

The British Astronomical Association

CIRCULAR 53 1983 MARCH/APRIL ***** 'LIGHT-CURVE' *****

Head Office: Burlington House, Piccadilly, London WIV 0NL, Telephone 01-734 4145

SECTION OFFICERS:

Director	D.R.B. Saw, 12 Taylor Road, Aylesbury, Bucks. HP21 8DR
	Tel: Aylesbury (0296) 22564
Assistant Director	S.R.Dunlop, 140 Stocks Lane, East Wittering, nr Chichester, West Sussex PO20 8NT
	Tel: Bracklesham Bay (0243) 670354
Programme Secretaries	
Main Secretary	G.A.V.Coady, 15 Cedar Close, Market Deeping, Peterborough PE6 8BD
	Tel: Market Deeping (0778) 345396
Binocular Secretary	M.D.Taylor, 17 Cross Lane, Wakefield, West Yorkshire WF2 8DA
	Tel: Wakefield (0924) 374651
Assistant	J.Toone, 2 Hilton Crescent, Boothstown, Worsley, Manchester M28 4FY
	Tel: 061 702 8619
Eclipsing Binary	
Secretary	J.E.Isles, Flat 5, 21 Bishops Bridge Road, London W2
	Tel: (Work) 01 212 0246
Nova/Supernova	
Search Secretary	G.M.Hurst, 1 Whernside, Manor Park, Wellingborough, Northants NN8 3QQ
	Tel: Wellingborough (0933) 676444
Chart Secretary	J.Parkinson, 28 Banks Road, Golcar, Huddersfield, West Yorkshire HD7 4LX
	Tel: Huddersfield (0484) 642947
CIRCULARS	U.V. C) for Circulars and light survey
<u>Charges:</u>	Other Countries £3. (Circulars only £1. and £1.50 respectively)
Send all payments (made out to the BAA) and material to Storm Dunlop.
CHARTS	
Charges:	Main programme SAE plus 20p per star (4 sheets) All other programmes SAE plus 5p per star (1 sheet)
Obtainable from Joh	n Parkinson

EDITORIAL

As readers will have noted, the format of these Circulars changes with this issue. We hope that this will lead to improvements in production and distribution, and avoid some of the problems previously encountered. There are a few points which may be mentioned regarding material which is submitted - and as we have said previously, we are always pleased to receive contributions. It is almost always necessary for material to be typed again - this is expected - so handwritten material is acceptable, but please bear in mind that it may be typed, as on this occasion, by a kind helper who is not necessarily familiar with variable stars. Therefore, please, try to take care over specialized terms and, most particularly, the use of capital and lower case letters in constellation abbreviations etc.

Diagrams and light-curves may be included easily. However they should be prepared (sideways if necessary) on A4 paper leaving a margin of 25mm all round. All material is photoreduced so this should be bornf in mind in annotations. Please use black (or dark blue) ink. If graph paper having a blue grid is used for light-curves, it is possible to arrange for the grid to be reproduced, or omitted, at will.

It will be noted that a short computer program is also included, for the first time. However, we cannot guarantee to do so in future, as retyping programs usually leads to errors. Clear listings may be reproduced directly.

Microcomputer Users' Group

Members are reminded that within the BAA's Computing Section there is a newly-formed Microcomputer Users' Group, which will be interested in receiving astronomical programs. It may be contacted (please send SAE) through Maurice Gavin whose address is:-

> 79 Ardrossan Gardens Worcester Park Surrey KT4 7AX Tel

Tel. 01-330-3116

Changes to Section Officers' addresses

Please note that John Isles may now be contacted at his home address, given in the listing inside the front cover. His home telephone number is not yet available but if the matter is urgent, he may still be contacted at work.

John Toone has now officially joined the VSS team, and will act as assistant to Melvyn Taylor for Binocular Group work and continue to prepare certain of our new charts and sequences.

The editor would like to apologise for giving - yet again! - the incorrect number for Melvyn Taylor's telephone. The correct one is shown - we hope! - on the list of officers.

Section Meeting

The Section meeting will be held at Chelmsley (nr. Birmingham) on Saturday, 1983 July 16. (Make a note now to try to attend!) We would like to thank Chelmsley Astronomical Society for their invitation. Full details will be published in the June issue of the Circular, but anyone requiring information beforehand may contact either the C.A.S.Secretary John Williams at 100 Stanway Road, Shirley, Birmingham (Tel 021-745-6395) or Gary Power at 212 Warren Farm Road, Kingstanding, Birmingham B44 OQA Please enclose an SAE if requesting details.

