

DAMAGE CONTROLBACKGROUND

1. ATLANTIC CONVEYOR (ACO) was taken up from trade on 16 April 1982 at Liverpool. She was converted at Devonport for her ferry carrier role, and sailed south on 25 April to transfer these aircraft to the carriers. She embarked a large amount of other stores (see Annex - ATLANTIC CONVEYOR - SHIP'S CARGO LOADING), much of it of a hazardous and/or inflammable nature. The risks associated with the cargo, distributed throughout the ship, were well appreciated, as were the problems of firefighting and damage control given the large, open plan cargo deck spaces with little or no watertight integrity between decks and the use of wooden (WORKHAUS) decks in certain areas. Risks associated with flying operations from each of the ship's two flight decks were also appreciated and required special measures.
2. The ship underwent a large number of modifications to equip her for her role and those for damage control included:
 - a. Upper deck firemain system for RN firefighting equipment, for aircraft emergencies (details included at Annex B).
 - b. Additions to the internal communications systems to link proposed damage control bases (Appendix 1 to this Annex).
 - c. The automatic spray system in the magazine areas was converted to a manual system.

The ship also embarked a large amount of extra RN firefighting equipment, both for flight deck emergencies and for normal ship damage control purposes, based on a frigate's normal outfit.

3. Initially, on sailing from Devonport, the firefighting and damage control (DC) organisation was based on Merchant Navy (MN) procedures. This was mainly because the 31 Merchant Navy officers and ratings formed the only possible organisation in the time available. They also had the ship knowledge, not yet shared by the some 120 service personnel who had joined during the previous week. However, soon after sailing, the organisation was changed to follow recognised RN procedures and practice. Additionally, hourly fire and security rounds throughout the ship were instigated.

DAMAGE CONTROL ARRANGEMENTSSHIP SYSTEMS

4. The ship's fixed firefighting systems are described in Annex E.

Internal Communications

5. The ship's normal internal communications consisted of:
 - a. A comprehensive internal ship's telephone system, serving much of the ship. It's main design shortcoming was that the individual receivers were insecurely mounted and liable to fall off even in heavy weather; once more than about three receivers were off their cradles, in these circumstances, the whole system failed on overload.
 - b. Limited SP telephones as shown in Appendix 1 to this Annex.

6. An additional SP telephone system was added in Devonport, also as shown in Appendix 1. Stormophones were carried, but proved to be materially unreliable, particularly the RN model. The possibility of employing 'leaky feeders' in the large internal deck areas was not appreciated and hence not tried. A rudimentary main broadcast was also installed in Devonport which is shown in detail at Appendix 2.

7. Electrical System. An outline of the electrical supply system is at Appendix 3. The interconnected breakers could only be closed remotely from the ECR, a design shortcoming which could have had serious consequences; they could also be closed manually. The main generation was at 440 volt 60 Hz 3 phase, the same as in RN ships, which was particularly fortunate given the large variety of converted supplies required for the extra facilities installed when the ship was converted at Devonport. Main services only had one supply to them, i.e. normal supply only, and there was no provision for emergency supplies. Only one trained MN electrician was borne, the Chief Electrician, and he required assistance from naval ratings in order to cope with the extra work. The drafting of an xxxxxxxx to STUFF may be necessary in future. N/R

ORGANISATION AND TRAINING

8. Merchant Navy Organisation. It is important to understand the MN organisation, as it has a bearing on subsequent events. This was the basic organisation on sailing from Devonport. In any fire, other than in the Engine Room, the xxxxxxxxxxxxxxxx would personally lead firefighting efforts. In this he was supported by:

a. No.1 Fire Party, consisting of about four ratings, forming an Attack Party.

b. Vent Party, led by xxxxxxxxxxxxxxxx to close down all vents and openings preparatory to the possible use of CO2 systems; thereafter available as additional manpower to the Fire Party. However, in normal circumstances, ventilation flaps were shut once the ship sailed, as it was not normal practice for there to be movement in cargo spaces during a passage. Whilst employed in the STUFF role, ventilation to cargo spaces was regularly used because of the necessary movement of military stores; this was the situation at the time of the missile attack and all flaps were open. N/R

c. First Aid Party, under the Purser, but also used for marshalling firefighting equipment as required.

