

FROM

HALIFAX CENTRE
1747 SUMMER ST.
HALIFAX, N.S.

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R.A.S.C.

12



May 71

TO

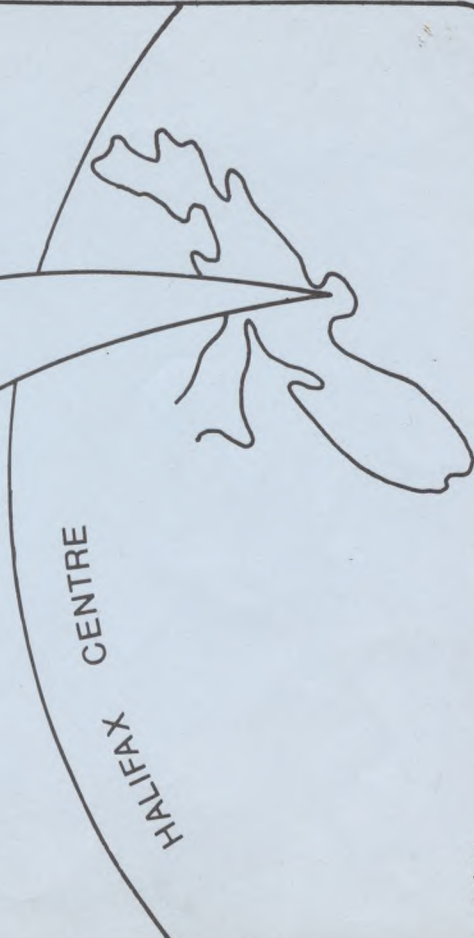
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THE PROPERTY OF:
THE ROYAL ASTRONOMICAL
SOCIETY OF CANADA
252 COLLEGE ST.
TORONTO 2B

NOVA *Supplement* NOTES



44° 38' N
63° 35' W





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PRE-NOVA NOTES, NOTES.

Notice of change of meeting.

The regular meeting of the Halifax Centre of the Royal Astronomical Society of Canada will be held on May 28th, on the fourth Friday of the month at the Nova Scotia Museum. This is to allow members, who wish to go away for the long weekend, to do so without missing the meeting.

SUPPLEMENT

Lt. Mary King, received the following predictions, and very kindly called it to our attention. Lt. King is an experienced occultation observer and would give procedural information to anyone serious about viewing this event. It is a rare one, and occurs fairly early in the evening, so we hope those of you with telescopes will try to see it and perhaps invite a friend.

Please bring any observations to the next meeting, which will be the last regular meeting of the year.

JMS.

Possible occultation of star by Io (Jupiter I)

A rare event will occur on 1971 May 14 shortly after the occultation of several stars by the planet Jupiter. One of these stars (SAO 159683, magnitude 5.1) will be occulted by the satellite Io. Due to uncertainties in the ephemeris position of the satellite, it is not possible to predict the precise limit of the occultation but observers should note that:

- (1) the area of visibility of the close approach includes Africa, Europe, South America, Antarctica, and the eastern seaboard of North America;
- (2) the time of geocentric closest approach is 1971 May 14^d 01^h 55^m U.T.
- (3) the maximum duration of any occultation is not likely to exceed 6 minutes.

There are several sources of uncertainty in the prediction, as follows:

- (1) The relative position of the star and Jupiter. The ephemeris of Jupiter has been taken directly from The Astronomical Ephemeris. Several values of the current (O - C) for the declination of Jupiter have been received but, unfortunately, there is considerable disagreement in these values (greater than the angular diameter of Io itself). The position of the star has been taken from the S.A.O. Catalog.
- (2) The relative position of Jupiter and Io. It is believed that the positions given in the current astronomical ephemerides are reliable enough for prediction purposes, although the time may be uncertain by a minute or two.
- (3) The diameter of the satellite. From micrometer measurements this is believed to be of the order of 3500 km, but this value is possibly uncertain by about 10%.

If there are no errors in the ephemerides, an occultation will be visible from Central and West Africa, Bermuda and the eastern seaboard of North America.

An (O - C) of $-0^{\text{m}}.5$ in the declination of Jupiter will mean that the occultation will be visible from Rhodesia, Central and West Africa, Bermuda and the eastern seaboard of North America.

An (O - C) of $+0^{\text{m}}.5$ in the declination of Jupiter will mean that the occultation will be visible from North Africa and Europe.

In view of these uncertainties, it is suggested that the event be observed as widely as possible. Some suggestions are enclosed.

As a guide to observers, the predicted mid-time of the phenomenon is given for selected places in the area of visibility as follows:

SAO 159683 is 13^{m} N.
of β Sco ($2^{\text{m}}.9$)

Area	Mid-time (U.T.)		
	h	m	
Mauritius	01	45	1. Time
South Africa	01	48	
Egypt	01	48	2. Lat, Long & elevation
South-west U.S.S.R.	01	49	
Greece	01	50	3. Type & description of telescope.
Great Britain	01	52	
Spain	01	53	
South America	01	58	4. Method of timing (CHU?)
Bermuda	02	01	
East coast of North America	11/02	01	

Daylite

From Mauritius, south-west U.S.S.R., northern Europe and the east coast of North America, observations can only be made at low latitudes.

Three suggested types of observation are suggested.

1. Photoelectric monitoring of the event so that, in the case of an actual occultation, information may be obtained about the satellite's atmosphere, if any. Times of "0.0 light, 0.5 light and 0.0 light" at both phases could be used for determining the satellite's diameter and position to a high degree of accuracy.

2. Visual monitoring of the event. In this case, one way to observe the phases of any occultation would appear to be to use a telescope with as small an aperture as is consistent with giving a good image of the star. The observer will then see only a combined image of satellite and star for some time before and after any occultation. He should then detect any occultation by noticing the decrease in magnitude (~~of the star~~). The star is of magnitude 5.1 and Io is 4.8. Thus the combined magnitude will be 4.2. If an occultation occurs this will fall to 4.8 (the magnitude of Io). ~~Some of the~~ If Jupiter can be obliterated by an occulting disc, then it might be better to use satellite ~~of~~ magnitude 5.5, or satellite II, magnitude 5.2, as comparison objects.- both these satellites will be on the other side of Jupiter.

The above method is open to the criticism that the changes in brightness may not be easily detected except by experienced variable star observers. Other observers may feel advised to try and observe the actual phases of the occultation using as large a telescope as possible.

Timings of the phases will be useful for determining the diameter and position of Io.

3. Filar micrometer observations around the time of closest approach will give the accurate position of Io.

This type of observation is so rare that the only previous occasion when enough observations of a similar occultation were available for determination of the diameter was in 1911 when satellite III occulted a star of magnitude 6.6. In view of this, it is hoped that every observatory in the area of visibility will attempt the observation.

I would be very grateful to receive any timed observations that are made in order to make a combined analysis to determine the satellite's shape and size.

H.M. Nautical Almanac Office,
Royal Greenwich Observatory
Herstmonceux Castle,
Hailsham, Sussex, England.

Gordon E. Taylor
26 April 1971

