

H.M.S. 'TRINIDAD'

COLD WEATHER OPERATION

BY

COMMANDER (E) G. W. TANNER, R.N.

A copy of Kipling's 'Actions and Reactions', and a Navigating Officer's Notebook, put to the improper use of becoming a machinery sketch book, are all that remain to me of the one short commission of H.M.S. *Trinidad*. These were in my duffel coat pocket when we were ordered to 'Abandon ship' during the return journey from our second Murmansk Convoy on 22nd May 1942. At that time the list was over 20° and remorselessly increasing, due to bomb damage received during a combined attack by 11 Heinkel 111s and a similar number of J.U. 88s.

On our outward journey we were torpedoed during an action with six *Narvik* Class destroyers, and apart from very heavy structural damage, described in more detail later, some 900 tons of oil fuel had been scattered throughout the wreckage between 41 and 90 bulkheads where it promptly froze solid. While in dry dock at Pola, in the Kola Inlet, time and facilities only permitted improvised

repairs to the hull, using railway lines for framing and various odd pieces of plate that were available welded together to form the patch. Had circumstances allowed it, full repairs would have been put in hand on our return.

During the final attack bombs had penetrated to the vicinity of the patch, but it had remained intact. New under-water damage of a serious nature had occurred, and worse, the frozen fuel ignited and an uncontrollable fire spread rapidly, until there was no means of getting forward either above or below decks. The bridge structure was burning fiercely and had to be abandoned. Ammunition in the ready use lockers was exploding. 'B' Magazine was a poor insurance risk. Even in this state it was a bitter experience to leave a ship one had 'stood by' while building, and of which one knew all those intimate little details which are for ever hidden when the machinery, turrets and fittings are installed.

So long as the 'cold' war lasts, operations under arctic conditions must remain an important factor. Much experience was gained in 1941-42, and only on limited occasions can such practice be now obtained. Some examples, taken at random from memory, may be of interest to those who have never had the somewhat doubtful pleasure of steaming in the very cold and adverse conditions which obtain within the Arctic Circle.

INTRODUCTION

H.M.S. *Trinidad* was neither designed nor modified for cold weather operation. Four days' notice was given before sailing on our first winter Murmansk convoy, and in that period, while anchored at Scapa, it was necessary to plan the requirements, obtain the materials needed, and prepare a work schedule to ensure completion by the time Jan Meyen Island was reached some ten days after sailing, when severe cold could be expected. The route was via Iceland where we were to oil in Seydis Fjord, proceeding on completion with the convoy.

The Requirements

These were summarized as follows :—

Fire Main. Hot water must be supplied and circulation provided. It was decided to achieve this by tapping the two drain cooler circulating water discharges and also those of the four turbo-generators. Discharge valves were almost shut and the pressure was boosted through the fire and bilge pumps. Hose connection adaptors were fitted and bridged with canvas or leather hoses. Circulation was achieved by drilling a $\frac{1}{8}$ -inch hole in most of the upper deck fire main valve caps, the valves being left two turns open with the caps in place. This was surprisingly successful and temperatures of over 40°F were maintained, even in the coldest weather at the fo'c'sle and on the quarterdeck. Ice which formed on the deck near the spurts of water from each cap had to be cleared frequently.

Steam Connections. Eight of these were strategically placed on the fo'c'sle deck, quarterdeck and superstructure, the supply being taken by tapping steam from the ship's heating system. Some deck pieces and adapters were obtained ashore but most had to be manufactured on board. The performance of these, using Pattern 230 smoke helmet hose to convey the steam from the deck connections to the required quarter, was somewhat disappointing, due to the high degree of condensation. For example, in very cold weather our Pattern 279 radar aerial froze so we tried a steam jet up the mast. After two hours very cold and uncomfortable work little was achieved as nothing but warm water issued from the hose.

Anti-Freeze Paste. Large quantities of 'Kilfrost' paste were necessary for many jobs ranging from crane wires to all exposed valve spindles and working parts. This treatment proved generally satisfactory.

Fresh Water Systems. All exposed parts had to be lagged and tanks fitted with heating coils. It was also found necessary to provide heating coils for some internal tanks as the sea water temperature fell to below 28°F, and so long as the steam supplies could be maintained, no difficulties were encountered.

