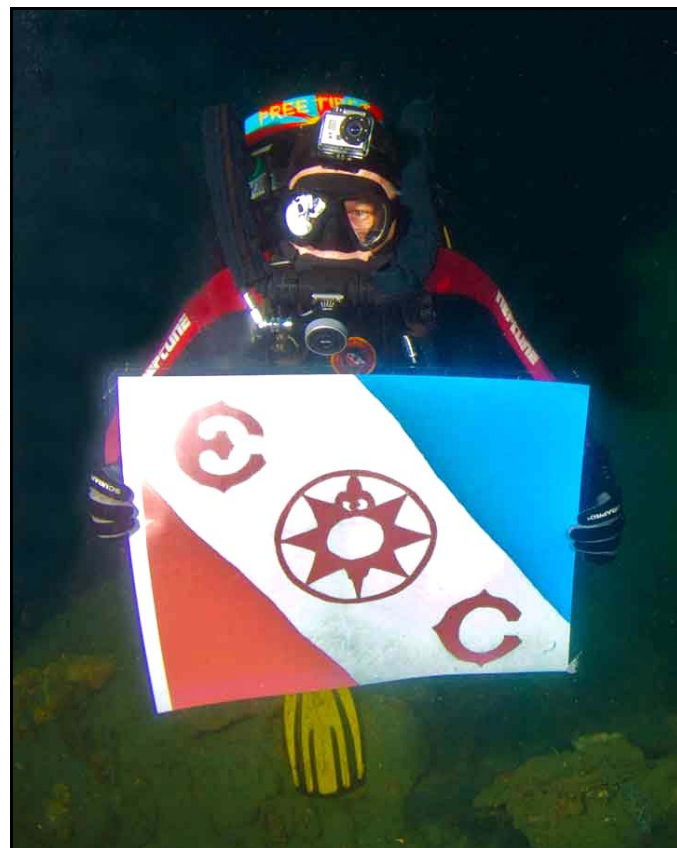


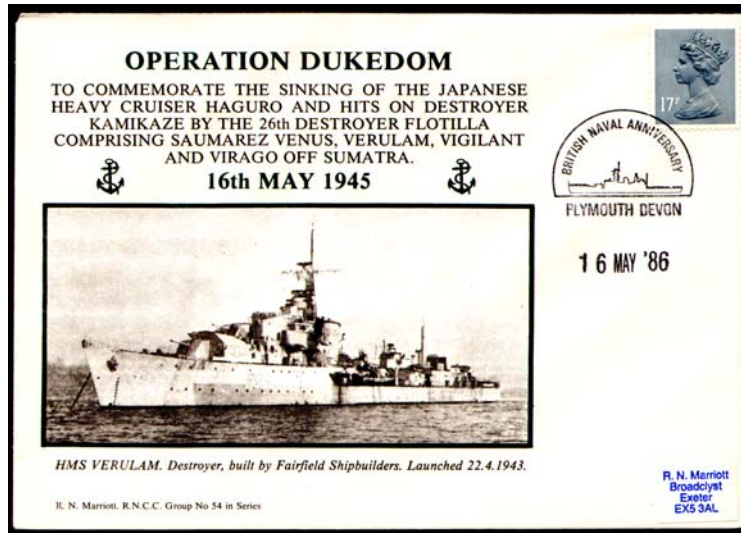


**Summary of *Expedition 'Operation Dukedom'* which carried  
Explorers Club Flag #52 while surveying the wreck of  
*HIJMS Haguro*,  
Malacca Strait  
November 8<sup>th</sup> - November 23<sup>rd</sup>, 2010**



This report written and submitted by expedition member and E.C. Flag applicant  
Kevin Denlay, Fellow International 1998.

[http://www.anzec.org/view\\_member.php?member\\_id=19](http://www.anzec.org/view_member.php?member_id=19)



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## Background: Historical Details for HIJMS *Haguro*

His Imperial Japanese Majesties Ship (HIJMS) *Haguro* was one of four heavy cruisers of the *Myoko* Class (the others being HIJMS's *Myoko*, *Nachi* and *Ashigara*) originally built to the so-called 10,000 Ton Standard and launched in 1928. However, by the time of her sinking in 1945 she had increased her displacement to almost 15,000 tons, through the many modifications and additions she underwent during the preceding years. She was 668.5 feet (204 metres) long and carried 10 x 8" (20cm) main guns in five twin turrets (three forward and two aft), 8 x 5" (12.7cm) dual purpose secondary guns in four twin mounts (two each side fore and aft of amidships) and 16 x 24" (61cm) torpedoes (plus reloads) in four quadruple mounts, two each side abaft the main mast. Her light anti-aircraft suite of 1" (25mm) guns was officially listed as 52 (when sunk) and supposedly arrayed in single, twin and triple mounts throughout the ship. She could also carry three spotter aircraft that were launched from catapults. Without question, a formidable warship by any navy's standards.



*A detailed painting of Haguro in her prime by the Japanese artist T Yuki*

Involved in the war in the Pacific from day one, she took part in almost every major naval battle thereafter. After supporting the landings in the Philippines in early December 1941, she then took part in the invasion of Java and the disastrous (for the Allies) Battle of the Java Sea (Feb 27<sup>th</sup>, 1942), sinking the flagship of the Combined Allied Striking Force (the Dutch cruiser) Hr Ms *De Ruyter*, and the destroyer Hr Ms *Kortenaer*, both with torpedoes. Two days later, also in the Java Sea, she participated in the cornering and sinking of HMS *Exeter* and HMS *Encounter*. Thereafter she took part in almost all the major Imperial Japanese Navy's (IJN) fleet operations for the rest of the war; the Pt Moresby / Tulagi operation, the Battle of Midway, the invasion of the Aleutians (Attu and Kiska), the reinforcement (and eventual evacuation) of Guadalcanal, the Battle of Empress Augusta Bay, the Battle of the Philippine Sea, the Battle of the Sibuyan Sea and the Battle off Samar (Leyte Gulf); these last three battles in mid/late 1944 spelling the end of the Japanese Navy as a fighting force.



*Haguro fighting off air attack during the Battle of the Sibuyan Sea, Philippines, 1944*

However, throughout all of these battles and other minor skirmishes *Haguro* was never seriously damaged, save for some minor shell hits at Empress Augusta Bay in November 1943, and a 100lb (45kg) bomb knocking out her #2 eight-inch turret during the Battle off Samar in October 1944.

By early 1945 with the IJN's area of operations being seriously curtailed, *Haguro* was, along with her sister ships *Myoko* and *Ashigara*, stationed in Singapore (*Nachi* having already been sunk in Manila Bay in November 1944). *Myoko* by then was however no more than a floating anti-aircraft battery, having been towed into Singapore in an 'unrepairable' condition after having lost her stern to the submarine USS *Bergall* (SS-320) in December 1944. And because of the Allies vice like grip on the remaining Asian outposts, *Haguro* and *Ashigara* were now relegated simply to troop supply and evacuation runs to the Dutch East Indies (Indonesia) and the Andaman Island outposts in the Bay of Bengal (Operation Akiraka), a rather mundane task for once proud fighting ships.



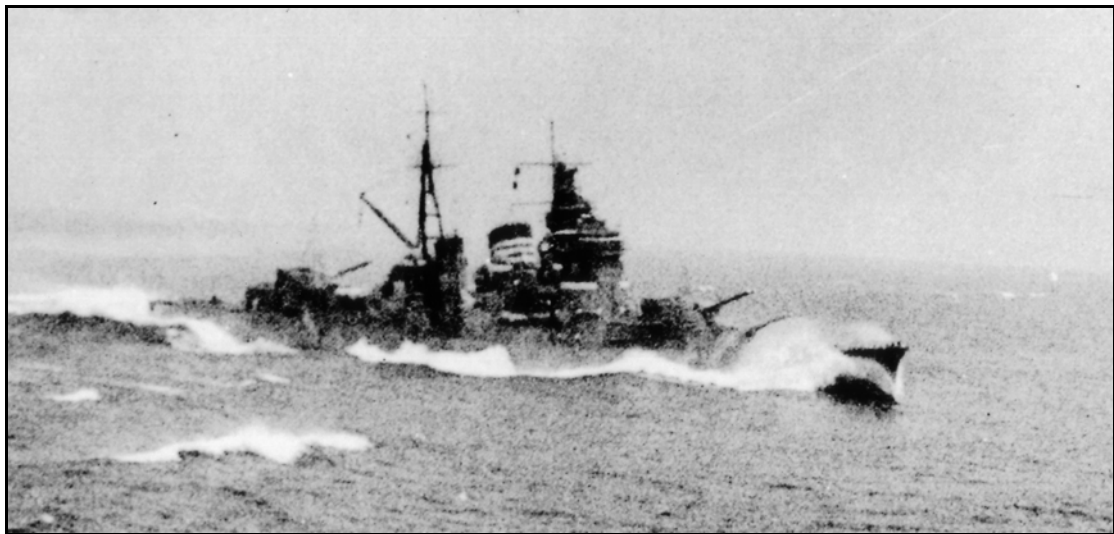
*Haguro* under air attack by USAAF B-25's in Rabaul Harbour (Papua New Guinea) after returning from the Battle of Empress Augusta Bay, November, 1943

On one such resupply run to the Andaman Islands in May, 1945, *Haguro*'s luck finally ran out when she was cornered by five British destroyers who were specifically out hunting for her (Operation Dukedom) and was sunk with heavy loss of life by gunfire and torpedoes in the early hours of May 16<sup>th</sup>, 1945. (Postscript: On the 8<sup>th</sup> of June, 1945, as *Ashigara* was returning from Java with evacuated army troops aboard she was attacked and sunk as she exited the northern entrance to Banka Strait by the British submarine HMS *Trenchant*. *Myoko* was then 'captured' in Singapore when Japan surrendered and was scuttled by the British in approximately 100m / 330ft of water in the Malacca Strait (but unfortunately that wreck site is in the middle of what is today the main shipping lane; which is one of the worlds busiest). Thus it was 'finis' for the four 'A' class heavy cruisers of the *Myoko* Class.

## Operation 'Dukedom' - The Sinking of HIJMS *Haguro*

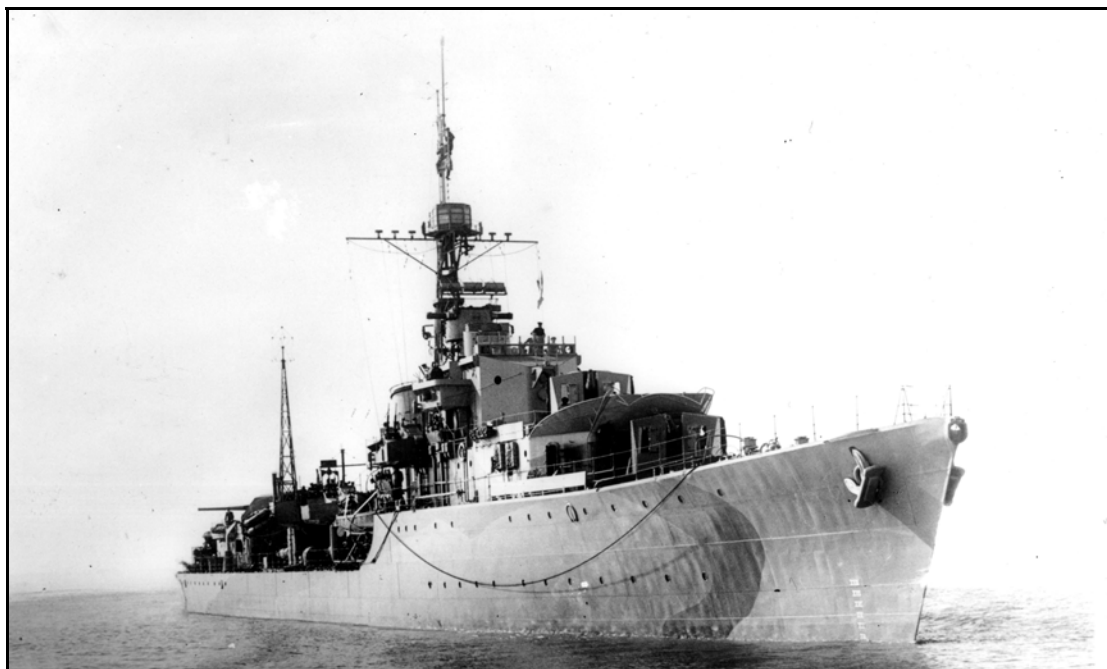
On the 14<sup>th</sup> of May, 1945, the heavy cruiser *Haguro*, escorted by the destroyer HIJMS *Kamikaze* sortied up the Malacca Strait from Singapore; destination Pt Blair in the Andaman Islands, Bay of Bengal. The mission; carrying food and supplies for the beleaguered garrison and to evacuate troops back to Singapore. Also at sea, but far to the west - having sortied from Trincomalee, Ceylon (now Sri Lanka) – and hunting for *Haguro* is the British Task Force 61, a task force which includes the battleships HMS *Queen Elizabeth* and the French *Richelieu*; cruisers HMS's *Cumberland*, *Royalist* and Hr Ms *Tromp*, escort carriers HMS's *Emperor*, *Hunter*, *Khediye* and *Shah*; and an assortment of destroyers. Operation 'Dukedom' had begun.

In the early afternoon of the 15th, when *Haguro* is well north of Sabang, the northern most city 'in' Sumatra (in actuality, it is on an island just off the northern tip of mainland Sumatra), she is spotted by aircraft from the carrier *Shah*. Soon after, *Haguro* is attacked and dive-bombed by four Grumman TBF 'Avenger' aircraft vectored in from the carrier *Emperor*. *Haguro* manages to shoot down one of the attacking aircraft and is only slightly damaged in the attack. Rear Admiral Sugiura aboard *Haguro* then receives a report of two British destroyer squadrons heading his way. Vice Admiral Hashimoto, the senior officer aboard *Haguro*, subsequently decides to cancel the resupply operation and orders *Haguro* to turn back south for a high speed run down the Malacca Strait to the 'relative' safety of Singapore.



*Haguro at speed!*

One of the destroyer squadrons racing to intercept *Haguro* is Captain Manley Power's 26th Destroyer Flotilla, made up of Power's HMS *Saumarez* along with HMS's *Venus*, *Verulam*, *Vigilant* and *Virago*. Power had anticipated *Haguro*'s course change and actually gets ahead (south) of *Haguro* hoping to prepare an 'ambush' in the Malacca Strait. Around midnight the British make radar contact with *Haguro* and *Kamikaze* coming from the north while still at extreme range. [In heavy rain squalls with lightning, *Venus* actually made radar contact at an amazing 34 nautical miles; the radar operator having to go to the point of insubordination before 'higher ups' aboard would believe his radar plot interpretation!] The trap is about to be sprung!



*HMS Saumarez, the leader of the 26<sup>th</sup> Destroyer Flotilla under Captain Power. The combined weight of all five destroyers was less than that of Haguro alone!*

The 26th Destroyer Flotilla, still continuing to head south while tracking *Haguro*, soon slows and arrays into a crescent, or semi-circle, the five destroyers spread from the East through South to West. *Haguro*, still unaware of the prowling destroyers, soon enters the trap. Suddenly becoming aware of the interlopers, the Japanese begin zigzagging, but still remain on their southerly course and soon are at the center of the semi-circle! With the range now closing fast the British destroyers turn north and commence their attack. Almost immediately, *Haguro* and *Kamikaze* reverse course to the northwest and increase speed to thirty knots with the 26th Flotilla now in hot pursuit. But barely five minutes into the chase *Haguro* surprisingly again reverses course to the southeast and right back into the jaws of the British trap. The 26th Flotilla now attacks from all sides. A wild melee ensues and *Saumarez* is soon hit by one or more 8" (20cm) shells. But the British launch torpedoes and the first torpedoes appear to hit *Haguro* on the port side abreast of the forward turrets and cause a huge explosion. [Unfortunately for the Japanese, *Haguro's* - and *Kamikaze's* - torpedo tubes have been removed so they cannot reply in-kind; *Haguro's* having only recently been removed in Singapore to make space for more stores and supplies for the Andaman's 'run'. And also, according to survivors from *Haguro* that this author met, so many drums of oil were stacked around the 8" turrets that they could not train properly to engage abeam.]

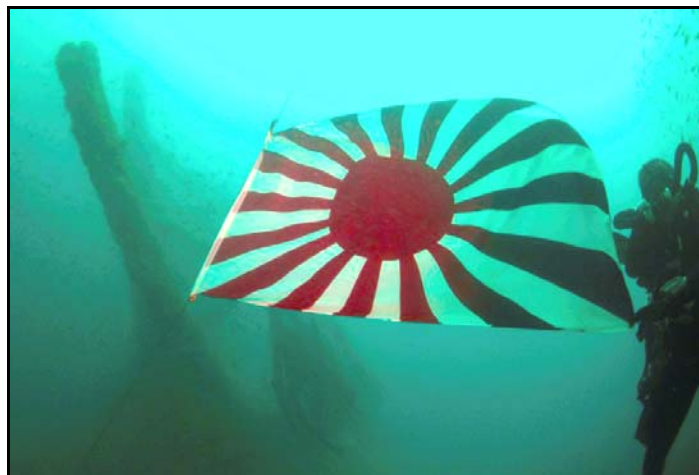
The British destroyer's main 4.7" guns mercilessly rake *Haguro* from all angles peppering the bridge and superstructure area killing many key command personnel. More torpedoes and shells strike home and *Haguro* becomes a blazing wreck from stem to stern with her decks soon awash. The British destroyers move in for the kill and strafe *Haguro* with 40mm shell fire, turning the blazing wreck into a charnel house. *Haguro* is now dead in the water and Commander De Chair aboard *Venus* puts two final torpedoes into *Haguro*, one to the starboard bow and one to the stern. [Altogether the British claim at least eight torpedo hits on *Haguro*.]

