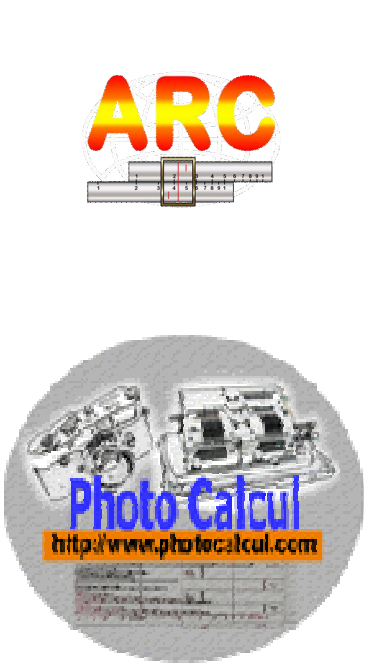
REGLA DE CALCULO

SEXTONS OMNIMETRE

La escala VERSED SINES



Gonzalo Martin
Julio 2012

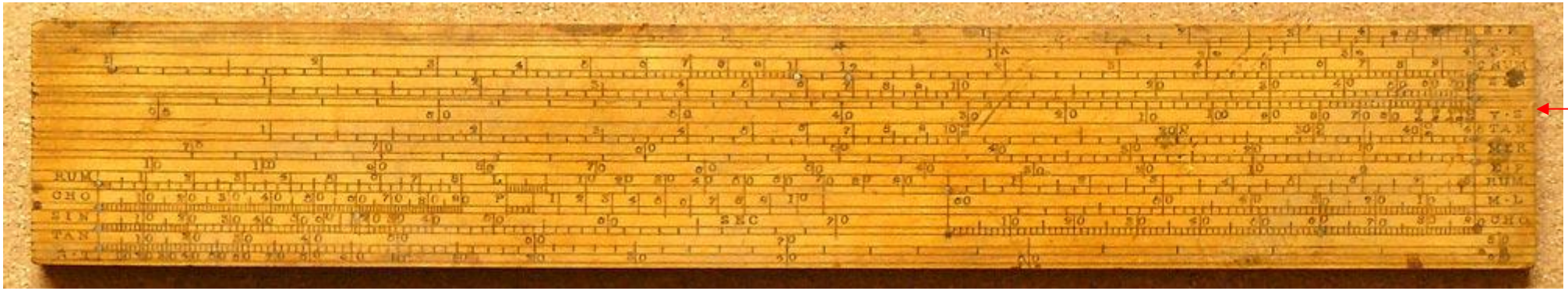
La escala 'versed sines' **(v.s.)** de la regla Omnimetre representa exactamente la función trigonométrica del mismo nombre y cuyo valor es vs(a)= 1-cos(a).

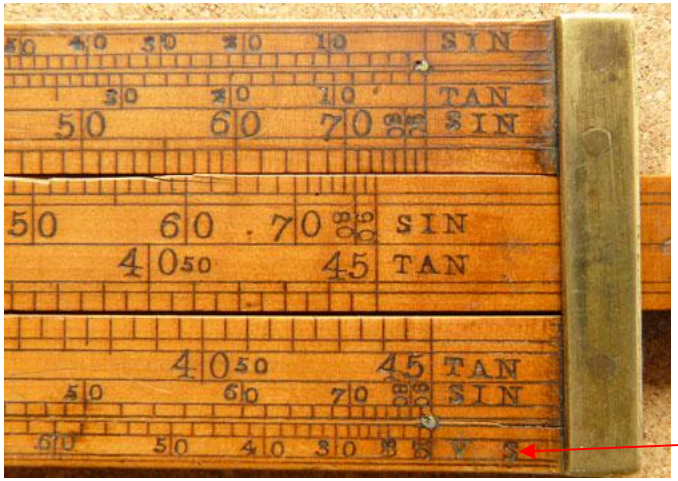
Esta escala se encuentra raramente en las reglas de cálculo salvo en las reglas antiguas llamadas de Gunter, pero en este caso el significado de la escala **V.S** es diferente, como veremos mas adelante.

