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This extra VSS Circular is being issued in order to announce details of the new Binocular Group resulting from our 'merger' with the Binocular Sky Society, mentioned in the last Circular. VSSC 20 will be distributed next month, and will contain the usual features including Photoelectric Photometry Supplement No. 3.

Alan Pickup writes below about the programme of the Binocular Group. BSS members will note that the following activities of the BSS are not covered:

1. Variable stars in the Orion Nebula. Observations should continue, but since these are telescopic rather than binocular objects they will be included in the main VSS programme. More details in VSSC 20.
2. Star Chart Corrections. This will become a VSS sideline, and a notice on the subject will appear in a forthcoming issue of the Journal.
3. Minor Planets. This field of observation does not fall clearly within the province of the VSS, but the matter is under consideration.

John Isles

The VSS Binocular Group.

The formation of a new Binocular Group (BG) within the VSS was announced in the last VSS Circular. This edition of the VSS Circular is being sent to members of the Binocular Sky Society in addition to normal VSS members. By combining the resources of the VSS and the BSS we are able to introduce a 'ready made' binocular programme to the BAA, and to regularise the organisation of variable star work in the UK. Binocularists and owners of small telescopes are invited to participate in the programme of the BG, details of which follow.

Aims of the BG.

- 1/ To encourage observation of variable stars which can be studied using binoculars and small telescopes, including stars on the main programme of the VSS.
- 2/ To help newcomers to the field of variable star work with the techniques of observation.
- 3/ To maintain a programme of observation related to the requirements of current astronomy - including professional research.
- 4/ To publish observations and analyses of the stars observed.

Officers of the BG.

The BG has inherited from the BSS a willing group of officers. They are:

Alan Pickup (BG Coordinator) to whom potential BG observers should write. He is responsible to John Isles for overall control of the BG, the training of new BG observers and the preparation and improvement of BG charts.

Alan Smith (Assistant BG Coordinator) whose special province is the mechanics of publication of BG results. Please write to AS if you think you may be able to assist with the 'behind the scenes' work of the BG.

Alan Forno (Recorder) to whom BG observations should be sent after the end of each year. AF is responsible for the checking and logging of all observations made of the stars on the BG programme. He will also supply blank report forms to observers who are requested to refund (or pay in advance) postage costs: 3½p will suffice for 10 forms.

Steve Anderson (Chart Curator) is responsible for distribution of all BAA VSS charts. All binocular charts cost 3p each, plus postage, though for telescopic stars requiring a set of two or more charts the charge is 2p per sheet, plus postage.

### Programme of the BG.

Enclosed with this Circular is a copy of the VSS BG chart catalogue. This lists the stars on the BG programme and includes stars on the main VSS programme which will be observed by the BG. The charts associated with the Eclipsing Binary Programme are not listed here.

Only observations made of stars on the BG programme will be analysed and published by the BG. Observations of stars on the main VSS programme will be passed on to VSS Secretary Doug Saw if submitted with other binocular observations to the BG Recorder. Note that observations for the Eclipsing Binary Programme should be sent directly to VSS Director John Isles as soon as possible after the end of the month in which they are made.

The BG programme contains a high proportion of red semi-regular and irregular stars. Amateur study of these variables was almost non-existent before the advent of the BSS, and they have received little professional attention simply because the type of variation does not lend itself to professional observing schedules. The information listed in the General Catalogue of Variable Stars for some of these variables has been shown by BSS work to be erroneous. We hope that by continuing this work, and extending it to cover all suitable variables in the northern celestial hemisphere, we will put the (GCVS) record straight.

In order to draw a satisfactory light curve for a variable on our programme it is necessary to obtain a minimum number of observations - this minimum being dictated by the amplitude and period of variation. With so many stars on the BG programme we must accept that many of them will not attract enough observations to enable a complete analysis to be made. However even a few observations of each star will enable useful conclusions to be drawn about the variation taking place, and may identify stars which are of potentially greater interest than others. For this reason no variables will be dropped from the old BSS programme, indeed the programme will continue to expand to include more variables and suspected variables as these are discovered.

