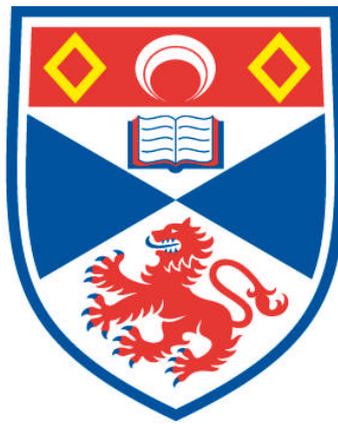


**VERNACULAR BOATS AND BOATBUILDING IN GREECE :
VOL. 2**

Kostas Damianidis

**A Thesis Submitted for the Degree of PhD
at the
University of St Andrews**



1991

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VERNACULAR BOATS AND BOATBUILDING
IN GREECE

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VOLUME II

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1989



VOLUME II

Figures

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1a. "Greek mould" (1.1)
Barker, R.A. (1983)

1b. Places with local boatbuilding activities during the 15th, 16th, 17th century in the Aegean and Ionian Sea
(-1-Kavala, -2-Patmos, -3-Symi, -4-Lindos, -5-Sphakia, -6-Zakynthos, -7-Galaxidi, -8-, Hydra)

2. Places with local boatbuilding activities during the 18th century in the Aegean and Ionian Sea

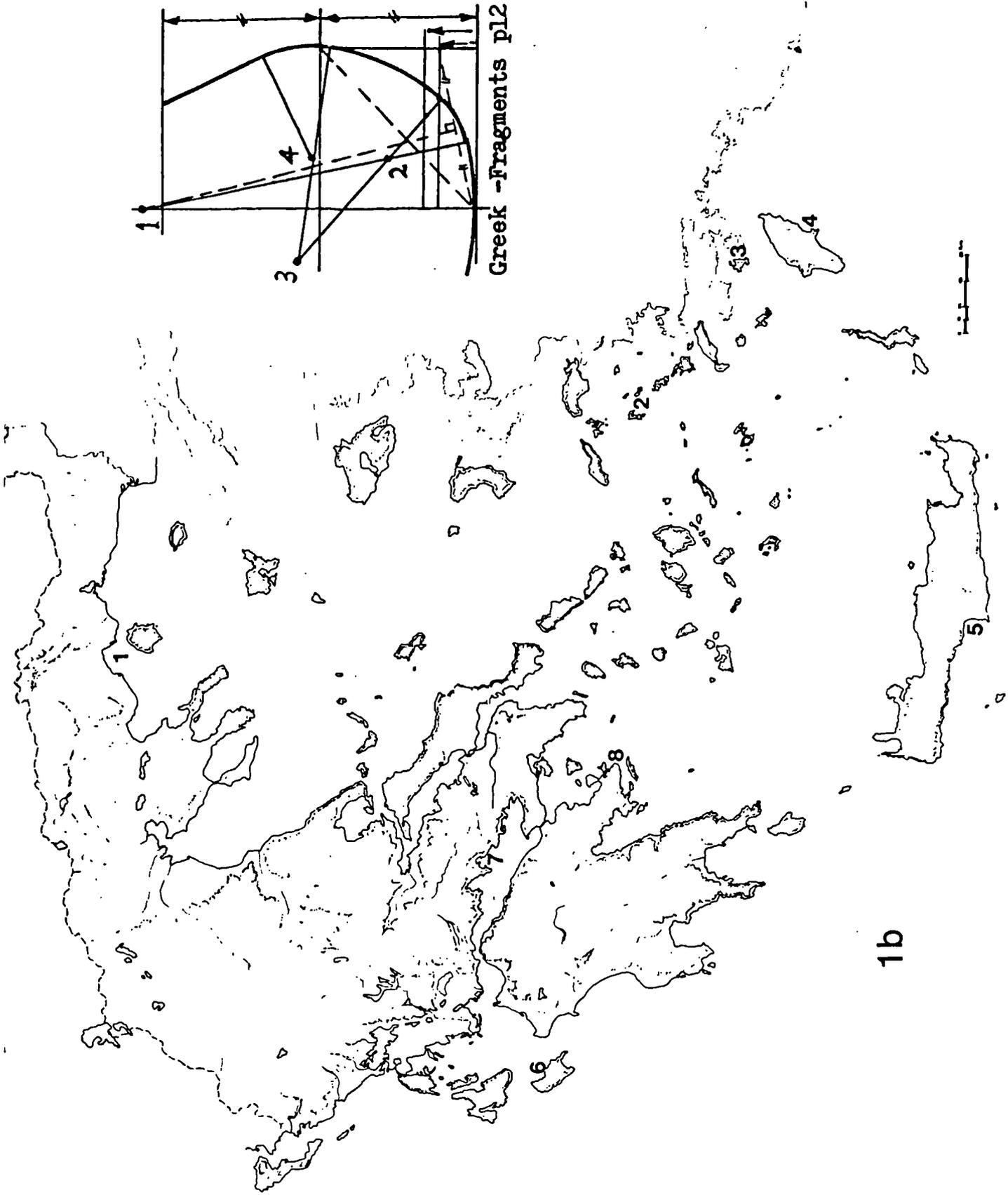
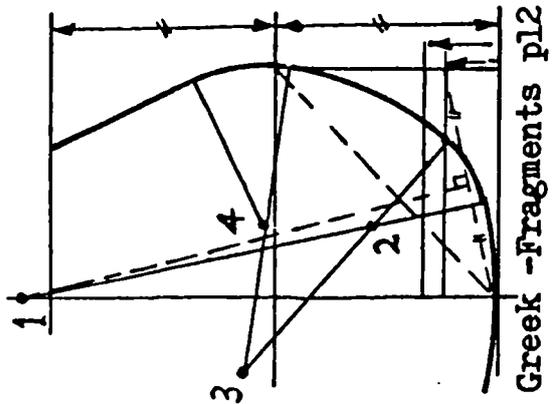
(-1-Ainos, -2-Kavala, -3-Litochoro, -4-Agio Oros, -5-Zagora, -6-Moutzeles, -7-Trikeri, -8-Skiathos, -9-Skopelos, -10-Skiros, -11-Kymi, -12-Chalkis, -13-Limni Evias, -14-Galaxidi, -15-Messologi, -16-Aitoloko, -17-Parga, -18-Ag. Marina, -19-Pilos, -20-Kalamata, -21-Kranidi, -22-Spetses, -23-Hydra, -24-Poros, -25-Andros, -26-Mikonos, -27-Paros, -28-Sphakia, -29-Kasos, -30-Karpathos, -31-Lindos -Rhodes, -32-Kastelorizo, -33-Symi, -34-Patmos, -35-Ikaria, -36-Samos, -37-Tsesme, -38-Chios, -39-Psara, -40-Aivali, -41-Lesvos, -42-Islands of Marmara)

3. Places with local wooden boatbuilding activities in 1987 and number of boatyards at each place⁽¹⁾

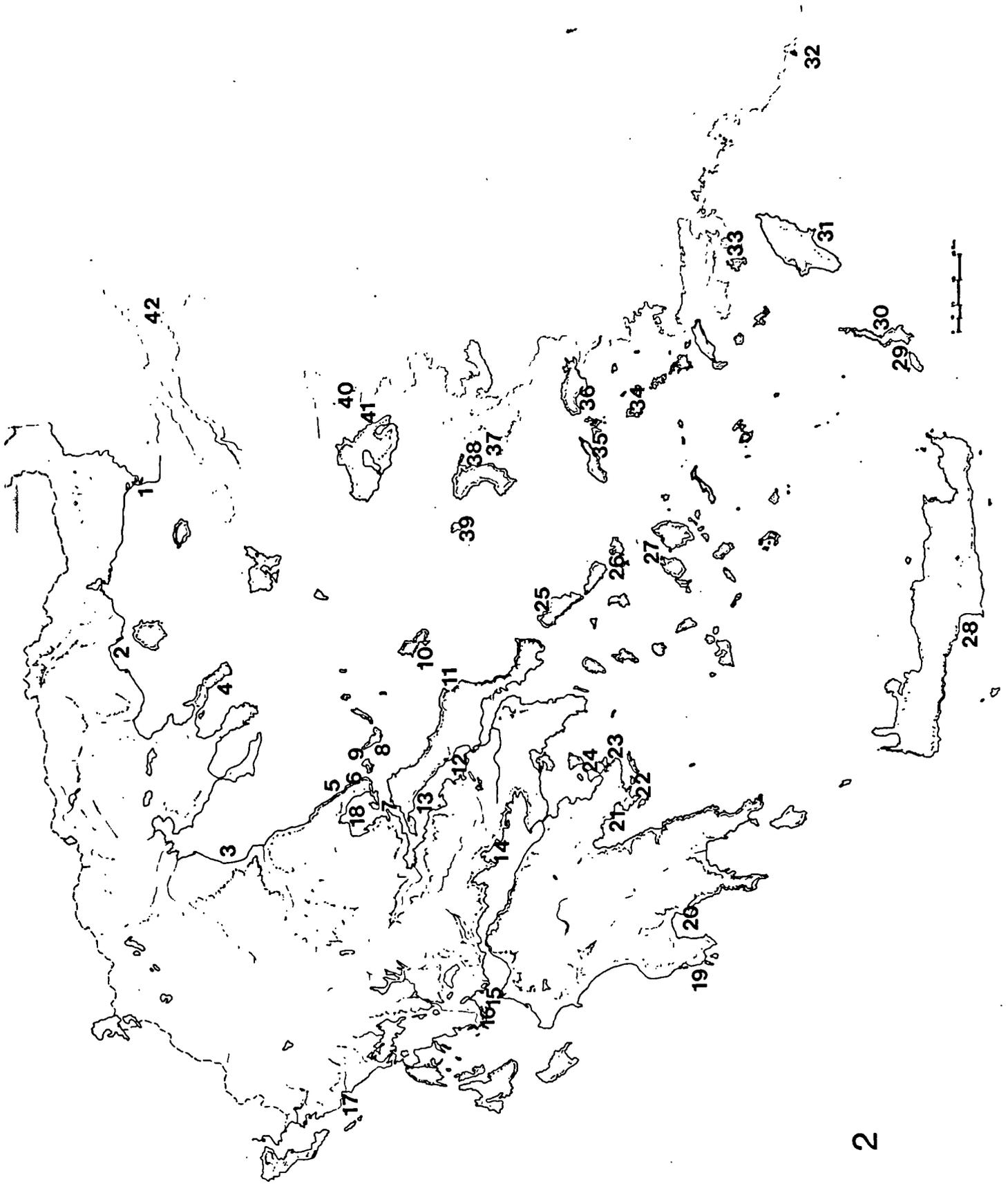
(-1-Alegandroupoli(1), -2-Samothraki(1), -3-Kavala(3), -4-Thasos(5), -5-Ierissos(6), -6-Nea Michaniona(4), -7-Thessaloniki(8), -8-Katerini(3), -9-Limnos(1), -10-Lesvos(3), -11-Plomari(2), -12-Skiathos(1), -13-Trikeri(1), -14-Volos(2), -15-Chalkis(7), -16-Peraeus & Perama(18), -17-Egina(2), -18-Chios(2), -19-Samos(2), -20-Agios Issidoros(3), -21-Siros(4), -22-Paros(2), -23-Koufonisi(1), -24-Amorgos(1), -25-Santorini(1) -26-Patmos(4), -27-Leros(1), -28-Kalimnos(5), -29-Kos(1), -30-Symi(4), -31-Rhodes(6), -32-Iraklion(2), -33-Rethimnon(1), -34-Chania(3), -35-Kithira(1), -36-Githion(1), -37-Kalamata(1), -38-Gerakas(1), -39-Naphplio(4), -40-Kilada(6), -41-Spetses(6), -42-Hydra(1), -43-Itea(1), -44-Patras(3), -45-Ithaki(1), -46-Levkas(3), -47-Prevaiza(2), -48-Kerkira(3))

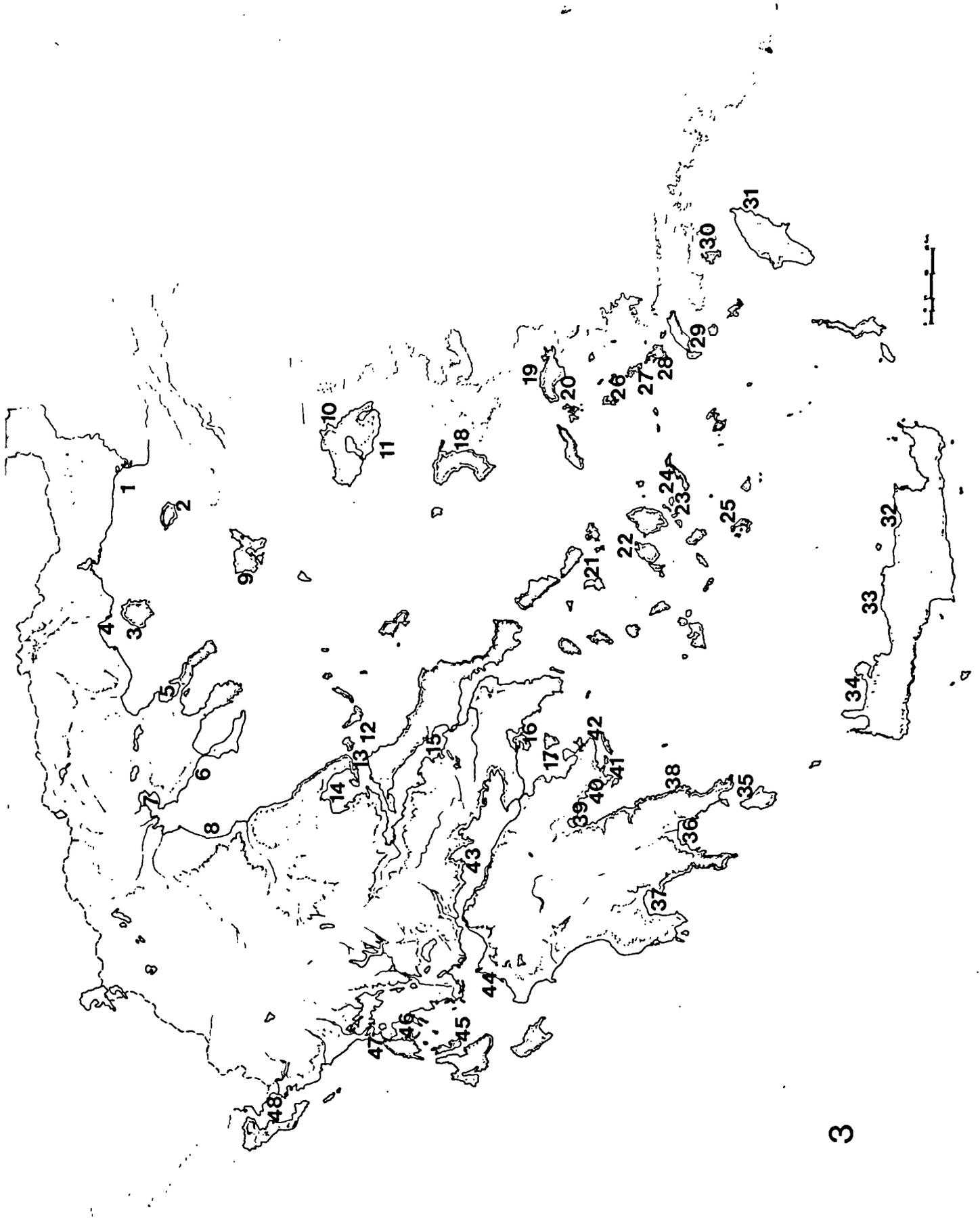
Total number of boatyards = 143

(1) The number of boatyards appears in parenthesis after the name of the place (Source : Hellenic Ministry of Transport/1987)



1b





4. Plan of the boatyards' location on Syros (1.4)
(Hydrographic Service of Hellenic Navy)
5. Plan of the boatyards' location on Spetses (1.4)
(Hydrographic Service of Hellenic Navy)
6. Plan of the boatyards' location on Symi (1.4)
(Hydrographic Service of Hellenic Navy)
7. Old photograph of Kavala showing the boatyard (1.4)
(Archaeological Museum of Kavala, postcard 30/4/1934)
8. Old lofting floor in Karlovasi (Samos /1988) (1.5)
- 9a. Structure of hand capstan (1.5)
(Poulianis, A.I. (1977, pp.591-93))
- 9b. Recorded hand capstan (Samos/1988) (1.5)
10. Careening (1.5)
(Zouroudis, G. (1974, p.171))

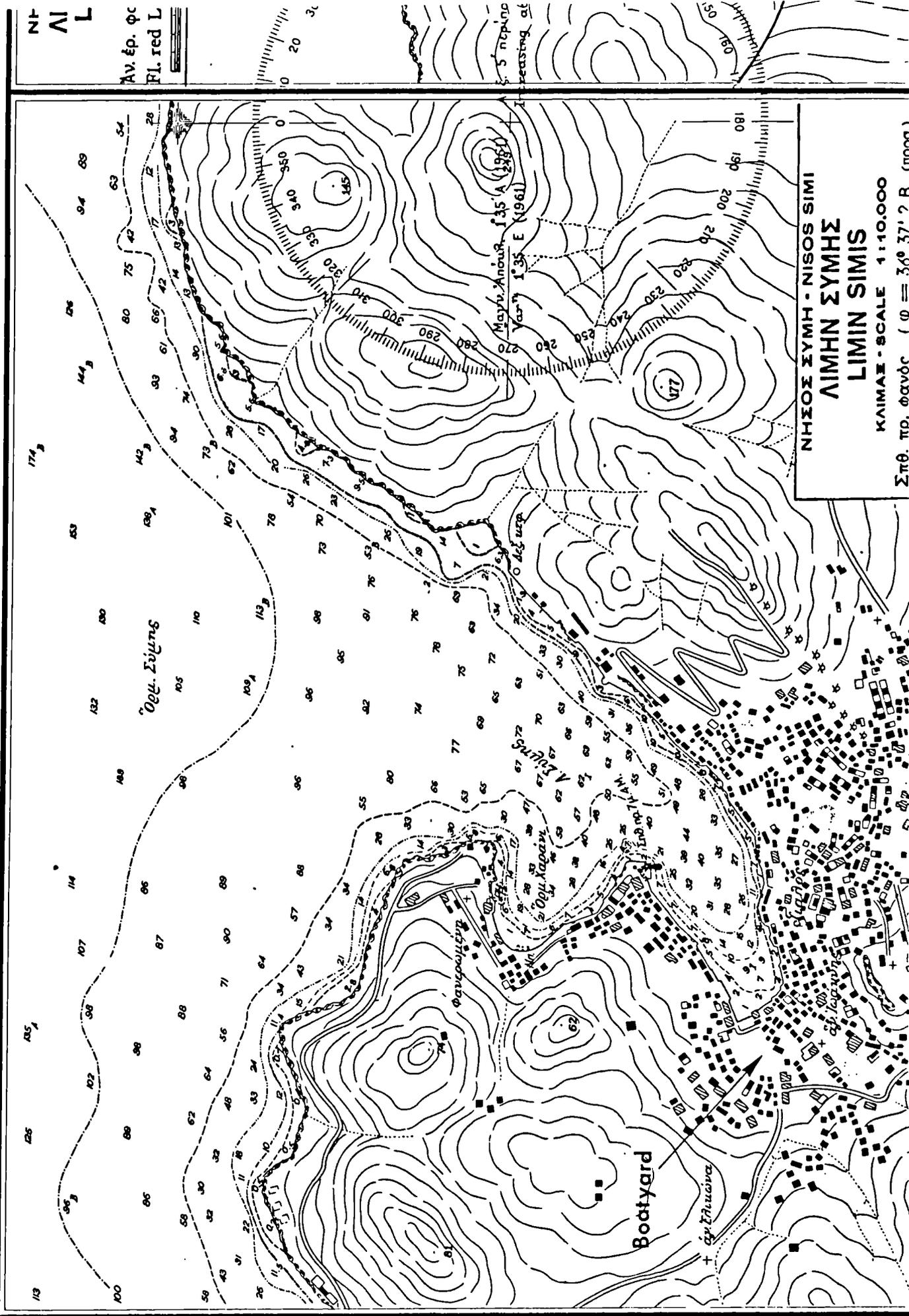


ΕΛΛΗΝΙΚΟ ΓΕΩΓΡΑΦΙΚΟ ΙΝΣΤΙΤΟΥΤΟ ΛΙΜΕΝ

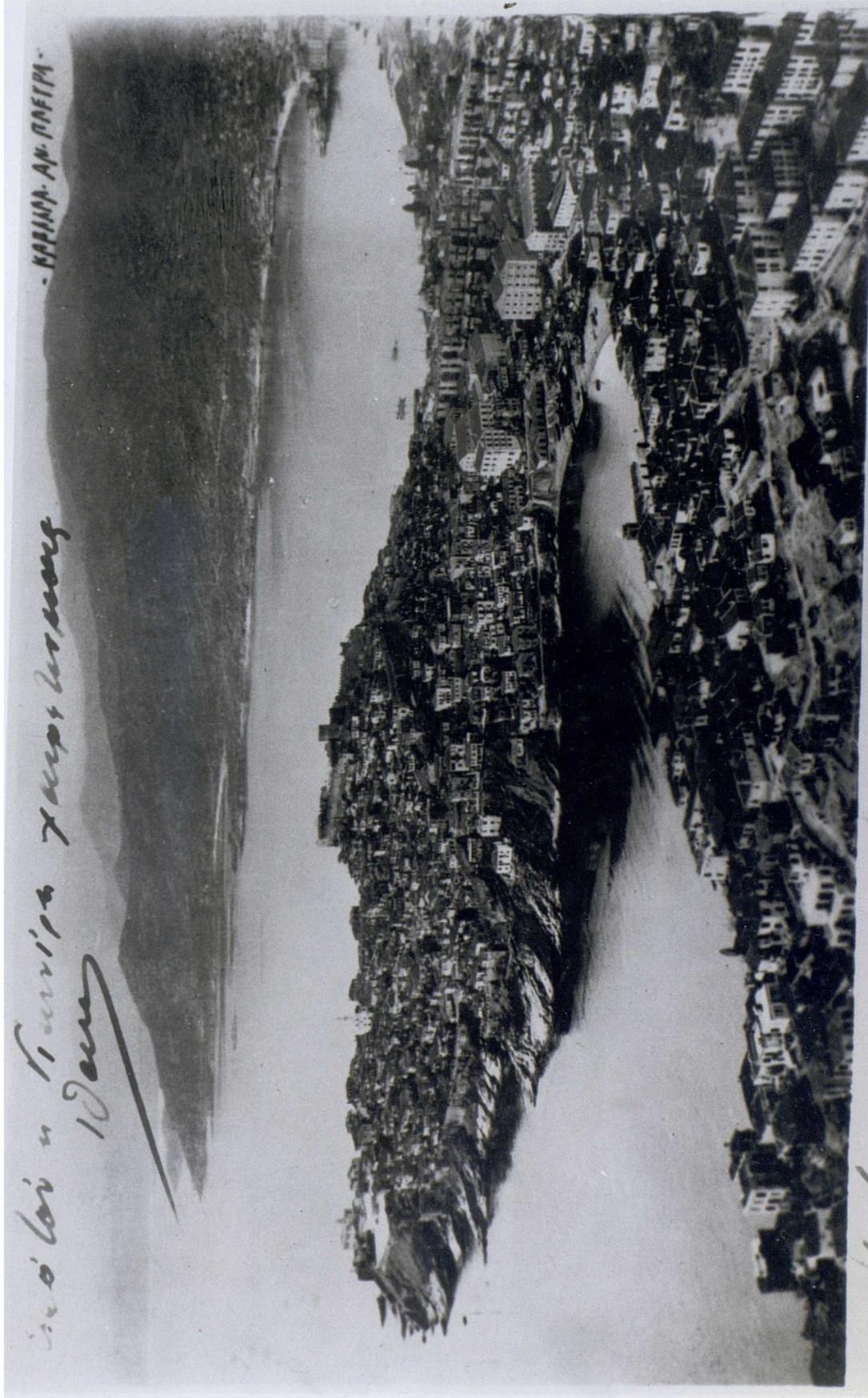
ΣΗΜΕΙΩΣΗ
Η αναπροσαρμογή του εμβαδού των πυρσών μέχρι Άγγελες 45/1970 άναφέρεται εις Γεωγραφικών τοσαύτην παλαιών δεδομένων. Διά την νυν Γεωγραφικών εμβαδών εις εφοδισμένην 1970.

375

Εξ Ἑλληνικῶν Ὑδρογραφῶσεων 1958 καὶ παλαιότερων μετὰ συμπληρώσεων ἐξ Ἴταλικῶν Γεωγραφικῶν Ὑδρογραφῶσεων 1958 and former with additions of Italian etc.



ΝΗΣΟΣ ΣΥΜΗ - NISOS SIMI
ΛΙΜΗΝ ΣΥΜΗΣ
LIMIN SIMIS
ΚΑΙΜΑΣ - SCALE 1:10,000
Σπθ. πρ. φανόρ (φ = 36° 37' 2 R (μοσα.)



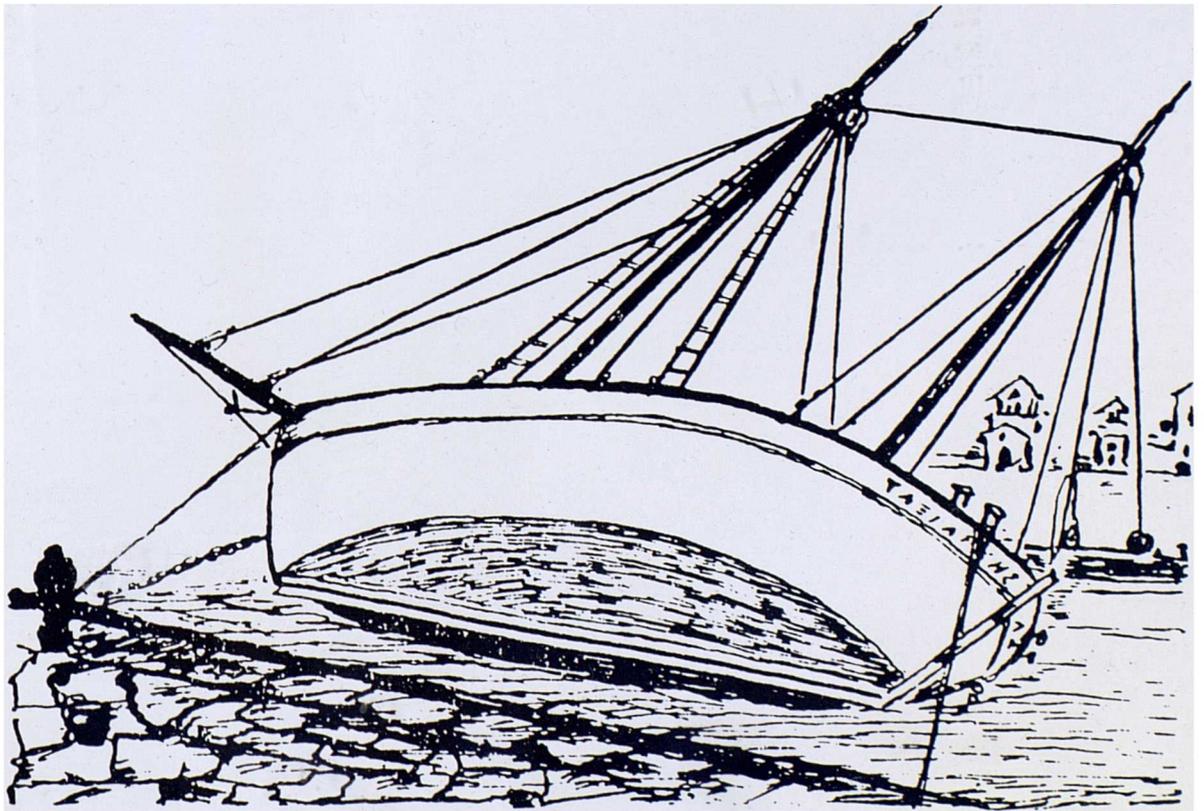
in o'lori u' Tauri'pa xaxp' l'omang
10 Jan

- KAPINPA AN. PAETPA -

Kabirja 20 August 1937

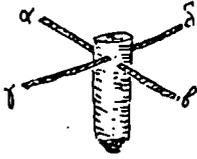


8



Ὁ ἐργάτης ἐν ἀκουμπῇ κατάχαμα. Κάτω στενίθγει καὶ πάσι καὶ σφινύνει στὸ σφουγγύλιον.

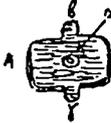
Ὁ ἐργάτης



α, β, γ, δ:
αἱ μανέλλες

Σφουγγύλιον. Ἐνα ξύλο, πλακερὸ στρωμένο κάτω μὲ αὐτιά, ποὺ μπαίνουν μίση τὴς κοτσές. Τὸ σφουγγύλιον ἔχει στὴν μέσην ἀράλιν. Ἐκεῖ μέσα φωλιάζει ὁ ἐργάτης καὶ (γ) ὑρῆζει.

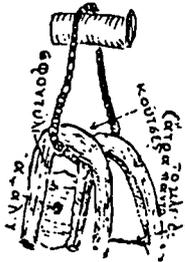
Σφουγγύλιον



α: τ' ἀράλι
β, γ: τ' αὐτιά

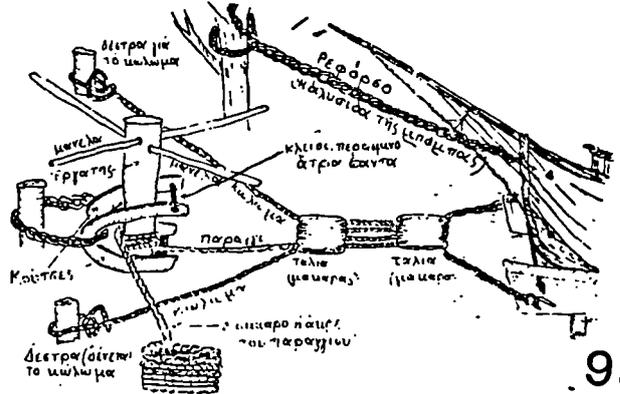
Κοτσές. Κοτσές εἶναι δύο μπρατσόλια - γωνιές τὸ ἕνα δίπλα στ' ἄλλο. Ἀπὸ μίση' στὴς γωνιές περνίεται ἀλωσίβα, ποὺ κρατᾷ τὴς κοτσές.

Κοτσές



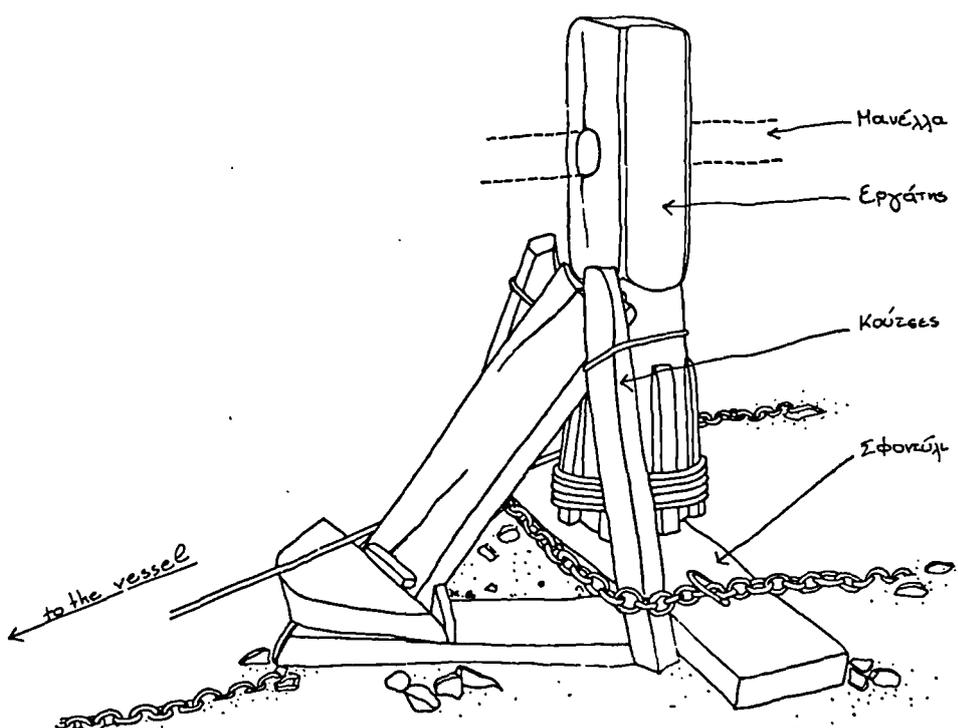
καὶ δίνεται γερὰ οἱ μὲγ κολόνα. Οἱ κοτσές μπαίνουν στήθε; κατὰ (γ) ἦς. Κε' ἀνέμεσα στὰ μπράτσα τῆς μανῆς καὶ τῆς ἀλλοῦνης κοτσές, περνοῦν τ' αὐτιά τοῦ σφουγγυλίου καὶ ἔτσι στεργιώνει τὸ σφουγγύλιον.

ΚΟΙΒΕΝΤΕΣ ΣΤΟ ΣΥΡΤΙΚΟ



9a

ΤΑ ΠΑΙΔΙΑ. Νὰ τοῦ Καγιαροῦ τὸ καϊκι!!!
 Νὰ τοῦ Καγιαροῦ τὸ καϊκι!!!
 ΚΑΠ. ΓΙΑΝ. Βρὲ Νικόλα, ἀκου τὰ παιδιὰ φωνάζουσι γιὰ τοῦ Καπιτᾶ - Κωσταντῆ τὸ καϊκιν. Γι' ἔμε ἴσα μὲ τὸν κάδο νὰ (β) εἶς, εἶν' αὐτὸς;
 ΝΙΚ. Ἄι, νάτο, ἤφάνικαι κα' ὄλας. Πίτυχεν ε' ἀποδόριν ὁ μπάρμιας μου, κα' ἤκαμει παγκὰ καὶ τοῦ ἔκασε στὰ πῆμα.
 ΚΑΠ. ΓΙΑΝ. Καλὸς ἠκόπισαις, Καπιτᾶ - Κωσταντῆ. Πῶς ἤχαλοπίρασαι στὸ ταξίδειν;
 ΚΑΠ. ΚΩΣ. Καλὰ πῆγαμει, Καπιτᾶ - Γιάννη. Θυμᾶσαι, μ' ὀστριο-Κάρμει ξεκίνησα, πρῶτο - δεῦτερα. Ἰστορεὶς προβεζάρισεν ὁ καιρὸς, ἐγὼ ὅμως εἶχα φηλώσει πιά. Ἐπειτα, καθὼς ἔξερεις, τὸ καϊκι μου τραβᾷ πολλὸν σουφράνο. Μὲ δύο ὅττες ἠπίδαμειν τὸ Βενέτικο καὶ μούχρα - μούχρα μπαίναμε στὸ λιμάνι.
 ΚΑΠ. ΓΙΑΝ. Ἰντα μαντάτα μὲς φέρνεις ἀπὸ τῆς Χιό;
 ΚΑΠ. ΚΩΣ. Καλὰ μαντάτα, ἡ σταφίδα ἔχει τραβήξη ἐφτός. Ὅσοι διαστῆμα κα' ἠπουλήσανε, τῆμ πάβαισι.



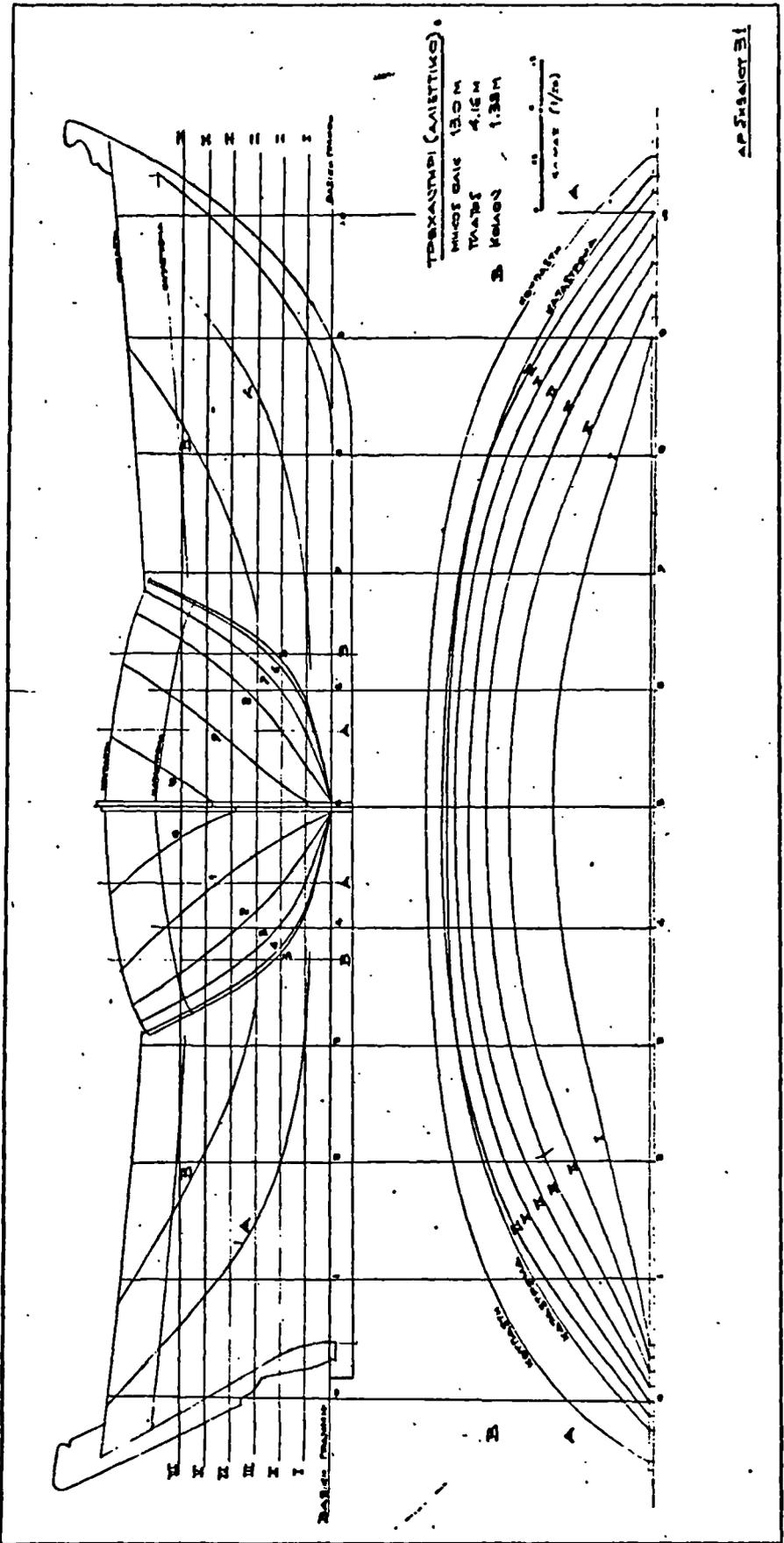
Samos 1988
 Height of 'εργάτης' 126cm.

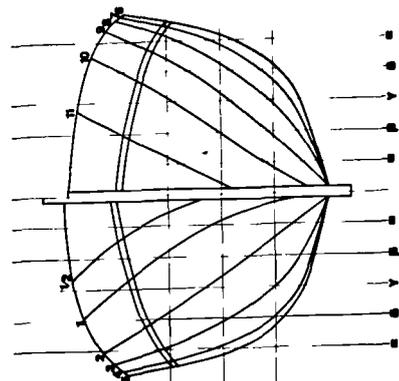
9b

11. Fishing Trechadiri (2.2.1)
(Adoniou,A. (1969, fig.31))
12. Trading Trechadiri (2.2.1)
Recorded lines of a model ([17]-Papastephanou)
13. Gatsao (2.2.2)
(Adoniou,A. (1969, fig.74))
- 14a. Body plan and sheer plan of a boat similar to the Botis type
(2.2.3)
Throckmorton's collection no.5
- 14b. Half breadth plan of a boat similar to the Botis type (2.2.3)
Throckmorton's collection no.5
- 15a. In the photograph the boats on the shore are of the Gaita type
(Damianidis,K. Zivas,A. (1986, 46)) (2.2.3)
- 15b. The boat in the background of the photogaph is a Gaita from
Constantinople (Benaki Museum negative no.B.3836) (2.2.3)
16. Tserniki (2.2.4)
(Adoniou,A. (1969, fig.14))
17. Boat similar to the Tserniki type (2.2.4)
Throckmorton's collection no.11, 13
- 18a. Sheer plan of "Phaneromeni" (2.2.5)
She was built on Skiathos in 1938 (recorded in 1989)
- 18b. Body plan of "Phaneromeni" (2.2.5)
- 18c. Half breadth plan of "Phaneromeni" (2.2.5)
- 19a. Tsernikoperama (2.2.5)
(Perama/1989)
- 19b. Small "Perama" type (2.2.5)
(Lesvos/1988)
20. Trata (2.2.6)
- 21a. Lines of a Trata (2.2.6)
(Adoniou,A. (2.2.6))
- 21b. Detail of the bow of a Trata (2.2.6)
(She was recorded on Samos/1988)

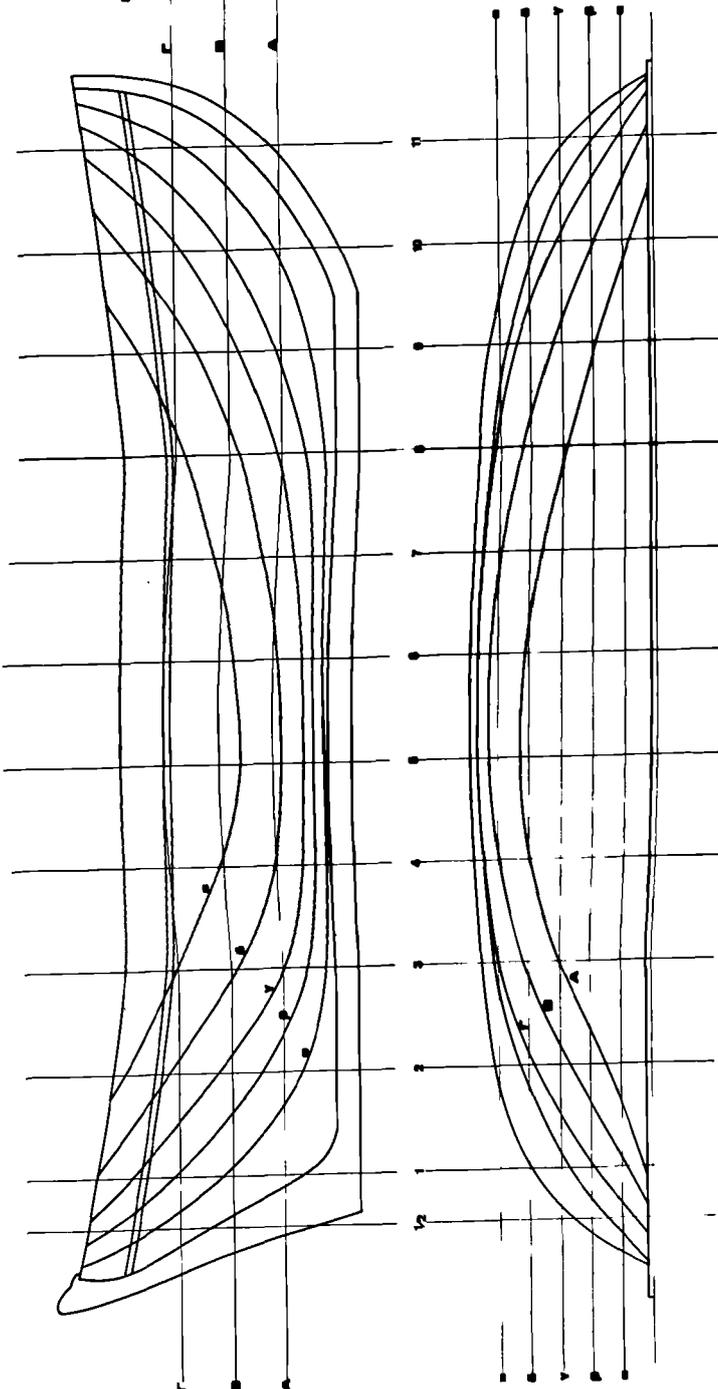
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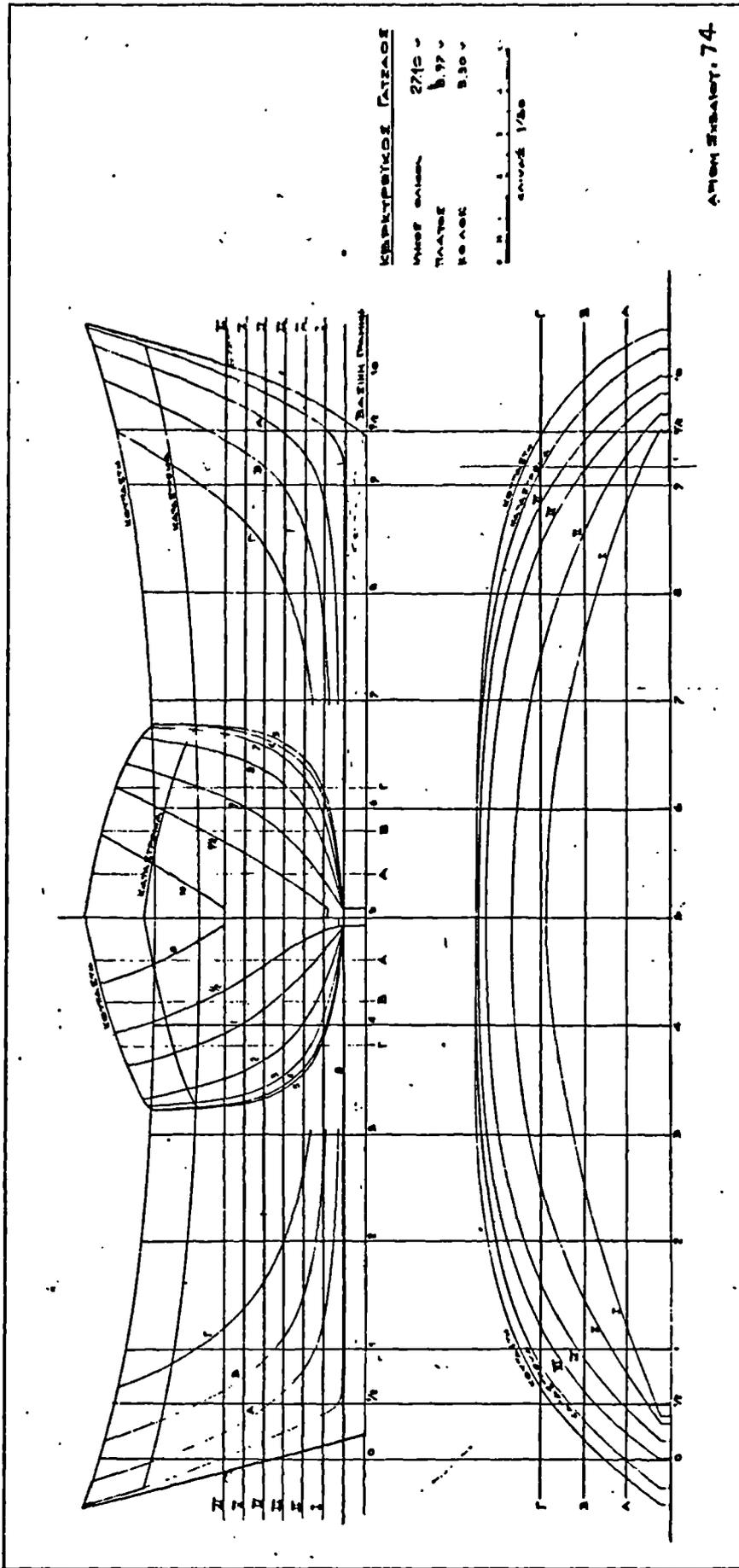
WELL 1
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WELL 100





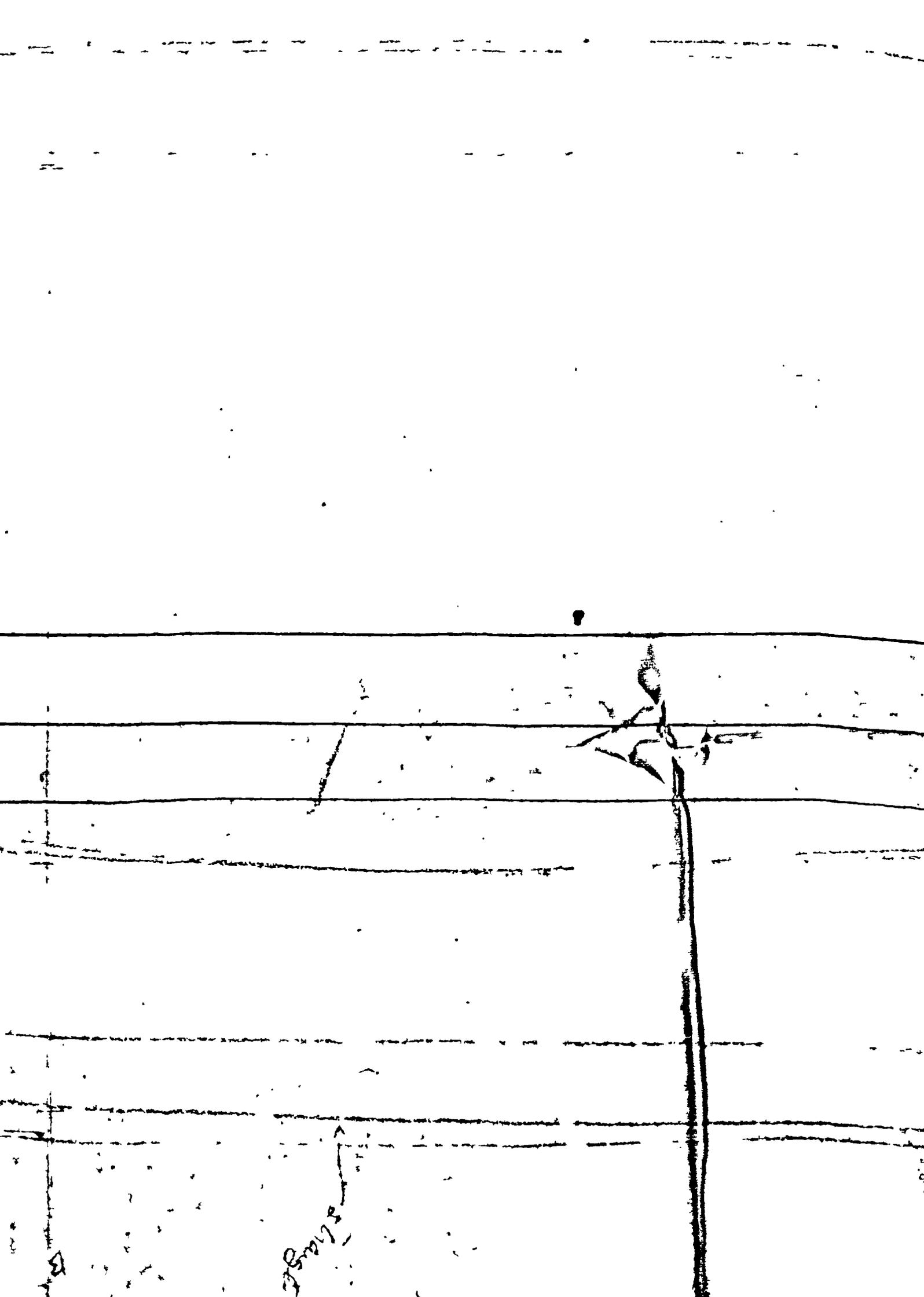
Ηπειρώτικα του Ηρακλείου
 Διάμετρος : 14,90 μ.
 Μέγιστη Καύση : 11,00 μ.
 Ζεστόλιθα : 16,00 μ.
 Ουρά Πύκνα : 15,00 μ.
 Μέγιστη Καύση : 11,00 μ.
 Μέγιστη Οψών : 4,40 μ.
 Μήκος Πύκνα : 4,92 μ.
 Οψώνια : 1:25





Лист 74





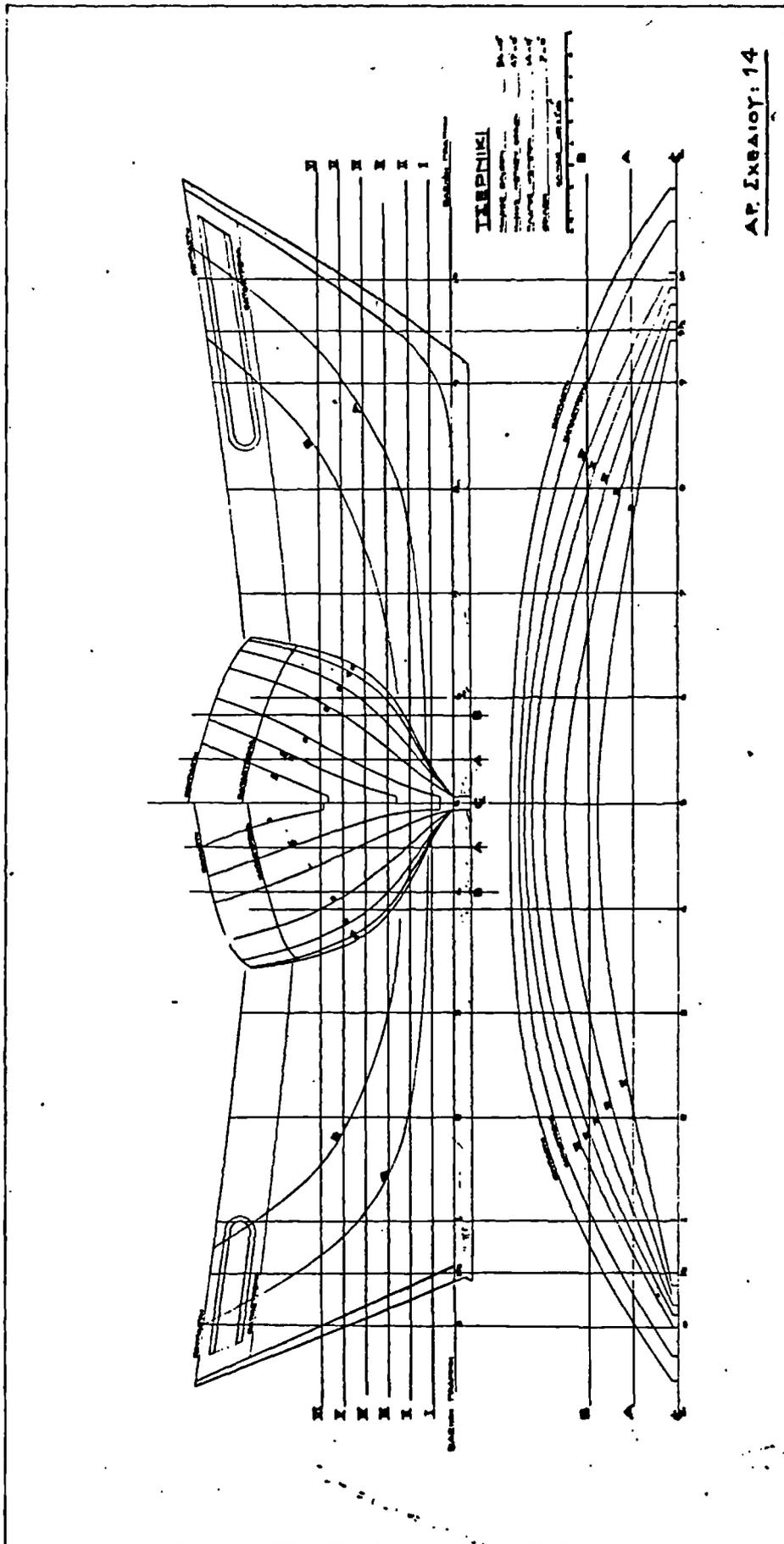
Ἀποβάθρα Προσφυγικοῦ Συνοικισμοῦ



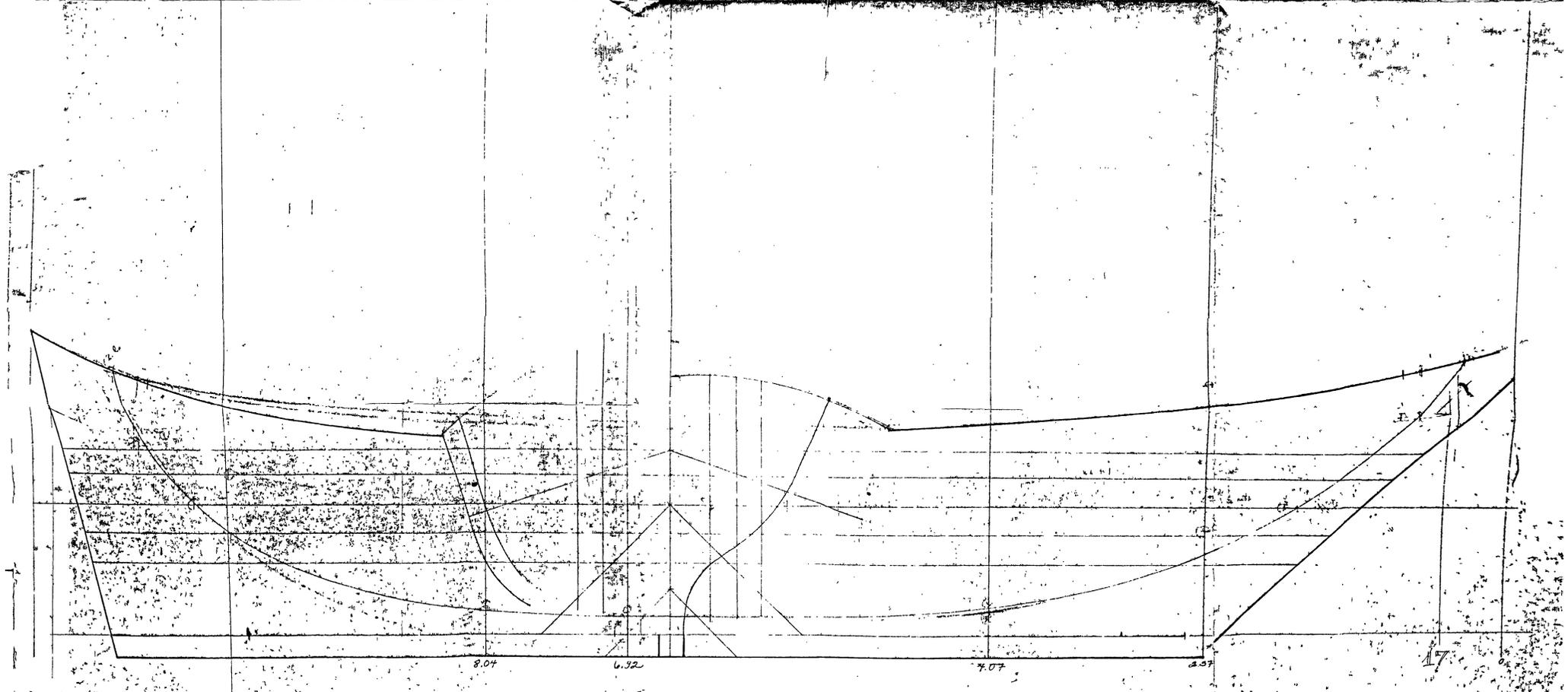
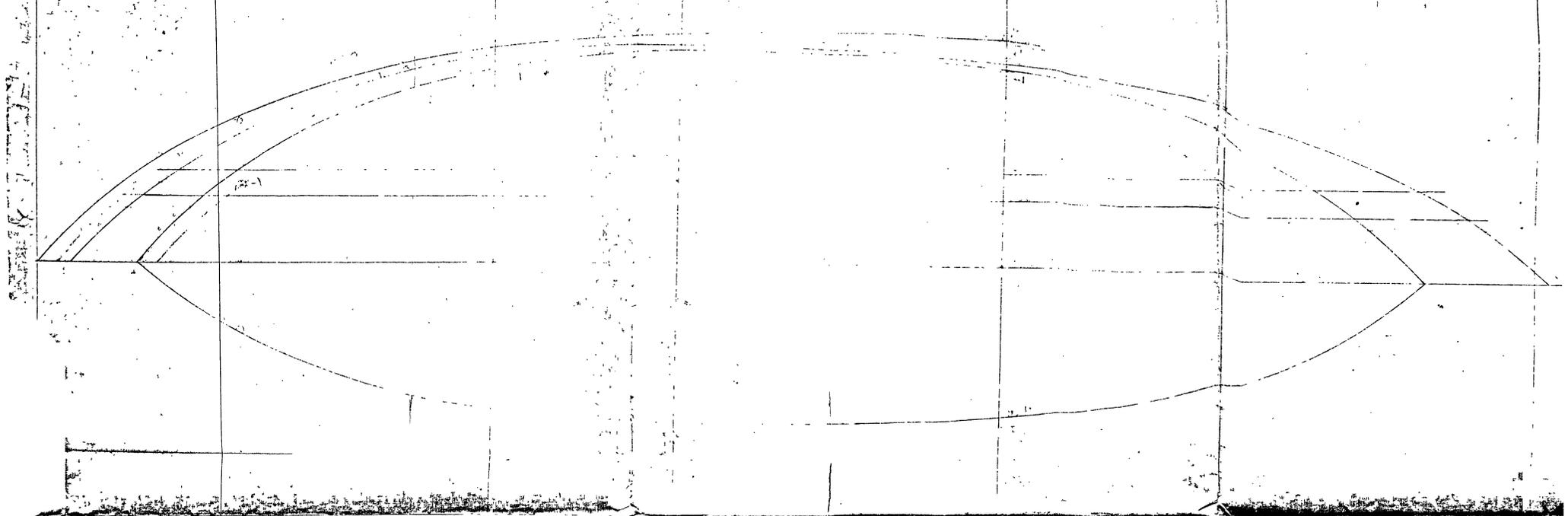
15α

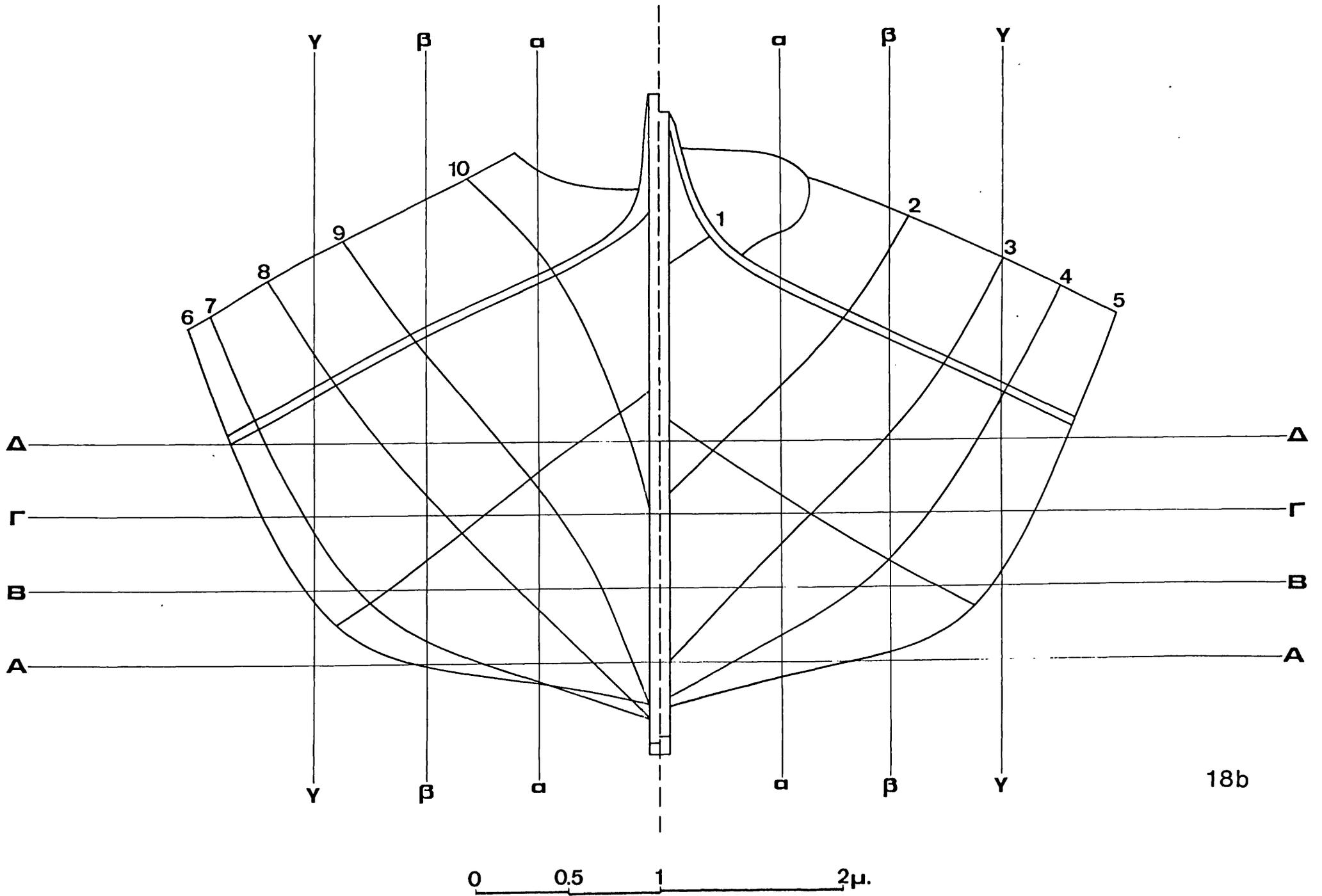


15β



AP. IXBAIOY: 14





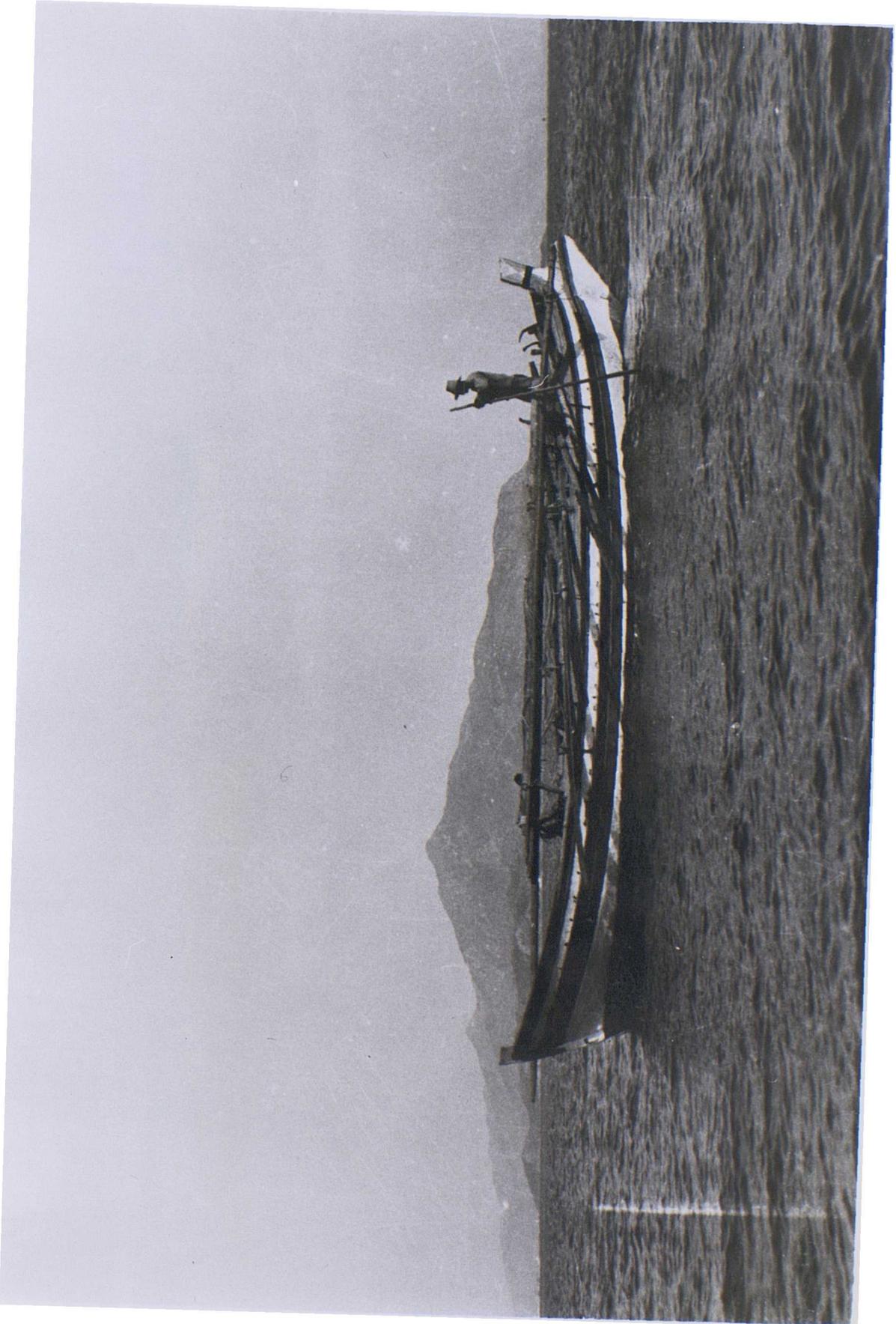
18b

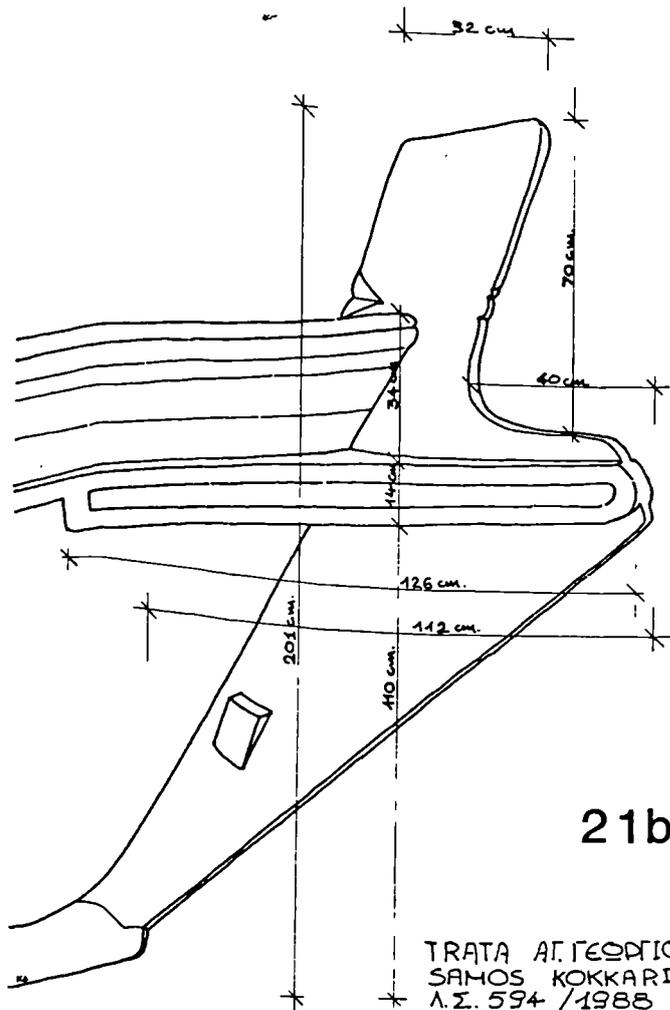


19a



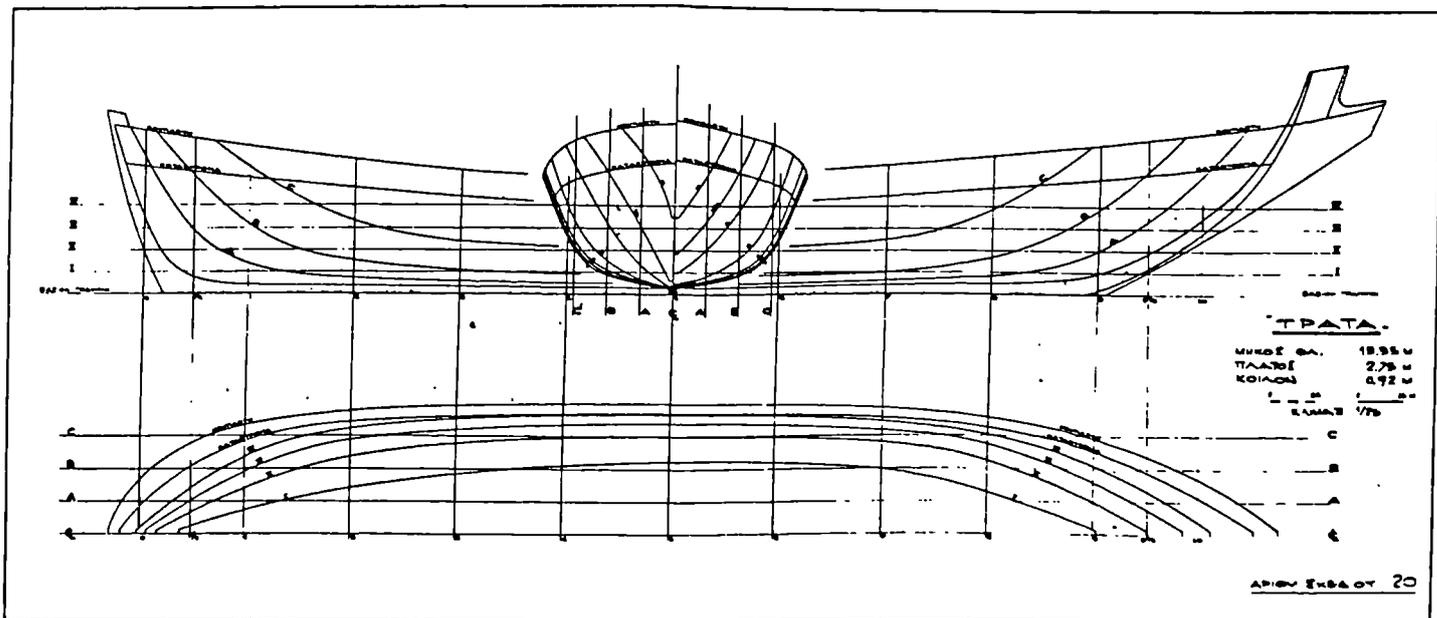
19b





21b

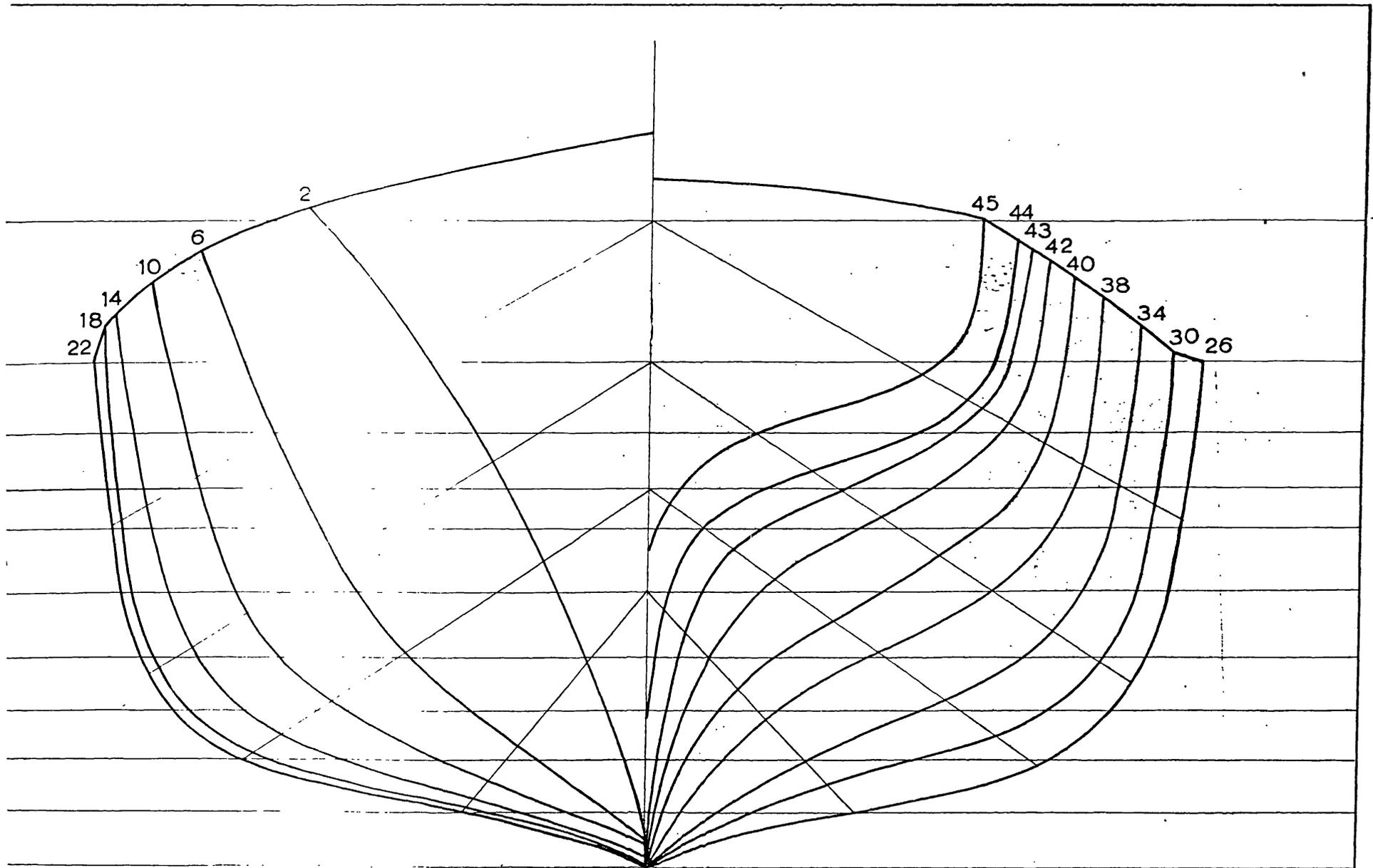
ΤΡΑΤΑ ΑΓ. ΓΕΩΡΓΙΟΣ
 ΣΑΜΟΣ ΚΟΚΚΑΡΙ
 Α.Σ. 594 / 1985