			STAR	TOTALS	1982	2			
R	And	177				RU		Her	82
W	And	157				SS		Her	148
RW	And	142				AC		Her	379
RX	And	339				AH		Her	217
DZ	And	137				R		Нуа	53
R	Aql	198				SU		Lac	123
00	IpA	59				DK		Lac	0
UV VCOO	AqI	145				X		Leo	202
V6U3	Aqı	10				AY		Lyr	268
	Aqr	4				DC		Oph	160
11	Roo	40				II		Ori	150
v	Boo	180				CN		Ori	128
v	Cam	122				CZ		Ori	129
X	Cam	161				RU		Peq	310
Z	Cam	400				S		Per	191
XX	Cam	302				RS		Per	172
S	Cas	179				ΤZ		Per	387
т	Cas	177				UV		Per	140
UV	Cas	260				BU		Per	166
Gamma	Cas	371				GK		Per	166
Rho	Cas	233				WZ		Sge	153
DM	Сер	21				HS		Sge	37
Omicron	Cet	134				R		Sct	461
R	CrB	607				Branchet	t's (Object	
S	CrB	172				2	in	Sct	34
т 	CrB	195				R		Ser	139
V	CrB	115				RV		Tau	192
W	CrB	96				50		Tau	159
R	Cyg	110						UMa	216
5	Cyg	213				SW		UMa	168
WT WT	Cyg	336				СН		UMa	335
55	Cyg	682				V		Vul	278
BC	Cva	143				PU		Vul	274
BI	Cva	147				Honda's	Objed	ct in	
CI	Cvq	297						Cyq	44
Chi	Cyq	114				Scovil's	Obj€	ectin	5
HR	Del	197						Суд	
т	Dra	234				Nova Agl		1982	54
AB	Dra	100				SN NGC 2	268		36
U	Gem	272				NQ		Vul	14
IR	Gem	286				3C273			1
						NGC 4151			1/
						MARK 421		6 ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~	19
						Nova		Sgr 82	1
			OBSE	RVER TOT	ALS	1982			
C.M.ALLE	CN		10	09		R.GODDEN	1		117
N.BONE			!	55		M.HAPGOO	D		50
T.BRELSI	AFF			56		S.HOSTE			263
L.BRUNDI	Æ		102	26		M.HOUCHE	N		52
R.CHAMBE	RS		22	25		J.HOWART	Н		39
E.COLLIN	ISON		18	55		G.HURST			219
H.COLQUH	IOUN		14	15		N.KIERNA	N		363
D.COUZIN	i .		1.	55		F.KNIGHT			648
R. DRYDEN	i -		10	20		A.KOCSIS			58
J.ELLS			24	20		T.LABAN	37		129
R.FRASER			1 🗆 .	10		J.LASHLE	ĭ		573
M. GAINSF	UKD		104	10		K.LEWIS			212

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1982	Observational	Totals -	Main	Programme
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OBSERVER TOTALS 1982

T.MARKHAM R.MIDDLETON C.MUNFORD I.MIDDLEMIST I.NARTOWICZ M.NICHOLLS J.PARKINSCH R.PATERSON R.PICKARD G.POYNER T.SAVILLE D.SAW J.SHANKLIN H.SMITH E.SPOONER S.SRINIVASAN	57 43 574 324 119 281 40 1081 371 1028 354 65 572 207 40 79	D.STOTT R.STUART T.TANTI M.TAYLOR F.VENTURA P.WHEELER P.WITHERS W.WORRAKER PHOTOGRAPHI J.GRILLS J.HOSTY D.MCADAM H.MIKUZ A.POOLE A.YOUNG	IC 32 1 41 20 1 33	2009 80 194 303 29 303 483 95 128
		OTHERS		95

TOTAL 15,622

New Charts and corrections to sequences

The following charts have been redrawn since the publication of circular 48, 1981 December:

Chart	Epoch	Sequence	Chart No
S Cas	1950	No change. Lettered A-BB omit O,I and V	054.01
RV Tau	1950	No change. Lettered A-W omit O,I and V	056.01
V CrB	1950	No change	057.01
U Ori	1950	No change. Lettered A-BB omit O,I and V	059.01
V Vul	1950	No change. Lettered A-M omit I	058.01
RU Her	2000	No change	060.01
UV Cas	2000	No change	061.01
W Суд	2000	No change	062.01
Errors have	ve come to ligh	nt on three charts currently	in use:-
R CrB	Comparison 'B	' is marked S, 1 ^O North of	Eta
T CrB	Comparison 'C	is marked i at RA 15h59m +	30 ⁰
RS Oph	C, E, H and F variable shoul	are missing. Keen follower: Id send an SAE to the Chart (s of this Curator for
	a replacement.		

Comments on the charts would be welcome and should be addressed to the Chart Curator. The latest revisions include more star detail which it is hoped will help in finding the variable, more than it will confuse. The change to epoch 2000 will no doubt infuriate those observers who do not possess 'Sky Atlas 2000'. RU Her and UV Cas chart: have been 'reduced' to single sheets in an effort to keep costs down.

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EFVSO - Secretary's circular

Pikonlinna, 1982 December 6

Dear colleagues,

Since my first letter in March I have received replies from some variable star organisations. During my trip to Hungary I had the opportunity to talk to many Hungarian people about EFVSO.

