MARINE ENGINEERING IN THE 'ARMY NAVY'

BY

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WAR—Just before, or at the beginning of, or during a war, when the Navy would be fully occupied and the trade too timid it is an advantage to have a ship of our own to carry explosives to Ireland, Gibraltar and Malta.

So concluded an interdepartmental committee on War Department Vessels in 1908, chaired by Major-General C. E. Heath, C.V.O., then Director of Transport and Remounts at the War Office. The same could be said today, albeit the last two destinations may be different.

History

The history of the 'Army Navy' can be traced back approximately 240 years when weapons and stores too numerous to be held in the Tower of London had to be transported by boat and barge to depots downstream. At this time the Board of Ordnance supplied munitions to both Services and 'Army' vessels—gun hoys—were used to take cannon from the Gunwharf of the Royal Arsenal Woolwich to the Navy 'Men of War' anchored offshore. Eventually a fleet of coasters, civilian manned, was run by the War Office (successor to the Board of Ordnance) to supply depots established world-wide.

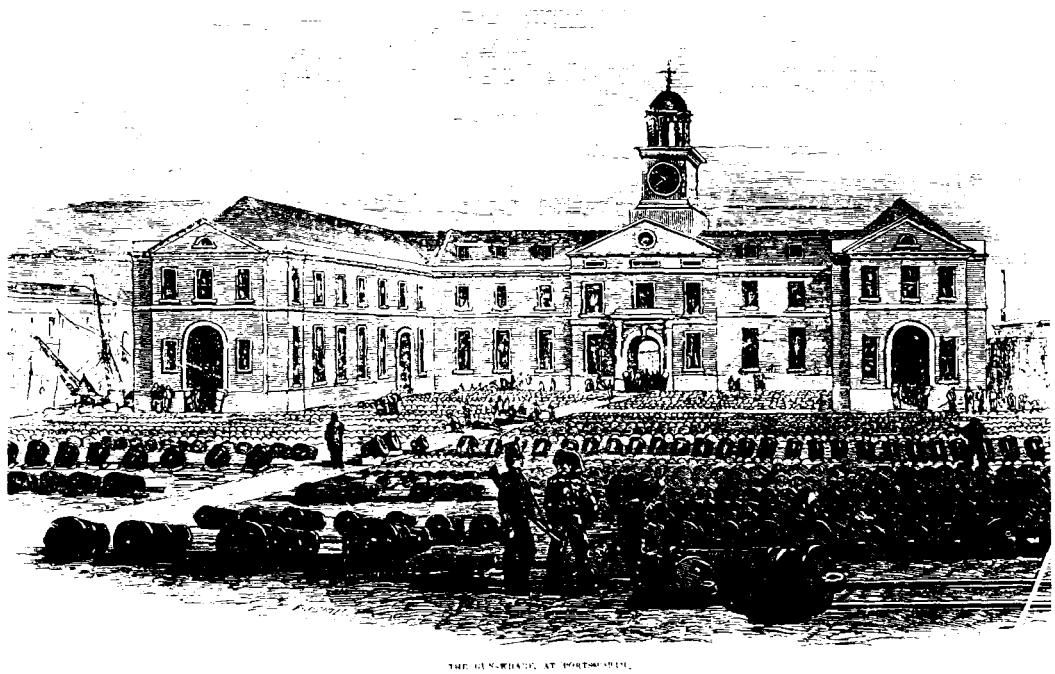

FIG. 1—THE GUNWHARF AT PORTSMOUTH DURING THE CRIMEAN WAR

An Army Gunwharf is still in existence at Portsmouth, alongside H.M.S. *Vernon* and is the base for 18 Squadron Royal Corps of Transport (small boat squadron) and a detachment of 17 Port and Maritime Workshop Royal Electrical and Mechanical Engineers. In earlier days the whole of H.M.S. *Vernon* was a War Department depot as depicted in the engraving (FIG. 1).

As Naval Ordnance became more specialized the usual problems of priorities between the Services arose, and in 1890 the Navy formed its own Ordnance Fleet. Up to then, Army vessels were procured by the Navy but, as if in retaliation, the Army decided to design and procure its own—hence the author's rather grand title. Even after 'Rationalization' in 1970 when design and procurement passed back to the Navy, the Army retained design authority for the older vessels.

Current Tasks

The Army fleet is operated by the Royal Corps of Transport who train their own ships' officers, crew, and Port Operators. The main tasks in U.K. consist of:—

(*a*) Maintaining supplies to the Royal Artillery Range in the Outer Hebrides and the tracking station on St Kilda.