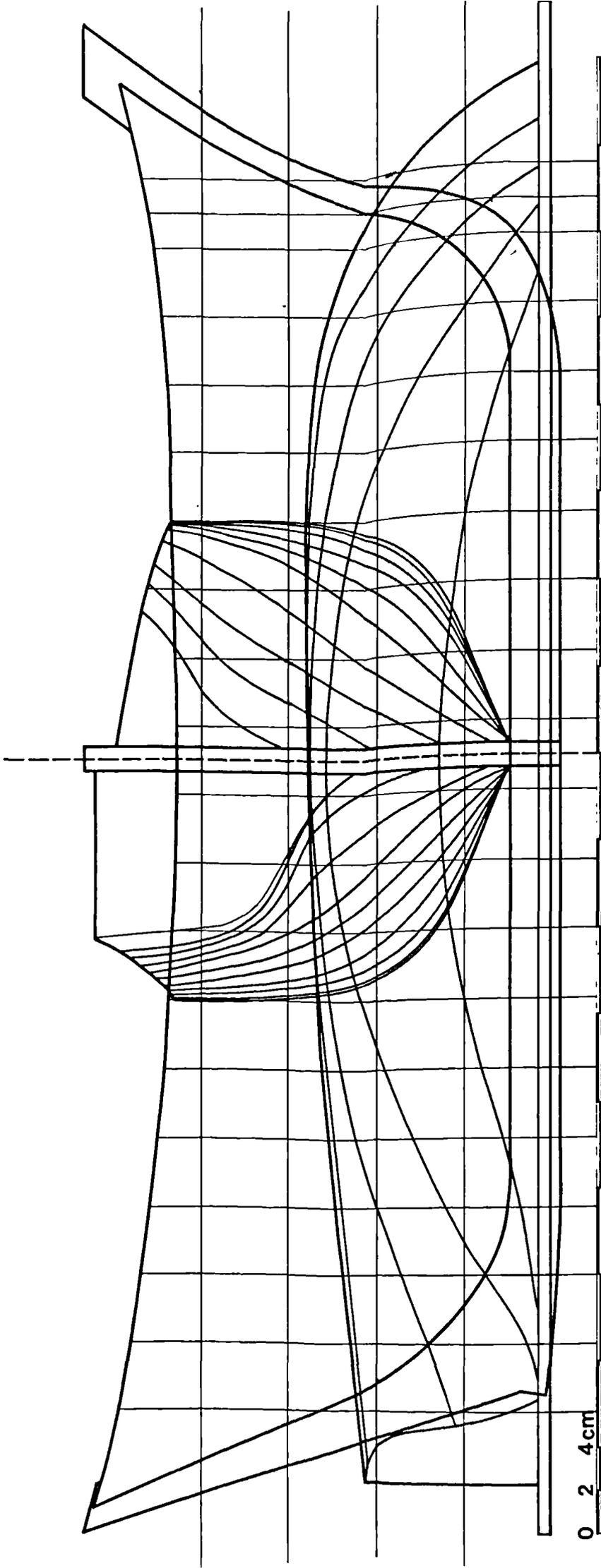


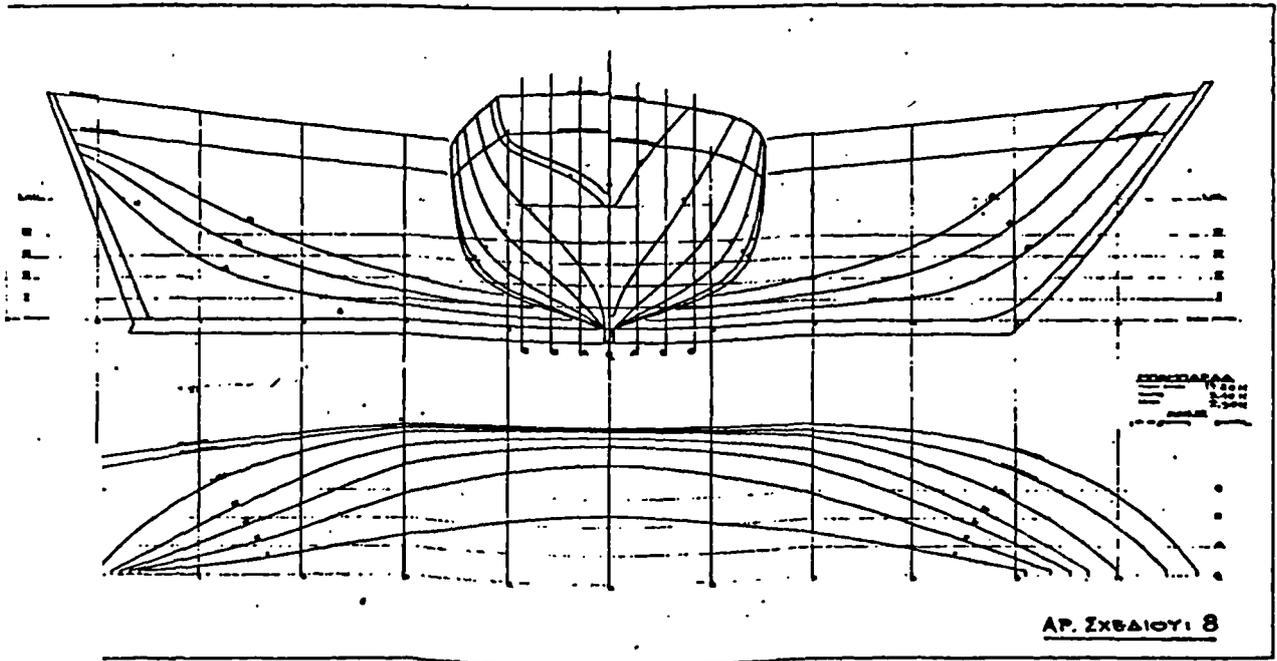
21a



- 22a. Body plan of a Varkalas (2.3.1)
Throckmorton's collection no.8
- 22b. Sheer plan and half breadth plan of a Varkalas (2.3.1)
Throckmorton's collection no.8
23. Lines of a Varcala model (2.3.1)
(model made by [11]-Polias)
- 24a. Bombarda (2.3.2)
(Adoniou, A. (1969, fig.8))
- 24b. Popoular drawing of a Bombarda (2.3.2)
(Lemos, A. (1963, p.88))
25. Lines of Skaphi from Symi (2.3.3)
Recorded patterns for a model ([11]-Polias) and lines from Adoniou, A.
(1969, fig.16)
26. Varkalas from Hydra (2.3.4)
(Adoniou, A. (1969, fig.78))
27. Profile of boat from Chania (2.3.5)
(recorded in Chania/1987)
28. Liberty (2.4.1)
(Adoniou, A. (1969, fig.52))
29. Trading Karavoskaro (2.5.1)
(Adoniou, A. (1969, fig.22))
30. Fishing Karavoskaro (2.5.1)
(Adoniou, A. (1969, fig.29))
- el

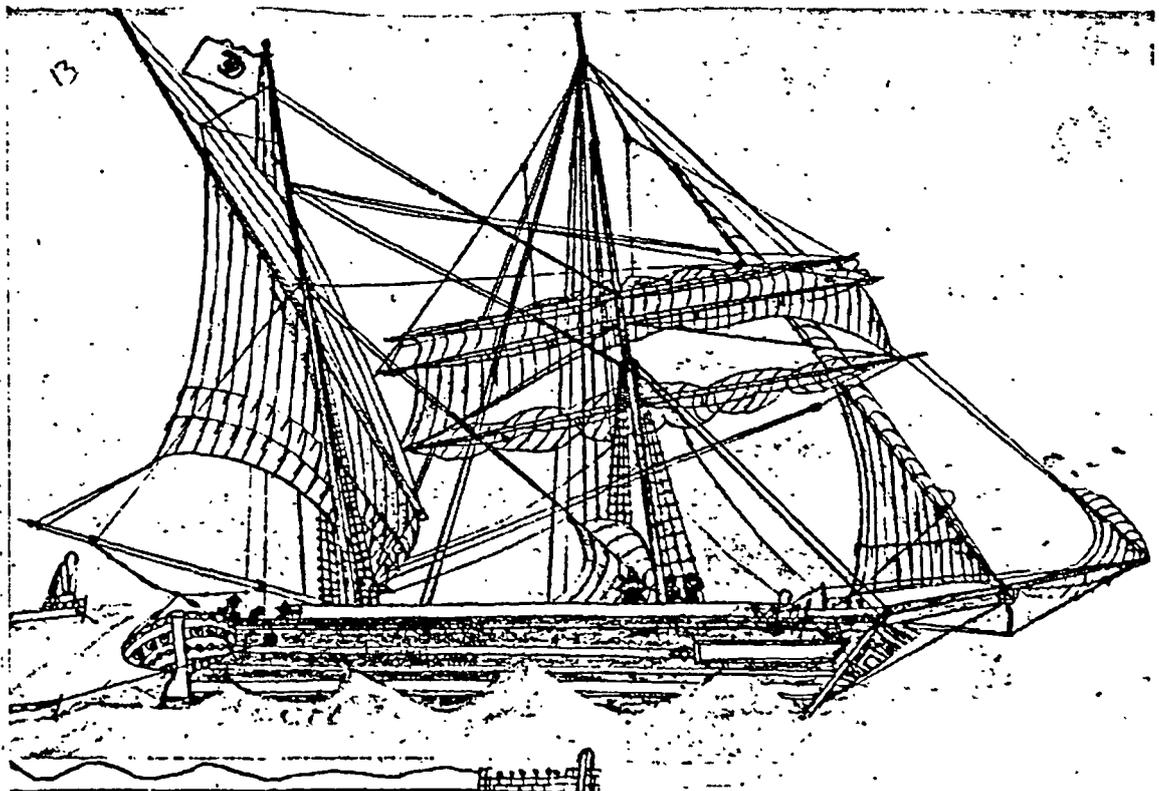




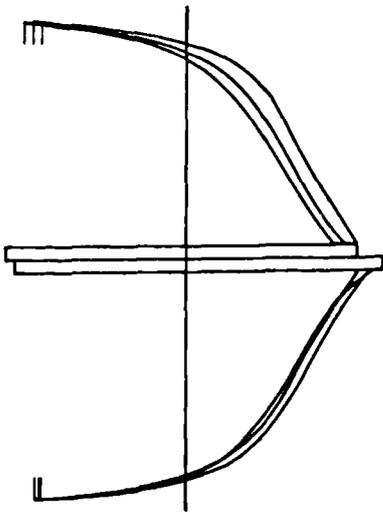


24b

Βομβάρδα



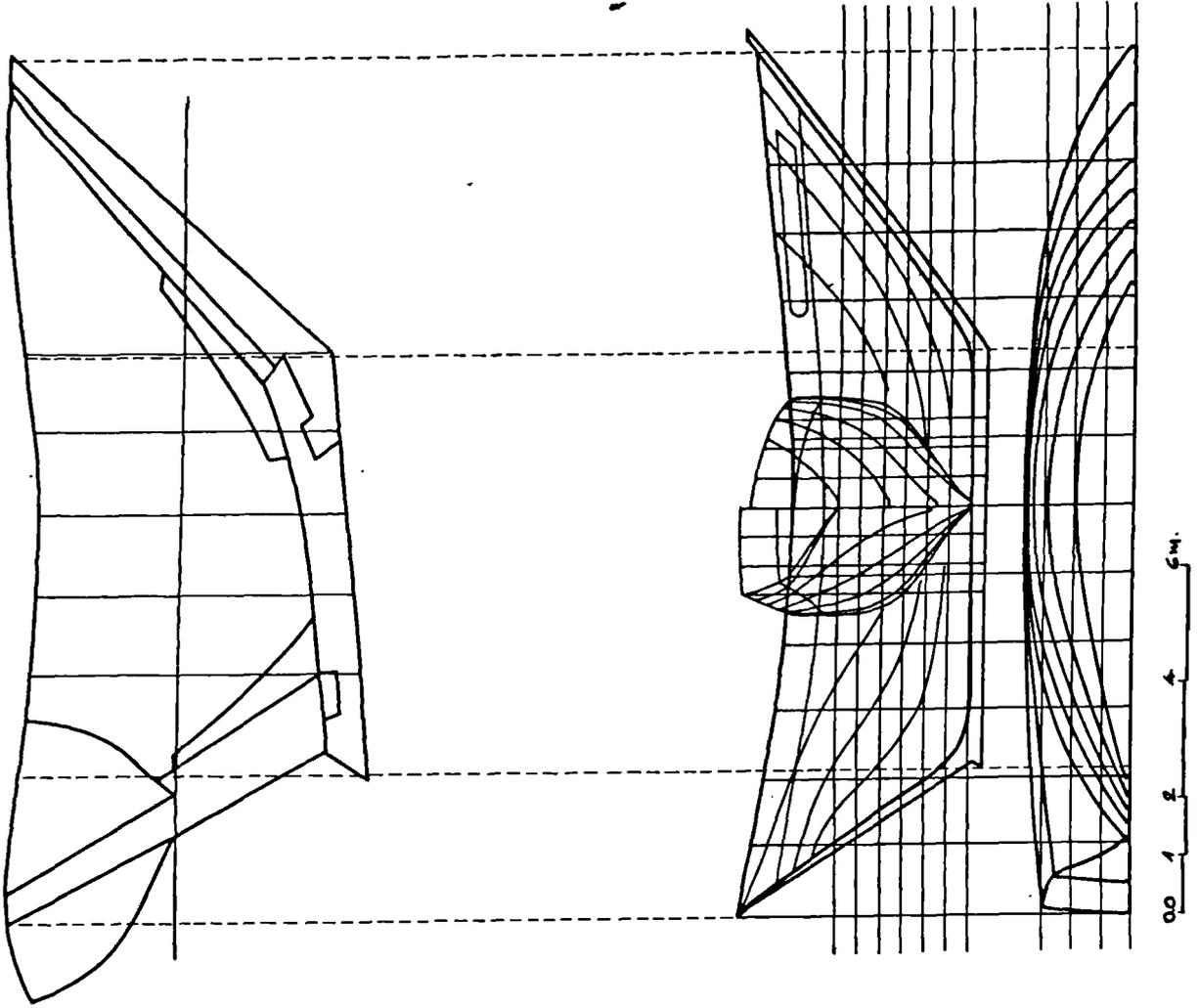
24a



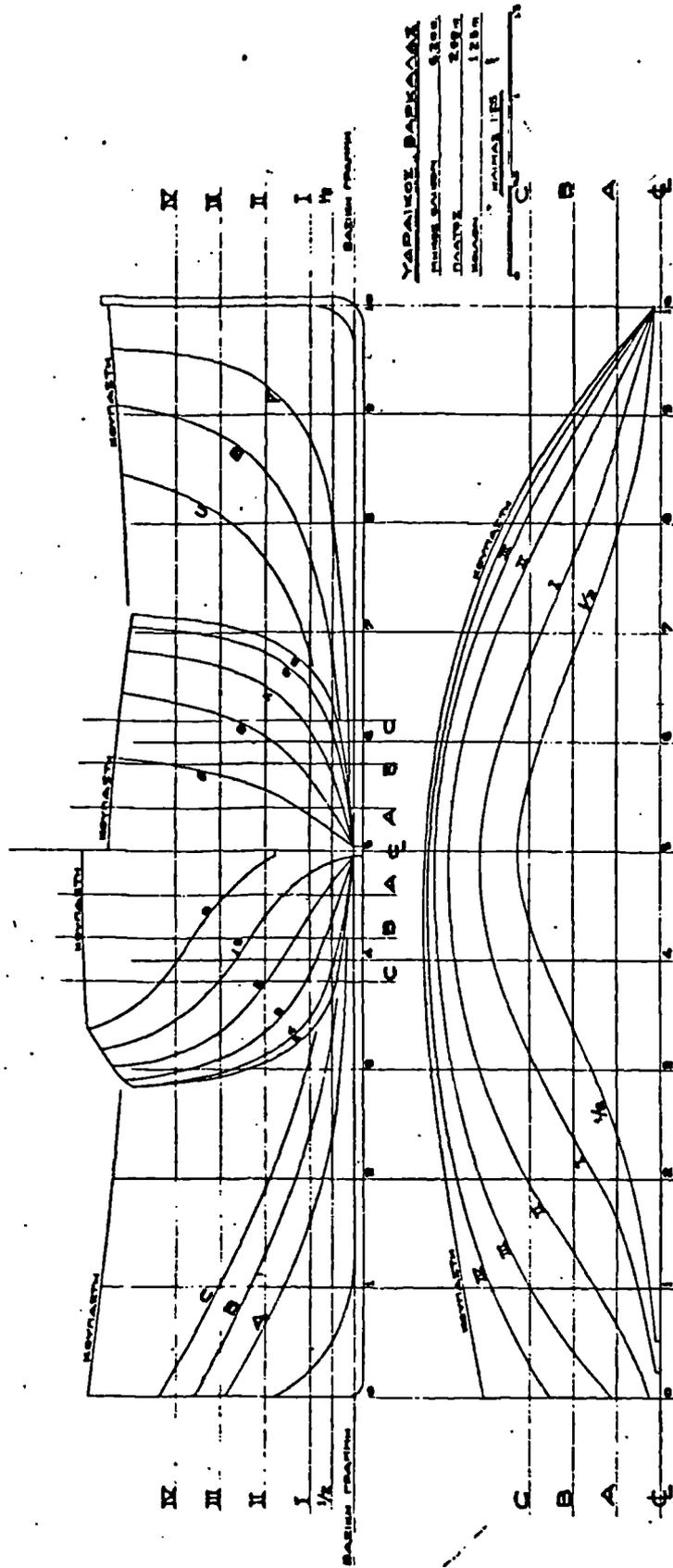
00 1 2 4 8 cm

Recorded patterns of a Skaphi model-2 (IMI-Podlas)

Adoniou, A. (1969) "Skaphi Symiaki"



00 1 2 4 8 cm

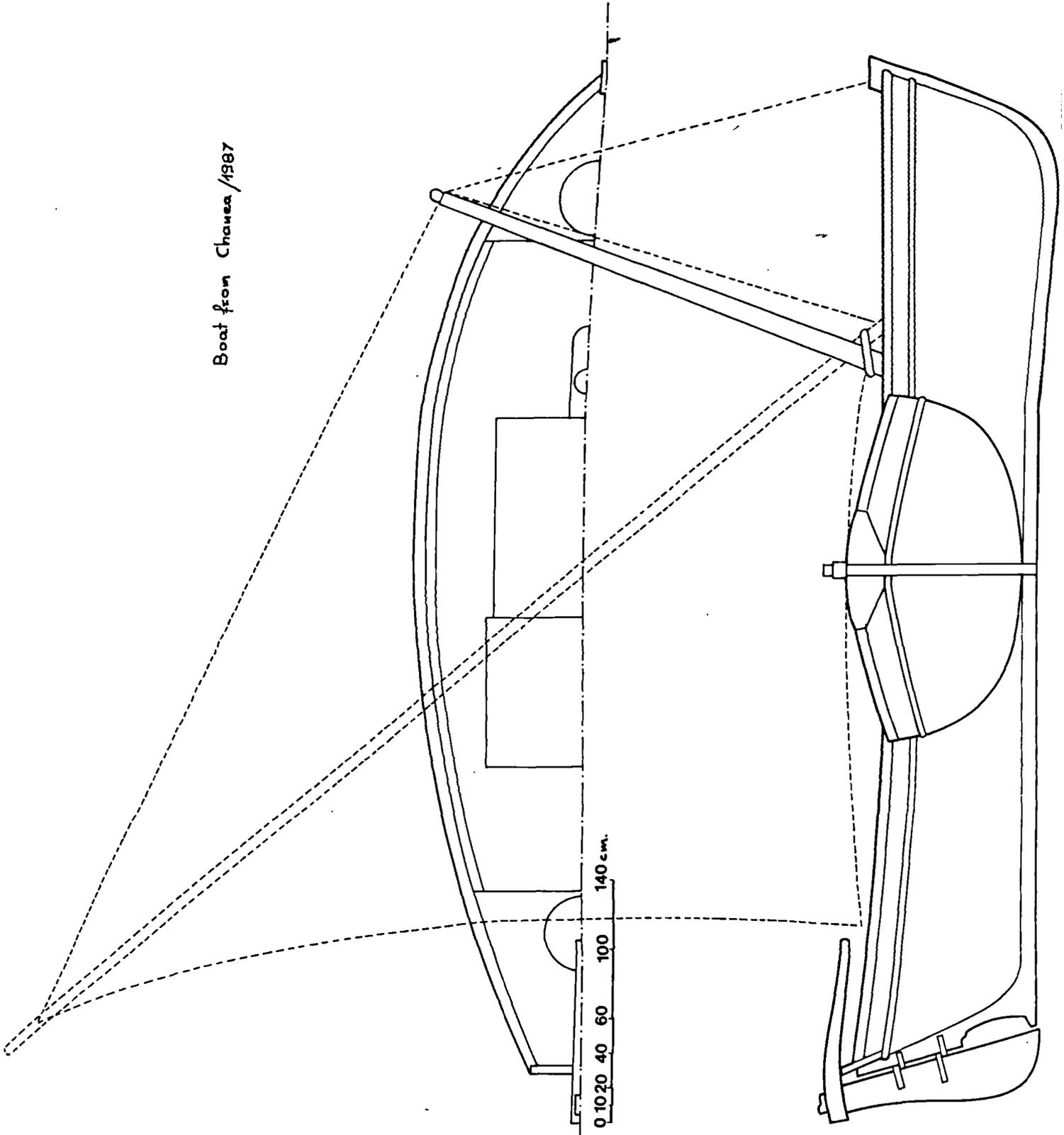


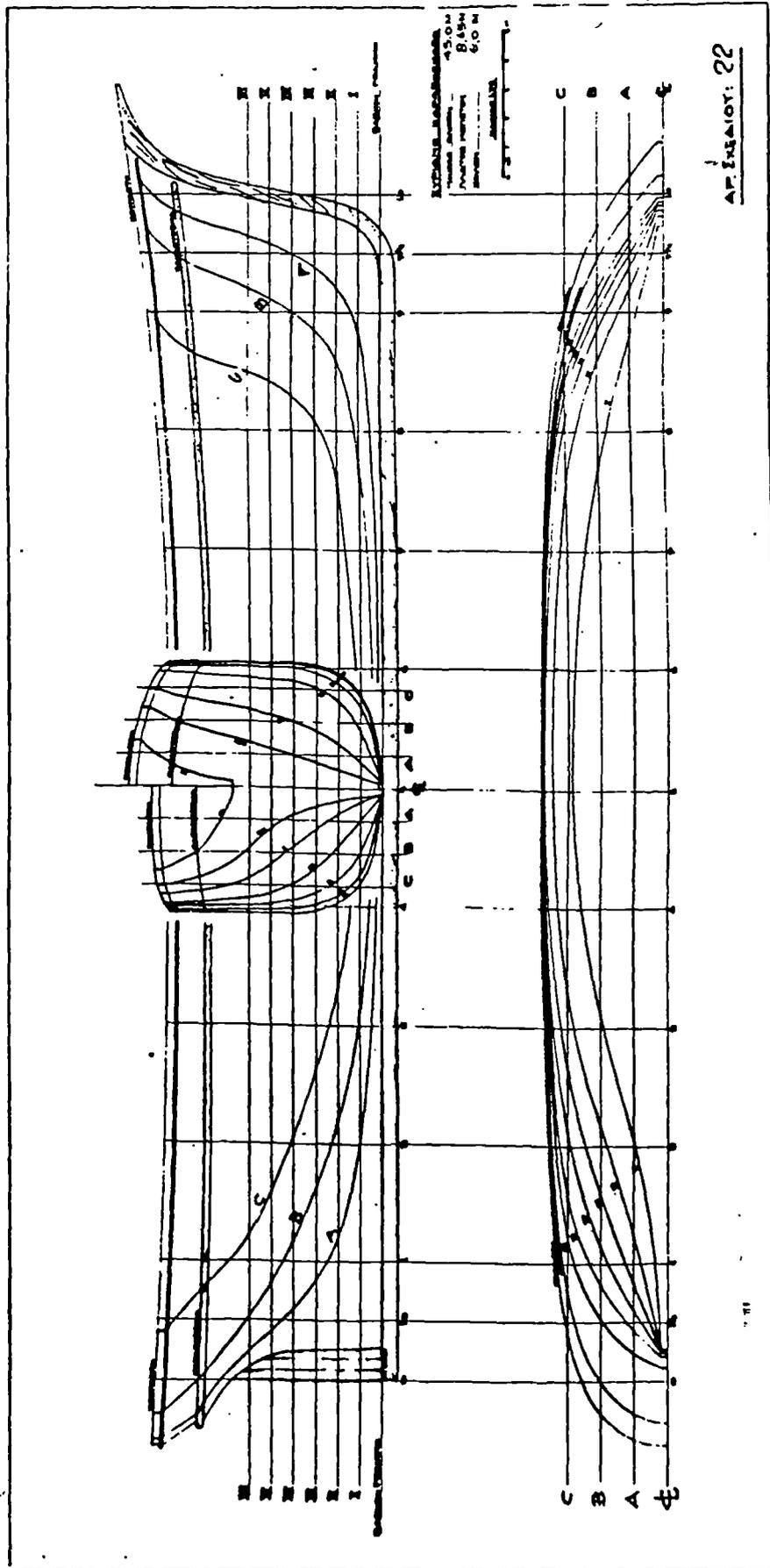
ΥΠΑΙΤΟΥΧΟΣ ΠΑΡΑΝΑΥΤΟΣ
 ΠΡΟΪΚΤΑΣ
 ΠΛΑΤΥΣ
 ΜΕΤΡΗΣΕΙΣ
 ΜΕΤΡΗΣΕΙΣ

ΑΡ. ΣΧΕΔΙΟΥ: 78



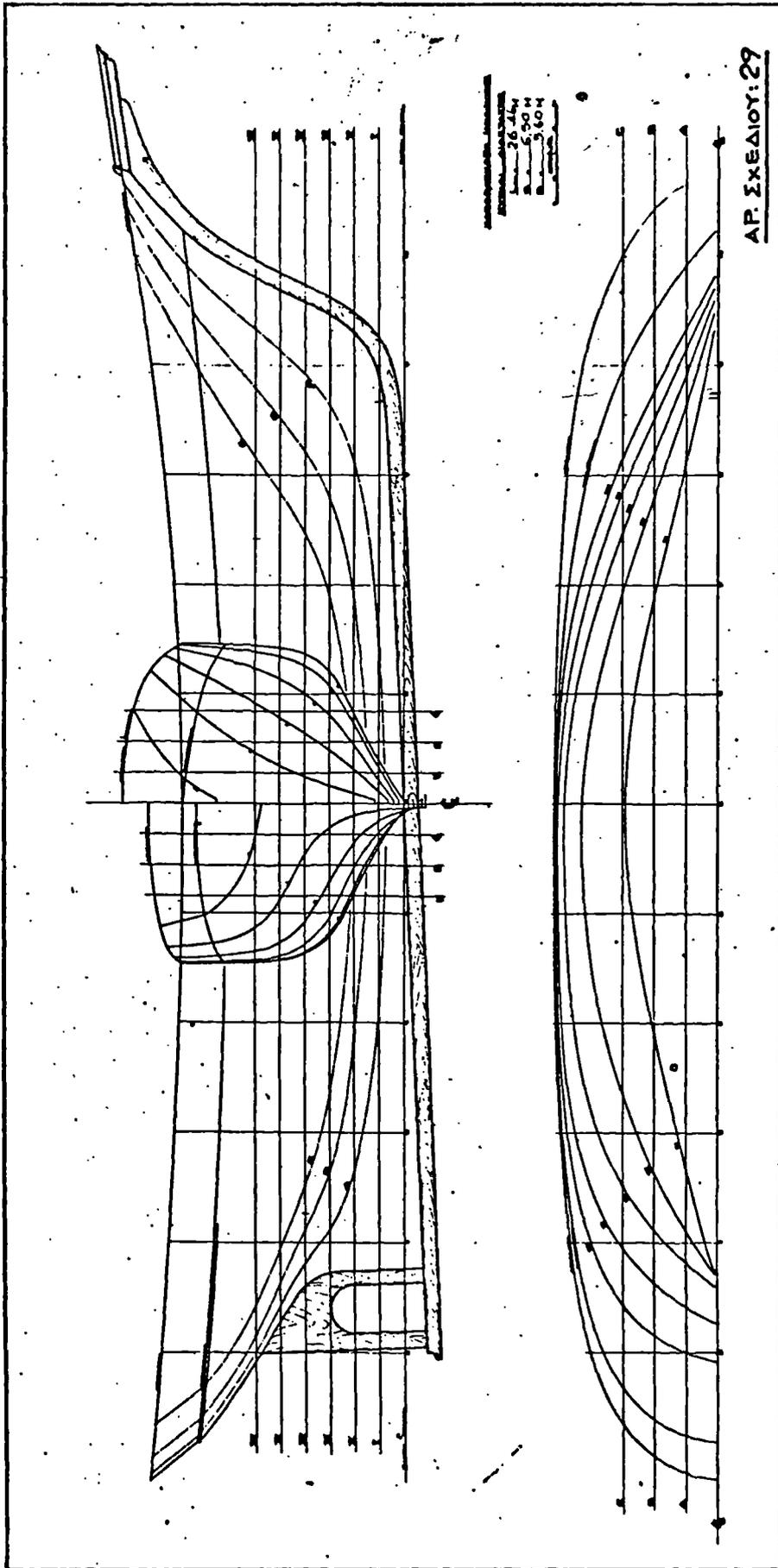
Boat from Chauca / 1987



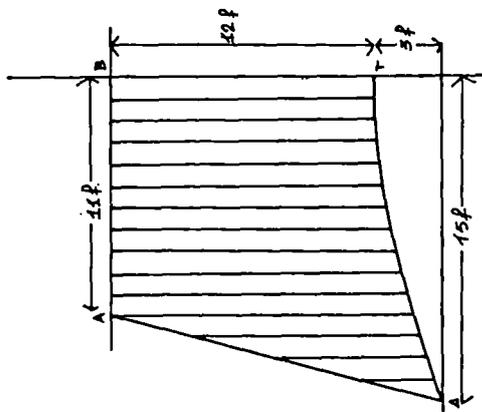


APPROXIMATE: 22

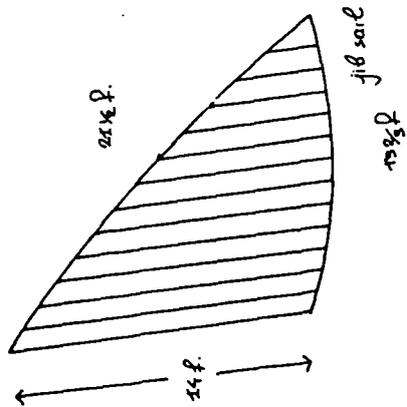




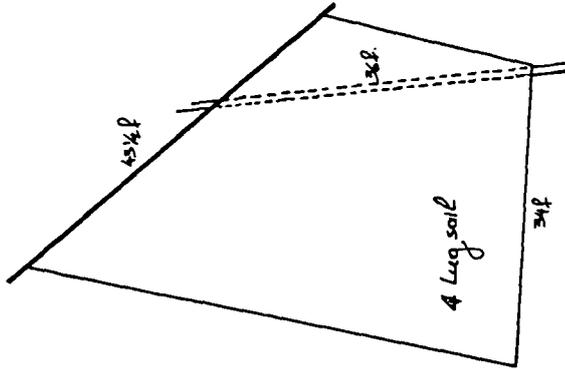
31. Diagram of mast positions (2.6.)
Measurements are taken from Kotsovilis.G.I. (1919)
32. Sail dimensions. (2.6.1,2,3,4,5)
Measurements are taken from Kotsovilis.G.I. (1919)
- 33a. Vessel rigged with square sails (2.6.1)
Benaki Museum, negative No. V7b (Giuseffe Berinda, Chania, 1863 - 1875)
- 33b. Vessel rigged with square sails (2.6.1)
Benaki Museum, negative No. V7a (Giuseffe Berinda, Chania, 1863 - 1875)
- 34a. Vessel rigged with square sails (2.6.1)
"Foto - Star, Proidis", 13 Adoniou, (Chalkis, 1880)
- 34b. Vessel rigged with square sails (2.6.1)
"Foto - Star, Proidis", 13 Adoniou, (Chalkis, 1880)
35. Vessel rigged with square sails on the fore mast (2.6.1)
Εταιρεία Ελληνικού Λογοτεχνικού και Ιστορικού Αρχείου. (Chios, 1907)
36. Vessel rigged with lateen sails (2.6.2)
Benaki Museum, negative No. P.207 (Nafplion, 1930)
37. Vessel rigged with lateen sails (2.6.2)
Benaki Museum, negative No. P.196.11
38. Vessel rigged with sprit sail (2.6.3)
(Damianidis, K. & Zivas, A. (1986, p22)) (Postcard, Pireaus, early 20th century)
39. Vessel rigged with sprit sail (2.6.3)
Benaki Museum, negative No. M.1337
40. Skaphi from Symi rigged with sprit sail
Oikonomopoulos, N. in Zouroudis, N. (1974, n.p.)
- 41a. Vessel rigged with lug sail (2.6.4)
Benaki Museum, negative No. P.20733
- 41b. Vessel rigged with lug sail (2.6.4)
Benaki Museum, negative No. M.1417
42. Vessel rigged with a fore sail and an after gaff sail
(2.6.4) Εταιρεία Ελληνικού Λογοτεχνικού και Ιστορικού Αρχείου
43. Vessel rigged with gaff sails (2.6.5)
Benaki Museum, negative No. P.207.10 (Nafplion, 1930)
44. Perama rigged with gaff sails (2.6.5)
Benaki Museum, negative No.P.281.4
45. Map of the distribution of hull's types according to the interviews reported in this work (2.8)



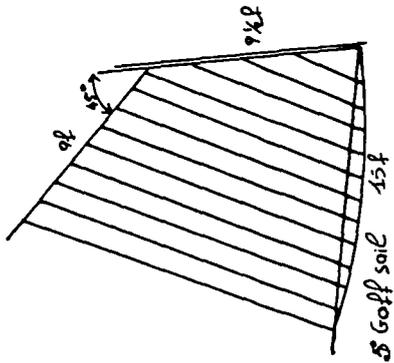
1. Square sail



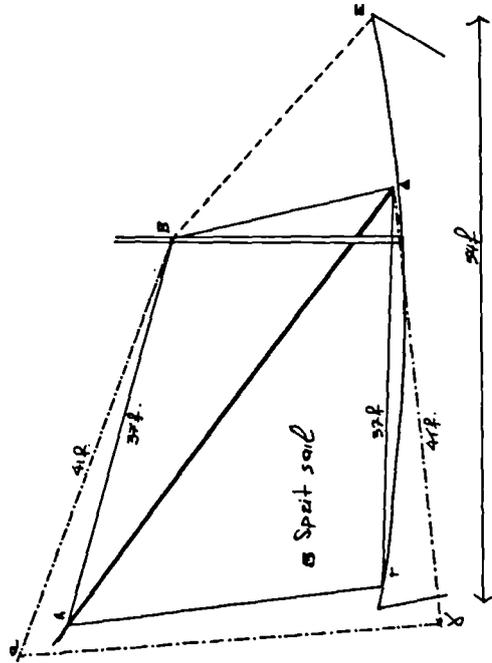
jib sail



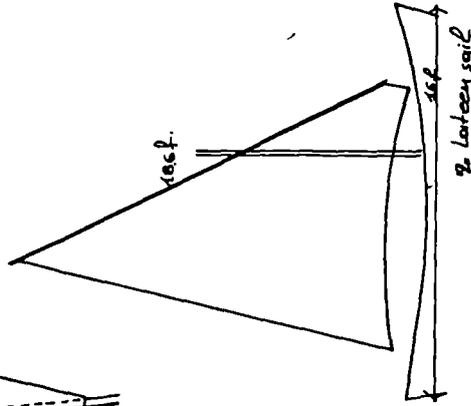
4 Leg sail



5 Gaff sail



6 Sprit sail



7 Lateen sail

SKETCHES OF SAILS BASED ON DRAWINGS FROM CAP. KOTSOVILLI'S BOOK.



33a



33b



37a



37b



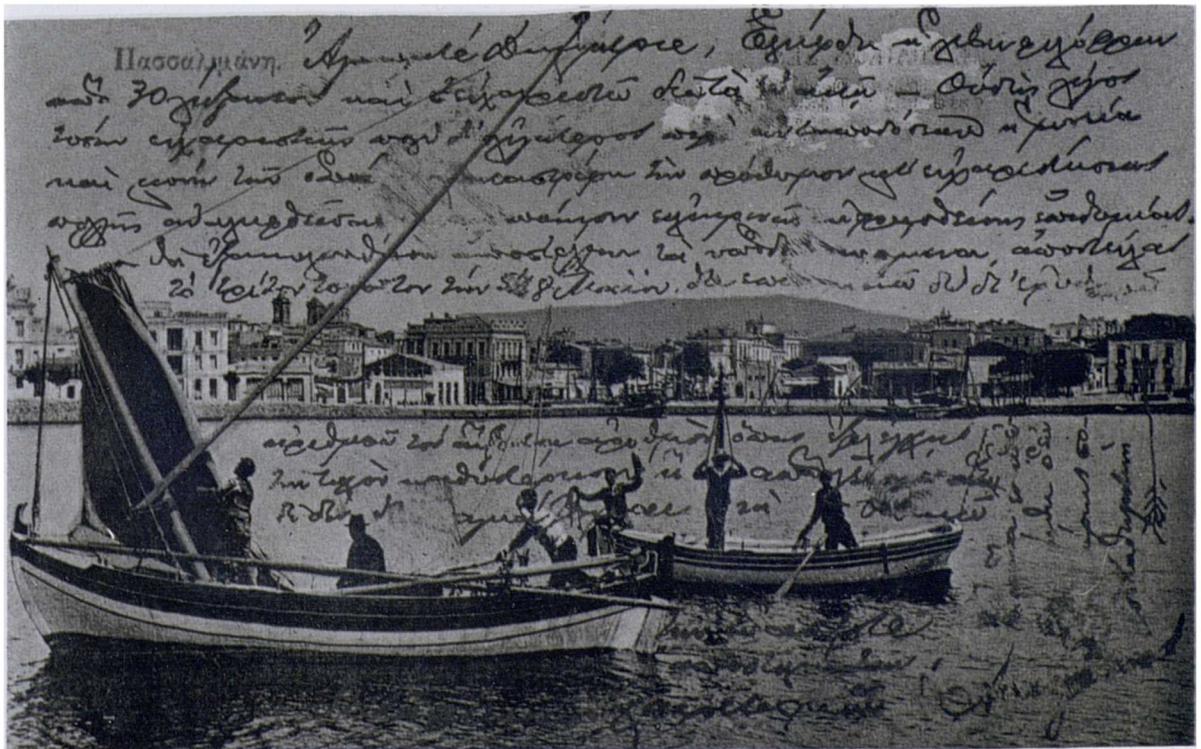
35



36



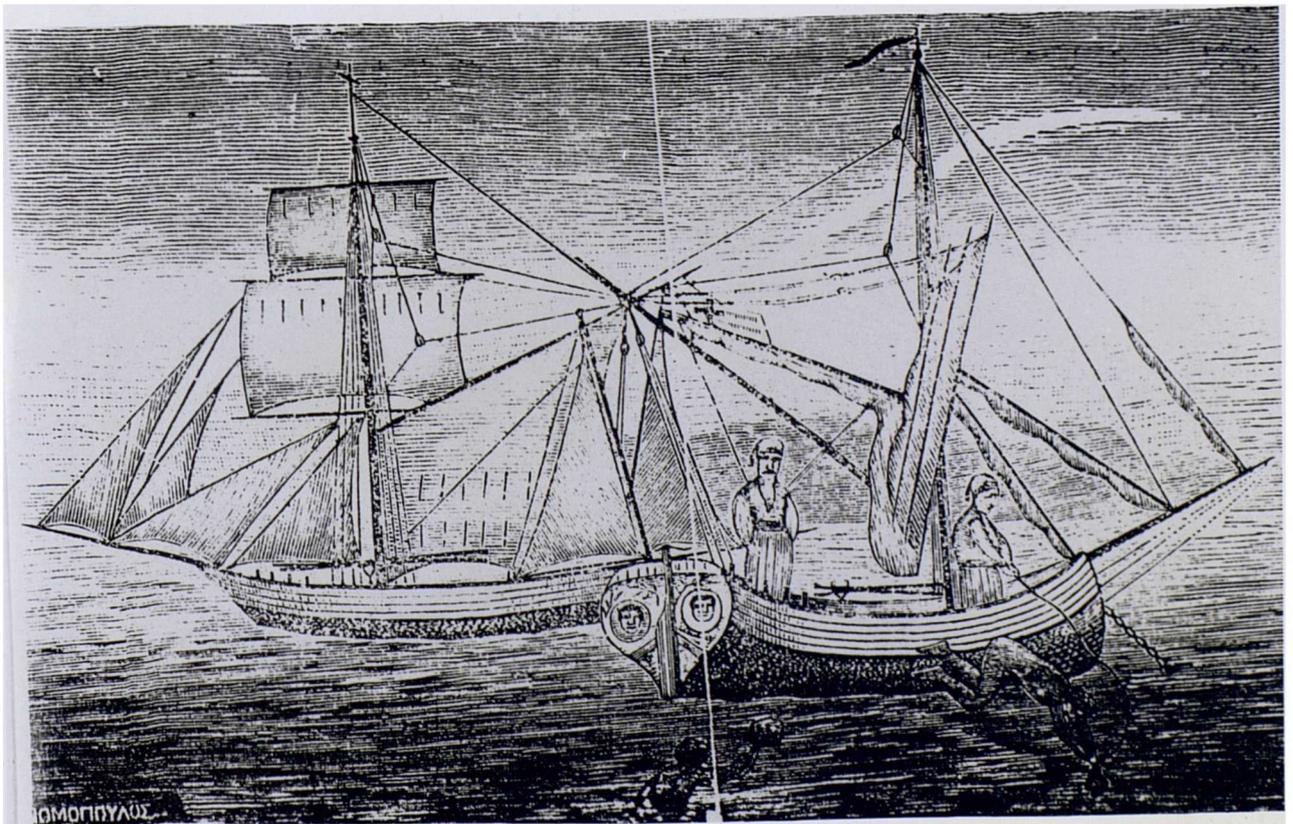
37



38



39



40



41a



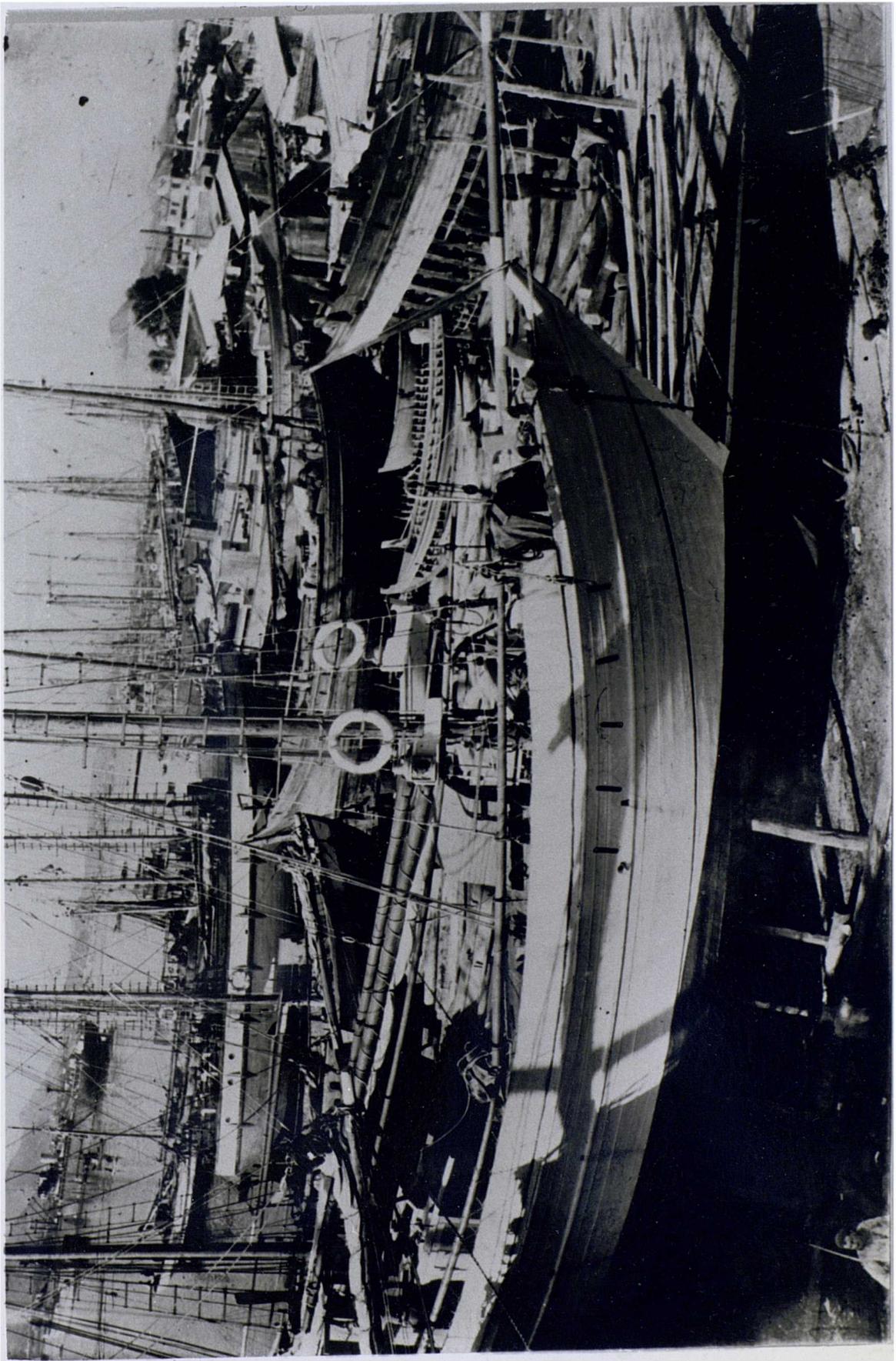
41b



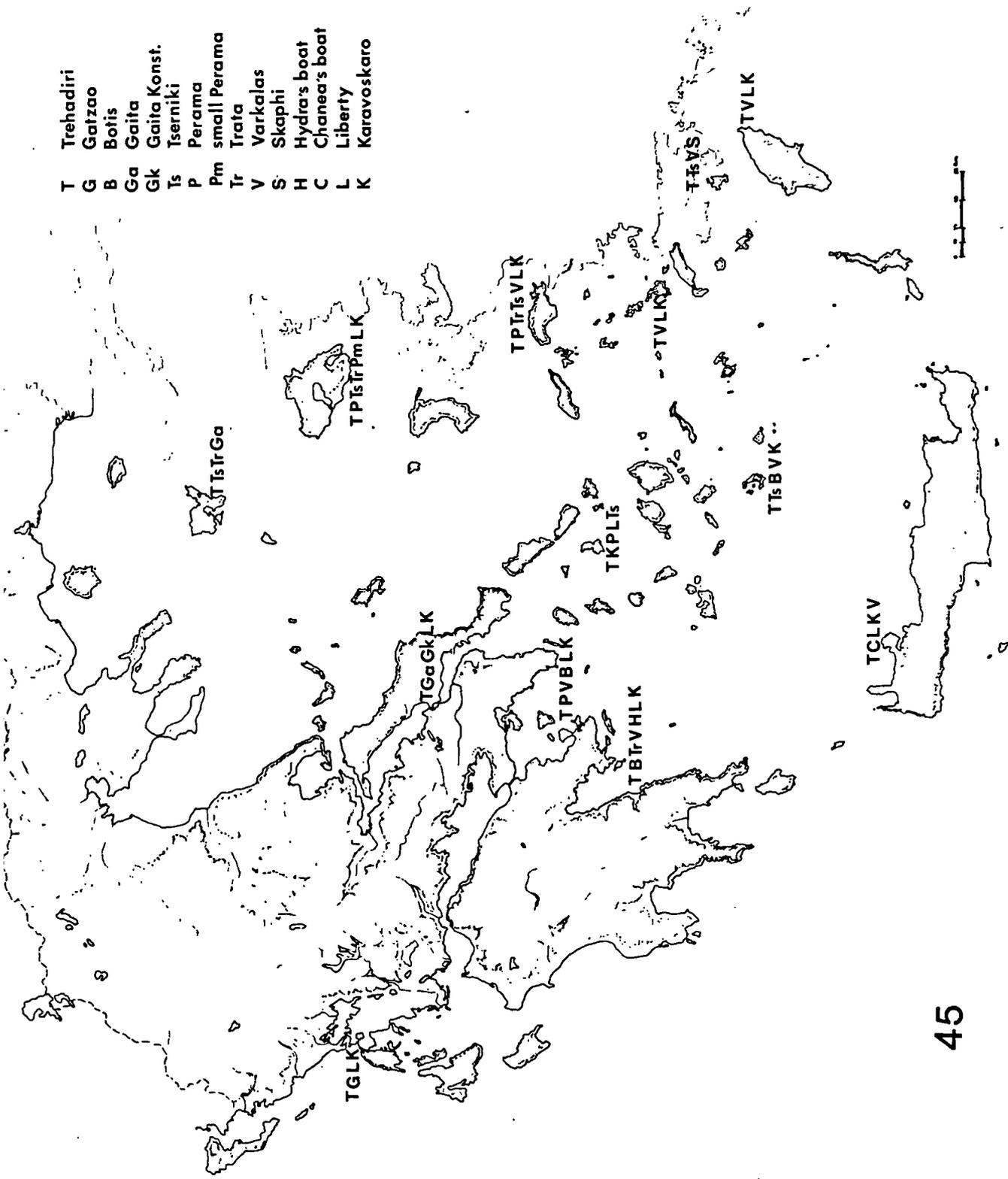
42



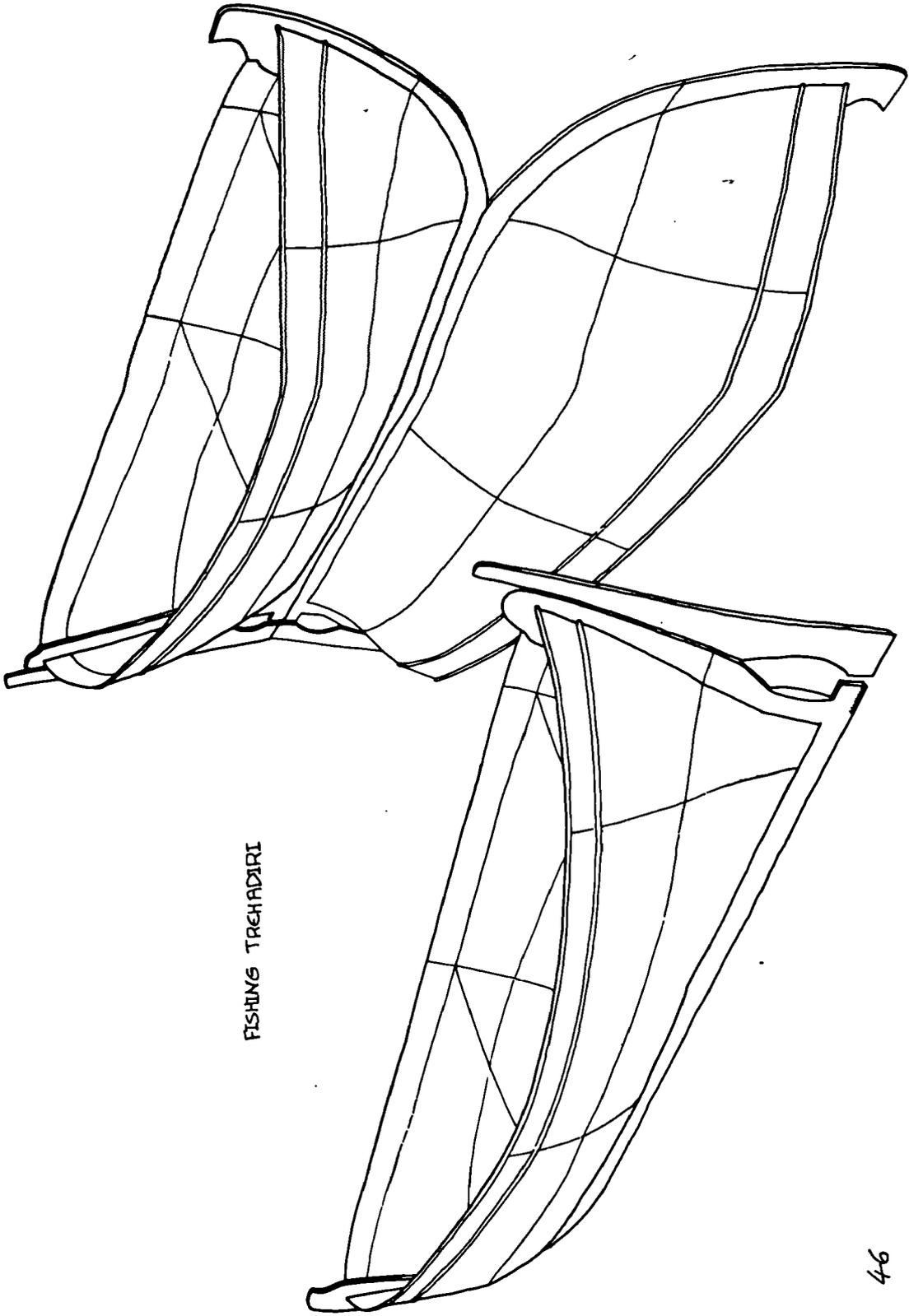
43



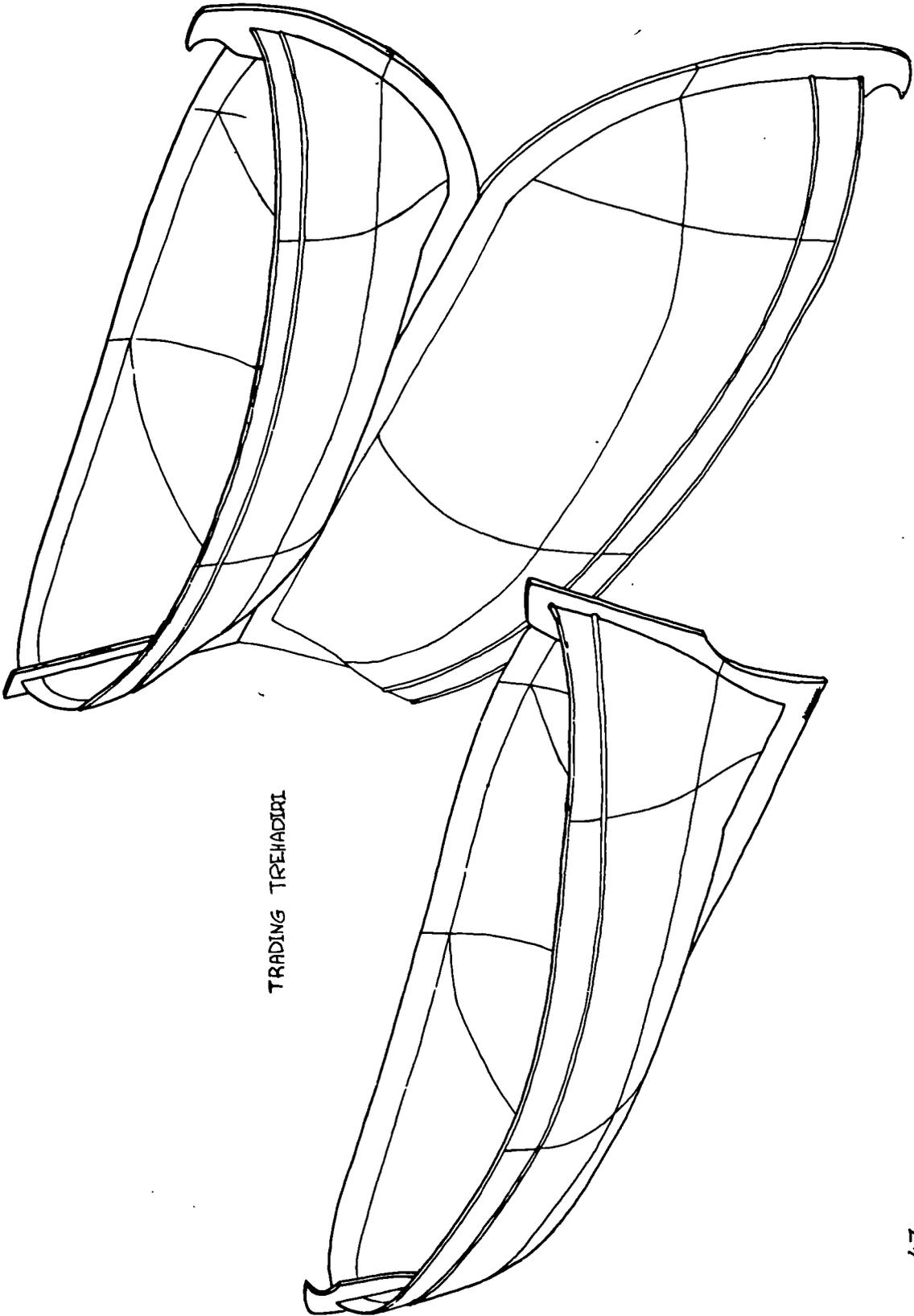
- T Trehadiri
- G Gatzao
- B Botis
- Ga Gaita
- Gk Gaita Konst.
- Is Tserniki
- P Perama
- Pm small Perama
- Tr Trata
- V Varkalas
- S Skaphi
- H Hydra's boat
- C Chanea's boat
- L Liberty
- K Karavoskaro



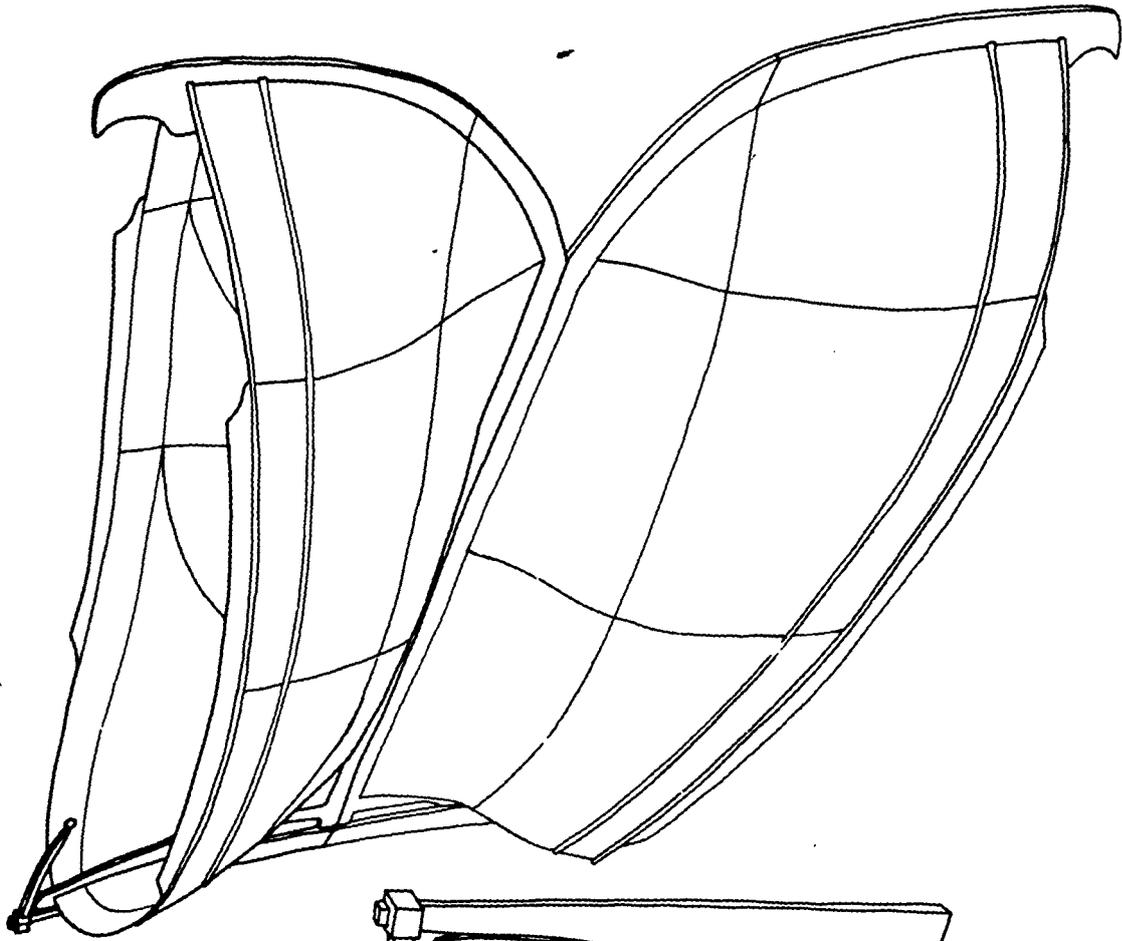
46. Schematic representation of the basic lines of a fishing Trechadiri (3.1)
47. Schematic representation of the basic lines of a trading Trechadiri (3.1)
48. Schematic representation of the basic lines of a diving Trechadiri (3.1)
49. Schematic plan of floating position of a Skaphi from Symi. The plan is based on the illustrations which appear in fig.25, fig.40, and in Zouroudis, G.I. (1979, fig.17) (3.2)
50. Schematic representation of the W.L. position on a fishing and on a trading vessel (3.2)
51. Comparison of the bow lines between the old and the new form of Trechadiri bow (3.3)
52. Comparison of the bow lines between the old and the new form of a Perama bow (3.4)
53. Comparison of the stern lines between the old and the new form of a Perama stern (3.4)



