N O T I C E

FINAL REPORT

August 15, 1985

CONTRACT NAS8-36134

COMPLETE SURVEY OF STARS NEARER THAN 25 PARSECS

(NASA-CR-178544) AN UNBIASED X-RAY SAMPLING OF STARS WITHIN 25 PARSECS OF THE SUN Final Report (Lockheed Missiles and Space Co.) 32 p HC A03/MF A01 CSCL 03A

N86-14206

Unclas G3/89 15835

LOCKHEED MISSILES & SPACE CO., INC.

3251 HANOVER ST.

PALO ALTO, CA 94304

Dr. H. M. Johnson

Principal Investigator

Prepared for George C. Marshall Space Flight Center

Marshall Space Flight Center, AL 35812

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Hugh M. Johnson

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ABSTRACT

The paper reports a search of all of the Einstein Observatory IPC and HRI fields for untargeted stars in the Woolley *et al.* Catalogue of the nearby stars. Optical data and IPC coordinates, flux density F_x, and luminosity L_x, or upper limits, are tabulated for 126 single or blended systems, and HRI results for a few of them. IPC luminosity functions are derived for the systems, for 193 individual stars in the systems (with L_x shared equally among blended components), and for 63 individual M dwarfs. These stars have relatively large X-ray flux densities that are free of interstellar extinction, because they are nearby, but they are otherwise unbiased with respect to the X-ray properties that are found in a defined small space around the Sun.

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Work continued satifactorily following the Midterm Report on the lines outlined then. Work is now complete with the result of a paper prepared for publication. A copy of the manuscript, entitled "An Unbiased X-Ray Sampling of Stars within 25 Parsecs of the Sun," is attached. The manuscript cover-page abstract and the page 12 conclusions provide a summary of the findings and conclusions of the research.

Thus, the paper reports a search of all of the Einstein Observatory IPC and HRI fields for untargeted stars in the Woolley et al. Catalogue of the nearby stars. Optical data and IPC coordinates, flux density F_x, and luminosity L_x, or upper limits, are tabulated for 126 single or blended systems, and HRI results for a few of them. IPC luminosity functions are derived for the systems, for 193 individual stars in the systems (with L_x shared equally among blended components), and for 63 individual M dwarfs. These stars have relatively large X-ray flux densities that are free of interstellar extinction, because they are nearby, but they are otherwise unbiased with respect to the X-ray properties that are found in a defined small space around the Sun.

Several tables exhibit the X-ray properties of the untargeted nearby stars in the IPC and HRI fields. The X-ray luminosities range over three orders of magnitude among detected stars. A few of them show evidence of variability. Luminosity functions include stars with less than 3-sigma upper limits on L_x by resort to a special algorithm. These luminosity functions peak at the lowest detectable L_x. Young-disk dwarf M stars occupy a range of higher L_x than old-disk dwarf M stars, with an overlap of ranges. A few stars with upper-limit L_x below the lowest detectable L_x are old-disk, and the Einstein Observatory was unable to detect stars near the faint end of the luminosity range unless they were within very few parsecs. Thus the distribution of stellar L_x below about 3×10^{26} ergs s^{-1} remains to be found in a future observational program.

No other publication is planned from this contract, but the P.I. draws attention to a reference in the manuscript to D. E. Harris and H. M. Johnson, "High-Resolution X-Ray Observations of Nearby Binary Systems: Flaring and Evidence for Unseen Companions," in Astrophys. J., 249, 649, 1985, where HRI observations of four stars were presented in such detail as to justify the omission of further discussion of them in this manuscript.

AN UNBIASED X-RAY SAMPLING OF STARS WITHIN 25 PARSECS OF THE SUN

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ABSTRACT

The paper reports a search of all of the *Einstein Observatory* IPC and HRI fields for untargeted stars in the Woolley *et al. Catalogue* of the nearby stars. Optical data and IPC coordinates, flux density F_x, and luminosity L_x, or upper limits, are tabulated for 126 single or blended systems, and HRI results for a few of them. IPC luminosity functions are derived for the systems, for 193 individual stars in the systems (with L_x shared equally among blended components), and for 63 individual M dwarfs. These stars have relatively large X-ray flux densities that are free of interstellar extinction, because they are nearby, but they are otherwise unbiased with respect to the X-ray properties that are found in a defined small space around the Sun.

I. INTRODUCTION

About 4000 target pointings were made with the Imaging Proportional Counter (IPC) of the *Einstein Observatory* (*EO*) and another 800 with its High Resolution Imager (HRI) as identified in Seward and Macdonald (1983). The nominal fields of view are, respectively, one square degree and 0.14 square degree. Many objects besides targets may be found in these areas, and some targets were not detected. Among the untargeted potential objects are stars in Woolley *et al.*'s (1970) *Catalogue of Stars within 25 Parsecs of the Sun* (WEPP in the following). Since WEPP does not include all of the stars in Gliese's (1969) catalog, it was tracked in parallel with WEPP in the search of all *EO* fields. It is clearly worth finding and discussing the untargeted Gliese/WEPP stars because, unlike selected targets, they represent an unbiased sampling of a specific volume, and they are mostly cataloged with an absolute trigonometric parallax, p, so that their X-ray flux density F_x (ergs $cm^{-2}s^{-1}$) may be reduced to X-ray luminosity $L_x = 1.2 \times 10^{38}$ $p^{-2}F_x$ (ergs s^{-1}). Most other untargeted stars in *EO* fields, on the contrary, have not been measured for p, so that only a ratio of log F_x to an optical apparent magnitude might be given for them. This ratio is not very informative in comparison with X-ray data coupled with p.

The reprocessed production data from the *Einstein Data Bank* (cf. Harris and Irwin 1984) are the basis for this work. The primary data are centroid coordinates of each detected image, and counts s^{-1} in a detector area and detector passband, corrected for background, vignetting, mirror scattering, detector spread of image, and for interruptions of exposure after start. Catalog stars must be detected to 3σ above background to be listed as IPC imaged in the *Einstein Data*

Bank; otherwise they are listed as upper limits. Conversion of counts s^{-1} in the IPC broadband (0.2 - 3.5 keV) to F_x depends next on the generally unknown X-ray source spectrum. Although pulse-height channel counts for sufficiently strong IPC sources may be fitted to model spectra, such sources were not found here. A "hardness ratio," defined as the source counts in the 0.8 -3.5 keV channels less the source counts in the 0.2 - 0.8 keV channels, normalized to source counts in all channels, also has too large statistical errors to be a significant spectral index for most sources here. A bimodal temperature distribution for thin plasma was suggested by the *EO* Solid State Spectrometer data for the only two red dwarfs observed with it (Swank and Johnson 1982), but isothermal coronae at a single canonical temperature are assumed for all sources in this sampling. This is permissible for the derivation of F_x since it has been shown (cf. Harris and Irwin 1984) that a conversion factor of 2×10^{-11} ergs $cm^{-2}s^{-1}$ per IPC count s^{-1} reasonably well represents a large range of temperature around $kT = 1$ keV for Raymond thermal plasma spectra (Raymond and Smith 1979). White dwarfs may be exceptions to this procedure because it is believed that they are photospheric rather than coronal sources of X-rays (Kahn *et al.* 1984), and may thus require different treatment. Nevertheless formal values of the upper limits on coronal (i.e. thin-plasma) L_x will be given for the white dwarfs that fall in the survey fields.

HRI results have been briefly given earlier (Johnson 1984) but with L_x derived according to the procedure in Cash, Charles, and Johnson (1980) for a defined plasma in cooling equilibrium. In this paper the HRI flux density is converted to L_x in a way analogous to the IPC method but with the factor 6×10^{-11} ergs $cm^{-2}s^{-1}$ per HRI count s^{-1} in the band 0.15 - 4.0 keV. Among stars in HRI fields are the resolvable components of four binaries (Gl 34AB, Gl 338AB, Gl 570 AB, and Gl 669AB) which have been discussed in detail by Harris and Johnson (1985) so that it is unnecessary to include their HRI results here.

