, W. A. Deutschman, and K. Haramundanis

1. INTRODUCTION

This Catalog contains the observational results obtained by the Celelescope Experiment during the first 16 months of operation of NASA's Orbiting Astronomical Observatory (OAO-2). It lists the results of the stellar observations, along with selected ground-based information obtained from the available literature. Lunar observations (Ahmad and Deutschman, 1972), as well as other analyses of the data, are being published as separate papers.

These data are available in three forms:

A. This magnetic tape and the necessary utility programs for reading and printing the contents of the tapes.

B. A printed catalog transcribed from the magnetic-tape catalog: It is available from the Government Printing Office.

C. A microfilm of the Catalog printed in each of five different sorts with the standard printing package.

This magnetic-tape version contains not only the compiled results as printed here but also the results of the individual observations from which these averaged data were compiled.

2. THE INSTRUMENTATION

Since detailed descriptions of the OAO and Telescope instrumentation are available elsewhere (e. g. , Davis et al. , 1972), we include here only information directly relevant to the user of this Catalog.

The Orbiting Astronomical Observatory (OAO-2) containing the Telescope Experiment was launched 7 December 1968 into a nearly circular orbit, 800 km above the earth's surface, with a 35° inclination. The Observatory (Figure 1) is octagonal in shape (2 m across, 3 m high) and weighs 2000 kg. The OAO allows us to point the Telescope photometers in the desired direction to an accuracy of 1 arcmin with a stability of 15 arcsec. The Telescope Experiment by the Smithsonian Astrophysical Observatory (SAO) and the Wisconsin Experiment Package by the University of Wisconsin make up this Observatory.

Telescope consists of two major integrated units: the Optical Package and the Bay E-4 electronic module assembly. The Telescope Optical Package contains four 12-inch Schwarzschild telescopes, each of which images a star field onto the ultraviolet-sensitive photocathode of a television image tube (Uvicon). Figure 1 shows how these telescopes and the electronic system are mounted. The field of view of each photometer is determined by the active area of the image-tube photocathodes and the area of the target scanned by the readout beam. The projected

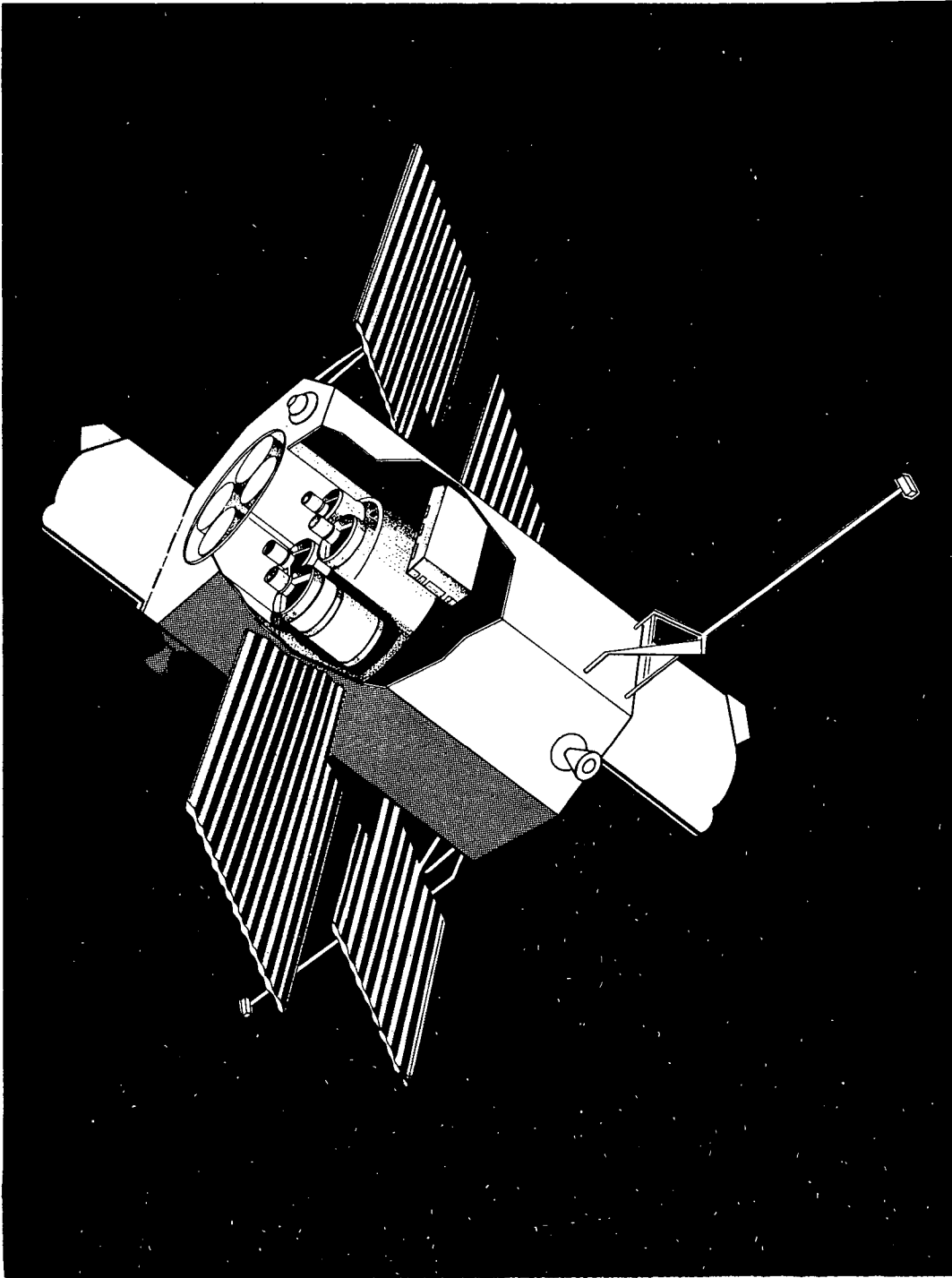


Figure 1. OAO spacecraft with cutaway showing the Telescope Experiment.

angular area is $2^{\circ}8 \times 2^{\circ}8$. Each field is optically split into two areas of different spectral sensitivity by mounting two different semicircular filters in front of each Uvicon. Further spectral selectivity is achieved by using two types of Uvicons, each with a different photocathode material. The resulting spectral responses are shown in Figure 2 and summarized in Table 1. The video signal developed by the readout of these tubes is amplified and supplied to an electronic data-processing system (Bay E-4 module assembly), which encodes the television pictures into a digital pulse train that indicates signal amplitude as a function of television line and element number for each of the four cameras. These digitized television pictures are transmitted via the OAO communications system to a receiving station in NASA's Satellite Tracking and Data Acquisition Network and eventually sent on magnetic tapes to SAO in Cambridge, Massachusetts.

3. THE DATA-PROCESSING SYSTEM

Each frame of data that arrives at SAO is first checked for quality and then sent through the automatic data-processing system. That system is divided into four basic sections: In the first, a program separates the star from the background signals in the frame and computes each star's frame coordinates and amplitude. The second section uses the final calibration data to calculate the observed magnitude for each star in the picture. The third identifies the stars in a frame or frames by matching them with a positional catalog of early-type stars prepared before launch.

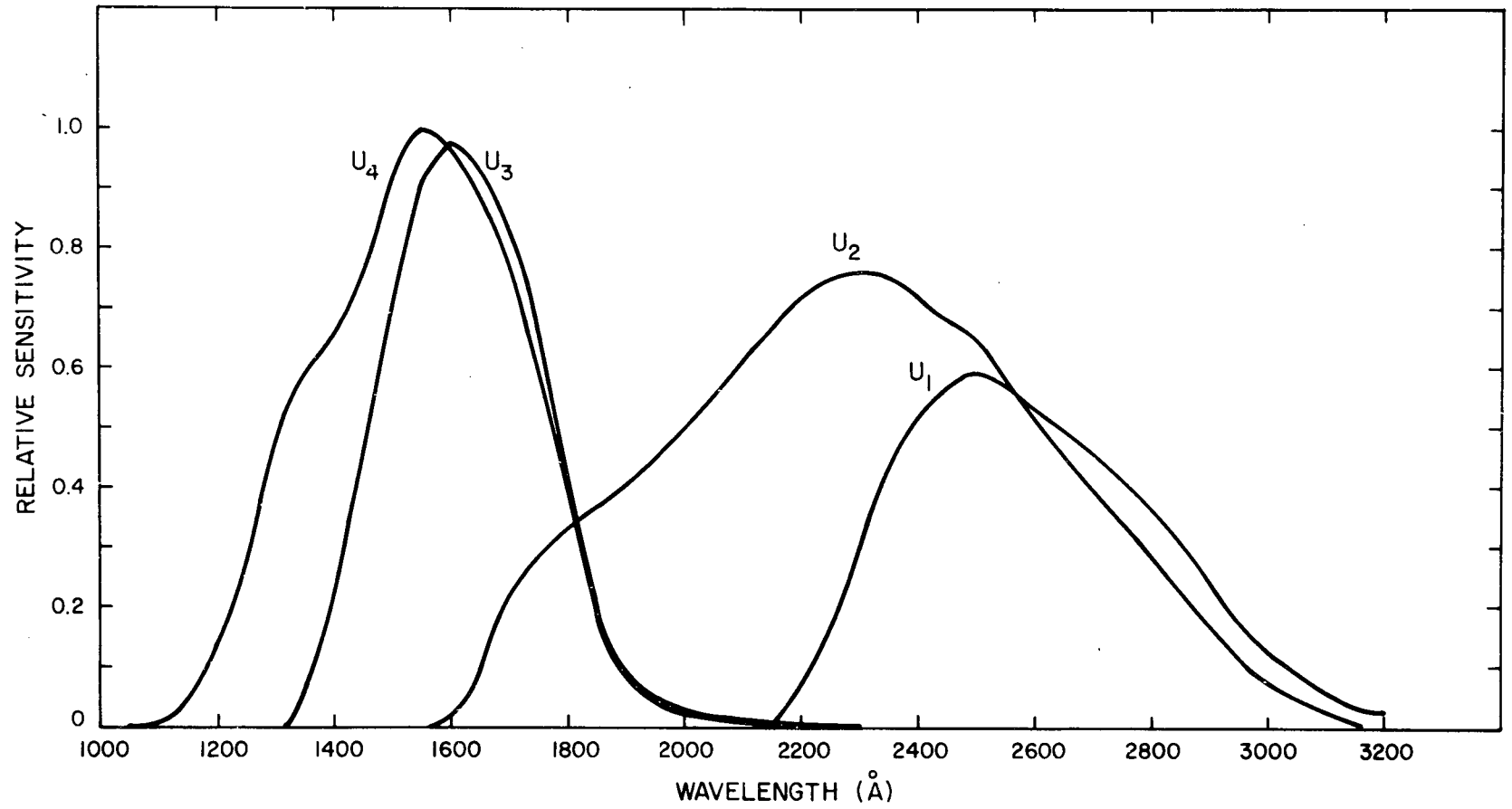


Figure 2. Relative spectral response of the filters.

Table 1. Relative sensitivity of the filters for each wavelength.*

Wavelength (Å)	Relative sensitivity			
	U1	U2	U3	U4
1050				1.455 -3
1100				1.018 -2
1150				5.081 -2
1200				1.463 -1
1250				2.779 -1
1300				4.765 -1
1350			6.879 -2	5.925 -1
1400			2.328 -1	6.555 -1
1450			4.565 -1	7.644 -1
1500			6.951 -1	9.151 -1
1550		8.979 -4	9.177 -1	1.000
1600		1.670 -2	9.760 -1	9.646 -1
1650		9.984 -2	9.390 -1	8.848 -1
1700		2.188 -1	8.327 -1	7.566 -1
1750		2.806 -1	6.535 -1	5.769 -1
1800		3.313 -1	4.053 -1	3.753 -1
1850		3.719 -1	1.941 -1	1.924 -1
1900		4.103 -1	8.114 -2	8.306 -2
1950		4.497 -1	5.051 -2	4.453 -2
2000		4.956 -1	3.329 -2	2.817 -2
2050		5.571 -1	2.201 -2	1.853 -2
2100		6.170 -1	1.451 -2	1.261 -2
2150	1.649 -2	6.608 -1	9.328 -3	7.968 -3
2200	6.748 -2	7.191 -1	5.878 -3	5.122 -3
2250	1.792 -1	7.452 -1	3.441 -3	2.788 -3
2300	3.028 -1	7.592 -1	1.610 -3	1.428 -3
2350	4.305 -1	7.509 -1		
2400	5.161 -1	7.165 -1		
2450	5.675 -1	6.769 -1		
2500	5.946 -1	6.472 -1		
2550	5.633 -1	5.789 -1		
2600	5.300 -1	5.227 -1		
2650	4.973 -1	4.690 -1		
2700	4.538 -1	4.106 -1		
2750	4.095 -1	3.615 -1		
2800	3.650 -1	3.194 -1		
2850	3.046 -1	2.563 -1		
2900	2.378 -1	1.928 -1		
2950	1.763 -1	1.329 -1		
3000	1.300 -1	9.145 -2		
3050	9.255 -2	6.222 -2		
3100	6.394 -2	4.085 -2		
3150	3.887 -2	2.335 -2		
3200	2.772 -2			

*The negative integers indicate the power of 10.

The last section adds further information, such as UBV magnitudes from the Naval Observatory Photoelectric Catalogue (Blanco et al., 1968), and checks the internal consistency of the data. These sections are described below.

In the first section, we assume that the stars are relatively sharp spikes on a smooth background and that any group of intensity points significantly above the background represents a star. The program (Deutschman, 1970) computes a "significance level" for each filter half of the frame, first by using a least-squares technique to fit the background equation $I. B. = A + Bk^4 + Ck^2 + Dk + Ek^2\ell + Fk\ell + Gk\ell^2 + H\ell + I\ell^2 + J\ell^4$ to every fifth intensity point k on every fifth line ℓ and then by adding 2.5 times the standard deviation of the fit to the background equation at each raster point. All intensities greater than or equal to the significance level are signal; all others are background noise. Then all contiguous points greater than or equal to the significance level are grouped into objects. Finally, the program calculates the center of intensity of the star, subtracts the calculated background from the individual points, and adds the results. On the basis of the shape of the object and the density of points in it, the program then decides whether it is a star, an object that may be either a star or noise, or merely noise.

Some objects contain more than 4000 points or are large and amorphous with $n < (\Delta k \Delta \ell)/c$, where n is the number of points in the object, Δk and $\Delta \ell$ are the maximum vertical and horizontal dimensions of the object, and c is an empirical constant (≈ 3). These are flagged as questionable and require manual review. Any object that has less than four contiguous points in one of the configurations

XX	XX	X
XX	XX	XXX
		X

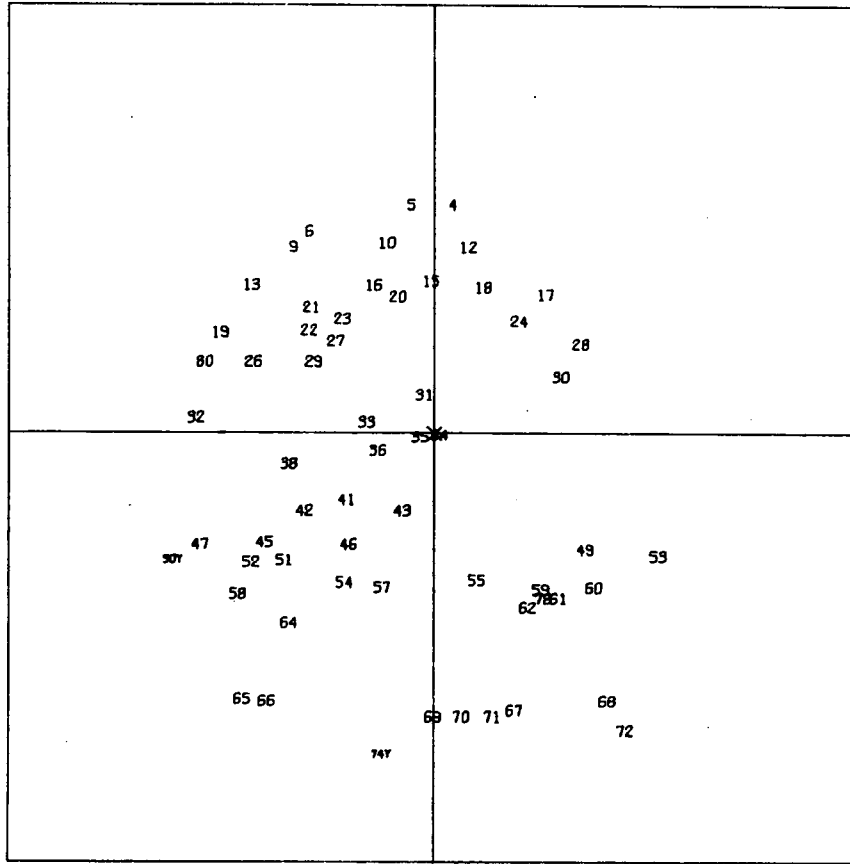
or a rotational permutation of these is classified as noise and automatically rejected. Objects that have a net intensity less than 25 in camera 1, 22 in camera 3, or 19 in camera 4 are also classified as noise. (Camera 2 was damaged before orbit number 400 and provided no data for this Catalog.)

The second section of the data-processing system calculates observed magnitudes by using the calibration parameters for each camera/filter combination, the frame position and intensity calculated by the first section, and pertinent satellite data (e.g., temperature and exposure time). The calibration model is described elsewhere (Deutschman, 1972a) and will not be discussed further here. The actual calibration parameters are described in this and other reports.

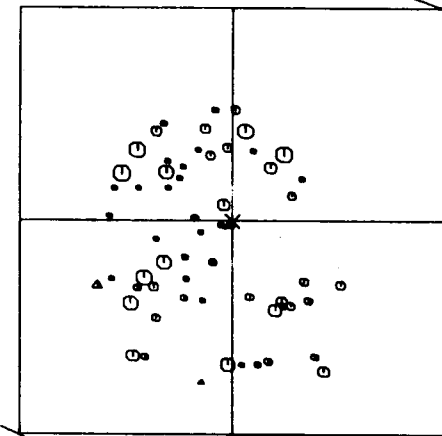
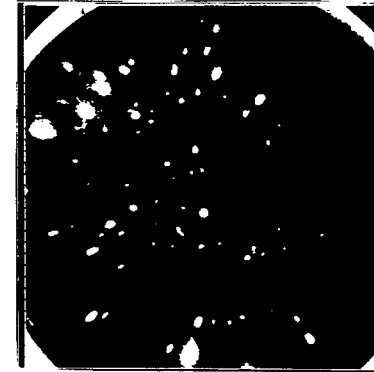
The third section matches the stars observed by Telescope with known catalog stars, using a configuration-matching program to compute the right ascensions and declinations of the stars. A number of contiguous pictures may be matched at the same time to improve reliability. Using this program, we were able to identify automatically about 60% of our observations. Visual matching of the BD, CD, or CPD charts with plots of our observations allowed us to identify the remaining objects.

We reconstructed the television image as a picture and produced a small plot to the scale of the Durchmusterung charts – which is the same as that of the Běčvář Atlases (Běčvář, 1962) – to facilitate this matching step. Figure 3 (not to scale) shows

6



8563- 2, M 410, C-3 8H 35M OS -45D OM



S

8563- 2, M 410, C-3

Figure 3. A sample identification plot and picture.

these plots and pictures of one Telescope data frame. The large-scale plot was used to identify the objects by the numbers assigned them by our signal-processing program. The results of the computer program were in most cases verified by our manual procedure of overlaying these plots on the appropriate Durchmusterung charts, with additional reference to the Bečvář Atlases where necessary.

The final stage of our system adds further ground-based data and checks our data for internal consistency. All the Telescope magnitudes of a star were compared, and any large discrepancies were manually checked. Configurations of stars were checked for consistency, and all manually separated stars were reexamined. Finally, the individual observations were compiled in the Telescope Catalog of Ultraviolet Stellar Observations.

4. EXPERIMENT CALIBRATION

Extensive prelaunch calibration procedures determined the basic transfer function of the experiment. These procedures are fully documented by Davis (1968) and Green (1970). In brief, a calibrated artificial star field established the positional sensitivity of the Uvicons. The filters were calibrated separately, and the results were mathematically combined with the gains of the amplifiers in Bay E-4 into the total system calibration. The experiment was then routinely monitored with nearly monochromatic calibration lamps to detect any changes before launch.

Before we launched the experiment, we realized the need for in-orbit calibration and planned to take data for it. The least we could expect was a decay in sensitivity with time; but because of the 2 years between the component calibration and the launch,

we also made plans to check the positional calibration in orbit. After the first month of operational checkout, we began systematically to gather data for this task. The data gathered and their use are described by Deutschman (1972b); only the time-decay analysis of the experiment will be repeated here.

The time decay of the system would be most easily determined if the same stars were observed at the same positions on the target at regular intervals. Because of sun, power, and thermal constraints, this was impossible with our experiment, but we did observe a number of standard star fields as often as practical. Three star fields were used as primary calibration areas; one of the three fields was observed at least once during every operating period.

We determined the time-decay history of each camera/filter combination by requiring that each star have a unique magnitude at time zero. Its magnitude calculated from data at any later time will increase if the system decays. (Magnitudes are defined as $-2.5 \log(\text{power})$; hence, lower power signals have larger magnitudes.) We therefore assumed that

$$M(t=0) = M(t_1) - \sum_1^n A_n t_1^n ,$$

where $\sum A_n t_1^n$ is the camera sensitivity function in magnitudes. Because the corrected magnitude for each star is required to be invariant, observations at times t_1 and t_2 give the following:

$$M(t=0) = M(t_1) - \sum_1^n A_n t_1^n = M(t_2) - \sum_1^n A_n t_2^n ,$$

and hence,

$$M(t_1) - M(t_2) = \sum_1^n A_n (t_1^n - t_2^n) .$$

When solved with a least-squares technique for all pairs of stars, this set of equations defines the coefficients A in the decay equation for the system.

The standard calibration-area data and all chance repeats greater than 20 orbits apart were used in these fits. Other data were not used, because they reflect area sensitivity changes and isolated frame shifts rather than time decays.

Figure 4 shows the resulting curves for the three cameras that we used for acquiring scientific data. The amount of correction in magnitudes is plotted versus the orbit number. The orbit numbers are discontinuous because we shared experiment time with the University of Wisconsin.

We defined the zero point for the Telescope ultraviolet magnitude system by specifying the values of U1, U2, and U3 to be assigned as the mean observed Telescope magnitudes for one star selected specifically for this purpose. The relationship between U3 and U4 was based on our prelaunch calibration of the Telescope Experiment against laboratory standards. We were unable to use the prelaunch calibration data to establish the relationships between the other Telescope colors, or between the Telescope magnitude system and absolute physical units, because the sensitivity of each camera changed rapidly during the first 700 orbits.

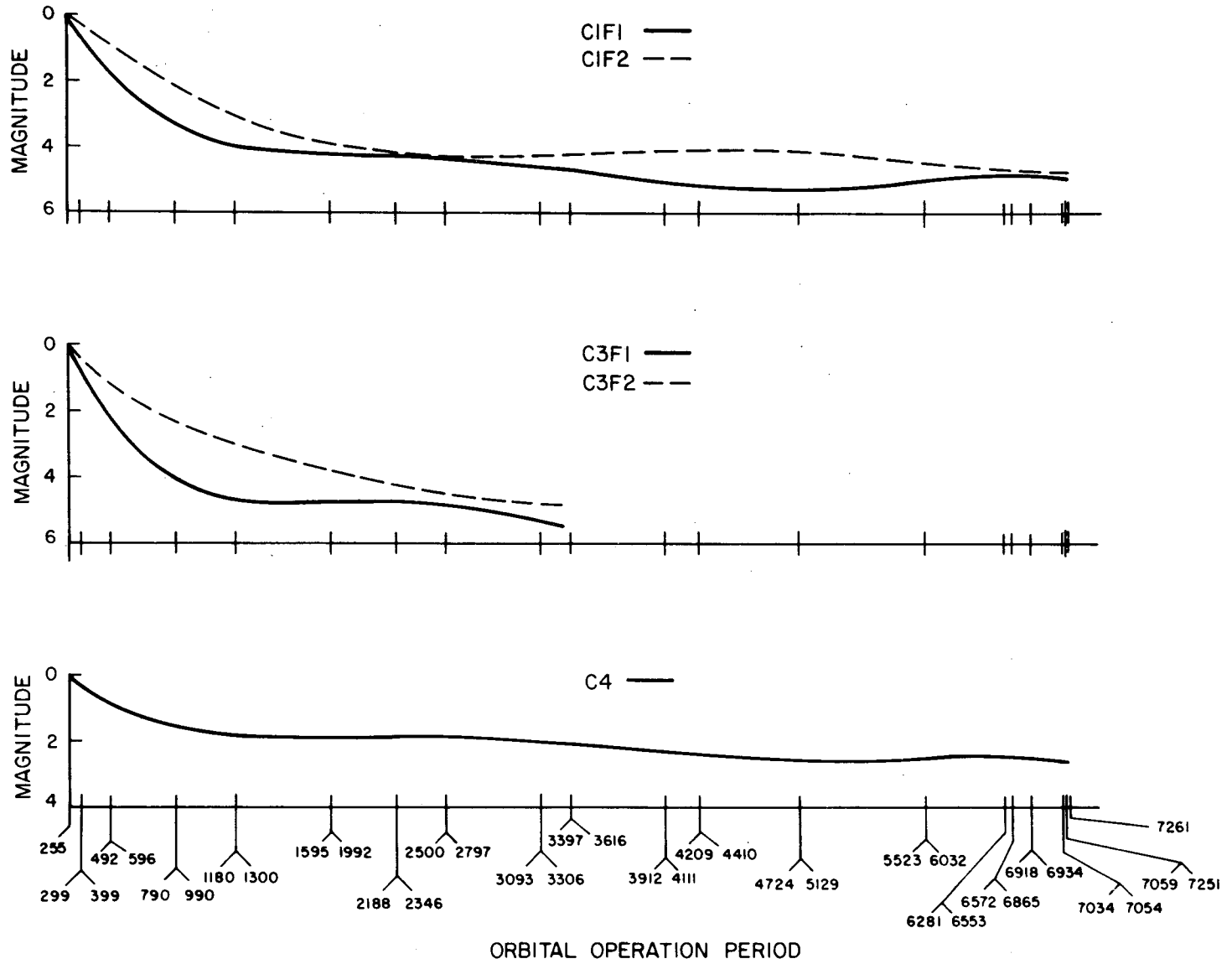


Figure 4. Relative sensitivity of the cameras vs. orbital operation period.

We chose CD -44°4704 and assigned the following magnitudes to it:

$$U1 = 9.44$$

$$U2 = 9.19$$

$$U3 = 9.56 \quad .$$

This star was selected since it had been observed repeatedly by Telescope from orbits 400 to 6233 and also by the Wisconsin OAO experiment. The magnitudes assigned were originally determined by comparing preliminary Telescope data for several slightly reddened stars of luminosity classes III, IV, and V with theoretical values based on the Smithsonian grid of model atmospheres and preliminary Telescope reddening parameters. Our later decision to use a single star as a calibration standard eliminated the problem of reproducing and intercomparing our standard with those of other observers.

5. STATISTICAL SUMMARY

The Telescope Catalog of Ultraviolet Stellar Observations has been compiled from 13,646 observations of 5068 stars. Their areal distribution in equatorial and galactic coordinates is illustrated in Figures 5 and 6. Ultraviolet magnitudes in the U1 passband are available for 17% of the stars, in the U2 passband for 60%, in the U3 passband for 66%, and in the U4 passband for 6%. Figure 7 shows the distribution in magnitude for each of the magnitude types. The root-mean-square difference for all observations in each filter is as follows:

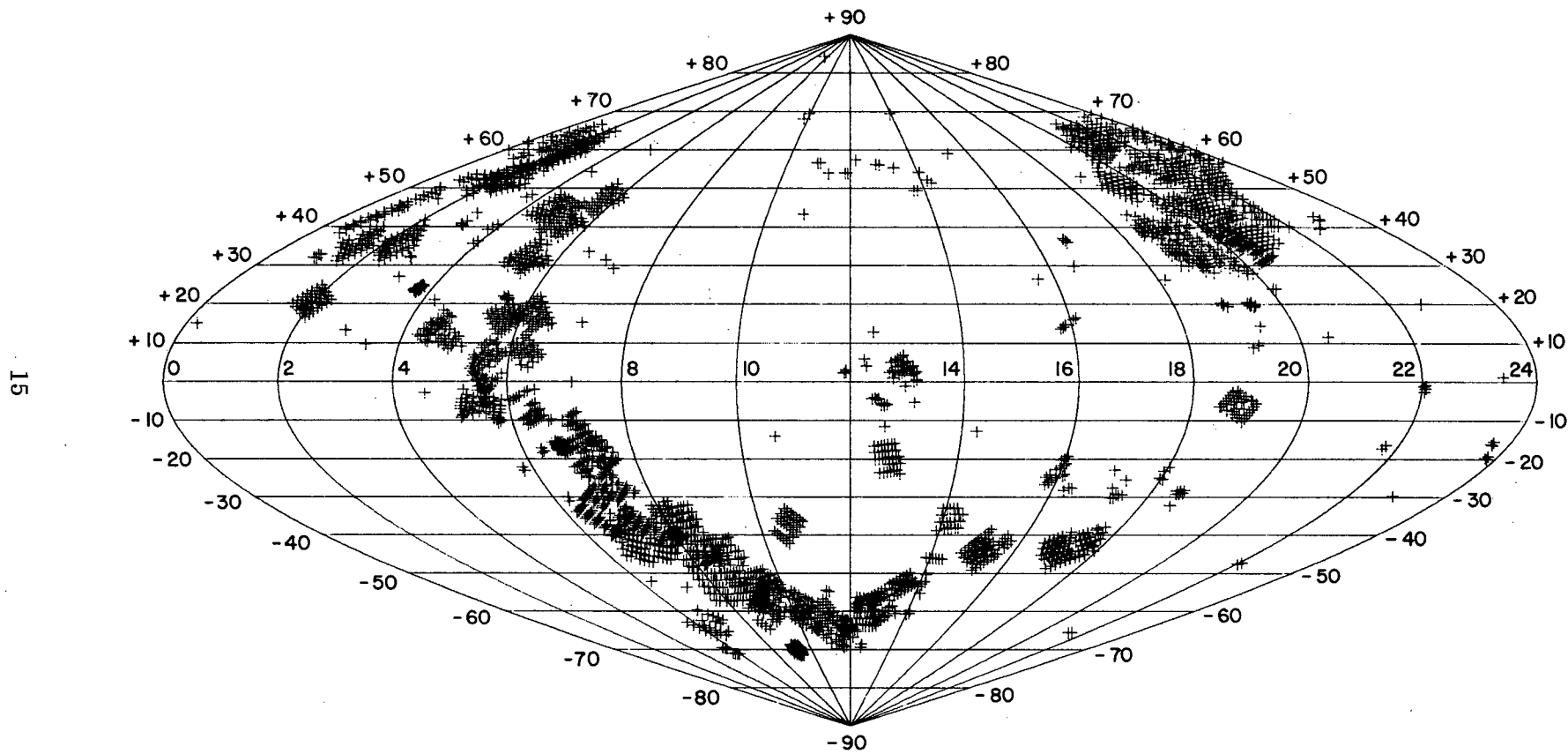


Figure 5. Plot in right ascension and declination of the exposures taken by Telescope.

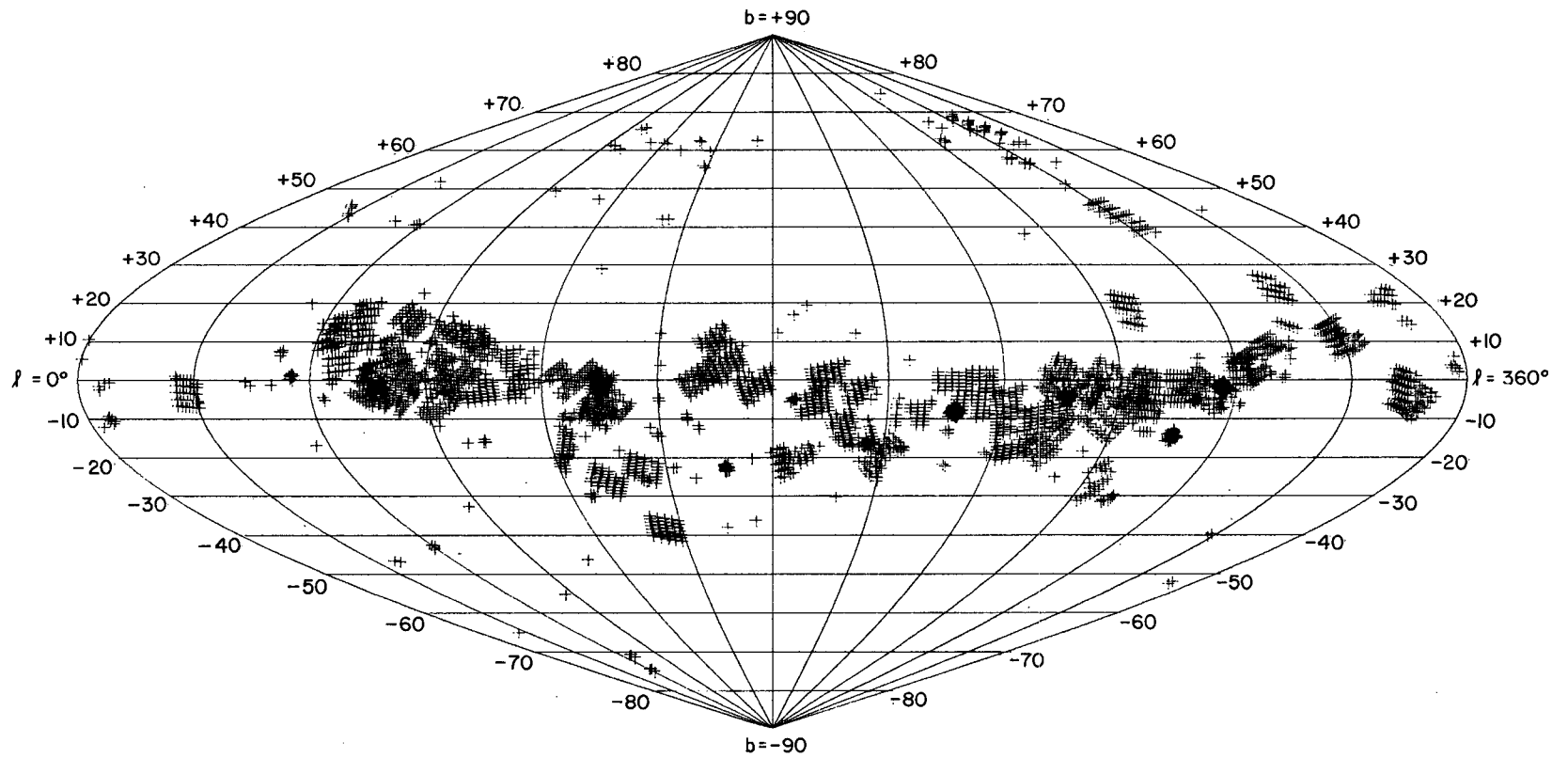


Figure 6. Plot in galactic coordinates of the exposures taken by Telescope.

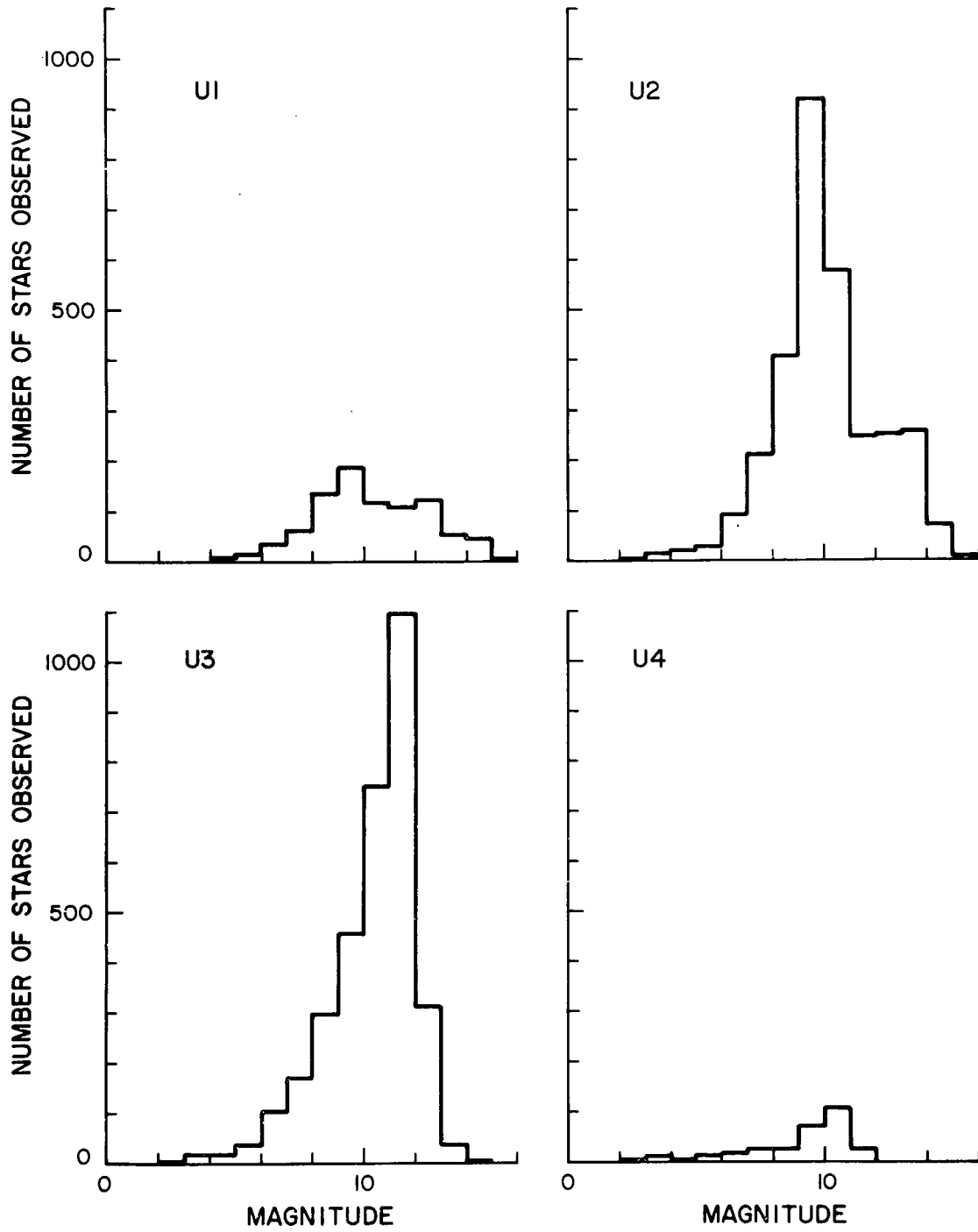


Figure 7. Distribution of Telescope magnitudes in each filter.

<u>Filter</u>	<u>RMS difference</u>
U1	0.24
U2	0.19
U3	0.20
U4	0.26

Figure 8 shows the number of stars in each visual magnitude range. Visual magnitude as used here means V , m_v , or m_{pg} and is intended to show the general magnitude distribution of Telescope observations. The V magnitudes on the UBV system are available for 36% of the stars, $B-V$ colors for 37%, $U-B$ colors for 27%, and $(U-B)_c$ colors for 6% of the stars. Spectral classifications in the MK system are given for 32% of the stars, and non-MK spectra for 62%. Figure 9 shows the number of Telescope observations in each spectral class, while Figure 10 displays the number of stars in each luminosity class. Of the observed stars, 1.4% are known to be variable in the visual; 56% of these variables are eclipsing binaries. Three percent of our observed stars are suspected variables. Nine percent of the stars are known binaries, and 8% are within 3 arcmin of other identified stars that may contribute some of the observed ultraviolet light. Finally, 0.3% of the stars have been classified as Wolf-Rayet stars, 1.5% as Ap stars, and 0.4% as Am stars.

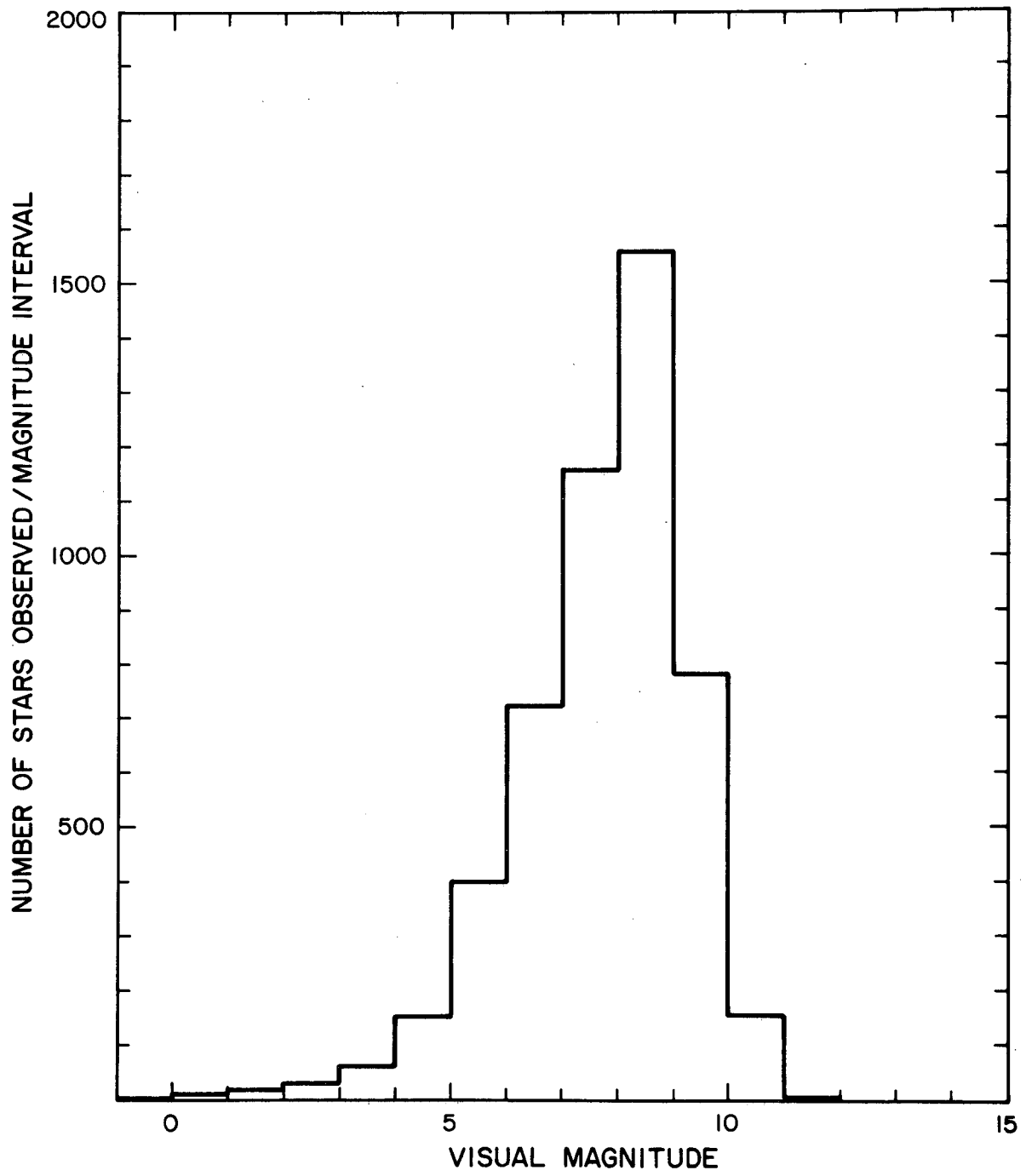


Figure 8. Distribution in visual magnitude of stars observed by Telescope.

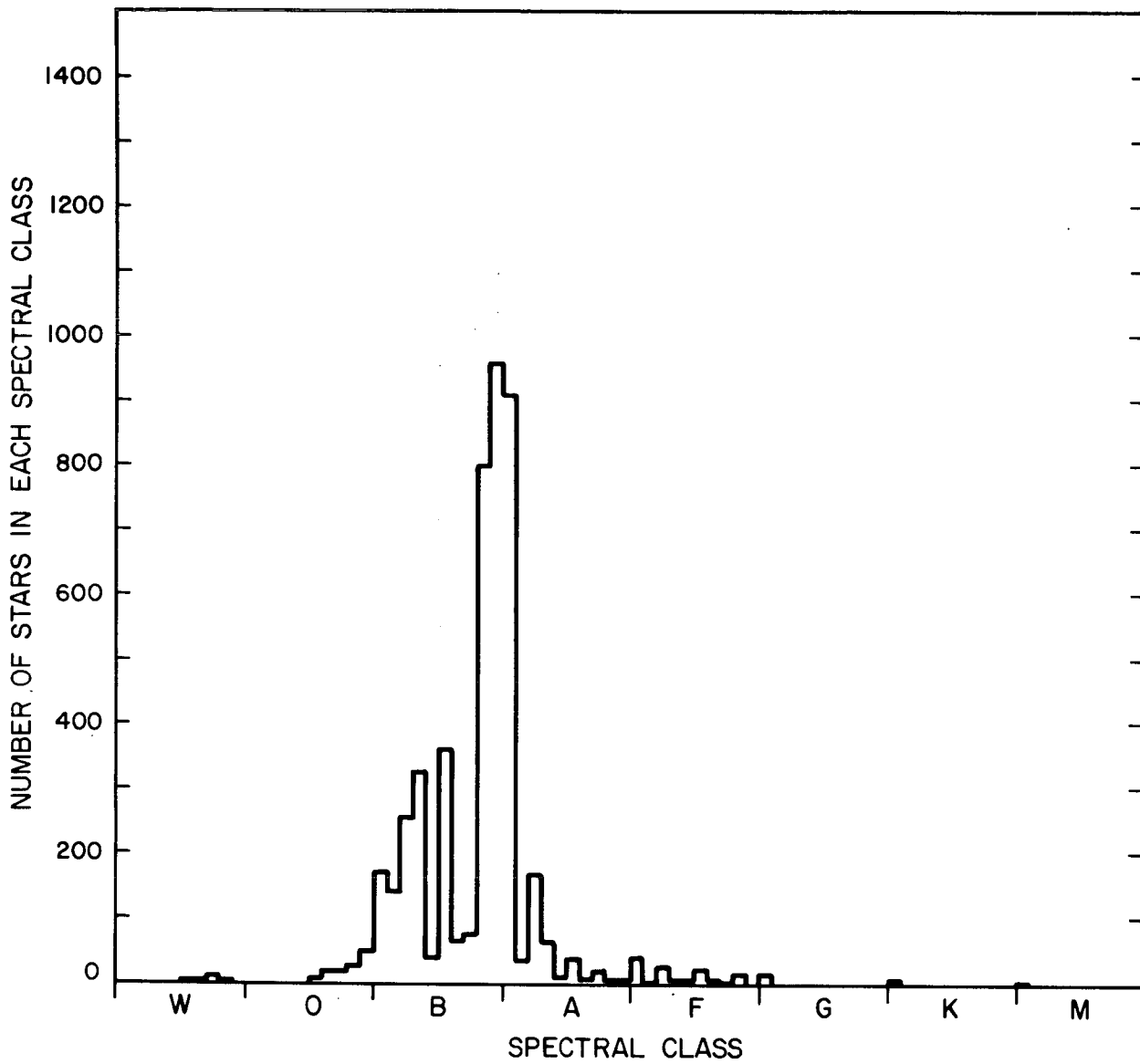


Figure 9. Distribution of stars by spectral class.

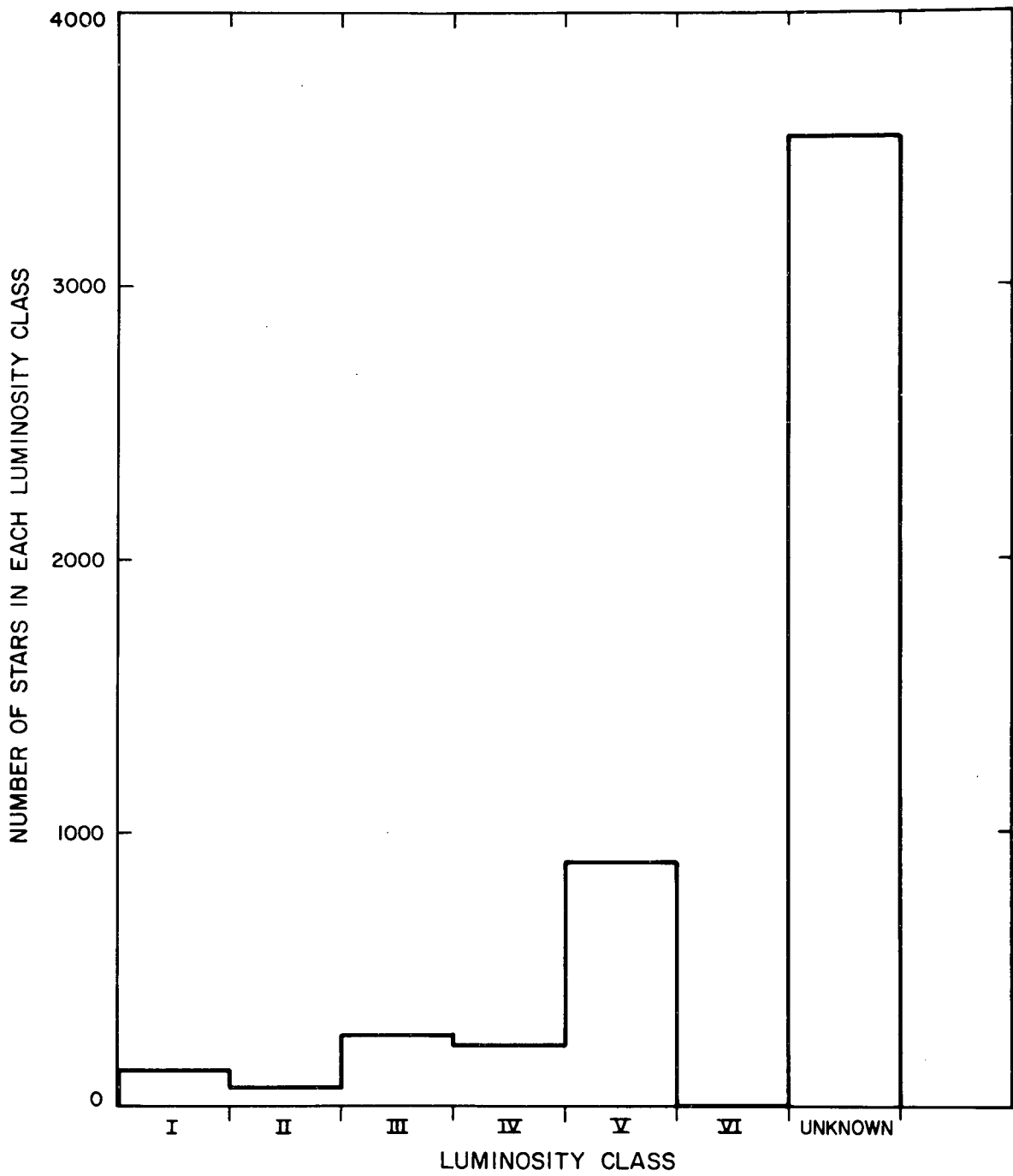


Figure 10. Distribution of stars by luminosity.

6. DRAMATIS PERSONAE

The general scientific planning that became the basis for Project Celeste originated in a series of meetings of the scientific staffs of the Smithsonian Astrophysical Observatory and Harvard College Observatory in February 1958. Following these meetings, a committee consisting of Dr. R. J. Davis, Dr. K. G. Henize, Dr. R. E. McCrosky, Dr. G. F. Schilling, and Dr. C. A. Whitney made more detailed plans and wrote a proposal that eventually became the basis for the NASA grants and contracts that supported Project Celeste. Dr. F. L. Whipple and Dr. Davis were SAO's delegates to NASA's Working Group on Orbiting Astronomical Observatories, which developed the relative roles of spacecraft and experiments in the OAO. Celeste became an official project of SAO in 1959. The name was suggested by Dr. D. H. Menzel in 1960 as the winning entry in an informal contest for naming the project; the name implies that the Smithsonian experiment is one of the first truly Celestial telescopes.

Since the beginning, Dr. Whipple has been Principal Investigator and Dr. Davis has been Coinvestigator and Project Scientist. From 1959 to 1961, engineering and administration were coordinated by Mr. F. R. Nitchie, Jr., Engineer-Administrator. In 1962, the title of this position was changed to Project Manager. Mr. G. K. Megerian served as Project Manager in 1962; Dr. C. A. Lundquist, as Acting Project Manager in 1963; Mr. J. J. Burke, as Project Manager in 1964-1968; Mr. J. J. Ainley, 1968-1970; Mr. R. T. Ayer, 1970-present. While Acting Project Manager, Dr. Lundquist was assisted for several months each by project administrators: Mr. L. McGrath, Mr. H. Rosenthal, and Mr. E. Kohn.

For the first few years, the major effort in Celescope was devoted to engineering. From 1959-1964, our engineering staff consisted of Dr. M. D. Grossi, Electronics Engineer; Mr. S. Sydor, Optical Specialist; and Mr. J. M. Franklin, Mechanical Specialist. From 1959-1962, Mr. H. Cobb served as Mechanical Engineer. From 1964-1972, Dr. Y. Nozawa was Electronics Engineer, and special engineering needs have been covered by Mr. T. E. Hoffman and others from SAO's Engineering Department. In 1966, the post of Project Engineer was filled by Dr. Nozawa. A critical activity of the engineering section from 1965-1969 was field engineering during subsystem and system testing, launch preparation, and orbital operations. Dr. Nozawa was SAO's field engineer during that time.

Members of the SAO Field Engineering Team, which performed engineering tests, system acceptance tests, and launch preparation, were as follows: Mr. J. Peters (Manager, 1967-1968), Mr. J. Munier (Assistant Manager, 1964-1965), Mr. B. A. McLean (Supervisor from EMR, 1964), Mr. J. W. Kennedy (Supervisor from EMR, 1965), Mr. D. R. Nelson (Supervisor from EMR, 1967-1968), Mr. J. Brown (Member from EMR, 1964-1965), Mr. J. Faso (Member from EMR, 1964-1965), Mr. G. Komen (Member from EMR, 1964-1965), and others who became members of the Orbital Operation Group. The successful completion of acceptance tests and launch preparation of the Celescope Experiment is heavily credited to the leadership, cooperation, and creativity of Mr. J. Peters, Mr. D. Nelson, and Mr. L. Koschmeder from the Test and Integration Division of Goddard Space Flight Center, and Mr. R. A. White from the OAO project office.

During 1968, 1969, and 1970, the major effort in Celescope was orbital operations; Dr. W. A. Deutschman was in charge of that activity. The success of the Celescope

mission during orbital operations was in large measure the result of the efforts by him and his team in planning, computer programming, controlling, and reviewing the operating requirements and procedures. Special recognition is due Mr. J. Thorp and Mr. J. Latimer for representing Telescope as Field Managers during this round-the-clock operation; Mr. J. Block, as EMR Field Manager; and Mr. T. Omara and Mr. D. Moyer of Grumman Aircraft Corp., who acted as Project Operations Controllers for the OAO satellite.

During the summer and fall of 1970, a data-processing-improvement group consisting of Dr. C. Lundquist, Dr. R. Davis, Dr. W. Deutschman, Dr. E. Avrett, Dr. E. Gaposchkin, Dr. S. Ross, Dr. E. Young, Dr. C. Payne-Gaposchkin, Dr. Y. Nozawa, Mrs. K. Haramundanis, Mr. R. Ayer, Mr. J. Thorp, and Mr. R. Loeser met every week to discuss the best way to use the calibration data. Many other individuals in the Observatory also contributed to this effort.

Since 1969, a major effort in Telescope has been data reduction, of which Mrs. K. L. Haramundanis has been in charge. Her data-reduction section was responsible not only for handling the vast amount of data involved in analyzing over 8000 Telescope pictures but also for keeping track of the source, location, and status of the individual data items.

During the entire life of the project, computer programming support has been important. From 1959-1963, Mr. G. Szabo was in charge of that activity. Since then, the programming effort has been headed by Mrs. M. Havelock (1963-1964), Mrs. B. (Feit) Nair (1964-1965), Mr. P. Conklin (1965), Mr. J. D. de Clercq Zubli (1966-1970), Mr. R. Loeser (1970), and Mrs. L. Kirschner (1966-present).

Since 1970, Dr. Deutschman has been Deputy Project Scientist, in charge of coordinating the activities of the various sections in Telescope. He has overall responsibility for Telescope data processing.

From 1959-1969, Telescope maintained a spectrophotometric standards laboratory for calibrating the optical and spectrophotometric characteristics of Telescope's optical elements, calibration lamps, and Uvicons. From 1959-1960, Dr. A. V. Baez headed this laboratory; from 1960-1962, Dr. O. P. Rustgi. In 1963, and other times on a temporary basis, Mr. C. Miles was in charge.

In 1964, scientific activities of the laboratory were supervised by Dr. J. Marsh and Dr. I. Simon under subcontract to A. D. Little, Inc. From 1965-1969, Mr. H. O'Brien was manager of the spectrophotometric standards laboratory; he had been one of the laboratory assistants during 1963-1964. In 1966, under subcontract again, A. D. Little, Inc., furnished the services of Dr. P. von Thüna for scientific supervision of the activity required for recalibrating the primary laboratory standards against a black thermocouple standard. During the entire lifetime of the laboratory, 1959-1969, Mr. P. J. Hofmann performed competently as a physical-science aide.

During the 14 years that Project Telescope has operated, the above Project Staff has been ably supported by a number of devoted employees, as follows:

Physical-Science Aides: Mrs. G. Wald, Dr. E. Godfredsen, Mr. F. Ahern, Mrs. A. Renshaw, Mr. J. Gallagher, Miss M. Drugan, Mr. J. Black, Mr. I. A. Ahmad, Mrs. E. Green, Dr. S. Strom, Dr. D. Cunnold, Mr. E. Gerard, Dr. D. J. Malaise, and Dr. N. Raghavan.

Programers: Miss V. Kan, Mr. R. Taylor, Mr. M. Patenaude, Mr. P. Collins, Mrs. D. Hills, Mrs. O. Johonnot, Mr. G. Bullock, and Mr. B. Welch.

Assisting Engineers: Mr. E. Arazi, Mr. S. Asano, Mr. W. Ng, Mr. A. Goldstein, Mr. W. Grim, and Mr. S. Shell.

