

# HMS *Prince of Wales* – Stern Damage Survey<sup>1</sup>

A REPORT ON THE TORPEDO DAMAGE TO THE STERN OF  
HMS *PRINCE OF WALES* PREPARED AND SUBMITTED BY  
KEVIN DENLAY FOR THE SD-7 PANEL MEETING,  
WASHINGTON, D.C., OCTOBER 2008. (*Updated 4/09*)

These pages – 1 through 25 - contain images, schematics and photos ('pulled' from low resolution video) depicting the stern section of HMS *Prince of Wales* as surveyed/photographed by divers during *Expedition 'Job 74'* in May 2007, and also observations and measurements made of the interior of the port outer propeller shaft 'tunnel' by divers in June 2008. Previously published details on the overall results of *Expedition 'Job 74'* can be viewed at the following web site of the Explorers Club:

[http://www.explorers.org/expeditions/reports/Flag\\_Reports\\_PDF/Expedition%20Job\\_74\\_web\\_version.pdf](http://www.explorers.org/expeditions/reports/Flag_Reports_PDF/Expedition%20Job_74_web_version.pdf)



HMS *Prince of Wales* leaving Jahore Strait (Singapore) on 8<sup>th</sup> December, 1941.



A Japanese propaganda photograph purportedly showing HMS *Prince of Wales* settling by the stern into the South China Sea off Malaya on the 10<sup>th</sup> December, 1941.

# HMS *Prince of Wales* – Stern Damage Survey<sup>2</sup>

## THE IMPERIAL JAPANESE NAVY'S SHIP-KILLERS



*Mitsubishi G3M Type 96 Rikko*: Allied code name 'Nell', carried either bombs or torpedoes in the attack (i.e. some carried bombs and some carried torpedoes).



*Mitsubishi G4M Type 1 Rikko*: Allied code name 'Betty', carried torpedoes in the attack.

The two capital ships of Force Z, HMS *Prince of Wales* and HMS *Repulse*, were attacked in successive 'waves' by 85 of the above aircraft types from the Imperial Japanese Navy's Genzan, Mihoro and Kanoya Kokutai (Air Groups) flying from bases in Indo-China (present day Vietnam). Of the 59 Nell's, 34 carried bombs and made high level attacks, scoring one hit on *Repulse*, and several near misses - at the start of the action; and one hit on *Prince of Wales*, and several near misses - to end the action. The remaining 25 Nell's, and all 26 Betty's (from the Kanoya Kokutai) carried torpedoes with an explosive warhead of either 150kg or 204kg respectively; and they scored four hits. The explosive charge the torpedoes carried was *substantially* less than what the prewar / preconstruction tests (i.e. *Job 74*, a series of underwater explosive tests using charges of up to 450kg) illustrated *Prince of Wales* should have effectively sustained / contained.

# HMS *Prince of Wales* – Stern Damage Survey<sup>3</sup>



A Japanese WW11 painting depicting a torpedo striking HMS *Prince of Wales* stern.

## **The positions of all four torpedo hits**



3D image of HMS *Prince of Wales* courtesy Stefan Draminski.



