THE ROYAL INSTITUTION OF NAVAL ARCHITECTS

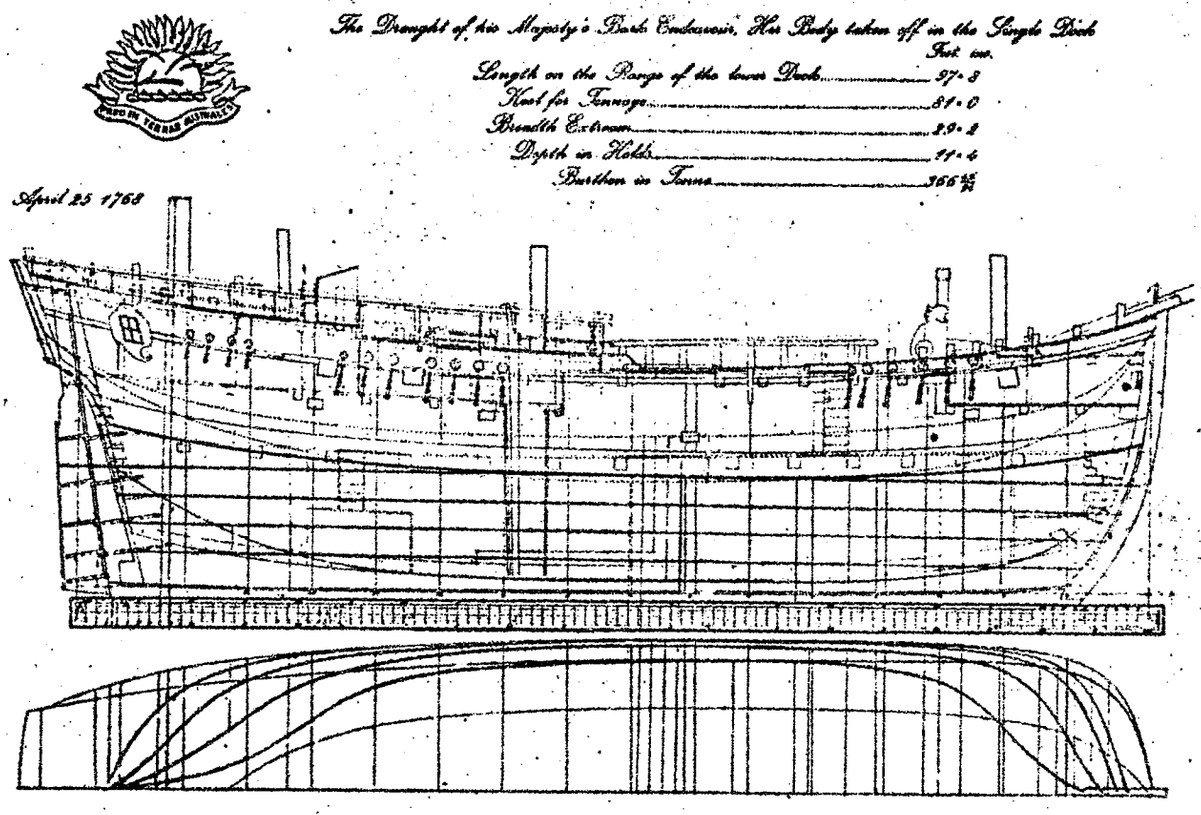
AUSTRALIAN BRANCH

CAPTAIN COOK'S SHIP

H. M. BARK "ENDEAVOUR"

CECIL E. BODEN

MEMBER



The plan which is superimposed on the cover is in the possession of the Australasian Pioneers' Club and is stated to be the only one in existence. It is The Master Shipwright's Copy from which alterations were made to the Cat-Built Bark purchased by the Admiralty, April 1768. Registered afterwards in the Royal Navy as the "Endeavour". She was thus altered by this plan to enable her to suitably accommodate Captain James Cook, R.N., Sir Joseph Banks, Dr. Solander and Party for the voyage to Tahiti to observe the Transit of Venus.

In presenting this paper concerning the H.M. Bark "Endeavour", it is natural that one should refer to the basic reason behind the setting up of the expedition for which the ship was intended and some of the incidents associated with the choice, survey and purchase of the vessel and her ultimate fitting out for the voyage.

With this in mind I have appended a note of some of the correspondence and minutes which were passed between the Admiralty, the Navy Board and Officers of the Yard in relation to these matters.

In brief the matter was first raised officially on the 15th February, 1768 by the Royal Society, requesting His Majesty's assistance to finance the proposed voyage to make an observation of the transit of Venus in the South Seas.

On the 5th March, the Admiralty Secretary advises the Navy Board that "His Majesty has been graciously pleased to express his Royal inclination to defray the expense of conveying such persons as it shall be thought proper to send .... to the place of their destination .... and that a proper vessel be prepared to sail early in the Spring ...."

The first vessel that was considered was called the "Tryal", a sloop that had recently been taken into the dock at Deptford to be repaired. It was subsequently found that the length of time required for the repair would prevent the vessel being ready in time to make the voyage. Because of this a further letter was written to the Board as follows: -

"You are to consider and report whether the Rose, lately ordered to be put into condition for foreign service may not be a proper ship to be employed in the first mentioned service instead of the Tryal, it being represented to them that it is necessary such ship or vessel should sail from England early this Spring."

In their reply of the 21st March, the Navy Board expressed "doubt of her being able to stow the quantity of provisions required on such an occasion, but if their Lordships inclined to make choice of a cat-built vessel for the said service, which in their kind are roomily and will afford the advantage of stowing and carrying a large quantity of provisions so necessary on such a voyage and in this respect preferable to a full ship of war. A vessel of this sort about 350 tons may now now purchased in the River Thames if wanted."

