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VARIABLE STAR SECTION

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Telephone Alert Numbers

The following may be called up to 23:00 UT (BST when in operation) to report variable-star activity, or at any time during the night for possible novae only:

Guy Hurst	0256 471074
Alan Young	0435 882102
Graham Keitch	0934 862924
Denis Buczynski	0524 68530

For subcription rates and charges for charts and publications see inside back cover.

Binocular and Telescopic Programmes 1988

The accompanying list gives details of all objects currently on the binocular and telescopic programme, and the charts available for them. It does not include objects on the separate programme of recurrent objects (see *VSSC 66*), eclipsing binaries (see the *Eclipsing Binary Handbook*), or Supernova search charts (listed elsewhere in this issue).

In addition to the objects mentioned in *VSSC 66*, two stars are dropped from the binocular programme as their ranges are too small for effective observation. They are NO Aur (6.10-6.30) and RR UMi (4.53-4.73).

The positions, types, ranges and periods are mostly from the GCVS, but account has also been taken of some data appearing since the catalogue was compiled. For many red variables, visual ranges have been taken from other sources. A key to the abbreviations under "Type" is given at the end of the list.

The column "Pr" indicates whether each star is on the binocular (B) or telescopic (T) programme. The separation into two programmes is a matter of administrative convenience and affects observers only in that the charges for binocular and telescopic charts differ (see inside back cover). Several objects on the telescopic programme are normally bright enough for observation with binoculars or the naked eye; these are marked "T*". Conversely, several objects on the binocular programme are often too faint for binoculars, and may be suitable for small telescopes; these are marked "B*".

The final column usually gives: the serial number appearing at the foot of the chart; the date of the latest revision or the name of the variable on whose chart the star in question appears. Observers are urged to check their charts to make sure they are using the latest versions, and were necessary to obtain replacements from the Chart Secretary.

Alert reports

Unusual activity in any star on the binocular or telescopic programme should be reported to any member of the alert team of "The Astronomer", whose telephone numbers are listed below (and inside the front cover). The following should be watched for in particular:

- major outbursts or subsidiary rises in the recurrent novae, old novae (especially GK Per), long-period dwarf novae (VY Aqr, WZ Sge, UV Per, SW UMa), and Z And stars
- supermaxima of UGSU stars
- fades of RCB stars to 0.5m or more below normal maximum brightness
- fading of PU Vul below its current brightness of 9m.

The following numbers are available up to 11 pm, and all night for possible novae: Guy Hurst 0256 471074; Alan Young 0435 882102; Graham Keitch 0934 862924; Denis Buczynski 0524 68530. Early detection and reporting will enable important observations to be made by amateurs and professionals world-wide.

Star	R.A. (1950)	Dec	Type	Range	Period	Pr	Chart
R And	00 21.4	+38 18	M	5.6 - 14.9 V	409	T	053.01
W And	02 14.4	+44 04	M	6.7 - 14.6 V	396	T	035.01
RS And	23 52.8	+48 22	SRA	7.0 - 9.1 V	136	B*	TZ And
RW And	00 44.6	+32 25	M	7.9 - 15.7 V	430	T	022.01
RX And	01 01.8	+41 02	UGZ	10.3 - 14.0 V	14	T	001.02
SU And	00 02.0	+43 16	LC	8.0 - 8.5 V		B*	TZ And
TZ And	23 48.4	+47 14	SRB	7.6 - 9.0 V		B*	1977 Sep 10
AQ And	00 24.9	+35 19	SR	8.0 - 8.9 V		B*	1982 Aug 16
BZ And	00 34.9	+45 20	LB	7.5 - 8.4 V		B*	1982 Aug 16
OS And	23 09.8	+47 12	N	6.3 - 18 V		T	N003.01
VY Aqr	21 09.5	-09 02	UGSU	8.4 - 17.2 P		T	1987 Oct 25
R Aql	19 04.0	+08 09	M	5.5 - 12.0 V	284	T	030.01
V Aql	19 01.7	-05 46	SRB	6.6 - 8.4 V	353	B	026.02
UU Aql	19 54.6	-09 27	UGSS	11.0 - 16.8 P	50	T	002.02
UW Aql	18 55.0	+00 23	LC	8.9 - 9.5 V		T	028.01
V450 Aql	19 31.3	+05 21	SRB	6.3 - 6.7 V	64	B	1978 Mar 10
V603 Aql	18 46.4	+00 32	NA/E+X	-1.1 - 12.0 V		T	1986 Oct 24
V1293 Aql	19 30.6	+04 55	SRB	6.7 - 7.4 V		B	V450 Aql
V Ari	02 12.3	+12 00	SRB	7.8 - 8.8 V	77?	B*	1984 Oct 26
SS Aur	06 09.6	+47 45	UGSS	10.3 - 15.8 V	56	T	003.02
UU Aur	06 33.1	+38 29	SRB	5.1 - 6.8 V	234	B	1984 Apr 9
AB Aur	04 52.6	+30 28	INA	6.9 - 8.4 B		B	TT Tau
Psi Aur	06 21.1	+49 19	LC	4.8 - 5.7 V		B	1973 Jul 14
U Boo	14 52.0	+17 54	SRB	9.8 - 13.0 V	201	T	036.01
V Boo	14 27.7	+39 05	SRA	7.0 - 12.0 V	258	T	037.01
W Boo	14 41.2	+26 44	SRB?	4.7 - 5.4 V	450?	B	undated
RV Boo	14 37.1	+32 45	SRB	6.3 - 8.0 V	137	B	1974 Jan 20
RW Boo	14 39.1	+31 47	SRB	6.4 - 7.9 V	209	B	RV Boo
RX Boo	14 21.9	+25 56	SRB	6.9 - 9.1 V	160	B*	1972 Aug 12
U Cam	03 37.5	+62 29	SRB	7.7 - 8.7 V		B*	1972 Nov 4
V Cam	05 56.0	+74 30	M	7.7 - 16.0 V	522	T	027.01
X Cam	04 39.2	+75 01	M	7.4 - 14.2 V	144	T	038.01
Z Cam	09 19.7	+73 16	UGZ	10.0 - 14.5 V	22	T	004.02
RY Cam	04 26.1	+64 20	SRB	7.3 - 9.4 V	136	B*	UV Cam
ST Cam	04 46.0	+68 05	SRB	6 - 8 V	300?	B	1976 Jun 2
UV Cam	04 01.5	+61 40	SRB	7.5 - 8.1 V	294?	B	1972 Jul 29
XX Cam	04 04.8	+53 14	RCB?	7.3 - 9.7 V		T*	068.01
ZZ Cam	04 13.3	+62 13	LB	7.1 - 7.9 V		B	UV Cam
X Cnc	08 52.6	+17 25	SRB	5.6 - 7.5 V	195?	B	1984 Apr 8
RS Cnc	09 07.6	+31 10	SRC?	5.1 - 7.0 V	120?	B	1984 Apr 12
RT Cnc	08 55.6	+11 02	SRB	7.1 - 8.6 V	60?	B*	1972 Jul 29
SU Cnc	08 10.7	+13 57	M	12.0 - [16 P	187	T	1973 Mar
U CVn	12 44.9	+38 39	M	7.0 - [13 V	346	T	1983 Mar
V CVn	13 17.3	+45 47	SRA	6.5 - 8.6 V	192	B*	Y CVn
Y CVn	12 42.8	+45 43	SRB	5.2 - 6.6 V	157	B	1984 Apr 12
RT CVn	13 46.5	+33 56	M	10.0 - 14 V	254	T	1971 May
TU CVn	12 52.7	+47 28	SRB	5.6 - 6.6 V	50	B	Y CVn
W CMa	07 05.7	-11 51	LB	6.4 - 7.9 V		B	1982 Nov 7
S Cas	01 16.0	+72 21	M	7.9 - 16.1 V	612	T	054.01
T Cas	00 20.5	+55 31	M	6.9 - 13.0 V	445	T	067.01

Star	R.A. (1950)	Dec	Type	Range	Period	Pr	Chart
UV Cas	23 00.2	+59 20	RCB	10.5 - 15.2 V		T	061.01
WZ Cas	23 58.7	+60 05	SRB	6.9 - 8.5 V	186	B*	1982 Aug 16
V391 Cas	01 52.5	+69 58	LB	7.6 - 8.4 V		B	1978 May 15
V393 Cas	01 58.5	+71 03	SRA	7.0 - 8.0 V	393	B	V391 Cas
V465 Cas	01 15.1	+57 32	SRB	6.2 - 7.2 V	60	B	1983 Oct 1
Gam Cas	00 53.7	+60 27	GCAS	1.6 - 3.0 V		T*	064.01
Rho Cas	23 51.9	+57 13	SRD	4.1 - 6.2 V	320	T*	Gam Cas
W Cep	22 34.6	+58 10	SRC	7.0 - 9.2 V		B*	RW Cep
RU Cep	01 14.4	+84 52	SRD	8.2 - 9.8 V	109	B*	RX Cep
RW Cep	22 21.2	+55 43	SRD	6.2 - 7.6 V	346?	B	1983 Oct 1
RX Cep	00 45.9	+81 42	SRD?	7.2 - 8.2 V	55?	B	1985 May 06
SS Cep	03 41.6	+80 10	SRB	6.7 - 7.8 V	90	B	1972 Nov 4
AR Cep	22 52.6	+84 47	SRB	7.0 - 7.9 V		B	RX Cep
DM Cep	22 07.4	+72 31	LB	6.9 - 8.6 V		B	undated
FZ Cep	21 18.2	+55 14	SR	7.0 - 7.6 V		B	1983 Oct 1
Mu Cep	21 42.0	+58 33	SRC	3.4 - 5.1 V	730	B	1973 Jul 14
Omi Cet	02 16.8	-03 12	M	2.0 - 10.1 V	332	T*	039.01
R Com	12 01.7	+19 04	M	7.1 - 14.6 V	363	T	1946
R CrB	15 46.5	+28 18	RCB	5.7 - 14.8 V		T*	041.01
S CrB	15 19.4	+31 33	M	5.8 - 14.1 V	360	T	043.01
T CrB	15 57.4	+26 04	NR	2.0 - 10.8 V	29000	T	025.01
V CrB	15 47.7	+39 43	M	6.9 - 12.6 V	358	T	057.01
W CrB	16 13.6	+37 55	M	7.8 - 14.3 V	238	T	044.01
RR CrB	15 39.6	+38 43	SRB	7.1 - 8.6 V	61	B	SW CrB
SW CrB	15 38.9	+38 53	SRB	7.8 - 8.5 V	100?	B	1984 Jan 4
R Cyg	19 35.5	+50 05	M	6.1 - 14.4 V	426	T	031.01
S Cyg	20 04.4	+57 50	M	9.3 - 16.0 V	323	T	032.01
V Cyg	20 39.7	+47 58	M	7.7 - 13.9 V	421	T	034.01
W Cyg	21 34.1	+45 09	SRB	5.0 - 7.6 V	131	T*	062.01
RU Cyg	21 39.0	+54 06	SRA	8.0 - 9.4 V	233	B*	FZ Cep
RV Cyg	21 41.2	+37 47	SRB	7.1 - 9.3 V	263	B*	V460 Cyg
SS Cyg	21 40.7	+43 21	UGSS	7.7 - 12.4 V	50	T	005.02
TT Cyg	19 39.0	+32 30	SRB	7.4 - 8.7 V	118	B*	1972 Sep 16
AF Cyg	19 28.7	+46 02	SRB	6.4 - 8.4 V	92	B	1983 Oct 2
BC Cyg	20 19.8	+37 22	SRC	9.6 - 10.5 V	700?	T	BI Cyg
BI Cyg	20 19.5	+36 46	LC	8.4 - 9.9 V		T	065.01
CH Cyg	19 23.2	+50 08	ZAND+SR	5.6 - 8.5 V		B	1982 Feb 20
CI Cyg	19 48.4	+35 33	EA/G+ZAND	9.1 - 11.5 V	855	T	006.01
V460 Cyg	21 39.9	+35 17	SRB	5.6 - 7.0 V	180?	B	1983 Sep 18
V973 Cyg	19 43.1	+40 36	SRB	6.2 - 7.0 V	40?	B	AF Cyg
V1819 Cyg	19 52.8	+35 34	N	8.7 - 19 V		T	1987 Oct 3
Chi Cyg	19 48.6	+32 47	M	3.3 - 14.2 V	408	T	045.01
P Cyg	20 16.0	+37 53	SDOR	3 - 6 V		B	1972 Jul 29
U Del	20 43.2	+17 54	SRB	5.6 - 7.5 V	110?	B	EU Del
EU Del	20 35.6	+18 06	SRB	5.8 - 6.9 V	60	B	1983 Oct 1
HR Del	20 40.1	+18 59	NB	3.5 - 12.0 V		T	1972 Nov
T Dra	17 55.6	+58 13	M	7.2 - 13.5 V	422	T	046.01
RY Dra	12 54.5	+66 16	SRB?	6.0 - 8.0 V	200?	B	VY UMa
TX Dra	16 34.3	+60 34	SRB	6.8 - 8.3 V	78?	B	AT Dra
UW Dra	17 56.5	+54 40	LB	7.0 - 8.2 V		B	1974 Jul 27

