The British Astronomical Association

VARIABLE STAR SECTION

CIRCULAR 59

"LIGHT CURVE"

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VARIABLE STAR SECTION

CIRCULAR 59

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Reg Shinkfield

It is with regret that we record the death, at the age of 82, of Reg Shinkfield, of Adelaide, Australia. Reg contributed a large number of observations to the VSS over a very long period, which began in 1927. He also took part in the work of various other observational sections. His work for the Variable Star Section was of particular importance in the years between the late 50's and the late 60's, when the number of observers was low and observations were few in number. It is hope that a full obituary notice will be published in the *Journal* at a later date.

1983 Binocular Programme - Secretary's Report

It is encouraging to see a 32% increase in the number of observations, which totalled 15,423 from 52 binocular observers during the year 1983. (In 1982 the figures were 11,681 observations from 51 observers.) The leading observers: Albrighton (1500), Fraser (1065), Hather (1247), Middlemist (1438), Taylor (1470), Toone (1819) and Worraker (1562) provided some 65% of the grand total. The following members did useful charting work or else took an interest in particular stars: Agar, Allmand, Baker, Betts, Bone, Chaplin, Collinson, Hoste, Howarth, Keenan, Moore, Parkinson, Ramsay, Saville, Shanklin, Spooner and Srinivasani. The Binocular Secretary would like to thank all members and contributors for their observational work.

As just mentioned, a few observers are giving special attention to some of the under-observed stars, but even so, more work is required on the fainter or 'difficult' objects. For example, FZ Cephei with only four estimates made in 1983 is a good case! There are some 35 objects for which we require more data urgently.

Over the last 18 months the stars suspected of variability have been reassessed in terms of being on a separate programme within the binocular group. Three sheets (A4 size) have been produced showing 24 'suspects' on 5° square fields. These stars deserve careful attention from both experienced visual and photoelectric observers. BD+61°0668 (Cam), Fl 69 Draconis and BD+47°2801 (Cyg) are not found in the New Catalogue of Suspect Variables (Moscow, 1982), and consequently VSS observers have the opportunity of some 'pioneering' work.

The previously named CSV 927 (Cep) has been designated OV Cephei and is due to be taken off the short set of 'suspects'. N.B. It has been decided to drop the under-observed Fl 33 (Cet) (= CSV 5895 = NSV 00422) from the programme. SAO 037607 (And), SAO 021020 (Cas) and BD+23°1192 (Gem), which are better placed for northern hemisphere observers, have been added. The stars in the list for 1983 have formed the binocular programme for 1984. As from 1985 Jan 1, three stars are being omitted: CO Aurigae, Fl 33 (Cet) and NQ Gemini.

Star totals for 1983 - Binocular Group

RS And	76	RW	226	IS Gem	31
SU	60	RX	100	NQ	16
TZ	74	SS	91	+23 ^{o}1192	0
AQ	52	AR	203	X Her	244
BZ	35	DM	93	ST	49
SAO 037607	1	FZ Cep	4	SX	14
V Aql	79	OV	6	UW	126
V450	110	μ	73	IQ	7
V1293	71	NSV 13656	60	OP	185
NSV 12088	52	NSV 13729	58	V566	35
V Ari	60	NSV 14680	134	g Her	213
UU Aur	251	NSV 00422 (Cet)	19	U Hya	66
AB	225	RR CrB	112	SX Lac	42
AE	222	SW	118	NSV 14213	90
CO	78	T Cyg	65	NSV 14260	81
NO	36	RU	37	RX Lep	60
ψ^1	10	RV	60	Y Lyn	171
NSV 02537	370	TT	48	SV	30
W Boo	21	AF	310	NSV 03597	19
RV	34	CH	417	R Lyr	83
RW	37	V460	53	XY	182
RX	144	V973	101	δ^2	55
UV	143	V1351	36	S Mon	37
U Cam	78	V1624	24	RV	92
RY	92	P	147	SX	76
ST	177	NSV 12247	16	X Oph	118
UV	98	NSV 12439	41	V2048	107
VZ	69	NSV 13784	84	W Ori	59
ZZ	116	NSV 13857	29	BL	75
+61 ^{o}0668	103	+47 ^{o}2801	8	BQ	124
X Cnc	123	U Del	178	CK	75
RS	153	EU	181	NSV 02917	76
RT	44	NSV 13150	85	AG Peg	161
V CVn	229	RY Dra	427	GO	100
Y	167	TX	277	X Per	247
TU	143	UW	73	SU	90
W CMa	34	UX	29	AD	98
WZ Cas	107	VW	62	KK	73
V377	142	AH	146	PR	95
V391	76	AT	97	Z Psc	59
V393	107	Fl 69	4	TX	37
V465	28	TU Gem	41	TZ	32
NSV 00021	34	TV	127	S Sct	53
NSV 00436	76	WY	106	Y Tau	93
NSV 00650	110	BN	70	TT	87
SAO 021020	12	BQ	23	BU	109
W Cep	195	BU	145	CE	28
RU	124	DW	19	NSV 01280	52

Star totals - cont.

NSV 01702 Tau	54	TV UMa	65	RW Vir	43
W Tri	59	VW	81	RX	39
Z UMa	235	VY	79	SS	67
RY	195	V UMi	130	SW	38
ST	113	RR	88	BK	34

Binocular Programme Observer Totals 1983

	Obs.		Obs.		Obs.
Agar	104	Horton	46	Saville	413
Albrighton	1500	Hoste	110	Saw	21
Allmand	361	Howarth	78	Shanklin	256
Baker	124	Hurst	89	Smith, H.	143
Barry	50	Januszewski	50	Smith, J.	47
Bell	85	Keenan	293	Spooner	44
Betts	151	Kelly	20	Srinivasani	422
Bone	426	Maris	233	Taylor	1470
Chaplin	206	Markham	332	Thorpe	106
Collinson	187	McAdam	21	Toone	1819
Dryden	23	Middlemist	1438	Worraker	1562
Fraser	1065	Moore	21		
Gardner	136	Parkinson	105	11 others	56
Grundy	33	Poyner	31		
Hather	1247	Ramsay	99	Total	15 423

BV Tauri

An interesting result of the examination of Tristram Brelstaff's observations of the eclipsing binary BV Tauri is the discovery that the quoted GCVS period of 12.349 days is gravely in error. The true period is of the order of 0.93044 days.