Variable star observing in Hungary is coordinated by the Pleione Variable Star Observer Network working under the TIT organisation. The Hungarians work in close cooperation with AAVSO using American sequences and send their results to AAVSO (and to the Sternberg Institute). The Hungarians are interested in European cooperation, but they wish to preserve their good connections with the AAVSO in the future. They see the present formula and the aims of EFVSO as being a bit unclear and abstract. They feel that EFVSO should have a headquarters which could collect observations and make them available like the AAVSO. Pleione is willing to try an experiment in that direction. It could collect observations of a few variables from various European associations and publish them in a supplement of the magazine of the organisation.

In his letter Mr. M. Fernandes of BAV describes the attitude of his association towards EFVSO. They see that the present field of EFVSO is in visual observing, mainly of long period variables. Instead, the main activities of BAV are in observing pulsating and eclipsing variables and in using photographic or photoelectric methods. Thus, it is not clear to them if EFVSO is useful and if they could do something in it.

Dietmar Bohme of Arbeitskreis Veränderliche Sterne im Kulturbund der DDR also asks what the role of his organisation in EFVSO could be.

From the above I conclude that the need and the aims of EFVSO are not generally obvious. It is worth discussing, if EFVSO should have headquarters and if it would collect observations. However, here we have financing difficulties. I would like to hear opinions concerning the offer of Pleione in publishing some data. Is it possible and desirable to extend the field of EFVSO also to the special activities mentioned by Mr. Fernandes?

At present European cooperation is best accomplished through the variable star pages of 'The Astronomer', which have many contributions from outside Great Britain. The pages of the BAA.VSS's Circular/'Light Curve' are also open e.g. for annual statistics of various associations.

Best wishes Aare Kellomaki

Commenting upon some of the points mentioned in this letter we feel, as Aare Kellomaki says, that an actual single headquarters for EFVSO would pose many problems including financial ones, not least those associated with the receipt of many thousands of observations and a vast deal of correspondence. Although at present it would seem best for the national organizations to continue to receive individual observations, progress is already being made in combining observations from different In particular BAA and SUAA observations are exchanged, each sources. organization handling particular declination zones, whilst copies of observations of 'southern' stars are passed to the New Zealand group. It is our aim to avoid piecemeal publication of small numbers of observations, insufficient for proper analysis, by several organizations rather than one single, carefully combined set of data. To avoid subsequent problems, it is therefore most important that duplicate submission of observations should not be made.

On the points made by the BAV, although naturally most observations are visual, many photographic results are already used and we hope this number will increase. Photoelectric observations would be of the very greatest interest in many fields. Similarly most types of variables are observed, although coverage of certain regular pulsating objects is not extensive. It would seem that the BAV could help in particular with observations of many eclipsing objects on the BAA's programme, for example.

This publication is, of course, open for contributions on any subject relating to variable stars. The BAA Journal itself is available for major analyses of individual stars or classes.

Eclipsing Binary Programme

Members interested in eclipsing binaries are asked to note my new address, given on the cover of this Circular. I have just moved in after being separated from my books and papers for a year. I offer a general apology for my own lack of progress during this period, and my thanks to those observers who have made efforts to ensure some continuity in our observations.

The programme remains as described in a paper in the February 1978 <u>Journal</u>. (I have offprints for anyone who does not have this issue.) Briefly it covers all objects reaching 10m at maximum, with an amplitude of at least 0m.4, north of -18° declination, plus any other objects which members care to observe. Observing techniques and other details are described in the paper.

Predictions for objects on lists A (north of the equator, reaching 8m at maximum, eclipses lasting two to twelve hourse) and D (eclipses longer than 48 hours) may be obtained by sending a supply of stamped addressed envelopes to John Smith, 18 St. James' Close, Hanslope, Milton Keynes MK19 7LF. Positions, etc. of the objects covered were given in VSSC 48. (Further copies available from me). When writing the paper mentioned above I expected predictions for lists B (objects similar to those in list A, but with maxima between 8m and 10m) and C (south of the equator, or eclipses over 12 and up to 48 hours) to be available before the paper appeared in print. In the event this was not possible, but I hope to organise these soon. Dr. Owen at the Royal Military College of Science, Shrivenham, has the computer programs working and I now have only to extract the elements for the stars concerned from my card index.

Analysis. Reports in the Journal have given timings of minima observed up to 1975. Before the reports can be brought up to date, two tasks need to be completed.

(a) Previous reports used the tracing paper method, described in the above paper, to determine times of minima. While this is believed to be satisfactory in most cases, it suffers from the disadvantage that different persons may derive different results from the same set of observations. There is thus a possibility of bias being introduced into the analysis. While this can never be entirely eliminated, the problem can be minimised by using computer programs to reduce the observations. A number of algorithms are available and a high priority task will be to evaluate their performance and decide a routine to be followed in the compilation of reports. We can than be sure that future reports will be computations. Since the results of this evaluation will be of interest both to members who own or have access to computers, and to other organisations, they will be published.