Star	R.A. (1950)	Dec	Type	Range	Period	Pr	Chart
UX Dra	19 23.4	+76 28	LB	5.9 - 7.1 V	168	B	1982 Nov 07
VW Dra	17 15.9	+60 43	SRD?	6.0 - 7.0 V	170?	B	AT Dra
AB Dra	19 51.1	+77 37	UGZ	11.0 - 15.3 V	13	T	007.03
AH Dra	16 47.4	+57 54	SRB	7.1 - 7.9 V	158	B	AT Dra
AT Dra	16 16.4	+59 52	LB	5.3 - 6.0 V		B	1972 Jan 25
U Gem	07 52.1	+22 08	UGSS+E	8.2 - 14.9 V	105	T	008.02
TU Gem	06 07.8	+26 02	SRB	7.4 - 8.3 V	230	B*	1972 Nov 11
TV Gem	06 08.8	+21 53	SRC	6.6 - 8.0 V		B	TU Gem
WY Gem	06 08.9	+23 13	LC+E?	7.2 - 7.9 V		B	TU Gem
BN Gem	07 34.2	+17 01	GCAS	6.8 - 6.9 V		B	1972 Jul 29
BQ Gem	07 10.5	+16 15	SRB	5.1 - 5.5 V	50?	B	1972 Sep 16
BU Gem	06 09.3	+22 55	LC	5.7 - 8.1 V		B	TU Gem
DW Gem	06 27.8	+27 29	LB	8 - 10 V		B*	1985 Mar 18
IR Gem	06 44.5	+28 08	UGSU	10.7 - [14.5 V	75	T	042.01
IS Gem	06 46.4	+32 40	SRC	5.3 - 6.0 V	47?	B	1972 Jun 10
X Her	16 01.2	+47 23	SRB	6.3 - 7.4 V	95	B	1982 Feb 7
RU Her	16 08.2	+25 12	M	6.8 - 14.3 V	485	T	060.01
SS Her	16 30.5	+06 58	M	8.5 - 13.5 V	107	T	047.01
ST Her	15 49.3	+48 38	SRB	7.0 - 8.7 V	148	B*	1971 May 1
SX Her	16 05.3	+25 02	SRD	8.0 - 9.2 V	103	B*	VSSC 65 p 9
UW Her	17 12.6	+36 25	SRB	7.8 - 8.7 V	104	B*	1973 Aug 30
AC Her	18 28.2	+21 50	RVA	6.8 - 9.0 V	75	T*	048.02
AH Her	16 42.1	+25 21	UGZ	10.9 - 14.7 P	20	T	009.03
IQ Her	18 15.7	+17 58	SRB	7.0 - 7.5 V	75	B	AC Her
OP Her	17 55.4	+45 21	SRB	5.9 - 6.7 V	120	B	1984 Apr 12
V566 Her	18 06.3	+41 43	SRB	7.1 - 7.8 V	137	B	OP Her
g Her	16 27.0	+41 59	SRB	4.3 - 6.3 V	89	B	X Her
N Her 1987	18 41.4	+15 16	N	7.5 - 18.0 P		T	1987 Feb 28
R Hya	13 27.0	-23 01	M	3.5 - 10.9 V	389	T*	049.01
U Hya	10 35.1	-13 07	SRB	4.3 - 6.5 V	450?	B	1982 Nov 01
SU Lac	22 21.0	+55 16	M	11 - 15 V	302	T	069.01
SX Lac	22 53.6	+34 56	SRD	7.7 - 8.7 V	190	B*	1974 Jul 28
DK Lac	22 47.7	+53 01	NA	5.0 - 15.5 P		T	GMH
X Leo	09 48.4	+12 07	UGSS	11.1 - 15.7 V	17	T	010.01
RS Leo	09 40.6	+20 05	M	10.7 - 16.0 P	208	T	1971 Mar
RY Leo	10 01.6	+14 14	SRB	9.0 - 11.8 V	155	T	1942 Feb 17
RX Lep	05 09.0	-11 55	SRB	5.0 - 7.4 V	60?	B	1972 Sep 16
U LMi	09 51.6	+36 20	SRA	10.0 - 13.3 V	272	T	1942
W LMi	10 41.9	+26 18	SRD	10.5 - 13.5 V	117	T	1976 Apr
W Lyn	08 13.4	+40 17	M	7.5 - 14.0 V	295	T	1971 Jul
X Lyn	08 22.3	+35 34	M	9.5 - 16 V	321	T	1982 Feb
Y Lyn	07 24.6	+46 06	SRC	6.9 - 8.0 V	110	B	1978 Jul 14
SV Lyn	08 00.4	+36 29	SRB	6.6 - 7.5 V	70?	B	1981 Jun 18
R Lyr	18 53.8	+43 53	SRB	3.9 - 5.0 V	46?	B	1972 Nov 11
XY Lyr	18 36.4	+39 37	LC	5.8 - 6.4 V		B	1972 Sep 16
AY Lyr	18 42.7	+37 57	UGSU	12.5 - 18.4 B	24	T	011.01
U Mon	07 28.4	-09 40	RVB	5.9 - 7.8 V	91	T*	029.02
RV Mon	06 55.7	+06 14	SRB	6.8 - 8.3 V	132	B	SX Mon
SX Mon	06 49.3	+04 50	SR	7.3 - 8.5 V	100	B*	1987 Dec 30
X Oph	18 36.0	+08 47	M	5.9 - 9.2 V	328	B*	1972 Nov 4

Star	R.A. (1950)	Dec	Type	Range	Period	Pr	Chart
RS Oph	17 47.5	-06 42	NR	4.3 - 12.5 V		T	024.01
V2048 Oph	17 57.8	+04 22	GCAS+UV?	4.6 - 4.9 V		B	1978 Jul 14
W Ori	05 02.8	+01 07	SRB	5.9 - 7.7 V	212	B	1972 Nov 4
U Ori	05 52.8	+20 10	M	4.8 - 13.0 V	368	T	059.01
BL Ori	06 22.6	+14 45	LB	6.3 - 6.9 V		B	1983 Oct 3
BQ Ori	05 54.1	+22 50	SR	6.9 - 8.9 V	110	B*	Y Tau
CK Ori	05 27.7	+04 10	SR?	5.9 - 7.1 V	120?	B	1972 Aug 12
CN Ori	05 49.7	-05 26	UGZ	11.0 - 16.2 V	16	T	012.02
CZ Ori	06 13.9	+15 25	UGSS	11.2 - 15.6 V	26	T	013.02
RU Peg	22 11.6	+12 27	UGSS+ZZ?	9.0 - 13.2 V	74	T	014.02
AG Peg	21 48.6	+12 24	NC	6.0 - 9.4 V		B*	1984 Apr 11
GO Peg	22 52.6	+19 18	LB	7.1 - 7.8 V		B	1971 Jul 28
S Per	02 19.2	+58 22	SRC	7.9 - 12.0 V	822	T	050.01
X Per	03 52.2	+30 54	GCAS+XP	6.0 - 7.0 V		B	1984 Apr 8
RS Per	02 18.8	+56 53	SRC	7.8 - 10.0 V	244	T	BU Per
SU Per	02 18.6	+56 23	SRC	7.0 - 8.5 V	533	B*	AD Per
TZ Per	02 10.3	+58 09	UGZ	12.0 - 15.6 V	17	T	015.02
UV Per	02 06.7	+56 57	UGSS	11.0 - 17.5 V	320	T	016.03
AD Per	02 17.0	+56 46	SRC	7.7 - 8.4 V	362	B*	1972 Feb 4
BU Per	02 15.4	+57 12	SRC	9.0 - 10.0 V	367	T	063.01
GK Per	03 27.8	+43 44	NA+XP	0.2 - 14.0 V		T	1977 Aug
KK Per	02 06.8	+56 19	LC	6.6 - 7.9 V		B	AD Per
PR Per	02 18.1	+57 38	LC	7.6 - 8.3 V		B*	AD Per
Z Psc	01 13.4	+25 30	SRB	7.0 - 7.9 V	144	B	1969 Nov 10
TV Psc	00 25.4	+17 37	SR	4.7 - 5.4 V	49	B	1972 Sep 9
TX Psc	23 43.8	+03 13	LB	4.8 - 5.2 V		B	1972 May 27
WZ Sge	20 05.3	+17 33	UGSU+E+ZZ	7.0 - 15.0 P		T	023.01
R Sct	18 44.8	-05 46	RVA	4.2 - 8.6 V	146	T*	V Aql
S Sct	18 47.6	-07 58	SRB	7.0 - 8.0 V	148	B	V Aql
R Ser	15 48.4	+15 17	M	5.2 - 14.4 V	356	T	033.01
Y Tau	05 42.7	+20 41	SRB	6.5 - 9.2 V	242	B*	1984 Apr 12
RV Tau	04 44.0	+26 05	RVB	8.8 - 11 V	77	T	056.01
SU Tau	05 46.1	+19 03	RCB	9.1 - 16.9 V		T	017.02
TT Tau	04 48.4	+28 27	SRB	8.1 - 8.8 V	166	B*	1983 Oct 1
BU Tau	03 46.2	+23 59	GCAS	4.8 - 5.5 V		B	1983 Oct 3
CE Tau	05 29.3	+18 34	SRC	4.2 - 4.5 V	165	B	1972 May 27
W Tri	02 38.4	+34 18	SRC	7.5 - 8.8 V	108	B*	1973 Jul 8
T UMa	12 34.1	+59 46	M	6.6 - 13.5 V	257	T	066.01
Z UMa	11 53.9	+58 09	SRB	6.2 - 9.4 V	196	B*	1984 Apr 12
RY UMa	12 18.1	+61 35	SRB	6.7 - 8.3 V	310?	B	Z UMa
ST UMa	11 25.1	+45 28	SRB	6.0 - 7.6 V	110?	B	1972 Jun 10
SU UMa	08 08.1	+62 45	UGSU	10.8 - 15.0 V	19	T	018.02
SW UMa	08 33.0	+53 39	UGSU	9.7 - 16.5 V	460	T	019.02
TV UMa	11 43.0	+36 10	SRB	6.8 - 7.3 V	42	B	1982 Aug 16
VW UMa	10 55.6	+70 15	SR	6.9 - 7.7 V	610	B	VY UMa
VY UMa	10 41.6	+67 40	LB	5.9 - 7.0 V		B	1983 Jun 11
CH UMa	10 03.2	+67 47	UG	10.6 - 16.0 B	204	T	020.02
V UMi	13 37.8	+74 34	SRB	7.2 - 9.1 V	72	B*	1981 May 10
RW Vir	12 04.7	-06 29	LB	6.7 - 7.4 V		B	RX Vir
RX Vir	12 02.2	-05 30	SRD?	8.0 - 8.4 V	200?	B*	1982 Feb 05

