

Rpt. 4b

Date of writing report 19.8.60 Received London Port GLASGOW. No. 91590.
Survey held at GRANGEMOUTH. No. of visits 5 In shops 3.12.59 15.8.60
On vessel 20 First date 11. 2.60 Last date 16.8.60

FIRST ENTRY REPORT ON INTERNAL COMBUSTION MACHINERY

No. in R.B. Name T.S. "M O A N A R O A" Gross tons 2892
Owners Government of New Zealand Managers -do- Port of Registry Auckland
Hull built at Grangemouth By Grangemouth Dockyard Co. Ltd., Yard No. 526 Year Month
Main Engines made at Sunderland By G. Clark & N.E. Marine Ltd., Eng. No. 1590A When 1960
Gearing made at - By - 1590B.
Donkey boilers made at - By - Blr. Nos. - When -
Machinery installed at Grangemouth By The Grangemouth Dockyard Co. Ltd., When 1960

Particulars of restricted service of ship, if limited for classification No restriction

Particulars of vegetable or similar cargo oil notation, if required Not required

Is ship to be classed for navigation in ice? No Is ship intended to carry petroleum in bulk? No

Is refrigerating machinery fitted? Yes If so, is it for cargo purposes? Yes Type of refrigerant dichlorodifluoromethane

Is the refrigerating machinery compartment isolated from the propelling machinery space? Yes Is the refrigerated cargo installation intended to be classed? Yes

The following particulars should be given as fully and as clearly as possible. Where the answer is "No" or "None", say so! Ticks and other signs of doubtful meaning are not to be used. Where the wording is not applicable to the installation, a black line may be inserted. If the main engines have been constructed at another port and are covered by a separate report, the particulars given in that report need not be repeated below, but the port and report number should be stated.

No. of main engines 2 No. of propellers 2 Brief description of propulsion system 2 - Diesel Engines direct coupled to twin screws

MAIN RECIPROCATING ENGINES. Licence Name and Type No. Clark-Sulzer 7 TAD36 2SCSA

No. of cylinders per engine 7 Dia. of cylinders 360 m.m. stroke(s) 600 m.m. 2 or 4 stroke cycle 2 Single or double acting single

Maximum approved BHP per engine 1540 at 250 RPM of engine and 250 RPM of propeller.

Corresponding MIP 7.3Kg/cm² (For DA engines give MIP top & bottom) Maximum cylinder pressure 70Kg/cm² Machinery numeral 616

Are the cylinders arranged in Vee or other special formation? No If so, number of crankshafts per engine

TWO STROKE ENGINES. Is the engine of opposed piston type? No If so, how are upper pistons connected to crankshaft?

Is the exhaust discharged through ports in the cylinders or through valve(s) in the cylinder covers? No, and type of mechanically driven scavenge pumps or blowers per engine and how driven

No. of exhaust gas driven scavenge blowers per engine SEE ATTACHED ENGINE REPORT

If a stand-by or emergency pump or blower is fitted, state how driven No. of scavenge air coolers Scavenge air pressure at full power

Are scavenge manifold explosion relief valves fitted?

FOUR STROKE ENGINES. Is the engine supercharged? Are the undersides of the pistons arranged as supercharge pumps? No. of exhaust gas driven blowers per engine

No. of supercharge air coolers per engine Supercharge air pressure Can engine operate without supercharger?

TWO & FOUR STROKE ENGINES--GENERAL. No. of valves per cylinder: Fuel Inlet Exhaust Starting Safety

Material of cylinder covers Material of piston crowns Is the engine equipped to operate on heavy fuel oil?

Cooling medium for :-Cylinders fresh water Pistons Oil Fuel valves fresh water Overall diameter of piston rod for double acting engines

Is the rod fitted with a sleeve? Is welded construction employed for: Bedplate? Frames? Entablature? Is the crankcase separated from the

underside of pistons? Is the engine of crosshead or trunk piston type? Total internal volume of crankcase No. and total area of explosion relief

devices Are flame guards or traps fitted to relief devices? Is the crankcase readily accessible? If not, must the engine be removed for

overhaul of bearings, etc? Is the engine secured directly to the tank top or to a built-up seating? to tank top How is the engine started? by compressed air

Can the engine be directly reversed? Yes If not, how is reversing obtained?

Has the engine been tested working in the shop? How long at full power?

CRANK & FLYWHEEL SHAFTING. Date of approval of torsional vibration characteristics of the propelling machinery system State barred speed range(s), if imposed

for working propeller For spare propeller Is a governor fitted? Is a torsional vibration damper or detuner fitted to the shafting?

