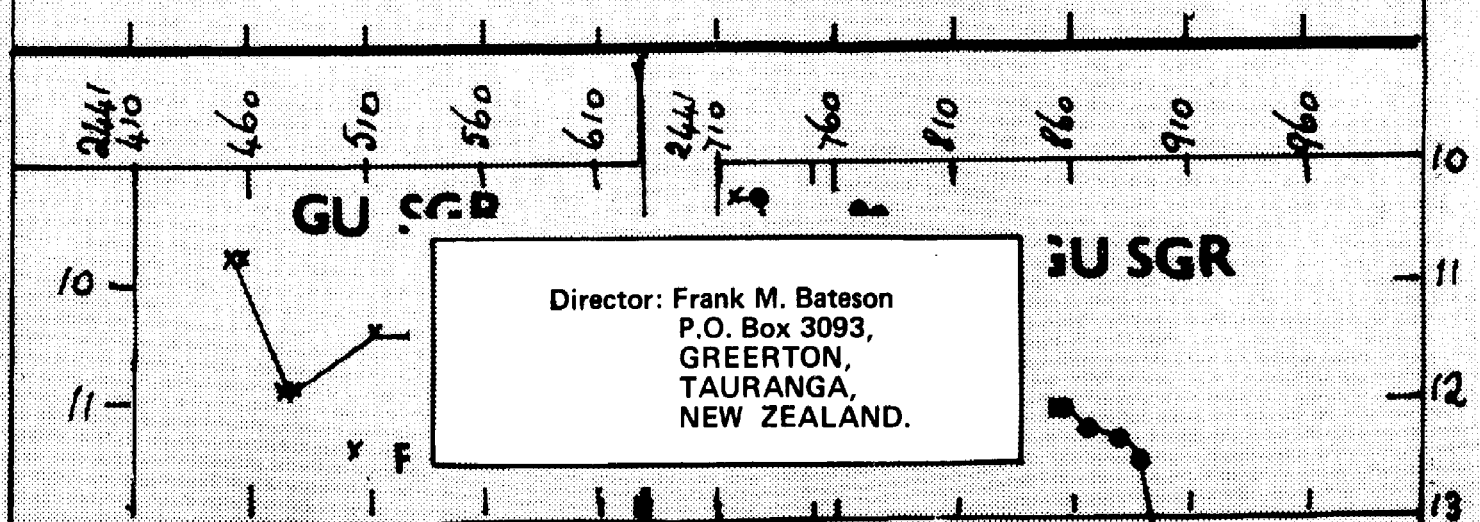


FIGURE 5

PUBLICATIONS of VARIABLE STAR SECTION, ROYAL ASTRONOMICAL SOCIETY OF NEW ZEALAND



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RESULTS FROM ANOTHER FIFTEEN YEARS MONITORING OF Z CHAMAELEONTIS

Frank M. Bateson
 Director, VSS., RASNZ.
 P.O.Box 3093, Greerton
 Tauranga, New Zealand.

SUMMARY: Seventy-seven outbursts of Z Cha were recorded between 1977 and 1991. Details are tabulated and the light curve reproduced. The main features for normal and super-maxima are given. The mean cycle for normal maxima is 51.3 days and 217.6 days for supermaxima. The latter have a mean maximum visual magnitude of 12.1 and a mean duration of 9.8 days compared to 12.6 and 0.92 days for normal maxima.

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1. INTRODUCTION.

Z Cha has now been monitored by members of the Variable Star Section, R.A.S.N.Z., for 38 years. Results for 1954-1976 were summarised by Bateson (1). These are now continued for 1977-1991.

2. OBSERVATIONS

All observations were made visually by members of the Variable Star Section using the same sequence of comparison stars as given in the previous paper. Coverage has been excellent with the result that there are few gaps in the records, none longer than 5 days. A summary of the salient features of super maxima are given in Table 1 and for normal maxima in Table 2. Table 3 lists the supermaxima observed, whilst all observed maxima are listed in Table 4.

The light curve is shown in Figs. 1 to 7 with enlarged light curves for portions of superoutbursts Nos. 147 and 162 are shown in Figs. 8 and 9.

I have used the original records, giving due weight to the sky conditions and degree of reliability given to each observation by observers. The degree of observational experience was also taken into account.

3. DISCUSSION

Z Cha is a fascinating member of the SU UMa sub-class of dwarf novae, having both normal and supermaxima. The orientation of this system enables eclipses to be observed. The star therefore attracts considerable professional interest with the result that the V.S.S. has taken part in many cooperative programmes for which it has supplied alert notices and resultant visual light curves. These facts account for the very close attention given by observers to Z Cha.

(a) SUPEROUTBURSTS

Since observations commenced in 1954 there have been 13 consecutive intervals of 1,000 days. The 51 supermaxima observed give a mean of four in every one thousand days. However, during the first 5,000 days only 16 supermaxima were observed and I conclude that some passed unobserved. The better coverage in the following 8,000 days included 35 superoutbursts and probably none were missed. It appears that in any interval of 1,000 days four or five supermaxima will occur.

Table 3 lists the 25 supermaxima observed between 1 January, 1977 and 31 July, 1991.

The dates of maxima and their magnitudes are for the top of the initial rise, which can be determined accurately. In some outbursts, but not all, Z Cha varied slightly around a few tenths of a magnitude brighter than shown in column 4 of Table 3. The width in column 5 is defined as the time the variable spent, in days, between magnitude 13.0 on the rise and fall as used in the earlier paper.

Columns 6 and 7 give respectively the intervals, in days, from the normal maximum preceding and following each supermaximum. The mean cycle for the supermaxima in Table 3 is 217.6 days, which is shorter than the 286.5 days in the earlier paper. That result reflects the better coverage in the more recent interval. For the same reason the intervals now found between supermaxima and the normal maxima that immediately preceding and following are shorter than previously found.

The following table summarises the main features of supermaxima.

TABLE No. 1.

Z Cha-SUMMARY OF SUPERMAXIMA.

MEAN CYCLE	217.6 days (25)
RANGE OF INTERVALS BETWEEN SUCCESSIVE SUPERMAXIMA:	160.4 - 265.7 days (25)
MEAN VISUAL MAXIMUM MAGNITUDE	12.1 (25)
RANGE IN MAXIMA MAGNITUDES	11.6 - 12.5 (25)
MEAN WIDTH AT MAXIMUM	9.8 days (25)
RANGE IN WIDTHS AT MAXIMA	5.5 - 14.4 days (25)
NORMAL MAXIMA TO SUPERMAXIMA--MEAN	85.5 days (24)
" " " " RANGE	46.4 to 238.0 days (24)
SUPERMAXIMA TO NORMAL MAXIMA--MEAN	71.7 days (23)
" " " " --RANGE	41.0 to 163.4 days (23)

(b) NORMAL MAXIMA

Table 4 provides a complete list of all observed outbursts. The number given to each outburst continues those listed in the earlier paper. The intervals in column 5 are those between outbursts, irrespective of whether they are probably consecutive, or not. The last column shows the number of positive estimates made during each maximum. These totals reflect how well an outburst was observed and, especially for supermaxima, the monitoring of eclipses.

Normal maxima have a mean maximum magnitude of 12.6 which means that their mean width at magnitude 13.0 is extremely short, just under one day. This also implies that it is highly probable that some passed unobserved. Of the 52 normal outbursts observed 27 appear to be consecutive.

The main parameters of normal maxima are shown in Table 2, in which the figures in brackets indicate the number of maxima used to determine each value.

The mean cycle for the 27 normal considered to be consecutive is 51.3 days which is much shorter than the 82.40 days of the previous paper. This result is a reflection of the better coverage in the last 15 years. The mean cycle for all maxima in Table 4 that are probably consecutive is 55.1 days compared to 93.35 days found in the earlier paper.

TABLE No. 2.Z Cha---SUMMARY OF NORMAL MAXIMA.

MAEN CYCLE	51.3 days (27)
RANGE OF INTERVALS OF CONSECUTIVE MAXIMA	27.0 - 88.9 days (27)
MEAN MAXIMUM VISUAL MAGNITUDE	12.6 (51)
RANGE OF MAGNITUDES AT MAXIMA	11.9 - 13.2 (51)
MEAN WIDTH AT MAXIMUM	0.92 days (40)
RANGE OF WIDTHS AT MAXIMA	0.1 - 2.3 days (40)

(c) ECLIPSES.

Results of visual timings of eclipses will appear in a separate paper.

4. CONCLUSIONS

Z Cha has a mean cycle of 55.1 days with the mean reoccurrence time for super outbursts being 217.6 days and for normal outbursts 51.3 days. All these cycles are shorter than previously found due to very close monitoring in the last 15 years. Even then it is probable that some normal maxima have gone unobserved owing to their very short duration. Super maxima are, on average, half a magnitude brighter than normal maxima.

ACKNOWLEDGEMENTS

It is a real pleasure to thank all observers for the care and accuracy with which they have monitored Z Cha over such a long interval. I thank Don Brunt and Ranauld McIntosh for computer processing of the records and for the light curves used in this paper.

REFERENCE

- (1) Bateson, F.M. 1978. Mon. Not.R. astr. Soc. 184, 567 & Microfiche MN 184/1

TABLE 3

Z Cha - OBSERVED SUPER OUTBURSTS

Outburst No.	J.D. Max 24... ..	Interval d.	Max Mag _v	Width 13.0 I-D d	Int. from Preceding Max n d	Int. to Following Max n d
89	43,146.3	202.4	12.3	10.1	46.4	97.6
92	366.8	220.5	11.6	5.8	61.9	85.1
95	590.9	224.1	12.3	8.9	79.9	41.0
100	833.9	243.0	12.0	11.6	53.9	49.0
105	44,058.6	224.7	11.8	10.8	70.7	46.3
109	285.0	226.4	11.8	10.9	61.0	47.8
112	486.9	201.9	12.3	10.6	65.2	125.1
115	719.8	232.9	12.4	10.5	60.0	45.0
117	908.9	189.1	12.4	6.9	144.1	63.0
121	45,114.8	205.9	12.1	11.1	52.7	47.0
124	311.9	197.1	12.1	12.9	46.8	43.9
129	560.2	248.3	12.0	8.8	54.0	140.7
131	825.9	265.7	11.6	9.2	125.0	42.8
133	46,061.9	236.0	12.1	11.5	187.2	48.0
137	244.6	182.7	12.4	9.9	61.7	44.1
139	405.0	160.4	12.1	14.4	116.3	77.3
143	655.2	250.2	12.2	6.1?	70.4	43.8?
147	885.9	230.7	12.0	12.0	238.0	?
148	47,123.9	238.0	11.7	8.4	?	65.1
151	331.9	208.0	12.3	5.5?	71.0	95.2
154	548.9	217.0	12.3	9.5?	62.9?	63.9
156	744.6	195.7	12.5	10.5	131.8	163.4
158	974.9	230.3	11.8	11.3	66.9	53.9
161	48,171.9	197.0	12.5	9.5	78.1	120.0
164	384.8	212.9	12.0	9.6	47.4	?

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TABLE 4

Z Cha - OBSERVED OUTBURSTS

No.	Type	J.D. Max 24	Mag v	Int d	13.0 I	13.0 D	Width d	No. Obs.
88	N	43,099.9	12.5	51.1	099.0	100.9	1.9	34
89	S	146.3	12.3	46.4	145.7	155.8	10.1	55
90	N	243.9	12.6	97.6	243.4	244.8	1.4	63
91	N	304.9	12.7	61.0	304.0	305.3	1.3	4
92	S	366.8	11.6	61.9	366.2	372.0	5.8	81
93	N	451.9	12.8	85.1	451.9	453.0	1.1	3 (1)
94	N	511.0	13.2	59.1	-	-	-	1 (2)
95	S	590.9	12.3	79.9	589.9	598.8	8.9	66
96	N	631.9	12.8	41.0	631.8	632.0	0.2	25
97	N	665.8	12.5	33.9	665.5	666.1	0.6	7
98	N	727.1	12.1	61.3	726.8	728.3	1.5	10
99	N	780.0	12.8	52.9	779.7	780.2?	0.5	4
100	S	833.9	12.0	53.9	833.5	845.1	11.6	112
101	N	882.9	12.4	49.0	882.8	883.0	0.2	8
102	N	909.9	13.1	27.0	-	-	-	9
103	N	943.?	12.8?	33.1?	-	-	-	1 (3)
104	N	987.9	12.6	44.9?	987.0	988.0	1.0	5
105	S	44,058.6	11.8	70.7	058.0	068.8	10.8	68
106	N	104.9	12.6	46.3	104.9	105.0	0.1	2 (4)
107	N	160.?	13.2?	55.1?	-	-	-	1 (5)

TABLE 4 Continued

Z Cha - OBSERVED OUTBURSTS

No.	Type	J.D. Max 24	Mag v	Int d	13.0 I	13.0 D	Width d	No. Obs
108	N	44,234.0	12.5	74.0?	233.9	236.0	2.1	15
109	S	285.0	11.8	61.0	284.9	295.8	10.9	33
110	N	332.8	12.8	47.8	332.7	333.6	0.9	6
111	N	421.7?	11.9	88.9	421.?	422.8	1.8?	8 (6)
112	S	486.9	12.3	65.2?	485.9	496.5	10.6	49
113	N	612.0	12.1	125.1	611.6	612.7	1.1	7
114	N	659.8	12.5	47.8	659.4	661.7	2.3	14
115	S	719.8	12.4	60.0	719.6	730.1	10.5	62
116	N	764.8	12.7	45.0	764.6	764.9	0.3	4
117	S	908.9	12.4	144.1	908.8	915.7	6.9	20
118	N	971.9	12.5	63.0	971.6	972.0	0.4	15
119	N	45,020.9	12.3	49.0	020.6	021.4	0.8	8
120	N	062.1	12.6	41.2	061.9	062.9	1.0	3
121	S	114.8	12.1	52.7	114.5	125.6	11.1	41
122	N	161.8	12.5	47.0	161.5?	162.8?	1.3?	2
123	N	265.1	12.4	103.3	264.7	266.3	1.6	8
124	S	311.9	12.1	46.8	311.5	324.4	12.9	65
125	N	355.8	12.8	43.9	355.6	356.0	0.4	9
126	N	406.3	12.8	50.5	406.2	407.1	0.9	6
127	N	447.8	12.8	41.5	447.7	447.8	0.1	8
128	N	506.2	12.3	58.4	505.9	508.0?	2.1	17
129	S	560.2	12.0	54.0	559.8	568.6	8.8	41
130	N	700.9	12.8	140.7	700.8	701.1	0.3	9
131	S	825.9	11.6	125.0	825.0?	834.2	9.2	28
132	N	874.7	13.0	48.8	-	-	-	9
133	S	46,061.9	12.1	187.2	061.4	072.9	11.5	56
134	N	109.9	12.8	48.0	109.9	110.9	1.0	7
135	N	137.0	12.8	27.1	137.0	137.2	0.2	3
136	N	182.9	12.6	45.9	182.9	183.3	0.4	15
137	S	244.6	12.4	61.7	243.9	253.8	9.9	38
138	N	46,288.7	12.4	44.1	288.7	289.4	0.7	2
139	S	405.0	12.1	116.3	404.7	419.1	14.4	121
140	N	482.3	12.8	77.3	482.3	482.7	0.4	11
141	N	519.8	12.7	37.5	519.6	520.4	0.8	11
142	N	584.8	12.1	65.0	583.9?	584.9	1.0?	3
143	S	655.2	12.2	70.4	654.9?	661.0?	6.1?	33
144	N	699.?	12.8?	43.8?	-	-	-	2 (7)
145	N	732.9	12.8	33.9?	732.8	733.1	0.3	5 (8)
146	N	787.9	12.4	55.0	787.7	789.5	1.8	14
147	S	885.9	12.0	98.0	885.9	897.9	12.0	312
148	S	47,123.9	11.7	238.0	123.6	132.0	8.4	26
149	N	189.0	12.6	65.1	188.6?	189.9	1.3?	10
150	N	260.9	12.8	71.9	260.8	261.0	0.2	8
151	S	331.9	12.3	71.0	331.5?	337.0?	5.5?	36
152	N	427.1	12.8?	95.2?	-	-	-	1 (9)
153	N	486.?	12.4?	58.9?	?	487.?	-	2 (10)
154	S	548.9	12.3	62.9?	548.4?	557.9	9.5?	71
155	N	612.8	12.3	63.9	612.7	613.3	0.6	35
156	S	744.6	12.5	131.8	743.5	754.0	10.5	54
157	N	908.0	12.0	163.4	907.5	909.3	1.8?	21
158	S	974.9	11.8	66.9	974.3	985.6	11.3	338
159	N	48,028.8	12.6	53.9	028.6	029.8	1.2	9
160	N	093.8	12.5	65.0	093.5	094.4	0.9	4
161	S	171.9	12.5	78.1	171.8	181.3	9.5	85
162	N	291.9	12.4	120.0	291.5	292.2	0.7	60
163	N	337.4	12.5	45.5	337.1	338.8	1.7	10
164	S	384.8	12.0	47.4	384.3	393.9	9.6	277

NOTES TO TABLE 4.

- (1) Outburst 93. Depends on three observations, all by the same observer, made under very poor sky conditions.
- (2) Outburst 94. Negative observations show outburst faint and short.
- (3) Outburst 103. Depends on a single estimate made in moonlight.
- (4) Outburst 106. An extremely short maxima. Recorded by two observers who were hundreds of kilometers apart.
- (5) Outburst 107. Gap 3 days before and 2 days after J.D. 2,444,160. Despite only a single positive observation it seems likely that a normal outburst occurred around this date.
- (6) Outburst 111. Gap 3 days before J.D. 2,444,421. Maximum may have been a day earlier than shown.
- (7) Outburst 144. Depends on two observations by different observers made in moonlight, both classed as 2 by observers.
- (8) Outburst 145. All observations made under class 3 (very poor) conditions.
- (9) Outburst 152. Gap 2 days before J.D. 2,447,427. Depends on a single positive estimate.
- (10) Outburst 153. Gaps 2 days before and after J.D. 2,447,486 making date of maximum uncertain as there were only two positive estimates.

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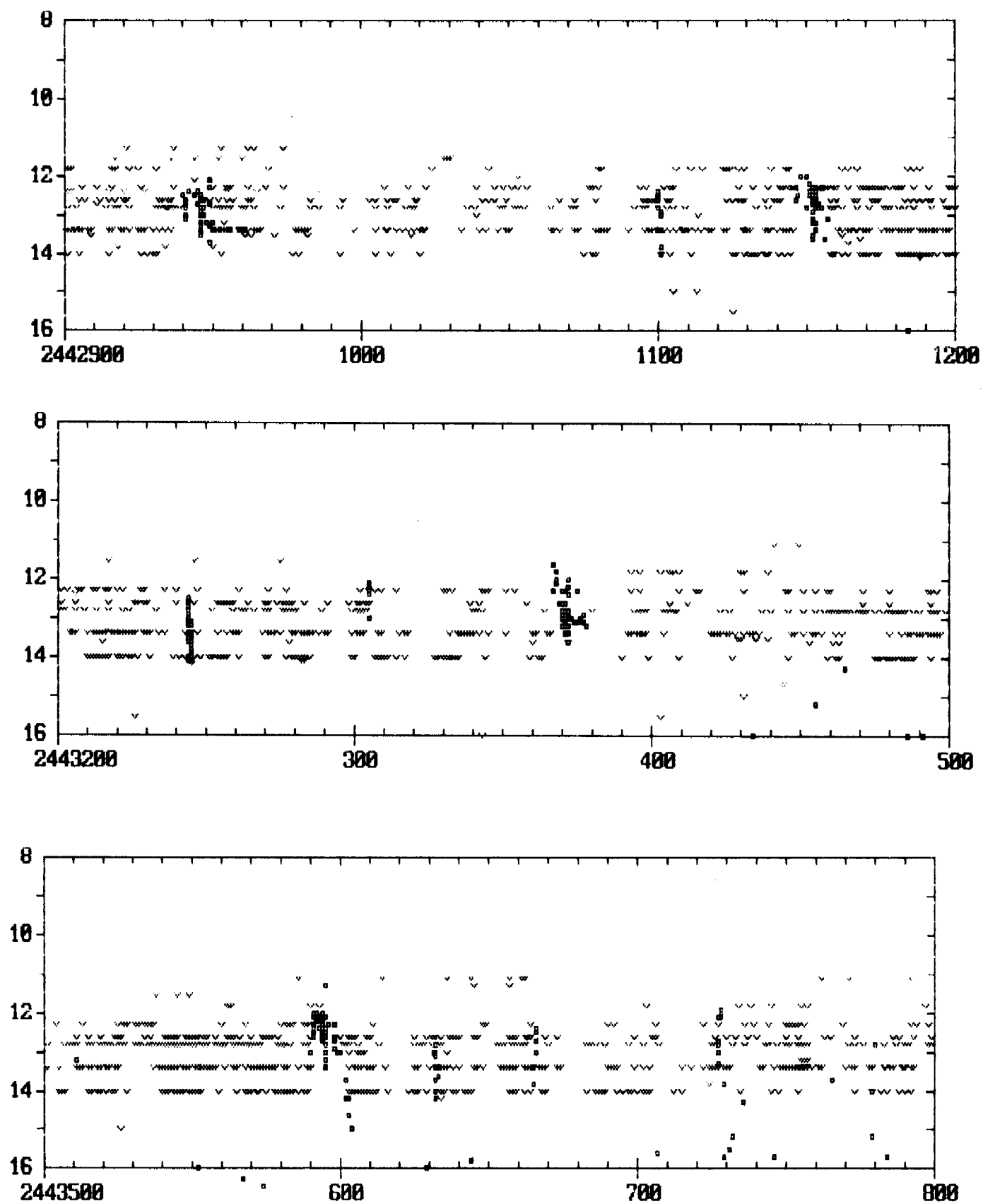


Fig. 1 Z Cha - LIGHT CURVE FROM INDIVIDUAL OBSERVATIONS
J.D. 2442,900 - 2443,800

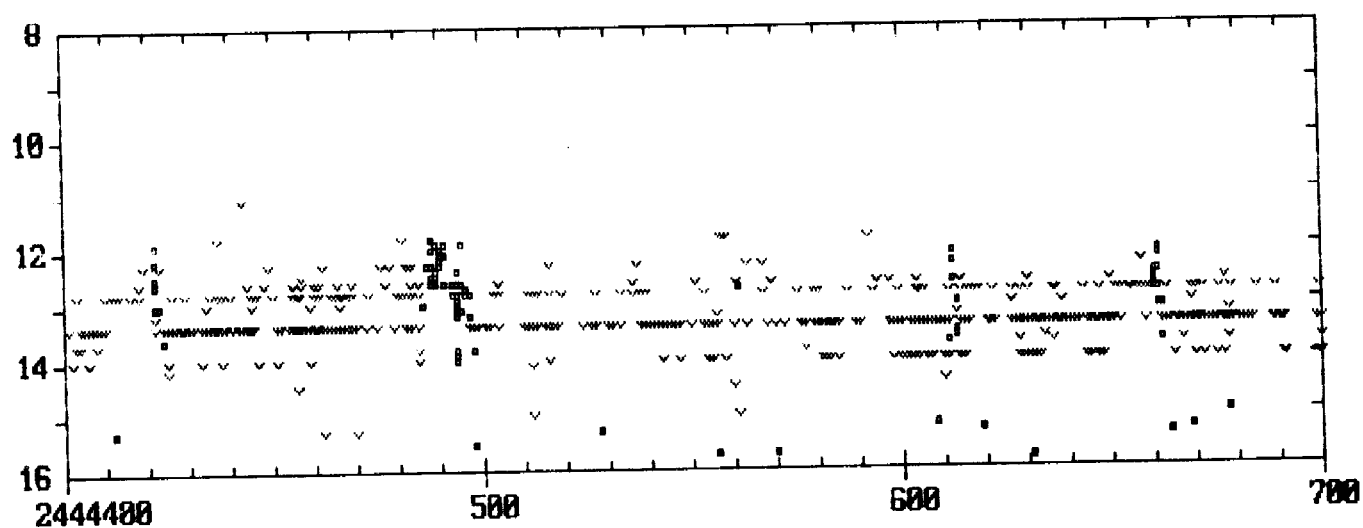
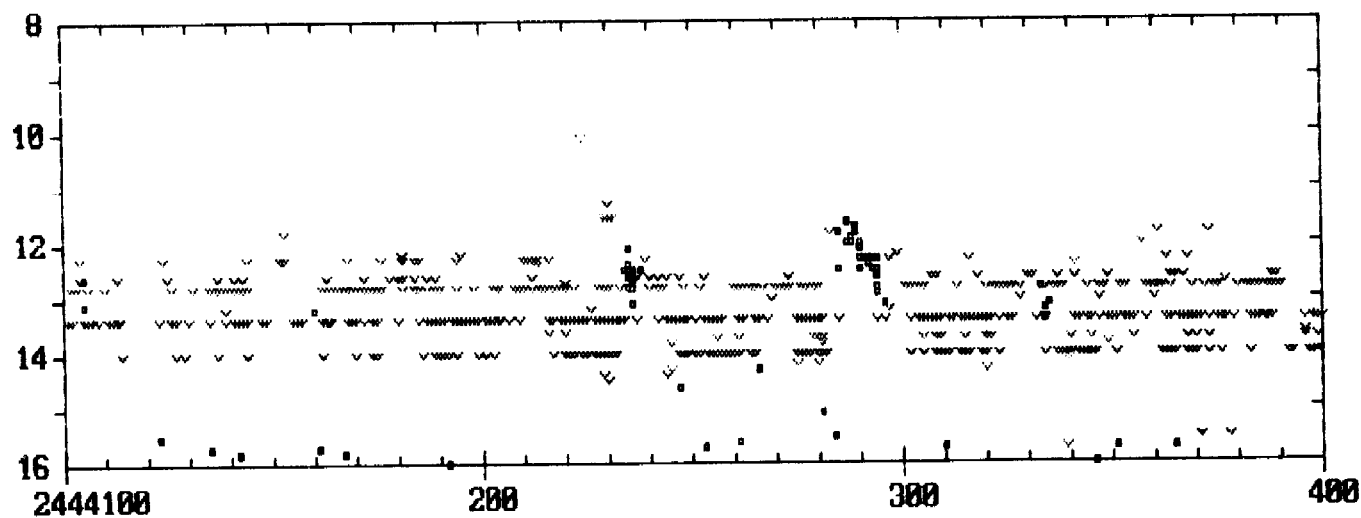
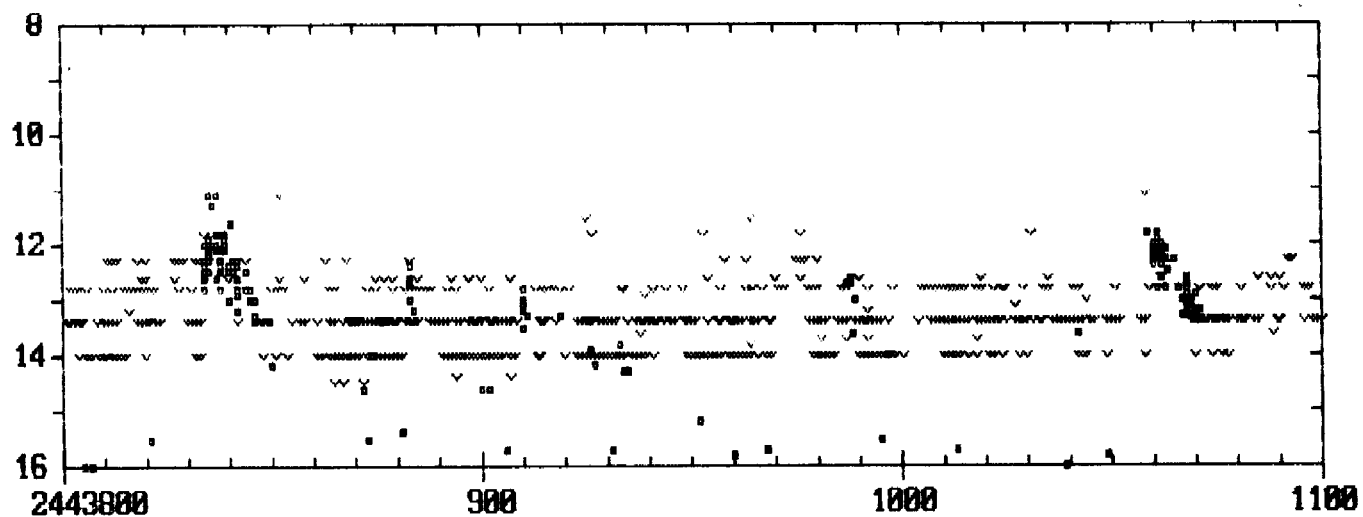


Fig. 2 Z Cha - LIGHT CURVE FROM INDIVIDUAL OBSERVATIONS
J.D. 2443,800 - 2444,700

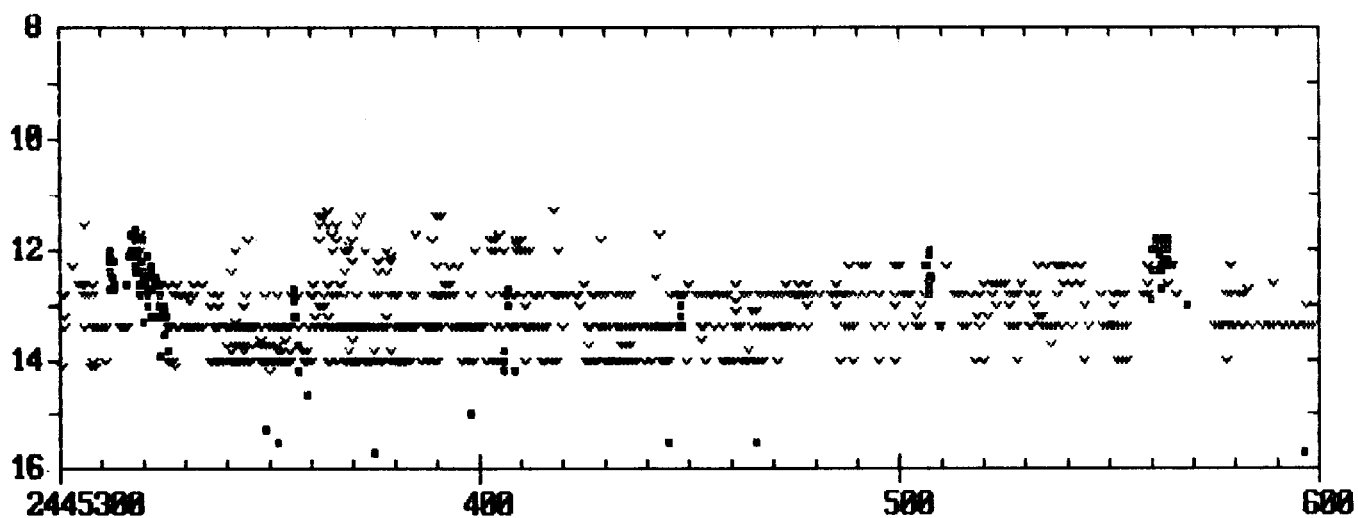
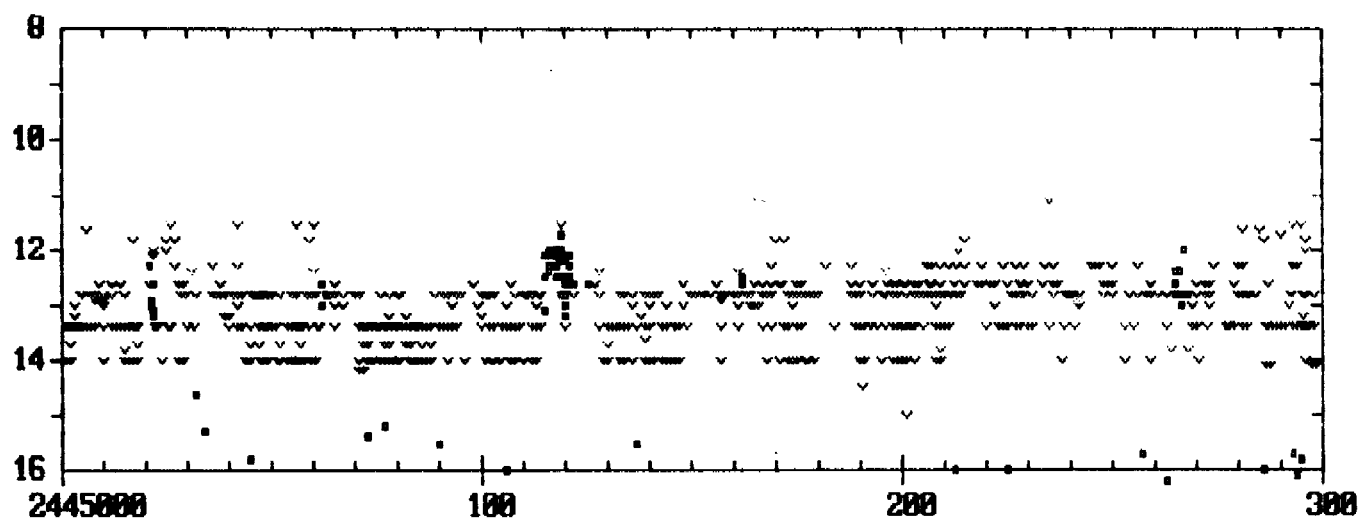
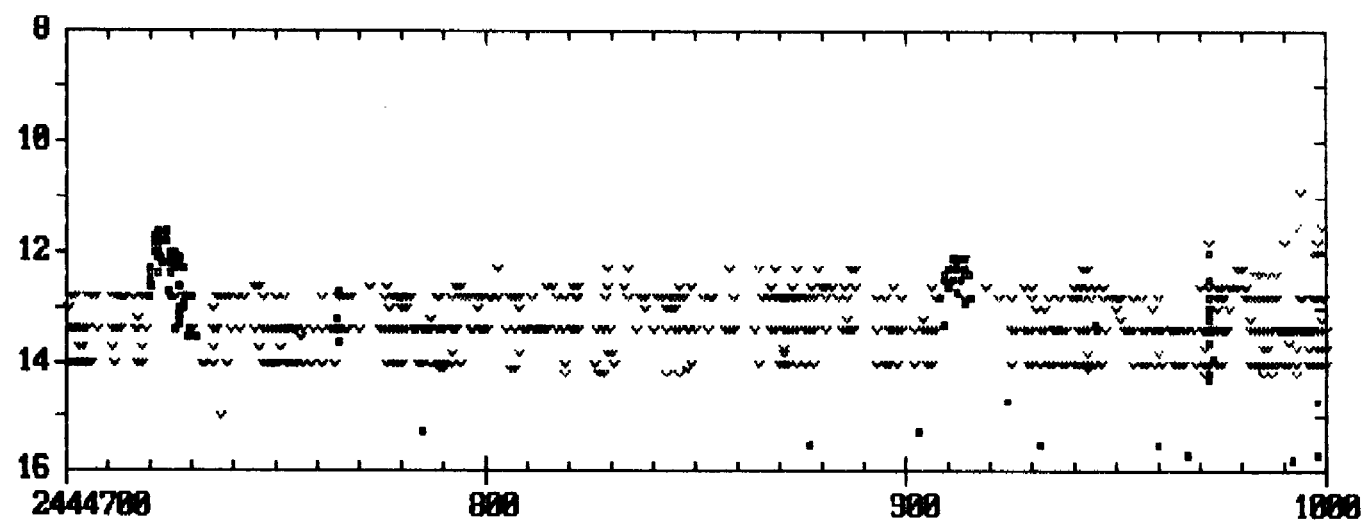