Star	R.A. (1950)	Dec	Type	Range	Period	Pr	Chart
SS Vir	12 22.7	+01 03	SRA	6.0 - 9.6 V	364	B*	1972 Aug 12
SW Vir	13 11.5	-02 33	SRB	6.4 - 7.9 V	150?	B	1974 Jan 21
BK Vir	12 27.8	+04 42	SRB	7.3 - 8.8 V	150?	B*	1974 Jan 21
V Vul	20 34.4	+26 26	RVA	8.1 - 9.5 V	76	T	058.01
PU Vul	20 19.0	+21 25	NC	8.7 - 16.6 P		T	052.01
PW Vul	19 24.1	+27 16	N	6.4 - 17: V		T	N008.01
QU Vul	20 24.7	+27 41	NA	5.6 - 19 V		T	1987 Oct 3
N Vul 1987	19 02.5	+21 42	N	7.0 - [15 V		T	N007.01
Mkn 421	11 01.7	+38 29	BLLAC	11.0 - 13.8 V		T	1984 Sep 9
NGC 4151	12 08.0	+39 41	GAL	10.8 - 12.7 V		T	1984 Jul 15
3C 273	12 26.6	+02 20	QSO	12.4 - 13.2 V		T	1984 Jul 15

Key to Abbreviations for Types of Variable

BLLAC	BL Lac: variable starlike galaxy nucleus with flat radio spectrum and no strong emission lines.
E	Eclipsing binary star.
EA	Algol-type eclipsing binary, with contact times identifiable from light curve. The suffix /G signifies giant component(s).
GAL	Optically variable galactic nucleus.
GCAS	Gamma Cas: shell star with temporary fades.
INA	Orion variable of early spectral type: young object in diffuse nebula with irregular variations and occasional abrupt Algol-like fades.
LB	Slow irregular variable of late spectral type.
LC	Slow irregular supergiant variable of late spectral type.
M	Mira: long-period variable giant.
N	Nova: thermonuclear runaway on white dwarf component of close binary.
NA	Fast nova, fading 3m in 100d or less.
NC	Very slow nova, at max. more than 10 years; often classed with ZAND.
NR	Recurrent nova.
QSO	Optically variable quasar.
RCB	R CrB: cyclic pulsations and irregular deep fades.
RVA	RV Tau star (pulsating supergiant with alternating primary and secondary minimum) with constant mean magnitude.
RVB	RV Tau star with varying mean magnitude.
SDOR	S Dor: high luminosity star, usually in diffuse nebula and with expanding shell.
SR	Semiregular.
SRA	Semiregular red giant with persistent periodicity.
SRB	Semiregular red giant with poorly expressed periodicity.
SRC	Semiregular red supergiant.
SRD	Semiregular giant or supergiant of intermediate spectral type.
UG	U Gem: dwarf nova, with pulsed release of gravitational energy from accretion disc around white dwarf component of close binary.
UGSS	SS Cyg: dwarf nova with outbursts lasting several days.
UGSU	SU UMa: dwarf nova with short outbursts like UGSS, and occasional supermaxima 2m brighter and five times longer.
UGZ	Z Cam: dwarf nova with cyclic outbursts interrupted by standstills.
UV	UV Cet: flare star.
X	X-ray binary containing compact object (white dwarf, neutron star or black hole).
XP	X-ray pulsar, with period 1 sec. to 100 min., and slower light change due to rotation of ellipsoidal component.
ZAND	Z And: symbiotic star, a close binary comprising a cool star and a hot one exciting an extended envelope.
ZZ	ZZ Cet: non-radially pulsating white dwarf.

MINIMA OF ECLIPSING BINARIES, 1986 - (2) Cyg to Ori

John Isles

In the accompanying list of observed minima, photoelectric determinations are underlined. For further explanations, see VSSC 58.

The total numbers of observations received for known and suspected eclipsing variables in constellations Cyg-Ori, including estimates reserved for separate discussion, are summarised below.

	Observations	Timings
Photoelectric:		
J Ells (EJ)	166	7
Visual:		
M Beveridge	24	-
N Bone	9	-
T Brelstaff (BS)	214	18
A Chapman	35	-
L Cluyse (UY)	69	2
H Duncan (DH)	478	8
R Geddes	158	-
B Green	5	-
J Hilder	18	-
J Isles (IS)	133	10
G Kirby (KG)	16	2
P Langridge	39	-
A Markham (QM)	93	2
I Middlemist (MM)	243	12
G Pointer	58	-
M Savage	5	-
M Taylor (TY)	90	1
N Taylor	147	-
W Williams	2	-
Composite timings	-	2
Total	1836	57
Grand total	2002	64

In addition to the above timings, we include some unpublished timings in earlier years for Beta Lyr, V505 Mon and FO Ori; and we repeat earlier results by observer EJ, which as previously published were affected by an error in the light-time corrections. An asterisk draws attention to further information in the following notes.

V367 Cyg. Observations 6578-6784 folded onto a single cycle in order to derive the timings.

68u Her. Observations 6492-6763 by DH and 6615-6790 by QM folded onto single cycles in order to derive the timings.

Beta Lyr, V505 Mon. Observations in each calendar year folded onto single cycles in order to derive the timings.

V1010 Oph. Observations 6559-6678 folded onto a single cycle in order to derive the timings.

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
WZ Cyg	6651	5	6675
CG Cyg	6643	1	6652
AK Her	6593	4	6652
	6613	2	6643
SW Lac	6707	2	6708
V566 Oph	6613	3	6643
V839 Oph	6643	13	6593-6652
FO Ori	5037	6	5055-5414
	6052	1	6109

Observed minima

Star	Epoch	Helio JD 244...	O - C	No	Observer	
WZ Cyg	9951	6641.524	+0.029	10	BS	
	9968	6651.454	+0.022	10	BS	*
CG Cyg	11437	6643.515	+0.034	6	IS	*
GO Cyg	17305	6351.3333	+0.0248	34	EJ	
	17808	6712.3731	+0.0294	11	EJ	
MR Cyg	7942	6715.4156	+0.0077	23	EJ	
V367 Cyg	498	6652.63	+0.11	36	DH	*
	498.5	6661.63	-0.19	32	DH	*
V466 Cyg	12852.5	6659.493	-0.001	6	BS	
	12874	6689.418	+0.004	9	BS	
V477 Cyg	1078	6719.321	+0.001	6	MM	
	1078	6719.324	+0.004	8	KG	

Star	Epoch	Helio JD 244...	O - C	No	Observer	
V477 Cyg	1078	6719.326	+0.006	7	TY	
V836 Cyg	2274	6339.3516	+0.0020	30	EJ	
V1143 Cyg	580	6644.416	+0.009	7	DH	
	583	6667.335?	+0.006?	4	DH	
	594	6751.365	-0.013	7	KG	
V1425 Cyg	4760	6362.2961	-0.0100	31	EJ	
	4778.5	6385.4769	+0.0016	25	EJ	
Z Dra	2167	6441.330	-0.013	10	BS	
	2349	6688.378	-0.022	11	BS	
TW Dra	823	6446.348	+0.017	8	MM	
AI Dra	2398	6166.3839	-0.0005	26	EJ	
	2531.5	6326.4311?	+0.0050?	12	EJ	
	2559	6359.3932	-0.0003	21	EJ	
	2886	6751.386	-0.020	9	MM	
BH Dra	3521	6418.2919	-0.0033	30	EJ	
BS Dra	1563	6719.3726	-0.0023	23	EJ	
YY Eri	15094.5	6434.446	+0.029	6	MM	
	15103.5	6437.346	+0.035	7	MM	
	15116	6441.357	+0.028	7	MM	
	15131.5	6446.341	+0.028	8	MM	
	15159.5	6455.337	+0.022	11	MM	
RX Her	7407	6344.2853	+0.0016	16	EJ	
	7416	6360.2940	+0.0031	21	EJ	
AK Her	10455	6593.462	-0.010	11	IS	*
	10502.5	6613.496	+0.001	9	IS	*
DQ Her	60394	6648.485	+0.001	19	UY	
	60399	6649.452	0.000	25	UY	
68u Her	19882.5	6609.628	+0.051	60	DH	*
	19883	6610.543	-0.059	44	DH	*
	19938.5	6724.352?	-0.082?	15	QM	*
	19939	6725.456?	+0.086?	9	QM	*
SW Lac	4266	6643.522	-0.021	6	IS	
	4294	6652.518	-0.006	7	IS	
	4340.5	6667.437	0.000	7	BS	

Star	Epoch	Helio JD 244...	O - C	No	Observer	
SW Lac	4371.5	6677.384	+0.005	7	BS	
	4406	6688.449?	+0.005?	6	BS	
	4465	6707.355	-0.011	6	MM	*
	4465	6707.4465	-0.0072	19	EJ	
	4490	6715.381	-0.003	7	MM	
AR Lac	2404	6361.2806?	-0.0254?	14	EJ	
	2576	6702.3824	-0.0326	21	EJ	
	2577	6704.378	-0.020	9	MM	
AW Lac	17354	6457.288?	+0.050?	5	BS	
CM Lac	12246	6677.368	-0.002	7	BS	
UV Leo	13466	6521.4739	+0.0060	19	EJ	
AM Leo	10946	6497.4051	-0.0023	22	EJ	
Beta Lyr	2496.5	0511.30	+23.96	26	1	*
	2497	0517.95	+24.16	17	1	*
	2522.5	0847.74	+24.64	29	2	*
	2523	0854.24	+24.69	33	2	*
	2541	1087.12	+25.12	18	7	*
	2541.5	1093.31	+24.86	16	6	*
	2579	1578.43	+25.75	81	5	*
	2579.5	1584.90	+25.71	108	6	*
	2664.5	2684.05	+27.19	27	4	*
	2665	2690.82	+27.50	20	3	*
	2972	6662.05	+34.19	303	13	*
	2972.5	6668.35	+34.03	320	13	*
MX Mon	23762	6441.456	-0.073	9	BS	
V505 Mon	-80.5	0309.5?	+3.5?	33	3	*
	-61.5	1327.6?	-0.2?	28	4	*
	-40.5	2456.5	-0.7	110	3	*
	-33.5	2836.8?	+3.1?	29	3	*
	-33	2862.8	+2.3	13	3	*
V566 Oph	11614	6593.489	+0.002	7	IS	
	11663	6613.580?	+0.021?	10	IS	*
V839 Oph	15073.5	6613.461?	+0.057?	8	IS	
	15078.5	6615.499	+0.050	9	IS	
	15147	6643.493?	+0.028?	16	IS	*
	15186	6659.442	+0.027	7	BS	
	15205.5	6667.424	+0.033	7	BS	
	15230	6677.451	+0.039	6	BS	

Star	Epoch	Helio JD 244...	O - C	No	Observer	
V839 Oph	15247	6684.404	+0.039	7	BS	
V1010 Oph	11650.5	6643.738	+0.024	33	DH	*
	11651	6644.050	+0.006	39	DH	*
FO Ori	703	5037.392?	-0.043?	16	BS	*
	757	6052.679?	+0.013?	7	BS	*
FT Ori	1616.5	6441.374?	+0.044?	6	MM	
V530 Ori	3420	6457.294?	-0.045	6	BS	
V640 Ori	8682	6441.384	-0.021	10	BS	

Forthcoming VSS Reports

(The full text of these reports will be published in the BAA Journal)

Mira Stars - III: R Dra, R Gem, S Her, T Her, U Her and R Leo
(J.E. Isles and D.R.B. Saw)

Some 54 000 visual observations of six Mira stars, observed for between 54 and 70 years, are analysed, and the results are compared with catalogue data. A number of interesting correlations are found among features in the light curves. The periods of S Her, U Her and R Leo may vary, though for none of these is the evidence conclusive. The period of T Her appears to show short-term, non-random oscillations about the mean value.

