SHIP AND RELATED TARGETS

PROVISIONS FOR MILITARY CONVERSION OF JAPANESE MERCHANT SHIPS

U.S. NAVAL TECHNICAL MISSION TO JAPAN
RESTRICTED

From: Chief, Naval Technical Mission to Japan.
To: Chief of Naval Operations.
Reference: (a) "Intelligence Targets Japan" (DNI) of Sept. 1945.

1. Subject report, covering Target S-82(N) of Fascicle S-1 of Reference (a), is submitted herewith.

2. The investigation of the target and the target report were accomplished by Lt. Comdr. Kenneth Messenger, USNR, and Lt. Comdr. C. B. Thorn, USNR, assisted by Lt. (jg) Philip Lehner, USNR, as interpreter and translator.

C. G. GRIMES
Captain, USN
PROVISIONS FOR MILITARY CONVERSION
OF JAPANESE MERCHANT SHIPS

"INTELLIGENCE TARGETS JAPAN" (DNI) OF 4 SEPT. 1945
FASCICLE S-1, TARGET S-82(N)

JANUARY 1946

U.S. NAVAL TECHNICAL MISSION TO JAPAN
SUMMARY

SHIP AND RELATED TARGETS

PROVISIONS FOR MILITARY CONVERSION
OF JAPANESE MERCHANT SHIPS

In 1932, the Japanese Government initiated action to provide in all merchant ships of 4000 gross tons and upward, and capable of a minimum speed of 13.5 knots, structural elements necessary for their eventual conversion for military use. These elements consisted principally of structural foundations for 12cm guns to 20cm guns, two to six per ship.

Certain merchant ships were so designed and constructed that they could be converted readily to aircraft carriers, others to "LSD" type transports. The minimum height between decks of some passenger ships was specified by the Army so that horses, as well as troops, could be transported. Attachments for paravanes were built into some merchant ships.

With rare exceptions, designs of merchant ships included no special provisions for making them more capable of withstanding battle damage.
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REFERENCES

Location of Target:

Shipping Section, Transportation Ministry, TOKYO.
Fourth Section, Navy Technical Department, Navy Ministry, TOKYO.
Shipping Section, Army Ministry, TOKYO.
Harima Shipbuilders, HARIMA.
Mitsubishi Gunworks, NAGASAKI.
Hakodate Dock Company, HAKODATE.
Hidachi Shipbuilders, Habu, INNOSHIMA.
Kawasaki Gunworks, KOBE

Japanese Personnel Who Assisted in Gathering Documents:

T. ONOGI, Shipping Section, Transportation Ministry, TOKYO.
S. MAKINO, Capt. (IJN), Fourth Section, Navy Technical Department, Navy Ministry, TOKYO.

Japanese Personnel Interviewed:

T. ONOGI, Chief, Shipping Section, Transportation Ministry. An authority on merchant ship design. Fifteen years in this section.
S. MAKINO, Capt. (IJN), Chief Designer of Fourth Section, Navy Technical Department, Navy Ministry. Connected with merchant ship design since 1938 from the point-of-view of military requirements.
C. MONOCHI, Lt. Gen., Chief of Staff, Shipping Section, Army Ministry, 1942-43; Chief, Philippine Shipping Section 1943-44. Fifteen years experience with army shipping.
T. UCHIYAMA, Lt. Col., Chief, Shipping Section, Maintenance Division, Army Transportation Department.
S. YOKO, President, Harima Shipbuilders, HARIMA.
MUTO, General Manager, Mitsubishi Gunworks, NAGASAKI.
J. WATANABE, General Manager, Hakodate Dock Co., HAKODATE.
T. KAKUNAGA, President, Hidachi Shipbuilders, HABU, INNOSHIMA.
Y. YOSHIKAWA, Managing Director, Kawasaki Gunworks, KOBE.
T. AKIYAMA, Capt. (IJN), Supervised shipbuilding in OSAKA during war.
INTRODUCTION

This report describes the arrangements made in designs of merchant ships (liners, cargo vessels, tankers, fishing vessels, etc.) to enable them to be used as fleet auxiliaries and to better withstand battle damage. Since the actual conversion, including the installation of wartime armament and armor, was not within the scope of this investigation, only the military provisions which were a part of the original ship construction plans are discussed.

