BRITISH ASTRONOMICAL ASSOCIATION

L I G H T C U R V E

VARIABLE STAR SECTION CIRCULAR No. 49 1982 MARCH

SECTION OFFICERS

Director: D.R.B. Saw, 12 Taylor Road, Aylesbury, Bucks. HP21 8DR

Tel: Aylesbury (0296) 22564

Assistant Director: S..R. Dunlop, 140 Stocks Lane, East Wittering, nr Chichester, West Sussex. PO20 8NT

Tel: Bracklesham Bay (0243) 670354

Programme Secretaries

Main Secretary: G.A.V. Coady, 15 Cedar Close, Market Deeping, Peterborough. PE6 8BD

Tel: Market Deeping (0778) 345396

Binocular Secretary: N.D. Taylor, 17 Cross Lane, Wakefield, West Yorkshire. WF2 8DA

Tel: Wakefield (0924) 374651

Eclipsing Binary Secretary: J.E. Isles (See note inside regarding address)

Nova/Supernova Search Secretary: G.M. Hurst, 1 Whernside, Manor Park, Wellingborough, Northants. NN8 3QQ

Tel: Wellingborough (0933) 676444

Chart Secretary: J. Parkinson, 28 Banks Road, Golcar, Huddersfield, West Yorkshire. HD7 4LX

Tel: Huddersfield (0484) 642947

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New Members and Changes of Address

H. Colquhoun now: 7 Betula Drive, Parkhall, Clydebank

U. Danielsson, Box 8055, S-771 00, Ludvika, Sweden

R. East, 12 Malton Road, North Hykeham, Lincoln

B.H. Granslo, 1138 Sogn Stud. By, Oslo 8, Norway

B. Hasseus, Wieselgrensplatsen 5, S-417 17, Göteborg, Sweden

R. Heikkilä, Pappila, SF-30100, Forssa 10, Finland

P. Heinonen, Vellamontie 5 C 49, SF-28370, Pori 37, Finland

E. Kinnanen, Moisiontie 12, SF-20360, Turku 36, Finland

H. Lehto, Puistokat 13 B 9, SF-20140, Turku 14, Finland

J. Lingäs, Värseterveien, N-2600, Lillehammer, Norway

E. Pedersen, Fjordparken 338, DK-8700, Horsens, Denmark

L.-A. Truedsson, Rapsvägen 28, S-240 17, Södra Sandby, Sweden

Also:

G. Dömény, Kadjacs, Ságvári u. 392, H-7051, Hungary
A. Mizser, Budapest, Frankel Leó út. 96, H-1023, Hungary
TIT Urania Public Observatory, Budapest, Sanc ut. 3/b, H-1016, Hungary
P. Kalv, Tahetorn 2, Tallinn 16, USSR 200016

Due to the many changes, and new members and subscribers in recent months a new list of members is being prepared and will be issued shortly.

Editorial:

We are very pleased to welcome so many new subscribers, especially those outside the UK. We sincerely hope that this will eventually become a fully European publication. Please do not forget that we are interested in receiving contributions on any aspect of variable star work, notes on suspected variables, non-programme stars, etc. If submitting light-curves please remember that these are expensive to reproduce and may have to be held over until others can be printed at the same time. Light-curves should be on a separate sheet of paper to any written material.

Any contributions may be sent to either the Director, Doug Saw, or the Assistant Director, Storm Dunlop

Eclipsing Binary Programme Will members please note that for the time being all urgent correspondence for John Isles should be addressed to:

John Isles
C/o Department of Transport,
Room B246,
Romney House,
Marsham Street,
London, S.W.1. Tel: 01-212 0246

John has moved from Hemel Hempstead, but legal problems have delayed his taking up residence in London. As all his reference material has had to go into store, he may not be able to answer all queries immediately. Further details of the Eclipsing Binary Programme, including a list of observations received will be published as soon as possible. A full description of the Programme appeared in the February issue of the Journal.

Chart Revisions 192150, CH Cygni, 6.4 - 8.7V, Z And, (97^d), M7IIIab + B. Activity in CH Cygni over the last 2 years has increased such that brighter comparison stars are now introduced. A maximum of magnitude 6.3 was recorded by VSS observers in 1980 June and over 1981 the brightness has increased steadily from 6.7 (1980 October) to about 5.8 by 1982 January. The Catalogue (GCVS) remarks that outbursts coincide with an increase in the ultra-violet continuum; also rapid variations are suspected by some observers. Four new comparisons are introduced:-

N,	RA 18^h	59^m	Dec + 50^o	28'	5.4, B3
M,	19	30	+ 50	12'	5.7, K0
L,	19	26	+ 52	13'	5.8, A0
K,	19	32	+ 49	09'	6.2, M4

These are shown on the revised chart dated 1982 Feb. 20.