Laboratory Technicians: Mr. R. Beckett, Mr. F. Licata, Mr. M. Kalish, Mr. T. Lee, Mr. P. Griffiths, Mr. A. Bardos, Mr. D. Frost, Mr. E. A. Monash, and Mr. J. Munier.

Data-Analyst Clerks: Mr. P. Sylvester, Mr. G. Westgate, Mrs. L. Cannell, Mr. R. Jarvis, Mr. R. van der Ley, Mr. W. Persons, Miss A. Ballard, Miss C. Jones, Mr. A. Kallai, Miss A. Brownlee, Mrs. S. Yeh, Mrs. Z. Gallagher, Mr. R. Palleschi, Mr. C. Sprangers, Mr. J. Orman, and Mr. A. Girnius.

Astronomers: Prof. C. Payne-Gaposchkin and Mrs. K. (Hebb) O'Neill.

Administrative Assistants: Mr. J. Taylor and Mr. E. Shenton.

Orbital Operations, SAO: Mr. J. Thorp (Field Manager), Mr. J. Latimer, Mr. J. Luce, Mr. L. Greenhouse, Mr. T. Cram, Mr. A. Oakes, and Mr. W. Munn; EMR: Mr. J. Block, Mr. L. O'Connor, Mr. O. Brown, Mr. P. Scoles, Mr. C. Sloan, Mr. K. Leilich, and Mr. T. Dennison.

Secretaries: Mrs. H. M. Beattie, Mrs. B. Hicks, Mrs. P. (Kluge) McMullen, Mrs. P. Januszkiewicz, Mrs. M. deJoie, Mrs. A. Green, Mrs. B. Millar, Mrs. M. V. Flaherty, Mrs. C. Williams, Miss E. Shipe, and Mrs. L. (Poireir) Jordan.

Assistance from other departments: Mr. M. N. Malec (Contracts), Dr. E. M. Gaposchkin (Satellite Geodesy), Mr. C. Tillinghast (Administration), Mr. L. Campbell (Administration), Mr. G. Woron (Contracts), Miss E. Collins (Ed. & Pub.), Mr. E. N. Hayes (Ed. & Pub.), Mrs. A. Omundsen (Ed. & Pub.), Mrs. C. Wong (Ed. & Pub.), Mr. C. Hanson (Ed. & Pub.), Mr. J. Cornell (Ed. & Pub.), and Mr. R. Martin (Computations Center).

Scientific advice and interpretation were provided by many other members of the Observatory staff, including the following: Dr. E. H. Avrett, Dr. J. G. Baker, Dr. D. F. Carbon, Dr. N. P. Carleton, Dr. G. G. Fazio, Dr. F. A. Franklin, Dr. O. J. Gingerich, Dr. P. W. Hodge, Dr. W. Kalkofen, Mr. R. L. Kurucz, Dr. D. W. Latham, Dr. R. W. Noyes, Dr. E. Peytremann, Dr. W. W. Salisbury, and Dr. R. E. Schild.

In addition to the above employees of the Smithsonian Astrophysical Observatory, we wish to acknowledge the support of many staff members at the Smithsonian Institution in Washington, D.C. Especially important were the support and encouragement given by Dr. Leonard Carmichael, Secretary of the Smithsonian Institution until 1964, and by Dr. S. Dillon Ripley, Secretary since that time. Mr. James Bradley, Assistant Secretary, helped in a number of ways, especially in negotiating contracts between the Smithsonian Institution and EMR, Westinghouse, and the National Aeronautics and Space Administration.

Almost all the detailed design, fabrication, and testing of the Telescope hardware were performed by subcontractors. Among the most important were the EMR Telemetry Division of Weston Instruments, Inc. (formerly known as Electro-Mechanical Research, Inc.); the Research Laboratories of the Westinghouse Electric Corp.; the Harshaw Chemical Co.; Astro-Data, Inc.; and A. D. Little, Inc. EMR was prime contractor to SAO for the payload and ground-support systems; they had important subcontracts with Westinghouse, Harshaw, and the Ferson Optical Co. Westinghouse was responsible to SAO for development and fabrication of the Uvicon camera tubes; later that responsibility was changed to become a subcontract through EMR, and in 1965 the effort was transferred from the Research Laboratories to the Tube Division. The raw

materials for all the barium fluoride and lithium fluoride optical elements used in the Telescope payload were provided by the Harshaw Chemical Company – some directly under contract to SAO, some under subcontract to EMR, and some under subcontract to Westinghouse. The Ferson Optical Co. fabricated the Schwarzschild telescopes and the Corning and Suprasil filters. They had an important subcontract with Saffran Engineering Company for manufacture of the titanium structural components of these telescopes. Astro-Data designed and fabricated the data-handling equipment that Telescope used to record selected television pictures at Goddard Space Flight Center and to reformat those pictures for analysis on the CDC 6400 computer at SAO. In addition to the spectrophotometric assistance described above, A. D. Little, Inc., performed a number of special engineering analyses for Telescope, including thermal and vibration analyses.

Key subcontractor personnel involved in the Telescope effort were Mr. S. D. Bass, Project Manager for Telescope at EMR; Mr. B. J. Tucker, Project Engineer for Telescope at EMR; Dr. J. P. Magnin, first as head of the Advanced Development Department at EMR, later as General Manager of the Telemetry Division, and finally as President of EMR; Dr. G. Goetze, Mr. R. Schneeberger, Mr. A. E. Anderson, Mr. D. D. Doughty, and Mr. H. Alting-Mees of Westinghouse; Mr. F. Ferson and Dr. A. Schatzel of Ferson.

The Orbiting Astronomical Observatory Project was operated by the Goddard Space Flight Center of the National Aeronautics and Space Administration. The most important single factor contributing to the success of the OAO and its experiments was the support provided by GSFC. The OAO Program Office provided the money for the Telescope Project at SAO, the spacecraft, the test facilities, and the guidance necessary

for SAO to produce a reliable experiment. The Data and Analysis Branch transformed the raw data received from the tracking stations into magnetic tapes that could be processed by SAO's CDC 6400 computer. The Tracking and Data Acquisition Branch provided the logistic support required for communicating with the OAO and with the Telescope experiment. Key personnel included Mr. R. Ziemer, Project Manager of the OAO Project, 1961-1965; Mr. J. Purcell, Project Manager since 1965; Mr. R. Stroup, Experiment Systems Manager; Mr. J. J. Ainley, Assistant Experiment Systems Manager; Mr. R. White, SAO Experiment Coordinator; Mr. W. White, Experiment Systems Manager since 1967; Mr. D. Parker, Data-Processing Engineer; Dr. J. E. Kupperian, Project Scientist for OAO; Mr. S. Osler, Mission Operations Manager; Mr. T. Omara of Grumman Aircraft Corp., Project Operations Controller; Mr. D. Moyer of GAC, Project Operations Controller; Mr. E. Light of GAC, and the other members of the Grumman Operations Crew; Mr. L. Koschmeder, Experiment Test Manager; Mr. J. Stucker, Experiment Coordinator; and Mr. S. Socia, SCPS Manager.

The Telescope Project was supported by Contract NAS 5-1535 from the National Aeronautics and Space Administration, and we appreciate both their monetary and their technical support.

The OAO Program Office at NASA Headquarters provided financial, administrative, policy, and scientific support to Goddard Space Flight Center, without which the OAO Project could not have occurred. Especially helpful in supporting the OAO and Project Telescope were Dr. N. G. Roman, Head of Astronomy; Mr. C. D. Ashworth; and Mr. E. Ott.

7. TAPE FORMAT OF THE CELESCOPE CATALOG

The CeleScope Catalog tape was written on a Control Data 6400 at SAO. The tape is a binary, 7-track tape with 556 bpi and variable-length records. Each record contains the data for all observations of a given star, with the length of the record depending on the number of observations. Each record is written with a FORTRAN binary BUFFER OUT statement. The content of each record is given in Table 2.

In the format description of the tape records, a "word" consists of 60 bits of information, numbered 59-0 from left to right:



All values on the tape are either alphanumeric or integer. Decimal values such as ultraviolet magnitudes, standard deviations, and composite weights have been multiplied by 100 and rounded in order to obtain integers. Alphanumeric quantities such as spectral type and ground-based magnitudes are given in CDC 6400 console display code (see Table 5 for the octal equivalents). Since a character occupies 6 bits, there is a maximum of 10 characters per 60-bit word.

The sign of whole-word, signed-integer (and rounded-decimal) quantities is given in bit 59, and the absolute value right-justified appears in bits 58-0. The following sign convention is used:

<u>Bit 59</u>	<u>Sign of quantity</u>
0	+
1	-

Table 2. Contents of the records in the Telescope Catalog.

Word	Contents			Bits
1	CHECKSUM	UNSIGNED	INTEGER	59-00
2	R. A. (1950) IN SECONDS OF TIME	UNSIGNED	INTEGER	59-00
3	DEC. (1950) IN TENTHS OF MIN. OF ARC	SIGNED	INTEGER	59-00
4	R. A. (2000) IN SECONDS OF TIME	UNSIGNED	INTEGER	59-00
5	DEC. (2000) IN TENTHS OF MIN. OF ARC	SIGNED	INTEGER	59-00
6	DM ZONE SIGN	UNSIGNED	INTEGER	59
6	DM ZONE ABSOLUTE VALUE	UNSIGNED	INTEGER	47-24
6	DM NUMBER	UNSIGNED	INTEGER	23-00
7	AMBIGUOUS I. D. FLAG (1 CHARACTER)	UNSIGNED	ALPHA	16-11
7	MERGED IMAGE FLAG (1 CHARACTER)	UNSIGNED	ALPHA	10-05
7	DM CODE	UNSIGNED	INTEGER	04-01
7	NON-STAR CODE	UNSIGNED	INTEGER	00-00
8	NGC-IC DESIGNATION (4 CHARACTERS)	UNSIGNED	ALPHA	43-20
8	HD NUMBER	UNSIGNED	INTEGER	19-00
9	PECULIARITY CODES 1-10	UNSIGNED	ALPHA	59-00
10	PECULIARITY CODES 11-20	UNSIGNED	ALPHA	59-00
11	PECULIARITY CODE 21	UNSIGNED	ALPHA	53-48
11	M1 × 100 (4 CHARACTERS)	SIGNED	ALPHA	47-24
11	M2 × 100 (4 CHARACTERS)	SIGNED	ALPHA	23-00
12	M3 × 100 (4 CHARACTERS)	SIGNED	ALPHA	48-25
12	MAGNITUDE CODE FOR M1, M2, M3 (Table 4)	UNSIGNED	INTEGER	24-18
12	SPECTRAL CLASS AND SUBCLASS (2 CHAR.)	UNSIGNED	ALPHA	17-06
12	LUMINOSITY (1 CHARACTER)	UNSIGNED	ALPHA	05-00
13	REFERENCE 1 (3 CHARACTERS)	UNSIGNED	ALPHA	53-36
13	REFERENCE 2 (3 CHARACTERS)	UNSIGNED	ALPHA	35-18
13	REFERENCE 3 (3 CHARACTERS)	UNSIGNED	ALPHA	17-00
14	REFERENCES 4-6 SAME AS REF. 1-3			
15	REFERENCES 7-9 SAME AS REF. 1-3			
16	REFERENCES 10-12 SAME AS REF. 1-3			
17	REFERENCES 13-15 SAME AS REF. 1-3			
18	REFERENCES 16-18 SAME AS REF. 1-3			
19	REFERENCE 19 (3 CHARACTERS)	UNSIGNED	ALPHA	53-36
19	REFERENCE 20 (3 CHARACTERS)	UNSIGNED	ALPHA	35-18
20	NAME OR COMMENT (CHARACTERS 1-10)	UNSIGNED	ALPHA	59-00
21	NAME OR COMMENT (CHARACTERS 11-20)	UNSIGNED	ALPHA	59-00

Table 2 (Cont.)

Word	Contents			Bits
22	U1 AVERAGE $\times 100$	SIGNED	INTEGER	59-00
23	(COMPOSITE WEIGHT OF U1) $\times 100$	SIGNED	INTEGER	59-00
24	(RMS DEVIATION OF U1) $\times 100$	SIGNED	INTEGER	59-00
25	U2 AVERAGE $\times 100$	SIGNED	INTEGER	59-00
26	(COMPOSITE WEIGHT OF U2) $\times 100$	SIGNED	INTEGER	59-00
27	(RMS DEVIATION OF U2) $\times 100$	SIGNED	INTEGER	59-00
28	U3 AVERAGE $\times 100$	SIGNED	INTEGER	59-00
29	(COMPOSITE WEIGHT OF U3) $\times 100$	SIGNED	INTEGER	59-00
30	(RMS DEVIATION OF U3) $\times 100$	SIGNED	INTEGER	59-00
31	U4 AVERAGE $\times 100$	SIGNED	INTEGER	59-00
32	(COMPOSITE WEIGHT OF U4) $\times 100$	SIGNED	INTEGER	59-00
33	(RMS DEVIATION OF U4) $\times 100$	SIGNED	INTEGER	59-00
34	NUMBER OF U1 MAGNITUDES TO FOLLOW	UNSIGNED	INTEGER	59-00
35	(FIRST U1 MAG.) $\times 100$	SIGNED	INTEGER	59-00
36	IDENTIFIER OF FIRST U1 MAG.			
36	STATION (1 CHARACTER)	UNSIGNED	ALPHA	59-54
36	ORBIT	UNSIGNED	INTEGER	53-40
36	TAPE (4 CHARACTERS)	UNSIGNED	ALPHA	39-16
36	FRAME	UNSIGNED	INTEGER	15-09
36	OBJECT NUMBER	UNSIGNED	INTEGER	08-00
37	WEIGHT OF FIRST U1 MAG.	UNSIGNED	INTEGER	59-00
38-1	SAME AS 35-37 FOR OTHER U1 MAGNITUDES			
I+1	NUMBER OF U2 MAGNITUDES TO FOLLOW			
(I+2)-J	SAME AS 35-37 FOR U2 MAGNITUDES			
J+1	NUMBER OF U3 MAGNITUDES TO FOLLOW			
(J+2)-K	SAME AS 35-37 FOR U3 MAGNITUDES			
(K+1)	NUMBER OF U4 MAGNITUDES TO FOLLOW			
(K+2)-L	SAME AS 35-37 FOR U4 MAGNITUDES			
L+1	NUMBER OF U1 MAGS. IN FILTER PROXIMITY TO FOLLOW			SEE 34
L+2	(FIRST U1 MAG. IN FILTER PROX.) $\times 100$			SEE 35
L+3	IDENTIFIER OF FIRST U1 MAG. IN FILTER PROX.			SEE 36
L+4	WEIGHT OF FIRST U1 MAG. IN FILTER PROX.			SEE 37
L+5	(ETA OF FIRST U1 MAG. IN FILT. PROX.) $\times 100$	SIGNED	INTEGER	59-00
(L+6)-M	SAME AS (L+2) - (L+5) FOR OTHER U1 MAGS. IN FILTER PROX.			
M+1	NUMBER OF U2 MAGS. IN FILTER PROX. TO FOLLOW			
(M+2)-N	SAME AS (L+2) - (L+5) FOR U2 MAGS. IN FILTER PROX.			
N+1	NUMBER OF U3 MAGS. IN FILTER PROX. TO FOLLOW			
(N+2)-R	SAME AS (L+2) - (L+5) FOR U3 MAGS. IN FILTER PROX.			
R+1	NUMBER OF U4 MAGS. IN FILTER PROX. TO FOLLOW			
(R+2)-S	SAME AS (L+2) - (L+5) FOR U4 MAGS. IN FILTER PROX.			

Table 3. Peculiarity codes.

Column	Information	Comment
1	P	Peculiar spectrum
2	E	Any type of emission
3	N S	Nebulous lines Sharp lines
4	A	Peculiar A-type stars
5	M	Metallic-line stars
6	S	Shell spectrum
7	U	Observed in the ultraviolet below 3000 Å
8	S	Standard on MK or UBV system
9	V S E C M	Visual binary Spectroscopic binary Eclipsing binary Composite spectrum Multiple star
10	E O	Emission nebula Object surrounded by or associated with nebulosity
11	G	Galactic cluster
12		Not used
13	A B C G H I L N P V X Y	α Canum Venaticorum variable β Canis Majoris variable Classical Cepheid variable Eclipsing variable Suspected variable Irregular variable other than Ia of Kurkakin <i>et al.</i> (1971) RR Lyrae variable Nova-like variable Peculiar variable RV Tauri variable Early-type irregular variable (type Ia of Kurkakin <i>et al.</i> , 1971) Unspecified variable

Table 3 (Cont.)

Column	Information	Comment
14	P	Polarization data given
15	C	Interstellar lines of calcium II, H and K
16	S	Interstellar lines of sodium D
17	A	Interstellar 4430 Å absorption band
18	R	Radio source
19	H	High velocity
20	R	Measured axial rotation
21	M	Magnetic field

Table 4. Magnitude code for m_1 , m_2 , m_3 .

Column	Code	Designation		
		m_1	m_2	m_3
52-53	1	V	B-V	U-B
	2	V	B-V	
	3	V		
	4	m_v	m_{pg}	
	5		m_{pg}	
	6	m_v		
	11	V	B-V	$(U-B)_c$
	17	V	m_{pg}	U-B
	19	m_v	B-V	U-B
	21	m_v	B-V	$(U-B)_c$
	28	m_v	B-V	
	36	V	B-V	U-V

Table 5. CDC 6400 FORTRAN character codes.

Source language character	Console display code
A	01
B	02
C	03
D	04
E	05
F	06
G	07
H	10
I	11
J	12
K	13
L	14
M	15
N	16
O	17
P	20
Q	21
R	22
S	23
T	24
U	25
V	26
W	27
X	30
Y	31
Z	32
0	33
1	34
2	35
3	36
4	37
5	40
6	41
7	42
8	43
9	44
+	45
-	46
*	47
/	50
(51
)	52
\$	53
=	54
blank (space)	55
, (comma)	56
. (period)	57

Unsigned quantities are always right-justified in the allocated bits. Although we have allotted 60 bits for many items on the tape for ease of programming, the absolute value never occupies more than the right-most 24 bits of the word.

The checksum in word 1 of the record is the EXCLUSIVE OR of the words in the record. It is useful only for reading the tape on a CDC 6400 machine.

8. PRINTING PACKAGE FOR THE CELESCOPE CATALOG

8.1 Introduction

The printing package for the Celestial Catalog is a computer program intended to allow users of the Catalog to access the magnetic tape with a minimum of programming effort. In the interest of making it as general as possible, we have sacrificed efficiency for generality. Therefore, users who will be reading and printing the tape repeatedly would do well to revise the routines appropriately. All routines have been written in USASI FORTRAN except where otherwise noted. Two versions of the reading and unpacking routines have been supplied with this package. One is a special version corresponding to a 60-bit word size; the other is a general version for a machine of variable word size.

This printing package consists of a driver subroutine (DRIVE) to be called by the user, plus several printing and processing subroutines optionally called by the driver for each star (USER, PRINT, VARPR, and SELCT, as specified on data cards). If the user elects to call PRINT, he will obtain the information for each star, and the

information will be printed in the standard Telescope Catalog format (described in Section 10). If he specifies a call to VARPR, the printout for each star will include only those items he has selected; they will be close-packed on one or more lines. By specifying a call to USER, he can write his own print or processing routine. In this case, USER will be called by the driver once for each star. The unpacked version of the record (see UNPAK, Section 9.6) is passed to USER, allowing the routine to print or otherwise access the data as desired.

The following options are available for printing the Catalog with routine PRINT:

1. All odd pages on one unit; all even pages on another.
2. All pages printed sequentially on one unit, alternating odd and even pages.
3. Only even or only odd pages printed.

Options 1 and 2 require a printer and a tape drive for the Catalog plus two scratch files (either magnetic tape drives or disk files). Option 3 requires a printer and a tape drive for the Catalog plus only one scratch file (either magnetic tape drive or disk).

In addition, when using PRINT, the user can specify if he wants galactic coordinates or right ascension and declination, printed on the even pages, given in an epoch other than the one (2000) normally given there. Note that precession and galactic-coordinate routines are included with this package.

Finally, the package can optionally call subroutine SELECT, which selects stars on the basis of right ascension and declination, HD number, or DM number. This allows the user to print or process only those records (stars) he wishes to see when using PRINT, VARPR, or USER.

8.2 Use of the Printing Package

Unless the user is working with a CDC 6400 series machine, he must supply a main program to call the driver subroutine DRIVE to set up the input/output logical unit numbers. DRIVE is called as follows:

```
CALL DRIVE (I1, I2, I3, I4, I5)
```

- I1 – Card reader unit.
- I2 – Printer unit.
- I3 – Tape drive unit containing the Catalog to be read.
- I4 – Scratch file unit or another printer unit.
- I5 – Scratch file unit.

The following examples and Data Section 3 (in Section 8.3) give more details on I2, I4, and I5.

Example 1

- a. The card reader is logical unit 5.
- b. The printer is logical unit 6.
- c. The tape drive with the Catalog is logical unit 10.
- d. The user has a disk on which he defines a scratch file, logical unit 99.
- e. The user has a tape drive (logical unit 11) on which he writes even-numbered Catalog pages to be copied later to the printer (default option in Data Section 3).

```
CALL DRIVE (5, 6, 10, 11, 99)
```

Example 2

- a. Same as above.
- b. Same as above.
- c. Same as above.
- d. The user has a disk or two extra tape drives on which he can define two scratch files, logical units 98 and 99, and he wishes the Catalog printed directly in odd/even, odd/even page order (DOUBLE option in Data Section 3).

```
CALL DRIVE (5, 6, 10, 98, 99)
```


Example 3

- a. Same as above.
- b. Same as above.
- c. Same as above.
- d. The user has only one scratch unit available (logical unit 40) and wishes to print only odd pages (option SINGLE ODD in Data Section 3).

CALL DRIVE (5, 6, 10, 0, 40)

Note that I4 = 0, but that I5 must always be defined when subroutine PRINT is called.

Example 4

- a. Same as above.
- b. Same as above.
- c. Same as above.
- d. The user wishes to print out selected Catalog information using the VARPR routine instead of PRINT. No scratch files are necessary.

CALL DRIVE (5, 6, 10, 0, 0)

8.3 Description of the Data

Input data for the package consist of several "sections," any of which may be omitted except the last. Each section has a default value that the program will use if no data card is encountered. If the user specifies more than one option card in a section, the last one encountered is used. All option cards begin in column 1 and must not have embedded blanks. All integer quantities must be right-justified in the columns provided.

Data Section 1, Card 1

- a. USER – Call user-supplied routine USER.
or
- b. VARPR – Call variable print routine VARPR.
- c. Default – Call standard Telescope Catalog print routine PRINT.

If option b. is chosen, the following cards are required after the VARPR card:

<u>Card</u>	<u>Columns</u>	<u>Contents</u>
2	1-5	Number of items to be printed by VARPR
3-N+2	1-5	First item number
	6-10	Second item number
	.	.
	.	.
	.	.
	76-80	Nth item number

See Table 7 of subroutine VARP (Section 9. 12) for the correspondence between the list of item numbers and the items in the Catalog.

Ordinarily, VARPR does not separate items in the printout by blanks. However, a facility does exist by which this can be done. If VARPR encounters a negative number in the list of item numbers, it prints as many blanks as the absolute value of the number in that position in the list. A zero is considered equal to -1 for this purpose.

For example, the list below will produce the result shown:

List: 6 -1 4 -2 5 0 9

Result: Item 6, one blank, item 4, two blanks, item 5, one blank, item 9.

If the user wishes to print more than one line of information, he should insert item number 999 in his list at appropriate points. For each such occurrence, a new line will be started with the succeeding item number.

Data Section 2 (used only if PRINT is called), Card 1

- a. GALACT – Print galactic coordinates on even pages.
- or
- b. PRECESS – Print precessed right ascension and declination on even pages.
- c. Default is right ascension and declination for epoch 2000 on even pages.

If option b. is chosen, the following card is required after the PRECESS card:

<u>Card</u>	<u>Columns</u>	<u>Contents</u>
2	1-4	Epoch for precession (e. g., 1975)

Data Section 3 (used only if PRINT is called), Card 1

- a. DOUBLE – Write the two pages of Catalog information on unit I2 in odd/even, odd/even order. I4 and I5 are used for scratch.
- or
- b. SINGLE – Write only even or only odd pages on unit I2, with unit I5 used for scratch (I4, not used, = 0).
- c. Default is to write all even pages on unit I4 and all odd pages on I2, with I5 used as scratch. I2 cannot equal I4. Note: Unless I4 is a printer unit, user must copy its contents to the printer.

If option b. is chosen, card 1 of this section must contain EVEN or ODD, beginning in column 8, to specify whether even or odd pages are desired. The odd pages contain the ultraviolet magnitudes and most other "vital" information.

I1, I2, I3, I4, and I5 must be defined in the user-supplied main program, which calls our driver subroutine DRIVE.

Data Section 4, Card 1

- a. SELECT – Call routine SELECT to select certain stars to be printed or processed; ignore all other stars. Selection is done by HD, DM, and/or R. A., Dec. An HD number occupies one selection word, while DM and R. A., Dec. each occupy two. The total number of selection words allowed per run is 297.
- b. Default is no selection.

If option a. is chosen, at least one of the following subsections is required after the SELECT card. The subsections must be in the order shown.

Subsection 1		
<u>Card</u>	<u>Columns</u>	<u>Contents</u>
1	1-2 11-13	HD Number of HD numbers to follow
2-N	1-6	HD number

Subsection 2		
<u>Card</u>	<u>Columns</u>	<u>Contents</u>
1	1-2 11-13	DM Number of DM numbers to follow
2-N	1-9	DM zone and number as ±ZZbNNNNN

Subsection 3		
<u>Card</u>	<u>Columns</u>	<u>Contents</u>
1	1-5 11-13	RADEC Number of R. A., Dec. pairs to follow
2-N	1-8 11-18	R. A. in hours, minutes, and seconds of time (1950) HHbMMbSS Dec. in degrees, minutes, and tenths of minutes of arc (1950) ±DDbMM. M

Data Section 4 must terminate with a card with FIN in columns 1-3.

Data Section 5, Card 1

- a. END
- b. No default – the END card must be present even if no other data cards are included. It must be the last data card.

8.4 Sample Data Setups

A. To print in Catalog format the whole tape with odd pages on one unit and even pages on another:

No data necessary except END card

B. To print in Catalog format the whole tape with odd/even, odd/even pages on one unit:

DOUBLE
END

C. To print in Catalog format the whole tape as in B. above, with even-page positions precessed to 1975:

DOUBLE
PRECESS
1975
END

D. To print in Catalog format as in B. above, selecting only stars with particular HD or DM numbers and printing even-page positions in galactic coordinates:

DOUBLE
GALACT
SELECT
HDbbbbbbbbbb3
234567
234568
234569
DMbbbbbbbbbb2
-12b34567
-12b34568
FIN
END

E. To print using VARPR R. A., Dec., and HD for all stars:

VARPR
bbbb3
bbbb2bbbb3bbb12

9. DESCRIPTION OF THE ROUTINES IN THE PRINTING PACKAGE

9.1 Introduction

The Telescope Catalog printing package allows the user to access the Catalog tape. It consists of a driver (DRIVE), initializer (INIT), finalizer (FINAL), reader (IREAD), unpackers (UNPAK or UNPAK2), selector (SELECT), and processors (PRINT, VARPR, or USER).

Unpacking the Catalog Tape

There are two versions of the reading and unpacking routines. The first (IREAD and UNPAK) is written for a CDC 6400 and assumes a 60-bit machine word. The second (IREAD and UNPAK2) is written for use on a machine with a word size of N bits, where N is specified by the user.

Treatment of DM Zones of -0

Since some machines do not distinguish between +0 and -0, the Catalog printing package uses the following convention:

Subroutines UNPAK and UNPAK2 convert -0 DM zones on the Catalog tape to -666 DM zones in storage.

When reading data cards to select DM numbers from the Catalog, subroutine INIT converts -0 DM zones to -666 DM zones in storage.

Subroutines PRINT and VARPR will print a DM zone of -666 as a DM zone of -0. A DM zone of -0 will be printed as +0.

Users who write their own UNPAK2 or USER routines should follow this convention.

9.2 Sample Program T (Diane Hills)

Program T is an example of a FORTRAN calling routine for DRIVE (see Section 9.3). Its purpose is to set up the I/O units used in the printing package.

```
PROGRAM T (INPUT, OUTPUT, TAPE1=INPUT, TAPE2=OUTPUT, TAPE3,  
          TAPE4, TAPE5)
```

where

```
TAPE1 (logical unit 1) = card reader.  
TAPE2 (logical unit 2) = printer.  
TAPE3 (logical unit 3) = catalog tape.  
TAPE4 (logical unit 4) = disk file.  
TAPE5 (logical unit 5) = disk file.
```

Program T calls DRIVE with

```
CALL DRIVE(1, 2, 3, 4, 5)
```

Note that unless PRINT is being called, units 4 and 5 can be accessed by the user.

9.3 DRIVE (Diane Hills)

Purpose

DRIVE is the main driver subroutine for the Telescope Catalog printing package. Its purpose is to call any of several subroutines to process or print information for stars on the Catalog tape.

Calling Sequence

DRIVE is called by a user-supplied program or routine, which must pass to it in the calling sequence the logical unit numbers of all I/O units involved:

DRIVE(I1, I2, I3, I4, I5)

where

I1 = card reader unit.
I2 = printer unit.
I3 = catalog tape unit.
I4 = scratch unit or another printer unit or 0.
I5 = scratch unit.

Method

All subroutines called by DRIVE have the following calling sequence:

(IØ, IBUF, IFLAG)

where IØ is the array of logical unit numbers for all I/O involved, as defined by the user in his call to DRIVE IØ is dimensioned 5:

IØ(1) = card reader unit.
IØ(2) = printer unit.
IØ(3) = catalog tape unit.
IØ(4) = scratch unit or another printer unit or 0.
IØ(5) = scratch unit or 0.

Note that while IØ(1), IØ(2), and IØ(3) are standard, IØ(4) and IØ(5) may vary, depending on the printout desired. For example, if VARPR is being called, IØ(4) and IØ(5) are never accessed and thus may be 0. However, if PRINT is being called, IØ(5) must always exist, while IØ(4) may or may not, depending on the page-ordering option.

IBUF is the array of unpacked Catalog items for a star with one integer (right-justified) or one character (left-justified with blank fill) per element. It is returned from routine IREAD. IBUF is dimensioned 3000.

IFLAG is the array of flags determining the purpose of the DRIVE routine. IFLAG is initially defined in INIT and subsequently altered by routines IREAD, SELCT, and FINAL. IFLAG is dimensioned 10. Default values for IFLAG are 0.

IFLAG(1) = 0 if PRINT is to be called.
 = 1 if VARPR is to be called.
 = 2 if USER is to be called.

- IFLAG(2) = 0 if SELECT is not to be called.
 = 1 if SELECT is to be called for every record read.
- IFLAG(3) = 0 if even-page positions are to be R. A. and Dec. at epoch 2000.
 = 1 if even-page positions are to be galactic coordinates.
 = epoch, if even-page positions are to be precessed (e. g., 1975).
- IFLAG(4) = 0 if all odd pages are to be printed on unit IØ(2) and all even pages on unit IØ(4), with unit IØ(5) used as scratch. IØ(4) ≠ IØ(2). (Default.)
 = 1 if all pages are to be printed on unit IØ(2) in odd/even, odd/even order, with IØ(4) and IØ(5) used as scratch. IØ(4) ≠ IØ(2). (DOUBLE option.)
 = 2 if only even pages are to be printed on unit IØ(2), with unit IØ(5) used as scratch. (SINGLE EVEN option.)
 = 3 if only odd pages are to be printed on unit IØ(2), with unit IØ(5) used as scratch. IØ(4) not used. (SINGLE ODD option.)
- IFLAG(5) = 0 throughout run.
 = 1. This is set by routine FINAL for the final call to PRINT or USER, depending on which was called. Note that there is no final call to VARPR.
 Note: IFLAG(3)–(5) are used only if PRINT is being called.
- IFLAG(6) = 0 throughout the run if SELECT is not called.
 = 0 if the SELECT routine rejects the record.
 = 1 if the SELECT routine accepts the record.
- IFLAG(7)–(9), not defined.
- IFLAG(10) = 0 throughout the run.
 = 1 when IREAD encounters an end of file on unit IØ(3).

Subroutines

The following routines are called by DRIVE:

- 1) INIT initializes the program by reading data cards from unit IØ(1) to set up the array IFLAG. INIT is called only once, before any records are read.
- 2) FINAL makes final calls to PRINT or USER and rewinds the Catalog tape. FINAL is called only once, after an end of file is encountered on the Catalog tape.
- 3) IREAD reads a record from the Catalog tape and returns it in unpacked form in buffer IBUF. The unpacked format is defined in Table 6 of UNPAK (Section 9.6). IREAD is called once for every record on the tape.
- 4) SELECT selects only certain records from the tape, when specified to do so by the data cards in INIT. Selection can be made on HD, DM, and/or R. A., Dec.
- 5) PRINT prints a record in standard Catalog format.

6) VARPR prints a record in variable close-packed format on one or more lines.

7) USER, a user-supplied routine, prints or processes a record according to the user's specifications.

Data cards read by INIT determine which one of the three subroutines 5), 6), or 7) is to be called. PRINT, VARPR, and USER are each called once for every record read (unless the record is not selected by SELCT)

FORTRAN

DRIVE is written in USASI FORTRAN.

9.4 INIT (Diane Hills)

Purpose

Subroutine INIT is a Celeste Catalog subroutine called by the routine DRIVE (Section 9.3) to read data cards and initialize arrays (see Section 8). The purpose of INIT is to determine:

- 1) Which of the following subroutines is to be called:
 - a. PRINT (default),
 - b. USER, or
 - c. VARPR.

2) Whether or not routine SELCT is to be called. If SELCT is to be called, INIT also reads data cards specifying which Catalog items are to be selected. Default is not to call SELCT.

3) Whether galactic coordinates or precessed positions are to be printed on even pages (if PRINT is being called).

- 4) Which page-ordering option is to be used (if PRINT is being called).

Calling Sequence

INIT(IØ, IBUF, IFLAG)

where

IØ = array of logical unit numbers.

IBUF = array of unpacked Catalog items. IBUF is not used by INIT.

IFLAG = array of option flags to be defined by INIT. See DRIVE (Section 9.3) for details of IFLAG array items.

Data Defined

INIT sets up the following data:

- 1) Array IFLAG
IFLAG(1)–(4), as determined by data cards.
IFLAG(5)–(10) = 0.
- 2) $I\emptyset(4) = I\emptyset(2)$ if IFLAG(4) = 2 (SINGLE EVEN option).
- 3) Array LIST, as determined by data cards only if VARPR is to be called. See VARPR (Section 9. 11) for further details.
- 4) Item NUM, as determined by data cards only if VARPR is to be called (see Section 9. 11).
- 5) Array ISEL, as determined by data cards only if routine SELCT is to be called. See SELCT (Section 9. 9) for further details.
- 6) Item MSEL, the maximum dimension of ISEL array (= 300).

Items 3–6 above are in the following common blocks in INIT:

```
COMMON/LDATA/NUM, LIST(200)
COMMON/SEL/ISEL(300), MSEL
```

FORTRAN

INIT is written in USASI FORTRAN.

9.5 IREAD (Diane Hills)

Purpose

Subroutine IREAD, a Telescope Catalog routine, is called by subroutine DRIVE (see Section 9. 3). It reads one record (a star) from the Catalog tape and returns it to DRIVE in unpacked form (see UNPAK, Section 9. 6).

Calling Sequence

```
IREAD(I $\emptyset$ , IBUF, IFLAG)
```

where

$I\emptyset$ = an array of logical unit numbers. Note that the Catalog tape is on unit $I\emptyset(3)$. See DRIVE, Section 9. 3.

IBUF = the unpacked array of Catalog items to be returned to DRIVE for further processing.

IFLAG = an array of flags. IREAD returns IFLAG(10) = 1 if an end of file is encountered on the Catalog tape. No other IFLAG elements are accessed.

Method

IREAD, written for the CDC 6400, uses a non-USASI FORTRAN BUFFER IN statement to obtain one record from the Catalog tape. IREAD then calls routine UNPAK to "unpack" the record into the format necessary for all further processing (the unpacked array IBUF).

If IREAD encounters an end of file on unit IØ(3), the flag IFLAG(10) is set to 1.

Comments

If a user wishes to write his own IREAD routine, he should note that the unpacked array has one character, or integer, per element. Since characters are in CDC display code on the tape, the routine CONVT should be used to convert to hollerith equivalents.

Also, the user must remember to return the end-of-file flag IFLAG(10) when necessary.

FORTRAN

IREAD is not written in USASI FORTRAN.

9.6 UNPAK (Diane Hills)

Purpose

Subroutine UNPAK is called by the read routine IREAD. It unpacks the Catalog record into an array containing one character (left-justified with blank fill) or one integer (right-justified) per element.

Calling Sequence

UNPAK(IAREA, IBUF)

where

IAREA = the packed array of Catalog tape items as read by IREAD (dimensioned 1000). See Table 2, Section 7, for a description of IAREA.

IBUF = the unpacked array of Catalog tape items to be returned to DRIVE (dimensioned 3000). See Table 6.

Table 6. Format of unpacked array items.

Unpacked word	Tape word	Contents of unpacked word
1	1	CHECKSUM (+ONLY) INTEGER
2	2	R. A. (1950) SECONDS OF TIME (+OR-) INTEGER
3	3	DEC (1950) 10THS OF MINUTES OF ARC (+OR-) INTEGER
4	4	R. A. (2000) SECONDS OF TIME (+OR-) INTEGER
5	5	DEC (2000) 10THS OF MINUTES OF ARC (+OR-) INTEGER
6	6	DM ZONE (+OR-) INTEGER
7	6	DM NUMBER (+ONLY) INTEGER
8	7	AMBIGUOUS I. D. FLAG LEFT JUST. ALPHANUMERIC CHAR.
9	7	MERGED IMAGE FLAG LEFT JUST. ALPHANUMERIC CHAR.
10	7	DM CODE (+ONLY) INTEGER
11	7	NONSTAR CODE (+ONLY) INTEGER
12	8	FIRST CHAR. OF NGC-IC DESIG. LEFT JUST. ALPHANUMERIC
13	8	SECOND CHAR. OF NGC-IC DESIG. LEFT JUST. ALPHANUMERIC
14	8	THIRD CHAR. OF NGC-IC DESIG. LEFT JUST. ALPHANUMERIC
15	8	FOURTH CHAR. OF NGC-IC DESIG. LEFT JUST. ALPHANUMERIC
16	8	HD NUMBER (+ONLY) INTEGER
17	9	PECULIARITY CODE1 LEFT JUST. ALPHA. CHAR.
.	.	.
.	.	.
.	.	.
37	11	PECULIARITY CODE21 LEFT JUST. ALPHA. CHAR.
38	11	FIRST CHAR. OF M1 × 100 LEFT JUST. ALPHANUMERIC
39	11	SECOND CHAR. M1 × 100 LEFT JUST. ALPHANUMERIC
40	11	THIRD CHAR. M1 × 100 LEFT JUST. ALPHANUMERIC
41	11	FOURTH CHAR. M1 × 100 LEFT JUST. ALPHANUMERIC
42	11	FIRST CHAR. M2 × 100 LEFT JUST. ALPHANUMERIC
43	11	SECOND CHAR. M2 × 100 LEFT JUST. ALPHANUMERIC
44	11	THIRD CHAR. M2 × 100 LEFT JUST. ALPHANUMERIC
45	11	FOURTH CHAR. M2 × 100 LEFT JUST. ALPHANUMERIC
46	12	FIRST CHAR. M3 × 100 LEFT JUST. ALPHANUMERIC
47	12	SECOND CHAR. M3 × 100 LEFT JUST. ALPHANUMERIC
48	12	THIRD CHAR. M3 × 100 LEFT JUST. ALPHANUMERIC
49	12	FOURTH CHAR. M3 × 100 LEFT JUST. ALPHANUMERIC
50	12	MAGNITUDE CODE (+ONLY) INTEGER
51	12	SPECTRAL CLASS LEFT JUST. ALPHA. CHAR.
52	12	SPECTRAL SUBCLASS LEFT JUST. ALPHANUMERIC CHAR.
53	12	LUMINOSITY LEFT JUST. ALPHANUMERIC CHAR.
54	13	FIRST CHAR. OF REF1 LEFT JUST. ALPHANUMERIC
55	13	SECOND CHAR. OF REF1 LEFT JUST. ALPHANUMERIC
56	13	THIRD CHAR. OF REF1 LEFT JUST. ALPHANUMERIC
.	.	.
.	.	.
.	.	.

Table 6 (Cont.)

Unpacked word	Tape word	Contents of unpacked word
111	19	FIRST CHAR. OF REF20 LEFT JUST. ALPHANUMERIC
112	19	SECOND CHAR. OF REF20 LEFT JUST. ALPHANUMERIC
113	19	THIRD CHAR. OF REF20 LEFT JUST. ALPHANUMERIC
114	20	FIRST CHAR. OF COMMENT LEFT JUST. ALPHANUMERIC
.	.	
.	.	
133	21	TWENTIETH CHAR. COMMENT LEFT JUST. ALPHANUMERIC
134	22	U1 AVERAGE $\times 100$ (+OR-) INTEGER
135	23	WT U1 $\times 100$ (+ONLY) INTEGER
136	24	RMS DEV U1 $\times 100$ (+ONLY)
.	.	
.	.	
143	31	U4 AVERAGE $\times 100$ (+OR-) INTEGER
144	32	WT U4 $\times 100$ (+ONLY) INTEGER
145	33	RMS DEV U4 $\times 100$ (+ONLY) INTEGER
146	34	NUMBER OF U1 MAGNITUDES
147	35	U1(I) $\times 100$ (+OR-) INTEGER
148	36	STATION LEFT JUST. ALPHA.
149	36	ORBIT (+ONLY) INTEGER
150	36	FIRST CHAR. OF TAPE LEFT JUST. ALPHANUMERIC
151	36	SECOND CHAR. OF TAPE LEFT JUST. ALPHANUMERIC
152	36	THIRD CHAR. OF TAPE LEFT JUST. ALPHANUMERIC
153	36	FOURTH CHAR. OF TAPE LEFT JUST. ALPHANUMERIC
154	36	FRAME (+ONLY) INTEGER
155	36	OBJECT NUMBER (+ONLY) INTEGER
156	37	WEIGHT U1(I) (+ONLY) INTEGER
.	.	
.	.	
.	.	
N	I+1	NUMBER U2 MAGNITUDES
.	.	
.	.	
NN	J+1	NUMBER U3 MAGNITUDES
.	.	
.	.	
M	K+1	NUMBER U4 MAGNITUDES
.	.	
.	.	
MM	L+1	NUMBER OF U1 MAGNITUDES IN FILTER PROXIMITY
.	.	
.	.	
MM+4	L+5	ETA OF U1(I) $\times 100$ (+OR-) INTEGER

Method

UNPAK can be used only on CDC 6400 machines. It assumes a 60-bit word size and utilizes the Telescope packing routine RUBY (Section 9.7). UNPAK also calls routine CONVT to convert alphanumeric items from CDC console display code to their hollerith equivalent.

If a user writes his own unpacking routine, he should follow this convention if he wishes to use either PRINT or VARPR.

FORTRAN

UNPAK is not written in USASI FORTRAN.

9.7 RUBY (Peter Collins)

Purpose

RUBY is a general-purpose packing and unpacking routine called by the Telescope Catalog printing package subroutine UNPAK (see Section 9.6). Its purpose is to unpack information in a Catalog record.

Method

RUBY was written for a CDC 6400 machine and assumes a 60-bit word. Given a starting bit position in a word, a number of bits N , and a flag as to whether an item is signed, RUBY returns the N bits in a word, right-justified, with extended sign bit if appropriate. RUBY will unpack any number of words at a time.

Calling Sequence

There are two calls necessary for each unpack or pack to be done. One initializes arrays and the other does the packing or unpacking.

- 1) To initialize,

```
ASSIGN N TO NCALL  
CALL RUBY(IBLOCK, NBLOCK, NCALL, IARRAY, NUSED)
```

where

N = statement number of PCK or UNPCK call.

IBLOCK = array of storage of length NBLOCK.

$$NBL\emptyset CK \geq 61 + \sum_{i=1}^n (1 + 1.6 * L_i),$$

where L_i is the length of the i th descriptor array and n is the number of calls to RUBY.

IARRAY = descriptor array of pointers to bits within words (see below).

NUSED = last position in IBL \emptyset CK not in use.

2) To pack or unpack

```
N CALL UNPCK(IREC, IBUF)
      or
N CALL PCK(IREC, IBUF)
```

where

N = statement label, assigned to NCALL in call to RUBY.

IREC = array of packed items.

IBUF = array of unpacked items (always hollerith or integer).

Descriptor Array IARRAY

All the description is done by assigning values to elements of an array called IARRAY. IARRAY's length is 1 greater than the sum of the lengths of IREC and IBUF. The first element gives n_p , the length of IREC. The rest of IARRAY is divided into n_p groups, each corresponding to a successive word of IREC. Each group contains, in turn, $(n_L + 1)$ elements, where n_L is the number of fields in that word of IREC. The first element gives n_L ; if n_L is 0, the IREC word has no fields and it will be the only element in the group. Otherwise, the remainder of the group will describe the n_L fields in the IREC word, with successive elements corresponding to the successive elements of IBUF that are matched with the IREC word's fields. The field description consists of three components: the left-most bit number K , the right-most bit number r , and a flag s (see page 30 for the description of the CDC 6400 bit structure). This last component is 0 if the field is unsigned and 1 if it is signed. The IARRAY element is formed by

$$IELMNT = K*1000 + r*10 + s$$

Thus, a field occupying an entire word would have an IARRAY descriptor value of either 59000 or 59001; a left-justified, signed, 3-bit field would be written as 59571.

Subroutines

The following subroutines are part of the RUBY package:

- 1) UNPCK provides a dummy entry point for the user unpack processing call. It provides a real entry point for RUBY to generate the unpacking code and link it with the processing call.
- 2) INST assembles instructions, transmitted one per call, in a storage block with no-ops as needed. This subroutine is used by PCK and UNPCK.
- 3) FINST terminates the INST assembly.
- 4) PCK provides a dummy entry point for the user pack processing call and a real entry point for RUBY to generate the packing code and link it with the processing call.
- 5) EQUARRAY is a utility routine to set two arrays equal to each other.
- 6) CLEAR is a utility routine to set an array to a single value.
- 7) BADGER is a utility routine to write an absolute address from FORTRAN.
- 8) ABTRACE is a utility routine that puts an error message in the dayfile and an error traceback with relative addresses on OUTPUT and then aborts.
- 9) TRACE, an entry to ABTRACE, provides traceback only, followed by normal return.
- 10) CONT is a utility routine to read an absolute address from FORTRAN.

FORTRAN

RUBY is not written in USASI FORTRAN.

9.8 CONVT (Diane Hills)

Purpose

CONVT is a subroutine called by UNPAK. Its purpose is to convert alphanumeric characters from CDC display code (on tape) to their hollerith equivalents (for printing).

Calling Sequence

CONVT(ID)

where

ID = input with the character in CDC display code right-justified with zero fill in the word.

ID = output with the character left-justified with blank fill in the word.

Method

CONVT is independent of word size. It utilizes the numeric correspondence between the CDC display codes on the tape (octal 01-57) and the characters A-Z, 0-9, +, -, *, /, (,), \$, =, blank, comma, and period.

It assumes a binary machine.

See Table 5, Section 7, for a listing of the console display codes.

FORTRAN

CONVT is written in USASI FORTRAN.

9.9 SELCT (Linda Kirschner)

Purpose

Subroutine SELCT is the star-selection routine for the Telescope Catalog printing package. It selects stars on the basis of HD number, DM zone and number, and/or R. A. and Dec.

Calling Sequence

SELCT(IØ, IBUF, IFLAG)

where

IØ = an array containing the I/O unit numbers. It is not used by SELCT.

IBUF = the unpacked array of Catalog items. See UNPAK writeup, Section 9.6.

IFLAG = an array of various flags. Only IFLAG(6) is used by SELCT.

Method

SELCT is called once by the driver subroutine DRIVE for each record (star). If the star satisfies any of the conditions specified on the selection data cards, SELCT returns with IFLAG(6) = 1 (accept star). Otherwise, IFLAG(6) = 0 (reject star).

COMMON Statements

SELCT contains a labeled common block

```
COMMON/ISEL/ISEL(300), MSEL
```

ISEL contains the selection information and is set up by subroutine INIT from the selection data cards. It is described in comment cards at the beginning of SELCT. The size of ISEL can be changed simply by changing its dimension and the value of variable MSEL to correspond to its length. Increasing the size of ISEL will allow more selection data cards.

Comments

Note that selection depends on an exact equality of the quantities.

Also note that R. A. and Dec. are stored in ISEL in seconds of time and tenths of a minute of arc, respectively (although they are specified on data cards in hours, minutes, and seconds and degrees and minutes). The epoch is 1950.0.

FORTRAN

SELCT is written in USASI FORTRAN.

9.10 PRINT (Peter Collins)

Purpose

Subroutine PRINT is called by the driver routine DRIVE (see Section 9.3). It prints, in standard Catalog format, information for stars on the Catalog tape.

Calling Sequence

```
PRINT(IØ, IBUF, IFLAG)
```

where IØ is an array of logical unit numbers:

IØ(1) = card reader (not used by PRINT).

IØ(2) = printer (always used by PRINT).

IØ(3) = Catalog tape (not used by PRINT).

IØ(4) = 0 if only odd pages are being printed by PRINT on unit IØ(2) (SINGLE ODD option in data) (i. e., IØ(4) not accessed).

$I\emptyset(4) = I\emptyset(2)$ if only even pages are being printed by PRINT on unit $I\emptyset(4)$ (= printer) (cont.) (SINGLE EVEN option in data). Note that subroutine INIT sets $I\emptyset(4) = I\emptyset(2)$ in this case.

= scratch-unit number or another printer if all even pages are to follow all odd pages in the printout. In this case, $I\emptyset(4)$ will contain all the even pages, and if it is a scratch unit, it must be copied to the printer after job termination in order to obtain the even-page printouts (default option in data). Note: $I\emptyset(4)$ cannot equal $I\emptyset(2)$.

= scratch-unit number if odd/even, odd/even page ordering is desired. In this case, $I\emptyset(4)$ is used as scratch (DOUBLE option in data).

$I\emptyset(5)$ = scratch-unit number. PRINT always accesses this scratch file, regardless of which page-ordering option is used.

IBUF is the unpacked array of Catalog items to be printed.

IFLAG is an array of flags.

Method

PRINT is called once for every star. It stores information for five stars at a time before printing, ensuring a multiple of five stars per page, except on the last. Each page is printed with headings.

FORTRAN

PRINT is written in USASI FORTRAN.

9.11 VARPR (Diane Hills)

Purpose

Subroutine VARPR is called by the driver routine DRIVE (see Section 9.3) to call subroutine VARP to print, in user-supplied variable order, a number of items from the Catalog tape (see VARP, Section 9.12).

Calling Sequence

($I\emptyset$, IBUF, IFLAG)

where

$I\emptyset$ = an array of logical units used by DRIVE ($I\emptyset(2)$ is the printer).

IBUF = an array of unpacked Catalog items returned from routine IREAD.

IFLAG = an array of flags used by DRIVE.

COMMON Statements

VARPR contains a labeled common block:

```
COMMON/LDATA/NUM, LIST(200)
```

set up in routine INIT, also called by DRIVE.

FORTRAN

VARPR is written in USASI FORTRAN.

9.12 VARP (Diane Hills)

Purpose

VARP prints, in close-packed format with no labels, any number of Telescope Catalog tape items, on one or more lines, using a variable format.

Method

VARP obtains the unpacked record items in the array IBUF, with one character (left-justified) or integer per element in the array. See Table 6, Section 9.6, for a description of the IBUF array.

A set of NUM pointers to the particular items to be printed is obtained in a list LIST. See Table 7 for a description of valid pointers and the items to which they refer. The order of item numbers in LIST determines the order of the printed output.

VARP sets up one line of information to be printed at a time. If the user attempts to print more items than will fit on a line (119 characters), the overflow items will appear on a subsequent line of print. See Table 7 for the individual formats associated with each item to be printed.

Owing to their special nature, items 74-109 automatically print at the beginning of a new line. However, if no value exists for a particular item 74-109 and an attempt is made to print it, no line is printed.

If a particular item 2-73 is nonexistent in a record and an attempt is made to print it, blanks are printed in the space available.

Table 7. Pointers and format of VARP items.

Item	Description	Format
1	Checksum	Not to be printed. Will result in one blank
2	R. A. (1950)	I6 (HHMMSS)
3	Dec. (1950)	I6 (\pm DDMMM)
4	R. A. (2000)	I6 (HHMMSS)
5	Dec. (2000)	I6 (\pm DDMMM)
6	DM number	I3, I5 (\pm ZZNNNNN)
7	Ambiguous I. D.	A1
8	Merged image	A1
9	DM code	I1
10	NONSTAR code	I1
11	NGC-IC designation	4A1
12	HD number	I6
13	Peculiarity code 1	A1
.	.	.
.	.	.
.	.	.
33	Peculiarity code 21	A1
34	M1	5A1 (MM. MM)
35	M2	5A1 (MM. MM)
36	M3	5A1 (MM. MM)
37	Magnitude code	I1
38	Spectrum	2A1
39	Luminosity	A1
40	Reference 1	3A1
.	.	.
.	.	.
.	.	.
59	Reference 20	3A1
60-61	Comment	20A1
62	U_1 average	F6. 2 (\pm XX. XX)
63	Composite weight of U_1	F6. 2 (XXX. XX)

Table 7 (Cont.)

Item	Description	Format
64	RMS deviation of U_1	F6.2 (+XX. XX)
65	U_2 average	F6.2 (\pm XX. XX)
66	Composite weight of U_2	F6.2 (XXX. XX)
67	RMS deviation of U_2	F6.2 (+XX. XX)
68	U_3 average	F6.2 (\pm XX. XX)
69	Composite weight of U_3	F6.2 (XXX. XX)
70	RMS deviation of U_3	F6.2 (+XX. XX)
71	U_4 average	F6.2 (\pm XX. XX)
72	Composite weight of U_4	F6.2 (XXX. XX)
73	RMS deviation of U_4	F6.2 (+XX. XX)
74	Number of U_1 magnitudes	I3
75	All $U_1(I)$	F6.2 (\pm XX. XX)
76	All ID $U_1(I)$	1X, A1, I4, 4A1, I2, I3
77	All WT $U_1(I)$	I6
78	Number of U_2 magnitudes	I3
.	.	.
.	.	.
.	.	.
90	Number of U_1 magnitudes in filter proximity	I3
.	.	.
.	.	.
.	.	.
94	All eta $U_1(I)$	F6.2 (\pm XX. XX)
.	.	.
.	.	.
.	.	.
109	All eta $U_4(I)$	F6.2 (\pm XX. XX)

Comments on Format

The user may determine his output format to a certain extent by means of the following:

1) The appearance of a negative number in LIST will cause that (absolute) number of blanks to be printed at that point. For example, to insert three spaces between HD number (pointer 16) and DM number (pointer 6), LIST would contain the elements 16 -3 6. Item number 0 will give one blank space.

2) The appearance of item number 999 in LIST will cause a new line to be started at that point.

Calling Sequence

VARP is called with

(IPR, IBUF, LIST, NUM)

where

IPR = the logical unit number of the printer or file on which all printed output appears.

IBUF = the array of unpacked Catalog items. Each element in the array contains either a single hollerith character, left-justified with blank fill, or a right-justified integer.

LIST = an array of pointers to the items to be printed. Item pointers may be positive numbers from 1 to 109 (see Table 7), negative numbers, or 999.

NUM = the number of pointers appearing in LIST, i.e., the number of items to be printed.

Special Comments on FORTRAN

VARP is written in USASI FORTRAN and assumes that the user's system has capabilities for:

1) Printing with variable format (non-USASI).

2) Equivalencing an integer and a real array.

3) Printing an integer variable with an F-format conversion as long as the contents of the integer variable are real (obtained through 2) above).

Example

The following DRIVE output gives a data-card setup for VARP, showing the 73 LIST elements.

DATA CARDS READ

VARPR

```
74
 2  3  4  5  6  0  9  0 12  0 34 35 36  0 37  0
 0 38 39  0 40 41 42 999 60 61 62 63 64 65 66 67
68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83
84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99
100 101 102 103 104 105 106 107 108 109
END
```

It would produce the following printout for the first star on the Catalog tape.

```
 9 59410 243 59577+59 2819 1 9.4 9.5 4 A0 897A20A23
W/ 59 2819 FØLL. 14.63 1.00 0.00
0
1
14.63
R 2698551 3 14
0
0
0
0
0
0
0
```

9.13 USER (Diane Hills)

Purpose

USER is a user-supplied subroutine called by the Telescope Catalog printing package driver routine DRIVE (Section 9.3). Its purpose is to process a record from the Catalog tape.

Calling Sequence

USER is called with

(IØ, IBUF, IFLAG)

where

IØ = an array of logical unit numbers.

IBUF = the unpacked array of Catalog items.

IFLAG = an array of flags.

Comments

The user should note the following when writing his own routine USER:

1) IFLAG(5) = 0 every time USER is called by DRIVE. When an end of file is encountered on the Catalog tape, USER is called one last time from FINAL with IFLAG(5) = 1. On each call to USER but the last, IBUF contains information about one star in the Catalog. The last call allows printing of totals and other such final processing.

2) Any initializing necessary can be done on the first call to USER, as follows:

```
SUB USER(IØ, IBUF, IFLAG)
.
.
DATA IFIRST/0/
.
.
IF(IFIRST.EQ.1) GØ TØ 30
.
.
initializing (print headings, etc.)
.
.
IFIRST=1
30 CONTINUE
.
.
```

3) The user may call routine VARPR (or VARP) from USER if the proper LIST elements are defined. Calls to PRINT, however, may be hazardous if other printing is done within routine USER. Calling PRINT from USER is not recommended.

Example of USER

The following example of the USER subroutine will count the number of A0 stars in the Telescope Catalog and print the total.

