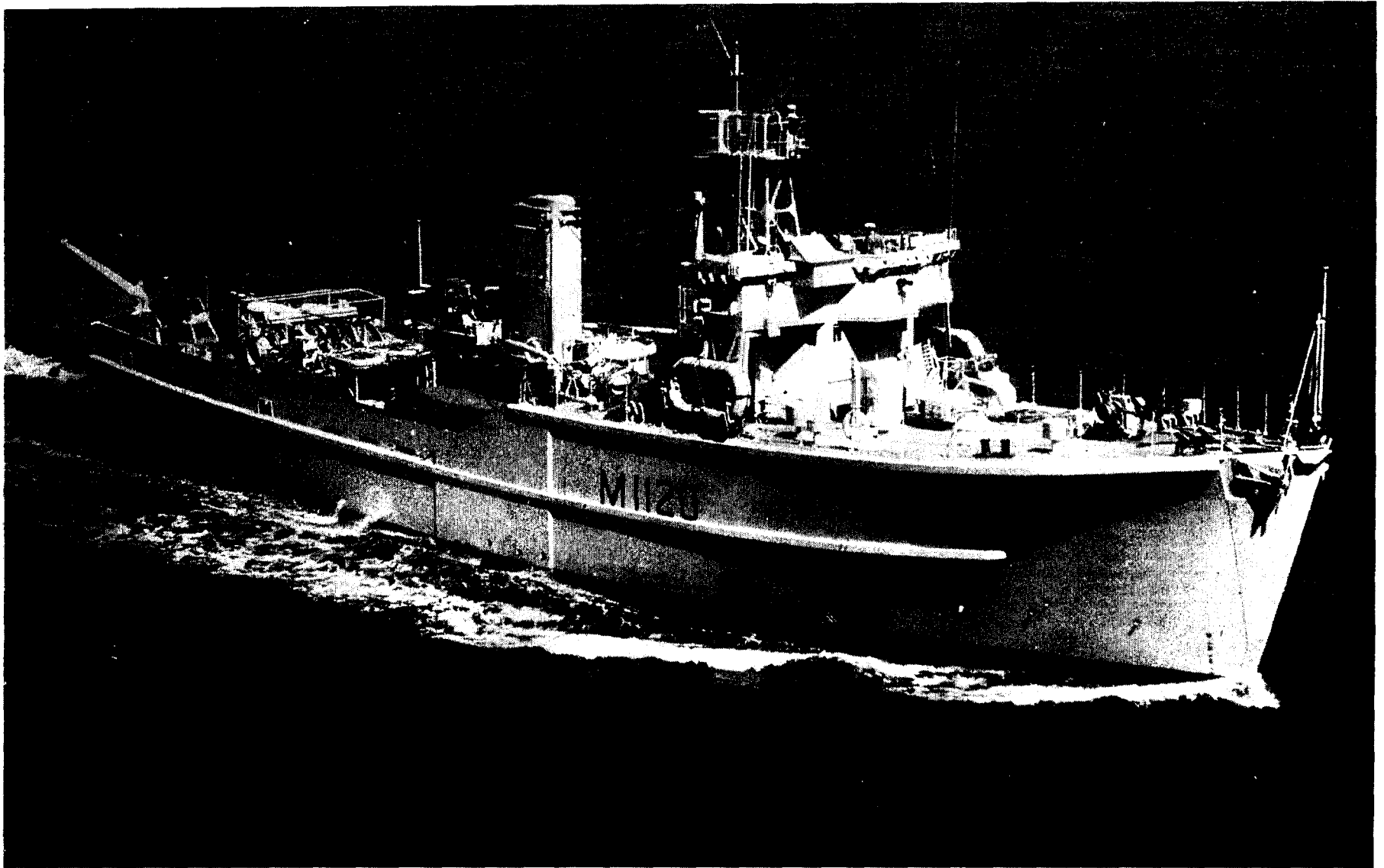


DE-PRESERVING A COASTAL MINESWEEPER

BY

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The Navy is now building up a large force of 450-ton coastal minesweepers, putting them almost immediately into 'mothballs' and reserve as they are completed. If an emergency develops in the future it is intended that these ships should be brought forward to active service very quickly and, it is hoped, in as good condition as when they were built. Until the middle of 1956, none of these ships, placed in preservation, had been brought forward into full commission, but in May, 1956, the first, H.M.S. *Gavinton*, was brought forward, firstly to supply a ship quickly to a training establishment, secondly, to evaluate plans drawn up by S.O.R.F., Hythe, for the de-preservation routine, and thirdly, to find out how effective the preservation had been.