155947 X Herculis
162542 g Herculis Due to a variety of reasons the comparison star $\frac{1}{2}^o$np (approximately) Phi Herculis is now designated 72 at magnitude 7.2. Latest date (revision noted) on chart is 1982 Feb 07; no other changes.

115905 RX Virginis
120206 RW Virginis The chart is simply redrawn with the only amendment being the location of T Virginis (Mira type, 9.6 - 14.2, p = 339^d). Chart date 1982 Feb 05. Both are semi-regular stars which need more observation; their location is given from Eta Virginis.

All charts are obtainable from J. Parkinson, 5p each plus SAE.

090431 - RS Cancri - 1971 to 1980 5.1 - 6.9v, SRc?, 120^{d+}, M6Ib-II, B-V + 1.60.
RA 09^h 07^m6 Dec + 31^o 10' (1950).

A preliminary analysis of over 800 estimates of RS Cancri, which Mr. E. H. Collinson checked and logged, from 38 VSS observers has just started. Initially it was thought there was 'trouble' with the sequence, as suggested in the CSN, but a detailed investigation of visual estimates revealed a set of mean magnitudes differing little from the chart, dated 1971 May 9. (It is worth noting that since the variable, and some comparisons, are bright (5^m magnitude) and reddish, substantial differences in the estimated magnitudes can occur. The Purkinje Effect in particular, and haze/artificial lights are

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contributory factors. The colour effect can be reduced if the observer uses an instrument just powerful enough to see the variable and its comparisons. Some observers de-focus slightly, thereby reducing colour effects, but then have to estimate a non-stellar sized image; this is acceptable practice. [But should be coded E (for extra focal) on report forms - SRD.] The light-curve is incomplete with at times a 4-monthly gap when the variable is near conjunction with the Sun. Variability is relatively well expressed for most of the duration of the curve but becomes slightly irregular in 1978 - 1980. It is possible to agree (which is not surprising) with the JBAA report, Vol 84, p 39, 1973, that the star is brighter than the Catalogue indicates. Our data shows an extreme range of 5.1 to 6.9 (visual), and an approximate period of 120 days. The star deserves better coverage and is ideal for following with binoculars of say, 8 x 30 or 8 x 40 size.

A Report on the Estimate Report forms The new style 'computer' Estimate Report form is relatively easy to complete, provided basic methods as used by the VSS are well known. However, several aspects of its introduction have caused genuine confusion among a few observers, and the aim of the following notes is to identify some of the errors and give advice where appropriate. Although we may be able to allow for some of these points in our programs, it will make life easier if observers can fill in the forms correctly. [It is hoped that Members will bear with the following statements if, to them the obvious is being 'explained'.]

1) 'Sheet - of - ' Often this is omitted. This is simple; if 2 reports are needed for one star, per 6-monthly submission, then the first is labelled sheet 1 of 2; the 2nd sheet 2 of 2.

2) Constellation 10 - 12 Please quote the correct form using upper and lower case letters, where needed; e.g. CVn not CVN. (Many astronomy references such as 'Norton's' give these).

3) Sequence No. 13 - 18 Often the HD (Harvard Designation) is quoted by Members - incorrectly. The correct number is needed so that the computer can uniquely find the magnitude sequence for that star. It is in the form 045.01-the decimal point is required-and at present only the Main Programme charts have this shown. For Binocular Programme stars please indicate under the boxes and in pencil the last date given at bottom right on the chart.

4) Month Abbreviation for July is JLY not JUL.

5) Method/Estimates

	Incorrect	Correct
P	V = A	P = A
F	= A	P = A
	F A I V I B	F A (1) V (1) B

NB: All symbols are required to be placed in a box, starting at box 37, i.e. A, B (or whatever comparison 'name'), as well as the bracket symbols (and). Do not forget < and > and - and/or +. Never show a P (= Pogson) estimate and an F (= Fractional) estimate on the same line. If several estimates are made by P and F methods, note that only one F estimate can be fully placed between boxes 37 - 49. A gap is requested between P estimates and one of these should not be split-up between different lines. Always start writing from the farthest left - i.e. box 37.