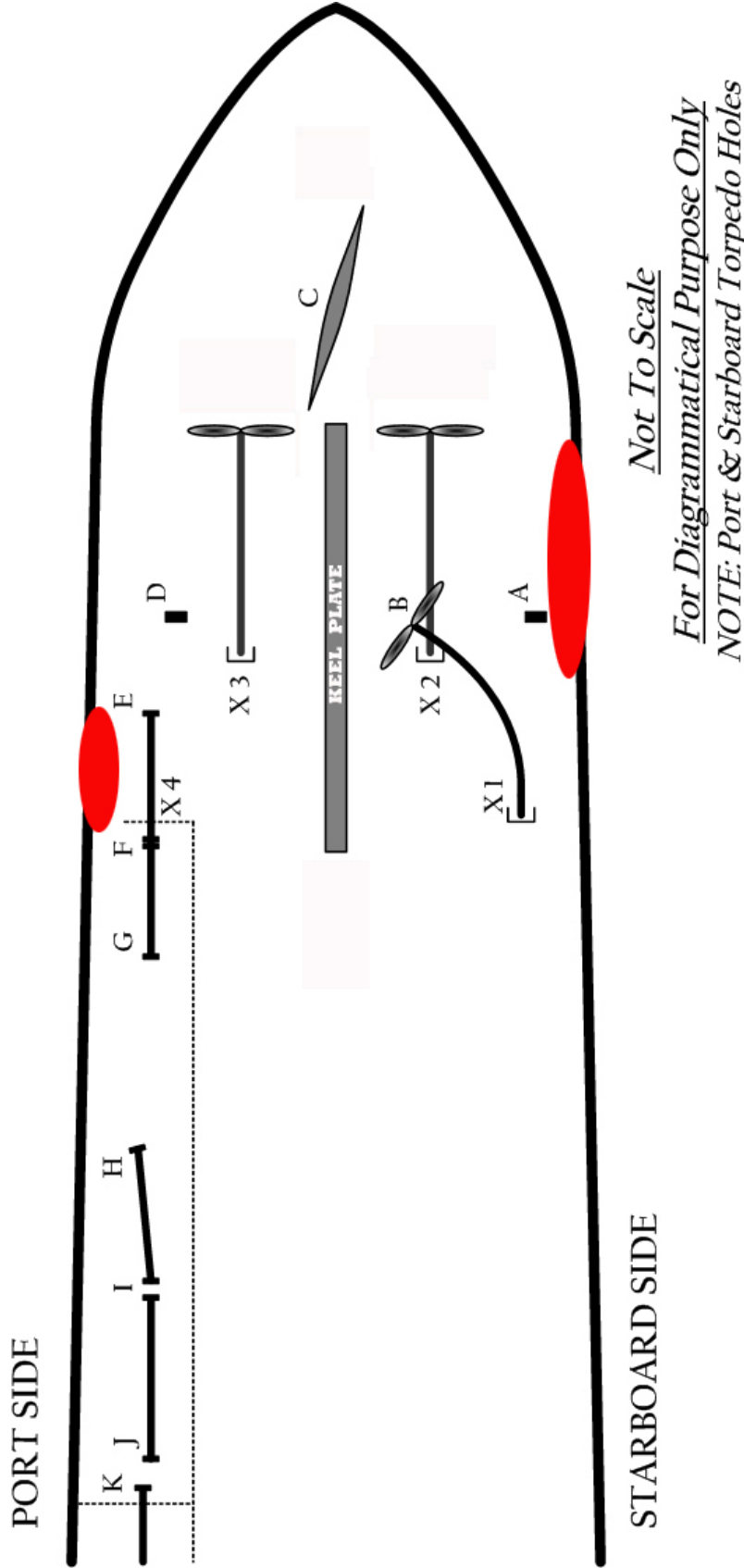


# HMS Prince of Wales – Stern Damage Survey<sup>5</sup>

## H.M.S. PRINCE OF WALES

Upside-Down Stern Section - Propeller Shafts

Details From Survey by Divers May 2007 & June 2008



STARBOARD SIDE

Not To Scale

For Diagrammatical Purpose Only

NOTE: Port & Starboard Torpedo Holes

Overall Exterior Survey - Expedition 'Job 74' - May 2007  
Port Shaft Survey - Craig Challen & Paul Garske - June 2008

Illustration by Enoch Denlay

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**The following captions (and photographs) are alphabetically ‘linked’ to the various objects/points depicted in the previous schematic from the diver surveys of HMS *Prince of Wales*’ propeller shafts, rudder and stern torpedo holes.**

**X1, X2, X3)** These are the exit points out of the hull of the three ‘intact’ shafts at their stern tube glands. The Starboard outer shaft’s exit point - X1- shows only slight signs of deformation – seen underneath the shaft - from the damage caused by the flailing shaft prior to it jamming over the inner shaft. **See following images X1 and X1/1**

**A)** Only a short stub remains of the *OUTER* strut of the outer Starboard shafts A-Bracket. (The inner strut appears to have sheared clean at the hull.) The Starboard torpedo hole is directly above this stub, and extends almost up to what would have been the lower row of scuttles/portholes in the hull. (Actually a line drawn up from the stub would ‘cut’ the hole approximately in ‘quarters, i.e. leaving about three quarters of the hole *aft* of the stub ‘line’.) **See following images A1 through A4**

**B)** The propeller of the outer Starboard shaft is wedged firmly ‘over the top’ of the inner Starboard shaft, so much so that two of the blades are actually between the inner shaft and the Keel Plate. **See following images B1 through B4**

**C)** Rudder is angled to Port at approx 20 degrees. **See following images C1 and C2**

**D)** Only a small stub remains of the *INNER* strut of the Port outer shafts A-Bracket. **See following images D1 and D2.** (The outer strut appears to have sheared off clean at the hull.)

**E)** The aft ‘end’ of the exterior section of the Port outer shaft, with flange noticeable. **See following image E1** Distance measured from D to E = 5.3m/17.38ft. **See following image E2**

**F)** Two flanges, still firmly joined, link the protruding section of the shaft and the next section of shaft ‘inside’ the shaft tunnel. The after most of these two joined flanges can be seen just inside the ripped open stern tube entry to the shaft tunnel. **See following image F1.** Distance measured from E to center of flanges F = 10.9m/35.75ft. The position of where the stern tube exit gland would have been is believed to be at, approximately, the dotted line X4 on the schematic. **See following image F2 (NOTE: There are NO images from beyond this point.)**

**G)** The flange at the forward end on of the second section of (joined) shaft. Distance measured from center of flange F to G = 7.65m/25.1ft.

**H)** The flange at the aft end of the third section of (separated) shaft laying on what was once the ‘deckhead’ above, but is now the ‘floor’ of the inverted tunnel as it were. The large ‘gap’ or distance measured between G and H = 14.1m/46.25ft. **(NOTE: This was the LAST / INNERMOST measurement taken by the divers.)**