We must ensure, though, that we obtain enough observations of certain variables to enable complete light curves to be drawn. The brighter, more easily identified, variables are the ones which appear to be most attractive to observers and, other things being equal, we can expect that these would receive the greatest attention. Such stars are not necessarily the ones we should be observing most, since a particularly difficult (or comparatively faint) variable may prove more deserving. We need a system of directing extra effort towards a selected list of stars - a list that can be revised from time to time as our interests change. Such a Priority List approach has been operational for a number of years in British and American satellite tracking circles, although there the scheme is taken a stage further by actually assigning an order of priority. All the stars on the BG Priority List (PL) have equal priority and it is hoped that observers will spread their observations as evenly as possible over the List members. The BG Priority List is given below.

Correspondence concerning the choice of stars, and suggested changes to the List, should be addressed to the BG Coordinator.

The PL contains stars on the main VSS programme which can usefully be studied using binoculars for at least part of their cycle. It is hoped that observers will attempt regular observation of as many PL members as they can handle (though see 'Frequency of observation' below), and that they will assign due priority to these stars when adding to their own programmes.

### The Priority List.

R And	V CVn	AR Cep	EU Del	AG Peg
R Aql	Y CVn	Omi Cet	RY Dra	X Per
V Aql	TU CVn	R CrB	X Her	R Sct
UU Aur	WZ Cas	S CrB	AC Her	S Sct
CO Aur	V377 Cas	W CrB	IQ Her	R Ser
V Boo	V465 Cas	R Cyg	OP Her	Y Tau
RX Boo	Wr162 Cas	W Cyg	g Her	BU Tau
UV Boo	Gam Cas	AF Cyg	R Hya	T UMa
X Cam	Rho Cas	CH Cyg	Y Lyn	Z UMa
XX Cam	W Cep	V460 Cyg	U Mon	RY UMa
X Cnc	RW Cep	Chi Cyg	U Ori	V Vul
RS Cnc	SS Cep	U Del	BQ Ori	

### Frequency of Observation.

The common temptation to observe, the same star on every possible occasion (sometimes more than once a night) should usually be suppressed. There are very few stars on the BG programme which require such diligent scrutiny. Red semi-regular and red irregular stars, which form the bulk of our programme, should be observed at intervals of 4 days or more. More frequent observation can so easily lead to biased results. This restriction on frequency of observation might, we hope, encourage observers to adopt more variables for study.

There is no restriction on the frequency of observation of other stars, though remember that (leaving aside eclipsing binary stars) few binocular objects deserve more than one observation per night.

#### Charts and Chart Corrections.

The present BSS charts will continue to be used and distributed within the BG. As old charts are reprinted, and new charts drawn, they will be designated as BAA VSS BG charts.

Minor corrections to charts will be announced in these Circulars, and observers are asked to correct their own chart copies at this time. In the event of more substantial revisions new charts will be issued which observers should adopt as soon as they can.

Many of the charts at present in use contain unsatisfactory magnitudes for one or more of the companion stars. The BG Coordinator will be pleased to receive comments and suggestions from observers about any anomalous magnitudes they find.

#### Publications.

The VSS Circulars, containing BG as well as main VSS programme news, will be sent to all VSS members provided they send several stamped self-addressed envelopes of at least 8½" x 4" to the Director. Write 'LAST SAE' on the top left-hand corner of one of the envelopes; this will serve as a reminder that a further batch of SAEs must be sent in. BSS members should supply these also, although for as long as their BSS subscriptions last, their copies of the VSS Circulars will be paid for by the BSS.

The BSS Third Report is in course of publication. Reports of observations obtained since 1970 Dec 31 will depart from the previous BSS practice of one report per year of observation. This will enable us to recover our lost ground more quickly than we could otherwise have done.

#### Please help!

If you wish to become involved with the BG, please write to the appropriate BG officer (see 'Officers of the BG'). It is of considerable help to the officer concerned, and to VSS finances, if you enclose a stamp (or a SAE) when you write.

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Assistant Coordinator:	A L Smith, 11 Lerryn Road, Gosport, Hants, PO13 0YG Tel: Fareham (032 92) 4677
Recorder:	A E J Forno, 92 Crockford Park Road, Addlestone, Surrey KT15 2LR Tel: Weybridge (0932) 44668
Chart Curator:	S J Anderson, 20 Bloomfield Avenue, Luton, Beds, LU2 0PS Tel: Luton (0582) 23360

VARIABLE STAR SECTION  
BINOCULAR CHART CATALOGUE

This catalogue lists the charts available in 1974 July for binocular observation of stars on the main and Binocular Group programmes of the BAA VSS. The successive columns of the table are as follows.