*Haguro* is finished and slowly sinks by the bow soon after 2am on May 16<sup>th</sup>, 1945, about 46 nautical miles southwest of Muka Head (Penang Island) in approximately 68m / 223ft of water. Over 900 of her 1200 odd crew perish including her captain and the two admirals on board. Other than *Saumarez's* funnel top and main radio aerial being shot away, and three men killed in a hit to her boiler room, there is no damage at all to the remainder of the 26th Destroyer Flotilla! HIJMS *Kamikaze*, although damaged and having sustained casualties, manages to escape north to Penang (the closest IJN base to the action), returning to the battle area the next day to rescue 320 survivors from *Haguro*. Remarkably, in one of those odd quirks of fate, many of the survivors had remained afloat throughout their ordeal, and are rescued still clinging to, some of the timber that was stored in place of *Haguro's* recently removed torpedo tubes.



*HIJMS Kamikaze, the IJN destroyer that was escorting Haguro but managed to escape the melee eventually survived the war. Unfortunately, her main offensive armament, her torpedo tubes, had been removed prior to the Haguro action.*

The battle itself had however proved anti-climatic for the rest of British Task Force 61, who had been racing at high speed to join the fray, as they sight only flashes over the horizon before turning away when advised that *Haguro* had sunk. One 'wag' aboard the cruiser HMS *Cumberland*, racing with TF 61 to join the action - the very same ship that had also just missed joining HMS *Exeter* for her famous encounter with the German panzerschiff DKM *Admiral Graf Spee* during the Battle of the River Plate (December 1939); that in turn culminated in the first major British naval victory of World War II – penned the lament; “*Too late the Plate: Too slow for Haguro*”. As it transpired, *Haguro's* sinking was to be the last major ship to ship action of WWII.



*As a mark of respect a Japanese Navy Ensign was left 'flying' on the foredeck between the bridge and the barrels of #3 eight inch turret (left) for several days during the expedition.*

## Background: The Discovery of the Wreck of HIJMS *Haguro*

In November 2002, we set out from Singapore aboard MV *Empress* to locate the wreck of the famous British heavy cruiser HMS *Exeter*, sunk by the Japanese northwest of Bawean Island in the Java Sea on March 1<sup>st</sup>, 1942. After two weeks at sea and an unsuccessful side scan sonar search we were somewhat dejected at not finding her at or near her captains reported sinking position, which we had naively thought was going to be a 'sure thing'. Little did we realize at the time that it would take us many more such search expeditions, that is, five more years and an obscure Japanese battle map before we located *Exeter* - sixty nautical miles away from her 'official' sinking position!

So imagine our surprise and excitement when, as we were heading back to port in Bali on December 2<sup>nd</sup> after our fruitless search, we stumbled - literally - onto the wrecks of the two Dutch cruisers Hr Ms *Java* and Hr Ms *De Ruyter* - the later the flagship of the Combined, or ABDA (American, British, Dutch, Australian) Striking Force during the Battle of the Java Sea (Feb 27<sup>th</sup>, 1942) - and sunk only two days before *Exeter*. This fortuitous discovery was the spark that then ignited our interest in, and search for, HIJMS *Haguro*.

Already aware that it was *Haguro* that had sunk *De Ruyter* (and Hr Ms *Kortenaer*, both with a torpedo, and seriously damaged HMS *Exeter* with gunfire earlier that same day) and had help trap and sink *Exeter* two days later - and was a famous Japanese warship in her own right - it was decided we should next search for her, given that *Empress's* skipper had a (British) position for her sinking (as she had been sunk by the British 26<sup>th</sup> Destroyer Flotilla). I had also recently read the book 'Sink the *Haguro*' (by John Winton) which contained a WWII Japanese position for *Haguro's* sinking, although it was somewhat different from the British position. So with both positions in hand we set out from Singapore a few months later - in late February 2003 - again aboard MV *Empress*, and headed up the Malacca Strait to the British position for *Haguro's* sinking. At the end of the first days (fruitless) search side scanning in an ever expanding 'box' around the position we had, we noticed an indigenous fishing boat anchored up several miles away towards the horizon. Thinking he may have been anchored over the wreck (as native fishing boats often are - we had after all discovered *Java* and *De Ruyter* under indigenous fishing boats) we headed over. Unfortunately he was not anchored over a wreck but after some back and forth 'conversation' he did give us a Lat / Long position that he 'thought' was a wreck about fifteen miles to the south, which as it turned was very near the sinking position recorded by the Japanese in WWII for *Haguro*. As it was then almost dark we decided to go down and check out the fisherman's position to see if there was a wreck there (or just a reef, as is also often the case with native fisherman's 'marks', as most don't have depth sounders on their boats, just GPS positions for 'good fishing' spots). If not, then we would scan during the night around the Japanese position - which as it turned out was only about a mile or so from the 'fisherman's position' - and if nothing turned up we would resume scanning at the British position the following morning.

But something did turn up, *and something big*, at the position the fisherman had given us! We had to wait until the next morning to dive but sure enough it was *Haguro*, and sitting upright no less, in 68m / 223ft of water. So, although we would have eventually found her when searching an ever expanding 'box' around the Japanese position - which was our plan if/when we had not found *Haguro* at the



British position - we have that fisherman to thank for saving us a lot of wasted time (i.e. side scanning around the British position, which was actually about 15 nautical miles from the actual wreck site). Hence, from that time on, we have always had a healthy respect for Japanese positions - and fishermen's marks - for sunken ships, and that (as it has turned out elsewhere) served us *very* well in the following years!



**Top.** Although she turned back before her destination, Haguro's last sortie was to take her from Singapore, in the lower right corner, to Pt Blair in the upper left, a distance of over 900 nautical miles. **Bottom.** The two different locations where Haguro 'supposedly' sank are actually about 16 nautical miles apart, the IJN's being the more accurate, even though the British were 'standing by' as she sank.

## **Preamble to the 2010 *Haguro* Wreck Survey Expedition**

The 2010 survey of *Haguro* came about, literally, quite unexpectedly. My Explorers Club Flag application had actually been approved for an expedition into the Java Sea to complete the survey of some of the Allied combatants' shipwrecks (that we had previously discovered) sunk during the Battle of the Java Sea (Hr Ms's *De Ruyter* and *Java*) and the latter Battle off Bawean Island (HMS's *Exeter* and *Encounter*), or known to the Japanese as the Battle South of Borneo. This then was to be expedition number one of a three expedition 'package' or timetable, the second expedition - envisioned for 2011 - was to survey HMAS *Perth* and USS *Houston* (sunk in the south-western Java Sea during the Battle of Sunda Strait) and a third expedition - originally envisaged for late 2011 or 2012 - was to survey HIJMS *Haguro*, one of the Allies main antagonists during the sea battles in the Java Sea (having sunk, or having a hand in sinking, four of the above warships). However in the week before the team prepared to leave Australia word came that our expedition vessel, MV *Empress*, had been refused a permit to operate in the Java Sea, or to be more exact had certain unexpected monetary 'hurdles' put in front of it that could not be surmounted in the short time remaining before our expedition 'kicked off'. Rather than lose the charter opportunity, as *Empress* is often booked out a year or more in advance, we decided to reshuffle / reverse the order of our expedition's timetable and complete the survey of *Haguro* first, diving in the Malacca Strait in 2010 as opposed to the Java Sea. Some quick last minute correspondence and the kind understanding of the Explorers Club Flag and Honors Committee re the new 'venue' saved the day and Flag 52 was subsequently 'transferred' to our *Haguro* expedition, entitled Expedition 'Operation Dukedom' in honour of the naval operation that sunk *Haguro*.

Unfortunately two of the original expedition members, who had previously been with me diving on *Haguro*, decided to opt out of this last minute change of plans regards going back to the wreck. This was understandable as *Haguro* had, over the years since her discovery, garnered a well deserved reputation as a 'nasty' dive site, and divers who had visited her wreck often thought 'once' (or in the case of those two proposed expedition members, twice) was or had been enough. Why? Because during the previous *Haguro* expeditions I had been on, in 2003 (when we discovered the wreck), 2004, 2005, and I am told during another in 2006 that I missed, the visibility had been very *very* poor and the currents exceedingly strong and erratic - at times going one way at the surface, another mid water and another on the bottom, and so consistently strong that on some days only one dive a day could be conducted (by getting in at slack water) - with the ambient light, or lack thereof on the bottom, requiring the use of dive lights even at midday! Needless to say conditions like these never bode well for photography or videography (or surveying for that matter).

That being said, during my previous visits I had personally focused upon examining in detail specific areas of the wreck but had always looked forward to going back and completing a comprehensive survey of the entire wreck before it collapsed and deteriorated completely. However, with the 'exit' of the two expedition members who had been to the wreck before and had known what to expect (that being the reason *why* they 'pulled out') this left only two other members and myself who had been on the wreck before - and thus 'knew our way around' so to speak - and five others who had not been diving in the Malacca Strait before. Given the conditions we had routinely experienced on *Haguro* and that it had often taken divers several dives

to gain even a basic orientation as to the layout of such a complicated wreck, let alone survey, I wasn't sure what to expect this time or how the survey would transpire.

So imagine our (and especially my) surprise when on our first 2010 dive on *Haguro* we found no current whatsoever, abundant ambient light on the bottom and *exceptional* visibility, as much as 30m / 100ft down on the wreck! Excellent, even by Pacific Ocean standards (and this *was* the Malacca Strait after all). No one, and I mean *no one*, had experienced anything close to these conditions on any previous trips to the wreck site (and, as a matter of fact, the conditions reverted to 'nasty' on the *very* next dive trip *Empress* took to the wreck the week after we came ashore). These unbelievable, and completely unexpected, conditions stayed with us for the first couple of days, but slowly deteriorated as the expedition progressed, although never getting close to the wicked conditions experienced on previous visits; that is save to say for the last dive on the last day when *Haguro* gave everyone a taste of what 'could have been'. Yes, that last dive was *n-a-s-t-y*, i.e. poor visibility, low ambient light and relatively strong current! No doubt about it, we had been very *very* lucky.

### **Expedition Diving Parameters**

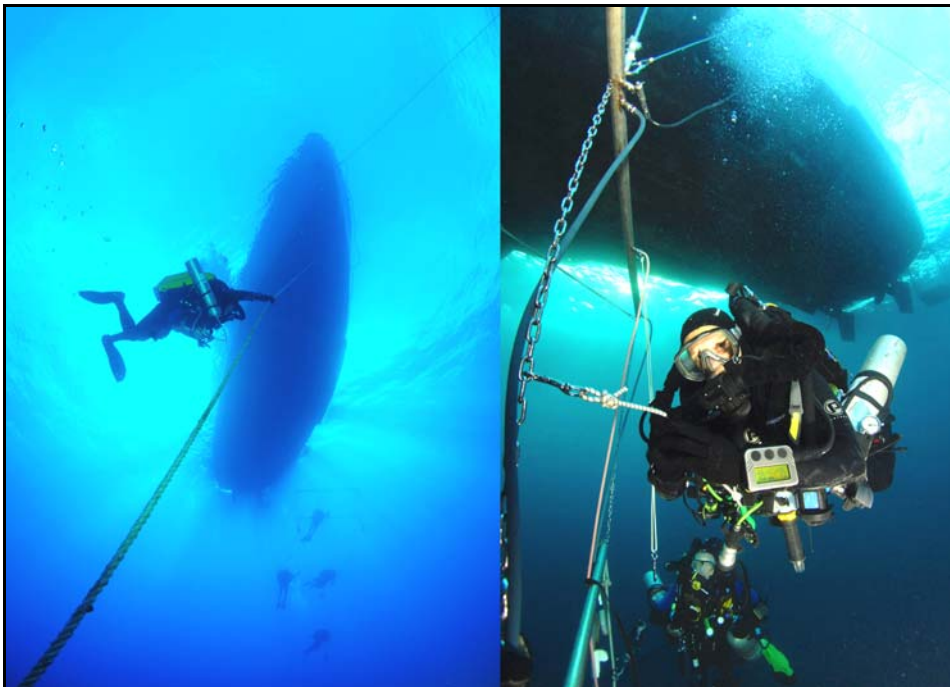
Five divers on the expedition, including myself, used Closed Circuit Rebreathers or CCR's, with, in this instance, a diluent mixture of 14% oxygen, 66% helium and a balance of 20% nitrogen (note; the air we 'normally' breathe is approximately 21% oxygen, 79% nitrogen). CCR's utilize two small onboard cylinders, one of (pure) oxygen and another of a diluent gas (consisting of either normal air or 'mixed gas' - i.e. a helium based mixture - depending on the depth of the dive) that is automatically mixed together 'on the fly' through the use of an inbuilt electronic controller and oxygen monitoring sensors, always keeping the divers breathing mixture at an optimum level for whatever depth the diver is operating at. And rather than being expelled into the water column (i.e. wasted), a CCR diver's exhaled gas is recirculated around a 'closed' breathing 'loop', through an inbuilt 'counter-lung' and a Co2 'scrubber' device, before going back to the diver. This makes for a *very* efficient and cost effective breathing system for deep diving.

Nevertheless, nitrogen becomes *narcotic* when under pressure and the deeper one goes the more one becomes effected by it; to the point of complete incapacitation should one go too deep, hence the term '*nitrogen narcosis*'. On the other hand helium is not narcotic, and is a less dense gas so has a lower 'work of breathing', therefore its use to replace nitrogen in the mix. The object of 'mixed gas diving' then is to keep the nitrogen content one is breathing as low as possible, or as low as required (hence limit or eliminate altogether the effects of nitrogen narcosis) and the oxygen level at a constant optimum. [Of note is that oxygen becomes *toxic* at or beyond a certain depth, or more accurately, at or beyond a certain partial pressure, which is generally considered to be a partial pressure of oxygen (PPo2) of 1.6 bar / ata. According to the National Oceanic and Atmospheric Administration tables, a respected authority, various maximum time limits apply - 45 minutes at 1.6 PPo2 for instance, with ever increasing times limits below 1.6 - before the toxic threshold is reached.]

As noted above, the diluent mixture the expedition CCR divers were using in this instance contained only 20% nitrogen (while the PPo2 of the breathing mix was individually preset by the divers at either 1.3 or 1.4 bar / ata, and then automatically

kept there by the CCR's electronics), which meant their breathing mixture when at the maximum depth of *Haguro* (68m / 223ft) had an equivalent air depth (or the 'air' diving depth that the nitrogen content of the mix equated to) of *barely* 10m / 33ft, and an oxygen level well below the 1.6 bar / ata 'threshold'. In other words, while diving at 68m / 223ft the diver was 'mentally affected' by the amount of nitrogen in the mix as if he were diving at only 10m / 33ft breathing regular air; which in other words is *negligible!* 'Mixed gas' then allows the diver to dive deep with a very clear head, which is mandatory when diving deep wrecks, and especially so on *Haguro*, which while not extremely deep by any means, is covered in copious amounts of discarded trawler net and generally effected by strong currents and poor visibility. One thing also noted by the expedition CCR divers using this (relatively) high helium diluent mix (i.e. higher than they would normally use for such a depth), was that the entire trip was incident free as regards even mild decompression illness symptoms, and how much better / less fatigued they felt post dive than on similar expeditions when using lower helium content mixtures. [The other divers on the expedition used regular open circuit scuba using either mixed gas or air, depending on their respective dive depth.]

Two dives a day were conducted (except for the first and last days), with bottom times of between 35 and 50 minutes, giving run times (i.e. the total time in water including decompression stop time) of between two and three hours per dive. Deep decompression stops were conducted on the 'downline' (the line from the dive vessel down to the wreck) and from 15m / 50ft to the surface on a decompression station slung under the dive vessel. Surface supplied open circuit oxygen was available through regulators on the decompression station trapeze at 6m / 20ft and above; and the CCR divers either stayed breathing on their CCR's all the way to the surface or switched to the open circuit oxygen a 6m / 20ft. The open circuit divers used a deep decompression mix of either 40% or 50% oxygen (balance nitrogen) and then switched to the surface supplied oxygen system at 6m / 20ft.



**Left.** A diver ascends the 'downline' attached to the wreck. Divers in the background are already on the 'deco station' slung under the dive support vessel. **Right.** Divers on the deco station trapeze with surface supplied oxygen lines left / upper left.