SUBROUTINE USER(IO, IBUF, IFLAG)

```
C
C      USER ROUTINE TO COUNT THE NUMBER OF A0 STARS IN THE CATALOG
C
000006      DIMENSION IO(5), IBUF(3000), IFLAG(10)
000006      DATA IA, IZERO/1HA, 1H0/
000006      DATA IK0/0/
C
C      CHECK FOR FINAL CALL
C      (FROM FINAL)
C
000006      IF(IFLAG(5).NE.0) GOTO900
C
C      CHECK FOR A0 STAR
C
C      SPECTRAL CLASS
000007      IF(IBUF(51).NE.IA) RETURN
C      SPECTRAL SUB CLASS
000011      IF(IBUF(52).NE.IZERO) RETURN
000014      IK0=IK0+1
000016      RETURN
C
C      FINALIZE
C      PRINT TOTAL
C
000016      900 CONTINUE
000016      LUPR=IO(2)
000020      WRITE(LUPR, 905) IK0
000025      905 FORMAT(1H1, 5HFOUND, I5, 9H A0 STARS)
000025      RETURN
000026      END
```

9.14 FINAL (Diane Hills)

Purpose

Subroutine FINAL is a Telescope Catalog routine called by the driver routine DRIVE (see Section 9.3). Its purpose is to rewind the Catalog tape and, if necessary, to make a final call to routine PRINT or USER.

FINAL is called only once, after an end of file has been encountered on the Catalog tape.

Calling Sequence

FINAL (IØ, IBUF, IFLAG)

where

IØ = an array of logical unit numbers.

IBUF = an array of unpacked Catalog items.

IFLAG = an array of flags.

Comments

FINAL sets IFLAG(5) = 1 and makes a final call to PRINT if PRINT has been called throughout the run or to USER if USER has been called throughout the run.

FORTRAN

FINAL is written in USASI FORTRAN.

9.15 UNPAK2 (Diane Hills)

Purpose

Subroutine UNPAK2 is a Telescope Catalog routine called by the Catalog tape-reading routine IREAD. It unpacks a Catalog record into an array containing one character (left-justified with blank fill) or one integer (right-justified) per element. UNPAK2 utilizes the user's machine word size (in bits) as a variable and thus will work on any machine.* Since it is a generalized routine, it takes approximately twice as long as the original unpacking routine UNPAK (which works only on machines with a 60-bit word) (see Section 9.6).

Those who wish to utilize UNPAK2, instead of UNPAK or their own unpacking routine, will have to supply an IREAD routine that calls UNPAK2 appropriately.

Calling Sequence

UNPAK2(LEN, IBUF, IARRAY)

where

LEN = the word length, in bits, of the machine being used to read the Catalog tape (e. g., LEN = 60 if the tape is being read by a CDC 6400 machine).

* UNPAK2 assumes a machine word ≥ 24 bits.

IBUF = the variable-length buffer containing one Catalog record as read by IREAD. IBUF consists of words of bit size LEN; the number of words in IBUF varies according to the number of observations in the record (dimensioned 1000).

IARRAY = the variable-length array of unpacked Catalog items returned to DRIVE. IARRAY consists of words of bit size LEN. See Table 6 for a description of this array.

Method

UNPAK2 utilizes the machine word size LEN and the known Catalog-item bit positions per 60-bit word on the tape to obtain bit positions per LEN-bit word in IBUF. With this information and the length, in bits, of each Catalog item, UNPAK unpacks IBUF into IARRAY.

UNPAK2 calls routines GETBIT to obtain item bit positions per LEN-bit word, IBITS to obtain the actual bits per Catalog item right-justified in a word, and CONVT to convert characters from CDC display code on tape to hollerith equivalents.

Note that UNPAK2 assumes the significance of only the right-most 24 bits of any 60-bit word containing a single item (e. g., declination). The sign bit, if present, is considered separately.

Signed Catalog Items

UNPAK unpacks signed quantities by obtaining first the absolute value of the item (in general, the right-most 24 bits of the 60-bit word) and then the sign bit (in general, the left-most bit of the 60-bit word).

FORTRAN

UNPAK2 is written in USASI FORTRAN.

9.16 GETBIT (Diane Hills)

Purpose

GETBIT is a general-purpose bit-conversion routine called by the Telescope Catalog printing package routine UNPAK2 (see Section 9.15). It has the following purpose:

Given

IWD = a word count in terms of 60-bit words

IBIT = a bit position in word number IWD (1-60, L-R)

LEN = a word length in bits (≤ 60),

GETBIT returns

JWD = a word count in terms of LEN-bit words

JBIT = a bit position in word number JWD (1-LEN, L-R) corresponding to bit-position IBIT in word number IWD.

COMMON

GETBIT has no arguments in its calling sequence. All values are transferred to and from GETBIT via a labeled common block:

COMMON/BITS/IWD, IBIT, JWD, JBIT, IDUM, LEN

where IWD, IBIT, JWD, JBIT, and LEN are described above and IDUM is a dummy variable not used by GETBIT.

FORTRAN

GETBIT is written in USASI FORTRAN.

9.17 IBITS (Diane Hills)

Purpose

Function IBITS is a general-purpose bit-shifting routine called by the Telescope Catalog printing package routine UNPAK2 (see Section 9.15). It has the following purpose:

Given

JBUF = an array of LEN-bit words

JWD = a word position in JBUF

JBIT = a starting bit-position in JBUF (JWD) (\leq LEN)

JLEN = a length, in bits (\leq LEN)

LEN = the machine word lengths, in bits,

IBITS is returned as a word containing the JLEN bits that start in bit-position JBIT of JBUF(JWD) and continue to the right for JLEN - 1 bits, right-justified with zero fill.

Arguments and COMMON

IBITS has the calling sequence

```
FUNCTION IBITS(JBUF)
```

All other values are transferred to the function via the labeled common block

```
COMMON/BITS/IDUM1, IDUM2, JWD, JBIT, JLEN, LEN
```

IDUM1 and IDUM2 are dummy arguments not used by IBITS. JWD, JBIT, JLEN, LEN, and JBUF are described above.

Method

IBITS calls two bit-shifting functions IRSHFT and ILSHFT, where

I = IRSHFT(I1, N) returns I as the word I1 shifted N bits to the right
and

I = ILSHFT(I1, N) returns I as the word I1 shifted N bits to the left

IRSHFT and ILSHFT are independent of machine word size and may produce either end-off or end-around shifts because IBITS always masks the shifted word I according to the significant bits desired.

The user must supply IRSHFT and ILSHFT. Presumably, comparable routines exist on the user's system.

FORTRAN

IBITS is written in USASI FORTRAN.

10. EXPLANATION OF THE CATALOG COLUMNS

The contents of the Catalog are printed in a two-page format. The first, or odd-numbered, pages include the primary data, identification, position, UBV, and ultraviolet magnitudes. The second, or even-numbered, pages contain the known peculiarities, remarks about the object, including the DM numbers of stars that may be merged with it, and a list of references used to compile the ground-based data on the star. The following gives a detailed explanation of each column in the Catalog. The number following a catalog name refers to its number in the Reference List. Sample pages are shown in Figure 11.

ODD-NUMBERED PAGES

<u>Column Heading</u>	<u>Contents</u>
—	Sequence number from 1-90 to permit identification of the star on the even-numbered page.
HD	Henry Draper Catalogue number (922) or Henry Draper Extension number (A23, A24).
DM	Durchmusterung number: B BD, Bonner Durchmusterung (898) C CD, or CoD, Cordoba Durschmusterung (899) P CPD, Cape Photographic Durchmusterung (900). The Henry Draper Catalogue convention was used in the selection of the DM number for a star.

I	HD	DM	R.A. (1950)	DEC	V	B-V	U-b	S-L	U1	SD1	U2	SD2	U3	SD3	U4	SD4
1	29082	B- 2	942	4 32 4 - 2	11.1	8.2 M	8.2 G	A0	11.15		11.41					
2	29226	B- 2	952	4 33 31 - 2	19.9	8.1 M	8.1 G	B9	10.00		9.96					
3		B- 3	832	4 33 45 - 3	38.2	8.3 M		B9			11.83					
4	33069	B- 8	1035	5 5 3 - 8	43.1	6.88M		B8 /			8.91					
5	33316	B- 6	1094	5 6 42 - 6	30.1	8.5 M		B9			10.34		11.03			
6	33370	B- 5	1172	5 7 11 - 5	36.9	8.8 M		A0			12.26					
7	33547	B- 5	1178	5 8 20 - 5	13.8	8.5 M		B9			10.75	.01				
8	33590	B- 5	1179	5 8 37 - 5	39.7	9.0 M		B9			11.67					
9	33610	B- 6	1104	5 8 42 - 6	5.0	8.3 M		A0			11.41	.25	12.83			
10		B- 8	1057	5 10 34 - 8	7.4	8.0 M		A0			11.21					
11	33902	B- 5	1191	5 10 52 - 5	1.9	9.40M		A0			12.52	.55				
12	33918	B- 4	1073	5 11 0 - 4	42.6	8.0 M		A0			12.06	.42				
13	33928	B- 3	1042	5 11 9 - 3	40.8	7.6 M	7.6 G	B8 /	9.47							
14	33994	B- 6	1112	5 11 22 - 6	48.3	8.0 M		B8	9.63	.06	9.23	.49	9.40		9.92	.26
15		B- 7	1009	5 12 4 - 7	20.3	8.5 M		A0			10.86	.20	11.92			
16	34164	B- 5	1204	5 12 37 - 5	18.5	9.0 M		A0			12.12					
17	34280	B- 3	1051	5 13 45 - 3	32.3	8.6 M	8.6 G	B9			11.35					
18	34342	B- 5	1208	5 14 6 - 5	6.9	8.8 M	8.9 G	A2			12.25	.20				
19	34417	B- 7	1024	5 14 31 - 6	59.4	8.0 M	8.0 G	A0			10.89	.06			11.77	
20	34481	B- 4	1090	5 15 8 - 4	46.9	6.85M	8.85G	A0			12.12					
21	34639	B- 9	1119	5 16 23 - 9	5.8	9.2 M	9.2 G	B9			12.32					
22	34686	B- 5	1219	5 16 39 - 5	.6	8.55M	8.55G	A0			12.19	.34				
23	34736	B- 7	1036	5 16 56 - 7	23.9	8.0 M		B9	10.56		10.18	.15	11.12			
24	34734	B- 4	1102	5 17 2 - 4	23.5	8.6 M	8.6 G	A0			12.57					
25	34774	B- 5	1221	5 17 14 - 4	55.6	7.35M	7.35G	A0			11.37					
26	34814	B- 7	1042	5 17 26 - 7	10.9	8.8 M		A0			11.79		12.84			
27	34813	B- 7	1041	5 17 26 - 6	58.9	8.8 M		A0			11.76		12.66			
28	34827	B- 5	1223	5 17 35 - 5	15.5	7.09M		B9	10.24	.36	10.07	.21	11.05		10.49	
29	34835	B- 6	1141	5 17 41 - 5	53.7	8.6 M		B8	11.10		10.65					
30	34861	B- 7	1043	5 17 47 - 7	9.2	8.8 M		A0			11.93		12.89			
31	34892	B- 8	1092	5 18 0 - 8	4.7	8.0 M	8.3 G	F2 /			12.02					
32	34890	B- 5	1226	5 18 2 - 5	51.7	9.2 M		A0			11.72					
33	34889	B- 5	1227	5 18 5 - 5	20.2	9.2 M		B9			11.20	.05	11.69			
34	35178	B- 7	1054	5 20 10 - 7	38.4	8.0 M	8.0 G	A0			12.15					
35	35225	B- 8	1103	5 20 28 - 8	8.0	9.0 M	9.0 G	A0			12.54					
36	35223	B- 6	1158	5 20 32 - 6	45.6	8.7 M		A2			12.37					
37	35261	B- 8	1105	5 20 40 - 8	9.1	8.5 M		A0	10.57	.42	10.15					
38	35353	B- 6	1109	5 21 20 - 8	20.1	8.6 M	8.6 G	A0			11.81					
39	35659	B- 7	1075	5 23 34 - 7	.2	8.5 M		A3			12.08					
40	36695	B- 1	943	5 30 59 - 1	11.4	5.34	-0.18 -1.09V	B15*	6.76		6.21	.22	6.74	.22	6.33	.52

Figure 11a. Sample odd-numbered page of the Catalog.

2 NS	R.A. (2000)	DEC	WT1	WT2	WT3	WT4	CBJ	PHOT	S-PEC	REMARKS	REFERENCES
1	4 34 35	- 2 4.9	1.0	1.0							897 922
2	4 36 2	- 2 13.8	1.0	1.0							897 922
3	4 36 15	- 3 32.1		1.0							897
4	5 7 27	- 8 39.2		1.0				0			897 922 969
5	5 9 8	- 6 26.3		1.0	1.0						897 922
6	5 9 38	- 5 33.2		1.0							897 922
7	5 10 48	- 5 10.2		2.0							897 922
8	5 11 4	- 5 36.1		1.0							897 922
9	5 11 9	- 6 1.4		3.0	1.0						897 922
10	5 12 58	- 8 3.9		1.0							897
11	5 13 20	- 4 58.4		2.0							897 922 A07
12	5 13 28	- 4 39.1		3.0							897 922
13	5 13 38	- 3 37.4	1.0					U			897 922 A26
14	5 13 48	- 6 44.9	2.0	4.0	1.0	2.0					897 922
15	5 14 29	- 7 16.9		2.3	1.0						897
16	5 15 5	- 5 15.2		1.0							897 922
17	5 16 15	- 3 29.0		1.0							897 922
18	5 16 34	- 5 3.7		2.0							897 922
19	5 16 57	- 6 56.2		2.0		1.0					897 922
20	5 17 36	- 4 43.7		1.0							897 922
21	5 18 46	- 9 2.7		1.0							897 922
22	5 19 7	- 4 57.5		2.0							897 922
23	5 19 21	- 7 20.9	1.0	2.0	1.0						897 922
24	5 19 31	- 4 20.5		1.0							897 922
25	5 19 42	- 4 52.6		1.0							897 922
26	5 19 51	- 7 7.9		1.0	1.0						897 922
27	5 19 52	- 6 55.9		1.0	1.0						897 922
28	5 20 3	- 5 12.5	3.0	3.0	1.0	1.0					897 922
29	5 20 8	- 5 50.7	1.0	1.0							897 922
30	5 20 12	- 7 6.2		1.0	1.0						897 922
31	5 20 24	- 8 1.7		1.0				0			897 922 969
32	5 20 29	- 5 48.7		1.0							897 922
33	5 20 33	- 5 17.3		2.0	.3						897 922
34	5 22 35	- 7 35.6		1.0							897 922
35	5 22 52	- 8 5.2		1.0							897 922
36	5 22 58	- 6 43.0		1.0							897 922
37	5 23 4	- 8 6.3	2.0	1.0					W/ -8 1103		897 922
38	5 23 44	- 8 17.4		1.0							897 922
39	5 26 0	- 6 57.7		1.0							897 922
40	5 33 31	- 1 9.4	1.0	15.0	2.0	6.0	U2P	NK	VV ORI, SB		897 002 012 013 020 036 259 377 756 884 901 921 922 969 A26 A42 A48 A54 A55 A59

Figure 11b. Sample even-numbered page of the Catalog.

Column Heading

Contents

R. A. (1950)DEC

Positions. The position is taken from the SAO Star Catalog if the first reference number is 897. The position is the DM position precessed to 1950.0 if the star was not in the SAO catalog and if one of the DM catalogs (898, 899, 900) is the first reference number. The position is the average of all positions given by the references after they were precessed to 1950.0 if neither the SAO nor the DM positions are available. If the star was not identified with a known object, the position was determined from the Telescope data and has an accuracy of about 1 arcmin. If the "star" is the merged image of two stars and is merged in all observations, then the more probable star is used. Average positions are used to distinguish among unique combinations if the images are merged differently on different frames.

V

The photoelectric V magnitude of the UBV system, when available; otherwise, in order of preference, m_v , m_{pv} , m_{pg} . To distinguish among these possibilities, the magnitude given may be followed by M(m_v), P(m_{pv}), or G(m_{pg}). If, when these data were compiled, different sources agreed to within 0.10^m , the arithmetic mean is given. If the star has any type of magnitudes listed in the Naval Observatory Catalogue

Column Heading

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V (cont.)

(reference A19 is always the first or second entry in the reference list), then that datum is used in preference to any other. Magnitudes given to one decimal place required a consistency of $\pm 0.^m5$ in the source material. Magnitudes given to two decimal places required a consistency of $\pm 0.^m05$ from those sources reporting the magnitude to two decimal places.

B-V

The photoelectric B-V color of the UBV system; otherwise, the magnitude m_{pg} (followed by a G) if available. The same conventions used in the V column with regard to accuracy and the use of reference A19 apply.

U-B

The photoelectric U-B color of the UBV system, when available; otherwise, in order of preference, U-V followed by a V or $(U-B)_c$ followed by a C. The same conventions for accuracy and use of A19 apply as in the V column.

S-L

Spectrum and luminosity. If different sources agreed to within ± 2 subclasses, the arithmetic mean was taken; otherwise, a decision was made on which spectrum to use. Intermediate spectral subclasses and luminosities have been truncated, and luminosities decimalized; i. e., a star of spectral type B0.5II-III is listed as B02.

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S-L (cont.)

Peculiarity flag. One of the following symbols may follow the spectrum and luminosity, indicating that the even-numbered page contains information affecting the spectrum:

- + A spectral peculiarity exists
- / A photometric peculiarity exists
- \$ A comment exists
- * More than one of the above exists.

U1

U1 magnitude, the weighted mean of the Telescope observational results in the U1 color band (2100 to 3200 Å). Telescope magnitudes are based on spectral irradiance in MKS units: $U_n = -2.5 \log I$, where I is the spectral irradiance from the observed star at the effective wavelength of the color band, in units of watts per square meter per meter of wavelength. The U1 magnitude is derived from the formula

$$U1 = \frac{\sum [1/(1+w_i)] U1_i}{\sum [1/(1+w_i)]} ,$$

where $U1_i$ is the *i*th observation of the U1 magnitude, and w_i is the weighting factor, equal to zero except:

w = 3 if the object could not be separated from a neighboring object by our standard computer program and was separated manually,

or

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U1 (cont.) if the object was within 15 arcmin of the line through the center of the field separating the two different optical filters, which were rigidly mounted in front of each television camera.

w = 6 if the object was both manually split and near the filter split line.

w = ∞ if the object was within 5 arcmin of the filter split line, or if the object was in a part of the picture having a bright background, or if the object touched the edge of the picture.

SD1 The root-mean-square (RMS) deviation of the observations used to compute U1, based on the formula

$$SD1 = \left\{ \frac{\sum [1/(1+w_i)] (U1_i - U1)^2}{\sum [1/(1+w_i)]} \right\}^{1/2}$$

If U1 is based on a single observation, the standard deviation is blank.

U2 U2 magnitude, the weighted mean of the Telescope observational results in the U2 color band (1550 to 3200 Å), calculated the same way as U1.

SD2 The RMS deviation of U2, computed in the same way as SD1.

U3 U3 magnitude, the weighted mean of the Telescope observational results in the U3 color band (1350 to 2150 Å), calculated the same way as U1.

<u>Column Heading</u>	<u>Contents</u>
SD3	The RMS deviation of U3, computed in the same way as SD1.
U4	U4 magnitude, the weighted mean of the Telescope observational results in the U4 color band (1050 to 2150 Å), calculated the same way as U1. Very few U4 magnitudes are given, because of interference from the bright Lyman-alpha background of the geocorona.
SD4	The RMS deviation of U4, computed in the same way as SD1.

EVEN-NUMBERED PAGES

<u>Column Heading</u>	<u>Contents</u>
-	Sequence number (the same number as on the matching odd-numbered page).
NS	The NGC, IC, 3C number or other designation for the object. Association names also appear in these columns.
R. A. (2000)DEC	The star's right ascension and declination precessed to epoch 2000.
WT1	The composite weight of the observations of the object in filter 1, calculated with the equation $WT1 = \sum [1/(1+w_i)] \quad ,$ where w_i is as defined in the U1 column.
WT2	The composite weight of the observations of the object in filter 2, calculated in the same manner as WT1.

<u>Column Heading</u>	<u>Contents</u>
WT3	The composite weight of the observations of the object in filter 3, calculated in the same manner as WT1.
WT4	The composite weight of the observations of the object in filter 4, calculated in the same manner as WT1.
OBJ	Codes referring to the general type of object, primarily to nonstellar objects. More than one of the following letters may apply, and the printed order is not significant: <ul style="list-style-type: none"> D Diffuse emission nebula G Galactic cluster O Object surrounded by or associated with nebulosity R Radio source.
PHOT	One-letter codes designating known photometric properties of the star, and a number code designating variability. More than one of the following letters or numbers may apply, and the order is not significant: <ul style="list-style-type: none"> B Visual binary H High-velocity star M Multiple star P Polarization data available S Standard on MK or UBV system U Observed in the ultraviolet below 3000 Å 0 Suspected variable 2 Eclipsing variable 3 Early-type irregular variable (type Ia of Kukarkin <u>et al.</u>, 1971)

Column Heading

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PHOT (cont.)

- 4 Variable star of unspecified type
- 5 Beta Canis Majoris variable
- 6 Alpha Canum Venaticorum variable
- 9 Peculiar variable
- 10 Classical Cepheid variable
- 12 Irregular variable other than type Ia of Kukarkin
et al. (1971)
- 14 RR Lyrae variable
- 16 Nova-like variable
- 22 RV Tauri variable.

S-PEC

One-column codes referring to the spectral characteristics of the star. One or more of the following may apply; their printed order is not significant:

- A Peculiar A-type star
- B Spectroscopic binary
- C Composite spectrum
- D Interstellar D lines of sodium
- E Any type of emission
- G Magnetic field
- H Interstellar H and K lines of calcium II
- M Metallic-line star
- N Nebulous lines
- P Peculiar spectrum
- R Measured axial rotation

Column HeadingContents

S-PEC (cont.)

S Sharp lines

Y Shell spectrum

4 Interstellar 4430 Å absorption band.

REMARKS

Comments about a star when applicable. Occasionally, more than one star has been included in the mean ultraviolet magnitude reported. Such cases are described as fully as possible. A primary identification has been assigned to the observations, given in the HD and/or DM columns, and the ground-based data only for that star have been reported. Normally, DM numbers in the Remarks column are from the same catalog as the primary number. Additional stars in the observed image are given in the Remarks, e.g., W/P-45 3137 indicates a secondary component of the observation having a CPD number of -45 3137. Ground-based data are not reported for secondary components, except for the spectral classifications for components of known binaries. Where more information than could be reported in the S-PEC column was deemed important, it has been included here. In addition to identifications of secondaries, spectral classes for binaries, and variable star names, the following abbreviations are used:

SB Spectroscopic binary

EB Eclipsing binary

CS Composite spectrum

PREC. Preceding in right ascension

FOLL. Following in right ascension.

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REFERENCES

The identification numbers of the references used in compiling the ground-based astrophysical information about the star. They are arranged in numerical and then alphabetical order, except for the following: The SAO Star Catalog reference number (897) is always first if it appears. If 897 is absent, the reference number of the DM catalog (898, BD; 899, CD; 900, CPD) will be first if it is given. The second reference is the Naval Observatory Photoelectric Catalogue (A19) if it appears.

11. DESCRIPTION OF THE MICROFILM CATALOG

The National Space Sciences Data Center (NSSDC) has sorted the Telescope data into five different sorts and printed them on microfilm.

Each version was printed with the standard printing package, and all items appear in their usual columns (e. g., the datum used in the sort has not been moved to a position of prominence). All sorts have R. A. /Dec as the final parameter, so that stars that are otherwise identical will be arranged in order of increasing right ascension, and within right ascension, by decreasing declination.

The five versions of the tape are as follows:

A. Right ascension, declination; the data are sorted by increasing right ascension (1950 epoch) and by decreasing declination if two or more stars have the same right ascension.

B. Henry Draper number; the data are sorted by increasing HD number. Stars that have no HD number follow those that do.

C. Durchmusterung number; the data are sorted by decreasing DM zone number, and within a zone, by increasing star number.

D. Magnitude; the data are sorted by increasing value (-1 to +11) of M_1 (V , m_v , or m_{pg}).

E. Spectral class-luminosity; the data are sorted by spectral class, and within spectral class, by luminosity. Stars without a spectral subclass follow all the stars with the same class. Stars without a spectral class follow the stars with spectral classes.

This film is available from the NSSDC, Code 601, National Aeronautics and Space Administration, Goddard Space Flight Center, Greenbelt, Maryland 20771. The data should be requested by the designation "68-110A-01 (Smithsonian OAO Data)."

12. REFERENCES CITED IN THE TEXT

Ahmad, I. A., and W. A. Deutschman

1972. Ultraviolet photometry of the moon with the Telescope Experiment on the OAO-II. *Astron. Journ.*, vol. 77, pp. 692-694.

Bečvář, A.

1962. Atlas Borealis. Atlas Australis. Atlas Eclipticalis. Czechoslovakian Academy of Science, Praha; Sky Publ. Co., Cambridge, Mass.

Blanco, V. M., S. Demers, G. G. Douglass, and M. P. Fitzgerald

1968. Photoelectric Catalogue: Magnitudes and Colors of Stars in the U, B, V and U_C , B, V Systems. *Publ. Naval Obs.*, 2nd ser., vol. 21, 772 pp.

Davis, R. J.

1968. The Telescope Experiment. Smithsonian Astrophys. Obs. Spec. Rep. No. 282, 145 pp.

Davis, R. J., W. A. Deutschman, C. A. Lundquist, Y. Nozawa, and S. D. Bass

1972. Ultraviolet television data from the Orbiting Astronomical Observatory. I. Instrumentation and analysis techniques for the Telescope Experiment. In The Scientific Results from the Orbiting Astronomical Observatory (OAO-2), ed. by A. D. Code, NASA SP-310, pp. 1-22.

Deutschman, W. A.

1970. Automatic computer reduction of astronomical television images. Publ. Roy. Obs. Edinburgh, vol. 8, pp. 192-193.

1972a. A calibration model for a stellar photometer using a SEC vidicon. Publ. Astron. Soc. Pacific, vol. 84, pp. 123-126.

1972b. Orbital operation and calibration of SEC vidicons in the Telescope experiment. In Photo-Electronic Image Devices, ed. by J. D. McGee, D. McMullan, and E. Kahan, vol. 33B of Advances in Electronics and Electron Physics, Academic Press, London, pp. 925-935.

Green, E.

1970. The calibration of the Telescope experiment. Telescope Calibration Report CCR-182, Smithsonian Astrophys. Obs., Cambridge, Mass., 66 pp.

Kurochkin, G. I. Medvedeva, N. B. Perova, V. P. Fedorovich, and M. S. Frolov

1969-1971. General Catalogue of Variable Stars. Academy of Sciences, USSR, Moscow, 3 vols.

13. REFERENCE LIST OF GROUND-BASED DATA

13.1 Numerical

001. HILTNER, W. A.	1956
001. PHOTOMETRIC, POLARIZATION, AND SPECTROGRAPHIC OBSERVATIONS OF O AND	
001. B STARS. ASTROPHYS. JOURN. SUPPL., VOL. 2, PP. 389-462.	
002. HALL, J. S.	1958
002. POLARIZATION OF STARLIGHT IN THE GALAXY. PUBL. U.S. NAVAL OBS.,	
002. VOL. 17, PART VI, PP. 272-342.	
003. HOAG, A. A., JOHNSON, H. L., IRIARTE, B., MITCHELL, R. I., HALLAM,	1961
003. K. L., AND SHARPLESS, S.	
003. PHOTOMETRY OF STARS IN GALACTIC CLUSTER FIELDS. PUBL. U.S. NAVAL	
003. OBS., VOL. 17, PP. 349-542.	
004. NOT USED	
005. BOUIGUE, R., BOULON, J., AND PEDOUSSAUT, A.	1961
005. CONTRIBUTION AUX RECHERCHES DE PHOTOMETRIE PHOTOELECTRIQUE	
005. DANS LA GALAXIE. PUBL. OBS. HAUTE PROVENCE, VOL. 5, NO. 49, 26 PP.	
006. ROBERTS, M. S.	1962
006. THE GALACTIC DISTRIBUTION OF THE WOLF-RAYET STARS. ASTRON. JOURN.,	
006. VOL. 67, PP. 79-85.	
007. BUSCOMBE, W.	1959
007. STANDARD STARS FOR SPECTRAL CLASSIFICATION. MT. STROMLO OBS.	
007. MIMEO. NO. 3, 10 PP.	
008. BUSCOMBE, W.	1962
008. SPECTRAL CLASSIFICATION OF SOUTHERN FUNDAMENTAL STARS. MT. STROMLO	
008. OBS. MIMEO. NO. 4, 15 PP.	
009. JOHNSON, H. L., AND MORGAN, W. W.	1953
009. FUNDAMENTAL STELLAR PHOTOMETRY FOR STANDARDS OF SPECTRAL TYPE ON	
009. THE REVISED SYSTEM OF THE YERKES SPECTRAL ATLAS. ASTROPHYS. JOURN.,	
009. VOL. 117, PP. 313-352.	
010. JOHNSON, H. L.	1955
010. A PHOTOMETRIC SYSTEM. ANN. D'ASTROPHYS., VOL. 18, PP. 292-316.	
011. HENIZE, K. G.	1956
011. CATALOGUES OF H ALPHA-EMISSION STARS AND NEBULAE IN THE MAGELLANIC	
011. CLOUDS. ASTROPHYS. JOURN. SUPPL., VOL. 2, PP. 315-344.	
012. MORGAN, W. W., CODE, A. D., AND WHITFORD, A. E.	1955
012. STUDIES IN GALACTIC STRUCTURE. II. LUMINOSITY CLASSIFICATION FOR	
012. 1270 BLUE GIANT STARS. ASTROPHYS. JOURN. SUPPL., VOL. 2, PP. 41-74.	
013. STEBBINS, J., HUFFER, C. M., AND WHITFORD, A. E.	1940
013. THE COLORS OF 1332 B STARS. ASTROPHYS. JOURN., VOL. 91, PP. 20-50.	

014. HARDORP, J., ROHLFS, K., SLETTEBAK, A., AND STOCK, J. 1959.
014. LUMINOUS STARS IN THE NORTHERN MILKY WAY. I. HAMBURGER STERNWARTE,
014. WARNER AND SWASEY OBS., 40 PP.
014. HARDORP, J., ROHLFS, K., SLETTEBAK, A., AND STOCK, J. 1960
014. LUMINOUS STARS IN THE NORTHERN MILKY WAY. II. HAMBURGER STERNWARTE,
014. WARNER AND SWASEY OBS., 30 PP.

015. NASSAU, J. J., AND MORGAN, W. W. 1951
015. A FINDING LIST OF O AND B STARS OF HIGH LUMINOSITY. ASTROPHYS.
015. JOURN., VOL. 113, PP. 141-149.

016. FEAST, M. W., STOY, R. H., THACKERAY, A. D., AND WESSELINK, A. J. 1961
016. SPECTRAL CLASSIFICATION AND PHOTOMETRY OF SOUTHERN B STARS.
016. MONTHLY NOTICES ROY. ASTRON. SOC., VOL. 122, PP. 239-253.

017. BURBIDGE, E. M., BURBIDGE, G. R., AND PRENDERGAST, K. H. 1962
017. THE ROTATION AND VELOCITY FIELD OF NGC 253. ASTROPHYS. JOURN.,
017. VOL. 136, PP. 339-351.

018. ABT, H. A., AND GOLSON, J. C. 1962
018. INTERSTELLAR ABSORPTION IN THE NORTH EQUATORIAL POLAR REGION.
018. ASTROPHYS. JOURN., VOL. 136, PP. 363-373.

019. MATHIS, J. S. 1962
019. PHOTOMETRY OF EMISSION LINES IN CERTAIN GASEOUS NEBULAE.
019. ASTROPHYS. JOURN., VOL. 136, PP. 374-380.

020. ABT, H. A., AND HUNTER, J. H., JR. 1962
020. STELLAR ROTATION IN GALACTIC CLUSTERS. ASTROPHYS. JOURN., VOL.
020. 136, PP. 381-392.

021. SARGENT, W. L. W., AND SEARLE, L. 1962
021. STUDIES OF THE PECULIAR A STARS. THE OXYGEN-ABUNDANCE ANOMALY.
021. ASTROPHYS. JOURN., VOL. 136, PP. 408-421.

022. STECHER, T. P., AND MILLIGAN, J. E. 1962
022. STELLAR SPECTROPHOTOMETRY FROM ABOVE THE ATMOSPHERE. ASTROPHYS.
022. JOURN., VOL. 136, PP. 1-13.

023. UNDERHILL, A. B. 1962
023. SPECTROSCOPIC OBSERVATIONS OF SOME W C STARS. ASTROPHYS. JOURN.,
023. VOL. 136, PP. 14-20.

024. MERRILL, P. W., DEUTSCH, A. J., AND KEENAN, P. C. 1962
024. ABSORPTION SPECTRA OF M-TYPE MIRA VARIABLES. ASTROPHYS. JOURN.,
024. VOL. 136, PP. 21-34.

025. ABT, H. A., AND GOLSON, J. C. 1962
025. COLORS AND VARIABILITY OF MAGNETIC STARS. ASTROPHYS. JOURN., VOL.
025. 136, PP. 35-50.

026. BABCOCK, H. W. 1958
 026. A CATALOG OF MAGNETIC STARS. ASTROPHYS. JOURN. SUPPL., VOL. 3,
 026. PP. 141-210.
027. ARP, H. 1962
 027. INTERMEDIATE-AGE STAR CLUSTERS. ASTROPHYS. JOURN., VOL. 136, PP.
 027. 66-74.
028. NOT USED
029. MENON, T. K. 1962
 029. PHYSICAL CONDITIONS IN THE ORION NEBULA. ASTROPHYS. JOURN., VOL.
 029. 136, PP. 95-99.
030. DE VAUCOULEURS, G., AND PAGE, J. 1962
 030. SOUTHERN GALAXIES. II. ISOPHOTOMETRY OF THE LARGE SPIRAL NGC 300.
 030. ASTROPHYS. JOURN., VOL. 136, PP. 107-118.
031. HOWARD, W. E., III, ROOD, H. J., AND BOYCE, P. B. 1962
 031. THE CENTRAL COMPONENT OF THE GALACTIC CENTER SOURCE, SAGITTARIUS A.
 031. ASTROPHYS. JOURN., VOL. 136, PP. 133-137.
032. HARRIS, D. E. 1962
 032. THE RADIO SPECTRUM OF SUPERNOVA REMNANTS. ASTROPHYS. JOURN., VOL.
 032. 135, PP. 661-678.
033. BURBIDGE, E. M., AND BURBIDGE, G. R. 1962
 033. IONIZED GAS IN SPIRAL AND IRREGULAR GALAXIES. ASTROPHYS. JOURN.,
 033. VOL. 135, PP. 694-710.
034. SPINRAD, H. 1962
 034. STELLAR POPULATIONS IN THE NUCLEI OF GALAXIES. ASTROPHYS. JOURN.,
 034. VOL. 135, PP. 715-735.
035. HERBIG, G. H. 1962
 035. SPECTRAL CLASSIFICATION OF FAINT MEMBERS OF THE HYADES AND
 035. PLEIADES AND THE DATING PROBLEM IN GALACTIC CLUSTERS. ASTROPHYS.
 035. JOURN., VOL. 135, PP. 736-747.
036. MCNAMARA, D. H., AND LARSSON, H. J. 1962
 036. AXIAL ROTATION OF ORION STARS OF SPECTRAL TYPE B0-B3. ASTROPHYS.
 036. JOURN., VOL. 135, PP. 748-754.
037. RINGUELET-KASWALDER, A. E. 1962
 037. 27 CANIS MAJORIS. ASTROPHYS. JOURN., VOL. 135, PP. 755-761.
038. LOCKE, J. L., GALT, J. A., AND COSTAIN, C. H. 1964
 038. A STUDY OF NEUTRAL HYDROGEN IN THE REGION OF IC 443. ASTROPHYS.
 038. JOURN., VOL. 139, PP. 1071-1073.

039. ARP, H. 1962
039. THE GLOBULAR CLUSTER M5. ASTROPHYS. JOURN., VOL. 135, PP. 311-332.
040. SANDAGE, A. 1962
040. PHOTOMETRIC DATA FOR THE OLD GALACTIC CLUSTER NGC 188. ASTROPHYS.
040. JOURN., VOL. 135, PP. 333-348.
041. SANDAGE, A. 1962
041. THE AGES OF M67, NGC 188, M3, M5, AND M13 ACCORDING TO HOYLE'S
041. 1959 MODELS. ASTROPHYS. JOURN., VOL. 135, PP. 349-365.
042. BURBIDGE, E. M., AND BURBIDGE, G. R. 1962
042. MOTIONS IN NGC 4736. ASTROPHYS. JOURN., VOL. 135, PP. 366-370.
043. O'DELL, C. R. 1962
043. A DISTANCE SCALE FOR PLANETARY NEBULAE BASED ON EMISSION-LINE
043. FLUXES. ASTROPHYS. JOURN., VOL. 135, PP. 371-384.
044. MENON, T. K. 1962
044. A STUDY OF THE ROSETTE NEBULA NGC 2237-46. ASTROPHYS. JOURN., VOL.
044. 135, PP. 394-407.
045. KRAFT, R. P. 1962
045. BINARY STARS AMONG CATAclySMIC VARIABLES. I. U GEMINORUM STARS
045. (DWARF NOVAE). ASTROPHYS. JOURN., VOL. 135, PP. 408-423.
046. ABT, H. A. 1962
046. NON-PERIODIC SPECTROSCOPIC CHANGES IN BETA LYRAE. ASTROPHYS.
046. JOURN., VOL. 135, PP. 424-428.
047. ABT, H. A., JEFFERS, H. M., GIBSON, J., AND SANDAGE, A. R. 1962
047. THE VISUAL MULTIPLE SYSTEM CONTAINING BETA LYRAE. ASTROPHYS.
047. JOURN., VOL. 135, PP. 429-438.
048. TRAVING, G. 1962
048. THE ATMOSPHERES OF TWO B-TYPE STARS IN THE GALACTIC HALO.
048. ASTROPHYS. JOURN., VOL. 135, PP. 439-458.
049. WALLERSTEIN, G., STONE, Y. H., AND WILLIAMS, J. A. 1962
049. ABUNDANCES IN HIGH-VELOCITY A STARS. I. 7 SEXTANTIS. ASTROPHYS.
049. JOURN., VOL. 135, PP. 459-473.
050. STRUVE, O., AND ZEBERGS, V. 1962
050. RADIAL VELOCITY OF BETA CANIS MAJORIS IN 1960. ASTROPHYS. JOURN.,
050. VOL. 135, PP. 652-653.
051. SARMA, M. B. K., AND WALKER, M. F. 1962
051. THE COLOR MAGNITUDE DIAGRAM OF NGC 2420. ASTROPHYS. JOURN.,
051. VOL. 135, PP. 11-15.

052. LIMBER, D. N. 1962
052. THE DYNAMICS OF THE PLEIADES CLUSTER, I. ASTROPHYS. JOURN.,
052. VOL. 135, PP. 16-40.
052. THE DYNAMICS OF THE PLEIADES CLUSTER, II. ASTROPHYS. JOURN.,
052. VOL. 135, PP. 41-63.
053. MCNAMARA, D. H., AND AUGASON, G. 1962
053. THE ABSOLUTE MAGNITUDE OF THE DELTA SCUTI STARS. ASTROPHYS.
053. JOURN., VOL. 135, PP. 64-68.
054. HEISER, A. M. 1962
054. PHOTOELECTRIC PHOTOMETRY OF THE ECLIPSING BINARY V367 CYGNI.
054. ASTROPHYS. JOURN., VOL. 135, PP. 78-84.
055. ELESS, R. C. 1962
055. THE NON-THERMAL RADIATION FROM NGC 4486. ASTROPHYS. JOURN.,
055. VOL. 135, PP. 187-194.
056. SARGENT, W. L. W., AND JUGAKU, J. 1961
056. THE EXISTENCE OF HE3 IN 3 CENTAURI A. ASTROPHYS. JOURN., VOL. 134,
056. PP. 777-782.
057. JUGAKU, J., SARGENT, W. L. W., AND GREENSTEIN, J. L. 1961
057. AN ABUNDANCE ANALYSIS OF 3 CENTAURI A. ASTROPHYS. JOURN., VOL. 134,
057. PP. 783-796.
058. POPPER, D. M. 1961
058. REDISCUSSION OF ECLIPSING BINARIES. VI. THE MASSES OF THE
058. COMPONENTS OF ZETA AURIGAE. ASTROPHYS. JOURN., VOL. 134,
058. PP. 828-838.
059. HILTON, W. B., AND MCNAMARA, D. H. 1961
059. THE ECLIPSING STAR AW PEGASI. ASTROPHYS. JOURN., VOL. 134,
059. PP. 839-849.
060. KRAFT, R. P., AND HILTNER, W. A. 1961
060. COLOR EXCESSES FOR SUPERGIANTS AND CLASSICAL CEPHEIDS. VI. ON THE
060. INTRINSIC COLORS AND THE HESS DIAGRAM OF LATE-TYPE SUPERGIANTS.
060. ASTROPHYS. JOURN., VOL. 134, PP. 850-860.
061. FRIEBOES, H. O. 1962
061. V PUPPIS. ASTROPHYS. JOURN., VOL. 135, PP. 762-769.
062. JOHNSON, H. L., AND SVOLGPOULOS, S. N. 1961
062. GALACTIC ROTATION DETERMINED FROM RADIAL VELOCITIES AND PHOTOMETRIC
062. DISTANCES OF GALACTIC CLUSTERS. ASTROPHYS. JOURN., VOL. 134,
062. PP. 868-873.

063. BURBIDGE, E. M., BURBIDGE, G. R., AND PRENDERGAST, K. H. 1961
063. THE ROTATION AND MASS OF NGC 157. ASTROPHYS. JOURN., VOL. 134.
063. PP. 874-879.
064. FISH, R. A. 1961
064. THE LUMINOSITY DISTRIBUTION IN THE SPIRAL GALAXY NGC 5055.
064. ASTROPHYS. JOURN., VOL. 134, PP. 880-909.
065. VAN DEN BERGH, S. 1961
065. RADIO SOURCES AND CLUSTERS OF GALAXIES. ASTROPHYS. JOURN.,
065. VOL. 134, PP. 970-974.
066. EDGE, D. O., SHAKESHAFT, J. R., MCADAM, W. B., BALDWIN, J. E., 1959
066. AND ARCHER, S.
066. A SURVEY OF RADIO SOURCES AT A FREQUENCY OF 159 MC/S. MEM. ROY.
066. ASTRON. SOC., VOL. 68, PP. 37-60.
067. BARRETT, A. H. 1961
067. OBSERVATION OF RADIO SOURCES AT 1.8-CM WAVELENGTH. ASTROPHYS.
067. JOURN., VOL. 134, PP. 945-958.
068. VORONTSOV-VELYAMINOV, B. A. (WORONZOW-WELJAMINOW, B. A.) 1953
068. GASNEBEL UND NEUE STERNE (PLANETARY NEBULAE). VERLAG KULTUR UND
068. FORTSCHRITT, BERLIN, PP. 688-701.
069. BENNETT, A. S. 1961
069. THE REVISED 3C CATALOGUE OF RADIO SOURCES, MEM. ROY. ASTRON. SOC.,
069. VOL. 68, PP. 163-172.
070. VORONTSOV-VELYAMINOV, B. A. (WORONZOW-WELJAMINOW, B. A.) 1953
070. GASNEBEL UND NEUE STERNE (SUPER-NOVAE). VERLAG KULTUR UND
070. FORTSCHRITT, BERLIN, P. 710.
071. PRESTON, G. W. 1961
071. THE SPECTRUM OF HD 174704. ASTROPHYS. JOURN., VOL. 134,
071. PP. 797-804.
072. WYLLER, A. A. 1961
072. ROTATIONAL TEMPERATURE OF C2, CH, ALH, MGH, AND SiH IN BETA PEGASI.
072. ASTROPHYS. JOURN., VOL. 134, PP. 805-808.
073. YOSS, K. M. 1961
073. SPECTRAL AND LUMINOSITY CLASSIFICATIONS AND MEASUREMENTS OF THE
073. STRENGTH OF THE CYANOGEN ABSORPTION FOR LATE-TYPE STARS FROM
073. OBJECTIVE-PRISM SPECTRA. ASTROPHYS. JOURN., VOL. 134, PP. 809-827.
074. ALLER, L. H., ELSTE, G., AND JUGAKU, J. 1957
074. THE ATMOSPHERES OF THE B STARS. III. THE COMPOSITION OF TAU
074. SCORPII. ASTROPHYS. JOURN. SUPPL., VOL. 3, PP. 1-36.

075. POPPER, D. M. 1957
075. PHOTOELECTRIC OBSERVATIONS OF ECLIPSING BINARIES. ASTROPHYS. JOURN.
075. SUPPL., VOL. 3, PP. 107-140.
076. MAESTRE, L. A., AND DEUTSCH, A. J. 1961
076. LIST OF ABSORPTION LINES IN TWO ULTRA-SHARP-LINE A STARS. ASTROPHYS.
076. JOURN., VOL. 134, PP. 562-567.
077. HEISER, A. M. 1962
077. SPECTROSCOPIC OBSERVATIONS OF THE ECLIPSING BINARY V367 CYGNI.
077. ASTROPHYS. JOURN., VOL. 135, PP. 78-84.
078. HARDIE, R. H., AND TOLBERT, C. R. 1961
078. THREE-COLOR PHOTOMETRY OF CY AQUARII. ASTROPHYS. JOURN., VOL. 134.
078. PP. 581-601.
079. PESCH, P. 1961
079. PHOTOMETRIC AND OBJECTIVE PRISM OBSERVATIONS IN THREE GALACTIC
079. CLUSTERS. ASTROPHYS. JOURN., VOL. 134, PP. 602-611.
080. SVOLOPOULOS, S. N. 1961
080. SPECTRAL CLASSIFICATION IN SOME OPEN CLUSTERS. ASTROPHYS. JOURN.,
080. VOL. 134, PP. 612-615.
081. KRAFT, R. P. 1961
081. COLOR EXCESSES FOR SUPERGIANTS AND CLASSICAL CEPHEIDS. V. THE
081. PERIOD-COLOR AND PERIOD-LUMINOSITY RELATIONS; A REVISION.
081. ASTROPHYS. JOURN., VOL. 134, PP. 616-632.
082. PRESTON, G. W. 1961
082. A COARSE ANALYSIS OF THREE RR LYRAE STARS. ASTROPHYS. JOURN.,
082. VOL. 134, PP. 633-650.
083. LYNDS, C. R. 1961
083. RADIO OBSERVATIONS OF THE PECULIAR GALAXY M82. ASTROPHYS. JOURN.,
083. VOL. 134, PP. 659-661.
084. KLEMOLA, A. R. 1961
084. THE SPECTRUM OF THE HELIUM STAR BD + 10 DEG. 2179. ASTROPHYS.
084. JOURN., VOL. 134, PP. 130-141.
085. SARGENT, W. L. W. 1961
085. THE CIRCUMSTELLAR ENVELOPE OF RHO CASSIOPEIAE. ASTROPHYS. JOURN.,
085. VOL. 134, PP. 142-160.
086. STRUVE, O., AND ZEBERGS, V. 1961
086. THE SPECTRUM OF THE B8 COMPONENT OF BETA LYRAE. II. ASTROPHYS.
086. JOURN., VOL. 134, PP. 161-170.

087. WALKER, M. F. 1961
087. PHOTOELECTRIC OBSERVATIONS OF NOVA(DQ)HERCULIS, 1957-1959.
087. ASTROPHYS. JOURN., VOL. 134, PP. 171-194.
088. SLETTEBAK, A., BAHNER, K., AND STOCK, J. 1961
088. SPECTRA AND COLORS OF EARLY-TYPE STARS NEAR THE NORTH GALACTIC
088. POLE. ASTROPHYS. JOURN., VOL. 134, PP. 195-206.
089. MCNAMARA, D. H., AND HANSEN, K. 1961
089. STELLAR ROTATION AND THE BETA CANIS MAJORIS STARS. ASTROPHYS.
089. JOURN., VOL. 134, PP. 207-213.
090. CKE, J. B. 1961
090. AN ANALYSIS OF THE ABSOLUTE ENERGY DISTRIBUTION IN THE SPECTRUM OF
090. DELTA CEPHEI. ASTROPHYS. JOURN., VOL. 134, PP. 214-221.
091. STEPHENSON, C. B., AND NASSAU, J. J. 1961
091. CLASSIFICATION OF COMPOSITE SPECTRA. ASTROPHYS. JOURN., VOL. 134,
091. PP. 222-225.
092. HODGE, P. W. 1961
092. STUDIES OF THE LARGE MAGELLANIC CLOUD. VII. THE OPEN CLUSTER NGC
092. 1844. ASTROPHYS. JOURN., VOL. 134, PP. 226-231.
093. BURBIDGE, E. M., BURBIDGE, G. R., AND PRENDERGAST, K. H. 1961
093. THE ROTATION AND APPROXIMATE MASS OF NGC 3623. ASTROPHYS. JOURN.,
093. VOL. 134, PP. 232-236.
094. BURBIDGE, E. M., BURBIDGE, G. R., AND PRENDERGAST, K. H. 1961
094. MOTIONS IN NGC 3646, A STRANGE SPIRAL GALAXY. ASTROPHYS. JOURN.,
094. VOL. 134, PP. 237-243.
095. BURBIDGE, E. M., AND BURBIDGE, G. R. 1961
095. A FURTHER INVESTIGATION OF STEPHAN'S QUINTET. ASTROPHYS. JOURN.,
095. VOL. 134, PP. 244-247.
096. BURBIDGE, E. M., AND BURBIDGE, G. R. 1961
096. THE STABILITY OF THE QUINTET OF GALAXIES V-V 116. ASTROPHYS.
096. JOURN., VOL. 134, PP. 248-250.
097. BURBIDGE, E. M., BURBIDGE, G. R., AND FISH, R. A. 1961
097. THE MASSES OF ELLIPTICAL GALAXIES. II. THE MASS OF NGC 3379.
097. ASTROPHYS. JOURN., VOL. 134, PP. 251-256.
098. GODFREYSEN, E. A. 1961
098. DYNAMICAL STABILITY OF THE LOCAL GROUP. ASTROPHYS. JOURN., VOL. 134,
098. PP. 257-261.

099. HODGE, P. W. 1961
 099. THE GRAVITATIONAL STABILITY OF THE NGC 7619 GROUP OF GALAXIES.
 099. ASTROPHYS. JOURN., VOL. 134, PP. 262-264.
100. ZWICKY, F., AND HUMASON, M. L. 1961
 100. SPECTRA AND OTHER CHARACTERISTICS OF INTERCONNECTED GALAXIES AND OF
 100. GALAXIES IN GROUPS AND IN CLUSTERS. II. ASTROPHYS. JOURN., VOL.
 100. 133, PP. 794-813.
101. BURBIDGE, E. M., BURBIDGE, G. R., AND PRENDERGAST, K. H. 1961
 101. THE ROTATION AND MASSES OF NGC 5005. ASTROPHYS. JOURN., VOL. 133,
 101. PP. 814-820.
102. HARDIE, R. H., AND CRAWFORD, D. L. 1961
 102. A STUDY OF THE II SCORPII ASSOCIATION. ASTROPHYS. JOURN., VOL. 133,
 102. PP. 843-859.
103. CRAWFORD, D. L. 1961
 103. H BETA PHOTOMETRY FOR THE ASSOCIATION I LACERTAE. ASTROPHYS.
 103. JOURN., VOL. 133, PP. 860-868.
104. EABCOCK, H. W. 1956
 104. THE MAGNETIC VARIABLE HD 71866. ASTROPHYS. JOURN., VOL. 124,
 104. PP. 489-498.
105. WAMPLER, E. J., PESCH, P., HILTNER, W. A., AND KRAFT, R. P. 1961
 105. CEPHEIDS IN GALACTIC CLUSTERS. VIII. A REINVESTIGATION OF U SGR IN
 105. M25 (=IC 4725). ASTROPHYS. JOURN., VOL. 133, PP. 895-906.
106. NOT USED
107. ABT, H. A. 1961
 107. RADIAL VELOCITIES OF THREE METALLIC-LINE STARS. ASTROPHYS. JOURN.,
 107. VOL. 133, PP. 910-913.
108. NASSAU, J. J., AND STEPHENSON, C. B. 1961
 108. SPECTRAL CLASSIFICATIONS FOR NEW OR UNCLASSIFIED EMISSION-LINE,
 108. CARBON AND S, LONG-PERIOD VARIABLE, AND DOUBLE STARS. ASTROPHYS
 108. JOURN., VOL. 133, PP. 920-923.
109. WALKER, M. F. 1961
 109. A NOTE ON THE SPECTRAL TYPES OF FAINT STARS IN NGC 6530.
 109. ASTROPHYS. JOURN., VOL. 133, PP. 1081-1082.
110. MITCHELL, R. I., JOHNSON, H. L., AND IRIARTE, B. 1961
 110. U, B, V OBSERVATIONS OF U SGR. ASTROPHYS. JOURN., VOL. 133, PP.
 110. 1083-1085.

111. BURBIDGE, E. M., BURBIDGE, G. R., AND FISH, R. A. 1961
 111. THE MASSES OF ELLIPTICAL GALAXIES. I. A REDETERMINATION OF THE
 111. MASSES OF M32. ASTROPHYS. JOURN., VOL. 133, PP. 393-404.
112. DE VAUCOULEURS, G. 1961
 112. SOUTHERN GALAXIES. I. LUMINOSITY, ROTATION, AND MASS OF THE
 112. MAGELLANIC SYSTEM NGC 55. ASTROPHYS. JOURN., VOL. 133, PP. 405-412.
113. HODGE, P. W. 1961
 113. STUDIES OF THE LARGE MAGELLANIC CLOUD. V. THE YOUNG POPULOUS
 113. CLUSTERS. ASTROPHYS. JOURN., VOL. 133, PP. 413-419.
114. WILDEY, R. L. 1961
 114. THE COLOR-MAGNITUDE DIAGRAM OF 47 TUC. ASTROPHYS. JOURN., VOL.
 114. 133, PP. 430-437.
115. WALKER, M. F. 1961
 115. STUDIES OF EXTREMELY YOUNG CLUSTERS. IV. NGC 6611. ASTROPHYS.
 115. JOURN., VOL. 133, PP. 438-456.
116. COLLINS, G. W., II, DAUB, C. T., AND O'DELL, C. R. 1961
 116. H BETA AND (O III) FLUXES FROM PLANETARY NEBULAE. II. ASTROPHYS.
 116. JOURN., VOL. 133, PP. 471-478.
117. SPINRAD, H. 1961
 117. SU DRACONIS AND LINE BLANKETING IN THE RR LYRAE STARS. ASTROPHYS.
 117. JOURN., VOL. 133, PP. 479-483.
118. PRESTON, G. W., SPINRAD, H., AND VARSAVSKY, C. M. 1961
 118. THE LIGHT AND RADIAL-VELOCITY VARIATIONS OF TU URSAE MAJORIS.
 118. ASTROPHYS. JOURN., VOL. 133, PP. 484-492.
119. JOY, A. H. 1961
 119. THE EMISSION SPECTRUM OF RS OPHIUCHI IN 1958. ASTROPHYS. JOURN.,
 119. VOL. 133, PP. 493-502.
120. MERRILL, P. W. 1961
 120. THE SPECTRUM OF XX OPHIUCHI IN 1959 AND 1960. ASTROPHYS. JOURN.,
 120. VOL. 133, PP. 503-508.
121. STRUVE, O., SAHADE, J., AND ZEBERGS, V. 1961
 121. THE RADIAL VELOCITY OF SIGMA SCORPII. ASTROPHYS. JOURN., VOL. 133,
 121. PP. 509-518.
122. STRUVE, O., AND ZEBERGS, V. 1961
 122. THE SPECTRUM OF THE B8 COMPONENT OF BETA LYRAE. ASTROPHYS. JOURN.,
 122. VOL. 133, PP. 519-530.

123. SEARLE, L. 1961
 123. AN ABUNDANCE ANALYSIS OF R CORONAE BOREALIS. ASTROPHYS. JOURN.,
 123. VOL. 133, PP. 531-550.
124. EONSACK, W. K. 1961
 124. THE ABUNDANCE OF BERYLLIUM IN FOUR STARS OF TYPE A. ASTROPHYS.
 124. JOURN., VOL. 133, PP. 551-561.
125. BURBIDGE, E. M., AND BURBIDGE, G. R. 1961
 125. NGC 4676, A PECULIAR SYSTEM IN THE COMA CLUSTER OF GALAXIES.
 125. ASTROPHYS. JOURN., VOL. 133, PP. 726-727.
126. OSTERBROCK, D. E., AND STOCKHAUSEN, R. E. 1961
 126. PHOTOMETRY AND RADIOMETRY OF GASEOUS NEBULAE. ASTROPHYS. JOURN.,
 126. VOL. 133, PP. 2-10.
127. KRAFT, R. P. 1961
 127. COLOR EXCESSES FOR SUPERGIANTS AND CLASSICAL CEPHEIDS. III. THE
 127. COLOR-MAGNITUDE ARRAY FOR CEPHEIDS IN THE VICINITY OF THE SUN.
 127. ASTROPHYS. JOURN., VOL. 133, PP. 39-56.
128. KRAFT, R. P. 1961
 128. COLOR EXCESSES FOR SUPERGIANTS AND CLASSICAL CEPHEIDS. IV.
 128. ON SYSTEMS FOR DETERMINING COLOR EXCESSES. ASTROPHYS. JOURN.,
 128. VOL. 133, PP. 57-63.
129. FERNIE, J. D. 1961
 129. CEPHEIDS IN GALACTIC CLUSTERS. VII. S NOR AND NGC 6087.
 129. ASTROPHYS. JOURN., VOL. 133, PP. 64-70.
130. HARDIE, R. H., AND LOTT, S. H. 1961
 130. THREE-COLOR PHOTOMETRY OF DY HERCULIS. ASTROPHYS. JOURN.,
 130. VOL. 133, PP. 71-89.
131. OKE, J. B. 1961
 131. AN ANALYSIS OF THE ABSOLUTE ENERGY DISTRIBUTION IN THE SPECTRUM
 131. OF ETA AGUILAE. ASTROPHYS. JOURN., VOL. 133, PP. 90-100.
132. BRETZ, M. C. 1961
 132. THE ORBIT OF THE SPECTROSCOPIC BINARY TAU URSAE MAJORIS.
 132. ASTROPHYS. JOURN., VOL. 133, PP. 139-142.
133. RACH, R. A., AND HERBIG, G. H. 1961
 133. THE ORBIT OF THE SPECTROSCOPIC BINARY PHI CYGNI. ASTROPHYS. JOURN.,
 133. VOL. 133, PP. 143-147.
134. POPPER, D. M. 1961
 134. REDISCUSSION OF ECLIPSING BINARIES. V. RS CANUM VENATICORUM.
 134. ASTROPHYS. JOURN., VOL. 133, PP. 148-158.