Hemos comparado diferentes valores de v.s., obtenidos directamente en la regla, con los valores determinados por una tabla de 'Natural Versed Sines' , los valores de la regla son correctos, se tratan bien de **'versed sines'**

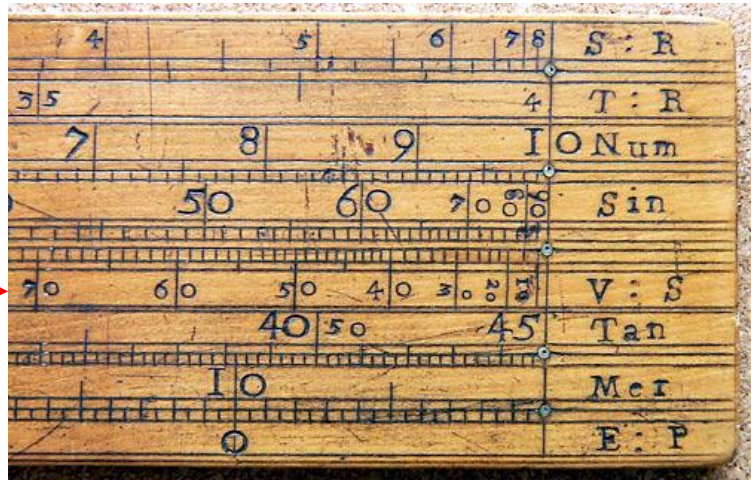
No se ha encontrado ningún ejemplo de utilización de la escala **V.S** en los tratados antiguos de navegación disponibles sur Internet. En la última página dos grandes coleccionistas explican que el valor de esta escala sería « 1-haversine »