Owing to the number of dives conducted during this multi day expedition and the relatively high PPO<sub>2</sub> the divers were subjected to over this time, they accumulated a significant 'oxygen dose', expressed as both pulmonary and central nervous system (CNS) 'loadings'. While negligible pulmonary symptoms were noted, and no CNS incidences occurred, tests were run for changes in visual acuity, another effect (i.e. Hyperoxic Induced Myopia or HIM) sometimes associated with high repetitive doses of oxygen, and these findings will be briefly noted on page 15 of this report.

## **Expedition Dairy**

**8<sup>th</sup> Nov** – Arrive Singapore from Brisbane, Australia, at 11.15pm and go straight to the dock and board MV *Empress*. (My dive and camera gear had been sent up previously and was already aboard *Empress*.)



*MV Empress. Note divers lift, or elevator, at stern (red arrow). When this is lowered into the water a heavily laden diver simply swims into the 'cage', stands up and is lifted back on board. Sure beats climbing up a dive ladder!*

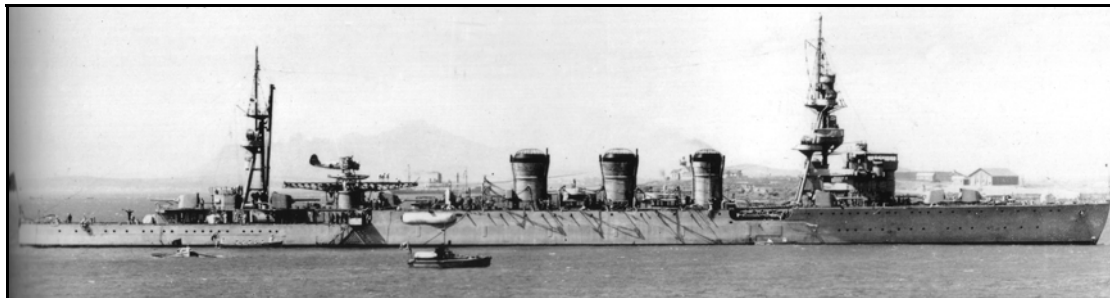
**9<sup>th</sup> November** – Late departure from Singapore, about 1pm. Besides crew, aboard are A Fock, P Yeutter and myself, rest of group to be picked up at Pt Klang, the seaport near Kuala Lumpur, Malaysia. Start assembling dive gear. Steam through the night.

**10<sup>th</sup> Nov.** – Early morning pass over the wreck of the British submarine HMS *Stratagem*, sunk by *CH-35* (a Japanese subchaser) off the town of Malacca in November 1944. Has only been dived once as far as we know. Although we had hoped to dive her, we don't have the time to stop – because of our late departure from Singapore - as the rest of the group are waiting in Pt Klang. Finish assembling our dive gear during day. Arrive Pt Klang about 6pm and overnight there.

**11<sup>th</sup> Nov.** - Depart about midday and while new arrivals spend afternoon assembling dive gear, we mix gas and map out the schedule for the days ahead. Plan to spend next day doing a brief search for the yet to be discovered British mine-laying submarine HMS *Porpoise*, lost with all hands, January 1945. Weather turns bad around midnight so we anchor up around 2am and wait behind an island in Malacca Strait till morning.

**12<sup>th</sup> Nov.** - No luck with side scan sonar search for *Porpoise* during the day at / near marks we have, so late in afternoon dive the wreck of the Italian (but German flagged)

submarine *UIT-23*, sunk by the British submarine *HMS Tally Ho* in February 1944. Unfortunately wreck blown apart by salvors years ago, but still an interesting dive. Depart and steam overnight to the wreck of the Japanese light cruiser *HIJMS Kuma* (below), which we had first discovered off Muka Head, Penang in March 2003.



**13<sup>th</sup> / 14<sup>th</sup> Nov.** – Anchored over *Kuma*, sunk by the British Submarine *HMS Tally Ho* in January 1944. The wreck lays on its starboard side in approximately 47m / 154ft of water with its stern missing, blown off just abaft the rear gun mount, but otherwise relatively intact save for lightweight structures, funnels, etc, that have collapsed onto the seabed. As a matter of fact a very interesting debris field runs the entire length of the wreck on the sea floor. Her bridge is intact and her gun mounts in place. Unfortunately visibility on the wreck is usually poor and this visit was no exception; maximum visibility of about 3m / 10ft or perhaps a little more on the very seabed. Depart evening of 14<sup>th</sup> to the wreck of the Japanese heavy cruiser *HIJMS Haguro* (below), which we had first discovered south-west of Penang in March 2003.



**15<sup>th</sup> through 21st Nov.** - Anchored over *Haguro*, part of the time tied in forward, part of the time tied in aft. *Details of the survey conducted during this time starts on page 17 of this report.* Depart evening of 21<sup>st</sup> to the wreck of the *SS Sun Vista* (below).



**22<sup>nd</sup> Nov.** – Anchored over the SS *Sun Vista* (ex SS *Galileo Galilei*), a modern cruise liner sunk in May 1999 after a fire in her engine room. Apparently so much water was pumped into her by the fire fighting tugs that it caused her to founder. The wreck lies on its port side in approximately 65m / 213ft of water and is still in exceptionally good condition although her funnel had collapsed since my last visit some years ago. A huge multi levelled wreck that much time could be spent on exploring - if exploring modern vessels was your thing that is. Strong currents usually flow over the wreck but once in the lee, which thankfully is usually the superstructure side, its effects are negligible. Visibility is generally reasonable but on this visit it was very good (for the Malacca Strait), the best I had seen on *Sun Vista*, probably 20m / 65ft or more - and no current to boot! In early afternoon we depart for Port Klang and overnight there.

**23<sup>rd</sup> Nov.** - End of expedition. Disembark MV *Empress* and fly back to Singapore and points beyond.

**MEDICAL ASPECTS** - Although a detailed report on the tests conducted during the expedition has not been submitted to the author, the following is a brief synopsis.

As CCR divers often report changes in visual acuity (typically HIM or Hyperoxic Induced Myopia) when exposed to repeated high oxygen levels, each diver was asked to record changes in their eye sight over the period of the expedition using a Snellen visual acuity chart and a series of corrective lenses. This test was performed each morning prior to diving with Dr Andrew Fock recording the lens value (in diopters correction) which produced the clearest vision for each diver and each eye.



- Interestingly, no significant decrement in visual acuity was noted whilst testing onboard MV *Empress* using the methods described above. *However* several of the CCR divers, including myself, noted significant changes in visual acuity beginning almost immediately post expedition which lasted for several weeks (or more) before their eyesight returned to normal.
- Despite several divers exceeding the REPEX (Repeat Exposure) limits and the NOAA daily oxygen limits, no Central Nervous System toxicity symptoms were observed.
- Despite repeated dives in the 'Extreme Exposure' range of the diving tables, no symptoms of decompression illness were noted or observed during the entire expedition.

## **2010 Expedition Members**

Mr Kevin Denlay – Mk15.5 (modernised) Closed Circuit Rebreather

Dr. Andrew Fock - Inspiration Vision Closed Circuit Rebreather

Dr. Leslie Rothbart - Inspiration Vision Closed Circuit Rebreather

Ass. Prof. Paul McMurrick - Inspiration Vision Closed Circuit Rebreather

Mr Michael Campbell - PRISM Closed Circuit Rebreather

Mr Simon McNally - Open Circuit Scuba

Captain Phil Yeutter (USN Ret.) - Open Circuit Scuba

Captain Vidar Skoglie (owner / skipper MV *Empress*) - Open Circuit Scuba



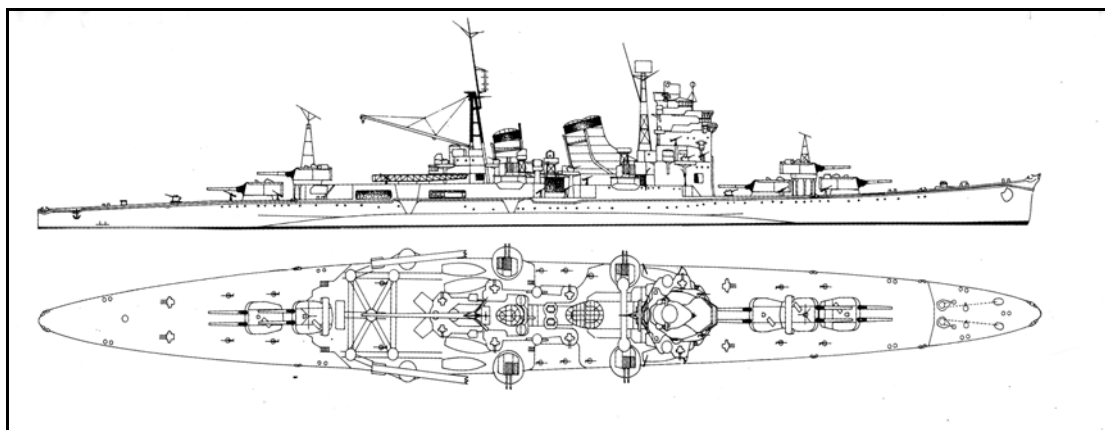
**Photos used throughout this report were taken by: Andrew Fock – page 1 bottom, page 23 bottom left and right, page 39; Paul McMurrick – page 7 bottom, page 18 right, page 30 left; (and Mike Gadd - page 19 left, page 29 top left, both taken during a 2006 visit to the wreck). All other ‘non-historical’ photos were taken by the author of this report, Kevin Denlay.**

***PS. Because EC Flag #52 is rather ‘fragile’ with age, a laminated copy was used for the underwater photos so as to safeguard the original.***



## HIJMS *Haguro* 2010 Wreck Survey Details

The wreck of the Imperial Japanese Navy heavy cruiser *Haguro* rests upright in approximately 68m/223ft of water in the Malacca Strait, on a bow heading of about 10 degrees true (just east of due north), approximately 46 nautical miles south-west of Muka Head, Penang, some distance from her generally accepted sinking position.

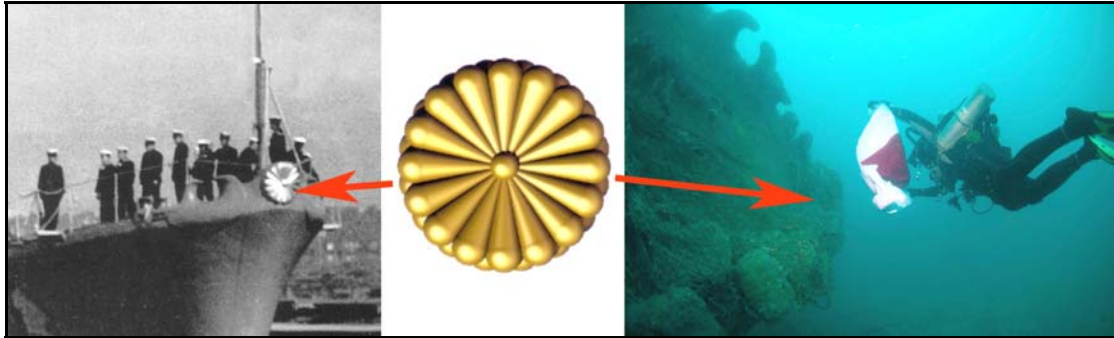


*Haguro as configured after her last 'official' refit, circa mid 1944. Note the number and positioning of the light 25mm AA weapons, which differs considerably as to what has actually been found on the wreck.*

**OVERVIEW:** The passage of time has taken its toll on this once mighty cruiser with about half the height of her superstructure/bridge having collapsed (numerous hits from the attacking destroyers were reported to have impacted the bridge killing many senior personnel), both her funnels are completely collapsed – the remains of which have rotted away leaving gaping holes and tangled piping where they once stood - and both the mainmast and foremast have collapsed and/or rotted away. Copious amounts of fishing trawler net, snagged and abandoned over the years, lay ensnared on many of her high points and also covers some of her amidships section, the 'snagging' of which has no doubt accelerated her deterioration over the years. Just aft of the #5 or rear-most eight-inch turret the wreck is broken completely in half across the deck, although the Quarterdeck section is still attached, as if 'hinged' to the main section at the bottom of the hull. The wreck itself has settled into the seabed to about her waterline forward, but much less so as one goes aft with both her port and starboard outboard shafts and most of their respective propellers actually up above the seabed.

**THE DETAILS: BOW TO STERN:** *Haguro's* bow/foredeck is almost – but not quite - severed at about the leading edge of the #2 eight-inch turret. There is massive damage forward of this turret with both the port and starboard sides of the hull completely blown out, while a tangled mess of debris stretches for approximately 26mtrs/85ft – i.e. from the #2 turret to the anchor capstans - before what could be considered recognizable deck again comes into view. Just forward of the capstans there is small 'bite' out of the port side deck edge and upper hull, with the port anchor chain spanning this gap before exiting the hawse pipe. What deck remains intact forward of the capstans is tilted well over to starboard, so much so that the starboard deck edge now rests on the sea bottom until almost the very bow stem, which itself is fractured (broken) in half just above where the waterline would have been. The very tip of her bow at deck level, on which the Imperial Chrysanthemum emblem once so

proudly graced, sits about 2m/6ft up off the seabed tilted over at an angle of about fifty five or sixty degrees.

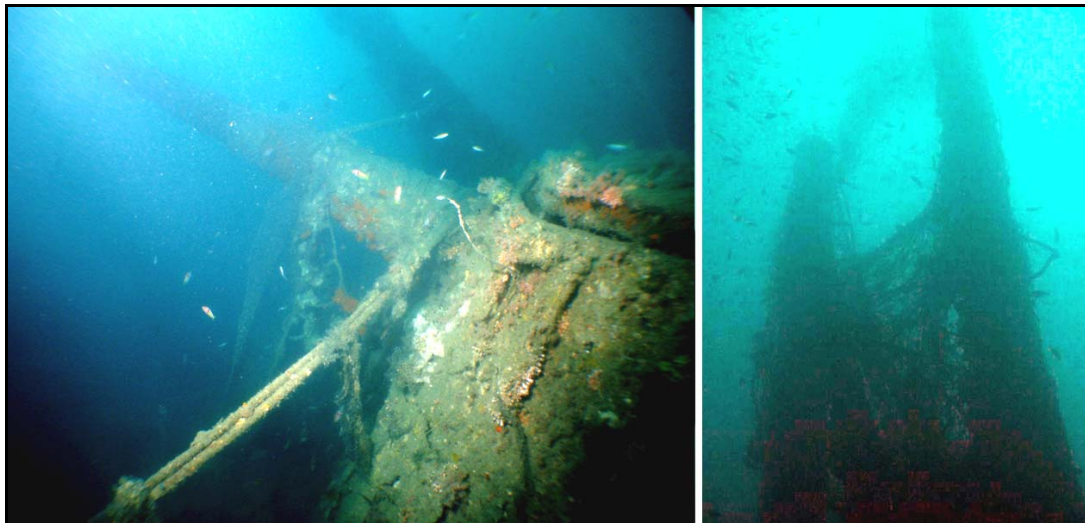


*All Japanese heavy cruisers had a large gold painted chrysanthemum (centre) on the bow, as seen in the picture at left. The diver at right is about to place a Japanese flag on the spot where the chrysanthemum once graced Haguro's bow.*

As stated above, the hull to both the port and starboard side of what was the #1 eight-inch turrets' position is spectacularly blown out as if this massive warships hull had been nothing but a thin soft-drink can. This is particularly obvious on the port side where the hull plates are actually peeled back aft-wards like a banana skin, and the port deck adjacent to the forward edge of #2 eight-inch turret is rent upwards in twisted disorder. [The manner that the hull plates are peeled back aftwards along the port side hull would imply that *Haguro* had substantial speed on when this damage occurred, which would correspond with historical reports of the timing of the first torpedo hit – or hits - in this area.] The destruction around #1 turret is so great that the turret itself has been completely uprooted with its barbette still attached – and now lies horizontally across the wreck - with the net entangled twin barrels of the turret pointing vertically towards the oceans surface; and the rear or back of the turret resting on the starboard seabed. The (starboard hull) damage in this area would also correspond with the reported position of one of the last two torpedoes to hit *Haguro*, which hit opposite, or just forward of, the #1 eight-inch turret. The roof of this turret has dislodged over time and has slewed down to now rest on the seabed behind the turret, allowing the breach blocks of the two big eight-inch guns to be clearly seen. [*If this turret were hypothetically stood back up into place the guns would be pointing out to port at approximately 9 o'clock, and the 'elevation' of the barrels would be relatively level. Note: For all gun angle descriptions in this report we shall consider the bow as the 12 o'clock position and the stern as the 6 o'clock position.*] As previously stated, it would not be an understatement to say that the ship is basically severed at the forward edge of #2 eight-inch turret, although it would seem that some of the ships bottom/underside must remain 'attached' for the ship to have settled to the seabed with the bow section to be still so well aligned with the rest of the wreck.