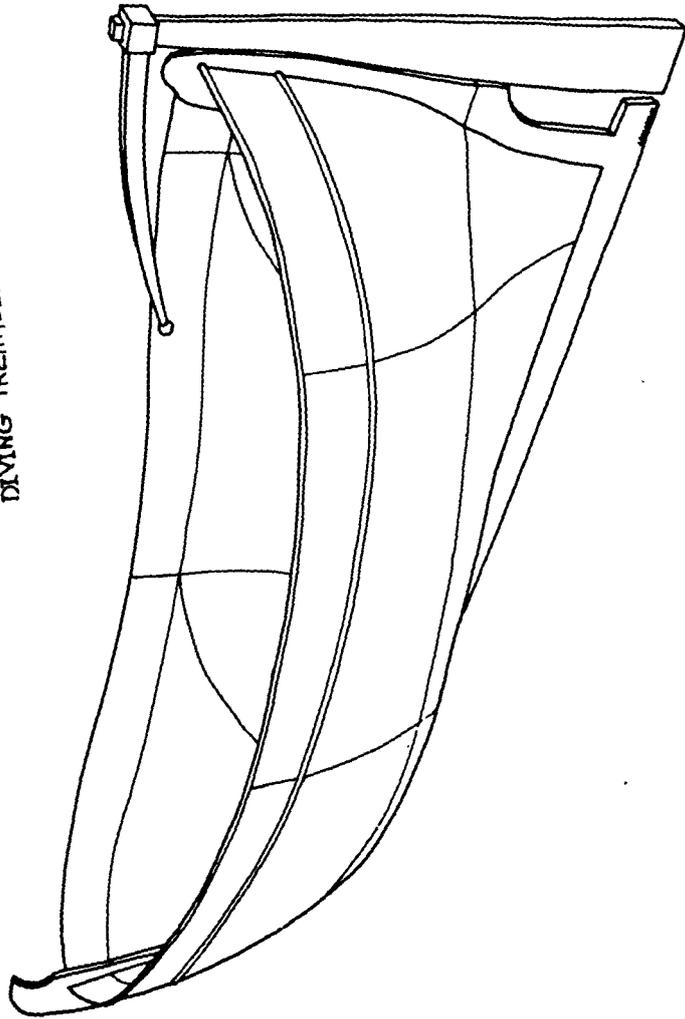
FISHING TACHADIRI

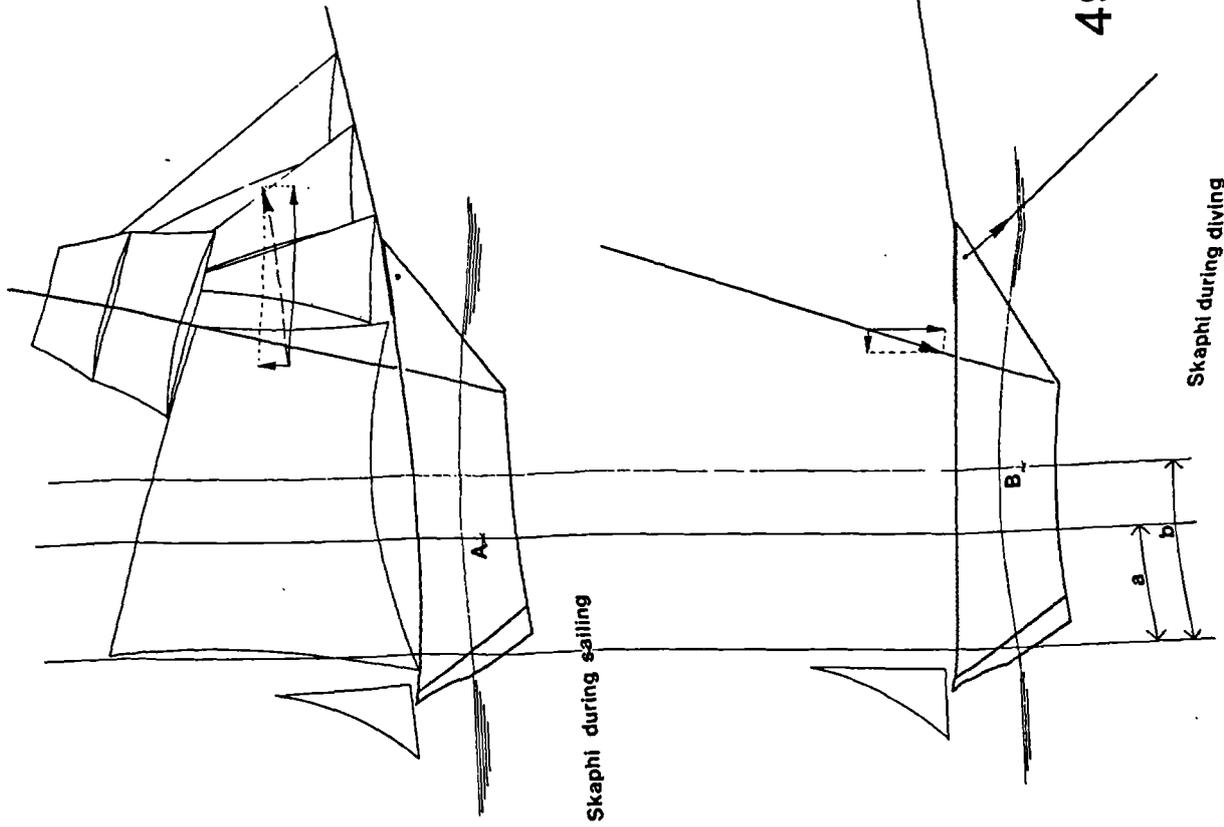


TRADING TRENADIRI

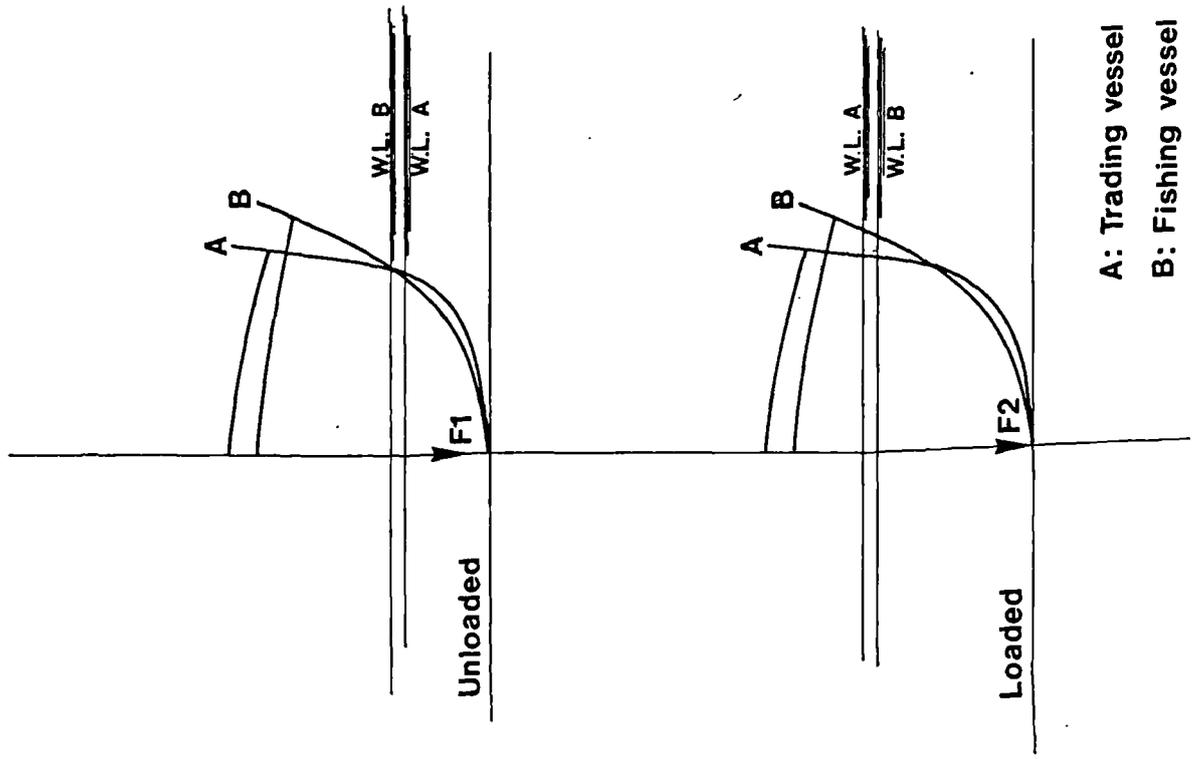


DIVING TREHADIRI

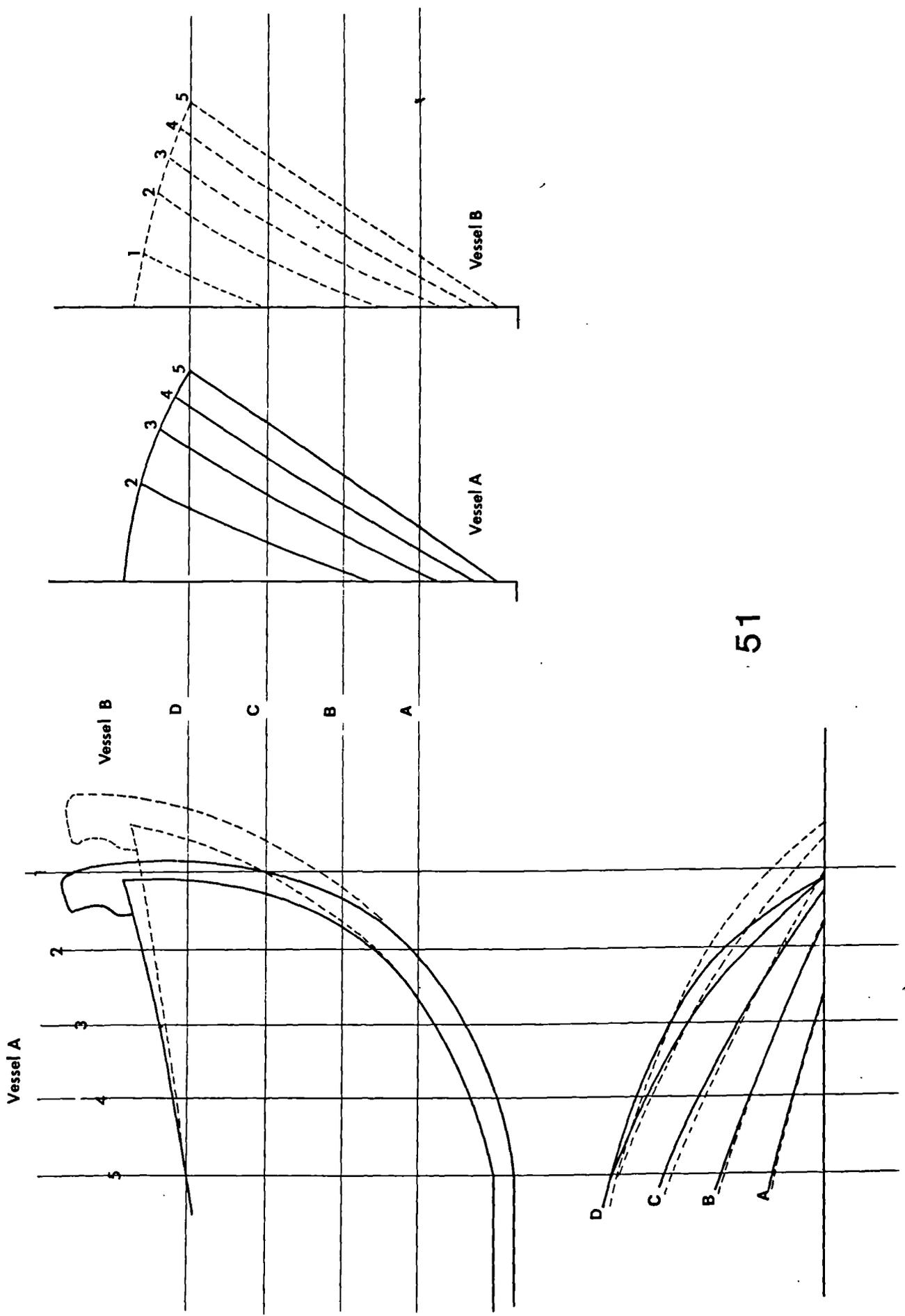


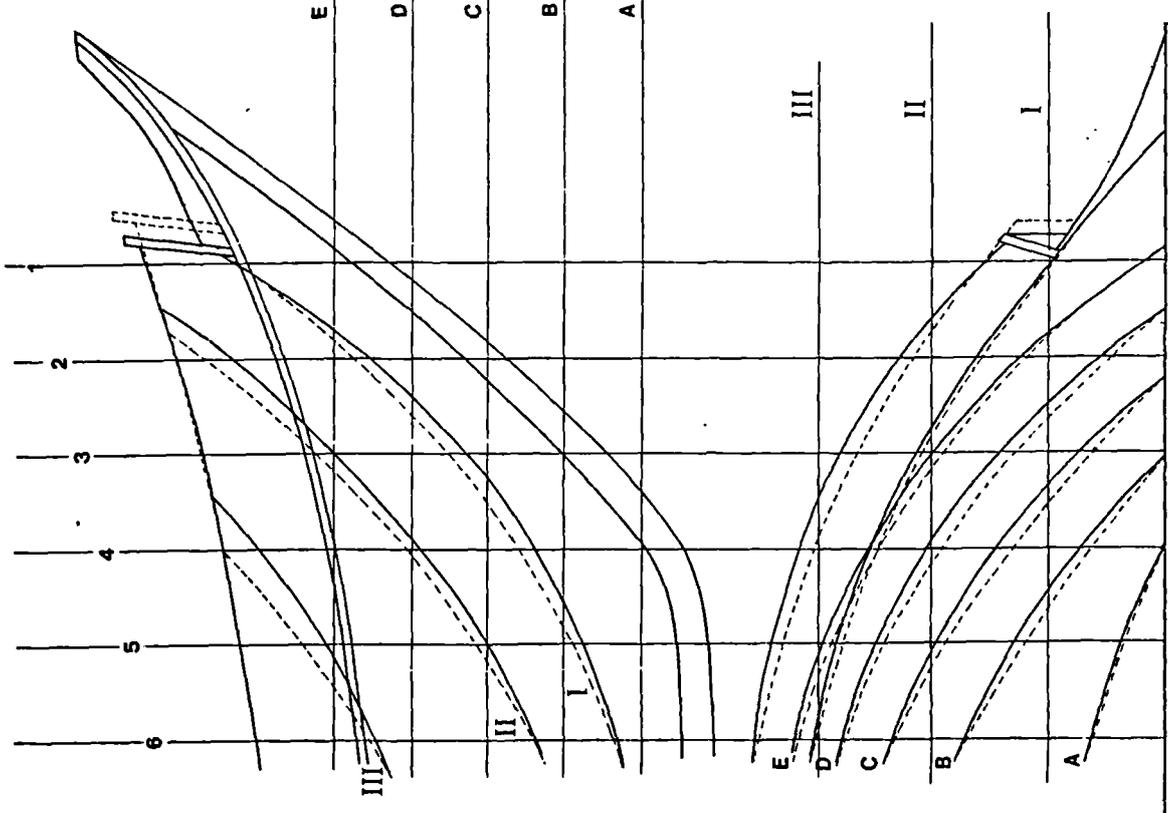
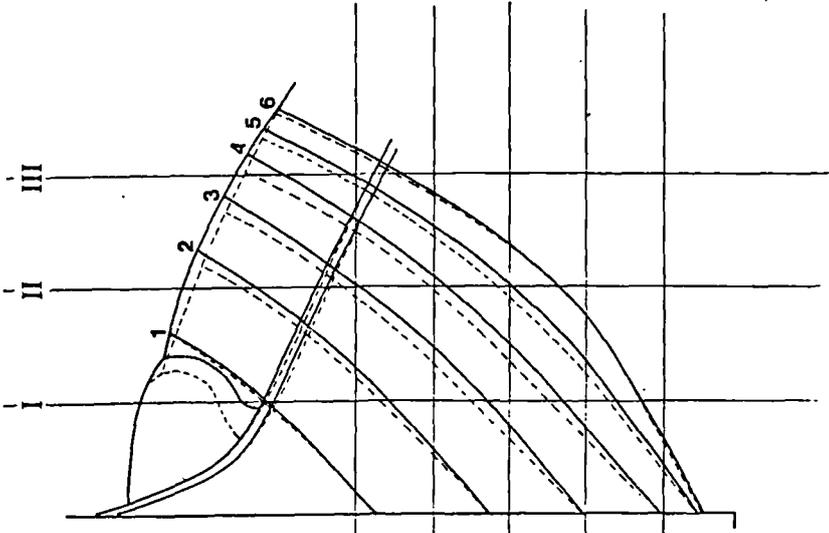


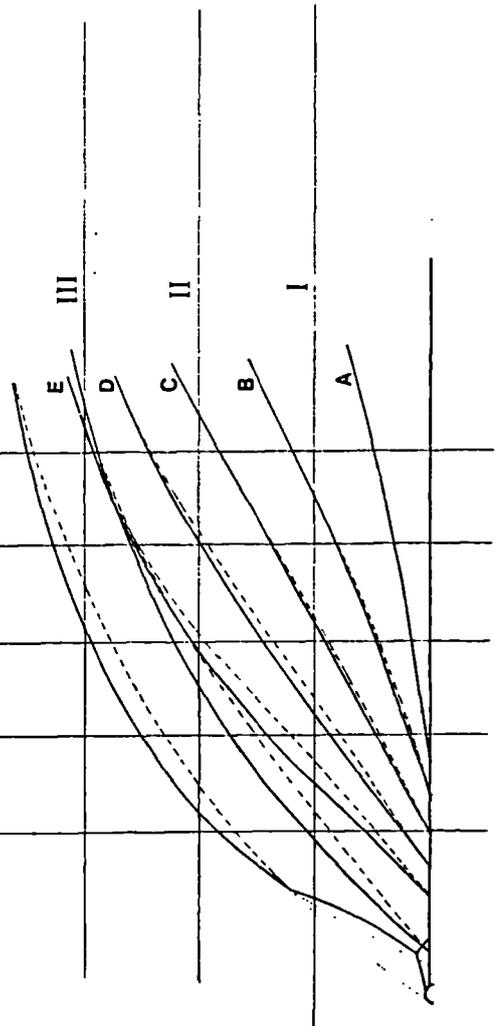
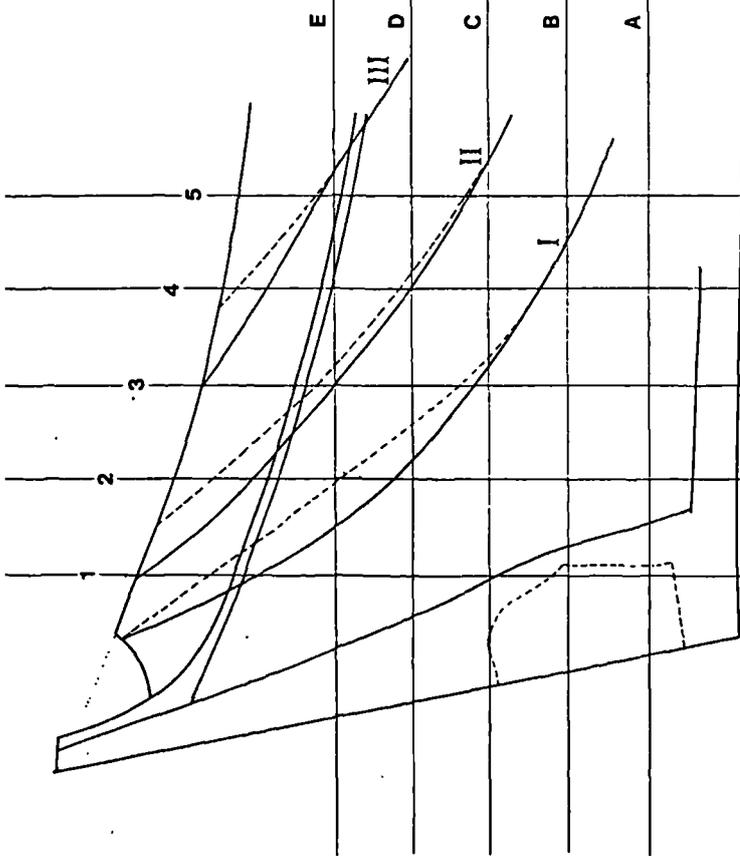
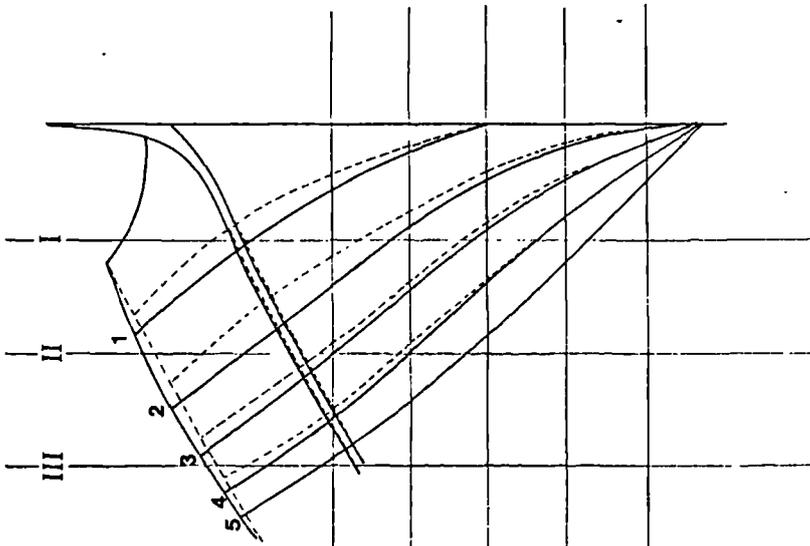
49



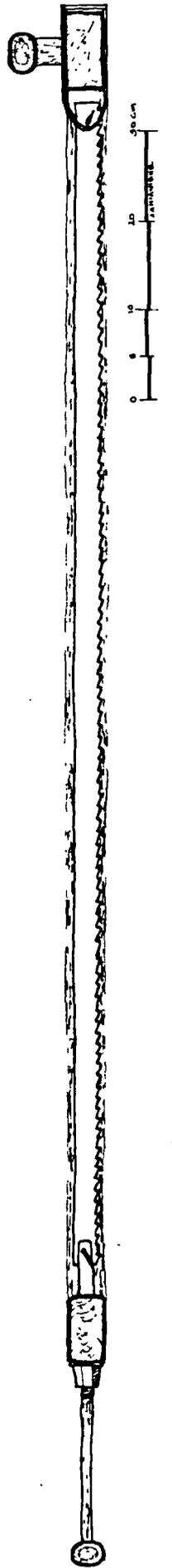
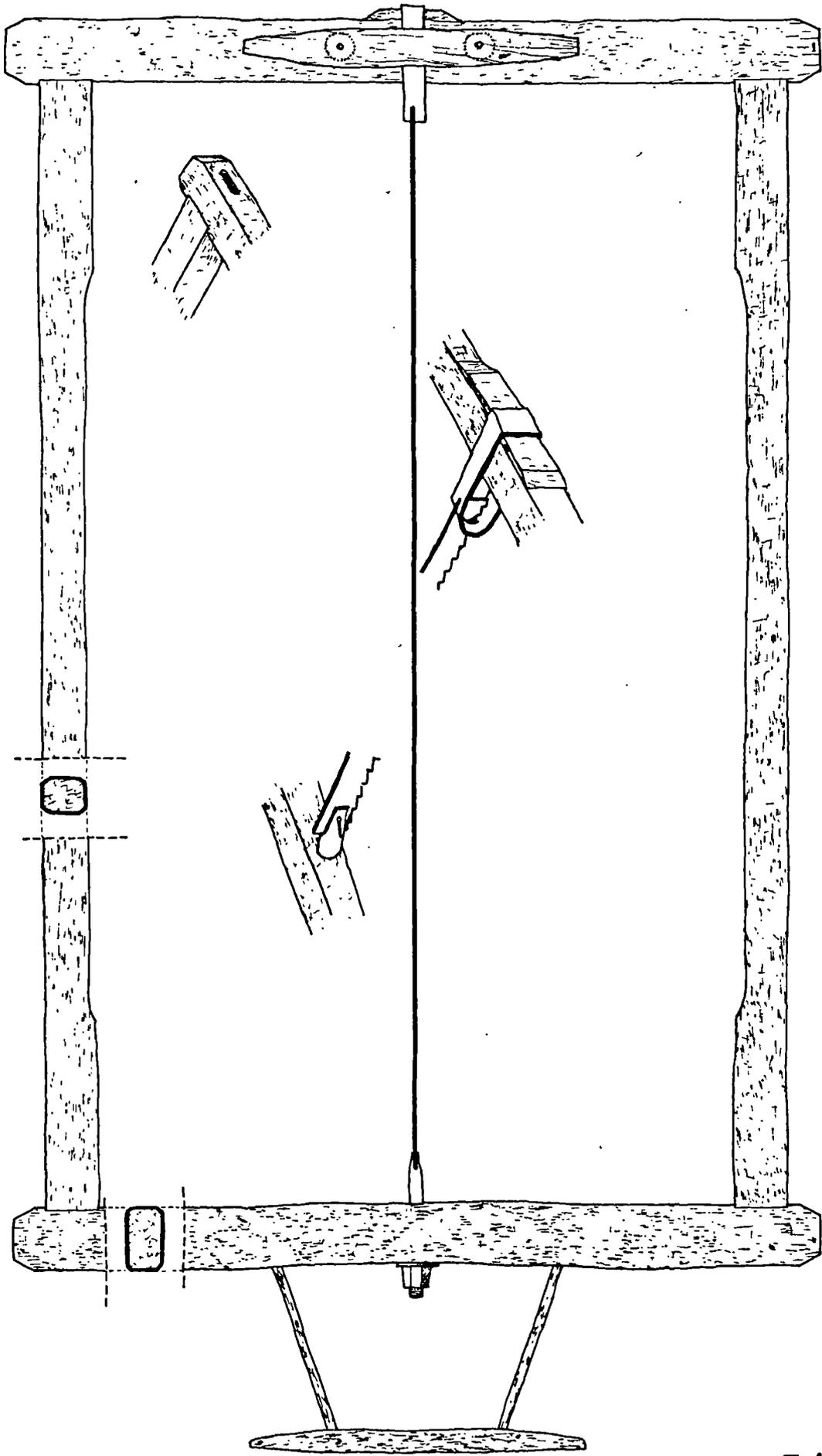
50

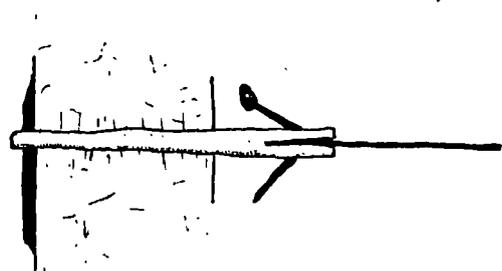
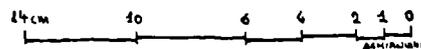
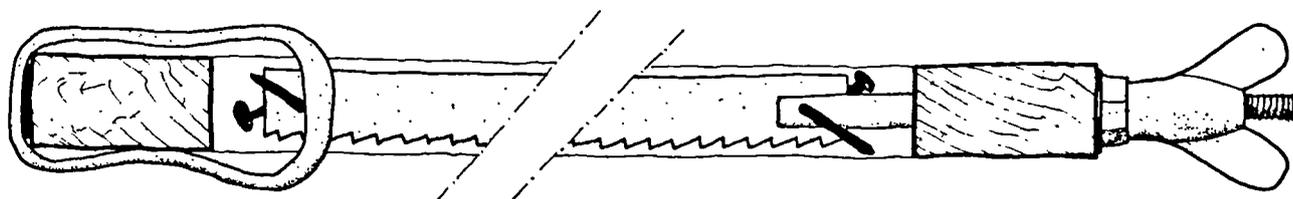
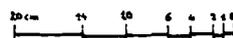
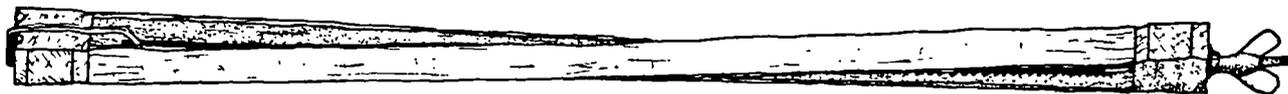
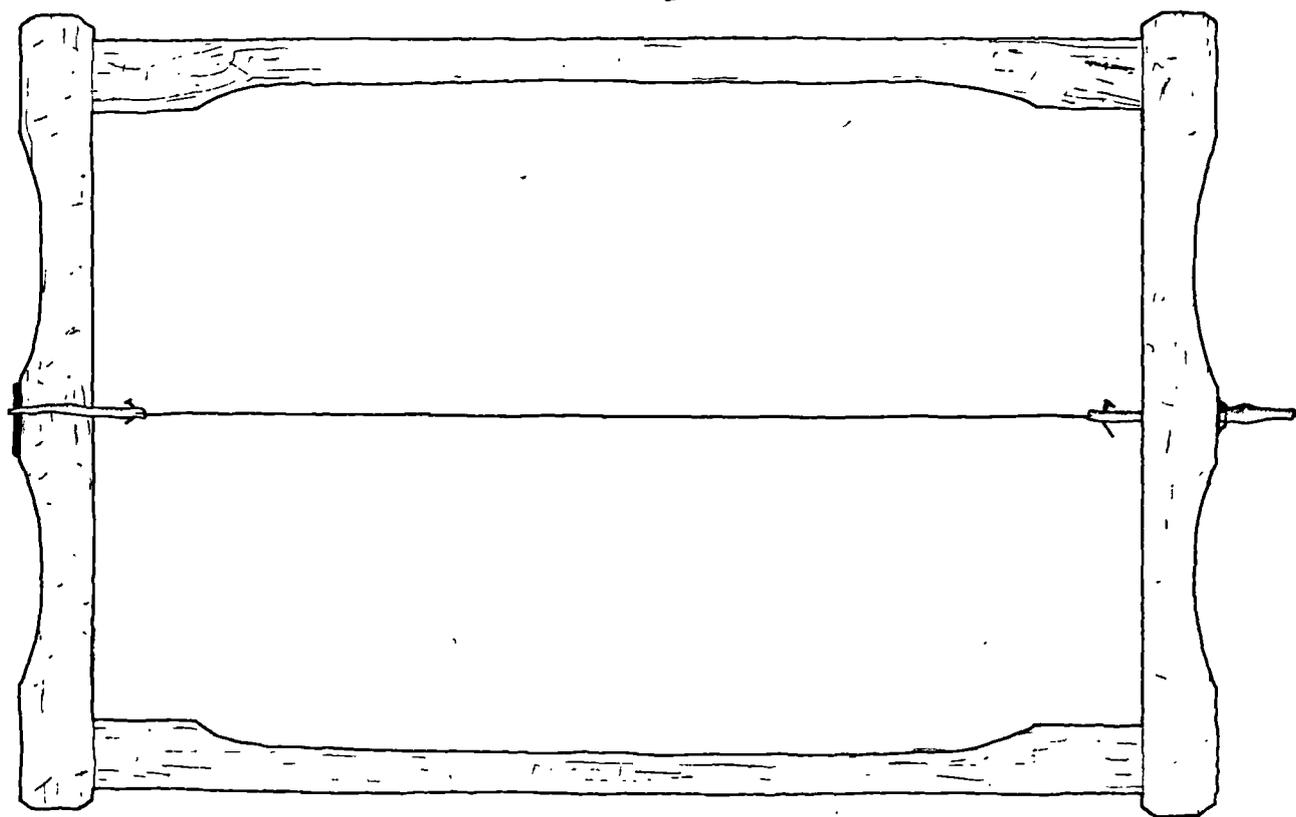


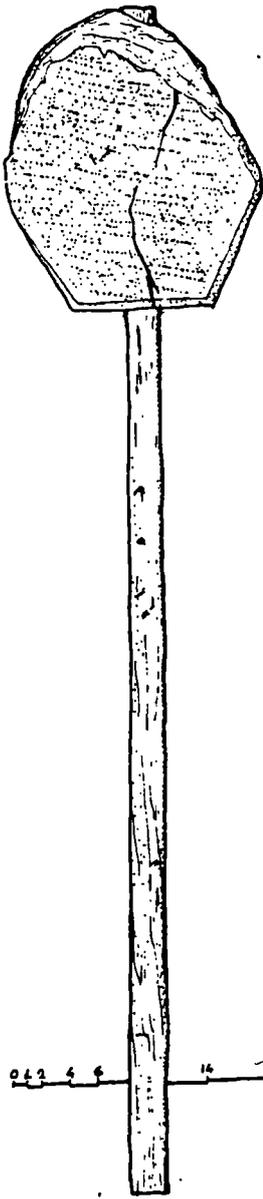




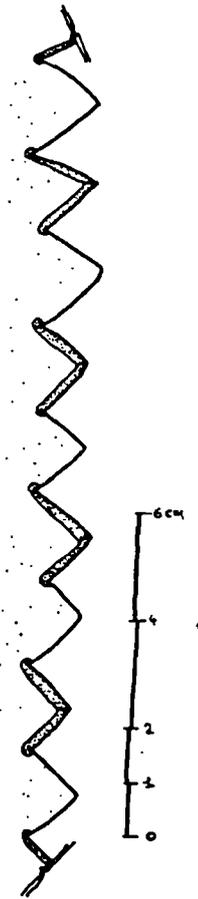
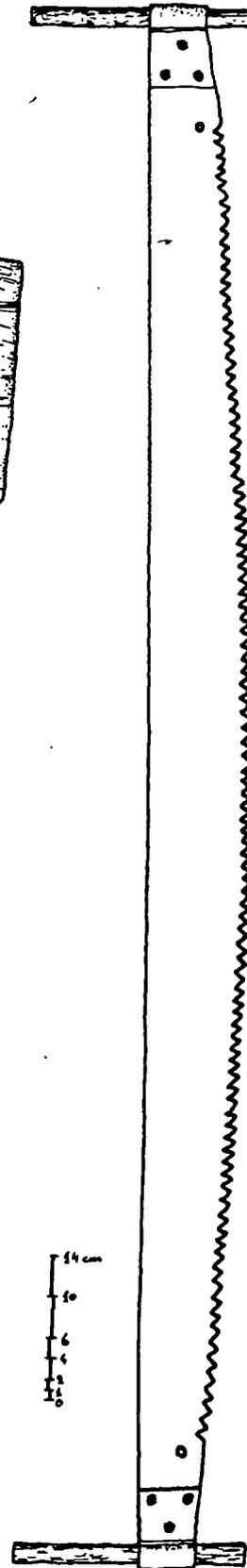
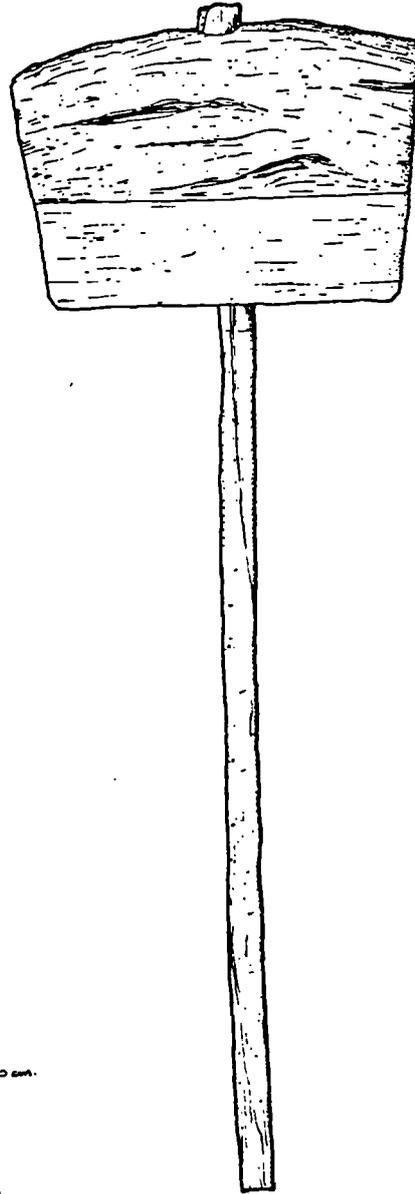
54. Frame saw (4.2.1)
([7]-Chimonas)
55. Small frame saw (4.2.2)
([7]-Chimonas)
- 56a. Crosscut saw (4.2.3)
([7]-Chimonas)
- 56b. Wooden sledge hammer (4.2.8)
Galaxidi Maritime Museum.
- 57a. Small crosscut saw (4.2.4)
([16]-Kritikopoulos)
- 57b. Bow or turning saw (4.2.5)
([11]-Polias)
- 57c. Saw setting tool (4.2.9)
([11]-Polias)
- 58a. Berel gauge (4.3.1)
([7]-Chimonas)
- 58b. Small square angle (4.3.3)
([7]-Chimonas)
- 59a. Big bevel gauge (4.3.3)
([7]-Chimonas)
- 59b. 135 degree gauge (4.3.4)
([7]-Chimonas)
- 59c. Big square angle (4.3.15)
([1]-Mantikos)
- 60a. Marking tool (4.3.8)
([1]-Mavrikos)
- 60b. Stripe marking tool (4.3.9)
([1]-Mavrikos)
61. Marking line (4.3.11)
([8]-Chalaris)



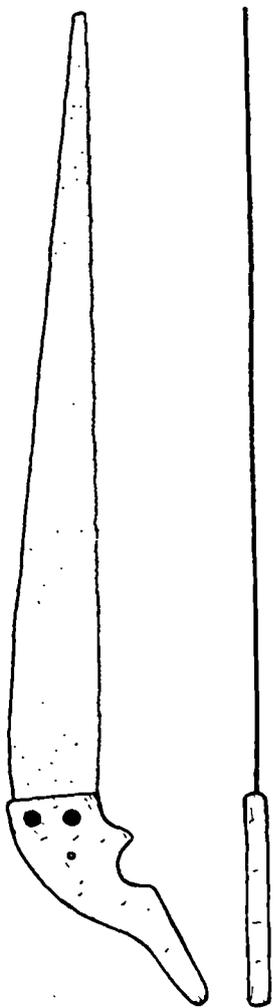




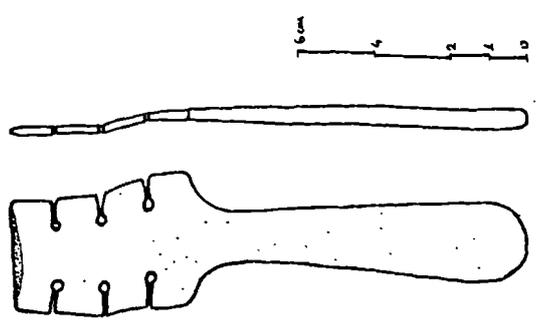
56b



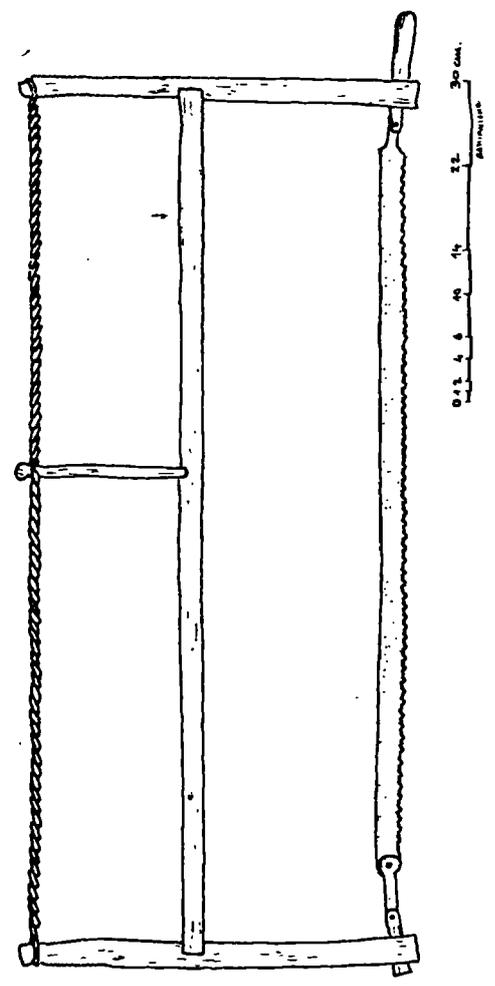
56a



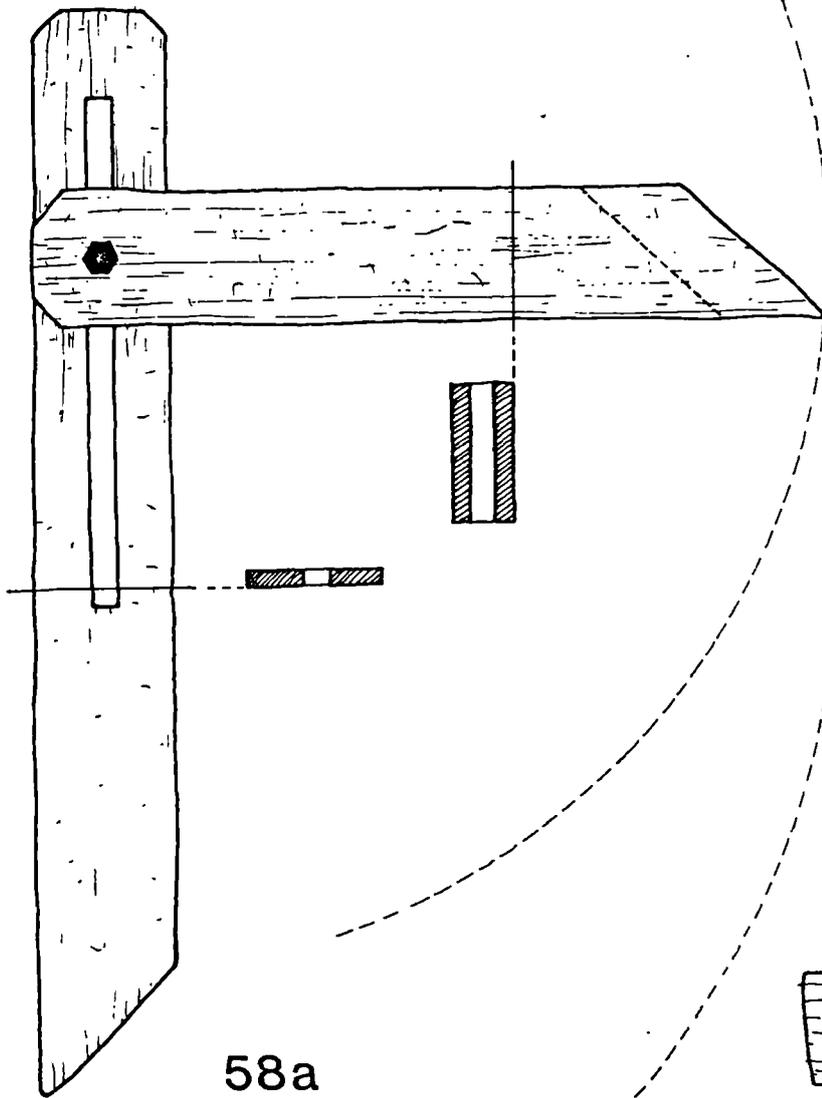
57a



57c

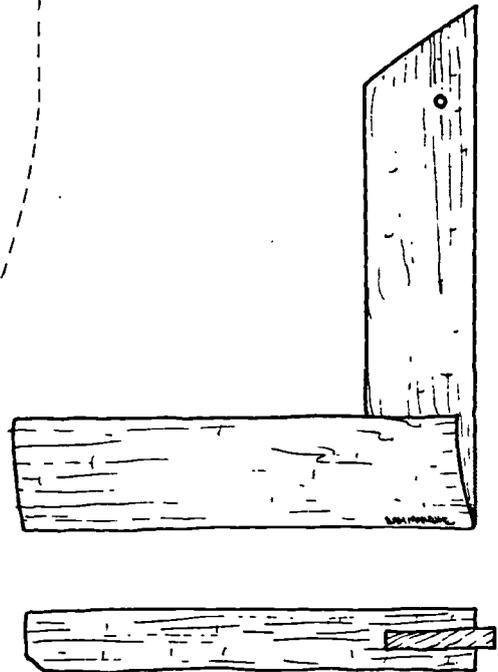


57b

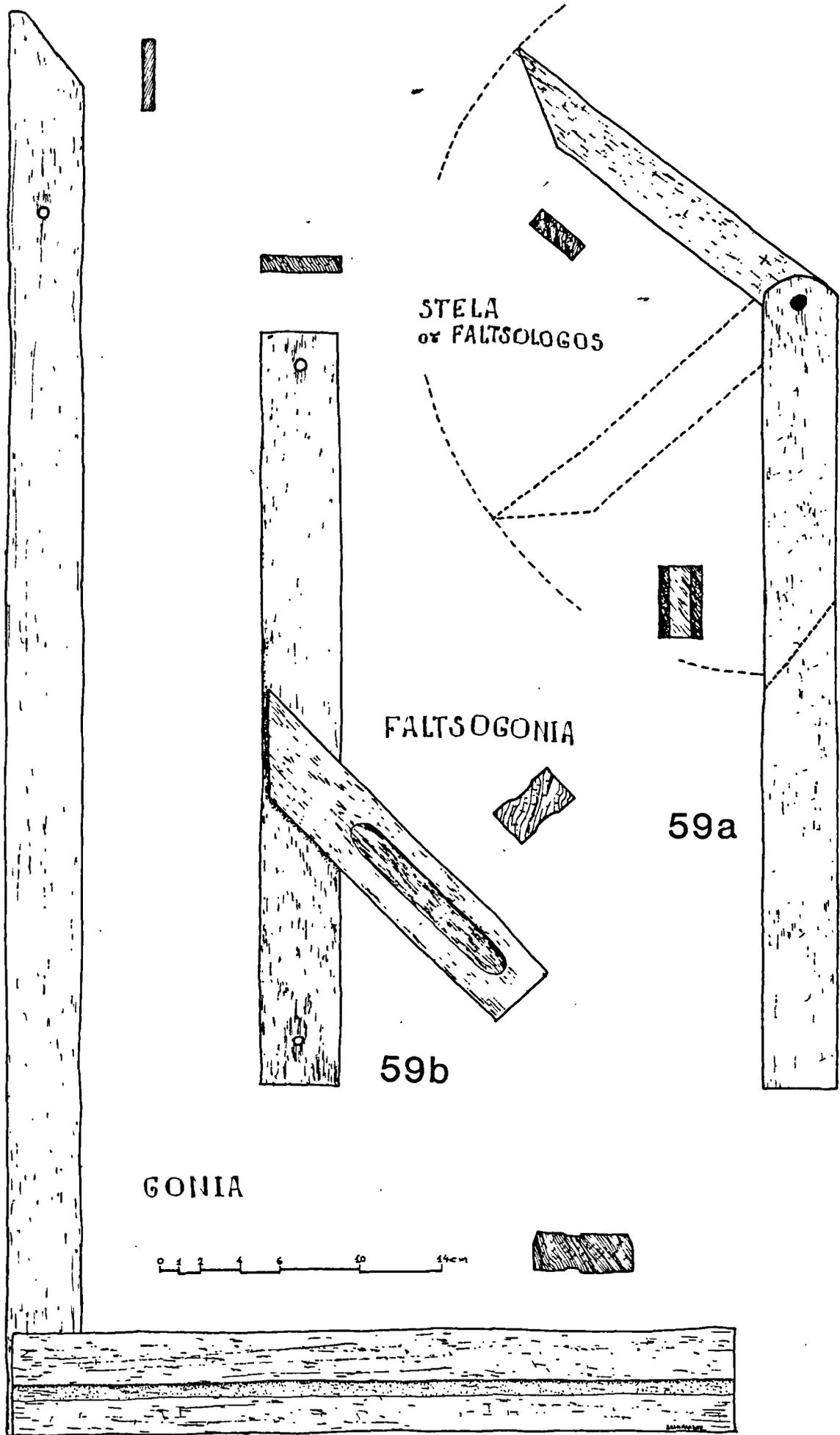


58a

0 2 4 6 10 14cm



58b



STELA
or FALTSOLOGOS

FALTSOGONIA

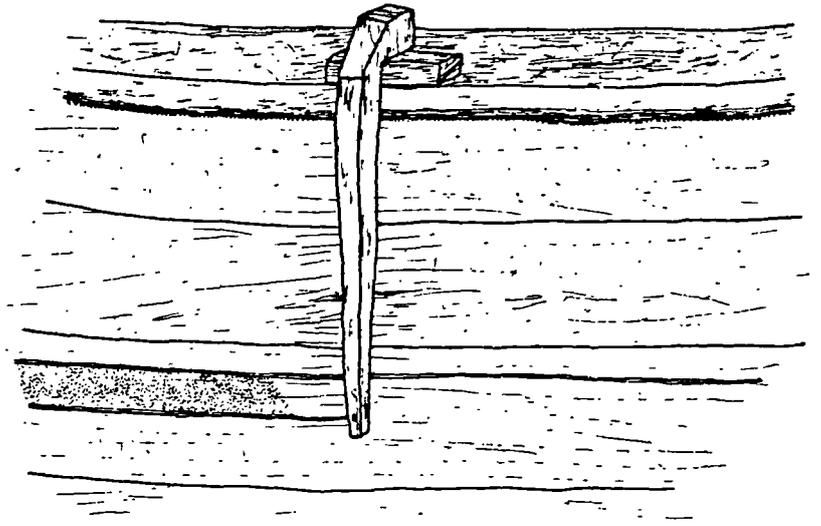
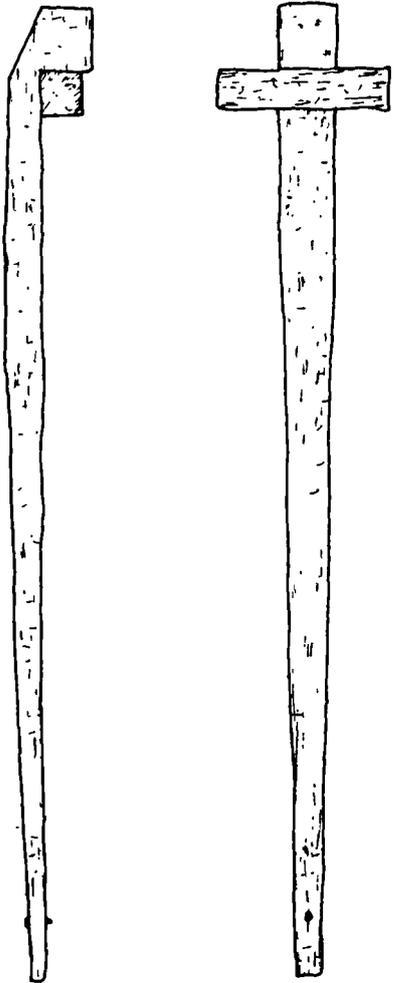
59a

59b

GONIA

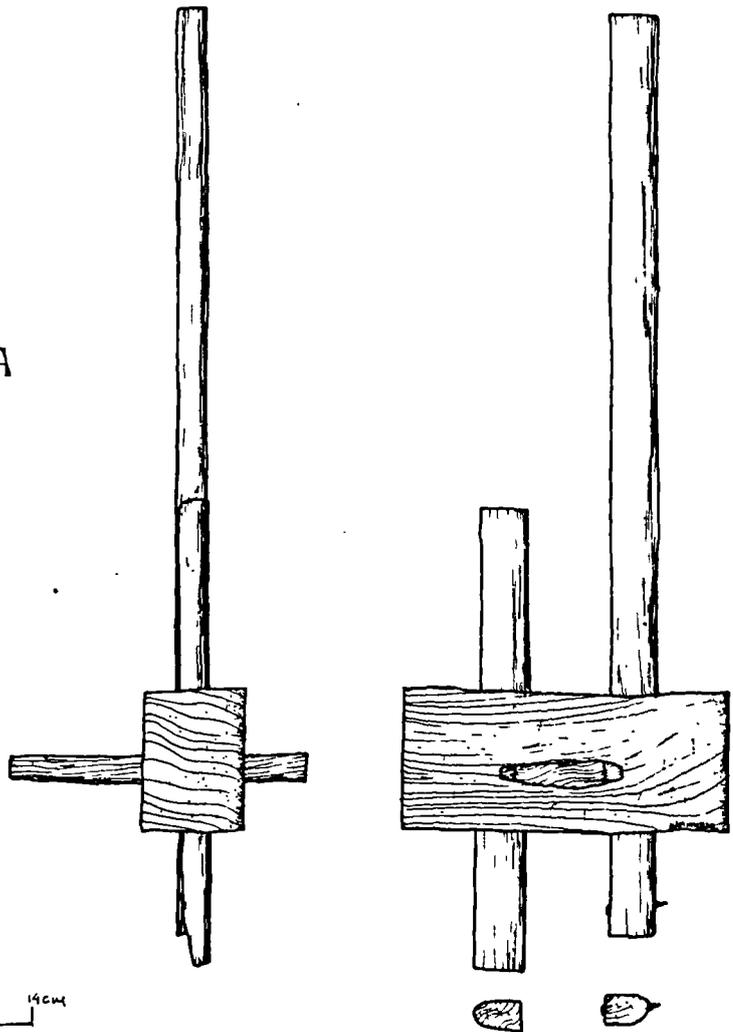
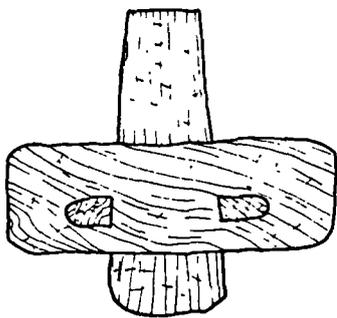
0 1 2 4 6 10 14cm

59c

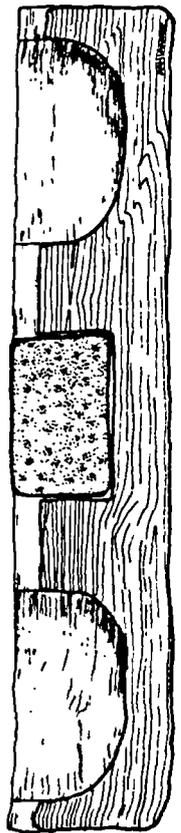
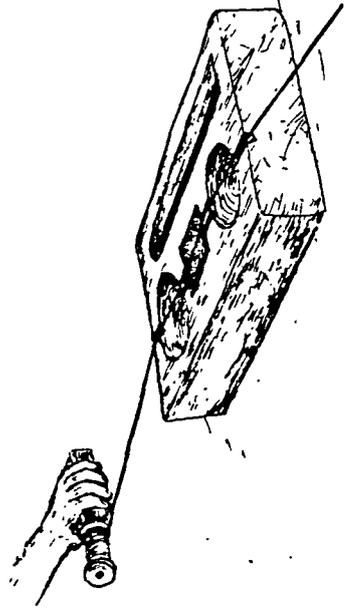
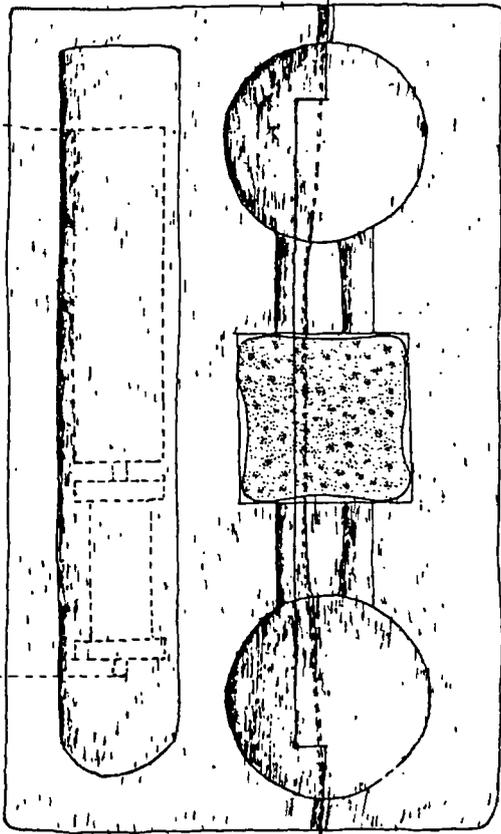


60b

SIMADURA

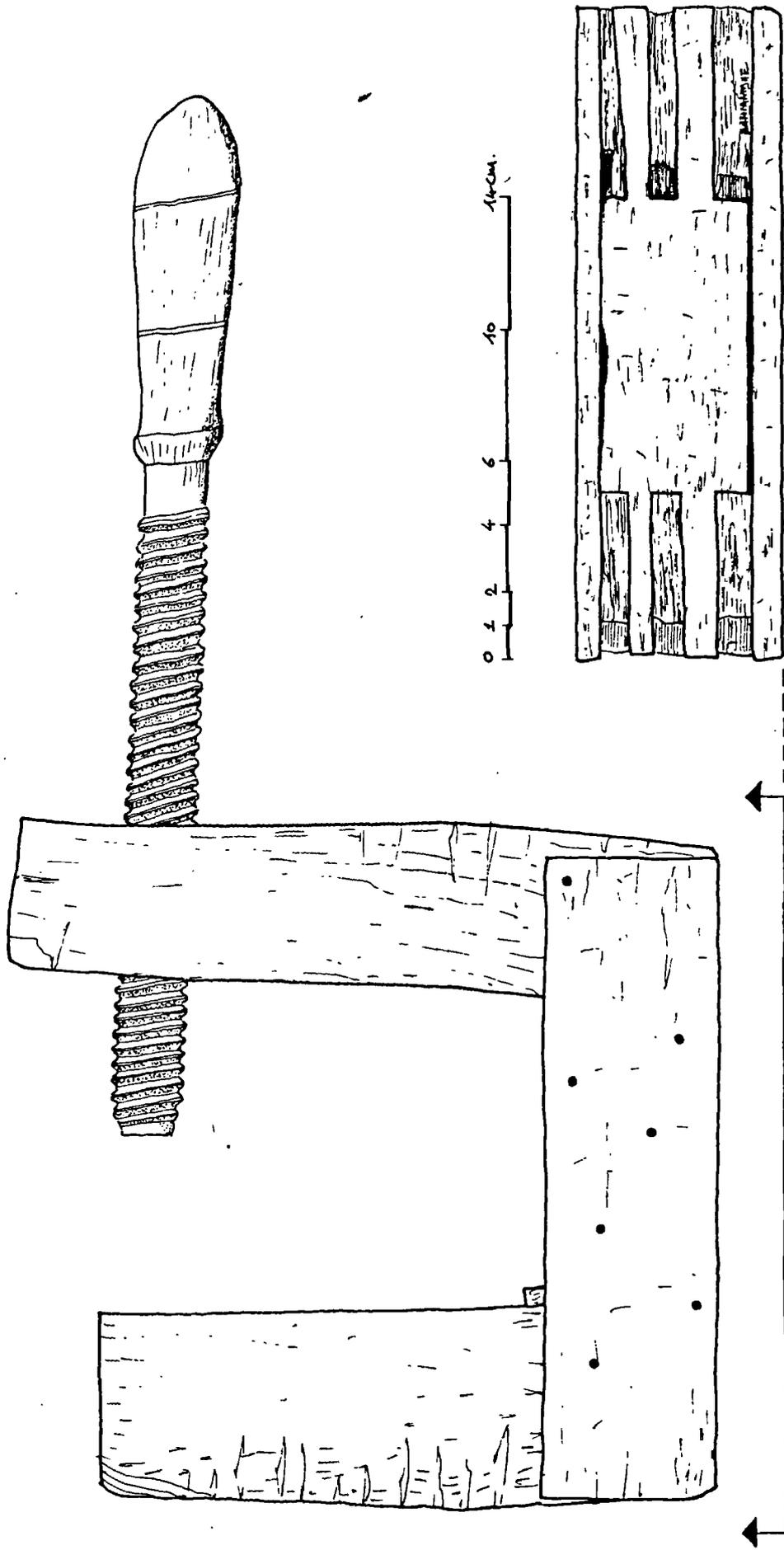


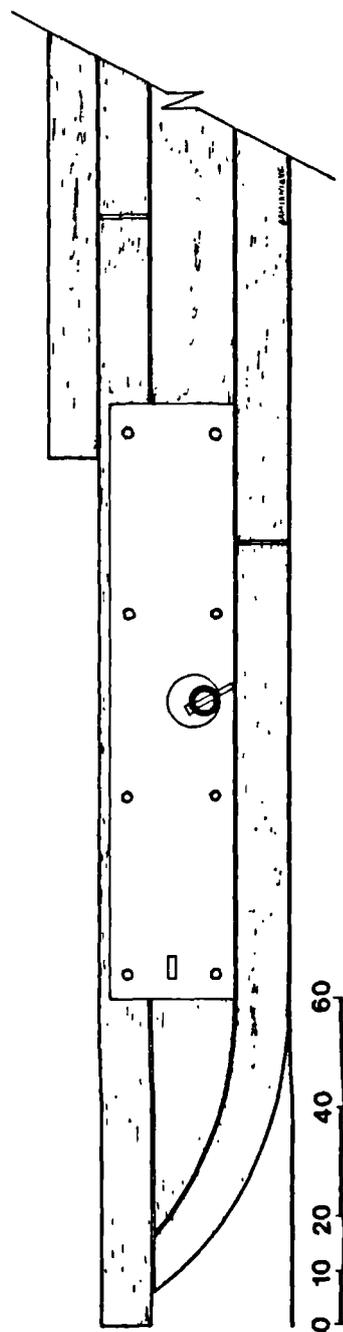
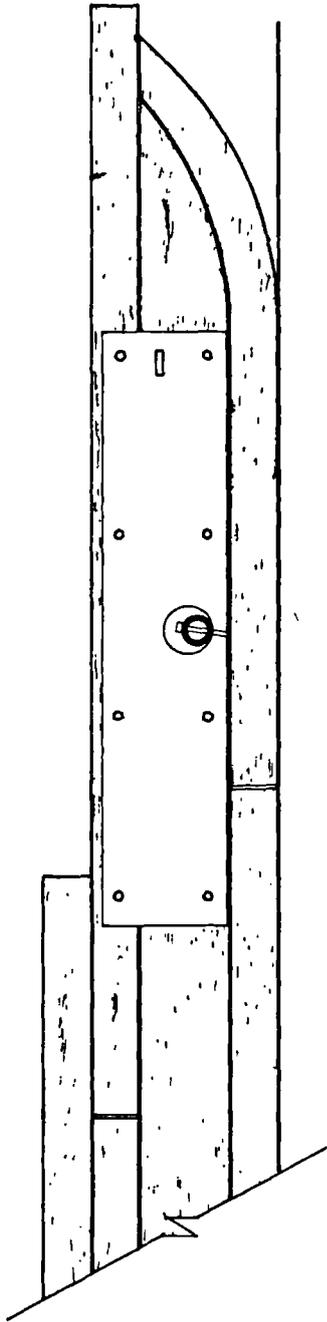
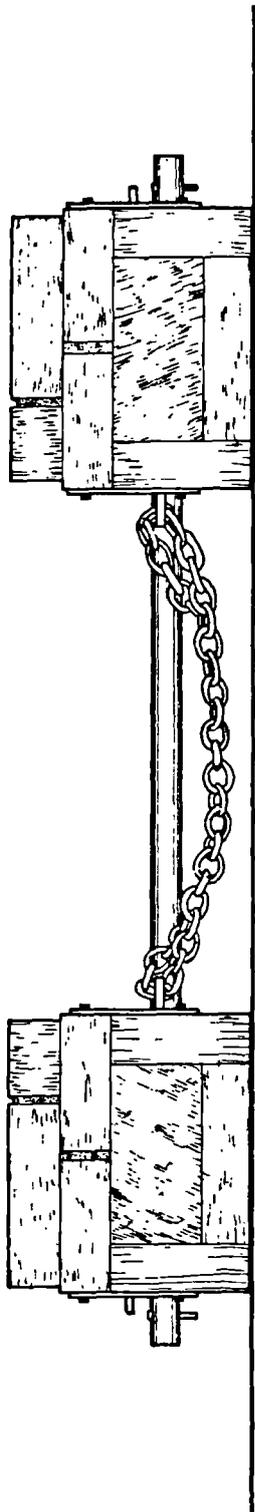
60a



00 1 2 4 6cm

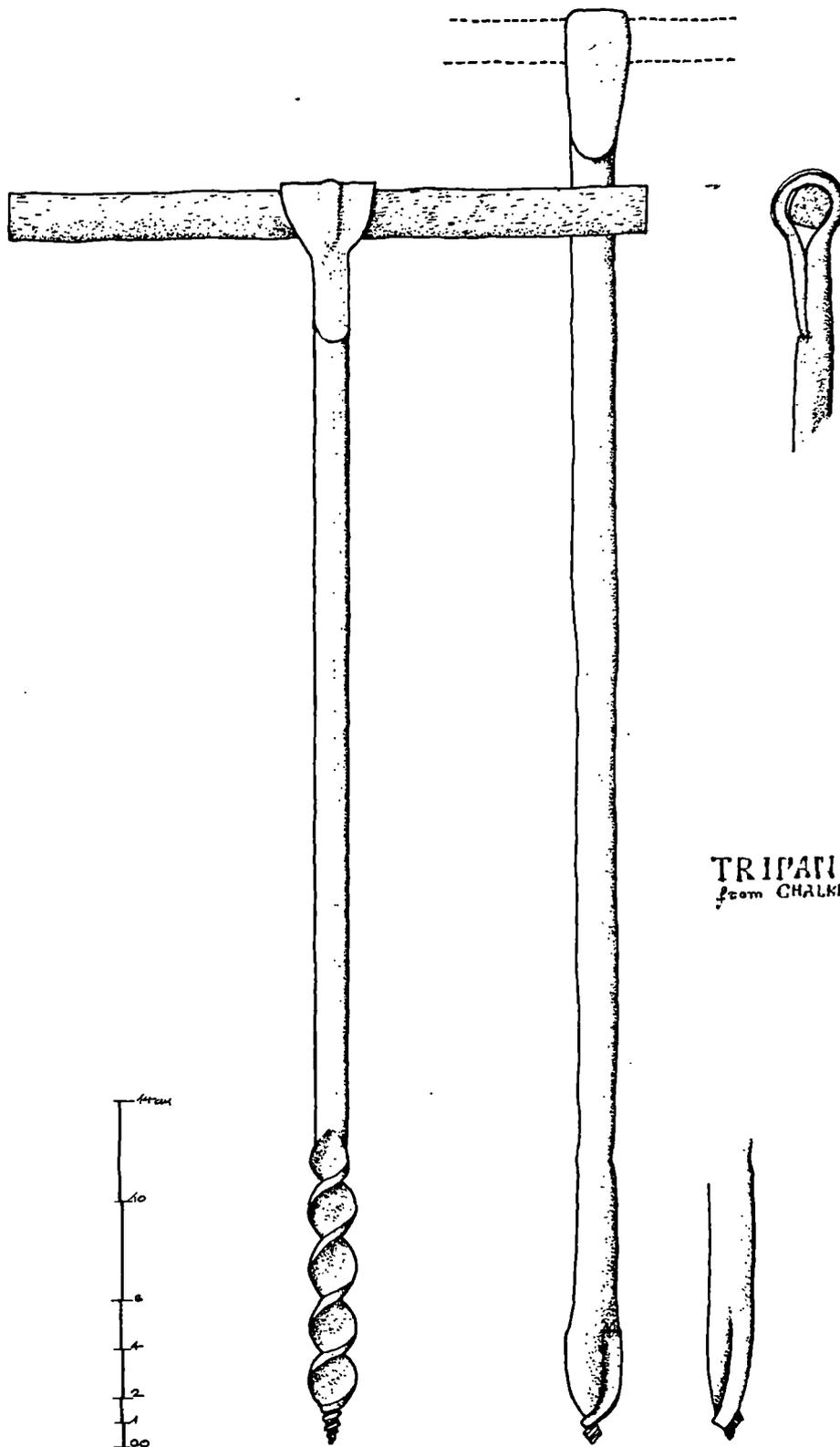
62. Wooden cramp (4.4.1)
Hellenic Institute of Preservation of the Maritime Heritage
63. Launching cradles (4.4.8)
([4]-Korakis)
- 64a. Shell auger with a screw shaped end (4.5.1)
([7]-Chimonas)
- 64b. Twist auger (4.5.2)
([7]-Chimonas)
- 65a. Shell auger (4.5.1)
([16]-Kritikopoulos)
- 65b. Small shell auger (4.5.1)
Hellenic Institute of Preservation of the Maritime Heritage
- 65c. Chisel (4.7.1)
([16]-Kritikopoulos)
- 65d. Narrow chisel (4.7.1)
([16]-Kritikopoulos)
- 66a. Heavy maul hammer (4.6.1)
([16]-Kritikopoulos)
- 66b. Maul hammer for spikes (4.6.1)
([16]-Kritikopoulos)
- 66c. Small maul hammer for nails (4.6.1)
([16]-Kritikopoulos)
- 66d. Small hammer (4.6.2)
([16]-Kritikopoulos)
- 66e. Sledge hammer with flat faces (4.6.3)
([16]-Kritikopoulos)
- 66f. Sledge hammer with dome-shaped faces (4.6.3)
([16]-Kritikopoulos)
- 66g. Wooden mallet (4.6.4)
([8]-Chalaris)
- 67a. Adze (4.7.3)
([16]-Kritikopoulos, [7]-Chimonas)
- 67b. Small adze (4.7.4)
([7]-Chimonas)
68. Schematic use of an adze (4.7.3)





63

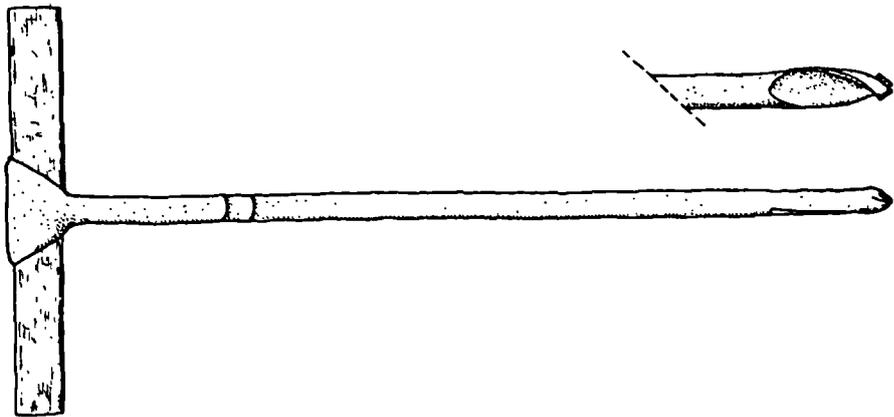
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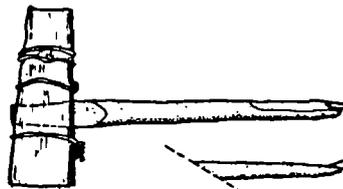
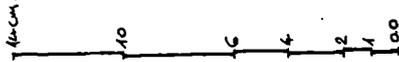
TRIPANI
from CHALKIS