Tristram Brelstaff's observations were made over the years 1981 to 1984, at first only once nightly, until it became obvious that the quoted period - which dates back to a publication by Kaura in 1938 - was wrong. Examination of the data enabled a minimum to be predicted for 1984 December 17 and this was successfully confirmed, at the expected time and with the expected duration. (Subsequent eclipses have now been observed, agreeing with the new elements.)

The object's classification as a Beta Lyrae variable remains correct, as does the depth of primary and secondary minima (about 0.7 mag 0.2 mag respectively). Approximate elements are:

Min I = 2446052.63 + 0.93044 E

Additional observations are very desirable and observers are urged to make these. A chart is available from John Parkinson.

Possible additions to the Main Observing Programme

It has been appreciated for some time that there are few stars on the Main Programme between Right Ascensions 8 and 14 hours. It has therefore been decided to add a number of objects in this region. These will probably include:

SU Cnc (M, 12 - 15 pg); U CVn (M, 8.8 - 12.5 pg);
RT CVn (M, 12.0 - 16.0 pg); R Com (M, 7.3 - 14.6 vis);
RS Leo (M, 10.4 - 15.7 vis); RY Leo (SRb, 9.5 - 12.0 pg);
U LMi (SRa, 10.0 - 13.3 vis); W LMi (SRd, 10.5 - 13.5 vis);
X Lyn (M, 9.5 - 16 vis).

These stars will not formally become programme objects immediately, but we would like to commence observations as soon as possible. Observers interested in including any of these objects on their observational lists are asked to contact the Director immediately.

Scandinavian Binocular Variable Star Charts - John Parkinson

The Scandinavian Variable Star Observers (formerly the Scandinavian Union of Amateur Astronomers) has recently sent a set of their binocular variable star charts to the VSS. There are 38 charts covering 67 variables. They are provided with a key to the symbols used, together with a catalogue of the charts, listed in Right Ascension. (Given below.) A separate sheet gives the coordinates for epoch 2000 although the charts themselves are drawn using epoch 1950, as they were copied by permission from the Skalnate Pleso Atlas, the AAVSO Variable Star Atlas and, in the case of BU Tau, the BAA VSS chart. The sequences used are mainly from the AAVSO charts.

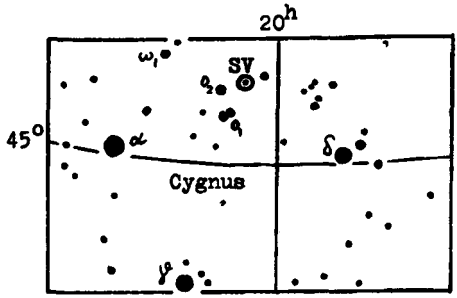
Having been drawn by one enthusiastic member, Veikko Mäkelä, they are uniform and look quite professional. In some instances a finder chart is included on the same sheet as the variable. All the relevant details are supplied: type, period, range, spectrum, and coordinates, along with the acknowledgements for the source material chart and sequence. In addition the limiting magnitude of the chart is given, useful for nova and supernova hunters. A table to calculate the effect of extinction is also supplied on some charts - obviously this is more of a problem to Scandinavian observers. The magnitude is printed next to the comparison. In a crowded part of the sky, such as Scutum, where the limiting magnitude is 9, the chart looks slightly cluttered as the size of type is rather large.

On the whole I feel that the Scandinavians can feel justly proud of their work. The only real problem lies in their preference for the AAVSO sequences. Whatever happened to EFVSO?

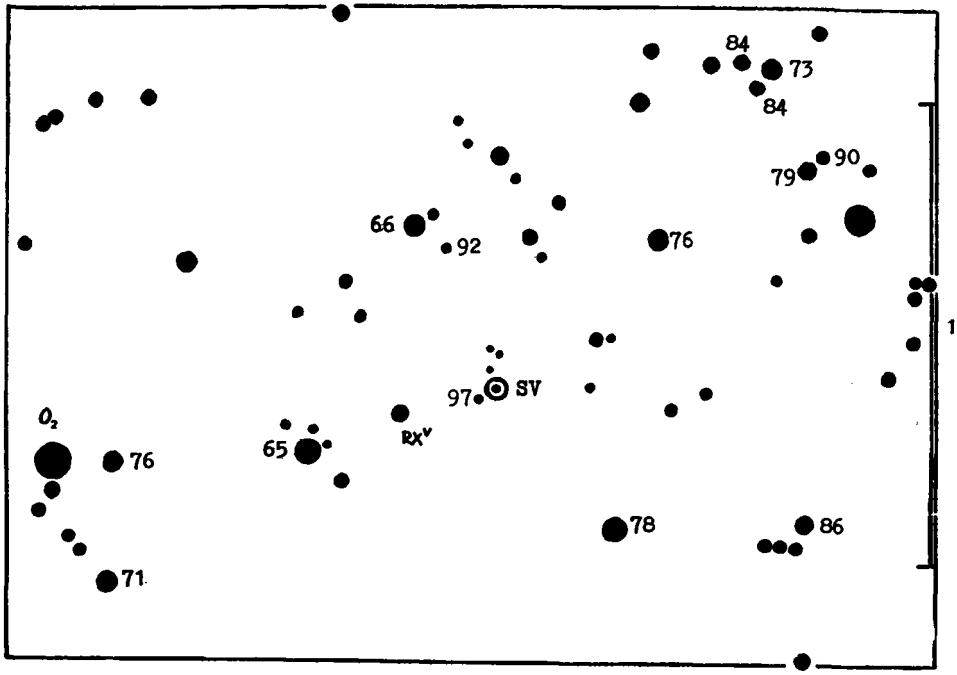
[A sample chart is reproduced opposite.]