Fig. 3 Z Cha - LIGHT CURVE FROM INDIVIDUAL OBSERVATIONS
JD 2444,700 to 2445,600

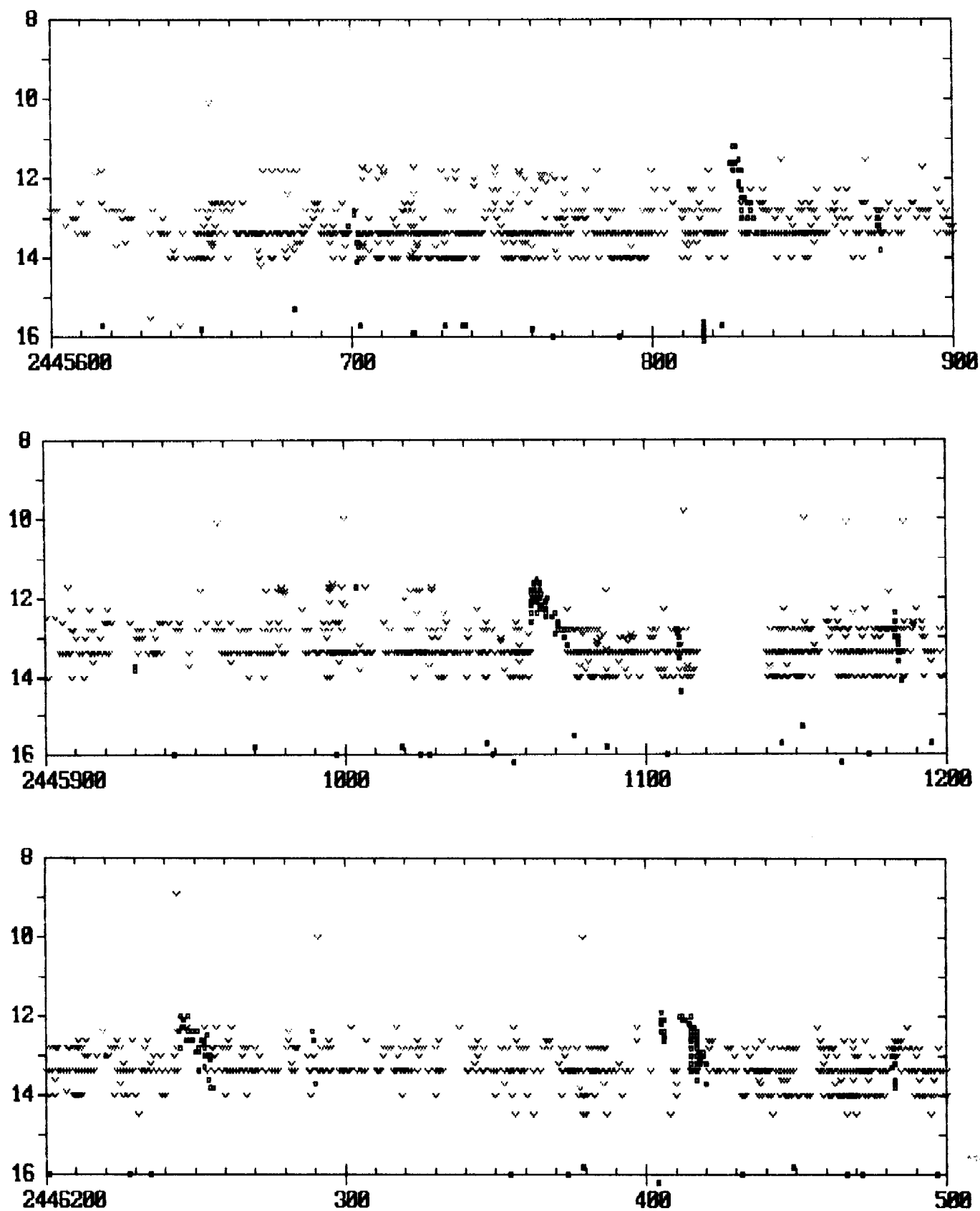


Fig. 4 Z Cha - LIGHT CURVE FROM INDIVIDUAL OBSERVATIONS
J.D. 2445,600 to 2446,500

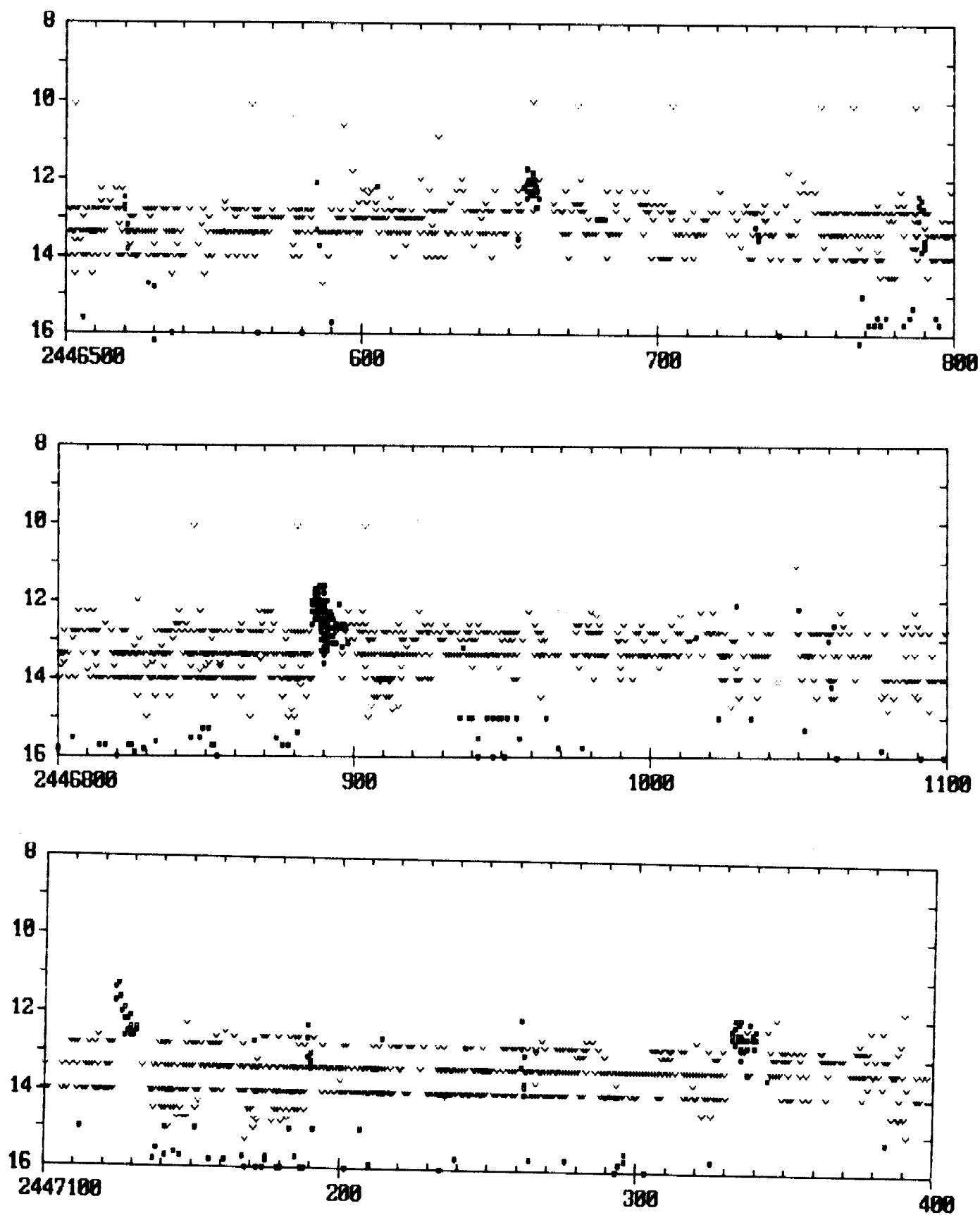


Fig. 5 Z Cha - LIGHT CURVE FROM INDIVIDUAL OBSERVATIONS
J.D. 2446,500 to 2447,400

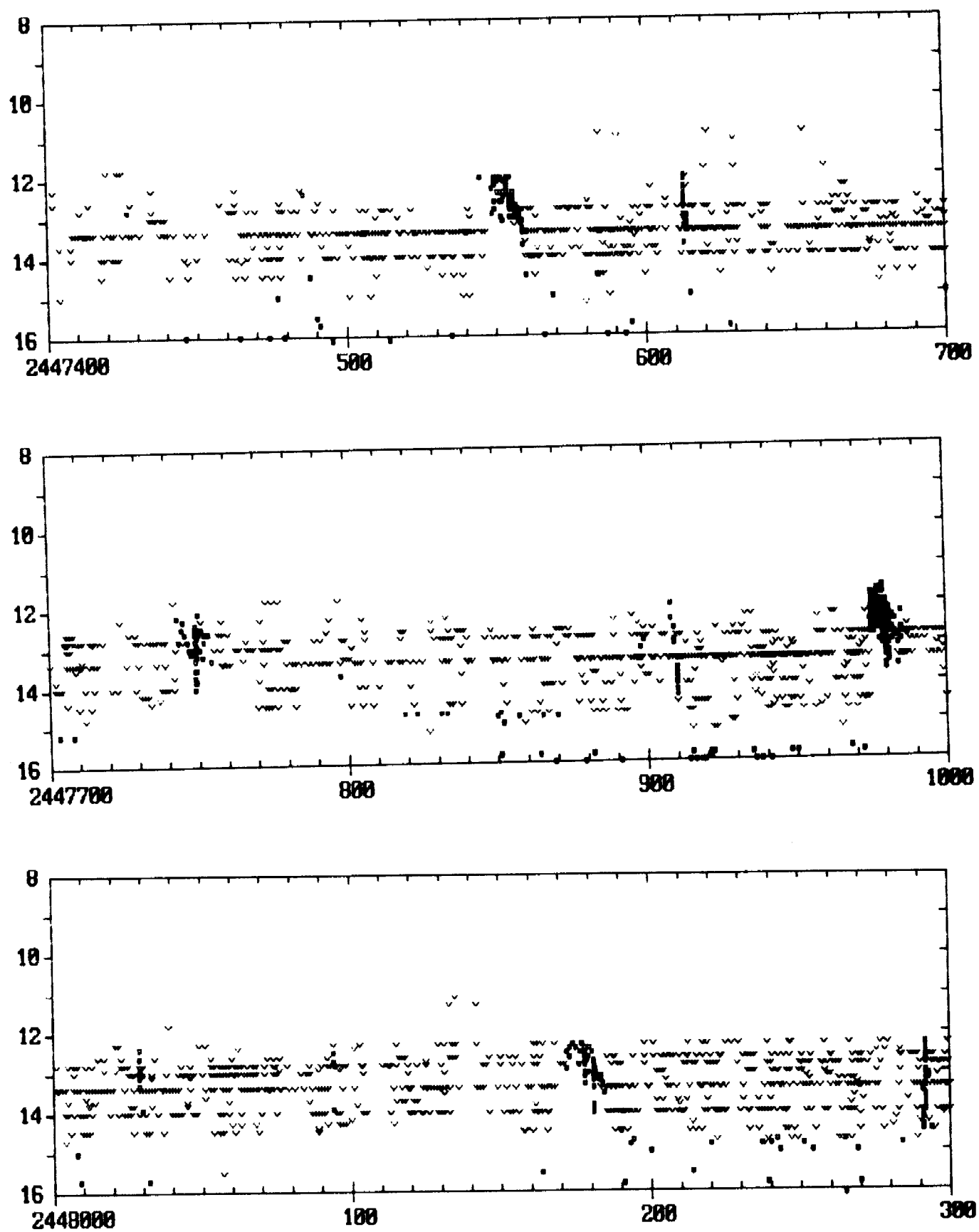


Fig. 6 Z Cha - LIGHT CURVE FROM INDIVIDUAL OBSERVATIONS
J.D. 2447,400 to 2448,300

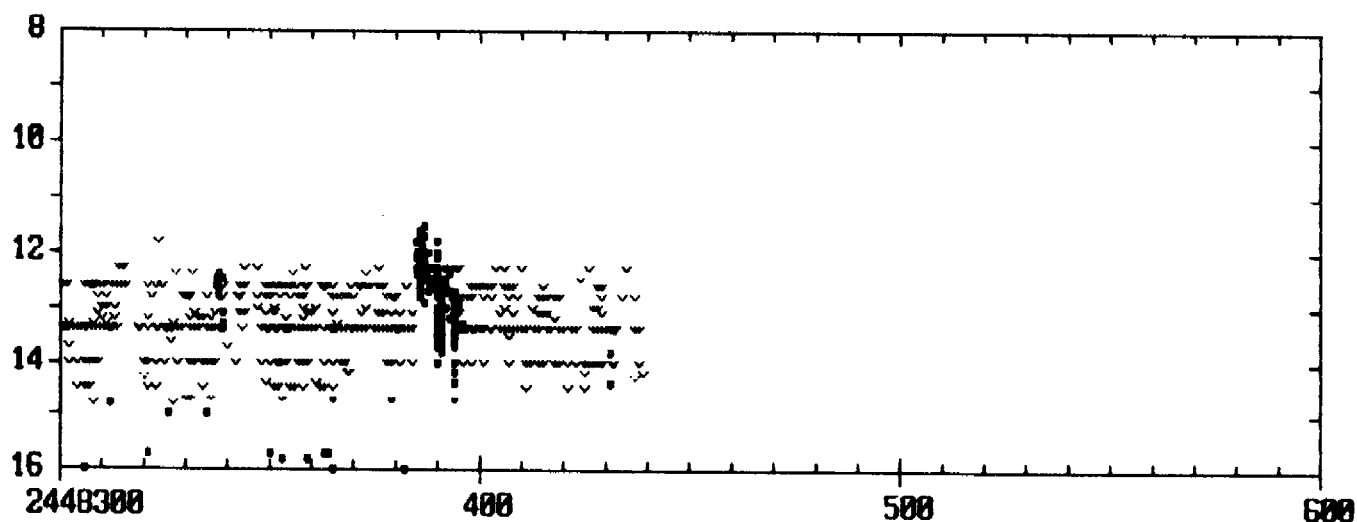


Fig. 7 Z Cha - LIGHT CURVE FROM INDIVIDUAL OBSERVATIONS
J.D. 2448,300 to 2448,440

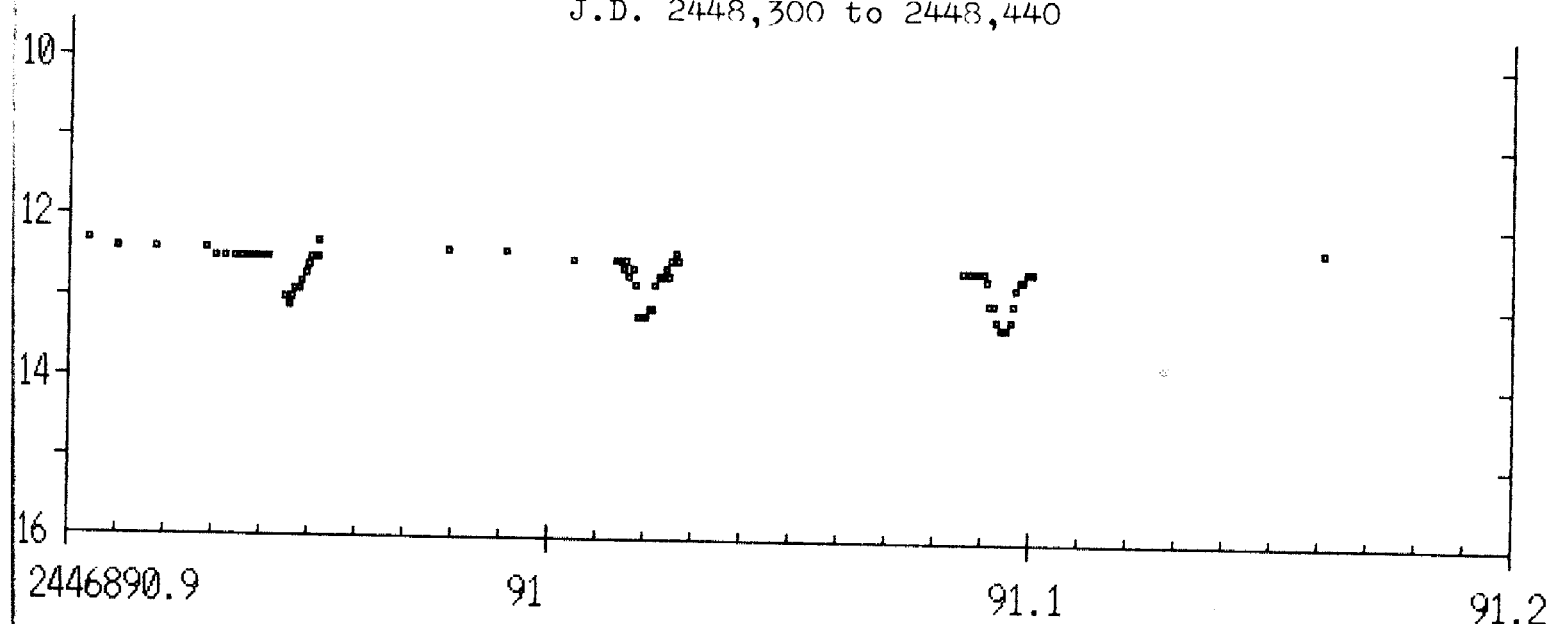


Fig. 8 Z Cha - J.D. 2446,890.9 - 91.2
Some of Eclipses observed in Super Outburst
No. 147

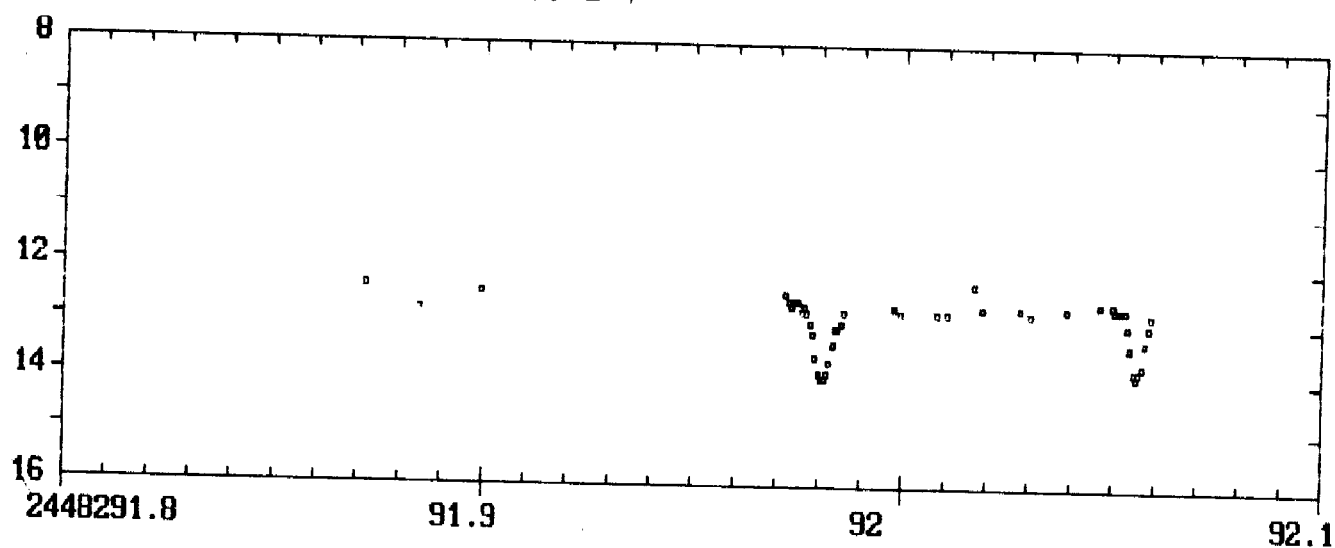


Fig. 9 Z Cha - J.D. 2448,291.8 - 92.1
Some of Eclipses observed in Super Outburst No. 162

THE RECURRENT NOVA, T PYXIDIS.

F.M.Bateson, R. McIntosh & D. Brunt
 Variable Star Section, R.A.S.N.Z.
 P.O. Box 3093, GREERTON,
 TAURANGA, NEW ZEALAND

SUMMARY: Attention is drawn to T Pyx, because it may possibly have another outburst in the near future. A light curve of the 1966 outburst is reproduced and discussed. Suggestions are made concerning the observations needed at the next outburst.

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1. INTRODUCTION

T Pyx had outbursts in 1890, 1902, 1920, 1944 and 1966. C. Payne-Gaposchkin (1) published a composite light curve for the outbursts of 1902, 1920 and 1944. M. Mayall (2) published light curve for the first four maxima and, a separate one for the 1966 outburst. The latter was from the combined observations from the Variable Star Section, R.A.S.N.Z. and the A.A.V.S.O.

M. Kato (3) gives theoretical predictions for the next outburst, which she considers can be expected in the very near future. It, therefore, appears desirable to report on the monitoring of T Pyx by the V.S.S., using charts (4).

2. OBSERVATIONS

The main observing season is December through June. Each year few observations are made in July, September, October and November with usually none in August. Observations of T Pyx by the V.S.S. commenced on March 19, 1955 and have continued ever since. Prior to the 1966 outburst, 452 observations were made, all negative. During the 1966-67 maximum, 1,270 estimates were recorded (see next section). After that outburst about 3,000 observations were made, almost all negative.

3. 1966 OUTBURST

This outburst was first detected by A. Jones at magnitude 12.9 on December 7.64 U.T., 1966 (Bateson (5)). Observations and a large-scale light curve were published by Bateson (6,7). The rise from 12.9 to 9.2 was 1.85 days, followed by a slower increase to magnitude 8.0 in 2.09 days. Then there was a distinct dip before a slow fluctuating rise of 15 days to a sharp maximum of 6.45 on J.D. 2,439,501.0.

There were marked oscillations on the decline, which for the first 100 days was at the rate of about 0.03 magnitudes per day. T Pyx had then reached magnitude 10.0. The decline rate then increased to 0.1 magnitude per day for 20 days by when it had faded to 12.0. Then the decline became very gradual reaching magnitude 14.0 on J.D. 2,439,918, after which observations have been negative apart from a very limited number at minimum of around 15th magnitude.

The light curve is shown in Figure 1 with the upper curve being from individual observations and the lower from daily means. The curve resembles those for slow novae.

4. NEXT TIME ROUND

In 1966 the prompt alert notice of the V.S.S. enabled professionals to commence observations before maximum was reached, e.g., the photometric and polarimetric measurements made by the Mt. Stromlo observers from Siding Spring. Thus the first essential for observers when the next outburst is detected is to advise Bateson at once by collect phone call.

Despite the attention that will be given by professionals to the next outburst of T Pyx, frequent estimates by visual observers will be essential. These should be accurately timed and made using the sequence of comparison stars (4). Each night an observer should make estimates at frequent intervals so that the various oscillations can be studied. Often, as happened in 1966, visual observations supplied the necessary information for those nights on which professionals were clouded out, or unable to observe for some other reason.

The observations should be continued for as long as T Pyx is visible and not merely during the time it is close to maximum. Should the next outburst occur during those months when T Pyx is badly placed every effort should be made to secure observations early in the evening or just prior to dawn so that a gap on the records is avoided as far as is possible.

ACKNOWLEDGEMENTS

We have the highest admiration for the dedication of observers who monitor a recurrent nova night after night for years without ever seeing it. Success finally comes as it did in 1966 and we are sure that will happen again as professionals rely on amateurs to detect these outbursts. We thank all observers for their persistent and patient monitoring.

The computer processing of the observations have been carried out by Don Brunt and Ranald McIntosh and F.M.B. is indebted to them for their assistance.

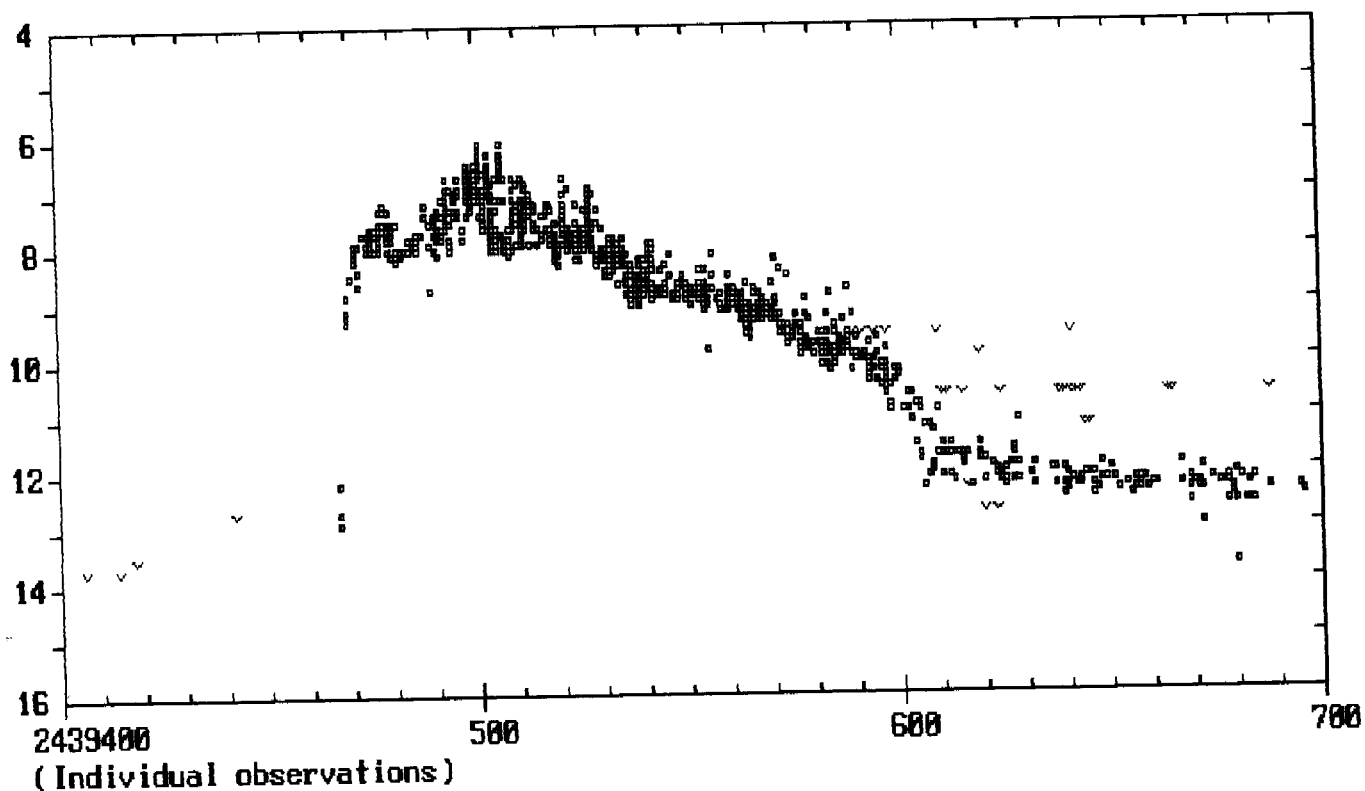
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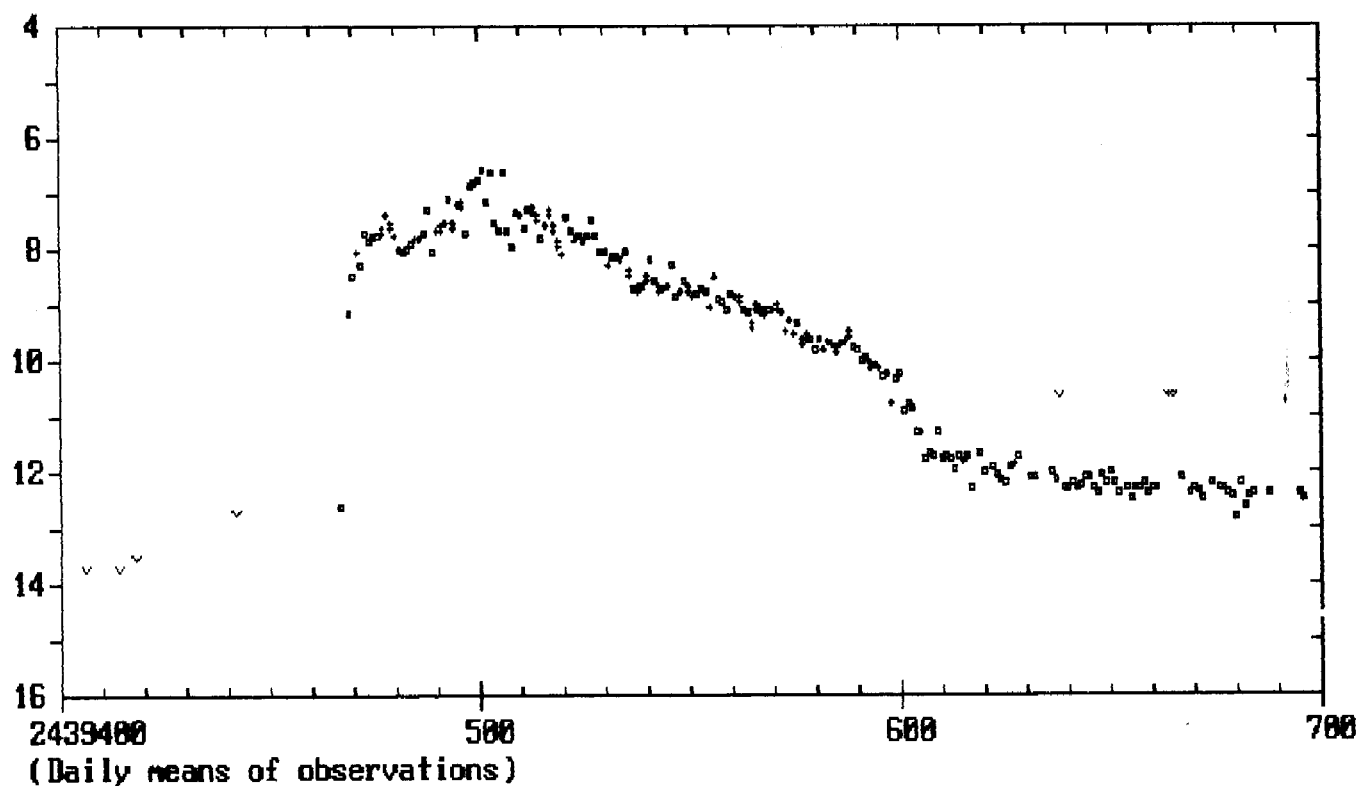


Figure 1. T Pyx. 1966 Outburst. Upper curve from individual observations;
lower curve from daily means.

VW HYDRI - RESULTS FROM ANOTHER 4000 DAYS OF MONITORING

Frank M. Bateson, R. McIntosh, & D. Brunt
 Variable Star Section, R. Astr. Soc. of N.Z.
 P.O. Box 3093, Greerton, TAURANGA, NEW ZEALAND.

SUMMARY: A table of 147 maxima and a light curve of VW Hyi covering the interval J.D. 2,444,502 to 2,448,440. A mean cycle of 26.84 days was found with a super cycle of 184.0 days. The salient parameters for both normal and supermaxima are tabulated.

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1. INTRODUCTION

VW Hyi has frequent normal maxima and usually two supermaxima each year. In addition, many observers use apertures which enable them to observe the variable at minima. These factors make VW Hyi the best observed southern dwarf nova. Bateson (1) discussed observations from 2,434,604 to 2,442,600 and, Bateson & McIntosh (2) those between 2,442,600 and 2,444,502. The published visual observations have been used extensively in professional papers and been subjected to detailed analysis, e.g. Smak (3).

2. OBSERVATIONS

Members of the Variable Star Section, R.A.S.N.Z., made 17,144 observations during the interval 2,444,502 to 2,448,440 which are discussed in the present paper. This brings the total observations of VW Hyi to 42,111.

All observations were made visually using the sequence shown on chart 350 (4). R.M. and D.B. have done all the computer processing and supplied the light curves. F.M.B. has been responsible for all reductions so that all results in this paper and the two previous ones have been done by the same person.

A limited number of observations were rejected, mainly because it was obvious that the observers concerned had recorded the wrong Julian dates or because the estimate were obviously erroneous.

It is apparent from the light curve that there have been no large gaps in the records. It is probable that few, if any, maxima have passed unobserved. This is due to the fact that VW Hyi can be observed throughout the year.

The observed outbursts are listed in Table 3 and the light curve appears in Fig. 1 - 5.

3. SUPER OUTBURSTS

A total of 21 super outbursts were recorded for which the main parameters are given in Table 1. The mean super cycle was 184.0 days, but, as usual there was wide differences in the length of individual cycles. Rises were very steep. Often, but not always, a normal maximum was superimposed on the rise to a super outbursts. Outburst 435 was unusual in having two normal maxima superimposed on it. This appears to be the first time this has been recorded.

TABLE 1

VW HYDRI - SUPER MAXIMA

Super cycle, MEAN	...	...	...	...	..	184.0 Days	(21)
" " RANGE	..	...	...	...	..	142.7-234.2 Days	
Maximum visual magnitude - MEAN	...	...	...	...	...	8.69	(21)
" " " - RANGE	...	...	...	...	...	8.3 - 9.0	
Width at 11.OI-11.OD - MEAN	...	...	...	...	...	12.8 Days	(21)
" " " " - RANGE	...	...	...	...	...	10.5 - 14.0 Days	
Number of normal maxima between successive super maxima - MEAN	...	...	...	...	...	5.8	(21)
" " " " - RANGE	...	...	...	...	...	4 - 8	

4. NORMAL OUTBURSTS

Table 2 gives the main features for those normal outbursts for which values could be accurately determined.

TABLE 2

VW HYDRI - NORMAL OUTBURSTS

<u>No. After Super Max</u>	<u>Mean Int</u> d	<u>Range</u> <u>Int</u> d	<u>Mean</u> <u>Max Mag</u>	<u>Range in</u> <u>Max Mag</u>	<u>Mean</u> <u>Width</u> d	<u>Range in</u> <u>Widths</u>
1st	27.8 (22)	18.4 - 366	9.6 (21)	9.0 -10.8	1.4 (19)	0.2 -2.1
2nd	20.93(21)	8.7 - 320	9.58(21)	9.1 -10.2	1.59(20)	0.2 -2.6
3rd	25.01(20)	6.1 - 366	9.40(20)	8.9 - 9.9	1.9 (18)	1.1 -2.3
4th	30.68(20)	21.4 - 533	9.34(21)	8.8 -10.2	2.16(19)	0.9 -2.9
5th	31.98(17)	23.1 - 459	9.17(17)	8.9 - 9.7	2.14(15)	0.3 -2.9
6th	24.80(12)	5.0 - 380	9.37(13)	8.9 -10.0	2.36(13)	1.5 -2.8
7th	20.30(17)	10.8 - 260	9.47(7)	9.0 -10.5	1.97(6)	1.2 -2.8
8th	14.37(3)	13.2 - 159	9.07(3)	8.7 - 9.4	2.23(3)	1.9 -2.5

The mean cycle for normal outbursts that were consecutive was 26.16 days.

There is a tendency for these outbursts to be progressively bright up to, and including, the fifth one after a super maxima. They also tend, with the exception of the second to occur at slightly longer intervals, but if there are more than five the mean intervals shorten.

5. MINIMA

Magnitudes at minima appear to vary continuously between 12.4 and 14.1, with an occasional estimate at a slightly fainter value. There is some scatter in the observations. However, when the observations from the most experienced observers are plotted alone, the variation appears to be smaller--half a magnitude-- and to be in harmony with the orbital period. We draw no definite conclusion from this because it is all too easy to credit visual observations with a greater accuracy than is warranted,

There is a definite tendency for the minimum magnitude to decrease just prior to the onset of the rise to most outbursts.

6. DISCUSSION

Rises to all outbursts are usually very steep and occur in 10 hours or less. Occasionally, as noted in some of the remarks to Table 3, the rise time is 22 hours. The steepness of most rises means that there are often few observations on the rise, whereas most falls are well observed. Falls from normal outbursts are steep but generally not quite as steep as the rises. Super outbursts tend to fall less steeply and, of course, the variable then spends several days close to maximum.

Widths of outbursts are defined as the time VW Hyi spends between magnitude 11.0 on the rise and fall. Super maxima had a mean width of 12.8 days with the widths of individual super maxima ranging from 10.5 to 14.0 days.

There is a tendency for normal outbursts to have progressively wider widths from the first to sixth normal outburst following a super maxima.

There is little difference in the various mean cycles from those in previous papers, with the exception that the super cycle is marginally longer.

7. CONCLUSIONS

We conclude that there has been no change in the behaviour of VW Hyi when compared to the results given in the previous papers.

We wish to stress to all observers that they time their observations accurately and take care to record the correct Julian Dates, which should be given to four decimals of a day. Attention to this request will ensure that observations do not have to be rejected because of incorrect J.Ds.

ACKNOWLEDGEMENTS

We thank all observers for their very close monitoring of VW Hydri without which the records would not be so complete. FMB is greatly indebted to his co-authors for computer processing all data.

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TABLE 3

VW HYDRI - OBSERVED MAXIMA

No.	Type	J.D. Max 24	Max Mag _y	Int d	11.0 I	11.0 D	Width d	No. Obs	Remarks
365	N	44,509.9	9.7	25.1	509.8	510.9	1.1	14	
366	N	529.8	10.2	19.9	529.8	530.0	0.2	10	
367	N	559.2	9.0	29.4	558.8	560.7	1.9	22	
368	N	604.9	9.0	45.7	604.3	607.2	2.9	45	(1)
369	S	641.9	8.6	37.0	640.5	654.4	13.9	90	
370	N	668.0	9.4	26.1	667.8	669.2	1.4	18	
371	N	695.8	9.3	27.8	695.7	697.3	1.6	42	
372	N	717.3	9.6	21.5	716.9	718.9	2.0	28	
373	N	741.3	9.5	24.0	740.8	742.0?	1.2?	5	(2)
374	N	774.8	9.7	33.5	774.6	777.0	2.4	15	
375	S	808.8	8.9	34.0	807.0	819.7	12.7	43	
376	N	827.2	11.8?	18.4	-	-	-	4	(3)
377	N	835.9	10.0	8.7	835.7	836.8	1.1	9	
378	N	856.6	9.1	20.7	856.2	858.0	1.8	12	
379	N	878.0	9.3	21.4	877.6	879.3	1.7	24	
380	N	902.9	9.0	24.9	902.6	904.4	1.8	17	
381	N	934.9	9.1	32.0	934.0	936.5	2.5	39	
382	N	960.9	9.0	26.0	960.0	962.8	2.8	21	
383	N	974.1	9.4	13.2	974.0	975.9	1.9	31	
384	S	993.9	8.9	19.8	991.2	005.2	14.0	160	(4)
385	N	45,021.2	9.5	27.3	020.6	022.3	1.7	23	
386	N	038.0	9.9	16.2	037.8	039.7	1.9	16	
387	N	061.9	9.8	23.9	061.7	063.6	1.9	7	
388	N	091.9	9.9	30.0	091.7	094.0	2.3	18	
389	N	129.4	9.2	37.5	128.6	131.2	2.6	14	
390	N	143.8	9.9	14.4	143.5	145.0	1.5	11	
391	N	154.6	9.0	10.8	153.7	155.6	1.9	10	
392	N	168.6	9.1	14.0	167.7	170.2	2.5	17	(5)
393	S	171.9	8.4	3.3	171.0	182.5	11.5	52	
394	N	195.6	9.0	23.7	195.1	196.9	1.8	13	
395	N	212.6	9.3	17.0	211.6	213.2	1.6	13	
396	N	236.1	9.3	23.5	235.8	237.9	2.1	18	
397	N	269.8	9.0	33.7	269.1	271.5	2.4	23	
398	S	314.6	9.0	44.8	314.2	327.9	13.7	113	
399	N	342.9	9.8	28.3	342.0	343.9	1.9	46	
400	N	362.9	9.7	20.0	362.5	364.2	1.7	40	
401	N	387.9	9.3	25.0	387.3	389.3	2.0	30	
402	N	419.9	9.5	32.0	419.6	422.0	2.4	12	
403	N	456.9	9.4	37.0	456.1	459.0	2.9	23	
404	N	473.9	10.0	17.0	473.5	476.2	2.7	18	
405	N	490.2	9.9	16.3	489.9?	490.9	1.0?	4	(6)
406	S	492.8	8.3	2.6	490.9	502.8	11.9	50	
407	N	516.8	9.9	24.0	516.4	517.5	1.1	9	
408	N	539.1	9.3	22.3	538.8	540.7	1.9	10	
409	N	562.2	9.4	23.1	562.0	563.8	1.8	23	
410	N	591.9	9.0	29.7	591.4	593.9	2.5	15	
411	N	626.9	9.1	35.0	626.7	627.0	0.3	7	(7)
412	N	631.9	9.0	5.0	631.6	634.1	2.5	23	
413	S	651.2	9.0	19.3	650.9	664.3	13.4	206	(8)
414	N	678.1	10.0	26.9	676.9	678.4	1.5	14	

TABLE 3 Continued

VW HYDRI - OBSERVED MAXIMA

No.	Type	J.D. Max 24	Max Mag _v	Int d	11.0 I	11.0 D	Width d	No. Obs	Remarks
415	N	45,702.9	9.2	24.8	702.4	705.0	2.6	43	
416	N	737.0	9.4	34.1	736.9	739.0	2.1	23	
417	N	775.2	9.0	38.2	774.7	777.3	2.6	21	
418	N	804.1	8.9	28.9	803.1	805.5	2.4	11	(9)
419	S	807.8	8.9	3.7	806.3	817.9	11.6	82	
420	N	834.6	9.1	26.8	834.5	835.4	0.9	4	
421	N	854.1	9.6	19.5	853.6	855.3	1.7	17	
422	N	872.1	9.5	18.0	871.9?	873.8	1.9?	12	(10)
423	N	898.8	9.7	26.7	897.6	899.7	2.1	15	
424	N	922.6	9.2	23.8	922.4	924.6	2.2	4	
425	N	949.0	9.8	26.4	948.8	951.2	2.4	9	
426	N	964.9	9.6	15.9	964.7	966.5	1.8	27	
427	N	980.8	8.7	15.9	980.2	982.5	2.3	48	
428	S	998.2	8.9	17.4	996.1	009.3	13.2	258	
429	N	46,025.2	9.2	27.0	024.9	026.9	2.0	24	
430	N	046.9	9.6	21.7	046.7	048.1	1.4	24	
431	N	063.0	9.6	16.1	063.0	065.2	2.2	30	(11)
432	N	084.9	9.7	21.9	084.5	086.0	1.5	30	
433	N	108.0	9.4	23.1	107.9	110.2	2.3	29	
434	N	140.3	9.4	32.3	140.0	142.8	2.8	33	(12)
435	S	168.8	8.7	28.5	167.3	179.2	11.9	109	(13)
436	N	191.9	9.7	23.1	191.6	193.2	1.6	17	
437	N	208.6	9.5	16.7	208.2	209.7	1.5	16	
438	N	228.6	9.6	20.0	228.4	230.0	1.6	8	
439	N	254.7	9.6	26.1	254.5	256.7	2.2	16	
440	N	280.6	9.4	25.9	?	282.1	?	14	(14)
441	N	316.6	9.6	36.0	316.5	319.0	2.5	22	
442	S	368.8	8.3	52.2	368.2	381.4	13.2	106	
443	N	400.0	9.4	31.2	?	401.3	?	6	(15)
444	N	414.2	10.2	14.2	413.9	415.2	1.3	6	
445	N	435.0	9.7	20.8	434.8	435.9	1.1	13	
446	N	457.9	9.8	22.9	457.7	459.9	2.2	26	
447	N	487.3	9.2	29.4	486.7	489.3	2.6	12	
448	N	517.2	9.4	29.9	516.8	519.0	2.2	19	
449	S	556.8	8.6	39.6	555.6	568.6	13.0	71	
450	N	585.9	9.9	29.1	585.7	586.6	0.9	14	
451	N	610.1	9.6	24.2	609.8	611.3	1.5	8	
452	N	636.6?	9.0?	26.5?	?	611.3	?	9	(16)
453	N	668.2	9.0	31.6?	668.1	669.9	1.8	11	
454	N	695.8	9.2	27.6	695.7	697.3	1.6	18	
455	N	719.1	9.1	23.3	719.0	721.1	2.1	7	
456	N	736.9	9.3	17.8	736.7	738.7	2.0	28	(17)
457	S	770.9	8.7	34.0	769.8	782.8	13.0	84	
458	N	800.4	9.7	29.5	800.2	801.3	1.1	8	
459	N	821.9	9.6	21.5	821.0	822.9	1.9	21	(18)
460	N	849.9	9.2	28.0	849.7	851.8	2.1	31	
461	N	881.8	8.9	31.9	881.1	883.3	2.2	37	(19)
462	N	923.2	9.0	41.4	922.6	925.0	2.4	26	(20)
463	N	942.6	9.4	19.4	942.3	944.6	2.3	17	(21)
464	S	946.6	8.7	4.0	945.7	956.2	10.5	63	

TABLE 3 Continued

VW HYDRI - OBSERVED MAXIMA

No.	Type	J.D. Max 24	Max Mag _v	Int d	11.0 I	11.0 D	Width d	No. Obs	Remarks
465	N	46,975.2	9.6	28.6	974.9	976.3	1.4	14	
466	N	997.2	9.3	22.0	996.7	998.6	1.9	10	
467	N	47,012.0?	8.5?	14.8?	-	-	-	1	(22)
468	N	038.8	9.2	26.8?	038.6	041.0	2.4	10	
469	N	082.0	9.0	43.2	081.6	083.7	2.1	11	
470	S	120.0	8.7	38.0	117.8	130.6	12.8	79	
471	N	146.0	9.6	26.0	146.0	146.8	0.8	13	
472	N	160.9	9.9	14.9	160.6	162.2	1.6	19	
473	N	179.0	9.9	18.1	178.7	180.2	1.5	19	
474	N	210.9	9.1	31.9	210.2	212.5	2.3	32	(23)
475	N	256.8	9.0	45.9	256.7	258.8	2.1	20	
476	S	309.2	8.7	52.4	308.1	320.3	12.2	48	(24)
477	N	345.8	10.4	36.6	344.5	346.5	2.0	7	(25)
478	N	368.2	9.5	22.4	367.7	369.4	1.7	10	
479	N	394.6	9.0	26.4	394.3	396.6	2.3	12	
480	N	423.9	9.4	29.3	423.2	425.3	2.1	11	(26)
481	N	460.8	9.0	36.9	460.1	462.6	2.5	21	(27)
482	S	503.3	8.8	42.5	502.7	516.0	13.3	73	
483	N	534.9	10.8	31.6	534.8	535.0	0.2	9	(28)
484	N	557.9	9.5	23.0	557.3	559.0	1.7	19	
485	N	582.8	9.2	24.9	582.6	584.2	1.6	28	
486	N	609.9	10.2	27.1	609.6	610.5	0.9	5	(29)
487	N	639.8	9.4	29.9	639.5?	641.9	2.4?	36	
488	N	677.8	8.9	38.0	677.1	679.3	2.2	19	
489	S	719.3	8.4	41.5	718.2	731.4	13.2	56	
490	N	749.9	9.8	30.6	749.7	751.2	1.5	13	
491	N	781.9	9.1	32.0	781.6	783.3?	1.7?	9	
492	N	813.6	9.4	31.7	813.3?	814.7?	1.4?	3	
493	N	866.9	8.8	53.3	866.1	868.7	2.6	21	(30)
494	N	888.9	9.0	22.0	888.1	890.3	2.2	31	
495	S	932.8	8.8	43.9	931.5	945.2	13.7	154	
496	N	963.1	9.8	30.3	962.8	964.9	2.1	15	
497	N	993.2	9.4	30.1	992.9?	994.5	1.6?	8	
498	N	48,029.8	8.9	36.6	029.1	031.4	2.3	18	
499	N	067.0	9.0	37.2	066.7	069.2	2.5	15	
500	S	114.6	8.5	47.6	113.5	126.5	13.0	40	
501	N	146.2	9.4	31.6	145.6?	147.4	1.8?	9	
502	N	167.8	9.2	21.6	167.0	168.4	1.4	6	
503	N	199.9	9.4	32.1	199.1	201.3	2.2	35	
504	N	229.0	9.4	29.1	227.5?	229.9	2.4?	8	
505	N	270.0	8.9	41.0	269.7	271.6	1.9	13	
506	N	294.0	9.0	24.0	293.3	295.9	2.6	39	(31)
507	N	306.0	10.5	12.0	306.0	307.2	1.2	32	
508	S	348.8	8.7	42.8	347.7	361.1	13.4	130	
509	N	379.2	9.8	30.4	378.8	380.3	1.5	21	
510	N	399.6	9.6	20.4	399.3	401.2	1.9	17	
511	N	426.0	9.7	26.4	424.8	426.8	2.0	5	

VW HYDRI- REMARKS TO TABLE 3.

- (1) One observer recorded maximum as 8.6 but this considered too bright as it was in disagreement with other observers.
- (2) Gap 3 days after 418,
- (3) Maximum in daylight and probably brighter than shown.
- (4) Commenced as a normal maximum on 990.5 reaching 11.9 on 990.9 and fading to (13.5 on 991.0. Then rose again fast.
- (5) Faded to 11.8 on 170.8. Then quickly rose to super maximum No.393.
- (6) Faded to 11.6 on 490.91. Then quickly rose to super maximum No. 406.
- (7) Faded to 13.3 on 630.0. Rose again from 630.97 to maximum No. 412.
- (8) Fluctuated just below 9.0 for 2 days and then brightened to 8.6 - 9.0 for 4 days before slow decline commenced.
- (9) Faded to 11.3 on 806.2 & then commenced to rise again.
- (10) Gap of 1.3 days before 971.9
- (11) After rising faded to 13.2 on 063.292 and then rose again to 9.6 on 063.99. This dip recorded by 3 observers.
- (12) Preceding this outburst there was a positive observation of 10.4 on 118.9 which was rejected as it was made by an inexperienced observer. Others on the same date & time recorded (12.9 and (13.4
- (13) Appears that two normal maxima were superimposed on this super maximum. From 165.9 to 166.263 remained at maximum. Then 9.6 on 166.80; 10.0 on 166.85; 11.3 on 166.858. Then rose to 9.7 on 188.879, remaining at that magnitude till 167.211. Decreased to 10.5 on 167.252; 11.5 on 167.273. Then rose steadily to 10.0 on 168.214. Next observation 8.7 on 168.80. Varied slightly around that magnitude till 171.926 after which it declined slowly. These changes all very well observed by 8 reliable observers whose observations were in excellent agreement.
- (14) Gap 3 days before 280.
- (15) Gap 3 days before 400.
- (16) Gap 2.3 days before 636.
- (17) Fell to 10.6 on 737.99; then rose to 9.2 on 738.04; 9.6 on 738.377 before fading to minimum. Observations confirmed by 3 observers.
- (18) Definitely a slower rise than usual.
- (19) Rise slower than usual
- (20) Rise slower than usual.
- (21) Faded to 11.8 on 945.2 before rising to super maximum No. 464.
- (22) A single positive observation. Gap 1.1 days before 012. Doubtful outburst.
- (23) Slower rise.
- (24) Rise commenced on 307.1; 9.4 on 307.582 & probably brightened in daylight. Fell to 13.2 on 307.9444; then rose sharply,
- (25) (26) & (27). All slower rises than usual.
- (28) May have been brighter in daylight.
- (29) Probably brighter than shown in daylight.
- (30) & (31) Both slower rises than usual.