Upon close inspection of the 'raised' #2 forward eight-inch turret one is presented with somewhat of a quandary, *as it has no guns – barrels or breaches – whatsoever!* However, when one studies the TROM - Tabular Record Of Movement - of *Haguro* for her prior actions/movements this is not really as surprising as it first would seem. During the disastrous - for the Japanese - Leyte Gulf battles in October 1944, *Haguro* was hit directly on the #2 eight-inch turret by a bomb from an American aircraft, wrecking the turret and killing the crew. [Some post war accounts have speculated that this turret was repaired in Singapore in the interim before *Haguro's* demise, but

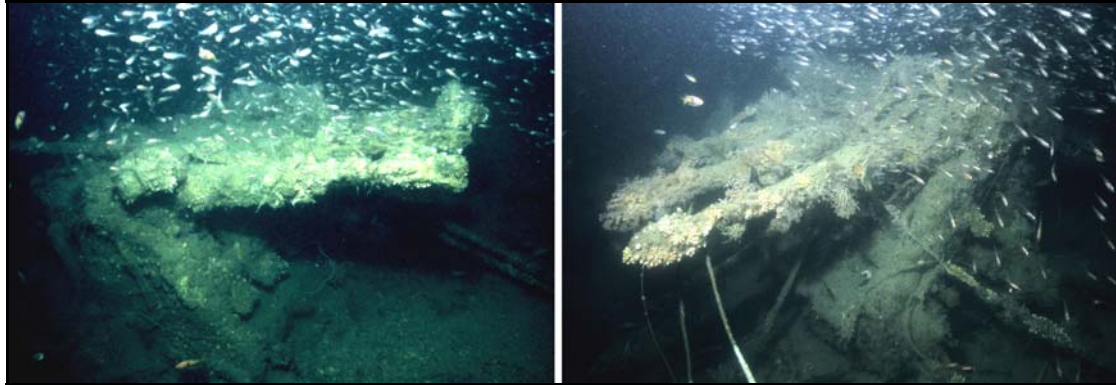
this is definitively now shown not to be the case. It would appear that the remains of the damaged guns were removed and the turret roof just hastily replaced.] The turret roof has deteriorated and collapsed to such an extent that a clear view into the turret from above is possible - and there are no barrels or breach remains to be seen anywhere. Of the four main gun turrets that remain upright - i.e. #2, #3, #4, #5 - this is the only turret with an inwardly collapsed roof, reinforcing the fact that the turret was only superficially - or cosmetically - refurbished while docked in Singapore undergoing her post Leyte repairs; and Japanese archive records from Singapore also confirm that repairs to *Haguro's* turret 'failed'. [*I believe the gun-less face of #2 eight-inch turret points to approximately 1 o'clock, but another expedition member thinks it points directly forward.* The 1 o'clock direction I believe this turret faces, if correct, agrees with the fact that when *Haguro's* #2 turret was knocked out by the bomb - during the Battle of Leyte Gulf - it was trained to fire off the starboard bow in pursuit of Task Force 3's ('Taffy' 3's) escort carriers. This would then imply that the turret was never even re-aligned, much less repaired, and the guns simply removed.]



**Right.** The barrels of the #1 8" turret, draped in discarded netting and now pointing vertically towards the ocean surface. **Left.** The askew barrels of #3 8" turret. Note how the roof and sidewall of the turret is just starting to delaminate, center right.

The #3 eight-inch turret is the most outwardly intact of the forward three main gun turrets, with its sidewalls and roof in place - although there is some 'delamination' around the edges where the roof meets the sidewalls - while its twin barrels are slightly askew (and often heavily draped in netting). However, while outwardly this turret looks quite intact, when looking inside through its open rear hatchway it is simply a shambles! [Japanese survivors report that all three forward turrets were knocked out and caught fire internally after the first torpedo/s hit to port.] Right beside this turret on the starboard deck is what appears to be a smallish hole left by the inward penetration of a shell hit, as the 'edges' of the hole bend inwards, not outwards, as you would expect from an internal explosion. [*The barrels of #3 eight-inch turrets guns point to approximately 8 o'clock, are askew somewhat and have an elevation of between about twenty to thirty degrees.*] The thin protective outer 'skins' that shielded the turrets' armoured sidewalls and roof from direct solar heat - and that covered all three forward eight-inch turrets (and the two aft eight-inch turrets) - has long ago rotted away (on all five turrets) leaving only the armour plated sidewalls and remaining roof's visible.

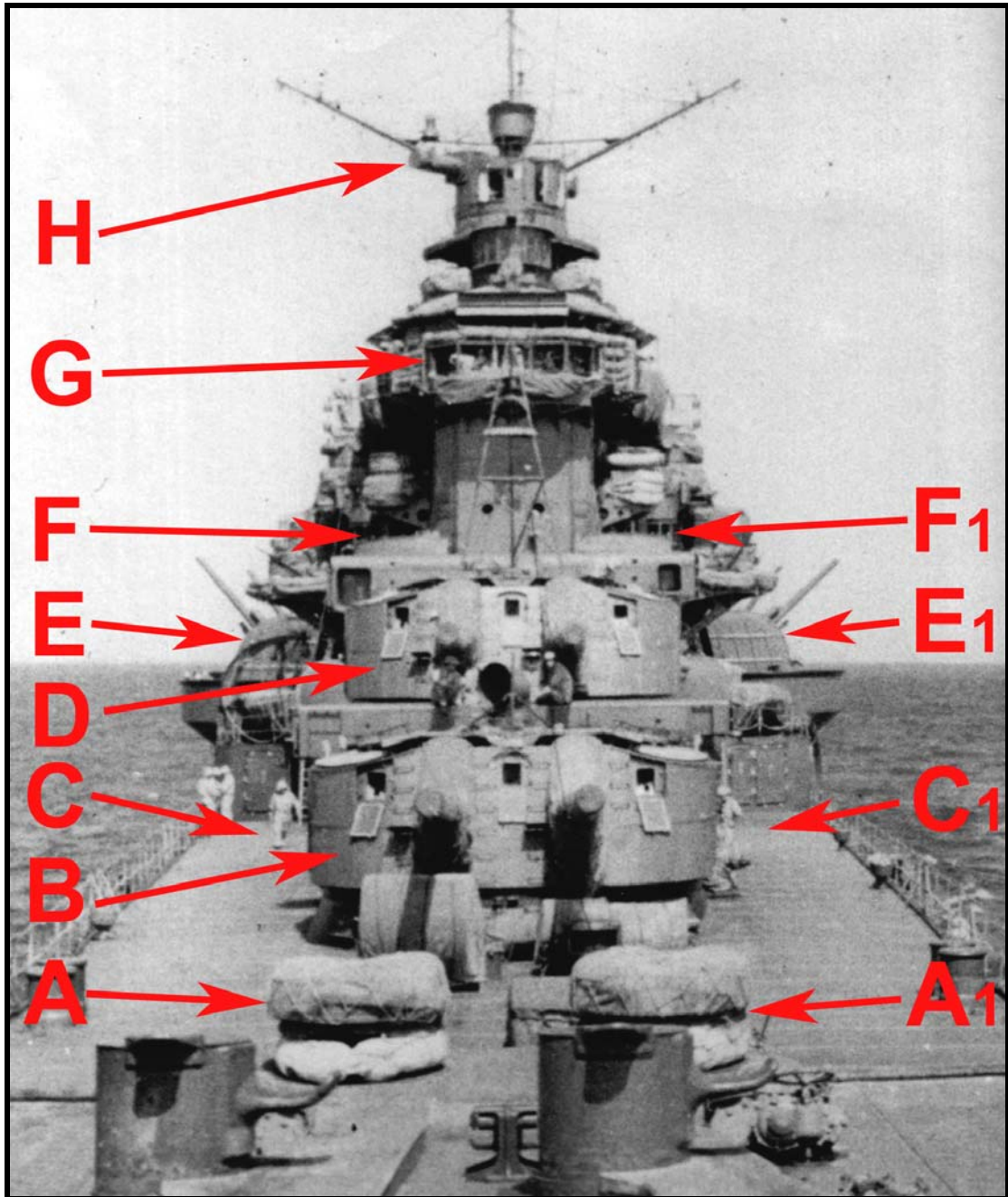
Just aft of the #3 eight-inch turret, and just forward of the bridge tower superstructure, are two triple barreled 25mm anti-aircraft (AA) weapons, situated on both the port and starboard deck. However, of note is there are no single barreled 25mm weapons, as shown on late war plans of *Haguro*, anywhere on the Foredeck. As a matter of fact, there has not been one single-barreled 25mm AA weapon found/seen *anywhere* on the wreck during any of the expeditions conducted to *Haguro*, or on other dives on the wreck since her 2003 discovery!



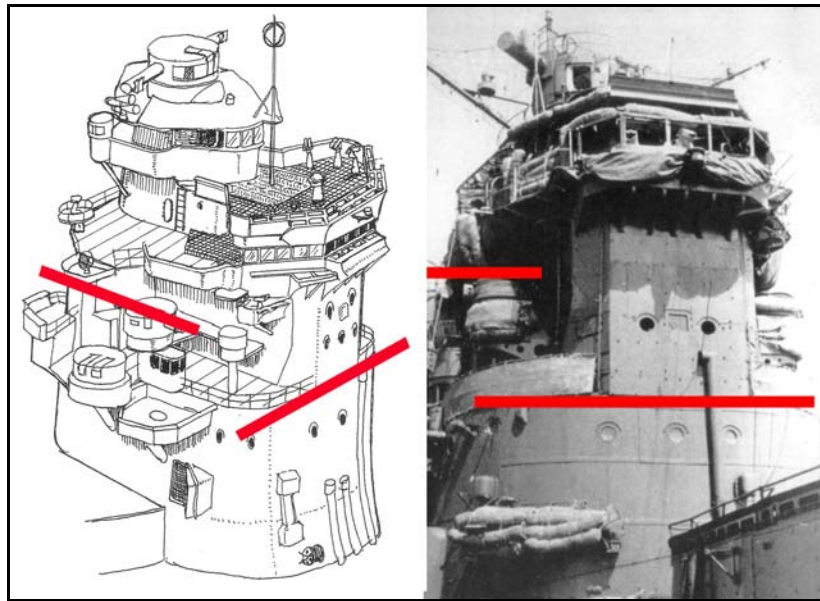
*The starboard and port triple 25mm AA guns on the deck forward of the bridge. Both these photos were taken in 2005, on a day when it was as dark as night on the bottom!*

Just aft of the triple 25mm AA weapons is the bridge superstructure. The lower portion of what remains of this superstructure (i.e. three deck levels) is relatively intact up to what was once the floor of the Middle Bridge deck level, while the upper portion above that level (forward) is 'missing' – having collapsed. However, noticeable deterioration has occurred in this lower portion since I last visited the wreck in 2005, with the forward center of this structure collapsing outwards onto the Foredeck; in turn, surprisingly, spilling out some of the rectangular windows that were (originally) installed on the upper bridge levels (and that were not visible there at the base of the superstructure on previous visits). Finding those rectangular window frames there (i.e. 'spilled out' at the base of the superstructure) highlights the fact that the upper bridge levels have simply collapsed directly downwards over the years, as opposed to having collapsed off onto the port (or starboard) seabed as was once thought. What remains of the bridge 'tower' itself above the Middle Bridge deck level is higher towards the rear of the remaining structure than at the front - by about 5m/16ft or so - and is very heavily covered in numerous layers of netting and line (thick rope) that 'spider-webs' out onto the Foredeck and #3 eight-inch turret, down the rear of the superstructure itself across where the fore funnel once stood, and also out to either side onto both the port and starboard twin barreled five-inch high angle (HA) guns abaft the bridge itself. [The top of this net covered 'hump' at the rear of the remaining superstructure is now the highest, or shallowest, point on the wreck - at a depth of approximately 47m/154ft - while the depth on the deck adjacent to the superstructure itself is approximately 60m/197ft.] The deck on both sides of the superstructure is heavily covered with debris of all sorts from the upper bridge levels - especially so to port where it has piled up extensively - and the main (6m/20ft) rangefinder 'arm', once at the very highest point above the bridge superstructure, can now be found bent awkwardly amongst the pile to port. Various other items and apparatus from the upper bridge level's can also be seen amongst the piles of debris on the deck on both sides adjacent to the superstructure. Again, this simply confirms the fact that the upper bridge levels have collapsed directly downward over the years.

## Reference Photo 1



*Haguro's foredeck and bridge superstructure. A historical photo taken from the bow looking towards the bridge superstructure, circa 1941. A through H are the 'objects' referenced or illustrated (i.e. underwater - u/w - photos) in the adjacent pages: A, A1) Starboard and port anchor capstans (covered), referenced page 17; B) #1 eight-inch turret, u/w photo page 19 and referenced page 18; C, C1) Note the absence - on the starboard and port deck just forward of the bridge - of the two triple 25mm AA guns which had not yet been installed, u/w photos and referenced page 20; D) #2 eight-inch turret, referenced pages 17,18,19; E, E1) Starboard and port (forward) five-inch dual HA guns, referenced pages 22,23; F, F1) Starboard and port open bridge wings, referenced page 22; G) Rectangular upper bridge windows, referenced page 20; H) 6m/20ft main (gun) rangefinder, referenced page 20.*



*The red lines on the above side view schematic (left) and forward view photo (right) of the bridge superstructure mark the highest levels fore and aft of the superstructure as seen on the wreck circa 2010. Everything above these levels has collapsed directly downwards.*

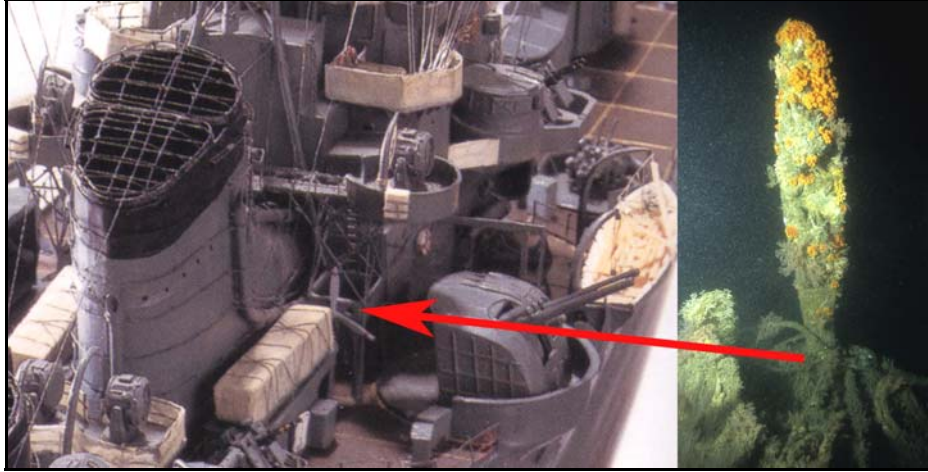
What was once the floor of the Middle Bridge deck level (or ceiling of the Lower Bridge deck level, i.e. the lower red line above) is now 'open' forward, having collapsed downwards - allowing penetration into the Lower Bridge level - while the two exposed or exterior open bridge 'wing' decks on either side at the Middle Bridge level remain intact. On either side of the Lower Bridge level aft are radio and coding rooms that are at times accessible, the port one quite well 'preserved'. However, net thickly enshrouds this superstructure area making access beneath it often impossible.