SVSO binocular variable chart

200647 SV CYGNI	(1950) $20^h08.0^m$ $+47^\circ43'$	
Type: Lb?	Mg: 7.5 - 9.2v	Sp: N3(C5.5)



FINDER CHART



From The Skalnate Pleso Atlas and The AAVSO Variable Star Atlas and the sequence from AAVSO by permissions of Sky Publishing Corporation and AAVSO. MH/AK 1977 VM 1983

The limiting magnitude of the finder chart: ~ 6.0^m
the sequence chart: ~10.0^m

SVSO Charts

1	003455	α Cas	22	161559	AT Dra
	005060	γ Cas		163360	TX Dra
2	010884	RU Cep		164657	AH Dra
3	025838	ρ Per		171560	VW Dra
4	033362	U Cam	23	171014	α Her
5	033380	SS Cep	24	184205	R Sct
	071082	VZ Cam		184408	S Sct
6	034323	BU Tau		185705	V Aql
7	040053	XX Cam	25	185135	δ^2 Lyr
8	044930b	AB Aur		185243	R Lyr
	050934	AE Aur	26	192150	CH Cyg
9	053920	Y Tau		192745	AF Cyg
10	054907	α Ori	27	200536	V1624 Cyg
	060822	η Gem		201036	V1644 Cyg
11	060426	TU Gem		201437	P Cyg
	060521	TV Gem		204334	T Cyg
	060523	WY Gem	28	200647	SV Cyg
	060622	BU Gem	29	200938	RS Cyg
12	062938	UU Aur	30	203317	EU Del
	072046	Y Lyn		204017	U Del
13	084917	X Cnc	31	213244	W Cyg
14	112245	ST UMa		213845	V1339 Cyg
15	115158	Z UMa	32	213753	RU Cyg
16	121561	RY UMa	33	213909	ε Peg
17	124045	Y CVn		225827	β Peg
	125047	TU CVn	34	213937	RV Cyg
	131546	V CVn	35	214058	μ Cep
18	125266	RY Dra		215363	VV Cep
19	133674	V UMi	36	214612	AG Peg
20	153738	RR CrB	37	225384	AR Cep
	153739	SW CrB	38	234956	ρ Cas
21	155947	X Her			
	162542	g Her			

Eclipsing Binary Programme - John Isles

The list of minima in this VSSC gives the results to the end of 1981. VSSC 60 will cover 1982-83 and future issues will report results as soon as possible after submission of observations.

These timings are only the first fruits of the harvest. The next step will be to go through the available data for each star, both the published timings and the original observers' reports, to see what further information can be gleaned by fitting together fragmentary observations, deriving revised elements for systems which have departed from prediction, and plotting mean light curves where these can yield further information. The results will be published in a series of reports in the *Journal*, and will provide material for notes in these Circulars on

eclipsing binaries of particular interest. The analysis will cover all available data for the years 1973 to 1984, so observers are urged to get their work for 1984 to me as quickly as possible to be sure it is included.

For some years now, most EBP results have been the work of just one observer. While Tristram is to be congratulated on his magnificent contribution, it is very unfortunate that we do not have any other active observers.

In theory, observers who have a good star atlas (the AAVSO Variable Star Atlas is the most useful) should be able to identify all the objects covered in the predictions, and can simply choose comparison stars at the telescope. The time at which the minimum occurred can be deduced from step estimates of the variable, without having to know the magnitudes of the comparison stars; see the *Journal*, 92, 76 1982 February (offprints available from me). But most observers would prefer to have charts for each variable, showing recommended comparison stars with their magnitudes. Accordingly, it has been decided that the range of available charts should be expanded.

Our Chart Secretary, John Parkinson, can already supply charts for the eclipsing binaries in the accompanying list. They include most of the objects on List A of the predictions, which can be observed with binoculars. We hope in the near future to make available to observers the charts issued by other groups active in this field, as well as a large number that have been drawn up by our own observers, particularly by Tristram Brelstaff, Melvyn Taylor, and Colin Henshaw, who is observing southern objects from Zimbabwe. Members who observe an object for which no chart has been issued can make a particularly valuable contribution by sending in, with their observations, a field sketch, which can be used by other observers.

Predictions are available from me for minima of most eclipsing binaries brighter than 10 m at maximum, observable from the British Isles. The computer programs have recently been transferred from the Royal Military College of Science to the RGO, where our predictions will be produced in future. See VSSC 55 for a description of the predictions and details of the stars covered. But observations of all eclipsing binaries are welcome, whether or not they are in the predictions.

Binocular Group members might like to experiment with WW Aur, AR Aur or TV Cas, which are shown on the BG charts for IS Gem, AE Aur and V377 / WZ Cas respectively. Predicted GMATs of forthcoming eclipses are given below.

WW Aur Primary and secondary eclipses last 6 hours.

1985 Jan 18d 11h, 19d 17h, 22d 6h, 23d 12h, 27d 7h, 28d 14h
Feb 1d 8h, 2d 15h, 6d 10h, 7d 16h, 11d 11h, 16d 12h,
20d 7h, 21d 13h, 25d 8h, 26d 14h
Mar 2d 9h, 7d 10h, 12d 12h, 17d 13h, 21d 8h, 22d 14h,
26d 9h, 31d 10h

AR Aur Primary and secondary eclipses last 7 hours.
1985 Jan 16d 8h, 18d 9h, 20d 11h, 22d 13h, 24d 14h, 26d 16h
Feb 14d 6h, 16d 8h, 18d 10h, 20d 11h, 22d 13h, 24d 14h
Mar 19d 8h, 21d 10h, 23d 12h

TV Cas Primary eclipses last 8 hours.
1985 Jan 15d 13h, 17d 9h, 25d 15h, 26d 10h, 28d 6h
Feb 2d 16h, 4d 12h, 6d 8h, 11d 18h, 13d 14h, 15d 9h, 22d 15h, 24d 10h
Mar 4d 16h, 5d 12h, 7d 8h, 14d 14h, 16d 9h, 24d 15h, 25d 11h

As the first stage in the introduction of additional sequence charts, 30 charts, not listed opposite, are now available from John Parkinson. Space precludes full details being given here, but a list will be published in VSSC 60. The stars are:

Andromeda	- TW, WW, AB, AD, BX, CD, DS
Aquarius	- ST, SU
Aquila	- OO, V346
Ara	- R
Aries	- RR, SS
Auriga	- SX, TT, AM, AR, BF, CQ, EO, HL, IU, IY, LY
Boötes	- SS, AC, AD
Camelopardalis	- SV, AN

UK Nova/Supernova Patrol - Guy Hurst

Members are asked to note that the telephone number given on the inside front cover is now available on an all-night basis for possible nova or supernova discoveries. However, please telephone routine matters through before 10 p.m. in the evening.

Although the primary aim of the patrol is to search for novae and supernovae, it is also important to obtain 'follow-up' results on recently reported objects and to investigate queries. A little while ago, Evans reported a supernova in NGC 7184 (IAUC 3962) and Tatum indicated that it was identical with a star on the Palomar Sky Survey (IAUC 3994). Using photographs obtained by our patrol member, Alan Young, and precise positions measured by P. Birtwhistle, we have established that the star and Evans' object are not identical but that the object is slowly fading. Furthermore, there is no definite candidate on the Palomar Sky Survey down to approximately magnitude 20. A report has been sent to the Central Bureau for Astronomical Telegrams in the U.S.A.

