CHAPTER VI

DIMENSIONS OF THE PORTUGUESE SHIPS

The early Portuguese vessels of exploration were of small tonnage and moderately equipped. After the discovery of the sea-route to India by Vasco da Gama, in 1498, the tonnage of the Portuguese India-ships went on increasing. This was mainly because of the fact that, the Portuguese ships such as Galleons, Galiota, Naus etc. sailed both as commercial and warships mounted with artillery pieces of different calibre. To ensure the structural safety every plank had to be in correct proportion to the general tonnage of the ship.

Along with the rise in tonnage the dimension of different parts of the ship also increased. The Portuguese naval architects while working out the structural plans laid more emphasis upon the tonnage of the ship. It is proposed in this chapter to examine the tonnage and dimensions of the Portuguese of the Portuguese oceangoing ships in brief. Tables showing the measuring units used by the ship builders have been put in Appendix 1-B.¹

The ships of 300 tons (t) and below were generally measured with spans in respect of the height and the width of the holds and rigging. But the length of the keel and the projection of the prow were measured with Palmos de Goa (pg) as in the case of the ship of 300t and above. All the ships of 150t to 200t with two sails having a prow, was equivalent to between one-third and one-quarter of the length of the keel, while the ships of 80t to 100t
with one sail having a prow was considered equivalent to a quarter-part of the length of the keel. If the ship was light and meant for war its width would be quarter-part of the length of the ship from the counter to a point of the prow which was called esfera (sphere). All ships of 150t to 300t having a prow was considered equivalent of between one-third and one-fourth of length of the keel.\(^2\)

The keel length was a main factor which determined the dimensions of the ship and its various components. The process of calculating the tonnage was a difficult task as the difference between the dimension and the tonnage was not always same. One document of 1633 states that, a Nau of 18 rumos (r) to 20r was of 700t to 800t, but this length of the keel corresponds to 750t to 1050t in 1600 and 700t and 1000t before 1580.\(^3\) Another thing that is to be noted is that, the measurements given in the paper were not always strictly followed by the Masters of the dockyard. An example of measurements alterations may be cited here Master Valentine Temudo, who in 1623 built a ship of 20t and of 3 decks whose stem was fourth of the keel length and not third as laid down in the Order.\(^4\)

In certain types of ships, specially in the case of Galleon and other warships, the measurement made by the scales were changed or altered to meet special requirements of the ship. In this way, the depth of the hold of the first deck was in general more than the calculated one. The Galleon of 200t with the keel of 12r would have been by calculation 10 pg of pontal but actually
it would have the *pontal* of more or less 13 *palmos*, because the deck was usually of more than a *vao* (8pg). 5 The tonnage and dimensions of the various Portuguese ocean-going ships are as under:

**Caravelas:**

The early Caravela used by Cadamosto was of 50t for exploration purpose. In 1497, the fleet of Vasco da Gama had a Caravela *Berrio* which was also of 50t. 6 The tonnage of the Caravela went on increasing and by 1530, it was between 150t to 180t. *Livro Nautico*, a naval treatise mentions 2 types of Caravelas of different tonnage, namely, the Caravela of 150t to 180t which was round (Fig.23) and used as an auxiliary vessel in the fleet and other was termed as *antiga meia*, the tonnage of which was more than Caravelas of the 15th century. 7 The round Caravela at the end of the 16th century of 150t to 180t had a keel length of about 18mtrs., the steam height of 7mts. and the height of the stern post 5.5 mts. The same Caravela in the same century had a *manga* of 33 pg. (8.25m.) and the *pontal* of 12 pg. (3m.). 8 The Caravela of 150t to 180t had a *traquete* of 98m while the Caravela of *antiga - meia* had 29m². The *cevadeira* in the case of the Caravela of 150t to 180t was 49m² while the same in the case of Caravela *antiga - meia* was 52m². The *vela de cevadeira* was however, little more in the Caravela *antiga - meia* whose yard had the length of 9.75m in place of 9m. The *vela de gavea* of the Caravela of 150t to 180t was 24m². The *vela grande* of the Caravela of 150t to 180 was of 123 m² and in the case of Caravela
Fig. 23. Caravela of 150t to 180t During the End of the XVIth Century.
antiga - meia it was 103 m². The vela de artimão in the case of the Caravela of 150t to 180t was of 92 m² while in the case of the Caravela antiga - meia it was 66 m². The vela de contra of 150t to 180t Caravela was 29 m² and it was also same in the case of the Caravela antiga-meia.⁹ The Caravela had a main deck, small foredeck above forecastle, a half deck and above it an open quarter-deck. Basically, the Caravela had velame exclusively latten or triangular with 2 or 3 masts.¹⁰