Escala V.S en una Plain Scale Gunter





Escala V.S en una regla Gunter

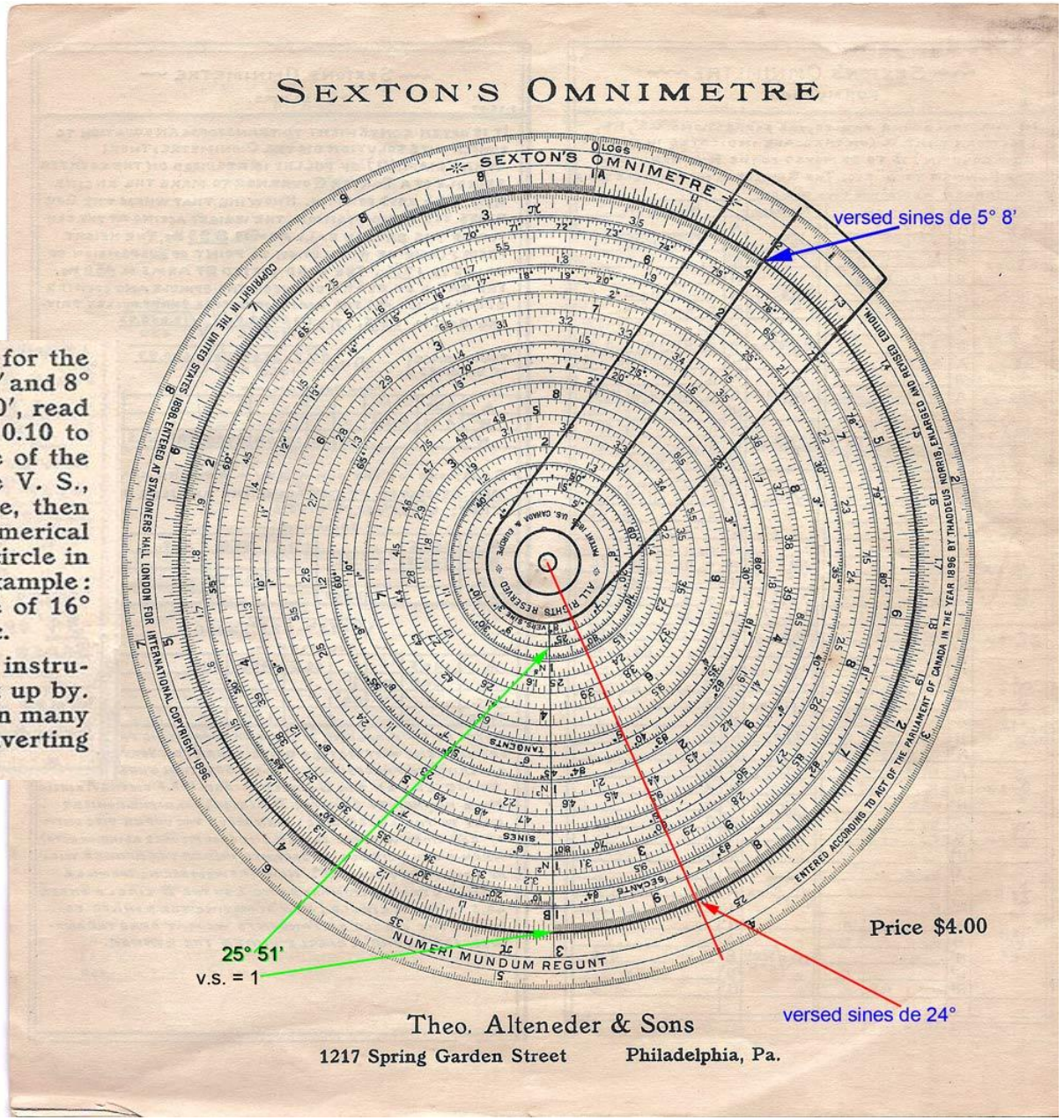


Escala V.S en una Sliding Gunter

Valores de diferentes ángversed sinesôencontrados con el Sextonôs Omnimetre

V. S. Scale of VERSED SINES, to be read on scale B for the angle shown on V. S. If the angle be between 2° 35′ and 8° 5′, read 0.001 to 0.010. If between 8° 5′ and 25° 50′, read 0.010 to 0.100. If between 25° 50′ and 90°, read 0.10 to 1.00. This means that to find the numerical value of the versed sine of any angle, find the angle on scale V. S., bring the runner over it, hold the runner in place, then look on scale B, and under the runner read its numerical value, placing the decimal point according to the circle in which the angle is found, as defined above. Example: The versed sine of 5° 8′=0.004. The versed sine of 16° 16′=0.040. The versed sine of 53° 8′=0.400, etc.

The Clamp-screw is not designed to turn any part of the instrument, but simply to serve as a pivot and to pick it up by. It is also used to clamp the two discs together when many readings are to be taken from one setting, as in converting cubic feet to gallons, inches to millimetres, etc.



A

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1852.

PRICE SIXTEEN SHILLINGS BOUND.

Verificación en una tabla de óversed sinesô de los valores encontrados con el Omnimetre

