

"I MEND NUCLEAR SUBMARINES"

A TRIBUTE TO ARTHUR ROBERTS OBE

BY

SIR Robert HILL, KBE, FRENG

Arthur ROBERTS was a man to whom the Royal Navy, the submarine service and many of its engineer officers personally owe a debt far greater than could ever be brought to account. He would have been appalled at the prospect of a memorial, but it exists nevertheless in the remarkable success of the early days of the United Kingdom's nuclear propulsion programme.

In life, he always dismissed thanks for his help, so we hope that these recollections will serve as a record of immense gratitude to Arthur in particular, but also to his many colleagues in Vickers Shipbuilding and Engineering (VSEL) who pioneered the building and entry into service of the Royal Navy's nuclear submarines.

Shortly after receiving his OBE, back in 1972, Arthur looked in to one of the offices in C Block Fox Hill and was asked how it went. His answer went as follows:

"We waited around a long time and then got into a line. Then it were my turn and she said,

'What do you do, like then?'

And I said,

'I mend nuclear submarines.'

And she said,

'Oh! Do they go wrong often?'

And then I remembered her son were going down one next week. So I said,

'Well ma'am, often enough to keep me in business.'"

A few years earlier, when *Dreadnought*, *Valiant*, *Warspite*, *Resolution*, *Repulse*, *Renown* were in service and *Revenge* was on sea trials, Arthur was seen in the bar in the Wardroom at *Faslane* looking gloomily into a pint of beer, about to make his daily evening phone call back to George STANDEN, his boss at Vickers in Barrow. Asked what was the matter, he replied,

"I've come to the conclusion that you're breaking them faster than we're mending them."

To describe himself simply as one who mended submarines was a typical Arthur understatement. At one time or another, he was closely involved with every aspect of the nuclear submarine business: with design and development; with building and commissioning; with trials and tuning; with repairs and maintenance; and as a member of the MoD'S safety working party. Though quiet and reserved, he was a highly intelligent engineer who had a special gift for getting to grips with difficult technical problems, invariably guiding people towards sensible and practical solutions which in retrospect often seemed simple, but which had evaded other people's minds until Arthur's intervention.

At one time it seemed impossible for a submarine reactor to achieve initial criticality without his presence. Neither was his immense mastery of submarine engineering confined to the nuclear propulsion systems. Whether it was a problem

with the periscopes, air purification machinery or with the torpedo discharge system, Arthur's ability to diagnose and apply first principles always seemed to come up trumps. But it was the manner of his contribution that was so extraordinary. He had an uncanny ability to anticipate situations where he could, with a quiet word and friendly assistance, change outcomes for the better. Frequently, this would be during long night hours. He would then just happen to be around to offer advice. But only if asked. He never said "Do it this way", but went to great lengths to guide people's thinking towards the appropriate course of action. He was invariably supportive and never judgmental.

Many engineers, through choice or circumstance, spend their lives at desks, drawing boards or, nowadays, computer screens. Arthur's contribution was made almost exclusively through direct contact with people. He built personal relationships with people in every organization associated with the nuclear submarine programme, learning their ways and their skills.

Stainless steel pipe welding is no easy matter and few people have just the right combination of manual skill and calm temperament. For the primary circuit, every weld has to be radiographed and if any defect is seen the weld has to be cut out and rewelded, costing the shipbuilder time and money. Furthermore, the job gets harder with each attempt. In the early days, Vickers' star welder was Phil MCGRATH, a man with whom Arthur had telepathic understanding and who was employed on the really difficult welds. Typically, Arthur would be found in the tunnel, waiting patiently for Phil to emerge after completing a root run. Arthur would lift his chin and raise his eyebrows in an unspoken question. If MCGRATH nodded, as soon as the radiographers had taken their shots he would be sent down to complete the weld without waiting for the film to be developed and assessed. If he shook his head, the weld would be cut out, without even bothering with radiography.

He was mostly a 'fix it' rather than a 'make it' engineer, and was thus closely aligned with the uniformed service where operation, maintenance and repair dominated our seagoing days. He was equally at home and welcome in the Junior Rates Dining Hall, the Wardroom and the Senior Rates Mess. He would prefer the latter, for here he would learn most about the boat and its problems and the capabilities of its officers and technical staff.

Towards the end of a Maintenance Period, faced with some intractable engineering problem, with the stores piling up on the jetty, and the Captain assuming an increasingly glittering eye, it was heaven to get that message,

'Arthur says he might drop in later.'

Arthur was educated at Barrow Grammar school and in the latter stages of the second World War he volunteered and served in the Fleet Air Arm initially as an aircraft engineering rating, once mentioning that he had worked on biplanes in an aircraft carrier hangar. He gained a commission and when the war ended he was a Sub Lieutenant on course at the RNEC Keyham. After the war he went to Cambridge University and gained a First Class Honours degree. He was a brilliant mathematician and if and when ever nuclear submarines failed to provide enough mental stimulation, he would be seen solving interesting problems or calculating odds.

On joining Vickers he worked for DR FORSYTH who was the Research and Development manager at the Admiralty Development and Experimental Base (ADEB). At that time, prior to the start of the nuclear programme, the work was on the hydrogen test peroxide plants in HM Submarines *Explorer* and *Excalibur*, as well as on submarine noise reduction.

With the signing of the 1958 Agreement (properly titled 'Agreement for Co-operation in the Use of Atomic Energy for Mutual Defence Purposes') Arthur, George STANDEN and others from Vickers went to the Electric Boat Company in the USA. There they were to learn the nuclear power plant and shipbuilding technology that Vickers would need to build HMS *Dreadnought*, incorporating the S5W nuclear propulsion plant provided under the agreement from Westinghouse. At that time, *Dreadnought*'s key engineer officers and senior rates were also in the USA, qualifying as S5W plant operators in USS *Skipjack*. Under tight US 'need to know' security, neither team could visit the other's place of work, but they met ashore and began to establish the teamwork which became crucial during *Dreadnought*'s building and commissioning.