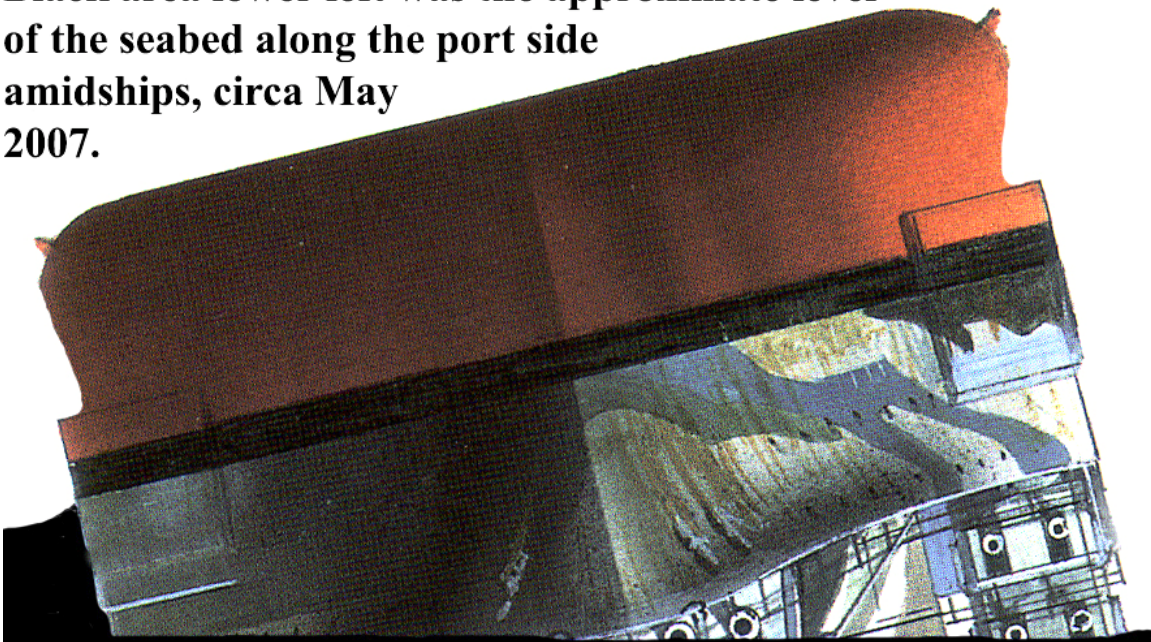


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- I)** A small gap now exists between these two sections of shaft that have separated at the flange. (Note; both lengths of shaft still have their respective flanges on the end, illustrating that the shaft is not ‘broken’ per se, but separated at a flange joint.)
- J)** The flange at the forward end of the fourth (or innermost) length of separated shaft. This section of shaft also lays on what was once the ‘deckhead’ above, but is now the ‘floor’ of the inverted tunnel.
- K)** A short length of shaft with a flange at the end protrudes (‘several’ feet according to the diver) in its ‘rightful’ supported place from a relatively intact bulkhead (dotted line), although the gland around the shaft in the bulkhead has been considerably elongated by the flailing shaft when it rotated out of center after the torpedo hit. This bulkhead stopped the diver going any further forward along the shaft. (*NOTE; See additional information at the end of this document – i.e. after the Port side photographs – on pages 23 and 24 - in relation to this point.*)
- X4)** The dotted line across the shaft next to X4 marks the approximate position of where the shaft exited the hull at the gland, but the gland / stern tube is no longer there and the general area surrounding is severely damaged from the torpedo explosion and the flailing shaft as it ripped away. **See following images X4/1 and X4/2.**

Where the gland once was, approximately, is now the forward edge of the port side torpedo hole, which is ‘centered’ somewhat further aft along and just above the shaft axis. **See following images X4/3 through X4/7.**

**Black area lower left was the approximate level of the seabed along the port side amidships, circa May 2007.**



The wreck of *Prince of Wales* rests inverted on an angle to Port of approx. 15° amidships. (Concave indentations in hull below armour belt are discussed in a separate survey report.)

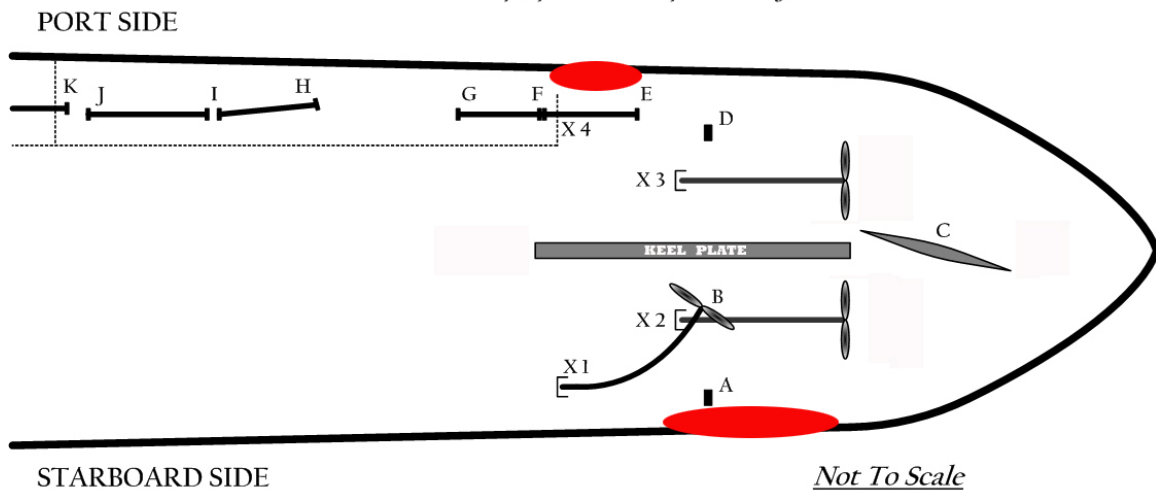
# HMS *Prince of Wales* – Stern Damage Survey<sup>8</sup>



HMS *Prince of Wales* Starboard (Stbd) stern section inverted as it appears on the ocean floor. (Note: For diagrammatical purposes *only*, not to scale.)