Observations of the two novae in Vulpecula to January 12 show that Nova Vul 1984 No.1 is about 9.9 and Nova Vul 1984 No.2 as around 6.6. Charts have been prepared for both and may be obtained from the Guy Hurst or the Chart Curator. Observations of these objects should be made every night.

[See also notes at bottom of page 12 and top of page 14.]

ECLIPSING BINARY CHARTS CURRENTLY AVAILABLE

STAR	LIST	R.A. (1950) h	m	DEC. °	′	RANGE m		MIN II* m	TYPE	PERIOD d	D* h	WITH*
V822 AQL	C	19	28.7	-02	13	6.7	- 7.1	7.1	EA	5.30	?	
WW AUR	A	06	29.0	+32	30	5.7	- 6.4	6.3	EA	2.53	6	
AR AUR	A	05	15.0	+33	43	6.1	- 6.8	6.7	EA	4.13	7	AE AUR
IM AUR	A	05	11.8	+46	21	7.9	- 8.5		EA	1.25	6	
ZZ BOO	A	13	53.9	+26	10	7.2	- 7.9	7.8	EA	4.99	7	
KS CVN	B	13	08.3	+36	12	8.4	- 9.9		EA	4.80	13	
RZ CAS	A	02	44.3	+69	26	6.2	- 7.7		EA	1.20	5	
TV CAS	A	00	16.6	+58	52	7.2	- 8.2		EA	1.81	8	V377 CAS
U CEP	A	00	57.7	+81	36	6.8	- 9.1		EA	2.49	10	
VW CEP	A	20	38.1	+75	25	7.8	- 8.2	8.1	EW	0.28	2	
EI CEP	A	21	28.7	+76	11	7.7	- 8.2	8.1	EA	8.44	12	VW CEP
GK CEP	A	21	30.4	+70	36	6.9	- 7.4	7.4	EB	0.94	6	
NN CEP	E	23	00.1	+62	15	8.2	- 8.7	8.6	EB	2.06	12	RW CEP
Y CYG	A	20	50.1	+34	28	7.3	- 7.9	7.8	EA	3.00	7	
V477 CYG	B	20	03.5	+31	50	8.5	- 9.3		EA	2.35	4	
TW DRA	A	15	33.1	+64	04	7.9	- 9.1		EA	2.81	10	
AI DRA	A	16	55.2	+52	47	7.1	- 8.1		EA	1.20	4	
BH DRA	A	19	02.8	+57	23	8.0	- 8.5		EA	1.82	7	
S EQU	A	20	54.7	+04	53	8.0	-10.1		EA	3.44	10	
Z HER	A	17	55.9	+15	09	7.3	- 8.1		EA	3.99	11	
RX HER	A	18	28.3	+12	35	7.3	- 7.9	7.8	EA	1.78	6	V451 OPH
NQ HER	E	18	09.4	+18	19	8.0	- 8.6		EA?	0.87?	3?	IQ HER
u HER	A	17	15.5	+33	09	4.6	- 5.3		EB	2.05	12	
AR LAC	A	22	06.6	+45	30	6.1	- 6.8	6.4	EA	1.98	8	
V505 MON	E	06	43.2	+02	33	7.2	- 7.7	?	EB	58.78?		
U OPH	A	17	14.0	+01	16	5.9	- 6.6	6.5	EA	1.68	7	
V451 OPH	A	18	26.9	+10	51	7.9	- 8.5	8.3	EA	2.20	6	
V566 OPH	A	17	54.4	+04	59	7.5	- 8.0	7.9	EW	0.41	2	
EE PEG	A	21	37.6	+08	57	6.9	- 7.6		EA	2.63	6	
DM PER	A	02	22.4	+55	53	7.7	- 8.5		EA	2.73	10	
IQ PER	A	03	56.1	+48	01	7.7	- 8.3		EA	1.74	5	
IZ PER	A	01	28.9	+53	46	7.8	- 9.0	8.3	EA	3.69	11	
BETA PER	A	03	04.9	+40	46	2.1	- 3.4		EA	2.87	10	
SZ PSC	A	23	10.8	+02	24	6.0	- 6.7		EA	3.97	10	
U SGE	A	19	16.6	+19	31	6.6	- 9.2		EA	3.38	11	
RW TAU	B	04	00.8	+28	00	8.0	-11.5		EA	2.77	9	
CD TAU	A	05	14.6	+20	05	7.3	- 7.9	7.9	EA	3.44	7	
HU TAU	A	04	35.3	+20	35	5.9	- 6.7		EA	2.06	9	
W UMA	A	09	40.3	+56	10	7.9	- 8.6	8.5	EW	0.33	2	
TX UMA	A	10	42.4	+45	50	7.1	- 8.8		EA	3.06	10	
Z VUL	A	19	19.6	+25	29	7.4	- 9.2		EA	2.45	11	

* MIN II = depth of secondary minimum, if at least 0.3m
D = length of eclipse in hours (or a quarter of the Period, for types EB, EW)
WITH = other variable on whose chart the star appears

Some Medium Brightness Red Variables - Ian Middlemist

This is a summary of recent observations of a number of red (semiregular and related) variable stars, which are too faint for inclusion in the Binocular Group Programme, but are not studied by the BAA VSS Main Programme, AAVSO, or to my knowledge, any other major amateur group. The stars generally speaking are in the range of mag. 8.0 - 11.0, and so are suitable for observation with 6 to 10 cm object glasses. Together with objects in the same general range in the VSS programmes, they would make a good basis for the observing list of observers with such telescopes.

A short summary or comment is given for each star, and light-curves of 13 are given on a separate page. The light-curves extend over a period of 18 months (1983 Jan to 1984 Jun). Earlier light-curves with comments were published in respect of a few of the stars in 'Light Curve' from 1976 to 1978.

VX And Only a few estimates, showing a rapid rise in 1983 Oct - Nov. Chart AAVSO Preliminary; Sequence BSS Preliminary.

TZ Cas Chart and sequence from visual estimates by IAM. Quite well-marked variations 9.7 - 10.5. At one time a candidate for inclusion in the VSS programme.

ST Cep Chart and sequence IAM, extension of BSS W & RW Cep. Good variations. Position is indicated on BG chart for W Cep. I have found this an interesting star over 8 years. Two previous reports in 'Light Curve'.