Braziers. A supply of coke was carried as a deck cargo for feeding braziers on the upper deck. We relied on these for keeping the crane in a usable condition, it being necessary to screen them at night. On occasions when the grab for picking up our Walrus aircraft froze, holding over a brazier was the best means of thawing it.

Removal of Ice and Snow. Various picks, shovels and brooms were provided, but each division preferred to make their own odd devices, varying in efficiency, but each claimed to be the best by the originator.

Canvas Covers. These were required for many exposed fittings as protection from snow and ice. The covers themselves became damp and froze, and experience showed that it is most necessary to manufacture them oversize, with large eyelets for lacing to ensure their ready removal when working with gloved hands.

Radiators. Some portable steam radiators were obtained and tried in various exposed positions such as the bridge, but they did not prove effective.

Protective Clothing. As much protective clothing and woollen comforts as possible were obtained, the minimum requirement being for every man working in an exposed position, and for those working below in the boiler rooms and more remote machinery compartments.

Main Armament. Throughout the whole of the very cold weather it was found necessary to train and elevate the main armament without ceasing, to ensure freedom of operation.

Materials

Application was made for 2,000 feet of assorted $\frac{1}{2}$ -inch, $\frac{3}{4}$ -inch and 1-inch copper tubing, very large quantities of lagging materials, twine, palms, needles and miscellaneous deck pieces and fittings. None had been provided specifically for *Trinidad*, so the supply department were naturally loath to issue any at all, let alone the large quantities required. Somewhat high-handed action was the only means of obtaining our requirements, and our popularity with the stores department was at a very low ebb on return to Scapa from our first Russian convoy.

Works Schedule

From the moment the items arrived on board work in two watches was commenced. At sea a reduced 3-watch system was necessary to keep the minimum requirement for steaming and damage control. All available day-work hands were worked throughout the hours of daylight on deck, and much of the night in the workshops, preparing the following day's materials. By the time Jan Meyen Island was reached the preparations were complete and proved generally satisfactory.

MACHINERY OPERATION

It was a weird sight to enter the boiler rooms and see the watch dressed in balaclava helmets, duffel coats, sea boots and woolly stockings, two pairs of