A COASTAL MINESWEEPER OF THE SQUADRON ATTACHED TO H.M.S. 'VERNON'

The minesweeper used for this exercise was laid down by Messrs. Doigs of Grimsby, in September, 1952, and completed acceptance trials in August, 1954. She was then put in a state of preservation by the Dorset Yacht Company and delivered to S.O.R.F., Hythe, in January, 1955. From that time, no machinery was turned and nothing more than routine ventilation was carried out, so that, at the beginning of the exercise the machinery had lain dormant for over eighteen months.

For preservation, all salt water induction and exhaust systems associated with the main and auxiliary machinery had been blanked. The salt water systems were blanked as convenient on the inboard side of the inlet and discharge valves and all open-ended systems were sealed off, ship side holes with wooden plugs and 'Koon' coating, and inboard apertures with sticky tape and greased brown paper. All machinery had been covered with large transparent polythene bags, and exposed, unpainted metal was heavily greased (rather more than necessary in most cases). In addition, all fresh and some salt water cooling pumps and systems had been filled with Patt. 1179 water displacement fluid and the engines inhibited in the normal way by running on Patt. 1168 preserving oil both as fuel and lubricant. Both these fluids had then been drained out of the water jackets and sumps. To obviate any running down while in reserve, the lubricating oil storage gravity outlets had also been blanked.

For de-preservation, the engineering commitment consisted of :—

- (i) Two Mirrlees V.12 supercharged main engines of 1,250 h.p. each, together with associated Vulcan-Sinclair clutches and M.W.D. reverse/reduction gearboxes and operating oil pumps.
- (ii) Three 50-kW. Foden Diesel generating sets, 220 volt D.C.
- (iii) One Mirrlees V.8 unsupercharged pulse generating set.
- (iv) Salt water and main suction services supplied by two 20-ton hull and fire pumps.
- (v) Pneumatic fresh water system supplied by a Mono-pump and air bottle.
- (vi) Reids direct acting type steering gear and mechanical wheel.
- (vii) One 350 lb/sq in two-stage air compressor and two air accumulators for starting the main engines.
- (viii) One Enfield single-cylinder motor boat Diesel engine.
- (ix) Spare gear and drawings.

The crew for this exercise was drawn *en bloc* from another coastal minesweeper that had suffered an engine breakdown necessitating dockyard refit, and hence they were quite familiar with the machinery layout and routines. The engineering staff consisted of one E.R.A.3 as Engineer Officer, one P.O.M.(E) and seven M.(E)s. Having everybody well versed in the vicissitudes of C.M.S. machinery was an ideal situation which would, unfortunately, not occur in an emergency. In all other respects the exercise was treated as such.

A very comprehensive programme was drawn up by the engineering staff of H.M.S. *Diligence*, Hythe, who allocated work to various parties. They, as base, supplied two E.R.A.s, one mechanic, one P.O.M.(E), three L.M.(E)s. and six M.(E)s. to assist the ships company. On the second and third days this number was reduced to one mechanic, one L.M.(E) and two M.(E)s. The ship's E.R.A. was not allocated work because it was considered that he would require all the time to feel his way round the systems before taking over the ship, assuming, for the exercise, that he had come straight from a different job.

The ship's company arrived on a Monday night and, according to the programme, the ship was due to sail for trials on the following Saturday. On the face of it, this seemed an impossibly short time after eighteen months inactivity. As it turned out, the task was completed with almost a day to spare, although only working eight or nine hours a day. Starting work on Tuesday morning at 0830 was rather like unwrapping a giant Christmas parcel. Although, from the outside, the ship looked rather derelict, inside it was a maze of brown paper parcels, polythene bags, and sticky tape. The preservation had been intended to last twenty years so in some applications it seemed a little overdone. The ship had been brought alongside a pier and coupled to shore power before starting, though normal practice would be to carry out the work at a buoy. (Another C.M.S. is now being brought forward at a buoy).