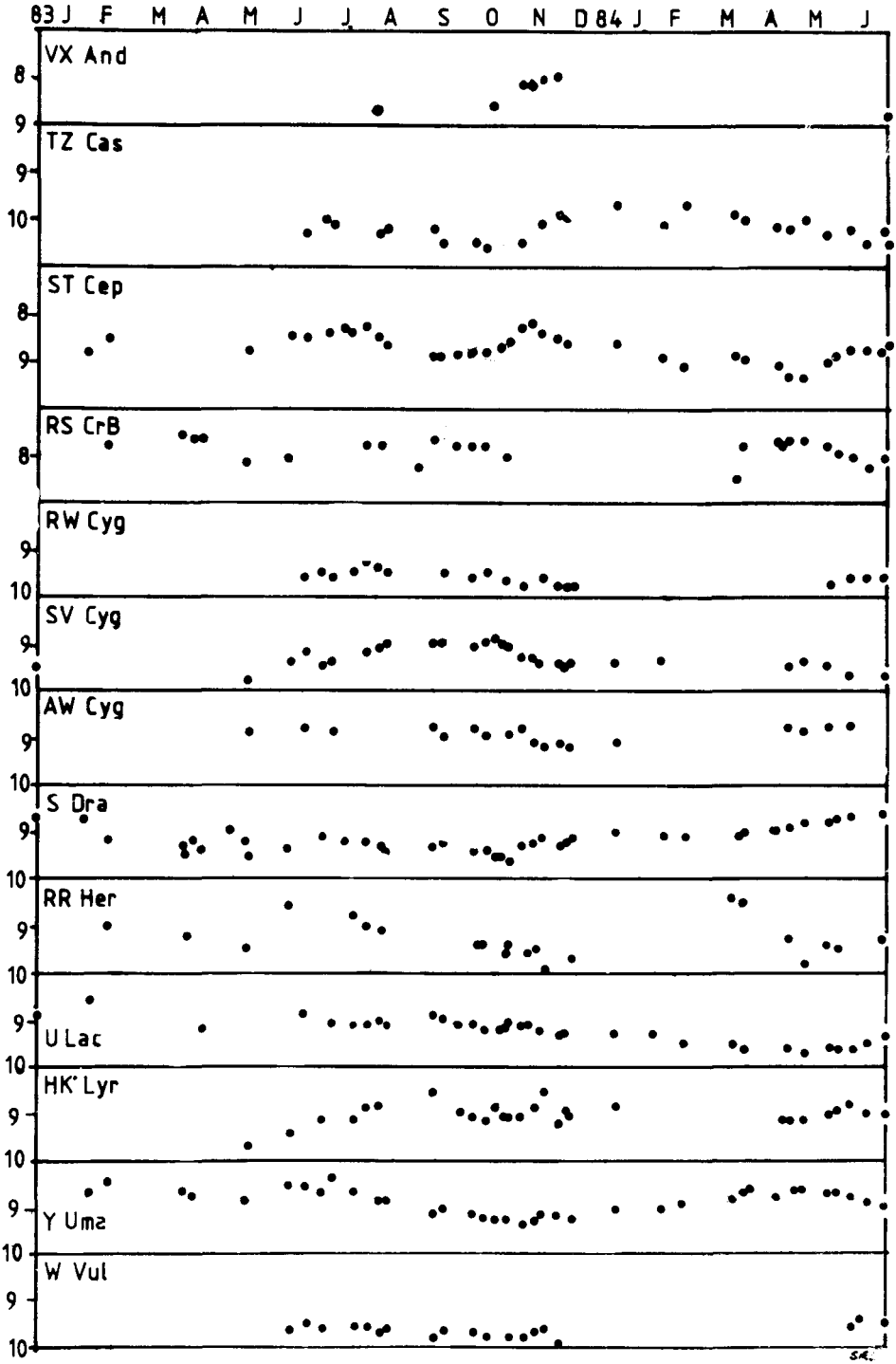
RS CrB Sequence IAM, chart JEI. No reliable estimates below 8.5 in 7 or 8 years. Observations do not support data in 3rd Edition of GCVS.

RW Cyg Chart and sequence Hagen ASV IV. Little in the way of certain fluctuation. 9.4 and 9.6 comparisons rather too close for ease of use. Another failed candidate for the VSS programme.

SV Cyg Chart and sequence Hagen ASV IV. Well-marked slow fluctuations, e.g. max. in Autumn 1983. This is a rewarding star for study.

AW Cyg Chart AAVSO AF Cyg 'b', sequence unknown source. Very shallow and uncertain fluctuation about mag. 9.0, belies the impressive photographic range.

S Dra Chart and sequence Hagen ASV IV. Over several years has varied slowly and steadily, with no resemblance to catalogue period. Reported previously in 'Light Curve'. When brighter than 8.9, this object can be observed in binoculars using the AH Dra sequence.


83 J F M A M J J A S O N D 84 J F M A M J
VX And
8
9
TZ Cas
9
10
ST Cep
8
9
RS CrB
8
RW Cyg
9
10
SV Cyg
9
10
AW Cyg
9
10
S Dra
9
10
RR Her
9
10
U Lac
9
10
HK Lyr
9
10
Y Uma
9
10
W Vul
9
10

RR Her Chart and sequence Hagen ASV IV. Scattered observations tantalizingly suggest marked fluctuations, but may merely be erratic.

U Lac Chart and sequence Hagen ASV IV. Slow variations, reminiscent of S Per. A good star repaying observation over a long period. One report in 'Light Curve'.

HK Lyr Chart and sequence IAM visual. Fluctuates quite noticeably about 9.0 in 3 - 4 months. Visual range probably smaller then photographic.

T Sge Chart and sequence Hagen ASV IV. No marked deviation from 9.6 - 9.7 in 8 years.

Y UMa Chart and sequence Hagen ASV IV. See also BG chart for Z and RY UMa. Good, slow, well-marked variations make this star well worth observing. Reported in 'Light Curve'.

W Vul Chart and sequence Hagen ASV IV. No notable deviation from 9.6 - 9.7 in 8 years.

In addition to the above, charts have been compiled for several other stars, which have, however, not been observed at all, or have only been observed a few times.

