A Map
of the
Principal Triangles
of the
Geodetical Operations of
Portugal,
Published by Order of His Royal Highness
The Prince Regent
of Portugal,
1803.

The Geodetical Operations in Portugal having been interrupted (principally by the War) two or three points are wanting to the North of Caramulo to reach to Galiza (Galicia.) In some of the Triangles the three angles have not been observed, many have been observed with only an ordinary Theodolite; some even without Signals; so that the calculated sides are no more than approximations which have served for reductions to the Center &c.

Immediately after the first Journeys made for choosing the Points, it was easy to see that the Extremities of the Countries might be connected in only five Triangles: but the principal object of the operations being to construct a Map of the Country, the smaller number of Triangles was not that which suited best, and therefore without multiplying the number of Points unreasonably we adopted a kind of Medium establishing those which appear in the Map. It offers some particularities which are not common to other series of Triangles.

In the first place there will be seen a double chain of Triangles whose common sides form nearly a Meridian line through the middle of the Kingdom. From all the Western Points (Sobral to Areas) may be observed the depression of the Horizon of the Sea, & consequently the Altitudes of the Signals above the level of the Sea were determined. Buarcos to Monte Redondo is the principal Base & is little less than 6 leagues. The Point Sico was chosen in such a manner that the first Triangle was nearly Rectangular. Batel to Montijo is a small base of almost two Leagues for verification. & was so taken that the Triangles on each side being Isosceles, the Diagonal Serves to Palmela, is the side of a Triangle nearly equilateral. By which the Chain is connected. Each of these Bases was measured in opposite directions & at the same time. The measuring rods were made of four thin slips of the fittest Brazil wood, joined together in the form of a Parallelopiped. On one of the surfaces there are 4 points, moveable in two directions, in order to preserve the Line, & to correct the effects of the temperature, which was daily observed, and found to have no sensible difference as measured by the Iron Standard Measure.

The points of the Map which have the mark (Sig^{l}) are the summits of the highest Mountains, where ultimately we constructed Pyramids of Stone and Mortar, from 40 to 50 Palms high, and 10 wide at the Base.

The numbers represent Bracas. 22 Bracas equal nearly to 25 Toises.

In all these Observations we made use of Repeating Circles, made by English Artists, from 16 to 18 Inches diameter. With these Instruments multiplying as was convenient the conjoined Observations, we have found the Angles within 1" of the truth. We expect soon another Circle made by M. Lenoir, its first constructor, with the additions by after the death of M. De Borda its inventor. Mess^{rs} Mechain, Delambre, & Lenoir. made. With this Instrument we purpose to complete the Observations, taking into the account the state of the Barometer. Thermometer, & Hygrometer.

Some Hundred Observations of the Circumpolar Stars at their greatest and least Altitude made with the same Instruments a little before & after their passage over the Meridian, & followed up for some months, gave us the Latitude also to a Second.

In the Calculations we employed the Rules of Spherical Trig: adapted to Geodetical Triangles & this because the sides were very small in respect to the Normals. It will be easy hereafter to continue the Triangles to the Sea North of Galiza. & a small Series of Triangles through the North of Spain would connect our Triangles with those of France, and the Observatory of Greenwich, Paris, & Lisbon would then rest determined by Geodetical Operations.

Lisbon 1. April 1803.

F. A. Vieira

R. MINHO — Caminha — Vianna — R. Lima — B^{a} de Villa de Conde — Villa de Conde — R. DOURO — PORTO — Areas (Humida) — B^{a} d'Aveiro — Caramulo (Sig^{l}) — Bussaco (Sig^{l}) — Estrella (Sig^{l}) — C. Mondego — Buarcos (Sig^{l}) — Louzan (Sig^{l}) — P^{ta} de Barretos — M^{te} Redondo (Sig^{l}) — Sico (Sig^{l}) — Melriça (Sig^{l}) — Nazareth (Torre) — Aire (Sig^{l}) — C. Carvoeiro — S^{t} Mamede (Sig^{l}) — M^{te} Junto (Sig^{l}) — M^{te} Argil (Sig^{l}) — Serves (Sig^{l}) — S^{t} Torquato (Sig^{l}) — C. DA ROCA — Pena (Torre) — LISBOA — Batel (Sig^{l}) — Montijo — Ossa (Sig^{l}) — EMB^{a} DO TEJO — Palmela (Guet^{a}) — Monfurado (Sig^{l}) — C. Espichel — Mendro (Sig^{l}) — P^{ta} de Pesqueiro — Atalaya (Sig^{l}) — C. Sines — Aljustrel (Sig^{l}) — Sobral (Sig^{l}) — B^{a} de Odemira — Alcaria — Almirante (Sig^{l}) — Foya (Sig^{l}) — C. DE S. VICENTE — C. DE S^{ta} MARIA — R. GUADIANA — MERIDIANO DO OBSERVATORIO DA ACADEMIA REAL DAS SCIENCIAS — PERPENDICULAR A MERIDIANA

Escala de 50000 Braças

0 5 10 15 20 25 30 35 40 45 50000

Escala de 10740,63 Mêtres

0 000000,000 — 11074,063 — 22148,126 — 33222,189 — 44296,252 — 55370,315 — 66444,378 — 77518,441 — 88592,504 — 99666,567 — 110740,630

Taboada de 10000 Braças

Braças	Metres	Braças	Metres
1000	7214,8126	6000	43288,8756
2000	14429,6252	7000	50503,6882
3000	21644,4378	8000	57718,5008
4000	28859,2504	9000	64933,3134
5000	36074,0630	10000	72148,1260

ESCALAS DE LEGOAS

Legoas Maritimas de Portugal de 20 ao Grão - a 3084 Bracas.

0 1 2 3 4 5 10 15 20

Legoas Maritimas de 20 ao Grão - a 11139, 6 de Metres.

0 1 2 3 4 5 10 15 20

Legoas Maritimas de Franca de 20 ao Grão - a 57028 Toesas.

0 1 2 3 4 5 10 15 20

Milhas Britanicas por Estatuto de 69 ½ ao Grão.

10 20 30 40 50 60 69½

Legoas Legaes de Castella de 26 ⅔ ao Grão.

0 5 10 15 20 26⅔

Milhas Communs d'Alemanha de 15 ao Grão.

0 1 2 3 6 9 12 15

Milhas Geographicas de 60 ao Grão.

0 10 20 30 40 50 60

Remark

The English degree is given above at 69 ½ British Miles according to Norwood in 1635. Now according to the Trigonometrical Survey of England the degree is found to contain 60820 fathoms. The middle point 52°.7.29.8. = 69.113. miles. see Philosophical Transactions

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