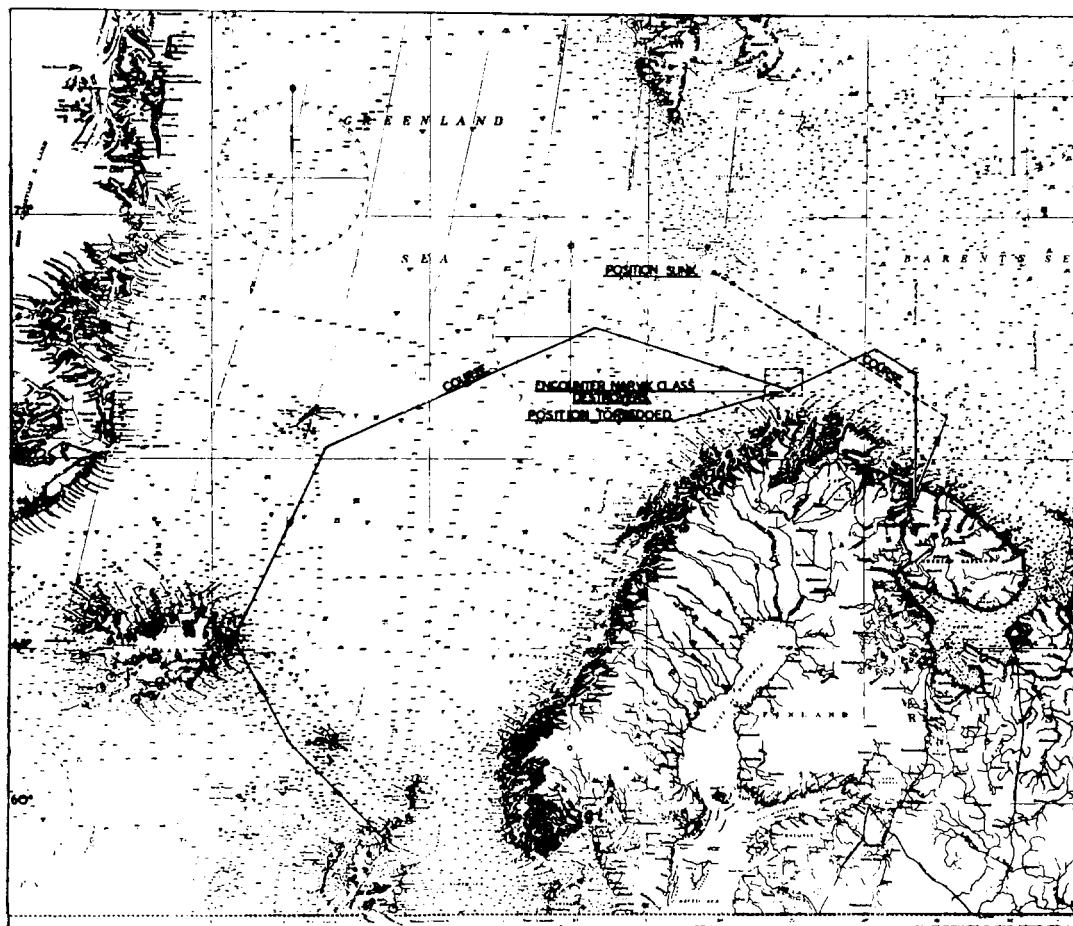


CHART OF AREA

gloves, and reinforced underneath with that ludicrous garment known affectionately as 'Long Annie's'; thick pants down to the ankle. Their abrasive quality was unbearable unless pyjama trousers were worn underneath. Every 20 minutes or thereabouts each boiler room fan had to be stopped, and the intakes closed to thaw out the ice which had built up on the fan rotor. Ample warning of this necessity was given, as the ice at the extremities eventually resulted in a minor hail-storm when it began to foul the fixed casing. In the engine rooms the answer to the time honoured question of 'Why are we using so much feed water?' was immediately apparent. Every leak condensed into a cloud of very visible and saturated steam, and their number was a continual and growing reproach. Steaming conditions were moist and uncomfortable. Here a thick jersey under one's boiler suit kept one comfortably warm, despite some three inches of ice at times on the main circulator inlets and condenser doors. A duffel coat and balaclava were necessary when going round the machinery spaces and the stern gland compartments were as cold as charity itself. The following orders, which are self-explanatory, were issued to the Engineer Officer of the Watch :—

COLD WEATHER ROUTINE

The Engineer Officer of the Watch is to see that the following routines are carried out while main steaming.

<i>Machine.</i>	<i>Action.</i>	<i>Remarks.</i>
<i>Main Circulators</i> ..	Shut down discharge to give 10° rise through condenser. Discharge valve not to be shut more than 15 turns.	Discharge valve to be fully open and shut to previous marks, once each watch (routine denoted later by 'A').
	Shut down discharge to circulating pump lub. oil cooler water system to keep 80°F temperature at inlet to F.L. pump (routine denoted where applicable later by 'B').	As 'A'.
<i>Main F.L. System Coolers.</i>	As 'B'.	As 'A'.
<i>Turbo-Generators</i> ..	As 'B'.	As 'A'.
<i>Oil Fuel Pumps</i> ..	As 'B'.	As 'A'.
<i>Boiler Room Auxiliaries</i>	Keep water service shut off on pumps not in use.	Open when starting and as 'A'.
<i>Engine Room Auxiliaries</i>	Ease down discharge on cooling water as far as possible. Main feed pump bearing temperatures not to exceed 145°F.	As 'A'.
<i>Evaporators</i>	Ease down discharge from distiller overboard until pipe warm. Do not shut valve more than half.	As 'A'.
<i>Drain Coolers</i> ..	Shut down discharge till condensate temperature 80°F.	As 'A'.
<i>Fans</i>	Adjust damper flaps to keep oil temperature at 110°F.	By-pass valves not to be shut.
<i>Sea Valves</i> (Suctions and discharges of all types, and valves on water service, including weed clearing ejectors on main circulators.)	Work once each watch.	
<i>Non-running Machinery</i>	Run 10 minutes each watch.	
<i>Galley Oil Fuel Systems</i>	Shut off supply to galley and burn sprayers until line empty.	
<i>Oil Fuel Tank Heating</i>	Keep temperature of tanks not in use above 60°F.	