SS And:	8.5 - 9.9, SRc;	AN Cep:	8.2 - 10.6, SRa;
Z Leo:	8.6 - 10.0, SRb;	X Lyr:	8.6 - 9.8, Lb;
KP Lyr:	8.8 - 9.8, SRb;	V438 Oph:	8.2 - 10.5, SRa;
RT Ori:	7.7 - 8.8 SRb;	V430 Ori:	8.3 - 9.8, SRb;
SW Per:	8.6 - 10.1, SRb;	TT Per:	8.2 - 9.7, SRb;
TU Tau:	9 - 10 SR;	X Sge:	8.8 - 9.8 Lb.

All these stars are, or should be, observable in small telescopes. Some of them may well prove to be interesting, whilst others will no doubt prove to be as disappointing as T Sge or W Vul.

Anyone wishing to observe any of the stars mentioned above can obtain charts from the writer, cost 10p each to cover photo-copying. Observations should be reported in the format of the old-style VSS report forms, omitting Julian Date. I hope that it will be possible to provide a further summary and a progress report for publication in these circulars in a year or 18 months. Two specimen charts are reproduced opposite.
[The charts have had to be redrawn for publication. Ian's address is: 26 Lockside, Marple, Stockport SK6 6BN - SRD]

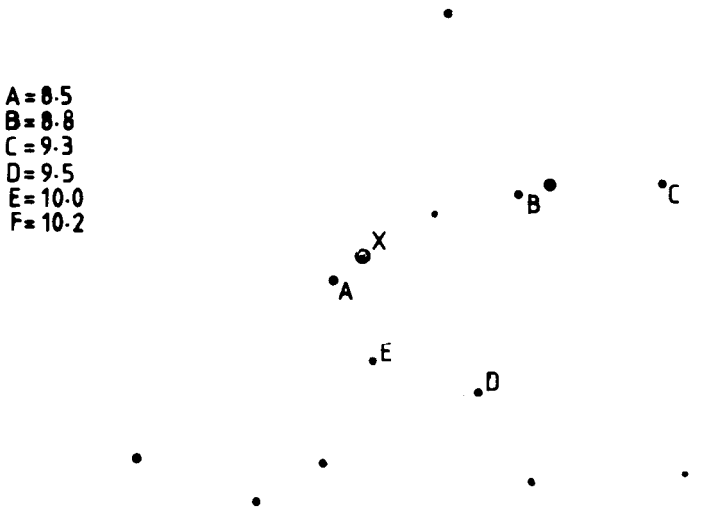
Supernova/Nova Chart Catalogue

A chart catalogue is available, giving details of charts for the supernova search project, and information on existing objects, such as novae. Copies obtainable from Guy Hurst for 35p + SAE.

TZ Cassiopeiae 9·0–10·5, Lc 234760

X Sagittae 8·8–9·8, Lb

Eta Sge 195820



SAS from IAPH 1984

RZ Leo

Ducoty has recorded an object (confirmed by Scovil) that may be RZ Leo (Nova Leonis 1918) undergoing another outburst. Mag is about 13.0. A chart is available from Guy Hurst.

Minima of Eclipsing Binaries: 1979-81 - John Isles

The Section's visual timings of minima of eclipsing binaries in the years 1979 -81 are given in the accompanying table. Unless otherwise stated, O - C values are against the linear elements of the 1969 GCVS. For further explanation, see the last Circular (VSSC58). The only change is that doubtful timings are indicated by ? rather than * for obscure computing reasons which it would be wearisome to explain.

The observers were as follows:

AV = J. Agar	FB = R.B.I. Fraser
BS = T. Brelstaff	HO = A.J. Hollis
BZ = A. Bedford	IS = J.E. Isles
DT = D. Stott	TN = A. Thomson
EA = S.J. Evans	TY = M.D. Taylor

An asterisk draws attention to a remark below.

Remarks

V822 Aql The period in the 1969 GCVS is wrong (see *BAAJ*, **85**, 447, 1975 Aug.), so the O - C is against the elements of the 1974 Supplement.

RX Cas All the estimates in the calendar year have been folded onto a single cycle, and used to derive the times of the minima nearest the median date of the observations.

V523 Cas Not listed in the 1969 GCVS. The O - C is against the elements of the 1976 Supplement.

NN Cep Elements not given in the GCVS or Supplements, so the O - C is against those in IBVS 1881.

XY Cet The period in the 1969 GCVS is wrong, so the O - C is against the elements of the 1971 Supplement.

V448 Cyg All the estimates in the calendar year have been folded onto a single cycle, and used to derive the times of the minima nearest the median date of the observations.

HP Lyr The first minimum is derived from estimates 4812-4854 and 4927-4970; the second from estimates 4856-4925. Primary and secondary minima are of equal depth, and because of the large O - C it is not known which is which.

β Lyr All estimates in each calendar year have been folded onto a single cycle, and used to derive times of minima nearest the median date of the observations. Observers in 197[illegible] were BS and IS; in 1980 BS, IS and DT; in 1981 BS, BZ, IS and TN.

V505 Mon Elements not given in the GCVS or Supplements. All the

estimates in each calendar year have been folded onto a single cycle, using the period of 53.7805d given in IBVS 1998 and confirmed by Stagni and Margoni, *Astrophys. and Space Sci.*, 88, 115 (1982). those near an apparent minimum were used to derive timings. But as the elements are given in neither reference, the epoch and O - C are not given. Observers in 1980 were BS and FB, and in 1981 FB and TY.

IQ Per No period is given in the 1969 GCVS, so the O - C is against the elements of the 1974 Supplement.

SAO 77615 Not listed in the GCVS or Supplements. The O - C is against the elements given in IBVS 1942.

The numbers of estimates given against certain minima include estimates made on other nights which were also used in deriving the time of minimum. These were as follows:

Star	Date	No.	Other Dates
WW And	4840	16	4816-4933
V822 Aql	4179	2	4110-4126
RS CVn	4363	10	4349-4392
RO Cas	4140	2	4131
EI Cep	4137	7	4120-4196
NN Cep	4158	14	4144-4187
U CrB	4051	5	4120-4158
U CrB	4348	4	4365
VW Cyg	4843	4	4876
V1143 Cyg	4176	3	4046-4115
TW Dra	4130	6	3785-4164
TW Dra	4891	9	4874
WW Dra	4168	18	4131-4196
S Equ	4933	4	4940
Z Her	4114	3	4046-4122
Z Her	4130	1	4126
Z Her	4146	2	4158
V450 Her	4869	11	4847-4932
U Oph	4167	5	4051
V451 Oph	4130	2	4132
V566 Oph	4166	3	4132
AW Peg	4166	9	4187
EE Peg	4168	12	4110-4152
IZ Per	4179	5	4164
β Per	4176	14	3875-4196
β Per	4629	5	4632
SZ Psc	4166	2	4158
V505 Sgr	4899	2	4893
CD Tau	3876	5	3869
GR Tau	4933	6	3970
HU Tau	4197	4	3876-4164
RT UMi	4813	52	4815-4933
Z Vul	4749	4	4874
RS Vul	4114	21	4123-4190

