SIR ROWLAND BAKER, KB, RCNC

A PERSONAL APPRECIATION

BY
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Note

In the author's view the three greatest British Naval Constructors are William WHITE, Stanley GOODALL and Rowland BAKER. I never met the first two, but had the unforgettable experience of working for BAKER and would like to leave some record of this brilliant, versatile and fearless man and why his staff worshipped him. Unattributed quotations are from personal letters from Sir Rowland to the author ca. 1979 while writing the history of the RCNC.[1]

Early life

Rowland BAKER was born[2] at Upchurch, Sittingbourne, on 3 June 1908, and he wrote:

> 'My father was a sailing bargeman. It must be from him that I inherit an almost infinite degree of patience. His father was a ship's carpenter in the days of declining sail and [learnt] from them both perhaps a feel for floating objects . . .'

Some may doubt the infinite patience but he did inherit a command of the English language unique amongst senior civil servants. At Upchurch Village School he was always top of the class and was successful in cricket and football. He entered Chatham Dockyard as a shipwright apprentice where, after four gruelling years of the Dockyard School[3], he was selected as a constructor cadet. He joined the RN College in September 1928, together with Alfred SIMS and Vic HALL and two private students. SIMS was a very hard working student and set the pace but BAKER's more light hearted approach won him second place, just missing the coveted 1st class certificate.

SIR ROWLAND BAKER

He then went to the Mediterranean Fleet for a year as a Constructor Lieutenant, serving in *Sussex, Achates, Basilisk* and *Royal Sovereign* and, during a visit to Rome, received a papal blessing. Returning to the UK early in 1933 he worked as Assistant Constructor, 2nd class, in Portsmouth dockyard, moving to the Admiralty on promotion to 1st class in the summer of 1934. There he worked on sloops, with trials on *Grimsby, Halcyon, Bittern*

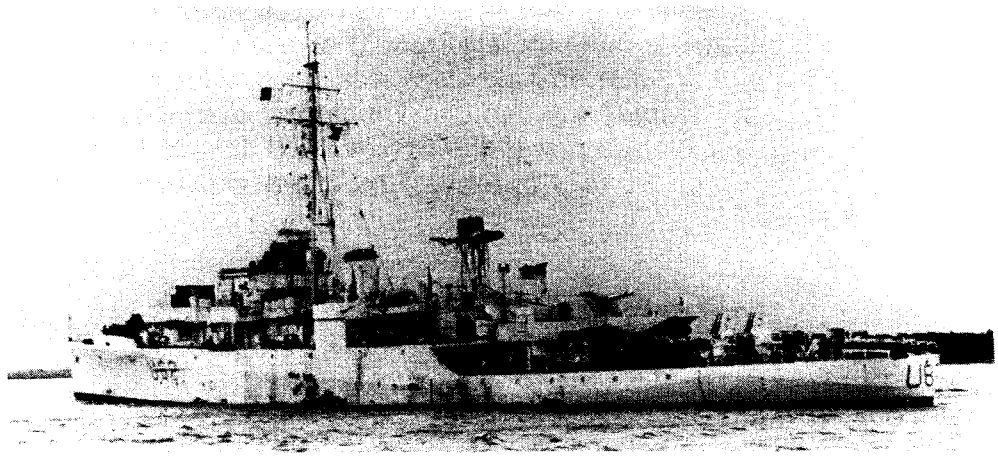

FIG. 1—HMS 'MAGPIE'.
BLACK SWAN CLASS SLOOP

and *Kingfisher*, and the design calculations for the *Black Swan* (FIG.1) and later KINGFISHERS.

'So I had a nostalgic feeling for the sloops.[4]

There was a brief interval at Sheerness in 1937–8 before return to the Admiralty as Constructor[5] in September 1938. He had expected to be in charge of his old sloop section but:

'. . . the section had been divided and I was given the poorer end.'

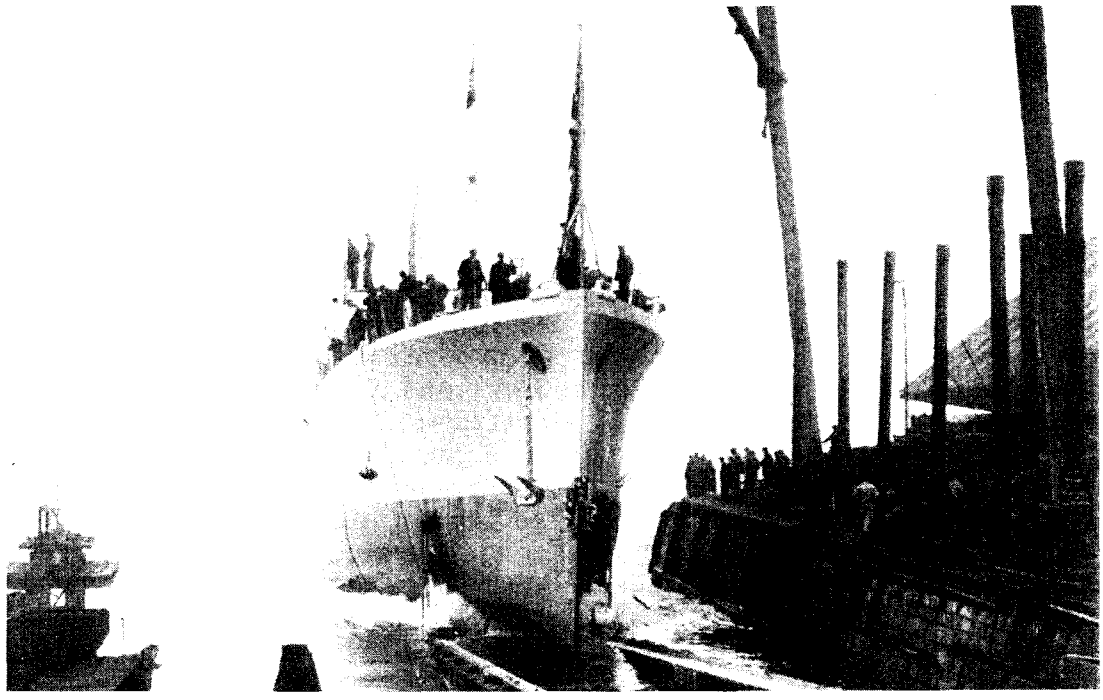

FIG. 2—HMS 'SEAGULL'
THE FIRST ALL WELDED SHIP FOR THE RN, BEING LAUNCHED AT DEVONPORT 28 OCTOBER 1937.

Minesweepers

The immediate task was the structural design of the *Seagull* (FIG.2), the first all welded ship for the RN. Externally, she looked like the riveted ships of the HALCYON class (except for the flush plating) but BAKER had designed

a radically new structure which would have still been seen as advanced 10 years later. The framing was longitudinal instead of transverse and the seams in the plating were butt welded. Private shipyards were, with rare exceptions, hostile to welding and *Seagull* was built in Devonport dockyard alongside a riveted half sister. Even though it was the first welded ship to be built in the yard, there were important savings in time of building, weight and cost compared with her sister.[6]

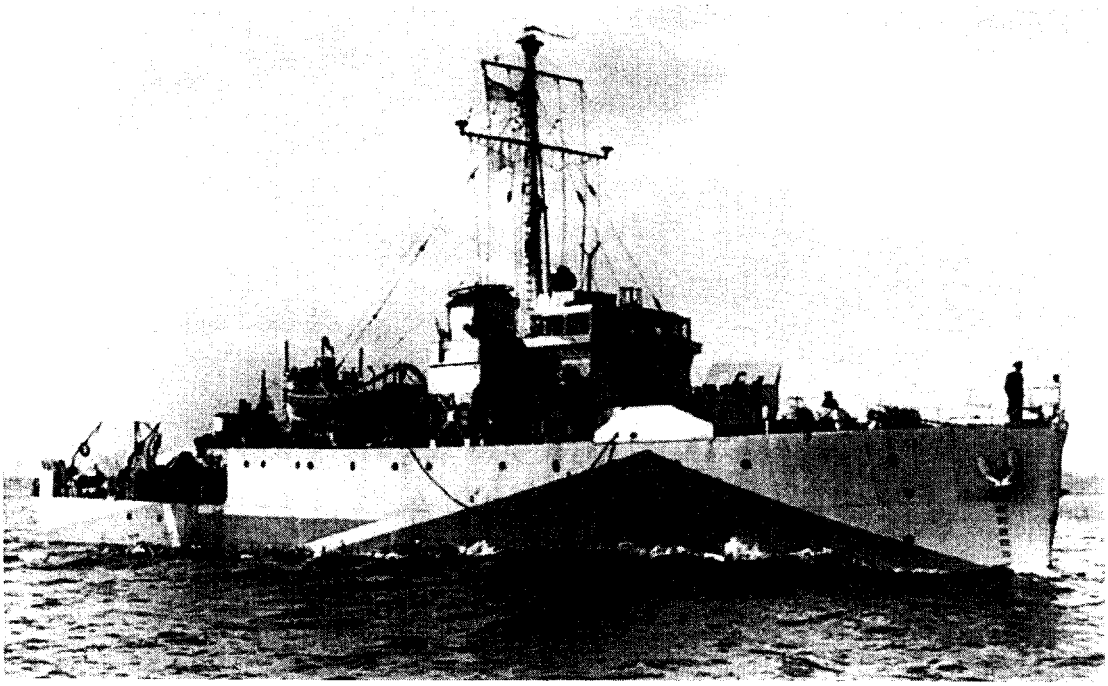

FIG. 3—HMS 'ANDROSSAN'
A BANGOR CLASS MINESWEEPER.

