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U. S. NAVAL TECHNICAL MISSION TO JAPAN
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From: Chief, Naval Technical Mission to Japan.
To : Chief of Naval Operations.
Subject: Target Report - Characteristics of Japanese Naval
Vessels, Article 8.
Reference: (a)"Intelligence Target Japan" (DNI) of 4 Sept. 1945.

1. Subject report, dealing with the characteristics and performance of a Japanese portable gasoline-driven pump unit similar in purpose to the U.S. Navy "Handy Billy," as requested by Targets S-01 and S-05 of Fascicle S-1 of reference (a), is submitted herewith.

2. The investigation of the target and the target report were accomplished by Comdr. M.H. Pryor, USNR, assisted by Lt.(jg) O.L. George, USNR, and Lt.(jg) P.S. Gilman, USNR, as interpreters and translators.



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Captain, USN

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S-01-8

CHARACTERISTICS OF JAPANESE NAVAL VESSELS
ARTICLE 8
PORTABLE GASOLINE-DRIVEN PUMP UNIT

"INTELLIGENCE TARGETS JAPAN" (DNI) OF 4 SEPT. 1945

FASCICLE S-1, TARGET S-01 AND S-05

JANUARY 1946

U.S. NAVAL TECHNICAL MISSION TO JAPAN

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S-01-8

SUMMARY

SHIP AND RELATED TARGETS

CHARACTERISTICS OF JAPANESE NAVAL VESSELS - ARTICLE 8 PORTABLE GASOLINE-DRIVEN PUMP UNIT

The portable gasoline-driven pump unit described in this report was similar in purpose to the U.S. Navy "Handy Billy" but was inferior in output and pressure and weighed substantially more. Since it represents a different approach to the same fundamental problem, it is felt that some benefits can be derived from a study of its construction.

The Japanese Navy did not consider this unit completely satisfactory but made no attempt to improve it, owing to the pressure of more important problems.

NTJ-L-S-01-8

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REFERENCES

Location of Target:

Office of Nippon Zoki K.K. No. 1, Nicho Machi, Kanda Ku, TOKYO.

Factory of Nippon Zoki K.K. Kanuma Machi, TOCHIGI Prefecture.

Japanese Personnel Interviewed:

Seiichi SAITO, Sales Manager of Nippon Zoki K.K.

Makoto MATSURA, General Affairs Manager of Nippon Zoki K.K.

S. INOUE, Technician, Fourth Section, Navy Technical Department.

LIST OF ENCLOSURES

- (A) Translation of Plates on Japanese Portable Pump Unit.
- (B) Assembly Print of Portable Gasoline-Driven Pump Unit.

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Figure 1. Japanese Portable Gasoline-Driven Pump Unit Page 7

INTRODUCTION

The Japanese had a version of the U.S. Navy "Handy Billy" portable gasoline-driven pump unit. This pump was considered worthy of investigation.

The complete unit, marked with NavTechJap Equipment No. JE50-1137, has been sent to the Ordnance Investigation Laboratory, Indian Head, Maryland, for further shipment to the Bureau of Ships.

THE REPORT

Early in the war the Japanese Navy recognized the need for a lightweight portable pump with an independent power source. It was found that battle damage as well as operating failures often caused loss of power at times when pumps were needed most critically. Since no such pump was available commercially it was decided to try the combination of a pump with an outboard motor used in small boats. It was stated that this idea was not the result of any contact with U.S. Navy equipment.

The Nippon Zoki Kabushiki Kaisha, or Japan Machinery Mfg. Co., Ltd., which already was producing fire pumps, as well as other items, was given the task of developing and producing the new units. A gear-type pump was developed to fit the 6.4 horsepower engine produced by the Kinuta Internal Combustion