- Star. The accepted name of the variable, usually from the General Catalogue of Variable Stars (GCVS, 1969-71, and first supplement 1972), or the Catalogue of Suspected Variable Stars (CSVS, 1951 and 1965).
- Desig. The 6-digit Harvard designation. The first four figures give the hours and minutes of right ascension, the final two the degrees of declination (underlined if negative), for epoch 1900.0. Thus, the approximate position of 185905 V Aql is  $18^{\text{h}} 59^{\text{m}}, -05^{\circ}$ .
- Range. The extreme visual limits of variation, from various sources, including BSS and VSS observations.
- Type. The type of variation according to the nomenclature adopted by the International Astronomical Union, generally from the GCVS. (See below)
- Period. The period of variation, generally from the GCVS. For stars of type RVa, which exhibit alternate deep and shallow minima, the formal (double) period is given. Semiregular variables frequently show a number of superimposed periods, and in such cases the value chosen is somewhat arbitrary.
- Spectrum. The spectral class, generally from the GCVS.
- Chart. Where no number appears here, the chart is for a single variable. Where a number is given, the chart may be used for more than one variable. For example the chart for AB Aur may also be used for TT Tau.

The Classification of Variable Stars.

I. Pulsating Variable Stars

- L Slow irregular variable stars.
- Lb Slowly varying irregular variables of late spectral classes, giants as a rule.
- Lc Irregular variable supergiants of late spectral classes.
- M Mira Ceti type stars: long period giant variables with amplitudes over 2.5m and well expressed periodicity,
- SR Semiregular variables: giants or supergiants possessing an appreciable periodicity, accompanied, or at times disturbed, by various irregularities in the light variations.
- SRa Semiregular variable giants of late spectral classes, which retain periodicity with comparative stability and possess, as a rule, small (less than 2.5m) amplitudes.
- SRb Semiregular variable giants of late spectral classes with a poorly expressed periodicity, i.e., with different duration of individual cycles (leading to the impossibility of predicting the epochs of maximum and minimum brightness) or with temporary replacement of the periodic changes by slow irregular variations or even by constancy of brightness.
- SRc Semiregular variable supergiants of late spectral classes.
- SRd Semiregular variable giants and supergiants of spectral classes F, G and K.
- RVa RV Tauri type variables with constant mean brightness: variable supergiants characterised by a comparatively stable periodicity of light variations with total amplitude up to 3m; the light curve consists of double waves with alternating main and secondary minima of variable depth, main minima being often replaced by the secondary and vice-versa.
- RVb RV Tauri type variables with periodically varying - mean brightness.

## II. Eruptive Variable Stars

1. Irregular variables, connected with diffuse nebulae, and rapid irregular stars,

Ia Irregular variables of early spectral classes.

In Orion variables: irregular variables connected with or observed in the regions of diffuse nebulae. If rapid light variations have been observed, the suffix 's' is added - Ina, Inas, Inbs.

Ina Orion variables of early spectral classes.

Inb Orion variables of intermediate or late spectral classes.

Isb Rapid irregular variables of intermediate and late spectral classes, apparently not connected with diffuse nebulae, with brightness variations by 0.5 - 1.0m during several hours or days.

2. Novae and novalike variables.

NI Novalike variable stars: objects resembling novae in their light variation or spectral properties. Many members of this group apparently bear no relation to the novae.

ZAnd Z Andromedae type variables (symbiotic stars).

RCB R Coronae Borealis type variables.