The frequent occurrence of binaries that are unresolvable with either the IPC or the HRI is a problem for X-ray astronomy. The ratio of L_x between the components is generally not known and not predictable even when several other physical parameters are well known, because L_x has been found over a large range among single stars that are optically classified alike (cf. Johnson 1983). This problem will be discussed in §III.

II. THE SAMPLE STARS

a) Optical Properties

EO targets are excluded from this work unless they must be considered in connection with blended binary-star images. In those cases where only one component of a binary is clearly specified as a target, the unspecified component will be included as an untargeted star in this study. It may not be certain whether the targeted component is the sole or even the dominant X-ray source in a blended image.

Both components of binaries with blended images (or potentially blended if undetected) are given in Table 1, the optical properties of the whole sample, so that IPC target stars in blended images are thus tabulated. The remarks column of Table 1, otherwise reserved for optical information, identifies such targets by T. T followed by an EO sequence number indicates that the star has been a target in another IPC observation than the one used in this sample, where it is untargeted. Most of the Table 1 data are from WEPP, with their notations, e.g. P attached to magnitudes that are photographic rather than V, and J attached to joint magnitudes of photometrically blended binaries. The parallax and its probable error (p.e.) in the third column are from WEPP, except for improved values in Gliese and Jahreiss (1979) and for Gl 323AB from van Altena (1985). One value of p+p.e. is assigned to all components of binaries and multiples. The Gl 395(C) parallax is based on the common proper motion (c.p.m.) noted in Hoffleit and Jaschek (1982). Following WEPP, (S) stands in place of p.e. for spectroscopic parallaxes. One binary, Gl 698AB, received p = 0".033 in Gliese and Jahreiss (1979), which removes it from the WEPP space. It is kept in the tables but is omitted from the data that are discussed in § III.

An exception to WEPP are the white dwarf data in Table 1, from McCook and Sion (1984).

Parenthetical binary-star designations are added to the Gliese/WEPP numbers when they are useful, e.g. lower-case (ab) indicates spectroscopic binaries, also found as SB in the remarks. The number in parentheses that sometimes follows SB gives the range of velocities (km s^{-1}) observed in the system, while SB1 or SB2 denote single-line or double-line SB's. Finally the notation may show that an SB orbit (O) has been published. Visual binary separation and position angle or the semi-major axis of an oribit are noted. Some binary data from Hoffleit and Jaschek (1982), attributed to C. Worley (W) supersede WEPP, and some of their data vary from WEPP, e.g. the respective identifications of components A and B in HD 10360-1. Optical as well as physical companions are noted when X-ray blending is possible. The $\underline{v}$ sin $\underline{i}$ measure of stellar rotation in km s^{-1} is sometimes available in Hoffleit and Jaschek (1982). Finally, the young disk (YD) and old disk (OD) age classification follows Eggen's (1969) kinematical definition, using velocity components in WEPP.

b) IPC Observations

The data are divided into detections in Table 2 and upper limits in Table 3. Upper limits on F_x and L_x are 3σ, computed by the EO LOCAL DETECT procedure in the broad band. The first column of Table 2 matches the corresponding names in Table 1 but omits target stars and combines binary or multiple stars with blended images into one entry. The coordinates of the IPC broadband image are followed by the difference, X-O, between the X-ray image coordinate and the WEPP optical coordinate of a single star or, arbitrarily, the first listed component of a binary or multiple, after applying proper motion to the optical coordinate from 1950 epoch to the epoch of the beginning of the X-ray exposure. The IPC broadband F_x and the 1σ statistical error follow next, then the corresponding L_x, and the U.T. epoch date. Values of L_x that depend on spectroscopic parallaxes are marked with a colon. A mean $\langle p \rangle$ = 0."046 is adopted for the blend of WEPP 9124,5,7 in an image, for their L_x.

Some stars have a detected image at one epoch but an upper limit at another, so that they enter both Table 2 and Table 3, respectively. Analysis for the probability that a star is secularly constant in X-ray emission during a given observation, typically $\sim 2 \times 10^3$ s of effective exposure, indicates possible variability by a value for the probability of less than 0.01 in Gl 490AB on 1980 June 30, WEPP 9550AB on 1981 January 10, and Gl 669AB on 1979 March 27. For the latter see Harris and Johnson (1985). All of the designated optical variables in Table 1 are flare stars, except WEPP 9550A(ab) which is an RS CVn spectroscopic binary, TZ CrB. When TZ CrB was the target in the 1979 January 28 observation the joint $\underline{L}_x$ with WEPP 9550B was double the joint $\underline{L}_x$ on 1981 January 10, but the earlier epoch does not reveal possible variability in the standard analysis despite the higher $\underline{L}_x$. Five of the stars in Table 2 had too few counts to accomplish the standard analysis for variability.

Variability over periods longer than the time devoted to one epoch, defined as one EO sequence number, may be shown by comparing the data for stars observed at more than one epoch. The result is that $\underline{F}_x$ is constant within errors at the two epochs of WEPP 9537 and WEPP 9584ABC, but a variation of $\underline{F}_x$ in Gl 659AB is more likely. The upper limits of $\underline{F}_x$ for those stars that are also detected at another epoch are generally greater than the $\underline{F}_x$ at detection, except for Gl 687(ab), which had too few counts in the detection to confirm variability.

c) HRI Observations

Table 4 presents the untargeted data, with the omissions noted in §I. Unlike IPC data the HRI upper limits are estimated from the $\underline{F}_x$ value of the weakest source detected. Gl 216A is the only HRI star without an IPC counterpart in Tables 2 or 3. The standard analysis for variability in the images of Gl 216A and Gl 216B formally resulted in a nil probability of constant $\underline{F}_x$. They are not optical variables, and the X-ray behavior is undoubtedly related to the extension of the 8479 s of net time in the processed images from a start on 1980 March 17 to an end on 1981 February 24. Gl 216C = VB1 is, unfortunately, outside the HRI field of view.

III. IPC CENSUS AND LUMINOSITY FUNCTIONS

Counting only the untargeted stars in Table 1 that contribute to the detections of Table 2 or the upper limits of Table 3, but counting known individual components of untargeted visual or spectroscopic binaries in blends, one finds seven A, eight F, 27 G, 30 K, and 63 M dwarfs (whether prefixed d or classified in the MK system), as well as fifteen F, G, or K stars without any luminosity label. All M stars without any luminosity label have been considered as dwarfs. In addition there are three white dwarfs and 36 unclassified stars. The latter have escaped classification because of faintness or membership in spectroscopic binaries. Finally, four A, F, or G stars of luminosity class III or IV make a total of 193 known stars. This is 8.4% of the 2294 known stars counted individually in WEPP. The WEPP stars in the volume 25 pc in radius are, in turn, only a small percent of the number expected from an extrapolation of the density in volumes of smaller radii where the fainter ones are more completely counted (cf. Gliese 1981). Many of the unidentified stars within any given distance may have been detected either optically or with the IPC, but they cannot be tabulated for lack of their parallaxes.

One of the incompletely solved problems of classical astronomy is the determination of the empirical luminosity function in the solar neighborhood, or the local population density of stars as a function of absolute magnitude. In order to provide an analogous general luminosity function of log $\underline{L}_x$, an unbiased sample such as the present one of WEPP stars in untargeted IPC fields is an essential starting point. This leaves open the question of whether an unbiased sample of WEPP stars is also an unbiased sample of X-ray sources within 25 pc of the Sun. Nevertheless it is clear that a luminosity function instead composed of targeted stars might be spectacularly biased toward "interesting" types. The unbiased luminosity function should show the onset and shape of the bright end under defined conditions, but underpopulation must progressively characterize the faint end. This is evident because the 3σ upper limits on 90% of the IPC-undetected WEPP stars of Table 3 are produced with less than 3×10^{-2} count s^{-1}, so that stellar $\underline{L}_x$ of 4.5×10^{28} ergs s^{-1} will usually be detected to $\underline{r} = 25$ pc, but stellar $\underline{L}_x$ of 4.5×10^{26} ergs s^{-1} only to $\underline{r} = 2.5$ pc. The threshold needed for 3σ depends on background, source position in field, and other factors. In order to use the available sample most fully, the upper limits on $\underline{L}_x$ in Table 3 will be included in the luminosity function by the method of Avni et al. (1980), which will partially correct the selection effect against weak X-ray sources.