Eclipsing Binaries, Lacerta to Orion, in 1969-1986 [revised version]
(J.E. Isles)

Photoelectric and visual observations of 37 known and suspected eclipsing binaries are discussed. Revised light elements are derived for HP Lyr, V389 Oph and V530 Ori. WZ Leo is probably constant. Both of the alternative periods given in the literature for UW Ori appear to be incorrect. The period of V643 Ori is confirmed to be 52.42d, and not 26.21d.

Hoffmeister's *Variable Stars* - Last chance of a discount

As a few persons have not taken up their orders of for this book at a special discount price, just a few copies are still available from the bulk orders that were placed. The price is £25.00 - exactly half of the nominal UK price - plus £1.60 for inland postage. This offer cannot be repeated - even at a higher price - so anyone wanting a copy is urged to contact Storm Dunlop as soon as possible. Please do not send payment, until availability is confirmed. First come, first served.

Eta Geminorum - A correction

An error was inadvertently made in discussing Eta Geminorum in *Circular 66*. This star is on the programme of the JAS Variable Star Section, but there are no plans for it to be incorporated in any of the BAA VSS programmes. Any members who have made observations are urged to send them, not to Melvyn Taylor, as stated, but direct to John Isles in his capacity as Director of the JAS Variable Star Section.

Price of Eclipsing Binary Handbook - A correction

Because of an error by the price of the Eclipsing Binary Handbook was given as two different amounts in *Circular 66*. The correct price, now shown inside the back cover, is £1.00 (collected from the BAA Office), £1.25 by post (inland) and £1.50 (overseas). Copies may be ordered from Storm Dunlop.

Does this star vary? - John Isles

(adapted from an article in *Light Curve*, Vol.2, No.6, 1977 Nov.)

The literature abounds with premature reports of suspected variables that have not been confirmed. These will appear in catalogues of suspected variables for all time and will cause many wasted hours of amateur and professional observing time, either in investigating them, or through avoiding them as comparison stars. Observers should not publish suspicions that a star is variable without good grounds.

When one has a series of observations of a suspect, there is a simple statistical test that may be used to decide if they show evidence of variation. One must remember that visual estimates do not strictly show a 'normal' distribution, partly because the standard error of an observation will vary according to the conditions of observation, and partly because of *scale error*. In a case where comparison star magnitudes are, e.g., 6.0, 6.4, and 7.0, an observer is quite likely to record estimates of 6.0, 6.2, 6.4, 6.7 and 7.0 more often than other values. Accurate comparison star magnitudes may not be available anyway. A non-parametric test is required, such as *Spearman's Rank-correlation Test* . This is illustrated in the following example.

Table 1 lists 25 estimates of BD+19°4450 Del (NSV 13150) made by the writer in 1968-1972. The observations are first ranked from 1 (brightest) to 25 (faintest); where more than one observation was made at a particular magnitude, the observations are ranked in random order, or in this case in order of Julian Date read from right to left, which serves well enough here. The unsigned differences between ranks of consecutive observations are then written down. We include the difference between the last and first ranks as this simplifies the test without appreciably reducing its sensitivity. If the star varies, we expect high (or low) rank values to tend to come together, and the rank differences to be lower on average than one would expect by chance. We substitute the sum of the squared rank differences, SSRD, into the formula for the rank-correlation coefficient: $r_s = 1 - \frac{(6 \times SSRD)}{n(n^2 - 1)}$

where n is the number of observations.

Table 1 - Observations of BD +19°4450 Del (NSV 13150)

JD	Mag.	Rank	Diff.	JD	Mag.	Rank	Diff.
2440080	6.9	2		2440780	7.7	15	
			3				1
087	7.3	5		940	7.7	14	
			4				11
100	6.9	1		053	7.9	25	
			3				19
117	7.0	4		059	7.4	6	
			3				1
121	6.9	3		073	7.5	7	
			13				5
393	7.7	16		092	7.6	12	
			4				7
414	7.8	20		131	7.8	19	
			3				3
438	7.8	23		145	7.8	22	
			4				11
440	7.8	17		151	7.6	11	
			13				10
455	7.5	8		174	7.8	21	
			1				3
709	7.5	9		221	7.8	18	
			4				6
739	7.6	13		269	7.8	24	
			2				14
780	7.7	15		510	7.6	10	
							8

Sum of squared differences = 1464

In this case we get $r_s = 0.44$.

$$r_s = 1 - \frac{(6 \times 1464)}{25(25^2 - 1)} = 0.44$$

We need to know whether this value is significantly greater than we should expect to get by chance. Table 2 shows critical values of r_s for various values of n. For n = 25, we obtain, by interpolation, critical values of 0.345 for a significance level of 5% and 0.48 for 1%. Thus the *a priori* probability of getting a value as high as 0.44 is much less than 1 in 20.

We cannot conclude from this that BD+19°4450 Del is necessarily variable, for the observations may be subject to systematic error, e.g. bias or seasonal effects, and there is also the possibility that the result was obtained by chance; the test rather works the other way round, for if r_s were less than the critical value, we should conclude that the observations do not show acceptable evidence for variation on a time-scale longer than the median interval between estimates. (Variation on a shorter time-scale cannot be demonstrated unless it is regular.) Before publishing a claim that a star is variable I suggest that an observer should check that the results are significant at the 5% level.

When the work of two or more observers is discussed together, a correction must first be made to allow for any constant difference between the individual observers' results, due to the use of different instruments or observing techniques, otherwise, spuriously significant results may be obtained when the observations are unevenly distributed.

Table 2 - Critical values of r_s for values of n

	Significance level			Significance level	
n	5%	1%	n	5%	1%
4	1.00	-	10	0.56	0.75
5	0.90	1.00	12	0.50	0.70
6	0.83	0.94	16	0.43	0.60
7	0.71	0.89	20	0.38	0.53
8	0.64	0.83	30	0.31	0.43
9	0.60	0.78	40	0.26	0.36

For more than 40 observations, critical values are, to sufficient accuracy: $\frac{1.64}{\sqrt{n}}$ at the 5% level, and $\frac{2.33}{\sqrt{n}}$ at the 1% level.

UK Nova/Supernova Patrol Catalogue of Galaxies - Guy Hurst

A new catalogue is now available for Supernova Search Galaxies. This abridged version gives the Messier/IC or NGC number for each galaxy, RA and DEC for (1950), and m_{pg} of the galaxy. This is followed by three columns giving chart availability. The first covers 'A' charts which are finders, then 'B' for general telescopic use, and 'C' for high power use. 'N' indicates that the chart is not yet available. The magnitude of the faintest star on the sequence is given, followed by the latest chart revision date.

We need the help of photographers where no chart yet exists. Please contact me if you feel you can help.

Orders for the charts should note the name of the galaxy, RA/DEC and chart type. Price is 10p per chart. Post and Packing: up to 20 charts 50p per order; over 20, £1.00. Overseas rates on request. Additionally the full 7-page copy of the Catalogue can be sent for £2.00 post paid. All remittances should be made payable to G.M. Hurst.

M	NGC	RA	Dec	mag.	Charts			Lim.	Revision
	0157	00 32.3	−08 40	11.2	N	B	C	13.6	860623
032	0221	00 40.0	+40 36	9.1	N	B36	N	14.0	860419
031	0224	00 40.0	+41 00	4.3	N	B36	C13	18.2	860824
	0278	00 49.2	+47 18	11.5	N	B69	N	13.9	871230
	0474	01 17.5	+03 10	13.0	N	N	N		
	0488	01 19.1	+05 00	11.1	N	N	N		
033	0598	01 31.1	+30 24	6.2	N	B45	C14	17.6	870420
074	0628	01 34.0	+15 32	9.7	N	N	N		
	0672	01 45.0	+27 11	11.3	N	N	N		
	0697	01 48.5	+22 06	12.5	N	N	N		
	0753	01 54.6	+35 41	12.9	N	N	N		
	0772	01 56.6	+18 46	11.1	N	N	N		
	0891	02 19.3	+42 07	10.9	N	B62	C	11.3	871030
	0908	02 20.8	-21 27	10.7	N	N	N		
	0925	02 24.3	+33 22	10.5	N	N	N		
	0949	02 27.6	+36 56	12.8	N	N	N		
	0972	02 31.3	+29 06	12.11	N	N	N		
	0977	02 31.6	-10 56	13.0	N	N	C7	15.9	860622
	1023	02 37.2	+38 52	10.5	N	B64	N	13.7	871031
	1055	02 39.2	+00 16	11.4	N	N	N		
077	1068	02 40.1	-00 14	9.6	N	N	N		
	1058	02 40.2	+37 08	11.8	N	B27	N	18.4	850405
	1073	02 41.1	+01 10	11.4	N	B38	N	18.0	850405
	1084	02 43.5	-07 47	11.1	N	N	C20	18.7	860825
	1090	02 44.0	-00 27	12.8	N	B42	N	19.4	860824
	1156	02 56.7	+25 03	11.8	N	N	N		
	1187	03 00.4	-23 04	11.3	A13	N	N	F	860622
	1232	03 07.5	-20 46	10.5	A13	N	N	F	860622
	1250	03 11.9	+41 10	14.0	N	B54	N	F	861025
	1257	03 13.1	+41 20	14.5	N	B54	N	F	861025
	1259	03 13.7	+41 10	15.5	N	B54	N	F	861025
	1260	03 14.2	+41 13	14.0	N	B54	N	F	861025
	1264	03 14.6	+41 16	15.5	N	B54	N	F	861025
	1265	03 15.2	+41 40	14.5	N	B54	N	F	861025
	1267	03 15.6	+41 17	15.5	N	B54	N	F	861025
	1268	03 15.6	+41 18	14.5	N	B54	N	F	861025
	1270	03 15.8	+41 17	12.7	N	B54	N	F	861025
	1272	03 16.2	+41 19	14.5	N	B54	C27	15.0	861025
	1273	03 16.2	+41 22	14.5	N	B54	C27	15.0	861025
	1274	03 16.4	+41 22	15.0	N	B54	C27	15.0	861025

M	NGC	RA	Dec	mag.	Charts			Lim.	Revision
	1275	03 16.5	+41 20	12vr	N	B54	C27	15.0	861025
	1276	03 16.6	+41 23		N	B54	N	F	861025
	1278	03 16.7	+41 23	14.5	N	B54	C27	15.0	861025
	1277	03 16.7	+41 24	15.0	N	B54	C27	15.0	861025
	1279	03 16.8	+41 18		N	B54	C27	15.0	861025
	1282	03 16.9	+41 11	14.5	N	B54	N	F	861025
	1283	03 17.1	+41 13	15.5	N	B54	N	F	861025
	1293	03 18.3	+41 13	15.0	N	B54	N	F	861025
	1294	03 18.5	+41 11	15.0	N	B54	N	F	861025
	1325	03 22.3	-21 43	12.2	A13	N	N	F	860622
	1332	03 24.1	-21 31	11.0	A13	N	N	F	860622
	1353	03 29.8	-21 00	12.4	A13	N	N	F	860622
	1385	03 35.2	-24 40	11.5	A13	N	N	F	860622
	IC 0342	03 41.9	+67 57	12.7	N	N	N		
	1559	04 16.9	-62 54	11.1	N	N	C28	15.0	861123
	1569	04 26.0	+64 45	11.8	N	N	N		
	1560	04 27.1	+71 46	12.1	N	N	N		
	1666	04 46.0	-06 39	13.5	N	B67	N	9.0	871228
	1667	04 46.2	-06 24	12.9	N	B67	C41	F	871228
	2146	06 10.7	+78 23	11.3	N	N	N		
	2268	07 00.8	+84 28	12.2	A10	B12	N	17.5	850405
	2276	07 11.0	+85 52	12.9	A10	B1	C36	14.8	870831
	2336	07 16.2	+80 20	11.0	N	N	C37	15.8	871026
	2300	07 16.5	+85 50	12.2	A10	B1	C36	14.8	870831
	IC 455	07 20.0	+85 40	14.3	N	B1	N	11.8	870831
	2366	07 23.6	+69 08	11.4	N	N	N		
	2403	07 32.0	+65 43	8.8	N	B	C	F	861019
	2486	07 55.2	+25 16	14.0	N	B22	N	17.3	860419
	2487	07 55.3	+25 16	14.0	N	B22	N	17.3	860419
	2500	07 58.2	+50 54	12.1	N	N	N		
	2537	08 09.7	+46 09	12.3	N	N	N		
	2541	08 11.1	+49 15	12.9	N	N	N		
	2552	08 15.4	+50 11	12.5	N	N	N		
	2713	08 54.7	+03 06	13.4	N	N	C23	16.6	860826
	2712	08 56.2	+45 07	12.8	N	N	N		
	2793	09 13.7	+34 39	12.9	N	N	N		
	2841	09 18.5	+51 12	9.9	N	B3	C10	17.4	860823
	2903	09 29.3	+21 44	9.5	N	B66	C	15.0	871231
	2964	09 40.0	+32 05	11.9	N	N	C21	17.5	860826
	2968	09 40.2	+32 10	13.1	N	N	C21	17.5	860826