BAKER was very proud of his design for the BANGOR class (FIG.3), described in his own words in reference 1, and upset by criticism of them. They were designed as very simple wire sweepers but soon became overcrowded with magnetic and acoustic sweeps, radar and more AA guns and the men to man them. Despite their size, they were very seaworthy craft and 45 were built in the UK with others in Canada, India and Hong Kong (Modified for the IJN). BAKER seems less proud of the bigger, more capable and much more expensive ships of the ALGERINE class (FIG.4). At this time he was also responsible for the design of the unusual, armoured, RANGER class of oilers, paddle ship conversions and auxiliary minelayers but landing craft were beginning to occupy more and more of his time. Few of these vessels had a Staff Requirement 'until after trials and completion'. His assistant director was WOOLARD, who allowed his young constructor unusual authority. The DNC, GOODALL, was concerned over this delegation but WOOLARD assured him that BAKER was worthy of it.

Landing craft

> 'My introduction was like this. In the early 30s there were a few Motor Landing Craft (MLC). These were nearly useless because the Staff Requirements were fouled up, partly by the Staff and partly by DNC.'

The constructor responsible was retired early but BAKER feels that the chief:

> '. . . did not understand our business, which is basically not to agree with the Staff, or argue with them, but control them—they can only have what we (constructors) can offer.'

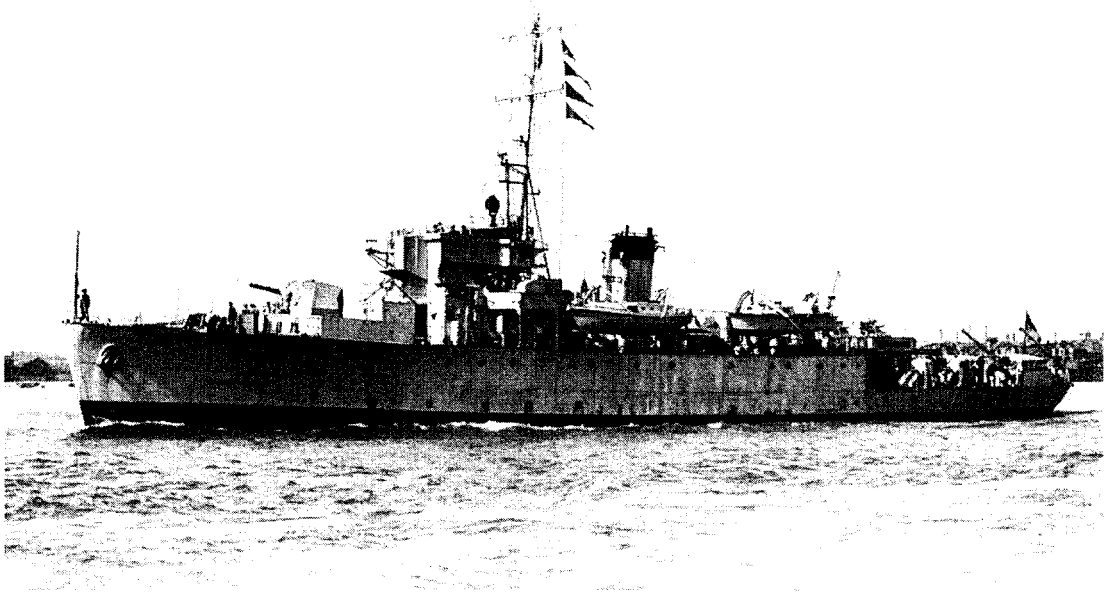

FIG. 4—HMS 'COQUETTE'
AN ALGERINE CLASS MINESWEEPER

He continues:

> 'The error in the MLC was quite fundamental. They were intended as ship to shore ferries....would be carried on board, put in the water and loaded with one or two vehicles, or some men, take them to the shore and come back for more. Although they were and had to be specialised, custom built, their use was always to be in association with the carrier ships which were the current troopers.'

This led to a weight limitation and, in turn, to low power while low endurance was accepted.

> 'Worse was to come, someone (in the Army I expect) put enormous stress on ability to unbeach. This led to the use of Gill or Hotchkiss so called jet propulsion, actually pumps.'

Thus when unloaded they had a high centre of gravity whilst when loaded they had a **very** high centre of gravity.[7] They were reasonably ('or was it unreasonably') boat shaped below the waterline, but the vehicle deck was above the water and occupied the full beam of the craft. The area of the vehicle deck (strictly the second moment of area) was greater than that of the waterplane. They had plated bulwarks and freeing ports. Modern readers will note the similarity with RO-RO ferries.

> 'By the mid 30s a new staff look decided that landings would probably be in Europe and they wanted the MLCs to cross the channel.'

Someone had the bright idea that crossing the Channel at 4 knots would be hazardous so they were tried stern first, achieving 5 knots. It was then decided to tow them behind a destroyer. A trial was laid on with 5 boats in line behind the destroyer, bow first, and ballasted to load condition.

> 'At the eleventh hour I was seconded from the sloop section . . . and went on board a V & W class destroyer and off we went. We followed the track of the Portsmouth-Ryde ferry intending to pass through the Solent. I was sitting in a deck chair on the quarter deck, we got up to 14 knots, when suddenly the first MLC capsized, immediately followed by the others. My explanation, spray had come over the bow ramps and flooded the vehicle deck; a sort of flash flood and the stability vanished.

This finished the MLCs of the day and, I thought, my association with landing craft. I had, however, learnt that freeing ports would never deal with flash floods and that even in landing craft the load should be kept low.

While BAKER was at Sheerness there were considerable developments in landing craft. The Inter Service Training and Development Centre (ISTDC) had been set up under CAPTAIN MAUND and they had sponsored propeller driven Assault and Mechanised Landing Craft, both designed by Ken BARNABY of Thornycrofts. Both these craft were successful and built in considerable numbers during the war.

On his return to the Admiralty, he had responsibility for landing craft.

'After Dunkirk it became evident to CHURCHILL first I think that if we were ever to get back into Europe we should have to have a new look at invasion techniques. In June 1940 he demanded of the Admiralty, landing craft to carry the largest tanks then envisaged—40 tons. The staff requirement was offered me by CAPTAIN MAUND (ISTDC); it said beach slope of 1 in 35, 3 tanks of 40 tons and a speed of 10 knots. He gave me the overall tank dimensions (of course there were no existing 40 tonners then, or for a long time) and said to land in 2½ feet of water. . . . The general view was that simplicity was all, but I felt that some elaboration was essential to overcome the errors that had beset the LCM. My innovations related to features as follows:

- The appearance of the craft, flush decked with a hold.
- Floating dock type section in which the inertia of the water on deck could not approach that of the waterplane.
- Acceptance of the fact that the bow ramp would always leak.'

It will be noted that these are almost identical to the recommendations following the loss of the *Herald of Free Enterprise*.[8] BAKER continues on the subject of the bow ramp:

'I arranged the tank deck (bottom of the hold) above the hinge at the bow and fitted preventer watertight doors at the highest point. The space between the ramp and the doors drained outboard. This system worked like a charm, the little well so formed half filled with water, and it did not really matter if ramp was tight or not. Most of the tank deck was below water. There was conventional close subdivision under the tank deck and in the wing spaces.

For leaving the beach, there were kedge anchors, also used as normal anchors, as the LCT anchored by the stern. (A device worthy of more general adoption) Propeller guards were fitted against beach obstructions.'

The LCTs were flat bottomed, hard chine barges, with buttock flow, and a long run. GAWN (Superintendent of AEW, Haslar) could not fault the form.[9]

'The craft were powered by what we could get, two Hall Scott Defender 500 bhp petrol engines, downgraded to 350 bhp. John Browns and Fairfields worked on the detailed drawings and 20 boats were ordered from shipbuilders; the first was delivered by Hawthorn Leslie in November 1940.