Further selection effects are embedded in the data. The first one is the unknown share of total $\underline{L}_x$ among $\underline{n} > 1$ components of blended IPC images. The extreme alternatives are to give the total $\underline{L}_x$ to one of the components, or to give $\underline{n}^{-1}\underline{L}_x$ to each component. Let us assume that $\underline{n}$ is not greater than known from the optical information about apparently individual stars ($\underline{n} = 1$) or systems ($\underline{n} > 1$), and assign $\underline{L}_x$ to single stars and $\underline{n}^{-1}\underline{L}_x$ to each component in physical systems. This excludes optical companions that are not physical components.

Finally, any star observed more than once with different values of L_x, or upper limits on L_x, is assigned the minimum value in the range on the assumption that a quiescent state of L_x is longer lasting and more typical than flaring or other active periods.

Table 5 presents a general luminosity function for the IPC data according to the given precepts. The first column lists factor of 2 bins of L_x for the number of detected stars in the second column. Undetected stars in the third column are binned so that each upper limit on L_x is less than the geometrical mean (central value) of the adjacent higher bin, as in Avni et al. (1980). The undetected stars are redistributed in the fourth column, according to the likelihood function formulated by Avni et al. (1980), and are added to the detected stars to make the total effective number of stars in each bin of the last column. The three stars of lowest upper limits on L_x cannot be assigned to the last three bins since no stars were detected in them. The luminosity function shows that the relative number of nearby stars per equal step of log L_x increases as L_x decreases to about 3×10^{26} ergs s^{-1}, but the peak may reflect only a limitation on the power of the EO to detect less luminous sources in the WEPP sample.

Another luminosity function may be derived for the WEPP systems. This uses the blended L_x of binaries and multiples in the same way as the L_x of single stars, but excludes all systems that contain any targeted components. The luminosity function of systems foregoes the optical knowledge of systems multiplicities and avoids arbitrariness in assuming the relative luminosities of the components. Table 6 gives the results for the 126 systems, presented as in Table 5. The very luminous system at $L_x = 1.3 \times 10^{30}$ ergs s^{-1} is the RS CVn system TZ CrB which was once targeted but also once fell in an IPC field that had targeted an extragalactic radio source. As compared with the general luminosity function in Table 5, the luminosity function of WEPP systems has two peaks rather than one, but the more populous peak is again at the lower L_x. The faintest upper limits cannot be added into effective numbers in any bins below this peak.

A luminosity function for just M dwarfs follows the precepts for the general luminosity function. Several stars that are spectroscopically unclassified in Table 1 may be M dwarfs or white dwarfs according to M_v. They are excluded from the present luminosity function. All 23 detected M dwarfs are classifiable as YD or OD, but 12 of the 40 M dwarfs left undetected as upper limits on L_x lack some of the kinematical data that are required for the age classification. In Table 7 the data for detections are subdivided into YD or OD stars, but the upper limits are not so subdivided. Table 7 shows that the seven most luminous detected M dwarfs are YD, while the six least luminous are equally divided between YD and OD. The three M dwarfs with upper limits of $L_x \leq 3.4 \times 10^{26}$ ergs s^{-1} (namely Gl 283B, Gl 666B, and Gl 699 = Barnard's star) are also OD stars. The results clearly show in an unbiased way that young-disk M dwarfs tend to be more luminous X-ray sources than old-disk M dwarfs are, but with an overlap in the range $2.5 \times 10^{26} < L_x < 1.6 \times 10^{28}$ ergs s^{-1}. The effective number of M dwarfs relative to the effective number of all stars per bin in the general luminosity function fluctuates from 17% to 58%, but the percentage shows little trend through a range of 10^3 in L_x.

IV. CONCLUSIONS

Several tables exhibit the X-ray properties of the untargeted nearby stars in IPC and HRI fields of the EO. The binaries and multiples of 126 systems are usually blended in X-ray images but, when that is so, they have been optically analyzed to make a total of 193 individual stars of a wide variety. The X-ray luminosities of detected stars range over three orders of magnitude. A few of them show evidence of variability. Luminosity functions of systems, of all individual stars, and of the M dwarfs are presented, including stars with less than 3σ upper limits on L_x by resort to a special algorithm. These luminosity functions peak at the lowest detectable L_x. YD dwarf M stars occupy a range of higher L_x than OD dwarf M stars, with an overlap of ranges. A few stars with upper-limit L_x below the lowest detectable L_x are old-disk, and the EO was unable to detect stars near the faint end of the luminosity range unless they were within very few parsecs. Thus the distribution of stellar L_x below $\sim 3 \times 10^{26}$ ergs s^{-1} remains to be found in a future observational program.

This work has been done as an *Einstein* Guest Investigator program under NASA contract NAS8-36134. I thank D. E. Harris for programming the search for all of the *Einstein Data Bank* fields that contain WEPP stars, and Sherene Aram and F. D. Seward for reprocessing these fields in a timely way. W. van Altena checked a list of the systems that lacked trigonometric parallaxes in 1970 and confirmed that only Gl 323AB has since then been measured for p.

TABLE 1

Optical Properties of the IPC and HRI Samples of Stars

Gliese/ WEPP	Other Name	p±p.e. (0".001)	Spectral Type	V	M_v	Age Group	Remarks
5	ADS 69A	69±7	K0 V	6.14	5.33	YD	CaIIem,B,C,D opt.?,sep.>153"
9006	LTT 10091	45±12	m	13.8P	14.2P	...	NLTT color class
28	HD 3765	72±7	K2 V	7.35	6.64	OD	CaIIem
33	HD 4628	143±4	K2 V	5.75	6.54	OD	T5433,WAB 181".2 opt.?
35	WD 0046+051	239±1	DZ7	12.41	14.30	OD	T861
38	Wolf 33	55±4	dM2	11.5	10.2	OD	...
9035	HD 5817	40±10	dG2	8.4	6.4	OD	...
9052A	HD 7895	46±6	K1 V	8.00	6.3	OD	AB 27".8,209°
9052B	ADS 1057B	46±6	M0	10.73	9.0	OD	...
66A(ab)	HD 10360	148±7	K0 V	5.82	6.67	YD	SB
66B	HD 10361	148±7	K0 V	5.86	6.71	YD	WAB 10".8 orb.
70	LTT 10604	114±14	dM2	10.95	11.2	OD	...
9067A	+3°275	43±12	dK5	10.6	8.8	YD	AB 15"
9067B	LTT 10690	43±12	M2	12.4	10.6	YD	...
9073A	HD 13043	40±7	G2 V	6.90	4.9	OD	AB 84",339°
9073B	Ross 681	40±7	...	10.52	8.5	OD	B-V=+1.24
9074	Ross 17	46±12	M3	15.4P	13.7P	...	...
86	HD 13445	89±7	K0 V	6.12	5.87	OD	...
9087	HD 16287	44±12	K0	8.10	6.3	...	...
9092A	HD 16619	43±12	dG4	7.83J	6.0J	OD	a=0".148
9092B	ADS 2028B	43±12	...	9.0	7.2	OD	...
121	HD 18978	58±9	A5 V	4.09	2.9	YD	v sin i=144
147	HD 22484	61±5	F8 V	4.28	3.21	YD	T5455,v sin i=0
9124	Yale 781	44±11	F8	10.8	9.0	...	...
9125	Yale 782	48±13	G0	11.0	9.4	...	...
9126	HD 23232	51±13	K2	9.2	7.7	...	...
9127	Yale 786	46±11	G3	11.2	9.5	...	...
9131	HD 23585	48±13	A9 V	8.4	6.8	YD	...
9132	HD 23713	45±10	F6 V	9.5P	7.8P	YD	...
9135	HD 283066	44±16	dK6	11.4P	9.6P	...	CaIIem
9137	-37°1501	54±8	K	12.8P	11.5P	OD	...
157A	HD 24916	102±12	dK5	8.06	8.1	YD	T, AB 11",20°
157B(ab)	ADS 2894B	102±12	dM3e	11.48	11.5	YD	SB(35)
160	HD 25680	69±5	G5 V	5.90	5.09	YD	v sin i=3,WAB 170".1 opt.
9849	...	50±8	...	15.0	14.2	...	...
9850	...	58±9	...	16.5	15.3	...	...
9157(ab)	HD 28527	52±10	A6 IV	4.78J	3.4J	YD	SB, v sin i=71,WAB 250"opt.?
9158	HD 28946	43±13	K1	8.0	6.2	...	...
9159A	Aldebaran	50±5	K5 III	0.85V	-0.64V	YD	T,AB 30".4,110°,
9159B	ADS 3321B	50±5	dM2	13.2	11.7	YD	...
172	HD 232979	93±6	K8 V	8.61	8.45	YD	weak CaIIem
180	LTT 2116	83±6	M3	12.5P	12.1P	OD	...
9177	HD 33811	40±14	G5	8.71	6.7	...	...
201	HD 35171	63±5	dK5	7.97	7.0	YD	CaIIem