TORPEDO DAMAGE

I had never appreciated the devastating power of a torpedo until I had an opportunity to view the effect some 20 minutes after the explosion. Extensive damage from the upper deck to the keel, over some 70 ft on the port side, was the result. About 2,500 tons of water had entered the ship, and seepage, due to welding on bulkheads yielding under the strain, was continuous. Oil fires in the wreckage continued for some three weeks, a permanent fire watch being necessary with largish outbreaks at fairly frequent intervals. A good indication of the force of the explosion can be seen from the following example :

One section of 4 inch ship's side armour plate was blown into the hull, up through the 2 inch armoured deck in the Marine barracks (station 71 to 79), through the 2 inch armoured bulkhead (79) into 'A' boiler room, finishing up half way through the auxiliary boiler steam drum.

The blast also blew out a small section of the ship's side plating on the starboard side.

'A' boiler room flooded in three minutes. We had been steaming at full power and a number of pump pedestals were afterwards found to be shattered. Despite this, and the unexpected entry of the armour plate previously mentioned, the whole boiler room crew floated up clear of all three sets of gratings, and none suffered injury, in fact all immediately set to work with the damage control parties.

The damage we suffered was, I imagine, fairly normal in the circumstances, comprising 'A' boiler room, the forward switch board, and numerous spaces flooded ; many lights and services out of action ; telegraphs shattered and the telephone system useless. The after unit feed water was contaminated, and eventually it was necessary to put both boilers on to salt water feed with two sprayers on each. For some hours, about 18 miles off the North Cape, with six *Narvik* Class German destroyers in the vicinity, we were in a precarious state, just able to steam at about 4 knots which was barely enough to enable us to claw our way off the lee shore. The boilers were priming so hard that one could only occasionally determine a water level in the gauge glasses. All drains were opened, and because of this it was hardly possible to see one's outstretched hand in the fog of steam which was augmented by most of the steam joints also blowing. This atmosphere made one so hoarse that one could only croak. We gagged both turbo-generator governors. One became so waterlogged that it stopped. Steam temperature dropped to the saturated level and the steam was liberally 'laced' with water. The exhaust valves to the condensers were working fitfully, with the back pressure fluctuating, so that each peak threatened to stop all the heavily labouring auxiliaries and reduce us to darkness and complete impotence. It took over an hour to persuade one of the evaporators to start functioning, as the distiller ejectors were waterlogged, and no vacuum could be achieved. It was necessary to slack back a joint further along the line before the ejector began to free itself and function normally. When two tons of distilled make up feed were achieved we felt rich indeed. From the moment when the boilers were again put on distilled water feed the transition was one of astonishing rapidity. The second set of evaporators was started, machinery ceased to labour, speed was increased, and from the time that the superheat temperature began to build up, leaks stopped and normal conditions returned much to our great relief. With frequent blowing down the boilers, the systems cleared themselves very rapidly, and once again the salinometers were switched on and could be watched with equanimity. It would be difficult to give a really coherent description of this period, as time became valueless, vision was limited in the engine room

to practically nothing, speech was difficult and the only thing that mattered and that monopolized every thought was the need to keep steaming until sufficient clean water had been made to rectify conditions.

We steamed up the Kola Inlet with a somewhat unorthodox telegraph system. One sound powered head set telephone carried orders from the bridge to the 'controller' seated in plain view of both manœuvring valves. The right hand controlled the starboard throttle, and the left the port. The code was as follows :—

One finger pointed up—Slow ahead.

Two fingers pointed up— $\frac{1}{2}$ ahead.

Three fingers pointed up—Full ahead.

One finger pointed down—Slow astern, etc.

Revolutions were passed from controller by messenger. The contortions required on manœuvring were quite remarkable and most exhausting, yet the system worked without error.

Incidental Damage

Apart from the damage previously recorded, we also had some damage aft from shell fire. A large part of the fire main system amidships had been put out of action and promptly froze solid. Each section had to be taken down, a pencil of ice thawed out, splits repaired and finally reassembled. The fresh water system was in a like state and while repairs were being effected the ship's water issue was made from one valve on the line adjacent to the rising main. Parts of the electrical ring main and control wiring were flooded, and most odd happenings resulted. Breakers and machinery stopped of their own accord and fires broke out spontaneously in some of the switch rooms.