Some "military requirements" were set up by the Government as a part of a subsidy program as early as 1932. These requirements were not applied throughout the ship-building industry, nor were they standard. It appears that, for security reasons, elements of ship construction were not specified in writing, but were mutually understood. These elements varied in design and scope largely in accordance with the initiative of the shipbuilder. A moderate degree of control, however, was exercised by the Government through its prerogative to approve plans.

At the beginning of the investigation, some indications were found of a broad, unified program for providing merchant ships with the elements necessary for installing armament and other military features. A rather exhaustive search, however, leading to many of the shipyards, revealed considerable disunity in government control.

In Part I of this report, the basic program for the inclusion of potential military features in the construction of merchant ships is outlined, and specific examples are given. A discussion of specific types of ships and shipbuilding programs is included. Part II covers the provisions made in the design of merchant ships to enable them to withstand battle damage.
THE REPORT

Part I

PROVISIONS FOR CONVERSION TO FLEET AUXILIARIES

A. The General Program

The basic policy for designing merchant ships capable of being readily converted to fleet auxiliaries, follows closely the Government's subsidized shipbuilding programs.

Under the first, the "Shipping Improvement Program" of 1932 (Enclosure (A)), cargo vessels and tankers, totalling approximately 300,000 gross tons, with minimum specifications of 13.5 knots and 4,000 gross tons, were constructed. Although the inclusion of structural military provisions was not a declared part of this program, it was a de facto requirement. The amount of the subsidy was expected to cover the extra cost of such elements of construction.

The second program, the "Superior Ship Construction Program" of 1937 (Enclosure (A)), called for the construction of another 300,000 gross tons, one-half to be cargo ships and tankers of the same minimum specifications as in the 1932 program, and one-half to be passenger and passenger-cargo ships of at least 6000 gross tons and capable of making a minimum speed of 19 knots. In 1938 and 1940 similar subsidy programs were adopted (Enclosure (A)).

Ships totalling approximately 730,000 gross tons were built under these programs between 1932 and 1941. Some military features were included in the construction of all of them. In addition, a majority of ships of more than 4,000 gross tons and 13.5 knots built during this period independent of the subsidy programs, had some provision for military conversions.

There is no evidence that ships smaller than 4000 gross tons were designed with military features at any time, with the exception of those wartime standard ships built with provisions for sound detection equipment.

The requirements laid down by the Navy and the Army varied, depending on the type of ship and the time of construction. No completely systematic policy was established, either as to the quantity or size of armament or to construction details. At first, some merchant ships with minimum specifications of 4000 gross tons and 13.5 knots had gun mount supports and others did not, but by 1937 nearly all ships of this category were designed with some military provisions.

In general, requirements were directed toward making ships convertible to armed cargo or transport ships rather than to any particular type of fleet auxiliary.

Plans for subsidized merchant ships were prepared by civilian shipbuilding companies and presented for approval to the Navy Technical Department (or in special cases, to the Army) and to the Transportation Ministry. It was required that these plans show the positions and construction details of gun supports.

In the first program, the only Navy requirements were for the construction of from four to six gun mount supports suitable for 12 to 20cm guns, depending on the size and type of ship. Details of construction varied with individual shipyards (see Enclosures (B) and (C)) but supports usually consisted of no more than a cylinder (extending downward through one or more decks), angle braces and reinforcing under the prospective location.
Supports intended for guns of 15cm or larger nearly always were cylindrical in form. For smaller guns and in instances of acute material shortages, double channels forming a built-up "H" column were used.

In practice, the number of guns actually installed at the time of military commission often was less than the number provided for in the original design. This was due primarily to a shortage of guns. Usually not more than two guns per ship were installed.

A number of ships (of more than 4000 gross tons), not qualifying for aid under the regular subsidy programs, were constructed with gun mount supports. The government paid an average subsidy of ¥3000 for each approved support.