## H.M.S. PRINCE OF WALES

Upside-Down Stern Section - Propeller Shafts  
Details From Survey by Divers May 2007 & June 2008



*Not To Scale*  
*For Diagrammatical Purpose Only*  
*NOTE: Port & Starboard Torpedo Holes*



# HMS *Prince of Wales* – Stern Damage Survey<sup>9</sup>



X1- The *Starboard* outer propeller shaft where it exits the hull from the stern tube gland.



X1/1- Only slight deformation is visible under the outer *Starboard* shaft at hull exit point.

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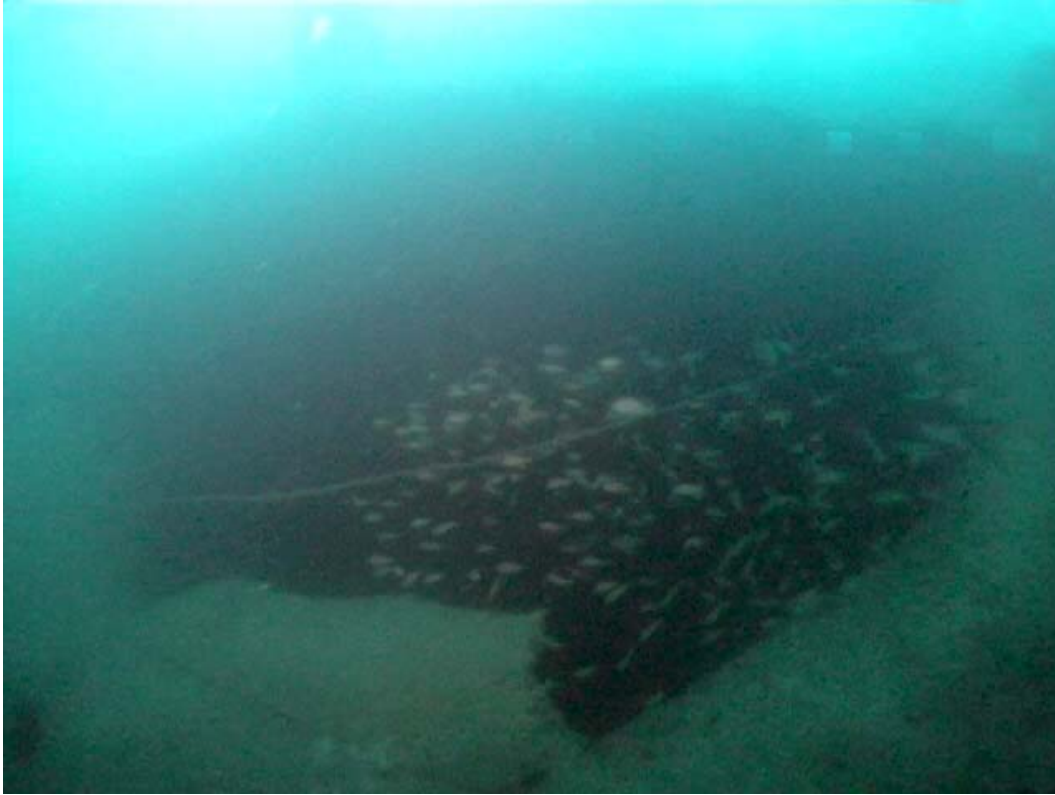


A1 - Only a short stub remains of the *outer* strut of the outer Starboard A-Bracket.



A2 - The short strut stub is just visible above the forward 'portion' of the torpedo hole.

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A3 - Aft edge of torpedo hole at right. A porthole is just visible lower left corner.



A4 - Center of torpedo hole. 'Lower' row of scuttles / portholes are clearly visible at left.



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B1 - Stub described in caption A is lower right. A-Bracket and propeller upper center.



B2 - Outer Starboard propeller upper right. Inner Starboard propeller shaft lower center.

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B3 – Inner Starboard propeller shaft lower center. Outer Starboard propeller upper right.

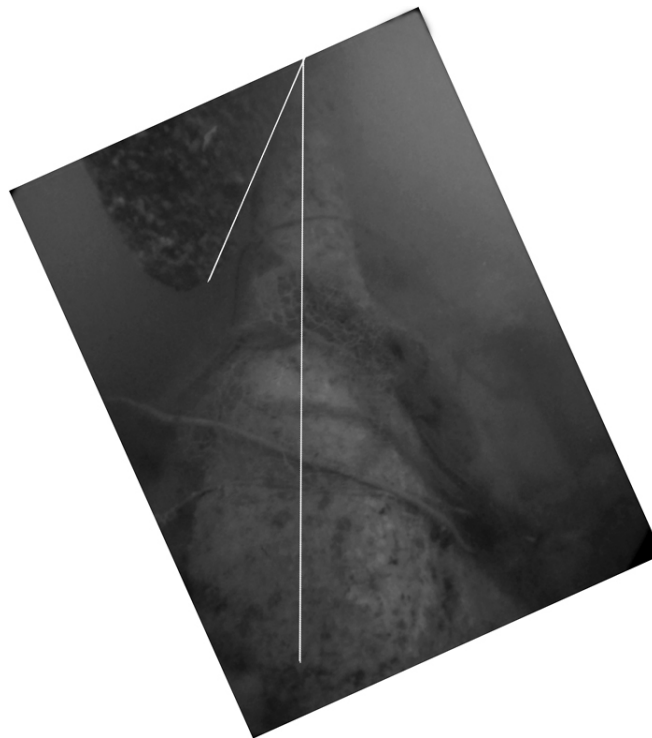


B4- Outer Stbd propeller left. Note disfigured blade. Keel Plate is dark area at right.