Two (2) vessels were especially mentioned, the "Valentine" and the "Earl of Pembroke" and of these the "Earl of Pembroke" was regarded the more suitable and accordingly the yard officers at Deptford were instructed to survey the vessel and submit a report to the Navy Board, which report was made on the 27th March, 1768, as follows: -

"Pursuant to your warrant of the 23rd inst., we have surveyed and measured the undermentioned ships..... and send you an account of their condition, age and dimensions and our opinion of the value of the hull, mast and yards ....."

"EARL OF PEMBROKE".

Length on the lower deck from the after side of the rabbet of the stem for the fore side of the rabbet of the post.		-	97ft. 7 in.
Length of keel for tonnage		-	81ft. 0⅜in.
Breadth extreme		-	29ft. 3 in.
Depth of hold		-	11ft. 4 in.
Burthen in tons		-	368 71/94
Height between decks:	afore	-	7ft. 6 in.
	midships	-	7ft. 9 in.
	abaft	-	7ft. 11in.
Length of fo'castle		-	18ft. 8 in.
Height of fo'castle:	afore	-	4ft. 8 in.
	abaft	-	4ft. 6 in.
Length from the after side of the stem to the first rise aft		-	51ft. 4 in.
Height of ditto		-	2ft. 1 in.
Length from the after side of the stem to the second rise aft		-	74ft. 10½in.
Height of ditto		-	11 in.
Height between plank and plank on the steerage:	afore	-	4ft. 7½ in.
	abaft	-	5ft. 0 in.
Height of waist in midships			11 in.
Length of great cabin		-	14ft. 4½ in.
Height of great cabin:	afore	-	6ft. 8 in.
	abaft	-	7ft. 2½ in.
Room and space of timbers		-	2ft. 5 in.
Floor timbers sided		-	1ft. 2 in.
Height of cutting down		-	1ft. 4 in.
Lower futtocks sided		-	11 in.
Timbers at the breadth:	sided	-	9 in.
	moulded	-	7/ in.
In hold - hooks under deck:	Nos.	-	3
	sided	-	1ft. 3 in.
	moulded	-	1ft. 6 in.
	No. of bolts	-	11
Transome knees on each side:	hooks Nos.	-	3
	sided	-	1ft. 11 in.
	moulded	-	1ft. 10 in.
	No. of bolts	-	13
Lower deck beams :	sided	-	1ft. 1 in.
	moulded	-	1ft. 1 in.
	spaced	-	5ft. 6 in.
	No. of bolts	-	14.
Knees lodging at each side:	No.	-	2
	sided	-	11 in.
	moulded	-	1ft. 2 in.
	No. of bolts	-	4

Upper deck beams:	No.	-	8
	sided	-	10 in.
	moulded	-	9 in.
Knees with one hanging and one lodging knee:	sided	-	8 in.
	moulded	-	1ft. 0 in.
	No. of bolts	-	6
Quarter deck beams:	sided	-	9 in.
	moulded	-	7 in.
Knees with one hanging and one lodging knee:	sided	-	6 in.
	moulded	-	9 in.
	No. of bolts	-	4
Fore hatch:	for and aft (Main hatch 8ft. 3 in)	-	3ft. 11 in.
	athwartships (5ft. 11in)	-	4ft. 11 in.
Raft port in hold:	fore and aft	-	2ft. 8 in.
	athwartships	-	2ft. 7 in.
Raft port between decks:	up and down	-	2ft. 8 in.
	athwartships	-	2ft. 7½ in.
Keel in two pieces one on the other:	depth	-	2ft. 10½ in.
Keel below rabbet		-	11 in.
Plank of bottom under wales to floorheads		-	4 in.
From thence to keel		-	3 in.
Main wale		-	5½ in.
Fir strakes above wales		-	3 in.
Topsides		-	2½ in.

Value of the hull masts and yards: -

Tons	Hull	Masts and Yards	Total
368.71/94	£2212.15.6.	£94.10.0.	£2307.5.6.

The "Earl of Pembroke" was owned by Thomas Milner and had been built at Whitby 3 years and 9 months previously and was described as "a square stern bark, single bottom, full built" and as a promising ship ".... fitted to stow provisions and stores as may be put on board her."

The "Earl of Pembroke" had been a collier carrying coals from Whitby to London and it is thought that the final choice of this vessel was influenced by James Cook who had considerable experience in sailing vessels of this type and no doubt fully appreciated its merits for task in hand.

Following on receipt of this report, the Navy Board on the 29th March, reported to the Admiralty that "we have purchased a cat-built Bark in Burthen 368 tons and of the age of 3 years and 9 months ..." and requested directions for fitting her for the service, "in which we presume it may be necessary to sheath and fill her bottom and repair her for carrying 6 or 8 carriage guns of four pounders and 8 swivels."

The purchase price is recorded in the Navy Treasurer's Ledger under the date of October 31st, 1769, as follows: -

"To Thomas Milner £2,840.10s.11d. By bill dated 24th June, 1768 for the value of the Earl of Pembroke, now called the Endeavour, bark, Burthen 368 71/94 tons, together with her masts and yards on the day above said £2,800. Interest on £1000, part thereof from 9th October, 1768 to 13th October 1769 being 370 days at 4% per annum £40.10s.11d. = £2840.10s.11d."

The Earl of Pembroke was docked on the 2nd April, at Deptford in the single dock and the Admiralty minute of the 5th April records that it was resolved that the Navy Board be directed to cause the ship to be sheathed, ballasted and fitted for the service and to be registered on the Navy list as a bark by the name of Endeavour .

During the re-fit the number of carriage guns, four pounders was increased to 6 and the swivels to 12. She was also fitted with anchors - one bower, one sheet, one stream and one kedge, total five. Boats - longboat, pinnance and yawl.

Cook was appointed to command the Endeavour on the 25th May, 1768.

She sailed from Deptford on July 21st., and anchored in Galleons Reach the same day. Guns were embarked and she sailed to the Downs arriving on the 3rd August and then to Plymouth which was reached on the 14th.