′ ″ Vers.	4° Versed	4° Parts for ″	4° Suvers.	5° Versed	5° Parts for ″	5° Suvers.	6° Versed	6° Parts for ″	6° Suvers.	7° Versed	7° Parts for ″	7° Suvers.	″ Sup.
0	002436	0	1.997561	003805	0	1.996195	005478	0	1.994522	007454	0	1.992546	60
1	02456	0	97544	03831	0	96169	05509	1	94491	07489	1	92511	59
2	02477	1	97523	03856	1	96144	05539	1	94461	07525	1	92475	58
3	02497	1	97503	03882	1	96118	05570	2	94430	07561	2	92439	57
4	02518	1	97482	03907	2	96093	05600	2	94400	07596	2	92404	56
5	02538	2	97462	03933	2	96067	05631	3	94369	07632	3	92368	55
6	02559	2	97441	03959	3	96041	05662	3	94338	07668	4	92332	54
7	02580	3	97420	03985	3	96015	05693	4	94307	07704	4	92296	53
8	02601	3	97399	04011	3	95989	05724	4	94276	07740	5	92260	52
9	02622	3	97378	04037	4	95963	05755	5	94245	07776	6	92224	51
10	02643	4	97357	04063	4	95937	05786	5	94214	07813	6	92187	50
11	002664	4	1.997336	004089	5	1.995911	005818	6	1.994182	007849	7	1.992151	49
12	02685	4	97315	04116	5	95884	05849	6	94151	07885	7	92115	48
13	02707	5	97293	04142	6	95858	05880	7	94120	07922	8	92078	47
14	02728	5	97272	04168	6	95832	05912	7	94088	07958	9	92042	46
15	02750	5	97250	04195	7	95805	05944	8	94056	07995	9	92005	45
16	02771	6	97229	04222	7	95778	05975	8	94025	08032	10	91968	44
17	02793	6	97207	04248	7	95752	06007	9	93993	08069	10	91931	43
18	02815	6	97185	04275	8	95725	06039	9	93961	08106	11	91894	42
19	02837	7	97163	04302	8	95698	06071	10	93929	08143	12	91857	41
20	02859	7	97141	04329	9	95671	06103	10	93897	08180	12	91820	40

versed sines de 5° 8' = 0.04011

Verificación en una tabla de óversed sinesô de los valores encontrados con el Omnimetre

TABLE XXXVI.

Natural Versed and Suversed Sines.

′ / ″ Vers.	16° Versed.	Parts for ″	16° Suvers.	17° Versed.	Parts for ″	17° Suvers.	18° Versed.	Parts for ″	18° Suvers.	19° Versed.	Parts for ″	19° Suvers.	″ Sup.
0	038738	0	1.961262	043695	0	1.956305	048943	0	1.951057	054481	0	1.945519	60
1	38818	1	61182	43780	1	56220	49033	2	50967	54576	2	45424	59
2	38899	3	61101	43865	3	56135	49123	3	50877	54671	3	45329	58
3	38979	4	61021	43951	4	56049	49213	5	50787	54766	5	45234	57
4	39060	5	60940	44036	6	55964	49304	6	50696	54861	6	45139	56
5	39140	7	60860	44121	7	55879	49394	8	50606	54956	8	45044	55
6	39221	8	60779	44207	9	55793	49484	9	50516	55051	10	44949	54
7	39302	9	60698	44293	10	55707	49575	11	50425	55146	11	44854	53
8	39382	11	60618	44378	11	55622	49665	12	50335	55242			
9	39463	12	60537	44464	13	55536	49756	14	50244	55337			
10	39544	14	60456	44550	14	55450	49846	15	50154	55432			
11	039625	15	1.960375	044636	16	1.955364	049937	17	1.950063	055528			
12	39706	16	60294	44722	17	55278	50028	18	49972	55624			
13	39787	18	60213	44808	19	55192	50119	20	49881	55719			
14	39869	19	60131	44894	20	55106	50210	21	49790	55815			
15	39950	20	60050	44980	22	55020	50301	23	49699	55911			
16	40032	22	59968	45066	23	54934	50392	24	49608	56007			
17	40113	23	59887	45153	24	54847	50483	26	49517	56103			
18	40195	24	59805	45239	26	54761	50574	27	49426	56199			
19	40276	26	59724	45326	27	54674	50666	29	49334	56295			
20	40358	27	59642	45412	29	54588	50757	30	49243	56391			
21	040440	28	1.959560	045499	30	1.954501	050849	32	1.949151	056488			
22	40522	30	59478	45586	32	54414	50940	33	49060	56584			
23	40604	31	59396	45673	33	54327	51032	35	48968	56681			
24	40686	32	59314	45760	35	54240	51124	36	48876	56777			

versed sines de 16° 16' = 0.040032

Natural Versed and Suversed Sines.