Where positioned? Type No. of main bearings Are main bearings of ball or roller

type? Distance between inner edges of bearings in way of crank(s) Distance between centre lines of side cranks or eccentrics of opposed piston engines

Crankshaft type: Built, semi-built, solid. (State which)

Diameter of journals Diameter of crankpins Centre Breadth of webs at mid-throw Axial thickness of webs

If shrunk, radial thickness around eyeholes Side Are dowel pins fitted? Crankshaft material Journals Minimum

Diameter of flywheel Weight Are balance weights fitted? Total weight Radius of gyration

Diameter of flywheel shaft Material Minimum approved tensile strength

Flywheel shaft: separate, integral with crankshaft, integral with thrustshaft. (State which)

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MAIN GAS TURBINES. Name and Type No.

No. of sets of turbines. Open or closed cycle. BHP per set. at. RPM of output shaft.

How is drive transmitted to propeller shaft?

ARRANGEMENT OF TURBINES. HP drives. at. RPM. HP gas inlet temperature. pressure.

IP drives. at. RPM. IP gas inlet temperature. pressure.

LP drives. at. RPM. LP gas inlet temperature. pressure.

No. of air compressors per set. Centrifugal or axial flow type? Material of turbine blades. Material.

compressor blades. No. of air coolers per set. No. of heat exchangers per set. How are turbines started?

How is reversing effected? Are the turbines operated in conjunction with free piston gas generators?

Total No. of free piston gas generators. Diameter of working pistons. Diameter of compressor pistons. No. of double strokes per minute at full power. Gas delivery pressure. Gas delivery temperature. Have the turbines and attached equipment been tested working in the shop? How long at full power?

ELECTRIC PROPULSION (Reciprocating engines or gas turbines. Electrical particulars to be reported on Form 4d.)

No. of generators. KW per generator. at. RPM. AC or DC? Position.

No. of propulsion motors. SHP per motor. at. RPM. Position.

How is power obtained for excitation of generators? Motors?

REDUCTION GEARING (Reciprocating engines or gas turbines. A small line sketch should be attached showing arrangement of gearing.)

Is gearing of single or double helical type? If single, position of gear thrust bearing. Is gearing of epicyclic type?

PCD of pinions: First reduction. Second reduction. PCD of wheels: First reduction. Main.

Material of pinions. Tensile strength. Material of wheel rims. Tensile strength.

Are gear teeth surface hardened? How are teeth finished? Diameter of pinion journals. Wheel shaft journals.

Are the wheels of welded construction? Is gearcase of welded construction? Has the wheel/gearcase been heat treated on completion of welding? Where is the propeller thrust bearing located? Are gear bearings of ball or roller type?

CLUTCHES, FLEXIBLE COUPLINGS, ETC. If a clutch or other flexible connection is fitted between engine/turbine and gearing or between engine and line shafting give brief description and, for clutches, state how operated.

Can the main engine be used for purposes other than propulsion when declutched? If so, what?

STRAIGHT SHAFTING. Diameter of thrustshaft. Material. Minimum approved tensile strength.

Shaft separate or integral with crank or wheel shaft? Integral. Diameter of intermediate shaft. Material.

Minimum approved tensile strength. Diameter of screwshaft cone at large end. Is screwshaft fitted with a continuous liner?

Diameter of tube shaft. Is tube shaft fitted with a continuous liner in way of stern tube. Thickness of screw/tube shaft liner.

bearings. Thickness between bearings. Material of screw/tube shaft. Minimum approved tensile strength.

Is an approved oil gland fitted? Yes. If so, state type. Length of bearing next to and supporting propeller.

Material of bearing. In multiple screw vessels is the liner between stern tube and A bracket continuous? If not, is the exposed length of shafting between liners readily visible in dry dock?

PROPELLER. Diameter of propeller. Pitch. Built up or solid. Total developed surface.

No. of blades. Blade thickness at top of root fillet. Blade material. Moment of inertia of dry propeller.

If propeller is of special design, state type. Is propeller of reversible pitch type? If so, is it of approved design?

State method of control. Material of spare propellers. Moment of inertia.

AIR COMPRESSORS & RECEIVERS. No. of main engine driven compressors per engine. Can they be declutched?

No. of independently driven air compressors. Main:-2 Electric driven 28.6 cu.ft./min. capacity covered by Southampton certs. D.14855 and D.14856 Auxiliary:- diesel driven Southampton D.7638 (star. side fwd.)