***Right.** Inside the Cipher Room at the rear of the Lower Bridge Level. **Left.** Live 5" ammunition lies scattered about on the starboard deck just abaft the superstructure.*

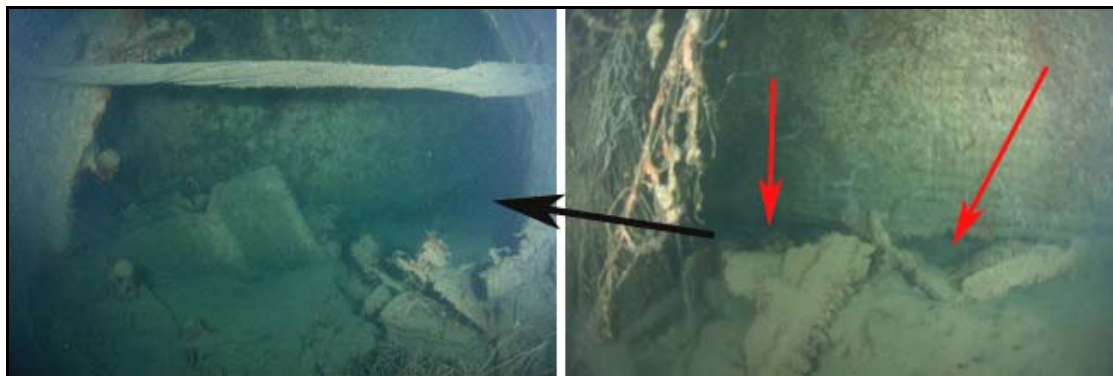
Aft of the superstructure itself there is no sign of the foremast, which is presumed to have collapsed and disintegrated, and where the fore funnel should be is now just a mass of twisted piping, and netting, covering/filling the hole left by the collapse/deterioration of the funnel itself. Also just aft of the bridge superstructure, but outboard to port and starboard of the fore funnel's remains, are *Haguro's* forward twin barreled five-inch high-angle (HA) gun mounts, both visible though periodically shrouded in netting, and 'live' five-inch ready ammunition lays scattered about on the deck just forward of the starboard mount. [*The forward starboard five-inch mount*

*points to approximately 3.30 o'clock while the forward port five-inch mount points to approximately 9.30 o'clock; and the guns of both are well elevated.] Just inboard of the forward starboard five-inch HA mount is a three bladed aircraft propeller stored upright – at first a surprising sight so far away from the rear aircraft-handling area; but which shows 'stored there' on highly detailed scale models of this cruiser class.*



*An intact three bladed (spare) aircraft propeller can be found inboard of the forward starboard five inch mount (as shown on the scale model left). Photo at right shows the upright coral encrusted blade.*

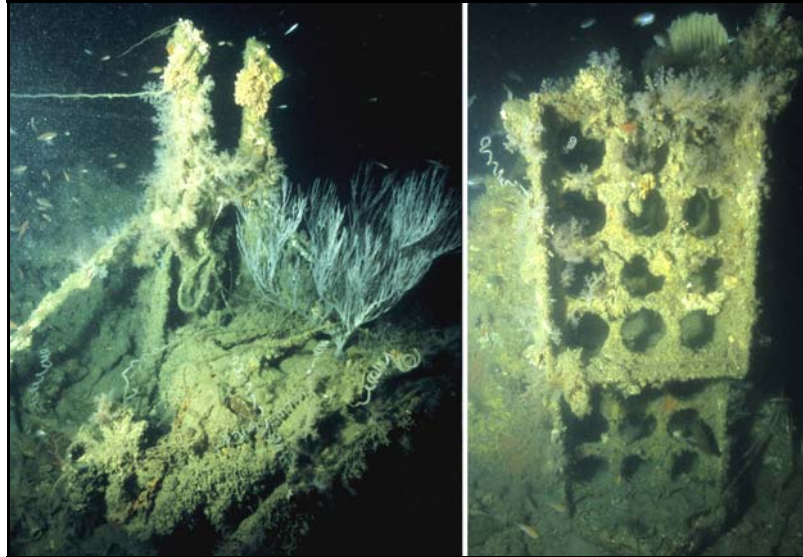
On the port hull almost directly below the aft 'side' of the forward port five-inch HA mount is evidence of a torpedo hit. However, the settling of the wreck into the seabed has obscured most of the actual hole; what is visible is the blown open outer torpedo bulge or blister, and a small space between the seabed and the bottom of the armour belt can clearly be seen, signifying that the destruction goes further *into* the ships innards. The 'top' of the damage to the torpedo bulge is 3m/10ft below the Upper Deck level, while the width of damage at the seabed is approximately 12m/39ft wide.



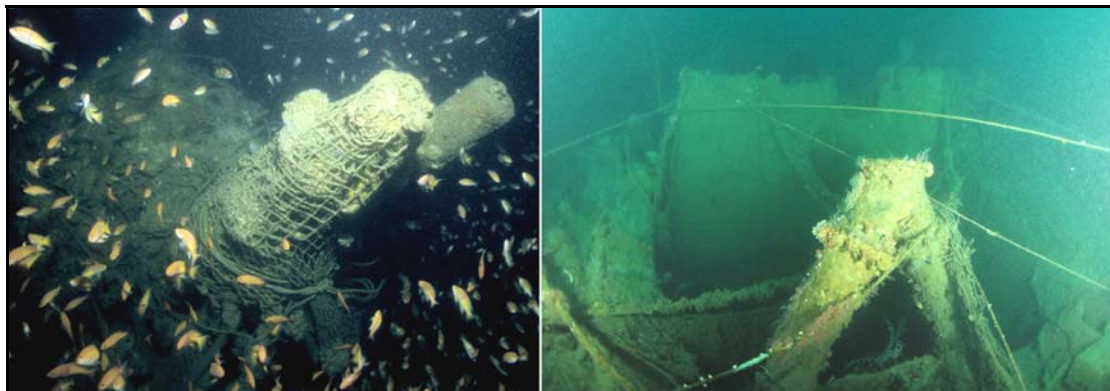
*The red arrows on image at right point to the gap between the seabed and the bottom of the armour belt, and is basically a 'close up' from just abaft where the black arrow points to in the picture at left - which itself is an image of the forward 'half' of the exposed damage. The horizontal 'line' across the upper left photo is netting.*

Quite noticeable on the deck on the port side, between the forward and aft five-inch HA mounts, obviously situated for 'easy access', are several completely empty cabinet-style five-inch ready ammunition racks looking for all the world like outsized wine-bottle cabinets with their empty circular storage holes (*below right*). Inboard of

one of these 'cabinets' is a pile of coral incrustated live five-inch shells that appear to have been stockpiled in a separate main storage area. On the opposite side of the ship, i.e. to starboard, in the area between the forward and aft starboard five-inch HA mounts is a twin 25mm AA weapon collapsed down onto the Upper Deck (*below left*).

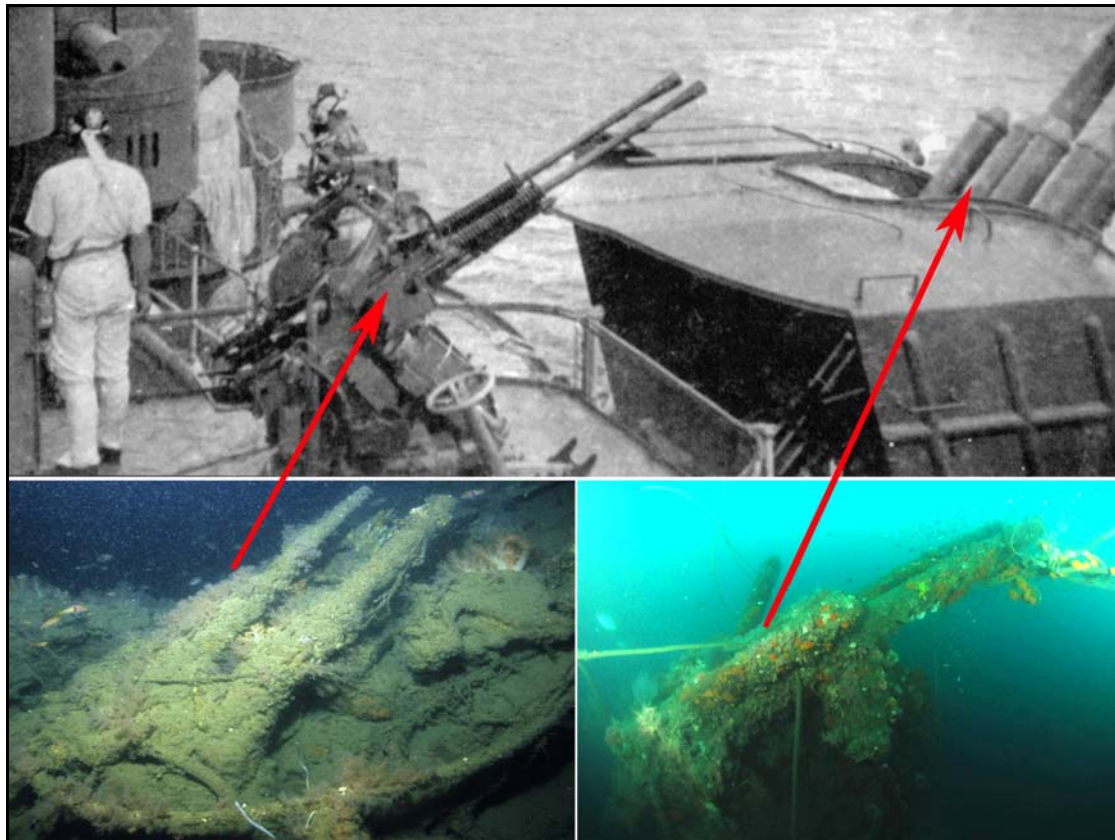


Just aft from there, that is just forward and outboard to starboard of where the rear funnel (now collapsed/disintegrated) once stood, is what appear to be the remains of the starboard amidships 4.5m/15ft rangefinder shrouded in netting. Unfortunately, thick layers of snagged/discarded trawler netting completely cover this structure and hence have made ID-ing just what this 'formation' is/was rather difficult.

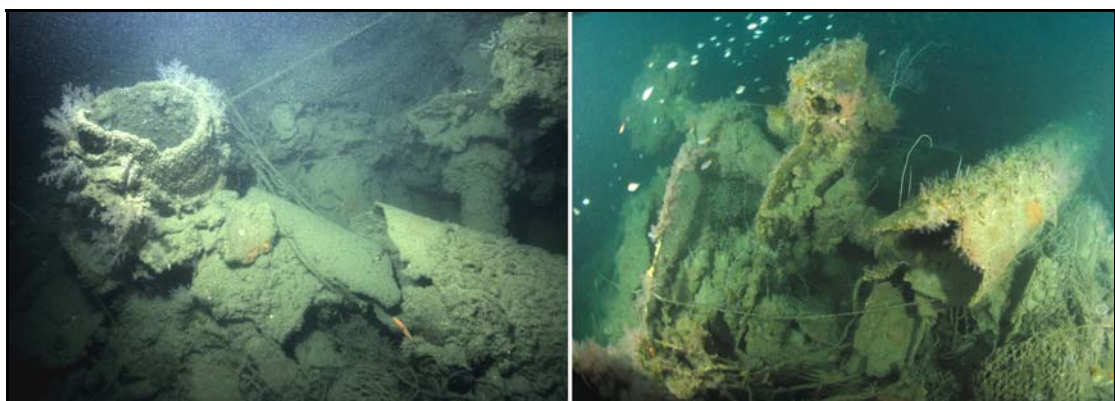


Where the aft funnel once stood is just a gaping hole (*above right*), while abaft it are the remains of the base of the collapsed tripod mainmast. Discarded netting stretches out from there and partially covers the port aft five-inch high angle (HA) gun mount, encasing one barrel (*above left*) of the twin guns which are raised almost vertical; *the mount itself now points forward to approximately 12.30 o'clock*. On the starboard side, outboard of where the aft funnel once stood is the remains of a 25mm AA gun director 'tower', now the highest point on the wreck amidships. Just abaft the director and inboard from the starboard aft five-inch HA gun mount is a twin 25mm AA gun collapsed down onto the deck. These 25mm guns can be seen in the image below (*bottom left*); the top photo is circa 1942, the lower photo as seen on the wreck today.



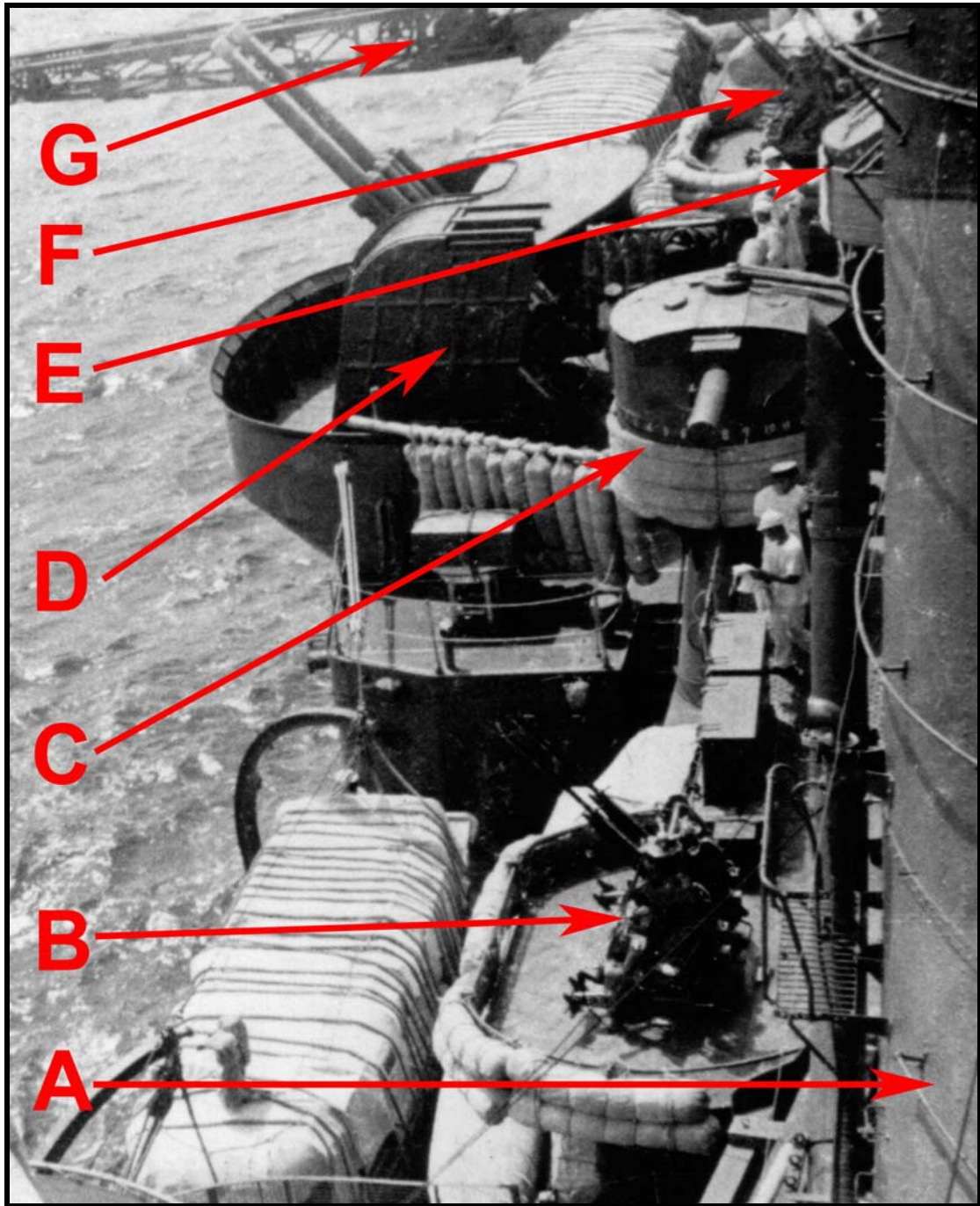


The starboard aft five-inch HA gun mount (*guns above bottom right*) is also draped in netting - which stretches down from there onto the seabed - while its twin guns are elevated to about thirty degrees; *the mount itself points to approximately 3.00 o'clock*. [Note: the actual gun-crews protective enclosures on *all* four of the five-inch HA gun mounts have completely rotted away leaving the barrels/breaches totally exposed.] The main tripod mast itself has completely collapsed to starboard and one of the 'legs' (*below left and right*) is laying across the deck and out over the deck edge just abaft the starboard aft five-inch HA mount, where it is also draped in the ubiquitous netting.

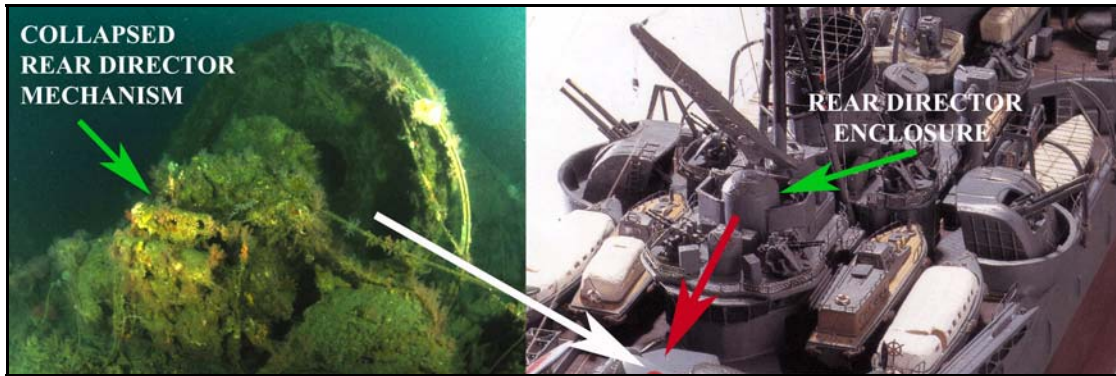


Abaft of the fallen mainmast is the now collapsed auxiliary main-gun director 'tower' - which has collapsed almost directly aftwards and is now laying aligned along the centerline of the ship - with its outer metal 'shell' rotted away and the director mechanism itself now spilled out onto the deck (*see top image page 27*).

