YACHTING MONTHLY

'EVENTIDE'

BILGE KEEL SLOOP

18ft/24ft and 20ft/26ft

SHEET 4. MOULDS, STRINGERS, CONSTRUCTION DETAILS, MATERIAL LISTS.

MODIFICATIONS

Regrawn December 1964 to include materials for 20'0"/26'0" yacht & additional details & data.
2. "Mould 4 #18 - 4/1966

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Schedule of Materials

Item	Timber	Scantlings	For Yacht 18'0"/24'0" Nº Required	Length or Size	For Yacht 20'0"/26'0" Nº Required	Length or Size
Wood Keel	English Oak	6"(152) × 6"(152)	1	9'0" (2743)	1	10'0" (3658)
Wood Keel	"	6"(152) × 3"(76)	1	9'0" (2743)	1	8'0" (2438)
Hog	"	8"(203) × 7½"(190) or 7½"(190) × 7½"(190)	1	20'0" (6096)	1	25'0" (7620)
	"	7½"(190) × 7½"(190)	2	22'0" (6909)	2	25'0" (7620)
Stem	"	4"(102) × 4"(102)	1	5'0" (1524)	1	5'0" (1524)
Stem Fairing	"	5"(127) × 4"(102)	1	9'0" (2743)	1	9'0" (2743)
P.C. Bone piece	"	7½"(190) × 7½"(190)	2	23'0" (7010)	2	26'0" (7925)
Chines	Hard Wood Mahogany	2½"(70) × 1½"(38)	2	27'0" (8229)	2	30'0" (9144)
Keelsons	"	3½"(90) × 1½"(38)	2	15'0" (4572)	2	16'0" (4876)
Keelson Deck Supports	"	2½"(60) × 1½"(38)	2	26'0" (7925)	2	29'0" (8839)
Transoms	"	2½"(60) × 1½"(38)	4	13'0" (3962)	4	16'0" (4877)
Bilge Stringers	"	2½"(60) × 1½"(38)	See Sheet 4 for exact lengths		30 lineal feet (9140) long lengths	
Bilge Stringers	"	3"(76) × 1½"(38)	2	4'0" (1219)	2	4'0" (1219)
Floors	English Oak	3"(76) × 3"(76)	1	4'0" (1219)	1	4'0" (1219)
Floors	"	4"(102) × 4"(102)			20 lineal feet (6096) long lengths	
Sole & Transom Knees	Hard Wood Mahogany	3"(76) × 1½"(38)	See Sheet 4 for exact lengths		15 lineal feet (4572) long lengths	
Bulkheads	"	3"(76) × 1½"(38)				
Deck Beams	English Oak	1½"(38) × 1½"(38)	1	8'0" (2438)	1	8'0" (2438)
Deck Beams	"	1½"(38) × 1½"(38)	1	6'0" (1800)	1	6'0" (1800)
Cabin Beams	"	1½"(38) × 1½"(38)	1	6'0" (1800)	1	10'0" (3962)
Half Beams	"	1½"(38) × 1½"(38)	OFFCUTS FROM		60 lineal feet (18288)	
Transom Knees	Hard Wood Mahogany	3"(127) × 3"(76)	60 lineal feet (18288) long lengths		200 lineal feet (60960)	
Gunwales	Pine	1½"(40) × 3"(76)				
Bulkheads	Mahogany	1/8"(3)	2 sheets	8'0" × 4'0" (2438 × 1219)	5 sheets	8'0" × 4'0" (2438 × 1219)
Decking	"	1/8"(3)	4 sheets	8'0" × 4'0" (2438 × 1219)	4½ sheets	8'0" × 4'0" (2438 × 1219)
Cabin Top	"	1/8"(3)	2 sheets	8'0" × 4'0" (2438 × 1219)	3 sheets	8'0" × 4'0" (2438 × 1219)
Cabin Sides	"	1/8"(3)	2 sheets	8'0" × 4'0" (2438 × 1219)	2½ sheets	8'0" × 4'0" (2438 × 1219)
Joinery	"	1/8"(3)	1½ sheets & offcuts from above	8'0" × 4'0" (2438 × 1219)	1½ sheets & offcuts from above	8'0" × 4'0" (2438 × 1219)
Carlins	Hard Wood Mahogany	1½"(40) × 1½"(38)	2	17'0" (5182)	2	20'0" (6096)
Floors	"	1½"(40) × 1½"(38)	1	9'0" (2743)	1	9'0" (2743)
Deck Rails	"	3"(76) × 1½"(38)	2	9'0" (2743)	2	9'0" (2743)
Fairleads	English Oak	1¾"(44) × 1¾"(38)	2	27'6" (8381)	2	30'0" (9144)
Toe Rubbers	Hard Wood Mahogany	1"(25) half rounds	2	17'6" (5334)	2	21'0" (6400)
Bowsprits	White Wood	3¾"(95) quarter-bowsprit	40 lineal feet (12192)		40 lineal feet (12192)	
Cut Shapes	Hard Wood Mahogany	1½"(305) × 1½"(38)	2	10'0" (3048)	2	10'0" (3048)
Cut Shapes	"	1½"(305) × 1½"(38)	1	10'0" (3048)	1	10'0" (3048)
Flooring	Pine	3¾"(95) × ¾"(19)	100 lineal feet (30480)		100 lineal feet (30480)	
Deck Beams	Silver Spruce	4"(102) × 2"(51)	2	26'6" (8080)	2	29'6" (8992)
Bowsprit Rig	"	4"(102) × 4"(102)	1	22'0" (6706)	1	22'0" (6706)
Bowsprit Rig	"	2¾"(70) × 1½"(38)	2	16'0" (4877)	2	16'0" (4877)
Bowsprit Rig	"	2¾"(70) × 2¾"(70)	1	12'0" (4114)	1	13'0" (4114)
Boom	"	2¾"(70) × 2¾"(70)				