TABLE 1-Continued

Gliese/ WEPP	Other Name	p±p.e. (0".0001)	Spectral Type	V	M_v	Age Group	Remarks
209	HD 37124	55±11	G4 V	7.61	6.3	OD	...
9185	HD 37656	42±12	K5 V	9.32	7.4	YD	...
9186	HD 37495	46±9	F4 V	5.28	3.6	YD	v sin i=31
216A	HD 38393	123±8	F6 V	3.60	4.05	YD	AB 96".3,350°,v sin i=11
216B	HD 38392	123±8	K2 V	6.15	6.60	YD	T
9191	HD 39194	47±13	K0 V	8.09	6.5	OD	...
9205	HD 42250	43±11	dG7	7.43	5.6	OD	...
9209A	HD 44120	42±12	G3 V	6.44	4.6	OD	AB 40".6,302°,also 38".3 opt.
9209B	WD0615-591	42±12	DB4	14.09	11.42	OD	...
233A	HD 45088	64±5	dK3	6.74	5.8	YD	T,AB 1".66,304°
233B	ADS 5054B	64±5	...	13.8	12.8	YD	...
234A	V577 Mon A	246±3	dM4e	11.07J	13.02J	YD	T,a=0".98
234B	V577 Mon B	246±3	...	14.4	16.4	YD	...
250A	HD 50281	104±8	dK6	6.66	6.75	YD	T,AB 58",177°
250B	LTT 2663	104±8	M2	10.11	10.20	YD	...
263	NSV03363	60±5	M5	11.4	10.3	...	...
283A	WD0738-172	125±7	DZQ6	12.98	13.42	OD	T,AB 21",276°
283B	LTT 2916	125±7	M	17.6P	18.4P	OD	...
9248	+14°1802	56±12	dK8	10.30	9.0	YD	CaIIem
9265	+29°1754	43(S)	dK8	9.65	7.8	...	...
9269	HD 72769	40±12	dG5	7.19	5.2	YD	...
311	HD 72905	69±5	G0 V	5.64	4.83	YD	v sin i=4
9275A	HD 74385	49±12	K0	8.10	6.6	YD	AB 45",188°
9275B	LTT 3222	49±12	M1	14.6P	13.1P	YD	...
9276	HD 74772	49±11	G5 III	4.06	2.5	YD	AB 45"3,63° opt.
9278A	HD 74956	48±7	A0 V	1.95J	0.4J	YD	T,AB 2".6,153°,v sin i=40
9278B	Yale 2098(B)	48±7	...	5.1	3.5	YD	...
9278C	Yale 2098(C)	48±7	...	11.0	9.4	YD	AC 69".2,61°
9878D	Yale 9098(D)	48±7	...	13.5	11.9	YD	CD 6".2,102°
323A	+8°2131	60±5	dM0p	9.08J	8.0J	YD	AB 2".6,119°
323B	ADS 7044B	60±5	...	9.9	8.8	YD	...
324A	HD 75732	74±7	G8 V	5.97	5.32	YD	T,AB 85",129°
324B	LTT 12311	74±7	M5	13.15	12.50	YD	...
331A(ab)	NSV04329	66±6	A7 V	3.14	2.24	YD	T,AB 4".5,16°,SB10,v sin i=151
331B	LTT 12348	66±6	dM1	11.4	10.5	YD	...
331C	ADS 7114C	66±6	...	11.7	10.8	YD	a=0".680
9298	+40°2208	42(S)	dK8	9.88	8.0	OD	...
346	-8°2689	53(S)	dM0	10.49	9.1	...	...
363	LFT 672	71±11	M5	14.2P	13.5P	...	...
9316B	HD 87884	41±14	K1 V	8.14	6.2	YD	AB 177",307°
9316C	ADS 7654C	41±14	...	13.5	11.6	YD	BC 2".5,86°
9316D	ADS 7654D	41±14	...	...	...	YD	AD 217",274°,(WEPP α,δ incorrect)
384A	HD 88746	66±13	G8 V	8.12J	7.2J	YD	AB 5".3",127°
384B	Yale2403(B)	66±13	...	10.8	9.9	YD	...
9322	HD 88725	43±6	G1 V	7.76	5.9	OD	...
9324	NSV04822	51±12	F6 IV	4.80	3.3	YD	v sin i=16,δ Sct var.?
394	+56°1458	77±5	K7 V	8.69	8.1	YD	T,AB 120",304°,394=395(B),c.p.m.
395(A)	HD 90839	77±5	F8 V	4.84	4.27	YD	AC 139", v sin i=0