### CATALOGUE

Star	Desig.	Range	Type	Period	Sp	Chart
R And	001838	6.0 - 14.9	M	409 <sup>d</sup>	S5	
RS And	235048	7.9 - 9.1	SRb	130	M8	1
SU And	235942	8.0 - 8.5	Lb	-	Nb	1
TZ And	234546	7.6 - 9.0	SRb	-	M6	1
AQ And	002235	8.0 - 8.9	SR	346	Nb	
BZ And	003245	7.5 - 8.4	Lb	-	M5	
R Aql	190108	5.7 - 12.0	M	293	M5	
V Aql	185905	6.7 - 8.2	SRb	353	N6	2
V450 Aql	182805	6.3 - 6.9	SRa	64	M8	3
CSV 101849 Aql	192502	6.1 var?	-	-	K5	3
CSV 101855 Aql	192804	6.7 var?	-	-	Mb	3
UU Aur	062938	5.1 - 6.8	SRb	235:	N3	
AB Aur	044930	7.3 - 8.5	Ina	-	B9	4
AE Aur	050934	5.4 - 6.1	Ina	-	O9	See note
CO Aur	055347	7.3 - 8.1	RV?	40	F5	See note
NC Aur	053431	6.1 - 6.7	Lb	-	M0	5
Psi <sup>1</sup> Aur	061749	4.8 - 5.4	Lc?	-	M0	
+31 1048 Aur	053431	? - 6.0	flares?	-	B8	5
V Boo	142539	7.6 - 10.4	SRa	258	M6	
RV Boo	143532	6.3 - 8.0	SRb	137	M5	6
RW Boo	143632	6.4 - 7.9	SRb	209	M5	6
RX Boo	141926	6.9 - 9.1	SRb	210:	M7	7
UV Boo	141826	8.0 - 8.7	Ia	-	F5	7
U Cam	033362	7.7 - 8.7	SRb	400:	N5	
X Cam	043274	7.4 - 14.2	M	144	M0	
RY Cam	042164	7.3 - 9.4	SRb	136	M3	8
ST Cam	044067	6 - 8	SRb	-	N5	9
UV Cam	035761	7.6 - 8.4	SR?	294?	R8	8
UX Cam	050068	7.8 - 8.8	Lb	-	M6	9
VZ Cam	071082	4.7 - 5.2	SR	24	M4	10
XX Cam	040053	7.3 - 9.7	RCB	-	G1	
ZZ Cam	040862	7.1 - 7.9	Lb	-	M5	8
+61 0668 Cam	035761	7.7 var?	-	-	A0	8
X Cnc	084917	5.9 - 7.3	SRb	170:	N3	
RS Cnc	090431	5.5 - 7.0	SRc?	120	M6	
RT Cnc	085211	6.9 - 8.0	SRb	90:	M5	
V CVn	131546	6.8 - 8.8	SRa	192	M5	11
Y CVn	124045	5.2 - 6.6	SRb	158	N3	11
TU CVn	125047	5.8 - 6.3	SRb?	50	M6	11
W CMa	070311	6.9 - 7.5	Lb	-	N	