64b

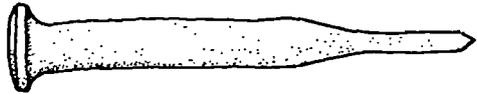
64a



65a

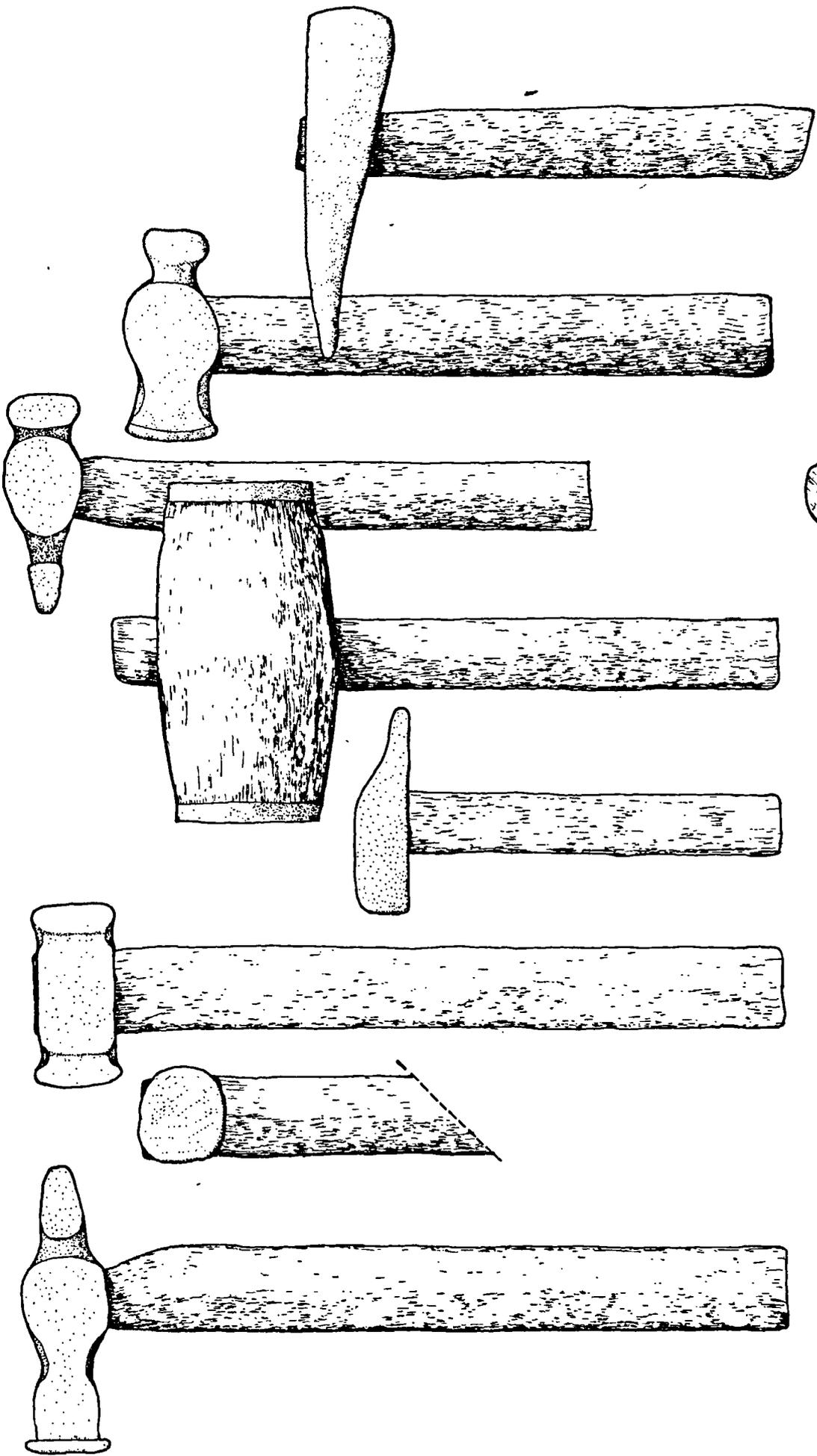


65b

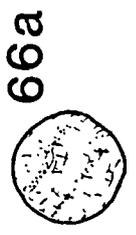


65c

65d



0 1 2 3 4 5 10 20 cm



66a

66b

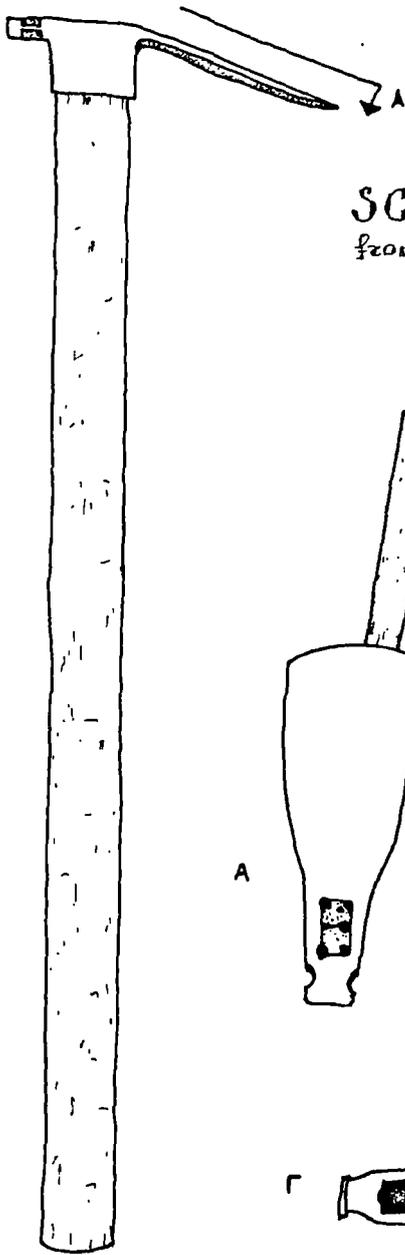
66d

66g

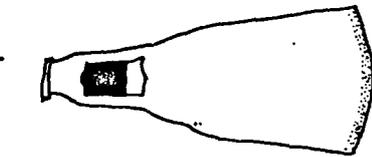
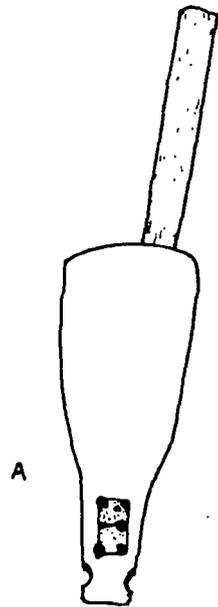
66e

66f

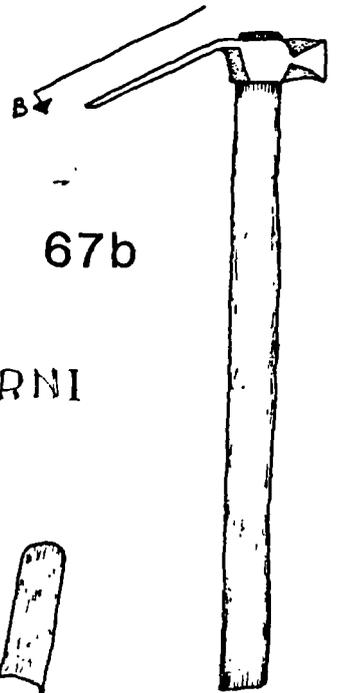
66c



SCEPARNIA
from PIREAUS

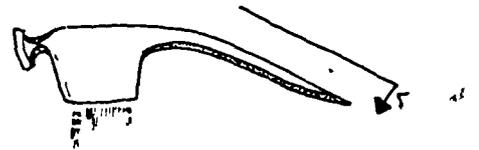
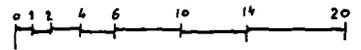


67a

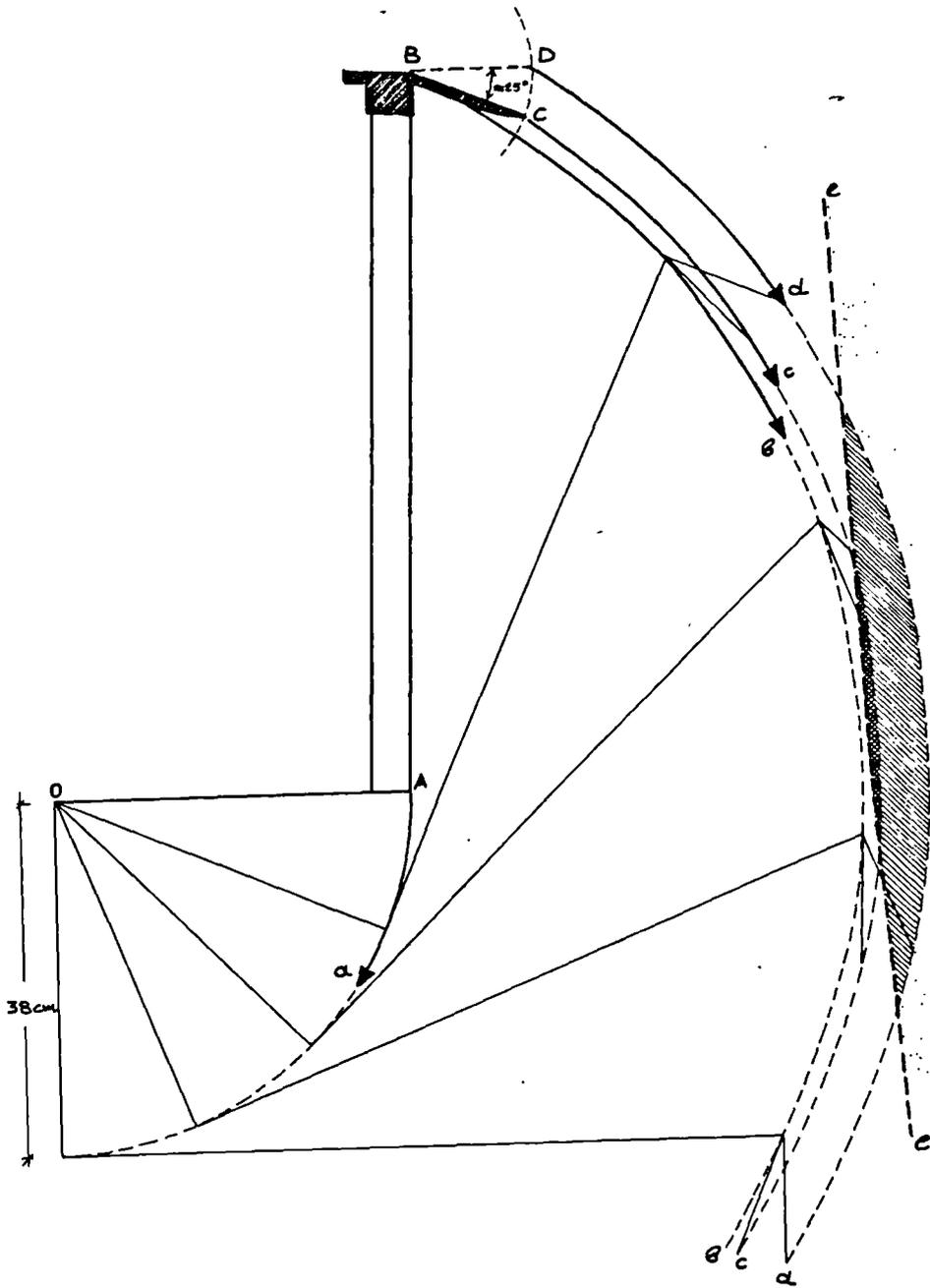


67b

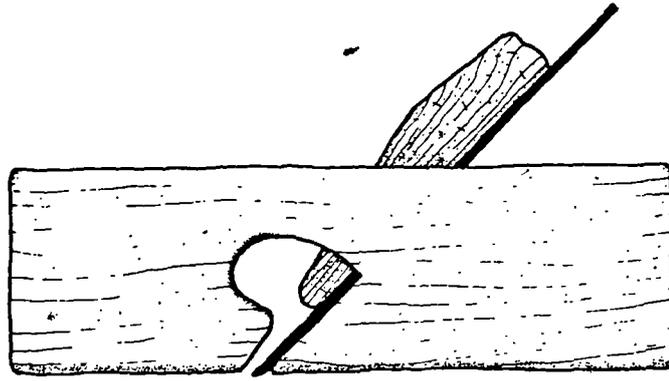
SCEPARNI



SCEPARNIA
from CHALKIS

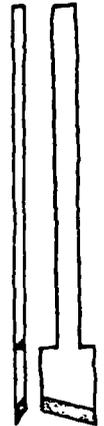
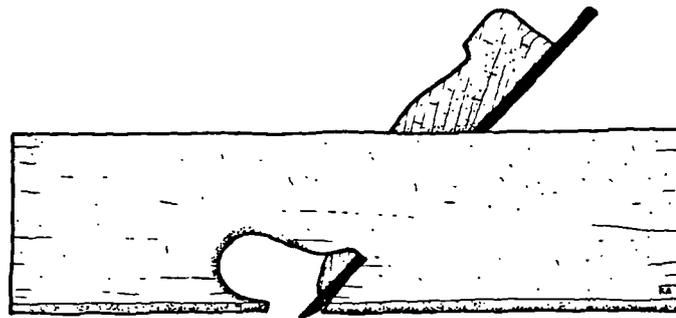


- 69a. Bound moulding plane (4.8.5.)
([10]-Binos)
- 69b. Keel and post rabbet plane (4.8.1)
([10]-Binos)
- 69c. Thin keel and post rabbet plane (4.8.1)
([10]-Binos)
- 70a. Flat plane (4.8.3)
([10]-Binos)
- 70b. Small grooving plane (4.8.2)
([10]-Binos)
- 70c. Grooving plane (4.8.2)
([7]-Chimonas)
71. Manufacture grooving plane (4.8.2)
Hellenic Institute of Preservation of the Maritime Heritage
- 72a. Side-hollow moulding plane (left) (4.8.4.b)
([10]-Binos)
- 72b. Thick keel and post rabbet plane (4.8.1)
([10]-Binos)
- 72c. Side-hollow moulding plane (right) (4.8.4.d)
([10]-Binos)
- 73a. Middle hollow moulding plane (4.8.4.d)
([10]-Binos)
- 73b. Almond-shaped moulding plane (4.8.4.d)
([10]-Binos)
- 73c. Grooving plane (4.8.2)
([10]-Binos)
- 74a. Flat "surface" plane (4.8.5)
([7]-Chimonas)
- 74b. Smooth bound "surface" plane (4.8.6)
([7]-Chimonas)
- 75a. Smooth-across-bound "surface" plane (4.8.8)
([7]-Chimonas)
- 75b. Bound "surface" plane (4.8.6)
([7]-Chimonas)
- 75c. Across-bound "surface" plane (4.8.7)
([7]-Chimonas)
76. Sharpening stone (4.8.9)
([7]-Chimonas)



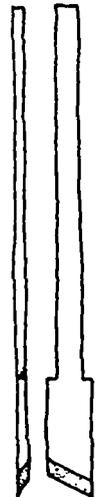
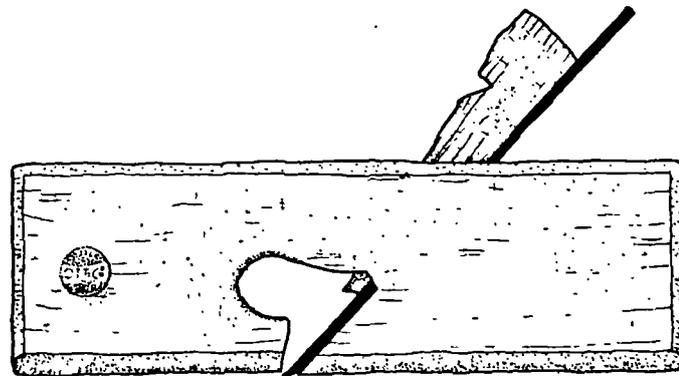
LOUKI

69a



NICHI CNYXID

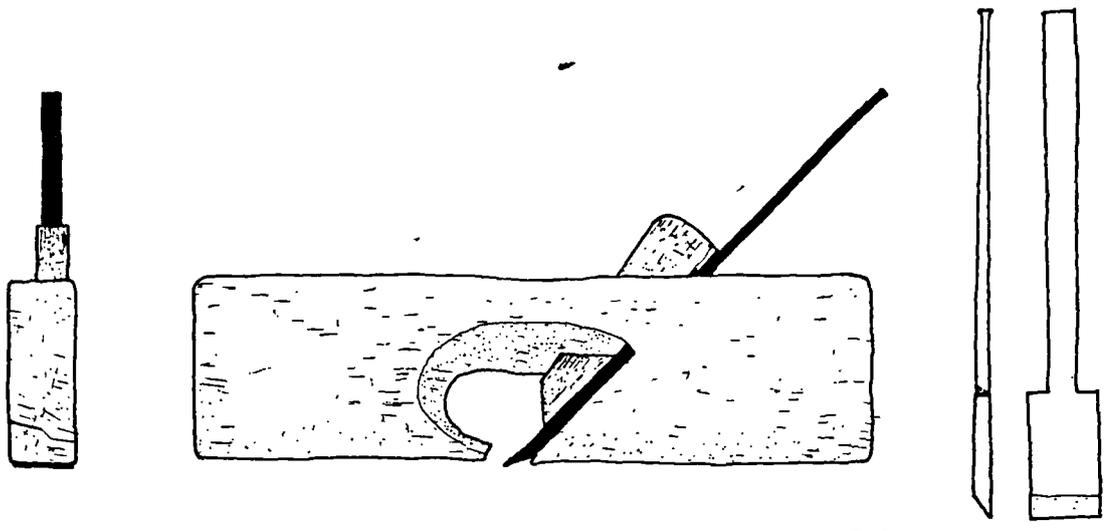
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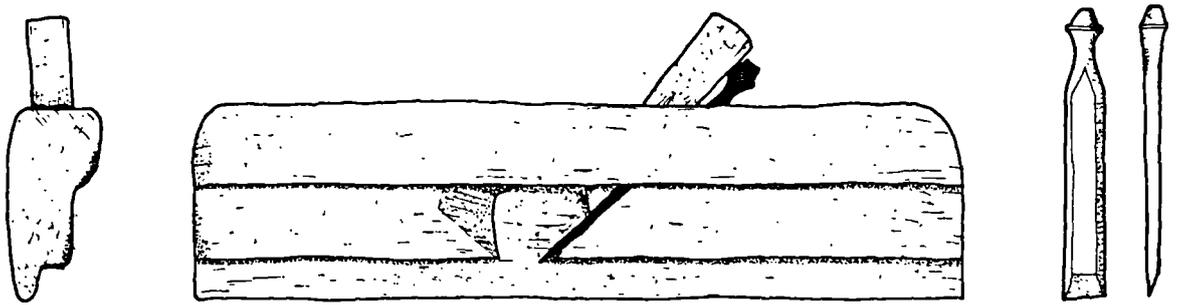
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69c

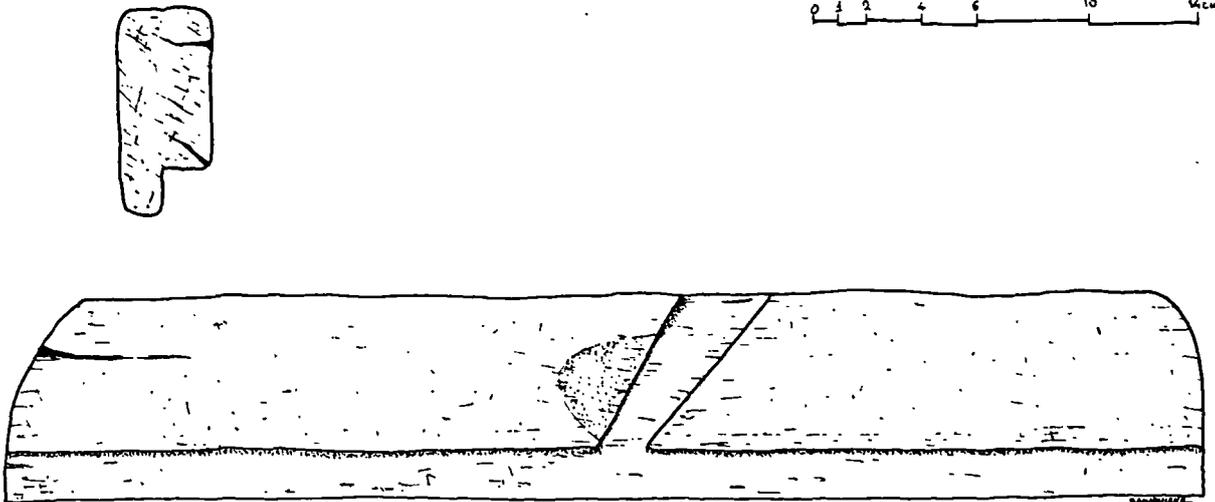




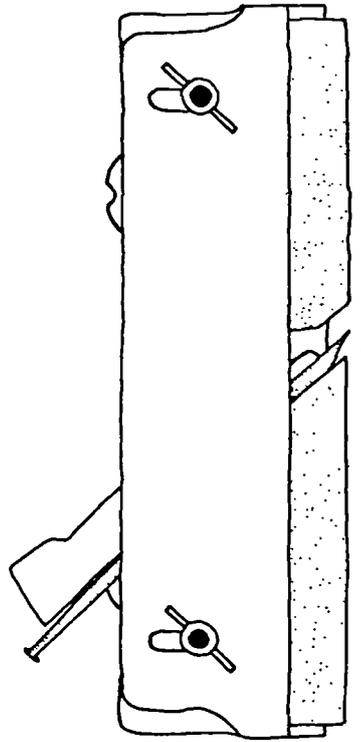
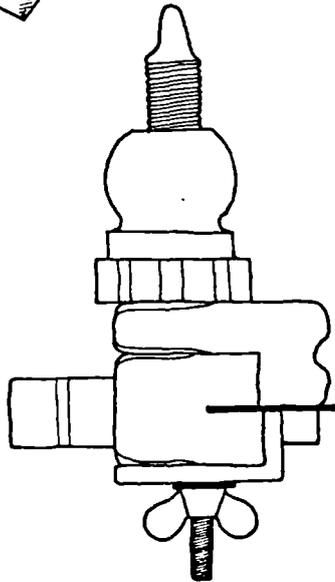
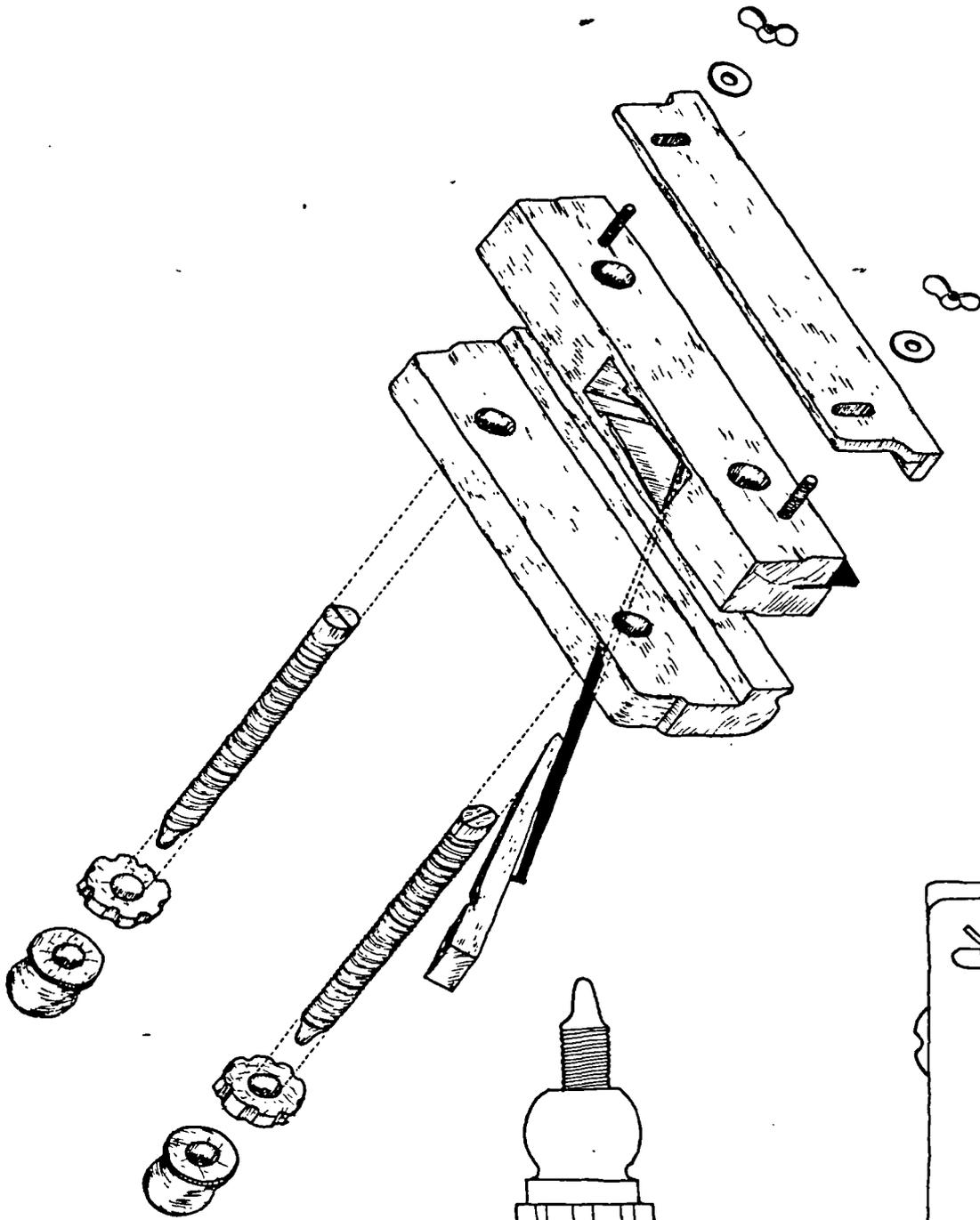
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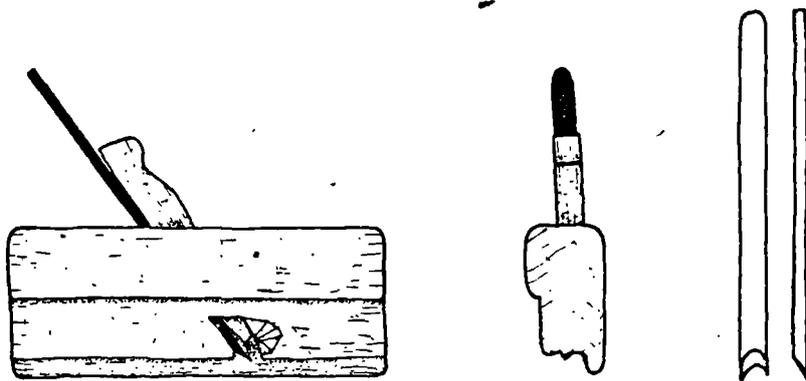
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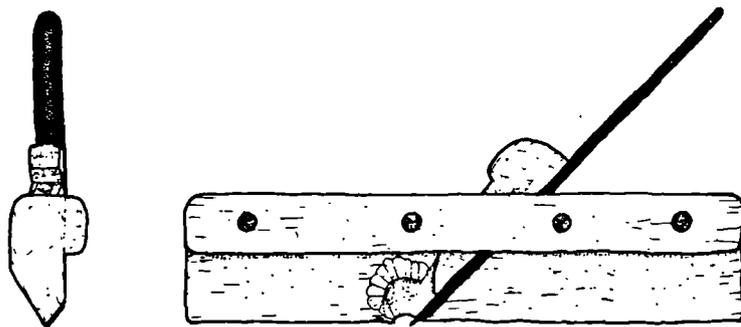
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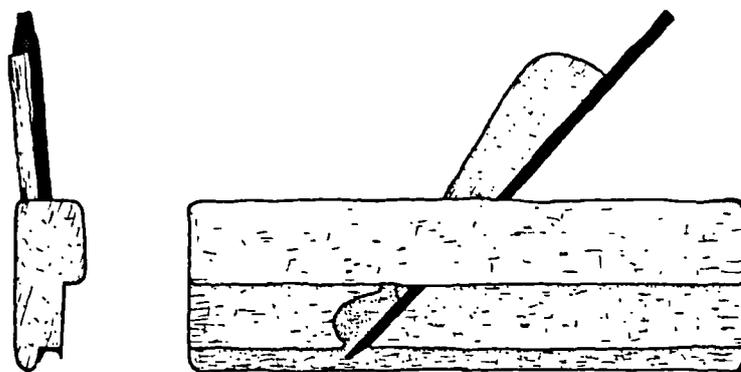
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TSIMPOUCAKI ARISTERO 72a

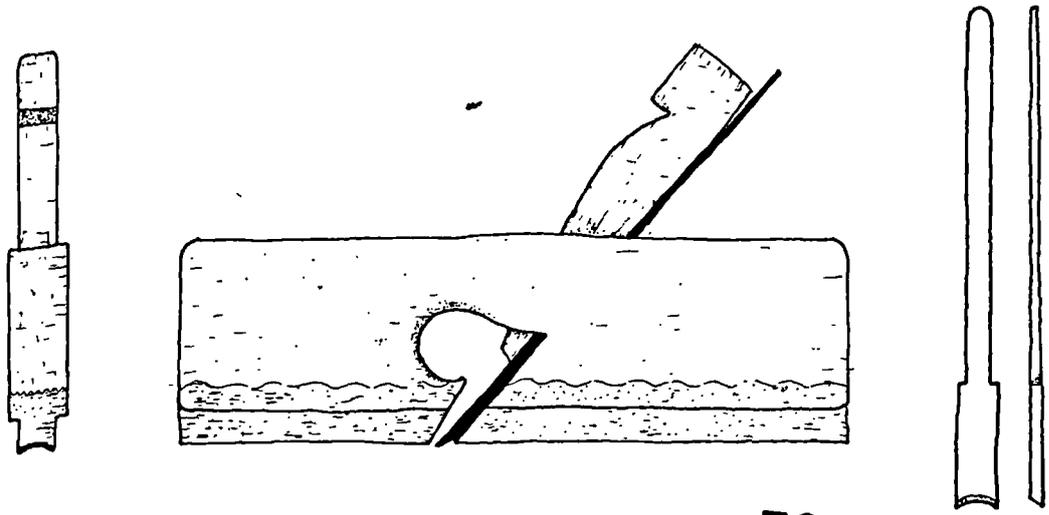


NICKI CHONTRO 72b



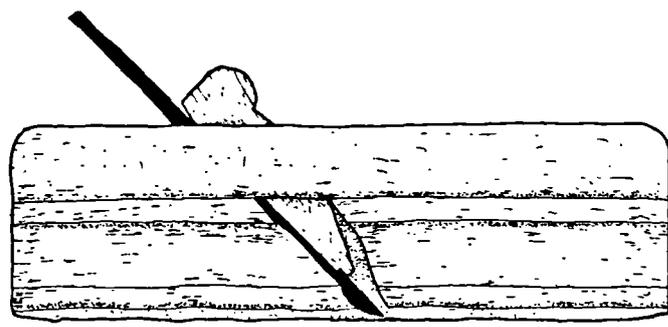
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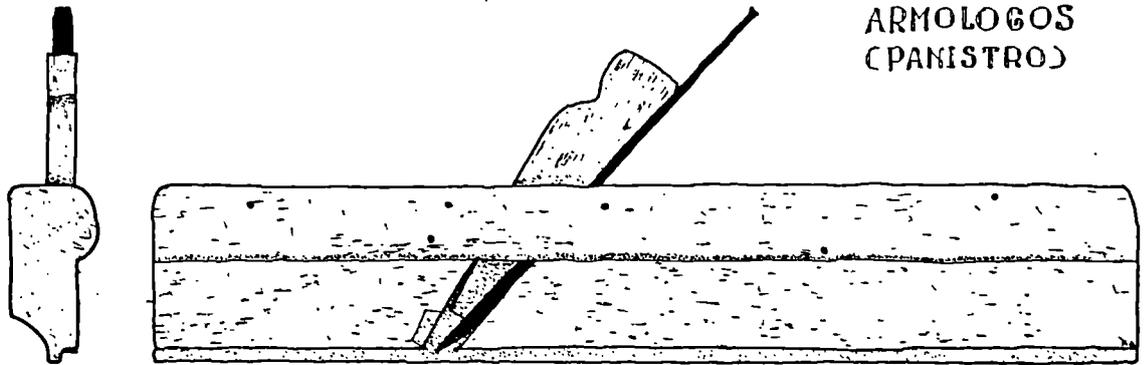
CORDONIERA TIS MESIS

73a

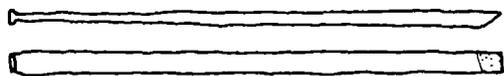


AMIGDALAKI (ERGALIO TRAVICHTO)

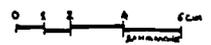
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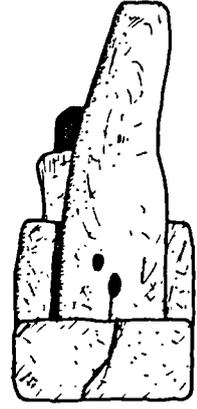
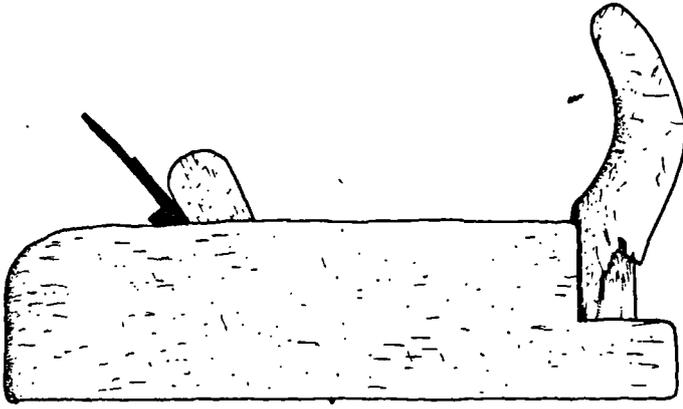


ARMOLOGOS
(PANISTRO)

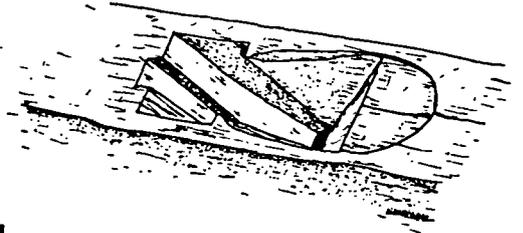


73c

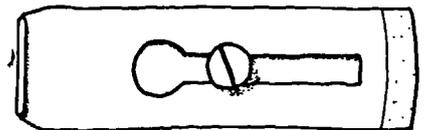
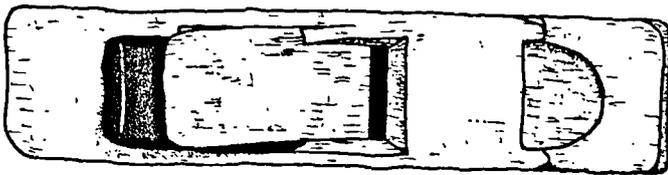
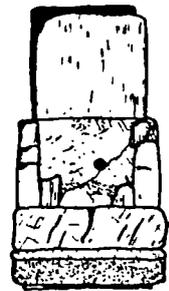
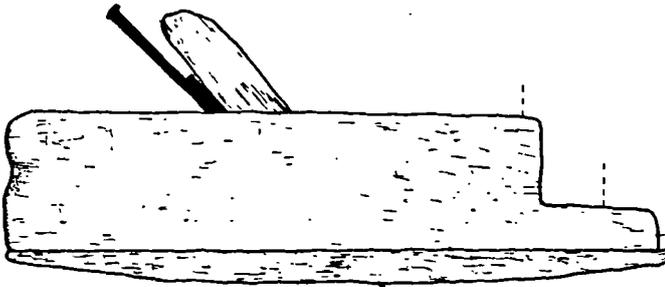
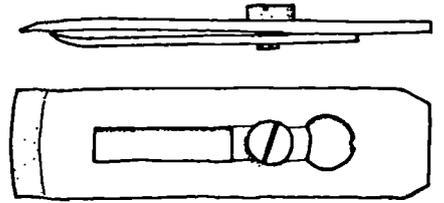
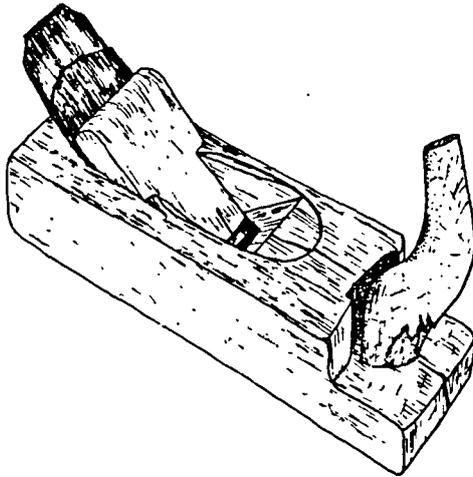




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from CHALKIS

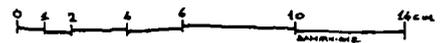


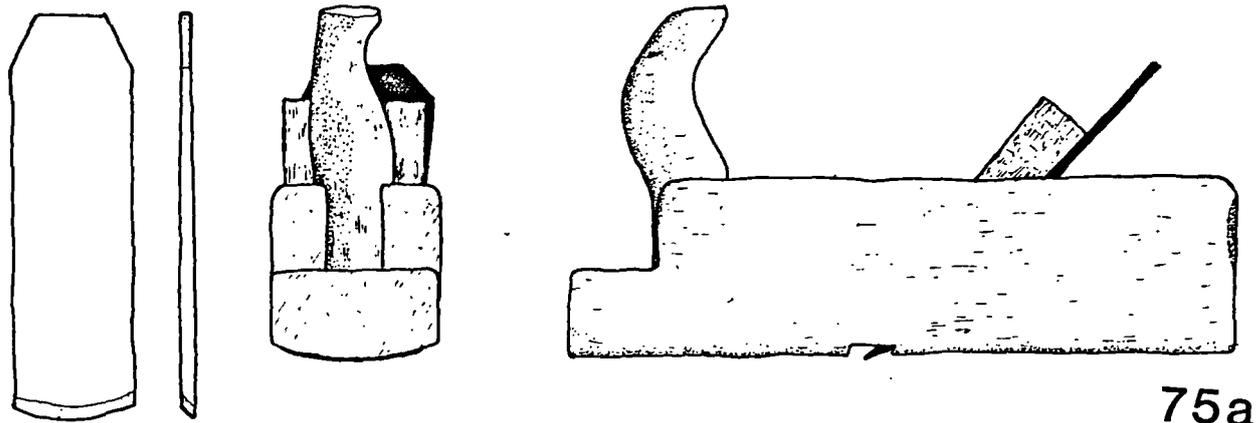
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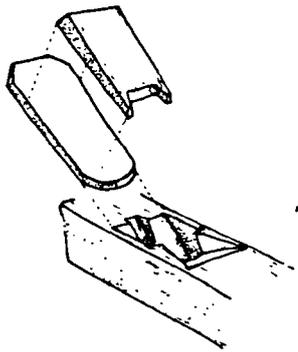
STRAVOROCANO
from CHALKIS

74b

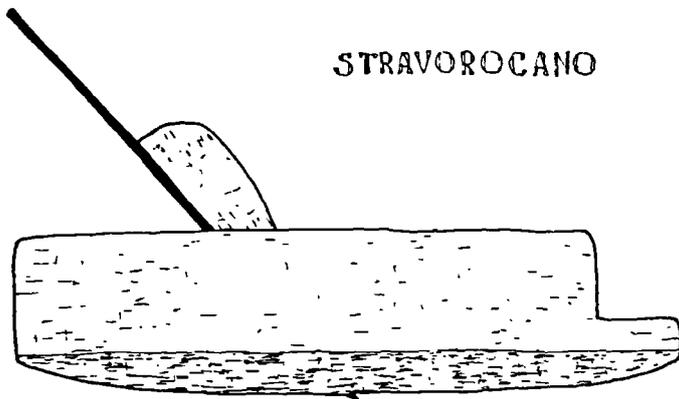
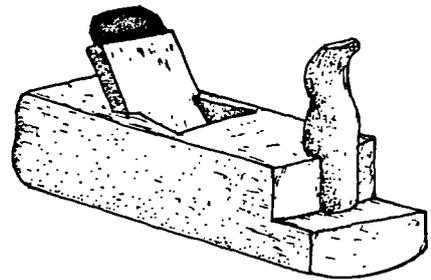




75a



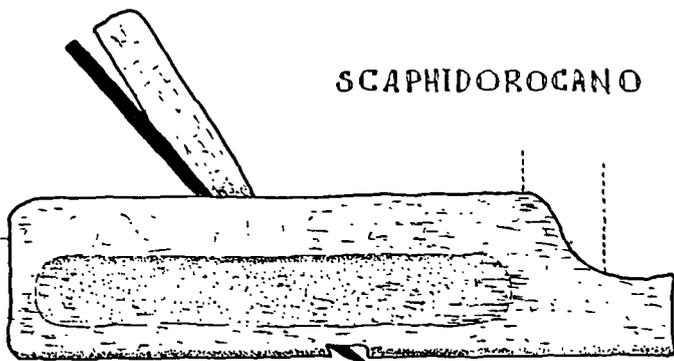
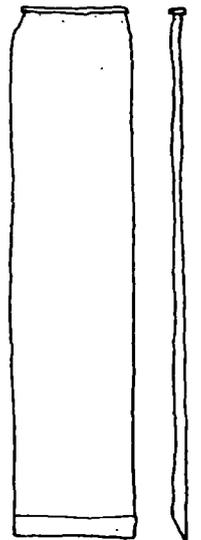
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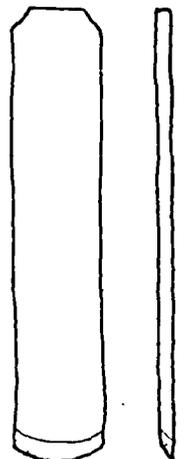
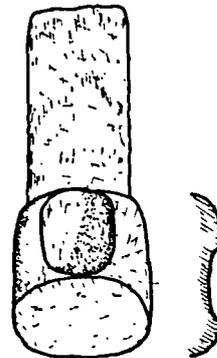
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75b

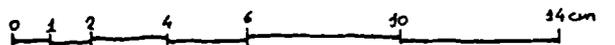
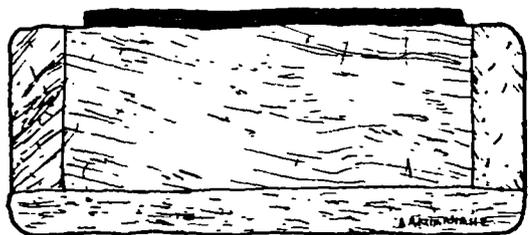
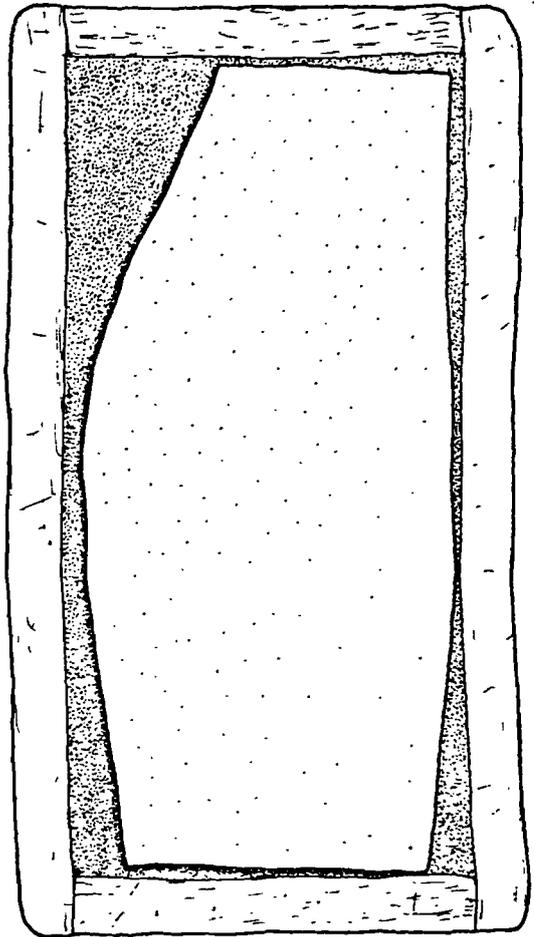
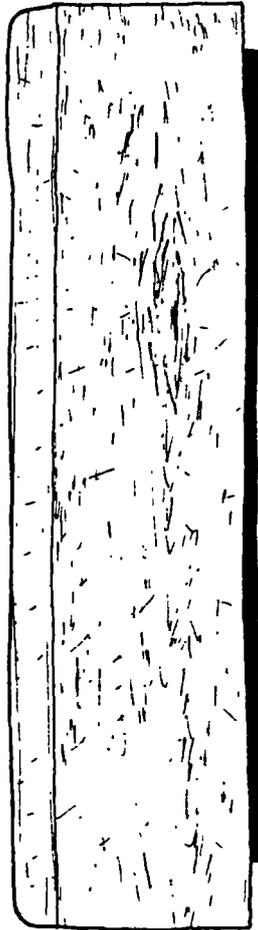


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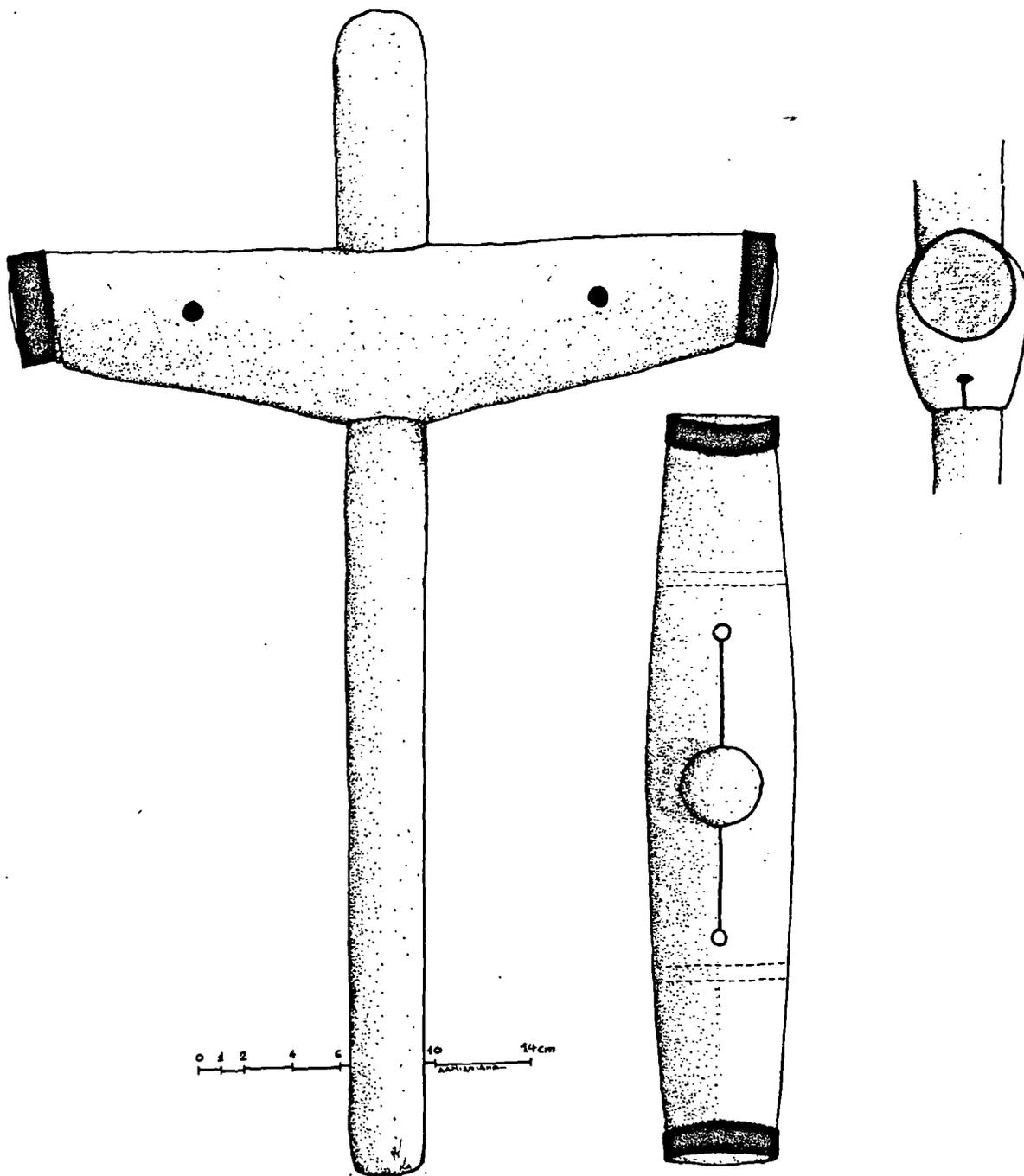


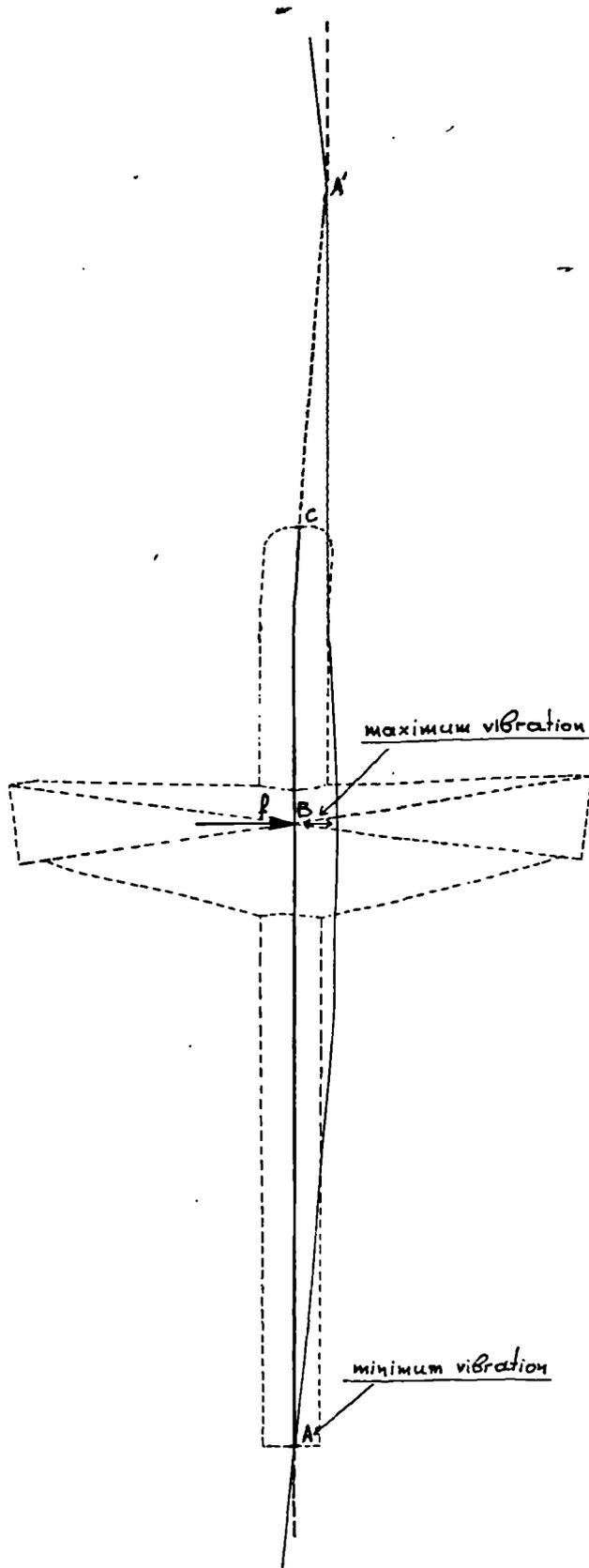
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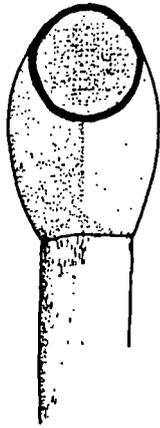




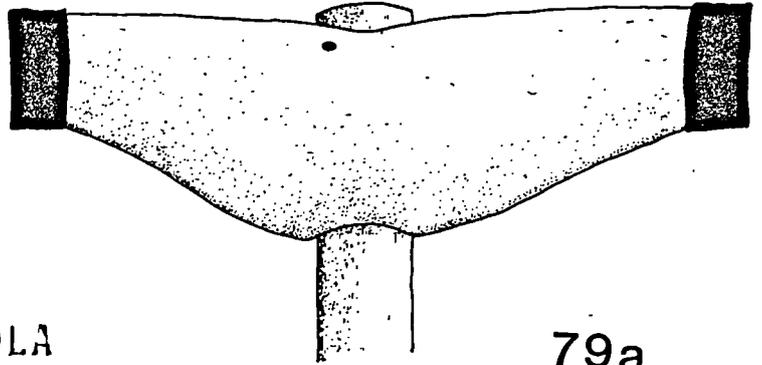
77. Caulking mallet (4.9.1)
([10]-Binos)
78. Schematic diagram of a caulking mallet (4.9.1)
([10]-Binos)
- 79a. Old caulking mallet (4.9.2)
([10]-Binos)
- 79b. Small old caulking mallet (4.9.2)
([10]-Binos)
- 80a. Sharp iron (4.9.3)
([10]-Binos)
- 80b. Setting iron (4.9.4)
([10]-Binos)
- 80c. Thin single iron (4.9.6)
([10]-Binos)
- 80d. Thick single iron (4.9.5)
([10]-Binos)
- 80e. Double iron (4.9.7)
([10]-Binos)
- 80f. Bent iron (4.9.8)
([10]-Binos)
- 80g. Treenail or spike iron (4.9.9)
([10]-Binos)
- 80h. Tool for checking nails on the hull (4.9.10)
([10]-Binos)
- 80i. Old iron (4.9.11)
([10]-Binos)
- 80j. Caulker's toolbox or "kit" (4.9.13)



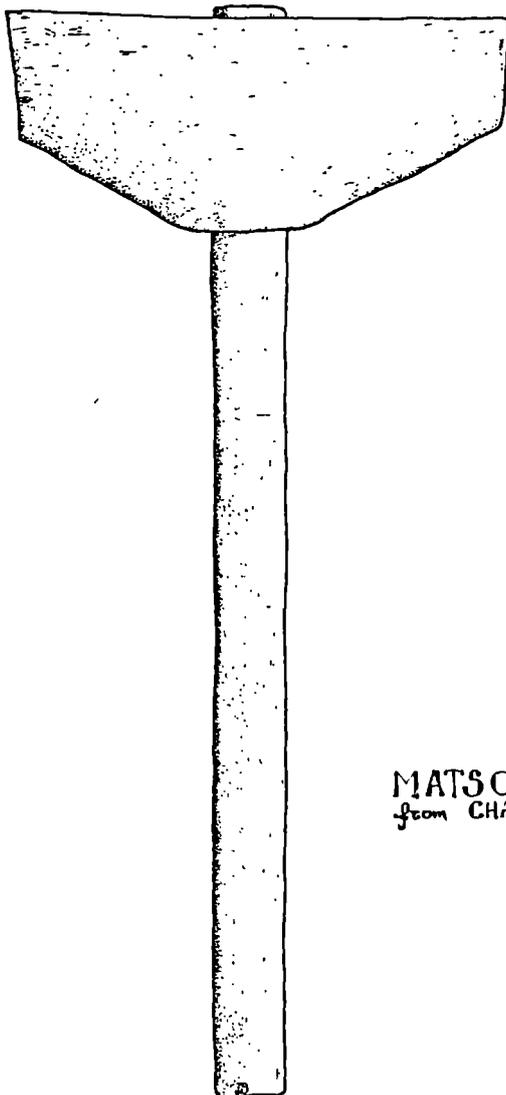




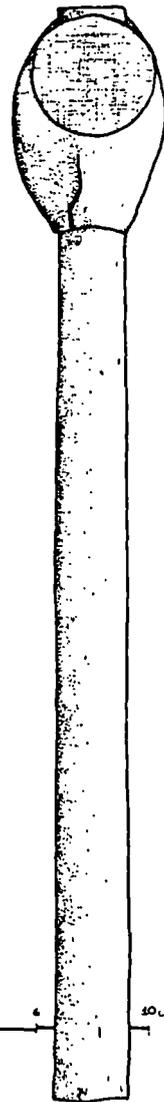
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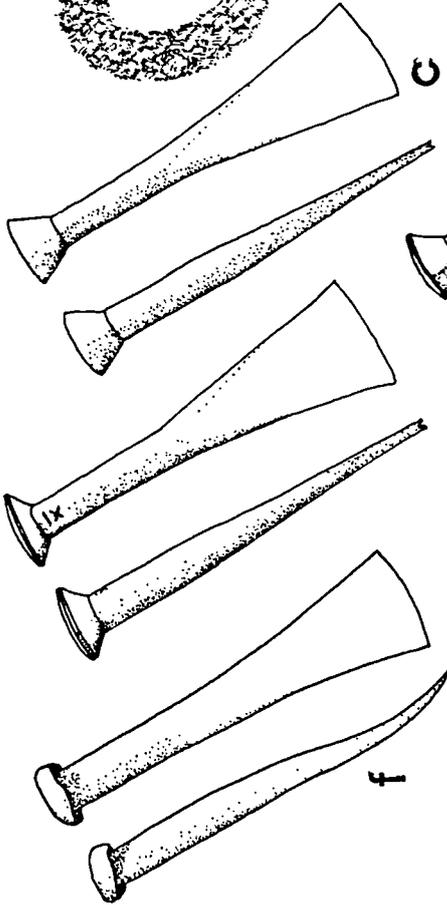
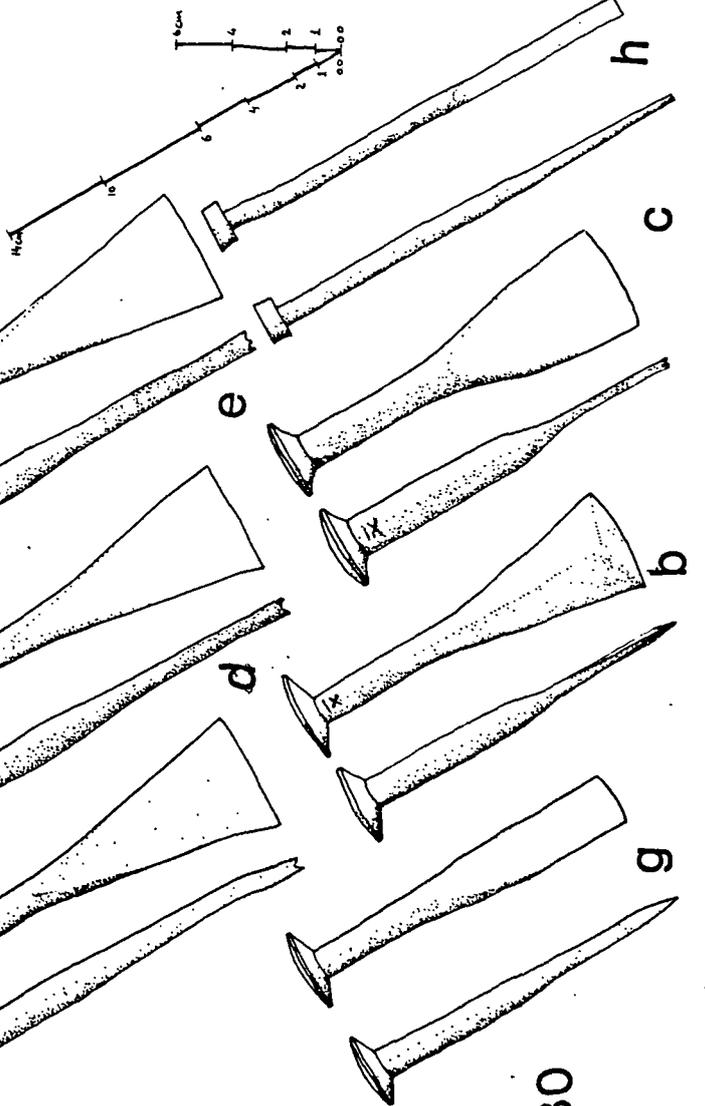
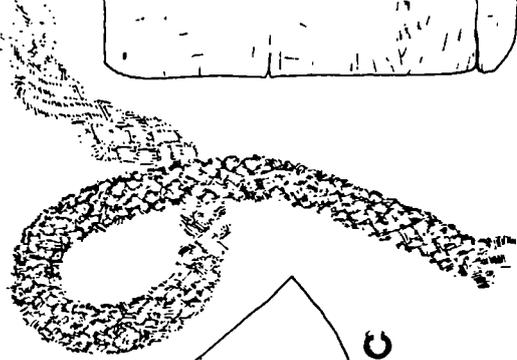
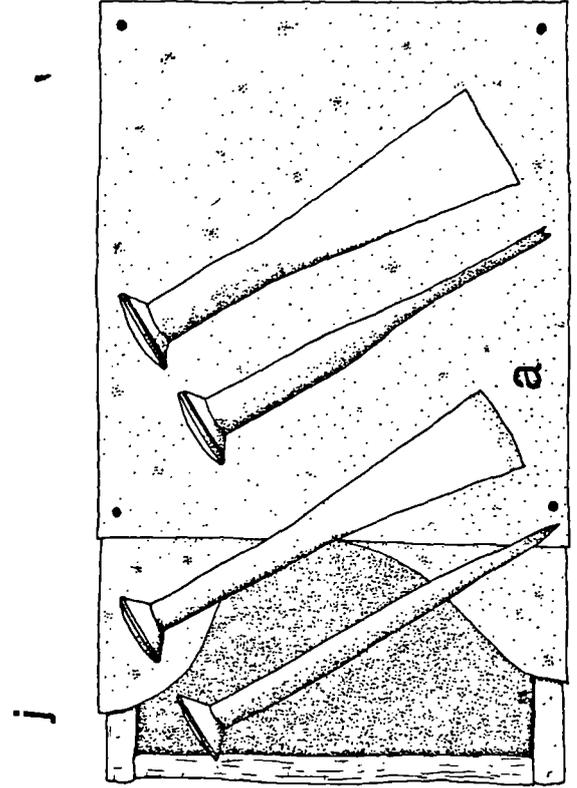
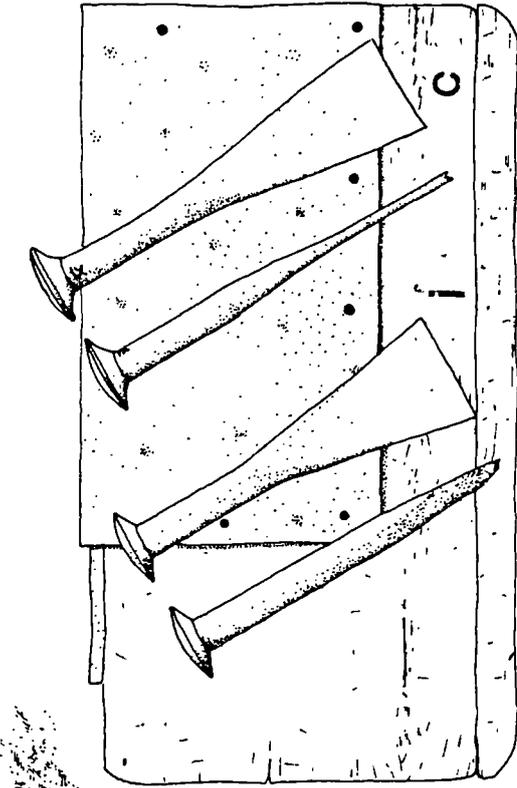
79a