If timber specified is unobtainable locally or is of poor quality use best available substitute e.g. West African Mahogany can be replaced with Iroko, Sapele, aformosia or similar. English Oak can be replaced with Iroko, Keruing or other hardwood.
Items marked * if not obtainable in lengths shown may be scarfed using scarfs not less than 8".
Nº 1 Revision — on for No. 2 & 3 1088 W.B.P.

Plywood Planking

Topside Planking	Mahogany Ply	1/8"(3)	10 sheets	8'0" × 4'0" (2438 × 1219)	12 sheets	8'0" × 4'0" (2438 × 1219)

Alternative Double-skin Planking

Topside Planking	Mahogany	5"(127) × 3/8"(10)	2	Bow: length of deck (6706) Stern: length of deck (3354)	2	Bow: length of deck (6706) Stern: length of deck (3354)
Topside Planking	"	3"(229) × 3/8"(10)	2	Bow: length of deck (6706) Stern: length of deck (3354)	2	Bow: length of deck (6706) Stern: length of deck (3354)
Bottom Planking	"	5"(127) × 3/8"(10)	2	Bow: length of deck (6706) Stern: length of deck (3354)	2	Bow: length of deck (6706) Stern: length of deck (3354)
Bottom Planking	"	5"(127) × 3/8"(10)	2	Bow: length of deck (6706) Stern: length of deck (3354)	2	Bow: length of deck (6706) Stern: length of deck (3354)
Bilge Stringers Inner	"	5"(127) × 3/8"(10)	Diagonal inner skin	Bow: length of deck (6706) Stern: length of deck (3354)	Diagonal inner skin	Bow: length of deck (6706) Stern: length of deck (3354)
Transom Knees	"	3¾"(203) × 3/8"(10)	Fore & Aft Outer skin	Bow: length of deck (6706) Stern: length of deck (3354)	Fore & Aft Outer skin	Bow: length of deck (6706) Stern: length of deck (3354)
Bilge Keels	"	6"(152) × 3/8"(10)	2	16'0" (4877)	2	16'0" (4877)

* Joint centred up between Floors and Iroko Steer Rubbers, width allows for shape of planks.
Note:- There is usually a lot of waste with double skin planking as random lengths supplied by timber merchants often leave an offcut of about half the length required for a plank. It will be quite in order to join these with one 2" glued scarf to make up the required length. Scarfed planks should have at least 3 unscarfed planks between them.