This was the first heavy vehicle landing craft in the world. She did not really need trials or evaluation to prove right and in fact the concept has never been questioned. Before the first order had been completed the view gained acceptance that their first use would be from Egypt so after trials they were broken down and shipped out as deck cargo in sections.

However, having got a start 'everyone' found the need for improvement and this is the story of landing craft from this time on. It seems absurd now, but it was only after the first LCT was running that it was realised that not only tanks but other vehicles could be, and should be, catered for. A slight increase in beam. . . . in the LCT 2 (meant) it could carry twice as many trucks while three engines in place of two gave a slight increase in speed.'

GOODALL noted in his diary that he did not believe BAKER's speed estimate but the following day's entry said that he had checked the estimate and 'BAKER was right'.

'At the beginning of 1941 there was a general realisation that numbers were the name of the game. At this time C.J.W. HOPKINS RCNC was working in the Ministry of Supply as Director Naval Land Equipment (The fabulous trench digging machine—'Nellie'). When we were forced out of Europe the need for this equipment lapsed and the Paxman engines were adapted for LCTs. The first LCTs were built by shipbuilders but the outcry was absolutely deafening because of the riveting. So HOPKINS was made responsible for LCT production under the Controller and authorised to get the actual building done by structural engineers. A vast programme was envisaged, but no shipyard labour was to be used to minimise the effect on merchant and warship building. HOPKINS organised groups of structural engineers in Glasgow and in the North East coast who organised the use of disused shipyards. The technical organisation was left to me and the shipbuilders drawings for LCT (2)s made by John Brown and Fairfields were 'structuralised' . . . by the Stockton Construction Co. At this time HOPKINS really had a marvellous way of dealing with the firms. He acted as though they were angels and he, God (but they all needed me).

The next development step was in May 1941 was when the LCT (2) was stretched by 32ft, Paxman engines fitted and became the LCT (3). (A prototype had been completed as a 32ft extended LCT(1)). The basic drawings still came from the shipbuilder but all production was with the structurals ...235 LCT(3) were finally built.'

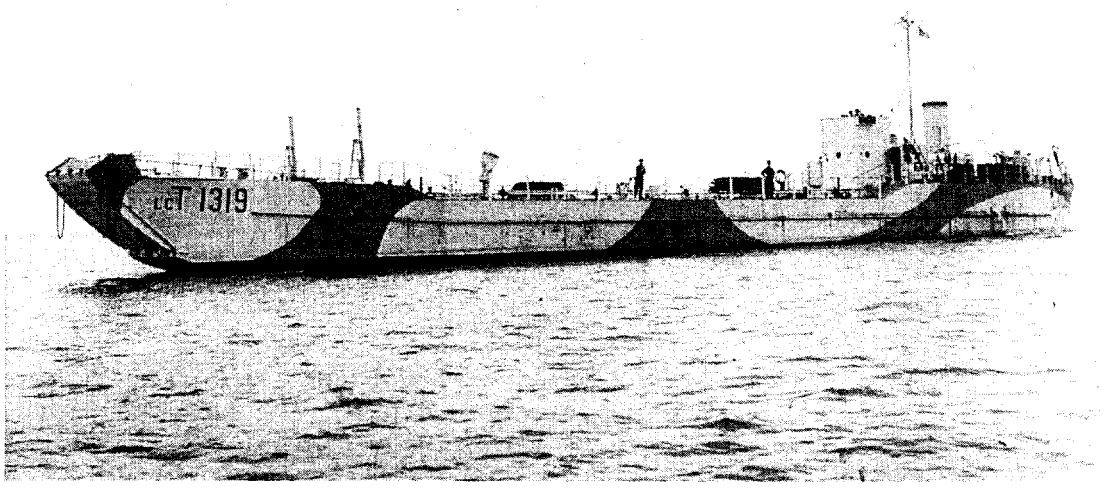

FIG. 5—AN LCT (4), STIFFENED FOR FAR EAST SERVICE

In late 1941 plans were made for the LCT (4) (FIG.5).

'The reasons for the change lay in the realisation that the Normandy beaches were very flat and it was unreasonable to have craft with any considerable stern trim. The LCT Staff Requirement made them expendable—a single cross channel voyage was the cry. They were built of very light scantlings and I also made a mistake. They had a sharp upward break at the poop. I thought the discontinuity would not matter for a single cross channel trip[10]—nor did it, but I should have known better than to believe that sort of limitation.'

The LCT (4) had the same bow ramp, bow doors and side pontoon feature as the earlier boat, but the tank deck was above the waterline and the vehicles were exposed. Fairly large propellers were essential but even so the draught of the LCT(4) was less than 5ft fully loaded. Construction continued until the end of the war. In November 1941 BAKER was given a special allowance of £150—then a considerable sum—in recognition of his unusual responsibilities.

Landing ships

'In the summer of 1940 CHURCHILL ordered a tank landing ship (LST)—this was meant to be a giant. It led to first of all the conversion of three MARACAIBO tankers[11] to carry tanks and launch them over the bow direct onto the beach. These ships were chosen because of their shallow draught, but no one liked their maximum speed of 10 knots. The first was completed by Greenwells of Sunderland in July 1941. She was, me thinks, the first tank landing ship in the world. Her trials proved that ships, as distinct from craft, could land on a beach, disembark tanks over a ramp and get off again by kedging.

Concurrently with the MARACAIBO conversions a new design of tank landing ships, LST (1), the BOXER class, was undertaken by me. They were very elaborate even though the Staff reduced Winston's Giant to three ships to do the same job. (They were often referred to as 'Winettes') This design was undertaken with no bench marks; we went from the LCT(1) direct to a ship 400ft long with a speed of 18 knots, to carry 13 Churchill tanks in the hold, 27 MT on the upper deck, an army complement of 13 officers and 180 men and a naval crew of 20 officers and 143 men. We fitted a very elaborate disembarking ramp (FIG.6) devised by Stothert and Pitt[12] and a lift to take MT up and down. ...All the systems worked. These were the first tank landing ships in the world to be specifically designed for the purpose.

Long before their completion, but before the first MARACAIBO trial in 1941, the condition of the war seemed to change from the need for raids on distant beaches to the invasion of Europe. The number of tanks seemed to grow astronomically and it became quite obvious that none of our schemes were grave enough. The question was asked of me—could LCTs cross the Atlantic under their own power? The answer was only if they were made larger—I thought 300ft. This led to two separate developments:

- We asked the Americans to build 7 LST (1) under Lend Lease.
- I produced a sketch design[13] for the Atlantic LST which was a marriage of the LST (1) and the LCT (3).'

A suggestion from CAPTAIN HUSSEY (ISTDC) led to a floating dock type LSD[14] which I claim as an invention of mine. The idea of a 'Go Between' was not dead either and Thornycrofts (Ken BARNABY) produced a proposal for a double ended small LCT. Actually, I would not agree the double end[15] and this proposal saw the light as LCT (5)'