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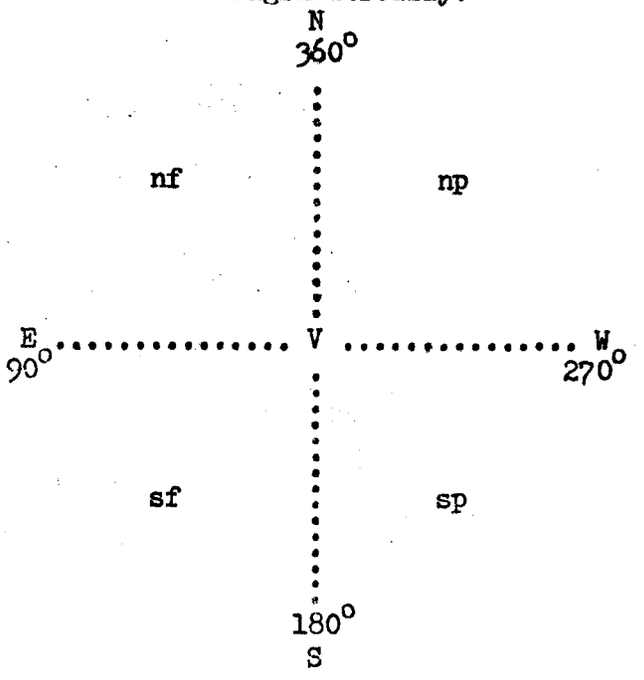
It is required for the analyst to know exactly which comparison star has been used in the making of an estimate. The case of a comparison being discovered to be variable, which is not unknown, would then necessitate a re-run of the affected data. This would also be the case in the event of a different sequence being employed. Previously both of these cases meant a vast amount of work, but with a computer file this now becomes relatively easy. In addition the preservation of the full estimate with comparison details is obviously scientifically desirable.

In order to describe, uniquely, the numbered comparisons, a standard notation which is shown in various books is as follows:

'North, or south preceding' i.e. np or sp; 'North or South following', i.e. nf or sf in relation to a variable star may be used. Thus n means the comparison is nearer the north celestial pole; and vice versa for south, s. Preceding means that its RA is less than that of the variable, and, following that its RA is greater.

diagramatically:



Non-inverted view

n = north s = south
p = preceding f = following

In the ESTIMATE boxes an example may be: 50f - 1 55np + 4, with each character in its box. The situation could be more complicated, and if so comments on the 'Observer' form may be needed.

6) Box 50 This is for symbols < or >, i.e. respectively: 'The variable was not seen and is fainter than comparison A" - for example. This is written as < A. 'The variable was seen brighter than comparison B' - for example. This is written as > B.

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7) Magnitude 51 - 54 Deduced magnitudes are required to the nearest tenth of a magnitude. In the case of a deduced magnitude 0.05, round to 0.1; 0.04 goes to 0.0. Where several estimates have been made, as in 5), the mean magnitude rounded as above should be given in 51 - 54 of the line corresponding to the last estimate. In this case a 'N' should appear in the box 58 to signify this is the mean of several estimates. This will normally apply more frequently to Pogson (or Argelander) estimates - each of which is truly a separate estimate, remember - than to Fractional, but can of course apply to a mixed set.

8) Box - 55 If your confidence in the estimate (at the telescope) is low and a 3 is given in the CLASS box 56, a symbol : (signifying 'approximately') is needed here in box 55.

9) Class - 56 Roman Numerals I, II, III cannot be read by the computer. Only 1, 2 or 3 please!

10) Instrument - 57 The cause of much confusion. Until you receive the 'observer' report form which allows full comments to be 'computerised' do not fill in 57. Pencil-in a note about instrument under BAA address. (just to tell you: the 'Instrument' or 'Observer' form will be filled in just once per year or half-year with details of all equipment used.)

11) Comments - 58 to 70 These are only for the standard single-letter abbreviations as shown on the example sheet. Writing 'Moon' in full is superfluous. Other comments which you feel are worthy, for example - change of site, details of non-standard comparison used in an estimate, unusual observing conditions, etc. - these are to be put on the new 'Observer Report Form'. If such a comment is to be made place an X, followed by a two-digit 'code', for example, 01, 02, 03 ... in the line of boxes 58 to 70. The 'code' must immediately follow X. Then on the new 'Observer Report Form' the 01 'code' goes in boxes 26 and 27, followed by your comment. Again, all characters are required in a numbered box. Example:

58,	59,	60,	61,	62, ...
M	V	X	0	1

This is read that the Moon was affecting the observation, averted vision was used, and that a non-standard comment coded 01 is made on the 'Observer Report Form' In the temporary absence of these new reports, a separate sheet of paper may be sent with any remarks.

Finally please bear in mind that a successful changeover to a computerised method of reporting should mean a more efficient VSS, and that observational and analytical statistics about variables on the programmes will be made faster. Moreover both professional and amateur workers will find it easier to make full scientific analyses without needing to use partial data.