Returning to Barrow, George STANDEN led the combined Vickers, Rolls-Royce & Associates and MoD team which built and commissioned *Dreadnought*. This was a huge challenge and Arthur was his right hand man throughout. He carried a heavy load and was always there when needed. During intensive periods of setting to work and testing, he was frequently the senior Test Engineer on the overnight shift, from 2000 to 0800. A dry sense of humour was never far below the surface and on two occasions when untoward events occurred, the shift log was found to contain the account presented in Arthur's hand in rhyming verse, greatly easing the tension.

ADMIRAL Hyman G. RICKOVER USN visited Barrow for the launch of HMS *Dreadnought*. Arthur showed him round ADEB, which had been used for testing the main machinery for *Valiant*. RICKOVER spotted a large hook above the test position and asked what it was for. Arthur explained that it was to suspend the vacuum bellows, which balanced the loads on the raft on which the turbines and gearbox (but not the condenser) were mounted. RICKOVER glared and grunted and moved on. On return to the USA, he initiated the first major noise reduction programme for nuclear submarines in the USA.

On their initial passages from Barrow to Faslane, on the surface in the Irish Sea, both *Valiant* and *Warspite* had great difficulty in persuading their evaporators to make enough good quality water. At Cambeltown, the NATO jetty had previously been used to berth *Explorer* and *Excalibur* and their tender. On *Valiant*'s arrival at the jetty there was what appeared to be a collection of rusty pipework. Arthur knew it to be a device for making pure, demineralised water—just what was needed, if it could be made to work. Huge relief: life blood restored.

In 1967 Arthur became commissioning manager for *Warspite*, *Resolution* and *Repulse*. Then, in view of the importance of ensuring the success of the submarine nuclear deterrent, he went to Faslane to lead the Vickers waterfront support team. In Faslane, Arthur's base was what was known universally as 'The Vickers caravan.' Young sailors seeking spiritual guidance frequently rang this ash-strewn cabin, which he shared with other resident and visiting Vickers engineers! Very little was dispensed. However, on one occasion he treated with great kindness the young sailor who turned up seeking advice on having marriage banns read in the Church of Scotland.

At the request of the MoD he returned to Barrow in 1970 to assist in the commissioning of HMS *Swiftsure*, the first of a new Class (soon given the soubriquet 'nearly as good as *Dreadnought*') and in 1973 became marine design manager. Four years later he once again adopted a troubleshooting role as the Company's Chief Engineer.

While exerting most of his influence through advising and helping other people, Arthur played a major role in the recovery from a number of major events which, but for his experience and initiative, could have caused the Navy significantly greater expense and loss of availability. Some notable examples:

- When *Churchill* bent her main shaft during sea trials (she was the first submarine to be fitted with a prototype pump jet) Arthur knew the Portsmouth Dockyard man who could straighten it in situ - and he did.
- When *Warspite* had a major machinery space fire during a visit to Liverpool, Arthur was despatched to help, specifically at the request of the MoD and Flag Officer Submarines where his exceptional qualities were well understood.
- Perhaps the biggest job he managed was in *Resolution*, changing the rotors of both motor-generators in 6 weeks – a job that the dockyard said would take as many months.
- When a serious problem arose with the gearbox in *Swiftsure*, Arthur devised a highly ingenious solution which obviated the need for the main wheel to be removed and modified.

When the nuclear submarine Safety Working Party was formed in 1964, he was invited to be a member and he served until his retirement, attending whenever circumstances allowed. He seldom said much, but was intently listened to when he spoke. From time to time the meeting would be locked in increasingly complex debate about some technical difficulty. When the wrangles had gone on for some time, the feeling would develop that a trick was being missed. A quick glance towards the end of the table would then reveal Arthur looking bemused and he would invariably produce a simple but workable solution, which addressed the real problem. Business could then move on to the next agenda item. At the end of a meeting, under AOB, Arthur would often come up with some gem. After a deathly hush the Design Authority would undertake to look into the matter. Arthur would smile in a selfdeprecatory manner and say,

“Aye, that’d probably be a good idea.”

No nuclear submarine problem was too small for his attention, nor any person denied his time and interest. He had a natural ability to put people at their ease and while he had a sharp wit it was never unkindly used, unless it was to dispel some irrelevant pomposity. He was a man who had a genius for making things work and who, without the trappings of formal position, probably did more than any other individual to ensure the engineering success of the new capital ships of the Royal Navy.

On retiring in October 1990 at the age of 65 he was dined out by the submarine branch in the Wardroom, HMS *Dolphin*, and continued as a consultant to VSEL.

Arthur died at home in Barrow in Furness on 22 June 2002. Among those at his funeral on 27 June were people from the organizations involved in the business – two former Managing Directors and many colleagues from Vickers; also people from Rolls-Royce & Associates, the Safety & Reliability Directorate of the UKAEA, the MoD and the Royal Navy, reflecting the huge respect in which he was held.

In the nuclear submarine business, SSN stands for Saturdays, Sundays and Nights. Arthur seemed to be there for all of them – and for all of us.

Roger BERRY, Vie BUXTON, John GROVE, Spam HAMMERSLEY, Bob HILL,
Bob ISAAC, John JACOBSEN, Patrick MIDDLETON, Ned PURVIS, Paul THOMAS,
Rob WALMSLEY, Nick WARNE.