TABLE 1–Continued

Gliese/ WEPP	Other Name	p±p.e. (0".0001)	Spectral Type	V	M_V	Age Group	Remarks
395(C)	+57°1266	77±5	...	8.2	7.6	YD	Am: Hoffleit and Jaschek(1982)
417	HD 97334	42(S)	G0 V	6.3	4.4	YD?	WAB 138".7 opt.,v sin i≤6
9357	HD 98281	54±7	G8 V	7.30	6.0	OD	...
427	WD1121+216	78±3	DZ7	14.12	13.58	OD	...
428A	HD 99279	90±6	K7 V	7.21J	6.98J	YD	AB 5".8
428B	Yale 2645B	90±6	M0 V	8.6	8.4	YD	CaIIem
450	+36°2219	125±9	M1 V	9.78	10.26	YD	CaIIem
9394	HD 106038	41±11	F6 V-VI	10.18	8.2	OD	...
9404	+29°2279	51±10	M2 V	10.62	9.2	OD	...
461	+1°2684	60(S)	dM0	10.2	9.1	YD	CaIIem
464	HD 107888	50±10	dM2	10.4	8.9	YD	...
471	+9°2636	69±7	dM1	9.78	8.97	OD	c.p.m. with 469
475(ab)	NSV05725	109±6	G0 V	4.27	4.46	YD	SB10, v sin i ≤3
9418	+71°632	40±9	K8	9.5	7.5	OD	...
490A	+36°2322	48±6	dM0e	10.60	9.01	YD	AB 17",CaIIem
490B	NSV06039	48±6	dMe	13.16	11.57	YD	CaII strong em
9427	+35°2406	51(S)	dK8	9.34	7.9	YD	...
9441	HD 115892	51±7	A2 V	2.73	1.3	YD	v sin i=85
509A	HD 116495	54±5	dM0	8.90J	7.6J	YD	AB 0".7
509B	ADS 8887B	54±5	dK6	9.7	8.4	YD	...
513	LTT 13924	55±12	M5	13.5P	12.2P	OD	...
9447	Ross 476	47±20	dM6	14.34	12.6	...	c.p.m. with Gl 515(T),AB 500"
516A	VW Com	57±8	dM4e	11.39J	10.2J	OD	AB 3".0,22°
516B	Vyss 144B	57±8	dM4e	11.5	10.3	OD	...
527A	NSV06444	57±9	F7 V	4.50	3.3	YD	T,AB 5".4,7°,v sin i=14
527B	ADS 9025B	57±9	M2	10.6	9.4	YD	...
528A	HD 120476	87±7	dK6	7.04J	6.71J	YD	AB 2".4
528B	ADS 9031B	87±7	dK6	8.2	7.9	YD	...
534(ab)	HD 121370	102±5	G0 IV	2.68	2.72	YD	T851,SB10,v sin i=13,
536	HD 122303	92±8	dM0	9.8	9.6	...	...
9468	HD 123505	40±5	G9 V	9.68	7.7	OD	...
547	HD 126053	61±5	G1 V	6.27	5.20	OD	v sin i=1
548A	+24°2733	65±7	dM1	9.71	8.77	OD	AB 45".4,74°
548B	BDS 6869B	65±7	dM2	9.9	9.03	OD	...
549A	NSV06669	68±6	F6 V	4.06	3.22	OD	T,AB 69".2,182°,v sin i=34
549B	LTT 14246	68±6	M3	11.8P	11.0P	OD	...
9480	+24°2735	50±8	dM0	10.91	9.4	OD	...
561	+27°2411	52±18	G5	9.5	8.1	YD	...
566A	HD 131156	153±4	G8 V	4.54J	5.46J	YD	T10418, a=4".9,CaIIem,v sin i=3
566B	ADS 9413B	153±4	K5 V	6.91	7.70	YD	CaIIem
567(ab)	NSV06847	84±7	K1 V	6.04	5.66	YD	SB(25)
9515	+8°3000	42(S)	dM0	10.6	8.7	...	...
9516	HD 135379	52±10	A3 V	4.07	2.7	YD	v sin i=59
584A	NSV07054	61±4	G2 V	4.98J	3.91J	YD	a=0".839, AC 58" opt.
584B	ADS 9617B	61±4	G2 V	5.9	4.8	YD	AB=SB20
9533	HD 143291	44±5	K0 V	8.02	6.2	YD	...

TABLE 1-Continued

Gliese/ WEPP	Other Name	p±p.e. (0".001)	Spectral Type	V	M_V	Age Group	Remarks
9537	HD 143761	42±8	G2 V	5.42	3.5	OD	v sin i=7 WAB 79".6 opt.
9542(ab)	HD 144287	53±6	G8 V	7.10	5.7	OD	SB
9549	LTT 14836	64±8	...	12.24	11.3	YD	c.p.m. with 9550AB
9550A(ab)	TZ CrB	43±5	G0 V	5.66	3.8	YD	T3219,a=6".599, SB20, CaIIem
9550B	ADS 9979B	43±5	G1 V	6.72	4.9	YD	C,D opt.
619	+41°2695	83±7	dM0p	8.98	8.58	YD	...
9565	-12°4542	48(S)	dM0	10.9	9.3	OD	...
9584A	HD 154906	44±7	F7 V	4.92J	3.1J	YD	T1702, a=5".210, v sin i=13
9584B	HD 154905	44±7	F7 V	5.8	4.0	YD	v sin i=23
9584C	ADS 10345C	44±7	...	13	11	YD	ABXC 13".2,175°
9587A(ab)	HD 155125	51±7	A2 V	2.42J	1.0J	YD	T,a=0".890,SB, AC 97".9, 142° opt.
9587B	ADS 10374B	51±7	...	3.5	2.0	YD	T
9587D	ADS 10374D	51±7	...	12.34	10.9	YD	AD 100",288°, B-V=+0.83
659A	HD 155674	50±7	dK8	8.85	7.34	YD	AB 22".3,135°
659B	ADS 10386B	50±7	dK8	9.34	7.84	YD	...
666A	HD 156274	131±7	G8 V	5.48J	6.07J	OD	T,a=8".826, AC 42",279°, opt.?
666B	LTT 6887	131±7	M0 V	8.69	9.28	OD	...
669A	Ross 868	99±5	dM4e	11.36	11.25	YD	AB 16"c.p.m. Also flares.
669B	V639 Her	99±5	dM5e	12.92V	12.81V	YD	...
672	NSV08553	72±5	G1 V	5.39	4.71	OD	v sin i=0
675(ab)	HD 158633	75±5	K0 V	6.43	5.81	OD	SB(28)
687(ab)	+68°946	214±4	M4 V	9.15	10.80	OD	astr.bin., poss. SB(16)
9599	HD 161284	41±12	K0	8.4	6.5	...	...
695A	HD 161797	128±7	G5 IV	3.42	3.96	OD	T,v sin i=20, AB 34".0,247°
695B	LTT 15267	128±7	dM4	9.78	10.32	OD	a=1".360(BC),CaIIem
695C	ADS 10786C	128±7	M4	10.7	11.2	OD	...
698(A)	+18°3497	33±9	dK8	9.22	6.81	YD	AB 18".70,287°
698(B)	...	33±9	...	11.2	8.8	YD	...
699	Barnard	545±2	M5 V	9.54	13.23	OD	T4409
9609	+4°3562	40±6	dK5	9.5	7.5	YD	CaIIem
9615A	HD 165777	40±5	A4 V	3.73	1.7	YD	AB 25".4,299°
9615B	ADS 11076B	40±5	...	14	12	YD	...
707	HD 166348	73±5	K7 V	8.39	7.71	YD	CaIIem
9619	HD 168151	47±6	F5 V	5.04	3.4	YD	...
9628	Ross 713	40±8	K6	12P	10P	...	...
720A	NSV11090	68±3	dM2	9.82	8.98	YD	AB 112"
720B	VB9	68±3	...	14	13	YD	...
725A	NSV11288A	284±3	dM4	8.90	11.17	YD	T,AB 17",155°, flares: Hα abs.
725B	HD 173740	284±3	dM5	9.69	11.96	YD	BC 50" opt.
9651A	+1°3942	46±6	M0	11.0P	9.3P	...	AB 9".2,180°,Sp.Upgren
9651B	Yale 4484.1(B)	46±6	...	11.5P	9.8P	...	...
9652A	LTT 15634	42±6	K	13.0P	11.1P	...	AB 45",178°
9652B	LTT 15635	42±6	...	14.4P	12.5P	...	...
9653A	LTT 7658	104±10	M3	12.12	12.21	YD	AB 27".2,308°
9653B	WD 1917-077	104±10	DBZ5	12.24	12.24	YD	T(WD is not comp. A)