At Plymouth the dockyard refitted some of the cabins and built a platform over the tiller and embarked four additional four pounder guns.

Cook records in his journal, as follows: -

"The Endeavour sailed from Plymouth at 2 p.m. on the 26th August, 1768 having on board 94 persons including officers, seamen and their servants, near 18 months provisions, 10 carriage guns, 12 swivels with a good store of ammunition and stores of all kinds."

The events between the departure of the "Endeavour" from Plymouth and her arrival at Botany Bay are fully recorded in Cook's Journal and are not matters of particular concern in regard to the present discussion, except to comment that the ship from time to time weathered severe gales with safety and that Cook's skilled seamanship and complete confidence in his ship enabled him to carry out his principle mission of observing the transit of Venus and resulting from secret orders there after voyaged west, circumnavigating New Zealand and continued until on Thursday, 19th April, 1770, Lieutenant Hicks first sighted the Eastern Coast of Australia.

Botany Bay was reached on the 29th April, 1770 and Cook remained there until the 7th May.

What happened at Endeavour River? The following pages relate to the circumstances surrounding the grounding and subsequent repair of the "Endeavour".

Of course the place known to us by that name was quite unknown to James Cook on the 7th May, when as he writes, we "at daylight in the morning weighed with a light breeze at N.W., and put to sea, and the wind soon after coming N.N.E., and at noon we were by observation in the latitude of 33° 50' S., about 2 or 3 miles from the land, and abreast of a bay, wherein there appeared to be safe anchorage, which I called Port Jackson. It lies 3 leagues to the northward of Botany Bay.

By the 17th May the Endeavour passed Cape Morton at the Glasshouse Mountains.

On the 23rd May, Cook decided to anchor in Bustard Bay (lat. 24° 4', Long. 208° 22' W). Here he noted that the rise of tide from low to high water was 8 ft.

The 25th, Cape Capricorn, immediately under the Tropic, was signted and named and from then on the Endeavour was required to negotiate a coastal area besot with Islands and Shoals and the beginnings of the Great Barrier Reef.

On Sunday, 27th, Cook reports. "We had not stood on to the northward quite an hour before we fell into 3 fatnoms upon which I anchored and sent away the Master with 2 boats to sound the channell which lay to leeward of us between the Northermost Island and the Main land..... the master reported to me .... that he found in many places 2½ fathoms and where we lay we had only 16ft., which was not 2ft. more than the ship drew. This was Keppel Bay.

On the morning or 28th May, the ship sailed north only to encounter shoal after shoal.

On Sunday, 3rd June and Monday, 4th, the ship negotiated the channel "Named Whitsunday Passage as it was discovered on the day the church commemorated that Festival."

Wednesday, 6th June, Magnetical Head or Island was passed - Cook reports "the compass did not traverse well when near it".

On Monday, 11th June, Cook names Cape Tribulation because as he reports "Here began all our troubles". He continues "at 6 o'clock the northermost land in sight bore north by west ½ west and 2 low woody Islands (Hope Islands) which some took to be rocks above water, bore N.½W. At this point we shorted sail and haul'd off shore S.S.E. and N.E. by E. close upon the wind. My intention was to stretch off all night as well to avoid the danger we saw ahead to see if any Islands lay in the off ing, especially as we now began to draw near the lat. of those discovered by Quiros which some Geographers, for what reason I know not, have thought proper to Tack to this land. Having the advantage of a fine breeze of wind and a clear Moon light night in standing off from 6 until near 9 o'clock, we deepned our water from 14 to 21 fathoms, when all at once we feel into 12, 10 and 8 fathoms. At this time I had everybody at their stations to put about and come to an Anchor; but in this I was not so fortunate, for meeting again with deep water, I thought there could be no danger in standing on.

Before 10 o'cbck we had 20 and 21 fathoms, and continued in that depth until a few minutes before 11, when we had 17, and before the man at the lead could heave another cast, the ship struck and stuck fast. Immediately upon this we took in all our sails, hoisted out the boats and sounded round the ship, and found that we had got upon the S.E. edge of a reef of Coral rocks, having in some places round the ship 3 and 4 fathoms water, and in other places not quite as many feet, and about a ship's length from us on the starboard side (the ship laying with her head to the N.E.) were 8, 10 and 12 fathoms. As soon as the long boat was out we struck yards and topmast, and carried out the stream anchor on our starboard bow, got the coasting anchor and cable into the boat, and were going to carry it out in the same way; but upon my sounding the 2nd time round the ship I found the most water a stern, and therefore had this anchor carried out upon the starboard quarter, and hove upon it a very great strain; which was to no purpose, the ship being quite fast, upon which we went to work to lighten her as fast as possible, which seem'd to be the only means we had left to get her off. As we went ashore about the top of high water we not only started water, but threw overboard our guns, iron and stone ballast, casks, hoop staves, oil jarrs, decay'd stores, etc., many of these last articles lay in the way at coming heavier. All this time the ship made little or no water. At 11 a.m., being high water as we thought we try'd to heave her off without success, she not being afloat by a foot or more, notwithstanding by this time we had thrown overboard 40 or 50 tuns weight. As this was not found sufficient we continued to lighten her by every method we could think off; as the tide fell the ship began to make water as much as two pumps could free; at noon she lay with 3 or 4 streakes heel to starboard; lat. observed 15° 45' S.