Rigging Of The Caravela:

The prime use of the masts was to carry sails. The masts were single spars cut from the trunk of a tree. In sailing ships, the masts were normally taken through in the deck and their heels which are square off fitted into the steeps in the keelson of the ship.¹¹ The early small Caravela used for fishing had only 1 mast. The main mast was of prow, followed by the stern termed as artimão and the mizzen mast. In the case of the Caravela of 2 masts, the mizzen mast was implanted on the keel half a distance between the main mast and couce de popa and also had the same inclination from the main to the vante. However, there are instances where this mast was implanted on Chapiteu as perpendicular at the keel by the topo do cadaste. For the Caravela of 3 masts there was 1 main mast in the same position like the one mentioned in the case of 2 masts Caravelas, implanting the mizzen mast on the keel to half a distance between the main and the couce de popa.¹² The Caravela of 4 masts had the same 3 latten masts in the same position and carry at the prow a
foresail mast inclining 35° towards the vanté in relation to the keel. This Caravela carried the *gurupes* mast. The latten Caravela never carried the *gurupes*. In the case of round Caravelas the foresail mast had *gavea* and the *mastareu de proa*. By the turn of 1600 to 1625 this Caravela began to have *topo de gurupes* and *1 mastareu de sobrecevadeira* which was an unique feature of the 17th century. The rigging of this Caravela was different because of the existence of 1 mast at the prow known as foremast. The length of the main mast was that of the keel i.e. 12 rumos of keel, 12 braços of mast with the thickness of 2½ pg. on garganta. The foresail mast had the length of 10 braços, while the *gurupes* would be of the same length as that of the foresail mast. The *mastro do artimão* had a length of 8 braços, while the length of *mastro de contra* was of 5 braços.

The yard of a Caravela was a large wooden spar crossing the masts of it horizontally or diagonally, from which a sail was set. Yards crossing the masts of a square-rigged ship horizontally were supported from the mast heads by slings and lifts and were held to the mast by a truss. The yards could be turned at an angle to the fore and the aftline of the ship inorder to take the greatest advantage of the wind direction in relation to the required course of the vessels. The Caravela had 3 yards, namely the mainyard, foresail yard and *verga de cevadeira*. The main yard had a length of 16 braços and the thickness of half of that of the main mast. The length of the foresail yard was 7 braços while the thickness was 11/2 of the foresail. The length
of the **verga de cevadeira** was 7 **braços** while that of the **mizzen yard** was 14 braços with the thickness of half that of the mast at the centre. The length of the **verga de contra** was of 8 braços and the thickness was as much as that of the mast at the centre.\(^{16}\) The latten mast Caravela carried the yards in which the Caravelas are proportionally very much longer than in the case of latin ship of that period which was an unique feature of this rigging in Portugal. The foresail mast had a foresail yard and the **mastareu de proa** had a **gavea de proa**.\(^{17}\)

The dimensions of the stem, stern and the **caverna-mestra** of 150t to 180t Caravela were as under:-

The stem had the height of 29 pg. and the breadth of \(2/3\)rd of its height and have 18 **palmos**. The stem carried 3 **paos**. The stern which was put on the **couce de popa** had a height of 22 pg. and the breadth of 7 **palmos** with the thickness of 1 pg. It carried 2 **paos**. The **caverna mestra** was laid before 8 **palmos** from the centre of the keel because at the centre of the keel, a pully for the main mast was placed. The Caravela of 150t to 180t would have 12 pairs of caverna which would be 24. The number of the pairs depended upon the rumos of the keel.\(^{18}\)

**Galleon**:

In Portugal there were Galleons from 200t upto 500 - 600t as permitted by rule. The Galleons had usually 2 decks with a prow. The number of sail differed. The Galleon of bigger size were equipped with 4 masts, 2 round infront and 2 latten in the
rear.\textsuperscript{19} The keel length of the Galleon of 1550 – 1880 was more than that of the Carrack.\textsuperscript{20}