TABLE 1-Continued

Gliese/ WEPP	Other Name	p±p.e. (0".001)	Spectral Type	V	M_v	Age Group	Remarks
9658	HD 183650	49±7	dG5	6.97	5.4	OD	...
765A	HD 185395	56±9	F5 IV	4.47	3.2	YD	T,AB 4".2,53° AC=40.4 opt.
765B	ADS 12695B	56±9	...	13.0	11.7	YD	...
766A	Ross 165	94±5	dM4e	12.7	12.6	...	AB 0".9, 247°
766B	Yale 4646(B)	94±5	...	13.7	13.6	...	...
9699(ab)	HD 195987	51±5	G9 V	7.09	5.65	YD	SB(29)
9705	Ross 766	40±7	dM3	11.5	9.5	OD	...
9707A(ab)	HD 197989	46±8	K0 III	2.46	0.8	YD	T,SB,CaIIem, AB 54".9,272° opt.
9707C	LTT 16072	46±8	dM4	13.4	11.7	YD	AC 78".1, 265°
830	HD 204587	61±7	M0 V	9.10	8.0	OD	...
9747	Ross 201	44±13	M4	16.3P	14.5P	...	...
849	-5°5715	112±5	dM3	10.42	10.67	YD	...
851	Ross 271	83±5	dM2	10.1	9.7	YD	CaIIem
9779(ab)	NSV 14132	42±5	A0 V	3.85	2.0	YD	SB,AB 37".4,140° opt.
889	HD 218294	53(S)	dM0	9.68	8.3	OD	...
9812A	HD 218641	40±10	G2 V	4.68J	2.7J	YD	AB 0".4,70
9812B	HD 218640	40±10	A2	5.6	3.6	YD	...
894	-42°16263	62±11	K5	10.3	9.3	...	...
900	+0°5017	59±10	dM1	9.59	8.4	YD	CaIIem
9842	LTT 17032	50±12	M5	17.0	15.5P	...	...
909A(ab)	HD 223778	93±4	K3 V	6.40	6.24	YD	T,SB20, AB 4".6,95°
909B	ADS 17062B	93±4	M0	11.8	11.6	YD	...
910	+28°4660	60±11	dM0	9.74	8.6	YD	CaIIem, AB 10" opt.

TABLE 2

The IPC Detections

Gliese/ WEPP	α (1950)			X-O (s)	δ (1950)			X-O (")	F_x (ergs $cm^{-2}s^{-1}$)	L_x (ergs s^{-1})	Epoch
5	0^h	4^m	$2^s.5$	+0.6	+28°	44′	37″	+0	(3.2±0.4)-12	(8.1±1.0)+28	79 Jun 27
9052AB	1	16	6.2	-0.7	-1	07	47	-3	(7.1±2.4)-14	(4.0±1.4)+27	80 Jul 13
66A(ab)B	1	38	0.1	+5.1	-56	27	42	+49	(3.9±0.9)-13	(2.1±0.5)+27	79 Nov 21
86	2	08	29.6	-2.0	-51	04	14	+33	(2.4±0.8)-13	(3.7±1.2)+27	80 Jun 3
9087	2	34	12.2	+2.5	-3	21	49	+33	(3.7±0.8)-13	(2.3±0.5)+28	80 Jul 11
9124,5,7	3	41	21.5	+4.5	+27	37	52	-42	(8.7±0.9)-13	(4.9±0.5)+28	81 Feb 7
9124,5,7	3	41	22.3	+5.3	+24	38	08	-26	(6.1±1.9)-13	(3.5±1.1)+28	81 Feb 8
9124,5,7	3	41	21.0	+4.0	+24	37	32	-62	(5.9±1.0)-13	(3.3±0.6)+28	81 Feb 8
157B(ab)	3	54	58.6	+2.0	-1	18	26	+21	(1.2±0.2)-12	(1.4±0.2)+28	80 Mar 1
160	4	02	21.4	-1.0	+21	52	21	-5	(1.5±0.1)-12	(3.7±0.3)+28	81 Feb 1
9850	4	19	28.1	+9.8	+19	23	35	+97	(1.1±0.5)-13	(3.9±1.4)+27	81 Feb 10
172	4	33	41.0	+3.0	+52	46	07	+99	(1.4±0.5)-13	(1.9±0.7)+27	80 Mar 12
201	5	20	44.4	+0.8	+17	17	13	+31	(2.0±1.1)-13	(6.2±3.3)+27	79 Sep 10
9186	5	35	47.8	+0.9	-28	43	03	-2	(7.0±0.4)-13	(4.0±0.2)+28	79 Mar 28
233B	6	23	14.5	+0.8	+18	47	06	-6	(5.9±0.3)-12	(1.7±0.1)+29	80 Apr 1
234B	6	26	52.7	+0.2	-2	46	27	+5	(2.0±0.1)-12	(4.0±0.2)+27	80 Oct 11
250B	6	49	50.4	-0.5	-5	06	17	+85	(6.4±1.0)-13	(7.1±1.2)+27	80 Mar 22
311	8	34	44.6	-2.3	+65	12	06	+21	(3.0±0.3)-12	(7.5±0.8)+28	79 Apr 29
9276	8	42	36.6	-0.4	-42	27	51	+9	(1.4±0.4)-12	(6.8±2.2)+28	80 May 31

9278BCD	8	43	20.3	+1.2	-54	31	24	+8	(6.9±0.1)-13	(3.6±0.6)+28	79 Jul 19
324B	8	49	36.9	+1.0	+28	30	26	+51	(5.5±1.4)-14	(1.2±0.3)+27	79 Oct 28
331BC	8	55	49.8	+3.1	+48	13	53	-24	(5.5±1.4)-13	(1.5±0.4)+28	79 Oct 30
9298	9	24	20.2	-0.2	+39	42	40	-46	(3.9±0.7)-13	(2.6±0.5)+28:	79 Oct 19
9316BC	10	05	31.4	-1.1	+12	13	57	+33	(3.0±0.9)-13	(2.1±0.7)+28	79 May 23
384AB	10	10	55.9	-0.6	-47	13	59	-16	(3.0±06)-13	(8.2±1.8)+27	79 Dec 15
395(AC)	10	27	12.6	-12.8	+56	15	14	+57	(7.1±1.4)-13	(1.4±0.3)+28	80 May 24
417	11	09	49.2	-0.9	+36	05	38	+25	(5.0±1.0)-13	(3.4±0.6)+28:	79 May 23
450	11	48	31.5	+0.8	+35	33	44	+49	(2.4±0.6)-13	(1.8±0.4)+27	79 Dec 12
9404	12	17	01.2	+6.6	+28	39	16	-17	(8.0±2.6)-14	(3.7±1.2)+27	80 Jun 27
475(ab)	12	31	24.7	+4.6	+41	38	14	+23	(1.0±0.4)-13	(1.1±0.4)+27	79 Dec 8
490AB	12	55	19.1	+0.8	+35	29	48	+6	(1.4±0.2)-12	(7.3±1.3)+28	78 Dec 18
490AB	12	55	17.4	-0.9	+35	29	50	+8	(1.2±0.04)-12	(6.0±0.2)+28	80 Jun 30
509AB	13	21	12.6	-0.4	+29	28	16	-93	(1.4±0.5)-13	(5.6±2.1)+27	79 Dec 13
516AB	13	30	19.9	+1.3	+17	04	10	+4	(2.1±0.7)-13	(7.6±2.5)+27	79 Dec 20
527B	13	44	52.9	+1.0	+17	42	18	-1	(2.3±0.2)-12	(8.6±0.7)+28	81 Jan 26
534(ab)	13	52	17.0	-0.9	+18	38	40	-3	(3.9±0.8)-13	(4.5±0.9)+27	81 Jan 11
549B	14	25	29.7	+0.5	+52	04	42	0	(6.7±0.2)-12	(1.7±0.05)+29	80 Jan 2
566AB	14	49	05.7	+0.4	+19	18	26	+5	(9.6±0.5)-12	(4.9±0.2)+28	80 Aug 11
567(ab)	14	51	07.0	+1.0	+19	21	47	+29	(2.0±0.3)-12	(3.5±0.5)+28	81 Jan 24
584AB	15	21	09.8	+1.5	+30	27	51	-3	(2.6±0.6)-13	(8.4±1.9)+27	81 Jan 11
9537	15	59	07.3	-0.2	+33	24	47	-122	(2.8±0.7)-13	(1.9±0.5)+28	79 Aug 15
9537	15	59	06.7	+1.2	+33	24	32	-137	(4.4±1.0)-13	(3.0±0.7)+28	80 Jan 20
9550B	16	12	48.3	+0.9	+33	59	08	+11	(4.3±0.1)-11	(2.8±0.1)+30	79 Jan 23
9550A(ab)B	16	12	48.8	+1.5	+33	59	01	+4	(2.0±0.3)-11	(1.3±0.2)+30	81 Jan 10
9584BC	17	04	17.4	+0.7	+54	32	12	+4	(2.8±0.2)-12	(1.7±0.1)+29	79 Jul 25
9584ABC	17	04	17.8	+1.1	+54	32	25	+17	(2.0±0.2)-12	(1.2±0.1)+29	80 Mar 12