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C1- Keel Plate of ship left center. Rudder angled off to Port upper left



C2- Lines show approx 20 degrees angle of rudder to center-line (Keel Plate) of ship.





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D1- Stub of *inner* strut of Port outer shaft A-Bracket. Inner Port propeller shaft upper left.

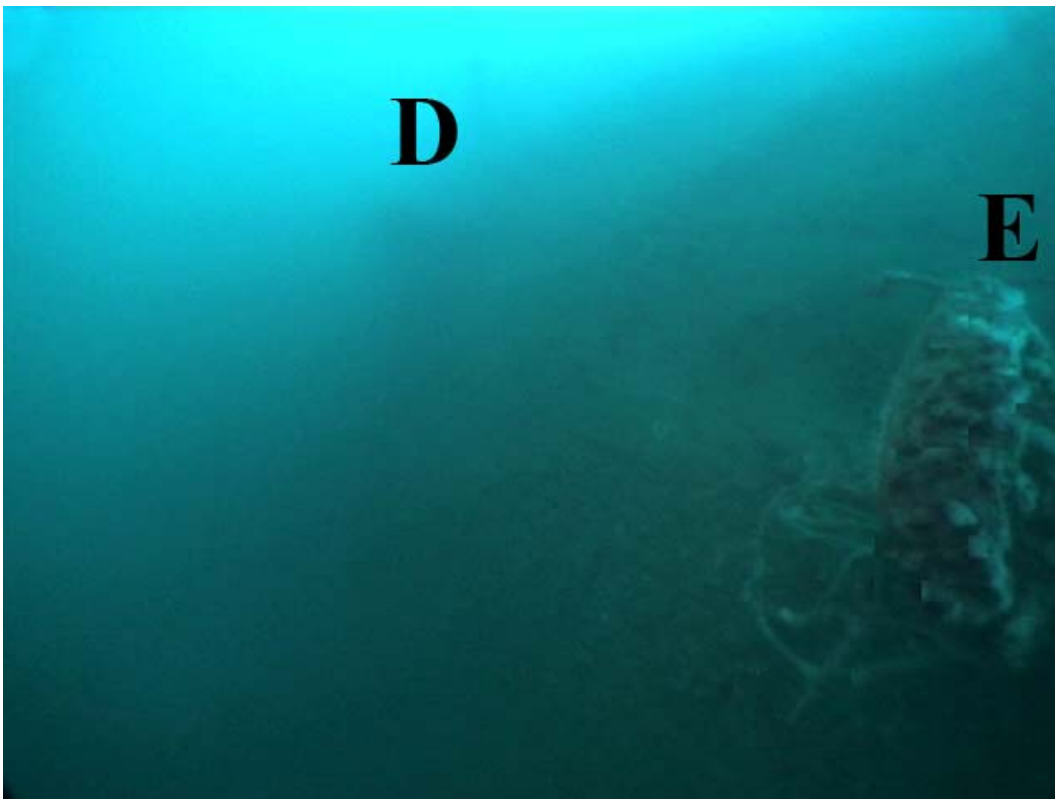


D2 - Only a short stub remains of the *inner* strut of the outer Port shaft A-Bracket.

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E1 - Upper center, the aft 'end' of the Port outer shaft with flange clearly visible on end.



E2- Below E is the flange on end of shaft, while just visible below D is *inner* strut stub.



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F1 - Distorted web frames and the flange that joins the two 'outermost' lengths of shaft.



F2 - The 'split' at right in image F1 as seen from the outside. Shaft at far left center.

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X4/1 - Massive deformation where outer *Port* shaft exits hull. Compare with image X1/2.