Tuesday, 12th - Fortunately we had little wind, fine weather, and a smooth sea, all this 24 hours, which in the p.m. gave us an opportunity to carry out the 2 bower anchors, one on the starboard quarter and the other right a stern, got blocks and tackles upon the cables, brought the falls in abaft and hove taught. By this time it was 5 o'clock p.m.; the tide we observed now begun to rise, and the leak increased upon us, which obliged us to set the 3rd pump to work, as we should have done the 4th also, but could not make it work. At 9 the ship righted and the leak gained upon the pumps considerably. This was an alarming and I may say, terrible circumstance, and threatened immediate destruction to us. However, I resolv'd to risque all, and heave her off in case it was practical, and accordingly turn'd as many hands to the capstan and windlass as could be spared from the pumps; and about 20 minutes past 10 o'clock the ship floated, and we hove her into deep water, having at this time 3 feet 9 inches water in the hold. This done I sent the long boat to take up the stream anchor, got the anchor, but lost the cable among the rocks; after this turn'd all hands to the pumps, the leak increasing upon us.

A mistake soon after hapned, which for the first time caused fear to approach upon every man in the ship. The man that attended the well took the depth of water above the ceiling; he, being relieved by another, who did not know in what manner the former had sounded, took the depth of water from the outside plank, the difference being 16 or 18 inches, and made it appear that the leak gained this upon the pumps in a short time. This mistake was no sooner cleared up that it acted upon every man like a charm, they redoubled their vigour, insomuch that before 8 o'clock in the morning they gained considerably upon the leak. We now hove up the best bower, but found it impossible to save the small bower, so cut it away at a whole cable; got up the fore topmast and foreyard, warped the ship to the S.E., and at 11 got under sail, and stood in for the land, with a light breeze at E.S.E. Some hands employ'd sewing Oakham, Wool, etc., into a lower steering sail to fother the ship; others employ'd at the pumps, which still gain'd upon the leak.

On Wednesday, 13th, through till Thursday afternoon Cook worked along the coast looking for a suitable Harbour. At 8 o'clock on that day the Pinnace returned and reported that they had found a good harbour about two leagues to leeward, in consequence of this information, we at 6 a.m. weighed and run down to it, first sending two boats ahead to lay upon the shoals that lay in our way, and notwithstanding this precaution we were once in three fathoms with the ship. Having passed these shoals the boats were sent to lay in the channel leading into the harbour. By this time it began to blow in so much that the ship could not work, having missed stays twice; and being entangled among shoals I was afraid to being drove to leeward before the boats could place themselves, and therefore anchored in 4 fathoms about a mile from the shore, and then made the signal for the boats to come on board, after which I went myself and buoyed the channel, which I found very narrow, and the Harbour much smaller than I had been told, but very convenient for our purpose.

On Friday a fresh gale blew and Cook took the opportunity to take down the top gallant yards unbend the mainsail and some of the small sails got down the fore top gallant mast and the jib boom and the spritsail yard intending to lighten the ship forward as much as possible in order to lay her ashore to come at the leak.

The gales persisted through Saturday and consequently no movement was made.

At 6 a.m. on the morning of Sunday, 17th, being pretty moderate we weighed and ran into the Harbour, in doing of which we ran the ship ashore twice. The first time she went off without much trouble, but the second time she stuck fast, but this was of no consequence any farther than giving us a little trouble and was no more than what I expected as we had the wind. While the ship lay fast we got down the foreyard, foretopmast, booms, etc., overboard and made a raft of them alongside.

On Monday, 18th, fresh gales and cloudy, with showers of rain. At 1 p.m. the ship floated and we warped her into the Harbour and moored her alongside of a steep beach on the south side; got the anchors, cables and all the hawers ashore. In the A.M. made a stage from the ship to the shore, erected two tents, one for the sick and the other for the stores and provisions; landed all the empty casks and part of the provisions and sent a boat to haul the sean which returned without success.

On Tuesday, 19th, fresh gales at S.E. and cloudy weather with frequent showers of rain. In the afternoon landed all the provisions and part of the stores, got the sick ashore, which amounted, at this time to 8 or 9.

On the morning of Wednesday, 20th, I got the four remaining guns out of the hold and mounted them on the quarter deck. Got a spare anchor and stock ashore and the remaining parts of the stores and ballast that were in the hold; set up the forge and set the armourer and his mate to work to make nails, etc., to repair the ship.

On Wednesday, 20th, with the winds at S.E., a fresh breeze, fore and middle part rainy and the latter fair. This day got out all the officer's stores and the ground tier of water, having now nothing in the fore and main holds, but the coals and a little stone ballast.

Thursday, 21st, in the afternoon landed the powder, got out the stone ballast, wood, etc., which brought the ship's draught of water to 8' 10" forward and 13ft. abaft. This I thought by trimming the coals aft would be sufficient as I find the tides will rise and fall upon a perpendicular 8ft. at spring tides, but after the coals were trimmed away from over the leak we could hear the water come gushing in a little abaft the foremast about 3ft. from her keel. This determined me to clear the hold entirely; accordingly very early in the morning we went to work to get out the coals which was employment for all hand.

On Friday, 22nd, with winds at S.E. fair weather. At 4 p.m. having got out most of the coals, cast loose the ship's moorings, and warped her a little higher up the harbour at a place I had pitched upon to lay her ashore to stop the leak, draught of water forward 7ft. 9in. and abaft 13ft. 6in. At 8, being high water hauled her bow close ashore, but kept her stern afloat because I was afraid of heaping her, and yet it was necessary to lay the whole of her as near the ground as possible. At 2 a.m. the tide left her, which gave us an opportunity to examine the leak which we found to be at her floor heads a little fore the starboard fore chains; here the rocks had made their way through 4 planks quite to, and even into the timbers and wounded 3 more. The manner these planks were damaged = or cut out as I may say, is hardly credible; scarce a splinter was to be seen but the whole was cut away as if it has been done by the hands of man with a blunt edge tool. Fortunately for us the timber in this place was very close; otherwise it would have been impossible to have

saved the ship, and even as it was appeared very extraordinary that she made no more water than what she did. A large piece of coral rock was sticking out of one hole and several pieces of the fothering small stones, etc., had made its way in and lodged between the timbers which stopped the water from forcing its way in in great quantities. Part of the sheathing was gone from under the larboard bow, part of the false kiel was gone, and the remainder in such a shattered condition that we should be much better off if it was gone also; her forefoot and some part of her main kiel was also damaged but not materially. What damage she may have received abaft we could not see, but believed not much as the ship makes but little water while the tide keeps below the leak forward. At 9 the carpenters went to work upon the ship while the armourers were busy making bolts, nails, etc.