(b) Although I have some observations for each year since 1976, I 'know there are some members whose observations have not been reported. The accompanying table summarises the observations I do have. Any observer who has results which are not in the table should write to me enclosing the observations, or for further details of which of their observations I possess.

Things are not quite as bad as they might seem from the table since I know Tristram Brelstaff has a lot of observations for the past four years which he has not yet sent in. Even so, the program is heavily dependent on this one observer and we badly need some more eclipsing binary specialists.

<u>Reporting observations</u>. Some reminders in the light of reports so far received for 1982:

1. Some eclipsing binaries are marked on binocular group charts. Isolated observations of these are unlikely to be useful, though by all means send them in if you make them - preferably to me, not to Melvyn Taylor, though any which go astray will be re-routed (at the BAA's expense)

2. The old (non-computer) report forms are more convenient both to observers and to me. I have supplies.

3. No need to complete the column for Julian Date and Decimal

4. The Ded. Mag. column can be used to enter grades - see BAAJ 1982 Feb.

List E. Objects with unknown periods, for which predictions cannot be produced, or with very short periods, for which predictions are unnecessary, are shown in the accompanying list. Observers are encouraged to start work on some of these as soon as possible. Except where mentioned, no charts are being provided, at least at present. Use the AAVSO Variable Star Atlas, or whatever you have, to identify them, and include with your report a field sketch showing the comparison stars you used (with magnitude estimates, if possible). For those objects with unknown periods, estimates may be made more or less at random perhaps hourly, or once a night. Computer programs will be used to search for the period in the data. For those with known short periods, estimates can be made perhaps every 15 minutes until a minimum has been covered.

The list (like those in VSSC 48) is based on the GCVS and Supplements up to 1976. An urgent task will be to conduct a literature search to update this list and the predictions to take account of more recent work. Another urgent job is to develop contacts with amateurs and professionals working on eclipsing binaries throughout the world, to ensure that our information remains up to date, that unnecessary duplication of effort is avoided, and that experience in techniques of observation and analysis is pooled. Progress in these and other areas will be reported in future Circulars.

Members will note that the present programme is primarily visual. My personal opinion is that photographic techniques are unlikely to yield a sufficient gain in precision to justify the trouble and expense involved, though I shall be happy to be proved wrong. It is certainly the case that photographic results can be freer from problems arising from the personality of the observer, which can be particularly serious in the case of rapidly changing variable stars. Photoelectric photometry is a direction in which the eclipsing binary programme will move sooner or later, preferably sooner. I shall be pleased to hear from any member who is in a position to attempt this.

John Isles

Eclipsing Binary Programme: observations received up to 1983 Feb 17 Each entry is No. of estimates/No. of stars.

	1976	1977	1978	1979	1980	1981	1982
S.Albington	61/3	149/11	18/3	-	11/1	-	-
M.Bailey	7/1	-	-	-	-	-	<u> </u>
B.J.Beesley	54/2	-	-	-	-	-	-
M.Bell	-	-		-	7/1	8/1	-
D.Bohme	-	31/1	22/1	-	-	-	-
N.M.Bone T.Brelstaff	_ 1131/38	_ 719/39	_ 801/44	- 84/15	43/3	_ 3/1	18/2
G.Broadbent	-	5/1	-	-	-	-	-
J.S.Bullivant	62/5	5/1	-	-	-	-	-
R.C.Dryden	-	-	-	-	-	-	7/4
B.Esprey	-	-	-	-	4/1	-	-
J.Evans	59/4	19/1	-	-	-	-	-
R.Fraser		-	-	-	4/1	6/1	-
A.Gardner	-	3/1	-	-	-	-	4/2
C.Henshaw	14/1	44/1	42/1	- 1	-	-	-
Z.Hevesi	-	-	1/1	-	-	-	-
A.J.Hollis	26/2	161/11	-	-	86/8	-	-
M.B.Houchen	-	-	_	-	8/1	-	3/2
D.Hufton	12/2	-	-	-	-	-	-
P.Ivers	14/1	-	-	-	-	-	-
I.H.Kennedy	-	-	-	-	-	-	3/1
G.J.Kirby	193/8	60/5	-	-	-	-	-
R.H.McNaught	-	10/1	56/8	-	1/1	-	-
P.Murphy	3/1	-	_	-	-	-	-
I.P.Nartowicz	-	-	-	-	-	47/5	25/3
A.Ostermann	-	-	4/1	-	-	-	-
R.D.Pickard	-	-	-	-	-	-	1/1
A.R.Pratt	-	-	6/1	-	-		-
S.Smith	3/1	33/1	38/1	-	-	-	-
R.M.Steele	-	-	-	-	-	8/1	-
D.Stott	74/3	5/1	-	-	-	-	-
C.Swan	-	-	-	-	19/1	-	-
P.J.Swift	-	7/1	-	-	-	-	-
M.D.Taylor	230/19	157/15	122/12	40/5	106/12	91/8	72/7
W.Vollmann	-	7/1	-	_	-	-	-
P.Wils	-	3/1	-	-	-	-	-
G.Winstanley	5/1	-	-	-	-	-	-
G.Worby	_	31/1	35/1	-	-	_	-