European Results - Interim Report Since mid 1981 the Binocular Secretary has received many reports and a great number of estimates from European Variable Star Observers. Some 2000 are received for one month, including all those submitted to 'The Astronomer' since in another role, the writer is a sub-editor of this observational magazine. The 'Collection' of preliminary estimates in the form of light-curves has proved both interesting, and alarming. Shown elsewhere in this publication are light curves of V CVn, AF Cyg, TX Dra, UW Her, AC Her, R Sct, Z UMa and V UMi made from these

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estimates by John Toone. These are some of the best examples of the most well-covered stars. There are, regrettably, some stars for which scatter between estimates made on the same day is very serious and is more than likely due to various groups using differing sequences. The stars in question are: V465 Cas, p Cas, W Cyg, U, EU Del and the 'EFVSO's' Secretary, Aawe Kellanaki, has been informed. (The accuracy of derived magnitudes/dates from such light-curves will, of course, be reinforced by adoption of a standard sequence).

A list of variables (names only) observed during 1981 September has been prepared and it is anticipated further additions will ensue. A copy of this may be obtained from the Binocular Secretary, Melvyn Taylor.

Active contributions of variable star results are summarised in the following table:

Country	No. Observers
Belgium	1
Canada	1
DDR	4
Eire	1
England	23
Finland	3
France	1
German Dem. Rep.	1
Hungary	12
Malta	1
Roumania	1
Scotland	4
U.S.A.	1
Wales	1
Zimbabwe	1
15 no.	56 no.

1981 Light-curves for 8 binocular stars. Enclosed with this circular are light-curves of V CVn, AF Cyg, TX Dra, UW Her, AC Her, R Sct, Z UMa and V UMi. Prepared by John Toone, these are plots of individual observations submitted to NWANSO until the end of August, thereafter TA observations being used. All light-curves are drawn to the same scale to allow intercomparison of activity.

The Computing Project The project for the computerization of VSS current and past observations is making slow but steady progress. A trial has already been made and sample computer-plotted light-curves have been produced from actual data. It is hoped that these will be displayed at the Exhibition Meeting on May 25. The BAA Council has approved expenditure underwriting costs of data preparation for a larger pilot trial to ensure the feasibility of the methods envisaged. This second phase is already in progress.

There has been a considerable response to the request for information about members' computers, with many offers of assistance. These are greatly appreciated and will doubtless be taken up in due course. We may expect that the first step will be the production of standard routines for data reduction to ensure that this is always carried out in a consistent manner, with identical results on different machines - more about this shortly. In the meantime, if anyone is having any problems and would like to discuss details with owners of similar machines, we are able to put them in touch. (Please contact Storm Dunlop for this.)

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Chart corrections and revisions R Hydrae: there is an error on some recently issued 30° charts for R Hya. Two comparisons with the same designation (H) are shown. The more northerly should be deleted. Charts issued after 1982 March are correct.

R Andromedae: the new chart for R And, drawn by Rodney Lyon, is now available from the Chart Secretary.

Two interesting stars Meinunger presents - MVS 9(3) - results of examination of Sonneberg plates of several poorly-known variables. Of potential interest to fairly well-equipped amateurs are AT Cancri and SV Canis Minoris. The first AT Cnc, (GCVS 3rd Suppl. classification E?) is shown to be a Z Cam star of approximate photographic range of 12.2 to 14.6 (minimum magnitude poorly defined) and should therefore appear brighter visually. A mean outburst interval cannot yet be defined for behaviour outside standstill, but inspection of the light-curve suggests 30 days or less. Position (1950) RA = $08^{h}\ 25^{m}\ 15^{s}$, Dec = $+\ 25^{\circ}\ 31'\text{-}3$. SV CMi has been known for some time as a possible U Gem or Z Cam star. Meinunger's work does not enable a positive classification to be assigned, but the outburst interval is apparently 8 - 10 days, although with great irregularities. This approximately halves the GCVS (3rd Suppl.) interval. GCVS range 13.0 - 16.3 pg, position (1950) RA = $07^{h}\ 28^{m}\ 28^{s}$, Dec = $+\ 06^{\circ}\ 05'.1$.

Visual Observations of RRs Stars We have received an interesting set of visual observations of SX Phoenicis a member of the dwarf cepheid (RRs) stars. However we are holding this note until the next issue as we learn that members of the Crayford Manor House group have been observing GY Aqr, another (fainter) RRs variable. We hope to be able to reproduce both light-curves.

I.A.P.P.P. Symposium The first European Symposium of the I.A.P.P.P. (see VSSC 45) on the subject of Photoelectric Photometry will be held in Bologna on 1982 August 14 - 16. Papers and discussions will take place on the first two days with visits to astronomical observatories on the 16th. Further details may be obtained from:

Dr. Luigi Baldinelli or Dr. Silvano Ghedini
Associazione Astrofili Bolognesi
C.P. 1630 A/D - Bologna - Italy

Receipt of Light-Curves Subscribers should remember that in order to receive the light-curves which will accompany the June and September issues, they should have paid the additional £1, which helps to cover production costs. Anyone else who requires the light-curves should make payment as soon as possible. PLEASE NOTE: all payments should be made out in the name of the BAA, not individuals.