M	NGC	RA	Dec	mag.	Charts			Lim.	Revision
	2976	09 43.2	+68 08	10.7	N	N	N		
	3003	09 45.6	+33 39	12.3	N	N	C18	17.7	860825
	2985	09 46.0	+72 31	11.1	N	N	N		
081	3031	09 51.5	+69 18	7.9	N	B40	C	15.5	870419
082	3034	09 51.9	+69 56	9.2	N	B40	C	12.9	870419
	3079	09 58.6	+55 57	11.1	N	N	N		
	3077	09 59.4	+68 58	10.6	N	N	N		
	3156	10 10.1	+03 22	13.1	N	B37	N	14.9	871224
	3165	10 10.9	+03 38	14.5	N	B37	N	17.5	871224
	3166	10 11.2	+03 40	11.5	N	B37	N	17.5	871224
	3169	10 11.7	+03 43	11.2	N	B37	N	17.5	871224
	3147	10 12.7	+73 38	11.3	N	B29	N	17.7	860406
	3184	10 15.2	+41 40	10.3	A2	B	N	15.8	820522
	3191	10 16.0	+46 43	14.0	N	B71	C43	F	880130
	3198	10 16.9	+45 49	10.7	N	B50	N	16.4	860826
	3206	10 18.4	+57 11	12.5	N	N	N		
IC	2574	10 24.9	+68 43	10.9	N	N	N		
	3294	10 33.4	+37 35	11.6	A2	N	N	F	820522
	3310	10 35.7	+53 46	11.3	N	N	N		
	3319	10 36.4	+41 56	11.7	N	N	N		
	3320	10 36.7	+47 40	12.9	A17	N	N	F	871025
	3329	10 40.5	+77 04	13.5	N	N	N		
	3344	10 40.7	+25 11	11.9	N	N	N		
095	3351	10 41.3	+11 58	10.5	N	N	N		
	3359	10 43.4	+63 30	10.9	N	N	C4	17.0	850423
	3367	10 44.0	+14 01	11.9	N	B35	N	14.3	860504
096	3368	10 44.2	+12 05	10.1	N	N	N		
105	3379	10 45.2	+12 51	10.5	N	B49	N	17.0	860826
	3384	10 45.7	+12 54	10.9	N	B49	N	17.0	860826
	3389	10 45.8	+12 48	12.1	N	B49	N	17.0	860826
	3415	10 48.9	+43 59	13.1	A17	N	N	F	871025
	3478	10 56.5	+46 23	13.2	A17	N	N	F	871025
	3486	10 57.8	+29 15	11.0	N	N	N		
	3504	11 00.5	+28 15	11.6	N	N	N		
	3512	11 01.3	+28 18	12.9	N	N	N		
108	3556	11 08.7	+55 57	10.6	A3	B13	N	16.6	850406
	3583	11 11.3	+48 36	11.6	A17	B33	N	17.5	871025
065	3623	11 16.3	+13 23	10.2	N	N	N		
066	3627	11 17.6	+13 17	9.7	N	B46	N	16.9	860825
	3631	11 18.3	+53 28	10.9	A3	B14	N	19.3	850406

M	NGC	RA	Dec	mag.	Charts			Lim.	Revision
	3642	11 19.6	+59 21	11.5	A3	B	N	F	830403
	3656	11 20.8	+54 07	13.4	A3	N	N	F	820523
	3675	11 23.5	+43 52	11.0	N	N	N		
	3726	11 30.7	+47 19	10.8	N	B	C	F	861019
	3733	11 32.2	+55 08	13.2	N	N	C17	16.4	860825
	3738	11 33.1	+54 48	12.0	N	N	N		
	3756	11 34.0	+54 34	12.1	N	B34	N	16.8	860406
	3780	11 36.7	+56 33	12.6	N	N	N		
	3782	11 36.9	+46 44	12.9	N	N	N		
	3810	11 38.4	+11 45	11.3	N	N	N		
	3811	11 38.6	+47 58	13.0	N	B15	N	16.4	850406
	3888	11 45.0	+56 15	13.0	N	N	N		
	3893	11 46.1	+49 00	11.1	N	B58	C34	F	870802
	3896	11 46.3	+48 57	14.0	N	B58	C34	F	870802
	3898	11 46.7	+56 22	11.7	N	N	N		
	3913	11 48.0	+55 37	14.2	N	B16	N	16.1	860622
	3916	11 48.2	+55 25	14.8	N	B16	N	16.1	860622
	3938	11 50.2	+44 24	10.8	N	N	N		
	3949	11 51.1	+48 08	11.4	N	N	N		
	3953	11 51.2	+52 37	10.7	N	N	N		
	3985	11 54.1	+48 37	12.9	N	N	N		
109	3992	11 55.0	+53 39	10.6	N	N	C33	19.0	870517
	3998	11 55.3	+55 44	11.6	N	N	N		
	4013	11 56.0	+44 13	12.7	N	N	N		
	4030	11 57.8	-00 49	11.2	N	N	N		
	4036	11 58.9	+62 10	11.5	N	N	N		
	4041	11 59.7	+62 25	11.5	N	N	N		
	4051	12 00.6	+44 48	10.8	N	N	C31	16.6	870503
	4062	12 01.5	+32 10	12.1	N	N	N		
	4085	12 02.8	+50 38	12.8	N	B51	C24	F	861019
	4088	12 03.0	+50 49	11.0	N	B51	C24	F	861019
	4100	12 03.6	+49 51	11.9	N	N	N		
	4145	12 07.5	+40 10	12.2	N	N	N		
	4151	12 08.0	+39 41	11.3	N	N	C32	12.8	870503
	4156	12 08.2	+39 45	14.5	N	N	C32	12.8	870503
	4157	12 08.6	+50 46	12.0	N	B	C	F	861019
	4165	12 09.7	+13 31	14.7	N	B47	N	16.7	860825
	4168	12 09.8	+13 29	12.3	N	B47	N	16.7	860825
	4183	12 10.7	+43 58	13.5	N	N	N		
098	4192	12 11.3	+15 11	10.9	A4	N	N	F	820503

M	NGC	RA	Dec	mag.	Charts			Lim.	Revision
	4236	12 14.3	+69 45	10.1	N	N	N		
	4242	12 14.9	+45 54	11.4	N	N	N		
099	4254	12 16.3	+14 42	10.2	A4	B31	N	16.7	860529
106	4258	12 16.5	+47 35	8.9	N	N	N		
061	4303	12 19.4	+04 45	10.0	N	N	N		
100	4321	12 20.4	+16 06	10.1	A4	B18	N	17.7	850406
084	4374	12 22.6	+13 10	10.2	A4	B2	C1	16.7	850407
	IC 3303	12 22.8	+13 00	?	N	B2	N	14.4	850407
085	4382	12 22.8	+18 28	10.1	A	B19	N	16.2	850406
	4389	12 23.1	+45 58	12.8	N	N	N		
	4387	12 23.2	+13 05	13.2	N	B2	C1	16.7	850407
	4388	12 23.3	+12 56	11.7	N	B2	N	14.4	850407
	4395	12 23.4	+33 49	10.7	N	N	N		
	4402	12 23.6	+13 23	13.5	N	B2	C2	16.9	850423
086	4406	12 23.7	+13 13	10.1	A4	B2	C2	16.9	850423
	4413	12 24.0	+12 53	13.6	N	B2	N	14.4	850407
	4414	12 24.0	+31 30	10.9	N	B26	N	15.3	860406
	4425	12 24.7	+13 01	12.8	N	B2	N	14.4	850407
	4435	12 25.2	+13 21	11.9	N	B2	N	14.4	850407
	4438	12 25.3	+13 17	10.9	N	B2	N	14.4	850407
	4449	12 25.8	+44 22	9.9	N	N	N		
	4470	12 27.1	+08 06	13.0	N	B53	N	12.4	861024
049	4472	12 27.3	+08 16	9.3	N	B53	N	12.4	861024
	4485	12 28.2	+41 58	12.2	N	N	C25	16.6	861024
087	4486	12 28.3	+12 40	9.6	A4	N	N	F	820503
	4490	12 28.3	+41 55	10.1	N	N	C25	16.6	861024
	4496	12 29.1	+04 13	13.3	N	B44	N	15.5	860824
088	4501	12 29.5	+14 42	10.1	A4	B3	N	19.5	830403
	4533	12 31.8	+02 36	14.7	N	B4	N	15.2	860823
	4535	12 31.8	+08 28	10.4	N	N	N		
	4536	12 31.9	+02 28	10.9	N	B4	N	15.2	860823
089	4552	12 33.1	+12 50	11.0	A4	N	N	F	820503
	4565	12 33.9	+26 16	10.3	N	N	C	F	870420
090	4569	12 34.3	+13 26	10.1	A4	N	N	F	820503
058	4579	12 35.1	+12 05	10.3	A4	B70	C42	15.2	880123
104	4594	12 37.3	-11 21		9.2	N	N	N	
	4605	12 37.5	+61 53	11.5	N	N	N		
	4618	12 39.2	+41 25	11.1	N	N	N		
059	4621	12 39.5	+11 55	11.0	A4	N	N	F	820503
	4627	12 39.6	+32 51	13.5	N	N	C38	F	870920