The measurement of the Galleon of 200t was given as 12 rumos from esquadria to esquadria, 6 on each side. The largura from boca was about 28 pg. and from the pontal 13 palmos, because on this deck the artillery was installed. The rodas had a height of 26 pg. The length of the Galleon of 350t was 14 1/2 rumos from esquadria to esquadria while the height of the stern was 34 palmos and the lancamento was one-third of the height of the stern.\textsuperscript{21}

The Galleon had main mast, foresail mast, mastro de aritimão, mastro de gavea and mastro de contra. The length of the main mast was that of the keel length i.e. 18 while that of the foresail mast was of 15 braços. The length of the mastro de aritimão was 12 braços, with the thickness to half of the main mast. The length of the mastro de gavea was 1/3rd of the main mast while mastro de contra had a length of 8 braços and thickness of less to 1/4 of the aritimão.\textsuperscript{22}

The main yard of the Galleon would be of such length, that it would be 3 times of the boca of the Galleon with the thickness of 1/2 of the main mast. The foresail had a length of 2/3rd of the mast. The verga de cevadeira was 2/3rd of that of the foresail yard. The verga de aritimão had the length of 1/3rd of the foresail yard and the thickness of 2 dedos less than the main yard.\textsuperscript{23}
The *caverna mestra* had 2rs. before from the centre of the keel because at the centre of the keel, the mast was fixed. The Galleon of 500t would have 18 pairs of *cavernas* and 72 *bracos*.24

**Galiotea of 18 Benches:**

Basically, the Galiotea would have the length of 44 goas from above of *roda* where it would nail the *sinta*. From *covado* to *covado* the depth of the Galiotea was 10 *palmos* and the *bocca* from where it would nail the *sinta* above the *canto* was 18 *palmos*.25 The height of the stem was given as 9 ½ *palmos* and the breadth as 15. The hold had the height of 7 *palmos* and 1/3rd. Whenever there was a need to put the keel on the *atacadas* the height of the atacadas of the poop was 5 *palmos* and from where it would lay the caverna mestre at the height of 2 *palmos*.26

**Fragata:**

As regards to the dimensions of the Fragata, the length from stem to stem was 8 ½ *goas* with the width of 6 1/3 *palmos*. The *almogana* of the prow was laid at a crossing distance measuring 6 1/3 *pg.* from the corner of the stem.27 The Fragata of 8 *goas* had the width of 6 *pg.* and the bottom of 5 *palmos de goa*. From *graminho* the dimension of this Fragata was 1 ¼th of the *palmo escaco* which would be divided into 9 parts, 4 towards the prow and 5 towards the poop. The *graminho* would have more height towards the poop. The Fragata of 10 *goas* with the width of 7 *pg* would have the bottom of 5 *palmos de vara*.28 The height of the *roda de proa* was given by Manuel Fernandes and 5 *palmos de vara*
and the poop by 5. The sinta was nailed to the prow at the height of 4 pg.29

Nau:

