

THE SINKING OF HMS 'EDINBURGH'

AN UNSOLVED MYSTERY

BY

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Design

The *Edinburgh* and her sister, *Belfast*, were designed under the 1936 programme. They were originally intended to be enlarged versions of the successful SOUTHAMPTON class, mounting four quadruple 6 inch turrets. The development of this turret proved more difficult than anticipated and the design was modified to take four of the new, long stalk triples. The design displacement was 9989 tons, standard, declared under the naval limitation treaty as 10,000 tons. By the time they were completing, war was imminent and some changes were made, bring the displacement measured during the inclining of *Edinburgh* (FIG. 1) in May 1939 to 10,550 tons¹.

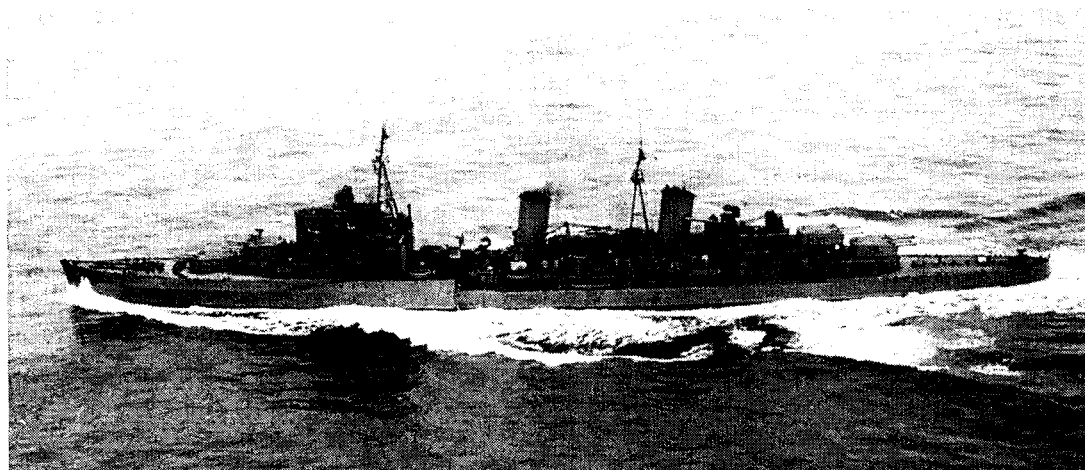


FIG. 1—HMS 'EDINBURGH'

NOTE THE EXTENSION OF THE FORECASTLE AS FAR AFT AS THE CATAPULT

The design team was experienced and capable, led initially by S.E. BOYLAND, followed by C.S. LILICRAP with E.G. KENNET as the constructor, assisted by J.L. BESSANT and M.C. DUNSTAN.

Particulars

Displacement	9989 tons.
Length × beam × mean draught	613-6 × 66-0 × 17-3.
Power	80,000shp (32½ kts at standard displacement)

The bending moments on an L/20 wave were 268,510 tons ft hogging and 268,970 tons ft sagging giving nominal stresses of between 5½ and 7½ tons/in.²

Problems

Hard steaming in the first winter of the war revealed a structural weakness in these two ships and the generally similar SOUTHAMPTONS³. The forecastle deck ended amidships leading to a stress concentration made worse by a step in the level of the deck armour nearby which led to cracks, torn rivets and leaks. The *Belfast* when mined broke her back at this point.⁴ *Edinburgh* (and others) was stiffened and the forecastle deck extended a little further aft to the athwartships catapult (See FIG. 1). This weakness may have been significant.

Narrative of the sinking

On 25 April 1942 *Edinburgh* loaded 93 boxes of gold at Murmansk, each box containing 4-28lb bars, with a total value in 1942 of £2M⁵, (£45M in 1981) and sailed on 28 April with convoy QP11 under CAPTAIN FAULKNER. She was steaming at 19 knots when detected by U456 (KAPITAN LIEUTENANT Max TEICHERT) at 1120 on 30 April, some 250 miles from Murmansk. A submarine was reported by ASDIC at 1555 but the Command decided it was a false echo. At 1618 the submarine fired 3 torpedoes⁶ at 1000m, point of aim the forefunnel. Running time indicated 1200m and there were 2 hits. The first hit amidships on the starboard side by the forward boiler room, below the stokers' mess, killing all in the area with a hole said to be 50ft long (visible on the video); many men fell through the deck into the oil tank while the second hit right aft. The latter hit caused the ship to **whip severely** and several survivors report being thrown off their feet. The stern was blown off and the steering gear wrecked. Y turret was severely damaged. The quarter deck was wrapped round both after 6in turrets and 63ft of the stern was hanging down. The rudder and two shafts were lost. It was said that only B turret could be worked, which suggests whipping damage by A, but other statements suggest that A turret was still usable.