M	NGC	RA	Dec	mag.	Charts			Lim.	Revision
	4631	12 39.8	+32 49	9.7	N	N	C38	F	870920
060	4649	12 41.1	+11 49	9.9	A4	N	N	F	820503
	4666	12 42.6	-00 12	11.4	N	N	N		
	4688	12 45.2	+04 36	14.5	N	B43	N	18.7	860824
	4725	12 48.i1	+25 46	10.1	N	B	N	F	870425
	4750	12 48.3	+73 09	12.5	N	N	N		
094	4736	12 48.6	+41 23	8.9	N	N	N		
	4753	12 49.8	-00 56	10.7	A12	B39	C5	15.1	860825
	4814	12 53.3	+58 37	12.8	N	N	N		
064	4826	12 54.3	+21 57	9.3	N	N	N		
	IC 4182	13 03.5	+37 52	13.5	N	N	N		
	4975	13 05.4	-04 45	15.5	N	N	C16	F	860825
	5005	13 08.5	+37 19	10.5	N	N	N		
	5033	13 11.2	+36 51	10.6	N	N	N		
063	5055	13 13.5	+42 17	9.7	N	B20	N	15.7	871220
	5112	13 19.6	+39 00	12.6	N	N	N		
051	5194	13 27.8	+47 27	8.9	N	B41	C8	F	860623
	5195	13 27.9	+47 31	10.5	N	B41	C8	F	860624
	5198	13 28.2	+46 56	12.9	N	B41	N	F	860624
	5204	13 28.3	+58 40	11.6	N	N	N		
083	5236	13 34.3	-29 37	8.0	N	N	C26	15.2	861025
	5248	13 35.1	+09 08	10.4	N	N	N		
	5253	13 37.1	-31 24	10.8	N	B21	N	11.3	850405
	5322	13 47.6	+60 26	11.1	N	N	N		
	5338	13 50.9	+05 27	14.5	N	B56	C	14.5	870824
	5348	13 51.7	+05 28	14.5	N	B56	C35	14.5	870803
	5356	13 52.5	+05 35	14.0	N	B56	C35	14.5	870803
	5360	13 53.2	+05 14	15.0	N	B56	C36	14.3	870823
	5363	13 53.6	+05 29	11.1	N	B56	C36	14.3	870823
	5364	13 53.7	+05 16	11.0	N	B56	C36	14.3	870803
101	5457	14 01.5	+54 35	8.7	N	B28	C	17.3	860824
	5480	14 02.4	+50 57	12.6	N	N	N		
	5474	14 03.2	+53 54	11.2	N	N	N		
	5548	14 15.7	+25 22	13.3	N	B	N	15.4	871220
	5585	14 18.0	+56 57	11.2	N	N	N		
	5846	15 04.0	+01 48	11.2	N	N	C28	14.6	870524
	5850	15 04.6	+01 44	11.6	N	N	C28	14.6	870524
102	5866	15 05.1	+55 57	10.9	N	N	N		
	5879	15 08.4	+57 12	12.2	N	N	N		
	5905	15 14.0	+55 42	13.6	N	N	C19	17.5	860825

M	NGC	RA	Dec	mag.	Charts			Lim.	Revision
	5949	15 27.2	+64 55	12.9	N	N	N		
	5982	15 37.6	+59 32	12.3	N	N	N		
	5985	15 38.6	+59 30	11.9	N	N	N		
	6015	15 50.7	+62 28	11.7	N	N	N		
	6070	16 07.4	+00 50	12.3	N	B	N	F	830403
	6217	16 34.8	+78 18	11.8	N	B	N	F	830404
	6384	17 30.0	+07 06	13.2	N	N	C22	15.9	860826
	6412	17 30.8	+75 45	12.2	N	N	N		
	6503	17 49.9	+70 10	10.8	N	N	N		
	6555	18 05.7	+17 35	12.7	N	B	N	14.0	820222
	6643	18 21.2	+74 33	11.6	N	B	N	F	830404
	6946	20 33.9	+59 58	9.7	N	N	C6	18.8	830327
	6951	20 36.5	+65 56	11.8	N	N	N		
	7177	21 58.3	+17 29	12.0	N	N	C	F	871230
	7184	21 59.9	-21 04	12.0	N	N	C30	F	870503
	7217	22 05.6	+31 07	11.0	N	N	N		
	7314	22 33.0	-26 18	11.6	N	N	N		
	7331	22 34.8	+34 10	10.4	N	B23	N	13.3	871223
	7343	22 36.3	+33 48	14.3	N	B23	C	18.0	871223
	7448	22 57.6	+15 43	11.9	N	N	N		
	7479	23 02.4	+12 03	11.6	N	N	C	F	871221
	7495	23 06.5	+11 48	14.7	N	B25	N	17.7	860406
	7497	23 06.6	+17 54	13.5	N	N	N		
	7606	23 16.5	-08 46	11.6	N	B68	N	14.8	871230
	7619	23 17.7	+07 55	12.7	N	B48	N	17.3	860826
	7634	23 19.1	+08 36	13.7	N	B24	N	F	860406
	7640	23 19.7	+40 35	11.3	N	N	N		
	7723	23 36.4	-13 14	12.1	N	B32	N	16.3	860406
	7741	23 41.4	+25 48	11.6	N	N	N		

IU Orionis - I.A. Middlemist

This star was listed in the 1969 GCVS as a possible eclipsing binary. In the new (1985) edition it is classified as a nebular variable showing rapid light changes.

During 1986, I made observations of this star as a possible eclipsing binary, and minima were timed on seven nights. The chart used was the chart of Orion Nebula variables issued by the Binocular Sky Society. A period search was carried out by the rather cumbersome use of a 48k Spectrum, and an adaptation of M.B. Houchen's program in *VSSC 57*, p.9 (1983). I found that the instructions for folding the observations onto the trial period had to be modified as follows:

```
0590 IF D(I)>P*1 AND D(I)<P*2 THEN LET D(I)=D(I)-P
0600 IF D(I)<P*2 THEN LET D(I)=D(I)-(Px2): GO TO 590
```

The best fit was obtained with a period of about 0.4945 days, which produced a Beta-Lyrae-like curve with two minima. A decrease in scatter was noted at P/2 and P/4, but the scatter at P/2 was greater than at P, implying that minima are asymmetric. The table sets out observed times of minimum, and predicted times according to the elements:

Min = JD 244 6437.360 + 0.49451/2.E

(which assumes symmetrical primary and secondary minima).

	O	C	O - C	Remarks
1	437.360	437.360	0	I
2	455.453	455.431	+0.022	II
3	466.400	466.323	+0.077	II
4	472.335	472.264	+0.071	II
5	475.300	475.482	-0.182	I
6	484.301	484.394	-0.093	I
7	488.400	488.355	+0.051	I

(The assignment of Mins I and II is arbitrary, treating the base-line as Min I.) Allowing for the likelihood of errors in observation, and in the derivation of times of minima, the accordance of the predicted and observed times is reasonable. The jump in the O-C diagram associated with the change from secondary to primary minima suggests again that I-II is less than 0.5P. The results seem to be consistent with IU Ori being an EB variable with a period just under 12 hours. However the possibility remains that the star was in an episode of quasi-periodic pulsation-related fluctuations with a time-scale of the order of 6 hours. Also if it is established that the minima are due to eclipses, this does not preclude the occurrence of 'Nebular'-type variability. T Tau, for example, is a multiple system. Further observation is called for to see if there are other modes of variation, or to test and improve the elements.

The Bruno-H.-Bürgel Observatory, Hartha, GDR

Helmut Busch, Director

The Bruno-H.-Bürgel Observatory was founded in 1956. It is a school and public observatory in Hartha, which is a small industrial town of just about 10,000 inhabitants, between the larger cities of Liepzig and Dresden. The observatory is sited to the north-west of the town, on the 324-metre high Gallberg, which is the highest point for some considerable distance. The location is very suitable for astronomical observation and was one reason for the observatory being built in Hartha.

However, the main reason was the proximity of a very famous observatory, which has supported us throughout our existence. This is Sonneberg Observatory, run by the Institute for Astrophysics of the GDR's Academy of Sciences. The close cooperation between the two observatories dates back to 1949, when I had the opportunity of visiting Sonneberg and seeing the scientific work that was being carried out there. Under the guidance of its founder, and Director for many years, Professor Hoffmeister, Sonneberg gained an international reputation for its work in various fields including observations of meteors, comets and meteor streams, but in particular for the study of variable stars. Cuno Hoffmeister and his colleagues have discovered more than 10,000 of them. It was not surprising that I became interested in the subject, and I started visual observation of variables in 1949, later observing photographically. Although an amateur, I had access to the second largest plate collection in the world, namely that of the Sonneberg Sky Patrol (SSP), with more than 200,000 photographs.

Before Prof. Hoffmeister died in 1968, we were given the opportunity of taking part in the work of the 'Sonneberg Field Survey'. This involves searching for, and studying variables in selected fields in the northern Milky Way. The photographs were obtained by very fast astrographs (OG diameters of 40 cm) that were put at our disposal. The plates contained variables down to 18th magnitude. Most of the variables were new discoveries and we determined the elements of their variation Known variables in the fields were also checked and their elements improved. The results are published in the *Veröffentlichungen der Sternwarte Sonneberg* [VSS - Publications of Sonneberg Observatory]. The fields that we have examined are:

psi UMa Beta Her Rho Per 2 Lac (in press)

In January 1958, our own equipment for the Hartha Sky Patrol (HSP) was finished and started work. Selected fields were photographed with a total of 6 Zeiss-Tessar cameras (f = 250 mm). These fields coincide with those in the Sonneberg Survey. We were therefore able to supplement the Sonneberg archives with our photo graphs. Annual visits to Sonneberg (since 1949) have been mainly concerned with examining these photographs. Countless variables have been monitored or newly studied by myself and my colleagues. Our visual observations are also passed to the professional observatory and we have specialized in the study of eclipsing

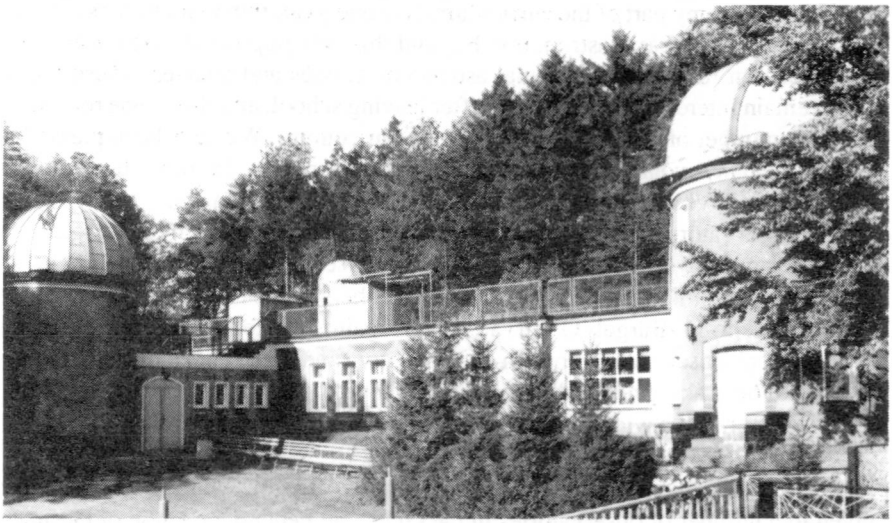
variables. We are interested in period-changes, eclipsing stars with secondary minima and apsidal motion, and in producing photometric elements. In order to increase the observational accuracy, since 1986 we have been using a photoelectric photometer by Schnitzer. Using this, we are able to cover many stars in the Russian *NSV* catalogue (*New Catalogue of Suspected Variable Stars*), which have not been studied previously. An advantage that is not, perhaps, generally appreciated, is that we are able to use the Sonneberg Observatory's card index. This includes information about all the literature relating to individual variable stars. This information is now also available from the Centre des Donnés Stellaires (Stellar Data Centre) at Strasbourg. We have also built up our own card index, which has been of great assistance. This was prepared from works in our own library at the observatory. This includes the major astronomical publications. We exchange publications with about 100 observatories in the GDR and around the world. These exchanges enable us to keep up-to-date with other observatories' results and changes in our knowledge of variable stars.

Our results are made available to professional astronomers. Since 1968, our observatory has had its own publication *Contributions of the Bruno-H.-Bürgel Observatory, Hartha*. Normally one issue is published each year. In addition, we send out at irregular intervals out *Hartha Observation Circulars*. Both publications are available on an exchange basis. Our most interesting results are published in the IBVS (*Information Bulletin on Variable Stars*) issued by IAU Commission 27 from Budapest. The results of the Sonneberg Field Survey are published in the VSS, and those regarding amateur astronomers in the GDR in the *Mitteilungen über Veränderliche Sterne* (MVS = Contributions about Variable Stars), published by Sonneberg. Some of the amateur observations are sent to our colleagues in the AFOEV at Strasbourg, where they appear in the AFOEV Bulletin.