135. JOHNSON, H. M. 1961
 135. THE NUCLEUS OF M31. ASTROPHYS. JOURN., VOL. 133, PP. 309-313.
136. JOHNSON, H. M. 1961
 136. PHOTOGRAPHIC PHOTOMETRY OF 50 GALAXIES. ASTROPHYS. JOURN.,
 136. VOL. 133, PP. 314-321.
137. HEESCHEN, D. S. 1961
 137. OBSERVATIONS OF RADIO SOURCES AT FOUR FREQUENCIES. ASTROPHYS.
 137. JOURN., VOL. 133, PP. 322-334.
138. GREENSTEIN, J. L. 1961
 138. THE GALAXIES IN THE RADIO SOURCE 3C 278. ASTROPHYS. JOURN.,
 138. VOL. 133, PP. 335-337.
139. HERBIG, G. H. 1961
 139. OBSERVATIONS OF RY TAURI. ASTROPHYS. JOURN., VOL. 133, PP. 337-340.
140. BONSAK, W. K. 1961
 140. THE ABUNDANCE OF LITHIUM IN T TAURI STARS: FURTHER OBSERVATIONS.
 140. ASTROPHYS. JOURN., VOL. 133, PP. 340-343.
141. BABCOCK, H. W. 1960
 141. THE 34-KILOGAUSS MAGNETIC FIELD OF HD 215441. ASTROPHYS. JOURN.,
 141. VOL. 132, PP. 521-531.
142. BLESS, R. C. 1960
 142. PHOTOELECTRIC SPECTROPHOTOMETRY OF A-TYPE STARS. ASTROPHYS. JOURN.,
 142. VOL. 132, PP. 532-552.
143. HELFER, H. L., WALLERSTEIN, G., AND GREENSTEIN, J. L. 1960
 143. ABUNDANCES IN G DWARF STARS. III. STARS IN MOVING CLUSTERS.
 143. ASTROPHYS. JOURN., VOL. 132, PP. 553-564.
144. SCHMALBERGER, D. C. 1960
 144. ON THE LOCATION OF BETA CEPHEI STARS IN THE THEORETICAL
 144. HERTZSPRUNG-RUSSELL DIAGRAM. ASTROPHYS. JOURN., VOL. 132,
 144. PP. 591-593.
145. ZWICKY, F., AND HUMASON, M. L. 1960
 145. SPECTRA AND OTHER CHARACTERISTICS OF INTERCONNECTED GALAXIES IN
 145. GROUPS AND IN CLUSTERS. I. ASTROPHYS. JOURN., VOL. 132,
 145. PP. 627-639.
146. BURBIDGE, E. M., BURBIDGE, G. R., AND PRENDERGAST, K. H. 1960
 146. THE ROTATION, MASS DISTRIBUTION, AND MASS OF NGC 2903. ASTROPHYS.
 146. JOURN., VOL. 132, PP. 640-653.

147. BURBIDGE, E. M., BURBIDGE, G. R., AND PRENDERGAST, K. H. 1960
 147. MOTIONS IN BARRED SPIRAL GALAXIES. II. THE ROTATION OF NGC 7479.
 147. ASTROPHYS. JOURN., VOL. 132, PP. 654-660.
148. BURBIDGE, E. M., BURBIDGE, G. R., AND PRENDERGAST, K. H. 1960
 148. MOTIONS IN BARRED SPIRAL GALAXIES. III. THE ROTATION AND
 148. APPROXIMATE MASS OF NGC 3504. ASTROPHYS. JOURN., VOL. 132,
 148. PP. 661-666.
149. CAPRIOTTI, E. R., AND DAUB, C. T. 1960
 149. H BETA AND (O III) FLUXES FROM PLANETARY NEBULAE. ASTROPHYS.
 149. JOURN., VOL. 132, PP. 677-680.
150. DE VAUCOULEURS, G. 1960
 150. NOVA V723 SCORPII 1952. ASTROPHYS. JOURN., VOL. 132, PP. 681-688.
151. PESCH, P. 1960
 151. THE GALACTIC CLUSTER NGC 7654 (M52). ASTROPHYS. JOURN., VOL. 132,
 151. PP. 689-695.
152. PESCH, P. 1960
 152. THE GALACTIC CLUSTER NGC 654. ASTROPHYS. JOURN., VOL. 132,
 152. PP. 696-700.
153. FITCH, W. S. 1960
 153. THE LIGHT VARIATION OF CC ANDROMEDAE. ASTROPHYS. JOURN., VOL. 132,
 153. PP. 701-715.
154. BROTON, N. W., AND MEDD, W. J. 1960
 154. ABSOLUTE FLUX MEASUREMENTS OF CASSIOPEIA A, TAURUS A, AND
 154. CYGNUS A, AT 3200 MC/S. ASTROPHYS. JOURN., VOL. 132, PP. 279-285.
155. OSTERBROCK, D. 1960
 155. INTERSTELLAR MATTER IN ELLIPTICAL GALAXIES. II. ASTROPHYS.
 155. JOURN., VOL. 132, PP. 325-340.
156. HODGE, P. W. 1960
 156. STUDIES OF THE LARGE MAGELLANIC CLOUD. II. THE GLOBULAR CLUSTER
 156. NGC 1846. ASTROPHYS. JOURN., VOL. 132, PP. 341-345.
157. HODGE, P. W. 1960
 157. STUDIES OF THE LARGE MAGELLANIC CLOUD. III. THE GLOBULAR CLUSTER
 157. NGC 1978. ASTROPHYS. JOURN., VOL. 132, PP. 346-350.
158. COUSINS, A. W. J., AND STOY, R. H. 1963
 158. PHOTOELECTRIC MAGNITUDES AND COLOURS OF SOUTHERN STARS. BULL. ROY.
 158. OBS., SERIES E, NO. 64, PP. 103-248.

159. HARDIE, R. H., SEYFERT, C. K., AND GULLEDGE, I. S. 1960
 159. A STUDY OF THE I GEMINORUM ASSOCIATION. ASTROPHYS. JOURN., VOL.
 159. 132, PP. 361-365.
160. KRAFT, R. P. 1960
 160. COLOR EXCESSES FOR SUPERGIANTS AND CLASSICAL CEPHEIDS. II. THE
 160. PERIOD-COLOR RELATION FOR CLASSICAL CEPHEIDS. ASTROPHYS. JOURN.,
 160. VOL. 132, PP. 404-416.
161. OKE, J. B., AND BONSAK, S. J. 1960
 161. AN ANALYSIS OF THE ABSOLUTE ENERGY DISTRIBUTION OF RR LYRAE.
 161. ASTROPHYS. JOURN., VOL. 132, PP. 417-429.
162. FITCH, W. S. 1960
 162. REDISCUSSION OF DELTA SCUTI. ASTROPHYS. JOURN., VOL. 132, PP.
 162. 430-434.
163. FLATHER, E., AND OSTERBROCK, D. E. 1960
 163. THE EMISSION-LINE SPECTRUM OF THE ORION NEBULA. ASTROPHYS. JOURN.,
 163. VOL. 132, PP. 18-21.
164. BURBIDGE, E. M., AND BURBIDGE, G. R. 1960
 164. MOTIONS IN BARRED SPIRAL GALAXIES. I. THE NUCLEI OF NGC 1097 AND
 164. NGC 1365. ASTROPHYS. JOURN., VOL. 132, PP. 30-36.
165. WALLERSTEIN, G. 1960
 165. RADIAL VELOCITIES OF THE BRIGHTER STARS IN M25. ASTROPHYS. JOURN.,
 165. VOL. 132, PP. 37-39.
166. THE, P.-S. 1960
 166. ON THE CLUSTER MEMBERSHIP OF OBJECTS IN NGC 6530 ABOVE THE MAIN
 166. SEQUENCE. ASTROPHYS. JOURN., VOL. 132, PP. 40-48.
167. DIETER, N. H. 1960
 167. NEUTRAL HYDROGEN IN OB ASSOCIATIONS. ASTROPHYS. JOURN., VOL.
 167. 132, PP. 49-57.
168. SEYFERT, C. K., HARDIE, R. H., AND GRENCHIK, R. T. 1960
 168. A STUDY OF THE II PERSEI ASSOCIATION. ASTROPHYS. JOURN., VOL. 132,
 168. PP. 58-65.
169. CRAWFORD, D. L. 1960
 169. EARLY-TYPE STARS USED AS STANDARDS IN PHOTOELECTRIC H BETA
 169. PHOTOMETRY. ASTROPHYS. JOURN., VOL. 132, PP. 66-67.
170. MITCHELL, R. I. 1960
 170. PHOTOMETRY OF THE ALPHA PERSEI CLUSTER. ASTROPHYS. JOURN.,
 170. VOL. 132, PP. 68-75.

171. STRUVE, O., AND ZEBERGS, V. 1960
 171. WAVE LENGTHS OF ABSORPTION LINES IN THE SPECTRA OF BETA CANIS MAJORIS
 171. STARS. ASTROPHYS. JOURN., VOL. 132, PP. 87-100.
172. MELBOURNE, W. G. 1960
 172. LINE-BLANKETING EFFECTS ON A-G DWARFS. ASTROPHYS. JOURN., VOL.
 172. 132, PP. 101-129.
173. MILLS, B. Y., SLEE, O. B., AND HILL, E. R. 1960
 173. A CATALOGUE OF RADIO SOURCES BETWEEN DECLINATIONS -20 DEGREES
 173. AND -50 DEGREES. AUSTRALIAN JOURN. PHYS., VOL. 13, PP. 676-699.
174. MINKOWSKI, R., AND OSTERBROCK, D. C. 1960
 174. ELECTRON DENSITIES IN TWO PLANETARY NEBULAE. ASTROPHYS. JOURN.,
 174. VOL. 131, PP. 537-540.
175. MILLS, B. Y., SLEE, O. B., AND HILL, E. R. 1958
 175. A CATALOGUE OF RADIO SOURCES BETWEEN DECLINATIONS + 10 DEGREES AND
 175. -20 DEGREES. AUSTRALIAN JOURN. PHYS., VOL. 11, PP. 360-387.
176. OSTERBROCK, D. E. 1960
 176. ELECTRON DENSITIES IN PLANETARY NEBULAE. ASTROPHYS. JOURN., VOL.
 176. 131, PP. 541-548.
177. BURBIDGE, E. M., BURBIDGE, G. R., AND PRENDERGAST, K. H. 1960
 177. THE ROTATION AND APPROXIMATE MASS OF NGC 3556. ASTROPHYS. JOURN.,
 177. VOL. 131, PP. 549-552.
178. DE VAUCOULEURS, G. 1960
 178. MAGNITUDES AND COLORS OF THE MAGELLANIC CLOUDS. ASTROPHYS. JOURN.,
 178. VOL. 131, PP. 574-584.
179. SANDAGE, A., AND WALLERSTEIN, G. 1960
 179. COLOR-MAGNITUDE DIAGRAM FOR THE DISK GLOBULAR CLUSTER NGC 6356
 179. COMPARED WITH HALO CLUSTERS. ASTROPHYS. JOURN., VOL. 131, PP.
 179. 598-609.
180. SANDAGE, A. 1960
 180. CEPHEIDS IN GALACTIC CLUSTERS. VI. U SGR IN M25. ASTROPHYS. JOURN.,
 180. VOL. 131, PP. 610-619.
181. JOHNSON, H. L. 1960
 181. THE GALACTIC CLUSTER M25 = IC 4725. ASTROPHYS. JOURN., VOL.
 181. 131, PP. 620-622.
182. MCLAUGHLIN, D. B. 1960
 182. NEON ABSORPTION LINES IN A NOVA SPECTRUM. ASTROPHYS. JOURN., VOL. 131,
 182. PP. 739-740.

183. DE VAUCOULEURS, G. 1960
 183. ROTATION AND MASS OF THE LARGE MAGELLANIC CLOUD. ASTROPHYS.
 183. JOURN., VOL. 131, PP. 265-281.
184. BURBIDGE, E. M., BURBIDGE, G. R., AND PRENDERGAST, K. H. 1960
 184. THE ROTATION, MASS DISTRIBUTION, AND MASS OF NGC 5055. ASTROPHYS.
 184. JOURN., VOL. 131, PP. 282-292.
185. BRANDT, J. C. 1960
 185. ON THE DISTRIBUTION OF MASS IN GALAXIES. I. THE LARGE SCALE
 185. STRUCTURE OF ORDINARY SPIRALS WITH APPLICATIONS TO M31. ASTROPHYS.
 185. JOURN., VOL. 131, PP. 293-303.
186. GSTERBROCK, D. E., AND STOCKHAUSEN, R. E. 1960
 186. PHOTOELECTRIC PHOTOMETRY OF DIFFUSE NEBULAE. ASTROPHYS. JOURN.,
 186. VOL. 131, PP. 310-321.
187. OKE, J. B. 1960
 187. STANDARD STARS FOR PHOTOELECTRIC SPECTROPHOTOMETRY. ASTROPHYS.
 187. JOURN., VOL. 131, PP. 358-362.
188. WOOD, D. B., AND WALKER, M. F. 1960
 188. PHOTOELECTRIC OBSERVATIONS OF BETA LYRAE. ASTROPHYS. JOURN., VOL.
 188. 131, PP. 363-384.
189. LYNDS, C. R. 1960
 189. THE LIGHT-VARIATIONS OF HD 183656. ASTROPHYS. JOURN., VOL.
 189. 131, PP. 390-394.
190. UNDERHILL, A. B. 1960
 190. A POSSIBLE IDENTIFICATION OF B III IN G-TYPE SPECTRA. ASTROPHYS.
 190. JOURN., VOL. 131, PP. 395-398.
191. BONSACK, W. K., AND GREENSTEIN, J. L. 1960
 191. THE ABUNDANCE OF LITHIUM IN T TAURI STARS AND RELATED OBJECTS.
 191. ASTROPHYS. JOURN., VOL. 131, PP. 83-98.
192. ABT, H. A. 1960
 192. THE SPECTRA OF TWO HIGH-LATITUDE SUPERGIANTS. ASTROPHYS. JOURN.,
 192. VOL. 131, PP. 99-110.
193. STRUVE, O., SVOLOPCULOS, S. N., AND ZEBERGS, V. 1960
 193. THE VELOCITY-CURVE OF BETA LYRAE IN 1958. ASTROPHYS. JOURN., VOL. 131,
 193. PP. 111-118.
194. ELSMORE, B., RYLE, M., AND LESLIE, P. R. R. 1959
 194. THE POSITIONS, FLUX DENSITIES AND ANGULAR DIAMETERS OF 64 RADIO
 194. SOURCES OBSERVED AT A FREQUENCY OF 178 MC/S. MEM. ROY. ASTRON.
 194. SOC., VOL. 68, PP. 61-67.

195. LYNDS, C. R. 1960.
 195. PHOTOELECTRIC AND SPECTROSCOPIC OBSERVATIONS OFOMICRON PERSEI.
 195. ASTROPHYS. JOURN., VOL. 131, PP. 122-126.
196. HILTNER, W. A. 1960
 196. COLORS AND MAGNITUDES OF CLUSTERS IN M31 AND M33. ASTROPHYS. JOURN.,
 196. VOL. 131, PP. 163-167.
197. DE VAUCOULEURS, G. 1959
 197. AN EXPANDING ASSOCIATION OF GALAXIES. ASTROPHYS. JOURN., VOL. 130,
 197. PP. 718-727.
198. DE VAUCOULEURS, G. 1959
 198. PHOTOELECTRIC PHOTOMETRY OF MESSIER 33 IN THE U,B,V. SYSTEM.
 198. ASTROPHYS. JOURN., VOL. 130, PP. 728-738.
199. EAUM, W. A., HILTNER, W. A., JOHNSON, H. L., AND SANDAGE, A. R. 1959
 199. THE MAIN SEQUENCE OF THE GLOBULAR CLUSTER M13. ASTROPHYS. JOURN.,
 199. VOL. 130, PP. 749-763.
200. FESCH, P. 1959
 200. THE GALACTIC CLUSTER NGC 457. ASTROPHYS. JOURN., VOL. 130,
 200. PP. 764-768.
201. ABT, H. A. 1959
 201. THE CEPHEID BINARY FF AQUILAE. ASTROPHYS. JOURN., VOL. 130,
 201. PP. 769-773.
202. HANSEN, K., AND MCNAMARA, D. H. 1959
 202. A SPECTROGRAPHIC STUDY OF THE ECLIPSING BINARY RZ SCUTI. ASTROPHYS.
 202. JOURN., VOL. 130, PP. 791-810.
203. STABLEFORD, C., AND ABHYANKAR, K. D. 1959
 203. A SPECTROPHOTOMETRIC STUDY OF SEVERAL BETA CANIS MAJORIS VARIABLES.
 203. ASTROPHYS. JOURN., VOL. 130, PP. 811-816.
204. STRUVE, U., AND ZEBERGS, V. 1959
 204. THE RED SATELLITE ABSORPTION SPECTRUM OF BETA LYRAE. ASTROPHYS.
 204. JOURN., VOL. 130, PP. 817-823.
205. ABHYANKAR, K. D. 1959
 205. AD CMI-A NEW ULTRASHORT-PERIOD VARIABLE. ASTROPHYS. JOURN., VOL.
 205. 130, PP. 834-842.
206. ABT, H. A. 1959
 206. A NEW RADIAL-VELOCITY-CURVE FOR THE CEPHEID SU CASSIOPEIAE.
 206. ASTROPHYS. JOURN., VOL. 130, PP. 1021-1022.

207. FITCH, W. S. 1959
 207. ON PERIOD RATIOS OF THE DELTA SCUTI-TYPE VARIABLES. ASTROPHYS.
 207. JOURN., VOL. 130, PP. 1022-1023.
208. UNDERHILL, A. B. 1959
 208. 9 SAGITTAE AND THE NITROGEN SEQUENCE. ASTROPHYS. JOURN., VOL. 130,
 208. PP. 1027-1028.
209. BLANCO, V. M., AND WILLIAMS, A. D. 1959
 209. A NEW O-B ASSOCIATION WITH AN UNUSUAL REDDENING EFFECT.
 209. ASTROPHYS. JOURN., VOL. 130, PP. 482-486.
210. PRESTON, G. W. 1959
 210. A SPECTROSCOPIC STUDY OF THE RR LYRAE STARS. ASTROPHYS. JOURN.,
 210. VOL. 130, PP. 507-538.
211. SHARPLESS, S. 1959
 211. A CATALOGUE OF H II REGIONS. ASTROPHYS. JOURN. SUPPL., VOL. 4,
 211. PP. 257-279.
212. LYNDS, C. R. 1959
 212. THE LIGHT-VARIABILITY OF EARLY B GIANTS. ASTROPHYS. JOURN., VOL.
 212. 130, PP. 577-598.
213. LYNDS, C. R. 1959
 213. THE LIGHT-VARIATION OF HD 224151. ASTROPHYS. JOURN., VOL. 130,
 213. PP. 599-602.
214. LYNDS, C. R. 1959
 214. A NEW ECLIPSING BINARY OF VERY SHORT PERIOD. ASTROPHYS. JOURN.,
 214. VOL. 130, PP. 603-610.
215. BURBIDGE, E. M., BURBIDGE, G. R., AND PRENDERGAST, K. H. 1959
 215. MASS DISTRIBUTION AND PHYSICAL CONDITIONS IN THE INNER REGION
 215. OF NGC 1068. ASTROPHYS. JOURN., VOL. 130, PP. 26-37.
216. WOLTJER, L. 1959
 216. EMISSION NUCLEI IN GALAXIES. ASTROPHYS. JOURN., VOL. 130,
 216. PP. 38-44.
217. ALLER, L. H., AND LILLER, W. 1959
 217. PHOTOELECTRIC SPECTROPHOTOMETRY OF GASEOUS NEBULAE. I. THE
 217. ORION NEBULA. ASTROPHYS. JOURN., VOL. 130, PP. 45-56.
218. WALKER, M. F. 1959
 218. STUDIES OF EXTREMELY YOUNG CLUSTERS. III. IC 5146. ASTROPHYS.
 218. JOURN., VOL. 130, PP. 57-68.

219. BLAAUW, A., HILTNER, W. A., AND JOHNSON, H. L. 1959
 219. PHOTOELECTRIC PHOTOMETRY OF THE ASSOCIATION III CEPHEI. ASTROPHYS.
 219. JOURN., VOL. 130, PP. 69-79.
220. KRAFT, R. P., CAMP, D. C., AND HUGHES, W. T. 1959
 220. THE HYDROGEN EMISSION LINES IN POPULATION II VARIABLE STARS.
 220. ASTROPHYS. JOURN., VOL. 130, PP. 90-98.
221. GREENSTEIN, J. L., AND KRAFT, R. P. 1959
 221. THE BINARY SYSTEM NOVA DG HERCULIS. I. THE SPECTRUM AND RADIAL
 221. VELOCITY DURING THE ECLIPSE CYCLE. ASTROPHYS. JOURN., VOL. 130,
 221. PP. 99-109.
222. KRAFT, R. P. 1959
 222. THE BINARY SYSTEM NOVA DG HERCULIS. II. AN INTERPRETATION OF THE
 222. SPECTRUM DURING THE ECLIPSE CYCLE. ASTROPHYS. JOURN., VOL. 130,
 222. PP. 110-122.
223. MERRILL, P. W. 1959
 223. WAVE LENGTHS OF ABSORPTION LINES IN THE SPECTRUM OF OMICRON CETI.
 223. ASTROPHYS. JOURN., VOL. 130, PP. 123-126.
224. STRUVE, O., AND ZEBERGS, V. 1959
 224. THE VELOCITY-CURVE OF 85 PEGASI. ASTROPHYS. JOURN., VOL. 130,
 224. PP. 134-136.
225. FRANKLIN, K. L. 1959
 225. A QUALITATIVE SPECTROPHOTOMETRIC INVESTIGATION OF CAPELLA.
 225. ASTROPHYS. JOURN., VOL. 130, PP. 139-158.
226. HILTNER, W. A. 1959
 226. PHOTOELECTRIC POLARIZATION OBSERVATIONS OF THE JET IN M87.
 226. ASTROPHYS. JOURN., VOL. 130, PP. 340-343.
227. POPPER, D. M. 1959
 227. REDISCUSSION OF ECLIPSING BINARIES. IV. RX HERCULIS AND OTHER
 227. A STARS. ASTROPHYS. JOURN., VOL. 129, PP. 659-667.
228. STRUVE, O., AND ZEBERGS, V. 1959
 228. THE RADIAL VELOCITY OF HD 21803 - A NEW BETA CANIS MAJORIS VARIABLE.
 228. ASTROPHYS. JOURN., VOL. 129, PP. 668-673.
229. LYNDS, C. R. 1959
 229. A NEW BETA CANIS MAJORIS STAR. ASTROPHYS. JOURN., VOL. 129,
 229. PP. 674-675.
230. BURBIDGE, G. R. 1959
 230. ESTIMATES OF THE TOTAL ENERGY IN PARTICLES AND MAGNETIC FIELD IN
 230. THE NON-THERMAL RADIO SOURCES. ASTROPHYS. JOURN., VOL. 129, PP.
 230. 849-852.

231. MUNCH, G., AND MUNCH, L. 1959
 231. ON THE DISTANCE OF THE CASSIOPEIA RADIO SOURCE. ASTROPHYS. JOURN.,
 231. VOL. 129, PP. 854-856.
232. HILTNER, W. A. 1959
 232. POLARIZATION OF THE CASSIOPEIA RADIO SOURCE. ASTROPHYS. JOURN.,
 232. VOL. 129, PP. 856-858.
233. MCCUSKEY, S. W. 1959
 233. STELLAR SPECTRA IN MILKY WAY REGIONS. VII. A REGION IN AURIGA.
 233. ASTROPHYS. JOURN. SUPPL., VOL. 4, PP. 1-22.
234. MCCUSKEY, S. W. 1959
 234. STELLAR SPECTRA IN MILKY WAY REGIONS. VIII. A REGION IN CRION.
 234. ASTROPHYS. JOURN. SUPPL., VOL. 4, PP. 23-43.
235. ALLER, L. H., AND JUGAKU, J. 1959
 235. THE ATMOSPHERES OF THE B STARS. VII. QUANTITATIVE CHEMICAL ANALYSIS
 235. OF GAMMA PEGASI. ASTROPHYS. JOURN. SUPPL., VOL. 4, PP. 109-155.
236. ABHYANKAR, K. D. 1959
 236. A STUDY OF SOME EARLY-TYPE CLOSE BINARY STARS. ASTROPHYS. JOURN.,
 236. SUPPL., VOL. 4, PP. 157-198.
237. WILSON, O. C., MUNCH, G., FLATHER, E. M., AND COFFEEN, M. F. 1959
 237. INTERNAL KINEMATICS OF THE ORION NEBULA. ASTROPHYS. JOURN. SUPPL.,
 237. VOL. 4, PP. 199-256.
238. HERBIG, G. H. 1959
 238. THE SPECTRA OF BE- AND AE-TYPE STARS ASSOCIATED WITH NEBULOSITY.
 238. ASTROPHYS. JOURN. SUPPL., VOL. 4, PP. 337-368.
239. BURBIDGE, E. M., AND BURBIDGE, G. R. 1959
 239. ROTATION AND INTERNAL MOTIONS IN NGC 5128. ASTROPHYS. JOURN., VOL.
 239. 129, PP. 271-281.
240. EATON, J. J., AND KRAUS, J. D. 1959
 240. A MAP OF THE CYGNUS REGION AT 915 MEGACYCLES PER SECOND.
 240. ASTROPHYS. JOURN., VOL. 129, PP. 282-286.
241. KRAFT, R. P., AND LANDOLT, A. U. 1959
 241. ECLIPSING BINARIES IN GALACTIC CLUSTERS AND O-B ASSOCIATIONS.
 241. ASTROPHYS. JOURN., VOL. 129, PP. 287-290.
242. HACK, M. 1959
 242. THE SPECTRUM OF EPSILON AURIGAE. ASTROPHYS. JOURN., VOL. 129,
 242. PP. 291-313.

243. STRUVE, O., HUANG, S.-S., AND ZEBERGS, V. 1959
 243. THE SPECTROSCOPIC BINARY HR 8800 = BD+45 DEGREES 4147. ASTROPHYS.
 243. JOURN., VOL. 129, PP. 314-319.
244. GRANT, G., AND ABT, H. A. 1959
 244. PHOTOELECTRIC OBSERVATIONS OF THE 1955-1956 ECLIPSE OF ZETA
 244. AURIGAE. ASTROPHYS. JOURN., VOL. 129, PP. 320-322.
245. GRANT, G., AND ABT, H. A. 1959
 245. PHOTOELECTRIC PHOTOMETRY OF AN OUTBURST OF δ CYGNI. ASTROPHYS.
 245. JOURN., VOL. 129, PP. 323-326.
246. OSTERBROCK, D., AND FLATHER, E. 1959
 246. ELECTRON DENSITIES IN THE ORION NEBULA. II. ASTROPHYS. JOURN.,
 246. VOL. 129, PP. 26-43.
247. MERRILL, P. W. 1959
 247. NEBULAR LINES IN THE SPECTRUM OF AG PEGASI. ASTROPHYS. JOURN.,
 247. VOL. 129, PP. 44-49.
248. STRUVE, O., SAHADE, J., AND ZEBERGS, V. 1959
 248. γ CYGNI. ASTROPHYS. JOURN., VOL. 129, PP. 59-61.
249. GRANT, G. 1959
 249. A PHOTOELECTRIC STUDY OF THE ECLIPSING VARIABLE RW TAURI.
 249. ASTROPHYS. JOURN., VOL. 129, PP. 62-77.
250. CSAWA, K. 1959
 250. SPECTRAL CLASSIFICATION OF 533 B8-A2 STARS AND THE MEAN ABSOLUTE
 250. MAGNITUDE OF A0 V STARS. ASTROPHYS. JOURN., VOL. 130, PP. 159-177.
251. KYLE, M., AND NEVILLE, A. C. 1962
 251. A RADIO SURVEY OF THE NORTH POLAR REGION WITH A 4.5 MINUTE
 251. CF ARC PENCIL-BEAM SYSTEM. MONTHLY NOTICES ROY. ASTRON. SOC.,
 251. VOL. 125, PP. 39-56.
252. GRANT, G. 1959
 252. A SPECTROSCOPIC AND PHOTOMETRIC STUDY OF THE ECLIPSING SYSTEM
 252. LAMBDA TAURI. ASTROPHYS. JOURN., VOL. 129, PP. 78-87.
253. SLETTEBAK, A. V., AND NASSAU, J. J. 1959
 253. PECULIAR AND METALLIC-LINE A-TYPE STARS IN A GALACTIC ZONE.
 253. ASTROPHYS. JOURN., VOL. 129, PP. 88-92.
254. KUPPERIAN, J. E., JR., BOGGESS, A., III, AND MILLIGAN, J. E. 1958
 254. OBSERVATIONAL ASTROPHYSICS FROM ROCKETS. I. NEBULAR PHOTOMETRY AT
 254. 1300 A. ASTROPHYS. JOURN., VOL. 128, PP. 453-464.

255. DE VAUCOULEURS, G. 1958
 255. PHOTOELECTRIC PHOTOMETRY OF THE ANDROMEDA NEBULA IN THE U,B,V
 255. SYSTEM. ASTROPHYS. JOURN., VOL. 128, PP. 465-488.
256. BERTIAU, F. C. 1958
 256. ABSOLUTE MAGNITUDES OF STARS IN THE SCORPIO-CENTAURUS ASSOCIATION.
 256. ASTROPHYS. JOURN., VOL. 128, PP. 533-561.
257. WOOD, D. B. 1958
 257. PHOTOMETRIC ELEMENTS OF U CORONAE BOREALIS. ASTROPHYS. JOURN.,
 257. VOL. 127, PP. 351-354.
258. BEARDSLEY, W. R. 1961
 258. THE SPECTRUM OF RHO CASSIOPEIAE, I. ASTROPHYS. JOURN. SUPPL.,
 258. VOL. 5, PP. 381-502.
259. CRAWFORD, D. L. 1958
 259. TWO-DIMENSIONAL SPECTRAL CLASSIFICATION BY NARROW-BAND PHOTOMETRY
 259. FOR B STARS IN CLUSTERS AND ASSOCIATIONS. ASTROPHYS. JOURN., VOL.
 259. 128, PP. 185-206.
260. MENDOZA, E. E., V 1958
 260. A SPECTROSCOPIC AND PHOTOMETRIC STUDY OF THE BE STARS. ASTROPHYS.
 260. JOURN., VOL. 128, PP. 207-218.
261. DE VAUCOULEURS, G. 1961
 261. INTEGRATED COLORS OF BRIGHT GALAXIES IN THE U,B,V SYSTEM.
 261. ASTROPHYS. JOURN. SUPPL., VOL. 5, PP. 233-290.
262. BABCOCK, H. W. 1958
 262. MAGNETIC FIELDS OF THE A-TYPE STARS. ASTROPHYS. JOURN., VOL. 128,
 262. PP. 228-258.
263. VAN HOOFF, A., AND BLAAUW, A. 1958
 263. THE BEHAVIOR OF THETA OPHIUCHI DURING FOUR CYCLES IN APRIL, 1956.
 263. ASTROPHYS. JOURN., VOL. 128, PP. 273-286.
264. STRUVE, O., PILLANS, H., AND ZEBERGS, V. 1958
 264. THE RADIAL VELOCITY OF EPSILON AURIGAE. ASTROPHYS. JOURN., VOL.
 264. 128, PP. 287-309.
265. STRUVE, O., SAHADE, J., HUANG, S.-S., AND ZEBERGS, V. 1958
 265. THE SPECTROSCOPIC BINARY ALPHA VIRGINIS (SPICA). ASTROPHYS.
 265. JOURN., VOL. 128, PP. 310-327.
266. STRUVE, O., SAHADE, J., HUANG, S.-S., AND ZEBERGS, V. 1958
 266. THE ORBIT OF THE SPECTROSCOPIC BINARY 29 UW CANIS MAJORIS.
 266. ASTROPHYS. JOURN., VOL. 128, PP. 328-335.

267. HILTNER, W. A., AND IRIARTE, B. 1958
 267. THREE-COLOR PHOTOMETRY OF EXTRAGALACTIC NEBULAE. ASTROPHYS.
 267. JOURN., VOL. 128, PP. 443-445.
268. SEARLE, L. 1958
 268. A STUDY OF THREE SHELL STARS. ASTROPHYS. JOURN., VOL. 128, PP.
 268. 61-76.
269. MCNAMARA, D. H., AND HANSEN, K. 1958
 269. THE ROTATIONAL DISTURBANCE IN THE SPECTRUM OF RZ SCUTI. ASTROPHYS.
 269. JOURN., VOL. 128, PP. 77-82.
270. MOFFET, A. T. 1962
 270. BRIGHTNESS DISTRIBUTION IN DISCRETE RADIO SOURCES. I. OBSERVATIONS
 270. WITH AN EAST-WEST INTERFEROMETER. ASTROPHYS. JOURN. SUPPL., VOL. 7,
 270. PP. 93-123.
271. MALTBY, P. 1962
 271. BRIGHTNESS DISTRIBUTION IN DISCRETE RADIO SOURCES. II.
 271. OBSERVATIONS WITH A NORTH-SOUTH INTERFEROMETER. ASTROPHYS.
 271. JOURN. SUPPL., VOL. 7, PP. 124-140.
272. HUFFER, C. M., AND COLLINS, G. W., II 1962
 272. COMPUTATION OF ELEMENTS OF ECLIPSING BINARY STARS BY HIGH-SPEED
 272. COMPUTING MACHINES. ASTROPHYS. JOURN. SUPPL., VOL. 7, PP. 351-410.
273. MCLAUGHLIN, D. B. 1962
 273. THE BE SPECTRUM VARIABLE PI AQUARI. ASTROPHYS. JOURN. SUPPL.,
 273. VOL. 7, PP. 65-92.
274. HARRIS, D. E., AND ROBERTS, J. A. 1960
 274. RADIO SOURCE MEASUREMENTS AT 960 MC/S. PUBL. ASTRON. SOC. PACIFIC,
 274. VOL. 72, PP. 237-247.
275. WILSON, R. W., AND BOLTON, J. G. 1960
 275. A SURVEY OF GALACTIC RADIATION AT 960 MC/S. PUBL. ASTRON.
 275. SOC. PACIFIC, VOL. 72, PP. 331-341.
276. ROBERTS, J. A., BOLTON, J. G., AND HARRIS, D. E. 1960
 276. POSITIONS AND SUGGESTED IDENTIFICATIONS FOR THE RADIO SOURCES
 276. HYDRA A AND HERCULES A. PUBL. ASTRON. SOC. PACIFIC, VOL. 72,
 276. PP. 5-9.
277. JOHNSON, H. M. 1960
 277. PHOTOELECTRIC PHOTOMETRY OF DIFFUSE GALACTIC NEBULAE AND COMET
 277. AREND-ROLAND. PUBL. ASTRON. SOC. PACIFIC, VOL. 72, PP. 10-23.
278. BIDELMAN, W. 1960
 278. THE UNUSUAL SPECTRUM OF 3 CENTAURI. PUBL. ASTRON. SOC. PACIFIC,
 278. VOL. 72, PP. 24-28.

279. BOLTON, J. G., AND CLARK, B. G. 1960
 279. A STUDY OF CENTAURUS A AT 31 CENTIMETERS. PUBL. ASTRON. SOC.
 279. PACIFIC, VOL. 72, PP. 29-35.
280. HANSEN, K., AND MCNAMARA, D. H. 1960
 280. AN ESTIMATE OF THE STREAM DENSITY IN RZ SCUTI. PUBL. ASTRON. SOC.
 280. PACIFIC, VOL. 72, PP. 36-41.
281. HOGG, A. R. 1960
 281. THE GALACTIC CLUSTER IC 2391. PUBL. ASTRON. SOC. PACIFIC, VOL. 72,
 281. PP. 85-93.
282. EIDELMAN, W. P., AND SVOLOPOULOS, S. N. 1960
 282. 88 HERCULIS: A BRIGHT NEW SHELL STAR. PUBL. ASTRON. SOC. PACIFIC,
 282. VOL. 72, PP. 129-130.
283. RINGUELET-KASWALDER, A., SAHADE, J., AND STRUVE, O. 1960
 283. THE SPECTRUM OF 27 CANIS MAJORIS IN 1957-59. PUBL. ASTRON. SOC.
 283. PACIFIC, VOL. 72, PP. 317-318.
284. BATTEN, A. H. 1960
 284. THE TRIPLE SYSTEM AR CASSIOPEIAE. PUBL. ASTRON. SOC. PACIFIC,
 284. VOL. 72, PP. 349-350.
285. STRUVE, O., AND WADE, M. S. 1960
 285. SPECTROSCOPIC FEATURES OF BETA LYRAE. PUBL. ASTRON. SOC. PACIFIC,
 285. VOL. 72, PP. 403-412.
286. HERNANDEZ, C. 1960
 286. SPECTROSCOPIC OBSERVATIONS OF STARS OF THE KAPPA CRUCIS CLUSTER.
 286. PUBL. ASTRON. SOC. PACIFIC, VOL. 72, PP. 416-418.
287. JOHNSON, H. M. 1960
 287. THE PLANETARY NEBULA NGC 2818. PUBL. ASTRON. SOC. PACIFIC, VOL. 72,
 287. PP. 418-420.
288. BIDELMAN, W. P. 1960
 288. THE SPECTRUM OF KAPPA CANCRI. PUBL. ASTRON. SOC. PACIFIC, VOL. 72,
 288. PP. 471-474.
289. SAHADE, J. 1960
 289. THE SPECTRUM OF 27 CANIS MAJORIS IN 1960. PUBL. ASTRON. SOC.
 289. PACIFIC, VOL. 72, PP. 478-480.
290. JOHNSON, H. L., AND MITCHELL, R. I. 1958
 290. THE COLOR-MAGNITUDE DIAGRAM OF THE PLEIADES CLUSTER. II. ASTROPHYS.
 290. JOURN., VOL. 128, PP. 31-40.

291. ABT, H. A. 1962.
 291. THE FREQUENCY OF BINARIES AMONG METALLIC-LINE STARS. ASTROPHYS.
 291. JOURN. SUPPL., VOL. 6, PP. 37-74.
292. HILTNER, W. A., IRIARTE, B., AND JOHNSON, H. L. 1958
 292. THE GALACTIC CLUSTER NGC 6633. ASTROPHYS. JOURN., VOL. 127,
 292. PP. 539-543.
293. SHANE, W. W. 1958
 293. THE RADIAL VELOCITY OF DELTA CEPHEI. ASTROPHYS. JOURN., VOL. 127,
 293. PP. 573-582.
294. HARDIE, R. 1958
 294. LIGHT-VARIATION OF THE SPECTRUM VARIABLE HD 124224. ASTROPHYS.
 294. JOURN., VOL. 127, PP. 620-624.
295. WALKER, M. F. 1958
 295. PHOTOELECTRIC OBSERVATIONS OF NOVA DQ HERCULIS (1934). ASTROPHYS.
 295. JOURN., VOL. 127, PP. 319-350.
296. WOOD, D. B. 1958
 296. PHOTOELECTRIC OBSERVATIONS OF U CORONAE BOREALIS. ASTROPHYS.
 296. JOURN., VOL. 127, PP. 351-354.
297. MENON, T. K. 1958
 297. INTERSTELLAR STRUCTURE OF THE ORION REGION. I. ASTROPHYS. JOURN.,
 297. VOL. 127, PP. 28-47.
298. BURBIDGE, G. R. 1958
 298. PARTICLE ENERGIES AND MAGNETIC ENERGY IN THE CRAB NEBULA.
 298. ASTROPHYS. JOURN., VOL. 127, PP. 48-53.
299. ALLER, L. H., AND JAGAKU, J. 1958
 299. THE ATMOSPHERES OF THE B STARS. V. THE SPECTRUM OF GAMMA PEGASI.
 299. ASTROPHYS. JOURN., VOL. 127, PP. 125-142.
300. MICZAIKA, G. R., AND WADE, M. S. 1958
 300. DOPPLER MOTIONS IN THE ATMOSPHERE OF δ CCMAE. ASTROPHYS.
 300. JOURN., VOL. 127, PP. 143-147.
301. BURBIDGE, G. R., AND BURBIDGE, E. M. 1955
 301. AN ANALYSIS OF THE MAGNETIC VARIABLE ALPHA 2 CANUM VENATICORUM.
 301. ASTROPHYS. JOURN. SUPPL., VOL. 1, PP. 431-477.
302. HEESCHEN, D. S. 1957
 302. NEUTRAL HYDROGEN IN M32, M51, AND M81. ASTROPHYS. JOURN., VOL. 126,
 302. PP. 471-479.

303. MATHIS, J. S. 1957
 303. THE RATIO OF HELIUM AND HYDROGEN ABUNDANCES IN PLANETARY NEBULAE.
 303. ASTROPHYS. JOURN., VOL. 126, PP. 493-502.
304. ABT, H. A. 1957
 304. LINE BROADENING IN HIGH-LUMINOSITY STARS. I. BRIGHT GIANTS.
 304. ASTROPHYS. JOURN., VOL. 126, PP. 503-508.
305. LYNDS, C. R., PEREGRINE, D. S., AND WOOD, D. B. 1957
 305. LIGHT VARIATION OF +74 DEGREES 493. ASTROPHYS. JOURN., VOL. 126.
 305. PP. 522-524.
306. SEEGER, C. L., WESTERHOUT, G., AND CONWAY, R. G. 1957
 306. OBSERVATIONS OF DISCRETE SOURCES, THE COMA CLUSTER, THE MOON, AND
 306. THE ANDROMEDA NEBULA AT A WAVE LENGTH OF 75 CM. ASTROPHYS. JOURN.,
 306. VOL. 126, PP. 585-587.
307. GREENSTEIN, J. L., HACK, M., AND STRUVE, O. 1957
 307. THE SPECTROSCOPIC BINARY BD +74 DEGREES 493. ASTROPHYS. JOURN.,
 307. VOL. 126, PP. 281-290.
308. VELGHE, A. G. 1957
 308. H-ALPHA EMISSION STARS AND PLANETARY NEBULAE IN THE VICINITY OF M8
 308. AND M20 IN VELA FROM L = 230 DEGREES TO L = 241 DEGREES ALONG THE
 308. GALACTIC EQUATOR. ASTROPHYS. JOURN., VOL. 126, PP. 302-317.
309. HART, A. B. 1957
 309. THE PERIOD OF BD + 36 DEGREES 3991. ASTROPHYS. JOURN., VOL. 126,
 309. PP. 463-465.
310. JOHNSON, F. M., AND TOWNES, C. H. 1957
 310. ACCELERATION IN THE EXPANSION OF THE CRAB NEBULA. ASTROPHYS.
 310. JOURN., VOL. 126, PP. 466-468.
311. MAYER, C. H., MCCULLOUGH, T. P., AND SLOANAKER, R. M. 1957
 311. EVIDENCE FOR POLARIZED RADIO RADIATION FROM THE CRAB NEBULA.
 311. ASTROPHYS. JOURN., VOL. 126, PP. 468-470.
312. WELLMAN, P. 1957
 312. SPECTROSCOPIC RESULTS ON 32 CYGNI. ASTROPHYS. JOURN., VOL. 126,
 312. PP. 30-45.
313. POPPER, D. M. 1957
 313. REDISCUSSION OF ECLIPSING BINARIES. III. Z VULPECULAE. ASTROPHYS.
 313. JOURN., VOL. 126, PP. 53-68.
314. JOHNSON, H. L. 1957
 314. THE COLOR-MAGNITUDE DIAGRAM FOR I ORIONIS. ASTROPHYS. JOURN.,
 314. VOL. 126, PP. 134-137.

315. OSTERBROCK, D. E. 1957
 315. COMET-TAIL STRUCTURES IN EMISSION NEBULAE. ASTROPHYS. JOURN.,
 315. VOL. 125, PP. 622-635.
316. WALKER, M. F. 1957
 316. STUDIES OF EXTREMELY YOUNG CLUSTERS. II. NGC 6530. ASTROPHYS.
 316. JOURN., VOL. 125, PP. 636-653.
317. MCNAMARA, D. H. 1957
 317. THE VELOCITY-CURVE OF 16 LACERTAE. ASTROPHYS. JOURN., VOL. 125,
 317. PP. 684-688.
318. SAHADE, J., AND STRUVE, G. 1957
 318. THE SPECTRUM OF BETA PERSEI DURING PRIMARY ECLIPSE. ASTROPHYS.
 318. JOURN., VOL. 125, PP. 689-691.
319. STRUVE, O., SAHADE, J., AND ZEBERGS, V. 1957
 319. THE RADIAL VELOCITY OF DELTA DELPHINI. ASTROPHYS. JOURN.,
 319. VOL. 125, PP. 692-695.
320. CSAWA, K. 1957
 320. THE ORBITS OF THE SPECTROSCOPIC BINARIES 52 PERSEI AND 35 CYGNI.
 320. ASTROPHYS. JOURN., VOL. 125, PP. 707-711.
321. VELGHE, A. G. 1957
 321. TWO BRIGHT KNOTS IN THE GASEOUS NEBULA M8. ASTROPHYS. JOURN.,
 321. VOL. 125, PP. 822-824.
322. HOFFMEISTER, C. 1957
 322. ON TWO ABNORMAL STARS OF DELTA CEPHEI TYPE. ASTROPHYS.
 322. JOURN., VOL. 125, PP. 824-825.
323. MATHIS, J. S. 1957
 323. THE RATIO OF HELIUM TO HYDROGEN IN THE ORION NEBULA. ASTROPHYS.
 323. JOURN., VOL. 125, PP. 328-335.
324. MELTZER, A. S. 1957
 324. A SPECTROSCOPIC INVESTIGATION OF ALGOL. ASTROPHYS. JOURN.,
 324. VOL. 125, PP. 359-371.
325. BURBIDGE, G. R., AND BURBIDGE, E. M. 1957
 325. THE SOURCES OF RADIO EMISSION IN NGC 5128 AND NGC 1316.
 325. ASTROPHYS. JOURN., VOL. 125, PP. 1-8.
326. ALLER, L. H. 1957
 326. CHEMICAL COMPOSITIONS OF SELECTED PLANETARY NEBULAE. ASTROPHYS.
 326. JOURN., VOL. 125, PP. 84-101.

327. ADAMS, W. S., AND MERRILL, P. W. 1957
 327. MOUNT WILSON SPECTROGRAMS OF P CYGNI. ASTROPHYS. JOURN., VOL. 125,
 327. PP. 102-106.
328. STRUVE, O., SAHADE, J., LYNDS, C. R., AND HUANG, S.-S. 1957
 328. ON THE SPECTRUM AND BRIGHTNESS OF MAIA (20 C TAURI). ASTROPHYS.
 328. JOURN., VOL. 125, PP. 115-117.
329. HILTNER, W. A. 1957
 329. POLARIZATION OF THE CRAB NEBULA. ASTROPHYS. JOURN., VOL. 125,
 329. PP. 300-305.
330. STRUVE, O., SAHADE, J., AND ZEBERGS, V. 1956
 330. THE RADIAL VELOCITIES OF RHO PUPPIS. ASTROPHYS. JOURN., VOL. 124,
 330. PP. 504-506.
331. EBBIGHAUSEN, E. G., AND STRUVE, O. 1956
 331. THE TRIPLE SYSTEM LAMBDA TAURI. ASTROPHYS. JOURN., VOL. 124,
 331. PP. 507-521.
332. BURBIDGE, E. M., AND BURBIDGE, G. R. 1956
 332. ON THE POSSIBLE PRESENCE OF HE3 IN THE MAGNETIC STAR 21 AQUILAE.
 332. ASTROPHYS. JOURN., VOL. 124, PP. 655-662.
333. LYNDS, C. R., SAHADE, J., AND STRUVE, O. 1956
 333. THE VELOCITY-CURVE OF 15 CANIS MAJORIS. ASTROPHYS. JOURN.,
 333. VOL. 124, PP. 321-324.
334. WILSON, O. C., AND WALKER, M. F. 1956
 334. SIMULTANEOUS SPECTROGRAPHIC AND PHOTOMETRIC OBSERVATIONS OF THE
 334. SHORT-PERIOD VARIABLES SX PHOENICIS AND CC ANDROMEDAE. ASTROPHYS.
 334. JOURN., VOL. 124, PP. 325-341.
335. CHAMBERLAIN, J. W. 1956
 335. EXCITATION IN NEBULAE; CHARGE TRANSFER AND THE CASSIOPEIA RADIO
 335. SOURCE. ASTROPHYS. JOURN., VOL. 124, PP. 390-398.
336. HILTNER, W. A., AND JOHNSON, H. L. 1956
 336. THE LAW OF INTERSTELLAR REDDENING AND ABSORPTION. ASTROPHYS.
 336. JOURN., VOL. 124, PP. 367-378.
337. MERRILL, P. W., AND BURWELL, C. G. 1949
 337. SECOND SUPPLEMENT TO THE MOUNT WILSON CATALOGUE AND BIBLIOGRAPHY OF
 337. STARS OF CLASSES B AND A WHOSE SPECTRA HAVE BRIGHT HYDROGEN LINES.
 337. ASTROPHYS. JOURN., VOL. 110, PP. 387-419.
338. JOHNSON, H. L., AND KNUCKLES, C. F. 1957
 338. THREE-COLOR PHOTOMETRY OF NEARBY STARS. ASTROPHYS. JOURN.,
 338. VOL. 126, PP. 113-120.

339. MUNCH, G. 1957
 339. INTERSTELLAR ABSORPTION LINES IN DISTANT STARS. I. NORTHERN MILKY
 339. WAY. ASTROPHYS. JOURN., VOL. 125, PP. 42-65.
340. SMITH, E. VAN P. 1956
 340. INTERSTELLAR POLARIZATION IN THE SOUTHERN MILKY WAY. ASTROPHYS.
 340. JOURN., VOL. 124, PP. 43-60.
341. MERRILL, P. W., AND BURWELL, C. G. 1943
 341. SUPPLEMENT TO THE MOUNT WILSON CATALOGUE AND BIBLIOGRAPHY OF STARS
 341. OF CLASSES B AND A WHOSE SPECTRA HAVE BRIGHT HYDROGEN LINES.
 341. ASTROPHYS. JOURN., VOL. 98, PP. 153-184.
342. MERRILL, P. W., AND BURWELL, C. G. 1933
 342. CATALOGUE AND BIBLIOGRAPHY OF STARS OF CLASSES B AND A WHOSE
 342. SPECTRA HAVE BRIGHT HYDROGEN LINES. ASTROPHYS. JOURN.,
 342. VOL. 78, PP. 87-140.
343. HOFFLEIT, D. 1956
 343. DISTANCES FOR SOUTHERN EARLY-TYPE STARS, ESPECIALLY IN CARINA
 343. AND OTHER H II REGIONS. ASTROPHYS. JOURN., VOL. 124, PP. 61-80.
344. MINKOWSKI, R., AND ALLER, L. H. 1956
 344. SPECTROPHOTOMETRY OF PLANETARY NEBULAE. ASTROPHYS. JOURN.,
 344. VOL. 124, PP. 93-109.
345. MINKOWSKI, R., AND ALLER, L. H. 1956
 345. THE INTERPRETATION OF THE SPECTRUM OF NGC 7027. ASTROPHYS. JOURN.,
 345. VOL. 124, PP. 110-115.
346. BURBIDGE, E. M., AND BURBIDGE, G. R. 1956
 346. THE CHEMICAL COMPOSITIONS OF FIVE STARS WHICH SHOW SOME OF THE
 346. CHARACTERISTICS OF POPULATION II. ASTROPHYS. JOURN., VOL. 124,
 346. PP. 116-129.
347. BURBIDGE, G. R., AND BURBIDGE, E. M. 1956
 347. ANOMALOUS ABUNDANCES OF MANGANESE, STRONTIUM, AND EUROPIUM IN HD
 347. 151199. ASTROPHYS. JOURN., VOL. 124, PP. 130-133.
348. MICZAIKA, G. R., FRANKLIN, F. A., DEUTSCH, A. J., AND 1956
 348. GREENSTEIN, J. L.
 348. A SPECTROPHOTOMETRIC ANALYSIS OF TWO METALLIC-LINE STARS.
 348. ASTROPHYS. JOURN., VOL. 124, PP. 134-154.
349. VAN HOOF, A., BERTIAU, F., AND DEURINCK, R. 1956
 349. THE RADIAL VELOCITY VARIATION OF THETA OPHIUCHI. ASTROPHYS.
 349. JOURN., VOL. 124, PP. 168-172.

350. SLETTEBAK, A. 1956
 350. LINE BROADENING IN THE SPECTRA OF O- AND EARLY B-TYPE STARS.
 350. ASTROPHYS. JOURN., VOL. 124, PP. 173-195.
351. POPPER, U. M. 1956
 351. REDISCUSSION OF ECLIPSING BINARIES. II. S. ANTLIAE. ASTROPHYS.
 351. JOURN., VOL. 124, PP. 208-213.
352. EUSCOMBE, W. 1962
 352. THE SCORPIO-CENTAURUS ASSOCIATION. III. RADIAL VELOCITIES OF 70
 352. ADDITIONAL STARS. MONTHLY NOTICES ROY. ASTRON. SOC., VOL. 124,
 352. PP. 189-194.
353. EUSCOMBE, W., AND KENNEDY, P. M. 1962
 353. THE SCORPIO-CENTAURUS ASSOCIATION. IV. INTERSTELLAR ABSORPTION
 353. LINES IN THE SOUTHERN MILKY WAY. MONTHLY NOTICES ROY. ASTRON. SOC.,
 353. VOL. 124, PP. 195-200.
354. THACKERAY, A. D. 1962
 354. THE INFRA-RED SPECTRUM OF ETA CARINAE. MONTHLY NOTICES ROY. ASTRON.
 354. SOC., VOL. 124, PP. 251-262.
355. WESSELINK, A. J. 1962
 355. U, B, V PHOTOMETRY IN AND NEAR THE MAGELLANIC CLOUDS. MONTHLY NOTICES
 355. ROY. ASTRON. SOC., VOL. 124, PP. 359-369.
356. BOK, B. J., AND BOK, P. F. 1962
 356. INTEGRATED MAGNITUDES AND COLOURS OF YOUNG ASSOCIATIONS IN THE
 356. LARGE MAGELLANIC CLOUD. MONTHLY NOTICES ROY. ASTRON. SOC.,
 356. VOL. 124, PP. 435-444.
357. THACKERAY, A. D., WESSELINK, A., AND HARDING, G. A. 1962
 357. THE CLUSTER NGC 6067. MONTHLY NOTICES ROY. ASTRON. SOC., VOL. 124,
 357. PP. 445-458.
358. ALLEN, L. R., ANDERSON, B., CONWAY, R. G., PALMER, H. P., 1962
 358. REDDISH, V. C., AND ROWSON, B.
 358. OBSERVATIONS OF 384 RADIO SOURCES AT A FREQUENCY OF 158 MC/S WITH A
 358. LONG BASELINE INTERFEROMETER. MONTHLY NOTICES ROY. ASTRON. SOC.,
 358. VOL. 124, PP. 477-499.
359. WESSELINK, A. J. 1962
 359. PHOTOELECTRIC MEASURES OF POLARIZATION IN THE HALO AROUND ETA
 359. CARINAE. MONTHLY NOTICES ROY. ASTRON. SOC., VOL. 124, PP. 501-504.
360. ELAAUW, A. 1956
 360. ON THE LUMINOSITIES, MOTIONS AND SPACE DISTRIBUTION OF THE NEARER
 360. NORTHERN O-B5 STARS. ASTROPHYS. JOURN., VOL. 123, PP. 408-439.

361. BAADE, W. S. 1956
 361. POLARIZATION IN THE JET OF MESSIER 87. ASTROPHYS. JOURN., VOL. 123,
 361. PP. 550-551.
362. ADAMS, W. S. 1956
 362. NOTES ON THE SHELL LINES AND THE RADIAL VELOCITY OF ALPHA ORIONIS.
 362. ASTROPHYS. JOURN., VOL. 123, PP. 189-200.
363. SANFORD, R. F. 1956
 363. RADIAL-VELOCITY-CURVES OF T MONOCEROTIS AND SV VULPECULAE.
 363. ASTROPHYS. JOURN., VOL. 123, PP. 201-209.
364. KOHM-VITENSE, E., AND STRUVE, O. 1956
 364. THE WIDTHS OF THE LINES OF Fe, Si, O, AND N IN THE SPECTRUM OF
 364. GAMMA PEGASI. ASTROPHYS. JOURN., VOL. 123, PP. 228-230.
365. HUANG, S.-S., AND STRUVE, O. 1956
 365. A MICROPHOTOMETRIC STUDY OF THE SPECTRUM OF MAIA. ASTROPHYS.
 365. JOURN., VOL. 123, PP. 231-245.
366. ROMAN, N. G. 1956
 366. SPECTRAL TYPES OF SOME ECLIPSING BINARIES. ASTROPHYS. JOURN.,
 366. VOL. 123, PP. 246-249.
367. STOCK, J. 1956
 367. PHOTOELECTRIC SPECTROPHOTOMETRY. I. HYDROGEN-LINE INTENSITIES OF
 367. G-, B-, AND A-TYPE STARS. ASTROPHYS. JOURN., VOL. 123, PP. 253-257.
368. JOHNSON, H. L., AND HILTNER, W. A. 1956
 368. OBSERVATIONAL CONFIRMATION OF A THEORY OF STELLAR EVOLUTION.
 368. ASTROPHYS. JOURN., VOL. 123, PP. 267-277.
369. HARRIS, D. L., III 1956
 369. PHOTOMETRY OF THE PERSEUS AGGREGATES. ASTROPHYS. JOURN., VOL. 123,
 369. PP. 371-372.
370. LAWRENCE, R. S. 1956
 370. RADIO OBSERVATIONS OF INTERSTELLAR NEUTRAL HYDROGEN CLOUDS.
 370. ASTROPHYS. JOURN., VOL. 123, PP. 30-33.
371. WALKER, M. F. 1956
 371. A PHOTOMETRIC INVESTIGATION OF THE SHORT-PERIOD ECLIPSING BINARY,
 371. NOVA DU HERCULIS (1934). ASTROPHYS. JOURN., VOL. 123, PP. 68-89.
372. ALLER, L. H. 1956
 372. ATMOSPHERES OF THE B STARS. I. THE SUPERGIANT EPSILON CANIS
 372. MAJORIS. ASTROPHYS. JOURN., VOL. 123, PP. 117-132.