Coding of 'Instrument' on Report Forms As there appears to be considerable confusion about the coding in column 57 of the forms, and as some members will wish to complete forms before the next issue of this circular, which will include a sample 'Observer' form, the following procedure may be used:

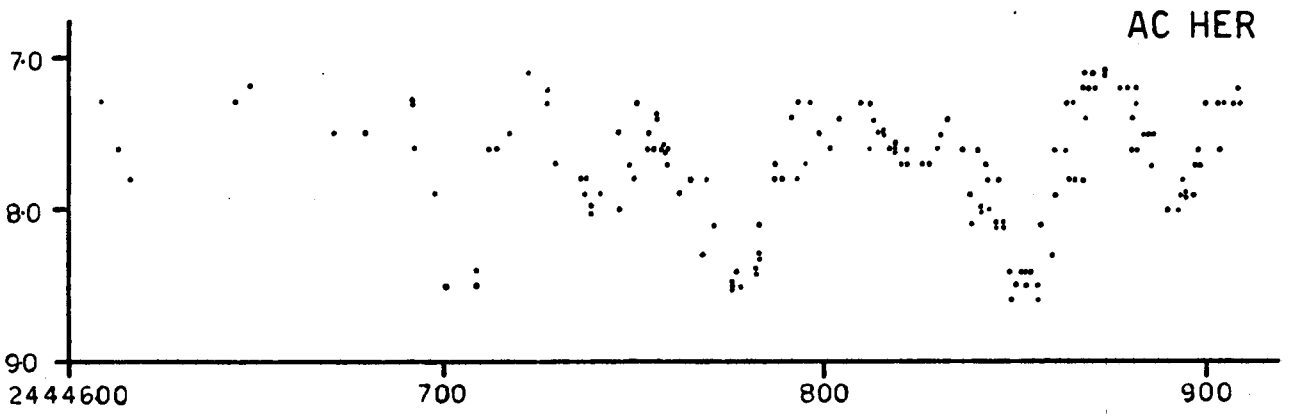
List all the instruments (<u>just</u> instruments not magnifications, etc.!) you use.
Give each a single-digit number (up to 8).
Use these single digits in column 57 to indicate the telescope or binoculars used.

1982 Predictions for Maxima and Minima of Long Period Variables

This information is obtained from AAVSO Bulletin 45,
by kind permission of the Director, Janet A. Mattei.

Star	Desig.	Maximum	Minimum
R And	0018+38	--- Sep 2	Apr 7
W And	0211+43a	May 17	---
RW And	0041+32	--- Sep 26	Apr 19
R Aql	1901+08	--- Jul 28	Mar 22 (Jan 6)
U Boo	1449+18	Mar 31? Oct 17?	Jul 10? (Jan 26?)
V Boo	1425+39	Mar 1 Nov 14	Jul 8 ---
V Cam	0549+74	---	Dec 11
X Cam	0432+74	--- May 18 Oct 9	Mar 7 Jul 29 Dec 20
S Cas	0112+72	May 3	---
T Cas	0017+55	Mar 16	Oct 11
o Cet	0214-03	--- Jul 16	Mar 22 (Feb 17)
S CrB	1517+31	Jan 5 Dec 31	Aug 23
V CrB	1546+39	--- Aug 19	Mar 28
W CrB	1611+38	--- Jun 19 (Feb 12)	Mar 9 Nov 2
R Cyg	1934+49	Mar 17	Dec 20
S Cyg	2003+57	Mar 29 (Feb 15)	Sep 8
V Cyg	2038+47	--- Oct 28	Mar 18
Chi Cyg	1946+32	Feb 13	Oct 14
T Dra	1754+58a	--- Aug 19	Feb 10
RU Her	1606+25	--- (Feb 18)	Jul 25
SS Her	1628+07a	Jan 30 May 17 Sep 1 Dec 17	Mar 29 Jul 14 Oct 29 (Feb 13)
R Hya	1324-22	--- Aug 5?	Jan 20?
SU Lac	2219+55b	--- May 2? (Feb 20?)	Jan 1? Oct 22?
U Ori	0549+20a	--- Oct 17	May 26
R Ser	1546+15	--- Jul 12	Feb 19 (Feb 10)
T UMa	1231+60	--- May 26 (Feb 7)	Feb 14 Oct 29
*V CVn	1315+46	--- Apr 23 Oct 31	Jan 22 Aug 1 (Feb 8)
*X Oph	1833+08	Apr 14	Sep 23
*SS Vir	1220+01	Feb 14 (Feb 4)	Jul 27