The Army required that cargo ships built under its cognizance be designed with sufficient between-deck height (8 feet minimum) to permit their use for the transportation of horses as well as men. Two such decks were required in ships of 4000 and 5000 gross tons and three in larger ships.

Depending upon the size of a ship, the Army specified that it be provided with (1) one or two 7-ton winches, (2) that it be able to transport from two to six large barges or from eight to twelve small ones, and (3) that it have a 20 to 30-day cruising range.

Starting in 1938, the Navy required that a paravane attaching device be constructed on the forecastle of each subsidized ship. This device is illustrated in Enclosure (C).

The Transportation Ministry set up no specifications for the size of radio rooms or for radio equipment except those necessary to meet the requirements of international law.

In a few ships, supports were so constructed and located (beneath the weather decks) that they could be used for either gun mounts or catapults (Enclosures (G), (H), and (I)).

No provisions were made for the installation of degaussing equipment.

During the war, standard-type ships A, B, C, D, TL, TM and their modifications were designed with provisions for the installation of sound detection gear. (See NavTechRep Report "General Arrangement and Capacity Plans of Japanese Standard Type Merchant Ships", Index No. S-12).

B. Ships Designed for Special Conversion.

In addition to the categories mentioned above, some ships and classes of ships were designed for future conversion into particular types of fleet auxiliaries.

1. Army Transports Built from 1932 to '36. Four 7,000 gross ton, 18-knot ships and two 4,500 gross ton, 14-knot ships built under the subsidy programs, although similar in most respects to other ships of their classes, were constructed according to particular Army requirements. Long, double hulls to provide an additional safety factor against war damage and to afford more fresh water tank space, heavy duty winches (one 25-ton, others 10-ton), and two gun mount supports forward and two aft were the significant elements of military interest.

2. Passenger Ships NITTA MARU, YAWATA MARU, KASUGA MARU. Three 17,000 gross ton, 22-knot passenger ships laid down in 1936, the NITTA MARU, YAWATA MARU, AND KASUGA MARU, were structurally designed to be converted to aircraft carriers. However, they did not embrace any obvious military characteristics, such as outboard funnels, special elevators, gun supports, or flight decks.
3. KASHIWABARA MARU, IZUMO MARU. KASHIWABARA MARU, which afterwards became HAYATAKA, and IZUMO MARU, which became HITAKA, were 27,700 gross ton, 24-knot passenger vessels. Their keels were laid in 1939. They were specifically designed for conversion to carriers. They had double hulls, extra height between decks, provision for elevators, extra tank capacity, and provisions for the installation of extra longitudinal and traverse bulkheads. No gun supports or outboard funnels were included in the construction.

4. The AKITSU MARU and MAYASAN MARU Class. In 1935, the Army drew up a "Special Ship Construction Program" for the subsidizing of large-type ships suitable for conversion to transports for landing craft and aircraft. Under this program, eight 10,000 gross ton, 20-knot and one 5,000 gross ton, LSD-type merchant ships were built (Enclosure(B)). These ships were designed for the fastest possible launching of landing craft. Under good conditions the 27 large barges carried by one ship could be launched in forty minutes. They had a continuous No. 2 deck running from the bow to a launching ramp in the stern. Hatches in this deck were flush and watertight. The funnels were outboard. Two of the ships of this class had the additional equipment necessary for carrying aircraft. The number of gun mount supports varied with the ship, but all the ships of this class were provided with the structural qualities necessary for heavy arming with AA guns and machine guns (Enclosure(D)).

C. Wartime Standard Merchant Ships.

During the war, standard-type merchant ships (Types A,B,C,D,E,F,TL,TM,TS,K, and their modifications) were built from plans prepared jointly by the Shipping Improvement Association, The Transportation Ministry, and the Navy. (See NavTechJap Report "General Arrangement and Capacity Plans of Japanese Standard Type Merchant Ships", Index No. S-12.)

The prime aim of this program was the rapid, economical construction of merchant ships. No military element entered into their design, except that in standard-types A,B,C,D,TL,TM and their modifications, there were provisions for the installation of sound detection equipment.

Part II

PROVISIONS FOR WITHSTANDING BATTLE DAMAGE

With rare exceptions, designs of merchant ships included no special provisions for making them more capable of withstanding battle damage.