On Saturday, the winds were south easterly, a fresh gale, and fair weather. The carpenters employed shifting the damaged planks as long as the tide would permit them to work. At low water p.m. we examined the ship's bottom under the starboard side, she being dry as far abaft as the after part of the fore chains, we could not find that she has received any other damage on this side, but what has been mentioned.

On Sunday, 24th, winds and weather as yesterday. P.M. the carpenters finished the starboard side and at 9 heeled the ship the other way and hauled her off about 2 feet for fear of neeping. In the a.m. (this would be of course on Monday) they went to work repairing the sheathing under the larboard bow, where we found 2 planks cut about half through.

Monday, 25th, at low water in the p.m. while the carpenters were busy in repairing the sheathing and plank under the larboard bow I got people to go under the ship's bottom to examine all her larboard side, she only being dry forward but abaft were 9 feet water. They found part of the sheathing off abreast of the mainmast about her floor heads, and a part of one plank a little damaged. There were 3 people who went down who all agreed in the same story, the master was one who was positive that she had received no material damage beside the loss of the sheathing. This alone will be sufficient to let in the worm into her bottom, which may prove of bad consequence. However we must run all risk for I know of no method to remedy this but by heaving her down which would be a work of emense labour and time, if not impractical in our present situation.

The carpenters continued hard at work under her bottom until put off by the tide in the evening and the morning tide did not ebb out far enough to permit them to work upon her, for here we have only one tolerable low and high tide in 24 hours. A.M. a party of men were employed ashore filling water, while others were employed overhauling the rigging.

Tuesday, 26th = fair weather, a S.E. wind and a fresh gale. At low water p.m. the carpenters finished under the larboard bow and every other place the tide would permit them to come at. Lashed some casks under the ship's bow in order to help her float and at high water in

the night attempted to heave her off, but could not, she not being afloat partly owing to some of the casks not holding that were lashed under her. A.M. employed getting more casks ready for the same purpose, but I am much afraid that we shall not be able to float her now the tides are taking off.

Wednesday, 27th = A fresh breeze of wind at S.E. and cloudy weather. P.M. lashed 38 empty butts under the ship's bottom in order to float her off which proved ineffectual, and therefore gave over all hope of getting her off until the next spring tides. At daylight we got a considerable weight of sundry articles from aft forward to ease the ship. The armourer at work at the forge repairing iron work, etc.; carpenters caulking and stocking one of the spare anchors; seamen employed filling of water and overhauling the rigging and I went in the pinnace up the Harbour and made several hauls with the sean, but caught only 20 and 30 lb. of fish, which were given to the sick and such as were weak and ailing.

Thursday, 28th - Fresh breezes and cloudy. All hands employed as yesterday.

Friday, 29th - Wind and weather as yesterday, and the employment of the people the same. The situation remained much like this for the next 3 or 4 days.

On Saturday, 30th, Cook reports that a low water "I saw what gave me no small uneasiness, which were a number of sand banks and shoals laying all along the coast; the innermost lay about 3 or 4 miles from the shore, and the outermost extended off to sea as far as I could see without my glass, some just appeared above water. The only hopes that I have of getting clear of them is to the northward where there seems to be a passage, for as the wind blows constantly from the S.E. we shall find it difficult, if not impractical, to return to the southward.

The "Endeavour" floated.

On Monday, 2nd, at low water, Cook lashed a number of empty casks under the ships bows with the hope that he might float her on the next high tide.

On Tuesday, 3rd July, at high water he made an attempt to heave the ship off, but could not succeed.

On Wednesday, although there were strong S.E. gales, in the afternoon at high water Cook reports that he hove the ship afloat and on the morning of the next day, Thursday, he started to trim her on an even keel with the intention of laying her ashore once more, "to come at her bottom under the larboard main chains."

On Thursday, 5th, in the afternoon, he "warped the ship over, and at high water laid her ashore on the sandbank on the S. side of the River, for I was afraid to lay her broad side to the shore where she lay before, because the ground lies upon too great a decent, and she hath already received some damage by laying there these last Niep Tides, at least

On Friday, he reports "At low water in the P.M. had hardly 4 feet water under the ship; yet could not repair the sheathing that was beat off, the place being all under water. One of the Carpenter's crew, a man I could trust, went down and examin'd it, and found 3 streakes of the sheathing gone about 7 or 8 feet long, and the main plank a little rubbed; this account agrees with the report of the Master and others that were under her bottom before. The Carpenter, who I look upon to be well skilled in his profession, and a good judges in these matters, was of opinion that this was of little consequence; and as I found that if would be difficult, if not impractical, for us to get under her bottom to repair it, I resolved to spend no more time about it. Accordingly at high water hove her off, and moor'd her alongside the beach where the stores etc., lay.

On the next day in the morning he began to take stores aboard and in particular "put on board 8 tuns of water and stow'd in the ground tier in the after hold".

On Saturday, 7th, he employed his men getting coals on board and ballast and caulking the ship in the area which could not be done while she lay aground.

On Monday, 9th, work continued, Carpenters, Smiths and Coopers were engaged in repairs to equipment and seamen were employed putting stones and ballast back on board.

On Tuesday, 10th, more water was stowed in the ground tier in the hold.

From Wednesday, 11th July, till Sunday, 15th, continued as before in preparing the ship.

On Monday, he put the cables on board and on Tuesday, 17th, he began to set up the rigging.

