

# WRECK OF THE JAPANESE TYPE 'A' MIDGET SUBMARINE *M24*

## Preliminary Archaeological Survey Report



Bungan Head, Newport, Sydney, Australia

**Heritage Branch**  
NSW Department of Planning  
Underwater Cultural Heritage Program



NSW GOVERNMENT  
Department of Planning

**Report by: Tim Smith**  
*M24* Project Manager  
Maritime Archaeologist, Deputy Director



Australian Government  
Department of the Environment and Heritage

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**Front cover:** 1:10 scale model of *M24* produced by Animax Films Pty. Ltd.  
Photograph by Tim Smith.

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## Summary of preliminary archaeological survey findings

1. The wreck site located by No Frills Divers (the finders) in November 2006 is confirmed to be the *M24*, third and final of the Japanese Type A Imperial Japanese Navy midget submarines lost from the 31 May – 1 June 1942 attack on Sydney Harbour (Port Jackson).
2. The wreck lies upright on sand in a water depth of 54 metres, three nautical miles offshore from Newport, Sydney, and east of Bungan Head.
3. The wreck lies slightly under half buried in surrounding sediments on a gently shelving sand plain.
4. The crew did not fire their internal demolition (scuttling) charges, which would have resulted in massive destruction of the hull.
5. *M24* is largely intact although has sustained damage by commercial fishing trawling operations since its loss 65 years ago.
6. These impacts (of unknown number and frequency), have most probably caused the observed removal of most of the conning tower structure, bow and conning tower net cutting equipment, torpedo and propeller protective cages, and the forward section of the upper torpedo tube.
7. Some removed elements, such as the conning tower access hatch, conning tower net cutting mechanism, and upper torpedo tube are retained in a debris field that surrounds the site.
8. A significant amount of corrosion has occurred to the main pressure hull immediately aft of the control room (conning tower), enabling access points into the main hull at the aft battery room.
9. The cause of this damage is presently unconfirmed, but most likely resulted from stress applied to the hull at this point during the attempted recovery of entrapped fishing nets.
10. Sand levels in the aft battery room are moderate (approximately 2/3<sup>rd</sup>s filled; 1.20 metres), with the openings into the hull acting to allow water movement and sand scouring.
11. The aft scuttling charge is projected to be located in this aft battery room, immediately forward of the motor room bulkhead (frame 54).
12. No visual trace of the charge has been made, but it is now considered likely to be buried under the accumulated sediment in this compartment.
13. There are no visual access points into the forward section of the submarine to enable an assessment of the condition of either the forward battery room, forward scuttling charge, or torpedo room.
14. The removal off site of the crew access chute that once passed through the conning tower has created a circular opening into the main hull at the control room.
15. The control room itself appears to be also approximately 2/3<sup>rd</sup>s filled with drift sand.
16. It is considered likely that the crew remains are retained within the hull, possibly within the sand-filled control room. This is indicated by the presence of the retractable crew exit ladder still stowed in its upright (unused) position.
17. Human remains have not been sighted as yet.

## 1.0 INTRODUCTION

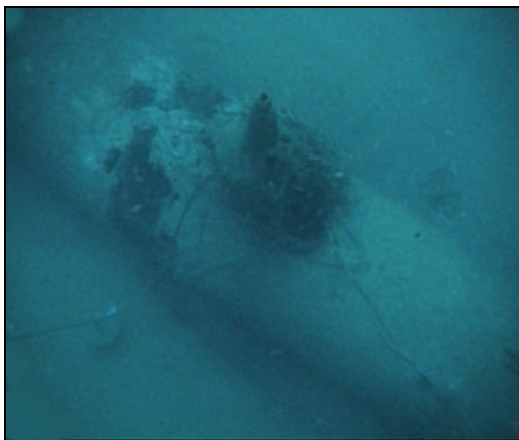
Under direction of the Hon. Frank Sartor the Minister of Planning (Heritage), since 1 December 2006, the Heritage Office, NSW Department of Planning has been coordinating maritime archaeological surveys<sup>1</sup> of the submarine wreck site identified as the missing Japanese midget submarine, *M24*.

Located seaward of Bungan Head, Newport, on Sydney's Northern Beaches, the wreck lies just under 3 nautical miles east of the coastline in a water depth of 54 metres.

The site was first located on 12 November 2006 by a Sydney-based recreational diving club, No Frills Divers, following their detection of a seabed anomaly using an echo sounder. Footage of their discovery was brought to the attention of the Royal Australian Navy and the Department of Defence (Commonwealth), who informed the appropriate heritage management agencies at both Commonwealth and State Government level. Navy experts quickly identified it as a midget submarine, possibly one of those used in the raid on Sydney in WWII<sup>2</sup>.

To confirm the tentative identification, the Royal Australian Navy directed a Navy mine hunter, HMAS *Yarra*, to inspect the site via remote operated vehicle (*Double Eagle*). This inspection (27 November 2006) confirmed the identification of the site as a Japanese Type A midget submarine lost during the daring raid at Sydney on the night of 31 May/1 June 1942. Maritime Archaeologists from the Heritage Office participated in the survey and corroborated the identification.

The wreck could only have been the missing midget deployed from mother submarine *I-24* henceforth referred to as (midget) *M24*, one of three midgets that attacked Sydney during the raid. The other two boats had been destroyed in the harbour (Midget *Ha-14* from *I-27* and Midget *Ha-21* from *I-22*), and recovered shortly after. *M24* had escaped and was never heard from again. 2007 marked the 65<sup>th</sup> anniversary of the raid making the current round of archaeological surveys of special and timely importance.



**Figure 1:** General view of the *M24* wreck site. Photo: Heritage Office/Royal Australian Navy. **Figure 2:** The wreck site teeming by fish life. Photo: Heritage Office/Royal Australian Navy.

<sup>1</sup> Maritime Archaeologists David Nutley and Tim Smith, Heritage Office - NSW Department of Planning (State Government), Underwater Cultural Heritage Program.

<sup>2</sup> This initial identification was made by Commander Shane Moore, Director Naval Heritage Collection.



The 2007 survey operations have confirmed the wreck to be *M24*:

- the wreck is that of a Type A Japanese midget submarine;
- Japanese records indicate that only three midgets took part in the sole 1942 Sydney raid; with two being recovered at the time, leaving *M24* unaccounted for;
- Allied intelligence considered that *M24* escaped the harbour to coastal waters;
- the wreck is devoid of its two torpedoes, and *M24* was the only midget to fire; and
- the wreck is located in a position that has an historical association to the raid

### 1.1 Previous Heritage Office involvement with *M24*

As the NSW agency responsible for underwater cultural heritage management, the Heritage Office, NSW Department of Planning, has investigated a number of earlier claims of the midget's discovery. The agency has also led its own searches for the site since the program's inception in 1988. In December 2005 the agency discounted the announcement of *M24*'s discovery under sand near Lion Island, inside Broken Bay<sup>3</sup>. That claim had been made in a television production, 'M24: The Last Sunrise', aired on pay-TV station Foxtel on 11 November 2005. It followed Sydney-based film company Animax Films' historical documentary, 'He's Coming South' detailing the historical details of the raid, and a theory proposed that the midget may have ended up in Broken Bay.

Subsequent sidescan sonar, sub-bottom profiler and magnetometer surveys commissioned by the Heritage Office proved that the claim was incorrect. The activity however served to reinvigorate interest and debate in the role and ultimate fate of *M24* and its crew.

The Heritage Office postulated at that time, that when found, the midget would be located upright and probably half buried if located on a sandy bottom.

### 1.2 Discovery

In Australia, underwater heritage management is implemented at both a Federal and State level. The Commonwealth Department of the Environment, Water, Heritage and the Arts (at the time: Department of Environment and Water Resources - DEWR), has carriage of the Commonwealth *Historic Shipwrecks Program* and delivers Commonwealth funding to State and Territory agencies responsible for program implementation.

Each State or Territory agency also coordinates its own underwater cultural heritage program that includes management of additional shipwrecks and other heritage sites not covered by the Commonwealth *Historic Shipwrecks Act* 1976 legislation. In NSW that agency is the Heritage Office, NSW Department of Planning.

The Department of the Environment, Water, Heritage and the Arts was advised on 20 November 2006 by the Department of Defence of the reported discovery of the missing Japanese midget submarine *M24* by amateur divers off Sydney's Northern Beaches.

A story on the discovery was aired on commercial television (Channel 9's 'Sixty

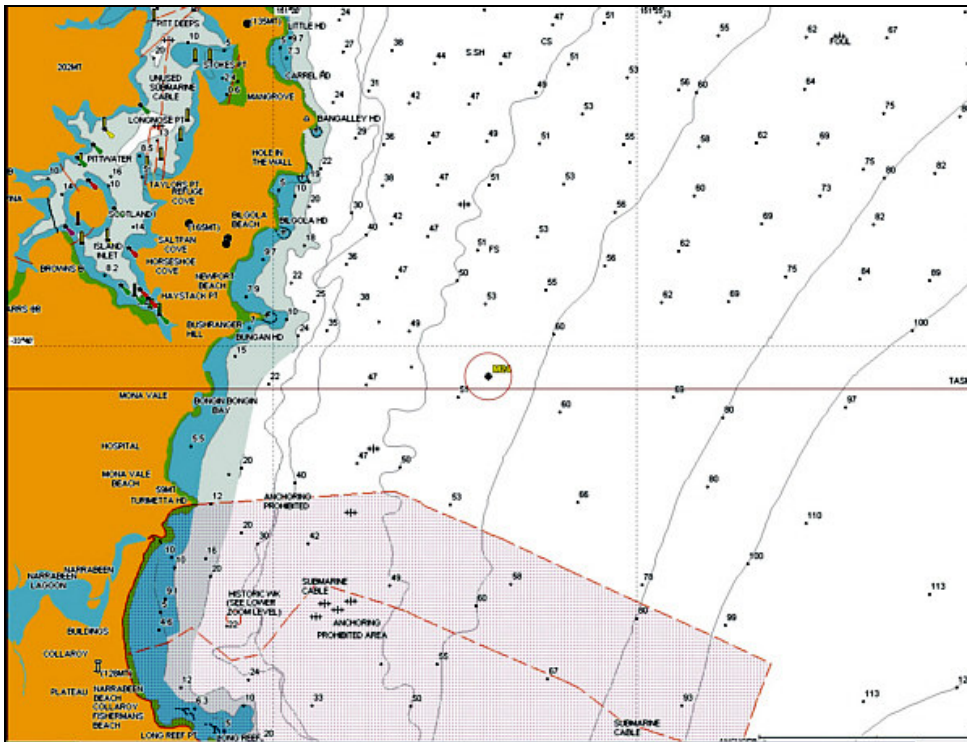
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<sup>3</sup> Smith, Tim., 2005, Investigations of the reported discovery site of the missing Japanese Type 'A' midget submarine, *M24*. Heritage Office. Parramatta.

Minutes' program) on Sunday 26 November 2006 and included video footage of the vessel. The discovery had occurred by chance when the avid recreational divers had detected an anomaly on their dive boats' echo sounder. Transiting near a known historic shipwreck at the time, they decided to dive the anomaly when conditions next allowed. The echo sounder probably picked up fish that live in the water column above the wreck and the entrapped fishing nets that festoon the site. The dive was adventurous being undertaken on air using standard SCUBA equipment, well beyond accepted recreational air diving limits (considered at 40 metres depth).

The NSW State Minister for Planning (and heritage), in conjunction with the (then) Federal Minister for the Environment and Heritage, quickly confirmed that the wreck was the missing Japanese Midget Submarine *M24* on 1 December 2006. This followed the remote operated vehicle (ROV) inspection by the Royal Australian Navy (above).

Because of the wreck's historic links to Japan and because of the potential for retention of Japanese war dead (Sub Lieutenant Katsuhisa Ban and Petty Officer Namori Ashibe) within the structure, the Japanese government has an interest in Australian discussions regarding preservation of the site.



**Figure 3:** *M24* location map. The site lies east of Bungun Head, Newport, north of Sydney.

The *M24* now lies within a 500-metre radius no-entry exclusion zone gazetted around the wreck under the Commonwealth *Historic Shipwrecks Act* 1976. Courtesy: NSW Department of Commerce.

The Australian Government therefore formed an Interdepartmental Committee (IDC) to guide future site actions. The IDC includes Japanese Government representation through participation of the Japanese Embassy and the Japanese Naval Attaché to Australia. All decisions made relative to the site involve consultation with the relevant parties.

### 1.3 Environmental location of *M24*

The *M24* lies in the coastal waters of New South Wales, Australia, just within the three nautical mile state boundary. The nearest adjacent headland is Bungan Head within the Sydney suburb of Newport. Lying at a depth of 54 metres, the wreck is one of only a handful of shipwrecks detected along Sydney's Northern Beaches – an area that spreads from Sydney Harbour at Manly (North Head) to Palm Beach (Barrenjoey Headland). Notable wrecks include the *Myola* (1919), *Duckenfield* (1889) and *Birchgrove Park* (1956). The other detected wrecks constitute a ships graveyard and fish breeding habitat formed off nearby Long Reef, to the south, from the 1970's.

*M24* sits upright on sand with its bow pointing in an easterly or seaward direction. The seabed consists of a uniformly shelving sand deposit from the coastal cliffs and is generally devoid of exposed reef platforms. There is no present indication of sand depths around the wreck but certainly no signs that the wreck sits on a buried reef structure.

A feature of the wreck is the plethora of marine life that has colonised it, including algae's sponges and whip corals however the depth of coverings appears light. The surface of the hull can be easily 'read' despite the accumulation of marine species and associated corrosion products. These coverings are very light, perhaps due to the rounded nature of the hull resisting colonisation and past scouring net hook-up activity, compared to nearby iron and steel historic shipwrecks. Resident and visiting fish species however make interpretation internal features difficult due to their abundance - particularly within the aft battery room.

The site is subject to the actions of swell and current, with the latter being measured in excess of 3-knots at various times during the present survey. A significant storm event during 9-11 June 2007 resulted in extreme sea conditions with 14-metre+ wave heights being measured on Sydney's offshore "Wave Rider" water monitoring buoys. The effects of this activity on the wreck and seabed has not been analysed but is likely to result in sand movement at depth, scouring by mobile sand transportation, and possible transfer of sand deposits through the extant openings in the pressure hull, perhaps resulting in seasonal deposit fluctuations. Generally the sand deposits surrounding the *M24* wreck have been observed to be uniform, with no obvious berms or areas of scouring.

### 1.4 Presentation of *M24*

The following summarises Section 8.0: Preliminary archaeological interpretation of survey imagery (below)

- The *M24* is generally in reasonable condition however the external fabric has been damaged by commercial fishing trawling operations over the last 65 years.
- The wreck lies upright on sand and just under half buried in the sediment. It appears that the bow is slightly elevated as the lower torpedo tube is approximately a third filled at sand level. Both tubes are empty of their torpedoes confirming the identification of the vessel as *M24*, the only midget to successfully fire its two torpedoes. The upper tube has been torn off the vessel back to a substantial bulkhead and lies almost totally buried in sand adjacent to the bow on the port quarter.

- At the stern, sand levels lie at the centreline of the propeller boss (missing). Both contra-rotating propellers are visible, although all exposed rudders, stabilisers and the protective cage around the propellers have been removed by fishing nets. Just forward of the stern, the topside manhole that gave access to the motor room appears lost to corrosion, providing a minor cavity in the hull plating.
- The internal hull aft of the control room is approximately two-thirds filled with sand as evidenced through several significant openings in the pressure hull. These openings extend around the hull immediately aft of the rear control room bulkhead and beyond the conning tower area (see below). They extend from sand level to the roof, with corrosion processes resulting in plate loss back to internal transverse frames. The openings allow water movement through this aft battery room and tend to 'self-flush' this major compartment, keeping sand levels down. Several fittings and fixtures that adorn the aft battery room are visible through these openings (discussed in detail below).
- Significantly, the control room compartment is partly filled with sand to under the original internal casing 'roof'. This sand has apparently entered the space as a result of significant damage to the upper conning tower structure and the aft battery room openings. Externally, all plating that comprised the conning tower has been removed from the hull, including the forward access 'chute' into the control room. This once formed part of the pressure hull and its removal has formed an artificial opening into the main hull atop the submarine. Only the pressure dome and periscope standard of the aft portion of the conning tower survives intact, however, the damage has created an opening of approximately fifty (50) centimetres in diameter.
- Drift sand has probably entered the control room space partly through this opening and apparently to the same depth as observed in the aft battery room. When the finders video footage of the wreck was first examined, there was an indication that the rear bulkhead door into the control room was closed. This led to speculation that both fore and aft doors were probably shut to enable sand accumulation and retention within the control room space. However, the current surveys have confirmed that the aft door to the control room is in fact open, though significantly sanded up. It is likely that the forward control room bulkhead door is closed to assist sand build up. If future examination shows this is not the case, the forward battery room and perhaps the torpedo room, must also have significant introduced sand deposits.
- Inside the periscope well, the upper portion of the periscope tube is visible transiting into the control room sand deposit. The periscope does not extend externally beyond the periscope standard, suggesting that it has retracted into the periscope well built into the floor of the control room, or been torn off if once extended. At no point could the upper portion (lens) of the periscope be sighted within the opening of the periscope standard.
- Around the internal upper 'walls' of the control room are several gauges and levers that comprise part of the operating controls of the submarine. Of particular interest are the 'steps' built into the forward face of the periscope well that allowed crew egress and ingress, and the clearly visible retractable two-step crew ladder hinged at the weld join of the periscope dome and the 'ceiling' of the pressure hull.

- This ladder is still in its upright or 'stowed' position, once within the cavity of the 1.5 metre-deep access chute, now lost. This is the firmest indication that the crew of *M24* are most probably still within the submarine hull. To exit the craft, Ban and Ashibe would have had to pull down this hinged ladder to climb up and out of the control room.
- The original 'signature' of the external conning tower plating is clearly visible on the upper surfaces of the wreck, marked by the angle iron framework where it was attached to the casing.



**Figure 4:** The sleek outer lines of a Type A midget conning tower (*Ha-14*).

This vessel, with *Ha-21*, was recovered after the Sydney Harbour raid. Photo: Tim Smith.



**Figure 5:** *M24* – View of conning tower from forward.

The image shows the steps built into the rear wall of the periscope pressure dome, with the forward chute largely torn off the vessel. Clearly visible is the small hinged access ladder still in the stowed position within the opening formed within the casing. Photo: Heritage Office/Royal Australian Navy.

Some elements of the conning tower still survive in the debris field that surrounds the wreck. Almost incredibly, the water-tight hatch that once sealed the access chute lies beside the conning tower on sand to port. Once upright, the lid has been turned over by divers to reveal its underside and locking mechanism (lugs), which tentatively appear to be in the 'locked' position (see discussion below). While there is no sign of the significant access chute itself (part of the original pressure hull), the harbour net cutter that once adorned the forward conning tower, with its distinctive 'teeth', lies separated on the sand, also on the port side, slightly abaft the conning tower. Resting against the submarine hull, its 'wishbone' attachment frame is clearly visible. There is no clear sign of the aft jumping wire that extended from the conning tower to the stern.

The main hull forward is mostly intact, and unlike the stern, reveals no visual access points into either the forward battery room or torpedo room. Apart from some abrasion to the upper hull surfaces caused by fishing nets, and perhaps some modern impact by an anchor or some other foreign object (starboard side of torpedo room), there is no significant damage to the casing. Hence it is impossible to postulate the condition of their internal spaces, including the presence, or otherwise, of sand levels or other relics.

Like the conning tower, the forward bow area has witnessed significant physical damage. As noted, the upper of two torpedo tubes has been almost half torn off the hull and now

lies in the sand to port. The main bulkhead (at frame 7) is clearly exposed, while the lower tube is completely intact to the bow. Running along the forward centreline of the casing, the original hydraulic lines that extended to the bow torpedo cap release have been torn off with one lying across the hull to port.

Most of the front end of the submarine is still concealed by entrapped fishing nets that make interpretation difficult. What is clear is that the protective cage around the torpedo tubes has been removed from the hull, including the forward net cutting gear and serrated cable that passed from here back to the conning tower. It is possible that some of these elements might be detected with a fuller examination of the major debris field that extends out from the bow of the wreck for some one-hundred meters on sand.

The initial archaeological survey taskings have indicated that no scuttling charges have been fired by the crew, nor that there is any obvious battle damage to the hull.

## 2.0 Management Issues

### 2.1 Significance

The *M24* is of heritage significance to Australia and Japan and the only Japanese midget submarine wreck located in Australian waters<sup>4</sup>. The site is the only in situ identified cultural relic surviving of the attack on Sydney Harbour in 1942 and is important as the vessel that sank the depot ship HMAS *Kuttabul*, killing all twenty one Allied personnel lost in the attack. The wreck is representative of Japanese submarine operations off Australia's eastern seaboard during the war and a direct physical reminder of the conflict at Sydney. Internationally, it represents one of only five Japanese midget submarine wreck sites located in their unique underwater contexts.

Remains of a further six are retained as static museum or outdoor display exhibits. The archaeological site is therefore of considerable importance in the comparative analysis of midget submarine wrecks discovered world-wide. The site also has the ability to contribute generally to studies of submarines as a specialised class of archaeological site type.

Only limited archival information related to these vessels survives and therefore the archaeological record is of added importance. In regard to the three submarines that attacked Sydney Harbour, *M24* is the only one retained in its original battle context and undisturbed, apart from the obvious effects of net entrapment and corrosion activity.

A formal assessment of significance has been completed for the wreck site (Appendix 5). All future site actions must be undertaken based on an understanding and appreciation of the site's heritage values, and to ensure those values are maintained.

### 2.2 Risks to site

There is a significant risk that nets from fishing boats could continue to cause damage to the hull and associated relics. This threat is however moderated with modern GPS navigation systems that provide for accurate positioning of submerged wreck sites. The 2006 gazetted no-entry protected zone around the site will also reduce accidental damage, with lit surface buoys denoting the wreck's presence into the future.

A sophisticated in-water acoustic and camera surveillance system has been installed at the site as a joint venture between Australian Federal and NSW State Government. The system allows for vessel tracking and in-water sound detection within the no-entry zone around the wreck. Operating from permanent (lit) buoys, an alert triggers a base station for action by appropriate authorities such as the NSW Water Police for breaches of the zone. The system includes a land-based long range CCTV camera that provides real-time visual imagery of any transgressions within the perimeter.

Boat anchors pose an enduring risk to the site with one presently fouled in the fishing nets entrapped at the bow. At this time, anchoring within the protected zone

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<sup>4</sup> *M24* is one of only ten submarine wreck sites in Australian waters out of approximately 6 500 shipwreck sites. The remains of the ocean-going submarine *I-124* off Darwin (1942), Northern Territory, represent the only other Japanese submarine wreck within Australian jurisdiction.

encompassing the wreck is prohibited, removing this immediate risk while the site is analysed.

There is a significant risk that, unprotected, divers could disturb the site (eg by inadvertent contact, poor anchoring techniques, via shot line placement), or in the worst case to attempted artefact recovery. Significant access points allow entry into the sensitive control room and aft battery room areas which are likely to retain significant relics in their original archaeological context, together with accessible hull fixtures and fittings. Further, the wider debris field has an undocumented number of relics removed from the site via fishing net contacts.

For these reasons diving has been prohibited at the site except by bone fide site managers until it is comprehensively mapped and inventoried, and sound policies developed that will enable possible controlled diver visitation as a recreational pursuit.



**Figure 6:** Part of the Zylotech Ltd. acoustic and camera surveillance system

Established at the site with real time alert and data capture capability (<http://www.zylotech.com.au/>). Photo: David Nutley.



**Figure 7:** NSW Water Police fast response.

NSW Police are designated Historic Shipwreck Officers under the Commonwealth *Historic Shipwrecks Act* 1976, and also have authority to investigate breaches of the NSW *Heritage Act* 1977. Photo: David Nutley.

### 2.3 Human remains

As the *M24* hull is substantially intact, the hull is likely to contain the remains of its two-man crew. While there has been no visual evidence to confirm the existence of human remains to date, there is corroborative evidence to suggest that the crew did not escape the vessel (see discussion below, Section 6.0). It is presently unknown whether the corrosion openings to the hull have compromised the retention or context of human remains.

### 2.4 Unexploded Ordnance

The Chief of Navy (Australia) and the Heritage Office have confirmed that two explosive scuttling charges (unexploded ordnance) will be retained within the vessel and may pose a danger. Their condition and exact location is not confirmed (see discussion at Appendix D). Historic analysis has indicated an explosive TNT charge ranging from 60 pounds (27 kilograms) to 300 pounds (c.135 kilograms) each. This is a reflection of the limited archival documentation surviving. Research will continue on the likely volatility of these charges, their integrity and probable form of casings.

### 2.5 Depth constraints

Because *M24* lies beyond approved recreational SCUBA diving, and normal non saturation occupational (Commercial) diving limits, visitation by Government heritage



managers and related professionals is constrained. However deep wreck recreational divers using mixed gas equipment such as Trimix or semi to closed circuit rebreathers systems can readily reach the site.

## **2.6 Heritage controls**

All management and survey activities at the site must adhere to the controls of established Commonwealth and State heritage legislation that apply, and be in keeping with the UNESCO *Convention on the Protection of the Underwater Cultural Heritage* (2001) <sup>5</sup>.

## **3.0 Statutory Protection**

### **3.1 *Historic Shipwrecks Act 1976***

On 24 November 2006 the then Minister for the Environment and Water Resources provisionally declared the wreck (believed to be the *M24*), an historic shipwreck under the Australian Commonwealth *Historic Shipwrecks Act 1976*. The declaration made it an offence to interfere with the wreck site, or its relics, without authorisation.

The then Minister for the Environment and Water Resources also declared a protected zone that encompasses the vessel on 1 December 2006 under Section 7 of the Act. The zone is centred at the intersection of the parallel 33° 40' 21" South latitude with the meridian 151° 22' 58" East longitude (WGS 84 datum) – not the actual position of the wreck.

Activities including the mooring, diving and use of a ship, are prohibited within the 500-metre radius protected zone around the *M24* site, unless authorised by permit. Permits to enter the protected zone are regulated by the Heritage Office, NSW Department of Planning, or the Federal Minister.

### **3.2 *New South Wales Heritage Act 1977***

On 1 December 2006 the New South Wales (NSW) State Minister for Planning, The Hon Frank Sartor MP, also announced that an interim heritage order (IHO) had been gazetted over the site under Section 24 of the NSW *Heritage Act 1977*.

The gazettal allowed for the protection of the remains with penalties of up to \$AUS1.1 million for physical disturbance to the item or associated relics for a twelve (12) month period.

During this time, the heritage significance of the structure was assessed by the Heritage Office, NSW Department of Planning, with a view to recommending that the Minister, on the advice of the Heritage Council of NSW, list the *M24* as an item of State heritage significance on the *NSW State Heritage Register* (SHR). This action would apply the full protection of the Act in perpetuity.

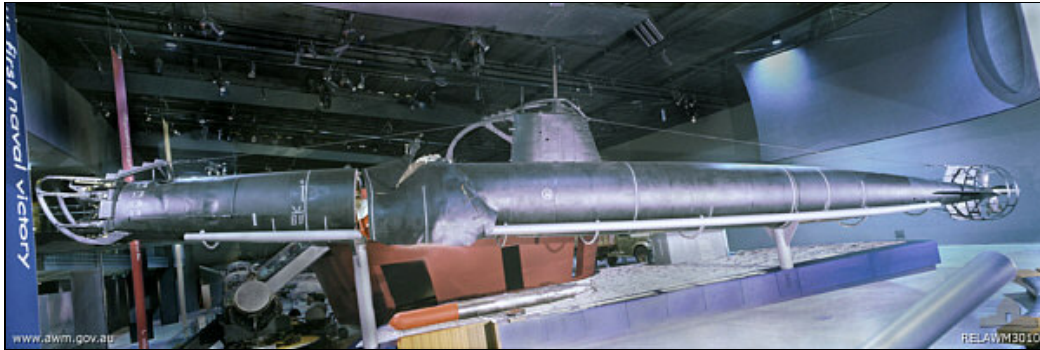
The interim heritage order concluded on 1 December 2007. On determination by the Minister for Planning, the *M24* was gazetted as an item of State heritage significance

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<sup>5</sup> It is noted that the UNESCO Convention does not apply to naval wrecks like *M24* or those under 100 years of age. Australia has not yet ratified the Convention. However, heritage agencies, like the Heritage Office, NSW Department of Planning, in tandem with the Heritage Council of New South Wales, acknowledge the Rules to the Convention as appropriate guiding principles in the management and interaction with underwater cultural heritage sites.

to the State of New South Wales on 7 December 2007 with a listing boundary matching the 500-metre radius no-entry zone of the Commonwealth Act.

The *M24* has been identified to be of possible national heritage significance, warranting consideration for listing on the Australian Commonwealth *National Heritage List* under the *Environmental Protection and Biodiversity Conservation Act* (EPBC) 1999. A recommendation to list the site under that legislation is currently under consideration.



**Figure 8:** The composite midget submarine on display at the Australian War Memorial, Canberra.

Image courtesy: Australian War Memorial (AWMRELAWM30104).