9584ABC	17	04	10.0	-6.7	+54	32	21	+13	(2.3±0.2)-12	(1.4±0.1)+29	80 Apr 8
659AB	17	09	13.1	+4.8	+54	32	53	-27	(1.9±0.7)-13	(9.3±3.5)+27	80 Mar 14
659AB	17	09	11.8	+3.5	+54	32	59	-21	(5.5±1.1)-13	(2.6±0.5)+28	80 Apr 8
669AB	17	17	55.2	+1.7	+26	32	53	-7	(3.0±0.2)-12	(3.7±0.3)+28	79 Mar 27
687(ab)	17	36	49.6	+9.6	+68	22	38	+10	(1.0±0.3)-12	(2.7±0.7)+27	80 May 29
695BC	17	44	30.5	+3.2	+27	44	52	+32	(1.8±0.4)-13	(1.3±0.3)+27	79 Aug 27
698(AB)	17	53	34.1	+0.1	+18	30	07	-16	(2.9±0.9)-13	(3.2±1.0)+28	79 Oct 11
9619	18	13	41.9	+4.3	+64	23	22	+33	(1.1±0.3)-12	(6.0±1.7)+28	80 May 25
725B	18	42	10.6	+1.8	+59	34	47	+54	(3.9±1.1)-13	(5.8±1.7)+26	79 Nov 8
9652AB	19	12	32.1	+4.4	+19	13	33	-56	(1.4±0.2)-12	(9.6±1.2)+28	81 Apr 10
765B	19	35	06.4	+0.5	+50	06	24	-1	(8.0±1.5)-13	(3.1±0.6)+28	79 Oct 28
9705	20	41	00.0	+2.2	+35	17	35	-85	(2.1±0.6)-13	(1.5±0.5)+28	80 Apr 30
849	22	06	59.0	-3.2	-04	54	26	-74	(2.1±0.5)-13	(2.0±0.5)+27	80 May 31
900	23	32	27.5	+0.8	+01	19	10	-33	(1.2±0.2)-12	(4.0±0.7)+28	79 Dec 20
909B	23	49	51.9	-7.7	+75	16	17	+21	(1.2±0.3)-12	(1.6±0.4)+28	80 Oct 12
909B	23	49	50.9	-8.7	+75	16	42	+46	(1.6±0.4)-12	(2.2±0.5)+28	80 Oct 14
909B	23	49	48.3	-11.3	+75	15	38	-18	(1.0±0.2)-12	(1.4±0.3)+28	81 Feb 1

TABLE 3

The IPC Upper Limits

Gliese/ WEPP	F_x (ergs cm^{-2}s^{-1})	L_x (ergs s^{-1})	Epoch
9006	<7.1-14	<4.2+27	80 Jan 1
9006	<3.6-14	<2.1+27	80 Jun 15
9006	<5.3-14	<3.1+27	81 Jan 2
28	<6.6-14	<1.5+27	79 Jan 23
33	<1.9-13	<1.1+27	79 Jun 27
35	<1.9-13	<4.2+26	81 Jan 5
38	<1.2-12	<4.7+28	79 Jul 12
9035	<6.6-14	<4.9+27	80 Mar 20
70	<2.1-13	<2.0+27	79 Jul 23
9067AB	<1.2-13	<7.6+27	80 Jul 13
9073AB	<2.9-13	<2.2+28	80 Jan 18
9074	<1.4-13	<7.8+27	80 Jul 26
9092AB	<1.2-13	<7.6+27	80 Jul 14
121	<1.5-13	<5.3+27	80 Aug 12
147	<6.2-14	<2.0+27	79 Jan 27
147	<2.1-13	<6.8+27	79 Jul 29
147	<1.8-13	<5.8+27	79 Aug 13
9126	<1.1-13	<4.9+27	81 Feb 7
9131	<1.5-13	<7.8+27	80 Feb 16
9131	<2.5-13	<1.3+28	81 Feb 7
9131	<2.3-13	<1.2+28	81 Feb 7
9131	<1.4-13	<7.5+27	81 Feb 8
9131	<2.2-13	<1.1+28	81 Feb 8

9131	<1.3-13	<6.9+27	81 Feb 8
9132	<1.8-13	<1.0+28	80 Feb 16
9132	<2.2-13	<1.3+28	81 Feb 8
9135	<1.6-13	<1.0+28	81 Feb 7
9137	<2.2-13	<9.2+27	80 Feb 19
9137	<3.1-13	<1.3+28	80 Aug 11
9849	<1.2-13	<3.0+27	80 Feb 15
9849	<1.5-13	<3.8+27	81 Feb 10
9850	<1.1-13	<3.9+27	80 Feb 15
9157(ab)	<1.8-13	<7.9+27	79 Sep 10
9157(ab)	<4.3-13	<1.9+28	79 Sep 11
9157(ab)	<6.5-14	<2.9+27	81 Jan 31
9158	<6.1-14	<3.9+27	79 Mar 8
9158	<3.9-14	<2.5+27	79 Aug 15
9158	<1.9-13	<1.2+28	79 Aug 15
9159B	<1.9-13	<9.3+27	80 Mar 2
180	<1.7-13	<3.0+27	79 Aug 17
9[illegible]7[illegible]	<3.9-13	<2.9+28	80 Apr 8
209	<1.3-13	<5.3+27	80 Oct 12
9185	<5.4-13	<3.7+27	80 Dec 12
9191	<3.0-13	<1.6+28	79 Apr 8
9191	<4.6-13	<2.5+28	79 Apr 10
9191	<2.4-13	<1.3+28	80 Feb 11
9205	<1.6-13	<1.0+28	80 Mar 9
9209AB	<7.3-14	<5.0+27	79 Nov 6
263	<1.0-13	<3.5+27	79 Oct 29
263	<1.0-13	<3.5+27	81 Apr 24

283B	<8.9-14	<6.8+26	79 Oct 10
9248	<2.3-13	<8.8+27	81 Mar 27
9265	<9.6-14	<6.3+27:	79 Apr 12
9269	<1.1-13	<8.6+27	81 Apr 15
9275AB	<9.0-13	<4.5+28	78 Dec 18
323AB	<8.2-13	<2.7+28	79 Oct 22
346	<6.3-13	<2.7+28:	79 May 24
363	<1.8-13	<4.3+27	80 Apr 30
9316D	<1.1-13	<8.1+27	79 May 23
9322	<1.4-13	<9.4+27	79 Dec 7
9324	<3.0-13	<1.4+28	80 May 13
9357	<5.6-13	<2.3+28	79 Jun 20
427	<1.3-13	<2.6+27	79 May 23
428AB	<5.2-13	<7.7+27	79 Jul 13
9394	<9.2-14	<6.6+27	79 Dec 6
9394	<2.4-13	<1.7+28	80 Jun 24
9404	<2.2-13	<1.0+28	80 Jun 30
461	<4.2-13	<1.4+28:	79 Jan 7
464	<1.1-12	<5.4+28	79 Jul 2
471	<1.9-12	<4.7+28	80 Jun 19
9418	<7.0-13	<5.2+28	79 Apr 28
9427	<1.6-13	<7.2+27:	80 Jul 4
9441	<2.0-13	<9.1+27	80 Jan 10
513	<1.5-13	<5.9+27	81 Jan 29
9447	<2.2-13	<1.2+28	79 Jul 1
9447	<2.5-13	<1.4+28	79 Aug 1
528AB	<2.2-13	<3.5+27	78 Dec 24