No. of starting air receivers. Main:-3 at 35 cu.ft. capacity aft E.R. port (Position:-Main-2 on aft bulkhead p.s. upper Sund. Cert. C.2606; 1 - Auxiliary at 5 cu.ft. capacity. Not. C20705 (Auxiliary:- star. side) 1 on aft bulkhead s.s. Main 425 lbs/sq.in.

How are receivers first charged? Maximum working pressure of starting air system. Are the safety devices in accordance with the Rules? Has the starting of the main engines been tested and found satisfactory?

COOLERS. No. of main engine fresh water coolers. No. of main engine lubricating oil coolers.

OIL FUEL TANKS. No. and position of oil fuel settling or service tanks not forming part of hull structure.

MAIN ENGINE DRIVEN PUMPS (No. and Purpose) One lubricating oil and two sea water circulating pumps per engine.

INDEPENDENT PUMPS

Name below essential pumps, state position and how driven. Give capacity of bilge pumps.

	SUCTION										DELIVERY							
	Bilge Main	Bilge Direct	Ballast Main	Oil Fuel	Fresh Water Cooling	Sea	Feed Tanks	Lub. Oil	Boiler Feed	Salt Water Cooling	Fresh Water Cooling	Oil Fuel Tanks	Fire Main	Lub. Oil	Piston Cooling	Sea		
Aft port General Service pump 70tons/hr	X	X	X			X				X			X			X		
Aft port Bilge & Ballast pump 70 tons/hr	X	X	X			X				X			X			X		
F.W. Cooling Pump fwd. port					X						X							
S.W. Cooling Pump fwd. centre		X				X				X						X		
F.W. Cooling Pump fwd. centre					X						X							
L.O. Pump fwd. star.								X						X				
O.F. transfer pump fwd. port tunnel				X								X						
Emergency bilge pump recess	X	X				X							X			X		
All pumps electric motor driven.																		

BILGE SUCTIONS. No. and size in each hold, deep tank or pump room. No.1 Hold:- One 3" dia. port & star; No.2 Hold:- One 3" dia. p & s. No.3 Hold:- One 2.1/2" dia. at centre. One 2 1/2" dia. p & s fwd. One 2 1/2" dia. fwd. port; One 2 1/2" dia. fwd. star. No. and size connected to main bilge line in main engine room. One 2 1/2" dia. aft port; One 2 1/2" dia. aft. star. In engine room. One 2 1/2" dia. centre. Size and position of direct bilge suction in machinery spaces. One 4" dia. fwd. centre. One 4" dia. tunnel recess. Is the bilge or ballast system fitted with means for separating oily water on the overboard discharge side? Yes. Do the piping arrangements comply with the Rules including special requirements for ships carrying petroleum in bulk, cargo oil or classed for navigation in ice? (strike out words not applicable). Yes.

STEAM & OIL ENGINE AUXILIARIES

Position of each	Type	Made by	Port and No. of Rpt. or Cert.	Driven Machinery (For electric generators, state output)
Engine Room Fwd. Port Side Diesel 6VCEXX.		Ruston & Hornsby	Nott. F.E. 1650	One 210 KW Generator
" " Aft " "	" "	" "	" "	" "
" " Aft Star. "	" "	" "	" "	" "
" " Fwd. Star "	" "	" "	" "	" "
Motor Generator	Electric motor driven (from shore power 400V 3 phase 60 cycles)	Electric	Electric test Certs. forwarded with electrical report.	" 30 KW "
Motor Generator	Electric motor driven (from shore power 400V 3 phase 60 cycles)	Campbell & Isherwood	"	" 30 KW "
Emergency Generator	Diesel 3YCZ	Ruston & Hornsby	"	" 20 KW "

Is electric current used for essential services at sea? Yes. If so, state the minimum No. and capacity of generators required in order that the ship may operate at sea. One 210 KW Generator. Is an electric generator driven by Main Engine? No.

STEAM INSTALLATION. No. of donkey boilers burning oil fuel. W.P. Type.

Position.

Is a superheater fitted? Are these boilers also heated by exhaust gas? No. of donkey boilers heated by exhaust gas only? W.P.

Type. Position. Can the exhaust heated boilers deliver steam directly to the steam range or do they operate only as economisers in conjunction with oil fired boilers? Port and No. of report on donkey boilers. Is steam essential for operation of the ship at sea? Are any steam pipes over 3 ins. bore? If so, what is their material? For oil fired boilers is the arrangement of pipes, valves, controls, etc., in accordance with the Rules? No. of oil burning pressure units. No. of steam condensers. No. of Evaporators.