(*b*) Transporting vehicles, stores, and ammunition to the British Army of the Rhine through the ports of Antwerp and Zeebrugge.

(*c*) Logistic tasks and exercises as required by the Director of Movements (Army) and Headquarters United Kingdom Land Forces.

(*d*) Range safety for coastal gunnery ranges.

(*e*) Lighterage operations at Marchwood Military Port.

Vessels engaged in logistic and lighterage tasks are military manned; range safety and training vessels are civilian manned.

Abroad, port operating and logistic tasks are carried out in Hong Kong, Cyprus, Belize, and the Falklands. Frequently it is essential to use a logistic vessel that has a beaching capability; thus Army landing craft are ideal for this type of operation and have proved their value on numerous occasions.

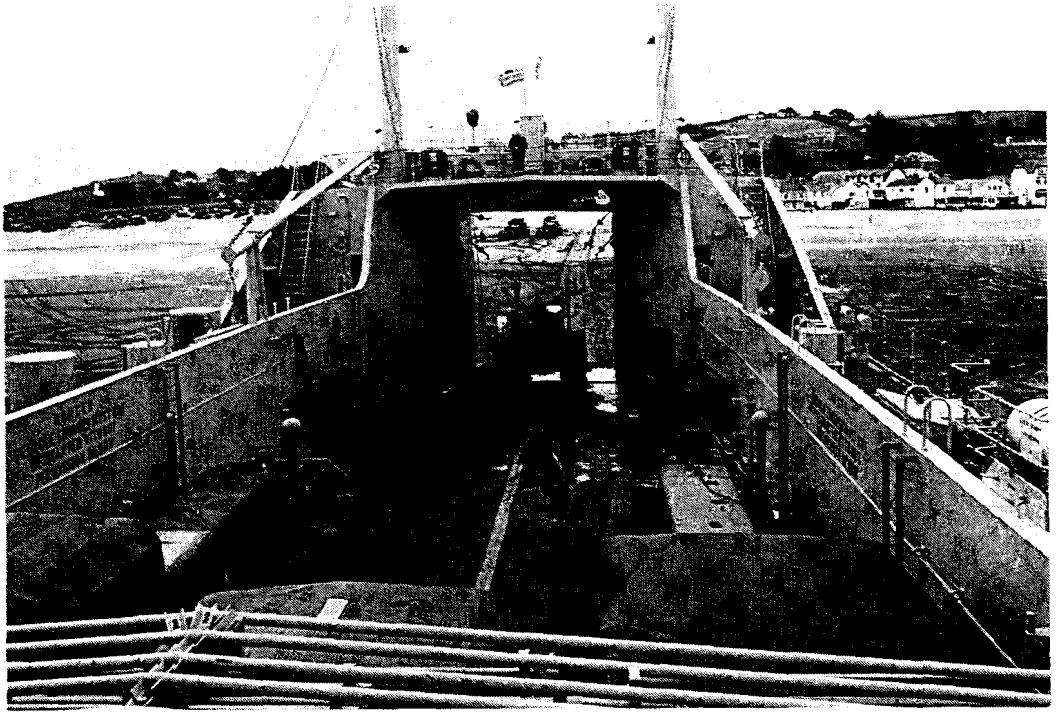

FIG. 2—LANDING CRAFT LOGISTIC (LCL) BEACHED AT INSTOW

Vessels

(*a*) *Major vessels:* consist of two Landing Craft Logistic (LCL) (FIG. 2) named H.M.A.V. *Ardennes* (FIG. 5) and H.M.A.V. *Arakan,* each capable of carrying 5 main battle tanks or 250 tonnes of containers or stores; and one Ammunition Ship Logistic (ASL) named H.M.A.V. *St George* (sister ship to R.M.A.S. *Throsk* and *Kinterbury*).

(*b*) *Coastal vessels:* consist of one 90 ft MFV for training, five Ramped Craft Logistic (RCL) (FIG. 3), six Ramped Powered Lighters (RPL), and approximately 20 various Range Safety Craft up to 24 metres in length. The RCL can carry one main battle tank or 96 tonnes of stores or containers.