d. Boat Party, under xxxxxxxxxxxxxxxx preparing boats for abandoning ship. N/R

e. Bridge, where the xxxxxx would be positioned to receive reports and assume overall command. The xxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxx would report to him there. N/R

In the Engine Room and machinery spaces, the xxxxxxxxxxxxxxxx would lead firefighting efforts with No.2 Fire Party manned by Engine Room personnel; No.1 Fire Party would be available in support if required. N/R

9. Merchant Navy Training. Firefighting training is normally limited to a four-day firefighting course, attended by all officers and a few of the ratings who are on Cunard contracts. Therefore, only a small core of MN personnel had any practical training out of a total complement of 31 in ACO.

10. The basic concept in fighting any fire onboard in normal peacetime cruising would be for immediate action by the Attack Party, following early detection by the fixed fire detection system, with the CO2 system in reserve if ordered by the xxxxxxxx, on the advice of the xxxxxxxxxxxxxxxx or xxxxxxxxxxx xxxxxxxxxxxx. In the absence of any known major fires in these ships in their time in service, the Attack Party had always been successful and no use of the fixed firefighting systems has been recorded. N/R

11. There were, therefore, a number of similarities between MN and RN firefighting procedures. The main differences were:

- a. The relative lack of general firefighting training.
- b. The small manpower pool available given the size of ship.
- c. The absence of any major incidents in the ships in service and hence no opportunity to fully prove in practice all the fixed firefighting systems available. As stated in Annex E the systems were designed to meet perceived peace-time risks with certain types of cargo.

DC Organisation in Force on 25 May 1982

12. The MN organisation was quickly superseded by a conventional RN organisation for DC after sailing from Devonport, and closed up whenever the ship went to Emergency Stations. The organisation in force on 25 May is at Appendix 4. It was exercised regularly on the passage south, but no outside expert assistance was available to run, monitor and wash-up exercises. Two NBCDIs were borne, the xxxxxxxx and xxxxxxxx but only the former could be considered to be "in-date". No smoke bombs were available to give some reality to the exercises and it is doubtful, given the large open between-decks areas, whether they would have been useful. N/R

13. The parties were formed mainly of RN personnel, with a number of trained MN personnel in addition to provide detailed ship knowledge. In the case of the After DC Party the 2nd Officer was put in charge, a decision apparently determined more by his rank than any practical firefighting experience. The majority of RN personnel were FAA ratings from MARTSU, whose knowledge of ship firefighting, as distinct from aircraft firefighting, was distinctly limited. However, the majority of these were Senior Ratings and their experience was able to make up in part for this lack of detailed knowledge and ship experience.

14. Initially, the After DC Party was stationed at C Deck level by the "Cathedral" area (aft of the Engine Room casing). However, for the reasons stated by xxxx in Appendix 1 to Annex O, para 1.12, the Party was moved up to its final position. This move did not meet with the agreement of the POPTI, but it is considered to have been the right decision and, in the event, one that saved a number of lives.

15. Therefore, at the time of the attack, the damage control parties were in as good a state of preparedness as could have been expected, given the limitations of material, training and experience.

FIXED FIREFIGHTING SYSTEMS

FIREMAIN SYSTEM

1. A fixed system serving hydrants on Port and Starboard sides of the ship from tank top level (F Deck) through to the Navigational Bridge level of the superstructure. Additional fire hydrants together with fixed in-line foam inductors were fitted to the upper deck in the vicinity of the Forward and After flight deck spots as part of the conversion.
2. The firemain system, unlike RN practice, provides pressure to hydrants only. The MN practice is to maintain a dry system in normal circumstances with manual pump operation when circumstances demand. The system is supplied by 2 in NO 120 tons/hour pumps, one situated in the Engine Room, the other in the Stabiliser Compartment (Starboard).
3. In ACO's role as an aircraft carrier, the MN SOP was adapted to one whereby a fire pump was started whenever the ship went to flying stations. It was soon realised that with no hydrant take-off, that fire pump damage would occur through churning in the pump casing and so the procedure was further adapted to have a bleed off from one hydrant to avoid pump damage. In the event, this proved unsatisfactory as aircraft parked forward and aft were being sprayed by the whipped up outlet from the hydrant and damage did occur to the Engine Room pump when the hydrant was inadvertently shut off, resulting in total write off of the pump. Thereafter, with only one fire pump available, the MN practice was reverted to maintaining a primed system and starting the pump whenever required.
4. The upper deck conversion providing additional hydrants forward and aft was of the RN instantaneous connection type, whereas the remainder of the fit above and below this level were of the bayonet connection type resulting in non-compatibility so that foam branch pipes could only be led and fed from the upper deck.