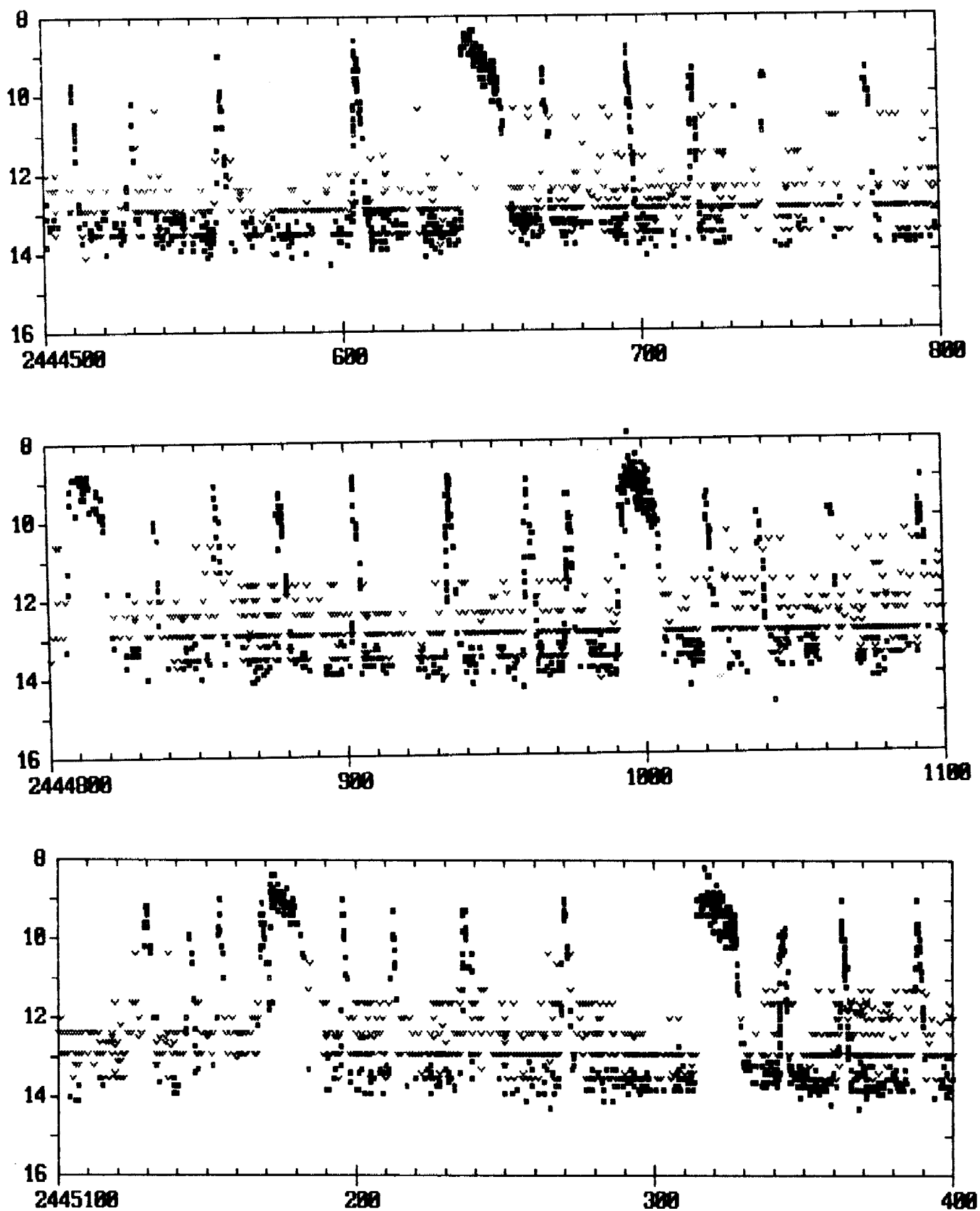


FIGURE 1

VW HYI LIGHT CURVE FROM INDIVIDUAL OBSERVATIONS
 J.D. 2,444,500 - 2,445,400

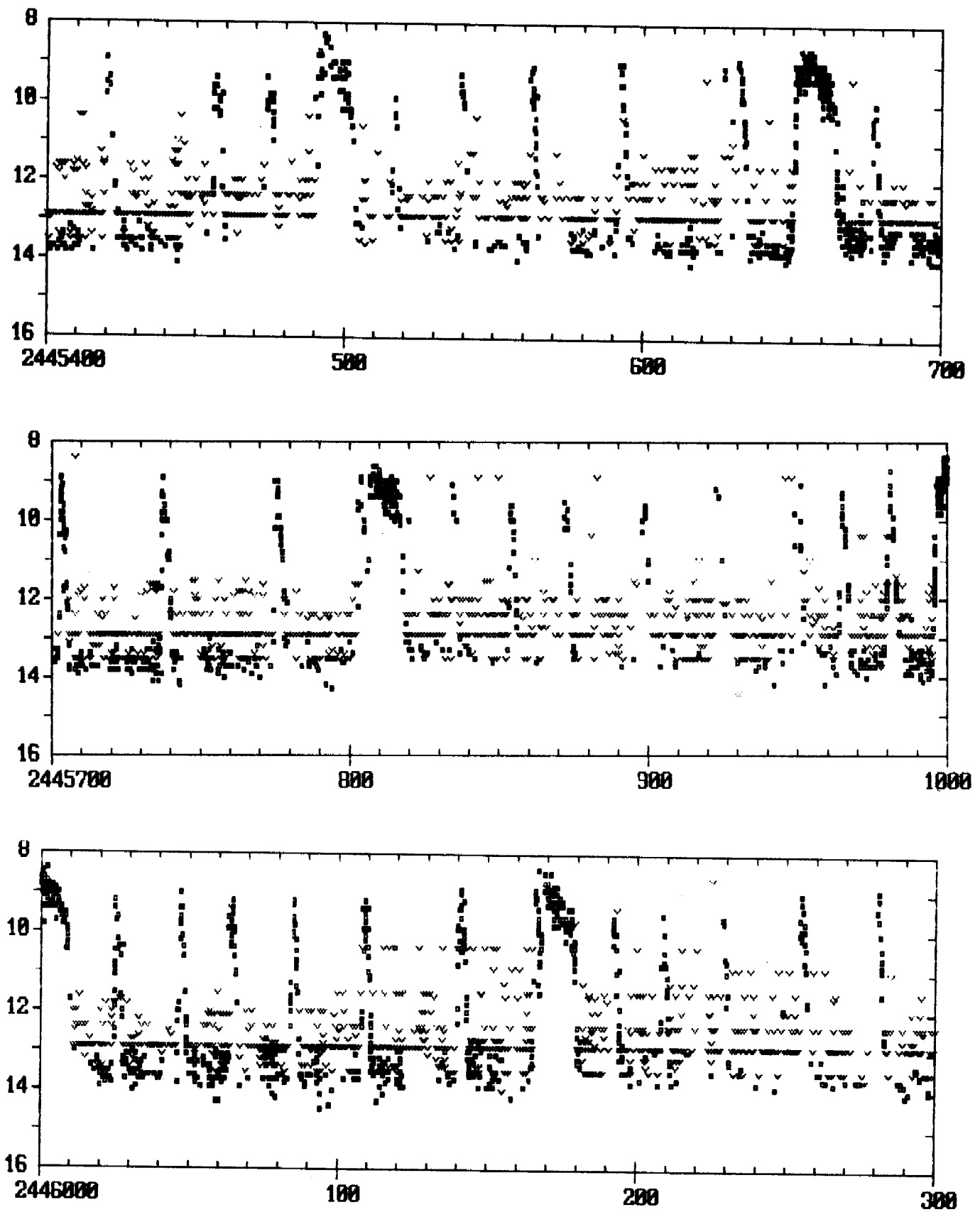


FIGURE 2

VW HYI LIGHT CURVE FROM INDIVIDUAL OBSERVATIONS
 J.D. 2,445,400 - 2,446,300

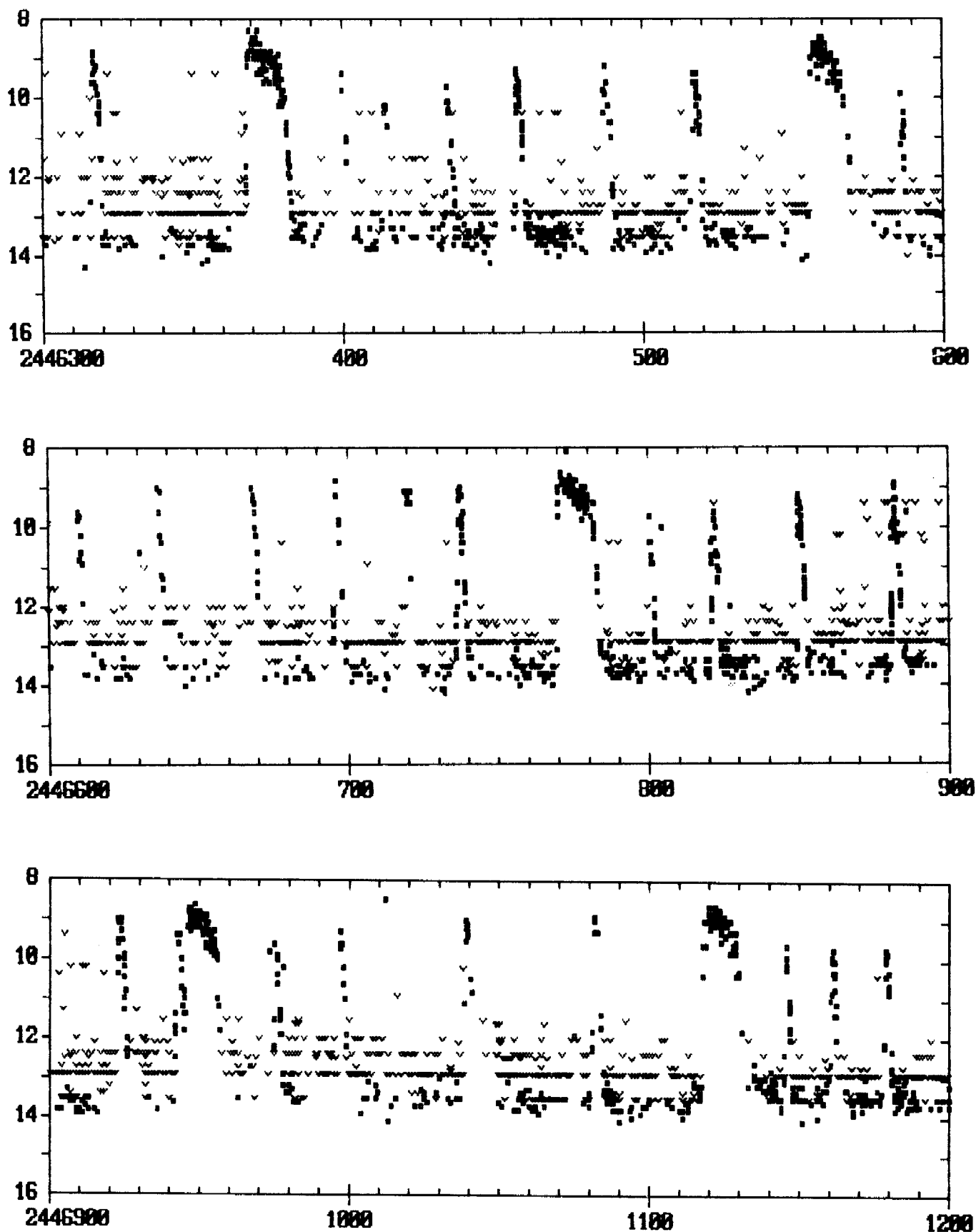


FIGURE 3

VW HYI LIGHT CURVE FROM INDIVIDUAL OBSERVATIONS
 J.D. 2,446,300 - 2,447,200

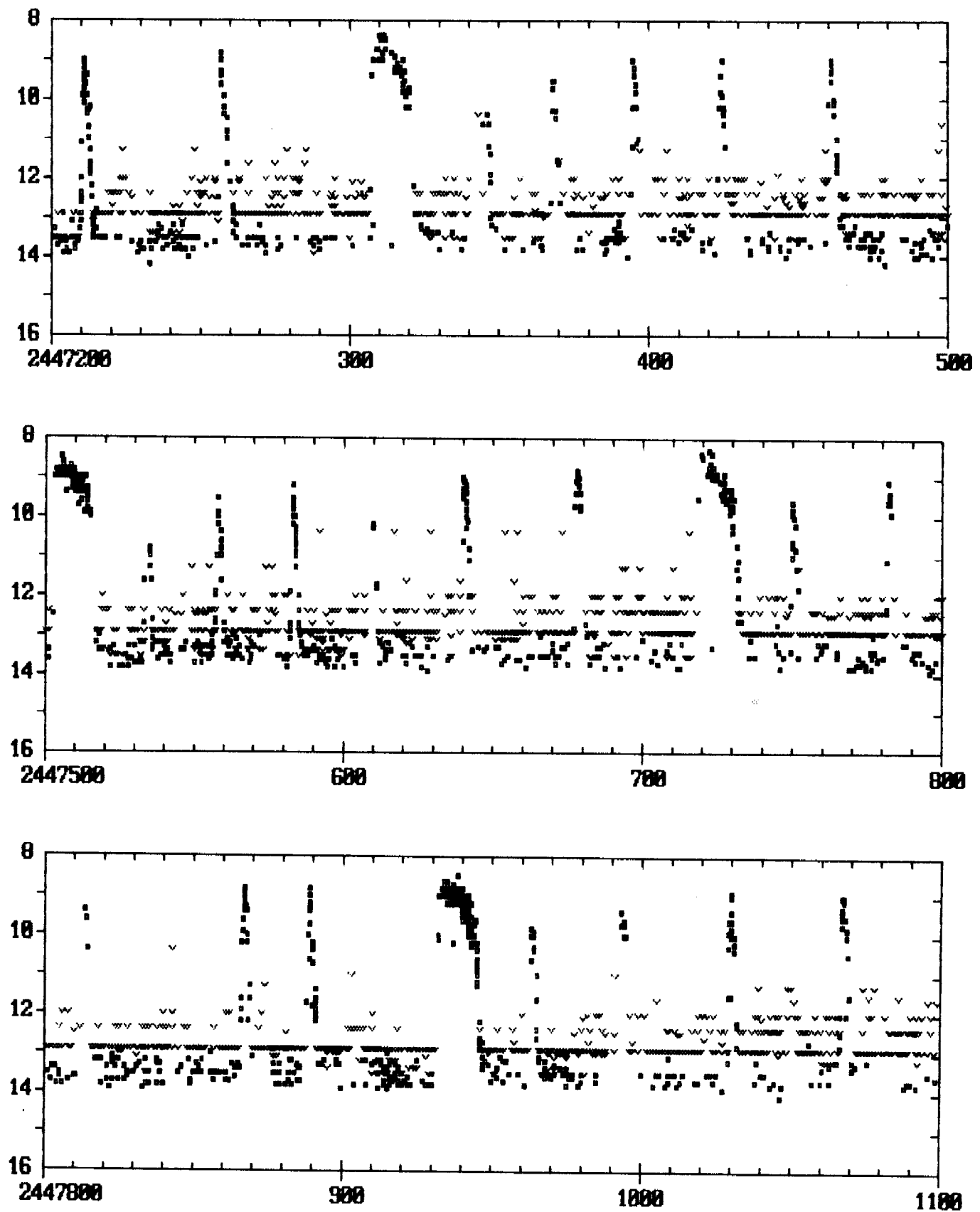


FIGURE 4

VW HYI LIGHT CURVE FROM INDIVIDUAL OBSERVATIONS
 J.D. 2,447,200 - 2,448,100

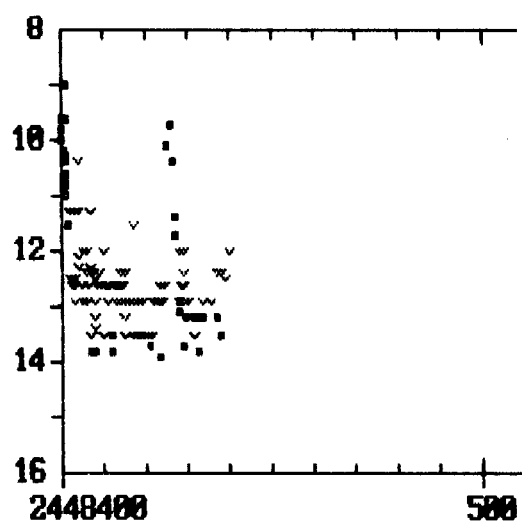
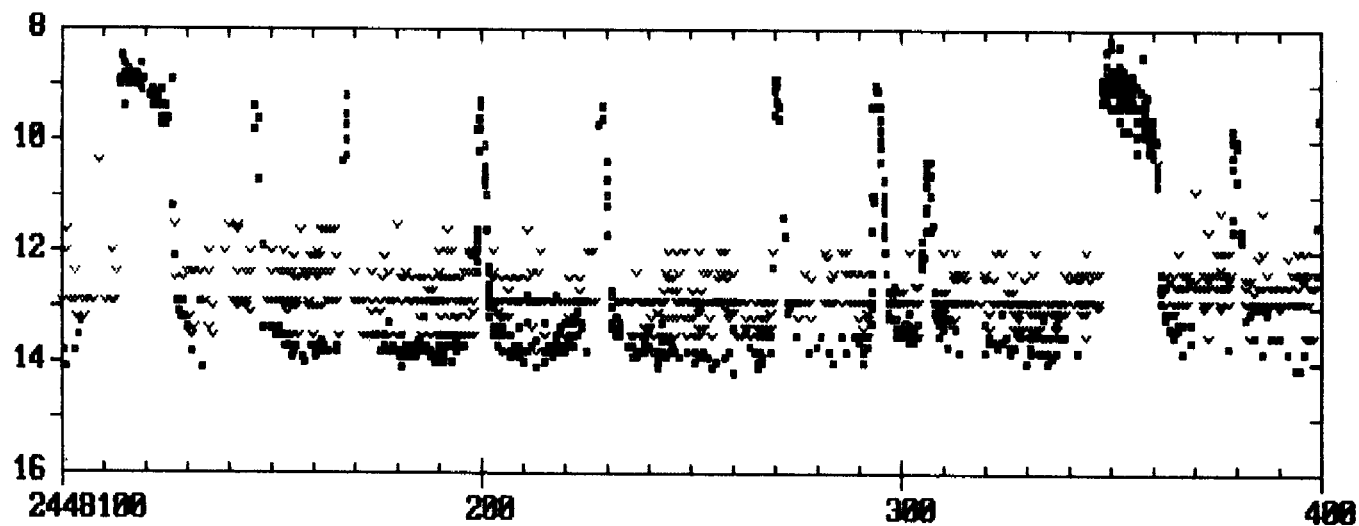


FIGURE 5

VW HYI LIGHT CURVE FROM INDIVIDUAL OBSERVATIONS
J.D. 2,448,100 - 2,448,440

WX HYDRI---RESULTS FROM ANOTHER 164 OUTBURSTS.

F.M. Bateson, R. McIntosh & D. Brunt
Variable Star Section, R.A.S.N.Z.
P.O. Box 3093, Greerton, Tauranga,
New Zealand.

SUMMARY: A light curve and table of 164 outbursts of WX Hyl are presented for J.D. 2,446,540 to 2,448,437. A mean super cycle of 198.09 days operated in this interval. Normal outbursts had a mean cycle of 11.25 days, and the mean cycle for all outbursts, irrespective of type, was 11.92 days.

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1. INTRODUCTION

The results from the visual monitoring of WX Hyl from J.D. 2,446,540 to 2,448,437 continue tables in previous papers (1,2).

2. OBSERVATIONS

A list of the observed outbursts appears in Table 3 and the light curve is shown in Figs. 1 and 2. It is presumed that all outbursts are consecutive as the coverage has been excellent and there are few gaps in the records. This assumption may be incorrect as, because of the very short duration of normal outbursts a few may have passed unobserved. Doubtful intervals, marked by a question mark in column 5 of Table 3, have been excluded from the normal outbursts summarised in Table 2.

When there was disagreement on the estimated magnitude between different observers use was made of their original reports. Usually it was found that the differences were apparently caused by adverse sky conditions and these doubtful estimates were rejected although some appear in the light curve.

All observations were made visually by members of the Variable Star Section, R.A.S.N.Z. using the same sequence and charts as in previous papers. All reductions have been made by FMB to keep details consistent with earlier results.

3. SUPER OUTBURSTS

There were eight superoutbursts in the interval reviewed. The supercycle from outburst No. 389 in (2) is 198.09 days compared to 187.91 days in (2). There was the usual wide spread in the lengths of individual super cycles. Details appear in Table 1 below.

TABLE 1.

WX HYDRI--SUPER OUTBURSTS

Super cycle--Mean	198.09 days (9)
" " --RANGE	109.3 - 281.2 days
Maximum Visual Magnitude--Mean	11.43 (9)
" " " --Range	11.2 - 11.8
Width of Maximum at Magnitude 13.0--Mean	11.88 days (8)
" " " " " " --Range	8.8 - 17.0 Days

4. NORMAL OUTBURSTS

The mean cycle for 145 normal outbursts, which appear to be consecutive, is 11.25 days. These are summarised in Table 2 according to the order in which they follow a super outburst.

TABLE 2.WX HYDRI---NORMAL OUTBURSTS

<u>MAX</u> <u>AFTER</u> <u>SUPER</u>	<u>MAXIMUM MAG.</u>		<u>INTERVAL</u>		<u>WIDTH</u>	
	<u>MEAN</u>	<u>RANGE</u>	<u>MEAN</u>	<u>RANGE</u>	<u>MEAN</u>	<u>RANGE</u>
1st	12.94(9)	12.7-13.4	^d 17.40(9)	12 ^d .0-27 ^d .2	0 ^d .77(4)	0 ^d .1 - 1 ^d .1
2nd	12.71(9)	12.1-13.4	11.90(10)	5.9-19.3	0.77(6)	0.1 - 1.1
3rd	12.73(10)	12.3-13.1	10.28(9)	5.0-18.4	0.86(7)	0.3 - 1.2
4th	12.73(9)	12.4-13.1	10.47(9)	5.6-19.0	0.66(3)	0.1 - 1.1
5th	12.72(10)	12.5-13.1	7.73(8)	0.6-16.0	0.96(5)	0.2 - 1.2
6	12.62(10)	12.0-13.0	11.98(10)	7.1-18.0	1.03(7)	0.4 - 2.3
7	12.53(9)	12.3-13.0	11.64(9)	7.0-25.1	1.03(6)	0.3 - 2.0
8	12.67(9)	12.4-13.3	10.44(9)	5.1-22.6	1.06(7)	0.8 - 1.4
9	12.52(8)	12.0-12.7	10.85(9)	10.0-23.5	1.32(6)	0.3 - 2.1
10	12.57(7)	12.4-13.0	12.41(8)	5.4-27.6	1.56(5)	0.5 - 2.3
11	12.50(8)	12.0-13.2	14.09(7)	6.4 -27.1	1.32(5)	0.3 - 3.2
12	12.54(7)	12.1-13.0	12.85(6)	5.0 -19.0	0.80(4)	0.2 - 1.5
13	12.33(7)	11.7-13.0	13.23(7)	7.0-20.4	1.18(6)	0.4 - 2.3
14	12.35(6)	12.2-12.7	11.27(6)	7.6-19.9	1.25(6)	0.5 - 1.7
15	12.52(5)	12.1-13.1	10.24(5)	7.3-12.7	1.37(4)	0.5 - 2.0
16	12.05(4)	12.0-12.2	8.75(4)	4.1-11.0	1.4 (2)	1.4
17	12.45(4)	12.2-13.0	8.90(3)	8.3- 9.7	1.75(2)	1.6 - 1.9
18	12.43(3)	12.3-12.5	7.83(3)	4.9-10.0	0.9 (3)	0.2 - 1.5
19	12.50(3)	12.3-12.7	8.57(3)	7.9- 9.4	1.13(3)	1.1 - 1.2
20	12.73(3)	12.6-12.8	11.2 (3)	6.9-17.1	0.3 (3)	0.1 - 0.5
21	12.4(2)	12.4	2.0 (2)	1.9 - 2.2	0.9 (2)	0.3 - 1.6
22	12.5 (2)	12.2-12.8	8.6 (2)	8.0 - 9.3	1.0 (2)	0.5 - 1.5
23	12.5 (2)	12.4-12.6	12.4 (2)	9.6-15.1	1.0 (2)	0.6 - 1.4
24	12.35(2)	12.2 -12.5	9.2 (2)	7.9 -10.4	0.9 (2)	0.5 - 1.2
25	12.0 (1)		9.6 (1)		1.0 (1)	
26	12.7 (1)		9.4 (1)		1.0 (1)	
27	12.5 (1)		8.0 (1)		1.2 (1)	

5 DISCUSSION

The mean cycle for all outbursts which appear to be consecutive, irrespective of type, is 11.92 days. WX Hyi differs from other southern SU UMa stars in having very frequent normal maxima. There appears to be a definite tendency for both the mean brightness and the duration of normal outbursts to progressively change from the first to nineteenth normal maxima in each supercycle. As they grow brighter so their duration lengthens. After the nineteenth normal outburst the data is based on a very small sample which is insufficient to show whether these trends continue.

The interval between successive normal maxima decreases from the first to ninth outburst in any super cycle. Then these intervals remain almost constant until the fifteenth outburst after which they become markedly shorter so that, when there are more than 15, the outbursts follow one another almost every nine days.

The number of normal outbursts in a supercycle varied from 7 to 27 with the number progressively increasing as the supercycle lengthened. The fact that this increase in number was not smooth was possibly due to the small number of supercycles. There was little variation in the mean maximum magnitude from one super outburst to the next but the longer the interval between successive super outbursts the shorter was the duration of the super outburst.

Numerous detailed light curves of super outbursts were published in (2). We did not consider it necessary to publish such curves for the super outbursts covered in this paper because they show the same features.

6. CONCLUSIONS

The number of normal outbursts in any supercycle depends on the length of the latter. In general terms the longer the supercycle the greater is the number of normal outbursts in it. As the number of normal outbursts in a supercycle increases there is a tendency for them to increase in mean brightness and duration but the intervals between them shorten to about nine days when there are more than 15 normal maxima.

The slightly longer supercycle in this paper compared to the previous result is probably due to the shorter time interval covered in the present paper.

ACKNOWLEDGEMENTS

Once again it is our pleasure to thank all observers for their very close attention to this variable. and the accuracy of their observations.

REFERENCES

- (1) Bateson, F.M. 1976. Publ. 4, Var. Star Section, R. astr. Soc. of N.Z. pp 5-14
- (2) Bateson, F.M. & McIntosh, R. 1988. Publ 14, Var. Star Section, R. astr. Soc. of N.Z. pp. 1 - 27.

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TABLE 3

WX HYDRI - OBSERVED OUTBURSTS

<u>No.</u>	<u>Type</u>	<u>J.D. Max</u> <u>24</u>	<u>Max</u> <u>Mag_v</u>	<u>Int.</u> <u>d</u>	<u>Width</u> <u>at 13.0_d</u>	<u>No.</u> <u>Obs</u>	<u>Remarks</u>
391	N	46,551.2	12.3	14.0	1.0	5	
392	N	563.2	12.7	12.0	1.0	2	
393	N	582.2	13.6?	19.0	-	1	
394	N	588.1	12.5	5.9	1.2	6	
395	N	600.6	13.0	12.5	-	2	
396	N	610.1	12.8	9.5	0.6	5	
397	S	629.0	11.3	18.9	15.1	29	
398	N	656.2	13.1	27.2	-	3	
399	N	671.0	13.4	14.8	-	3	
400	N	678.0	12.7	7.0	1.2	11	
401	N	688.1?	12.7	10.1?	?	3	Gap 1.5 days after 688.1
402	N	697.0	12.9	8.9?	0.8?	11	
403	N	711.8	12.3	14.8	2.3	12	
404	N	720.9	12.5	9.1	?	2	
405	N	726.0	12.7	5.1	1.1	4	
406	S	738.3	11.8	12.3	17.0	44	Fell to 13.9 on 741.0 to 741.6 & then recovered to 11.8.
407	N	756.9	12.7	18.6	1.1	12	
408	N	768.0	12.5	11.1	1.1	9	
409	N	777.0	12.8	9.0	0.5	5	
410	N	784.0	12.9	7.0	-	7	
411	N	792.9	12.6	8.9	1.0	12	
412	N	803.4	12.9	10.5	-	3	
413	N	811.1	13.0	7.7	-	10	
414	N	818.9	13.3	7.8	-	11	
415	N	831.3	12.2	12.4	1.8	18	
416	N	858.9	12.4	27.6	2.0	11	
417	N	873.9	12.7	15.0	0.3	5	
418	S	902.2	11.5	28.3	10.3	34	
419	N	917.2	13.4	15.0	-	3	
420	N	929.2	12.1	12.0	1.1	4	
421	N	947.6	12.7	18.4	1.1	6	
422	N	959.2	12.7	11.6	-	1	Gap 1.6 days before 959.2 Gap 9 days after 968.3
423	N	968.3?	12.7	9.1?	-	1	
424	N	978.2	12.5	9.9	0.4	5	
425	N	47,000.6	11.9?	22.4	2.0	5	
426	N	023.2	12.7	22.6	1.1	7	
427	N	036.1	12.2	12.9	2.1	7	
428	N	054.9	12.4	18.8	2.3	17	
429	N	082.0	12.3	27.1	3.2	17	
430	N	094.9	12.5	12.9	1.5	7	

TABLE 3 Continued

WX HYDRI - OBSERVED OUTBURSTS

<u>No.</u>	<u>Type</u>	<u>J.D. Max</u> <u>24</u>	<u>Max</u> <u>Mag_v</u>	<u>Int.</u> <u>d</u>	<u>Width</u> <u>at 13.0_d</u>	<u>No.</u> <u>Obs</u>	<u>Remarks</u>
431	N	47,109.9	12.0	15.0	0.4	9	
432	S	128.9	11.2	19.0	11.2	38	
433	N	147.0	12.8	18.1	0.1	11	
434	N	157.2	12.6	10.2	0.3	7	
435	N	167.0	13.0	9.8	-	7	
436	N	182.3	12.4	15.3	1.1	21	
437	N	198.3	12.5	16.0	1.2	8	
438	N	207.9	12.3	9.6	1.0	8	
439	N	223.0	12.4	25.1	-	1	
440	N	234.8	12.7	11.8	0.9	10	
441	N	244.8	13.4	10.0	-	2	
442	N	250.2	12.7	5.4	0.3?	2	
443	N	268.2	12.3	18.0	1.7	7	
444	N	282.2	12.9	14.0	-	2	
445	N	302.6	12.0	20.4	2.3	6	
446	N	322.5	12.2	19.9	1.5	3	
447	S	347.2	11.3	24.7	11.2	19	
448	N	363.2	12.7	16.0	0.8	5	
449	N	382.5	13.0	19.3	-	2	
450	N	396.6	12.5	14.1	0.7	4	
451	N	409.6	12.5	13.0	0.8	3	
452	N	418.9	12.8	9.3	1.2	6	
453	N	436.9	12.8	18.0	0.4	5	
454	N	444.8	12.4	7.9	0.3	9	
455	N	454.0	12.5	9.2	-	1	Gaps 1 ^d before & 2 ^d after 454.
456	N	464.0	12.6	10.0	0.3	4	
457	N	472.5	12.5	8.5	1.4	10	
458	N	478.9	13.2	6.4	-	7	
459	N	483.9	12.7	5.0	0.2	4	
460	N	490.9	12.6	7.0	0.5	10	
461	N	501.0	12.2	10.1	1.6	9	
462	N	508.3	13.1	7.3	-	7	
463	N	512.4	12.2	4.1	-	1	
464	N	522.1	13.0	9.7	-	8	
465	N	527.0	12.5	4.9	1.0	7	
466	N	534.9	12.7	7.9	1.1	9	
467	N	552.0	12.6	17.1	0.5	9	
468	N	559.9	12.4	7.9	1.6	11	
469	N	567.9	12.8	8.0	0.5	8	
470	N	583.0	12.4	15.1	0.6	7	
471	N	590.9	12.2	7.9	0.5	11	
472	S	595.9	11.6	5.0	10.4	29	
473	N	615.8	12.9	19.9	-	2	
474	N	622.8	13.1	7.0	-	3	
475	N	627.8	12.5	5.0	0.3	4	
476	N	636.2	12.7	8.4	?	1	Gap 3.6 days after 636.2) during which only negative) obs of <11.5.

TABLE 3 Continued

WX HYDRI - OBSERVED OUTBURSTS

<u>No.</u>	<u>Type</u>	<u>J.D. Max</u> <u>24</u>	<u>Max</u> <u>Mag_v</u>	<u>Int.</u> <u>d</u>	<u>Width</u> <u>at 13.0_d</u>	<u>No.</u> <u>Obs</u>	<u>Remarks</u>
477	N	47,642.2	12.6	6.0	-	1	
478	N	656.2	12.8	14.0	0.4	2	
479	N	677.2?	12.3	21.0?	1.1	4	Gap 2.5 days before 677.2
480	N	686.4	12.7	9.2?	0.8	5	
481	N	697.6	12.5	11.2	0.9?	2	
482	N	707.2	12.4	9.6	1.6	4	
483	N	721.5	12.0	14.3	1.7?	5	Gap 2 days before 721.5
484	N	740.5	12.1	19.0	2.0?	2	
485	N	757.6	11.7	17.1	0.9	4	
486	N	769.9	12.5	12.3	1.7	9	
487	N	782.6	12.1	12.7	2.0	4	Faded to <13.7 before rise } to outburst 488.
488	S	788.9	11.7	6.3	11.0	31	
489	N	802.3	13.0	13.4	-	6	Had fallen to 14.3 after) outburst 488, before rise) of 489.
490	N	815.6	12.7	13.3	1.0	5	
491	N	826.9	12.3	11.3	1.2	9	
492	N	833.8	13.1	6.9	-	2	
493	N	842.8	12.7	9.0	?	2	
494	N	851.9	12.6	9.1	1.3	7	
495	N	861.0	12.3	9.1	0.9	10	
496	N	871.0	12.4	10.0	1.1	4	
497	N	884.0	12.6	13.0	1.1	11	
498	N	892.9	12.6	8.9	0.5	4	
499	N	902.4	12.6	9.5	0.9	5	
500	N	912.9	12.2	10.5	0.8	9	
501	N	921.0	12.5	8.1	1.5	9	
502	N	929.3	12.3	8.3	1.3	8	
503	N	937.9	12.5	8.6	1.2	11	
504	N	948.9	12.0	11.0	1.4	9	
505	N	957.2	12.2	8.3	1.9	4	
506	N	965.8	12.5	8.6	0.2	5	
507	N	974.2	12.5	8.4	1.1	12	
508	N	983.8?	12.8	9.6	-	2	
509	S	996.8	11.2	13.0	10.5?	13	Gap 7.6 days before 995.8) bottom of rise missed.) Width possibly greater) than 10.5 days.
510	N	48,016.2	13.2	19.4	-	3	Maximum probably in) daylight.
511	N	027.6?	13.0?	11.4	-	1	Gap 3 ^d before 027.6
512	N	034.6	13.0	7.0?	-	2	
513	N	040.2	12.9	5.6	-	2	
514	N	046.3	12.8	6.1	0.2	3	
515	N	060.6	12.0	14.3	1.4	4	
516	N	067.6	12.3	7.0	1.3	5	

WX HYDRI - OBSERVED OUTBURSTS

<u>No.</u>	<u>Type</u>	<u>J.D. Max</u> <u>24</u>	<u>Max</u> <u>Mag_v</u>	<u>Int.</u> <u>d</u>	<u>Width</u> <u>at 13.0_d</u>	<u>No.</u> <u>Obs</u>	<u>Remarks</u>
517	N	48,078.6	12.5	11.0	1.4	6	
518	N	102.1	12.0	23.5	1.6	6	
519	N	114.6?	13.0?	12.5	-	2	Gap 2 ^d before 114.6
520	N	122.4?	12.2	7.8?	1.3?	4	Gap 4 ^d before 122.4
521	N	130.6	12.4	8.2?	0.7	4	
522	N	146.9	12.5	16.3	1.5	6	
523	N	156.3	12.2	9.4	0.9	9	
524	N	166.9	12.7	10.6	0.9	5	
525	N	175.8	12.0	8.9	1.4	14	
526	N	184.5	12.3	8.7	1.6	13	
527	N	194.5	12.3	10.0	1.5	7	
528	N	203.9	12.3	9.4	1.2	13	
529	N	210.8	12.8	6.9	0.1	3	)Negative obs. of <13.7 (separated these maxima.
530	N	213.0	12.4	2.2	0.3	8	
531	N	222.3	12.2	9.3	1.5	20	
532	N	231.9	12.6	9.6	1.4	12	
533	N	242.3	12.5	10.4	1.2	20	
534	N	251.9	12.0	9.6	1.0	14	
535	N	261.3	12.7	9.4	1.0	4	
536	N	269.3	12.5	8.0	1.2	13	
537	S	278.0	11.3	8.7	8.8	42	
538	N	290.0	12.7	12.0	1.1	14	
539	N	295.9	12.7	5.9	0.1	6	
540	N	301.8	13.1	5.9	-	7	
541	N	309.2	12.7	7.4	0.1	8	
542	N	315.8	13.1	6.6	-	2	
543	N	322.9	13.0	7.1	-	6	
544	N	329.9	12.8	7.0	?	3	
545	N	337.2	12.5	7.3	1.0	5	
546	N	351.9	12.7	14.7	1.0	8	
547	N	359.9	13.0	8.0	-	2	
548	N	368.2	12.7	8.3	0.5	5	
549	N	383.9	13.0	15.7	-	2	
550	N	392.6	13.0	8.7	-	3	
551	N	400.2	12.7	7.6	0.5	3	
552	N	412.2	12.2	12.0	1.3	6	
553	N	423.2?	12.0	11.0?	2.1?	5	Gap 4 ^d before 423.2
554	N	432.3	12.3	9.1?	?	2	

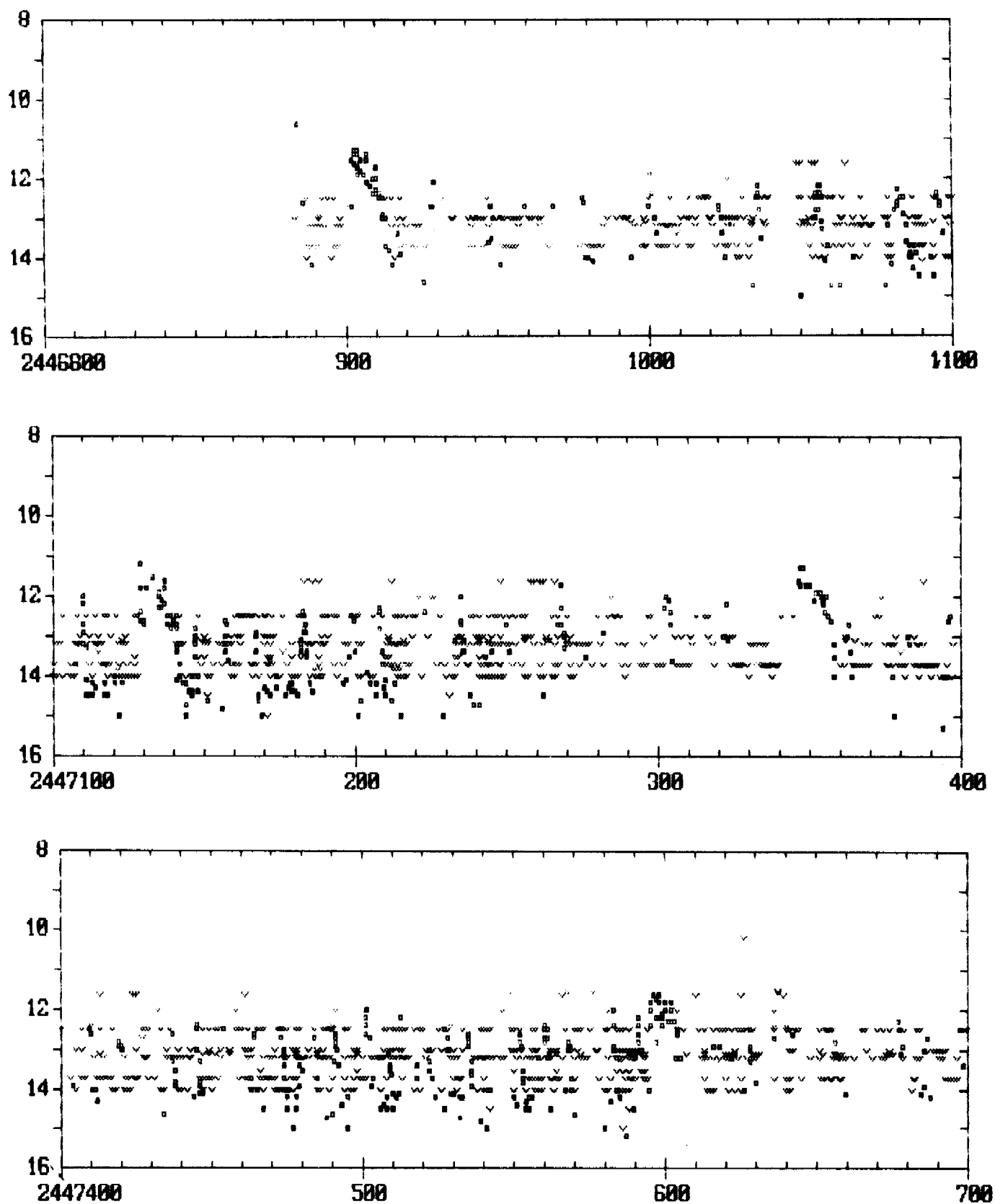


FIGURE 1

WX HYI LIGHT CURVE FROM INDIVIDUAL OBSERVATIONS
 J.D. 2,446,880 - 2,447,700

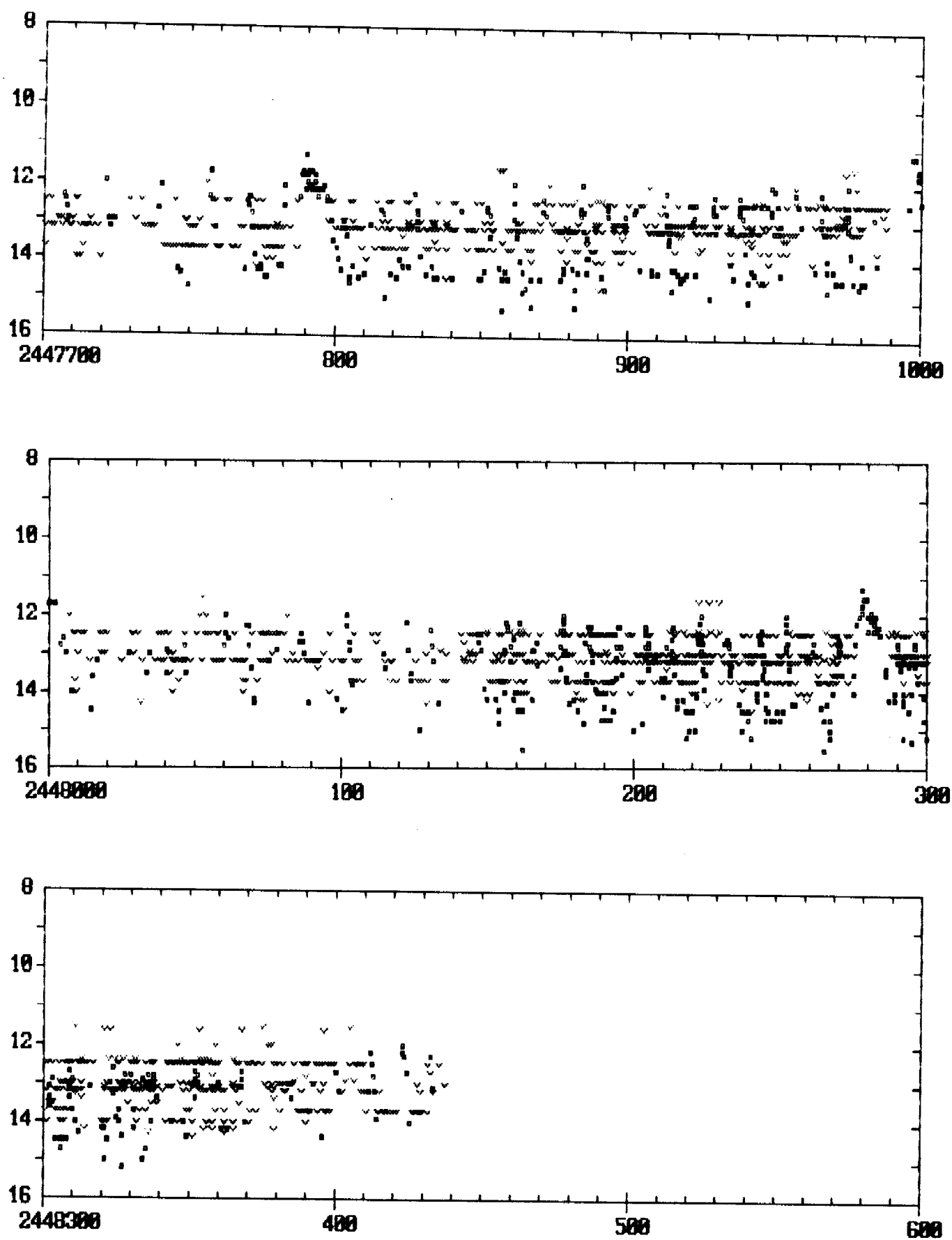


FIGURE 2

WX HYI LIGHT CURVE FROM INDIVIDUAL OBSERVATIONS
 J.D. 2,447,700 - 2,448,440

THE SUPER MAXIMA OF AQ ERIDANI, A SU UMa VARIABLE

F.M. Bateson, R. McIntosh & D. Brunt
 Variable Star Section, R.A.S.N.Z.
 P.O. Box 3093, Greerton, Tauranga
 New Zealand

SUMMARY: A list of 37 outbursts of AQ Eri are given with a light curve. These are discussed with results previously published. AQ Eri appears to be a SU UMa dwarf nova with a super-cycle of about 300 days and a mean cycle of 44 days.