Bulk Fastenings

Type	Size	Gauge Number	Quantity For Yacht 18'0"/24'0"	Quantity For Yacht 20'0"/26'0"
Copper Nails	2¾"(70) or 3"(76)	12	7 lbs. (3.175 Kg.)	8 lbs. (3.629 Kg.)
Copper Nails	2½"(64)	12	4 lbs. (1.814 Kg.)	5 lbs. (2.268 Kg.)
Copper Nails	1¾"(38)	12	22 lbs. (9.979 Kg.)	26 lbs. (11.793 Kg.)
Copper Nails	3/8"(19)	8	1 lbs. (0.454 Kg.)	1 lbs. (0.454 Kg.)
Copper Rivets	3/4"(10)		9 lbs. (4.082 Kg.)	9 lbs. (4.082 Kg.)
Copper Rivets	1/2"(13)		36 only	36 only
Bronze Screws F.H.	3/8"(10)	16	24 only	24 only
"	3/8"(10)	14	60 only	60 only
"	2"(51)	14	288 (2 gross)	288 (2 gross)
"	2½"(64)	14	144 (1 gross)	144 (1 gross)
"	3"(76)	16	144 (1 gross)	144 (1 gross)
"	1½"(32)	10	1872 (13 gross)	1872 (13 gross)
"	1¼"(32)	10	1152 (8 gross)	1152 (8 gross)
"	1"(25)	8	288 (2 gross)	288 (2 gross)
"	1/2"(38)	8	432 (3 gross)	432 (3 gross)
"	2"(51)	10	576 (4 gross)	576 (4 gross)
"	3/4"(19)	7	288 (2 gross)	288 (2 gross)

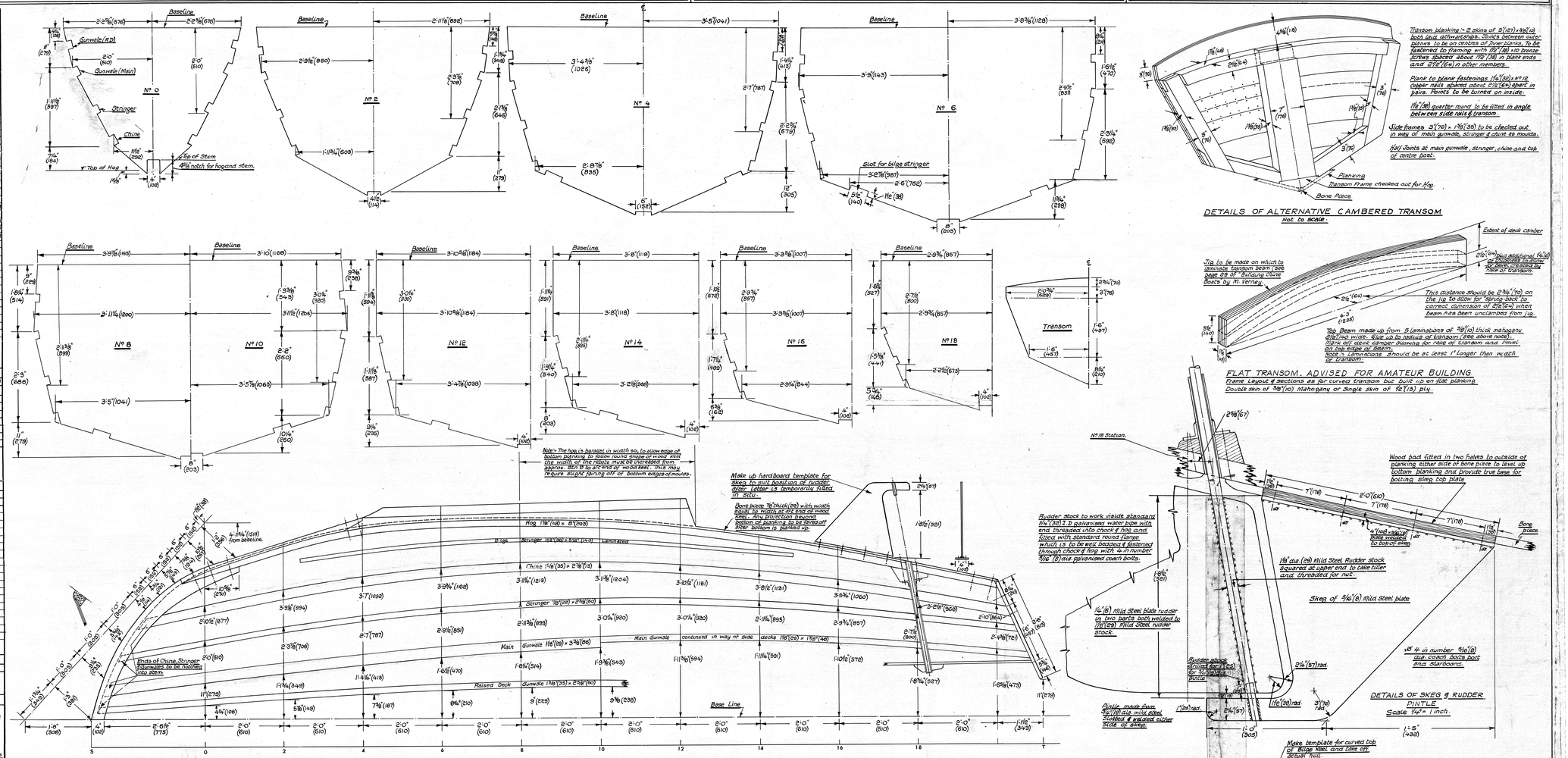
* Omit if nails are turned
Note:- For Plywood Planking omit the copper nails shown in the above table except 3 lbs.(1.36 Kg) of 1¼"(32)×12 and add 432 (3 gross) 1½"(38)×10 Bronze screws.