The Nau was an important vessel which played a crucial role in Portuguese maritime expansion. The Nau of the 15th century was a prototype of the high side ship which continued to dominate till the middle of the 19th century. The Nau underwent some structural changes both in terms of tonnage and dimension. During the 14th century the Nau of 2 masts appeared and in the second half of the 15th century the Nau began to have 3 masts, 2 of which were round rigged and 1 latten with the castles totally integrated on the casco.30 (Fig.24) The Naus of Vasco de Gama, Saô Gabriel and Saô Raphael were of 120t and 100t respectively.31 But after less than 20 years the tonnage of India Nau went on increasing. The Naus of Carreira da India which were called Nau Grossas of 300t to above with a keel of 20,02m. with much common tonnage of 450t and 500t to 600t to 700t with the keel length of 17r to 18r by the middle of the 16th century appeared. By the first half of 17th century, the Naus of 650t (Q=7, R=26,95m.) and of 700t (Q=18, R 1 27,72m.) was very much common.32 In 1570, D. Sebastiao issued a decree by which the upper tonnage limit was fixed as 450t and the number of the decks to 3.33 (Fig. 25) However, this order was not strictly followed. The arrangement of the Nau of 3 decks was as under :-
Fig. 24, Portuguese Nau of the xvi
d Century
Fig. 25, The Nau of three Decks
<table>
<thead>
<tr>
<th>Deck Type</th>
<th>Term</th>
<th>Translation</th>
</tr>
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<tbody>
<tr>
<td>First Deck or Upper Deck</td>
<td>Tolda de Capitão</td>
<td>Quarter</td>
</tr>
<tr>
<td></td>
<td>Camarotes de Perpao</td>
<td>Steerage</td>
</tr>
<tr>
<td></td>
<td>Masto Grande</td>
<td>Main Mast</td>
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<tr>
<td></td>
<td>Traquete</td>
<td>Bits</td>
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<tr>
<td>Second Deck or Middle Deck</td>
<td>Ceisbordo</td>
<td>Ballast Port</td>
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<tr>
<td></td>
<td>Corpo da Nao da Caixaria</td>
<td>Baggage Room.</td>
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<tr>
<td></td>
<td>Caruas</td>
<td>Kness.</td>
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<tr>
<td></td>
<td>Carpenteiro de Viagem</td>
<td>Carpenter</td>
</tr>
<tr>
<td></td>
<td>Calafate de Viagem</td>
<td>Caulker</td>
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<td></td>
<td>Carpenteiro de Sobrecelente</td>
<td>Caulker Mate</td>
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<td></td>
<td>Tanoeiro</td>
<td>Cooper</td>
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<td></td>
<td>Marinheiros</td>
<td>Sailors</td>
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<td></td>
<td>Alboi</td>
<td>Foremast</td>
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<td></td>
<td>Estrinca</td>
<td>Hatchway</td>
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<tr>
<td></td>
<td>Escotilha</td>
<td>Main Hatchway</td>
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<td></td>
<td>Sota Piloto</td>
<td>Second Pilot</td>
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<td></td>
<td>Escrivão</td>
<td>Clerk</td>
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<td></td>
<td>Dispenseiro</td>
<td>Steward</td>
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<tr>
<td></td>
<td>Contra-Mestra</td>
<td>Boatswain</td>
</tr>
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<td></td>
<td>Guardiaõ</td>
<td>Bosun’s Mate</td>
</tr>
<tr>
<td>Third Deck or Lower Deck</td>
<td>Paiol das Drogas</td>
<td>Storeroom for spicies</td>
</tr>
<tr>
<td></td>
<td>Paiol de Pimenta</td>
<td>Storage place for pepper</td>
</tr>
<tr>
<td></td>
<td>Arca de bomba</td>
<td>Pumbwell</td>
</tr>
<tr>
<td></td>
<td>Masto de Traquete</td>
<td>Fore mast</td>
</tr>
</tbody>
</table>
As regards to the flooring of the Nau, it had 1 or 2 decks, castle prow with proper castle and sentry box with its mareagem and the castle poop with quarter-deck and chapiteu with its mareagem. The free space between the quarter-deck and the castle was convés. The space found (Chapiteu, Convés and Guarita) was protected by the xeratas. The xeratas which were used for defense against the falling of the masts and the yards were made out of net. By the first quarter of the 16th century, the Nau began to have at the prow more than 1 pavement. Towards the end of the second quarter of the 16th century, the quarter-deck and later on chapiteu were provided with varandhas from one side to another, from the poop with its telhado. The third deck appeared by the middle of the 16th century and was formed by the pavements of the quarter deck and of prow castle. The fourth deck appeared by the fourth quarter of the 16th century. The castles of all the Naus had the same number of pavements. On the prow castle, there was a castle, the guarita and the sobreguarita all with windows which was a special feature of that period. The same was however, vanished by the third quarter of the 16th century. On the castle poop there was a tolda, the tolda dos bombardeiros, the alcacova and the chapiteu.

The Nau of high tonnage with high castles at the prow and the poop were equipped with 3 masts, namely foremast, main mast and mizzen mast. The first 2 were carrying round sail normally, papafigos and gaveas and on the mizzen 1 bastardo. Besides these sails it also had the gurupes and round sail called cavadeira. Basically, the Nau of 4 decks would have a keel of 17½r from
esquadria to esquadria. The cadaste measures about 44 palmos and would have the length of 13 palmos.\textsuperscript{39} Manuel Fernandes, Master Carpenter, in his work, Livro de Tracas, states that, the main mast of 4 decks Nau should have a length of 18 braços and the thickness of tamborete $4\frac{1}{2}$ palmos redondas esforçados. The foresail mast was of the length of 15\textsuperscript{\textfrac{1}{2}} braços and the thickness on tamborete 3 palmos de Goa esforçado. The mizzen mast had a length of 10 braços from lais to lais with the thickness of 2 palmos redondas esforçados.\textsuperscript{40}