The exhibit includes portions of the two recovered boats from the Sydney attack, *Ha-14* and *Ha-21*. Photograph: Australian War Memorial.

#### 4.0 Historical setting of the Sydney Harbour attack

The Japanese midget submarine attack on Sydney Harbour was a calculated mission that had the potential to seriously affect the security of one of the major Allied naval arsenals retained in the Southern Hemisphere. Like the midget attacks at Pearl Harbour six months before (7 December 1941), and the parallel raid at Diego Suarez Harbour in Madagascar (30 May 1942), the outcome was arguable. No significant fleet units were damaged, although the United States Navy heavy cruiser USS *Chicago* was lucky to survive the torpedoes of *M24*. Running past their principle target, the torpedoes struck Garden Island Naval Base, one failing to explode, the other detonating under a Sydney ferry converted to a naval depot ship, HMAS *Kuttabul*, killing twenty-one aboard and injuring another ten.

While two of the submarines and their crews were destroyed in the harbour (midget *Ha-14* deployed from *I-27* and midget *Ha-21* from *I-22*), with *M24* lost outside the harbour following the raid, the attack did reveal the vulnerability of ports like Sydney to long-range submarine patrols and the need for heightened security.

Many Sydney-siders still recall the moments at night on 31 May as the harbour lit up with depth charge explosions, torpedo detonations, tracer fire and searchlights. It brought the reality of the 'northern' war home to Sydney's somewhat complacent population. The war was not going well - the British bastion of Singapore had fallen on 15 February, the Australian mainland was bombed at Darwin from 19 February, and the recent dramatic naval engagement known as the battle of the Coral Sea had just occurred north of Australian waters (4-8 May 1942).

The Sydney raid involved five large ocean going submarines, *I-22*, *I-24*, *I-27* with their three midget submarines, and *I-21* and *I-29* providing aircraft support. The five

mother-submarines (with ~100 crew and approximately 109 metres in length<sup>6</sup>), had left the marshalling point of Chuuk (Truk) Lagoon in the Caroline Islands, arranged themselves in a semi-circle centred on Sydney Heads, spread between Broken Bay and Port Hacking. A final flight (29 May) by a reconnaissance aircraft launched from *I-21* has spotted potential targets inside the harbour. This included the cruisers USS *Chicago* and HMAS *Canberra*, although their identification was not known to the Japanese at the time. *I-21*'s Yokosuka E14YI 'Glen' twin-float seaplane capsized when returning to its submarine and was scuttled. The aircraft's remains have not been positively located.



**Figure 9:** The Sydney Harbour boom net defences as finally completed.

Photo courtesy: Australian War Memorial AWM304574.



**Figure 10:** Bow of midget *Ha-14*, one of the captured Sydney midgets.

Featured in a series of postcards issued after the May 1942 raid. Courtesy: Denis Gojak Collection.

#### 4.1 Midget 14 – Chuman and Ohmori

At about 8:00 pm on Sunday evening 31 May 1942, the first midget (*Ha-14* from *I-27*, also known as *M27*, and Midget 'B' in the initial Allied assessments<sup>7</sup>), commanded by Lieutenant Kenshi Chuman with Petty Officer Takeshi Ohmori, motored submerged into the harbour and crossed the partly operating seabed indicator loop<sup>8</sup> detection gear.

Unfortunately for its crew, when crossing from the Eastern Channel entrance across the inside of the unfinished anti-submarine boom net (stretching between Georges Head and Watson's Bay), *Ha-14* became fouled in the net at 8:15 pm. Recent research has suggested that the midget may have inadvertently collided with the Western Channel pile light, reversed whilst still underwater, and fatally fouled its

<sup>6</sup> *I-21*, *I-27* and *I-29* were of the 'New Junsen Type B1' scouting boats, with *I-22* and *I-24* being 'Junsen Type' C1 boats. Boyd & Yoshida, 1995, *The Japanese Submarine Force and World War II*. Naval Institute Press. Annapolis. pp.24; 26; Carpenter & Polmar, 1986, *Submarines of the Imperial Japanese Navy*. Naval Institute Press. Annapolis.

<sup>7</sup> *Japanese midget submarines attack on Sydney Harbour 31<sup>st</sup> May – 1st June 1942*. Navy Office, Melbourne, 1 August 1942. Australian War Memorial (AWM69, 185), pp.1-13.

<sup>8</sup> See: Walding, Richard, 2006, "Indicator loops and anti-submarine harbour defences in Australia in WWII". *Journal of Australian Naval History*. Vol.3 (1). The Naval Historical Society of Australia. pp.1-34; Oppenheim, Peter, 2005, *The Fragile Forts: The Fixed Defences of Sydney Harbour 1788-1963*. Australian Military History Publications. Canberra.

propellers in the net <sup>9</sup>. Observed by a Maritime Service Board (MSB) night watchman, James Cargill, and later inspected and unsuccessfully depth charged by a naval vessel, HMAS *Lolita* <sup>10</sup> (the depth charges were set to explode too deep), the two-man Japanese crew committed suicide by detonating the forward internal scuttling charge at 10:35 pm.

*Lolita* was lucky that it wasn't destroyed in the explosion, having begun a third depth charge run at the target. The partial remains of Midget *Ha-14* were inspected in the first week of June, the stern having to be cut out of the net with underwater cutting torches. Divers Lance Bullard and Roy Coote found the bow section still with its unexploded torpedoes several metres ahead of the trapped hull <sup>11</sup>, and successfully freed the wreck for lifting on 13 June 1942 <sup>12</sup>.

#### 4.2 Midget 'M24' – Ban and Ashibe

The midget from *I-24*, (also referred to in the initial Allied reports as 'Midget A', and colloquially as *M24*), commanded by Sub Lieutenant Katsuhisa Ban with Petty Officer Namori Ashibe, entered the harbour, crossing the indicator loop at 9:48 pm. It apparently followed a Manly ferry also through the Eastern Channel gate in the boom <sup>13</sup>. The submarine ran up the harbour unobserved for a further hour until at 10:52 pm it was spotted near the Garden Island Naval Base, across from Sydney's central business district. This sighting occurred just twenty (20) minutes after Chuman and Ohmori in *Ha-14* blew themselves up in the anti-submarine nets at the other end of the harbour. Military authorities finally started to appreciate the scale of the problem.

*M24's* conning tower had been sighted by one of its prime targets – the American heavy cruiser USS *Chicago* (*CA-29*, Northampton-class, 1928-1943), and soon by the Dockyard Motor Boat *Nestor*. This conforms to Japanese tactical orders which suggested midgets take observations approximately every thirty (30) minutes while en route to the target zone. Now in a position 200 yards (183 metres) off Garden Island and apparently proceeding in a direction towards Sydney's Harbour Bridge, USS *Chicago* opened up with its five-inch guns and oerlikons. *M24* was further attacked by *Whyalla* with its machine guns and HMAS *Geelong* from Bradleys Head. Recent research indicates that even one of *Chicago's* crew emptied the clip of his .45 automatic pistol at *M24's* conning tower in the near 'hand-to-hand' fighting! <sup>14</sup>.

The historical events have been well covered (eg Yamashita & Clarke 1966, Carruthers 1982, Jenkins 1992, Carruthers 2006 and most recently by Grose 2007), however it is still unclear why it took Ban and Ashibe another hour-and-a-half to run the mile from just west of *Chicago* to an attack position off its eastern-pointing stern, even considering the large turning circle of Type A midget submarines.

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<sup>9</sup> Grose, Peter, 2007, *A Very Rude Awakening: The Night Japanese Midget Subs Came to Sydney Harbour*. Allen & Unwin, Crows Nest, p.105ff.

<sup>10</sup> Personal hand written account of attack Warrant Officer Herbert "Tubby" Anderson, Commanding Officer of HMAS *Lolita*. Kindly loaned by Mr Steven Carruthers.

<sup>11</sup> Bullard, Lance, undated, Personal account of salvage diving operations to recover Japanese submarine wrecks. Kindly loaned by Mr Steven Carruthers.

<sup>12</sup> Muirhead-Gould, RADM., 31 August 1942, *Salvage of Midget Submarine*. Report presented to Naval Board on salvage operations. In papers related to Navy Correspondence 1925-1955, (then) Australian Archives, Accession No. SP 338/1. Obtained under a Freedom of Information request by researcher, Mr Steven Carruthers, 1981.

<sup>13</sup> *Japanese midget submarines attack on Sydney Harbour 31<sup>st</sup> May – 1st June 1942*. Navy Office, Melbourne, 1 August 1942. Australian War Memorial (AWM69, 185), p.10.

<sup>14</sup> Grose, Peter, 2007, *A Very Rude Awakening: The Night Japanese Midget Subs Came to Sydney Harbour*. Allen & Unwin, Crows Nest, p.124.

Allowing for the need to complete necessary manoeuvres, *M24* had sufficient time to transit that limited distance, compared to the hour it had only taken to pass right up through the harbour. It is more surprising that Ban did not attempt to get into a more optimum firing position, immediately broadside of *Chicago's* hull. It now appears that Ban fired both his 'fish' from a position astern of *Chicago* using the observed 60-degree deflection setting on his torpedoes – a tricky shot, outside the standard practiced by the crews of between 70 -110 degrees<sup>15</sup>. This is possibly part of the explanation why he missed. The unexplained time lapse and then apparent hurried attack requires some additional thought. For some period *M24's* crew must have rested on the seabed prior to attacking their target, perhaps recovering from the volley of fire previously sustained. This would partially accord with midget submarine tactical rules of engagement – if having come under attack, the midget crews were to dive deep, and turn at right angles to the previous course<sup>16</sup>.

It is confirmed that the submarine did successfully fire its two torpedoes about 12:30 am on 1 June from a position nearing the centre of the harbour abreast of Bradley's Head. The target was USS *Chicago* still at its mooring at Man of War anchorage #2 and attempting to build steam to quit the harbour. The workers lights on Garden Island were extinguished at about the same time Ban was taking his shots.

Both torpedoes missed *Chicago*, one running onto Garden Island and failing to explode amongst a pile of rope near the Gun Wharf<sup>17</sup> The other struck the island seawall under the ferry HMAS *Kuttabal* and exploded sinking the vessel. The torpedo had first passed under the Dutch submarine *K-IX* at its berth alongside (later wrecked in 1945 at Submarine Beach, Seal Rocks, NSW, and relocated by the Heritage Office via a remote magnetometer survey in 1999<sup>18</sup>)

The sinking of *Kuttabal* killed twenty-one of those aboard, with ten others injured. Ban's midget submarine was never recovered by the mother submarines. What was later identified as an outer crossing on the harbour indicator loop at 01:58 am on 1 June had generally been regarded as *M24* safely exiting Sydney Harbour. It was the only midget to successfully fire torpedoes and the only one of the three to escape.

Again *M24* took some one and a half hours to leave from its attack position and exit the harbour. This is compared to the hour that it took to enter and first be sighted in the vicinity of *Chicago*. The passage also accords with tactical operational orders that dictated the fastest direct approach to the target to heighten the element of surprise, and an avoiding course post attack<sup>19</sup>. A subsequent wartime assessment of recovered Japanese operations concluded that the midget submarines should follow '*a suitable circuitous route back to base avoiding counter-attacking craft with*

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<sup>15</sup> Grose, Peter, 2007, *A Very Rude Awakening: The Night Japanese Midget Subs Came to Sydney Harbour*. Allen & Unwin, Crows Nest, 2007:137ff

<sup>16</sup> New Zealand Intelligence Memoranda. Serial No.11, "Japanese Midget Submarines", 3 September 1943. Secret. Contained in papers obtained under Freedom of Information requests by researcher, Mr Steven Carruthers, 1981.

<sup>17</sup> *Report of investigations into a Japanese torpedo fired from midget submarine during the attack on Sydney Harbour, dated 7-8 June 1942*. Torpedo School, Flinders Naval Depot. Report released 14 Jan 1943. Australian War Memorial (AWM124, 4/473).

<sup>18</sup> Smith, T., 2000, *K-IX Submarine: Conservation Management Plan*. NSW Heritage Office. Parramatta.

<sup>19</sup> New Zealand Intelligence Memoranda. Serial No.11, "Japanese Midget Submarines", 3 September 1943. Secret. Contained in papers obtained under Freedom of Information requests by researcher, Mr Steven Carruthers, 1981.

*deceptive manoeuvre*'<sup>20</sup>. *M24* may have rested again inside the harbour again for up to half an hour on its way out.

### 4.3 Midget 21 – Matsuo and Tsuzuku

Midget *Ha-21* from *I-22* (also known as *M22*), commanded by Lieutenant Keiu Matsuo (aged 25<sup>21</sup>) with Petty Officer Masao Tsuzuku, was the third boat to enter the harbour, very late, when spotted near the loops at 10:52 pm. This sighting was made by naval auxiliary vessel HMAS *Lauriana* who notified anti-submarine vessel HMAS *Yandra*. *Yandra* sighted the vessel at 10:58 pm and allegedly rammed it, continuing with a depth charge attack with six let go in a close pattern from 11:07 pm<sup>22</sup>.

The midget appears to have retired to the seabed, either just outside or perhaps within the Heads for another four hours. It must have been a lucky miss for the crew but the sudden dive to escape depth charges might have resulted in the later observed damage to the important bow torpedo protective cage. When making a belated entrance at 2.50 a.m. on 1 June, *Ha-21* was spotted by USS *Chicago* as it left the harbour and maybe given another glancing blow. At this time it was the only midget left in the harbour – *Ha-14* had earlier blown up in the nets, while *M24* with Ban and Ashibe had departed before 2:00 am.

*Ha-21* now inside passed into the harbour proper and, based on plots recovered from charts in the vessel, crept up the Western Channel towards the main fleet anchorage. Sighted intermittently in the area of Robertson Point (near Taronga Zoo) and Bradley's Head, the midget was definitely observed on the surface in Taylor's Bay at 05:00 am on 1 June.

It is highly probable that the crew had found this quiet cove, out of searchlight glare, to finally surface and examine presumed damage to the bow<sup>23</sup>. When later inspected both torpedoes had been fired unsuccessfully, suggesting that Matsuo had attempted to sink a target. The protective torpedo bow cage had been badly buckled, trapping the torpedo tube caps, stopping the torpedoes firing. It is therefore probable that one of the Allied vessels in port had unwittingly been spared.

Once detected by Channel patrol boat *Sea Mist* and depth charged at about 5:00 am, the boat was progressively depth charged by HMAS *Steady Hour* and *Yarroma* for a further three hours until 8:30 am. Reports indicate that the initial charge from *Sea Mist* threw the submarine into the air, where it possibly rolled right over.

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<sup>20</sup> New Zealand Naval Intelligence Memoranda. Serial No.20, 'Japanese midget submarine tactics', 29 November 1943. Contained in papers related to the Directorate of Naval Intelligence. Obtained under Freedom of Information requests by researcher Mr Steven Carruthers, in 1981.

<sup>21</sup> Jenkins, D., 1992, *Battle surface: Japan's submarine war against Australia 1942-44*. Sydney. p.15,

<sup>22</sup> Carruthers, Steven. L., 2006 ed, *Japanese Submarine Raiders 1942: A Maritime Mystery*. Casper Publications. Sydney.pp.157ff; Grose, Peter, 2007, *A Very Rude Awakening: The Night Japanese Midget Subs Came to Sydney Harbour*. Allen & Unwin, Crows Nest. pp.157ff.

<sup>23</sup> Mrs Margaret Coote (nee Hamilton), a local resident at Mosman at the time and living above Taylors Bay, recalled seeing the submarine close in against the rocky foreshore on its southern side. Pers.com. with Tim Smith, 31 May 2007.



**Figure 11:** Ocean going submarine *I-16*.

Of the class that were fitted to carry midgets, bow facing aft, on their rear deck casings. Image courtesy: Australian War Memorial AWM128899.



**Figure 12:** Matsuo's midget *Ha-21* being recovered from Taylors Bay.

Image courtesy: Australian War Memorial AWM305088.

When detected by divers in the Western Shipping channel opposite Taylor's Bay, its engines were observed still operating. *'I walked towards it and saw a submarine lying practically on an even keel and apparently undamaged. I put my hand on the hull, which was quite warm'*<sup>24</sup>. When lifted, the crew were found dead, each having been shot with the single 8mm, eight-round, Taisho ('Nambu') service pistol (probably Matsuo last).

The junior officer, Tsuzuku, had taken off his shoes prompting contemporary speculation that he may have tried to escape the craft during the devastating depth charge attack in shallow water<sup>25</sup> (13 ½ fathoms, 24.7 metres). It is difficult to image the scene that was taking place inside the stricken submarine. The force of the explosions appears to have blown both the conning tower and underside hatch open.

The crew had previously attempted to fire the demolition charges, but the wick fuses were flooded and inactive (possibly as a result of the depth charging). There is no explanation why the charges weren't fired electrically, as wartime reports indicated that the submarines had this capacity. As noted, divers observed the motor to be operational, hence the boat had electrical power.

It is highly likely that the crew decided to commit suicide very early in the depth charge attacks, as it would have been impossible for them to withstand such a bombardment in shallow water for any length of time.

The wrecked submarine was recovered on 6 June 1942 and being intact, became the focus of intensive intelligence examination. *Ha-21* is the most documented of the midgets involved in the Sydney Harbour raid.

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<sup>24</sup> Bullard, Lance, Leading Seaman, undated papers, Personal account of salvage diving operations to recover Japanese submarine wrecks. Mr Steven Carruthers collection.

<sup>25</sup> *Japanese midget submarines attack on Sydney Harbour 31<sup>st</sup> May – 1st June 1942*. Navy Office, Melbourne, 1 August 1942. Australian War Memorial (AWM69, 185), p.8.

## 5.0 Type A midget submarines: Historical background and displays

The development of Japanese midget submarines has been covered in some detail however studies are hampered by the lack of surviving or identified Japanese archival records. Beside the paucity of detailed technical documents, plans and photographs, there is an equal lack of oral accounts by Japanese sailors who trained and manned them. Hence the operational characteristics of the craft are only glimpsed in extant interviews with past crew and instructors at naval establishments like the Eta Jima Naval Academy, and some captured operational tactical orders.

The Japanese Midget Submarine Association has long since been disbanded with the passing and elderly age of its few remaining members, hence eyewitness insights into the operational capacity and environmental conditions inside the boats is now generally lost. Today there are so many questions to be asked regarding the standard operating practices of Type A midgets: what were the tasks of relative crew, what actions did they take in combat (e.g shutting bulkhead doors), how long could they maintain submerged without fresh air, how many times would they come to periscope depth, what would the crews do to pass the transit times?, etc).

Type A midget submarines were deployed at Hawai'i, Sydney, Madagascar, Guadalcanal, the Aleutians, the Philippines, Saipan and Okinawa. Kemp identified the Type A 'Ko-Hyoteki', as possibly the most sophisticated and well designed midget submarines used by any of the belligerents in the Second World War <sup>26</sup>. Today the few located Type A midget wreck sites, and those retained on land in museum display have become a rare and important record of these craft.

### 5.1 Midget submarine classifications

The Japanese Imperial Navy Type A midget submarines deployed at Sydney were approximately 24 metres in length (80.5 feet), of 46-7 tons, and carried two 18-inch Type 97 'Special' torpedoes (using pressure enriched air, oxygen, kerosene and seawater mixture), from the Kure Naval Yard <sup>27</sup>. With a two-man crew, contemporary assessments suggested that they could remain submerged for about 12 hours in most normal operating circumstances. After this time the crew would be forced to replenish air and stamina levels. The submarines were of single (pressure) hull design using all welded cold rolled steel plates (MS44 quality – 5/16<sup>th</sup> inch (16mm), with a normal diving depth of up to 100 metres and a collapse depth of 200 metres <sup>28</sup>.

Powered by a 600 horsepower electric motor, the boats could not recharge their initial battery capacity and therefore were totally reliant on the initial charge, careful management of the power reserve, and susceptibilities of any technical breakdowns or events that might impact battery operation. The design achieved an impressive surface speed reportedly up to 24 knots on the surface and 19 knots submerged – far greater than other midget designs of World War Two.

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<sup>26</sup> Kemp, Paul., *Midget Submarines of the Second World War*. Shipshape Books.

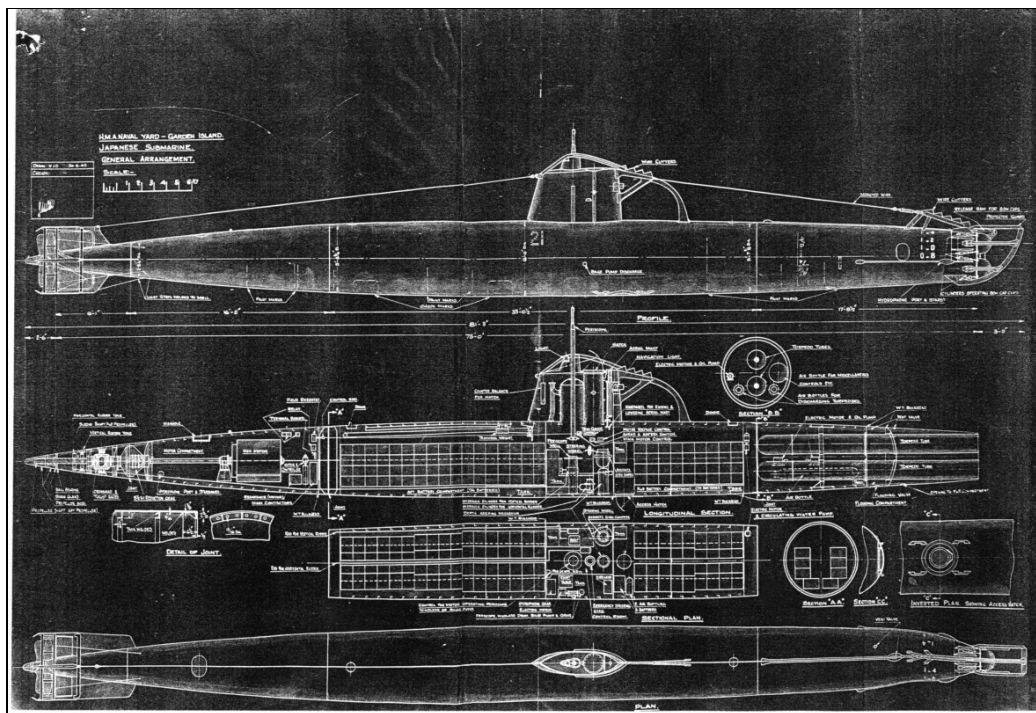
<sup>27</sup> Steven Carruthers, pers.com. Tim Smith, 30 July 2007; Report of investigation into Japanese torpedo fired from a Japanese submarine during the attack on Sydney Harbour. 7<sup>th</sup>-8<sup>th</sup> June 1942. Torpedo School, Flinders Naval Depot, 14 January 1943. Australian War Memorial, AWM124 (4/473).

<sup>28</sup> Kemp, Paul, *Midget Submarines of the Second World War*. Shipshape Books. p.73.



The Sydney boats had some design modifications to those captured at Pearl Harbour, with a slightly wider hull at 6-feet (1.8 metres). The vessels were electrically powered by 208 lead acid wet cell batteries (72 forward and 136 aft), and had three main sections joined by internal flanges, bolted together. These comprised: the Forward Section (containing the torpedo tubes), the Central Section (containing the forward battery room, conning tower and aft battery room), and the After Section (containing the motor, propeller shaft and gearing).

The Sydney boats also had an improved gyro compass, an all-weather access hatch on the underside to permit enclosed crew transfers at sea ('traffic sheath'), and a slightly longer periscope at 8-feet (compared to 7-foot) extension above the conning tower <sup>29</sup>. Other fundamental additions included the fitting of improved nose and propeller guards, the distinctive 'net cutters' at bow and atop the conning tower, and external torpedo caps with hydraulic ram releases.



**Figure 13:** Plan of midget *Ha-21* recovered from Taylor's Bay, Sydney, Australia.

Drawn by Garden Island draftsman William Dinnie, shortly after its recovery from the harbour. This plan is one of the few detailed drawings of a Type A midget to survive internationally. Source: Plans and diagrams, photographs of midget (Japanese) submarine and components involved in the Sydney Harbour attack, 1942. Australian War Memorial, AWM54, 505/6/7. An additional and alternate plan survives at the Department of Defence, Sea Power Centre, Canberra, (at DD/6).

The type was designed in Japan during the 1930's with two experimental boats *Ha-1* and *Ha-2* built as early as 1936. The building program was concentrated from 1938 onwards where some fifty Type A boats were built at Ourazaki and Kure naval yards, the majority between the main building program of 1938-1942 (number sequence *Ha-3* to *Ha-52*). The class were known by many secret names, such as 'sheaths' and 'flies' to conceal their secret development, the most commonly ascribed being 'Ko-

<sup>29</sup> Carruthers, Steven. L., 2006 ed, *Japanese Submarine Raiders 1942: A Maritime Mystery*. Casper Publications. Sydney.pp.57ff.

Hytteki' or 'Target A'. The Sydney boats were an improved (post Pearl Harbour) version, Type A Kai 1 (improved version 1)<sup>30</sup>. Records of production are limited and total production numbers are variously reported, for example, some quoting 59 Type A's produced<sup>31</sup>.

The Japanese designed several variants to the Type A midget during the war, including the 'Otsu-Gata' (Type B), the important 'Hei-Gata' (Type C) and the most prolific 'Koryu' (Type D), fitted with generators to allow battery recharge and additional crew.

Japanese midget submarines had their own numeric designation based on production sequences (a 'Ha' number reference is often used today, and historically was used to denote the midget's coastal use classification<sup>32</sup>). They could be deployed on any of the mother carrier submarines fitted for same and therefore their identification number was often different to the I-class submarine carrier.

While the individual series number for Matsuo's and Chuman's midget submarines were known from visible painted serial numbers on the recovered hulls (midget *Ha-21* and *Ha-14* respectively), the original designation of Ban and Ashibe's midget has not been confirmed. Justin Taylan's Pacific Wrecks Database web site identifies it as *Ha-17* although this attribution has not been verified<sup>33</sup>.

Documents recovered from *Ha-21* included operational fleet orders for the "Advanced Detachment" under command of Ishizaki. The records list the midget submarines assigned to the task force which included the Sydney and Madagascar attack units. The designated midgets were 9, 21, 22, 23, 25, 26, 27 and 28<sup>34</sup>. Interestingly, while confirming Matsuo's *Ha-21*, the list did not include Chuman's *Ha-14*, and does not refer to *Ha-17*. Midget *Ha-14*'s omission might indicate that replacements were made to the original midgets consigned, perhaps due to mechanical failures or some other cause.

Ban and Ashibe's midget is generally referred to as *M24* in consequence of it being the midget deployed from mother submarine, *I-24*, as part of common nomenclature. However it is noted that this is not a true Japanese classification. Any vestige of the original painted numerals on the *M24* wreck site hull will now have been lost. Conservation works on the composite midget submarine display at the Australian War Memorial confirmed that the serial numbers were also punched into the main hull plating under the conning tower. Known as 'witness punched markings', they served as guides for rapid reproduction or painting-out of markings in combat.

*M24*'s serial number was probably also witness punched on the main hull, although it is likely that due to marine colonisation and corrosion activity, these light markings will not be locatable today. The Sydney midgets might have had a variety of other markings painted out during their final mission. *Ha-21*'s conning tower, for instance,

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<sup>30</sup> Lenihan, D., editor, 2001, USS Arizona Memorial: Submerged Cultural Resources Study. Submerged Cultural Resources Unit, National Parks Service. Mexico. Ch.2; [http://www.combinedfleet.com/type\\_a%20midget.htm](http://www.combinedfleet.com/type_a%20midget.htm)

<sup>31</sup> Compton-Hall, Richard, 1985, *Submarine Warfare: Monsters and Midgets*. Blandford Press. London. p.135.

<sup>32</sup> Carpenter, Dorr., & Polmar, Norman, 1986, *Submarines of the Imperial Japanese Navy*. Naval Institute Press. Annapolis. p.127; Boyd, Carl., & Yoshida, Akihiko, 1995, *The Japanese Submarine Force and World War II*. Naval Institute Press. Annapolis. p.12.

<sup>33</sup> <http://www.pacificwrecks.com/ships/subs/midget-sub-m24.html>

<sup>34</sup> Eastern Fleet Intelligence Summary: Midget Submarines. Index No.915, 1st Edition A. September 1942 (prepared by COIS E.F. Kilindini, 2 Sept 1942.

had additional witness marks for a Japanese ensign (hinamaru) and possible unit markings, amongst others <sup>35</sup>. With *M24*'s conning tower plating being removed, any vestige of similar marks are now lost forever.

Of historical interest is the fact that two of the Sydney mother submarines, *I-22* and *I-24*, had previously launched midget submarines during the Pearl Harbour attack of 1941, *I-24* deploying the ill-fated *Ha-19* (Ensign Kazuo Sakamaki and Petty Officer Inagaki Kiyoshi), that famously ran aground near Waimanalo on Oahu Island. *I-24* was involved in midget submarine operations beyond the Pearl Harbour and Sydney attacks, deploying midget *Ha-12* near Guadalcanal in November 1942, and *Ha-38* in December that year <sup>36</sup>.