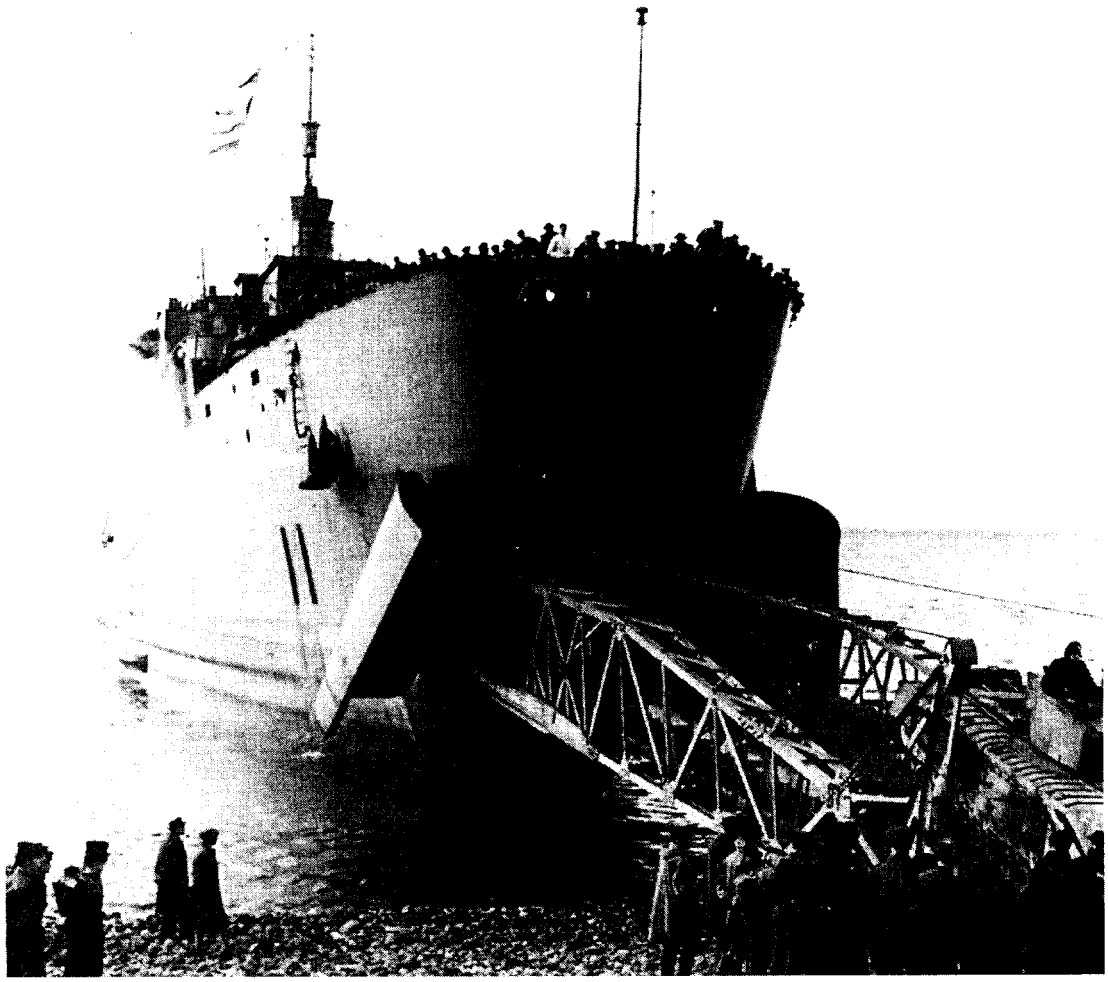

FIG. 6—A BOXER CLASS LST(1) LOWERING THE ENORMOUS RAMP

Visit to the USA

'By the autumn of 1941 we were therefore building LCT, LCM, LCA and some LST but we were scarcely touching the fringe of the possible requirement for numbers and it was decided that only American help could enable this requirement to be met. So at the end of November 1941 I was sent to Washington with CAPTAIN HUSSEY and COMMANDER TODHUNTER (of DNE) to explain to the US authorities what we had in mind. They already had drawings of the LCT (1)—(4) and of the LST (1) and we took my sketch of the Atlantic LCT, the sketch design of the LSD and of the LCT (5).

We arrived in Washington on 20th November and on the 28th were taken by ADMIRAL Sir Charles LITTLE to see ADMIRAL STARK, ADMIRAL ROBINSON (the US Controller), the Chief of the Bureau of Ships and CAPTAIN COCHRANE (later Admiral and himself Chief of the Bureau). Actually, of these only COCHRANE was clearly on our side. It took a week for STARK to turn us down. The curse of the situation was that we could only get building done under Lend Lease if the appropriate US Service would certify that the items met a US need.

Actually, the US Marine Corps were in conflict at this time with the Bureau of Ships, for the Bureau had a few LCMs, rather like our LCM (1) and the Marines disliked them so much that they had gone to HIGGINS of New Orleans to get their own version. HIGGINS was already in the field for he had sold his *Eureka* boat (originally a rum runner) to

the USN and to us as a raiding craft. Hundreds of these were built during the war, and at the end they were beginning to replace the LCA generally. The LCM which HIGGINS produced for the US Marines was a conversion of some boats he was producing for Peru. They had a floating dock type section and a bow ramp. Finally, hundreds were built for the USN and ourselves as the LCM (3) and at the end of the war we built similar craft as the LCM (7). By the time we got to HIGGINS, events had made me the expert and though it was nearly unbelievable, what I said went. All the LCM (3) had the bow ramp 3in wider and kedge anchors because I said so.'

Someone who was at the Washington meetings said that after demolishing the USN studies, BAKER 'had them eating out of his hand'.

COMMANDER TODHUNTER has some wonderful stories[16] of the first meeting of 'BYKER' (as he was often known in recognition of his Medway accent) and HIGGINS.

'Basically, HIGGINS and Mr BYKER were from the same mould, no mincing of words, no tempering of the wind to the shorn lamb, but to start with they had some flaming rows, maybe because HIGGINS suspected that BYKER might be a secret agent from the enemy camp (BuShips) . . . but once he got over that and realised that he was the one person in the world who knew as much about landing craft as he did himself, they got on like a house on fire.'

BAKER continues:

'Meanwhile CAPTAIN COCHRANE suggested to me that while the rest of our mission was deadlocked we should get on in BuShips Preliminary Design with the Atlantic LCT. After all, ADMIRAL STARK would not know that I was working on a bench. This period fixed all the basic parameters of the design. COCHRANE also suggested that if the navy were not prepared to certify perhaps the army would so I used to walk up the road from the old Navy Building[17] to the old Munitions Building. The initial army reaction was that there were plenty of US ferries that would do so I had to go and examine some of these and reject them. Then came Pearl Harbour and we lost the Navy Department altogether. Again COCHRANE sent me to the Maritime Commission, for by this time it was agreed that non warship firms would need to be brought in. The outcome of this was that the sketch design of the LST (2) was brought to the contract design stage by the Maritime Commission who also made initial contact with the Dravo Corporation of Pittsburg.'

It will be noted that this account differs in almost every aspect from that given by NEIDERMEIR.[18]

'Then at the end of December CHURCHILL arrived in Washington and, in a flash, landing craft rose in priority from 10 to 2. BuShips took the LST (2) back and all our requirements were accepted, immediate orders being placed for these, for LSD, for LCT (5), for LCM and LCP(L). I had two schemes for getting the LCT (5) across the Atlantic, as deck cargo in sections or complete on the upper deck of LSTs. Both worked throughout the war. The design of the LSD was brought to the contract stage by Gibbs and Cox. Nearly all of these original orders for us under Lend Lease were actually taken over by the USN.'

BAKER's idea of carrying LCTs as deck cargo was initially opposed due to lack of cranes at the destination, but he suggested carrying them on inclined ramps so that they could be launched into the water. This scheme was then validated by a model test at Haslar.

Richard Moss[19] writes that one of BAKER's most awe-inspiring traits was in astounding those present at a meeting with a completely new solution. Critics said it was sheer luck, but they did not know that he sat up half the next night checking that his hunch was sound.

'By February 1942 the programme was in full swing and I was able to return to the UK, being relieved by McMURRAY to provide continuing technical expertise. I actually made the Atlantic crossing in HMS *Delhi* (FIG.7) which had been re-armed in America. The vulnerability of this class (C & D of World War I) to the smallest underwater damage almost proved that I was the first and last Constructor officer to take passage in one of them.

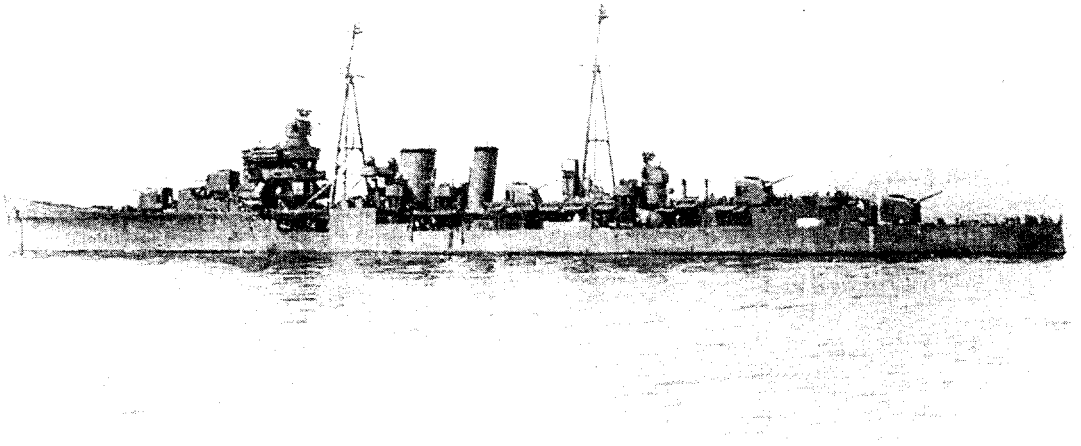

FIG. 7—HMS 'DELHI'
RE-ARMED WITH THE EXCELLENT US 5" GUN IN 1943

In the summer of 1942, I was promoted to Chief Constructor and given a new title, Superintendent of Landing Craft. I was transferred to London and took over LCT production from HOPKINS who still had an office in Bush House (Ministry of Supply). I also took over all production of minor landing craft from SCW (C.J. BUTT). My instructions were that, under Controller, and without stealing any shipyard labour, I was to maintain production of all types. Unofficially, I was supposed to be McMURRAY's guide, comforter and friend and the principal liaison between COHQ and DNC. WOOLARD had been my ADNC throughout all the time until now and he had supported me at every stage. McMURRAY had to proceed with a lot of projects that I had started with the team that I had nurtured and he deserved great credit.[20] At the end of the war the US Army awarded me the Medal of Freedom with Silver Palms, whilst DORLING was still depreciating my efforts.