* Stars on the VSS Binocular programme.
All the other stars are on the VSS Main programme.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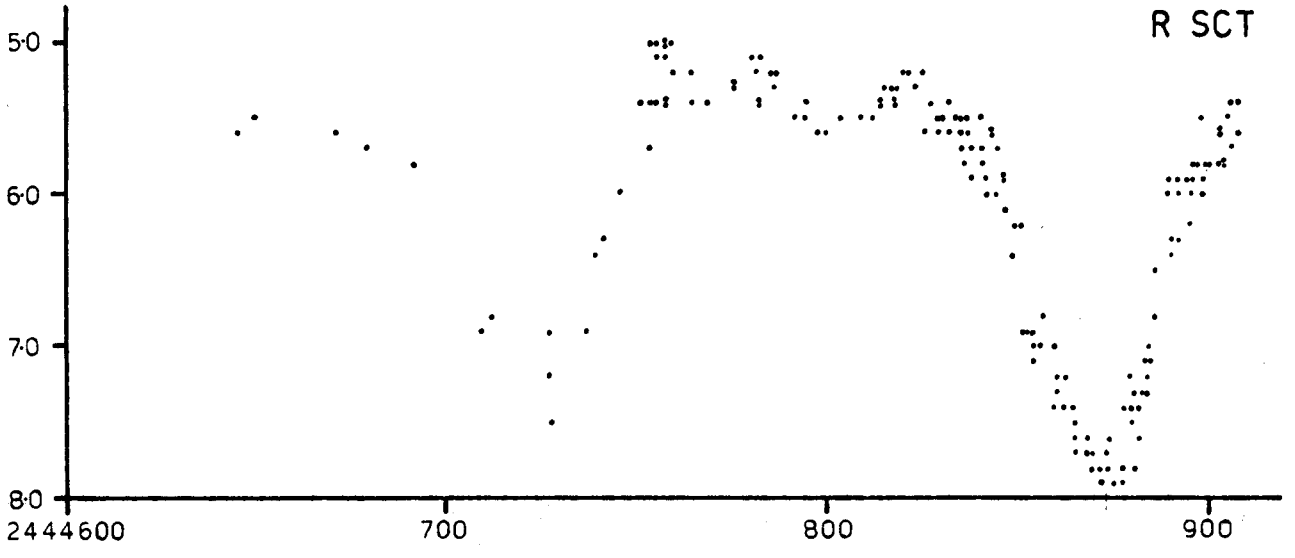
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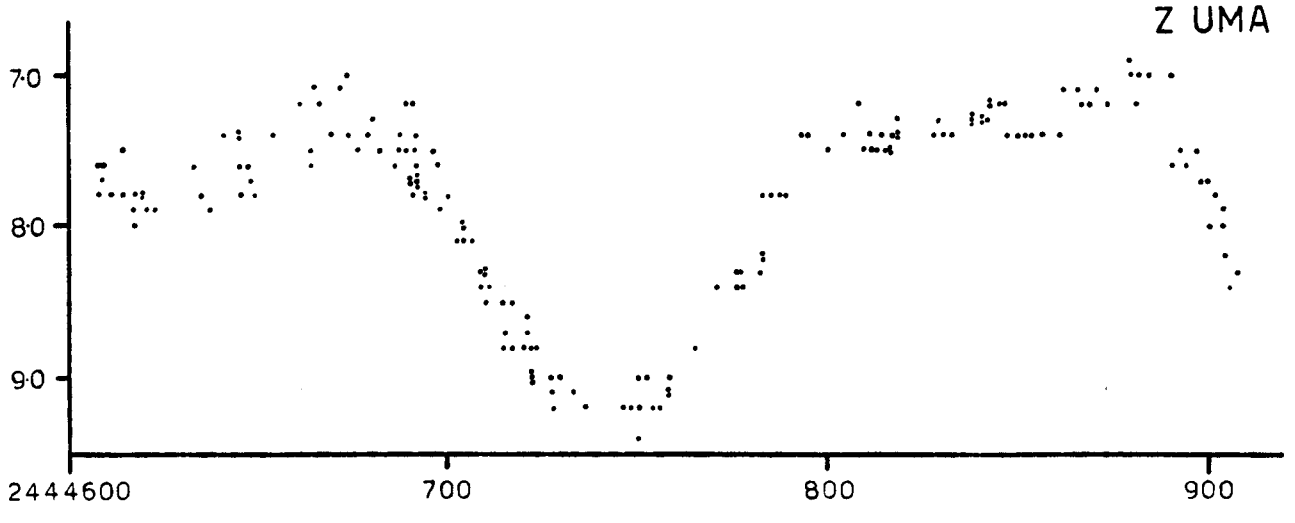