In order to obtain observations of scientific value, the observatory has been equiped in an adequate manner. Our main instruments are installed in 5-m and 4-m domes. In the 5-m dome there is a 360-mm Cassegrain telescope (f = 5250 mm) with a photoelectric photometer for observations in UBV. In the 4-m dome there is a 162-mm refractor, with which visual observations are made. A smaller, 2-m dome and another building contain the 2 mountings with the 6 Zeiss-Tessar cameras used in the sky patrol. Four of these cameras have an electronic guiding system. For special photographs, an 80-mm (f = 500 mm) telephoto lens may be used. The photographic plates are measured with photoelectric and visual photometers. Our library and card index have already been mentioned.

Many amateur astronomers in our country are interested in variable stars, so professional astronomers are interested in collecting and interpreting their observations. In 1972, I succeeded in bringing these amateur astronomers together in the 'Arbeitsgruppe Veränderliche Sterne' (Variable-Star Working Group) under the GDR's Kulturbund (Cultural Association), and this has now been functioning successfully for 15 years. The aim of the Working Group is to teach interested amateurs to obtain and analyze observations of variable stars. In return we hope to

receive good observations. One can only be a member of the Working Group by sending in observational results. About 70 people in the GDR belong to the Group, with two foreign observers (in the Soviet Union and Czechoslovakia). Most of the members are young, with some older observers and the group includes both students and retired professors. An internal bulletin keeps members informed of news and gives them information about observing, and it is also used for discussing some results.



The Hartha Observatory is the centre for the Working Group. Several colleages have undertaken the (honorary) work of coordinating work on various classes of variables. They collect the observations, interpret them and prepare them for publication. In the last 15 years, members of the Working Group have made and reported more than 200,000 observations. Professional astronomers confirm the value of our observations. An example of this is R CrB. This erratic variable is kept under close surveillance by us. Every year, the Sonneberg Observatory publishes a light-curve in the MVS that includes our observations.

Our members are covering other interesting variables and publishing their results. For example, Dietmar Böhme, an engineer, who is a member of the Working Group, makes both photoelectric and polarimetric observations. More and more members are carrying out analyses of the observational material. It is planned to send copies of all our work over the last 15 years to the CDS in Strasbourg.

Our Working Group also cooperates with foreign groups that are also working on variable stars. In particular, with groups in Czechoslovakia, the Soviet Union, Federal Republic of Germany, France, Belgium, Hungary, and Switzerland.

In our country, the use of photoelectric photometry is relatively new. With help from professional astronomers and interested amateurs we are encouraging amateurs to use photoelectric methods, and in 1986 we organised a colloquium on

the subject. This colloquium included specific information about the construction of photometers for amateur use. The number of active observers is continually increasing.

Because our observatory is also a school observatory, we take part in teaching astronomy for 10th-form pupils at our General Polytechnic Schools. Since 1959, astronomy is an obligatory subject in school, and I feel that this is an important achievement that has been made in this country. In only four other countries in the world is astronomy part of the curriculum. In a one-year, thirty-hour course, pupils get a grounding in basic astronomy. Beyond this, any pupils who are particularly interested can take part in optional astronomy classes and courses. These pupils often remain interested in astronomy after leaving school, and this is one reason for the large number of amateur astronomers in our country. We have been pleased to find that many young amateurs who have taken part in our observatory's programmes have moved on to become professional astronomers.

Our observatory acts as advisor on astronomy for the area around Leipzig. Every year, during the winter holidays, we hold a course for teachers and this helps to improve astronomical knowledge amongst teachers in the area.

The Bruno-H.-Bürgel Observatory has gained a reputation as a serious astronomical observatory, both in this country, and in other countries. We are pleased to be making a contribution to the science of astronomy and to spreading knowledge of it to a wider public.

[Note by Emile Schweitzer (AFOEV): Bruno-H. Bürgel, whose name has been given to a number of observatories in the GDR, the Federal Republic of Germany and Austria, was born in 1875 and died in 1948. Of very humble origins (he started out in life as a cobbler), and self-taught, he was the author of numerous, popular astronomical books, which were published in more than 2 million copies.]

BS-551 And (SAO 037607) - Ian Middlemist

This star was added only a few years ago to the Binocular Programme, as a suspected variable. I undertook observations from 1974 to 1980, making 192 estimates in that period, and made preliminary reports in *Light Curve* about ten years ago. Markham has also observed this star, and reported a possible minimum in late 1980. Suspicion was originally aroused by a reference in Lampkin's 'Naked Eye Stars', where it was listed at magnitude 4.2. If at its normal brightness, it should not have been listed at all. The probability that the entry was merely a repetition of an entry in a source publication arising from a compositor's error did not cancel curiosity, so I undertook the obsevations. I stopped observing in 1980, as it seemed impossible to persuade others to join me, and a single observer's visual estimates would not be likely to be taken as conclusive evidence of variability, or constancy.

More recently, I have now reviewed my old observations, and on plotting them was surprised to find some well-marked features in the resulting light-curve. These are notably a short but well-marked minimum about JD 2442450 (early 1975), a fade from 6.2 to 6.6 in the course of about 110 days in Autumn 1975, followed by a rise to 6.2 by December, followed by a further fade to 6.5 by the end of March 1976, and another short minimum at 6.6 in early 1978. There are suggestions of minima at a few other times as well. I have attempted to fit some sort of period to the various minima, but found that whilst 360d and 260d kept recurring, no elements satisfied even some of the observed minima, without being defied by the absence of minima near other predicted dates. This apparently eliminates the hypothesis, entertained for a while, that the system might be a long-period eclipsing binary. More consistent with the observations is the possibility that SAO 037607 is a small-amplitude variable, of type L or SR, which at some times is more active than normally, and at others almost constant.

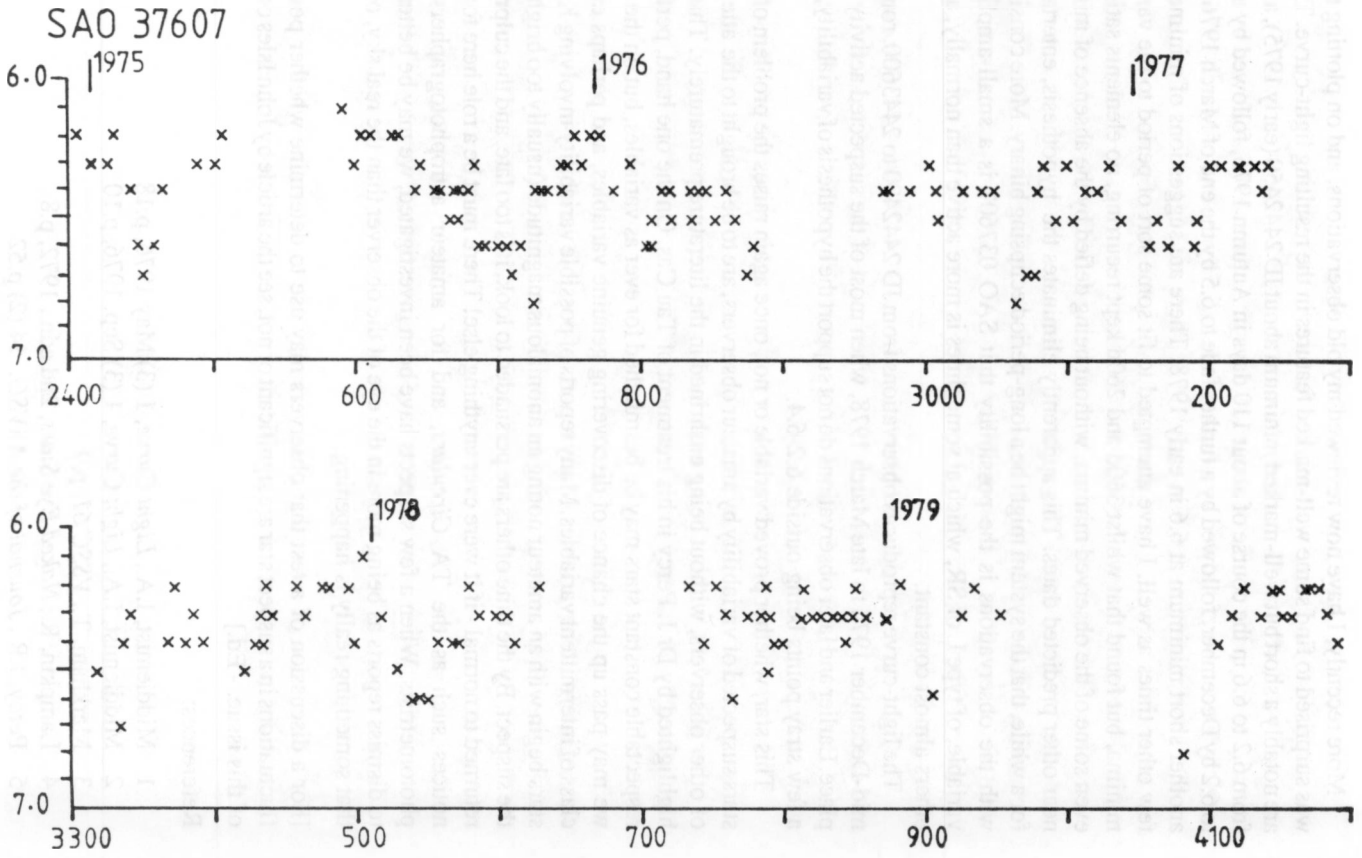
The light-curve reproduces observations from JD 2442400 to 2443600, roughly mid-December 1974 to late March 1978, when most of the suspected activity took place. Earlier and later observations do not support the hypothesis of variability, only a few stray points being outside 6.2-6.4.

This star, whether proved variable or not, once again raises the problem of how stars suspected of variability by amateur observers, are to be brought to the attention of other observers, without being enshrined in the literature prematurely. This was highlighted by Dr J. Percy in his treatment of Tau Cas. On the one hand, perfectly respectable constant stars may be besmirched for ever as variables, but on the other we may pass up the chance of discovering genuine variables, and perhaps even a class of intermittent variables. Many reports of possible variability involving K-type stars begin with an amateur noting an anomalous magnitude (usually too bright) for the suspect. By the time others are persuaded to look, it is too late, and the culprit has returned to normal - if it were ever anything else! There must be a role here for alert notices such as the TA *Circulars*, and for amateur astrophotographers and photometrists. When a few suspects have been investigated, we may be better able to dismiss reports as being more in the eye of the observer than the real sky, or find that something really is happening.

[For a discussion of a test that observers may use to determine whether possible fluctuations in a suspect star are significant or not, see the article by John Isles on p.12 of this issue. - Ed.]