As regards to the yards of the Nau, the verga de cavadeira was given as of 9 braços from the lais to lais and on the tamborete the thickness was of 2 palmos redondo esforçado. The foresail yard had a length of 13 braços and the thickness of 2 pg., while the mizzen yard, the length was given as 13 braços with the thickness of 1 palmos on ostaguadar.\textsuperscript{41}

The stern post was the aftermost timber in a wooden ship forming the stern of a ship and joined to the keel by scarfing the wood. João Baptista Lavanha, the great Portuguese naval architect, states that, the dimension of the stern post as the height in perpendicular equal to 2/5 of the keel and width of 27th that of the height.\textsuperscript{42} In the case of the Nau of 3 decks of Manuel Fernandes the rules of Lavanha were applied for the stern posts. The width in the Livro Nautico, was given as 1/4th of the height in the case of Nau. Manuel Fernandes states that the width of the Nau of 4 decks as 13 pg.\textsuperscript{43}
Stem was the foremost timber, forming the bow of a vessel joined at the bottom of the keel by scarfing the wood. In wooden ships, all timber strakes were rabbieted to the stem. There were 5 rules discussing the plan of the stem. However, it is proposed here to examine only 3, namely of Fr. Fernando Oliveira, a General rule and the Rule of Lavanha.

i) According to Fr. Fernando Oliveira, the stem is formed by one unique arch of circumference of the radius equal to breadth. In the plan of Fr. Fernando Oliveira, it was equal to the height according to which the stem was ⅗ of the circumference till the 3rd deck. Oliveira however, admits certain variations in the height of the stem between 3 pg more and 3 pg less, depending whether it was a warship or merchantship. From the 3rd deck to above, the stem rises straight towards the vante.

ii) The General Rule written in the Livro de Tracas and applied to the ships of 800t, defines the three points of the arch namely, the height of the capelo, the width and the centre of the quadrante arch of the radius equal to 4/9th of the height and the centre on the vertex of esquadria. This design was applied to the Galleon of 400t and in the Patacho of 11 rs.

iii) Lavanha states that, to complete the stem the following three points were required:

a) The couce de Quilha the points of the height marked on perpendicular from the width and which was 5/6th of the total height of stem.
b) The point of meia - lua of radius equal to 1/27th of total height and

c) Centre on the vertex of the square of the stem. 46

Lavanha further states that the height of stem as half of the length of the keel and the breadth to 1/3rd. Fr. Fernando Oliveira describes the height and breadth as equal to 1/3rd of keel, measuring the height on the 3rd deck, depending whether it was a warship or merchantship. Lavanha gives the total height till the capelo da roda while Fernando Oliveira measures it till the 3rd deck. The stem was high in the case of warships. 47

Master Valentim Temudo, giving the measurement of the breadth states that, the breadth should be of 1/4th of the keel so that the hatchways remains intact and protected. 48

Caverna of the Ship:

A caverna or rib of a ship was running from the Keel to the side-rail. A ship's frame form the shape of the hull and provide the skeleton on which the hull was secured. 49 All ribs or cavernas including the mareagem of the Portuguese Galleons of 350t, 300t and 200t and of the Caravela were designed with 1 or 2 archs only. The plan of the ribs of the ship was always determined by the following factors.

Manga-Boca maior,
Largura de fundo de covado a covado,
Pontal de Primeira Coberta
Altura da Manga. 50
Lavanha gives the number of the cavernas from the bottom of the ship as 11,5 for each side. The maximum number of cavernas was 7 and 11 in case if the ships were of large dimensions. The amount of the pairs of the caverna depended upon the amount of the rumos of the keel, which had to be measured from the bottom. However, in some ships, specially designed by Manuel Fernandes, the number of cavernas was always less to the rumos of the keel. All the cavernas are gramintated which define the position of the almogamas determining the form of the depth and in this way the whole of hull. The cavernas were based on 2 plans one circumference and the second oval. Initially, the caverna were accepted as nailing to the keel. Till the end of the 16th century the caverna do fundo were all gramintated giving it a term madeira le conta. The number was as much as double of the keel measuring in rumos. One Nau of 17,5r of keel was having 35 cavernas do conto or pairs because each caverna and the malha had the same measure and in this way forming one pair. At the end of the 16th century the number of caverna da conta rose from 5 to 11.