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BAA VSS ECLIPSING BINARY PROGRAMME: LIST E : 1983 FEBRUARY

Star	R.A. h	(1950) m	Dec o	1	Туре	Range	MinII	Period	D/P
AO Cam	04	24.3	+52	56	E	9.5-10			
V529Caş	02	26.0	+60	27	E?	8.4-8.9		≥0 . 5	
BV Dra	15	10.9	+62	02	EW	8.4-9.0	9.0	0.35	-
BW Dara	15	10.9	+62	02	EW	9.2-9.6	9.6?	0.29	-
BM Eri	04	11.1	-10	31	EA	9.0-9.8			
BV Eri	03	49.5	-10	40	EB?	8.6-9.0			
CU Eri	02	44.6	-13	33	EW	8.0-8.6	8.6	0.63	
NQ Her	18	09.4	+18	19	EA?	8.0-8.6		0.87	0.15
SW Lac	22	51.4	+37	40	EW	8.5-9.3	9.3	0.32	-
XY Leo	09	58.6	+17	39	EW	9.5-9.9	9.8	0.28	- 1
V505 Mon	06	43.2	+02	33	EB?	7.2-7.7			
V536 Mon	07	11.4	-02	49	Е	9.1-10.1			
V578 Mon	06	29.4	+04	54	E	8.5-?		2.42	
IU Ori	05	32.1	-05	44	E?	9.6-11.1			
VW Peg	22	54.0	+32	58	E?	9.9-10.6			

Objects with unknown periods, or with very short periods

 $\underline{\text{BV}}$, $\underline{\text{BW}}$ Dra are respectively the southern and northern components of $\overline{2}$ 1927. The period of $\underline{\text{BW}}$ is apparently incorrect: Isles (TA 1979 Sept, with chart) suggests 0.25. The period of $\underline{\text{BV}}$ requires confirmation. A paper on this object is available from me.

BM Eri. Only one eclipse was observed, in 1943/44, lasting a year. The period is very long, at least 55 years, according to the GCVS. Small amplitude variations are also observed with a period of 30 days.

CU Eri. No initial epoch given in GCVS.

NQ Her. Eclipses apparently ceased in 1960. Chart available from John Parkinson.

<u>V505 Mon</u>. Period 53^{d} .78 according to two recent papers. Chart available from John Parkinson.

V536 Mon. Period may be a sub-multiple of 31.035

<u>V578 Mon</u>. Above details from 1976 GCVS Supplement which gives no initial epoch. 1974 Supplement gave period as 4.51

IU Ori. In Orion nebula. Rapid irregular variations.

VW Peg. Period of 2.64 not confirmed by later observations.

'MISSING' OBERVATIONS

We recently made an appeal for members to let us have copies of certain sets of observations which we were unable to trace. We are delighted to say that all the 'missing' observations have been located, so that this request is no longer necessary.

8

A COMPUTER PROGRAM FOR THE STORAGE AND DISPLAY OF OBSERVATIONS USING ZX81 BASIC

Observers of variable stars often wish to obtain a composite light curve of their necessarily scattered observations. Prior to the advent of reasonably priced home computers with cassette storage the only methods available have been time consuming even when the period has been known.

The program given here is in ZX81 BASIC but could easily be translated to any other dialect.

The program will list the shortened Julian Date of an observation along with the deduced magnitude and will then plot the observations reduced to a period, the length of which is determined by the value, in days of the variable P which is asked for as input. The program will obviously work best with eclipsing binaries or Cepheids where the period is known but guite presentable curves are produced with RV Tauri type stars. Where observations have been made over several periods it is possible to determine the length of the period with accuracy, provided that the observations have been correctly timed. Using Stebbins' [1] observations of Eta Aquilae published in 1952, the hump in the light curve is easily seen and the period can be found with a precision of 0.001 days. With my own observations of R Scuti both primary and secondary minima are well displayed although these are at different magnitudes for each period.

Once the relevant data are stored on cassette they can be updated readily, thus forming a computer 'log' and the program can be modified and extended, using the same data, to do more than the storage and display outlined here. Purist may argue that the scattered observations of a single individual are of doubtful value on their own, but I think that when observers see a light curve building up on the screen they will become more aware of the importance of each single observation and I hope will endeavour to work to the limits of accuracy afforded by the equipment and techniques available to them.