534(ab)	<5.4-13	<6.2+27	79 Jan 24
536	<2.0-13	<2.9+27	79 Jan 23
9468	<7.4-13	<5.6+28	79 Aug 28
547	<1.0-13	<3.3+27	80 Jul 11
548AB	<3.7-13	<1.1+28	80 Jan 23
9480	<2.1-13	<1.0+28	80 Jan 23
561	<1.3-13	<5.6+27	80 Jan 21
9515	<3.8-13	<2.6+28:	79 Jul 22
9516	<2.0-13	<8.9+27	80 Aug 15
9533	<2.4-13	<1.5+28	79 Jan 29
9533	<4.8-13	<3.0+28	79 Aug 15
9542(ab)	<1.3-13	<5.4+27	79 Jan 29
9549	<2.1-13	<6.1+27	79 Jan 28
9549	<2.8-13	<8.1+27	80 Aug 15
9549	<3.8-13	<1.1+28	81 Jan 10
619	<1.0-13	<1.8+27	79 Jul 30
9565	<3.5-13	<1.8+28:	80 Aug 30
9587D	<1.2-13	<5.7+27	79 Sep 22
666B	<8.1-14	<5.7+26	80 Oct 3
672	<8.6-14	<2.0+27	80 Aug 11
675(ab)	<9.4-13	<2.0+28	80 May 25
675(ab)	<5.8-13	<1.2+28	80 May 27
687(ab)	<6.4-13	<1.7+27	80 May 26
9599	<6.1-13	<4.3+28	80 May 27
699	<3.2-13	<1.3+26	80 Mar 23
699	<1.8-13	<7.3+25	81 Apr 7
9609	<1.5-13	<1.2+28	79 Sep 26

9609	<2.3-13	<1.7+28	79 Sep 26
9615AB	<1.8-12	<1.4+29	80 Oct 8
707	<3.9-13	<8.7+27	80 Mar 9
9628	<1.2-13	<9.0+27	80 Mar 21
9628	<1.6-13	<1.2+28	80 Mar 23
720A	<1.0-13	<2.7+27	79 Oct 8
720B	<1.1-13	<2.9+27	79 Oct 8
9651AB	<1.2-12	<6.6+28	80 Oct 8
9653A	<1.7-13	<1.8+27	79 Oct 22
9658	<1.6-13	<7.9+27	79 Apr 11
766	<2.6-13	<3.5+27	79 Nov 20
9699(ab)	<1.2-13	<5.5+27	78 Dec 17
9707C	<1.3-13	<7.5+27	79 Nov 23
830	<4.3-13	<1.4+28	80 Jun 10
9747	<2.7-13	<1.7+28	80 Jul 8
851	<2.3-13	<4.0+27	80 Jun 15
9779(ab)	<2.3-13	<1.6+28	79 May 20
889	<2.3-13	<9.8+27:	79 May 24
889	<5.1-13	<2.2+28:	79 May 25
9812AB	<1.5-13	<1.1+28	79 May 24
9812AB	<1.4-13	<1.0+28	79 May 25
894	<2.6-13	<8.1+27	79 Nov 20
894	<2.2-13	<6.7+27	79 Nov 21
894	<2.0-13	<6.4+27	80 May 15
894	<2.2-13	<6.9+27	80 May 17
894	<1.3-13	<3.9+27	80 Jun 6
9842	<9.0-14	<4.3+27	80 Jan 10
910	<2.8-13	<9.2+27	79 Jan 8
910	<3.7-13	<1.2+28	79 Jun 16

TABLE 4

The HRI Dections and Upper Limits[a]

Gliese/ WEPP	(1950)	X - O	(1950)	X - O	F_x (ergs $cm^{-2}s^{-1}$)	L_x (ergs s^{-1})	Epoch
216A[b]	$5^h42^m22\overset{s}{.}04$	$+0\overset{s}{.}04$	$-22°27'59\overset{''}{.}4$	$+0\overset{''}{.}3$	$(7.2\pm2.1)-13$	$(5.7\pm1.7)+27$	80 Mar 17
324B	...	...	...	...	<6.0 -14	<1.3 +27	80 May 12
9549	...	...	...	...	<3.6 -13	<1.1 +28	79 Aug 24
695BC	...	...	...	...	<6.0 -13	<4.4 +27	80 Oct 2

[a] Cf. §I regarding omission of Gl 34AB, Gl 338AB, Gl 570AB, and Gl 669AB.

[b] No IPC data.

TABLE 5

IPC Luminosity Function of 193 Untargeted Individual WEPP Stars

L_x (ergs s^{-1})	Number of Detected Stars	Number of Undetected Stars	Redistributed Undetected Stars	Effective Number of Stars
(2.56 - 5.12)+29	3	0	0	3
(1.28 - 2.56)+29	0	0	0	0
(6.4 - 12.8)+28	5	0	0	5
(3.2 - 6.4)+28	11	7	0	11
(1.6 - 3.2)+28	11	7	1	12
(8 - 16)+27	10	13	2	12
(4 - 8)+27	12	28	7	19
(2 - 4)+27	12	28	16	28
(1 - 2)+27	7	19	22	29
(5 - 10)+26	5	7	30	35
(2.5 - 5)+26	3	2	33	36
(1.25 - 2.5)+26	0	2	...	...
(6.25 - 12.5)+25	0	0	...	...
(3.12 - 6.25)+25	0	1	...	...

TABLE 6

IPC Luminosity Function of 126 Untargeted WEPP Systems

L_x (ergs s^{-1})	Number of Detected Systems	Number of Undetected Systems	Redistributed Undetected Systems	Effective Number of Systems
(1.02 - 2.05)+30	1	0	0	1
(5.12 - 10.2)+29	0	0	0	0
(2.56 - 5.12)+29	0	0	0	0
(1.28 - 2.56)+29	0	0	0	0
(6.4 - 12.8)+28	5	1	0	5
(3.2 - 6.4)+28	10	6	1	11
(1.6 - 3.2)+28	4	7	0	4
(8 - 16)+27	4	12	1	5
(4 - 8)+27	4	28	5	9
(2 - 4)+27	6	22	22	28
(1 - 2)+27	4	9	56	60
(5 - 10)+26	0	1	...	...
(2.5 - 5)+26	0	1	...	...
(1.25 - 2.5)+26	0	0	...	...
(6.25 - 12.5)+25	0	0	...	...
(3.12 - 6.25)+25	0	1	...	...

TABLE 7

IPC Luminosity Function of 63 Untargeted WEPP M Dwarfs

L_x (ergs s^{-1})	Number of Detected Stars YD	CD	Total	Number of Undetected Stars	Redistributed Undetected Stars	Effective Number of Stars
(6.4 - 12.8)+29	1	0	1	0	0	1
(3.2 - 6.4)+28	4	0	4	3	0	4
(1.6 - 3.2)+28	2	0	2	3	0	2
(8 - 16)+27	0	1	1	7	1	2
(4 - 8)+27	2	0	2	5	1	3
(2 - 4)+27	4	3	7	11	9	16
(1 - 2)+27	1	1	2	6	6	8
(5 - 10)+26	1	0	1	2	5	6
(2.5 - 5)+26	1	2	3	0	15	18
(1.25 - 2.5)+26	0	0	0	2	...	...
(6.25 - 12.5)+25	0	0	0	0	...	...
(3.12 - 6.25)+25	0	0	0	1	...	...

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Hugh M. Johnson: Department 91-20, Building 255, Lockheed Missiles and Space Company, 3170 Porter Drive, Palo Alto, CA 94304