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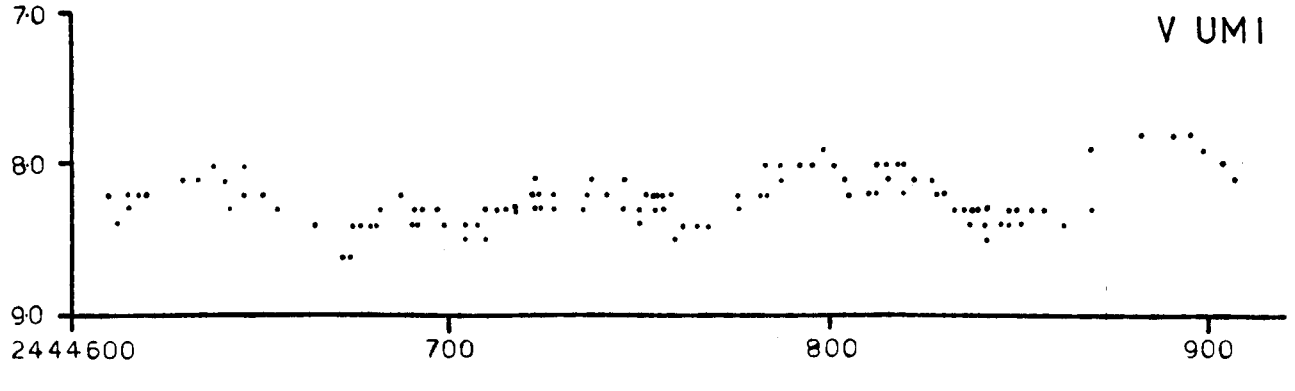
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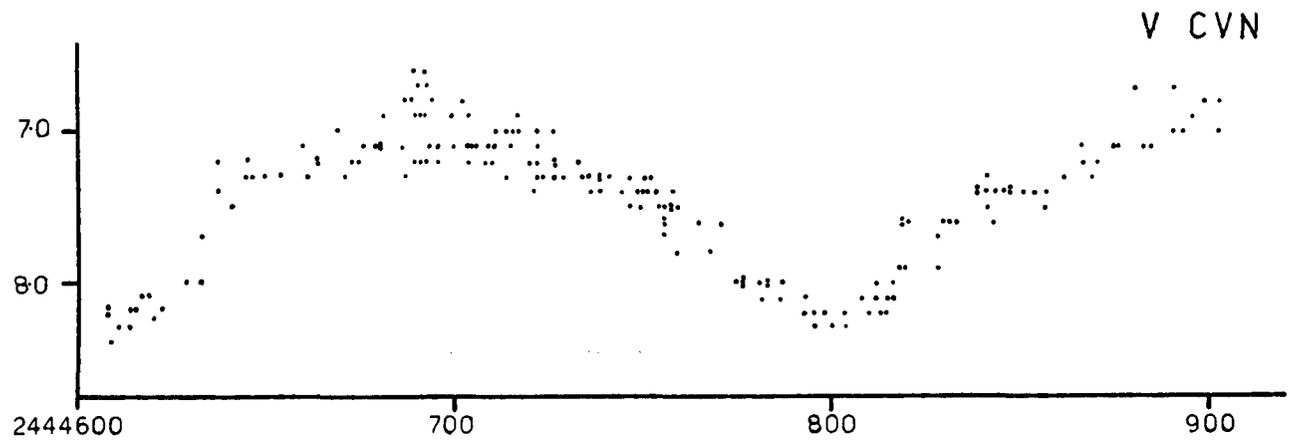
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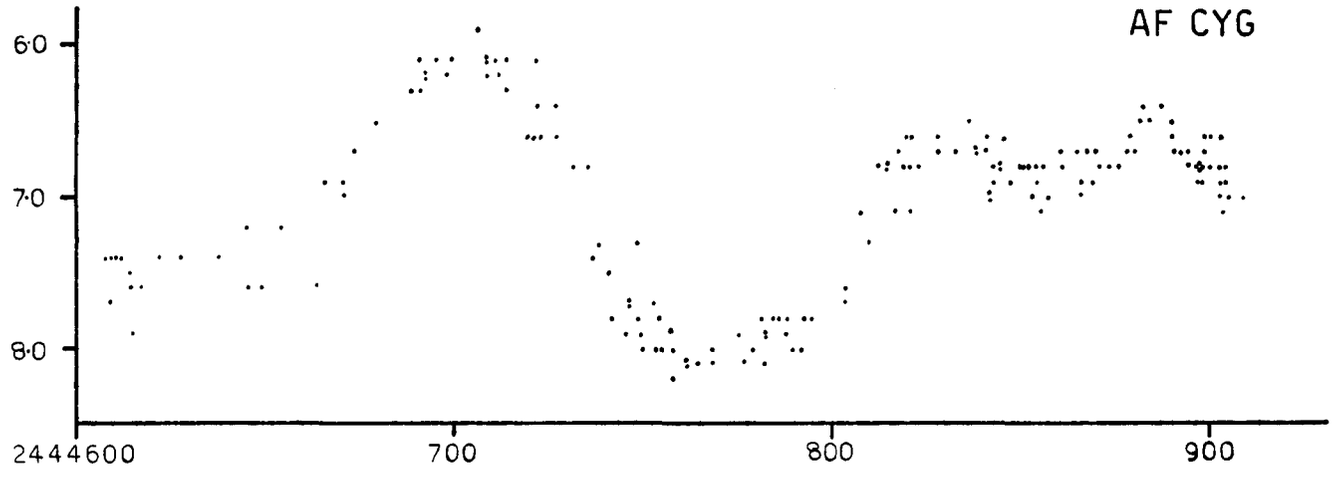