Three of the Sydney parent submarines, the floatplane carrier *I-21* and the midget carriers *I-24* and *I-27*, later played an active role in submarine attacks along the east coast of NSW, Australia. *I-21* shelled Newcastle and *I-24* Sydney's eastern suburbs on 8 June 1942 immediately following the failed raid. One can sense the anger and frustration of their respective captains. In a spate of attacks now focussed against shipping, *I-21* is credited with sinking the *Iron Chieftain* (3 June 1942), with *I-24* damaging the *Australian* (3 June 1942) and *Orestes* (9 June). *I-24* chased several other vessels unsuccessfully, finally sinking the *Guatemala* (12 June 1942). *I-27* sank the BHP ore carrier *Iron Crown* with significant loss (4 June 1942) and damaged the *Barwon* that day. *I-21* returned to Australia in 1943 and sank the *Kalingo* (18 Jan 1943), *Starr King* (10 Feb 1943), then damaged the *Mobilube* (18 Jan 1943) and *Peter H Burnett* (22 Jan 1943).

All 'mother' submarines involved in the Sydney attack were sunk by war's end <sup>37</sup>.

- I-22* sunk on 25 December 1942, south-east New Guinea, by US motor torpedo boat.
- I-24* sunk on 27 July 1943 by submarine USS *Scamp*, south-east of Admiralty Islands.
- I-21* sunk on 4 Feb 1944 by USS *Charrette* using depth charges, north-west of Jaluit.
- I-27* sunk on 12 Feb 1944 by destroyers HMS *Paladin* and *Petard* south of Addu Atoll, south west of Ceylon.
- I-29* sunk on 26 July 1944 by submarine USS *Sawfish*, north of Luzon.

## 5.2 Midget submarines on museum display

In total, six (6) Japanese midget submarines are on international display in museum or outdoor exhibition contexts, including a possible Type 'C' at Guam and the composite display in Canberra, Australia. These display vessels offer a unique opportunity for the public to view first hand the Type A midgets and appreciate their size and operational capabilities. Unfortunately most of the display boats were recovered during World War Two and were extensively stripped of fittings for intelligence gathering purposes and to fund war bonds schemes and hence their value for scientific analysis has been partially constrained. The boats however offer a unique opportunity to interpret the features of those midget submarines found wrecked underwater like *M24*.

The current archaeological survey of the *M24* wreck therefore drew heavily on extant display items in Australia and associated relics collections. In order to identify further

<sup>35</sup> Kemister, John, undated, *Midget Submarine Conservation Report*. Australian War Memorial (unpublished).

<sup>36</sup> According to: Pacific Wrecks Database (<http://www.combinedfleet.co/>).

<sup>37</sup> Hashimoto, M., 1954, Sunk: *The story of the Japanese Submarine Fleet 1942-1945*. London.

research opportunities and to establish the significance of the newly located *M24* wreck, the Heritage Office identified the need to establish the comparative range of Type A midget submarine sites, both above and below water.

### ***Ha-14 and Ha-21***

Elements of the two recovered Sydney midget submarines are on display in Australia. The Australian War Memorial, Canberra, has a composite display made up from the remains of the conning tower and aft section of midget *Ha-14* and bow of *Ha-21*, with a separate display of the spare stern section kept from *Ha-21*.

The 'left over' conning tower (from midget *Ha-21*) is on display at the Naval Heritage Centre, Garden Island Naval Base, Sydney. The remainder of the two boats not utilised for display were apparently scrapped, together with many of the fixtures and fittings removed for intelligence gathering purposes.

There is a significant collection of artefacts recovered from the two Sydney wrecks managed by the Australian War Memorial. These include a Type 97 'Special' torpedo, a Japanese naval ensign, crew uniforms, a pistol and holster, ceremonial sword, food and related containers, and ceremonial crew items such as a sennimbari (belt of a thousand stitches) worn by Lieutenant Matsuo<sup>38</sup>. A few items are also maintained at the Naval Heritage Centre, Sydney, including a torpedo gyro compass and navigational aids.

Many other relics are scattered across private collections in Australia and largely result from the souveniring of the two boats and sale of relics to support Australian War Bonds schemes during 1942. Featured in these collections are miniature midget submarines cast from the lead ballast, and sections of piping and wiring.

### ***Ha-8?***

One of the Guadalcanal recovered midgets identified as possibly *Ha-8*, is on display at the Historic Ship Nautilus & Submarine Force Museum in Groton, Connecticut<sup>39</sup>.

### ***Ha-19***

Sakamaki's Pearl Harbour midget *Ha-19*, launched from *I-24*, is now on display at the Admiral Nimitz Museum in Fredericksburg, Texas, and has seen some of the more published analysis<sup>40</sup>.

### ***Ha-51?***

Possibly a Type C Japanese midget submarine, identified as *Ha-51*, is on display at Camp Dealy, Guam<sup>41</sup>. The midget was initially found sunk in shallow waters off Togcha Beach near Talofoto, Guam, in 1944 and recovered in 1945 for display ashore. The midget received conservation support in 2001 and is a listed US National Register monument.

### ***Midget 'D'***

Pearl Harbour midget '*Midget D*', based on the original United States classification, was located in 76 feet (23 meters) of water off Pearl Harbour's entrance in 1960, by US Navy divers. The wreck was recovered in 1968, gifted to Japan, and is now on

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<sup>38</sup> Reid, Richard, 2007ed, *Australian Under Attack: Sydney and the Midget Submarines 1942*. Department of Veterans Affairs. Canberra. p.13.

<sup>39</sup> [http://www.nautilus571.com/submarine\\_as\\_a\\_museum.htm](http://www.nautilus571.com/submarine_as_a_museum.htm).

<sup>40</sup> Delgado, James, 1989, *Japanese midget submarine HA-19 National Historic Landmark Study*, December 1988. US National Parks Service.

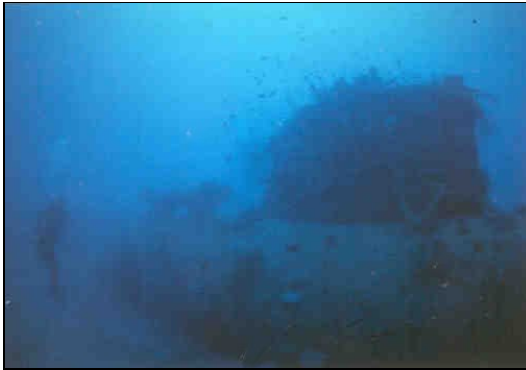
<sup>41</sup> <http://www.pbase.com/ghipps/image/36009269>.

permanent outdoor display at Eta Jima Naval Academy, although in poor structural condition.

Another midget, midget 'B' was rammed and sunk by the USS *Monaghan* inside Pearl Harbour and was raised and buried (twice), and finally deposited under land fill at the submarine base in 1942. This craft is no longer visible.

### 5.3 Other midget submarines located underwater

The discovery of the *M24* midget submarine near Sydney adds another wreck site to those located in the Pacific Ocean and its periphery.



**Figure 14:** The midget submarine possibly *Ha-23*. Detected at Three Island Harbour, New Hannover, Papua New Guinea. Photo courtesy: Mark Spencer.



**Figure 15:** Photograph of a midget submarine wreck at Kiska Harbour.

Located in the Aleutian Islands, Alaska, the wreck is unique being in a partly 'dry' state. Photo courtesy: US National Parks Service.

Very few Type A midgets have been detected in their original underwater settings since the salvage and recovery of captured craft during the war. Notable contemporary salvage programs involved the detected Pearl Harbour and Sydney midgets and a number captured in the Guadalcanal region. The fate of some of these recovery projects is not known or the final disposition of the midget remains.

#### *New Guinea*

The midget identified as *Ha-23* is commonly dived in Papua New Guinea waters (Kavieng area), near Three Island Harbour, New Hannover. The submarine was sunk in company with the tanker *Sanko Maru* in 1944. The wreck lies in twenty metres of water and is intact on sand. No crew were lost with this vessel and divers have inspected the internal conning tower area with a drop camera<sup>42</sup>. Some have identified it as possibly a Type C midget submarine<sup>43</sup>.

#### *Madagascar*

The wreck of another midget submarine was filmed by Japanese television network, NHK, at Madagascar. Located in only a few metres of water sitting on reef, the hull was reduced to the propeller shaft and screws and floor plating up to the bow. Situated in a highly volatile marine environment in a surf break, the wreck is considered likely to be that carried by *I-20* which wrecked on a reef at Antali Keli

<sup>42</sup> See for example: <http://www.niuginidiving.com/japsub.html>; <http://www.combinedfleet.com/>.

<sup>43</sup> <http://www.pacificwrecks.com/ships/ijn/type-c.html>.

islet. The crew, Akieda and Takemoto had escaped the craft and were later killed ashore by a British patrol <sup>44</sup>.

#### *Pearl Harbour*

A Type A midget submarine was located in about 400 metres of water off Hawai'i in 2002 by the Hawai'i Underwater Research Laboratory (HURL). The vessel has been well documented externally <sup>45</sup> and is almost certainly 'Midget A', based on the initial American classifications, sunk by USS *Ward* in the opening battle of the Pearl Harbour attack. The wreck is one of the most important sites for comparative research purposes to the located Australian midget, *M24*. The submarine has been the focus of initial environmental and corrosion studies by relevant managing authorities, including an initial internal inspection by remotely controlled endoscopic cameras <sup>46</sup>.

Remains of a fourth detected midget submarine from the five deployed at Pearl Harbour were allegedly found in coastal Oahu waters in 1992 by aircraft salvagers. The wreckage constitutes only the tail section of a Type A midget with the position being restricted <sup>47</sup>. The conning tower of a Japanese midget submarine was reported to have been imaged by the Hawai'i Underwater Research Laboratory in 2000 <sup>48</sup>, while the bow section of the 1960 recovered midget was left on the seafloor during recovery <sup>49</sup>.

#### *Aleutians*

A remaining Type A midget submarine was surveyed by Alaska's State Maritime Archaeologists and the US National Parks Service in Kiska Harbour within the Aleutians during 1989 <sup>50</sup>. The work forms part of a National Historic Landmark study with the wreck being one of a number of midget submarines destroyed by the Japanese in submarine pens in late 1942, prior to the American invasion. Several midgets have been identified to have been in the area including *Ha-29*, *Ha-32*, *Ha-33* and *Ha-34* <sup>51</sup>.

#### *Guadalcanal*

Divers have undertaken searches for up to three midget wrecks reported to have been seen in the Guadalcanal area, where some eight midgets may have lost here during the war. The midgets are reported to be *Ha-22* near Tassafaronga, one off Savo Island, and possibly one in the Cape Esperance area. No searches have been successful to date <sup>52</sup>.

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<sup>44</sup> VCR copy of Japanese NHK television documentary in possession of Tim Smith, Heritage Office. The propellers were recovered from the wreck and are on display at the crew's grave site (2001). See:<http://www.combinedfleet.com/>.

<sup>45</sup> Van Tilburg, Hans, 2006, "Japanese midget sub at Pearl Harbour: collaborative maritime heritage preservation". *Underwater Cultural Heritage at Risk: Managing Natural and Human Impacts*. ICOMOS, Munich. pp.67-69.

<sup>46</sup> Hans Van Tilburg, Pers.com. with Tim Smith, 15 December 2006; Larry Murphy, Pers.com. with Tim Smith, 13 December 2006.

<sup>47</sup> Steven Carruthers, Pers.com. with Tim Smith, 12 December 2006.

<sup>48</sup> Wiltshire, John, 2002, "The search, discovery and survey of a World War Two Japanese Type "A" midget submarine". In: *Oceanography*. Vol.15 (4). pp.37.

<sup>49</sup> Boyd, Carl., & Yoshida, Akihiko, 1995, *The Japanese Submarine Force and World War II*. Naval Institute Press. Annapolis.p.61.

<sup>50</sup> Dave McMahan, pers.com. with Tim Smith, 13 December 2006. Larry Murphy, pers.com. with Tim Smith 13 December 2006. See also: Morgan, Lael, 1983, "Alaska's far-out islands: the Aleutians. *National Geographic Magazine*, Vol.164(3). pp.336-263.

<sup>51</sup> See:<http://www.combinedfleet.com/Kiska.htm>

<sup>52</sup> Kevin Denlay, pers.com. with Tim Smith. 25 November 2005.

## 6.0 Key management issues: Human remains and unexploded ordnance

Discovery of the missing Japanese midget submarine *M24* provided an opportunity, based on the new evidence, to re-evaluate the attack and the final fate of its crew. A number of general historical questions could now be asked of the wreck:

- what condition is it in?
- was there any battle damage?
- what does that infer regarding the vessel's state at time of loss?
- why is *M24* off Sydney's Northern Beaches?
- will the wreck provide information on *M24*'s final movements and the actions of its crew?

These questions will be asked of the archaeological evidence in Section 9.0 (below). Discovery also raised immediate management issues that had a fundamental effect on site protection needs, and on archaeological survey approaches that could be applied to the site.

1. risk that the site possessed
2. potential war dead - human remains

The Heritage Office, Department of Planning, identified the need to have complete access restrictions placed at *M24* while the issue of unexploded ordnance could be addressed through additional historic research and site-based inspections. Similarly, a fundamental aim of the proposed survey operations was directed to assessing the likelihood of human remains being present.

## 6.1 Scuttling charges

Historic research confirms that the located *M24* wreck will contain two unexploded scuttling charges and associated detonators. The Heritage Office has been investigating the likely location and size of these charges as part of the archaeological project.

Torpedo Fitter F.J. Lingard was charged with diffusing torpedoes and scuttling charges on the captured Sydney midgets, following their recovery by clearance divers Lance Bullard and Roy Coote. Lingard was noted in a formal commendation report dated 16 July 1942 for this dangerous work, the others omitted in the formal notices.

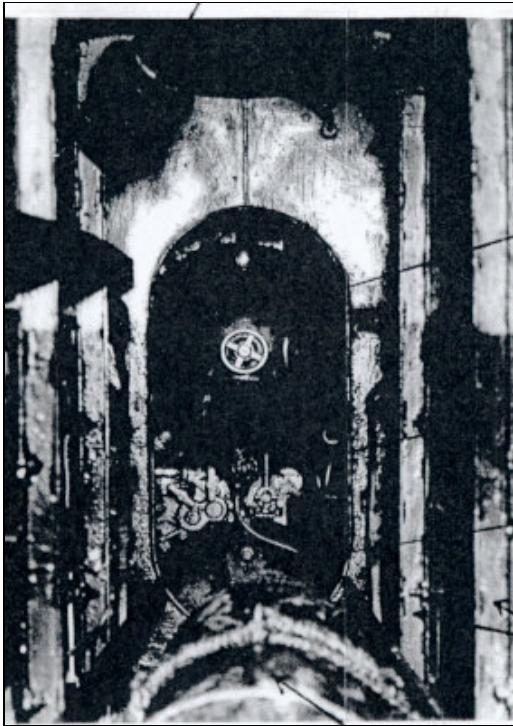
Rear Admiral Muirhead Gould, Rear Admiral-In-Charge, Sydney, in his report noted that Lingard not only diffused the unexploded torpedo that ran ashore at Garden Island (*M24*'s), but each of the four unfired torpedoes recovered from midgets *Ha-14* and *Ha-21*. He also diffused, '*three demolition charges remaining unexploded in the Battery Rooms. The method of firing these charges was not known until the first charge had been removed*', i.e. when the midgets were brought ashore at Clarke Island<sup>53</sup>.

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<sup>53</sup> Lind, Lew, 1992, *Toku Tai: Japanese Submarine Operations in Australian Waters*. Kangaroo Press. p.84.



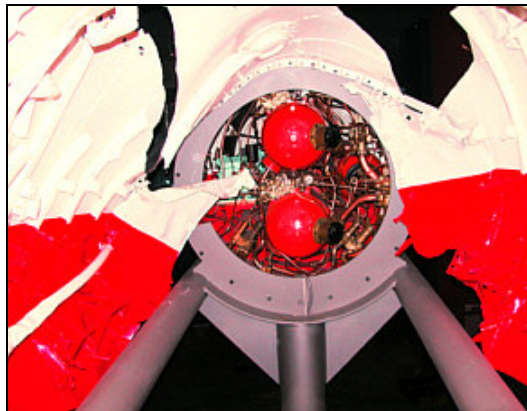
A search of Australian archives has so far failed to reveal construction details of the charges<sup>54</sup>. They may have escaped proper recording in the rush to remove and render them safe. It is known that the Sydney midgets had two charges, one forward and one aft, compared to the Pearl Harbour midgets' sole charge reported aft. The location of the Pearl harbour midget's explosive is variously reported as '300 pounds TNT demolition charge carried under the stern ... one 300 pound bomb attached to battery ... 300 pound demolition charge in aft compartment with 50-ft fuse' (See discussion at Appendix 4)<sup>55</sup>.



**Figure 16:** Historic photo of a forward scuttling charge (in foreground).

The only located photograph recording the nature and location of the charges in the Sydney midget submarines. This shows the charge in the forward battery room aboard midget *Ha-21* prior to its removal and rendering safe. The image confirms that the charge was placed close to the bulkhead leading to the torpedo room.

Source: Plans and diagrams, photographs of midget (Japanese) submarine and components involved in the Sydney Harbour attack, 1942. Australian War Memorial, AWM54, 505/6/7, Plate XIII.



**Figure 17:** Blast damage to Chuman's midget *Ha-14*.

This resulted from the firing of forward charge when trapped in the harbour boom net defences. The damage confirms the location of the forward charge immediately aft of the torpedo room bulkhead, and within the forward battery room. Photo: Tim Smith.

<sup>54</sup> A report in the National Archives of Australia is being sought which might provide important details: MP1049/5, "Attack by midget submarines on Sydney - appreciation from study of Japanese charts and magnetic surveys. Report on demolition charge from Japanese submarine recovered at Sydney".

<sup>55</sup> Researcher Steven Carruthers questions the accuracy of the US naval assessments as the midget destroyed by USS *Monhegan* could show demolition charge damage to fore end of boat. Pers.Com, Steven Carruthers to Tim Smith, 30 July 2007.

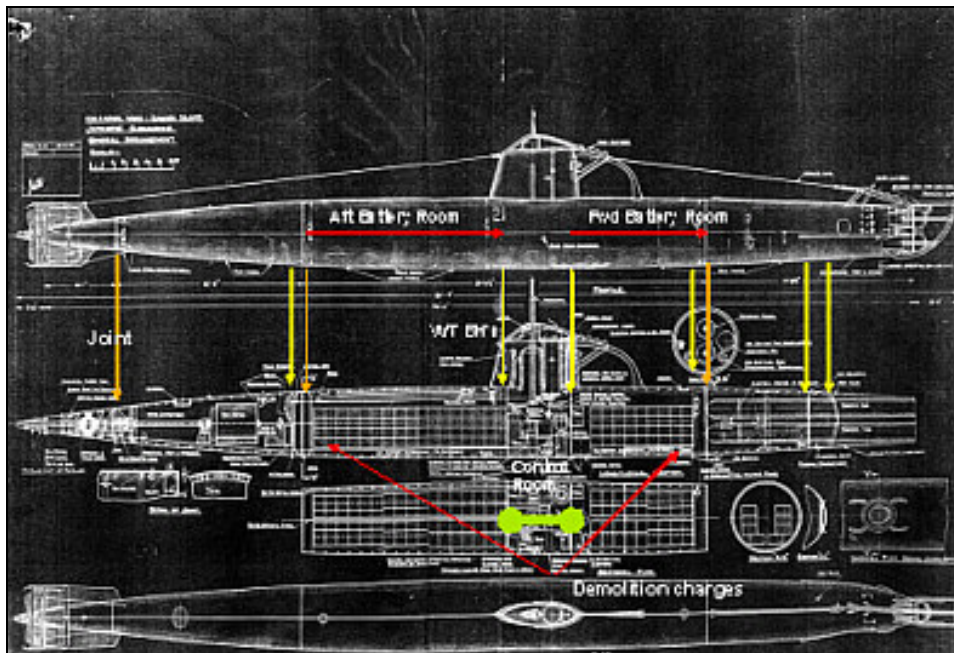


A unique photograph taken inside midget *Ha-21* (Taylor's Bay), post recovery, shows the forward demolition charge still in situ on the floor of the forward battery room. It is positioned between the port and starboard battery stacks, just aft of the bulkhead that leads into the torpedo room, at about hull frame 22-24. The explosive is described as a 'Scuttling charge lashed to improvised chocks'<sup>56</sup>.

This position is supported by the devastating destruction to the comparable section of midget *Ha-14* which detonated this scuttling charge when trapped in the harbour boom nets. The explosion completely removed the floor in the forward battery room, blew the sides out and the roof up, and separated the torpedo room (forward section) completely at the bulkhead.

The charges appear to be contained within cylindrical metal canisters (similar to a beer keg), fastened down with rope. They were probably placed here in an area of floor least in the way of the crews and where the detonation would be best to separate the main three sections of a midget submarine and cause instant flooding.

Several Australian reports confirm that the charges could be fired via a wick. However one Australian report indicates that the charges were also wired into the batteries for electronic firing, '*the demolition charges were very temporarily wired in ordinary twin flex (23/0076)*', identified as the fifth and lowest class of electrical cabling within the submarines<sup>57</sup>.



**Figure 18:** Proposed location of demolition charges aboard *M24*, based on research. Tim Smith.

Knowing that the Sydney midget's had two charges, it now appears likely that the rear explosive was located in the aft battery room (as confirmed in Muirhead Gould's

<sup>56</sup> Plans and diagrams, photographs of midget (Japanese) submarine and components involved in the Sydney Harbour attack, 1942. Australian War Memorial, AWM54, 505/6/7, Plate XIII.

<sup>57</sup> Report on Japanese Submarines. Japanese midget submarine, Garden Island Naval Dockyard. Australian War Memorial, PR89/172, p.6.

commendation letter above), probably slightly forward of the motor (engine) room bulkhead. A visual search for this charge was deemed a critical task of the present archaeological survey operations, in order to confirm its existence and form, and to enable appropriate risk management analyses to be initiated<sup>58</sup>.

Appendix 4 details the probable size of the demolition charges as derived from United States and Australian intelligence summary reports of the captured midgets (no.'s 14, 19 and 21). There is still uncertainty over the size of each charge similarly the nature of the explosive and detonation systems remains unresolved. In summary, it appears that the Pearl Harbour midgets had a single charge aft of approximately 300 pounds of explosive (c.125 kilograms) located under the stern and electrically connected to the batteries, while the Sydney boats had two charges, with estimates of between 60 pounds (c.27 kilograms) to 300 pounds (c.135 kilograms) each. These appear to have had both electrical (with timer) and lit fuse contacts.

Until the exact nature of the explosive (referred to as TNT) and their canisters can be determined<sup>59</sup>, any future disturbance-based archaeological survey taskings (e.g corrosion surveys) will need to be planned to mitigate accidental contact or impact, or undue vibration to the fragile hull.

The existence of unexploded ordnance within the *M24* hull is a significant contradiction for archaeological recovery of the wreck for conservation and public display. The existence of these explosives is also a significant issue guiding decisions regarding future public access to the wreck, for example through controlled diving activities. This is particularly so as access into the aft battery room is possible through corrosion openings.

## 6.2 The crew

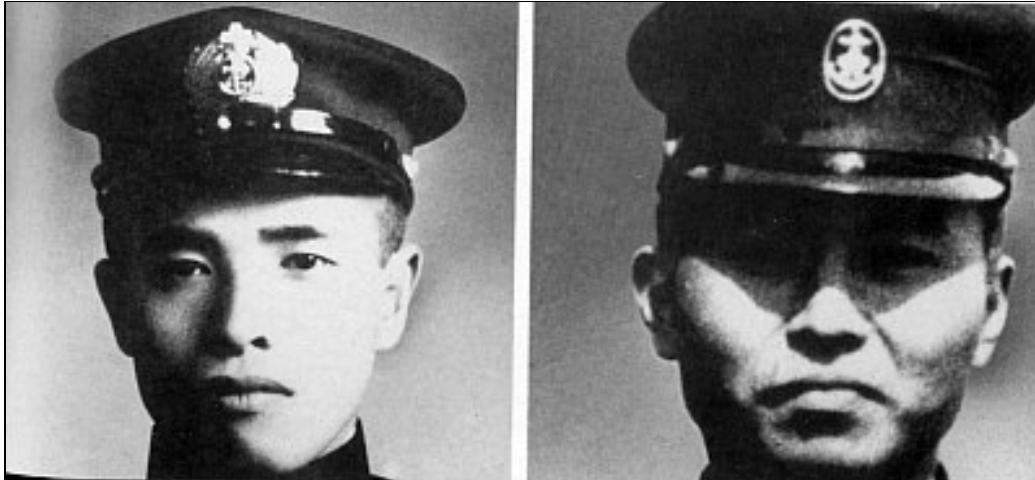
The midget *M24* from *I-24* was commanded by First Class Sub-Lieutenant Katsuhisa Ban, aged just 23, and First Class Petty Officer Mamoru Ashibe, Navigator, aged 24. The two men were part of the Second Special Attack Flotilla.

Discovery of the missing midget raises questions on the final actions and fate of its crew. Ban was the most junior of the three Sydney raid midget commanders, Matsuo and Chuman being Lieutenants. Matsuo had already established a key tactical role with midget operations, recognised as a spy in Hawai'i before the Pearl Harbour attack, and aboard *I-22* as an observer on that mission in company with submarine operations commander, Captain Sasaki (also in charge of the Sydney raid).

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<sup>58</sup> A similar risk analysis has been completed for the remaining Type VII World War One torpedo contained within the Australian *AE2* submarine wreck. Prepared by the Submarine Institute of Australia (SIA) this study (unpublished) is a model on how to assess and mitigate risk associated with unexploded ordnance contained within historic shipwrecks.

<sup>59</sup> See for example studies of Japanese explosives undertaken at the end of World War Two: *US Naval Technical Mission to Japan December 1945: Japanese Explosives*, Fascicle O-1, Target O-25, US archives. Copy kindly forwarded by Dr Hans Van Tilburg.



**Figure 19:** Sub Lieutenant Katsuhisa Ban.

Petty Officer Mamoru Ashibe.  
After Lind, L, 1992.

Matsuo also assisted in transmitting midget design modifications following Pearl Harbour as reflected in the Sydney Harbour attack boats - particularly better torpedo and propeller protective cages, net cutting devices and crew access at sea into the midgets. He was also acutely aware of the operational difficulties of driving a Type A midget, narrowly escaping drowning during a training operation in Japan. Here his midget crashed to the seafloor following the failing of its electric motor<sup>60</sup>.

Ban was remembered by fellow submariners as a man of passion and dedication to his country. When colleagues were interviewed post war they described both Ban and Matsuo as extroverts with a liking for recreational pursuits. Ban was certainly tenacious as reflected in his farewell letter written immediately before the Sydney attack, '*Nations that fear death will surely be destroyed. It is necessary for the youth of Japan to take notice of this. "Sure-to-die" is the spirit that will bring about the final victory*'<sup>61</sup>.

Remembered as perhaps the most '*dashing, dare-devil of the three (Sydney) midget commanders*', Ban was the son of a highly decorated soldier and had passed the gruelling entrance exams of both the navy and army military academies<sup>62</sup>. Ban and Ashibe were posthumously (31 May 1942) promoted two ranks to the rank of Lieutenant Commander and Special Second Sub Lieutenant respectively in recognition of their bravery<sup>63</sup>.

The midget crews were certainly the elite special forces of their day and all had completed a three year course at the Imperial Naval Academy at Eta Jima. Crews were selected for midget submarine service based on their courage, discipline and

<sup>60</sup> Transcript of interview with Teiji Yamaki, midget submarine officer, after the war. Steven Carruthers Collection.

<sup>61</sup> Jenkins, D., 1992, *Battle surface: Japan's submarine war against Australia 1942-44*. Sydney., p.204ff.

<sup>62</sup> Grose, Peter, 2007, *A Very Rude Awakening: The Night Japanese Midget Subs Came to Sydney Harbour*. Allen & Unwin, Crows Nest., p.91.

<sup>63</sup> Domei, Tokyo 27 March 1942, "Sydney, Diego Suarez Sub Raids: Heroes Honoured". Issued by wireless from Batavia at 17.30hrs. Australian War Memorial. AWM54 (622/5/6).

skill<sup>64</sup>. Yamaki however reflecting after the war considered the men to be no different to any other Japanese fighting forces in their skill and determination<sup>65</sup>.

The midget crews chosen for the second Sydney mission began training on 20 March 1942 at Aki-Nada and Iyo-Nada in the Japanese Inland Sea. Key elements included:

- Communication training
- Despatch and rendezvous training
- Obstacle breaking (nets, sea bottom crawling)
- Sea Strait passing
- Following vessels into harbour, and
- Firing training

The carrier submarines picked up their respective midgets at Truk (Chuuk) Lagoon after their delivery by the specially converted carrier ship *Chiyoda*<sup>66</sup>.

The mentality of the commanders is critical to any assessment of their operational decisions, as much as their tactical or leadership ability. This is particularly so when the location of the *M24* wreck site is considered and scenarios discussed regarding Ban's thought processes following his safe exit from the harbour (see discussion below).