The program listings gives data for AC Herculis

0001 LET N\$ = "AC HERCULIS 182621" 0002 PRINT N\$ 0003 PRINT 0010 DIM D(100) 0020 DIM M(100) 0100 LET D(1) = 4115.44 0101 LET M(1) = 7.2 . . 0235 LET M(68) = 7.3 0301 PRINT "DO YOU REQUIRE A DATA LISTING? TYPE YES IF YOU DO"

```
0310 INPUT AS
0320 IF AS "YES" THEN GOTO 0400
0330 CLS
0340 PRINT " J.D. MAG."
0350 PRINT
0360 FOR I = 1 TO 100
0370 PRINT D(I), M(I)
0380 NEXT I
0390 PAUSE 200
0400 CLS
0410 PRINT "WHAT PERIOD WOULD YOU LIKE TO TRY FOR ":NS;" ?"
J420 PRINT
0430 PRINT "ENTER A PERIOD IN DAYS AND DECIMALS OF A DAY."
0440 PRINT
0450 PRINT "THIS PERIOD WILL BE REPRESENTED BY THE LENGTH OF THE
           ""X"" AXIS."
0460 INPUT P
0470 CLS
0480 FOR I = 1 TO 31
0490 PRINT AT 21, I;"-"
0500 NEXT I
0510 FOR I = 0 TO 21
0520 PRINT AT I,O;"-"
0530 NEXT I
0540 PRINT AT 21,5; "PERIOD = ";P;" DAYS"
0550 PRINT AT 10*7-70,0;"7"
0560 PRINT AT 10*7-80,0;"8"
0570 PRINT AT 10*7-90,0;"9"
0580 FOR I = 1 TO 100
0590 LET D(I) = D(I)/P
0600 \text{ LET } D(I) = D(I) - INT D(I)
0610 PRINT AT 10*M(I) - 70, D(I)*30 + 1;"+"
```

0620 NEXT I

0630 STOP



Figure 1. An example of the output obtained, using the observations of Stebbins for Eta Aquilae at a mean wavelength of 3530 Å.

REFERENCE

1 Stebbins, J., Kron,G.E., and Smith,J.L.: 1952 Astrophys.J. 115, 292

M.B.Houchen

(Notes on this program - omitted here - may be obtained in exchange for an SAE sent to Storm Dunlop.)

NAKED EYE VARIABLES

A number of bright variable stars are often observed by members, even though they are not on the BAA VSS programmes. The Junior Astronomical Society's Variable Star Section would welcome observations of these objects by BAA members.

The JAS programme comprises 16 naked eye variables, of which 7 are already on one or other of the BAA programmes. GCVS details of the remaining 9 are given in the table.

The evidence for variability in Epsilon Peg is slender. The Cepheid variables may perhaps be best regarded as 'recreational' objects, but the observations are analysed to check on possible period variations, in the same way as in our Eclipsing Binary Programme. (The AAVSO has a serious full-scale programme on Cepheids, designed to detect period changes.) Of the semiregulars, Eta Gem, Alpha Her and Alpha Ori often show variations noticeable visually. Beta Peg and Rho Per are less spectacular, but the combined work of several observers clearly reveals the variations. Reports on the observations are produced by the JAS and circulated to the observers and to observatories and libraries throughout the world. The last report dealt with Epsilon Peg and Rho Fer. Observations may be published elsewhere. For example, Dietmar Böhme is preparing a paper for the BAA Journal on JAS and other observations of the eclipses of Eta Gem (the next is in 1988)

Instructions, comparison star lists and report forms are available from John Isles. Observations of these stars made since the mid-1970's will be particularly welcome (provided they have not already been reported to other organisations) as JAS observations recently went through a lean period.

Star	Type	Range	Period	Remarks
Eta Aql	Cδ	3.5-4.3	7 <mark>.</mark> 18	Period varies
Delta Cep	Сδ	3.5-4.3	5.37	Period varies
Zeta Gem	Cδ	3.7-4.2	10.15	Period varies
Eta Gem	SRb	3.3-3.9	233	Also eclipses, period 8.2years
Alpha Her	SRc	3.0-4.0	-	Possible periods 50-130 days and 6 years
Alpha Ori	SRC	0.4-1.3	-	Possible periods 200-400 days and 6 years
Beta Peg	Гp	2.3-2.7	-	
Epsilon Peg	?	0.7-3.5	-	Flares?
Rho Per	SRb	3.3-4.0	-	Possible periods 50 days and 3 years

PHOTOELECTRIC PHOTOMETRY

Since the beginning of 1980, we at the Crayford Manor House AS have been attempting to undertake photoelectric photometry (PEP). Interest in this subject was increased greatly following a series of lectures at Crayford by John Mason on 'Astronomy and electronics'. Also it would not have been possible to pursue this subject further without the help of Dick Young who, as a fellow member of the Society, made available not only the photomultiplier tube (PMT) but also the necessary associated electronics.

This equipment consists of an EMI 9524B PMT which is a little more sensitive than the standard UBV system's 1P21. The signal is fed into a current-to-voltage amplifier where it may be read via an inbuilt meter or passed onto a strip chart recorder. The power supply is contained in the same housing as the amplifier and is capable of delivering 1000V at better than 0.01% stability. .