373. ALLER, L. H. 1956
 373. ATMOSPHERES OF THE B STARS. II. THE SUPERGIANT 55 CYGNI. ASTROPHYS.
 373. JOURN., VOL. 123, PP. 133-138.
374. LILLEY, A. E., AND MCCLAIN, E. F. 1956
 374. THE HYDROGEN-LINE RED SHIFT OF RADIO SOURCE CYGNUS A. ASTROPHYS.
 374. JOURN., VOL. 123, PP. 172-175.
375. BURGESS, A., AND SEATON, M. J. 1960
 375. THE ABUNDANCE OF OXYGEN IN THE PLANETARY NEBULA NGC 7027. MONTHLY
 375. NOTICES ROY. ASTRON. SOC., VOL. 121, PP. 76-94.
376. LOVELL, A. C. B., AND WELLS, H. W. 1960
 376. THE SPECTRUM OF THE CYGNUS (19N4A) AND CASSIOPEIA (23N5A) RADIO
 376. SOURCES BELOW 30 MC/S. MONTHLY NOTICES ROY. ASTRON. SOC., VOL.
 376. 121, PP. 111-114.
377. STEBBINS, J., AND KRON, G. E. 1956
 377. SIX-COLOR PHOTOMETRY OF STARS. IX. THE COLORS OF 409 STARS OF
 377. DIFFERENT SPECTRAL TYPES. ASTROPHYS. JOURN., VOL. 123, PP. 440-457.
378. NOT USED
379. JOHNSON, H. L., AND KNUCKLES, C. F. 1955
 379. THE HYADES AND COMA BERENICES STAR CLUSTERS. ASTROPHYS. JOURN.,
 379. VOL. 122, PP. 209-221.
380. OSTERBROCK, D. E. 1955
 380. ELECTRON DENSITIES IN THE ORION NEBULA. ASTROPHYS. JOURN., VOL.
 380. 122, PP. 235-239.
381. LILLER, W. 1955
 381. THE PHOTOELECTRIC PHOTOMETRY OF PLANETARY NEBULAE. ASTROPHYS.
 381. JOURN., VOL. 122, PP. 240-255.
382. HARDIE, R. H. 1955
 382. A STUDY OF RR LYRAE IN THREE COLORS. ASTROPHYS. JOURN., VOL. 122,
 382. PP. 256-262.
383. HAGEN, J. P., LILLEY, A. E., AND MCCLAIN, E. F. 1955
 383. ABSORPTION OF 21-CM RADIATION BY INTERSTELLAR HYDROGEN. ASTROPHYS.
 383. JOURN., VOL. 122, PP. 361-375.
384. MCCLAIN, E. F. 1955
 384. AN APPROXIMATE DISTANCE DETERMINATION FOR RADIO SOURCE SAGITTARIUS
 384. A. ASTROPHYS. JOURN., VOL. 122, PP. 376-384.
385. WHITNEY, C. 1955
 385. THE RADII OF DELTA CEPHEI AND ETA AQUILAE. II. ASTROPHYS. JOURN.,
 385. VOL. 122, PP. 385-389.

386. BURBIDGE, E. M., AND BURBIDGE, G. R. 1955
 386. RELATIVE ABUNDANCES AND ATMOSPHERIC CONDITIONS IN THE MAGNETIC
 386. STAR HD 133029. ASTROPHYS. JOURN., VOL. 122, PP. 396-408.
387. STRUVE, O., AND ABHYANKAR, K. D. 1955
 387. THE SPECTRUM OF NU ERIDANI. ASTROPHYS. JOURN., VOL. 122,
 387. PP. 409-416.
388. RODGERS, A. W., CAMPBELL, C. T., AND WHITEOAK, J. B. 1960
 388. A CATALOGUE OF H-ALPHA EMISSION REGIONS IN THE SOUTHERN MILKY WAY.
 388. MONTHLY NOTICES ROY. ASTRON. SOC., VOL. 121, PP. 103-110.
389. FEAST, M. W., THACKERAY, A. D., AND WESSELINK, A. J. 1960
 389. THE BRIGHTEST STARS IN THE MAGELLANIC CLOUDS. MONTHLY NOTICES ROY.
 389. ASTRON. SOC., VOL. 121, PP. 337-385.
390. JOHNSON, H. L., AND MORGAN, W. W. 1955
 390. PHOTOMETRIC AND SPECTROSCOPIC OBSERVATIONS OF THE DOUBLE CLUSTER
 390. IN PERSEUS. ASTROPHYS. JOURN., VOL. 122, PP. 429-433.
391. WALLERSTEIN, G. 1962
 391. PRIVATE COMMUNICATION.
392. STROMGREN, B., AND PERRY, C. 1962
 392. PHOTOELECTRIC U, V, B, Y, PHOTOMETRY FOR 1217 STARS BRIGHTER THAN
 392. V = 6.5, MOSTLY OF SPECTRAL CLASSES A, F, AND G. INSTITUTE FOR
 392. ADVANCED STUDY, PRINCETON, DECEMBER.
393. LE VAUCOULEURS, G., AND DE VAUCOULEURS, A. 1963
 393. ROTATION AND MASS OF THE MAGELLANIC-TYPE GALAXY NGC 4631. ASTROPHYS.
 393. JOURN., VOL. 137, PP. 363-375.
394. BURBIDGE, E. M., BURBIDGE, G. R., AND PRENDERGAST, K. H. 1963
 394. THE ROTATION AND MASS OF NGC 1084. ASTROPHYS. JOURN., VOL. 137,
 394. PP. 376-380.
395. CAYREL, R., AND CAYREL, G. 1963
 395. A DETAILED ANALYSIS OF THE SPECTRUM OF EPSILON VIRGINIS.
 395. ASTROPHYS. JOURN., VOL. 137, PP. 431-469.
396. CRAWFORD, D. L. 1963
 396. PHOTOMETRY OF THE STARS OF THE CASSIOPEIA-TAURUS GROUP. ASTROPHYS.
 396. JOURN., VOL. 137, PP. 523-529.
397. CRAWFORD, D. L. 1963
 397. U, B, V, AND H BETA PHOTOMETRY FOR THE BRIGHT B8- AND B9-TYPE
 397. STARS. ASTROPHYS. JOURN., VOL. 137, PP. 530-546.

398. FESCH, P. 1963
398. SPECTROGRAPHIC AND PHOTOMETRIC OBSERVATIONS OF SOME STARS FROM
398. THE LUMINOUS STARS IN THE NORTHERN MILKY WAY I AND II CATALOGUES.
398. ASTROPHYS. JOURN., VOL. 137, PP. 547-551.
399. MORRIS, D., AND RADHAKRISHNAN, V. 1963
399. TESTS FOR LINEAR POLARIZATION IN THE 1390 MC/S RADIATION FROM SIX
399. INTENSE RADIO SOURCES. ASTROPHYS. JOURN., VOL. 137, PP. 147-152.
400. MALTBY, P., MATTHEWS, T. A., AND MOFFET, A. T. 1963
400. BRIGHTNESS DISTRIBUTION IN DISCRETE RADIO SOURCES. IV. A DISCUSSION
400. OF 25 IDENTIFIED SOURCES. ASTROPHYS. JOURN., VOL. 137, PP. 153-163.
401. LITTLE, A. G. 1963
401. OBSERVATIONS AT 9.1 CM OF TAURUS A, THE CRION NEBULA, VIRGO A,
401. CENTAURUS A, SAGITTARIUS A, AND THE OMEGA NEBULA, WITH A 2.3 ARC
401. MINUTE FAN BEAM. ASTROPHYS. JOURN., VOL. 137, PP. 164-174.
402. SEARLE, L., SARGENT, W. L. W., AND JUGAKU, J. 1963
402. THE LUMINOSITIES AND COMPOSITIONS OF THE HIGH-GALACTIC LATITUDE
402. SUPERGIANTS 89 HERCULIS AND HD 161796. ASTROPHYS. JOURN., VOL. 137,
402. PP. 268-279.
403. WALLERSTEIN, G., GREENSTEIN, J. L., PARKER, R., HELFER, H. L., 1963
403. AND ALLER, L. H.
403. RED GIANTS WITH EXTREME METAL DEFICIENCIES. ASTROPHYS. JOURN.,
403. VOL. 137, PP. 280-300.
404. MCNAMARA, D. H. 1963
404. AXIAL ROTATION OF ORION STARS OF SPECTRAL TYPES B5-B9. ASTROPHYS.
404. JOURN., VOL. 137, PP. 316-320.
405. DE VAUCOULEURS, G. 1963
405. REVISED CLASSIFICATION OF 1500 BRIGHT GALAXIES. ASTROPHYS. JOURN.
405. SUPPL., VOL. 8, PP. 31-97.
406. ALLER, L. H., BOWEN, I. S., AND MINKOWSKI, R. 1955
406. THE SPECTRUM OF NGC 7027. ASTROPHYS. JOURN., VOL. 122, PP. 62-71.
407. BURBIDGE, E. M., AND BURBIDGE, G. R. 1955
407. PASCHEN AND BALMER SERIES IN SPECTRA OF CHI OPHIUCHI AND P CYGNI.
407. ASTROPHYS. JOURN., VOL. 122, PP. 89-94.
408. MCNAMARA, D. H. 1955
408. THE BETA CANIS MAJORIS STARS GAMMA PEGASI, DELTA CETI, AND XI1
408. CANIS MAJORIS. ASTROPHYS. JOURN., VOL. 122, PP. 95-102.
409. HUANG, S.-S., AND STRUVE, O. 1955
409. A MICROPHOTOMETRIC STUDY OF THE SPECTRUM OF SIGMA SCORPII.
409. ASTROPHYS. JOURN., VOL. 122, PP. 103-121.

410. STRUVE, O., MCNAMARA, D. H., AND ZEBERGS, V. 1955
 410. THE RADIAL VELOCITY OF SIGMA SCORPII. ASTROPHYS. JOURN., VOL.
 410. 122, PP. 122-133.
411. STRUVE, O., AND ZEBERGS, V. 1955
 411. THE VELOCITY-CURVE OF 12 DD LACERTAE. ASTROPHYS. JOURN., VOL.
 411. 122, PP. 134-141.
412. JOHNSON, H. M. 1955
 412. SYMMETRIC GALACTIC NEBULAE. ASTROPHYS. JOURN., VOL. 121, PP.
 412. 604-610.
413. JOHNSON, H. L., AND KNUCKLES, C. F. 1955
 413. THE HYADES AND COMA BERENICES STAR CLUSTERS. ASTROPHYS. JOURN.,
 413. VOL. 122, PP. 209-221.
414. HILTNER, W. A., AND IRIARTE, B. 1955
 414. PHOTOMETRIC AND SPECTROSCOPIC STUDIES OF EARLY-TYPE STARS BETWEEN
 414. GALACTIC LONGITUDE L = 338 DEGREES AND L = 33 DEGREES. ASTROPHYS.
 414. JOURN., VOL. 122, PP. 185-189.
415. NAUR, P. 1955
 415. MAGNITUDES AND COLORS OF BRIGHT F STARS. ASTROPHYS. JOURN., VOL.
 415. 122, PP. 182-184.
416. TREANOR, P. J. 1963
 416. WAVELENGTH DEPENDENCE OF INTERSTELLAR POLARIZATION. ASTRON. JOURN.,
 416. VOL. 68, PP. 185-189.
417. VAN DEN BOS, W. H. 1962
 417. ORBITS OF THREE VISUAL BINARIES. ASTRON. JOURN., VOL. 67, PP.
 417. 552-554.
418. ROBERTS, M. S. 1962
 418. THE NEUTRAL HYDROGEN CONTENT OF LATE-TYPE SPIRAL GALAXIES. ASTRON.
 418. JOURN., VOL. 67, PP. 437-446.
419. RUBIN, V. C., BURLEY, J., KIASATPOOR, A., KLOCK, B., PEASE, G., 1962
 419. RUTSCHEIDT, E., AND SMITH, C.
 419. KINEMATIC STUDIES OF EARLY-TYPE STARS. I. PHOTOMETRIC SURVEY, SPACE
 419. MOTIONS, AND COMPARISON WITH RADIO OBSERVATIONS. ASTRON. JOURN.,
 419. VOL. 67, PP. 491-531.
420. KLEMOLA, A. R. 1962
 420. MEAN ABSOLUTE MAGNITUDE OF THE BLUE STARS AT HIGH GALACTIC LATITUDE.
 420. ASTRON. JOURN., VOL. 67, PP. 740-756.
421. WILSON, R. W. 1963
 421. CATALOGUE OF RADIO SOURCES IN THE GALACTIC PLANE. ASTRON. JOURN.,
 421. VOL. 68, PP. 181-185.

422. DIETER, N. H. 1962
422. NEUTRAL HYDRUGEN IN M33. ASTRON. JOURN., VOL. 67, PP. 217-221.
423. DIETER, N. H. 1962
423. A SEARCH FOR HI IN CENTAURUS A. ASTRON. JOURN., VOL. 67, PP.
423. 222-223.
424. KOCH, R. H. 1962
424. A THREE-COLOR PHOTOELECTRIC INVESTIGATION OF DELTA LIBRAE, ASTRON.
424. JOURN., VOL. 67, PP. 130-141.
425. COLDSTEIN, S. J., JR. 1962
425. OBSERVATIONS OF SIXTY DISCRETE SOURCES AT 1423 MC. ASTRON. JOURN.,
425. VOL. 67, PP. 171-175.
426. HOBBS, R. W. 1961
426. A STUDY OF THE REGION OF M17 AT A WAVELENGTH OF 3.75 CM. ASTRON.
426. JOURN., VOL. 66, PP. 517-521.
427. WOOD, F. B., AND MCCLUSKEY, G. E., JR. 1961
427. THE ECLIPSING SYSTEM V TUCANAE. ASTRON. JOURN., VOL. 66, PP. 413-
427. 417.
428. KINMAN, T. D. 1961
428. PHOTOELECTRIC OBSERVATIONS OF SX PHOENICIS. ASTRON. JOURN., VOL.
428. 66, PP. 348-350.
429. STEPHENSON, C. B., AND HOBBS, R. W. 1961
429. A LIST OF NEW OB STARS NEAR THE GALACTIC NEBULA M17. ASTRON.
429. JOURN., VOL. 66, PP. 186-187.
430. MCCUSKEY, S. W. 1955
430. STELLAR SPECTRA IN MILKY WAY REGIONS. III. A REGION IN CEPHEUS-
430. LACERTA. ASTROPHYS. JOURN. SUPPL., VOL. 2, PP. 75-122.
431. FARNSWORTH, A. H. 1955
431. STELLAR SPECTRA AND COLORS IN A MILKY WAY REGION IN CASSIOPEIA.
431. ASTROPHYS. JOURN. SUPPL., VOL. 2, PP. 123-140.
432. FOMAN, N. G. 1955
432. A CATALOGUE OF HIGH-VELOCITY STARS. ASTROPHYS. JOURN. SUPPL., VOL.
432. 2, PP. 195-224.
433. MCCUSKEY, S. W. 1956
433. STELLAR SPECTRA IN MILKY WAY REGIONS. V. A REGION IN MONOCEROS.
433. ASTROPHYS. JOURN. SUPPL., VOL. 2, PP. 271-297.
434. MCCUSKEY, S. W. 1956
434. STELLAR SPECTRA IN MILKY WAY REGIONS. VI. A REGION IN CAMELOPARDALIS.
434. ASTROPHYS. JOURN. SUPPL., VOL. 2, PP. 298-314.

435. DE VAUCOULEURS, G. 1963
 435. SOUTHERN GALAXIES. III. ISOPHOTOMETRY OF THE LARGE BARRED SPIRAL
 435. NGC 1313. ASTROPHYS. JOURN., VOL. 137, PP. 720-732.
436. MILLER, R. H. 1963
 436. FURTHER INVESTIGATIONS OF THE PHOTOMETRY OF NGC 3379. ASTROPHYS.
 436. JOURN., VOL. 137, PP. 733-746.
437. BLAAUW, A., AND VAN HOOFF, A. 1963
 437. THE SPECIROSOPIC BINARY HD 23625. ASTROPHYS. JOURN., VOL. 137,
 437. PP. 821-823.
438. VAN HOOFF, A., BERTIAU, F. C., AND DEURINCK, R. 1963
 438. RADIAL VELOCITIES OF TWENTY-NINE STARS IN THE SCORPIO-CENTAURUS
 438. REGIONS. ASTROPHYS. JOURN., VOL. 137, PP. 824-833.
439. SAHADE, J., AND HERNANDEZ, C. A. 1963
 439. DELTA LIRAEE. ASTROPHYS. JOURN., VOL. 137, PP. 845-850.
440. BINNENDIJK, L. 1960
 440. PHOTOELECTRIC OBSERVATIONS OF BETA LYRAE. ASTRON. JOURN., VOL. 65,
 440. PP. 84-87.
441. FREDRICK, L. W. 1960
 441. OBSERVATIONS OF EPSILON AURIGAE. ASTRON. JOURN., VOL. 65, PP.
 441. 97-100.
442. SLOANAKER, R. M., AND NICHOLS, J. H. 1960
 442. POSITIONS, INTENSITIES, AND SIZES OF BRIGHT CELESTIAL SOURCES
 442. AT A WAVELENGTH OF 10.2 CM. ASTRON. JOURN., VOL. 65, PP. 109-116.
443. KOCH, R. H. 1960
 443. THREE-COLOR PHOTOMETRY OF AD CASSIOPEIAE. ASTRON. JOURN., VOL. 65,
 443. PP. 127-138.
444. KOCH, R. H. 1960
 444. PHOTOELECTRIC PHOTOMETRY OF AS ERIDANI. ASTRON. JOURN., VOL. 65,
 444. PP. 139-147.
445. SYGLOPOULOS, S. N. 1960
 445. SIX-COLOR PHOTOMETRY OF TEN CLASSICAL CEPHEIDS. ASTRON. JOURN.,
 445. VOL. 65, PP. 473-480.
446. KRON, G. E., AND MAYALL, N. U. 1960
 446. PHOTOELECTRIC PHOTOMETRY OF GALACTIC AND EXTRAGALACTIC STAR
 446. CLUSTERS. ASTRON. JOURN., VOL. 65, PP. 581-620.
447. BINNENDIJK, L. 1959
 447. PHOTOELECTRIC LIGHT CURVES OF V566 OPHIUCHI AND AB ANDROMEDAE.
 447. ASTRON. JOURN., VOL. 64, PP. 65-73.

448. LIPPINCOTT, S. L. 1959
448. PARALLAX AND MASS RATIO OF 10 URSAE MAJORIS. ASTRON. JOURN., VOL.
448. 64, PP. 415-418.
449. CHOL CHOU, K. 1959
449. NEW LIGHT ELEMENTS OF FIVE ECLIPSING VARIABLES. ASTRON. JOURN.,
449. VOL. 64, PP. 468-472.
450. CSVALDS, V. 1958
450. THE ASTROMETRIC ORBIT OF DELTA AQUILAE. ASTRON. JOURN., VOL. 63,
450. PP. 222-228.
451. FRANZ, O. 1958
451. THE TRIPLE SYSTEM ZETA AQUARII. ASTRON. JOURN., VOL. 63, PP. 329-
451. 337.
452. WOOD, F. B., AND BLITZSTEIN, W. 1957
452. OBSERVATION OF ZETA AURIGAE IN THE 1955-56 ECLIPSE. ASTRON. JOURN.,
452. VOL. 62, PP. 165-168.
453. LYNDS, C. R., AND THOMAS, N. 1957
453. PHOTOELECTRIC OBSERVATIONS OF 12 DD LACERTAE. ASTRON. JOURN., VOL.
453. 62, PP. 186-189.
454. STRUVE, O., SAHADE, J., AND EBBIGHAUSEN, E. 1957
454. THE RADIAL VELOCITY OF 12 DD LACERTAE. ASTRON. JOURN., VOL. 62,
454. PP. 189-191.
455. SMITH, H. J. 1957
455. PHOTOELECTRIC OBSERVATIONS OF 12 (DD) LACERTAE. ASTRON. JOURN.,
455. VOL. 62, PP. 220-222.
456. MICZAIKA, G. R. 1957
456. A TWO-COLOR LIGHT CURVE OF THE ECLIPSING BINARY RX HERCULIS.
456. ASTRON. JOURN., VOL. 62, PP. 376-378.
457. VAN DE KAMP, P., AND DAMKOEHLER, J. E. 1957
457. PARALLAX AND ORBITAL MOTION OF THE SPECTROSCOPIC BINARY ETA PEGASI
457. FROM PHOTOGRAPHS TAKEN WITH THE 24-INCH SPROUL REFRACTOR. ASTRON.
457. JOURN., VOL. 62, PP. 393-396.
458. GAPOSCHKIN, S. 1956
458. PHOTOGRAPHIC AND VISUAL LIGHT CURVES OF NOVA HERCULIS 1934 (DQ
458. HER). ASTRON. JOURN., VOL. 61, PP. 36-39.
459. ROBERTS, M. S. 1956
459. A THEORETICAL LUMINOSITY FUNCTION FOR THE ELLIPTICAL NEBULA M32.
459. ASTRON. JOURN., VOL. 61, PP. 195-199.

460. CAPOSCHKIN, S. 1956
460. NEW PHOTOGRAPHIC MINIMA OF BETA LYRAE. ASTRON. JOURN., VOL. 61,
460. PP. 397-398.
461. VAN WIJK, U., ROGERSON, J. B., AND SKUMANICH, A. 1955
461. THE ECLIPSING VARIABLE GL CARINAE. ASTRON. JOURN., VOL. 60,
461. PP. 95-100.
462. ARP, H. C. 1958
462. SOUTHERN HEMISPHERE PHOTOMETRY. II. PHOTOELECTRIC MEASURES OF
462. BRIGHT STARS. ASTRON. JOURN., VOL. 63, PP. 118-127.
463. EAUM, W. A., AND SCHWARZSCHILD, M. 1955
463. A COMPARISON OF STELLAR POPULATIONS IN THE ANDROMEDA GALAXY AND ITS
463. ELLIPTICAL COMPANION. ASTRON. JOURN., VOL. 60, PP. 247-253.
464. COWLEY, C. R. 1958
464. A SEARCH FOR BLUE STARS IN HIGH GALACTIC LATITUDES. ASTRON. JOURN.,
464. VOL. 63, PP. 484-487.
465. BINNENDIJK, L. 1955
465. THE LIGHT VARIATION AND ORBITAL ELEMENTS OF 44 I BOOTIS. ASTRON.
465. JOURN., VOL. 60, PP. 355-363.
466. HOGG, A. R., AND KRON, G. E. 1955
466. THE GALACTIC CLUSTER IC 4665. ASTRON. JOURN., VOL. 60, PP. 365-370.
467. LARGE, M. I., MATHEWSON, D. S., AND HASLAM, C. G. T. 1961
467. A RADIO SURVEY OF THE GALACTIC PLANE AT A FREQUENCY OF 408 MC/S. I.
467. THE DISCRETE SOURCES. MONTHLY NOTICES ROY. ASTRON. SOC., VOL. 123,
467. PP. 113-122.
468. EUSCOMBE, W., AND MORRIS, P. M. 1961
468. THREE SOUTHERN SPECTROSCOPIC BINARIES. MONTHLY NOTICES ROY.
468. ASTRON. SOC., VOL. 123, PP. 183-188.
469. BROWN, R. HANBURY, AND HAZARD, C. 1961
469. THE RADIO EMISSION FROM NORMAL GALAXIES. III. OBSERVATIONS OF
469. IRREGULAR AND EARLY-TYPE GALAXIES AT 158 MC/S AND A GENERAL
469. DISCUSSION OF THE RESULTS. MONTHLY NOTICES ROY. ASTRON. SOC., VOL.
469. 123, PP. 279-283.
470. HOGG, A. R. 1963
470. THE GALACTIC CLUSTER NGC 3228. MONTHLY NOTICES ROY. ASTRON. SOC.,
470. VOL. 125, PP. 307-312.
471. WHITEOAK, J. B. 1963
471. AN ASSOCIATION OF O AND B STARS IN ARA. MONTHLY NOTICES ROY.
471. ASTRON. SOC., VOL. 125, PP. 105-125.

472. RISHBETH, H. 1958
472. RADIO EMISSION FROM ORION. MONTHLY NOTICES ROY. ASTRON. SOC., VOL.
472. 118, PP. 591-602.
473. FEAST, M. W. 1958
473. SPECTRAL TYPES AND RADIAL VELOCITIES IN THE GALACTIC CLUSTER NGC
473. 3293. MONTHLY NOTICES ROY. ASTRON. SOC., VOL. 118, PP. 618-630.
474. WALKER, G. A. H. 1963
474. PHOTOELECTRIC MEASURES OF THE 4430A DIFFUSE INTERSTELLAR BAND.
474. MONTHLY NOTICES ROY. ASTRON. SOC., VOL. 125, PP. 141-167.
475. CRAMPIN, J., AND HOYLE, F. 1960
475. PROBLEMS CONCERNING PLEIONE. MONTHLY NOTICES ROY. ASTRON.
475. SOC., VOL. 120, PP. 33-42.
476. JONES, D. H. P. 1960
476. THE RADIAL VELOCITIES OF FIVE STARS IN THE ZETA PERSEI AGGREGATE.
476. MONTHLY NOTICES ROY. ASTRON. SOC., VOL. 120, PP. 43-50.
477. BALDWIN, J. E., AND LESLIE, P. R. R. 1960
477. RADIO EMISSION FROM THE CYGNUS LOOP. MONTHLY NOTICES ROY.
477. ASTRON. SOC., VOL. 120, PP. 72-78.
478. MATHEWSON, D. S., LARGE, M. I., AND HASLAM, C. G. T. 1960
478. A SPECTRAL ANALYSIS OF THE RADIO SOURCES IN CYGNUS X AT 1390 MC/S
478. AND 408 MC/S. MONTHLY NOTICES ROY. ASTRON. SOC., VOL. 120, PP.
478. 242-247.
479. SEATON, M. J. 1960
479. HI, HEI, AND HEII INTENSITIES IN PLANETARY NEBULAE. MONTHLY
479. NOTICES ROY. ASTRON. SOC., VOL. 120, PP. 326-337.
480. ROWSON, B. 1959
480. ANGULAR DIAMETER MEASUREMENTS OF THE RADIO SOURCES CYGNUS (19N4A)
480. AND CASSIOPEIA (23N5A) ON A WAVELENGTH OF 10.7 CM. MONTHLY
480. NOTICES ROY. ASTRON. SOC., VOL. 119, PP. 26-33.
481. HAGEMANN, G. 1959
481. THE SYSTEM OF ZETA PHOENICIS. MONTHLY NOTICES ROY. ASTRON. SOC.,
481. VOL. 119, PP. 143-149.
482. EVANS, D. S. 1959
482. NOTES ON FIVE SOUTHERN GASEOUS NEBULAE. MONTHLY NOTICES ROY.
482. ASTRON. SOC., VOL. 119, PP. 150-156.
483. JENNISON, R. C., AND LATHAM, V. 1959
483. THE BRIGHTNESS DISTRIBUTION WITHIN THE RADIO SOURCES CYGNUS A
483. (19N4A) AND CASSIOPEIA A (23N5A). MONTHLY NOTICES ROY. ASTRON.
483. SOC., VOL. 119, PP. 174-183.

484. EROWN, R. HANBURY, AND HAZARD, C. 1959
 484. THE RADIO EMISSION FROM NORMAL GALAXIES. I. OBSERVATIONS OF M31
 484. AND M33 AT 158 MC/S AND 237 MC/S. MONTHLY NOTICES ROY. ASTRON.
 484. SOC., VOL. 119, PP. 297-308.
485. EARBER, D. R. 1959
 485. VISUAL AND FAR-RED GRADIENTS AND COLOUR TEMPERATURES OF GAMMA
 485. CASSIOPEIAE. II. MONTHLY NOTICES ROY. ASTRON. SOC., VOL. 119, PP.
 485. 534-537.
486. WHITFIELD, G. R. 1960
 486. A SURVEY OF RADIO STARS AT A FREQUENCY OF 38 MC/S. MONTHLY NOTICES
 486. ROY. ASTRON. SOC., VOL. 120, PP. 581-588.
487. EVANS, D. S., MENZIES, A., AND STOY, R. H. 1959
 487. FUNDAMENTAL DATA FOR SOUTHERN STARS (SECOND LIST). MONTHLY NOTICES
 487. ROY. ASTRON. SOC., VOL. 119, PP. 638-647.
488. CHUBB, T. A., AND BYRAM, E. T. 1963
 488. STELLAR BRIGHTNESS MEASUREMENT AT 1314 AND 1427 A OBSERVATION OF THE
 488. C I TWILIGHT GLOW. ASTROPHYS. JOURN., VOL. 138, PP. 617-630.
489. BEER, A., REDMAN, R. O., AND YATES, G. G. 1954
 489. PHOTOGRAPHIC AND PHOTOVISUAL MAGNITUDES OF 7M-10M STARS IN THE
 489. + 15 DEGREES SELECTED AREAS. MEM. ROY. ASTRON. SOC., VOL. 67,
 489. PP. 1-50.
490. GUM, C. S. 1954
 490. A SURVEY OF SOUTHERN H II REGIONS. MEM. ROY. ASTRON. SOC., VOL. 67,
 490. PP. 155-177.
491. HOGG, A. R. 1957
 491. VARIATIONS IN THE LIGHT OF SIGMA SCORPII. MONTHLY NOTICES ROY.
 491. ASTRON. SOC., VOL. 117, PP. 95-103.
492. LAVIES, K. D. 1957
 492. ON THE NATURE OF THE CYGNUS-X RADIO SOURCE AS DERIVED FROM
 492. OBSERVATIONS IN THE CONTINUUM AND AT THE HYDROGEN-LINE FREQUENCY.
 492. MONTHLY NOTICES ROY. ASTRON. SOC., VOL. 117, PP. 663-679.
493. CONWAY, R. G. 1957
 493. OBSERVATIONS OF DISCRETE RADIO-SOURCES AT A FREQUENCY OF 500 MC/S.
 493. MONTHLY NOTICES ROY. ASTRON. SOC., VOL. 117, PP. 692-697.
494. GAPOSCHKIN, S. 1955
 494. THE BRIGHT DOUBLE-LINED ECLIPSING VARIABLE CV VEL. MONTHLY NOTICES
 494. ROY. ASTRON. SOC., VOL. 115, PP. 391-395.

495. FEAST, M. W. 1955
 495. THE SPECTRUM OF NOVA SAGITTARII 1954 (HARO-HERRARO). MONTHLY
 495. NOTICES ROY. ASTRON. SOC., VOL. 115, PP. 461-467.
496. BROWN, R. HANBURY, PALMER, H. P., AND THOMPSON, A. R. 1955
 496. POLARIZATION MEASUREMENTS ON THREE INTENSE RADIO SOURCES. MONTHLY
 496. NOTICES ROY. ASTRON. SOC., VOL. 115, PP. 487-492.
497. WESSELINK, A. J. 1956
 497. SPECTROSCOPIC AND PHOTOMETRIC OBSERVATIONS OF S DORADUS. MONTHLY
 497. NOTICES ROY. ASTRON. SOC., VOL. 116, PP. 3-9.
498. PAGEL, B. E. J. 1956
 498. RESULTS OF A SEARCH FOR BRIGHT BETA CEPHEI VARIABLES IN THE
 498. SOUTHERN SKY. MONTHLY NOTICES ROY. ASTRON. SOC., VOL. 116, PP.
 498. 10-24.
499. BUSCOMBE, W. 1956
 499. THE ORBIT OF THE SPECTROSCOPIC BINARY HD 170523. MONTHLY NOTICES
 499. ROY. ASTRON. SOC., VOL. 116, PP. 262-266.
500. EVANS, D. S. 1956
 500. THE SYSTEM OF P VELORUM. MONTHLY NOTICES ROY. ASTRON. SOC.,
 500. VOL. 116, PP. 537-546.
501. ARP, H. C., AND EVANS, D. S. 1956
 501. P VELORUM AND STELLAR EVOLUTION. MONTHLY NOTICES ROY. ASTRON. SOC.,
 501. VOL. 116, PP. 547-551.
502. BATTEN, A. H. 1956
 502. A STUDY OF THE FOUR ECLIPSING BINARY SYSTEMS: RW MONOCEROTIS, RW
 502. GEMINORUM, U CORONAE BOREALIS, AND TY PEGASI. MONTHLY NOTICES ROY.
 502. ASTRON. SOC., VOL. 116, PP. 552-560.
503. EVANS, D. S. 1956
 503. THE SENSE OF ROTATION OF NGC 253. MONTHLY NOTICES ROY. ASTRON.
 503. SOC., VOL. 116, PP. 659-661.
504. BUTLER, H. E., AND SEDDON, H. 1960
 504. SPECTROPHOTOMETRIC MEASUREMENTS OF EARLY TYPE STARS. 6. RESULTS
 504. AND DISCUSSION FOR 25 STARS OF M.K. TYPE B3. PUBL. ROY. OBS.
 504. EDINBURGH, VOL. 2, PP. 187-217.
505. EVANS, D. S., MENZIES, A., AND STOY, R. H. 1957
 505. FUNDAMENTAL DATA FOR SOUTHERN STARS (FIRST LIST). MONTHLY NOTICES
 505. ROY. ASTRON. SOC., VOL. 117, PP. 534-561.
506. FEAST, M. W. 1957
 506. RADIAL VELOCITIES AND SPECTRAL TYPES IN THE GALACTIC CLUSTERS M 25
 506. AND NGC 6087. MONTHLY NOTICES ROY. ASTRON. SOC., VOL. 117, PP. 193-
 506. 197.

507. BLYTHE, J. H. 1957
507. RESULTS OF A SURVEY OF GALACTIC RADIATION AT 38 MC/S. MONTHLY
507. NOTICES ROY. ASTRON. SOC., VOL. 117, PP. 652-662.
508. LE VAUCOULEURS, A. 1957
508. SPECTRAL TYPES AND LUMINOSITIES OF B, A AND F SOUTHERN STARS.
508. MONTHLY NOTICES ROY. ASTRON. SOC., VOL. 117, PP. 449-462.
509. WILSON, R. 1956
509. SPECTROPHOTOMETRIC MEASUREMENTS OF EARLY TYPE STARS. 3. FURTHER
509. RESULTS AND DISCUSSION FOR B1 STARS. PUBL. ROY. OBS. EDINBURGH,
509. VOL. 2, PP. 3-26.
510. WILSON, R. 1958
510. SPECTROPHOTOMETRIC MEASUREMENTS OF EARLY TYPE STARS. 4. RESULTS FOR
510. STARS OF TYPES O6-B0. PUBL. ROY. OBS. EDINBURGH, VOL. 2,
510. PP. 61-111.
511. BUTLER, H. E., AND SEDDON, H. 1958
511. SPECTROPHOTOMETRIC MEASUREMENTS OF EARLY TYPE STARS. 5. RESULTS AND
511. DISCUSSION FOR 20 STARS OF M.K. TYPE B2. PUBL. ROY. OBS. EDINBURGH,
511. VOL. 2, PP. 113-183.
512. BUTLER, H. E., AND THOMPSON, G. I. 1961
512. SPECTROPHOTOMETRIC MEASUREMENTS OF EARLY TYPE STARS. 7. RESULTS AND
512. DISCUSSION FOR 10 STARS OF M.K. TYPE B5 AND 7 STARS OF
512. MISCELLANEOUS TYPES. PUBL. ROY. OBS. EDINBURGH, VOL. 2,
512. PP. 225-257.
513. HJELLMING, R. M., AND HILTNER, W. A. 1963
513. LIGHT-CURVES FOR TWO WOLF-RAYET BINARIES: CV SER AND HD 211853.
513. ASTROPHYS. JOURN., VOL. 137, PP. 1080-1084.
514. MCLAUGHLIN, D. B. 1963
514. THE BE SPECTRUM VARIABLE HD 20336. ASTROPHYS. JOURN., VOL. 137,
514. PP. 1085-1101.
515. RINGUELET-KASWALDER, A. E. 1963
515. SHORT-PERIOD RADIAL-VELOCITY VARIATION OF 48 LIBRAE. ASTROPHYS.
515. JOURN., VOL. 137, PP. 1310-1313.
516. BAKER, E. A. 1955
516. SPECTROPHOTOMETRIC MEASUREMENTS OF EARLY TYPE STARS. 1. METHODS
516. OF OBSERVATION AND RESULTS OF OES STARS. PUBL. ROY. OBS. EDINBURGH,
516. VOL. 1, PP. 13-40.
517. GREAVES, W. M. H., BAKER, E. A., AND WILSON, R. 1955
517. SPECTROPHOTOMETRIC MEASUREMENTS OF EARLY TYPE STARS. 2. RESULTS
517. FOR STARS OF TYPE B1. PUBL. ROY. OBS. EDINBURGH, VOL. 1,
517. PP. 115-149.

518. VAN HOUTEN, C. J. 1961
518. SURFACE PHOTOMETRY OF EXTRAGALACTIC NEBULAE. BULL. ASTRON.
518. NETHERLANDS, VOL. 16, PP. 1-69.
519. KOELBLOED, D. 1962
519. A STUDY OF THE LOW-EXCITATION NEBULA AROUND HD 138403.
519. BULL. ASTRON. NETHERLANDS, VOL. 16, PP. 163-172.
520. BRAES, L. L. E. 1962
520. THE GALACTIC CLUSTER IC 2602. BULL. ASTRON. NETHERLANDS,
520. VOL. 16, PP. 297-306.
521. ALLER, L. H., AND KALER, J. B. 1964
521. SPECTROPHOTOMETRIC STUDIES OF GASEOUS NEBULAE. I. THE DOUBLE-RING
521. PLANETARY NGC 7009. ASTROPHYS. JOURN., VOL. 139, PP. 1074-1080.
522. WEHLAU, W. 1962
522. LIGHT VARIABILITY OF HD 173650. PUBL. ASTRON. SOC. PACIFIC,
522. VOL. 74, PP. 137-141.
523. HOUZIAUX, L. 1962
523. ON THE INFRARED SPECTRUM OF PLEIONE. PUBL. ASTRON. SOC. PACIFIC,
523. VOL. 74, PP. 250-253.
524. MALTBY, P., MATTHEWS, T. A., AND MOFFET, A. T. 1962
524. THE RADIO SOURCE HERCULES A. PUBL. ASTRON. SOC. PACIFIC,
524. VOL. 74, 277-281.
525. WEHLAU, W. 1962
525. PHOTOMETRY OF GAMMA EQUULEI AND HD 140728. PUBL. ASTRON. SOC.
525. PACIFIC, VOL. 74, PP. 286-290.
526. BUSCOMBE, W., AND KENNEDY, P. M. 1962
526. TWO B-TYPE SPECTROSCOPIC BINARIES. PUBL. ASTRON. SOC. PACIFIC,
526. VOL. 74, PP. 323-325.
527. MATTHEWS, T. A., AND SANDAGE, A. 1962
527. 3C 196 AS A SECOND RADIO STAR. PUBL. ASTRON. SOC. PACIFIC, VOL.
527. 74, PP. 406-407.
528. WILSON, O. C., AND O'DELL, C. R. 1962
528. INTERNAL MOTIONS IN THE PLANETARY NEBULA IC 4997. PUBL. ASTRON.
528. SOC. PACIFIC, VOL. 74, PP. 511-514.
529. PRINGLE, J. K., AND MCNAMARA, D. H. 1962
529. ON THE RADIAL VELOCITY OF ZETA TAURI. PUBL. ASTRON. SOC. PACIFIC,
529. VOL. 74, PP. 525-527.

530. ALEXANDER, J. D. H., BCWEN, P. J., AND HEDDLE, D. W. D. 1963
530. SOUTHERN HEMISPHERE OBSERVATIONS OF ULTRA-VIOLET LIGHT FROM
530. CELESTIAL OBJECTS. SPACE RESEARCH III, ED. BY W. PRIESTER, NORTH-
530. HOLLAND PUBL. CO., PP. 1068-1075.
531. KRUSZEWSKI, A. 1962
531. POLARIZATION: WAVELENGTH DEPENDENCE AND RATIO TO ABSORPTION.
531. PUBL. ASTRON. SOC. PACIFIC, VOL. 74, PP. 519-522.
532. EIDELMAN, W. P., AND MCKELLAR, A. 1957
532. DOUBLE LINES IN THE SPECTRUM OF RHO CASSIOPEIAE. PUBL. ASTRON.
532. SOC. PACIFIC, VOL. 69, PP. 31-40.
533. STRUVE, O., AND SAHADE, J. 1957
533. SPECTROGRAPHIC OBSERVATIONS OF ALGOL. PUBL. ASTRON. SOC.
533. PACIFIC, VOL. 69, PP. 41-45.
534. FAYNE-GAPOSCHKIN, C. 1957
534. SPECTROPHOTOMETRIC STUDY OF STELLAR ROTATION: AN ANALYSIS OF BETA
534. CASSIOPEIAE. PUBL. ASTRON. SOC. PACIFIC, VOL. 69, PP. 46-53.
535. SANFORD, R. F., AND GREENSTEIN, J. L. 1957
535. THE ABSOLUTE MAGNITUDE OF NOVA PUPPIS 1942. PUBL. ASTRON. SOC.
535. PACIFIC, VOL. 69, PP. 75-77.
536. NOT USED
537. MUNCH, G., AND FLATHER, E. 1957
537. THE RADIAL VELOCITY OF 53 ARIETIS. PUBL. ASTRON. SOC. PACIFIC,
537. VOL. 69, PP. 142-146.
538. WALLERSTEIN, G. 1957
538. THE ABSOLUTE MAGNITUDE OF U SAGITTARII AND ITS MEMBERSHIP
538. IN M25. PUBL. ASTRON. SOC. PACIFIC, VOL. 69, PP. 172-175.
539. JASCHEK-CORVALAN, M., AND JASCHEK, C. 1957
539. CA II EMISSION IN THE SPECTRUM OF GAMMA URSAE MAJORIS. PUBL.
539. ASTRON. SOC. PACIFIC, VOL. 69, PP. 176-177.
540. WALKER, M. F. 1957
540. PHOTOELECTRIC OBSERVATIONS OF 12 LACERTAE. PUBL. ASTRON. SOC.
540. PACIFIC, VOL. 69, PP. 177-178.
541. VAN HOOF, A. 1957
541. A REQUEST FOR PHOTOMETRIC OBSERVATIONS OF THETA OPHIUCHI.
541. PUBL. ASTRON. SOC. PACIFIC, VOL. 69, P. 179.
542. GOULD, N. L., HERBIG, G. H., AND MORGAN, W. W. 1957
542. BD+75 DEGREES 325: A SUBLUMINOUS O-TYPE STAR. PUBL. ASTRON. SOC.
542. PACIFIC, VOL. 69, 242-244.

543. RUIZ, J. J. 1957
543. A PHOTOELECTRIC LIGHT CURVE OF U HERCULIS. PUBL. ASTRON. SOC.
543. PACIFIC, VOL. 69, PP. 261-264.
544. STRUVE, O., SAHADE, J., AND HUANG, S.-S. 1957
544. THE SPECTRUM OF U CORONAE BOREALIS. PUBL. ASTRON. SOC. PACIFIC,
544. VOL. 69, PP. 342-346.
545. GREENSTEIN, J. L., SANFORD, R. F., AND ZWICKY, F. 1957
545. ON THE ABSOLUTE MAGNITUDE OF NOVA PUPPIS 1942. PUBL. ASTRON. SOC.
545. PACIFIC, VOL. 69, PP. 352-353.
546. RUIZ, J. J. 1957
546. PHOTOELECTRIC OBSERVATIONS OF 12 LACERTAE. PUBL. ASTRON. SOC.
546. PACIFIC, VOL. 69, PP. 357-358.
547. CHAMBERLIN, C., AND MCNAMARA, D. H. 1957
547. THE ORBIT OF THE ECLIPSING BINARY TX LEONIS. PUBL. ASTRON. SOC.
547. PACIFIC, VOL. 69, PP. 462-464.
548. JASCHEK, M., AND JASCHEK, C. 1957
548. SPECTROSCOPIC OBSERVATIONS OF L CARINAE. PUBL. ASTRON. SOC.
548. PACIFIC, VOL. 69, PP. 465-468.
549. WRIGHT, K. O. 1957
549. RECENT CHANGES IN THE SPECTRUM OF 17 LEPORIS. PUBL. ASTRON. SOC.
549. PACIFIC, VOL. 69, PP. 552-556.
550. MCNAMARA, D. H. 1957
550. THE RADIAL VELOCITY OF THETA OPHIUCHI. PUBL. ASTRON. SOC. PACIFIC,
550. VOL. 69, PP. 570-572.
551. MCNAMARA, D. H. 1957
551. THE H ALPHA LINE IN THE SPECTRUM OF RZ SCUTI. PUBL. ASTRON. SOC.
551. PACIFIC, VOL. 69, PP. 574-576.
552. MCNAMARA, D. H., AND GEBBIE, K. B. 1961
552. H BETA PHOTOMETRY OF BW VULPECULAE. PUBL. ASTRON. SOC. PACIFIC,
552. VOL. 73, PP. 56-60.
553. JOHNSON, H. M. 1961
553. NEGATIVE OBSERVATIONS OF THE REPORTED NEBULA AROUND SPICA. PUBL.
553. ASTRON. SOC. PACIFIC, VOL. 73, PP. 73-74.
554. WANNER, J. F. 1961
554. A CONTOUR MAP OF IC 443 AT 1400 MC/S. PUBL. ASTRON. SOC. PACIFIC,
554. VOL. 73, PP. 143-146.

555. HENIZE, K. G. 1961
555. SEVEN NEW PLANETARY NEBULAE. PUBL. ASTRON. SOC. PACIFIC, VOL. 73,
555. PP. 159-162.
556. HOUZIAUX, L. 1961
556. ATMOSPHERIC PARAMETERS OF KAPPA CASSIOPEIAE. PUBL. ASTRON. SOC.
556. PACIFIC, VOL. 73, PP. 164-166.
557. NASSAU, J. J., AND STEPHENSON, C. B. 1961
557. A STAR HAVING EXTRAORDINARILY INTENSE CA II EMISSION. PUBL. ASTRON.
557. SOC. PACIFIC, VOL. 73, PP. 224-225.
558. JUGAKU, J., AND SARGENT, W. L. W. 1961
558. THE SPECTRUM OF ALPHA SCULPTORIS. PUBL. ASTRON. SOC. PACIFIC, VOL.
558. 73, PP. 249-255.
559. NASSAU, J. J., AND STEPHENSON, C. B. 1961
559. NOVA SCUTI 1960 AND NOVA SERPENTIS 1960. PUBL. ASTRON. SOC.
559. PACIFIC, VOL. 73, PP. 256-258.
560. MCCUSKEY, S. W. 1961
560. EMISSION OBJECTS NEAR SELECTED AREA 158. PUBL. ASTRON. SOC.
560. PACIFIC, VOL. 73, PP. 264-265.
561. SMITH, H. J., AND HOFFLEIT, D. 1961
561. PHOTOGRAPHIC HISTORY AND SUGGESTED NATURE OF THE RADIO SOURCE 3C
561. 48. PUBL. ASTRON. SOC. PACIFIC, VOL. 73, PP. 292-300.
562. FEINSTEIN, A. 1961
562. THE SOUTHERN GALACTIC CLUSTER IC 2391. PUBL. ASTRON. SOC. PACIFIC,
562. VOL. 73, PP. 410-417.
563. SAHADE, J., AND FRIEBOES-CONDE, H. 1963
563. THE RADIAL VELOCITY OF GAMMA URSAE MINORIS. PUBL. ASTRON. SOC.
563. PACIFIC, VOL. 75, PP. 39-44.
564. WALLERSTEIN, G., AND HANNIBAL, D. 1963
564. A NEW MANGANESE STAR, HR 8349. PUBL. ASTRON. SOC. PACIFIC, VOL. 75,
564. PP. 72-73.
565. SVOLOPOULOS, S. N. 1963
565. A STAR WITH VERY STRONG LAMBDA 4430 ABSORPTION. PUBL. ASTRON. SOC.
565. PACIFIC, VOL. 75, PP. 73-74.
566. BABCOCK, H. W. 1963
566. MAGNETIC AND LIGHT VARIATIONS OF 53 CAMELOPARDALIS. PUBL. ASTRON.
566. SOC. PACIFIC, VOL. 75, PP. 74-75.

567. ELAAUW, A. 1961
567. ON THE ORIGIN OF THE O- AND B-TYPE STARS WITH HIGH VELOCITIES (THE
567. 'RUN-AWAY' STARS), AND SOME RELATED PROBLEMS.
567. BULL. ASTRON. NETHERLANDS, VOL. 15, PP. 265-290.
568. VAN ALBADA, T. S. 1961
568. 72 COLUMBAE, A B3V RUN-AWAY STAR FROM THE ASSOCIATION I SCORPII.
568. BULL. ASTRON. NETHERLANDS, VOL. 15, PP. 301-305.
569. VOLDERS, L., AND HOGBOM, J. A. 1961
569. OBSERVATIONS OF NEUTRAL HYDROGEN IN IC 1613, NGC 6822, AND M 82.
569. BULL. ASTRON. NETHERLANDS, VOL. 15, PP. 307-314.
570. HEIDMANN, J. 1961
570. NEUTRAL HYDROGEN IN M51. BULL. ASTRON. NETHERLANDS, VOL. 15,
570. PP. 314-318.
571. WRIGHT, K. O., AND LEE, E. K. 1956
571. THE LIGHT-RATIO AND THE SPECTRUM OF THE SECONDARY COMPONENT OF THE
571. ECLIPSING BINARY 31 CYGNI. PUBL. ASTRON. SOC. PACIFIC, VOL. 68,
571. PP. 17-22.
572. ELSTE, G., JUGAKU, J., AND ALLER, L. H. 1956
572. THEORETICAL LINE INTENSITIES AND THE SPECTRUM OF TAU SCORPII. PUBL.
572. ASTRON. SOC. PACIFIC, VOL. 68, PP. 23-26.
573. STRUVE, U. 1956
573. EPSILON AURIGAE. PUBL. ASTRON. SOC. PACIFIC, VOL. 68, PP. 27-37.
574. BOHM-VITENSE, E. 1956
574. VARIATIONS IN THE SPECTRUM OF 89 HERCULIS. PUBL. ASTRON. SOC.
574. PACIFIC, VOL. 68, PP. 57-61.
575. WORLEY, C. E. 1956
575. LIGHT-VARIATION OF 89 HERCULIS. PUBL. ASTRON. SOC. PACIFIC, VOL.
575. 68, PP. 62-63.
576. DEUTSCH, A. J. 1956
576. THE SPECTRUM VARIABLES OF TYPE A. PUBL. ASTRON. SOC. PACIFIC, VOL.
576. 68, PP. 92-114.
577. WALKER, M. F. 1956
577. THE LIGHT VARIABILITY OF 15 CANIS MAJORIS. PUBL. ASTRON. SOC.
577. PACIFIC, VOL. 68, PP. 154-157.
578. MCNAMARA, D. H. 1956
578. THE RADIAL VELOCITY OF GAMMA PEGASI. PUBL. ASTRON. SOC. PACIFIC,
578. VOL. 68, PP. 158-161.

579. GREENSTEIN, J. L. 1956
579. A NEW METALLIC-LINE SPECTROSCOPIC BINARY. PUBL. ASTRON. SOC.
579. PACIFIC, VOL. 68, P. 165.

580. EGGEN, O. J. 1956
580. RHO PUPPIS: A NEW SHORT-PERIOD VARIABLE STAR. PUBL. ASTRON. SOC.
580. PACIFIC, VOL. 68, PP. 238-241.

581. GREENSTEIN, J. L., MACRAE, D. A., AND FLEISCHER, R. 1956
581. TWO B-TYPE STARS OF HIGH VELOCITY. PUBL. ASTRON. SOC. PACIFIC,
581. VOL. 68, PP. 242-248.

582. BONSAK, W. K., AND GREENSTEIN, J. L. 1956
582. A HIGH-VELOCITY SUPERGIANT, HD 172324. PUBL. ASTRON. SOC. PACIFIC,
582. VOL. 68, PP. 249-252.

583. INGLIS, S. J. 1956
583. A STUDY OF THE SPECTRUM OF PI SCORPII. PUBL. ASTRON. SOC. PACIFIC,
583. VOL. 68, PP. 259-263.

584. MCNAMARA, D. H. 1956
584. THE RADIAL VELOCITY OF XI 1 CANIS MAJORIS. PUBL. ASTRON. SOC.
584. PACIFIC, VOL. 68, PP. 263-266.

585. SAHADE, J., STRUVE, O., AND WILLIAMS, A. D. 1956
585. SPECTROSCOPIC AND PHOTOMETRIC OBSERVATIONS OF 23 SEXTANTIS. PUBL.
585. ASTRON. SOC. PACIFIC, VOL. 68, PP. 266-269.

586. HERBIG, G. H. 1956
586. THE SOURCE OF ILLUMINATION OF NGC 1579. PUBL. ASTRON. SOC.
586. PACIFIC, VOL. 68, PP. 353-356.

587. WORLEY, C. E., AND EGGEN, O. J. 1956
587. A NEW ECLIPSING BINARY: BD + 10 DEGREES 2234(A). PUBL. ASTRON. SOC.
587. PACIFIC, VOL. 68, PP. 452-455.

588. MATHEWS, R. T. 1956
588. SPECTROSCOPIC OBSERVATIONS OF 53 PISCUM. PUBL. ASTRON. SOC.
588. PACIFIC, VOL. 68, PP. 455-457.

589. EGGEN, O. J. 1956
589. TWO NEW BRIGHT VARIABLE STARS: DELTA DELPHINI AND DELTA CAPRICORNI.
589. PUBL. ASTRON. SOC. PACIFIC, VOL. 68, PP. 541-544.

590. BONSAK, W. K. 1958
590. WAVELENGTH VARIATIONS IN THE SPECTRUM OF 56 ARIETIS. PUBL. ASTRON.
590. SOC. PACIFIC, VOL. 70, PP. 90-97.

591. STRUVE, O., AND SAHADE, J. 1958
591. EMISSION OF H ALPHA IN AC CASSIOPEIAE. PUBL. ASTRON. SOC. PACIFIC,
591. VOL. 70, PP. 111-113.
592. OSTERBROCK, D. E. 1958
592. ELECTRON DENSITIES IN FILAMENTARY NEBULAE. PUBL. ASTRON. SOC.
592. PACIFIC, VOL. 70, PP. 180-184.
593. SAHADE, J., AND WALLERSTEIN, G. 1958
593. THE SPECTRUM OF ALGOL IN THE NEAR INFRARED AT PRINCIPAL ECLIPSE.
593. PUBL. ASTRON. SOC. PACIFIC, VOL. 70, PP. 207-208.
594. STRUVE, O., SAHADE, J., HUANG, S.-S., AND ZEBERGS, V. 1958
594. THE RADIAL VELOCITY OF NU PERSEI. PUBL. ASTRON. SOC. PACIFIC,
594. VOL. 70, PP. 409-411.
595. ABHYANKAR, K. D., AND SPINRAD, H. 1958
595. LIGHT VARIABILITY OF HD 47129. PUBL. ASTRON. SOC. PACIFIC,
595. VOL. 70, PP. 411-414.
596. HERBIG, G. H. 1958
596. THE SPECTRUM OF THE NEBULOSITY AT AE AURIGAE. PUBL. ASTRON. SOC.
596. PACIFIC, VOL. 70, PP. 468-472.
597. WALLERSTEIN, G. 1958
597. THE SPECTRUM OF THE IRREGULAR VARIABLE VY CANIS MAJORIS. PUBL.
597. ASTRON. SOC. PACIFIC, VOL. 70, PP. 479-484.
598. SANFORD, R. F., AND MERRILL, P. W. 1958
598. MOUNT WILSON SPECTROGRAMS OF AB AURIGAE. PUBL. ASTRON. SOC.
598. PACIFIC, VOL. 70, PP. 602-604.
599. STRUVE, O. 1958
599. H ALPHA IN THE SPECTRUM OF V448 CYGNI. PUBL. ASTRON. SOC. PACIFIC,
599. VOL. 70, PP. 608-609.
600. WALRAVEN, TH., AND WALRAVEN, J. H. 1960
600. A NEW PHOTO-ELECTRIC METHOD OF CLASSIFICATION OF LUMINOSITY AND
600. SPECTRAL TYPES FOR O AND B STARS. BULL. ASTRON. NETHERLANDS,
600. VOL. 15, PP. 67-80.
601. EBBIGHAUSEN, E. G., AND STRUVE, O. 1959
601. THE ANOMALOUS BEHAVIOR OF THE RADIAL VELOCITIES OF ALGOL A. PUBL.
601. ASTRON. SOC. PACIFIC, VOL. 71, PP. 39-45.
602. HETZLER, C., AND SUMMERS, R. D. 1959
602. AN IMPROVED PERIOD FOR THE SPECTROSCOPIC BINARY PI SCORPII. PUBL.
602. ASTRON. SOC. PACIFIC, VOL. 71, PP. 50-52.

603. SPINRAD, H. 1959
603. PHOTOELECTRIC OBSERVATIONS OF THE ECLIPSING SYSTEM V401 CYGNI.
603. PUBL. ASTRON. SOC. PACIFIC, VOL. 71, PP. 53-55.
604. SAHADE, J. 1959
604. AN ALTERNATIVE MODEL FOR 29 UY CANIS MAJORIS. PUBL. ASTRON. SOC.
604. PACIFIC, VOL. 71, PP. 151-155.
605. HYNK, J. A., AND STANGER, P. C. 1959
605. THE COMPOSITE-SPECTRUM STAR 5 LACERTAE. PUBL. ASTRON. SOC. PACIFIC,
605. VOL. 71, PP. 310-315.
606. WALLERSTEIN, G. 1959
606. THREE-COLOR PHOTOMETRY OF U GEMINORUM DURING AN OUTBURST. PUBL.
606. ASTRON. SOC. PACIFIC, VOL. 71, PP. 316-320.
607. VAN HOOFF, A. 1959
607. THE MULTIPLE PERIODICITY OF NU ERIDANI. PUBL. ASTRON. SOC. PACIFIC,
607. VOL. 71, PP. 455-460.
608. JASCHEK, M., AND JASCHEK, C. 1959
608. HD 96446: A HELIUM-RICH B-TYPE STAR. PUBL. ASTRON. SOC. PACIFIC,
608. VOL. 71, PP. 465-467.
609. WRIGHT, K. O., AND MCDONALD, J. K. 1959
609. CHROMOSPHERIC K-LINE INTENSITIES IN THE SPECTRUM OF 32 CYGNI AT THE
609. 1952 AND 1959 ECLIPSES. PUBL. ASTRON. SOC. PACIFIC, VOL. 71,
609. PP. 506-509.
610. SKY AND TELESCOPE 1963
610. VERY REMOTE RADIO GALAXIES. SKY AND TEL., VOL. 25, P. 311.
611. STRUVE, O. 1963
611. THE STORY OF U CEPHEI. SKY AND TEL., VOL. 25, PP. 199-201.
612. SKY AND TELESCOPE 1963
612. STELLAR EXPLOSION. SKY AND TEL., VOL. 25, P. 135.
613. VAN DE HULST, H. C., RAIMOND, E., AND VAN WOERDEN, H. 1957
613. ROTATION AND DENSITY DISTRIBUTION OF THE ANDROMEDA NEBULA DERIVED
613. FROM OBSERVATIONS OF THE 21-CM LINE. BULL. ASTRON. NETHERLANDS,
613. VOL. 14, PP. 1-16.
614. SCHMIDT, M. 1957
614. THE DISTRIBUTION OF MASS IN M31. BULL. ASTRON. NETHERLANDS,
614. VOL. 14, PP. 17-19.
615. RAIMOND, E., AND VOLDERS, L. M. J. S. 1957
615. PRELIMINARY OBSERVATIONS OF 21-CM EMISSION FROM M 33. BULL. ASTRON.
615. NETHERLANDS, VOL. 14, PP. 19-20.