As regards my work in the production field, I did inherit a going concern, whereas in the design field I had started from nothing.[21] It was also a great asset that the design side was in stability under my control (and very hard pressed). Later in 1942 Lord REITH was brought into the Admiralty as Director Combined Operations Material and my office space was provided by him in 36 Whitehall. He really would have liked to 'take me over' but by this time DNC (rightly) could not agree for, of course, I used all DNC's facilities including the WPSs, who were all very much my seniors. However, there was a rapport between REITH and me—the Mountain and the Midget.'

There is a tale told by COMMANDER TODHUNTER[22] of a very high level meeting at which BAKER was present but told not to speak unless called upon. However the debate became too great for his silence and (quoting TODHUNTER's attempt to reproduce 'BYKER's' accent)

> "Excuse me Admiral (MOUNTBATTEN). This 'ere General talks about beaches of 1 in 30. That one says of 1 in 25. Naow this one mentions 1 in 15!!! You'l let me know when the bloody beaches slope the other waiy, wontcher???"

MOUNTBATTEN led the laughter and ensured a sensible response.

> 'At this time also MERRINGTON (RCNC) was on the staff of COHQ and in a way DNC had three advisers there, MERRINGTON, McMURRAY and me, but whenever there was any disagreement the old ISTDC element (HUSSEY) batted for me.'
>
> I did have some rapport also with MOUNTBATTEN for he arrived on the scene just as we went to Washington and there is no doubt that HUSSEY even before that time together with the Admiral encouraged me at every turn.'

In 1978 Earl MOUNTBATTEN was to write:[23]

> 'I had two constructors on my staff in Combined Operations. The senior one was MERRINGTON and the junior one BAKER. They were both excellent but BAKER had a flare for designing new types of ship and craft. Notably, the LSD, or Landing ship Dock, . . .'

> 'After the war, when some one got an award for a little flap on the LCT ramp I put in a claim to the Royal Commission on Awards to inventors for some objects of the above vessels. The RCNC establishment . . .[24] proved to them that all I ever did was slightly less than ought to have been expected of me. No award but the Secretary of the Commission wrote me an extraordinary letter which said in effect "Did I remember ADMIRAL BYNG?"'

The question of awards to civil servants doing their job, rather better than usual, is, and remains, a difficult one but BAKER certainly felt that he had been badly treated by the standards of the day.

Canada

When the war finished, the landing craft empire collapsed and BAKER was appointed DNC's special design assistant.

> 'The scheme did not work in my time' due to lack of supporting staff but 'I did get some benefit in that I got a broad idea of what was going on and thought a lot about design.'

One product of this period was an interesting design of hull form, with nearly semi circular sections, which would remain upright no matter how much was flooded so that, as BAKER put it, if the worst happened 'it may be abandoned with due decorum.'

BAKER became aware that the RCNC officer in Canada was anxious to come home and that the Canadians wanted a replacement. Since he was almost the most junior (acting) Chief Constructor, he was concerned that he might be reverted in the post war reductions and hence he decided to volunteer for Canada where his old experience in sloop design would be valuable.

> 'I got to Ottawa and had a weekend turnover from HARRISON and then found I was expected to design an icebreaker. I scarcely knew what the word meant and there was certainly no British experience to help me. There was also a danger, for while the RCN had got the plans and

calculations for the US Coast Guard EAST WIND class, there was an opposition group in the Department of Transport who had considerable experience of icebreakers and did not want the navy to get involved. However, there was considerable support for the RCN. So we took the basic EAST WIND design, changed the steel (to UK DW) altered the bow shape and made a few cosmetic alterations (including missing out the bow propeller) and set off.'

Labrador (FIG.8), as she was called, was another success.

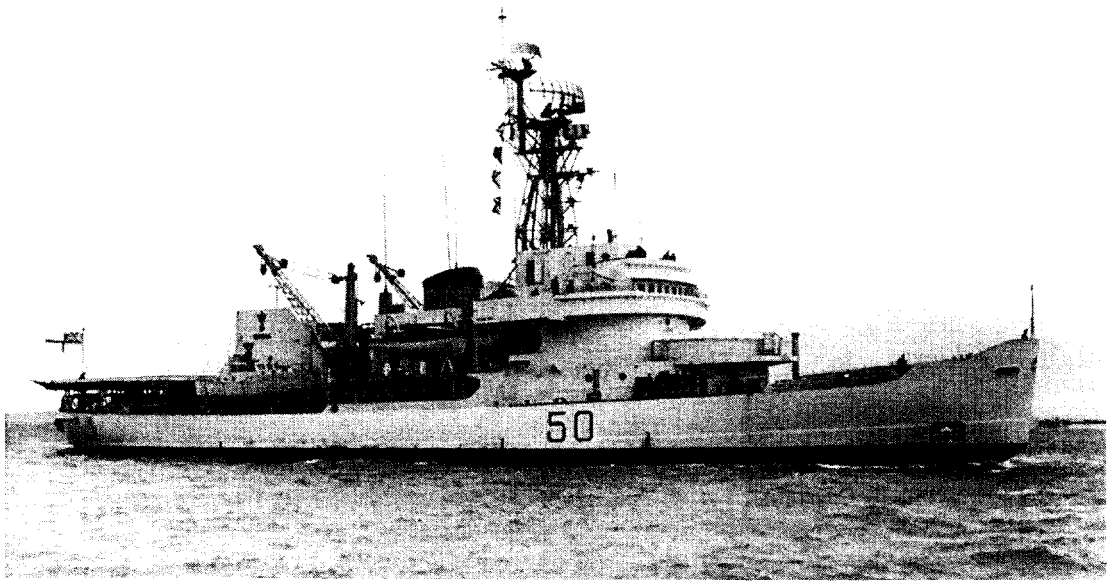

FIG. 8—HMCS 'LABRADOR'
ICEBREAKER BASED ON THE US EAST WIND CLASS

The Canadian Navy was clear that new escort vessels were needed and the government had allocated funds. The original intention, backed by HARRISON, was to buy the WHITBY design from the UK, complete with working drawings, following the pre war practise of the RCN. However, the slow development of the WHITBYS and the desire of the RCN to 'Canadianise' led to the idea of a home design. BAKER says:

'This encouraged my private wish to embark on a design'

But there were real difficulties. The small design team was competent to tackle a sketch design but there was little experience in detail work. The naval staff wanted British sonar and A/S weapons and British machinery with which the Canadian engineer officers were familiar and gradually a team was built up.

'I (Baker) became more Canadian than the Canadians. Fundamentally, I said you cannot rely for ever on the British, you cannot rely on German and Milne (Design consultants) what you need is to help me by strengthening the Constructor Staff at Ottawa and setting up a central drawing office that will become competent to develop any design that I produce'.

This constructor staff was originally built up from RCNC officers on loan but BAKER was slowly able to recruit Canadians, often putting them through the RCNC course at Greenwich.

'I set out to please every body, usually a recipe for disaster. The ships were all welded and built on a unit system, no plating less than 3/8in thick and, hopefully no force fits. My philosophy regarding basic naval

architecture was, at this time matured, even if wrong, and whilst some of the differences between *St Laurent* (FIG.9) and *Whitby* (FIG.10) could be dismissed as cosmetic, and my activity to have an appearance different from the British could be dismissed as rank Canadianisation, there were differences deliberately introduced by me to satisfy myself:

- The actual form.
- The dimensions.
- Above water profile.
- De icing scheme.
- Anti slamming (also cafeteria messing and bunks).

I tried to please the British by making my dimensions conservative compared to the Type 12s, by having a model run at Haslar and had good relations with N.G. HOLT (Designer of *Whitby*) and GAWN (Superintendent AEW). As regards the form, I would not follow HOLT in his fine entrance and relatively low prismatic, so the resistance characteristics of my ships were marginally inferior, even so GAWN committed himself to saying "A reasonable compromise" (but all design is compromise). Also my beam was greater, my displacement greater. I had a flush upper deck and put the A/S mortar under cover. I argued that de-icing would be less of a problem if the above water surfaces were smooth. This led to plated masts, later copied by everybody. I also argued that you could not stop water coming on board so efforts should be made to let it get away as easily as possible, which led to well rounded deck edges and a turtle back fo'c'sle.[25] I very much wanted to have a rising M curve but partly lost my nerve, even so my midship section was much finer than the type 12s and my sections much more V shaped[26] in the slamming area. (We nearly slipped up on my finer midship section because of difficulties in getting the Y100 boilers in!)