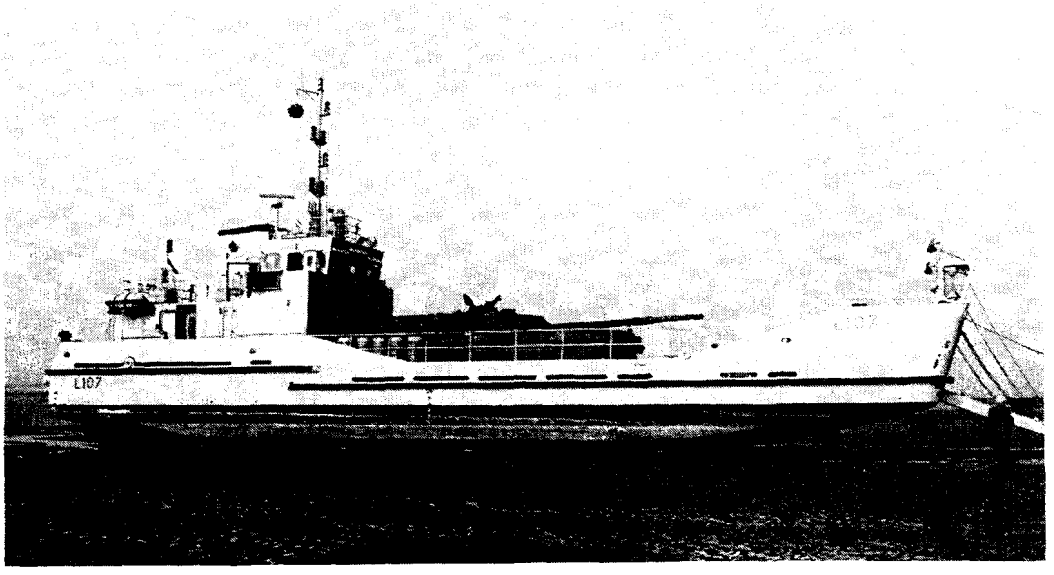

FIG. 3—RAMPED CRAFT LOGISTIC (RCL) LOADED WITH A CENTURION BATTLE TANK

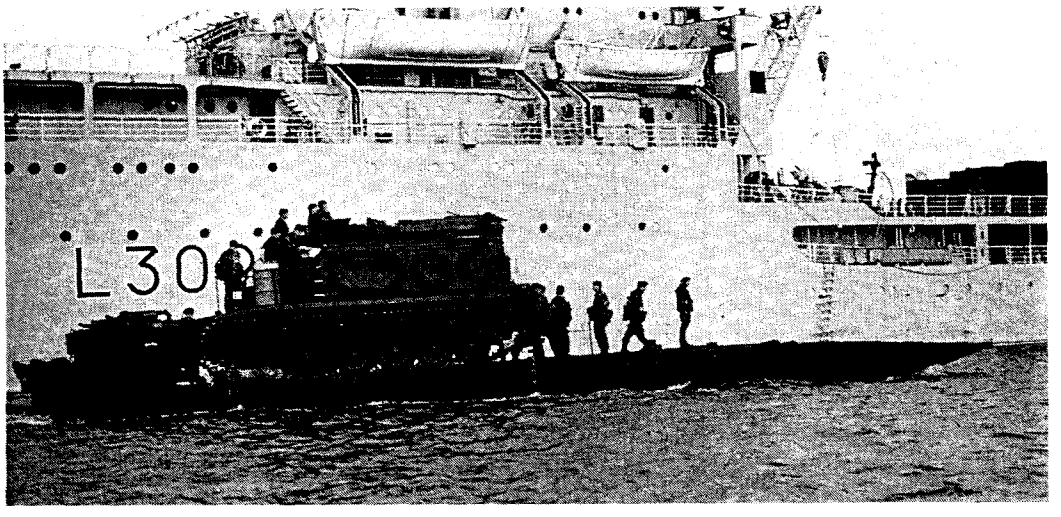

FIG. 4—MEXEFLOTE RAFT WITH BEACH ARMOURED RECOVERY VEHICLE (BARV), ALONGSIDE LSL

(*c*) *Other vessels:* consist of 5 Workboats for towing fuel dracones, 12 Harbour and General Service Launches, 2 GIRL class tugs, a Trojan beaching craft, and approximately 300 Mexeflote pontoons.

Mexeflote pontoons are capable of being linked together to form rafts or causeways and in the raft configuration are powered by Harbormaster propulsion units. The rafts are designed for carrying by, and working with Landing Ships Logistic (LSL) in a ship/shore lighterage role (FIG. 4). This allows vehicles and equipment to be landed over a beach rather than beaching the LSL itself—a procedure used extensively in the Falklands campaign.