By 1730 she began to steam back to Murmansk and made about 60 miles in 36 hours, shadowed by U456. *Forester* got a tow line aboard, later moving astern to steer. *Forester* having sighted a U boat on the surface, which had then dived, engaged and dropped 2 depth charges which damaged U456's periscope. Destroyers were sighted and engaged by A and B turrets (*Hermann Schoemann*, Z24 and Z25). *Foresight* and *Forester* were also in the action while a Soviet patrol vessel (tug), *Rubin*, with *Harrier*, *Niger*, *Gossamer* and *Hussar* were in company. By 0530 on 2 May the two F class destroyers were on the beam and the three minesweepers behind.

Snow showers reduced visibility to between 2 and 8 miles (varying). *Hussar* had sighted the Germans ca 0600. *Schoemann* was soon sunk by *Edinburgh* (again PEARCE says only B turret firing under local control) but the German destroyers had fired 15 torpedoes and scored one hit on the port side amidships, close to the bomb room at about 0700, which almost cut her in two and caused her to list 17° to port. There was some further whipping, the turret officer was thrown out of B turret. Both British destroyers were temporarily disabled. About 800 men out of a crew of 850 were then taken off *Edinburgh*. *Harrier* fired 20 rounds Semi Armour Piercing shells to hasten her sinking and dropped two patterns of depth charges, but to no avail. *Edinburgh* was then torpedoed by *Foresight*. She sank stern first in about 800ft at 72° 05N, 35° 02E. (PEARCE says 71° 51N, 35° 10E and that the fore part broke away, clearly it didn't but was this the superstructure coming off? He continues by saying that stem rose in the air.).

Discovery, the video evidence

In preparation for the salvage of the gold in 1981 a video was taken of the wreck which revealed a number of surprising features. In particular, virtually the whole of the superstructure, masts and funnels had gone, separated neatly, as with a knife.

The ship lies on her port side in 220 metres. (This is actually the operating depth of the remote operating vehicle (ROV); the sea bed is lower by about the beam of the ship).

The video is taken from an ROV moving along the starboard side, initially at 2 deck level. The picture starts at the support to the aftermost twin 4in on the starboard side (S4). The support is in good condition, slightly fouled. The camera pans on to the 32 ft motor cutter which is in good condition. It is on its chocks—more or less. There is a nick out of the top strake immediately abaft the stem. (It is not impossible that the cutter moved forward on impact, hit something causing the nick and bounced back but, even should this be so, any impact was gentle.)

After noting the support to S2, the torpedo tubes are visible. As far as can be determined, these have not moved on their roller path. (Torpedo tubes are easily dislodged—a few by seas only). There is a clear shot of the under side of the deck over the tubes; intact, no fouling or corrosion. The guard rails to 2 deck, forward of S1 support are sound.

The picture moves up to 1 deck by the catapult (Note: Fo'c'sle deck extended aft after damage to *Belfast*.) The catapult seems undamaged. Moving forward, everything above 1 deck is **gone** (FIG. 2). The commentary on the video suggests that it could be that the boundary rivets sheared on impact or that air trapped in the hangar led to implosion. (See later discussion.) The commentator also says that there was no sign of explosive charges from a pirate salvage operation. The camera travels slowly along the 1 deck/side intersection and there is no sign of any superstructure nor guard rails until the very forward end of the bridge where there is a little something crumpled. (I have studied this several times without making anything of it.) At the after end of this area there is a trawl board. Near the bridge front there is a large hawser, probably the tow rope. B turret is there, intact and trained about Green 45. A turret is also intact, similarly trained. (While it could be coincidence, the similar training does suggest that A turret was working.) The guard rails in this area are crumpled.