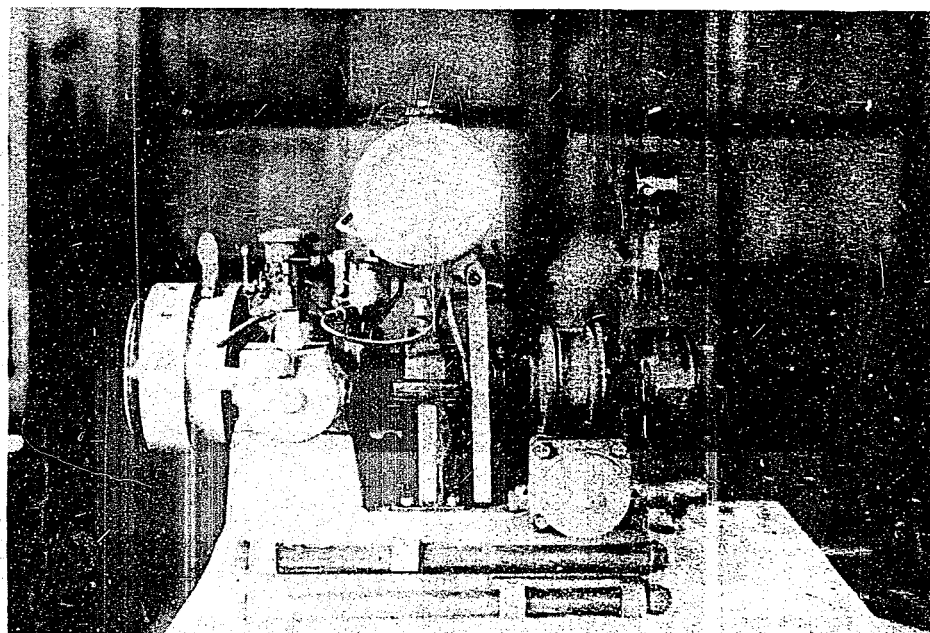


Figure 1

JAPANESE PORTABLE GASOLINE-DRIVEN PUMP UNIT

Engine co., of TOKYO. A total of 729 units were produced from the fall of 1943 until the end of the war.

The Nippon Zoki K.K., started in 1934, had two plants in TOKYO and two in KANUMA Machi, Tochigi Prefecture, about 80 miles north of TOKYO. Both the TOKYO plants were destroyed, one of the KANUMA Machi plants was partially destroyed, and the other only slightly damaged. The latter plant is now in operation manufacturing fire pump units for truck mounting, repair parts for previous production and other miscellaneous items. It is reported that the company now employs 600 against a wartime maximum of 2500.

Production was at the rate of around 30 units per month, although a production of 60 per month was possible when engines were available. Apparently

the bottleneck was the hardened drive shaft. In order to increase production, the Nippon Zoki K.K. attempted to produce additional engines of the Kinuta design. These were called Nikko. In general they were substantially inferior to the Kinuta in performance and were so rated by the Japanese Navy. A comparison is shown in the table which follows.

The characteristics of the unit were said to be as follows:

<u>Pump</u>	<u>Engine speed</u>	<u>Rotary-gear pressure head</u>	<u>Discharge</u>
	1800 RPM	18.5 lb/in	2915 GHP
	2400 RPM	21.3 lb/in	3180 GHP
	2800 RPM	28.4 lb/in	3650 GHP
Suction head			26 ft
Discharge nose diam.			50mm (1.9685 in)
Suction nose diam.			2 1/2 in
Nozzle			1/2 in or 3/4 in
Outside diam. of rotor			3 1/16 in
Width of rotor			1 3/4 in
Gear ratio			2.46
<u>Engine</u>	<u>Kinuta</u>	<u>Nikko</u>	
Output	6.4 hp	4.5 hp	
RPM, maximum	4000	3500	
optimum	3100	2800	
No. of cylinders	2	2	
Diam. of bore	63mm (2.48 in)	63mm (2.48 in)	
Stroke	52mm (2.05 in)	52mm (2.05 in)	
<u>Overall Dimensions</u>			
Weight			75 kg (165.345 lbs)
Height			450mm (17.72 in)
Length			650mm (25.59 in)
Width			480mm (18.90 in)

It was stated that, while the engines would turn in excess of 2800 RPM, it was not considered that the pump would perform properly at the higher speed.

Surprisingly, it was stated that the above unit weighed less and performed better than a pump driven by the standard Navy type electric motor. Comparative data follow:

	<u>Weight</u>	<u>Discharge</u>	<u>Pressure Head</u>
Gasoline-powered unit	75 kg	3650 GHP	28.4 lb/in ²
1 hp electric motor driven pump	100 kg	530 GHP	14.2 lb/in ²
5 hp electric motor driven pump	130 kg	1325 GHP	28.4 lb/in ²

The gasoline-powered unit was designed for the purpose of pumping bilges and firefighting. Eight units were supplied to each capital ship and one or two to smaller ships. The difficulties experienced were exhaust gases in small compartments and lack of skill in starting the engine. Men could stay in the compartment only 20 - 30 minutes when the unit was operating. Due to the rapid reduction in size of the Navy and the pressure of more important problems, nothing was done to improve these two defects. The Navy felt that some method of exhausting gases outside could have been developed and that training and improvement in design could have overcome the difficulty in starting.

It was stated that the complete unit cost the Japanese Navy ¥ 2700 but that today's price would be approximately ¥ 5000. At the present official exchange rate of 15 to 1, this latter price is \$333.33. There is no comparable exchange figure for the war years.