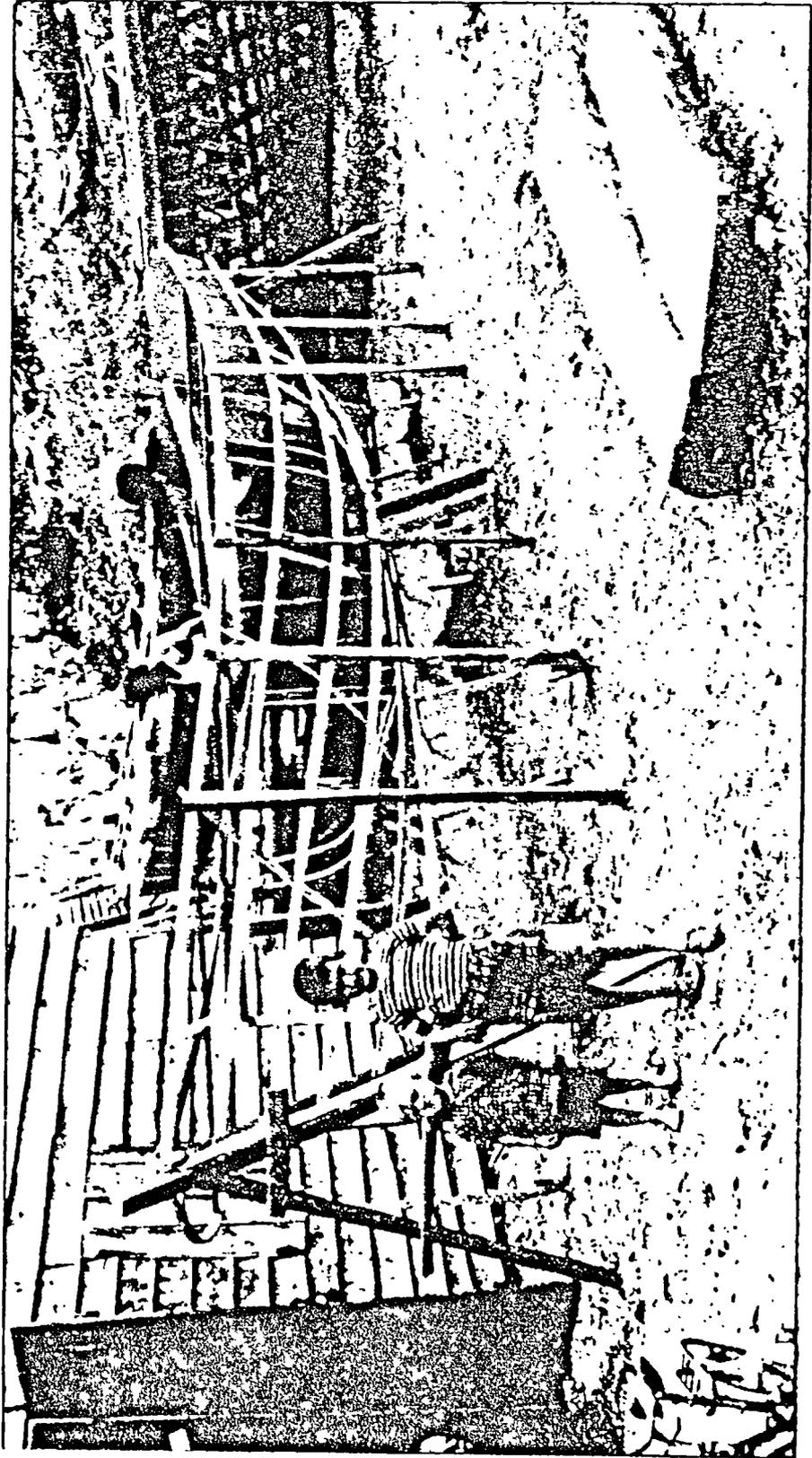
MATSOLINO
from CHALKIS

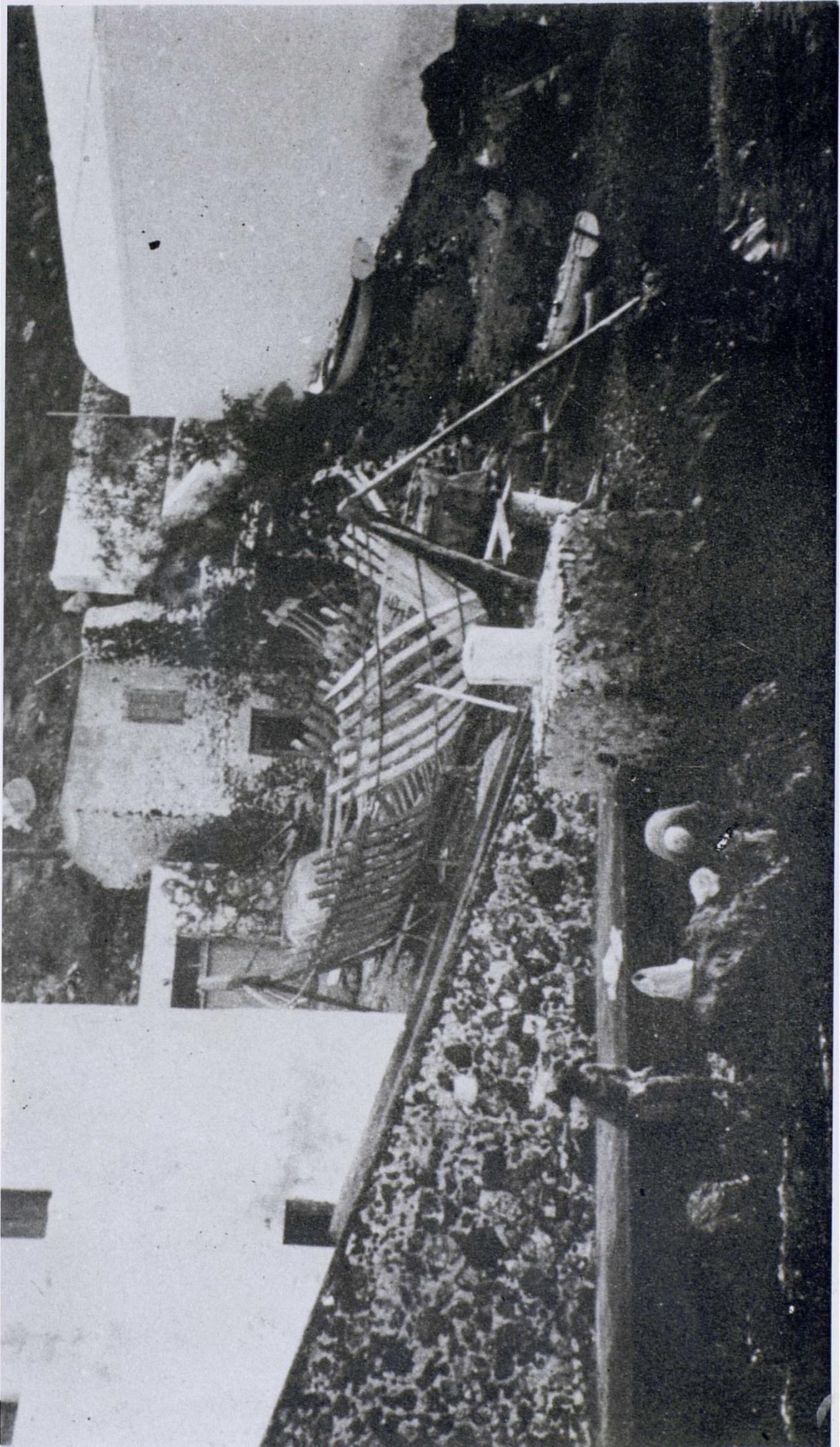


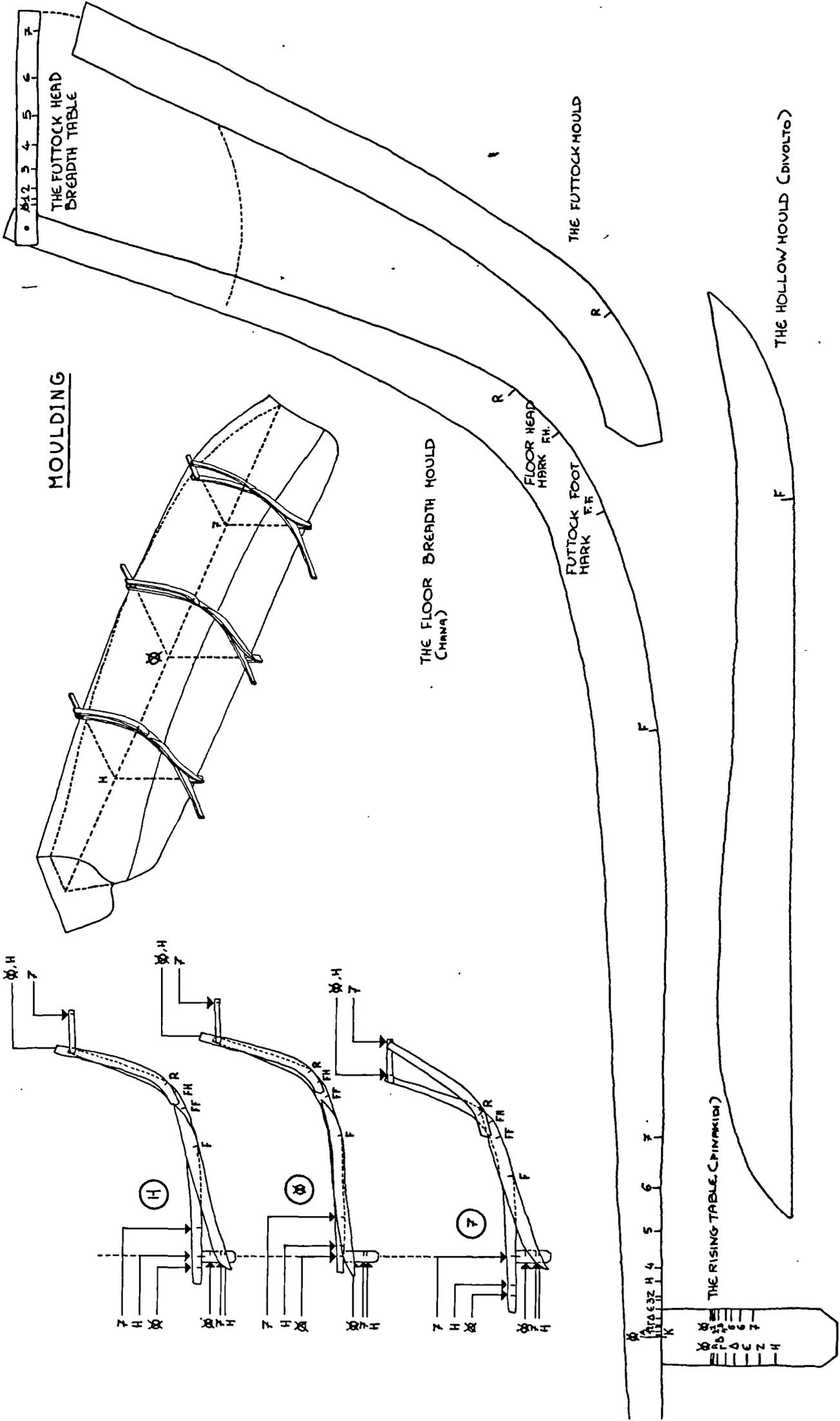
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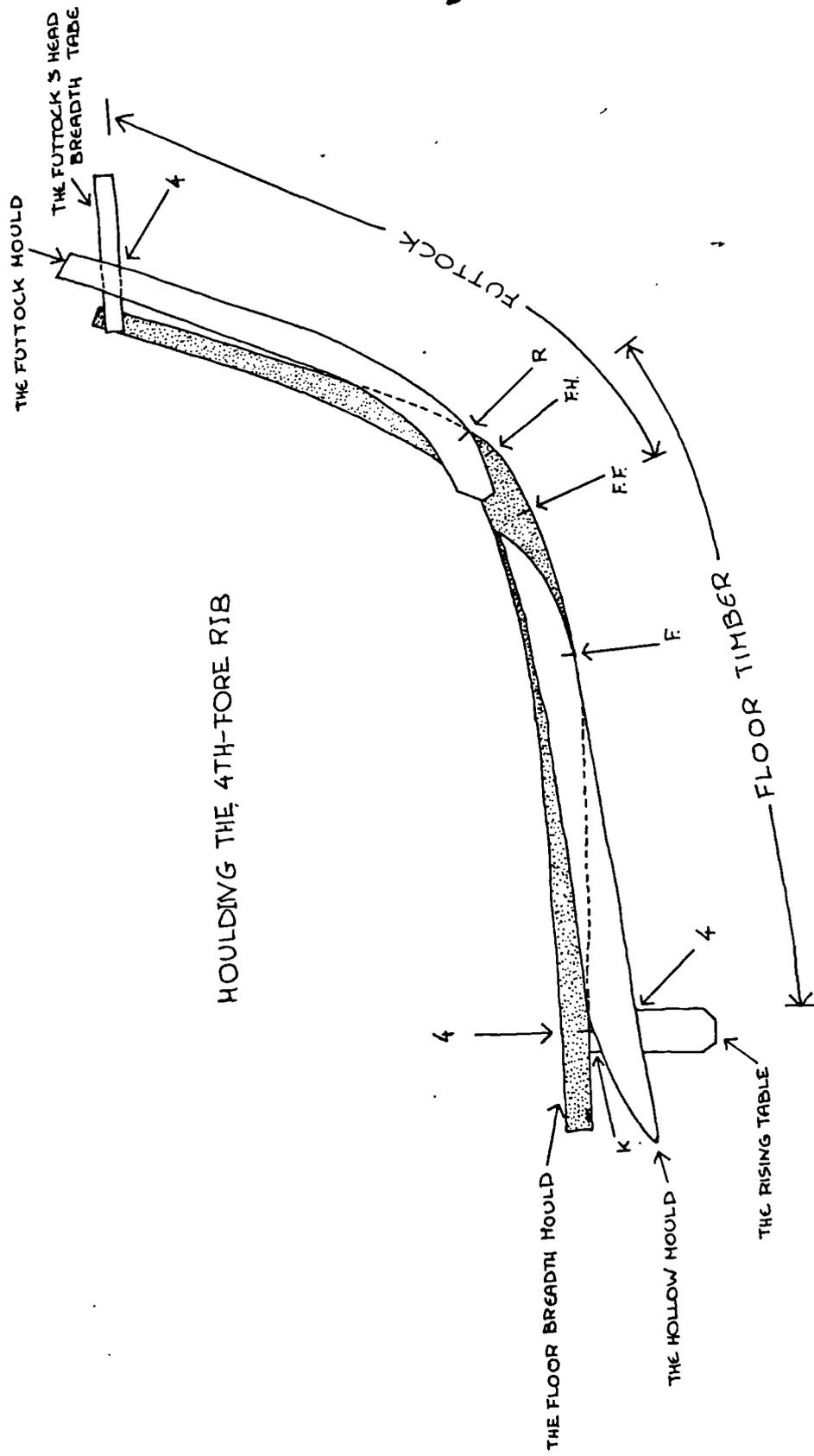
81. "Master frame and ribbands" method (5.2.1)
(Lee, N.J. (1978) "The Aegean Tradition")
82. Boat under construction by moulding with adjustable templates (5.2.2)
(Bozinaki Didoni V.) (Santorini)
83. Moulding aids with adjustable templates (version with five aids) (5.2.2)
84. Shaping the 4th fore frame by moulding with adjustable templates (5.2.2)
85. The "Saleto" plan (5.2.2.f)
86. "METZAROLA" diagram (5.2.2.f)
87. Studying two "METZAROLA" diagrams (5.2.2.g)
- 88a. Comparison between a "METZAROLA" plan and the golden section (5.2.2.g)
- 88b. Trigonometrical study of a "METZAROLA" plan. (5.2.2.g)
89. Boat lines provided by the recorded method of moulding with adjustable templates (five aids) (5.2.2.g)
- 90a. The "MEZA-LUNA" diagram (5.2.2.h)
(Lane, F.C. 1943, p.94)
- 90b. Trigonometrical study of a "MEZA-LUNA" diagram and comparison of elements provided by "METZAROLA" and "MEZA-LUNA" diagrams (5.2.2.h)
91. Comparison of lines provided by "METZAROLA" and "MEZA-LUNA" diagrams.
92. Diagrams similar to "METZAROLA" and "MEZA-LUNA" from other lofting techniques (5.2.2.h)
93. Comparison between the "METZAROLA" and the "MEZA-LUNA" diagrams (5.2.2.i)
94. Proposed schema for the conception of the "MEZA-LUNA" diagram (5.2.2.i)
95. "Entasis" on the columns of classical temples. (5.2.2.j)
(Mauch, J.M. von & Lohde, L. (1875, pl. TXXXVII), and Fletcher, B. (1948, p.134)

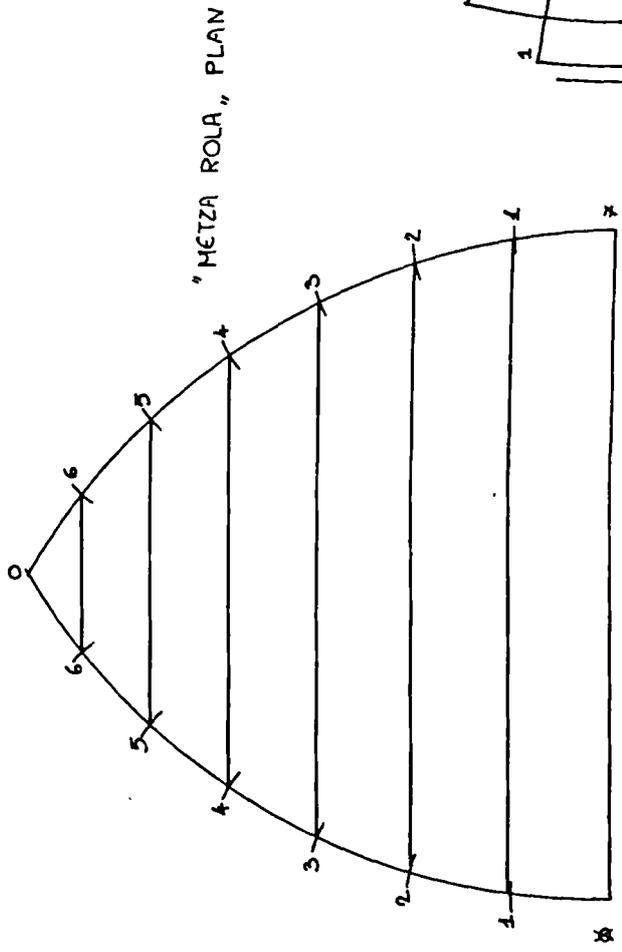




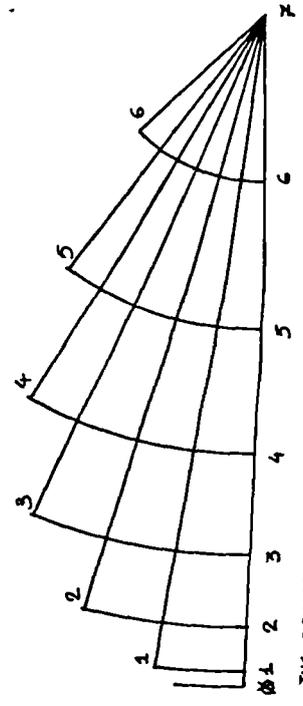


MOULDS FROM MR. CHATZ. NIKOLAOU'S BOATYARD.
RECORDED BY K. DAMIANIDIS.

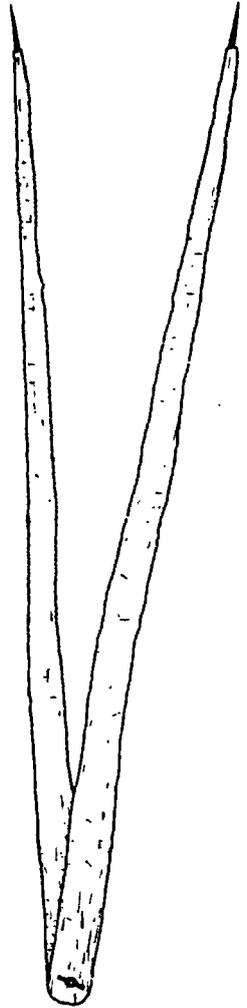


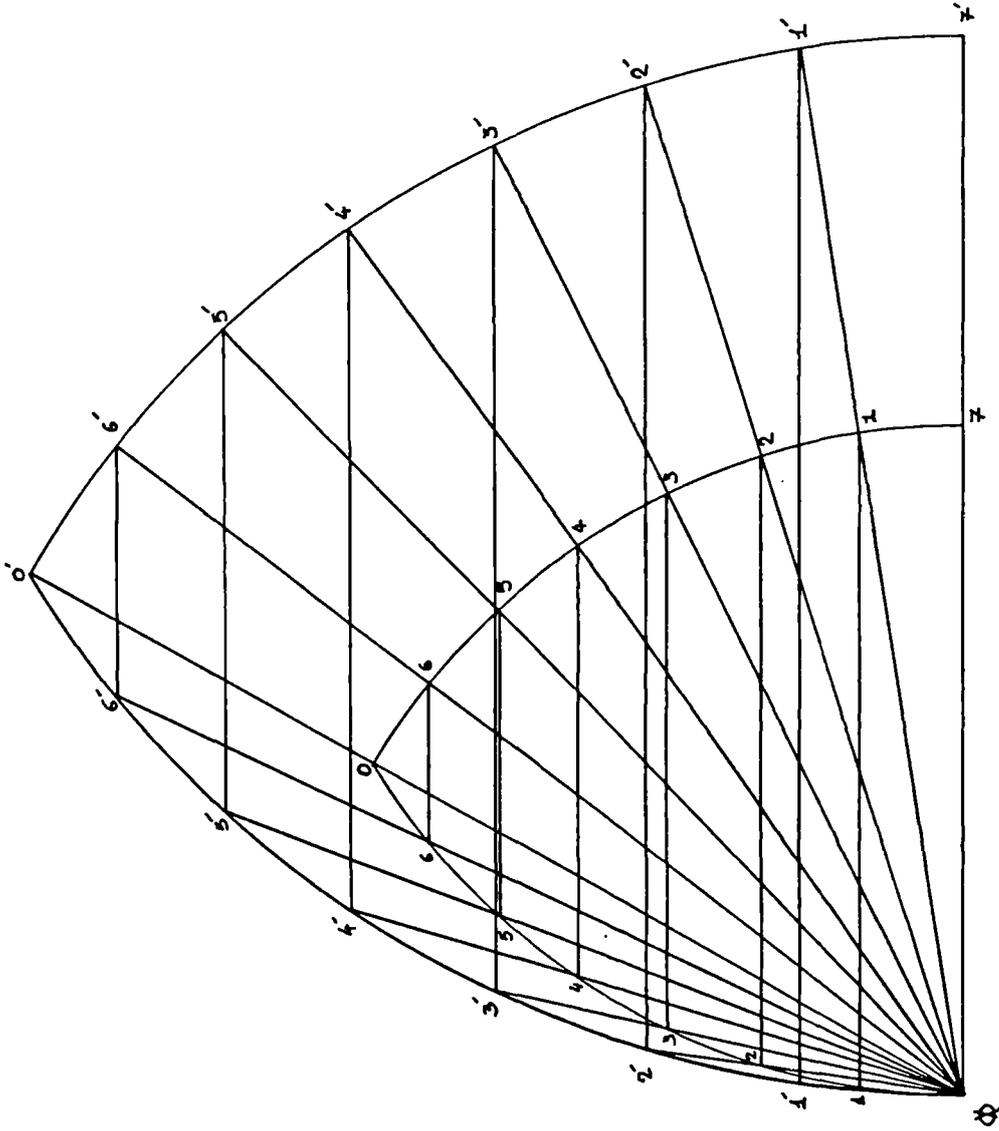


"METZA ROLA", PLAN



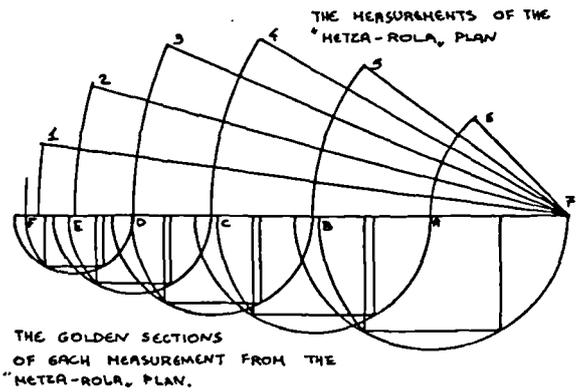
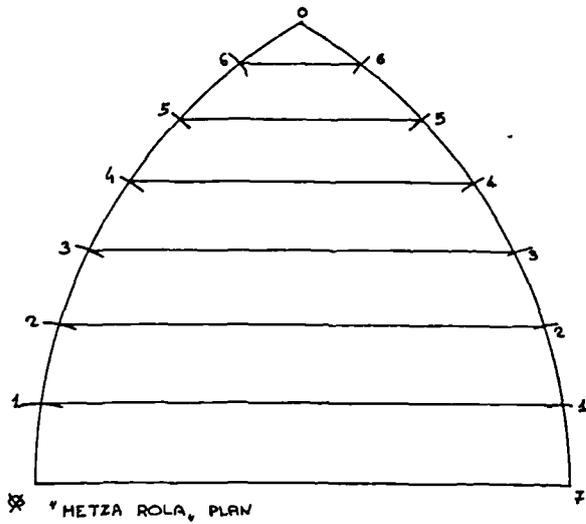
THE SIRMARKS 0,1,2...7 OF THE FLOOR BRGADTH MOULD.



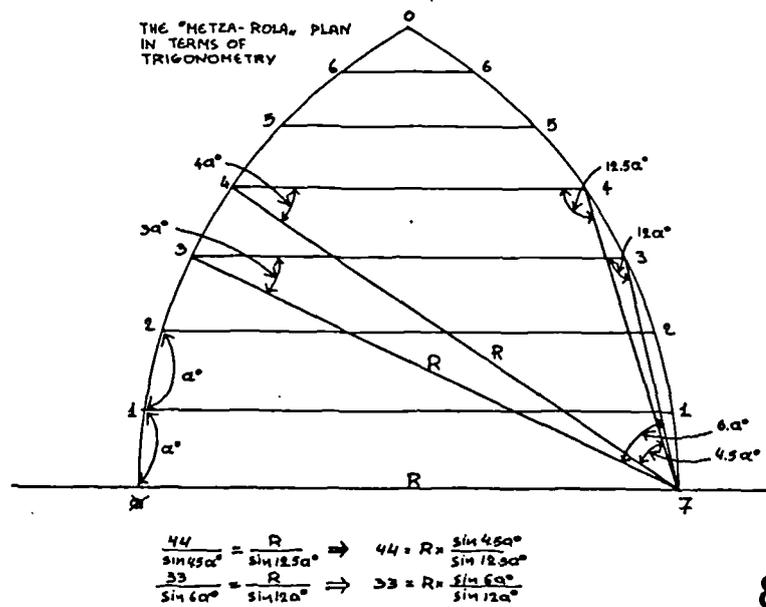


BETWEEN THE SIRMARKS OF TWO DIFFERENT "METHA ROLA", PLANS THE FOLLOWING
 RATIO EXISTS: $\frac{07}{07'} = \frac{11}{11'} = \frac{22}{22'} = \dots = \frac{66}{66'}$ (BY EXAMINING THE

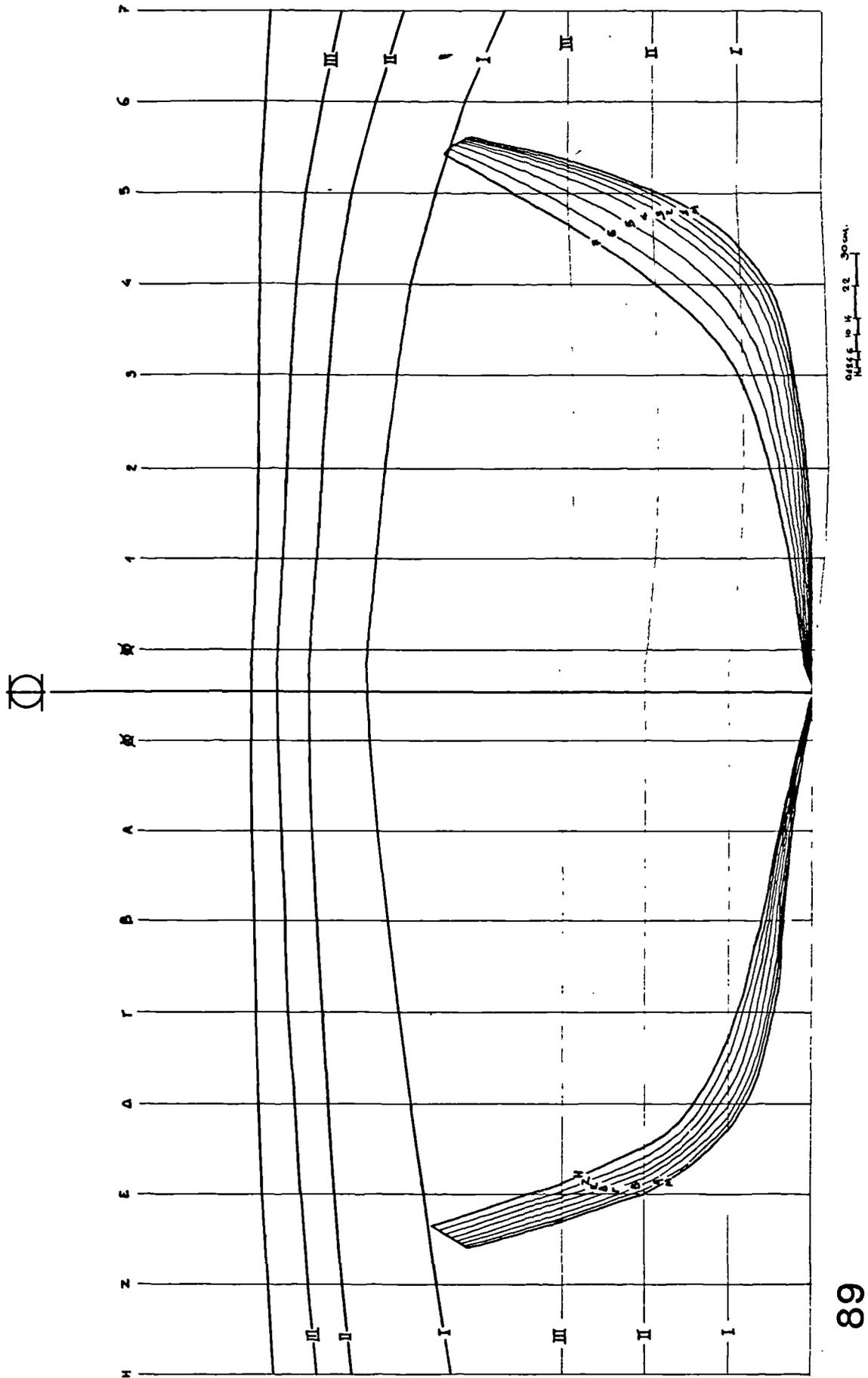
TRIANGULARS: $\triangle 1'1'1, \triangle 2'2'2, \dots, \triangle 6'6'6$)



88a



88b



Two diagrams which might
these measures, and show them

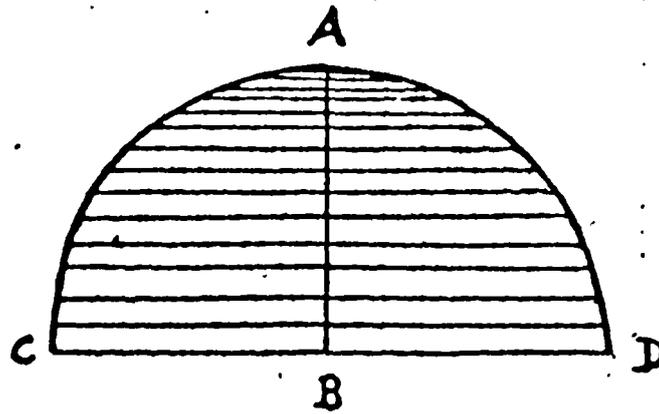
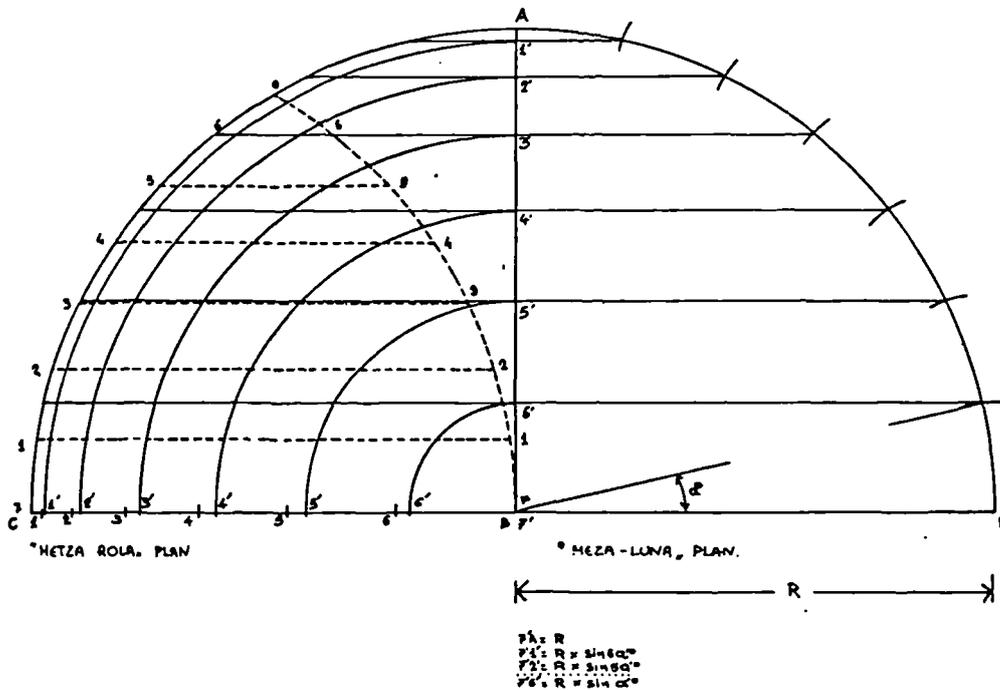


FIGURE XVII. THE MEZA-LUNA.

fully is that shown in figure XV
meza-luna, the "half-moon." A

90a



90b

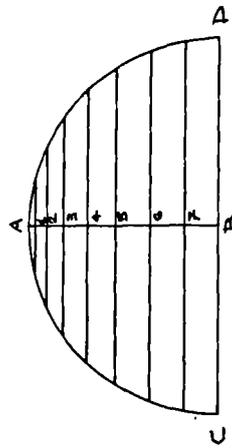


DIAGRAM "B" "HEZA-LUNA"

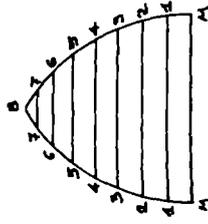
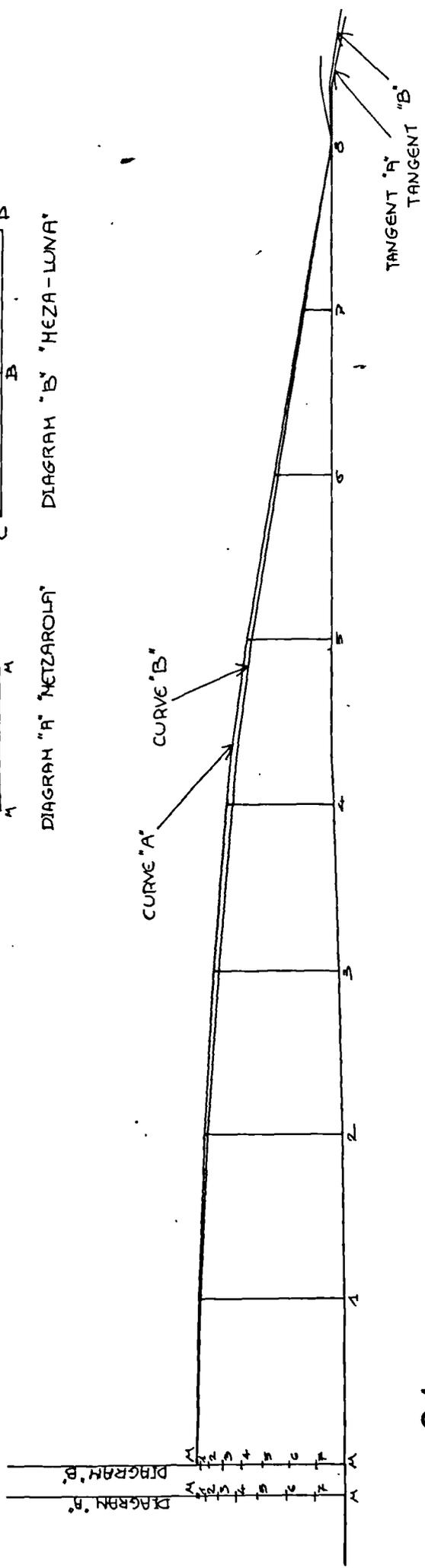
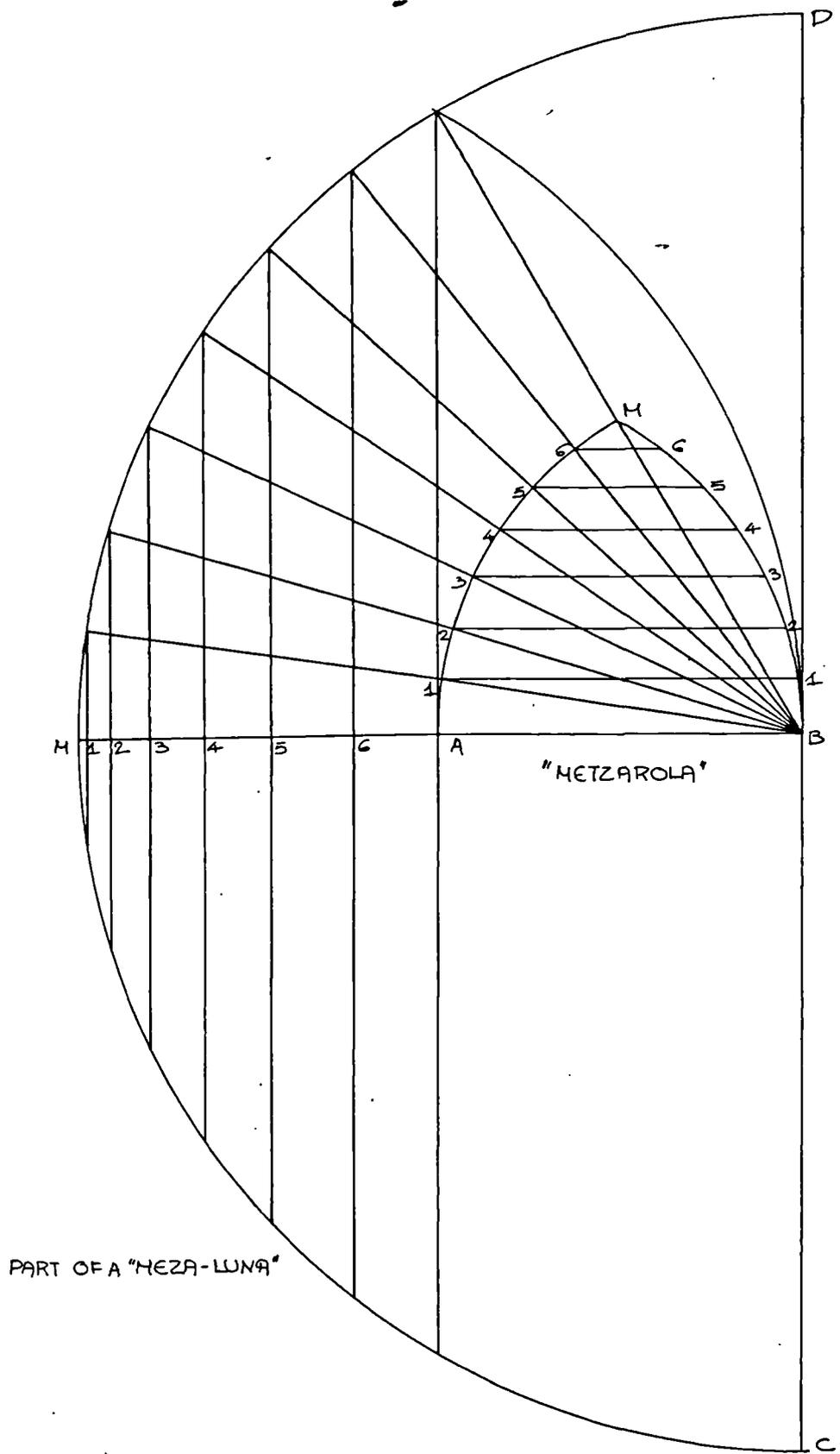
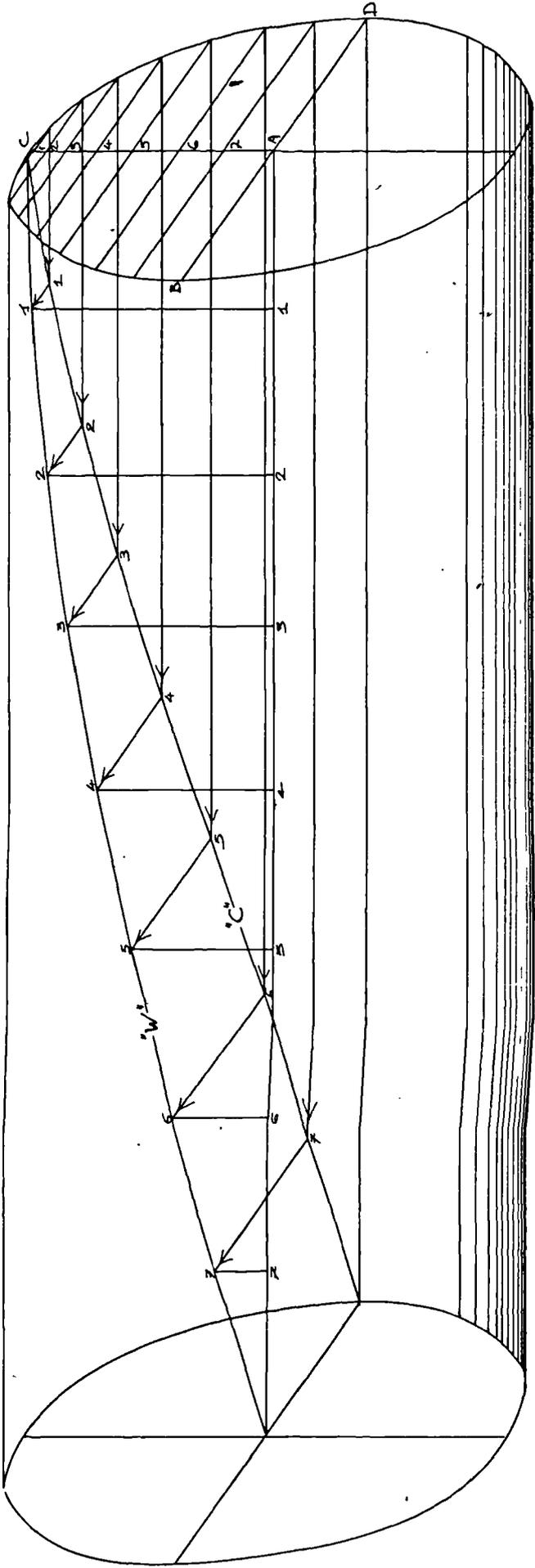


DIAGRAM "A" "NETZAROLA"

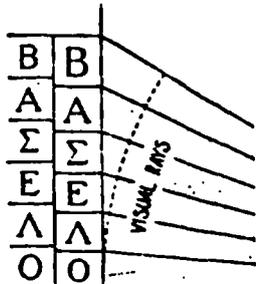


SCHEMATIC CURVES
 PROVIDED BY THE "NETZAROLA"
 AND THE "HEZA-LUNA" DIAGRAMS.

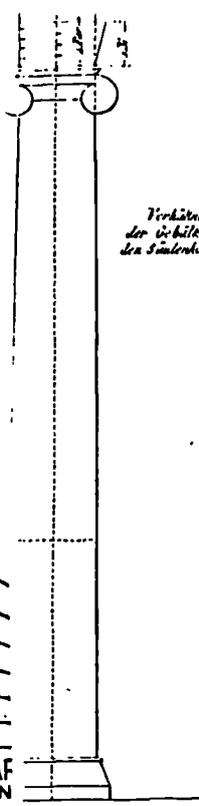




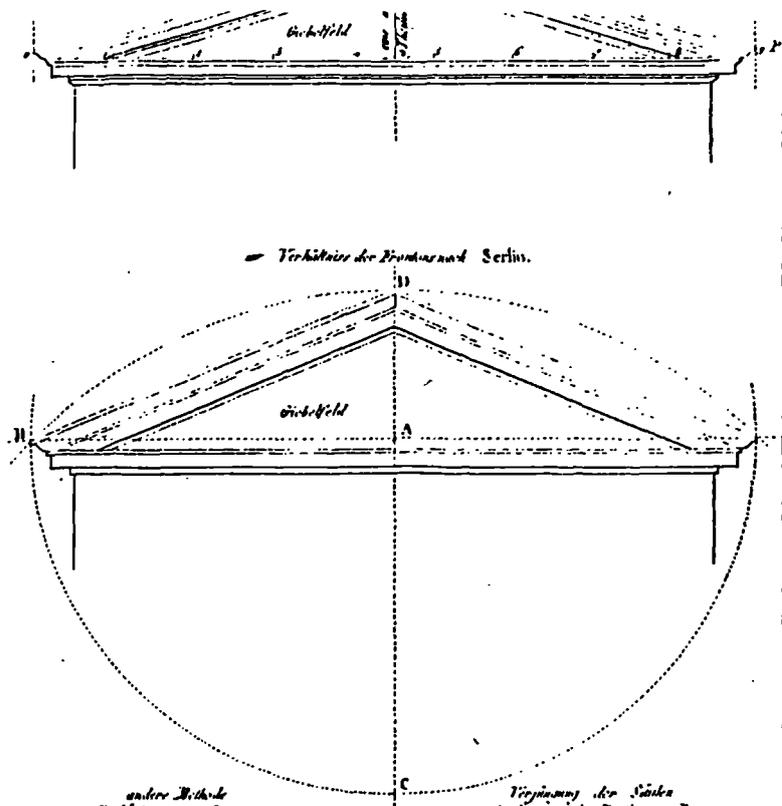
OPTICAL



CORRECTION OF APPAR FROM AN INSCRIPTION ON OF A TEMPLE AT PRIENE



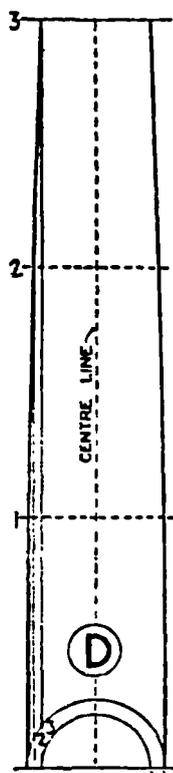
Verhältnis der Gebälke zu den Säulenhäfen.



Verhältnis der Frontwand Serlin.

andere Methode die Säulen zu verjüngen.

Verjüngung der Säulen im Innern des Parthenon zu Rom.



der Säulen in Innern des Parthenon.

von Streifen der von Thiele der Schaft B.

D METHOD FOR ENTASIS
 abcd ARE BOTTOM & TOP DIAMETERS RESPECTIVELY. DESCRIBE SEMICIRCLES ON THESE & AT c ERECT PERPENDICULAR CUTTING LARGER ONE IN 3 DIVIDE SEGMENT a 3 = HEIGHT OF COLUMN INTO ANY NUMBER OF EQUAL PARTS - SAY 3 - & NUMBER BOTH 1 2 3 FROM a THRO POINTS 1 2 3 IN SEGMENT ERECT PERPENDICULARS CUTTING CORRESPONDING DIVISIONS OF THE HEIGHT THRO THE POINTS THUS OBTAINED DRAW CURVE

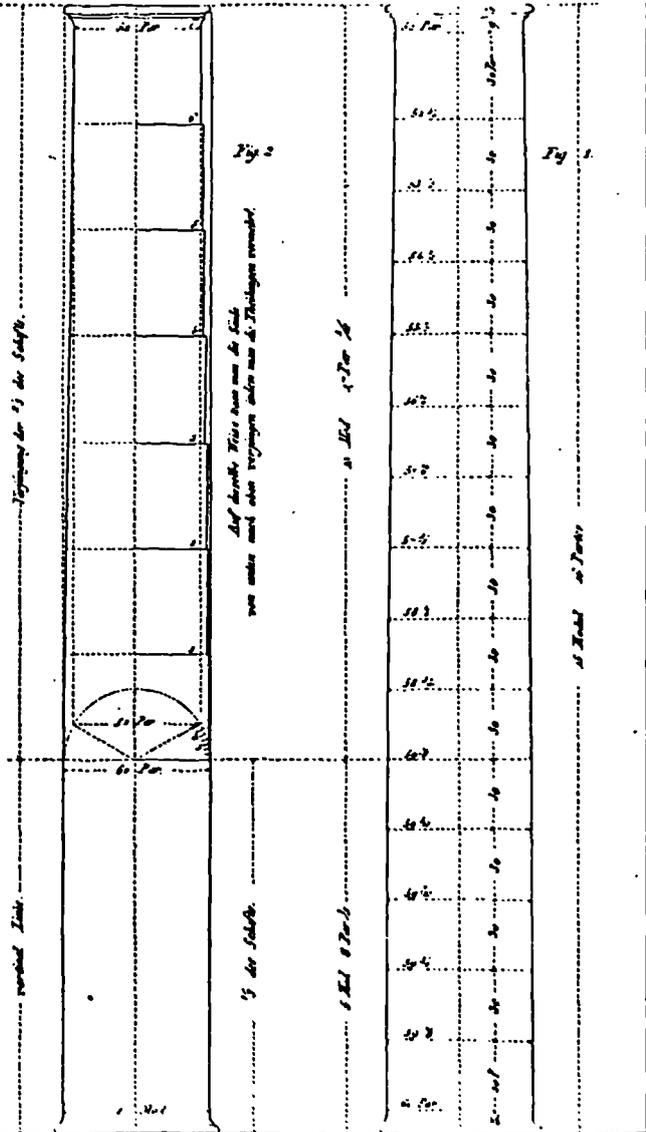


Fig. 2

Fig. 1

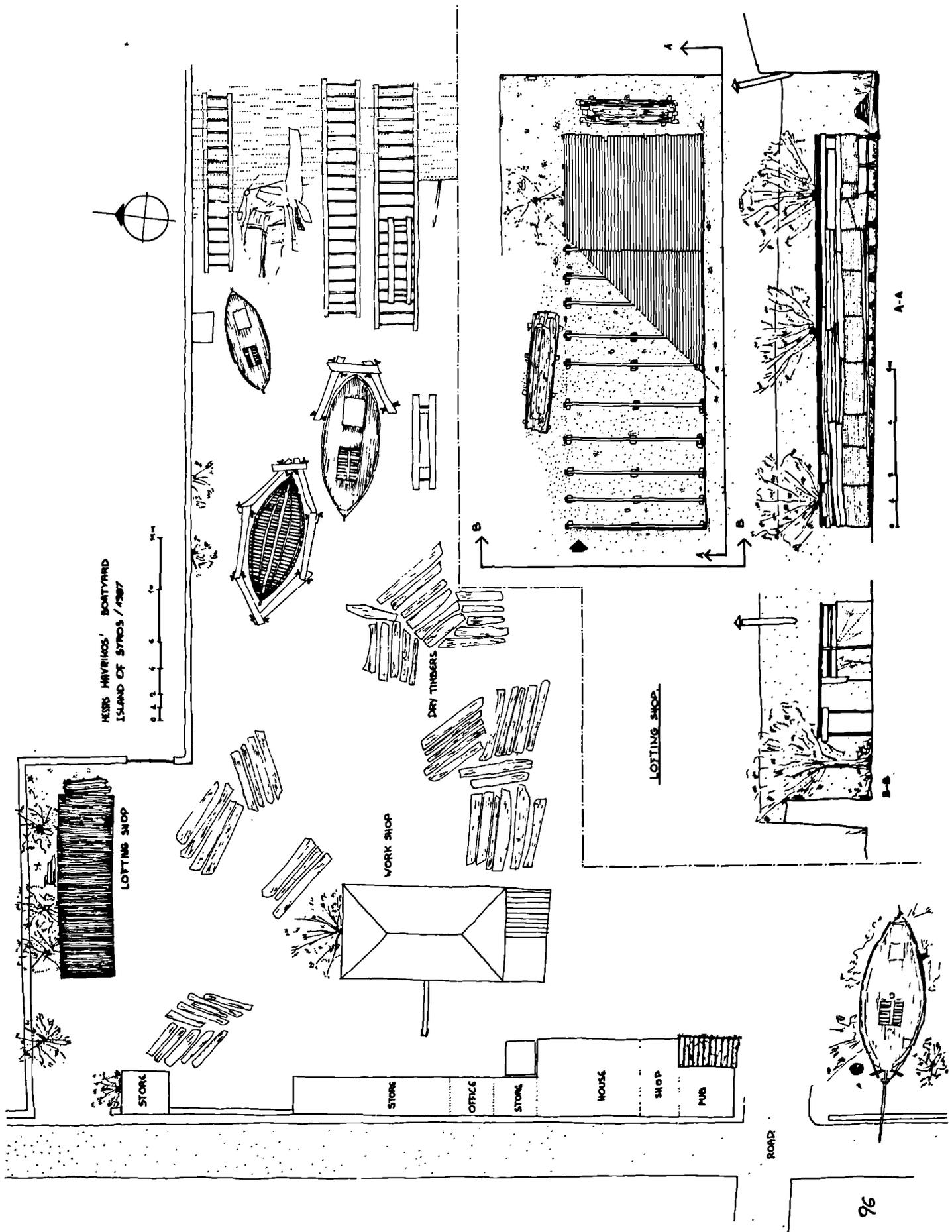
Auf dieser Höhe kann man die Höhe von unten nach oben verjüngen oder man die Höhe von oben nach unten verjüngen.

5 der Schaft.

6 der Schaft.

11 der Schaft.

96. Plan of [1]-Mavrikos boatyard moulding (5.3.1)
97. Photograph of the [1]-Mavrikos lofting floor from inside (5.3.1)
98. Lofting floor in Perama (5.3.1) -
Benaki Museum, negative No. B9277
99. Plan of recorded lofting floor in [1]-Mavrikos boatyard (5.3.1)
100. The red boat from the lofting floor (5.3.1)
101. The blue boat from the lofting floor (5.3.1)
102. The green and the yellow boats from the lofting floor (5.3.1)
103. The brown boat from the lofting floor (5.3.1).
104. The black boat from the lofting floor (5.3.1)
- 105a. The body plan of "Evaggelistria" (5.3.1)
- 105b. The half breadth plan of "Evaggelistria" (5.3.1)
- 105c. The sheer plan of "Evaggelistria" (5.3.1)
106. Laying out the lines of a boat straight on the lofting floor (lines from red boat) (5.3.1)
107. Patterns for the lofting floor (lines from the red boat) (5.3.1)
108. Lines of a boat from Hydra from lofted patterns (the patterns belong to the Hellenic Institute of Preservation of the Maritime Heritage) (5.3.1)
109. Diagram of model boat lines, copied from Throckmorton's collection (5.3.2)
110. Diagram of model boat lines copied from Throckmorton's collection (5.3.2)
- 111a. Body plan of a Perama by [3]-Stilianou (5.3.3)
- 111b. Sheer plan and breadth plan of a Perama by [3]-Stilianou (5.3.3)
112. Lines plan of a Karavoskaro by [3]-Stilianou (5.3.3)

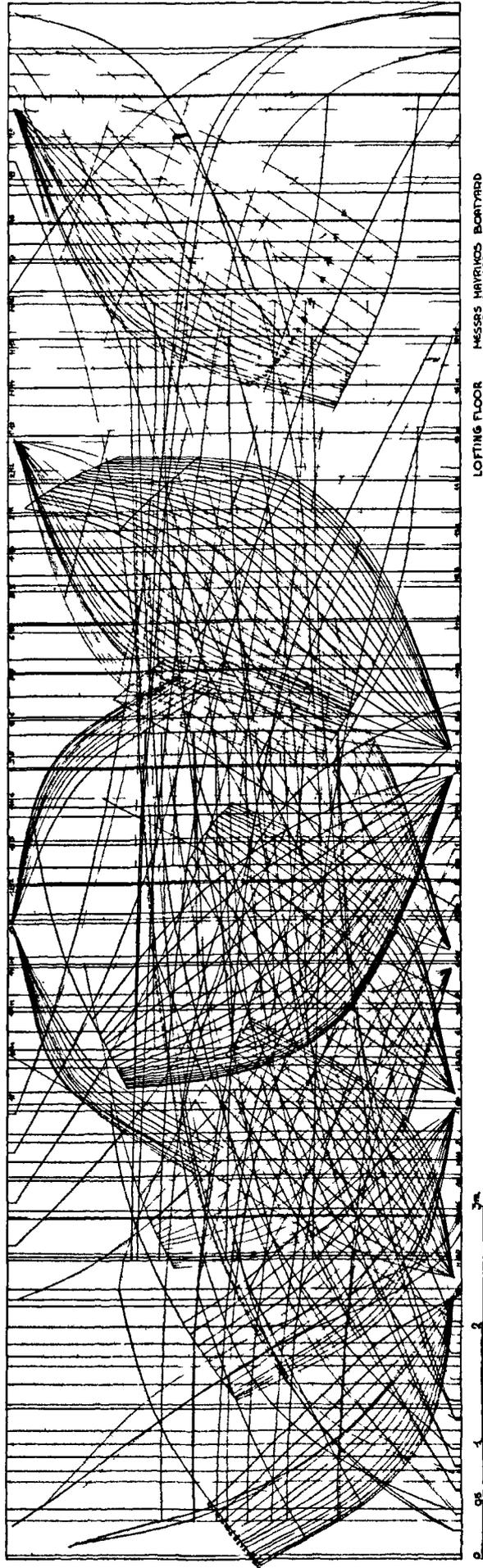




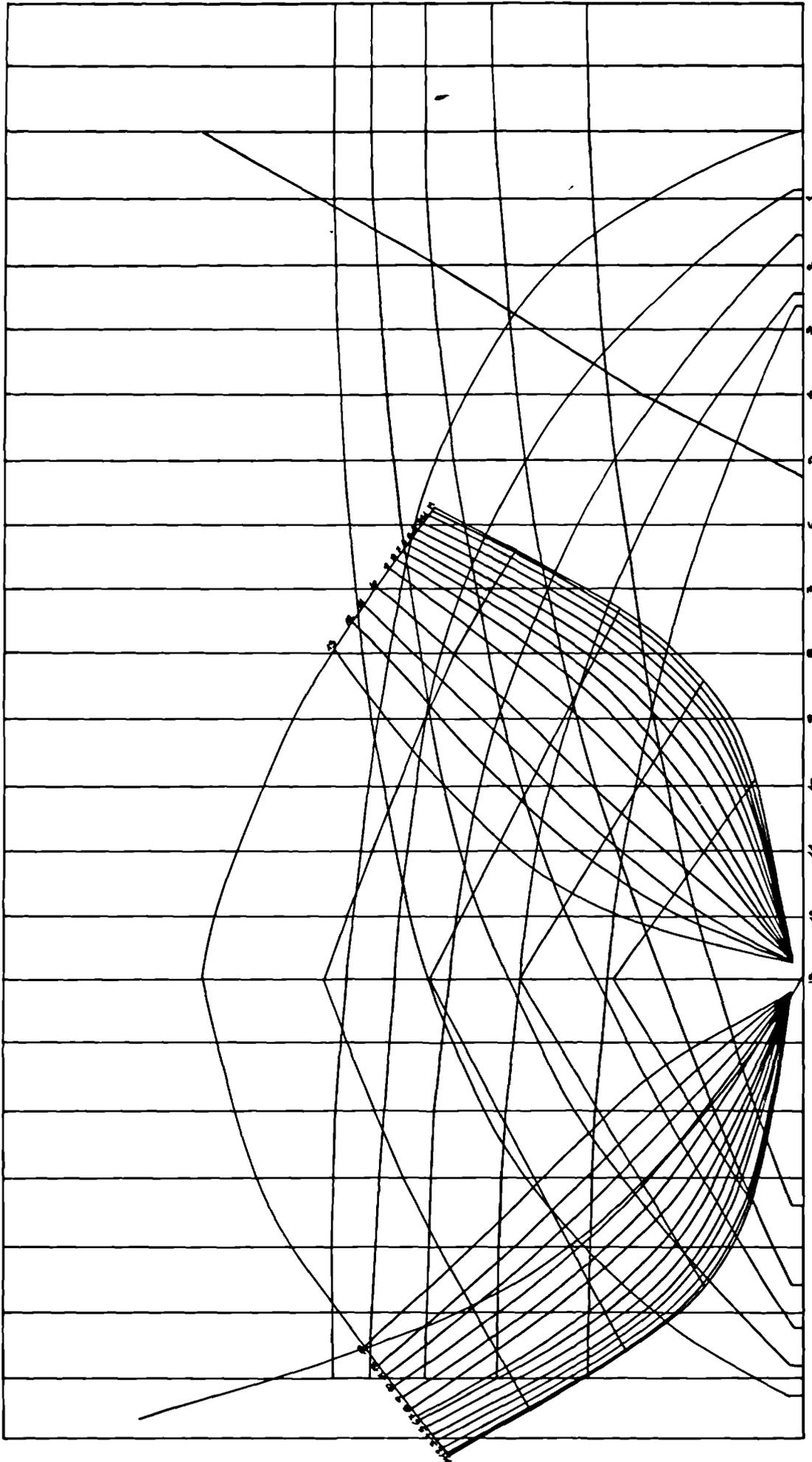
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98

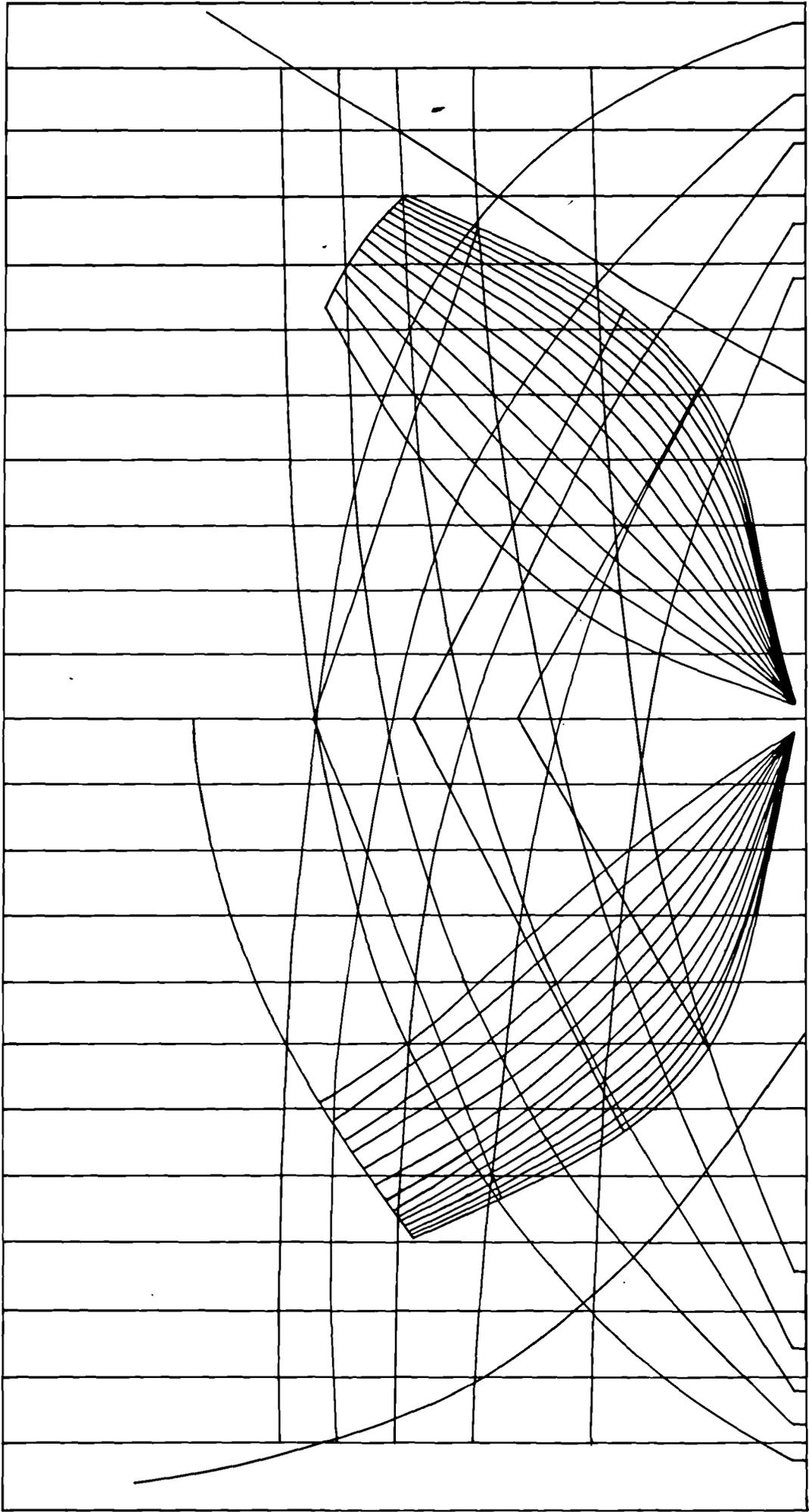


LOFTING FLOOR
MESSRS HAYWARDS BORTHARD
ISLAND OF YACHT BUILDERS 1867



0.00 0.40 0.80 1.20 1.60 2.00 2.40 2.80 3.20 3.60 4.00 4.40 4.80 5.20 5.60 6.00 6.40 6.80 7.20 7.60 8.00 8.40 8.80 9.20 9.60 10.00 10.40 10.80 11.20 11.60 12.00 12.40 12.80 13.20 13.60 14.00 14.40 14.80 15.20 15.60 16.00 16.40 16.80 17.20 17.60 18.00 18.40 18.80 19.20 19.60 20.00 20.40 20.80 21.20 21.60 22.00 22.40 22.80 23.20 23.60 24.00 24.40 24.80 25.20 25.60 26.00 26.40 26.80 27.20 27.60 28.00 28.40 28.80 29.20 29.60 30.00 30.40 30.80 31.20 31.60 32.00 32.40 32.80 33.20 33.60 34.00 34.40 34.80 35.20 35.60 36.00 36.40 36.80 37.20 37.60 38.00 38.40 38.80 39.20 39.60 40.00 40.40 40.80 41.20 41.60 42.00 42.40 42.80 43.20 43.60 44.00 44.40 44.80 45.20 45.60 46.00 46.40 46.80 47.20 47.60 48.00 48.40 48.80 49.20 49.60 50.00 50.40 50.80 51.20 51.60 52.00 52.40 52.80 53.20 53.60 54.00 54.40 54.80 55.20 55.60 56.00 56.40 56.80 57.20 57.60 58.00 58.40 58.80 59.20 59.60 60.00 60.40 60.80 61.20 61.60 62.00 62.40 62.80 63.20 63.60 64.00 64.40 64.80 65.20 65.60 66.00 66.40 66.80 67.20 67.60 68.00 68.40 68.80 69.20 69.60 70.00 70.40 70.80 71.20 71.60 72.00 72.40 72.80 73.20 73.60 74.00 74.40 74.80 75.20 75.60 76.00 76.40 76.80 77.20 77.60 78.00 78.40 78.80 79.20 79.60 80.00 80.40 80.80 81.20 81.60 82.00 82.40 82.80 83.20 83.60 84.00 84.40 84.80 85.20 85.60 86.00 86.40 86.80 87.20 87.60 88.00 88.40 88.80 89.20 89.60 90.00 90.40 90.80 91.20 91.60 92.00 92.40 92.80 93.20 93.60 94.00 94.40 94.80 95.20 95.60 96.00 96.40 96.80 97.20 97.60 98.00 98.40 98.80 99.20 99.60 100.00

THE RED BOAT



THE BLUE BORT

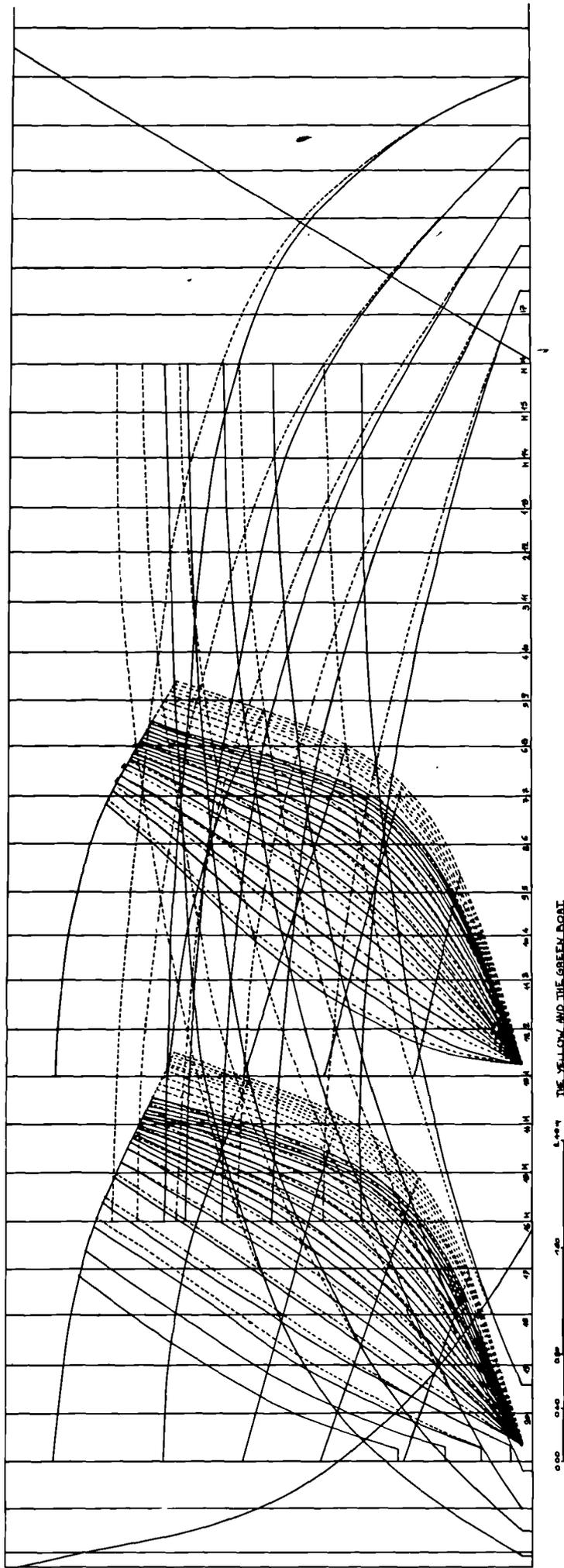
2.40M

1.20

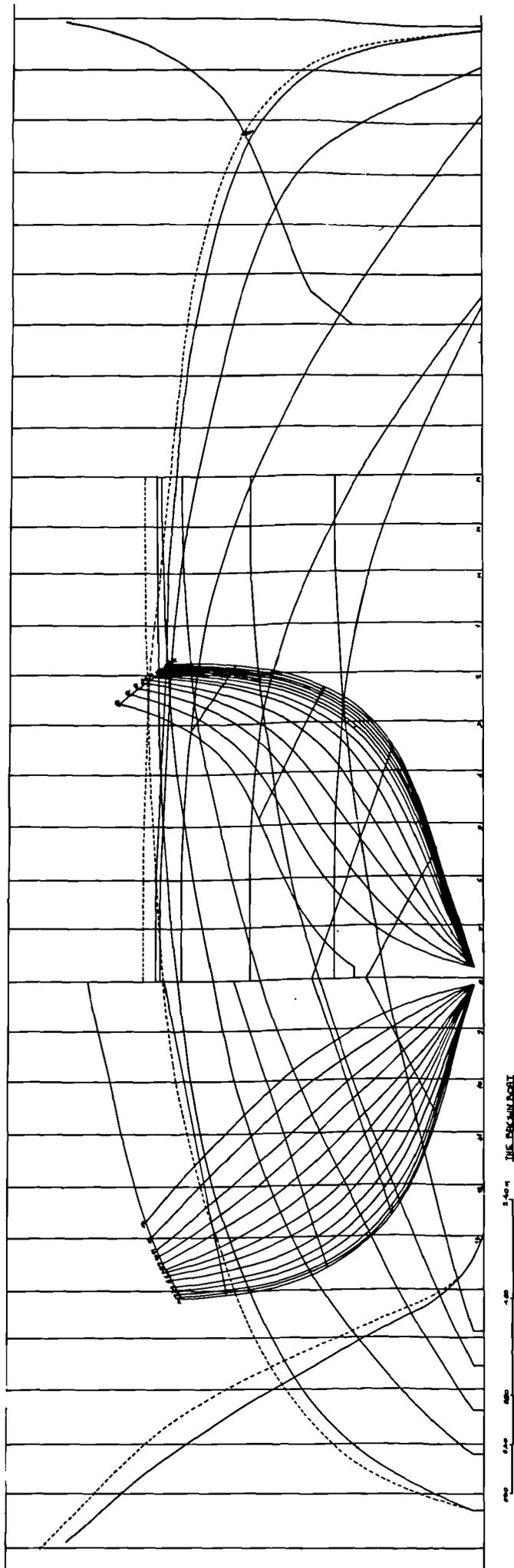
0.80

0.40

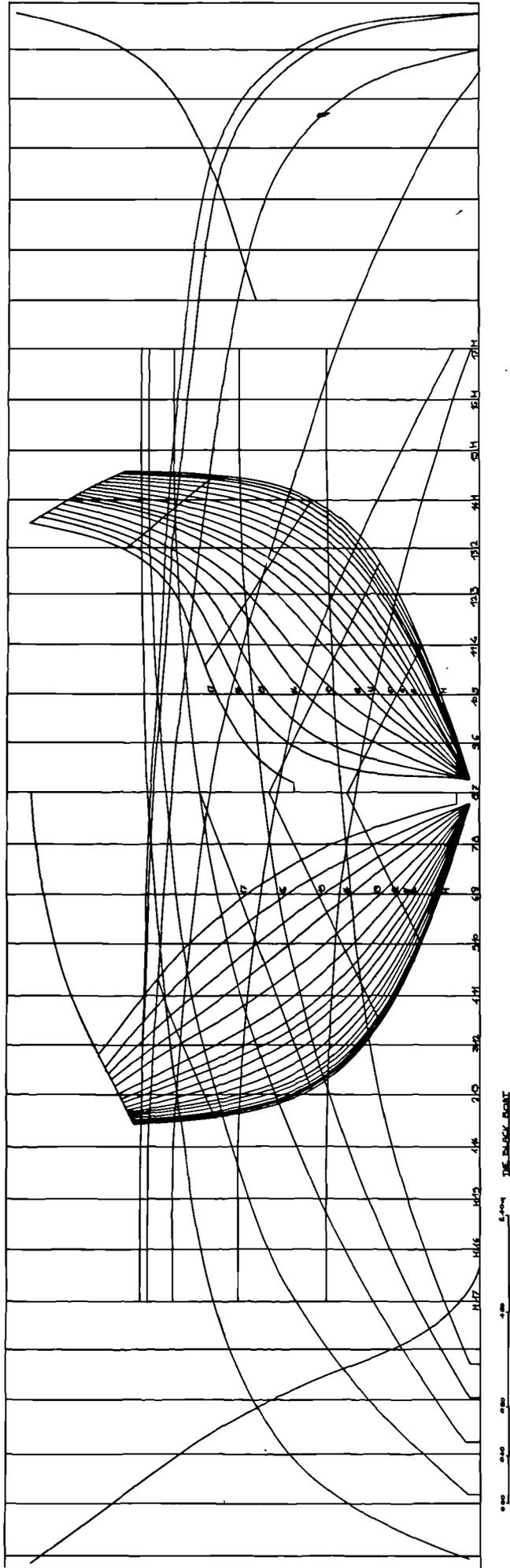
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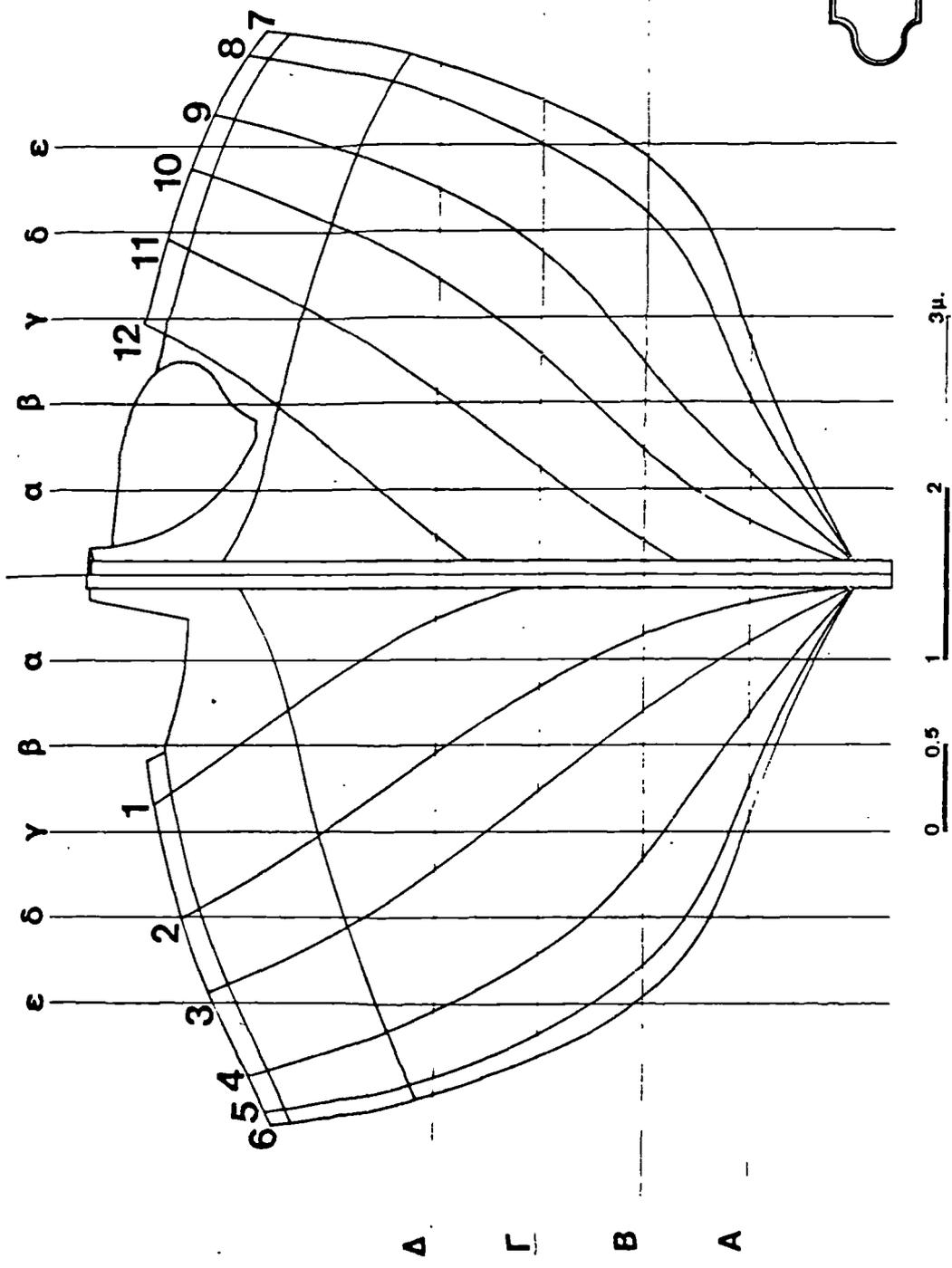