However, before this equipment could be used several modifications and improvements had to be made to my 40cm Newtonian. This had only recently been built for me by John Wall and as an experiment had a very thin mirror working at only f/3.75! But as it could show images of 15th mag under the very best conditions I felt that it was worth keeping and was a big improvement on the 21cm reflector that I had used previously.

One early problem I had was with the drive in RA which uses a friction bearing to transmit motion to the polar axis. This kept on slipping as it has not proved possible to balance the telescope perfectly, but was cured by wrapping and glueing a strip of fine grade emery cloth around the final drive roller, and increasing the spring tension pulling

this roller onto the polar axis. The drive is via a synchronous meter which has a fast slewing overide which acts through a differntial and works very well. I'm hoping to add a variable frequency oscillator later this year for greater control over the drive, which is really essential for serious PEP work.

The whole telescope is housed in an observatory with a rotating dome that had been built for my 21cm telescope and any new telescope had to fit inside, hence the small f-ratio of the 40cm.

Whilst I was sorting out these problems, Dick Young was assembling a photometer head. The purpose of this is to allow the starlight to be diverted either into the eyepiece or into the PMT. In any PEP system a star (or whatever) must be centred in a small diaphragm - typically of 60 arc secs in diameter - to exclude unwanted light from nearby stars and also the surrounding sky. (See Fig.1). Once this is done a mirror can be used to send the light on its way to the PMT. (Actually it is better to have all the available light going directly to the PMT and using the mirror or whatever to divert the light to the eyepiece only when the star is being located and centred in the diaphragm.) Before entering the PMT the light passes through a filter (depending on whether U, B or V photometry is being undertaken) and finally through a Fabry The purpose of this lens is to spread out the light a little lens. over the photo-sensitive surface of the PMT, so that any irregularities in that surface will be evened out. It also compensates for any slight movement of the star in the diaphragm.

The photometer head finally tried on my telescope did not actually use a Fabry lens and the 'moveable shaft with small mirror on the end' was in reality a steel pin that was cut at 45° and highly polished! It was really only built 'just to see if the system would work', which it does, but not very well, and so Photometer Head Mark II is being constructed. This is being designed around the use of a Barlow lens in the system. This was not included in the Mark I version. The small f-ratio of the 40cm is not ideally suited to PEP work and I quickly realis that a Barlow would somewhat alleviate the situation.

It was very fortunate that the IAPPP came into existence at about this time, and I immediately joined on behalf of the Society and have found the help and encouragement given to be invaluable, especially from Russ Genet, one of the founder members. Particularly useful has been the IAPPP publication "Photoelectric Photometry of Variable Stars" and I strongly recommend it as essential reading to anyone thinking of undertaking PEP.

As indicated above my system is not yet fully operational, the main problem having been electrical 'tracking' across the PMT pins, but whilst solving this it was decided to redesign the photometer head. (Actually Russ Genet has informed me that when the dark current starts to rise on his system due to dampness, he uses a hair dryer to cure it! On low setting and with the whole system switched off!)

Jack Ells, another member of the Society, has also nearly completed a PEP system, again with the help of Dick Young, and it is hoped that as Jack has a well equipped <u>heated</u> observatory with a telescope that tracks well he will not experience quite so many small problems that I have had.

To my knowledge there are now at least six other amateurs in this country who are seriously interested in PEP with perhaps Dr. Richard Miles being the most advanced in that his system is already fully operational. However I would be most interested to hear from anyone else who is contemplating PEP or who, perhaps is already making PE observations. Finally, I would add that we at Crayford are in the process of formulating plans for an IAPPP Symposium, probably in early 1984. Roger Pickard, (28 Appletons, Hadlow, Kent TN11 ODT Tel. 0732 850663)



THE SUPERNOVA SEARCH PROGRAMME

As we know that a number of members have been concerned about the situation with regards the Section's Supernova Search Programme, and that the involvement of the Deep Sky Section might complicate the situation, we are pleased to be able to announce that complete agreement has been reached as to the manner in which searching will be carried out. As far as observers are concerned there are essentially no changes whatsoever to the existing arrangements. All reports are to continue to be passed to Guy Hurst, who will be Co-ordinator for both the Variable Star Section and the Deep Sky Section.

NOVA/SUPERNOVA SEARCH MEETING

A meeting of the above programme's members was held at Earls Barton on 1983 April 23. A full report will be appearing in the BAA Journal in due course, and we hope to follow up one or two items in the next issue of the Circular.