Generally, there were five options available to Sub Lieutenant Ban and Petty Officer Ashibe aboard *M24* in any mission:

1. Rendezvous with mother submarine, scuttling of midget and crew recovery
2. Suicide by firing internal scuttling charges (if hopelessly trapped)
3. Suicide by pistol (if hopelessly trapped)
4. Death by some other cause (eg, depth charge, collision, asphyxiation, starvation)
5. Escape from vessel and attempt to land ashore.

Each of these options has an historical precedent, indicating that no one course of action was chosen between midget crews – it was rather a matter of circumstances.

Japanese sources indicated that none of the three midget crews returned to the rendezvous (as with the Pearl Harbour and Madagascar raids), eliminating Option 1. Discovery of the wreck has revealed that it is intact and therefore the internal scuttling charges were not fired, or attempts to fire them proved ineffective, eliminating Option 2. It is worth noting that Chuman in *Ha-14* detonated his forward charge only when hopelessly trapped in the Sydney Harbour boom nets. Matsuo in midget *Ha-21* had attempted to blow his boat when cornered and under depth charge attack in Taylor's Bay, however the fuses were wet – they had to resort to Option 3.

Other midgets are recorded sinking from mechanical or some other technical breakdown resulting in crew deaths. Others, like Sakamaki in *Ha-19* attempted to return to the mother submarine (in this case *I-24* again) after experiencing catastrophic gear failure, Option 1. Other crews ditched their midgets and attempted

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<sup>64</sup> Grose, Peter, 2007, *A Very Rude Awakening: The Night Japanese Midget Subs Came to Sydney Harbour*. Allen & Unwin, Crows Nest, p.53.

<sup>65</sup> Transcript of interview with Teiji Yamaki, midget submarine officer, after the war. Steven Carruthers Collection.

<sup>66</sup> Official Japan War History. Chapter 6: Attack of Sydney Harbour by Special Submarine Boats. Japanese version translated to English. Steven Carruthers Collection.

to swim ashore to affect a rendezvous per Option 5, for example the Madagascar midget, and perhaps the crew aboard the midget wreck located in 23 metres of water at Keehi Lagoon, Pearl Harbour in 1960, with its hatch open and crew gone<sup>67</sup>.

Discovery of Ban and Ashibe's midget *M24* has revealed significant damage to its conning tower which has constrained the ability to confirm the status of the upper access hatch, following the vessel coming to rest on the seabed. If *M24* had been found with the conning tower intact and the hatch closed, it would be proof that the crew were still inside. In this scenario, it would be most likely that they had committed suicide via Option 3, or had been overtaken by battery fumes or lack of oxygen, Option 4.

Fishing nets however have ripped off the conning tower access chute in its entirety, leaving the hatch lid alone on the seabed, forward of the conning tower on the port side. The access chute appears to be missing altogether from the wreck site and debris field.

This therefore raises the possibility that the crew may have attempted an escape, with land being within 3 miles of the wreck, Option 5. Currently however there is no indication that this course was followed, as no records confirm the discovery of bodies ashore. The men certainly never reached Japan.

### **6.3 Crew remains likely retained aboard**

There is one remaining visual clue – the state of the internal access ladder within the opening of the pressure hull. Type A midgets had a small two-step steel ladder that pivoted from a vertical 'up' (stowed) position, to a vertical 'down' position. It was located at the 'roof' level immediately above the conning tower space, at the junction of the conning tower tube access and the main hull. The crew could only exit the hull by pulling the ladder down in order to climb up the chute.

Initial video and still footage by the finders, and confirmed by the Heritage Office-led surveys, revealed the ladder exposed and in the 'up', or stowed position. This would indicate that the crew did not exit the boat (see *Preliminary archaeological interpretation of survey imagery*, below).

The Heritage Office is conscious of sensitivities associated with the announcement of the discovery of the Japanese midget submarine. The Japanese Government has previously indicated a desire for relevant Government heritage authorities to take a leading role with any discovery reports should they arise. The Japanese Government remains particularly concerned that the discovery recognises the potential issue of war dead being retained in a located sealed hull, and that any human remains receive the highest level of protection and respect.

The Office of Australian War Graves (within the Department of Veterans Affairs) has provided preliminary advice that such remains could not constitute a 'War Grave' under the terms of existing Australian legislation. The public announcement of the discovery has raised sensitivities for the families of the two missing crew, and requires appropriate liaison between the respective Australian-Japanese Governments and lead agencies. Both formal and informal briefings have been initiated at the time of writing this report, with a ceremonial event taking place over the wreck site by families of Sydney midget crews (21 May 2007).

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<sup>67</sup> Jenkins, D., 1992, *Battle surface: Japan's submarine war against Australia 1942-44*. Sydney. p.27ff.

The Heritage Office considers it likely that remains of the crew will be retained within the confines of the wreck site. It is most likely that they are contained within the central conning tower compartment as this provided the only part of the hull with any sufficient head-room to sit or stand during operational use. However it is noted that Tsuzuku's body, when recovered from *Ha-21* in Taylor's Bay, was found in the aft battery room (possibly also a result of the vertical lifting of the hull upon recovery).

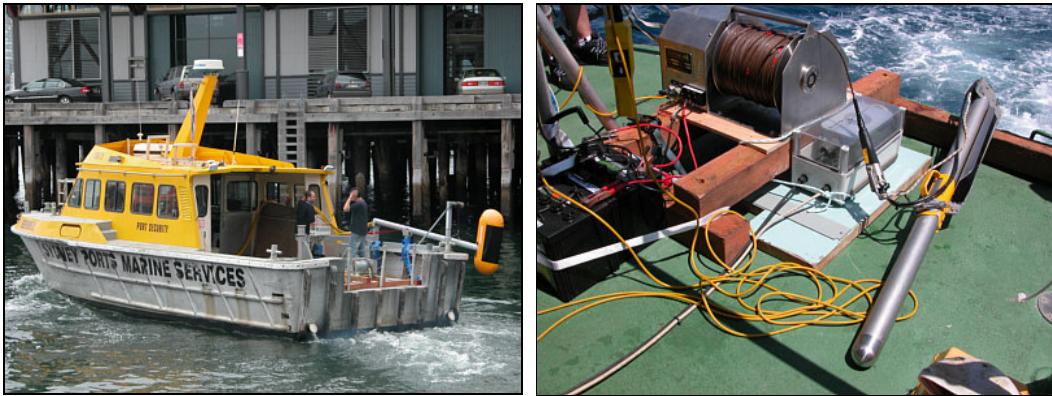
Based on the *Ha-21* evidence, Ban and Ashibe's remains could also be found within the forward battery room or aft battery room, the only other compartments that provided any meaningful access and space, via a narrow passageway between the battery stacks. As visual access to the forward battery room is impossible today due to the integrity of the hull in that area, only the remaining compartments offer any opportunity for further archaeological interrogation.

Sand levels evident in these areas (approximately 1.20 metres deep) would be sufficient to bury human remains in an anaerobic environment. What is not clear is the effect of sand and water movements and possible scouring patterns on the internal sand deposits. The artificial openings formed in the aft battery room through corrosion and control room via loss of the access chute, have compromised the once pristine sealed nature of the submarine hull. The current surveys have identified the need to undertake future sensitive surveys of the internal sediment deposits to model the potential for human remains to be retained. Possible remote survey imaging of the deposits using endoscopic cameras (as used on the Hawai'i midget wreck), has been identified as one possible future survey priority.

## 7.0 Archaeological Surveys - Methodology

### 7.1 Introduction

The Heritage Office identified a number of preliminary survey tasks to gain a better insight into the nature and condition of the *M24* wreck site. This initial documentation phase was deemed to be non-disturbance in nature and to particularly build on the initial graphic documentation of the structure obtained by the finders and the Royal Australian Navy. Key tasks included mapping the wreck site within its localised environmental setting via remote sidescan sonar imagery, detailed remote operated video inspection of the hull, and follow up diver-based 'close-up' inspections of the fabric.



**Figure 20:** Sonartech Atlas Pty Ltd. sonar survey.

The image to right shows the deployment of C-Max side scan sonar from a Sydney Ports Corporation vessel. The image at left shows an experimental multibeam *Fansweep* imaging system trialled at the wreck site. Photographs: Tim Smith

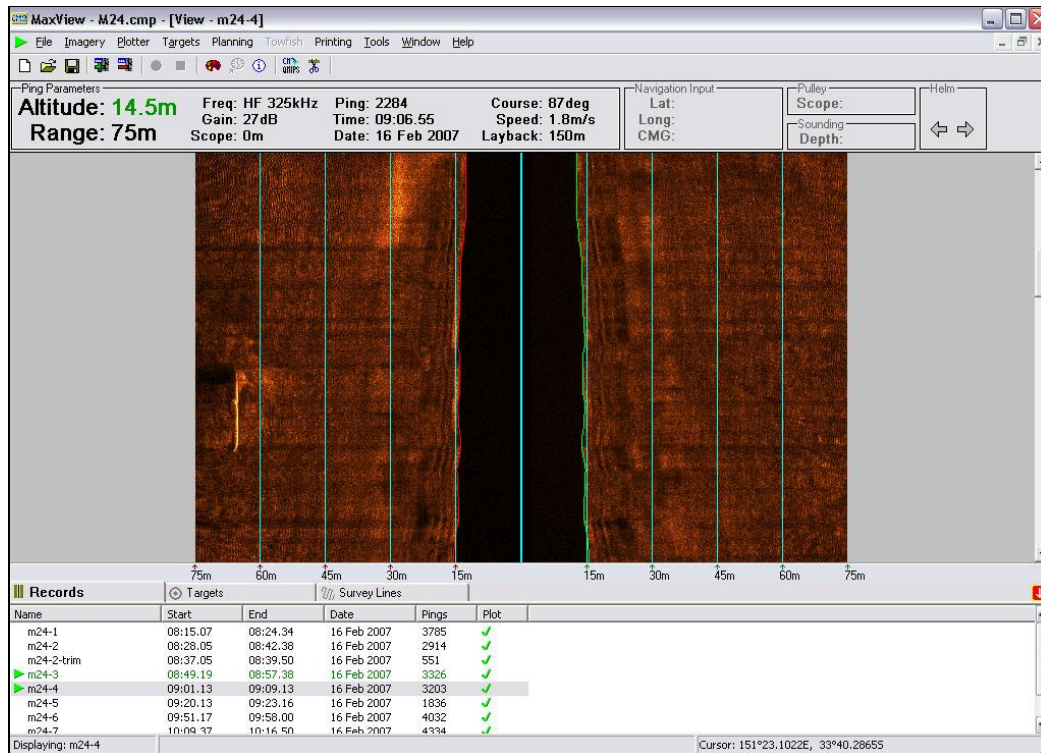
This report presents the findings of the preliminary archaeological survey operations. Future inspections will aim to gather more empirical site data including water and sediment sampling, analysis of marine habitat and microbial activity, possible corrosion studies of the hull and ultrasonic thickness surveys to determine condition and corrosion activity. Further tasks could include a camera probe inspection of the submarine's internal compartments. Additional surveys will add to the documentation of the structure and associated relics and may alter or refine the tentative interpretations presented in this report.

### 7.2 Sidescan Sonar Survey

The Sydney Ports Corporation assisted in a sidescan sonar survey of the wreck site by Sonartech Atlas Pty Ltd. The survey was conducted over two days (21 December 2006 and 16 February 2007), with poor sea conditions (3 metre seas) restricting quality data gathering.

The sonar imaging and preliminary 3-dimensional seabed mapping using Sonartech Atlas's experimental *Fansweep* multibeam sonar (results not available for this report), indicated that the submarine lies in an east-westerly direction, with the bow pointed towards the open ocean (east).





**Figure 21:** Sonartech Atlas Pty Ltd. survey.

Imagery derived from C-Max side scan sonar. Photo: Tim Smith.

The seabed terrain is universally comprised of mobile sand deposits of a uniform gradient, indicating a very gently sloping sand plain adjacent to the coast. The closest other historic shipwreck is the steamer *Birchgrove Park* (1956) located approximately three kilometres north of the *M24* wreck.

The detailed sonar imaging of *M24* was constrained by the existence of large fishing nets still entrapped on the bow and held aloft by fishing floats. These extend some fourteen metres above the seabed and were a navigational and entrapment hazard. Further, water currents documented at the wreck greater than three (3) knots) can pull the net at an angle in the current flow, increasing the snagging risk.

Due to this danger and because of the potential impact to the wreck structure, the removal of nets was identified as a critical task of the diver based surveys (see below). At present nets obscure detailed examination of the bow structure.

### 7.3 Remote Operated Vehicle Surveys

A key priority of the initial inspection of the *M24* was the gaining of additional independent visual footage of the wreck. Because the site is located beyond standard commercial diving depths which constrain access by heritage managers (like the Heritage Office staff), remote vehicle footage was an alternative option. Three ROV surveys have been conducted at the wreck, the initial survey by the Royal Australian Navy using a 'Double Eagle' ROV deployed from mine hunter, HMAS *Yarra* on 27 November 2006. The initial data gathered was sufficient to confirm the identification of the wreck at a Japanese Type A midget submarine.



A further survey was conducted by Ocean Modules Pty Ltd, aboard a NSW Water Police launch on 23 January 2007 but was aborted as 3+ knot currents extended to the bottom and were beyond the ROV's deployment capability.



**Figure 22:** View aft of the conning tower on the port side.

Supplementary imagery obtained during the *Curv* remote operated vehicle survey. Photograph: Defence Maritime Services/US Navy.



**Figure 23:** ROV *Curv*.

The vehicle was deployed above the midget submarine on 22 February 2007. Photograph: David Nutley.

A third ROV survey was undertaken with the support of the Royal Australian Navy and Defence Maritime Services (DMS) on 22 February 2007. The arrival in Australia of the United States Navy (USN) deep sea submersible *Curv* provided the opportunity for work up trials at the *M24*. The one-day inspection was successful with additional black & white and colour footage being obtained of the wreck, including detail of the objects in the relics field and the extent of openings in the hull aft of the conning tower. The ROV was deployed from the Defence Maritime Services (DMS) vessel, MV *Seahorse Standard* operating from Garden Island Naval Base (HMAS Kuttabul), Sydney.

#### **7.4 Royal Australian Navy Clearance Diving Survey**

At the request of the Heritage Office, the Royal Australian Navy provided a team of specialist Clearance Divers to assist in the archaeological survey operations. This support proved invaluable and also provided a suitable new training ground for Navy divers during their periodic deep water training programs. Operating out of the HMAS Waterhen base at Waverton in Sydney, Clearance Diving Team One (AUSCDT1) undertook the work over a week within 7-22 May 2007. The five diving days coincided with a period of exceptionally calm and clear seas with visibility at the *M24* wreck over 25 metres.



**Figure 24:** Royal Australian Navy Clearance Diving Team One. (AUSCDT1)

Diving survey operations undertaken in May 2007.  
Photo: Tim Smith.



**Figure 25:** Pre dive checks.

Royal Australian Navy Clearance Diver undertaking pre-dive checks. Photo: Tim Smith.

Engagement of the Navy divers also provided a fitting link to the Royal Australian Navy's defence of Sydney Harbour during the 31 May 1942 raid, and recovery by Clearance Divers of both the midget *Ha-14* and *Ha-21* wrecks over following days.

Critical tasks during the May 2007 survey included the capturing of additional video imagery of the wreck, preliminary inspection of the aft battery room compartment, visual inspection to identify the presence of the suspected aft scuttling charge, and general battle damage survey. The work also involved the attempted clearing of entrapped fishing nets at the bow, inspection of surrounding debris fields, and collection of sand to be presented to the relatives of both Ban and Ashibe. A significant media event, involving Australian and Japanese media, and the then Australian Federal Minister for the Environment, The Hon Malcolm Turnbull, was held above the wreck site on 21 May 2007.

The 14-person operation was undertaken in a short window available between other planned naval exercises. The divers found that the entrapped nets at the bow were severely fouled around and under the wreck. Hand cutting the various lines and interwoven stainless steel wires proved extremely difficult and had to be aborted until a future diving opportunity where thermal cutting tools could be deployed. All other survey tasks were completed or initiated.

## 8.0 Preliminary archaeological interpretation of survey data

### 8.1 M24 Orientation

Most internationally located midget submarines have been found upright and largely exposed when settling on a sandy bottom<sup>68</sup>. Even the limited remains of the midget at Diego Suarez in Madagascar, was found upright on reef within a volatile surf zone. The New Hannover midget in Papua New Guinea sits in a shallow water depth of twenty (20) metres and has an identical appearance to *M24*, while the 2002-located Pearl Harbour midget submarine, located in 400 metres of water, is similarly presented but with a slight list to port. That site differs in that the bow and stern are noticeably proud of the seabed, indicating a shallower settling depth in sand, probably resulting from less mobile sand movement around the wreck at its considerable depth.

Indeed, the majority of full-size submarines tend to settle with a general upright, half buried presentation (Smith, 1999c). This also reflects their rigid construction leading to complete (or near complete survival) as intact shipwreck structures. The strength of their hulls and the heavy ballasting required to keep them upright in working situations tend to keep submarine wreck sites intact and upright, or slightly tilted on their bilge.

The hull of *M24* sits in the surrounding sediment slightly deeper by the stern. Here the sand level bisects the propeller boss and therefore the centreline of the vessel, but at the bow, the lower torpedo tube is almost clear of the sand, indicating a slightly 'bow up' orientation. This is exactly as the Papua New Guinea midget wreck presents. The settling pattern seems to reflect the greater weight of internal machinery and fittings aft, including the rear-mounted engine and aft battery room compliment of 136 batteries. Both of these wrecks are also devoid of their two 18-inch torpedoes, whose combined weight in the bow was 842 kilograms (1858 pounds).

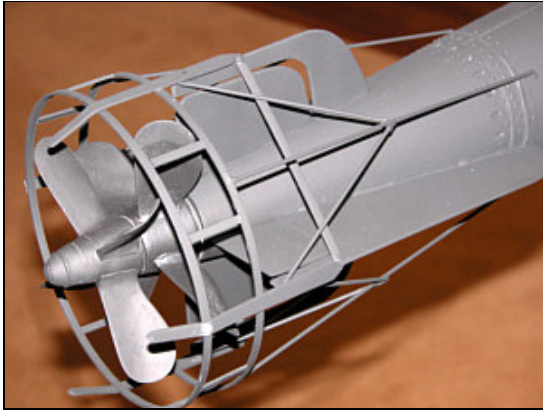
### 8.2 Stern

Most noticeable is the amount of damage suffered to external elements of the hull through contact with commercial fishing nets. As previously noted, this has resulted in the stern propeller cage and the upper vertical stabiliser fin and rudder, being completely torn off from the hull. It is possible that the other lower and horizontal stabiliser fins and rudders are intact but just buried under the sand. However, the total absence of the protective propeller cage suggests that past fishing hook-ups at the stern might have largely removed all traces of these features. Only the remains of a 'strut' that possibly once acted as a stiffener to the upper rudder is retained on the port side. Corrosion, and possibly abrasion from passing fishing nets, has almost dislodged it from the hull.

A few metal fragments in the sand surrounding the stern might indicate that at least some elements lie buried nearby.

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<sup>68</sup> In terms of burial, *U-166* in Gulf of Mexico is slightly different. Whilst upright, the hull has buried up to casing level in sand at 5000 feet depth (1524 m). This might reflect a relationship to the collision speed of impact with the seabed. See: Warren, Daniel, 2004, *ROV Investigations of the DKM U-166 Shipwreck site to Document the Archaeological and Biological Aspects of the Wreck Site*. NOAA Office of Ocean Exploration. Laafayette, USA.



**Figure 26:** Detail of original Type A midget stern arrangement.

The model indicates how much of *M24*'s tail structure has been removed by fishing nets, or still lies buried. Photo: Tim Smith. Model courtesy: Animax Films Pty.Ltd.



**Figure 27:** *M24*'s propellers.

The image shows loss of the upper rudder and surrounding cages. Note fishing lines fouled around propellers, probably the result of past snags. Photo: Heritage Office/Royal Australian Navy.

### 8.3 Propellers

Both contra-rotating propellers are intact, although the tip of the central boss is missing, with sand levels at the centreline of the screws. Only two blades of each of the four-bladed (3-foot diameter) propellers are visible where they protrude above the sediment. It is not clear how the central boss has been removed as examination of the same element at the Australian War Memorial midget submarine display indicates its complex attachment.

A few strands of rope are observed trapped around the screws and most likely represent the remains of an earlier net once entrapped at the stern. A line still wrapped in a corkscrew fashion around the extreme aft hull (see below), is a further indication that past hook-up activity here resulted in the removal of most exposed elements at the stern. The after-most stern compartment housed the shaft gearing mechanism and would have been originally filled with oil. Its present internal status is not known.

In the sand surrounding the stern lie more sections of net and ropes or cables which suggest that the remains of earlier fishing gear lie buried under present sand levels.

### 8.4 Engine (Motor) Room

The motor room is intact and will contain the 1.5-tonne 600 horsepower electric motor. Moving forward along the upper casing, the aft manhole that once gave limited service access into the motor room appears as a corroded opening. It is unclear whether this damage has been caused by past fouling of nets or reflects general corrosion activity around its semi-recessed form. Isolated corrosion holes in the roof line are found immediately forward of the manhole and it appears that the motor room is totally filled with sand.





**Figure 28:** Aft man hole cover on the stern section of midget *Ha-14*.

As displayed at the Australian War Memorial, Canberra. Photo: Tim Smith.

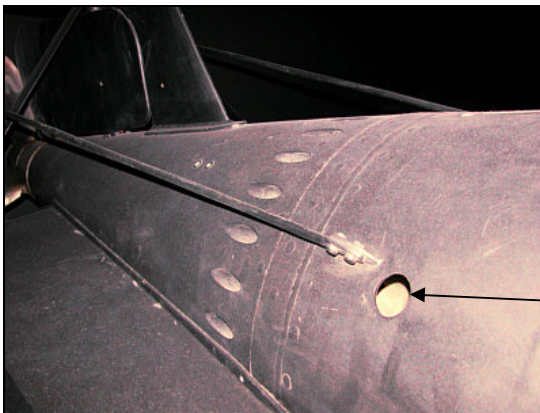


**Figure 29:** Detail of manhole on *M24* wreck.

This image shows additional corrosion damage in the surrounding casing. The circular hole (at left of picture) appears to correspond to the external lug position on *Ha-14*'s stern (Figure 28). Photo: Heritage Office/Royal Australian Navy.

### 8.5 Fouled line astern

Of special interest is a rope that has snagged the wreck at an earlier time, 'corkscrewing' around the hull completely in two turns. The turns lie either side of the manhole area and disappear into the sand. It is clear that this rope, possibly a lead line from a fishing trawling net, could only have wrapped around the hull if the midget's stern was once proud of the sand at this point. Later settling of the wreck or build up of surrounding sand deposits has now 'trapped' the rope.



**Figure 30:** Aft section of Chuman's midget submarine *HA-14*.

General arrangement of rudders and guards. Photo: Tim Smith.

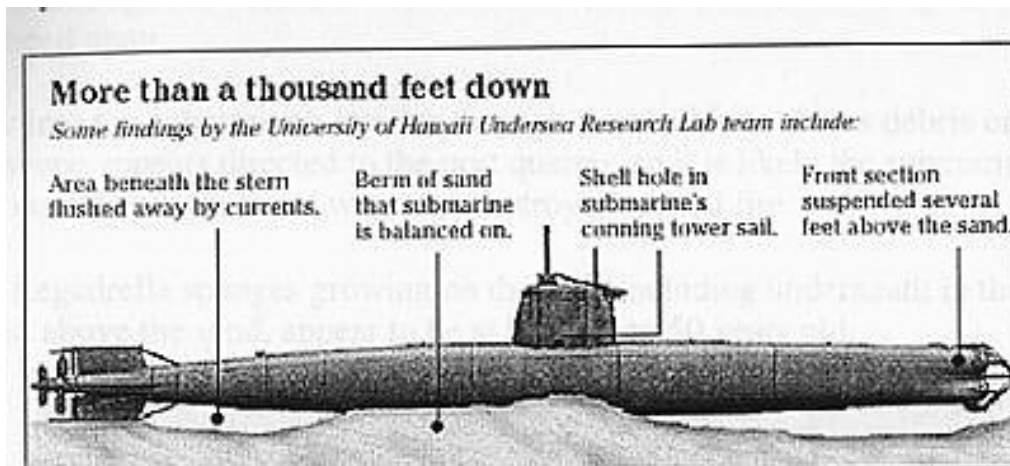


**Figure 31:** Detail of fishing net line wrapped around the *M24* hull at aft tail section. Photo: Heritage Office/Royal Australian Navy.

Note the lower circular hole in the casing below the rope – the aft hydrophone aperture (also visible at left on *Ha-14*).

Again the 2002-located Pearl Harbour midget might provide a possible clue to how this rope became fouled under the hull. When located, both the bow and stern of that

deep water site were observed almost proud of the surrounding sand levels. This perhaps reflects less mobile sediment movements in 400 metres of water, where the more benign environment appears to have limited the amount of hull burial. It might also provide a glimpse of an earlier state of Sydney's *M24*. Certainly when *M24* first settled on the seabed it lay completely proud of the sand. Over time the hull, in a more fluid water column that experiences surge and current to depth, has settled into the sand. This has probably resulted from scour patterns that have tended to 'dig' the wreck into the seabed, and from external sand build up where mobile sand has fallen out of suspension when impacting the hull surface.



**Figure 32:** Pearl Harbour midget submarine.

Located on sand in over 400 metres of water. Note the semi-exposed nature of bow and stern extremities of hull. It is considered that Sydney's *M24* wreck once presented in a similar manner. Image source: <http://www.nurp.noaa.gov/Minisub/honolulu/star-japsub.html>.

The nature of the nets trapped at *M24*'s bow proves that the bow too, was once proud of the seabed post 1942. At least some of the present nets are completely fouled around and under the bow with the contact points now buried under the sand (below).

### 8.6 Aft Battery Room – internal examination

Large openings either side of the hull and around the roof of the aft battery room are the most noticeable feature of the *M24* wreck. Lying immediately behind the control room - the 'heart' of the submarine, the aft battery room compartment holds 136 batteries - the largest concentration within the hull.

The openings have compromised the integrity of the hull, the internal compartment and associated relics. The largest opening has formed on the starboard side of the hull and extends from sand level up to the original external plating line of the conning tower. It extends from approximately internal frame 35 (forward) to 39 (aft). Importantly, the main water tight bulkhead that separates the aft battery room from the control room lies at frame 36. This means that the hull has witnessed corrosion between Frame 35 and 36 inside of the control room space.

This is intriguing as the control room was found to be partly filled with sand. To enable this sand to be retained in situ, the control room was thought to be effectively sealed with both bulkhead doors closed. However additional camera penetration into

the aft battery room openings indicates that the aft bulkhead door to the control room is open, and what appears to be the door swung open to starboard. Closer investigation suggests that the sand level observed in the aft battery room continues into the control room space itself, with no obstruction. Some remnant fishing nets are visible inside the control room but likely carried in by swell action. It is unknown whether the forward door is closed or open as no detailed inspection has yet been made of the forward bulkhead. If open, similar sand levels may have penetrated the entire forward end of the submarine.



**Figure 33:** Vertical view inside aft battery room. The image shows a largely buried structure that appears to be the top of the curved hinged door separating the control room. Photo: Heritage Office/Royal Australian Navy.



**Figure 34:** The port-side coaming of the doorway. The view is through the main bulkhead looking from the aft battery room into the control room. Note continuation of introduced sediment levels. Photo: Heritage Office/Royal Australian Navy.

Looking in through the 'roof' of the control room, enough of the control room walls are exposed to record a range of dials and levers, part of the complicated mass of controls, above the sand levels.

The corrosion opening noted above between Frames 35 and 36 must not then extend into the control room space proper. Something must be stopping the sand there draining out through this opening. Further inspection suggests that this corrosion point only extends into the starboard ballast tank within the control room.

When entering the aft battery room through the main starboard opening, the flat tops of batteries are immediately recognisable. Neatly stacked in their original racks ('trays') behind the starboard wall of the hull, only one row of batteries is visible. The batteries were stacked four high atop each other in the linked racks. As the outside hull is buried approximately 50% amidships, it is apparent that the top row of battery stacks are on show. This is supported by examining the cross-sectional drawings of the aft battery room in the archival drawings of *Ha-21* (figure 60).

The central passageway between the port and starboard battery stacks is therefore sanded over to the extent that none of the floor frames or lower batteries levels are visible. Based on the level of external and internal deposits this suggests that a depth of some four-feet or 1.2 metres of sand has entered the compartment.



**Figure 35:** Preserved battery stack in the aft battery room of midget *Ha-14*.

Aft battery room of *Ha-14* on display at the Australian War Memorial. This stack lies in a similar position to the batteries observed through the hull openings immediately aft of the control room on *M24*. Note that the bottom battery in the stack is out of photo at floor level. Photo: Tim Smith.



**Figure 36:** View aft within aft battery room, *Ha-14*.

This image shows the floor frame levels which would have been covered by an original removable floor. These features lie buried under sand within *M24*. Photo: Tim Smith.

Along the centreline of the roof, and adjoined by further corrosion openings, lies the girder (track) that supports the movable trimming weight. This 406-kilogram weight could be moved through the length of the aft battery room via a hand wheel attached to the roof of the compartment exactly above the current corrosion openings. At present, the internal film footage has not captured the rectangular weight (which might be positioned further aft). It is possible that the weight has dislodged during the wrecking process and may lie buried within accumulated sand deposits.