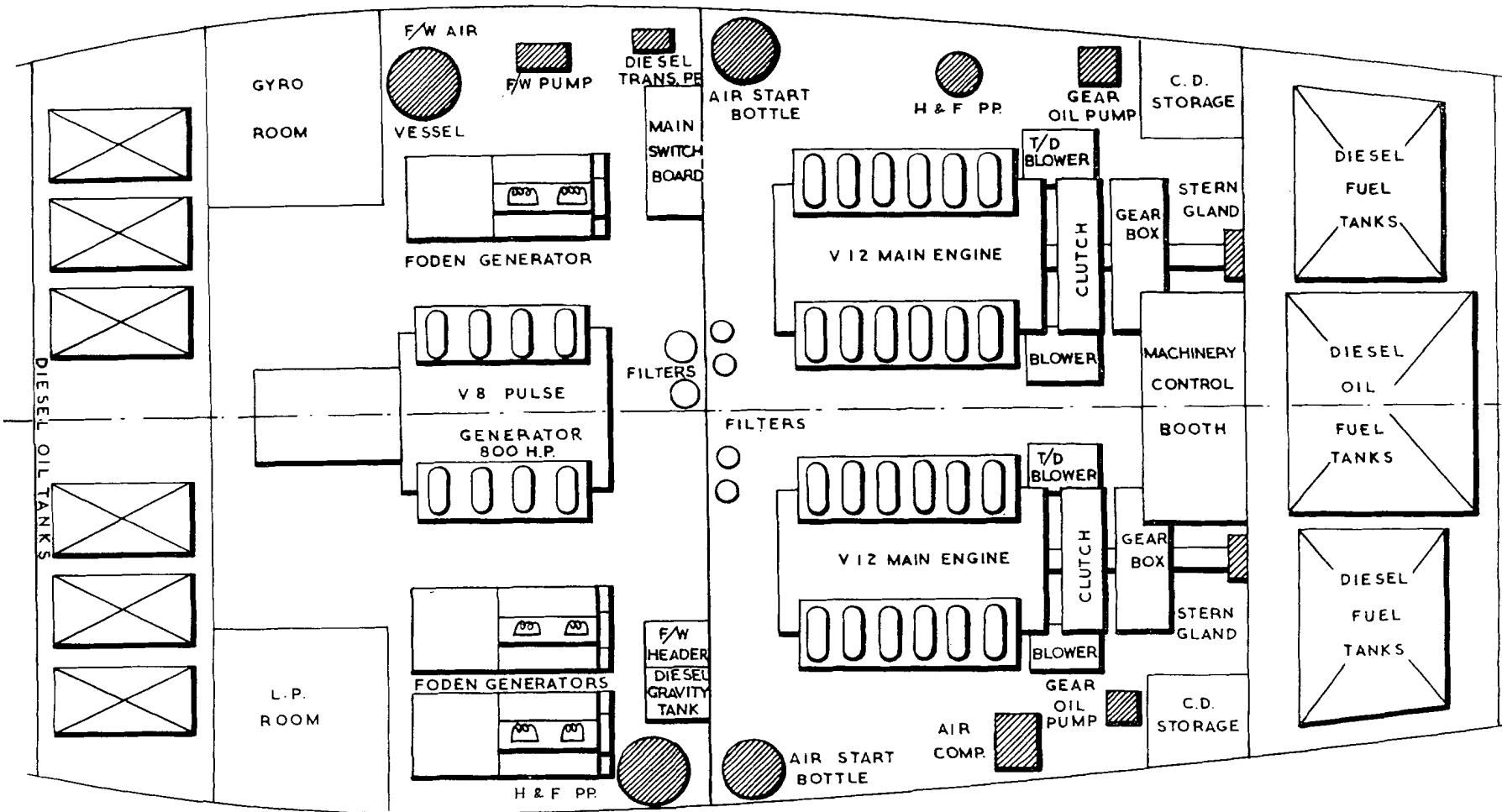
The first job was to remove all the blanks from the systems and the plugs from the ship's sides. The sea inlets had not been plugged, so the assistance of divers was not necessary. The P.O.M.(E) and two M.(E)s, supplied by the base, extracted the wooden plugs, two E.R.A.s, with an M.(E) and L.M.(E) each, worked on the blanks, and the mechanic, with an L.M.(E) and two M.(E)s, prepared the Foden for running. Room to manoeuvre in C.M.S. bilges is very limited, and sometimes impossible, so the extraction of some sea water inlet blanks proved to be a very difficult operation. In one case a whole chest of valves and associated piping had to be removed to get at one main engine sea suction, causing many hours delay. Some of the wooden plugs were very troublesome because of the over-fine Morse taper with which they had been provided. This caused them to jamb in the holes and defy all conventional methods of removal.