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1. INTRODUCTION

AQ Eri is classified as "UGZ:" with a possible mean cycle of 76 days (1). Bateson (2) derived a mean cycle of 52.2 days and pointed out that this variable had both wide and normal (short) maxima with a cycle of about 366 days for wide maxima, which, however, had a wide spread in intervals from 20 to 759 days.

He pointed out that in the two best observed wide maxima there appeared to be an indication of small variations, but because the observations were not frequent enough it was impossible to state whether these indicated that AQ Eri had superhumps that suggested the variable was of SU UMa type.

Kato, Fujino & Iida (3) concluded that AQ Eri had all the characteristics of SU UMa type including a possible superhump period of 0.06703 days during an outburst in November 1987 (No. 43 in Table 1).

2. OBSERVATIONS

Bateson (2) summarized visual observations by members of the Variable Star Section, R.A.S.N.Z. to J.D. 2,445,821. We now extend these results to 2,448,600. The observed outbursts are listed in Table 1 and the light curve appears in Figs. 1-4 with large scale curves for individual outbursts in Figs. 5-10.

The observing season is August through April each year. This causes large gaps in the records when the variable is unobservable. There are also substantial gaps in the observations during the main observing season in some years.

3. DISCUSSION

In this discussion we have used both the outbursts in Table 1 and those previously published by Bateson (2, 4). We find it difficult to be definite that any of the reported outbursts are consecutive, because of the gaps in the observations and due to the very short duration of normal maxima and their faintness.

We consider that the detailed plots of wide maxima clearly show that these are in fact super outbursts. Nos. 13 & 14 given in (4) were probably the same outburst, which was not apparent because of the limited number of observations. If this assumption is correct there are 16 superoutbursts which may be consecutive. These give a possible supercycle of 300.4 days with a range in intervals of 161 to 533 days.

The mean maximum magnitude for these superoutbursts is 12.71 and their mean widths (durations) 9.9 days.

There are 24 normal maxima that may be consecutive, although it is impossible to be certain.

The possible mean cycle is 44.7 days with a spread in intervals from 14 to 72 days. The mean visual maximum magnitude for normal outbursts is 13.43 with a range of 12.8 to 14.0. The mean duration of normal maxima is 1.15 days. Most lasted for only 1 day and a few for 2 days. This simply means that owing to their faintness the greater portion of their rises and falls were not observed.

4. CONCLUSIONS

We believe that AQ Eri is of the SU UMa sub-class of dwarf novae. The possible mean supercycle is 300.4 days. At supermaximum the mean visual magnitude is 12.71 and their mean duration is 9.9 days.

Normal outbursts have a mean maximum visual magnitude of 13.43 and a duration of 1.15 days. The possible mean cycle is 44.7 days although we consider that this could be shorter because we believe that the faintness and very short durations of normal outbursts means that some have passed unobserved even during the main observing season.

No attempt has been made to determine a superhump period owing to the lack of estimates on each night during a superoutburst.

We urge all observers to pay more attention to AQ Eri and to make frequent and accurately timed estimates during every superoutburst,

ACKNOWLEDGEMENTS

All members of the Variable Star Section, R.A.S.N.Z. are thanked for their observations.

REFERENCES

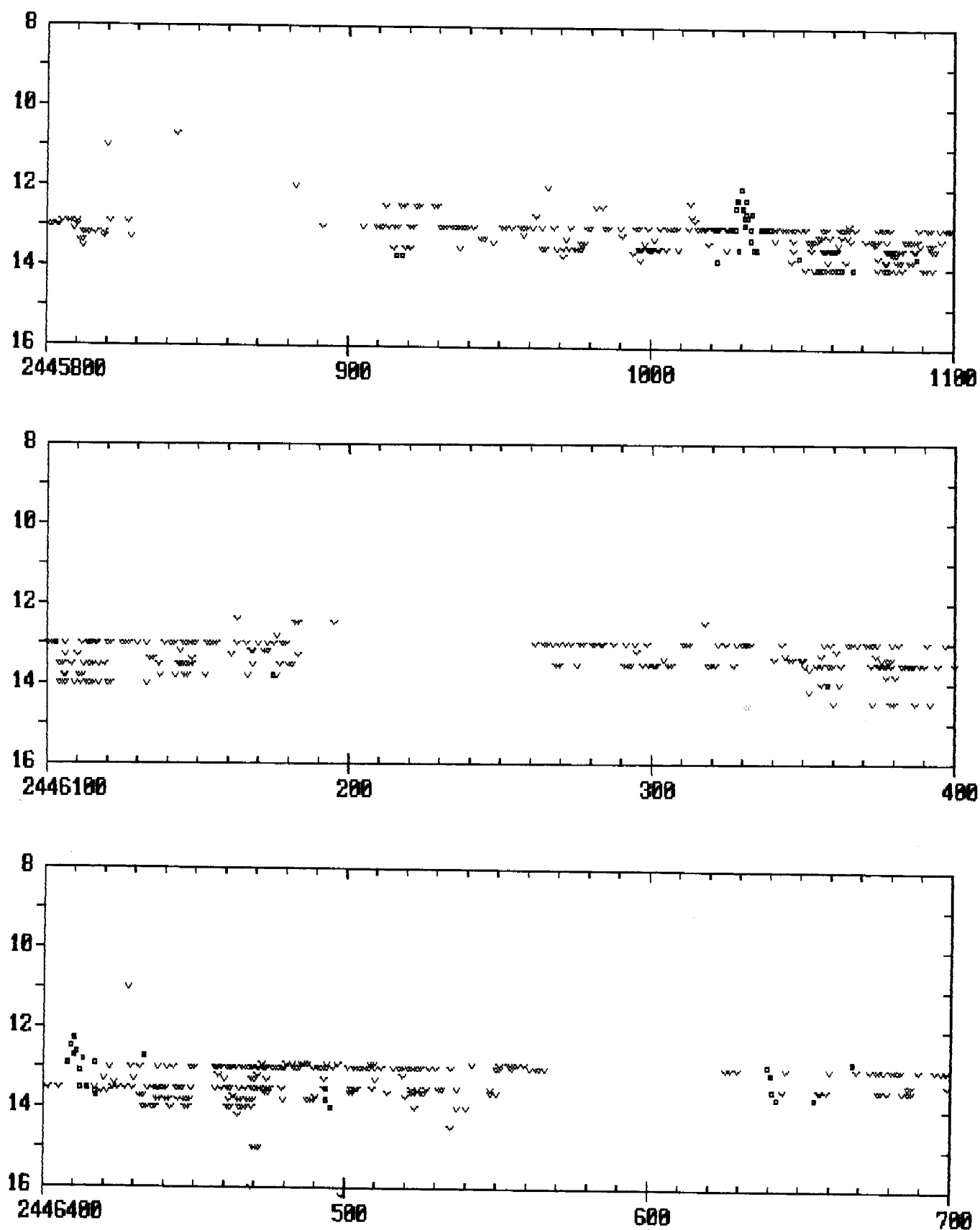
- (1) Kholopov, P.N. (ed). 1985. General Catalogue of Var. Stars. Vol.2, 4th ed. Nauka, Moscow.
- (2) Bateson, F.M. 1985. Publ. 12, Var. Star Section, R. astr. Soc. of N.Z. pp 47-48.
- (3) Kato, T., Fujino, S & Iida, M. 1989. Japanese Var. Star Bull. 9
- (4) Bateson, F.M. 1982. Publ. 9, Var. Star Section, R. astr. Soc. of N.Z. p.4.

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TABLE No. 1

AQ ERIDANI---OBSERVED OUTBURSTS.

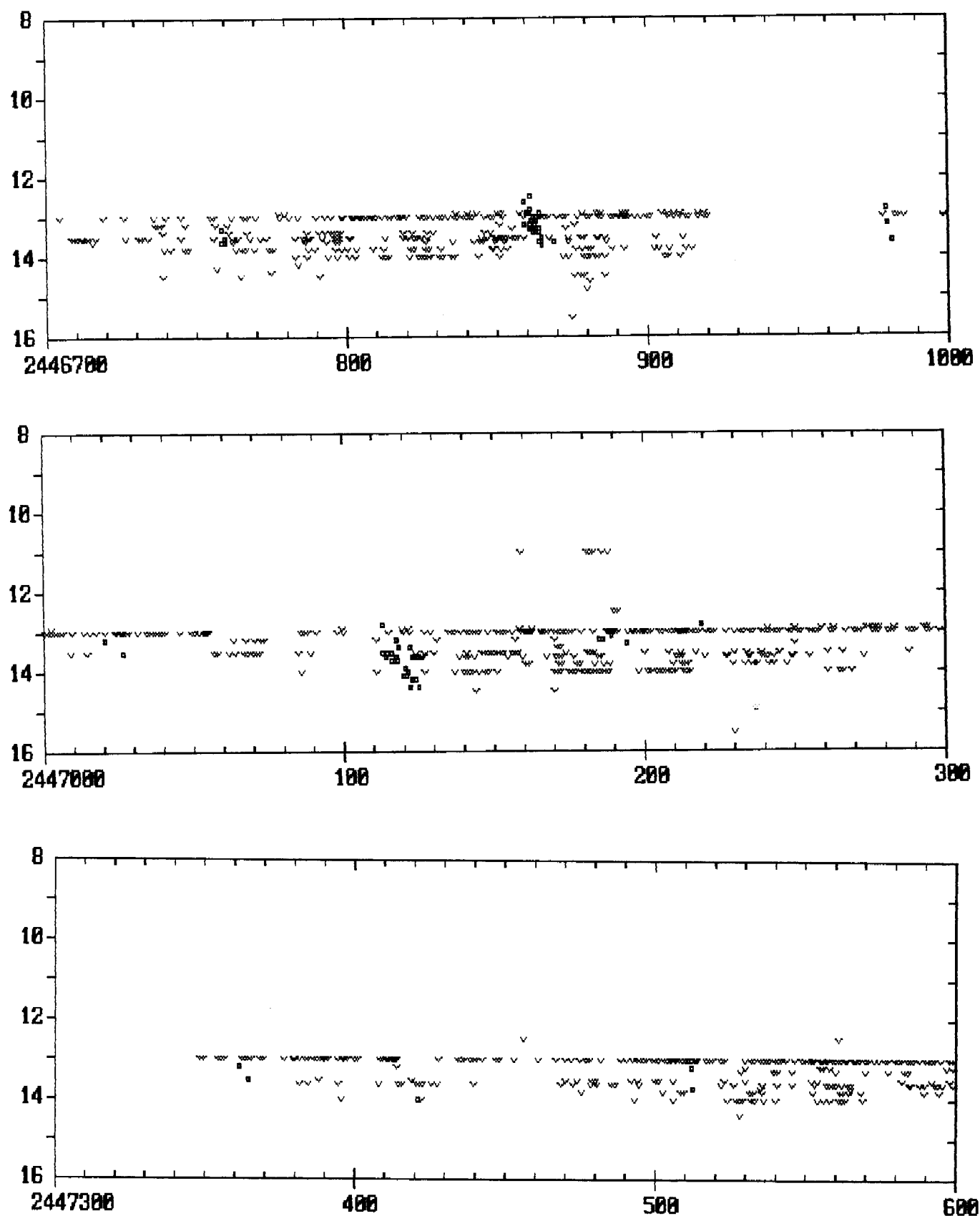
<u>No</u>	<u>TYPE</u>	<u>J.D. MAX</u> <u>24.....</u>	<u>Max.</u> <u>MAG</u>	<u>INTERVAL</u> <u>D</u>	<u>WIDTH</u> <u>d</u>	<u>No.</u> <u>OBS</u>	<u>REMARKS</u>
27	N	45,916	13.7	215	2	2	
28	N	46,022	13.8	106	1	1	Possible precursor to 29 as faded to (13.8 before onset of outburst 29
29	S	030	12.0	8	12	25	Rose in 2 days to 12,3 on 028.4 Then faded to 13.5 on 029.1 before rising to maximum.
30	N	049	13.7	19	1	1	
31	N	088	13.7	39	1	1	
32	N	103	13.0	15	1	1	
33	N	175	13.8	72	1	1	
34	S	409	12.5	234	9	14	
35	N	433	12.7?	24	1	1	
36	N	493	13.8	60	2	2	
37	S	639?	12.9?	146	16?	5	Gap 10 ^d before 639
38	N	667?	12.8?	28?	1	1	Observed in moonlight
39	N	758	13.3	91	1.2	4	
40	S	859	12.6	101	10	26	
41	N	47,020	13.2	161	1?	1	Gap 3 ^d after 020
42	N	026	13.5	6	1	1	
43	S	113	12.8	87	12	24	
44	N	185?	13.2	72	1?	2	
45	N	189?	13.1	4?	1	2	Very doubtful.
46	N	219	12.8	30	?	1	Gap 2 ^d after 219. Very doubtful
47	N	237	13.8	18	1	1	
48	S?	362	13.2	125	3	2	
49	N	421	14.0	59	1	1	
50	N	511	13.0	90	1.4	3	
51	N	738	13.4	227	1	1	
52	N	773	13.4	35	2	5	
53	N	822	13.3	49	1	1	
54	N	881	13.3	59	1	2	Gap 2 ^d before 881
55	S?	895	12.8	14	3	6	
56	N	980	14.0	85	1	1	
57	S?	48,104	12.8	124	?	2	Gap 4 ^d before 104 & 6 ^d after 106.
58	N	134	13.4	30	1?	1	Gaps 10 ^d before & 2 ^d after 134.
59	N	168	13.6	34	1	1	Gap 2 ^d after 168.
60	N	236	13.3	68	1	5	
61	S	303	12.9	67	9	21	
62	S	464	12.9	61	10	5	Gap 6 ^d after 464
63	N?	506?	12.8?	42?	1?	1	Very doubtful. A class 3 observation.



AQ ERI

FIGURE 1

LIGHT CURVE FROM INDIVIDUAL OBSERVATIONS
 J.D. 2,445,800 - J.D. 2,446,700

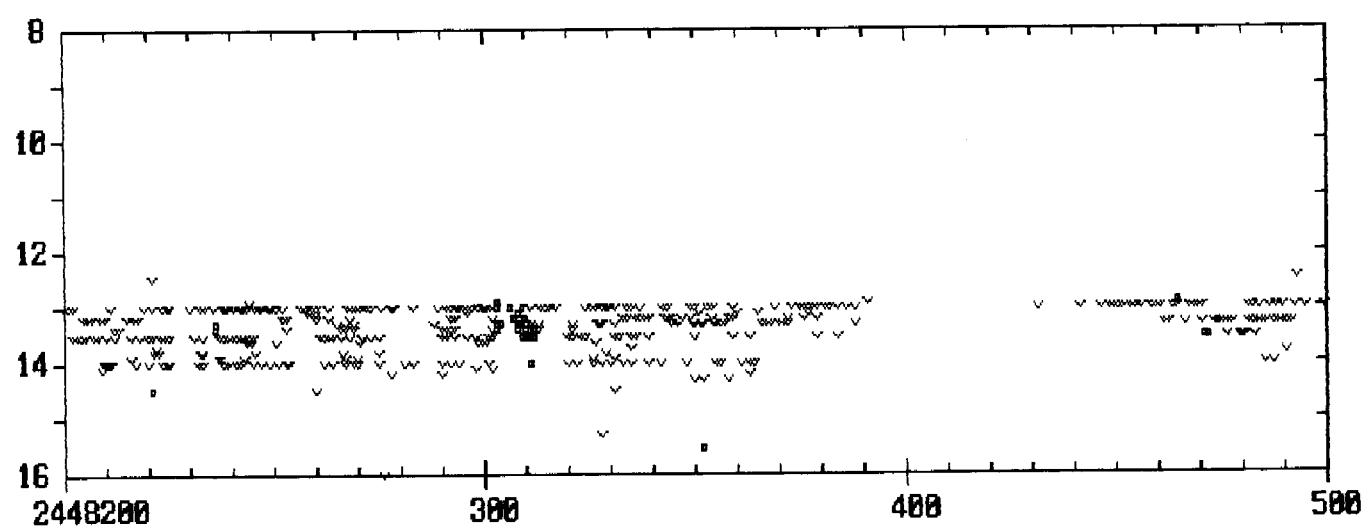
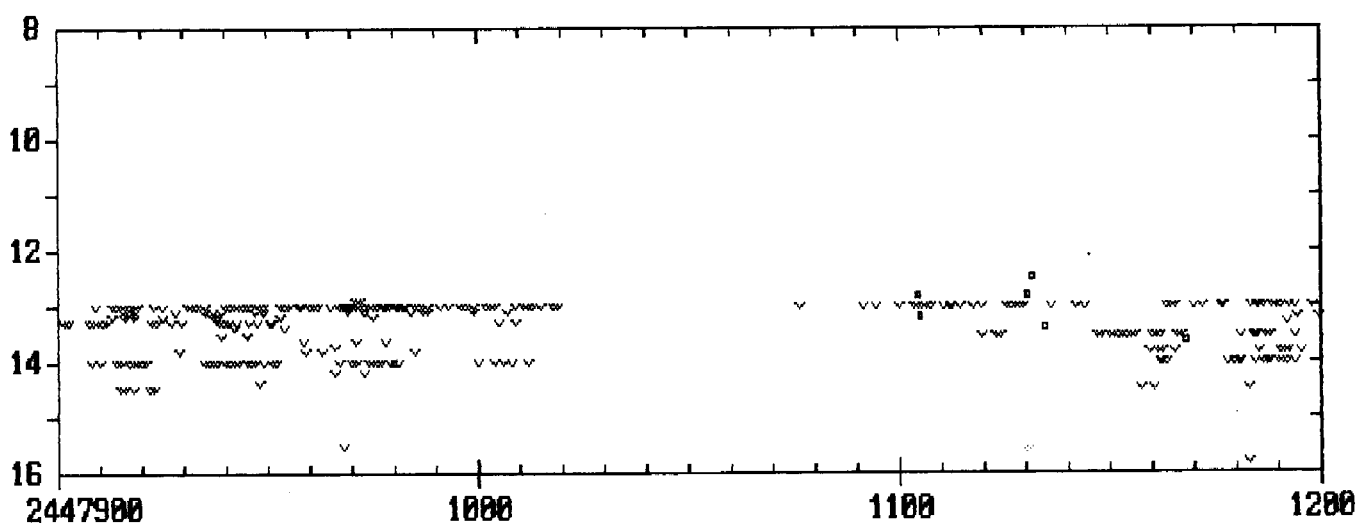
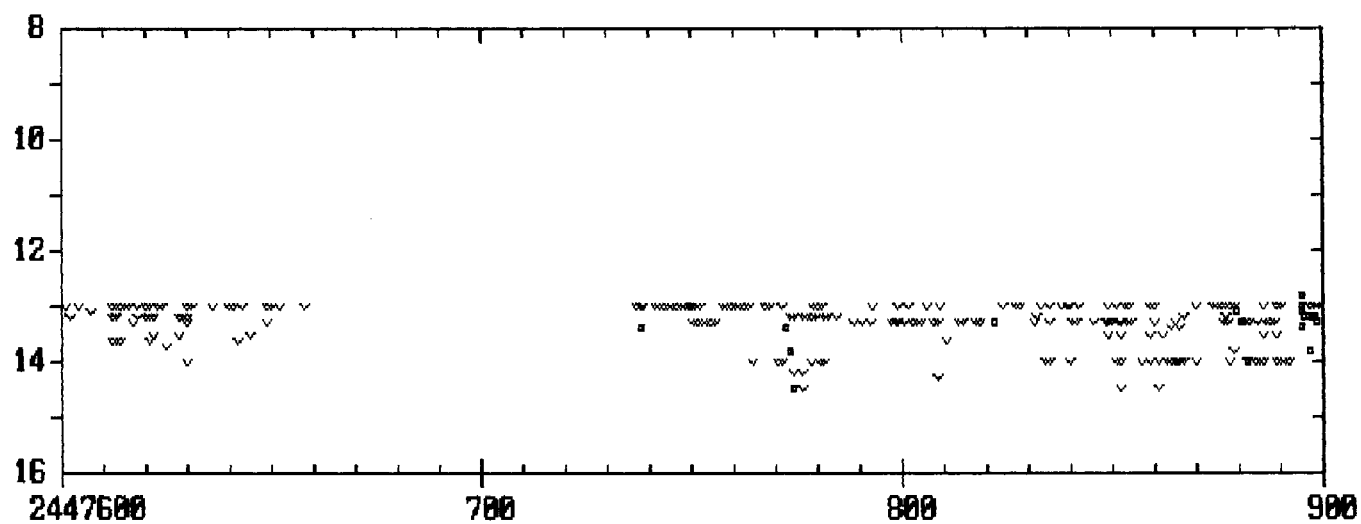


AQ ERI

FIGURE 2

LIGHT CURVE FROM INDIVIDUAL OBSERVATIONS

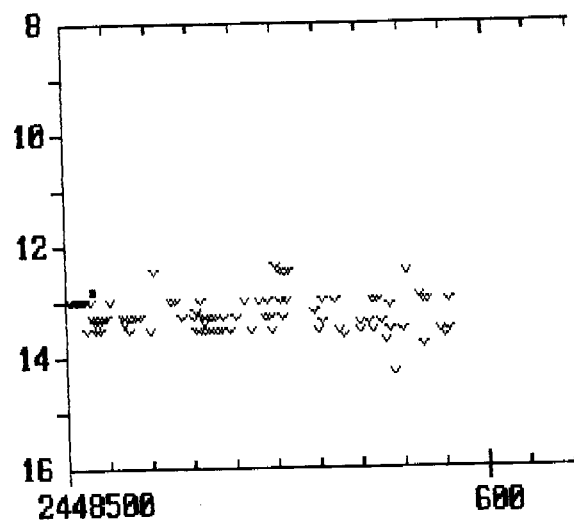
J.D. 2446,700 - J.D. 2447,600



AQ ERI

FIGURE 3

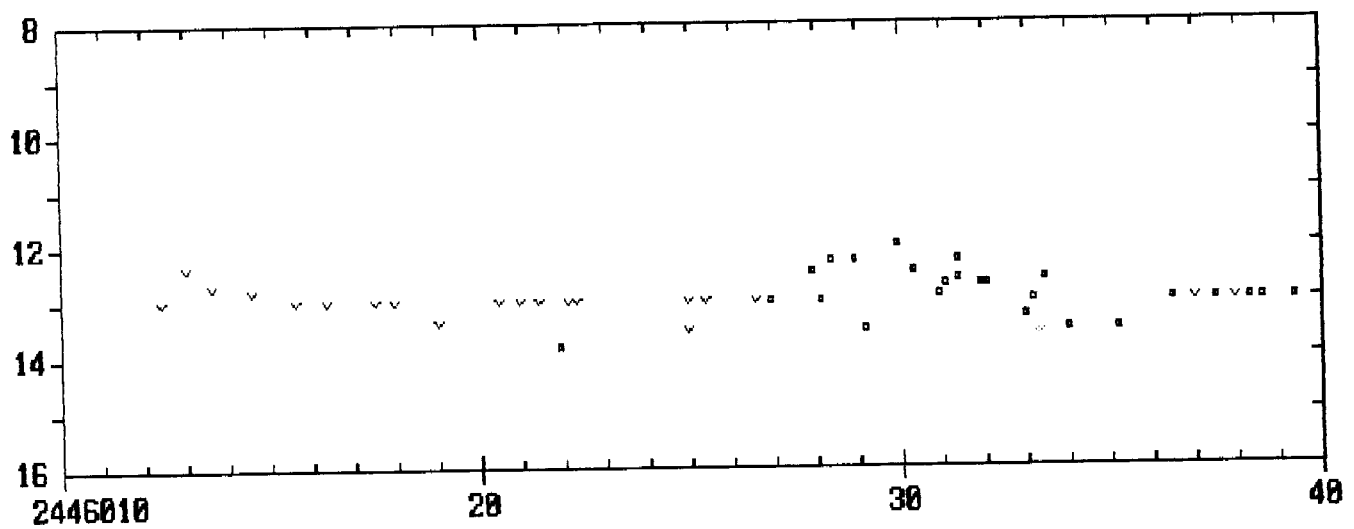
LIGHT CURVE FROM INDIVIDUAL OBSERVATIONS
 J.D. 2447,600 - J.D. 2448,500



AQ ERI

FIGURE 4

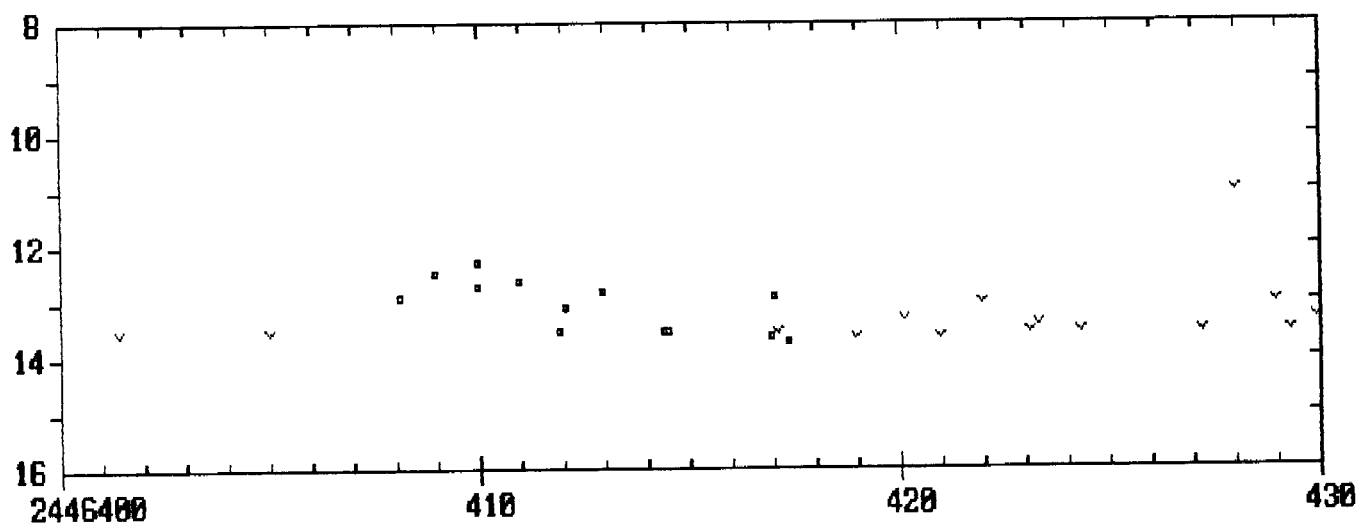
LIGHT CURVE FROM INDIVIDUAL OBSERVATIONS
J.D. 2448,500 - J.D. 2448,600



AQ ERI

FIGURE 5

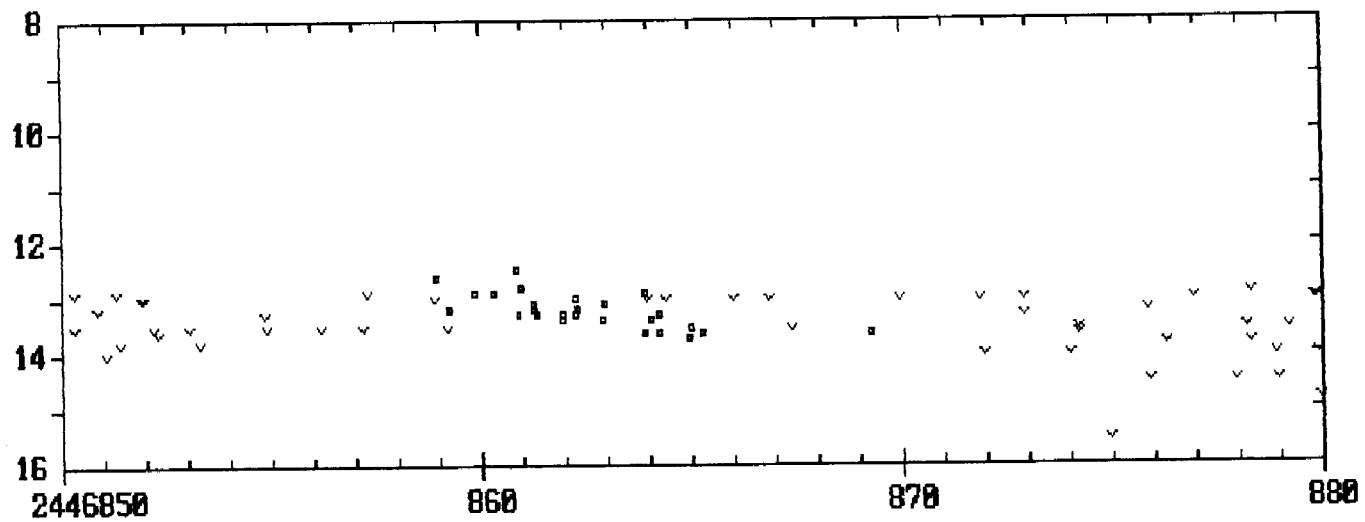
NORMAL OUTBURST No. 28 & SUPER OUTBURST No. 29



AQ ERI

FIGURE 6

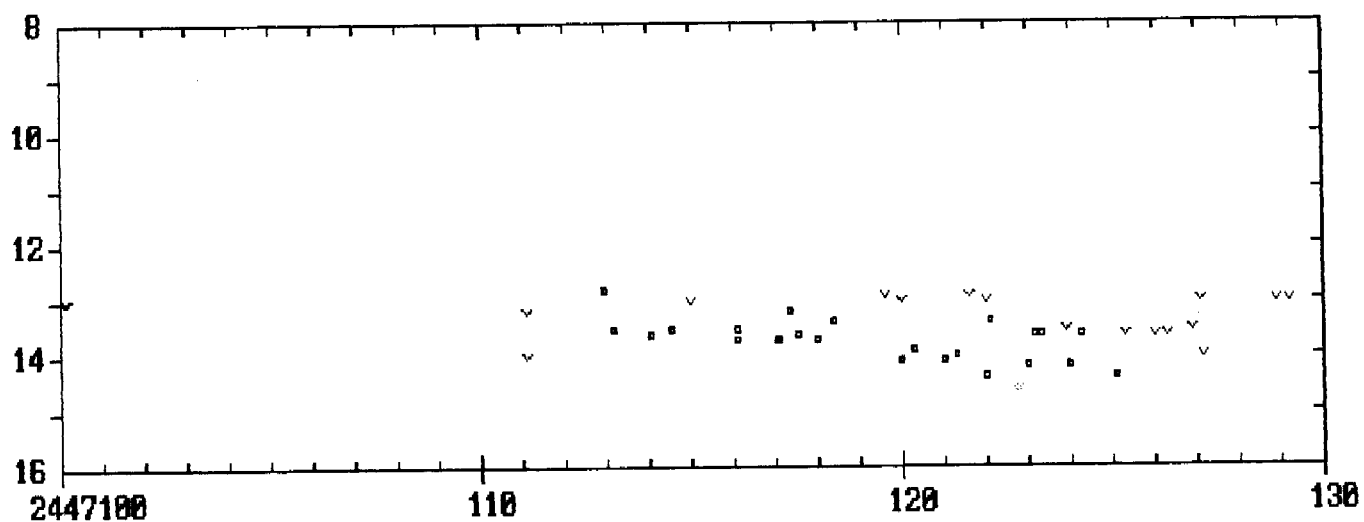
SUPER OUTBURST No. 34



AQ ERI

FIGURE 7

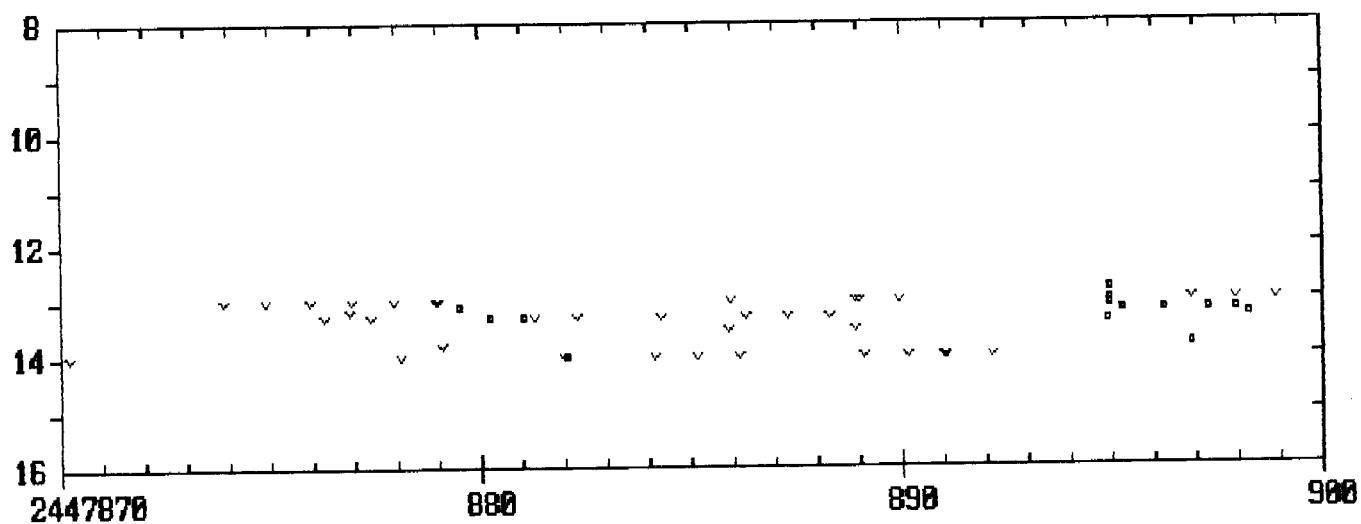
SUPER OUTBURST No. 40



AQ ERI

FIGURE 8

SUPER OUTBURST No. 43



AQ ERI

FIGURE 9

NORMAL OUTBURST No. 54 & SUPER OUTBURST No. 55

VISUAL VARIATIONS OF V517 OPHIUCHI

A.F. Jones
Deputy Director, V.S.S., R.A.S.N.Z.
31 Ranui Road, Stoke, Nelson
New Zealand.

SUMMARY: Visual observations of V517 Oph are listed for the interval J.D. 2,435,876 to 2,448,498 and the light curve is reproduced. This star appears to show variations similar to R CrB variables with frequent fades to deep minima.

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1. INTRODUCTION

In 1957 G. Herbig advised that V517 Oph was a suspected R CrB variable. He sent a photo of this region which enabled me to select some preliminary comparison stars. Observations commenced on February 6, 1957. Later that year Frank Bateson was at Yerkes Observatory and obtained another photo of this area. Later, when he was at the Lick Observatory, Herbig advised that no further information on V517 Oph had been obtained.

The main observing season is February through October, during which I made about four observations in each of these months. There were no reliable magnitudes for the selected comparison stars but I noticed that from time to time V517 Oph became invisible in my telescope and remained in that state for varying intervals.

Charts 645-7 were published (1) showing the comparison stars lettered. P.M. Kilmartin (2) published a two-colour sequence down to magnitude 13.57. The magnitudes of four fainter comparison stars could not be measured. Charts 646 and 647 were reproduced in her paper.

2. OBSERVATIONS

Frank Bateson reduced all observations using Kilmartin's sequence. These are listed in Table 1, where a minus sign in front of a magnitude indicates that the variable was invisible and fainter than the magnitude shown. All negative observations using the fainter unmeasured comparison stars have been reduced as showing the variable fainter than 13.6.

The light curve is reproduced in Figs 1-14.

3. DISCUSSION

Most maxima show very slight variations around magnitude 12.0 to 12.2 and occasionally rising to 11.5. Observations at maxima are not numerous enough to show whether the small variations at maximum occur in a semi-periodic manner as occurs with some R CrB variables.

There appears to have been 21 fades to invisibility in my instrument, which means that the variable declined to below about 13.6. These fades are of varying lengths and the decline, as far as it is possible to tell, were sudden. The rises from minima also appeared to be steep but this is probably because the greater part of the rise was not visible to me. The fades appear to have a random distribution. The time that V517 Oph spends at maximum varies widely. However, as far as the observations go it appears to show all the characteristics of R CrB variables.

In most respects V517 Oph shows features sumular to those of the unique star, V348 Sgr (3). Naturally, I am unable to provide any information on the minimum magnitude.

4. CONCLUSION

The purpose of this paper is to present the visual observations. I conclude that the fades and subsequent rises of V 517 Oph resemble those of some R CrB variables, but they are also similar to the variations of V348 Sgr.

I urge all members of the Variable Star Section, and, especially those with larger aperatures to add V517 Oph to their observing list.

ACKNOWLEDGEMENTS

My thanks are extended to Tom Cragg and Bill Goltz for their observations; to Maureen Phizacklea for her accurate tabulation of the observations and to Ranald McIntosh for the light curves reproduced in this paper.

My sprcial thanks go to Frank Bateson for his guidance and reduction of the data. In fact without his help this paper would not have been written.

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- (1) Bateson, F.M., Morel, M. & Summer, B. 1982. Charts for Southern Variables, Ser. 14. Publ. by Astronomical Research Ltd., Tauranga, N.Z.
- (2). Kilmartin, P.M. 1991. Publ. 16, Var. Star Section, R. astr. Soc. of N.Z.p.16
- (3) Bateson, F.M. & Dodson, A.W. 1982. Publ. "Var. Star Section, R. astr. Soc. N.Z. No. 10, pp.1-9

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48.

OBSERVATIONS OF V517 OPHIUCHIStar Name : V517 OPH
Designation: -170928

Julian Date	Magnitude	Obs	Julian Date	Magnitude	Obs
0.0000	99.00	Jo	2436444.9000	12.10	Jo
2435876.2000	11.60	Jo	2436451.9000	11.80	Jo
2435899.2000	11.80	Jo	2436455.9000	11.90	Jo
2435930.2000	12.40	Jo	2436464.0000	12.00	Jo
2435932.2000	12.60	Jo	2436469.9000	11.90	Jo
2435937.2000	12.60	Jo	2436481.9000	11.30	Jo
2435953.2000	-12.80	Jo	2436490.9000	11.40	Jo
2435968.2000	-12.80	Jo	2436497.9000	12.20	Jo
2435983.0000	-13.60	Jo	2436506.9000	12.10	Jo
2435992.0000	-13.60	Jo	2436587.1000	-12.40	Jo
2436006.9000	-13.60	Jo	2436592.2000	12.50	Jo
2436010.9000	-13.60	Jo	2436604.2000	-12.80	Jo
2436017.0000	-13.60	Jo	2436615.2000	-13.60	Jo
2436026.2000	-13.60	Jo	2436642.2000	-13.60	Jo
2436032.8000	-12.80	Jo	2436650.2000	-13.60	Jo
2436044.9000	12.70	Jo	2436662.2000	-13.60	Jo
2436046.9000	12.80	Jo	2436675.0000	-13.60	Jo
2436049.9000	13.10	Jo	2436691.0000	-13.40	Jo
2436071.0000	-13.60	Jo	2436704.0000	-13.60	Jo
2436079.9000	-13.60	Jo	2436717.9000	-13.40	Jo
2436095.9000	-13.60	Jo	2436723.0000	-13.40	Jo
2436102.9000	-13.60	Jo	2436729.0000	-13.60	Jo
2436109.9000	-13.60	Jo	2436735.1000	-13.40	Jo
2436121.8000	-13.40	Jo	2436748.0000	-13.40	Jo
2436131.9000	-13.40	Jo	2436756.0000	-13.40	Jo
2436141.9000	-12.80	Jo	2436770.8000	-12.40	Jo
2436223.2000	-12.50	Jo	2436777.9000	-13.60	Jo
2436244.2000	13.10	Jo	2436781.9000	-13.60	Jo
2436257.2000	12.70	Jo	2436788.9000	-13.40	Jo
2436260.2000	12.70	Jo	2436802.9000	-13.60	Jo
2436278.1000	12.30	Jo	2436809.9000	-13.40	Jo
2436286.2000	12.40	Jo	2436817.9000	-13.60	Jo
2436294.2000	12.40	Jo	2436831.9000	-13.60	Jo
2436305.0000	12.30	Jo	2436835.9000	-13.60	Jo
2436308.2000	12.40	Jo	2436844.9000	13.40	Jo
2436313.3000	12.40	Jo	2436860.9000	-13.60	Jo
2436319.0000	12.20	Jo	2436879.9000	-12.50	Jo
2436334.0000	12.30	Jo	2436963.1000	-12.40	Jo
2436340.0000	12.20	Jo	2436973.2000	-12.80	Jo
2436353.2000	12.20	Jo	2436987.2000	-12.80	Jo
2436361.9000	12.20	Jo	2436995.2000	12.80	Jo
2436370.0000	12.20	Jo	2436999.2000	12.70	Jo
2436376.9000	11.70	Jo	2437017.2000	12.70	Jo
2436382.2000	12.20	Jo	2437029.2000	12.60	Jo
2436394.0000	11.90	Jo	2437034.3000	12.70	Jo
2436400.8000	12.00	Jo	2437041.9000	12.70	Jo
2436416.8000	12.10	Jo	2437060.0000	12.60	Jo
2436420.9000	12.10	Jo	2437069.9000	12.50	Jo
2436427.0000	11.90	Jo	2437078.0000	12.70	Jo
2436432.9000	11.90	Jo	2437090.1000	-13.60	Jo

Star Name : V517 OPH
Designation: -170928

49.