616. WOLTJER, L. 1958
616. THE CRAB NEBULA. BULL. ASTRON. NETHERLANDS, VOL. 14, PP. 39-80.
617. HOAG, A. A., AND SMITH, E. V. P. 1959
617. POLARIZATION IN NGC 2244. PUBL. ASTRON. SOC. PACIFIC, VOL. 71,
617. PP. 32-38.
618. STEPHENSON, C. B. 1959
618. A POSSIBLE NEW GALACTIC CLUSTER INVOLVING DELTA LYRAE. PUBL.
618. ASTRON. SOC. PACIFIC, VOL. 71, PP. 145-150.
619. BIDEKMAN, W. P., AND BACHM, K. H. 1955
619. SPECTRAL CLASSIFICATION OF SOME PECULIAR A STARS. PUBL. ASTRON.
619. SOC. PACIFIC, VOL. 67, PP. 179-180.
620. WESTERLUND, B. 1959
620. THREE-COLOR PHOTOMETRY OF BRIGHT SOUTHERN SUPERGIANTS. PUBL.
620. ASTRON. SOC. PACIFIC, VOL. 71, PP. 156-161.
621. WILLIAMS, A. D., AND STRUVE, O. 1955
621. THE PHASE RELATION OF THE VELOCITY AND LIGHT OF SIGMA SCORPII.
621. PUBL. ASTRON. SOC. PACIFIC, VOL. 67, PP. 250-252.
622. WORLEY, C. E. 1955
622. THE ECLIPSING BINARY DELTA ORIONIS. PUBL. ASTRON. SOC. PACIFIC,
622. VOL. 67, PP. 330-333.
623. ABHYANKAR, K. D. 1955
623. A STUDY OF THE SPECTRUM OF NU ERIDANI. PUBL. ASTRON. SOC. PACIFIC,
623. VOL. 67, PP. 336-337.
624. DEUTSCH, A. J. 1955
624. SPECTRUM VARIATION IN 21 COMAE BERENICES. PUBL. ASTRON. SOC.
624. PACIFIC, VOL. 67, PP. 342-345.
625. SAHADE, J. 1955
625. THE SPECTRUM OF THE SOUTHERN WOLF-RAYET STAR GAMMA 2 VELORUM.
625. PUBL. ASTRON. SOC. PACIFIC, VOL. 67, P. 348.
626. THOMSEN, I. L., ABT, H. A., AND KRON, G. E. 1955
626. 'DISTORTIONS' IN THE LIGHT-VARIATION OF THE SPECTROSCOPIC BINARY
626. HD 22124. PUBL. ASTRON. SOC. PACIFIC, VOL. 67, PP. 412-415.
627. SMAK, J. 1964
627. ON THE COLORS OF T TAURI STARS AND RELATED OBJECTS. ASTROPHYS.
627. JOURN., VOL. 139, PP. 1095-1104.
628. AUER, L. H. 1964
628. A COARSE ANALYSIS OF THE ATMOSPHERE OF 10 AQUILAE. ASTROPHYS.
628. JOURN., VOL. 139, PP. 1148-1162.

629. TOLBERT, C. R. 1964
629. A UBV STUDY OF 94 WIDE VISUAL BINARIES. ASTROPHYS. JOURN., VOL.
629. 139, PP. 1105-1125.
630. ABT, H. A., AND SNOWDEN, M. S. 1964
630. THE GALACTIC CLUSTER IC 4665. ASTROPHYS. JOURN., VOL. 139,
630. PP. 1139-1147.
631. VOLDERS, L. 1959
631. NEUTRAL HYDROGEN IN M33 AND M101. BULL. ASTRON. NETHERLANDS,
631. VOL. 14, PP. 323-335.
632. WENTZEL, D. G., AND VAN WOERDEN, H. 1959
632. OBSERVATIONS OF M32 AT 21 CM. BULL. ASTRON. NETHERLANDS, VOL. 14,
632. PP. 335-337.
633. MULLER, A. B., WALRAVEN, TH., AND WOLTJER, L. 1956
633. RADIAL VELOCITIES OF OMICRON PERSEI AND ZETA PERSEI. BULL. ASTRON.
633. NETHERLANDS, VOL. 13, PP. 51-53.
634. WOLTJER, L. 1956
634. THE RADIAL-VELOCITY CURVE OF SX PHOENICIS, DERIVED FROM PLATES
634. TAKEN BY G. WESTERHOUT. BULL. ASTRON. NETHERLANDS, VOL. 13,
634. PP. 53-56.
635. FOTTASCH, S. 1956
635. A STUDY OF BRIGHT RIMS IN DIFFUSE NEBULAE. BULL. ASTRON.
635. NETHERLANDS, VOL. 13, PP. 77-88.
636. SEEGER, CH. L., WESTERHOUT, G., AND VAN DE HULST, H. C. 1956
636. THE FLUX DENSITIES OF SOME RADIO SOURCES AT 400 MC/S. BULL. ASTRON.
636. NETHERLANDS, VOL. 13, PP. 89-99.
637. SEEGER, CH. L. 1956
637. A TENTATIVE MEASURE OF THE FLUX DENSITY OF CASSIOPEIA A AT 400
637. MC/S. BULL. ASTRON. NETHERLANDS, VOL. 13, PP. 100-104.
638. DE JAGER, C. 1956
638. NOTE ON THE COMPLEX LIGHT- AND VELOCITY CURVES OF DD LACERTAE.
638. BULL. ASTRON. NETHERLANDS, VOL. 13, PP. 149-150.
639. WALRAVEN, TH. 1957
639. PHOTO-ELECTRIC OBSERVATIONS OF THE POLARIZATION AND SURFACE
639. BRIGHTNESS OF THE CRAB NEBULA MADE AT THE OBSERVATOIRE DE HAUTE
639. PROVENCE. BULL. ASTRON. NETHERLANDS, VOL. 13, PP. 293-301.
640. WOLTJER, L. 1957
640. THE POLARIZATION AND INTENSITY DISTRIBUTION IN THE CRAB NEBULA
640. DERIVED FROM PLATES TAKEN WITH THE 200-INCH TELESCOPE BY DR. W.
640. BAADE. BULL. ASTRON. NETHERLANDS, VOL. 13, PP. 301-311.

641. LE VAUCOULEURS, G., AND DE VAUCOULEURS, A. 1959
641. A QUANTITATIVE ANALYSIS OF THE COMPOSITE SPECTRUM OF THE LARGE
641. MAGELLANIC CLOUD. LOWELL OBS. BULL., VOL. 4, PP. 58-81.
642. LE VAUCOULEURS, G. 1959
642. MAGNITUDES AND COLORS OF GALAXIES IN THE UBV SYSTEM. LOWELL OBS.
642. BULL., VOL. 4, PP. 105-114.
643. JOHNSON, H. L. 1959
643. ADDITIONAL MAGNITUDES AND COLORS OF GALAXIES. LOWELL OBS. BULL.,
643. VOL. 4, P. 115.
644. JOHNSON, H. L. 1959
644. THE INTEGRATED MAGNITUDES AND COLORS OF GLOBULAR CLUSTERS. LOWELL
644. OBS. BULL., VOL. 4, PP. 117-121.
645. FOQUES, P. E. 1955
645. A SEARCH FOR FLARE STARS. PUBL. ASTRON. SOC. PACIFIC, VOL. 67,
645. PP. 34-38.
646. WOOD, F. B., AND LEWIS, E. M. 1955
646. A NOTE ON V367 CYGNI. PUBL. ASTRON. SOC. PACIFIC, VOL. 67, PP.
646. 39-44.
647. SOBOLEVA, N. S., PROZOROV, V. A., AND PARIISKII, YU. N. 1963
647. DISTRIBUTION OF POLARIZED AND NONPOLARIZED RADIATION IN THE CRAB
647. NEBULA. SOVIET ASTRONOMY-AJ, VOL. 7, PP. 1-7.
648. LAZAREVSKII, V. S., STANKEVICH, K. S., AND TROITSKII, V. S. 1963
648. PRECISE ABSOLUTE MEASUREMENTS OF THE FLUX DENSITY OF THE CRAB AND
648. ORION NEBULAE AT 3.2 CM. SOVIET ASTRONOMY-AJ, VOL. 7, PP. 8-11.
649. RYZHKOVA, N. F., EGOROVA, T. M., GOSACHINSKII, I. V., AND BYSTROVA, 1963
649. N. V.
649. ABSORPTION OF THE RADIATION FROM THE SOURCE SAGITTARIUS-A BY
649. INTERSTELLAR NEUTRAL HYDROGEN. SOVIET ASTRONOMY-AJ, VOL. 7, PP.
649. 12-16.
650. PSKOVSKII, YU. P. 1963
650. THE EVOLUTION OF SUPERNOVA REMNANTS OF THE TYPE OF CASSIOPEIA-A:
650. CHANGES IN THE SPECTRAL INDEX OF RADIO EMISSION. SOVIET ASTRONOMY-
650. AJ, VOL. 7, PP. 17-22.
651. ARKHIPOVA, V. P. 1963
651. PHOTOMETRY OF THE CONTINUOUS SPECTRUM OF P CYGNI STARS. SOVIET
651. ASTRONOMY-AJ, VOL. 7, PP. 51-59.
652. RUBLEV, S. V. 1963
652. SPECTROPHOTOMETRIC TEMPERATURES, ABSOLUTE MAGNITUDES, AND INTRINSIC
652. COLOR INDICES OF WOLF-RAYET STARS. SOVIET ASTRONOMY-AJ, VOL. 7, PP.
652. 75-85.

653. UDAL'TSOV, V. A. 1963
653. POLARIZATION OF 21-CM RADIATION OF THE CRAB NEBULA. SOVIET
653. ASTRONOMY-AJ, VOL. 6, PP. 665-669.
654. RUBLEV, S. V. 1963
654. QUANTITATIVE INTERPRETATION OF EMISSION-LINE PROFILES IN WOLF-
654. RAYET SPECTRA. SOVIET ASTRONOMY-AJ, VOL. 6, PP. 686-691.
655. STANKEVICH, K. S. 1963
655. PRECISION MEASUREMENTS OF THE SPECTRUM OF THE DISCRETE SOURCE
655. CASSIOPEIA-A IN THE CENTIMETER REGION. SOVIET ASTRONOMY-AJ, VOL. 6,
655. PP. 480-482.
656. ARKHIPOVA, V. P., AND DOKUCHAEVA, O. D. 1963
656. SPECTROPHOTOMETRY OF AG PEGASI. SOVIET ASTRONOMY-AJ, VOL. 6, PP.
656. 483-487.
657. KARDASHEV, N. S., KUZ'MIN, A. D., AND SYROVATSKII, S. I. 1962
657. THE NATURE OF THE EMISSION FROM THE RADIO GALAXY CYGNUS A. SOVIET
657. ASTRONOMY-AJ, VOL. 6, PP. 167-171.
658. ARKHIPOVA, V. P. 1962
658. THE EMISSION STAR HD 51585. SOVIET ASTRONOMY-AJ, VOL. 6,
658. PP. 286-287.
659. KUZ'MIN, A. D. 1962
659. THE SPECTRA OF THE DISCRETE RADIO SOURCES OBSERVED WITH THE 22-M
659. RADIO TELESCOPE. SOVIET ASTRONOMY-AJ, VOL. 6, PP. 15-19.
660. BRAUDE, S. YA., MEN', A. V., ZHUK, I. N., AND BABENKOV, K. A. 1962
660. THE RADIO EMISSION SPECTRUM OF CASSIOPEIA A AT FREQUENCIES BELOW
660. 30 MC. SOVIET ASTRONOMY-AJ, VOL. 6, PP. 122-124.
661. JUNG-HAD, C. 1962
661. OBSERVATIONS OF THE SOURCE SAGITTARIUS A ON 1500 MC. SOVIET
661. ASTRONOMY-AJ, VOL. 6, PP. 124-125.
662. KARACHUN, A. M., KUZ'MIN, A. D., AND SALOMONOVICH, A. E. 1961
662. OBSERVATIONS OF SOME DISCRETE RADIO SOURCES ON A WAVELENGTH OF
662. 3.2 CM. SOVIET ASTRONOMY-AJ, VOL. 5, PP. 59-62.
663. VORONTSOV-VEL'YAMINOV, B. A. 1961
663. VARIATIONS IN THE SPECTRUM OF THE PLANETARY NEBULA NGC 6905. SOVIET
663. ASTRONOMY-AJ, VOL. 5, PP. 186-187.
664. KUZ'MIN, A. D., SALOMONOVICH, A. E., AND UDAL'TSOV, V. A. 1961
664. THE RADIO EMISSION OF THE PLANETARY NEBULAE NGC 6853 AND NGC 7293.
664. SOVIET ASTRONOMY-AJ, VOL. 5, PP. 276-277.

665. PARIISKII, YU. N. 1961
665. THE DISTRIBUTION OF OPTICAL AND RADIO EMISSION IN M 17.
665. SOVIET ASTRONOMY-AJ, VOL. 5, PP. 358-360.
666. KUPO, I. D. 1961
666. THE VARIABLE SPECTRUM OF CHI OPHIUCHI. SOVIET ASTRONOMY-AJ, VOL. 5,
666. PP. 368-375.
667. PARIISKII, YU. N. 1962
667. A MODEL OF THE ORION NEBULA FROM RADIO OBSERVATIONS. SOVIET
667. ASTRONOMY-AJ, VOL. 5, PP. 611-618.
668. KHROMOV, G. S. 1962
668. THE VARIATIONS IN THE SPECTRA OF THE PLANETARY NEBULAE IC 4997 AND
668. NGC 6905. SOVIET ASTRONOMY-AJ, VOL. 5, PP. 619-625.
669. KUZ'MIN, A. D. 1962
669. THE DISCRETE SOURCE OF RADIO EMISSION ALPHA = 18H 53.7M
669. DELTA = + 1 DEGREE 16M. SOVIET ASTRONOMY-AJ, VOL. 5, PP. 692-696.
670. JUNG-HAO, C. 1961
670. RADIO OBSERVATIONS OF THE DIFFUSE NEBULAE NGC 6618, NGC 6523, AND
670. NGC 6514 ON DECIMETER WAVELENGTHS. SOVIET ASTRONOMY-AJ, VOL. 5,
670. PP. 819-822.
671. VORONTSOV-VEL'YAMINOV, B. A. 1961
671. A DESCRIPTION OF FIFTY PLANETARY NEBULAE. SOVIET ASTRONOMY-AJ, VOL.
671. 5, PP. 53-58.
672. FRANTSMAN, YU. L. 1962
672. DETERMINATION OF THE COORDINATES OF PLANETARY NEBULAE FROM
672. PHOTOGRAPHS TAKEN WITH AN OBJECTIVE PRISM. SOVIET ASTRONOMY-AJ,
672. VOL. 6, PP. 198-201.
673. KUZ'MIN, A. D., AND UDAL'TSOV, V. A. 1959
673. AN INVESTIGATION OF THE POLARIZATION OF THE 10-CM RADIATION OF THE
673. CRAB NEBULA. SOVIET ASTRONOMY-AJ, VOL. 3, PP. 39-45.
674. EFIMOV, YU. S. 1959
674. PHOTOMETRY OF THE PLANETARY NEBULA NGC 7293 (HELIX). SOVIET
674. ASTRONOMY-AJ, VOL. 3, PP. 447-450.
675. DOKUCHAEVA, O. D. 1959
675. DETERMINATION OF THE MASS OF THE ORION NEBULA FROM PHOTOGRAPHS
675. TAKEN IN RED LIGHT. SOVIET ASTRONOMY-AJ, VOL. 3, PP. 451-457.
676. BOYARCHUK, A. A. 1959
676. A QUANTITATIVE ANALYSIS OF THE CHEMICAL COMPOSITION OF THE
676. ATMOSPHERE OF THE BRIGHT COMPONENT OF BETA LYRAE. SOVIET ASTRONOMY-
676. AJ, VOL. 3, PP. 748-758.

677. KUPO, I. D. 1959
677. THE SPECTROPHOTOMETRIC STUDY OF CHI OPHIUCHI. I. VARIATIONS OF THE
677. CONTINUOUS SPECTRUM OF CHI OPHIUCHI. SOVIET ASTRONOMY-AJ, VOL. 3,
677. PP. 802-807.
678. ARTYUKHINA, N. M., AND KARIMOVA, D. K. 1959
678. THE MERIDIAN PROPER MOTIONS OF 161 STARS IN THE REGION OF THE BELT
678. OF ORION. SOVIET ASTRONOMY-AJ, VOL. 3, PP. 123-130.
679. PARENAGO, P. P. 1958
679. THE MASSES OF THE COMPONENTS OF GAMMA LECNIS, WHICH BELONG TO THE
679. GIANTS OF THE SPHERICAL COMPONENT OF THE GALAXY. SOVIET ASTRONOMY-
679. AJ, VOL. 2, PP. 260-262.
680. DOMBROVSKII, V. A. 1958
680. ON THE NATURE OF THE RADIATION FROM THE OMEGA NEBULA. SOVIET
680. ASTRONOMY-AJ, VOL. 2, PP. 646-652.
681. CRLOV, M. YA. 1958
681. ON THE ANOMALOUS EXCITATION OF HYDROGEN IN THE ATMOSPHERE OF ALPHA
681. BOO. SOVIET ASTRONOMY-AJ, VOL. 2, PP. 704-711.
682. BOIARCHUK, A. A. 1957
682. SOME CHARACTERISTICS OF SHELLS OF BE STARS. SOVIET ASTRONOMY-
682. AJ, VOL. 1, PP. 192-200.
683. GULAK, IU. K. 1957
683. PHOTOMETRY OF THE IMAGES OF SOME PLANETARY NEBULAE. SOVIET
683. ASTRONOMY-AJ, VOL. 1, PP. 508-516.
684. SHKLOVSKII, I. S. 1957
684. ON THE NATURE OF THE OPTICAL EMISSION FROM THE CRAB NEBULA. SOVIET
684. ASTRONOMY-AJ, VOL. 1, PP. 690-697.
685. GULAK, IU. K. 1957
685. THE SPATIAL STRUCTURE OF SOME PLANETARY NEBULAE. SOVIET
685. ASTRONOMY-AJ, VOL. 1, PP. 802-811.
686. BARKHATOVA, K. A. 1957
686. THE OPEN STELLAR CLUSTERS NGC 6823 AND NGC 6830. SOVIET
686. ASTRONOMY-AJ, VOL. 1, PP. 822-833.
687. ZAKHARENKOV, V. F., K AidANOVSKII, N. L., PARIISKII, YU. N., AND 1963
687. PROZOROV, V. A.
687. OBSERVATIONS OF DISCRETE RADIO SOURCES AT 3.2 CM. SOVIET ASTRONOMY-
687. AJ, VOL. 7, PP. 167-171.
688. SHOLOMITSKII, G. B. 1963
688. THE MASS OF THE FILAMENTARY NEBULAE (THE LOOP) IN CYGNUS. SOVIET
688. ASTRONOMY-AJ, VOL. 7, PP. 172-176.

689. KHARITONOV, A. V. 1963.
 689. EXTRA-ATMOSPHERIC SPECTROPHOTOMETRIC STANDARDS. ENERGY DISTRIBUTION
 689. IN THE SPECTRA OF SELECTED STARS IN CGS UNITS. SOVIET ASTRONOMY-
 689. AJ, VOL. 7, PP. 258-266.
690. EGOROVA, T. M. 1963
 690. 21-CM OBSERVATIONS OF THE RADIO SOURCE SAGITTARIUS A. SOVIET
 690. ASTRONOMY-AJ, VOL. 7, PP. 290-291.
691. DIBAI, E. A. 1960
 691. THE ORIGIN OF COMETARY NEBULAE. SOVIET ASTRONOMY-AJ, VOL. 4,
 691. PP. 13-18.
692. KUPO, I. D. 1960
 692. A SPECTROPHOTOMETRIC STUDY OF CHI OPHIUCHI. SOME PROPERTIES OF THE
 692. EMISSION SPECTRUM OF CHI OPH. SOVIET ASTRONOMY-AJ, VOL. 4,
 692. PP. 85-90.
693. MOROZ, V. I. 1960
 693. THE RADIATION FLUX FROM THE CRAB NEBULA AT LAMBDA 2 MU AND SOME
 693. CONCLUSIONS ON THE SPECTRUM AND MAGNETIC FIELD. SOVIET ASTRONOMY-
 693. AJ, VOL. 4, PP. 250-257.
694. RAZMADZE, N. A. 1960
 694. A SUPERDENSE PLANETARY NEBULA. SOVIET ASTRONOMY-AJ, VOL. 4,
 694. PP. 322-323.
695. IKHSANOV, R. N. 1960
 695. SOME PROBLEMS IN THE INTERRELATION OF STARS AND NEBULAE, AND THEIR
 695. EVOLUTION. SOVIET ASTRONOMY-AJ, VOL. 4, PP. 613-628.
696. MATTHEWS, T. A., AND SANDAGE, A. R. 1963
 696. OPTICAL IDENTIFICATION OF 3C 48, 3C 196, AND 3C 286 WITH STELLAR
 696. OBJECTS. ASTROPHYS. JOURN., VOL. 138, PP. 30-56.
697. VORONTSOV-VEL'YAMINOV, B. A. 1960
 697. VARIATIONS IN THE SPECTRUM OF THE PLANETARY NEBULA IC 4997 AND
 697. THEIR ORIGIN. SOVIET ASTRONOMY-AJ, VOL. 4, PP. 929-934.
698. JUGAKU, J., AND SARGENT, W. L. W. 1963
 698. THE ULTRAVIOLET SPECTRUM OF 3 CENTAURI A. ASTROPHYS. JOURN.,
 698. VOL. 138, PP. 90-96.
699. SLETTEBAK, A. 1963
 699. THE SPECTRA AND AXIAL ROTATIONAL VELOCITIES OF THE COMPONENTS OF
 699. 116 VISUAL DOUBLE-STAR SYSTEMS. ASTROPHYS. JOURN., VOL. 138,
 699. PP. 118-139.

700. GRIFFIN R. F. 1963
700. POSITIONS OF OPTICAL OBJECTS IN THE FIELDS OF 42 RADIO SOURCES.
700. ASTRON. JOURN., VOL. 68, PP. 421-428.
701. RAKOS, K. D. 1962
701. PHOTOELECTRIC INVESTIGATION OF MAGNETIC AND SPECTRUM VARIABLE
701. STARS. LOWELL OBS. BULL., VOL. 5, PP. 227-256.
702. ELVIUS, A. 1962
702. A POLARIMETRIC STUDY OF THE GALAXY M 82. LOWELL OBS. BULL., VOL. 5,
702. PP. 281-294.
703. KINMAN, T. D. 1961
703. PHOTOELECTRIC OBSERVATIONS OF SX PHOENICIS. LICK OBS. BULL.,
703. VOL. 21, NO. 570, PP. 348-350.
704. VAN DEN BOS, W. H. 1962
704. ORBITS OF THREE VISUAL BINARIES. LICK OBS. BULL., VOL. 22, NO.
704. 578, PP. 552-554.
705. MARTEL, L. 1961
705. ETUDE STATISTIQUE DE LA COURBE DE LUMIERE DE L'ETOILE VARIABLE SS
705. CYGNI. ANN. D'ASTROPHYS., VOL. 24, PP. 267-308.
706. ZUCKERMANN, M.-C. 1961
706. OBSERVATIONS ET INTERPRETATION DE L'ETOILE VARIABLE SS CYG. ANN.
706. D'ASTROPHYS., VOL. 24, PP. 431-508.
707. MAO-LIN, T., AND BLOCH, M. 1954
707. LES SPECTRES DE BF CYGNI, AX PERSEI ET CI CYGNI EN 1952. ANN.
707. D'ASTROPHYS., VOL. 17, PP. 6-17.
708. COURTES, G. 1960
708. METHODES D'OBSERVATION ET ETUDE DE L'HYDROGENE INTERSTELLAIRE EN
708. EMISSION. ANN. D'ASTROPHYS., VOL. 23, PP. 115-217.
709. POTTASCH, S. R., AND VARSAVSKY, C. M. 1960
709. THE SPECTRUM OF RR TELESCOPII BETWEEN MAY 1949 AND AUGUST 1950.
709. ANN. D'ASTROPHYS., VOL. 23, PP. 516-527.
710. HARDIE, R. H., AND SCHROEDER, N. H. 1963
710. THREE-COLOR PHOTOMETRY OF 56 ARIETIS. ASTROPHYS. JOURN., VOL. 138,
710. PP. 350-355.
711. BURBIDGE, E. M., BURBIDGE, G. R., AND PRENDERGAST, K. H. 1963
711. THE VELOCITY FIELD, ROTATION, AND MASS OF NGC 4258. ASTROPHYS.
711. JOURN., VOL. 138, PP. 375-384.

712. CHADEAU, C. 1955
 712. SUR LA COURBE DE CROISSANCE DE ALPHA CYGNI. ANN. D'ASTROPHYS.,
 712. VOL. 18, PP. 100-112.
713. MANNINO, G., AND HUMBLET, J. 1955
 713. OBSERVATIONS SPECTROSCOPICIQUES DE QUELQUES ETOILES OF (I). ANN.
 713. D'ASTROPHYS., VOL. 18, PP. 237-258.
714. ANDRILLAT, H. 1955
 714. LES TEMPERATURES ELECTRONIQUES DES NEBULEUSES PLANETAIRES. ANN.
 714. D'ASTROPHYS. SUPPL., NC. 1, 58 PP.
715. CAYREL, R. 1958
 715. OBSERVATIONS ET ETUDE THEORIQUE DU SPECTRE DE ZETA PER. ANN.
 715. L'ASTROPHYS. SUPPL., NC. 6, 124 PP.
716. STRUVE, O., AND ZEBERGS, V. 1957
 716. STELLAR WAVE LENGTHS IN THE SPECTRUM OF GAMMA PEGASI. ANN.
 716. D'ASTROPHYS., VOL. 20, PP. 10-22.
717. FAYNE-GAPOSCHKIN, C. 1963
 717. THE 1960 MINIMUM OF R CORONAE BOREALIS. ASTROPHYS. JOURN.,
 717. VOL. 138, PP. 320-341.
718. HUANG, S.-S. 1963
 718. AN INTERPRETATION OF BETA LYRAE. ASTROPHYS. JOURN., VOL. 138, PP.
 718. 342-349.
719. PRESTON, G., AND WALLERSTEIN, G. 1963
 719. PROPERTIES OF TWO LATE-TYPE VARIABLE STARS OF THE HALO POPULATION.
 719. ASTROPHYS. JOURN., VOL. 138, PP. 820-831.
720. MILLER, R. H. 1965
 720. THE ENERGY DISTRIBUTION OF STARS IN A SPHERICAL GALAXY: NGC 3379.
 720. ASTROPHYS. JOURN., VOL. 138, PP. 849-862.
721. CHOPINET, M. 1963
 721. CONTRIBUTION A L'ETUDE DES NEBULEUSES PLANETAIRES GRACE A LA
 721. CAMERA ELECTRONIQUE. JOURN. DES OBS., VOL. 46, PP. 27-103.
722. SKY AND TELESCOPE 1963
 722. CATAclysm IN MESSIER 82. SKY AND TEL., VOL. 26, PP. 261-262.
723. BATTEN, A. H. 1962
 723. A STUDY OF THE BINARY SYSTEM V380 CYGNI (BOSS 5070). PUBL. DOMINION
 723. ASTROPHYS. OBS., VICTORIA, B.C., VOL. 12, PP. 91-109.
724. PETRIE, R. M. 1962
 724. THE O-TYPE SPECTROSCOPIC BINARY 14 CEPHEI. PUBL. DOMINION ASTROPHYS.
 724. OBS., VICTORIA, B.C., VOL. 12, PP. 111-116.

725. UNDERHILL, A. B. 1963
 725. RADIAL-VELOCITY OBSERVATIONS OF EIGHT SHORT-PERIOD VISUAL BINARIES.
 725. PUBL. DOMINION ASTROPHYS. OBS., VICTORIA, B.C.,
 725. VOL. 12, PP. 159-171.
726. EATTEN, A. H. 1961
 726. THE SPECTROSCOPIC ORBIT OF DELTA CAPRICORNI (H.D. 207098). PUBL.
 726. DOMINION ASTROPHYS. OBS., VOL. 11, PP. 395-403.
727. PETRIE, R. M., AND EBBIGHAUSEN, E. G. 1961
 727. THE SPECTROSCOPIC BINARY BOSS 1107. PUBL. DOMINION ASTROPHYS. OBS.,
 727. VOL. 11, PP. 385-394.
728. UNDERHILL, A. B. 1961
 728. SOME SPECTROSCOPIC OBSERVATIONS OF THE SUPERGIANTS 67 OPHIUCHI,
 728. 55 CYGNI AND CHI 2 ORICNIS. PUBL. DOMINION ASTROPHYS. OBS., VOL.
 728. 11, PP. 353-361.
729. LEE, E. K., AND WRIGHT, K. O. 1960
 729. THE LIGHT-RATIO AND SECONDARY SPECTRUM OF THE ECLIPSING BINARY
 729. ZETA AURIGAE. PUBL. DOMINION ASTROPHYS. OBS., VOL. 11, PP. 339-351.
730. UNDERHILL, A. B. 1960
 730. A LINE-INTENSITY STUDY OF THE SPECTRUM OF H. D. 188001, 9 SAGITTAE.
 730. PUBL. DOMINION ASTROPHYS. OBS., VOL. 11, PP. 283-306.
731. EBBIGHAUSEN, E. G. 1960
 731. THE SPECTROSCOPIC ORBIT OF BETA TRIANGULI. PUBL. DOMINION
 731. ASTROPHYS. OBS., VOL. 11, PP. 277-282.
732. EBBIGHAUSEN, E. G. 1960
 732. THE ORBIT OF THE SPECTROSCOPIC BINARY OMEGA URSAE MAJORIS. PUBL.
 732. DOMINION ASTROPHYS. OBS., VOL. 11, PP. 265-275.
733. EBBIGHAUSEN, E. G., AND PETRIE, R. M. 1960
 733. THE SPECTROSCOPIC ORBIT OF NU ORIONIS. PUBL. DOMINION ASTROPHYS.
 733. OBS., VOL. 11, PP. 247-252.
734. EBBIGHAUSEN, E. G. 1960
 734. THE SPECTROSCOPIC ORBIT OF THETA TWO TAURI. PUBL. DOMINION ASTROPHYS.
 734. OBS., VOL. 11, PP. 235-245.
735. UNDERHILL, A. B. 1959
 735. A STUDY OF THE WOLF-RAYET STARS H.D. 192103 AND H.D. 192163.
 735. PUBL. DOMINION ASTROPHYS. OBS., VOL. 11, PP. 209-234.
736. ODGERS, G. J., AND KUSHWAHA, R. S. 1958
 736. SHOCK WAVES IN THE ATMOSPHERE OF THE BETA CEPHEI STAR BW
 736. VULPECULAE. PUBL. DOMINION ASTROPHYS. OBS., VOL. 11, PP. 185-200.

737. UNDERHILL, A. B. 1958
737. A WAVE-LENGTH STUDY OF THE SPECTRUM OF H.D. 188001, 9 SAGITTAE.
737. PUBL. DOMINION ASTROPHYS. OBS., VOL. 11, PP. 143-184.
738. ODGERS, G. J. 1955
738. A FURTHER STUDY OF THE BETA CEPHEI STAR H.D. 199140 (BW VULPECULAE).
738. PUBL. DOMINION ASTROPHYS. OBS., VOL. 10, PP. 215-252.
739. PETRIE, R. M. 1955
739. THE ORBITS AND SPECTRA OF H.D. 190967 (V448 CYGNI). PUBL. DOMINION
739. ASTROPHYS. OBS., VOL. 10, PP. 259-276.
740. RICHARDSON, E. H., AND MCKELLAR, A. 1955
740. SPECTROGRAPHIC ORBITAL ELEMENTS FOR H.D. 110854. PUBL. DOMINION
740. ASTROPHYS. OBS., VOL. 10, PP. 253-258.
741. PEARCE, J. A. 1956
741. THE SPECTROGRAPHIC ORBIT OF H.D. 123299, ALPHA DRACONIS. PUBL.
741. DOMINION ASTROPHYS. OBS., VOL. 10, PP. 331-339.
742. MCKELLAR, A., AND BUTKOV, E. 1956
742. SPECTROGRAPHIC OBSERVATIONS AT THE 1953 AND 1955-56 ECLIPSES OF
742. ZETA AURIGAE. PUBL. DOMINION ASTROPHYS. OBS., VOL. 10, PP. 341-348.
743. PEARCE, J. A. 1956
743. THE SPECTROGRAPHIC ORBIT OF H.D. 24118. PUBL. DOMINION ASTROPHYS.
743. OBS., VOL. 10, PP. 349-355.
744. RICHARDSON, E. H., AND MCKELLAR, A. 1957
744. REDETERMINATION OF THE SPECTROGRAPHIC ORBIT OF DELTA LYRAE. PUBL.
744. DOMINION ASTROPHYS. OBS., VOL. 10, PP. 407-413.
745. PEARCE, J. A. 1957
745. H.D. 23642, A SPECTROGRAPHIC BINARY IN THE PLEIADES. PUBL.
745. DOMINION ASTROPHYS. OBS., VOL. 10, PP. 435-445.
746. PETRIE, R. M. 1959
746. APSIDAL MOTION IN THE SPECTROSCOPIC BINARY H.R. 8800. PUBL.
746. DOMINION ASTROPHYS. OBS., VOL. 10, PP. 459-446.
747. HODGE, P. W. 1963
747. DISTRIBUTION OF LUMINOSITY AND COLOR IN THE GALAXY NGC 185. ASTRON.
747. JOURN., VOL. 68, PP. 691-696.
748. KENDERDINE, S. 1963
748. RADIO EMISSION FROM THE CYGNUS LOOP. MONTHLY NOTICES ROY. ASTRON.
748. SOC., VOL. 126, PP. 55-60.

749. BERTAUD, CH. 1960
749. CATALOGUE ET BIBLIOGRAPHIE DES ETOILES A A SPECTRE PARTICULIER,
749. PREMIER SUPPLEMENT. JOURN. DES OBS., VOL. 43, PP. 129-144.
750. MORTON, D. C. 1964
750. NEUTRON STARS AS X-RAY SOURCES. ASTROPHYS. JOURN., VOL. 140, PP.
750. 460-469.
751. BURBIDGE, E. M., BURBIDGE, G. R., AND RUBIN, V. C. 1964
751. A STUDY OF THE VELOCITY FIELD IN M82 AND ITS BEARING ON EXPLOSIVE
751. PHENOMENA IN THAT GALAXY. ASTROPHYS. JOURN., VOL. 140, PP. 942-968.
752. KUCEWICZ, B. 1963
752. SOUTHERN B STARS WITH H ALPHA EMISSION. PUBL. ASTRON. SOC.
752. PACIFIC, VOL. 75, PP. 192-193.
753. BERTAUD, CH. 1959
753. CATALOGUE ET BIBLIOGRAPHIE DES ETOILES A A SPECTRE PARTICULIER.
753. JOURN. DES OBS., VOL. 42, PP. 45-73.
754. FERRAUD, H., AND PELLETIER, H. 1959
754. LISTES ET CLASSIFICATIONS D'ETOILES A EMISSION. JOURN. DES OBS.,
754. VOL. 42, PP. 75-76.
755. ARGUE, A. N. 1963
755. UBV PHOTOMETRY OF 300 G AND K TYPE STARS. MONTHLY NOTICES ROY.
755. ASTRON. SOC., VOL. 125, PP. 557-570.
756. DELHAYE, J. 1959
756. COORDONNEES MOYENNES DE 86 ETOILES O ET B DETERMINEES A
756. L'OBSERVATOIRE DE PARIS ET REDUITES SANS MOUVEMENT PROPRE A
756. L'EQUINOXE 1950.0. JOURN. DES OBS., VOL. 42, PP. 94-101.
757. VAN HOOF, A. 1962
757. MULTIPERIODICITY OF BETA CEPHEI. ZEITS. FUR ASTROPHYS., VOL. 56,
757. PP. 15-26.
758. VAN HOOF, A. 1962
758. MULTIPLE PERIODS IN BETA CANIS MAJORIS. ZEITS. FUR ASTROPHYS., VOL.
758. 56, PP. 27-30.
759. GHOBROS, R. A. 1962
759. DIE WASSERSTOFF- UND HELIUM-LINIEN IM SPEKTRUM VON P CYGNI. ZEITS.
759. FUR ASTROPHYS., VOL. 56, PP. 113-126.
760. VAN HOOF, A. 1962
760. MULTIPLE PERIODS IN XI 1 CANIS MAJORIS. ZEITS. FUR ASTROPHYS.,
760. VOL. 56, PP. 141-149.

761. KALER, J. 1962
761. STELLAR ROTATION AND LUMINOSITY CLASSIFICATION. ZEITS. FUR
761. ASTROPHYS., VOL. 56, PP. 150-152.
762. RAKOSCH, K. D. 1962
762. LICHTELEKTRISCHE BEOBACHTUNGEN DES MAGNETISCHEN UND SPEKTRUM-
762. VERANDERLICHEN STERNES HD 71866. ZEITS. FUR ASTROPHYS., VOL. 56,
762. PP. 153-160.
763. HUNGER, K. 1963
763. DIE BREITEN DER ABSORPTIONSLINIEN IM SPEKTRUM VON T TAURI. ZEITS.
763. FUR ASTROPHYS., VOL. 56, PP. 285-290.
764. BECKER, W., AND FENKART, R. 1963
764. DIE RAUMLICHE VERTEILUNG VON 55 H II-REGIONEN IN DER MILCHSTRASSE.
764. ZEITS. FUR ASTROPHYS., VOL. 56, PP. 257-263.
765. SINNERSTAD, U. 1961
765. SPECTROPHOTOMETRIC MEASUREMENTS OF ABSORPTION-LINE INTENSITIES.
765. STOCKHOLM OBS. ANN., VOL. 21, NO. 6, 64 PP.
766. SINNERSTAD, U. 1961
766. QUANTITATIVE SPECTRAL CLASSIFICATION AND LUMINOSITY DETERMINATION
766. OF EARLY-TYPE STARS. STOCKHOLM OBS. ANN., VOL. 22, NO. 2, 57 PP.
767. KEGEL, W. H. 1962
767. DIE ATMOSPHERE DES F6 IV-V STERNES GAMMA SERPENTIS. ZEITS. FUR
767. ASTROPHYS., VOL. 55, PP. 221-268.
768. WALLERSTEIN, G. 1962
768. SOME SUGGESTED EXPERIMENTS RELEVANT TO THE PECULIAR STAR 3 CENTAURI
768. AND RELATED OBJECTS. PHYS. REV. LETTERS, VOL. 9, PP. 143-144.
769. WALLERSTEIN, G. 1962
769. DISCUSSION OF THE COMPOSITION OF THE PECULIAR STAR 3 CENTAURI.
769. (ABSTRACT) ASTRON. JOURN., VOL. 67, P. 589.
770. FEHRENBACH, C., AND DUFLOT, M. 1962
770. DEUX ETOILES A GRANDE VITESSE DECOUVERTES DANS LE CIEL AUSTRAL.
770. COMPT. REND., VOL. 255, PP. 1291-1292.
771. MCLAUGHLIN, D. B. 1962
771. V/R VARIATIONS OF SOME BRIGHT BE STARS. (ABSTRACT) ASTRON. JOURN.,
771. VOL. 67, P. 581.
772. HAZARD, C., MACKAY, M. B., AND SHIMMINS, A. J. 1963
772. INVESTIGATION OF THE RADIO SOURCE 3C 273 BY THE METHOD OF LUNAR
772. OCCULTATIONS. NATURE, VOL. 197, PP. 1037-1039.

773. OKE, J. B. 1963
773. ABSOLUTE ENERGY DISTRIBUTION IN THE OPTICAL SPECTRUM OF 3C 273.
773. NATURE, VOL. 197, PP. 1040-1041.
774. SCHMIDT, M. 1963
774. 3C 273; A STAR-LIKE OBJECT WITH LARGE RED-SHIFT. NATURE, VOL. 197,
774. P. 1040.
775. GREENSTEIN, J. L., AND MATTHEWS, T. A. 1963
775. RED-SHIFT OF THE UNUSUAL RADIO SOURCE: 3C 48. NATURE, VOL. 197,
775. PP. 1041-1042.
776. DE VAUCOULEURS, G. 1963
776. SOUTHERN GALAXIES. IV. ISOPHOTOMETRY OF THE LARGE BARRED SPIRAL
776. NGC 6744. ASTROPHYS. JOURN., VOL. 138, PP. 934-944.
777. ALLER, L. H., BOWEN, I. S., AND WILSON, C. C. 1963
777. THE SPECTRUM OF NGC 7027. ASTROPHYS. JOURN., VOL. 138,
777. PP. 1013-1017.
778. O'DELL, C. R. 1963
778. PHOTOELECTRIC SPECTROPHOTOMETRY OF PLANETARY NEBULAE. ASTROPHYS.
778. JOURN., VOL. 138, PP. 1018-1034.
779. ROSLUND, C. 1963
779. A SURVEY OF O AND B STARS IN A REGION OF SCUTUM. ARKIV FOR ASTRON.,
779. VOL. 3, PP. 97-120.
780. WAYMAN, P. A. 1962
780. PHOTOELECTRIC MAGNITUDES AND COLOURS OF SOUTHERN DOUBLE STARS.
780. ROY. OBS. BULL., SERIES E, NO. 50, PP. 61-76.
781. EGGEN, O. J. 1963
781. LUMINOSITIES, COLORS, AND MOTIONS OF THE BRIGHTEST A-TYPE STARS.
781. ASTRON. JOURN., VOL. 68, PP. 697-714.
782. OSAWA, K., AND HATA, S. 1960
782. THREE-COLOR PHOTOMETRY OF B8-A2 STARS. I. ANN. TOKYO ASTRON. OBS.,
782. VOL. 6, PP. 148-153.
782. THREE-COLOR PHOTOMETRY OF B8-A2 STARS. II. ANN. TOKYO ASTRON. OBS.,
782. VOL. 7, PP. 209-212.
783. WOODS, M. L. 1955
783. SPECTRAL TYPES OF BRIGHT SOUTHERN STARS. MEM. COMMONWEALTH OBS.,
783. VOL. 3, NO. 12, 18 PP.
784. HILL, P. W. 1964
784. THE SPECTRA OF HELIUM STARS. I. WAVELENGTHS AND EQUIVALENT WIDTHS
784. FOR HD 168476 AND HD 124448. MONTHLY NOTICES ROY. ASTRON. SOC.,
784. VOL. 127, PP. 113-131.

785. BEHR, A. 1959
785. DIE INTERSTELLARE POLARISATION DES STERNLICHTS IN SONNENUMGEBUNG.
785. VEROFF. UNIV.-STERNWARTE GOTTINGEN, NO. 126, PP. 185-240.
786. PETIT, M. 1960
786. CATALOGUE DES ETOILES VARIABLES DU TYPE U GEMINORUM. JOURN. DES
786. OBS., VOL. 43, PP. 17-23.
787. PETIT, M. 1960
787. OBSERVATIONS D'ETOILES DU TYPE U GEMINORUM. JOURN. DES OBS.,
787. VOL. 43, PP. 24-32.
788. PETIT, M. 1960
788. L'ETOILE VARIABLE SU URSAE MAJORIS. JOURN. DES OBS., VOL. 43,
788. PP. 33-37.
789. PETIT, M. 1960
789. NOTE SUR X LEONIS ET UZ SERPENTIS. JOURN. DES OBS., VOL. 43,
789. PP. 38-40.
790. PETIT, M. 1960
790. OBSERVATIONS D'ETOILES DU TYPE U GEMINORUM. JOURN. DES OBS.,
790. VOL. 43, PP. 122-126.
791. HOUZIAUX, L. 1960
791. LE SPECTRE DE HD 50138 EN 1958 ET 1959. JOURN. DES OBS., VOL. 43,
791. PP. 217-228.
792. MUMFORD, G. S. 1962
792. THE DWARF NOVAE-I. SKY AND TEL., VOL. 23, PP. 71-74.
792. THE DWARF NOVAE-II. SKY AND TEL., VOL. 23, PP. 135-137.
793. HOGG, A. R. 1958
793. PHOTOMETRIC OBSERVATIONS OF 244 BRIGHT STARS. MT. STROMLO OBS.
793. MIMEO. NO. 2., 7 PP.
794. HOUZIAUX, L. 1961
794. RESULTATS COMPARES DE LA PHOTOMETRIE PHOTOELECTRIQUE ET DE LA
794. SPECTROPHOTOMETRIE PHOTOGRAPHIQUE. BULL. SOC. ROY. SCI. LIEGE.
794. VOL. 30, 91-96.
795. HOUZIAUX, L. 1957
795. NOTE SUR LE SPECTRE DE HD 195907. BULL. SOC. ROY. SCI. LIEGE,
795. VOL. 26, PP. 236-240.
796. LENOVEL, F., AND DAGUILLON, J. 1956
796. OBSERVATIONS PHOTOELECTRIQUES. JOURN. DES OBS., VOL. 39, PP. 1-11.

797. CODE, A. D., AND BLESS, R. C. 1964
 797. ON THE SPECTRUM OF GAMMA 2 VELORUM. ASTROPHYS. JOURN., VOL. 139,
 797. PP. 787-792.
798. BARBIER, M. 1962
 798. STRUCTURE DE LA GALAXIE DANS LA REGION DE P CYGNI. JOURN. DES OBS.,
 798. VOL. 45, PP. 57-115.
799. WEHLAU, W., AND LEUNG, K.-C. 1964
 799. THE MULTIPLE PERIODICITY OF DELTA DELPHINI. ASTROPHYS. JOURN.,
 799. VOL. 139, PP. 843-863.
800. FETIT, M. 1961
 800. SUPPLEMENT AU CATALOGUE DES ETOILES VARIABLES DU TYPE U GEMINORUM,
 800. JOURN. DES OBS., VOL. 44, PP. 6-10.
801. DE VAUCOULEURS, G. 1964
 801. SOUTHERN GALAXIES. V. ISOPHOTOMETRY OF THE LARGE BARRED SPIRAL NGC
 801. 4945. ASTROPHYS. JOURN., VOL. 139, PP. 899-908.
802. STEBBINS, J., AND KRON, G. E. 1964
 802. SIX-COLOR PHOTOMETRY OF STARS. XI. BLACK-BODY COLOR TEMPERATURES
 802. OF 25 STARS. ASTROPHYS. JOURN., VOL. 139, PP. 424-434.
803. WILDEY, R. L., AND MURRAY, B. C. 1964
 803. 10-MICRON PHOTOMETRY OF 25 STARS FROM B8 TO M7. ASTROPHYS. JOURN.,
 803. VOL. 139, PP. 435-441.
804. TIFFT, W. G. 1964
 804. DH PEGAS1, AN RR LYRAE STAR OF TYPE C. ASTROPHYS. JOURN., VOL. 139,
 804. PP. 451-456.
805. KRAFT, R. P. 1964
 805. BINARY STARS AMONG CATAclySMIC VARIABLES. III. TEN OLD NOVAE.
 805. ASTROPHYS. JOURN., VOL. 139, PP. 457-475.
806. PARKER, R. A. R. 1964
 806. PHYSICAL CONDITIONS IN THE CYGNUS LOOP AND SOME OTHER POSSIBLE
 806. SUPERNOVA REMNANTS. ASTROPHYS. JOURN., VOL. 139, PP. 493-513.
807. PIKE, E. M., AND DRAKE, F. D. 1964
 807. A HIGH-RESOLUTION RADIO MAP OF THE CYGNUS X REGION. ASTROPHYS.
 807. JOURN., VOL. 139, PP. 545-550.
808. MORRIS, D., RADHAKRISHNAN, V., AND SEIELSTAD, G. A. 1964
 808. ON THE MEASUREMENT OF POLARIZATION DISTRIBUTIONS OVER RADIO SOURCES.
 808. ASTROPHYS. JOURN., VOL. 139, PP. 551-569.

809. HILTNER, W., SCHILD, R. E., AND JACKSON, S. 1964
809. SPECTRA OF SIX FAINT WOLF-RAYET STARS. ASTROPHYS. JOURN., VOL. 139,
809. PP. 763-764.
810. SCHMIDT, M., AND MATTHEWS, T. A. 1964
810. REDSHIFTS OF THE QUASI-STELLAR RADIO SOURCES 3C 47 AND 3C 147.
810. ASTROPHYS. JOURN., VOL. 139, PP. 781-785.
811. ALLER, L. H., AND BIDE LMAN, W. P. 1964
811. THE MANGANESE STAR 53 TAURI. ASTROPHYS. JOURN., VOL. 139, PP.
811. 171-189.
812. RYLE, M., AND SANDAGE, A. 1964
812. THE OPTICAL IDENTIFICATION OF THREE NEW RADIO OBJECTS OF THE 3C 48
812. CLASS. ASTROPHYS. JOURN., VOL. 139, PP. 419-421.
813. SHOLOMITSKII, G. B. 1963
813. THE MASS OF THE FILAMENTARY NEBULAE (THE LOOP) IN CYGNUS. SOVIET
813. ASTRONOMY-AJ, VOL. 7, PP. 172-176.
814. HOUZIAUX, L. 1963
814. CONTRIBUTIONS A L'ETUDE DES ETOILES A ENVELOPPE. MEM. ACAD. ROY.
814. BELGIQUE CLASSE DES SCIENCES, VOL. 33, NC. 8, 103 PP.
815. BOULON, J. 1963
815. ETUDE PHOTOMETRIQUE ET CINEMATIQUE DE DIX CHAMPS GALACTIQUES.
815. JOURN. DES OBS., VOL. 46, PP. 225-317.
816. STOECKLY, R., AND DRESSLER, K. 1964
816. ON THE INTERSTELLAR LAMBDA 4430 LINE. ASTROPHYS. JOURN., VOL. 139,
816. PP. 240-247.
817. ROSLUND, C. 1963
817. INVESTIGATIONS OF A MILKY WAY FIELD IN SCORPIUS, I. ARKIV FOR
817. ASTRON., VOL. 3, PP. 357-386.
818. NOT USED
819. GREENSTEIN, J. L., AND SCHMIDT, M. 1964
819. THE QUASI-STELLAR RADIO SOURCES 3C 48 AND 3C 273. ASTROPHYS.
819. JOURN., VOL. 140, PP. 1-34.
820. RUBIN, V. C., BURBIDGE, E. M., BURBIDGE, G. R., AND 1964
820. PRENDERGAST, K. H.
820. THE ROTATION AND MASS OF NGC 1792. ASTROPHYS. JOURN., VOL. 140,
820. PP. 80-84.
821. HARRIS, D. L., III, AND UPGREN, A. R. 1964
821. PHOTOELECTRIC MAGNITUDES AND COLORS OF STARS NEAR THE NORTH
821. GALACTIC POLE. ASTROPHYS. JOURN., VOL. 140, PP. 151-161.

822. ALLER, L. H., AND FAULKNER, D. J. 1964
822. SPECTROPHOTOMETRY OF THE WOLF-RAYET STAR GAMMA 2 VELORUM.
822. ASTROPHYS. JOURN., VOL. 140, PP. 167-172.
823. PRESTON, G. W., AND PACZYNSKI, B. 1964
823. ATMOSPHERIC PHENOMENA IN THE RR LYRAE STARS. I. THE SINGLY
823. PERIODIC VARIABLES. ASTROPHYS. JOURN., VOL. 140, PP. 181-213.
824. WALLERSTEIN, G., AND HUNZIKER, W. 1964
824. ABUNDANCES IN HIGH-VELOCITY A STARS. II. THE METAL-POOR STAR HD
824. 109995. ASTROPHYS. JOURN., VOL. 140, PP. 214-220.
825. RODGERS, A. W., AND BELL, R. A. 1964
825. THE ATMOSPHERE OF BETA DORADUS. I. DIFFERENTIAL CURVES OF GROWTH.
825. MONTHLY NOTICES ROY. ASTRON. SOC., VOL. 127, PP. 471-491.
826. WESTERLUND, B. E. 1963
826. AN OB ASSOCIATION IN THE REGION OF RS PUPPIS. MONTHLY NOTICES ROY.
826. ASTRON. SOC., VOL. 127, PP. 71-81.
827. BENNETT, A. S. 1963
827. A SURVEY OF EXTENDED SOURCES OF RADIO EMISSION. MONTHLY NOTICES
827. ROY. ASTRON. SOC., VOL. 127, PP. 3-13.
828. WESTERLUND, B. E. 1963
828. THREE-COLOUR PHOTOMETRY OF EARLY-TYPE STARS NEAR THE GALACTIC
828. POLES. MONTHLY NOTICES ROY. ASTRON. SOC., VOL. 127, PP. 82-95.
829. SJOGREN, U. 1963
829. PHOTOELECTRIC AND SPECTROPHOTOMETRIC OBSERVATIONS WITH A
829. DISCUSSION OF THE INTERSTELLAR ABSORPTION IN THE REGION OF
829. KAPTEYN'S SELECTED AREA 8. ARKIV FOR ASTRON., VOL. 3, PP. 82-95.
830. LODEN, L. O., AND LODEN, K. 1963
830. A PHOTOMETRIC STANDARD REGION IN CYGNUS. ARKIV FOR ASTRON., VOL.
830. 3, PP. 299-305.
831. EVANS, D. S., LAING, J. D., MENZIES, A., AND STOY, R. H. 1964
831. FUNDAMENTAL DATA FOR SOUTHERN STARS (FIFTH LIST). ROY. OBS. BULL.,
831. SERIES E, NO. 85, PP. 207-224.
832. COUSINS, A. W. J. 1963
832. PHOTOMETRIC DATA FOR STARS IN THE EQUATORIAL ZONE (FIFTH LIST).
832. MONTHLY NOTICES ASTRON. SOC. SOUTH AFRICA, VOL. 22, PP. 130-133.
833. COUSINS, A. W. J. 1964
833. PHOTOMETRIC DATA FOR STARS IN THE EQUATORIAL ZONE (SIXTH LIST).
833. MONTHLY NOTICES ASTRON. SOC. SOUTH AFRICA, VOL. 23, PP. 10-13.

834. LAKE, R. 1964
834. PHOTOELECTRIC MAGNITUDES AND COLOURS FOR 100 SOUTHERN STARS.
834. MONTHLY NOTICES ASTRON. SOC. SOUTH AFRICA, VOL. 23, PP. 14-16.
835. COUSINS, A. W. J. 1963
835. PHOTOMETRIC DATA FOR STARS IN THE EQUATORIAL ZONE (FOURTH LIST).
835. MONTHLY NOTICES ASTRON. SOC. SOUTH AFRICA, VOL. 22, PP. 58-62.
836. STOY, R. H. 1963
836. PHOTOELECTRIC THREE COLOUR MAGNITUDES FOR 354 SOUTHERN STARS.
836. MONTHLY NOTICES ASTRON. SOC. SOUTH AFRICA, VOL. 22, PP. 157-166.
837. JANKOWITZ, N. E., AND MCCOSH, C. J. 1963
837. PHOTOMETRIC OBSERVATIONS OF NGC 3114. MONTHLY NOTICES
837. ASTRON. SOC. SOUTH AFRICA, VOL. 22, PP. 18-30.
838. COUSINS, A. W. J. 1963
838. PHOTOMETRIC DATA FOR STARS IN THE EQUATORIAL ZONE (THIRD LIST).
838. MONTHLY NOTICES ASTRON. SOC. SOUTH AFRICA, VOL. 22, PP. 12-17.
839. COUSINS, A. W. J. 1962
839. PHOTOMETRIC DATA FOR STARS IN THE EQUATORIAL ZONE (FIRST LIST).
839. MONTHLY NOTICES ASTRON. SOC. SOUTH AFRICA, VOL. 21, PP. 20-24.
840. COUSINS, A. W. J. 1962
840. PHOTOMETRIC DATA FOR STARS IN THE EQUATORIAL ZONE (SECOND LIST).
840. MONTHLY NOTICES ASTRON. SOC. SOUTH AFRICA, VOL. 21, PP. 61-63.
841. LAKE, R. 1962
841. PHOTOELECTRIC MAGNITUDES AND COLOURS FOR 168 SOUTHERN STARS.
841. MONTHLY NOTICES ASTRON. SOC. SOUTH AFRICA, VOL. 21, PP. 56-61.
842. LAKE, R. 1963
842. PHOTOELECTRIC MAGNITUDES AND COLOURS FOR 242 SOUTHERN STARS.
842. MONTHLY NOTICES ASTRON. SOC. SOUTH AFRICA, VOL. 22, PP. 79-84.
843. FAULKNER, D. J. 1963
843. ON THE DISTANCE OF THE ETA CARINAE NEBULA. PUBL. ASTRON. SOC.
843. PACIFIC, VOL. 75, PP. 269-277.
844. BERGER, J., AND GREENSTEIN, J. L. 1963
844. A NEW HELIUM-RICH STAR, BD + 13 DEGREES 3224. PUBL. ASTRON. SOC.
844. PACIFIC, VOL. 75, PP. 336-342.
845. JASCHEK, M., AND JASCHEK, C. 1963
845. HD 49798, A NEW O-TYPE SUBDWARF. PUBL. ASTRON. SOC. PACIFIC,
845. VOL. 75, PP. 365-369.