Structural Difference Between
The Galleon And The Nau:

To know the structural difference between the Galleon and the Naus, we have to take into considerations the main dimensions as well as rigging of the Nau of 600t and the Galleon of 500t. The keel of the Nau of 600t was of 17 rumos while that of the Galleon of 500t was 18 rumos. The breadth of the prow of the 600t Nau was 35 pg. while that of the Galleon of 500t was 30 pg.
of the poop of the Nau of 600t was 10 \( \frac{1}{2} \) pg. while that of the Galleon of 500t was 52 pg. In the case of the Nau of 600t, the height of the stem was 50 pg. and in the case of the Galleon of 500t it was 45 pg. The height of the stern post of the Nau of 600t was 42 pg. While that of the Galleon of 500t was 57 pg.\textsuperscript{55} As regards to the rigging, the Galleon of 500t had 4 masts, main, fore sail, mizzen and the contra artimão. The Nau on the other hand had only 3 masts, besides of gurupes, namely, main foresaid and mizzen.\textsuperscript{56}
Measurements of The Nau of 600t And the Galleon of 500t During the XVI Century

<table>
<thead>
<tr>
<th></th>
<th>Quilha</th>
<th>Manga</th>
<th>Pontal</th>
<th>Esloria</th>
<th>Altura da Roda</th>
<th>Altura do Cadaste</th>
<th>Lançamento da Roda</th>
<th>Lançamento do Cadaste</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Nau of 600t</strong></td>
<td>17 R</td>
<td>50pg</td>
<td>14pg</td>
<td>147pg</td>
<td>50pg</td>
<td>42pg</td>
<td>35pg</td>
<td>10pg</td>
</tr>
<tr>
<td></td>
<td>(26.18m)</td>
<td>(12.80m)</td>
<td>(3.58m)</td>
<td>(37.63m)</td>
<td>(12.80m)</td>
<td>(10.75m)</td>
<td>(8.96m)</td>
<td>(2.56m)</td>
</tr>
<tr>
<td><strong>Galleon of 500t</strong></td>
<td>18 R</td>
<td>52pg</td>
<td>13pg</td>
<td>154pg</td>
<td>45pg</td>
<td>37pg</td>
<td>30pg</td>
<td>9pg</td>
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<tr>
<td></td>
<td>(27.72m)</td>
<td>(13.31m)</td>
<td>(3.33m)</td>
<td>(39.42m)</td>
<td>(11.52m)</td>
<td>(9.47m)</td>
<td>(7.68m)</td>
<td>(2.30m)</td>
</tr>
</tbody>
</table>

R = rumo (6pg = 1,54m).
Pg = palmo de Goa (9,256 m).
REFERENCES


2. Ibid., p. 194.

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4. Ibid., p. 165.

5. Ibid., p. 163.


8. Ibid., p. 421.


10. Ibid., p. 421.


19. Mathew, K. M. History of the Portuguese Navigation In India, 1498-1600, Mittal Publications, New Delhi, 1988, p.27.


21. Ibid., f1.11.


23. Ibid., p.96.

24. Ibid., pp.96-98.

26. Ibid., f1.35v.


29. Ibid., f1.59.


32. Oliveira, B. Os Navios de Descobrimentos, Ministerio da Marinha, Lisbon, 1940, pp.18-19.


36. Ibid., p.262.


38. Ibid., p.283.

39. Ibid., f1.8.

Livro Nautico is the collections of the manuscripts containing systemetically the various phases of the construction of the nau of 600t, galleon of 500t, 2 Caravelas and 7 galleys. It also contains the dimensions and some rules of general proportion. Ibid, p.158.

João Baptista Lavanha was nominated as a Chief Cosomographer in 1591 and in 1618 as Chronicler in Chief of Portugal. Leitão, H.L. Viagens do Reino Para India E da India Para Reino (1608-1612), Vol.2, Agencia Geral do Ultramar, Lisbon, 1958, p.25.

Valetim Temudo was nominated as a Chief-Master of the naval dockyard at Goa on 26th March 1608.


53. Ibid., p. p.179.

54. Ibid., p.174.


57. Ibid., p.30.