Julian Date	Magnitude	Obs	Julian Date	Magnitude	Obs
2437100.9000	-12.80	Jo	2437790.2000	-12.80	Jo
2437112.0000	13.50	Jo	2437795.0000	-13.60	Jo
2437117.0000	-13.40	Jo	2437821.0000	-13.40	Jo
2437126.8000	-13.40	Jo	2437829.2000	-13.40	Jo
2437132.9000	-13.40	Jo	2437840.0000	-13.40	Jo
2437137.9000	-13.40	Jo	2437847.0000	-13.40	Jo
2437144.0000	-13.60	Jo	2437852.9000	-13.40	Jo
2437158.9000	-13.40	Jo	2437867.9000	13.00	Jo
2437168.0000	-13.40	Jo	2437881.9000	12.70	Jo
2437172.9000	-13.60	Jo	2437902.0000	-12.80	Jo
2437187.9000	-13.60	Jo	2437932.9000	12.50	Jo
2437198.9000	-13.40	Jo	2437943.9000	12.50	Jo
2437217.9000	-13.40	Jo	2437953.9000	12.10	Jo
2437228.9000	-13.60	Jo	2437971.9000	12.20	Jo
2437249.9000	-12.40	Jo	2438049.1000	-12.50	Jo
2437325.2000	-12.40	Jo	2438054.2000	-12.80	Jo
2437347.2000	-13.40	Jo	2438074.2000	-13.40	Jo
2437356.2000	-13.40	Jo	2438087.2000	-13.60	Jo
2437372.2000	-13.40	Jo	2438116.2000	-13.60	Jo
2437377.1000	-13.60	Jo	2438124.2000	-13.60	Jo
2437384.2000	-13.60	Jo	2438144.0000	-13.60	Jo
2437388.2000	-13.60	Jo	2438156.2000	-13.60	Jo
2437401.2000	-13.40	Jo	2438163.9000	-13.60	Jo
2437409.2000	-13.60	Jo	2438177.0000	-13.60	Jo
2437436.0000	-13.40	Jo	2438181.2000	-13.60	Jo
2437446.2000	13.10	Jo	2438192.9000	-13.60	Jo
2437456.0000	12.80	Jo	2438205.0000	-13.60	Jo
2437460.0000	12.70	Jo	2438210.0000	-13.60	Jo
2437463.0000	12.50	Jo	2438230.9000	-13.60	Jo
2437466.0000	12.70	Jo	2438236.9000	-13.60	Jo
2437470.0000	12.60	Jo	2438252.9000	-13.60	Jo
2437474.2000	12.50	Jo	2438259.9000	-13.60	Jo
2437482.9000	12.50	Jo	2438263.9000	-13.60	Jo
2437488.8000	12.40	Jo	2438282.9000	-13.60	Jo
2437512.9000	12.30	Jo	2438313.9000	-13.60	Jo
2437521.9000	12.40	Jo	2438472.2000	12.50	Jo
2437527.9000	12.20	Jo	2438480.2000	12.70	Jo
2437539.9000	12.20	Jo	2438493.2000	13.10	Jo
2437554.9000	12.20	Jo	2438501.2000	12.70	Jo
2437561.8000	12.20	Jo	2438525.2000	12.50	Jo
2437569.9000	12.10	Jo	2438536.2000	12.50	Jo
2437574.9000	12.10	Jo	2438557.2000	12.40	Jo
2437580.9000	11.90	Jo	2438563.2000	12.50	Jo
2437586.9000	12.10	Jo	2438587.0000	12.60	Jo
2437606.9000	12.00	Jo	2438609.0000	12.50	Jo
2437699.2000	11.70	Jo	2438613.9000	12.30	Jo
2437728.2000	-12.10	Jo	2438636.9000	12.60	Jo
2437739.2000	12.20	Jo	2438648.9000	12.70	Jo
2437759.2000	12.20	Jo	2438665.9000	-13.60	Jo
2437771.2000	12.40	Jo	2438675.9000	-13.60	Jo

50. Star Name : V517 OPH
Designation: -170928

Julian Date	Magnitude	Obs	Julian Date	Magnitude	Obs
2438696.9000	-13.40	Jo	2439533.1000	11.90	Jo
2438786.2000	-12.80	Jo	2439542.2000	12.10	Jo
2438794.2000	-12.80	Jo	2439563.2000	12.20	Jo
2438804.2000	-12.80	Jo	2439567.2000	12.00	Jo
2438823.2000	-13.60	Jo	2439575.2000	12.30	Jo
2438857.2000	-13.60	Jo	2439589.2000	12.20	Jo
2438876.2000	13.90	Jo	2439596.2000	12.20	Jo
2438885.2000	-13.40	Jo	2439600.2000	12.20	Jo
2438891.2000	-13.60	Jo	2439605.2000	12.20	Jo
2438920.2000	-13.40	Jo	2439612.0000	12.30	Jo
2438931.9000	-13.40	Jo	2439614.9000	12.20	Jo
2438941.9000	-13.60	Jo	2439621.2000	12.30	Jo
2438962.9000	-13.60	Jo	2439626.9000	12.30	Jo
2438976.9000	-13.40	Jo	2439631.2000	12.40	Jo
2438993.0000	-13.60	Jo	2439638.9000	12.30	Jo
2439001.9000	-13.60	Jo	2439645.9000	12.30	Jo
2439021.9000	-13.40	Jo	2439651.9000	12.30	Jo
2439029.9000	13.20	Jo	2439660.2000	12.30	Jo
2439052.9000	13.10	Jo	2439666.9000	12.20	Jo
2439064.9000	12.80	Jo	2439677.9000	12.20	Jo
2439150.2000	12.60	Jo	2439682.1000	12.20	Jo
2439159.2000	12.50	Jo	2439684.1000	12.20	Jo
2439191.2000	12.50	Jo	2439687.1000	12.30	Jo
2439205.2000	12.30	Jo	2439694.8000	12.30	Jo
2439218.2000	12.30	Jo	2439707.9000	12.30	Jo
2439233.2000	12.20	Jo	2439709.9000	12.30	Jo
2439248.2000	12.20	Jo	2439722.8000	12.50	Jo
2439259.2000	12.10	Jo	2439731.9000	12.60	Jo
2439266.9000	12.00	Jo	2439736.9000	12.70	Jo
2439270.9000	12.10	Jo	2439756.9000	-12.80	Jo
2439274.2000	12.10	Jo	2439763.8000	-13.40	Jo
2439284.9000	11.90	Jo	2439784.9000	-12.30	Jo
2439287.9000	12.00	Jo	2439786.9000	13.30	Jo
2439290.9000	11.90	Jo	2439791.9000	-12.80	Jo
2439301.9000	11.70	Jo	2439793.9000	-12.80	Jo
2439315.9000	11.40	Jo	2439883.2000	-12.80	Jo
2439326.9000	11.80	Jo	2439887.2000	-13.40	Jo
2439329.9000	11.90	Jo	2439896.2000	-13.60	Jo
2439339.8000	11.70	Jo	2439910.2000	-13.60	Jo
2439344.9000	12.10	Jo	2439917.2000	-13.60	Jo
2439355.9000	12.20	Jo	2439938.2000	-13.60	Jo
2439357.9000	12.10	Jo	2439953.0000	-13.60	Jo
2439368.8000	12.10	Jo	2439959.2000	12.80	Jo
2439378.9000	12.10	Jo	2439968.2000	-13.60	Jo
2439393.8000	12.00	Jo	2439973.0000	-13.40	Jo
2439400.9000	11.60	Jo	2439976.2000	-13.60	Jo
2439414.9000	11.50	Jo	2439984.2000	-13.60	Jo
2439429.9000	11.80	Jo	2439997.9000	12.70	Jo
2439514.2000	11.90	Jo	2440002.9000	12.60	Jo
2439527.1000	11.90	Jo	2440008.9000	12.40	Jo

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Julian Date	Magnitude	Obs	Julian Date	Magnitude	Obs
2440012.9000	12.40	Jo	2440505.9000	-13.40	Jo
2440027.0000	12.30	Jo	2440513.9000	-12.40	Jo
2440041.0000	12.30	Jo	2440523.9000	-12.80	Jo
2440044.2000	12.00	Jo	2440531.9000	-12.30	Jo
2440050.9000	12.20	Jo	2440603.2000	-12.30	Jo
2440060.9000	12.20	Jo	2440624.2000	-13.40	Jo
2440065.0000	12.20	Jo	2440628.2000	-13.40	Jo
2440068.9000	12.20	Jo	2440649.2000	-13.40	Jo
2440082.9000	12.10	Jo	2440661.2000	-13.60	Jo
2440093.0000	12.30	Jo	2440681.2000	-13.40	Jo
2440098.9000	12.10	Jo	2440690.2000	-13.60	Jo
2440106.8000	12.10	Jo	2440705.0000	-13.40	Jo
2440113.9000	12.20	Jo	2440708.2000	-13.60	Jo
2440115.9000	11.20	Jo	2440719.2000	-13.60	Jo
2440126.9000	11.40	Jo	2440722.2000	-13.60	Jo
2440132.9000	12.30	Jo	2440733.0000	-13.40	Jo
2440135.9000	12.10	Jo	2440762.0000	-13.40	Jo
2440143.9000	11.70	Jo	2440772.9000	-13.60	Jo
2440150.9000	11.80	Jo	2440793.8000	-13.40	Jo
2440155.9000	11.80	Jo	2440809.9000	-13.40	Jo
2440169.9000	12.10	Jo	2440821.9000	-13.60	Jo
2440241.2000	11.80	Jo	2440831.9000	-13.60	Jo
2440242.1000	11.90	Jo	2440856.9000	-12.80	Jo
2440251.2000	11.90	Jo	2440863.9000	-12.80	Jo
2440255.2000	11.80	Jo	2440883.9000	-12.80	Jo
2440270.2000	11.70	Jo	2440978.2000	-12.80	Jo
2440275.2000	11.50	Jo	2441011.2000	13.50	Jo
2440282.2000	11.80	Jo	2441019.2000	12.60	Jo
2440308.2000	11.90	Jo	2441031.2000	12.40	Jo
2440313.2000	12.20	Jo	2441037.2000	12.50	Jo
2440321.2000	11.90	Jo	2441045.2000	12.50	Jo
2440326.2000	11.60	Jo	2441050.2000	12.40	Jo
2440333.2000	12.10	Jo	2441060.2000	12.40	Jo
2440340.2000	12.10	Jo	2441067.2000	12.40	Jo
2440349.9000	12.10	Jo	2441079.2000	12.30	Jo
2440356.9000	12.30	Jo	2441087.9000	12.40	Jo
2440369.2000	12.30	Jo	2441096.2000	12.40	Jo
2440376.9000	12.70	Jo	2441113.9000	12.20	Jo
2440382.9000	12.70	Jo	2441115.9000	12.50	Jo
2440394.0000	12.60	Jo	2441122.0000	12.70	Jo
2440409.0000	12.70	Jo	2441132.9000	-13.60	Jo
2440415.8000	12.70	Jo	2441136.9000	-12.40	Jo
2440424.0000	12.70	Jo	2441146.0000	-13.60	Jo
2440432.8000	12.80	Jo	2441163.0000	-13.40	Jo
2440436.9000	12.80	Jo	2441174.9000	-13.40	Jo
2440443.9000	-13.60	Jo	2441185.9000	-13.60	Jo
2440451.9000	-13.60	Jo	2441188.9000	-13.40	Jo
2440464.9000	-12.80	Jo	2441201.9000	-13.40	Jo
2440477.9000	-13.60	Jo	2441203.9000	-13.40	Jo
2440498.9000	-13.60	Jo	2441214.9000	-12.50	Jo

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Julian Date	Magnitude	Obs	Julian Date	Magnitude	Obs
2441233.9000	-13.40	Jo	2441817.2000	-13.60	Jo
2441237.9000	-13.60	Jo	2441832.9000	-13.60	Jo
2441243.9000	-13.60	Jo	2441854.9000	-13.40	Jo
2441334.2000	-12.30	Jo	2441859.9000	-13.40	Jo
2441357.2000	-12.30	Jo	2441864.8000	-13.40	Jo
2441360.2000	12.70	Jo	2441870.9000	-13.40	Jo
2441373.2000	12.30	Jo	2441882.9000	-13.40	Jo
2441389.2000	12.40	Jo	2441899.8000	-13.40	Jo
2441391.2000	12.50	Jo	2441911.9000	-13.40	Jo
2441394.2000	12.50	Jo	2441917.9000	-13.40	Jo
2441407.2000	12.40	Jo	2441929.9000	12.80	Jo
2441416.2000	12.30	Jo	2441947.9000	12.70	Jo
2441418.0000	12.30	Jo	2441950.8000	13.40	Jo
2441422.2000	12.20	Jo	2441954.9000	12.70	Jo
2441425.2000	12.30	Jo	2441970.9000	12.80	Jo
2441433.2000	12.30	Jo	2441974.9000	12.50	Jo
2441445.0000	12.30	Jo	2442067.1000	12.10	Jo
2441447.9000	12.30	Jo	2442148.0000	-12.10	Jo
2441455.0000	12.40	Jo	2442163.9000	-13.60	Jo
2441460.2000	12.30	Jo	2442178.9000	-13.40	Jo
2441468.9000	12.30	Jo	2442184.9000	-13.40	Jo
2441474.9000	12.30	Jo	2442192.9000	-13.60	Jo
2441482.9000	12.30	Jo	2442215.8000	-13.60	Jo
2441486.9000	12.70	Jo	2442220.8000	-13.60	Jo
2441496.8000	12.30	Jo	2442239.9000	-13.40	Jo
2441499.8000	12.30	Jo	2442249.9000	-13.60	Jo
2441513.8000	12.20	Jo	2442267.8000	-13.40	Jo
2441524.8000	12.30	Jo	2442277.8000	-13.40	Jo
2441534.9000	12.20	Jo	2442295.8200	13.80	Jo
2441542.9000	12.30	Jo	2442303.8900	12.60	Jo
2441551.9000	12.20	Jo	2442324.9000	12.70	Jo
2441563.9000	11.90	Jo	2442336.9000	12.70	Jo
2441566.9000	11.90	Jo	2442436.2000	12.20	Jo
2441569.9000	12.10	Jo	2442480.2000	12.40	Jo
2441563.9000	12.10	Jo	2442496.2000	12.40	Jo
2441594.9000	12.10	Jo	2442510.9000	12.70	Jo
2441604.9000	12.10	Jo	2442536.0000	12.20	Jo
2441619.9000	12.80	Jo	2442538.0000	12.20	Jo
2441711.1000	-12.50	Jo	2442555.9000	11.90	Jo
2441717.2000	-12.80	Jo	2442561.9000	11.70	Jo
2441722.2000	-13.40	Jo	2442571.9000	11.40	Jo
2441736.2000	-13.60	Jo	2442580.8000	11.40	Jo
2441746.2000	-13.40	Jo	2442589.9000	11.90	Jo
2441749.2000	-13.40	Jo	2442595.9000	12.10	Jo
2441758.2000	-13.60	Jo	2442605.9200	11.50	Jo
2441772.0000	-13.40	Jo	2442620.9200	11.80	Jo
2441777.2000	-13.60	Jo	2442624.9000	11.90	Jo
2441782.2000	-13.60	Jo	2442631.9400	12.10	Jo
2441801.9000	-13.60	Jo	2442649.8000	11.90	Jo
2441813.2000	-13.60	Jo	2442655.8000	11.90	Jo

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Julian Date	Magnitude	Obs	Julian Date	Magnitude	Obs
2442671.9000	11.80	Jo	2443358.9400	11.90	Jo
2442680.9000	11.30	Jo	2443361.9300	12.10	Jo
2442683.9000	11.30	Jo	2443376.9300	12.10	Jo
2442690.9000	11.30	Jo	2443394.8000	12.30	Jo
2442713.9000	11.80	Jo	2443397.8400	12.30	Jo
2442871.0000	11.60	Jo	2443543.2000	12.90	Jo
2442874.9000	12.10	Jo	2443545.2000	12.30	Jo
2442887.9000	11.40	Jo	2443603.9000	11.90	Jo
2442890.9000	12.10	Jo	2443606.2000	11.50	Jo
2442893.9000	12.10	Jo	2443628.0000	11.90	Jo
2442899.9000	11.90	Jo	2443632.9000	11.90	Jo
2442900.9000	11.70	Jo	2443639.9000	11.90	Jo
2442901.9000	11.60	Jo	2443650.0000	11.90	Jo
2442908.2000	11.70	Jo	2443653.8000	11.90	Jo
2442915.8000	12.10	Jo	2443657.0000	11.30	Jo
2442920.0000	11.60	Jo	2443661.9400	11.80	Jo
2442925.9000	11.70	Jo	2443672.9400	11.20	Jo
2442935.8000	11.70	Jo	2443701.9000	11.90	Jo
2442943.9000	11.30	Jo	2443714.9000	12.20	Jo
2442948.8000	11.60	Jo	2443722.0000	12.20	Jo
2442954.9000	11.40	Jo	2443726.0000	12.10	Jo
2442961.9300	11.40	Jo	2443736.0000	12.20	Jo
2442963.8000	11.40	Jo	2443740.8000	12.60	Jo
2442971.8000	11.40	Jo	2443747.0000	12.80	Jo
2442978.9000	11.50	Jo	2443749.0000	12.80	Jo
2442981.9000	11.40	Jo	2443784.9000	12.80	Jo
2443004.8000	11.80	Jo	2443966.9000	-12.30	Jo
2443011.9000	11.40	Jo	2443977.9000	-12.30	Jo
2443019.9000	11.40	Jo	2443985.9000	-12.30	Jo
2443037.0000	11.30	Jo	2443988.0000	-12.80	Jo
2443049.9000	11.80	Jo	2443996.9000	-12.80	Jo
2443079.9000	11.30	Jo	2444010.9000	-12.80	Jo
2443222.0000	12.20	Jo	2444013.9000	-12.80	Jo
2443236.2000	11.60	Jo	2444017.9000	-12.80	Jo
2443248.2000	11.60	Jo	2444022.9000	-12.80	Jo
2443255.0000	11.30	Jo	2444026.9500	-12.80	Jo
2443258.9000	11.80	Jo	2444032.3000	-12.80	Jo
2443262.0000	11.60	Jo	2444041.9000	-12.80	Jo
2443274.9000	11.60	Jo	2444050.9000	-13.40	Jo
2443283.8000	11.60	Jo	2444057.8000	-12.80	Jo
2443290.0000	11.60	Jo	2444066.8000	-12.80	Jo
2443298.8000	11.90	Jo	2444071.8000	-13.40	Jo
2443301.9000	11.60	Jo	2444075.9000	-13.60	Jo
2443307.9000	11.80	Jo	2444078.8000	-12.80	Jo
2443313.9000	12.10	Jo	2444081.8000	-13.40	Jo
2443317.0000	11.90	Jo	2444094.8000	-12.30	Jo
2443331.0000	11.80	Jo	2444095.8000	-13.40	Jo
2443333.9000	11.70	Jo	2444100.8000	-13.60	Jo
2443334.9000	11.90	Jo	2444106.8000	-13.40	Jo
2443339.9000	12.10	Jo	2444112.9000	-13.40	Jo

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Julian Date	Magnitude	Obs	Julian Date	Magnitude	Obs
2444122.9400	-13.60	Jo	2444696.2000	12.10	Jo
2444126.9100	-13.60	Jo	2444698.1800	12.20	Jo
2444134.8600	-13.60	Jo	2444711.2000	12.10	Jo
2444140.9600	-13.60	Jo	2444719.2400	12.00	Jo
2444155.9000	12.70	Jo	2444725.9000	12.10	Jo
2444161.9000	12.90	Jo	2444727.2100	11.90	Jo
2444171.9000	-12.40	Jo	2444735.9300	11.90	Jo
2444260.1000	12.20	Jo	2444741.2300	11.90	Jo
2444264.2000	12.10	Jo	2444747.8500	12.10	Jo
2444268.2000	12.30	Jo	2444751.9400	12.10	Jo
2444276.1700	12.20	Jo	2444754.9800	12.10	Jo
2444280.1700	12.30	Jo	2444764.9200	11.90	Jo
2444296.1900	12.70	Jo	2444770.3000	11.80	Jo
2444311.2000	-13.40	Jo	2444775.8000	12.10	Jo
2444314.2000	-13.40	Jo	2444777.9000	12.10	Jo
2444325.2000	-13.60	Jo	2444785.9000	12.50	Jo
2444337.9000	-12.30	Jo	2444786.9000	12.60	Jo
2444349.2000	-13.60	Jo	2444789.8000	12.70	Jo
2444365.9000	-13.60	Jo	2444797.9000	-12.30	Jo
2444369.9000	-13.40	Jo	2444804.8000	-12.80	Jo
2444377.0000	-13.60	Jo	2444811.8000	-12.80	Jo
2444387.2000	-13.60	Jo	2444820.8000	-12.80	Jo
2444395.9000	-13.40	Jo	2444835.8000	-12.80	Jo
2444404.8000	-13.40	Jo	2444843.8000	-12.80	Jo
2444412.0000	-13.60	Jo	2444844.8000	-12.50	Jo
2444425.8600	-13.40	Jo	2444846.8000	-12.80	Jo
2444432.9500	-13.60	Jo	2444867.8000	-12.80	Jo
2444434.9100	-13.40	Jo	2444873.9000	-12.80	Jo
2444439.8900	-13.40	Jo	2444877.9000	-12.80	Jo
2444450.8400	-13.60	Jo	2444895.9000	-12.80	Jo
2444458.8000	-13.40	Jo	2444903.9000	-12.50	Jo
2444468.8000	-13.40	Jo	2444908.9000	-12.50	Jo
2444482.9000	-13.40	Jo	2444990.2000	-12.30	Jo
2444487.8000	-13.40	Jo	2444992.2000	-12.50	Jo
2444495.8000	-13.40	Jo	2444998.1600	-12.50	Jo
2444510.9000	-13.60	Jo	2445000.1600	-12.80	Jo
2444511.8000	-13.60	Jo	2445032.2000	-13.60	Jo
2444517.9000	-13.40	Jo	2445037.2000	-12.80	Jo
2444532.8600	-12.30	Jo	2445050.2000	-13.40	Jo
2444538.8500	-13.40	Jo	2445052.2000	-13.60	Jo
2444542.9000	-13.60	Jo	2445063.2000	-13.60	Jo
2444546.9000	-12.50	Jo	2445078.2000	13.40	Jo
2444623.2000	-12.10	Jo	2445085.9000	-12.80	Jo
2444629.2000	-12.10	Jo	2445091.2500	13.30	Jo
2444637.1000	12.50	Jo	2445101.8600	-12.50	Jo
2444643.2000	12.50	Jo	2445104.9000	12.70	Jo
2444651.1000	12.40	Jo	2445110.2000	12.70	Jo
2444675.1900	12.20	Jo	2445115.9000	12.70	Jo
2444683.2000	12.10	Jo	2445122.2000	13.30	Jo
2444692.2000	12.20	Jo	2445130.8000	12.90	Jo

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Julian Date	Magnitude	Obs	Julian Date	Magnitude	Obs
2445134.9000	12.60	Jo	2445606.8000	12.30	Jo
2445138.9000	12.60	Jo	2445617.9000	12.00	Jo
2445146.9000	12.40	Jo	2445633.9000	11.30	Jo
2445150.8000	12.20	Jo	2445643.9000	11.80	Jo
2445158.8000	12.20	Jo	2445713.1000	-12.30	Jo
2445163.9000	12.20	Jo	2445723.2000	12.50	Jo
2445165.8000	12.20	Jo	2445725.2000	12.30	Jo
2445171.9000	12.10	Jo	2445729.2000	12.30	Jo
2445187.8000	11.80	Jo	2445737.2000	12.10	Jo
2445203.9000	12.30	Jo	2445756.2000	11.80	Jo
2445221.8000	-12.50	Jo	2445758.2000	11.60	Jo
2445229.9000	-12.50	Jo	2445767.2000	11.80	Jo
2445233.9000	-13.40	Jo	2445793.2000	11.60	Jo
2445249.9000	-12.50	Jo	2445800.2000	11.70	Jo
2445255.9000	-12.50	Jo	2445805.2000	11.90	Jo
2445355.2000	12.20	Jo	2445818.3000	11.50	Jo
2445357.2000	12.20	Jo	2445819.2000	11.40	Jo
2445362.2000	12.10	Jo	2445824.2000	11.60	Jo
2445370.2000	12.10	Jo	2445834.3000	11.50	Jo
2445375.2000	12.30	Jo	2445839.9000	11.70	Jo
2445384.2000	12.30	Jo	2445850.9000	11.60	Jo
2445388.2000	12.30	Jo	2445853.2000	11.50	Jo
2445398.2000	12.40	Jo	2445856.9000	11.60	Jo
2445402.2000	12.30	Jo	2445868.0000	11.90	Jo
2445410.2000	12.40	Jo	2445869.9000	11.80	Jo
2445415.2000	12.30	Jo	2445875.9000	12.20	Jo
2445419.2000	12.70	Jo	2445884.9000	12.50	Jo
2445432.0100	-12.80	Jo	2445896.8000	12.70	Jo
2445437.2000	-13.60	Jo	2445897.9000	12.40	Jo
2445447.2000	-13.60	Jo	2445898.9000	12.40	Jo
2445467.2000	-13.40	Jo	2445899.9000	12.30	Jo
2445478.3000	12.70	Jo	2445908.9000	-12.40	Jo
2445486.8000	-12.80	Jo	2445913.9000	12.70	Jo
2445499.8000	-12.80	Jo	2445938.9000	12.60	Jo
2445506.2000	13.10	Jo	2445956.9000	12.30	Jo
2445515.9000	12.40	Jo	2445961.8000	11.90	Jo
2445521.9000	12.50	Jo	2445970.9000	11.90	Jo
2445527.9000	12.50	Jo	2445974.9000	11.30	Jo
2445542.8000	12.30	Jo	2445984.8000	12.30	Jo
2445547.9000	12.30	Jo	2445987.9000	11.90	Jo
2445550.9000	12.30	Jo	2445991.9000	12.30	Jo
2445553.9000	12.20	Jo	2445998.9000	12.30	Jo
2445557.9000	12.20	Jo	2446091.2000	12.40	Jo
2445561.9000	12.40	Jo	2446101.2000	-12.40	Jo
2445575.8500	12.50	Jo	2446115.2000	-12.80	Jo
2445576.9000	12.10	Jo	2446117.2000	-12.80	Jo
2445578.9000	12.10	Jo	2446140.2000	-13.40	Jo
2445581.8000	12.10	Jo	2446146.2000	-13.40	Jo
2445588.8000	12.10	Jo	2446172.0000	-12.80	Jo
2445593.8000	11.40	Jo	2446180.2000	-12.80	Jo

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Julian Date	Magnitude	Obs	Julian Date	Magnitude	Obs
2446200.9000	-12.80	Jo	2446615.9000	11.80	Jo
2446207.1000	-13.40	Jo	2446619.9000	11.90	Jo
2446210.9000	-13.60	Jo	2446623.9000	12.00	Jo
2446224.8600	-13.60	Jo	2446624.9000	12.00	Jo
2446228.8700	-13.60	Jo	2446627.8000	12.10	Jo
2446232.9000	-13.60	Jo	2446634.8000	12.20	Jo
2446240.9000	-13.60	Jo	2446640.9000	12.30	Jo
2446254.9000	-13.40	Jo	2446644.9000	12.10	Jo
2446260.9000	-13.40	Jo	2446648.9000	12.10	Jo
2446265.9000	-13.40	Jo	2446652.8000	12.00	Jo
2446282.9000	-13.40	Jo	2446655.9000	12.00	Jo
2446291.9000	-13.40	Jo	2446664.9000	12.30	Jo
2446319.9000	-12.80	Jo	2446670.8000	12.00	Jo
2446324.9000	-13.60	Jo	2446676.9000	12.00	Jo
2446340.9000	-13.40	Jo	2446683.9000	12.20	Jo
2446445.1000	-12.50	Jo	2446685.9000	11.90	Jo
2446450.1000	-12.50	Jo	2446692.8000	11.90	Jo
2446458.2000	-12.40	Jo	2446698.9000	12.30	Jo
2446462.1000	-12.50	Jo	2446703.9000	11.80	Jo
2446465.2000	-13.40	Jo	2446717.8000	11.60	Jo
2446467.2000	13.50	Jo	2446725.9000	12.20	Jo
2446468.2000	13.50	Jo	2446729.9000	12.00	Jo
2446470.2000	12.70	Jo	2446824.1000	12.00	Jo
2446472.2000	13.00	Jo	2446836.1000	11.30	Jo
2446474.1000	12.80	Jo	2446838.2000	11.80	Jo
2446480.1000	12.70	Jo	2446846.2000	11.90	Jo
2446490.2000	-12.50	Jo	2446850.2000	11.80	Jo
2446494.2000	-12.50	Jo	2446860.2000	11.70	Jo
2446497.2000	12.40	Jo	2446861.2000	11.40	Jo
2446500.1000	12.40	Jo	2446865.2000	11.80	Jo
2446503.1000	12.40	Jo	2446868.2000	11.60	Jo
2446507.2000	12.40	Jo	2446874.2000	11.70	Jo
2446513.2000	12.50	Jo	2446878.2000	11.40	Jo
2446525.2000	12.40	Jo	2446880.2000	11.40	Jo
2446527.2000	12.40	Jo	2446883.2000	11.30	Jo
2446534.2000	12.30	Jo	2446887.2000	-11.40	Jo
2446536.2000	12.40	Jo	2446891.2000	-11.40	Jo
2446538.2000	12.30	Jo	2446893.2000	-11.40	Jo
2446542.2000	12.30	Jo	2446896.2000	-11.30	Jo
2446550.9000	12.30	Jo	2446898.2000	-11.30	Jo
2446554.9000	12.20	Jo	2446908.3000	-11.40	Jo
2446558.9000	12.40	Jo	2446913.2000	-11.50	Jo
2446562.9000	12.40	Jo	2446950.9000	-12.80	Jo
2446577.9000	12.30	Jo	2446952.2000	-13.40	Jo
2446579.9000	12.30	Jo	2446954.2000	-13.40	Jo
2446584.2000	12.20	Jo	2446955.2000	-13.40	Jo
2446592.2000	12.20	Jo	2446963.0000	-12.80	Jo
2446596.0000	12.20	Jo	2446963.9000	-13.40	Jo
2446607.9000	12.10	Jo	2446967.9000	-12.80	Jo
2446611.9000	12.10	Jo	2446974.9000	-13.40	Jo

Star Name : V517 OPH
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Julian Date	Magnitude	Obs	Julian Date	Magnitude	Obs
2446977.9000	-13.40	Jo	2447346.9000	12.20	Jo
2446989.8000	-13.40	Jo	2447349.9000	12.20	Jo
2446992.9000	-13.40	Jo	2447353.9000	12.10	Jo
2447000.9000	-13.40	Jo	2447354.9000	12.20	Jo
2447005.8000	-13.40	Jo	2447356.9000	12.30	Jo
2447008.9000	-13.60	Jo	2447363.8000	12.30	Jo
2447017.8000	-12.40	Jo	2447373.8000	12.40	Jo
2447020.9000	-13.60	Jo	2447374.8000	12.70	Jo
2447026.9000	-13.40	Jo	2447375.1000	12.70	Cj
2447051.8000	-13.40	Jo	2447376.8000	-12.80	Jo
2447057.9000	-13.40	Jo	2447379.0000	-13.10	Jo
2447061.8000	-13.40	Jo	2447385.9000	-12.80	Jo
2447065.9000	-13.40	Jo	2447386.9000	-12.80	Jo
2447182.1000	12.50	Jo	2447390.9000	-12.80	Jo
2447186.2000	12.50	Jo	2447410.9000	-12.80	Jo
2447190.1000	12.50	Jo	2447412.9000	-12.80	Jo
2447201.2000	12.40	Jo	2447418.9000	-13.10	Jo
2447212.2000	12.30	Jo	2447426.9000	-11.80	Jo
2447214.2000	12.30	Jo	2447435.9000	-12.80	Jo
2447219.1000	12.40	Jo	2447444.9000	-12.40	Jo
2447221.2000	12.30	Jo	2447446.9000	-12.60	Jo
2447234.1000	12.30	Jo	2447466.9000	-12.40	Jo
2447236.2000	12.30	Jo	2447542.1000	-12.40	Jo
2447238.1000	12.10	Jo	2447548.9900	-13.40	Jo
2447242.2000	12.20	Jo	2447555.2000	-12.80	Jo
2447244.1000	12.30	Jo	2447556.2000	-12.80	Jo
2447245.1000	12.20	Jo	2447561.2000	-12.40	Jo
2447246.2000	12.20	Jo	2447563.2000	-12.70	Jo
2447251.2000	12.10	Jo	2447570.2000	-12.80	Jo
2447262.0000	12.20	Jo	2447572.2000	-13.10	Jo
2447266.2000	12.10	Jo	2447576.2000	13.40	Jo
2447267.2000	12.10	Jo	2447589.1000	-13.10	Jo
2447268.2000	12.10	Jo	2447601.1000	-13.10	Jo
2447270.2000	12.10	Jo	2447604.2000	-13.10	Jo
2447271.1000	12.20	Jo	2447617.0000	-12.80	Jo
2447273.2000	12.20	Jo	2447618.2000	-12.80	Jo
2447274.2000	12.20	Jo	2447621.2000	13.30	Jo
2447276.2000	12.30	Jo	2447625.2000	12.80	Jo
2447277.2000	12.10	Jo	2447628.2000	12.70	Jo
2447280.1000	11.80	Jo	2447630.2000	12.70	Jo
2447281.2000	12.20	Jo	2447636.2000	12.70	Jo
2447282.2000	12.40	Jo	2447643.9000	12.40	Jo
2447316.9000	12.10	Jo	2447650.9000	12.80	Jo
2447317.9000	12.10	Jo	2447654.0000	12.70	Jo
2447322.9000	12.00	Jo	2447655.2000	12.40	Jo
2447326.9000	12.10	Jo	2447657.2000	12.70	Jo
2447333.9000	12.10	Jo	2447671.9000	12.40	Jo
2447335.9000	12.20	Jo	2447673.9000	12.20	Jo
2447337.2000	12.10	Jo	2447675.9000	12.10	Jo
2447344.8000	12.10	Jo	2447677.9000	12.20	Jo

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Designation: -170928

Julian Date	Magnitude	Obs	Julian Date	Magnitude	Obs
2447681.9000	12.20	Jo	2447980.3000	-13.60	Gp
2447682.9000	12.10	Jo	2447983.2000	-12.80	Jo
2447691.2000	12.20	Jo	2448000.2000	-12.50	Jo
2447692.2000	12.30	Jo	2448002.2000	-13.40	Jo
2447698.8000	12.30	Jo	2448006.3000	-13.60	Gp
2447704.8000	12.20	Jo	2448011.2000	-13.40	Jo
2447707.0000	12.20	Jo	2448012.3000	-13.60	Gp
2447708.9000	12.10	Jo	2448083.8000	-12.80	Jo
2447709.9000	12.10	Jo	2448088.9000	-12.50	Jo
2447710.9000	12.10	Jo	2448113.9000	13.10	Gp
2447713.9000	11.90	Jo	2448118.8000	12.70	Jo
2447714.8000	12.10	Jo	2448123.9000	12.70	Jo
2447715.8000	12.10	Jo	2448124.0000	12.70	Gp
2447727.8000	12.30	Jo	2448130.0000	12.80	Gp
2447728.8000	12.20	Jo	2448135.8000	-12.50	Jo
2447733.9000	12.30	Jo	2448140.8000	12.80	Jo
2447734.9000	12.30	Jo	2448146.9000	12.70	Jo
2447735.9000	12.40	Jo	2448151.9000	12.30	Jo
2447737.9000	12.40	Jo	2448151.9000	12.50	Gp
2447740.9000	12.20	Jo	2448153.9000	12.50	Jo
2447744.9000	12.30	Jo	2448156.9000	12.50	Jo
2447749.1000	12.40	Gp	2448157.9000	12.70	Gp
2447757.8000	12.30	Jo	2448161.9000	12.50	Jo
2447772.9000	12.40	Gp	2448164.9000	12.70	Gp
2447783.0000	12.40	Gp	2448171.8000	12.50	Jo
2447788.9000	12.60	Jo	2448177.9000	12.50	Gp
2447790.9000	12.60	Jo	2448179.9000	12.50	Jo
2447793.0000	12.60	Gp	2448186.9000	12.50	Gp
2447798.9000	12.70	Jo	2448273.1000	-12.50	Jo
2447801.0000	12.70	Gp	2448288.2000	-12.50	Jo
2447815.9000	-12.60	Jo	2448292.2000	-12.50	Jo
2447819.0000	13.60	Gp	2448295.1000	-12.50	Jo
2447822.9000	-12.40	Jo	2448302.1000	-12.80	Jo
2447824.9000	-11.80	Jo	2448309.2000	-12.80	Jo
2447833.9000	13.40	Gp	2448311.2000	-12.80	Jo
2447910.1000	-12.10	Jo	2448326.2000	-12.80	Jo
2447912.1000	-12.10	Jo	2448330.2000	-12.80	Jo
2447916.1000	-12.40	Jo	2448331.2000	-12.80	Jo
2447922.1500	-12.40	Jo	2448332.3000	-13.60	Gp
2447925.2000	-12.40	Jo	2448336.1000	-12.80	Jo
2447926.1000	-12.80	Jo	2448337.1000	-12.80	Jo
2447944.1000	-12.80	Jo	2448356.2000	-13.60	Jo
2447945.3000	-13.60	Gp	2448362.0000	13.90	Jo
2447948.2000	-12.80	Jo	2448366.1800	-13.60	Jo
2447951.3000	-14.50	Gp	2448380.9000	-13.40	Jo
2447953.2000	-12.80	Jo	2448385.2000	-13.40	Jo
2447973.2000	-13.60	Gp	2448386.3000	-13.60	Gp
2447973.2000	-12.80	Jo	2448390.9000	-13.40	Jo
2447975.2000	-13.00	Jo	2448396.9000	-13.40	Jo
2447978.2000	-12.80	Jo	2448400.2000	13.40	Jo

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Julian Date	Magnitude	Obs	Julian Date	Magnitude	Obs
2448400.3000	-13.60	Gp			
2448409.9000	-13.40	Jo			
2448413.2000	13.60	Jo			
2448419.9000	-13.40	Jo			
2448425.0000	-13.60	Gp			
2448426.9000	-13.40	Jo			
2448436.8000	-13.40	Jo			
2448439.9000	-13.40	Jo			
2448440.0000	-14.00	Gp			
2448444.9000	-13.40	Jo			
2448451.0100	-13.40	Jo			
2448452.9000	-13.40	Jo			
2448453.9000	-14.00	Gp			
2448465.8000	-13.40	Jo			
2448470.9000	13.60	Gp			
2448471.0000	13.90	Jo			
2448477.9000	-13.40	Jo			
2448483.9000	-13.40	Jo			
2448498.9000	12.70	Gp			

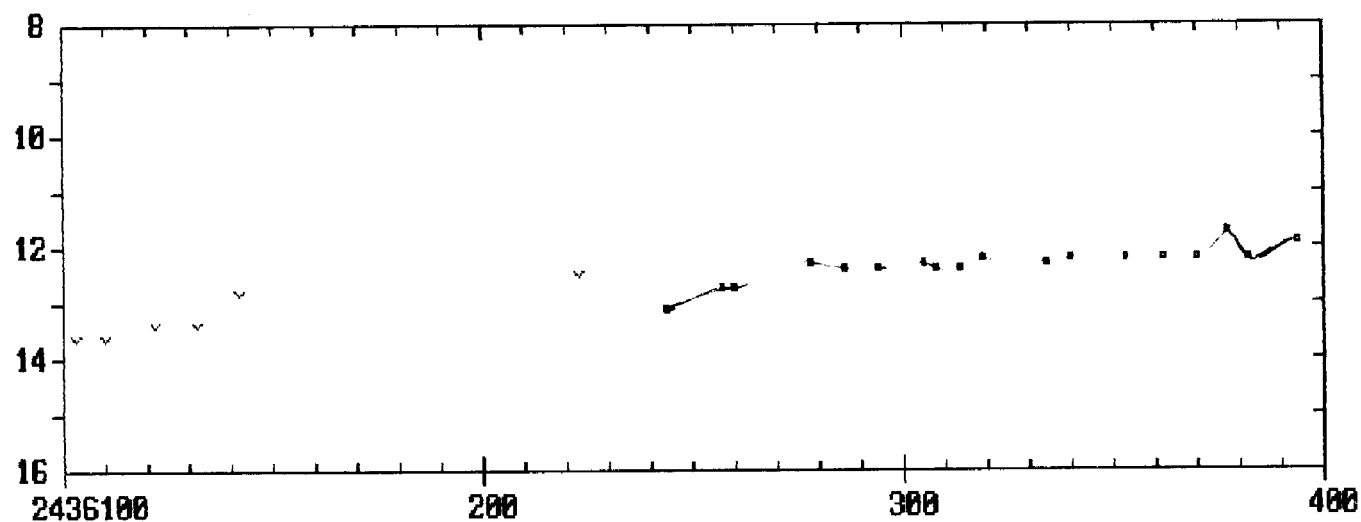
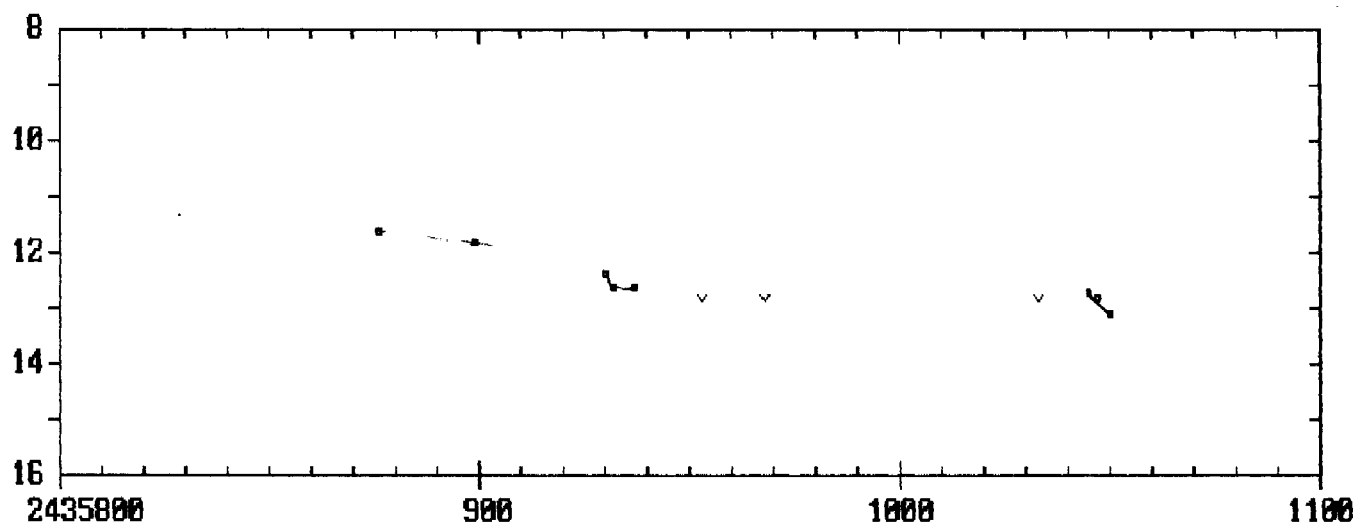
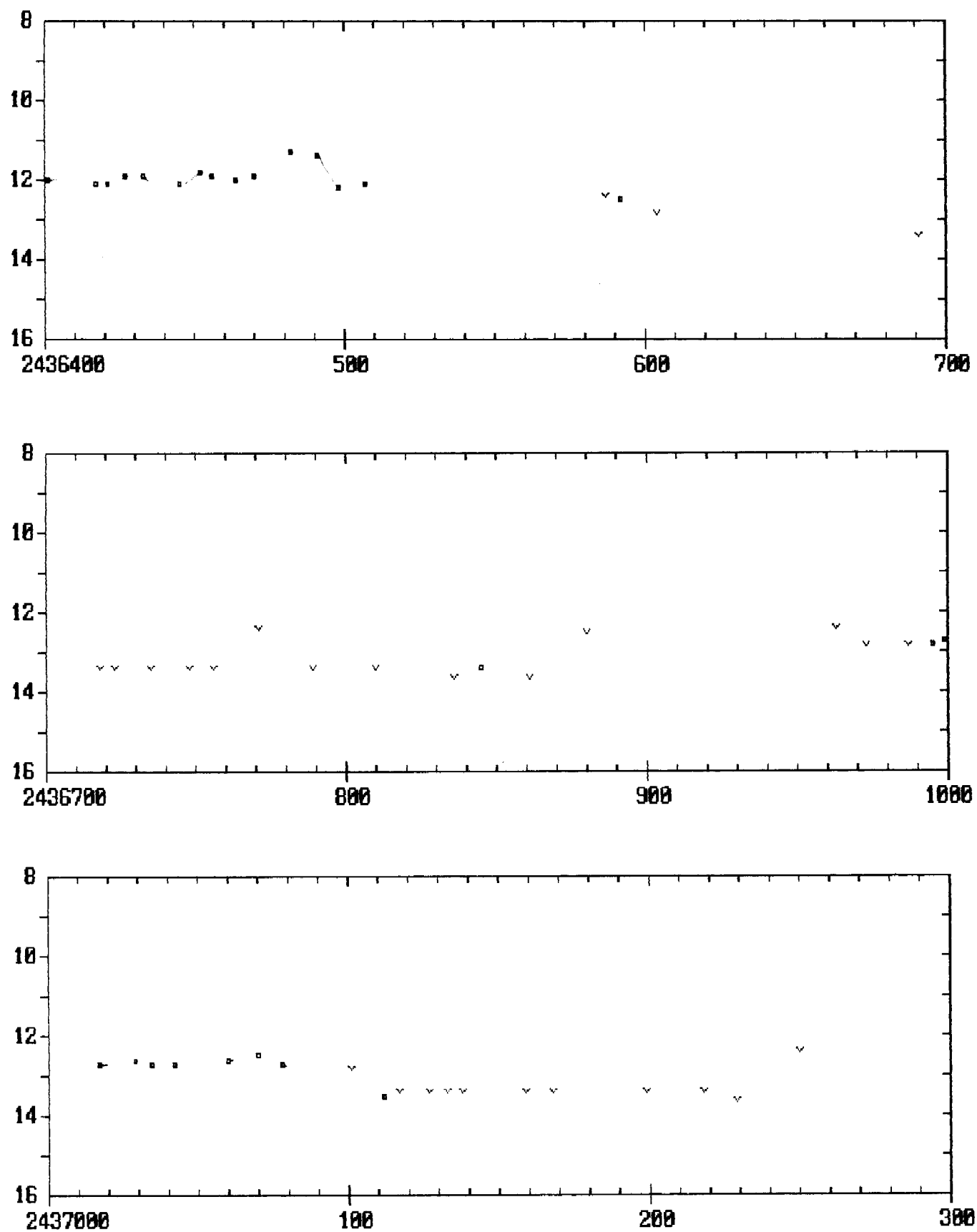