THE YELLOW AND THE GREEN BOAT



1.40 m
1.20
0.80
0.60
0.40
0.20





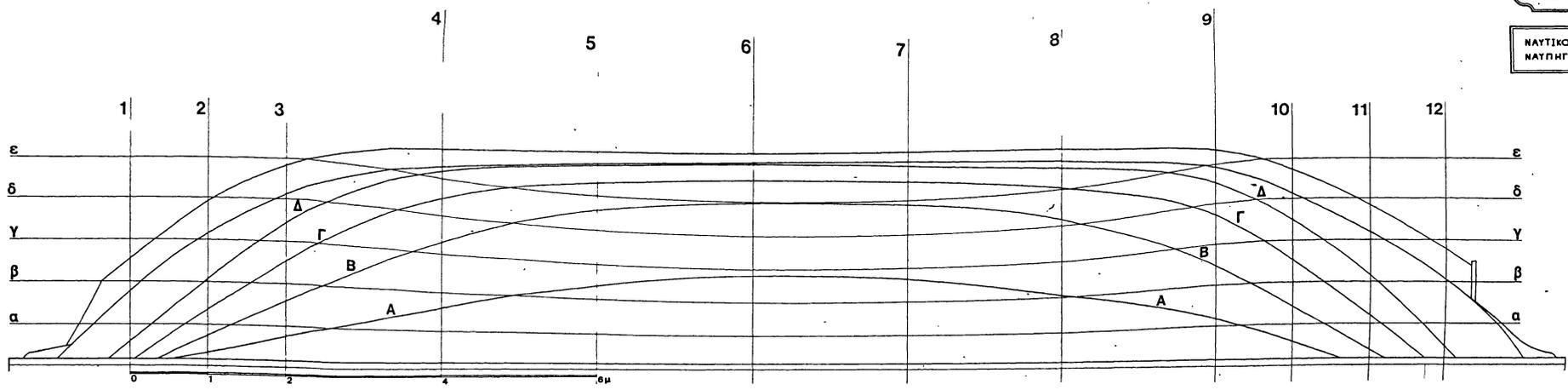
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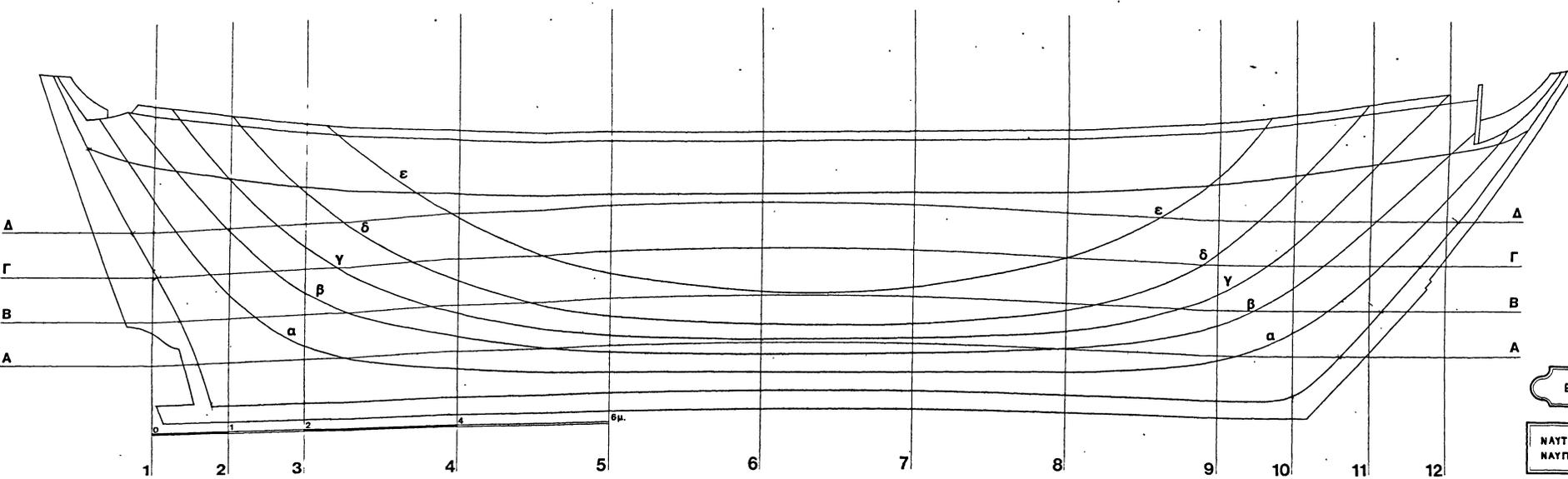
ΝΑΥΤΙΚΟ ΜΟΥΣΕΙΟ ΑΙΓΑΙΟΥ 1988
 ΝΑΥΠΗΓΗΣ ΣΥΡΟΣ 1940

Ε. ΚΑΡΑΓΙΑΝΝΙΔΗΣ

ΕΥΑΓΓΕΛΙΣΤΡΙΑ

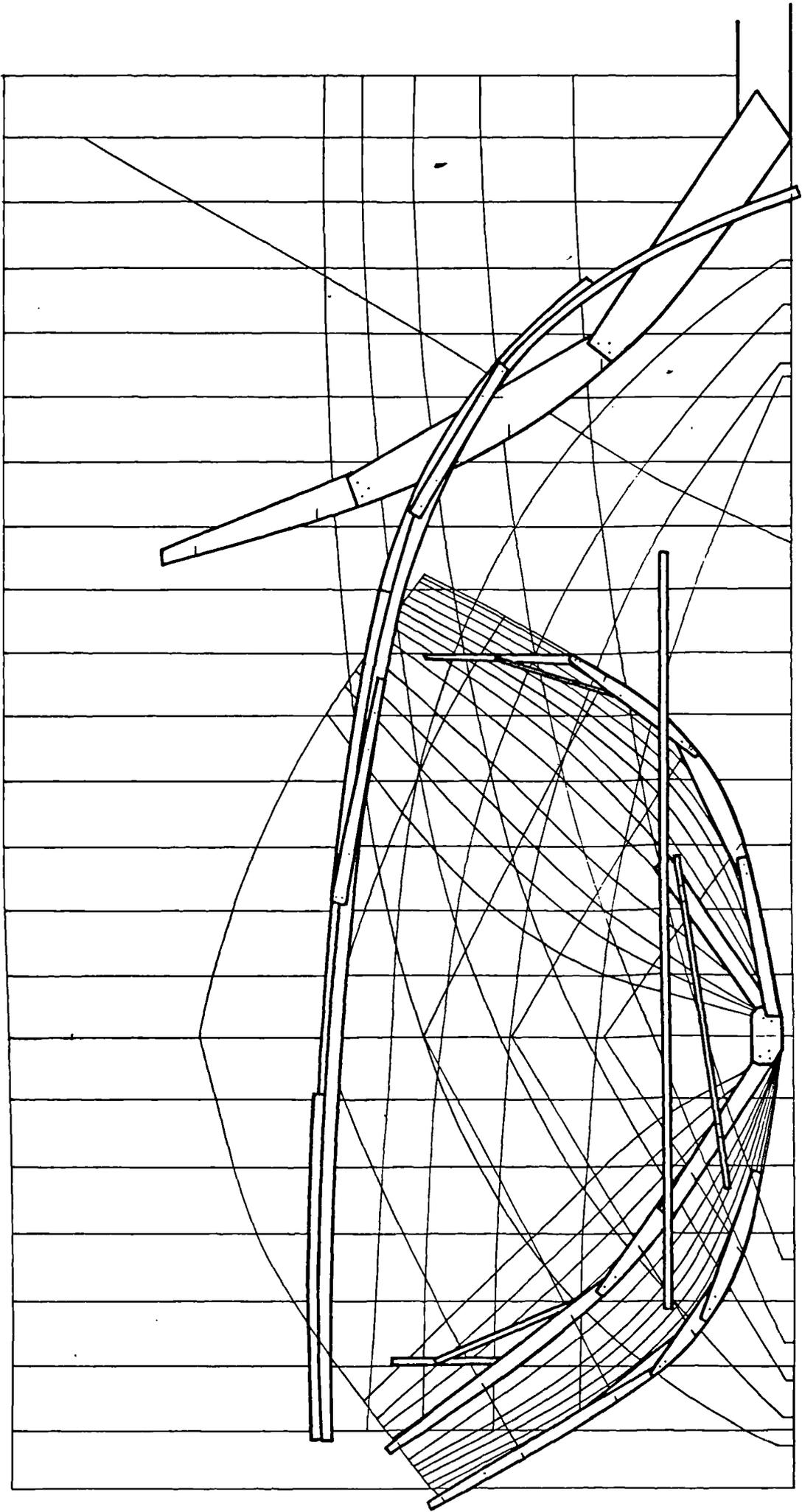
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ΝΑΥΠΗΓΗΣΗ ΣΥΡΟΣ 1940



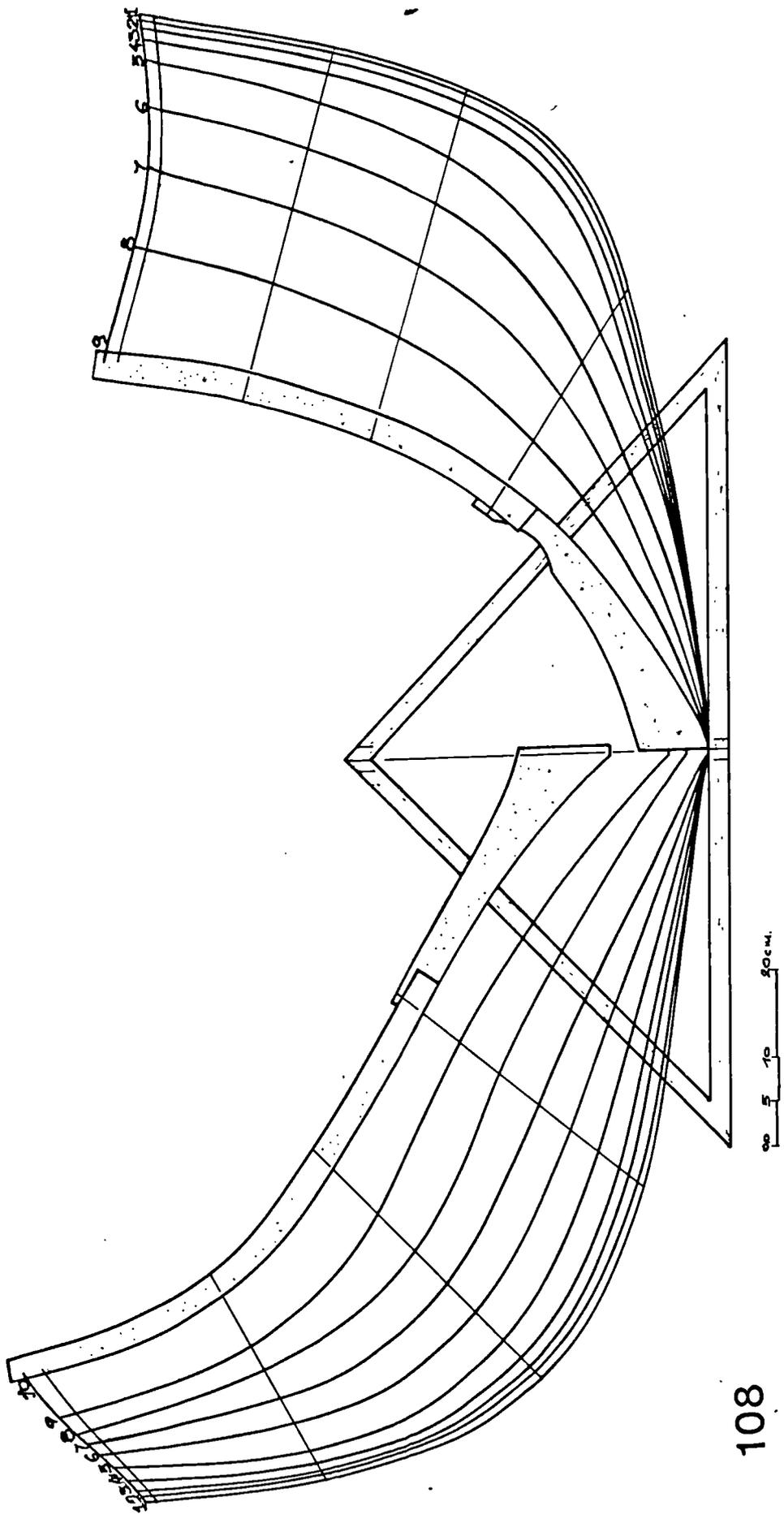


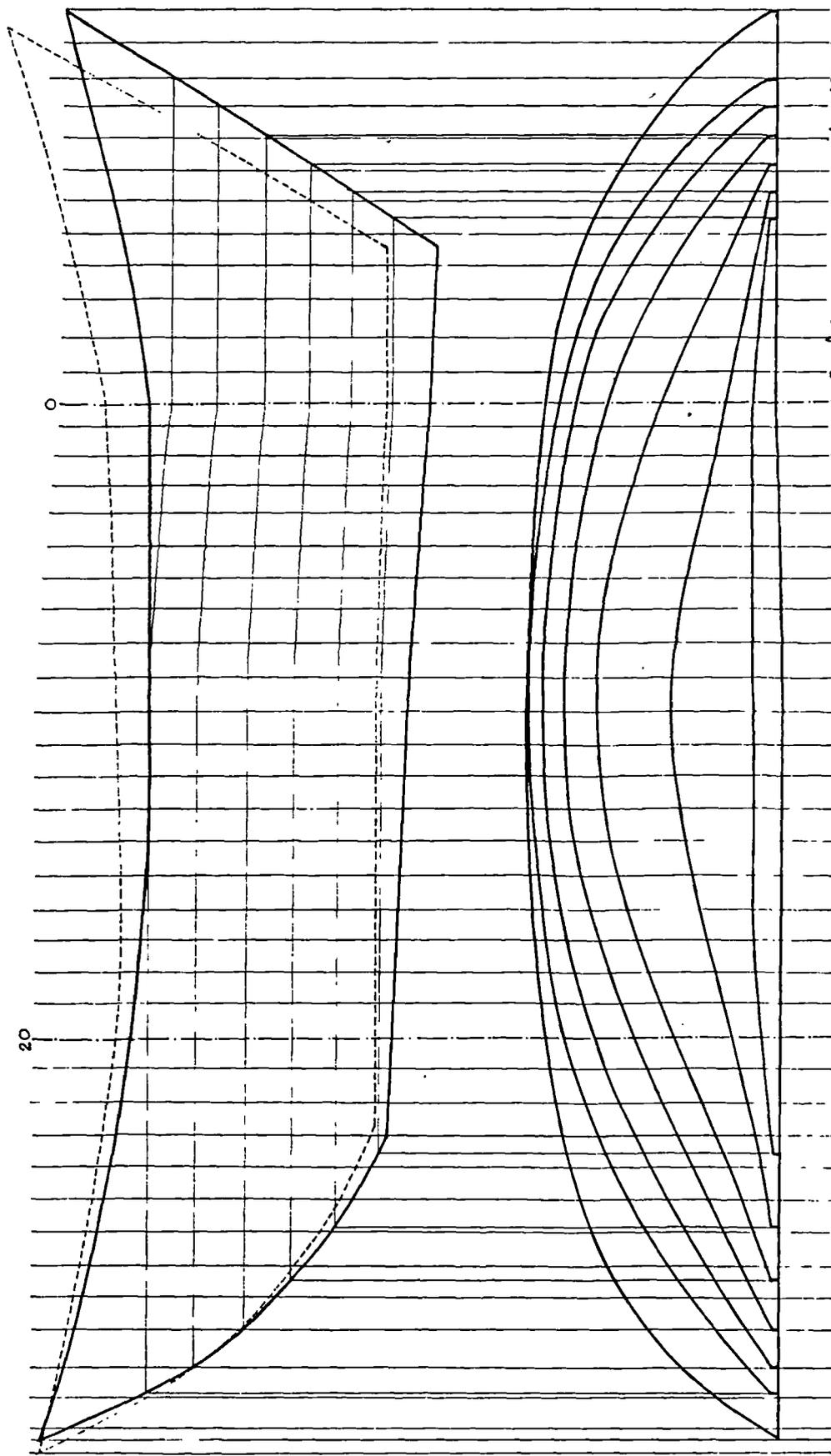
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ΝΑΥΤΙΚΟ ΜΟΥΣΕΙΟ ΑΙΓΑΙΟΥ 1988 ΝΑΥΠΗΓΗΣΗ ΣΥΡΟΣ 1940
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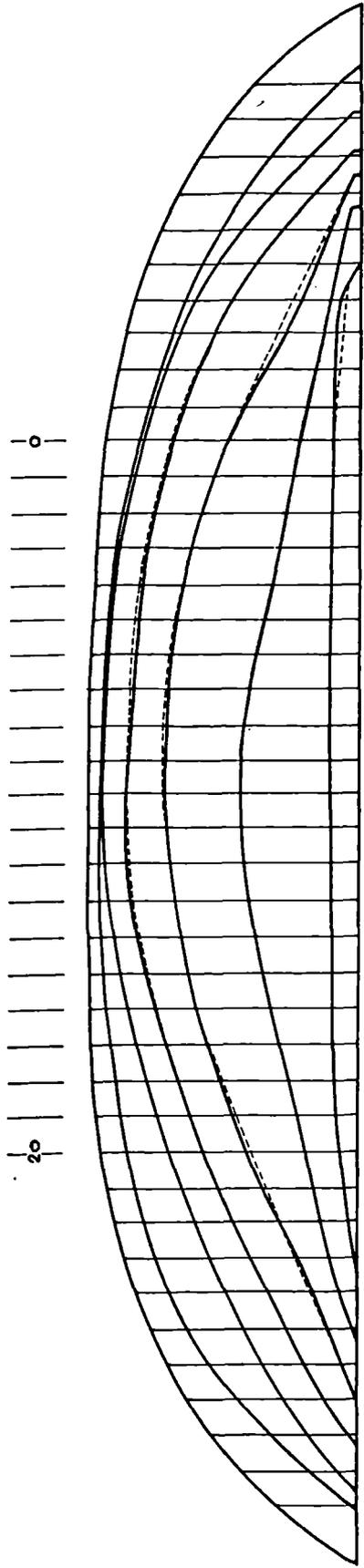


00 01 02 04 06 1.00 1.40 m





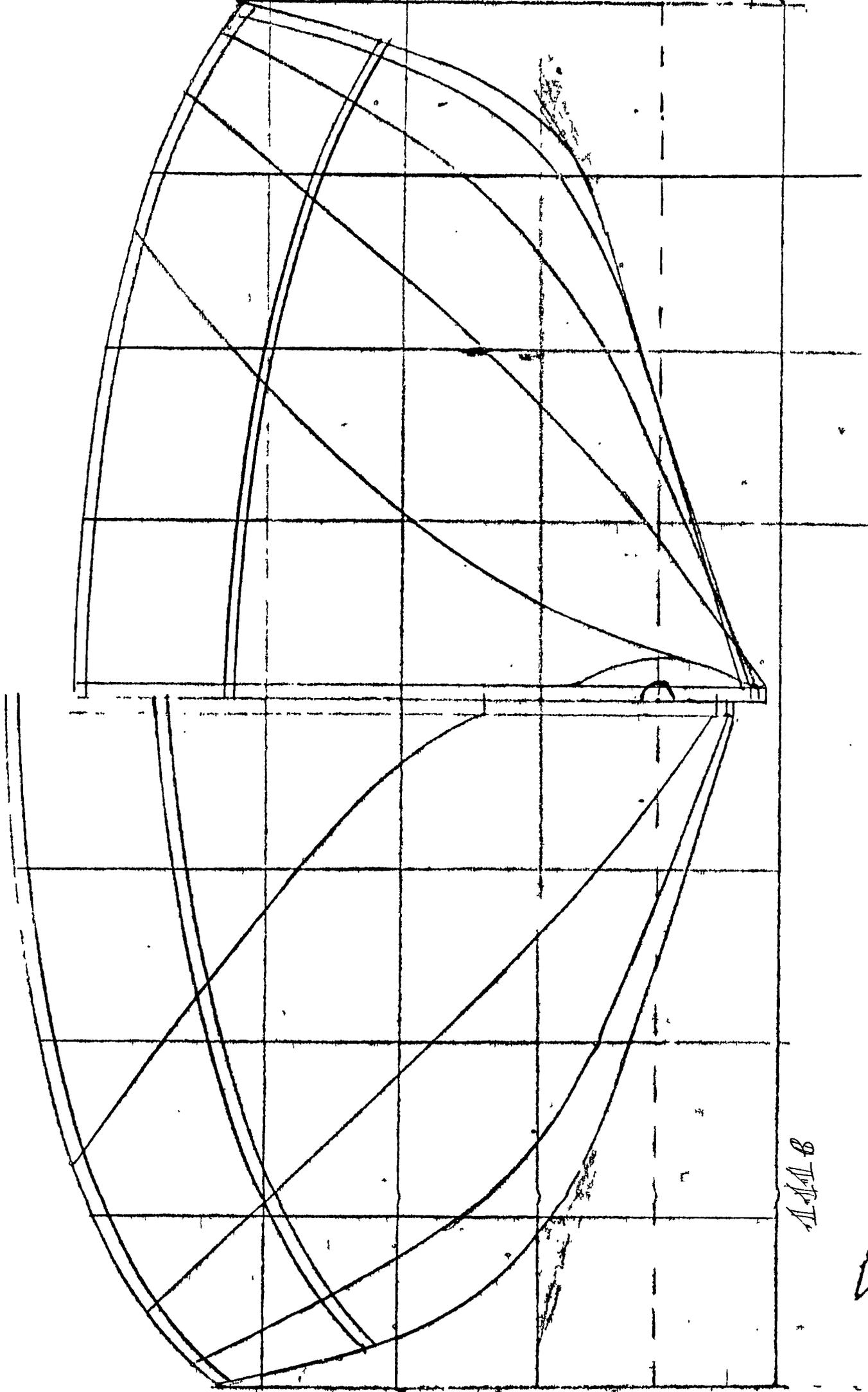
"Half model of SAVAS VIKAS Technodici 1937"
 From Mr. Petze Throckmorton's collection
 redrawn by K. Damianidis.



0 1 2 4 6 8 10 12 14 cm.

110

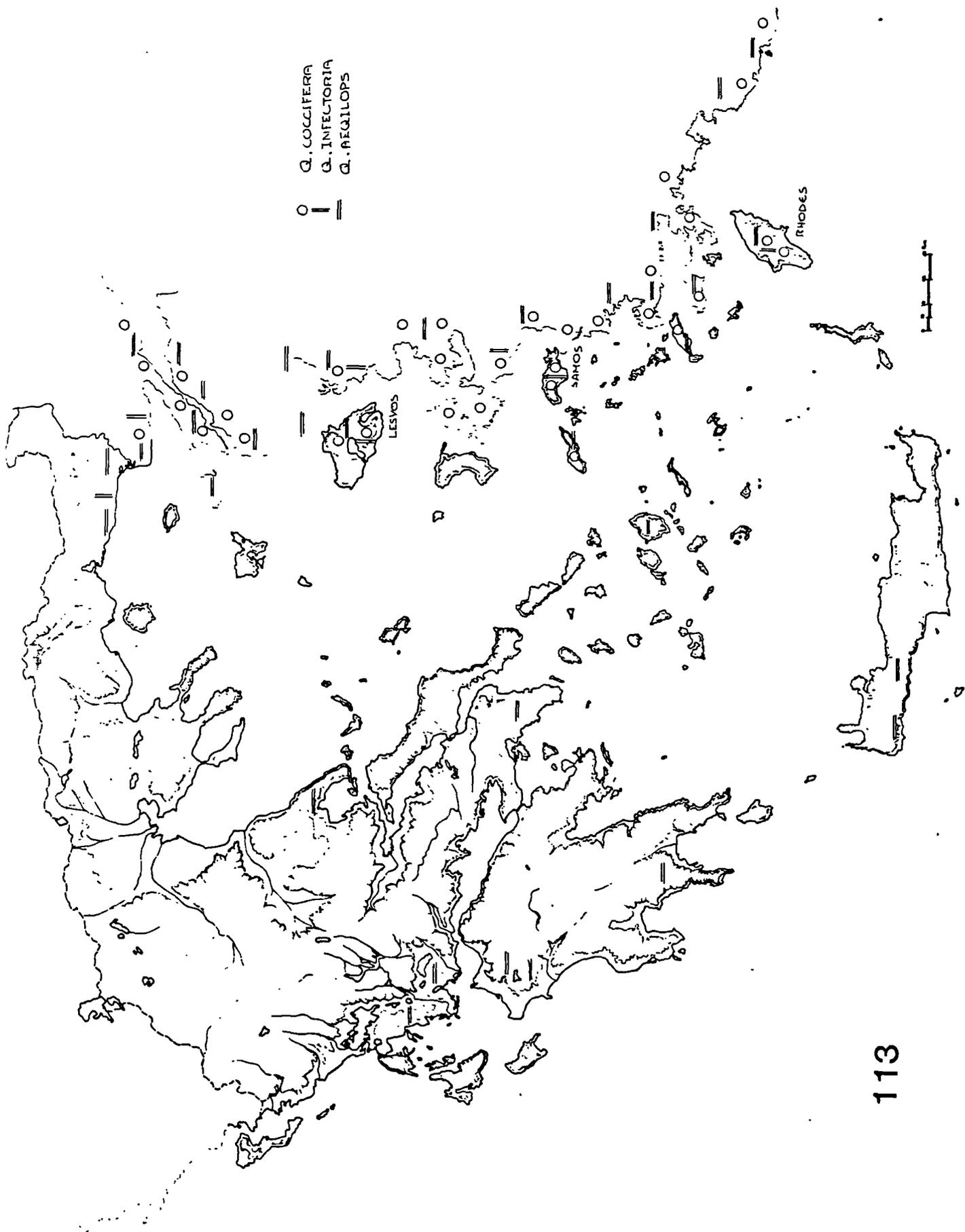
"Half model double-ended boat
 from Peter Throckmorton's collection
 redrawn by K. Daniandis."

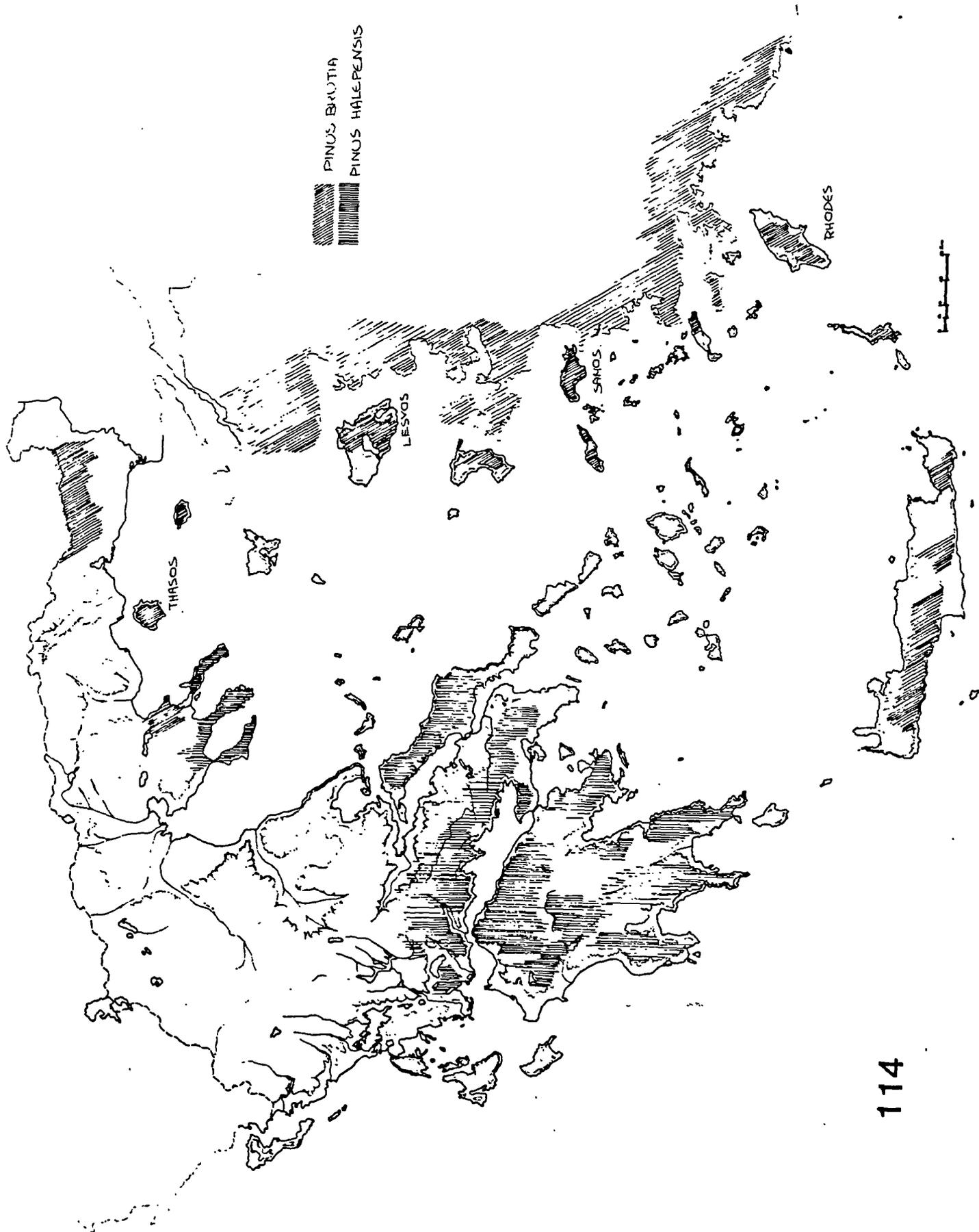


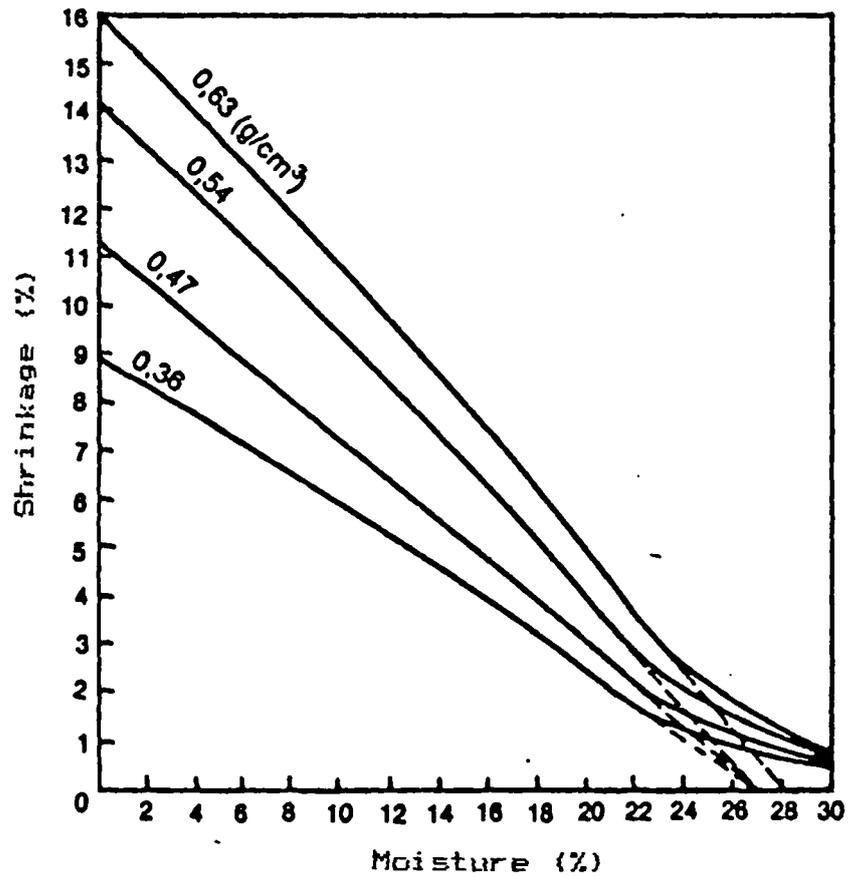
A.A.B.



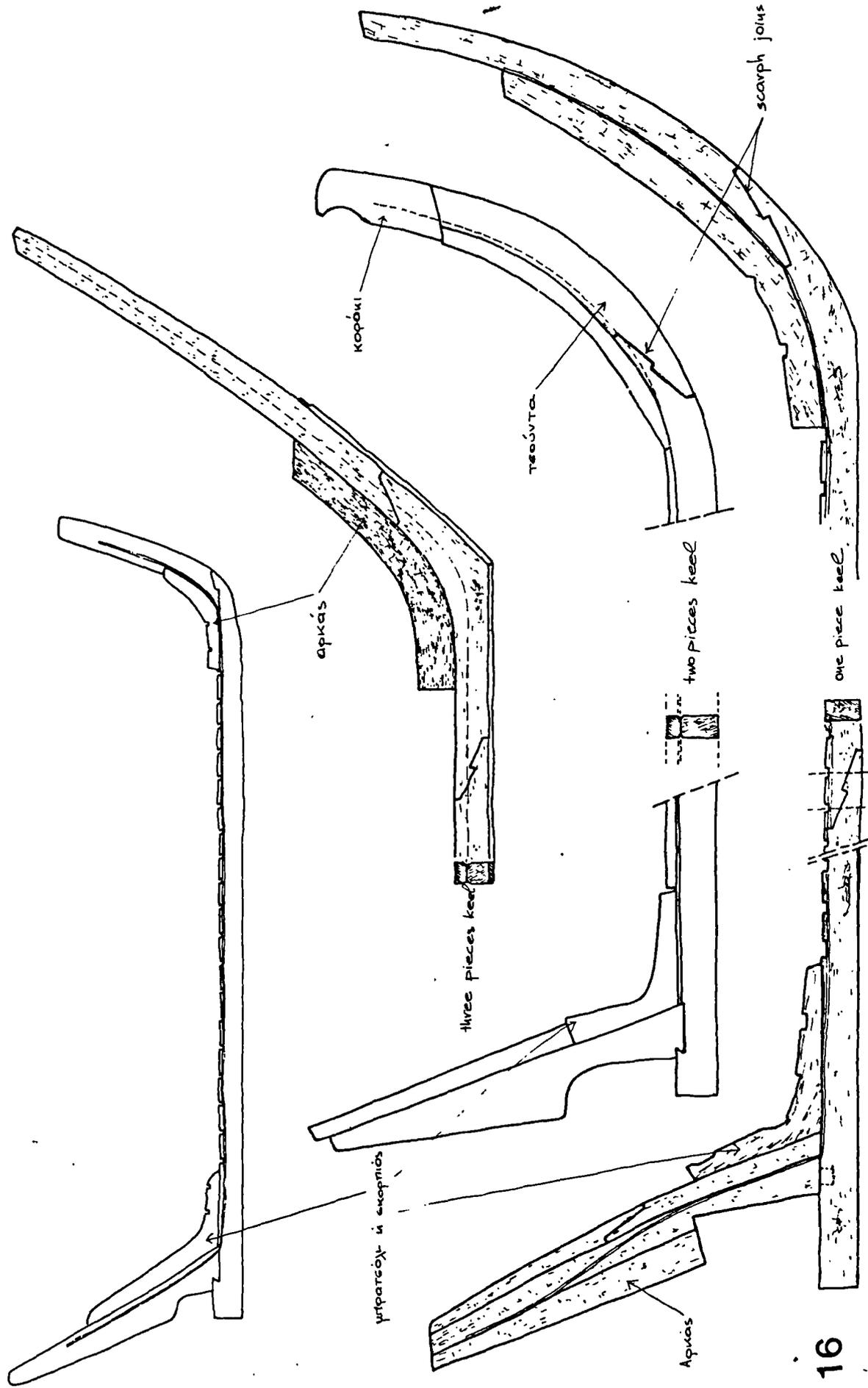
113. Distribution map of oak trees for boatbuilding (6.1.2.a)
(Tsoumis,G.T. (1972, p.315), and Davis,D. (1982, vol.1, pp.890-91)
114. Distribution map of pine trees for boatbuilding (6.1.3.a)
P.brutia (Tsoumis,G.T., 1972, p.312) (Davis,D.,1982, Vol.1, p.73)
P.halepensis (Tsoumis,G.T., 1972, p.312) (Davis,D.,1982, Vol.1, p.77)
115. Diagram of timber shrinkage (Tsamis,G., 1983, p.157) (6.2.3)
116. Keel stem and stern posts of double ended boats (7.2.1)
117. Stem and stern posts of boats with a transom stern (7.2.2)
118. Stern posts of Liberty boats (7.2.3)
119. Stern post of a Liberty boat (7.2.3.)
Benaki Museum, negative No. B.3802, Kavala
120. Stern post of a Karavoskaro boat (7.2.4)
121. Long section of a Trechadiri boat
(Damianidis,K. and Zivas,A., (1986))

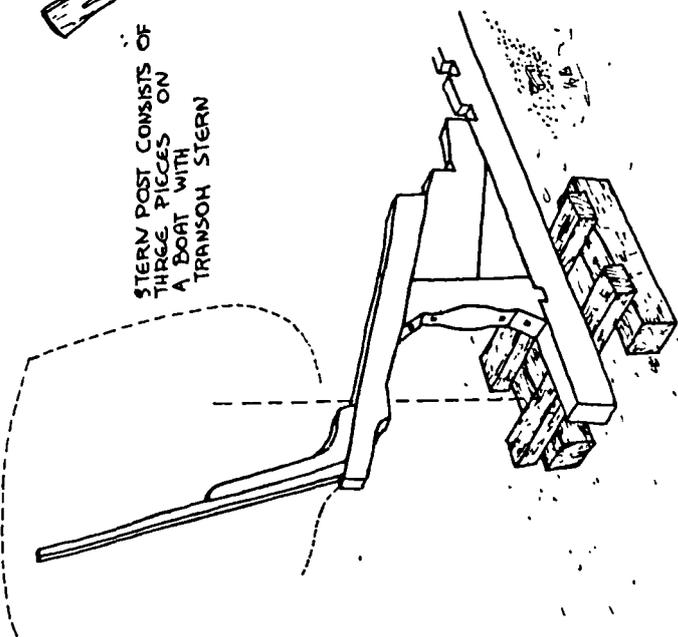




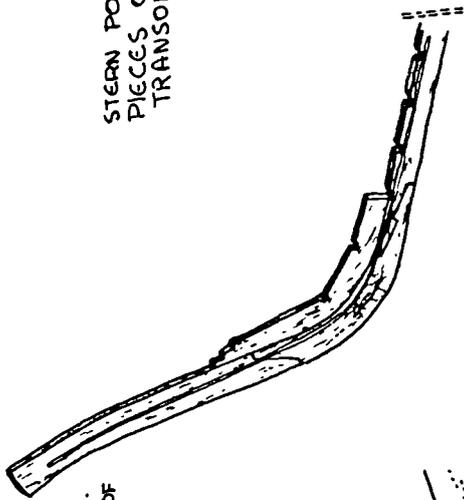


Relation between shrinkage of volume and moisture of pine wood under different specific gravities (stemm) (source: Tsoumis, G.Th. (1983, fig.46))

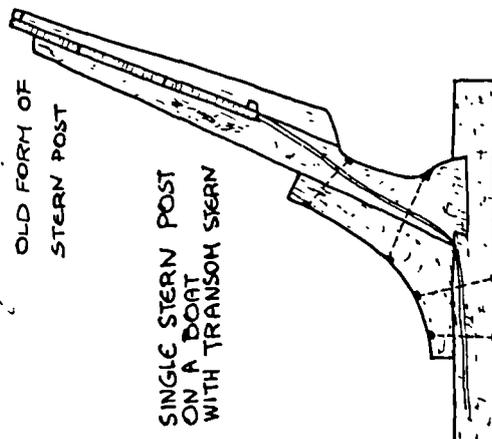
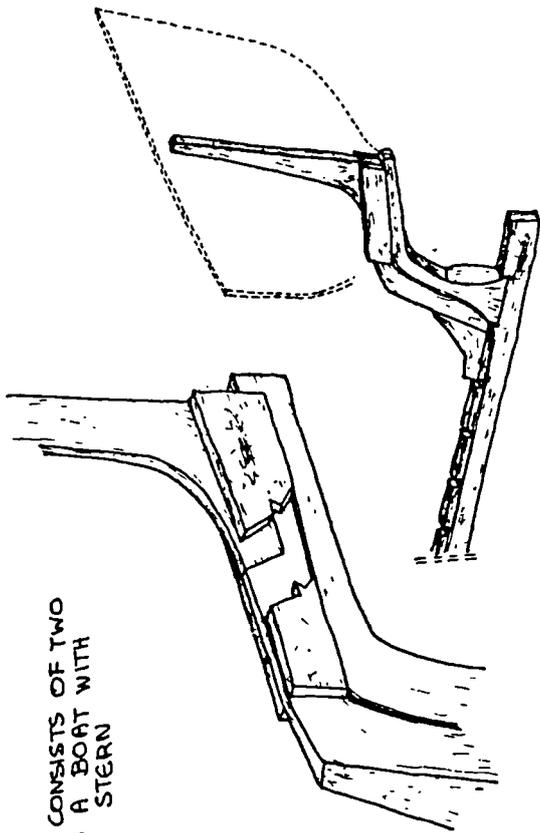




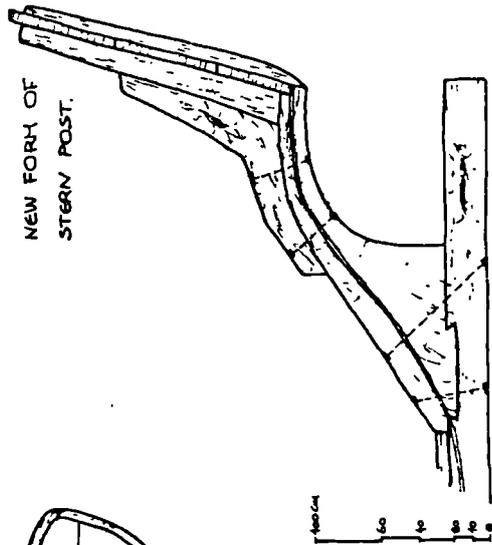
STERN POST CONSISTS OF THREE PIECES ON A BOAT WITH TRANSOM STERN



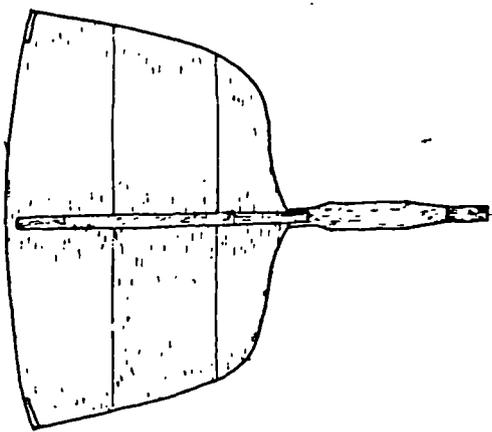
STERN POST CONSISTS OF TWO PIECES ON A BOAT WITH TRANSOM STERN



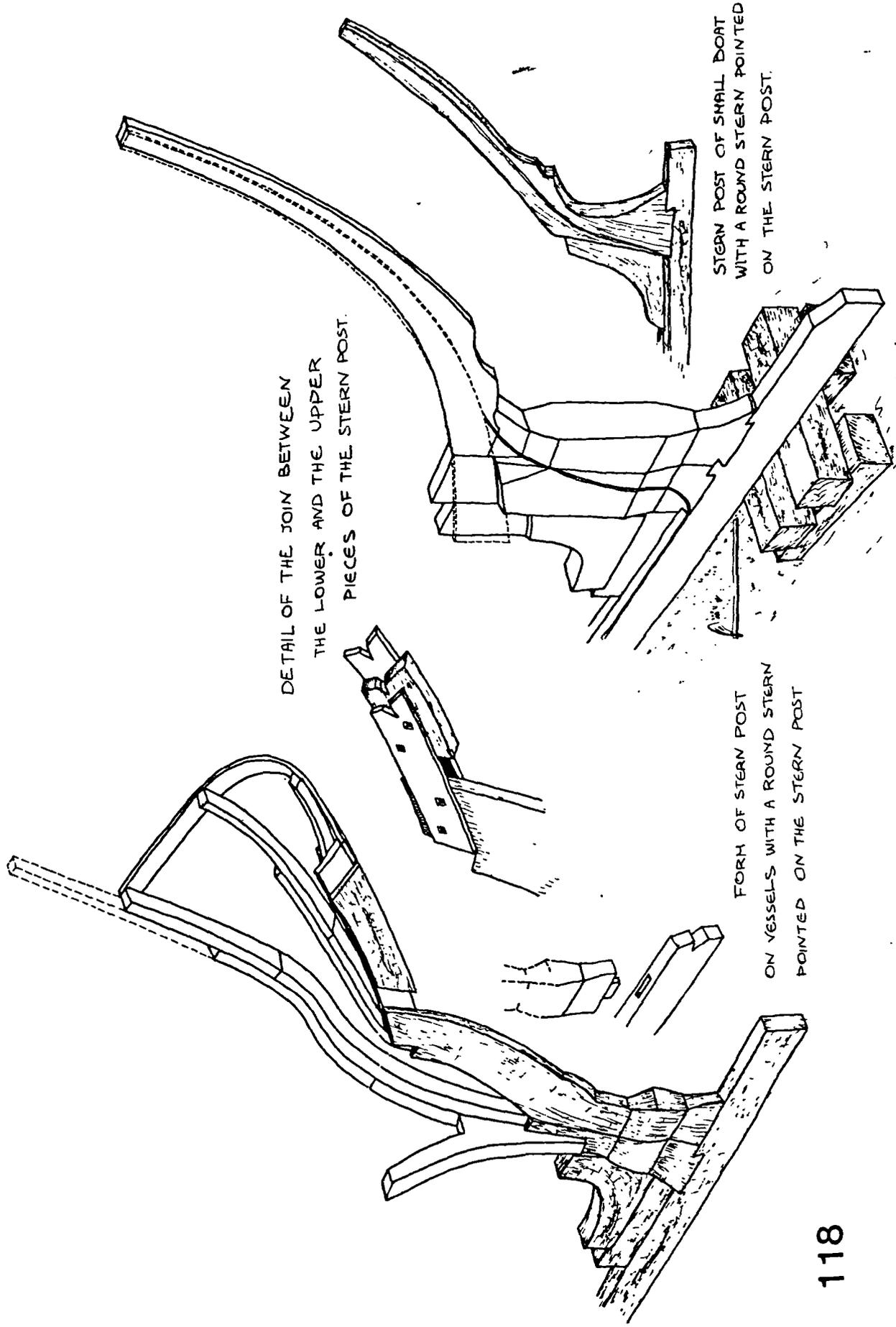
SINGLE STERN POST ON A BOAT WITH TRANSOM STERN



NEW FORK OF STERN POST.



OLD FORM OF STERN POST



DETAIL OF THE JOIN BETWEEN
THE LOWER AND THE UPPER
PIECES OF THE STERN POST.

STERN POST OF SMALL BOAT
WITH A ROUND STERN POST
ON THE STERN POST.

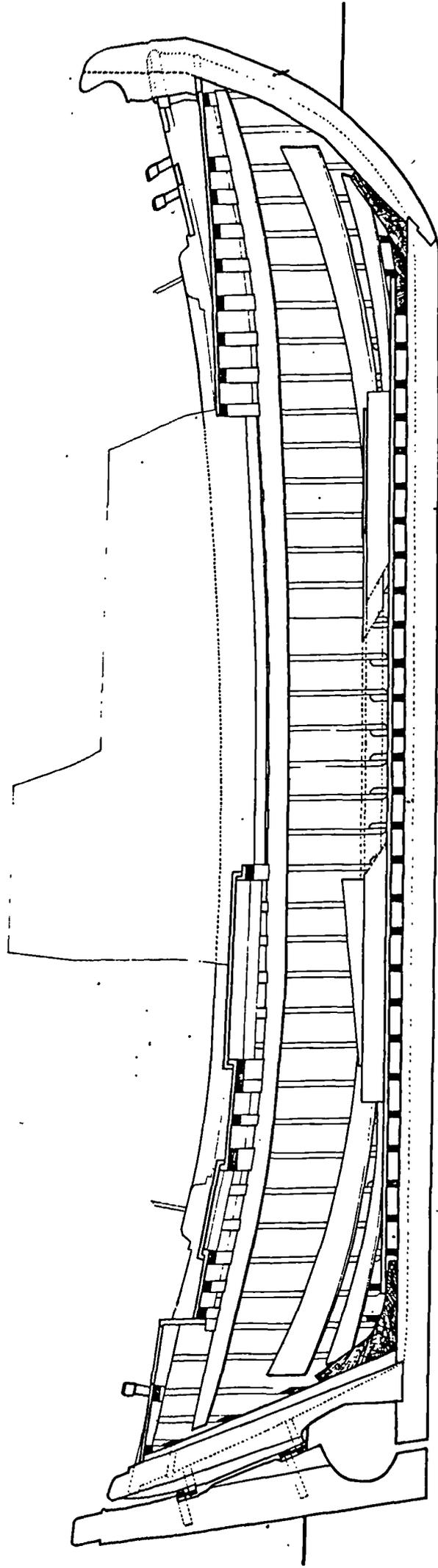
FORM OF STERN POST
ON VESSELS WITH A ROUND STERN
POINTED ON THE STERN POST



119



120



ΣΧΕΔΙΟ
121

ΑΠΟΤΥΠΩΣΗ ΤΡΕΧΑΝΤΗΡΙΟΥ ΜΗΚΟΥΣ 9,1μ.
ΔΙΑΜΗΚΗΣ ΤΟΜΗΣ
ΝΑΥΠΗΓΗΣΗ: ΧΑΛΚΙΔΑ 1948

- 122a. Midship section of "Evaggelistria" (7)
 - b. Fore section of "Evaggelistria"
 - c. After section of "Evaggelistria"
 - d. Long section of "Evaggelistria"
 - e. Deck plan of "Evaggelistria"
 - f. Fore elevation of "Evaggelistria"
 - g. After elevation of "Evaggelistria"
 - h. Side elevation of "Evaggelistria"
 - i. Diagram of "Evaggelistria" planking

123. Two Perama boats under construction (7.3)
Benaki Museum, negative No. P.1969

124. A Trechadiri boat under construction (7.4.1)
(Chalkis, 1987)

125. The structure of the gunwale (7.4.2)

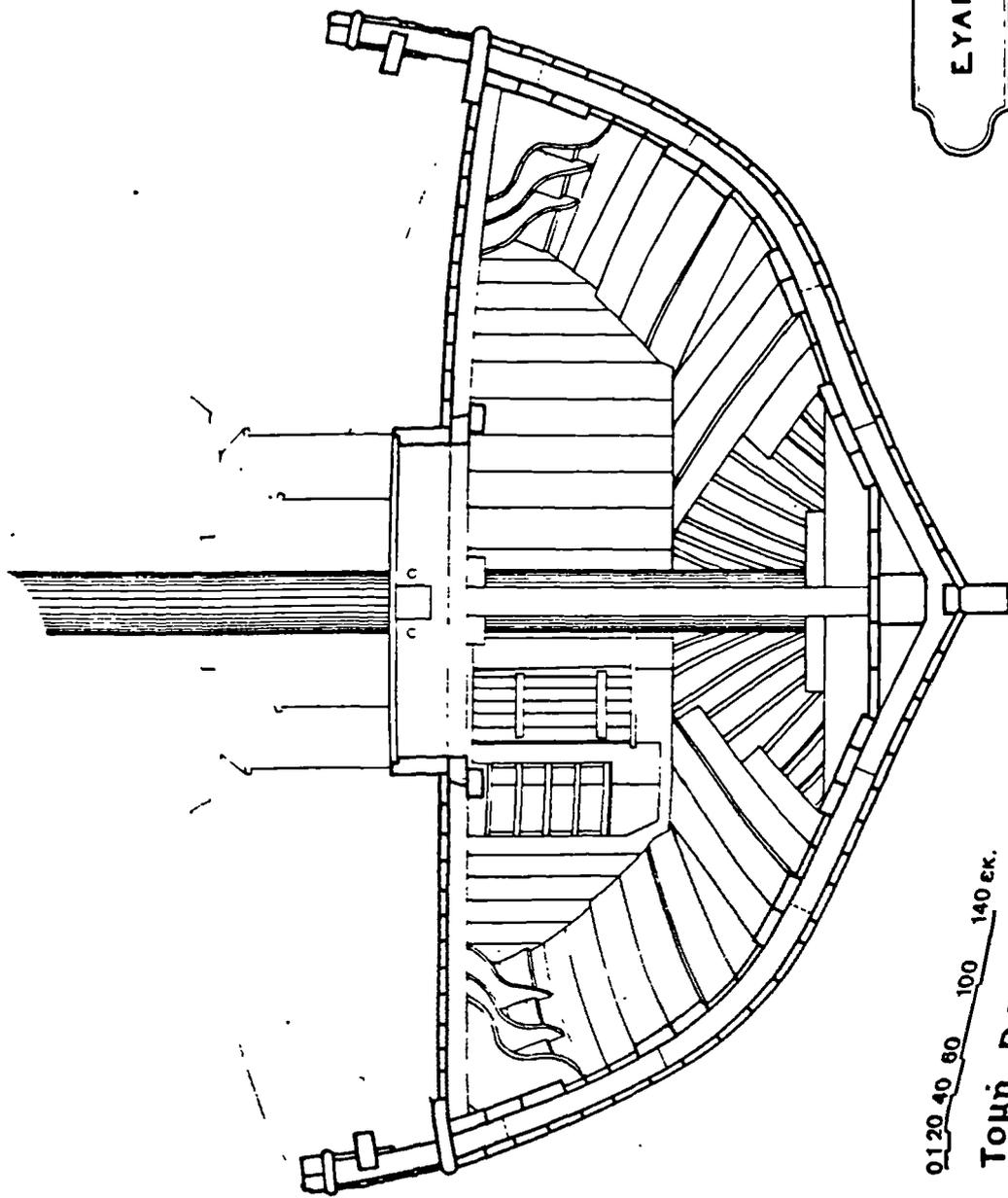
126. Reinforcements of the stern and the stem post (7.4.2) (Ντουφέκι, φουρνιστή, σώωμα) (Damianidis, K. and Zivas, A. (1986, p.59))

127. Horizontal knee on the stern post of "Evaggelistria" (7.4.2)

128. Small Trechadiri and Perama under construction (Perama) (7.4.2)
Benaki Museum negative no. B.9206

129. The structure of the waterway timber (7.4.2)
(Damianidis, K. and Zivas, A. (1986, p.58))

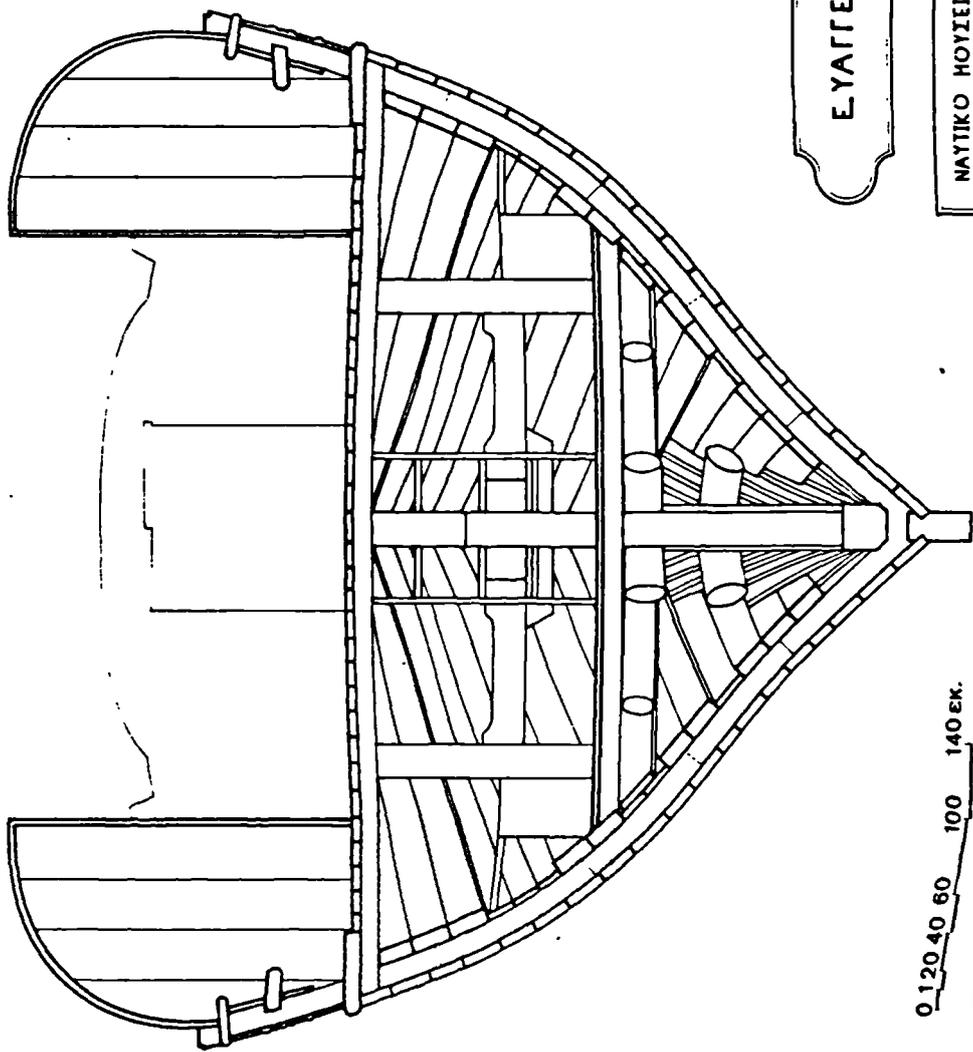
130. The use of "Mastari and Stantsola" method to find the shape of the waterway timber (7.4.2)



ΕΥΑΓΓΕΛΙΣΤΡΙΑ

ΝΑΥΤΙΚΟ ΜΟΥΣΕΙΟ ΑΙΓΑΙΟΥ 1986
ΝΑΥΠΗΓΗΝ ΣΥΡΟΣ 1540
Α. ΚΑΡΑΜΑΝΩΛΗΣ

0 120 40 80 100 140 εκ.
Τομή Β-Β



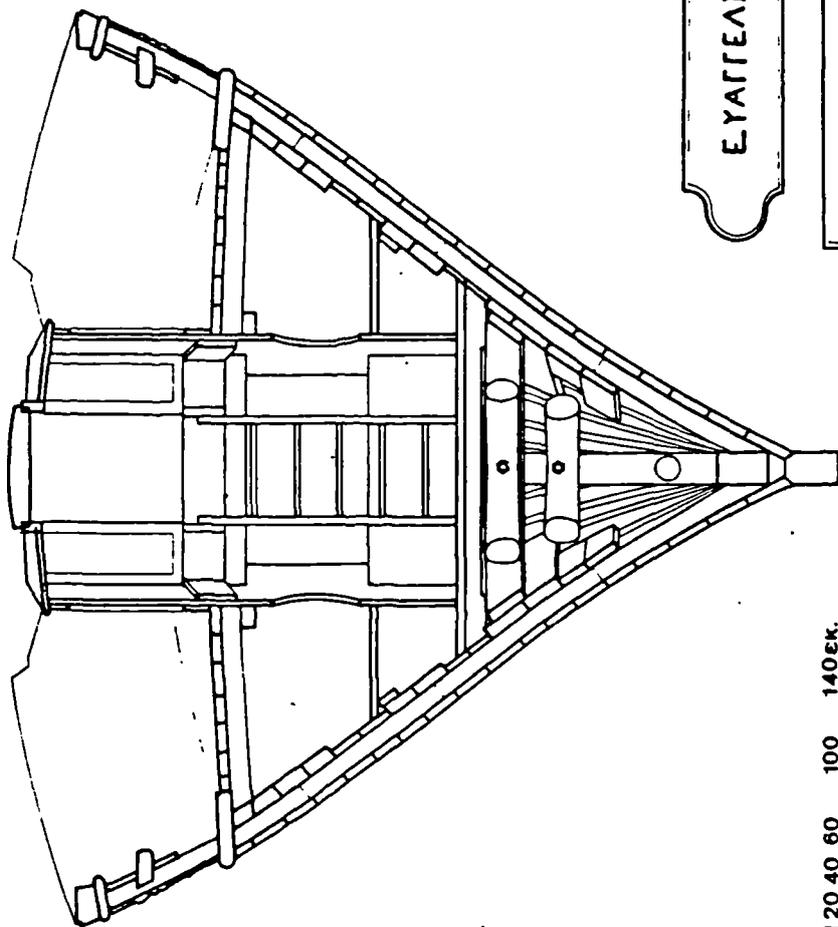
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ΝΑΥΤΙΚΟ ΜΟΥΣΕΙΟ ΑΙΓΑΙΟΥ 4988
ΝΑΥΠΗΓΗΤΗ ΣΥΡΟΣ 4940

Μ. ΔΑΜΙΑΝΙΔΗΣ

0 120 40 60 100 140 εκ.