On the port side of the hull a similar opening has been formed, though not quite as large as the starboard hole. The opening is concentrated higher on the hull and extends also from frame 36 to approximately frame 38. The opening is partly blocked by internal machinery which prevents camera access. At least one transverse frame (number 37) has been lost to corrosion and net abrasion. Fragments of fishing net are observed trapped well within the aft battery compartment indicating later abrasion and tearing of nets around this opening. A number of electrical cables are suspended around the internal walls and ceiling of the compartment.

### **Hull severed**

The corrosion holes also extend around the ceiling of the aft battery room. The concentration of corrosion activity aft of the control room rear bulkhead suggests that the *M24* hull is effectively 'severed' at this point in terms of structural integrity and rigidity. This has important ramifications for any future discussions regarding the feasibility of recovering the wreck for conservation and public display.

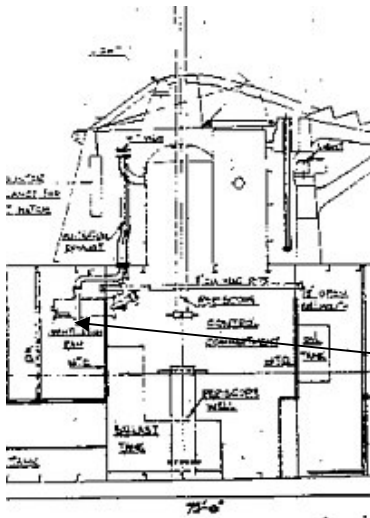
Visible inside the aft battery room are a number of discreet machinery items. The compartment contained one of two ventilation fans (the other being in the forward



battery room), the air heating unit, and two Well Glass Watertight lights. A 1942 intelligence report into the captured Sydney submarines noted that '*air circulation and heating was carried out by means of two blower motors, one in each Battery Compartment and a thermostat controlled Heater Uni*'<sup>69</sup>.

The air was circulated through metal trunking (pipes) with a series of controllable openings into various compartments. This allowed circulation of air within the boat and through the heater to maintain regular temperatures. During battery charging operations, air could be exhausted outboard from the battery compartments through the conning tower casing. The remains of the associated ventilation exhaust (piping) attached to the periscope dome is clearly visible on the *M24* wreck at the after end of the conning tower structure.

The ventilation fan is marked on the Garden Island plans of *Ha-21* (below) and is visible in situ inside the port side of the hull, still fitted to trunking passing into the control room space.



**Figure 37:** Contemporary plans of Sydney midget *Ha-21*.

The ventilation fan is marked in the aft battery room, behind the control room bulkhead.  
Source: Australian War Memorial.



**Figure 38:** View into corrosion opening on port side of aft battery room.

Visible in foreground is the Blower Unit/Ventilation Fan still in its original context. Photo: Heritage Office/Royal Australian Navy.

An object that appears to be the thermostat controlled Heater Unit lies in situ on the internal starboard side of the aft battery room, within the exposed opening caused by corrosion. This long cylindrical object appears to exactly match the Heater Unit fixed to the internal circulation system. The single unit is mentioned in Australian intelligence reports on the recovered Sydney midgets but does not appear on any drawings, perhaps having been earlier removed for analysis.

<sup>69</sup> Report on Japanese Submarines. Japanese midget submarine, Garden Island Naval Dockyard. Australian War Memorial, PR89/172, p.4.



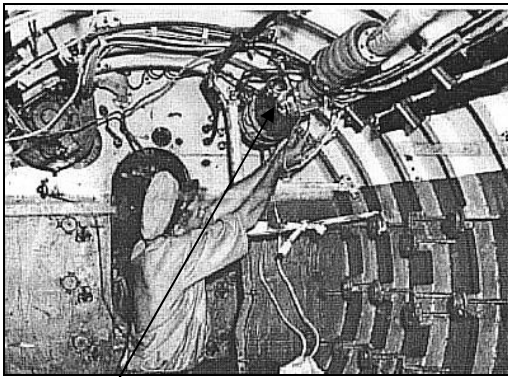
**Figure 39:** USN ROV *Curv* imagery of *M24*.

Footage of corrosion openings in port hull aft of control room. Photo: Royal Australian Navy/Defence Maritime Services.



**Figure 40:** Detail of object in aft battery room.

The object might represent a light fitting of the 'Well-Type', two of which were fitted in the compartment. Photo: Heritage Office/Royal Australian Navy.



**Figure 41:** Heater Unit.

Interesting US archival photograph which shows the bulkhead behind the control room of a largely stripped out midget (*Ha-19?*). Clearly left attached near the ceiling is the Blower Unit/Ventilation Fan to port (or left), and the Heater Unit to starboard (right). The latter closely matches an object observed on the *M24* wreck site at this position.

Image source:  
<http://www.nurp.noaa.gov/Minisub/honolulu/star-japsub.html>.



**Figure 42:** Heater Unit in situ.

Detail of object identified as the heater unit, aft battery room, starboard side. Photo: Heritage Office/Royal Australian Navy.

## 8.7 Conning tower

The conning tower or fin (modern day 'sail') has witnessed extensive damage. The entire external fairing (or plating) has been removed with no sign of remnant plates anywhere in the debris field.

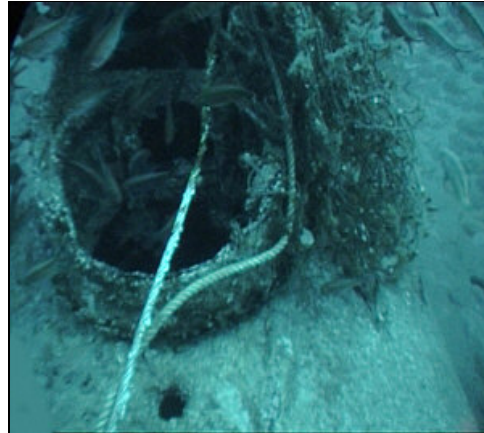
When located, fishing nets still enshrouded the wreck from the bow to the conning tower, obscuring half of the wreck site. At least one net was cut off the conning tower by the finders, and was left suspended from its entrapment point at the bow. The

direction of the nets confirms that past hook-ups tended to snag the bow first, then carry down the wreck to also foul the remains of the conning tower structure.

Past fouls by nets most likely explain the total removal of the access chute that once passed through the conning tower forming the main crew entry into the pressure hull. This item formed part of the pressure hull and therefore its removal has allowed direct sand ingress into the conning tower compartment. There is no sign of the chute, although the robust conning tower hatch (or 'lid') has been wrenched off the chute and lies beside the hull, a little forward of the conning tower, on the port side. It is sitting upside down on the sand (although when first found was observed lying 'right way up').



**Figure 43:** Remains of *M24*'s conning tower. View from bow, aft. Note the access chute removed, and steps built into the junction with the periscope well behind.



**Figure 44:** Detail of the opening into the pressure hull at the control room.

This opening is caused by the removal of the access chute. The hole in foreground (within original plating line visible) is associated with the aerial mast and hand wheel raising mechanism (under plating). Photo: Heritage Office/Royal Australian Navy.



**Figure 45:** Conning tower access hatch. The hatch is sitting on the seabed forward of the conning tower, on port side. View of internal locking mechanism which appears to be in the locked position. The central wheel operating the three lugs is missing.



**Figure 46:** The conning tower net cutter. This 4-tooth cutter that once attached to the conning tower is lying against the hull on the port side, aft of conning tower remains. Photo: Heritage Office/Royal Australian Navy.

The locking mechanism comprising three lugs operated through a system of bell crank levers appears to be in the 'closed' position, indicating that the hatch was sealed when nets broke this element from the wreck. Interestingly, the central wheel commonly observed to operate the three lugs is missing.

The visible form of the conning tower has therefore been substantially altered, only the pressure dome comprising the periscope well being intact with its in-built access steps now open to the sea on the forward face.

The upper portion of the periscope tubing is visible within the exposed cavity of the pressure dome and passing down into the sand deposit inside the control room space. When Navy Clearance Divers attempted to film inside the protruding periscope standard from outside the hull, they could not sight the lens (or extremity) of the periscope. It is not clear whether the periscope has naturally retracted into the lower well in the centre floor of the control room following loss of electrical power, or whether it was in the retracted position when the vessel sank. The periscope could be manually operated to save battery power or in the event of a malfunction and had an overall length of 17 ½ feet (5.3 meters). The periscope was the only fixture deliberately camouflaged. The top was painted green and the lower tube a rust brown colour<sup>70</sup>.

The finders initially reported the eye-piece and handles of the periscope visible within the confines of the control room. This would indicate that the periscope was still partly extended, and that the external portion had been lost to net action or some other cause. The current surveys did not confirm the status of the periscope which will be the focus of future surveys.

Outside the hull, there is no visual trace of the port and starboard bilge pump discharges, as they are positioned slightly under the mid section of the hull, and thus lie buried under present sand levels.

### **8.8 Crew access ladder**

A critical clue to the fate of the crew lies with the state of the small retractable access ladder hinged at the junction of the roof level in the control room. The crew needed to pull this ladder down from its vertical 'up' or stowed position, to climb out of the control room. From here they continued up the built-in steps that formed the partition between the access chute and the periscope well behind.

The ladder is clearly visible on the wreck in its 'up' position. Although the bulk of the original 1.5 metre-long pressure-tight conning tower access chute (or tube) has been wrenched from the hull, the ladder has been protected by a remnant portion of the chute (about 30 centimetres in height), that appears to have shielded it from a similar fate. The diameter of the opening is 49 centimetres.

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<sup>70</sup> Examination of Japanese Submarine Captured in Sydney Harbour. 16 June 1942, 6/2/17. Royal Australian Air Force, HQ Eastern Area. Obtained under Freedom of Information requests in 1981, by Steven Carruthers, researcher.





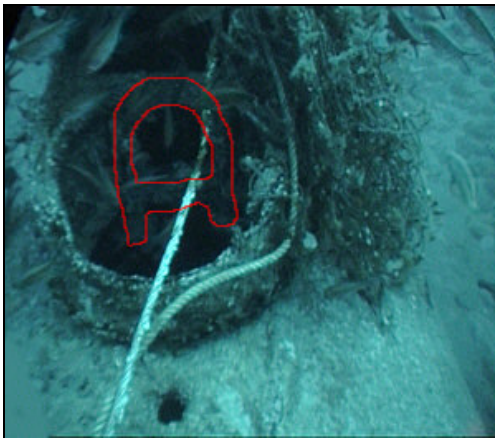
**Figure 47:** Inside Chuman's conning tower from midget *Ha-14*.

Note access chute and hatch (top of picture), and inside of periscope well. These two elements formed part of the pressure hull and a cavity above the 'roof' of the control room. Note that the retractable crew ladder (opposite) has been removed from this AWM display. Photo: Tim Smith.



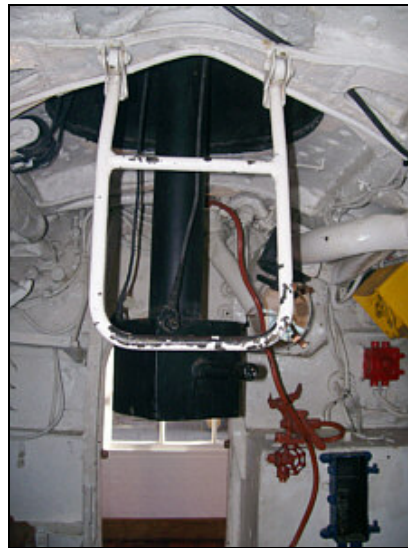
**Figure 48:** Inside Matsuo's conning tower from midget *Ha-21*.

Note the retractable crew ladder in stowed 'up' position, replicating the state of *M24*'s exit ladder observed at the wreck site. Photo: Tim Smith.



**Figure 49:** Outlined in red is the access ladder in its upright position.

The ladder is located today within the remains of the vertical access chute. Photo: Heritage Office/Royal Australian Navy.



**Figure 50:** View inside midget *Ha-21*.

Garden Island Naval Heritage Centre, Sydney, showing the crew ladder in the 'down' or in-use position, looking aft. Photo: Tim Smith.

## 8.9 Forward casing

The forward casing, concealing the forward battery room and beyond the torpedo room, appears totally intact. This restricts any interpretation of the condition of these internal compartments, the state of bulkheads, fixtures, fittings and any relic collections. Heading forward from the periscope, a notable feature includes the original frame outline of the conning tower casing, now removed. Within this outline is a distinct circular opening into the pressure hull, which once accepted the worm gear and worm wheel (inside control room) used to retract the small UHF radio aerial mast into the conning tower space.

Slightly ahead of the conning tower appear two small identical lugs on the centreline of the casing. These were the attachment points for the 'wishbone-shaped' net cutter that passed from here back to the top of the conning tower. As noted, the cutter has been torn off the wreck and lies against the hull on the port side, abaft the control room.

Continuing along the casing towards the bow, the most noticeable feature is the raised channel running along the centreline of the torpedo room compartment. This channel once guided a conduit with four hydraulic lines that ran from the torpedo room bulkhead forward to the bow, terminating in the release ram for the bow caps. One copper hydraulic line is visible, torn from the bow and wrapped at ninety degrees to the hull around the port side into the sand. It is further evidence of the sweeping effects of fishing nets along the casing surface, dislodging and distorting any exposed or raised features.



**Figure 51:** Detail of damage to the upper torpedo tube.

Torn off to expose a main bulkhead and internal 'running' tracks along ceiling of the tube. Photo: Heritage Office/Royal Australian Navy.



**Figure 52:** Detail of forward face of upper torpedo tube.

The tube has been removed from the hull and is lying buried in sand, approximately at 45° off the port bow. Photo: Heritage Office/Royal Australian Navy.

## 8.10 Bow and torpedo tubes

The bow area requires further inspection and only a preliminary assessment of its condition can be made. It is clear that the bow has sustained significant and perhaps constant fouling by commercial fish trawl nets. When attempting to remove the entangled nets, Navy Clearance Divers indicated that at least four separate nets

were still fouled. These were predominantly nylon nets (post c.1960s) with attached floats that keep the mass suspended vertically above the wreck some fourteen metres (14m) high off the seabed. Entwined within the nets are a variety of rope and stainless steel cables that appear to be wrapped around and under the bow, disappearing into the sand below. This indicates that the bow may have been elevated and perhaps proud of the seabed at an earlier time.

It is clear that bow torpedo tubes are devoid of their 45.7 centimetre Type 97 'Special' torpedoes, confirming that the wreck is that of *M24*, the only midget that successfully fired its torpedoes.

The protective cage fitted at the bow to protect the tubes appears to be totally removed. This cage was one of the identified improvements to the midgets post Pearl Harbour (which were fitted with a 'figure-8' guard), and the loss is again probably caused by net action. The distinctive bow torpedo caps, also a post Pearl Harbour modification, were jettisoned somewhere inside Sydney harbour and might await discovery. A search of the surrounding debris field ahead of the bow found no obvious trace of the framework or the original serrated jumping wire that passed from the bow to the conning tower. Aft of the conning tower was a continuing jumping wire to the stern, also lost.

Intriguingly, the original video footage taken of the wreck in November 2006 caught an object in this debris field that looked distinctly like the forward 'saw-tooth' serrated 'net cutter'. A search of the same area by Navy divers in May 2007 found no trace of this diagnostic relic, which may have sanded over in the interval.

Critical damage has been sustained at the bow. The lower torpedo tube is intact throughout its length, the opening and front casing clearly visible, and only one-third filled with sand. However part of the upper tube is missing – the tube has been torn off the wreck back to the bulkhead at possibly Frame 7, behind which lies the No.2 ballast tank (672 litres) used to compensate for the launch of the torpedoes. It is possible that the main ballast tank of 1336 litres, located further aft might also have been compromised. A bulkhead is clearly exposed, with the remainder of the tube disappearing through it aft. Of special interest are the exposed guide rails that jut out of the 'ceiling' of the damaged upper tube, that once assisted the torpedoes exit and straight running from the tube.

Hence some 2.4 metres (eight feet) of the original 5.4 metre long tube is missing. The inspection of the bow debris field confirmed the presence of (at least part) of this tube largely buried in the sand off the bow's port quarter.

There is no indication of the two hydrophones that run the length of the forward bow compartment on either side of the hull. It is likely that they remain just buried under the present sand levels or have just missed visual recording due to the amount of fishing nets enshrouding the bow.

During the initial media announcements following discovery, Navy spokespeople considered that this bow damage might constitute evidence of a sudden and catastrophic impact with the seabed (with implications for the state of the craft or crew at this critical time). Others suggested that the bow was out of alignment, confirming this sinking interpretation. However the Heritage Office surveys contradict these initial assessments. There is no visible distortion to the bow and no sign of creases in hull plating along the forward casing indicative of a heavy forward impact with the seabed. The fact that the lower tube is intact, in its original alignment and

apparently undamaged, indicates that the midget settled onto the seabed in a more controlled manner (further discussion below).

All visible damage can be explained by the significant contact with extensive fishing nets and possibly trailing gear such as otter boards and wires. It is probable that the removal of the torpedo tube occurred some decades after the sinking of *M24*, when corrosion processes had already destabilised the hull to a point where a heavy foul by nets made the tube fail. The fact that it lies beside the wreck in a debris field that includes runs of nets and cables supports its removal by trawling gear.

### **8.11 Debris Field**

A preliminary diver-based survey of the debris field was made to ascertain its principle characteristics, spread and likelihood to retain relics from the wreck site. The debris field comprised lines of twisted fishing net, cables and ropes that 'run' out from the wreck. Largely buried, these provide an indication of the direction of past net hook up activity. One mass runs off from the bow seaward in an easterly direction, while another significant bundle runs out from the bow and centre of the wreck on the starboard side. The full extent of these 'runs' was not documented although they are believed to extend over one hundred metres in each direction. It is possible that trawling hook ups have taken material from the wreck far beyond the observed field, perhaps explaining the complete absence of the conning tower access chute and plating from the conning tower itself.

The visual inspection of the debris field immediately around the wreck confirmed the presence of the conning tower net cutter and crew access hatch (discussion above). The tentative identification of the bow net cutter was suggested in the field immediately ahead of the bow (from the finders video footage) but could not be reconfirmed during the current survey.

It is clear that a wide area magnetometer survey is required to locate and isolate buried metal artefacts that might survive beneath current sand levels (eg 500 metres radius) around the *M24* wreck. Future inspections should continue to monitor the surrounding seabed to document changes in sand levels and possible exposure of the debris field and any associated archaeological relics.

## **9.0 Preliminary Discussion of Archaeological Findings**

This archaeological report is based on limited duration field surveys and therefore the findings presented here are preliminary in nature and subject to alteration or refinement through the future archaeological life of the *M24* submarine wreck site.

Two of the principle questions asked of *M24* post discovery have been '*What caused it to wreck*', and '*why at that location?*'.

The exact operational environment faced by the crew in their final moments may never now be revealed, or the vessel's actual movements post attack. After *M24* left USS *Chicago* the archival and oral evidence is largely mute. All subsequent actions can only be evidenced through interrogation of the archaeological evidence, although this has limited capacity.



It is considered that even full archaeological recovery, excavation and rigorous scientific analysis of fixtures and fittings, will not provide a final answer. Compelling insights would likely have been found on crew charts and recordings - however it is now highly unlikely that such organic materials will have survived within the hull. If crew remains were confirmed aboard, analysis of their spatial orientation and condition (eg evidence of gunshot wounds, number of rounds in Ban's service pistol, spent shells, state of dress, etc), might provide some insights into their last movements. Gauges and dials might provide some limited intelligence on the conditions aboard the boat at the time.

At this stage however, the considered management option is to leave *M24* in situ in its significant battle context (see discussion below).

This section will look at the historical evidence of mission recovery planning, *M24*'s operational orders and Ban and Ashibe's characters, to give possible clues to their final movements. The state of the wreck as observed through the archaeological surveys will also be introduced to assist interpretation of a range of possible scenarios.

## 9.1 Exit confirmed

It is now conclusively established that Ban and Ashibe exited Sydney Harbour, as previously suggested by the 1 June 1942 Indicator loop crossing evidence.

What is not clear is why they went north, with the vessel wrecked on the seabed east of Newport, on Sydney's Northern Beaches.

The previous discussion of Ban and Ashibe's character reveals an important point, they did not exit the harbour and turn north by chance – based on their training and resolve it must have been a calculated decision. However, were they observing operational orders that demanded they effect a rendezvous with their carrier submarine? If so, why would they go north for this cause if the generally presumed rendezvous was south? Were there other operational factors that dictated this course of action?, battle damage?, weather conditions?, battery power?, a tactical decision?

## 9.2 Recovery the goal?

Commander-in-Chief, Combined Fleet, Admiral Yamamoto determined that the midget submarine attacks should conclude with the recovery of the crews.

Captain Sasaki, commander of the midget submarines recounted after the war that '*Admiral Yamamoto said to me, "Be sure to recover the (midget) crews". Although I did my best, we could recover none of the crews in either case. I am very sorry for them. But those young men's spirit, fighting spirit of bravely carrying out their duty for their country ever*'<sup>71</sup>. This valour was confirmed by Rear Admiral Muirhead Gould in his address at the formal naval ceremony when the four recovered crew members were cremated<sup>72</sup>.

The official Japan War History confirms the standing operational orders that the Sydney midget crews were to be '*retrieved before the following morning*', but if this

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<sup>71</sup> Clarke, Yamashita, 1966, *To Sydney by Stealth*, p.128

<sup>72</sup> Lind, Lew, 1992, *Toku Tai*, p.80.

was not successful, the waiting submarines would continue attempts for three (3) consecutive nights<sup>73</sup>.

Ban's final letter expounding his '*Sure to die*' sentiments has often been held up to indicate that the midget submariners were resolved that death was a likely outcome of their operations – but this does not necessarily suggest that suicide was part of that understanding. A compelling argument against this view is that Ban and Ashibe chose to exit the harbour after their attack. If they had resigned to die, they could have motored their submarine under a target warship and detonated their extensive remaining demolition charges<sup>74</sup>.

Sakamaki (ex- *Ha-19*, Pearl Harbour) suggested after the war that Ban would have attempted to reach the designated recovery position. That they did not make it was probably because their batteries would have been exhausted. '*Ban would have had no power to return to the mother ship ... In my case it was the same. I had no power to move*'<sup>75</sup>.

This summation has proved partially incorrect as *M24* is located some ten miles north of the harbour entrance, meaning that he retained at least some residual motive power. However it is a very important insight – the midget submarines did not necessarily meet their full operational range in a combat situation.

### 9.3 Rendezvous Risk?

Contemporary commander Teiji Yamaki (who was to have been aboard the midget assigned first to *I-24*), contradicted Sakamaki's thoughts. He postulated that Ban and Ashibe would not have risked a return to the five waiting mother submarines with their 500-odd crew. To do so would have proved too great a risk of being followed or captured on the surface while disembarking aboard one of the I-class submarines. This was particularly so if short-wave radio communications had to be made and the time needed to make a successful transfer. The Japanese mother submarine fleet were awaiting radio communication with the returning midgets and noted that none were received<sup>76</sup>.

Detonating the midget sub scuttling charges post crew recovery would have been another consideration with searching Allied forces.

Yamaki concluded that there was a '*tacit understanding amongst the midget crews not to return, surrender of course, was unthinkable*'. So death was the only honourable way out'<sup>77</sup>. However there is evidence that some crews attempted to return, such as those that made it ashore at Diego Suarez from *I-20*'s midget, and even Sakamaki aboard *Ha-19* at Pearl Harbour in 1941.

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<sup>73</sup> Official Japan War History. Chapter 6: Attack of Sydney Harbour by Special Submarine Boats. Japanese version translated to English. Steven Carruthers Collection.

<sup>74</sup> Grose, Peter, 2007, *A Very Rude Awakening: The Night Japanese Midget Subs Came to Sydney Harbour*. Allen & Unwin, Crows Nest, p.195.

<sup>75</sup> Jenkins, David, 1992, *Battle Surface*. Random House. p.217.

<sup>76</sup> Official Japan War History. Chapter 6: Attack of Sydney Harbour by Special Submarine Boats. Japanese version translated to English. Steven Carruthers Collection.

<sup>77</sup> Jenkins, David, 1992, *Battle Surface*. Random House. p.153.

It does highlight why Chuman and Matsuo, together with their navigators, decided to kill themselves – but only when escape was hopeless and the security of the craft at immediate risk.

Some have suggested that according to Japanese psyche, while it was honourable to die in battle, it was more important if your body could be found and returned to further the hero status, not lost at sea in a steel coffin<sup>78</sup>. However Japanese authorities did glorify their un-recovered dead submariners at Pearl Harbour as war heroes (except Sakamaki who had been captured), and similarly the six crews of the Sydney raid – even though Ban and Ashibe's final actions and bodily remains were unknown of<sup>79</sup>. Some of Ban's other contemporary submariners, in line with Yamaki, felt that Ban would have headed out to sea, scuttling his vessel once the batteries were exhausted and gone down with it<sup>80</sup>.

Before the *M24* wreck was located, this was a commonly held view by many wreck searches, the offshore deep water preserving the highly secret nature of the technology. Perhaps going north also fitted this pattern, although if Ban had made the decision to scuttle the craft from the outset, it would appear odd to compromise discovery by hugging the coast, just three miles off, to the north.

It was Admiral Yamamoto's directive that the crews were to rendezvous and '*are not to die*', and the fact that the I-class submarines waited off Sydney for three days after the attack<sup>81</sup>, confirms that the mother submarine commanders, at least, were certain that the crews would attempt to meet these orders.

#### 9.4 Don't give up the secrets?

As noted, the development of Japanese Type A midget submarines was undertaken in great secrecy. They had only been used once before at Pearl Harbour. While the Japanese authorities possibly understood that Sakamaki and *Ha-19* had been captured at that time, and possibly the midget sunk by USS *Monaghan*<sup>82</sup>, the Sydney crews would have been conscious of the element of surprise and the need to conceal the weapon as much as practicable. Again the tactical operational orders for midget submarine attacks confirm that '*every attempt should be made to ensure that the midget does not fall into the hands of the enemy*'<sup>83</sup>. At the time they exited Sydney Harbour Ban and Ashibe may have had no knowledge of the fate of their crew mates aboard midget *Ha-14* which blew itself up in the harbour nets. Matsuo and midget *Ha-21* was still operational and had not yet entered proper until after Ban and Ashibe had left.

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<sup>78</sup> Damien Lay, Director, Animax Films, Pers.com with Tim Smith on 19 June 2007.

<sup>79</sup> Domei, Tokyo 27 March 1942, "Sydney, Diego Suarez Sub Raids: Heroes Honoured". Issued by wireless from Batavia at 17.30hrs. Katsuhisa Ban was posthumously awarded the rank of 1st Lieutenant (from Sub-Lieutenant) and Ashibe Special Second Lieutenants, from 1st Class Petty Officer. AWM54/A2663 (622/5/6).

<sup>80</sup> Jenkins, David, 1992, *Battle Surface*. Random House. p.217. p.218.

<sup>81</sup> Jenkins, David, 1992, *Battle Surface*. Random House. p.79, 235.

<sup>82</sup> Grose, Peter, 2007, *A Very Rude Awakening: The Night Japanese Midget Subs Came to Sydney Harbour*. Allen & Unwin, Crows Nest, p.31.

<sup>83</sup> New Zealand Naval Intelligence Memoranda. Serial No.20, 29 November 1943, 'Japanese midget submarine tactics'. Contained in papers related to the Directorate of Naval Intelligence, obtained under Freedom of Information requests by researcher Mr Steven Carruthers, in 1981.

Ban's contemporaries also confirmed after the war that every effort was to be made to prevent capture of their craft <sup>84</sup>. An example is the midget from *I-20* at the Madagascar raid where, once the craft was crippled, attempts were made to destroy it unsuccessfully by firing internal demolition charges <sup>85</sup>.

Meticulous planning went into the original design, testing and operational training of the midget's, and dictates that the Japanese military was not keen to divulge their secrets. For this reason, it is considered unlikely that Ban and Ashibe would have taken any action that would have compromised the intelligence contained in their boat. This includes going north to simply scuttle the vessel in its present location, instead of deep offshore waters. A theory that *M24* actually headed further north than the final wreck location and entered Broken Bay, later to be set as a floating northern decoy (see below), is similarly dismissed on these grounds.

It is possible that the demolition charges aboard *M24* were not fired as this may have provided evidence to the Allies of its final location. This may have been one of Ban's last decisions.

There are however indications that *M24* was taken north based a calculated tactical decision, not a whim. A new possible reason for a northern escape route is postulated below, but first the operational status of the craft at time of loss is considered.

### 9.5 *M24* battle damage?

Did *M24* succumb to battle damage inflicted by the guns of USS *Chicago* or other naval vessels inside Sydney Harbour? <sup>86</sup>. *Chicago* is known to have fired at *M24* with its five-inch gun crews and red tracer pom pom which according to Mate, Art King was, 'throwing up fountains of water, but with apparently no hits'. HMAS *Geelong* also fired with 20 millimetre rounds and some tracer which churned up the water to white foam <sup>87</sup>.