## Reference Photo 2

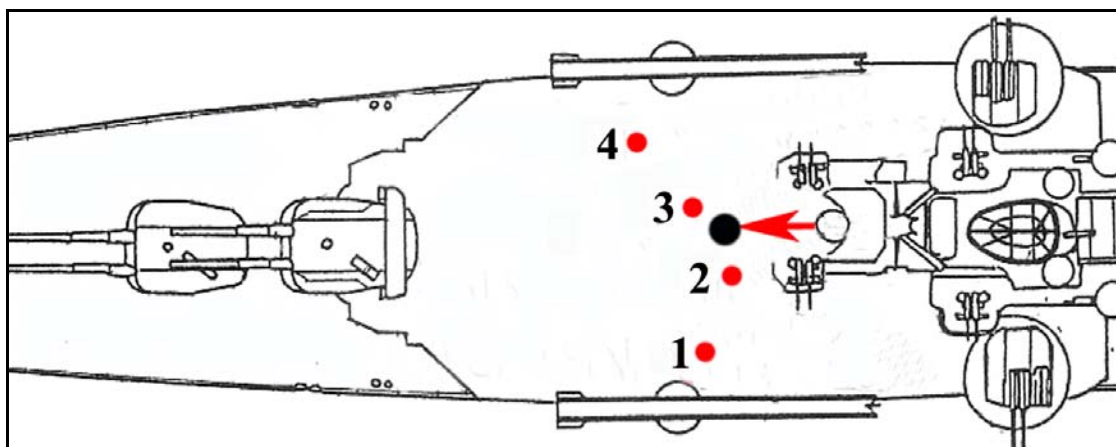


*Haguro's starboard side amidships. A historical photo taken from the rear of the upper bridge looking down amidships on the starboard side, circa 1941. A through G are the 'objects' referenced or illustrated (i.e. underwater - u/w - photos) in the adjacent pages: A) Fore funnel, referenced page 22; B) 25mm dual AA gun, u/w photo and referenced page 24; C) Type 91 4.5m/15ft rangefinder (for the five-inch HA guns), referenced page 24; D) Rear five-inch dual HA gun. u/w photo page 24 and referenced pages 24,25; E) Type 95 director (for the 25mm AA guns), referenced page 24; F) 25mm dual AA gun, u/w photo page 25 and referenced pages 24,25; G) Aircraft catapult launching track (swivelled outboard), referenced pages 27,28.*

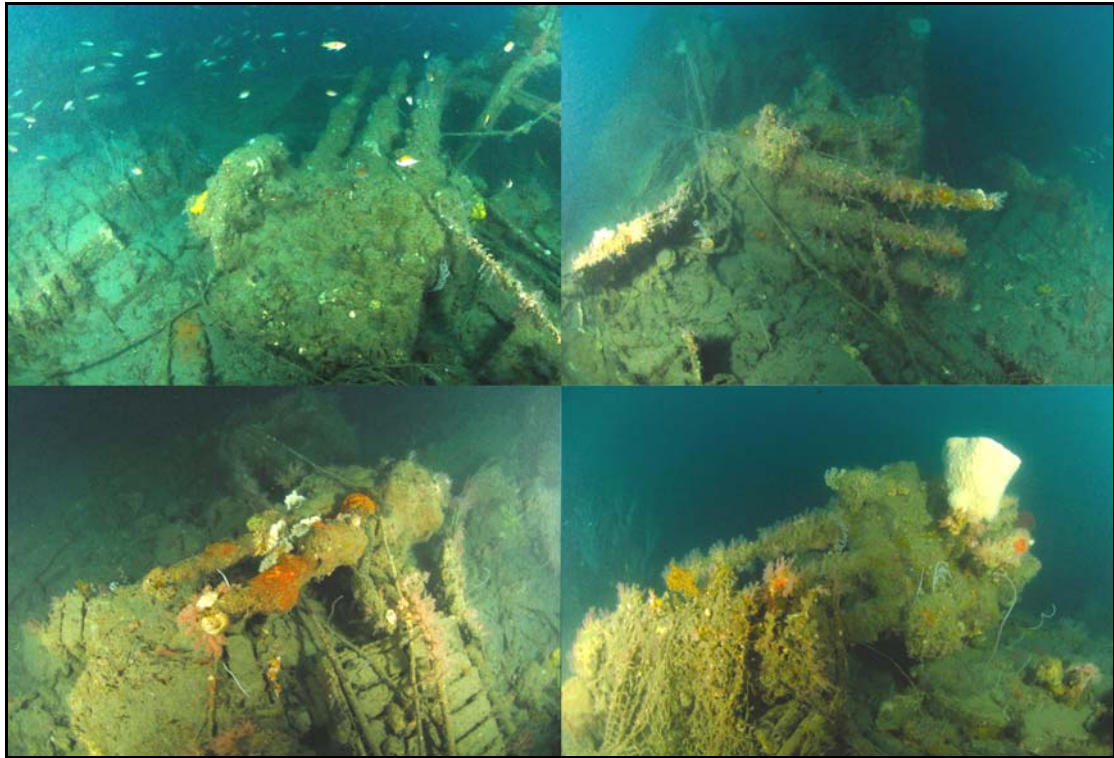


**Right.** The green arrow points to the aft auxiliary Type 94 director enclosure (on a model) while the red arrow points in the direction which the whole structure has collapsed. *Note:* Although the model (and 1944 refit plans) shows twin 25mm AA guns abaft the director, the wreck shows that triples were fitted in their place. **Left.** The collapsed director as seen on the wreck. The white arrow points to where it now lies.

Just outboard and abaft either side of the collapsed auxiliary director itself are two sets of *triple* 25mm AA guns (one laying over on its side - #2 red dot below; and one upright - #3 red dot below), which apparently had been situated at the same level as the director itself and have hence collapsed down with it. Further outboard and abaft these two triples, that is just inboard of the port and starboard catapult rotation points, are another two sets of *triple* 25mm AA guns (one upright - #1 red dot below; and one laying over on its side - #4 red dot below). [Note; *none* of these four triple 25mm AA guns are shown on any late war plans/schematics of *Haguro*.] All four triples (and the director) now lay on the Upper Deck, the Aircraft Handling Deck above having completely collapsed/disintegrated since the sinking. [Given the fires reported raging throughout this area just prior to sinking, that is not surprising]. However, the two triple 25mm's that are now found just inboard of the catapult rotation bases must have originally been mounted on that higher Aircraft Handling Deck, as where they now lie (on the Upper Deck) would have once been a covered area on the ship. Liberally spread around near these weapons are stacks and stacks of 25mm reload magazines.



Shown are the positions of the now collapsed director (black dot; having collapsed aftward in the direction of the red arrow from where it originally stood), and the positions of the four triple 25mm AA guns found in that general area (red dots). The numbers correspond to the photos on the next page. It is assumed that triples #2 and #3 collapsed aft with the director structure; having replaced the two twin 25mm's shown on the schematic outboard the director at some stage post 1944 refit.



**Top left;** Triple #1 sits upright. (Note the numerous 25mm AA ammunition reload cases that can be seen in left of picture, while Triple #2 can just be seen top left corner.) **Top right;** Triple #2 is on its side, **Bottom left;** Triple #3 sits upright, upon a stack of 25mm AA ammunition reload magazines, with one barrel (far left) broken off. **Bottom Right;** Triple # 4 is on its side

Given that none of these four triple 25mm mounts show on any late war plan of *Haguro*, it is almost certain they were 'late' war additions in Singapore. Interestingly, although these triple 25mm AA guns and the auxiliary main-gun director were clearly visible on dives during our 2010 expedition (and when I visited in 2004), they were not to be seen at all on my 2005 dives; at that time the whole area abaft the main mast had been completely encased in 'fresh' trawler netting that had covered/encased the entire area in the interim between our 2004 and 2005 expeditions. This netting was however no longer there in 2010 leaving the whole area 'open for inspection'; which in turn gives some indication to the changing nature of the wreck from year to year, with trawler netting being either added (snagged) or removed by trawlers trying to dislodge their own (newly snagged) net.

There are no torpedo tubes between the starboard aft five-inch HA mount and starboard aircraft catapult rotation base - which has most of its launching track collapsed or rotted away - nor is there a set in the 'same' space on the port side. Aft of the catapults there are also no torpedo tubes port or starboard either. [*Haguro* at one time had four sets of quadruple torpedo tubes, two to port and two to starboard just fore and aft of the catapults.] However, while the aft set of tubes were known to have been removed in June 1944, the forward sets were only removed in Singapore just prior to *Haguro's* Andaman missions, unfortunately depriving her of those very effective offensive weapons. As stated above, most of the actual aircraft catapult launching tracks themselves have rotted away on both the port and starboard catapult mounts, and what tracks remain are also liberally 'adorned' with the omnipresent

netting. Also as stated previously, the Aircraft Handling Deck itself has completely 'disappeared', having collapsed down onto the Upper Deck and degraded/rotted away entirely, leaving the two catapult rotation bases and their remaining tracks standing up well off the (Upper) deck. It appears, given the 'height' or lack thereof of almost any readily identifiable structure down the center line of the ship - from the bridge superstructure all the way to the aft eight-inch turrets - that the fires raging amidships just prior to *Haguro's* sinking destroyed or so weakened all the steel in the entire amidships area that it greatly accelerated the (underwater) structural collapse and subsequent deterioration there over the years.



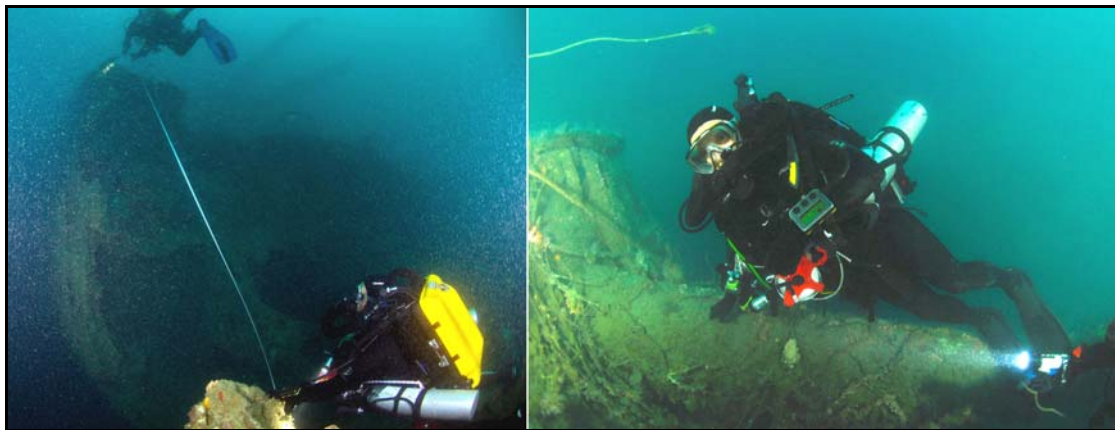
Both rear eight-inch turrets are in place as it were, with the top of the raised #4 eight-inch turret now the highest point aft of the net enshrouded 25mm AA director stand amidships referred to previously (*page 24*). However, the entire rear-wall of the #4 turret has collapsed away (*above right*), and the sidewalls have also partially collapsed (*above left*), completely separating them from the roof of the turret, leaving the turrets innards exposed and the eight-inch gun breaches visible. [*The barrels of the guns in #4 eight-inch turret point directly astern, that is to the 6 o'clock position - and their elevation is, basically, just above level.*]



The #5 eight-inch turrets roof has also 'delaminated' at the edges from the sidewalls and face (*above left*) and part of the starboard sidewall is collapsing down towards the deck (*above right*); its askew barrels just visible lower left. [*The barrels of the guns in #5 eight-inch turret point directly astern, that is to the 6 o'clock position and are slightly askew; the port barrel basically level with the starboard barrel having actually collapsed down somewhat.*] Visible inside this turret are several 'sets' of undisturbed human remains, some still with gas/smoke masks 'in place' as it were.

[It seems somewhat surprising that both these aft eight-inch turrets point directly astern – as opposed to abeam as the forward ones do - although this just may coincide with them being 'knocked out' during *Haguro's* attempt to take up a northerly heading and get out of the trap sprung by the British destroyers. Another possibility that a *Haguro* survivor reported to this author at a reunion in Penang between 26<sup>th</sup> Destroyer Flotilla veterans and *Haguro* and *Kamikaze* survivors/veterans during September 2005 (the first time the two antagonists had met since *Haguro's* sinking), was that there were so many barrels of oil - meant for Pt Blair - stacked around the turrets that they could not train, or swivel, outward/abeam.] Also noted along the upper hull on the port side - from just abaft the catapult rotation base and continuing on past #4 turret - is that the hull plates have fallen/rotted away revealing the Main Deck and numerous metal bunks, stacked two high; an area seemingly corresponding with the location of crew quarters on plans of this class of cruiser.

Continuing on, immediately aft of the #5 turret, the Upper Deck itself starts to 'angle down' towards a *break that runs right across the Quarterdeck*. However, the decks edges (where the deck meets the hull) remain relatively 'level' as it were, giving the impression that the edges are 'bent up' on either side of the ship. What has happened however is that most of the deck itself has collapsed almost 2m/6ft downwards 'into' the break, leaving the deck edges themselves forward of the break now slightly higher (at the deck/hull edge) than the rest of the deck *across* the wreck.

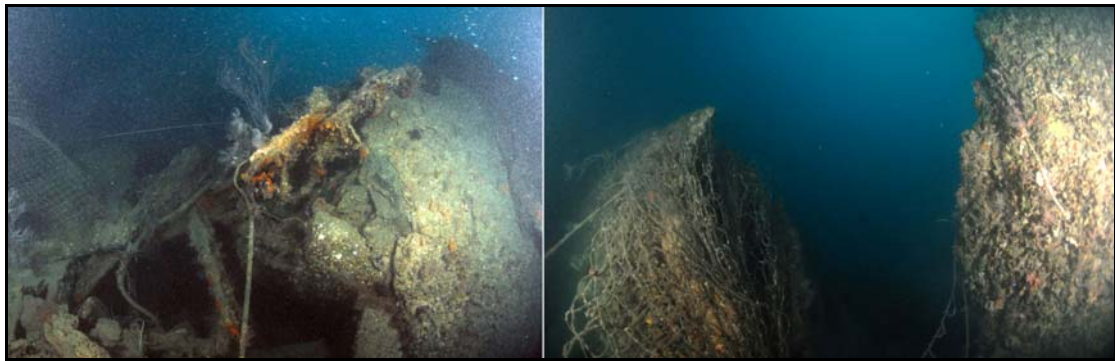


**Right.** A survey diver, measuring tape in hand, swims across the starboard barrel of #5 eight inch turret on route to his survey point. The cylinder seen slung at the CCR diver's side (here and in all this reports photos) is open circuit 'bail out' - or emergency - breathing gas, carried simply for safety in the event the CCR should fail.

**Left.** Divers take survey measurements on the port side of the break across the Quarterdeck. The barrels of #5 eight inch turret can be seen at the top just right of the diver while the Main Deck level can also just be made out midway between the divers.

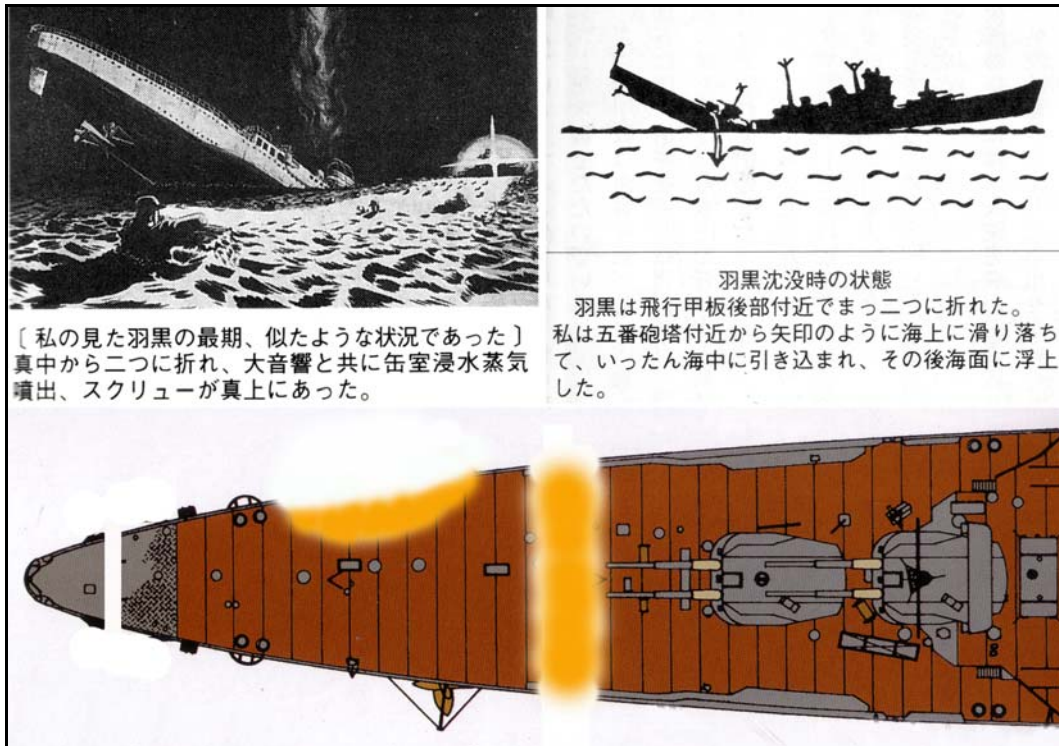
The forward edge of the break itself starts about 2m/6ft aft of the very end of the barrels of #5 eight-inch turret (which point directly aft) where the collapsed Upper Deck ends and the wreck is split completely in half; that is laterally across the Quarterdeck from the port to the starboard hull in a straight line at or just aft of Frame 304, and as stated previously the deck directly behind the #5 turret has begun to collapse down into this break (i.e. the Upper Deck has collapsed down – at the edge of the very break itself - to such an extent as to make the head-space on the Main Deck level directly below less than half of its original height).