WZ Cas	235659	6.9 - 8.5	SRa	186	N1	see note
V391 Cas	014869	7.6 - 8.4	Lb	-	M4	12
V393 Cas	015470	6.8 - 7.9	SR	-	M0	12
V465 Cas	011157	6.2 - 7.2	Lb	-	Mb	13
Gam Cas	005060	1.6 - 3.0	N1	-	B0	
Rho Cas	234956	4.1 - 6.2	RCB?	-	F8	see note
CSV 171 Cas	014667	7.3 - 7.7?	N1	-	A0	12
Wr 162 Cas	010757	7.2 - 7.9	L	-	K5	13
+49 4329 Cas	235949	7.0 - 8.0	var?	-	K0	
W Cep	223257	6.9 - 8.6	SRc	-	K0	14
RU Cep	010884	8.2 - 9.4	SRd	109	G9	15
RW Cep	221955	6.2 - 7.6	Lc	-	M0	14
RX Cep	004181	7.3 - 7.8	L	-	G5	15
SS Cep	033380	6.7 - 7.8	SRb	90	M5	
AR Cep	225384	7.1 - 7.8	SRb	-	M4	15
FZ Cep	211655	7.0 - 7.6	SR	-	M7	
Mu Cep	214058	3.6 - 5.1	SRc	-	M2	
CSV 927 Cep	065387	5.4 - ?	?	-	M0	10
CSV 8815 Cep	225861	7.8 - 8.3	?	-	A5	14
+59 2383 Cep	212459	6.1 - 6.5	slow	-	M0	16
+60 2217 Cep	211660	6.5 - 7.3	Lb?	-	M5	16
+84 0536 Cep	233984	8.0 var?	-	-	G5	15
33 Cet	010501	5.1 - 7.0	slow	-	K5	
Omi Cet	021403	2.0 - 10.1	M	332	M5	see note
R CrB	154428	5.8 - 14.4	RCB	-	F	
S CrB	151731	5.8 - 14.0	M	360	M6	
W CrB	161138	7.8 - 14.3	M	238	M2	
RR CrB	153738	7.1 - 8.6	SRb	61	M5	17
SW CrB	153739	7.6 - 8.3	Lb?	-	M0	17
R Cyg	193449	6.5 - 14.2	M	427	S4	
W Cyg	204334	5.0 - 5.5	Lb?	-	K3	18
W Cyg	213244	5.0 - 7.6	SRb	126	M4	see note
RU Cyg	213753	8.0 - 9.4	SRa	234	M6	
RV Cyg	213937	7.1 - 9.3	SRb	300:	N5	19
TT Cyg	193732	7.4 - 8.7	SRb	118	M3	20
AF Cyg	192745	6.4 - 8.4	SRb	94	M5	21
CH Cyg	192150	6.6 - 8.5	ZAnd	-	M7	
V460 Cyg	213735	6.1 - 7.0	Lb	-	N1	
V1351 Cyg	193554	7.5 - ?	?	-	M4	
Chi Cyg	194632	3.3 - 14.2	M	407	S8	
P Cyg	201437	3.0 - 6.0	N1	-	B1	18
CSV 8307 Cyg	194532	7.5 - 8.2?	SR?	-	K5	20
CSV 8683 Cyg	213940	4.7 - 5.5	Lb?	-	M2	19
28 Cyg	200536	4.8 var?	-	-	B2	18
+47 2801 Cyg	191447	7.4 var?	-	-	G5	21
U Del	204017	5.6 - 7.5	Lb	-	M5	22
EU Del	203317	6.0 - 6.9	SRb	60	M6	22
+19 4450 Del	202919	7.3 - 7.8	slow	-	Mb	22
RY Dra	125266	6.5 - 8.0	SRb	173	N4	
TX Dra	163360	6.8 - 8.3	SRb	78	M4	23
UW Dra	175554	7.0 - 8.0	Lb?	-	K5	
UX Dra	192576	5.9 - 6.5	SRa	168	N0	24
VW Dra	171560	6.0 - 6.5	SRd	170:	G9	23
AH Dra	164657	7.1 - 7.9	SRb	158	M7	23
AT Dra	161559	5.3 - 6.0	Lb	-	M4	23
69 Dra	200276	6.4 var?	-	-	M3	24
TU Gem	060426	7.4 - 8.3	SRb	230	N3	25
TV Gem	060521	6.6 - 8.0	SRc	182	M1	25
WY Gem	060523	7.2 - 7.9	Lc	-	M2	25
BN Gem	073117	6.0 - 6.6	Ia?	PA	O8	