By Friday, 20th July, he reports that he had got everything on board the ship and "new berthed her, and let her swing with the tide". He "sounded and buoy'd the bar, being now ready to put to sea the first opportunity."

On Saturday, 21st, unfortunately the wind was not suited for sailing, so the carpenters were employed in repairing the boats and overhauling the pumps.

The weather continued unsuitable for sailing until Sunday, 29th, when a light breeze from the shore sprung up. The boat was sent to check to water over the bar and the anchors were taken up in order to put to sea, but "as there was only 13ft. of water on the bar, which was 6 inches less water than what the ship draw'd" he changed his mind and anchored again.

On August 1st. Cook had his carpenters repair the pumps which were made from wood. He reports "carpenters employ'd overhauling the pumps, all of which we find in a state of decay; and this the carpenter says is owing to the sap having been left in which in time has decay'd the sound wood. One of them is quite useless and was so rotten when hoisted up as to drop to pieces. However I cannot complain of a leaking ship for the most water she makes is not quite an inch an hour.

The winds continued unfavourable to attempt to leave the river through Thursday, 2nd August.

On Friday morning the wind moderated and Cook says "we unmoor'd, hove up the anchor and began to warp out; but the ship tailing upon the sand on the north side of the river, the tide of ebb making out, and a fresh breeze setting in, we were obliged to desist and moor the ship again just within the Bar."

The Endeavour was warped out of the river between 5 and 7 a.m. on Saturday, 4th August, and at early afternoon anchored in 15 fathoms of water, sandy bottom for I did not think it safe to run in among the shoals until I had well view'd them from the mast head; that I might be able to judge which way to steer; for as yet I had not resolved whether I should beat back to the southward round all the shoals, or seek a passage to the eastwood or northwood, all of which appear to be equally difficult and dangerous.

With this came to an end the whole experience at Endeavour River, in which Cook, by great courage and patience, was able to repair his ship and maintain the good spirits of his crew during a period extending from the 11th May until the 4th August.

After leaving Endeavour River Cook found that while he had surmounted one difficulty and overcame the dangers involved in coming ashore, he still faced the most treacherous section of his voyage before being able to make his way through the Torres Strait to Batavia.

With regard to the sailing qualities of the "Endeavour", Captain Cook completed a questionnaire on the 3rd August, 1771, which was turned to the Admiralty, this was headed "Observations of the Qualities of His Majesty's Bark the Endeavour", as follows: -

"Her best sailing draft of water, when victualed and stored for Channel Service, Afore 13ft. 6 ins. Abaft 13ft. 10 ins. or as much lighter (at the same difference) as she is able to bear sail.

Query the 1st. How she behaves close haul'd and how many Knots she runs.	In a Top Gallant Gale	Steers well and runs about 5 knots
	In a Topsail Gale	Six knots
	How she steers and how she wears and stays	Steers and wears very well
	Under her Reef Topsails	Keep her rack full and she goe's as well as with whole Topsails
	Under her Courses	She behaves as well under her courses as most ships
	And Query, Whether she will stay under her Courses	I do not remember that this every (sic) tried.
2d.	In each Circumstance above mentioned (in sailing with other ships) in what proportion she gathers to windward, and in what proportion she forereaches, and in general her proportion to Lee-way	We never but once had an opportunity to try her with other Ships and then she fell to Lee-ward, her proportion of Lee-way is a Point or a Point and a half.
3d.	How she proves in Sailing thro' all the Variations of the Wind from its being a Point or two abaft the beam, to its veering forward upon the bow-line in every strength of gale, especially in a stiff gale and a head sea; and how many knots she runs in each circumstance; and how she carries her helm.	Her best sailing is with the Wind a point or two abaft the beam she will then run 7 or 8 knots and carry a weather helm.
4th	The most knots she runs before the wind; and how she rolls in the trough of the sea	Eight knots and rolls easy in the trough of the sea.
5th	How she behaves in lying too or a try, under a main-sail, and also under a Mizzen ballanc'd	No sea can hurt her laying Too under a Main Sail or Mizzen ballanc'd.
6th	What for a Roader she is, and how she careens?	She is a good Roader and Careens easy and without the least danger.
7th	If upon Trial the best sailing draft of water given as above should not prove to be so, what is the best sailing Draft of water?	Afore) As above. Abaft)
8th.	What is her Draft of water when victualed to six months, and stored for Foreign Service?	Afore - 14...8 Abaft - 15...0
9th.	What height is her lowest Gundeck-Port then above the surface of the water?	Under water
10th	The Trim of the Ship	Three or Four Inches by Stern.

Plans of the "Endeavour":

It is opportune at this stage to look closer at the plans and to study the structure of the vessel and for this reason a series of slides have been prepared showing several of the available plans and depicting some of the models that have been made both Overseas and in Australia.

With regard to the form of the ship there appears to be two or possibly three independent drawing which have been reproduced and claimed as depicting the vessel. These include the Master Shipwright's plan, a copy of which is at present hanging in the Pioneer Club, Sydney and was purchased by them on September 21st, 1911. Another is the "Draught of H.M. Bark Endeavour" which appears to have been prepared when the vessel was in the single dock at Deptford on the 11th July, 1768. This plan also bears a reference made at Woolwich yard on the 16th October, 1771.

There are several plans which no doubt have been produced from one or other of these two (2) original drawings.

I am indebted to the President of the Pioneer's Club, Mr. Noel Grayson for permission to reproduce a slide of the Master Shipwright's plan which gives an outline of the vessel as purchased and in dotted lines indicates the proposed changes.

The Deptford plans would seem to be the record of the vessel as set up ready for the expedition to the South Seas.

There are a number of differences and apparent anomalies between the various plans, models made and artist's sketches that have been published from time to time.

Some Anomalies;

Comparing the Master Shipwright's plan with the Deptford Plan, dated the 11th July, 1768, there are some interesting differences.