All in all I tried to incorporate the staff requirements in a model which included the experience of all the design work I had ever done, or wished to do, including plenty of space (as I've often said, the cheapest quality to provide)'

When the first vessel was completed the Queen and the MOUNTBATTENS visited her in Oslo and on one of the MOUNTBATTEN visits to Bath the Earl said to Edwina:

'This is the young man who designed that lovely Canadian ship you were on the other day.'

There was a lot more to BAKER's Canadian career which lasted eight years. He was president of the Ottawa Cricket Club (once getting a hat trick) and played golf and bridge with enthusiasm. Technically, he found that the new central drawing office had no schedule or programme for output of drawings, which he soon remedied and proved a lesson which would stand him in good stead in his later career. He planned the modernization of the carrier *Bonaventure* and that of the older, RIVER class frigates:

'Which I improved fantastically by making them flush decked.'

At one meeting of the Canadian Naval Board, all members were opposed to his proposal to which he responded:

'Since all of you gentlemen disagree with me, it just goes to show that I am probably right.'[27]

When he returned to England the Canadian Naval Staff wrote formally to the Admiralty (asking that their letter be shown to BAKER) praising his work and saying:

FIG .9—HMCS 'ST LAURENT'
INTENDED TO LOOK AS DIFFERENT AS POSSIBLE FROM WHITBY

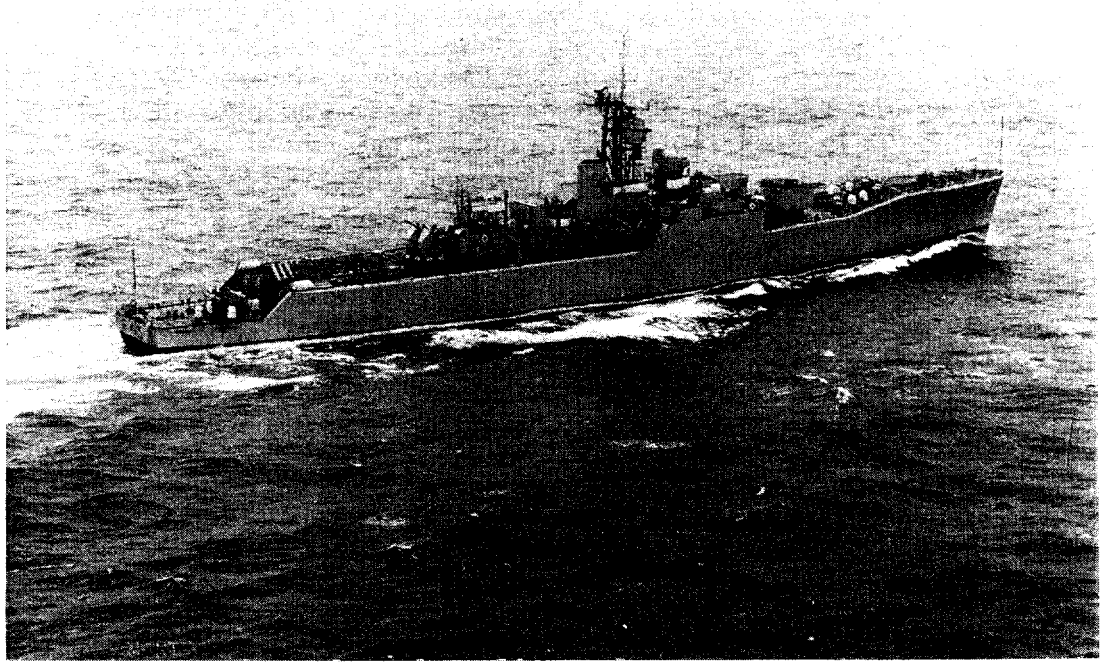

FIG. 10—HMS 'TORQUAY'
N.G. HOLT'S TYPE 12—THE WHITBY CLAS

'His initiative, zeal and resourcefulness have played a major part in enabling this country to design and build major warships entirely from Canadian resources for the first time in history.'

At the time of Sir Rowland's death it was apparent that he was still admired by many in Canada.

Dreadnought (FIG.11)

'I came back from Canada in the fall of 1956 to find that no one really wanted me and that the DNC had authorized a circulated a memorandum proving that the WHITBY class were superior in every way to my ST LAURENTS. His main point was that the WHITBYS were 450 tons lighter. He could not have foreseen the WHITBY modification which added 400+.[28] When rumours of the re-organization of Controller's department began to circulate, I found that even Sir John LANG (Permanent Secretary) was plumping for a DGS much my junior. However during 1957 Lord SELKIRK who wanted to implement the re-organization came to Bath and interviewed SIMS, PALMER and me. I found this a little encouraging (and depressing). In November Sir Victor SHEPHERD told me he had recommended me to MOUNTBATTEN and that wheels were being set in motion to put me in charge of the nuclear submarine development. I was sworn to secrecy and told to wait.'

The story of the *Dreadnought* project has been told elsewhere[29] and this account will be confined to BAKER's enormous contribution and to the troubles which he experienced.

'In the fall of 1957, RICKOVER told MOUNTBATTEN that we should never get off the ground (under the water!) unless we radically changed the organization, but if we did change and he was satisfied that we meant it, he would sell us a reactor plant to give us a start. Of course he did not have the authority to do this nor MOUNTBATTEN that to accept. So they set about it. Note that RICKOVER's beginnings were incredibly humble. His attitude to MOUNTBATTEN was near idolatry; you could not just say he was a snob, he was, of course.

'It was in, I think, February 1958, that RICKOVER came over to help MOUNTBATTEN get Board and government approval for his scheme. As promised, MOUNTBATTEN explained to him that he had set up a Project, under a Constructor, to deal with the whole thing. I went to Derby to see RICKOVER but he would not see me. The second time we met (in the Admiralty Board Room) he again ignored me.'

Finally, MOUNTBATTEN convinced RICKOVER that BAKER was the best choice.

'My own views alternated between elation at the prospect and terror. Terror because just when they were about to sign a government to government agreement, I realised that no one of those who would have to be on my staff (except STARKS), approved of me in any way, or of the scheme. They had pottered about for several years, and now had not only a solution but a chieftain imposed on them. Of course they all hated it. There was one favourable thing, Terence RIDLEY had been appointed as the head of the Engineer-in-Chief nuclear element; on the whole he was happy to have me as chief, and he had no *amour propre*. My terror derived in part from the conviction that even if we had a Rickover reactor, all and sundry would want to 'improve' it and feed in their national ideas throughout the ship. In fact having a SKIPJACK reactor could have opened the field that it was in my personal interest to close. I did succeed in this and still believe that in so far as our nuclear submarine programme has been a success it is mainly due, first to