The current battle damage survey has not identified any obvious signs of shell damage to the presently visible portions of the hull. Due to the absence of the conning tower, particularly its plating, it is impossible to detail if *M24* sustained any damage to this portion of the hull.

Any shell damage to the pressure hull, including the crew access hatch, would have totally compromised *M24*'s diving capability. However the midget was last seen to successfully submerge during its torpedo strike at USS *Chicago* and was never sighted again within the harbour (despite the heightened awareness and searches of harbour defence vessels). This indicates that *M24* retained operational diving capacity after its fire-fight with Allied vessels. Further, the Indicator Loop crossing at 1:58 am on 1 June, generally regarded as *M24*'s escape signature, suggests that *M24* left Sydney Harbour submerged.

There is no indication whether the northern voyage was made also submerged, if the vessel regularly came up to periscope depth for sighting and charting purposes, or

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<sup>84</sup> Jenkins, David, 1992, *Battle Surface*. Random House, p.217, p.74.

<sup>85</sup> See:<http://www.combinedfleet.co/>.

<sup>86</sup> Clarke, H, & Yamashita, Takeo, 1966, *To Sydney By Stealth*. Horwitz Publications. p.89.

<sup>87</sup> Jenkins, David, 1992, *Battle Surface*. Random House, p.212, 217.

travelled on the surface totally at this stage. However the fact that it made it all the way to Newport indicates that a level of operational control was available to the crew.

## **9.6 Transit time, fatigue, foul air and toxic fumes**

If *M24* exited the harbour about 2.00 am and proceeded on their northerly course directly to the observed wreck location, they covered approximately ten (10) further nautical miles. Hypothesising that they did this at approximately 3-4 knots to save critical battery power, and with the prevailing swell at their back, it must have taken at least 4-5 hours to reach Bungan Head.

### At battle stations over thirteen hours

Ban and Ashibe had been at battle stations for approximately twelve-thirteen hours (12-13 hours), since deployment.

In this time they had transited to the harbour and into its deep recesses probably totally submerged, been attacked furiously from machine gun to five-inch shell fire, been swept by searchlights, and generally harried continuously. It also appears that they had remained submerged inside the harbour for approximately one-and-a-half hours immediately prior to launching their ill-fated torpedo attack, then exited the harbour again probably submerged for another hour and a half.

The environment inside their submarine must have been critical and their endurance similarly stretched. The air inside the boat would have been foul and damp, the state of fumes from overworked batteries unknown. Even if they had managed to surface and open the conning tower hatch, or come near the surface to ventilate the boat semi-submerged, it would have only provided minimal ventilation of the boat.

### Arrival at wreck position at daylight

It is important to note that if they arrived direct to the final wreck location, it would have been the early morning of 1 June 1942 with the sun breaking – possibly about 6:00 -7:00 am.

Ban and Ashibe would know that a comprehensive surface and aerial reconnaissance search would begin at first light. To stay on the surface would have meant capture or sinking. They would have definitely been forced to stay low by the time they arrived off Newport. This could mean remaining submerged for another 12 hours until nightfall.

Ban and Ashibe, separate from the fighting condition of their submarine, were almost certainly suffering from elevated levels of fatigue and probably stress – just keeping a midget submarine in level trim without porpoising being a long established design deficiency<sup>88</sup>. Again foul air in Sakamaki's midget led the crew to periods of confusion, dizziness and ultimate collapse. Here, water leakage into the battery stacks created a toxic environment, reducing available oxygen supplies.

It is impossible to ascertain the air quality within *M24* unless future trapped samples are discovered, for example, in forward battery or torpedo rooms and extracted for conservation analysis. A dangerous build up of potentially lethal fumes was known to occur during battery charging, hence the ventilation system designed to off-gas this air through the conning tower extraction piping. Here it is timely to recall events on the midget submarine that *I-24* was supposed to bring to Sydney.

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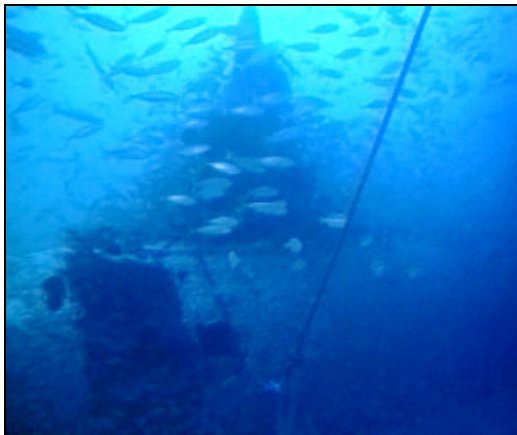
<sup>88</sup> Jenkins, D., 1992, *Battle surface: Japan's submarine war against Australia 1942-44*. Sydney. p.70.

Although its unique number is not known, the story provides an insight into the operational environment of Type A midget submarines. *I-24* successfully loaded her midget at Truk (Chuuk) Lagoon for the Sydney raid on 18 May 1942<sup>89</sup>. On the second day transiting, Lieutenant Teiji Yamaki<sup>90</sup> entered the submarine following routine maintenance. A technician turned on one of the nine lights aboard which resulted in igniting a gas build up. The resulting explosion badly burned his leg, but blew his crew member Petty Officer Shizuka Masumoto into the sea. He was unfortunately just entering the hatch and was never found. With the midget damaged, *I-24* went back to Truk, picked up another midget and its crew comprising Sub-Lieutenant Ban and Petty Officer Ashibe. Their role in the Sydney raid was finally assured.

This midget, with Ban and Ashibe, may have been the team assigned to submarine *I-28* - part of the original planned submarine force which included four midget submarines. However *I-28* was sunk by US submarine USS *Tautog* on 17 May apparently leaving it without a carrier. *M24* subsequently went with *I-24* on its second departure for Australian waters. As previously noted, the exact hull or number assigned to this midget has not been identified officially.

## 9.7 Batteries

A critical issue with the operation of Type A midget submarines was their power endurance. With pre-charged batteries (from the mother submarine), they had a finite power source that could not be replenished. The actual battery life verses power usage rates are not well known. Estimates of vessel performance are only available through intelligence assessments of the recovered vessels (e.g midget *Ha-21* in Australia, and midget *Ha-19* from Pearl Harbour), conducted during the war, or based on hypothesis.



**Figure 53:** Opening in starboard hull.

The opening provides an entry to forward end of aft battery room. Photo: Heritage Office/Royal Australian Navy.



**Figure 54:** Detail of battery.

Detail of upper of four suspected batteries in racks, aft battery room. Photo: Heritage Office/Royal Australian Navy.

<sup>89</sup> Carruthers, Steven., 2006 ed, *Japanese Submarine Raiders 1942: A Maritime Mystery*. Casper Publications. Sydney, p.85.

<sup>90</sup> Author Steven Carruthers was in contact with Mr Yamaki – the only identified living member of the Special Attack Force and former member of the Japan Midget Submarine Association which has subsequently disbanded. Mr Carruthers was uncertain of his health status at the time of the discovery of the *M24* wreck site. Steven Carruthers, pers. Com. 12 December 2006 with Tim Smith.

In many ways they are only an interpretation of the technology being analysed, without a detailed understanding of the design specifics or operational history of the craft.

Assessments of the design qualities of the midget batteries are intriguing but it is impossible for researchers today to know the state of *M24*'s batteries as they departed on their mission, any mechanical faults that might have occurred in operation (e.g water leakage into battery compartments), speed of transit, bursts of power used, etc. *M24* was perhaps at or exceeding its operational endurance when it reached the waters off Bungan Head.

If *M24* used excessive bursts of speed within Sydney Harbour, in fighting swell and currents to enter and exit the harbour (noting the poor sea conditions during the raid), it is possible that the batteries were beginning to fail by the next morning, or were severely constrained limiting operational opportunities. Again Sakamaki in midget *Ha-19* at Pearl Harbour identified loss of power, within a comparatively short mission as a key factor in his vessel's demise.

The midget's had been launched some seven miles off Sydney Heads on 31 May, with Ban probably around 4.40 pm<sup>91</sup>. In *M24*'s case, the boat had been active in attack for nine and a half (9.5) hours, if the detection on the indicator loops at 01.58 am. is determined to be Ban and Ashibe's outward crossing. Added to this was probably an additional four-five (4-5) hours transiting to the final wreck location; the crew and batteries had now been running for some 13-14 hours. Sakamaki's views that Ban and Ashibe would have been effectively out of battery power before leaving the harbour are noted above. Akieda and Takemoto's midget also allegedly ran out of battery power during the Madagascar raid, and was beached ashore, when the crew escaped but were later killed<sup>92</sup>.

It is interesting to note that an official wartime report suggested that a midget '*could remain submerged for at least twelve hours*'<sup>93</sup>. This is partly an estimate of crew endurance levels as much as technical capabilities<sup>94</sup>. The crew of *M24* might have been close to the end of their physical and mental endurance. According to some reports, a midget could run at its top underwater speed of 19 knots but only for 50 minutes total, while it could extend for 12 hours if run consistently at 6 knots – an unlikely scenario for Ban as he manoeuvred around the harbour and travelled in and out against current and swell<sup>95</sup>.

## 9.8 Why North?

There have been many theories advanced to speculate on the final location of *M24*. Many believed that Ban and Ashibe did finally escape the harbour and would have

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<sup>91</sup> Official Japan War History. Chapter 6: Attack of Sydney Harbour by Special Submarine Boats. Japanese version translated to English. Steven Carruthers Collection. Others have identified the release time as 5.40 p.m. (eg Carruthers, Steven., 2006 ed, *Japanese Submarine Raiders 1942: A Maritime Mystery*. Casper Publications. Sydney. p.116).

<sup>92</sup> See:<http://www.combinedfleet.co/>.

<sup>93</sup> *Japanese midget submarines attack on Sydney Harbour 31<sup>st</sup> May – 1st June 1942*. Navy Office, Melbourne, 1 August 1942. Australian War Memorial (AWM69, 185), p.13.

<sup>94</sup> *Japanese midget submarines attack on Sydney Harbour 31<sup>st</sup> May-1st June 1942*:Navy Office, Melbourne. 1<sup>st</sup> August 1942. Australian War Memorial AWM69/185. Canberra. p 13.

<sup>95</sup> Jenkins, David, 1992, *Battle Surface*. Random House. p.217; also: initial US naval intelligence estimates, in American Fleet Intelligence Summary, 'Midget Submarines'. Index 915, 1<sup>st</sup> Edition. August 1942. Obtained under Freedom of Information requests in 1981, by Steven Carruthers, researcher.

been attempting to rendezvous with the waiting mother submarines south of Sydney, near Port Hacking. This followed analysis of Japanese war records that indicated the final rendezvous at that place<sup>96</sup>.

Indeed Telegraphic Order No.4 issued by Captain Sasaki, operational commander, at 6.00pm on 29 May, two days before the attack included the following details<sup>97</sup>:

The following alterations are made to Telegraphic order No.3.

Day one ... No.2 recovery rendezvous. Setting the starting point at 180 degrees 4nm of Port Hacking, position at 100 degrees the following vessels: I-29, I-27, I-22 and I-24 (in that order). Distance 4nm, 190 degrees 6km from the centre position of the retrieval for I-21.

Depending upon the situation, some submarines may be ordered to search the foreshores after the second day.

The intact midget recovered from Taylor's Bay inside Sydney Harbour contained copies of British Admiralty charts<sup>98</sup>, including:

Admiralty Chart 1020, Jervis Bay – Port Jackson (Sydney)  
Admiralty Chart 1021, Port Jackson – Port Stephens (Sydney)  
Admiralty Chart 1069, Port Jackson (Sydney)  
Admiralty Chart 2119, Newcastle Harbour

## 9.9 A northern recovery position first proposed

On Admiralty Chart 1021 (Port Jackson – Port Stephens), marked positions described as "*picking up dispositions*" noted one particular rendezvous point for the five I-class submarines and midget submarines. This rendezvous was on a line off Broken Bay (north of Sydney) 110 degrees from a position 170 degrees, 4 miles from First Point.

The crew of *Ha-21* had drawn up this rendezvous and the bearings from the harbour entrance. These positions were also plotted up by naval intelligence after their recovery from the wreck of *Ha-21* and attached as a Plate to the formal intelligence summary report. That these Admiralty charts were in contemporary use during the raid is indicated by several 'fixes' made onto one copy by the *Ha-21* crew, following its release outside the Sydney Heads en route to the harbour entrance.

So midget *Ha-21* had recovery positions, not just for the southern Port Hacking rendezvous, but for an alternate, northern one. Indeed, based on this sketch, initial Allied intelligence suggested that this northern recovery position '*was chosen for the night of the attack*'<sup>99</sup>.

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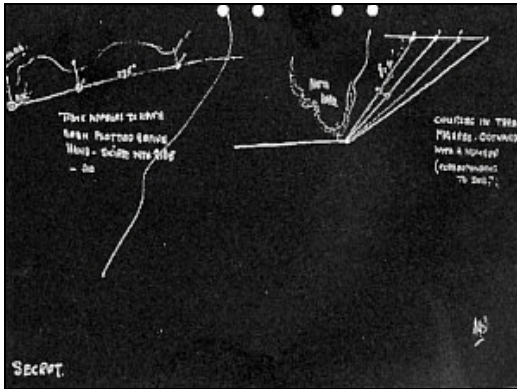
<sup>96</sup> Clarke, H, & Yamashita, Takeo, 1966, *To Sydney By Stealth*. Horwitz Publications. End plate.

<sup>97</sup> Reprinted in: Carruthers, Steven., 2006 ed, *Japanese Submarine Raiders 1942: A Maritime Mystery*. Casper Publications. Sydney. p.89; 30 May according to Jenkins, p.194.

<sup>98</sup> *Japanese midget submarines attack on Sydney Harbour 31<sup>st</sup> May – 1st June 1942*. Navy Office, Melbourne, 1 August 1942. Australian War Memorial (AWM69, 185), p.9.

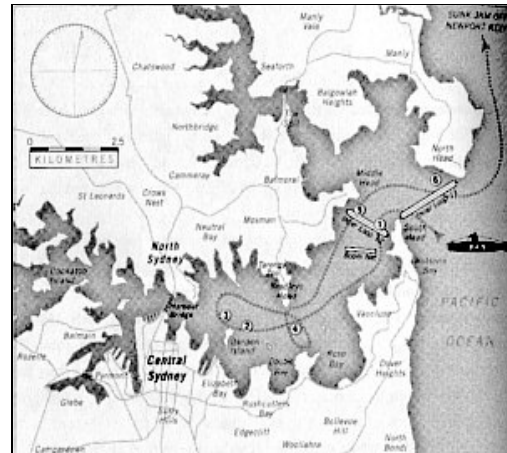
<sup>99</sup> Eastern Fleet Intelligence Summary: Midget Submarines. Index No.915, 1st Edition A. September 1942 (prepared by COIS E.F. Kilindini, 2 Sept 1942).





**Figure 55:** Copy of original sketch recovered from *Ha-21* in Taylors Bay.

The chart shows the course plotted inside the harbour, and northern rendezvous area and bearings. After: Carruthers, 2006.



**Figure 56:** Reconstruction of midget *M24*'s likely passage in and out of Sydney Harbour.

Based on latest assessments. Reproduced from: Grose, 2007.

It is intriguing to note that in previous Telegraphic Order No.3, issued on 26 May (six days before the raid), two midget recovery places were identified<sup>100</sup>:

After the completion of the attack, the following recovery rendezvous is to be taken.

Day 1 ... No.4 recovery rendezvous (off Broken Bay)

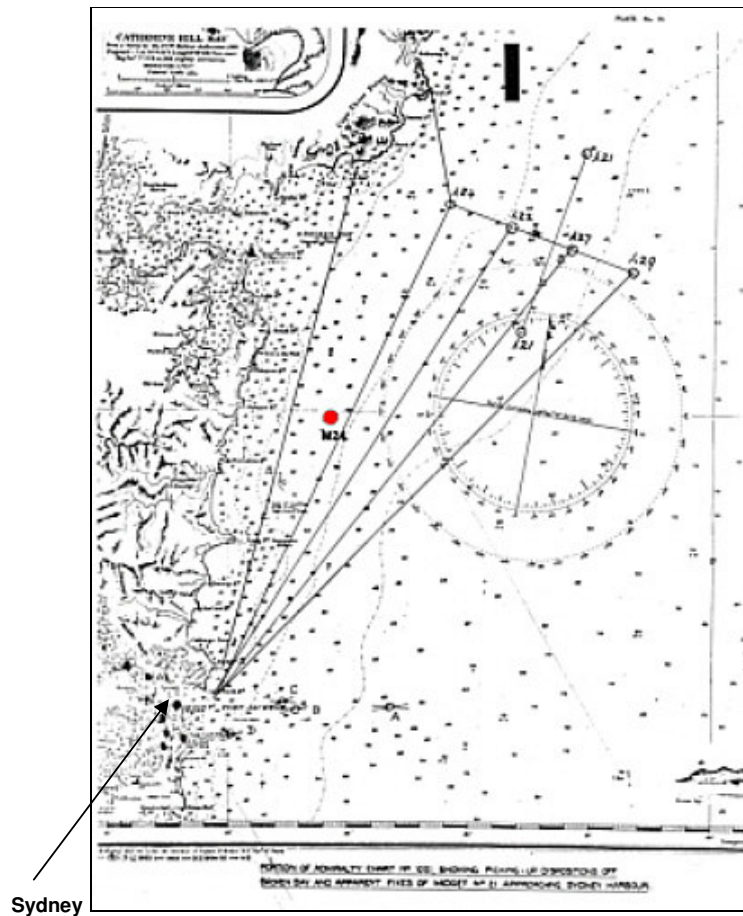
Day 2 ... No.2 recovery rendezvous (noted above as off Port Hacking)

Also of note was the Japanese plan at 26 May to include flexibility in recovery positions, interchanging Broken Bay and Port Hacking on successive days after escape from Sydney Harbour.

According to the Broken Bay rendezvous bearings *I-24*, the mother carrier for the midget *M24*, was to be the most inshore of the northern waiting group<sup>101</sup>. When this bearing and position is overlaid with modern charts of the actual sinking location of *M24*, the wreck lies almost exactly along the projected track line to *I-24*, and over half way along the voyage distance.

<sup>100</sup> Carruthers, Steven., 2006 ed, *Japanese Submarine Raiders 1942: A Maritime Mystery*. Casper Publications. Sydney. P.88.

<sup>101</sup> *Japanese midget submarines attack on Sydney Harbour 31<sup>st</sup> May – 1st June 1942*. Navy Office, Melbourne, 1 August 1942. Australian War Memorial (AWM69, 185), plate 10.



**Figure 57:** The Broken Bay (northern) recovery route plotted by *Ha-21*.

Following recovery of plans and documents inside Matsuo's midget (midget 21), naval intelligence authorities scaled up the planned recovery data. Overlaid on this 1942 annotated plan is the wreck site location of *M24*, which falls almost exactly on its proposed return bearing to waiting mother submarine, *I-24*. Reproduced from: *Japanese midget submarines attack on Sydney Harbour 31<sup>st</sup> May – 1st June 1942*. Navy Office, Melbourne, 1 August 1942. Australian War Memorial (AWM69, 185).

Could this indicate that Ban and Ashibe were not adequately made aware of the change in operational plans (Telegraph Order No.4, 29 May 1942), or forgot them in the heat of battle and escape? This is considered unlikely – what is clear is that the crews were well briefed on the range of rendezvous locations. Confirmation that the submarines did wait in the Port Hacking area collection is provided by crew members of *I-29*<sup>102</sup>.

Today it is intriguing that midget *M24* clearly went north immediately after exiting Sydney Harbour, and that midget *Ha-21* contained charts that only had the northern Broken Bay rendezvous plotted. Had Matsuo and his navigator pencilled this up immediately upon receipt of Telegraphic Order No.3 back on 26 May?

As noted prior, Ban was an extremely capable commander so by turning north it can be inferred that this was a tactical decision.

<sup>102</sup> Jenkins, David, 1992, *Battle Surface*. Random House. p. 221

## 9.10 Flexibility in recovery positions?

The apparent flexibility in recovery positions is of interest alone. It shows that the midget crews planned to have between one or more days to make a recovery as per Telegraphic Order 3. They could do this by waiting on the surface hoping to be spotted by the mother submarines, perhaps by lamp, or by making radio contact from the surface. Therefore, it did not potentially matter where they finally surfaced, as long as it was within the allocated recovery time frame, near one of the gazetted pick up areas, and that visual or radio directions could be made to find them.

In this scenario, going north, even if the recovery was to be off Port Hacking might have been Ban's plan to head away from the dangers of surfacing near the mother submarines. He would have known that the Allies would initiate intensive air and sea searches at first light after the raid. Indeed, Allied reports confirmed that eight aircraft undertook an unsuccessful search along Sydney's coastline at day break on 1 June 1942<sup>103</sup>. Ban and Ashibe may well have made a calculated decision to go to an alternate (northern) recovery position, stay low for a period (perhaps even a day), and then make contact with *I-24* when things had settled down a bit.

### Five collection points

In fact there were more than two proposed recovery positions – there were five (5) collection points. Charts number 1020 and 1021 recovered from Matsuo's midget had these positions pencilled in (#1: 37 miles [to northward of Sydney], #2: 19 miles to Northward (Broken Bay), #3: 20 miles, #4: 33 miles (Port Hacking) and #5: 50.5 miles to southward of Outer North Head (Sydney Harbour entrance – author)<sup>104</sup>. It is not known whether these original charts survive in Australian archives to confirm the recovery point spatial locations.

What is clear is that the midget *M24* did not finally make contact at all, but settled to the seabed almost halfway along an original planned recovery point near Broken Bay.

The mystery of Ban and Ashibe's final decisions may never now be revealed. While it is tantalising to think that Ashibe plotted their exit route from Sydney Harbour on their British Admiralty charts of Sydney, like the crew of midget *Ha-21*, it is unlikely that such organic paper records will now have survived within the *M24* wreck.

## 9.11 Impact with seabed?

Inspection of the wreck site indicates that the midget did not have a fatal impact with the seabed. Indeed there is no indication that the vessel crashed in an uncontrolled way with the seafloor. While the upper torpedo tube is broken, this impact appears solely caused by abrasion from fishing nets. The fact that the lower tube is totally intact, in alignment, and that there are no fold or impact marks along the exposed forward casing, indicates that the bow did not hit the seabed hard.

The casing aft of the conning tower has suffered damage but again, this damage is more likely explained by corrosion exacerbated by fouling with nets, flexing of the hull during net recovery operations by trawlers, or more unlikely, from anchor damage.

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<sup>103</sup> Cable message, Navy Office, 1 June 1942. Steven Curruthers Collection.

<sup>104</sup> Eastern Fleet Intelligence Summary: Midget Submarines. Index No.915, 1st Edition A. September 1942 (prepared by COIS E.F. Kilindini, 2 Sept 1942).

While more investigation of wear patterns on the hull is warranted, the initial appearance of the hull suggests that it settled on the seabed in an upright manner. Whether this was a controlled dive or out-of-control crash dive is unknown, but the impact with the seabed appears to have been completed in a level plane.

This has several implications for the crew at this critical period. Either they were:

- alive and deliberately chose to place the submarine on the seabed (e.g. to rest during daylight hours)
- they were alive but battling a sinking, perhaps partly uncontrollable submarine
- they were critically incapacitated and the submarine sank by its own accord

Analysis past this point is impossible until further studies are conducted at the wreck site. If the crew had been attempting to meet the northern rendezvous and chose to rest the submarine at its present location, some other event must have occurred to stop their progression north. Either they:

- chose to sit on the bottom now that it was daylight
- could not resurface the boat due to a mechanical problem (e.g. final loss of electrical power/engine malfunction/compressed air depletion)
- were overtaken by some other technical problem, e.g. poisonous air/lack of oxygen
- deliberately chose to commit suicide and not to affect final recovery

In the latter scenario it is intriguing that the hull is pointed in an easterly direction. Was this a final endeavour to lie in death facing the eternal rising sun in favoured Japanese tradition? This can only be speculation at this stage. It is known that the internal firing charges had not been activated. Would scuttling the vessel draw attention to their present location? Or did they too attempt to fire the demolition charges only to find them fail, as other crews had done?

Therefore, if *M24* transited from Sydney Harbour direct to the final location, with no other movements, some event or series of events caused its demise. Either 1) the crew were overtaken by one of a range of possible mechanical, environmental problems, or a catastrophic event, or 2), perhaps purposefully decided to end their lives with no other way out, simply making a conscious decision not to carry on with what ever their northern escape plan contained.

The evidence on the wreck site – the state of their exit ladder and the position of the locking mechanism on the underside of the hatch lid, confirms that they did not attempt to escape the vessel.

### **9.12 Did *M24* exit Sydney Harbour and enter Broken Bay?**

A theory was put forward in 2002 that *M24* had actually gone north into Broken Bay after leaving Sydney Harbour. This theory was based on reports contained in the “War Diaries” of local Army units. Here several sightings of an object described as a mini submarine were observed in the days immediately following the Sydney raid and perhaps for nearly a month after<sup>105</sup>. This theory, which attracted documentary film interest in 2005, proposed that Ban and Ashibe deliberately set their midget to be a partly floating decoy, after committing suicide. While the reported sightings of a midget submarine inside and at the entrance to Broken Bay are tantalising, it seems

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<sup>105</sup> Macken, James, 2002, “Sydney 1942: Two wartime mysteries or none?”. *History Magazine of the Royal Australian Historical Society*. June (72).

unlikely that the 'floating' wreck could have remained for up to a month without being detected by authorities, despite dedicated searches. The theory suggested that *M24* finally sank within the entrance to Broken Bay. Now that the wreck has been located south of that entrance, the theory has been revisited.

For the highly classified status of the submarine at the time alone, the possible remaining endurance of the craft, and the lack of a tactical fighting capacity (no torpedoes left), the theory is questioned by the Heritage Office and other researchers (such as Carruthers and Grose). It is acknowledged that the captured midgets had documents that confirmed their knowledge of Broken Bay and the significant Hawkesbury (rail) Bridge as a potential mission target.

However the sightings of the submarine might be explained by over anxious personnel with the whole of Sydney on midget submarine alert after the raid. There are many instances of submarine sightings along the entire New South Wales coastline following the raid <sup>106</sup>. In fact, there was another significant scare within Sydney Harbour in 1943 that resulted in depth charge attacks of 'sighted' midget submarines near the harbour boom net <sup>107</sup>. However, the decoy theory warrants future debate in light of the northern beaches discovery of the wreck, although to the south of the entrance to Broken Bay.

### **9.13 Explanations for corrosion openings to hull**

The *M24* wreck site is largely intact and recognisable as a submarine. The most obvious changes to the hull include the removal of the conning tower 'shape' and the large openings that have formed in the hull immediately aft of the control room. These are significant changes to the hull and must be explained.

The amount of entrapped fishing nets on the wreck indicate that the fragile hull and fittings have suffered significantly from past hook ups. Much of the observed damage can be readily explained by the abrasive force of large open ocean trawl nets (of various vintage and manufacture), ancillary wire cables and rope work. Items like the conning tower net cutter have been ripped off the hull and lie exposed on the seabed, still with net entanglements attached, proving the cause of this damage.

The bow is still heavily fouled by a concentration of many nets which again shows that huge force has been applied to that end of the wreck. This most likely explains the removal of half of the upper torpedo tube and total loss of the former torpedo tube protective cage. This light structure, like the stern propeller guard, appears to have been totalling removed from the site.

At the stern, the loss of the upper rudder and perhaps horizontal dive planes, together with the protective cage, indicates that quite massive forces have once been applied at this section. Today the area is largely devoid of fishing nets, although lines are still fouled around the propellers and stern casing, indicating that past net hook ups have occurred.

The large openings formed either side of the hull and at the roof level have several possible causes.

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<sup>106</sup> For example, *Daily Telegraph* (Newspaper), 6 June 1942.

<sup>107</sup> The author is indebted to Mr John Perryman, Director, Sea Power Center for information regarding this event.

These could include:

- internal explosion
- impact and resultant corrosion by passing ship's anchors or trawl gear
- degradation from leaking battery acid from the aft battery room stacks
- mechanical force to the hull
- rolling of the hull since deposition

It is clear that the forward and aft demolition charges have not been activated. Based on the destructive force of just the forward fired charge on *Ha-14*, the *M24* wreck would have lost at least half of its length (for a single charge), or possibly two-thirds of its structural form if both charges had been successfully fired.

Could the damage be explained by an isolated explosion – perhaps the result of ignition of a build up of hydrogen gas from the over-worked batteries? The potential force of a gas explosion was vividly shown in *I-24*'s original midget embarked at Truk. Here the electrically-ignited explosion badly burnt the officer and blew the navigator out through the hatch to drown. The midget was unserviceable for future use but unfortunately the amount of structural damage sustained was not documented.

A limited gas explosion in the aft battery room on *M24* cannot be ruled out but there are no tell-tale ruptures to the hull plates indicating a significant outward force. It is noted however that corrosion processes have tended to reduce the edges of the compromised hull plates back to internal transverse frame lines. Because of this secondary activity, the hull openings appear today quite angular and regular, and larger than the initial wear points.