The chain plates for the foremast on the shipwright's plan are six (6) in number and the main mast seven (7) in number and for the mizzen four (4). On the Deptford plan the number of chain plates is eight (8) forward, eight (8) for the main mast and four (4) for the mizzen.

Another difference is the fact that on the Master Shipwright's plan a covered companion way is shown just forward of the mizzen mast which does not appear on the copy dated the 11th July. The position of the swivel gun posts shown on the 11th July copy are not in agreement with those shown on the Master Shipwright's plan.

On the Master Shipwright's plan the original deck levels showing two (2) breaks, one forward of the main mast and one forward of the mizzen mast, still are in full lines and the modifications to be made are shown as dotted lines. These modifications in general agree with the plan dated the 11th July, although here again there are some changes.

Some other interesting differences refer to the pumps. In the 11th July copy four (4) pump shafts are shown in plan view and two (2) of these are distinctly visable in the profile, surrounding these two (2) are the walls of the well. The well in the Master Shipwright's plan is shown with vertical side forward and sloping side aft. In the Master Shipwright's copy in the profile only one (1) pump shaft is drawn extending from the ceiling to the upper deck.

Looking at Parkinson's sketches, which are shown in the book by Rientits, and comparing this with the Master Shipwright's copy, there does seem to be an agreement on the number of chain plans and certain other features, even allowing for the fact that Parkinson's sketch is an artist's impression, the agreement is quite interesting, it rather shows the vessel at the time when Parkinson made his sketch is more in keeping with the Master Shipwright's plan with with the subsequent plan referred to as being lifted from the vessel in the single dock. This raises the question whether perhaps the Draught of the H.M. Bark Endeavour dated the 11th July, 1768, does in fact represent the ship which sailed.

The sketch by Parkinson shows apparently four (4) windows with a centre mock window, whereas on the plan of the 11th July, five (5) windows of equal size are shown. These are all of horizontal tops, whereas in Parkinson's sketch, suggestion is that the tops of the windows are curved. Looking at the plan view of the lines of the Master Shipwright's copy, the shape of the extreme after end above the transom appears to be different to the shape shown on the 11th July plan.

Parkinson's sketch shows the top of the transom to be curved and ornamented with carved leaf work above which a stern lantern is shown, there is no suggestion of this on the plan of the 11th July.

Internal Construction of the "Endeavour":

The most helpful source of information available in studying the structure of the "Endeavour", as the plans prepared by Marcus H. Fletcher for the H.M.S. "Endeavour" Trust, which was established to commemorate the 200th Anniversary of Captain Cook's discovery of New Zealand and Eastern Australia.

The intention was to build a replica of Captain Cook's "Endeavour" and to sail her in Cook's wake to arrive in time for the 200th Anniversary Celebrations.

Despite the fact that a considerable sum of money was contributed it was found that the funds raised were insufficient to permit of the building of the vessel and the proposal lapsed. However an extensive study of the original documents and available drawings was made on behalf of the Trust by Marcus Fletcher and I am indebted to Captain Bloxham for the loan of plans and papers setting out the result of this study. From these it is possible for us to obtain a very accurate indication of the general construction of the vessel in all its parts and the several slides shown during the evening will enable a detailed study and discussion to be made of this structure.

The Endeavour's Boats:

The working boats which accompanied the "Endeavour" consisted of a pinnance, long boat and yawl. The following schedule of scantlings has been taken from Marcus Fletcher's proposed specification for the replica which was to be used in the H.M.S."Endeavour" during its voyage to Australia.

Length o.a.	- 19ft.
Breadth moulded	- 7ft. 1 in.
Depth amidships	- 2ft. 10in.
Depth fore	- 3ft. 3 in.
Depth aft	- 3ft. 4 in.
Keel sided	- 3¾ in.
depth below rabbet	- 5 in.
Stem sided	- 3½ in.
moulded	- 6⅜ in.
Transom broad	- 3ft. 4 in.
thick	- 2¼ in.
knees	- 2 in.
Sternpost - sided	- 3 in.
broad at keel	- 10 in.
Floor timbers sided	- 1¾ in.
moulded	- 1⅝ in.
throat	- 3¾ in.
Futtocks, sided at heels	- 1¾ in.
sided at heads	- 1½ in.
moulded at heads	- 1½ in.
Keelson, broad	- 10½ in.
thick	- 1½ in.
Footwaling	- 1 in.
Rising	- 6½ in x 1 in.
Thwarts - Main broad	- 10 in x 3 in.
After broad	- 9 in.x 2 in.
Fore broad	- 10 in x 2½ in.
Loose broad	- 8 in x 1½ in.
Knees sided	- 2¼ in.
Benches - broad	- 11 in. x 1¼ in.
Planking - thick	- ⅞ in.
Gunwales - deep	- 2¼ in. x 2 in.
Breasthook - sided	- 2 in.
Washboards - bow broad	- 5¼ in.
Windlass	- 7 in. dia.
Chocks - thick	- 4 in.
broad	- 9 in.
Rudder - thick	- 1¼ in.

Construction: Carvel - copper fastened. Material generally Oak framework on Larch planking, thwarts of Fir or Larch, transom Elm. Painted three coats white lead paint.

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Capt. D.T.F.C. Bloxham, M.R.I.N.A., F.I.D., R.A.H.S., F.A.I.M., (Company of Master Mariners) of the H.M.S. Endeavour Trust - Australia, who graciously made available prints of the original plans and specification prepared by Marcus F. Fletcher for the replica of the "Endeavour" which was to have been built and sailed to Australia as part of the 200th Anniversary Celebration.

Mr. W. Armstead, Senior Shipwright Surveyor, Maritime Services Board of N.S.W., to whom I am indebted for access to paper in his possession referring to the "Endeavour".

Mr. A. Noel Grayson of the Australasian Pioneer's Club for the opportunity to examine the original drawing of the Master Shipwright's plan held by the club and for making available copies of the Club's Christmas Card with the illustration of the "Endeavour" by Francis J. Bayldon, Commander R.N.R.