′ / ″ Vers.	24° Versed.	Parts for ″	24° Suvers.	25° Versed.	Parts for ″	25° Suvers.	26° Versed.	Parts for ″	26° Suvers.	27° Versed.	Parts for ″	27° Suvers.	″ Sup.
0	086454	0	1.913546	093692	0	1.906308	101206	0	1.898794	108993	0	1.891007	60
1	86573	2	13427	93815	2	06185	01333	2	98667	09126	2	90874	59
2	86691	4	13309	93938	4	06062	01461	4	98539	09258	4	90742	58
3	86810	6	13190	94061	6	05939	01589	6	98411	09390	6	90610	57
4	86928	8	13072	94185	8	05815	01717	8	98283	09522	8	90478	56
5	87047	10	12953	94308	10	05692	01844	11	98156	09655	11	90345	55
6	87166	12	12834	94431	12	05569	01972	13	98028	09787	13	90213	54
7	87285	14	12715	94555	14	05445	02100	15	97900	09920	15	90080	53
8	87403	16	12597	94678	16	05322	02228	17	97772	10052	17	89948	52
9	87522	18	12478	94802	18	05198	02357	19	97643	10185	19	89815	51
10	87642	20	12358	94925	21	05075	02485	21	97515	10318	21	89682	50
11	087761	22	1.912239	095049	23	1.904951	102613	23	1.897387	110451	23	1.889549	49

versed sines de 24° = 0.086454

45	91857	90	08143	99302	95	00698	07021	97	92979	15012	101	84988	15
46	91979	92	08021	99428	97	00572	07152	100	92848	15148	103	84852	14
47	92100	94	07900	99555	99	00445	07283	102	92717	15283	105	84717	13
48	92222	96	07778	99681	101	00319	07414	104	92586	15419	107	84581	12
49	92345	98	07655	99808	103	00192	07545	106	92455	15555	110	84445	11
50	92467	100	07533	99935	105	1.900065	07677	108	92323	15690	112	84310	10
51	092589	102	1.907411	100061	107	1.899939	107808	111	1.892192	115826	114	1.884174	9
52	92711	104	07289	00188	109	99812	07939	113	92061	15962	116	84038	8

versed sines = 1 para 25° 51'

Significado de la escala Gunter V.S

A line of Verſed Sines, marked V. S. This line, when compared with that of ſines, &c. is uſeful in finding the ſun's true azimuth, or the apparent time, the ſun's altitude, declination, and the latitude of the place, being given.

Ron Manleys dice lo siguiente sobre la escala V.S. :

A pair of adjacent scales marked SIN and V.SIN. In navigation use is sometimes made of Versines (or Versed sine), such that Versine (q) = 2 $\sin^2(q/2)$, or Haversine such that Haversine (q) = $\sin^2(q/2)$.
The pairs of values of this scale are arranged such that the sine of the angles marked SIN have the same values as 1 - Haversine.
For example: Haversine (90°) = $\sin^2(45°)$ = 0.7072 .
$1 - 0.7072^2 = 0.5$
sin-1(0.5) = 30°.
As can be seen the 90° on the V.SIN line is adjacent the 30° on the SIN line

http://www.sliderules.info/collection/specialised/9948-navigation.htm

Otto van Poelje dice al respecto :

Logarithmic scales - NUM, SIN, TAN, S * R, T * R, V * S
...
The scale title V * S means ñversed sinesò but it does not reflect our current versine which equals (1 ï cosine).
It actually represents, in modern terminology, the logarithm of (1 ï haversine), or ½ (1 + cosine).
The haversine function (half-versed-sine) was introduced for computational reasons in the formula which calculates the angular distance between two arbitrary points on the globe. This formula could be calculated between the NUM, the SIN and the V * S scales on the Gunter rule.

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