An indication of an internal explosion might be the destabilisation of internal fixtures and fittings such as the battery stack frames, etc. However with the current sand levels within the aft battery room it is difficult to determine if any batteries have been dislodged, piping sheared or any other sign of a destructive force. Further investigation is warranted.

Another consideration is hull degradation through leaking and pooling of sulphuric acid from the batteries. It is interesting to note that the lost plates extend around the roof line of the compartment and at its 'highest' end against the aft bulkhead to the control room. Should acid have leaked from the batteries it might have concentrated at this location weakening hull plates. Loss of structural material through battery leakage is not considered very likely however. The amount of acid contained within the battery cells is limited. To activate serious localised corrosive effects the amount of acid would have to involve the bulk of the aft battery stock – 136 batteries. This would require a catastrophic event to cause the rupture of the batteries in the first instance, or extensive breakdown of the battery containers through corrosion in the years following the wreck event.

It is considered likely that post wrecking, the hull probably naturally filled with seawater through minor openings and valves, resulting in the complete, or near complete, flooding of the internal compartments. Any battery acid leakage following this time would tend to dilute the acid's effectiveness. An alternative proposition is the build up of gaseous vapours within the hull that may have collected in that end, post wrecking, particularly if the hull had remained air tight and sealed for a number of years post deposition. Further analysis is required to identify the viability of such corrosion processes.



**Figure 58:** Detail of corrosion opening on port hull, aft.

Visible within the hull is the roof-mounted track for carrying the counter weight. Photo: Heritage Office/Royal Australian Navy.

**Figure 59:** Overhead view of *M24*.

This image shows the main corrosion openings to hull. Photo: Heritage Office/Royal Australian Navy.

The complete rolling of the *M24* hull has been examined and is one other event that could explain the amount of damage sustained to the conning tower and the hull immediately aft. The wreck is known to be heavily fouled with modern (post 1960's) nylon mesh fishing nets and entwined metal trawl gear (cables), with one rope line passing in a corkscrew fashion twice around the very aft hull. This rope might indicate a previous roll event, although might also be explained by random fouling. The entwined nature of this rope does indicate that the stern of the wreck, at least, was once completely proud of the seabed.

If the wreck was fouled by fishing nets early in its depositional history, before it buried into the surrounding sediments, there might have been an opportunity for rolling the hull over in a severe net hook up event. In this scenario, the conning tower plating could have been wrenched from the main hull and the forward torpedo tube removed. The force could have weakened the hull aft of the conning tower initiating the corrosion activity witnessed. In this scenario, other major elements from the hull such as the missing access chute might now lie buried in sand under or near to the wreck.

A Type A midget submarine is still a sizable structure of 46-tons and filled with sea water (and possible sediment), significantly more so. Further analysis of the types of local trawlers is required to identify the potential pulling strain of their winches when trying to retrieve fouled nets. Initial estimates suggest trawler winch capacities of up to 16 tons pulling power<sup>108</sup>. While Type A midget submarines deployed at Sydney had a displacement of 46 tons, in their intact operational state they had a total buoyancy tank lift estimate of 3.3 tons<sup>109</sup> (3, 300 kilograms). This is considered sufficiently low to allow a trapped Type A wreck to be rolled by a fishing vessel if the hull had not suffered any loss of watertight integrity or any significant burial depth.

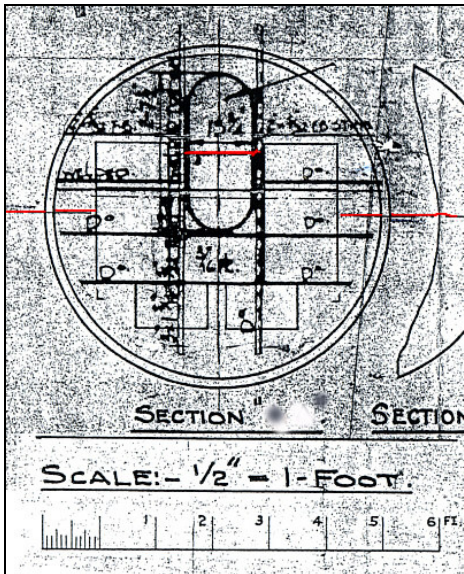
If a past fishing hook up resulted in the rolling of the submarine, this event could only have occurred in the first few decades post wrecking, when the hull was much more lightly buried in surrounding sediments. Here it is interesting to note that the wreck

<sup>108</sup> Mr Ken Graham, Scientific Officer, Cronulla Fisheries Research Centre, based on ex-NSW Fisheries research vessel MV *Kapala*. pers.com. with Tim Smith, 27 July 2007.

<sup>109</sup> Mr Steven Carruthers, pers.com. with Tim Smith, 30 July 2007.

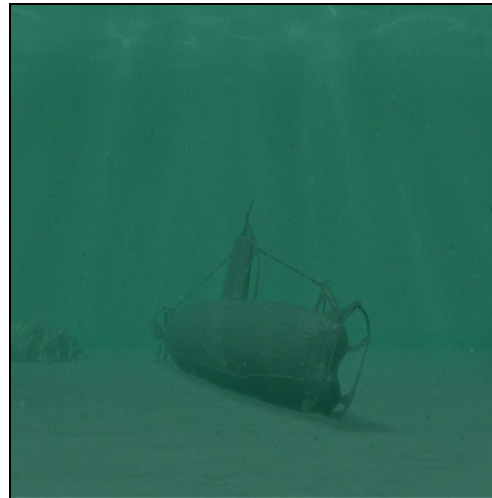


site appears to have been detected at least by 1959, as an isolated obstruction (marked as a 'rock') appears on coastal Naval Hydrographic charts in the general vicinity <sup>110</sup>. It is unclear if this represents a reported snag site by commercial trawler operators at the time, or the results of remote seabed surveys.



**Figure 60:** Approximate cross-section of M24 hull at Frame 36.

This divides the control room from the aft battery room. The red line denotes approximate sand levels inside and outside the wreck site. Some 4-foot or 1.21 metres of sand is calculated to lie within these compartments.



**Figure 61:** Computer generated image of M24 resting on the seabed.

The possible scene as Ban and Ashibe came to rest the midget off Bungan Head. Courtesy: Animax Films Pty Ltd.

Further detailed analysis of the nature of the net hook ups still around the bow might provide clues to the date of this activity, based on the style and manufacturing dates of the nets observed. This analysis is currently underway with relevant authorities, research specialists, and local fishing operators (current and retired). At present the bulk of the trapped nets appear to be nylon types, although the possibility of pre-1960 era rope (hand made) nets cannot be ruled out at this time.

The hull openings aft of the control room could also derive from fishing net hook ups at the bow. Known to be heavily fouled with nets, a trawler winching up vertically to recover its nets could have applied tremendous force to the hull. The general practice when attempting to clear a fouled net is to run forward and back in the direction of the foul. This could explain the stripping of external hull elements such as protective cages. Should the net still hold, a trawler operator would generally pull up vertically over the obstruction and take in slack. The additional force of the fishing trawler could be brought to bear by hauling on the winches until the stern semi-submerged. This added buoyancy force could add to the winch action. If the net did not tear off it would have to be cut. This process has been observed at the site where the majority of fouled nets at the bow are largely intact, including 'cod-ends'.

<sup>110</sup> Australian East Coast chart series, 'Port Jackson to Port Stephens', from surveys by the Royal Australian Navy to 1959, AUS 809. The obstruction was probably fixed with radar marks at the time.



Submarine hulls are not traditionally strongest in their longitudinal plane. Further, the rear half of the wreck from the control room aft, contains the most significant weight – the aft battery room stacks and main motor. It is interesting that the corrosion damage to the hull is localised and has occurred between the rear main bulkhead of the control room (frame 36), extending aft to frame 39 (approximately one metre). This area comprises one of the natural ‘joint’ areas of the pressure hull – frame 36 being the bulkhead at the rear of the control room compartment, and Frame 40 being one of the main butt joints for the welded hull plates.

It is a natural area of weakness then for the long cylindrical hull. If a trawler was heaving up on nets trapped at the bow, it is conceivable that the forces were translated back through the hull and caused a fatal flaw at this ‘joint’ area that forms the start of the heavy aft hull section. In this scenario, the forward hull may have been flexed upwards, perhaps repeatedly, causing a spit or contusion to the pressure hull plating behind the conning tower. When the net recovery was abandoned, the hull would have resumed its setting on the seafloor, however the stress applied aft could have initiated corrosion activity in the steel plates. Over decades, this natural corrosion could have resulted in the plate loss observed today – extremely localised corrosion, not replicated in any other part of the 24-metre long hull. The hull was fashioned from 5/8th inch steel plates (16 millimetres). The defined nature of the corrosion, and its extension through the roof line, is suggestive of a concentration of force to the hull at this point.

Again, further detailed analysis of the hull is warranted here, and future hull corrosion studies focussed on identifying the current corrosion profiles and plate thicknesses in this area. Other corrosion activity based on galvanic corrosion, where two dissimilar metals are in electrical contact with each other, needs also to be assessed. In this situation the less ‘noble’ metal will sacrificially corrode. Generally there is little in the form of other internal fittings items, such as engines or framework, which could explain localised degradation through aggravated dissimilar metal corrosion processes, aft of the control room.

Another explanation to be considered is past contact with the hull at this location by passing anchors or perhaps otter boards from net trawling gear. The *M24*'s location relatively close inshore puts it away from favoured anchoring grounds of larger container ships. While visiting vessels to the northern main port of Newcastle or south to Sydney can occasionally anchor up of Sydney's Northern Beaches, they generally do so at 5-10 miles offshore. If an anchor had caused the damage that has resulted in the present corrosion to the pressure hull, then it would have been an extremely unlucky event. It is considered that an anchor would more likely damage one side of the hull, rather than cause two mirror openings forming either side, unless it tore completely through the hull.

## 10.0 Site protection and ongoing management

### 10.1 A Question of Ownership

Ownership of the *M24* wreck site most likely resides with the Japanese government who have previously confirmed their interests in the protection and management of their other submarine wreck located in Australia waters, *I-124* (Darwin, Northern Territory). This has also been demonstrated by the German Government retaining title of the historic U-boat wrecks under international Admiralty Law provisions of sovereign immunity. They include wrecks such as *U-85*, heavily looted by divers off the United States of America <sup>111</sup>.

In the normal instance, according to McCarthy, '*regardless of whose waters a ship lies in, unless the vessel was surrendered before it sank, it remains the property of the parent 'State' until rights to the remains are sold or given up by its government*' <sup>112</sup>. The Japanese government has made no formal claim with regard to the *M24* wreck site at this early stage. It is interesting to note that with the 2002-discovered midget submarine off Pearl Harbour, the Japanese Government transferred their rights to the United States in 2004. That wreck is now being managed under a joint partnership arrangement with leading US management agencies such as NOAA and the National Parks Service, in cooperation with the sites finders, the Hawai'i Undersea Research Laboratory (HURL) and associated universities <sup>113</sup>.

In the Australian case, the *M24* continues to be protected and managed within the terms of NSW State and Australian Commonwealth heritage legislation, as this protection is pre-eminent, regardless of ownership. The Japanese Government is closely informed of site protective measures and outcomes of initial archaeological survey tasks, via the Federal Government Interdepartmental Committee (IDC) that includes representation by the Japanese Embassy. The Japan Maritime Self Defence Force has been present at several commemoration ceremonies above the wreck site and at the Garden Island Naval base in 2007 (7 February, 21 May, 1 June), including the personal involvement of the Japanese Chief of Navy with his Australian counterpart, Vice-Admiral Russ Shalders AO CSC RAN, Chief of the Australian Navy (CN). Families of the Japanese submariners lost in the Sydney Harbour raid, including the sole surviving younger brother of Katsuhisa Ban, have paid their respects at the site and been presented with a ceremonial offering of sand recovered from the wreck site, obtained during the current survey operations. These ceremonies were held in conjunction with annual remembrance services for the Australian and British casualties aboard HMAS *Kuttabul*.

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<sup>111</sup> McCarthy, Michael (a), "The Flamingo Bay Voyage". *Report to the Western Australian Maritime Museum. No.45*, 1991. pp.1-52. See also: Keatts, Henry, "divers desecrate another war grave", in: *Discover Diving Magazine*. Jan/Feb, 1997.

<sup>112</sup> McCarthy, Michael, 1998, The submarine as a class of archaeological site. *Bulletin of the Australian Institute for Maritime Archaeology*. **22**.

<sup>113</sup> Van Tilburg, Hans, 2006, "Japanese midget sub at Pearl Harbour: collaborative maritime heritage preservation". *Underwater Cultural Heritage at Risk: Managing Natural and Human Impacts*. ICOMOS, Munich. pp.67-69.

## 10.2 Public outreach and education program

A number of public educational initiatives have been completed since the discovery of the *M24*. This education program aims to provide divers, the general public and researchers with regular updates on the protection and management of the wreck site.

Key initiatives have included updating the Heritage Office's web site content relative to the wreck (<http://maritime.heritage.nsw.gov.au>, and <http://www.heritage.nsw.gov.au>), a range of public lectures to key groups including the Naval Historical Society of Australia, Australian National Maritime Museum, veterans groups, historical societies, and at international dive conferences such as OzTek'07 in Sydney.

*M24* heritage ferry tours have been held on Sydney Harbour in partnership with NSW State Government agencies recreating the scene of the attack and attracted strong participation.

A broad public media program has involved several media releases issued by relevant State and Federal Ministers to provide updates to the vessel's legislative protection, on site surveillance systems, and the results of archaeological survey.

The divers who located the wreck were officially presented with *Historic Shipwreck Awards* by the Executive Director of the Heritage Office, NSW Department of Planning, in March 2007, signed by the NSW Minister for Planning, to recognise their achievement.

Interim articles on the wreck have been published in *Heritage NSW*, the Heritage Office's flagship newsletter, and conference presentations to the annual combined Australian archaeology conference held in Sydney in September 2007 (in press).

A two-sided historical Fact Sheet has been disseminated that provide a summary of the significance of the wreck site and the 2007 survey operations.



**Figure 62:** No Frills Divers presented with Historic Shipwreck Awards.

Signed by the NSW Minister for Planning and presented by the Executive Director, Heritage Office, at the international OzTek Dive Conference, Sydney on 17 May 2007. Photo: MarkSpencer.com.au.

The Heritage Office intends to produce additional informative publications documenting the *M24* wreck site and its archaeology. Over forty media interviews have been completed with Australian and foreign television, print and radio media outlets.

The Heritage Office has, through the development of a *Site Options Paper*, identified the possibility of opening the site up to recreational diver visitation. This could only be contemplated after the archaeological mapping of the site and associated relics was completed and a sound understanding gained of the corrosion and other factors operating at the site.

The risk posed by the unexploded scuttling charges is critical to decisions regarding future public access to the site. The probable retention of human remains within the hull and the access formed to the control room and aft battery room raises issues of long term site security. Any decisions regarding controlled access to the site must consider the interests of both Governments and the input of Ban and Ashibe's next-of-kin.

The option of placing a protective steel or aluminium cage over and around the wreck has been identified as one possibility. This would serve to safeguard the hull, relics and any human remains from damage or removal (accidental or deliberate), while allowing visual access to the wreck through the cage. Issues of attachment to the seafloor, rigidity, cleaning, access to wreck by professionals, and long term maintenance, must be addressed. Access might be considered as part of a regulated permit system amongst commercial dive charter companies. Similar examples have been identified internationally that could serve as a model <sup>114</sup>.

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<sup>114</sup> Heritage Office, NSW Department of Planning, is currently undertaking comparative research, with wreck cages in place in Croatia and other European sites as examples.

## 11.0 MANAGEMENT RECOMMENDATIONS

This report details the preliminary survey findings from the *M24* Archaeological Project. The results and interpretations are interim in nature and subject to alteration or re-interpretation at any time.

With discovery and positive identification, a conservation and management strategy should now be completed for the site. This strategy should assess appropriate management options for the wreck and associated artefact collections, following consultation with appropriate Governments, organisations and specialists. Management options are dependent on a thorough understanding of the nature and complexity of the site. Constraints such as ownership, threats, research potential, conservation requirements, access and interpretation issues will define the management options applicable to the site.

A standard primary management requirement would be the continuation of this initial pre-disturbance maritime archaeological survey. This task is essential to establish base data on which to construct a viable plan of management. It is essential to determine the site's integrity, condition, physical spread, the local environmental conditions impacting on the site and importantly, perceived threats affecting its long term survival.

Based upon a thorough knowledge of the site, including the complete documentation of its external structure, assessment of hull condition and corrosion processes, a more objective strategy for preserving the site can be formulated.

One management option for the site is to leave it undisturbed. Retention of *M24* in its historical setting would also adhere to Rule 1 of the UNESCO *Convention on the Protection of the Underwater Cultural Heritage* 2001, which stipulates that fragile archaeological wreck sites should be managed *in situ* in the first instance.

This approach identifies the underwater site as a cultural monument that should be allowed to deteriorate naturally in its contextual setting. In this sense, *M24* also stands as a memorial or monument to its lost crew, and a place of remembrance. The *M24* survives as the largest direct war relic from the Sydney attack in existence.

The effective application of this approach requires strict upholding of the provisions of legislation governing archaeological heritage, in consultation with international codes of conduct established to preserve and protect these sites. This might require the continuation of the exclusion zone established around the wreck site barring human visitation, fishing activities and vessel traffic; the augmenting of effective site surveillance regimes; and a publicity campaign aimed at identifying the cultural significance of the site and the need for its long term protection and survival.

A variation to this approach would be to allow controlled human visitation to the site. Visitation would require the establishment of strict access for the purposes of bone fide research, conservation and possibly recreation. Mitigating factors would include site depth, diver safety, access, adequate surveillance and effective legislative control to ensure the security of the site. The issue of war dead and unexploded ordnance is critical to these discussions as mentioned.

Recovery of the *M24* wreck site for research, conservation and public display has been canvassed publicly. The complexity of full scale archaeological submarine

recovery projects has been documented widely (see bibliographical references related to the *Holland 1*, *Resurgam*, *H.L. Hunley*, *USS Monitor*, *I-124* and *AE2* submarine archaeological projects, and related ethical studies). Such an approach should only be considered on the heritage values of the site, in terms of a unique story a site has to tell, of new archaeological and technical insights that could only be obtained through interrogation of a particular site, on rarity, and likelihood of a successful outcome, or of risks associated with in situ retention.

There are several significant issues with the *M24* wreck that are relevant to this discussion: disturbance of human remains, unexploded ordnance and associated risk, the current unknown structural and chemical condition of the hull, the apparent near severing of the pressure hull aft (suggesting a recovery option might not be achievable), and reduced display potential with loss of the conning tower structure. Allied to these issues are the costs of recovery, conservation and ultimate public display into the future; the fact that a world-class midget submarine exhibit already exists within Australia of the composite *Ha-14* and *Ha-21* boats; and the questionable new insights that such a massive and costly undertaking will generate. A number of other museum examples have been identified internationally reducing the need for another shore-based display.

Recovery would allow the existence of human remains to be determined (or not), and possibly a picture formed of the men's last moments. Additional details of hull construction, the complete analyses of internal fixtures and fittings would be achievable, and additional understanding of corrosion processes of a steel submarine shipwreck in a coastal marine environment. However on balance, the value of these new insights would have to be weighed up with the massive costs and logistical obstacles involved, and the need for a long term Government and commercial commitment. The dangers of embarking on such a task can result in the partial or total destruction of the object and associated relics as witnessed by the recovery, for example, of German U-boat *U-534* (recovered from Danish waters in 1993 and now languishing in the United Kingdom with no financial or conservation support). Any interventionist activities at the *M24* site will be guided by the archaeological protocols of both the Commonwealth *Historic Shipwrecks Act 1976*, and NSW *Heritage Act 1977*.

A favourable option would be a joint management involvement between the Australian and Japanese governments and relevant heritage professionals. The partnership developed between the US Government, heritage agencies, universities and commercial companies in the documentation of the 2002-located Pearl Harbour midget submarine is an excellent example of a multi-skilled approach to site preservation.

The Heritage Office will continue to liaise with relevant bodies that have a management or monitoring role with *M24*. These agencies include, but are not limited to: the State Minister for Planning (NSW), the Minister for the Environment, Water, Heritage and the Arts (Commonwealth) Department of Environment, Water, Heritage and the Arts (DEWHA), Royal Australian Navy (RAN), Department of Defence, Department of Foreign Affairs and Trade (DFAT), Department of Veterans Affairs (DVA), Embassy of Japan, NSW Water Police, Department of Commerce (NSW), NSW Maritime Authority, NSW Department of Primary Industries (Fisheries), the recreational dive industry, commercial fishing industry, recreational boat uses, and national archival bodies such as the Australian War Memorial, Sea Power Centre, the National Archives, Canberra, and the finders of the site, No Frills Divers.

All activities at the *M24* site should be guided by the identified heritage values of the site and seek to ensure the safeguarding of those values.

It is important to consider the rarity of Japanese midget submarine wrecks located in their unique underwater contexts. To date only five (5) midget subs or remnants thereof have been reported internationally.

Of these, only the New Hannover, Papua New Guinea, midget wreck is really accessible to recreational divers (in twenty metres of water). There are limited heritage controls at this site.

Therefore, the Sydney midget, *M24*, is especially rare with its location within diving depths, in its original historical and archaeological (1942) battle context, and adjacent to Australia's largest capital city.

The retention and proper management of this unique structure in this important setting would be of international interest. A successful management and public education program will promote Australia's expertise in the area of heritage management on a world stage.

The Heritage Office, NSW Department of Planning, has identified in situ preservation of the *M24* wreck site as the preferred course of action.

The current and future archaeological and environmental studies aim to determine the fragility of the site and the nature of the surrounding environment in order to best manage the wreck into the future. There will be many years of survey and analysis to obtain the necessary site data. These studies should be undertaken in collaboration with international projects at comparative sites such as the Pearl Harbour and Aleutian midget submarine wrecks.

The following tasks have been identified as critical in furthering the understanding of the *M24* wreck site and its contextual setting.

**1. complete the initial phase of archaeological and environmental assessment of the site, specifically undertake:**

- a hull corrosion and ultrasonic hull thickness survey, to identify corrosion profiles, chemical activity and structural integrity of wreck site.
- An environmental survey of the surrounding water column and seabed deposits to support analysis of corrosion activity and natural processes affecting the long term survival of the site.
- detailed visual inspections of the aft battery room through the exposed openings in the casing.
- implement a magnetometer survey to identify possible presence, both exposed and buried, or elements of the wreck removed by fishing nets.
- initiate a remote or diver-based examination of the sand deposits within the control room, using an endoscopic camera, or similar probe, to examine the potential for human remains and relics to be retained within this compartment,

and obtain the endorsement of both Australian and Japanese Governments and next of kin prior to undertaking such activity.

2. **Examine practicality and benefits of implementing anodic protection at the wreck, following the corrosion survey above.**
3. **Complete the recording of entrapped fishing nets and trawling gear at bow and along hull to clarify past hook-up and site depositional histories, prior to removal of nets to mitigate further damage.**
4. **Complete the preliminary battle damage survey, particularly of observed small corrosion holes in after casing near stern to clarify probable cause (eg natural corrosion or man-made piercings).**
5. **Determine, through ongoing research, the nature of the unexploded scuttling charges, their possible volatility, and complete a risk analysis of the threat they pose.**
6. **Initiate spatial mapping and interrogation of the surrounding debris field.**
7. **Develop a marine biological survey to identify the nature of colonisation systems, resident and passing marine species.**
8. **Initiate geological surveys of surrounding seabed to examine potential anchoring methods that might support a purpose-built protective cage over the main elements of the site.**
9. **initiate design planning for a suitable protective cage following confirmation that seabed geology, corrosion regime and environmental factors support potential placement of a cage.**
10. **Undertake all studies in association with additional historical research - in particular, the assembly of supportive technical and empirical data on the design and materials used in construction of midget submarines.**



## 12.0 Conclusion

The Imperial Japanese Navy midget submarine *M24* is one of Australia's most significant military shipwrecks and a site of international importance in the study of comparable submarine wreck sites. The discovery of the site received intensive public attention, particularly with the 2007 survey operations being undertaken in the year commemorating the 65<sup>th</sup> anniversary of the Sydney harbour attack.

The discovery of the midget submarine by recreational Sydney dive club, No Frills Divers, was thought to close a significant maritime mystery. Instead, locating *M24* has re-opened the debate surrounding the raid and particularly Ban and Ashibe's critical role in it. Interrogation of the wreck site will hopefully unlock some of the unknown stories of the vessel and its crew. However it is likely that many of the questions to be asked, e.g what condition were the crew and vessel in?, what was their final tactical planning?, how did they end their lives?, may still never be known.

The current studies have identified the heritage significance of the site and the need to preserve it into the future. Immediate steps were undertaken to protect the site under available heritage legislation and to enforce a no-entry protected zone around the wreck until the critical archaeological documentation can be completed.

The *M24* wreck site will become the focus of ongoing archaeological and corrosion studies, continued historic research, and environmental and habitat assessments. These ongoing studies have the potential to add further details to the archaeological insights gained from the preliminary 2007 survey inspections that form the basis of this report. In that regard, the initial findings presented here may change significantly with new data.

At present the critical management issues involve the need to mitigate accidental or planned human disturbance to the site, to respect and protect the likely human remains contained within, and to safeguard the public and the archaeological structure from the onboard unexploded ordnance. Allied to this is the need to formulate a picture of the corrosion activity at the site to understand past site degradation processes and current visual form, and to guide site management options into the future. While these and other studies are initiated, public access to the site will be restricted to ensure the site's values are maintained and not inadvertently compromised by vessel anchoring and diver contact with the wreck.

Future long term site management options might be determined in light of ongoing archaeological findings, in partnership with relevant Australian authorities and the Government of Japan. The interests of the next of kin of Sub Lieutenant Ban and Petty Officer Ashibe will be integral to these discussions.

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<http://www.History.Navy.Mil/Photos/Sh-Fornv/Japan/Japtp-Ss/Mdg-A-2.Htm>

#### **Office of Australian War Graves:**

<http://www.dva.gov.au/commem/oawg/publication.htm>

#### **Unexploded Ordnance Safety Program**

<https://www.denix.osd.mil/denix/Public/Library/Explosives/UXOSafety/faqs.html>

#### **Hawai'i Undersea Research Laboratory (HURL)**

<http://www.soest.hawaii.edu/HURL/midget.html#images>

#### **US Navy Submarine Force Museum**

Ha-8 midget submarine display, Groton, Connecticut

<http://www.ussnautilus.org/>

#### **Ha-19 midget submarine display, Texas**

<http://www.hnsa.org/ships/ha19.htm>

#### **National Museum of the Pacific War, Texas**

<http://www.nimitz-museum.org/>

#### **Pearl Harbour midget display, Submarine Force Museum, Groton**

<http://www.ussnautilus.org/>

#### **Australian War Memorial**

Remembering Sydney Harbour Attack – historical guide

[http://www.awm.gov.au/atwar/remembering1942/midget\\_submarine/index.htm](http://www.awm.gov.au/atwar/remembering1942/midget_submarine/index.htm)

#### **National Archives of Australia (NAA)**

<http://www.naa.gov.au/>

Fact Sheet 192: Japanese midget submarine attacks on Sydney, 1942.



**Picture Australia (historic photograph collections online)**

<http://www.pictureaustralia.org/index.html>

**State Records (NSW)**

<http://www.records.nsw.gov.au/>

**Submarine Institute of Australia (SIA)**

<http://www.submarineinstitute.com/>

**Nihon Keigun (Combined Fleet –Imperial Japanese Navy web site)**

<http://www.combinedfleet.com/>

**Steve's IJN Web Page**

<http://users.bigpond.net.au/ijnsite/>

**Pacific Wreck Database**

<http://www.pacificwrecks.com/>

**NOAA's Undersea Research Program**

<http://www.nurp.noaa.gov/>

**Legislation**

***Historic Shipwrecks Act 1976***

[http://www.austlii.edu.au/au/legis/cth/consol\\_act/hsa1976235/](http://www.austlii.edu.au/au/legis/cth/consol_act/hsa1976235/)

***NSW Heritage Act 1977***

<http://www.legislation.nsw.gov.au/viewtop/inforce/act+136+1977>

***UNESCO Convention on the Protection of the Underwater Cultural Heritage 2001***

[http://portal.unesco.org/en/ev.php-URL\\_ID=13520&URL\\_DO=DO\\_TOPIC&URL\\_SECTION=201.html](http://portal.unesco.org/en/ev.php-URL_ID=13520&URL_DO=DO_TOPIC&URL_SECTION=201.html)



NEW SOUTH WALES

1 December 2006

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## MEDIA RELEASE

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### The Hon Frank Sartor MP

*Minister for Planning*

*Minister for Redfern Waterloo*

*Minister for Science and Medical Research*

*Minister Assisting the Minister for Health (Cancer)*

#### **\$1.1 MILLION FINES TO PROTECT JAPANESE WWII SUB**

The NSW Government has taken swift action to deter opportunists from damaging the Japanese midget submarine discovered off Sydney – after the wreck’s identity was confirmed today.

Planning Minister Frank Sartor has announced fines of up to \$1.1 million or up to six months’ jail for anyone caught damaging the site, through an emergency Interim Heritage Order.