There is then a wide V shaped gap spanning about 6m/20ft until the Quarterdeck resumes, and the section of the ship aft of the break has now settled several meters lower than the deck abreast the #5 turret. That is, the deck on this very aft section, while relatively level 'longitudinally' along its centerline, has pulled away from and settled down deeper than the deck outboard of the rear (#5) eight-inch turret. However, when looked at from outboard of the wreck, this V shaped gap in the hull has relatively 'even' edges. That is, the break/gap does not look like it was caused by a direct torpedo hit to that location; more like the stern section has simply collapsed/pulled away at this point with the ships bottom acting as a 'hinge'. Once across the gap the starboard side of the Quarterdeck itself is basically intact *almost* all the way to the very stern, although the deck near the edge of the break has collapsed – just like the deck abaft the rear turret - into the gap. However, on the port side, after one crosses the gap, a very different scene unfolds than that on the starboard side; that is, the deck is to some extent a shambles. As a matter of fact, the whole port side deck on the stern abaft the break is a rather confused mess with little symmetry to it at all.



**Right.** Looking up at the break in the hull on the starboard side, aft edge to the left. Both port and starboard splits in the hull look similar, with little or almost none of the ships innards spilled out onto the seabed. [The use of an ultra wide 'fisheye' lens makes the break look much narrower than it actually is] **Left.** Looking up at the aft edge of the 'bite' out of the hull just aft of the 'V' shaped break on the port side. Here the innards of the ship have spilled out and down over the port outer propeller and propeller shaft itself. The stern hull-side is the 'lighter' shaded area at right.

That is, just aft of the deck/hull break the port deck edge is intact for a about 3m/10ft before a large piece of deck and hull is actually missing (rather than just collapsed down), almost like 'something' (a torpedo) took a big 'bite' out of the ship. Here much debris has spilled out of the innards of the ship, down and over the port outer shaft and propeller. This bite and associated damage starts (at Quarterdeck level) just forward and above the outer port propeller, and the damage 'ends' just forward of the aft set of bollards. [Given the nature of the damage it seems likely that *Haguro* took a torpedo hit there on the port side about midway between the very stern and #5 eight-inch turret.] From there the port-side deck then continues intact for about 4m/13ft before again collapsing abruptly, this time right *across* the Quarterdeck at the very stern itself. That is, the Quarterdeck at the very stern is now squared off, as opposed to being its 'original' or proper elliptical shape. It is also to be noted that there are no signs of any triple 25mm AA guns on the Quarterdeck section, nor any single 25mm's there either (or beside the two aft 8" turrets for that matter), although two sets of triple's do show on the Quarterdeck on late war plans of *Haguro*. An examination by several divers 'in the break', i.e. at the bottom of the V shaped gap, also failed to find any trace of these triples, so it appears they were removed/resituated post 1944 refit.



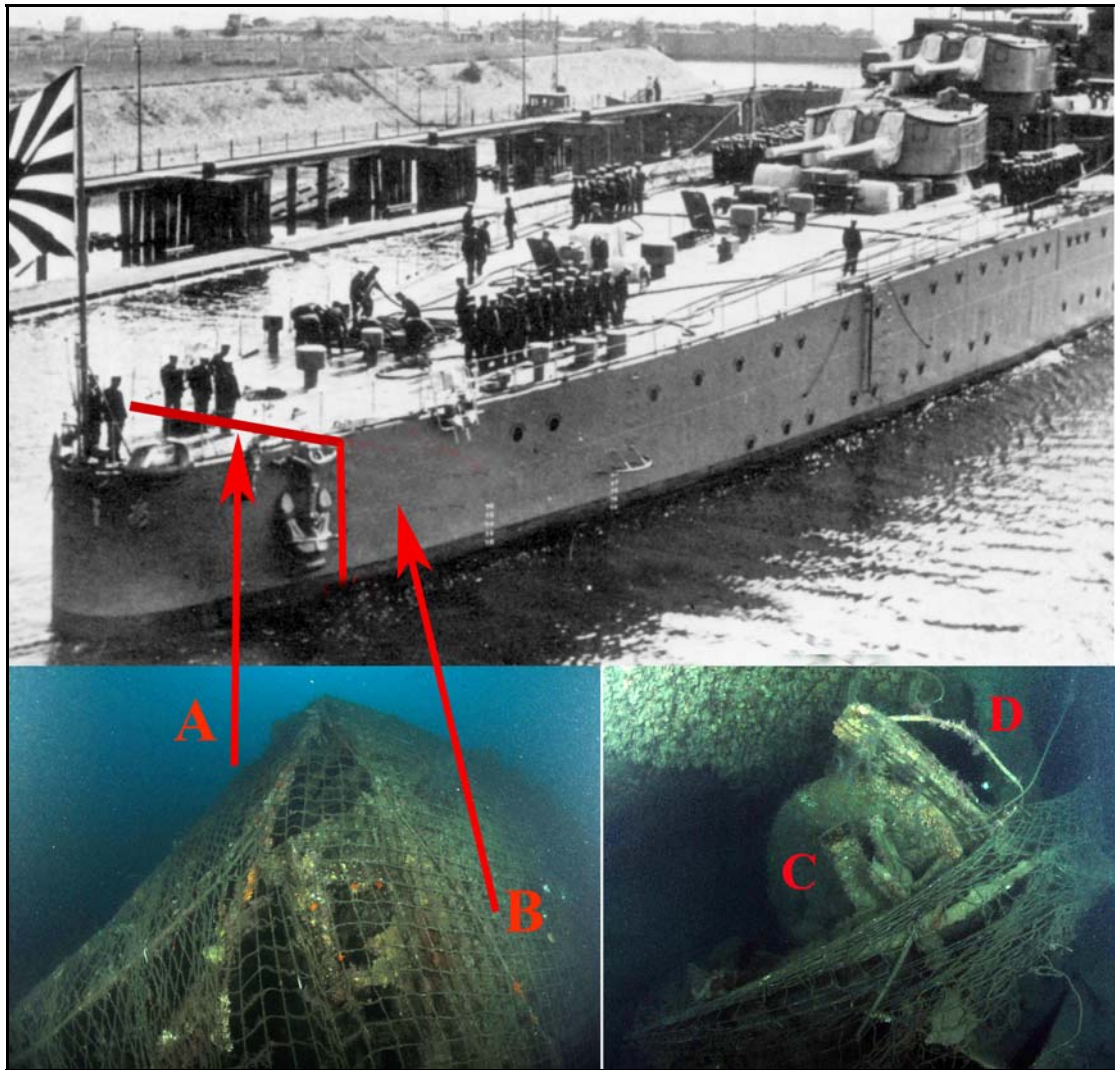
〔私が見た羽黒の最期、似たような状況であった〕  
真中から二つに折れ、大音響と共に缶室浸水蒸気噴出、スクリューが真上にあった。

羽黒沈没時の状態  
羽黒は飛行甲板後部付近でまっ二つに折れた。  
私は五番砲塔付近から矢印のように海上に滑り落ちて、いったん海中に引き込まれ、その後海面に浮上した。

**Bottom.** A illustration showing the location of the break in the quarter deck aft of the #5 turret, the bite out of the port deck and hull (yellow shading in break and bite signifies debris), while the white line aft shows about where the very stern is sheared off. **Top** These two drawings are from a book published by the Haguro Survivors Association and are survivor account depictions as to how they 'saw', or thought/recalled they saw, Haguro sinking. The one to the right even shows where that survivor jumped overboard from (i.e. arrow beside #5 turret) with the ship, supposedly, breaking in half forward of there. However we can state unequivocally that there is no break 'amidships' (the only other 'break' being in the Foredeck), but is actually directly aft of the #5 turret from where he jumped. While no offence is meant, I have found, while forensically examining other wrecks, that as often as not, what some survivors thought had occurred, or thought they saw occur when their vessel was going down, had actually not transpired as they remembered. This is to be understood, given that at a time when your ship is sinking, and there is death and destruction all about, that you would be more concerned with you and your shipmates safety than the actual details of what may or may not be going on about you to the ship; but goes to show that survivor accounts may not always be entirely accurate.

The aft anchor capstan is clearly visible on the Quarterdeck, (the aft edge of the bite out of the port deck previously mentioned being just outboard of it) although the capstan itself is now extended upwards on its shaft about 2m/6ft above the actual deck, as if the capstans' shaft has been pushed upwards through the deck; seemingly as a result of the aforesaid torpedo hit to port, as the surrounding deck *does not* appear to have settled downwards, (i.e. leaving the shaft raised as it were). Approximately the last 6m/20ft of the very stern itself has sheared completely off and the deck has collapsed down onto the seabed, leaving the very stern itself now 'squared off', at about 5m/17ft *across* instead of elliptical. The location of this stern 'shear' is about at a point where, on historical photos of this class of ship, anchors can be seen fixed on the starboard and port side of the hull. [In fact, what appears to be the port anchor, the smaller of the two, can be seen on the seabed abaft the outer port propeller.]

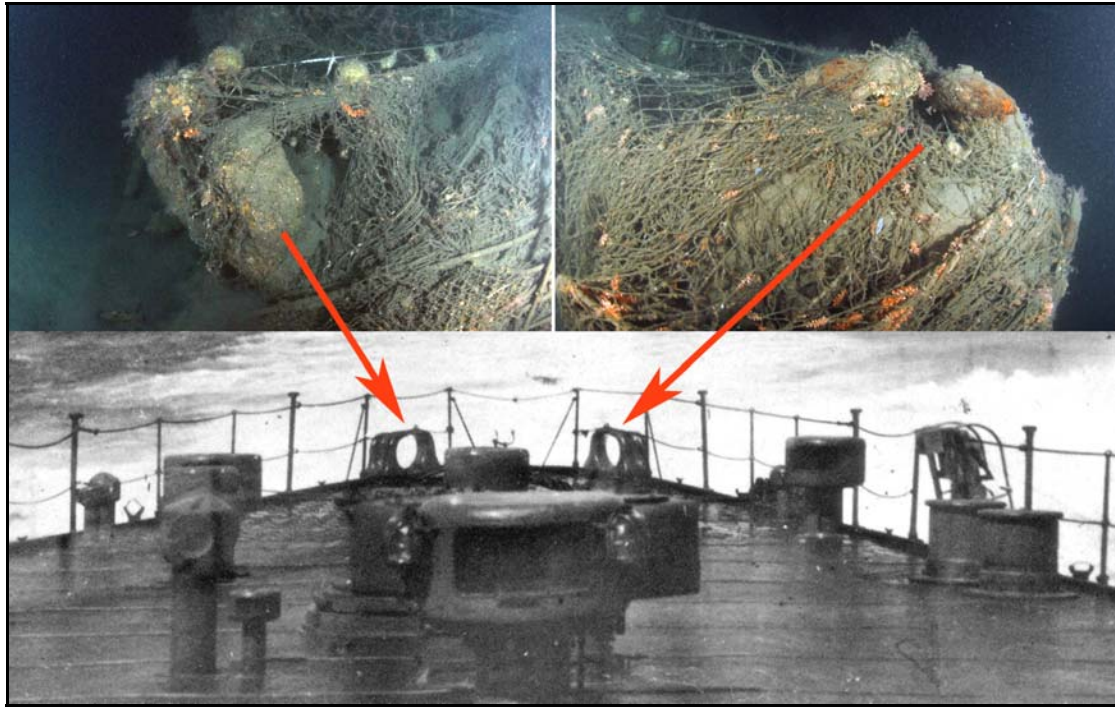




**Bottom left.** The squared-off stern deck edge is directly beneath A arrow, which points to the corresponding position, i.e. the red line across the deck in top photo. B is the starboard hull side. The whole area is incased in net. **Bottom right.** C is one of the blades of the starboard outer propeller (the other two blades are hidden behind the netting), D is one 'arm' of the A Bracket that holds the propeller shaft to the hull.

*Haguro* had four propeller shafts each mounting a three bladed propeller, and one single rudder. The two outer propeller shafts to port and starboard are clearly visible above the seabed, and both propellers are on their respective shafts, although about half of one (the now lower) blade appears to be buried into the seabed. Both outer shafts appear unbent and intact and the 'A' Bracket that holds the shaft onto the hull also appears intact on both shafts. [When one looks inboard under the wreck near the outer starboard shafts A Bracket, several hull plates can be seen hanging down.] Both these outer propeller shafts are up off the seabed by between 1m/3ft to 1.25m/4ft, which also gives an indication of how *Haguro's* stern has not settled into the seabed anywhere near as far as her bow has. Both inner propeller shafts can be seen just abaft of exiting the hull, but further aft the shafts and the propellers themselves are buried under the seabed with only the very top of a blade showing, and the top of those inner shafts' A Brackets can still be seen attached to the hull. [What the absence of damage to the A Brackets (and propeller shafts themselves) implies is that if a torpedo did hit on the stern it did so much 'higher up' on the hull - as the damage, or bite, out of the

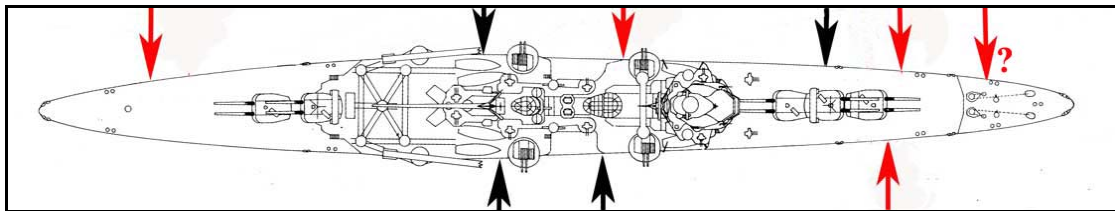
port deck/hull also seems to imply - which would also indicate that it did so very late in the action after *Haguro* had settled low in the water with decks awash (which, according to the 'watching' British destroyer-men, was the state she was in for some time before finally sinking).]



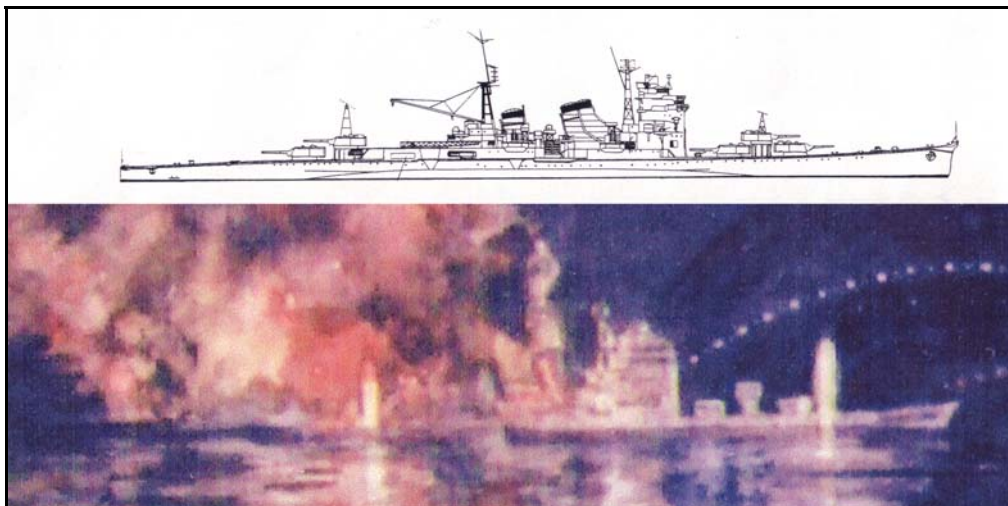
There is a substantial amount of trawler net and heavy line covering the sheared off stern area, all hanging down to the seabed over the now squared off Quarterdeck edge. Follow that net and line down to the seabed and some of the deck and upper hull edge *only* (i.e. almost *no* hull) of this very aft-most piece of stern (i.e. about the last 6m/20ft or so of the rounded off Quarterdeck itself) can be seen elevated about 1m/3ft or so just up off the seabed, with the two aft-most fairleads clearly visible although encased in netting (*see above image*). Because of the amount of netting and several hull plates hanging down onto the seabed at or under the stern, coupled with the collapse of the last 6m/20ft of the very stern itself, and its associated debris, the rudder could not be seen. It remains rather odd however that the aft-most part of the hull itself – i.e. from that 6m/20ft stern piece that has 'sheared off' and collapsed - is mysteriously 'missing' and it is only the very deck itself with the smallest amount of hull beneath, little more than the deck edge itself, that now sits on the seabed.