The three Foden generators were scheduled to be started on the first day to ease shore load and charge their L.P. batteries (a portable set of batteries having been provided for the initial start). The air compressor was also scheduled to be started, since the main engines, pulse generator, and gearboxes could not be run without it. It was also found advantageous to have a service pump and the firemain in operation, since it was a very long walk to any heads facilities from the ship, and this wasted time.

Since the Foden generators had been run on Patt. 1168 oil before being shut down, the fuel system was well flushed with Diesel oil before being re-started. The engine was motored by battery with the injector pipes connections slackened off and pump priming cocks open. The cooling systems were flushed through to remove traces of displacing fluid, and were then topped up with fresh water. Considerable speculation attended the starting of this first piece of machinery, and it was with some relief that the engine fired and accelerated to governing speed after only a couple of turns. Although one other engine was treated similarly, it showed much more reluctance to start than the first and the third was left until the next day as its sea suction blank was proving difficult to remove. Both engines seemed free of defects, and No. 1 was left running all night to charge the batteries.

Less success, however, attended the starting of the air compressor. For some reason, water had remained in the cylinder barrel and rusted the H.P. cylinder plunger rings. This meant stripping down the pump and taking the piston assembly (two-stage composite piston) into the base to be freed. This proved impossible and a plunger had to be cannibalized from another ship in reserve.

The hull and fire pumps were started during the first day but proved troublesome because of excessive quantities of grease on the commutators and brush gear. By trial and error it was also found that every firemain valve in the ship was open, and one broken, and this service was consequently shut down quickly



LAYOUT OF MACHINERY AND FUEL TANKS IN A COASTAL MINESWEEPER

pending further investigation. (All firemain valves are left open in craft in reserve to prevent the rubber valves sticking to the seats).

The oddities of the pneumatic fresh water system (in place of a gravity feed system) defeated us on the first day. Before starting the F.W. service pump, an air bottle has to be pumped up to about 20 lb/sq in by car type tyre inflator to provide the continuous hydrostatic pressure required. Air seemed to leak out as fast as it went in, and the problem was left overnight.

The position at the end of the first day's work was :—

- (a) One air compressor stripped and in base for repair
- (b) All but three obstinate pipe blanks removed. (There had been 29 fitted)
- (c) Two Foden generators running and tested on load
- (d) All but one ship side plugs removed (ships company heads)
- (e) One hull and fire pump run up and one found to be full of grease in the commutators
- (f) Positive shaft locking gear removed
- (g) Main engine sump oil tanks filled from ship's reserve tanks.

This last was a very slow process with the semi-rotary hand pump provided, and it was found far more satisfactory to uncouple the discharge from the lubricating oil storage tanks and fill the sump tanks by buckets through the inspection manhole. A few bucketfuls were also poured into the engine sumps via the crankcase inspection doors to provide a suction for the scavenge pump when starting.

From the dismal note of scepticism on which the work had started in the morning, the mood changed overnight to cautious optimism. Perhaps, the preservation yard had done a good job after all, and the target date wasn't as impossible as it had at first seemed.

On the second day, Wednesday, the remaining Foden started easily, and all three generators had to be run on load at various times as the automatic shut down panels gave a lot of trouble and necessitated the almost constant attendance of a base E.A. throughout the commissioning period.

While the air compressor was still being repaired, the main engine fuel systems were thoroughly primed, prior to running, to remove air and preserving oil. This necessitated working the semi-rotary pump fitted, and bleeding from the suction strainers (by gravity pressure from the tank), Vokes filters, engine fuel rails and injector pumps, bleed off cocks being provided at appropriate intervals. The injectors were primed by opening the bleed valves on the injector bodies, and working each injector pump by hand. The injectors were taken out of the engine for this, but afterwards it was found that this was not necessary.