Procurement

Since 1970 the naval side of MOD(PE) has been responsible for procurement of all Army new vessels to the Army Statements of User Requirements. This has resulted in greater standardization of vessels, but not necessarily of equipment, since procurement is by means of a design and build contract. Except for the relatively few items specified by MOD the shipbuilder selects equipment and fittings as he chooses and naturally chooses the cheapest. Reliability and spares support suffer in consequence. Other problems, such as manufacturers going out of business and the lack of high power/weight ratio diesel propulsion engines for small craft in the MOD(N) approved range, have resulted in greater variations than the Army would have wished.

Equally the Army has not always been able to forsee changing requirements and variations within a class of vessel, and retrospective modifications are far too common.

Landing craft these days are quite sophisticated vessels compared with those used in the Second World War. Both the classes illustrated have air conditioning, a sewage disposal system, and crew accommodation and domestic services to naval standards. Navigation and communication equipment is comprehensive and either MOD(N) owned or of commercial design. The LCL has waste heat evaporators for additional fresh water and both classes have 440 volt 3 phase 60 cycle electrical generating systems. New to the Army is the ISIS 200 machinery monitoring system installed in the Ammunition Ship Logistic *St George;* likewise the Hewlett Packard 85 desk top computer to give stability information for various loadings of cargo.

Engineering Support

Although scheduled repairs and refits are a MOD(N) CED responsibility,

much of the technical work is carried out by the Army. As well as assisting with preventive maintenance, the two REME Maritime Workshops at Marchwood and H.M. Gunwharf Portsmouth carry out much of the corrective maintenance on the vessels based locally. Wherever possible the Navy Maintenance Management System (MMS) is adopted for new vessels, likewise Rationalized Tool kits (RATTS) and Type B support for spares.

The Army has long operated a Survey and Classification system for its vessels similar to that used by Lloyds Register of Shipping in the commercial world. A team of civilian surveyors, which the author has the honour to command, is established in Maritime Branch REME. In this Branch, vessel survey reports and 'cradle to grave' records of all technical matters are maintained on a world-wide basis. The Branch is the custodian of all 'as fitted' drawings and acts as the essential link between Army and Navy on all enginering support, repair, and refit matters. It is also the design authority for the older vessels and investigates all defects and modification proposals in the first instance. After carrying out pre-refit trials and verifying outstanding defects reported by the crew the surveyor takes account of surveys due and produces a defect list in naval format or (more commonly) a specification of work for competitive tender. He liaises with the Dockyard or oversees the contract repairs and refits on behalf of, and to cash limits set by, the Chief Executive Dockyards.

Wherever possible the Army has adopted naval marine engineering procedures, contract refitting procedures, Naval Engineering Standards, and Quality Assurance requirements. Full use is made of the S2022 system for reporting failures and shortcomings; and likewise of the reporting systems for operational defects and defects in new vessels under guarantee. The three major Army vessels have adopted the naval on-board stores accounting procedures, so one day perhaps we can expect to install the OASIS system!

Problem Areas

Landing craft are unique in several respects, not the least being the Officer Commanding being paid to go aground (FIG. 5)! 'Hard' beachings can give