**TORPEDO HITS.** One of the objectives of the expedition was to determine exactly how many torpedo hits *Haguro* actually took. This was easier said than done, especially given the amount of damage to the hull in the Foredeck area and the break across the Quarterdeck (stern) and the damage abaft that break. The Japanese themselves reported only four hits, three of those in the amidships area. [The black arrows on the diagram below denote where the Japanese thought the torpedoes to have impacted, the red arrows are where Expedition '*Operation Dukedom*' could confirm, or in the case of the '? arrow', suspect hits.] Expedition divers swam along the seabed to both port and starboard, from the bridge superstructure all the way to the very stern, and the only definite torpedo hit that could be ascertained in the amidships area was the one mentioned previously, i.e. below and abaft the port forward dual five-inch HA mount. There is however some deterioration in the torpedo bulge/blister between the

forward and aft five-inch HA mounts on both port and starboard sides *at the very seabed*, but none of this 'damage' is directly comparable to what one would expect from a torpedo hit. That is, the damage goes longitudinally along the hull (torpedo bulge) at *just* the seabed itself, giving the impression that it was caused more from corrosion than torpedo damage itself. So, given that the seabed in that whole amidships area is now actually well below what was once the waterline of the ship, if torpedoes did hit in that area then they must have impacted almost under the ship itself. Of course, given that *Haguro* took on a heavy list to port immediately after the first torpedo hit or hits to the port bow, this is not out of the realm of possibility. Some other damage and missing hull plates were found along the upper hull, but this appeared to be from shell hits and/or fire weakened metal; certainly not the size or shape of damage one would expect to see from a torpedo impact; and besides, the majority of this damage was high on the hull well *above* the waterline.



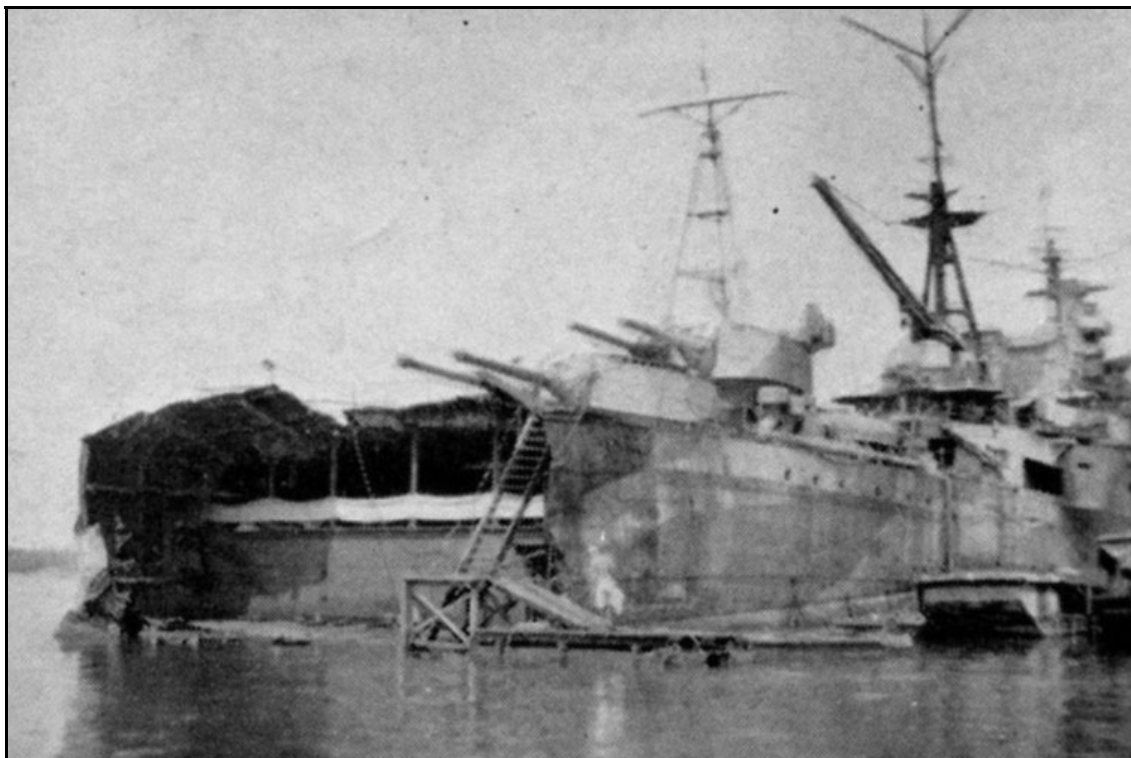
According to British reports they thought they saw the first *three* torpedoes hit simultaneously forward of the bridge. The reason for this was that British sailors reported seeing three columns of flames shoot up very high “*like the Prince of Wales feathers*” - a reference to the feathers on the Prince of Wales crest. Another sailor said the flames looked like ‘*tall Poplar trees*’. However, we know from Japanese reports that all three foreword turrets burst into flames after the forward hit or hits and flames emanating from all three forward turrets leaped as high as the upper bridge. A surviving Japanese officer also reported that drums of fuel (for Pt Blair) were stacked around some of the turrets and it could also have been these that ignited. [No drums or their remains were found on the wreck during the expedition, but given their light construction and the fires that raged on board they would have long ago rotted away.]



Various British destroyers reported other torpedo hits during the engagement, but in any account the author of this report has seen it is not stated, save for the port bow hit/s, exactly where they impacted. [As stated, the British report at least eight hits in total.] However, reproduced above is a painting that Commander De Chair - in charge

of HMS *Venus* which delivered the last two torpedoes to hit *Haguro* - made post-war and depicts where his torpedoes hit. However, while the forward hit (to starboard) is painfully obvious on the wreck, the one he shows hitting towards the stern is not. That is, although the ship is broken in half across the Quarterdeck just aft of the #5 eight-inch turret, the damage on the starboard side does not look at all like it was caused by a torpedo impact, as it is a very clean 'V' shape, and no torpedo holes were found forward of there. Further aft on the starboard hull there is no 'hole' per se, although there are some hull plates hanging down abaft the outer and inner propellers and, as stated previously, the very stern itself is sheered off. [Could this damage have been caused then by one of the last torpedoes having just 'clipped' *Haguro's* very stern?)

On the port side the break is just slightly more 'U' shaped than 'V' shaped, but the adjacent damage to the hull there is not indicative of a torpedo hit either. Abaft the break on the port side however is that large 'bite' out of the deck and upper hull, and if the damage there is from a torpedo hit, which it certainly appears to be, then it must have struck very late in the action when *Haguro's* decks were awash. This is reinforced by the fact that it appears that all propeller shaft A Brackets are intact (certainly the outboard two are, and what can be seen of the inner shafts and their respective A Brackets don't appear to be damaged either); whereas a hit low, or below the waterline, on the hull there would have almost certainly affected - i.e. damaged/broken - the A Brackets and/or the propeller shafts themselves in some way. [It is of interest that one of *Haguro's* sister ships, HIJMS *Myoko*, had her stern break *completely* off in the same general area as where *Haguro's* Quarterdeck is split across - i.e. abaft frame 304 for *Myoko* - while under tow after a torpedo from the submarine USS *Bergall* had previously hit further aft.]



*HIJMS Myoko* in Singapore, circa 1945. Note how her stern has broken off just aft of where *Haguro* has split across her Quarterdeck. Note also that *Myoko's* interior appears to be 'shored up' at about the same location as can be seen when looking forward into the break in *Haguro*, i.e. the photo on left, page 28.

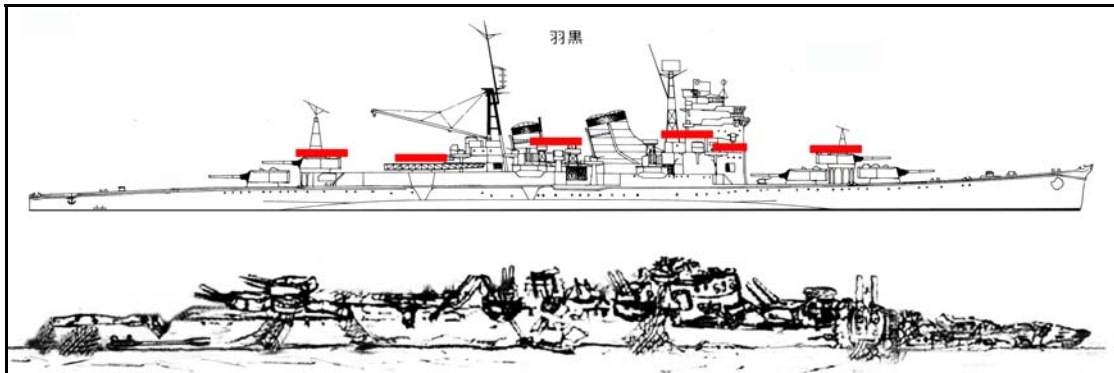
To summarize then, the expedition believes that there have been torpedo hits on the port side at or about Frames 325, 150 and 50 (and *possibly* at or about Frame 20), and on the starboard side at or about Frame 57. It looks also *possible* that there may have been another hit forward of Frame 57 on the starboard side, but the collapse and deterioration of the Foredeck in that whole bow area – to both starboard and port as a matter of fact – makes it difficult to ascertain with any certainty. [There is also the break right across the Quarterdeck at or about Frame 304, which *may* be the result of a torpedo hit, but given the lack of visual evidence one would expect to see on either hull-side there from a torpedo hit, it seems *much more likely* that the ship simply fractured laterally in that location when or after sinking, deteriorating/collapsing further over the years.] If there are other torpedo hits amidships on *either* side then they are under the seabed and hence must have impacted very *very* low on the hull.

Finally, with regards the 'attitude' of the ship when sinking; it could be that given the (as reported) extremely waterlogged - or almost fully flooded - nature of the ship just prior to sinking, and all the extra weight that entailed, that if the stern did start to raise *slightly* out of the water as the ship sank, then the hull simply broke at/about Frame 304, and then settled on the bottom 'in place' as it were. However, that this Quarterdeck break was caused by *Haguro* sinking at an *acute* 'down by the bow' angle, with the stern raised high up out of the water as the drawing on page 29 would imply (as opposed to a relatively level but bow first descent) would be contrary to British observer reports which state that prior to her sinking "...the cruiser was lying deep in the water like a sodden log with her upper deck awash almost from end to end...", which is *highly* suggestive of a critically flooded or 'fully waterlogged' ship. This 'sodden log' description seems further born out by the positioning of the wreck on the seabed, i.e. the almost perfect overall longitudinal alignment of the wreck even though there are 'breaks' fore and aft so to speak, *and* the fact that the wreck is *upright* (as most warships that this author has dived that sank in this depth and were not 'decks awash' just prior to sinking are either on their side or upside down).

### SPECIFIC OBSERVATIONS

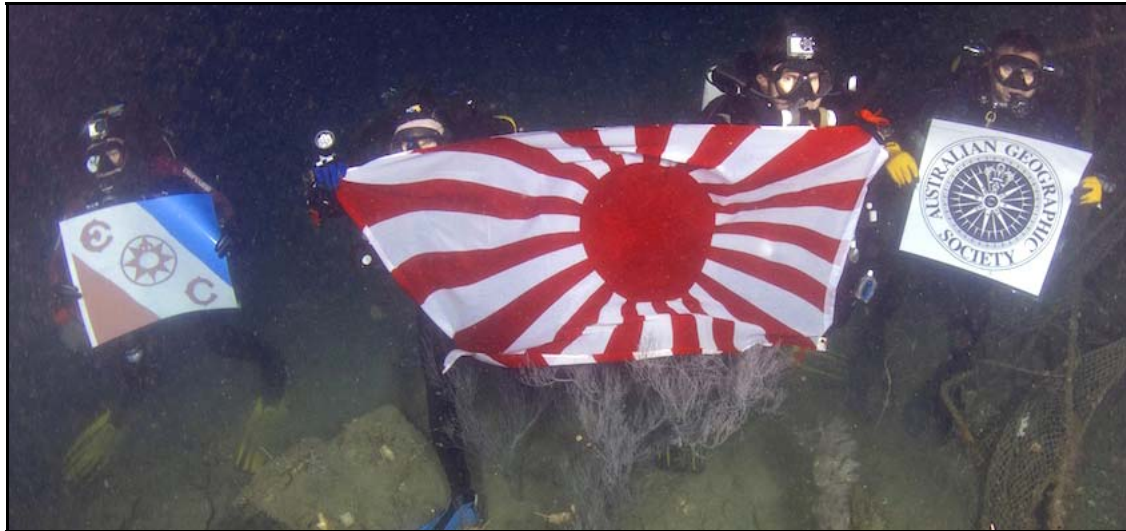
- No single barrel 25mm AA guns were found anywhere on the wreck, although numerous 'singles' are shown on a 1944 refit plan (the latest recorded).
- Triple barrel 25mm AA guns were found in places where they are not shown on the 1944 refit plans (the latest recorded) and are not to be found in places where they are shown (on those same plans).
- Torpedo hits or suspected torpedo hits were found in places other than where the Japanese reported those hits. However, if torpedoes had hit very low on the hull amidships the damage in some places *may* be buried under the seabed, although the seabed there *is* now well below the waterline. If hits had occurred *after* the ship had been abandoned then these may have just gone unrecorded.
- Although massive damage exists to *Haguro's* bow, it seems unlikely that the first three torpedoes hit simultaneously there (at the start of the action). More likely what British observers witnessed were fire columns from internal explosions caused by a single hit. [It would also be highly unusual for a spread of *three* torpedoes (fired by a single destroyer) to have impacted in such a tight 'grouping', i.e. in the area between #2 eight-inch turret and the bow.]

- The wreck is shown to be 'broken in half' abaft the aftermost (#5) eight-inch turret, not abaft amidships [For the record, although there are some Japanese reports that *Haguro* 'broke in half' just abaft the mainmast (i.e. between the mainmast and #4 eight-inch turret) prior to sinking this can now be definitively stated not to be the case. There is *no* break amidships, that is the deck and hull on both the port and starboard sides, from the bridge to abaft the aft-most eight-inch turret is intact. As stated, the break is actually somewhat aft of #5 eight-inch turret and appears to be at or just about Frame 304.]
- The upper portion of the bridge superstructure was found to have collapsed directly downwards onto itself and the surrounding deck over the years since submerged, as opposed to having been pulled off (by trawlers trying to retrieve snagged netting), or having collapsed over onto the seabed to either side of the wreck some time after sinking.
- Netting encases many areas of the wreck, but these areas change and vary in coverage as more net is either added, or in some way 'removed', over time.



*The red lines on the upper schematic depict the highest points at various locations along the wreck, 2010. The lower image is an 'updated' version of a sketch historian and author Tony Tully made after discussions with this author circa 2004. That is, in 2010 we found that the seabed was not at the ship's waterline as originally envisaged, but much lower, and that the outer propeller shafts were visible above the seabed; so his original sketch was 'altered' to take that and other new information into account.*

**FOOTNOTE:** Although HIJMS *Haguro* is a very fascinating wreck to explore it is unfortunate that so much snagged/discarded trawler net and heavy line lie across so much of the wreck, 'hiding' many distinguishing features. Also the constant snagging and dislodging of trawler net, etc, over the years has no doubt accelerated the deterioration of the wreck site considerably – and continues to do so. [As a matter of fact, due to extreme fishing pressure, as well as other forms of human impact, many of the wrecks I have dived throughout the Asian region have been impacted in this way. Given that fact, I believe it is of paramount importance to document and conserve what knowledge can be obtained from many of these historic warship-wrecks before they degrade even further.] *Haguro* is also a challenging wreck to dive, very much so at times, because of the depth, the customary low visibility, the very strong currents that generally sweep the wreck, and of course that *ubiquitous* trawler netting. And hence why the wreck is only very seldom visited by divers. However, *Haguro* is still a very interesting and historic wreck to dive, and although she is now disintegrating at a rapid rate, remains one of my favourites to explore.



*Divers hold the various flags that were carried on the expedition - or laminated copies thereof, left and right - on the port Foredeck of Haguro under the barrels of #3 eight-inch turret; left to right, Explorers Club Flag, Japanese Navy Ensign and Australian Geographic Society Flag.*

## WEB SITES OF INTEREST

Photos from the 2003 *Haguro* discovery and 2005 Survivors Reunion in Penang  
<http://www.ijn.dreamhost.com/IJN%20Wrecks/IJN%20Wrecks%20-%20Haguro.htm>

HIJMS *Haguro* TROM (Tabular Record Of Movement)  
[http://www.combinedfleet.com/haguro\\_t.htm](http://www.combinedfleet.com/haguro_t.htm)

Several chapters from the book 'Sink The *Haguro*' by John Winton  
<http://www.secondworldwar.org.uk/haguro.html>

HIJMS *Kuma* TROM  
[http://www.combinedfleet.com/kuma\\_t.htm](http://www.combinedfleet.com/kuma_t.htm)

HM Submarine *Tally-Ho* (Sank HIJMS *Kuma* and UIT 23)  
[http://en.wikipedia.org/wiki/HMS\\_Tally-Ho\\_%28P317%29](http://en.wikipedia.org/wiki/HMS_Tally-Ho_%28P317%29)

SS *Sun Vista* (ex SS *Galileo Galilei*)  
[http://en.wikipedia.org/wiki/SS\\_Galileo\\_Galilei](http://en.wikipedia.org/wiki/SS_Galileo_Galilei)

Information on Closed Circuit Rebreather (CCR) technology  
<http://en.wikipedia.org/wiki/Rebreather>

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