Glue

Beetle Cement 'A' or Aerolite 306 & Hardener BPX. Initial (5.95 Kg) for planked hull, 3 litres (6.32 Kg) for plywood hull.
Note:- All joints except those directly connected with double skin planking to be bonded with Beetle Cement 'A'. Plywood planking to be bonded throughout. Beetle Cement & Resin Hardener can be obtained from Messrs Synthite Ltd, Hyde Brentwich, Gothenburg.

General Notes

The Scantlings shown in the above table are all "finished sizes". Plywood to comply with B.S.S. 1088 W.B.P.
MOULDS to be made up of rough timber sawn to accurate profile shown. Outside measurements allow for planking. Moulds to be erected at appropriate stations 2'0"(610) apart and they are not to be dismantled or removed until the hull is planked & all stringers etc are in place. Notches to be cut in sides of moulds for Gunwales, Chines & Stringers. Side members of moulds to be extended above Main Gunwale to carry Raised Deck Gunwale. No alterations are needed in tube or to dimensions of moulds when using plywood planking.
PLYWOOD PLANKING:- 1/8" Mahogany to B.S.S. 1088 W.B.P. in standard 8'0" × 4'0" (2438 × 1219) sheets. Joints between panels made with 4" wide (102) ply butt straps or 3" (76) scarfs with ends squared in to depth of outer veneer. Fastenings:- To Stem, Transom, Gunwale & Chine 1½"(38) × 10 bronze screws spaced 3" (76). To Stringer, Frames & Bulkheads 1½"(38) × 10 bronze screws spaced about 6" (152).
DOUBLE SKIN PLANKING:- Two skins of 3/8" (10) Mahogany. Inner skin diagonal at about 30° rate from L.W.L. in topsides with upper ends laying aft. Bottom planking at about 30° angle with keel. Outboard ends forward. Outer skin laid fore and aft. - 5 planks per side in topsides, 7 per side in bottom. Lock inner skin in place with 1"(25) × 10 copper nails then fasten outer skin through all as follows:- To stem & transom 2"(51) × 10 bronze screws spaced about 1½"(38). To frames 1½"(38) × 10 bronze screws - 3 per plank. To Gunwales 2¾"(70) × 12 copper nails spaced 3" (76). To Chines 2½"(64) × 12 copper nails spaced 3" (76). To Stringer 2½"(64) × 12 copper nails spaced 1¾"(38). Plank to plank 1¾"(38) × 12 copper nails. To hog 1½"(38) × 10 bronze screws spaced 2½"(64). Copper nails can be turned or clenched on rooves.



Note:- The hog is tapered in width too, to allow edge of bottom planking to follow round shape of wood keel, the width of the rebate must be increased from approx. 8cm 8 to 4½" end of wood keel. This may require slight fairing off of bottom edges of moulds.

Make up hardboard template for skeg to suit bottom of rudder after rudder is temporarily fitted in situ.

Bone piece 7½"thick(190) with width equal to moulds at aft end of wood keel. Any projection beyond bottom of planking to be trimmed off after bottom is planked up.