846. FEINSTEIN, A. 1963
846. ETA CARINAE AND THE TRUMPLER 16 CLUSTER. PUBL. ASTRON. SOC.
846. PACIFIC, VOL. 75, PP. 492-497.
847. BERTOLA, F. 1964
847. A PLANETARY NEBULA WITH WN NUCLEUS. PUBL. ASTRON. SOC. PACIFIC,
847. VOL. 76, PP. 241-244.
848. VERON, P. 1965
848. ON THE OPTICAL POSITION OF THE STELLAR OBJECT ASSOCIATED WITH THE
848. RADIO SOURCE MSH 14-121. ASTROPHYS. JOURN., VOL. 141,
848. PP. 1284-1285.
849. SCHMIDT, M. 1965
849. LARGE REDSHIFTS OF FIVE QUASI-STELLAR SOURCES. ASTROPHYS. JOURN.,
849. VOL. 141, PP. 1295-1300.
850. BOGGESS, A., III, AND BORGMAN, J. 1964
850. INTERSTELLAR EXTINCTION IN THE MIDDLE ULTRAVIOLET. ASTROPHYS.
850. JOURN., VOL. 140, PP. 1636-1639.
851. ALLER, L. H., FAULKNER, D. J., AND NORTON, R. H. 1964
851. PHOTOELECTRIC SPECTROPHOTOMETRY OF SELECTED SOUTHERN STARS.
851. ASTROPHYS. JOURN., VOL. 140, PP. 1609-1612.
852. WALLERSTEIN, G., AND WOLFF, S. C. 1965
852. SPECTROSCOPIC OBSERVATIONS OF RUNAWAY STARS. PUBL. ASTRON. SOC.
852. PACIFIC, VOL. 77, PP. 12-18.
853. WHITFORD, A. E. 1964
853. LICK OBSERVATORY REPORT. ASTRON. JOURN., VOL. 69, PP. 675-683.
854. BUSCOMBE, W. 1965
854. THE HYDROGEN-DEFICIENT STAR HD 96446. MONTHLY NOTICES ROY. ASTRON.
854. SOC., VOL. 129, PP. 1-17.
855. WESTERLUND, B. E., AND SMITH, L. F. 1964
855. WOLF-RAYET STARS IN THE LARGE MAGELLANIC CLOUD. MONTHLY NOTICES
855. ROY. ASTRON. SOC., VOL. 128, PP. 311-325.
856. GLUSHNEVA, I. N. 1964
856. ULTRAVIOLET SPECTROPHOTOMETRY OF SOME HOT STARS.
856. SOVIET ASTRONOMY-AJ, VOL. 8, PP. 163-171.
857. BOGGESS, A., III 1964
857. B STAR COLOURS BETWEEN 2000 AND 3000 ANGSTROMS. ANN. D'ASTROPHYS.,
857. VOL. 27, PP. 805-808.

858. HEDDLE, D. W. C. 1964
858. THE IMPORTANCE OF ABSOLUTE PHOTOMETRY. ANN. D'ASTROPHYS., VOL. 27,
858. PP. 800-804.
859. WALRAVEN, J. H., TINBERGEN, J., AND WALRAVEN, TH. 1964
859. FIVE-COLOUR OBSERVATIONS OF 24 CLASSICAL CEPHEIDS. BULL. ASTRON.
859. NETHERLANDS, VOL. 17, PP. 520-536.
860. DE GROOT, M., AND UNDERHILL, A. B. 1964
860. AN INVESTIGATION OF THE PROFILES OF SOME ABSORPTION LINES IN THE
860. SPECTRUM OF 10 LACERTAE. BULL. ASTRON. NETHERLANDS, VOL. 17,
860. PP. 280-292.
861. GRYGAR, J. 1964
861. VARIABILITY OF THE RADIAL VELOCITY OF 10 LACERTAE. BULL. ASTRON.
861. NETHERLANDS, VOL. 17, PP. 305-309.
862. VAN GENDEREN, A. M. 1964
862. NOVA HERCULIS 1963. BULL. ASTRON. NETHERLANDS, VOL. 17,
862. PP. 293-297.
863. VAN GENDEREN, A. M. 1964
863. PHOTO-ELECTRIC OBSERVATIONS IN FOUR COLOURS OF THE
863. ULTRA-SHORT-PERIOD VARIABLE SZ LYNCIS. BULL. ASTRON. NETHERLANDS,
863. VOL. 17, PP. 243-249.
864. BORGMAN, J., AND BLAAUW, A. 1964
864. LUMINOSITIES AND PHOTOMETRIC DISTANCES OF EARLY-TYPE STARS.
864. BULL. ASTRON. NETHERLANDS, VOL. 17, PP. 358-379.
865. JOHNSON, H. L., AND BORGMAN, J. 1964
865. THE LAW OF INTERSTELLAR EXTINCTION. BULL. ASTRON. NETHERLANDS,
865. VOL. 17, PP. 115-126.
866. VAN GENDEREN, A. M. 1964
866. PHOTO-ELECTRIC OBSERVATIONS OF ZETA AURIGAE DURING THE ECLIPSE OF
866. 1963-1964. BULL. ASTRON. NETHERLANDS, VOL. 17, PP. 446-447.
867. OOSTERHOFF, P. TH. 1964
867. AP VELORUM, A CLASSICAL CEPHEID WITH SECONDARY PERIOD. BULL.
867. ASTRON. NETHERLANDS, VOL. 17, PP. 448-450.
868. VAN HOOFF, A., AND BLAAUW, A. 1964
868. A PROVISIONAL PERIOD FOR THE BETA CANIS MAJORIS TYPE VARIABLE
868. 53 ARIETIS. BULL. ASTRON. NETHERLANDS, VOL. 17, PP. 451-452.
869. DE JAGER, C. 1964
869. COMBINED LIGHT-, COLOUR-, AND RADIAL-VELOCITY MEASUREMENTS OF THE
869. BETA CEPHEI-TYPE VARIABLE 12 (DD) LACERTAE. BULL. ASTRON.
869. NETHERLANDS, VOL. 17, PP. 1-21.

870. BARNING, F. J. M. 1964
870. THE NUMERICAL ANALYSIS OF THE LIGHT CURVE OF 12 LACERTAE. BULL.
870. ASTRON. NETHERLANDS, VOL. 17, PP. 22-28.
871. PONSEN, J. 1964
871. THE SHORT-PERIOD PULSATING VARIABLE V 703 SCORPII. BULL. ASTRON.
871. NETHERLANDS, VOL. 17, PP. 29-43.
872. PONSEN, J. 1964
872. PHOTOMETRIC OBSERVATIONS OF THE SHORT-PERIOD VARIABLE STAR RHO
872. PUPPIS. BULL. ASTRON. NETHERLANDS, VOL. 17, PP. 44-52.
873. BORGMAN, J. 1964
873. SEVEN-COLOUR PHOTOMETRY OF A, F, G, K AND M STARS. BULL. ASTRON.
873. NETHERLANDS, VOL. 17, PP. 58-68.
874. BORGMAN, J. 1964
874. NOTE ON THE ALGOL SYSTEM. BULL. ASTRON. NETHERLANDS, VOL. 17,
874. PP. 111-113.
875. SHAKHOVSKOI, N. M. 1965
875. POLARIZATION IN VARIABLE STARS. II. ECLIPSING BINARIES. SOVIET
875. ASTRONOMY-AJ, VOL. 8, PP. 833-842.
876. RUBLEV, S. V. 1965
876. ON THE DYNAMIC STATE OF THE ATMOSPHERES OF WOLF-RAYET STARS. SOVIET
876. ASTRONOMY-AJ, VOL. 8, PP. 848-853.
877. EGGEN, D. J. 1965
877. MASSES, LUMINOSITIES, COLORS, AND SPACE MOTIONS OF 228 VISUAL
877. BINARIES. ASTRON. JOURN., VOL. 70, PP. 19-93.
878. MALIK, G. M. 1965
878. BY CASSIOPEIAE, LIGHT CURVE AND PERIOD. ASTRON. JOURN., VOL. 70,
878. PP. 94-99.
879. KLOCK, B. L. 1965
879. LIGHT CURVE OF IOTA CASSIOPEIA. ASTRON. JOURN., VOL. 70,
879. PP. 176-177.
880. SANDAGE, A. 1965
880. THE EXISTENCE OF A MAJOR NEW CONSTITUENT OF THE UNIVERSE: THE
880. QUASI-STELLAR GALAXIES. ASTROPHYS. JOURN., VOL. 141,
880. PP. 1560-1578.
881. WILLSTROP, R. J. 1965
881. ABSOLUTE MEASURES OF STELLAR RADIATION. II. MEM. ROY. ASTRON. SOC.,
881. VOL. 69, PP. 83-143.

882. KOPYLOV, I. M. 1965
882. THE EQUIVALENT WIDTHS OF ABSORPTION LINES IN THE SPECTRA OF 109
882. O5-B7 STARS. TRANSL. FROM THE RUSSIAN BY SYLVIA BOYD,
882. SMITHSONIAN ASTROPHYS. OBS. TRANSL. NO. 4, 43 PP.
883. KOPYLOV, I. M. 1965
883. A TWO-DIMENSIONAL QUANTITATIVE SPECTRAL CLASSIFICATION OF 238 O5-B7
883. STARS AND THE CONSTRUCTION OF A SPECTRUM-ABSOLUTE MAGNITUDE
883. DIAGRAM. ANN. CRIMEAN ASTROPHYS. OBS., VOL. 20, PP. 156-207,
883. TRANSL. FROM THE RUSSIAN BY SYLVIA BOYD, SMITHSONIAN ASTROPHYS.
883. OBS. TRANSL. NO. 5, 74 PP.
884. HOFFLEIT, D. 1964
884. YALE CATALOGUE OF BRIGHT STARS. 3RD ED., YALE UNIVERSITY OBS.,
884. NEW HAVEN, CONN.
885. HARO, G., AND LUYTEN, W. J. 1962
885. FAINT BLUE STARS IN THE REGION NEAR THE SOUTH GALACTIC POLE.
885. BOL. OBS. TONANTZINTLA Y TACUBAYA, VOL. 3, NO. 22, PP. 37-117.
886. SANDAGE, A. R., AND VERON, P. 1965
886. PHOTOMETRIC RESULTS OF A SPECIAL SURVEY FOR INTERLOPERS. ASTROPHYS.
886. JOURN., VOL. 142, PP. 412-414.
887. THE, P.-S. 1965
887. A NEW WOLF-RAYET STAR IN SCORPIUS. THE OBSERVATORY, VOL. 85,
887. P. 122.
888. OSAWA, K., NISHIMURA, S., AND ICHIMURA, K. 1965
888. LIGHT VARIATION OF THE A-TYPE PECULIAR STAR HD 221568.
888. PUBL. ASTRON. SOC. JAPAN, VOL. 17, PP. 199-203.
889. JASCHEK, M., JASCHEK, C., AND GONZALEZ, Z. 1965
889. SPECTROSCOPIC STUDIES OF PECULIAR A-TYPE STARS. I. THE
889. MANGANESE GROUP. ZEITS. FUR ASTROPHYS., VOL. 62, PP. 21-29.
890. SKY AND TELESCOPE 1965
890. QUASI-STELLAR GALAXIES. SKY AND TEL., VOL. 30, PP. 67 AND 71.
891. DIVAN, L. 1965
891. ETUDE SPECTROPHOTOMETRIQUE DE LA RADIO-SOURCE 3C 273 ENTRE 6100 ET
891. 3300 ANGSTROMS. ANN. D'ASTROPHYS., VOL. 28, PP. 70-74.
892. BYRAM, E. T., CHUBB, T. A., AND WERNER, M. W. 1965
892. 1115 ANGSTROM FAR ULTRAVIOLET STELLAR PHOTOMETRY. ANN.
892. D'ASTROPHYS., VOL. 28, PP. 594-597.
893. BALAZS, B. 1965
893. LUMINOUS STARS IN A REGION SOUTH OF H AND CHI PERSEI. ZEITS. FUR
893. ASTROPHYS., VOL. 62, PP. 6-11.

894. COWLEY, A. P., AND COWLEY, C. R. 1965
894. SLIT SPECTRA OF SOME PECULIAR AND METALLIC-LINE A STARS. PUBL.
894. ASTRON. SOC. PACIFIC, VOL. 77, PP. 184-188.
895. JOHNSON, H. L. 1965
895. INTERSTELLAR EXTINCTION IN THE GALAXY. ASTROPHYS. JOURN., VOL. 141,
895. PP. 923-942.
896. ADGIE, R. L., GENT, H., SLEE, O. B., FROST, A. D., PALMER, H. P., 1965
896. AND ROWSON, B.
896. NEW LIMITS TO THE ANGULAR SIZES OF SOME QUASARS. NATURE, VOL. 208,
896. PP. 275-276.
897. STAFF OF THE SMITHSONIAN ASTROPHYSICAL OBSERVATORY 1966
897. SMITHSONIAN ASTROPHYSICAL OBSERVATORY STAR CATALOG;
897. POSITIONS AND PROPER MOTIONS OF 258,997 STARS FOR THE EPOCH AND
897. EQUINOX OF 1950.0.
897. SMITHSONIAN INSTITUTION, WASHINGTON, D. C.
898. ARGELANDER, F., DIRECTOR 1859
898. BONNER DURCHMUSTERUNG DES NORDLICHEN HIMMELS, A. MARCUS AND
898. E. WEBER'S VERLAG, BONN. -1861
899. THOME, J. M., DIRECTOR 1892
899. CORDOBA DURCHMUSTERUNG, RESULTADOS OBS. NAC. ARGENTINO,
899. VOLS. 16, 17, 18, AND 21. -1914
900. GILL, D., AND KAPTEYN, J. C. 1896
900. THE CAPE PHOTOGRAPHIC DURCHMUSTERUNG FOR THE EQUINOX 1875. ANN.
900. CAPE OBS., VOLS. 3, 4, AND 5. -1900
901. CODE, A. D. 1966
901. UNIVERSITY OF WISCONSIN, OAO OBSERVING LIST, PRIVATE COMMUNICATION,
901. JUNE.
902. STOCKTON, A. N., AND LYNDS, C. R. 1966
902. THE REMARKABLE ABSORPTION SPECTRUM OF 3C 191.
902. ASTROPHYS. JOURN., VOL. 144, PP. 451-453.
903. SCHMIDT, M. 1966
903. REDSHIFTS OF FOURTEEN QUASI-STELLAR RADIO SOURCES.
903. ASTROPHYS. JOURN., VOL. 144, PP. 443-445.
904. NOT USED
905. LYNDS, C. R., AND STOCKTON, A. N. 1966
905. THE LARGE REDSHIFT OF THE QUASI-STELLAR SOURCE 1116+12. ASTROPHYS.
905. JOURN., VOL. 144, PP. 446-447.

906. HAYAKAWA, S., MATSUOKA, M., AND SUGIMOTO, D. 1966
906. GALACTIC X-RAYS. SPACE SCI. REVS., VOL. 5, PP. 109-163.
907. BURBIDGE, E. M., LYNDS, C. R., AND BURBIDGE, G. R. 1966
907. ON THE MEASUREMENT AND INTERPRETATION OF ABSORPTION FEATURES IN THE
907. SPECTRUM OF THE QUASI-STELLAR OBJECT 3C 191. ASTROPHYS. JOURN.,
907. VOL. 144, PP. 447-451.
908. FEIGE, J. 1958
908. A SEARCH FOR UNDERLUMINOUS HOT STARS. ASTROPHYS. JOURN., VOL. 128,
908. PP. 267-272.
909. SCHEUER, P. A. G., AND WILLS, D. 1966
909. IDENTIFICATIONS OF RADIO SOURCES WITH HARO-LUYTEN OBJECTS.
909. ASTROPHYS. JOURN., VOL. 143, PP. 274-276.
910. HARDORP, J. 1966
910. THE ATMOSPHERE OF THE B4P-TYPE STAR β CENTAURI A.
910. ZEITS. FUR ASTROPHYS., VOL. 63, PP. 137-165.
911. NOT USED
912. RENSON, P. 1965
912. REPARTITION DES PERIODES DES VARIABLES AP. ANN. D'ASTROPHYS.,
912. VOL. 28, PP. 679-682.
913. VAN GENDEREN, A. M. 1965
913. THE MAGNETIC VARIABLE STAR HD 10783. BULL. ASTRON. NETHERLANDS,
913. VOL. 18, PP. 67-70.
914. NOT USED
915. SARGENT, W. L. W. 1965
915. A POSSIBLE RELATIONSHIP BETWEEN THE PECULIAR A STARS AND THE LAMBDA
915. BOOTIS STARS. ASTROPHYS. JOURN., VOL. 142, PP. 787-790.
916. WYNDHAM, J. D. 1966
916. OPTICAL IDENTIFICATION OF RADIO SOURCES IN THE 3C REVISED
916. CATALOGUE. ASTROPHYS. JOURN., VOL. 144, PP. 459-482.
917. BOWYER, C. S. 1965
917. GALACTIC X-RAY ASTRONOMY. SKY AND TEL., VOL. 30, PP. 264-266.
918. NOT USED
919. NOT USED
920. BOWYER, S., BYRAM, E. T., CHUBB, T. A., AND FRIEDMAN, H. 1965
920. OBSERVATIONAL RESULTS OF X-RAY ASTRONOMY.
920. ANN. D'ASTROPHYS., VOL. 28, PP. 791-803.

921. IRIARTE, B., JOHNSON, H. L., MITCHELL, R. I., AND WISNIEWSKI, W. K. 1965
 921. FIVE-COLOR PHOTOMETRY OF BRIGHT STARS. THE ARIZONA-TONANTZINTLA
 921. CATALOGUE. SKY AND TEL., VOL. 30, PP. 21-31.
922. CANNON, A. J., AND PICKERING, E. C. 1918
 922. HENRY DRAPER CATALOGUE. HARVARD ANN., VOLS. 91-99. -1924
923. NOT USED
924. KINMAN, T. D., BOLTON, J. G., CLARKE, R. W., AND SANDAGE, A. 1967
 924. RADIO AND OPTICAL DATA ON 16 QUASI-STELLAR OBJECTS.
 924. ASTROPHYS. JOURN., VOL. 147, PP. 848-850.
925. SANDERS, W. L. 1966
 925. LBV PHOTOMETRY OF 1055 STARS. ASTRON. JOURN., VOL. 71, PP. 719-729.
926. STEPHENSON, C. B. 1966
 926. SEARCH FOR NEW NORTHERN WOLF-RAYET STARS. ASTRON. JOURN., VOL. 71,
 926. PP. 477-481.
927. ALLER, L. H., FAULKNER, D. J., AND NORTON, R. H. 1966
 927. PHOTOELECTRIC SPECTROPHOTOMETRY OF SELECTED SOUTHERN STARS.
 927. ASTROPHYS. JOURN., VOL. 144, PP. 1073-1100.
928. BOND, H. E., AND BIDELMAN, W. P. 1966
 928. ON TWO NONEXISTENT WOLF-RAYET STARS.
 928. PUBL. ASTRON. SOC. PACIFIC, VOL. 78, P. 261.
929. EKERS, R. D., AND BOLTON, J. G. 1965
 929. IDENTIFICATION OF TWO SOUTHERN QUASI-STELLAR OBJECTS.
 929. AUSTRALIAN JOURN. PHYS., VOL. 18, PP. 669-670.
930. HAUG, U., PFLEIDERER, J., AND DACHS, J. 1966
 930. STERNE FRUEHEN SPEKTRALTYPEN IN NORMA UND CIRCINUS.
 930. ZEITS. FUR ASTROPHYS., VOL. 64, PP. 140-157.
931. FERNIE, J. D., HILTNER, W. A., AND KRAFT, R. P. 1966
 931. ASSOCIATION II PUP AND CLASSICAL CEPHEID AO PUP.
 931. ASTRON. JOURN., VOL. 71, PP. 999-1002.
932. SMITH, A. M. 1967
 932. STELLAR PHOTOMETRY FROM A SATELLITE VEHICLE.
 932. ASTROPHYS. JOURN., VOL. 147, PP. 158-171.
933. SMITH, A. M. 1967
 933. PRIVATE COMMUNICATION TO W. A. DEUTSCHMAN.
934. MORTON, D. C. 1967
 934. THE FAR-ULTRAVIOLET SPECTRA OF SIX STARS IN ORION. ASTROPHYS.
 934. JOURN., VOL. 147, PP. 1017-1024.

935. EIDELMAN, W. P., AND VICTOR, R. C. 1966
 935. TWENTY-THREE STARS WITH PECULIAR SPECTRA.
 935. PUBL. ASTRON. SOC. PACIFIC, VOL. 78, PP. 550-551.
936. WESTERLUND, B. E. 1966
 936. MULTICOLOR PHOTOMETRY OF NORTHERN WOLF-RAYET STARS.
 936. ASTROPHYS. JOURN., VOL. 145, PP. 724-734.
937. APPENZELLER, I. 1967
 937. MK SPECTRAL TYPES FOR 185 BRIGHT STARS, PUBL. ASTRON. SOC. PACIFIC,
 937. VOL. 79, PP. 102-109.
938. SHIMMINS, A. J., CLARKE, M. E., AND EKERS, R. D. 1966
 938. ACCURATE POSITIONS OF 644 RADIO SOURCES.
 938. AUSTRALIAN JOURN. PHYS., VOL. 19, PP. 649-685.
939. BOLTON, J. G., AND EKERS, J. 1966
 939. FURTHER IDENTIFICATIONS FOR STRONG EXTRAGALACTIC RADIO SOURCES
 939. IN THE DECLINATION ZONE 0 DEGREES TO -20 DEGREES.
 939. AUSTRALIAN JOURN. PHYS., VOL. 19, PP. 713-715.
940. SHIMMINS, A. J., DAY, G. A., EKERS, R. D., AND COLE, D. J. 1966
 940. THE PARKES CATALOGUE OF RADIO SOURCES DECLINATION ZONE
 940. 0 DEGREES TO -20 DEGREES. AUSTRALIAN JOURN. PHYS., VOL. 19,
 940. PP. 837-874.
941. HILL, P. W., AND HILL, S. R. 1966
 941. FAINT BLUE STARS IN THE FAR SOUTHERN HEMISPHERE.
 941. MONTHLY NOTICES ROY. ASTRON. SOC., VOL. 133, PP. 205-211.
942. KELLERMANN, K. I., AND PAULINY-TOTH, I. I. K. 1966
 942. A SEARCH FOR RADIO EMISSION FROM BLUE STELLAR OBJECTS AND
 942. SEYFERT GALAXIES. NATURE, VOL. 212, PP. 781-782.
943. DICKENS, R. J. 1967
 943. HD 24550: A NEW DELTA SCUTI VARIABLE. ASTROPHYS. JOURN., VOL.
 943. 148, P. L33.
944. RODGERS, A. W., AND SEARLE, L. 1967
 944. SPECTROPHOTOMETRY OF THE OBJECT ETA CARINAE. MONTHLY NOTICES ROY.
 944. ASTRON. SOC., VOL. 135, PP. 99-119.
945. FISHER, P. C., JORDAN, W. C., MEYEROTT, A. J., ACTON, L. W., AND 1967
 945. ROETHIG, D. T.
 945. X-RAY SPECTRA OF SEVERAL COSMIC SOURCES. ASTROPHYS. JOURN.,
 945. VOL. 147, PP. 1209-1213.
946. SHELUS, P. J. 1967
 946. A SPECTROGRAM OF GAMMA CASSIOPEIAE. SKY AND TEL., VOL. 33, P. 220.

947. MUMFORD, G. S. 1966
 947. QUASAR 3C-446 ERUPTS (IN NEWS NOTES). SKY AND TEL.,
 947. VOL. 32, P. 127.
948. LEDOUX, P., AND RENSON, P. 1966
 948. MAGNETIC STARS. ANN. REV. ASTRON. AND ASTROPHYS., VOL. 4, PP. 293-352.
949. PETERSON, L. E., AND JACOBSON, A. S. 1966
 949. THE SPECTRUM OF SCORPIUS XR-1 TO 50 KEV. ASTROPHYS. JOURN.,
 949. VOL. 145, PP. 962-965. (LETTER).
950. MCCRAY, R. 1967
 950. THE ELECTROMAGNETIC SPECTRUM OF ETA CARINAE. ASTROPHYS.
 950. JOURN., VOL. 147, PP. 544-555.
951. ICHIMURA, K., ISHIDA, G., JUGAKU, J., ODA, M., OSAWA, K., AND 1966
 951. SHIMIZU, M.
 951. OPTICAL OBSERVATION OF SCO X-1. PUBL. ASTRON. SOC. JAPAN, VOL. 18,
 951. PP. 469-473.
952. LODEN, L. O. 1967
 952. A STUDY OF POSSIBLE VARIATIONS IN THE POLARIZATION OF STARLIGHT.
 952. ARKIV FOR ASTRON., VOL. 4, PP. 357-373.
953. GLUSHNEVA, I. N. 1966
 953. THE UV SPECTRAL DISTRIBUTION OF FOUR STARS. SOVIET ASTRONOMY-AJ,
 953. VOL. 10, PP. 61-63.
954. BRODSKAYA, E. S. 1966
 954. PHOTOELECTRIC OBSERVATIONS OF RHO CAS. SOVIET ASTRONOMY-AJ,
 954. VOL. 10, PP. 186-187.
955. BOYARCHUK, A. A., ESIPCV, V. F., AND MOROZ, V. I. 1966
 955. THE CONTINUOUS SPECTRUM OF AG PEGASI. SOVIET ASTRONOMY-AJ,
 955. VOL. 10, PP. 331-333.
956. POLOSUKHINA, N. S., AND LEBEDEVA, L. 1966
 956. POLARIZATION AND BRIGHTNESS VARIATIONS OF THE MAGNETIC VARIABLE
 956. HD 215441. SOVIET ASTRONOMY-AJ, VOL. 10, PP. 407-410.
957. ORLOV, M. YA. 1967
 957. ANALYSIS OF THE SPECTRUM OF MU CEPHEI IN THE LAMBDA LAMBDA 6600-4250
 957. ANGSTROM REGION. SOVIET ASTRONOMY-AJ, VOL. 10, PP. 619-622.
958. DIBAI, E. A. 1967
 958. SPECTRA OF THE COMETARY NEBULA NGC 2261 AND THE ASSOCIATED
 958. STAR R MONOCEROTIS. SOVIET ASTRONOMY-AJ, VOL. 10, PP. 724-727.

959. BOYARCHUK, A. A. 1967
 959. SPECTROPHOTOMETRY OF AG PEGASI 1964-1965. SOVIET ASTRONOMY-AJ,
 959. VOL. 10, PP. 783-793.
960. UNDERHILL, A. B. 1966
 960. APPARENTLY UNUSUAL ABUNDANCES IN EARLY TYPE STARS. IN
 960. THE EARLY TYPE STARS, D. REIDEL PUBL. CO., DORDRECHT, P. 178.
961. UNDERHILL, A. B. 1966
 961. THE WOLF-RAYET STARS BRIGHTER THAN MAGNITUDE 9.5 (TABLE 27). IN THE
 961. EARLY TYPE STARS, D. REIDEL PUBL. CO., DORDRECHT, P. 188.
962. UNDERHILL, A. B. 1966
 962. SUPERGIANTS AND P CYGNI. IN THE EARLY TYPE STARS, D REIDEL
 962. PUBL. CO., DORDRECHT, PP. 213-225.
963. UNDERHILL, A. B. 1966
 963. SOME BRIGHT SHELL STARS (TABLE 32). IN THE EARLY TYPE STARS,
 963. D. REIDEL PUBL. CO., DORDRECHT, P. 233.
964. UNDERHILL, A. B. 1966
 964. THE BETA CANIS MAJORIS STARS (TABLE 33). IN THE EARLY TYPE STARS,
 964. D. REIDEL PUBL. CO., DORDRECHT, PP. 246-259.
965. HARRIS, D. L., III, STRAND, K. AA., AND WORLEY, C. E. 1963
 965. EMPIRICAL DATA ON STELLAR MASSES, LUMINOSITY, AND RADII.
 965. IN BASIC ASTRONOMICAL DATA, UNIV. OF CHICAGO PRESS, P. 287.
966. GREENSTEIN, J. L. 1958
 966. THE SPECTRA OF THE WHITE DWARFS. IN HANDBUCH DER PHYSIK, ED. BY
 966. S. FLUGGE, SPRINGER-VERLAG, BERLIN, VOL. 50, PP. 161-186.
967. ALLEN, C. W. 1963
 967. SELECTED WHITE DWARFS. IN ASTROPHYSICAL QUANTITIES, 2ND ED.,
 967. ATHLONE PRESS, UNIV. OF LONDON, LONDON, P. 218.
968. UNDERHILL, A. B. 1966
 968. P CYGNI. IN THE EARLY TYPE STARS, D. REIDEL PUBL. CO., DORDRECHT,
 968. PP. 219-225.
969. KUKARKIN, B. V., KHOLOPOV, P. N., EFREMOV, YU. N., KUKARKINA, N. P., 1969
 969. KUROCHKIN, N. E., MEDVEDEVA, G. I., PEROVA, N. B., -1971
 969. FEDOROVICH, V. P., AND FROLOV, M. S.
 969. GENERAL CATALOGUE OF VARIABLE STARS. ACADEMY OF SCIENCES,
 969. USSR, MOSCOW, 3 VOLS.
970. WALKER, M. F. 1966
 970. ULTRAVIOLET EXCESS IN T TAURI STARS. IN STELLAR EVOLUTION,
 970. ED. BY R. F. STEIN AND A. G. W. CAMERON, PLENUM PRESS,
 970. NEW YORK, PP. 405-409.

971. BECVAR, A. 1964
 971. EXTERNAL GALAXIES (TABLE). IN ATLAS OF THE HEAVENS - II. CATALOGUE
 971. 1950.0. SKY PUBL. CO., CAMBRIDGE, MASS., PP. 309-335.
972. BECVAR, A. 1964
 972. GALACTIC STAR CLUSTERS (TABLE). IN ATLAS OF THE HEAVENS - II.
 972. CATALOGUE 1950.0. SKY PUBL. CO., CAMBRIDGE, MASS., PP. 283-290.
973. BECVAR, A. 1964
 973. GLOBULAR CLUSTERS (TABLE). IN ATLAS OF THE HEAVENS - II. CATALOGUE
 973. 1950.0. SKY PUBL. CO., CAMBRIDGE, MASS., PP. 291-294.
974. BECVAR, A. 1964
 974. PLANETARY NEBULAE (TABLE). IN ATLAS OF THE HEAVENS - II. CATALOGUE
 974. 1950.0. SKY PUBL. CO., CAMBRIDGE, MASS., PP. 295-299.
975. BECVAR, A. 1964
 975. BRIGHT DIFFUSE NEBULAE (TABLE). IN ATLAS OF THE HEAVENS - II.
 975. CATALOGUE 1950.0. SKY PUBL. CO., CAMBRIDGE, MASS., PP. 301-307.
976. MARKARYAN, B. E., OGANESYAN, E. YA., AND ARAKELYAN, S. N. 1965
 976. A DETAILED PHOTOMETRIC AND COLORIMETRIC STUDY OF GALAXIES IN
 976. THE CONSTELLATION VIRGO. ASTROPHYSICS, VOL. 1, PP. 23-53.
977. MUSTEL, E. R., AND BOYARCHUK, A. A. 1965
 977. A SPECTROSCOPIC STUDY OF V 603 AQL (NAGL 1918).
 977. ASTROPHYSICS, VOL. 1, PP. 178-182.
978. IVANOVA, N. L., OGANESYAN, R. KH., AND EPREMYAN, R. A. 1965
 978. SOME RESULTS OF A SPECTROPHOTOMETRIC STUDY OF V 444 CYG.
 978. ASTROPHYSICS, VOL. 1, PP. 211-214.
979. MIRZOYAN, L. V., AND KALLOGLYAN, N. L. 1965
 979. ON THE CONTINUOUS EMISSION OF SS CYG. ASTROPHYSICS, VOL. 1,
 979. PP. 203-209.
980. DRAGOMIRETSKAYA, B. A. 1965
 980. BN ORI-A STAR OF THE RW AUR TYPE. ASTROPHYSICS, VOL. 1,
 980. PP. 241-244.
981. SPITE, M. 1967
 981. ETUDE DE L'ETOILE CHI DRACONIS. ANN. D'ASTROPHYS., VOL. 30,
 981. PP. 211-247.
982. FUENFSCHILLING, H. 1967
 982. DER OFFENE STERNHAUFEN NGC 6834. ZEITS. FUR ASTROPHYS.,
 982. VOL. 66, PP. 440-445.

983. HAUG, U., DACHS, J., PESCH, J., AND PFLEIDERER, J. 1967
 983. UBV-HELLIGKEITEN VON ACHT STERNPAAREN AM AEQUATOR.
 983. ZEITS. FUR ASTROPHYS., VOL. 66, PP. 433-439.
984. KARETNIKOV, V. G. 1967
 984. SPECTROPHOTOMETRY OF RZ SCUTI. SOVIET ASTRONOMY-AJ,
 984. VOL. 11, PP. 16-22.
985. DIBAI, E. A., AND ESIPCV, V. F. 1967
 985. THE OPTICAL SPECTRUM OF THE QUASISTELLAR RADIO SOURCE 3C-345.
 985. SOVIET ASTRONOMY-AJ, VOL. 11, PP. 43-44.
986. KOMAROV, N. S. 1967
 986. KINEMATIC AND MORPHOLOGICAL PROPERTIES OF STARS WITH ENHANCED METAL
 986. LINES. SOVIET ASTRONOMY-AJ, VOL. 11, PP. 84-91.
987. GLENN, W. H. G. 1967
 987. CH CYGNI. A COMBINATION VARIABLE. SKY AND TEL., VOL. 34, P. 127.
988. MUMFORD, G. S. 1967
 988. NOVA DELPHINI 1967 (IN NEWS NOTES). SKY AND TEL., VOL. 34, P. 82.
989. MUMFORD, G. S. 1967
 989. OPTICAL IDENTIFICATION OF AN X-RAY SOURCE IN CYGNUS
 989. (IN NEWS NOTES). SKY AND TEL., VOL. 34, P. 82.
990. DIBAI, E. A., AND SHAKHOVSKOI, N. M. 1967
 990. POLARIZATION OBSERVATIONS OF DQ HERCULIS (NOVA HERCULIS 1934).
 990. SOVIET ASTRONOMY-AJ, VOL. 10, PP. 1059-1060.
991. MARKARYAN, B. E., OGANESYAN, E. YA., AND ARAKELYAN, S. N. 1966
 991. DETAILED PHOTOMETRIC AND COLORIMETRIC STUDIES OF SIX SPIRAL
 991. GALAXIES IN VIRGO. ASTROPHYSICS, VOL. 2, PP. 21-38.
992. BOYARCHUK, A. A. 1966
 992. THE VARIABLE STAR AG DRA. ASTROPHYSICS, VOL. 2, PP. 50-56.
993. HERMAN, R., AND DUVAL, M. 1962
 993. QUELQUES NOUVELLES ETOILES B A EMISSION. ANN. D'ASTROPHYS.,
 993. VOL. 25, PP. 9-11.
994. RINGUELET-KASWALDER, A. E. 1964
 994. DOUBLE ABSORPTION CORES IN THE SHELL SPECTRUM OF 48 LIBRAE.
 994. ANN. D'ASTROPHYS., VOL. 27, PP. 7-10.
995. SAHADE, J., AND HERNANDEZ, C. A. 1964
 995. THE SPECTROSCOPIC BINARY ZETA HOROLOGII. ANN D'ASTROPHYS., VOL. 27,
 995. PP. 11-13.

996. BIGAY, J. H. 1964
 996. MEASURES PHOTOELECTRIQUES U. B. V. DE GALAXIES ELLIPTIQUES SO
 996. ET SPIRALES DU CHAMP GENERAL ET DE L'AMAS VIRGO.
 996. ANN. D'ASTROPHYS., VOL. 27, PP. 170-182.
997. MARTEL, L., AND MARTEL, M. TH. 1964
 997. POLARISATION DE LA LUMIERE DES ETOILES DANS LE SYSTEME U. B. V. R.
 997. ANN. D'ASTROPHYS., VOL. 27, PP. 203-218.
998. CLARKE, D., AND GRAINGER, J. F. 1966
 998. POLARIZATION EFFECTS IN STELLAR ABSORPTION LINES. ANN.
 998. D'ASTROPHYS., VOL. 29, PP. 355-359.
999. SVOLOPOULOS, S. N. 1966
 999. THE SPECTRUM OF THE MANGANESE STAR ALPHA ANDROMEDAE. ANN.
 999. D'ASTROPHYS., VOL. 29, PP. 23-27.
- A00. SVOLOPOULOS, S. N. 1966
 A00. THE SPECTRUM OF BETA ORIONIS. ANN. D'ASTROPHYS., VOL. 29,
 A00. PP. 29-32.
- A01. OOSTERHOFF, P. TH., AND PONSEN, J. 1966
 A01. DISCUSSION OF FIVE-COLOUR OBSERVATIONS OF STARS OF HIGH VELOCITY.
 A01. BULL. ASTRON. NETHERLANDS, VOL. 18, PP. 150-155.
- A02. OOSTERHOFF, P. TH., AND WALRAVEN, TH. 1966
 A02. DISCUSSION OF PHOTO-ELECTRIC FIVE-COLOUR OBSERVATIONS OF DIFFERENT
 A02. TYPES OF PULSATING VARIABLES. BULL. ASTRON. NETHERLANDS,
 A02. VOL. 18, PP. 387-403.
- A03. TOLBERT, C. R., PECKER, J. C., AND POTTASCH, S. R. 1967
 A03. RS OPHIUCHI: REDUCTION OF SPECTRA FROM THE 1958 OUTBURST.
 A03. BULL. ASTRON. NETHERLANDS, VOL. 19, PP. 17-33.
- A04. DE VAUCOULEURS, G., AND DE VAUCOULEURS, A. 1964
 A04. REFERENCE CATALOGUE OF BRIGHT GALAXIES. UNIV. OF TEXAS PRESS,
 A04. AUSTIN, 268 PP.
- A05. ALTER, G., RUPRECHT, J., AND VANYSEK, V. 1958
 A05. CATALOGUE OF STAR CLUSTERS AND ASSOCIATIONS.
 A05. CZECHOSLOVAKIAN ACAD. SCI., PRAGUE.
- A06. ALTER, G., AND RUPRECHT, J. 1967
 A06. CATALOGUE OF STAR CLUSTERS AND ASSOCIATIONS. BULL. ASTRON.
 A06. CZECHOSLOVAKIA, VOL. 18, APPENDIX (SUPPL. 9).
- A07. WILSON, R. E. 1953
 A07. GENERAL CATALOGUE OF STELLAR RADIAL VELOCITIES.
 A07. CARNEGIE INST. OF WASHINGTON PUBL. 601.

A08. NOT USED

A09. ALLEN, C. W. 1963
A09. BRIGHT DIFFUSE NEBULAE. IN ASTROPHYSICAL QUANTITIES, 2ND ED.,
A09. ATHLONE PRESS, UNIV. OF LONDON, LONDON, PP. 245-247.

A10. BIDELMAN, W. P., AND HUMPHREYS, R. M. 1968
A10. UNUSUAL EMISSION OBJECT. IAU CIRCULAR NO. 2130.

A11. THACKERAY, A. D. 1968
A11. AN EARLY-TYPE STAR WITH VERY HIGH VELOCITY. OBSERVATORY,
A11. VOL. 88, PP. 56-58.

A12. NARIAI, K. 1967
A12. ULTRAVIOLET SPECTRA OF PECULIAR A STARS. PUBL. ASTRON. SOC. JAPAN,
A12. VOL. 19, PP. 180-193.

A13. NOT USED

A14. RODGERS, A. W. 1968
A14. THE RAPIDLY ROTATING OLD DISK STAR HD 6870. ASTROPHYS.
A14. JOURN., VOL. 152, PP. 109-116.

A15. SARGENT, W. L. W., AND SEARLE, L. 1968
A15. A QUANTITATIVE DESCRIPTION OF THE SPECTRA OF THE BRIGHTER
A15. FEIGE STARS. ASTROPHYS. JOURN., VOL. 152, PP. 443-452.

A16. JOHNSON, H. L., MACARTHUR, J. W., AND MITCHELL, R. I. 1968
A16. THE SPECTRAL-ENERGY CURVES OF SUBDWARFS. I. ASTROPHYS.
A16. JOURN., VOL. 152, PP. 465-476.

A17. LEE, T. A. 1968
A17. INTERSTELLAR EXTINCTION IN THE ORION ASSOCIATION. ASTROPHYS.
A17. JOURN., VOL. 152, PP. 913-941.

A18. SMITH, L. F. 1968
A18. ABSOLUTE MAGNITUDES AND INTRINSIC COLOURS OF WOLF-RAYET STARS.
A18. MONTHLY NOTICES ROY. ASTRON. SOC., VOL. 140, PP. 409-433.

A19. BLANCO, V. M., DEMERS, S., DOUGLASS, G. G., AND FITZGERALD, M. P. 1968
A19. PHOTOELECTRIC CATALOGUE. MAGNITUDES AND COLORS OF STARS
A19. IN THE U,B,V AND U(C),B,V, SYSTEMS. PUBL. U.S. NAVAL OBS.,
A19. SECOND SERIES, VOL. 21, 772 PP.

A20. BALZ, A. G. A., JR. 1956
A20. SPECTRAL CLASSIFICATIONS OF FAINT STARS, DECLINATION ZONES
A20. +50 DEGREES TO +85 DEGREES. PUBL. LEANDER MCCORMICK OBS. OF
A20. THE UNIV. OF VIRGINIA, VOL. 13, PART 1.

- A21. VYSSOTSKY, A. N., AND BALZ, A. G. A. 1958
A21. SPECTRAL CLASSIFICATIONS OF FAINT STARS, DECLINATION ZONES
A21. -2 DEGREES TO +49 DEGREES. PUBL. LEANDER MCCORMICK OBS. OF
A21. THE UNIV. OF VIRGINIA, VOL. 13, PART 2.
- A22. SHAPLEY, H., AND AMES, A. 1932
A22. PHOTOMETRIC SURVEY OF THE NEARER EXTRAGALACTIC NEBULAE. BULL.
A22. HARVARD COLL. OBS., NO. 887.
- A23. CANNON, A. J. 1925
A23. THE HENRY DRAPER EXTENSION. ANN. HARV. COLL. OBS., VOL. 100. -1936
- A24. CANNON, A. J., AND MAYALL, M. W. 1949
A24. THE A. J. CANNON MEMORIAL VOLUME OF THE HENRY DRAPER EXTENSION.
A24. ANN. HARV. COLL. OBS., VOL. 112.
- A25. NOT USED
- A26. WEBER, S. V., HENRY, R. C., AND CARRUTHERS, G. R. 1971
A26. FAR-ULTRAVIOLET INTERSTELLAR ABSORPTION IN ORION AND MONOCEROS.
A26. ASTROPHYS. JOURN., VOL. 166, PP. 543-557.
- A27. HILTNER, W. A., GARRISON, R. F., AND SCHILD, R. E. 1969
A27. MK SPECTRAL TYPES FOR BRIGHT SOUTHERN OB STARS. ASTROPHYS. JOURN.,
A27. VOL. 157, PP. 313-326.
- A28. SCHILD, R. E., HILTNER, W. A., AND SANDULEAK, N. 1969
A28. A SPECTROSCOPIC STUDY OF THE ASSOCIATION SCORPIUS OB 1. ASTROPHYS.
A28. JOURN., VOL. 156, PP. 609-615.
- A29. ALEXANDER, J. B. 1970
A29. U,B,V PHOTOMETRY OF SOME VISUAL BINARIES. MONTHLY NOTICES
A29. ASTRON. SOC. SOUTH AFRICA, VOL. 29, PP. 44-48.
- A30. GARRISON, R. F. 1970
A30. SPECTRAL CLASSIFICATION IN THE ASSOCIATION III CEPHEI AND THE
A30. RATIO OF TOTAL-TO-SELECTIVE ABSORPTION. ASTRON. JOURN., VOL. 75,
A30. PP. 1001-1006.
- A31. GUTIERREZ-MORENO, A., AND MORENO, H. 1968
A31. A PHOTOMETRIC INVESTIGATION OF THE SCORPIO-CENTAURUS
A31. ASSOCIATION. ASTROPHYS. JOURN. SUPPL., VOL. 15, PP. 459-498.
- A32. PERRY, C. L., AND HILL, G. 1969
A32. PHOTOMETRIC STUDIES OF SOUTHERN GALACTIC CLUSTERS. I. IC 2391.
A32. ASTRON. JOURN., VOL. 74, PP. 899-907.
- A33. HILL, G., AND PERRY, C. L. 1969
A33. PHOTOMETRIC STUDIES OF SOUTHERN GALACTIC CLUSTERS. II. IC 2602.
A33. ASTRON. JOURN., VOL. 74, PP. 1011-1021.

- A34. WOODEN, W. H., II 1970
 A34. UBV PHOTOELECTRIC PHOTOMETRY IN FOUR SOUTHERN MILKY WAY FIELDS.
 A34. ASTRON. JOURN., VOL. 75, PP. 324-336.
- A35. NOT USED
- A36. NOT USED
- A37. HAGGKVIST, L., AND OJA, T. 1968
 A37. PHOTOELECTRIC BV PHOTOMETRY OF 368 NORTHERN STARS. ARKIV FOR
 A37. ASTRON., VOL. 5, PP. 125-135.
- A38. LODEN, L. O. 1968
 A38. PHOTOMETRIC STANDARD SEQUENCES IN PUPPIS L II = 235 DEGREES -
 A38. 255 DEGREES. ARKIV FOR ASTRON., VOL. 5, PP. 149-160.
- A39. LODEN, L. O. 1968
 A39. PHOTOMETRIC STANDARD SEQUENCES IN CARINA L II = 275 DEGREES -
 A39. 295 DEGREES. ARKIV FOR ASTRON., VOL. 5, PP. 161-179.
- A40. BLESS, R., CODE, A. D., HOUCK, T. E., MCNALL, J. F., AND TAYLOR, D. J. 1968
 A40. ASTRONOMICAL RADIATION MEASUREMENTS. II. OBSERVATIONS OF STARS IN
 A40. THE SPECTRAL REGION LAMBDA LAMBDA 2800-2100. ASTROPHYS. JOURN.,
 A40. VOL. 153, PP. 557-560.
- A41. SCHILD, R. 1971
 A41. PRIVATE COMMUNICATION.
- A42. JASCHEK, C., CONDE, H., AND DE SIERRA, A. C. 1964
 A42. CATALOGUE OF STELLAR SPECTRA CLASSIFIED IN THE MORGAN-KEENAN SYSTEM.
 A42. OBS. ASTRON. DE LA UNIV. NAC. DE LA PLATA,
 A42. SER. ASTRON., VOL. 28, NO. 2.
- A43. NAVACH, C., AND BURKI, G. 1970
 A43. CATALOGUE OF ULTRAVIOLET STELLAR MEASUREMENTS. OBS. DE GENEVE,
 A43. GROUPE DE RECHERCHE SPATIALE, JAN. 1970
- A44. BOND, H. E. 1970
 A44. NEW PECULIAR STARS NOTED ON OBJECTIVE-PRISM PLATES.
 A44. PUBL. ASTRON. SOC. PACIFIC, VOL. 82, PP. 321-328.
- A45. GARRISON, R. F. 1967
 A45. SOME CHARACTERISTICS OF THE B AND A STARS IN THE UPPER SCORPIUS
 A45. COMPLEX. ASTROPHYS. JOURN., VOL. 147, PP. 1003-1016.
- A46. METZGER, P. H., AND CLARK, M. A. 1971
 A46. OBSERVATION OF EARLY-TYPE STARS FROM OGO-VI. ASTRON. AND ASTROPHYS.,
 A46. VOL. 10, PP. 155-158.

- A47. CARRUTHERS, G. R. 1969
A47. FAR-ULTRAVIOLET PHOTOMETRY OF ORION STARS. ASTROPHYS. AND SPACE SCI.,
A47. VOL. 5, PP. 387-402.
- A48. KENNEDY, P. M. 1971
A48. MK SPECTRAL CLASSIFICATIONS PUBLISHED SINCE JASCHEK'S LA PLATA
A48. CATALOGUE. MT. STROMLO OBS.
- A49. CAMPBELL, J. W. 1970
A49. ABSOLUTE STELLAR PHOTOMETRY IN THE REGION 1900-3000 A. ASTROPHYS.
A49. AND SPACE SCI., VOL. 9, PP. 128-145.
- A50. COUSINS, A. W. J. 1970
A50. UBV SUBSTANDARDS IN SCORPIO-CENTAURUS REGION. MONTHLY NOTICES
A50. ASTRON. SOC. SOUTH AFRICA, VOL. 29, PP. 88-91.
- A51. COUSINS, A. W. J., AND STOY, R. H. 1970
A51. UBV PHOTOMETRY OF LATE B TYPE STARS. MONTHLY NOTICES ASTRON. SOC.
A51. SOUTH AFRICA, VOL. 29, PP. 91-99.
- A52. WALBORN, N. R. 1971
A52. SOME EXTREMELY EARLY O STARS NEAR ETA CARINAE. ASTROPHYS. JOURN.,
A52. VOL. 167, L31-L33.
- A53. FEINSTEIN, A. 1969
A53. THE OB STARS IN CARINA-CENTAURUS. MONTHLY NOTICES ROY. ASTRON.
A53. SOC., VOL. 143, PP. 273-287.
- A54. SCHILD, R. E., AND CHAFFEE, F. 1971
A54. ENERGY DISTRIBUTIONS AND SPECTRA OF ORION B STARS.
A54. ASTROPHYS. JOURN., VOL. 169, PP. 529-536.
- A55. SCHILD, R. E., AND COWLEY, A. P. 1971
A55. SPECTRAL TYPES OF STARS IN THE ORION AND HYDRA STELLAR RINGS.
A55. ASTRON. AND ASTROPHYS., VOL. 14, PP. 66-69.
- A56. CARRUTHERS, G. R. 1971
A56. FAR-ULTRAVIOLET SPECTRA AND PHOTOMETRY OF PERSEUS STARS.
A56. ASTROPHYS. JOURN., VOL. 166, PP. 349-359.
- A57. WALBORN, N. R. 1971
A57. ON THE EXISTENCE OF OB STARS WITH ANOMALOUS NITROGEN AND CARBON
A57. SPECTRA. ASTROPHYS. JOURN., VOL. 164, L67-L69.
- A58. CONTI, P. S., AND ALSCHULER, W. R. 1971
A58. SPECTROSCOPIC STUDIES OF O-TYPE STARS. I. CLASSIFICATION
A58. AND ABSOLUTE MAGNITUDES. ASTROPHYS. JOURN., VOL. 170, PP. 325-344.

- A59. CRAWFORD, D. L., BARNES, J. V., AND GOLSON, J. C. 1971
A59. FOUR-COLOR, H-BETA AND UBV PHOTOMETRY FOR BRIGHT B-TYPE STARS
A59. IN THE NORTHERN HEMISPHERE. ASTRON. JOURN., VOL. 76, PP. 1058-1071.
- A60. BOGGESS, A., III, AND KONDO, Y. 1968
A60. ROCKET ULTRAVIOLET SPECTROPHOTOMETRY IN THE ORION REGION.
A60. ASTROPHYS. JOURN., VOL. 151, PP. L5-L7.
- A61. SUDBURY, G. C. 1971
A61. ULTRAVIOLET CONTINUUM BRIGHTNESSES OF STARS MEASURED BY A ROCKET-
A61. BORNE PHOTOELECTRIC SPECTROPHOTOMETER. MONTHLY NOTICES ROY.
A61. ASTRON. SOC., VOL. 153, PP. 241-249.
- A62. YAMASHITA, K. 1968
A62. OBSERVATIONS OF FAR ULTRAVIOLET RADIATION FROM EARLY-TYPE STARS.
A62. ASTROPHYS. AND SPACE SCI., VOL. 2, PP. 4-22.
- A63. WALBORN, N. R. 1971
A63. SOME SPECTROSCOPIC CHARACTERISTICS OF THE OB STARS - AN INVESTIGATION
A63. OF THE SPACE DISTRIBUTION OF CERTAIN OB STARS AND THE REFERENCE
A63. FRAME OF THE CLASSIFICATION. ASTROPHYS. JOURN. SUPPL., VOL. 23,
A63. PP. 257-282.
- A64. CONTI, P. S., AND SMITH, L. F. 1972
A64. THE ABSOLUTE MAGNITUDES AND SPECTRAL TYPES OF THE STARS IN THE
A64. GAMMA VELORUM SYSTEM. ASTROPHYS. JOURN., VOL. 172, PP. 623-630.
- A65. EGGEN, O. J. 1972
A65. NGC 2516 AND THE PLEIADES GROUP. ASTROPHYS. JOURN., VOL. 173,
A65. PP. 63-86.
- A66. CAMPBELL, J. W. 1971
A66. STELLAR PHOTOMETRY IN THE REGION 1300-2000 ANGSTROM, PART II.
A66. ASTROPHYS. AND SPACE SCI., VOL. 13, PP. 189-202.
- A67. FERNIE, J. D. 1972
A67. PHOTOMETRIC DATA FOR 139 SUPERGIANTS. ASTRON. JOURN., VOL. 77,
A67. PP. 150-151.
- A68. CORBEN, P. M. 1971
A68. PHOTOELECTRIC MAGNITUDES AND COLOURS FOR BRIGHT SOUTHERN STARS.
A68. MONTHLY NOTICES ASTRON. SOC. SOUTH AFRICA, VOL. 30, PP. 37-50.
- A69. CARTER, B. S., CORBEN, P. M., AND HARVEY, G. M. 1971
A69. VALUES OF U-B FOR SOME BRIGHT SOUTHERN STARS. MONTHLY NOTICES
A69. ASTRON. SOC. SOUTH AFRICA, VOL. 30, PP. 109-111.
- A70. LODEN, L. O., AND NORDSTROM, B. 1968
A70. PHOTOMETRIC STANDARD SEQUENCES IN NORMA. L II = 320 - 340.
A70. ARKIV FOR ASTRON., VOL. 5, PP. 231-239.

- A71. CORBEN, P. M. 1971
 A71. PHOTOELECTRIC MAGNITUDES AND COLOURS FOR BRIGHT SOUTHERN STARS.
 A71. MONTHLY NOTICES ASTRON. SOC. SOUTH AFRICA, VOL. 30, PP. 79-80.
- A72. CORBEN, P. M., AND STOY, R.H. 1968
 A72. PHOTOELECTRIC MAGNITUDES AND COLOURS FOR BRIGHT SOUTHERN STARS.
 A72. MONTHLY NOTICES ASTRON. SOC. SOUTH AFRICA, VOL. 27, PP. 11-16.
- A73. STOY, R. H. 1968
 A73. PHOTOELECTRIC MAGNITUDES AND COLOURS FOR BRIGHT SOUTHERN STARS.
 A73. MONTHLY NOTICES ASTRON. SOC. SOUTH AFRICA, VOL. 27, PP. 119-128.
- A74. LODEN, L. O. 1967
 A74. PHOTOMETRIC STANDARD SEQUENCE IN VELA. ARKIV FOR ASTRON.,
 A74. VOL. 4, PP. 425-432.
- A75. COUSINS, A. W. J., LAKE, R., AND STOY, R. H. 1966
 A75. PHOTOELECTRIC MAGNITUDES AND COLOURS OF SOUTHERN STARS, II.
 A75. ROY. OBS. BULL. NO. 121, PP. E3-E55.