BQ Gem	070716	5.1 - 5.5	SRb	50:	M4	
BU Gem	060622	6.1 - 7.5	Lc?	-	M1	25
DW Gem	062427	8? - 10.4	Lb	-	M4	
IS Gem	064332	5.3 - 6.0	SRd	47:	K4	see note
+24 1686 Gem	072524	8 var?	-	-	R8	
X Her	155947	6.3 - 7.4	SRb	95	M6	26
ST Her	154748	7.0 - 8.7	SRb	148	M6	
SX Her	160325	8.0 - 9.2	SRd	103	G6	
UW Her	171036	7.8 - 8.7	SRb	100	M5	
AC Her	182621	7.0 - 8.4	RVa	75	F8	27
IQ Her	181317	7.3 - 8.2	SRb	75	M4	27
OP Her	175345	6.0 - 6.6	Lb	-	M5	
V566 Her	180441	7.1 - 7.8	SR?	400:	M4	
g Her	162542	4.6 - 6.0	SRb	70:	M6	26
R Hya	132422	3.0 - 11.0	M	388	M6	see note
U Hya	103212	4.8 - 5.8	SRb	450:	N2	
SX Lac	225134	7.7 - 8.7	SRb	190	M0	
CSV 8775 Lac	222956	5.8 - 6.8	slow	365:	K0	14
CSV 102195 Lac	223456	5.5 var?	-	-	Mb	14
RX Lep	050611	5.7 - 7.0	Lb	-	M6	
Y Lyn	072046	6.9 - 8.0	SRc	110	M5	28
SV Lyn	075736	6.6 - 7.5	SRb	70:	M5	
CSV 100869 Lyn	072148	7.1 var?	-	-	Mb	28
R Lyr	185243	3.9 - 5.0	SRb	46	M6	29
XY Lyr	183439	6.1 - 6.6	Lc	-	M4	
Delta <sup>2</sup> Lyr	185136	4.5 - 4.9	?	-	M4	29
S Mon	063509	4.5 - 4.9	Ia?	-	O7	
U Mon	072609	5.5 - 7.5	RVb	92	F8	see note
RV Mon	065306	6.3 - 7.9	SRb	131	N6	30
SX Mon	064604	7.8 - 8.9	SR	100	M6	30
V505 Mon	064002	7 - 8	?	-	B5	
X Oph	183308	5.9 - 9.2	M	334	M6	
V2048 Oph	175504	4.0 - 4.8	flares	-	B4	
U Ori	054920	5.3 - 12.6	M	372	M7	
W Ori	050001	5.9 - 7.7	SRb	212	N5	
BL Ori	061914	6.3 - 6.9	Lb	-	Nb	31
BQ Ori	055122	6.9 - 8.9	SRa	110	M5	32
CK Ori	052504	6.2 - 6.6	SR?	120?	K2	
+14 1247 Ori	061414	5.5 - 6.1	Lb?	-	M0	31
AG Peg	214612	6.0 - 9.4	ZAnd	-	M1	
GO Peg	225019	7.1 - 7.8	Lb	-	M4	
X Per	034930	6.0 - 6.6	Ina	-	O	
SU Per	021556	7.0 - 8.5	SRc	470	M3	33
AD Per	021356	7.7 - 8.4	SRc	320	M2	33
KK Per	020356	6.6 - 7.8	Lc	-	M1	33
PR Per	021457	7.6 - 8.3	Lc	-	K5	33
Z Psc	011025	7.0 - 7.9	SRb	144	N0	
TV Psc	002217	4.8 - 5.7	SR	49	M3	
TX Psc	234102	4.9 - 5.8	Lb	-	N0	
R Sct	184205	5.9 - 7.9	RVa	140	G5	see note
S Sct	184408	7.0 - 8.0	SR	148	N3	2
R Ser	154615	5.7 - 14.4	M	357	M6	
Y Tay	053920	6.8 - 9.2	SRa	241	N2	32
TT Tau	044528	8.1 - 8.8	SRb	166	N3	4
BU Tau	034323	5.0 - 5.5	Ia	-	B8	34
CE Tau	052618	4.5 - 4.9	SRc	165	M2	
CSV 6048 Tau	033922	7.1 - 7.9	Ia?	-	A0	34
+22 0743 Tau	043722	6.5 - 7.0	var?	-	B9	
W Tri	023534	7.5 - 8.8	SRc	108	B9	
T UMa	123160	6.6 - 13.4	M	256	M5	

Z UMa	115158	6.6 - 9.1	SRb	196	M5	35
RY UMa	121561	7.0 - 8.0.	SRa	311	M3	35
ST UMa	112245	6.4 - 7.5	SRb	81	M4	
TV UMa	114036	6.7 - 7.6	SRb	50	M5	
VW UMa	105270	7.2 - 7.8	SR	125	M2	36
VY UMa	103867	5.9 - 6.5	Lb	-	N0	36
V UMi	133674	7.4 - 8.8	SRb	72	M5	
RW Vir	120206	7.0 - 8.2	Lb	-	M5	37
RX Vir	115905	8.0 - 8.4	SR?	200:	K0	37
SS Vir	122001	6.0 - 9.6	M	355	N	
SW Vir	130802	6.5 - 7.7	SRb	150:	M7	
BK Vir	122504	7.3 - 8.7	SRb	150:	M7	
V Vul	203226	8.1 - 9.4	RVa	76	G4	see note

**Notes:**

AE Aur, WZ Cas and IS Gem are on the same charts as AR Aur, TV Cas and WW Aur respectively. The latter stars are all members of the Eclipsing Binary Programme.

CO Aur, Rho Cas, Omi Cet, W Cyg, R Hya, U Mon and R Sct: for each of these stars a set of binocular charts consists of two sheets, the cost being 2p per sheet plus postage.

V Vul: for this star a set of binocular charts consists of three charts, the cost being 2p per sheet plus postage.