XLV. *Observation of the Transit of* Venus, *and other Astronomical Observations, made at* Gibraltar; *contained in a Letter to the Astronomer Royal from Lieutenant* Jardine.

To regulate the clock.

Read Dec. 7, 1769. AN equal altitude instrument was fixed (nearly such as is described in Smith's Optics, vol. II. p. 328), on which was mounted a small telescope with cross hairs.

			Sun's upper limb touched the horizontal hair at			Sun's lower limb touched the horizontal hair at		
			h	′	″	h	′	″
June 1		Morning	8	32	43	8	35	8
		Afternoon	3	24	33	3	22	0
	2	Morning	8	32	20	8	34	46
		Afternoon	3	25	4	3	22	36
	4	Morning	8	32	27	8	35	13
		Afternoon	3	25	27	3	22	47
	5	Morning	8	32	35	8	35	10
		Afternoon	3	25	53	neglected		

TRANSIT OF VENUS.

By three observers, with two 7½ feet refractors, and one 2 feet reflecting telescope.

	h	′	″
June 3, Venus's 1st external contact with the Sun, at	6	49	58
1st internal contact with the Sun, at	7	7	11
Sun set behind a hill	7	8	3
Clock before mean time	0	1	8,8

For

For the LATITUDE of the place.

Obſerved by a Hadley's quadrant, divided into minutes, the double meridian altitudes of Jupiter and Cor Scorpii, reflected from water.

Double meridian altitude of Jupiter.				Double meridian altitude of Cor Scorpii.			
	o	′	″		o	′	″
May 30 =	77	6		June 28 =	56	7	
June 14 =	77	50		29 =	56	5	
17 =	77	55	30	July 7 =	56	6	30
21 =	78	3	30	8 =	56	5	0
By another obſerver, =	78	3	0				
June 22 =	78	4	0				
29 =	78	10	45				
July 4 =	78	14	0				

Clear weather, in general, during theſe obſervations; and Fahrenheit's thermometer, in the middle of the day, between } 75 and 80

in the night, between   68 and 71

For the LONGITUDE of the place.

		h	′	″	
May 30	Emerſion of Jupiter's firſt ſatellite	12	59	56	
	Clock before mean time	0	1	2	
May 31	Emerſion of Jupiter's 2d ſatellite	10	51	51	
	Clock before mean time	0	1	3½	
June 8	Emerſion of Jupiter's firſt ſatellite	9	22	34	⎫
	Clock before mean time	0	1	16½	⎬ Theſe two are
June 15	Emerſion of Jupiter's firſt ſatellite	11	15	54½	⎪ moſt to be de-
	Clock before mean time	0	1	28	⎭ pended upon.
June 25	Immerſion of Jupiter's 3d ſatellite	11	59	56	{ uncertain to
	Clock before mean time	0	1	44	perhaps 5 or 6″
July 8	Emerſion of Jupiter's firſt ſatellite	11	30	57	
	Clock before mean time	0	2	4	

ECLIPSE

ECLIPSE OF THE SUN.

	h	′	″	
June 4 First contact at	6	6	54	seen perhaps a little too late.
Last contact at	7	19	28	exact.
Clock before mean time	0	1	9	

Elev. of ☉'s l. limb by Hadley's quad. at $\left\{\begin{array}{l}\text{1st contact } \quad 14 \quad 41\\ \text{2d contact } \quad 28 \quad 55\end{array}\right\}$ both ex-
act.

Dip of the horizon, for 160 feet above the level of the sea, is to be allowed.

S I R,

I Have been disappointed in the pleasure I pro-
mised myself, when I saw you, of observing
some occultations of fixt stars, by the Moon, &c.
We shall be glad, if these observations can be of any
service. We have endeavoured to discover to you the
degree of dependance to be placed thereon.

With regard to the clock, we conclude from these
equal altitudes (correcting for difference of declination,
&c.), that, on the 3d of June, it was before mean
time 1′ 8″,8. You will easily discover if there is
any error. We afterwards regulated by frequent
equal altitudes, by a meridian line on the bottom of
a window, and by the setting of stars behind some
solid buildings.

The latitude appears, from these double altitudes,
to be somewhere between 36° 3′, and 36° 4′; but
from more correct declinations, &c. you will be able
to determine it more precisely.

For the eclipse, we had no micrometer, nor any
other method of determining the quantity of it.

I   To

To the eye, between $\frac{1}{4}$th or $\frac{1}{5}$th of the Sun's diameter feemed to be eclipfed. Though the beginning be rather incorrect, the end may be depended on.

We fhall be glad if you can determine, from hence, the latitude and longitude of the place, and to know the refult of the difcoveries made in our fyftem, by the obfervations of the late tranfit, if you will favour us.

I am,

SIR,

Your moft obedient,

humble fervant,

Gibraltar, July 14, 1769.   Alexander Jardine.

By re-computing thefe obfervations, I find, that the external contact of Venus happened at 6^h $51'$ $8''$, the internal contact at 7^h $8'$ $21''$, the beginning of the eclipfe of the Sun at 18^h $8'$ $0''$, and the end at 19^h $20'$ $33''$, all apparent time; and that the latitude of the place, by the mean of the 4 altitudes of Cor Scorpii, is $36°$ $4'$ $44''$, N. The dip of the horizon of the fea, for an elevation of 160 feet, may be reckoned $12'$ $5''$.

Nevil Mafkelyne.

XLVI. *Obfer-*