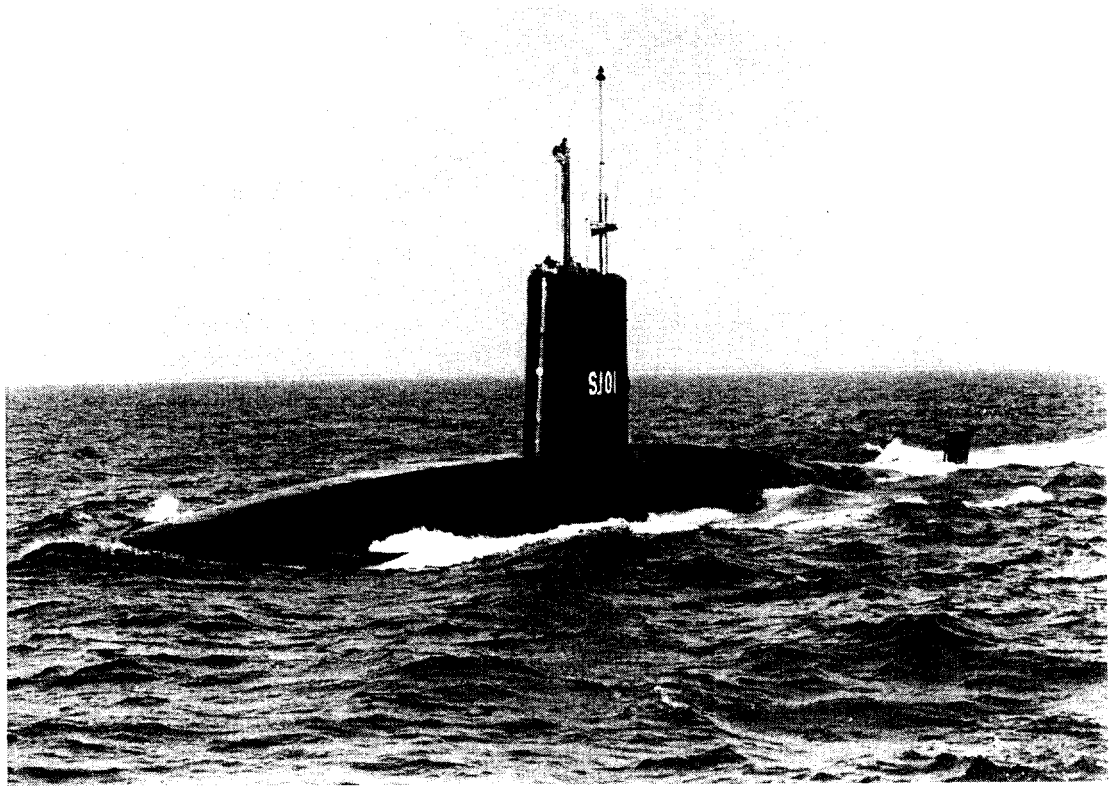

FIG. 11—HMS 'DREADNOUGHT'
THE FIRST RN NUCLEAR SUBMARINE

RICKOVER selling us his bit and second to me for insisting that this S5W plant be used by us in an environment similar to *Skipjack*, and that we should buy from America a complete machinery installation.'

This led to a lengthy debate on whether the Dounreay prototype British reactor was still needed. BAKER as Technical Chief Executive took the line that we should accept everything that RICKOVER could provide and build on it to create a UK expertise.

'Neither the AEA nor the Treasury liked this very much and I did not get enormous support from within the Admiralty or from RICKOVER. RICKOVER was particularly sarcastic about our Dounreay activities although it originated from his Idaho experiment. however, in the end he must have supported me and my only other support came from Sir John COCKCROFT. Harwell practically washed their hands of us (though not RIDLEY) and we were warned that the UKAEA Safety rules would be applied to us with the utmost rigour. They were.'

The author was responsible, under BAKER, for the final nuclear safety trials and feels that he is too hard in his comments on the AEA at this point; to me they seemed firm but reasonable over the safety of a potentially hazardous installation.

In 1958 the whole of the Admiralty submarine activity was concentrated in one block at Bath and the major companies involved set up appropriate divisions.

'The fore end of *Dreadnought* was designed to take account of the sonar system then under development by DGW and was to include DNC's plans for ballast, accommodation, stability etc.

There was, of course, an extreme subtlety in my title. I was not a Director nor a Deputy, just Technical Chief Executive and was not even

promoted. No part of the organization was directly controlled by me; not even the planning for I got a planner, W.H. BARNES, to whom we owe a lot.'

The author joined the project about 18 months before *Dreadnought* completed and was surprised to find, for the first time in his career, that everyone in every profession was working as one to a schedule with dates for each key activity to complete. This organization was initiated by BAKER and detailed by BARNES with the result that *Dreadnought* completed on time and on cost, the first major defence project to do so for a very long time.

'Success in building *Dreadnought* (and within the cost estimates) derived from the validity of such plans, their acceptance, the favourable publicity given to the project and also from the fact that US supplies often came ahead of schedule.

All the Bath departments seconded staff into my group, but as RICKOVER pointed out, as I did not write their "fitness reports", they looked elsewhere for reward. However, I did have access to the Controller (Peter REID), in part to MOUNTBATTEN (First Sea Lord) and I believe the geographical concentration of the group finally brought the realisation that loyalty to the project overrode loyalty to cloth.'

Again, it is suggested that BAKER is wrong and that his own burning determination had a great deal to do with the loyalty to the group. The annual Submarine Dinner and the Christmas party, to both of which BAKER made hilarious contributions, were a major factor in achieving group identity.

'So it seemed to me that if I could keep the whole team to work to the plans which they had prepared for doing all the work—wherever—success would be assured. Regular project meetings started to show promise, but I also initiated a Change Notice Procedure which inhibited change and importantly treated all alike. ...though I could if I wished complain to Controller or 1SL. I did not wish and my sanctions were minimal.' (see final section for the terror with which it was implemented)

'I wanted to order our second nuclear submarine *Valiant*, but even after the decision was made to design her on the basis of Dounreay aft and *Dreadnought* forward, there was difficulty because Dounreay was so far unproven. However the chance had to be taken and it seemed that by the end of 1962 that we had a small set pattern of nuclear submarine building; *Dreadnought* on trial, *Valiant* half completed on the slipway and DSMP just beginning to move.'

It was a very busy time—the author well remembers a very difficult and rushed journey from Arran (*Dreadnought* trials) to more trials at Dounreay. Then came POLARIS and a new set of difficulties.

POLARIS

'During 1962 ADMIRAL Le FANU had written a memorandum outlining a possible organization for a UK POLARIS development. It included an overlord and, in fact, seemed to wish to take the whole activity away from the established set up—DGS. I wrote a paper saying we had a perfectly good submarine constructor set up—but I did not know then that DGS (SIMS) was preparing to abolish the whole *Dreadnought* project as such, arguing that with the impending completion of *Dreadnought* continuing activity could be dealt with in the "usual way." '

It is perhaps fair to point out that, though a special project is a very good way of dealing with an unusual task, it is often at the expense of delay elsewhere. The immediate consequence was that a high level mission went to the

States, including two senior members of BAKER's staff, and he was not even informed!

> 'In the mean time Le FANU (Controller) got approval for his organization. I was sent for and given a piece of paper and he said there you have it. Actually his organization took the submarine activity out of DGS and me with it. So what Le FANU gave me, although it included promotion, was not what I had been arguing for. . . . I was soon satisfied that Le FANU's scheme was superior to mine and enabled C Block to build and outfit the submarine whilst some one else worried about the rest of the programme.
>
> The POLARIS Management Board which included me was set up before I joined and all our field activities were run by monthly meetings at which field officers reported to the Board in the PERT Milestone framework. The arrangements worked, the programme was completed on time. I attribute this to two factors apart from national priority—people and planning in depth. The time scale, we were allowed 5 years to get a ship on station, was short but just right.'

There were various ways of getting the ship. It would be possible to use the US drawings of their submarine which would mean a lot of re-tooling, one could cut *Valiant* in half and insert a missile section (as *George Washington* was produced) or to use an after end similar to *Valiant*, graft it to a missile space as in the US boats and add a new bow. The latter seemed to be the best choice. BAKER concludes:

> 'I still feel that the resulting overall organization and the methods used were inevitable, and an inevitable development from previous successful practice. The lesson for the Royal Corps now is that for success we have to ensure that **we give as much attention to the sketch design of a programme as we do to the sketch design of the artifact.** Just like Marks and Spencer.'

BAKER—The man and his achievement

His technical record of success after success speaks for itself:

- *Seagull* and her welded hull.
- The improved *Black Swan*, BANGORS, ALGERINES.
- Almost all the landing craft and the landing ships, including a major influence on USN programmes, the LST and LSD.

After the war:

- The magnificent ST LAURENTS and other Canadian work.
- The *Dreadnought* and POLARIS programmes as his crowning glory.

No wonder that Earl MOUNTBATTEN wrote:

> 'I was instrumental in getting BAKER put onto the design of the *Dreadnought* as I thought he would be just the right person to design our first nuclear submarine, and a great success he made of it, as you know. I was very happy that we were able to get him a knighthood.'

He received the KB (Knight Bachelor) in the New Years Honours List 1968, a very unusual honour for a civil servant of his rank. He retired in September 1968 but returned to sort out some of the many problems of the Mk 24 torpedo.

Later he tried to develop a steel platform design, BALAENA, for the North Sea oil industry. It was to adhere to the sea bottom like an inverted bucket, very difficult to lift out of wet sand. It was to be built on its side for towing out to the site across shallow water. On arrival, it would be tilted and sunk

without needing external power. The scheme failed for lack of funds and because it was a year late for the market.[30]

Working for him was terrifying until one learnt to ignore his language and appreciate his ability and loyalty to his staff. The author worked under BAKER from about 18 months before *Dreadnought* completed (mainly on nuclear safety matters) until about two years after (as trouble shooter). His ability to switch from the senior civil servant to the bargee was devastating to the uninitiated.