FIGURE 1

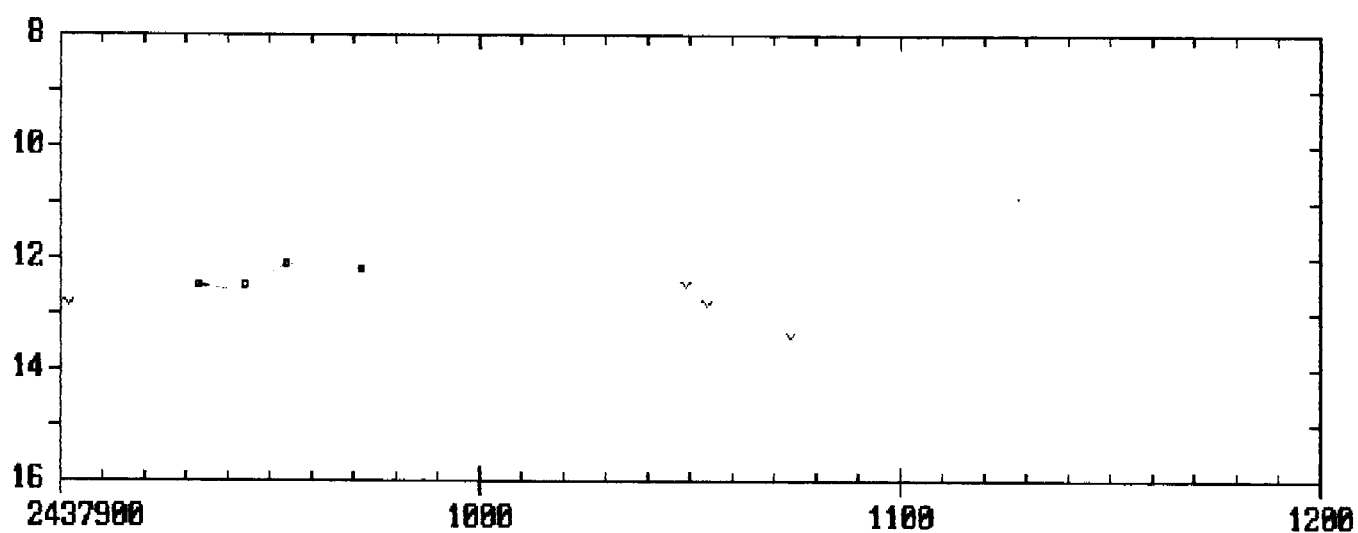
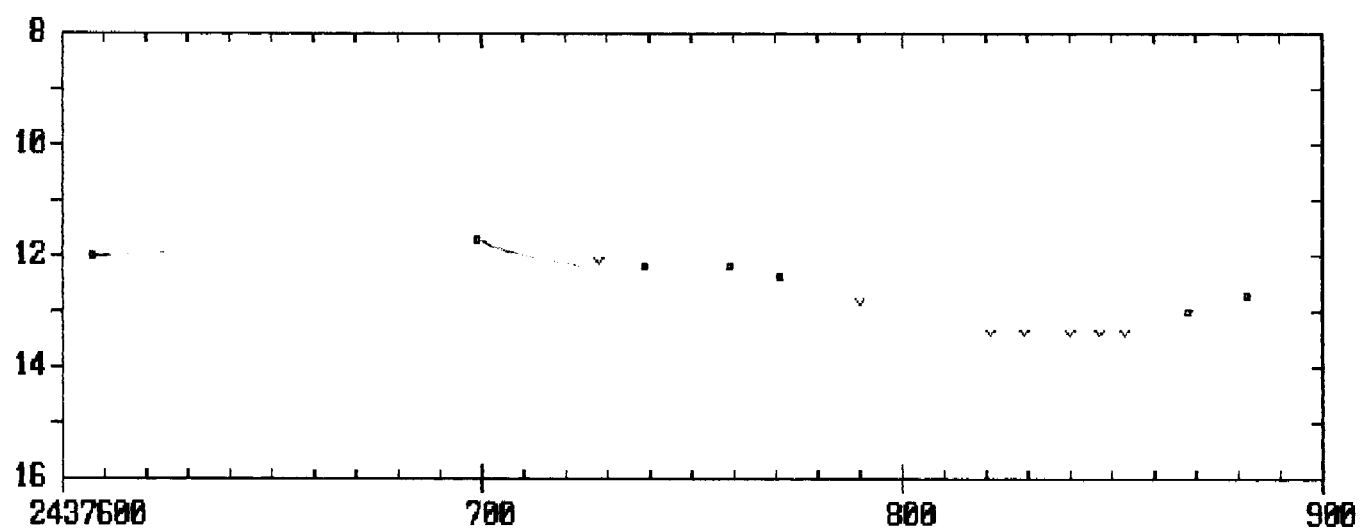
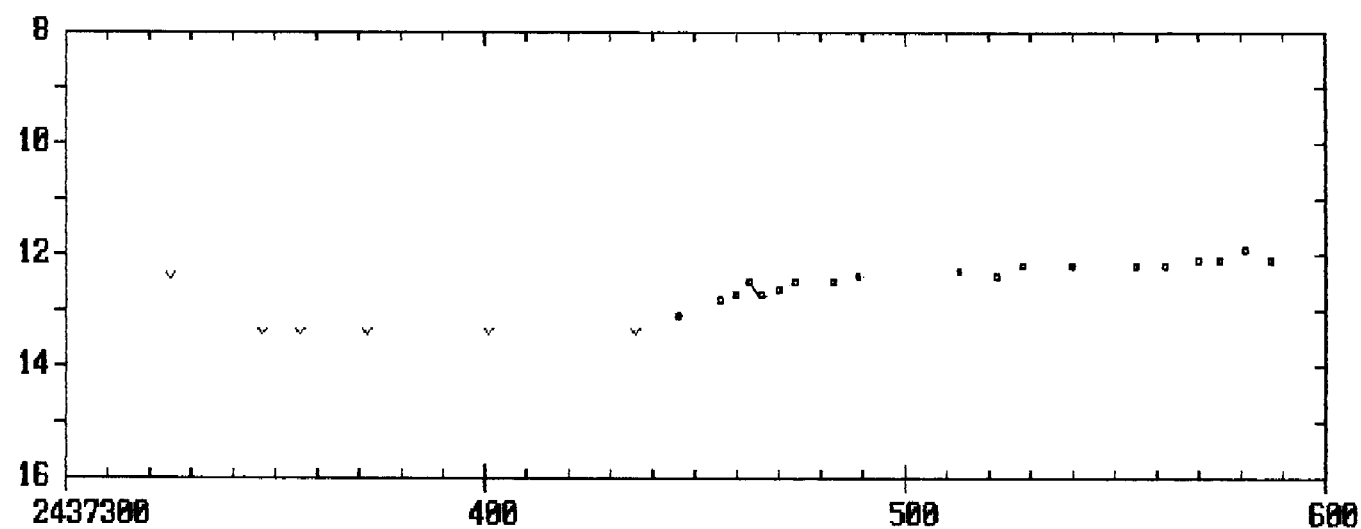
V517 OPH LIGHT CURVE FROM INDIVIDUAL OBSERVATIONS
J.D. 2435,800 - J.D. 2436,400



V517 OPH

FIGURE 2

LIGHT CURVE FROM INDIVIDUAL OBSERVATIONS
 J.D. 2436,400 - J.D. 2437,300

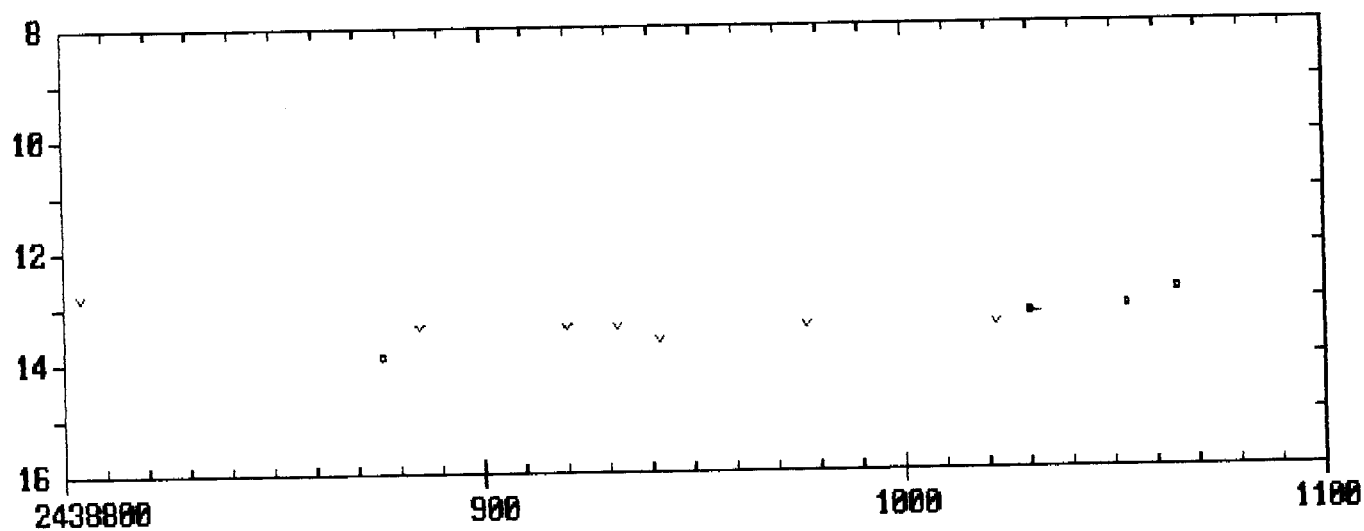
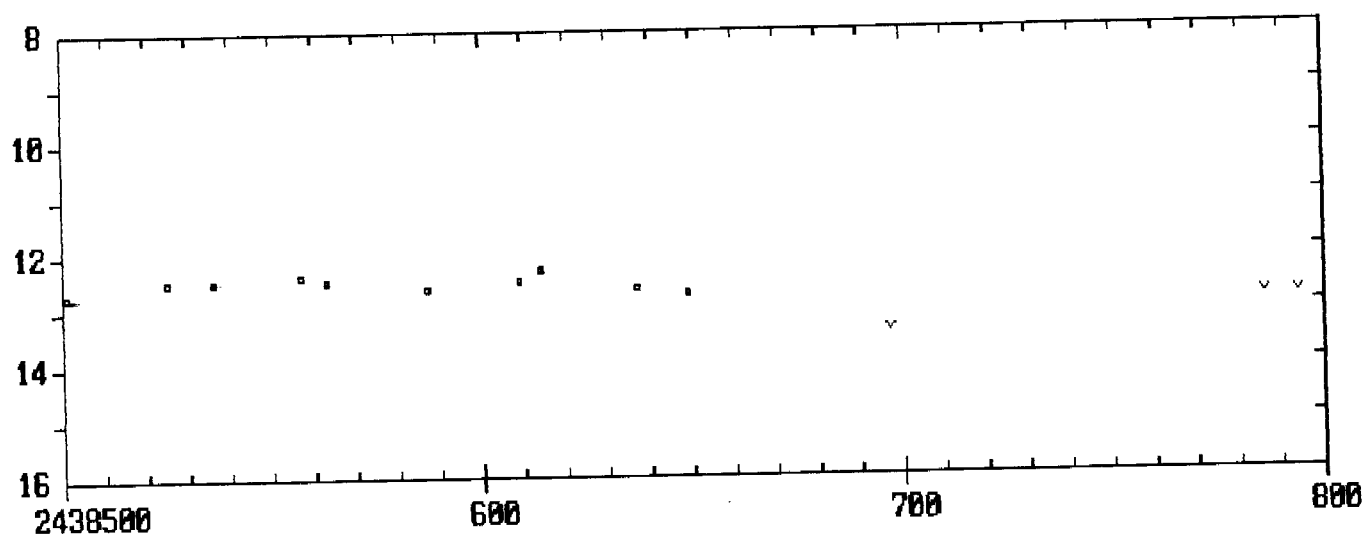
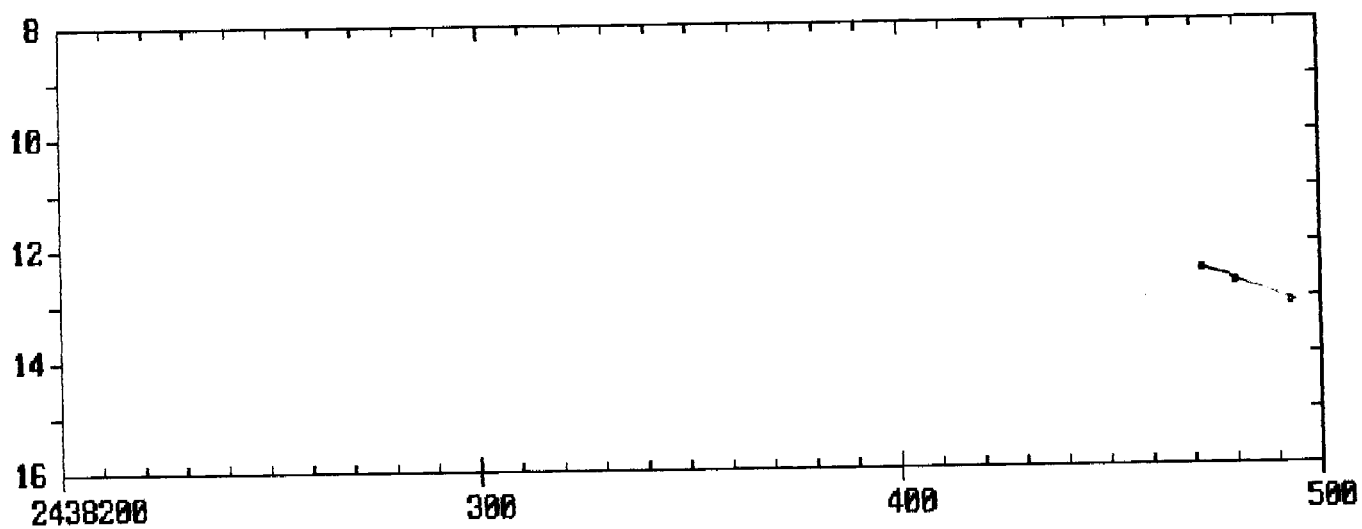


V517 OPH

FIGURE 3

LIGHT CURVE FROM INDIVIDUAL OBSERVATIONS

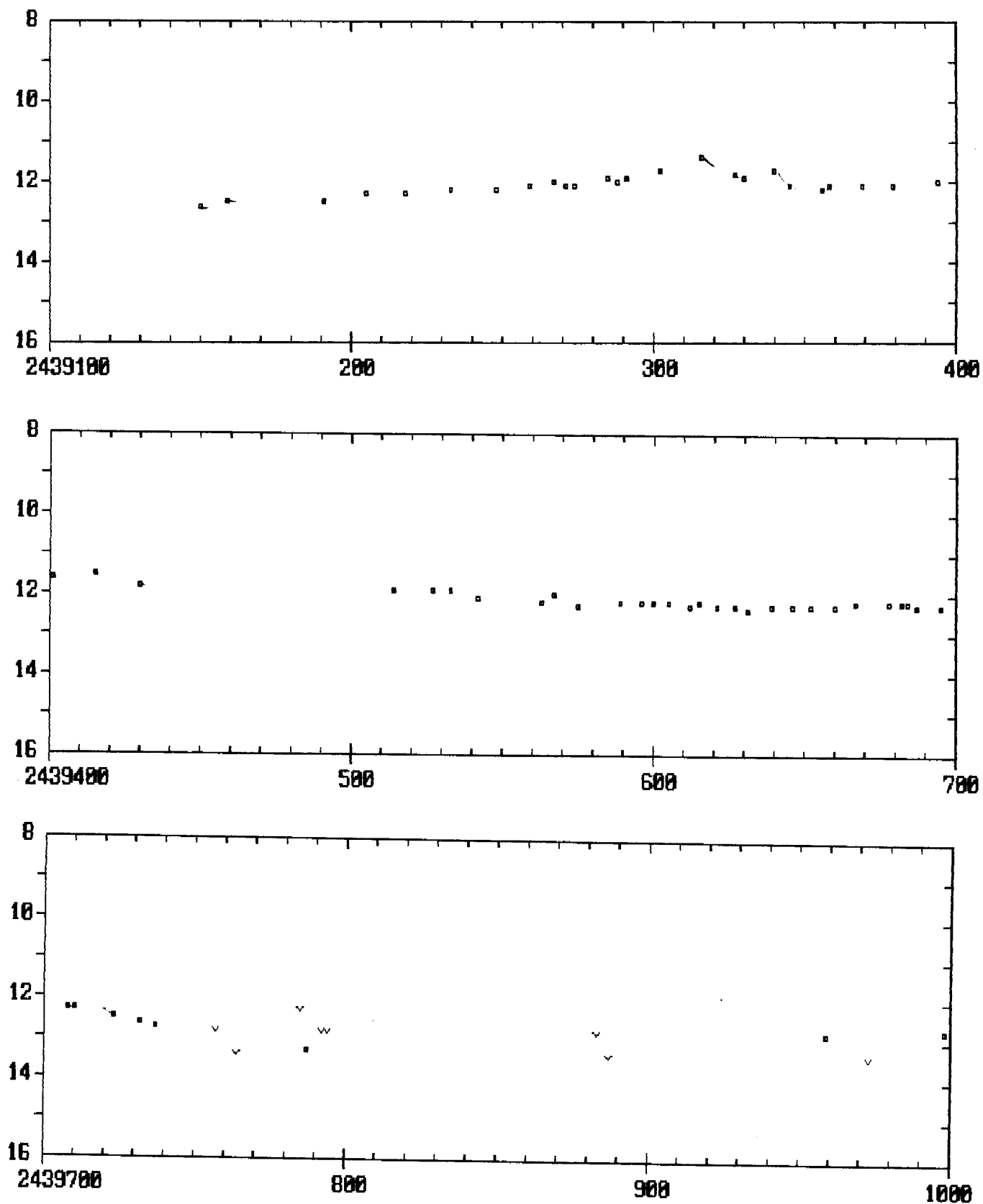
J.D. 2437,300 - 2438,200



V517 OPH

FIGURE 4

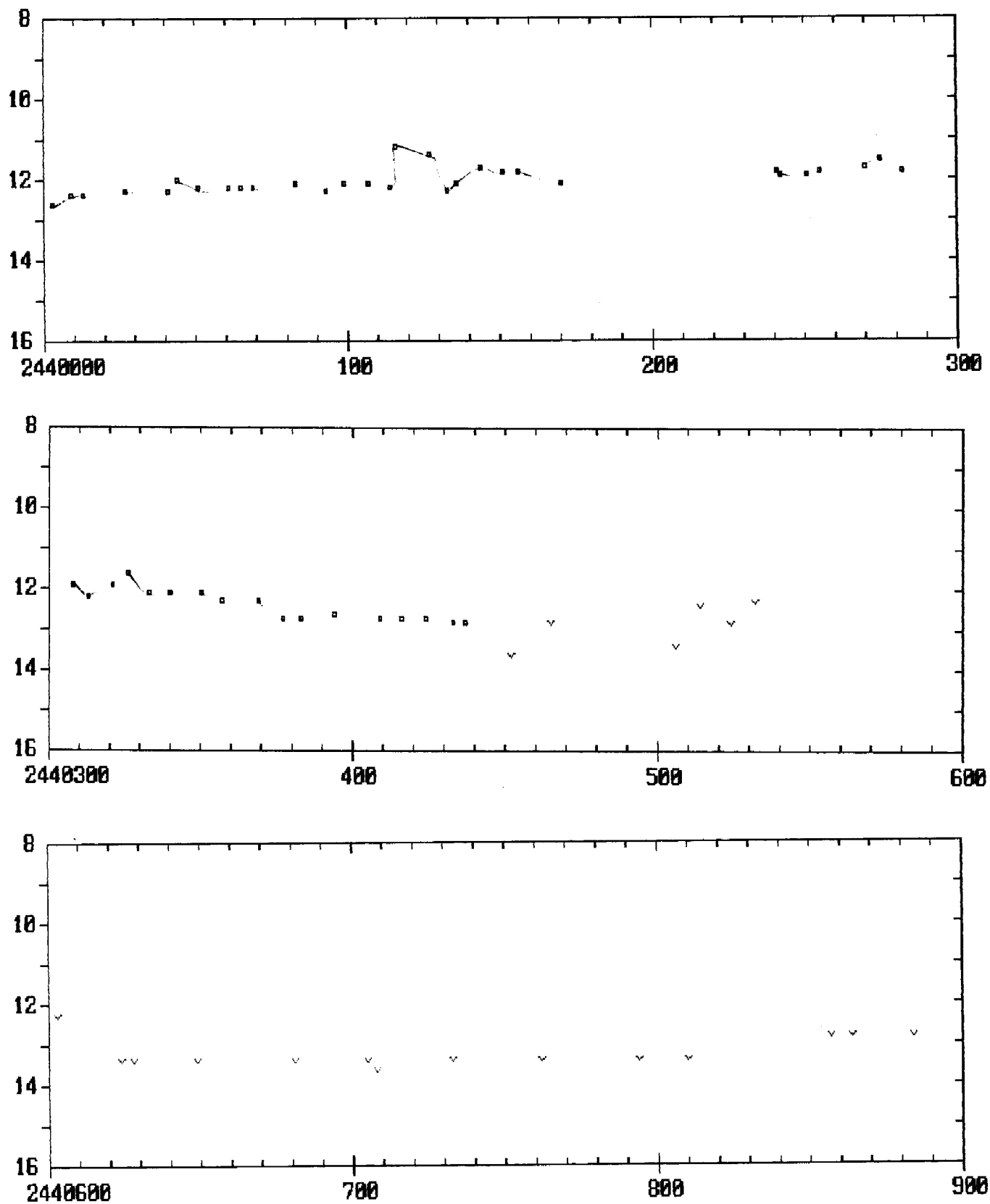
LIGHT CURVE FROM INDIVIDUAL OBSERVATIONS
 J.D. 2438,200 - 2439,100



V517 OPH

FIGURE 5

LIGHT CURVE FROM INDIVIDUAL OBSERVATIONS
 J.D. 2439,100 - 2440,000

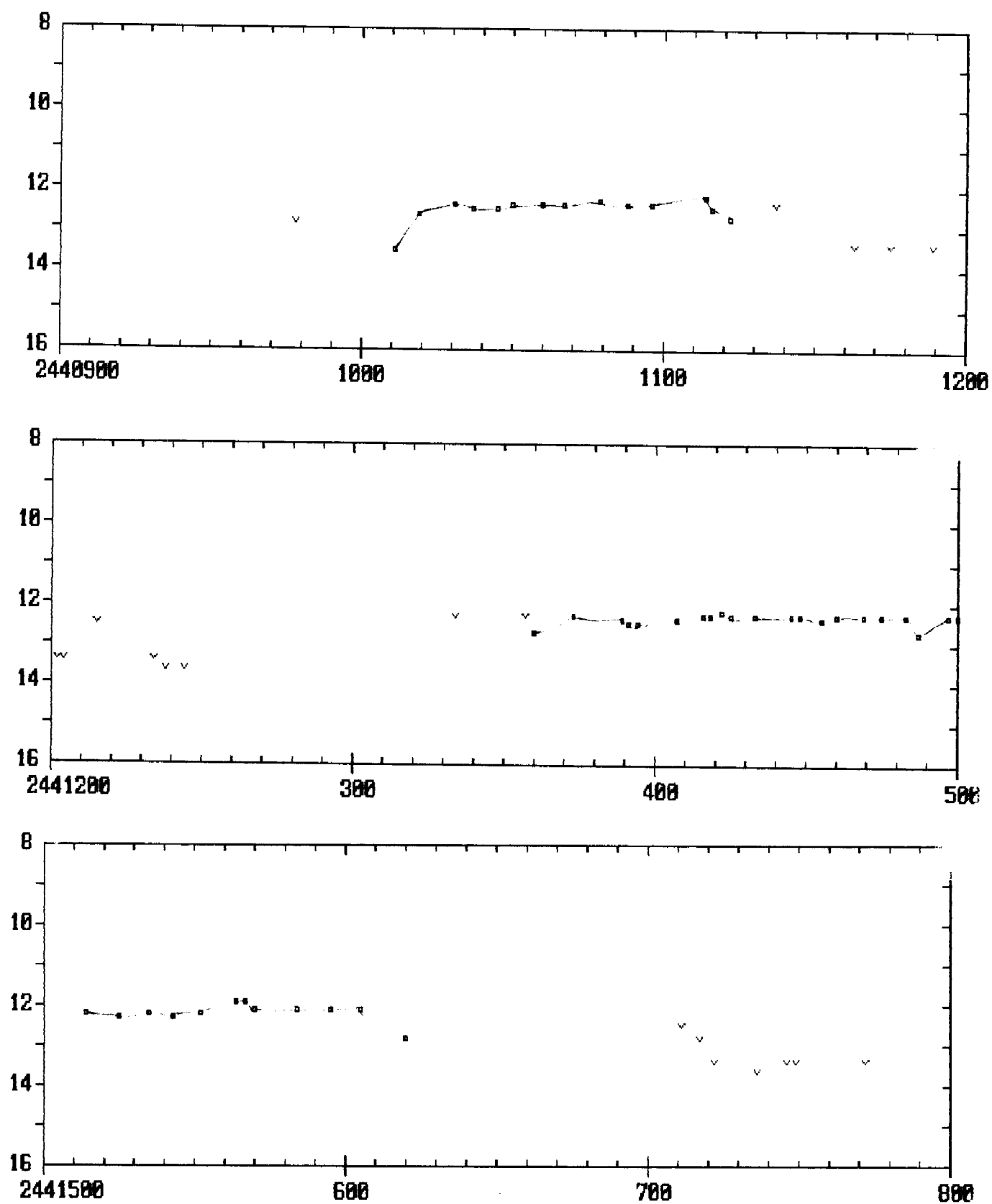


V517 OPH

FIGURE 6

LIGHT CURVE FROM INDIVIDUAL OBSERVATIONS

J.D. 2440,000 - 2440,900

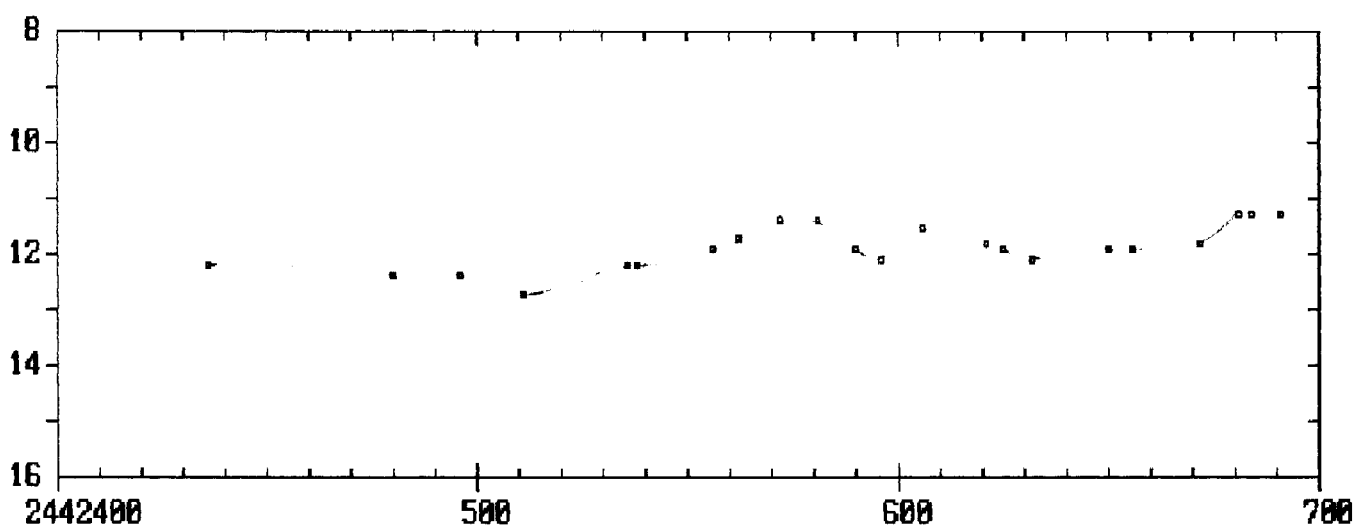
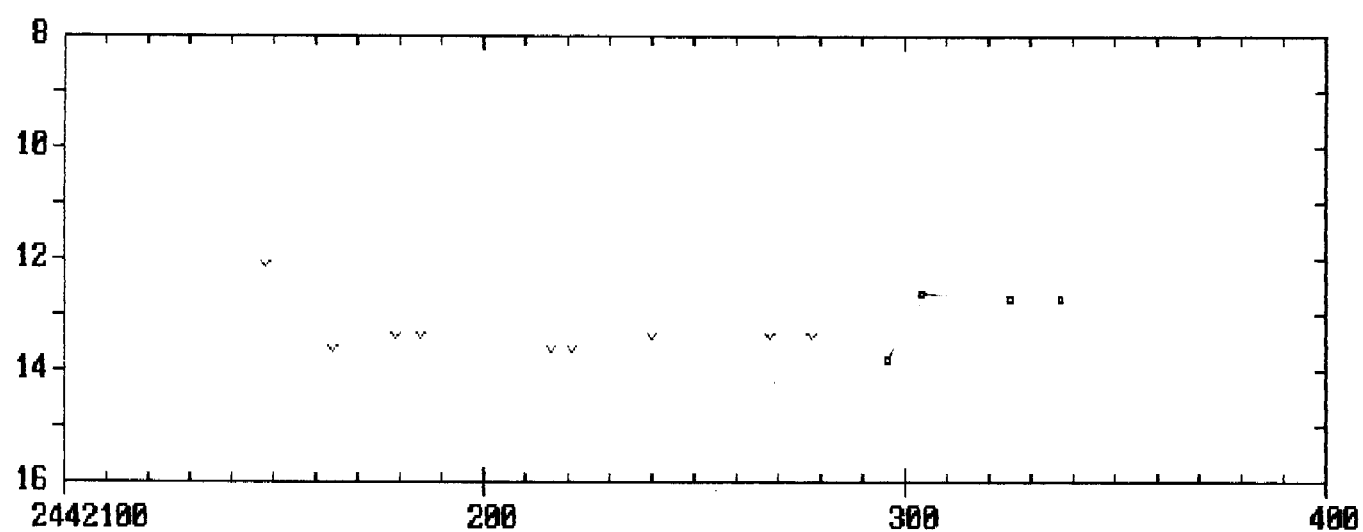
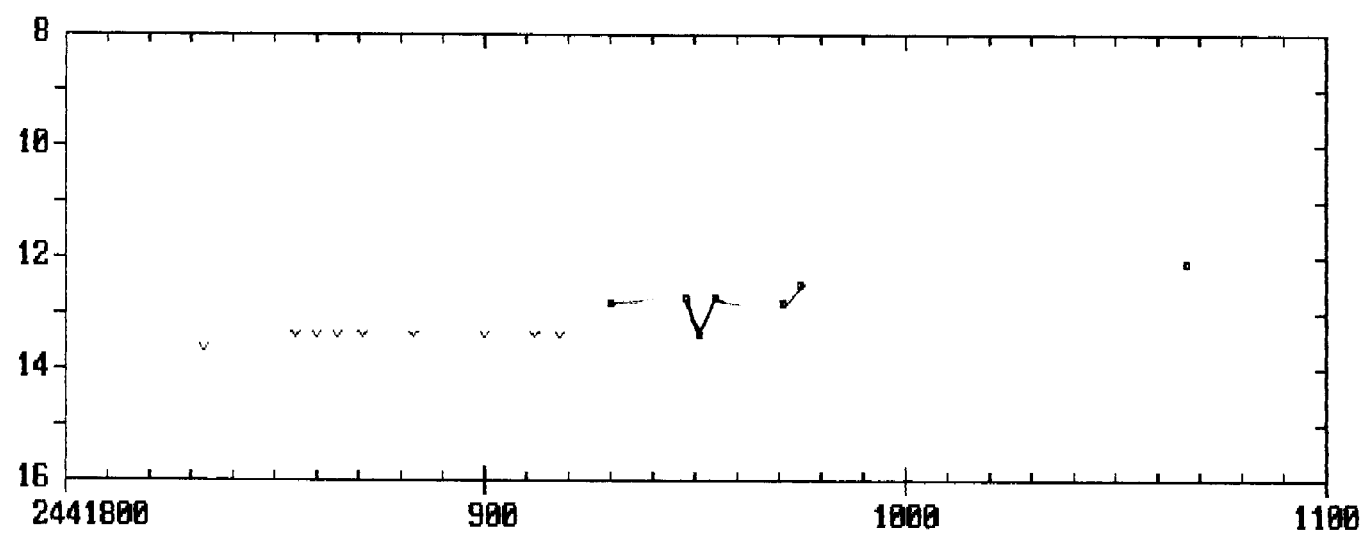