STAR	EPOCH	HELIO JD 244...	O - C	No	OBSERVER	
AW AND	950	4840.3957	-0.0117	20	BS	*
WZ AND	14224	4970.414	-0.024	10	BS	
BX AND	12043	3876.3917	-0.0057	9	BS	
	12476	4140.573	-0.003	6	BS	
	12520	4167.431	+0.009	8	BS	
DS AND	8736	4970.314	+0.114	6	BS	
OO AQL	21545.5	4844.439	-0.060	11	BS	
	21636	4890.310	-0.054	8	BS	
1822 AQL	2719.5	4179.247	-0.018	7	BS	*
SX AUR	15223	4166.493	+0.029	10	BS	
WW AUR	4329	3876.352	+0.005	9	BS	
	4338.5	3900.340	+0.005	8	TY	
	4436	4146.510	-0.014	6	BS	
BF AUR	5950.5	3876.341	+0.008	9	BS	
	6135	4168.455	+0.018	8	BS	
IM AUR	4291	4121.459	-0.037	7	BS	
	4309.5	4144.574	+0.003	12	BS	
	4311	4146.411	-0.031	10	BS	
	4628.5	4542.407	-0.053	5	HO	
LV AUR	1275.5	4166.616	-0.180	6	BS	
AW CAM	23097	4166.422	+0.026	8	BS	
RS CVN	3984	4363.584	-0.162	16	BS	*
RX CAS	624.5	4193.1	+2.9	12	BS	*
	625	4207.8	+1.5	10	BS	*
RZ CAS	5851	4137.385	+0.005	6	BS	
	5857	4144.554	+0.002	10	BS	
	5953	4259.295	-0.001	8	TY	
	6005	4321.454	+0.006	10	TY	
	6481	4890.389	+0.003	9	TY	
TV CAS	13268	4167.442	-0.017	7	BS	
	13274	4178.315	-0.019	10	BS	
TW CAS	17043	4166.590	-0.010	9	BS	
DO CAS	14918	4140.313	+0.009	8	BS	*
	14924	4144.410	-0.002	12	BS	
	14927	4146.461	-0.005	12	BS	
V523 CAS	15388.5	4816.460	+0.010	18	BS	*
	15508	4844.381	+0.006	16	BS	*
	15615	4869.387	+0.006	14	BS	*
VW CEP	38778	3956.481	-0.090	6	TY	

STAR	EPOCH	HELIO JD 244...	O - C	No	OBSERVER	
VW CEP	39403	4130.442	-0.077	7	BS	
	39482	4152.425	-0.082	5	BS	
	39533	4166.616?	-0.084?	4	BS	
	39536	4167.435	-0.101	5	BS	
	40746.5	4504.336	-0.103	4	HO	
	40782.5	4514.338	-0.120	5	HO	
	40818.5	4524.391	-0.087	4	HO	
	40822	4525.360	-0.092	5	HO	
	40843.5	4531.335	-0.101	6	TY	
	40847	4532.318	-0.092	5	HO	
	40897.5	4546.338	-0.127	6	HO	
	42030	4861.551	-0.109	6	IS	
	42062	4870.481	-0.085	6	IS	
	42162	4898.279	-0.119	6	TY	
	42162.5	4898.446	-0.092	6	TY	
EI CEP	867	4137.367	-0.029	13	BS	*
	892	4348.395?	+0.015?	5	BS	
EK CEP	1168	4174.405	+0.024	11	BS	
GK CEP	6035	3875.457	-0.021	6	BS	
	6036	3876.421	+0.007	7	BS	
	6307.5	4130.557	-0.027	14	BS	
	6324.5	4146.481	-0.018	11	BS	
	7108.5	4880.408	-0.049	8	IS	
GT CEP	3766	4114.508?	-0.117?	6	BS	
NN CEP	-169.5	4158.534	+0.013	18	BS	*
XY CET	2083.5	4166.546	-0.017	9	BS	*
U CRB	7909	4051.429	-0.018	9	BS	*
	7995	4348.308	-0.028	9	BS	*
Y CYG	11549.5	4140.495	+0.026	9	BS	
	11551.5	4146.469	+0.008	11	BS	
VW CYG	2908	4843.095	+0.100	11	BS	*
V448 CYG	4267	4180.68?	-0.09?	16	BS	*
	4267.5	4184.14	+0.10	16	BS	*
V477 CYG	5133	4893.350	-0.033	7	TY	
V836 CYG	26964.5	4166.386	-0.034	8	BS	
V1143 CYG	2438	4130.598	+0.054	11	BS	
	2444	4176.425	+0.036	6	BS	*
	2519	4749.498	+0.054	9	BS	
	2542	4925.259	+0.078	8	BS	
TW DRA	3649	4130.681	-0.040	13	BS	*
	3666	4178.402	-0.036	12	BS	
	3723	4338.404	-0.025	7	BS	
	3920	4891.354?	-0.028?	14	BS	

STAR	EPOCH	HELIO JD 244...	O - C	No	OBSERVER	
WW DRA	3488	4168.521?	+0.166?	25	BS	*
	3640.5	4874.373	+0.007	6	BS	
AI DRA	4240	4140.391	+0.010	8	BS	
	4245	4146.387	+0.011	10	BS	
	4437	4376.552	+0.004	7	TY	
	4567	4532.410	+0.016	9	HO	
	4849	4870.478	+0.019	7	IS	
S EQU	1798	4146.418	+0.016	10	BS	
	1908	4524.369	-0.002	9	HO	
	2027	4933.293	+0.030	9	BS	*
YY ERI	32812.5	4166.598	-0.016	7	BS	
	32818.5	4168.539	-0.004	6	BS	
Z HER	7771	4114.419	+0.012	9	BS	*
	7775	4130.379	+0.001	7	BS	*
	7779	4146.374	+0.026	10	BS	*
RX HER	6183	4167.306	-0.005	7	BS	
TX HER	7075	4898.375	+0.017	7	TY	
V450 HER	21016	4869.270	-0.208	16	BS	*
u HER	18666	4114.498	-0.002	6	BS	
SW LAC	20559	4166.463	+0.041	5	BS	
	20559.5	4166.612	+0.030	5	BS	
	20562	4167.430	+0.046	6	BS	
	20565	4168.383	+0.037	7	BS	
	20565.5	4168.544	+0.038	7	BS	
	20583.5	4174.319	+0.039	13	BS	
AR LAC	8699	3876.385	+0.011	8	BS	
CM LAC	10703	4201.331	+0.001	8	BS	
AM LEO	24010	4376.516	-0.038	7	TY	
HP LYR	127.5	4817	-39	24	BS	*
	128	4893	-33	27	BS	*
BETA LYR	3524	4126.67	+47.86	39	2	*
	3524.5	4132.94	+47.68	36	2	*
	3550	4462.89	+48.46	95	2	*
	3550.5	4468.99	+48.11	90	3	*
	3580.5	4857.19	+49.07	35	4	*
	3581	4864.02	+49.45	30	4	*
V505 MON		4309.5		5	2	*
		4690.9?		9	2	*
U OPH	21383	4146.333	+0.003	6	BS	
	21395.5	4167.289	-0.008	9	BS	*
V451 OPH	4536.5	4130.355	+0.006	12	BS	*