Just forward of A turret, abaft a conspicuous fairlead, the sheer strake is cracked. The crack is straight and vertical and is probably a seam (the fore end was probably welded), but picture quality is not good enough to confirm this. The commentary suggests bottom impact; I suspect it is whipping from the hit right aft which several survivors refer to. (I would have expected whipping damage more at $\frac{1}{4}$ length though; perhaps it was a poor weld).

This part of the video concludes with inspection of the torpedo damage close to the bomb room, forward end of the bilge keel. At least one armour plate has fallen off.

Note: My somewhat unreliable memory is that there was a bit more on the original video which I saw in 1981. I thought the aft shelter deck showed both funnels and the after mast gone; in the current version this is not seen. (A model made by the salvage team is held by Jon WENZEL, Curator of HMS *Belfast*, and this shows the after funnel and mast detached but alongside.)

Risk numerals

The technical assessors to Lord DONALDSON's inquiry into the *Derbyshire* used risk numerals to compare the various scenarios of the sinking of that ship. In the following sections, a similar approach will be tried for the *Edinburgh*.

Pi is the notational probability of the event occurring, rated as follows:

Very low probability	<5%	1
Low	5–10	2
Medium	10–25	3
High	25–50	4
Very High	>50	5

Sc is the rating of the seriousness of the consequences on a scale of 1-5. It will be noted that both Pi and Sc are subjective ratings but serve to concentrate the mind. The risk numeral, Rn, is the product of Pi and Sc. The following section considers various scenarios which have been suggested to explain the observed state of the wreck and ascribes values to Rn.

Damage scenarios

Impact

The ship sank stern first and the impact with the bottom was sufficient to shear the rivets in the boundary angles holding the superstructure. The fact that the cutter is in its chocks and the torpedo tubes are on their roller path makes this almost impossible. Pi = 1. If it did occur, the consequences would be as observed.

Water Pressure

As the ship sank, stern first, water pressure would act on the after side of the superstructure and the force could have been sufficient to push the superstructure away, particularly if the rivets had already been weakened. Though Pi is high, it would seem that Sc, the consequences, would be low.

Pirates

A criminal attempt to salvage the gold led to them blowing the wreck apart—'Bash and Grab'. The salvage operation was taken to forestall any such attempt and the wreckage was examined carefully for signs of any previous attempt. No such evidence was found and it is unlikely that any such attempt would remove the superstructure so tidily. Pi and Sc both low.

Corrosion

Either the superstructure or the connecting rivets corroded, removing the superstructure while on the bottom. Whilst this cannot be ruled out, it seems unlikely to occur and even less likely to lead to the observed state.

Implosion

In other wrecks which have been studied (*Titanic* and *Derbyshire*) there is clear evidence that air filled spaces have imploded at depth. Much of the forward superstructure of *Edinburgh* was occupied by hangars and photos of her sinking clearly show that the hangar doors were open making implosion of that area impossible.

Trawl Ropes

Trawl ropes could have cut the superstructure away. A trawl rope is clearly seen in the video, trawling was common in the area but the probability of a rope cutting away a strong superstructure, neatly, over a considerable extent