13.2 Alphabetical-Numerical Cross Reference

205.	ABHYANKAR, K. D.	1959
236.	ABHYANKAR, K. D.	1959
595.	ABHYANKAR, K. D., AND SPINRAD, H.	1958
623.	ABHYANKAR, K. D.	1955
018.	ABT, H. A., AND GOLSON, J. C.	1962
020.	ABT, H. A., AND HUNTER, J. H., JR.	1962
025.	ABT, H. A., AND GOLSON, J. C.	1962
046.	ABT, H. A.	1962
047.	ABT, H. A., JEFFERS, H. M., GIBSON, J., AND SANDAGE, A. R.	1962
107.	ABT, H. A.	1961
192.	ABT, H. A.	1960
201.	ABT, H. A.	1959
206.	ABT, H. A.	1959
291.	ABT, H. A.	1962
304.	ABT, H. A.	1957
630.	ABT, H. A., AND SNOWDEN, M. S.	1964
327.	ADAMS, W. S., AND MERRILL, P. W.	1957
362.	ADAMS, W. S.	1956
896.	ADGIE, R. L., GENT, H., SLEE, O. B., FROST, A. D., ET AL.	1965
530.	ALEXANDER, J. D. H., BOWEN, P. J., AND HEDDLE, D. W. O.	1963
A29.	ALEXANDER, J. B.	1970
967.	ALLEN, C. W.	1963
A09.	ALLEN, C. W.	1963
358.	ALLEN, L. R., ANDERSON, B., CONWAY, R. G., PALMER, H. P., ET AL.	1962
074.	ALLER, L. H., ELSTE, G., AND JUGAKU, J.	1957
217.	ALLER, L. H., AND LILLER, W.	1959
235.	ALLER, L. H., AND JUGAKU, J.	1959
299.	ALLER, L. H., AND JUGAKU, J.	1958
326.	ALLER, L. H.	1957
372.	ALLER, L. H.	1956
373.	ALLER, L. H.	1956
406.	ALLER, L. H., BOWEN, I. S., AND MINKOWSKI, R.	1955
521.	ALLER, L. H., AND KALER, J. B.	1964
777.	ALLER, L. H., BOWEN, I. S., AND WILSON, C. C.	1963
811.	ALLER, L. H., AND BIDELMAN, W. P.	1964
822.	ALLER, L. H., AND FAULKNER, D. J.	1964
851.	ALLER, L. H., FAULKNER, D. J., AND NORTON, R. H.	1964
927.	ALLER, L. H., FAULKNER, D. J., AND NORTON, R. H.	1966
A05.	ALTER, G., RUPRECHT, J., AND VANYSEK, V.	1958
A06.	ALTER, G., AND RUPRECHT, J.	1967
714.	ANDRILLAT, H.	1955
937.	APPENZELLER, I.	1967
898.	ARGELANDER, F., DIRECTOR	1859
755.	ARGUE, A. N.	1963
651.	ARKHIPOVA, V. P.	1963
656.	ARKHIPOVA, V. P., AND DOKUCHAEVA, G. D.	1963
658.	ARKHIPOVA, V. P.	1962
027.	ARP, H.	1962
039.	ARP, H.	1962
462.	ARP, H. C.	1958

501. ARP, H. C., AND EVANS, D. S.	1956
678. ARTYUKHINA, N. M., AND KARIMOVA, D. K.	1959
628. AUER, L. H.	1964
361. BAADE, W.	1956
026. BABCOCK, H. W.	1958
104. BABCOCK, H. W.	1956
141. BABCOCK, H. W.	1960
262. BABCOCK, H. W.	1958
566. BABCOCK, H. W.	1963
516. BAKER, E. A.	1955
893. BALAZS, B.	1965
477. BALDWIN, J. E., AND LESLIE, P. R. R.	1960
A20. BALZ, A. G. A., JR.	1956
485. BARBER, D. R.	1959
798. BARBIER, M.	1962
686. BARKHATOVA, K. A.	1957
870. BARNING, F. J. M.	1964
067. BARRETT, A. H.	1961
284. BATTEN, A. H.	1960
502. BATTEN, A. H.	1956
723. BATTEN, A. H.	1962
726. BATTEN, A. H.	1961
199. BAUM, W. A., HILTNER, W. A., JOHNSON, H. L., AND SANDAGE, A. R.	1959
463. BAUM, W. A., AND SCHWARZSCHILD, M.	1955
258. BEARDSLEY, W. R.	1961
764. BECKER, W., AND FENKART, R.	1963
971. BECVAR, A.	1964
972. BECVAR, A.	1964
973. BECVAR, A.	1964
974. BECVAR, A.	1964
975. BECVAR, A.	1964
489. BEER, A., REDMAN, R. O., AND YATES, G. G.	1954
785. BEHR, A.	1959
069. BENNETT, A. S.	1961
827. BENNETT, A. S.	1963
844. BERGER, J., AND GREENSTEIN, J. L.	1963
749. BERTAUD, CH.	1960
753. BERTAUD, CH.	1959
256. BERTIAU, F. C.	1958
847. BERTOLA, F.	1964
278. BIDELMAN, W.	1960
282. BIDELMAN, W. P., AND SVOLOPOULOS, S. N.	1960
288. BIDELMAN, W. P.	1960
532. BIDELMAN, W. P., AND MCKELLAR, A.	1957
619. BIDELMAN, W. P., AND BOHM, K. H.	1955
935. BIDELMAN, W. P., AND VICTOR, R. C.	1966
A10. BIDELMAN, W. P., AND HUMPHREYS, R. M.	1968
996. BIGAY, J. H.	1964
440. BINNENDIJK, L.	1960
447. BINNENDIJK, L.	1959

465.	EINNENDIJK, L.	1955
219.	BLAAUW, A., HILTNER, W. A., AND JOHNSON, H. L.	1959
360.	BLAAUW, A.	1956
437.	BLAAUW, A., AND VAN HOCF, A.	1963
567.	BLAAUW, A.	1961
209.	BLANCO, V. M., AND WILLIAMS, A. D.	1959
A19.	BLANCO, V. M., DEMERS, S., DOUGLASS, G. G., AND FITZGERALD, M. P.	1968
055.	BLESS, R. C.	1962
142.	BLESS, R. C.	1960
A40.	BLESS, R., CODE, A. D., HOUCK, T. E., MCNALL, J. F., AND TAYLOR, D. J.	1968
507.	BLYTHE, J. H.	1957
850.	BOGGESS, A., III, AND BORGMAN, J.	1964
857.	BOGGESS, A., III	1964
A60.	BOGGESS, A., III, AND KONDO, Y.	1968
364.	BOHM-VITENSE, E., AND STRUVE, O.	1956
574.	BOHM-VITENSE, E.	1956
682.	BOIARCHUK, A. A.	1957
356.	BOK, B. J., AND BOK, P. F.	1962
279.	BOLTON, J. G., AND CLARK, B. G.	1960
939.	BOLTON, J. G., AND EBERS, J.	1966
928.	BOND, H. E., AND BIDEKMAN, W. P.	1966
A44.	BOND, H. E.	1970
124.	BONSACK, W. K.	1961
140.	BONSACK, W. K.	1961
191.	BONSACK, W. K., AND GREENSTEIN, J. L.	1960
582.	BONSACK, W. K., AND GREENSTEIN, J. L.	1956
590.	BONSACK, W. K.	1958
864.	BORGMAN, J., AND BLAAUW, A.	1964
873.	BORGMAN, J.	1964
874.	BORGMAN, J.	1964
005.	BOUGUIE, R., BOULON, J., AND PEDOUSSAUT, A.	1961
815.	BOULON, J.	1963
917.	BOWYER, C. S.	1965
920.	BOWYER, S., BYRAM, E. T., CHUBB, T. A., AND FRIEDMAN, H.	1965
676.	BOYARCHUK, A. A.	1959
955.	BOYARCHUK, A. A., ESIPCOV, V. F., AND MORCZ, V. I.	1966
959.	BOYARCHUK, A. A.	1967
992.	BOYARCHUK, A. A.	1966
520.	BRAES, L. L. E.	1962
185.	BRANDT, J. C.	1960
660.	BRAUDE, S. YA., MEN', A. V., ZHUK, I. N., AND BABENKOV, K. A.	1962
132.	BRETZ, M. C.	1961
954.	BRODSKAYA, E. S.	1966
154.	BRGTEN, N. W., AND MEDD, W. J.	1960
469.	BROWN, R. HANBURY, AND HAZARD, C.	1961
484.	BROWN, R. HANBURY, AND HAZARD, C.	1959
496.	BROWN, R. HANBURY, PALMER, H. P., AND THOMPSON, A. R.	1955
017.	BURBIDGE, E. M., BURBIDGE, G. R., AND PRENDERGAST, K. H.	1962
033.	BURBIDGE, E. M., AND BURBIDGE, G. R.	1962
042.	BURBIDGE, E. M., AND BURBIDGE, G. R.	1962

063.	BURBIDGE, E. M., BURBIDGE, G. R., AND PRENDERGAST, K. H.	1961
093.	BURBIDGE, E. M., BURBIDGE, G. R., AND PRENDERGAST, K. H.	1961
094.	BURBIDGE, E. M., BURBIDGE, G. R., AND PRENDERGAST, K. H.	1961
095.	BURBIDGE, E. M., AND BURBIDGE, G. R.	1961
096.	BURBIDGE, E. M., AND BURBIDGE, G. R.	1961
097.	BURBIDGE, E. M., BURBIDGE, G. R., AND FISH, R. A.	1961
101.	BURBIDGE, E. M., BURBIDGE, G. R., AND PRENDERGAST, K. H.	1961
111.	BURBIDGE, E. M., BURBIDGE, G. R., AND FISH, R. A.	1961
125.	BURBIDGE, E. M., AND BURBIDGE, G. R.	1961
146.	BURBIDGE, E. M., BURBIDGE, G. R., AND PRENDERGAST, K. H.	1960
147.	BURBIDGE, E. M., BURBIDGE, G. R., AND PRENDERGAST, K. H.	1960
148.	BURBIDGE, E. M., BURBIDGE, G. R., AND PRENDERGAST, K. H.	1960
164.	BURBIDGE, E. M., AND BURBIDGE, G. R.	1960
177.	BURBIDGE, E. M., BURBIDGE, G. R., AND PRENDERGAST, K. H.	1960
184.	BURBIDGE, E. M., BURBIDGE, G. R., AND PRENDERGAST, K. H.	1960
215.	BURBIDGE, E. M., BURBIDGE, G. R., AND PRENDERGAST, K. H.	1959
239.	BURBIDGE, E. M., AND BURBIDGE, G. R.	1959
332.	BURBIDGE, E. M., AND BURBIDGE, G. R.	1956
346.	BURBIDGE, E. M., AND BURBIDGE, G. R.	1956
386.	BURBIDGE, E. M., AND BURBIDGE, G. R.	1955
394.	BURBIDGE, E. M., BURBIDGE, G. R., AND PRENDERGAST, K. H.	1963
407.	BURBIDGE, E. M., AND BURBIDGE, G. R.	1955
711.	BURBIDGE, E. M., BURBIDGE, G. R., AND PRENDERGAST, K. H.	1963
751.	BURBIDGE, E. M., BURBIDGE, G. R., AND RUBIN, V. C.	1964
907.	BURBIDGE, E. M., LYNDS, C. R., AND BURBIDGE, G. R.	1966
230.	BURBIDGE, G. R.	1959
298.	BURBIDGE, G. R.	1958
301.	BURBIDGE, G. R., AND BURBIDGE, E. M.	1955
325.	BURBIDGE, G. R., AND BURBIDGE, E. M.	1957
347.	BURBIDGE, G. R., AND BURBIDGE, E. M.	1956
375.	BURGESS, A., AND SEATON, M. J.	1960
007.	BUSCOMBE, W.	1959
008.	BUSCOMBE, W.	1962
352.	BUSCOMBE, W.	1962
353.	BUSCOMBE, W., AND KENNEDY, P. M.	1962
468.	BUSCOMBE, W., AND MORRIS, P. M.	1961
499.	BUSCOMBE, W.	1956
526.	BUSCOMBE, W., AND KENNEDY, P. M.	1962
854.	BUSCOMBE, W.	1965
504.	BUTLER, H. E., AND SEDDON, H.	1960
511.	BUTLER, H. E., AND SEDDON, H.	1958
512.	BUTLER, H. E., AND THOMPSON, G. I.	1961
892.	BYRAM, E. T., CHUBB, T. A., AND WERNER, M. W.	1965
A49.	CAMPBELL, J. W.	1970
A66.	CAMPBELL, J. W.	1971
922.	CANNON, A. J., AND PICKERING, E. C.	1918
A23.	CANNON, A. J.	1925
A24.	CANNON, A. J., AND MAYALL, M. W.	1949
149.	CAPRIOTTI, E. R., AND DAUB, C. T.	1960
A47.	CARRUTHERS, G. R.	1969

A56.	CARRUTHERS, G. R.	1971
A69.	CARTER, B. S., CORBEN, P. M., AND HARVEY, G. M.	1971
395.	CAYREL, R., AND CAYREL, G.	1963
715.	CAYREL, R.	1958
712.	CHADEAU, C.	1955
335.	CHAMBERLAIN, J. W.	1956
547.	CHAMBERLIN, C., AND MCNAMARA, D. H.	1957
449.	CHOL CHOU, K.	1959
721.	CHOPINET, M.	1963
488.	CHUBB, T. A., AND BYRAM, E. T.	1963
998.	CLARKE, D., AND GRAINGER, J. F.	1966
797.	CODE, A. D., AND BLESS, R. C.	1964
901.	CODE, A. D.	1966
116.	COLLINS, G. W., II, DAUB, C.T., AND O'DELL, C. R.	1961
A58.	CONTI, P. S., AND ALSCHULER, W. R.	1971
A64.	CONTI, P. S., AND SMITH, L. F.	1972
493.	CONWAY, R. G.	1957
A68.	CORBEN, P. M.	1971
A71.	CORBEN, P. M.	1971
A72.	CORBEN, P. M., AND STOY, R.H.	1968
708.	COURTES, G.	1960
158.	COUSINS, A. W. J., AND STOY, R. H.	1963
832.	COUSINS, A. W. J.	1963
833.	COUSINS, A. W. J.	1964
835.	COUSINS, A. W. J.	1963
838.	COUSINS, A. W. J.	1963
839.	COUSINS, A. W. J.	1962
840.	COUSINS, A. W. J.	1962
A50.	COUSINS, A. W. J.	1970
A51.	COUSINS, A. W. J., AND STOY, R. H.	1970
A75.	COUSINS, A. W. J., LAKE, R., AND STOY, R. H.	1966
894.	COWLEY, A. P., AND COWLEY, C. R.	1965
464.	COWLEY, C. R.	1958
475.	CRAMPIN, J., AND HOYLE, F.	1960
103.	CRAWFORD, D. L.	1961
169.	CRAWFORD, D. L.	1960
259.	CRAWFORD, D. L.	1958
396.	CRAWFORD, D. L.	1963
397.	CRAWFORD, D. L.	1963
A59.	CRAWFORD, D. L., BARNES, J. V., AND GOLSON, J. C.	1971
492.	DAVIES, R. D.	1957
860.	DE GROOT, M., AND UNDERHILL, A. B.	1964
638.	DE JAGER, C.	1956
869.	DE JAGER, C.	1964
756.	DELHAYE, J.	1959
576.	DEUTSCH, A. J.	1956
624.	DEUTSCH, A. J.	1955
508.	DE VAUCOULEURS, A.	1957
030.	DE VAUCOULEURS, G., AND PAGE, J.	1962
112.	DE VAUCOULEURS, G.	1961

150.	DE VAUCOULEURS, G.	1960.
178.	DE VAUCOULEURS, G.	1960
183.	DE VAUCOULEURS, G.	1960
197.	DE VAUCOULEURS, G.	1959
198.	DE VAUCOULEURS, G.	1959
255.	DE VAUCOULEURS, G.	1958
261.	DE VAUCOULEURS, G.	1961
393.	DE VAUCOULEURS, G., AND DE VAUCOULEURS, A.	1963
405.	DE VAUCOULEURS, G.	1963
435.	DE VAUCOULEURS, G.	1963
641.	DE VAUCOULEURS, G., AND DE VAUCOULEURS, A.	1959
642.	DE VAUCOULEURS, G.	1959
776.	DE VAUCOULEURS, G.	1963
801.	DE VAUCOULEURS, G.	1964
804.	DE VAUCOULEURS, G., AND DE VAUCOULEURS, A.	1964
691.	DIBAI, E. A.	1960
958.	DIBAI, E. A.	1967
985.	DIBAI, E. A., AND ESIPOV, V. F.	1967
990.	DIBAI, E. A., AND SHAKHOVSKOI, N. M.	1967
943.	DICKENS, R. J.	1967
167.	DIETER, N. H.	1960
422.	DIETER, N. H.	1962
423.	DIETER, N. H.	1962
891.	DIVAN, L.	1965
675.	DOKUCHAEVA, O. D.	1959
680.	DOMBROVSKII, V. A.	1958
980.	DRAGOMIRETSKAYA, B. A.	1965
240.	EATON, J. J., AND KRAUS, J. D.	1959
331.	EBBIGHAUSEN, E. G., AND STRUVE, O.	1956
601.	EBBIGHAUSEN, E. G., AND STRUVE, O.	1959
731.	EBBIGHAUSEN, E. G.	1960
732.	EBBIGHAUSEN, E. G.	1960
733.	EBBIGHAUSEN, E. G., AND PETRIE, R. M.	1960
734.	EBBIGHAUSEN, E. G.	1960
066.	EDGE, D. O., SHAKESHAFT, J. R., MCADAM, W. B., ET AL.	1959
674.	EFIMOV, YU. S.	1959
580.	EGGEN, O. J.	1956
589.	EGGEN, O. J.	1956
781.	EGGEN, O. J.	1963
877.	EGGEN, O. J.	1965
A65.	EGGEN, O. J.	1972
690.	EGOROVA, T. M.	1963
929.	EKERS, R. D., AND BOLTON, J. G.	1965
194.	ELSMORE, B., RYLE, M., AND LESLIE, P. R. R.	1959
572.	ELSTE, G., JUGAKU, J., AND ALLER, L. H.	1956
702.	ELVIUS, A.	1962
482.	EVANS, D. S.	1959
487.	EVANS, D. S., MENZIES, A., AND STOY, R. H.	1959
500.	EVANS, D. S.	1956
503.	EVANS, D. S.	1956

505.	EVANS, D. S., MENZIES, A., AND STOY, R. H.	1957.
831.	EVANS, D. S., LAING, J. D., MENZIES, A., AND STOY, R. H.	1964
431.	FARNSWORTH, A. H.	1955
843.	FAULKNER, D. J.	1963
016.	FEAST, M. W., STOY, R. H., THACKERAY, A. D., AND WESSELINK, A. J.	1961
389.	FEAST, M. W., THACKERAY, A. D., AND WESSELINK, A. J.	1960
473.	FEAST, M. W.	1958
495.	FEAST, M. W.	1955
506.	FEAST, M. W.	1957
770.	FEHRENBACH, C., AND DUFLLOT, M.	1962
908.	FEIGE, J.	1958
562.	FEINSTEIN, A.	1961
846.	FEINSTEIN, A.	1963
A53.	FEINSTEIN, A.	1969
129.	FERNIE, J. D.	1961
931.	FERNIE, J. D., HILTNER, W. A., AND KRAFT, R. P.	1966
A67.	FERNIE, J. D.	1972
064.	FISH, R. A.	1961
945.	FISHER, P. C., JORDAN, W. C., MEYEROTT, A. J., ACTON, L. W., ET AL.	1967
153.	FITCH, W. S.	1960
162.	FITCH, W. S.	1960
207.	FITCH, W. S.	1959
163.	FLATHER, E., AND OSTERBROCK, D. E.	1960
225.	FRANKLIN, K. L.	1959
672.	FRANTSMAN, YU. L.	1962
451.	FRANZ, O.	1958
441.	FREDRICK, L. W.	1960
061.	FRIEBOES, H. O.	1962
982.	FUENFSCHILLING, H.	1967
458.	GAPOSCHKIN, S.	1956
460.	GAPOSCHKIN, S.	1956
494.	GAPOSCHKIN, S.	1955
A30.	GARRISON, R. F.	1970
A45.	GARRISON, R. F.	1967
759.	GHOBBROS, R. A.	1962
900.	GILL, D., AND KAPTEYN, J. C.	1896
987.	GLENN, W. H. G.	1967
856.	GLUSHNEVA, I. N.	1964
953.	GLUSHNEVA, I. N.	1966
098.	GODFREDSSEN, E. A.	1961
425.	GOLDSTEIN, S. J., JR.	1962
542.	GOULD, N. L., HERBIG, G. H., AND MORGAN, W. W.	1957
244.	GRANT, G., AND ABT, H. A.	1959
245.	GRANT, G., AND ABT, H. A.	1959
249.	GRANT, G.	1959
252.	GRANT, G.	1959
517.	GREAVES, W. M. H., BAKER, E. A., AND WILSON, R.	1955
138.	GREENSTEIN, J. L.	1961
221.	GREENSTEIN, J. L., AND KRAFT, R. P.	1959
307.	GREENSTEIN, J. L., HACK, M., AND STRUVE, O.	1957

545. GREENSTEIN, J. L., SANFORD, R. F., AND ZWICKY, F.	1957
579. GREENSTEIN, J. L.	1956
581. GREENSTEIN, J. L., MACRAE, D. A., AND FLEISCHER, R.	1956
775. GREENSTEIN, J. L., AND MATTHEWS, T. A.	1963
819. GREENSTEIN, J. L., AND SCHMIDT, M.	1964
966. GREENSTEIN, J. L.	1958
700. GRIFFIN, R. F.	1963
861. GRYGAR, J.	1964
683. GULAK, I. U. K.	1957
685. GULAK, I. U. K.	1957
490. GUM, C. S.	1954
A31. GUTIERREZ-MORENO, A., AND MORENO, H.	1968
242. HACK, M.	1959
481. HAGEMANN, G.	1959
383. HAGEN, J. P., LILLEY, A. E., AND MCCLAIN, E. F.	1955
A37. HAGGKVIST, L., AND OJA, T.	1968
002. HALL, J. S.	1958
202. HANSEN, K., AND MCNAMARA, D. H.	1959
280. HANSEN, K., AND MCNAMARA, D. H.	1960
078. HARDIE, R. H., AND TOLBERT, C. R.	1961
102. HARDIE, R. H., AND CRAWFORD, D. L.	1961
130. HARDIE, R. H., AND LOTT, S. H.	1961
159. HARDIE, R. H., SEYFERT, C. K., AND GULLEDGE, I. S.	1960
294. HARDIE, R.	1958
382. HARDIE, R. H.	1955
710. HARDIE, R. H., AND SCHROEDER, N. H.	1963
014. HARDORP, J., ROHLFS, K., SLETTEBAK, A., AND STOCK, J.	1959
910. HARDORP, J.	1966
885. HARO, G., AND LUYTEN, W. J.	1962
032. HARRIS, D. E.	1962
274. HARRIS, D. E., AND ROBERTS, J. A.	1960
369. HARRIS, D. L., III	1956
821. HARRIS, D. L., III, AND UPGREN, A. R.	1964
965. HARRIS, D. L., III, STRAND, K. AA., AND WORLEY, C. E.	1963
309. HART, A. B.	1957
930. HAUG, U., PFLEIDERER, J., AND DACHS, J.	1966
983. HAUG, U., DACHS, J., PESCH, J., AND PFLEIDERER, J.	1967
906. HAYAKAWA, S., MATSUOKA, M., AND SUGIMOTO, D.	1966
772. HAZARD, C., MACKAY, M. B., AND SHIMMINS, A. J.	1963
858. HEDDLE, D. W. O.	1964
137. HEESCHEN, D. S.	1961
302. HEESCHEN, D. S.	1957
570. HEIDMANN, J.	1961
054. HEISER, A. M.	1962
077. HEISER, A. M.	1962
143. HELFER, H. L., WALLERSTEIN, G., AND GREENSTEIN, J. L.	1960
011. HENIZE, K. G.	1956
555. HENIZE, K. G.	1961
035. HERBIG, G. H.	1962
139. HERBIG, G. H.	1961

238. HERBIG, G. H.	1959
586. HERBIG, G. H.	1956
596. HERBIG, G. H.	1958
993. HERMAN, R., AND DUVAL, M.	1962
286. HERNANDEZ, C.	1960
602. METZLER, C., AND SUMMERS, R. D.	1959
784. HILL, P. W.	1964
941. HILL, P. W., AND HILL, S. R.	1966
A33. HILL, G., AND PERRY, C. L.	1969
001. HILTNER, W. A.	1956
196. HILTNER, W. A.	1960
226. HILTNER, W. A.	1959
232. HILTNER, W. A.	1959
267. HILTNER, W. A., AND IRIARTE, B.	1958
292. HILTNER, W. A., IRIARTE, B., AND JOHNSON, H. L.	1958
329. HILTNER, W. A.	1957
336. HILTNER, W. A., AND JOHNSON, H. L.	1956
414. HILTNER, W. A., AND IRIARTE, B.	1955
809. HILTNER, W., SCHILD, R. E., AND JACKSON, S.	1964
A27. HILTNER, W. A., GARRISON, R. F., AND SCHILD, R. E.	1969
059. HILTON, W. B., AND MCNAMARA, D. H.	1961
513. HJELLMING, R. M., AND HILTNER, W. A.	1963
003. HOAG, A. A., JOHNSON, H. L., IRIARTE, B., MITCHELL, R. I., ET AL.	1961
617. HOAG, A. A., AND SMITH, E. V. P.	1959
426. HOBBS, R. W.	1961
092. HODGE, P. W.	1961
099. HODGE, P. W.	1961
113. HODGE, P. W.	1961
156. HODGE, P. W.	1960
157. HODGE, P. W.	1960
747. HODGE, P. W.	1963
343. HOFFLEIT, D.	1956
884. HOFFLEIT, D.	1964
322. HOFFMEISTER, C.	1957
281. HOGG, A. R.	1960
466. HOGG, A. R., AND KRON, G. E.	1955
470. HOGG, A. R.	1963
491. HOGG, A. R.	1957
793. HOGG, A. R.	1958
523. HOUZIAUX, L.	1962
556. HOUZIAUX, L.	1961
791. HOUZIAUX, L.	1960
794. HOUZIAUX, L.	1961
795. HOUZIAUX, L.	1957
814. HOUZIAUX, L.	1963
031. HOWARD, W. E., III, ROOD, H. J., AND BOYCE, P. B.	1962
365. HUANG, S.-S., AND STRUVE, O.	1956
409. HUANG, S.-S., AND STRUVE, O.	1955
718. HUANG, S.-S.	1963
272. HUFFER, C. M., AND COLLINS, G. W., II	1962

763. HUNGER, K.	1963
605. HYNEK, J. A., AND STANGER, P. C.	1959
951. ICHIMURA, K., ISHIDA, G., JUGAKU, J., ODA, M., ET AL.	1966
695. IKHSANOV, R. N.	1960
583. INGLIS, S. J.	1956
921. IRIARTE, B., JOHNSON, H. L., MITCHELL, R. I., AND WISNIEWSKI, W. K.	1965
978. IVANOVA, N. L., OGANESYAN, R. KH., AND EPREMYAN, R. A.	1965
837. JANKOWITZ, N. E., AND MCCOSH, C. J.	1963
539. JASCHEK-CORVALAN, M., AND JASCHEK, C.	1957
A42. JASCHEK, C., CONDE, H., AND DE SIERRA, A. C.	1964
548. JASCHEK, M., AND JASCHEK, C.	1957
608. JASCHEK, M., AND JASCHEK, C.	1959
845. JASCHEK, M., AND JASCHEK, C.	1963
889. JASCHEK, M., JASCHEK, C., AND GONZALEZ, Z.	1965
483. JENNISON, R. C., AND LATHAM, V.	1959
310. JOHNSON, F. M., AND TOWNES, C. H.	1957
009. JOHNSON, H. L., AND MORGAN, W. W.	1953
010. JOHNSON, H. L.	1955
062. JOHNSON, H. L., AND SVOLOPOULOS, S. N.	1961
181. JOHNSON, H. L.	1960
290. JOHNSON, H. L., AND MITCHELL, R. I.	1958
314. JOHNSON, H. L.	1957
338. JOHNSON, H. L., AND KNUCKLES, C. F.	1957
368. JOHNSON, H. L., AND HILTNER, W. A.	1956
379. JOHNSON, H. L., AND KNUCKLES, C. F.	1955
390. JOHNSON, H. L., AND MORGAN, W. W.	1955
413. JOHNSON, H. L., AND KNUCKLES, C. F.	1955
643. JOHNSON, H. L.	1959
644. JOHNSON, H. L.	1959
865. JOHNSON, H. L., AND BORGMAN, J.	1964
895. JOHNSON, H. L.	1965
A16. JOHNSON, H. L., MACARTHUR, J. W., AND MITCHELL, R. I.	1968
135. JOHNSON, H. M.	1961
136. JOHNSON, H. M.	1961
277. JOHNSON, H. M.	1960
287. JOHNSON, H. M.	1960
412. JOHNSON, H. M.	1955
553. JOHNSON, H. M.	1961
476. JONES, D. H. P.	1960
119. JOY, A. H.	1961
057. JUGAKU, J., SARGENT, W. L. W., AND GREENSTEIN, J. L.	1961
558. JUGAKU, J., AND SARGENT, W. L. W.	1961
698. JUGAKU, J., AND SARGENT, W. L. W.	1963
661. JUNG-HAO, C.	1962
670. JUNG-HAO, C.	1961
761. KALER, J.	1962
662. KARACHUN, A. M., KUZ'MIN, A. D., AND SALCMONOVICH, A. E.	1961
657. KARDASHEV, N. S., KUZ'MIN, A. D., AND SYROVATSKII, S. I.	1962
984. KARETNIKOV, V. G.	1967
767. KEGEL, W. H.	1962

942.	KELLERMANN, K. I., AND PAULINY-TOTH, I. I. K.	1966
748.	KENDERDINE, S.	1963
A48.	KENNEDY, P. M.	1971
689.	KHARITONOV, A. V.	1963
668.	KHROMOV, G. S.	1962
428.	KINMAN, T. D.	1961
703.	KINMAN, T. D.	1961
924.	KINMAN, T. D., BOLTON, J. G., CLARKE, R. W., AND SANDAGE, A.	1967
084.	KLEMOLA, A. K.	1961
420.	KLEMOLA, A. R.	1962
879.	KLOCK, B. L.	1965
424.	KOCH, R. H.	1962
443.	KOCH, R. H.	1960
444.	KOCH, R. H.	1960
519.	KOELBLOED, D.	1962
986.	KOMAROV, N. S.	1967
882.	KOPYLOV, I. M.	1965
883.	KOPYLOV, I. M.	1965
045.	KRAFT, R. P.	1962
060.	KRAFT, R. P., AND HILTNER, W. A.	1961
081.	KRAFT, R. P.	1961
127.	KRAFT, R. P.	1961
128.	KRAFT, R. P.	1961
160.	KRAFT, R. P.	1960
220.	KRAFT, R. P., CAMP, D. C., AND HUGHES, W. T.	1959
222.	KRAFT, R. P.	1959
241.	KRAFT, R. P., AND LANDOLT, A. U.	1959
805.	KRAFT, R. P.	1964
446.	KRON, G. E., AND MAYALL, N. U.	1960
531.	KRUSZEWSKI, A.	1962
752.	KUCEWICZ, B.	1963
969.	KUKARKIN, B. V., KHOLOPOV, P. N., EEFREMCV, YU. N., ET AL.	1969
666.	KUPO, I. D.	1961
677.	KUPO, I. D.	1959
692.	KUPO, I. D.	1960
254.	KUPPERIAN, J. E., JR., BOGGESS, A., III, AND MILLIGAN, J. E.	1958
659.	KUZ'MIN, A. D.	1962
664.	KUZ'MIN, A. D., SALOMONOVICH, A. E., AND UDAL'TSOV, V. A.	1961
669.	KUZ'MIN, A. D.	1962
673.	KUZ'MIN, A. D., AND UDAL'TSOV, V. A.	1959
834.	LAKE, R.	1964
841.	LAKE, R.	1962
842.	LAKE, R.	1963
467.	LARGE, M. I., MATHEWSON, D. S., AND HASLAM, C. G. T.	1961
370.	LAWRENCE, R. S.	1956
648.	LAZAREVSKII, V. S., STANKEVICH, K. S., AND TROITSKII, V. S.	1963
948.	LEDOUX, P., AND RENSON, P.	1966
729.	LEE, E. K., AND WRIGHT, K. O.	1960
A17.	LEE, T. A.	1968
796.	LENOUVEL, F., AND DAGUILLON, J.	1956

381. LILLER, W.	1955
374. LILLEY, A. E., AND MCCLAIN, E. F.	1956
052. LIMBER, D. N.	1962
448. LIPPINCOTT, S. L.	1959
401. LITTLE, A. G.	1963
038. LOCKE, J. L., GALT, J. A., AND COSTAIN, C. H.	1964
830. LODEN, L. O., AND LODEN, K.	1963
952. LODEN, L. O.	1967
A38. LODEN, L. O.	1968
A39. LODEN, L. O.	1968
A70. LODEN, L. O., AND NORDSTROM, B.	1968
A74. LODEN, L. O.	1967
376. LOVELL, A. C. B., AND WELLS, H. W.	1960
083. LYNDS, C. R.	1961
189. LYNDS, C. R.	1960
195. LYNDS, C. R.	1960
212. LYNDS, C. R.	1959
213. LYNDS, C. R.	1959
214. LYNDS, C. R.	1959
229. LYNDS, C. R.	1959
305. LYNDS, C. R., PEREGRINE, D. S., AND WOOD, D. B.	1957
333. LYNDS, C. R., SAHADE, J., AND STRUVE, O.	1956
453. LYNDS, C. R., AND THOMAS, N.	1957
905. LYNDS, C. R., AND STOCKTON, A. N.	1966
076. MAESTRE, L. A., AND DEUTSCH, A. J.	1961
878. MALIK, G. M.	1965
271. MALTBY, P.	1962
400. MALTBY, P., MATTHEWS, T. A., AND MOFFET, A. T.	1963
524. MALTBY, P., MATTHEWS, T. A., AND MOFFET, A. T.	1962
713. MANNINO, G., AND HUMBLET, J.	1955
707. MAO-LIN, T., AND BLOCH, M.	1954
976. MARKARYAN, B. E., OGANESYAN, E. YA., AND ARAKELIAN, S. N.	1965
991. MARKARYAN, B. E., OGANESYAN, E. YA., AND ARAKELIAN, S. N.	1966
705. MARTEL, L.	1961
997. MARTEL, L., AND MARTEL, M. TH.	1964
588. MATHEWS, R. T.	1956
478. MATHEWSON, D. S., LARGE, M. I., AND HASLAM, C. G. T.	1960
019. MATHIS, J. S.	1962
303. MATHIS, J. S.	1957
323. MATHIS, J. S.	1957
527. MATTHEWS, T. A., AND SANDAGE, A.	1962
696. MATTHEWS, T. A., AND SANDAGE, A. R.	1963
311. MAYER, C. H., MCCULLOUGH, T. P., AND SLOANAKER, R. M.	1957
384. MCCLAIN, E. F.	1955
950. MCCRAY, R.	1967
233. MCCUSKEY, S. W.	1959
234. MCCUSKEY, S. W.	1959
430. MCCUSKEY, S. W.	1955
433. MCCUSKEY, S. W.	1956
434. MCCUSKEY, S. W.	1956

560. MCCUSKEY, S. W.	1961
742. MCKELLAR, A., AND BUTKOV, E.	1956
182. MCLAUGHLIN, D. B.	1960
273. MCLAUGHLIN, D. B.	1962
514. MCLAUGHLIN, D. B.	1963
771. MCLAUGHLIN, D. B.	1962
036. MCNAMARA, D. H., AND LARSSON, H. J.	1962
053. MCNAMARA, D. H., AND AUGASON, G.	1962
089. MCNAMARA, D. H., AND HANSEN, K.	1961
269. MCNAMARA, D. H., AND HANSEN, K.	1958
317. MCNAMARA, D. H.	1957
404. MCNAMARA, D. H.	1963
408. MCNAMARA, D. H.	1955
550. MCNAMARA, D. H.	1957
551. MCNAMARA, D. H.	1957
552. MCNAMARA, D. H., AND GEBBIE, K. B.	1961
578. MCNAMARA, D. H.	1956
584. MCNAMARA, D. H.	1956
172. MELBOURNE, W. G.	1960
324. MELTZER, A. S.	1957
260. MENDOZA, E. E., V	1958
029. MENON, T. K.	1962
044. MENON, T. K.	1962
297. MENON, T. K.	1958
024. MERRILL, P. W., DEUTSCH, A. J., AND KEENAN, P. C.	1962
120. MERRILL, P. W.	1961
223. MERRILL, P. W.	1959
247. MERRILL, P. W.	1959
337. MERRILL, P. W., AND BURWELL, C. G.	1949
341. MERRILL, P. W., AND BURWELL, C. G.	1943
342. MERRILL, P. W., AND BURWELL, C. G.	1933
A46. METZGER, P. H., AND CLARK, M. A.	1971
300. MICZAIKA, G. R., AND WADE, M. S.	1958
348. MICZAIKA, G. R., FRANKLIN, F. A., DEUTSCH, A. J., ET AL.	1956
456. MICZAIKA, G. R.	1957
436. MILLER, R. H.	1963
720. MILLER, R. H.	1965
173. MILLS, B. Y., SLEE, O. B., AND HILL, E. R.	1960
175. MILLS, B. Y., SLEE, O. B., AND HILL, E. R.	1958
174. MINKOWSKI, R., AND OSTERBROCK, D. C.	1960
344. MINKOWSKI, R., AND ALLER, L. H.	1956
345. MINKOWSKI, R., AND ALLER, L. H.	1956
979. MIRZOYAN, L. V., AND KALLOGLYAN, N. L.	1965
110. MITCHELL, R. I., JOHNSON, H. L., AND IRIARTE, B.	1961
170. MITCHELL, R. I.	1960
270. MOFFET, A. T.	1962
012. MORGAN, W. W., CODE, A. D., AND WHITFORD, A. E.	1955
693. MOROZ, V. I.	1960
399. MORRIS, D., AND RADHAKRISHNAN, V.	1963
808. MORRIS, D., RADHAKRISHNAN, V., AND SEIELSTAD, G. A.	1964

750.	MORTON, D. C.	1964
934.	MORTON, D. C.	1967
633.	MULLER, A. B., WALRAVEN, TH., AND WOLTJER, L.	1956
792.	MUMFORD, G. S.	1962
947.	MUMFORD, G. S.	1966
988.	MUMFORD, G. S.	1967
989.	MUMFORD, G. S.	1967
231.	MUNCH, G., AND MUNCH, L.	1959
339.	MUNCH, G.	1957
537.	MUNCH, G., AND FLATHER, E.	1957
977.	MUSTEL, E. R., AND BOYARCHUK, A. A.	1965
A12.	NARIAI, K.	1967
015.	NASSAU, J. J., AND MORGAN, W. W.	1951
108.	NASSAU, J. J., AND STEPHENSON, C. B.	1961
557.	NASSAU, J. J., AND STEPHENSON, C. B.	1961
559.	NASSAU, J. J., AND STEPHENSON, C. B.	1961
415.	NAUR, P.	1955
A43.	NAVACH, C., AND BURKI, G.	1970
043.	O'DELL, C. R.	1962
778.	O'DELL, C. R.	1963
736.	ODGERS, G. J., AND KUSHWAHA, R. S.	1958
738.	ODGERS, G. J.	1955
090.	OKE, J. B.	1961
131.	OKE, J. B.	1961
161.	OKE, J. B., AND BONSAK, S. J.	1960
187.	OKE, J. B.	1960
773.	OKE, J. b.	1963
867.	OOSTERHOFF, P. TH.	1964
A01.	OOSTERHOFF, P. TH., AND PONSEN, J.	1966
A02.	OOSTERHOFF, P. TH., AND WALRAVEN, TH.	1966
681.	ORLOV, M. YA.	1958
957.	ORLOV, M. YA.	1967
250.	OSAWA, K.	1959
320.	OSAWA, K.	1957
782.	OSAWA, K., AND HATA, S.	1960
888.	OSAWA, K., NISHIMURA, S., AND ICHIMURA, K.	1965
126.	OSTERBROCK, D. E., AND STOCKHAUSEN, R. E.	1961
155.	OSTERBROCK, D.	1960
176.	OSTERBROCK, D. E.	1960
186.	OSTERBROCK, D. E., AND STOCKHAUSEN, R. E.	1960
246.	OSTERBROCK, D., AND FLATHER, E.	1959
315.	OSTERBROCK, D. E.	1957
380.	OSTERBROCK, D. E.	1955
592.	OSTERBROCK, D. E.	1958
450.	OSVALDS, V.	1958
498.	PAGEL, B. E. J.	1956
679.	PARENAGO, P. P.	1958
665.	PARIISKII, YU. N.	1961
667.	PARIISKII, YU. N.	1962
806.	PARKER, R. A. R.	1964

534.	FAYNE-GAPOSCHKIN, C.	1957
717.	FAYNE-GAPOSCHKIN, C.	1963
741.	PEARCE, J. A.	1956
743.	PEARCE, J. A.	1956
745.	PEARCE, J. A.	1957
754.	PERRAUD, H., AND PELLETIER, H.	1959
A32.	PERRY, C. L., AND HILL, G.	1969
079.	FESCH, P.	1961
151.	PESCH, P.	1960
152.	PESCH, P.	1960
200.	PESCH, P.	1959
398.	PESCH, P.	1963
949.	PETERSON, L. E., AND JACOBSON, A. S.	1966
786.	PETIT, M.	1960
787.	PETIT, M.	1960
788.	PETIT, M.	1960
789.	PETIT, M.	1960
790.	PETIT, M.	1960
800.	PETIT, M.	1961
724.	PETRIE, R. M.	1962
727.	PETRIE, R. M., AND EBBIGHAUSEN, E. G.	1961
739.	PETRIE, R. M.	1955
746.	PETRIE, R. M.	1959
807.	FIKE, E. M., AND DRAKE, F. D.	1964
956.	POLOSUKHINA, N. S., AND LEBEDEVA, L.	1966
871.	PONSEN, J.	1964
872.	PONSEN, J.	1964
058.	POPPER, D. M.	1961
075.	POPPER, D. M.	1957
134.	POPPER, D. M.	1961
227.	POPPER, D. M.	1959
313.	POPPER, D. M.	1957
351.	POPPER, D. M.	1956
635.	FOTTASCH, S.	1956
709.	FOTTASCH, S. R., AND VARSAVSKY, C. M.	1960
071.	PRESTON, G. W.	1961
082.	PRESTON, G. W.	1961
118.	PRESTON, G. W., SPINRAD, H., AND VARSAVSKY, C. M.	1961
210.	PRESTON, G. W.	1959
719.	PRESTON, G., AND WALLERSTEIN, G.	1963
823.	PRESTON, G. W., AND PACZYNSKI, B.	1964
529.	PRINGLE, J. K., AND MCNAMARA, D. H.	1962
650.	PSKOVSKII, YU. P.	1963
133.	RACH, R. A., AND HERBIG, G. H.	1961
615.	RAIMOND, E., AND VOLDERS, L. M. J. S.	1957
701.	RAKOS, K. D.	1962
762.	RAKOSCH, K. D.	1962
694.	RAZMADZE, N. A.	1960
912.	RENSON, P.	1965
740.	RICHARDSON, E. H., AND MCKELLAR, A.	1955

744. RICHARDSON, E. H., AND MCKELLAR, A.	1957
037. RINGUELET-KASWALDER, A. E.	1962
283. RINGUELET-KASWALDER, A., SAHADE, J., AND STRUVE, O.	1960
515. RINGUELET-KASWALDER, A. E.	1963
994. RINGUELET-KASWALDER, A. E.	1964
472. RISHBETH, H.	1958
276. ROBERTS, J. A., BOLTON, J. G., AND HARRIS, D. E.	1960
006. ROBERTS, M. S.	1962
418. ROBERTS, M. S.	1962
459. ROBERTS, M. S.	1956
388. RODGERS, A. W., CAMPBELL, C. T., AND WHITEOAK, J. B.	1960
825. RODGERS, A. W., AND BELL, R. A.	1964
944. RODGERS, A. W., AND SEARLE, L.	1967
A14. RODGERS, A. W.	1968
366. ROMAN, N. G.	1956
432. ROMAN, N. G.	1955
645. ROQUES, P. E.	1955
779. ROSLUND, C.	1963
817. ROSLUND, C.	1963
480. ROWSON, B.	1959
419. RUBIN, V. C., BURLEY, J., KIASATPOOR, A., KLOCK, B., ET AL.	1962
820. RUBIN, V. C., BURBIDGE, E. M., BURBIDGE, G. R., ET AL.	1964
652. RUBLEV, S. V.	1963
654. RUBLEV, S. V.	1963
876. RUBLEV, S. V.	1965
543. RUIZ, J. J.	1957
546. RUIZ, J. J.	1957
251. RYLE, M., AND NEVILLE, A. C.	1962
812. RYLE, M., AND SANDAGE, A.	1964
649. RYZHKOVA, N. F., EGOROVA, T. M., GOSACHINSKII, I. V., ET AL.	1963
289. SAHADE, J.	1960
318. SAHADE, J., AND STRUVE, C.	1957
439. SAHADE, J., AND HERNANDEZ, C. A.	1963
563. SAHADE, J., AND FRIEBOES-CONDE, H.	1963
585. SAHADE, J., STRUVE, O., AND WILLIAMS, A. D.	1956
593. SAHADE, J., AND WALLERSTEIN, G.	1958
604. SAHADE, J.	1959
625. SAHADE, J.	1955
995. SAHADE, J., AND HERNANDEZ, C. A.	1964
040. SANDAGE, A.	1962
041. SANDAGE, A.	1962
179. SANDAGE, A., AND WALLERSTEIN, G.	1960
180. SANDAGE, A.	1960
880. SANDAGE, A.	1965
886. SANDAGE, A. R., AND VERON, P.	1965
925. SANDERS, W. L.	1966
363. SANFORD, R. F.	1956
535. SANFORD, R. F., AND GREENSTEIN, J. L.	1957
598. SANFORD, R. F., AND MERRILL, P. W.	1958
021. SARGENT, W. L. W., AND SEARLE, L.	1962

056.	SARGENT, W. L. W., AND JUGAKU, J.	1961
085.	SARGENT, W. L. W.	1961
915.	SARGENT, W. L. W.	1965
A15.	SARGENT, W. L. W., AND SEARLE, L.	1968
051.	SARMA, M. B. K., AND WALKER, M. F.	1962
909.	SCHEUER, P. A. G., AND WILLS, D.	1966
A28.	SCHILD, R. E., HILTNER, W. A., AND SANDULEAK, N.	1969
A41.	SCHILD, R.	1971
A54.	SCHILD, R. E., AND CHAFFEE, F.	1971
A55.	SCHILD, R. E., AND COWLEY, A. P.	1971
144.	SCHMALBERGER, D. C.	1960
614.	SCHMIDT, M.	1957
774.	SCHMIDT, M.	1963
810.	SCHMIDT, M., AND MATTHEWS, T. A.	1964
849.	SCHMIDT, M.	1965
903.	SCHMIDT, M.	1966
123.	SEARLE, L.	1961
268.	SEARLE, L.	1958
402.	SEARLE, L., SARGENT, W. L. W., AND JUGAKU, J.	1963
479.	SEATON, M. J.	1960
306.	SEEGER, C. L., WESTERHOUT, G., AND CONWAY, R. G.	1957
636.	SEEGER, CH. L., WESTERHOUT, G., AND VAN DE HULST, H. C.	1956
637.	SEEGER, CH. L.	1956
168.	SEYFERT, C. K., HARDIE, R. H., AND GRECHIK, R. T.	1960
875.	SHAKHOVSKOI, N. M.	1965
293.	SHANE, W. W.	1958
A22.	SHAPLEY, H., AND AMES, A.	1932
211.	SHARPLESS, S.	1959
946.	SHELUS, P. J.	1967
938.	SHIMMINS, A. J., CLARKE, M. E., AND EKERS, R. D.	1966
940.	SHIMMINS, A. J., DAY, G. A., EKERS, R. D., AND COLE, D. J.	1966
684.	SHKLOVSKII, I. S.	1957
688.	SHOLOMITSKII, G. B.	1963
813.	SHOLOMITSKII, G. B.	1963
765.	SINNERSTAD, U.	1961
766.	SINNERSTAD, U.	1961
829.	SJOGREN, U.	1963
610.	SKY AND TELESCOPE	1963
612.	SKY AND TELESCOPE	1963
722.	SKY AND TELESCOPE	1963
890.	SKY AND TELESCOPE	1965
088.	SLETTEBAK, A., BAHNER, K., AND STOCK, J.	1961
253.	SLETTEBAK, A. V., AND NASSAU, J. J.	1959
350.	SLETTEBAK, A.	1956
699.	SLETTEBAK, A.	1963
442.	SLOANAKER, R. M., AND NICHOLS, J. H.	1960
627.	SMAK, J.	1964
932.	SMITH, A. M.	1967
933.	SMITH, A. M.	1967
340.	SMITH, E. VAN P.	1956

455.	SMITH, H. J.	1957
561.	SMITH, H. J., AND HOFFLEIT, D.	1961
A18.	SMITH, L. F.	1968
647.	SOBOLEVA, N. S., PROZOROV, V. A., AND PARIISKII, YU. N.	1963
034.	SPINRAD, H.	1962
117.	SPINRAD, H.	1961
603.	SPINRAD, H.	1959
981.	SPITE, M.	1967
203.	STABLEFORD, C., AND ABHYANKAR, K. D.	1959
897.	STAFF OF THE SMITHSONIAN ASTROPHYSICAL OBSERVATORY	1966
655.	STANKEVICH, K. S.	1963
013.	STEBBINS, J., HUFFER, C. M., AND WHITFORD, A. E.	1940
377.	STEBBINS, J., AND KRON, G. E.	1956
802.	STEBBINS, J., AND KRON, G. E.	1964
022.	STECHER, T. P., AND MILLIGAN, J. E.	1962
091.	STEPHENSON, C. B., AND NASSAU, J. J.	1961
429.	STEPHENSON, C. B., AND HOBBS, R. W.	1961
618.	STEPHENSON, C. B.	1959
926.	STEPHENSON, C. B.	1966
367.	STOCK, J.	1956
902.	STOCKTON, A. N., AND LYNDS, C. R.	1966
816.	STOECKLY, R., AND DRESSLER, K.	1964
836.	STOY, R. H.	1963
A73.	STOY, R. H.	1968
392.	STROMGREN, B., AND PERRY, C.	1962
050.	STRUVE, O., AND ZEBERGS, V.	1962
086.	STRUVE, O., AND ZEBERGS, V.	1961
121.	STRUVE, O., SAHADE, J., AND ZEBERGS, V.	1961
122.	STRUVE, O., AND ZEBERGS, V.	1961
171.	STRUVE, O., AND ZEBERGS, V.	1960
193.	STRUVE, O., SVOLOPOULOS, S. N., AND ZEBERGS, V.	1960
204.	STRUVE, O., AND ZEBERGS, V.	1959
224.	STRUVE, O., AND ZEBERGS, V.	1959
228.	STRUVE, O., AND ZEBERGS, V.	1959
243.	STRUVE, O., HUANG, S.-S., AND ZEBERGS, V.	1959
248.	STRUVE, O., SAHADE, J., AND ZEBERGS, V.	1959
264.	STRUVE, O., PILLANS, H., AND ZEBERGS, V.	1958
265.	STRUVE, O., SAHADE, J., HUANG, S.-S., AND ZEBERGS, V.	1958
266.	STRUVE, O., SAHADE, J., HUANG, S.-S., AND ZEBERGS, V.	1958
285.	STRUVE, O., AND WADE, M. S.	1960
319.	STRUVE, O., SAHADE, J., AND ZEBERGS, V.	1957
328.	STRUVE, O., SAHADE, J., LYNDS, C. R., AND HUANG, S.-S.	1957
330.	STRUVE, O., SAHADE, J., AND ZEBERGS, V.	1956
387.	STRUVE, O., AND ABHYANKAR, K. D.	1955
410.	STRUVE, O., MCNAMARA, D. H., AND ZEBERGS, V.	1955
411.	STRUVE, O., AND ZEBERGS, V.	1955
454.	STRUVE, O., SAHADE, J., AND EBBIGHAUSEN, E.	1957
533.	STRUVE, O., AND SAHADE, J.	1957
544.	STRUVE, O., SAHADE, J., AND HUANG, S.-S.	1957
573.	STRUVE, O.	1956

591.	STRUVE, O., AND SAHADE, J.	1958
594.	STRUVE, O., SAHADE, J., HUANG, S.-S., AND ZEBERGS, V.	1958
599.	STRUVE, U.	1958
611.	STRUVE, U.	1963
716.	STRUVE, O., AND ZEBERGS, V.	1957
A61.	SUDBURY, G. C.	1971
080.	SVOLOPOULOS, S. N.	1961
445.	SVCLOPOULOS, S. N.	1960
565.	SVCLOPOULOS, S. N.	1963
999.	SVCLOPOULOS, S. N.	1966
A00.	SVOLOPOULOS, S. N.	1966
354.	THACKERAY, A. D.	1962
357.	THACKERAY, A. D., WESSELINK, A., AND HARDING, G. A.	1962
A11.	THACKERAY, A. D.	1968
166.	THE, P.-S.	1960
887.	THE, P.-S.	1965
626.	THOMSEN, I. L., ABT, H. A., AND KRON, G. E.	1955
899.	THOME, J. M., DIRECTOR	1892
804.	TIFFT, W. G.	1964
629.	TOLBERT, C. R.	1964
A03.	TOLBERT, C. R., PECKER, J. C., AND POTTASCH, S. R.	1967
048.	TRAVING, G.	1962
416.	TREANOR, P. J.	1963
653.	UDAL'TSOV, V. A.	1963
023.	UNDERHILL, A. B.	1962
190.	UNDERHILL, A. B.	1960
208.	UNDERHILL, A. B.	1959
725.	UNDERHILL, A. B.	1963
728.	UNDERHILL, A. B.	1961
730.	UNDERHILL, A. B.	1960
735.	UNDERHILL, A. B.	1959
737.	UNDERHILL, A. B.	1958
960.	UNDERHILL, A. B.	1966
961.	UNDERHILL, A. B.	1966
962.	UNDERHILL, A. B.	1966
963.	UNDERHILL, A. B.	1966
964.	UNDERHILL, A. B.	1966
968.	UNDERHILL, A. B.	1966
568.	VAN ALBADA, T. S.	1961
613.	VAN DE HULST, H. C., RAIMOND, E., AND VAN WOERDEN, H.	1957
457.	VAN DE KAMP, P., AND DAMKOEHLER, J. E.	1957
065.	VAN DEN BERGH, S.	1961
417.	VAN DEN BOS, W. H.	1962
704.	VAN DEN BOS, W. H.	1962
862.	VAN GENDEREN, A. M.	1964
863.	VAN GENDEREN, A. M.	1964
866.	VAN GENDEREN, A. M.	1964
913.	VAN GENDEREN, A. M.	1965
263.	VAN HOOFF, A., AND BLAAUW, A.	1958
349.	VAN HOOFF, A., BERTIAU, F., AND DEURINCK, R.	1956

438.	VAN HOOF, A., BERTIAU, F. C., AND DEURINCK, R.	1963
541.	VAN HOOF, A.	1957
607.	VAN HOOF, A.	1959
757.	VAN HOOF, A.	1962
758.	VAN HOOF, A.	1962
760.	VAN HOOF, A.	1962
868.	VAN HOOF, A., AND BLAAUW, A.	1964
518.	VAN HOUTEN, C. J.	1961
461.	VAN WIJK, U., ROGERSON, J. B., AND SKUMANICH, A.	1955
308.	VELGHE, A. G.	1957
321.	VELGHE, A. G.	1957
848.	VERON, P.	1965
569.	VOLDERS, L., AND HOGBOM, J. A.	1961
631.	VOLDERS, L.	1959
068.	VORONTSOV-VEL'YAMINOV, B. A. (WORONZOW-WELJAMINOW, B. A.)	1953
070.	VORONTSOV-VEL'YAMINOV, B. A. (WORONZOW-WELJAMINOW, B. A.)	1953
663.	VORONTSOV-VEL'YAMINOV, B. A.	1961
671.	VORONTSOV-VEL'YAMINOV, B. A.	1961
697.	VORONTSOV-VEL'YAMINOV, B. A.	1960
A21.	VYSSOTSKY, A. N., AND BALZ, A. G. A.	1958
A52.	WALBORN, N. R.	1971
A57.	WALBORN, N. R.	1971
A63.	WALBORN, N. R.	1971
A76.	WALBORN, N. R.	1972
474.	WALKER, G. A. H.	1963
087.	WALKER, M. F.	1961
109.	WALKER, M. F.	1961
115.	WALKER, M. F.	1961
218.	WALKER, M. F.	1959
295.	WALKER, M. F.	1958
316.	WALKER, M. F.	1957
371.	WALKER, M. F.	1956
540.	WALKER, M. F.	1957
577.	WALKER, M. F.	1956
970.	WALKER, M. F.	1966
049.	WALLERSTEIN, G., STONE, Y. H., AND WILLIAMS, J. A.	1962
165.	WALLERSTEIN, G.	1960
391.	WALLERSTEIN, G.	1962
403.	WALLERSTEIN, G., GREENSTEIN, J. L., PARKER, R., ET AL.	1963
538.	WALLERSTEIN, G.	1957
564.	WALLERSTEIN, G., AND HANNIBAL, D.	1963
597.	WALLERSTEIN, G.	1958
606.	WALLERSTEIN, G.	1959
768.	WALLERSTEIN, G.	1962
769.	WALLERSTEIN, G.	1962
824.	WALLERSTEIN, G., AND HUNZIKER, W.	1964
852.	WALLERSTEIN, G., AND WOLFF, S. C.	1965
859.	WALRAVEN, J. H., TINBERGEN, J., AND WALRAVEN, TH.	1964
600.	WALRAVEN, TH., AND WALRAVEN, J. H.	1960
639.	WALRAVEN, TH.	1957

105.	WAMPLER, E. J., PESCH, P., HILTNER, W. A., AND KRAFT, R. P.	1961
554.	WANNER, J. F.	1961
780.	WAYMAN, P. A.	1962
A26.	WEBER, S. V., HENRY, R. C., AND CARRUTHERS, G. R.	1971
522.	WEHLAU, W.	1962
525.	WEHLAU, W.	1962
799.	WEHLAU, W., AND LEUNG, K.-C.	1964
312.	WELLMAN, P.	1957
632.	WENTZEL, D. G., AND VAN WOERDEN, H.	1959
355.	WESSELINK, A. J.	1962
359.	WESSELINK, A. J.	1962
497.	WESSELINK, A. J.	1956
620.	WESTERLUND, B.	1959
826.	WESTERLUND, B. E.	1963
828.	WESTERLUND, B. E.	1963
855.	WESTERLUND, B. E., AND SMITH, L. F.	1964
936.	WESTERLUND, B. E.	1966
471.	WHITEOAK, J. B.	1963
486.	WHITFIELD, G. R.	1960
853.	WHITFORD, A. E.	1964
385.	WHITNEY, C.	1955
114.	WILDEY, R. L.	1961
803.	WILDEY, R. L., AND MURRAY, B. C.	1964
621.	WILLIAMS, A. D., AND STRUVE, O.	1955
881.	WILLSTROP, R. J.	1965
237.	WILSON, O. C., MUNCH, G., FLATHER, E. M., AND COFFEEN, M. F.	1959
528.	WILSON, O. C., AND O'DELL, C. R.	1962
334.	WILSON, O. C., AND WALKER, M. F.	1956
A07.	WILSON, R. E.	1953
275.	WILSON, R. W., AND BOLTON, J. G.	1960
421.	WILSON, R. W.	1963
509.	WILSON, R.	1956
510.	WILSON, R.	1958
216.	WOLTJER, L.	1959
616.	WOLTJER, L.	1958
634.	WOLTJER, L.	1956
640.	WOLTJER, L.	1957
188.	WOOD, D. B., AND WALKER, M. F.	1960
257.	WOOD, D. B.	1958
296.	WOOD, D. B.	1958
427.	WOOD, F. B., AND MCCLUSKEY, G. E., JR.	1961
452.	WOOD, F. B., AND BLITZSTEIN, W.	1957
646.	WOOD, F. B., AND LEWIS, E. M.	1955
A34.	WOODEN, W. H., II	1970
783.	WOODS, M. L.	1955
575.	WORLEY, C. E.	1956
587.	WORLEY, C. E., AND EGGEN, O. J.	1956
622.	WORLEY, C. E.	1955
068.	WORONZOW-WELJAMINOW, B. A. (VORONTSOV-VEL'YAMINOV, B. A.)	1953
070.	WORONZOW-WELJAMINOW, B. A. (VORONTSOV-VEL'YAMINOV, B. A.)	1953

549.	WRIGHT, K. O.	1957
571.	WRIGHT, K. O., AND LEE, E. K.	1956
609.	WRIGHT, K. O., AND MCDONALD, J. K.	1959
072.	WYLLER, A. A.	1961
916.	WYNDHAM, J. D.	1966
A62.	YAMASHITA, K.	1968
073.	YOSS, K. M.	1961
687.	ZAKHARENKOV, V. F., K AidANOVSKII, N. L., PARIISKII, YU. N., ET AL.	1963
706.	ZUCKERMANN, M.-C.	1961
100.	ZWICKY, F., AND HUMASON, M. L.	1961
145.	ZWICKY, F., AND HUMASON, M. L.	1960

BIOGRAPHICAL NOTES

ROBERT J. DAVIS received the A. B., A. M., and Ph. D. degrees in astronomy from Harvard University in 1951, 1956, and 1960, respectively.

Before joining the staff at Smithsonian Astrophysical Observatory in 1956, Dr. Davis was an astrophysicist at Varo Manufacturing Company, Garland, Texas. He also held a teaching fellowship at Harvard College Observatory from 1955 to 1958.

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