STEERING GEAR. (State No. and Type of Steam Engines, Electric Motors, Hydraulic Pumps and other particulars) Brown's electric hydraulic steering gear consisting of two hydraulic cylinders and rams two variable speed pumps and two electric motors Leith Cert. No. 10076 Have the Rule Requirements for fire extinguishing arrangements been complied with? Yes. Brief description of arrangements. Sprinkler system (see attached Man. Cert. No. C.1840 accommodation only). 1-30 gallon Phomene; 4-2 gallon Phomene 1 - carbon tetrachloride; 2-2 1/2" dia. 30 ft. hoses with combined spray and Jet. 1-sand bin and scoop Has the spare gear required by the Rules been supplied? Yes. Has all the machinery been tried under full working conditions and found satisfactory? Yes. Date and duration of full-power sea trials of main engines. 11.7.60 8 hours. Does this machinery installation contain any features of a novel or experimental nature? (Give particulars) No.

The foregoing description of the main engine and installation is correct and the particulars are as approved for torsional vibration characteristics (strike out words not applicable).

THE GRAMSCOTT & BOURN COY. LTD. Lloyd's Register Foundation

0045 2/2

GENERAL REMARKS

State if the machinery has been constructed and/or installed under special survey in accordance with the Rules, approved plans and Secretary's letters. State quality of materials and workmanship and give recommendations for classification, including any special notation to be assigned. Where existing machinery is submitted for classification the circumstances should be explained as fully as possible.

The machinery has been installed under Special Survey in accordance with the Rules, approved plans and Secretary's letters. Materials and workmanship are good. Full power sea trials were witnessed and the machinery is eligible in my opinion to be classed +LMC 8,60 with the notation T.S.O.G. p & s 8,60

R.M. Nicholson

Engineer Surveyor to Lloyd's Register of Shipping.
(R.M. NICHOLSON).

PARTICULARS OF IDENTIFICATION MARKS ((Including Port of origin) of important Forgings and Castings. (Copies of certificates should be forwarded with report.)

RODS

CRANKSHAFT OR ROTORSHAFT

FLYWHEEL SHAFT

THRUSTSHAFT

GEARING

INTERMEDIATE SHAFTS Nos. 4604; 4606; 4607; 4608; 4609; 4615; 4616; 4631; 4632; 4633. R.M.N. Gl.s. 17.2.60

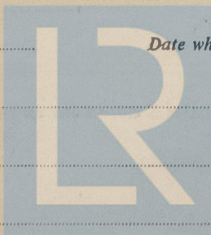
SCREW AND TUBE SHAFTS Port - M.O.T. V.419 Lloyd's 4617 SDL. R.M.N. Gl.s. 17.2.60, Star. M.O.T. V.421 Lloyd's 4617. A.B.S. Gl.s. 17.2.60

PROPELLERS Port BM & M Co. Ltd. Lloyd's 64048 16.2.60 A.B.S. Gl.s. Star-BM & M Co.Ltd., Lloyd's 63776 3.2.60 A.B.S. Gl.s. 17.2.60

OTHER IMPORTANT ITEMS Two spare propellers C.I. Glasgow Cert. C.64841. Two spare tailshafts Lloyd's 4605

MOT. V.408 R.M.N. Gl.s. 17.2.60 Lloyd's 4615 MOT V.420 R.M.N. Gl.s. 17.2.60

Is the installation a duplicate of a previous case?	No	If so, state name of vessel	-
Date of approval of plans for crankshaft	-	Straight shafting	17.9.59
Separate oil fuel tanks	-	Pumping arrangements	17.9.59
Cargo oil pumping arrangements	-	Air receivers	26.8.59
Dates of examination of principal parts:-		Clutch	-
Port 11.2.60	p & s	Oil fuel arrangements	17.9.59
Fitting of stern tube 17.2.60	Fitting of propeller 1.3.60	Donkey boilers	-
Engine chocks & bolts 23.5.60	Alignment of gearing -	Alignment of crankshaft in main bearings	23.5.60
Oil fuel lines 1.7.60	Donkey boiler supports -	Alignment of straight shafting	20.4.60
GLASGOW - 6 SEP 1960		Testing of pumping arrangements	4.7.60
Date of Committee	Decision + LMC ES	Steering machinery	11.7.60
	TS(OG) P & S	Windlass	11.7.60
	8.60	Mach. Installn.	£138. -.
		Special Survey Fee	
		Expenses	£ 6. 5.



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