BAKER's idea of Change Notices has been mentioned earlier—the reality was very different. One would put the proposal to him in a cardboard file and a few days later one would be summoned to the Presence. As you went through the door the file would be thrown at you with a roar of:

"I'm not signing this f– rubbish. What are you wasting my b– time for?"

I was very proud that, after a short and noisy debate, he signed all the changes I put to him. Many years later I found that he signed virtually everything and the shouting was just to keep us on our toes. A modern Industrial Tribunal would die of shock if they were told of the language he used to lead his team. He could be kind, too. We had some problems with *Dreadnought* after completion and I had to cut corners with the financial arrangements to keep the boat running. My boss did not want to know but eventually BAKER saw copies of my letters and wrote me a little note in his own (almost illegible) hand:

'Cor Mate, you ain't 'alf sticking your neck out. Don't worry, I'll back you if it goes wrong!'

I had in fact covered myself fairly well but, even so, BAKER's note was very welcome. It was acts like that which made his staff worship him—it was worship in the sense of the Greek Gods; Zeus could and would hurl thunderbolts if he was not satisfied. Perhaps his only weakness was that he took less trouble in dealing with his seniors than his juniors, even then the greatest, like MOUNTBATTEN and Le FANU, saw his merit.

He was fun, too, his ribald speeches at parties were unforgettable, more for the way in which they were put over than for their content. There are great people in every generation and there are still young men and women prepared to kick the system—and their seniors—but I do believe 'Mr BYKER'" is unrepeatable, the greatest man I met.

My thanks are due to Lady BAKER and other members of his family, to Richard MOSS, VICE ADMIRAL STEPHENS RCN, REAR ADMIRAL DAVIS RCN, COMMANDER TODHUNTER and others who have enriched this account.

References

1. The original letters are in the manuscript collection of the National Maritime Museum—RCNC Centenary collection. BAKER's handwriting is not easy to read and there is some guesswork in interpretation but the author has had considerable practise in reading BAKER missives.
2. Eldest son of Isaac and Lizzie BAKER; he was a tiny baby and not expected to survive. He had a brother and three sisters.
3. For an account of the Dockyard Schools, see: D.K. BROWN. *A Century of Naval Construction*, Conway, London, 1983.

   In brief, one-half of the surviving students left at the end of each year; even reaching the 4th year was a major achievement whilst a 4th year pass was seen as the equivalent of a pass degree.
4. BAKER's views on the pre war sloops are of considerable interest and the following is taken verbatim from his letter dated 10 January 1979:

   I joined the sloop section in 1933. V.G. SHEPHERD was the constructor (shortly relieved by A.W.G. STANTON). I relieved Ivor KING who went to Sheerness. Because of financial stringency there was a period in which the cheap little sloops had more activity than any other class—certainly more continuity. When I joined the GRIMSBY class were completing, they were basically cheap patrol and minesweeping vessels. They did in fact represent the end of their particular line. (1931 programme, I think). The ships in the immediate preceding programme were (I think) 'repeat SHOREHAMS', before that SHOREHAMS and before that BRIDGEWATER, the first post war design.

This last was one of DNC's disasters. The data available was not good enough for the skills available and the outcome was that the profile of these little ships was destroyer like, a fo'c'sle OK, but generally low freeboard.[31] Then they came out heavy and when the first one was completed the range of stability was deficient (57 deg, I think) and DNC had to go to the Board and say the fo'c'sle had to be extended aft (and ballast added) to improve the range. The outcome of this was that all the later classes had a less destroyer type look (i.e. longer fo'c'sles), but not ballast, that was too much for the RCNC of the time. Also SHEPHERD's predecessors became very weight conscious. The design work for which SHEPHERD and KING were responsible was also greatly expanded.

Original Sloop Family	**Sloop Minesweeper**	**Escort Sloops**	**Coastal Sloops**
BRIDGEWATER	HALCYON	BITTERN	KINGFISHER
GRIMSBY (1)		BLACK SWAN	repeat KKINGFISHER(3)
		repeat Black SWAN (2)	

Notes:

(1) Ships of this class (*Grimsby*) got the weights right. I did the inclining experiment and trials.

(2) These were larger vessels and I think the design was successful because the pattern derived from going up in size. However S & K deliberately over estimated weight. The sloop section was now very successful and the BITTERN class weights provided a 'Bible' for all subsequent escort sloop development.

(3) In *Kingfisher* S & K cut the weight after design and 'saved' 150 tons on 500! *Kingfisher* was condemned by the operators because her draught was too low for the ASDIC[32]. When I did the inclining there seemed to be a discrepancy of about a foot on the draught. So I made Fairfields check the draught marks; my action so infuriated Fairfields that G.W. BARR, the Manager, rang Sir Stanley GOODALL with a view to getting me sacked. (this was a good thing for me. The draught marks were OK, the ship was just a foot light—in seven!)

In the repeat KINGFISHERS (The end of the road for this class) I wanted ballast but STANTON and WOOLARD said "No" so we reduced the block coefficient and added structural weight. We got good ships then but the war killed the type.

So the family continued only from the repeat BLACK SWANS and this is the first type for which I did the calculations. The weights were based on *Bittern* completion (She was built by John Brown and finished as the Admiralty Yacht (*Enchantress*)). **The weights were fantastically accurate** (for which I take all credit!)

5. During the re-armament of the late 30s and throughout the war, most promotions were 'acting', which I have omitted.
6. A. NICHOLLS. *Trans Institute of Naval Architects*, London, 1939.
7. This passage is based closely on BAKER's words but has been altered slightly to clarify it for non naval architects.
8. The author was a member of the committee which drafted them and remembered BAKER's wise words.
9. Paragraph based on notes by BAKER, largely using his words.
10. In a lengthy passage BAKER says that you could stand on the poop of an LCT (3) and watch ripples run along in the steel tank deck due to the alternating loading on the low Depth/Length (D/L) hull. The D/L of the LCT(4) was even less and the side decks little higher.
11. Shallow draught ships built ca. 1937 for service in the oilfields of Lake Maracaibo.
12. This ramp was 143ft long and took up so much space that the class was known to cynics as Landing Ships Ramp.
13. The term 'sketch design' implies much more than a back of the envelope sketch. Whilst not fully detailed, it would have some supporting calculations.
14. Confirmed by COLONEL D.P. WYCKOFF USMC. 'Let there be built great ships.' *US Naval Institute Proceedings*, November 1982.
15. The double ended version appeared in the USN as the successful Mk 6.
16. Personal letter to the author. There is the tale of HIGGINS' dinner for BAKER—gold plates and liveried servants.
17. A disgusting 'temporary' building dating from World War I.
18. J.C. NIEDERMEIR. 'Designing the LST'. *US Naval Institute Proceedings*, November 1982.
    BAKER is a reliable witness wherever checks can be made, willing to give credit to both US and British colleagues and his account is confirmed by TODHUNTER. It is not impossible that NIEDERMEIR was working independently and reached similar conclusions to BAKER.
19. Richard MOSS, RCNC, formerly Director of Ship production and later BAKER's business partner.
20. An outstanding constructor who began in Lloyds Register and transferred to the RCNC.
21. Non naval architects will not appreciate the full significance of this remark. Before computers, designers were almost forced to use an existing ship as a starting point and where there was no previous similar ship there tended to be a lengthy trial and error phase. BAKER did start from nothing and deserves enormous credit for it.
22. Letter to the author 1983.
23. Private letter to Mr PAYNE for the RCNC history dated 5 July 1978.

24. BAKER names some of those he thought opposed him. I have deleted the names as I am not sure he is correct in all cases.
25. I was impressed by this argument and searched WW I records when the RN had a number of destroyers with turtle back fo'c'sles and also consulted RCN operators but could not find evidence to justify the high cost of turtle backs.
26. It would be hard to design frigates with hull forms more different than those of *Whitby* and *St Laurent* but repeated questionnaires in NATO put these two as equal best of their size as sea boats.
27. Letter from VICE ADMIRAL R.St.G. STEPHENS, RCN.
28. I had charge of the DNC stand at a major secret exhibition and part of my brief was to compare models of the two classes and explain the superiority of *Whitby*. One day, when I had finished, a stranger came up and asked who wrote that rubbish—and introduced himself as BAKER!
29. D.K. BROWN. *A Century of Naval Construction*, Conway, London, 1983.
30. Based on notes by Richard MOSS, RCNC, formerly Director of Ship production and BAKER's partner in this venture.
31. This low freeboard was not obvious as the main deck had bulwarks and there was a shelter deck over. The extension to the fo'c'sle only meant filling the gap between bulwark and shelter deck.
32. This is an interesting point. The P boats used on asdic trials were paid off because their draught was too low. The staff requirement for the *Kingfisher* should have taken care of this.