VY AQUARII

As members will probably know, a very considerable amount of information about this star has come to light since the last Circular. We hope that a full account will be prepared and appear in the <u>Journal</u>, but in summary, not only has the 1973 outburst been confirmed, but both Sonneberg and Harvard patrol plates have been examined and a further four outbursts have been fully confirmed, plus another single bright image. The course of some of the declines can also be plotted from the photographic images. I would appear that this object must be a dwarf nova - rather than a recurrent nova - with a range somewhere between 8m (the maximum recorded) and less than 16m. From an interval between outbursts of a possible 55 years, there is now a distinct possibility that the true interval has been reduced to a few hundred days especially if the single image is taken into account.

Observations of this object are very desirable, and it has now been added to the Main Programme, and a chart is available.

PHOTOGRAPHS OF STAR FIELDS

The response to our appeal in the last Circular, for photographs of particular star fields was absolutely minimal. Does no-one possess telescope and camera anymore? Or was everyone waiting for everyone else? Luckily Charles Scovil came to our rescue with copies of plates from the Papadopoulos True Visual Magnitude Star Atlas - Northern Series, which he took with the original camera/filter/film combination. He kindly enlarged these to the requisite scale for our purposes, and chart revisions will be issued in due course.

However, reverting to our original point and considering the number of suggestions that we have had that individuals would help with just such specific requests - why no response? It can't just have been the weather - does no-one read these Circulars nowadays? We have several other star fields which we would like photographed, so shall we try again? Please contact Storm Dunlop for details.

LATE EDITORIAL NOTE AND REQUEST

Unfortunately this issue of the Circular looks as though it will be delayed for various reasons. We would like to apologise to everyone for this - particularly Guy Hurst for not going to press before the Nova/Supernova Meeting. Distribution is posing some difficulties, and if there is anyone who would be able to hold a file of our 200-odd names and addresses, and produce address labels for us - presumably via their computer - their help would be gratefully accepted. Please contact Storm Dunlop.

We have been given a few suggestions for the inclusion of other types of material into this Circular and shall be pleased to receive any ideas which members may have as to what they would like to see. In the meantime we would remind members, especially new members, that any of the Section Officers will be happy to help them with any queries regarding VS work - please do not be frightened to ask because you feel it is too trivial. We may be able to print the most interesting questions and answers in these pages.

FOR SALE AND WANTED

Books for Sale: (All PLUS POSTAGE)

Chandrasekhar, S.	Introduction to the study of Stellar Structure, Dover, N.Y., 1957 - Ex BAA Library, advanced theoretical work (excellent example of complex
	mathematical typesetting!) Pbk, 50p
Dufay, J.	Introduction to Astrophysics: The Stars, Dover, N.Y., 1964 - Very useful work, most of which is still valid. New, paperback, £1.50 *Several copies available*
Glasby, J.S.	Variable Stars, Constable, London, 1968 - useful for a quick general reference, with less errors than later works by the same author - which are not recommended Hardback, d.w., £1.50
Johnson, M.	Astronomy of Stellar Energy and Decay, Faber, London, 1950 - Old classic, but still contains some useful information. Hardback vgc, d.w., £1.50
Payne-Gaposchkin, C.	Stars in the Making, E.&S., London, 1953 - Old, but the classic work. Hardback, vgc, £2.00
Wanted:	
Shklovsky, I.S.	Supernovae, Wiley/Interscience, London 1968

Strohmeier <u>Variable Stars</u>, Pergamon, Oxford, 1972

For details of any of the above, or to advertise your own items wanted or for sale, contact Storm Dunlop - who is, in any case always interested in any books on variables, in most European languages. (If anyone requires any specific books - particularly on the subject of variable stars - and likes to let Storm know, he will be happy to inform them if anything becomes available, either from private or commercial sources.)

VARIABLE STAR SECTION

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CHANGES OF ADDRESS:

J.E.Isles - Please see inside front cover G.Chaplin - now: 19 Longdown Road, Lower Bowne, Farnham, Surrey J.Thorpe - now: 9 Birtrick Drive, Meopham, Kent

NEW MEMBERS:

R.Billington, 4 Banff Grove, Darnhill, Heywood, Lancs. OL1 3RG
F.Barretto, 28 Howard Road, Kings Heath, Birmingham B14 7PA
R.N.Goodger, 55 Dovedale Avenue, Ashmore Lake, Willenhall, W.Midlands WV12 4NA
K.Grundy, 43 St James' Road, Cannock, Staffs.
D.McAdam, 33 Wrekin View, Madeley, Telford, Salop TF7 5HZ
A.Morris, 92 Linden Lea, Hamilton, Strathclyde
J.Smith, 41 Sedgley Road, Penn Common, nr Wolverhampton, Staffs.
K.Smith, 37 Childs Avenue, Woodcross, Wolverhampton, Staffs.
A.Wiggans, 16 Lowfield Close, Newton, nr Kirkham, Preston, Lancs PR4 3SY

(Messrs. Baretto, Goodger, Grundy, McAdam, J.Smith and K.Smith are all members of the Wolverhampton A.S. VARSTAR section)

Charles E.Scovil, Stamford Observatory, Stamford Museum, Stamford Connecticut 06903, U.S.A.