Two exceptions were KASHIWABARA MARU and IZUMO MARU (Part I, Section B, Paragraph 3 of this report), which were built with double hulls and fitted with special angle irons so that extra bulkheads could be attached at the time of conversion.

Other exceptions were six Army transports (Part I, Section B, Paragraph 1), which were built with double hulls.

No additional exceptions were found.
### Subsidized Shipbuilding Programs

**30 May, 1942. Shipbuilding Section**

<table>
<thead>
<tr>
<th>Name</th>
<th>Classification</th>
<th>Time Required</th>
<th>No. of Ships to be Built*</th>
<th>Total Tonnage Built*</th>
<th>Total Tonnage to be Scrapped</th>
<th>Subsidy Per Ton ($)**</th>
<th>Total Subsidy ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shipping Improvement Program</td>
<td>1st</td>
<td>From Oct. 1932 To March 1935</td>
<td>(31)</td>
<td>200,000 (198,929)</td>
<td>400,000</td>
<td>55</td>
<td>22,000,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(2 years)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2nd</td>
<td>From April 1935 To March 1936</td>
<td>(8)</td>
<td>50,000 (50,834)</td>
<td>50,000 (35,202) not yet scrapped</td>
<td>30</td>
<td>1,500,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(1 year)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3rd</td>
<td>From April 1936 To March 1937</td>
<td>(9)</td>
<td>50,000 (50,892)</td>
<td>50,000 (41,952) not yet scrapped</td>
<td>30</td>
<td>1,500,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(1 year)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td>(48)</td>
<td>300,000</td>
<td>425,964</td>
<td></td>
<td>25,000,000</td>
</tr>
<tr>
<td>Superior Ship Construction Program</td>
<td>No. 1 Capital Ship</td>
<td>From April 1937 To March 1941 (4 years)</td>
<td>(15)</td>
<td>150,000 (156,623)</td>
<td></td>
<td>Average $44,693,567</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No. 2 Capital Ship</td>
<td></td>
<td>(21)</td>
<td>150,000 (139,018)</td>
<td></td>
<td>40</td>
<td>6,000,000</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td>(36)</td>
<td>300,000 (291,641)</td>
<td></td>
<td></td>
<td>50,693,567</td>
</tr>
<tr>
<td>Large Size Superior Ship Construction Program</td>
<td>San Francisco Line</td>
<td>From April 1938 To March 1941 (3 years)</td>
<td>(2)</td>
<td>55,400</td>
<td></td>
<td>About 56% (60% of Building cost)</td>
<td>28,800,000</td>
</tr>
<tr>
<td>Special Ship Construction Program</td>
<td>Type A 8000-T. Type</td>
<td>From April 1940 To March 1943 (3 years)</td>
<td>(6)</td>
<td>48,000</td>
<td>60</td>
<td>2,880,000</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Type B 4000-T. Type</td>
<td>From April 1940 To March 1942 (2 years)</td>
<td>(2)</td>
<td>6,000</td>
<td>60</td>
<td>600</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Type 1500-T. Type</td>
<td>From April 1940 To March 1942</td>
<td>(1)</td>
<td>1,500</td>
<td>90</td>
<td>135</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Type 5000-T. Type</td>
<td></td>
<td>(2)</td>
<td>10,000</td>
<td>50</td>
<td>500</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td>(13)</td>
<td>17,500</td>
<td></td>
<td></td>
<td>4,737,000</td>
</tr>
<tr>
<td>Subsidized Tanker Building</td>
<td>10,000-T. Type</td>
<td>From April 1941 To March 1944 (2 years)</td>
<td>(15)</td>
<td>150,000</td>
<td>72</td>
<td>10,800,000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5,000-T. Type</td>
<td></td>
<td>(10)</td>
<td>50,000</td>
<td>108</td>
<td>5,400,000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td>(25)</td>
<td>200,000</td>
<td></td>
<td></td>
<td>16,200,000</td>
</tr>
</tbody>
</table>

*Bracketed figures in "Total Tonnage Built*" and "Number of Ships to be Built*" columns show actual results.