V517 OPH

FIGURE 7

LIGHT CURVE FROM INDIVIDUAL OBSERVATIONS

J.D. 2440,900 - 2441,800

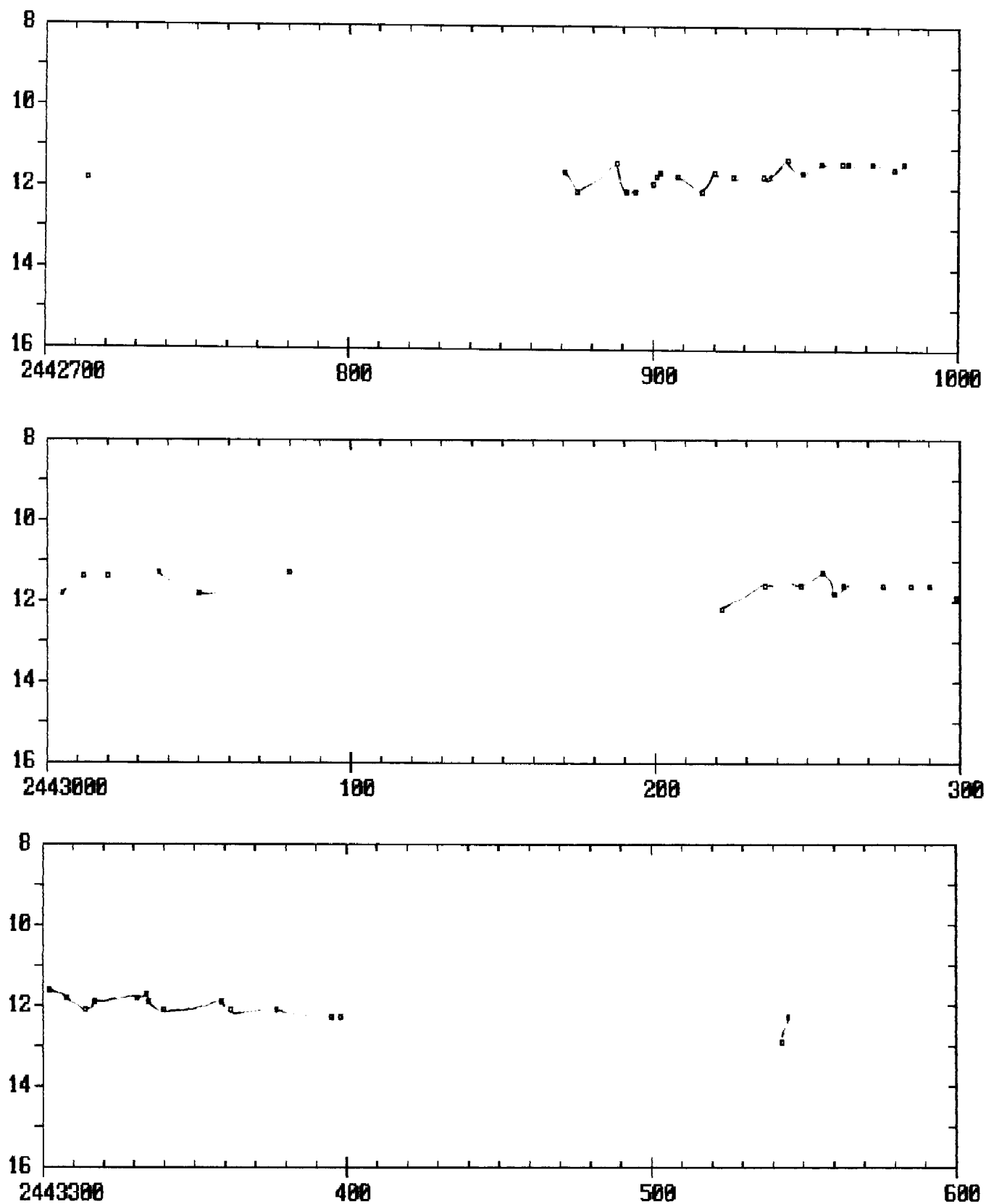


V517 OPH

FIGURE 8

LIGHT CURVE FROM INDIVIDUAL OBSERVATIONS

J.D. 2441,800 - 2442,700

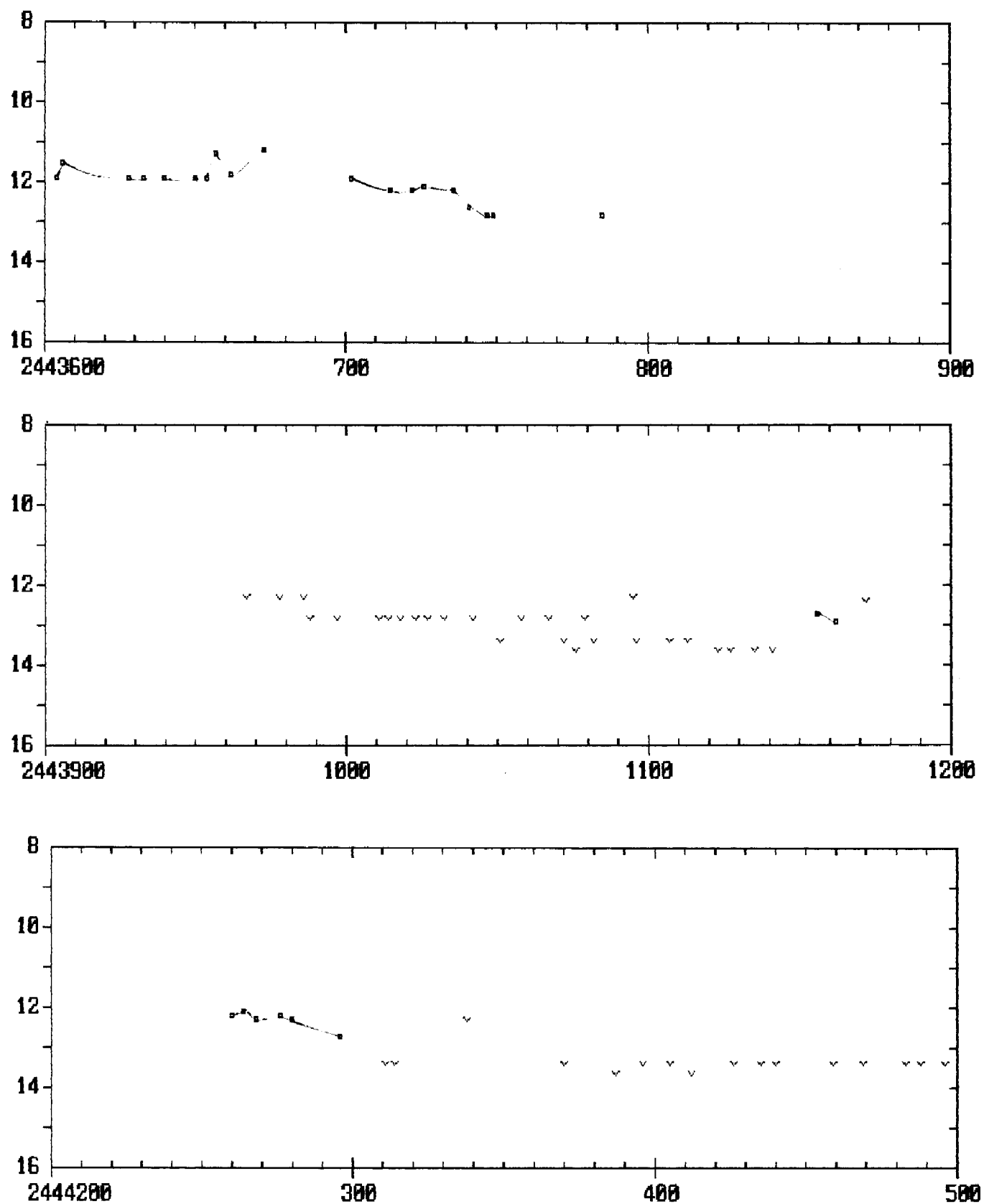


V517 OPH

FIGURE 9

LIGHT CURVE FROM INDIVIDUAL OBSERVATIONS

J.D. 2442,700 - J.D. 2443,600

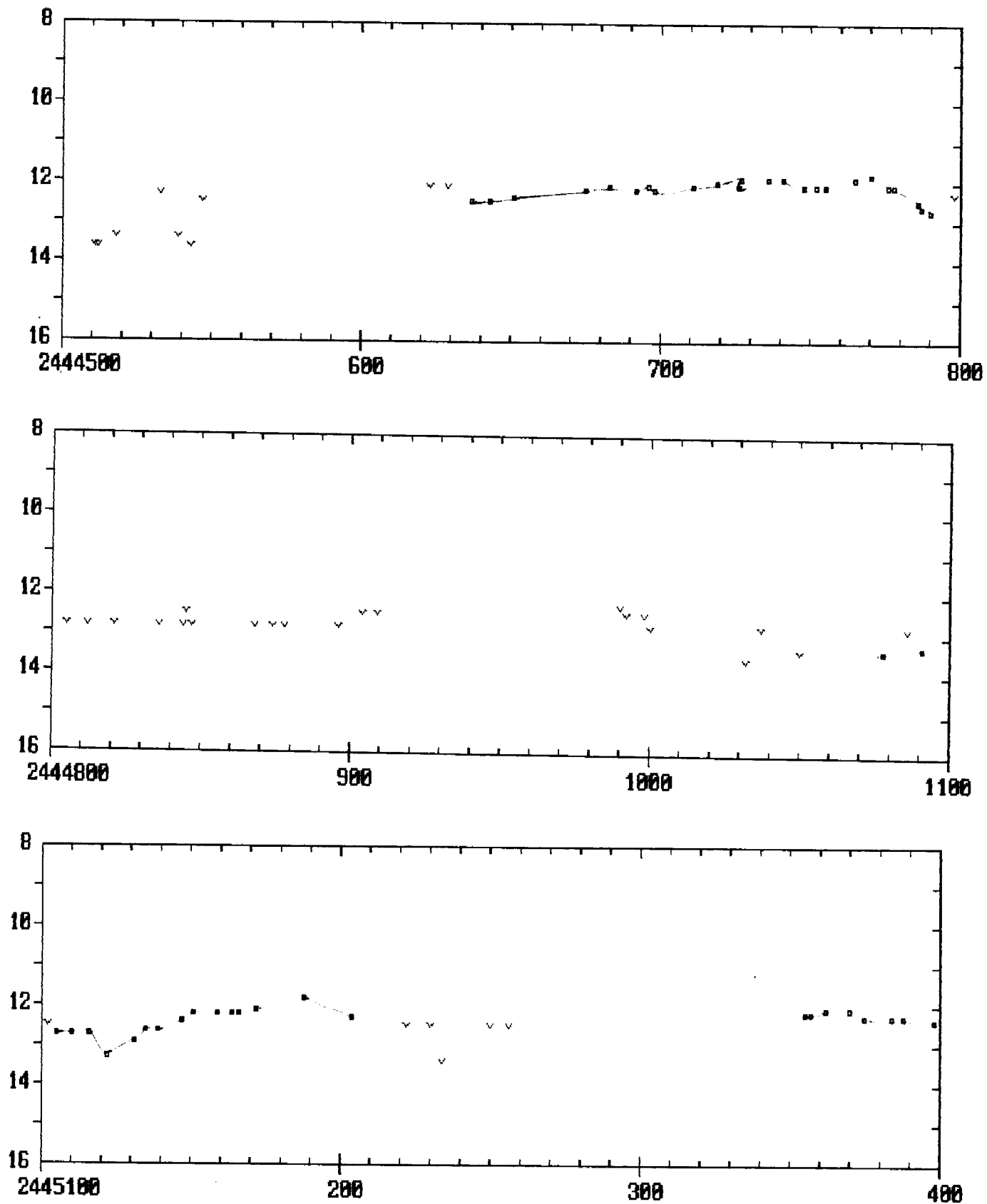


V517 OPH

FIGURE 10

LIGHT CURVE FROM INDIVIDUAL OBSERVATIONS

J.D. 2443,600 - J.D. 2444,500

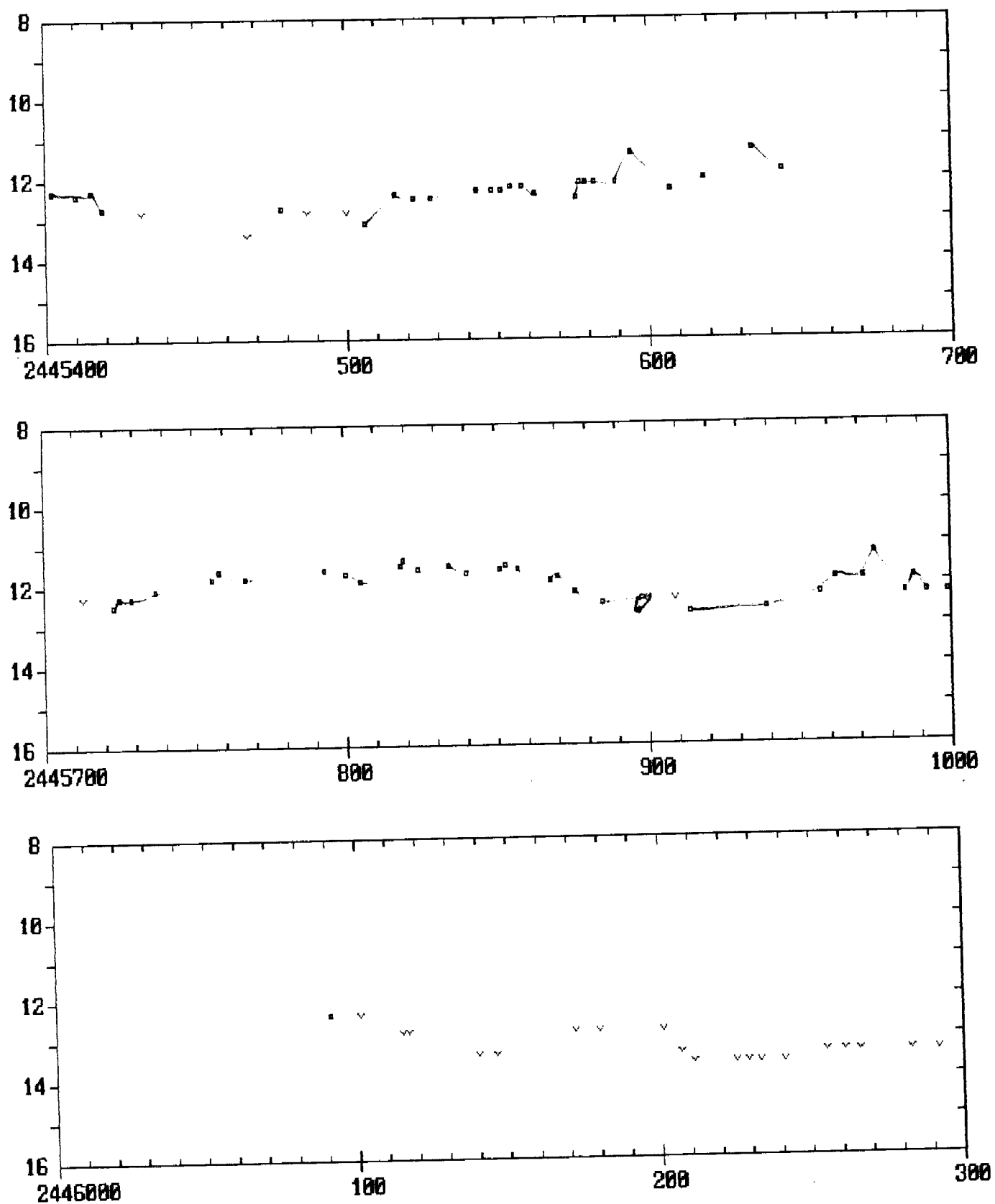


V517 OPH

FIGURE 11

LIGHT CURVE FROM INDIVIDUAL OBSERVATIONS

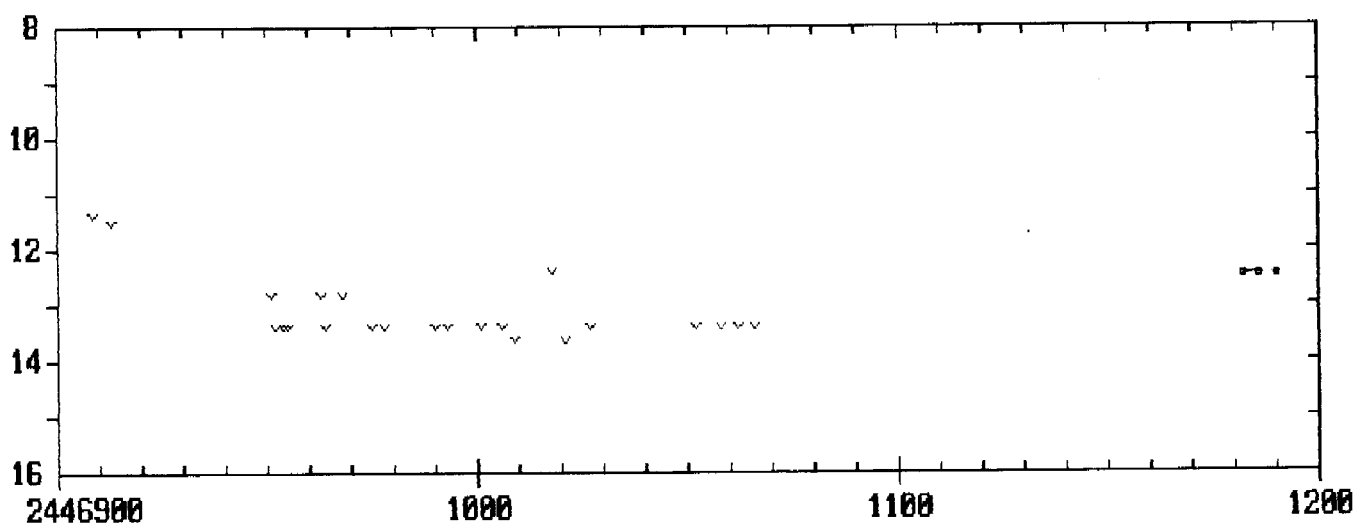
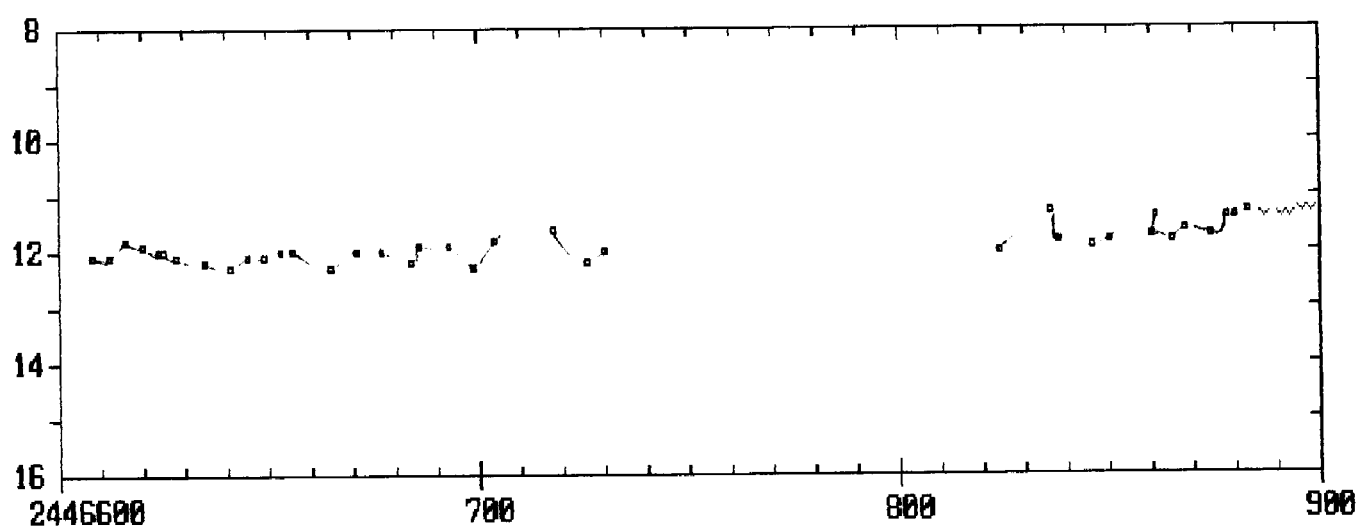
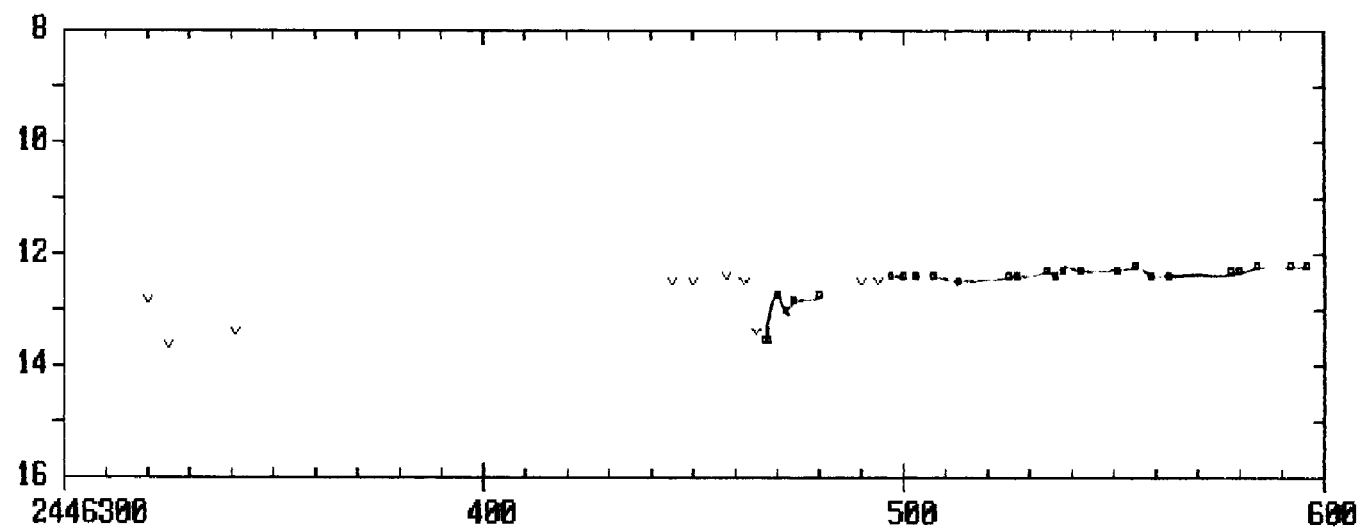
J.D. 2444,500 - J.D. 2445,400



V517 OPH

FIGURE 12

LIGHT CURVE FROM INDIVIDUAL OBSERVATIONS
 J.D. 2445,400 - J.D. 2446,300

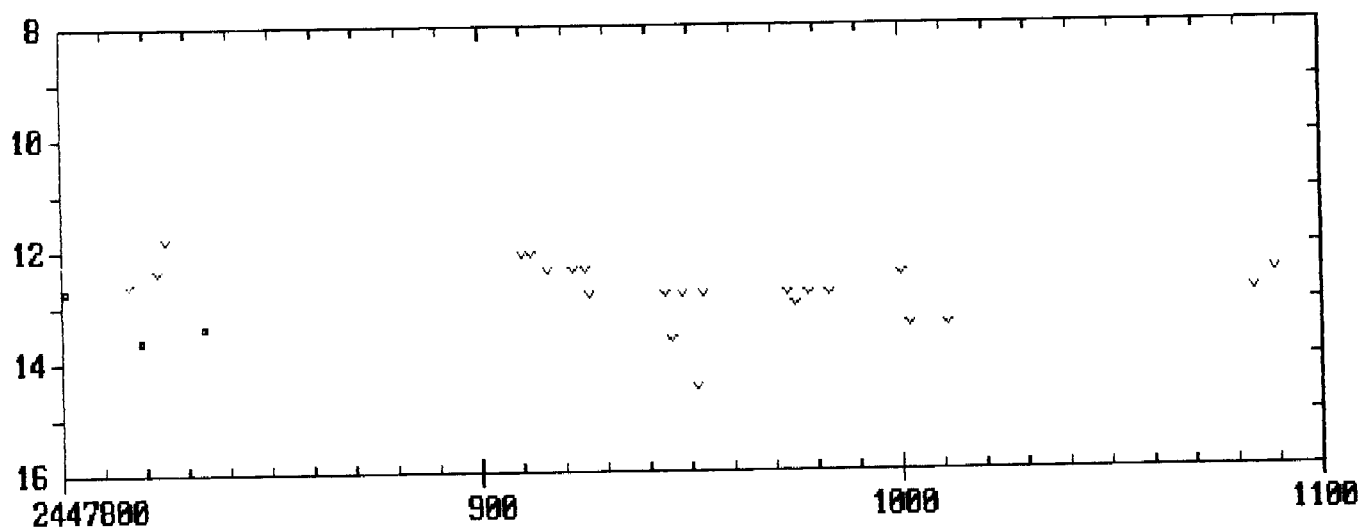
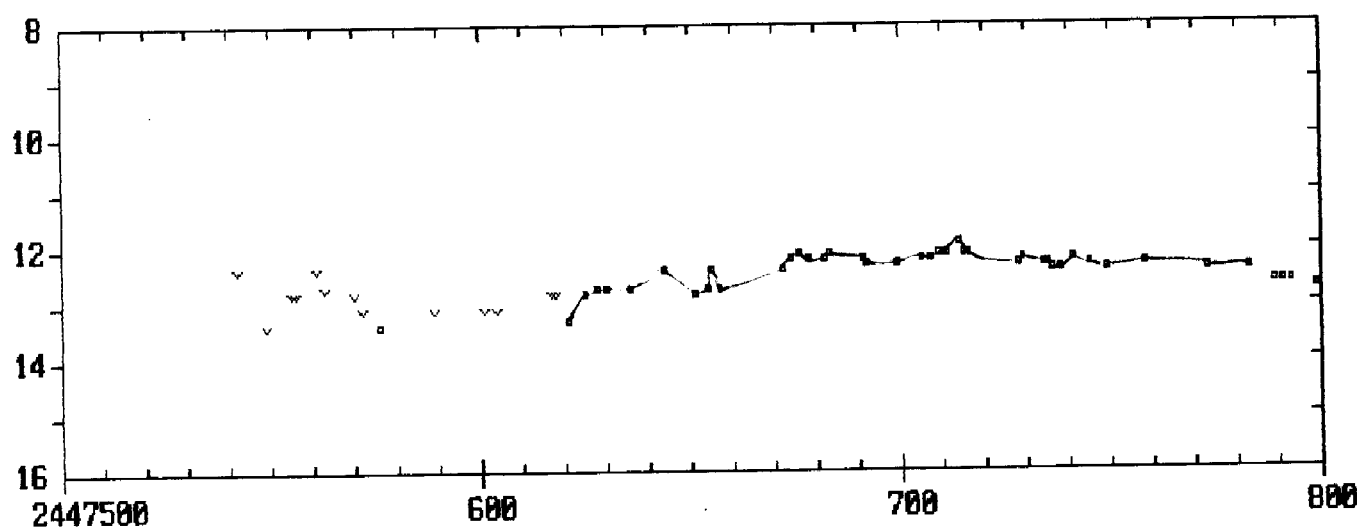
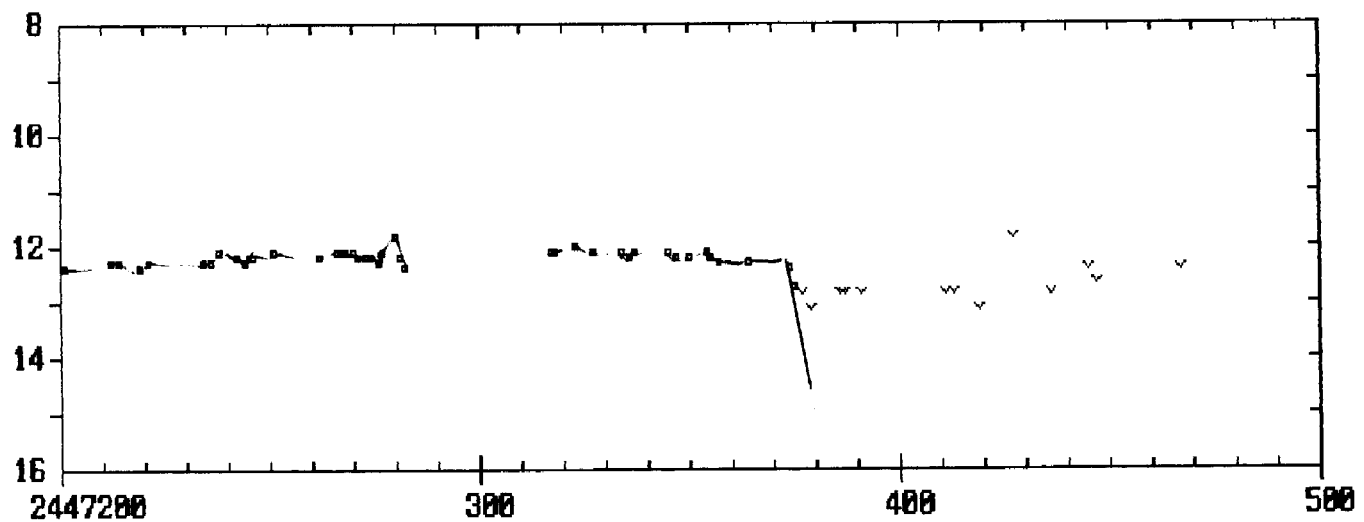


V517 OPH

FIGURE 13

LIGHT CURVE FROM INDIVIDUAL OBSERVATIONS

J.D. 2446,300 - 2447,200

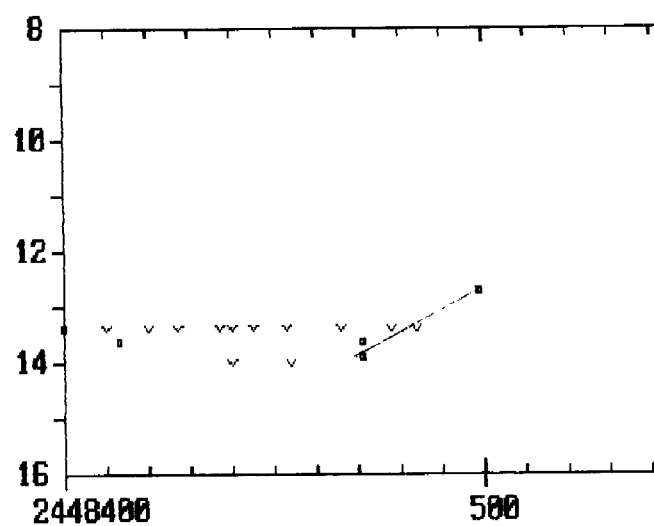
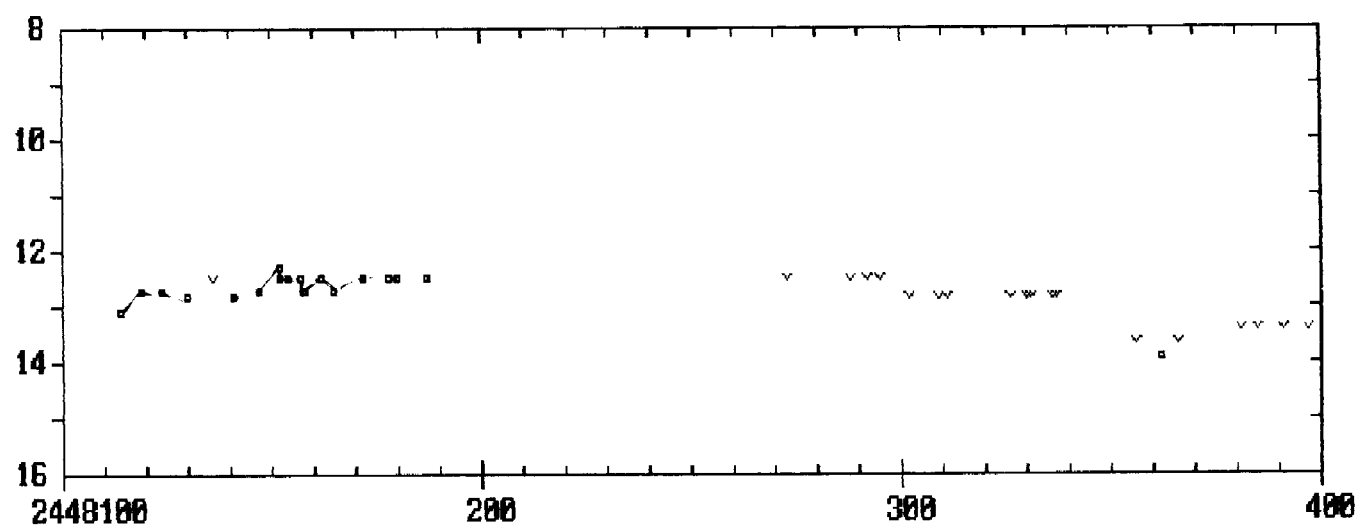


V517 OPH

FIGURE 14

LIGHT CURVE FROM INDIVIDUAL OBSERVATIONS

J.D. 2447,200 - 2448,100



V517 OPH

FIGURE 15

LIGHT CURVE FROM INDIVIDUAL OBSERVATIONS

J.D. 2448,100 - J.D. 2448,500

DO SOME DWARF NOVAE HAVE SHORT-LIVED FLARES OR PRECOURSERS TO OUTBURSTS?--PAPER 2.

Frank M. Bateson
 Director, Variable Star Section,
 Royal Astronomical Society of N.Z.,
 P.O. Box 3093, Greerton, Tauranga
 New Zealand

SUMMARY: Decades of visual monitoring of the dwarf nova Z Cha provides 26 examples of observations that may be possible short-lived flares or precursors to outbursts. These are tabulated as the second paper on this subject.

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1. INTRODUCTION

Paper 1 (1) outlined the objectives of very closely examine the decades of records by members of the Variable Star Section, R.A.S.N.Z. for any unusual events. It was shown that such observations might occur if dwarf novae had either short-lived flares or precursors to their outbursts. This paper lists 26 examples of such possible events in the observations of Z Cha.

2. GENERAL COMMENTS

Z Cha is an ideal object for the study of any unusual observations, because its minima are faint and well below the thresholds of the telescopes used by observers. It also has a well-determined sequence of comparison stars.

These facts imply that positive observations are either made during an outburst, or, a misidentification of the variable with a field star. When examples of the latter are discarded there remained for Z Cha 26 positive estimates that might be unusual events outside of observed outbursts.

3. OBSERVATIONS

The observations are listed in the following Table in the same format as in the previous paper. These may represent short-lived flares or precursors to outbursts. However, it appears probable that events 25 and 26 are observations of an outburst that was otherwise not seen. The long intervals by which these two events preceded the next recorded outburst supports this view.

A discussion of these observations and those in paper 1 will appear in the final paper in this series.

REFEREBCE

- *1) Bateson, F.M. 1991. Publ. 16, Var. star section, R. Astr. Soc. of N.Z. p. 75/

Z CHA - POSSIBLE PRECOURSERS TO OUTBURSTS

No.	OBSERVATION			MAX J.D. 24	Int _d	PRECEDING OBS.			FOLLOWING OBS.		
	J.D. 24	Mag _v	Obs			J.D.	Mag _v	Obs	J.D.	Mag	Obs
1	36,171.00	13.7	Jo	36,201.1	30	161.14	<13.2	Jo	173.95	<13.4	Jo
2	37,502.23	14.0	Jo	37,557.1	55	494.95	<13.4	Bt	505.79	<12.3	Jo
3	37,525.92	12.3	Bt	37,557.1	31	525.23	<14.0	Jo	526.24	<14.0	Jo
4	37,580.02	14.0	Bt	37,624.0	44	579.91	<13.4	Jo	580.84	<14.0	Bt
5	37,605.94	14.0	Bt	37,624.0	18	605.92	<13.4	Jo	607.02	<14.0	Jo
6	37,609.03	13.9	Bt	37,624.0	15	607.04	<14.0	Bt	613.14	<14.0	Jo
7	37,643.90	14.0	Bt	37,670.6	26	643.02	<13.4	Jo	643.97	<12.8	Jo
8	38,000.03	13.8	Bt	38,019.0	19	996.96	<14.0	Jo	000.94	<13.4	Bt
9	38,014.94	13.8	Bt	38,019.0	4	012.92	<14.0	Jo	014.95	<14.0	Jo
10	38,903.86	12.6	Jo	38,978.2	74	902.79	<13.4	Jo	906.94	<13.4	Jo
11	39,293.81	14.0	Bt)	39,301.2	7)	292.90	<13.4	Jo	294.87	<13.4	Jo
	293.99	14.0	Bt)		)						
	294.83	13.6	Bt)		)						
	295.83	14.0	Bt)		)	295.80	<14.0	Bt	295.83	<13.4	Jo
12	39,503.98	13.4	Bt	39,508.9	5	503.96	<14.0	Jo	504.93	<13.4	Bt
13	40,735.91	14.0	Sr	40,797.2	56	735.84	<12.6	Mf	735.94	<12.6	Mm
14	40,767.92	14.0	Sr	40,797.2	29	767.86	<12.8	Jn	768.86	<12.8	Jn
15	40,937.99	12.3	Ww	40,970.0	32	936.93	<14.0	Jo	939.02	<14.0	Mt
16	41,059.95	13.6	Sr)	41,062.6	2	059.87	<13.4	Jo	061.88	<12.8	Jn
	060.94	13.6	Sr)								
	061.87	13.6	Sr)								
17	41,356.95	13.5	Jo)	41,452.9	46	354.99	<14.0	Ty	358.04	<14.0	Jo
	357.13	14.3	Jo)								
18	42,593.80	12.7	Ve	42,640.2	47	592.92	<13.4	Aa	593.92	<13.4	Aa
19	42,630.95	14.0	Mt	42,640.2	9	630.86	<13.4	Mm	631.93	<13.4	Jo
20	42,746.17	13.6	Mt	42,863.8	117	745.94	<13.4	Rg	746.89	<13.4	Jo
21	42,858.8	12.3	Cj	42,863.8	5	857.96	<13.4	Ho	858.96	<14.0	Ty
22	43,903.91	12.9	Ve	43,943	40	903.89	<13.4	Jo	903.92	<13.4	H1
23	44,561.13	12.7	Jo	44,612	51	561.0	<15.0	Cj	562.90	<12.3	Jo
24	44,945.23	13.3	BA)	44,972	27	944.87	<14.0	Rg	946.30	<14.0	BA
	945.32	13.4	BA)								
25	46,924.87	12.8	Mf	47,124	199	923.81	<12.6	Jo	924.993	<14.0	SE
26	46,937.20	13.2	CH	47,124	187	936.20	<13.0	Ov	937.77	<13.4	H1

THE DWARF NOVA---UU AQUILAE

F.M. Bateson & R. McIntosh
 Variable Star Section, RASNZ
 P.O. BOX 3093, Greerton,
 Tauranga, New Zealand.

SUMMARY: Tabulated are 26 outbursts of UU Aql observed between J.D. 2,443,816 and 2,446,721. Maxima are either wide or narrow. The results are discussed. A mean cycle of 71.6 days is found and is probably too long owing to gaps in the records.

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1. INTRODUCTION

Observations of UU Aql from J.D. 2,440,410 to 2,443,815 were discussed by Bateson (1). We continue the observations of this star to J.D. 2,446,721.

2. OBSERVATIONS

All observations were made visually using the same sequence as given in the previous paper. The observing season is from March through November. The Variable Star Section, British Astronomical Association (BAA) supplied the observations made by their members for the years 1976 to 1984 and for 1986-7. This contribution included 612 estimates. The members of the Variable Star Section, Royal Astronomical Society of N.Z. made 1,781 estimates. Most of the observations from both Sections were negative.

Table 1 lists the outbursts observed as the result of the combined results. This table is in the same format as in the previous paper. The light curve appears in Figs. 1 to 5.

3. DISCUSSION

There are many gaps in the observations, firstly because UU Aql cannot be observed for three months each year. Secondly, this variable has not been closely monitored even in those months when it is observable. It appears probable that a number of narrow maxima have passed unobserved although it seems that most of the wide outbursts were recorded.

UU Aql is a typical variable of the SS Cyg type with both wide and narrow outbursts. These do not appear to alternate or follow any other regular pattern. This is an observational effect due to the small number of narrow maxima observed owing to their comparatively short duration and the many gaps in the observations.

Wide maxima for which the parameters in Table 1 are considered reliable give a mean maximum brightness of 11.40 with a range of 11.0 to 11.7. Their mean width at magnitude 13.5 is 9.17 days (Range 6.2 to 11.7 days).

The mean maximum magnitude of narrow outbursts is 11.76 from five examples that range from 11.1 to 12.5. There are only two narrow maxima for which widths could be determined. These had durations of 4.2 and 5.4 days.

The mean cycle, derived from those maxima that appear to be consecutive is 71.6 days. We consider that the true mean cycle is actually much shorter assuming that many narrow maxima went unobserved.

4. CONCLUSIONS

UU Aql rises to maximum usually in a day and declines less steeply. A limited number of estimates between 15.0 and 16.0 suggest that its minimum magnitude is about 16.0, or slightly fainter. Maxima are either wide or narrow. The former have a mean maximum magnitude of 11.40 and a mean width at magnitude 13.5 of 9.17 days.

Narrow maxima appear to average magnitude 11.76 and are probably about 4 days in duration. We conclude that a number of narrow maxima have not been seen owing to gaps in the records. If this assumption is correct then the mean cycle of 71.6 days found from the observations is too long.

We conclude that UU Aql has not been as closely monitored as desirable. The correct mean cycle will only be determined when UU Aql receives closer attention.

ACKNOWLEDGEMENTS

We thank observers of both the B.A.A. and N.Z. Variable Star Sections for their contributions. Our special thanks are due to the late Doug Saw for sending the observations made by the B.A.A.

REFERENCE

- (1) Bateson, F.M. 1979. Publ. Var Star Section, R.astr.Soc. of N.Z. 7, pp.10-23

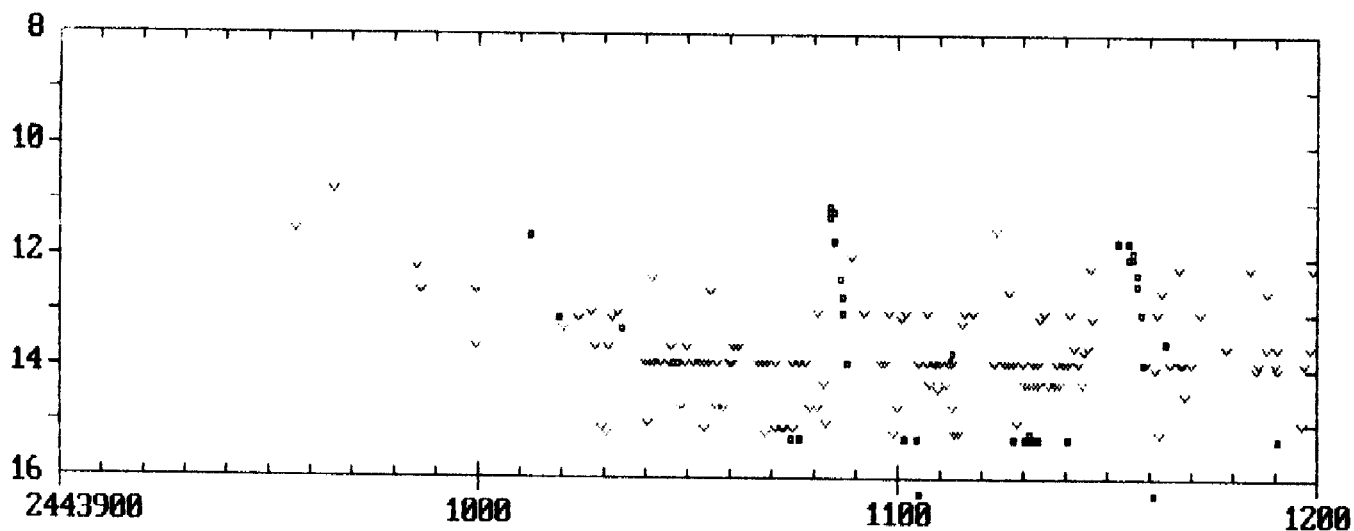
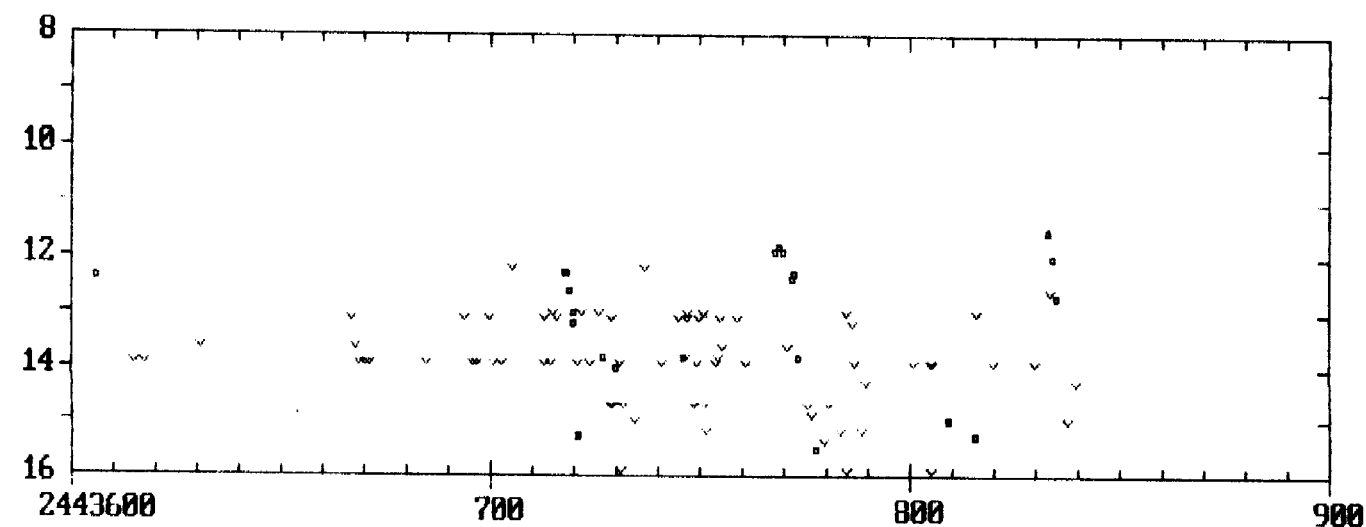
TABLE 1
UU AQUILAE - OBSERVED OUTBURSTS

No.	Type	J.D. Max 24	Max Mag _v	Int d	13.5 Rise	13.5 Fading	Width d	No. Obs	Remarks
24	N?	43,833	11.5	65	-	835	-	3	1
25	W?	44,012	11.6	(179)	-	020	-	2	2
26	N	084	11.1	72	083.5	087.7	4.2	10	
27	W	152	11.7	68	-	158.2	-	10	3
28	N?	349	12.4	(197)	-	352	-	2	4
29	W	431	11.0	82	428.2	439.9	11.7	23	
30	?	508	11.4	77	-	511.9	-	7	5
31	N?	571	11.5	63	570.5	-	-	6	
32	?	683?	11.8?	(112)	-	-	-	1	6
33	W?	772	11.7	46	-	781	-	9	
34	N	823	12.5	51	821.6	827.0	5.4	10	
35	W	896	11.5	73	895.9	905.0	9.1	18	
36	?	45,050?	13.2?	(154)	-	-	-	1	7
37	W?	098	11.3	48?	-	109	-	4	8
38	W	189	11.6	91	183?	194.3	11.3	12	
39	W	261	11.7	72	257.8	264.0	6.2	13	
40	N?	467	11.3	(206)	-	-	-	3	9
41	W	582	11.3	(115)	579.7	589.3	9.6	41	
42	W	818	11.3	(236)	-	-	-	11	10
43	W	928	11.5	(110)	927.3?	937.3	10.00?	32	
44	?	46,159?	12.2	(231)	-	-	-	2	11
45	W	257	11.0	98?	255.1	265.3	10.2	20	
46	W	340	11.6	83	359.6	365.8	6.2	22	
47	W	551	11.0	(211)	550.0?	559.5	9.5	14	
48	W	629	11.5	78	628.2	636.6	8.4	10	
49	W	711	11.2	82	711.0	720.5	9.5	19	

REMARKS TO TABLE 1

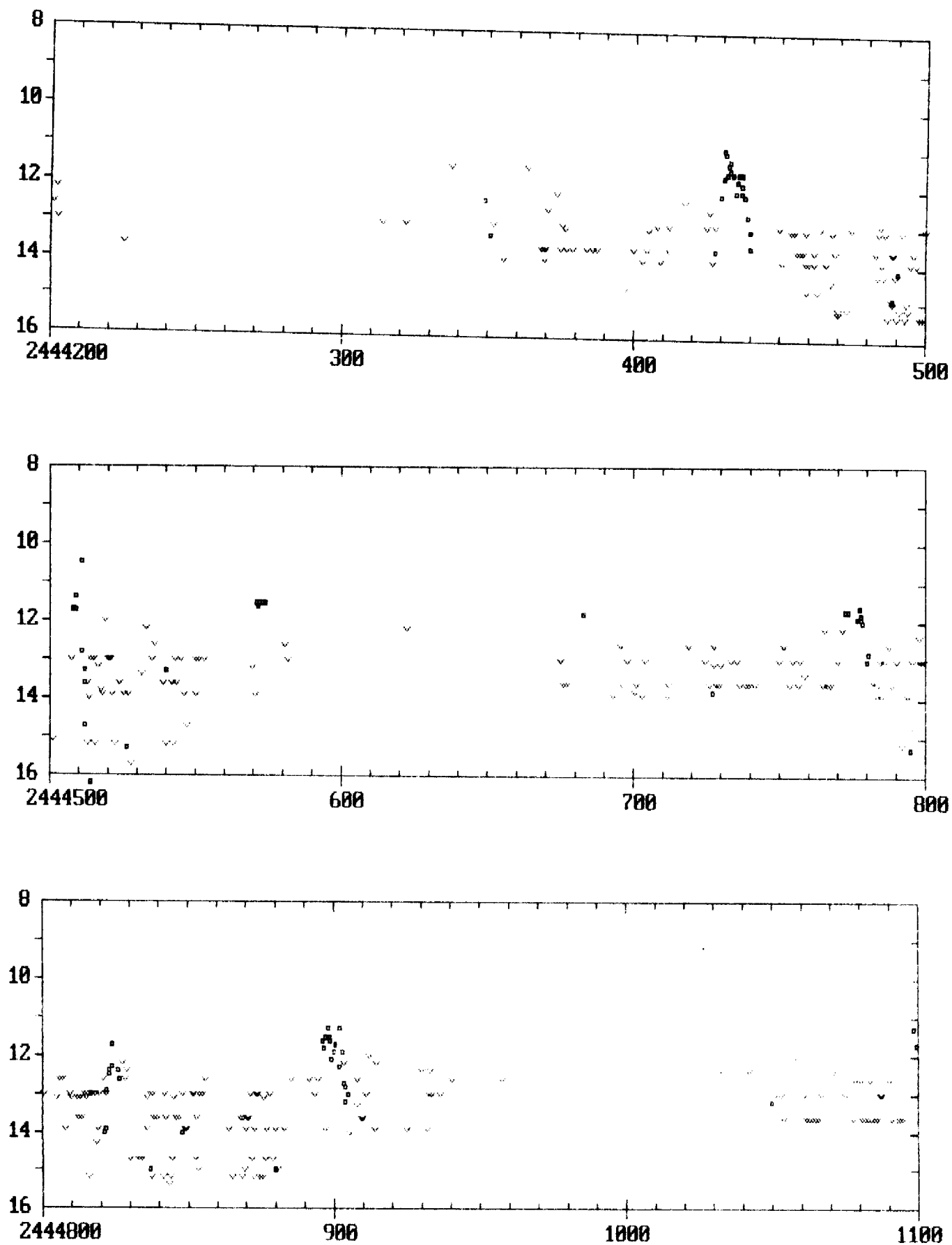
- 1) Gap 3^d before 833
- 2) " 13^d " 012
- 3) " 6^d " 152
- 4) " 7^d " 349
- 5) <13.0 on 507, otherwise Gap 7^d before 508
- 6) Gaps 6^d before & 9^d after 683
- 7) Gap 6^d " 050
- 8) " 3^d " 098
- 9) " 6^d " 467
- 10) " 3^d " 818
- 11) Gaps 2^d before & 6^d after 159

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UU Aql

FIGURE 1
LIGHT CURVE FROM INDIVIDUAL OBSERVATIONS
J.D. 2,443,600 - 2,444,200

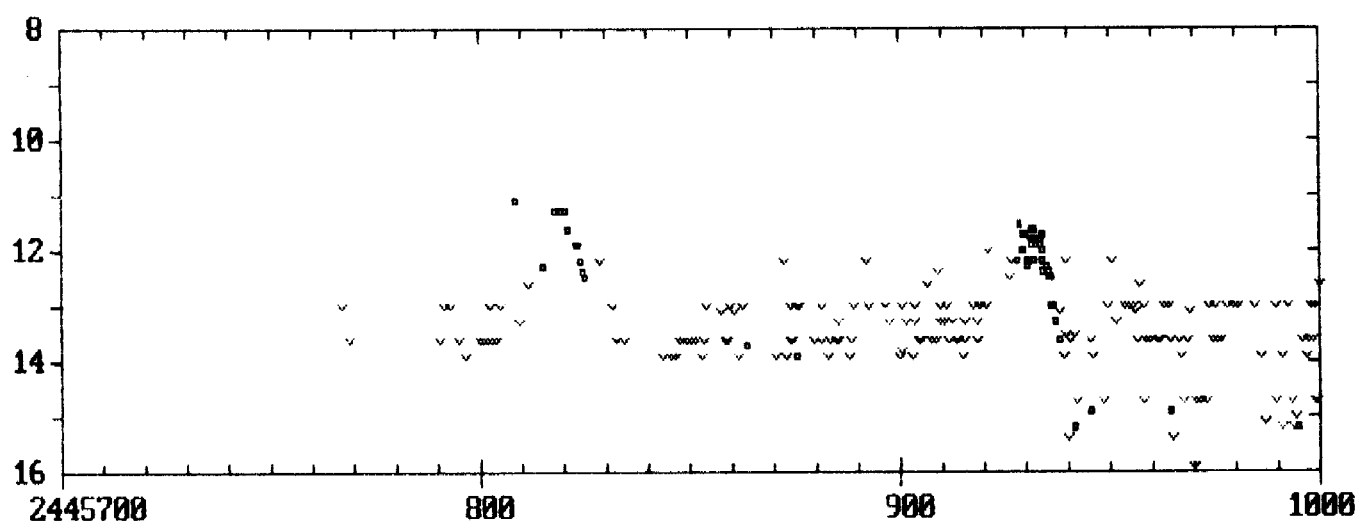
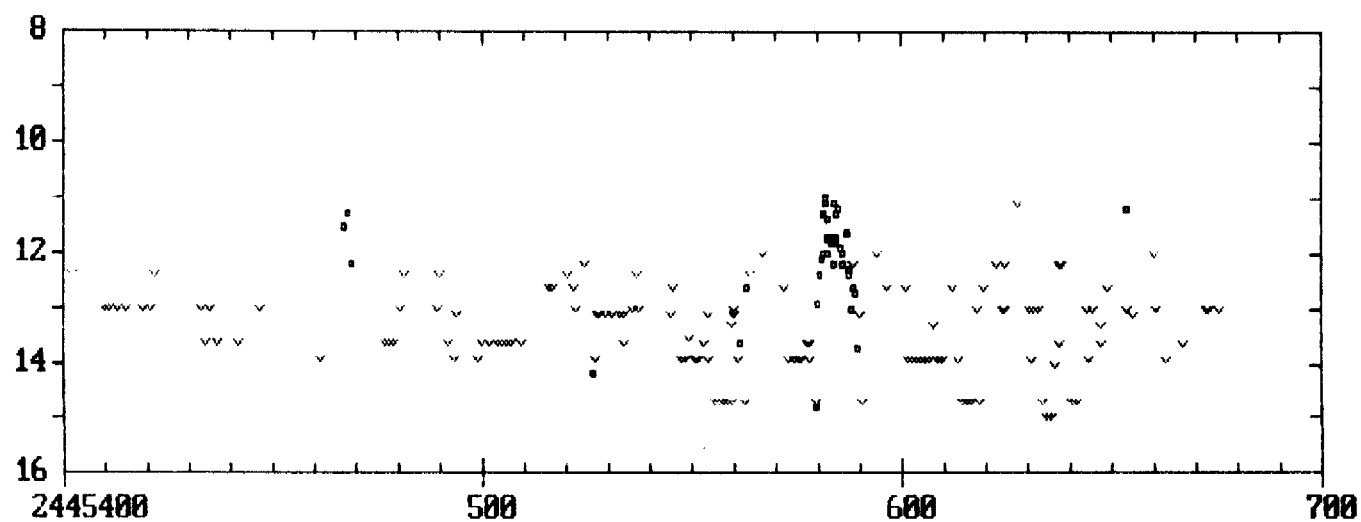
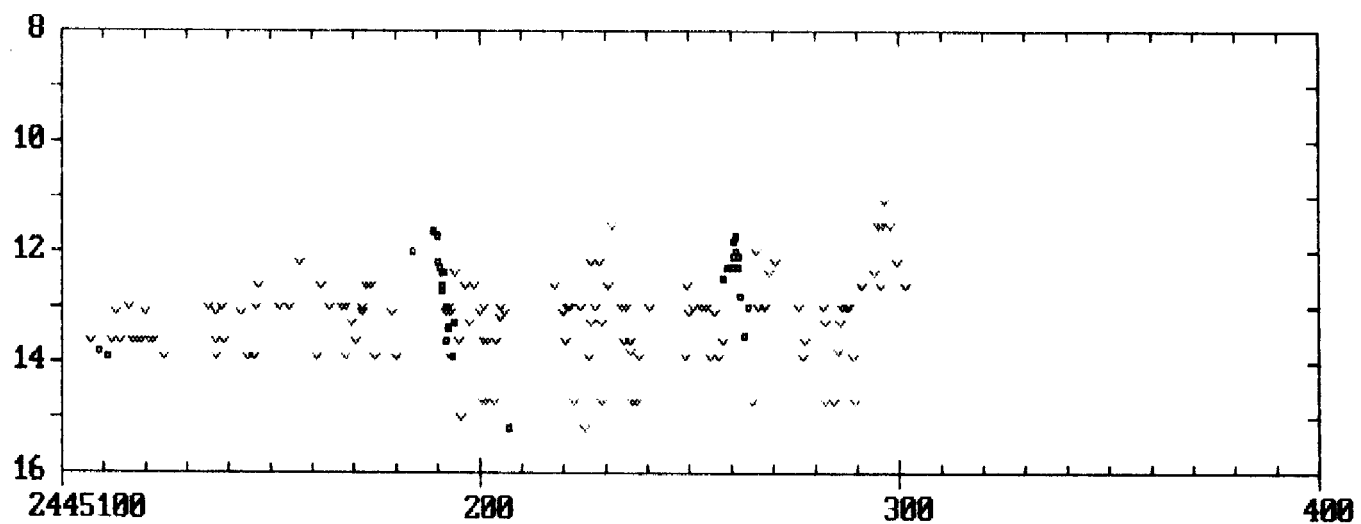