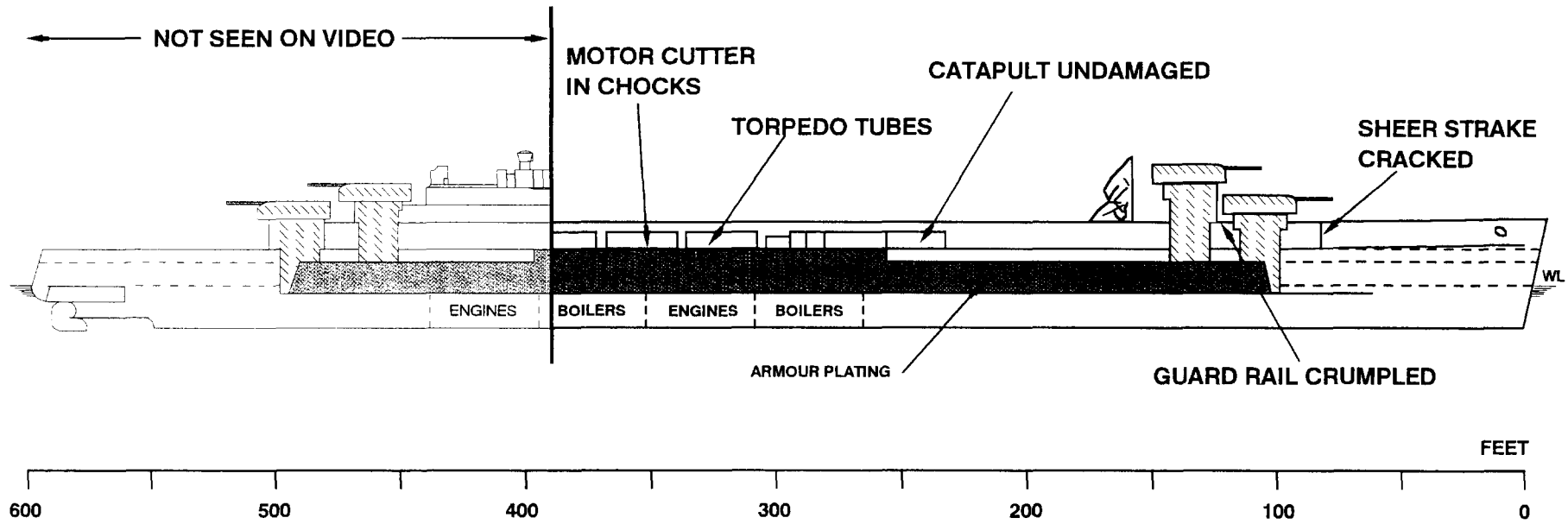


FIG. 2—HMS 'EDINBURGH' IN HER FINAL CONDITION

seems remote. In particular, the intact B turret stands high above the level at which the superstructure is severed. The loss of the trawler *Gaul* is still seen as a mystery and it has even been suggested that her loss was due to snagging her trawl round the *Edinburgh*. *Gaul* was last heard of in 72° 15N, 25° 51E. This is rather west of *Edinburgh* (72° 05N, 35° 02E)—and *Gaul*'s exact location is uncertain anyway. The coincidence of their position cannot be ignored but it is unlikely to be significant.

Whipping

When a torpedo hit right aft she is known to have whipped violently. In a 2 node flexure, the bridge would have been at a node with maximum shearing force. Perhaps many rivets in the superstructure boundary angle broke? There are problems; when *Belfast* was mined she flexed far more violently and there is no mention of the superstructure falling off. The bridge was set back from the side giving shear lag and was far from the neutral axis. However, this is the only 'explanation' so far which is not completely impossible.

Risk numerals for these scenarios

	Pi	Sc	Rn
Impact	1	2	2
Water Pressure	4	1	4
Pirate	1	1	1
Corrosion	2	2	4
Implosion	1	3	3
Trawl rope	5	1	5
Whipping	5	2	10

None of the values of risk numeral are high enough to be convincing. There remains the possibility of a double cause, rivets weakened by corrosion failed under impact or when snagged by a trawl rope. Whipping remains the least improbable explanation but the fact that many ships—particularly her sister *Belfast*—whipped far more severely without reported damage to superstructure attachment. Rivets weakened by whipping and failing under the dynamic pressure as she sank cannot be ruled out. It is tempting to suggest that PEARCE's story of the bow separating as she sank was a muddled interpretation of the superstructure falling off but the evidence is weak.

All possible explanations are impossible

My thanks are due to David KEOUGH, Chief Salvage Officer, MoD for considerable help and advice—he was present at the gold salvage.

References

1. A. RAVEN & J. ROBERTS: 'British Cruisers of World War II'; London 1980.
2. D.K. BROWN (Editor): 'The Design and Construction of British Warships, Vol 1'; London 1995.
3. A. HAGUE: 'World War II Mysteries'; *Warships Supplement*, Kendal 1986. (See reply in *Warships Supplement* 87, based on Sir Stanley GOODALL's diaries).
4. D.K. BROWN: 'The Mining of HMS Belfast'; *Warship Supplement* 87, Kendal 1986.
5. F. PEARCE: 'Last call for HMS Edinburgh'; Collins 1982. Says £5M.
6. PEARCE says 2, the only ones remaining.