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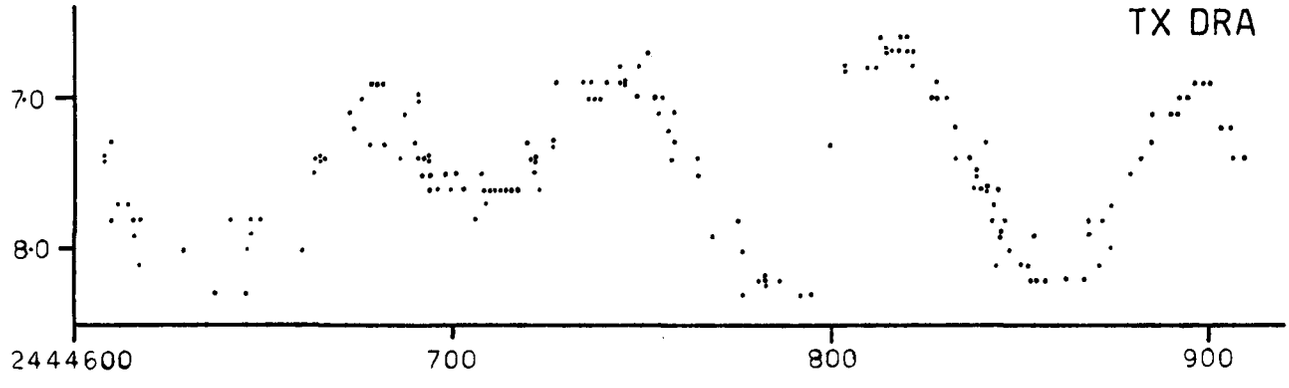
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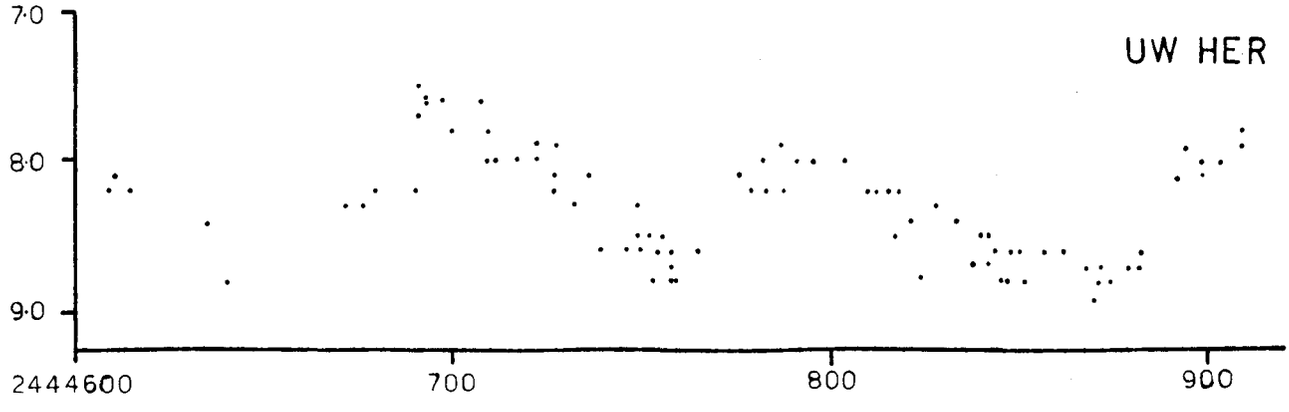
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