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ENCLOSURE (A)

TRANSLATION OF PLATES ON JAPANESE PORTABLE PUMP UNIT

Plate on right:

Japan Machinery Manufacturing Co., Ltd., (Nippon Zoki K.K.) Kanda, TOKYO.

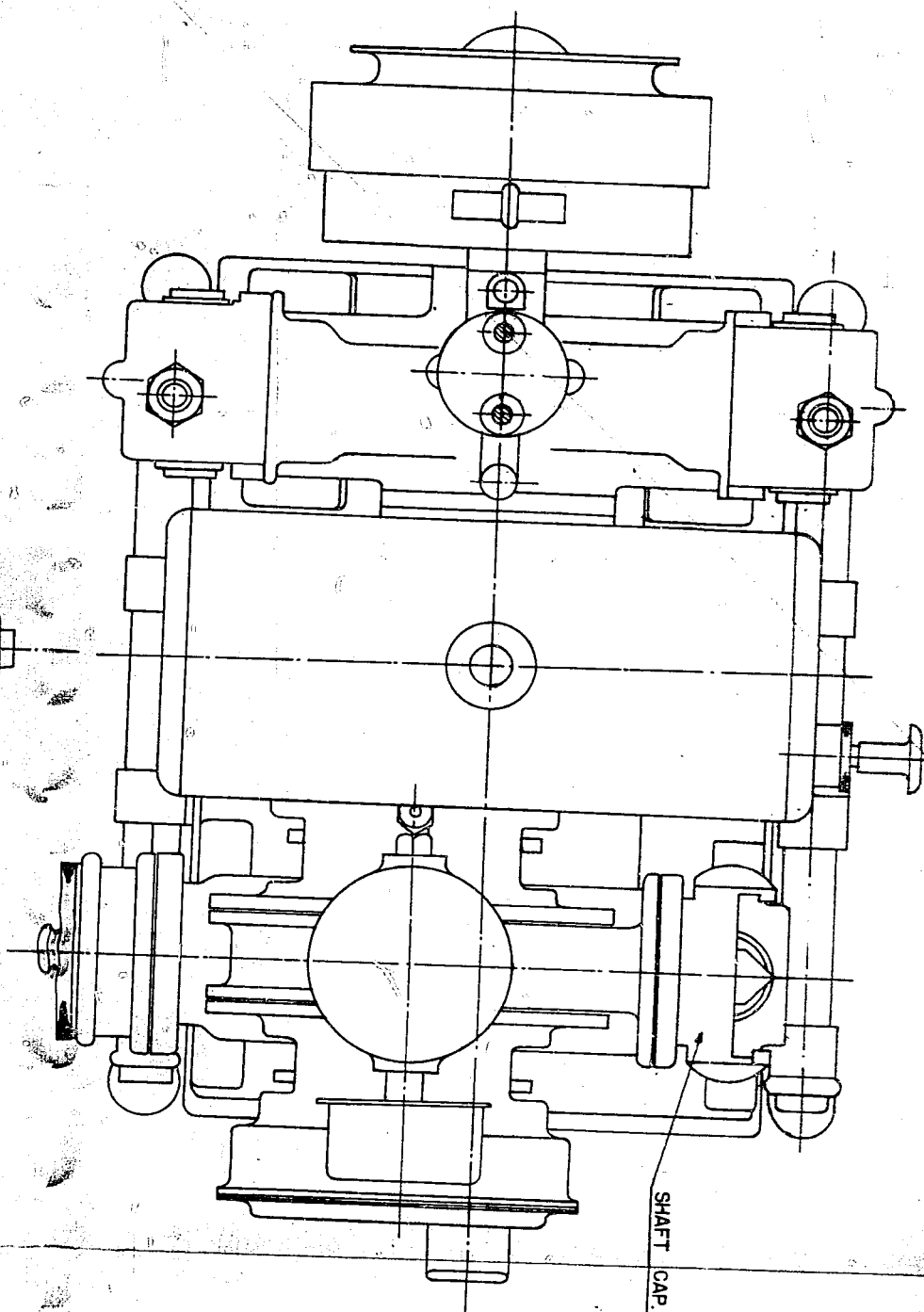
Plate on left:

Concerning fuel:

1. Fuel mixture should be 10 parts gasoline to two of "Mobil" (oil).
2. Mix well in a separate container and then strain before filling the tank.

Concerning operation:

1. Grease every part.
2. Press the carburetor choke and watch the flow of gasoline.
3. Put the magneto bar at a 45° angle and after starting return it to the normal position. At starting put the throttle lever on "start" and afterwards put in on "high".



SHAFT CAP

ENCLOSURE (B)