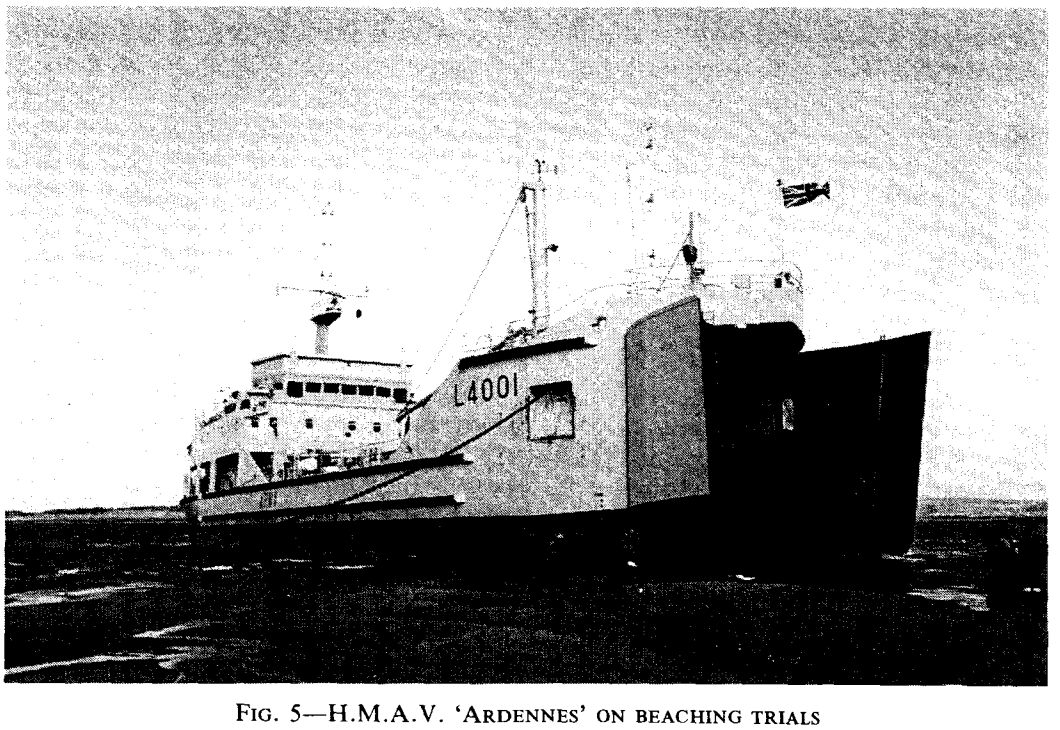

FIG. 5—H.M.A.V. 'ARDENNES' ON BEACHING TRIALS

headaches to the Survey and Repair organizations who appreciate such items as propellers, tailshafts, rudders and 'retractable' logs being easy to replace. Consequently the Army statement of user requirement specifies that the crew must be able to change rudders and propellers when a vessel is dried out between tides on a beach. Frequent inspection for underwater damage is undertaken and careful design is required to prevent sand entering stern tubes and sea inlets. To allow generators to continue running when a vessel is dried out a re-circulating system is used incorporating sea-water ballast tanks.

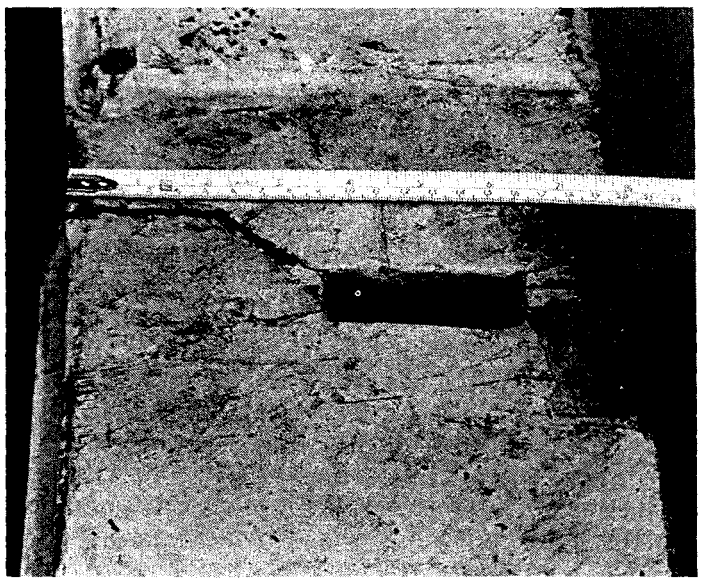

FIG. 6—H.M.A.V. 'ARDENNES'. SLOTTED HOLE IN BULWARK CAPPING FOR REMOVABLE HOLD COVER BEAMS—A STRESS RAISER

Being almost flat-bottomed, landing craft are particularly prone to slamming in heavy seas and both LCLs have suffered a fair degree of cracking due to fatigue. This has necessitated reinforcement of the bulwarks in the vulnerable areas just forward of the superstructure. Both masts have also had to be strengthened at their bases and the wind speed indicator on top of the forecastle sampson post is rarely serviceable. The code of practice recommended by Foulger and Chalmers[1] is very relevant to Army landing craft and is thoroughly endorsed.

FIG. 6 shows typical stress raisers encountered, where more attention to detail design by commercial shipbuilders is required.

Conclusion

It is hoped that this article will give a little insight into the workings of the Army Navy from an engineer's point of view and perhaps provoke a few arguments. Space can only permit a very broad and incomplete picture—in this first article in the Journal it was felt important to try and cover the whole perspective. The views expressed are not official but merely those of the author who for the last sixteen years has usually been at the receiving end when things go wrong!

References

1. Foulger, K. and Chalmers, D. W.: Cracking in R.N. surface ships; *Journal of Naval Engineering*, vol. 28, no. 2, June 1984, pp. 301–308 (p. 306).