IN DOCK AT POLA

Four endeavours to enter the dry dock were abortive partly due to high squally winds and bad conditions, but mainly because the caisson was frozen in place and could not be worked. It was not known whether the keel was damaged, and we were heavily down by the bows. To get as near as possible to a reasonable docking trim, so as to avoid further damage, adjustments had to be made which left us in a far from stable condition. Apart from intense cold life was made more uncomfortable by the harbour being dive bombed every night regularly at 1800, 2000, 2200, 2400 and 0200. These attacks, mainly by Stukas, continued throughout our stay. We had to dock ourselves without assistance, spacing the chocks, and cutting the shores to length, stripped pine trunks being the raw material provided. We were assured of ample electrical supplies both A.C. and D.C. On arrival in the dock it was found that the maximum D.C. available was 80 amp. which was totally inadequate. The decision was therefore made to attempt to run our own turbo-generator, and arrangements had to be complete before the dock was dry, as pumping could not be delayed. A large strainer was made up of wire netting and secured to the end of a long length of our large size oil fuel filling hose which was then connected, through adaptors, to the suction of the after hull and fire pump. The strainer was lowered over the end of the caisson and with five minutes to spare a suction was obtained. A lead was taken from the fire main in the engine room to one of the connections previously put in on the turbo-generator discharge for fire main heating. The turbo-generator was run with the condenser flow reversed, the circulation being through the discharge pipe at entry and leaving by the normal inlet. Despite very intense cold this system never froze up during the weeks we were in dock and throughout this whole period we were able to generate our own

power. As a standby the ring main was split, one half being fed with Russian A.C. for emergency heating and lighting circuits. Later, when we found the local fresh water supply unpalatable, we also ran our own distilling plant. Keeping a boiler alight enabled us to remain reasonably warm despite some two inches of ice internally on the side and bottom plating throughout the whole of the ship. An exception was the regrettable necessity of making periodic trips to a shack, some 300 yards away along a snow-banked path, precariously poised over the ice at the edge of the water. The 'Specialist' himself would not have been proud of this '800 men 32 holer'. The cold and discomfort of such excursions were acute, but even in this one officer found a degree of humour by remarking that 'Never before have I been able to get my own back on the seagulls'.

Ashore

We were allowed to visit the local village so long as we kept to the approved tracks. The Hall of Culture was an interesting building comprising an entrance hall, the walls of which were covered with pictorial histories of national heroes ; a reading room with the walls furnished with charts showing the progressive achievement of production in all main commodities ; and an entertainments hall. We saw several interesting films and some excellent variety shows, including 'Rosa Maria' suitably amended to conform with local ideology.

SAILING ORDERS

After a trial down the Kola Inlet it was proved that leakage passing the hastily constructed patch could be kept within bounds by running four portable 'Snorer' pumps supplementing the main suction. We sailed in weather promising fog with the after unit only serviceable. Our hope was to avoid detection, a difficult task with the front line less than 25 miles away. The inevitable Bloem and Voss reconnaissance aircraft spotted us almost immediately and the attack that led to our destruction built up with ponderous precision. When finally ordered to abandon ship one boiler was left steaming on two sprayers, one dynamo on load, and the necessary auxiliaries running. Leaving this machinery operating enabled a thorough search to be made between decks, to verify that no one was left below. Fortunately we were able to step over to our destroyer escort which came alongside one by one, as the list progressively increased and the fire steadily spread. Transferring first the wounded and then the ship's company took longer than anticipated and a fire starting further aft would have been dangerous. With this in mind I visited the after boiler room to see if all was well, and to shut down the oil fuel pump as lights below were now no longer necessary. Apart from an occasional slight flash-back from the sprayers, the boiler room was steaming as if a watch was in attendance. The feed regulator was keeping half a glass. The fuel pump was slowly creeping round until the steam was shut off. Gauge readings were normal. The boiler room with its rather ghost-like unattended appearance was the last glimpse I had of the machinery which I had first seen put into place some two years previously in Devonport Dockyard. *Trinidad* found her grave, under the outer ice of the Arctic Circle, at midnight with the sun still showing dully on the horizon.

Note

More than 11 years have elapsed since the above events occurred. Diaries were not permitted in war-time and practically all our possessions were lost. This account has therefore perforce been written almost entirely from memory and may well contain minor errors. The Author's apologies are proffered in advance for any that may be apparent.