The cooling jackets on the main engines were filled with shore water by hose through an inspection cover in the gravity header tanks, the ships filling system, again, being much too slow for such a large capacity. The tanks required frequent topping up at first as air pockets were vented, the starboard engine taking a long time to settle down. It soon became obvious, however, that this was not entirely due to escaping air, and a leaking external water pipe was later found. This was the only defect in either of the main engines or associated auxiliaries.

Whilst this work was going on, the ship side party of one P.O.M.(E) and two M.(E)s were employed filling the M.W.D. reverse/reduction gear boxes and Vulcan clutches with lubricating oil. This proved a bigger job than it seemed, as over 200 gallons had to be poured in by hand, man-handling bucketfuls from the storage tanks. The air compressor, hastily reassembled in the morning, was set to pumping up one of the two air starting bottles to 350 lb/sq in. The

sea water circulating pump for the oil, water and boost air heat exchangers was primed by filling by bucket through an inspection cover, and at mid-day everything was ready to start one main engine. As with the Foden generators, the port main engine lumbered into life after only a short duration of air blast, though it showed obvious reluctance to run up to idling speed. This was cured by momentarily putting the fuel racks to the 'full fuel' position on the control wheel to free the governor. Great difficulty was experienced in achieving salt water circulation, and a satisfactory state of affairs was reached only after continual priming of the Drysdale self-priming pump fitted to the engine. The H.P. air compressor chose this moment to develop a fault in its electric-drive motor, and that put an end to any hopes of starting the other main engine that day. Work was continued filling the hydraulic drive systems, and getting the salt and fresh water service systems to run correctly.

At the end of the second day the position was :—

- (a) All three Foden generators run on load, but one U/S due to shut-down panel faults.
- (b) Both salt water hull and fire pumps in operation and firemain connected.
- (c) Fresh water system in operation.
- (d) Port main engine run satisfactorily.
- (e) Starboard main engine ready to run but losing water.
- (f) Air compressor U/S due to electrical fault.
- (g) Gear boxes filled, clutches partially filled, with O.M.D. 111.

This was up to schedule except that one main engine had not run, and various defects had arisen.

On the third day the V8 Mirrlees pulse generator was primed and cleared away for running in the same way as the main engines. The motor fault on the compressor had been repaired, and both starting bottles were charged. The other main engine was started, but again showed reluctance to run up to idling speed. This time, it was found to be due to the lubricating oil pump not being able to get a suction through a closed change-over valve. After this was opened, the engine ran up correctly. Both main engines were run for some time to complete the filling of the Vulcan clutches, the leak on the starboard engine having been cured earlier.

The pulse generator was then started up without any trouble, kept running for a period to test pressures and temperatures, and then shut down again, everything being satisfactory.

The steering gear only needed grease removing from the commutator of the driving motor, and that started without trouble, too. Mechanical wheel, telegraphs, and engine remote controls were tested, and then both engines did a short basin trial to prove that the transmission and propellers were still attached. It was not possible to do more than engage the clutches while idling, as the moorings precluded exerting very much strain.

The motor boat engine had been preserved in roughly the same way as the other auxiliary engines, but still gave a little difficulty on starting, which perhaps, is not surprising, since they seem awkward to start at the best of times when not modified for ether injection. When it did go, however, the engine performed well, and no adjustments had to be made.

At the end of the third day's work everything was running or had run, and the only fault outstanding being the shut-down panel on one Foden generator. All were a little unreliable, and needed attention at one time or another. All wrappings and signs of preservation had been removed from the machinery and, after tidying up all round, the machinery compartments looked very clean and new—which really they were, never having been in commission before.

The engineering staff commitment was virtually finished in three days, and the base staff departed. Most of the engineering ratings were used to embark stores and spare gear on the fourth day, and on the fifth day, Saturday, the ship moved under her own power down channel to the fuelling depot. The main engines behaved faultlessly, and have continued to do so, up to the time of writing.

One Foden generator dropped an exhaust valve after 60-hours running causing extensive damage to one cylinder unit and head, though this cannot be attributed to deterioration in reserve.

The exercise was a complete vindication of the general methods employed to preserve the machinery in these ships. Everything worked remarkably well, and with negligible trouble. Considering that this was one of the first ships to be put into reserve, and methods have, if anything, improved with each ship, I do not think that there will be much cause for concern in future evolutions of this nature.