Transom planking:- 2 skins of 5"(127) × 3/8"(10) both laid athwartships. Joints between outer planks to be on centres of Inner planks. To be fastened to framing with 1½"(38) x 10 bronze screws spaced about 1½"(38) in plank ends and 2½"(64) in other members.

Plank to plank fastenings 1¼"(30) × Nº 12 copper nails spaced about 2½"(64) apart in pairs. Points to be turned on inside.

1½"(38) quarter round to be fitted in angle between side rails & transom.

Side frames 3"(76) × 1½"(38) to be cleated out in way of main gunwale, stringer & chine as moulds.

Half joints at main gunwale, stringer, chine and top of centre post.

Planking
Transom Frame checked out for Hog.
Bone Piece.

DETAILS OF ALTERNATIVE CAMBERED TRANSOM
Not to scale.

Jig to be made on which to laminate transom beam (see page 69 of "Building Yacht Boats" by M. Verney.

Extent of deck camber

Allow additional 1½"(38) at Waterline bulging to deck camber by piece of transom.

This distance should be 2¾"(70) on the jig to allow for "spring-back" to correct dimension of 2½"(64) when beam has been unclamped from jig.

Top Beam made up from 5 laminations of 3/8"(10) thick mahogany edge glued inside. Glue up to outside of transom. Take off deck camber planing for rake of transom and level top edge of beam.
Note:- Laminations should be at least 1" longer than width of transom.

FLAT TRANSOM. ADVISED FOR AMATEUR BUILDING.
Frame Layout & sections are for curved transom but built up on flat planking.
Double skin of 3/8"(10) mahogany or Single skin of 1/2"(13) ply.

Wood back fitted in two halves to outside of planking either side of bone piece to level up bottom planking and provide true base for bolting skeg top plate.

Rudder stock to work inside standard 1¼"(30) I.D. galvanised water pipe with end threaded into chock & hog and fitted with standard round flange which is to be well bedded & fastened through chock & hog with 4 in number 5/16"(8) dia. galvanised coach bolts.

1½"(38) dia.(29) Mild Steel Rudder stock squared at upper end to take tiller and threaded for nut.

Skeg of 5/16"(8) Mild Steel plate

¼"(6) Mild Steel plate rudder in two parts both welded to 1½"(29) Mild Steel rudder stock.

Rudder blade drilled for 1"(25) or 3/4"(19) bolts.

Partly made from 1"(25) dia. mild steel. Slotted & welded either side of skeg.

Make template for curved top of Bilge Keel and take off. Scrub hull.

Top flange of bilge keel to be drilled where marked thus ✻ to take 3/8"(10) bolts in pairs and spaced as shown. Athwartship centres of holes to be 3/8"(10) inboard from edges of plate.

DETAILS OF SKEG & RUDDER PINTLE
Scale 1/4" = 1 inch.

DETAILS OF BILGE KEELS (2 OFF)
(to be fitted exactly parallel to ℄ of yacht)
Scale 1/4" = 1 foot.

PLYWOOD PLANKING

ALTERNATIVE DOUBLE - SKIN PLANKING

DETAIL SHOWING SCARF JOINT

Note:- This scarf joint can be used if preferred but it is more difficult to make & not so strong as the butt-strap shown below.

DETAIL SHOWING BUTT STRAP JOINT

Butt Straps 4" wide to be fitted between Gunwale, Chine & Stringer. Hog & Chine - Fasten with 1¼"(32) copper nails with points turned on inside. (Alternatively use copper rooves - see page 100 of "Building Chine Boats" by Michael Verney). 2 lines of nails either side of joint spaced 2" apart. Reduce length of battens if necessary to bring butt straps clear of frames & bulkheads.

DETAIL SHOWING LAYOUT OF PLANK TO PLANK FASTENINGS, TOPSIDES AND BOTTOM, 1¼" × 12 COPPER NAILS

DETAIL SHOWING LAYING-OFF OF DECK CAMBER
(4"(102) in 4'0"(1220))
Scale 2"(51) = 1 foot (305)

4"(102) × 3/8"(10) Mild Steel flat welded to top of bilge keel.

Bilge keel 3/8"(10) Mild Steel plate

2½"(64) × 3/8"(10) Mild Steel flat welded to lower edge of bilge keel.

NOTE:- THE FIGURES SHOWN IN BRACKETS ARE EQUIVALENT DIMENSIONS IN MILLIMETRES