The Order, under the *NSW Heritage Act 1977*, applies because the wreck lies in NSW waters. It is the first time in NSW that such an order has been applied to a maritime site.

“The mystery has been solved and we have taken immediate steps to deter any would-be profiteers from approaching the site,” Mr Sartor said.

“We must treat this site with absolute respect and honour because of its significance to both Australia and Japan.

“It is now an historical site of international significance and more than likely also contains the remains of the Japanese submariners.”

Under Commonwealth laws, a 500m protection zone has been established around the wreck and penalties of up to \$10,000 apply for individuals breaching that zone (up to \$50,000 for a body corporate).

The *NSW Heritage Act* also applies a 500m protection zone and the more hefty penalties of up to \$1.1 million.

“The NSW Government will continue to cooperate with the Commonwealth Government – through the Heritage Office of the NSW Department of Planning – to protect the site into the future,” Mr Sartor said.

“The Heritage Office is preparing advice on a possible State Heritage Register listing. I will also pursue the option of a nomination to the National Heritage List.

“Marine archaeologists from the Heritage Office assisted the Navy with its efforts to positively identify the wreck and establish its exact location.

“This is a major milestone in maritime history and answers some long-standing questions about the most damaging attack on NSW during World War II.”

Three Japanese midget submarines entered Sydney Harbour on the night of 31 May 1942. Two were destroyed and recovered, but the missing midget *M24* vanished without a trace.

It was responsible for the attack on the *HMAS Kuttabul* which claimed 21 lives.



NEW SOUTH WALES

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## MEDIA RELEASE

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**The Hon Frank Sartor MP**

*Minister for Planning*

*Minister for Redfern Waterloo*

*Minister for the Arts*

28 April 2007

### ACOUSTIC SURVEILLANCE FOR JAPANESE SUBMARINE WRECK

Planning Minister Frank Sartor today announced a sophisticated underwater surveillance and alarm system is in place off the coast of Sydney to protect the wreck of the World War II Japanese submarine.

Planning Minister Frank Sartor said the cutting-edge acoustic camera system, which was developed in partnership with the Commonwealth, was a first for an Australian shipwreck.

The system includes monitoring of the water around the no-entry protected zone surrounding the wreck through high-tech buoys, with detailed camera surveillance and underwater sonar alarm monitoring.

Any intrusions can trigger an immediate response from the NSW Water Police. The system will be managed by the Heritage Office of the NSW Department of Planning.

"The M24 midget submarine was a remarkable discovery and must be protected as a significant historical site – both for Australia and Japan," Mr Sartor said.

"The surveillance system will help to ensure the important maritime find is protected for future generations.

"This technology could be applied to other maritime surveillance such as oil and gas platforms, defence and critical infrastructure and environmental monitoring."

Minister Sartor said the Heritage Office of the Department of Planning had undertaken detailed archaeological mapping of the wreck site, using the latest remote vehicle video and sonar imaging technology.

The Royal Australian Navy agreed to support the M24 survey with the same US Navy deep sea remote operated vehicle used to retrieve the Black Hawk helicopter which sank in deep water off Fiji.

Mr Sartor said archaeologists were piecing together the final moments of the M24 which disappeared mysteriously after the attack on Sydney Harbour in May 1942.

"We are now discovering details of the wreck structure which will help us better understand the effects of 65 years resting on the seabed off Sydney's northern beaches," Minister Sartor said.

"While the submarine hull is intact, it has suffered deterioration at key areas, such as the hull behind the conning tower."

Media contact:

Ann-Marie Wilcock

3228-4700 / 0413 872 275



# MEDIA RELEASE

**The Hon Malcolm Turnbull MP**

Minister for the Environment and Water Resources

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21 May, 2007

## **NAVY DIVERS TO PERFORM ARCHAEOLOGICAL SURVEY ON JAPANESE MIDGET SUBMARINE M24**

Elite Navy divers today inspected the World War II M24 Japanese Midget Submarine to assess the condition of the wreck and obtain crucial archaeological information.

The submarine, which disappeared after an attack on Sydney Harbour in 1942, was found late last year by a group of amateur divers around 5km off Bungan Head, Sydney.

Minister for the Environment and Water Resources, the Hon Malcolm Turnbull MP, who was onboard the Navy vessel to observe the dive today, said the whereabouts of the submarine has been one of Australia's most baffling maritime heritage mysteries.

"The dive will provide us with crucial archaeological information, and will help us piece together what happened to the M24 in its final hours.

"The submarine is of international historical significance, and is presumed to still contain the remains of its Commander and Navigator, Sub-Lieutenant Katsuhisa Ban and Petty Officer Mamoru Ashibe. Navy divers collected sand from the seabed for presentation to the relatives of the two submariners later in the year," Mr Turnbull said.

Footage of the wreck taken by a remote operated vehicle and sonar imaging show the submarine lies upright and largely intact, although the external fabric has been damaged by commercial fishing trawling operations over the last 65 years.

"The inspection, which was conducted by the Navy Clearance Diving Team One, will allow archaeologists to analyse the physical and chemical condition of the hull and associated relics, assess any possible battle damage and the status of the undetonated scuttling charges, and provide further clues as to whether the remains of the submariners are still onboard," Mr Turnbull said.

The Australian Government has protected the M24 Japanese Midget Submarine under the *Historic Shipwrecks Act 1976*. Breaches of the Act carry a fine of up to \$10,000 or imprisonment for up to five years. It has also declared a protected zone around the site to ensure the integrity of the wreck, its relics and any human remains are undisturbed. In addition, the NSW Government has placed an Interim Heritage Order over the site, which provides for fines of up to \$1.1 million or up to six months jail.

Mr Turnbull said the Australian and NSW Governments, in consultation with the Government of Japan, were considering long-term management options for the submarine.

"We are committed to ensuring this internationally significant wreck is protected, and treated with honour and respect. The survey work being undertaken today is part of our ongoing management planning," said Mr Turnbull.

## APPENDIX B: Technical features of the “Type A” Midget Submarine

The Type “A” Midget submarines witnessed some change during their manufacturing life, but were generally approximately 23.9 metres long with a diameter of 1.85 meters and weight of 46.2 tonnes. They had limited space for basic crew amenity and contained 208 batteries, 72 in the bow sections and 136 in the stern. They could stay submerged for approximately 12 hours at regular running speed, but significantly compromised their endurance if run at or close to their maximum speed of c.19 knots.

Compressed air bottles were carried for blowing ballast tanks and launching the 45 cm kerosene motor-powered torpedoes, which weighed 950 kilograms each. Sliding lead weight helped adjust boat trim after discharge of the torpedoes, but the vessels were apparently difficult to manage and maintain trim and depth control. They had a periscope, a two-way radio and demolition charges for self-destruction. After Pearl Harbour some modifications were made to the two-man Type ‘A’ midget submarines, including the fitting of improved gyro compasses, serrated net-cutters on bow and conning tower for net cutting, a sled-like bow guard to help the bow manoeuvre over obstacles, and a propeller guard to prevent entanglement in nets or cables.

### DATA

Weight:	46 tons
Length:	24.54 meters (80.5 feet)
Forward section:	17 feet
Midship section:	34 feet 11 inches
After section:	22 feet 4 inches
Noseguard:	3 feet
Diameter amidship:	6 feet
Height of conning tower:	4 feet 6 inches with additional guard structure 15 inches high. (Clarke and Yamashita 1966; <i>To Sydney By Stealth</i> )
Beam:	1.8 metres (6 feet)
Electrically propelled:	1 x 600 hp
Maximum surface speed:	24 knots
Maximum submerged speed:	19 knots
Propulsion:	1 shaft but fitted with contra-rotating propellers.
Range:	About 15 miles at full speed or 80 miles at 2 knots, and without any self-recharging capability for the batteries.
Crew:	2
Equipment:	Radio set with a raiseable mast. Electrically raised periscope. Echo sounder.

(Source: *The Naval Historical Society of Australia Inc.* Monograph 165. John C. Date, 2001)

## APPENDIX C: Probable relics to be retained within the *M24* hull



- 8mm Taisho service pistol – Matsuo, recovered from *Ha-21*.
- Ceremonial sword carried by Lt. Matsuo in *Ha-21* (Clarke, Yamashita, 1966:87).
- *Ha-21* contained lists of call signs allocated to float planes and charts on which a course to Garden Island had been plotted in pencil, operational orders, operational abbreviations for use when contacting the enemy and aircraft, photographic prints of preferred targets (Clarke, Yamashita, 1966:96-7).
- Rations recovered in the wrecked Sydney midgets included 100 grams of soda biscuits, 25 grams of bonito (dried fish), 10 pickled plums, 10 peas, 25 grams of chocolate, 6 special caramels, mineral water, lemonade, wine and whisky (Clarke, Yamashita, 1966:96; Japanese midget submarines attack on Sydney Harbour 31<sup>st</sup> May-1st June 1942:Navy Office, Melbourne. 1<sup>st</sup> August 1942. Australian War Memorial AWM69/185. Canberra).
- The potential for a Leica camera and several embroidered scarves was also considered likely (Lind, 1992, 79).
- The Australian War Memorial collection includes: sea boot, uniform buttons, Lt. Chuman's Nambu Type 14 pistol and leather pistol case, Lt Chuman's sword cover, Naval issue pocket watch, saki cup, boat hook, Himitsu-Bako puzzle box, cap, leather belt, footboards from the cat walk passage ways, glove, and Japanese flag.
- Captured midgets also had life jackets and life rings, small wooden stools and a bucket for excretions. American Fleet Intelligence Summary, 'Midget Submarines'. Index 915, 1<sup>st</sup> Edition. 25 August 1942, C.O.I.S. Eastern Fleet. Obtained under Freedom of Information requests in 1981, by Steven Carruthers, researcher.
- Navigational instruments and other operational items.



## APPENDIX D: Scuttling charges aboard M24 – initial risk assessment



NSW GOVERNMENT

Department of Planning  
Heritage Office

### DISCUSSION PAPER - Ordnance – M24

**ISSUE:** Does the archaeological wreck site of M24 retain unexploded and volatile ordnance.

#### BACKGROUND:

- The collective evidence of WW2 Imperial Japanese midget submarine wreck sites provides clues to the probability of scuttling (or demolition) charges being located within the remains of M24.
- The Japanese midget submarine crews had provision to destroy their craft upon recovery with their mother submarines (I-class), or to destroy themselves and their vessel immediately should they be in a position where capture was likely.
- This is evidenced in the Sydney Harbour raid where the midget caught in the submarine net (Ha-14) was destroyed by firing a forward scuttling charge, and the midget trapped in Taylor's Bay (Ha-21) attempting to wreck by firing scuttling charges which did not operate (wet fuses).
- What is clear is that M24 is intact and therefore scuttling charges were not activated for some reason (either choice or due to mechanical defect).

#### What is the nature of the scuttling charges on the Sydney attack boats?

The original Pearl Harbour (Dec 1941) midget submarine attack force comprised Type A midgets of a different design to the later boats used in the Sydney raid.

- From two contemporarily recovered Hawai'i midgets, it was found that they were fitted with a single demolition, "**300 pounds TNT (135 kg) demolition charge carried under the stern electrically connected to the batteries to permit self destruction or suicide attack against ship of harbour objects**".

"Intelligence Report. Serial 81-41, Monograph Index 912-1000. From: Op-16-F-2 at Washington DC dated December 15 1941, Subject: "Japanese Midget Submarines".

- Another record provides a slightly different picture, "*Demolition charges: At Pearl Harbour – 300 lbs. demolition charge in aft compartment, with 50ft. fuse. Sydney Harbour – two charges, one forward and one aft*".

New Zealand Intelligence Memoranda. Serial No.11, "Japanese Midget Submarines", 3 September 1943. Secret.

- The official assessment of the two Sydney midget submarines recovered was conducted by the RAAF. The report, "Examination of Japanese Submarine Captured in Sydney Harbour. 16 June 1942, 6/2/17. Royal Australian Air Force, HQ Eastern Area", states:

*"Two demolition charges are carried in each submarine, 1 fore and the other aft (following text removed by official wartime censor), **and packed in a round canister, 2 fuses to each, 1 electrical contact and 1 match**".*

- A contemporary document confirms that, "*Whereas the Pearl Harbour design only had a self-demolition charge fitted aft, the Sydney type had two such charges, one forward and one aft*"

Eastern Fleet Intelligence Summary: Midget Submarines. Index No.915, 1st Edition A. September 1942 (prepared by COIS E.F. Kilindini, 2 Sept 1942. On inside page, "Japanese employment of midget submarines in an attack on Sydney Harbour, description of the midgets used and suggested methods of countering this form of attack".

- The remaining charges in the two recovered Sydney midgets (two in the Taylor's Bay midget (Matsuo's), and one remaining in the Harbour net wreck (Chuman's), were diffused by Torpedo Fitter Frank Lingard, as reported by Rear Admiral Murihead Gould in his commendation report.
- A key surviving Australian line drawing (profile and sections) of the midget submarines was made by draughtsman Binnie at Garden Island Naval Base and are maintained by the Australian War Memorial as part of the original intelligence assessments of the two recovered midgets from the Sydney raid. Complimentary plans are also held by the Sea Power Centre, Canberra.
- They were drawn after much vital material was removed from inside the craft for analysis and after the charges were taken out for rendering safe. The drawings largely reflect midget *Ha-21*, the most intact midget recovered from Taylor's Bay. Many details of internal fittings and fixtures, especially piping, cabling, light fixtures, and ancillary equipment outside of the control room, were not recorded at all on the general arrangement plans.
- Admiral Ishino, a former midget submarine officer in Japan, corrected author Steven Curruthers book, "*Submarine Raiders*", confirming that the **Sydney midget's had a charge of 135kg, forward only**. This is contradicted by the Sydney contemporary intelligence reports.

### **M24 situation**

- Initial Heritage Office, NSW Department of Planning, examination of Chuman's midget (*Ha-14*) destroyed by firing a forward scuttling charge (when trapped in the harbour boom nets), suggested that the canister was stored at ground level. This is reflected by the upward and outward explosion and shearing of the fore plates. Initial photographs of the recovered wreck show the hull plates bent backwards around the conning tower. They were later straightened out to enable the midget to be paraded around New South Wales on the back of an Army lorry. This is how they now present today at the Australian War Memorial exhibit, Canberra.

- An official wartime report (AWM PR84/047), Certificate & Technical Report of CMDR K. Urquardt RAN (AWM File 419/11/48, noted:

**“The scuttling charges were wired in a temporary fashion through a clockwork timer to 4 dry cells. Each charge was about 60 pounds of explosive with 4 primers in each charge”.** This is the most detailed description located to date, although varies in the overall size of the scuttling charges carried. A clockwork timer would appear appropriate – enabling the returning midget crews to preset the scuttling, exit the boat and make for the waiting I-class submarine, before the midget exploded and sank. The amount of explosive is at odds with other contemporary accounts.

### Likely charge locations

Research indicates that it is likely that the two demolition charges contained within *M24* will be located:

1. In forward battery room
  2. In the aft battery room
- These charges would be accessible to the crew from their main position within the conning tower area, to enable manual lighting of fuses.
  - They would be placed to cause the maximum damage at the junction of the principle joint areas comprising the 3 principle sections of the submarine.
  - They would most likely be removable to allow fitting to other midget submarines and during maintenance and refit of individual submarines.

This initial hypothesis has proved correct with the subsequent discovery of a photograph contained within an initial intelligence investigation of *Ha-21*, held at the Australian War Memorial, Canberra (Plans and diagrams, photographs of midget (Japanese) submarine and components involved in the Sydney Harbour attack, 1942. Australian War Memorial, AWM54, 505/6/7).

Plate XIII shows the forward scuttling charge still in situ. The charge appears to be a cylindrical canister, similar in shape to a modern-day pressurised beer keg.

- The caption adjoining the photograph notes “**Scuttling charge lashed to improvised chocks**”.
- The charge is clearly situated in the passageway between the forward battery stacks and slightly aft of the bulkhead that separates the forward torpedo room. It appears to be situated between frames 22-24 on the Australian War Memorial, Canberra, vessel plan.
- Another report indicates that the charges were also wired into the batteries for electronic firing, “**the demolition charges were very temporarily wired in ordinary twin flex (23/0076)**”, identified as the fifth and lowest class of electrical cabling identified within the submarines (Report on Japanese Submarines. Japanese midget submarine, Garden Island Naval Dockyard. Australian War Memorial, PR89/172, p.6).

## Explosive potential

- Only further research will be able to gauge whether the remaining charges on *M24* are volatile or rendered mute from the effects of salt water corrosion. Of critical concern is the exact nature of the canister that housed the explosives, and the nature and packing of the explosive materials.
- Research with international experts is continuing in this regard.
- Evidence from a contemporary WW2 Type VII depth charge recovered from Sydney Harbour in the 1970s (probably from the attack), shows that such ordnance could still be live. The depth charge exploded when destroyed at a weapons range (Mr Kevin Slade, Australian Hydrographic Office, pers.com).

## Summary

The evidence gathered to date provides certainty that the Sydney midget submarines had two demolition charges that were placed inside the boats forward and aft. The evidence from the blast damage in *Ha-14* and the historic photograph of the remaining charge in *Ha-21*, confirms that they are located in the forward and aft battery rooms. The *Ha-21* photographic evidence also indicates that the charges were placed near the bulkheads defining the three main sections: Forward Section/Central section and Aft Section/Central Section. The charges on the *M24* were most likely steel canisters lashed to the passageway floors and had both wicks for manual firing and electric connections to the boats' main power source. The possibility of an electric timer should also be considered. The archaeological evidence has confirmed the inability to view these two charges within the *M24* hull. The forward charge will be retained with the forward battery room but that compartment is intact and sealed, preventing inspection. The aft charge will be in the aft battery room that is open to the sea at its forward end. However, the accumulation of sand deposits within the compartment means that the charge will be buried entirely. The current inspection did not find any visual trace of this weapon.

Without an ability to locate, inspect and document the *M24* demolition charges, it is difficult to ascertain their current condition and the impact of corrosion to the canisters and explosives. However, it is likely that the demolition charges (at least aft) are buried in an anaerobic environment that could preserve the fabric significantly. This could indicate a possibly intact and waterproof charge being retained. Even if corrosion processes have caused a failure of the canisters with seawater immersion of interior contents, the volatility of the explosive could be retained, or even enhanced. Therefore and disturbance of the *M24* shipwreck, including corrosion testing of outer hull plates (eg by standard pneumatic drilling or sample test sites to original bare metal fabric), should be restricted within the vicinity of the probable location sites. This would minimise any vibration/other effects that could potentially elevate the risk potential of these charges.

This paper acknowledges the assistance of Mr Steven Carruthers, Peter Grose, CMDR Shane Moore, Director Navy Heritage Collection, Angus McInnes (ex-DSTO), and John White, Australian War Memorial, for access to the above-mentioned historical records.

### Tim Smith

*M24* Project Manager  
Heritage Office  
NSW Department of Planning  
18 December 2007

## APPENDIX E: Assessment of Significance

Significance has been assessed in accordance with the nature and degree of significance of the site's primary attributes. These include attributes related to historical, social, archaeological, scientific and interpretative significance. This assessment was conducted using the New South Wales Heritage Assessment Criteria developed by the Heritage Office, NSW Department of Planning, in conjunction with the Heritage Council of New South Wales.

Attributes of Significance

**Criterion (a): An item is important in the course, or pattern, of NSW's cultural or natural history.**

	<b>Include</b>	
	<ul style="list-style-type: none"> <li>shows evidence of a significant human activity</li> </ul>	<ul style="list-style-type: none"> <li>has incidental or unsubstantiated connections with historically important activities or processes</li> </ul>
X	<ul style="list-style-type: none"> <li>is associated with a significant activity or historical phase</li> </ul>	<ul style="list-style-type: none"> <li>provides evidence of activities or processes that are of dubious historical importance</li> </ul>
	<ul style="list-style-type: none"> <li>maintains or shows the continuity of a historical process or activity</li> </ul>	<ul style="list-style-type: none"> <li>has been so altered that it can no longer provide evidence of a particular association</li> </ul>

Comment

The Japanese submarine attack on Sydney Harbour was part of a series of pivotal aggressive moves by Japan during the early stages of World War Two, and closely followed the attack at Pearl Harbour, Hawai'i, just six months prior. The sizeable Japanese naval force of eight submarines comprised the first active attack on Sydney during its history. While the raid was militarily of limited success, it highlighted the vulnerability of important Allied naval station and repair facilities, and ships, to long range submarine attack. The loss of 21 naval ratings aboard the depot ship HMAS *Kuttabul* to one of *M24's* torpedoes is still remembered by the navy through the annual HMAS *Kuttabul* Memorial Service held at Garden Island Naval Base. The raid awoke a complacent Sydney population to the realities of war. The sale of artefacts and regional tour of one of the captured midget submarines played a major role in raising awareness and in generating financial contributions to the War Bonds Scheme.

**Criterion (b): An item has strong or special association with the life or works of a person, or group of persons, of importance in NSW's cultural or natural history.**

	<b>Include</b>	
	<ul style="list-style-type: none"> <li>shows evidence of a significant human occupation</li> </ul>	<ul style="list-style-type: none"> <li>has incidental or unsubstantiated connections with historically important people or events</li> </ul>
X	<ul style="list-style-type: none"> <li>is associated with a significant event, person, or group of persons</li> </ul>	<ul style="list-style-type: none"> <li>provides evidence of people or events that are of dubious historical importance</li> </ul>
		<ul style="list-style-type: none"> <li>has been so altered that it can no longer provide evidence of a particular association</li> </ul>

Comment

The *M24* was the only Japanese midget submarine to safely enter Sydney Harbour, fire its torpedoes and escape. The other two boats, *Ha-14* and *Ha-21* were disabled in the conflict

and later recovered. The final fate of *M24* and its brave crew of Sub Lieutenant Ban and Petty Officer Ashibe became part of one of Australia's enduring naval mysteries until the site was discovered by recreational divers in November 2006.

Criterion (c): An item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in NSW.

	<b>Include</b>	
X	<ul style="list-style-type: none"> <li>shows or is associated with, creative or technical innovation or achievement</li> </ul>	<ul style="list-style-type: none"> <li>is not a major work by an important designer or artist</li> </ul>
	<ul style="list-style-type: none"> <li>is the inspiration for a creative or technical innovation or achievement</li> </ul>	<ul style="list-style-type: none"> <li>has lost its design or technical integrity</li> </ul>
X	<ul style="list-style-type: none"> <li>is aesthetically distinctive</li> </ul>	<ul style="list-style-type: none"> <li>its positive visual or sensory appeal or landmark and scenic qualities have been more than temporarily degraded</li> </ul>
	<ul style="list-style-type: none"> <li>has landmark qualities</li> </ul>	<ul style="list-style-type: none"> <li>has only a loose association with a creative or technical achievement</li> </ul>
X	<ul style="list-style-type: none"> <li>exemplifies a particular taste, style or technology</li> </ul>	

Comment

The *M24* wreck site provides a unique opportunity to document and analyse the form, fit out and construction of a Japanese Type A midget submarine from World War Two. The archaeological record is of added importance with a limited number of archival references relative to this type of vessel. Aesthetically the *M24* represents a unique opportunity to see a historically significant submarine wreck site in its unique underwater setting, providing scope for world-class photographic documentation and potential future controlled visitation by the recreational/other communities.

**Criterion (d): An item has strong or special association with a particular community or cultural group in NSW for social, cultural or spiritual reasons.**

	<b>Include</b>	<b>Exclude</b>
	<ul style="list-style-type: none"> <li>Is important for its associations with an identifiable group</li> </ul>	<ul style="list-style-type: none"> <li>is only important to the community for amenity reasons</li> </ul>
X	<ul style="list-style-type: none"> <li>is important to a community's sense of place</li> </ul>	<ul style="list-style-type: none"> <li>is retained only in preference to a proposed alternative</li> </ul>

Comment

The attack awoke a relatively complacent Sydney wartime population to the realities of the present conflict. The raid which included eight Japanese submarines and over 500 Japanese Imperial Navy sailors was the only direct attack on Sydney in history. The event is well remembered by the population nationally.

**Criterion (e): An item has potential to yield information that will contribute to an understanding of NSW's cultural or natural history.**

	<b>Include</b>	<b>Exclude</b>
X	<ul style="list-style-type: none"> <li>has the potential to yield new or further substantial scientific and/or archaeological information</li> </ul>	<ul style="list-style-type: none"> <li>the knowledge gained would be irrelevant to research on science, human history or culture</li> </ul>
X	<ul style="list-style-type: none"> <li>is an important benchmark or reference site or type</li> </ul>	<ul style="list-style-type: none"> <li>has little archaeological or research potential</li> </ul>
	<ul style="list-style-type: none"> <li>provides evidence of past human cultures that is unavailable elsewhere</li> </ul>	<ul style="list-style-type: none"> <li>only contains information that is readily available from another resource or archaeological sites</li> </ul>

Comment

The *M24* is the largest surviving archaeological relic in situ from the Japanese attack on Sydney Harbour on 31 May 1942. The *M24* hull and associated relics have been retained in their archaeological context and unaltered apart from damage by fishing net hook-ups. The site and artefacts have the potential to contribute to technical studies of the construction, fit out and materials used in Japanese midget submarines of World War Two. The site has potential to contribute to studies of corrosion activity of steel shipwrecks in coastal marine environments, and the effects of localised environmental factors. The archaeological site is of added value to researchers as a storehouse of information that is not available through scant archival records that survive for this class of vessel.

**Criterion (f): An item possesses uncommon, rare or endangered aspects of NSW cultural or natural history.**

	<b>Include</b>		<b>Exclude</b>
	<ul style="list-style-type: none"> <li>provides evidence of a defunct custom, way of life or process</li> </ul>		<ul style="list-style-type: none"> <li>is not rare</li> </ul>
	<ul style="list-style-type: none"> <li>demonstrates a process, custom or other human activity that is in danger of being lost</li> </ul>		<ul style="list-style-type: none"> <li>is numerous but under threat</li> </ul>
	<ul style="list-style-type: none"> <li>shows unusually accurate evidence of a significant human activity</li> </ul>		
X	<ul style="list-style-type: none"> <li>is the only example of its type</li> </ul>		
	<ul style="list-style-type: none"> <li>demonstrates designs or techniques of exceptional interest</li> </ul>		
	<ul style="list-style-type: none"> <li>shows rare evidence of a significant human activity important to a community</li> </ul>		

Comment

The *M24* represents the only Type A Imperial Japanese midget submarine located in its original underwater context in Australian territorial waters. The partial remains of only two other examples survive in museum displays within Australia which have been substantially stripped of fittings and fixtures. The *M24* is one of five midget submarine wrecks located underwater internationally and one of six on museum display.

**Criterion (g): An item is important in demonstrating the principal characteristics of a class of NSW cultural or natural places; or cultural or natural environments.**

	<b>Include</b>		<b>Exclude</b>
	<ul style="list-style-type: none"> <li>is a fine example of its type</li> </ul>		<ul style="list-style-type: none"> <li>is a poor example of its type</li> </ul>
X	<ul style="list-style-type: none"> <li>has the principal characteristics of an important class or group of items</li> </ul>		<ul style="list-style-type: none"> <li>does not include or has lost the range of characteristics of a type</li> </ul>
	<ul style="list-style-type: none"> <li>has attributes typical of a particular way of life, philosophy, custom, significant process, design, technique or activity</li> </ul>		<ul style="list-style-type: none"> <li>does not represent well the characteristics that make up a significant variation of a type</li> </ul>
	<ul style="list-style-type: none"> <li>is a significant variation to a class of items</li> </ul>		
X	<ul style="list-style-type: none"> <li>is part of a group which collectively illustrates a representative type</li> </ul>		
X	<ul style="list-style-type: none"> <li>is outstanding because of its setting, condition or size</li> </ul>		
	<ul style="list-style-type: none"> <li>is outstanding because of its integrity or the esteem in which it is held</li> </ul>		



**Comment**

The wreck site is a representative example of the Type A Japanese midget submarines deployed in the first stages of World War Two. The type saw action through the war but was superseded by later variants. As an example of the boats deployed in major war theatres such as Pearl Harbour, Sydney and Madagascar, the *M24* wreck has potential to document the main attributes of the class and particular design additions. Sitting upright on sand, the wreck site's distinctive submarine form provides an outstanding visual presence on the seabed.

**STATEMENT OF SIGNIFICANCE**

The *M24* is of heritage significance to Australia and Japan and the only Japanese midget submarine wreck located in Australian waters. The site is the only in situ identified cultural relic surviving of the attack on Sydney Harbour in 1942. The wreck is representative of Japanese submarine operations off Australia's eastern seaboard during the war and a direct physical reminder of the conflict at Sydney. Internationally, it represents one of only five Japanese midget submarine wreck sites located in their unique underwater contexts. Remains of a further six are retained as static museum or outdoor display exhibits. The archaeological site is therefore of considerable importance in the comparative analysis of midget submarine wrecks discovered world-wide. The site also has the ability to contribute generally to studies of submarines as a specialised class of archaeological site type. Only limited archival information related to these vessels survives and therefore the archaeological record is of added importance. In regard to the three submarines that attacked Sydney Harbour, *M24* is the only one retained in its original battle context and undisturbed, apart from the obvious effects of net entrapment and corrosion activity.