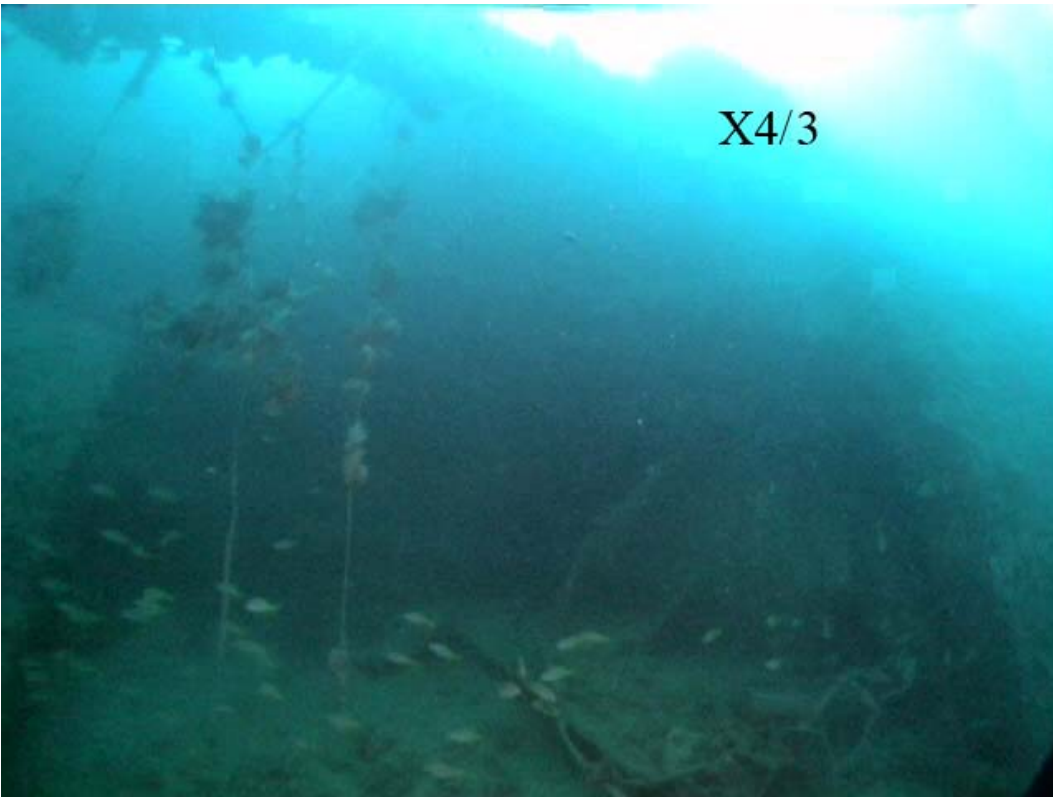


X4/2 - Looking forward along outer *Port* shaft to where stern tube gland 'should' be.

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X4/3 - Torp hole to left, shaft center left. Forward edge of hole just below shaft exit point.



X4/4 - Torp 'hole'. Shaft upper left & center, exits ripped open hull at upper right (X4/3).



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X4/5 - Looking aft from beneath outer shaft (upper left), interior of torp 'hole' at right.



X4/6- Looking aft at a collapsed hull side plate. Torp hole to right, shaft upper left center.



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X4/7 - Aft edge of same collapsed hull plate as seen in X4/6 is just below flange on outer shaft end.



Chipped blade on *inner* Port propeller; right, outer strut of its intact supporting A-Bracket.

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## FURTHER NOTES IN RELATION TO THE 2008 DIVER PENETRATION OF THE PORT OUTER SHAFT TUNNEL.

On the following page (24) is a section of the original builder's plans for HMS *Prince of Wales* showing the outer port shaft and the interior compartments it passes through, along with a comparison of that shaft's segments that the diver who penetrated the tunnel in 2008, Craig Challen, is reported to have seen.

From the divers initial report of his observations it was believed he reached 'only' the aft bulkhead of Y Action Machinery Room, One of the reasons for this 'conclusion' was his apparent lack of seeing any machinery at the furthest point of penetration; so it was assumed he was still in the 'shaft tunnel' itself, a non crewed or 'working' space. *It was not his intention nor had he set out to penetrate actual crew compartments.* However, as author John Roberts has since pointed out, the divers report on the number of sections of shaft, and especially the small length of shaft (with a flange on the end) protruding from the bulkhead the diver reached at his furthest point of penetration, coincides with him having reached the aft bulkhead of the Diesel Generator (Dynamo) Room! If this is so, *and it certainly does appear to be*, the only explanation for him not seeing machinery is that his concentration was on the shaft segments beneath him, while the machinery – in Y Action Machinery Room – would have been suspended above him. This being the case, then the damage caused by the flailing/disintegrating shaft to the bulkheads, plumper blocks, etc, aft, is even greater than first thought. However, for a definitive understanding of the damage sustained throughout there, another foray would need to be conducted to photograph and *survey in detail* the shaft tunnel and the separated sections of shaft, etc.

### **Comparison of measurements; diver survey to port outer shaft plan.**

*Note on 'method' of comparison.* I obtained the figures below in **bold** by measuring the actual shaft lengths - centre of flange to centre of flange - as shown/depicted on the Builders Plans (of the *Hold Section*) and I believe they are, while not necessarily exact, as the hard copy I have of the plan is not full size, *very close* to what the shaft lengths actually are. *When comparing measurements from the plans to what the diver measured and observed, they match almost exactly. (It should be noted that the diver had never seen any plans or measurements of Prince of Wales prior to his excursion up the tunnel.)*

\*From the forward edge of the outer shaft A-Bracket enclosure (where shaft itself 'ends' as it were) to the centre of the first flange is approx **17.3m**. *This complete section of shaft along with the A Bracket and prop is missing from the wreck, having pulled away and separated soon after the torpedo hit.*