Mr. J. Penford, for a small scale print of the original shipwright's plan made by his company.

Mr. Ray Biddle, Lecturer in Shipbuilding Sydney Technical College, for his information concerning the building of the model produced by the Sydney Technical College.

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Mrs. C. Pillar, my secretary, for her unflagging labours in typing and collating this paper.

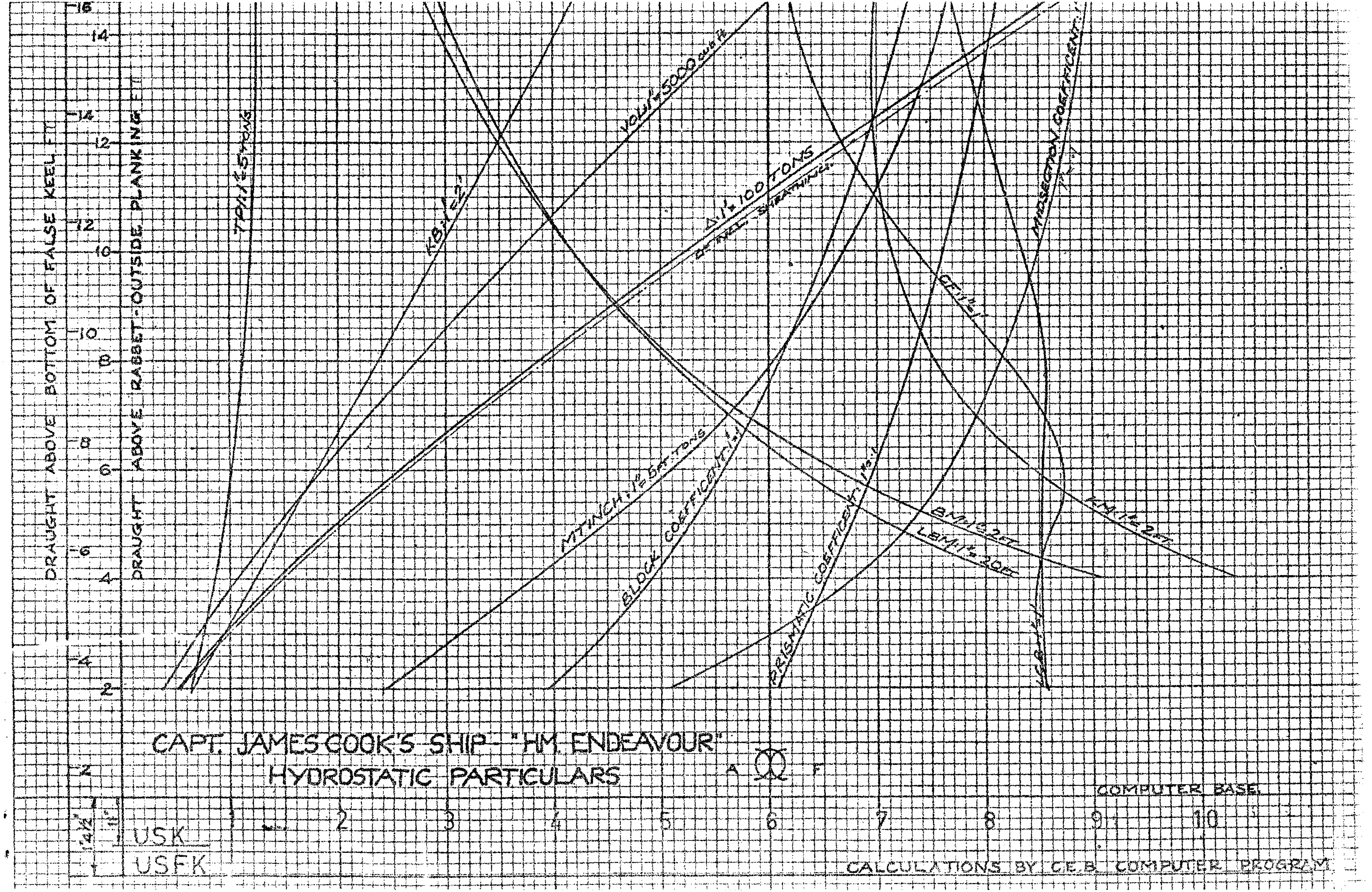
Quotation from Capt. Cook's Journal extracted from the "Australian Facsimile Edition No. 188", published by the Libraries Board of South Australia.

Quotations have been made from an article entitled "H.M. Bark Endeavour" by Mr. C. Knight in the Mariners Mirror.

Photos of scale model of Cook's Endeavour - National Maritime Museum, Greenwich, from Rex and Thea Rienits "The Viyages of Capt. Cook".

Photo of Endeavour from "Captain Cook and the South Pacific" Cassell, London.

The Bank of N.S.W., for a photos of a model made by A.W. Middleditch, Art Director of the Collingwood Technical College in 1937.


DRAUGHT ABOVE BOTTOM OF FALSE KEEL FT
DRAUGHT ABOVE RABBET-OUTSIDE PLANKING FT
TPI 1" = 5 TONS
KB 1" = 2'
VOL 1" = 5000 cub ft
Δ 1" = 100 TONS
Δ INCL. SHEATHING
MT INCH 1" = 5 FT-TONS
BLOCK COEFFICENT 1" = .1
PRISMATIC COEFFICENT 1" = .1
MIDSECTION COEFFICENT
BM 1" = 2 FT
LBM 1" = 20 FT
KM 1" = 2 FT
CAPT. JAMES COOK'S SHIP "HM. ENDEAVOUR"
HYDROSTATIC PARTICULARS
A
F
COMPUTER BASE
USK
USFK
CALCULATIONS BY C.E.B. COMPUTER PROGRAM