**Indicates subsidy which comes from principal and interest of funds (interest 1.75 per year, non-redeemable for 2 years, equal redemption each year for following 25 years) collected for shipbuilding cost and calculated by total tonnage on an average of $225.

Using the speed equation for calculating the subsidy per ton:

\[
   \text{Subsidy per ton} = \frac{225}{V} \text{ (with } V \text{ in knots)}
\]

gives $ = \$201.5 for 20 knots and $ = \$243.5 for 21 knots.
<table>
<thead>
<tr>
<th>Ship Name</th>
<th>Ship Yard</th>
<th>Owner</th>
<th>Construction Date</th>
<th>Gross Tonnage</th>
<th>Type of Ship When Converted</th>
<th>Subsidy</th>
</tr>
</thead>
<tbody>
<tr>
<td>AKITSU MARU</td>
<td>Harima</td>
<td>Japanese Maritime Service Kabushiki Co.</td>
<td>Nov. 1939  March 1941</td>
<td>10,000 (approx.)</td>
<td>Large size landing craft and airplane transport</td>
<td>No subsidy</td>
</tr>
<tr>
<td>GYOSEN MARU (KIBITSU MARU)</td>
<td>Harima</td>
<td>Japanese Maritime Service Kabushiki Co.</td>
<td>June 1941  March 1943</td>
<td>10,000 (approx.)</td>
<td>Large size landing craft and airplane transport</td>
<td>($ 50 per ton)</td>
</tr>
<tr>
<td>MAYASAN MARU</td>
<td>Mitsui TAMA</td>
<td>Mitsui Shipping</td>
<td>Feb. 1941  Nov. 1942</td>
<td>10,000 (approx.)</td>
<td>Transport for personnel, ammunition, and large size landing craft</td>
<td>($ 50 per ton)</td>
</tr>
<tr>
<td>TAMATSU MARU</td>
<td>Mitsui TAMA</td>
<td>OSAKA-Shosen Co.</td>
<td>Oct. 1942  Jan. 1944</td>
<td>10,000 (approx.)</td>
<td>Transport for personnel, ammunition, and large size landing craft</td>
<td>($ 50 per ton)</td>
</tr>
<tr>
<td>TAKATSU MARU</td>
<td>Uraga</td>
<td>Yamashita Steamship Co.</td>
<td>Feb. 1943  Jan. 1944</td>
<td>5,000 (approx.)</td>
<td>Transport for personnel, ammunition, and large size landing craft</td>
<td>($ 50 per ton)</td>
</tr>
<tr>
<td>KIBITSU MARU</td>
<td>INADACHI</td>
<td>Japanese Mail Steamship Co.</td>
<td>March 1943  Jan. 1944</td>
<td>10,000 (approx.)</td>
<td>Transport for personnel, ammunition, and large size landing craft</td>
<td>($ 50 per ton)</td>
</tr>
<tr>
<td>HIUGA MARU</td>
<td>INADACHI</td>
<td>NSHIKO Shipbuilders</td>
<td>March 1944  Nov. 1944</td>
<td>10,000 (approx.)</td>
<td>Transport for personnel, ammunition, and large size landing craft</td>
<td>($ 50 per ton)</td>
</tr>
<tr>
<td>KUMANO MARU</td>
<td>INADACHI</td>
<td>Kawasaki Steamship Co.</td>
<td>Aug. 1944  March 1945</td>
<td>10,000 (approx.)</td>
<td>Large size landing craft and airplane transport (flight deck)</td>
<td>($ 50 per ton)</td>
</tr>
<tr>
<td>SETSU MARU</td>
<td>INADACHI</td>
<td>OSAKA Shosen Co.</td>
<td>April 1944  Jan. 1945</td>
<td>10,000 (approx.)</td>
<td>Transport for Personnel, ammunition and large size landing craft</td>
<td>($ 50 per ton)</td>
</tr>
</tbody>
</table>
ARIMASAN MARU
GENERAL ARRGT. PLANS
SHOWING LOCATION OF GUNS & CATAPULT MOUNT
26 JULY 1937