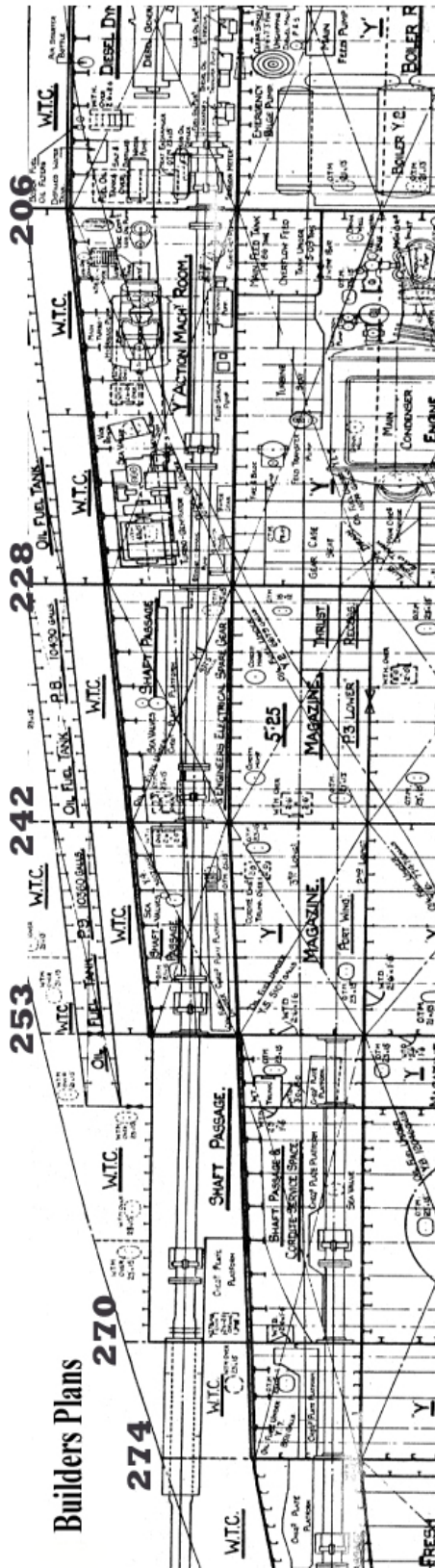
\*2<sup>nd</sup> length of shaft on plan is approx **10.8m** (diver measured 10.9m from E to F).

\*3<sup>rd</sup> length of shaft on plan is approx **7.6m** (diver measured 7.65m from F to G).

\*4<sup>th</sup> length of shaft on plan is approx **10.8m** (this section seen but not measured by diver).

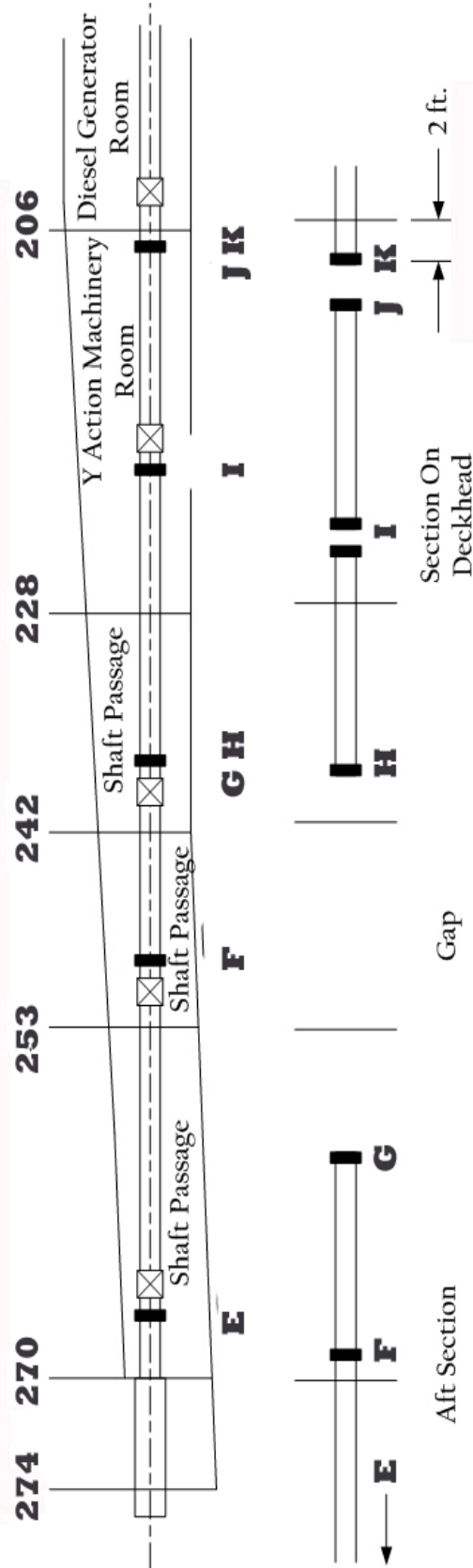
\*5<sup>th</sup> length of shaft on plan is approx **8.7m** (this section seen but not measured by diver).

\*The short length of shaft with flange that protrudes from the Diesel Generator Room bulkhead is approximately **0.6m** (diver reported seeing it protruding 'several' feet).