References:

1 Middlemist, I.A., *Light Curve*, **1** (3) May 1976, p.18
2 Middlemist, I.A., *Light Curve*, **1** (3) Sep. 1976, p.10
3 Markham, T., *VSSC 61*, p.9
4 Lampkin, R., *Naked Eye Stars*, 2nd edn., 1972, p.8
5 Percy, J.R., *Journal of the AAVSO*, **14** (2) p.52


SAO 37607
1975
1976
1977
6.0
7.0
2400
600
800
3000
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1978
1979
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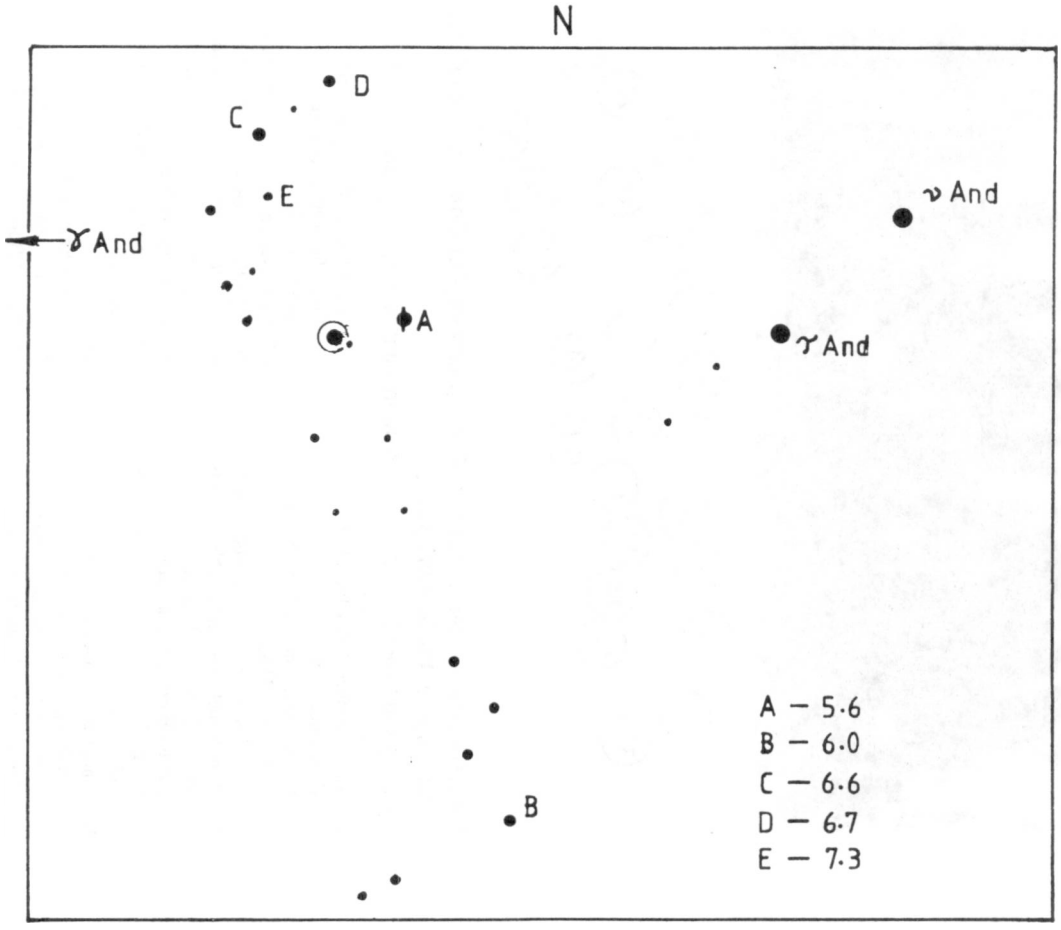
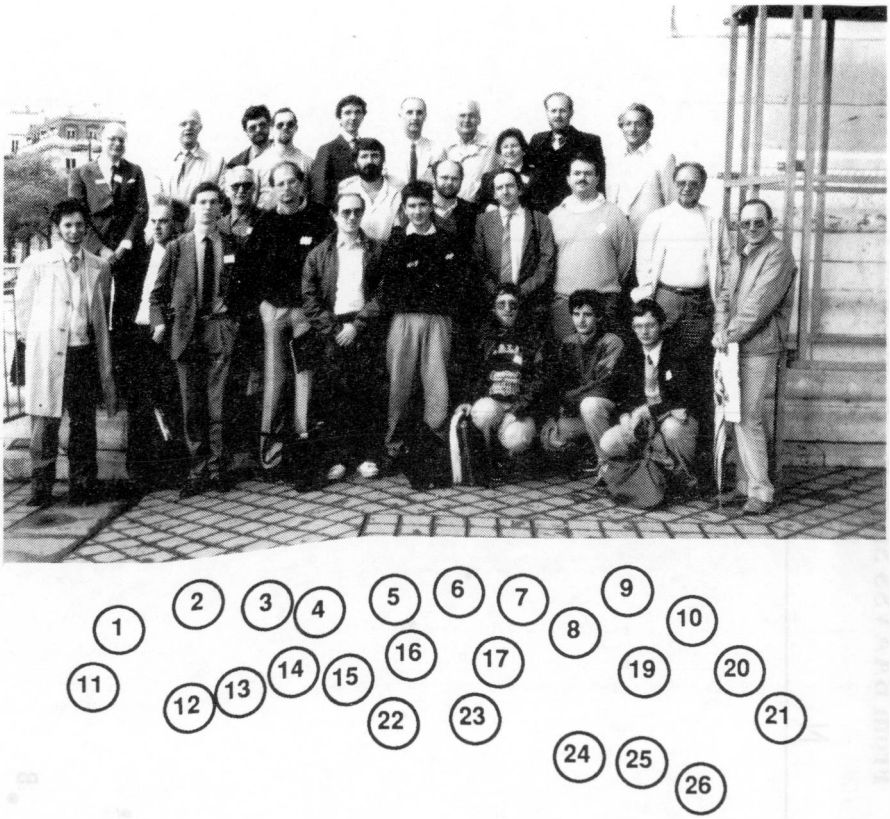
900
4100

SAO 037607

From BAAVSS Suspect variable sheet 1





Variable Star Observers at IAU Colloquium 98, *The Contribution of Amateurs to Astronomy*, Paris, 1987 June.
(Photograph taken by Anna Faye Williams and kindly supplied by Janet Mattei.)

1 Storm Dunlop (BAA President), Chichester, U.K.
2 Thomas Williams (AAVS President), Houston, Texas, U.S.A.
3 Peter Serne, Amsterdam, Netherlands
4 Wim Nobel, Amsterdam, Netherlands
5 Marco Cavagna, Milan, Italy
6 Sandro Baroni, Milan, Italy
7 Daniel Overbeek, Edenvale, Republic of South Africa
8 Janet Mattei (AAVSO Director), Cambridge, Mass., U.S.A.
9 Mart de Groot (Director, Armagh Observatory), Armagh, N. Ireland
10 Michel Grenon, Sauverny, Switzerland
11 David Valls-Gabaud, Paris, France
12 Jean Gunther, Paris, France
13 Angel Romez Roldan, Madrid, Spain
14 Emile Schweitzer (AFOEV President), Strasbourg, France
15 Niels Nelson, Hoeven, Netherlands
16 Pepe Pirero Osorio, Madrid, Spain
17 Michel Dumont, Versailles, France
18 Diego R. Perez, Mardid, Spain
19 Ennio Poretti, Merate, Italy
20 Zdenek Kviz, Kensington, NSW, Australia
21 ??
22 Joseph Remeis, Paris, France
23 Pedro Velasco, Madrid, Spain
24 Roland Boninsegna, Dourbes, Belgium
25 Enrique Velasco, Madrid, Spain
26 Jose Prieto, Madrid, Spain

Professional-Amateur Collaboration

On 1988 May 07, a meeting of professional and amateur astronomers was held at Universty College, London to discuss collaboration in the study of variable stars.

The outcome of the meeting was the formation of the Professional-Amateur Co-ordinating Committee (PACC-VS) consisting of representatives from both sides. The committee members are:

Professional:	Amateur:
Constanze le Dous (University of Cambridge)	Guy Hurst
Robert Smith (University of Sussex)	Richard Miles
David Stickland (Rutherford Appleton Laboratory)	Roger Pickard

The PACC-VS has the following broad objectives:

1. To foster communications and collaboration between amateur and professional astronomers concerned with the study of variable stars.
2. To promote the use of advanced techniques by amateurs, especially photoelectric photometry and to encourage technology transfer between professionals and amateurs.

The committee will meet regularly and will produce a quarterly newsletter containing news of professional and amateur activity, appeals for observations, advice on equipment and observing techniques, anouncements etc. The newsletter will be circulated with the BAA VSS Circular and to any other interested persons.

Communications to the committee should be sent to:

R.D. Pickard, 28 Appletons, Hadlow,Kent TN11 ODT U.K.
Telephone No.: (0732) 850663
International: +44 0732 850663

CH Cygni - Deep fade continues

The very deep fade of CH Cygni continues, latest reports to hand before this Circular finally closed for press (on 1988 July 12), indicate that it is at around magnitude 9.0-9.1. (Unconfirmed reports from some observers suggest that it may even be slightlylower.) It has been around this magnitude throughout June.

Some years ago CH Cygni was exceptionally bright (at around 5.5) and the BAA VSS sequence had to be extended towards brighter magnitudes. Now it appears likely that fainter comparisons will have to be added. The Secretary, Melvyn Taylor, warns observers to take additional care in estimating this object at present, as it is particularly faint for users of binoculars, so that a change to different instruments is probably necessary. Such alteration in instrument is almost certain to produce a 'step' in the magnitudes of estimates. Please ensure that any change of equipment is recorded fully; that unintentional bias does not creep into your estimates; and that observations with different instruments are reported exactly as they are made, and not 'adjusted' to fit one another.

Reporting of observations for first half of 1988

Observers are reminded that reports of estimates in the period of 1988 Jan.-Jun. for objects on the Main and Telescopic Programmes should be sent to the Secretary, Melvyn Taylor, as soon as possible.

Indexing of the *Circulars* in progress

We are very grateful to Peter Wheeler for offering to prepare an index to the VSS *Circulars*, and for promptly completing the first batch. Pending the completion of this task, anyone with queries about particular items is invited to contact Storm Dunlop, who is prepared to locate the necessary information. Much material is held in machine-readable form, which may be searched (relatively) rapidly.

Chart Booklets

Many members have enquired about whether additional chart booklets are to be issued, including the second set of binocular objects that was announced some time ago. It is indeed our intention to issue further booklets, but it has been considered advisable to delay publication ofuntil it has been possible to improve and redraw certain charts. (The process of improving many charts on both the Binocular and Telescopic programmes is now in hand, and details of availability will be announced in the *Circulars* in due course.)

Proceedings of IAU Colloquium 98 - *The Contribution of Amateurs to Astronomy*

The Proceedings of this Colloquium will be published shortly by Springer-Verlag, and will contain several items of interest to variable-star observers, including;

Eclipsing Binary Stars - F.B. Wood
Giovanni Battista Lacchini - Favero
Roberts of Lovedale and Eclipsing Binary Stars T. Williams
Amateur Astronomers and the IAU Central Bureau for astronomical telegrams and Minor Planet Centre - B. Marsden
Contributions of amateur astronomers to variable-star observing - J. Mattei
Reduction of variable-star observations using BASICODE - T. Jurriens
Elimination of errors in the estimation of variable stars - E. & P. Velasco
The study of variable stars - E. Porreti
The contribution of amateurs to the study of variable stars - D. Proust & E. Schweitzer
Professional/amateur cooperation in the study of variable stars - N. Frolov
Amateurs and the search for supernovae S. Lucas
The UK Nova/Supernova Search programme G. Hurst
GEOS - M. Dumont
Period and light-curve of PX Cep R. Boninsegna

Many other contributions - for example those on equipment - contain considerable information of interest to variable-star observers. A paper, which could not be included in the Proceedings in full (in English) on the Bruno-H.-Bürgel Observatory in Hartha, GDR, is published on p.23 of this Circular.

CHANGES OF ADDRESS

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D.J. Herbert	5 Radcliffe Court, Rose Crescent, Cambridge CB2 3LR
K. Xlyaris	Lymbia, Nicosia, Cyprus

CIRCULARS

Charges:	U.K. & Eire	£4 for Circulars and light-curves (4 issues)
	Other countries	£5
	Payments (made out to the BAA) and material for inclusion	
should be	sent to Storm Dunlop.	

CHARTS: Eclipsing - Order from Mrs E. Isles; All others - John Toone

Charges:	Telescopic	SAE plus 30p per star
	Eclipsing	SAE plus 6p per star (1 sheet)
	Binocular	SAE plus 8p per star (1 sheet)

NB: SAEs should preferably be A4 size

BOOKLETS

Direct sale prices apply to material collected from the Office at Burlington House or purchases at BAA Meetings.

Binocular Variable Star Charts: Vol.1

£1.25 (U.K) or £1.50 (Overseas) each, including postage
(Direct sale price £1.00)

Eclipsing Binary Programme Handbook: 1988

£1.25 (U.K.) or £1.50 (Overseas) each, including postage (Direct sale price £1.00)

Available from Storm Dunlop or BAA Office at Burlington House

VARIABLE STAR SECTION
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Castle Printers of Wittering, Chichester, England.