Τομή Γ-Γ



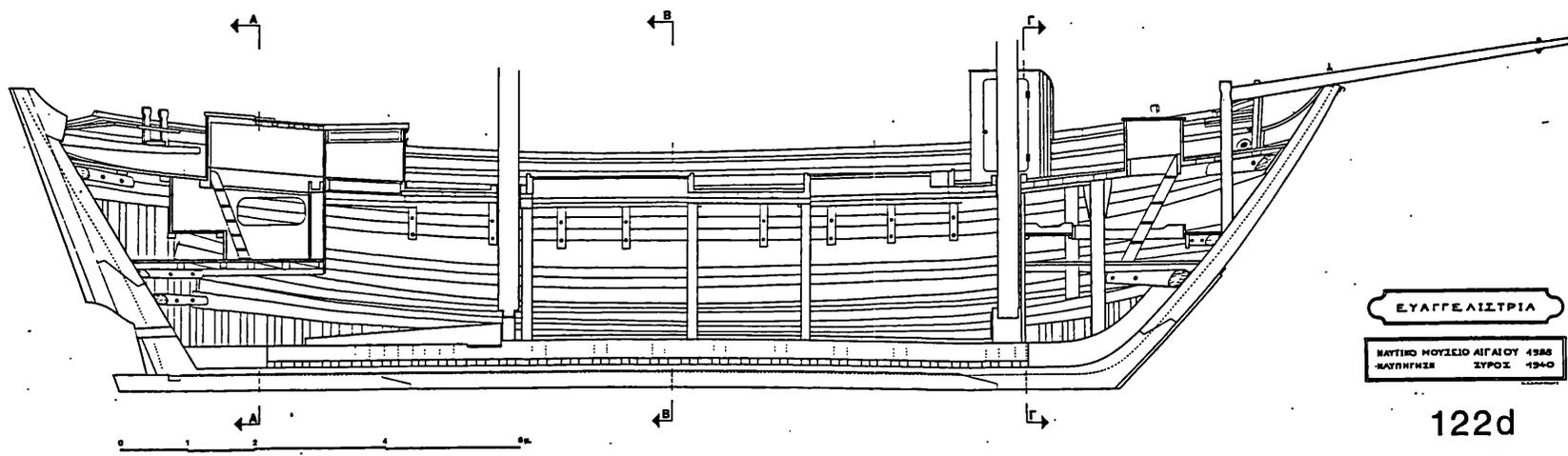
ΕΥΑΓΓΕΛΙΣΤΡΙΑ

ΝΑΥΤΙΚΟ ΜΟΥΣΕΙΟ ΑΙΓΑΙΟΥ 1988
ΝΑΥΠΗΓΗΣ ΣΥΡΟΣ 1940

Κ. ΔΑΜΙΑΝΑΚΗΣ

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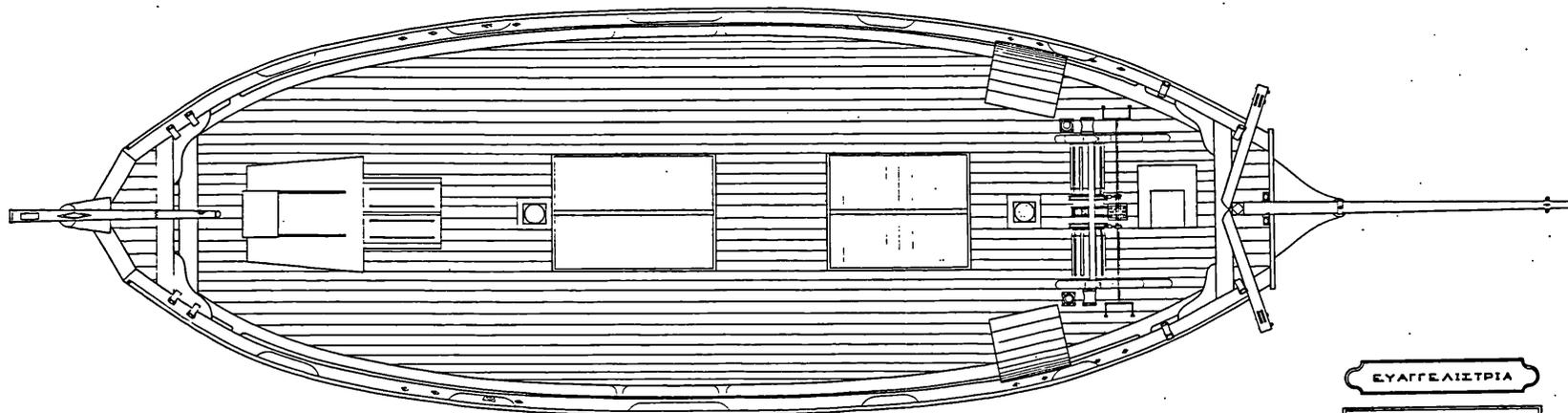
Τομή Α-Α



ΕΥΑΓΓΕΛΙΣΤΡΙΑ

ΝΑΥΤΙΟ ΜΟΥΣΕΙΟ ΑΙΓΑΙΟΥ 1986
ΚΑΥΜΗΝΗΣ ΣΥΡΟΣ 1940

122d

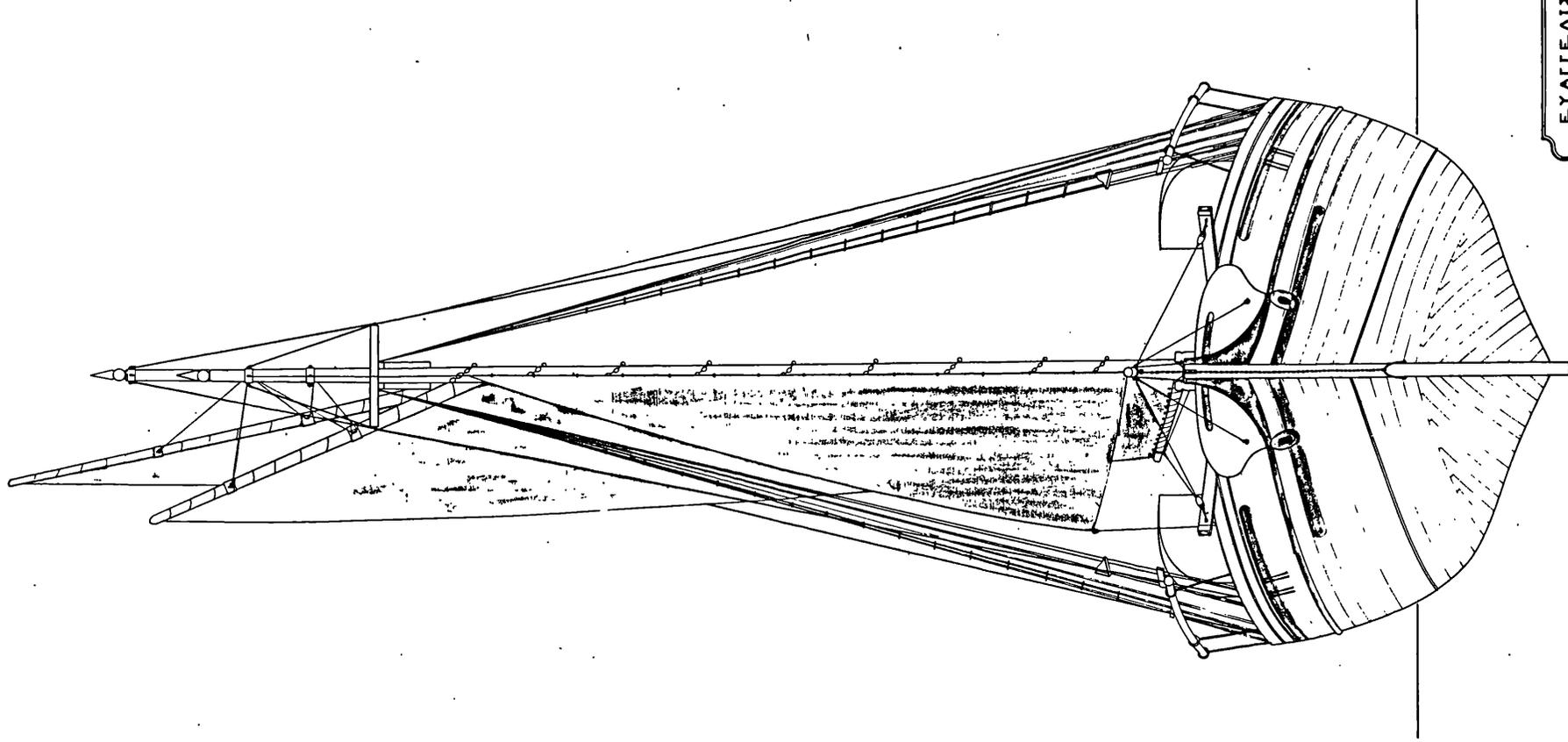


0 1 2 4 8m

ΕΥΑΓΓΕΛΙΣΤΡΙΑ

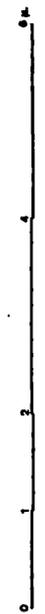
ΝΑΥΤΙΟ ΜΟΥΣΕΙΟ ΑΙΓΑΙΟΥ 1988
ΝΑΥΠΗΓΕΙΟ ΣΥΡΟΥ 1940

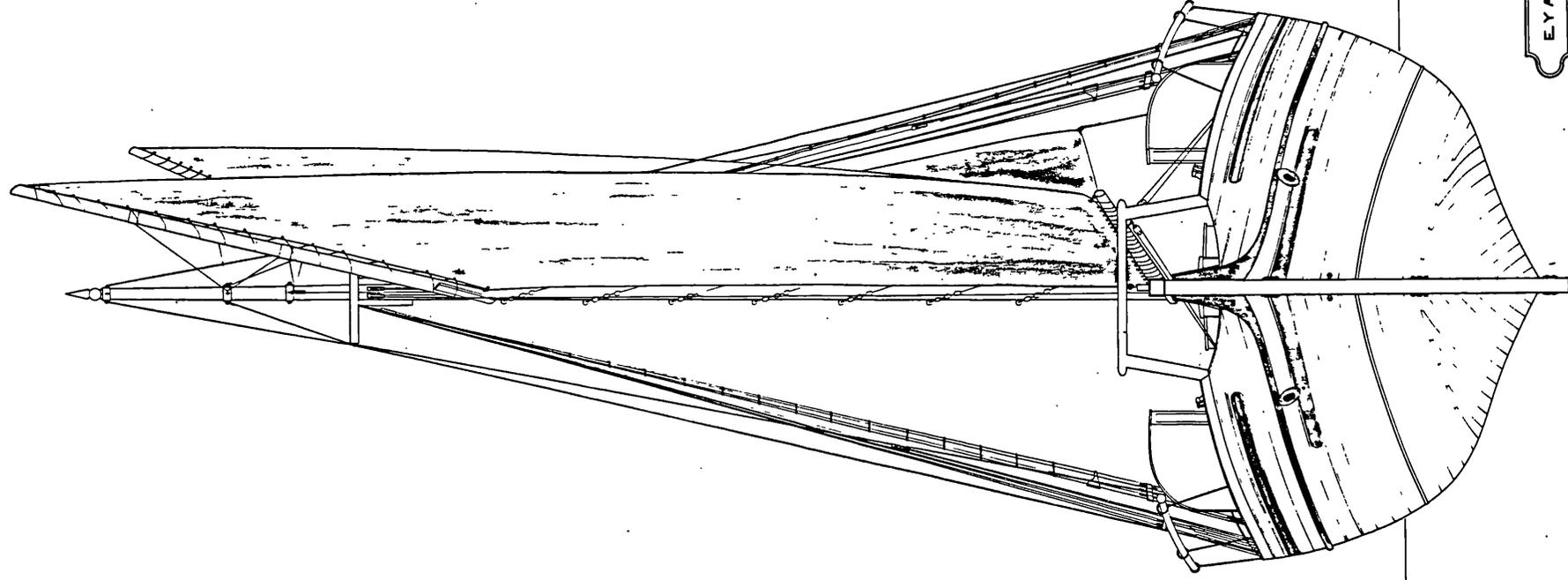
122e



ΕΥΑΓΓΕΛΙΣΤΡΙΑ

ΜΑΤΙΟ ΜΟΤΙΣΙΟ ΑΓΙΑΙΟΥ 4908
ΜΑΥΡΗΝΗ ΣΥΡΟΣ 4940



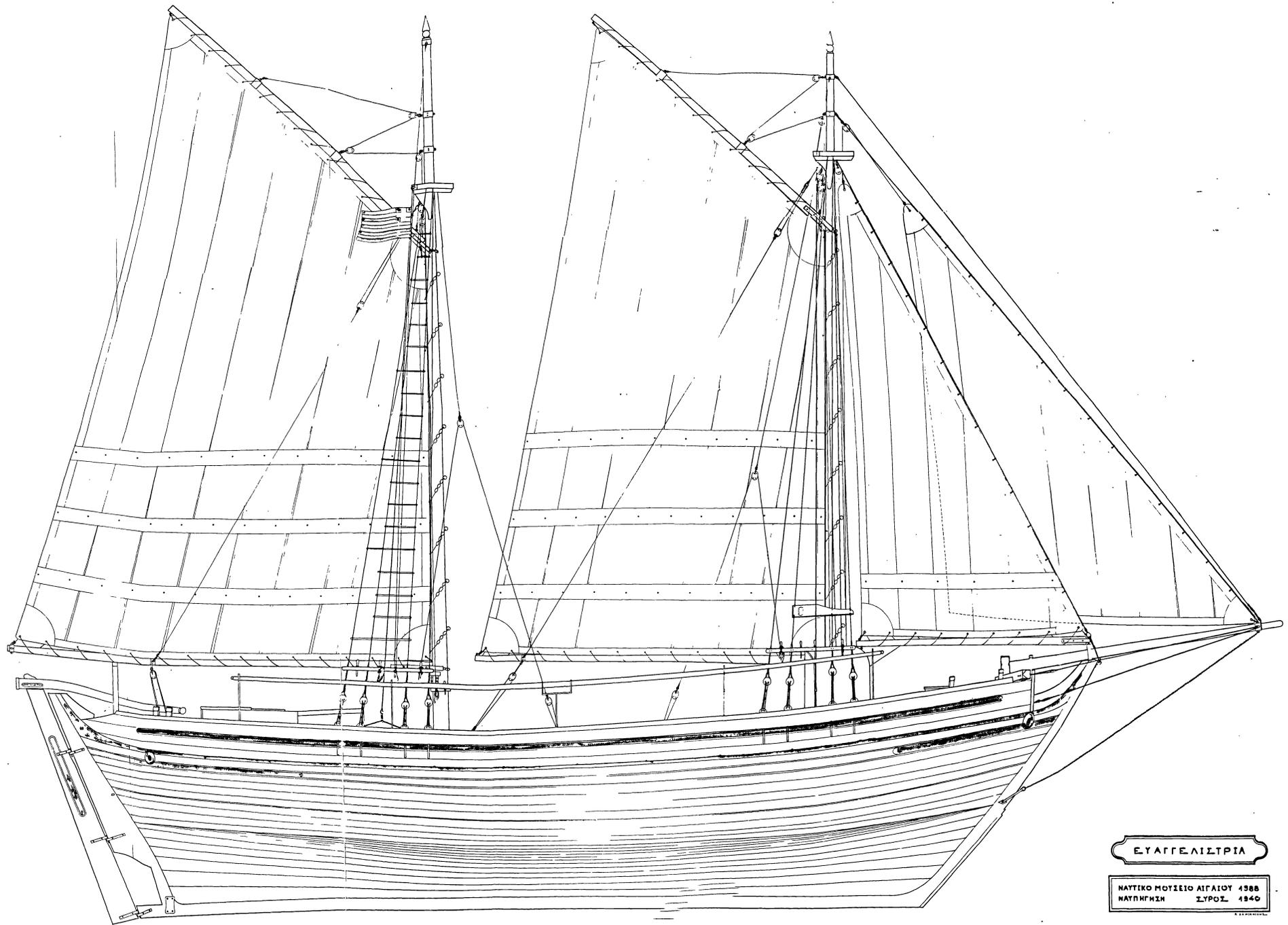


ΕΥΑΓΓΕΛΙΣΤΡΙΑ

ΝΑΥΤΙΚΟ ΜΟΥΣΕΙΟ ΑΙΓΑΙΟΥ 1988
ΝΑΥΠΗΓΗΣ ΖΥΡΟΣ 1940



1229

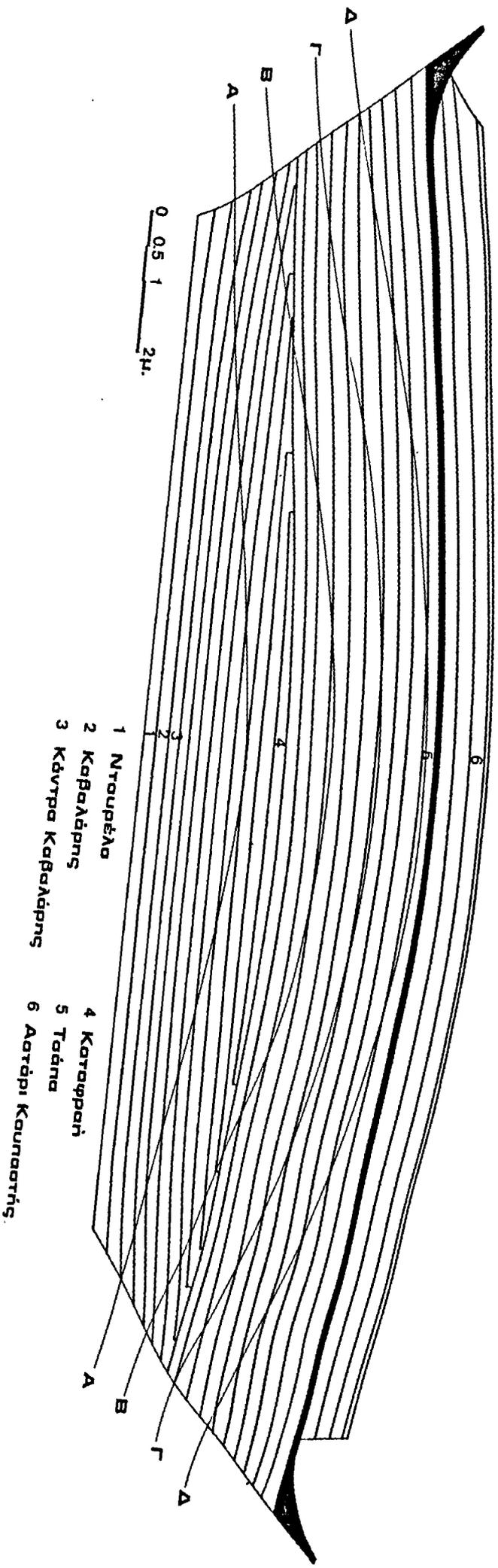


0 1 2 4 6μ.

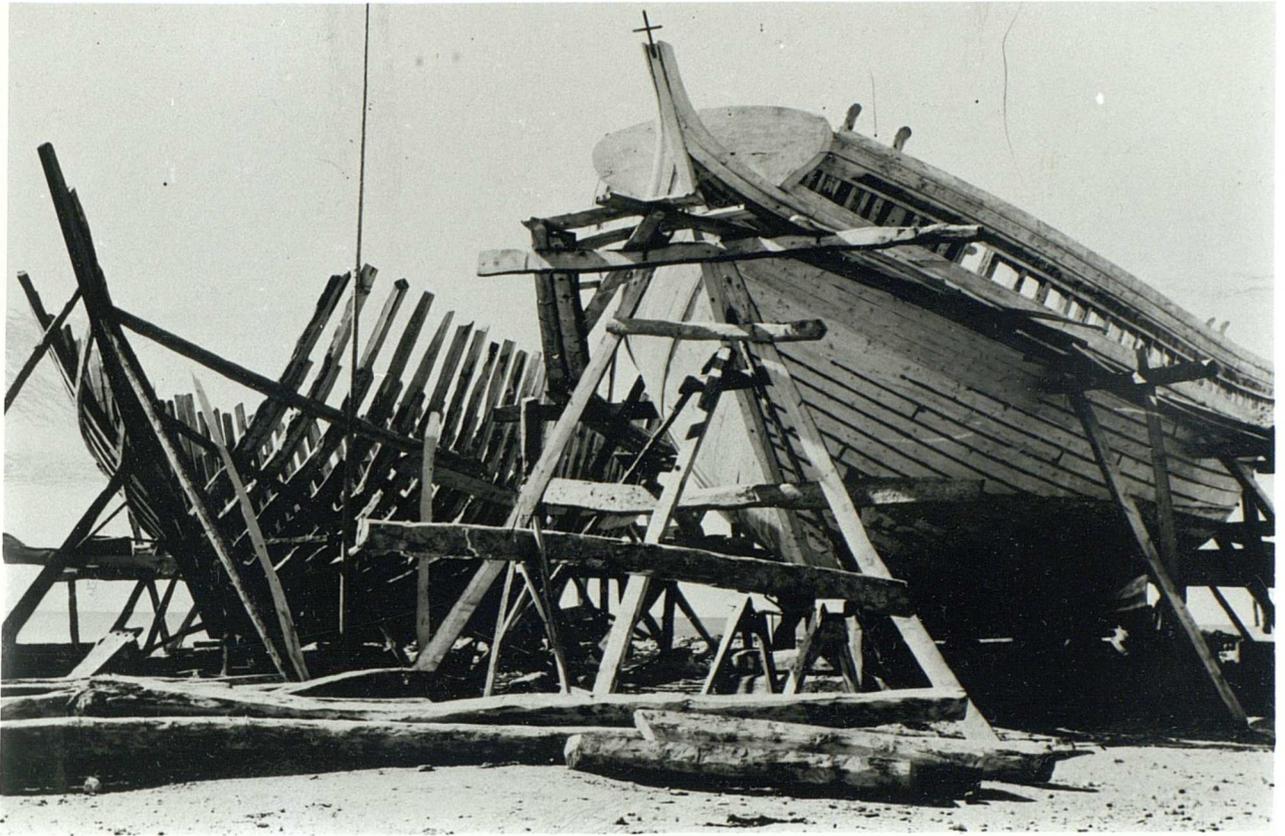
Πλάγια Όψη

ΕΥΑΓΓΕΛΙΣΤΡΙΑ

ΝΑΥΤΙΚΟ ΜΟΥΣΕΙΟ ΑΙΓΑΙΟΥ 4388
ΝΑΥΠΗΓΙΑ ΣΥΡΟΣ 1940



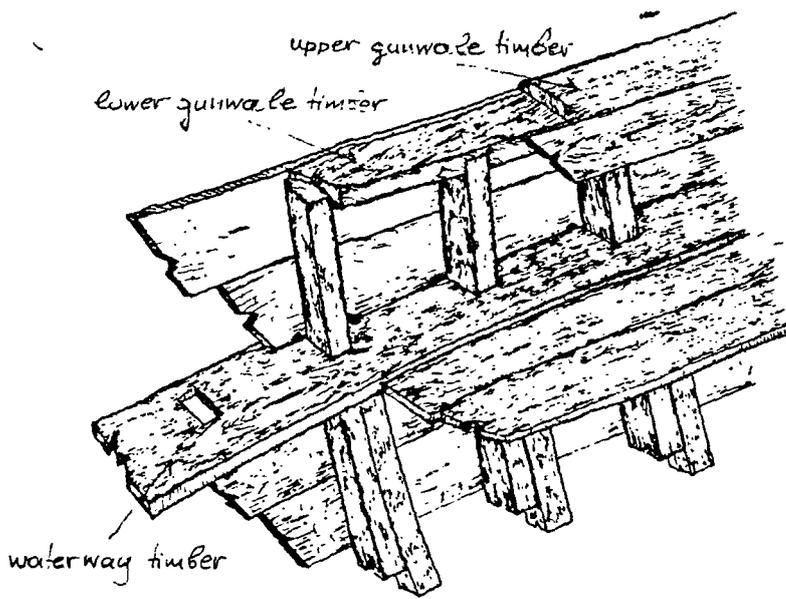
122i



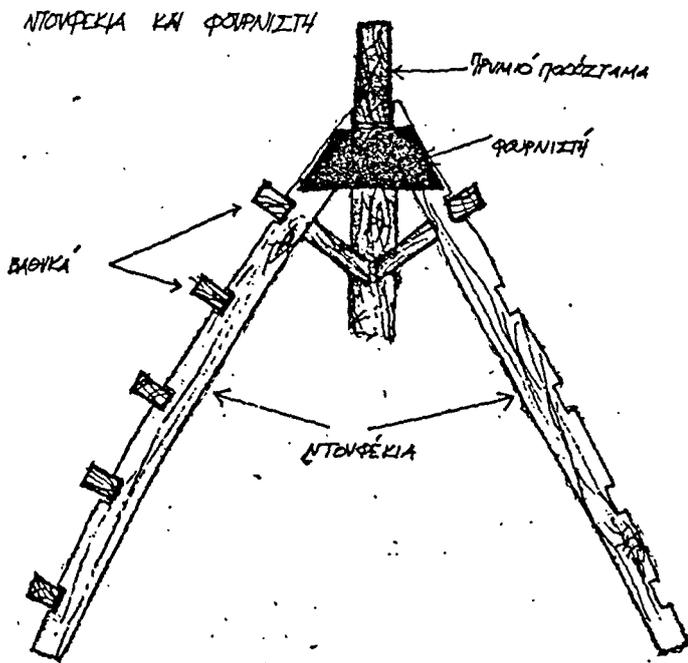
123



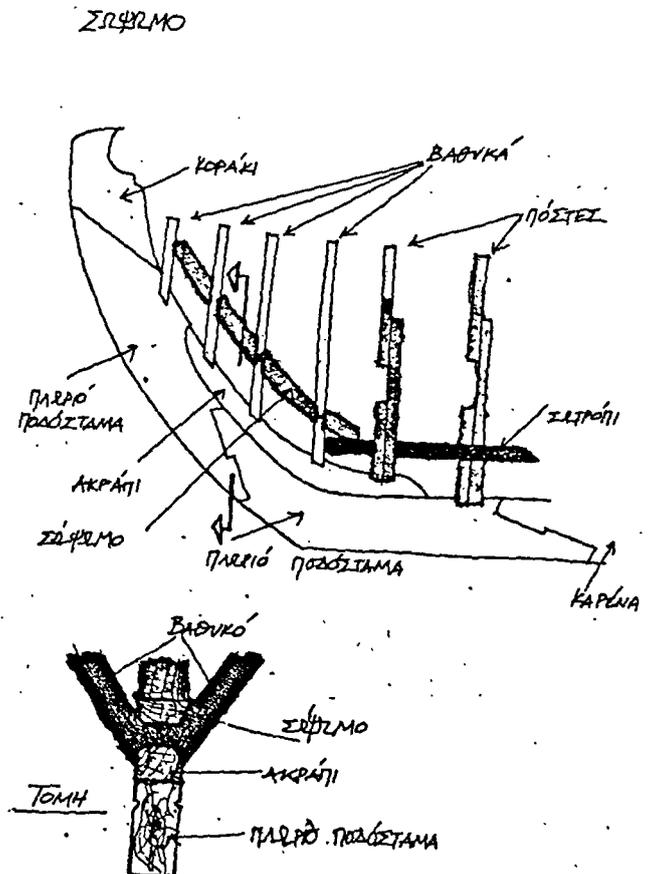
124



125



126

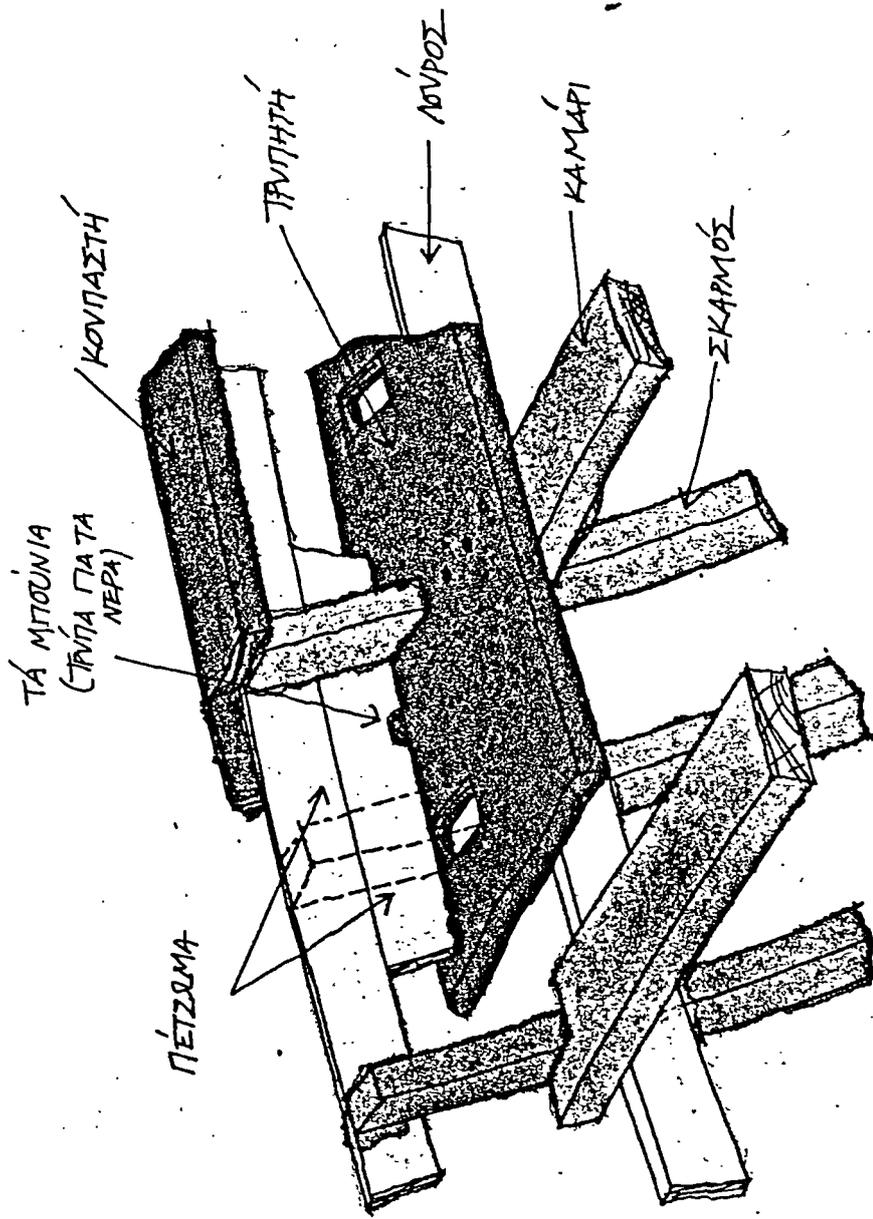




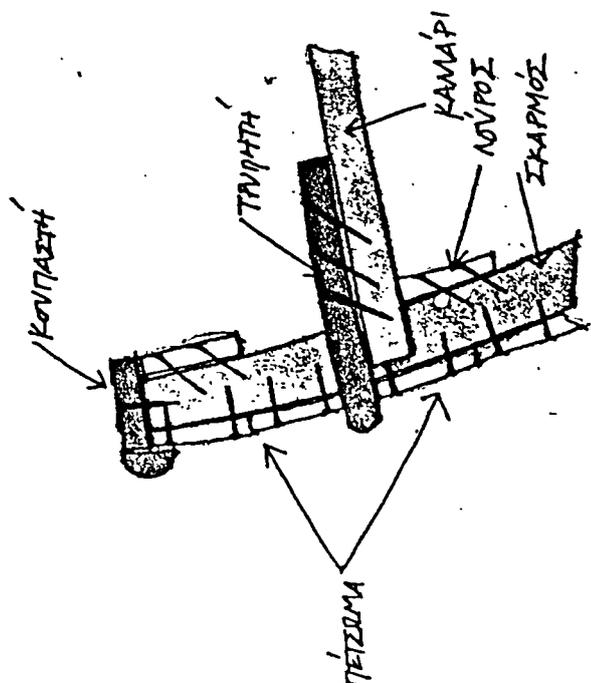
127



128



ΛΕΠΤΟΜΕΡΕΙΑ ΤΡΥΠΗΤΗΣ

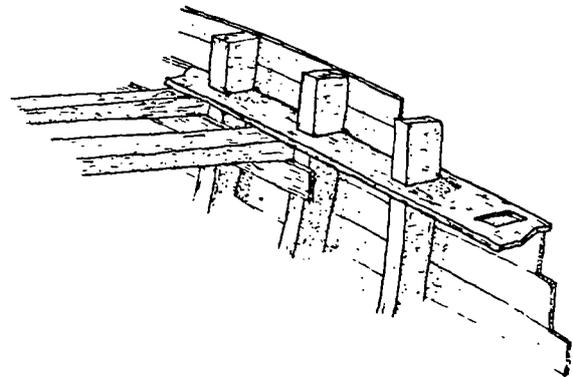
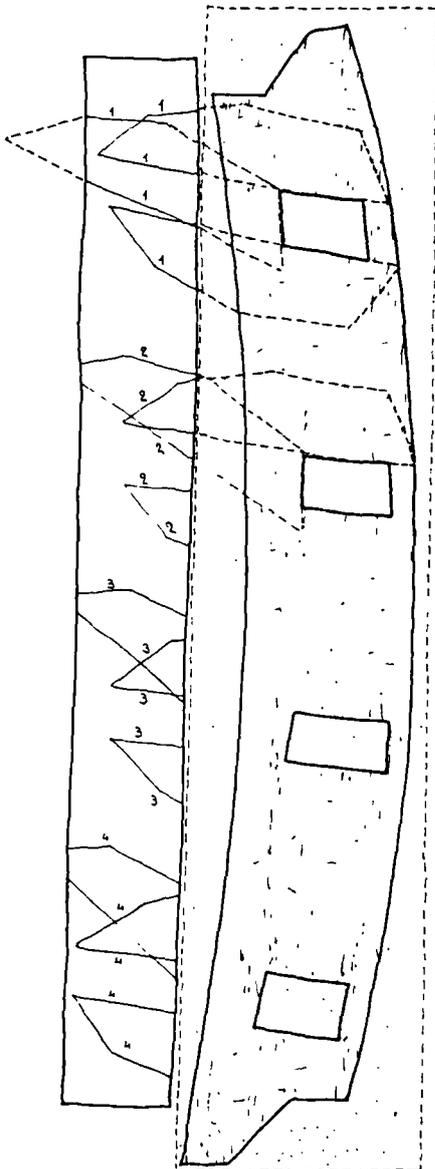
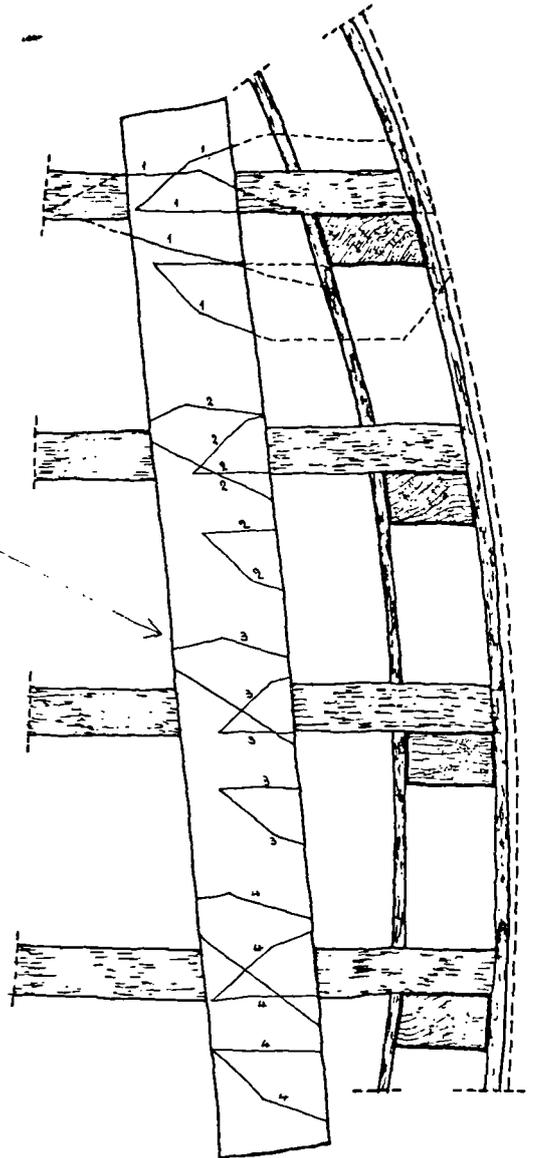


ΤΟΜΗ



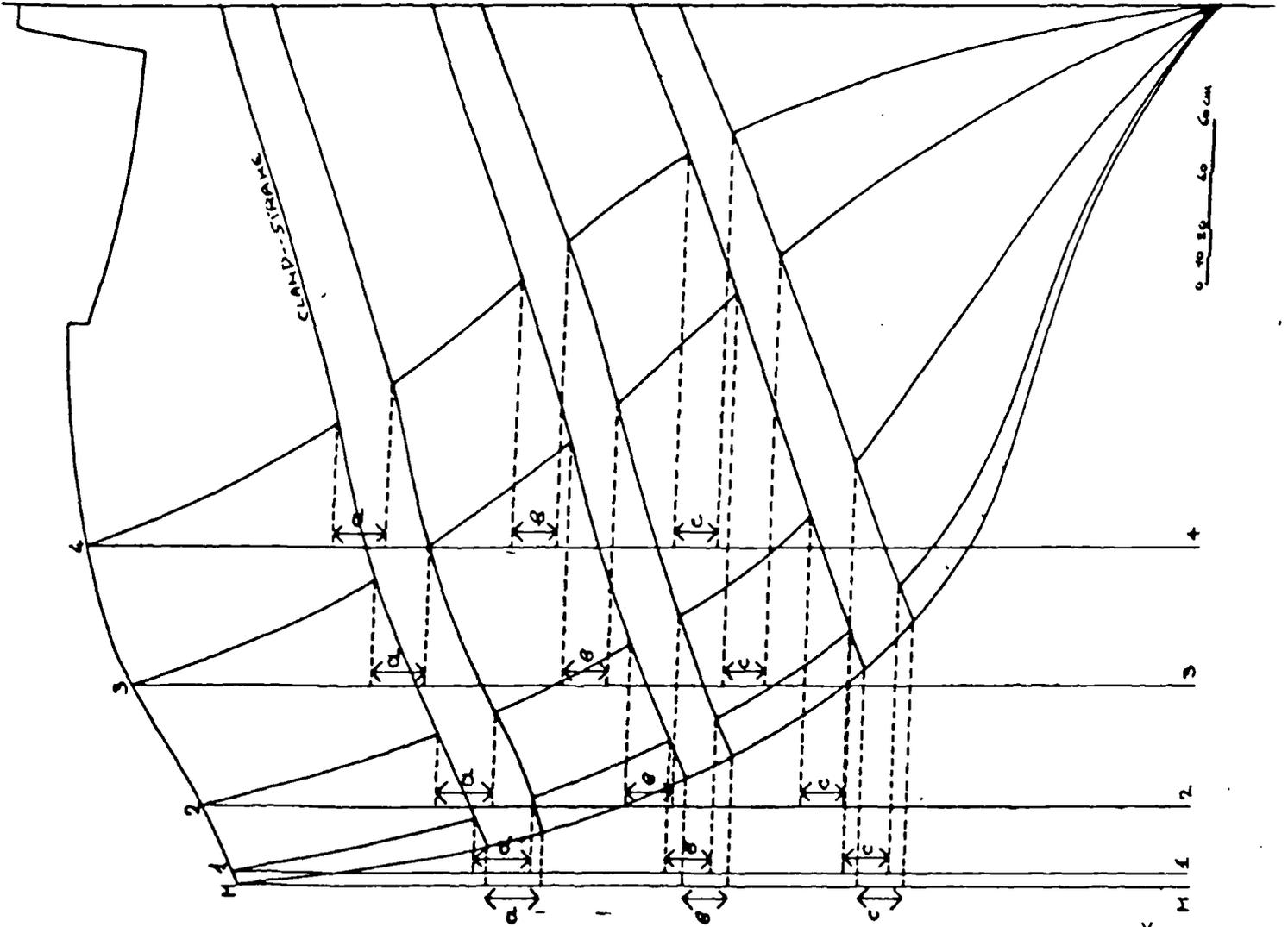
MASTARI

STATSOLA



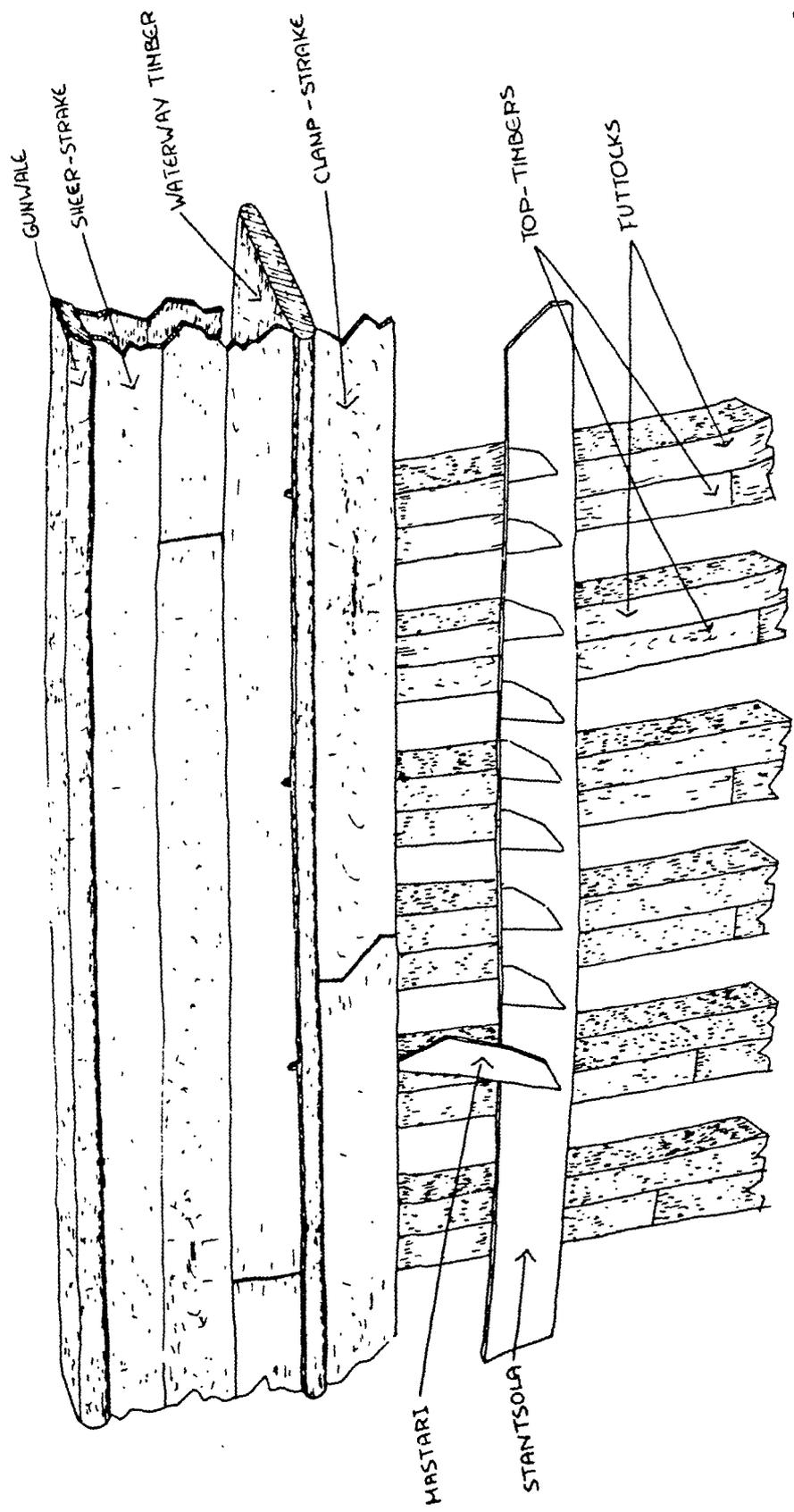
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HALF BODY PLAN
OF A MERMAN

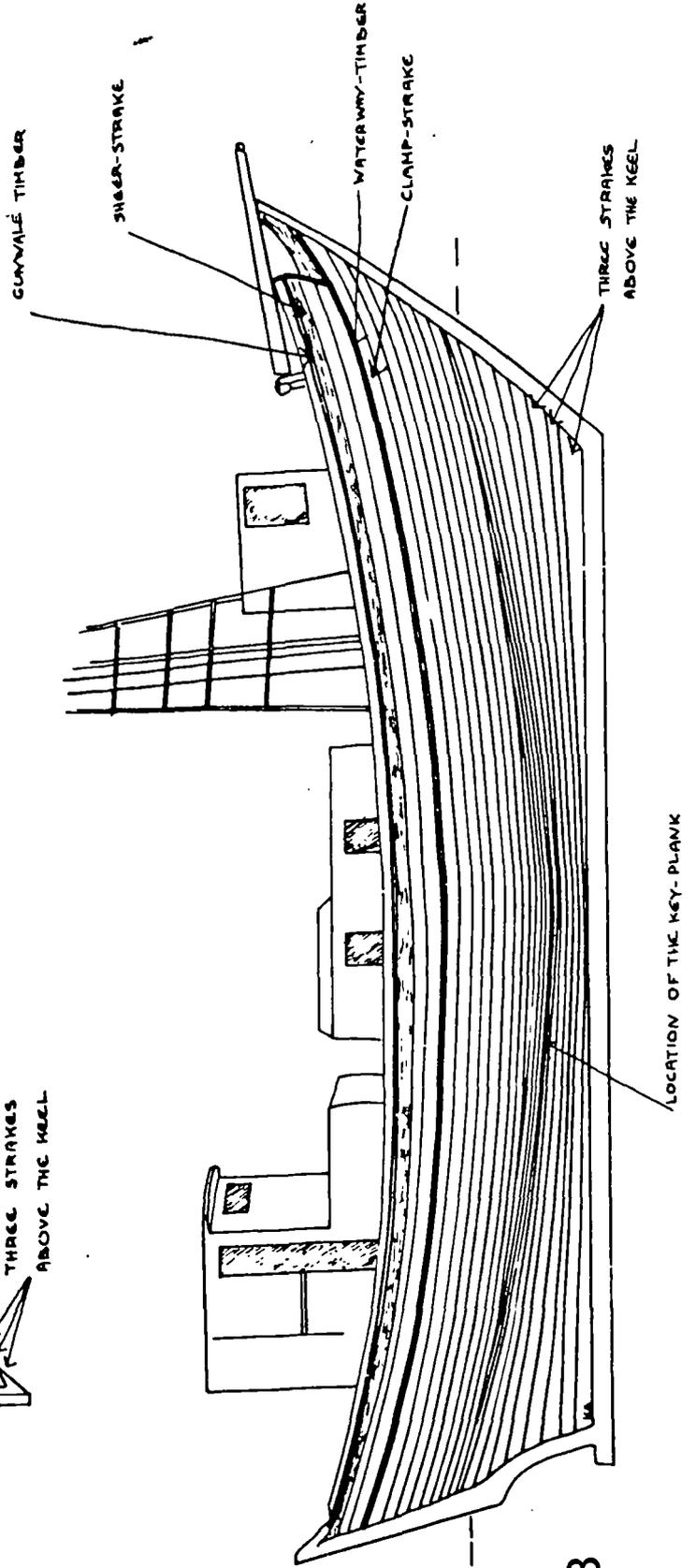
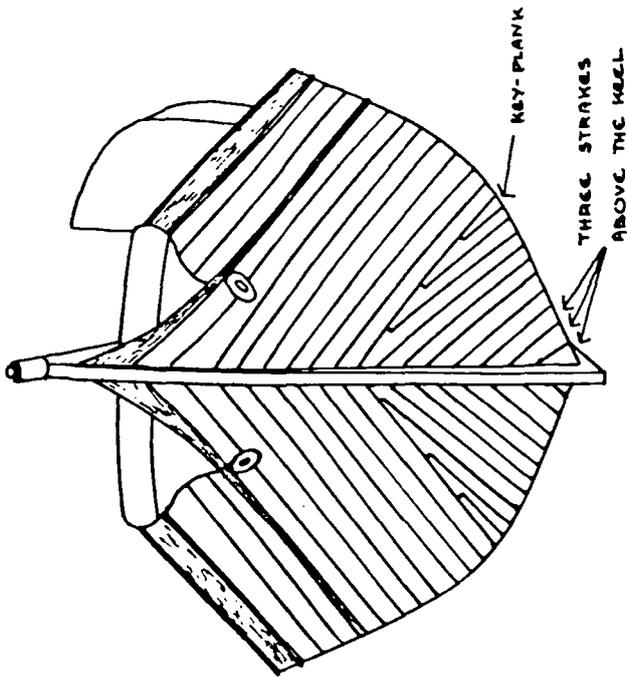


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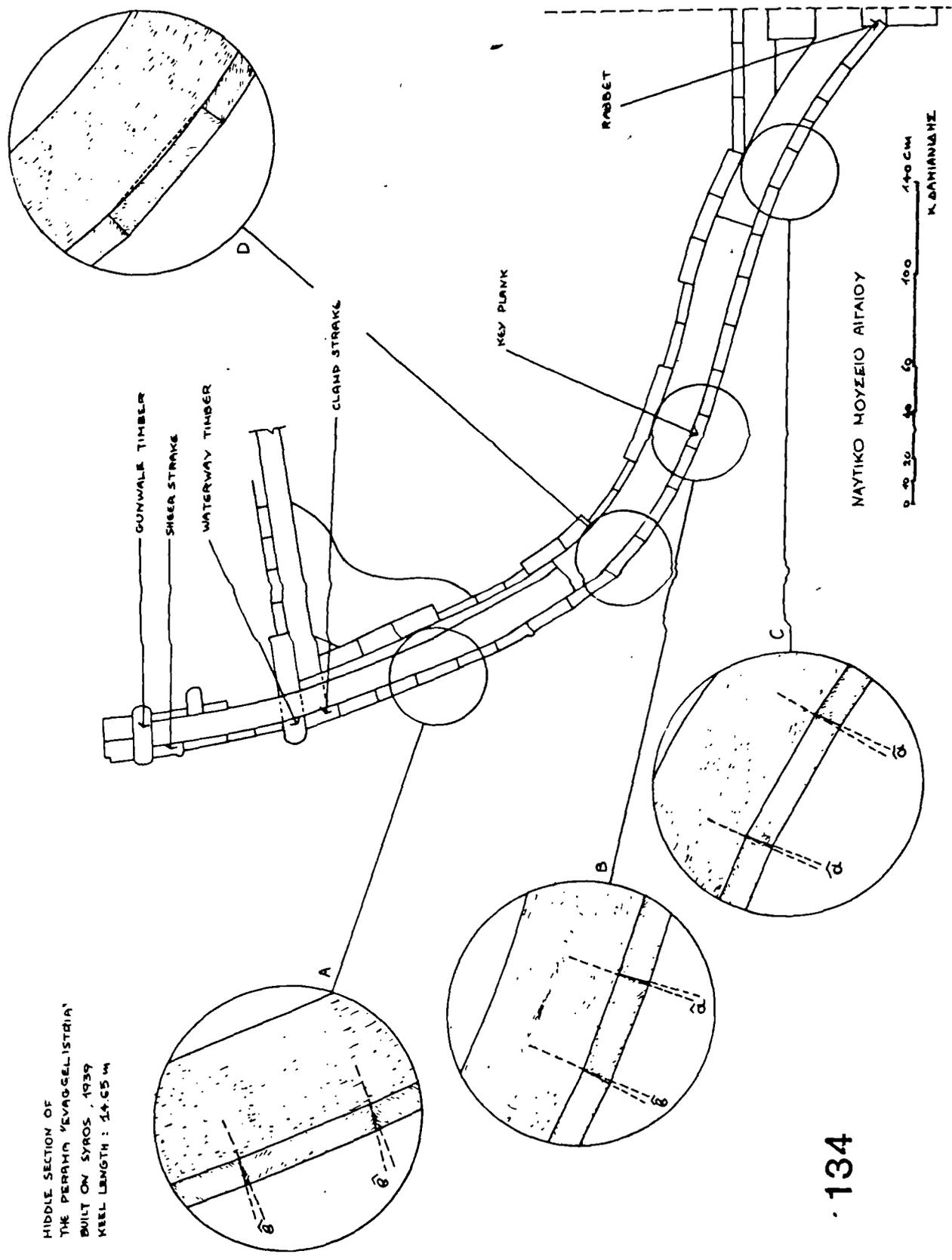
BOW & BUTTOCK
SECTIONS



PERANA A.I. 16
 BUILT ON SAMOS 30
 KEEL LENGTH 6.50M



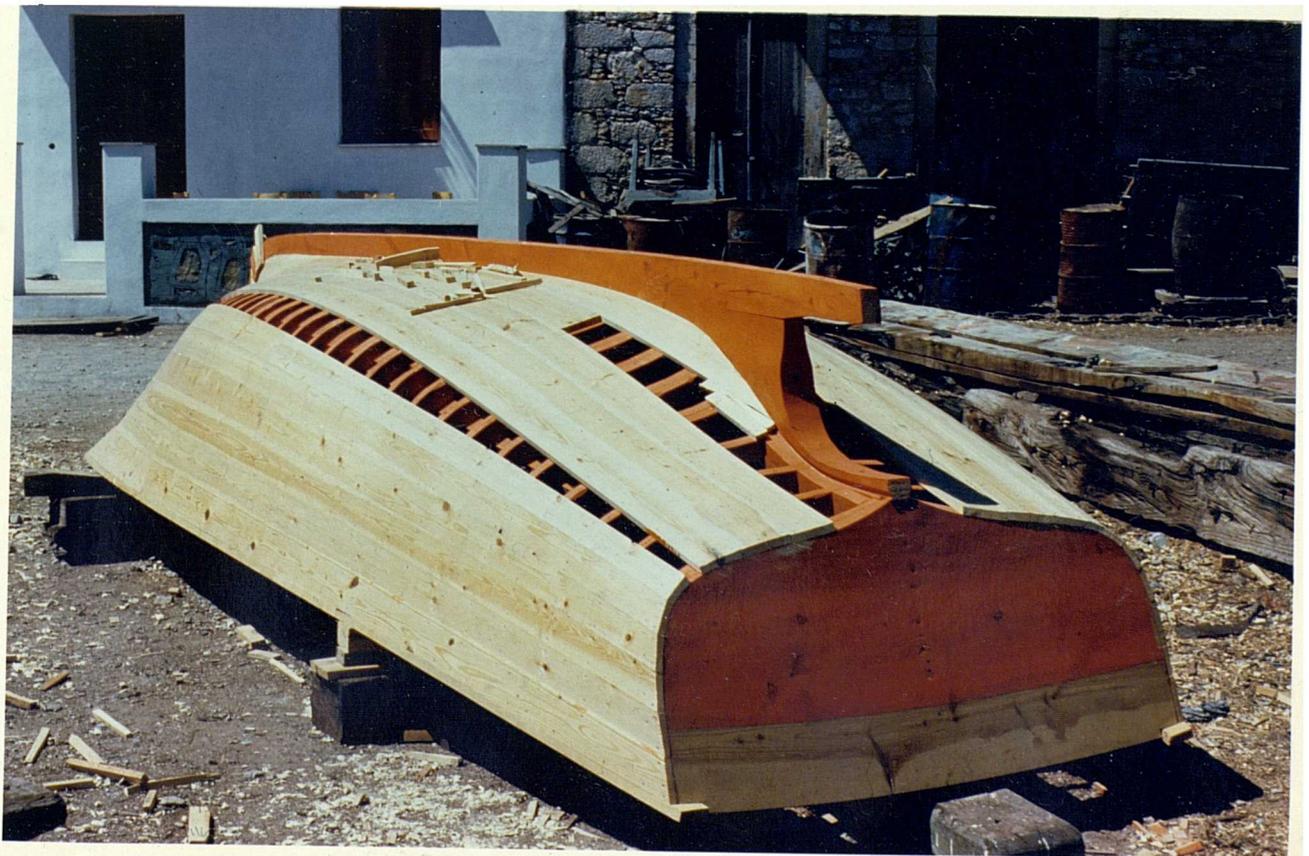
MIDDLE SECTION OF
 THE PERAMA 'EVAGGELISTRIA'
 BUILT ON SYROS, 1939
 KEEL LENGTH: 14.65 m





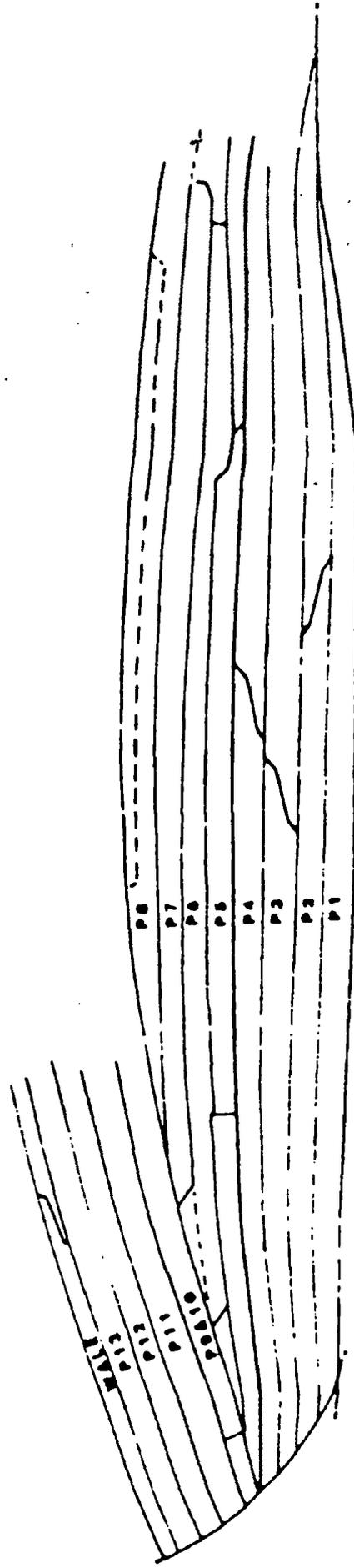


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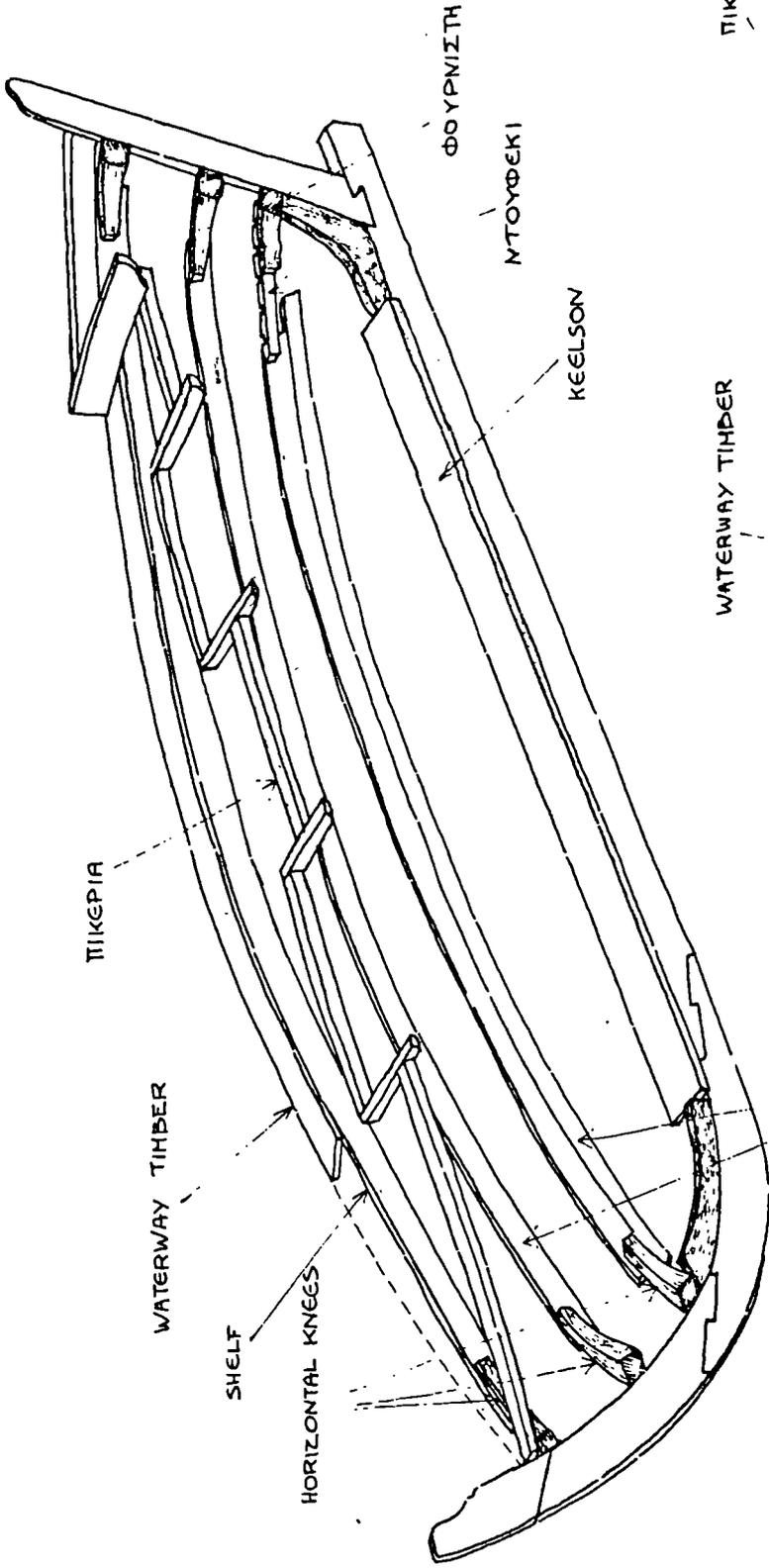


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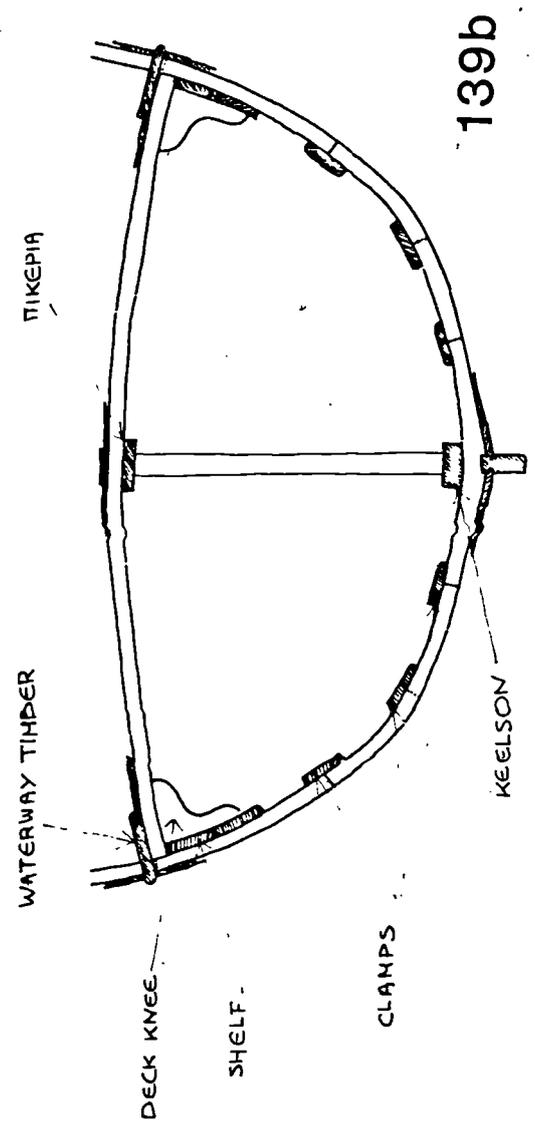
J. R. STEFFY: RECONSTRUCTION OF SERÇE LIMAN VESSEL



Schematic diagram of the portside planking. Not to scale



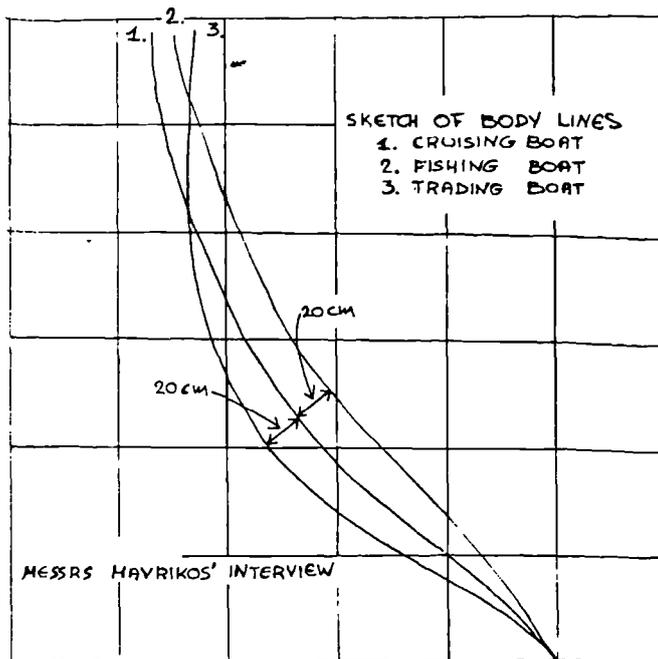
139a



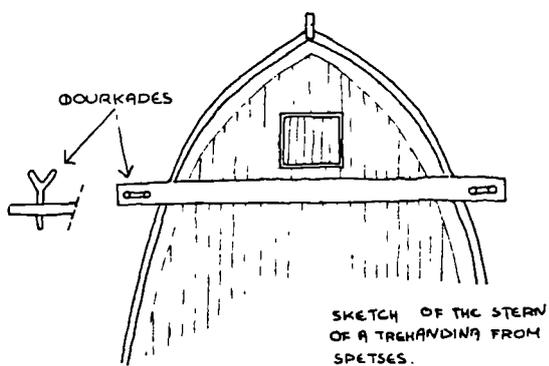
139b



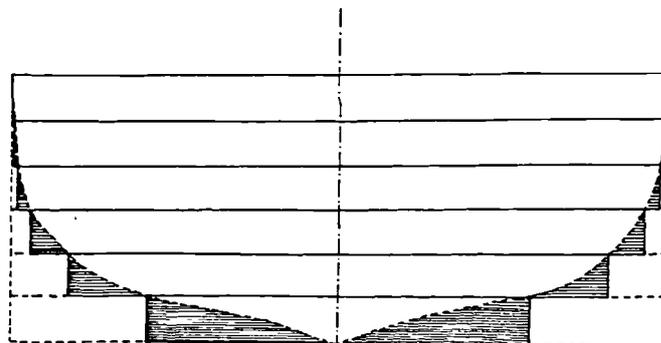
- 141a. Sketch from the interview with [1]-Mavrikos
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- 142b. Sketch from the interview with [6]-Arvanitis
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- 143. Recorded lines of a diving Trechadiri model, interview [11]-Polias



141a



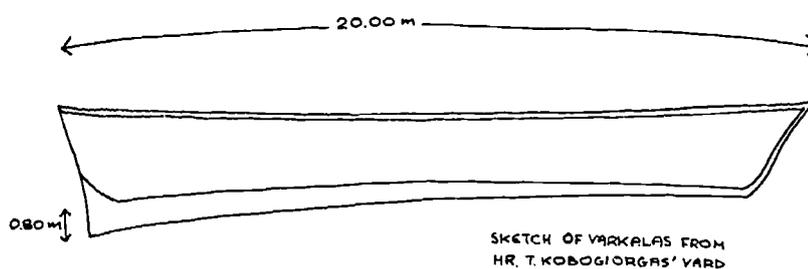
141c

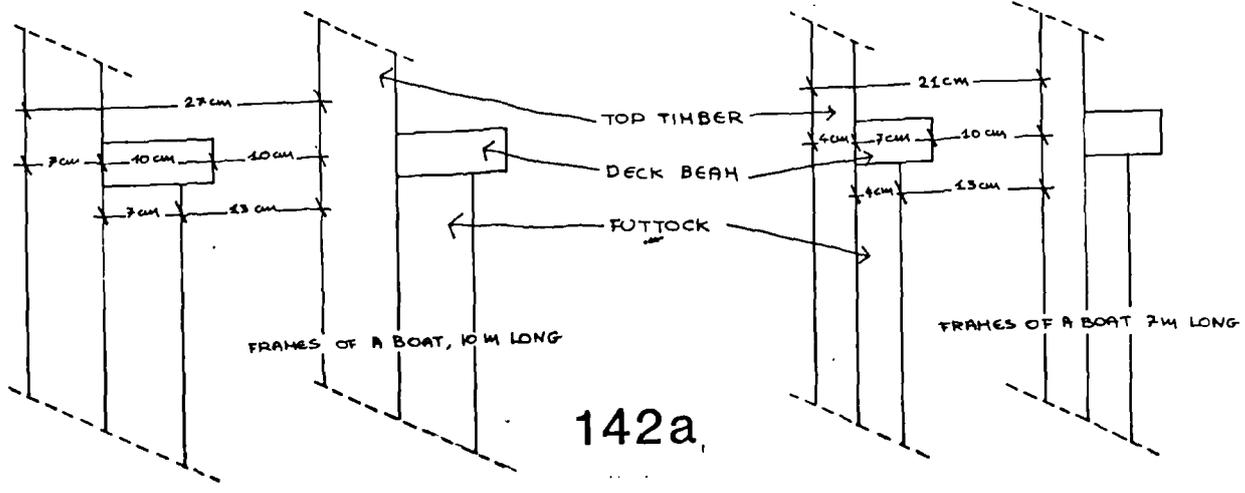


141b

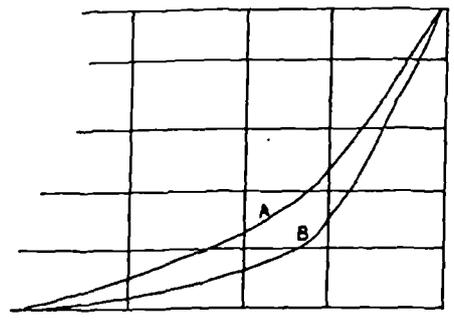
MIDDLE SECTION OF
 A HALF MODEL
 DESCRIBED BY
 MR. S. STILIANOS.

141d



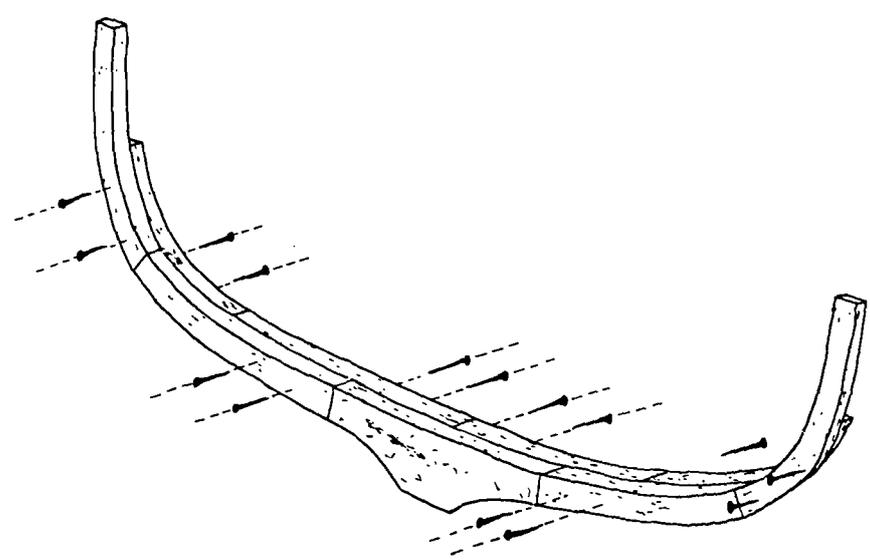
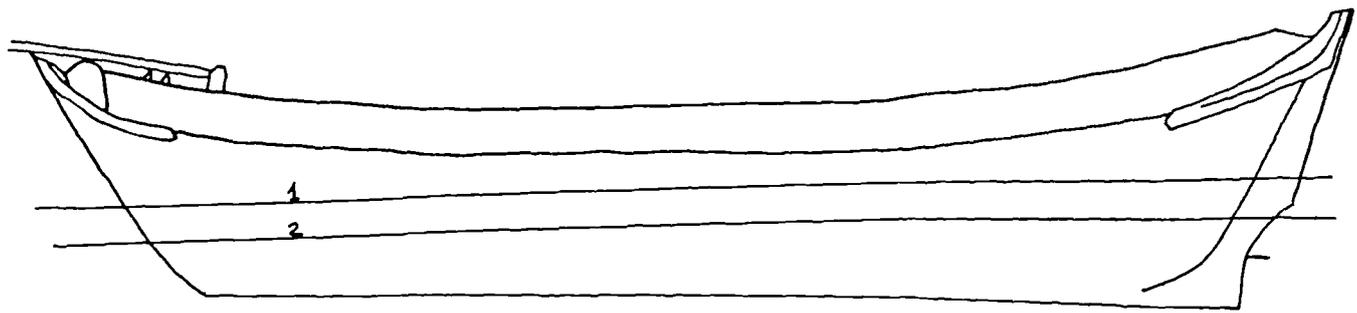


142a

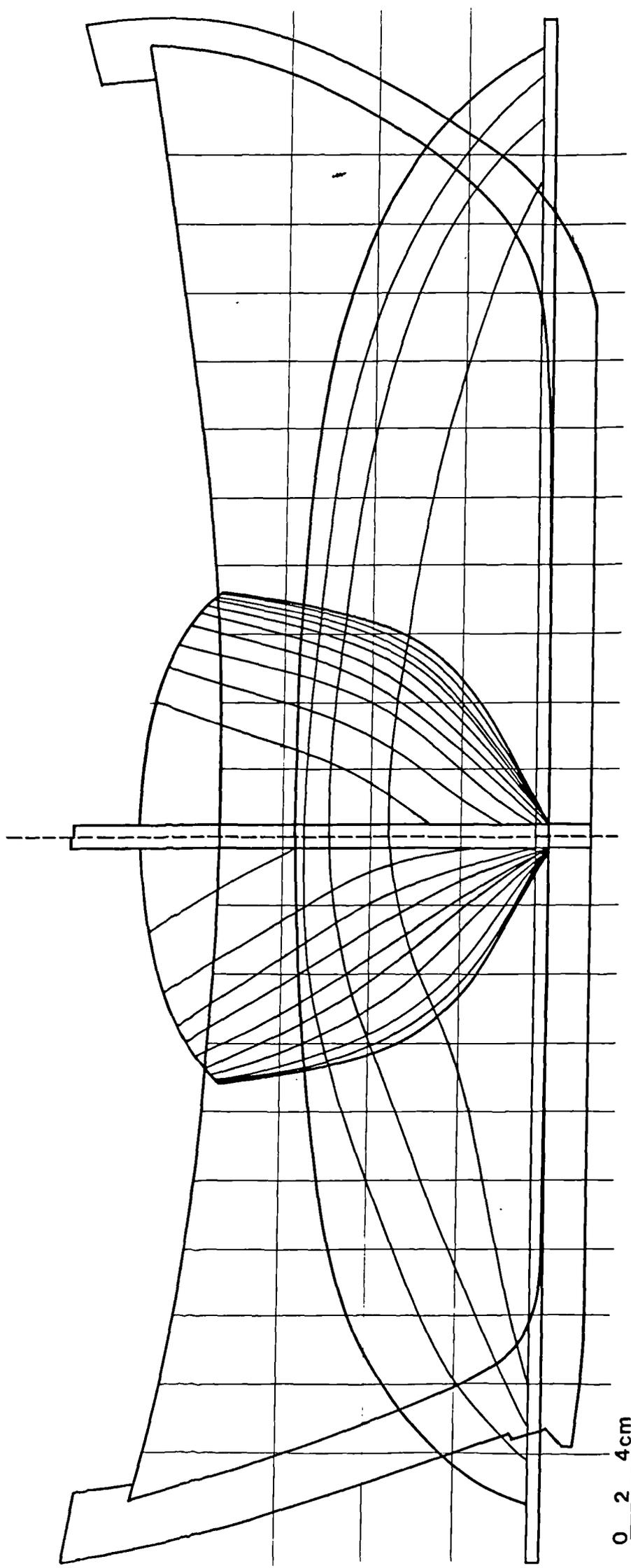


- A. MIDDLE SECTION OF FISHING BOAT.
- 1. WATER LEVEL ON FISHING BOAT PROFILE.
- B. MIDDLE SECTION OF TRADING BOAT.
- 2. WATER LEVEL ON TRADING BOAT PROFILE.