STAR	EPOCH	HELIO JD 244...	O - C	No	OBSERVER	
V451 OPH	4719.5	4532.332	+0.006	5	HO	
V566 OPH	21777	4166.348	+0.052	7	BS	*
	22653.5	4525.351	+0.005	4	HO	
	22668	4531.337	+0.051	11	TY	
AW PEG	1659	4166.351	+0.078	24	BS	*
BK PEG	27165.5	4843.423	-0.016	11	BS	
	27166	4843.574	-0.005	10	BS	
	27169	4844.409	-0.011	11	BS	
	27258	4869.375	-0.003	12	BS	
DI PEG	16472	4166.492	-0.016	9	BS	
FE PEG	3632	4168.311	+0.057	19	BS	*
AY PER	1513	4970.342	+0.036	5	BS	
IQ PER	2247	4140.405?	+0.012?	8	BS	*
	2262	4166.563	+0.016	9	BS	*
	2532	4637.303	-0.007	11	BS	*
IU PER	12771	4843.549	+0.074	22	BS	
	12807	4874.405	+0.078	15	BS	
	12919	4970.384	+0.071	8	BS	
IZ PER	5035.5	4140.571	-0.006	10	BS	
	5042.5	4166.398	+0.008	9	BS	
	5046	4179.300	+0.003	10	BS	*
	5231	4861.520	+0.005	12	IS	
BETA PER	1638	4176.316	-0.116	18	BS	*
	1766	4543.333	-0.125	7	HO	
	1796	4629.358	-0.122	12	BS	*
	2060	4933.280	-0.142	17	AY	
	2060	4933.306	-0.117	9	EA	
SZ PSC	2025	4146.452	-0.012	10	BS	
	2030	4166.374	+0.078	10	BS	*
UV PSC	18733	4168.551	+0.021	11	BS	
	19547	4869.447	+0.026	14	BS	
U SGE	4438	4114.499?	-0.009?	10	BS	
EL SGE	23122.5	4839.537	+0.059	10	BS	
	23128.5	4841.527	+0.053	12	BS	
	23167	4854.358	+0.070	5	BS	
	23320	4905.266	+0.060	3	BS	
V505 SGR	9624	4899.261	-0.023	7	TY	*
CD TAU	4973	3876.294	-0.060	12	BS	*
	4980	3900.345	-0.055	8	TY	
	5047	4130.547	-0.008	8	BS	
	5057.5	4166.602	-0.022	11	BS	

El	STAR	EPOCH	HELIO JD 244...	O - C	No	OBSERVER	
	GR TAU	39010	4841.599	+0.036	7	BS	*
		39204	4933.583?	+0.062?	9	BS	*
	HU TAU	9009	4166.497	+0.032	10	BS	
		9024	4197.326	+0.017	6	BS	*
		9044	4238.463	+0.028	8	TY	
		9238	4637.364	+0.007	11	BS	
		9347	4861.516	+0.023	8	IS	
	X TRI	7615	4970.417	-0.045	11	BS	
	W UMA	15477	3956.467	-0.095	7	TY	
		16041	4144.609	-0.130	8	BS	
		16106	4166.328	-0.097	6	BS	
		16107	4166.631	-0.128	5	BS	
		16736	4376.477	-0.146	7	TY	
		16739	4377.478	-0.146	6	TY	
		17518	4637.387	-0.147	10	BS	
	W UMI	6282	4144.413	-0.020	12	BS	
		6295	4166.501	-0.047	14	BS	
	RT UMI	9871	4813.421	-0.106	68	BS	*
	RU UMI	35026	4842.479	-0.011	14	BS	
	∠ VUL	7859	4749.468	+0.087	12	BS	*
	RS VUL	2525	4114.364	+0.007	27	BS	*
	SAO 77615	8125	4144.497	+0.040	6	BS	*
		8125.5	4144.671	+0.040	7	BS	*
		8189	4166.570	-0.060	6	BS	*

CHANGES OF ADDRESS

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STOP PRESS

HT Cassiopeiae - This eruptive object, which at one time was a possible candidate for inclusion on the BAA Main Programme has been seen at outburst by T. Kinnunen in Finland on 1985 Jan 13.70 at approximately 12.0 mag. (confirmed by Guy Hurst on Jan 13.80 at about 11.9). If anyone has the old preliminary BAA chart (or the AAVSO preliminary chart, derived from it), please attempt observations. Although this object has a catalogue period of 30 days, it has been rarely observed and Guy Hurst's preliminary check showed no observations since 1978. There were certain difficulties with this object and its field. Guy reports that the comparison that is nominally of magnitude 10.9 appears to be about a magnitude fainter. All other comparisons seem to be correct. It is possible that this comparison is itself variable and was the cause of some (or most) of the difficulties previously experienced.

A PLEA FROM THE SECRETARY

Will members submitting observations please include their full addresses. Many reports have been received without this information and in some cases it is difficult to identify the observers. If you have not received acknowledgement of your reports, this may be why!

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CIRCULARS

Charges: (4 issues)	U.K. & Eire - £2 for Circulars and light-curves Other countries - £3

Payments (made out to the BAA) and material for inclusion should be sent to Storm Dunlop.

CHARTS

Charges:	Main programme - SAE plus 20p per star (4 charts) All other programmes - SAE plus 5p per star (1 sheet)