**Below: Frame numbers and shaft segments as per builders plans**

Shaft comparison illustration courtesy John Roberts

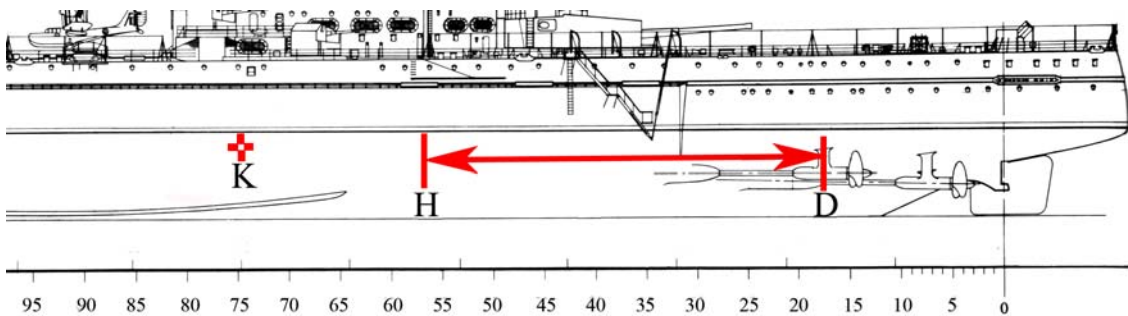
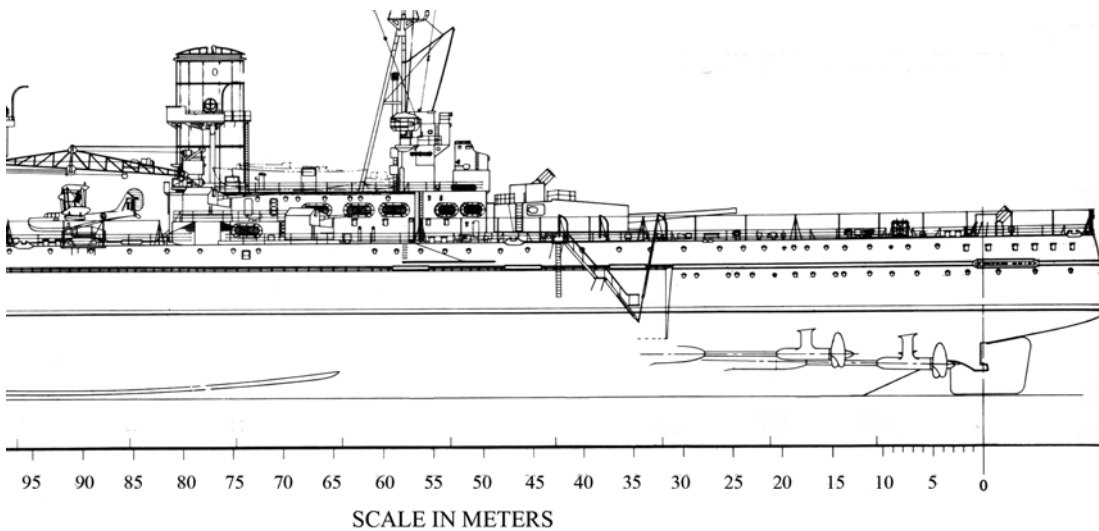
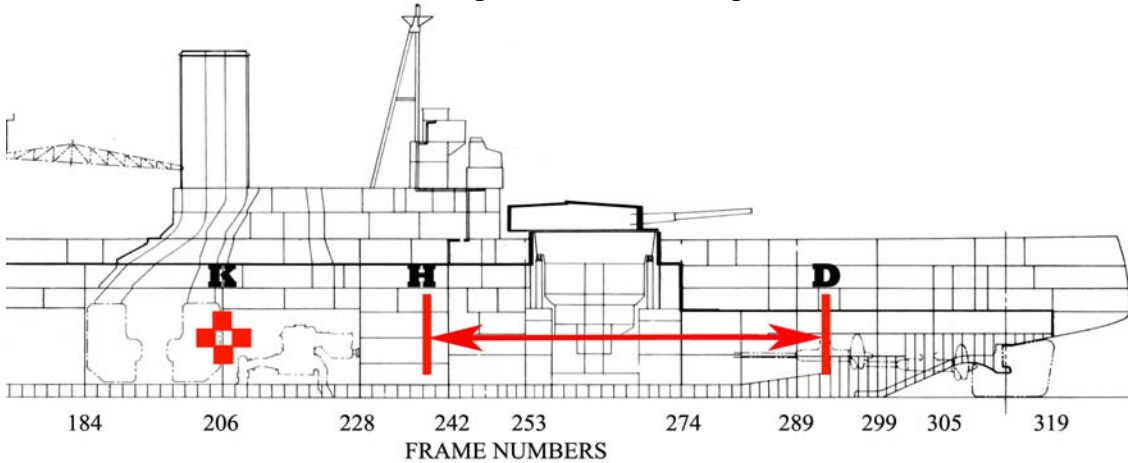


Shaft segments as surveyed by diver & described on pages 6 & 7 NOTE: Image not to scale

# HMS *Prince of Wales* – Stern Damage Survey<sup>25</sup>

The port side aft of a King George V class battleship – the same class as HMS *Prince of Wales* – showing frame number positions and distances in meters for reference purposes.

(Modified illustration from Battleships - Allied Battleships of WW11 / Garzke and Dulin)



The overall distance on Port side measured by the diver was 37.95m/124.5ft, as marked by the red arrow, starting at strut stub D and ending at flange H, across the large 'gap' that separates the two lengths of shaft (i.e. flanges G and H) inside the tunnel. Letter K marks diver's furthest penetration point; to the aft bulkhead of the Diesel Generator (Dynamo) Room. These 'letters' can all be cross referenced to previous drawings above.