UU Aql

FIGURE 2

LIGHT CURVE FROM INDIVIDUAL OBSERVATIONS

J.D. 2,444,200 - 2,445,100

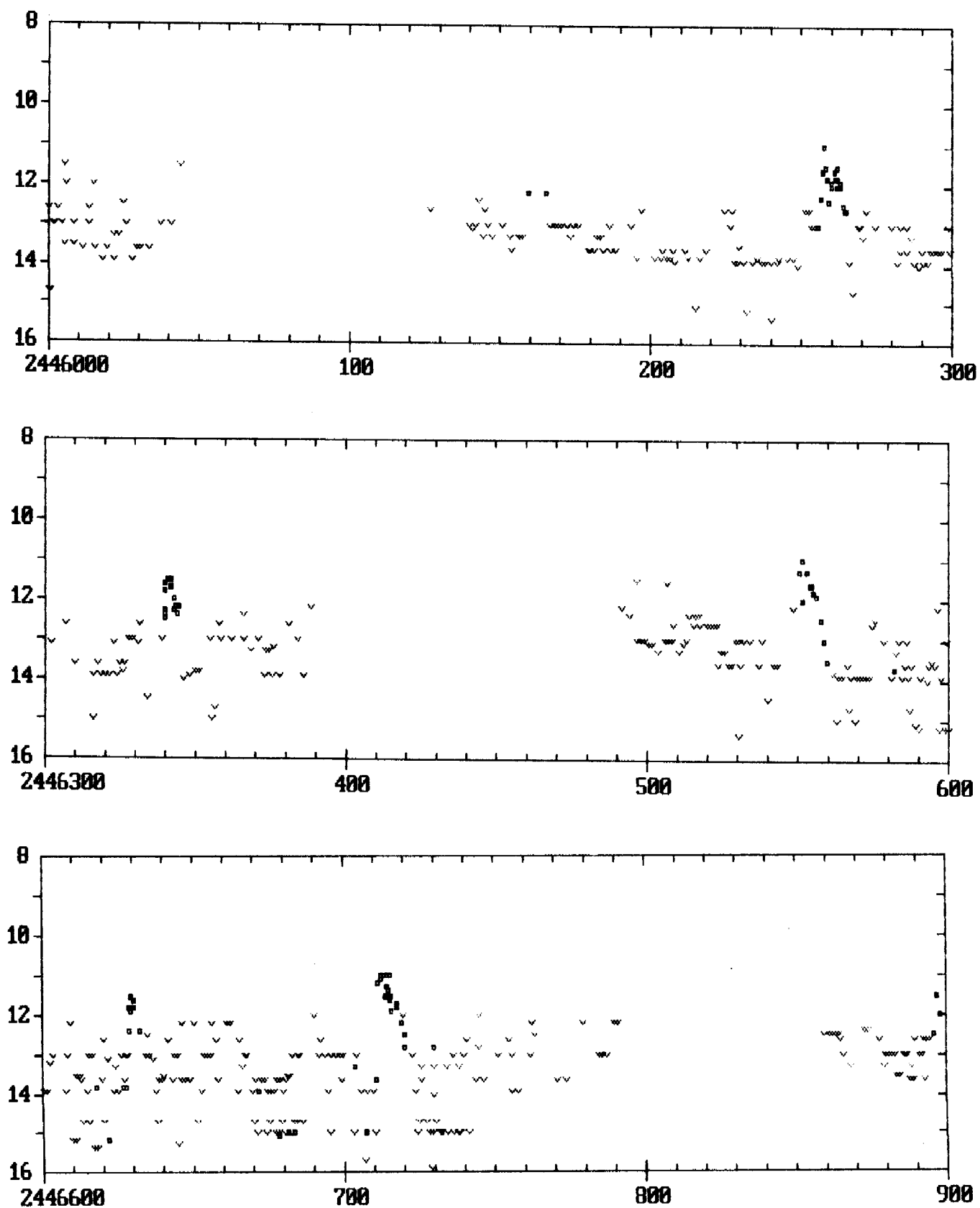


UU Aql

FIGURE 3

LIGHT CURVE FROM INDIVIDUAL OBSERVATIONS

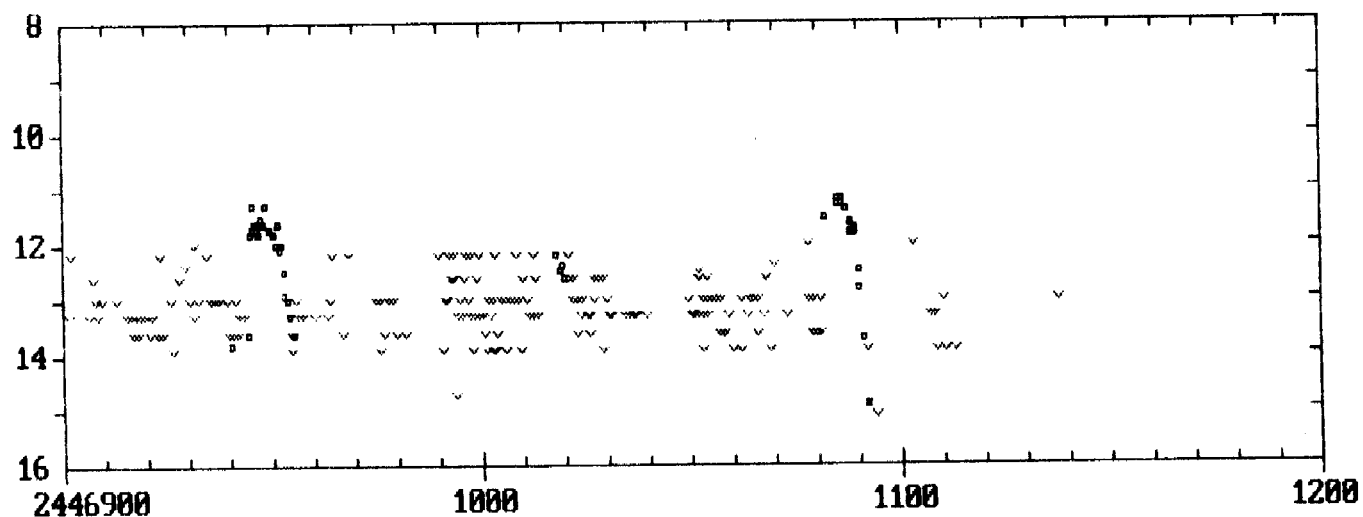
J.D. 2,445,100 - 2,446,000



UU Aql

FIGURE 4

LIGHT CURVE FROM INDIVIDUAL OBSERVATIONS
 J.D. 2,446,000 - J.D. 2,446,900



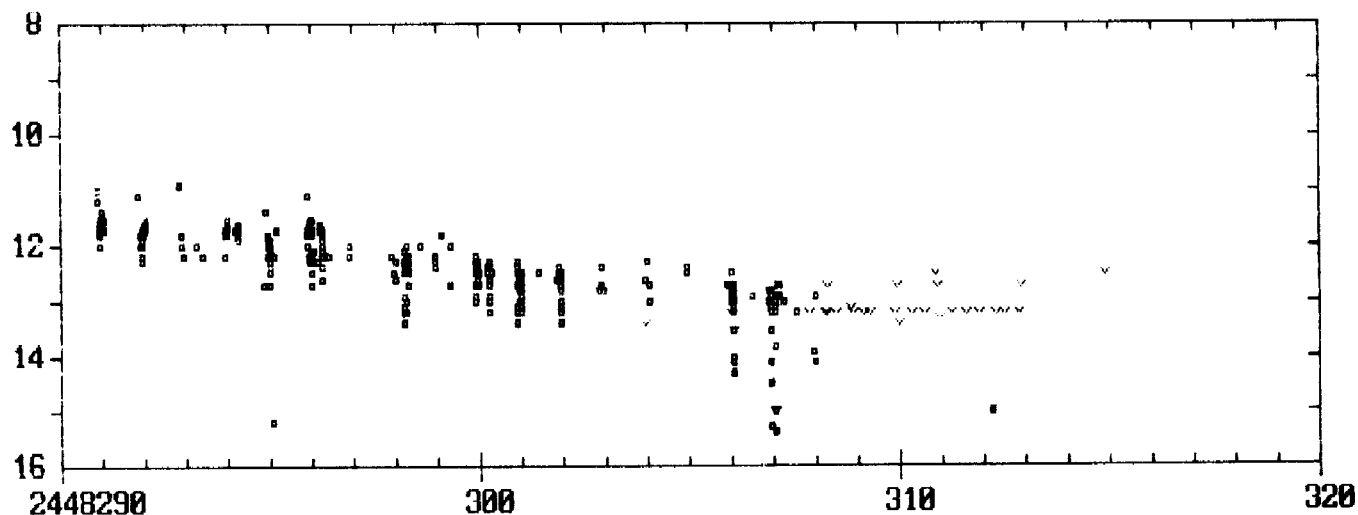
UU Aql

FIGURE 5

LIGHT CURVE FROM INDIVIDUAL OBSERVATIONS

J.D. 2,446,900 - J.D. 2,447,140

LIGHT CURVE OF OY CARINAE
(refer to article on following pages)



OY CAR

LIGHT CURVE FROM INDIVIDUAL OBSERVATIONS

J.D. 2,448,290 - J.D. 2,448,320

THE SUPEROUTBURST CYCLE OF OY CARINAE

F.M. Bateson, D. Brunt & R. McIntosh
Variable Star Section, R.A.S.N.Z.
P.O. Box 3093, Greerton, Tauranga
New Zealand

SUMMARY: A super cycle of 346.5 days is found for OY Car from outbursts observed from 1963 through 1991. Individual cycles vary in length from 254 to 472 days. Normal maxima appear to be short and possibly infrequent, but this may be due to gaps in the records. The data is discussed.

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1. INTRODUCTION

Observed outbursts of OY Car are listed from 1983 June 1 to 1991 December 31. This continues the data previously published (1).

2. OBSERVATIONS

All observations were made visually by members of the Variable Star Section, R.A.S.N.Z. using the same charts and sequence of comparison stars as used for the previous results.

OY Car can be observed every month, but the estimates are infrequent in the southern spring, especially in September and October, because the variable is then badly placed and also because spring is the worst weather conditions. Apart from this season OY Car has been well monitored in recent years but in the earlier years there are substantial and frequent gaps in the observations.

The outbursts observed are listed in Table 1 in the same format as in the previous paper (1).

3. DISCUSSION

OY Car has superoutbursts at roughly yearly intervals as well as normal short maxima. The latter appear to be infrequent, but we consider that this may be an observational effect due to their short durations. This means that they could pass unobserved when there are gaps in the records of 2 or 3 days.

There are a number of very long intervals between some supermaxima, i.e. between outbursts 5 and 10; 10 and 13; 22 and 25; 25 and 28; 39 and 40. A close examination of the observations shows that in these intervals there were gaps or that outbursts were observed but were dependent on very few estimates. For example, between outbursts 5 and 10 four outbursts were recorded of which three depended on a single estimate and one on three observations. The latter was definitely a normal outburst but the others were uncertain. It appears that Nos. 6 and 8 could have been super outbursts.

The above reasons have made us ignore these outbursts in determining a mean super cycle. This leaves 17 supermaxima that appear to be consecutive. They give a mean super cycle of 346.5 days with the individual cycles ranging from 254 to 472 days. The mean maximum visual magnitude is 11.45. Their widths at magnitude 13.0 are from 7 to 17.5 days with a mean of 12.06 days.

It is probable that supermaxima are separated from each other by one normal maximum which occur roughly 160-170 days before and after a supermaximum. This suggests that their mean cycle is the same as the super cycle. However, the few observed makes it impossible to be definite on this. Ten normal maxima have been well enough observed to give reliable magnitudes at maximum. These range from 12.0 to 12.5 with a mean of 12.29. Their widths at magnitude 13.0 range from 0.7 to 2.5 days with a mean of 1.7 days. This shows how difficult it is for all normal outbursts to be observed as a gap of 2 days would be enough for them to go unobserved.

4. CONCLUSIONS

Super maxima of OY Car occur in a mean super cycle of 346.5 days. Their mean maximum visual magnitude is 11.45 and their mean width 12.06 days. The mean magnitude of normal maxima is 12.29 and their mean widths 1.7 days. They may possibly have the same mean cycle as super outbursts but the lack of sufficient records of normal outbursts makes it impossible to be definite on their frequency.

ACKNOWLEDGMENTS

Our thanks go to all observers who have contributed observations. .

REFERENCE

- (1) Bateson, F.M. & Dodson, A.W. 1983. Publ. 11, Var. star Section, R. astr. Soc. of N.Z. pp. 1-14.

TABLE 1
OY CARINAE - OBSERVED OUTBURSTS

No.	Type	J.D. Max 24	Max Mag _v	Int d	13.0 Rise	13.0 Decline	Width d	No. Obs	Remarks
36	S	45,542.8	11.8	266	541.9	553.9	12.0	101	
37	N	791.2	12.3	248	791.0	793.3	2.3	17	
38	S	796.8	11.6	56	796.4	807.0	10.6	399	(1)
39	S	46,184.2	11.0	387	183.7	197.1	13.4	122	
40	S	828.9	11.0	645	828.6	846.1	17.5	173	
41	S	47,136.9	11.5	308	135.0	146.0	11.0	148	
42	N	267.1	12.5	130	266.7	267.9	1.2	16	
43	S?	427.6	11.8	160	426.8	435.5	8.7	5	
44	N	584.2	12.0	157	584.1	586.0	1.9	22	
45	?	819?	12.0	235?	-	-	-	1	(2)
46	?	825?	12.4	6?	-	-	-	1	(3)
47	N	985.9	12.4	161	985.6	987.8	2.2	30	
48	?	48,143?	12.7	157?	-	-	-	1	(4)
49	S	290.9	11.0	147?	289.7	306.0	16.3	451	
50	N	498.9	12.1	208	498.4	499.8	1.4	10	

REMARKS TO TABLE 1

- (1) Faded to 14.8 between outbursts 37 & 38.
 (2) Gaps 9 d before & 2 d after 819.
 (3) Gaps 2 d before & after 825. This outburst may have been part of No. 45 as only observations separating the two outbursts were: 821.8 < 12.3 and 823.9 < 12.7
 (4) Gap 11 d before 143.

AN APPEAL

For the first time in the long history of the Variable Star Section I appeal to members and those using these Publications to make donations to the Section. The purpose of such donations is to assist in paying the wages of a permanent Secretary at Headquarters.

The background to this appeal is simply that the volume of work has become such that it is imperative to have this assistance. We are in the process of publishing the light curves and other data on southern variables of many diverse types. This data is being produced at a very rapid rate with the volunteer assistance of Ranald McIntosh, Don Brunt, Bill Goltz and with the computer recently installed at Headquarters. The preparation of all this data for publication falls on my shoulders in addition to the maintenance of current programmes and correspondence (currently running at just over 5,000 letters per annum).

I still manage to work an 16 hour day, seven days a week, but to do justice to the Section some permanent assistance is essential. Up to now a part-time Secretary is employed on an irregular basis dependant upon when I personally have money available to pay wages. If I had help on a regular basis I could then more profitably devote my time to research as a Secretary would relieve me of routine matters. Unfortunately grants for wages are generally excluded from grant applications under the conditions laid down by the various granting authorities. Hence this appeal which I trust will be supported by members and others according to their means.

No donation will be too small - or too large - to aid the speed and efficiency with which our data can be made available to the astronomical community. Your help will be much appreciated.

Frank M. Bateson
DIRECTOR

REPORT OF THE VARIABLE STAR SECTION, ROYAL ASTRONOMICAL SOCIETY
OF NEW ZEALAND

FOR THE YEARS ENDED 31 DECEMBER 1989 & 1990

Originally reports for the years 1989 and 1990 were written in the usual detail for publication in Publ.16. The demand by professionals for data and light curves of a large number of southern dwarf novae made it necessary to drop these reports from Publ. 16. in order to make space available in that issue for data needed urgently for professional programmes.

The lapse of time that has ensued, coupled with the fact that members have been kept fully informed on the activities of the Section through details published in various issues of "CHANGING TRENDS" means that anything now written concerning the years 1989 and 1990 amounts to publishing stale news.

Under these circumstances it appears better to merely publish the usual graphs of monthly totals showing the seasonal distribution of observations. These appear on pages 88 and 89. The total observations were 56,216 in 1989 and 53,553 in 1990.

The individual observers' totals for 1989 appear on page 87. The totals for 1990 do not appear as it did not accompany the seasonal graph. That was caused by the pressure to make available to me so many light curves and I overlooked the omission which was my fault for which I apologise.

The attention of all members is directed to the very full report for the year 1991 which follows from page 90. That report details the current position of the Section and its activities. Coupled with the details for 1989 and 1990 as published in "CHANGING TRENDS" this will keep all members up to date on all activities.

Frank M. Bateson
DIRECTOR

OBSERVATIONS - 1988-89

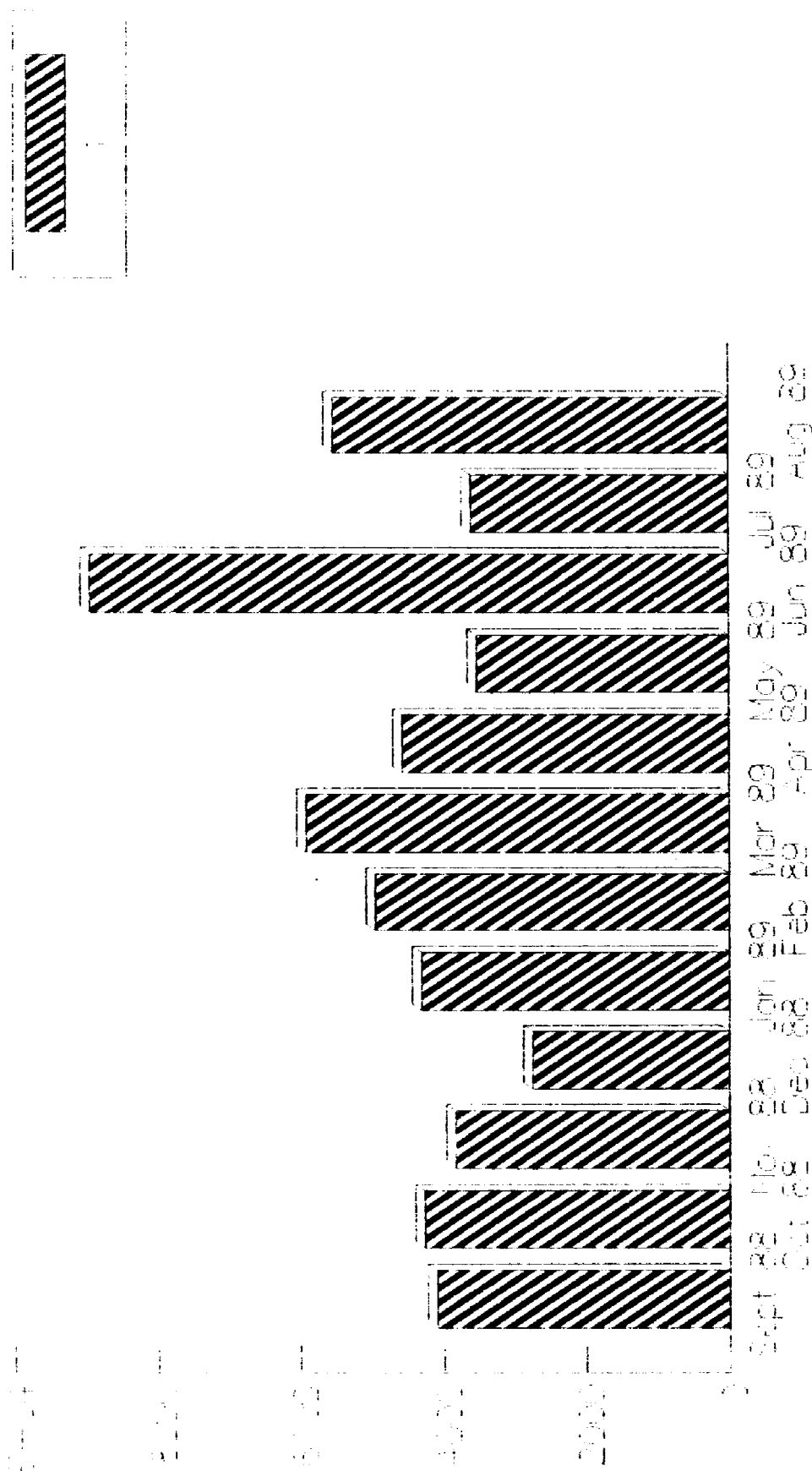
<u>OBSERVER</u>	<u>CODE</u>	<u>OBS. TOTALS</u>
ALBRECHT, W.M.B.	Aj	4967
BALL, S.J.	BB	3
BEMBRICK, C.	BJ	7
BRYANT, K.	Bk	17
BENNIE, I.D.	BN	30
BRUNT, D.	BP	143
BAMBER, K.	BR	47
COOPER, T.	CH	573
CRAGG, T.A.	Cj	1523
COOK, G.W.	CK	10
CLARKE, G.	CL	9
CAMPOS, J.A.	Cv	281
DODSON, A.W.	Dd	131
DE BOBO, I.	Dj	3
EVANS, R.W.	En	19
FLETT, R.W.	Fc	34
GOLTZ, W.	Gp	1200
GEYSER, J.J.	Gq	13
GARCIA, G.	Gv	89
HERDMAN, G.	HA	2233
HARRIES-HARRIS, E.	Hi	674
HULL, O.R.	Hl	814
HERS, J.	Hx	218
IVES, F.	Iv	619
JOOSTE, J.L.	Jf	131
JONES, R.W.	Jg	431
JONES, A.F.	Ho	13095
LUMLEY, E.	Lm	374
KESLIE, (Mrs) A,	Ls	196
LEE, P.	Lx	6
MENZIES, B.	Mf	1227
MEYERS, P.	MQ	34
MOREL, M.	Mv	15
NELSON, P.	Nl	905
NOVAK, Z.	Nv	5
O'KANE, J.	Ok	142
ORCHISTON, (Dr). W.	Or	10
OVERBEEK, M.D.	Ov	12359
PARK, J.	Pj	205
PEARCE, A.	Pm	2450
ATABENOQ, R.	SE	3256
STEPHANOPOULOS, G.	SK	784
SMIT, (Dr) J.A.	SP	197
SCHILLER, D.	SS	8
TURNER, D.	Tq	112
TREGASKIS, T.B.	Tr	472
TURK, C.	Tu	57
THOMPSON, K.	Tv	289
THEUNISSEN, R.	TW	52
TAYLOR, (DR)N,W.	Ty	1454
VENIMORE, (Rev) C.W.	Ve	569
WILLIAMS, D.	WA	401
WATSON, (Mrs) D.	WJ	142
WILLIAMSON, L.	Wm	721
WINNETT, R.D.	Wu	191
WILLIAMS, P.	Wy	2270

TOTAL OBSERVATIONS

56216

Variable Star Section Observations

1988/89

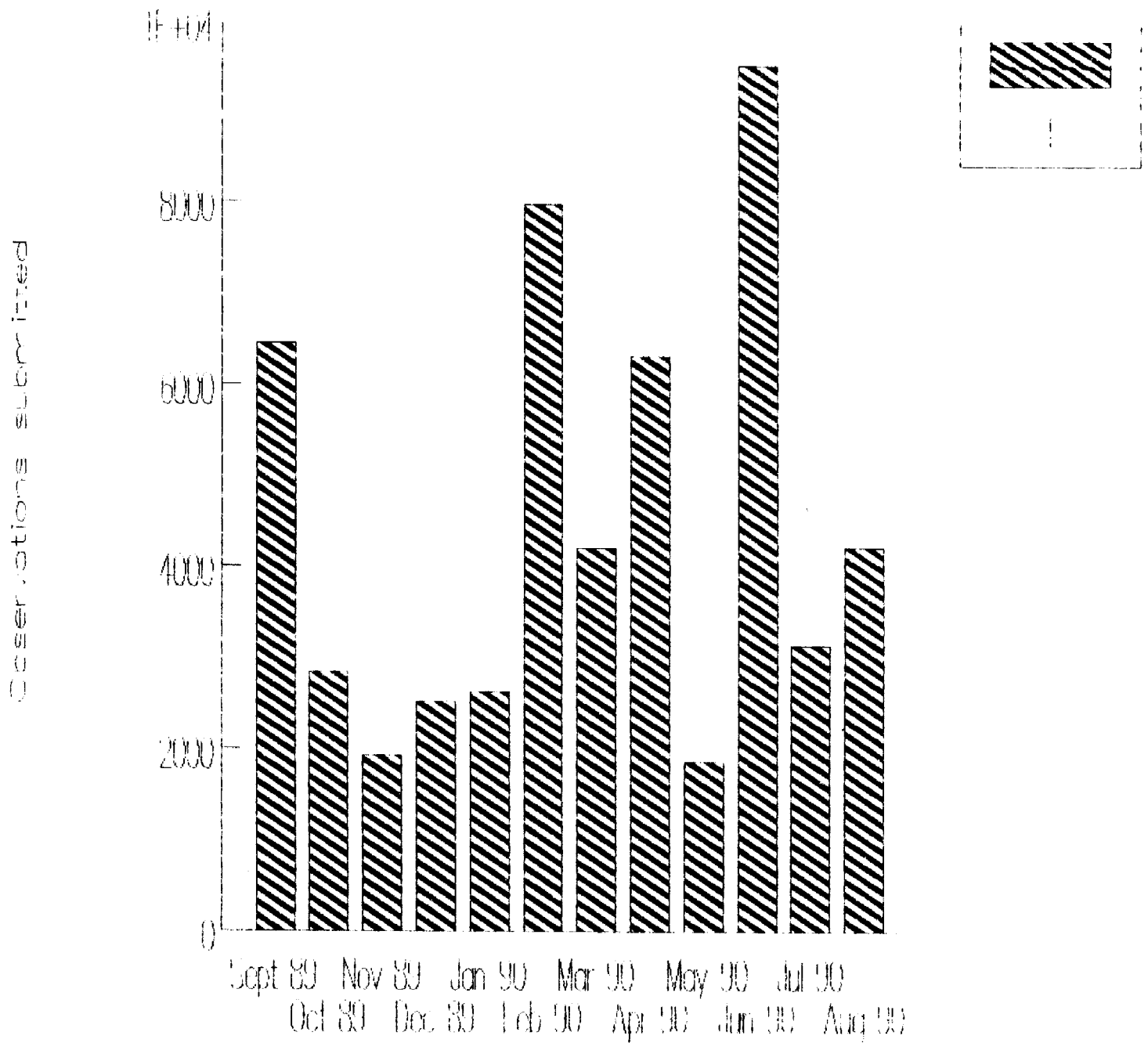


Total Obs 1988/89 = 56216

89 Variable Star Section Observations

89.

1989/90



Total observations for year -- 58835

REPORT OF THE VARIABLE STAR SECTION, ROYAL ASTRONOMICAL SOCIETY OF NEW ZEALAND
FOR YEAR ENDED 1991 DECEMBER 31

1. OBSERVATIONS

A total of 71,312 observations were contributed by 53 observers. Although this report is for the year ending on 31 December, 1991, the record of observations is for the 12 months to 31 August, 1991 in order to provide a strict comparison with previous years before the Society changed its financial year.

Ranald McIntosh has kindly supplied the list of observations that follows this report and their monthly distribution. This diagram clearly reflects the drop in observations in the spring months, due to weather conditions, and in the short summer nights. The sudden marked increase in February was a direct effect of novae discoveries. In fact the large increase in the total observations this year is partly due to the four novae discovered by Paul Camilleri. The better seeing in autumn and early winter is also reflected in the graph.

Fourteen observers made over 1,000 observations each with both Albert Jones and Danie Overbeek both submitting over 15,000 observations each.

2. COMPUTER PROCESSING.

We are indebted to Ranald McIntosh, who has continued to process all the monthly observations on his computer, supplying print outs for the Hipparcos programme; print outs for the Monthly Circulars and for the many special requests for data in advance of publication as well as supplying light curves for reproduction in our PUBLICATIONS and for requests from professionals for these.

Don Brunt has worked steadily in processing data from the hand-written ledger sheets on which records prior to 1 April 1987 were recorded. Bill Goltz recently kindly offered to assist with this work. The objective in having all our observations in computer readable form is so that light curves covering many decades can be published. It has always been your Director's belief that data for each variable should cover as long a time base as possible. That view has been approved and supported by professional colleagues.

This objective has been accelerated by grants from The Donovan Astronomical Trust, the Kingdon-Tomlinson Bequest and the Scientific Research Committee of the N.Z. Lottery Board which have enabled a computer and printer to be installed at Headquarters. We record our appreciation to these organisations for their generous grants and to the Council, R.A.S.N.Z. and the professional referees who supported our grant applications.

Bill Goltz and Peter Nelson now submit their monthly results on diskettes. In the case of Peter Nelson this also includes observations made by other members of the Variable Star Section, Astronomical Society of Victoria. Jan Hers also sends the results from the South African observers on diskette. This valuable help makes the work of Ranald McIntosh somewhat lighter.

Computer processing means that the Monthly Circulars are printed later than they used to be but the saving in my time is enormous. Producing these Circulars without a computer formerly took at least seven 14 hour days. Now they can be typed up in two to three days from the print outs.

3. CIRCULARS. In addition to the Monthly Circulars 12 Special Circulars were issued during the year. These were concerned with details of southern novae discoveries and special programmes, which also were listed in the five Newsletters published so that observers were kept fully informed on the stars that needed close monitoring. Some special circulars had a limited circulation as the object mentioned was too faint for most observers, Such was the case with BL Hyi, for which ROSAT required a magnitude estimate. This was obtained by Tom Cragg (magnitude 15.3).

Our newsletter "CHANGING TRENDS" has a twofold purpose, i.e. to keep observers informed on special programmes and to keep all members in touch with each other and details of their instruments and problems. It is often difficult to obtain suitable news items and I appeal to all members to send in short notes of matters likely to interest other observers.

4. PUBLICATIONS

Publications No. 16 was intended to be published earlier than it was. We had to rearrange this issue, because professionals requested details of the mean cycles of many Dwarf Novae to provide essential details for their own studies.

Publication No. 17 mainly continues the publication of the essential basic details of Dwarf Novae. Now that a profusion of light curves have become available from the computer we hope to publish several issues of the Publications in 1992 with papers on variables of different types once all data on Dwarf Novae have been brought up to date. Hopefully No. 18 will go to the printer in March/April and No. 19 three months later.

Dick Hull has kindly provided a comprehensive Index to the Publications. This was in different formats from which I am selecting one with some amendments. It will be continued to include the issues due for publication in 1992 and then published after No. 20 has appeared.

5. SPECIAL PROGRAMMES

Throughout the year we have continued to fax monthly lists of observations of large amplitude red variables for the HIPPARCOS predictions.

The ROSAT programme finished on February 28. During the seven months the close cooperation of all observers enabled me to phone and fax details of a large number of outbursts. Subsequently visual light curves requested were supplied.

The two remarkable dwarf novae, Z Cha and OY Car, continued to attract a great deal of professional interest. Our alert notices and light curves were sent to a number of professionals for use with their observations from ROSAT and IUE.

Other dwarf novae continued to attract professional interest and alert notices and light curves were supplied for many of the fainter stars of this type to Steve Howell (Arizona).

A detailed study of WW Ceti is being made both at the University of Sussex and by Steve Howell. Complete details of all our observations were supplied to both centres.

Nikolaus Vogt (Chile) has requested my cooperation in a joint study of the mean cycles of all dwarf novae, which is another reason why I am bringing up to date details of our observations of all stars of this type.

The cooperation of all observers has enabled alert notices to be sent to S.A.A.O. on the fades of R CrB variables. They have also received many light curves. Our observations have also been used in a series of papers by the Canterbury (N.Z.) group and myself.

Albert Jones has monitored V517 Oph ever since George Herbig advised him that it was a suspected R CrB variable. During the year Pam Kilmartin supplied measures of some of the sequence stars in this field. This has enabled all observations, except those at the faintest levels, to be reduced. This star obviously behaves like S Aps, a fact that was confirmed by spectroscopic data from S.A.A.O. All our observations were faxed to Dave Kilkenny at S.A.A.O. and a combined paper is being submitted to "The Observatory."

A request for light curves of several variables came from the Isaac Newton Telescope Group at La Palma (Canary Islands). These were supplied.

The four novae discovered by Paul Camilleri all received close attention by observers. We are now trying to disentangle the various comparison stars used prior to publishing the light curves.

I have continued to work on a joint paper with Andrew Pogonyants on EX Lupi. The current situation in Russia tends to make the exchange of information a protracted affair.

H.W. Duerbeck (West Germany) obtained details of our observations of four old novae that are still visible (RR Picl CP Pup; V841 Oph & V603 Aql) for his studies into nova theories and the rate of declines.

Several requests for our observations of a number of unusual variables have all been filled.

We have continued to supply data to graduates in N.Z., U.K. and Europe for use in their theses. Such requests first commenced to be requested fifteen years ago since then every year has brought such requests.

Several variables have been found to be wrongly classified in the G.C.V.S. no doubt due to the original observations being rather sketchy and few in number. The consistent monitoring by the V.S.S. have revealed their true nature. Reports on these stars will appear in forthcoming issue of our Publications.

6. SEQUENCES.

Alan Gilmore and Pam Kilmartin, Mount John University Observatory, have supplied precise positions of novae and V and B-V measurements for comparison stars in the fields of recently discovered novae and in a number of variable star fields. This valuable assistance has been of great value enabling observations to be reduced.

Mati Morel with his usual efficiency and care for detail has kindly circulated preliminary charts for recently discovered novae.

Tom Richards has supplied charts for a number of fields using a computer programme that plots the fields from the G.S.C. Whilst most of the magnitudes have to be measured more accurately these charts provide a sound basis for establishing order out of uncertainty in the fields concerned.

We still have a great need for reliable sequences in a number of fields. Albert Jones is listing the sequences for those fields for which details were published in Circulars, etc., long out of print. This work proceeds slowly and could not be otherwise considering Albert's enormous observational output.

7. HEADQUARTERS

During the year we have welcomed a number of new members as well as some who, due to their circumstances, were unable to observe for some years but have now returned to active observing.

Correspondence continues to flow in and out at what appears to be an alarming rate. A glance at our postage book indicates that the rate is around 5,000 letters per annum. I apologise to observers for the delays that occur at times in answering their letters but these are unavoidable.

The pressure on the filing system has been relieved, at least temporarily, by sending five cartons of old correspondence to the Alexander Turnbull Library, where it is stored along with earlier shipments for possible historical use at some future time.

A problem that will have to be solved in 1992 is how best to provide space in the computer maintained by Ranauld McIntosh as this is now almost at full capacity. It may prove desirable to extract data on stars for which all details have been published and send the records to an international centre. The problem will be discussed with Ranauld McIntosh and hopefully a solution found.

After all records for any particular star have been stored in the computer and the results published the old hand written records are being destroyed, although the original records from observers are retained. The demand on storage space makes this policy essential.

Our fax machine has proved to be an invaluable aid in transmitting data and alert notices. However, we still refrain from turning it on to automatic especially at night in order to keep the phone clear for inward messages from observers advising on the activity of variables on the various special programmes or of some unusual event. We are sorry that this has caused problems with inward messages but overseas but it cannot be avoided if we are to provide the prompt alert messages that are required.

Obviously the sheer volume of work at headquarters demands that I have some secretarial assistance. This year we have been fortunate to obtain some grants and donations that have enabled me to employ Mrs. Maureen Phizacklea on a more or less permanent part-time basis. Apart from attending to the filing and assisting with the typing Maureen is steadily processing data on our computer.

I gratefully acknowledge receipt of the grants and donations from the following whose practical assistance has enabled Maureen to be employed for ten hours per week: W. Albrecht; S. Dreves; A. Fujii; G. Herdman; W. Orchiston; Trust Bank, B.O.P.; D. Turner and an anonymous supporter.

I appeal to all members and supporters, who can afford to do so, to give donations, be they large or small, to assist the Section with secretarial assistance.

8. ACKNOWLEDGEMENTS.

It is once again my great pleasure to thank all members for their wonderful cooperation and assistance throughout the year. First and foremost I wish to say a very sincere thank you to all observers, be their contribution large or small, as without their valuable observations there would be no Section.

I must express special thanks to our two ace observers Danie Overbeek and Albert ("Abby") Jones. Each year they seem to record a terrific number of high class observations. Their respective totals form a major contribution. Danie submits each month a computer record of his estimates, whilst Abby's long lists are a joy to handle. In addition, Abby, as Deputy Director makes many other contributions to the work of the Section.

The above comments in no way detracts from the value of the records from other

observers as all have maintained a very high standard.

Ranald McIntosh in maintaining the computer records and providing the required data has enabled the Section to function in an efficient manner. His superb knowledge of all aspects of computing has meant that there is no problem he cannot solve. The Section is most fortunate to have his assistance.

Don Brunt has already processed around two hundred thousand observations and steadily and accurately works his way through many more. He also supplies the forms on which I prepare the Monthly Circulars. Don has proved a tower of strength. I am also indebted to him and Ranald for getting us over the preliminary problems in operating our computer.

My thanks are due to Peter Nelson for coordinating the work of the Variable Star Section, Astronomical Society of Victoria. Both he and Bill Goltz in sending their estimates on diskettes have lightened the burden of work done by Ranald McIntosh.

In the same way the assistance of Jan Hers, Variable Star Section, Astronomical Society of Southern Africa has been invaluable by listing the results from all his observers on diskettes each month.

Mati Morel has supplied many charts, all of which have been on the very high standard that is a hallmark of all his work. His prompt circulation of charts for novae has enabled observers to commence observations within a few days of each discovery.

The Section is indebted to Dick Hull for producing the Julian Date Calendar and for the work he is doing in indexing the contents of the Publications. Peter Nelson has supplied most kindly a very handy Index arranged under star designations to papers in the Publications. The final Index will be a more detailed listing from the work of both Dick and Peter.

Thanks are due to Tom Richards for using his computer programme to produce data from the G.S.C. for our use.

Once again the Section has received a major contribution from Alan Gilmore and Pam Kilmartin, Mount John University Observatory in their precise positions for novae; copies of photos of areas around novae and their sequence measurements.

My personal thanks are extended to Maureen Phizacklea for the rapid and cheerful manner in which she has come to grips with strange methods and my chaotic methods.

My thanks are also extended to so many professionals for their kindly encouragement, guidance and interest in the Section as well as to all those who have supported the Section financially through their subscriptions, grants and donations.

Finally I cannot too strongly stress to all observers that their observations form a valuable contribution because it is only long term monitoring of variable stars that their basic behaviour and at times changes can be made available to the professionals. In this age of very costly large ground based telescopes and satellites professionals have to rely on us to provide such data and its value increases with time.

1991 December 31

Frank M. Bateson
DIRECTOR

VSS OBSERVATIONS 1990/1991

Observer Name	Obs code	Obs total
Albrecht, W.M.B.	AJ	8258
Brown, N.J.	BA	1
Bryant, K.	Bk	15
Brunt, D.	BP	21
Boattini, A.	BS	430
Biggins, L.	BI	4
Blane, D.	Bz	961
Cooper, T.	CH	2159
Cragg, T.A.	Cj	2740
Cook, C.J.	CJ	219
Camilleri, P.	CM	45
Campas, J.A. da S.	Cv	50
Dodson, A.W.	Dd	78
Dreves, S.	Dx	1622
Farrell, F.	Fm	141
Goltz, W.	Gp	6287
Geyser, M.J.	Gq	50
Garfield, T.	Gx	9
Herdman, G.	HA	3044
Harries-Harris, E.	Hi	1009
Hull, O.R.	HI	2135
Hers, J.	Hx	275
Ives, F.	Iv	676
Jooste, J.L.	Jf	14
Jones, R.W.	Jg	403
Jones, A.F.	Jo	15571
Kriek, N.	KN	4
Lumley, E.	Lm	477
Leslie, A.	Ls	59
Menzies, B.	Mf	1115
Murray, A.M.	MG	74
Morel, M.	Mv	8
Nelson, P.	NI	577
O'Kane, J.	Ok	168
Overbeek, M.D.	Ov	15754
Park, J.	Pj	140
Pearce, A.	Pm	898
Richards, T.	Ri	96
SAAS	SAAS	6011 (Note 1)
Stabnow, R.	SE	74
Stephanoploulos, G.	SK	246
Smit, J.A.	SP	201
Turner, D.	Tq	51
Tregaskis, T.B.	Tr	935
Taylor, N.W.	Ty	2567
Venimore, C.W.	Ve	477
Watson, D.	WJ	211
Wardle, T.	WK	14
Williamson, L.J.	Wm	347
Wadhwa, S.S.	WM	338
Warnes, P.	WQ	27
Winnett, R.D.	Wu	104
Williams, P.	Wy	2380

TOTAL: 71,312

(1) This total includes many of the South African observers that were only later sorted out into discrete observer codes. This accounts for the apparent low observation count for Jan Hers etc.

Variable Star Section Observations

1990/91