SPRINKLER SYSTEM

5. Supply by one 120 tons/hour electrically driven pump situated in the Engine Room. The system is a heat sensitive automatic operation system employing a quartzoid bulb at each sprinkler head. The system embraced a pneumatically pressurised header tank, whose pressure provides the initial discharge to a fractured bulb resulting in the pump being started by pressure switch as the header tank pressure decays.
6. Manual starting of the pump could be achieved at the Control Room and local position.
7. A batch of section control valves situated in the Sprinkler Room on the upper deck gave the facility to isolate sections not required, in the event of a fire and thus concentrate the sprinkling effect on the section involved. The practice adopted in ATLANTIC CONVEYOR was to isolate Sections 1 and 2 on C Deck where the cluster bombs were stowed and break the quartzoid bulbs in those sections, thus providing manual control. In the event, when these sections were required there is no evidence that the sprinkler pump operated after the initial pressure was released.

8. In the event of failure of this pump, the firemain could be bridged to the sprinkler system through upper deck hydrant hose connected to a sprinkler system hydrant normally used when taking a supply from shore. This connection was not made in ATLANTIC CONVEYOR.

CO2 FIRE EXTINGUISHING SYSTEM

9. ATLANTIC CONVEYOR (ACO) was equipped with a combined detection and extinguishing system designed to monitor and give protection to 45 locations in the general cargo spaces on A, B, C, D, E Decks and tank top level, Port and Starboard Bow Thruster compartments with additional cover for Engine/Boiler Room, Diesel Generator compartment and Steering compartment.

10. The system comprised a gas bottle stowage right aft on A Deck level with access from the mooring deck. 515 x 47 kg bottles of CO2 were stored, ganged up in banks of 12 bottles with a single release lever for each bank. The bottles discharged to a common ring main manifold which was then led by piping to the Safety Room which contained a series of identified location 3-way valves. From this point, the system became a detection/extinguishing one whereby the same piping led to each outlet was used for continual and simultaneous monitoring. Extraction fans mounted in the superstructure drew samples of air from each protected space and passed them through a viewing chamber. The chamber had direct lighting so arranged that although it was normally quite dark, the light illuminated strongly any smoke emanating from the ends of the sampling pipes. The pipe ends were labelled so that the source of smoke could be immediately located. On leaving the viewing chamber, all samples passed through an automatic detector which sounded an audible alarm when the optical density exceeded a pre-determined level.

11. The action to be taken in the event of the alarm sounding was to go immediately to the viewing chamber in the safety room, identify the location of the source of the smoke, concurrently all ventilation fans would be crash stopped and ventilation flaps closed by hydraulic action. Having identified a genuine presence of smoke and located its source, the operator would then operate the appropriate number of 3-way valves to the section(s) involved, effectively isolating the detection equipment from the piping and allowing a direct passage from the discharge manifold to the source of the fire. The operator would then consult a comprehensive chart, giving details of the recommended number of cylinders of CO2 to be released to the section involved.

12. It should be emphasised that the system was so designed to have an "initial" discharge level to each protected area, which should contain a normal cargo fire, thereafter and at set intervals, lesser "delayed" discharge levels are employed to prevent re-ignition and help cool the source of the fire.

13. Having ascertained the amount of gas to be released, the operator would then go to the storage room and release the appropriate number of cylinders to effect an initial discharge. At later intervals, the operator would revert the 3-way valves back to the monitoring position to assess whether the discharge had been effective by the presence of smoke in the viewing chamber.