142b



142c



0 2 4cm

INDEX OF INTERVIEW SUMMARIES

This index provides the summaries of the interviews in the same order as the given tapes. For convenient listing the information gained is presented in sections which follow the sequence of the chapters in this work:

[H] -History

[Tp]-Typology

[M] -Morphology

[T] -Tools

[D] -Designing

[W] -Timber

[C] -Construction

In addition to economy of space the form of this index facilitates cross references with the text. The recorded tapes of these interviews are available from the ^{Scottish} Institute of Maritime Studies.

[1]-Mavrikos, Aris and Mavrikos, Nireas (September-1986, March-1987)
(tape 1 & 2), Island of Syros-tel. 28818 (Syros)

[H]. Mr. Aris and Mr. Nireas Mavrikos (68 years old) learned the boatbuilding technique from their father. Their boatyard has been located on the same site for more than 120 years. Their father used to say that in this yard about 250 people were working during the end of last century. Most of their production of boats was sold to other islands than Syros. In the past the owner of the boat could include in the contract of the order of the boat as many structural details as he wished (see published contract in Tzamtzis, A. (1987)).

Today the whole area of the yard covers about 3.000m². The work shop covers 80 m² and the lofting floor 45 m².

[Tp]. On Syros they were specialized in the construction of Karavoskaro and Perama types. Trechadiria were often the smaller

boats (less than 15m long). In addition to these types they used to build in the past Tserniki and Pena but today they do not. In contrast today they build only Trechadiri, Liberty and rarely Karavoskaro. A Karavoskaro it must have 30cm beam per metre of keel in contrast to a Trechadiri which must have almost 50cm beam per metre of keel..

[M]. When the yard belonged to their father most of the boats built were trading boats. The Karavoskaro boats were sailing all over the Mediterranean and Trechadiria were trading boats as well. Today most of them are fishing boats. This evolution effects the shape of the boats. The trading boats were beamier on the underwater part of the boat while the fishing boats had more deck space (fig.141a). If a boat had been built as Ananemotrata (kind of fishing) she must have more draught than an ordinary fishing boat of the same type. This is because this sort of fishing (the Anemotrata was a kind of trawler) required a strong engine and therefore a strong and stable boat to accommodate this engine.

[T]. They do not have any old tools because the yard with all the equipment got burnt twenty years ago.

[W]. In the past they used timbers from Tsanakale (Turkey). Today the best timbers come from the Island of Samos. They used pine for the planks and oak or elm for the structural components. On the underwater part of the hull they used to fasten the planks with treenails made from scrub oak.

Pine is the best wood for planking. If you repair a boat with some new pine planks every year, she can be used for 80 years without deterioration problems!

More elements about the required features of wood for boatbuilding are mentioned in the chapter on BOATBUILDING TIMBER. As mentioned in the chapter on CONSTRUCTION, they usually do not steam, warm up or soak the planks of the hull. In the exceptional case though when the

grain of the planks is not parallel to their main direction, their flexibility is low and they need some soaking in order to avoid shakes of the planks when they nail them on the frames (a timber without the desired grain-structure was called "νίκουπο").

For a Trechadiri 10m long they need about 15 m³ wood.

[C]. They need about one and a half months to build up a Trechadiri boat 10m long. Of this time two weeks are for the skeleton of the boat and another two weeks for planking up the hull and the deck. They described the process of building the stern area of a Karavoskaro boat which is mentioned in the chapter on CONSTRUCTION.

[D]. This is one of the few boatyards where an old type of lofting floor is still in use. A full description and plans of this lofting floor are given in the chapter on DESIGNING.

[2]-Kornidaris, Kiriakos (September 1986)

Island of Lefkas tel.-92226 (Lefkas)

[H]. This yard was opened in 1912. The next one on the same island was opened about 1950. His grandfather invited a good boatbuilder from Corfu to teach him the art of boatbuilding. In those days, during the first half of the 20th century, the best boatyards in the Ionian Islands were on the Islands of Corfu and Ithaki. Today he does not know whether they are still building boats on these two Islands. Because of financial reasons he usually does not build boats any more and he is only involved in repair-works on boats. He is young (about 45 years old) and he does not remember many things about the boat yard in the past.

[Tp]. The typical boat from the Ionian Islands used to be the Gatsao. This was a double ended boat which was beamier than the other boats especially on her fore and aft part. This type was a trading boat and it was formed to provide inboard space. Most of the Gatsao used to be built with a L.O.A. of 20m.

This time he is building one of this type of boats but she is not as beamy as this type used to be, because this boat is built for cruising rather than for trading. In addition to Gatsao the other types of boats, which they used to build were Trechadiri, Karavoskaro and Liberty.

[W]. The wood is pine from the Island of Lefkas or from Aitoloakarnania (the mainland near this Island). He remembers that in the past they often used cypress.

[D]. The shape of the Gatsao boats was determined by moulds as they used to do for the Trechadiria and the other boats.

[3]-Stilianou, Stelios (March 1988) (tape 3,4 & 5)

Island of Spetses. tel.7700423 (Athens)

[H]. He was born on this island at the beginning of the twentieth century. As a boy he was working in his father's boatyard until 1917. Between 1917 and 1922 he did his military service in the Navy. This was the period when Mr. Stilianou learnt how to use boat lines-plans (in the Navy during this period the measurement system in boatyards was based on feet instead of metres). After his service he worked in a boatyard in Perama where he improved his skill. Later he opened his own boatyard on the island.

During the beginning of the 20th century about ten boatyards were opened on this island. Mr.Ph.Michelis and Mr.I.Kasiotis owned the two biggest yards at that time. The first inboard engine must have been installed in a boat of this Island in 1916 or 1917.

Before the Second World War they built stronger and more seaworthy vessels than today.

[Tp]. Trechadiri (or Skouna) was a double ended boat usually with a tonnage less than 250tons. Karavoskaro was a boat with an counter stern and her tonnage was not more than 350tons. Varkalas was a boat of the same size as Karavoskaro with a transom on the stern post.

This type was usually built on the islands of the eastern Aegean sea. Very similar to the Varkalas was the Bombarda boat. Her stem had less rake than the Varkalas and her transom board was beamier and shallower than that of the Varkalas. This type was more common in the eastern than in the western Aegean where the Island of Spetses belongs to. Another type of boat with transom stern was known under the name Mavrothalasitiko (boat from Black Sea). Her stem was like Karavoskaro and her stern had a transom like Varkalas. The most peculiar feature of this boat was that her stern was significantly higher than her stem. He believes that the conditions of the Black Sea determined this form of the boat (they had to sail in a southerly direction under a strong wind from the north and against a very rough sea). Another type of boat was Nava. This boat was like a Karavoskaro with an oval transom on the stern instead of the counter stern which on the Karavoskaro was formed by the planks of the hull. He believes that this type of boat came from North America. The most popular type of small boat on the Island was a boat with a transom stern, less than 8 m. O.A.L., and with one lateen sail.

[M]. Fishing boats must be shallow in order to be sufficiently manoeuvrable. Trading boats must have more draught than fishing boats for faster sailing and seaworthiness. When the boat (Trechadiri or Karavoskaro) had two gaff sails (bouma) she was called "Lauver" (or Lover, "Λόβερ"). The Karavoskaro with two masts and a top square sail on the main mast was called "Briki". The most popular arrangements of rigging on Trechadiri with two masts were what they used to call "lauver", and a lateen sail on Trechadiri with one mast. The hull of a Perama boat was the same as a Trechadiri. The only difference was the arrangement of the end of the gunwale on the stem and the stern post. He believes that the top stem post and the fore end of the gunwale had this form in order to protect the people on deck from the spray of the waves in a rough sea.

[T]. He was the first who introduced electrical tools on the Island. That was in 1925 with an electrical saw, plane and drill. It was not until the end of the Second World War that a second yard started to use electrical power.

[W]. The best timber comes from the Island of Samos. But they used timber from the Island of Evia as well as from the Island of Thasos. Pine from Spetses was not long enough to be used on planking. They often used it on skeleton components as well as imported oak from Czechoslovakia. The general rule for the amount of wood wanted was that for one ton of weight of the boat one cubic meter of timber was needed. The timber must be seasoned as long as possible and without knots.

[C]. He described the process of building up a Karavoskaro. This description is included in 7.2.4 Boats with a counter stern where the construction of boats with a counter stern is mentioned.

[D]. He used to work with plans and laid down the lines of the boat on the lofting floor. His description about the plans is included in the chapter of the determination of the shape of the boats, where the method with plans is mentioned (5.3.3 The use of boat lines plans, fig.111 and 112).

He said that some older boatbuilders on the Island used half models to determine the shape of the lines of the boat. The models consisted of five or six horizontal levels made of straight planks. The first job on the model was the determination of the water lines on each one of the horizontal levels (fig.141b). When they found the shape of the water lines they trimmed the edges of the horizontal levels to form the hull of the model. He described some rules to determine the fundamental dimensions of the boats (Tables.no.5 & 6, 5.1 Fundamental dimensions, 5.3.3 The use of boat lines-planes).

Spetses tel.-72526 (Spetses)

[H]. The best boatbuilder on the Island was Mr. Stelios Stilianos who now lives in Athens (previous interview). He believes that the most famous boatbuilders came from Asia Minor, like [15]-Vrochidis.

[Tp]. Today they build only small Trechadiri and Liberty boats and only few bigger boats for tourist purposes. These bigger boats are usually Liberty and Varkalas. There is a painting in the small chapel of Panagia Armata from 1887 where a trata boat appears with the same details as she used to be built with 30 years ago (he mentions that the board on the stem post of a trata boat was called gaga or armata).

Another type of small boat was Gaita. She was popular among the costal fishermen for being very stable in a stream or current. Gaita required a small engine and was a very economical boat.

[M]. The boat from Hydra island with a transom on the stern (see Typology) had this distinguished form in order to be used in a special kind of fishing with the giala (Glass through which one could see the seabed from the boat).

Some of the Trechadiria had a raised deck level at the aft part of the boat which formed a step with the main deck level. This form was called "komiza". When the deck level was the same along the whole length of the boat the Trechadiri was called "Trechadira". On this last type of Trechadiri often a timber perpendicular to the axis of the boat was placed on top of the gunwale with the two ends to be extended outside the boat. This was to accommodate the heel of the sprit, the mast and the oars during the fishing time (fig.141c).

[T]. There is a description how they use the tools mastari and stantsola to find the shape of each strake of the hull. This is mentioned in 7.5.4 Planking up the hull.

They still use the hand saw for certain tasks one of which was the forming of the scarf joints on the keel. It was a couple of

carpenters who used to work all the time on the frame saw. They used to unscrew the blade of the saw every night and screwed it up again the following morning in order to avoid twisting of the wooden frame.

[W]. Most of the timber come from Samos and from Lesvos;

[C]. On a Varkalas boat they extended the height of the aft part of the keel from 20cm to 80cm. That was because the form of this Varkalas had not enough draught at the aft part of the boat (fig.141d) (this Varkalas was built in the next door boatyard of Mr. Thanasis Kobogiorgas).

When the keel consisted of two piices the scarph joint between them was abaft the middle of the boat.

Planking started by trimming the ribs to form the proper bevel. That was done by separating the area of each strake with a rope and a small axe on the ribs and determining the angle of the bevel before they then trimmed down with the axe and the bevel gauge. This Varkalas boat which is 20m long, has frames which consist of nine pieces.

[D]. All the yards today on the Island work with moulds except Mr. Kobogiorgas who works with plans. In the past there were more boatbuilders who were working with the lofting floor. Mr. Kobogiorgas has not a proper lofting floor and he uses part of the road next to the yard to loft each of the frame lines. In this way he does not chalk all the lines on the floor at the same time. According to Mr. Korakis the moulding method is more efficient because one can use less wood than in the case of determining the lines on a lofting floor (this possibly had to do with the type of the boat, like Karavoskaro, which can be built only with the aid of a lofting floor requiring more wood because of its form, than with the actual method of lofting). One of the tests to see if the form of a boat was decent was to look at her from a distance of about 40-60m away. From that distance the gunwale of the boat ought to have the same height along

the whole length of the boat. This is difficult if the rake of the gunwale changes on different parts of the boat. The only exception to that rule is the fore part of a Liberty boat where the gunwale is higher in order to meet the stem post with the appropriate form.

This test was repeated several times during the building process in order to test the positions of newly placed components.

[5]-Dardanos (April & June 1986) (tape 6 & 7)

Chalkis tel. 225658 (Chalkis)

[H]. His grandfather was from the Island of Hydra. He used to travel to other places in Greece repairing or building boats there. In 1910 he died while he was working on a boat in Lavrio and his father finished the job there and he came to Chalkis in 1921 and he opened this yard. They now have the yard on this place since 1941 and he showed a picture taken in 1950. The boats on the photograph were the first boats with inboard diesel engines in Chalkis (these engines were made in Greece by Papathanasiou and Koukouvinou fabric). On the inside part of the boat both me and my father used to make a mark with our names. Today he has clients from all over the country and Cyprus.

[Tp]. We used to build almost only Trechadiri. The Perama type was similar to Trechadiri. The middle section of a Perama was the same as that of a Trechadiri. Only the bow and the stern were different. He believes that this difference provided higher sides of the boat amidship. In order to form higher sides on the middle of the boat they raised the top line of the sides on the stem and stern post by the arrangement of a Perama type and in this way they provided a higher hull of the boat and more carrying capacity.

He used to build a type of small boats with a transom which were known as boats from the Island of Hydra. On these boats the stern was higher than the stem. The stem post was almost vertical (it was very slightly raking backwards) and the transom was placed higher than the

water level. The boat was beamy on the water level and like double ended in the sea. Above the sea she had a normal beam and transom on the stern post. The longest he has ever seen was 6-6.5m. These boats were sailing as far as the north coasts of Africa for fishing. The form of the boat was proper for this long sailing trips. She was narrow on the stem and beamy on the stern. She was very light in order to be run fast by oars. He can build one of these boats with a length of 5m long and still her weight would be only 80 kilos. This can be achieved by reducing the dimensions of the sections of all the skeleton-timbers of the boat except the planks of the hull (during the second interview, he mentioned that even the planks of the hull were thinner than on the other boats). The seams between the planks were carefully made and usually did not need caulking.

[M].When the boats were sailing they often put ballast inside. Today they put ballast in the boat when something is wrong with her form and therefore not enough draught for the propeller to be sufficiently submerged. He used to build a type of small boat which was called Gaita (botis). This was usually less than 6m long with a double ended form. Although her form was similar to a Trechadiri, there were some differences which make the Gaita more suitable for coastal fishing (more stable). She had a longer keel (60-70cm on a boat 6m long) than a Trechadiri with the same length. She was narrower than a Trechadiri and had less inside space than a Trechadiri (only the deck sometimes was wider on the fore and aft part).

She needs a smaller engine than a Trechadiri. There was another type of Gaita from the Sea of Marmora which was called Gaita Konstantinopolitiki. She was even narrower than the ordinary Gaita and also lighter and they used to draw her off shore when not using her (she could be propelled with just one side oar). Fishing boats must have draught even without having cargo on board. The bow on the sailing trehadiri was narrower above the sea and beamier below the

sea level than the stern.

[T]. All the tools were made by the boatbuilders themselves. Only the blades of the planes were made by smiths who used to make tools.

[W]. Pine was the wood which was mainly used. The forests in North Evia provide most of the pine which is used in the yards of Chalkis. Sometimes eucalyptus was used for keels and posts.

When the timber for planking was long enough seasoned he usually heated it up on one side (the inside surface) and soaked it on the other side. This treatment takes place only during the winter. He passes the planks several times above a fire and at the same time wets the other side of them with a sponge. The required time that the planks must be heated depends on the sharpness of the required curve of the plank. He suggested that the maximum time was one hour. During the summer the strong sun makes firing obsolete. The timber which required the longest heating-time were the three first planks above the keel (pistrofi, kavalaris and kontra kavalaris).

[C]. On a Trechadiri being 10m long the components of the boat had the following dimensions in cross section: keel-8 or 8.5cm.x19cm. The posts had the same cross section as the keel. The deadwood had a trapezoid section, of which the small side was equal to the beam of the keel and the other wider. In this way it provides a surface where the plank of the hull can be nailed on. Only on the place where the axis of the propeller will pass through the stern post the section of the post was about 14x19cm. Ribs about 5x11cm and usually a whole frame consists of five pieces. The floor timber was often wider than the futtocks. Keelson was about 4.5x19 or 22cm (it depends on the dimensions of the available timber). On the boat that he was building that day (10m L.Keel) the keelson was about 22cm on the middle area and at the two ends was narrowing to 16cm.

Sometimes the purpose of the keelson was served above the stem post by an other component called "σώγκιο".

Clamps were a little wider than the planks of the hull. They were placed above the joins between floor timbers and futtocks, usually, two on each side. They had a cross section of 3 or 4x14cm. On boats less than 10m long they did not insert special reinforcements like "ντουφέκι" and "φουρνιστή". Sometimes if they could not find a timber with the proper dimensions and given they were looking for a timber 2.5x14cm they chose in that case another one with 3x12cm. In this way they always made sure to have sufficiently strong timbers on cross section.

The width of the ribs and the beams of the deck were related to the desired free space between them. The general rule was that the free space between two ribs or two beams of the deck must be almost the same for any size of boat. For example, fig.142a gives these dimensions for a boat 7m respectively 10m long. The height of the deck beams must be just enough to cover the whole length of the nails. Some boatbuilders use moulds in order to find the shape of the deck beams. The waterway was 4.2 or 4.3x22 or 28cm depending of the available timber. The joints of the different pieces of the waterway were simple scarfs nailed on the deck beams. The planks of the hull and the deck were 2.5x12 or 13cm.

Under the waterway timber and the deck beams they placed wooden knees to reinforce the structure. For a boat about 10m long the arms of these knees should be about 30cm and with natural curve.

He did not caulk the hull because the seams between the planks were tight enough and their swelling in the sea made caulking dispensable. He used to caulk the butt seams between the planks of the same strake and the rabbets along the posts and the keel.

[D]. He can draw the boat lines of a boat but he prefers to work with moulds because this was a more practical and simple method. He has some moulds which were made by his father. If he had to make the boat-lines of a boat he forms patterns from these plans using them as

moulds.

[6]-Arvanitis (April & June 1986) (tape 8 & 9)

Chalkis tel.21192 (Chalkis).

[H]. He started in the Navy and continued in Perama and in Chalkis as an apprentice. The most famous boat builders from the previous generation were Mr. Margaritis from Chalkis, who used to build boats with a tonnage of 200- 300tons, Mr. Livadaras, who built a boat on Syros, the boat Argo 2.000tons(!) and Mr.Mastrodonis from Syros who used to work in Perama being specialized on the Liberty type.

Most of the boatbuilders in Perama come from the islands like Symi (Mr.Psaros), Samos and Spetses. Boatbuilders from Asia Minor came across in 1922. Perama used to be a good school for wooden boatbuilding until the 1960's.

[Tp]. In Chalkis they usually build Trechadiri, Liberty and Karavoskaro. The Perama was more rarely built here. The price of building a Trechadiri was lower than the price of a Liberty. The Karavoskaro was the most expensive type to be built. This was because of the simpler form of a Trechadiri which required less timbers compared with boats with a counter stern.

The best Peramata were built on the Islands of Samos and Lesbos (Mr.Rologas was famous from Samos). The yards from Syros were famous for their Karavoskara and Trechadiria (Mr. Venturis was a famous boatbuilder from Syros). The family of Tsiveleki was famous for building Trechadiria on the Islands of Skiathos and Scopelos (they used to build boats of 300-400tons). Gatsao boats used to be built only on the Ionian Islands. He has seen a Gatsao of 350tons made of cypress wood with frames made of oak.

[M]. The boat for sponge divers was a Trechadiri with a modified form. The bow was beamier and higher than on an ordinary Trechadiri. The deck was extremely curved. On the direction along the axis of the

boat the deck was a sheer or curve upwards and on the direction across the axis was a downwards curve or camber. The stern was narrower below the water line and wider above it than on other boats. The boat with this form was capable not only to sail under heavy weather but to stay in the open sea during heavy weather. This was necessary because often the places where they had to dive were out in the open sea. The form of the boat was appropriate to remain stable enough in this situation and to let the water from the waves on the deck run fast out of it. The name of this kind of Trechadiri was Michanokaiko. On a sailing boat the beamier section was one or two stations abaft the middle of the boat. This was only for the beam of the deck whereas the water lines below the deck had the beamier section exactly on the middle of the boat. This form makes the sailing boats more seaworthy. The trading sailing boats were more beamy under the waterline than the fishing boats, namely on the middle section (fig.142b). Because of this difference of the form of the boats the fishing ones show more draught than unloaded trade boats (fig.142b). The fishing boat was formed to be capable of moving slowly during fishing without problems from the wind, the waves or the streams in the sea. The trading boat carrying cargo was more stable while sailing than the fishing boat.

[T]. He didn't have old tools.

[W]. He used pine from Evia, Thasos, Samos. He used oak and mulberry for the skeleton. Apart from the strength, the content of resin was the second important wood quality. The more resin the timber contained the more resistance against rotting it had. According to him the best timber comes from Evia because it is full of resin. The trees must be felled during the first full moon of January. The pine can be easily curved just as the intended curves of the hull of the boats required. Only in special conditions, if a boat had some extreme curves for example, they heated them up without

soaking them.

[C]. A boat of the Karavoskaro type with L.O.A. 40-60feet was about 60-70tons. On this boat the planks must be 5-5.5cm wide. If the planks were less wide than that the boat will have less than 60tons. This boat needed about 70-75 cubic meters timber. Some years ago he built a Perama boat and she was 275tons instead of 250tons because he left the planks 6-7cm wide instead of 5.5cm. The planks of the deck were usually narrower than the planks of the hull. To find their shape they used a marking line and the mastary and stantsola tools.

The construction of boats before the introduction of electric tools was stronger. This was basically because all the timbers were cut and split in respect to the direction of their grain.

[D]. On a Trechadiri of 60feet length the middle beam was 20feet and the middle height was 9feet. He usually works with models. In the past half models were more common. Today they prefer to make full models. The slices of the models must be absolutely straight. After completion of a model he separated each slice of plank and made the drawings. The first available drawing was a sheer plan with the water lines corresponding to the slices of the model.

[7]-Chimonas, Thanasis (April & June 1986)

Chalkis tel. 80241-27606

[H]. His father was a boatbuilder in the same place. He was working with the traditional moulding method building most often Trechadiri, Varkalas and Liberty. Today Mr.Th.Chimonas prefers maintaining and repairing boats instead of building new ones.

[T]. Mr. Chimonas kindly offered me some tools of his father to be recorded. He mentioned the adze as a boatbuilder's tool which had to be formed in a special shape. Only few of the carpenters could successfully use the adze to hew the planks. Frame saws too were used only by specialized carpenters. He describes the use of some tools

(4. Tools).

[W]. Pine from the forests of North Evia.

[C]. The older boatbuilding technique included some details which are not in use anymore. The first was the lower piece of the gunwale which was formed with cuts on the lower surface to accommodate the top ends of the ribs. This was common on big boats where the top timbers (Μοντάλιο) of the ribs were extended above the waterway about 80cm. On the same big boats the waterway timber consisted of two pieces. The external was formed with cuts on one side to accommodate the ribs (Χαραχτό) and the internal was faced on the inside of the ribs (7. CONSTRUCTION). Another constructional detail were some longitudinal placed deck beams at the middle axis of the boat (Πικεριά).

After caulking they passed a fire over the whole surface of the hull of the boat. This fire caused a very thin black surface on the planks providing protection against fungi penetration. They used to drive a small wedge in the scarf joints between keel and posts in order to provide extra tight seams.

[8]-Chalaris, Andonis (July 1986) (tape 9 & 10)

Island of Santorini tel. -71275 (Santorini)

[H]. His father started to build boats on the Island of Syros. He came to Santorini and opened this yard at the beginning of this century. All the big boats they used to build on the island were trading boats. Before the last earthquake on the island (1956) forty people used to work in this yard. Today only small boats (less than 12m) are built on the island and most of them are fishing boats. Santorini was the second island after Syros in the Cyclades where they used to build boats. He remembers that the biggest boat that has been built on the island was a Karavoskaro of 220tons. Before the earthquake they used to build the boats on the shore. Today he uses

an old building and because all the boats are less than 12m in length it is easy to build them inside. This building used to be a cellar and its owner kept in his property a boat of 600tons. This boat was carrying wine and volcanic earth for buildings to Crete and Malta and brought back animal-food from Crete and special building stones from Malta. When the boat was carrying barrels of wine they used to carry so many in the hold and on the deck that the hull part below the waterway timber was completely submerged during sailing.

[Tp]. In the past they used to build Trechadiri, Perama, Varkalas, Karavoskaro, Tserniki and Botis. Karavoskaro must be an Italian design of boat. Botis was a type of small boat with a straight stem and stern post. Another name for it was Koutoulo and they were less than 30tons. The type of Gatsao which they used to build on the Ionian islands seems to be similar to the type of Botis which they used to build in the Aegean sea. The type of Tserniki was like the type of Perama without the small vertical board on the stem post which was characteristic only for the Perama boats. The stem post of both these types had more rake than the stern post and the vertical board on the stem of the Perama was placed in such a way to protect the deck from the water of the waves which were coming on deck when the boat was sailing into the wind and waves. Tserniki was usually a fishing vessel and only rarely used as a trading boat.

The most common type of small fishing boat with oars was the Trata. These boats were about 7-8m and they usually were propelled by four oars. This type was like the Trechadiri boat with a small transom on the stern to accommodate the man who hold the tiller and a board in front of the stem post like a ram. This board (Καρσούλι) was used like a step for the fishermen when they were fishing close to the shore. On the stern of the boat they had a structure across the stern post to accommodate the nets.

[M]. When the boats were sailing the form of their hull was different

than that of the boats with inboard engine. These differences from the boat today were almost the same for trading, fishing and sponge divers' boats. These boats then had more draught and were beamier below the water level than the boats they usually build today. The fore part of the hull was beamier than the aft part. These features provided a more seaworthy and faster form of hull. The deck had more camber and sheer than today in order to let the water run out of it especially when the boat was carrying cargo. The fishing boats with one mast had a sprit sail (Σοκολέβα). This kind of sail was formed to provide an upward direction of the force from the sail (2. CLASSIFICATION). This direction of the force from the sail made the boat more stable. Additionally this kind of sail had the center of the sail force lower than the other kinds of sails, this was another reason to use them as more stable sails (2. CLASSIFICATION). This kind of sail needs more space along the deck than any other sail and the masts for a sakoleva sail were placed sufficiently forward in order to provide enough length aft from it. In the case of a boat with two masts the use of a sail of this kind was impossible. The trading boats were usually equipped with two masts and sails being either lateen (Λατίνιο) or gaff sails (Μπούμες).

The lateen sails were more often on Trechadiri boats with a small square top sail and a jib. Perama boats too usually had lateen sails. Another combination was a lateen for the fore sail and a gaff the aft one. This arrangement gives the boat more manoeuvrability and it was easier to be manipulated than with two lateen sails.

Almost 2/3 of the cargo of the boat was used like ballast. The hull of the fishing boats was formed in a way in order to require less ballast than the trading boats.

[T]. Some of the tools recorded in the chapter of tools come from this boatyard (4. TOOLS). Most of the tools were made from scrub oak.

[W]. In the past all the timber for boatbuilding stemmed from the

island of Samos. Today the timber comes also from other places. The best timber must be felled in January when the moon is small and it must be seasoned for almost a year. Sometimes in the past they brought elm and scrub oak from Mount Athos.

Cypress was used for planking in the boatyards of the Ionian sea and at the coasts of Peloponnese.

[C]. Mr. Chalaris was one of the basic sources for the constructional descriptions in Damianidis, K. and Zivas, A. (1986). Some additional information about the construction I gained from this interview in July 1986:

Before the earthquake (1956) special craftsmen were employed in the yards: for caulking, sawing the timber and carpenters. The three first planks of the hull of the bottom of the boat had separate names (pistrofi, kavalaris and kontra kavalaris) because they had been measured and cut before they placed on the boat (7. CONSTRUCTION).

[D]. In the past they used to work with the method of "Σόλα" (lofting floor) for the big boats and with "Μονόχυτρο" (moulds) for the small boats. With the moulding method they used to build boats less than 16m O.A.L. (50-60tons). For the description of the moulding method from this yard see the chapter on 7. DESIGNING.

[9]-Chilas, Emanouil (July 1987)

Island of Kalymnos

[H]. His father used to build boats for sponge divers and fishing boats. This yard is a hundred years old but today the authorities want them to give up this place. First they built the electricity station next to the yard and now they think that this boatyard pollutes the area of the city of Kalymnos.

Today in the yard only repair work on boats takes place.

[Tp]. Most of the boats for sponge divers were Trechadiria boats. In addition to Trechadiri they used to build Varkalas and Liberty boats.

[M]. The Trechadiri for sponge-divers used to be beamier on the fore part and with more draught than the fishing-Trechadiri.

[T]. He had no time to speak about the tools.

[W]. The best pine for boatbuilding comes from the island of Samos. Sometimes they brought timber from the island of Lesvos and from Rhodes.

One of the most crucial properties of the timbers were their natural curves. The woodcutters ought to know how to cut the trees in order to provide the right shape of the timbers for the skeleton of the boats. The timber had to be clear of knots and other defects as much as possible. The timber should have been seasoned before it came to the yard. In the yard they used to season the timber once more for no more than two months. During the summer they placed the timbers in a sheltered place to protect them from the strong sun.

For a Trechadiri boat ten meters long, they need six cubic meters of wood for the skeleton and eight cubic meters for the planks of the hull.

[C]. If a plank will be placed on a position on the hull where the required form is extremely curved they used to heat up one side of it while soaking the other with sea-water. The three first planks next to the keel and some of the planks close to the posts used to be treated with this technique. The only places on the hull which needed caulking are the seams in the rabbets and the butt seams between planks of the same strake of the hull. The other seams of the hull generally did not need caulking except if any of the planks was not properly fitted on the hull.

[D]. They used moulds to find the shape of the frames of the middle part of the boat. From Mr.Chilas I had a description of the method of "Μετζορόλα" which is described in the chapter on 5. DESIGNING. Some new features of this method which are mentioned by this boatbuilder are :

- 1) The radius of the metzarola plan was half the measurement of the distance between two stations of frames.
- 2) With this method they could determine the shape of ten frames and in fact the shape of the twenty middle part frames of a boat (this requires a total number of ribs more than thirty-six).
- 3) They used the same metzarola diagram for the sirmarks on the rising table and on the half breadth mould.

[10]-Binos, Vassilis (August 1986, March 1987)

(tape 11,12 & 13)

Island of Lemnos tel. 4829180 (Piraeus)

[H]. His uncle was a boatbuilder on the island of Moschonisi (Turkey). In 1922 he emigrated to Lesvos and from there later to Lemnos. He taught Mr. Binos the boatbuilding technique and Mr. Binos opened his yard on Lemnos in 1949. Later he came to Perama (Piraeus) and he worked there as a caulker until 1988.

[Tp]. Syros and Plomary (Lesvos) were the places where they used to build Πέρωμα boats. The best Πέρωματα were built in Ai Vali (Turkey). The best Τσερνίκι were built on the island of Moschonosi (Turkey). Perama and Tserniki were similar types of hull. However, the tserniki's post was often raked forward more than that of the Perama. His father had a small Tserniki boat which was built before 1900. He gave a description of this boat. This type was often used as a fishing boat and only rarely as a cargo boat.

In Reis dere (Tsesme) they used to build Τρότα boats.

[M]. The last Trata that he built on Limnos was 8m long. Her stem post was raised about half a metre above the deck-level. In front of the stem post she had the typical board (γκάγκα). Her main propulsion was by oars but a sprit sail could be used without a jib. Most of the boats with one mast had sprit sails (sacoleva) instead of lateen sails on the island of Limnos.

Lateen sail: The mast was placed on 1/3 of the length of the boat from the stem. With lateen sails the boat could sail closer to the wind than the boats with sacoleva sails. The long yard was tied on the mast in a way that permitted the sail to be emptied when the wind was strong. This arrangement makes the lateen sail safer to work, but under a strong wind the boat with this sail was slower than a boat with other kinds of sails.

Sacoleva sail (sprit sail) : This sail was stronger than the lateen sail.

With a sacoleva sail the boats could sail under heavier weather than with a lateen sail. The center of the force from the wind on this sail was lower than on a lateen sail. This is the reason why the sacoleva provides more steadiness than the lateen sail. Boats with a sacoleva sail can not sail as close to the wind as with a lateen sail. The sacoleva had a curved form on its upper part which provided an upward direction of the force from the wind. This arrangement enables the boat to sail under heavy weather without dangerous pounding on the waves.

[T]. Mr. Binos described all the tools for caulking which are included in the chapter of TOOLS and gave me permission to record his caulking tools.

[W] Timber for boatbuilding comes from Samos, Skiathos, Thasos, Lesbos, Evia and Mount Athos.

On the Ionian Islands they used to build Gatsao boats from cypress. On Lemnos they used oak, elm and red mulberry. They used to cut timber from the slopes of the hills where the trees have natural curves. He describes how the boatbuilders on Lemnos used to go and cut trees grown on the steep slopes of the hills.

The higher on the bole of a tree the boughs are the better it is for its use for boatbuilding. He believes that the pine which is grown on the lower levels of the hills on a fertile ground has less boughs and

a more healthy bole than a pine which is grown on an infertile earth. This is the reason why Mr. Binos believes that the pine from Samos is the best pine for boatbuilding in the Aegean.

He remembers descriptions from older boatbuilders where in order to form the planks for the hull of a boat they split the trees with wedges and they produced planks with different widths (5-6-...-10cm). Then they planed and formed them to roughly the same width. In this way the planks were extremely strong because they had their main dimension following the direction of their grain.

[C]. Mr. Binos described the process of caulking. Most of the information in the section on caulking in the chapter on 7. CONSTRUCTION comes from this description (7.6 Caulking).

He also gave some information about the construction of a boat which is included in the chapter on 7. CONSTRUCTION.

[D]. He used the method of moulds to determine the shape of the ribs of the boats. Usually with this method they determined 5 fore ribs and 5 aft ribs in addition to the middle pair of ribs. If they wished to form a more beamy fore part of the boat they repeated twice the form of the first fore rib. In this case they determined 6 fore ribs of the boat. When they set up the middle ribs which derived from the moulding method they nailed the ribbands on. First they nailed the upper one, then the lower one and finally the middle one. To determine the form of the middle ribband they used a flexible wire to find the desirable beam of this ribband on the fore and aft parts of the boat. When they had defined the position of the three ribbands they used the same flexible wire to determine the shape of each of the remaining ribs on the fore and aft part of the boat. They used this process only on one side of the boat and they transferred the same forms to the other side of the boat, so that here only two ribbands were necessary.

As many yards were the length of the boat as many sirmarks were on

the moulds. The radius of the metzarola plan was the distance between two frames of the boat.

On a double ended boat L.O.A.=6m. the M.B. was equal to 1/3 of the L.O.A. plus 10-15cm. and the M.D was equal to 1/3 of the M.B. plus 5-10cm.

[11]-Polias, Adonis (August 1987) (tape 14,15,16 & 17)

Island of Symi. tel.71487 (Symi)

[H]. His father was a sponge diver. When he was young he started to work as an apprentice in a boatyard. Later he went to Piraeus to work as a boatbuilder and before the second world war he was in Libya working with Italians as a boatbuilder. During the Second World War he came back to the island of Symi. During the war many of the island's boats were destroyed and there was no work in the boatyards. After the war most of the yards closed and for the last ten years he is building only models of traditional boats (on a scale 1:20). Today he is 75 years old.

Many of the boatbuilders from the island went to Libya to work there during the Italian occupation on Symi. They say that some of the children of these people are still working there as boatbuilders.

The time when many sailing boats were on the island (1917-1928) the divers used to sail to the north coasts of Africa during May and to sail back to Symi during October. They had boats about 150-200tons which were carrying 6-8 small boats. The big boats were Varkalas, Trechadiri or Karavoskaro. The small ones were Gialadiki boats. Turkish people, ordering boats, often came to the yards of the island. In this case it was common to import the timber for the boats from the forests of Asia Minor.

On this island they used to build boats for divers. Only rarely they built trading boats. They used to build the boats under trees which could provide shadow during the summer months.

The island used to have a smith's factory where almost all the metal work of the boats was manufactured. Turkish people called the island of Symi "Shubekili" and the type of Skafi boat "Subeki". This means island of Skafi boats. When the island was under Turkish occupation the boatbuilders were travelling to the coasts of Asia Minor and built boats there.

[Tp]. The Tserniki was a double ended boat and she was used by the sponge divers. She was more manoeuvrable than the boats with a transom but less stable. This is the reason why these boats could sink more easily than boats with transom. The length of a Tserniki boat was usually between 13-17m. The Bratsera was a boat with a Trechadiri hull and two masts. The sails of a Bratsera were two lugs and two jibs (fore lug was standing to leave enough space for the two jibs).

Another version of the Bratsera was under a gaff sail on the fore mast, a stay sail and two jibs. On a Bratsera boat three people were required in order to use all the sails. Perama boats usually were built on the Island of Samos although he believes that she was rather a turkish type of boat. Karavoskaro used to be built on the Island of Syros. Here on Symi they used to build Varkalas and Trechadiri boats. He believes that the type of Karavoskaro was brought in the yards of the island from the island of Kasteloriso. On this last island they built in the past big trading boats mainly of the Karavoskaro type. Moreover this type comes from the Italian tradition.

[M]. Skafi from Symi was a boat for sponge divers. The stem post of this boat was straight and it had the same length as the keel of the boat. The stern was formed with a transom. Skafi had a small aft mast with a lateen sail. This sail in relation to the form of the stem post provided the boat with the ability to make small movements while the boat had actually cast anchor for diving. In this way the divers on the sea bed could move without walking. They had just to let

themselves be pulled by means of a rope from the boat which was moving slowly.

He has seen the last two Skafi boats on the Island when he was a child.

The sprit sail gave the vessels the desired stability and it was easier to use than the lateen sail. The lateen sail though was faster and could be used closer to the direction of the wind than the sacoleva sail. Moreover none of these two sails could be used easily in combination with more than two other sails (jib and top sail).

He had two models of Trechadiria. One was a boat for divers (fig.143) and the other a trading boat. In order to be fast the Trechadiri ought to be beamy on the bow and narrow on the stern along the water-level. The trading Trechadiri had more draught because when she was loaded she should be faster than the Trechadiri used by divers or by fishermen. At the same time the boats for divers were beamier on the bow than the trading boats. This is because the boats for divers must be sailed in heavy weather on the way to the north coasts of Africa where they used to dive for sponges. These boats carried stones as ballast while on the trading boats the cargo served as ballast. He remembers that they used to paint each strake of the hull of the Skafi boat with different colours. They painted them before they set them on the hull. The main colours were red, blue, green and brown.

The other common type, Varkalas, was beamier on the part below the water line because she was a cargo boat. The lines of a Varkalas boat were the same as these of a Karavoskaro boat at the middle part of the boat. Varkalas was beamy as well on the bow and this form made her more stable than other boats. That was the reason why they preferred to use this type of boat to sail to the southern Mediterranean carrying the small boats for divers. Varkalas had the transom located above the water level. This enables a faster sailing.

The older Varkalas had a straight piece of stem post, the more recent had the same stem post as the Karavoskaro boat.

[W]. The more wood was used in the structure of a boat the better she is balanced. Sometimes they used cypress only on the deck of the boat. This species is not flexible enough and less strong in the sea than pine. Oak and elm were used on the strongest structural components. After the Italian occupation they used pine from the forest of the island. The people of the yards went to the forest and they stayed there for a few days. They marked the trees and cut them. Then bulls pulled the trees to the coasts and from there boats carried them to the yards. Before this period they used to import timber from Asia Minor. If the timbers were too many to be transported by boat they built a float of them which then was taken in tow. The trees were peeled by means of the adze and sometimes cut by a frame saw (Καρμονιόλα).

The timber for the planks of the boats must be seasoned even longer than a year. The other timbers for the skeleton of the boats should be seasoned less because it was easier to saw them when they contained some moisture. When they sawed the timbers they placed wedges on the cut made by the saw to make the sawing easier. They could not saw more than one hundred metres length of timber a day. They marked straight lines on the timber with a marking line and they sawed by following this line. This was done only for the planks of the hull.

The paint they used was made in Italy.

[C]. In the yards of this island the waterway timber was called παρακλαμάς. The keel of the boat was sometimes built to be slightly curved downward on the middle in order to avoid hogging. The stern is always slightly higher than the stem.

The keel consisted of two pieces on big boats. The upper one accommodated the frames and formed the rabbets. The lower one was the

rest keel below the rabbets. In case of damage of the lower part the replacement was very easy if a lower part of the keel did exist. The upper one was about 5-6cm high and was called "panino". The keel and the posts were supported from the beginning of the building process by means of poles the "ποντελιο". Before they place the frames on the keel they test the vertical location of the keel and the stem and stern post.

Any cross section of the frames consisted of two pieces. One with extension above the other which is extended below the previous. The nails of the upper one are always fastened on the low one from the side of the former (fig.142c). In case of treenails this arrangement is not necessary.

On small boats the clamp strakes were wider on the middle part than on the bow and the stern.

They dubbed the planks of the hull on the inside surface in order to provide a curved surface which can be fitted more safely on the external curve of the frames.

The internal ceiling planking was not covering all the internal faces of the frames. Usually they left areas free of internal planking for better ventilation.

[D]. The older boatbuilders did not know how to use the lofting floor. They used only moulds. He started to use plans and a lofting floor during his work in Piraeus. The use of moulding was more a matter of experience than knowledge. Moulding was not so accurate as drawings and lofting. When they determined the frames with moulds they used to place the middle pair of them on the keel closer than the other frames. The last frames placed fore or aft of the moulded frames of a vessel were called "protovathiko".

Trechadiri was wider than Karavoskaro. On a Trechadiri 15m long the M.B. was 5m & (5x5)cm = 5.25m .

[12]-Kozonis, Thomas and Kozonis, (April 1988)

Island of Samos tel. 31569 (Samos)

[H]. They live in the small village of Agios Isidoros. The village consists of about 10 houses and everybody works in the boatyards. There are four boatyards in the village. The village and the boatyards had the same history which is going back at least one century. Before the Second World War 60-70 people were working in the yards. The village is remote on the Island and electricity arrived there just one year ago(!).

[Tp]. The favourable types of boats on the Island were Trechadiri, Perama, Karavoskaro and Varkalas. They used to build the Trata type as well, which were less than 15m L.O.A. and rarely Tserniki boats which were less than 10m L.O.A.

They remember another type which is called Maurothalasitiko being usually built in Turkey. This type had a straight stem post and her bow was higher and beamier than on the other types.

[M]. The M.B. of a Trechadiri is $\frac{1}{2}$ of the length of the keel, while the M.B. of a Perama and a Karavoskaro is $\frac{1}{3}$ - $\frac{1}{4}$ of the length of the keel. Liberty boats are even narrower with a M.B. $\frac{1}{4}$ of the length of the keel.

On Varkalas the M.B. was equal to $\frac{1}{3}$ of the length of the keel. However small Varkalas were built wider than the bigger one. Sometimes only the wide area on the middle of the deck was extended farther aft.

The more height the sides of a boat have the more draught she needs. Moreover the shape of the middle section of a Trechadiri provides the possibility of an extra draught height while that of a Perama or Karavoskaro boat limits this possibility. Equipped with an inboard engine the boats need less draught than when carrying sails. For a Trechadiri with a keel 30-40feet long the draught was 30-40cm less than for the same type carrying sails.

The bow of a Perama boat had this form with the vertical board because this was the only strong arrangement of the fore part of the gunwale of this boat. Furthermore this sort of bow provides a better accommodation of the bowsprit. As far as they remember the most common sail on the island was lateén. Even the boats with two masts, Trechadiri or Perama, used to carry lateen sails.

They remember that boats from the island of Kalymnos used to carry sprit sails (Sakoleva).

The deck of a cargo boat was more curved upwards along the bow and the stern than that of a fishing boat. The stern was usually higher than the stem. On a boat 10m long the stern is 10-20cm higher than the stem.

The Trata was a fishing boat with a characteristic ram on the stem post (2.2.6 Trata). She was less beamy than the other boats. The last Trata that they built ten years ago belonged to a fisherman from Kokari of Samos.

[W]. They used only pine from Samos which they believed to be the best kind of available wood for boatbuilding. The high content of resin in the pine trees of this island provides a really high standard of decay resistance.

The trees were felled by boatbuilders and in the past bulls carried them from the forest to the yards. The trees with natural curves were very valuable in the boatbuilding process.

They used to coat the timber with red lead (minion) before soaking them. Then they put them in the sea. If the plank was going to be placed on a position with a sharp curve they left it in the sea for 2-3 hours (this is the plank above the keel and some planks close to the stem and stern). Otherwise they left the planks in the sea less than half of an hour. When the planks were placed on the hull of the boat they were seasoned again under the strong summer sun and the wind. Usually they avoided to plank a boat during winter when the

atmosphere had a high moisture level.

They did not have problems in obtaining natural curved trees from the forest.

[D]. They determined the shape of a boat straight on a lofting floor as it is already described by messres Mavrikos from the Island of Syros.

[13]-Kontatos (April 1988)

Island of Samos tel. 32391 (Karlovasi - Samos)

[Tp]. They used to build Karavoskaro, Liberty and Varkalas but more often they built Trechadiri and Perama.

[M]. On a Trechadiri the M.B. was $\frac{1}{3}$ of the L.O.A. On a Perama the M.B. was $\frac{1}{4}$ of the L.O.A. The middle draught was $\frac{1}{3}$ of the M.B. on a fishing boat and more than $\frac{1}{3}$ of the M.B. on a cargo boat.

In the past they used to form a step on the aft part of the deck of the Trechadiri. He believes that the reason for this was to provide some extra space below the deck at the aft part of the boat. The old form of the stern post of the Varkalas boat was straight like the Trechadiri. Today they prefer the arrangement of the internal rudder and therefore they form the stern post with three pieces as described in the chapter on 7. CONSTRUCTION (7.2.2.b New form of transom).

The Perama boat had this form of stem in order to support the bowsprit. He believes that the rake of the stem post of a Perama together with the extreme rise of the sheer on the bow necessitated the construction with this vertical board at the end of the gunwale above the stem post.

[W]. He believes that the main reason for the good quality of pine from Samos was that they did not extract resin from the trees as they did on pine trees from other places.

For the skeleton of the boats they needed naturally curved boles and for the planking straight boles. The timbers must be as free as

possible of other defects.

He used to soak the timber for about one hour before using it for planking. The planks of the three strakes above the keel needed more soaking than the other planks.

[C]. The first plank above the keel must be carefully measured in order to be placed with its upper edge as parallel as possible to the keel. The same care must be taken for the next two planks. These three planks determined the lines of the seams of the planks as far as the level of the key plank (Καταρραή).

[D]. They determined the shape of the lines of the boats on a lofting floor. For a boat 15m L.O.A. they measured 36feet for the keel. After the determination of the lines, with a keel of 36feet, the L.O.A. was about 15.15m.

[14]-Chatzinikolaou (August 1987) (tape 18)

Island of Rhodes tel. 32331 (Rhodes)

[H]. When he was young he used to work as an apprentice in Mr. Chatsinikitas' boatyard on the island of Symi. Seven years ago he opened this yard on Rhodes (before that he had another job)

[Tp]. They used to build Trechadiri, Varkalas, Liberty and Karavoskaro boats.

[W]. He believes that is not worthwhile soaking or heating up the timber for planking. The accurate measuring and marking of each plank of the hull alone would ensure the design of the desired curved shape without any other treatment. However, even he couldn't avoid sometimes the three planks above the keel being soaked or indeed even heated up occasionally. This is because these three planks must have a twisted form. The planks must be seasoned in the yard longer than two months.

The timber for the skeleton should be green when sawn. He uses timber from Rhodes because they have a better price and it is easier to find

them. The trees must be felled some time between September and January. The more resin the tree contained the better was the protection in the sea against decay.

[D]. He gave a detailed description of the method of moulding that he used. He learnt this method when he was working as an apprentice on the island of Symi. This method is presented in the chapter on 5. DESIGNING (5.2.2 Moulding with adjustable templates).

He could produce the profile of the frames for Trechadiri, Varkala and Liberty hulls.

[15]-Vrochidis (September 1986) (tape 19)

City of Perama tel. 4310526 (Athens)

[H]. He was born in 1903. He came from the Northern coasts of Turkey in the Black Sea, in 1924. His father had a boatyard in Kerts (USSR). When he came to Perama, he was one of the few people who could build any kind of boat using a half model to determine their shape. The best boatyard in Perama at this time was Mr. Psaros' yard.

[Tp]. In Perama they used to build all types of boats. Moreover the most famous Perama type of hull was made on the Islands of Samos and Syros. He believes that the Tserniki boat was a Turkish boat. The Gatsao was an ugly type of boat that they used to build on the islands of the Ionian sea and on the west coast of Peloponnese.

The last type which was introduced in Greece was the Liberty type. He believes that the features of this type already did exist on other types of boats in Greece before the introduction of this type. But the determination of this as a separate type was done only after the Second World War.

[M]. He remembers that he made the model of a boat which had the stem of a Trechadiri boat and the stern of a Karavoskaro. The ratio of the fundamental dimensions of this boat was like that of the Karavoskaro boat.

[D]. On Trechadiri and Perama boats the M.B. was 1/3 of the L.O.A. On Karavoskaro the M.B. is 5.6/20 of the L.O.A. .

When he came to Perama most of the boatbuilders used to determine the lines of a boat straight on the lofting floor. He was the first who used to work with half models. Seeing the model the boat owner might suggest some changes and Mr.Vrochidis easily would have been able to make these changes according to the owner's wishes.

The slices for the models should be straight and 1, 1.5 or 2cm thick. The models were in a scale 1:20 . When he would form the model he separates each piece of the slices and records them. Finally he lays the lines on the lofting floor. His father used to lay the whole lines on a floor, while he prefers to lay one half on the top of the other in order to use a smaller floor than the one which his father used.

The boatbuilders could not determine very fair lines of the boats by means of moulds. The only way to do so was to use a model or plans and to lay the lines on a lofting floor.

The lines of a Karavoskaro could only be determined by means of a lofting floor.

[16]-Kritikopoulos, Vangelis (June 1987) (tape 20)

Perama, tel. 4310219 (Piraeus)

[H]. Although he is from Samos he started in Perama working in the boatyard when he was young. Most of the boatbuilders in Perama come from the islands (Symi, Samos, Syros) and from Asia Minor.

He knows the method of moulding but he is working now in a boatyard where they use a lofting floor.

[T]. He was working as a carpenter in the boatyards of Perama and he used almost all existant tools of this trade. The big frame saw was a tool very common in the yards thirty years ago. They had workers specialized on the use of this saw. In respect to the log that they

had to saw the appropriate blade on the saw was necessary. The width of the blades can vary from 3-4cm to 1.6cm (the wider blade was used to cut timbers of about 50cm wide). It was very important to keep the edge of the blade sharp all the time. For this task they used a steel file. One of the special saws was a small crosscut saw. That was the only proper saw to cut sharply bent edges. All saws were made by the boatbuilder and only the blades were made by the local black smith.

They did not use axes. Only the adze was a boatbuilder's tool.

They used wooden wedges to tighten up timbers or to split planks but they never used wedges made of steel.

They used three types of cramps: the ship cramps, the joiner's cramp and the gee cramp. He did not remember the use of any wooden cramp.

They had two basic types of auger: the "τριπόδι" (shell auger) and the "βίδα" (twist auger). There was a great variety of sizes on these augers starting from the biggest for the keel, the posts and the keelson and ending with the smallest with which they made the first point for a hole.

The pair of sweep was used in any kind of measurements. Each sweep was 20-25cm long. The big right angle was used either on big vessels or on the lofting floor. The small one was used on any piece of timber from which a right angle section was to be formed. The plumb line was made of wool.

In the past the nails that they used on the vessels were 7cm to 20cm long and 8mm to 16mm wide.

The helve of the hammers was made either of oak, of eucalyptus or of elm and it was specially selected for additional strength. He never used a wooden mallet but he suspects that this was used on wooden parts in order to produce less damage on their surface.

There was a variety of planes which were used to trim the hull of the vessels. All of them were made of oak. The keel and post rabbet planes (Νύχια) were used to provide the starting mark of any stripe.

Then one of the other planes was used to produce the specific cross section of a stripe. In the yards there were basically two categories of planes, one for stripes (Νύχια, Πάνιστρα, Γκινόσσοι, Λούκια, etc.) and the other for surfaces (Ροκάνια). There was a special plane for surfaces called Λακορόκανο which was used only on the inside surfaces of the planks of the hull. In this way they produced smooth concave surfaces on the planks in order to face the ribs. There were right and left hand planes. The blades of the planes were sharpened by means of a file stone. According to each kind of stripe cross section they had a special plane.

[W] The trees for the skeleton were naturally curved. The good timber for boatbuilding should show a high content of resin and should be free of defects like knots or splits on the planks.

If it was difficult to find naturally curved timbers they used to form up the curved components of the skeleton with small curved timbers. For example in two boats with the same length they might set frames comprising seven pieces on the one of them and frames comprising nine pieces to the other of them. This was in respect to the available naturally curved timbers in the boatyard.

[17]-Papastephanou, Pachos (June 1987)

Perama tel. 4416307-4417148 (Piraeus)

[H]. His father was working as a boatbuilder on the Island of Symi. He left Symi in 1920 and went to Syros where he worked in Mr.Orologas' yard for ten years. In 1930 he came to Piraeus and started to work in Mr.Psaros' yard in Perama in 1936. Mr.Psaros came from Piraeus in 1926. His origin was also from the Island of Symi. Mr.Pachos Papastephanou worked in Mr.Psaros' yard from 1932 until 1942 when his father died. They were working very hard these days.

Today he is working in his own boatyard in Perama with his son Giorgos Papastephanou.

[Tp]. He can build any of the traditional Greek kind of boats. Today the majority of the boats which he builds are Trechadiria. The construction of all the boats had the same structural principals. The differences were on the form and on the lines of each kind. The vernacular kind of boat from the Island of Symi was called " Symiaki Skaphi ". She had a very raked and straight stem post and a transom board on the stern. The stem post of this boat was as long as the length of the keel and the transom was extended higher than usual on boats with a transom (2.3.3 Skaphi from Symi). Only one boat of this type survived. She is in the port of "Zeas", she has a lot of new work inside and on the deck but the skeleton and the hull of the boat must be more than fifty years old. She was built on Symi and belongs today to a second or third owner (her name is Kali Tychi N.S.211).

He mentioned the existence of another type of boat which he called "Tserniko-perama". This type showed features both from the Perama and from the Tserniki type (2.2.5 Perama).

[M]. The form of the middle section of the boat (the middle pair of ribs) depends of the kind of use which the boat was built for. On trading boats the middle pair of frames was higher than on the fishing boats. The hull below the water level was beamier on trading boats than on fishing boats. He gives the description of a "Βρατζέρα" type (two lug sails on a Trechadiri hull) (2.6.4 Lug sail). He mentioned the absence of a decorated head of the stem post on this type.

The lower part of the hull of cruising boats was even narrower than of fishing boats. Today the boats are shallower than those which were built early this century. The fore part of the deck of the boats used to be narrower than today. They believed that this sort of shape provided a better way of sailing than the shape of the hull of the boats today.

He mentioned that there is a limit on the shape of the curves on the

vertical sections on the hull of a boat (lines of a body plan) which depends on the ability of the planks of the hull to be bent perpendicular to the direction of their grain. This was the reason why the lower part of the hull can not be as concave as on boats built of a modern material.

[W]. The timbers must be naturally curved and without defects. The grain of the timbers should be formed in a regular way. So the planks shouldn't have very wide or very narrow areas between their grain. Today it is difficult to find proper Greek boatbuilding timber.

[C]. The key plank on the gunwale was not on the middle part as on the hull of a boat but on one of the two ends (fore or aft). This is because these parts were usually wider than the middle part of the gunwale. Oak and elm was used for the keel, the posts and the knees. If scrub oak was available they used it to make treenails. If the boat was bigger than 15m they form the waterway timber as "χαραχτό" instead of "τριπλιτό". Practically the decision what kind of waterway they were going to place was a matter of the width of the available naturally curved timbers in the boatyard.

In some scarf joints they used to drive small wedges of hard wood in order to stiffen the joints.

He gives a very interesting description of the beginning of the frames' assembling based on the moulding with adjustable templates method. According to this description the boatbuilder used a "master frame and ribbands method" to determine the position of the frames and later assembled the frames (7.3 Framing up).

[D]. He is working today by means of drawings but he knows how to use moulds to determine the shape of the ribs of a boat.

Karavoskaro was the only type on which moulding techniques were extremely difficult.

His father taught him the method of moulds used on the Island of Symi. The method includes three aids (5.2.2 Moulding with adjustable

templates). He produced the sirmarks of the moulds by means of a "Metzarola" plan. The basic radius of the plan of "Metzarola" is equal to the desired narrowing or rising of a certain rib from the middle rib. This is the last rib fore or aft which is determined by means of moulds (5.2.2 Moulding with adjustable templates). The boatbuilder determined these basic radii by rule of thumb. This is according to the size of the boat and the intended shape of the hull. There are two pair of ribs which are called "Mastori". Often the last ribs fore and aft were shaped by means of moulds. The main feature of these ribs was that their form was the nearest to a straight line from all the other ribs of the skeleton of the boat.

On the aids of the moulds were marks which, after having been transferred to the parts of each rib, were used for the determination of the exact position of the overlapping between two neighbouring parts of a rib (5.2.2 Moulding with adjustable templates).

At the same time this position of the overlapping pieces of the frames determines the position of the ribbands and the inside clamps. Moulds were often used to provide the shape of the beams of the deck. There were no sirmarks on these moulds and the boatbuilder used to determine the shape of these moulds by rule of thumb. One of the most important features of these moulds was the symmetrical shape along their middle point.

[18]-Kastrinos, Nomikos (August 1987)

Island of Kalymnos tel. 31228 (Vathi-Kalymnos)

[H]. He learnt to determine the form of the boats on models when he was in the Navy.

[Tp]. He built Trechadiri, Varkalas, Liberty and Karavoskaro. There is a type of small boat usually built on the island. This boat was called Γιοιάδικη. She was with a transom on the stern and her gunwale was lower than for other boats. The fishermen on the boat used a box

with a bottom made of glass to observe the seabed. This sort of fishing required a low gunwale of the boat to use the box with the glass-bottom.

[D]. He uses the moulding method for boats less than 10m long. For boats longer than 10m he uses models to determine their shapes.

[19]-Bilias, Panagiotis (September 1988) (tape 21 & 22)

Island of Salamis tel. 4672437 (Piraeus)

[H]. He is 80 years old and his father was a sail-maker on the Island of Salamis too. His father sewed the sails starting from the aft end of them and ending on the fore end.

Most of the boatbuilders in Perama and Salamis came from the islands and from Asia Minor. They do not build anymore big and strong wooden boats.

[Tp]. When the length of the boat from the rabbet of the stem post to the rabbet of the stern post was more than 15m two masts became necessary. The measurements which were used to determine the dimensions of rigging were the length (as it is described above), the beam (this was the beam at $1/3$ of the length on boats which were shorter than 15m and at $1/2$ of the length on boats longer than 15m), the height (this was the vertical distance between the keelson and the deck beams at the position of the mast).

Three masts were used on vessels longer than 28m (Matsaphora). In this case the height of the masts is worked out from the same rule as on vessels with two masts (with the beam at the middle of the boat).

On boats with two masts the fore was placed at $1/5$ of the length and the aft at $3/5$ of the length. The length of the mast was equal to twice the beam plus the height of the boat plus the length and the length of the topmast (which was not less than 2m). The mast was usually one piece. The length of the top part of the mast depended on the position of the peak halliards because the gaff topping lift

should not be in the horizontal position. When the mast consisted of two pieces the top mast was fastened on the main mast by means of a heel structure and wooden wedges without fastening permanently the top mast on the main mast. The mast should have the same vertical position as the stem and the stern post. The structure on top of the mast (Kopha or kourzeto) was placed two times the beam above the deck of the boat. The aft mast should be one metre higher than the fore mast. This was to provide higher space for the main sail.

The angle between the mast and the upper boom of the main sail was less than 45 degrees. The upper boom was about 10cm shorter than the main boom. This was to form a wider area on the lower part of the sail. The fore sail was either with or without a boom (skotado). The whole dimensions and arrangements of sails and rigging were to provide the maximum area of sail on the middle of the boat.

All boats under sails need ballast and even the boats carrying engines in addition to sails need ballast too.

Most of the boats after 1932 were carrying both sails and engines. A boat with an overall tonnage of 300tons needs ballast of stones about 33tons. Sometimes the cargo was used as ballast. In this case they threw the ballast in the sea.

The aft mast was always vertical while the fore mast was usually raking forward (the plumb line from the top of the fore-mast should end about 50cm aft of the aft end of the bowsprit). This was to provide wider space to the main-sail.

In addition to the types of hull, there were names for types of boats in respect to the kind of rigging. Lauver (Λόβερ) was the name of boat with two gaff sails and 2 or 3 jib sails. Moulo-Besty was the name of the boat with two gaff sails, two square top sails on the fore mast and 2 or 3 jib sails. Besty was the name of the vessel with three masts. The aft was carrying a gaff sail and the two other masts were carrying square sails. Barco-Besty was with three masts. All of

them were carrying square sails and the aft a gaff mizzen sail as well.

Nava was a vessel with four masts carrying gaff sails and square top sails. The illustrations with a combination of lots of sails on a boat were not true. For example there was not any vessel which was carrying lateen sail, square sail, top sail and jib (illustration in Landstrom, B. (1962, fig.506,510)).

The square sail covered the area of the jib and it was impossible to operate all these sails together. There was a boat which was carrying a triangular shape lateen sail with a yard standing close to the mast and a half-boom to carry the clew of the foot of the sail. This half-boom was supported by a pole placed between the mast and the stern post and closer to the tiller of the boat. These boats were called "Alamana" and they were used to carry sand or other material for buildings. Their gunwales were extended higher than usual and were built stronger in order to carry cargo on the deck. He believes that their origin was from Asia Minor.

--Sprit Sail (Sacoleva). Boat under sacoleva can sail about 10-15 degrees close to the wind. This sail needs more people than the other sails to be used. This is the main reason why the sacoleva has been first abandoned in our century. Moreover this sail was safer than other sails because its shape influenced the direction of the force from the wind.

In this case the force had an upward direction which had as an effect a better stability of the boat. The upper edge of the sprit sail was longer than the lower one. That was an effect of the design of the sail in order to form a curved (baggy) shape of the upper part of the sail when the wind set it up. In this case the lower and aft foot of the sail was very close to the head of the rudder. Three people were needed to sail a boat with a sprit sail. One at the fore-end of the foot of the sail, the other at the aft-end of the foot of the sail

and the third to use the tiller of the boat. Boats under sprit sail could not carry a jib sail. The forestay of the sprit sail was tied on the head of the stem post, making the setting of a jib difficult. The sprit sail could not be reefed.

--Lateen sail (Λατίνι). Boats under a lateen sail could sail closer to the direction of the wind than under any other traditional sail. The short mast for the lateen sail was placed at 1/3 fore of the length of the boat. This sail was often used on small boats less than 5m L.O.A. The yard of the sail was extended above the head-board more than 60cm in order to avoid any mess of the sail while changing course. A boat under lateen sail could be sailed by one person. A version of the lateen sail is the half-lateen (μισολάτινο). The fore edge of this sail was tied on the mast. In this case the lateen did not extend fore of the mast. These boats were carrying one stay sail and one jib. Top sails were not used on the lateens.

On boats with a big lateen sail the people climbed on the yard to tie the sail. Boats from the area of Mesologhi which were called "Πασάρα", were under lateen sails with an extremely curved foot.

--Lug sail (Πσάθα or Τουρκετο μαϊστρα). Boats under lug sail could sail as close to the direction of the wind as five degrees(!). The fore mast of a boat under lug sails had usually a rake forward (that was only on lug and never on gaff sails). This kind of sails needed more people to work than the gaff sail (each lug sail on a boat of two masts needed five people to set it up). The lug sails used in the Aegean were bigger than the gaff sails. For this reason the boats under lug sail needed more draught and ballast than the boats under the other sails. The top yard of the lug sail was tied on the mast in a way to avoid fouling of the sail on the rigging and the yard on the mast.

On boats with two masts the sails were not on the same side of the masts. One was on the port-side, called "sopra" and the other on the

starbord-side, called "bratso". The aft lug-sail was always a standing lug and the fore sail was a balance.

--Gaff sail (Μνούμα or Πάντα). Boat under Bouma could sail about ten degrees close to the wind.

--Square sail (Σταυρώσεις). Boat under stavrosis could sail no more than forty degrees close to the direction of the wind. The yard (Pina) of the lower square sail (Trigos) was equal to 1.5 times the beam of the boat. The side edges of this sail were vertical. The yard of the first sail above the lower square sail (Vassogapia) was shorter 1/4 times of the yard of the lower sail. The yard of the second sail above the lower square sail (Gapia) was equal to the beam of the boat. Finally the top sail (Papaphigos) was equal to 1/2 of the beam of the boat. A vessel carrying five square sails on one mast was called "Briki". "Karavoskaro" was the most common kind of hull which could carry square sails. Only boats with a length under 28m could have masts which consisted of one piece and carry square sails which could tie all of their yards just above the yard of the main square sail.

The yard of the square sails were always on the fore side of the mast.

There was a storm sail called "Psaras" which was set between the two masts with a lift from the boom-stay of the aft mast to a halliard on the head of the fore mast. The shape of this sail was triangular.

The sails were made even before the building of the vessel and only for the jib sails they had to know the length and the angle of the bowsprit.

[C]. The mast was placed on a strong beam above the keelson and it was passing through the deck from a hole situated between two deck beams. The mast was not nailed on the deck-beams and it was only fastened by means of wooden wedges between the mast and the beams.

Most of the boatbuilders do not know to make the masts and the spars

of the traditional boats.

When the boats were under lateen or sprit sail the rudder was extended below the keel to provide enough draught. The position of this rudder was movable by means of two chains from the deck.

The height of the gunwale of a "Karavoskaro" had a minimum of 60cm and a maximum of 80cm. The masts were made of cypress usually from Southern Peloponnese. The shrouds of the masts corresponded to the deck beams fore and aft of the mast.

[20]-Giamougianis, Ioannis (April 1989) (tape 23 & 24)

Plomari (Lesvos) tel. 81200 (Plomari)

[Tp] Plomari was famous for the "Perama" boats that used to be built there. Today they don't built any more "Perama". This kind of vessel had a bow beamier than the other traditional vessels. Because of this form of the Perama's bow these vessels were good on sailing during rough weather. The Trechadiri's bow was less beamy that of the Perama. Nevertheless the bows of both these vessels should be considered beamier than those of the Liberty or Karavoskaro. The maximum beam of a Perama and a Trechadiri was more than 1/3 of the length of the keel and less than 1/2 of the length of the keel.

The Tserniki was usually a small fishing vessel. At Polichnitos on the same island they used to build a small local type of boat and they called it "Perama". The form of this boat was very similar to bigger Perama vessels but on the bow and stern the structure was simpler (without the board across the stem "Κατσούλι"). The last builder of these boats is Mr.Grigoris Grigoriou (tel.41133 (Polichnitos)). The boats were extremely beamy on the bow and the stern area compared with any other boat of this size. Mr.Grigoriou learnt to build these boats from his father who came early this century to Lesvos from Asia Minor (Μοσχονήσια). Mr.Grigoriou used moulds from his father.

[W] For all the parts of the boats except the keel they used pine from the forests of the Island. The grain of the timbers for the ribs must follow the profile of the rib but the grain of the timbers for the planks must be as straight as possible. The timber must contain as much resin as possible. For the keel they used oak.

[C] The gunwale of a vessel must have the same vertical height on its entire length. This is very difficult to achieve because the rake of the gunwale varies as it runs from stem to stern.

[D] The starting point of all types of vessels was the form of the stern part of them. For example one of the reasons that Perama and Trechadiri had a beamier bow than Liberty and Karavoskaro was the form of the stern part. The round shape of the aft part of the sheer line on Liberty and Karavoskaro determined the narrower M.B. of these vessels than on Perama and Trechadiri. For the same reason the middle part of the sheer lines on the former vessels was less curved than that of the later vessels. Therefore the bow of Liberty and Karavoskaro can't be as round as the other vessels.

The rising of the deck of the Perama was not the same as the rising of the top line of the gunwale. This top line of the gunwale was rising on the fore and the aft part more than the deck (otherwise we would not be able to walk along the deck!).

Perama boat had usually very flaring profile on the fore and the aft part. They had deep draught when they were under sails.